Report of Geotechnical Exploration KFFT Terminal Design

Terminal Design

Capital City Airport

Franklin County, Kentucky

Stantec

Prepared for:
KYTC: Capital City Airport

Prepared by:
Andrew Findley

April 11, 2025

Project/File:
rpt_01_178579162

Stantec Consulting Services Inc.

Revision Schedule

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
0		Andrew Findley	4/11/25	Luis Arduz	4/11/25	Adam Crace	4/11/25

Disclaimer

The conclusions in the Report titled Report of geotechnical Exploration KFFT Terminal Design are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from KYTC: Capital City Airport (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

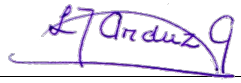
This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided by the Client to applicable authorities having jurisdiction and to other third parties in connection with the project, Stantec disclaims any legal duty based upon warranty, reliance or any other theory to any third party, and will not be liable to such third party for any damages or losses of any kind that may result.

Prepared by: 

Signature

Andrew Findley

Printed Name

Reviewed by: 

Signature

Luis Arduz

Printed Name

Approved by: 

Signature

Adam Crace

Printed Name

Table of Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

The Capital City Airport Board has proposed the addition of a new two-story terminal building south-east of the existing terminal building. Stantec Consulting Services Inc. (Stantec) was retained to complete a geotechnical field exploration and a geotechnical report to assist with the design. This report discusses the project site conditions and site geology and presents the results of Stantec's geotechnical exploration, laboratory testing program, and analyses for the project site.

The proposed terminal is a two-story rectangular building 50 feet wide and 80 feet long, located between the current terminal building and the Department of Aviation building. At the time of this geotechnical exploration, only an approximate building footprint was made available to Stantec, however, no finished floor elevation was established. Additionally, a new auto parking area and improvements to the existing access road are planned to support the traffic for the new terminal building; no new taxi ways or roads that will experience plane traffic are proposed for this project. The project site at the time of the exploratory borings the ground was covered in snow. Several trees are in the footprint of the proposed terminal and parking area on each side of the existing Airport Road.

The Capital City Airport is located in Central Franklin County, Kentucky. It is located approximately 1 mile southwest of downtown Frankfort, Kentucky. The location is shown in **Figure 1. Site Location Map**

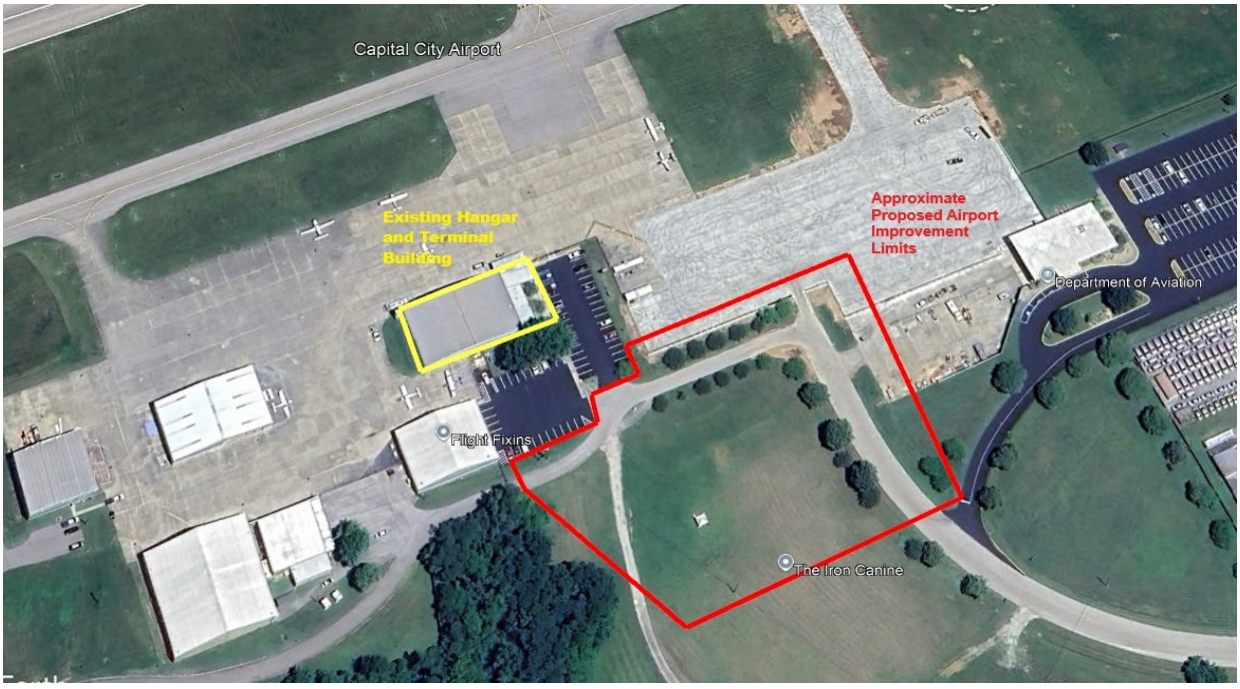


Figure 1. Site Location Map

2 General Site Geology

The geologic Map of the Frankfort West Quadrangle (GQ-1221), compiled by the U.S. Geological Survey (1970), indicates that the project area is underlain by the Tanglewood Limestone Formation. The Formation consists of limestone. The bedrock in this area has an approximately 1.0% dip to the southwest with no mapped faults in the immediate project area.

The limestone in this formation is medium light gray to grayish orange, medium- to coarse-grained, commonly bioclastic, mostly thin-bedded, partly cross bedded, and phosphatic.; weathers grayish orange with thin to medium bedded; tabular to irregular bedded; locally ripple marked. Some areas contain thin beds of shale in upper parts.

3 Scope of Work Performed

3.1 Soil and Rock Core Borings

A total of 14 borings were scoped for this field exploration, and are presented on the boring location plan in **Appendix A**. The boring layout was developed using a proposed project layout provided to Stantec by the designer, the layout is presented in **Appendix B**. These borings were drilled to identify subsurface strata and to evaluate the strata in terms of site development and foundation support. Boring locations are designated as CCA-01 through CCA-14. The borings were drilled on January 29, 2025. A Stantec Engineer was present with the drill crew during the drilling operations. The Engineer supervised the field work, directed the drill crew, and logged the pavement boring, and soils encountered during the exploration process.

Borings were advanced using a CME 45 truck-mounted drill rig. Borings requiring pavement thickness measurements were drilled through the pavement with 3.25-inch inside diameter hollow stem augers. Other borings were advanced through soil with 3.25-inch inside diameter hollow stem augers or 3.25-inch diameter solid stem augers based on sampling intervals. Standard Penetration Test (SPT) disturbed samples were collected in general accordance with ASTM D1586. In cohesive soil strata, undisturbed thin-walled (Shelby) tube (ST) soil samples were taken in accordance with ASTM D1587. Additionally, bulk soil samples were collected from auger cuttings. Soil and pavement base were logged by the engineer giving particular attention to soil color, texture, consistency or relative density, and natural moisture content.

During field exploration borings were advanced to a target depth of 10 feet below ground surface or auger refusal, whichever occurred first. Rock coring was performed in Hole Nos. CCA-02 and CCA-06 using NQ-size coring equipment. The recovered bedrock core samples were logged by the field engineer with attention given to rock type, color, texture, weathering, hardness, and any encountered discontinuities.

Upon completion of the borings, all borings were backfilled with auger cuttings. Borings that included pavement core were backfilled with auger cuttings to within three feet of the pavement surface, then patched with a commercially available bagged asphalt mix.

Recovered soil samples were transported to the Stantec geotechnical laboratory, located in Lexington Kentucky, for testing and analysis to determine the subsurface engineering soil classification, natural moisture content determinations, and in-situ strength characteristics.

A layout showing the boring locations is presented in **Appendix A**. Typed boring logs are included in **Appendix C**. The laboratory test results used to characterize soils for analyses are presented in **Appendix D**. An overall summary of the borings is presented below in **Table 1. Summary of Borings**

Table 1. Summary of Borings

Boring ID	Ground Surface Elevation[1]	Top of Rock/Auger Refusal (ft.)[2]		Bottom of Boring (ft.)		Pavement Section Thickness (ft.)	
		Depth	Elevation	Depth	Elevation	Bituminous Concrete Thickness (ft.)	Base Stone Thickness (ft.)
CCA-01	772.4	--	--	10.0	762.4	--	--
CCA-02	771.9	5.6	766.3	14.3	757.6	--	--
CCA-03	774.2	4.2	770.0	4.2	770.0	--	--
CCA-04	772.3	--	--	10.0	762.3	--	--
CCA-05	772.6	--	--	10.0	762.6	--	--
CCA-06	774.1	11.5	762.6	20.3	753.8	--	--
CCA-07	772.8	--	--	10.0	762.8	--	--
CCA-08	772.0	--	--	10.0	762.0	--	--
CCA-09	774.3	--	--	10.0	764.3	--	--
CCA-10	772.8	--	--	10.0	762.8	0.5	1.2
CCA-11	773.7	9.2	764.1	9.2	764.1	--	--
CCA-12	773.3	--	--	10.0	763.3	--	--
CCA-13	773.3	--	--	10.0	763.3	--	--
CCA-14	773.2	--	--	10.0	763.2	0.7	1.2

[1] Top of boring elevations and site survey was completed by Stantec.

[2] Auger refusal indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders, or rock remnants. An exact determination is only possible on borings where rock coring was performed.

3.1.1 General Surface Conditions

Geotechnical borings within the project site encountered soils which generally classified as Fat Clay (CH) and Lean Clay (CL) with colors varying from light brown to yellowish red. The soil material is described as soft to stiff, low to high plasticity with varying amounts of rock fragments. Individual borings logs indicate local changes in color, variations in stiffness, or increases in plasticity and can be found in **Appendix C**.

In-situ strengths consistency of site soils ranged from soft to stiff as determined from the SPTs performed. The average blow per foot (bpf) for the 6 SPT tests was 5, this is excluding SPT-2 at boring CCA-02 which was sampled at refusal and had zero feet of recovery.

