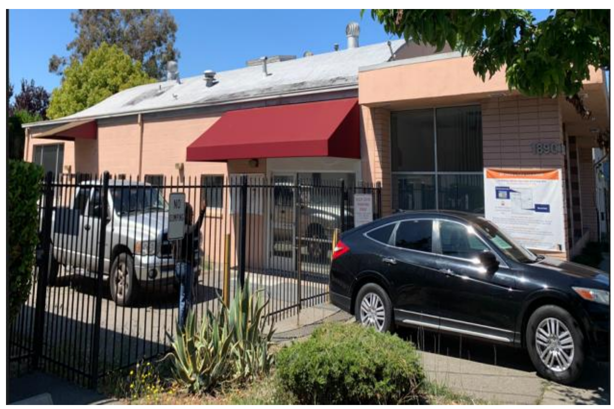
STRUCTURAL ENGINEERS

ASCE 41-17 Tier 2 Seismic Evaluation Report



Prepared for: CITY OF BERKELEY
African American Holistic Cultural Ctr
1890 Alcatraz Avenue
Berkeley, California 94703

September 22, 2022

IDA Job No. 18095.12

1629 Telegraph Avenue, Ste 300 | Oakland, CA 94612 | t: 510.834.1629
ida-se.com

STRUCTURAL ENGINEERS

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Appendices

1 Introduction

IDA Structural Engineers (IDA) has performed a seismic evaluation of African Amer Holistic Cultural Ctr, located at 1890 Alcatraz Avenue, Berkeley, California using an ASCE 41-17 Tier 2 procedure. ASCE 41-17, titled "Seismic Evaluation and Retrofit of Existing Buildings", published by the American Society of Civil Engineers (ASCE) in 2017, is the industry standard procedure for the seismic evaluation and retrofit of existing buildings.

A Tier 1 screening is a checklist-based procedure. The checklists identify potential deficiencies in a building based on performance of similar buildings in past earthquakes. IDA issued a Tier 1 report on June 2, 2022.

Since IDA issued the Tier 1 report in June 2020, two events have occurred that further inform the Tier 2 report presented herein:

- A geotechnical report was issued by Construction Testing Services (CTS). Report is dated September 2, 2022, Project 18735
- Investigation of the existing Concrete Masonry Unit walls by Applied Materials & Engineering Inc. (AME) was prepared. Report is dated July 5, 2022.

Other than testing performed as part of the aforementioned reports, no destructive testing was performed. Exploration was limited to visual observation of the building.

Much of the information presented below (site information, building information, etc.) is duplicated from the Tier 1 report for convenience.

The information below forms the foundation for the Tier 2 screening. This information is either derived from owner requirements, such as risk category and desired structural performance level, or is site specific, such as seismic hazard level.

Subject Property	African American Holistic Cultural Ctr
Address	1890 Alcatraz Avenue, Berkeley, California
Latitude and Longitude	37.848856, -122.269222
Risk Category	II
Basic Performance Objective for Existing Buildings (BPOE)	Collapse Prevention Structural Performance at BSE-2E Life Safety Nonstructural Performance at BSE-1E

2 Site Information

2.1 *General*

The site is bounded by Alcatraz Avenue on the north private residential lots on the east, west and south. The entrance to the building is on Alcatraz Avenue. An additional driveway is provided at the west via Alcatraz Avenue. Parking is provided on site to the west and south of the building. In general, the site is flat.

2.2 *Geotechnical and Seismic Hazard Information*

CTS performed on subsurface investigation on July 21, 2022. Two hand augered borings were advanced to between 5 and 7 feet below the surface. Two Cone Penetrometer Tests (CPT) were advanced to approximately 63 ½ feet below the surface. The hand borings found 1 foot of fill, overlaying various sandy clays and clayey sands to bottom of borings. CPT's found similar soils, with higher resistant materials encountered at depth. IN all instances, the upper 3 to 3 ½ feet of material is classified as "undocumented fill." Groundwater was encountered at 10 to 14 feet below the surface.

Significantly, on site soils were found to not be subject to liquefaction. The main design considerations will be mitigating expansive soils and undocumented fill.

The CTS report is included as Appendix D.

3 Building Information

The building, constructed in 1958 is a single story CMU structure. Roof height is approximately 12 ft. The building totals approximately 3910 square foot. The roof is framed with bowstring trusses clear spanning the width supported on CMU pilasters. The roof consists of plywood sheathing supported on wood rafters. The wood rafters span between trusses. The exterior walls at east, west and south consists of CMU. The CMU walls typically stops at 12 foot elevation. CMU walls are supported on continuous concrete footings. There is a 1000 square foot mezzanine at the center potion of the building plan. The mezzanine is framed with wood joists supported on wood beams, wood posts and concrete footings. The existing floor is a non-structural slab on grade.

Lateral forces are resisted by the fully grouted CMU walls. Roof diaphragm consists of plywood sheathing.

A renovation was performed in 1989. All floor, wall and ceiling finishes at the ground floor were removed. New finishes were installed. Windows were removed and replaced. The mezzanine framing was completely reframed.

4 Existing Building Information and Site Observations

IDA performed a site visit on June 27, 2022. The site visit consisted of visual observations only.

Masonry testing was completed on June 27, 2022. The results are included in the report as Appendix C.

5 Available Documents

The following drawings were available for review for this evaluation:

- Original architectural and structural drawings, dated 01/05/1958.
  Architect: W. J Hubbard, George A. Shallow Architect
- Renovation drawings dated 05/25/89
  Architect: Jack B. Byars, Dommer & Byars Architect & Planners

6 Tier 1 and 2 Procedure Discussion.

The ASCE 41 Tier 1 procedure consists of a series of checklists that quickly identifies potential seismic deficiencies in a building. The purpose of Tier 2 investigation is to further analyze those potential deficiencies identified in a Tier 1 to either confirm the deficiency or demonstrate the adequacy of the structure as it relates to the potential deficiency.

For many of the deficiencies highlighted in the Tier 1 check, there are no further calculations that can be done since the element is nonexistent and needs to be provided to meet the required performance level. For instance, a load path deficiency identifies that there is no path for seismic forces to use to get from the roof to the foundation. Or for a diaphragm with no cross ties, the ties must be provided.

The deliverable for this Tier 2 report is a set of schematic plans used for cost estimating and budgeting purposes only.

7 Structural Deficiencies and Discussion

7.1 *Vertical irregularities/ Load Path-No Tier 2 check performed*

There is no vertical line of resistance along exterior line at the north. The original structural drawings indicate a short wood shear wall approximately 35 feet back from the front of the building. This wall aligns with the front edge of the mezzanine shown in the Renovation drawings. The next line of resistance in east west direction is at exterior line at the south.

The wood shear wall is significantly undersized, has an inadequate foundation, and does not appear to be properly connected to the roof truss directly above.

7.2 Diaphragm discontinuity-No Tier 2 check performed

There is a big step in the diaphragm near the north side of the roof diaphragm. The sloped diaphragm steps down to a flat diaphragm. Based on the evaluation of the diaphragm load path it appears that the diaphragm is insufficient to transfer seismic loads across the discontinuity.

7.3 Wall anchorage – No Tier 2 check performed

The wall anchorage to the roof diaphragm doesn't appear to have sufficient capacity for out- of -plane forces.

7.4 Cross ties- No Tier 2 check performed

Continuous cross ties between the diaphragm chords are needed to develop out of plane forces into the diaphragm. Along the longitudinal direction, there are not continuous cross ties.

7.5 Redundancy – No Tier 2 check performed

There is only one line of wall along transverse direction. There is no shear wall line along exterior line at the north. The next line of shear wall is only at exterior line at south. The short wood shear wall at the front edge of the mezzanine is deemed insufficient.

7.6 Torsion – No Tier 2 check performed

There are shear wall lines along three exterior lines of the building. The south line doesn't have any line of resistance.

7.7 Unblocked diaphragm spans – No Tier 2 check performed

The existing diaphragm is unblocked and has horizontal span greater than 40ft. Blocking may be necessary at diaphragm boundaries. The shear capacity of unblocked diaphragms is less than of fully blocked wood structural panel diaphragms because of the limited ability for direct shear transfer at unsupported edges.

8 Mitigation

See Appendix A for schematic mitigation plan

8.1 Vertical irregularities/Load path

To mitigate the deficiency, add new vertical lines of resistance (moment frame/braced frame) at exterior and interior in the transverse direction.

8.2 Diaphragm discontinuity

Continuity can be provided by adding continuous elements to connect the different levels of diaphragm. The elements would consist of new transfer shear walls, straps and hold downs.

8.3 Wall anchorage

New wall anchors could be added. The out of plane forces would be developed into the diaphragm via steel hold down hardware.

8.4 Cross ties

New wood members and straps could be added to provided proper cross tie detailing.

8.5 Redundancy

Add new vertical lines of resistance (moment frame/braced frame) at exterior and interior in the transverse direction.

8.6 Torsion

Add new vertical lines of resistance (moment frame/braced frame) at exterior and interior in the transverse direction.

8.7 Unblocked diaphragm spans

The shear capacity of unblocked diaphragms can be improved by adding new blocking and fastening at the unsupported panel edges. Placing a new wood structural panel over the existing diaphragm also increase the shear capacity.

9 Addition of 2nd floor

A 2-story building may be required to fit all architectural program elements on the site. Several options exist for creating this building.

1. Add a 2nd story on top of the existing structure.
2. Save part of the existing structure and build on top of the saved parts.
3. Demolish the existing structure and construct a new building from the ground up.

These options are discussed in turn below.

9.1 *Add a 2nd story on existing structure*

The existing building is framed with bowstring trusses spanning the width of the building. The trusses have curved tops, and are not suitable for use as a floor. Any new 2nd floor would need to be framed over the top of and clear from the trusses. This would raise the 2nd floor to more than 20 feet above the 1st floor, with a large interstitial space consisting of the existing trusses in between. Long stair and elevator runs would be necessary. It is our opinion that this option is infeasible.

9.2 *Save part of existing structure and add on top*

This option can take many different paths, from retaining only the foundations and slabs, to removing the roof and building up off the existing masonry walls.

Masonry testing indicated the existing walls are only partially filled with grout and are mostly hollow. Steel reinforcing is present, although at approximately one half the amount required in current building codes. Foundations are likewise lightly reinforced.

A new 2nd floor would impose additional gravity loads on the masonry walls and foundations. Preliminary calculations indicate the masonry is not capable of supporting gravity loads from an additional story. Foundations have suitable width for supporting additional load on 3 sides of the building where the footing is centered under the wall. At the west side, the footing is offset to stay within the property line. This footing would be overstressed. In all cases, the foundations are too shallow to mitigate the effects of expansive soils.

The slab on grade could be maintained, with some risk. The condition of the under slab vapor barrier, if any, is unknown. Vapor transmission through the floor will lead to failure of any glue adhered flooring. Additionally, vapor trapped under a finish floor can create conditions for mold to grow.

For the reasons listed above, it is our opinion that that saving any part of the structure for re-use is infeasible.

9.3 *Build a new structure from the ground up*

We believe this to be the most constructable and economical path forward. The new building would be constructed to modern code standards. Risks of unforeseen conditions being discovered during construction are minimized. The existing building is small and relatively simple and straight forward to demolish. IDA recommends this option.

10 Conclusions

The existing building does not currently meet the Structural Performance Level required. The building is almost 64 years old. Seismic demands have increased and detailing demands have become more stringent since the original construction. Retrofits are required to meet the Structural Performance Level.

If a two-story building is required to meet the program, IDA recommends demolishing the existing structure completely and building a new building from the ground up.

Thank you for the opportunity to be of service. Please call with any questions.

IDA Structural Engineers, Inc.

Stephen DeJesse, S.E.
President

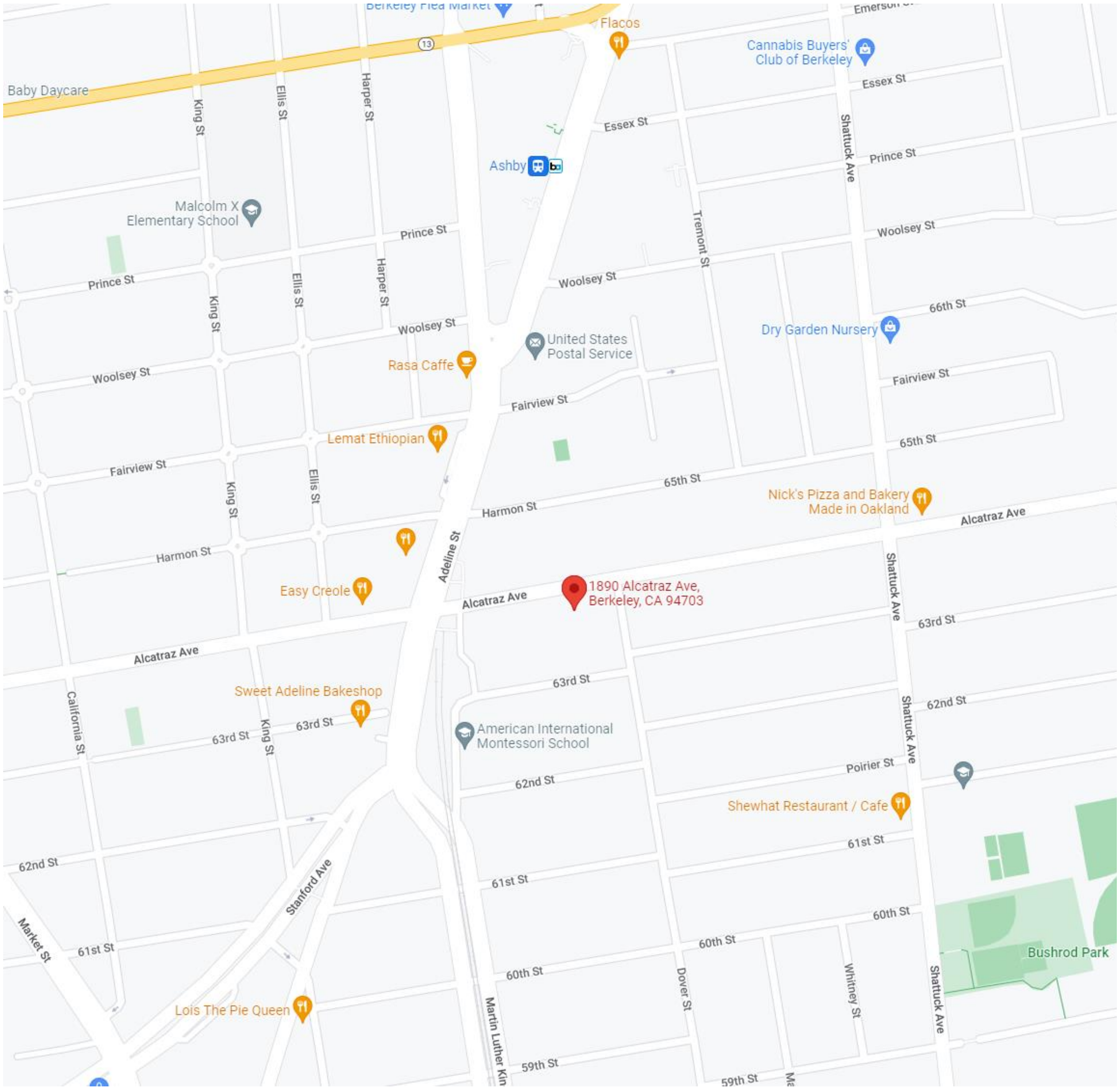

Figure 1. Proximity map of site

Figure 2. Aerial view

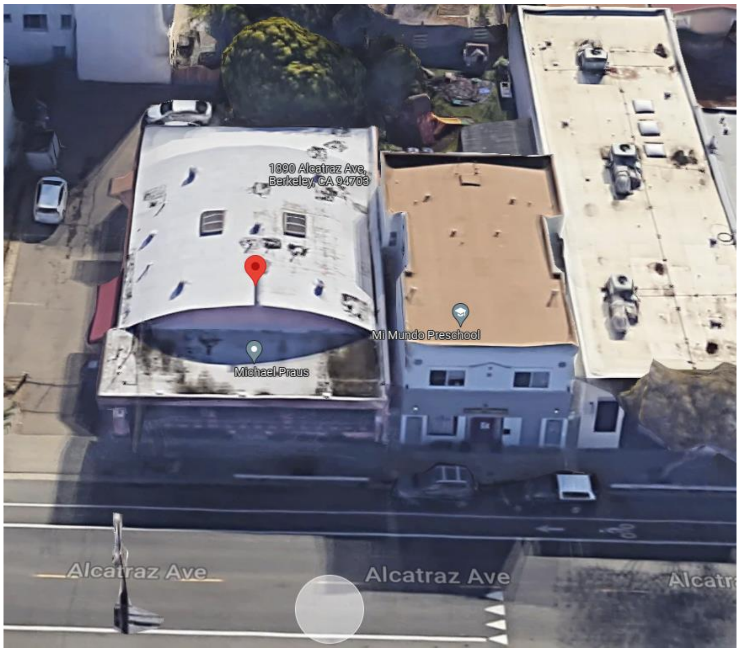

Figure 3. View from North

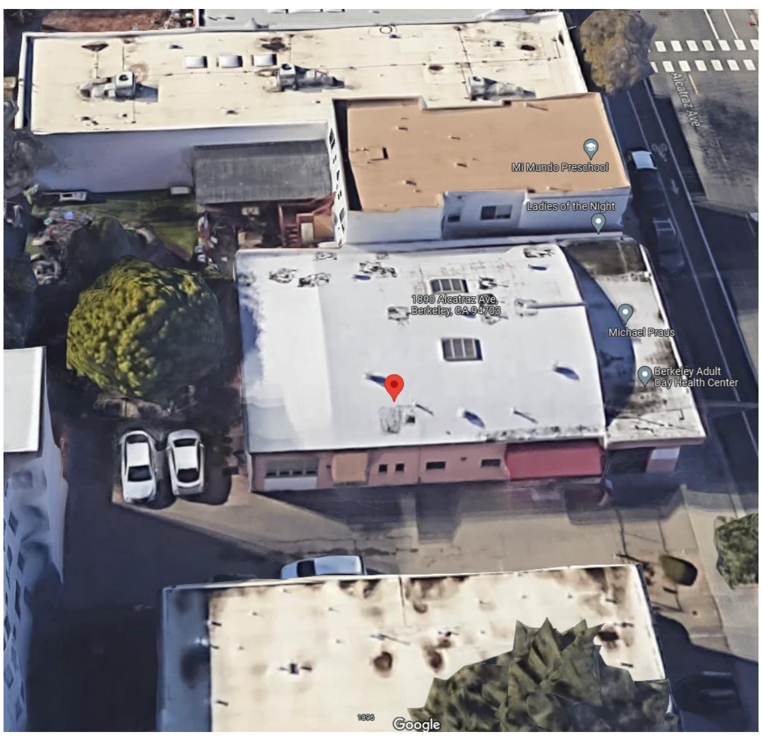

Figure 4. View from East

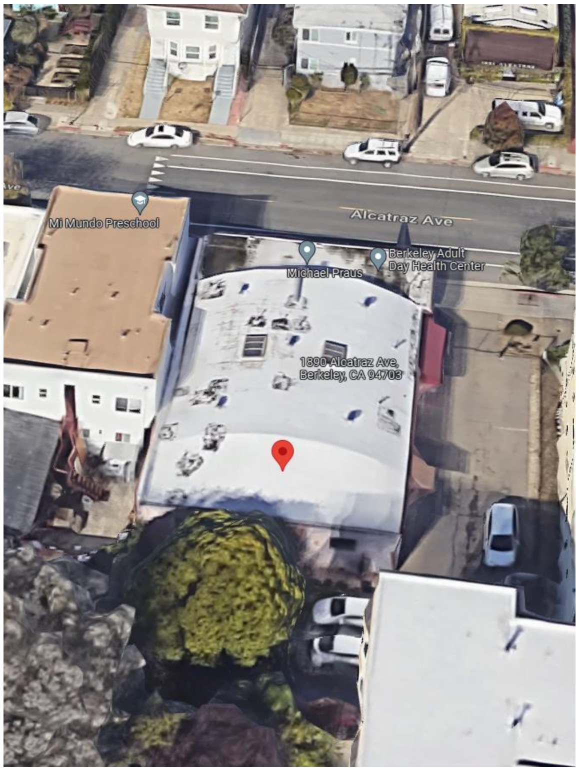

Figure 5. View from South

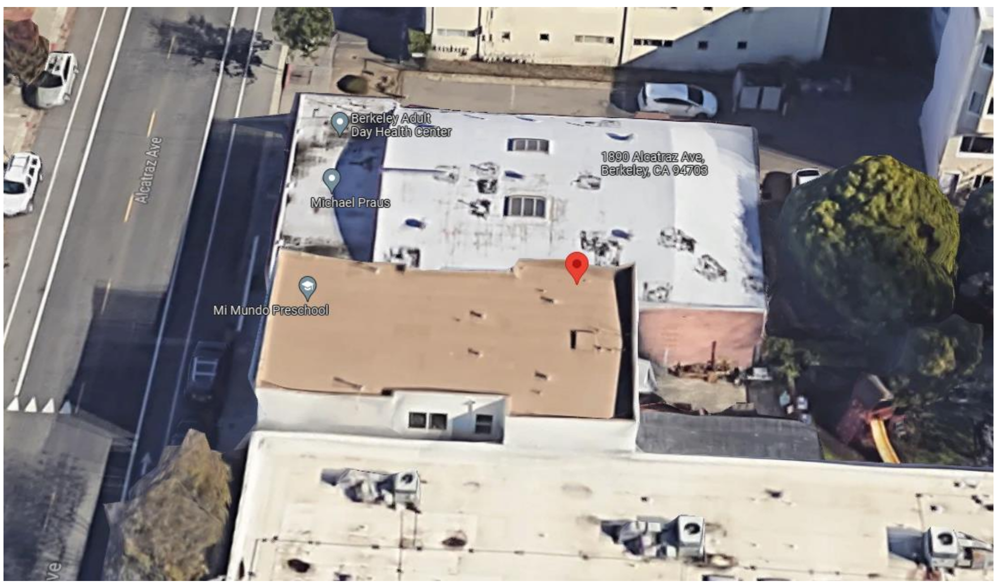

Figure 6. View from West

Figure 7. View from Alcatraz Avenue

Figure 8. Exterior East Wall

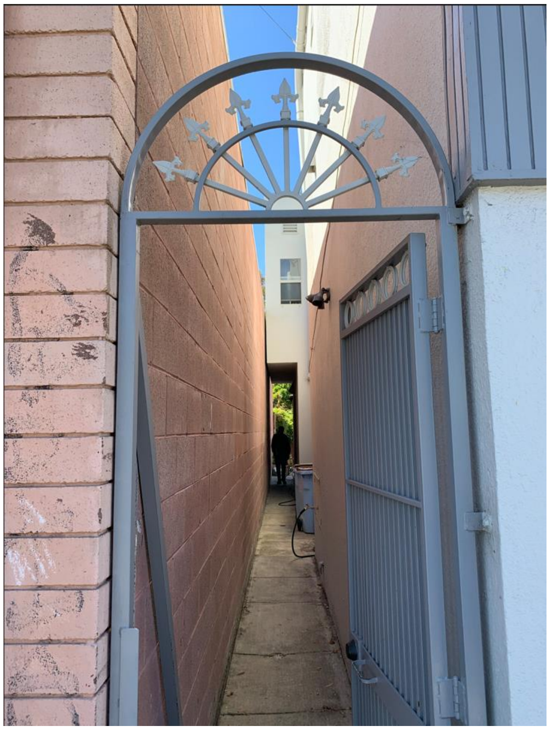

Figure 9. Exterior West Wall

Figure 10. View looking at Front

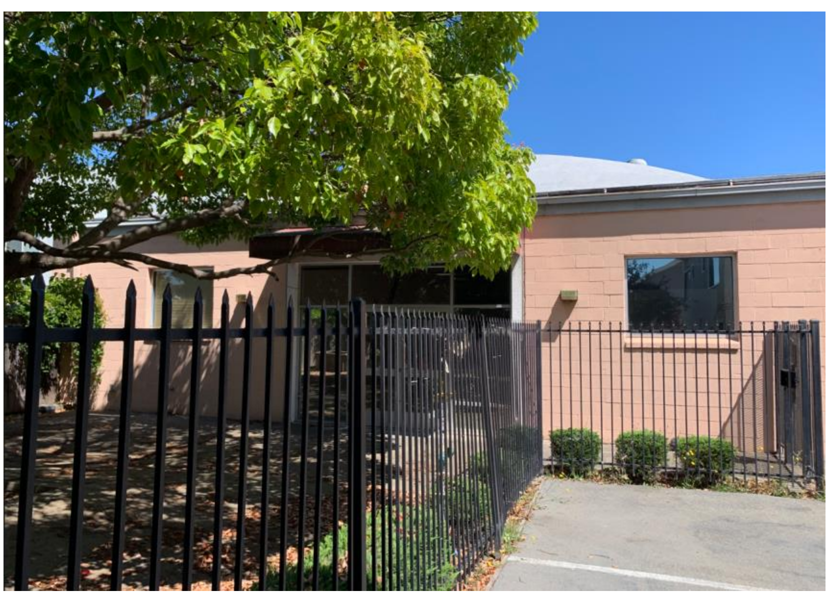

Figure 11. Exterior South Wall

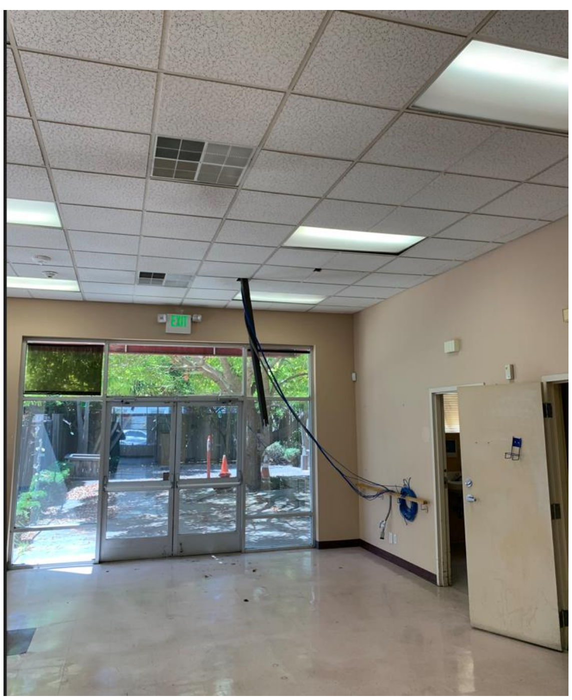

Figure 12: Interior Elevations

Figure 13: Roof Framing Observed from Mezzanine

Figure 14: Restrained water heater at mezzanine floor

Figure 15: Furnaces at mezzanine floor.

Appendix A. General information

African Amer Holistic Cultural Ctr

1890 Alcatraz Ave, Berkeley, CA 94703, USA

Latitude, Longitude: 37.8487638, -122.269598

Date	6/1/2022, 9:58:38 AM
Design Code Reference Document	ASCE41-17
Custom Probability	
Site Class	D - Stiff Soil

Type	Description	Value
Hazard Level		BSE-2N
S_S	spectral response (0.2 s)	2.04
S_1	spectral response (1.0 s)	0.784
S_{XS}	site-modified spectral response (0.2 s)	2.04
S_{X1}	site-modified spectral response (1.0 s)	1.332
F_a	site amplification factor (0.2 s)	1
F_v	site amplification factor (1.0 s)	1.7
ssuh	max direction uniform hazard (0.2 s)	2.645
crs	coefficient of risk (0.2 s)	0.908
ssrt	risk-targeted hazard (0.2 s)	2.401
ssd	deterministic hazard (0.2 s)	2.04
s1uh	max direction uniform hazard (1.0 s)	1.013
cr1	coefficient of risk (1.0 s)	0.898
s1rt	risk-targeted hazard (1.0 s)	0.91
s1d	deterministic hazard (1.0 s)	0.784

Type	Description	Value
Hazard Level		BSE-1N
S_{XS}	site-modified spectral response (0.2 s)	1.36
S_{X1}	site-modified spectral response (1.0 s)	0.888

Type	Description	Value
Hazard Level		BSE-2E
S_S	spectral response (0.2 s)	1.861
S_1	spectral response (1.0 s)	0.693
S_{XS}	site-modified spectral response (0.2 s)	1.861
S_{X1}	site-modified spectral response (1.0 s)	1.179
f_a	site amplification factor (0.2 s)	1
f_v	site amplification factor (1.0 s)	1.7

Type	Description	Value
Hazard Level		BSE-1E
S_S	spectral response (0.2 s)	0.918
S_1	spectral response (1.0 s)	0.321
S_{XS}	site-modified spectral response (0.2 s)	1.04
S_{X1}	site-modified spectral response (1.0 s)	0.635
F_a	site amplification factor (0.2 s)	1.133
F_v	site amplification factor (1.0 s)	1.979

Type	Description	Value
Hazard Level		TL Data
T-Sub-L	Long-period transition period in seconds	8

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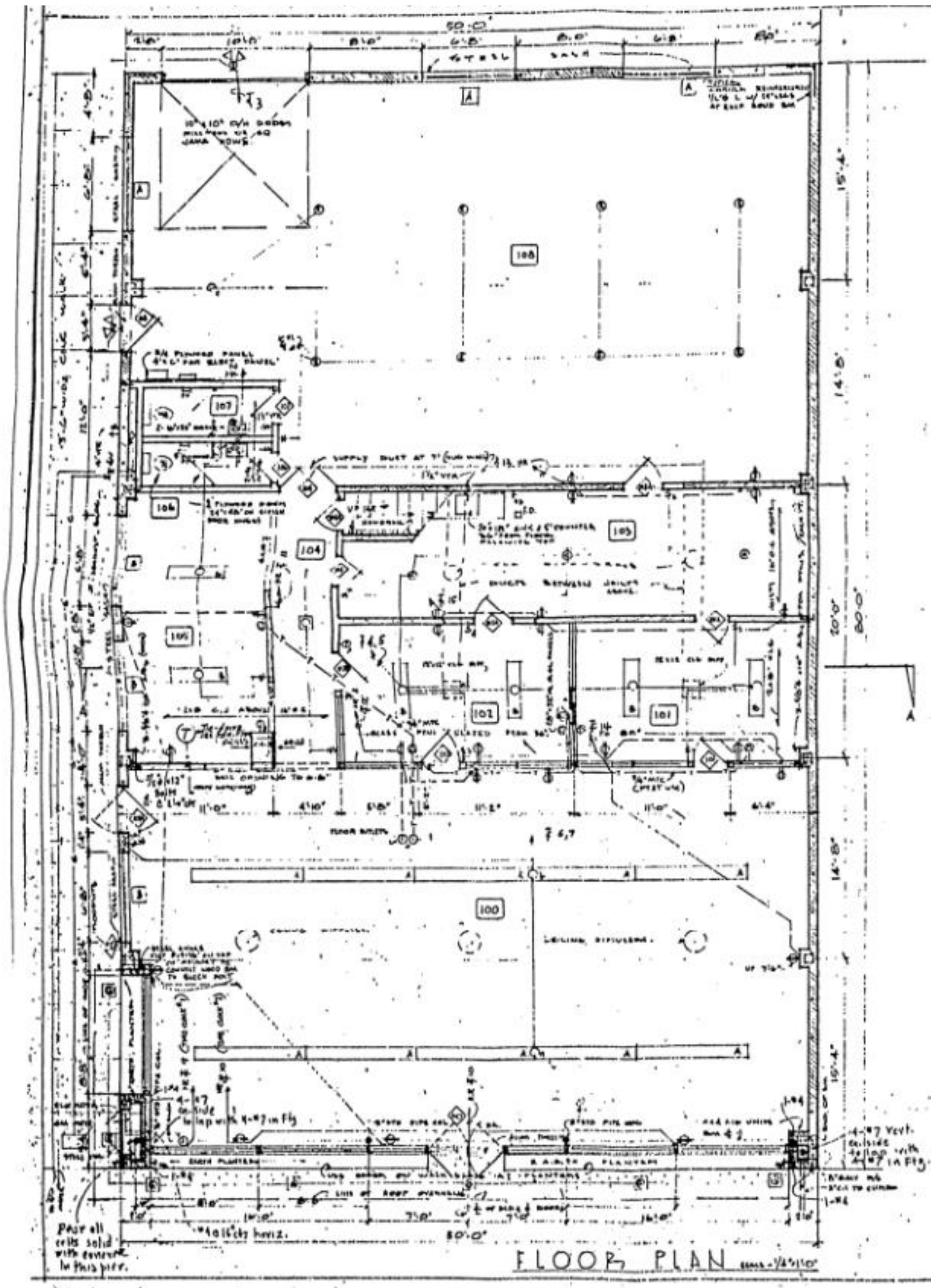
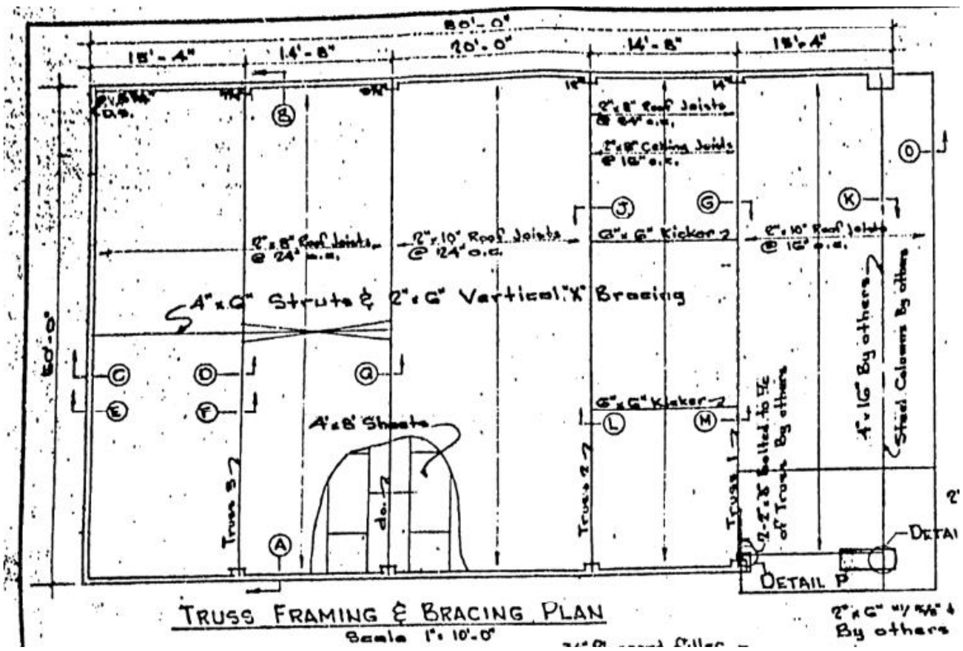
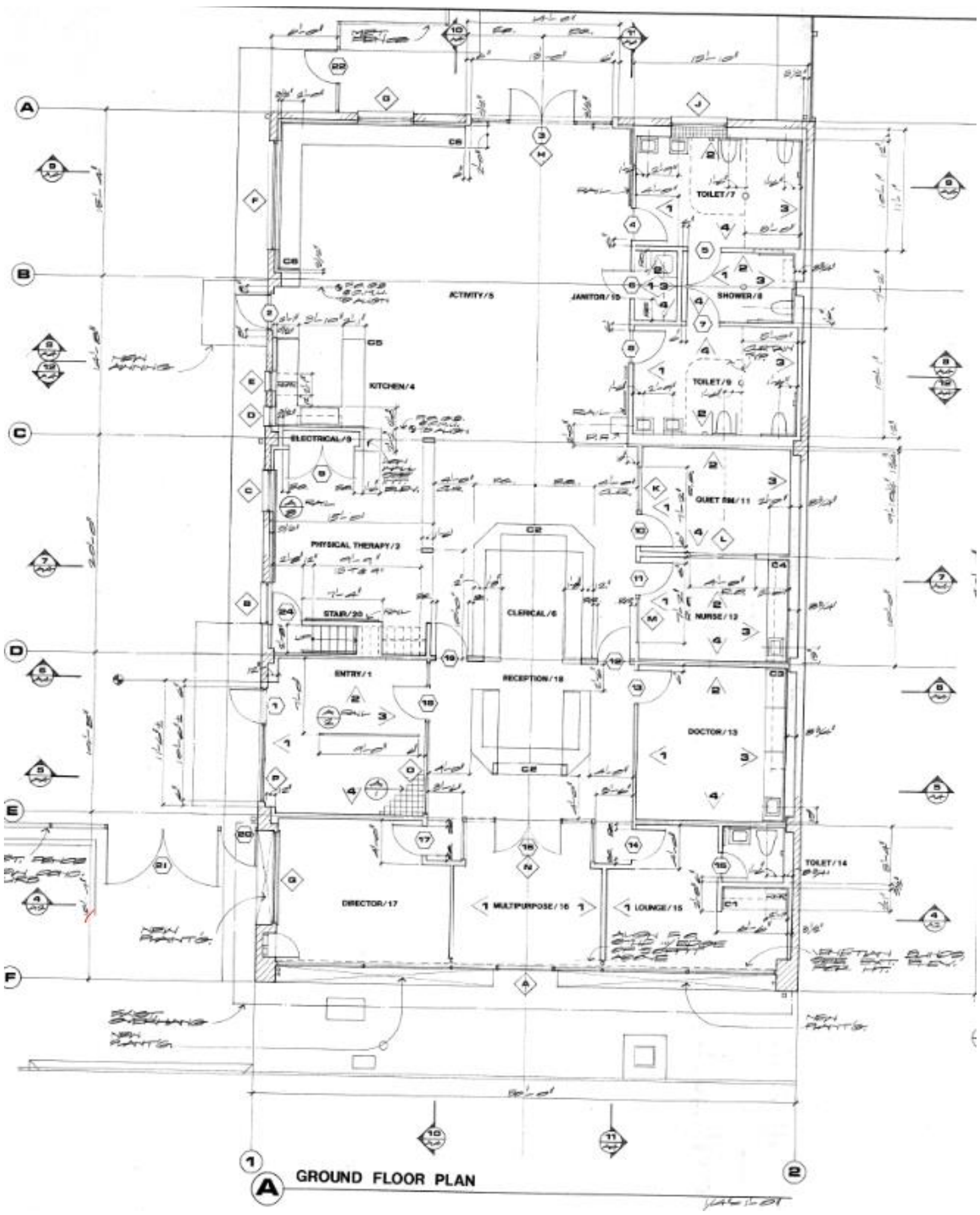


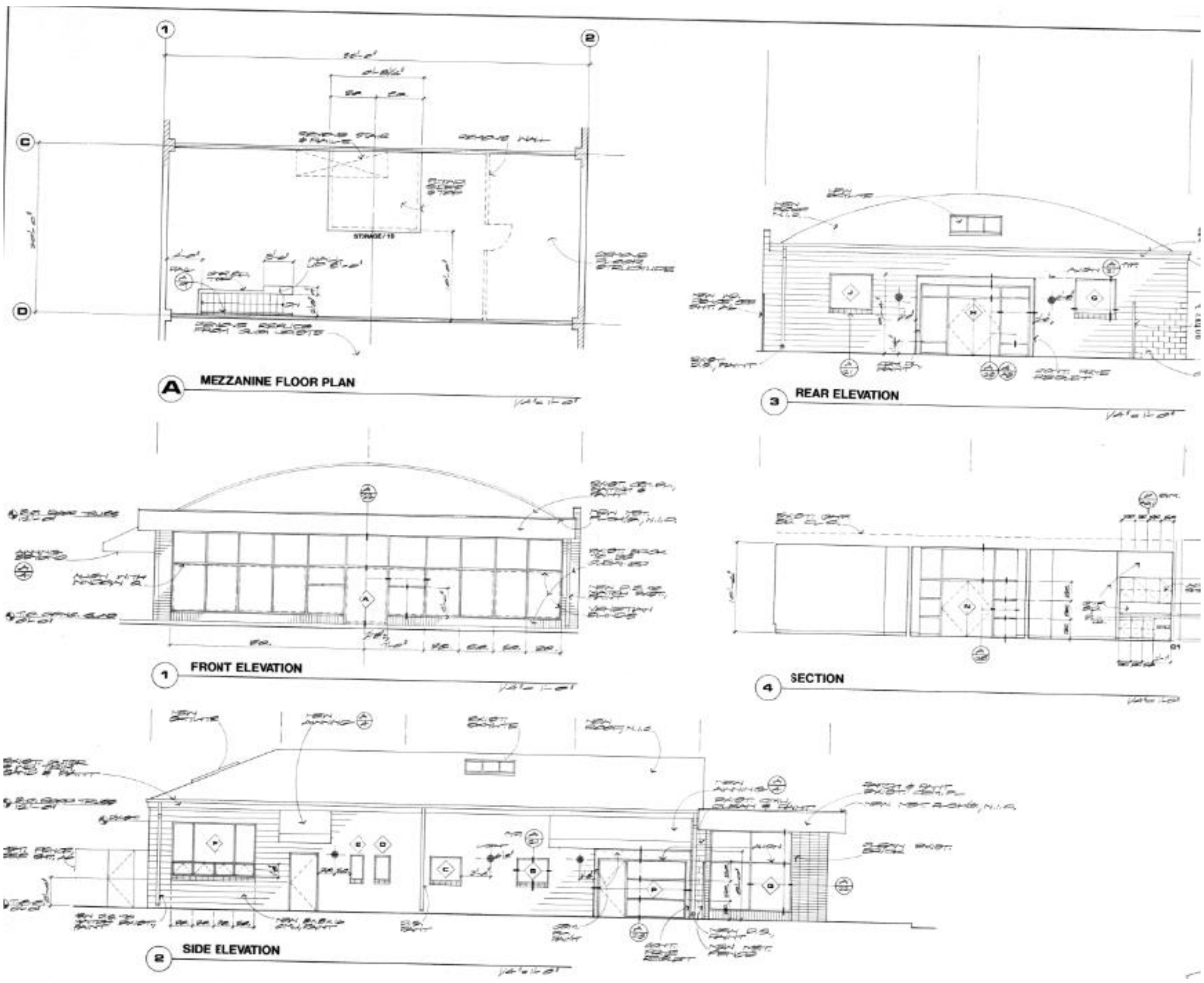
1958 architectural floor plans- foundation and 1st floor (Original Drawing).



