



Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00

Precinct No. 4, Key Map No.: 326G and L

Cypress, Texas

January 25, 2024

Terracon Project No. 92225364.Revision2

Prepared for:

Tomball Independent School District

Tomball, Texas

Prepared by:

Terracon Consultants, Inc.

Houston, Texas

terracon.com

Terracon

Environmental



Facilities



Geotechnical



Materials

January 25, 2024

Tomball Independent School District
310 South Cherry Street
Tomball, Texas 77375



Attn: Mr. Jim Ross
Chief Financial Officer

Re: Geotechnical Engineering Report
Tomball ISD HCFCD Unit No.: L 109-00-00 Precinct No. 4, Key Map No.: 326G and L
Cypress, Texas
Terracon Project No. 92225364.Revision2

Dear Mr. Ross:

We have completed the Geotechnical Engineering services for the above referenced project. We trust that this report is responsive to your project needs. Please contact us if you have any questions or if we can be of further assistance.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.

(Texas Firm Registration No.: F-3272)

A handwritten signature in blue ink, appearing to read "Jonathan N. Han".

Jonathan N. Han, E.I.T.
Staff Geotechnical Engineer



A handwritten signature in black ink, appearing to read "Rebecca C. Rice".

Rebecca C. Rice, P.E.
Project Engineer

A handwritten signature in black ink, appearing to read "Kierstyn M. Burrell".

Kierstyn M. Burrell, P.E.
Geotechnical Services Manager

TABLE OF CONTENTS

EXECUTIVE SUMMARY	III
INTRODUCTION.....	1
1.0 INTRODUCTION	1
2.0 PURPOSE & SCOPE OF WORK.....	1
3.0 SITE EXPLORATION.....	2
3.1 Site Conditions	2
3.2 Project Description	2
3.3 Geology	3
3.4 Geologic Faults	3
4.0 FIELD EXPLORATION	3
4.1 Soil Boring and Sampling.....	3
4.2 Environmental Issues.....	5
5.0 LABORATORY TESTING.....	5
6.0 DESCRIPTION OF SUBSURFACE SOIL AND GROUNDWATER CONDITIONS	
6.1 Description of Soil Stratigraphy.....	6
6.1.1 Subsurface Profile 1	7
6.1.2 Subsurface Profile 2	7
6.1.3 Subsurface Profile 3.....	7
6.2 Description of Groundwater Conditions	7
7.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS	8
7.1 Recommendations for the Drainage Channel.....	8
7.1.1 Global Stability Analysis.....	8
7.1.2 Borrow Material Analysis	13
7.2 Construction Considerations for the Drainage Channel	15
7.2.1 Temporary Groundwater Control for the Drainage Channel.....	15
7.2.2 Slope Grading	16
7.2.3 Clay Liner	16
7.2.4 Slope Protection and Erosion Control.....	17
8.0 GENERAL COMMENTS	17
9.0 REFERENCES.....	19

APPENDIX A – FIELD EXPLORATION

Exhibit A-1	Site Location
Exhibit A-2	Exploration Plan
Exhibit A-3	Principal Faults in the Houston, Texas, Metropolitan Area
Exhibit A-4	Subsurface Soil Profile
Exhibits A-5 to A-10	Boring Logs
Exhibits A-11 to A-12	Terms and Symbols used on HCFCD Boring Logs
Exhibit A-13	Classification of Soils for Engineering Purposes (HCFCD)

APPENDIX B – LABORATORY TESTING

Exhibits B-1 to B-2	Summary of Laboratory Results
Exhibits B-3 to B-8	Double Hydrometer Test Results
Exhibits B-9 to B-10	Consolidated Undrained Results
Exhibit B-11 to B-12	Specific Gravity Results
Exhibits B-13 to B-15	Crumb Test Results

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No.: 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



APPENDIX C – CHANNEL SLOPE STABILITY ANALYSIS

Exhibits C-1 to C-26

Slope Stability Analysis Results

Exhibits C-27 to C-34

Backup Calculations in Slope Stability Analysis

Exhibit C-35

Computer Input & Output for Slope Stability Analysis

APPENDIX D – INFORMATION PROVIDED BY CLIENT

Exhibits D-1 to D-4

Plans Provided by Brooks & Sparks, Inc.

Exhibits D-5 to D-7

Plans Provided by West Belt Surveying, Inc.

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No.: 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



EXECUTIVE SUMMARY

This geotechnical engineering report has been prepared for the proposed improvements southeast of the intersection of Mueschke Road and future Destination Drive in Cypress, Texas.

We understand that a new drainage channel, approximately 2,500 feet in length, is planned to flow north to south and is planned to have a maximum depth of 15 feet with maximum sideslope declinations of 4H:1V.

Six test borings, designated as B-1 through B-6, were drilled to depths of about 30 feet below existing grade within the area of the proposed drainage channel. Terracon utilized the soil and groundwater information from borings B-1 through B-6 to provide recommendations and perform global stability analysis of the proposed drainage channel.

Based on the information obtained from our subsurface exploration, the site can be developed for the proposed project. A summary of our findings and recommendations is provided below.

- Borings B-2, B-3, and B-6 were advanced using dry drilling techniques to depths of about 20 feet in an effort to evaluate groundwater conditions at the time of our field program. Wet rotary techniques were used thereafter to the termination depths of these borings (about 30 feet). Borings B-1, B-4, and B-5 were advanced using dry drilling techniques to the termination depths of about 30 feet. Groundwater was generally observed at depths that ranged from about 16 to 18 feet while drilling and generally at depths that ranged from about 14½ to 17½ feet about one day after completion of drilling. Groundwater was not observed at boring B-1 during or after completion of drilling.
- Excavations that extend into the clay soils and surficial sand soils may occur without advance dewatering. Seepage that may occur in these clay soils and surficial sand soils is expected to be minor and likely can be handled utilizing a system of sumps and pumps positioned at the bottom of the excavation. However, excavations that extend through deeper zones of sand soils, such as those observed at borings B-2 through B-5, will likely require some form of advance dewatering, depending on the groundwater conditions at the time of construction.
- Based on the results of our slope stability analyses, the proposed sideslope configuration of 4 Horizontal (H) to 1 Vertical (V) or flatter and corresponding channel depth of 15 feet would be appropriate for the proposed drainage channel provided a clay liner is constructed where sand soils and dispersive soils are exposed along the sideslopes. Results of the slope stability analyses are presented in Appendix C.
- The soils observed within the proposed excavation depths are generally non-dispersive to dispersive based on our dispersive potential testing. The presence of dispersive soil can result in significant erosion and piping/washout of the sideslopes. To reduce potential of

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No.: 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



these soils eroding, we recommend that the backslope drainage system have interceptors spaced a maximum of 400 feet according to Section 11 of the 2019 HCFCD PCPM where dispersive clays were observed. Portions of the soils that were classified as lean clay with sand met the requirements for select fill in accordance with Section 02314 of the 2020 HCFCD Standard Specifications. We recommend that soil samples should be obtained for verification by laboratory testing and be approved by the Geotechnical Engineer before utilization.

This executive summary should be used in conjunction with the entire report for design purposes. Details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled **“8.0 GENERAL COMMENTS”** should be read for an understanding of the report limitations.

Geotechnical Engineering Report
Tomball ISD HCFCD Unit No.: L 109-00-00
Precinct No. 4, Key Map No.: 326G and L
Cypress, Texas
Terracon Project No. 92225364.Revision2
January 25, 2024

1.0 INTRODUCTION

Terracon is pleased to submit our revised geotechnical engineering report for the proposed drainage channel, planned to be approximately 2,500 linear feet long, located southeast of the intersection of Mueschke Road and the future Destination Drive in Cypress, Texas. Six (6) test borings, designated B-1 through B-6, were drilled to depths of about 30 feet below the existing ground surface along the alignment of the proposed drainage channel.

This project was authorized by Mr. Robert Willbanks, AIA Senior Program Manager with Lockwood, Andrews, and Newnam Inc. (LAN) through electronic correspondence dated July 8, 2022, and under Tomball ISD's existing Purchase Order No. 2205778 dated March 21, 2022. The project scope was performed in general accordance with Terracon Document No. P92225364.Revision1, dated July 26, 2022.

Based on information provided by Brooks & Sparks, we understand the project consists of the construction of a new drainage channel, approximately 2,500 feet in length, with a maximum depth of 15 feet below existing grade and sideslope declinations of 4 horizontal to 1 vertical (4H:1V). A Site Location Plan indicating the general site location is provided on Exhibit A-1 of Appendix A.

2.0 PURPOSE & SCOPE OF WORK

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Boring logs with field and laboratory data
- Stratification based on visual soil classification
- Groundwater levels observed during drilling and one day after completion of drilling
- Site and Boring location plans
- Active fault map to identify the proximity of published faults near the site
- Subsurface exploration procedures
- Description of subsurface conditions
- Description of environmental hazards identified during field exploration (if observed)

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



- Potential use of soils observed in the borings as fill material in accordance with HCFCD “Standard Specifications Book – 2020” Section 02314
- Global stability analyses of the drainage channel sideslopes
- Drainage channel sideslope protection and erosion control
- Excavation considerations and temporary groundwater control
- Drainage channel construction considerations

The geotechnical engineering Scope of Services for this project included the advancement of six test borings, designated B-1 through B-6, to depths of approximately 30 feet below existing site grade.

Maps showing the site and boring locations are shown in Appendix A. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs and as separate graphs in Appendix B.

3.0 SITE EXPLORATION

3.1 Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration.

Table 1

Item	Description
Project location	The project site is located southeast of the intersection of Mueschke Road and the future Destination Drive in Cypress, Texas. See Exhibit A-1
Existing improvements	The project site was vacant at the time of our field program. Various retail and residential structures are located around the proposed channel alignment.
Current ground cover	Grass, weeds, and scattered trees. Portions of the site were heavily wooded.
Existing topography	Relatively level.

3.2 Project Description

Based on the information provided by Brooks & Sparks, we understand that the current scope includes construction of an approximately 2,500 foot long drainage channel with a maximum depth of 15 feet below existing grade and sideslope declinations of 4 horizontal to 1 vertical (4H:1V). We understand that the channel is planned to be designed and constructed in accordance with Harris County Flood Control District (HCFCD) guidelines.

3.3 Geology

Based on the geologic maps published by the Bureau of Economic Geology, the site for the proposed project is in the upper Lissie formation, sometimes denoted the Montgomery formation. The upper Lissie formation is heterogeneous, containing interbedded layers of clay, sand and silt. This formation was deposited in mid-Pleistocene time in shallow coastal river channels and flood plains.

The clay present in the formation has been preconsolidated by a process of desiccation. Numerous wetting and drying cycles have produced a network of randomly oriented and closely-spaced joints, which are sometimes slickensided, that is, have a shiny appearance when exposed. The joint pattern strongly influences the engineering behavior of the soil.

The sand layers vary in compactness from loose to very dense, and in thickness from a fraction of an inch to many feet due to an irregular depositional environment. Sands are generally subrounded to subangular and vary from coarse to very fine, are poorly graded, and often contain significant amounts of silt-sized particles in the sand matrix.

3.4 Geologic Faults

The coastal plain in this region has a complex tectonic geology, several major features of which are: Gulf Coastal geosyncline, salt domes, and major sea level fluctuations during the glacial stages, subsidence and geologic faulting activities. Most of these geologic faulting activities have ceased for millions of years, but some are still active. Based on a review of the map "Principal Faults in the Houston, Texas, Metropolitan Area" by Shah and Lanning-Rush (2005), no faults appear to be located in the vicinity of the project site, as shown on Exhibit A-3 of Appendix A. A detailed geologic fault investigation and study of the site geology were beyond the scope of this report.

4.0 FIELD EXPLORATION

4.1 Soil Boring and Sampling

The borings completed for this project are summarized in the following table:

Table 2

Summary of Field Exploration				
Boring No.	Approximate Depth ¹ (feet)	Surface Elevation ² (feet)	Northing ^{2, 3}	Easting ^{2, 3}
B-1	30	171	13936342	3005949

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



Summary of Field Exploration				
Boring No.	Approximate Depth ¹ (feet)	Surface Elevation ² (feet)	Northing ^{2, 3}	Easting ^{2, 3}
B-2	30	170	13935740	3005975
B-3	30	168	13935389	3005606
B-4	30	169	13934944	3005708
B-5	30	167	13934456	3005753
B-6	30	165	13934017	3005815

1. Below grade at the time of our field program.

2. Survey data was provided to Terracon by West Belt Surveying, Inc.

3. Northing and Easting were provided in grid format coordinates by West Belt Surveying, Inc..

We used handheld Global Positioning System (GPS) equipment to locate the approximate latitude and longitude of the drainage channel borings with an accuracy of +/-25 feet. The boring depths were measured from the existing ground surface at the time of our field activities.

We advanced the soil borings with an all-terrain vehicle (ATV) mounted drill rig using solid stem continuous flight augers (ASTM D6151). Samples were obtained continuously at 2-foot intervals to 20 feet below existing grade and at intervals of 5 feet thereafter.

Cohesive soil samples were generally recovered using open-tube samplers (ASTM D1587). Hand penetrometer tests were performed on samples of cohesive soils in the field to serve as a general measure of consistency.

Granular soils and soils for which good quality open-tube samples could not be recovered were sampled by means of the Standard Penetration Test (SPT) (ASTM D1586). This test consists of measuring the number of blows (N) required for a 140-pound hammer free falling 30 inches to drive a standard split-spoon sampler 12 inches into the subsurface material after being seated six inches. This blow count or SPT "N" value is used to evaluate the stratum.

The samples were placed in appropriate containers, taken to our soil laboratory for testing, and classified by a geotechnical engineer (ASTM D4220). In addition, we observed and recorded groundwater levels during drilling and sampling. Groundwater levels were also observed and recorded one day after completion of drilling. Borings B-1 through B-6 were backfilled with auger cuttings one day after completion of drilling.

Our exploration team prepared the field boring logs as part of standard drilling operations including sampling depths, penetration distances, and other relevant sampling information. The field logs include visual classifications of materials observed during drilling, and our interpretation of subsurface conditions between samples. The final boring logs, prepared from the field logs,

Geotechnical Engineering Report

Tomball ISD HCFCU Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



represents an interpretation of the field logs by a geotechnical engineer and includes modifications based on laboratory observation and tests on select samples.

4.2 Environmental Issues

We did not observe any environmental anomalies in the soil and groundwater samples during the sampling activities. Detailed environmental evaluation for the soil and groundwater was beyond the scope of this project.

5.0 LABORATORY TESTING

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed. The performed laboratory testing included the following:

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D1140-17 Standard Test Methods for Determining the Amount of Material Finer than 75- μ m (No. 200) Sieve in Soils by Washing
- ASTM D7263-21 Standard Test Method for Determination of Density and Unit Weight of Soil Specimens
- ASTM D2166/D2166M Standard Test Method for Unconfined Compressive Strength of Cohesive Soil
- ASTM D6572-13 Standard Test Methods for Determining Dispersive Characteristics of Clayey Soils by the Crumb Test
- ASTM D4221-18 Standard Test Method for Dispersive Characteristics of Clay Soil By Double Hydrometer
- ASTM D4767 Standard Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils
- ASTM D854 Standard Test Methods for Specific Gravity of Soil Solids by Water Pycnometer

The laboratory testing program included examination of soil samples by an engineer. Based on the results of the field and laboratory test programs, we described and classified the soil samples in accordance with the Unified Soil Classification System and the attached Terms and Symbols Used on HCFCU Boring Logs document in Appendix A.

Geotechnical Engineering Report

Tomball ISD HCFCU Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



Samples not tested in the laboratory will be stored for a period of 30 days subsequent to submittal of this report and will be discarded after this period, unless we are notified otherwise.

6.0 DESCRIPTION OF SUBSURFACE SOIL AND GROUNDWATER CONDITIONS

The subsurface conditions observed at the project site were obtained from the soil test borings performed within the area of the proposed improvements. We have developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the information from the soil test borings and laboratory test results. The subsurface soil conditions and groundwater conditions are described in the following subsections.

Table 3

Subsurface Soils						
Description	Plasticity Index	Moisture Content (%)	Moisture Content vs. Plastic Limit ¹	Undrained Shear Strength ² (psf)	SPT N-Value ³ (bpf)	Percentage of Fines ⁴ (%)
Lean Clay and Sandy Lean Clay	9 to 31	5 to 21	-8 to +3	300 to 3,000	---	50 to 89
Fat Clay	37 to 48	10 to 24	-4 to +6	1,500 to 1,800	---	64 to 95
Sandy Silt	3	7	-7	---	4	52
Silty Sand, Clayey Sand, and Silty Clayey Sand	---	6 to 23	---	---	20 to 61	18 to 47

1. The difference between a soil sample's moisture content and its corresponding plastic limit.

2. Based on unconfined compressive strength tests.

3. bpf = blows per foot.

4. Percent passing the No. 200 sieve.

6.1 Description of Soil Stratigraphy

The soil stratigraphy, as evaluated from our field and laboratory programs, is shown in detail on the boring logs in Appendix A. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual.

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



6.1.1 Subsurface Profile 1

The near-surface soils within borings B-1 and B-2 generally consisted of firm to very stiff sandy lean clay that extended to depths of about 10 feet below existing grade. The underlying soils consisted of primarily stiff to very stiff fat clay to their termination depths of 30 feet.

6.1.2 Subsurface Profile 2

The near-surface soils within borings B-3 through B-5 generally consisted of soft to hard lean clay that extended to depths of about 12 feet below existing grade. The underlying soils consisted of primarily medium dense to very dense silty sand to their termination depths of 30 feet.

6.1.3 Subsurface Profile 3

The near-surface soils within boring B-6 generally consisted of dense silty sand that extended to depths of about 6 feet below existing grade. The underlying soils consisted of primarily stiff to hard sandy lean clay to its termination depth of 30 feet.

6.2 Description of Groundwater Conditions

Borings B-2, B-3, and B-6 were advanced using dry drilling techniques to depths of about 20 feet in an effort to evaluate groundwater conditions at the time of our field program. Wet rotary techniques were used thereafter to the termination depths of these borings (about 30 feet). Borings B-1, B-4, and B-5 were advanced using dry drilling techniques to their termination depths of about 30 feet. Upon reaching groundwater, drilling was suspended for a period of about 15 minutes to allow the groundwater to rise and the groundwater levels to be recorded in an effort to evaluate groundwater conditions at the time of our field program. The water levels observed in the boreholes can be found on the boring logs in Appendix A and are summarized below.

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



Table 4

Summary of Groundwater Level Observations ¹						
Boring No.	Approximate Boring Depth (feet) ²	Approximate Depth of Dry Drilling (feet) ²	Approximate Depth of Groundwater (feet) ²			
			Initial/During Dry Drilling	After 5 Minutes	After 15 Minutes	After One Day
B-1	30	30	No free water observed			
B-2	30	20	18	15½	14	14½
B-3	30	20	16	14 ³	---	14 ³
B-4	30	30	No free water observed			17½
B-5	30	30	No free water observed			20½
B-6	30	20	18	16½	14½	17½ ³

1. Groundwater readings were obtained on July 25 to 28, 2022.

2. Below existing grade.

3. Caved-in.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the proposed improvements may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project and should be evaluated prior to construction.

7.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS

The following recommendations are based upon the data obtained in our field and laboratory programs, project information provided to us, and on our experience with similar subsurface and site conditions.

7.1 Recommendations for the Drainage Channel

We understand that a new dry drainage channel, approximately 2,500 feet in length, is planned to be located southeast of the intersection of Mueschke Road and the future Destination Drive and is planned to have a maximum depth of 15 feet with sideslope declinations of 4H:1V. Drainage channel cross sections were not available at the time of this report. Terracon should be contacted if the channel configuration is different from those analyzed to review and revise our analyses, if necessary.

7.1.1 Global Stability Analysis

Slope stability analyses were performed utilizing the commercial slope stability software program, SLIDE2. This software calculates the factor of safety against slope failure using a two-dimensional

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



limiting equilibrium method. The factors of safety for analyzing slope stability were computed utilizing the Bishop (simplified) method. The slope stability analyses performed included analysis of both global and local short-term saturated, long-term, and rapid drawdown conditions.

- Short-Term Saturated – This condition was analyzed to evaluate the stability of the sideslopes after construction is complete. Short term (total stress) soil parameters were utilized because the soil is not anticipated to have had time to drain since completion of construction. A surcharge of 250 psf was imposed at the top of bank to account for construction and maintenance equipment. If the anticipated surcharges due to construction or maintenance equipment are greater than the ones considered herein, Terracon should be contacted so changes can be made to the slope stability analysis, if needed. Groundwater was assumed to follow the contours of the channel sideslopes.
- Long-Term – The long-term case represents steady state piezometric and stress conditions. When a slope is excavated, altered stress conditions create pore pressure changes within the slope and the undrained strength of the bank soils is mobilized. With time, the soil pore pressures adjust to the imposed stress and piezometric conditions, and the bank soils rely on their available strength for long-term stability. Therefore, effective stress soil parameters were used in these analyses. We understand that the proposed slopes are not planned to be lined with concrete slope paving, therefore, weathered parameters were also considered in our analyses. Based on groundwater readings obtained from the field program, the water level for the drainage channel was assumed at a depth of 15 feet below the top of the bank. A surcharge of 250 psf was also imposed at the top of bank to account for maintenance equipment. If the anticipated surcharges due to construction or maintenance equipment are greater than the ones considered herein, Terracon should be contacted so changes can be made to the slope stability analysis, if needed.
- Rapid Drawdown – A rapid drawdown condition is considered to occur when the channel contains water to its full capacity for a time sufficient to allow saturation of the soils near the surface of the sideslopes. The drainage channel then drains within a short time frame such that the water that has infiltrated the sideslopes does not dissipate, thereby imposing additional driving loads on the sideslopes. The rapid drawdown condition was evaluated utilizing total stress and effective stress soil parameters. The water level behind the bank was assumed at the top of the bank, along the sideslopes, and at the bottom of the drainage channel. In addition, a rapid drawdown case was performed to determine the steepest stable slope for each soil profile.

Three subsurface profiles were developed for the proposed drainage channel. Based on the field and laboratory test results and our experience with similar subsurface soil conditions, the strength parameters in the following tables were used in the slope stability analyses.

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2

**Table 6**

Summary of Soil Parameters for Slope Stability Analysis
Soil Profile 1 (Based on Borings B-1 and B-2)

Soil Description	Depth ¹ (feet)	Total Unit Weight (pcf)	Design PI ² (LL) ³	Short-Term		Long-Term/Rapid Drawdown ⁴				Long-Term/Rapid Drawdown (Weathered) ⁴			
				c _u (psf)	φ _u (deg)	c (psf)	φ (deg)	c' (psf)	φ' (deg)	c _r (psf)	φ _r (deg)	c' _r (psf)	φ' _r (deg)
Sandy Lean Clay	0 to 10	120	27 (40)	1,300	---	175	17	150	22	125	17	110	21
Fat Clay	10 to 30	120	48 (66)	1,300	---	175	13	150	20	100	13	85	18

1. Below existing grade.

2. PI = Plasticity Index.

3. LL = Liquid Limit.

4. See Appendix C, Backup Data for Calculations, for details regarding the evaluation of the soil strength parameters. Total stress cohesion and total stress friction angles were evaluated by increasing the effective stress cohesion by approximately 15 percent and reducing the effective stress friction angle by approximately 30 percent.

Table 7

Summary of Soil Parameters for Slope Stability Analysis
Soil Profile 2 (Based on Borings B-3 through B-5)

Soil Description	Depth ¹ (feet)	Total Unit Weight (pcf)	Design PI ² (LL) ³	Short-Term		Long-Term/Rapid Drawdown ⁴				Long-Term/Rapid Drawdown (Weathered) ⁴			
				c _u (psf)	φ _u (deg)	c (psf)	φ (deg)	c' (psf)	φ' (deg)	c _r (psf)	φ _r (deg)	c' _r (psf)	φ' _r (deg)
Sandy Lean Clay	0 to 12	120	31 (45)	1,500	---	175	15	150	22	115	14	100	20
Silty Sand	12 to 30	120	---	---	32	---	32	---	32	---	---	---	---
Clay Liner ⁵	---	120	20 (35)	1,000	---	125	16	100	20	---	---	---	---

1. Below existing grade.

2. PI = Plasticity Index.

3. LL = Liquid Limit.

4. See Appendix C, Backup Data for Calculations, for details regarding the evaluation of the soil strength parameters. Total stress cohesion and total stress friction angles were evaluated by increasing the effective stress cohesion by approximately 15 percent and reducing the effective stress friction angle by approximately 30 percent.

5. A clay liner meeting the requirements of Section 02314 Fill Material of the 2020 HCFCD Standard Specifications document was utilized in our analysis.

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



Table 8

Summary of Soil Parameters for Slope Stability Analysis									
Soil Profile 3 (Based on Boring B-6)									
Soil Description	Depth ¹ (feet)	Total Unit Weight (pcf)	Design PI ² (LL) ³	Short-Term		Long-Term/Rapid Drawdown ⁴			
				c _u (psf)	φ _u (deg)	c (psf)	φ (deg)	c' (psf)	φ' (deg)
Silty Sand	0 to 6	120	---	---	32	---	32	---	32
Sandy Lean Clay ⁵	10 to 30	120	15 (29)	1,000	---	150	15	125	21
Clay Liner ⁶	---	120	20 (35)	1,000	---	125	16	100	20

1. Below existing grade.

2. PI = Plasticity Index.

3. LL = Liquid Limit.

4. See Appendix C, Backup Data for Calculations, for details regarding the evaluation of the soil strength parameters. Total stress cohesion and total stress friction angles were evaluated by increasing the effective stress cohesion by approximately 15 percent and reducing the effective stress friction angle by approximately 30 percent.

5. Soils generally consisted of clays with Liquid Limits less than 40. Based on previous conversations with HCFCD, we understand clay soils with lower expansion potential (Liquid Limits less than 40) were less susceptible to changes from wetting and drying cycles. Therefore, weathered parameters were not considered in the analysis.

6. A clay liner was meeting the requirements of Section 02314 Fill Material of the 2020 HCFCD Standard Specifications document was utilized in our analysis.

Where,

c _u	Undrained Cohesion
φ _u	Angle of Internal Friction
c	Consolidated-Undrained Cohesion
φ	Consolidated-Undrained Friction Angle
c'	Effective Stress Cohesion
φ'	Effective Stress Friction Angle
c _r	Consolidated-Undrained Residual (weathered) Cohesion
φ _r	Consolidated-Undrained Residual (weathered) Friction Angle
c' _r	Effective Stress Residual (weathered) Cohesion
φ' _r	Effective Stress Residual (weathered) Friction Angle

The results of the analyses are summarized in the following table and are also presented in Appendix C. Due to the presence of sand and dispersive soils, we recommend a clay liner be constructed as discussed in the “7.2.3 Clay Liner” section of this report to improve stability and to reduce the potential for the soils eroding.

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2

**Table 9**

Cross-section	Computed Factor of Safety (Soil Profile 1)							
	Short-Term Saturated		Long-Term		Rapid Drawdown – Total Stress		Rapid Drawdown – Effective Stress	
	Local	Global	Local	Global	Local	Global	Local	Global
Soil Profile 1 (B-1)	6.05	4.31	1.98	1.87	1.28	1.25	1.35	1.33
Minimum Acceptable Factor of Safety	1.3		1.5		1.25			

Table 10

Cross-section	Computed Factor of Safety								
	Short-Term Saturated	Short-Term Saturated ²		Long-Term ²		Rapid Drawdown – Total Stress ²		Rapid Drawdown – Effective Stress ²	
	Local	Local	Global	Local	Global	Local	Global	Local	Global
Soil Profile 2 (B-2 to B-5)	1.22 ¹	3.20	2.44	2.34	2.56	1.42	1.40	1.42	1.41
Soil Profile 3 (B-6)	1.12 ¹	4.45	3.15	2.27	2.04	1.39	1.31	1.53	1.48
Minimum Acceptable Factor of Safety	1.3	1.3		1.5		1.25			

1. Does not meet HCFCD's Minimum Acceptable Factor of Safety.

2. The presented factor of safety includes a clay liner as recommended in Section 7.2.3 Clay Liner.

Table 9 indicates the slope stability factors of safety for the configurations analyzed exceed the minimum safety factor requirements for the short-term saturated, long-term, and rapid drawdown conditions for Soil Profile 1.

Table 10 indicates the slope stability factors of safety for subsurface Soil Profiles 2 and 3. The short-term saturated condition for Soil Profiles 2 and 3 do not meet the minimum required safety factors for the proposed slope configurations with the existing in-situ soils. However, if a clay liner is constructed on the sideslopes of the proposed drainage channel as discussed in the “**7.2.3 Clay Liner**” section of this report, then the factors of safety against slope failures for the proposed slope configurations should meet or exceed the typical minimum required safety factor for short-term saturated, long-term, and rapid drawdown conditions for Subsurface Soil Profiles 2 and 3.

As stated previously, if the final geometric configurations are different from those analyzed, Terracon should be contacted to review and revise our analyses, if necessary.

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



In addition, the steepest stable sideslopes were determined to be 4 horizontal to 1 vertical (4H:1V) for Soil Profiles 1 through 3 based on the critical (rapid drawdown) global stability analyses. The factor of safety exceeded HCFCD's safety factor criteria for rapid drawdown for these cases.

7.1.2 Borrow Material Analysis

Crumb tests and double hydrometer tests were performed for evaluation of the dispersive nature of the on-site soils. The results are summarized below.

Table 11

Dispersive Potential Test Results				
Boring No.	Sample Depth ¹ (feet)	Soil Description	Crumb Test Grade	Double Hydrometer Test Results (% Dispersion)
B-1	6 to 8	Lean Clay with Sand (CL)	2	---
B-1	10 to 12	Fat Clay (CH)	4	22.4
B-2	6 to 8	Sandy Lean Clay (CL)	4	---
B-2	10 to 12	Fat Clay (CH)	4	47.2
B-3	4 to 6	Sandy Lean Clay (CL)	2	---
B-4	8 to 10	Lean Clay with Sand (CL)	4	53.8
B-5	2 to 4	Sandy Lean Clay (CL)	3	---
B-5	12 to 14	Sandy Lean Clay (CL)	4	34.6
B-6	6 to 8	Sandy Lean Clay (CL)	4	48.5
B-6	12 to 14	Sandy Lean Clay (CL)	4	45.9

1. Below existing grade.

The crumb test may be used as an indicator of field performance of dispersive soils using the following evaluation of soil crumb reaction:

Grade 1:	No dispersion problem.
Grade 2:	Possible dispersion problem.
Grade 3 or 4:	Definite dispersion problem.

The double hydrometer test may also be used as an indicator of the dispersive characteristics of clay soils. According to ASTM D4221-18, percent dispersion less than 30 percent, indicates a nondispersive clay. When the percent dispersion ranges from 30 to 50 percent, it indicates an intermediate dispersive clay. If the percent dispersion is greater than 50 percent, it indicates a dispersive clay. Based on the results of our dispersive potential testing, the soils tested are nondispersive to dispersive.

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



Based on the information provided in Section 02314 Fill Material Item 2.2A Fill Material Excavation from On-Site of the 2020 HCFCD Standard Specifications document, the material to be re-used as select fill shall be free from roots, trash, organic matter, and other objectionable material; and should be classified by their group name and symbol in accordance with ASTM D2487 as follows:

Lean Clay	CL
Lean Clay with Sand	CL
Sandy Lean Clay	CL

The table below shows the approximate depths for on-site soils observed in the upper 20 feet of the soil borings that meet the current HCFCD fill specifications as described in Section 02314 Fill Material Item 2.2A Fill Material Excavation from On-Site of the 2020 HCFCD Standard Specifications document.

Table 12

On-site Soils Meeting HCFCD Fill Specifications in Accordance with Section 02314 Item 2.2A	
Boring No.	Depth of Lean Clay with Sand/Sandy Lean Clay ¹ (feet)
B-1	0 to 10
B-2	0 to 10; 16 to 18
B-3	0 to 12
B-4	0 to 14
B-5	0 to 16
B-6	2 to 4; 6 to 30

1. Below existing grade at the time of our field program.

Based on the information provided in Section 02314 Fill Material Item 2.1 Imported Select Fill Material of the 2020 HCFCD Standard Specifications document, material that can be exported to other HCFCD projects to be used as select fill shall be a fine-grained lean clay with sand or sandy lean clay. This material shall have a maximum liquid limit of 45 percent, plasticity index between 12 percent and 30 percent, percent passing the No. 200 sieve between 60 percent and 85 percent, and have no or low dispersion potential. Based on our laboratory testing results, the on-site soils do not meet the current HCFCD Fill specifications as described in Section 02314 Fill Material Item 2.1 Imported Select Fill Material of the 2020 HCFCD Standard Specifications document.

In general, we recommend that soil samples should be obtained for verification by laboratory testing and be approved by the Geotechnical Engineer before utilization.

7.2 Construction Considerations for the Drainage Channel

7.2.1 Temporary Groundwater Control for the Drainage Channel

Based on groundwater information presented “**6.2 Description of Groundwater Conditions**”, we anticipate that excavations that extend into the clay soils and surficial sand soils may occur without advance dewatering. Seepage that may occur in these clay soils is expected to be minor and likely can be handled utilizing a system of sumps and pumps. However, excavations that extend through deeper zones of sand soils, such as those observed at borings B-2 through B-5, will likely require some form of advance dewatering, depending on the groundwater conditions at the time of construction. Groundwater is typically controlled by the installation of vacuum wellpoints. However, vacuum wellpoints are generally less effective below a depth of about 15 feet beneath the top of the wellpoint. In addition, dewatering with wellpoints may not be effective in zones containing significant amounts of fine-grained soils. Deeper dewatering typically requires eductors or deep wells with submersible pumps or multiple-stage wellpoint systems.

The suggested methods given above serve as a guideline for groundwater control; other appropriate means may be required for groundwater control during construction. Control of groundwater should be accomplished in a manner that will preserve the strength of the soils, will not cause instability of the excavation, and will not result in damage to existing structures. If necessary, the water should be lowered in advance of excavation by wellpoints, deep wells, eductors, or similar methods. Open pumping should not be permitted if it results in boils, loss of fines, softening of the subgrade, or excavation instability. Wellpoints, deep wells and eductors should be installed with suitable screen and filter so that pumping of fines does not occur.

The well system should be in operation for at least 3 to 5 days prior to excavating to the design depth. We recommend that the groundwater head be lowered at least 3 feet below the bottom of the excavation to provide a working area with increased stability. The dewatering should continue until the construction has been completed, and the dewatering system should be turned off in stages to allow groundwater to recover to its original level gradually, over a period of about 3 to 5 days.

Dewatering of medium dense sands might cause subsidence or compression of adjacent soils and adjacent structures, in spite of safeguards and methodology selected and used. For this reason, the dewatering operations must be performed and provided with great care to ensure caution and control of the potential subsidence resulting from the dewatering operations.

As stated previously, the groundwater levels will fluctuate with seasonal and climatic changes and should be evaluated just prior to construction. To further evaluate groundwater at the time of construction, piezometers can be set just prior to construction. As an alternative, test pits may be dug to the planned excavation depths. Based on the results, the contractor should determine

effective methods of groundwater management prior to starting excavation operations.

7.2.2 Slope Grading

Construction areas should be stripped of vegetation, topsoil, and other debris/unsuitable surface material in accordance with 2020 HCFCD Standard Specifications Section 02200, Site Preparation and Restoration and Section 02233, Clearing and Grubbing. Once the grass and other vegetative cover has been removed from the sideslopes, the sideslopes should be benched in accordance with HCFCD Standard Specification 02315.

The excavations and slope grading should be in accordance with HCFCD Specification Section Nos. 02314 and 02315. Generally, the soils excavated from the sides of the drainage channel during the slope grading will consist of sand soils and some variable plasticity clay soils.

7.2.3 Clay Liner

As mentioned previously, the maximum depth of the drainage channel is planned to be 15 feet. The soils observed in the borings generally consisted of sand soils and variable plasticity clay soils that are classified as nondispersive to dispersive. A clay liner will be required in areas where the subgrade consists of sand soils to improve stability of the sideslopes and in areas where the subgrade consists of dispersive clays. In such areas, we recommend the channel be over-excavated and a clay liner with a minimum thickness of 2 feet be placed along the sideslopes and should extend a minimum of 10 feet from the crest or the toe of the sideslopes. Additionally, to reduce the potential for erosion of the sideslopes, we recommend exposed sand/silt soils along the channel sideslopes and channel bottom be over-excavated and replaced with a clay liner with a minimum thickness of 2 feet. Where a clay liner is not required, the exposed surface of the sideslopes should be scarified to a depth of at least 12 inches, moisture conditioned between optimum and +4 percent of the optimum moisture content, and recompacted to at least 95 percent of the Standard Effort (ASTM D 698) maximum dry density.

Any loose soil present in the areas requiring fill for the construction of the clay liner should be removed prior to fill placement. The loose thickness of the lifts for the clay liner along sideslopes and bottom should be approximately 8 to 9 inches (maximum) with a compacted lift thickness not to exceed 6 inches. Fill should be placed on a flat level surface in horizontal lifts. The fill should be compacted to at least 95 percent of the Standard Effort (ASTM D 698) maximum dry density at a moisture content within plus or minus 3 percent of optimum moisture content. The use of a sheepsfoot roller is recommended to help knead the clays and break up any secondary structures within the clay soils.

In areas where a clay liner will be necessary on the slopes, the sideslopes of the drainage channel should be benched as backfilling proceeds in accordance with HCFCD Standard Specification 02315. Benching the sideslopes will improve compaction capabilities and reduce the potential for separation between the newly placed clay liner and existing in-situ soils. The placement of the fill

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



material for the construction of the clay liner should be continuously observed by an experienced soil technician.

The imported fill materials used to construct the liner should meet the requirements of section 02314 Item 2.1 Imported Select Fill Material and the onsite material that will be reused should be in accordance with Section 02314 Item 2.2A Fill Material Excavation from On-Site of the HCFCD 2020 Standard Specifications document. Soils used for clay liner should be tested for dispersive characteristics prior to placement. Soils that are considered dispersive should not be used as a clay liner.

7.2.4 Slope Protection and Erosion Control

If water flow is permitted along the sideslopes of the drainage channel, the near-surface soils will likely erode, causing gradual steepening and subsequent sloughing of the sideslopes. Therefore, the sideslopes within the drainage channel should be protected against sheet flow down the banks or concentrated high velocity water flow especially at nearby inlet or outfall structures. Measures to protect the sideslopes may include slope paving, rip-rap, geofabrics, tighter outfall spacing, backslope swales, or vegetation with an aggressive root system. Backslope swales and drains should be constructed as soon as practical to prevent over-bank runoff according to Item 3.6A and 3.8A2, Section 02315 of the 2020 HCFCD Standard Specifications. Routine maintenance of the sideslopes should be performed to reconstruct areas where sloughing and/or erosion have occurred.

Based on the Crumb and Double Hydrometer tests, nondispersive to dispersive soils were observed in our borings. To reduce potential of these soils eroding, we recommend that the backslope drainage system have interceptors spaced a maximum of 400 feet according to Section 11 of the 2019 HCFCD PCPM where dispersive clays were observed, and to excavate and backfill the dispersive clay soils with clay liner material in accordance with the requirements of Section 02315 items 2.1 or 2.2A of the HCFCD 2020 Standards Specifications document.

8.0 GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other services should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



9.0 REFERENCES

1. *Barnes, V.E., Arnow, Saul, LeBlanc, R.J., Evans, F.G., Hinds, G.W., Holland, W.C., Van Siden, D.C., Macon, J.W., and Hartmann, B., "Geologic Atlas of Texas, Houston Sheet", Bureau of Economic Geology, The University of Texas at Austin, 1982.*
2. *Shah, S.D., and Lanning-Rush, Jennifer, 2005, Principal Faults in the Houston, Texas, Metropolitan Area*
3. *NAVFAC Soil Mechanics Design Manual 7.01, 1986*
4. *ASCE Journal of Geotechnical Engineering, Vol. 119, Issue 8, August 1993, Cohesion Intercept in Effective Stress Stability Analysis, G. Mesri and E.M. Abdel-Ghaffar*
5. *Harris County Flood Control District. Standard Specifications Book, 2020*
6. *Harris County Flood Control District. Geotechnical Guidelines, 2021.*
7. *Harris County Flood Control District Policy, Criteria, and Procedure Manual, 2019*

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



APPENDIX A – FIELD EXPLORATION

Contents:

Exhibit A-1	Site Location
Exhibit A-2	Exploration Plan
Exhibit A-3	Principal Faults in the Houston, Texas, Metropolitan Area
Exhibit A-4	Subsurface Soil Profile
Exhibits A-5 to A-10	Boring Logs
Exhibits A-11 to A-12	Terms and Symbols used on HCFCD Boring Logs
Exhibit A-13	Classification of Soils for Engineering Purposes (HCFCD)

EXHIBIT A-1 – SITE LOCATION

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No.: 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2

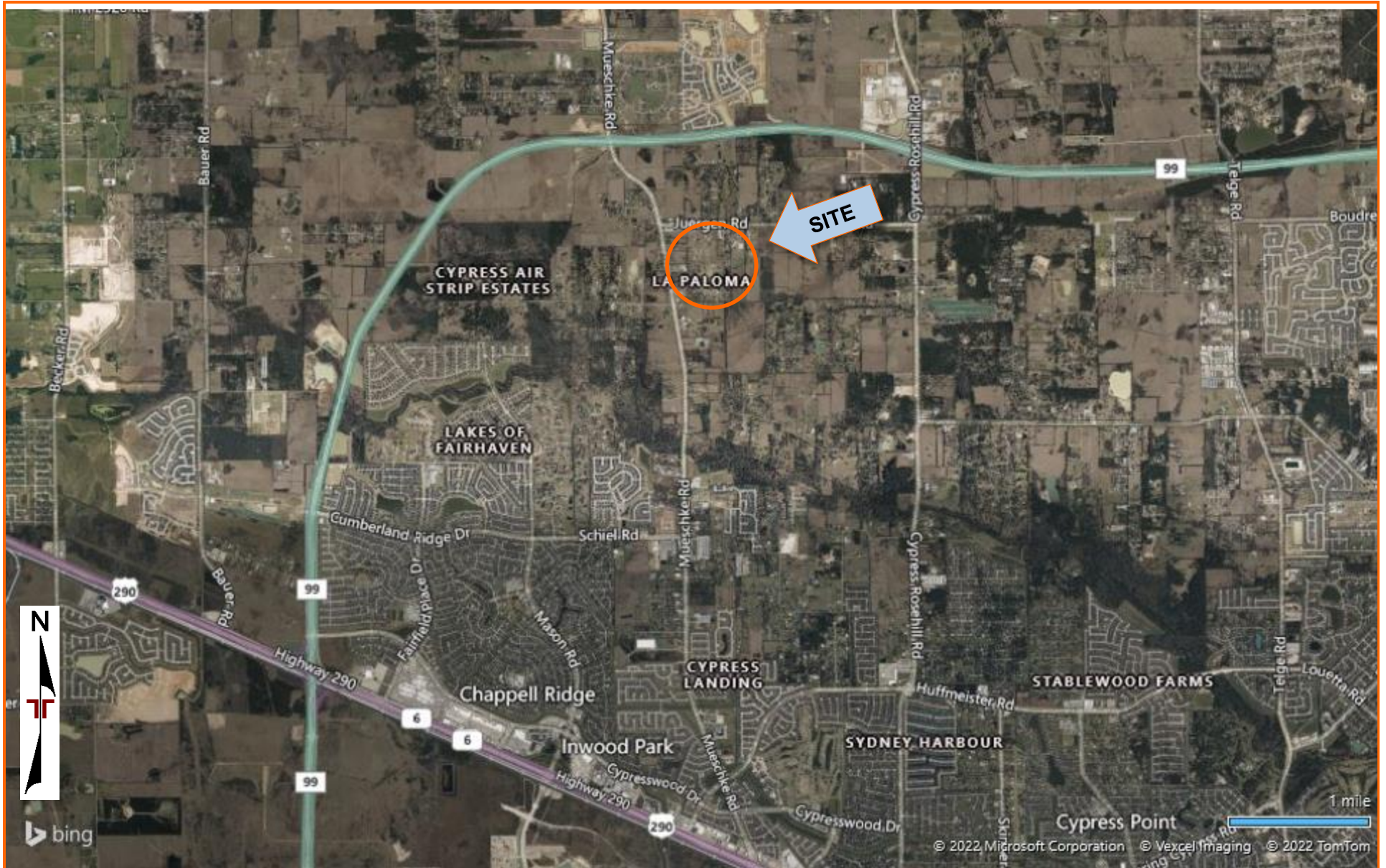


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXHIBIT A-2 – EXPLORATION PLAN

Tomball ISD HCFCU Unit No.: L 109-00-00 ■ Precinct No.: 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2

Terracon

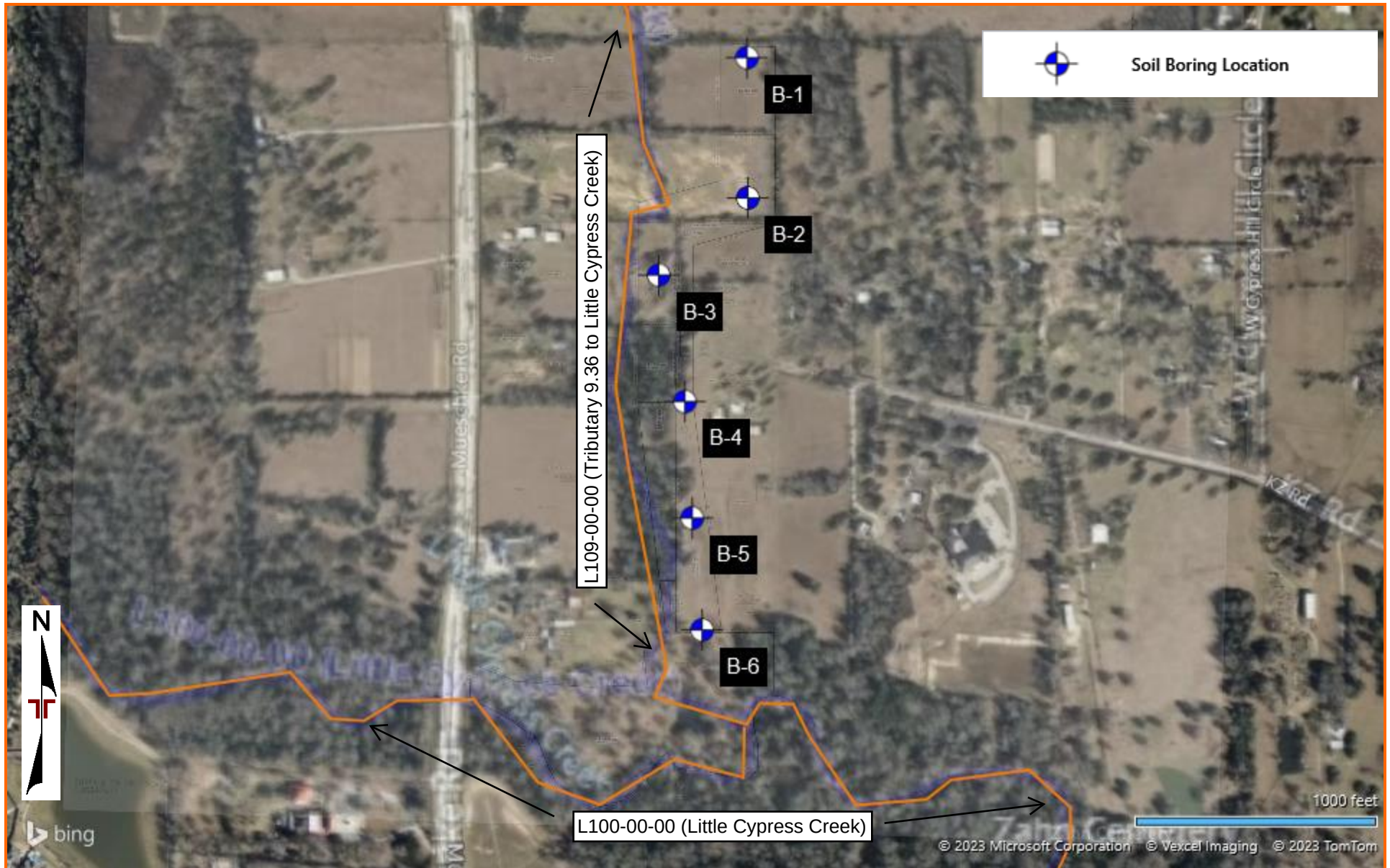


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXHIBIT A-3 – PRINCIPAL FAULTS IN THE HOUSTON, TEXAS, METROPOLITAN AREA

Tomball ISD HCFC Unit No.: L 109-00-00 ■ Precinct No.: 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2