Table 2. SPT and ST Summary

SPT	Sample Depth (ft)	Recovery (ft.)
CCA-02 SPT-1	2.0 – 3.5	1.4
CCA-02 SPT-2	5.0 – 6.5	0.0
CCA-03 ST-1	2.0 – 4.0	1.2
CCA-05 ST-1	2.0 – 4.0	1.7
CCA-05 SPT-1	5.0 – 6.5	1.5
CCA-06 SPT-1	2.0 – 3.5	1.5
CCA-06 ST-1	5.0 – 7.0	1.6
CCA-07 SPT-1	2.5 – 4.0	1.3
CCA-07 SPT-2	5.0 – 6.5	1.5
CCA-11 ST-1	2.0 – 4.0	2.0
CCA-11 ST-2	5.0 – 7.0	2.0
CCA-14 ST-1	3.0 – 5.0	2.0
CCA-14 SPT-1	7.0 – 8.5	1.5

Topsoil thicknesses ranged from 0.5 to 0.6. Auger refusal was encountered between 4.2 to 11.5 feet below ground surface and generally appeared to coincide with the beginning of weathered gray limestone. Bedrock was sampled in borings CCA-02 and CCA-06 to verify the bedrock surface and evaluate the type and condition of the bedrock encountered. Recovered bedrock cores was described as limestone, light gray to gray, fine to coarse crystalline grained, irregular bedded, moderately fossiliferous, and slightly to moderately weathered. Seams of clay were encountered in boring CCA-02 at 10.8 feet and in boring CCA-06 at 11.7 and 17.8 feet. It should be noted that the encountered bedrock appeared to be generally consistent with mapped data.

3.1.2 Subsurface Water Conditions

During drilling operations each boring was checked for groundwater. Subsurface groundwater was not encountered in any of the advanced borings. It should be noted that subsurface water levels may fluctuate due to seasonal changes, precipitation events, and other factors.

3.2 Laboratory Testing

Recovered soil samples were transported to a Stantec geotechnical laboratory for testing and analysis. The results of laboratory testing performed are included within **Appendix D**. A summary of the results is provided in the following sections.

3.2.1 Standard Penetration Test Samples

A total of seven SPT samples were collected during this exploration. Recovered SPT samples were subjected to natural moisture content testing (ASTM D 2216). Natural moisture content ranged from 22% to 38% with a mean value of 30%. Select SPT samples were also subjected to standard engineering classification testing including sieve and hydrometer analyses (ASTM D 422) and Atterberg Limits (ASTM D 4318). A summary of the testing is presented in **Table *3***.

Table 3. USCS Soil Classifications Laboratory Results

Boring	Sample Depth (ft)	% Gravel	% Sand	% Fines	USCS Class
CCA-02	3.0 – 3.5	3.2	24.8	71.0	Fat Clay with Sand (CH)

3.2.2 Undisturbed (Shelby) Tube Samples

Samples taken form select borings included three-inch diameter undisturbed (Shelby) tube samples within cohesive soil horizons. Select specimens extruded from Shelby tubes were then subjected to unconfined compressive strength testing (UC). Determination of unit weights (wet and dry) and natural moisture content of the undisturbed specimens is included in the UC testing. A summary of the results is included in **Table *4***. Full details of these laboratory tests are included in **Appendix D**.

Table 4. Unconfined Compressive Strength (Soils) Results Summary

Boring	Sample Depth (ft)	Initial Wet Density (pcf)	Initial Moisture Content (%)	Unconfined Compressive Strength (tsf)
CCA-03	2.0 – 4.0	128.6	23.3	3.14
CCA-05	2.0 – 4.0	122.4	31.2	1.66
CCA-06	5.0 – 7.0	128.6	21.6	1.28
CCA-11	2.0 – 4.0	125.2	23.6	0.86

3.2.3 Bulk Sample

A bulk soil sample collected from boring CCA-12 was subject to Modified Proctor moisture-density testing and California Bearing Ratio (CBR) testing, in accordance with ASTM D 1577 and ASTM 1883, respectively. Results of this testing are shown in **Table *5***.

Table 5. Modified Proctor and CBR Test

Borings	Sample Depth (ft)	Maximum Dry Density (pcf)	CBR (%)*
CCA-12	4.0 – 7.0	117.5	3.0 (93.9)

* The number in parentheses the percentage of maximum dry density at which the CBR was performed

4 Engineering Recommendations

The conclusions and recommendations that follow are based upon our conceptual understanding of the project as discussed throughout this report. If the concepts are incorrect, or if changes are made during design, Stantec should be contacted so that we may review our recommendations in conjunction with project changes and revise our recommendations if necessary.

4.1 Earthwork

1. Prior to any earthwork involving soil excavation or the placement of fill materials, it is recommended that trees, roots, topsoil, vegetation, and other deleterious materials be removed/stripped within the limits of structural fill, new construction, or pavement areas. After removal of topsoil and deleterious materials, soils in this area should be evaluated by a geotechnical engineer or an experienced soils technician working under the direction of a geotechnical engineer to evaluate if the material is suitable to support construction. If determined unsuitable, the unsuitable material should be undercut and removed from the site.

2. Prior to any earthwork involving soil excavation or the placement of fill materials, it is recommended that existing pavement be removed from within the project limits per Federal Aviation Administration (FAA) specifications in Advisory Circular AC 150/5370-10G Item P-152 Excavation, Subgrade, and Embankment. An estimate of the required depth of existing pavement may be inferred from **Table 1** and the boring logs in **Appendix C**, but the actual depths should be verified in the field during construction.

3. Site grading and temporary drainage ditches/pipes should be maintained so that positive drainage away from excavation is provided during construction. Final grading should be accomplished in such a manner as to divert surface runoff from the hangar and foundation elements.

4. If site grading requires the use of off-site borrow materials, either processed durable crushed stone or soil can be used. If soil is selected, the following criteria should be met:

    - Contains no organic material or other detrimental debris.
    - Classifies as GM, GO, GW, GC, SP, SW, SC, SM, CL-ML or CL in accordance with the Unified Soil Classification System.
    - Contains no rock fragments with a maximum dimension of four inches or greater.
    - Does not exhibit pronounced shrink-sell properties.
    - Exhibits a CBR value equal to or greater than the design value.

5. If required, fill should ne compacted in maximum eight-inch lifts (loose thickness) to a density of at least 95 percent of the Modified Proctor maximum density (ASTM D-1557) at moisture content within the range of plus or minus two percent of optimum. The design modified proctor returned a maximum dry density of 117.5 pcf with an optimum moisture content of 14.2%. The on-site soils should be suitable for use as fill material provided, they are free of organic material, detrimental debris, and rock fragments larger than four inches in diameter.

    - Due to the results of natural moisture content tests of SPT samples, it should be anticipated that the on-site soils may require drying to bring the moisture content within the recommended range of optimum moisture required for compaction.

6. If construction occurs during periods of extended wet weather, the Contractor should be prepared for additional work such as (1) removal or scarification and recompaction of water-softened materials in areas to receive fill or pavement, (2) construction delays due to rain or snow, or due to overall wet project conditions, (3) use of crushed stone to stabilize soft ground areas, and (4) additional efforts to aerate wet souls to proper moisture content prior to compaction. Efforts should be made to schedule project construction during drier months.

4.2 Terminal Building Foundations

1. Based on the results of the borings drilled in the immediate vicinity of the proposed terminal building, top of bedrock appears to vary from approximate elevation 770 to as low as 762.6. These elevations correspond to depths of 4.2 feet to 11.6 feet below the ground surface. Because the planned finished floor elevation was not available to at the time of the writing of this report there is a concern that portions of foundation elements for the building could encounter bedrock while other portions would be entirely founded on soil. Because of the potential risk of differential settlement if the entire building is not founded on soil, recommendations will be provided below to perform inspection services to confirm that all foundation elements, such as continuous or spread footings be underlain by a minimum of two-foot soil thickness.

2. Soil fill required in structure and sidewalk areas should be placed in maximum eight-inch loose-lift thicknesses and compacted to the following minimum dry densities:

a. Structure Areas - 100%

b. Sidewalk Areas - 95%

3. These minimum densities are relative to the soil's maximum dry density, as determined by standard Proctor testing. The moisture content of the fill should be within ±2 percent of the soil's optimum moisture content. The recommended maximum net allowable bearing values for footings placed on satisfactorily compacted fill material are the same as those noted below in paragraph 5.

4. The on-site soils, free of organic material, are suitable for use as fill provided, they contain no rock fragments exhibiting any dimension greater than four inches. Based on the results of natural moisture content tests, some drying of the on-site soils will be needed to achieve optimum moisture contents prior to placement and compaction.

5. Based upon the information obtained from the borings drilled for this project, it is recommended that the foundations for the proposed structure be designed to bear totally on soil. The recommended net allowable bearing capacity values for footings bearing on in-situ soils are as follows:

    a. Isolated Spread Footings – Three thousand two hundred (3,200) pounds per square foot.

    b. Continuous Wall Footings – Two thousand six hundred (2,600) pounds per square foot.

6. Provided that the above bearing capacity values are not exceeded, and the recommendations presented herein are followed, it is estimated that total settlements of the building could range from ¼ of an inch to 1 inch, and differential settlements could range from ⅛ to ¾ of an inch. It should be noted that no consolidation testing was proposed in the original scope of the work. Such testing is expensive and time consuming but would be necessary to refine the settlement estimates.

7. The minimum recommended width of continuous wall footings is 24 inches. The minimum recommended plan dimensions for isolated spread footings is two feet by two feet. Actual footing sizes should be determined by a structural engineer and should be based on the anticipated structural loads and the allowable bearing capacities.

8. Based upon a review of the borings, it is possible that the planned terminal building's foundation elements will be completely supported by a soil-bearing (yielding) medium. However, because of the irregular depths to bedrock it is possible that following site grading operations, the underlying bedrock may be encountered near the bottom of some of the foundation elements. To reduce potential differential settlements, foundation systems for the structures should not be allowed to bear partially on bedrock and partially on soil. A minimum of two (2) feet of soil should exist between the bottoms of all footings and the top of rock. If rock is encountered during footing excavation, or within a zone two (2) feet below planned bottom of footing, the rock should be undercut to sufficient depth and replaced with approved compacted soil in accordance with Paragraph 2, above.

9. It is possible that soils encountered within foundation excavations near top of rock will exhibit soft and wet conditions. It is recommended that any such soils be undercut, as necessary, and replaced with approved compacted soil, or stabilized with No. 2 size crushed stone. Additionally, the Owner, Architect and Contractor should anticipate the presence of some isolated limestone slabs/remnants, particularly at depths near top of bedrock. Such slabs should be broken into pieces exhibiting no dimension larger than four inches prior to placement as fill.

10. Excavated footing trenches should not be left open to allow the accumulation of water. Footing excavations should be concreted and backfilled immediately after excavation is complete, or if this cannot be done, the last four to six inches of the foundation material should not be removed until preparations for placing concrete are complete.

11. It is recommended that the bottoms of exterior footings extend a minimum of thirty inches below finished grade to reduce the possibility of damage from frost heave.

12. Reinforcing steel should be placed in all footings to provide rigidity and strength to bridge over any weak or more compressible materials which may occur beneath the foundation system. As with any soil-bearing foundation system, a small amount of settlement will occur and should be anticipated. This precaution will tend to cause any settlement which may occur to be of a more uniform nature which will help to reduce damage to the foundation elements.

13. The floor slabs should be placed over a minimum four-inch layer of compacted crushed limestone. A polyethylene liner should be installed between the slab and crushed stone as a water-proofing membrane.