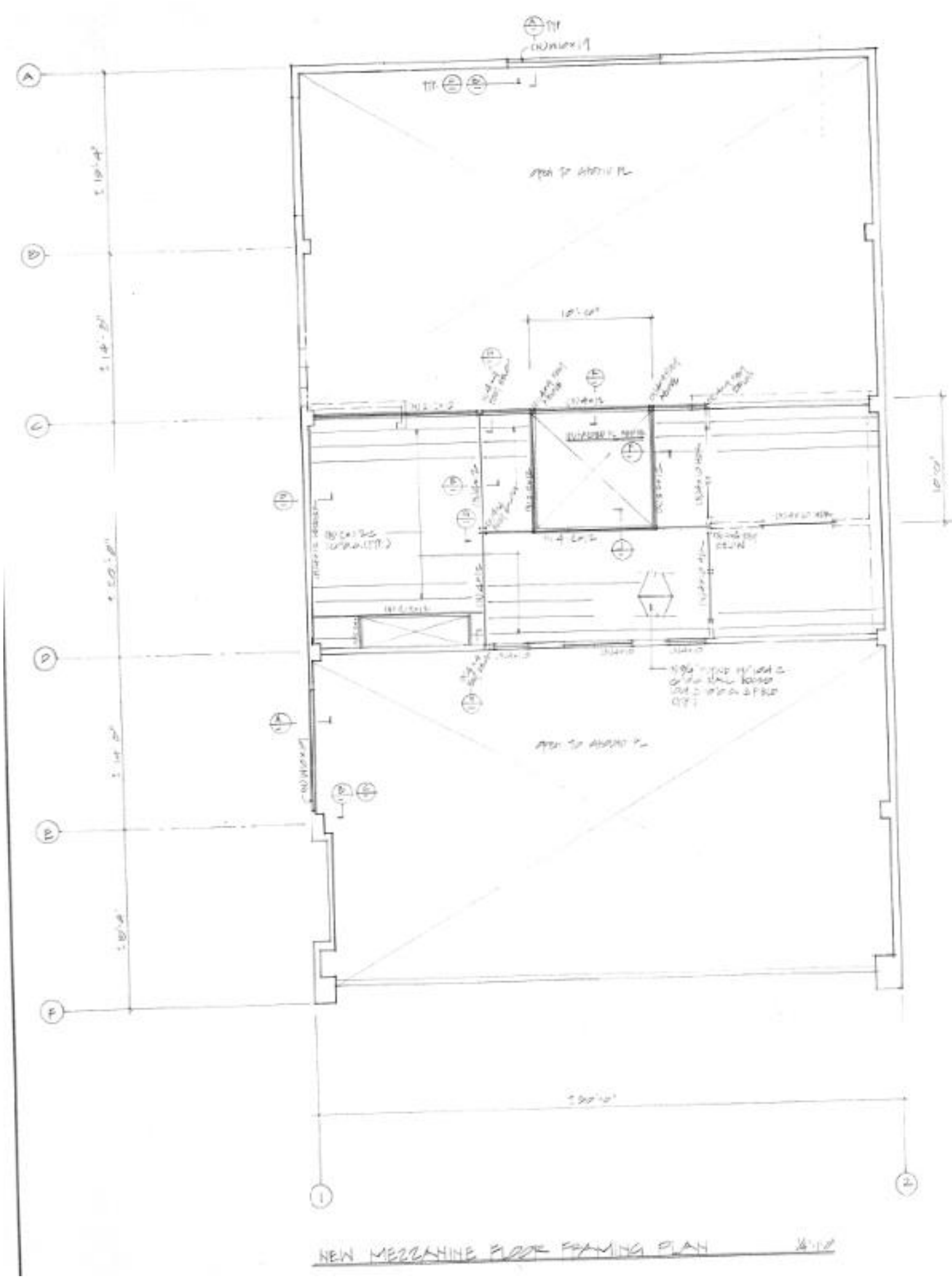
1958 Truss Framing Plan (Original Drawing).



1989 Architectural Floor Plan – 1st floor (Renovation Drawing)



1989 New Mezzanine Floor Plan and Exterior Elevations (Renovation Drawing)



1989 New Mezzanine Floor Plan (Renovation Drawing)

Appendix B: Conceptual Retrofit Plans

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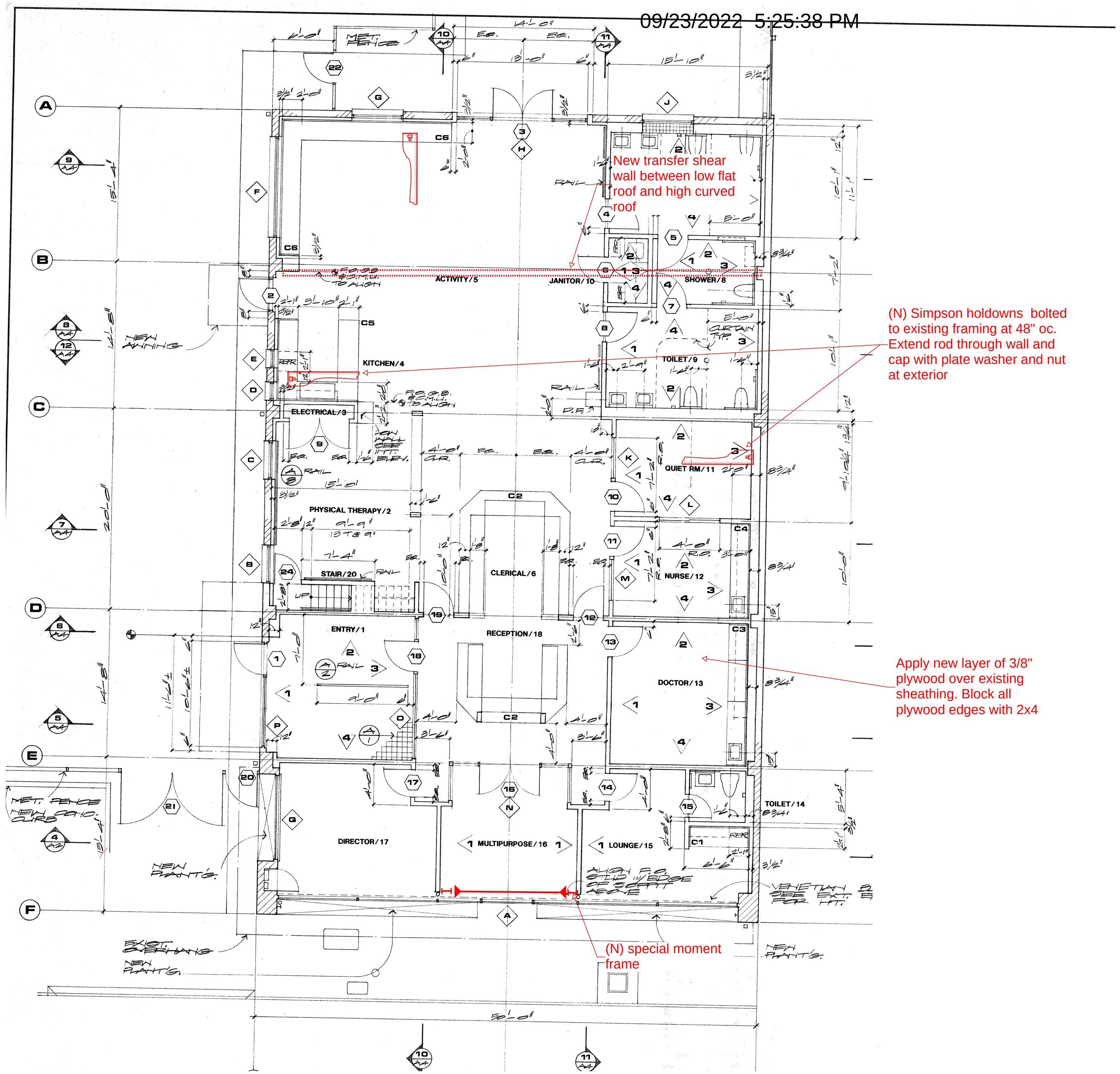
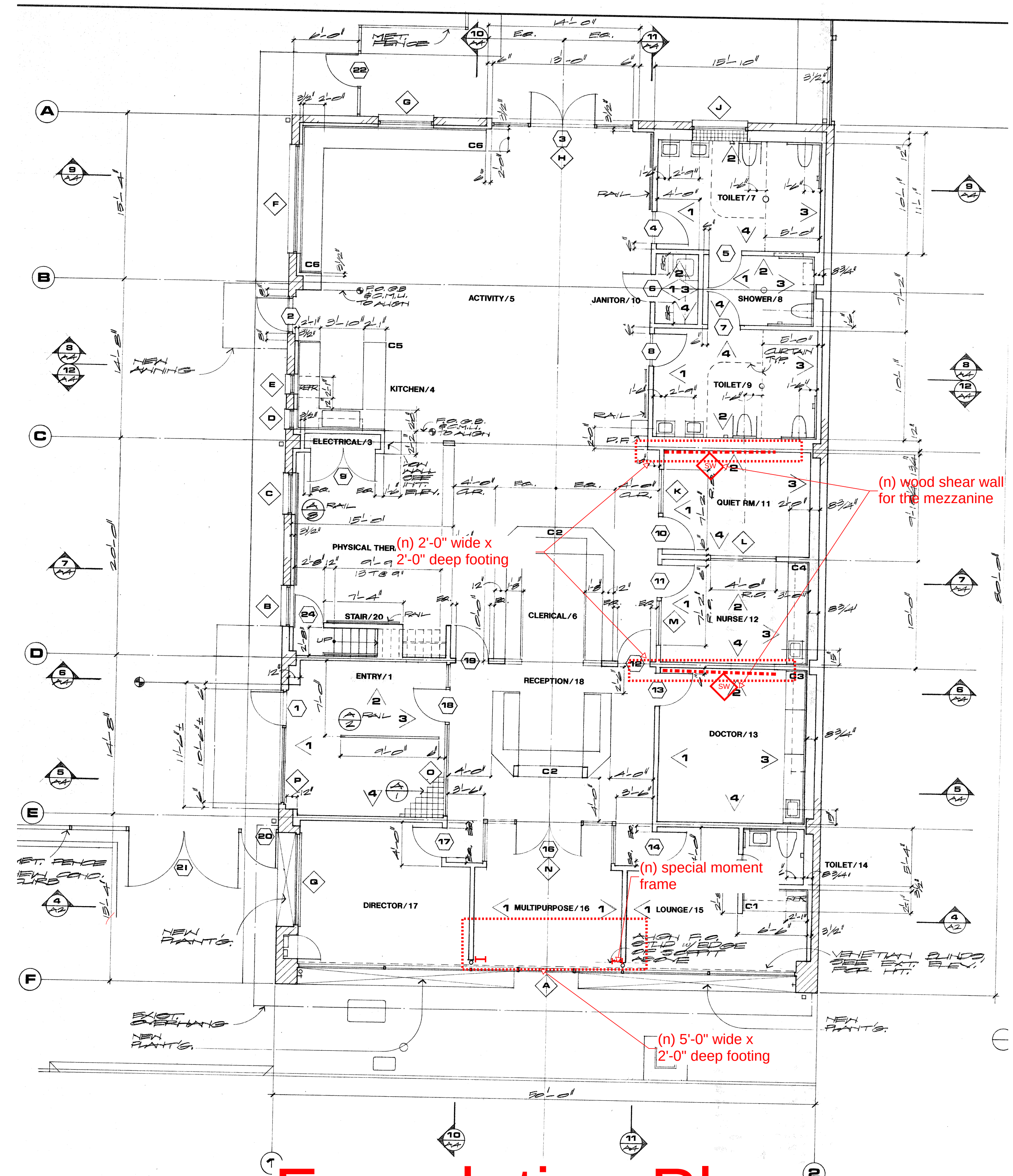


Roof Framing Plan



Foundation Plan

IDA STRUCTURAL ENGINEERS

1629 Telegraph Ave
Suite 300
Oakland, CA 94612
Tel.510.834.1629

ida-se.com

AAHRC
1890 Alcatraz Avenue
Berkeley, California

IDA No. 18095.12

SKETCH #: **SSK-01**

SCALE: **None**

Conceptual Retrofit Plans

DATE: **09/22/2022**

Appendix C: CMU Testing Report

APPLIED MATERIALS & ENGINEERING, INC.
980 41st Street
Oakland, CA 94608
Tel: (510) 420-8190
FAX: (510) 420-8186
e-mail: info@appmateng.com

July 5, 2022

Project No.: 1220428C

Mr. Tej Rokaya
IDA STRUCTURAL ENGINEERS, INC.
1629 Telegraph Avenue, Suite 30
Oakland, CA 94612

Email: TRokaya@ida-se.com

Subject: IDA African Amer Holistic Cultural Center CMU Testing
1890 Alcatraz Avenue, Berkeley, CA

Dear Mr. Rokaya:

As requested, Applied Materials & Engineering, Inc. (AME) has completed an investigation of the CMU (Concrete Masonry Unit) walls reinforcing steel and grout at the subject location.

PROCEDURES & RESULTS

1. CMU Compressive Strength (f'm) Testing

A total of two (2) grout core samples (C1 and C2) were removed from CMU walls and tested for compressive strength per ASTM C42 (dry). Locations of removed cores are shown in Figure 1.

Results of our compressive strength testing are provided in Table I. The average grout compressive strength is 3950 psi. The grout was estimated to be a Type N.

The Code specifies the compressive strength of the CMU, f'm, for grout of 3750 psi as f'm = 2,350 psi, and for grout of 4800 psi as f'm = 2,800 psi. By linear interpretation the f'm of the tested CMU is approximately 2,550 psi.

2. Reinforcing Steel (Rebar) Tensile Testing

A total of one (1) rebar sample (R1) was removed from a CMU wall, and tested for tensile properties per ASTM A370. Location of removed rebar is shown in Figure 1.

Results of our tensile testing are provided in Table II.

3. Reinforcing Steel (Rebar) Layout (Size & Spacing) of CMU Walls + Grouting

GPR (ground penetrating radar) was used to survey a total of two (2) CMU wall locations (W1 and W2) for reinforcing steel spacing. Locations of tested rebar are shown in Figure 1.

At each location, the rebar was exposed with an electric chipping gun to determine bar size.

Reinforcing steel size and spacing results are given in Table III.

In addition, the CMU walls were determined to be partially (minimally) grouted in the long wall (W1) and ungrouted in the short wall (W2). A substantial reduction for f'm of 2,550 should be made as the grouting of the cells is partial or non-existent.

Please call if any questions arise.

Sincerely,

APPLIED MATERIALS & ENGINEERING, INC.

Jonathan Lesnansky

Jonathan Lesnansky
Field Technician

Reviewed by:

Armen Tajirian, Ph.D., PE
Principal

TABLE I

GROUT CORES COMPRESSIVE STRENGTH TEST RESULTS

1890 Alcatraz Avenue, Berkeley, CA

AME Project No. 1220428C

Core* ID	Element	Floor Level	Diameter (in.)	Capped Height (in.)	Area (in.^{2})	Correction Factor	Ultimate Load (lbs)	Ultimate Compressive Strength (psi)
C1	CMU Wall	Ground	2.00	4.01	3.14	1.000	13,600	4330
C2	CMU Wall	Ground	1.97	2.47	3.05	0.930	11,650	3560
						Average		**3950**

*See Figure 1 for core locations.

TABLE II

REINFORCING STEEL TENSILE STRENGTH TEST RESULTS

1890 Alcatraz Avenue, Berkeley, CA

AME Project No. 1220428C

Sample ID*	**R1**
Element	CMU WALL
Floor Level	ground
Sample Type	Rebar
Diameter (in.)	0.625
Actual Area (in.^{2})	0.307
Yield Point (lbs)	15,435
Ultimate Load (lbs)	23,692
Yield Strength (psi)	50,310
Tensile Strength (psi)	77,223
Elongation (2")	2.58
Elongation (%)	29

*See Figure 1 for rebar location.

TABLE III

CMU WALL REINFORCING STEEL SURVEY RESULTS

1890 Alcatraz Avenue, Berkeley, CA

AME Project No. 1220428C

Survey ID*	Element	Wall Thickness (in.)	Rebar Size & Spacing
W1 (Long Wall)	CMU Wall	8	Horizontal: #4, 48" o.c. @ $3^{3}/_{4}$" from outside side face. Vertical: #5, 32" o.c. @ 5" from outside face.
W2 (Short Wall)	CMU Wall	8	Horizontal: #4, 48" o.c. @ $3^{3}/_{4}$" from outside face. Vertical: #5, 32" o.c. @ 5" from outside face.

*See Figure 1 for survey locations.

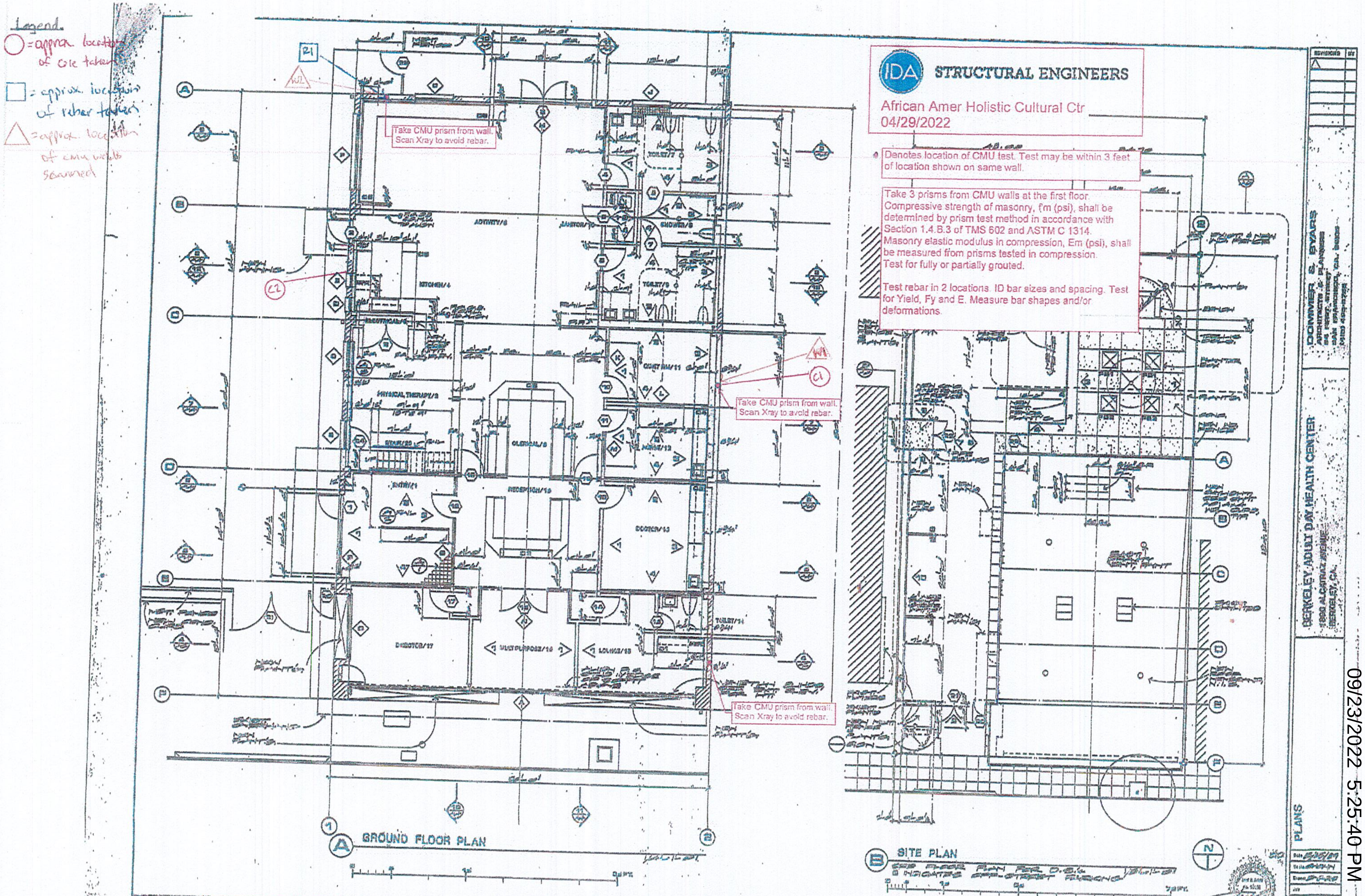


Figure 1. Ground floor plan showing locations of testing.

Appendix D: Geotechnical Report

CONSTRUCTION
TESTING SERVICES

GEOTECHNICAL INVESTIGATION REPORT

CITY OF BERKELEY
AFRICAN AMERICAN HOLISTIC RESOURCE CENTER
1890 ALCATRAZ AVENUE
BERKELEY, CA

September 2, 2022

Prepared for

Mr. Isaac Carnegie
Parks, Recreation and Waterfront Department
City of Berkeley

CTS Project 18735

4400 Yankee Hill Road, Rocklin, CA 95677 • Phone (916) 419-4747 • Fax (916) 419-4774
2118 Rheem Drive, Pleasanton, CA 94588 • Phone (925) 462-5151 • Fax (925) 462-5183
One Embarcadero Center, Suite 535, San Francisco, CA 94111 • Phone (415) 438-2357 • Fax (415) 334-4747
246 30th St., Suite 101, Oakland, CA 94601 • Phone (510) 444-4747 • Fax (510) 835-1825

CONSTRUCTION
TESTING SERVICES

September 2, 2022

Mr. Isaac Carnegie
City of Berkeley - Parks, Recreation & Waterfront Department
2180 Milvia Street
Berkeley, CA 94704

Subject: **City of Berkeley**
African American Holistic Resource Center
1890 Alcatraz Avenue
Berkeley, CA 94703

Geotechnical Investigation Report

Dear Mr. Isaac,

Construction Testing Services (CTS) is pleased to present this Geotechnical Investigation Report for the subject property located at 1890 Alcatraz Avenue in Berkeley, California. The purpose of our investigation was to explore and evaluate the subsurface conditions at the site and develop soils engineering conclusions and recommendations for project design and construction as well as provide an assessment the of geohazards present at and in the vicinity of the property.

Our explorations and analysis conclude the project is feasible for design and construction from a geotechnical engineering perspective. Due to the presence of near surface expansive soils, undocumented fill, and the potential for strong ground shaking, designs and construction details related to the geotechnical engineering aspects will be needed to accommodate such effects. A discussion of the subsurface conditions, our conclusions, and recommendations for geotechnical aspects of design and construction for the planned site improvements are presented in the following report.

We appreciate the opportunity to be of service to you over the course of this project. If you have any questions regarding the contents of this report, or if we could provide further assistance, please contact the undersigned.

Sincerely,

CONSTRUCTION TESTING SERVICES

REGISTERED PROFESSIONAL ENGINEER
BRADFORD LEE QUON
GE 2841
EXP. 6/30/2024
GEOTECHNICAL
STATE OF CALIFORNIA

for

Gavin Lynch
Staff Engineer

Bradford Quon, GE
Principal Geotechnical Engineer

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INTRODUCTION

1.1 GENERAL

Presented herein is a Geotechnical Investigation Report for the subject project located at 1890 Alcatraz Avenue, Berkeley, California, as shown on Plate 1. The purpose of our investigation was to explore and evaluate the subsurface conditions at the site and develop soils engineering conclusions and recommendations for project design and construction.

1.2 PROJECT DESCRIPTION

Based on our discussions with you and review of the Request for Proposal and Addendum dated May 9, 2022, we understand the City of Berkeley is seeking to renovate and/or rebuild the existing building located at 1890 Alcatraz Avenue. There are no details for the planned development at this time, however the following improvements are being considered:

- A second story addition **or** an expanded footprint for the existing structure
- Underground utilities and concrete flatwork, and
- Asphalt and rigid concrete pavements.

Building materials and structure type are not finalized at this time, but we assume the new buildings will be lightly to moderately loaded and constructed with concrete slab-on-grade floors with maximum wall and column loads of 2 kips per lineal foot and 100 kips maximum for walls and columns respectively. The structural loads were not provided and will need to be verified by the project Structural Engineer for the final foundations design.

1.3 SCOPE OF SERVICES

Our scope of services was outlined in our Proposal dated May 19, 2022 (CTS Proposal P21730) and authorized under City of Berkeley Contract No. 10907, dated and signed on June 10, 2021, as well as City of Berkeley Purchase Order No. 22204423 dated and signed on June 6, 2022. Our scope of services generally included the following:

- Review of readily available background materials, including geologic maps, aerial photographs, topographic maps, and hazard maps;

- Coordination with Underground Service Alert (USA) to locate underground utilities in the vicinity of our subsurface explorations;

- Coordination with you to locate underground utilities not covered by USA;

- Subsurface exploration consisting of two (2) borings using hand-auger techniques to depths of up to 7 feet below the ground surface. A Staff Engineer from CTS logged the subsurface conditions and collected disturbed samples for testing;

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- Advancement of two (2) cone penetration tests (CPTs) to depths of up to 65 feet below the ground surface with performance of seismic velocity measurements;

- Laboratory testing on selected samples to evaluate the in-situ moisture content, grain size distribution, Atterberg Limits, Expansion Index, and soil corrosion potential;

- CPT based Liquefaction analyses;

- Engineering analysis and compilation of the field and laboratory data collected, and our findings from the background research; and

- Preparation of this report to presenting our findings, conclusions, and recommendations related to geotechnical conditions observed at the project site, and our and our recommendations or the proposed improvements.

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FIELD EXPLORATIONS AND LABORATORY TESTING

2.1 FIELD EXPLORATION

Prior to initiating our field exploration, the planned exploration locations were checked for underground utilities by contacting Underground Service Alert (USA) which located underground and aboveground utilities within the vicinity of our proposed explorations. Based on the planned depths of the explorations and review of the available data regarding depth to groundwater, it was determined drilling permits with the City of Berkeley Toxics Management Division would be required for the CPTs.

The subsurface CPT and boring explorations were conducted on July 21, 2022. The locations of the CPT probes and the soil borings related to the proposed performing arts building are shown on Plates 3.

The CPT exploration program was originally planned to consist of the advancement of two (2) CPTs to depths of 100 feet and 50 feet below the ground surface (bgs); however, CPT-01 met refusal at approximately 63 ½ feet bgs due to friction from the sidewalls of the excavation on the probe. CPT-2 was also attempted to advance to 100 feet bgs; however, the CPT also met refusal at a depth of approximately 63 ½ feet bgs due to friction from the sidewalls of the excavation on the probe.

The boring exploration program consisted hand auguring two (2) soil borings identified as Borings B1 and B2 to depths of between approximately 5 to 7 feet bgs. The borings were advanced using a 4-inch diameter geotechnical hand auger with an open bucket. Table 2-1 below summarized the CPT and Boring depths and approximate locations.

Table 2-1 – Exploration Depths and Locations

Exploration ID	Depth of Exploration (ft)	Type of Exploration	Approximate Latitude	Approximate Longitude	General Location
CPT-01	63.65	CPT	37.848840°	-122.269444°	Northeast corner of parking lot
CPT-02	63.48	CPT	37.848638°	-122.269481°	Southwest corner of parking lot
B-1	7	HA	37.848661°	-122.269651°	Southwest corner of existing building
B-2	5	HA	37.848905°	-122.269702°	Northwest corner of existing building

Notes:
1. HA = Hand Auger; CPT – Cone Penetration Test
2. Latitude and longitude estimated from Google Earth.

Bulk samples were collected at select depths from the borings and transported to our laboratory for further analysis and geotechnical testing.

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2.2 LABORATORY TEST RESULTS

Laboratory testing was performed to quantify and evaluate the geotechnical characteristics of the soil samples obtained at the site. The following laboratory tests were performed on selected samples from the borings:

- Moisture Content (ASTM D 2216)
- Atterberg Limits (ASTM D 4318)
- Particle Size Distribution (ASTM D6913/D1140)
- Expansion Index (ASTM D4829)
- pH and Electrical Resistivity (CT 643)
- Sulfate and Chloride Content (CT417 and CT422)

The results of the tests performed above are discussed in the Subsurface Conditions section of the report (Section 3.4). They are also presented on the boring logs provide in Appendix A, and as summaries and reports provided in Appendix B.

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FINDINGS

3.1 SITE DESCRIPTION

The site is located at 1890 Alcatraz Avenue in Berkeley, California. The property fronts on the south side of Alcatraz Avenue, and east side of Dover Street. A single-story building with a mezzanine storage area is currently located on northwest portion of the property. An asphalt concrete parking area is located on the east and southeast portion of the property. A courtyard is located to the south of the building and is primary paved with concrete flatwork. A large tree is located at the center of the courtyard, with smaller plants and trees located around the perimeter. Small shrubbery is also located along the north face of the building. The property if generally free of overhead utilities, with the exception of power lines leading from Alcatraz Avenue to the north face of the building.

The property slopes very gently down from the south to the north with elevations ranging from approximately 109 feet above MSL in the south to approximately 108 feet in the north as shown on Plate 2. (Google Earth, 2020; USGS 2018). Residential properties border to the east, west, and south, and Alcatraz Avenue to the north.

The coordinates near the center of the planned performing arts center referenced from Google Earth are:

38.848762º N Latitude
122.269512º W Longitude

Based on a review of available aerial photographs and construction documents, the construction of the existing building appears to have been started in the late 1950's. A new mezzanine area also appears to have been constructed in the building in the late 1980's. Prior to the construction of the existing building the site appears to have been used as a residential property.

3.2 SUBSURFACE CONDITIONS

3.1.1 Borings

Borings B-1 and B-2 were performed on July 21, 2022 to depths between approximately 5 and 7 feet below the ground surface (bgs). Borings B-1 and B-2 encountered undocumented fill material consisting of Silty Sand (SM) with gravel and debris consisting of brick and concrete to a depth of approximately 1-foot bgs. Beneath the fill material in Boring B-1, Sandy Lean Clay (CL) and Lean Clay with Sand (CL) were encountered to a final depth of approximately 7 feet bgs. Beneath the fill material in Boring B-2, Sandy Fat Clay (CH) was encountered to a depth of approximately 3.5 feet bgs, and the boring was terminated in Clayey Sand (SC) at a final depth of approximately 5 feet bgs.

Plate 3 shows the locations of the borings and CPT's. Graphical presentations of the boring logs are shown in Appendix A.

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3.1.2 Cone Penetration Tests

The CPT exploration program was originally planned to consist of two (2) CPTs to depths of 100 feet and 50 feet below the ground surface (bgs); however, CPT-01 met hydraulic refusal at approximately 63 ½ feet bgs due to friction from the sidewalls of the excavation on the probe. CPT-2 was also attempted to advance to 100 feet bgs; however, the CPT also met hydraulic refusal at a depth of approximately 63 ½ feet bgs due to friction from the sidewalls of the excavation on the probe.

Data files and plots generated by Middle Earth Geo Testing, Inc. are provided in Appendix A.

The material behavior types listed are consistent with those observed in the soil borings with higher resistant materials encountered with depth.

Middle Earth GeoTesting also recorded the average shear wave velocities at 5-foot intervals in CPT-01 and CPT-02 by measuring the time for the produced seismic energy to travel from the ground surface from the drive of a sledgehammer through the ground and to the seismometer mounted in the cone. The distance to the seismometer divided by the travel time of the shear-wave is approximately the average shear-wave velocity. Table 3-1 below summarizes their measurements.

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Table 3-1 Average Seismic Velocities			
Exploration ID	**CPT Refusal Depth (ft)**	**Approximate Test Depth (ft)**	**Average Recorded Shear Wave Velocity (ft/sec)**
CPT-01	63.65 (hydraulic refusal)	10	515.77
		15	1209.70
		20	930.94
		25	1090.89
		30	1452.06
		35	1610.96
		40	1113.86
		45	1664.26
		50	1468.42
		55	1391.35
		60	913.25
		63	1437.28
CPT-02	63.55 (hydraulic refusal)	10	528.56
		15	636.57
		2	806.81
		25	1295.43
		30	904.9
		35	1334.79
		40	1092.05
		45	1020.03
		50	1099.59
		55	1132.95
		60	954.14
		63	932.05

3.3 GROUNDWATER CONDITIONS

3.3.1 On-Site Conditions

Groundwater was encountered in the CPTs. Table 3.2, below summarizes these findings.

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Table 3.2 – Observed Local Groundwater Conditions at Time of Exploration			
Exploration ID	Approx. Ground Surface Elevation (ft, msl)	Approx. Depth to Groundwater (ft)[1]	Approx. Groundwater Surface Elevation (ft, msl)
Boring B-1	109	Not Encountered	N/A
Boring B-2	108	Not Encountered	N/A
CPT-01	108	10	98
CPT-02	109	14	95

[1] The groundwater depths reported in the CPT's were recorded during drilling with a tape measure and do not represent stabilized groundwater conditions because the borings commenced immediately after completion of the borings.

3.3.2 Regional Groundwater Conditions

The Department of Water Resources Water Data Library for wells and related depths to groundwater in the vicinity of the site were reviewed. Table 3.3 below summarizes these findings.

Table 3.3 – Regional Groundwater Conditions (lowest site elevation = approx. 108 feet)				
Well ID	Ground Surface Elevation (ft, msl)	Distance/Direction from Site	Reported Range in Depth to Groundwater/ Record Dates	Approx. Groundwater Surface Elevation (ft, msl)
01S04W11K001M	116.8	0.2 miles Northwest	16.4 to 20.3 1993 to 1995	100.4 to 96.5
OW-4	98.0	0.8 miles Southeast	9.9 to 24.1 2016 to 2022	88.1 to 73.9
01S04W23E001M	59.7	1.2 miles Southwest	8.4 to 12.1 1993 to 2000	51.3 to 47.6
01S04W03H001M	86.1	1.7 miles Southwest	9.5 to 11.6 1993 to 1994	76.6 to 74.5

Source: http://wdl.water.ca.gov/waterdatalibrary/

Variations in groundwater levels may occur due to variations in ground surface topography, subsurface geologic conditions and structure, seasonal rainfall, local irrigation practices, new construction, and/or other factors beyond our control.

Based on the review of the existing available groundwater elevation data and that obtained from this study, it is recommended a ground water depth of 7 feet below the ground surface should be used in design.

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GEOGLOGIC HAZARDS

This investigation considered the geologic hazards relevant to the proposed construction, including liquefaction, undocumented fill, and expansive soils. These hazards are discussed in the following subsections.

4.1 LIQUEFACTION

Soil liquefaction results from loss of strength during cyclic loading, such as imposed by earthquakes. Soils most susceptible to liquefaction are clean, loose, saturated, uniformly graded sand below the groundwater table. Empirical evidence indicates that low plasticity silt and clay are also potentially liquefiable, though this phenomenon is commonly referred to as cyclic softening. When seismic ground shaking occurs, the soil is subjected to cyclic shear stresses that can cause excess hydrostatic pressures to develop. This can lead to lateral spreading of sloping or unconfined ground. Sand boils can also develop and lead to subsidence of the ground surface. The site is mapped having moderate liquefaction susceptibility (Knudsen, 2000 and 2006). The Liquefaction Potential Map is shown as Plate 4.

Based on the field explorations conducted, liquefaction evaluation was conducted using CPT based methods and concluded not to be a design consideration.