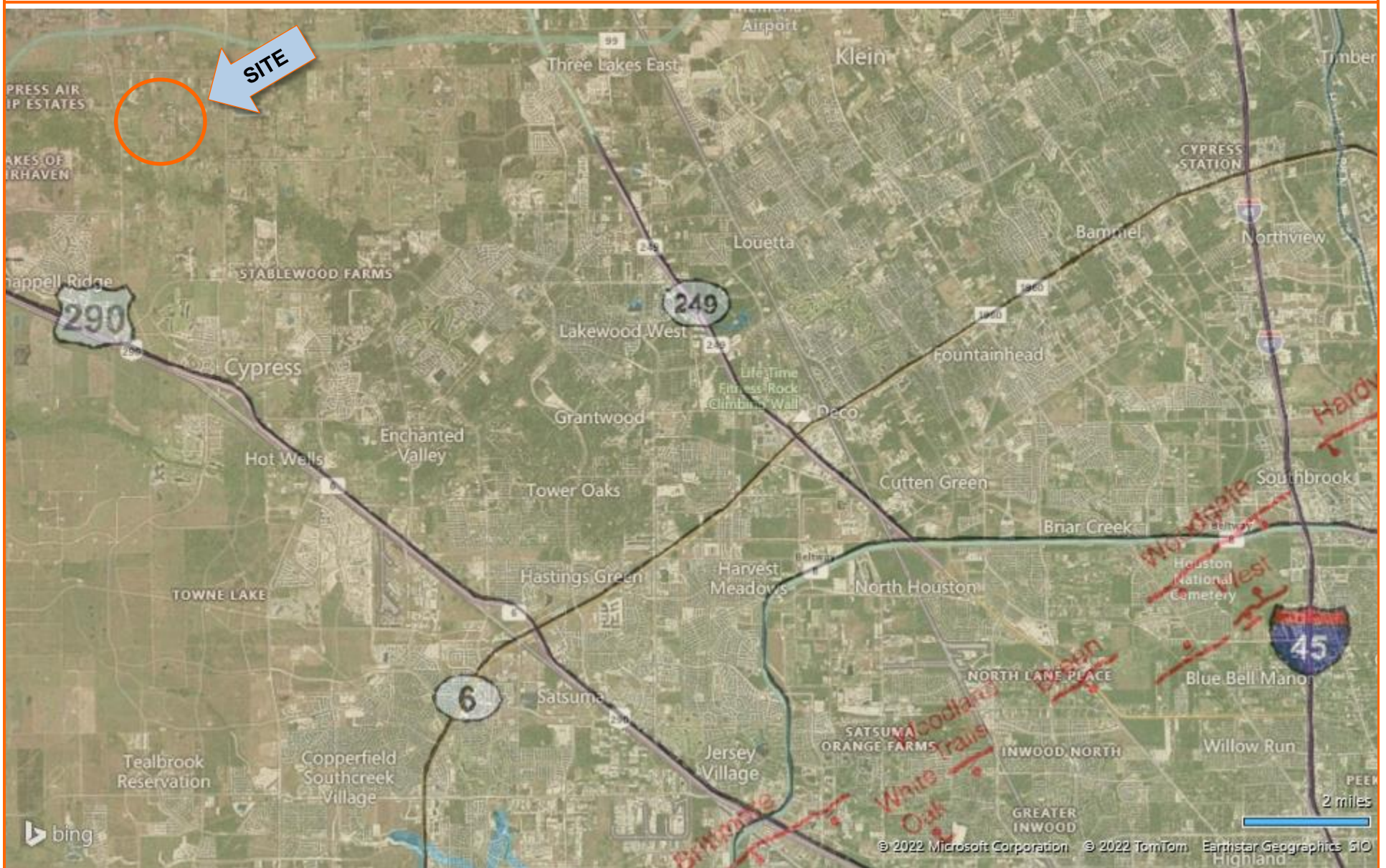
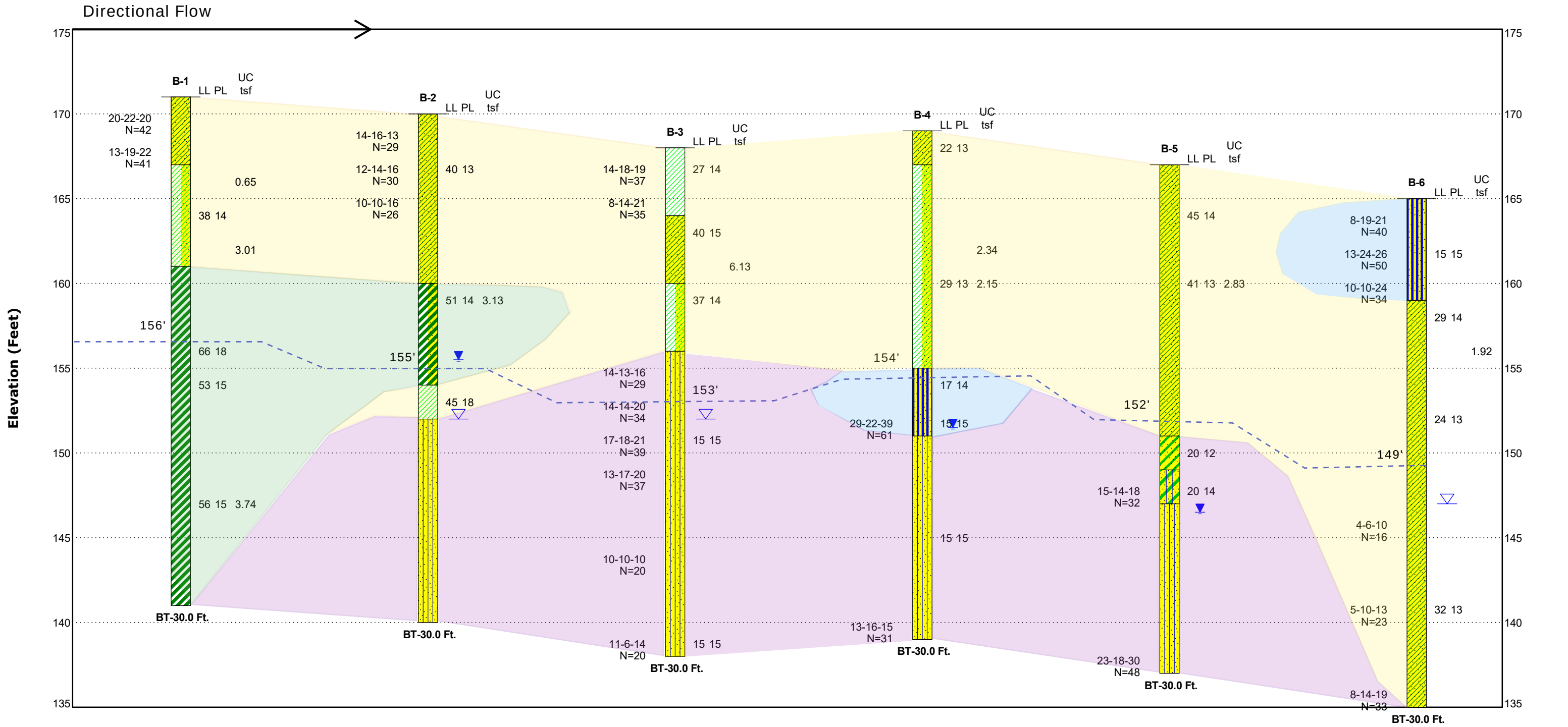


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Subsurface Profile



Notes	Water Level Observations	Explanation	Material Legend
See Exploration Plan for orientation of soil profile. See General Notes in Supporting Information for symbols and soil classifications. Soils profile provided strictly for illustration purposes only. Soils between borings are subject to variation. AR - Auger Refusal BT - Boring Termination	▽ Water Level Reading at time of drilling. ▽ Water Level Reading after drilling.	B-1 — Borehole Number LL PL — Liquid and Plastic Limits — Borehole Lithology AR BT — Borehole Termination Type Moisture Content — %w Sampling (See General Notes)	Sandy Lean Clay Lean Clay with Sand Fat Clay Fat Clay with Sand Lean Clay Silty Sand Sandy Silt Clayey Sand Silty Clayey Sand

Exhibit A-4

DATE	7/26/2022
SURFACE ELEVATION	171 ft

LOCATION	
Northing: 13936342 Easting: 3005949	
MATERIAL DESCRIPTION	
0 CL 5 CL 10 CH 15 20 25 30	<u>SANDY LEAN CLAY (CL)</u>, hard, tan and reddish brown, moist, with sand pockets <u>LEAN CLAY WITH SAND (CL)</u>, firm to very stiff, high plasticity, light gray and tan, moist, with sand pockets and ferrous stains <u>FAT CLAY(CH)</u>, stiff to hard, high to very high plasticity, light gray and reddish brown, moist, with sand pockets - with ferrous stains below 28 feet <i>Boring Terminated at 30 feet</i>

[illegible]

Exhibit A-5

Terracon Consultants, Inc. 11555 Clay Road, Suite 100 Houston, Texas 77043 Ph: (713) 690-8989 Fax: (713) 690-8787				LOG OF BORING B-2										PAGE 1 OF 1 DATE 7/26/2022							
				PROJECT: Tomball ISD HCFCFCD Drainage Channel Cypress, Texas PROJECT NO.: 92225364 BORING TYPE: Dry augered to 20 feet; wet rotary thereafter.										SURFACE ELEVATION 170 ft							
														ATTERBERG LIMITS(%) LIQUID LIMIT PLASTIC LIMIT PLASTICITY INDEX LL PL PI							
LOCATION														MOISTURE CONTENT (%)		PASSING #200 SIEVE (%)		ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS			
MATERIAL DESCRIPTION														Natural Moisture Content and Atterberg Limits		Plastic Limit Moisture Content Liquid Limit					
FIELD STRENGTH DATA														DRY DENSITY (pcf)		UNDRAINED SHEAR STRENGTH (tsf)		FAILURE STRAIN (%)		CONFINING PRESSURE (psi)	
BLOW COUNT														UNDRAINED SHEAR STRENGTH (tsf)		FAILURE STRAIN (%)		CONFINING PRESSURE (psi)			
C _u (tsf)														UNDRAINED SHEAR STRENGTH (tsf)		FAILURE STRAIN (%)		CONFINING PRESSURE (psi)			
SS (tsf)														UNDRAINED SHEAR STRENGTH (tsf)		FAILURE STRAIN (%)		CONFINING PRESSURE (psi)			
Torvane (tsf)														UNDRAINED SHEAR STRENGTH (tsf)		FAILURE STRAIN (%)		CONFINING PRESSURE (psi)			
20 40 60 80														UNDRAINED SHEAR STRENGTH (tsf)		FAILURE STRAIN (%)		CONFINING PRESSURE (psi)			
1.0 2.0 3.0 4.0														UNDRAINED SHEAR STRENGTH (tsf)		FAILURE STRAIN (%)		CONFINING PRESSURE (psi)			
0.1 0.2 0.3 0.4														UNDRAINED SHEAR STRENGTH (tsf)		FAILURE STRAIN (%)		CONFINING PRESSURE (psi)			
20 40 60 80														UNDRAINED SHEAR STRENGTH (tsf)		FAILURE STRAIN (%)		CONFINING PRESSURE (psi)			
DEPTH (ft.) 0 5 10 15 20 25 30	SAMPLES USC CL CH CL SM	WATER LEVEL 	Northing: 13935740 Easting: 3005975	N=29					121.8	1.57	13.1	0		8	40	13	27	70	CRUMB: 6' - 8' Grade 4 CRUMB: 10' - 12' Grade 4 DOUBLE HYDRO: 10' - 12' 47%		
			SANDY LEAN CLAY (CL), very stiff to hard, high plasticity, tan and reddish brown, moist, with sand pockets	N=30					121.8	1.57	13.1	0		8	40	13	27	70			
			N=26					121.8	1.57	13.1	0		8	40	13	27	70				
			P=4.5					121.8	1.57	13.1	0		8	40	13	27	70				
			P=4.5					121.8	1.57	13.1	0		8	40	13	27	70				
			P=4.5					121.8	1.57	13.1	0		8	40	13	27	70				
			P=4.5					121.8	1.57	13.1	0		8	40	13	27	70				
			P=4.5					121.8	1.57	13.1	0		8	40	13	27	70				
			P=4.5					121.8	1.57	13.1	0		8	40	13	27	70				
			P=4.5					121.8	1.57	13.1	0		8	40	13	27	70				
P=4.5					121.8	1.57	13.1	0		8	40	13	27	70							
P=4.0					121.8	1.57	13.1	0		8	40	13	27	70							
N=50/5.5"					121.8	1.57	13.1	0		8	40	13	27	70							
N=50/5"					121.8	1.57	13.1	0		8	40	13	27	70							
N=50/5"					121.8	1.57	13.1	0		8	40	13	27	70							
N=50/5"					121.8	1.57	13.1	0		8	40	13	27	70							
Boring Terminated at 30 feet																					

Water Level Est.: Measured: Perched:

Water Observations: Water level while dry drilling = 18.0 feet. Water level at 15 minutes = 14.0 feet. Water level after one day = 14.5 feet.

Sample Key: SPT Shelby Tube Disturbed

Key to Abbreviations:

N - SPT Data (Blows/Ft)

P - Pocket Penetrometer (tsf)

T - Torvane (tsf)

C_u - Undrained Shear Strength (tsf)

SS - Estimated Shear Strength (P/2, tsf)

Notes:

Boring terminated at 30 feet. Survey data provided by West Belt Surveying, Inc.

Exhibit A-6

Terracon Consultants, Inc. 11555 Clay Road, Suite 100 Houston, Texas 77043 Ph: (713) 690-8989 Fax: (713) 690-8787				LOG OF BORING B-3 PROJECT: Tomball ISD HCFCFCD Drainage Channel Cypress, Texas PROJECT NO.: 92225364 BORING TYPE: Dry augered to 20 feet; wet rotary thereafter.										PAGE 1 OF 1		DATE 7/26/2022					
				SURFACE ELEVATION 168 ft																	
DEPTH (ft.)	SAMPLES	USC	WATER LEVEL	LOCATION		FIELD STRENGTH DATA	● BLOW COUNT ● 20 40 60 80		DRY DENSITY (pcf)	UNDRAINED SHEAR STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits			MOISTURE CONTENT (%)	ATTERBERG LIMITS(%)			PASSING #200 SIEVE (%)	ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS
				Northing: 13935389 Easting: 3005606			▲ C _u (tsf) ▲ 1.0 2.0 3.0 4.0						Plastic Limit	Moisture Content	Liquid Limit		LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
				MATERIAL DESCRIPTION			■ SS (tsf) ■ 1.0 2.0 3.0 4.0														
0		CL		LEAN CLAY (CL), hard, medium plasticity, tan, moist, with sand pockets		N=37									11	27	14	13	89	CRUMB: 4' - 6' Grade 2	
5		CL		SANDY LEAN CLAY (CL), hard, high plasticity, tan and reddish brown, moist, with sand pockets		N=35									11	40	15	25	66		
						P=4.5									13						
						P=4.5															
10		CL		LEAN CLAY WITH SAND (CL), hard, high plasticity, tan and reddish brown, moist, with sand pockets		P=4.5									11	37	14	23	71		
						P=4.5															
						P=4.5															
15		SM		SILTY SAND (SM), medium dense to dense, non-plastic, tan and reddish brown, moist		N=29															
						N=34															
						N=39									6			NP	37		
						N=37															
						N=20															
						N=20															
25																					
30																					
				Boring Terminated at 30 feet																	
Water Level Est.: ▮ Measured: ▮ Perched: ▮ Water Observations: Water level while dry drilling = 16 feet. Caved-in at 14 feet after 5 minutes. Caved in at 14 feet after one day. Sample Key: ▮ SPT ▮ Shelby Tube ▮ Disturbed				Key to Abbreviations: N - SPT Data (Blows/Ft) P - Pocket Penetrometer (tsf) T - Torvane (tsf) C _u - Undrained Shear Strength (tsf) SS - Estimated Shear Strength (P/2, tsf)				Notes: Boring terminated at 30 feet. Survey data provided by West Belt Surveying Inc.													
								Exhibit A-7													

DATE	7/25/2022
SURFACE ELEVATION	169 ft

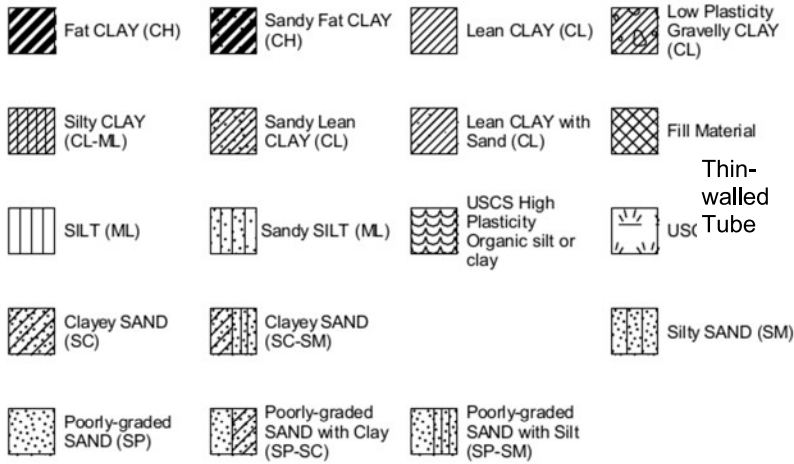
BORING TYPE: Dry augered to 30 feet.

[illegible]

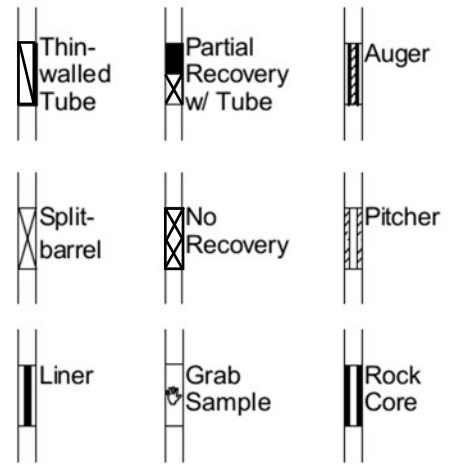
Exhibit A-8

Terracon Consultants, Inc. 11555 Clay Road, Suite 100 Houston, Texas 77043 Ph: (713) 690-8989 Fax: (713) 690-8787			LOG OF BORING B-6										PAGE 1 OF 1		DATE 7/26/2022									
			PROJECT: Tomball ISD HCFC D Drainage Channel Cypress, Texas										SURFACE ELEVATION 165 ft											
			PROJECT NO.: 92225364 BORING TYPE: Dry augered to 20 feet; wet rotary thereafter.																					
DEPTH (ft.)	SAMPLES	USC	WATER LEVEL	LOCATION		FIELD STRENGTH DATA	BLOW COUNT				DRY DENSITY (pcf)	UNDRAINED SHEAR STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits			MOISTURE CONTENT (%)	ATTERBERG LIMITS(%)			PASSING #200 SIEVE (%)	ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS	
				Northing: 13934017	Easting: 3005815		20	40	60	80					Plastic Limit	Moisture Content	Liquid Limit		LL	PL	PI			
							●	▲	■	◆														
							20	40	60	80														
							1.0	2.0	3.0	4.0														
							1.0	2.0	3.0	4.0														
							0.1	0.2	0.3	0.4														
0		ML			SANDY SILT (ML), dense, non-plastic, tan, moist	N=40																		
5		CL			SANDY LEAN CLAY (CL), stiff to hard, medium plasticity, light gray and tan, moist with sand pockets	N=50																		
10						N=34																		
15						P=4.0																		
20						P=4.0																		
25						P=4.5																		
30						P=4.5																		
						P=3.0																		
						P=2.0																		
						N=16																		
						N=23																		
						N=33																		
				Boring Terminated at 30 feet																				
Water Level Est.: ▮ Measured: ▼ Perched: ▼ Water Observations: Water level while dry drilling = 18 feet. Water level at 15 minutes = 14.5 feet. Caved-in at 17.5 feet after one day. Sample Key: ☒ SPT ☒ Shelby Tube ☒ Disturbed				Key to Abbreviations: N - SPT Data (Blows/Ft) P - Pocket Penetrometer (tsf) T - Torvane (tsf) C _u - Undrained Shear Strength (tsf) SS - Estimated Shear Strength (P/2, tsf)				Notes: Boring terminated at 30 feet. Survey data provided by West Belt Surveying, Inc.																
												Exhibit A-10												

SOIL TYPES



SAMPLER TYPES



SOIL GRAIN SIZE

U.S. Standard Sieve

6"	3"	3/4"	4	10	40	200		
Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		
152	76.2	19.1	4.76	2.00	0.420	0.074	0.002	(mm)

SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample
Parting	Inclusion less than 1/8 inch thick extending through the sample
Seam	Inclusion 1/8 inch to 3 inches thick extending through the sample
Layer	Inclusion greater than 3 inches thick extending through the sample
Laminated	Containing alternating partings or seams of different soil type
Interlayered	Containing alternating layers of different soil type
Intermixed	Containing pockets of different soil type and layered or laminated structure is not evident
Calcareous	Having appreciable quantities of carbonate
Carbonate	Having more than 50% carbonate content

SPLIT-BARREL SAMPLER DRIVING RECORD (SPT)

1 / 3 / 4	Represents blows per each 6" driving interval
25	25 blows drove sampler 12 inches, after initial 6 inches of seating
50/7"	50 blows drove sampler 7 inches, after initial 6 inches of seating
Ref/3"	50 blows drove sampler 3 inches during initial 6-inch seating
PUSH	Sampler pushed to collect material with no blow count obtained
WOH	Sampler sinks under the weight of hammer, no blow count
WOP	Sampler sinks under the weight of pipe, no blow count

DEGREE OF PLASTICITY OF COHESIVE SOILS

Degree of Plasticity	PI
None (non-plastic)	0 - 4
Slight	5 - 10
Medium	11 - 20
High	21 - 40
Very High	> 40

DENSITY OF GRANULAR SOILS

Consistency	Relative Density (%)	Blows per Foot (SPT)*
Very Loose	< 15	0 to 4
Loose	15 to 35	5 to 10
Medium Dense	35 to 65	11 to 30
Dense	65 to 85	31 to 50
Very Dense	> 85	> 50

*Apply depth, ground water level, & grain size corrections

STRENGTH OF COHESIVE SOILS

Consistency	Undrained Shear Strength (ksf)	Blows per Foot Approx. (SPT)
Very Soft	< 0.25	0 to 2
Soft	0.25 to 0.50	2 to 4
Firm	0.50 to 1.00	4 to 8
Stiff	1.00 to 2.00	8 to 16
Very Stiff	2.00 to 4.00	16 to 32
Hard	> 4.00	> 32

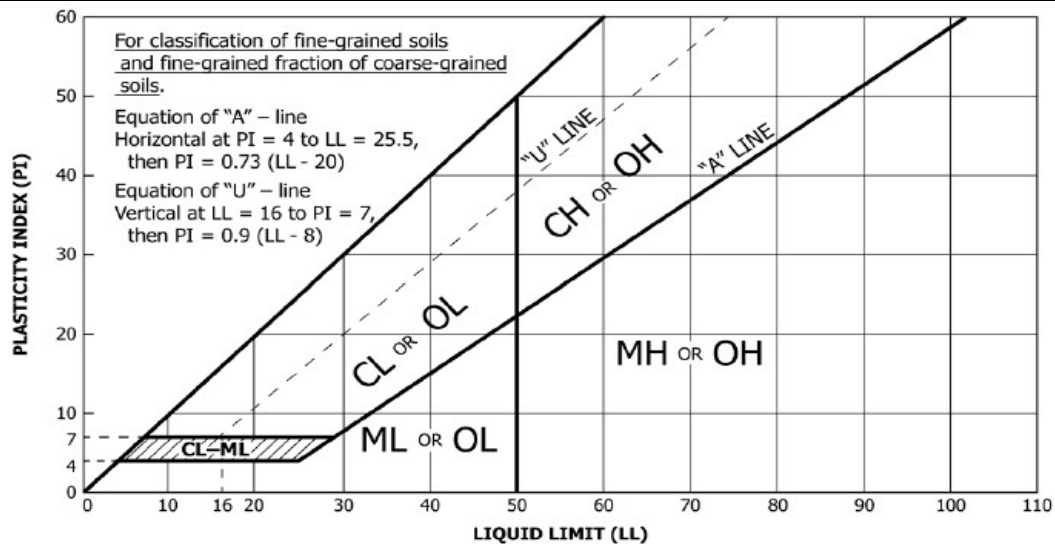
TERMS AND SYMBOLS USED ON HCFC D EXPLORATION LOGS

Exhibit A-11

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES (ASTM D2487)

MAJOR DIVISIONS				GROUP SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS (less than 50% passes No. 200 Sieve)	GRAVELS less than 50% of Coarse Fraction passes No. 4 Sieve	Clean Gravels	less than 5% passes No. 200 Sieve	GW	well-graded gravel, well-graded gravel with sand
				GP	poorly-graded gravel, poorly-graded gravel with sand
		Gravels with Fines (more than 12% passes No. 200 Sieve)	Limits plot below "A" line & hatched zone of Plasticity Chart	GM	silty gravel, silty gravel with sand
			Limits plot above "A" line & hatched zone of Plasticity Chart	GC	clayey gravel, clayey gravel with sand
	SANDS 50% or more of Coarse Fraction passes No. 4 Sieve	Clean Sands	less than 5% passes No. 200 Sieve	SW	well-graded sand, well-graded sand with gravel
				SP	poorly-graded sand, poorly-graded sand with gravel
		Sands with Fines (more than 12% passes No. 200 Sieve)	Limits plot below "A" line & hatched zone of Plasticity Chart	SM	silty sand, silty sand with gravel
			Limits plot above "A" line & hatched zone of Plasticity Chart	SC	clayey sand, clayey sand with gravel
FINE GRAINED SOILS (50% or more passes No. 200 Sieve)	Silts and Clays	Liquid Limit less than 50%		ML	silt, silt with sand, silt with gravel, sandy silt, gravelly silt
				CL	lean clay, lean clay with sand, lean clay with gravel, sandy lean clay, gravelly lean clay
				OL	organic clay, organic clay with sand, sandy organic clay, organic silt, sandy organic silt
		Liquid Limit 50% or more		MH	elastic silt, elastic silt with sand, sandy elastic silt, gravelly elastic silt
				CH	fat clay, fat clay with sand, fat clay with gravel, sandy fat clay, gravelly fat clay
				OH	organic clay, organic clay with sand, sandy organic clay, organic silt, sandy organic silt

NOTE: Dual Group Symbols for coarse grained soils with 5% to 12% passing No. 200 Sieve and fine grained soils with Limits plotting in the hatched zone of the Plasticity Chart.



$$C_u = \frac{D_{60}}{D_{10}}$$

$$C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

**Classification of FINE-GRAINED Soils
(50% or more passes No. 200 Sieve)
ASTM D2487**

LL > 50	Inorganic	PI > 7 and plots on or above "A"-line	CL	< 30% +No. 200	< 15% +No. 200	% sand ≥ % gravel	Lean clay	
				≥ 30% +No. 200	15% ≤ +No. 200 < 30%	% sand < % gravel	Lean clay with sand	
						% sand ≥ % gravel	< 15% gravel	Lean clay with gravel
							≥ 15% gravel	Sandy lean clay
		4 ≤ PI ≤ 7 and plots on or above "A"-line	CL-ML	≥ 30% +No. 200	% sand < % gravel	% sand < % gravel	Gravelly lean clay	
						≥ 15% sand	Gravelly lean clay with sand	
						< 15% +No. 200	Silty clay	
				< 30% +No. 200	15% ≤ plus No. 200 < 30%	% sand ≥ % gravel	Silty clay with sand	
						% sand < % gravel	Silty clay with gravel	
						< 15% gravel	Sandy silty clay	
PI < 4 or plots below "A"-line	ML	≥ 30% +No. 200	% sand ≥ % gravel	≥ 15% gravel	Sandy silty clay with gravel			
				< 15% sand	Gravelly silty clay			
				≥ 15% sand	Gravelly silty clay with sand			
		< 30% +No. 200	< 15% +No. 200	% sand ≥ % gravel	Silt			
				% sand < % gravel	Silt with sand			
				< 15% gravel	Silt with gravel			
				≥ 15% gravel	Sandy silt			
				< 15% sand	Sandy silt with gravel			
≥ 30% +No. 200	% sand < % gravel	≥ 15% sand	Gravelly silt					
		≥ 15% sand	Gravelly silt with sand					
Organic	OL (See next Page) LL (oven dried) / LL (not dried) < 0.75							
LL ≤ 50	Inorganic	PI plots on or above "A"-line	CH	< 30% +No. 200	< 15% +No. 200	% sand ≥ % gravel	Fat clay	
				≥ 30% +No. 200	15% ≤ +No. 200 < 30%	% sand < % gravel	Fat clay with sand	
						% sand ≥ % gravel	< 15% gravel	Fat clay with gravel
							≥ 15% gravel	Sandy fat clay
		PI plots below "A"-line	MH	≥ 30% +No. 200	% sand < % gravel	< 15% sand	Sandy fat clay with gravel	
						≥ 15% sand	Gravelly fat clay	
						≥ 15% sand	Gravelly fat clay with sand	
				< 30% +No. 200	15% ≤ +No. 200 < 30%	% sand ≥ % gravel	Elastic silt	
						% sand < % gravel	Elastic silt with sand	
						< 15% gravel	Elastic silt with gravel	
≥ 30% +No. 200	% sand ≥ % gravel	< 15% gravel	Sandy elastic silt					
		≥ 15% gravel	Sandy elastic silt with gravel					
		< 15% sand	Gravelly elastic silt					
		≥ 15% sand	Gravelly elastic silt with sand					
Organic	OH (See next Page) LL (oven dried) / LL (not dried) < 0.75							

Classification of ORGANIC FINE-GRAINED Soils
(50% or more passes No. 200 Sieve)
ASTM D2487

LO	PI ≥ 4 and plots on or above "A"-line	< 30% +No. 200	< 15% +No. 200	Organic clay	
				% sand $\geq$ % gravel	Organic clay with sand
	$\geq 30\%$ +No. 200	$\geq 30\%$ +No. 200	15% $\leq$ +No. 200 < 30%	% sand < % gravel	Organic clay with gravel
				< 15% gravel	Sandy organic clay
				$\geq 15\%$ gravel	Sandy organic clay with gravel
				< 15% sand	Gravelly organic clay
	PI < 4 or plots below "A"-line	< 30% +No. 200	< 15% +No. 200	$\geq 15\%$ sand	Gravelly organic clay with sand
				Organic silt	
				% sand $\geq$ % gravel	Organic silt with sand
				% sand < % gravel	Organic silt with gravel
				< 15% gravel	Sandy organic silt
				$\geq 15\%$ gravel	Sandy organic silt with gravel
HO	PI plots on or above "A"-line	$\geq 30\%$ +No. 200	15% sand < % gravel	< 15% sand	Gravelly organic silt
				$\geq 15\%$ sand	Gravelly organic silt with sand
				Organic clay	
				% sand $\geq$ % gravel	Organic clay with sand
				% sand < % gravel	Organic clay with gravel
				< 15% gravel	Sandy organic clay
	PI plots below "A"-line	< 30% +No. 200	15% $\leq$ +No. 200 < 30%	$\geq 15\%$ gravel	Sandy organic clay with gravel
				< 15% sand	Gravelly organic clay
				$\geq 15\%$ sand	Gravelly organic clay with sand
				< 15% +No. 200	Organic silt
	PI plots on or above "A"-line	< 30% +No. 200	< 15% +No. 200	% sand $\geq$ % gravel	Organic silt with sand
				% sand < % gravel	Organic silt with gravel
				< 15% gravel	Sandy organic silt
				$\geq 15\%$ gravel	Sandy organic silt with gravel
				< 15% sand	Gravelly organic silt
				$\geq 15\%$ sand	Gravelly organic silt with sand
	PI plots below "A"-line	$\geq 30\%$ +No. 200	15% sand < % gravel	Organic clay	
				% sand $\geq$ % gravel	Organic clay with sand
				% sand < % gravel	Organic clay with gravel
				< 15% gravel	Sandy organic clay

Classification of COARSE-GRAINED Soils
(Less than 50% passes No. 200 Sieve)
ASTM D2487

GRAVEL % gravel > % sand	< 5% fines	Cu ≥ 4.0 and 1.0 ≤ Cc ≤ 3.0	GW	< 15% sand ≥ 15% sand	Well graded gravel
5 - 12% fines	Cu < 4.0 and/or [Cc < 1.0 or Cc > 3.0]	Fines = ML or MH	GP	< 15% sand	Poorly graded gravel
				≥ 15% sand	Poorly graded gravel with sand
				< 15% sand	Well graded gravel with silt
				≥ 15% sand	Well graded gravel with silt and sand
	Cu ≥ 4.0 and 1.0 ≤ Cc ≤ 3.0	Fines = CL, CH (or CL-ML)	GW-GC	< 15% sand	Well graded gravel with clay (or silty clay)
				≥ 15% sand	Well graded gravel with clay and sand (or silty clay and sand)
				< 15% sand	Poorly graded gravel with silt
				≥ 15% sand	Poorly graded gravel with silt and sand
	> 12% fines	Fines = ML or MH	GP-GM	< 15% sand	Poorly graded gravel with clay (or silty clay)
				≥ 15% sand	Poorly graded gravel with clay and sand (or silty clay and sand)
				< 15% sand	Silty gravel
				≥ 15% sand	Silty gravel with sand
> 12% fines	Cu < 4.0 and/or [Cc < 1.0 or Cc > 3.0]	Fines = CL, CH (or CL-ML)	GC	< 15% sand	Clayey gravel
				≥ 15% sand	Clayey gravel with sand
				< 15% sand	Silty, clayey gravel
				≥ 15% sand	Silty, clayey gravel with sand
	Cu ≥ 4.0 and 1.0 ≤ Cc ≤ 3.0	Fines = ML or MH	GC-GM	< 15% sand	Silty, clayey gravel with sand
				≥ 15% sand	Silty, clayey gravel with sand
				< 15% sand	Silty, clayey gravel with sand
				≥ 15% sand	Silty, clayey gravel with sand
	> 12% fines	Fines = CL, CH (or CL-ML)	GC-GM	< 15% sand	Silty, clayey gravel with sand
				≥ 15% sand	Silty, clayey gravel with sand
				< 15% sand	Silty, clayey gravel with sand
				≥ 15% sand	Silty, clayey gravel with sand

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



APPENDIX B – LABORATORY TESTING

Contents:

Exhibits B-1 to B-2	Summary of Laboratory Results
Exhibits B-3 to B-8	Double Hydrometer Test Results
Exhibits B-9 to B-10	Consolidated Undrained Results
Exhibit B-11 to B-12	Specific Gravity Results
Exhibits B-13 to B-15	Crumb Test Results

SUMMARY OF LABORATORY RESULTS

PAGE 1 OF 2

BORING ID	Depth (Ft.)	Soil Classification USCS	Liquid Limit	Plastic Limit	Plasticity Index	Unit Weight Dry Density (pcf)	Unconfined Compressive Strength (tsf)	% Fines
B-1	0.5-2							68.6
B-1	4-6					114.5	0.65	
B-1	6-8	LEAN CLAY with SAND(CL)	38	14	24			73.6
B-1	8-10					122.7	3.01	
B-1	10-12							65.9
B-1	11							64.1
B-1	14-16	FAT CLAY(CH)	66	18	48			
B-1	16-18	FAT CLAY(CH)	53	15	38			94.5
B-1	23-25	FAT CLAY(CH)	56	15	41	110.2	3.74	94.4
B-2	2.5-4	LEAN CLAY with SAND(CL)	40	13	27			70.3
B-2	10-12	FAT CLAY with SAND(CH)	51	14	37	121.8	3.13	78.9
B-2	11							77.8
B-2	16-18	LEAN CLAY(CL)	45	18	27			
B-2	23.5-25							37.7
B-3	0.5-2	LEAN CLAY(CL)	27	14	13			88.8
B-3	4-6	SANDY LEAN CLAY(CL)	40	15	25			66.0
B-3	6-8					116.6	6.13	
B-3	8-10	LEAN CLAY with SAND(CL)	37	14	23			71.0
B-3	16.5-18	SILTY SAND(SM)			NP			36.8
B-3	28.5-30	SILTY SAND(SM)			NP			17.6
B-4	0-2	SANDY LEAN CLAY(CL)	22	13	9			61.2
B-4	6-8					121.1	2.34	
B-4	8-10	LEAN CLAY with SAND(CL)	29	13	16	120.6	2.15	71.3
B-4	9							70.5
B-4	14-16	SANDY SILT(ML)	17	14	3			51.9
B-4	16.5-18	SANDY SILT(ML)			NP			57.5
B-4	23-25	SILTY SAND(SM)			NP			21.6
B-5	2-4	SANDY LEAN CLAY(CL)	45	14	31			63.2

PROJECT: Tomball ISD HCFCD Drainage Channel

SITE: Juergen Road and Mueschke Road
Cypress, Texas


11555 Clay Rd, Ste 100
Houston, TX

PH. 713-690-8989

FAX. 713-690-8787

PROJECT NUMBER: 92225364

CLIENT: Tomball Independent School District
Tomball, Texas

Exhibit B-1

SUMMARY OF LABORATORY RESULTS

PAGE 2 OF 2

BORING ID	Depth (Ft.)	Soil Classification USCS	Liquid Limit	Plastic Limit	Plasticity Index	Unit Weight Dry Density (pcf)	Unconfined Compressive Strength (tsf)	% Fines
B-5	6-8	SANDY LEAN CLAY(CL)	41	13	28	123.2	2.83	61.1
B-5	12-14							50.9
B-5	13							52.4
B-5	16-18	CLAYEY SAND(SC)	20	12	8			40.4
B-5	18.5-20	SILTY, CLAYEY SAND(SC-SM)	20	14	6			46.9
B-6	2.5-4	SANDY SILT(ML)			NP			50.1
B-6	6-8	SANDY LEAN CLAY(CL)	29	14	15			60.1
B-6	7							59.4
B-6	8-10					119.1	1.92	54.9
B-6	12-14	SANDY LEAN CLAY(CL)	24	13	11			66.3
B-6	13							66.0
B-6	23.5-25	SANDY LEAN CLAY(CL)	32	13	19			53.9
PROJECT: Tomball ISD HCFCDD Drainage Channel			Terracon 11555 Clay Rd, Ste 100 Houston, TX			PROJECT NUMBER: 92225364		
SITE: Juergen Road and Mueschke Road Cypress, Texas						CLIENT: Tomball Independent School District Tomball, Texas		
			PH. 713-690-8989 FAX. 713-690-8787			Exhibit B-2		

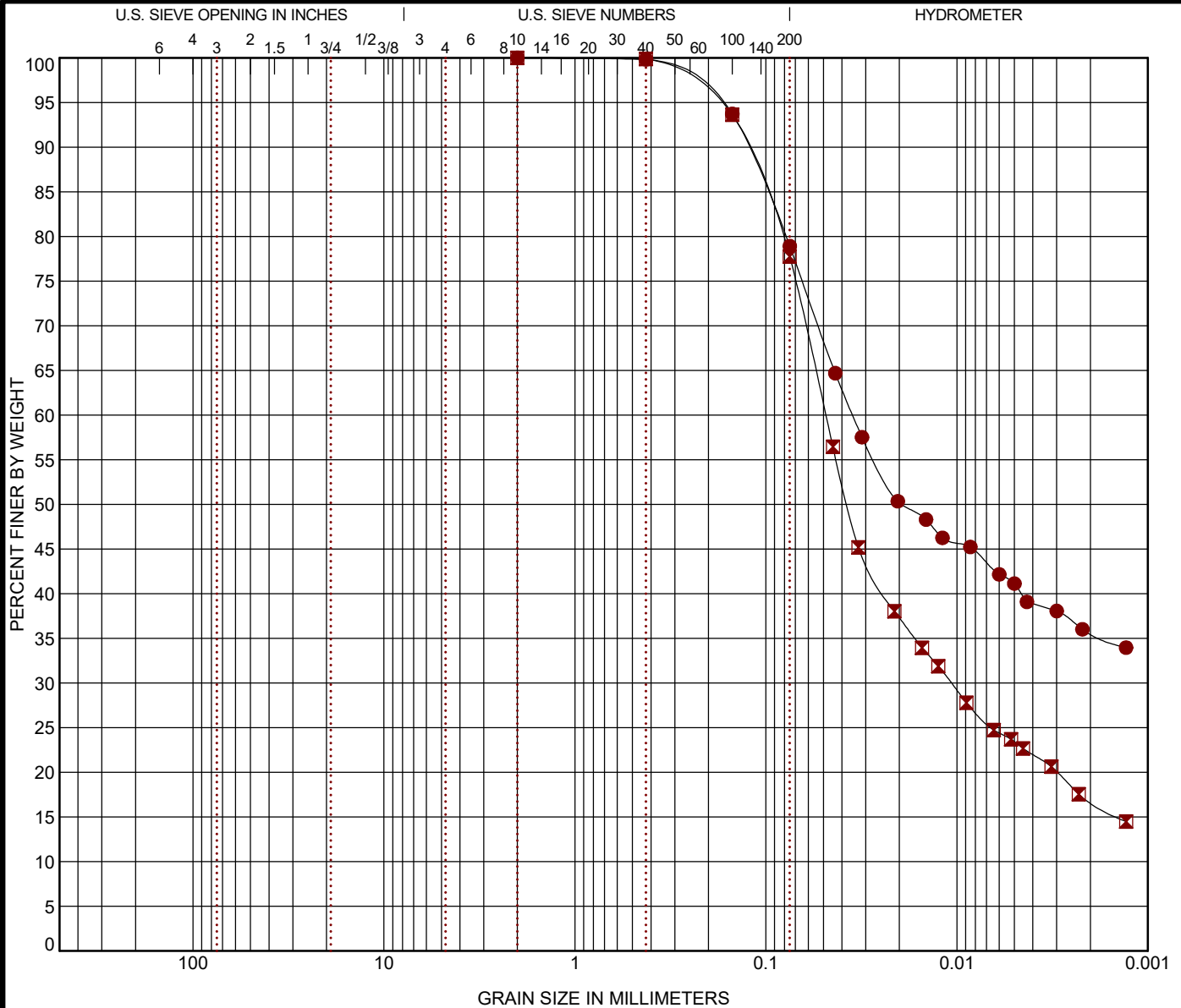
ASTM D4221-18



LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. IDOT GRAIN SIZE: USCS 2 9225364 TOMBALL ISD HCFCD.GPJ TERRACON DATATEMPLATE.GDT 9/14/22

DOUBLE HYDROMETER

ASTM D4221-18



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID	Depth	USCS Classification				LL	PL	PI	Cc	Cu
● B-2	10.0 - 12.0	FAT CLAY with SAND (CH) - Natural				51	14	37		
✠ B-2	10.0 - 12.0	FAT CLAY with Sand (CH)								

Boring ID	Depth	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Gravel	%Sand	%Silt	%Clay
● B-2	10.0 - 12.0	2	0.035			0.0	21.1	43.3	35.6
✠ B-2	10.0 - 12.0	2	0.049	0.011		0.0	22.2	61.0	16.8

Calculate Dispersion (%) : 47.2% (Reference Page 13)

PROJECT: Tomball ISD HCFC Drainage Channel

SITE: Juergen Road and Mueschke Road Cypress, Texas

Terracon
11555 Clay Rd, Ste 100
Houston, TX

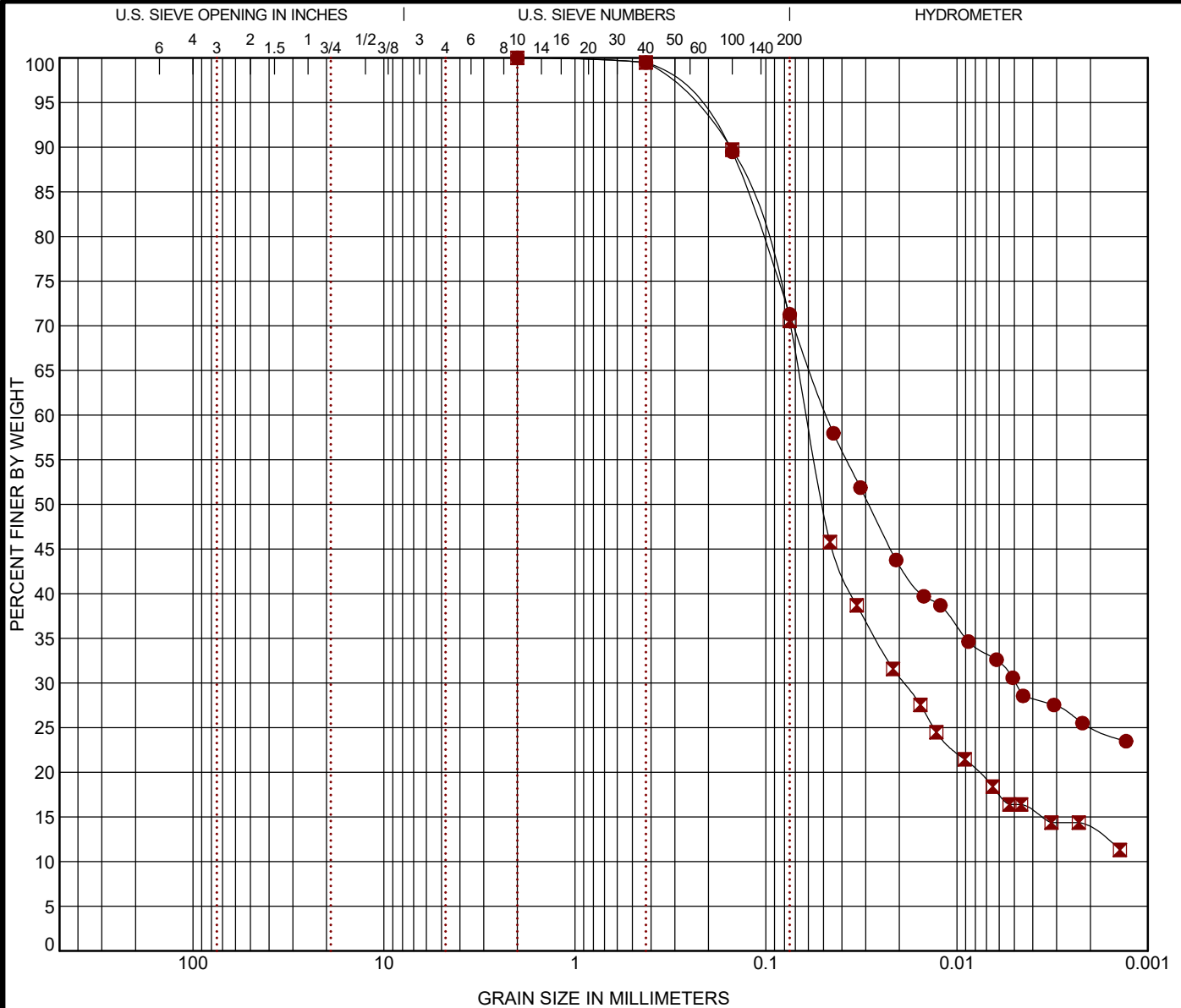
PROJECT NUMBER: 92225364

CLIENT: Tomball Independent School District
Tomball, Texas

EXHIBIT: B-4

DOUBLE HYDROMETER

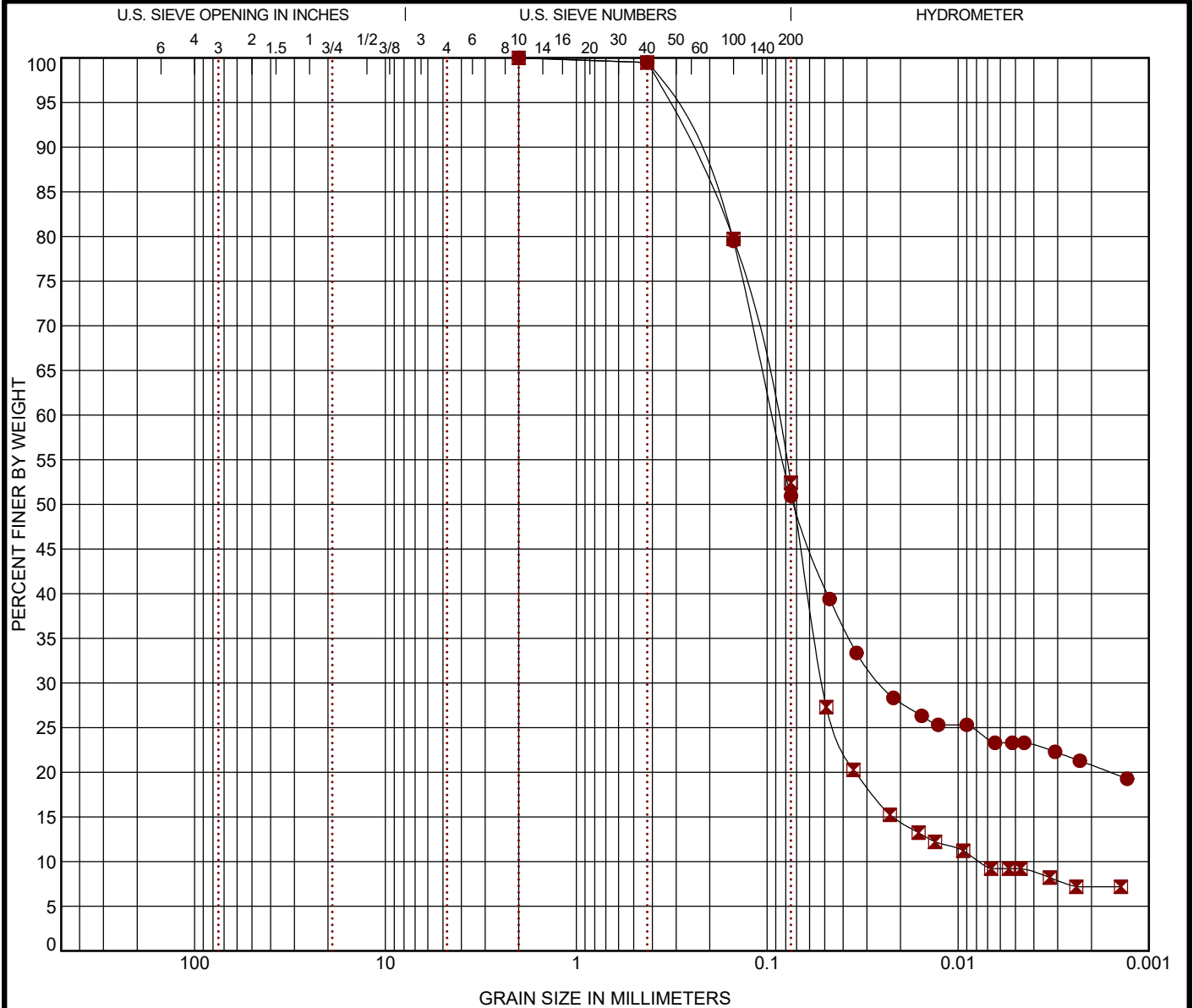
ASTM D4221-18



DOUBLE HYDROMETER

ASTM D4221-18

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. IDOT GRAIN SIZE: USCS 2 92225364 TOMBALL ISD HCFCD.GPJ TERRACON_DATATEMPLATE.GDT 9/14/22