14. It is recommended that floating ground floor slabs, i.e., slabs not connected to the foundation system, be used in the proposed building. This design feature will help reduce the potential for differential settlement between foundations and floor slabs.

15. All construction operations involving earthwork and placement of steel reinforcement and concrete should be performed in the presence of a qualified technician who is experienced in monitoring and testing earthwork and concrete construction. The technician should operate under the direct supervision of a professional engineer experienced in geotechnical engineering.

4.3 Pavements

CBR tests were completed on a bulk sample specimen compacted to within +/- 2 percentage points of 95 percent of the MDD and within +/- 2 percentage points of the optimum moisture content. Based on returned testing, a CBR of 3.0% should be used for design.

1. In accordance with FAA Advisory Circular AC 150/5370-10GA Item P-152. The soil subgrade should be scarified to a depth of at least six inches and compacted to at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557). The moisture content should be the optimum moisture content plus or minus two percentage points and must be maintained until the stone base is placed.

2. If any portion of project site is undercut due to poor subgrade conditions, and fill is required to achieve subgrade elevation, fill supporting flexible pavement should be compacted in maximum eight-inch lifts (loose thickness) to a density of at least 95 percent of the Modified Proctor maximum density (ASTM D-1557) at moisture content within the range of plus or minus two percent optimum. The on-site soils should be suitable for use as fill material given, they are free of organic material, detrimental debris, and rock fragments larger than four inches in diameter.

3. Based upon the CBR test results of 3.0, it is recommended that the soil subgrade be mechanically stabilized. Because of the moderately plastic clay soils encountered at this project site, rock stabilization is recommended. Construction of a twelve (12)-inch rock layer (KY Coarse Aggregate No. 2s, 3s, or 23s) should be done for all pavement layers of this project.

    a. The rock layer should be underlain with a type III fabric geotextile fabric for stabilization in accordance with KYTC Standard Specifications for Road and Bridge Construction (Current Edition) Item 214.03.05 Subgrade Stabilization.

    b. In addition, a triaxial geogrid shall be installed between the rock layer and geotextile fabric in accordance with KYTC Standard Specifications for Road and Bridge Construction (Current Edition) Section 304. The geogrid will provide an enhanced level of in-plane stiffness ensuring a high level of stabilization for the pavement section.

5 Closure and Limitations of Study

All construction operations involving earthwork and paving should be performed in the presence of a qualified technician who is experienced in monitoring and testing earthwork construction. The technician should operate under the direct supervision of a Professional Engineer experienced in geotechnical engineering. We recommend that our staff be retained for earthwork and paving inspection in order to maintain continuity of the assessment of soil materials from this study through paving construction.

The boring logs and related information presented in this report depict approximate subsurface conditions only at the specific boring locations noted and at the time of drilling. Conditions at other locations may differ from those occurring at the boring locations. Also, the passage of time may result in a change in the subsurface conditions at the boring locations. Any correlations shown between borings are unknown and may differ from those shown.

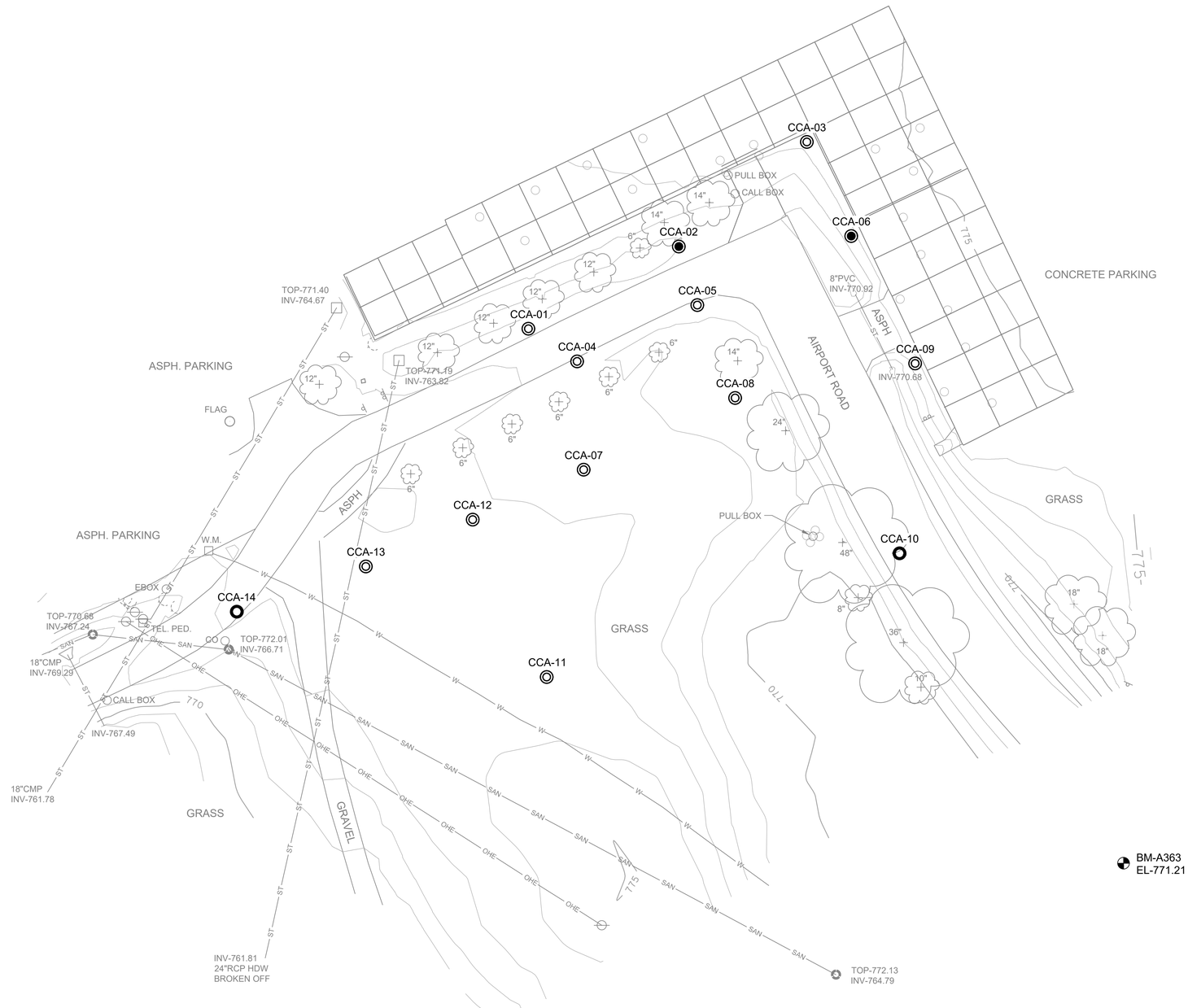
These conclusions and recommendations are based on data and subsurface conditions from the borings advanced during this investigation using that degree of care and skill ordinarily exercised under similar circumstances by competent members of the engineering profession. No warranties can be made regarding the continuity of conditions between borings.

5.1 Limitations of Study

Recommendations regarding any specific conditions encountered in future field operations were not included in this scope. These instances may include, but are not limited to, the stability of cut slopes, mitigation of subsurface seepage, handling of wet materials, encountering unknown underground storage tanks, environmentally sensitive materials, and/or other subsurface conditions.

Recommendations within this report are limited to the new hangar and may not be extended to other parts of the Capital City Airport. If engineering recommendations are needed for different areas with the airfield, Stantec should be retained to complete field exploration and analysis.

Appendix A Boring Location Plan



BORING LOCATION TABLE			
BORING	NORTHING	EASTING	ELEVATION (FEET)
CCA-01	248,567.32	1,452,712.07	772.38
CCA-02	248,607.38	1,452,785.19	771.86
CCA-03	248,658.24	1,452,847.52	774.24
CCA-04	248,551.43	1,452,735.78	772.25
CCA-05	248,578.83	1,452,794.24	772.63
CCA-06	248,612.45	1,452,869.11	774.09
CCA-07	248,498.78	1,452,738.95	772.75
CCA-08	248,533.68	1,452,812.62	772.01
CCA-09	248,550.48	1,452,900.26	774.28
CCA-10	248,458.02	1,452,892.65	772.76
CCA-11	248,397.91	1,452,720.91	773.73
CCA-12	248,474.46	1,452,684.90	773.33
CCA-13	248,451.69	1,452,632.93	773.27
CCA-14	248,429.67	1,452,570.11	773.24

LEGEND

- SOIL BORING WITH SAMPLES
- SOIL BORING WITH ROCK CORE
- ASPHALT BORING
- TEMPORARY BENCHMARK - ESTABLISHED BY SURVEYOR FOR SITE SURVEY

0 30' 60'

Stantec
Stantec
3050 Beaumont Centre Circle
Lexington, Kentucky 40513-1703
Tel: (859) 422-3000
www.stantec.com

Consultant

No.	Revision	By	Appd	YYYY.MM.DD
0				

No.	Issued	By	Appd	YYYY.MM.DD
A				

Permit/Seal

PRELIMINARY NOT FOR CONSTRUCTION

Not for permits, pricing or other official purposes. This document has not been completed or checked and is for general information or comment only.

Client/Project
KFFT - CAPITAL CITY AIRPORT

GEOTECHNICAL SURVEY

FRANKFORT, KENTUCKY

Project No.: 178579162

File Name: 79162_BORE_LAYO

Scale: 1"=30'

XXX	XXX	XXX	YYYY.MM.DD
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GEOTECHNICAL BORING LOCATION PLAN

Revision:X Sheet: X of XX

Drawing No.
1

PlotDate: 2025.04.09 8:20 AM Login: FindleyAndrew
\\us229-pstfs01\Shared_projects\178579162\e0_technical\e0i_geotechnical\drawing\79162_bore_layo.dwg

ORIGINAL SHEET - ANSI D

Appendix B Proposed Project Layout

EXISTING TAXIWAY

TOFA

EXISTING APRON

EXISTING HANGAR AND TERMINAL BUILDING

EXISTING AUTO PARKING

50' RADIUS FROM END OF FUEL LOCATION

EXISTING APRON

NEW GATE TO BE ADDED FOR FUEL FARM ACCESS

EXISTING HANGAR

EXISTING AUTO PARKING

PROPOSED 2-STORY TERMINAL BUILDING

PROPOSED ACCESS ROAD REROUTE

EXISTING ACCESS ROAD

PROPOSED AUTO PARKING

EXISTING AUTO PARKING

KENTUCKY DEPARTMENT OF AVIATION

EXISTING AUTO PARKING

EXACT ROAD ALIGNMENT TO BE EVALUATED DURING DESIGN

EXISTING ROAD

EXISTING ROAD

GARVER

REV	DATE	DESCRIPTION	BY

CAPITAL CITY AIRPORT
FRANKFORT, KY

TERMINAL BUILDING REPLACEMENT

TERMINAL BUILDING LOCATION

JOB NO.: N/A
DATE: DEC. 2024
DESIGNED BY: WCA
DRAWN BY: WCA

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER

EX. 1

Appendix C Boring Logs

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 4/9/25

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-01***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***sample***
Surface Elevation ***772.4'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***10.0'***	Driller ***L. Wethington***	Northing ***248567.32***	
Location ***+ ' Lt.***		Easting ***1452712.07***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
771.9	0.5	Topsoil.						
		Soft, brown, moist, sandy fat clay.						
764.4	8.0							
762.4	10.0	Soft, brown, moist, silty clay (medium plasticity).						
		(Bottom of Hole 10.0') (No Refusal)						