4.2 UNDOCUMENTED FILL

Undocumented fill was encountered in the borings to depths of about 3 to 3 ½ feet below existing site grade. The undocumented fill will cause non-uniform bearing support and cause potential for intolerable foundation, or slab differential settlement. **It is concluded that the presence of undocumented fill is a concern for the project.**

4.3 EXPANSIVE SOILS

Expansive soils are common in the area and have the potential to impact the development where fluctuations in the moisture contents can cause unacceptable shrinkage and/or swell beneath buildings and/or flatwork. The Mediterranean climate, with dry summers and wet winters, causes these clays to cyclically shrink as they dry and then swell as they become wetter. Controlling this moisture change will reduce this shrink-swell capability.

The near-surface soils at our exploratory borings are classified as Fat Clay (CH). Atterberg Limits testing was performed on select samples and show:

- A range of Plasticity Indices of between 33 and 50 and Liquid Limits of between 51 and 66, and
- Expansion Index values of 112 and 122, indicating high expansion potential

Expansive soils are expected to be an impact and design consideration.

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CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL

Based on the results of our findings and analysis, the project is feasible for design and construction from a geotechnical engineering perspective. Our exploratory borings show the near-surface soils are undocumented fill comprised of medium to high plasticity Fat Clay. The site is also located in an area subject to strong ground shaking. Specific recommendations to accommodate the expansive soils and strong ground shaking are presented below.

5.2 UNDOCUMENTED FILL SOILS

Undocumented fill was encountered in the borings to depths of about 3 to 3 ½ feet below existing site grade. The presence undocumented fill will cause non-uniform bearing support and cause potential for intolerable foundation, or slab differential settlement.

In building areas and where structural improvements are intended, undocumented fills should be removed completely and laterally to at least 3 feet beyond the face of the foundation for perimeter foundations. and backfilled with engineered fill. For design and estimating purposes and assuming the current grade will be constructed as the pad grade, a depth of 3 feet of complete over-excavation and replacement with engineered fill across the pad should be anticipated with deeper excavations required for elevator pits, etc. The Geotechnical Engineer of Record, or his representative should be present during grading operations to verify the undocumented fill materials are removed to expose firm native soils prior to backfill.

In pavement areas, undocumented fills should be removed to a depth of at least 2 feet and replaced with engineered fill. The upper 12 inches of paved areas should consist of non-expansive fill as discussed in the Expansive Soils and Earthwork sections of this report.

In sitework areas consisting of exterior flatwork, or landscape areas, no over-excavation is required provide the areas are prepared in accordance with the Earthwork recommendations presented in this report.

5.3 EXPANSIVE SOILS

Expansive soils are common in the area and have the potential to impact the project where fluctuations in the moisture contents can cause unacceptable shrinkage and/or swell beneath buildings and/or flatwork. We have evaluated acceptable methods to address expansive soils to include specific earthwork construction guidelines or use of structural alternatives for structures as summarized below:

- Earthwork solutions:
  - Strict moisture conditioning and compaction control during mass grading, and
  - Use of non-expansive fill in the upper portions of building pad, concrete flatwork, or pavements are feasible alternatives to reduce the expansion potential. Use of non-expansive fill should meet the requirements for fill material as described in Section 5.4.2 and be spread within the upper 12 inches of building pads to at least 3 feet beyond the building

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footprint. This option is discussed in this report and used in conjunction with shallow spread foundations as described in Section 5.4.

- Structural solutions that require design considerations from the structural engineer may consist of mat foundation or post tensioned slabs. Given the complexity of the structure with the various elevations, mat foundations could be feasible.

The solutions presented herein are typical in the project area and should be evaluated by the project design team in consultation with the Owner. Recommendations for each of these alternatives are discussed in this report.

5.4 EARTHWORK

5.4.1 Site Preparation

Prior to any site grading, any existing flatwork, pavements, or existing structures and associated foundations requiring demolition should be removed from the construction limits. Where roots are less than an 1/8-inch diameter, they may remain in place provided they do not comprise more than 3 percent by dry weight of organics in the surrounding native soil. Where trees are removed, the entire tree root ball should also be removed and backfilled with compacted engineered fill.

After stripping and any required over-excavation of undocumented fills, the exposed subgrade to receive engineered fill or to be used for future support of structural improvements (i.e., foundations or slabs-on-grade), should be scarified to a depth of at least 8 inches. Fill material encountered during our explorations should be removed completely. The exposed native subgrade should be moisture conditioned to no less than two percent above the optimum moisture content, and then compacted to no less than 90 percent relative compaction based on the ASTM D 1557 test method, latest edition. Fills 5 feet and thicker should be compacted to a minimum of 95 percent relative compaction for the full depth. In paved areas, the level of compaction should be increased to at least 95 percent in the upper 6 inches.

All excavations should be observed by the project Geotechnical Engineer or their designated representative to verify any fill encountered have been removed and the subgrade meets the intent of this report.

5.4.2 Engineered Fill

If fill is to be imported from off-site, it should meet the requirements of engineered fill above as well as those for Class 3 Subbase in the State of California Standard Specifications, Chapter 25 (latest edition). Any imported fill should be sampled by the project Geotechnical Engineer prior to being imported to evaluate its suitability for its intended use and to perform confirmatory testing listed below, if necessary.
Imported fill should be nearly free of organic or other deleterious debris, essentially non-plastic, and less than 6 inches in maximum dimension; except that in the upper two feet of subgrade material, the maximum size shall be 3 inches. Specific requirements for engineered fill including the applicable test procedures to verify suitability are presented in the following table.

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Table 5.1 –Suitable Materials for Engineered Fill		
Gradation		
Sieve Size	Percent Passing	Test Procedures
3-Inch	100	ASTM[1] D 422
No. 200	More than 15	ASTM[1] D 422
Atterberg Limits		
Liquid Limit	Plasticity Index	Test Procedures
Less than 30	Less than 12	ASTM[1] D 4318
Expansion Potential (EI)		Test Procedures
Less than 20		ASTM[1] D 4829
Sand Equivalent		Test Procedures
Greater than 20		Caltrans Test 217
R-Value		Test Procedures
Greater than 40		Caltrans Test 301

1 – American Society for Testing and Materials Standards

It should be noted that onsite clay soils are considered expansive and do not meet the requirements of engineered fill as presented in Table 5.1. However, they may be used if they are clean and free of organic laden material, debris, and are moisture conditioned and compacted per the requirements presented for engineered fill. Clay soils should also be moisture conditioned to over-optimum conditions as presented in Table 5-2. The moisture content shall be maintained until it is covered with overlying flatwork.

5.4.3 Compaction Criteria Engineered Fill

Engineered fill within building areas, trench backfill, flatwork, and pavement subgrades should be placed uniformly in horizontal loose lifts not exceeding 8 inches.

Exposed subgrades and subsequent engineered fill should be uniformly compacted, and moisture conditioned according to the recommended criteria presented in Table 5.2 below.

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Table 5.2 – Recommended Compaction and Moisture Conditioning for Subgrade and Engineered Fills			
Material Type and Location	Compaction and Moisture Content per Modified Proctor ASTM D1557		
	Minimum Compaction Requirement, %	Range of Moisture Contents Above Optimum	
		Minimum	Maximum
Non-Expansive soils / Engineered fill	90	0%	+5%
Expansive Soils / Engineered fill			
Beneath Foundations	90	+2%	+5%
Beneath Slabs	90	+2%	+5%
Exterior Flatwork	90	+2%	+5%
Trench[1] and/or Structure Backfill	90	+2%	+5%
Pavement	95	+2%	+5%
Fills 5 feet and greater w/i building pad	95	+2%	+5%
[1]Trench backfill may consist of onsite expansive soils provided they are not used in the upper 12 inches of subgrades			

As previously mentioned, onsite soil is considered expansive and does not meet the non-expansive fill requirements. However, expansive soils may be used provided they meet the dual requirement for compaction and moisture content, and they are not used in the upper 12 inches of building pads or flatwork areas. The moisture content shall be maintained until it is covered with overlying flatwork.

5.4.4 Controlled Low-Strength Material (CLSM)

Where access may be limited when conventional compaction methods are used, a flowable type fill or controlled low-strength material (CLSM) may be used in lieu of compacted engineered fill. This material is typically prepared and batched by ready mix suppliers. A material having a 28-day strength of at least 50 psi and maximum 150 psi per ASTM D4832 is typical for properly compacted engineered fill. This strength requirement is based on an average of two strength specimen fabricated in 6-inch diameter by 12-inch-tall cylindrical molds. The CLSM shall be sampled at least once per placement or every 150 cubic yards placed. The intended use and application and material including historical strength data should be submitted to the Geotechnical Engineer of Record for approval prior to use.

5.4.5 Construction Considerations

Based on our exploratory borings, it is anticipated that excavation may generally be accomplished with typical earthwork grading equipment in good operating condition. It is anticipated that the soils will generally consist of alluvial materials.

5.4.6 Wet Weather Construction and/or Unstable Soil Conditions

The in-situ moisture content of the site soils may increase after long periods of rainfall. Soil subgrades may become saturated due to exposure to wet weather conditions. When wet soils are encountered, they should

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be remediated by aeration, removing, and replacing with drier material, or chemically treated with lime or cement combinations. Additionally, deeper excavations, such as those for the elevator pits, may encounter groundwater seepage. These conditions may be addressed with localized sump pumps to lower the groundwater temporarily to facilitate construction.

CTS should be contacted if these conditions are encountered for assurance of the method selection, specifications, acceptance criteria, and quality assurance.

5.5 TEMPORARY EXCAVATIONS

Excavations for foundations can be performed with typical conventional excavating machines generally in use for such projects. During construction, excavations as deep as 4 feet should temporarily stand vertically. Most of the soils will be OSHA Types C. Although not anticipated, temporary cuts deeper/higher than 4 feet should be sloped back at maximum 1 horizontal to 1 vertical, 1(h) to 1(v), above the 4-foot level, or stabilized by shoring in accordance with OSHA regulations. The contractor is responsible for providing suitable shoring systems, if required, based on the soils encountered. Deeper excavations may require a shoring system designed by an experienced and licensed civil engineer.

5.6 SHALLOW SPREAD FOUNDATIONS FOR BUILDING STRUCTURES

5.6.1 Allowable Bearing Capacity

Shallow spread foundations may be incorporated for the new structure or rehabbed foundation. An ultimate bearing capacity of 11,400 psf should be used for the design of spread footings supported on firm native soil. A corresponding allowable bearing capacity of 3,800 psf may be used based on a safety factor of 3. The minimum width and embedment depths as shown below.

Table 5.3 – Minimum Footing Dimensions

Performing Arts Center		
Footing Type	**Minimum Depth (inches)**	**Minimum Width (Inches)**
Continuous	24	12
Isolated	24	18

Allowable bearing capacity may be increased at a rate of 20 percent for each additional foot of embedment to a maximum of three times the designated value. The allowable bearing capacity is a net value so the weight of the foundation extending below grade may be disregarded when computing dead loads. The allowable bearing capacity is based on a factor of safety of 3 and applies to dead- plus live load conditions. The allowable bearing capacity may be increased by 1/3 for short-term loading due to wind or seismic forces.

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5.6.2 Estimated Settlement

Total static and any minor anticipated seismic settlement may vary depending on the plan dimensions of the foundation and the actual load supported. Total combined static and seismic settlements of foundations designed in accordance with the recommendations of this report are estimated to be on the order of 1 inch. Differential settlements between adjacent footings are expected to be less than ¾ of the estimated total settlement, provided footings are founded on similar materials. The differential settlement of approximately ¾ inch is expected over a span of 20 feet. Settlement of all foundations is anticipated to occur rapidly and should be essentially complete following initial application of the loads.

5.6.3 Lateral Resistance

Resistance to lateral loads may be provided from frictional forces between the bottom of the footing and the underlying soils, and by passive soil resistance against the sides of the foundations. An allowable coefficient of friction equal to 0.30 may be used between existing cast-in-place concrete footings and the underlying soil or lean concrete. If moisture barriers or other substances are placed beneath footings, the coefficient of friction can be significantly lower. Allowable passive pressure from engineered fill or undisturbed native soil may be taken as equivalent to the pressure exerted by a fluid pressure of 250 pounds per square foot, per foot of depth, (psf/ft or pcf) acting over the existing foundation depth. The passive pressure should be neglected to a depth of 1 foot where the ground adjacent to the foundation is not covered by a slab or pavement. Lateral resistance parameters provided are based on a factor of safety of at least 1.5. The appropriate factor of safety should be determined by the project Structural Engineer. Allowable passive resistance and sliding friction may be combined without reduction.

5.6.4 Construction Considerations

Foundation excavations should be firm, neat, and clean of debris, loose or soft soil, or water prior to placing any reinforcement. All footings excavations should be observed by the project Geotechnical Engineer or their designated representative just prior to placing reinforcing steel or concrete to verify the recommendations presented herein are implemented during construction.

Additionally, footings may experience an overall loss of bearing capacity or an increased potential for settlement when located near existing or future utility trenches. Further, stresses imposed by the footings on the utility lines may cause cracking, collapse, and/or a loss of serviceability. To reduce this risk, open or backfilled trenches parallel with a footing shall not be below a plane having a downward slope of 2 horizontal to 1 vertical (2:1) slope from a line 9 inches above the bottom edge of the footing and not closer than 18 inches from the face of the footing. When pipes cross under footings, the footings shall be specially designed. This may require encasement of the pipe with lean concrete. Pipe sleeves shall be provided where pipes cross through footings or footing walls and sleeve clearances shall provide for possible footing settlement but not less than 1 inch all around the pipe.

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5.7 SEISMIC DESIGN PARAMETERS

5.7.1. Seismic Design Parameters from Mapped Values

The design of the proposed improvements should be performed in accordance with the requirements of governing jurisdictions and applicable building codes. The structural engineer should confirm the appropriate values to use for this structure. Map-based design criteria presented in this section are based on entering the site coordinates (latitude and longitude), the risk category, and the Site Class.

Based on the data the shear wave velocity obtained from the CPT, the generalized profile is characterized by a stiff soil profile. It was determined the site may be classified as Site Class D. If the building is designed per ASCE 41-17 requirements the parameter in Table 5.4 should be used. If the building and new foundations are designed per ASCE 7-16 the parameters in Table 5.5 should be used with account to the exceptions allowed in Section 11.4.8.

Table 5.4–Seismic Design Criteria per 2019 California Building Code and ASCE 41-17

Reference	Seismic Parameter	Value	
Google Earth	Latitude	38.848762	
Google Earth	Longitude	-122.269512	
	Site Class	D – Stiff Soil	
		BPON[1]	BPOE[2]
Variable	**Seismic Parameter**	**BSE-2N[3]**	**BSE-1E[4]**
S_s	Spectral Response at 0.2s	2.041g	0.918g
S_1	Spectral Response at 1.0s	0.784g	0.321g
S_{xs}	Site Modified Spectral Response at 0.2s	2.041g	1.040g
S_{x1}	Site Modified Spectral Response at 1.0s	0.784g	0.635g
F_a	Site Amplification Factor at 0.2s	1.0	1.133
F_v	Site Amplification Factor at 1.0s	1.7	1.979
T_L	Long Period Transition Period in seconds	8	8

[1]BPON – Building Performance Objective Equivalent to New Building Standards
[2]BPOE – Building Performance Objective for Existing Buildings
[3]BSE-2N – Basic Safety Earthquake-2 for use with the BPON, taken as the ground shaking based on the Risk-Targeted Maximum Considered Earthquake (MCE_R) per ASCE 7 at a site
[4]BSE-1E – Basic Safety Earthquake-1 for use with BPOE, taken as a seismic hazard with a 20% probability of exceedance in 50 years, but not greater than the BSE-1N, at a site

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Table 5.5 – Seismic Design Criteria per 2019 California Building Code and ASCE 7-16

Reference		Seismic Parameter	Value
ASCE 7-16	Google Earth	38.848762	38.848762
	Google Earth	Longitude	-122.269512
	Table 20.3-1	Site Class	D
	Table 1.5-1	Risk Category	II
	Table 11.4-1	Site Coefficient for Short Period, F_A	1.0
	Table 11.4-2	Site Coefficient for Long Period, F_v (Note 1)	1.7
	Figure 22-7	Peak Ground Acceleration, PGA	0.857
	Table 11.8-1	Site Amplification Factor, F_{PGA}	1.1
	Equation 11.8-1	Peak Ground Acceleration, PGA_M	0.943
	Figure 22-1	Mapped MCE_R Spectral Response Acceleration at 0.2-second period, S_s	2.041
	Figure 22-2	Mapped MCE_R Spectral Response Acceleration at 1.0-second period, S_1	0.784
	Equation 11.4-1	Site-Adjusted MCE_R Spectral Acceleration at 0.2-second period, S_{MS}	2.041
	Equation 11.4-2	Site-Adjusted MCE_R Spectral Acceleration at 1.0-second period, S_{M1}	1.333
	Equation 11.4-3	Design Spectral Response Acceleration at 0.2-second period, S_{DS}	1.361
	Equation 11.4-4	Design Spectral Response Acceleration at 1.0-second period, S_{D1}	0.889
	Table 11.6-1	Seismic Design Category for Short Period Response Acceleration	D
	Table 11.6-2	Seismic Design Category for 1-s Period Response Acceleration	D
		TL	8
		$Ts = S_{D1}/S_{DS}$	0.653

Note 1: The value of 1.7 was applied for F_v per the 2019 CBC, Table 1613.2.3(2).

A site-specific response spectra and ground motion study was not performed for this study. The structural engineer should confirm the appropriate values for use on the project during foundation design.

5.8 CORROSIVITY

Laboratory testing was performed on a representative sample of the on-site earth materials to evaluate pH and electrical resistivity, as well as chloride and sulfate contents. These laboratory test results are summarized below in Table 5.6 and presented in Appendix B.

Table 5.6 – Evaluation for Soil Corrosion					
Boring	**Depth**	**Soil pH**	**Minimum Resistivity**	**Chloride Content**	**Sulfate Content**
B-1	1 to 3 feet	5.9	4690 Ohm-cm	8.8 ppm	27.7 ppm
B-2	1 to 3 ½ feet	6.9	4434 Ohm-cm	12.9 ppm	52.6 ppm

Based on the Caltrans Highway Design Manual corrosion criteria (Caltrans, 2018), corrosive soils are defined as soils with an electrical resistivity of 1,000 ohm-cm or less, more than 500 ppm chlorides, more than 0.2 percent sulfates, and a pH less than 5.5. Based on the Minimum Resistivity results, the on-site soils would not be classified as corrosive.

5.9 CONCRETE

Concrete in contact with soil or water that contains high concentrations of water-soluble sulfates can be subject to premature chemical and/or physical deterioration. The soil samples tested in this evaluation indicated a maximum water-soluble sulfate content of 0.00526 percent by weight (52.6 ppm). According to American Concrete Institute (ACI) 318, the potential for sulfate attack is negligible for water-soluble sulfate contents in soil ranging from 0.00 to 0.10 percent by weight (i.e., 0 to 1,000 ppm). Based on the testing, the soils may be classified as Exposure Class S0 per ACI 318, Table 19.3.1.1. Soils identified as Exposure Class S0 are assigned for conditions where the water-soluble sulfate concentration in contact with concrete is low and injurious sulfate attack is not a concern

CTS does not practice in the field of corrosion engineering and mitigation. If corrosion sensitive improvement are planned, it is recommended that a corrosion engineer be retained to evaluate corrosion test results and incorporate the necessary precautions to avoid premature corrosion of buried metal pipes and concrete structures in direct contact with the subject soils.

5.10 INTERIOR CONCRETE SLAB-ON-GRADE

We understand the building will be a permanent structure with slab-on-grade floors. The subgrade should be prepared in accordance with the earthwork recommendations included herein as well as the following:

- Thickness of reinforced concrete shall be determined by the Structural Engineer. Where moisture sensitive floor coverings are used, the slab reinforcing should be designed by the Structural Engineer. At a minimum, the slab reinforcement should consist of No. 4 bars spaced 16 inches on-center each way.
    - A vapor retarding membrane consisting that conforms to ASTM E 1745-97 Class A requirements. Placement of the vapor retarder and "welding" of overlaps should follow the manufacturer's guidelines and is the responsibility of the foundation contractor.

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- A layer of crushed rock at least 4 inches thick should underlie the vapor retarding membrane. The rock shall be clean, crushed, and free-draining having a nominal 1-inch maximum size with less than 3 percent passing the No. 200 sieve.

Some cracking of the slabs-on-grade may be anticipated at the site because of concrete shrinkage and the expansive nature of the onsite soils. Frequent control joints should be provided to control the cracking. As a general guideline, control joints should be spaced at distances equal to 24 to 36 times the slab thickness. Joint spacing that is greater than 15 feet require the use of load transfer devices (dowels or diamond plates). Added steel or slab thickness would also serve to improve the performance of the slabs. Subgrade materials should not be allowed to desiccate between grading and the construction of the concrete slabs.

5.11 EXTERIOR FLATWORK

Prior to constructing exterior slabs-on-grade (i.e., sidewalks), the near surface soils should be prepared as indicated in Earthwork section of this report. Exterior slabs should be at least 4 inches thick and placed over a subgrade prepared in accordance with the recommendations of this report. For shrinkage control, we recommend the slabs be reinforced with minimum No. 4 bars at 18 inch-centers both ways centered at midpoint throughout the slab. The design professional should determine the final slab thickness, reinforcing, and joint spacing based upon the anticipated loads. Slab support may be derived from at least 12 inches of aggregate base soil beneath exterior slabs. Slab reinforcement should be supported on dobie blocks or similar. Due to the expansive soils, slabs should be provided with contraction joints on a rectangular pattern, no greater than 10 feet square and with a length-to-width ratio not exceeding 3. Tee-joints should be avoided. Place trimmer bars at least 4 feet long diagonally across L-corners. Provide expansion joints in any concrete paving at 30-foot maximum centers to accommodate expansive soil and thermal expansion. These should have ½” or thicker joint board and greased dowels. The moisture content of subgrade soils shall be maintained until it is covered with overlying aggregate base, and not be allowed to dry out.

5.12 DRAINAGE

To minimize moisture intrusion into foundation and slab subgrades, we recommend the ground surface should slope away from building pad and pavement areas in accordance with jurisdictional and/or California Building Code requirements toward the appropriate drop inlets or other surface drainage devices. These grades should be maintained for the life of the project. Building pads should also be designed such that the lowest adjacent grade surrounding the building is at or below the elevation of the building pad surface (at or below the bottom of the capillary break material beneath the floor slab. Downspouts should be directed to discharge away from the building to an appropriate catch basin.

Landscaping after construction should not promote ponding of water adjacent to the structures. Landscaping adjacent to foundations should include vegetation with low-water demands and irrigation should be limited to that which is needed to sustain the plants. Trees should be restricted from the areas adjacent to foundations a distance equivalent to the canopy radius of the mature tree. Stormwater management facilities that percolate water into the subgrade soil should not be located within a distance of 20 feet from structure foundations.

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5.13 BURIED SHALLOW EXISTING UTILITIES

Based on our experience at existing school sites, buried shallow existing utilities may be present near the upper 12 to 18 inches of subgrades that may impact site grading. Provision should be considered to allow for a modified section over the pipe to allow for protection of the pipe during construction and to facilitate construction. A suitable means to protect pipes in place during pavement subgrade preparation would be to encase the pipe with CLSM or utilize geotextile (i.e., Mirifi Rs380i, or approved equivalent) over the pipe to provide additional stability to the pavement section. A separate line item unit price should be provided by the Contractor to allow for such conditions if they occur.

5.14 FLEXIBLE AND RIGID PAVEMENTS

5.14.1. Flexible (Asphalt Concrete) Pavements

Asphalt and base course materials should meet the requirements of the *Caltrans Standard Specifications, latest edition*. Pavement sections were determined per the California Highway Design Manual are shown below. The pavement sections are based on a subgrade R-value equal to the minimum design value of 5.

Table 5.7 –Recommended Pavement Sections

Traffic Index[1]	Asphalt Concrete (in)	Class 2 Aggregate Base (in)
4	3	8
5	3	12
6	3	18
7	3	22

[1]Traffic Indices were assumed.

If adverse conditions are encountered during the preparation of subgrade materials, special construction methods may need to be employed. Subgrade materials should be processed to a minimum depth of 12 inches below the Class II aggregate base and compacted to a minimum 95 percent of ASTM D1557 laboratory maximum dry density at or near the optimum moisture content. Class II Aggregate Base material should be compacted to 95 percent of ASTM D1557 laboratory maximum dry density at or near optimum moisture content. The base should meet the quality requirements outlined in Section 26 of the Caltrans Standard Specifications.

The pavement section is intended as a minimum. Positive site drainage should be always maintained. Water should not be allowed to pond or seep into the ground. If the average daily traffic (ADT) increases beyond that intended, as reflected by the assumed traffic designation, increased maintenance could be required for the pavement section. The project Civil Engineer should determine the Traffic Index appropriate for the project.

5.14.2. Rigid (Portland Cement Concrete) Pavements

Where rigidity of pavement is desired for areas designed for, high volume vehicular traffic, heavy maintenance or equipment traffic, entry driveways or trash enclosure slabs, it is recommend using Portland cement concrete paving. The slab should be at least 8 inches thick over a 12-inch thick layer of compacted

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aggregate baserock based on a Traffic Index up to 7 and assuming lateral support is provided. In addition, the driveway slabs should be designed with thickened edges at least twice the slab thickness and slabs reinforced with at least No. 4 reinforcing bars placed 12 inches on center both ways at the midpoint of the slab. The design and thickness of rigid pavement slabs should be confirmed with the design professional.

5.14.3. Construction Considerations for Pavements

Additional requirements and/or assumptions for pavements are outlined below:

- Baserock materials used should comply with the requirements outlined in Section 26 of the State Standard Specifications. We strongly recommend that baserock be a virgin, crushed aggregate product.
- Baserock should be firm and stable prior to placing asphalt and compacted to a minimum of 95 percent based on the ASTM D 1557 test method.
- Subgrade beneath paved areas shall be compacted to a minimum of 95 percent based on the ASTM D 1557 test method.
- Proof rolling of subgrade and of baserock with fully loaded water truck, or equivalent, should be performed under observation of our field representatives to detect for any instabilities of pavement subgrade and baserock following final grading. Proof rolling of subgrade should occur immediately (i.e., less than 24 hours) before placement of baserock. Baserock should be proofrolled immediately prior to placement of tack coat.
- Subgrade preparation is performed as outlined in the Earthwork sections of this report.

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ADDITIONAL SERVICES

6.1 PLAN AND SPECIFICATIONS REVIEW

The preparation of the geotechnical investigation for design purposes is a portion of the services CTS can provide. It is essential that CTS be requested to perform a general review of the plans and specifications to evaluate if the recommendations contained in this report are properly interpreted and implemented during the design phase. CTS will not be responsible for any misinterpretation of our recommendations if we are not retained to perform this recommended task.

6.2 EARTHWORK OBSERVATIONS, SPECIAL INSPECTIONS, AND MATERIALS TESTING

To provide project continuity, it is essential that CTS be retained to observe earthwork construction, to evaluate exposed foundation soils for appropriate bearing capacity, and provide special inspections and materials testing. The purpose in having a representative of CTS observe the grading operations during site preparation, and test trench backfill, engineered fill, would be to observe the surface and subsurface conditions during construction, evaluate the applicability of the recommendations contained in this report, and recommend appropriate changes in construction procedures if conditions are found to differ from those encountered during this investigation.

Separate proposals and estimates can be provided for each of the additional services described above when requested. CTS can also prepare a master agreement for providing these services.

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LIMITATIONS

The conclusions and recommendations provided in this report are based on our understanding of the proposed improvements, data developed from the results of our field and laboratory testing program laboratory testing, and our engineering analyses. The field explorations were located in the field by pacing from available landmarks as surveying was not part of our work scope. It is possible that actual subsurface conditions can vary between the points of exploration provided during this investigation. If this is found to be the case, CTS should be notified and requested to review the changes and provide appropriate modifications to our recommendations if needed.

We have strived to prepare this report in substantial accordance with generally accepted geotechnical engineering practice as it exists in the local area at the time of the work. No warranty, express or implied, is made. This report may be used by the Client, for the purposes stated, for a maximum of two years from the date of the report. If construction is delayed, or if the final construction varies from that stated herein, and land use or other factors modify site and subsurface conditions beyond our control, additional field explorations, laboratory testing, and an updated analysis and report may be required. CTS shall be released from any liability resulting from any misuse of the report by the authorized party.

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REFERENCES

ASTM International, American Society for Testing and Materials, annual books of standards, current edition.

Boulanger, R. W. and Idriss, I. M; CPT and SPT Based Liquefaction Procedures; UCD/CGM-14/01

Bryant, W.A., Jennings, C.W.; Fault Activity Map of California, California Geologic Survey; 2010.

California Department of Transportation (Caltrans); Highway Design Manual; Sixth Edition; 2018.

California Building Code; 2019 Edition.

California Geologic Survey; Note 36, California Geomorphic Provinces; 2002;
Website: https://www.coastal.ca.gov/coastalvoices/resources/California_Geomorphic_Provinces.pdf.

California Geologic Survey, Earthquake Zones of Required Investigation;
Website: https://maps.conservation.ca.gov/cgs/EQZApp/app/.

Google Earth™

Graymer, R. W.; Geologic Map and Map Database of the Oakland Metropolitan Area, Alameda, Contra Costa, and San Francisco Counties, California; 2000.

Ishihara, K.; Stability of Natural Deposits During Earthquakes, Proceedings 11th International Conference on Soil Mechanics and Foundation Engineering, San Francisco; 1985.

State of California; Standard Specifications; latest edition; issued by the Department of Transportation, (Caltrans).

State of California, California Geologic Survey; Earthquake Zones of Required Investigation, Oakland West Quadrangle; Earthquake Zones, January 1, 1982; Seismic Hazard Zones, February 14, 2003.

State of California, Department of Conservation, California Geologic Survey; Seismic Hazard Zone Report for the Oakland West 7½ Minute Quadrangle, Alameda County, California, Seismic Hazard Zone Report 081; 2003.

Structural Engineers Association of California (SEAOC) Seismic Design Maps;
Website: https://seismicmaps.org.

U.S. Geological Survey; Quaternary Fault and Fold Database of the United States; Website:https://earthquake.usgs.gov/cfusion/qfault/show_report_AB_archive.cfm?fault_id=1&section_id=c).

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Witter, R.C., Knudsen, K. L., Sowers, J.M., Wentworth, C.M., Koehler, R. D., Randolph, C.E.; Map of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California; U.S. Geological Survey, Open File report 2006-1037; 2006 (2 Maps).

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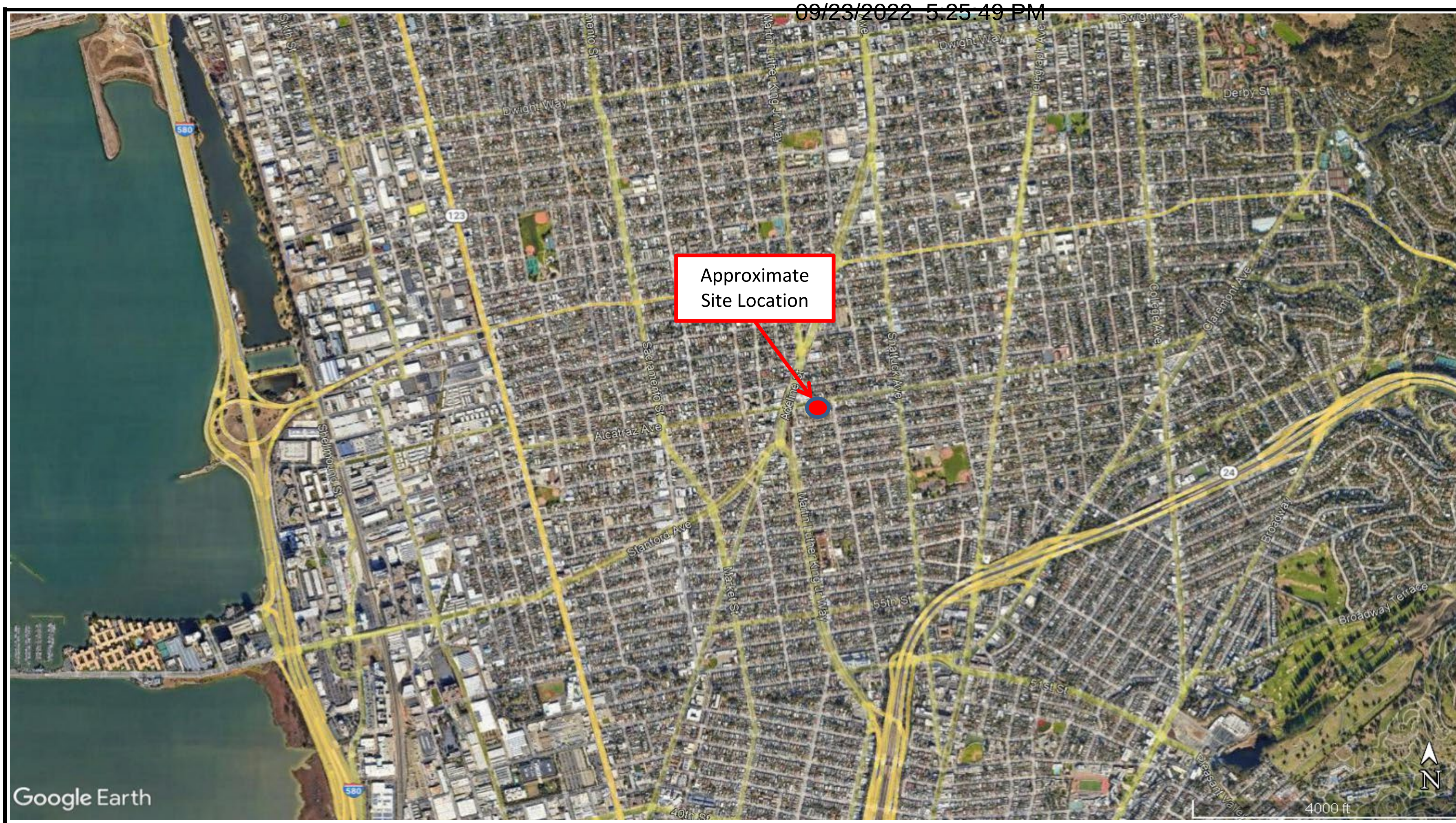
PLATES

Site Location Map
Topographic Map
Exploration Location Map
Liquefaction Susceptibility



North

Not to Scale

Legend

Approximate site location

Notes:
1. Site image referenced from "Google Earth"

CONSTRUCTION TESTING SERVICES

Drawn by: Gavin Lynch
CTS Job: 18735

Date: 7/29/2021
File: Site Location

SITE LOCATION MAP
AFRICAN AMERICAN HOLISTIC RESOURCE CENTER
1890 ALCATRAZ AVENUE
BERKELEY, CA

PLATE
1

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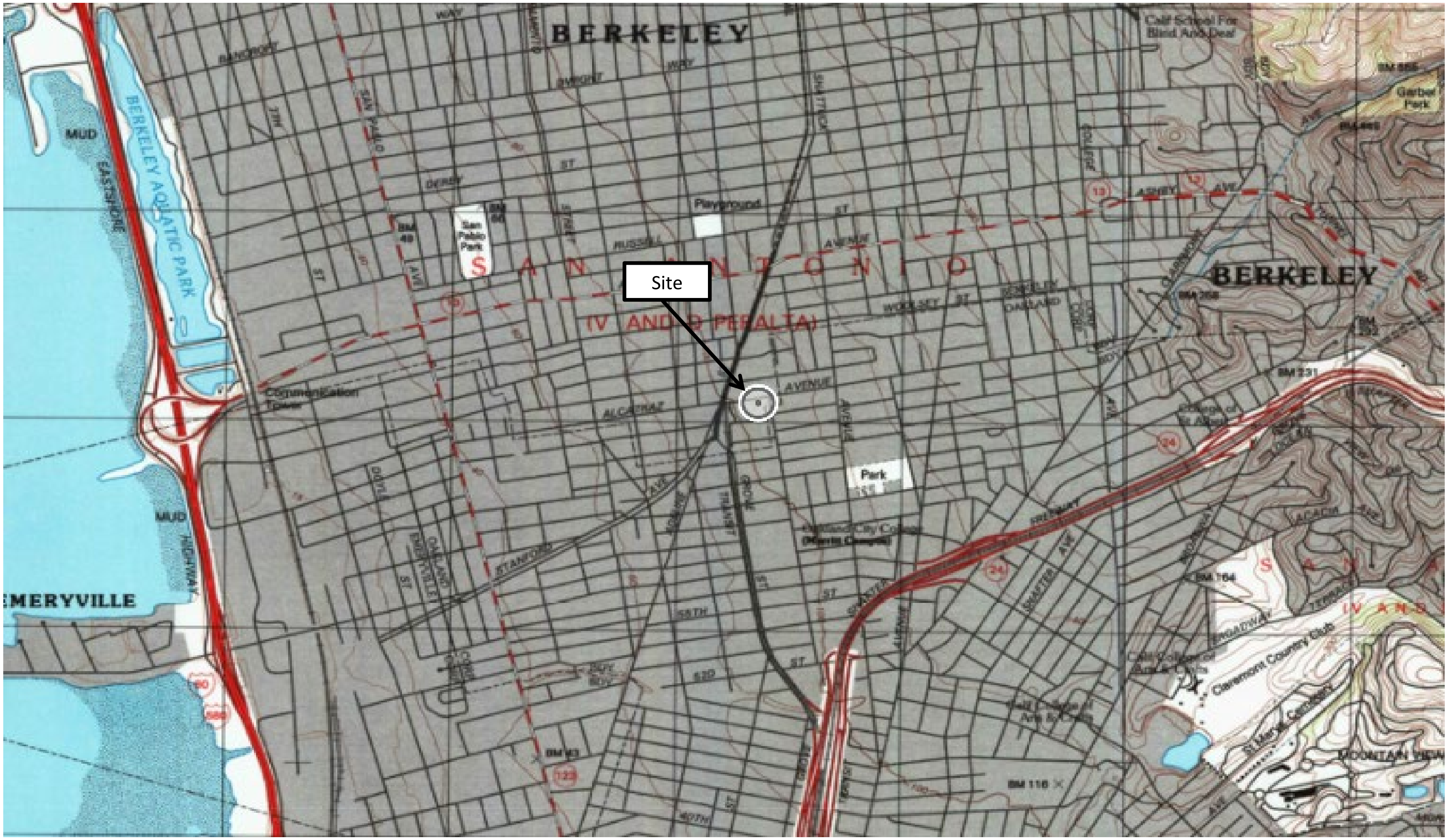

SCALE: Approx. 1-MIle

North

Ref: Gaiagps.com, USGS Topo

CONSTRUCTION TESTING SERVICES

Drawn by: G. Lynch
CTS Job: 18735

Date: 8/18/2022
File: Topo Map

TOPOGRAPHIC MAP
AFRICAN AMERICAN HOLISTIC RESOURCE CENTER
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PLATE

2

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North

Not to Scale

Legend

Approximate Boring Location

Approximate Cone Penetration Test Location

Notes:
1. Site image referenced from "Google Earth"

CONSTRUCTION TESTING SERVICES

Drawn by: Gavin Lynch
CTS Job: 18735

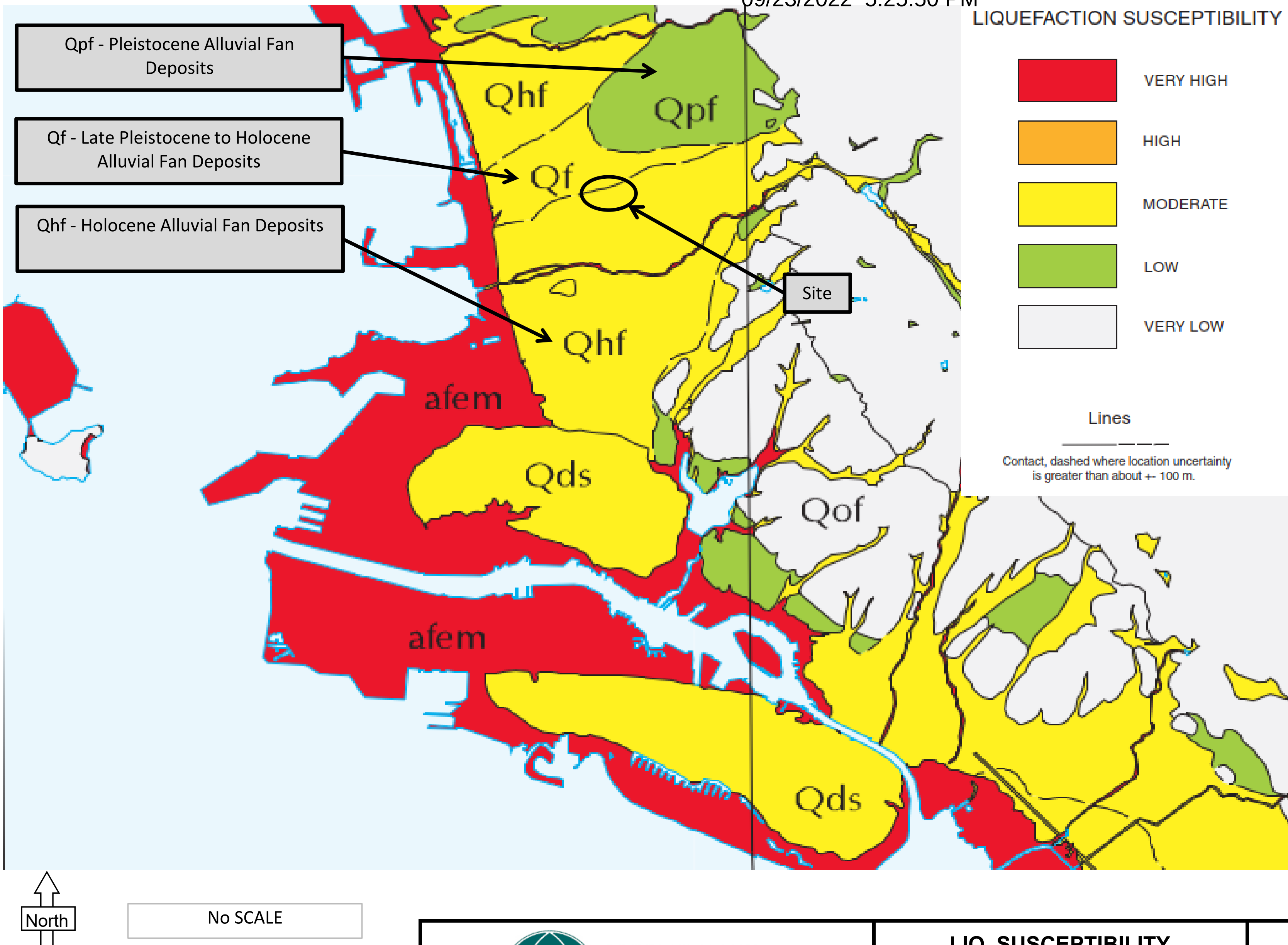
Date: 7/29/2022
File: Exp Locations

EXPLORATION LOCATION MAP
AFRICAN AMERICAN HOLISTIC RESOURCE CENTER
1890 ALCATRAZ AVENUE
BERKELEY, CA

PLATE
3

Draft Print

09/23/2022 5:25:50 PM



No SCALE

Ref: Witter, R.C., Knudsen, K. L., Sowers, J.M., Wentworth, C.M., Koehler, R. D., Randolph, C.E.; Map of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California; U.S. Geological Survey, Open File report 2006-1037; 2006 (2 Maps).