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID	Depth	USCS Classification				LL	PL	PI	Cc	Cu
● B-5	12.0 - 14.0	SANDY LEAN CLAY (CL) - Natural								
☒ B-5	12.0 - 14.0	SANDY LEAN CLAY (CL)							3.78	11.87

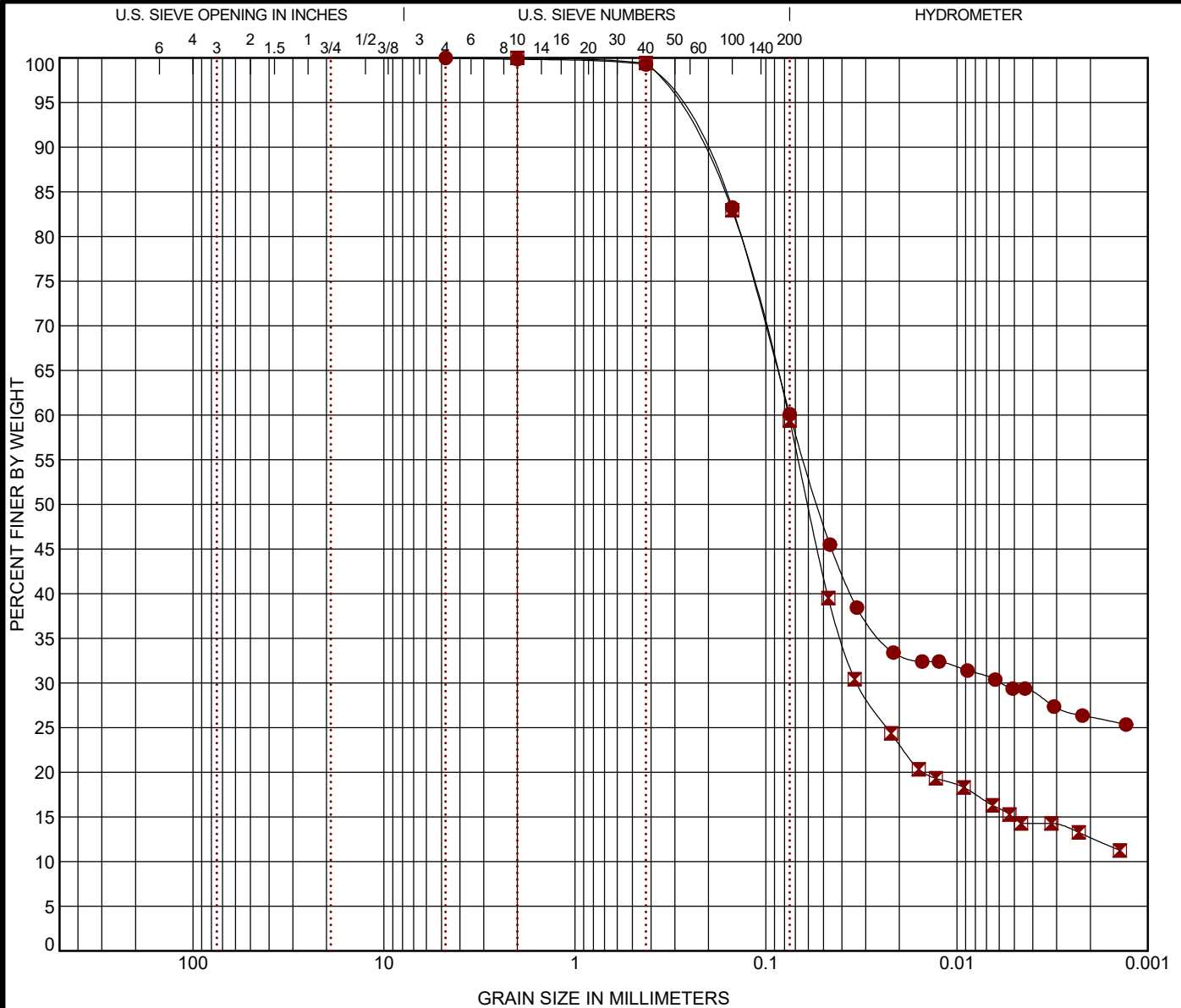
Boring ID	Depth	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Gravel	%Sand	%Silt	%Clay
● B-5	12.0 - 14.0	2	0.093	0.025		0.0	49.1	30.1	20.8
☒ B-5	12.0 - 14.0	2	0.091	0.051	0.008	0.0	47.6	45.2	7.2

Calculate Dispersion (%) : 34.6% (Reference Page 13)

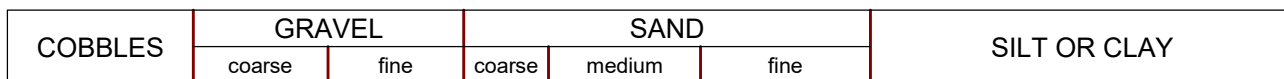
PROJECT: Tomball ISD HCFCD Drainage Channel	11555 Clay Rd, Ste 100 Houston, TX	PROJECT NUMBER: 92225364
SITE: Juergen Road and Mueschke Road Cypress, Texas		CLIENT: Tomball Independent School District Tomball, Texas
		EXHIBIT: B-6

DOUBLE HYDROMETER

ASTM D4221-18



ASTM D4221-18



Boring ID	Depth	USCS Classification	LL	PL	PI	Cc	Cu
● B-6	12.0 - 14.0	SANDY LEAN CLAY (CL) - Natural	24	13	11		
☒ B-6	12.0 - 14.0	SANDY LEAN CLAY (CL)					

[illegible]

Calculate Dispersion (%) :	45.9%

(Reference Page 13)

PROJECT NUMBER: 92225364

CLIENT: Tomball Independent School District
Tomball, Texas

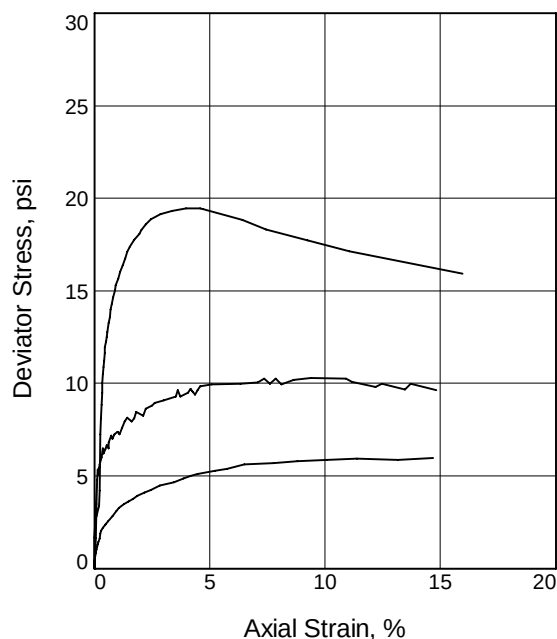
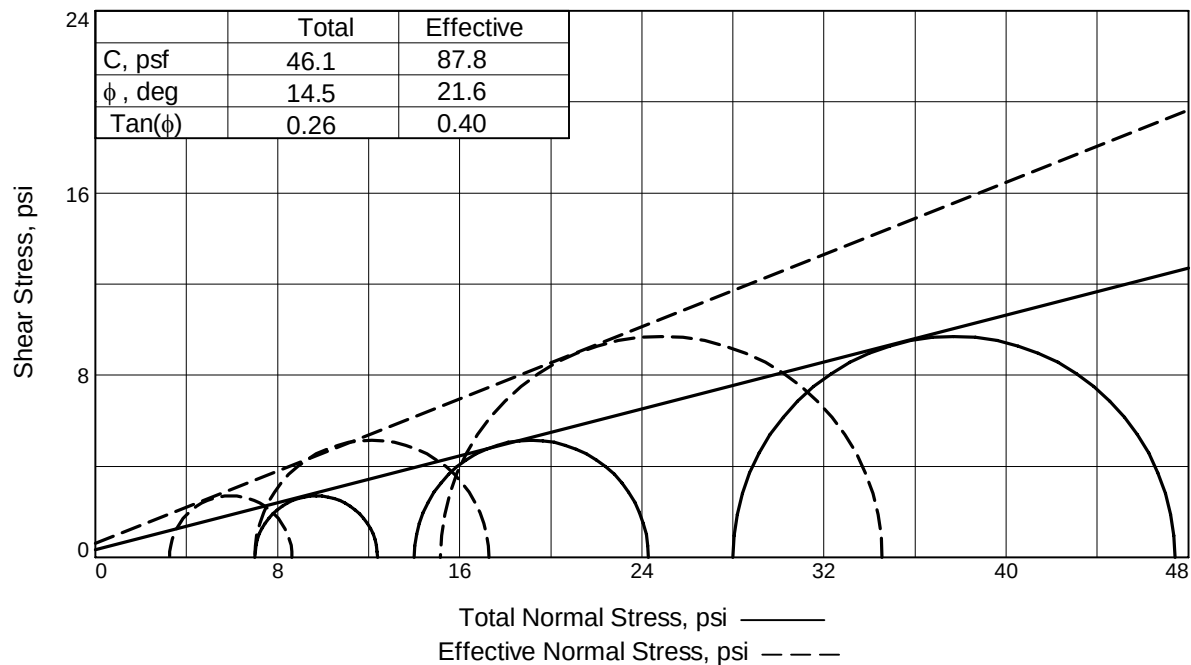
EXHIBIT: B-8

PROJECT: Tomball ISD HCFCD Drainage Channel

SITE: Juergen Road and Mueschke Road
Cypress, Texas

Terracon
11555 Clay Rd, Ste 100
Houston, TX

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. IDOT GRAIN SIZE: USCS 2 9225364 TOMBALL ISD HCFCD.GPJ TERRACON DATATEMPLATE.GDT 9/14/22



Sample No.		1	2	3
Initial	Water Content, %	16.6	17.5	16.7
	Dry Density, pcf	105.2	110.2	115.8
	Saturation, %	74.4	89.3	98.9
	Void Ratio	0.6023	0.5294	0.4557
	Diameter, in.	2.75	2.78	2.76
	Height, in.	5.56	5.67	5.56
At Test	Water Content, %	21.8	18.6	15.9
	Dry Density, pcf	105.9	111.3	117.6
	Saturation, %	99.4	97.7	99.1
	Void Ratio	0.5920	0.5139	0.4334
	Diameter, in.	2.74	2.77	2.74
	Height, in.	5.55	5.66	5.54
Strain rate, in./min.		0.001	0.001	0.001
Back Pressure, psi		50.0	50.0	50.0
Cell Pressure, psi		57.0	64.0	78.0
Fail. Stress, psi		5.4	10.3	19.4
Excess Pore Pr., psi		3.8	7.0	12.9
Ult. Stress, psi				
Excess Pore Pr., psi				
$\bar{\sigma}_1$ Failure, psi		8.6	17.3	34.6
$\bar{\sigma}_3$ Failure, psi		3.2	7.0	15.1

Type of Test:

CU with Pore Pressures

Sample Type: Tube

Description: Sandy Lean Clay

LL-PL-PI: 24-13-11

Failure Criteria: Maximum Deviator Stress

Specific Gravity: 2.7

Remarks: Three Specimen Series

B-4, 12'-14'

B-5, 8'-10'

B-6, 10'-12'

Exhibit: B-9

Client: Tomball ISD

Project: Tomball ISD HCFCF Drainage Channel

Source of Sample: CU-1

Depth: 8-14 ft

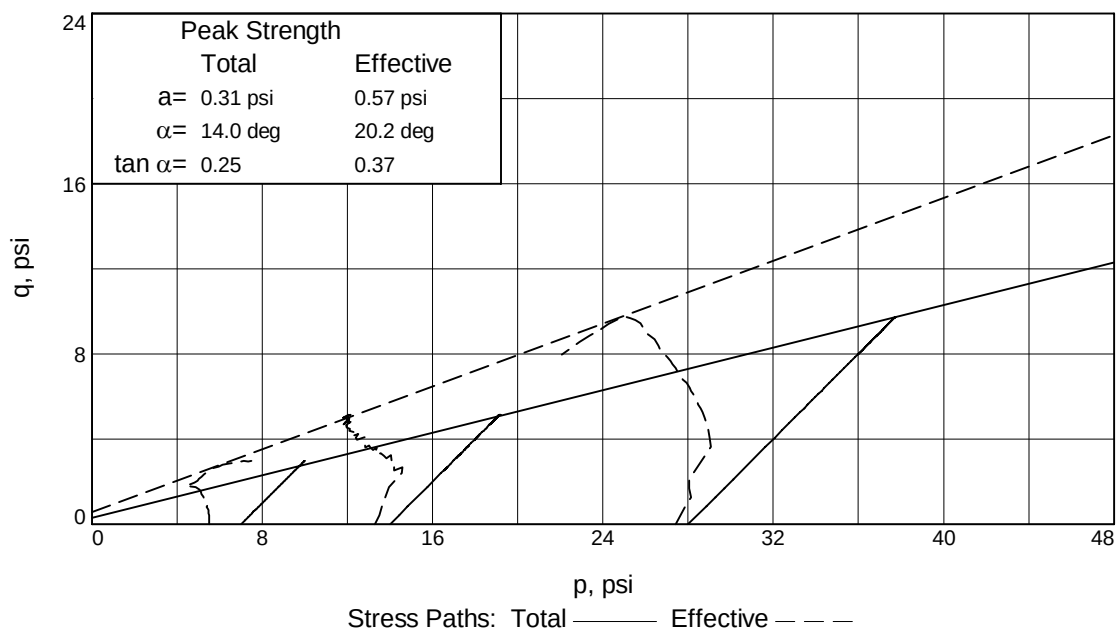
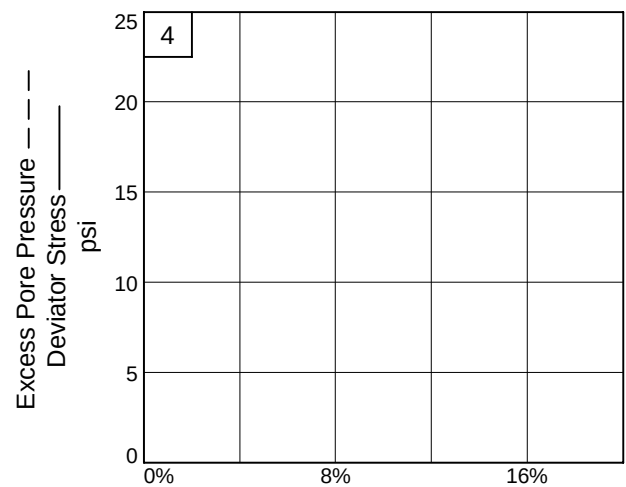
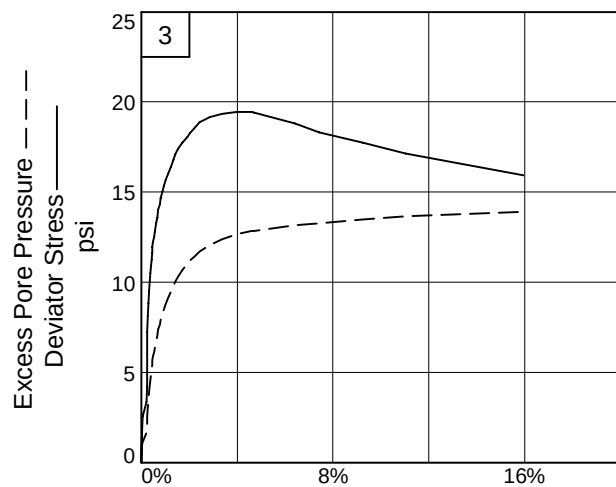
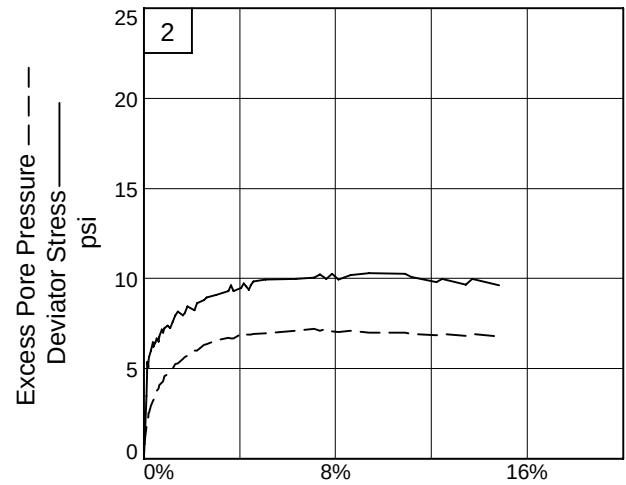
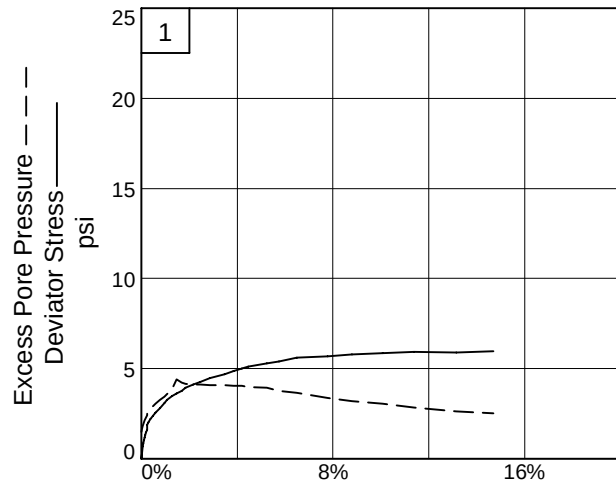
Sample Number: B-4 to B-6

Proj. No.: 92225364

Date Sampled: 8/31/2022

TRIAXIAL SHEAR TEST REPORT

Terracon Consultants, Inc.



Client: Tomball ISD

Project: Tomball ISD HCFCD Drainage Channel

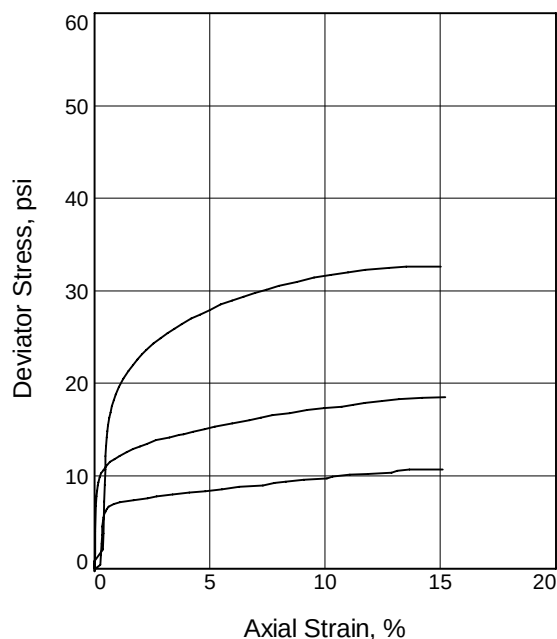
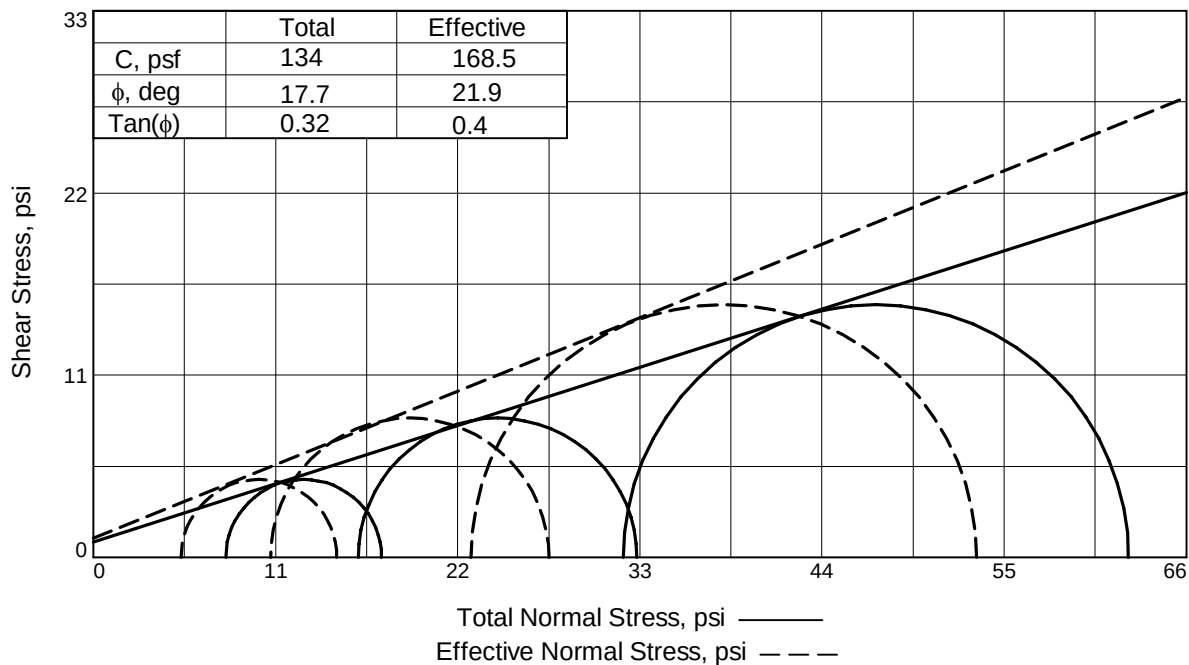
Source of Sample: CU-1

Depth: 10-12 ft

Sample Number: N/A

Project No.: 92225364

Terracon Consultants, Inc.



Sample No.		1	2	3
Initial	Water Content, %	13.7	14.6	16.2
	Dry Density, pcf	121.8	115.0	116.3
	Saturation, %	96.7	84.6	97.3
	Void Ratio	0.3836	0.4658	0.4495
	Diameter, in.	2.75	2.82	2.79
	Height, in.	5.57	5.61	5.59
At Test	Water Content, %	13.9	17.0	16.3
	Dry Density, pcf	122.1	115.5	117.0
	Saturation, %	98.7	99.9	99.8
	Void Ratio	0.3801	0.4594	0.4412
	Diameter, in.	2.75	2.81	2.78
	Height, in.	5.57	5.62	5.60
Strain rate, in./min.		0.001	0.001	0.001
Back Pressure, psi		50.0	50.0	50.0
Cell Pressure, psi		58.0	66.0	82.0
Fail. Stress, psi		9.4	16.8	30.5
Excess Pore Pr., psi		2.7	5.3	9.2
Ult. Stress, psi				
Excess Pore Pr., psi				
$\bar{\sigma}_1$ Failure, psi		14.7	27.5	53.3
$\bar{\sigma}_3$ Failure, psi		5.3	10.7	22.8

Type of Test:

CU with Pore Pressures

Sample Type: Tube

Description: Fat Clay

LL-PL-PI: 66-18-48

Failure Criteria: Maximum Deviator Stress

Specific Gravity: 2.6

Remarks: Three Specimen Series

B-1, 14'-16'

B-1, 16'-18'

B-2, 12'-14'

Exhibit: B-10

Client: Tomball ISD

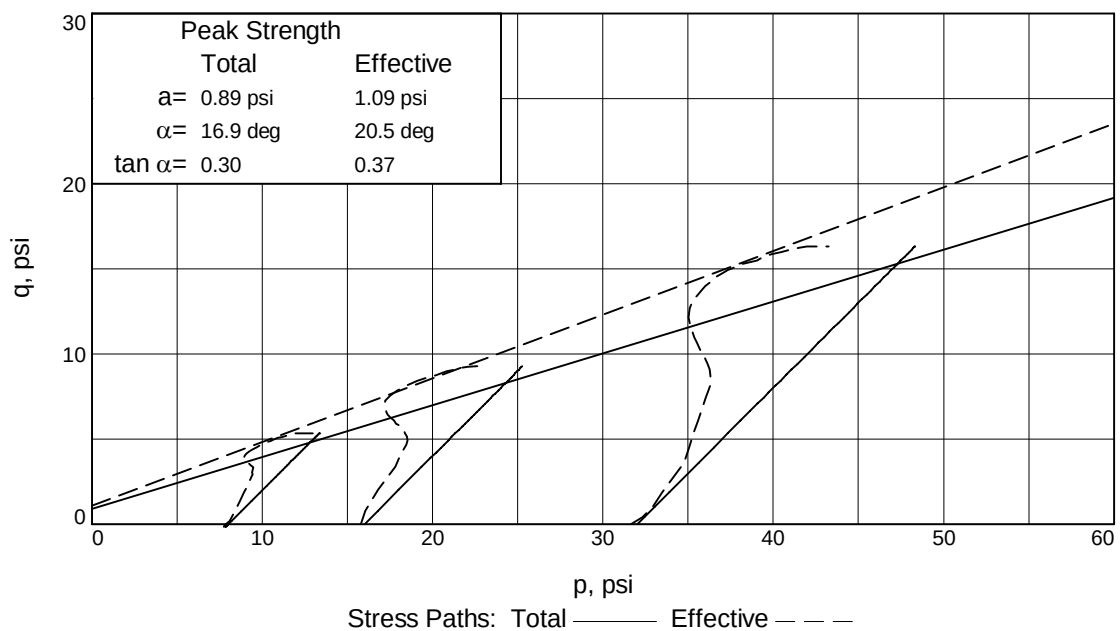
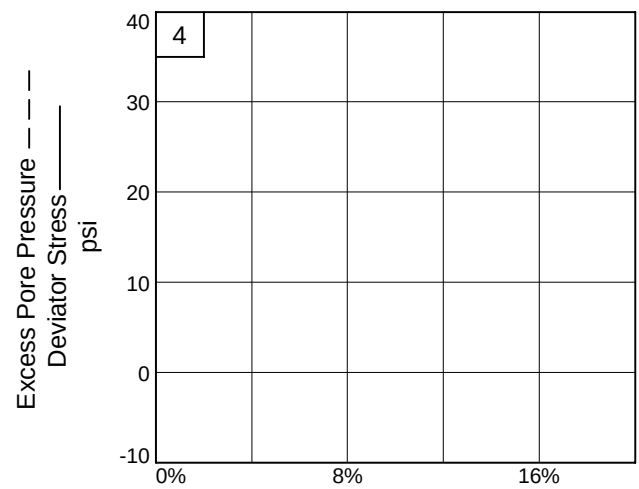
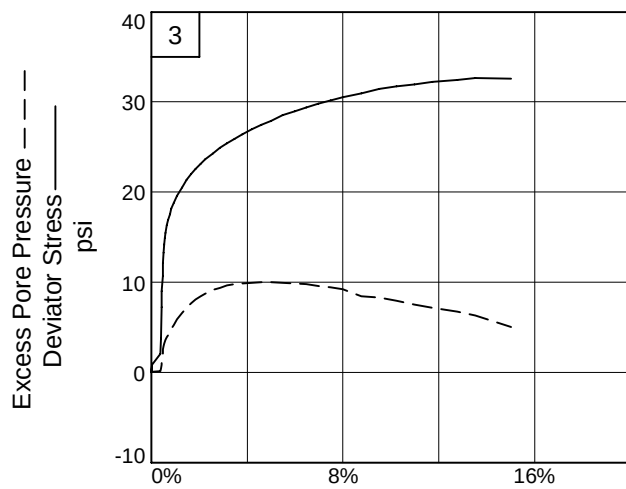
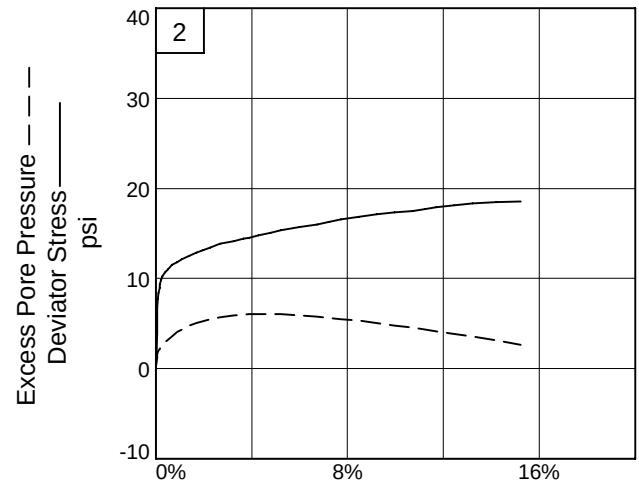
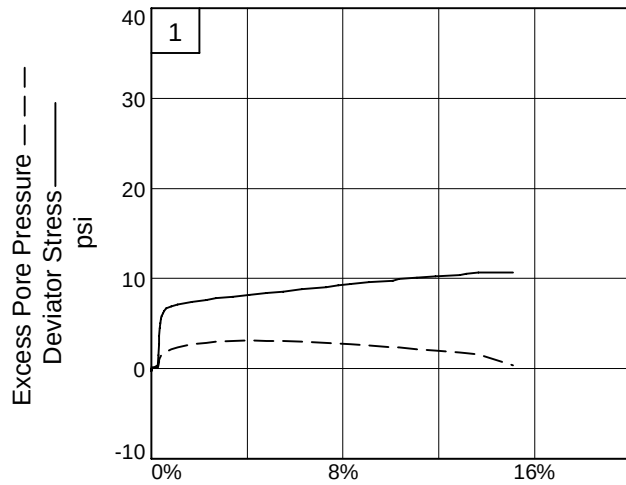
Project: Tomball ISD HCFCF Drainage Channel

Source of Sample: CU-2 **Depth:** 12.0-18.0 ft

Sample Number: B-1 and B-2

Proj. No.: 92225364 **Date Sampled:** 8/31/2022

TRIAXIAL SHEAR TEST REPORT
 Terracon Consultants, Inc.



Client: Tomball ISD

Project: Tomball ISD HCFCD Drainage Channel

Source of Sample: CU-2

Depth: 12.0-18.0 ft

Sample Number: N/A

Project No.: 92225364

Terracon Consultants, Inc.



SPECIFIC GRAVITY OF SOIL TEST
ASTM D 854

Job No. 364
Project Name: _____

Tested By: DA/SP
Date: 8.19.22
Computed by: _____
Checked by: _____

$$G_s = \frac{W_5 G_1}{W_3 - (W_1 - W_2)}$$

Boring No.	B-1				
Depth	14-16				
Description					
Bottle No.	2				
W ₁ , of bottle + soil + water, (W ₁) (gm)	361.63				
Temperature, T in C°	22.2°				
W ₁ of bottle + water, (W ₂) (gm)	336.61				
Tare No.					
W ₁ , Dry Soil + Tare (gm)					
Tare Wt. (gm)					
W ₁ , of soil (W ₅) (gm)	40.91				
Temp. Correction	0.99957				
20° C Specific Gravity of soil, (G _s)	2.573				



SPECIFIC GRAVITY OF SOIL TEST
ASTM D 854

Job No. 92225364
Project Name: _____

Tested By: SR
Date: 8/9/2012
Computed by: _____
Checked by: [Signature] 8/11/12

$$G_s = \frac{W_5 G_1}{W_3 - (W_1 - W_2)}$$

Boring No.	B-5				
Depth	8-10				
Description	tan, loam clay 4' Fe				
Bottle No.	(3)				
W ₁ , of bottle + soil + water, (W ₁) (gm)	394.44 394.44				
Temperature, T in C°	22.0				
W ₁ of bottle + water, (W ₂) (gm)	368.29				
Tare No.					
W ₁ . Dry Soil + Tare (gm)					
Tare Wt. (gm)					
W ₁ . of soil (W ₅) (gm)	41.71				
Temp. Correction	0.99959				
20° C Specific Gravity of soil, (G _s)	2.679				

Exhibit B-12

CRUMB TEST (ASTM D6572)

PROJECT NAME: _____

PROJECT NO.: 92225 364

	⁵	⁷	⁹	^B
BORING NO. SAMPLE NO. DEPTH	B-1 6-8	B-2 6-8	B-1 10-12	B-2 10-12
VISUAL DESCRIPTION	Dark Lgn, sa lean clay H Iron	Dark, lean clay w/ sand	Dark Lgn, sandy clay	Lgn, Dark sa lean clay
HEIGHT INCHS				
VOLUME INCH CUBE				
SAMPLE WT. (GRAMS)	20.69	18.53	19.61	20.68
TEMPERATURE				
TIME				
2 MIN GRADE	grade 2	grade 2	grade 2	grade 2
1 HOUR GRADE	4 2	4 3	4 4	4 4
6 HOURS GRADE	4 2	4 4	4 4	4 4
DISPERSIVE				

TESTED BY: SR

DATE: 8/22

REVIEWED BY: _____

DATE: _____

CRUMB TEST (ASTM D6572)

PROJECT NAME: _____

PROJECT NO.: 92225364

	^C	^A	^A	⁵
BORING NO.	B-3	B-4	B-5	B-5
SAMPLE NO.				
DEPTH	4-6	8-10	2-4	12-14
VISUAL DESCRIPTION	gr, Rbr, Low clay Hsc & Iron & Fe	Dark Low clay Hsc	Lgr, Rbr, sand clay & Iron	Lgr, sandy clay
HEIGHT INCHS				
VOLUME INCH CUBE				
SAMPLE WT. (GRAMS)	19.95	17.89	17.13	20.41
TEMPERATURE				
TIME				
2 MIN GRADE	grade 2	grade 2	grade 2	grade 2
1 HOUR GRADE	" 2	" 4	" 3	" 4
6 HOURS GRADE	" 2	" 4	" 3	" 4
DISPERSIVE				

TESTED BY: SP

DATE 8/22

REVIEWED BY _____

DATE: _____

CRUMB TEST (ASTM D6572)

PROJECT NAME: _____

PROJECT NO.: 92225364

BORING NO. SAMPLE NO. DEPTH	³ B-6 6-8	³ B-6 12-14		
VISUAL DESCRIPTION	Red, Tan, sandy clay with fines	Lgn, sh, lam, ch Hcd		
HEIGHT INCHS				
VOLUME INCH CUBE				
SAMPLE WT. (GRAMS)	18.99	21.55		
TEMPERATURE				
TIME				
2 MIN GRADE	grade 2	grade 2		
1 HOUR GRADE	" 4	" 4		
6 HOURS GRADE	" 4	" 4		
DISPERSIVE				

TESTED BY: SR

DATE: 8/22

REVIEWED BY: _____

DATE: _____

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



APPENDIX C – SLOPE STABILITY ANALYSIS

Contents:

Exhibits C-1 to C-26

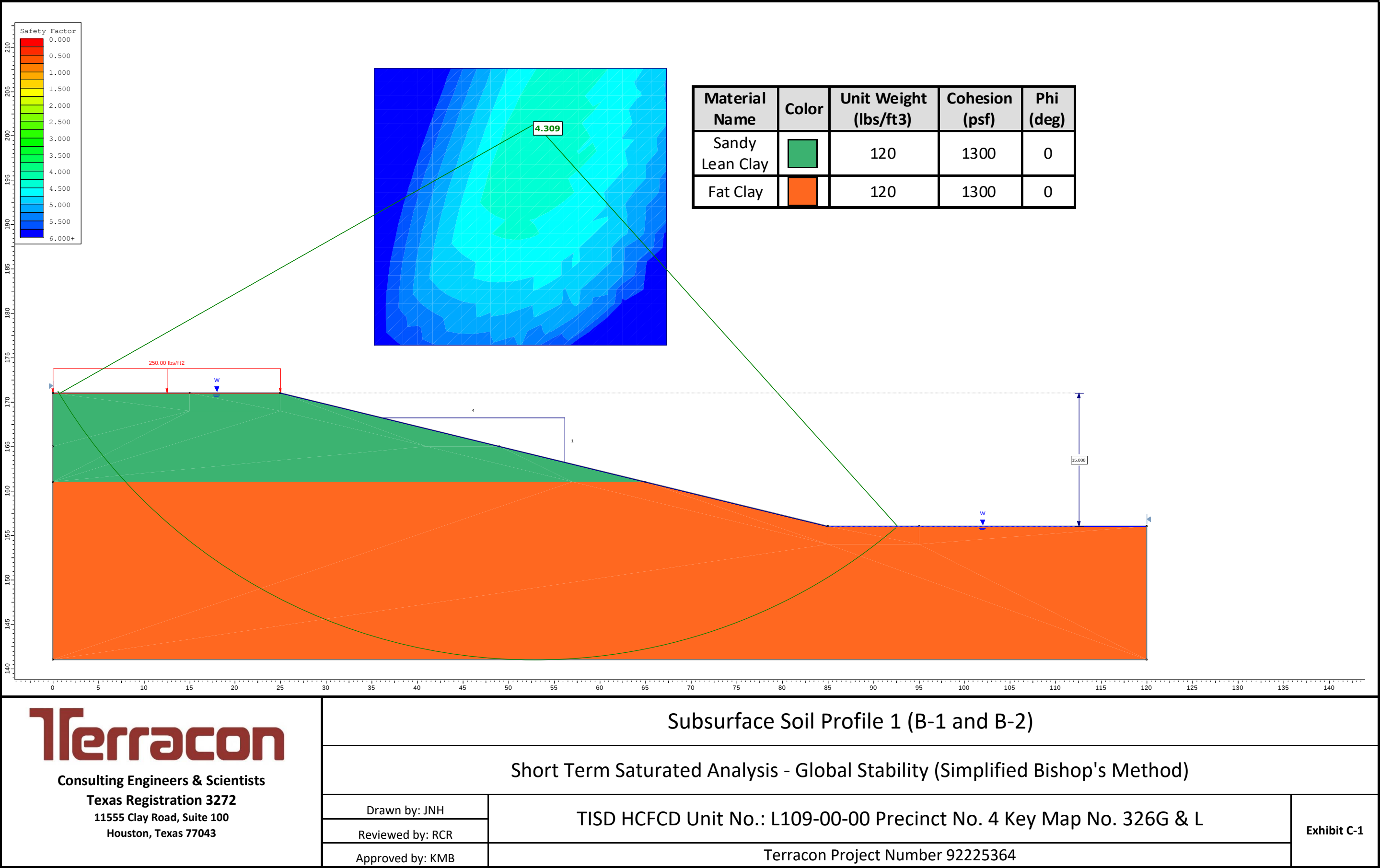
Exhibits C-27 to C-34

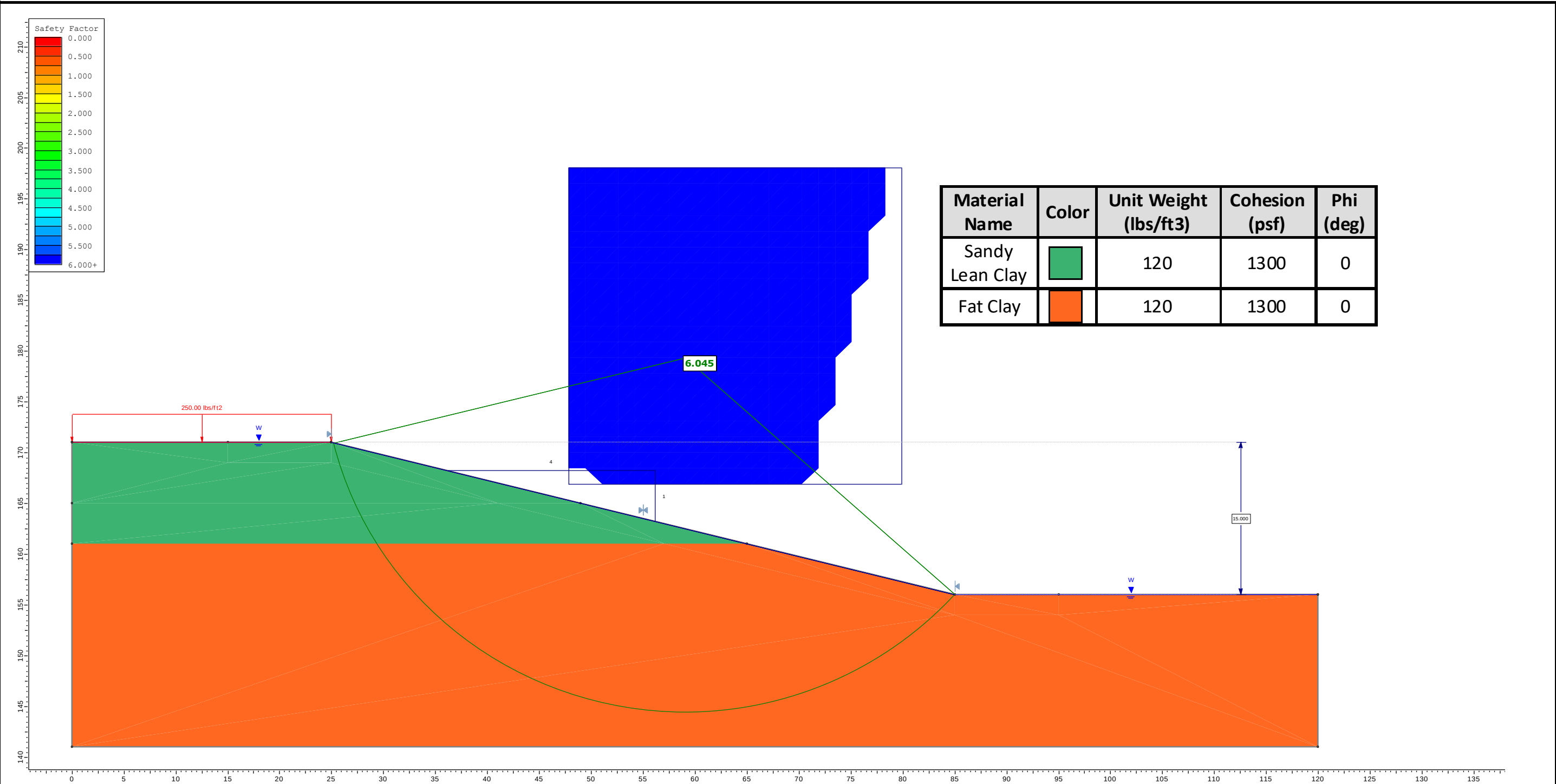
Exhibit C-35

Slope Stability Analysis Results

Backup Calculations in Slope Stability Analysis

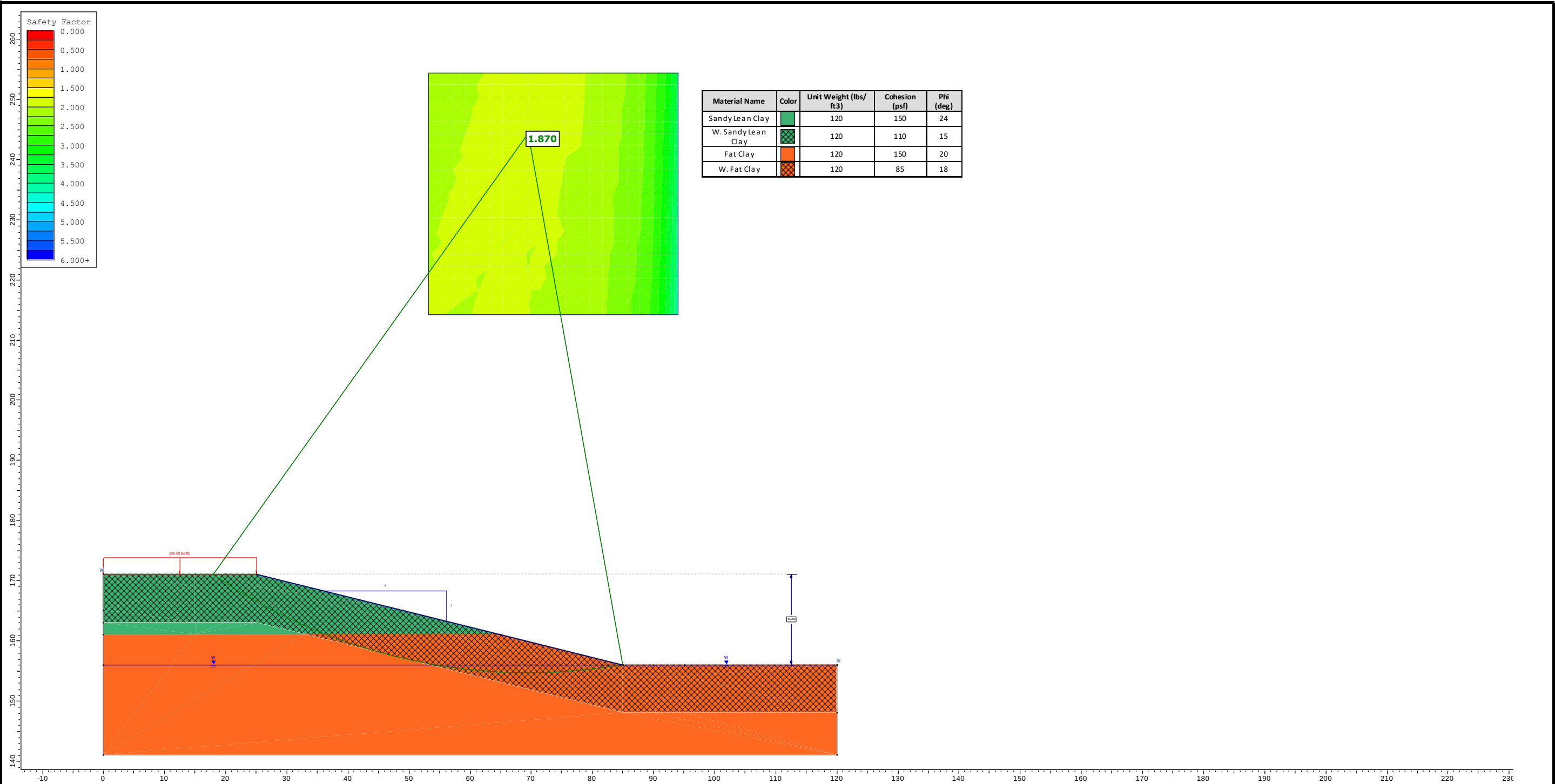
Computer Input & Output for Slope Stability Analysis





Terracon
Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 1 (B-1 and B-2)		
Short Term Saturated Analysis - Local Stability (Simplified Bishop's Method)		
Drawn by: JNH	TISD HCFCD Unit No.: L109-00-00 Precinct No. 4 Key Map No. 326G & L	Exhibit C-2
Reviewed by: RCR		
Approved by: KMB		
Terracon Project Number 92225364		



Consulting Engineers & Scientists

Texas Registration 3272

11555 Clay Road, Suite 100

Houston, Texas 77043

Subsurface Soil Profile 1 (B-1 and B-2)

Long Term Analysis - Global Stability (Simplified Bishop's Method)

Drawn by: JNH

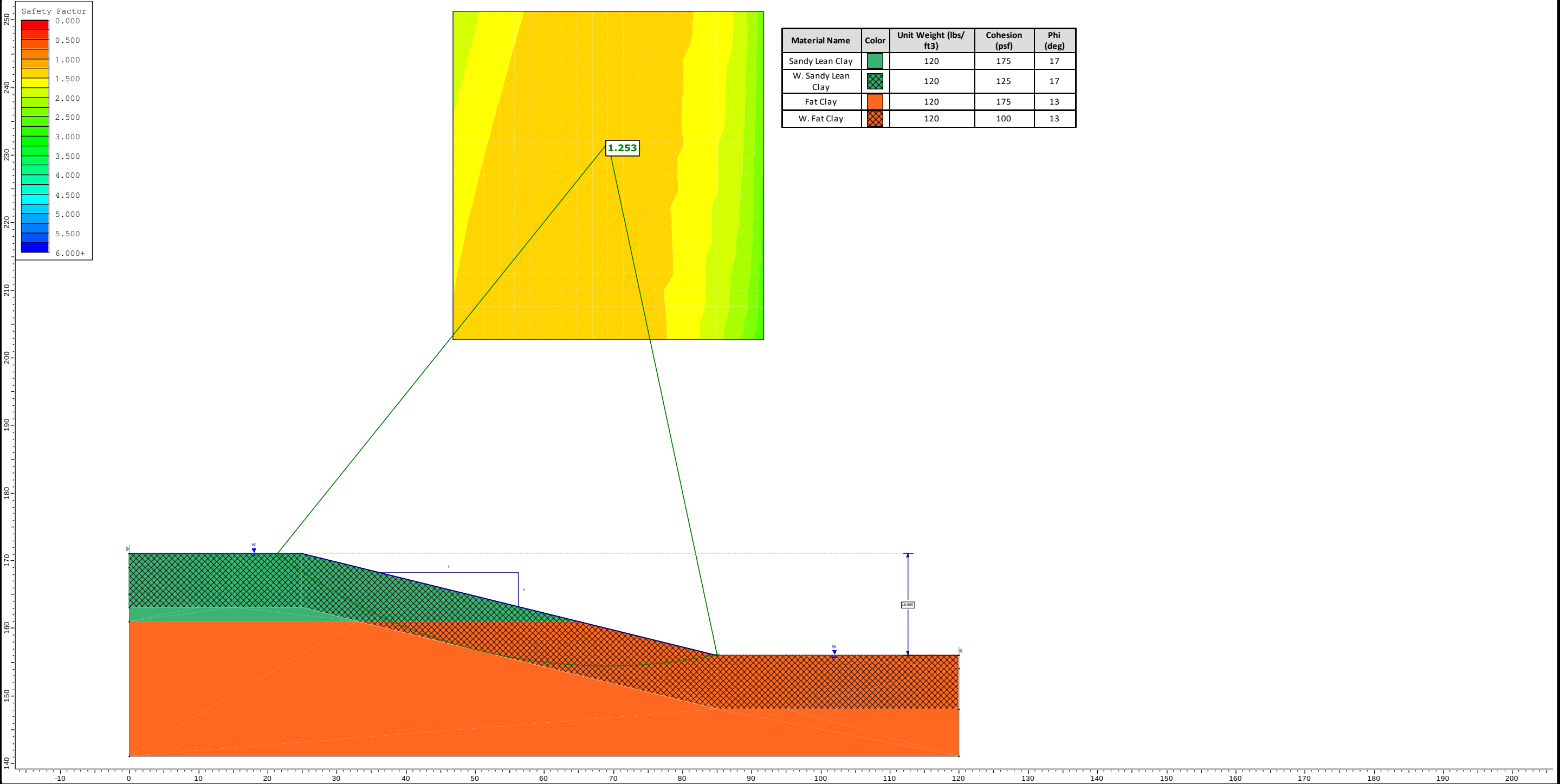
Reviewed by: RCR

Approved by: KMB

TISD HCFCD Unit No.: L109-00-00 Precinct No. 4 Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-3



Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 1 (B-1 and B-2)

Rapid Drawdown Analysis - Total Stress - Global Stability (Simplified Bishop's Method)

Drawn by: JNH

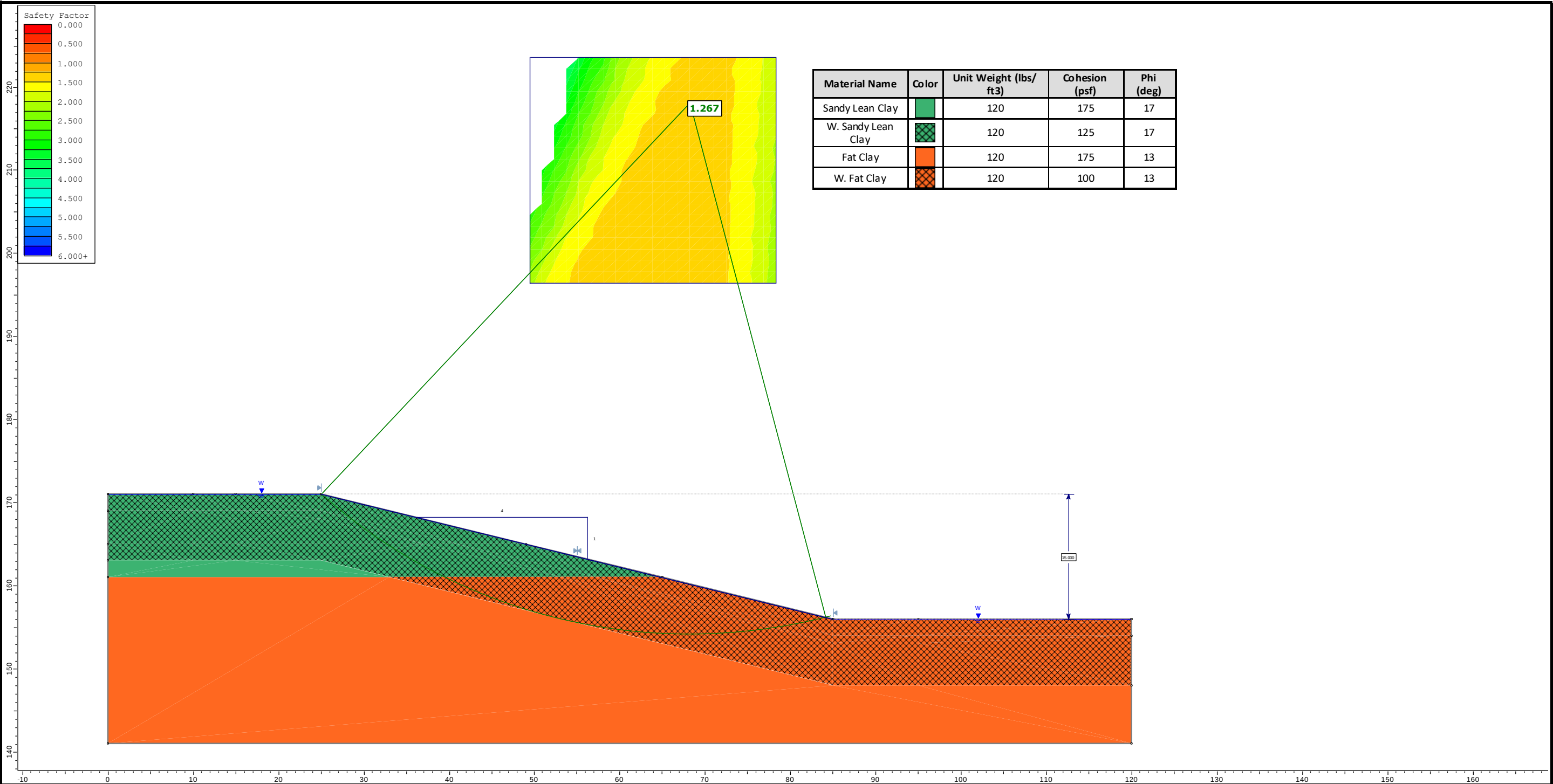
Reviewed by: RCR

Approved by: KMB

TISD HCFCD Unit No.: L109-00-00 Precinct No. 4 Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-5



Terracon

Consulting Engineers & Scientists

Texas Registration 3272

11555 Clay Road, Suite 100

Houston, Texas 77043

Subsurface Soil Profile 1 (B-1 and B-2)

Rapid Drawdown Analysis - Total Stress - Local Stability (Simplified Bishop's Method)

Drawn by: JNH

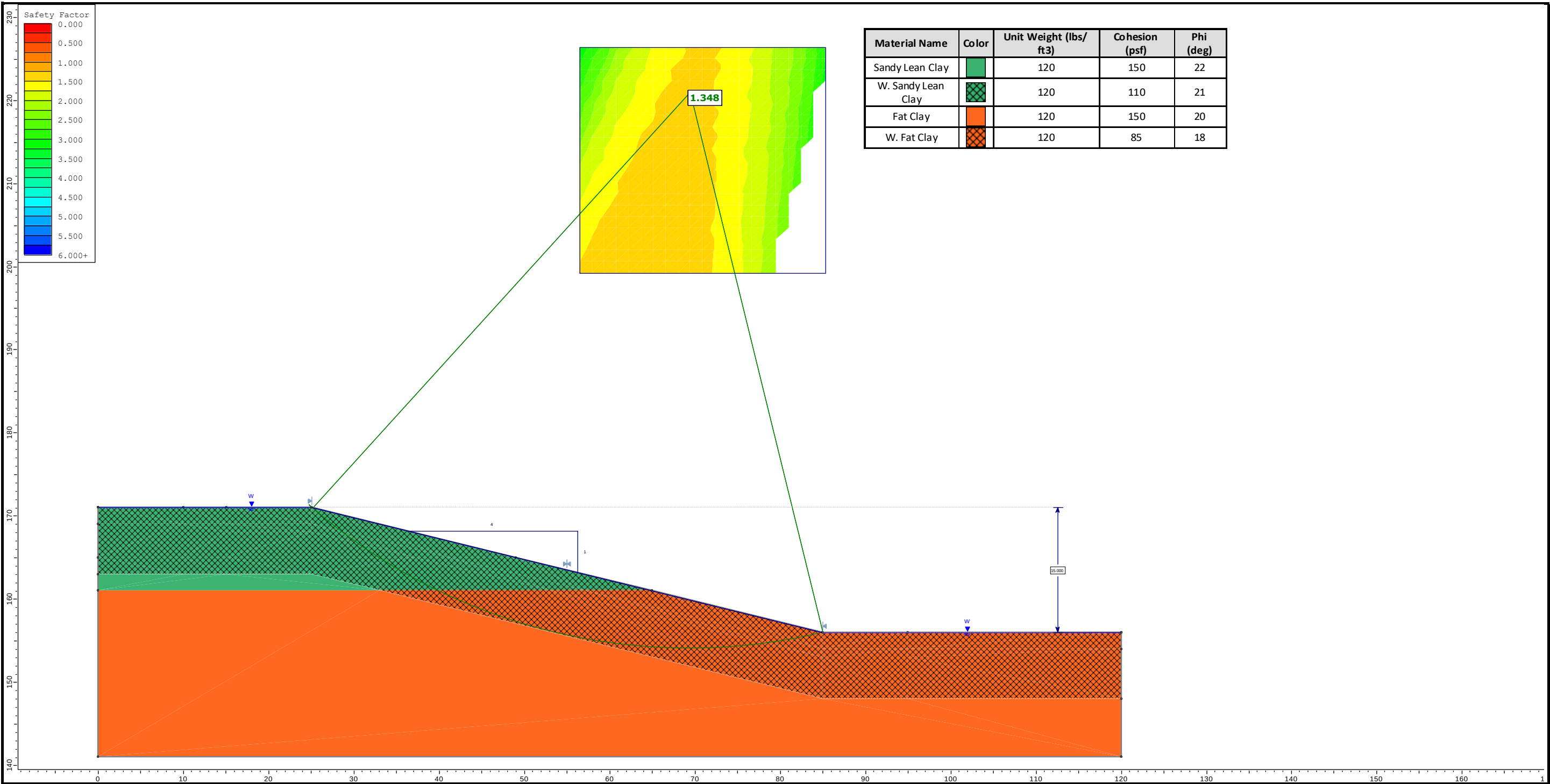
Reviewed by: RCR

Approved by: KMB

TISD HCFCD Unit No.: L109-00-00 Precinct No. 4 Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-6



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Sandy Lean Clay		120	150	22
W. Sandy Lean Clay		120	110	21
Fat Clay		120	150	20
W. Fat Clay		120	85	18



Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 1 (B-1 and B-2)

Rapid Drawdown Analysis - Effective Stress - Local Stability (Simplified Bishop's Method)

Drawn by: JNH

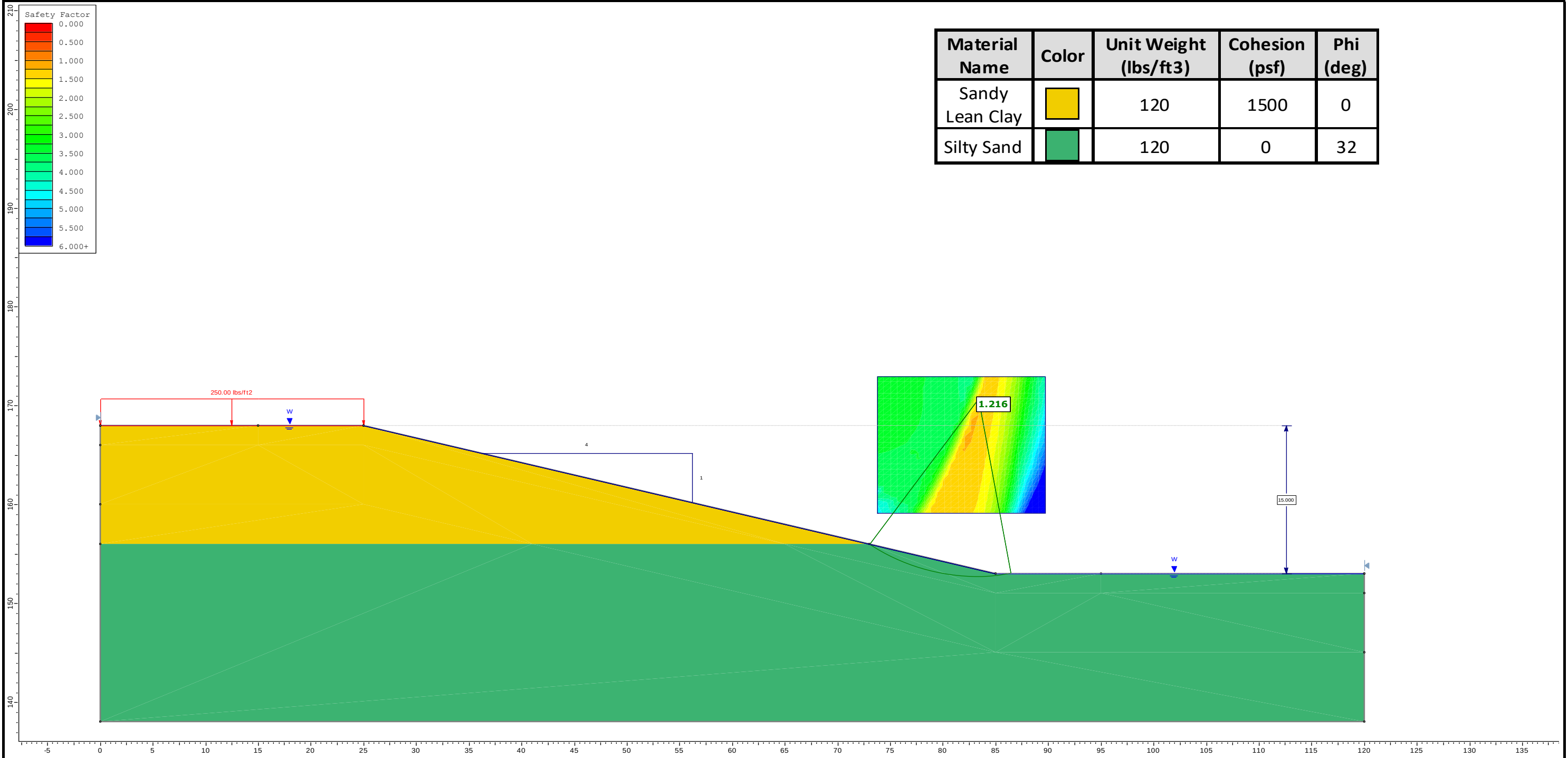
Reviewed by: RCR

Approved by: KMB

TISD HCFCD Unit No.: L109-00-00 Precinct No. 4 Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-8



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Sandy Lean Clay		120	1500	0
Silty Sand		120	0	32



Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 2 (B-3 through B-5)

Short Term Saturated Analysis - Local Stability - No Clay Liner (Simplified Bishop's Method)

Drawn by: JNH

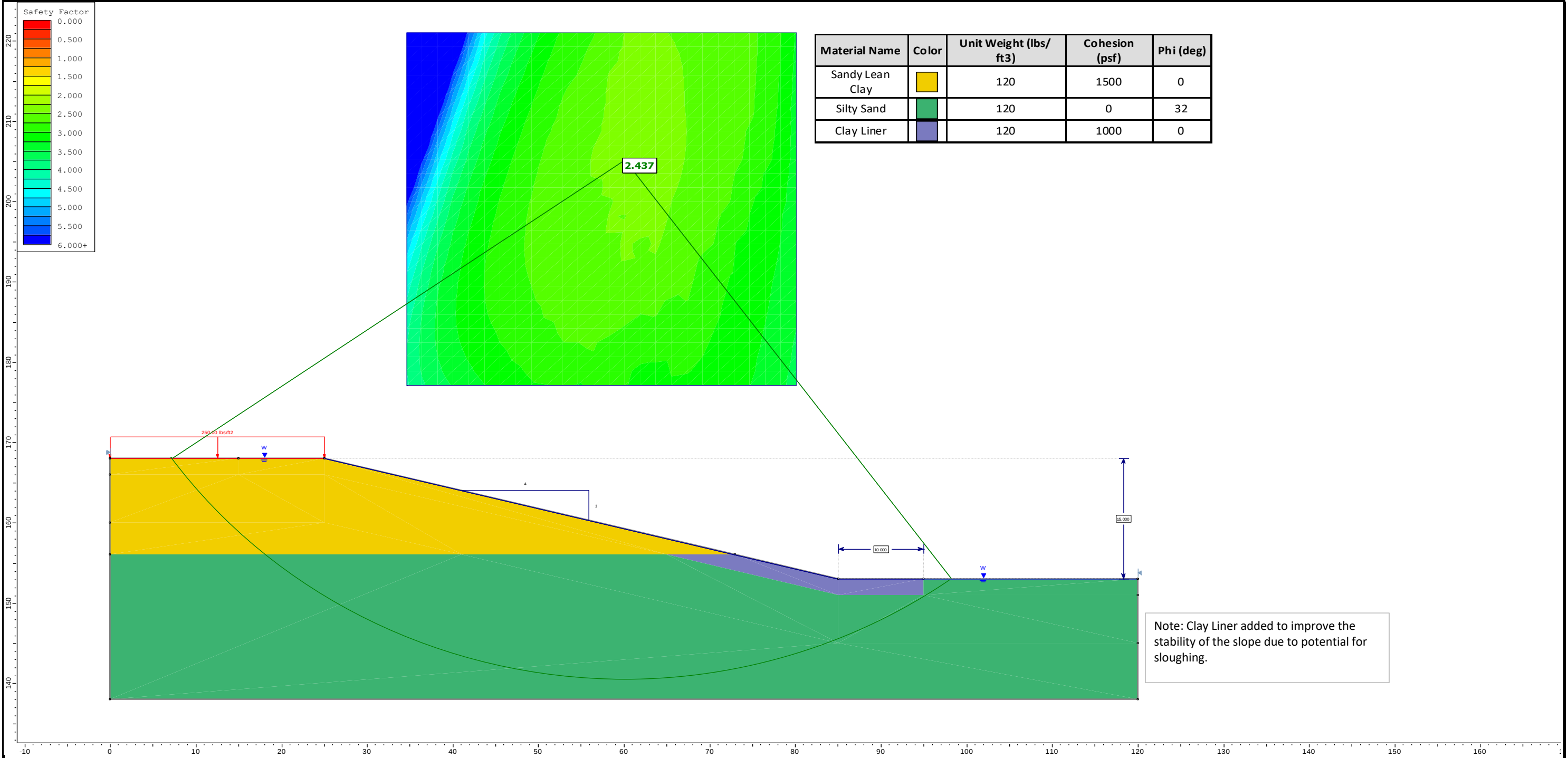
Reviewed by: RCR

Approved by: KMB

TISD HCFC Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326 G & L

Terracon Project Number 92225364

Exhibit C-9



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Sandy Lean Clay		120	1500	0
Silty Sand		120	0	32
Clay Liner		120	1000	0



Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 2 (B-3 through B-5)

Short Term Saturated Analysis - Global Stability (Simplified Bishop's Method)

Drawn by: JNH

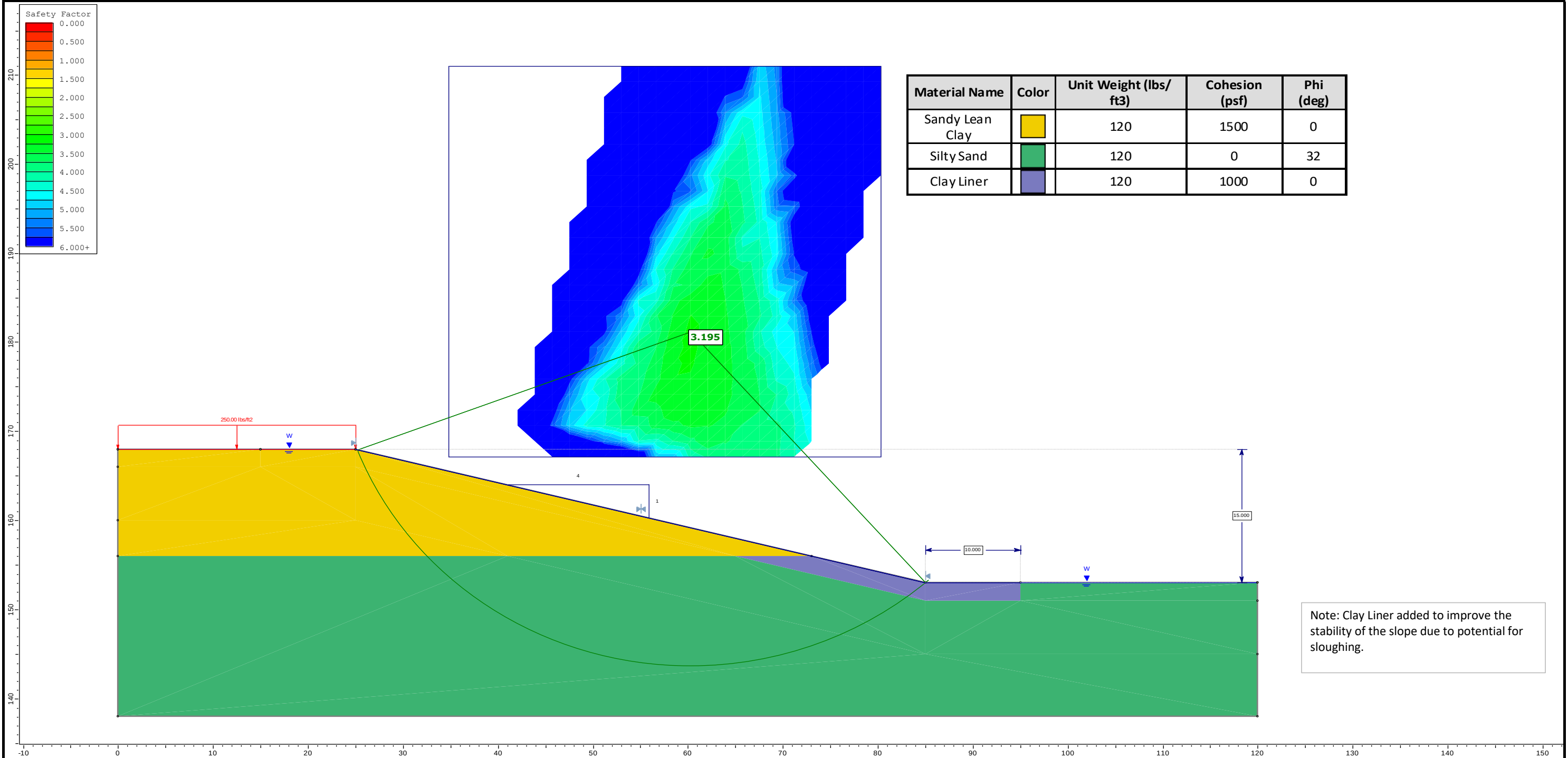
Reviewed by: RCR

Approved by: KMB

TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326 G & L

Terracon Project Number 92225364

Exhibit C-10



Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 2 (B-3 through B-5)

Short Term Saturated Analysis - Local Stability (Simplified Bishop's Method)

Drawn by: JNH

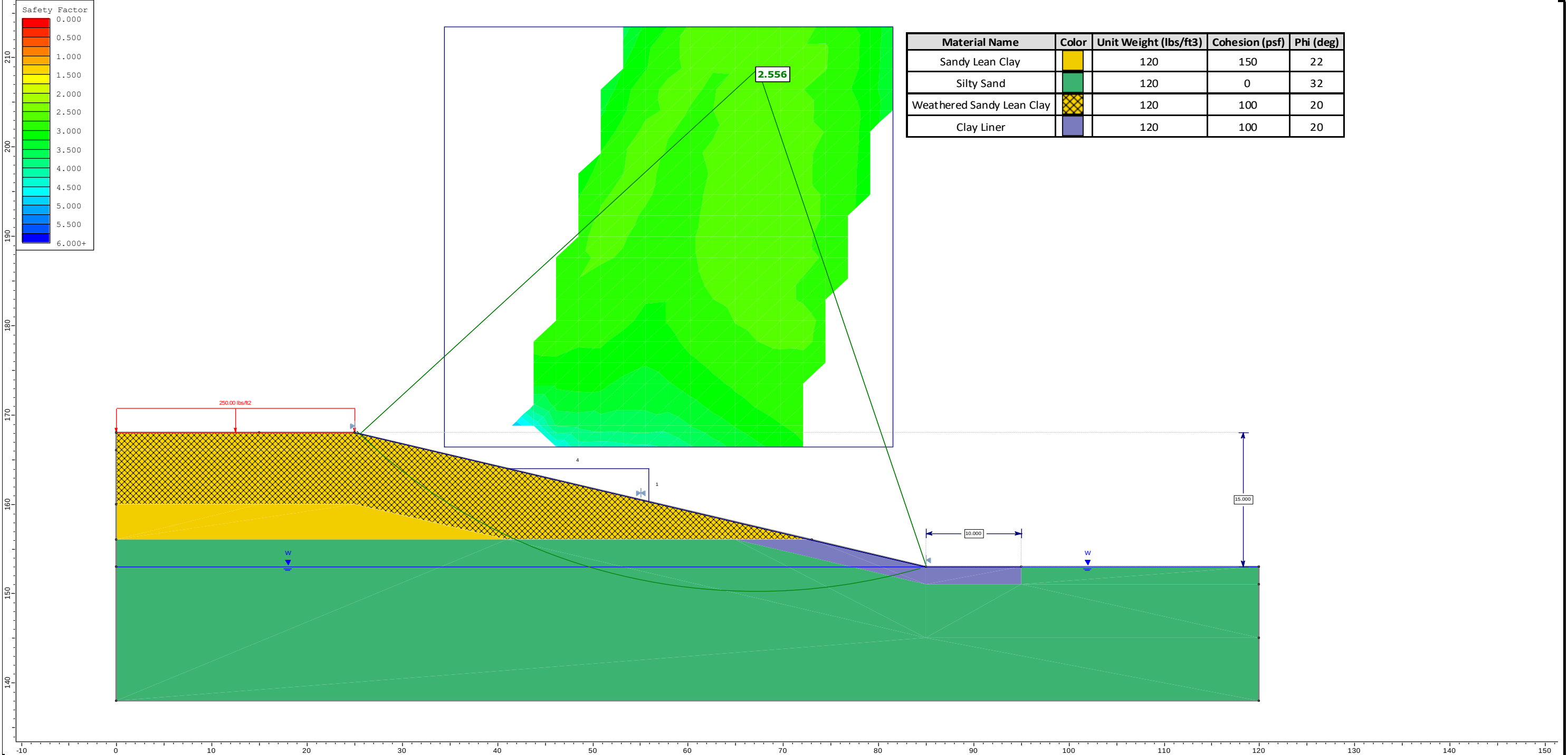
Reviewed by: RCR

Approved by: KMB

TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326 G & L

Terracon Project Number 92225364

Exhibit C-11



Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 2 (B-3 through B-5)

Long Term Analysis - Global Stability (Simplified Bishop's Method)

Drawn by: JNH

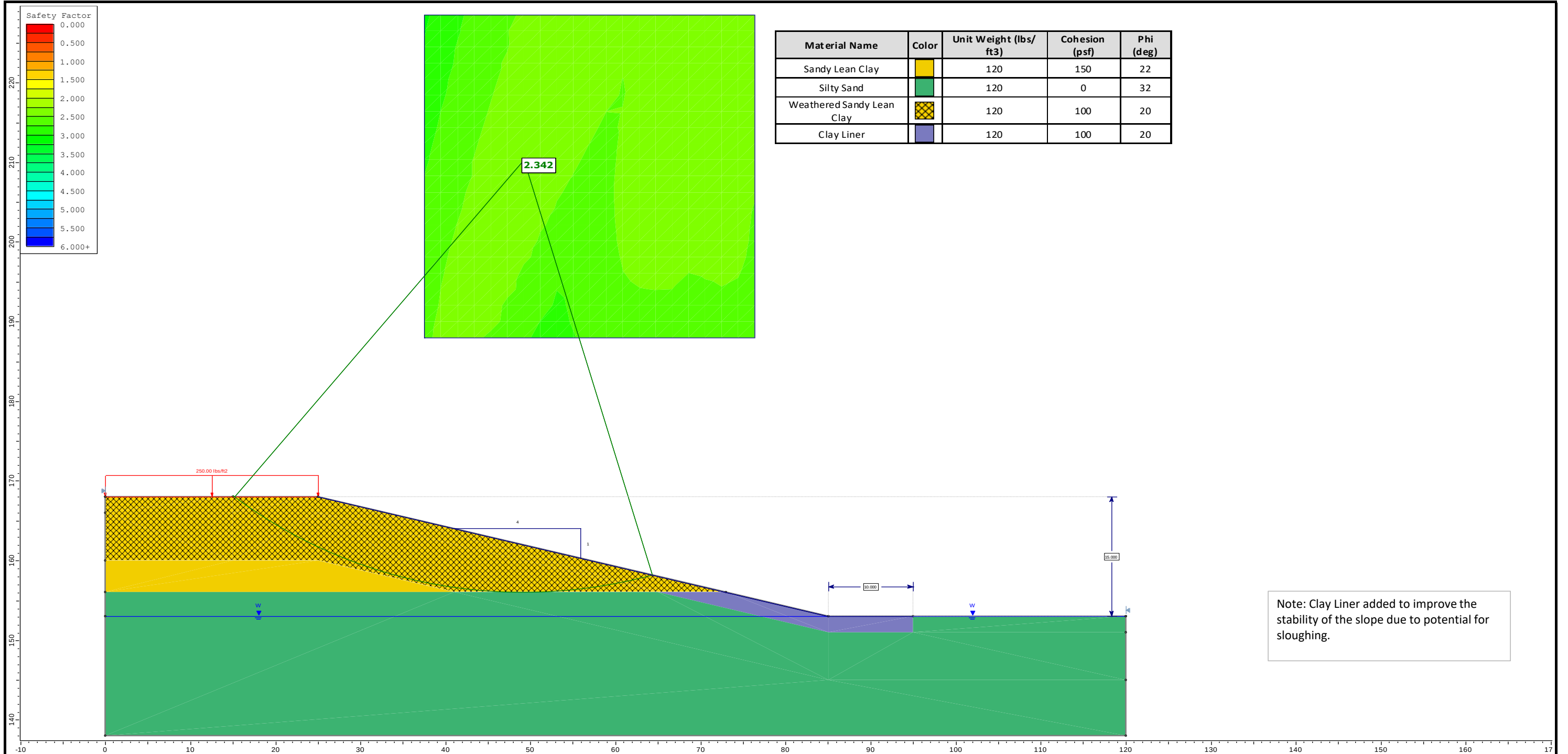
Reviewed by: RCR

Approved by: KMB

TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326 G & L

Terracon Project Number 92225364

Exhibit C-12



Terracon

Consulting Engineers & Scientists

Texas Registration 3272

11555 Clay Road, Suite 100

Houston, Texas 77043

Subsurface Soil Profile 2 (B-3 through B-5)

Long Term Analysis - Local Stability (Simplified Bishop's Method)

Drawn by: JNH

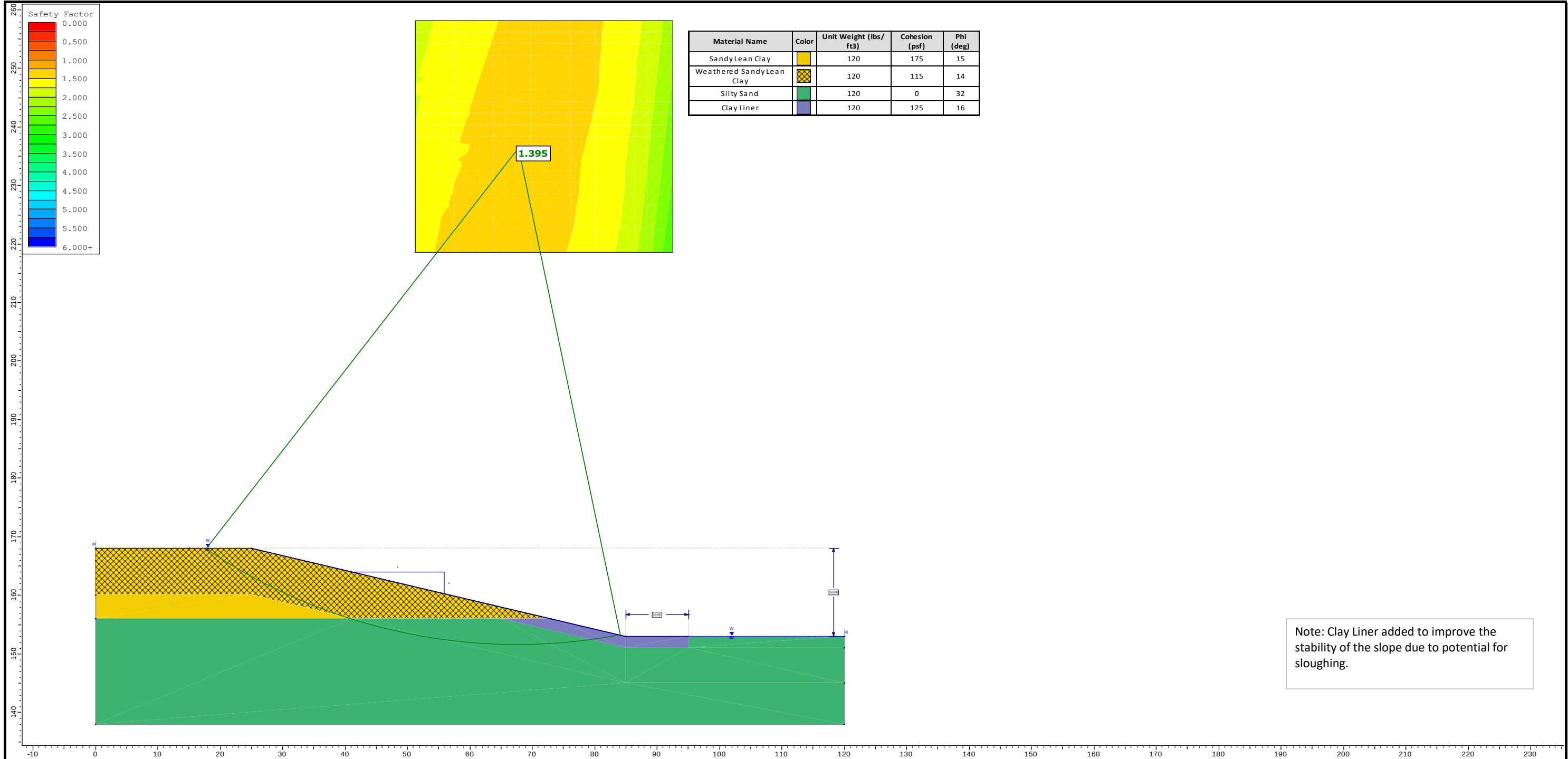
Reviewed by: RCR

Approved by: KMB

TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326 G & L

Terracon Project Number 92225364

Exhibit C-13



Consulting Engineers & Scientists

Texas Registration 3272

11555 Clay Road, Suite 100

Houston, Texas 77043

Subsurface Soil Profile 2 (B-3 through B-5)

Rapid Drawdown Analysis - Total Stress - Global Stability (Simplified Bishop's Method)

Drawn by: JNH

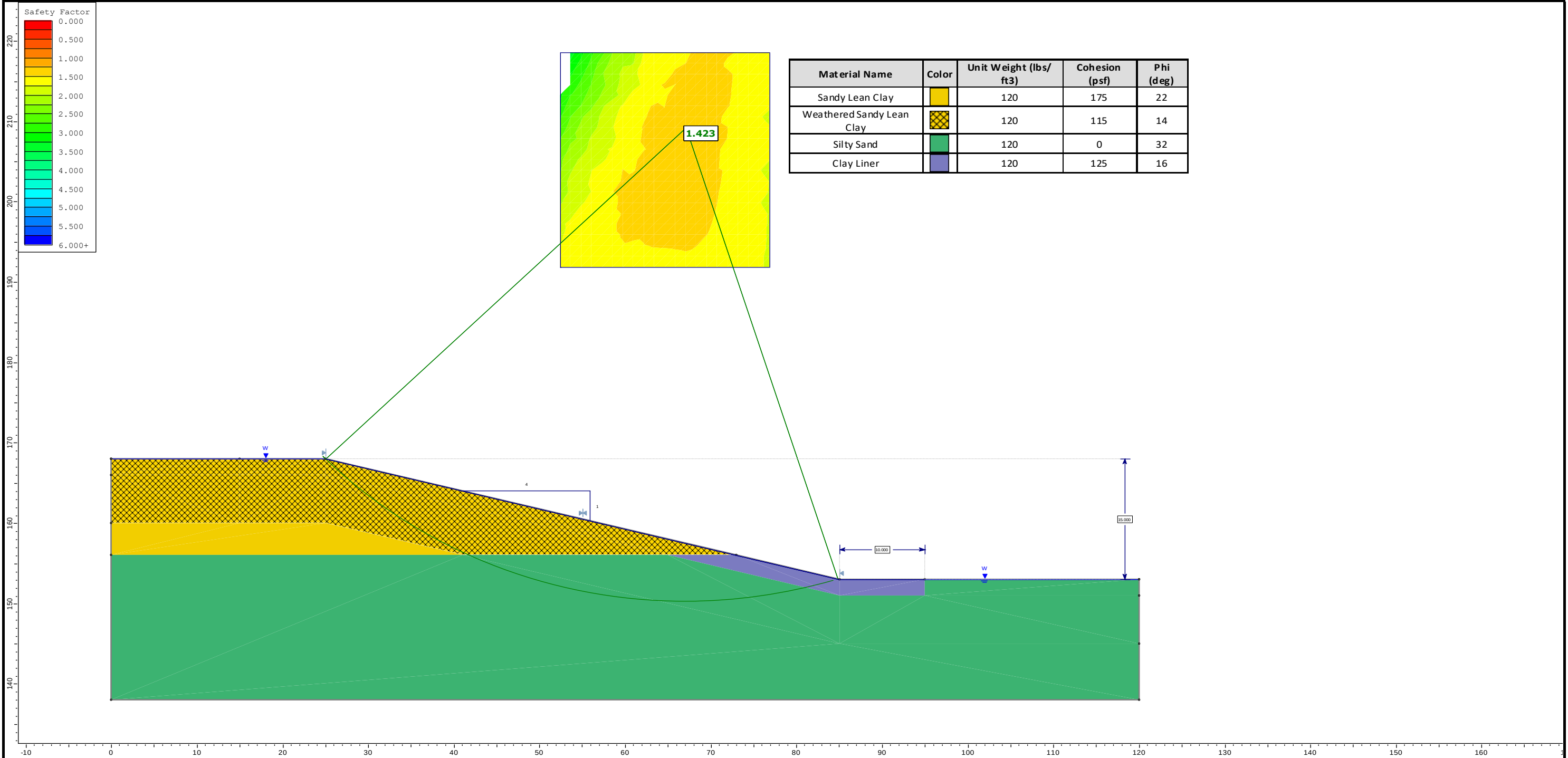
Reviewed by: RCR

Approved by: KMB

TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326 G & L

Terracon Project Number 92225364

Exhibit C-14



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Sandy Lean Clay		120	175	22
Weathered Sandy Lean Clay		120	115	14
Silty Sand		120	0	32
Clay Liner		120	125	16



Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 2 (B-3 through B-5)

Rapid Drawdown Analysis - Total Stress - Local Stability (Simplified Bishop's Method)

Drawn by: JNH

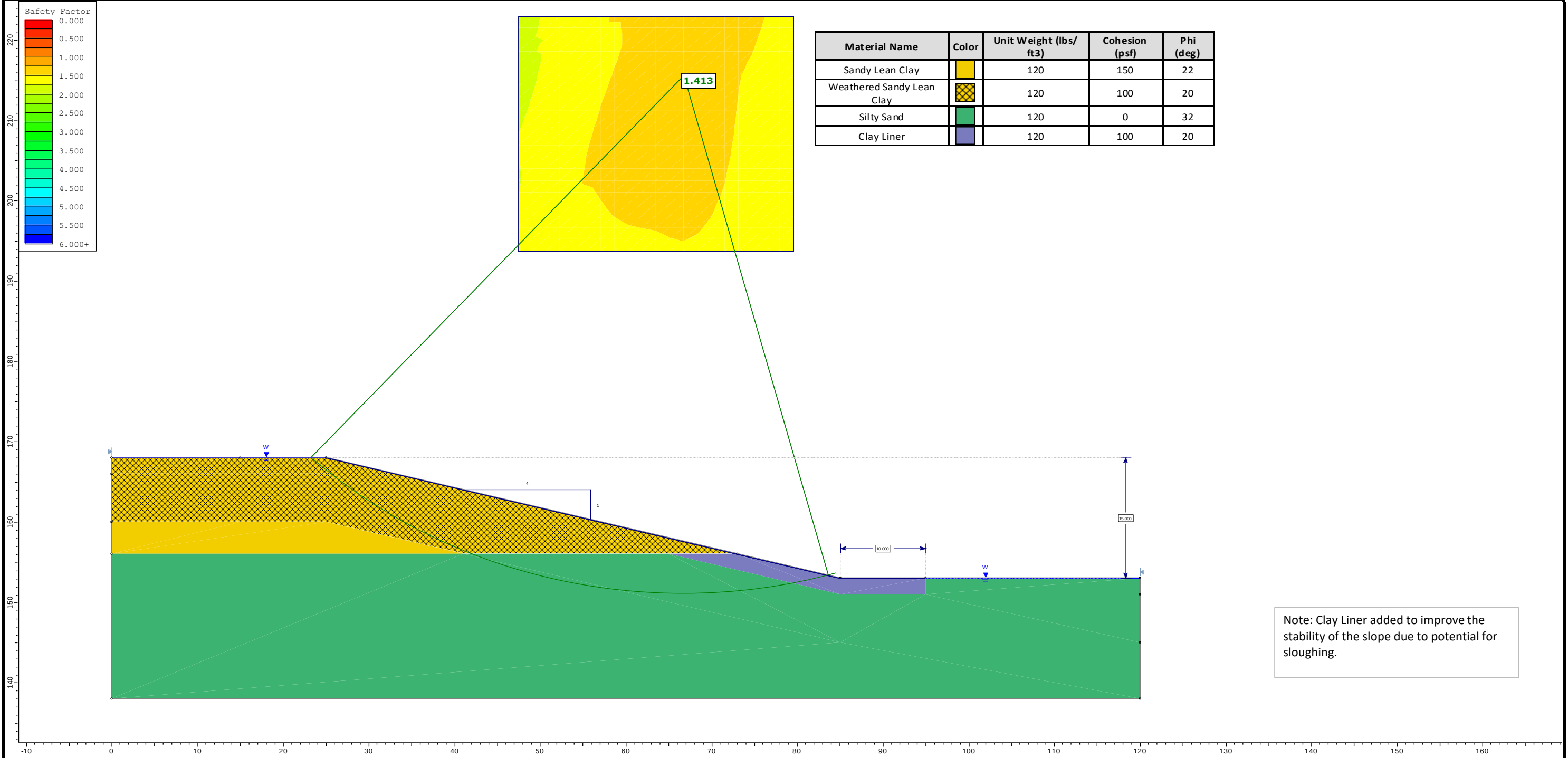
Reviewed by: RCR

Approved by: KMB

TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326 G & L

Terracon Project Number 92225364

Exhibit C-15



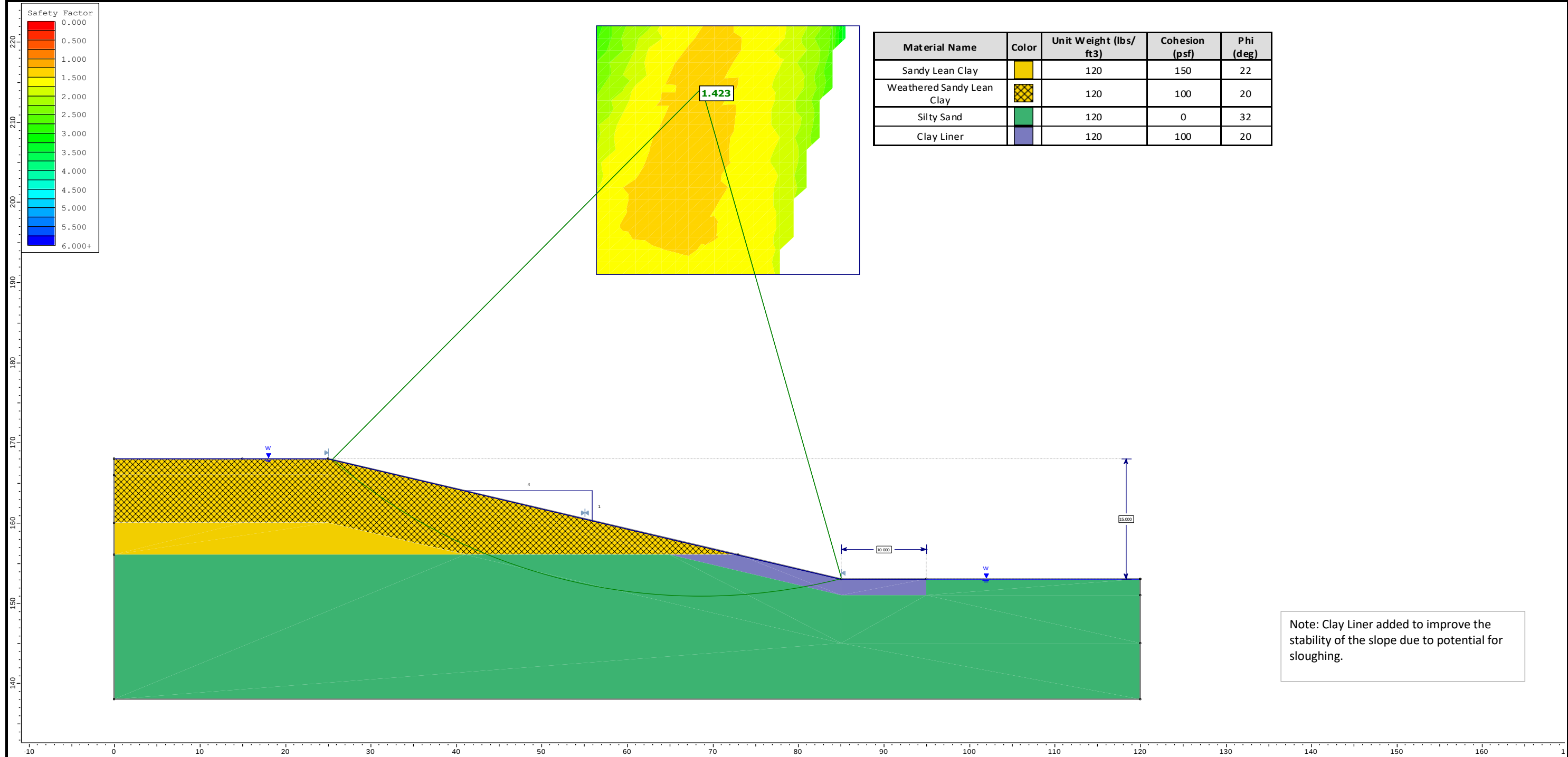
Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 2 (B-3 through B-5)

Rapid Drawdown Analysis - Effective Stress - Global Stability (Simplified Bishop's Method)

Drawn by: JNH	TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326 G & L	Exhibit C-16
Reviewed by: RCR		
Approved by: KMB		

Terracon Project Number 92225364



Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 2 (B-3 through B-5)

Rapid Drawdown Analysis - Effective Stress - Local Stability (Simplified Bishop's Method)

Drawn by: JNH

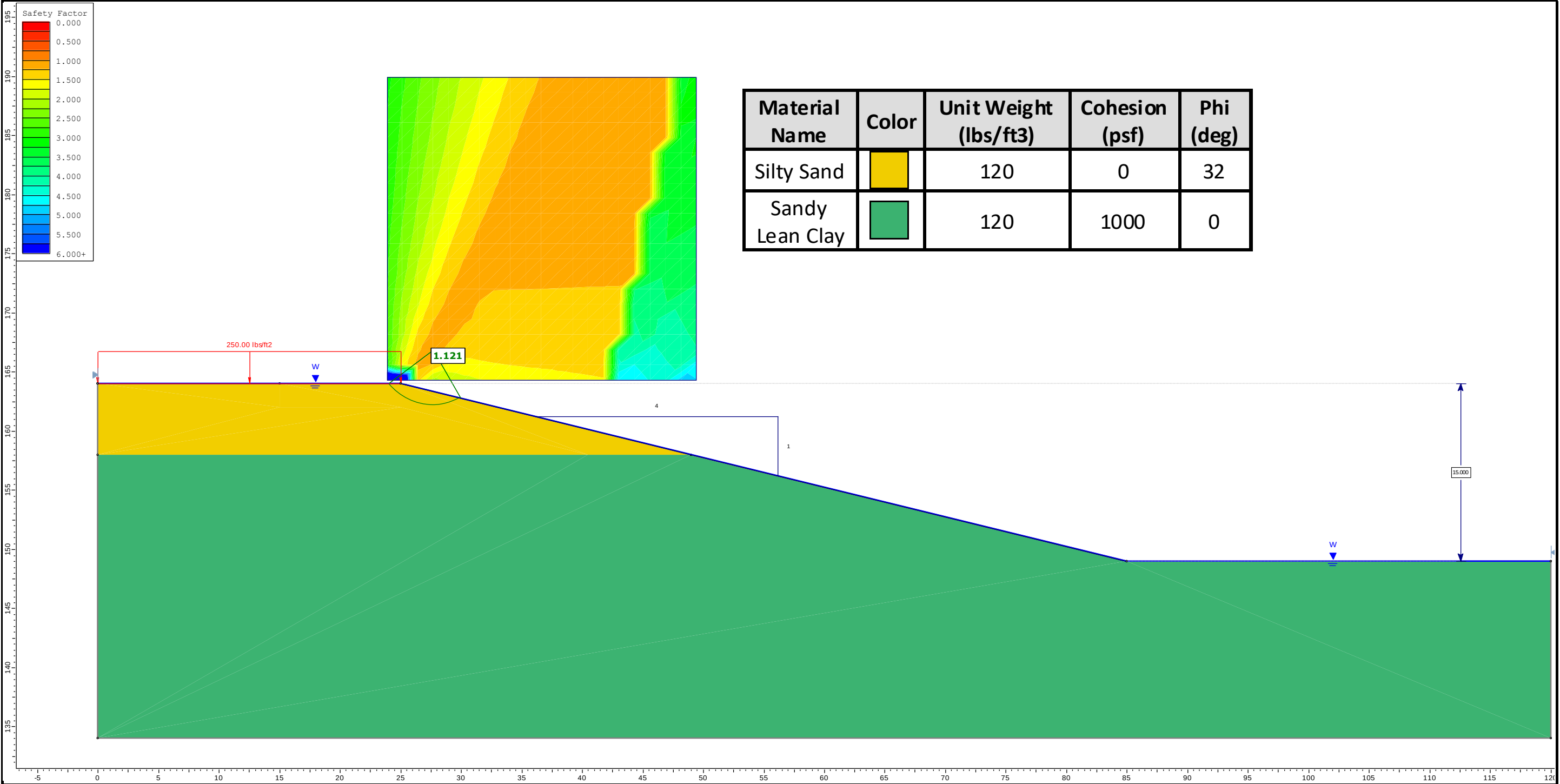
Reviewed by: RCR

Approved by: KMB

TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326 G & L

Terracon Project Number 92225364

Exhibit C-17



Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 3 (B-6)