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-02***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***core and sample***
Surface Elevation ***771.9'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***14.3'***	Driller ***L. Wethington***	Northing ***248607.38***	
Location ***+ ' Lt.***		Easting ***1452785.19***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
771.4	0.5	Topsoil.						
		Brown, silty fat clay with sand (moist and stiff).	1	2.0-3.5	1.4	3-4-4	SPT	
766.3	5.6	(Begin Core)	2	5.0-6.5	0.0	0-0-50/0.50'	SPT	5
		Light gray limestone, (Fine to coarse crystalline grained, irregular bedded. Slightly to moderately weathered to 6.9', ~20 degree fracture at 8.1'.).	42 / -	3.6	3.6	100		
762.7	9.2							9.2
		Gray limestone, (with shale partings, stringers and streaks throughout, fossiliferous, vuggy (5.6'-8.3'). Shale layer from 10.8' to 11.0'.).	61 / -	3.1	3.1	100		10
759.6	12.3							12.3
		Gray limestone, (Irregular bedded, moderately fossilerous.).	100 / -	2.0	2.0	100		
757.6	14.3							14.3
		(Bottom of Hole 14.3')						15
								20
								25
								30
								35
								40
								45
								50

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 4/9/25

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-03***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***sample***
Surface Elevation ***774.2'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***4.2'***	Driller ***L. Wethington***	Northing ***248658.24***	
Location ***+ ' Lt.***		Easting ***1452847.52***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
773.6	0.6	Topsoil.						
		Stiff to very stiff, brown, moist, lean clay (medium plasticity).	1	2.0-4.0	1.2		ST	
770.0	4.2	(Bottom of Hole 4.2') (Refusal @ 4.2)						

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 4/9/25

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-04***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***sample***
Surface Elevation ***772.3'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***10.0'***	Driller ***L. Wethington***	Northing ***248551.43***	
Location ***+ ' Lt.***		Easting ***1452735.78***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
771.7	0.6	Topsoil.						
		Brown, moist, silty clay (low plasticity).	1	8.0-9.0				
762.3	10.0	(Bottom of Hole 10.0') (No Refusal)						

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 4/9/25

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-05***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***sample***
Surface Elevation ***772.6'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***10.0'***	Driller ***L. Wethington***	Northing ***248578.83***	
Location ***+ ' Lt.***		Easting ***1452794.24***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
772.1	0.5	Topsoil.						
		Stiff, light brown to red brown, moist, lean clay (medium plasticity).	1	2.0-4.0	1.7		ST	
767.6	5.0							
		Soft, yellow interbedded with red, moist, silty lean clay with gravel.	1	5.0-6.5	1.5	3-6-7	SPT	
762.6	10.0							
		(Bottom of Hole 10.0') (No Refusal)						

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 4/9/25

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-06***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***core and sample***
Surface Elevation ***774.1'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***20.3'***	Driller ***L. Wethington***	Northing ***248612.45***	
Location ***+ ' Lt.***		Easting ***1452869.11***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
773.5	0.6	Topsoil.						
771.6	2.5	Soft, brown, moist, silty clay (low plasticity).						
770.6	3.5	Soft, brown, moist, clayey silt (low plasticity).	1	2.0-3.5	1.5	3-4-4	SPT	
5								5
			1	5.0-7.0	1.6		ST	
		Medium stiff, brown red, moist, lean clay (low plasticity).						
10								10
762.6	11.5	(Begin Core)						
		Gray limestone, (Fine to coarse crystalline grained, irregular bedded. Slightly to moderately weathered. Clay seam at 11.7'.).	70 / -	3.7	3.7	100		
15 758.9	15.2							15.2 15
		Medium gray limestone, (Fine to coarse crystalline grained, irregular bedded. Shale layer at 17.8' - 18.1', becomes more shaly below 17.8'.).	75 / -	5.1	5.0	98		
20 753.8	20.3							20.3 20
25		(Bottom of Hole 20.3')						25
30								30
35								35
40								40
45								45
50								50

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 4/9/25

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-07***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***sample***
Surface Elevation ***772.8'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***10.0'***	Driller ***L. Wethington***	Northing ***248498.78***	
Location ***+ ' Lt.***		Easting ***1452738.95***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
772.3	0.5	Topsoil.						
		Medium stiff, gray and brown, damp, silty clay (low palsticity).	1	2.5-4.0	1.3	2-5-7	SPT	
767.8	5.0							
		Medium stiff, yellow and red, damp, silty clay (medium plasticity).	2	5.0-6.5	1.5	4-6-9	SPT	
762.8	10.0							
		(Bottom of Hole 10.0') (No Refusal)						

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-08***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***sample***
Surface Elevation ***772.0'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***10.0'***	Driller ***L. Wethington***	Northing ***248533.68***	
Location ***+ ' Lt.***		Easting ***1452812.62***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
771.5	0.5	Topsoil.						
		Soft, brown, moist, silty clay (low to medium plasticity).	1	6.0-7.0				
762.0	10.0	(Bottom of Hole 10.0') (No Refusal)						

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-09***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***sample***
Surface Elevation ***774.3'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***10.0'***	Driller ***L. Wethington***	Northing ***248550.48***	
Location ***+ ' Lt.***		Easting ***1452900.26***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
773.8	0.5	Topsoil.						
771.3	3.0	Soft, yellow and red, moist, silty clay with gravel (low plasticity).						
769.3	5.0	Soft, brown, moist, silty clay (medium plasticity).						
		Medium stiff, yellow and red, moist, silty clay (low plasticity).						
764.3	10.0		1	9.0-10.0				
		(Bottom of Hole 10.0') (No Refusal)						

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 4/9/25

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-010***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***sample***
Surface Elevation ***772.8'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***10.0'***	Driller ***L. Wethington***	Northing ***248458.02***	
Location ***+ ' Lt.***		Easting ***1452892.65***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
772.3	0.5	Bituminous concrete.						
771.6	1.2	DGA.						
		Soft to medium stiff, brown, moist, silty clay (medium to low plasticity).						
			1	8.0-9.0				
762.8	10.0							
		(Bottom of Hole 10.0') (No Refusal)						

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 4/9/25

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-011***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***sample***
Surface Elevation ***773.7'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***9.2'***	Driller ***L. Wethington***	Northing ***248397.91***	
Location ***+ ' Lt.***		Easting ***1452720.91***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
773.1	0.6	Topsoil.						
			1	2.0-4.0	2.0		ST	
		Stiff, brown, moist, lean clay (medium plasticity).						
			2	5.0-7.0	2.0		ST	
764.5	9.2							
		(Bottom of Hole 9.2') (Refusal @ 9.2)						

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 4/9/25

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-012***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***sample***
Surface Elevation ***773.3'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***10.0'***	Driller ***L. Wethington***	Northing ***248474.46***	
Location ***+ ' Lt.***		Easting ***1452684.90***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
772.8	0.5	Topsoil.						
		Stiff, brown, moist, lean clay.	1	4.0-7.0				
763.3	10.0	(Bottom of Hole 10.0') (No Refusal)						

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 4/9/25

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-013***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***sample***
Surface Elevation ***773.3'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***10.0'***	Driller ***L. Wethington***	Northing ***248451.69***	
Location ***+ ' Lt.***		Easting ***1452632.93***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
772.7	0.6	Topsoil.						
		Soft, yellow and red, moist, clay (low plasticity).	1	6.0-7.0				
763.3	10.0	(Bottom of Hole 10.0') (No Refusal)						

Drilling Firm:
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 4/9/25

Project ID: ***178579162*** Item Number:	**KFFT - Capital City Airport**	Project Type: ***Geotechnical Exploration*** Project Manager: **Luis Arduz**

Hole Number ***CCA-014***	Immediate Water Depth ***NA***	Start Date ***01/29/2025***	Hole Type ***sample***
Surface Elevation ***773.2'***	Static Water Depth ***NA***	End Date ***01/29/2025***	Rig_Number ***811***
Total Depth ***10.0'***	Driller ***L. Wethington***	Northing ***248429.67***	
Location ***+ ' Lt.***		Easting ***1452570.11***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
~~772.5~~	~~0.7~~	Bituminous concrete.						
772.0	1.2	DGA.						
		Soft, yellow and red, moist, silty clay (medium plasticity).	1	3.0-5.0	2.0		ST	
766.2	7.0							
		Soft, yellow and red, moist, silty clay with gravel (low plasticity).	1	7.0-8.5	1.5	4-8-11	SPT	
763.2	10.0							
		(Bottom of Hole 10.0') (No Refusal)						

Appendix D Laboratory Testing Results

Stantec

Laboratory Testing
Cover Letter

Project Name KYTC - KFFT Terminal Project Number 178579162

All testing reports in this directory, including all sub-directories, relate only to the samples tested.
We have, to the best of our abilities, complied with client specifications and instructions.
These reports shall not be reproduced except in full.