CONSTRUCTION TESTING SERVICES		LIQ. SUSCEPTIBILITY AFRICAN AMERICAN HOLISTIC RESOURCE CENTER 1890 ALCATRAZ AVENUE BERKELEY, CA	PLATE 4
Drawn by: G. Lynch CTS Job: 18735	Date: 8/18/2022 File: Liq Sus.		

APPENDIX A
FIELD EXPLORATION

Collection of Disturbed Samples

Bulk Samples

Bulk samples of representative earth materials were obtained from the exploratory borings

Middle Earth Geo Testing – Cone Penetration Test Reports, dated August July 22, 2022

Construction Testing Services
2118 Rheem Drive
Pleasanton, CA 94588
Telephone: 925-462-5151

BORING NUMBER B-1

CLIENT City of Berkeley
PROJECT NAME African American Hollistic Resource Center
PROJECT NUMBER 18735
PROJECT LOCATION 1890 Alcatraz Ave, Berkeley, CA
DATE STARTED 7/21/2022 **COMPLETED** 7/21/2022
GROUND ELEVATION 108 ft msl **HOLE SIZE** 4 inches
DRILLING CONTRACTOR CTS
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger
AT TIME OF DRILLING --- Not encountered.
LOGGED BY Gavin Lynch **CHECKED BY** Brad Quon, GE
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (FT)	SAMPLE TYPE NUMBER	POCKET PEN (tsf)	BLOW COUNTS (N VALUE)	UNCONFINED STRENGTH (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) FILL: Dark brown, dry to moist, silty **SAND** with gravel; debris (brick and concrete) and gravel (< 1.5").	107.0	1									
		(CH) FILL: Brown, dry to moist, sandy **FAT CLAY**.	105.0	2						51	18	33	54
		(CL) Mottled grayish brown and light brown, moist, **LEAN CLAY** with sand.	104.0	3									81
5		(CL) Light yellowish brown, moist, **LEAN CLAY**; lenses of weathered grayish white siltstone.	102.0	4									92
		(CL) Light yellowish brown, moist, **LEAN CLAY** with sand.	101.0	5									85

Bottom of borehole at 7.0 feet.

Construction Testing Services
2118 Rheem Drive
Pleasanton, CA 94588
Telephone: 925-462-5151

BORING NUMBER B-2

CLIENT City of Berkeley
PROJECT NAME African American Hollistic Resource Center
PROJECT NUMBER 18735
PROJECT LOCATION 1890 Alcatraz Ave, Berkeley, CA
DATE STARTED 7/21/2022 **COMPLETED** 7/21/2022
GROUND ELEVATION 108 ft msl **HOLE SIZE** 4 inches
DRILLING CONTRACTOR CTS
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger
AT TIME OF DRILLING --- Not encountered.
LOGGED BY Gavin Lynch **CHECKED BY** Brad Quon, GE
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (FT)	SAMPLE TYPE NUMBER	POCKET PEN (tsf)	BLOW COUNTS (N VALUE)	UNCONFINED STRENGTH (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) FILL: Grayish brown, dry to moist, silty **SAND**; trace gravel (< 3/4").	107.0	1									
		(CH) FILL: Light brown, dry to moist, **FAT CLAY** with sand; trace gravel (< 1").	104.5	2						66	16	50	67
5		(SC) Dark brown, moist, clayey **SAND**; trace gravel (< 3/4"), lenses of iron-oxide staining.	103.0	3									40

Bottom of borehole at 5.0 feet.

African American Hollister Resources Center

Draft Print

Project ID: Construction Testing Services
Data File: SDF(319).cpt
CPT Date: 7/21/2022 2:23:53 PM
GW During Test: 10 ft

09/23/2022 5:25:51 PM

Page: 1
Sounding ID: CPT-01
Project No: 18735
Cone/Rig: DDG1627

Depth ft	qc PS tsf	* qc1n PS -	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Ratio %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	* SPT R-N1 60%	SPT R-N 60%	* SPT IcN1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR - -	* Fin Ic %	* D50 - mm	* Ic SBT Indx	* Nk - -
0.33	119.9	192.3	192.3	119.9	0.6	1.1	0.5	6	clean SAND to silty SAND	125	5.0	38	24	32	89	48	-	-	5	0.350	1.51	16
0.49	80.5	129.1	148.6	80.5	0.9	1.2	1.1	6	clean SAND to silty SAND	125	5.0	26	16	24	75	48	-	-	9	0.350	1.86	16
0.66	45.9	73.6	126.2	45.9	0.9	0.7	2.1	5	silty SAND to sandy SILT	120	4.0	18	11	16	57	48	-	-	20	0.200	2.22	16
0.82	25.4	40.7	134.6	25.4	1.0	0.7	3.9	4	clayy SILT to silty CLAY	115	2.0	20	13	10	-	-	1.8	9.9	35	0.070	2.60	15
0.98	16.7	26.8	-	16.8	1.0	4.5	6.0	3	silty CLAY to CLAY	115	1.5	18	11	8	-	-	1.2	9.9	49	0.005	2.86	15
1.15	19.8	31.8	-	20.0	1.0	8.8	4.8	3	silty CLAY to CLAY	115	1.5	21	13	9	-	-	1.4	9.9	43	0.005	2.74	15
1.31	20.2	32.3	-	20.3	1.0	4.5	4.8	3	silty CLAY to CLAY	115	1.5	22	13	9	-	-	1.4	9.9	42	0.005	2.73	15
1.48	17.7	28.3	-	17.7	0.8	1.2	4.6	3	silty CLAY to CLAY	115	1.5	19	12	8	-	-	1.2	9.9	44	0.005	2.76	15
1.64	15.0	24.0	-	15.0	0.6	0.1	4.0	3	silty CLAY to CLAY	115	1.5	16	10	7	-	-	1.1	9.9	45	0.005	2.78	15
1.80	12.4	19.9	-	12.4	0.6	0.9	5.2	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.9	9.9	53	0.005	2.91	15
1.97	11.2	17.9	-	11.2	0.8	1.9	7.0	3	silty CLAY to CLAY	115	1.5	12	7	6	-	-	0.8	9.9	61	0.005	3.03	15
2.13	12.1	19.4	-	12.2	0.8	4.0	6.9	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.8	9.9	59	0.005	3.00	15
2.30	12.2	19.6	-	12.3	0.8	3.7	6.9	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.9	9.9	58	0.005	3.00	15
2.46	12.3	19.7	-	12.4	0.8	4.7	7.0	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.9	9.9	59	0.005	3.00	15
2.62	13.1	21.1	-	13.2	0.9	5.1	7.3	3	silty CLAY to CLAY	115	1.5	14	9	7	-	-	0.9	9.9	58	0.005	3.00	15
2.79	14.0	22.4	-	14.1	1.0	5.1	7.3	3	silty CLAY to CLAY	115	1.5	15	9	7	-	-	1.0	9.9	57	0.005	2.98	15
2.95	14.1	22.7	-	14.2	1.0	4.9	6.9	3	silty CLAY to CLAY	115	1.5	15	9	7	-	-	1.0	9.9	56	0.005	2.96	15
3.12	13.7	21.9	-	13.8	0.8	5.7	5.9	3	silty CLAY to CLAY	115	1.5	15	9	7	-	-	1.0	9.9	53	0.005	2.92	15
3.28	13.8	22.1	-	13.9	0.7	6.8	5.3	3	silty CLAY to CLAY	115	1.5	15	9	7	-	-	1.0	9.9	51	0.005	2.89	15
3.45	15.0	24.0	-	15.2	0.7	8.9	4.9	3	silty CLAY to CLAY	115	1.5	16	10	7	-	-	1.0	9.9	48	0.005	2.83	15
3.61	16.5	26.5	-	16.7	0.8	8.0	5.2	3	silty CLAY to CLAY	115	1.5	18	11	8	-	-	1.2	9.9	47	0.005	2.82	15
3.77	18.4	29.4	-	18.5	0.9	8.1	5.1	3	silty CLAY to CLAY	115	1.5	20	12	8	-	-	1.3	9.9	45	0.005	2.78	15
3.94	19.7	31.6	-	19.9	1.0	8.5	4.9	3	silty CLAY to CLAY	115	1.5	21	13	9	-	-	1.4	9.9	43	0.005	2.75	15
4.10	20.3	32.6	-	20.6	0.9	10.6	4.6	3	silty CLAY to CLAY	115	1.5	22	14	9	-	-	1.4	9.9	42	0.005	2.72	15
4.27	20.5	32.9	-	20.7	0.9	11.3	4.4	4	clayy SILT to silty CLAY	115	2.0	16	10	9	-	-	1.4	9.9	41	0.070	2.70	15
4.43	21.1	33.8	-	21.4	1.0	12.8	4.6	3	silty CLAY to CLAY	115	1.5	23	14	9	-	-	1.5	9.9	41	0.005	2.71	15
4.59	20.8	33.3	-	21.1	1.0	16.4	4.9	3	silty CLAY to CLAY	115	1.5	22	14	9	-	-	1.4	9.9	42	0.005	2.73	15
4.76	22.1	35.4	-	22.4	1.0	18.5	4.8	3	silty CLAY to CLAY	115	1.5	24	15	10	-	-	1.5	9.9	41	0.005	2.71	15
4.92	20.9	33.5	-	21.3	1.0	21.1	4.9	3	silty CLAY to CLAY	115	1.5	22	14	9	-	-	1.5	9.9	42	0.005	2.73	15
5.09	19.6	31.5	-	19.8	1.0	10.7	5.0	3	silty CLAY to CLAY	115	1.5	21	13	9	-	-	1.4	9.9	43	0.005	2.76	15
5.25	17.9	28.6	-	18.0	0.9	7.3	5.0	3	silty CLAY to CLAY	115	1.5	19	12	8	-	-	1.2	9.9	45	0.005	2.79	15
5.41	13.9	22.3	-	14.0	0.7	4.5	5.2	3	silty CLAY to CLAY	115	1.5	15	9	7	-	-	1.0	9.9	51	0.005	2.88	15
5.58	13.2	21.1	-	13.2	0.8	4.3	6.0	3	silty CLAY to CLAY	115	1.5	14	9	6	-	-	0.9	9.9	54	0.005	2.94	15
5.74	14.1	22.6	-	14.2	0.9	6.8	6.8	3	silty CLAY to CLAY	115	1.5	15	9	7	-	-	1.0	9.9	56	0.005	2.96	15
5.91	23.5	37.7	-	23.7	1.0	11.7	4.4	4	clayy SILT to silty CLAY	115	2.0	19	12	10	-	-	1.6	9.9	39	0.070	2.66	15
6.07	24.7	39.7	-	24.9	1.1	7.7	4.6	4	clayy SILT to silty CLAY	115	2.0	20	12	10	-	-	1.7	9.9	38	0.070	2.66	15
6.23	23.7	38.1	-	24.0	1.1	15.7	4.8	3	silty CLAY to CLAY	115	1.5	25	16	10	-	-	1.7	9.9	40	0.005	2.69	15
6.40	23.2	37.3	-	23.6	1.2	17.8	5.2	3	silty CLAY to CLAY	115	1.5	25	15	10	-	-	1.6	9.9	41	0.005	2.72	15
6.56	24.4	39.2	-	24.8	1.2	19.2	5.1	3	silty CLAY to CLAY	115	1.5	26	16	11	-	-	1.7	9.9	40	0.005	2.70	15
6.73	24.4	39.1	-	24.8	1.2	21.4	5.1	3	silty CLAY to CLAY	115	1.5	26	16	10	-	-	1.7	9.9	40	0.005	2.70	15
6.89	24.3	39.0	-	24.8	1.2	23.1	5.0	3	silty CLAY to CLAY	115	1.5	26	16	10	-	-	1.7	9.9	40	0.005	2.69	15
7.05	24.3	39.0	-	24.8	1.2	24.0	4.9	3	silty CLAY to CLAY	115	1.5	26	16	10	-	-	1.7	9.9	40	0.005	2.68	15
7.22	22.6	36.3	-	23.1	1.0	25.5	4.4	4	clayy SILT to silty CLAY	115	2.0	18	11	10	-	-	1.6	9.9	39	0.070	2.68	15
7.38	22.2	35.6	-	22.7	0.8	27.4	3.9	4	clayy SILT to silty CLAY	115	2.0	18	11	9	-	-	1.5	9.9	38	0.070	2.64	15
7.55	23.4	37.6	-	24.1	0.8	35.3	3.6	4	clayy SILT to silty CLAY	115	2.0	19	12	10	-	-	1.6	9.9	36	0.070	2.60	15
7.71	25.3	40.6	134.3	26.0	1.0	36.4	3.8	4	clayy SILT to silty CLAY	115	2.0	20	13	10	-	-	1.8	9.9	35	0.070	2.60	15
7.87	26.7	42.9	142.1	27.5	1.1	37.4	4.1	4	clayy SILT to silty CLAY	115	2.0	21	13	11	-	-	1.9	9.9	35	0.070	2.60	15
8.04	26.9	43.1	-	27.5	1.2	33.1	4.6	4	clayy SILT to silty CLAY	115	2.0	22	13	11	-	-	1.9	9.9	37	0.070	2.63	15
8.20	25.6	41.0	-	26.1	1.3	26.9	5.0	3	silty CLAY to CLAY	115	1.5	27	17	11	-	-	1.8	9.9	39	0.005	2.68	15
8.37	24.5	39.3	-	25.0	1.3	21.8	5.2	3	silty CLAY to CLAY	115	1.5	26	16	11	-	-	1.7	9.9	41	0.005	2.70	15
8.53	24.6	39.5	-	25.0	1.2	19.9	5.1	3	silty CLAY to CLAY	115	1.5	26	16	11	-	-	1.7	9.9	40	0.005	2.70	15
8.69	23.6	37.8	-	23.9	1.1	15.8	5.0	3	silty CLAY to CLAY	115	1.5	25	16	10	-	-	1.6	9.9	40	0.005	2.70	15
8.86	22.4	36.0	-	22.7	1.0	15.4	4.5	4	clayy SILT to silty CLAY	115	2.0	18	11	10	-	-	1.5	9.9	40	0.070	2.69	15
9.02	22.2	35.7	-	22.6	1.0	16.0	4.5	4	clayy SILT to silty CLAY	115	2.0	18	11	10	-	-	1.5	9.9	40	0.070	2.69	15
9.19	21.8	35.0	-	22.2	1.0	18.4	4.6	3	silty CLAY to CLAY	115	1.5	23	15	9	-	-	1.5	9.9	41	0.005	2.70	15
9.35	22.1	35.4	-	22.5	1.0	19.5	4.6	3	silty CLAY to CLAY	115	1.5	24	15	10	-	-	1.5	9.9	40	0.005	2.70	15
9.51	21.3	34.2	-	21.7	1.0	18.7	5.0	3	silty CLAY to CLAY	115	1.5	23	14	9	-	-	1.5	9.9	42	0.005	2.73	15
9.68	21.8	35.0	-	22.2	1.1	21.1	5.2	3	silty CLAY to CLAY	115	1.5	23	15	10	-	-	1.5	9.9	43	0.005	2.74	15
9.84	23.3	37.4	-	23.7	1.0	19.6	4.6	4	clayy SILT to silty CLAY	115	2.0	19	12	10	-	-	1.6	9.9	39	0.070	2.68	15
10.01	23.3	37.3	-	23.6	1.0	18.1	4.6	4	clayy SILT to silty CLAY	115	2.0	19	12	10	-	-	1.6	9.9	39	0.070	2.68	15
10.17	23.1	37.1	-	23.6	1.1	25.4	4.7	3	silty CLAY to CLAY	115	1.5	25	15	10	-	-	1.6	9.9	40	0.005	2.69	15
10.34	25.0	40.0	-	25.4	1.2	24.1	5.1	3	silty CLAY to CLAY	115	1.5	27	17	11	-	-	1.7	9.9	40	0.005	2.69	15
10.50	26.2	42.0	-	26.7	1.1	28.7	4.5	4	clayy SILT to silty CLAY	115	2.0	21	13	11	-	-	1.8	9.9	37	0.070	2.64	15
10.66	27.4	43.9	-	28.0	1.2	32.8	4.6	4	clayy SILT to silty CLAY	115	2.0	22	14	11	-	-	1.9	9.9	37	0.070	2.63	15
10.83	26.5	42.5	-	27.2	1.1	36.7	4.4	4	clayy SILT to silty CLAY	115	2.0	21	13	11	-	-	1.8	9.9	37	0.070	2.63	15
10.99	28.5	45.7	-	28.7	1.2	11.8	4.4	4	clayy SILT to silty CLAY	115	2.0	23	14	12	-	-	2.0	9.9	36	0.070	2.60	15
11.16	22.6	36.3	-	23.1	1.5	26.0	6.9	3	silty CLAY to CLAY	115	1.5	24	15	10	-	-	1.6	9.9	47	0.005	2.82	15
11.32	32.7	52.4	-	33.3	2.9	33.8	9.1	3	silty CLAY to CLAY	115	1.5	35	22	15	-	-	2.3	9.9	46	0.005	2.80	15
11.48	75.5	93.8	224.7	76.3	3.6	37.7	4.8	9	very stiff fine SOIL	120	2.0	47	38	22	65	42	-	-	27	0.250	2.42	30
11.65	81.1	100.3	243.8	81.2	4.1	2.8	5.1	9	very stiff fine SOIL	120	2.0	50	41	24	67	42	-	-	28	0.250	2.43	30
11.81	96.5	118.9	245.8	96.5	4.3	2.8	4.5	9	very stiff fine SOIL	120	2.0	59	48	27	73	43	-	-	24	0.250	2.34	30
11.98	110.5	135.7	259.7	110.6	4.7	1.8	4.3	9	very stiff fine SOIL	120	2.0	68	55	30	77	43	-	-	22	0.250	2.29	30
12.14	98.7	120.7	297.1	98.6	5.9	-2.2	6.0	9	very stiff fine SOIL	120	2.0	60	49	28	73	43	-	-	28	0.250	2.44	30
12.30	85.1	103.7	291.6	85.1	5.6	0.1	6.6	9	very stiff fine SOIL	120	2.0	52	43	25	68	42	-	-	31	0.250	2.51	30
12.47	95.5	116.0	298.7	95.5	5.9	-0.4	6.3	9	very stiff fine SOIL	120	2.0	58	48	28	72	43	-	-	29	0.250	2.46	30
12.63	83.5	101.0	264.8	83.6	4.8	3.2	5.8	9	very stiff fine SOIL	120	2.0	51	42	24	67	42	-	-	29	0.250	2.47	30
12.80	78.4	94.5	253.7	78.5	4.5	5.1	5.8	9	very stiff fine SOIL	120	2.0	47	39	23	65	42	-	-	30	0.250	2.48	30
12.96	63.1	83.5	-	63.4	4.8	12.5	7.6	9	very stiff fine SOIL	120	2.0	42	32	21	61	40	-	-	36	0.250	2.61	30
13.12	80.6	96.4	266.5	81.0	4.9	23.2	6.1	9	very stiff fine SOIL	120	2.0	48	40	23	66	42	-	-	31	0.250	2.50	30
13.29	80.7	96.1	247.8	80.8	4.4	9.2	5.5	9	very stiff fine SOIL	120	2.0	48	40	23	66	42	-	-	29	0.250	2.46	30
13.45	52.6	78.6	-	52.8	3.7	11.2	7.1	9	very stiff fine SOIL	120	2.0	39	26	20	59	39	-	-	36	0.250	2.61	30
13.62	40.7	60.5	-	41.3	3.6	29.9	9.0	9	very stiff fine SOIL	120	2.0	30	20	17	50	38	-	-	44	0.250	2.76	30
13.78	76.2	89.8	242.5	77.5	4.2	70.1	5.6	9	very stiff fine SOIL	120	2.0	45	38	22	63	41	-	-	30	0.250	2.49	30
13.94	74.8	87.9	260.2	75.3	4.7	26.3	6.3	9	very stiff fine SOIL	120	2.0	44	37	22	63	41	-	-	32	0.250	2.54	30
14.11	68.0	79.7	242.0	68.8	4.1	39.6	6.1	9	very stiff fine SOIL	120	2.0	40	34	20	60	40	-	-	33	0.250	2.55	30
14.27	63.5	74.1	231.2	64.5	3.8	53.4	6.0	9	very stiff fine SOIL	120	2.0	37	32	19	57	40	-	-	34	0.250	2.57	30
14.44	57.8	67.3	222.1	58.7	3.5	43.5	6.1	9	very stiff fine SOIL	120	2.0	34	29	17	54	39	-	-	35	0.250	2.60	30
14.60	52.3	65.8	-	53.2	3.1	46.8	6.1	9	very stiff fine SOIL	120	2.0	33	26	17	53	39	-	-	36	0.250	2.60	30
14.76	50.9	72.1	-	51.9	3.4	48.3	6.9	9	very stiff fine SOIL	120	2.0	36	25	19	56	39	-	-	36	0.250	2.62	30
14.93	52.6	73.9	-	53.7	3.5	58.6	6.8	9	very stiff fine SOIL	120	2.0	37	26	19	57	39	-	-	36	0.250	2.61	30
15.09	56.9	65.3	212.9	57.6	3.3	32.9	5.8	4	clayy SILT to silty CLAY	115	2.0	33	28	17	-	-	4.0	9.9	35	0.070	2.59	15
15.26	50.2	62.1	-	50.9	2.9	34.2	5.9	4	clayy SILT to silty CLAY	115	2.0	31	25	16	-	-	3.5	9.9	36	0.070	2.61	15
15.42	48.9	60.2	-	49.7	2.7	38.7	5.7	4	clayy SILT to silty CLAY	115	2.0	30	24	15	-	-	3.4	9.9	36	0.070	2.61	15

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Construction Testing Services
Data File: SDF(319).cpt
CPT Date: 7/21/2022 2:23:53 PM
GW During Test: 10 ft

Sounding ID: SCPT-01
Project No: 18735
Cone/Rig: DDG1627

Depth ft	qc PS tsf	* qc1n PS -	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Ratio %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	* SPT R-N1 60%	SPT R-N 60%	* SPT IcN1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR -	* Fin Ic %	* D50 - mm	* Ic SBT Indx	* Nk -
15.58	49.7	60.9	196.6	50.4	2.6	39.4	5.4	4	clayy SILT to silty CLAY	115	2.0	30	25	15	-	-	3.5	9.9	35	0.070	2.58	15
15.75	45.5	55.5	-	46.4	2.5	49.6	5.7	3	silty CLAY to CLAY	115	1.5	37	30	14	-	-	3.2	9.9	37	0.005	2.63	15
15.91	43.9	59.6	-	44.9	2.6	48.2	6.0	3	silty CLAY to CLAY	115	1.5	40	29	15	-	-	3.1	9.9	37	0.005	2.63	15
16.08	42.4	57.1	-	43.3	2.5	48.7	6.0	3	silty CLAY to CLAY	115	1.5	38	28	15	-	-	2.9	9.9	37	0.005	2.64	15
16.24	41.6	55.7	-	42.5	2.3	45.5	5.6	4	clayy SILT to silty CLAY	115	2.0	28	21	14	-	-	2.9	9.9	37	0.070	2.62	15
16.40	41.0	54.7	-	42.0	2.1	50.8	5.2	4	clayy SILT to silty CLAY	115	2.0	27	21	14	-	-	2.8	9.9	36	0.070	2.60	15
16.57	41.3	54.7	-	42.4	2.1	54.9	5.2	4	clayy SILT to silty CLAY	115	2.0	27	21	14	-	-	2.9	9.9	36	0.070	2.61	15
16.73	40.5	53.3	-	41.4	2.4	50.0	6.1	3	silty CLAY to CLAY	115	1.5	36	27	14	-	-	2.8	9.9	38	0.005	2.66	15
16.90	40.9	53.5	-	41.8	2.7	48.5	6.8	3	silty CLAY to CLAY	115	1.5	36	27	14	-	-	2.8	9.9	40	0.005	2.70	15
17.06	47.1	61.3	-	47.8	3.2	39.4	7.0	3	silty CLAY to CLAY	115	1.5	41	31	16	-	-	3.3	9.9	39	0.005	2.67	15
17.23	51.5	66.7	-	52.4	3.9	45.5	7.7	9	very stiff fine SOIL	120	2.0	33	26	18	54	38	-	-	39	0.250	2.68	30
17.39	57.9	74.6	-	58.7	3.9	38.9	6.8	9	very stiff fine SOIL	120	2.0	37	29	19	57	39	-	-	36	0.250	2.60	30
17.55	52.2	66.7	-	52.5	3.5	17.9	6.8	9	very stiff fine SOIL	120	2.0	33	26	17	54	38	-	-	37	0.250	2.63	30
17.72	41.5	52.8	-	42.1	3.5	30.9	8.6	3	silty CLAY to CLAY	115	1.5	35	28	15	-	-	2.9	9.9	45	0.005	2.78	15
17.88	44.2	55.9	-	45.2	3.7	54.1	8.6	3	silty CLAY to CLAY	115	1.5	37	29	16	-	-	3.1	9.9	44	0.005	2.76	15
18.05	64.2	74.1	-	64.9	4.2	35.3	6.7	9	very stiff fine SOIL	120	2.0	37	32	19	57	39	-	-	35	0.250	2.60	30
18.21	56.3	70.4	-	56.8	4.4	25.1	7.9	9	very stiff fine SOIL	120	2.0	35	28	19	55	39	-	-	39	0.250	2.67	30
18.37	56.2	69.9	-	56.9	3.9	34.0	7.0	9	very stiff fine SOIL	120	2.0	35	28	18	55	39	-	-	37	0.250	2.63	30
18.54	63.2	78.1	-	63.6	4.6	21.5	7.4	9	very stiff fine SOIL	120	2.0	39	32	20	59	39	-	-	36	0.250	2.62	30
18.70	75.6	81.4	262.3	76.2	5.1	29.9	6.8	9	very stiff fine SOIL	120	2.0	41	38	21	60	40	-	-	35	0.250	2.58	30
18.87	99.7	107.0	259.0	100.2	5.3	26.3	5.3	9	very stiff fine SOIL	120	2.0	54	50	25	69	42	-	-	27	0.250	2.43	30
19.03	73.1	82.3	270.4	73.4	5.1	16.2	7.1	9	very stiff fine SOIL	120	2.0	41	37	21	61	40	-	-	35	0.250	2.59	30
19.19	58.7	70.9	-	59.1	4.2	23.0	7.2	9	very stiff fine SOIL	120	2.0	35	29	18	56	39	-	-	37	0.250	2.64	30
19.36	49.6	59.6	-	50.1	3.7	27.7	7.6	3	silty CLAY to CLAY	115	1.5	40	33	16	-	-	3.4	9.9	41	0.005	2.71	15
19.52	50.1	59.9	-	51.1	3.4	47.7	7.0	3	silty CLAY to CLAY	115	1.5	40	33	16	-	-	3.5	9.9	39	0.005	2.68	15
19.69	56.3	66.9	-	57.0	3.7	37.0	6.7	9	very stiff fine SOIL	120	2.0	33	28	17	54	38	-	-	37	0.250	2.63	30
19.85	51.9	61.3	-	52.5	3.6	32.4	7.1	3	silty CLAY to CLAY	115	1.5	41	35	16	-	-	3.6	9.9	39	0.005	2.68	15
20.01	55.9	65.7	-	56.4	4.1	30.0	7.4	9	very stiff fine SOIL	120	2.0	33	28	17	53	38	-	-	39	0.250	2.67	30
20.18	60.7	71.0	-	61.2	4.4	23.6	7.4	9	very stiff fine SOIL	120	2.0	36	30	19	56	39	-	-	38	0.250	2.65	30
20.34	73.1	76.6	234.0	73.5	4.3	18.7	6.0	9	very stiff fine SOIL	120	2.0	38	37	19	58	40	-	-	33	0.250	2.55	30
20.51	50.1	58.0	-	50.6	3.8	24.6	7.7	3	silty CLAY to CLAY	115	1.5	39	33	16	-	-	3.5	9.9	41	0.005	2.72	15
20.67	43.4	49.9	-	44.0	2.5	29.4	6.0	3	silty CLAY to CLAY	115	1.5	33	29	13	-	-	3.0	9.9	39	0.005	2.68	15
20.83	31.5	36.0	-	32.2	2.3	36.1	7.7	3	silty CLAY to CLAY	115	1.5	24	21	11	-	-	2.2	9.9	49	0.005	2.86	15
21.00	31.1	35.5	-	32.2	2.6	51.8	8.6	3	silty CLAY to CLAY	115	1.5	24	21	11	-	-	2.1	9.9	52	0.005	2.90	15
21.16	48.4	54.9	-	49.6	2.6	62.6	5.6	4	clayy SILT to silty CLAY	115	2.0	27	24	14	-	-	3.4	9.9	37	0.070	2.63	15
21.33	53.1	54.8	171.5	53.9	2.4	40.8	4.6	4	clayy SILT to silty CLAY	115	2.0	27	27	14	-	-	3.7	9.9	34	0.070	2.57	15
21.49	36.1	40.6	-	37.2	1.9	56.4	5.5	3	silty CLAY to CLAY	115	1.5	27	24	11	-	-	2.5	9.9	41	0.005	2.72	15
21.65	33.7	37.6	-	35.1	1.6	73.8	4.9	3	silty CLAY to CLAY	115	1.5	25	22	10	-	-	2.3	9.9	41	0.005	2.70	15
21.82	33.7	37.5	-	35.1	1.6	70.7	5.0	3	silty CLAY to CLAY	115	1.5	25	22	10	-	-	2.3	9.9	41	0.005	2.71	15
21.98	36.0	39.8	-	37.5	1.7	78.2	5.0	3	silty CLAY to CLAY	115	1.5	27	24	11	-	-	2.5	9.9	40	0.005	2.69	15
22.15	40.7	44.8	-	42.2	1.9	76.2	4.8	4	clayy SILT to silty CLAY	115	2.0	22	20	12	-	-	2.8	9.9	37	0.070	2.64	15
22.31	41.0	44.9	-	42.5	2.1	78.9	5.2	3	silty CLAY to CLAY	115	1.5	30	27	12	-	-	2.8	9.9	39	0.005	2.67	15
22.47	42.8	46.7	-	44.5	2.2	83.8	5.3	3	silty CLAY to CLAY	115	1.5	31	29	12	-	-	3.0	9.9	38	0.005	2.66	15
22.64	43.6	47.4	-	45.1	2.5	77.8	5.9	3	silty CLAY to CLAY	115	1.5	32	29	13	-	-	3.0	9.9	40	0.005	2.69	15
22.80	39.9	43.1	-	41.1	2.6	62.4	6.8	3	silty CLAY to CLAY	115	1.5	29	27	12	-	-	2.8	9.9	44	0.005	2.76	15
22.97	31.7	34.2	-	32.5	2.3	41.0	7.5	3	silty CLAY to CLAY	115	1.5	23	21	10	-	-	2.2	9.9	50	0.005	2.87	15
23.13	27.8	29.7	-	28.4	1.9	34.5	7.1	3	silty CLAY to CLAY	115	1.5	20	19	9	-	-	1.9	9.3	52	0.005	2.89	15
23.30	25.8	27.5	-	26.8	1.7	50.0	6.8	3	silty CLAY to CLAY	115	1.5	18	17	8	-	-	1.8	8.6	52	0.005	2.90	15
23.46	25.9	27.5	-	26.9	1.6	46.9	6.6	3	silty CLAY to CLAY	115	1.5	18	17	8	-	-	1.8	8.6	52	0.005	2.90	15
23.62	26.2	27.7	-	27.1	1.5	42.8	6.1	3	silty CLAY to CLAY	115	1.5	18	17	8	-	-	1.8	8.7	50	0.005	2.87	15
23.79	25.3	26.7	-	26.2	1.4	42.9	5.6	3	silty CLAY to CLAY	115	1.5	18	17	8	-	-	1.7	8.3	49	0.005	2.86	15
23.95	24.8	25.9	-	25.6	1.5	44.4	6.3	3	silty CLAY to CLAY	115	1.5	17	17	8	-	-	1.7	8.1	52	0.005	2.90	15
24.12	24.8	25.8	-	25.7	1.9	47.7	8.3	3	silty CLAY to CLAY	115	1.5	17	17	8	-	-	1.7	8.0	57	0.005	2.98	15
24.28	31.6	32.8	-	32.5	2.6	43.1	8.5	3	silty CLAY to CLAY	115	1.5	22	21	10	-	-	2.2	9.9	53	0.005	2.92	15
24.44	40.0	41.3	-	40.7	3.3	35.4	8.6	3	silty CLAY to CLAY	115	1.5	28	27	12	-	-	2.8	9.9	49	0.005	2.85	15
24.61	45.3	46.6	-	46.0	3.8	35.2	8.5	3	silty CLAY to CLAY	115	1.5	31	30	13	-	-	3.1	9.9	47	0.005	2.82	15
24.77	50.6	51.8	-	51.2	4.2	32.1	8.6	3	silty CLAY to CLAY	115	1.5	35	34	15	-	-	3.5	9.9	45	0.005	2.79	15
24.94	50.4	51.4	-	51.0	4.6	28.2	9.4	3	silty CLAY to CLAY	115	1.5	34	34	15	-	-	3.5	9.9	47	0.005	2.82	15
25.10	62.3	63.2	-	62.8	5.1	23.2	8.4	9	very stiff fine SOIL	120	2.0	32	31	17	52	38	-	-	42	0.250	2.72	30
25.26	78.2	76.3	234.1	78.6	4.6	22.3	6.0	9	very stiff fine SOIL	120	2.0	38	39	19	58	39	-	-	33	0.250	2.56	30
25.43	67.4	67.7	-	67.8	4.3	23.4	6.6	9	very stiff fine SOIL	120	2.0	34	34	17	54	38	-	-	36	0.250	2.62	30
25.59	50.3	50.4	-	51.3	4.0	51.1	8.3	3	silty CLAY to CLAY	115	1.5	34	34	14	-	-	3.5	9.9	45	0.005	2.78	15
25.76	56.9	56.7	-	57.8	4.3	44.9	7.7	3	silty CLAY to CLAY	115	1.5	38	38	15	-	-	3.9	9.9	42	0.005	2.72	15
25.92	56.3	55.9	-	57.1	4.4	39.4	8.1	3	silty CLAY to CLAY	115	1.5	37	38	15	-	-	3.9	9.9	43	0.005	2.75	15
26.08	57.2	56.5	-	58.2	4.4	48.4	7.9	3	silty CLAY to CLAY	115	1.5	38	38	15	-	-	4.0	9.9	42	0.005	2.73	15
26.25	57.1	56.2	-	58.1	4.4	50.2	8.0	3	silty CLAY to CLAY	115	1.5	37	38	15	-	-	4.0	9.9	43	0.005	2.74	15
26.41	67.9	66.5	-	68.9	5.0	47.1	7.5	9	very stiff fine SOIL	120	2.0	33	34	18	54	38	-	-	39	0.250	2.67	30
26.58	77.6	75.7	-	78.3	5.3	33.3	6.9	9	very stiff fine SOIL	120	2.0	38	39	19	58	39	-	-	36	0.250	2.61	30
26.74	67.3	65.3	-	68.0	5.5	35.3	8.4	9	very stiff fine SOIL	120	2.0	33	34	18	53	38	-	-	41	0.250	2.71	30
26.90	70.9	68.5	-	71.6	5.4	35.9	7.8	9	very stiff fine SOIL	120	2.0	34	35	18	55	38	-	-	39	0.250	2.68	30
27.07	70.2	67.5	-	70.8	5.5	30.9	8.0	9	very stiff fine SOIL	120	2.0	34	35	18	54	38	-	-	40	0.250	2.69	30
27.23	66.0	63.2	-	66.6	5.5	26.2	8.6	9	very stiff fine SOIL	120	2.0	32	33	17	52	38	-	-	42	0.250	2.73	30
27.40	68.0	64.8	-	68.5	5.1	28.6	7.6	9	very stiff fine SOIL	120	2.0	32	34	17	53	38	-	-	40	0.250	2.69	30
27.56	61.4	58.2	-	61.9	5.0	25.7	8.4	3	silty CLAY to CLAY	115	1.5	39	41	16	-	-	4.3	9.9	43	0.005	2.75	15
27.72	69.4	65.6	-	70.0	4.8	32.1	7.1	9	very stiff fine SOIL	120	2.0	33	35	17	53	38	-	-	38	0.250	2.66	30
27.89	77.7	73.1	-	78.2	5.3	25.5	7.0	9	very stiff fine SOIL	120	2.0	37	39	19	57	39	-	-	36	0.250	2.62	30
28.05	71.6	67.1	-	72.2	5.2	27.4	7.4	9	very stiff fine SOIL	120	2.0	34	36	18	54	38	-	-	39	0.250	2.67	30
28.22	62.6	58.4	-	63.2	4.8	26.6	7.9	3	silty CLAY to CLAY	115	1.5	39	42	16	-	-	4.4	9.9	42	0.005	2.72	15
28.38	56.8	52.7	-	57.6	4.8	42.6	8.6	3	silty CLAY to CLAY	115	1.5	35	38	15	-	-	3.9	9.9	45	0.005	2.78	15
28.54	77.0	71.3	-	77.8	5.2	38.4	6.9	9	very stiff fine SOIL	120	2.0	36	39	18	56	39	-	-	37	0.250	2.63	30
28.71	71.5	65.9	-	72.2	5.1	32.5	7.3	9	very stiff fine SOIL	120	2.0	33	36	17	53	38	-	-	39	0.250	2.66	30
28.87	59.8	54.9	-	60.3	4.9	24.9	8.5	3	silty CLAY to CLAY	115	1.5	37	40	15	-	-	4.2	9.9	44	0.005	2.77	15
29.04	45.3	41.3	-	45.9	4.0	31.6	9.2	3	silty CLAY to CLAY	115	1.5	28	30	12	-	-	3.1	9.9	51	0.005	2.88	15
29.20	46.5	42.3	-	47.4	3.6	46.5	8.0	3	silty CLAY to CLAY	115	1.5	28	31	12	-	-	3.2	9.9	47	0.005	2.82	15
29.36	45.8	41.5	-	46.8	3.5	50.2	7.9	3	silty CLAY to CLAY	115	1.5	28	31	12	-	-	3.2	9.9	48	0.005	2.83	15
29.53	42.4	38.2	-	43.6	3.9	61.8	9.6	3	silty CLAY to CLAY	115	1.5	25	28	12	-	-	2.9	9.9	53	0.005	2.91	15
29.69	58.4	52.5	-	59.7	4.4	67.7	7.7	3	silty CLAY to CLAY	115	1.5	35	39	14	-	-	4.0	9.9	43	0.005	2.75	15
29.86	66.7	59.7	-	67.3	4.4	33.9	6.8	3	silty CLAY to CLAY	115	1.5	40	44	16	-	-	4.6	9.9	39	0.005	2.67	15
30.02	65.2	58.2	-	66.5	4.1	64.7	6.4	3	silty CLAY to CLAY	115	1.5	39	43	15	-	-	4.5	9.9	38	0.005	2.66	15
30.19	57.7	51.3	-	59.1	3.6	73.1	6.3	3	silty CLAY to CLAY	115	1.5	34	38	14	-	-	4.0	9.9	40	0.005	2.69	15
30.35	65.5	58.0	-	66.6	3.7	54.3	5.8	4	clayy SILT to silty CLAY	115	2.0	29	33	15	-	-	4.5	9.9	36	0.070	2.62	15
30.51	56.9	50.2	-	58.6	4.3	90.9	7.8	3	silty CLAY to CLAY	115	1.5	33	38	14	-	-	3.9	9.9	44	0.005	2.77	15
30.68	71.2	62.5	-	73.1	5.7	99.7	8.2	9	very stiff fine SOIL	120	2.0	31	36	17	52	38	-	-	41	0.250	2.72	30
30.84	117.6	106.8	267.3	118.6	6.5	53.1	5.6	9	very stiff fine SOIL	120	2.0	53	59	25	69	41	-	-	28	0.250	2.44	30