Short Term Saturated Analysis - Local Stability (Simplified Bishop's Method)

Drawn by: JNH

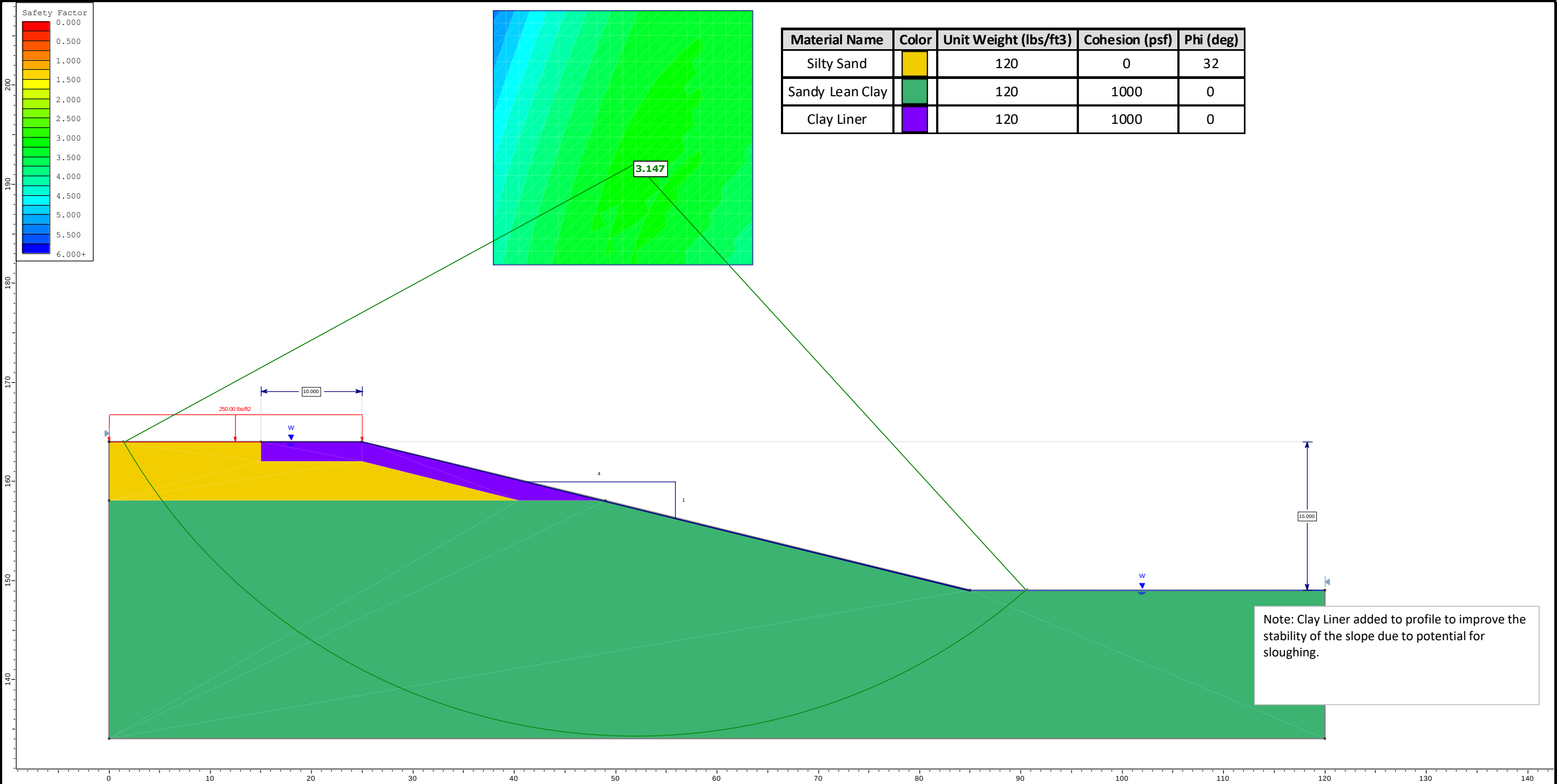
Reviewed by: RCR

Approved by: KMB

TISD HCFCDC Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-18



Terracon

Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 3 (B-6)

Short Term Saturated Analysis - Global Stability (Simplified Bishop's Method)

Drawn by: JNH

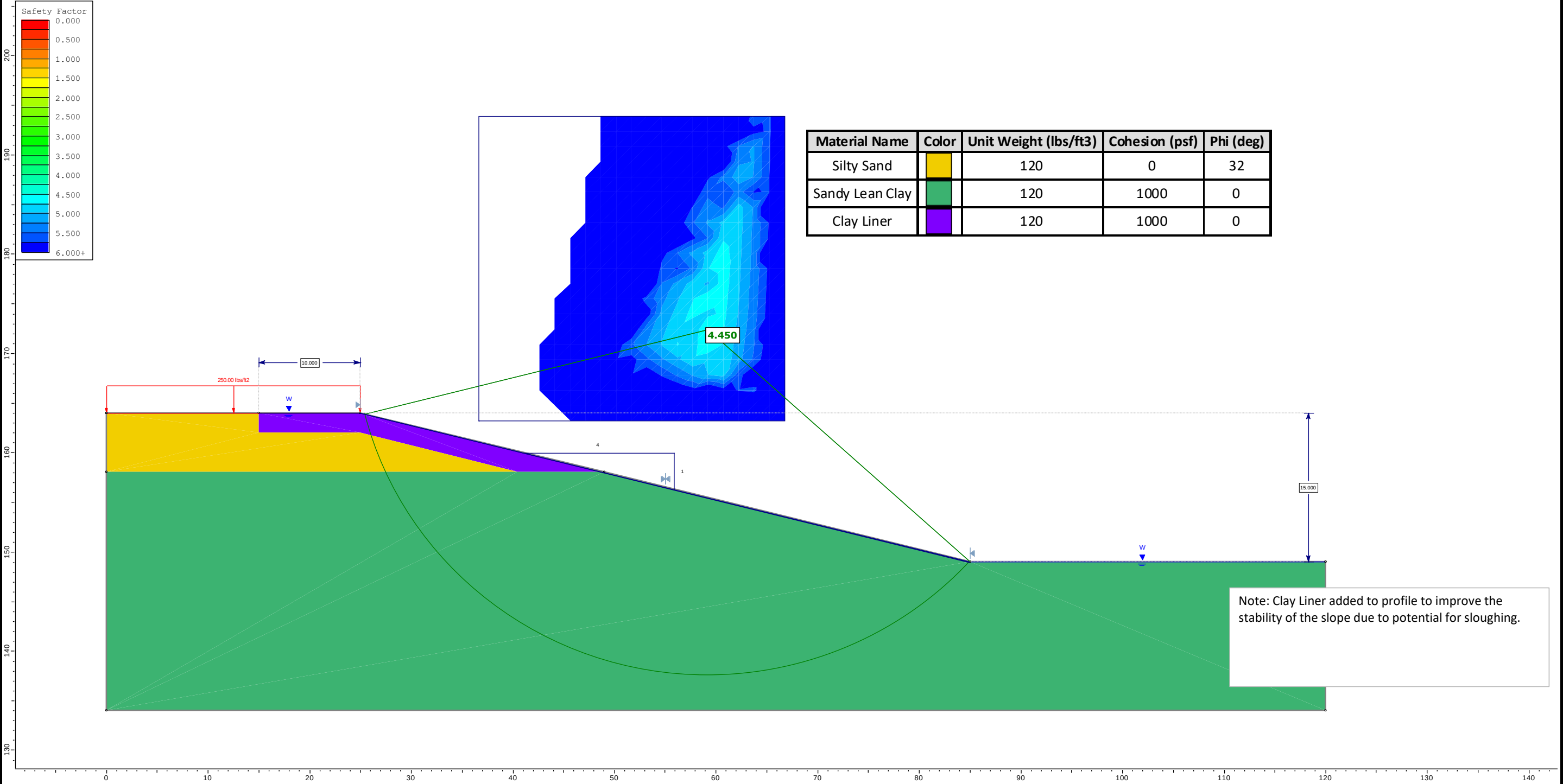
Reviewed by: RCR

Approved by: KMB

TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-19



Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 3 (B-6)

Short Term Saturated Analysis - Local Stability (Simplified Bishop's Method)

Drawn by: JNH

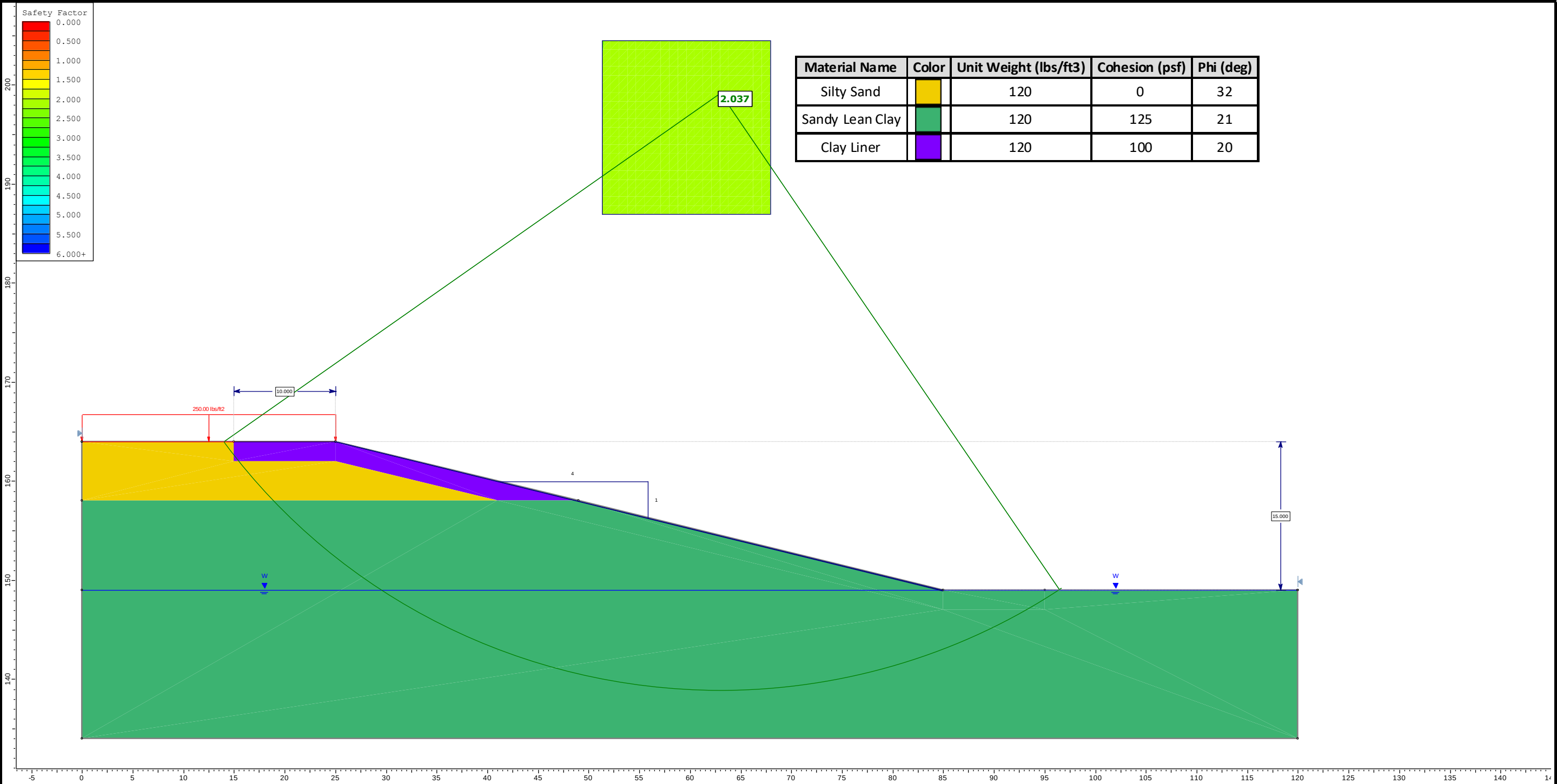
Reviewed by: RCR

Approved by: KMB

TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-20



Consulting Engineers & Scientists

Texas Registration 3272

11555 Clay Road, Suite 100

Houston, Texas 77043

Subsurface Soil Profile 3 (B-6)

Long Term Analysis - Global Stability (Simplified Bishop's Method)

Drawn by: JNH

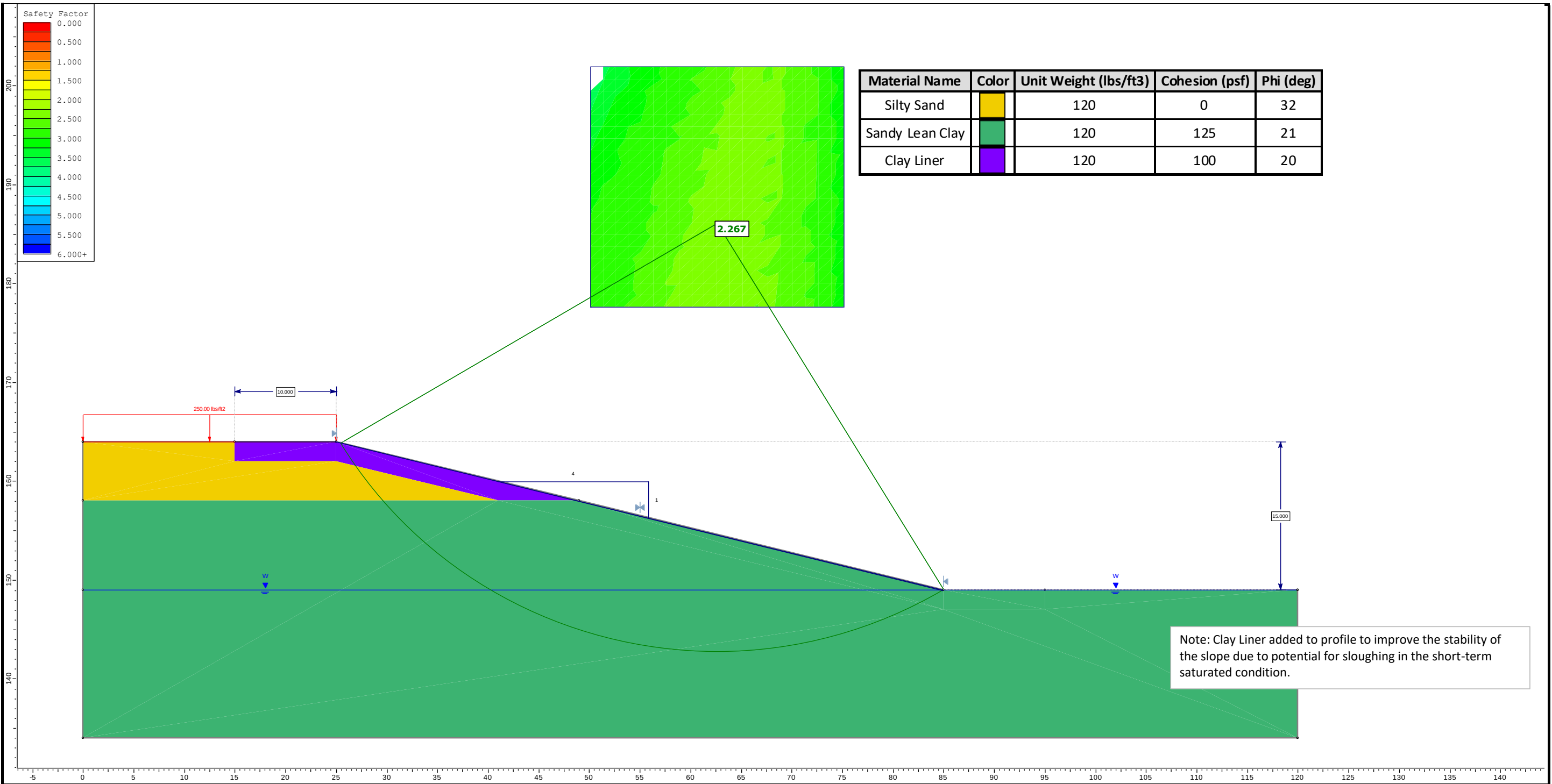
Reviewed by: RCR

Approved by: KMB

TISD HCFCD Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-21



Consulting Engineers & Scientists
Texas Registration 3272
11555 Clay Road, Suite 100
Houston, Texas 77043

Subsurface Soil Profile 3 (B-6)

Long Term Analysis - Local Stability (Simplified Bishop's Method)

Drawn by: JNH

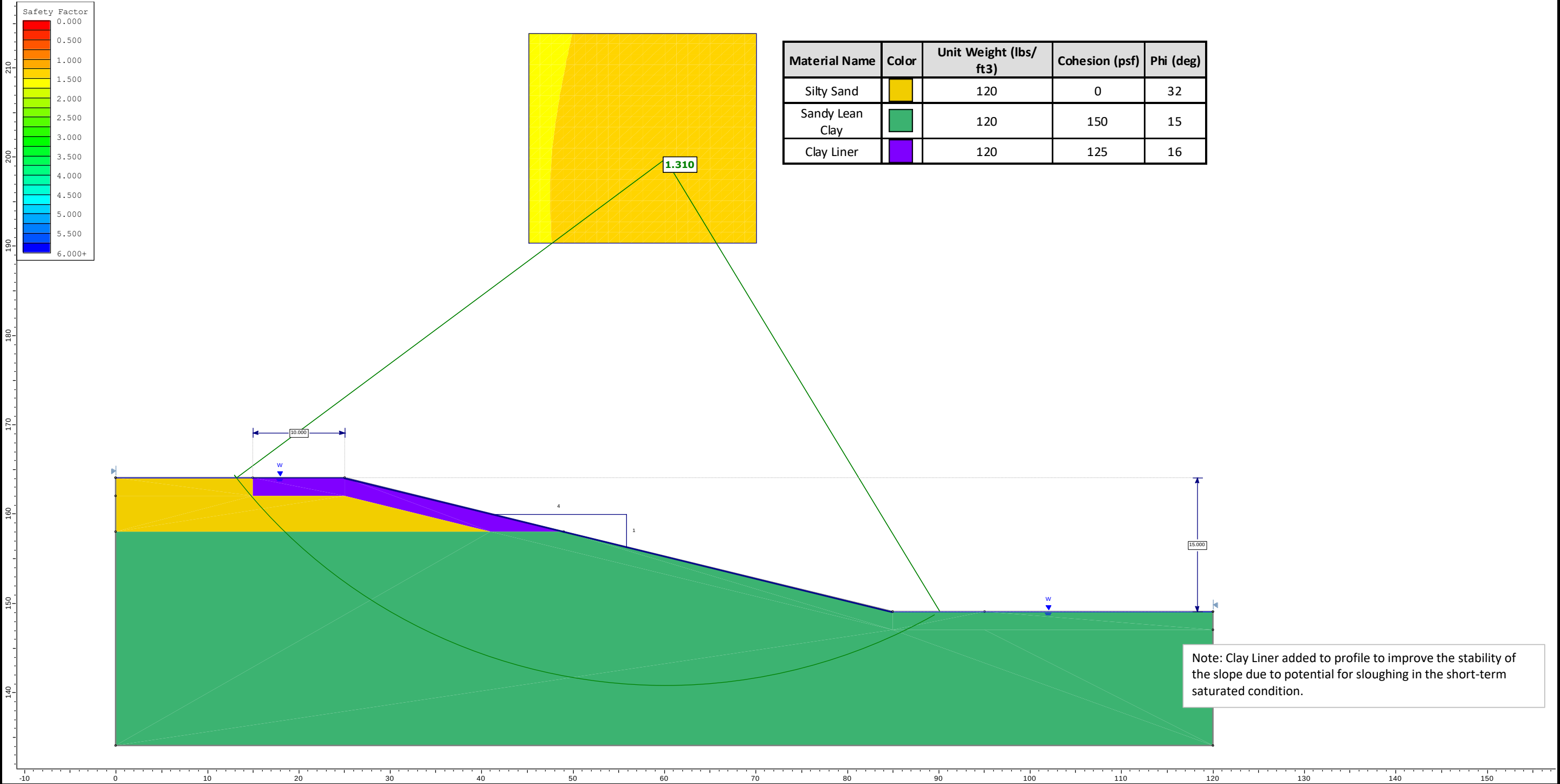
Reviewed by: RCR

Approved by: KMB

TISD HCFCDC Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-22



Consulting Engineers & Scientists

Texas Registration 3272

11555 Clay Road, Suite 100

Houston, Texas 77043

Subsurface Soil Profile 3 (B-6)

Rapid Drawdown Analysis - Total Stress - Global Stability (Simplified Bishop's Method)

Drawn by: JNH

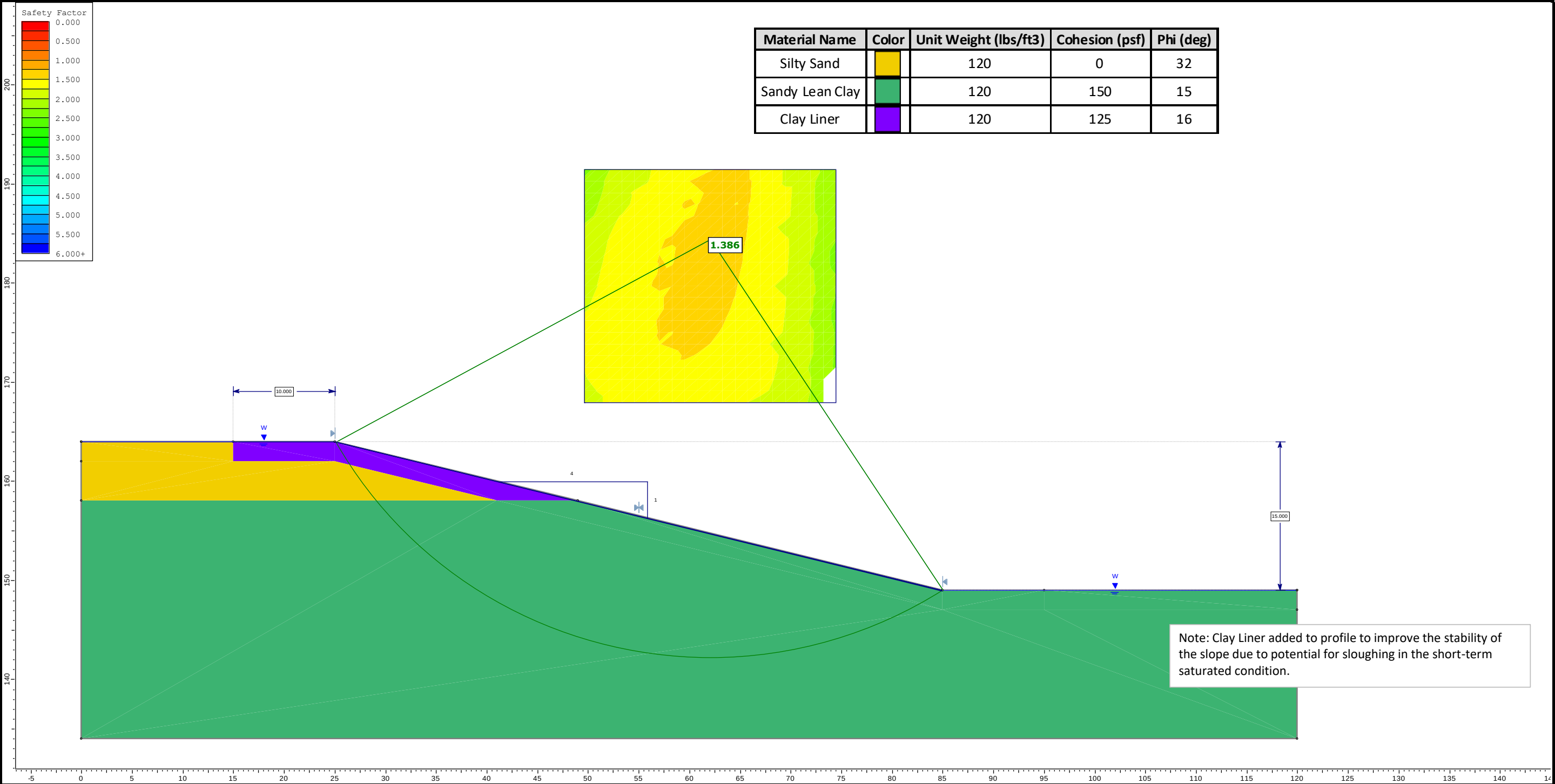
Reviewed by: RCR

Approved by: KMB

TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-23



Terracon

Consulting Engineers & Scientists

Texas Registration 3272

11555 Clay Road, Suite 100

Houston, Texas 77043

Subsurface Soil Profile 3 (B-6)

Rapid Drawdown Analysis - Total Stress - Local Stability (Simplified Bishop's Method)

Drawn by: JNH

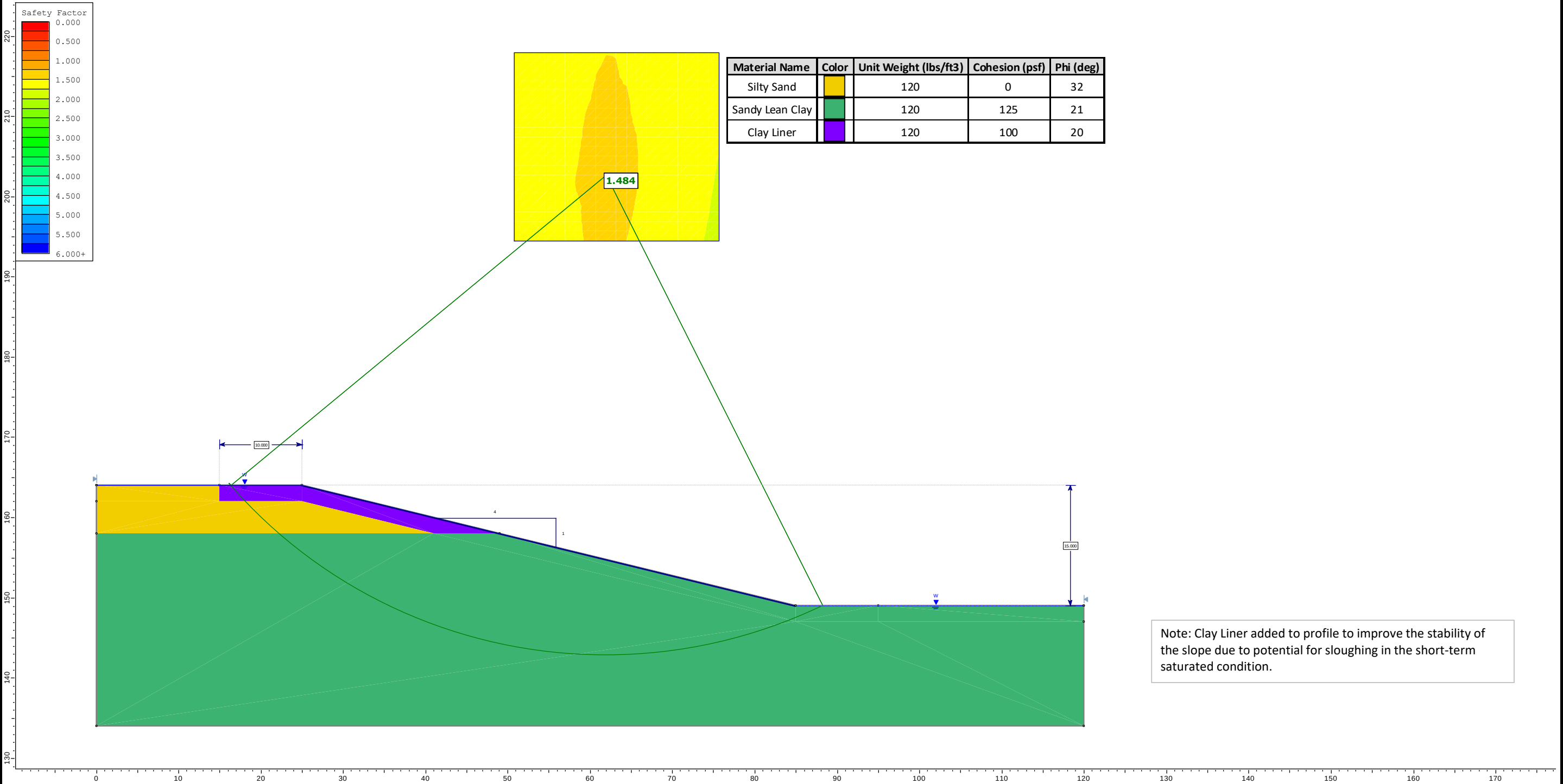
Reviewed by: RCR

Approved by: KMB

TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-24



Terracon

Consulting Engineers & Scientists

Texas Registration 3272

11555 Clay Road, Suite 100

Houston, Texas 77043

Subsurface Soil Profile 3 (B-6)

Rapid Drawdown Analysis - Effective Stress - Global Stability (Simplified Bishop's Method)

Drawn by: JNH

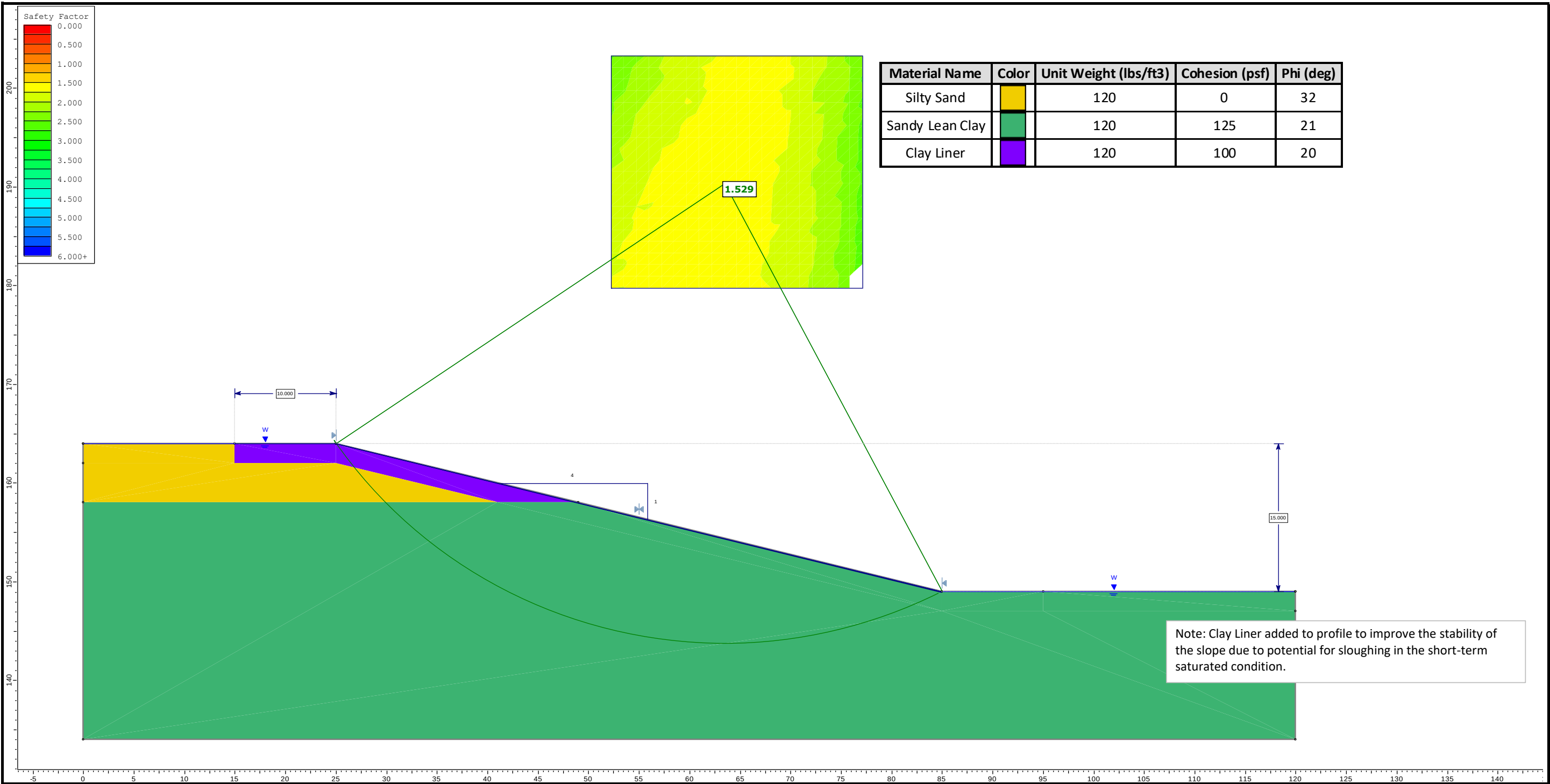
Reviewed by: RCR

Approved by: KMB

TISD HCFCDC Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-25



Terracon

Consulting Engineers & Scientists

Texas Registration 3272

11555 Clay Road, Suite 100

Houston, Texas 77043

Subsurface Soil Profile 3 (B-6)

Rapid Drawdown Analysis - Effective Stress - Local Stability (Simplified Bishop's Method)

Drawn by: JNH

Reviewed by: RCR

Approved by: KMB

TISD HCFCDC Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326G & L

Terracon Project Number 92225364

Exhibit C-26

TISD HCFC Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326G & L

PROJECT: _____ Page _____ of _____

JOB NO. 92225364 Date 11/2/23 Comp. By JH CHECKED BY: RR

c_u = unconsolidated cohesion
 ϕ_u = unconsolidated friction angle
 c = consolidated unconsolidated cohesion
 ϕ = consolidated unconsolidated friction angle
 c' = effective stress cohesion
 ϕ' = effective stress friction angle
 c_r = consolidated unconsolidated residual (weathered) cohesion
 ϕ_r = consolidated unconsolidated residual (weathered) friction angle
 c_r' = effective stress residual (weathered) cohesion
 ϕ_r' = effective stress residual (weathered) friction angle

[Soil Profile I (B-1 & B-2)]:

Sandy lean clay, 0' - 10' :

Total Unit Weight: 120 pcf, based on U_L , SPT, HP, & experience
 $c_u = 1,200$ pcf based on HP, U_L , and experience
 $c' = 110$ pcf based on U_L . Use $c' = 150$ pcf; based on WAVFAC, HP, U_L , & experience
 $\phi' = 21.6^\circ$ based on U_L . Use $\phi' = 24^\circ$ based on experience
 $c = 1.15c' = 172.5$, use 175 pcf
 $\phi = 0.7\phi' = 16.8^\circ$, use 17°
 $LL = 40$, $LL \geq 40$, Supporting calculations for weathered parameters attached.

Fat Clay, 10' - 30' :

Total Unit Weight: 120 pcf; based on experience
 $c_u = 1,300$ pcf; based on HP, U_L & experience
 $c' = 168.5$ based on CU Test. Use $c' = 150$ pcf based on U_L , SPT, HP, & experience
 $\phi' = 21.9^\circ$ based on CU Test. Use $\phi' = 20^\circ$ based on U_L , SPT, HP, & experience
 $c = 1.15c' = 172.5$. Use 175 pcf
 $\phi = 0.7\phi' = 13^\circ$
 $LL = 66$; $LL \geq 40$, Supporting calculations for weathered parameters attached.

TISD HCFC Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326G & L

PROJECT: _____ Page _____ of _____

JOB NO. 92225364 Date 11/2/23 Comp. By JH CHECKED BY: RR

[Soil Profile II (B-3 through B-5)]:

Sandy Lean Clay, 0'-12':

Total Unit Weight: 120 pcf, based on experience

$C_u = 1,500$ pcf, based on HP, UC, & experience

$C = 168.5$ pcf

$\phi' = 21.9^\circ$ from CU Test. Use $C' = 150$ pcf $\phi' = 22^\circ$ based on UC, SPT, HP, and experience

$C = 1.15C' = 1.15 \cdot 150 \text{ pcf} = 175 \text{ pcf}$

$\phi' = \phi \cdot 0.7 = 22^\circ \cdot 0.7 = 15^\circ$

LL=45, LL $\geq$ 40, supporting calculations attached.

Silty Sand, 12' to 30':

$\phi_u = 32^\circ$ based on NAVFAC, SPT blow count, & experience

$\phi_u = \phi' = \phi = 32^\circ$

[Soil Profile III (B-6)]:

Silty Sand, 0 to 6':

Total Unit Weight: 120 pcf

Based on NAVFAC, SPT, $\phi_u = \phi' = \phi = 32^\circ$

Sandy Lean Clay, 6 to 30':

Total Unit Weight = 120 pcf

$C_u = 1,000$ pcf based on HP, UC, & experience

$C' = 87.8$ pcf from CU test. Use $C' = 125$ pcf based on experience

$\phi' = 21.8^\circ$

$\phi' = 21^\circ$

$C = 1.15C' = 150 \text{ pcf}$

$\phi = 0.7\phi' = 15^\circ$

Design LL $\leq$ 40; weathered parameters not considered.

TISD HCFCU Unit No.: L109-00-00 Precinct No. 4, Key Map No. 326G & L

PROJECT: _____ Page _____ of _____

JOB NO. 92225364 Date 11/2/23 Comp. By JH CHECKED BY: RR

[Clay Liner]:

Based on Section 02314 fill Material of the 2020 HCFCU Standard Specifications

Total Unit Weight: 120 pcf

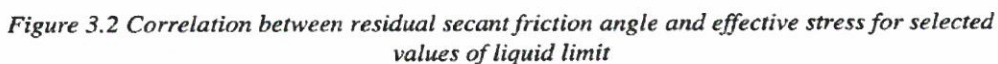
$U_c = 1,000$ pcf

$C = 125$ pcf

$\phi = 16^\circ$

$C' = 100$

$\phi' = 20^\circ$



0-10'

Project No.:

Project name:

Boring No.: B-1 and B-2

Sample No.:

Depth, ft 0 to 10

Lab Data		unit		
c'	150	psf	from UC, PP, previous experience	input
ϕ'	21.6	°	from cu test	from charts
LL	40	n/a	from boring log (encounter layer)	output
PI	27	n/a		
Weathered				
d	8	ft	(assumption)	
γ_w	62.4	lbf/ft ³		
γ	120	lbf/ft ³		
σ_0'	460.8	psf	22.06 kPa	
$\phi'w$	20.5	°	(LL, σ_0') from Figure 3.2 (Saleh et al, 1977)	
η	0.85	n/a	(PI) from Figure 13 (Mesri and Abdel-Ghaffar, 1993)	
Speak	332.44	psf	$c' + \sigma_0' \tan(\phi')$	
Smob	282.58	psf	$\eta * \text{Speak} = c'w + \sigma_0' \tan(\phi'w)$	
c'w	110.29	psf	$\text{Smob} - \sigma_0' \tan(\phi'w)$	
c'w	110	psf	Use $c'_w = 110 \text{ psf}$	
$\phi'w$	20.5	°	$\phi'_w = 21^\circ$	
$C_w = 1.15 (110 \text{ psf}) = 126.5 \text{ psf}$, Use 125 psf $\phi_w = 0.7 (21^\circ) = 14.7^\circ$, Use 15°				

Computed by: _____ Date: _____

Checked by: _____ Date: _____

note

1 psf 0.04788 kPa

B-1 and B-2
10-30'

Project No.:
Project name:

Boring No.: B-1 and B-2
Sample No.:
Depth, ft 10-30

Lab Data		unit	
c'	168.5	psf	from UC, PP, previous experience
ϕ'	21.9	°	from cu test
LL	66	n/a	from boring log (encounter layer)
PI	48	n/a	
Weathered			
d	8	ft	(assumption)
γ_w	62.4	lbf/ft ³	
γ	120	lbf/ft ³	
σ_0'	460.8	psf	22.06 kPa
ϕ'_w	17.5	°	(LL, σ_0') from Figure 3.2 (Saleh et al, 1977)
η	0.65	n/a	(PI) from Figure 13 (Mesri and Abdel-Ghaffar, 1993)
Speak	353.74	psf	$c' + \sigma_0' \tan(\phi')$
Smob	229.93	psf	$\eta * Speak = c'_w + \sigma_0' \tan(\phi'_w)$
c'w	84.64	psf	$Smob - \sigma_0' \tan(\phi'_w)$
c'w	85	psf	Use $c'_w = 85 \text{ psf}$
ϕ'_w	17.5	°	$\phi'_w = 13^\circ$
$C_w = 1.15 c'_w = 97.75 \text{ psf}$, Use 100 psf $\phi_w = \phi'_w \cdot 0.7 = 13^\circ$			

Computed by: _____ Date: _____

Checked by: _____ Date: _____

note

1 psf 0.04788 kPa

Project No.:

Project name:

Boring No.: B-3 through B-5

Sample No.:

Depth, ft 0-30

Lab Data		unit	
c'	150	psf	from UC, PP, previous experience
ϕ'	21.6	°	from cu test
LL	45	n/a	from boring log (encounter layer)
PI	31	n/a	
Weathered			
d	8	ft	(assumption)
γ_w	62.4	lbf/ft ³	
γ	120	lbf/ft ³	
σ_0'	460.8	psf	22.06 kPa
ϕ'_w	20	°	(LL, σ_0') from Figure 3.2 (Saleh et al, 1977)
η	0.8	n/a	(PI) from Figure 13 (Mesri and Abdel-Ghaffar, 1993)
Speak	332.44	psf	$c' + \sigma_0' \tan(\phi')$
Smob	265.95	psf	$\eta * Speak = c'_w + \sigma_0' \tan(\phi'_w)$
c'_w	98.24	psf	$Smob - \sigma_0' \tan(\phi'_w)$
c'_w	98	psf	
ϕ'_w	20	°	

$$Use \quad c'_w = 100$$

$$\phi'_w = 20$$

$$c_w = 1.15 c'_w = 115 \text{ psf}$$

$$\phi_w = 0.7 \phi'_w = 14^\circ$$

Computed by: _____ Date: _____

Checked by: _____ Date: _____

note

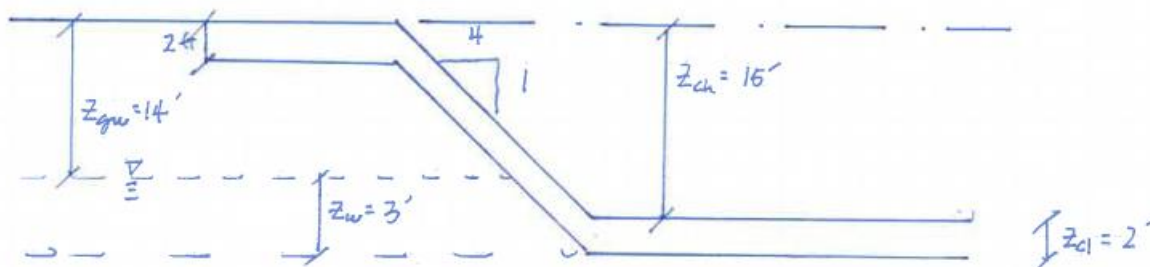
1 psf 0.04788 kPa

TISD HCFCF Unit No.: L 109-00-00 Precinct No. 4 Key Map No.: 326G and L

PROJECT: _____ Page _____ of _____

JOB NO. 92225364 Date 1/15/24 Comp. By JH CHECKED BY: RR

* Drawing Not to Scale



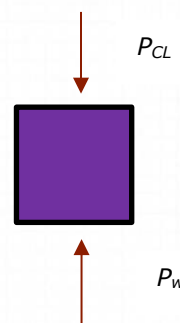
Assumptions:

1. Use the highest observed long-term reading (15-minute or 24 hour); use a groundwater level of 14 feet for worst case (B-3).
2. Depth of bottom of clay liner at the bottom of channel is assumed to be 17 feet below existing grade.