Robert Blessing
Laboratory Manager

Stantec

CBR of Laboratory Compacted Soils

ASTM D 1883

Project Name	KYTC - KFFT Terminal	Project No.	178579162
Source	CCA-12, 4.0'-7.0'	Sample ID	15
Sample Description	Lean Clay (CL), brown	Maximum Particle Size	No. 4
Compaction	ASTM D1557 modified to achieve the required density.	Plus 3/4" % (replaced)	0

Moisture Contents (%)

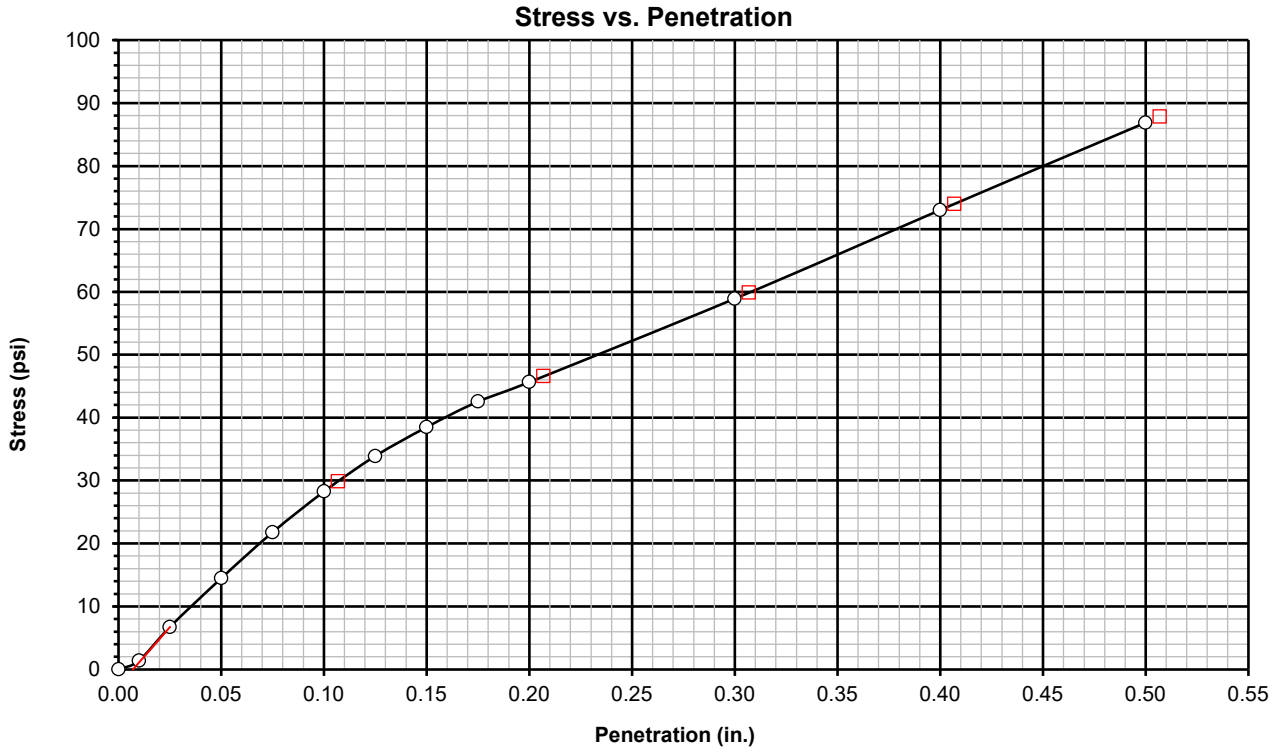
Before Compaction	14.3
After Compaction	13.9
Average Compaction	14.1
Top 1" After Soaking	26.9
Average After Soaking	21.9

Dry Unit Weights (pcf)

Before Soaking	110.3
After Soaking	106.2
Maximum	117.5
Percent of Maximum	93.9
Surcharge Mass (g)	4546

Penetration (in)	Stress (psi)	Corrected Stress (psi)	Standard Stress (psi)	CBR %
0.010	1.4			
0.025	6.7			
0.050	14.5			
0.075	21.8			
0.100	28.3	29.8	1000	3.0
0.125	33.9			
0.150	38.5			
0.175	42.6			
0.200	45.7	46.6	1500	3.1
0.300	58.9	59.9		
0.400	73.0	74.0		
0.500	86.9	87.8		

Soak Start Date	3-3-25	Percent Swell	3.9	**CBR % @ 0.1 inch**	3.0
Punch Date	3-7-25	Penetration Correction (in.)	0.007	**CBR % @ 0.2 inch**	3.1



Comments

Reviewed By RHB

Stantec

Moisture Content of Soil

ASTM D 2216

Project Name KYTC - KFFT Terminal

Project Number 178579162

Tested By MW/RC

Test Method ASTM

Maximum Particle Size in Sample	No. 10	No. 4	3/8"	3/4"	1 1/2"	3"
Recommended Minimum Mass (g)	20	100	500	2,500	10,000	50,000

Material Type: Stratified, Laminated, Lensed, Homogeneous, Disturbed

Source	Lab ID	Date Tested	Material Type	Maximum Particle Size	Material Excluded Amount	Material Excluded Size	Pass Min. Mass? (Y/N)	Can Weight (g)	Wet Soil & Can Weight (g)	Dry Soil & CanWeight (g)	Moisture Content (%)
CCA-02, 2.0'-3.5'	1	2/10/25	Hom	3/8"			No	30.00	93.69	78.78	30.6
CCA-03, 2.0'-4.0'	2	2/7/25	Hom	No. 4			No	21.35	102.61	87.26	23.3
CCA-04, 8.0'-9.0'	3	2/10/25	Dist	No. 4			No	31.36	142.63	115.19	32.7
CCA-05, 2.0'-4.0'	4	2/7/25	Hom	No. 4			No	20.77	84.46	69.31	31.2
CCA-05, 5.0'-6.5'	5	2/10/25	Hom	No. 4			No	31.43	148.82	116.31	38.3
CCA-06, 2.0'-3.5'	6	2/10/25	Dist	No. 4			Yes	31.50	166.05	136.52	28.1
CCA-06, 5.0'-7.0'	7	2/7/25	Hom	No. 4			No	20.17	95.33	81.96	21.6
CCA-07, 2.5'-40.0'	8	2/10/25	Hom	No. 4			No	30.93	132.68	107.61	32.7
CCA-07, 5.0'-7.5'	9	2/10/25	Hom	No. 4			No	31.58	133.76	115.38	21.9
CCA-08, 6.0'-7.0'	10	2/10/25	Dist	No. 4			No	31.51	141.53	118.76	26.1
CCA-09, 9.0'-10.0'	11	2/10/25	Dist	No. 4			No	31.90	109.47	95.37	22.2
CCA-10, 8.0'-9.0'	12	2/10/25	Dist	No. 4			No	30.24	138.44	117.58	23.9
CCA-11, 2.0'-4.0'	13	2/7/25	Hom	No. 4			No	21.14	106.40	90.13	23.6
CCA-11, 5.0'-7.0'	14	2/7/25	Hom	No. 4			No	20.70	91.17	76.68	25.9
CCA-12, 4.0'-7.0'	15	2/10/25	Dist	No. 4			No	30.17	109.24	94.52	22.9
CCA-13, 6.0'-7.0'	16	2/10/25	Dist	No. 4			No	30.76	114.85	99.25	22.8
CCA-14, 3.0'-5.0'	17	2/7/25	Hom	No. 4			No	20.96	93.31	78.66	25.4
CCA-14, 7.0'-8.5'	18	2/10/25	Hom	No. 4			Yes	31.63	161.40	133.83	27.0

Stantec

Compaction Characteristics of Soil Using Modified Effort

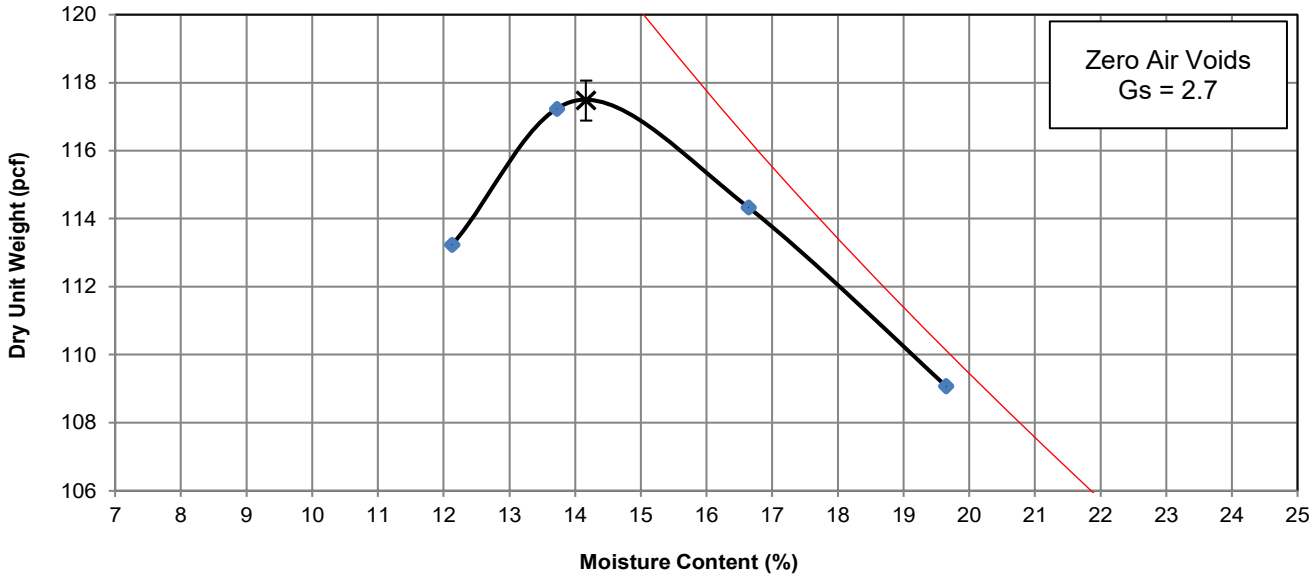
ASTM D 1557 - Method A

Project	KYTC - KFFT Terminal	Project No.	178579162
Source	CCA-12, 4.0'-7.0'	Sample ID	15
Description	Lean Clay (CL), brown	Date Received	02/06/2025
Visual Notes		Date Tested	02/18/2025

Test Fraction (%)	99.9		Oversized Fraction (%)	0.1	
Gs of Test Fraction	2.70	Assumed	Gs of Oversized Fraction	N/A	
Oversized Fraction Sieve	No. 4		MC of Oversized Fraction (%)	2.7	

Mold Weight (g)	4233.1	Preparation Method	Moist	Rammer Type	Manual

Wet Soil & Mold Weight (g)	Wet Soil Weight (g)	Moisture Content Determination: Wet Soil & Tare (g)	Dry Soil & Tare (g)	Tare (g)	Water Content (%)	Dry Unit Weight (pcf)
6145.1	1912.0	935.8	841.9	67.7	12.1	113.2
6240.7	2007.6	731.7	651.5	67.1	13.7	117.2
6241.3	2008.2	608.7	532.1	71.9	16.6	114.3
6198.5	1965.4	563.8	483.7	75.7	19.6	109.1



Maximum Dry Unit Weight (pcf)	**117.5**
Optimum Moisture Content (%)	**14.2**
Corrected Maximum Dry Unit Weight (pcf)	**N/A**
Corrected Optimum Moisture Content (%)	**N/A**

Reviewed By RHB

Comments

Stantec

Summary of Soil Tests

Project Name	KYTC - KFFT Terminal	Project Number	178579162
Source	CCA-02, 2.0'-3.5'	Lab ID	1
Sample Type	SPT	Date Received	2-6-25
		Date Reported	2-21-25

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 30.6

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
	N/A	
	N/A	
	N/A	
	N/A	
	N/A	
3/8"	9.5	100.0
No. 4	4.75	99.9
No. 10	2	96.8
No. 40	0.425	84.9
No. 200	0.075	71.0
	0.02	63.4
	0.005	53.4
	0.002	48.5
Estimated	0.001	45.3