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Depth ft	qc PS tsf	* qc1n PS -	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Ratio %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	* SPT R-N1 60%	SPT R-N 60%	* SPT IcN1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR -	* Fin Ic %	* D50 - mm	* Ic SBT Indx	* Nk -
31.01	101.8	92.3	260.9	102.4	6.1	30.3	6.1	9	very stiff fine SOIL	120	2.0	46	51	23	64	40	-	-	31	0.250	2.51	30
31.17	76.0	65.9	-	77.0	5.3	51.8	7.1	9	very stiff fine SOIL	120	2.0	33	38	17	53	38	-	-	38	0.250	2.65	30
31.33	80.8	69.8	-	82.1	5.7	67.9	7.2	9	very stiff fine SOIL	120	2.0	35	40	18	55	39	-	-	38	0.250	2.64	30
31.50	88.7	76.4	-	90.2	6.5	77.3	7.4	9	very stiff fine SOIL	120	2.0	38	44	20	58	39	-	-	37	0.250	2.63	30
31.66	99.9	89.8	276.8	100.5	6.7	32.0	6.8	9	very stiff fine SOIL	120	2.0	45	50	22	63	40	-	-	33	0.250	2.56	30
31.83	89.8	76.7	-	90.5	6.6	37.1	7.5	9	very stiff fine SOIL	120	2.0	38	45	20	58	39	-	-	37	0.250	2.63	30
31.99	98.3	83.6	-	99.1	7.4	41.1	7.7	9	very stiff fine SOIL	120	2.0	42	49	22	61	40	-	-	36	0.250	2.62	30
32.15	117.4	104.9	286.7	118.1	7.3	38.9	6.4	9	very stiff fine SOIL	120	2.0	52	59	25	69	40	-	-	30	0.250	2.49	30
32.32	102.1	91.1	267.5	102.7	6.4	29.0	6.4	9	very stiff fine SOIL	120	2.0	46	51	22	64	40	-	-	32	0.250	2.53	30
32.48	68.9	57.9	-	69.6	3.8	36.1	5.7	4	clayy SILT to silty CLAY	115	2.0	29	34	15	-	-	4.8	9.9	36	0.070	2.62	15
32.65	47.8	40.1	-	49.4	2.3	79.3	5.1	3	silty CLAY to CLAY	115	1.5	27	32	11	-	-	3.3	9.9	40	0.005	2.69	15
32.81	38.6	32.2	-	41.1	1.8	126.6	4.8	3	silty CLAY to CLAY	115	1.5	21	26	9	-	-	2.6	9.9	43	0.005	2.75	15
32.97	34.7	28.9	-	36.6	1.6	97.3	5.0	3	silty CLAY to CLAY	115	1.5	19	23	8	-	-	2.4	9.0	46	0.005	2.79	15
33.14	35.4	29.3	-	37.7	1.7	117.3	5.1	3	silty CLAY to CLAY	115	1.5	20	24	8	-	-	2.4	9.2	46	0.005	2.80	15
33.30	35.7	29.5	-	38.0	2.1	116.6	6.1	3	silty CLAY to CLAY	115	1.5	20	24	9	-	-	2.4	9.2	49	0.005	2.85	15
33.47	38.5	31.6	-	40.7	2.9	114.6	8.1	3	silty CLAY to CLAY	115	1.5	21	26	10	-	-	2.6	9.9	53	0.005	2.91	15
33.63	50.9	41.7	-	53.1	3.2	111.1	6.6	3	silty CLAY to CLAY	115	1.5	28	34	12	-	-	3.5	9.9	44	0.005	2.76	15
33.79	52.8	43.2	-	53.8	3.3	49.3	6.5	3	silty CLAY to CLAY	115	1.5	29	35	12	-	-	3.6	9.9	43	0.005	2.75	15
33.96	45.1	36.7	-	46.9	2.7	91.9	6.4	3	silty CLAY to CLAY	115	1.5	24	30	10	-	-	3.1	9.9	46	0.005	2.79	15
34.12	43.3	35.1	-	45.1	2.7	91.1	6.6	3	silty CLAY to CLAY	115	1.5	23	29	10	-	-	3.0	9.9	47	0.005	2.82	15
34.29	41.9	33.9	-	43.7	2.8	89.4	7.0	3	silty CLAY to CLAY	115	1.5	23	28	10	-	-	2.9	9.9	49	0.005	2.85	15
34.45	40.9	33.0	-	42.7	2.7	89.9	6.8	3	silty CLAY to CLAY	115	1.5	22	27	10	-	-	2.8	9.9	49	0.005	2.85	15
34.61	41.3	33.1	-	42.9	2.5	82.8	6.4	3	silty CLAY to CLAY	115	1.5	22	28	10	-	-	2.8	9.9	48	0.005	2.83	15
34.78	41.2	32.9	-	42.9	2.6	85.7	6.6	3	silty CLAY to CLAY	115	1.5	22	27	10	-	-	2.8	9.9	48	0.005	2.84	15
34.94	40.9	32.6	-	42.6	2.8	85.9	7.3	3	silty CLAY to CLAY	115	1.5	22	27	10	-	-	2.8	9.9	50	0.005	2.87	15
35.11	45.4	36.1	-	47.1	3.2	87.4	7.4	3	silty CLAY to CLAY	115	1.5	24	30	11	-	-	3.1	9.9	49	0.005	2.85	15
35.27	50.6	40.1	-	52.0	3.0	73.1	6.2	3	silty CLAY to CLAY	115	1.5	27	34	11	-	-	3.5	9.9	44	0.005	2.76	15
35.43	55.4	43.7	-	56.9	2.6	76.7	4.9	4	clayy SILT to silty CLAY	115	2.0	22	28	11	-	-	3.8	9.9	38	0.070	2.66	15
35.60	45.5	35.8	-	47.0	2.4	71.7	5.6	3	silty CLAY to CLAY	115	1.5	24	30	10	-	-	3.1	9.9	44	0.005	2.76	15
35.76	46.2	36.2	-	48.3	3.0	106.5	6.9	3	silty CLAY to CLAY	115	1.5	24	31	10	-	-	3.2	9.9	47	0.005	2.82	15
35.93	48.3	37.7	-	51.0	4.3	135.8	9.3	3	silty CLAY to CLAY	115	1.5	25	32	11	-	-	3.3	9.9	52	0.005	2.90	15
36.09	70.2	54.6	-	72.0	5.4	94.1	7.9	3	silty CLAY to CLAY	115	1.5	36	47	15	-	-	4.9	9.9	43	0.005	2.75	15
36.26	74.9	58.1	-	75.9	5.8	51.9	7.9	3	silty CLAY to CLAY	115	1.5	39	50	16	-	-	5.2	9.9	42	0.005	2.73	15
36.42	76.0	58.7	-	77.3	6.0	68.3	8.1	3	silty CLAY to CLAY	115	1.5	39	51	16	-	-	5.3	9.9	42	0.005	2.73	15
36.58	76.6	59.0	-	78.1	6.3	78.7	8.4	3	silty CLAY to CLAY	115	1.5	39	51	16	-	-	5.3	9.9	43	0.005	2.74	15
36.75	104.9	89.3	266.3	105.9	6.6	49.1	6.4	9	very stiff fine SOIL	120	2.0	45	52	22	63	39	-	-	33	0.250	2.54	30
36.91	93.1	71.2	-	93.9	6.3	40.6	7.0	9	very stiff fine SOIL	120	2.0	36	47	18	56	39	-	-	37	0.250	2.63	30
37.08	68.5	52.2	-	69.0	5.9	25.8	8.8	3	silty CLAY to CLAY	115	1.5	35	46	15	-	-	4.7	9.9	46	0.005	2.80	15
37.24	65.7	49.9	-	66.3	5.3	30.6	8.3	3	silty CLAY to CLAY	115	1.5	33	44	14	-	-	4.6	9.9	45	0.005	2.79	15
37.40	67.8	51.3	-	68.5	5.6	37.7	8.5	3	silty CLAY to CLAY	115	1.5	34	45	14	-	-	4.7	9.9	45	0.005	2.79	15
37.57	73.0	55.1	-	73.9	6.0	47.7	8.4	3	silty CLAY to CLAY	115	1.5	37	49	15	-	-	5.1	9.9	44	0.005	2.76	15
37.73	84.7	63.8	-	85.5	6.1	41.5	7.4	9	very stiff fine SOIL	120	2.0	32	42	17	52	38	-	-	39	0.250	2.68	30
37.90	75.8	56.8	-	76.3	5.5	28.7	7.5	3	silty CLAY to CLAY	115	1.5	38	51	15	-	-	5.3	9.9	41	0.005	2.72	15
38.06	64.7	48.4	-	65.6	4.8	46.7	7.7	3	silty CLAY to CLAY	115	1.5	32	43	14	-	-	4.5	9.9	44	0.005	2.77	15
38.22	54.6	40.7	-	55.7	4.5	55.4	8.6	3	silty CLAY to CLAY	115	1.5	27	36	12	-	-	3.8	9.9	49	0.005	2.86	15
38.39	65.4	48.6	-	66.6	4.8	63.6	7.6	3	silty CLAY to CLAY	115	1.5	32	44	14	-	-	4.5	9.9	44	0.005	2.77	15
38.55	56.3	41.7	-	57.4	4.6	54.2	8.5	3	silty CLAY to CLAY	115	1.5	28	38	12	-	-	3.9	9.9	49	0.005	2.85	15
38.72	60.1	44.4	-	61.3	4.3	57.7	7.5	3	silty CLAY to CLAY	115	1.5	30	40	12	-	-	4.2	9.9	45	0.005	2.79	15
38.88	51.9	38.1	-	53.2	4.6	68.7	9.2	3	silty CLAY to CLAY	115	1.5	25	35	11	-	-	3.6	9.9	52	0.005	2.90	15
39.04	57.1	41.9	-	58.8	4.5	89.8	8.2	3	silty CLAY to CLAY	115	1.5	28	38	12	-	-	3.9	9.9	48	0.005	2.83	15
39.21	69.0	50.5	-	70.1	4.9	56.3	7.3	3	silty CLAY to CLAY	115	1.5	34	46	14	-	-	4.8	9.9	43	0.005	2.74	15
39.37	55.0	40.1	-	56.6	4.4	79.4	8.3	3	silty CLAY to CLAY	115	1.5	27	37	12	-	-	3.8	9.9	49	0.005	2.85	15
39.54	62.9	45.7	-	64.5	4.7	80.8	7.7	3	silty CLAY to CLAY	115	1.5	30	42	13	-	-	4.3	9.9	45	0.005	2.79	15
39.70	76.0	55.0	-	77.7	5.2	87.1	7.0	3	silty CLAY to CLAY	115	1.5	37	51	15	-	-	5.3	9.9	41	0.005	2.70	15
39.86	90.0	65.0	-	91.6	6.3	80.3	7.2	9	very stiff fine SOIL	120	2.0	32	45	17	53	38	-	-	39	0.250	2.66	30
40.03	115.5	95.2	271.9	116.3	7.2	40.8	6.3	9	very stiff fine SOIL	120	2.0	48	58	23	65	40	-	-	31	0.250	2.52	30
40.19	110.2	90.6	277.1	111.3	7.3	58.5	6.8	9	very stiff fine SOIL	120	2.0	45	55	23	64	39	-	-	33	0.250	2.55	30
40.36	106.5	76.1	-	107.6	7.2	53.0	6.9	9	very stiff fine SOIL	120	2.0	38	53	20	58	39	-	-	36	0.250	2.61	30
40.52	100.5	71.6	-	101.8	8.2	63.5	8.4	9	very stiff fine SOIL	120	2.0	36	50	19	56	39	-	-	40	0.250	2.69	30
40.68	129.7	92.0	-	130.6	10.3	45.7	8.1	9	very stiff fine SOIL	120	2.0	46	65	24	64	40	-	-	36	0.250	2.61	30
40.85	221.1	180.6	338.6	221.7	11.0	30.5	5.0	9	very stiff fine SOIL	120	2.0	90	100	40	87	43	-	-	22	0.250	2.28	30
41.01	159.9	130.4	320.8	160.6	9.9	35.0	6.3	9	very stiff fine SOIL	120	2.0	65	80	31	76	41	-	-	28	0.250	2.43	30
41.18	112.8	79.3	-	113.2	7.9	20.3	7.2	9	very stiff fine SOIL	120	2.0	40	56	20	59	39	-	-	36	0.250	2.61	30
41.34	102.3	71.6	-	103.2	7.0	48.7	7.0	9	very stiff fine SOIL	120	2.0	36	51	19	56	39	-	-	37	0.250	2.63	30
41.50	99.5	69.4	-	100.8	7.9	66.7	8.1	9	very stiff fine SOIL	120	2.0	35	50	19	55	38	-	-	40	0.250	2.69	30
41.67	116.4	81.0	-	117.6	8.7	56.7	7.7	9	very stiff fine SOIL	120	2.0	41	58	21	60	39	-	-	37	0.250	2.63	30
41.83	135.9	109.9	281.2	137.2	7.9	64.8	5.9	9	very stiff fine SOIL	120	2.0	55	68	26	70	40	-	-	29	0.250	2.46	30
42.00	122.0	98.5	275.8	123.0	7.5	51.6	6.3	9	very stiff fine SOIL	120	2.0	49	61	24	66	40	-	-	31	0.250	2.51	30
42.16	105.8	72.9	-	107.1	7.0	64.0	6.7	9	very stiff fine SOIL	120	2.0	36	53	19	57	39	-	-	36	0.250	2.61	30
42.32	113.0	90.9	264.3	114.9	6.9	99.3	6.3	9	very stiff fine SOIL	120	2.0	45	56	22	64	39	-	-	32	0.250	2.53	30
42.49	110.0	88.4	265.5	110.7	6.9	33.7	6.5	9	very stiff fine SOIL	120	2.0	44	55	22	63	39	-	-	33	0.250	2.54	30
42.65	88.2	60.2	-	89.2	6.6	49.3	7.8	3	silty CLAY to CLAY	115	1.5	40	59	16	-	-	6.1	9.9	41	0.005	2.71	15
42.82	86.7	59.0	-	88.4	6.4	87.6	7.6	3	silty CLAY to CLAY	115	1.5	39	58	16	-	-	6.0	9.9	41	0.005	2.71	15
42.98	82.1	55.7	-	83.2	6.7	58.2	8.4	3	silty CLAY to CLAY	115	1.5	37	55	15	-	-	5.7	9.9	44	0.005	2.76	15
43.15	80.6	54.5	-	82.3	6.8	87.1	8.7	3	silty CLAY to CLAY	115	1.5	36	54	15	-	-	5.6	9.9	45	0.005	2.78	15
43.31	83.8	56.5	-	84.6	6.8	38.2	8.4	3	silty CLAY to CLAY	115	1.5	38	56	16	-	-	5.8	9.9	43	0.005	2.75	15
43.47	77.7	52.3	-	78.5	5.6	38.9	7.4	3	silty CLAY to CLAY	115	1.5	35	52	14	-	-	5.4	9.9	42	0.005	2.74	15
43.64	73.4	49.2	-	74.2	4.7	42.3	6.7	3	silty CLAY to CLAY	115	1.5	33	49	13	-	-	5.1	9.9	42	0.005	2.72	15
43.80	61.7	41.2	-	63.6	5.5	100.7	9.3	3	silty CLAY to CLAY	115	1.5	27	41	12	-	-	4.3	9.9	51	0.005	2.88	15
43.97	80.6	53.7	-	82.8	7.0	111.1	9.0	3	silty CLAY to CLAY	115	1.5	36	54	15	-	-	5.6	9.9	46	0.005	2.79	15
44.13	117.3	77.9	-	118.0	8.2	37.2	7.2	9	very stiff fine SOIL	120	2.0	39	59	20	59	39	-	-	36	0.250	2.61	30
44.29	105.8	70.1	-	106.5	7.7	32.4	7.5	9	very stiff fine SOIL	120	2.0	35	53	18	55	39	-	-	38	0.250	2.66	30
44.46	91.2	60.3	-	92.3	7.1	54.1	8.1	3	silty CLAY to CLAY	115	1.5	40	61	16	-	-	6.3	9.9	42	0.005	2.72	15
44.62	83.3	54.9	-	85.0	6.8	84.6	8.5	3	silty CLAY to CLAY	115	1.5	37	56	15	-	-	5.8	9.9	44	0.005	2.77	15
44.79	99.3	65.2	-	100.6	7.4	67.0	7.7	9	very stiff fine SOIL	120	2.0	33	50	17	53	38	-	-	40	0.250	2.69	30
44.95	124.8	98.1	286.4	125.6	8.2	41.6	6.7	9	very stiff fine SOIL	120	2.0	49	62	24	66	39	-	-	32	0.250	2.53	30
45.11	110.8	72.3	-	111.6	7.4	43.6	6.9	9	very stiff fine SOIL	120	2.0	36	55	19	56	39	-	-	36	0.250	2.62	30
45.28	91.5	59.5	-	92.1	5.9	32.1	6.6	3	silty CLAY to CLAY	115	1.5	40	61	16	-	-	6.4	9.9	38	0.005	2.66	15
45.44	67.7	43.9	-	68.6	3.9	41.9	6.0	3	silty CLAY to CLAY	115	1.5	29	45	12	-	-	4.7	9.9	41	0.005	2.72	15
45.61	52.9	34.2	-	54.6	2.5	83.1	5.0	3	silty CLAY to CLAY	115	1.5	23	35	9	-	-	3.6	9.9	43	0.005	2.74	15
45.77	48.2	31.1	-	50.1	2.1	96.6	4.6	3	silty CLAY to CLAY	115	1.5	21	32	9	-	-	3.3	9.7	43	0.005	2.75	15
45.93	44.6	28.7	-	46.4	2.0	93.6	4.8	3	silty CLAY to CLAY	115	1.5	19	30	8	-	-	3.0	8.9	45	0.005	2.79	15
46.10	41.7	26.7	-	43.5	1.9	91.5	4.9	3	silty CLAY to CLAY	115	1.5	18	28	8	-	-	2.8	8.3	47	0.005	2.82	15
46.26	40.1	25.6	-	41.5	1.8	73.6	4.8	3	silty CLAY to CLAY	115	1.5	17	27	7	-	-	2.7	7.9	48	0.005	2.83	15

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Construction Testing Services
Data File: SDF(319).cpt
CPT Date: 7/21/2022 2:23:53 PM
GW During Test: 10 ft

Sounding ID: CPT-01
Project No: 18735
Cone/Rig: DDG1627

. Depth ft	. qc PS tsf	* qc1n PS -	. q1ncs PS -	* qt PS tsf	. Slv Stss tsf	. pore prss (psi)	. Frct Ratio %	* Mat Typ Zon	* Material Behavior Description	. Unit Wght pcf	. Qc to N	* SPT R-N1 60%	. SPT R-N 60%	* SPT IcN1 60%	* Rel Den %	* Ftn Ang deg	. Und Shr tsf	. OCR - -	* Fin Ic %	* D50 - mm	* Ic SBT Indx	* Nk - -
46.43	38.1	24.3	-	39.6	1.7	76.7	4.7	3	silty CLAY to CLAY	115	1.5	16	25	7	-	-	2.6	7.5	48	0.005	2.84	15
46.59	37.3	23.7	-	38.7	1.6	75.7	4.6	3	silty CLAY to CLAY	115	1.5	16	25	7	-	-	2.5	7.3	48	0.005	2.84	15
46.75	37.6	23.9	-	39.1	1.6	76.3	4.6	3	silty CLAY to CLAY	115	1.5	16	25	7	-	-	2.5	7.3	48	0.005	2.84	15
46.92	38.2	24.2	-	39.6	1.8	74.7	5.0	3	silty CLAY to CLAY	115	1.5	16	25	7	-	-	2.6	7.4	49	0.005	2.86	15
47.08	39.6	25.0	-	41.0	1.8	72.2	4.8	3	silty CLAY to CLAY	115	1.5	17	26	7	-	-	2.7	7.7	48	0.005	2.83	15
47.25	38.7	24.4	-	40.1	1.7	70.0	4.6	3	silty CLAY to CLAY	115	1.5	16	26	7	-	-	2.6	7.5	48	0.005	2.83	15
47.41	38.5	24.1	-	39.8	1.6	69.3	4.6	3	silty CLAY to CLAY	115	1.5	16	26	7	-	-	2.6	7.4	48	0.005	2.83	15
47.57	38.6	24.2	-	40.0	1.6	73.5	4.6	3	silty CLAY to CLAY	115	1.5	16	26	7	-	-	2.6	7.4	48	0.005	2.83	15
47.74	40.2	25.1	-	41.6	2.2	75.7	5.8	3	silty CLAY to CLAY	115	1.5	17	27	7	-	-	2.7	7.7	51	0.005	2.89	15
47.90	42.0	26.2	-	43.5	2.7	74.7	6.8	3	silty CLAY to CLAY	115	1.5	17	28	8	-	-	2.9	8.1	53	0.005	2.92	15
48.07	48.8	30.3	-	50.3	2.8	74.0	6.2	3	silty CLAY to CLAY	115	1.5	20	33	9	-	-	3.3	9.4	49	0.005	2.85	15
48.23	52.2	32.4	-	53.5	3.3	64.5	6.7	3	silty CLAY to CLAY	115	1.5	22	35	9	-	-	3.6	9.9	49	0.005	2.85	15
48.39	51.9	32.1	-	53.5	3.6	78.0	7.3	3	silty CLAY to CLAY	115	1.5	21	35	10	-	-	3.6	9.9	51	0.005	2.88	15
48.56	67.9	41.8	-	69.9	3.2	105.1	4.9	4	clayy SILT to silty CLAY	115	2.0	21	34	11	-	-	4.7	9.9	39	0.070	2.67	15
48.72	74.6	56.8	152.0	75.5	2.6	45.9	3.6	4	clayy SILT to silty CLAY	115	2.0	28	37	14	-	-	5.2	9.9	30	0.070	2.48	15
48.89	43.3	26.5	-	45.4	1.7	106.8	4.2	3	silty CLAY to CLAY	115	1.5	18	29	7	-	-	2.9	8.2	45	0.005	2.78	15
49.05	41.6	25.4	-	44.0	1.6	122.4	4.2	3	silty CLAY to CLAY	115	1.5	17	28	7	-	-	2.8	7.8	45	0.005	2.79	15
49.22	43.5	26.5	-	45.9	1.7	122.0	4.1	3	silty CLAY to CLAY	115	1.5	18	29	7	-	-	3.0	8.2	44	0.005	2.77	15
49.38	45.1	27.5	-	47.7	1.8	128.3	4.4	3	silty CLAY to CLAY	115	1.5	18	30	8	-	-	3.1	8.5	45	0.005	2.77	15
49.54	47.1	28.6	-	49.6	2.2	129.0	4.9	3	silty CLAY to CLAY	115	1.5	19	31	8	-	-	3.2	8.8	46	0.005	2.80	15
49.71	49.6	30.0	-	52.0	2.2	122.9	4.8	3	silty CLAY to CLAY	115	1.5	20	33	8	-	-	3.4	9.3	44	0.005	2.77	15
49.87	52.1	31.4	-	54.6	2.8	128.1	5.6	3	silty CLAY to CLAY	115	1.5	21	35	9	-	-	3.6	9.8	46	0.005	2.81	15
50.04	54.1	32.5	-	56.3	3.5	113.1	6.9	3	silty CLAY to CLAY	115	1.5	22	36	10	-	-	3.7	9.9	49	0.005	2.86	15
50.20	57.5	34.5	-	59.8	3.6	117.3	6.6	3	silty CLAY to CLAY	115	1.5	23	38	10	-	-	3.9	9.9	48	0.005	2.83	15
50.36	68.3	40.9	-	69.6	3.6	69.2	5.6	3	silty CLAY to CLAY	115	1.5	27	46	11	-	-	4.7	9.9	41	0.005	2.72	15
50.53	53.8	32.1	-	55.9	3.0	108.2	6.0	3	silty CLAY to CLAY	115	1.5	21	36	9	-	-	3.7	9.9	47	0.005	2.82	15
50.69	51.4	30.6	-	53.6	2.8	112.1	5.8	3	silty CLAY to CLAY	115	1.5	20	34	9	-	-	3.5	9.5	47	0.005	2.82	15
50.86	50.1	29.8	-	52.5	2.7	122.4	5.7	3	silty CLAY to CLAY	115	1.5	20	33	9	-	-	3.4	9.2	48	0.005	2.83	15
51.02	49.2	29.2	-	51.8	2.7	128.6	5.8	3	silty CLAY to CLAY	115	1.5	19	33	8	-	-	3.4	9.0	48	0.005	2.84	15
51.18	48.5	28.6	-	50.8	2.6	118.6	5.8	3	silty CLAY to CLAY	115	1.5	19	32	8	-	-	3.3	8.9	49	0.005	2.85	15
51.35	47.4	27.9	-	49.7	2.6	118.1	5.9	3	silty CLAY to CLAY	115	1.5	19	32	8	-	-	3.2	8.6	49	0.005	2.86	15
51.51	46.5	27.3	-	48.9	2.5	124.3	5.7	3	silty CLAY to CLAY	115	1.5	18	31	8	-	-	3.2	8.4	49	0.005	2.86	15
51.68	46.5	27.3	-	48.9	2.5	126.1	5.7	3	silty CLAY to CLAY	115	1.5	18	31	8	-	-	3.2	8.4	49	0.005	2.85	15
51.84	47.1	27.6	-	49.7	2.5	128.7	5.7	3	silty CLAY to CLAY	115	1.5	18	31	8	-	-	3.2	8.5	49	0.005	2.85	15
52.00	48.1	28.0	-	50.6	2.7	127.9	5.9	3	silty CLAY to CLAY	115	1.5	19	32	8	-	-	3.3	8.7	49	0.005	2.86	15
52.17	48.2	28.0	-	50.7	2.7	128.8	6.0	3	silty CLAY to CLAY	115	1.5	19	32	8	-	-	3.3	8.7	50	0.005	2.86	15
52.33	47.7	27.7	-	50.3	2.7	130.1	6.0	3	silty CLAY to CLAY	115	1.5	18	32	8	-	-	3.3	8.6	50	0.005	2.87	15
52.50	47.1	27.3	-	49.5	2.5	122.2	5.6	3	silty CLAY to CLAY	115	1.5	18	31	8	-	-	3.2	8.4	49	0.005	2.85	15
52.66	45.9	26.5	-	48.4	2.3	125.2	5.4	3	silty CLAY to CLAY	115	1.5	18	31	8	-	-	3.1	8.2	49	0.005	2.85	15
52.82	43.3	24.9	-	45.8	2.3	127.3	5.6	3	silty CLAY to CLAY	115	1.5	17	29	7	-	-	2.9	7.6	51	0.005	2.88	15
52.99	42.0	24.2	-	44.4	2.3	122.4	5.9	3	silty CLAY to CLAY	115	1.5	16	28	7	-	-	2.8	7.4	53	0.005	2.91	15
53.15	40.6	23.3	-	42.6	2.5	103.0	6.7	3	silty CLAY to CLAY	115	1.5	16	27	7	-	-	2.7	7.1	56	0.005	2.96	15
53.32	38.8	22.2	-	41.1	2.9	117.8	8.2	3	silty CLAY to CLAY	115	1.5	15	26	7	-	-	2.6	6.7	61	0.005	3.03	15
53.48	42.2	24.1	-	44.3	3.5	108.5	8.9	3	silty CLAY to CLAY	115	1.5	16	28	8	-	-	2.9	7.4	61	0.005	3.03	15
53.64	52.8	30.0	-	55.0	3.3	115.0	6.7	3	silty CLAY to CLAY	115	1.5	20	35	9	-	-	3.6	9.3	50	0.005	2.87	15
53.81	48.9	27.8	-	49.9	2.0	46.8	4.3	3	silty CLAY to CLAY	115	1.5	19	33	8	-	-	3.3	8.6	44	0.005	2.77	15
53.97	37.7	21.4	-	39.4	1.6	87.3	4.7	3	silty CLAY to CLAY	115	1.5	14	25	6	-	-	2.5	6.5	51	0.005	2.89	15
54.14	35.2	19.9	-	37.4	1.6	115.3	5.0	3	silty CLAY to CLAY	115	1.5	13	23	6	-	-	2.4	6.0	54	0.005	2.93	15
54.30	33.4	18.8	-	35.8	1.7	123.8	5.5	3	silty CLAY to CLAY	115	1.5	13	22	6	-	-	2.2	5.6	57	0.005	2.98	15
54.46	33.8	19.0	-	36.3	1.7	127.5	5.6	3	silty CLAY to CLAY	115	1.5	13	23	6	-	-	2.3	5.7	57	0.005	2.98	15
54.63	34.2	19.2	-	36.7	1.6	128.2	5.2	3	silty CLAY to CLAY	115	1.5	13	23	6	-	-	2.3	5.7	56	0.005	2.96	15
54.79	33.7	18.8	-	36.1	1.6	124.9	5.2	3	silty CLAY to CLAY	115	1.5	13	22	6	-	-	2.3	5.6	56	0.005	2.96	15
54.96	33.9	18.9	-	36.5	1.6	137.0	5.1	3	silty CLAY to CLAY	115	1.5	13	23	6	-	-	2.3	5.6	55	0.005	2.95	15
55.12	35.5	19.8	-	38.2	1.7	135.2	5.3	3	silty CLAY to CLAY	115	1.5	13	24	6	-	-	2.4	5.9	55	0.005	2.95	15
55.28	37.6	20.9	-	40.4	1.9	138.9	5.6	3	silty CLAY to CLAY	115	1.5	14	25	6	-	-	2.5	6.3	55	0.005	2.94	15
55.45	39.3	21.8	-	41.7	2.1	124.2	5.8	3	silty CLAY to CLAY	115	1.5	15	26	7	-	-	2.6	6.6	54	0.005	2.94	15
55.61	39.9	22.1	-	42.2	2.2	115.7	5.9	3	silty CLAY to CLAY	115	1.5	15	27	7	-	-	2.7	6.7	55	0.005	2.94	15
55.78	39.7	21.9	-	42.0	2.2	121.5	6.0	3	silty CLAY to CLAY	115	1.5	15	26	7	-	-	2.7	6.6	55	0.005	2.95	15
55.94	41.9	23.1	-	44.6	2.1	136.1	5.5	3	silty CLAY to CLAY	115	1.5	15	28	7	-	-	2.8	7.0	52	0.005	2.91	15
56.11	42.8	23.5	-	45.4	2.2	132.4	5.5	3	silty CLAY to CLAY	115	1.5	16	29	7	-	-	2.9	7.2	52	0.005	2.90	15
56.27	41.6	22.8	-	44.5	2.1	146.1	5.6	3	silty CLAY to CLAY	115	1.5	15	28	7	-	-	2.8	6.9	53	0.005	2.91	15
56.43	40.0	21.8	-	42.7	1.9	140.6	5.2	3	silty CLAY to CLAY	115	1.5	15	27	7	-	-	2.7	6.6	52	0.005	2.91	15
56.60	40.3	22.0	-	42.8	1.9	127.0	5.2	3	silty CLAY to CLAY	115	1.5	15	27	7	-	-	2.7	6.7	52	0.005	2.90	15
56.76	38.2	20.8	-	41.2	2.0	151.7	5.8	3	silty CLAY to CLAY	115	1.5	14	25	6	-	-	2.6	6.3	56	0.005	2.96	15
56.93	39.2	21.3	-	42.1	2.1	144.9	5.8	3	silty CLAY to CLAY	115	1.5	14	26	7	-	-	2.6	6.4	55	0.005	2.95	15
57.09	40.6	22.0	-	43.4	2.1	144.8	5.6	3	silty CLAY to CLAY	115	1.5	15	27	7	-	-	2.7	6.7	54	0.005	2.93	15
57.25	41.5	22.4	-	44.3	2.1	145.4	5.5	3	silty CLAY to CLAY	115	1.5	15	28	7	-	-	2.8	6.8	53	0.005	2.92	15
57.42	42.5	22.9	-	45.4	2.1	150.1	5.5	3	silty CLAY to CLAY	115	1.5	15	28	7	-	-	2.9	7.0	52	0.005	2.90	15
57.58	43.2	23.2	-	46.3	2.2	159.8	5.6	3	silty CLAY to CLAY	115	1.5	15	29	7	-	-	2.9	7.1	52	0.005	2.91	15
57.75	44.8	24.0	-	47.8	2.2	156.2	5.4	3	silty CLAY to CLAY	115	1.5	16	30	7	-	-	3.0	7.3	51	0.005	2.89	15
57.91	45.4	24.3	-	48.4	2.4	152.2	5.6	3	silty CLAY to CLAY	115	1.5	16	30	7	-	-	3.1	7.4	51	0.005	2.89	15
58.07	44.2	23.6	-	47.2	2.6	152.9	6.4	3	silty CLAY to CLAY	115	1.5	16	29	7	-	-	3.0	7.2	55	0.005	2.94	15
58.24	45.5	24.2	-	48.2	2.8	138.7	6.7	3	silty CLAY to CLAY	115	1.5	16	30	7	-	-	3.1	7.4	55	0.005	2.95	15
58.40	47.1	25.0	-	49.9	3.1	142.7	7.0	3	silty CLAY to CLAY	115	1.5	17	31	8	-	-	3.2	7.7	55	0.005	2.95	15
58.57	48.0	25.5	-	51.1	3.0	155.4	6.7	3	silty CLAY to CLAY	115	1.5	17	32	8	-	-	3.3	7.8	54	0.005	2.93	15
58.73	49.8	26.3	-	52.8	2.7	153.3	5.9	3	silty CLAY to CLAY	115	1.5	18	33	8	-	-	3.4	8.1	51	0.005	2.88	15
58.89	49.4	26.1	-	52.7	2.4	168.3	5.2	3	silty CLAY to CLAY	115	1.5	17	33	8	-	-	3.4	8.0	49	0.005	2.85	15
59.06	47.1	24.8	-	50.5	2.5	177.2	5.7	3	silty CLAY to CLAY	115	1.5	17	31	7	-	-	3.2	7.6	51	0.005	2.89	15
59.22	49.2	25.9	-	53.0	2.7	192.5	5.9	3	silty CLAY to CLAY	115	1.5	17	33	8	-	-	3.3	7.9	51	0.005	2.88	15
59.39	52.8	27.7	-	55.8	3.1	155.7	6.2	3	silty CLAY to CLAY	115	1.5	18	35	8	-	-	3.6	8.5	51	0.005	2.88	15
59.55	52.8	27.6	-	56.1	3.2	166.3	6.4	3	silty CLAY to CLAY	115	1.5	18	35	8	-	-	3.6	8.5	51	0.005	2.89	15
59.71	52.9	27.6	-	55.9	3.2	153.2	6.4	3	silty CLAY to CLAY	115	1.5	18	35	8	-	-	3.6	8.5	51	0.005	2.89	15
59.88	52.0	27.1	-	55.4	3.9	171.0	7.9	3	silty CLAY to CLAY	115	1.5	18	35	8	-	-	3.5	8.3	56	0.005	2.96	15
60.04	59.8	31.1	-	62.2	4.8	119.9	8.5	3	silty CLAY to CLAY	115	1.5	21	40	10	-	-	4.1	9.7	54	0.005	2.94	15
60.21	73.6	38.2	-	75.6	5.6	101.3	7.9	3	silty CLAY to CLAY	115	1.5	25	49	11	-	-	5.1	9.9	49	0.005	2.85	15
60.37	80.9	41.8	-	82.0	5.4	56.2	7.0	3	silty CLAY to CLAY	115	1.5	28	54	12	-	-	5.6	9.9	45	0.005	2.79	15
60.53	70.1	36.2	-	70.8	5.2	36.5	7.8	3	silty CLAY to CLAY	115	1.5	24	47	11	-	-	4.8	9.9	50	0.005	2.87	15
60.70	65.9	33.9	-	67.3	4.4	71.4	7.1	3	silty CLAY to CLAY	115	1.5	23	44	10	-	-	4.5	9.9	49	0.005	2.85	15
60.86	64.3	33.0	-	65.4	3.6	56.2	5.9	3	silty CLAY to CLAY	115	1.5	22	43	9	-	-	4.4	9.9	46	0.005	2.80	15
61.03	52.8	27.0	-	54.2	2.7	73.3	5.5	3	silty CLAY to CLAY	115	1.5	18	35	8	-	-	3.6	8.3	49	0.005	2.85	15
61.19	44.9	22.9	-	47.0	2.3	108.3	5.6	3	silty CLAY to CLAY	115	1.5	15	30	7	-	-	3.0	7.0	53	0.005	2.91	15
61.35	42.7	21.8	-	45.0	2.2	117.5	5.7	3	silty CLAY to CLAY	115	1.5	15	28	7	-	-	2.9	6.6	54	0.005	2.93	15
61.52	43.0	21.9	-	45.3	2.3	118.5	5.7	3	silty CLAY to CLAY	115	1.5	15	29	7	-	-	2.9	6.6	54	0.005	2.93	15
61.68	42.5	21.6	-	44.7	2.3	112.5	5.8	3	silty CLAY to CLAY	115	1.5	14	28	7	-	-	2.9	6.5	55	0.005	2.94	15