Definitions:

- γ_{CL} = Total Unit Weight of the Clay Liner (pcf)
 γ_w = Unit Weight of Water (pcf)
 z_w = Hydraulic Head (ft.)
 z_{ch} = Depth of proposed channel (ft.)
 z_{cl} = Clay Liner, proposed thickness (ft.)
 P_{CL} = Weight of Clay Liner (lbs)
 P_w = Hydrostatic Uplift (lbs)

Free Body Diagram:



Analysis:

- γ_{CL} = 120 pcf, based on report, and requirements of Section 02314 Fill Material of the 2020 HCFCF Standard Specifications.
 γ_w = 62.4 pcf
 z_{gw} = 14 feet; based on shallowest 15-minute/24 hour reading from boring logs (B-3)
 z_w = 3 feet, based on z_{gw} and the depth of bottom of liner

$$F_s \text{ for Blowout} = \frac{\Sigma \text{Resisting Forces}}{\Sigma \text{Applied Forces}} = \frac{\gamma_{CL} z_{CL}}{\gamma_w z_w} = \frac{P_{CL}}{P_w} = \frac{120 \frac{\text{lbs}}{\text{ft}} * 2 \text{ ft}}{62.4 \frac{\text{lbs}}{\text{ft}} * 3 \text{ ft}} = \frac{240 \text{ lbs}}{187.2 \text{ lbs}} = 1.282$$



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 1, Short-Term Saturated, Global Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:44:53 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.417s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:44:53 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft ³]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	20
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Loading

1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	250
Orientation:	Normal to boundary

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	1300
Friction Angle [deg]	0
Water Surface	Water Table
Hu Value	1

Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	1300
Friction Angle [deg]	0
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	4.309240
Center:	52.870, 201.370
Radius:	60.341
Left Slip Surface Endpoint:	0.729, 171.000
Right Slip Surface Endpoint:	92.653, 156.000
Resisting Moment:	8.34563e+06 lb-ft
Driving Moment:	1.93668e+06 lb-ft
Total Slice Area:	1547.03 ft2
Surface Horizontal Width:	91.9235 ft
Surface Average Height:	16.8296 ft

Method: janbu simplified

FS	3.972490
Center:	52.870, 201.370
Radius:	60.341
Left Slip Surface Endpoint:	0.729, 171.000
Right Slip Surface Endpoint:	92.653, 156.000
Resisting Horizontal Force:	119500 lb
Driving Horizontal Force:	30082 lb
Total Slice Area:	1547.03 ft2
Surface Horizontal Width:	91.9235 ft
Surface Average Height:	16.8296 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	14589
Number of Invalid Surfaces:	3492

Error Codes

Error Code -103 reported for 3492 surfaces

Method: janbu simplified

Number of Valid Surfaces:	14537
Number of Invalid Surfaces:	3544

Error Codes

Error Code -103 reported for 3492 surfaces

Error Code -108 reported for 36 surfaces

Error Code -111 reported for 16 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = Safety factor equation did not converge

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 4.30924

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.8234	321	-58.1408	Sandy Lean Clay	1300	0	301.677	1300	-59.3912	91.5415	-150.933	426.044	334.502
2	1.8234	926.806	-54.9914	Sandy Lean Clay	1300	0	301.677	1300	327.582	264.306	63.2758	758.284	493.978
3	1.8234	1467.62	-52.0737	Sandy Lean Clay	1300	0	301.677	1300	667.728	418.537	249.191	1054.88	636.346
4	1.8234	1955.86	-49.3365	Sandy Lean Clay	1300	0	301.677	1300	971.459	557.772	413.687	1322.64	764.87
5	1.83978	2423.5	-46.7333	Fat Clay	1300	0	301.677	1300	1246.77	684.982	561.789	1567.28	882.295
6	1.83978	2837.03	-44.2395	Fat Clay	1300	0	301.677	1300	1498.27	801.863	696.41	1792.05	990.183
7	1.83978	3216.68	-41.8476	Fat Clay	1300	0	301.677	1300	1728.22	909.168	819.056	1998.41	1089.24
8	1.83978	3566.23	-39.5422	Fat Clay	1300	0	301.677	1300	1939.34	1007.97	931.371	2188.4	1180.43
9	1.83978	3888.66	-37.3112	Fat Clay	1300	0	301.677	1300	2133.75	1099.1	1034.65	2363.66	1264.56
10	1.83978	4186.41	-35.1447	Fat Clay	1300	0	301.677	1300	2313.12	1183.26	1129.86	2525.49	1342.23
11	1.83978	4461.44	-33.0345	Fat Clay	1300	0	301.677	1300	2478.82	1260.99	1217.83	2674.99	1414
12	1.83978	4715.4	-30.9737	Fat Clay	1300	0	301.677	1300	2631.95	1332.77	1299.18	2813.03	1480.26
13	1.83978	4949.67	-28.9566	Fat Clay	1300	0	301.677	1300	2773.44	1398.99	1374.45	2940.36	1541.37
14	1.83978	5135.16	-26.9782	Fat Clay	1300	0	301.677	1300	2694.59	1452.16	1242.43	2848.16	1396
15	1.83978	5234.48	-25.0339	Fat Clay	1300	0	301.677	1300	2704.28	1479.48	1224.8	2845.17	1365.69
16	1.83978	5314.49	-23.1201	Fat Clay	1300	0	301.677	1300	2759.85	1502.1	1257.75	2888.65	1386.55
17	1.83978	5378.56	-21.2332	Fat Clay	1300	0	301.677	1300	2806.27	1520.21	1286.06	2923.48	1403.27
18	1.83978	5427.33	-19.3701	Fat Clay	1300	0	301.677	1300	2843.93	1533.99	1309.94	2949.99	1416
19	1.83978	5461.32	-17.5282	Fat Clay	1300	0	301.677	1300	2873.18	1543.6	1329.58	2968.46	1424.86
20	1.83978	5481.03	-15.7048	Fat Clay	1300	0	301.677	1300	2894.35	1549.17	1345.18	2979.18	1430.01
21	1.83978	5486.84	-13.8976	Fat Clay	1300	0	301.677	1300	2907.69	1550.81	1356.88	2982.33	1431.52
22	1.83978	5479.1	-12.1044	Fat Clay	1300	0	301.677	1300	2913.43	1548.62	1364.81	2978.13	1429.51
23	1.83978	5458.1	-10.3231	Fat Clay	1300	0	301.677	1300	2911.77	1542.69	1369.08	2966.72	1424.03
24	1.83978	5424.09	-8.55194	Fat Clay	1300	0	301.677	1300	2902.86	1533.08	1369.78	2948.23	1415.15
25	1.83978	5377.26	-6.78896	Fat Clay	1300	0	301.677	1300	2886.86	1519.84	1367.02	2922.77	1402.93
26	1.83978	5317.78	-5.03241	Fat Clay	1300	0	301.677	1300	2863.88	1503.03	1360.85	2890.44	1387.41
27	1.83978	5245.76	-3.2806	Fat Clay	1300	0	301.677	1300	2834	1482.67	1351.33	2851.3	1368.63
28	1.83978	5161.29	-1.53186	Fat Clay	1300	0	301.677	1300	2797.31	1458.8	1338.51	2805.38	1346.58
29	1.83978	5064.41	0.21545	Fat Clay	1300	0	301.677	1300	2753.86	1431.42	1322.44	2752.73	1321.31
30	1.83978	4955.14	1.96296	Fat Clay	1300	0	301.677	1300	2703.68	1400.53	1303.15	2693.34	1292.81
31	1.83978	4833.46	3.71231	Fat Clay	1300	0	301.677	1300	2646.77	1366.14	1280.63	2627.2	1261.06
32	1.83978	4699.31	5.46513	Fat Clay	1300	0	301.677	1300	2583.14	1328.22	1254.92	2554.28	1226.06
33	1.83978	4552.6	7.2231	Fat Clay	1300	0	301.677	1300	2512.77	1286.76	1226.01	2474.53	1187.77
34	1.83978	4393.19	8.98794	Fat Clay	1300	0	301.677	1300	2435.61	1241.7	1193.91	2387.89	1146.19
35	1.83978	4220.93	10.7614	Fat Clay	1300	0	301.677	1300	2351.6	1193.01	1158.59	2294.26	1101.25
36	1.83978	4035.59	12.5454	Fat Clay	1300	0	301.677	1300	2260.65	1140.63	1120.02	2193.52	1052.89
37	1.83978	3836.93	14.3419	Fat Clay	1300	0	301.677	1300	2162.67	1084.48	1078.19	2085.54	1001.06
38	1.83978	3624.64	16.1529	Fat Clay	1300	0	301.677	1300	2057.53	1024.48	1033.05	1970.15	945.673
39	1.83978	3398.37	17.9807	Fat Clay	1300	0	301.677	1300	1945.07	960.522	984.546	1847.16	886.637
40	1.83978	3157.69	19.8276	Fat Clay	1300	0	301.677	1300	1825.11	892.495	932.619	1716.34	823.845
41	1.83978	2902.11	21.6962	Fat Clay	1300	0	301.677	1300	1697.46	820.259	877.196	1577.43	757.168
42	1.83978	2631.08	23.5895	Fat Clay	1300	0	301.677	1300	1561.84	743.655	818.19	1430.11	686.456
43	1.83978	2343.95	25.5105	Fat Clay	1300	0	301.677	1300	1418	662.497	755.501	1274.04	611.541
44	1.83978	2039.94	27.4628	Fat Clay	1300	0	301.677	1300	1265.59	576.571	689.016	1108.79	532.222
45	1.83978	1718.17	29.4504	Fat Clay	1300	0	301.677	1300	1104.24	485.626	618.611	933.901	448.275
46	1.83978	1378.91	31.4777	Fat Clay	1300	0	301.677	1300	934.203	389.371	544.832	749.496	360.125
47	1.83978	1084.02	33.5501	Fat Clay	1300	0	301.677	1300	789.264	306.388	482.876	589.209	282.821
48	1.83978	803.551	35.6735	Fat Clay	1300	0	301.677	1300	653.33	227.116	426.214	436.764	209.648
49	1.83978	499.917	37.8551	Fat Clay	1300	0	301.677	1300	506.198	141.296	364.902	271.728	130.432
50	1.83978	171.036	40.1035	Fat Clay	1300	0	301.677	1300	347.033	48.3406	298.692	92.9658	44.6252

Global Minimum Query (janbu simplified) - Safety Factor: 3.97249

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.8234	321	-58.1408	Sandy Lean Clay	1300	0	327.251	1300	-101.124	91.5415	-192.666	425.461	333.92
2	1.8234	926.806	-54.9914	Sandy Lean Clay	1300	0	327.251	1300	290.554	264.306	26.2481	757.767	493.461
3	1.8234	1467.62	-52.0737	Sandy Lean Clay	1300	0	327.251	1300	634.444	418.537	215.907	1054.42	635.881
4	1.8234	1955.86	-49.3365	Sandy Lean Clay	1300	0	327.251	1300	941.265	557.772	383.493	1322.22	764.447
5	1.83978	2423.5	-46.7333	Fat Clay	1300	0	327.251	1300	1219.22	684.982	534.236	1566.89	881.911
6	1.83978	2837.03	-44.2395	Fat Clay	1300	0	327.251	1300	1473.02	801.863	671.152	1791.69	989.829
7	1.83978	3216.68	-41.8476	Fat Clay	1300	0	327.251	1300	1704.99	909.168	795.827	1998.08	1088.91
8	1.83978	3566.23	-39.5422	Fat Clay	1300	0	327.251	1300	1917.93	1007.97	909.96	2188.1	1180.13
9	1.83978	3888.66	-37.3112	Fat Clay	1300	0	327.251	1300	2113.98	1099.1	1014.88	2363.38	1264.28
10	1.83978	4186.41	-35.1447	Fat Clay	1300	0	327.251	1300	2294.86	1183.26	1111.6	2525.24	1341.98
11	1.83978	4461.44	-33.0345	Fat Clay	1300	0	327.251	1300	2461.95	1260.99	1200.96	2674.75	1413.76
12	1.83978	4715.4	-30.9737	Fat Clay	1300	0	327.251	1300	2616.38	1332.77	1283.61	2812.8	1480.03
13	1.83978	4949.67	-28.9566	Fat Clay	1300	0	327.251	1300	2759.09	1398.99	1360.1	2940.16	1541.17
14	1.83978	5135.16	-26.9782	Fat Clay	1300	0	327.251	1300	2681.39	1452.16	1229.23	2847.97	1395.81
15	1.83978	5234.48	-25.0339	Fat Clay	1300	0	327.251	1300	2692.16	1479.48	1212.68	2845	1365.52
16	1.83978	5314.49	-23.1201	Fat Clay	1300	0	327.251	1300	2748.78	1502.1	1246.68	2888.5	1386.4
17	1.83978	5378.56	-21.2332	Fat Clay	1300	0	327.251	1300	2796.19	1520.21	1275.98	2923.34	1403.13
18	1.83978	5427.33	-19.3701	Fat Clay	1300	0	327.251	1300	2834.81	1533.99	1300.82	2949.86	1415.87
19	1.83978	5461.32	-17.5282	Fat Clay	1300	0	327.251	1300	2864.99	1543.6	1321.39	2968.35	1424.75
20	1.83978	5481.03	-15.7048	Fat Clay	1300	0	327.251	1300	2887.06	1549.17	1337.89	2979.07	1429.9
21	1.83978	5486.84	-13.8976	Fat Clay	1300	0	327.251	1300	2901.27	1550.81	1350.46	2982.25	1431.44
22	1.83978	5479.1	-12.1044	Fat Clay	1300	0	327.251	1300	2907.87	1548.62	1359.25	2978.05	1429.43
23	1.83978	5458.1	-10.3231	Fat Clay	1300	0	327.251	1300	2907.04	1542.69	1364.35	2966.65	1423.96
24	1.83978	5424.09	-8.55194	Fat Clay	1300	0	327.251	1300	2898.96	1533.08	1365.88	2948.17	1415.09
25	1.83978	5377.26	-6.78896	Fat Clay	1300	0	327.251	1300	2883.77	1519.84	1363.93	2922.73	1402.89
26	1.83978	5317.78	-5.03241	Fat Clay	1300	0	327.251	1300	2861.59	1503.03	1358.56	2890.41	1387.38
27	1.83978	5245.76	-3.2806	Fat Clay	1300	0	327.251	1300	2832.52	1482.67	1349.85	2851.27	1368.6
28	1.83978	5161.29	-1.53186	Fat Clay	1300	0	327.251	1300	2796.62	1458.8	1337.82	2805.38	1346.58
29	1.83978	5064.41	0.21545	Fat Clay	1300	0	327.251	1300	2753.96	1431.42	1322.54	2752.73	1321.31
30	1.83978	4955.14	1.96296	Fat Clay	1300	0	327.251	1300	2704.56	1400.53	1304.03	2693.35	1292.82
31	1.83978	4833.46	3.71231	Fat Clay	1300	0	327.251	1300	2648.45	1366.14	1282.31	2627.22	1261.08
32	1.83978	4699.31	5.46513	Fat Clay	1300	0	327.251	1300	2585.62	1328.22	1257.4	2554.31	1226.09
33	1.83978	4552.6	7.2231	Fat Clay	1300	0	327.251	1300	2516.06	1286.76	1229.3	2474.58	1187.82
34	1.83978	4393.19	8.98794	Fat Clay	1300	0	327.251	1300	2439.71	1241.7	1198.01	2387.95	1146.25
35	1.83978	4220.93	10.7614	Fat Clay	1300	0	327.251	1300	2356.53	1193.01	1163.52	2294.33	1101.32
36	1.83978	4035.59	12.5454	Fat Clay	1300	0	327.251	1300	2266.42	1140.63	1125.79	2193.6	1052.97
37	1.83978	3836.93	14.3419	Fat Clay	1300	0	327.251	1300	2169.3	1084.48	1084.82	2085.63	1001.15
38	1.83978	3624.64	16.1529	Fat Clay	1300	0	327.251	1300	2065.04	1024.48	1040.56	1970.25	945.774
39	1.83978	3398.37	17.9807	Fat Clay	1300	0	327.251	1300	1953.48	960.522	992.962	1847.28	886.754
40	1.83978	3157.69	19.8276	Fat Clay	1300	0	327.251	1300	1834.47	892.495	941.971	1716.47	823.976
41	1.83978	2902.11	21.6962	Fat Clay	1300	0	327.251	1300	1707.77	820.259	887.514	1577.57	757.311
42	1.83978	2631.08	23.5895	Fat Clay	1300	0	327.251	1300	1573.17	743.655	829.512	1430.27	686.611
43	1.83978	2343.95	25.5105	Fat Clay	1300	0	327.251	1300	1430.37	662.497	767.878	1274.21	611.714
44	1.83978	2039.94	27.4628	Fat Clay	1300	0	327.251	1300	1279.07	576.571	702.496	1108.98	532.41
45	1.83978	1718.17	29.4504	Fat Clay	1300	0	327.251	1300	1118.88	485.626	633.255	934.105	448.479
46	1.83978	1378.91	31.4777	Fat Clay	1300	0	327.251	1300	950.079	389.371	560.708	749.715	360.344
47	1.83978	1084.02	33.5501	Fat Clay	1300	0	327.251	1300	806.464	306.388	500.076	589.45	283.062
48	1.83978	803.551	35.6735	Fat Clay	1300	0	327.251	1300	671.95	227.116	444.834	437.026	209.91
49	1.83978	499.917	37.8551	Fat Clay	1300	0	327.251	1300	526.355	141.296	385.059	272.009	130.713
50	1.83978	171.036	40.1035	Fat Clay	1300	0	327.251	1300	368.875	48.3406	320.535	93.2709	44.9303

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 4.30924

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	0.729083	171	0	0	0
2	2.55248	168.066	-724.337	0	0
3	4.37589	165.463	-421.638	0	0
4	6.19929	163.123	590.792	0	0
5	8.02269	161	2102.76	0	0
6	9.86247	159.045	3984.68	0	0
7	11.7022	157.254	6113.93	0	0
8	13.542	155.606	8406.51	0	0
9	15.3818	154.087	10797.1	0	0
10	17.2216	152.685	13233.8	0	0
11	19.0614	151.39	15674.7	0	0
12	20.9011	150.194	18085.2	0	0
13	22.7409	149.089	20436.6	0	0
14	24.5807	148.071	22704.9	0	0
15	26.4205	147.135	24673.5	0	0
16	28.2603	146.276	26442	0	0
17	30.1	145.49	28054.9	0	0
18	31.9398	144.775	29505.8	0	0
19	33.7796	144.128	30790.3	0	0
20	35.6194	143.547	31904.8	0	0
21	37.4592	143.03	32847.1	0	0
22	39.2989	142.575	33615.7	0	0
23	41.1387	142.18	34210.2	0	0
24	42.9785	141.845	34630.9	0	0
25	44.8183	141.569	34879	0	0
26	46.6581	141.349	34956.3	0	0
27	48.4978	141.187	34865.2	0	0
28	50.3376	141.082	34609.1	0	0
29	52.1774	141.033	34191.7	0	0
30	54.0172	141.04	33617.6	0	0
31	55.857	141.103	32892.1	0	0
32	57.6967	141.222	32021.1	0	0
33	59.5365	141.398	31011.4	0	0
34	61.3763	141.631	29870.5	0	0
35	63.2161	141.922	28606.7	0	0
36	65.0559	142.272	27229.4	0	0
37	66.8956	142.681	25748.9	0	0
38	68.7354	143.152	24176.6	0	0
39	70.5752	143.685	22525.2	0	0
40	72.415	144.282	20808.8	0	0
41	74.2547	144.945	19043	0	0
42	76.0945	145.677	17245.5	0	0
43	77.9343	146.481	15435.7	0	0
44	79.7741	147.358	13635.8	0	0
45	81.6139	148.315	11870.6	0	0
46	83.4536	149.353	10168.5	0	0
47	85.2934	150.48	8561.16	0	0
48	87.1332	151.7	7043.21	0	0
49	88.973	153.021	5625.32	0	0
50	90.8128	154.451	4346.48	0	0
51	92.6525	156	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 3.97249

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	0.729083	171	0	0	0
2	2.55248	168.066	-894.076	0	0
3	4.37589	165.463	-735.061	0	0
4	6.19929	163.123	152.193	0	0
5	8.02269	161	1552.78	0	0
6	9.86247	159.045	3333.13	0	0
7	11.7022	157.254	5369.42	0	0
8	13.542	155.606	7576.01	0	0
9	15.3818	154.087	9886.38	0	0
10	17.2216	152.685	12247.7	0	0
11	19.0614	151.39	14617.2	0	0
12	20.9011	150.194	16959.7	0	0
13	22.7409	149.089	19246.3	0	0
14	24.5807	148.071	21452.3	0	0
15	26.4205	147.135	23360.7	0	0
16	28.2603	146.276	25071.2	0	0
17	30.1	145.49	26627.6	0	0
18	31.9398	144.775	28023.7	0	0
19	33.7796	144.128	29254.5	0	0
20	35.6194	143.547	30316.5	0	0
21	37.4592	143.03	31207.3	0	0
22	39.2989	142.575	31925.3	0	0
23	41.1387	142.18	32469.9	0	0
24	42.9785	141.845	32841.3	0	0
25	44.8183	141.569	33040.6	0	0
26	46.6581	141.349	33069.5	0	0
27	48.4978	141.187	32930.4	0	0
28	50.3376	141.082	32626.3	0	0
29	52.1774	141.033	32161.2	0	0
30	54.0172	141.04	31539.4	0	0
31	55.857	141.103	30766.1	0	0
32	57.6967	141.222	29847.2	0	0
33	59.5365	141.398	28789.4	0	0
34	61.3763	141.631	27600	0	0
35	63.2161	141.922	26287.3	0	0
36	65.0559	142.272	24860.5	0	0
37	66.8956	142.681	23329.9	0	0
38	68.7354	143.152	21706.8	0	0
39	70.5752	143.685	20003.7	0	0
40	72.415	144.282	18234.5	0	0
41	74.2547	144.945	16414.9	0	0
42	76.0945	145.677	14562	0	0
43	77.9343	146.481	12695.5	0	0
44	79.7741	147.358	10836.9	0	0
45	81.6139	148.315	9011.15	0	0
46	83.4536	149.353	7246.12	0	0
47	85.2934	150.48	5573.18	0	0
48	87.1332	151.7	3986.53	0	0
49	88.973	153.021	2496.34	0	0
50	90.8128	154.451	1140.96	0	0
51	92.6525	156	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	171
25	171
85	156
120	156

Distributed Load

X	Y
25	171
0	171

External Boundary

X	Y
0	171
0	165
0	161
0	141
120	141
120	156
95	156
85	156
65	161
49	165
25	171
15	171

Material Boundary

X	Y
0	161
57	161
65	161

Material Boundary

X	Y
15	171
15	169
25	169
41	165
57	161
85	154
95	154
95	156



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 1, Short-Term Saturated Local Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:44:53 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.361s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:44:53 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft ³]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	20
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Loading

1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	250
Orientation:	Normal to boundary

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	120
Cohesion [psf]	1300
Friction Angle [deg]	0
Water Surface	Water Table
Hu Value	1

Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	120
Cohesion [psf]	1300
Friction Angle [deg]	0
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	6.045450
Center:	59.070, 179.355
Radius:	34.897
Left Slip Surface Endpoint:	25.200, 170.950
Right Slip Surface Endpoint:	85.000, 156.000
Resisting Moment:	3.42742e+06 lb-ft
Driving Moment:	566941 lb-ft
Total Slice Area:	813.339 ft ²
Surface Horizontal Width:	59.7998 ft
Surface Average Height:	13.601 ft

Method: janbu simplified

FS	5.676760
Center:	59.070, 179.355
Radius:	34.897
Left Slip Surface Endpoint:	25.200, 170.950
Right Slip Surface Endpoint:	85.000, 156.000
Resisting Horizontal Force:	77739.7 lb
Driving Horizontal Force:	13694.4 lb
Total Slice Area:	813.339 ft ²
Surface Horizontal Width:	59.7998 ft
Surface Average Height:	13.601 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	14027
Number of Invalid Surfaces:	4054

Error Codes

Error Code -101 reported for 234 surfaces
Error Code -103 reported for 64 surfaces
Error Code -106 reported for 18 surfaces
Error Code -108 reported for 68 surfaces
Error Code -112 reported for 547 surfaces
Error Code -114 reported for 417 surfaces
Error Code -1000 reported for 2706 surfaces

Method: janbu simplified

Number of Valid Surfaces:	13833
Number of Invalid Surfaces:	4248

Error Codes

Error Code -101 reported for 234 surfaces
Error Code -103 reported for 64 surfaces
Error Code -106 reported for 18 surfaces
Error Code -108 reported for 104 surfaces
Error Code -111 reported for 158 surfaces
Error Code -112 reported for 547 surfaces
Error Code -114 reported for 417 surfaces
Error Code -1000 reported for 2706 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

- 101 = Only one (or zero) surface / slope intersections.
- 103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
- 106 = Average slice width is less than $0.0001 * (\text{maximum horizontal extent of soil region})$. This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
- 108 = Total driving moment or total driving force < 0.1 . This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 111 = Safety factor equation did not converge
- 112 = The coefficient $M\text{-}\alpha = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F) < 0.2$ for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
- 114 = Surface with Reverse Curvature.
- 1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 6.04545

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.04745	200.256	-73.1034	Sandy Lean Clay	1300	0	215.038	1300	-516.735	99.4147	-616.15	191.187	91.772
2	1.04745	545.858	-67.8612	Sandy Lean Clay	1300	0	215.038	1300	-7.41576	270.987	-278.403	521.132	250.145
3	1.04745	807.6	-63.6418	Sandy Lean Clay	1300	0	215.038	1300	337.032	400.928	-63.8956	771.018	370.09
4	1.04745	1021.49	-59.9854	Sandy Lean Clay	1300	0	215.038	1300	602.983	507.113	95.87	975.221	468.108
5	1.20891	1401.89	-56.4693	Fat Clay	1300	0	215.038	1300	835.115	603.004	232.111	1159.62	556.62
6	1.20891	1606.83	-53.0222	Fat Clay	1300	0	215.038	1300	1043.56	691.158	352.402	1329.16	637.997
7	1.20891	1783.33	-49.8333	Fat Clay	1300	0	215.038	1300	1220.39	767.079	453.312	1475.15	708.075
8	1.20891	1936.9	-46.8434	Fat Clay	1300	0	215.038	1300	1372.84	833.133	539.707	1602.18	769.047
9	1.20891	2071.29	-44.0123	Fat Clay	1300	0	215.038	1300	1505.6	890.94	614.663	1713.35	822.412
10	1.20891	2189.23	-41.3109	Fat Clay	1300	0	215.038	1300	1621.92	941.67	680.248	1810.91	869.236
11	1.20891	2292.74	-38.7175	Fat Clay	1300	0	215.038	1300	1724.15	986.196	737.954	1896.54	910.34
12	1.20891	2383.41	-36.2153	Fat Clay	1300	0	215.038	1300	1814.06	1025.2	788.862	1971.53	946.334
13	1.20891	2462.46	-33.7909	Fat Clay	1300	0	215.038	1300	1893.02	1059.2	833.817	2036.92	977.723
14	1.20891	2530.89	-31.4335	Fat Clay	1300	0	215.038	1300	1962.1	1088.63	873.47	2093.53	1004.9
15	1.20891	2589.52	-29.134	Fat Clay	1300	0	215.038	1300	2022.17	1113.85	908.32	2142.03	1028.18
16	1.20891	2639.01	-26.8851	Fat Clay	1300	0	215.038	1300	2073.94	1135.14	938.799	2182.96	1047.82
17	1.20891	2679.92	-24.68	Fat Clay	1300	0	215.038	1300	2117.99	1152.74	965.246	2216.8	1064.06
18	1.20891	2712.72	-22.5134	Fat Clay	1300	0	215.038	1300	2154.8	1166.84	987.963	2243.93	1077.09
19	1.20891	2737.79	-20.3803	Fat Clay	1300	0	215.038	1300	2184.79	1177.63	1007.16	2264.67	1087.04
20	1.20891	2755.49	-18.2763	Fat Clay	1300	0	215.038	1300	2208.29	1185.24	1023.05	2279.31	1094.07
21	1.20891	2766.07	-16.1976	Fat Clay	1300	0	215.038	1300	2225.61	1189.79	1035.82	2288.07	1098.28
22	1.20891	2769.79	-14.1407	Fat Clay	1300	0	215.038	1300	2236.97	1191.39	1045.58	2291.14	1099.75
23	1.20891	2766.84	-12.1021	Fat Clay	1300	0	215.038	1300	2242.59	1190.12	1052.47	2288.7	1098.58
24	1.20891	2757.39	-10.0791	Fat Clay	1300	0	215.038	1300	2242.66	1186.06	1056.6	2280.89	1094.83
25	1.20891	2741.56	-8.06863	Fat Clay	1300	0	215.038	1300	2237.31	1179.25	1058.06	2267.79	1088.54
26	1.20891	2719.47	-6.06817	Fat Clay	1300	0	215.038	1300	2226.66	1169.75	1056.91	2249.52	1079.77
27	1.20891	2691.19	-4.07512	Fat Clay	1300	0	215.038	1300	2210.81	1157.59	1053.22	2226.13	1068.54
28	1.20891	2656.79	-2.087	Fat Clay	1300	0	215.038	1300	2189.84	1142.79	1047.05	2197.67	1054.88
29	1.20891	2616.3	-0.101391	Fat Clay	1300	0	215.038	1300	2163.79	1125.37	1038.42	2164.17	1038.8
30	1.20891	2569.73	1.88409	Fat Clay	1300	0	215.038	1300	2132.72	1105.34	1027.38	2125.65	1020.31
31	1.20891	2517.06	3.87185	Fat Clay	1300	0	215.038	1300	2096.65	1082.68	1013.97	2082.09	999.413
32	1.20891	2458.28	5.86428	Fat Clay	1300	0	215.038	1300	2055.55	1057.4	998.148	2033.46	976.061
33	1.20891	2393.32	7.86387	Fat Clay	1300	0	215.038	1300	2009.42	1029.46	979.965	1979.72	950.264
34	1.20891	2322.1	9.87316	Fat Clay	1300	0	215.038	1300	1958.24	998.823	959.418	1920.81	921.992
35	1.20891	2244.52	11.8948	Fat Clay	1300	0	215.038	1300	1901.95	965.455	936.491	1856.65	891.195
36	1.20891	2160.46	13.9316	Fat Clay	1300	0	215.038	1300	1840.45	929.294	911.159	1787.11	857.817
37	1.20891	2069.74	15.9866	Fat Clay	1300	0	215.038	1300	1773.68	890.273	883.403	1712.07	821.797
38	1.20891	1972.17	18.0629	Fat Clay	1300	0	215.038	1300	1701.5	848.307	853.19	1631.37	783.059
39	1.20891	1867.53	20.1641	Fat Clay	1300	0	215.038	1300	1623.77	803.296	820.47	1544.8	741.504
40	1.20891	1755.53	22.2941	Fat Clay	1300	0	215.038	1300	1540.33	755.121	785.205	1452.16	697.038
41	1.20891	1635.85	24.457	Fat Clay	1300	0	215.038	1300	1450.97	703.643	747.326	1353.17	649.522
42	1.20891	1508.11	26.6579	Fat Clay	1300	0	215.038	1300	1355.44	648.693	706.749	1247.49	598.794
43	1.20891	1371.83	28.9021	Fat Clay	1300	0	215.038	1300	1253.48	590.075	663.404	1134.76	544.686
44	1.20891	1226.48	31.1961	Fat Clay	1300	0	215.038	1300	1144.74	527.554	617.187	1014.53	486.975
45	1.20891	1071.39	33.5472	Fat Clay	1300	0	215.038	1300	1028.83	460.846	567.981	886.242	425.396
46	1.20891	905.779	35.9643	Fat Clay	1300	0	215.038	1300	905.283	389.609	515.674	749.253	359.644
47	1.20891	728.664	38.458	Fat Clay	1300	0	215.038	1300	773.535	313.425	460.11	602.743	289.318
48	1.20891	538.837	41.0414	Fat Clay	1300	0	215.038	1300	632.924	231.773	401.151	445.722	213.949
49	1.20891	334.768	43.7308	Fat Clay	1300	0	215.038	1300	482.633	143.995	338.638	276.917	132.922
50	1.20891	114.48	46.5475	Fat Clay	1300	0	215.038	1300	321.676	49.2406	272.435	94.6966	45.456

Global Minimum Query (janbu simplified) - Safety Factor: 5.67676

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.04745	200.256	-73.1034	Sandy Lean Clay	1300	0	229.004	1300	-562.594	99.4147	-662.009	191.305	91.8904
2	1.04745	545.858	-67.8612	Sandy Lean Clay	1300	0	229.004	1300	-41.6532	270.987	-312.64	521.222	250.235
3	1.04745	807.6	-63.6418	Sandy Lean Clay	1300	0	229.004	1300	308.921	400.928	-92.0075	771.092	370.164
4	1.04745	1021.49	-59.9854	Sandy Lean Clay	1300	0	229.004	1300	578.871	507.113	71.7579	975.285	468.172
5	1.20891	1401.89	-56.4693	Fat Clay	1300	0	229.004	1300	814.097	603.004	211.093	1159.68	556.677
6	1.20891	1606.83	-53.0222	Fat Clay	1300	0	229.004	1300	1025.06	691.158	333.903	1329.2	638.047
7	1.20891	1783.33	-49.8333	Fat Clay	1300	0	229.004	1300	1203.89	767.079	436.809	1475.2	708.119
8	1.20891	1936.9	-46.8434	Fat Clay	1300	0	229.004	1300	1357.99	833.133	524.855	1602.22	769.09
9	1.20891	2071.29	-44.0123	Fat Clay	1300	0	229.004	1300	1492.15	890.94	601.206	1713.39	822.447
10	1.20891	2189.23	-41.3109	Fat Clay	1300	0	229.004	1300	1609.68	941.67	668.007	1810.94	869.27
11	1.20891	2292.74	-38.7175	Fat Clay	1300	0	229.004	1300	1712.98	986.196	726.789	1896.57	910.37
12	1.20891	2383.41	-36.2153	Fat Clay	1300	0	229.004	1300	1803.86	1025.2	778.658	1971.56	946.358
13	1.20891	2462.46	-33.7909	Fat Clay	1300	0	229.004	1300	1883.7	1059.2	824.495	2036.95	977.747
14	1.20891	2530.89	-31.4335	Fat Clay	1300	0	229.004	1300	1953.58	1088.63	864.951	2093.55	1004.92
15	1.20891	2589.52	-29.134	Fat Clay	1300	0	229.004	1300	2014.4	1113.85	900.552	2142.04	1028.19
16	1.20891	2639.01	-26.8851	Fat Clay	1300	0	229.004	1300	2066.88	1135.14	931.738	2182.98	1047.84
17	1.20891	2679.92	-24.68	Fat Clay	1300	0	229.004	1300	2111.58	1152.74	958.842	2216.82	1064.08
18	1.20891	2712.72	-22.5134	Fat Clay	1300	0	229.004	1300	2149.03	1166.84	982.186	2243.94	1077.1
19	1.20891	2737.79	-20.3803	Fat Clay	1300	0	229.004	1300	2179.61	1177.63	1001.98	2264.69	1087.06
20	1.20891	2755.49	-18.2763	Fat Clay	1300	0	229.004	1300	2203.69	1185.24	1018.45	2279.32	1094.08
21	1.20891	2766.07	-16.1976	Fat Clay	1300	0	229.004	1300	2221.56	1189.79	1031.77	2288.08	1098.29
22	1.20891	2769.79	-14.1407	Fat Clay	1300	0	229.004	1300	2233.46	1191.39	1042.07	2291.16	1099.77
23	1.20891	2766.84	-12.1021	Fat Clay	1300	0	229.004	1300	2239.61	1190.12	1049.49	2288.71	1098.59
24	1.20891	2757.39	-10.0791	Fat Clay	1300	0	229.004	1300	2240.19	1186.06	1054.13	2280.89	1094.83
25	1.20891	2741.56	-8.06863	Fat Clay	1300	0	229.004	1300	2235.33	1179.25	1056.08	2267.8	1088.55
26	1.20891	2719.47	-6.06817	Fat Clay	1300	0	229.004	1300	2225.18	1169.75	1055.43	2249.52	1079.77
27	1.20891	2691.19	-4.07512	Fat Clay	1300	0	229.004	1300	2209.82	1157.59	1052.23	2226.14	1068.55
28	1.20891	2656.79	-2.087	Fat Clay	1300	0	229.004	1300	2189.33	1142.79	1046.54	2197.67	1054.88
29	1.20891	2616.3	-0.101391	Fat Clay	1300	0	229.004	1300	2163.77	1125.37	1038.4	2164.17	1038.8
30	1.20891	2569.73	1.88409	Fat Clay	1300	0	229.004	1300	2133.19	1105.34	1027.85	2125.65	1020.31
31	1.20891	2517.06	3.87185	Fat Clay	1300	0	229.004	1300	2097.59	1082.68	1014.91	2082.09	999.408
32	1.20891	2458.28	5.86428	Fat Clay	1300	0	229.004	1300	2056.98	1057.4	999.579	2033.46	976.059
33	1.20891	2393.32	7.86387	Fat Clay	1300	0	229.004	1300	2011.35	1029.46	981.891	1979.72	950.261
34	1.20891	2322.1	9.87316	Fat Clay	1300	0	229.004	1300	1960.67	998.823	961.847	1920.81	921.99
35	1.20891	2244.52	11.8948	Fat Clay	1300	0	229.004	1300	1904.88	965.455	939.421	1856.64	891.184
36	1.20891	2160.46	13.9316	Fat Clay	1300	0	229.004	1300	1843.91	929.294	914.612	1787.1	857.805
37	1.20891	2069.74	15.9866	Fat Clay	1300	0	229.004	1300	1777.66	890.273	887.387	1712.05	821.779
38	1.20891	1972.17	18.0629	Fat Clay	1300	0	229.004	1300	1706.03	848.307	857.728	1631.35	783.042
39	1.20891	1867.53	20.1641	Fat Clay	1300	0	229.004	1300	1628.88	803.296	825.587	1544.79	741.493
40	1.20891	1755.53	22.2941	Fat Clay	1300	0	229.004	1300	1546.04	755.121	790.915	1452.14	697.021
41	1.20891	1635.85	24.457	Fat Clay	1300	0	229.004	1300	1457.3	703.643	753.658	1353.15	649.502
42	1.20891	1508.11	26.6579	Fat Clay	1300	0	229.004	1300	1362.44	648.693	713.742	1247.47	598.776
43	1.20891	1371.83	28.9021	Fat Clay	1300	0	229.004	1300	1261.17	590.075	671.094	1134.74	544.666
44	1.20891	1226.48	31.1961	Fat Clay	1300	0	229.004	1300	1153.18	527.554	625.621	1014.51	486.953
45	1.20891	1071.39	33.5472	Fat Clay	1300	0	229.004	1300	1038.07	460.846	577.22	886.22	425.374
46	1.20891	905.779	35.9643	Fat Clay	1300	0	229.004	1300	915.386	389.609	525.777	749.223	359.614
47	1.20891	728.664	38.458	Fat Clay	1300	0	229.004	1300	784.598	313.425	471.173	602.714	289.289
48	1.20891	538.837	41.0414	Fat Clay	1300	0	229.004	1300	645.046	231.773	413.273	445.686	213.913
49	1.20891	334.768	43.7308	Fat Clay	1300	0	229.004	1300	495.959	143.995	351.964	276.882	132.887
50	1.20891	114.48	46.5475	Fat Clay	1300	0	229.004	1300	336.379	49.2406	287.138	94.6576	45.417

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 6.04545

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.2002	170.95	0	0	0
2	26.2477	167.502	-2007.09	0	0
3	27.2951	164.927	-2251.43	0	0
4	28.3426	162.813	-1764.2	0	0
5	29.39	161	-896.132	0	0
6	30.5989	159.176	367.445	0	0
7	31.8079	157.57	1783	0	0
8	33.0168	156.138	3270.93	0	0
9	34.2257	154.849	4781	0	0
10	35.4346	153.681	6279.49	0	0
11	36.6435	152.618	7742.75	0	0
12	37.8524	151.649	9153.71	0	0
13	39.0613	150.764	10499.7	0	0
14	40.2702	149.955	11771.2	0	0
15	41.4792	149.216	12961.1	0	0
16	42.6881	148.542	14063.7	0	0
17	43.897	147.929	15074.9	0	0
18	45.1059	147.374	15991.5	0	0
19	46.3148	146.872	16811.3	0	0
20	47.5237	146.423	17532.5	0	0
21	48.7326	146.024	18154.2	0	0
22	49.9415	145.673	18675.8	0	0
23	51.1505	145.368	19097.2	0	0
24	52.3594	145.109	19418.5	0	0
25	53.5683	144.894	19640.5	0	0
26	54.7772	144.723	19764	0	0
27	55.9861	144.594	19790.2	0	0
28	57.195	144.508	19720.6	0	0
29	58.4039	144.464	19557.1	0	0
30	59.6128	144.462	19301.8	0	0
31	60.8218	144.502	18957	0	0
32	62.0307	144.584	18525.5	0	0
33	63.2396	144.708	18010.3	0	0
34	64.4485	144.875	17414.8	0	0
35	65.6574	145.085	16742.8	0	0
36	66.8663	145.34	15998.6	0	0
37	68.0752	145.64	15186.7	0	0
38	69.2841	145.986	14312.4	0	0
39	70.4931	146.38	13381.6	0	0
40	71.702	146.824	12400.8	0	0
41	72.9109	147.32	11377.4	0	0
42	74.1198	147.87	10319.6	0	0
43	75.3287	148.477	9237	0	0
44	76.5376	149.144	8140.45	0	0
45	77.7465	149.876	7042.5	0	0
46	78.9554	150.678	5957.84	0	0
47	80.1644	151.555	4903.79	0	0
48	81.3733	152.515	3901.1	0	0
49	82.5822	153.567	2975.04	0	0
50	83.7911	154.724	2156.91	0	0
51	85	156	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 5.67676

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.2002	170.95	0	0	0
2	26.2477	167.502	-2179.81	0	0
3	27.2951	164.927	-2526.88	0	0
4	28.3426	162.813	-2113.67	0	0
5	29.39	161	-1303.91	0	0
6	30.5989	159.176	-95.5217	0	0
7	31.8079	157.57	1273.49	0	0
8	33.0168	156.138	2720.95	0	0
9	34.2257	154.849	4195.03	0	0
10	35.4346	153.681	5660.95	0	0
11	36.6435	152.618	7094.37	0	0
12	37.8524	151.649	8477.67	0	0
13	39.0613	150.764	9797.8	0	0
14	40.2702	149.955	11044.9	0	0
15	41.4792	149.216	12211.6	0	0
16	42.6881	148.542	13292.2	0	0
17	43.897	147.929	14282.2	0	0
18	45.1059	147.374	15178.4	0	0
19	46.3148	146.872	15978.5	0	0
20	47.5237	146.423	16680.6	0	0
21	48.7326	146.024	17283.6	0	0
22	49.9415	145.673	17786.9	0	0
23	51.1505	145.368	18190.4	0	0
24	52.3594	145.109	18494.1	0	0
25	53.5683	144.894	18698.7	0	0
26	54.7772	144.723	18805	0	0
27	55.9861	144.594	18814.2	0	0
28	57.195	144.508	18727.7	0	0
29	58.4039	144.464	18547.3	0	0
30	59.6128	144.462	18275.2	0	0
31	60.8218	144.502	17913.5	0	0
32	62.0307	144.584	17465.1	0	0
33	63.2396	144.708	16932.9	0	0
34	64.4485	144.875	16320.3	0	0
35	65.6574	145.085	15630.9	0	0
36	66.8663	145.34	14869.1	0	0
37	68.0752	145.64	14039.3	0	0
38	69.2841	145.986	13146.8	0	0
39	70.4931	146.38	12197.4	0	0
40	71.702	146.824	11197.5	0	0
41	72.9109	147.32	10154.3	0	0
42	74.1198	147.87	9076.26	0	0
43	75.3287	148.477	7972.59	0	0
44	76.5376	149.144	6854.06	0	0
45	77.7465	149.876	5733.1	0	0
46	78.9554	150.678	4624.19	0	0
47	80.1644	151.555	3544.44	0	0
48	81.3733	152.515	2514.29	0	0
49	82.5822	153.567	1558.63	0	0
50	83.7911	154.724	708.245	0	0
51	85	156	0	0	0

Discharge Sections

Entity Information

Water Table

X		Y	
0		171	
25		171	
85		156	
120		156	

Distributed Load

X		Y	
25		171	
0		171	

External Boundary

X		Y	
0		171	
0		165	
0		161	
0		141	
120		141	
120		156	
95		156	
85		156	
65		161	
49		165	
25		171	
15		171	

Material Boundary

X		Y	
0		165	
41		165	
49		165	

Material Boundary

X		Y	
0		161	
57		161	
65		161	

Material Boundary

X		Y	
15		171	
15		169	
25		169	
41		165	
57		161	
85		154	
95		154	
95		156	



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 1, Long-Term Saturated Global Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:44:53 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.434s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:44:53 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	20
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Loading

1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	250
Orientation:	Normal to boundary

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	24
Water Surface	Water Table
Hu Value	1

W. Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	110
Friction Angle [deg]	15
Water Surface	Water Table
Hu Value	1

Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

W. Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	85
Friction Angle [deg]	18
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.870260
Center:	69.482, 244.344
Radius:	89.675
Left Slip Surface Endpoint:	17.885, 171.000
Right Slip Surface Endpoint:	84.948, 156.013
Resisting Moment:	1.80429e+06 lb-ft
Driving Moment:	964724 lb-ft
Total Slice Area:	369.16 ft2
Surface Horizontal Width:	67.0632 ft
Surface Average Height:	5.50467 ft

Method: janbu simplified

FS	1.805810
Center:	65.400, 214.223
Radius:	68.857
Left Slip Surface Endpoint:	11.799, 171.000
Right Slip Surface Endpoint:	102.161, 156.000
Resisting Horizontal Force:	45067.5 lb
Driving Horizontal Force:	24957 lb
Total Slice Area:	1065.04 ft ²
Surface Horizontal Width:	90.3622 ft
Surface Average Height:	11.7863 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	17915
Number of Invalid Surfaces:	166

Error Codes

Error Code -103 reported for 152 surfaces
Error Code -108 reported for 14 surfaces

Method: janbu simplified

Number of Valid Surfaces:	17895
Number of Invalid Surfaces:	186

Error Codes

Error Code -103 reported for 152 surfaces
Error Code -108 reported for 34 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.87026

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.32148	72.317	-34.6131	W. Sandy Lean Clay	110	15	93.2597	174.42	240.418	0	240.418	304.785	304.785
2	1.32148	214.231	-33.5934	W. Sandy Lean Clay	110	15	107.626	201.289	340.694	0	340.694	412.182	412.182
3	1.32148	350.799	-32.5855	W. Sandy Lean Clay	110	15	121.545	227.32	437.845	0	437.845	515.533	515.533
4	1.32148	482.201	-31.5889	W. Sandy Lean Clay	110	15	135.026	252.533	531.942	0	531.942	614.974	614.974
5	1.32148	608.605	-30.6028	W. Sandy Lean Clay	110	15	148.079	276.946	623.049	0	623.049	710.633	710.633
6	1.32148	720.232	-29.6266	W. Sandy Lean Clay	110	15	139.321	260.567	561.923	0	561.923	641.154	641.154
7	1.32148	788.566	-28.6598	W. Sandy Lean Clay	110	15	133.838	250.311	523.648	0	523.648	596.8	596.8
8	1.32148	848.46	-27.7019	W. Sandy Lean Clay	110	15	140.261	262.324	568.48	0	568.48	642.124	642.124
9	1.32148	903.903	-26.7523	W. Sandy Lean Clay	110	15	146.259	273.543	610.352	0	610.352	684.08	684.08
10	1.32148	955.007	-25.8106	W. Sandy Lean Clay	110	15	151.841	283.983	649.313	0	649.313	722.751	722.751
11	1.32148	1001.88	-24.8763	W. Sandy Lean Clay	110	15	157.013	293.656	685.414	0	685.414	758.218	758.218
12	1.32148	1044.61	-23.949	W. Sandy Lean Clay	110	15	161.782	302.574	718.697	0	718.697	790.555	790.555
13	1.32148	1083.3	-23.0283	W. Sandy Lean Clay	110	15	166.153	310.749	749.202	0	749.202	819.827	819.827
14	1.32148	1118.02	-22.1139	W. Sandy Lean Clay	110	15	170.131	318.189	776.973	0	776.973	846.104	846.104
15	1.36185	1184.38	-21.1916	W. Fat Clay	85	18	184.147	344.403	798.358	0	798.358	869.753	869.753
16	1.36185	1212.97	-20.2612	W. Fat Clay	85	18	188.131	351.854	821.292	0	821.292	890.739	890.739
17	1.36185	1237.45	-19.3364	W. Fat Clay	85	18	191.636	358.41	841.474	0	841.474	908.721	908.721
18	1.36185	1257.91	-18.4167	W. Fat Clay	85	18	194.668	364.08	858.917	0	858.917	923.738	923.738
19	1.36185	1274.42	-17.502	W. Fat Clay	85	18	197.23	368.871	873.661	0	873.661	935.855	935.855
20	1.36185	1287.03	-16.5918	W. Fat Clay	85	18	199.325	372.789	885.724	0	885.724	945.114	945.114
21	1.36185	1295.79	-15.686	W. Fat Clay	85	18	200.956	375.84	895.116	0	895.116	951.549	951.549
22	1.36185	1300.77	-14.7841	W. Fat Clay	85	18	202.127	378.03	901.858	0	901.858	955.203	955.203
23	1.36185	1302.01	-13.886	W. Fat Clay	85	18	202.84	379.364	905.963	0	905.963	956.108	956.108
24	1.36185	1299.55	-12.9913	W. Fat Clay	85	18	203.098	379.846	907.439	0	907.439	954.296	954.296
25	1.36185	1293.44	-12.0999	W. Fat Clay	85	18	202.901	379.478	906.308	0	906.308	949.805	949.805
26	1.36185	1283.72	-11.2114	W. Fat Clay	85	18	202.252	378.264	902.578	0	902.578	942.666	942.666
27	1.36185	1270.41	-10.3256	W. Fat Clay	85	18	201.152	376.206	896.241	0	896.241	932.89	932.89
28	1.39928	1287.71	-9.43022	W. Fat Clay	85	18	198.348	370.963	887.352	7.2495	880.103	920.296	913.046
29	1.39928	1266.09	-8.52506	W. Fat Clay	85	18	193.94	362.719	875.774	21.0448	854.729	904.845	883.8
30	1.39928	1240.68	-7.62203	W. Fat Clay	85	18	189.283	354.008	861.357	33.4312	827.926	886.687	853.256
31	1.39928	1211.51	-6.7209	W. Fat Clay	85	18	184.378	344.834	844.106	44.4181	799.688	865.834	821.415
32	1.39928	1178.59	-5.82144	W. Fat Clay	85	18	179.223	335.194	824.028	54.0139	770.014	842.301	788.287
33	1.39928	1141.95	-4.92342	W. Fat Clay	85	18	173.82	325.088	801.142	62.2257	738.916	816.115	753.889
34	1.39928	1101.6	-4.02661	W. Fat Clay	85	18	168.167	314.516	775.433	69.0596	706.374	787.271	718.212
35	1.39928	1057.55	-3.13079	W. Fat Clay	85	18	162.264	303.476	746.92	74.5208	672.4	755.796	681.275

36	1.39928	1009.83	-2.23573	W. Fat Clay	85	18	156.11	291.966	715.59	78.6131	636.976	721.684	643.071
37	1.39928	958.425	-1.34122	W. Fat Clay	85	18	149.704	279.985	681.442	81.3397	600.103	684.947	603.608
38	1.39928	903.353	-0.447038	W. Fat Clay	85	18	143.044	267.53	644.472	82.7025	561.769	645.588	562.885
39	1.39928	844.614	0.447038	W. Fat Clay	85	18	136.129	254.597	604.669	82.7025	521.967	603.607	520.905
40	1.39928	782.208	1.34122	W. Fat Clay	85	18	128.957	241.184	562.025	81.3397	480.686	559.006	477.666
41	1.39928	716.132	2.23573	W. Fat Clay	85	18	121.527	227.287	516.527	78.6131	437.914	511.783	433.17
42	1.39928	646.38	3.13079	W. Fat Clay	85	18	113.835	212.901	468.16	74.5208	393.639	461.933	387.413
43	1.39928	572.946	4.02661	W. Fat Clay	85	18	105.879	198.022	416.905	69.0596	347.846	409.452	340.392
44	1.39928	495.817	4.92342	W. Fat Clay	85	18	97.657	182.644	362.743	62.2257	300.517	354.33	292.105
45	1.39928	414.98	5.82144	W. Fat Clay	85	18	89.1649	166.762	305.65	54.0139	251.636	296.559	242.546
46	1.39928	330.42	6.7209	W. Fat Clay	85	18	80.3998	150.369	245.602	44.4181	201.184	236.127	191.709
47	1.39928	242.116	7.62203	W. Fat Clay	85	18	71.358	133.458	182.569	33.4312	149.138	173.02	139.589
48	1.39928	150.046	8.52506	W. Fat Clay	85	18	62.0353	116.022	116.521	21.0448	95.4765	107.222	86.1775
49	1.39928	54.1848	9.43022	W. Fat Clay	85	18	52.4275	98.0531	47.4229	7.2495	40.1734	38.7152	31.4657
50	0.0743706	0.140928	9.90749	W. Fat Clay	85	18	47.2086	88.2923	10.1327	0	10.1327	1.88714	1.88714