Plus 3 in. Material, Not Included: 0 (%)

	ASTM	AASHTO
Range	(%)	(%)
Gravel	0.1	3.2
Coarse Sand	3.1	11.9
Medium Sand	11.9	---
Fine Sand	13.9	13.9
Silt	17.6	22.5
Clay	53.4	48.5

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit:	69
Plastic Limit:	24
Plasticity Index:	45
Activity Index:	0.9

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3):	N/A
Maximum Dry Density (kg/m^3):	N/A
Optimum Moisture Content (%):	N/A
Over Size Correction %:	N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%):	N/A
Compacted Dry Density (lb/ft^3):	N/A
Compacted Moisture Content (%):	N/A

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry

Particle Size:	No. 10
Specific Gravity at 20° Celsius:	3.02

Classification

Unified Group Symbol:	CH
Group Name:	Fat Clay with Sand
AASHTO Classification:	A-7-6 (32)

Comments:

Reviewed By RJ

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name	KYTC - KFFT Terminal	Project Number	178579162
Source	CCA-02, 2.0'-3.5'	Lab ID	1

Sieve Analysis for the Portion Coarser than the No. 10 Sieve

Test Method	ASTM D 422
Prepared Using	ASTM D 421
Particle Shape:	Angular
Particle Hardness:	Hard and Durable
Tested By	CR
Test Date	02-11-2025
Date Received	02-06-2025

Maximum Particle Size: 3/8" Sieve

Sieve Size	% Passing
3/8"	100.0
No. 4	99.9
No. 10	96.8

Analysis for the Portion Finer than the No. 10 Sieve

Analysis Based on -3 inch Fraction Only

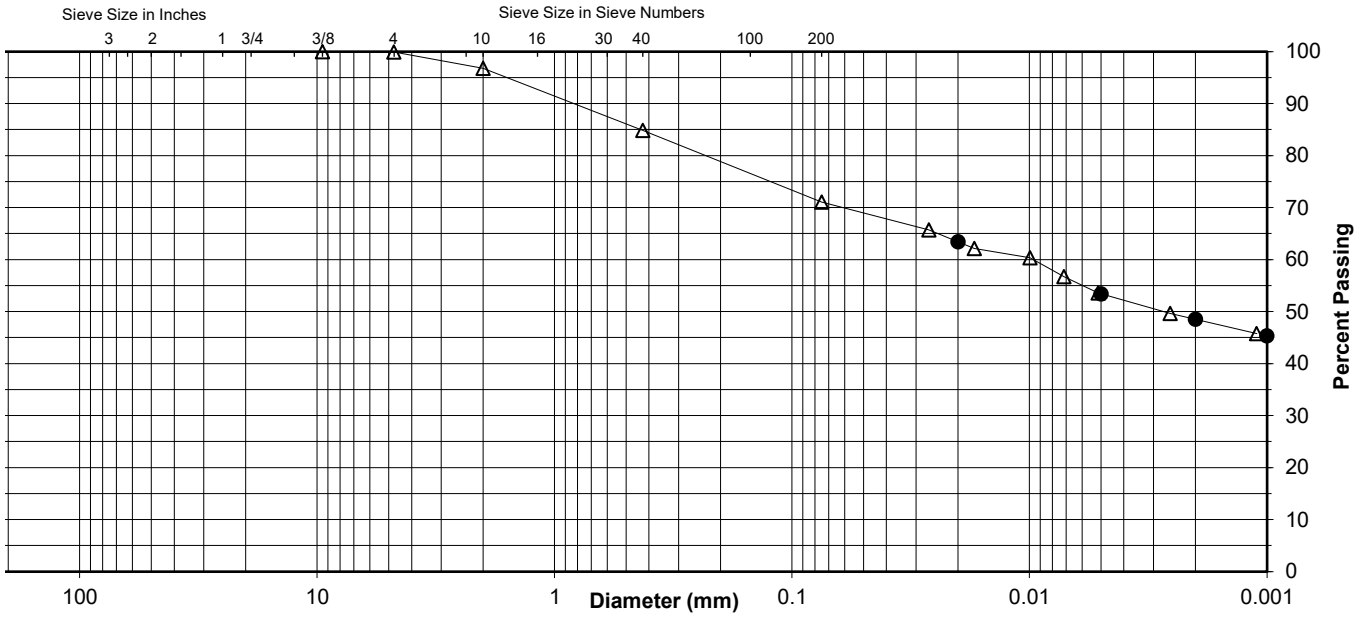
Specific Gravity 3.02

Dispersed Using Apparatus A - Mechanical, for 1 Minute

No. 40	84.9
No. 200	71.0
0.02 mm	63.4
0.005 mm	53.4
0.002 mm	48.5
0.001 mm	45.3

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.1	3.1	11.9	13.9	17.6	53.4
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	3.2			11.9	13.9	22.5	48.5



Comments

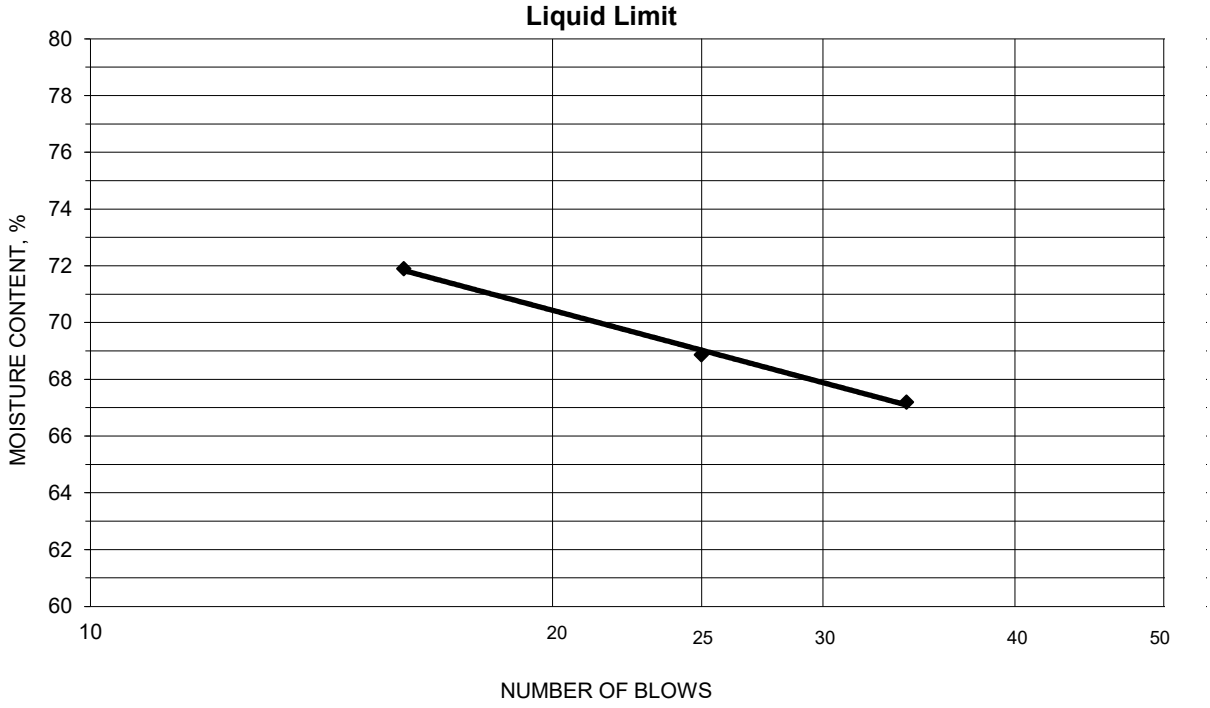
Reviewed By RJ

Stantec

ATTERBERG LIMITS

Project	KYTC - KFFT Terminal			Project No.	178579162
Source	CCA-02, 2.0'-3.5'			Lab ID	1
				% + No. 40	15
Tested By	DB	Test Method	ASTM D 4318 Method A	Date Received	02-06-2025
Test Date	02-14-2025	Prepared	Dry		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
17.16	14.55	10.92	16	71.9	
17.39	14.78	10.99	25	68.9	
17.16	14.60	10.79	34	67.2	69



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
17.92	16.61	11.08	23.7	24	45
17.10	15.85	10.66	24.1		

Remarks:

Reviewed By RJ

Stantec

Summary of Soil Tests

Project Name	KYTC - KFFT Terminal	Project Number	178579162
Source	CCA-12, 4.0'-7.0'	Lab ID	15
Sample Type	BULK	Date Received	2-6-25
		Date Reported	3-10-25

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 22.9

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
	N/A	
	N/A	
	N/A	
2"	50	100.0
3/4"	19	100.0
3/8"	9.5	100.0
No. 4	4.75	99.9
No. 10	2	99.8
No. 40	0.425	97.7
No. 200	0.075	93.1
	0.02	69.4
	0.005	47.6
	0.002	39.6
Estimated	0.001	34.8

Plus 3 in. Material, Not Included: 0 (%)

	ASTM	AASHTO
Range	(%)	(%)
Gravel	0.1	0.2
Coarse Sand	0.1	2.1
Medium Sand	2.1	---
Fine Sand	4.6	4.6
Silt	45.5	53.5
Clay	47.6	39.6

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit:	42
Plastic Limit:	17
Plasticity Index:	25
Activity Index:	0.6

Moisture-Density Relationship

ASTM D 1557 - Method A

Maximum Dry Density (lb/ft^3):	117.5
Maximum Dry Density (kg/m^3):	1882
Optimum Moisture Content (%):	14.2
Over Size Correction %:	0.0

California Bearing Ratio

ASTM D 1883

Bearing Ratio (%):	3.1
Compacted Dry Density (lb/ft^3):	110.3
Compacted Moisture Content (%):	14.1

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry

Particle Size:	No. 10
Specific Gravity at 20° Celsius:	2.80

Classification

Unified Group Symbol: CL

Group Name: Lean Clay

AASHTO Classification: A-7-6 (24)

Comments:

Reviewed By RHB

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name	KYTC - KFFT Terminal	Project Number	178579162
Source	CCA-12, 4.0'-7.0'	Lab ID	15

Sieve Analysis for the Portion Coarser than the No. 10 Sieve

Test Method	ASTM D 422
Prepared Using	ASTM D 421
Particle Shape:	Angular
Particle Hardness:	Hard and Durable
Tested By	CR
Test Date	03-03-2025
Date Received	02-06-2025