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

African American Hollister Resources Center

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09/23/2022 5:25:52 PM

Project ID: Construction Testing Services
Data File: SDF(319).cpt
CPT Date: 7/21/2022 2:23:53 PM
GW During Test: 10 ft

Page: 5
Sounding ID: CPT-01
Project No: 18735
Cone/Rig: DDG1627

. Depth ft	. qc PS tsf	* qc1n PS -	. q1ncs PS -	* qt PS tsf	. Slv Stss tsf	. pore prss (psi)	. Frct Ratio %	* Mat Typ Zon	* Material Behavior Description	. Unit Wght pcf	. Qc to N	* SPT R-N1 60%	. SPT R-N 60%	* SPT IcN1 60%	* Rel Den %	* Ftn Ang deg	. Und Shr tsf	. OCR - -	* Fin Ic %	* D50 - mm	* Ic SBT Indx	* Nk - -
61.85	44.2	22.4	-	46.5	2.3	118.1	5.7	3	silty CLAY to CLAY	115	1.5	15	29	7	-	-	3.0	6.8	53	0.005	2.92	15
62.01	44.9	22.7	-	47.4	2.8	128.7	6.8	3	silty CLAY to CLAY	115	1.5	15	30	7	-	-	3.0	6.9	57	0.005	2.97	15
62.17	52.2	26.3	-	55.3	4.2	159.2	8.7	3	silty CLAY to CLAY	115	1.5	18	35	8	-	-	3.5	8.1	58	0.005	3.00	15
62.34	75.5	38.0	-	77.8	5.7	114.9	8.0	3	silty CLAY to CLAY	115	1.5	25	50	11	-	-	5.2	9.9	49	0.005	2.86	15
62.50	97.3	48.9	-	98.5	6.9	57.7	7.3	3	silty CLAY to CLAY	115	1.5	33	65	14	-	-	6.7	9.9	43	0.005	2.75	15
62.67	97.9	49.1	-	98.4	7.7	26.6	8.1	3	silty CLAY to CLAY	115	1.5	33	65	14	-	-	6.8	9.9	45	0.005	2.79	15
62.83	97.2	48.6	-	97.7	6.1	27.2	6.5	3	silty CLAY to CLAY	115	1.5	32	65	13	-	-	6.7	9.9	41	0.005	2.71	15
63.00	75.3	37.6	-	75.6	4.6	13.1	6.4	3	silty CLAY to CLAY	115	1.5	25	50	11	-	-	5.2	9.9	45	0.005	2.79	15
63.16	51.6	25.7	-	53.1	3.3	77.1	7.0	3	silty CLAY to CLAY	115	1.5	17	34	8	-	-	3.5	7.9	54	0.005	2.94	15

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Construction Testing Services

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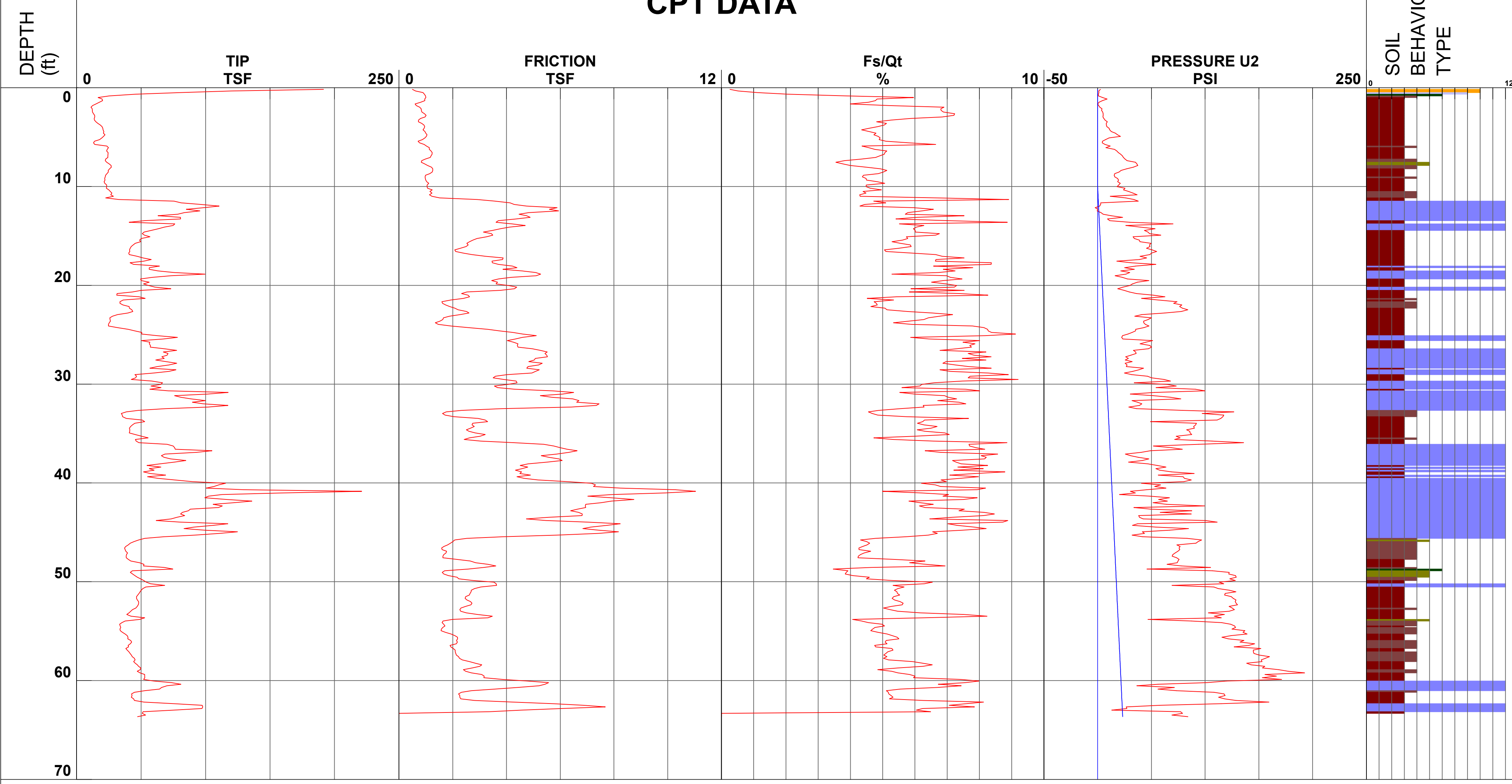
Project	African American Hollister Resources Cen	Operator	JM-GM	Filename	SDF(319).cpt
Job Number	18735	Cone Number	DDG1627	GPS	
Hole Number	CPT-01	Date and Time	7/21/2022 2:23:53 PM	Maximum Depth	63.65 ft
EST GW Depth During Test			10.00 ft		

09/23/2022 5:25:52 PM

Net Area Ratio .8

CPT DATA



- 1 - sensitive fine grained
- 2 - organic material
- 3 - clay
- 4 - silty clay to clay
- 5 - clayey silt to silty clay
- 6 - sandy silt to clayey silt
- 7 - silty sand to sandy silt
- 8 - sand to silty sand
- 9 - sand
- 10 - gravelly sand to sand
- 11 - very stiff fine grained (*)
- 12 - sand to clayey sand (*)

Cone Size 15cm squared

S*Soil behavior type and SPT based on data from UBC-1983

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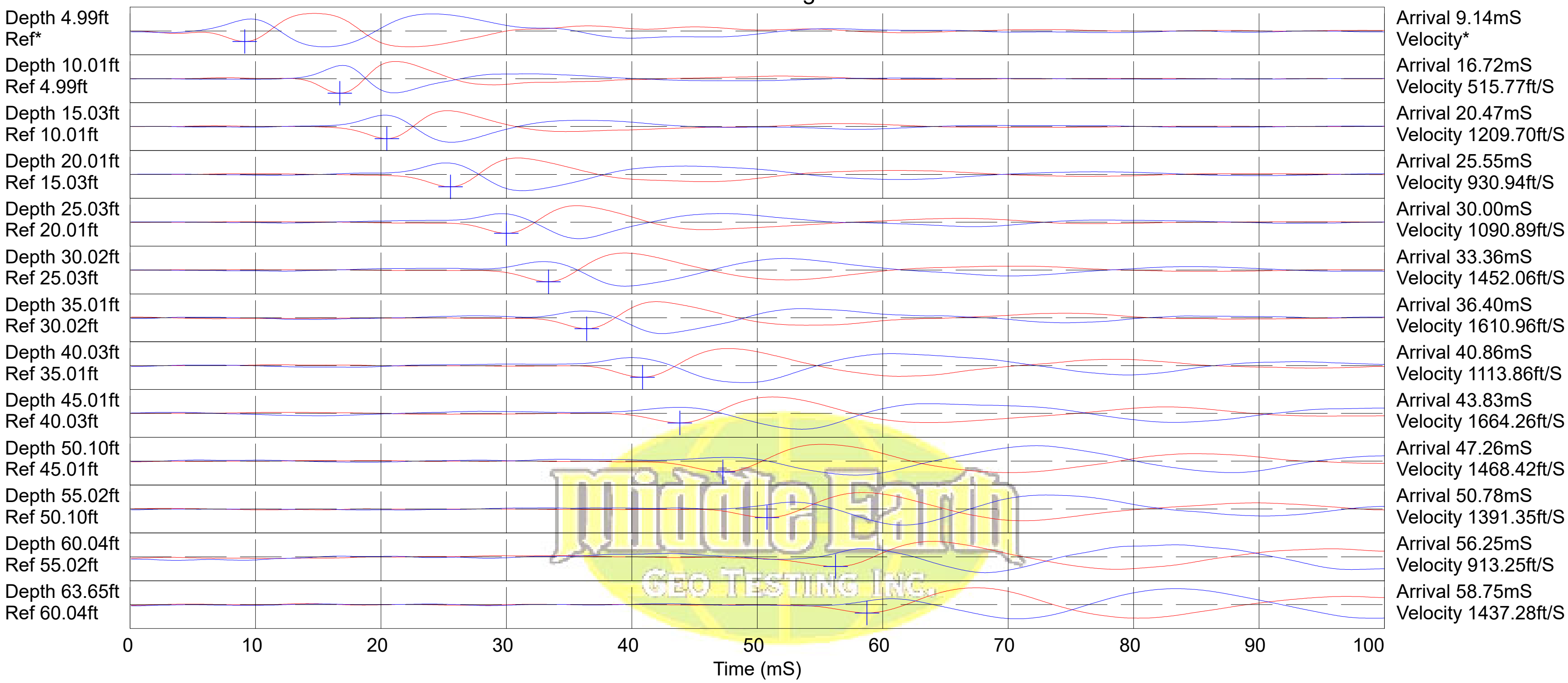
09/23/2022 5:25:53 PM

CPT-01 | Construction Testing Services | African American Hollister Resources Center



Hammer to Rod String Distance (ft): 5.83
* = Not Determined

COMMENT:

African American Hollister Resources Center

Project ID: Construction Testing Services
Data File: SDF(320).cpt
CPT Date: 7/21/2022 4:13:39 PM
GW During Test: 14 ft

Sounding ID: CPT-02
Project No: 18735
Cone/Rig: DDG1627

Depth ft	qc PS tsf	* qc1n PS -	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Ratio %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	* SPT R-N1 60%	SPT R-N 60%	* SPT IcN1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR - -	* Fin Ic %	* D50 - mm	* Ic SBT Indx	* Nk - -
0.33	183.8	294.8	294.8	183.9	0.9	5.2	0.5	6	clean SAND to silty SAND	125	5.0	59	37	46	95	48	-	-	5	0.350	1.36	16
0.49	111.4	178.7	191.8	111.6	1.2	6.6	1.1	6	clean SAND to silty SAND	125	5.0	36	22	32	86	48	-	-	7	0.350	1.75	16
0.66	55.1	88.3	152.9	55.2	1.4	4.4	2.5	5	silty SAND to sandy SILT	120	4.0	22	14	19	63	48	-	-	20	0.200	2.23	16
0.82	28.4	45.5	-	28.4	1.3	3.5	4.8	4	clayy SILT to silty CLAY	115	2.0	23	14	12	-	-	2.0	9.9	37	0.070	2.62	15
0.98	18.3	29.4	-	18.4	1.2	5.1	6.5	3	silty CLAY to CLAY	115	1.5	20	12	9	-	-	1.3	9.9	49	0.005	2.85	15
1.15	16.8	26.9	-	16.9	1.1	5.4	6.8	3	silty CLAY to CLAY	115	1.5	18	11	8	-	-	1.2	9.9	52	0.005	2.90	15
1.31	16.9	27.1	-	17.0	1.1	5.8	6.7	3	silty CLAY to CLAY	115	1.5	18	11	8	-	-	1.2	9.9	51	0.005	2.89	15
1.48	15.0	24.1	-	15.1	0.9	4.5	5.7	3	silty CLAY to CLAY	115	1.5	16	10	7	-	-	1.1	9.9	51	0.005	2.88	15
1.64	14.6	23.5	-	14.7	0.7	5.0	4.9	3	silty CLAY to CLAY	115	1.5	16	10	7	-	-	1.0	9.9	48	0.005	2.84	15
1.80	12.5	20.1	-	12.6	0.6	4.8	5.0	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.9	9.9	52	0.005	2.90	15
1.97	12.0	19.3	-	12.1	0.6	5.0	4.9	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.8	9.9	52	0.005	2.91	15
2.13	11.5	18.5	-	11.6	0.6	4.9	5.5	3	silty CLAY to CLAY	115	1.5	12	8	6	-	-	0.8	9.9	55	0.005	2.95	15
2.30	11.8	18.9	-	11.9	0.6	5.0	5.4	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.8	9.9	54	0.005	2.94	15
2.46	11.4	18.3	-	11.5	0.6	4.8	5.5	3	silty CLAY to CLAY	115	1.5	12	8	6	-	-	0.8	9.9	55	0.005	2.95	15
2.62	11.3	18.1	-	11.4	0.6	5.0	5.3	3	silty CLAY to CLAY	115	1.5	12	8	6	-	-	0.8	9.9	55	0.005	2.95	15
2.79	10.2	16.4	-	10.3	0.6	4.8	5.6	3	silty CLAY to CLAY	115	1.5	11	7	5	-	-	0.7	9.9	58	0.005	3.00	15
2.95	10.3	16.6	-	10.4	0.6	4.8	5.6	3	silty CLAY to CLAY	115	1.5	11	7	5	-	-	0.7	9.9	58	0.005	2.99	15
3.12	10.0	16.0	-	10.1	0.6	5.1	6.0	3	silty CLAY to CLAY	115	1.5	11	7	5	-	-	0.7	9.9	60	0.005	3.03	15
3.28	9.5	15.2	-	9.6	0.7	5.2	7.2	3	silty CLAY to CLAY	115	1.5	10	6	5	-	-	0.7	9.9	65	0.005	3.10	15
3.45	9.7	15.6	-	9.9	0.7	5.3	7.8	3	silty CLAY to CLAY	115	1.5	10	6	5	-	-	0.7	9.9	66	0.005	3.11	15
3.61	10.8	17.3	-	10.9	0.8	5.4	7.5	3	silty CLAY to CLAY	115	1.5	12	7	6	-	-	0.7	9.9	63	0.005	3.07	15
3.77	11.6	18.6	-	11.7	0.8	5.5	7.2	3	silty CLAY to CLAY	115	1.5	12	8	6	-	-	0.8	9.9	61	0.005	3.03	15
3.94	11.9	19.1	-	12.0	0.8	5.7	6.7	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.8	9.9	59	0.005	3.00	15
4.10	12.6	20.2	-	12.7	0.8	5.6	6.2	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.9	9.9	56	0.005	2.96	15
4.27	12.4	20.0	-	12.6	0.7	5.8	6.0	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.9	9.9	55	0.005	2.95	15
4.43	12.3	19.8	-	12.5	0.7	5.8	5.7	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.9	9.9	55	0.005	2.95	15
4.59	12.4	19.9	-	12.5	0.7	5.8	5.8	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.9	9.9	55	0.005	2.95	15
4.76	12.8	20.5	-	12.9	0.8	5.9	6.3	3	silty CLAY to CLAY	115	1.5	14	9	6	-	-	0.9	9.9	56	0.005	2.96	15
4.92	15.6	25.0	-	15.7	0.9	6.1	5.8	3	silty CLAY to CLAY	115	1.5	17	10	7	-	-	1.1	9.9	50	0.005	2.87	15
5.09	20.3	32.6	-	20.5	1.0	6.2	5.1	3	silty CLAY to CLAY	115	1.5	22	14	9	-	-	1.4	9.9	43	0.005	2.75	15
5.25	20.3	32.5	-	20.4	1.1	6.4	5.5	3	silty CLAY to CLAY	115	1.5	22	14	9	-	-	1.4	9.9	45	0.005	2.78	15
5.41	16.5	26.5	-	16.6	1.1	4.9	6.7	3	silty CLAY to CLAY	115	1.5	18	11	8	-	-	1.1	9.9	52	0.005	2.90	15
5.58	13.2	21.2	-	13.3	1.0	4.7	7.5	3	silty CLAY to CLAY	115	1.5	14	9	7	-	-	0.9	9.9	59	0.005	3.01	15
5.74	14.4	23.1	-	14.5	1.1	5.7	7.9	3	silty CLAY to CLAY	115	1.5	15	10	7	-	-	1.0	9.9	58	0.005	2.99	15
5.91	19.4	31.1	-	19.5	1.6	6.7	8.4	3	silty CLAY to CLAY	115	1.5	21	13	9	-	-	1.3	9.9	53	0.005	2.92	15
6.07	27.6	44.3	-	27.8	2.1	6.7	7.8	3	silty CLAY to CLAY	115	1.5	30	18	13	-	-	1.9	9.9	46	0.005	2.79	15
6.23	36.0	57.8	-	36.1	2.7	5.6	7.5	3	silty CLAY to CLAY	115	1.5	39	24	16	-	-	2.5	9.9	41	0.005	2.71	15
6.40	39.3	63.0	-	39.4	2.4	5.6	6.2	9	very stiff fine SOIL	120	2.0	31	20	16	52	41	-	-	36	0.250	2.62	30
6.56	36.6	57.6	180.4	36.7	1.8	5.5	4.9	4	clayy SILT to silty CLAY	115	2.0	29	18	14	-	-	2.6	9.9	34	0.070	2.57	15
6.73	26.9	43.2	-	27.1	1.3	6.5	4.9	4	clayy SILT to silty CLAY	115	2.0	22	13	11	-	-	1.9	9.9	38	0.070	2.65	15
6.89	17.5	28.1	-	17.6	1.0	6.1	5.7	3	silty CLAY to CLAY	115	1.5	19	12	8	-	-	1.2	9.9	48	0.005	2.83	15
7.05	12.4	19.9	-	12.5	0.8	4.1	6.3	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.8	9.7	57	0.005	2.98	15
7.22	12.3	19.7	-	12.4	0.7	3.8	5.8	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.8	9.4	55	0.005	2.95	15
7.38	12.7	20.3	-	12.7	0.6	3.4	4.8	3	silty CLAY to CLAY	115	1.5	14	8	6	-	-	0.9	9.5	51	0.005	2.89	15
7.55	12.0	19.2	-	12.0	0.6	3.5	5.0	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.8	8.7	53	0.005	2.92	15
7.71	9.7	15.5	-	9.8	0.6	3.3	6.6	3	silty CLAY to CLAY	115	1.5	10	6	5	-	-	0.7	6.8	64	0.005	3.07	15
7.87	9.8	15.8	-	9.9	0.6	3.2	6.9	3	silty CLAY to CLAY	115	1.5	11	7	5	-	-	0.7	6.8	64	0.005	3.08	15
8.04	12.0	19.2	-	12.0	0.7	3.4	5.8	3	silty CLAY to CLAY	115	1.5	13	8	6	-	-	0.8	8.2	56	0.005	2.97	15
8.20	15.0	24.0	-	15.1	0.7	4.4	4.8	3	silty CLAY to CLAY	115	1.5	16	10	7	-	-	1.0	9.9	48	0.005	2.84	15
8.37	13.0	20.9	-	13.1	0.8	4.3	6.1	3	silty CLAY to CLAY	115	1.5	14	9	6	-	-	0.9	8.5	55	0.005	2.95	15
8.53	14.8	23.8	-	14.9	0.8	3.7	5.7	3	silty CLAY to CLAY	115	1.5	16	10	7	-	-	1.0	9.6	51	0.005	2.89	15
8.69	22.0	35.3	-	22.1	0.9	5.2	4.2	4	clayy SILT to silty CLAY	115	2.0	18	11	9	-	-	1.5	9.9	39	0.070	2.67	15
8.86	24.2	38.9	-	24.4	1.0	7.8	4.4	4	clayy SILT to silty CLAY	115	2.0	19	12	10	-	-	1.7	9.9	38	0.070	2.65	15
9.02	24.0	38.5	-	24.2	1.1	8.5	4.6	4	clayy SILT to silty CLAY	115	2.0	19	12	10	-	-	1.7	9.9	39	0.070	2.67	15
9.19	25.4	40.7	-	25.5	1.2	8.9	4.8	4	clayy SILT to silty CLAY	115	2.0	20	13	11	-	-	1.8	9.9	39	0.070	2.67	15
9.35	26.4	42.4	-	26.6	1.3	9.4	4.8	4	clayy SILT to silty CLAY	115	2.0	21	13	11	-	-	1.8	9.9	38	0.070	2.66	15
9.51	27.2	43.7	-	27.4	1.3	9.6	5.0	4	clayy SILT to silty CLAY	115	2.0	22	14	11	-	-	1.9	9.9	38	0.070	2.66	15
9.68	27.6	44.3	-	27.8	1.4	9.6	5.3	3	silty CLAY to CLAY	115	1.5	30	18	12	-	-	1.9	9.9	39	0.005	2.67	15
9.84	27.6	44.2	-	27.8	1.4	9.8	5.3	3	silty CLAY to CLAY	115	1.5	29	18	12	-	-	1.9	9.9	39	0.005	2.67	15
10.01	27.3	43.7	-	27.4	1.5	9.5	5.5	3	silty CLAY to CLAY	115	1.5	29	18	12	-	-	1.9	9.9	40	0.005	2.69	15
10.17	25.9	41.6	-	26.1	1.5	9.4	6.0	3	silty CLAY to CLAY	115	1.5	28	17	11	-	-	1.8	9.9	42	0.005	2.73	15
10.34	24.7	39.6	-	24.9	1.5	9.7	6.1	3	silty CLAY to CLAY	115	1.5	26	16	11	-	-	1.7	9.9	43	0.005	2.75	15
10.50	23.8	38.2	-	24.0	1.4	8.8	5.9	3	silty CLAY to CLAY	115	1.5	25	16	11	-	-	1.6	9.9	43	0.005	2.75	15
10.66	22.3	35.8	-	22.5	1.2	8.9	5.3	3	silty CLAY to CLAY	115	1.5	24	15	10	-	-	1.5	9.9	43	0.005	2.74	15
10.83	21.5	34.4	-	21.7	1.0	9.1	5.0	3	silty CLAY to CLAY	115	1.5	23	14	9	-	-	1.5	9.9	42	0.005	2.73	15
10.99	20.8	32.8	-	21.0	0.9	9.4	4.7	3	silty CLAY to CLAY	115	1.5	22	14	9	-	-	1.4	9.9	42	0.005	2.73	15
11.16	19.5	30.3	-	19.7	1.0	9.1	5.2	3	silty CLAY to CLAY	115	1.5	20	13	9	-	-	1.3	9.7	45	0.005	2.78	15
11.32	19.4	29.7	-	19.6	0.9	9.0	5.0	3	silty CLAY to CLAY	115	1.5	20	13	8	-	-	1.3	9.5	45	0.005	2.78	15
11.48	20.6	31.0	-	20.7	0.9	8.8	4.4	3	silty CLAY to CLAY	115	1.5	21	14	8	-	-	1.4	9.9	42	0.005	2.73	15
11.65	21.1	31.3	-	21.3	0.9	9.1	4.2	4	clayy SILT to silty CLAY	115	2.0	16	11	8	-	-	1.4	9.9	41	0.070	2.71	15
11.81	20.7	30.4	-	20.9	0.9	9.3	4.7	3	silty CLAY to CLAY	115	1.5	20	14	8	-	-	1.4	9.7	43	0.005	2.75	15
11.98	23.1	33.4	-	23.3	1.2	9.7	5.4	3	silty CLAY to CLAY	115	1.5	22	15	9	-	-	1.6	9.9	44	0.005	2.77	15
12.14	24.5	35.0	-	24.7	1.2	9.5	5.1	3	silty CLAY to CLAY	115	1.5	23	16	10	-	-	1.7	9.9	42	0.005	2.73	15
12.30	26.7	37.6	-	26.9	1.1	9.7	4.3	4	clayy SILT to silty CLAY	115	2.0	19	13	10	-	-	1.8	9.9	38	0.070	2.66	15
12.47	24.1	33.4	-	24.3	1.0	9.9	4.2	4	clayy SILT to silty CLAY	115	2.0	17	12	9	-	-	1.7	9.9	40	0.070	2.69	15
12.63	24.8	34.0	-	25.0	1.0	9.9	4.3	4	clayy SILT to silty CLAY	115	2.0	17	12	9	-	-	1.7	9.9	40	0.070	2.69	15
12.80	23.0	31.2	-	23.2	1.2	10.0	5.4	3	silty CLAY to CLAY	115	1.5	21	15	9	-	-	1.6	9.9	45	0.005	2.79	15
12.96	25.4	33.9	-	25.6	1.4	10.7	5.6	3	silty CLAY to CLAY	115	1.5	23	17	9	-	-	1.7	9.9	44	0.005	2.77	15
13.12	32.5	42.9	-	32.7	1.6	11.4	5.0	3	silty CLAY to CLAY	115	1.5	29	22	11	-	-	2.2	9.9	39	0.005	2.67	15
13.29	36.4	47.5	-	36.7	1.8	12.3	5.0	4	clayy SILT to silty CLAY	115	2.0	24	18	12	-	-	2.5	9.9	37	0.070	2.63	15
13.45	37.0	47.7	-	37.3	1.9	12.9	5.2	3	silty CLAY to CLAY	115	1.5	32	25	12	-	-	2.6	9.9	38	0.005	2.65	15
13.62	35.9	45.7	-	36.1	1.9	12.8	5.3	3	silty CLAY to CLAY	115	1.5	30	24	12	-	-	2.5	9.9	39	0.005	2.66	15
13.78	33.7	42.4	-	34.0	1.7	12.7	5.3	3	silty CLAY to CLAY	115	1.5	28	22	11	-	-	2.3	9.9	40	0.005	2.69	15
13.94	30.7	38.2	-	31.0	1.5	13.1	5.1	3	silty CLAY to CLAY	115	1.5	25	20	10	-	-	2.1	9.9	41	0.005	2.71	15
14.11	28.7	35.5	-	29.0	1.4	13.2	4.9	3	silty CLAY to CLAY	115	1.5	24	19	10	-	-	2.0	9.9	41	0.005	2.72	15
14.27	28.7	35.3	-	29.0	1.3	13.9	4.5	4	clayy SILT to silty CLAY	115	2.0	18	14	9	-	-	2.0	9.9	40	0.070	2.69	15
14.44	28.2	34.5	-	28.5	1.2	14.1	4.5	3	silty CLAY to CLAY	115	1.5	23	19	9	-	-	1.9	9.9	41	0.005	2.70	15
14.60	27.0	32.9	-	27.3	1.1	13.8	4.4	4	clayy SILT to silty CLAY	115	2.0	16	14	9	-	-	1.9	9.9	41	0.070	2.71	15
14.76	24.9	30.1	-	25.2	1.1	14.0	4.7	3	silty CLAY to CLAY	115	1.5	20	17	8	-	-	1.7	9.6	43	0.005	2.76	15
14.93	23.6	28.5	-	23.9	1.0	13.9	4.5	3	silty CLAY to CLAY	115	1.5	19	16	8	-	-	1.6	9.0	44	0.005	2.77	15
15.09	24.8	29.7	-	25.1	1.1	14.1	4.5	3	silty CLAY to CLAY	115	1.5	20	17	8	-	-	1.7	9.5	43	0.005	2.75	15
15.26	24.6	29.3	-	24.9	1.1	14.8	4.5	3	silty CLAY to CLAY	115	1.5	20	16	8	-	-	1.7	9.3	43	0.005	2.75	15
15.42	24.4	28.9	-	24.7	1.0	14.4	4.3	3	silty CLAY to CLAY	115	1.5	19	16	8	-	-	1.7	9.2	43	0.005	2.75	15