Global Minimum Query (janbu simplified) - Safety Factor: 1.80581

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.89617	256.124	-49.8932	W. Sandy Lean Clay	110	15	100.341	181.196	265.707	0	265.707	384.836	384.836
2	1.89617	747.681	-47.5007	W. Sandy Lean Clay	110	15	134.668	243.184	497.048	0	497.048	644.016	644.016
3	1.89617	1200.45	-45.213	W. Sandy Lean Clay	110	15	166.943	301.467	714.566	0	714.566	882.755	882.755
4	1.89617	1619.06	-43.014	W. Sandy Lean Clay	110	15	197.334	356.347	919.379	0	919.379	1103.49	1103.49
5	2.32868	2514.97	-40.6578	Sandy Lean Clay	150	24	339.044	612.249	1038.23	0	1038.23	1329.42	1329.42
6	1.73163	2220.86	-38.4605	Fat Clay	150	20	337.77	609.948	1263.7	0	1263.7	1531.99	1531.99
7	1.73163	2497.12	-36.6425	Fat Clay	150	20	364.275	657.811	1395.2	0	1395.2	1666.15	1666.15
8	1.73163	2702.65	-34.8664	Fat Clay	150	20	348.593	629.492	1317.4	0	1317.4	1560.27	1560.27
9	1.73163	2855.46	-33.128	Fat Clay	150	20	367.054	662.83	1408.99	0	1408.99	1648.52	1648.52
10	1.80538	3123.02	-31.3878	Fat Clay	150	20	378.196	682.951	1498.63	34.3646	1464.27	1729.37	1695.01
11	1.80538	3255.84	-29.6436	Fat Clay	150	20	382.299	690.36	1585.41	100.786	1484.63	1802.98	1702.19
12	1.80538	3373.03	-27.9292	Fat Clay	150	20	385.562	696.251	1663.51	162.703	1500.81	1867.91	1705.21
13	1.80538	3475.32	-26.2415	Fat Clay	150	20	388.016	700.684	1733.32	220.331	1512.99	1924.6	1704.27
14	1.80538	3563.39	-24.5781	Fat Clay	150	20	389.693	703.712	1795.17	273.861	1521.31	1973.41	1699.54
15	1.80538	3637.81	-22.9364	Fat Clay	150	20	390.618	705.381	1849.36	323.46	1525.9	2014.65	1691.19
16	1.80538	3699.09	-21.3145	Fat Clay	150	20	390.812	705.732	1896.13	369.274	1526.86	2048.62	1679.35
17	1.80538	3747.68	-19.7103	Fat Clay	150	20	390.296	704.8	1935.73	411.431	1524.3	2075.56	1664.12
18	1.80538	3783.96	-18.122	Fat Clay	150	20	389.085	702.614	1968.34	450.046	1518.3	2095.68	1645.63
19	1.80538	3808.29	-16.5481	Fat Clay	150	20	387.195	699.201	1994.13	485.217	1508.92	2109.18	1623.96
20	1.80538	3820.97	-14.9869	Fat Clay	150	20	384.637	694.581	2013.25	517.033	1496.22	2116.22	1599.19
21	1.80538	3822.26	-13.437	Fat Clay	150	20	381.421	688.774	2025.84	545.57	1480.27	2116.97	1571.4
22	1.80538	3812.4	-11.8971	Fat Clay	150	20	377.556	681.794	2031.99	570.895	1461.09	2111.53	1540.63
23	1.80538	3791.59	-10.3658	Fat Clay	150	20	373.048	673.653	2031.79	593.065	1438.73	2100.03	1506.96
24	1.80538	3760.01	-8.84202	Fat Clay	150	20	367.901	664.359	2025.32	612.131	1413.19	2082.55	1470.42
25	1.80538	3717.78	-7.32451	Fat Clay	150	20	362.119	653.919	2012.64	628.133	1384.51	2059.19	1431.05
26	1.80538	3665.05	-5.81216	Fat Clay	150	20	355.705	642.335	1993.79	641.107	1352.68	2030	1388.89
27	1.80538	3601.89	-4.30386	Fat Clay	150	20	348.657	629.608	1968.79	651.08	1317.71	1995.03	1343.95
28	1.80538	3528.38	-2.79854	Fat Clay	150	20	340.974	615.735	1937.67	658.073	1279.6	1954.34	1296.26
29	1.80538	3444.58	-1.29516	Fat Clay	150	20	332.655	600.711	1900.41	662.1	1238.31	1907.94	1245.84
30	1.80538	3350.51	0.207336	Fat Clay	150	20	323.692	584.527	1857.02	663.169	1193.86	1855.85	1192.68
31	1.80538	3246.19	1.70997	Fat Clay	150	20	314.082	567.173	1807.46	661.284	1146.17	1798.08	1136.8
32	1.80538	3131.59	3.21378	Fat Clay	150	20	303.816	548.634	1751.68	656.439	1095.24	1734.62	1078.18
33	1.80538	3006.68	4.71982	Fat Clay	150	20	292.884	528.893	1689.63	648.626	1041	1665.45	1016.82
34	1.80538	2871.4	6.22913	Fat Clay	150	20	281.275	507.93	1621.23	637.827	983.402	1590.53	952.701
35	1.80538	2725.68	7.7428	Fat Clay	150	20	268.976	485.719	1546.4	624.02	922.38	1509.83	885.809
36	1.80538	2569.42	9.26193	Fat Clay	150	20	255.969	462.232	1465.03	607.176	857.851	1423.29	816.109
37	1.80538	2402.48	10.7877	Fat Clay	150	20	242.238	437.436	1376.98	587.258	789.723	1330.83	743.568
38	1.80538	2224.72	12.3212	Fat Clay	150	20	227.762	411.294	1282.12	564.222	717.899	1232.37	668.151
39	1.80538	2035.96	13.8637	Fat Clay	150	20	212.515	383.762	1180.27	538.017	642.256	1127.82	589.806
40	1.80538	1835.99	15.4166	Fat Clay	150	20	196.471	354.79	1071.24	508.582	562.657	1017.06	508.478
41	1.75555	1610.51	16.9594	W. Fat Clay	85	18	133.781	241.583	958.26	476.346	481.914	917.463	441.117
42	1.75555	1489.94	18.4932	W. Fat Clay	85	18	128.094	231.313	891.628	441.323	450.305	848.785	407.462
43	1.75555	1360.64	20.0409	W. Fat Clay	85	18	122.034	220.371	819.653	403.023	416.63	775.138	372.115
44	1.75555	1219.95	21.604	W. Fat Clay	85	18	115.321	208.248	740.67	361.352	379.318	695.002	333.65
45	1.75555	1067.53	23.1842	W. Fat Clay	85	18	107.922	194.887	654.401	316.204	338.197	608.181	291.977
46	1.75555	902.954	24.7833	W. Fat Clay	85	18	99.8	180.22	560.513	267.456	293.057	514.434	246.978
47	1.75555	725.768	26.4033	W. Fat Clay	85	18	90.9132	164.172	458.64	214.973	243.667	413.503	198.53
48	1.75555	535.447	28.0464	W. Fat Clay	85	18	81.213	146.655	348.355	158.599	189.756	305.089	146.49
49	1.75555	331.393	29.715	W. Fat Clay	85	18	70.6429	127.568	229.167	98.1581	131.009	188.849	90.6909
50	1.75555	112.927	31.4119	W. Fat Clay	85	18	59.1372	106.791	100.512	33.4477	67.0641	64.3975	30.9498

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.87026

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	17.8849	171	0	0	0
2	19.2063	170.088	96.155	0	0
3	20.5278	169.21	253.114	0	0
4	21.8493	168.366	462.472	0	0
5	23.1708	167.553	716.476	0	0
6	24.4922	166.771	1007.96	0	0
7	25.8137	166.02	1246.32	0	0
8	27.1352	165.297	1447.84	0	0
9	28.4567	164.604	1657.1	0	0
10	29.7781	163.937	1870.59	0	0
11	31.0996	163.298	2085.12	0	0
12	32.4211	162.686	2297.81	0	0
13	33.7426	162.099	2506.06	0	0
14	35.0641	161.537	2707.53	0	0
15	36.3855	161	2900.13	0	0
16	37.7474	160.472	3071.12	0	0
17	39.1092	159.969	3228.03	0	0
18	40.4711	159.491	3369.42	0	0
19	41.8329	159.038	3494.06	0	0
20	43.1948	158.608	3600.91	0	0
21	44.5566	158.203	3689.11	0	0
22	45.9185	157.82	3758.03	0	0
23	47.2803	157.461	3807.16	0	0
24	48.6422	157.124	3836.19	0	0
25	50.004	156.81	3844.97	0	0
26	51.3659	156.518	3833.51	0	0
27	52.7278	156.248	3801.97	0	0
28	54.0896	156	3750.67	0	0
29	55.4889	155.768	3679.61	0	0
30	56.8882	155.558	3592.19	0	0
31	58.2874	155.371	3488.87	0	0
32	59.6867	155.206	3370.3	0	0
33	61.086	155.063	3237.32	0	0
34	62.4853	154.942	3090.89	0	0
35	63.8845	154.844	2932.18	0	0
36	65.2838	154.767	2762.51	0	0
37	66.6831	154.713	2583.37	0	0
38	68.0824	154.68	2396.42	0	0
39	69.4816	154.669	2203.48	0	0
40	70.8809	154.68	2006.58	0	0
41	72.2802	154.713	1807.89	0	0
42	73.6795	154.767	1609.79	0	0
43	75.0787	154.844	1414.82	0	0
44	76.478	154.942	1225.74	0	0
45	77.8773	155.063	1045.5	0	0
46	79.2766	155.206	877.243	0	0
47	80.6758	155.371	724.349	0	0
48	82.0751	155.558	590.408	0	0
49	83.4744	155.768	479.245	0	0
50	84.8737	156	394.933	0	0
51	84.948	156.013	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.80581

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	11.7991	171	0	0	0
2	13.6953	168.749	407.525	0	0
3	15.5915	166.679	1180.24	0	0
4	17.4876	164.769	2228.1	0	0
5	19.3838	163	3479.63	0	0
6	21.7125	161	4764.99	0	0
7	23.4441	159.625	5917.08	0	0
8	25.1758	158.337	7082.06	0	0
9	26.9074	157.13	8066.65	0	0
10	28.639	156	9022	0	0
11	30.4444	154.899	9988.56	0	0
12	32.2498	153.871	10925.9	0	0
13	34.0552	152.914	11820.5	0	0
14	35.8605	152.024	12661.2	0	0
15	37.6659	151.198	13438.6	0	0
16	39.4713	150.434	14144.8	0	0
17	41.2767	149.73	14773.5	0	0
18	43.0821	149.083	15319.5	0	0
19	44.8874	148.492	15778.7	0	0
20	46.6928	147.956	16147.9	0	0
21	48.4982	147.473	16425.1	0	0
22	50.3036	147.041	16609	0	0
23	52.109	146.661	16698.9	0	0
24	53.9143	146.331	16695	0	0
25	55.7197	146.05	16598.3	0	0
26	57.5251	145.818	16410.2	0	0
27	59.3305	145.634	16133.2	0	0
28	61.1359	145.498	15770	0	0
29	62.9413	145.41	15324.1	0	0
30	64.7466	145.369	14799.9	0	0
31	66.552	145.376	14202.3	0	0
32	68.3574	145.429	13536.7	0	0
33	70.1628	145.531	12809.5	0	0
34	71.9682	145.68	12027.8	0	0
35	73.7735	145.877	11199.5	0	0
36	75.5789	146.122	10333.4	0	0
37	77.3843	146.417	9438.99	0	0
38	79.1897	146.761	8527.12	0	0
39	80.9951	147.155	7609.51	0	0
40	82.8004	147.601	6699.17	0	0
41	84.6058	148.099	5810.45	0	0
42	86.3614	148.634	5062.1	0	0
43	88.1169	149.221	4313.24	0	0
44	89.8725	149.861	3573.68	0	0
45	91.628	150.557	2855.89	0	0
46	93.3836	151.309	2174.04	0	0
47	95.1391	152.119	1544.16	0	0
48	96.8947	152.991	984.489	0	0
49	98.6502	153.926	515.826	0	0
50	100.406	154.928	161.944	0	0
51	102.161	156	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
-2.77556e-17	156
85	156
120	156

Distributed Load

X	Y
25	171
0	171

External Boundary

X	Y
0	171
0	165
0	163
0	161
0	141
120	141
120	148
120	156
95	156
90	156
85	156
65	161
49	165
25	171
20	171
15	171

Material Boundary

X	Y
0	161
15	161
33	161
57	161
65	161

Material Boundary

X	Y
0	163
15	163
20	163
25	163
33	161
85	148
90	148
95	148
120	148

Material Boundary

X		Y	
15		171	
15		169	
25		169	
57		161	
85		154	
95		154	
95		156	

Material Boundary

X		Y	
15		161	
15		163	
15		169	

Material Boundary

X		Y	
95		148	
95		154	



TISD HCFC Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 1, Long-Term Local Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:44:53 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:01.302s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:44:53 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	20
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Loading

1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	250
Orientation:	Normal to boundary

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	24
Water Surface	Water Table
Hu Value	1

W. Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	110
Friction Angle [deg]	15
Water Surface	Water Table
Hu Value	1

Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

W. Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	85
Friction Angle [deg]	18
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.981510
Center:	69.289, 219.794
Radius:	65.700
Left Slip Surface Endpoint:	25.406, 170.899
Right Slip Surface Endpoint:	85.000, 156.000
Resisting Moment:	1.11338e+06 lb-ft
Driving Moment:	561885 lb-ft
Total Slice Area:	315.779 ft2
Surface Horizontal Width:	59.594 ft
Surface Average Height:	5.29884 ft

Method: janbu simplified

FS	1.894750
Center:	69.289, 204.096
Radius:	50.597
Left Slip Surface Endpoint:	32.793, 169.052
Right Slip Surface Endpoint:	85.000, 156.000
Resisting Horizontal Force:	13850.3 lb
Driving Horizontal Force:	7309.81 lb
Total Slice Area:	282.376 ft ²
Surface Horizontal Width:	52.2067 ft
Surface Average Height:	5.4088 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	15695
Number of Invalid Surfaces:	2386

Error Codes

Error Code -101 reported for 290 surfaces
 Error Code -106 reported for 20 surfaces
 Error Code -108 reported for 26 surfaces
 Error Code -1000 reported for 2050 surfaces

Method: janbu simplified

Number of Valid Surfaces:	15659
Number of Invalid Surfaces:	2422

Error Codes

Error Code -101 reported for 290 surfaces
 Error Code -106 reported for 20 surfaces
 Error Code -108 reported for 62 surfaces
 Error Code -1000 reported for 2050 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

- 101 = Only one (or zero) surface / slope intersections.
- 106 = Average slice width is less than $0.0001 \times$ (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
- 108 = Total driving moment or total driving force < 0.1 . This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.98151

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.21345	55.2673	-41.2043	W. Sandy Lean Clay	110	15	55.1501	109.281	-2.68504	0	-2.68504	45.6025	45.6025
2	1.21345	162.088	-39.8122	W. Sandy Lean Clay	110	15	66.1309	131.039	78.5188	0	78.5188	133.641	133.641
3	1.21345	261.698	-38.4477	W. Sandy Lean Clay	110	15	76.4755	151.537	155.018	0	155.018	215.736	215.736
4	1.21345	354.505	-37.1086	W. Sandy Lean Clay	110	15	86.2097	170.825	227.003	0	227.003	292.224	292.224
5	1.21345	440.871	-35.7928	W. Sandy Lean Clay	110	15	95.3566	188.95	294.646	0	294.646	363.401	363.401
6	1.21345	521.114	-34.4985	W. Sandy Lean Clay	110	15	103.938	205.953	358.103	0	358.103	429.533	429.533
7	1.21345	595.523	-33.2239	W. Sandy Lean Clay	110	15	111.972	221.873	417.516	0	417.516	490.855	490.855
8	1.21345	664.351	-31.9677	W. Sandy Lean Clay	110	15	119.477	236.744	473.014	0	473.014	547.577	547.577
9	1.21345	727.83	-30.7284	W. Sandy Lean Clay	110	15	126.468	250.597	524.715	0	524.715	599.891	599.891
10	1.21345	786.167	-29.5049	W. Sandy Lean Clay	110	15	132.96	263.462	572.726	0	572.726	647.967	647.967
11	1.21345	839.551	-28.296	W. Sandy Lean Clay	110	15	138.967	275.364	617.146	0	617.146	691.959	691.959
12	1.21345	888.151	-27.1007	W. Sandy Lean Clay	110	15	144.499	286.327	658.063	0	658.063	732.009	732.009
13	1.23737	950.892	-25.9065	W. Fat Clay	85	18	156.461	310.03	692.572	0	692.572	768.567	768.567
14	1.23737	991.858	-24.7127	W. Fat Clay	85	18	162.117	321.237	727.064	0	727.064	801.673	801.673
15	1.23737	1028.2	-23.5303	W. Fat Clay	85	18	167.228	331.363	758.23	0	758.23	831.048	831.048
16	1.23737	1060.06	-22.3584	W. Fat Clay	85	18	171.802	340.427	786.126	0	786.126	856.791	856.791
17	1.23737	1087.54	-21.1963	W. Fat Clay	85	18	175.848	348.444	810.802	0	810.802	878.995	878.995
18	1.23737	1110.75	-20.0433	W. Fat Clay	85	18	179.374	355.432	832.301	0	832.301	897.741	897.741
19	1.23737	1129.78	-18.8986	W. Fat Clay	85	18	182.388	361.403	850.679	0	850.679	913.119	913.119
20	1.23737	1144.72	-17.7618	W. Fat Clay	85	18	184.894	366.37	865.971	0	865.971	925.199	925.199
21	1.23737	1155.66	-16.6321	W. Fat Clay	85	18	186.9	370.344	878.202	0	878.202	934.034	934.034
22	1.23737	1162.66	-15.5091	W. Fat Clay	85	18	188.409	373.335	887.404	0	887.404	939.687	939.687
23	1.23737	1165.79	-14.3921	W. Fat Clay	85	18	189.426	375.35	893.601	0	893.601	942.21	942.21
24	1.16376	1095.93	-13.3136	W. Fat Clay	85	18	188.597	373.706	897.139	8.59067	888.548	941.769	933.178
25	1.16376	1092.21	-12.2728	W. Fat Clay	85	18	186.049	368.657	898.085	25.0816	873.003	938.558	913.476
26	1.16376	1085.4	-11.2361	W. Fat Clay	85	18	183.276	363.164	896.298	40.1935	856.104	932.708	892.514
27	1.16376	1075.53	-10.2032	W. Fat Clay	85	18	180.282	357.23	891.776	53.9419	837.834	924.224	870.282
28	1.16376	1062.65	-9.17352	W. Fat Clay	85	18	177.064	350.855	884.557	66.3407	818.217	913.152	846.811
29	1.16376	1046.78	-8.14687	W. Fat Clay	85	18	173.626	344.042	874.65	77.4022	797.247	899.505	822.103
30	1.16376	1027.94	-7.12285	W. Fat Clay	85	18	169.967	336.792	862.074	87.1373	774.936	883.313	796.176
31	1.16376	1006.15	-6.10111	W. Fat Clay	85	18	166.087	329.104	846.832	95.5556	751.277	864.585	769.03
32	1.16376	981.427	-5.08131	W. Fat Clay	85	18	161.988	320.98	828.937	102.665	726.272	843.34	740.675

33	1.16376	953.794	-4.06313	W. Fat Clay	85	18	157.667	312.418	808.393	108.473	699.92	819.593	711.12
34	1.16376	923.261	-3.04623	W. Fat Clay	85	18	153.124	303.417	785.203	112.985	672.218	793.352	680.367
35	1.16376	889.836	-2.03028	W. Fat Clay	85	18	148.36	293.977	759.368	116.204	643.164	764.628	648.424
36	1.16376	853.526	-1.01498	W. Fat Clay	85	18	143.372	284.094	730.884	118.134	612.75	733.424	615.29
37	1.16376	814.336	0	W. Fat Clay	85	18	138.161	273.768	699.745	118.778	580.967	699.745	580.967
38	1.16376	772.266	1.01498	W. Fat Clay	85	18	132.724	262.994	665.944	118.134	547.81	663.592	545.458
39	1.16376	727.315	2.03028	W. Fat Clay	85	18	127.06	251.77	629.469	116.204	513.265	624.964	508.76
40	1.16376	679.48	3.04623	W. Fat Clay	85	18	121.166	240.091	590.306	112.985	477.321	583.858	470.873
41	1.16376	628.753	4.06313	W. Fat Clay	85	18	115.041	227.954	548.439	108.473	439.966	540.267	431.794
42	1.16376	575.125	5.08131	W. Fat Clay	85	18	108.681	215.352	503.848	102.665	401.183	494.184	391.519
43	1.16376	518.584	6.10111	W. Fat Clay	85	18	102.084	202.281	456.509	95.5556	360.953	445.597	350.041
44	1.16376	459.113	7.12285	W. Fat Clay	85	18	95.2476	188.734	406.396	87.1373	319.259	394.494	307.356
45	1.16376	396.696	8.14687	W. Fat Clay	85	18	88.1668	174.703	353.481	77.4022	276.079	340.859	263.457
46	1.16376	331.31	9.17352	W. Fat Clay	85	18	80.8386	160.182	297.728	66.3407	231.387	284.673	218.333
47	1.16376	262.931	10.2032	W. Fat Clay	85	18	73.2584	145.162	239.102	53.9419	185.16	225.917	171.975
48	1.16376	191.532	11.2361	W. Fat Clay	85	18	65.4216	129.634	177.562	40.1935	137.369	164.565	124.372
49	1.16376	117.082	12.2728	W. Fat Clay	85	18	57.3232	113.586	113.062	25.0816	87.98	100.592	75.5101
50	1.16376	39.5446	13.3136	W. Fat Clay	85	18	48.9573	97.0093	45.5517	8.59067	36.961	33.9664	25.3757

Global Minimum Query (janbu simplified) - Safety Factor: 1.89475

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	0.998573	45.6233	-45.3577	W. Sandy Lean Clay	110	15	56.428	106.917	-11.5062	0	-11.5062	45.6307	45.6307
2	0.998573	133.603	-43.77	W. Sandy Lean Clay	110	15	67.7838	128.433	68.7941	0	68.7941	133.728	133.728
3	0.998573	215.297	-42.2235	W. Sandy Lean Clay	110	15	78.4652	148.672	144.326	0	144.326	215.533	215.533
4	0.998573	291.163	-40.7141	W. Sandy Lean Clay	110	15	88.5073	167.699	215.336	0	215.336	291.502	291.502
5	0.998573	361.597	-39.2381	W. Sandy Lean Clay	110	15	97.941	185.574	282.046	0	282.046	362.033	362.033
6	0.998573	426.94	-37.7926	W. Sandy Lean Clay	110	15	106.794	202.349	344.65	0	344.65	427.466	427.466
7	0.998573	487.49	-36.3749	W. Sandy Lean Clay	110	15	115.092	218.071	403.326	0	403.326	488.102	488.102
8	0.998573	543.511	-34.9826	W. Sandy Lean Clay	110	15	122.857	232.783	458.231	0	458.231	544.201	544.201
9	0.998573	595.233	-33.6136	W. Sandy Lean Clay	110	15	130.108	246.522	509.508	0	509.508	595.996	595.996
10	0.998573	642.862	-32.266	W. Sandy Lean Clay	110	15	136.864	259.324	557.284	0	557.284	643.693	643.693
11	1.07994	744.28	-30.8849	W. Fat Clay	85	18	147.864	280.165	600.655	0	600.655	689.097	689.097
12	1.07994	790.689	-29.47	W. Fat Clay	85	18	155.346	294.342	644.288	0	644.288	732.071	732.071
13	1.07994	832.567	-28.0746	W. Fat Clay	85	18	162.212	307.352	684.329	0	684.329	770.85	770.85
14	1.07994	870.093	-26.6972	W. Fat Clay	85	18	168.479	319.226	720.874	0	720.874	805.6	805.6
15	1.07994	903.427	-25.3362	W. Fat Clay	85	18	174.161	329.992	754.009	0	754.009	836.469	836.469

Tomball ISD HCFC Drainage Channel

Monday, January 15, 2024

16	1.07994	932.711	-23.9904	W. Fat Clay	85	18	179.272	339.675	783.808	0	783.808	863.589	863.589
17	1.07994	958.077	-22.6585	W. Fat Clay	85	18	183.822	348.296	810.342	0	810.342	887.08	887.08
18	1.07994	979.639	-21.3394	W. Fat Clay	85	18	187.822	355.876	833.671	0	833.671	907.049	907.049
19	1.07994	997.502	-20.032	W. Fat Clay	85	18	191.283	362.433	853.851	0	853.851	923.593	923.593
20	1.07994	1011.76	-18.7355	W. Fat Clay	85	18	194.211	367.982	870.93	0	870.93	936.801	936.801
21	1.04738	991.571	-17.4681	W. Fat Clay	85	18	194.915	369.315	885.312	10.2819	875.03	946.649	936.367
22	1.04738	998.532	-16.2288	W. Fat Clay	85	18	193.519	366.671	896.973	30.0771	866.896	953.301	923.224
23	1.04738	1002.41	-14.9972	W. Fat Clay	85	18	191.869	363.543	905.611	48.3432	857.268	957.012	908.668
24	1.04738	1003.27	-13.7726	W. Fat Clay	85	18	189.964	359.935	911.27	65.1077	846.163	957.834	892.726
25	1.04738	1001.15	-12.5545	W. Fat Clay	85	18	187.809	355.852	913.992	80.3949	833.597	955.816	875.421
26	1.04738	996.101	-11.342	W. Fat Clay	85	18	185.406	351.298	913.809	94.2269	819.582	950.999	856.772
27	1.04738	988.159	-10.1348	W. Fat Clay	85	18	182.756	346.277	910.752	106.623	804.129	943.42	836.797
28	1.04738	977.359	-8.93201	W. Fat Clay	85	18	179.861	340.791	904.845	117.6	787.245	933.114	815.514
29	1.04738	963.732	-7.73321	W. Fat Clay	85	18	176.721	334.842	896.109	127.174	768.935	920.107	792.933
30	1.04738	947.303	-6.53781	W. Fat Clay	85	18	173.337	328.431	884.56	135.357	749.203	904.425	769.068
31	1.04738	928.094	-5.34527	W. Fat Clay	85	18	169.71	321.558	870.212	142.159	728.053	886.09	743.931
32	1.04738	906.124	-4.15504	W. Fat Clay	85	18	165.839	314.224	853.07	147.591	705.479	865.118	717.527
33	1.04738	881.406	-2.96661	W. Fat Clay	85	18	161.724	306.427	833.141	151.658	681.483	841.522	689.864
34	1.04738	853.952	-1.77946	W. Fat Clay	85	18	157.364	298.166	810.424	154.367	656.057	815.313	660.946
35	1.04738	823.767	-0.593068	W. Fat Clay	85	18	152.758	289.438	784.917	155.72	629.197	786.498	630.778
36	1.04738	790.857	0.593068	W. Fat Clay	85	18	147.904	280.241	756.611	155.72	600.891	755.08	599.36
37	1.04738	755.22	1.77946	W. Fat Clay	85	18	142.8	270.571	725.494	154.367	571.127	721.058	566.691
38	1.04738	716.854	2.96661	W. Fat Clay	85	18	137.444	260.422	691.553	151.658	539.895	684.43	532.772
39	1.04738	675.751	4.15504	W. Fat Clay	85	18	131.833	249.791	654.766	147.591	507.175	645.189	497.598
40	1.04738	631.9	5.34527	W. Fat Clay	85	18	125.964	238.671	615.11	142.159	472.951	603.325	461.166
41	1.04738	585.288	6.53781	W. Fat Clay	85	18	119.834	227.055	572.556	135.357	437.199	558.823	423.466
42	1.04738	535.896	7.73321	W. Fat Clay	85	18	113.437	214.935	527.071	127.174	399.897	511.667	384.493
43	1.04738	483.702	8.93201	W. Fat Clay	85	18	106.769	202.301	478.617	117.6	361.017	461.836	344.236
44	1.04738	428.681	10.1348	W. Fat Clay	85	18	99.8258	189.145	427.149	106.623	320.526	409.305	302.682
45	1.04738	370.803	11.342	W. Fat Clay	85	18	92.6008	175.455	372.62	94.2269	278.393	354.046	259.819
46	1.04738	310.032	12.5545	W. Fat Clay	85	18	85.0873	161.219	314.973	80.3949	234.578	296.025	215.63
47	1.04738	246.33	13.7726	W. Fat Clay	85	18	77.2781	146.423	254.147	65.1077	189.04	235.205	170.097
48	1.04738	179.652	14.9972	W. Fat Clay	85	18	69.1651	131.051	190.072	48.3432	141.729	171.543	123.2
49	1.04738	109.95	16.2288	W. Fat Clay	85	18	60.7396	115.086	122.673	30.0771	92.5959	104.993	74.9164
50	1.04738	37.1682	17.4681	W. Fat Clay	85	18	51.9915	98.5109	51.8643	10.2819	41.5824	35.5033	25.2214

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.98151

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.406	170.899	0	0	0
2	26.6194	169.836	-69.6957	0	0
3	27.8329	168.825	-70.4299	0	0
4	29.0463	167.861	-13.7727	0	0
5	30.2598	166.943	90.1312	0	0
6	31.4732	166.068	232.354	0	0
7	32.6867	165.234	405.013	0	0
8	33.9001	164.44	601.136	0	0
9	35.1136	163.682	814.54	0	0
10	36.327	162.961	1039.74	0	0
11	37.5405	162.274	1271.87	0	0
12	38.7539	161.621	1506.6	0	0
13	39.9674	161	1740.1	0	0
14	41.2048	160.399	1962.97	0	0
15	42.4421	159.83	2176.64	0	0
16	43.6795	159.291	2378.5	0	0
17	44.9169	158.782	2566.27	0	0
18	46.1542	158.302	2738	0	0
19	47.3916	157.85	2892.03	0	0
20	48.629	157.427	3026.98	0	0
21	49.8664	157.031	3141.7	0	0
22	51.1037	156.661	3235.32	0	0
23	52.3411	156.318	3307.17	0	0
24	53.5785	156	3356.79	0	0
25	54.7422	155.725	3384.64	0	0
26	55.906	155.471	3395.74	0	0
27	57.0697	155.24	3389.92	0	0
28	58.2335	155.031	3367.15	0	0
29	59.3973	154.843	3327.57	0	0
30	60.561	154.676	3271.47	0	0
31	61.7248	154.531	3199.27	0	0
32	62.8885	154.406	3111.55	0	0
33	64.0523	154.303	3009.04	0	0
34	65.2161	154.22	2892.59	0	0
35	66.3798	154.158	2763.23	0	0
36	67.5436	154.117	2622.11	0	0
37	68.7073	154.096	2470.52	0	0
38	69.8711	154.096	2309.93	0	0
39	71.0349	154.117	2141.92	0	0
40	72.1986	154.158	1968.26	0	0
41	73.3624	154.22	1790.86	0	0
42	74.5262	154.303	1611.8	0	0
43	75.6899	154.406	1433.33	0	0
44	76.8537	154.531	1257.88	0	0
45	78.0174	154.676	1088.07	0	0
46	79.1812	154.843	926.695	0	0
47	80.345	155.031	776.775	0	0
48	81.5087	155.24	641.538	0	0
49	82.6725	155.471	524.442	0	0
50	83.8362	155.725	429.187	0	0
51	85	156	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.89475

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	32.7933	169.052	0	0	0
2	33.7919	168.041	-68.0387	0	0
3	34.7905	167.084	-69.9861	0	0
4	35.789	166.178	-17.6309	0	0
5	36.7876	165.318	78.9447	0	0
6	37.7862	164.503	211.059	0	0
7	38.7848	163.729	371.195	0	0
8	39.7833	162.993	552.812	0	0
9	40.7819	162.294	750.198	0	0
10	41.7805	161.63	958.352	0	0
11	42.7791	161	1172.88	0	0
12	43.859	160.354	1401.02	0	0
13	44.9389	159.744	1626.27	0	0
14	46.0189	159.168	1845.1	0	0
15	47.0988	158.625	2054.47	0	0
16	48.1788	158.113	2251.73	0	0
17	49.2587	157.633	2434.63	0	0
18	50.3386	157.182	2601.24	0	0
19	51.4186	156.76	2749.93	0	0
20	52.4985	156.366	2879.35	0	0
21	53.5785	156	2988.41	0	0
22	54.6258	155.67	3075.85	0	0
23	55.6732	155.366	3146.41	0	0
24	56.7206	155.085	3199.35	0	0
25	57.768	154.828	3234.14	0	0
26	58.8154	154.595	3250.41	0	0
27	59.8628	154.385	3248	0	0
28	60.9102	154.198	3226.91	0	0
29	61.9575	154.033	3187.29	0	0
30	63.0049	153.891	3129.46	0	0
31	64.0523	153.771	3053.9	0	0
32	65.0997	153.673	2961.25	0	0
33	66.1471	153.597	2852.28	0	0
34	67.1945	153.542	2727.95	0	0
35	68.2418	153.51	2589.33	0	0
36	69.2892	153.499	2437.68	0	0
37	70.3366	153.51	2274.41	0	0
38	71.384	153.542	2101.08	0	0
39	72.4314	153.597	1919.44	0	0
40	73.4788	153.673	1731.4	0	0
41	74.5262	153.771	1539.06	0	0
42	75.5735	153.891	1344.69	0	0
43	76.6209	154.033	1150.79	0	0
44	77.6683	154.198	960.064	0	0
45	78.7157	154.385	775.43	0	0
46	79.7631	154.595	600.06	0	0
47	80.8105	154.828	437.385	0	0
48	81.8578	155.085	291.116	0	0
49	82.9052	155.366	165.268	0	0
50	83.9526	155.67	64.1868	0	0
51	85	156	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
-2.77556e-17	156
85	156
120	156

Distributed Load

X	Y
25	171
0	171

External Boundary

X	Y
0	171
0	165
0	163
0	161
0	141
120	141
120	148
120	156
90	156
85	156
65	161
49	165
25	171
20	171

Material Boundary

X	Y
0	161
33	161
57	161
65	161

Material Boundary

X	Y
0	163
20	163
25	163
33	161
85	148
90	148
120	148

Material Boundary

X		Y	
20		171	
20		169	
25		169	
41		165	
57		161	
85		154	
90		154	
90		156	

Material Boundary

X		Y	
20		163	
20		165	
20		169	

Material Boundary

X		Y	
90		148	
90		154	



TISD HCFC Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 1, Rapid Drawdown - Total Stress Global Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:44:53 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.731s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:44:53 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft ³]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	20
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	175
Friction Angle [deg]	17
Water Surface	Water Table
Hu Value	1

W. Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	125
Friction Angle [deg]	17
Water Surface	Water Table
Hu Value	1

Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	175
Friction Angle [deg]	13
Water Surface	Water Table
Hu Value	1

W. Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	13
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.253400
Center:	69.241, 231.834
Radius:	77.440
Left Slip Surface Endpoint:	21.324, 171.000
Right Slip Surface Endpoint:	84.967, 156.008
Resisting Moment:	908535 lb-ft
Driving Moment:	724859 lb-ft
Total Slice Area:	346.052 ft2
Surface Horizontal Width:	63.6432 ft
Surface Average Height:	5.43738 ft

Method: janbu simplified

FS	1.156240
Center:	60.241, 202.685
Radius:	56.408
Left Slip Surface Endpoint:	13.574, 171.000
Right Slip Surface Endpoint:	91.900, 156.000
Resisting Horizontal Force:	24101.3 lb
Driving Horizontal Force:	20844.5 lb
Total Slice Area:	940.66 ft ²
Surface Horizontal Width:	78.3262 ft
Surface Average Height:	12.0095 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	17641
Number of Invalid Surfaces:	440

Error Codes

Error Code -103 reported for 438 surfaces
Error Code -108 reported for 2 surfaces

Method: janbu simplified

Number of Valid Surfaces:	17629
Number of Invalid Surfaces:	452

Error Codes

Error Code -103 reported for 438 surfaces
Error Code -108 reported for 14 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.2534

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.27863	75.6217	-37.6292	W. Sandy Lean Clay	125	17	89.7747	112.524	-10.0558	30.7527	-40.8085	59.153	28.4003
2	1.27863	223.68	-36.4439	W. Sandy Lean Clay	125	17	101.866	127.678	99.7266	90.966	8.76059	174.949	83.983
3	1.27863	365.127	-35.2765	W. Sandy Lean Clay	125	17	113.537	142.307	205.255	148.646	56.6091	285.574	136.928
4	1.27863	470.726	-34.1257	W. Sandy Lean Clay	125	17	122.574	153.634	285.093	191.436	93.6567	368.161	176.725
5	1.27863	551.837	-32.9903	W. Sandy Lean Clay	125	17	129.722	162.594	347.386	224.423	122.963	431.598	207.175
6	1.27863	627.454	-31.8694	W. Sandy Lean Clay	125	17	136.489	171.075	405.881	255.175	150.706	490.737	235.562
7	1.27863	697.779	-30.7619	W. Sandy Lean Clay	125	17	142.882	179.089	460.691	283.776	176.915	545.738	261.962
8	1.27863	762.996	-29.6671	W. Sandy Lean Clay	125	17	148.909	186.642	511.92	310.298	201.622	596.743	286.445
9	1.27863	823.273	-28.584	W. Sandy Lean Clay	125	17	154.575	193.744	559.664	334.812	224.852	643.885	309.073
10	1.27863	878.764	-27.512	W. Sandy Lean Clay	125	17	159.887	200.402	604.008	357.379	246.629	687.283	329.904
11	1.27863	929.609	-26.4504	W. Sandy Lean Clay	125	17	164.85	206.623	645.035	378.057	266.978	727.048	348.991
12	1.27863	975.938	-25.3984	W. Sandy Lean Clay	125	17	169.47	212.414	682.817	396.899	285.918	763.282	366.383
13	1.27863	1017.87	-24.3555	W. Sandy Lean Clay	125	17	173.751	217.78	717.423	413.953	303.47	796.078	382.125
14	1.27084	1048.99	-23.3243	W. Fat Clay	100	13	141.524	177.386	764.414	429.222	335.192	825.435	396.213
15	1.27084	1082.07	-22.3042	W. Fat Clay	100	13	144.172	180.705	792.329	442.758	349.571	851.47	408.712
16	1.27084	1111.13	-21.2915	W. Fat Clay	100	13	146.566	183.706	817.217	454.65	362.567	874.336	419.686
17	1.27084	1136.26	-20.2857	W. Fat Clay	100	13	148.711	186.394	839.148	464.933	374.215	894.116	429.183
18	1.27084	1157.54	-19.2863	W. Fat Clay	100	13	150.608	188.772	858.148	473.638	384.51	910.85	437.212
19	1.27084	1175.03	-18.2931	W. Fat Clay	100	13	152.261	190.844	874.282	480.796	393.486	924.617	443.821
20	1.27084	1188.8	-17.3055	W. Fat Clay	100	13	153.671	192.612	887.578	486.432	401.146	935.458	449.026
21	1.27084	1198.92	-16.3232	W. Fat Clay	100	13	154.842	194.079	898.071	490.573	407.498	943.418	452.845
22	1.27084	1205.44	-15.3458	W. Fat Clay	100	13	155.774	195.247	905.804	493.241	412.563	948.553	455.312
23	1.27084	1208.42	-14.3729	W. Fat Clay	100	13	156.469	196.119	910.793	494.457	416.336	950.889	456.432
24	1.27084	1207.89	-13.4043	W. Fat Clay	100	13	156.929	196.695	913.078	494.242	418.836	950.476	456.234
25	1.27084	1203.91	-12.4396	W. Fat Clay	100	13	157.155	196.979	912.67	492.612	420.058	947.337	454.725
26	1.27084	1196.51	-11.4784	W. Fat Clay	100	13	157.148	196.97	909.603	489.585	420.018	941.514	451.929
27	1.27084	1185.73	-10.5205	W. Fat Clay	100	13	156.909	196.669	903.899	485.175	418.724	933.038	447.863
28	1.27084	1171.61	-9.56555	W. Fat Clay	100	13	156.437	196.079	895.561	479.395	416.166	921.923	442.528
29	1.27084	1154.16	-8.61328	W. Fat Clay	100	13	155.735	195.198	884.602	472.257	412.345	908.192	435.935
30	1.27084	1133.43	-7.66341	W. Fat Clay	100	13	154.8	194.027	871.05	463.773	407.277	891.879	428.106
31	1.27084	1109.43	-6.71565	W. Fat Clay	100	13	153.635	192.566	854.903	453.952	400.951	872.994	419.042
32	1.27084	1082.18	-5.76974	W. Fat Clay	100	13	152.238	190.815	836.164	442.802	393.362	851.546	408.744
33	1.27084	1051.7	-4.8254	W. Fat Clay	100	13	150.609	188.773	814.853	430.331	384.522	827.567	397.236
34	1.27084	1018	-3.88237	W. Fat Clay	100	13	148.747	186.44	790.957	416.544	374.413	801.051	384.507
35	1.27084	981.106	-2.9404	W. Fat Clay	100	13	146.652	183.814	764.483	401.446	363.037	772.016	370.57

36	1.27084	941.015	-1.99922	W. Fat Clay	100	13	144.322	180.894	735.431	385.042	350.389	740.469	355.427
37	1.27084	897.737	-1.05858	W. Fat Clay	100	13	141.757	177.678	703.794	367.333	336.461	706.413	339.08
38	1.27084	851.277	-0.118221	W. Fat Clay	100	13	138.954	174.165	669.568	348.323	321.245	669.854	321.531
39	1.27084	801.635	0.822102	W. Fat Clay	100	13	135.913	170.353	632.742	328.01	304.732	630.792	302.782
40	1.27084	748.812	1.76265	W. Fat Clay	100	13	132.63	166.239	593.308	306.396	286.912	589.226	282.83
41	1.27084	692.803	2.70367	W. Fat Clay	100	13	129.105	161.82	551.25	283.479	267.771	545.153	261.674
42	1.27084	633.602	3.64542	W. Fat Clay	100	13	125.334	157.094	506.554	259.255	247.299	498.569	239.314
43	1.27084	571.201	4.58816	W. Fat Clay	100	13	121.315	152.056	459.202	233.722	225.48	449.467	215.745
44	1.27084	505.589	5.53214	W. Fat Clay	100	13	117.045	146.704	409.174	206.874	202.3	397.837	190.963
45	1.27084	436.75	6.47763	W. Fat Clay	100	13	112.521	141.034	356.445	178.707	177.738	343.669	164.962
46	1.27084	364.669	7.4249	W. Fat Clay	100	13	107.739	135.04	300.99	149.213	151.777	286.949	137.736
47	1.27084	289.325	8.37422	W. Fat Clay	100	13	102.696	128.719	242.78	118.384	124.396	227.662	109.278
48	1.27084	210.696	9.32586	W. Fat Clay	100	13	97.3869	122.065	181.784	86.2107	95.573	165.791	79.5801
49	1.27084	128.757	10.2801	W. Fat Clay	100	13	91.8076	115.072	117.966	52.6829	65.2827	101.314	48.6313
50	1.27084	43.478	11.2372	W. Fat Clay	100	13	85.9531	107.734	51.2868	17.7887	33.4981	34.2096	16.4209

Global Minimum Query (janbu simplified) - Safety Factor: 1.15624

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.64538	226.801	-54.3896	W. Sandy Lean Clay	125	17	91.7534	106.089	9.82088	71.676	-61.8551	137.932	66.2557
2	1.64538	658.609	-51.6086	W. Sandy Lean Clay	125	17	119.172	137.791	249.981	208.143	41.8376	400.384	192.241
3	1.64538	1050.41	-48.9894	W. Sandy Lean Clay	125	17	145.059	167.723	471.709	331.966	139.743	638.518	306.552
4	1.64538	1408.38	-46.5017	W. Sandy Lean Clay	125	17	169.539	196.028	677.42	445.099	232.321	856.087	410.988
5	2.08409	2250.82	-43.8204	Sandy Lean Clay	175	17	230.085	266.033	859.356	561.598	297.758	1080.16	518.559
6	1.53458	1965.7	-41.3156	Fat Clay	175	13	233.217	269.655	1076.08	666.084	409.996	1281.08	614.994
7	1.53458	2204	-39.2711	Fat Clay	175	13	248.384	287.192	1233.28	747.318	485.958	1436.37	689.049
8	1.53458	2379	-37.2847	Fat Clay	175	13	260.378	301.059	1352.15	806.134	546.02	1550.4	744.264
9	1.53458	2516.16	-35.3495	Fat Clay	175	13	270.25	312.474	1448.07	852.61	595.463	1639.77	787.162
10	1.53458	2639.12	-33.4596	Fat Clay	175	13	279.343	322.988	1535.28	894.275	641.005	1719.89	825.615
11	1.53458	2748.81	-31.6102	Fat Clay	175	13	287.7	332.65	1614.3	931.445	682.857	1791.37	859.922
12	1.53458	2846.04	-29.7969	Fat Clay	175	13	295.356	341.502	1685.59	964.389	721.196	1854.72	890.327
13	1.53458	2931.48	-28.0159	Fat Clay	175	13	302.34	349.578	1749.52	993.342	756.18	1910.39	917.045
14	1.53458	3005.73	-26.2639	Fat Clay	175	13	308.683	356.912	1806.45	1018.5	787.952	1958.77	940.271
15	1.53458	3069.31	-24.538	Fat Clay	175	13	314.407	363.53	1856.66	1040.05	816.61	2000.2	960.145
16	1.53458	3122.67	-22.8355	Fat Clay	175	13	319.531	369.455	1900.4	1058.13	842.273	2034.95	976.824
17	1.53458	3166.19	-21.1541	Fat Clay	175	13	324.075	374.709	1937.91	1072.88	865.032	2063.31	990.434
18	1.53458	3200.23	-19.4916	Fat Clay	175	13	328.055	379.31	1969.37	1084.41	884.965	2085.49	1001.08
19	1.53458	3225.09	-17.846	Fat Clay	175	13	331.481	383.272	1994.96	1092.83	902.127	2101.68	1008.85
20	1.53458	3241.02	-16.2155	Fat Clay	175	13	334.368	386.61	2014.81	1098.23	916.584	2112.06	1013.83
21	1.53458	3248.27	-14.5984	Fat Clay	175	13	336.724	389.334	2029.07	1100.69	928.382	2116.77	1016.08
22	1.53458	3247.02	-12.9931	Fat Clay	175	13	338.558	391.454	2037.84	1100.26	937.575	2115.95	1015.69
23	1.53458	3237.46	-11.3982	Fat Clay	175	13	339.877	392.979	2041.2	1097.03	944.167	2109.72	1012.69
24	1.53458	3219.74	-9.81214	Fat Clay	175	13	340.684	393.913	2039.24	1091.02	948.218	2098.16	1007.14
25	1.53458	3193.97	-8.23365	Fat Clay	175	13	340.987	394.263	2032.02	1082.29	949.728	2081.36	999.069
26	1.53458	3160.27	-6.66144	Fat Clay	175	13	340.786	394.03	2019.59	1070.87	948.722	2059.39	988.523
27	1.53458	3118.72	-5.09425	Fat Clay	175	13	340.083	393.218	2001.99	1056.79	945.203	2032.31	975.52
28	1.53458	3069.39	-3.53088	Fat Clay	175	13	338.879	391.826	1979.25	1040.07	939.178	2000.16	960.089
29	1.53458	3012.32	-1.97014	Fat Clay	175	13	337.173	389.853	1951.36	1020.73	930.632	1962.96	942.23
30	1.53458	2947.54	-0.410861	Fat Clay	175	13	334.962	387.297	1918.34	998.785	919.555	1920.74	921.957
31	1.53458	2875.08	1.14811	Fat Clay	175	13	332.244	384.154	1880.18	974.229	905.948	1873.52	899.29
32	1.53458	2794.91	2.70794	Fat Clay	175	13	329.014	380.419	1836.84	947.066	889.77	1821.27	874.208
33	1.53458	2707.03	4.26978	Fat Clay	175	13	325.266	376.085	1788.28	917.287	870.997	1764	846.713
34	1.53458	2611.39	5.8348	Fat Clay	175	13	320.992	371.144	1734.48	884.88	849.595	1701.67	816.793
35	1.53458	2507.95	7.40421	Fat Clay	175	13	316.185	365.586	1675.34	849.826	825.515	1634.25	784.426
36	1.53458	2396.61	8.97923	Fat Clay	175	13	310.833	359.398	1610.81	812.099	798.716	1561.7	749.6
37	1.53458	2277.29	10.5611	Fat Clay	175	13	304.925	352.566	1540.79	771.667	769.125	1483.94	712.274
38	1.53458	2149.87	12.1512	Fat Clay	175	13	298.445	345.074	1465.17	728.492	736.674	1400.91	672.414
39	1.53458	2014.22	13.7509	Fat Clay	175	13	291.379	336.904	1383.81	682.526	701.281	1312.5	629.977
40	1.53458	1870.18	15.3616	Fat Clay	175	13	283.707	328.033	1296.57	633.717	662.856	1218.63	584.915
41	1.53458	1717.56	16.9848	Fat Clay	175	13	275.407	318.437	1203.29	581.999	621.294	1119.17	537.173
42	1.53458	1556.14	18.6222	Fat Clay	175	13	266.457	308.088	1103.77	527.302	576.469	1013.98	486.682
43	1.61012	1449.24	20.3167	W. Fat Clay	100	13	186.533	215.677	969.095	468.04	501.055	900.032	431.992
44	1.61012	1250.8	22.0711	W. Fat Clay	100	13	175.108	202.467	847.787	403.954	443.833	776.786	372.832
45	1.61012	1041.2	23.8477	W. Fat Clay	100	13	162.826	188.266	718.586	336.26	382.326	646.609	310.349
46	1.61012	823.141	25.6489	W. Fat Clay	100	13	150.067	173.514	583.237	264.814	318.423	511.18	246.366
47	1.61012	647.701	27.4778	W. Fat Clay	100	13	139.52	161.319	474.779	209.178	265.601	402.218	193.04
48	1.61012	479.38	29.3377	W. Fat Clay	100	13	129.551	149.792	370.491	154.818	215.673	297.678	142.86
49	1.61012	297.632	31.2321	W. Fat Clay	100	13	118.548	137.069	256.686	96.1209	160.565	184.8	88.6796
50	1.61012	101.654	33.1654	W. Fat Clay	100	13	106.415	123.041	132.63	32.8285	99.8017	63.0859	30.2574