Maximum Particle Size: 2" Sieve

Sieve Size	% Passing
2"	100.0
3/4"	100.0
3/8"	100.0
No. 4	99.9
No. 10	99.8

Analysis for the Portion Finer than the No. 10 Sieve

Analysis Based on -3 inch Fraction Only

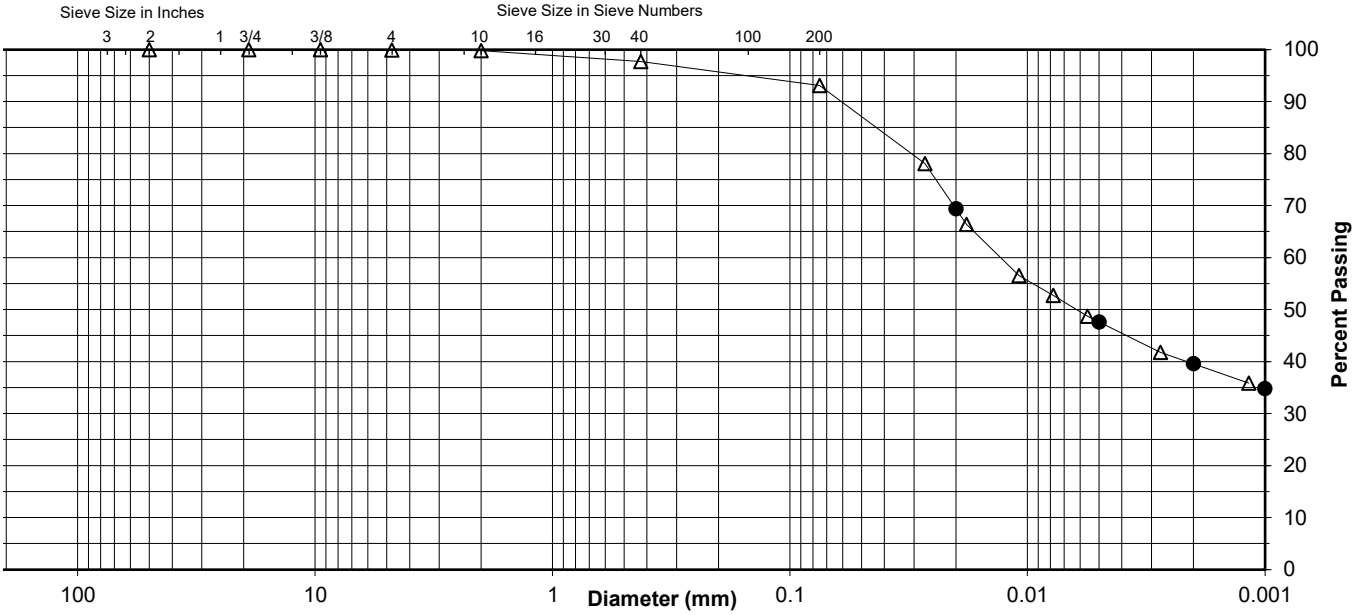
Specific Gravity 2.8

Dispersed Using Apparatus A - Mechanical, for 1 Minute

No. 40	97.7
No. 200	93.1
0.02 mm	69.4
0.005 mm	47.6
0.002 mm	39.6
0.001 mm	34.8

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.1	0.1	2.1	4.6	45.5	47.6
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	0.2			2.1	4.6	53.5	39.6



Comments

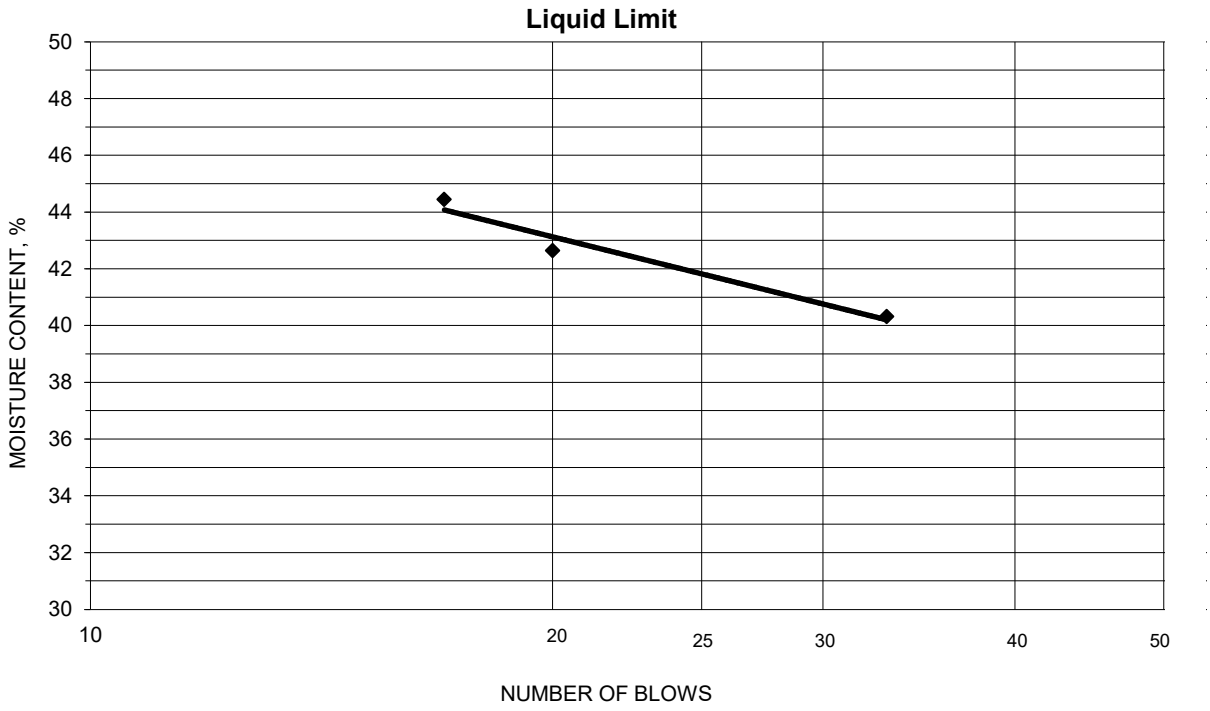
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	KYTC - KFFT Terminal			Project No.	178579162
Source	CCA-12, 4.0'-7.0'			Lab ID	15
				% + No. 40	2
Tested By	RS	Test Method	ASTM D 4318 Method A	Date Received	02-06-2025
Test Date	03-04-2025	Prepared	Dry		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
18.73	16.33	10.93	17	44.4	
19.40	16.88	10.97	20	42.6	
20.35	17.60	10.78	33	40.3	42



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
17.27	16.37	11.08	17.0	17	25
17.74	16.79	11.34	17.4		

Remarks:

Reviewed By RHB

Stantec

Unconfined Compressive Strength of Cohesive Soil

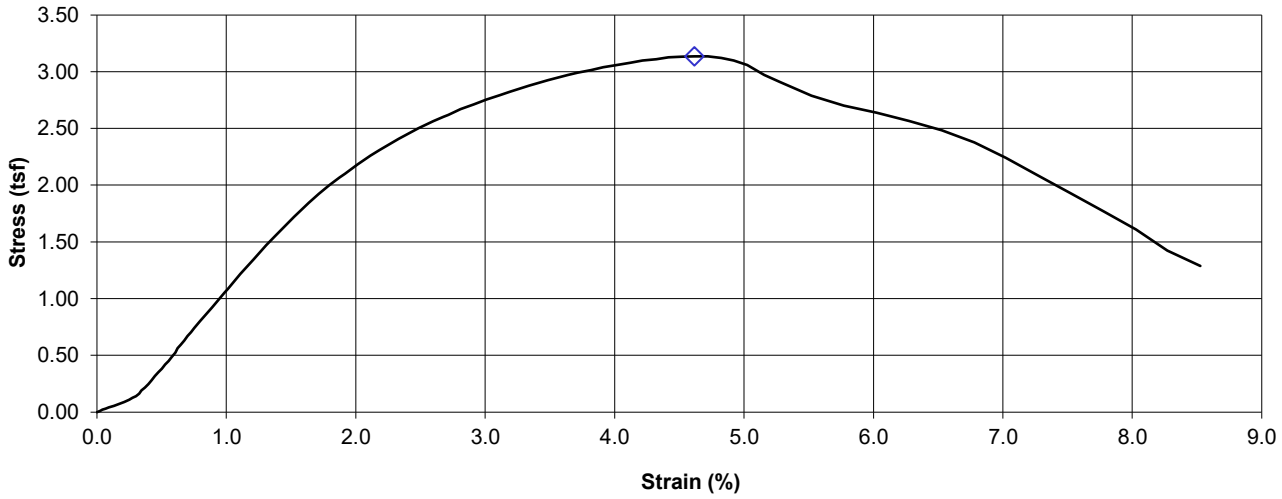
ASTM D 2166

Project Name KYTC - KFFT Terminal | Project Number 178579162
Source CCA-03, 2.0'-4.0' | Lab ID 2
Visual Description Lean Clay (CL), brown, moist, firm
Recovered 1.1'
Test Interval 2.5' - 3.0'

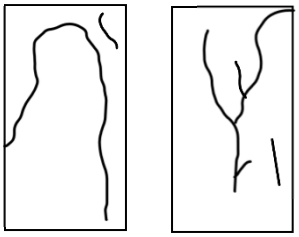
Specimen Type: Undisturbed | LL N/A | PL N/A | PI N/A
Date Extruded 02/07/2025
Date Tested 02/07/2025

Initial Wet Density (pcf)	128.6		
Initial Moisture Content (%)	23.3	Initial MC Taken	After Test, From Center of Specimen
Initial Dry Density (pcf)	104.3		
At Test Moisture Content (%)	N/A	At Test MC Taken	N/A
At Test Dry Density (pcf)	N/A		
Specific Gravity	N/A		
Degree of Saturation (%)	N/A	Unconfined Compressive Strength (tsf)	3.14
Average Height (in)	6.062	Undrained Shear Strength (tsf)	1.57
Average Diameter (in)	2.884	Strain at Maximum Stress (%)	4.6
Height to Diameter Ratio	2.1	Strain Rate to Failure (% / min.)	1.00