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

. Depth ft	. qc PS tsf	* qc1n PS -	. q1ncs PS -	* qt PS tsf	. Slv Stss tsf	. pore prss (psi)	. Frct Rato %	* Mat Typ Zon	* Material Behavior Description	. Unit Wght pcf	. Qc to N	* SPT R-N1 60%	. SPT R-N 60%	* SPT IcN1 60%	* Rel Den %	* Ftn Ang deg	. Und Shr tsf	. OCR - -	* Fin Ic %	* D50 - mm	* Ic SBT Indx	* Nk - -
15.58	24.2	28.5	-	24.5	0.9	14.6	3.9	4	clayy SILT to silty CLAY	115	2.0	14	12	8	-	-	1.7	9.1	42	0.070	2.72	15
15.75	23.4	27.4	-	23.7	0.8	14.7	3.7	4	clayy SILT to silty CLAY	115	2.0	14	12	7	-	-	1.6	8.7	41	0.070	2.72	15
15.91	22.6	26.3	-	22.9	0.8	14.9	3.6	4	clayy SILT to silty CLAY	115	2.0	13	11	7	-	-	1.5	8.3	42	0.070	2.72	15
16.08	22.7	26.4	-	23.0	0.8	15.2	3.8	4	clayy SILT to silty CLAY	115	2.0	13	11	7	-	-	1.5	8.3	43	0.070	2.74	15
16.24	23.7	27.3	-	24.0	0.8	15.3	3.6	4	clayy SILT to silty CLAY	115	2.0	14	12	7	-	-	1.6	8.7	41	0.070	2.71	15
16.40	23.6	27.1	-	23.9	0.8	15.1	3.6	4	clayy SILT to silty CLAY	115	2.0	14	12	7	-	-	1.6	8.6	41	0.070	2.72	15
16.57	22.5	25.7	-	22.8	0.9	15.5	4.3	3	silty CLAY to CLAY	115	1.5	17	15	7	-	-	1.5	8.1	45	0.005	2.78	15
16.73	22.7	25.8	-	23.0	1.0	15.4	4.5	3	silty CLAY to CLAY	115	1.5	17	15	7	-	-	1.5	8.2	46	0.005	2.80	15
16.90	23.5	26.6	-	23.8	1.0	15.0	4.3	3	silty CLAY to CLAY	115	1.5	18	16	7	-	-	1.6	8.4	45	0.005	2.78	15
17.06	22.9	25.8	-	23.2	0.9	15.7	4.2	3	silty CLAY to CLAY	115	1.5	17	15	7	-	-	1.6	8.1	45	0.005	2.78	15
17.23	22.9	25.6	-	23.2	0.8	15.9	3.8	4	clayy SILT to silty CLAY	115	2.0	13	11	7	-	-	1.6	8.1	43	0.070	2.75	15
17.39	23.0	25.7	-	23.3	0.8	16.0	3.7	4	clayy SILT to silty CLAY	115	2.0	13	11	7	-	-	1.6	8.1	43	0.070	2.74	15
17.55	22.9	25.4	-	23.2	0.9	16.6	4.0	3	silty CLAY to CLAY	115	1.5	17	15	7	-	-	1.6	8.0	44	0.005	2.77	15
17.72	23.8	26.3	-	24.1	1.2	16.8	5.4	3	silty CLAY to CLAY	115	1.5	18	16	8	-	-	1.6	8.3	48	0.005	2.84	15
17.88	26.8	29.5	-	27.1	1.7	17.1	6.4	3	silty CLAY to CLAY	115	1.5	20	18	9	-	-	1.8	9.4	50	0.005	2.86	15
18.05	35.5	38.8	-	35.8	2.2	17.2	6.5	3	silty CLAY to CLAY	115	1.5	26	24	11	-	-	2.4	9.9	45	0.005	2.78	15
18.21	40.0	43.7	-	40.4	3.2	16.3	8.1	3	silty CLAY to CLAY	115	1.5	29	27	12	-	-	2.8	9.9	47	0.005	2.82	15
18.37	90.9	91.9	228.6	91.2	4.5	18.3	5.0	9	very stiff fine SOIL	120	2.0	46	45	22	64	40	-	-	28	0.250	2.44	30
18.54	134.4	135.6	306.3	134.7	7.6	16.6	5.7	9	very stiff fine SOIL	120	2.0	68	67	31	77	42	-	-	26	0.250	2.39	30
18.70	172.8	173.9	314.8	173.0	8.0	12.9	4.7	9	very stiff fine SOIL	120	2.0	87	86	38	85	44	-	-	21	0.250	2.25	30
18.87	122.1	122.6	297.6	122.2	7.2	5.3	5.9	9	very stiff fine SOIL	120	2.0	61	61	29	74	42	-	-	28	0.250	2.43	30
19.03	71.8	76.4	-	72.0	5.0	8.1	7.1	9	very stiff fine SOIL	120	2.0	38	36	20	58	39	-	-	36	0.250	2.61	30
19.19	49.6	52.4	-	49.9	5.4	18.5	9.9	3	silty CLAY to CLAY	115	1.5	35	33	15	-	-	3.4	9.9	48	0.005	2.83	15
19.36	80.4	84.7	-	81.0	5.9	29.1	7.4	9	very stiff fine SOIL	120	2.0	42	40	22	62	40	-	-	35	0.250	2.60	30
19.52	143.8	143.0	325.0	144.3	8.5	23.8	5.9	9	very stiff fine SOIL	120	2.0	72	72	33	79	43	-	-	26	0.250	2.39	30
19.69	190.8	189.2	346.0	191.3	9.5	25.9	5.0	9	very stiff fine SOIL	120	2.0	95	95	41	88	44	-	-	21	0.250	2.26	30
19.85	201.3	199.2	361.6	201.7	10.2	20.4	5.1	9	very stiff fine SOIL	120	2.0	100	100	43	90	44	-	-	21	0.250	2.26	30
20.01	168.9	166.7	356.6	169.4	10.0	23.0	6.0	9	very stiff fine SOIL	120	2.0	83	84	38	84	43	-	-	25	0.250	2.36	30
20.18	149.7	147.4	353.0	150.2	9.8	24.1	6.6	9	very stiff fine SOIL	120	2.0	74	75	35	80	43	-	-	27	0.250	2.42	30
20.34	116.1	114.1	354.4	116.5	9.5	19.4	8.2	9	very stiff fine SOIL	120	2.0	57	58	29	71	41	-	-	34	0.250	2.56	30
20.51	121.8	119.4	364.4	122.4	10.0	26.7	8.3	9	very stiff fine SOIL	120	2.0	60	61	30	73	42	-	-	33	0.250	2.55	30
20.67	187.6	183.4	335.4	188.9	9.1	67.3	4.9	9	very stiff fine SOIL	120	2.0	92	94	40	87	44	-	-	21	0.250	2.26	30
20.83	193.4	188.6	319.5	194.4	8.4	49.4	4.4	9	very stiff fine SOIL	120	2.0	94	97	40	88	44	-	-	19	0.250	2.21	30
21.00	191.0	185.8	292.6	191.5	7.1	25.7	3.7	8	stiff SAND to clayy SAND	115	1.0	100	100	39	-	-	12.6	9.9	18	0.250	2.16	16
21.16	188.1	182.6	287.7	188.4	6.9	17.2	3.7	8	stiff SAND to clayy SAND	115	1.0	100	100	38	-	-	12.4	9.9	18	0.250	2.16	16
21.33	167.5	162.2	319.9	168.0	8.5	26.2	5.1	9	very stiff fine SOIL	120	2.0	81	84	36	83	43	-	-	23	0.250	2.31	30
21.49	177.2	171.2	312.2	177.6	8.2	24.2	4.7	9	very stiff fine SOIL	120	2.0	86	89	37	85	43	-	-	21	0.250	2.26	30
21.65	162.2	156.4	278.8	162.9	6.8	32.1	4.2	9	very stiff fine SOIL	120	2.0	78	81	34	82	43	-	-	21	0.250	2.24	30
21.82	103.0	99.1	217.1	103.9	4.3	42.9	4.3	9	very stiff fine SOIL	120	2.0	50	52	23	67	41	-	-	25	0.250	2.37	30
21.98	74.6	71.6	207.0	77.8	3.8	167.5	5.2	4	clayy SILT to silty CLAY	115	2.0	36	37	18	-	-	5.2	9.9	32	0.070	2.52	15
22.15	64.5	62.7	-	67.4	4.9	149.1	7.8	9	very stiff fine SOIL	120	2.0	31	32	17	52	38	-	-	40	0.250	2.70	30
22.31	104.4	99.7	234.5	105.1	5.0	34.8	4.8	9	very stiff fine SOIL	120	2.0	50	52	23	67	41	-	-	27	0.250	2.41	30
22.47	80.9	77.2	215.9	81.4	4.2	23.4	5.2	4	clayy SILT to silty CLAY	115	2.0	39	40	19	-	-	5.6	9.9	31	0.070	2.51	15
22.64	44.1	42.3	-	44.8	2.4	37.7	5.6	3	silty CLAY to CLAY	115	1.5	28	29	11	-	-	3.0	9.9	41	0.005	2.71	15
22.80	35.9	34.3	-	37.2	1.4	67.4	4.0	4	clayy SILT to silty CLAY	115	2.0	17	18	9	-	-	2.5	9.9	39	0.070	2.67	15
22.97	34.2	32.6	-	35.5	1.4	67.7	4.3	4	clayy SILT to silty CLAY	115	2.0	16	17	9	-	-	2.3	9.9	41	0.070	2.71	15
23.13	34.7	32.9	-	36.0	1.5	68.0	4.4	3	silty CLAY to CLAY	115	1.5	22	23	9	-	-	2.4	9.9	41	0.005	2.71	15
23.30	38.8	36.6	-	39.8	1.6	51.1	4.2	4	clayy SILT to silty CLAY	115	2.0	18	19	10	-	-	2.7	9.9	38	0.070	2.66	15
23.46	38.4	36.1	-	39.5	1.6	53.7	4.4	4	clayy SILT to silty CLAY	115	2.0	18	19	10	-	-	2.6	9.9	39	0.070	2.68	15
23.62	39.4	36.9	-	40.4	1.8	51.6	4.6	3	silty CLAY to CLAY	115	1.5	25	26	10	-	-	2.7	9.9	40	0.005	2.69	15
23.79	40.1	37.4	-	41.1	1.9	51.0	4.9	3	silty CLAY to CLAY	115	1.5	25	27	10	-	-	2.8	9.9	41	0.005	2.70	15
23.95	38.2	35.4	-	39.1	1.9	46.4	5.3	3	silty CLAY to CLAY	115	1.5	24	25	10	-	-	2.6	9.9	43	0.005	2.74	15
24.12	35.4	32.8	-	36.2	1.9	38.7	5.7	3	silty CLAY to CLAY	115	1.5	22	24	9	-	-	2.4	9.9	46	0.005	2.79	15
24.28	31.5	29.0	-	32.2	1.8	36.0	6.1	3	silty CLAY to CLAY	115	1.5	19	21	8	-	-	2.1	9.1	49	0.005	2.85	15
24.44	30.3	27.8	-	31.0	1.7	35.0	6.0	3	silty CLAY to CLAY	115	1.5	19	20	8	-	-	2.1	8.8	50	0.005	2.86	15
24.61	29.9	27.3	-	30.5	1.6	34.4	5.5	3	silty CLAY to CLAY	115	1.5	18	20	8	-	-	2.0	8.6	48	0.005	2.84	15
24.77	29.7	27.1	-	30.3	1.6	30.3	5.6	3	silty CLAY to CLAY	115	1.5	18	20	8	-	-	2.0	8.5	49	0.005	2.85	15
24.94	30.3	27.5	-	30.9	1.6	29.6	5.5	3	silty CLAY to CLAY	115	1.5	18	20	8	-	-	2.1	8.6	48	0.005	2.84	15
25.10	31.9	28.8	-	32.4	1.6	26.3	5.3	3	silty CLAY to CLAY	115	1.5	19	21	8	-	-	2.2	9.1	47	0.005	2.81	15
25.26	32.8	29.5	-	33.3	1.7	27.5	5.5	3	silty CLAY to CLAY	115	1.5	20	22	8	-	-	2.2	9.3	47	0.005	2.82	15
25.43	33.1	29.7	-	33.7	1.8	26.8	5.7	3	silty CLAY to CLAY	115	1.5	20	22	9	-	-	2.3	9.4	47	0.005	2.82	15
25.59	37.4	33.4	-	38.0	1.9	27.8	5.3	3	silty CLAY to CLAY	115	1.5	22	25	9	-	-	2.6	9.9	44	0.005	2.76	15
25.76	37.5	33.4	-	38.1	2.4	28.8	6.6	3	silty CLAY to CLAY	115	1.5	22	25	10	-	-	2.6	9.9	48	0.005	2.83	15
25.92	40.2	35.6	-	40.8	3.0	30.4	7.6	3	silty CLAY to CLAY	115	1.5	24	27	10	-	-	2.8	9.9	49	0.005	2.86	15
26.08	55.7	49.2	-	56.3	3.9	28.1	7.1	3	silty CLAY to CLAY	115	1.5	33	37	13	-	-	3.9	9.9	43	0.005	2.74	15
26.25	54.8	48.2	-	55.3	4.7	26.0	8.9	3	silty CLAY to CLAY	115	1.5	32	37	14	-	-	3.8	9.9	47	0.005	2.82	15
26.41	73.7	64.5	-	74.2	5.5	28.4	7.6	9	very stiff fine SOIL	120	2.0	32	37	17	53	38	-	-	40	0.250	2.68	30
26.58	88.0	76.8	-	88.5	6.8	24.8	7.9	9	very stiff fine SOIL	120	2.0	38	44	20	58	39	-	-	38	0.250	2.65	30
26.74	90.8	78.9	-	91.2	6.6	21.3	7.4	9	very stiff fine SOIL	120	2.0	39	45	20	59	39	-	-	36	0.250	2.62	30
26.90	83.5	72.2	-	83.9	6.1	22.2	7.4	9	very stiff fine SOIL	120	2.0	36	42	19	56	39	-	-	38	0.250	2.64	30
27.07	63.0	54.3	-	63.5	4.4	28.1	7.1	3	silty CLAY to CLAY	115	1.5	36	42	15	-	-	4.4	9.9	41	0.005	2.71	15
27.23	51.3	44.0	-	51.9	2.8	29.6	5.7	3	silty CLAY to CLAY	115	1.5	29	34	12	-	-	3.5	9.9	40	0.005	2.70	15
27.40	35.0	29.9	-	35.6	1.5	33.4	4.4	3	silty CLAY to CLAY	115	1.5	20	23	8	-	-	2.4	9.4	43	0.005	2.75	15
27.56	29.5	25.2	-	30.5	1.4	47.9	5.1	3	silty CLAY to CLAY	115	1.5	17	20	7	-	-	2.0	7.9	48	0.005	2.84	15
27.72	32.8	27.8	-	33.8	1.9	51.6	6.2	3	silty CLAY to CLAY	115	1.5	19	22	8	-	-	2.2	8.7	50	0.005	2.87	15
27.89	38.2	32.3	-	39.3	2.2	54.3	6.1	3	silty CLAY to CLAY	115	1.5	22	25	9	-	-	2.6	9.9	47	0.005	2.82	15
28.05	56.9	50.8	157.2	57.9	2.3	51.7	4.2	4	clayy SILT to silty CLAY	115	2.0	25	28	13	-	-	3.9	9.9	33	0.070	2.56	15
28.22	43.8	36.7	-	44.7	2.2	49.7	5.2	3	silty CLAY to CLAY	115	1.5	24	29	10	-	-	3.0	9.9	42	0.005	2.73	15
28.38	42.8	35.8	-	43.9	2.0	53.5	4.7	3	silty CLAY to CLAY	115	1.5	24	29	10	-	-	2.9	9.9	41	0.005	2.71	15
28.54	42.1	35.1	-	43.2	1.5	56.0	3.7	4	clayy SILT to silty CLAY	115	2.0	18	21	9	-	-	2.9	9.9	37	0.070	2.64	15
28.71	33.8	28.1	-	34.8	1.3	48.7	4.1	3	silty CLAY to CLAY	115	1.5	19	23	8	-	-	2.3	8.8	43	0.005	2.75	15
28.87	30.1	24.9	-	31.2	1.7	55.0	6.1	3	silty CLAY to CLAY	115	1.5	17	20	7	-	-	2.0	7.8	52	0.005	2.90	15
29.04	32.2	26.5	-	33.3	1.9	57.2	6.2	3	silty CLAY to CLAY	115	1.5	18	21	8	-	-	2.2	8.3	51	0.005	2.89	15
29.20	48.8	40.1	-	49.9	2.0	55.2	4.2	4	clayy SILT to silty CLAY	115	2.0	20	24	10	-	-	3.4	9.9	37	0.070	2.63	15
29.36	39.1	32.0	-	39.9	1.8	42.1	4.9	3	silty CLAY to CLAY	115	1.5	21	26	9	-	-	2.7	9.9	44	0.005	2.76	15
29.53	34.9	28.5	-	35.8	1.7	46.1	5.2	3	silty CLAY to CLAY	115	1.5	19	23	8	-	-	2.4	8.9	47	0.005	2.81	15
29.69	37.7	30.7	-	38.6	1.6	43.8	4.6	3	silty CLAY to CLAY	115	1.5	20	25	8	-	-	2.6	9.7	43	0.005	2.75	15
29.86	37.4	30.3	-	38.1	2.5	37.5	6.9	3	silty CLAY to CLAY	115	1.5	20	25	9	-	-	2.6	9.5	51	0.005	2.88	15
30.02	37.8	30.5	-	38.6	3.5	42.3	9.7	3	silty CLAY to CLAY	115	1.5	20	25	10	-	-	2.6	9.6	57	0.005	2.98	15
30.19	74.0	59.6	-	74.8	5.1	37.3	7.1	3	silty CLAY to CLAY	115	1.5	40	49	16	-	-	5.1	9.9	40	0.005	2.68	15
30.35	87.7	70.4	-	88.4	6.5	31.3	7.6	9	very stiff fine SOIL	120	2.0	35	44	19	55	39	-	-	38	0.250	2.66	30
30.51	126.7	110.0	290.6	127.2	7.8	28.0	6.2	9	very stiff fine SOIL	120	2.0	55	63	26	70	41	-	-	30	0.250	2.47	30
30.68	198.0	171.6	318.6	198.3	9.4	13.4	4.8	9	very stiff fine SOIL	120	2.0	86	99	38	85	43	-	-	21	0.250	2.27	30
30.84	166.7	144.2	303.1	167.0	8.7	16.7	5.3	9	very stiff fine SOIL	120	2.0	72	83	33	79	42	-	-	24	0.250	2.35	30

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Construction Testing Services
Data File: SDF(320).cpt
CPT Date: 7/21/2022 4:13:39 PM
GW During Test: 14 ft

Sounding No: CPT-02
Project No: 18735
Cone/Rig: DDG1627

Depth ft	qc PS tsf	* qc1n PS -	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Ratio %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	* SPT R-N1 60%	SPT R-N 60%	* SPT IcN1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR - -	* Fin Ic %	* D50 - mm	* Ic SBT Indx	* Nk - -
31.01	117.4	101.3	258.1	117.6	6.4	14.3	5.6	9	very stiff fine SOIL	120	2.0	51	59	24	67	40	-	-	29	0.250	2.45	30
31.17	79.7	68.6	217.1	80.1	4.5	25.3	5.7	4	clayy SILT to silty CLAY	115	2.0	34	40	17	-	-	5.5	9.9	34	0.070	2.57	15
31.33	49.2	38.6	-	50.0	2.0	41.9	4.2	4	clayy SILT to silty CLAY	115	2.0	19	25	10	-	-	3.4	9.9	38	0.070	2.65	15
31.50	41.1	32.2	-	42.3	1.5	57.5	3.9	4	clayy SILT to silty CLAY	115	2.0	16	21	9	-	-	2.8	9.9	40	0.070	2.69	15
31.66	38.8	30.3	-	40.2	1.4	69.2	3.9	4	clayy SILT to silty CLAY	115	2.0	15	19	8	-	-	2.7	9.5	41	0.070	2.71	15
31.83	36.1	28.1	-	37.6	1.5	76.6	4.3	3	silty CLAY to CLAY	115	1.5	19	24	8	-	-	2.5	8.8	44	0.005	2.76	15
31.99	34.9	27.0	-	36.4	1.4	74.8	4.3	3	silty CLAY to CLAY	115	1.5	18	23	8	-	-	2.4	8.4	44	0.005	2.77	15
32.15	34.1	26.3	-	35.6	1.4	74.2	4.3	3	silty CLAY to CLAY	115	1.5	18	23	7	-	-	2.3	8.2	45	0.005	2.78	15
32.32	33.2	25.6	-	34.7	1.2	75.0	4.0	4	clayy SILT to silty CLAY	115	2.0	13	17	7	-	-	2.3	8.0	44	0.070	2.77	15
32.48	32.1	24.6	-	33.5	1.3	71.4	4.3	3	silty CLAY to CLAY	115	1.5	16	21	7	-	-	2.2	7.6	46	0.005	2.80	15
32.65	30.7	23.5	-	32.1	1.6	69.6	5.5	3	silty CLAY to CLAY	115	1.5	16	20	7	-	-	2.1	7.3	51	0.005	2.89	15
32.81	34.8	26.5	-	36.1	2.2	69.5	6.7	3	silty CLAY to CLAY	115	1.5	18	23	8	-	-	2.4	8.3	53	0.005	2.91	15
32.97	45.6	34.6	-	47.1	3.7	74.7	8.5	3	silty CLAY to CLAY	115	1.5	23	30	10	-	-	3.1	9.9	52	0.005	2.90	15
33.14	52.8	39.9	-	54.1	5.4	66.0	9.9	3	silty CLAY to CLAY	115	1.5	27	35	12	-	-	3.6	9.9	53	0.005	2.91	15
33.30	98.0	73.9	-	99.1	6.8	54.4	7.1	9	very stiff fine SOIL	120	2.0	37	49	19	57	39	-	-	36	0.250	2.62	30
33.47	130.8	110.1	313.1	131.3	9.0	24.8	7.0	9	very stiff fine SOIL	120	2.0	55	65	27	70	40	-	-	31	0.250	2.51	30
33.63	196.6	165.2	313.7	197.1	9.5	29.7	4.9	9	very stiff fine SOIL	120	2.0	83	98	36	84	43	-	-	22	0.250	2.28	30
33.79	154.3	129.4	314.3	154.6	9.4	14.1	6.1	9	very stiff fine SOIL	120	2.0	65	77	30	76	41	-	-	28	0.250	2.43	30
33.96	118.1	98.9	227.2	118.7	5.3	30.6	4.6	9	very stiff fine SOIL	120	2.0	49	59	23	67	40	-	-	26	0.250	2.40	30
34.12	84.2	70.4	178.3	84.7	3.3	28.5	4.1	4	clayy SILT to silty CLAY	115	2.0	35	42	17	-	-	5.9	9.9	29	0.070	2.45	15
34.29	48.5	35.8	-	49.9	2.1	72.2	4.5	4	clayy SILT to silty CLAY	115	2.0	18	24	10	-	-	3.3	9.9	40	0.070	2.69	15
34.45	44.2	32.5	-	45.7	2.1	76.5	5.0	3	silty CLAY to CLAY	115	1.5	22	29	9	-	-	3.0	9.9	44	0.005	2.76	15
34.61	44.3	32.5	-	46.1	2.3	89.7	5.5	3	silty CLAY to CLAY	115	1.5	22	30	9	-	-	3.0	9.9	45	0.005	2.79	15
34.78	49.7	36.3	-	51.5	2.5	91.3	5.2	3	silty CLAY to CLAY	115	1.5	24	33	10	-	-	3.4	9.9	42	0.005	2.73	15
34.94	47.9	34.9	-	49.5	2.4	80.9	5.2	3	silty CLAY to CLAY	115	1.5	23	32	10	-	-	3.3	9.9	43	0.005	2.75	15
35.11	46.3	33.7	-	47.8	2.2	76.1	4.9	3	silty CLAY to CLAY	115	1.5	22	31	9	-	-	3.2	9.9	43	0.005	2.74	15
35.27	47.1	34.1	-	48.7	2.0	81.2	4.4	4	clayy SILT to silty CLAY	115	2.0	17	24	9	-	-	3.2	9.9	41	0.070	2.70	15
35.43	43.4	31.3	-	45.3	1.8	99.2	4.4	3	silty CLAY to CLAY	115	1.5	21	29	9	-	-	3.0	9.8	42	0.005	2.73	15
35.60	42.4	30.5	-	44.2	1.8	94.5	4.5	3	silty CLAY to CLAY	115	1.5	20	28	8	-	-	2.9	9.6	43	0.005	2.75	15
35.76	42.0	30.1	-	43.9	1.9	99.1	4.7	3	silty CLAY to CLAY	115	1.5	20	28	8	-	-	2.9	9.5	44	0.005	2.76	15
35.93	42.6	30.5	-	44.5	2.2	96.4	5.5	3	silty CLAY to CLAY	115	1.5	20	28	9	-	-	2.9	9.6	46	0.005	2.81	15
36.09	46.3	33.0	-	48.2	2.8	97.4	6.2	3	silty CLAY to CLAY	115	1.5	22	31	9	-	-	3.2	9.9	47	0.005	2.82	15
36.26	55.0	39.1	-	56.9	2.9	96.1	5.5	3	silty CLAY to CLAY	115	1.5	26	37	11	-	-	3.8	9.9	42	0.005	2.73	15
36.42	57.3	40.6	-	58.5	2.8	61.3	5.0	3	silty CLAY to CLAY	115	1.5	27	38	11	-	-	3.9	9.9	40	0.005	2.69	15
36.58	50.8	35.9	-	52.5	2.3	86.7	4.7	3	silty CLAY to CLAY	115	1.5	24	34	10	-	-	3.5	9.9	41	0.005	2.71	15
36.75	45.5	32.1	-	48.0	1.8	128.3	4.2	4	clayy SILT to silty CLAY	115	2.0	16	23	9	-	-	3.1	9.9	41	0.070	2.71	15
36.91	43.2	30.4	-	45.6	1.8	122.9	4.4	3	silty CLAY to CLAY	115	1.5	20	29	8	-	-	3.0	9.5	43	0.005	2.74	15
37.08	39.5	27.7	-	41.9	2.0	120.2	5.3	3	silty CLAY to CLAY	115	1.5	18	26	8	-	-	2.7	8.6	48	0.005	2.83	15
37.24	39.3	27.5	-	41.4	2.0	107.0	5.5	3	silty CLAY to CLAY	115	1.5	18	26	8	-	-	2.7	8.6	48	0.005	2.84	15
37.40	39.7	27.7	-	41.8	2.0	105.0	5.3	3	silty CLAY to CLAY	115	1.5	18	26	8	-	-	2.7	8.6	48	0.005	2.83	15
37.57	40.0	27.8	-	42.1	1.9	105.5	5.1	3	silty CLAY to CLAY	115	1.5	19	27	8	-	-	2.7	8.7	47	0.005	2.82	15
37.73	40.8	28.2	-	43.0	2.1	110.9	5.5	3	silty CLAY to CLAY	115	1.5	19	27	8	-	-	2.8	8.8	48	0.005	2.83	15
37.90	41.9	28.9	-	44.1	2.3	111.9	5.9	3	silty CLAY to CLAY	115	1.5	19	28	8	-	-	2.9	9.0	49	0.005	2.84	15
38.06	43.7	30.1	-	45.5	2.4	91.4	5.9	3	silty CLAY to CLAY	115	1.5	20	29	9	-	-	3.0	9.4	48	0.005	2.83	15
38.22	43.3	29.7	-	45.3	3.0	101.1	7.2	3	silty CLAY to CLAY	115	1.5	20	29	9	-	-	3.0	9.3	52	0.005	2.90	15
38.39	48.3	33.0	-	50.2	3.9	98.5	8.5	3	silty CLAY to CLAY	115	1.5	22	32	10	-	-	3.3	9.9	53	0.005	2.92	15
38.55	61.3	41.8	-	62.5	3.9	63.2	6.7	3	silty CLAY to CLAY	115	1.5	28	41	12	-	-	4.2	9.9	44	0.005	2.77	15
38.72	56.0	38.1	-	56.9	3.2	43.3	6.0	3	silty CLAY to CLAY	115	1.5	25	37	11	-	-	3.9	9.9	44	0.005	2.76	15
38.88	43.1	29.2	-	44.1	2.1	54.3	5.2	3	silty CLAY to CLAY	115	1.5	19	29	8	-	-	2.9	9.1	46	0.005	2.80	15
39.04	36.3	24.6	-	38.2	1.8	95.3	5.3	3	silty CLAY to CLAY	115	1.5	16	24	7	-	-	2.5	7.6	50	0.005	2.86	15
39.21	34.1	23.0	-	36.1	2.1	98.3	6.7	3	silty CLAY to CLAY	115	1.5	15	23	7	-	-	2.3	7.1	56	0.005	2.96	15
39.37	39.3	26.4	-	41.2	3.0	98.3	8.2	3	silty CLAY to CLAY	115	1.5	18	26	8	-	-	2.7	8.2	57	0.005	2.98	15
39.54	63.7	42.7	-	65.6	3.6	97.9	5.9	3	silty CLAY to CLAY	115	1.5	28	42	12	-	-	4.4	9.9	42	0.005	2.72	15
39.70	60.8	40.6	-	61.7	2.9	49.3	4.9	3	silty CLAY to CLAY	115	1.5	27	41	11	-	-	4.2	9.9	39	0.005	2.68	15
39.86	42.2	28.1	-	43.1	2.1	45.6	5.3	3	silty CLAY to CLAY	115	1.5	19	28	8	-	-	2.9	8.8	47	0.005	2.82	15
40.03	30.1	20.0	-	31.7	1.3	81.4	4.8	3	silty CLAY to CLAY	115	1.5	13	20	6	-	-	2.0	6.1	53	0.005	2.91	15
40.19	32.5	21.5	-	34.2	1.2	88.1	4.0	3	silty CLAY to CLAY	115	1.5	14	22	6	-	-	2.2	6.6	48	0.005	2.83	15
40.36	29.4	19.4	-	31.3	1.1	97.7	4.2	3	silty CLAY to CLAY	115	1.5	13	20	6	-	-	2.0	5.9	51	0.005	2.88	15
40.52	26.8	17.6	-	28.6	0.9	93.7	3.8	3	silty CLAY to CLAY	115	1.5	12	18	5	-	-	1.8	5.3	52	0.005	2.89	15
40.68	25.3	16.6	-	27.0	0.9	87.7	3.9	3	silty CLAY to CLAY	115	1.5	11	17	5	-	-	1.7	5.0	53	0.005	2.92	15
40.85	24.9	16.3	-	26.7	0.9	93.6	4.1	3	silty CLAY to CLAY	115	1.5	11	17	5	-	-	1.6	4.9	55	0.005	2.95	15
41.01	25.5	16.7	-	27.4	1.0	94.3	4.5	3	silty CLAY to CLAY	115	1.5	11	17	5	-	-	1.7	5.0	56	0.005	2.96	15
41.18	29.5	19.2	-	31.4	1.0	100.4	3.6	3	silty CLAY to CLAY	115	1.5	13	20	6	-	-	2.0	5.8	49	0.005	2.85	15
41.34	31.6	20.5	-	33.6	1.0	99.3	3.4	3	silty CLAY to CLAY	115	1.5	14	21	6	-	-	2.1	6.3	46	0.005	2.81	15
41.50	30.5	19.7	-	32.6	0.9	107.6	3.3	3	silty CLAY to CLAY	115	1.5	13	20	6	-	-	2.0	6.0	47	0.005	2.82	15
41.67	27.4	17.7	-	29.2	1.0	95.7	4.0	3	silty CLAY to CLAY	115	1.5	12	18	5	-	-	1.8	5.3	52	0.005	2.90	15
41.83	30.0	19.3	-	32.1	1.0	106.1	3.5	3	silty CLAY to CLAY	115	1.5	13	20	6	-	-	2.0	5.9	48	0.005	2.84	15
42.00	30.2	19.4	-	32.2	1.0	101.4	3.6	3	silty CLAY to CLAY	115	1.5	13	20	6	-	-	2.0	5.9	49	0.005	2.84	15
42.16	30.3	19.4	-	32.4	1.0	108.8	3.7	3	silty CLAY to CLAY	115	1.5	13	20	6	-	-	2.0	5.9	49	0.005	2.85	15
42.32	29.8	19.0	-	31.9	1.0	108.3	3.8	3	silty CLAY to CLAY	115	1.5	13	20	6	-	-	2.0	5.8	50	0.005	2.87	15
42.49	30.6	19.5	-	32.8	1.1	108.1	3.8	3	silty CLAY to CLAY	115	1.5	13	20	6	-	-	2.1	5.9	49	0.005	2.85	15
42.65	30.9	19.6	-	33.2	1.1	114.9	3.8	3	silty CLAY to CLAY	115	1.5	13	21	6	-	-	2.1	6.0	49	0.005	2.85	15
42.82	31.8	20.1	-	34.0	1.1	115.2	3.8	3	silty CLAY to CLAY	115	1.5	13	21	6	-	-	2.1	6.1	49	0.005	2.85	15
42.98	33.1	20.9	-	35.5	1.1	121.0	3.6	3	silty CLAY to CLAY	115	1.5	14	22	6	-	-	2.2	6.4	47	0.005	2.82	15
43.15	34.7	21.9	-	37.2	1.1	128.1	3.6	3	silty CLAY to CLAY	115	1.5	15	23	6	-	-	2.3	6.7	46	0.005	2.80	15
43.31	37.8	23.8	-	40.6	1.2	138.8	3.5	4	clayy SILT to silty CLAY	115	2.0	12	19	7	-	-	2.6	7.3	44	0.070	2.76	15
43.47	41.4	25.9	-	44.3	1.4	150.0	3.7	4	clayy SILT to silty CLAY	115	2.0	13	21	7	-	-	2.8	8.0	43	0.070	2.74	15
43.64	45.2	28.3	-	48.3	1.6	156.3	3.6	4	clayy SILT to silty CLAY	115	2.0	14	23	8	-	-	3.1	8.8	41	0.070	2.71	15
43.80	49.3	30.7	-	52.5	2.1	165.0	4.4	3	silty CLAY to CLAY	115	1.5	20	33	8	-	-	3.4	9.6	43	0.005	2.74	15
43.97	51.7	32.1	-	55.0	2.7	168.1	5.5	3	silty CLAY to CLAY	115	1.5	21	34	9	-	-	3.5	9.9	45	0.005	2.79	15
44.13	47.3	29.3	-	49.8	3.7	127.2	8.3	3	silty CLAY to CLAY	115	1.5	20	32	9	-	-	3.2	9.2	55	0.005	2.95	15
44.29	78.2	48.3	-	80.9	5.4	137.2	7.1	3	silty CLAY to CLAY	115	1.5	32	52	13	-	-	5.4	9.9	43	0.005	2.75	15
44.46	122.0	93.0	253.5	122.9	6.9	45.3	5.8	9	very stiff fine SOIL	120	2.0	47	61	23	65	39	-	-	30	0.250	2.49	30
44.62	114.4	87.1	247.0	115.3	6.5	46.3	5.8	9	very stiff fine SOIL	120	2.0	44	57	21	62	39	-	-	31	0.250	2.51	30
44.79	90.1	55.2	-	91.0	6.7	43.7	7.6	3	silty CLAY to CLAY	115	1.5	37	60	15	-	-	6.3	9.9	42	0.005	2.73	15
44.95	75.0	45.9	-	76.3	5.8	66.8	8.0	3	silty CLAY to CLAY	115	1.5	31	50	13	-	-	5.2	9.9	46	0.005	2.80	15
45.11	90.4	55.1	-	91.2	4.7	41.6	5.3	4	clayy SILT to silty CLAY	115	2.0	28	45	14	-	-	6.3	9.9	36	0.070	2.61	15
45.28	59.9	36.5	-	60.8	3.3	42.5	5.8	3	silty CLAY to CLAY	115	1.5	24	40	10	-	-	4.1	9.9	44	0.005	2.76	15
45.44	45.5	27.6	-	47.5	2.2	102.1	5.2	3	silty CLAY to CLAY	115	1.5	18	30	8	-	-	3.1	8.6	47	0.005	2.82	15
45.61	43.8	26.5	-	46.3	1.8	124.7	4.4	3	silty CLAY to CLAY	115	1.5	18	29	7	-	-	3.0	8.2	45	0.005	2.79	15
45.77	42.8	25.8	-	45.5	1.9	137.3	4.6	3	silty CLAY to CLAY	115	1.5	17	29	7	-	-	2.9	8.0	47	0.005	2.81	15
45.93	42.0	25.3	-	44.7	1.9	140.0	4.7	3	silty CLAY to CLAY	115	1.5	17	28	7	-	-	2.9	7.8	47	0.005	2.83	15
46.10	42.9	25.8	-	45.5	1.9	131.6	4.6	3	silty CLAY to CLAY	115	1.5	17	29	7	-	-	2.9	8.0	47	0.005	2.81	15
46.26	43.0	25.7	-	45.5	1.8	130.0	4.5	3	silty CLAY to CLAY	115	1.5	17	29	7	-	-	2.9	8.0	46	0.005	2.80	15

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

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Project ID: Construction Testing Services
Data File: SDF(320).cpt
CPT Date: 7/21/2022 4:13:39 PM
GW During Test: 14 ft