Stress vs. Strain



Failure Sketch



Pocket Penetrometer Reading (tsf) N/A
Torvane Reading (kg/cm^2) N/A

Comments
2.0'-2.5' - Left in Shelby Tube
2.5'-3.0' - UC

Reviewed By RHB

Stantec

Unconfined Compressive Strength of Cohesive Soil

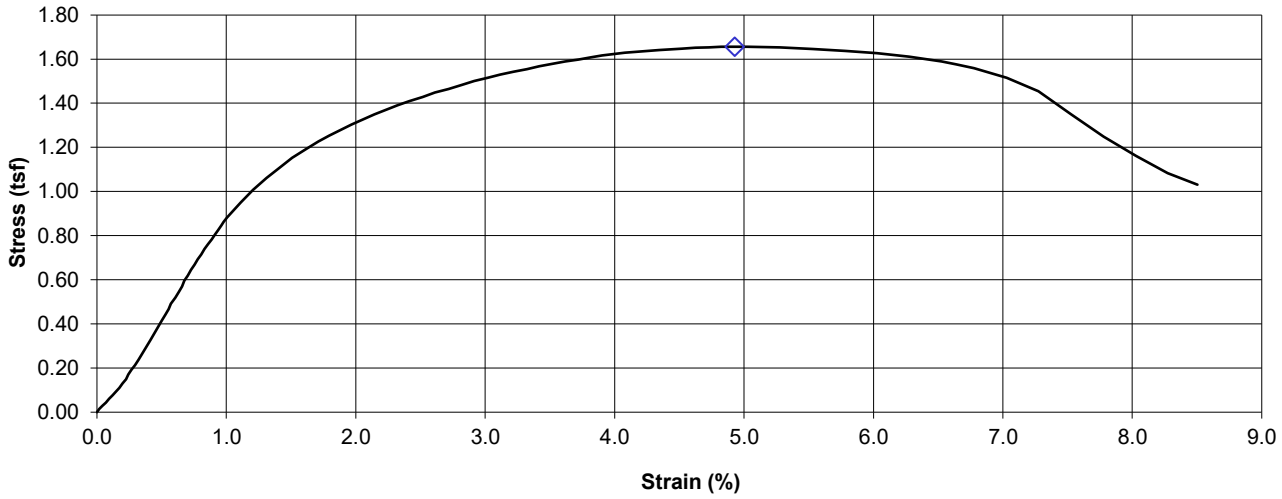
ASTM D 2166

Project Name KYTC - KFFT Terminal | Project Number 178579162
Source CCA-05, 2.0'-4.0' | Lab ID 4
Visual Description Lean Clay (CL), light brown, moist, firm
Recovered 1.6'
Test Interval 3.0' - 3.5'

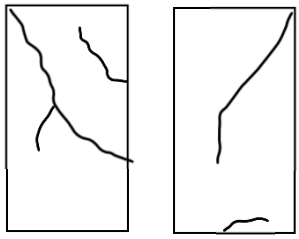
Specimen Type: Undisturbed | LL N/A | PL N/A | PI N/A
Date Extruded 02/07/2025
Date Tested 02/07/2025

Initial Wet Density (pcf)	122.4		
Initial Moisture Content (%)	31.2	Initial MC Taken	After Test, From Center of Specimen
Initial Dry Density (pcf)	93.3		
At Test Moisture Content (%)	N/A	At Test MC Taken	N/A
At Test Dry Density (pcf)	N/A		
Specific Gravity	N/A		
Degree of Saturation (%)	N/A	Unconfined Compressive Strength (tsf)	1.66
Average Height (in)	6.001	Undrained Shear Strength (tsf)	0.83
Average Diameter (in)	2.880	Strain at Maximum Stress (%)	4.9
Height to Diameter Ratio	2.1	Strain Rate to Failure (% / min.)	1.00

Stress vs. Strain



Failure Sketch



Pocket Penetrometer Reading (tsf) N/A
Torvane Reading (kg/cm^2) N/A

Comments
2.0'-3.0' - Left in Shelby Tube
3.0'-3.5' - UC

Reviewed By RHB

Stantec

Unconfined Compressive Strength of Cohesive Soil

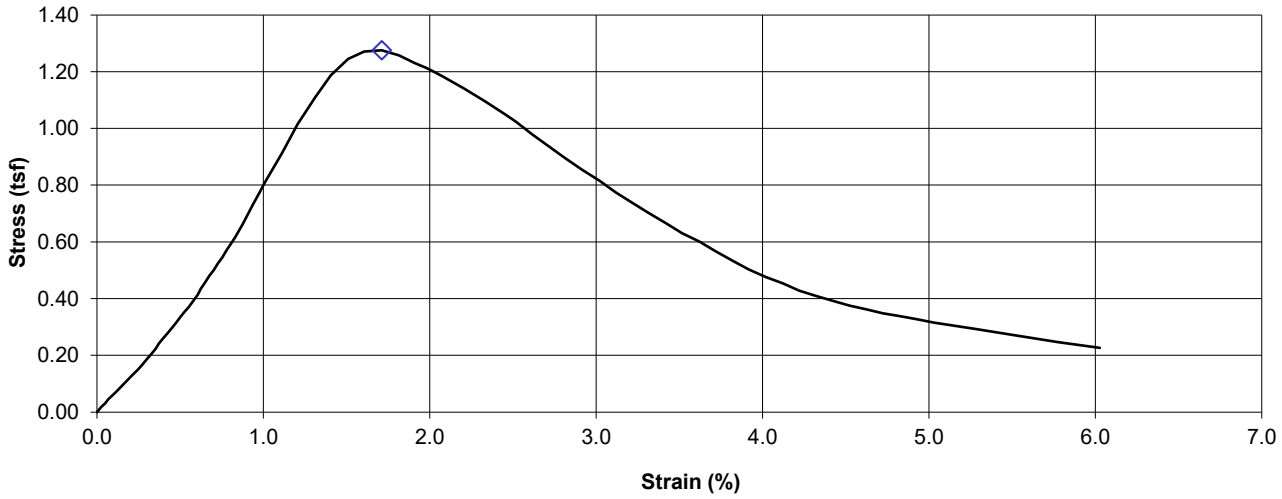
ASTM D 2166

Project Name KYTC - KFFT Terminal | Project Number 178579162
Source CCA-06, 5.0'-7.0' | Lab ID 7
Visual Description Lean Clay (CL), brown, moist, firm
Recovered 1.7'
Test Interval 6.1' - 6.6'

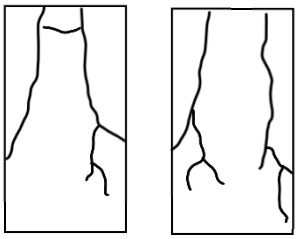
Specimen Type: Undisturbed | LL N/A | PL N/A | PI N/A
Date Extruded 02/07/2025
Date Tested 02/07/2025

Initial Wet Density (pcf)	128.6		
Initial Moisture Content (%)	21.6	Initial MC Taken	After Test, From Center of Specimen
Initial Dry Density (pcf)	105.7		
At Test Moisture Content (%)	N/A	At Test MC Taken	N/A
At Test Dry Density (pcf)	N/A		
Specific Gravity	N/A		
Degree of Saturation (%)	N/A	Unconfined Compressive Strength (tsf)	1.28
Average Height (in)	6.040	Undrained Shear Strength (tsf)	0.64
Average Diameter (in)	2.867	Strain at Maximum Stress (%)	1.7
Height to Diameter Ratio	2.1	Strain Rate to Failure (% / min.)	1.00

Stress vs. Strain



Failure Sketch



Pocket Penetrometer Reading (tsf) N/A
Torvane Reading (kg/cm^2) N/A

Comments
5.0'-6.1' - Left in Shelby Tube
6.1'-6.6' - UC

Reviewed By RHB

Stantec

Unconfined Compressive Strength of Cohesive Soil

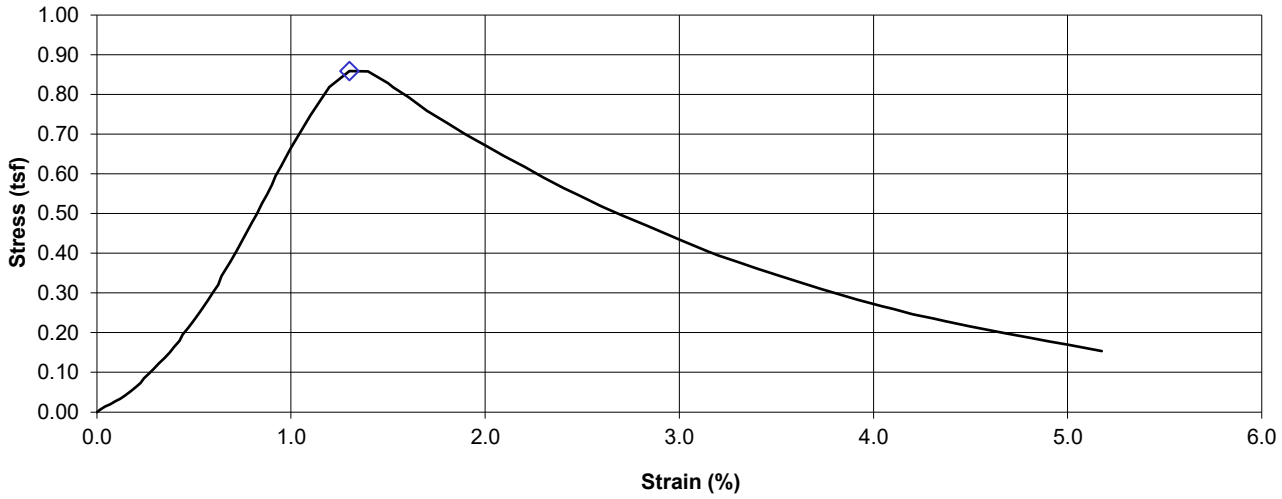
ASTM D 2166

Project Name KYTC - KFFT Terminal | Project Number 178579162
Source CCA-11, 2.0'-4.0' | Lab ID 13
Visual Description Lean Clay (CL), brown, moist, firm
Recovered 2'
Test Interval 3.4' - 3.9'

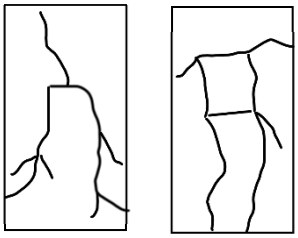
Specimen Type: Undisturbed | LL N/A | PL N/A | PI N/A
Date Extruded 02/07/2025
Date Tested 02/07/2025

Initial Wet Density (pcf)	125.2		
Initial Moisture Content (%)	23.6	Initial MC Taken	After Test, From Center of Specimen
Initial Dry Density (pcf)	101.3		
At Test Moisture Content (%)	N/A	At Test MC Taken	N/A
At Test Dry Density (pcf)	N/A		
Specific Gravity	N/A		
Degree of Saturation (%)	N/A	Unconfined Compressive Strength (tsf)	0.86
Average Height (in)	5.988	Undrained Shear Strength (tsf)	0.43
Average Diameter (in)	2.854	Strain at Maximum Stress (%)	1.3
Height to Diameter Ratio	2.1	Strain Rate to Failure (% / min.)	1.00

Stress vs. Strain



Failure Sketch



Pocket Penetrometer Reading (tsf) N/A
Torvane Reading (kg/cm^2) N/A

Comments
2.0'-3.4' - Left in Shelby Tube
3.4'-3.9' - UC

Reviewed By RHB

With every community, we redefine what's possible.

Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

Stantec Consulting Services Inc.
10200 Alliance Road, Suite 300
Cincinnati OH 45242-4754
stantec.com