Sounding ID: CPT-02
Project No: 18735
Cone/Rig: DDG1627

Depth ft	qc PS tsf	* qc1n PS -	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Ratio %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	* SPT R-N1 60%	SPT R-N 60%	* SPT IcN1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR -	* Fin Ic %	* D50 - mm	* Ic SBT Indx	* Nk -
46.43	42.9	25.6	-	45.4	1.7	124.3	4.3	3	silty CLAY to CLAY	115	1.5	17	29	7	-	-	2.9	7.9	46	0.005	2.80	15
46.59	42.5	25.3	-	45.0	1.8	128.1	4.6	3	silty CLAY to CLAY	115	1.5	17	28	7	-	-	2.9	7.8	47	0.005	2.82	15
46.75	41.6	24.7	-	43.9	1.9	118.3	4.9	3	silty CLAY to CLAY	115	1.5	16	28	7	-	-	2.8	7.6	49	0.005	2.85	15
46.92	40.6	24.1	-	42.8	1.7	110.4	4.4	3	silty CLAY to CLAY	115	1.5	16	27	7	-	-	2.8	7.4	47	0.005	2.82	15
47.08	39.9	23.6	-	41.9	1.8	103.8	4.9	3	silty CLAY to CLAY	115	1.5	16	27	7	-	-	2.7	7.2	50	0.005	2.86	15
47.25	37.2	21.9	-	39.2	1.7	104.9	4.8	3	silty CLAY to CLAY	115	1.5	15	25	7	-	-	2.5	6.7	51	0.005	2.88	15
47.41	29.8	17.5	-	31.5	1.5	89.8	5.5	3	silty CLAY to CLAY	115	1.5	12	20	6	-	-	2.0	5.2	58	0.005	3.00	15
47.57	32.3	18.9	-	34.2	1.3	99.8	4.5	3	silty CLAY to CLAY	115	1.5	13	22	6	-	-	2.2	5.7	53	0.005	2.91	15
47.74	29.5	17.3	-	31.5	1.2	100.8	4.5	3	silty CLAY to CLAY	115	1.5	12	20	5	-	-	2.0	5.2	55	0.005	2.95	15
47.90	29.5	17.2	-	31.6	1.2	103.2	4.5	3	silty CLAY to CLAY	115	1.5	11	20	5	-	-	2.0	5.2	55	0.005	2.95	15
48.07	30.6	17.8	-	32.7	1.2	107.5	4.3	3	silty CLAY to CLAY	115	1.5	12	20	5	-	-	2.0	5.3	54	0.005	2.93	15
48.23	30.9	17.9	-	32.9	1.2	103.9	4.3	3	silty CLAY to CLAY	115	1.5	12	21	5	-	-	2.1	5.4	53	0.005	2.92	15
48.39	31.2	18.1	-	33.2	1.3	106.1	4.4	3	silty CLAY to CLAY	115	1.5	12	21	6	-	-	2.1	5.4	54	0.005	2.93	15
48.56	32.1	18.6	-	34.4	1.6	116.2	5.3	3	silty CLAY to CLAY	115	1.5	12	21	6	-	-	2.1	5.6	56	0.005	2.97	15
48.72	35.1	20.3	-	37.3	1.8	108.8	5.5	3	silty CLAY to CLAY	115	1.5	14	23	6	-	-	2.4	6.1	55	0.005	2.95	15
48.89	39.4	22.7	-	41.4	2.1	100.6	5.6	3	silty CLAY to CLAY	115	1.5	15	26	7	-	-	2.7	6.9	53	0.005	2.91	15
49.05	40.2	23.0	-	42.0	2.5	94.8	6.6	3	silty CLAY to CLAY	115	1.5	15	27	7	-	-	2.7	7.1	56	0.005	2.96	15
49.22	48.3	27.6	-	50.7	2.8	123.0	6.1	3	silty CLAY to CLAY	115	1.5	18	32	8	-	-	3.3	8.6	50	0.005	2.87	15
49.38	58.5	33.4	-	60.4	2.7	94.7	4.9	3	silty CLAY to CLAY	115	1.5	22	39	9	-	-	4.0	9.9	43	0.005	2.74	15
49.54	53.2	30.3	-	55.2	2.6	102.4	5.2	3	silty CLAY to CLAY	115	1.5	20	35	9	-	-	3.6	9.5	45	0.005	2.79	15
49.71	47.0	26.7	-	49.5	2.8	124.5	6.4	3	silty CLAY to CLAY	115	1.5	18	31	8	-	-	3.2	8.3	52	0.005	2.90	15
49.87	52.9	29.9	-	56.1	3.9	164.6	7.9	3	silty CLAY to CLAY	115	1.5	20	35	9	-	-	3.6	9.3	54	0.005	2.93	15
50.04	65.9	37.3	-	67.3	5.1	69.4	8.1	3	silty CLAY to CLAY	115	1.5	25	44	11	-	-	4.5	9.9	50	0.005	2.87	15
50.20	80.6	45.4	-	82.2	5.2	80.3	6.7	3	silty CLAY to CLAY	115	1.5	30	54	13	-	-	5.6	9.9	43	0.005	2.75	15
50.36	67.4	37.9	-	68.3	4.0	45.8	6.2	3	silty CLAY to CLAY	115	1.5	25	45	11	-	-	4.6	9.9	45	0.005	2.78	15
50.53	51.4	28.8	-	52.7	2.5	69.5	5.1	3	silty CLAY to CLAY	115	1.5	19	34	8	-	-	3.5	9.0	46	0.005	2.80	15
50.69	42.0	23.5	-	44.7	2.0	134.9	5.0	3	silty CLAY to CLAY	115	1.5	16	28	7	-	-	2.8	7.2	50	0.005	2.87	15
50.86	42.9	24.0	-	46.3	1.9	174.4	4.7	3	silty CLAY to CLAY	115	1.5	16	29	7	-	-	2.9	7.4	49	0.005	2.84	15
51.02	43.8	24.4	-	47.1	2.0	165.9	4.8	3	silty CLAY to CLAY	115	1.5	16	29	7	-	-	3.0	7.5	48	0.005	2.84	15
51.18	43.8	24.3	-	47.2	2.1	176.4	5.1	3	silty CLAY to CLAY	115	1.5	16	29	7	-	-	3.0	7.5	50	0.005	2.86	15
51.35	44.4	24.6	-	47.9	2.0	182.9	4.9	3	silty CLAY to CLAY	115	1.5	16	30	7	-	-	3.0	7.6	49	0.005	2.85	15
51.51	45.7	25.3	-	49.0	2.1	168.5	4.9	3	silty CLAY to CLAY	115	1.5	17	30	7	-	-	3.1	7.8	48	0.005	2.84	15
51.68	45.3	25.0	-	48.6	2.3	168.0	5.3	3	silty CLAY to CLAY	115	1.5	17	30	7	-	-	3.1	7.7	50	0.005	2.86	15
51.84	46.0	25.3	-	49.2	2.3	162.0	5.4	3	silty CLAY to CLAY	115	1.5	17	31	7	-	-	3.1	7.8	50	0.005	2.87	15
52.00	47.1	25.8	-	50.0	2.5	147.5	5.7	3	silty CLAY to CLAY	115	1.5	17	31	8	-	-	3.2	8.0	50	0.005	2.87	15
52.17	46.9	25.7	-	49.9	2.5	154.4	5.8	3	silty CLAY to CLAY	115	1.5	17	31	8	-	-	3.2	7.9	51	0.005	2.88	15
52.33	46.8	25.6	-	49.7	2.6	147.5	5.9	3	silty CLAY to CLAY	115	1.5	17	31	8	-	-	3.2	7.9	51	0.005	2.89	15
52.50	45.6	24.9	-	48.4	2.5	139.3	5.8	3	silty CLAY to CLAY	115	1.5	17	30	7	-	-	3.1	7.7	51	0.005	2.89	15
52.66	42.4	23.0	-	44.7	2.4	117.9	6.1	3	silty CLAY to CLAY	115	1.5	15	28	7	-	-	2.9	7.1	54	0.005	2.93	15
52.82	44.8	24.3	-	47.7	2.4	151.1	5.7	3	silty CLAY to CLAY	115	1.5	16	30	7	-	-	3.0	7.5	52	0.005	2.90	15
52.99	44.5	24.1	-	47.6	2.4	155.9	5.9	3	silty CLAY to CLAY	115	1.5	16	30	7	-	-	3.0	7.4	52	0.005	2.91	15
53.15	45.6	24.6	-	48.5	2.5	150.5	5.8	3	silty CLAY to CLAY	115	1.5	16	30	7	-	-	3.1	7.6	52	0.005	2.90	15
53.32	46.5	25.1	-	49.5	2.4	151.8	5.6	3	silty CLAY to CLAY	115	1.5	17	31	7	-	-	3.2	7.7	51	0.005	2.88	15
53.48	45.8	24.6	-	48.7	2.3	150.8	5.4	3	silty CLAY to CLAY	115	1.5	16	31	7	-	-	3.1	7.6	51	0.005	2.88	15
53.64	44.7	24.0	-	48.1	2.2	174.9	5.4	3	silty CLAY to CLAY	115	1.5	16	30	7	-	-	3.0	7.4	51	0.005	2.88	15
53.81	44.3	23.7	-	47.5	2.3	164.7	5.7	3	silty CLAY to CLAY	115	1.5	16	30	7	-	-	3.0	7.3	52	0.005	2.90	15
53.97	44.0	23.5	-	47.3	2.8	168.8	6.9	3	silty CLAY to CLAY	115	1.5	16	29	7	-	-	3.0	7.2	56	0.005	2.96	15
54.14	45.8	24.4	-	49.2	3.5	171.0	8.3	3	silty CLAY to CLAY	115	1.5	16	31	8	-	-	3.1	7.5	59	0.005	3.01	15
54.30	53.9	28.7	-	56.6	3.5	137.8	6.9	3	silty CLAY to CLAY	115	1.5	19	36	9	-	-	3.7	8.9	52	0.005	2.90	15
54.46	65.2	34.6	-	66.8	3.2	79.9	5.2	3	silty CLAY to CLAY	115	1.5	23	43	10	-	-	4.5	9.9	43	0.005	2.75	15
54.63	49.6	26.2	-	50.8	2.2	58.2	4.7	3	silty CLAY to CLAY	115	1.5	17	33	7	-	-	3.4	8.1	47	0.005	2.81	15
54.79	37.0	19.5	-	39.2	2.0	112.5	5.8	3	silty CLAY to CLAY	115	1.5	13	25	6	-	-	2.5	5.9	57	0.005	2.98	15
54.96	37.1	19.5	-	39.7	1.9	132.9	5.6	3	silty CLAY to CLAY	115	1.5	13	25	6	-	-	2.5	5.9	56	0.005	2.97	15
55.12	35.9	18.9	-	38.5	1.9	131.1	5.7	3	silty CLAY to CLAY	115	1.5	13	24	6	-	-	2.4	5.7	57	0.005	2.98	15
55.28	36.2	19.0	-	39.6	1.8	170.8	5.3	3	silty CLAY to CLAY	115	1.5	13	24	6	-	-	2.4	5.7	56	0.005	2.96	15
55.45	34.0	17.8	-	37.5	1.6	182.3	5.1	3	silty CLAY to CLAY	115	1.5	12	23	6	-	-	2.3	5.3	57	0.005	2.98	15
55.61	32.4	16.9	-	35.6	1.5	166.2	5.2	3	silty CLAY to CLAY	115	1.5	11	22	5	-	-	2.2	5.0	58	0.005	3.00	15
55.78	31.8	16.6	-	35.4	1.5	181.4	5.1	3	silty CLAY to CLAY	115	1.5	11	21	5	-	-	2.1	4.9	58	0.005	3.00	15
55.94	32.9	17.1	-	36.4	1.5	178.0	5.1	3	silty CLAY to CLAY	115	1.5	11	22	5	-	-	2.2	5.1	58	0.005	2.99	15
56.11	32.5	16.9	-	35.9	1.6	174.1	5.5	3	silty CLAY to CLAY	115	1.5	11	22	5	-	-	2.2	5.0	59	0.005	3.01	15
56.27	33.7	17.4	-	37.1	1.6	174.8	5.4	3	silty CLAY to CLAY	115	1.5	12	22	6	-	-	2.2	5.2	58	0.005	2.99	15
56.43	36.6	18.9	-	40.3	1.7	186.1	5.2	3	silty CLAY to CLAY	115	1.5	13	24	6	-	-	2.5	5.7	56	0.005	2.96	15
56.60	38.8	20.0	-	42.3	2.0	181.9	5.5	3	silty CLAY to CLAY	115	1.5	13	26	6	-	-	2.6	6.0	55	0.005	2.95	15
56.76	39.8	20.4	-	43.3	1.8	176.7	5.0	3	silty CLAY to CLAY	115	1.5	14	27	6	-	-	2.7	6.2	53	0.005	2.92	15
56.93	40.0	20.5	-	43.3	1.8	169.3	4.8	3	silty CLAY to CLAY	115	1.5	14	27	6	-	-	2.7	6.2	52	0.005	2.91	15
57.09	39.0	20.0	-	42.0	1.7	153.6	4.7	3	silty CLAY to CLAY	115	1.5	13	26	6	-	-	2.6	6.0	53	0.005	2.91	15
57.25	35.4	18.1	-	38.5	1.7	154.8	5.3	3	silty CLAY to CLAY	115	1.5	12	24	6	-	-	2.4	5.4	57	0.005	2.98	15
57.42	35.1	17.9	-	38.3	1.7	163.4	5.4	3	silty CLAY to CLAY	115	1.5	12	23	6	-	-	2.3	5.3	58	0.005	2.99	15
57.58	35.6	18.1	-	38.6	1.7	153.0	5.4	3	silty CLAY to CLAY	115	1.5	12	24	6	-	-	2.4	5.4	57	0.005	2.98	15
57.75	35.4	17.9	-	38.7	1.7	169.4	5.4	3	silty CLAY to CLAY	115	1.5	12	24	6	-	-	2.4	5.4	57	0.005	2.98	15
57.91	36.0	18.2	-	39.5	1.8	177.4	5.4	3	silty CLAY to CLAY	115	1.5	12	24	6	-	-	2.4	5.5	57	0.005	2.98	15
58.07	38.1	19.3	-	41.4	1.9	166.4	5.4	3	silty CLAY to CLAY	115	1.5	13	25	6	-	-	2.6	5.8	56	0.005	2.96	15
58.24	39.9	20.1	-	43.3	1.9	170.1	5.3	3	silty CLAY to CLAY	115	1.5	13	27	6	-	-	2.7	6.1	55	0.005	2.94	15
58.40	40.4	20.3	-	43.9	2.0	175.6	5.3	3	silty CLAY to CLAY	115	1.5	14	27	6	-	-	2.7	6.1	54	0.005	2.94	15
58.57	40.9	20.5	-	44.2	2.0	172.5	5.3	3	silty CLAY to CLAY	115	1.5	14	27	6	-	-	2.7	6.2	54	0.005	2.93	15
58.73	41.4	20.7	-	44.9	2.0	179.0	5.3	3	silty CLAY to CLAY	115	1.5	14	28	6	-	-	2.8	6.3	54	0.005	2.93	15
58.89	42.2	21.1	-	45.8	2.1	184.0	5.3	3	silty CLAY to CLAY	115	1.5	14	28	6	-	-	2.8	6.4	54	0.005	2.93	15
59.06	43.0	21.4	-	46.6	2.2	183.0	5.4	3	silty CLAY to CLAY	115	1.5	14	29	7	-	-	2.9	6.5	54	0.005	2.92	15
59.22	43.6	21.7	-	47.0	2.2	175.0	5.5	3	silty CLAY to CLAY	115	1.5	14	29	7	-	-	2.9	6.6	54	0.005	2.93	15
59.39	43.7	21.7	-	47.2	2.2	176.1	5.5	3	silty CLAY to CLAY	115	1.5	14	29	7	-	-	2.9	6.6	53	0.005	2.92	15
59.55	43.5	21.5	-	47.0	2.1	179.2	5.2	3	silty CLAY to CLAY	115	1.5	14	29	7	-	-	2.9	6.5	53	0.005	2.91	15
59.71	43.9	21.7	-	47.6	2.1	188.3	5.1	3	silty CLAY to CLAY	115	1.5	14	29	7	-	-	3.0	6.6	52	0.005	2.90	15
59.88	44.2	21.8	-	47.9	2.1	190.9	5.2	3	silty CLAY to CLAY	115	1.5	15	29	7	-	-	3.0	6.6	52	0.005	2.90	15
60.04	43.2	21.3	-	47.0	2.0	194.7	5.1	3	silty CLAY to CLAY	115	1.5	14	29	6	-	-	2.9	6.5	52	0.005	2.91	15
60.21	45.0	22.1	-	48.5	2.2	179.6	5.2	3	silty CLAY to CLAY	115	1.5	15	30	7	-	-	3.0	6.7	52	0.005	2.90	15
60.37	45.1	22.1	-	49.5	2.3	226.2	5.5	3	silty CLAY to CLAY	115	1.5	15	30	7	-	-	3.0	6.7	53	0.005	2.92	15
60.53	47.4	23.2	-	51.3	2.5	201.8	5.7	3	silty CLAY to CLAY	115	1.5	15	32	7	-	-	3.2	7.1	53	0.005	2.91	15
60.70	47.9	23.4	-	52.1	2.6	213.5	5.8	3	silty CLAY to CLAY	115	1.5	16	32	7	-	-	3.2	7.2	53	0.005	2.91	15
60.86	48.3	23.5	-	52.4	2.7	210.6	6.1	3	silty CLAY to CLAY	115	1.5	16	32	7	-	-	3.3	7.2	54	0.005	2.93	15
61.03	47.4	23.0	-	51.8	2.7	224.9	6.2	3	silty CLAY to CLAY	115	1.5	15	32	7	-	-	3.2	7.0	55	0.005	2.94	15
61.19	48.1	23.3	-	52.1	2.7	201.8	6.2	3	silty CLAY to CLAY	115	1.5	16	32	7	-	-	3.3	7.1	54	0.005	2.93	15
61.35	46.3	22.4	-	50.5	2.6	212.7	6.0	3	silty CLAY to CLAY	115	1.5	15	31	7	-	-	3.1	6.8	54	0.005	2.94	15
61.52	45.8	22.1	-	49.9	2.7	209.0	6.3	3	silty CLAY to CLAY	115	1.5	15	31	7	-	-	3.1	6.7	56	0.005	2.96	15
61.68	47.2	22.7	-	51.3	2.8	208.1	6.5	3	silty CLAY to CLAY	115	1.5	15	31	7	-	-	3.2	6.9	56	0.005	2.96	15

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Construction Testing Services
Data File: SDF(320).cpt
CPT Date: 7/21/2022 4:13:39 PM
GW During Test: 14 ft

Sounding ID: CPT-02
Project No: 18735
Cone/Rig: DDG1627

Depth ft	qc PS tsf	* qc1n PS -	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	* SPT R-N1 60%	SPT R-N 60%	* SPT IcN1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR -	* Fin Ic %	* D50 - mm	* Ic SBT Indx	* Nk -
61.85	49.6	23.8	-	52.6	2.9	156.0	6.4	3	silty CLAY to CLAY	115	1.5	16	33	7	-	-	3.4	7.3	54	0.005	2.94	15
62.01	48.8	23.4	-	52.1	2.6	168.5	5.7	3	silty CLAY to CLAY	115	1.5	16	33	7	-	-	3.3	7.2	52	0.005	2.91	15
62.17	48.0	23.0	-	51.3	2.3	167.2	5.2	3	silty CLAY to CLAY	115	1.5	15	32	7	-	-	3.2	7.0	51	0.005	2.89	15
62.34	44.0	21.0	-	47.7	2.3	191.3	5.8	3	silty CLAY to CLAY	115	1.5	14	29	7	-	-	3.0	6.4	55	0.005	2.95	15
62.50	43.8	20.9	-	47.5	2.1	187.8	5.2	3	silty CLAY to CLAY	115	1.5	14	29	6	-	-	2.9	6.3	53	0.005	2.92	15
62.67	46.4	22.1	-	49.9	2.0	176.6	4.8	3	silty CLAY to CLAY	115	1.5	15	31	7	-	-	3.1	6.7	51	0.005	2.88	15
62.83	45.5	21.6	-	49.2	2.0	189.4	4.8	3	silty CLAY to CLAY	115	1.5	14	30	6	-	-	3.1	6.6	51	0.005	2.89	15
63.00	43.1	20.4	-	46.9	1.8	195.8	4.7	3	silty CLAY to CLAY	115	1.5	14	29	6	-	-	2.9	6.2	52	0.005	2.90	15

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Construction Testing Services

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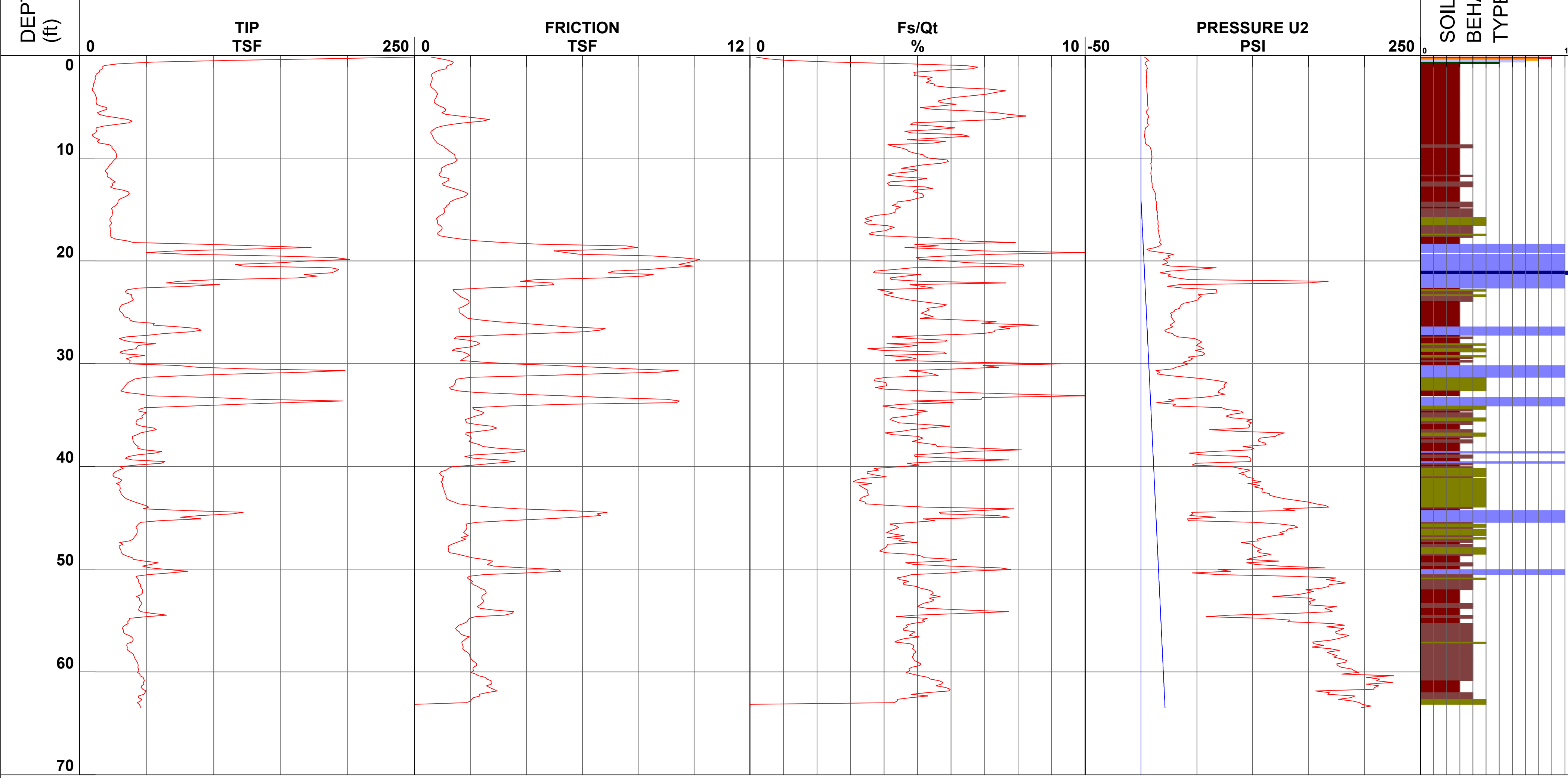
Project	African American Hollister Resources Cen	Operator	JM-GM
Job Number	18735	Cone Number	DDG1627
Hole Number	CPT-02	Date and Time	7/21/2022 4:13:39 PM
EST GW Depth During Test			14.00 ft

Filename	SDF(320).cpt
GPS	
Maximum Depth	63.48 ft

Net Area Ratio .8

CPT DATA



- 1 - sensitive fine grained
- 2 - organic material
- 3 - clay
- 4 - silty clay to clay
- 5 - clayey silt to silty clay
- 6 - sandy silt to clayey silt
- 7 - silty sand to sandy silt
- 8 - sand to silty sand
- 9 - sand
- 10 - gravelly sand to sand
- 11 - very stiff fine grained (*)
- 12 - sand to clayey sand (*)

Cone Size 15cm squared

S*Soil behavior type and SPT based on data from UBC-1983

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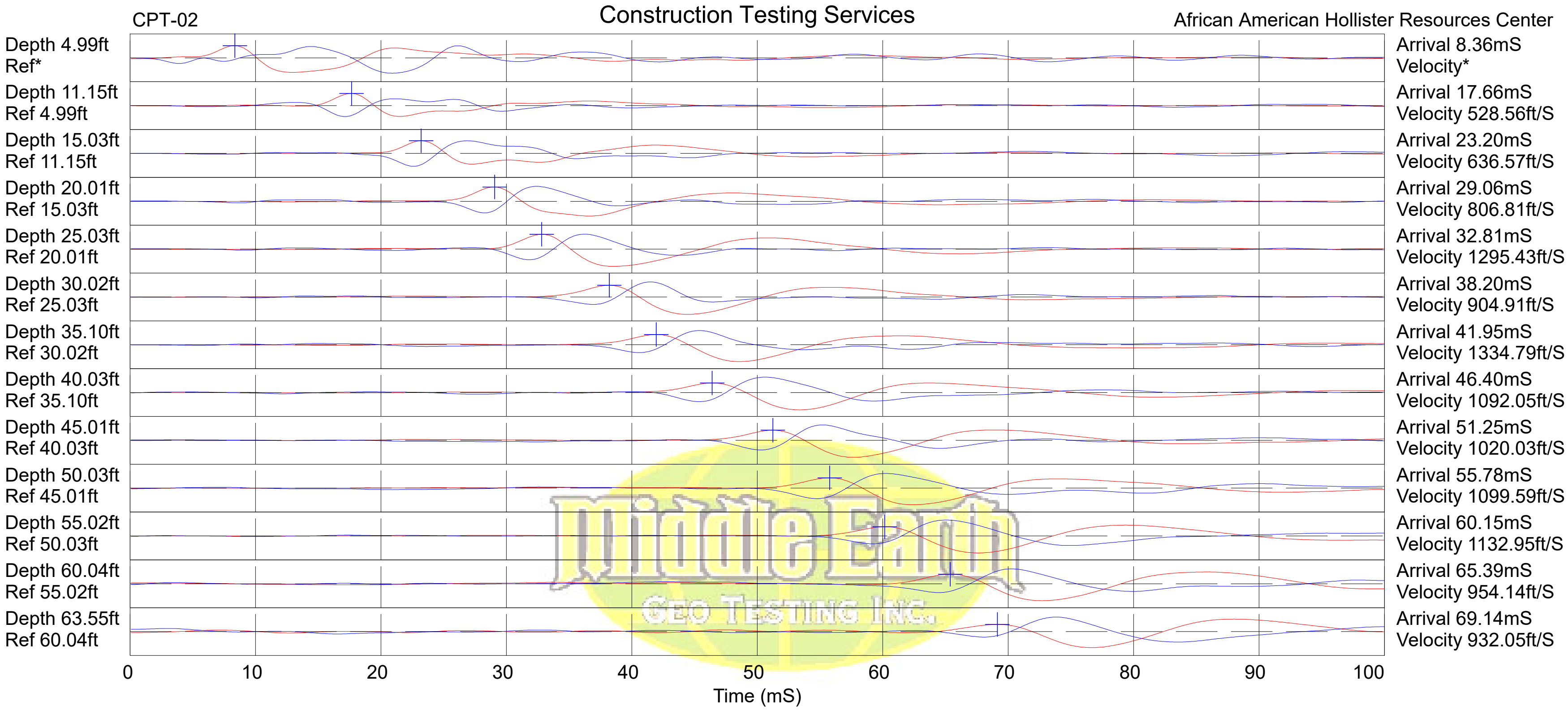

Hammer to Rod String Distance (ft): 5.83
* = Not Determined

COMMENT:

APPENDIX B
LABORATORY TESTING

Classification
Soils were classified in accordance with the Unified Soil Classification System (USCS) in general accordance with ASTM D 2488 and modified as necessary in general accordance with ASTM D 2487 based on laboratory results. The classifications are indicated on the boring logs in Appendix A.

Moisture Tests
The moisture content and dry density of relatively undisturbed samples obtained from the exploratory borings were evaluated in general accordance with ASTM D 2937. The test results are indicated on the boring logs in Appendix A.

Atterberg Limits
Tests were performed on selected representative fine-grained soil samples to evaluate the liquid limit, plastic limit, and plasticity index in general accordance with ASTM D 4318.

Particle Size Distribution
Gradation analysis testing was performed on selected representative soil samples in general accordance with ASTM D 6913 and D 1140.

Expansion Index
Expansion Index testing was performed on selected representative soil samples in general accordance with ASTM D 4829.

Evaluation for Soil Corrosion
Evaluation for soil corrosion was performed on a selected representative soil sample in general accordance with CA DOT Test #643 for pH and minimum resistivity, CA DOT Test #417 for sulfate, and CA DOT Test #422 for chloride.

Construction Testing Services
2118 Rheem Drive
Pleasanton, CA 94588
Telephone: 925-462-5151

SUMMARY OF LABORATORY RESULTS

CLIENT City of Berkeley

PROJECT NAME African American Hollistic Resource Center

PROJECT NUMBER 18735

PROJECT LOCATION 1890 Alcatraz Ave, Berkeley, CA

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Unconfined Compressive Strength (tsf)
B-1	1.0	51	18	33	9.5	54	CH				
B-1	3.0				9.5	81	CL				
B-1	4.0				9.5	92	CL				
B-1	6.0				9.5	85	CL				
B-2	1.0	66	16	50	25	67	CH				
B-2	3.5				19	40	SC				

Construction Testing Services
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Pleasanton, CA 94588
Telephone: 925-462-5151

ATTERBERG LIMITS' RESULTS

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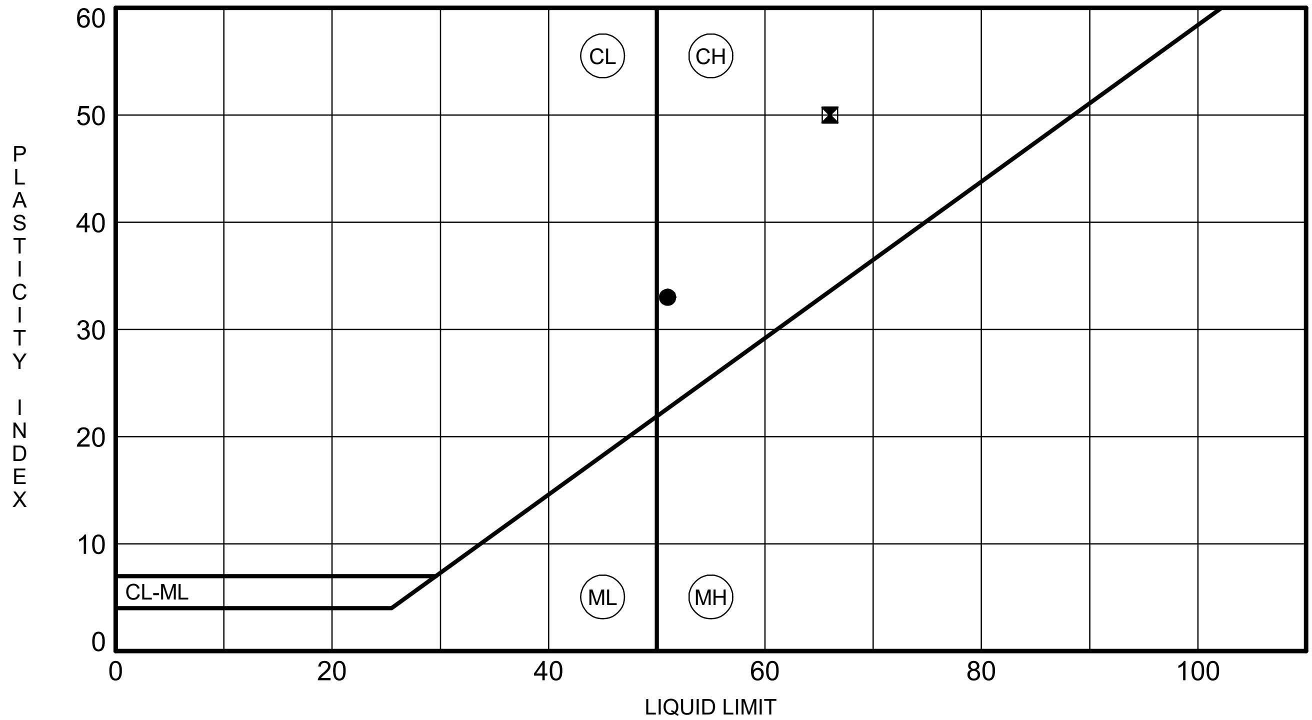
PROJECT NAME African American Hollistic Resource Center

PROJECT NUMBER 18735

PROJECT LOCATION 1890 Alcatraz Ave, Berkeley, CA



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**B-1**	**1.0**	**51**	**18**	**33**	**54**	**CH**
⊠	**B-2**	**1.0**	**66**	**16**	**50**	**67**	**CH**

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GRAIN SIZE DISTRIBUTION

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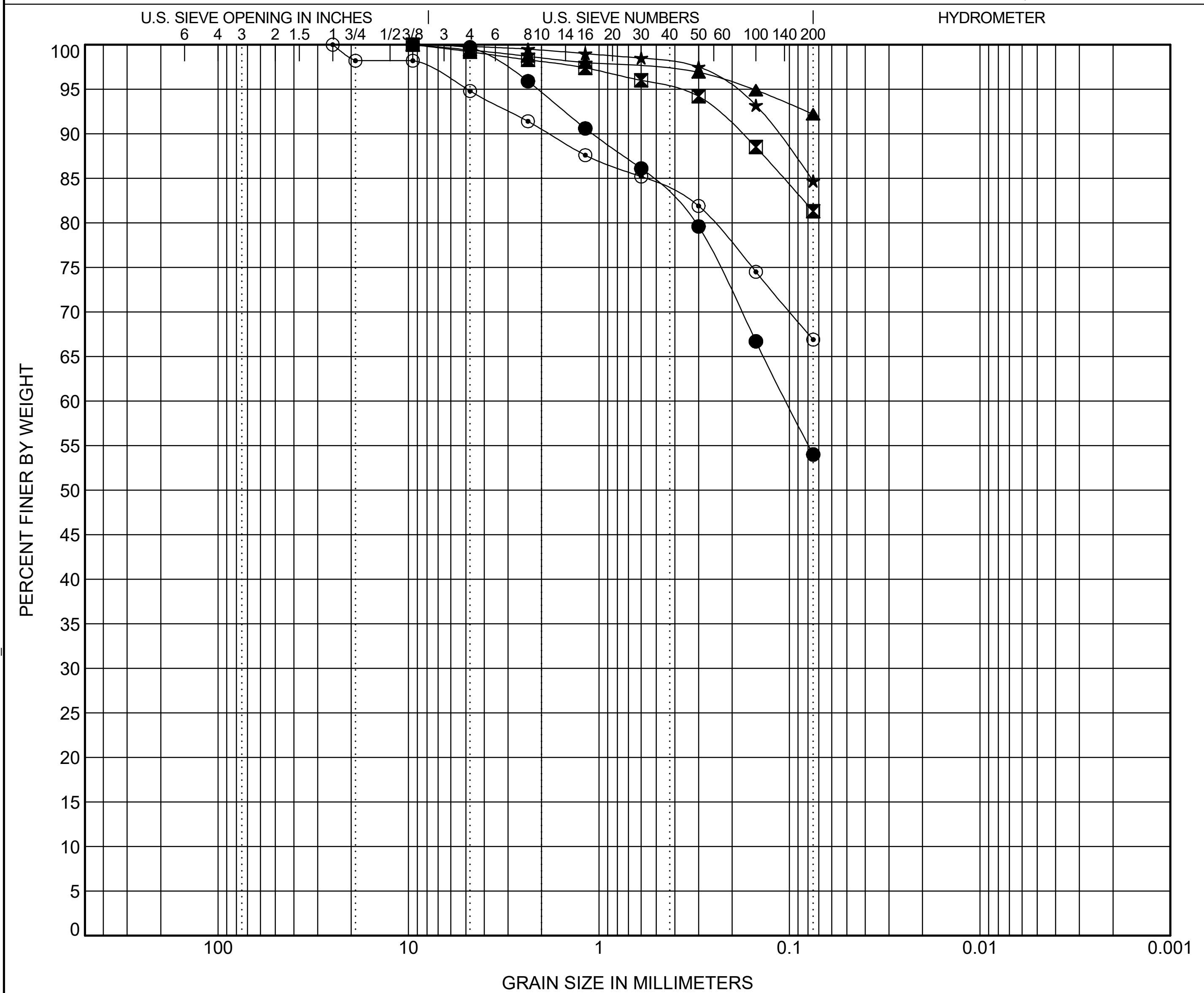

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-1	1.0	CH	51	18	33		
⊠	B-1	3.0	CL					
▲	B-1	4.0	CL					
★	B-1	6.0	CL					
⊙	B-2	1.0	CH	66	16	50		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1	1.0	9.5	0.104			0.3	45.7	54.0	
⊠	B-1	3.0	9.5				0.8	17.9	81.3	
▲	B-1	4.0	9.5				0.6	7.2	92.2	
★	B-1	6.0	9.5				0.2	15.1	84.7	
⊙	B-2	1.0	25				5.2	27.9	66.9	

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GRAIN SIZE DISTRIBUTION

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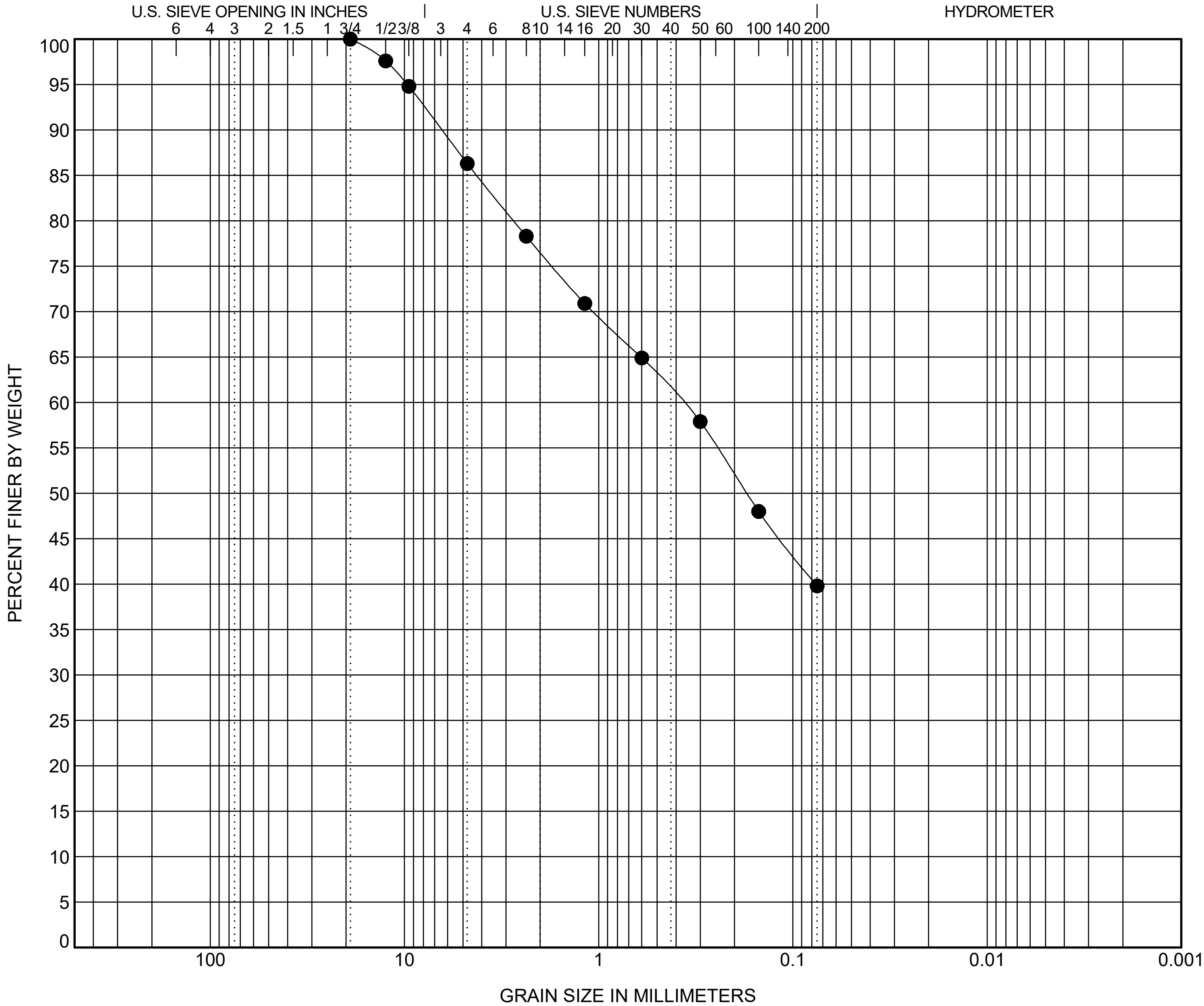

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-2**	**3.5**	**SC**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-2**	**3.5**	**19**	**0.369**			**13.7**	**46.5**	**39.8**	

CONSTRUCTION TESTING SERVICES

Expansion Index

Test Performed in General Accordance with ☑ ASTM D 4829-08 ☐ UBC 29-2

Project Name:	AAHRC	**CTS Job No.**	18735
Project Location:	7/21/2022	**Log #**	248573
Date Sampled:	7/22/2022	**Sample Description:**	Fat Clay
Date Tested:	8/4/2022	**Sampled by:**	G. Lynch
Tested By:	M. Mahurin		

Measured

Expansion Index (EI)	112
Molding Water Content (%)	13.35%
Final Water Content (%)	16.47%
Initial Dry Density (pcf)	121.1

Comments

Expansion Index determined by adjusting water content to achieve a degree of saturation of 48-52%.

Classification of Potentially Expansive Soil

Expansion Index, EI	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>130	Very High

Tested by: M. Mahurin	Reviewed by: Gavin Lynch
Title: Senior Lab Tech	Title: Staff Engineer
Date: 8/6/2022	Date: 8/12/2022

Limitations: Testing was performed by qualified personnel in accordance with specification requirements, but please note this report shall not be relied upon by others, as acceptance or guarantee of the work. Even with diligent testing and inspection techniques, the contractor is solely liable for defects or failures to adhere to the code. This report is applicable only to the items listed herein.

2118 Rheem Drive, Suite A, Pleasanton, CA 94588 | (925) 462-5151 office | (925) 462-5183 fax
4770 Duckhorn Drive, Sacramento, CA 95834 | (916) 419-4747 office | (916) 419-4774 fax

CONSTRUCTION TESTING SERVICES

Expansion Index

Test Performed in General Accordance with ☑ ASTM D 4829-08 ☐ UBC 29-2

Project Name:	AAHRC	**CTS Job No.**	18735
Project Location:	7/21/2022	**Log #**	248578
Date Sampled:	7/22/2022	**Sample Description:**	Fat Clay
Date Tested:	8/8/2022	**Sampled by:**	G. Lynch
Tested By:	M. Mahurin		

Measured

Expansion Index (EI)	122
Molding Water Content (%)	15.84%
Final Water Content (%)	19.22%
Initial Dry Density (pcf)	119.9

Comments

Expansion Index determined by adjusting water content to achieve a degree of saturation of 48-52%.

Classification of Potentially Expansive Soil

Expansion Index, EI	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>130	Very High

Tested by: M. Mahurin	Reviewed by: Gavin Lynch
Title: Senior Lab Tech	Title: Staff Engineer
Date: 8/12/2022	Date: 8/15/2022

Limitations: Testing was performed by qualified personnel in accordance with specification requirements, but please note this report shall not be relied upon by others, as acceptance or guarantee of the work. Even with diligent testing and inspection techniques, the contractor is solely liable for defects or failures to adhere to the code. This report is applicable only to the items listed herein.

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Corrosivity Test Summary

COOPER TESTING LABORATORY

CTL # 568-159 | Date: 8/25/2022 | Tested By: PJ | Checked: PJ
Client: CTS | Project: AAHRC Berkeley | Proj. No: 18735
Remarks:

Sample Location or ID			Resistivity @ 15.5 °C (Ohm-cm)			Chloride	Sulfate		pH	ORP	Moisture	Soil Visual Description
Boring	Sample, No.	Depth, ft.	As Rec.	Minimum	Saturated	mg/kg	mg/kg	%		(Redox)	At Test	
						Dry Wt.	Dry Wt.	Dry Wt.		mv	%	
			ASTM G57	Cal 643	ASTM G57	Cal 422-mod.	Cal 417-mod.	Cal 417-mod.	Cal 643	SM 2580B	ASTM D2216	
B-1	A	1 - 3	-	4690	-	8.8	27.7	0.0028	5.9	-	5.4	Very Dark Brown CLAY w/ Sand
B-2	B	1 - 3.5	-	4434	-	12.9	52.6	0.0053	6.9	-	2.5	Brown CLAY w/ Sand, trace Gravel