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.2534

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	21.324	171	0	0	0
2	22.6026	170.014	-124.684	0	0
3	23.8813	169.07	-160.751	0	0
4	25.1599	168.166	-120.242	0	0
5	26.4385	167.299	-29.9026	0	0
6	27.7171	166.469	92.6008	0	0
7	28.9958	165.674	240.754	0	0
8	30.2744	164.913	408.703	0	0
9	31.553	164.185	591.185	0	0
10	32.8316	163.488	783.47	0	0
11	34.1103	162.822	981.305	0	0
12	35.3889	162.186	1180.87	0	0
13	36.6675	161.579	1378.75	0	0
14	37.9462	161	1571.87	0	0
15	39.217	160.452	1810.91	0	0
16	40.4878	159.931	2040.77	0	0
17	41.7587	159.435	2259.27	0	0
18	43.0295	158.966	2464.49	0	0
19	44.3004	158.521	2654.74	0	0
20	45.5712	158.101	2828.57	0	0
21	46.842	157.705	2984.75	0	0
22	48.1129	157.333	3122.24	0	0
23	49.3837	156.984	3240.21	0	0
24	50.6545	156.658	3338	0	0
25	51.9254	156.356	3415.13	0	0
26	53.1962	156.075	3471.29	0	0
27	54.4671	155.817	3506.34	0	0
28	55.7379	155.581	3520.28	0	0
29	57.0087	155.367	3513.3	0	0
30	58.2796	155.174	3485.7	0	0
31	59.5504	155.003	3437.95	0	0
32	60.8212	154.854	3370.66	0	0
33	62.0921	154.725	3284.59	0	0
34	63.3629	154.618	3180.64	0	0
35	64.6338	154.532	3059.85	0	0
36	65.9046	154.467	2923.41	0	0
37	67.1754	154.422	2772.65	0	0
38	68.4463	154.399	2609.05	0	0
39	69.7171	154.396	2434.24	0	0
40	70.988	154.414	2250.01	0	0
41	72.2588	154.453	2058.28	0	0
42	73.5296	154.514	1861.15	0	0
43	74.8005	154.594	1660.88	0	0
44	76.0713	154.696	1459.9	0	0
45	77.3421	154.82	1260.81	0	0
46	78.613	154.964	1066.4	0	0
47	79.8838	155.129	879.654	0	0
48	81.1547	155.317	703.745	0	0
49	82.4255	155.525	542.063	0	0
50	83.6963	155.756	398.217	0	0
51	84.9672	156.008	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.15624

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	13.574	171	0	0	0
2	15.2194	168.703	-128.301	0	0
3	16.8648	166.626	194.863	0	0
4	18.5101	164.734	848.862	0	0
5	20.1555	163	1744.73	0	0
6	22.2396	161	2984.26	0	0
7	23.7742	159.651	4078.14	0	0
8	25.3088	158.396	5244.69	0	0
9	26.8434	157.228	6425.25	0	0
10	28.3779	156.139	7587.1	0	0
11	29.9125	155.125	8715.76	0	0
12	31.4471	154.181	9799.21	0	0
13	32.9817	153.302	10827.5	0	0
14	34.5163	152.486	11792.3	0	0
15	36.0509	151.728	12686.9	0	0
16	37.5854	151.028	13505.5	0	0
17	39.12	150.382	14243.5	0	0
18	40.6546	149.788	14897.3	0	0
19	42.1892	149.245	15463.9	0	0
20	43.7238	148.75	15941.2	0	0
21	45.2584	148.304	16327.7	0	0
22	46.7929	147.905	16622.3	0	0
23	48.3275	147.55	16824.7	0	0
24	49.8621	147.241	16935	0	0
25	51.3967	146.976	16953.8	0	0
26	52.9313	146.754	16882.1	0	0
27	54.4659	146.574	16721.4	0	0
28	56.0005	146.438	16473.8	0	0
29	57.535	146.343	16141.5	0	0
30	59.0696	146.29	15727.5	0	0
31	60.6042	146.279	15234.9	0	0
32	62.1388	146.31	14667.6	0	0
33	63.6734	146.382	14029.7	0	0
34	65.208	146.497	13326.1	0	0
35	66.7425	146.654	12561.8	0	0
36	68.2771	146.853	11742.8	0	0
37	69.8117	147.096	10875.6	0	0
38	71.3463	147.382	9967.14	0	0
39	72.8809	147.712	9025.36	0	0
40	74.4155	148.088	8058.86	0	0
41	75.95	148.509	7077.17	0	0
42	77.4846	148.978	6090.82	0	0
43	79.0192	149.495	5111.44	0	0
44	80.6293	150.091	4233.6	0	0
45	82.2395	150.744	3398.37	0	0
46	83.8496	151.456	2624.93	0	0
47	85.4597	152.229	1932.56	0	0
48	87.0698	153.066	1310.5	0	0
49	88.6799	153.971	766.779	0	0
50	90.29	154.948	325.42	0	0
51	91.9002	156	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	171
25	171
85	156
120	156

External Boundary

X	Y
0	171
0	169
0	165
0	163
0	161
0	141
120	141
120	148
120	154
120	156
95	156
85	156
65	161
49	165
25	171
15	171
10	171

Material Boundary

X	Y
0	161
33	161
53	161
57	161
65	161

Material Boundary

X	Y
0	163
10	163
15	163
25	163
33	161
85	148
95	148
120	148



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 1, Rapid Drawdown - Total Stress Local Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:44:53 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.491s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:44:53 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	20
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	175
Friction Angle [deg]	17
Water Surface	Water Table
Hu Value	1

W. Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	125
Friction Angle [deg]	17
Water Surface	Water Table
Hu Value	1

Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	175
Friction Angle [deg]	13
Water Surface	Water Table
Hu Value	1

W. Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	13
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.267370
Center:	68.178, 218.122
Radius:	63.913
Left Slip Surface Endpoint:	25.000, 171.000
Right Slip Surface Endpoint:	84.102, 156.225
Resisting Moment:	694603 lb-ft
Driving Moment:	548067 lb-ft
Total Slice Area:	317.622 ft2
Surface Horizontal Width:	59.1016 ft
Surface Average Height:	5.37417 ft

Method: janbu simplified

FS	1.225080
Center:	68.178, 218.122
Radius:	63.913
Left Slip Surface Endpoint:	25.000, 171.000
Right Slip Surface Endpoint:	84.102, 156.225
Resisting Horizontal Force:	10145.6 lb
Driving Horizontal Force:	8281.54 lb
Total Slice Area:	317.622 ft ²
Surface Horizontal Width:	59.1016 ft
Surface Average Height:	5.37417 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	16532
Number of Invalid Surfaces:	1549

Error Codes

Error Code -101 reported for 234 surfaces
 Error Code -102 reported for 2 surfaces
 Error Code -106 reported for 18 surfaces
 Error Code -108 reported for 24 surfaces
 Error Code -1000 reported for 1271 surfaces

Method: janbu simplified

Number of Valid Surfaces:	16500
Number of Invalid Surfaces:	1581

Error Codes

Error Code -101 reported for 234 surfaces
 Error Code -102 reported for 2 surfaces
 Error Code -106 reported for 18 surfaces
 Error Code -108 reported for 56 surfaces
 Error Code -1000 reported for 1271 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

- 101 = Only one (or zero) surface / slope intersections.
- 102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
- 106 = Average slice width is less than $0.0001 \times (\text{maximum horizontal extent of soil region})$. This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
- 108 = Total driving moment or total driving force < 0.1 . This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.26737

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.20909	56.4213	-41.7726	W. Sandy Lean Clay	125	17	85.5928	108.478	-29.7779	24.2638	-54.0417	46.6773	22.4135
2	1.20909	165.393	-40.3349	W. Sandy Lean Clay	125	17	95.011	120.414	56.1301	71.1298	-14.9997	136.805	65.675
3	1.20909	266.86	-38.9272	W. Sandy Lean Clay	125	17	103.938	131.728	136.776	114.768	22.0082	220.725	105.957
4	1.20909	361.267	-37.547	W. Sandy Lean Clay	125	17	112.392	142.442	212.42	155.371	57.0488	298.807	143.436
5	1.20909	449.008	-36.1919	W. Sandy Lean Clay	125	17	120.385	152.573	283.293	193.106	90.1867	371.375	178.269
6	1.20909	530.427	-34.8598	W. Sandy Lean Clay	125	17	127.934	162.139	349.6	228.122	121.478	438.715	210.593
7	1.20909	605.834	-33.549	W. Sandy Lean Clay	125	17	135.049	171.158	411.527	260.553	150.974	501.081	240.528
8	1.20909	675.502	-32.2579	W. Sandy Lean Clay	125	17	141.744	179.642	469.24	290.515	178.725	558.701	268.186
9	1.20909	739.677	-30.9848	W. Sandy Lean Clay	125	17	148.027	187.605	522.888	318.115	204.773	611.778	293.663
10	1.20909	798.581	-29.7285	W. Sandy Lean Clay	125	17	153.91	195.06	572.606	343.449	229.157	660.496	317.047
11	1.20909	852.414	-28.4878	W. Sandy Lean Clay	125	17	159.4	202.018	618.516	366.601	251.915	705.019	338.418
12	1.20909	901.355	-27.2615	W. Sandy Lean Clay	125	17	164.505	208.489	660.729	387.649	273.08	745.496	357.847
13	1.17349	917.158	-26.0662	W. Fat Clay	100	13	135.198	171.346	715.444	406.413	309.031	781.578	375.165
14	1.17349	954.617	-24.9007	W. Fat Clay	100	13	138.338	175.325	749.282	423.012	326.27	813.499	390.487
15	1.17349	988.008	-23.7461	W. Fat Clay	100	13	141.208	178.962	779.831	437.808	342.023	841.952	404.144
16	1.17349	1017.44	-22.6017	W. Fat Clay	100	13	143.811	182.262	807.169	450.851	356.318	867.037	416.186
17	1.17349	1043.02	-21.4667	W. Fat Clay	100	13	146.153	185.23	831.352	462.184	369.168	888.825	426.641
18	1.17349	1064.82	-20.3405	W. Fat Clay	100	13	148.237	187.871	852.454	471.848	380.606	907.408	435.56
19	1.17349	1082.95	-19.2225	W. Fat Clay	100	13	150.066	190.19	870.536	479.88	390.656	922.861	442.981
20	1.17349	1097.47	-18.112	W. Fat Clay	100	13	151.645	192.19	885.635	486.315	399.32	935.235	448.92
21	1.17349	1108.46	-17.0085	W. Fat Clay	100	13	152.974	193.875	897.804	491.184	406.62	944.598	453.414
22	1.17349	1115.98	-15.9115	W. Fat Clay	100	13	154.058	195.249	907.086	494.515	412.571	951.004	456.489
23	1.17349	1120.08	-14.8204	W. Fat Clay	100	13	154.898	196.313	913.509	496.333	417.176	954.494	458.161
24	1.17349	1120.82	-13.7348	W. Fat Clay	100	13	155.496	197.071	917.122	496.663	420.459	955.128	458.465
25	1.17349	1118.26	-12.6542	W. Fat Clay	100	13	155.854	197.524	917.951	495.526	422.425	952.944	457.418
26	1.17349	1112.42	-11.5782	W. Fat Clay	100	13	155.972	197.675	916.017	492.941	423.076	947.971	455.03
27	1.17349	1103.36	-10.5063	W. Fat Clay	100	13	155.853	197.523	911.349	488.925	422.424	940.252	451.327
28	1.17349	1091.11	-9.43809	W. Fat Clay	100	13	155.496	197.071	903.959	483.495	420.464	929.808	446.313
29	1.17349	1075.69	-8.37319	W. Fat Clay	100	13	154.903	196.319	893.865	476.664	417.201	916.665	440.001
30	1.17349	1057.14	-7.3112	W. Fat Clay	100	13	154.073	195.267	881.088	468.444	412.644	900.856	432.412
31	1.17349	1035.48	-6.25174	W. Fat Clay	100	13	153.006	193.916	865.637	458.846	406.791	882.399	423.553

32	1.17349	1010.73	-5.19441	W. Fat Clay	100	13	151.703	192.264	847.519	447.879	399.64	861.31	413.431
33	1.17349	982.911	-4.13885	W. Fat Clay	100	13	150.163	190.312	826.735	435.55	391.185	837.601	402.051
34	1.17349	952.031	-3.08471	W. Fat Clay	100	13	148.385	188.058	803.289	421.866	381.423	811.285	389.419
35	1.17349	918.102	-2.0316	W. Fat Clay	100	13	146.367	185.502	777.18	406.832	370.348	782.372	375.54
36	1.17349	881.133	-0.979185	W. Fat Clay	100	13	144.11	182.641	748.406	390.45	357.956	750.869	360.419
37	1.17349	841.128	0.0729025	W. Fat Clay	100	13	141.611	179.473	716.957	372.723	344.234	716.777	344.054
38	1.17349	798.088	1.12501	W. Fat Clay	100	13	138.867	175.996	682.827	353.651	329.176	680.1	326.449
39	1.17349	752.012	2.17751	W. Fat Clay	100	13	135.878	172.208	646.002	333.233	312.769	640.835	307.602
40	1.17349	702.895	3.23073	W. Fat Clay	100	13	132.641	168.106	606.466	311.468	294.998	598.979	287.511
41	1.17349	650.728	4.28505	W. Fat Clay	100	13	129.153	163.685	564.201	288.352	275.849	554.524	266.172
42	1.17349	595.501	5.34083	W. Fat Clay	100	13	125.411	158.942	519.185	263.879	255.306	507.461	243.582
43	1.17349	537.199	6.39843	W. Fat Clay	100	13	121.411	153.873	471.393	238.044	233.349	457.778	219.734
44	1.17349	475.805	7.45823	W. Fat Clay	100	13	117.15	148.472	420.796	210.839	209.957	405.46	194.621
45	1.17349	411.298	8.5206	W. Fat Clay	100	13	112.623	142.736	367.362	182.254	185.108	350.489	168.235
46	1.17349	343.653	9.58593	W. Fat Clay	100	13	107.827	136.656	311.055	152.279	158.776	292.845	140.566
47	1.17349	272.843	10.6546	W. Fat Clay	100	13	102.755	130.228	251.834	120.902	130.932	232.503	111.601
48	1.17349	198.835	11.7271	W. Fat Clay	100	13	97.4019	123.444	189.655	88.107	101.548	169.436	81.3291
49	1.17349	121.594	12.8037	W. Fat Clay	100	13	91.7622	116.297	124.469	53.8798	70.5891	103.615	49.735
50	1.17349	41.0804	13.885	W. Fat Clay	100	13	85.8291	108.777	56.2203	18.2021	38.0182	35.0036	16.8015

Global Minimum Query (janbu simplified) - Safety Factor: 1.22508

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.20909	56.4213	-41.7726	W. Sandy Lean Clay	125	17	88.0117	107.821	-31.9247	24.2638	-56.1885	46.6911	22.4273
2	1.20909	165.393	-40.3349	W. Sandy Lean Clay	125	17	97.7204	119.715	53.8442	71.1298	-17.2856	136.819	65.6896
3	1.20909	266.86	-38.9272	W. Sandy Lean Clay	125	17	106.928	130.995	134.377	114.768	19.6089	220.741	105.973
4	1.20909	361.267	-37.547	W. Sandy Lean Clay	125	17	115.65	141.681	209.931	155.371	54.5596	298.823	143.452
5	1.20909	449.008	-36.1919	W. Sandy Lean Clay	125	17	123.903	151.791	280.735	193.106	87.629	371.391	178.285
6	1.20909	530.427	-34.8598	W. Sandy Lean Clay	125	17	131.7	161.343	346.993	228.122	118.871	438.731	210.609
7	1.20909	605.834	-33.549	W. Sandy Lean Clay	125	17	139.053	170.351	408.889	260.553	148.336	501.097	240.544
8	1.20909	675.502	-32.2579	W. Sandy Lean Clay	125	17	145.974	178.83	466.586	290.515	176.071	558.717	268.202
9	1.20909	739.677	-30.9848	W. Sandy Lean Clay	125	17	152.475	186.794	520.233	318.115	202.118	611.794	293.679
10	1.20909	798.581	-29.7285	W. Sandy Lean Clay	125	17	158.563	194.253	569.964	343.449	226.515	660.512	317.063
11	1.20909	852.414	-28.4878	W. Sandy Lean Clay	125	17	164.249	201.219	615.9	366.601	249.299	705.035	338.434
12	1.20909	901.355	-27.2615	W. Sandy Lean Clay	125	17	169.54	207.7	658.15	387.649	270.501	745.512	357.863
13	1.17349	917.158	-26.0662	W. Fat Clay	100	13	139.473	170.865	713.365	406.413	306.952	781.59	375.177
14	1.17349	954.617	-24.9007	W. Fat Clay	100	13	142.731	174.857	747.254	423.012	324.242	813.51	390.498

15	1.17349	988.008	-23.7461	W. Fat Clay	100	13	145.711	178.507	777.861	437.808	340.053	841.964	404.156
16	1.17349	1017.44	-22.6017	W. Fat Clay	100	13	148.416	181.822	805.258	450.851	354.407	867.042	416.191
17	1.17349	1043.02	-21.4667	W. Fat Clay	100	13	150.852	184.806	829.52	462.184	367.336	888.841	426.657
18	1.17349	1064.82	-20.3405	W. Fat Clay	100	13	153.022	187.464	850.697	471.848	378.849	907.424	435.576
19	1.17349	1082.95	-19.2225	W. Fat Clay	100	13	154.929	189.8	868.847	479.88	388.967	922.867	442.987
20	1.17349	1097.47	-18.112	W. Fat Clay	100	13	156.577	191.819	884.031	486.315	397.716	935.244	448.929
21	1.17349	1108.46	-17.0085	W. Fat Clay	100	13	157.969	193.524	896.281	491.184	405.097	944.602	453.418
22	1.17349	1115.98	-15.9115	W. Fat Clay	100	13	159.107	194.918	905.651	494.515	411.136	951.009	456.494
23	1.17349	1120.08	-14.8204	W. Fat Clay	100	13	159.993	196.004	912.174	496.333	415.841	954.507	458.174
24	1.17349	1120.82	-13.7348	W. Fat Clay	100	13	160.629	196.783	915.88	496.663	419.217	955.14	458.477
25	1.17349	1118.26	-12.6542	W. Fat Clay	100	13	161.017	197.258	916.796	495.526	421.27	952.947	457.421
26	1.17349	1112.42	-11.5782	W. Fat Clay	100	13	161.158	197.431	914.956	492.941	422.015	947.973	455.032
27	1.17349	1103.36	-10.5063	W. Fat Clay	100	13	161.052	197.302	910.385	488.925	421.46	940.253	451.328
28	1.17349	1091.11	-9.43809	W. Fat Clay	100	13	160.702	196.873	903.093	483.495	419.598	929.807	446.312
29	1.17349	1075.69	-8.37319	W. Fat Clay	100	13	160.107	196.143	893.106	476.664	416.442	916.672	440.008
30	1.17349	1057.14	-7.3112	W. Fat Clay	100	13	159.267	195.114	880.429	468.444	411.985	900.863	432.419
31	1.17349	1035.48	-6.25174	W. Fat Clay	100	13	158.182	193.786	865.078	458.846	406.232	882.406	423.56
32	1.17349	1010.73	-5.19441	W. Fat Clay	100	13	156.852	192.157	847.054	447.879	399.175	861.313	413.434
33	1.17349	982.911	-4.13885	W. Fat Clay	100	13	155.277	190.227	826.367	435.55	390.817	837.603	402.053
34	1.17349	952.031	-3.08471	W. Fat Clay	100	13	153.456	187.996	803.017	421.866	381.151	811.287	389.421
35	1.17349	918.102	-2.0316	W. Fat Clay	100	13	151.387	185.461	777.003	406.832	370.171	782.373	375.541
36	1.17349	881.133	-0.979185	W. Fat Clay	100	13	149.069	182.621	748.321	390.45	357.871	750.869	360.419
37	1.17349	841.128	0.0729025	W. Fat Clay	100	13	146.5	179.474	716.964	372.723	344.241	716.778	344.055
38	1.17349	798.088	1.12501	W. Fat Clay	100	13	143.679	176.018	682.921	353.651	329.27	680.1	326.449
39	1.17349	752.012	2.17751	W. Fat Clay	100	13	140.603	172.25	646.181	333.233	312.948	640.835	307.602
40	1.17349	702.895	3.23073	W. Fat Clay	100	13	137.269	168.166	606.726	311.468	295.258	598.978	287.51
41	1.17349	650.728	4.28505	W. Fat Clay	100	13	133.675	163.763	564.538	288.352	276.186	554.522	266.17
42	1.17349	595.501	5.34083	W. Fat Clay	100	13	129.817	159.037	519.595	263.879	255.716	507.459	243.58
43	1.17349	537.199	6.39843	W. Fat Clay	100	13	125.692	153.983	471.871	238.044	233.827	457.776	219.732
44	1.17349	475.805	7.45823	W. Fat Clay	100	13	121.296	148.597	421.336	210.839	210.497	405.457	194.618
45	1.17349	411.298	8.5206	W. Fat Clay	100	13	116.624	142.873	367.958	182.254	185.704	350.486	168.232
46	1.17349	343.653	9.58593	W. Fat Clay	100	13	111.671	136.805	311.701	152.279	159.422	292.841	140.562
47	1.17349	272.843	10.6546	W. Fat Clay	100	13	106.431	130.387	252.522	120.902	131.62	232.499	111.597
48	1.17349	198.835	11.7271	W. Fat Clay	100	13	100.9	123.611	190.378	88.107	102.271	169.432	81.3254
49	1.17349	121.594	12.8037	W. Fat Clay	100	13	95.0709	116.469	125.217	53.8798	71.337	103.611	49.731
50	1.17349	41.0804	13.885	W. Fat Clay	100	13	88.9359	108.954	56.9843	18.2021	38.7822	34.9997	16.7976

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.26737

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25	171	0	0	0
2	26.2091	169.92	-135.632	0	0
3	27.4182	168.893	-192.864	0	0
4	28.6273	167.917	-184.943	0	0
5	29.8364	166.987	-123.401	0	0
6	31.0455	166.103	-18.3162	0	0
7	32.2545	165.261	121.464	0	0
8	33.4636	164.459	288.155	0	0
9	34.6727	163.696	474.885	0	0
10	35.8818	162.97	675.584	0	0
11	37.0909	162.279	884.881	0	0
12	38.3	161.623	1098.02	0	0
13	39.5091	161	1310.81	0	0
14	40.6826	160.426	1562.87	0	0
15	41.8561	159.881	1808.72	0	0
16	43.0295	159.365	2045.63	0	0
17	44.203	158.876	2271.21	0	0
18	45.3765	158.415	2483.37	0	0
19	46.55	157.98	2680.29	0	0
20	47.7235	157.571	2860.41	0	0
21	48.897	157.187	3022.42	0	0
22	50.0705	156.828	3165.21	0	0
23	51.2439	156.493	3287.9	0	0
24	52.4174	156.183	3389.81	0	0
25	53.5909	155.896	3470.41	0	0
26	54.7644	155.633	3529.41	0	0
27	55.9379	155.392	3566.63	0	0
28	57.1114	155.175	3582.1	0	0
29	58.2849	154.98	3576	0	0
30	59.4583	154.807	3548.65	0	0
31	60.6318	154.656	3500.53	0	0
32	61.8053	154.528	3432.29	0	0
33	62.9788	154.421	3344.71	0	0
34	64.1523	154.336	3238.73	0	0
35	65.3258	154.273	3115.43	0	0
36	66.4993	154.231	2976.05	0	0
37	67.6727	154.211	2821.98	0	0
38	68.8462	154.213	2654.76	0	0
39	70.0197	154.236	2476.1	0	0
40	71.1932	154.28	2287.85	0	0
41	72.3667	154.347	2092.05	0	0
42	73.5402	154.435	1890.91	0	0
43	74.7137	154.544	1686.81	0	0
44	75.8871	154.676	1482.32	0	0
45	77.0606	154.829	1280.23	0	0
46	78.2341	155.005	1083.5	0	0
47	79.4076	155.203	895.346	0	0
48	80.5811	155.424	719.188	0	0
49	81.7546	155.668	558.708	0	0
50	82.9281	155.935	417.85	0	0
51	84.1016	156.225	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.22508

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25	171	0	0	0
2	26.2091	169.92	-140.857	0	0
3	27.4182	168.893	-203.69	0	0
4	28.6273	167.917	-201.704	0	0
5	29.8364	166.987	-146.39	0	0
6	31.0455	166.103	-47.7949	0	0
7	32.2545	165.261	85.265	0	0
8	33.4636	164.459	245.029	0	0
9	34.6727	163.696	424.65	0	0
10	35.8818	162.97	618.077	0	0
11	37.0909	162.279	819.957	0	0
12	38.3	161.623	1025.55	0	0
13	39.5091	161	1230.68	0	0
14	40.6826	160.426	1476.56	0	0
15	41.8561	159.881	1716.17	0	0
16	43.0295	159.365	1946.82	0	0
17	44.203	158.876	2166.09	0	0
18	45.3765	158.415	2371.92	0	0
19	46.55	157.98	2562.49	0	0
20	47.7235	157.571	2736.25	0	0
21	48.897	157.187	2891.89	0	0
22	50.0705	156.828	3028.31	0	0
23	51.2439	156.493	3144.63	0	0
24	52.4174	156.183	3240.17	0	0
25	53.5909	155.896	3314.43	0	0
26	54.7644	155.633	3367.09	0	0
27	55.9379	155.392	3398.01	0	0
28	57.1114	155.175	3407.21	0	0
29	58.2849	154.98	3394.86	0	0
30	59.4583	154.807	3361.3	0	0
31	60.6318	154.656	3307.02	0	0
32	61.8053	154.528	3232.67	0	0
33	62.9788	154.421	3139.03	0	0
34	64.1523	154.336	3027.05	0	0
35	65.3258	154.273	2897.82	0	0
36	66.4993	154.231	2752.57	0	0
37	67.6727	154.211	2592.71	0	0
38	68.8462	154.213	2419.78	0	0
39	70.0197	154.236	2235.5	0	0
40	71.1932	154.28	2041.73	0	0
41	72.3667	154.347	1840.51	0	0
42	73.5402	154.435	1634.06	0	0
43	74.7137	154.544	1424.77	0	0
44	75.8871	154.676	1215.23	0	0
45	77.0606	154.829	1008.21	0	0
46	78.2341	155.005	806.708	0	0
47	79.4076	155.203	613.935	0	0
48	80.5811	155.424	433.332	0	0
49	81.7546	155.668	268.592	0	0
50	82.9281	155.935	123.672	0	0
51	84.1016	156.225	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	171
25	171
85	156
120	156

External Boundary

X	Y
0	171
0	169
0	165
0	163
0	161
0	141
120	141
120	148
120	154
120	156
95	156
85	156
65	161
49	165
25	171
15	171
10	171

Material Boundary

X	Y
0	165
10	165
15	165
37	165
41	165
49	165

Material Boundary

X	Y
0	161
33	161
53	161
57	161
65	161

Material Boundary

X	Y
0	163
10	163
15	163
25	163
33	161
85	148
95	148
120	148

Material Boundary

X	Y
0	169
10	169
15	169
25	169
41	165
57	161
85	154
95	154
120	154

Material Boundary

X	Y
95	154
95	156

Material Boundary

X	Y
15	169
15	171

Material Boundary

X	Y
15	163
15	165
15	168
15	169

Material Boundary

X	Y
95	148
95	153
95	154

Material Boundary

X	Y
10	169
10	171

Material Boundary

X		Y	
10		163	
10		165	
10		169	

Material Boundary

X		Y	
15		168	
25		168	
37		165	
53		161	
85		153	
95		153	



TISD HCFCU Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 1, Rapid Drawdown - Effective Stress Global Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:44:53 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.962s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:44:53 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:10116

Random Number Generation Method:Park and Miller v.3

Surface Options

Surface Type:Circular

Search Method:Grid Search

Radius Increment:20

Composite Surfaces:Disabled

Reverse Curvature:Invalid Surfaces

Minimum Elevation:Not Defined

Minimum Depth:Not Defined

Minimum Area:Not Defined

Minimum Weight:Not Defined

Seismic Loading

Advanced seismic analysis:No

Staged pseudostatic analysis:No

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

W. Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	110
Friction Angle [deg]	21
Water Surface	Water Table
Hu Value	1

Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

W. Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	85
Friction Angle [deg]	18
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.327940
Center:	69.611, 228.857
Radius:	74.687
Left Slip Surface Endpoint:	22.380, 171.000
Right Slip Surface Endpoint:	86.043, 156.000
Resisting Moment:	925093 lb-ft
Driving Moment:	696635 lb-ft
Total Slice Area:	343.949 ft2
Surface Horizontal Width:	63.6629 ft
Surface Average Height:	5.40266 ft

Method: janbu simplified

FS		1.283880
Center:	69.611, 228.857	
Radius:	74.687	
Left Slip Surface Endpoint:	22.380, 171.000	
Right Slip Surface Endpoint:	86.043, 156.000	
Resisting Horizontal Force:	11678.7 lb	
Driving Horizontal Force:	9096.45 lb	
Total Slice Area:	343.949 ft2	
Surface Horizontal Width:	63.6629 ft	
Surface Average Height:	5.40266 ft	

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	17455
Number of Invalid Surfaces:	626
Error Codes	
Error Code -103 reported for 626 surfaces	

Method: janbu simplified

Number of Valid Surfaces:	17449
Number of Invalid Surfaces:	632
Error Codes	
Error Code -103 reported for 626 surfaces	
Error Code -108 reported for 6 surfaces	

Error Code Descriptions

- The following errors were encountered during the computation:
- 103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
 - 108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.32794

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]

1	1.23293	72.864	-38.6207	W. Sandy Lean Clay	110	21	73.9614	98.2163	0.0316975	30.7294	-30.6977	59.1181	28.3887
2	1.23293	215.512	-37.4199	W. Sandy Lean Clay	110	21	87.6992	116.459	107.719	90.8922	16.8271	174.819	83.9265
3	1.23293	334.672	-36.2381	W. Sandy Lean Clay	110	21	99.4033	132.002	198.615	141.299	57.3158	271.469	130.17
4	1.23293	420.31	-35.0739	W. Sandy Lean Clay	110	21	108.186	143.665	264.967	177.268	87.6994	340.928	163.66
5	1.23293	500.095	-33.9261	W. Sandy Lean Clay	110	21	116.476	154.673	327.295	210.918	116.377	405.64	194.722
6	1.23293	574.605	-32.7935	W. Sandy Lean Clay	110	21	124.349	165.128	385.956	242.343	143.613	466.074	223.731
7	1.23293	644.042	-31.6752	W. Sandy Lean Clay	110	21	131.813	175.04	441.063	271.629	169.434	522.393	250.764
8	1.23293	708.59	-30.5702	W. Sandy Lean Clay	110	21	138.874	184.417	492.714	298.852	193.862	574.747	275.895
9	1.23293	768.419	-29.4777	W. Sandy Lean Clay	110	21	145.539	193.267	541.005	324.086	216.919	623.272	299.186
10	1.23293	823.68	-28.3968	W. Sandy Lean Clay	110	21	151.814	201.6	586.019	347.392	238.627	668.093	320.701
11	1.23293	874.515	-27.3269	W. Sandy Lean Clay	110	21	157.704	209.421	627.834	368.833	259.001	709.325	340.492
12	1.23293	921.054	-26.2672	W. Sandy Lean Clay	110	21	163.214	216.738	666.521	388.461	278.06	747.07	358.609
13	1.23293	963.415	-25.217	W. Sandy Lean Clay	110	21	168.347	223.555	702.148	406.327	295.821	781.427	375.1
14	1.28742	1046.77	-24.1531	W. Fat Clay	85	18	143.736	190.873	748.64	422.796	325.844	813.096	390.3
15	1.28742	1084.01	-23.0751	W. Fat Clay	85	18	147.526	195.906	779.17	437.837	341.333	842.019	404.182
16	1.28742	1116.84	-22.0057	W. Fat Clay	85	18	150.971	200.48	806.51	451.099	355.411	867.523	416.424
17	1.28742	1145.37	-20.9443	W. Fat Clay	85	18	154.072	204.599	830.712	462.623	368.089	889.683	427.06
18	1.28742	1169.69	-19.8904	W. Fat Clay	85	18	156.836	208.269	851.831	472.446	379.385	908.575	436.129
19	1.28742	1189.89	-18.8434	W. Fat Clay	85	18	159.263	211.492	869.905	480.603	389.302	924.257	443.654
20	1.28742	1206.04	-17.803	W. Fat Clay	85	18	161.357	214.273	884.988	487.126	397.862	936.804	449.678
21	1.28742	1218.22	-16.7685	W. Fat Clay	85	18	163.12	216.613	897.107	492.044	405.063	946.258	454.214
22	1.28742	1226.49	-15.7397	W. Fat Clay	85	18	164.553	218.516	906.302	495.384	410.918	952.678	457.294
23	1.28742	1230.91	-14.7161	W. Fat Clay	85	18	165.657	219.983	912.606	497.171	415.435	956.115	458.944
24	1.28742	1231.54	-13.6972	W. Fat Clay	85	18	166.436	221.017	916.045	497.427	418.618	956.609	459.182
25	1.28742	1228.44	-12.6827	W. Fat Clay	85	18	166.888	221.617	916.633	496.172	420.461	954.19	458.018
26	1.28742	1221.64	-11.6723	W. Fat Clay	85	18	167.014	221.785	914.408	493.426	420.982	948.911	455.485
27	1.28742	1211.19	-10.6655	W. Fat Clay	85	18	166.816	221.522	909.373	489.205	420.168	940.789	451.584
28	1.28742	1197.12	-9.66208	W. Fat Clay	85	18	166.293	220.827	901.558	483.524	418.034	929.87	446.346
29	1.28742	1179.48	-8.66162	W. Fat Clay	85	18	165.443	219.699	890.962	476.398	414.564	916.165	439.767
30	1.28742	1158.29	-7.66381	W. Fat Clay	85	18	164.268	218.138	877.594	467.838	409.756	899.699	431.861
31	1.28742	1133.57	-6.66834	W. Fat Clay	85	18	162.766	216.143	861.468	457.856	403.612	880.498	422.642
32	1.28742	1105.36	-5.67488	W. Fat Clay	85	18	160.934	213.711	842.595	446.459	396.136	858.587	412.128
33	1.28742	1073.66	-4.68314	W. Fat Clay	85	18	158.773	210.841	820.956	433.657	387.299	833.963	400.306
34	1.28742	1038.5	-3.6928	W. Fat Clay	85	18	156.28	207.531	796.564	419.457	377.107	806.65	387.193
35	1.28742	999.892	-2.70357	W. Fat Clay	85	18	153.453	203.776	769.417	403.862	365.555	776.663	372.801
36	1.28742	957.842	-1.71514	W. Fat Clay	85	18	150.288	199.574	739.5	386.878	352.622	744	357.122
37	1.28742	912.359	-0.727217	W. Fat Clay	85	18	146.784	194.92	706.807	368.506	338.301	708.67	340.164

38	1.28742	863.445	0.260486	W. Fat Clay	85	18	142.936	189.811	671.325	348.75	322.575	670.676	321.926
39	1.28742	811.102	1.24827	W. Fat Clay	85	18	138.742	184.241	633.041	327.608	305.433	630.018	302.41
40	1.28742	755.327	2.23642	W. Fat Clay	85	18	134.196	178.205	591.935	305.08	286.855	586.694	281.614
41	1.28742	696.116	3.22523	W. Fat Clay	85	18	129.295	171.696	547.987	281.164	266.823	540.702	259.538
42	1.28742	633.459	4.21502	W. Fat Clay	85	18	124.033	164.708	501.173	255.857	245.316	492.032	236.175
43	1.28742	567.345	5.20606	W. Fat Clay	85	18	118.404	157.234	451.467	229.153	222.314	440.678	211.525
44	1.28742	497.759	6.19867	W. Fat Clay	85	18	112.404	149.265	398.835	201.047	197.788	386.627	185.58
45	1.28742	424.682	7.19315	W. Fat Clay	85	18	106.024	140.794	343.246	171.531	171.715	329.865	158.334
46	1.28742	348.095	8.18981	W. Fat Clay	85	18	99.2586	131.81	284.661	140.596	144.065	270.376	129.78
47	1.28742	267.971	9.18897	W. Fat Clay	85	18	92.0993	122.302	223.038	108.234	114.804	208.14	99.9057
48	1.28742	184.282	10.191	W. Fat Clay	85	18	84.5377	112.261	158.332	74.4314	83.9006	143.135	68.7036
49	1.28742	96.997	11.1961	W. Fat Clay	85	18	76.5648	101.673	90.4913	39.1762	51.3151	75.3365	36.1603
50	1.28742	22.4044	12.2048	W. Fat Clay	85	18	69.8362	92.7383	32.5026	8.68646	23.8161	17.3974	8.71092

Global Minimum Query (janbu simplified) - Safety Factor: 1.28388

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.23293	72.864	-38.6207	W. Sandy Lean Clay	110	21	76.0081	97.5853	-1.61205	30.7294	-32.3414	59.1095	28.3801
2	1.23293	215.512	-37.4199	W. Sandy Lean Clay	110	21	90.1461	115.737	105.837	90.8922	14.9448	174.809	83.9165
3	1.23293	334.672	-36.2381	W. Sandy Lean Clay	110	21	102.199	131.211	196.555	141.299	55.2564	271.458	130.159
4	1.23293	420.31	-35.0739	W. Sandy Lean Clay	110	21	111.252	142.834	262.803	177.268	85.5354	340.917	163.649
5	1.23293	500.095	-33.9261	W. Sandy Lean Clay	110	21	119.801	153.81	325.047	210.918	114.129	405.629	194.711
6	1.23293	574.605	-32.7935	W. Sandy Lean Clay	110	21	127.924	164.239	383.641	242.343	141.298	466.062	223.719
7	1.23293	644.042	-31.6752	W. Sandy Lean Clay	110	21	135.629	174.131	438.696	271.629	167.067	522.382	250.753
8	1.23293	708.59	-30.5702	W. Sandy Lean Clay	110	21	142.922	183.494	490.311	298.852	191.459	574.735	275.883
9	1.23293	768.419	-29.4777	W. Sandy Lean Clay	110	21	149.809	192.337	538.58	324.086	214.494	623.26	299.174
10	1.23293	823.68	-28.3968	W. Sandy Lean Clay	110	21	156.296	200.665	583.584	347.392	236.192	668.081	320.689
11	1.23293	874.515	-27.3269	W. Sandy Lean Clay	110	21	162.388	208.487	625.401	368.833	256.568	709.313	340.48
12	1.23293	921.054	-26.2672	W. Sandy Lean Clay	110	21	168.091	215.809	664.102	388.461	275.641	747.058	358.597
13	1.23293	963.415	-25.217	W. Sandy Lean Clay	110	21	173.409	222.636	699.753	406.327	293.426	781.416	375.089
14	1.28742	1046.77	-24.1531	W. Fat Clay	85	18	148.163	190.224	746.641	422.796	323.845	813.083	390.287
15	1.28742	1084.01	-23.0751	W. Fat Clay	85	18	152.094	195.27	777.212	437.837	339.375	842.007	404.17
16	1.28742	1116.84	-22.0057	W. Fat Clay	85	18	155.669	199.86	804.601	451.099	353.502	867.514	416.415
17	1.28742	1145.37	-20.9443	W. Fat Clay	85	18	158.891	203.997	828.862	462.623	366.239	889.677	427.054
18	1.28742	1169.69	-19.8904	W. Fat Clay	85	18	161.765	207.687	850.034	472.446	377.588	908.561	436.115
19	1.28742	1189.89	-18.8434	W. Fat Clay	85	18	164.293	210.932	868.185	480.603	387.582	924.254	443.651
20	1.28742	1206.04	-17.803	W. Fat Clay	85	18	166.477	213.736	883.332	487.126	396.206	936.791	449.665

21	1.28742	1218.22	-16.7685	W. Fat Clay	85	18	168.319	216.102	895.53	492.044	403.486	946.248	454.204
22	1.28742	1226.49	-15.7397	W. Fat Clay	85	18	169.822	218.031	904.814	495.384	409.43	952.676	457.292
23	1.28742	1230.91	-14.7161	W. Fat Clay	85	18	170.986	219.526	911.201	497.171	414.03	956.11	458.939
24	1.28742	1231.54	-13.6972	W. Fat Clay	85	18	171.814	220.589	914.724	497.427	417.297	956.599	459.172
25	1.28742	1228.44	-12.6827	W. Fat Clay	85	18	172.305	221.219	915.413	496.172	419.241	954.189	458.017
26	1.28742	1221.64	-11.6723	W. Fat Clay	85	18	172.46	221.418	913.275	493.426	419.849	948.902	455.476
27	1.28742	1211.19	-10.6655	W. Fat Clay	85	18	172.279	221.186	908.342	489.205	419.137	940.787	451.582
28	1.28742	1197.12	-9.66208	W. Fat Clay	85	18	171.763	220.523	900.616	483.524	417.092	929.859	446.335
29	1.28742	1179.48	-8.66162	W. Fat Clay	85	18	170.909	219.427	890.125	476.398	413.727	916.161	439.763
30	1.28742	1158.29	-7.66381	W. Fat Clay	85	18	169.719	217.899	876.855	467.838	409.017	899.693	431.855
31	1.28742	1133.57	-6.66834	W. Fat Clay	85	18	168.19	215.936	860.836	457.856	402.98	880.499	422.643
32	1.28742	1105.36	-5.67488	W. Fat Clay	85	18	166.322	213.537	842.054	446.459	395.595	858.581	412.122
33	1.28742	1073.66	-4.68314	W. Fat Clay	85	18	164.111	210.699	820.515	433.657	386.858	833.959	400.302
34	1.28742	1038.5	-3.6928	W. Fat Clay	85	18	161.557	207.42	796.223	419.457	376.766	806.65	387.193
35	1.28742	999.892	-2.70357	W. Fat Clay	85	18	158.657	203.696	769.17	403.862	365.308	776.662	372.8
36	1.28742	957.842	-1.71514	W. Fat Clay	85	18	155.407	199.524	739.346	386.878	352.468	743.999	357.121
37	1.28742	912.359	-0.727217	W. Fat Clay	85	18	151.805	194.9	706.743	368.506	338.237	708.67	340.164
38	1.28742	863.445	0.260486	W. Fat Clay	85	18	147.847	189.818	671.348	348.75	322.598	670.676	321.926
39	1.28742	811.102	1.24827	W. Fat Clay	85	18	143.53	184.275	633.146	327.608	305.538	630.018	302.41
40	1.28742	755.327	2.23642	W. Fat Clay	85	18	138.848	178.264	592.118	305.08	287.038	586.695	281.615
41	1.28742	696.116	3.22523	W. Fat Clay	85	18	133.797	171.779	548.242	281.164	267.078	540.702	259.538
42	1.28742	633.459	4.21502	W. Fat Clay	85	18	128.371	164.813	501.495	255.857	245.638	492.034	236.177
43	1.28742	567.345	5.20606	W. Fat Clay	85	18	122.564	157.358	451.847	229.153	222.694	440.68	211.527
44	1.28742	497.759	6.19867	W. Fat Clay	85	18	116.371	149.406	399.268	201.047	198.221	386.628	185.581
45	1.28742	424.682	7.19315	W. Fat Clay	85	18	109.783	140.949	343.722	171.531	172.191	329.867	158.336
46	1.28742	348.095	8.18981	W. Fat Clay	85	18	102.794	131.976	285.172	140.596	144.576	270.378	129.782
47	1.28742	267.971	9.18897	W. Fat Clay	85	18	95.3954	122.476	223.574	108.234	115.34	208.142	99.9077
48	1.28742	184.282	10.191	W. Fat Clay	85	18	87.5777	112.439	158.881	74.4314	84.4495	143.137	68.706
49	1.28742	96.997	11.1961	W. Fat Clay	85	18	79.3314	101.852	91.0414	39.1762	51.8652	75.339	36.1628
50	1.28742	22.4044	12.2048	W. Fat Clay	85	18	72.3722	92.9173	33.0533	8.68646	24.3669	17.3996	8.71311

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.32794

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	22.3804	171	0	0	0
2	23.6133	170.015	-91.1273	0	0
3	24.8463	169.072	-97.6033	0	0
4	26.0792	168.168	-40.6449	0	0
5	27.3121	167.302	55.391	0	0
6	28.5451	166.473	183.262	0	0
7	29.778	165.679	336.593	0	0
8	31.0109	164.918	509.665	0	0
9	32.2439	164.19	697.34	0	0
10	33.4768	163.493	895.002	0	0
11	34.7097	162.826	1098.5	0	0
12	35.9427	162.189	1304.12	0	0
13	37.1756	161.581	1508.52	0	0
14	38.4085	161	1708.71	0	0
15	39.6959	160.423	1955.93	0	0
16	40.9834	159.874	2193.42	0	0
17	42.2708	159.354	2418.75	0	0
18	43.5582	158.861	2629.81	0	0
19	44.8456	158.395	2824.74	0	0
20	46.1331	157.956	3001.97	0	0
21	47.4205	157.543	3160.18	0	0
22	48.7079	157.155	3298.26	0	0
23	49.9953	156.792	3415.32	0	0
24	51.2828	156.454	3510.71	0	0
25	52.5702	156.14	3583.94	0	0
26	53.8576	155.85	3634.73	0	0
27	55.145	155.584	3662.98	0	0
28	56.4325	155.342	3668.78	0	0
29	57.7199	155.123	3652.37	0	0
30	59.0073	154.926	3614.18	0	0
31	60.2947	154.753	3554.81	0	0
32	61.5822	154.603	3474.99	0	0
33	62.8696	154.475	3375.67	0	0
34	64.157	154.369	3257.91	0	0
35	65.4444	154.286	3122.97	0	0
36	66.7319	154.225	2972.25	0	0
37	68.0193	154.187	2807.34	0	0
38	69.3067	154.17	2629.98	0	0
39	70.5941	154.176	2442.09	0	0
40	71.8816	154.204	2245.78	0	0
41	73.169	154.255	2043.31	0	0
42	74.4564	154.327	1837.15	0	0
43	75.7438	154.422	1629.97	0	0
44	77.0313	154.539	1424.62	0	0
45	78.3187	154.679	1224.19	0	0
46	79.6061	154.842	1031.97	0	0
47	80.8935	155.027	851.481	0	0
48	82.181	155.235	686.5	0	0
49	83.4684	155.467	541.057	0	0
50	84.7558	155.722	419.46	0	0
51	86.0432	156	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.28388

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	22.3804	171	0	0	0
2	23.6133	170.015	-95.2831	0	0
3	24.8463	169.072	-106.567	0	0
4	26.0792	168.168	-54.9345	0	0
5	27.3121	167.302	35.4289	0	0
6	28.5451	166.473	157.315	0	0
7	29.778	165.679	304.377	0	0
8	31.0109	164.918	470.92	0	0
9	32.2439	164.19	651.83	0	0
10	33.4768	163.493	842.511	0	0
11	34.7097	162.826	1038.84	0	0
12	35.9427	162.189	1237.1	0	0
13	37.1756	161.581	1433.98	0	0
14	38.4085	161	1626.52	0	0
15	39.6959	160.423	1866.86	0	0
16	40.9834	159.874	2097.37	0	0
17	42.2708	159.354	2315.63	0	0
18	43.5582	158.861	2519.53	0	0
19	44.8456	158.395	2707.26	0	0
20	46.1331	157.956	2877.23	0	0
21	47.4205	157.543	3028.13	0	0
22	48.7079	157.155	3158.87	0	0
23	49.9953	156.792	3268.59	0	0
24	51.2828	156.454	3356.6	0	0
25	52.5702	156.14	3422.46	0	0
26	53.8576	155.85	3465.89	0	0
27	55.145	155.584	3486.8	0	0
28	56.4325	155.342	3485.29	0	0
29	57.7199	155.123	3461.6	0	0
30	59.0073	154.926	3416.18	0	0
31	60.2947	154.753	3349.63	0	0
32	61.5822	154.603	3262.7	0	0
33	62.8696	154.475	3156.34	0	0
34	64.157	154.369	3031.64	0	0
35	65.4444	154.286	2889.84	0	0
36	66.7319	154.225	2732.38	0	0
37	68.0193	154.187	2560.85	0	0
38	69.3067	154.17	2377	0	0
39	70.5941	154.176	2182.76	0	0
40	71.8816	154.204	1980.25	0	0
41	73.169	154.255	1771.76	0	0
42	74.4564	154.327	1559.76	0	0
43	75.7438	154.422	1346.94	0	0
44	77.0313	154.539	1136.18	0	0
45	78.3187	154.679	930.559	0	0
46	79.6061	154.842	733.399	0	0
47	80.8935	155.027	548.245	0	0
48	82.181	155.235	378.891	0	0
49	83.4684	155.467	229.392	0	0
50	84.7558	155.722	104.078	0	0
51	86.0432	156	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	171
25	171
85	156
120	156

External Boundary

X	Y
0	171
0	169
0	165
0	163
0	161
0	141
120	141
120	148
120	154
120	156
95	156
85	156
65	161
49	165
25	171
15	171
10	171

Material Boundary

X	Y
0	165
10	165
15	165
37	165
41	165
49	165

Material Boundary

X	Y
0	161
33	161
53	161
57	161
65	161

Material Boundary

X	Y
0	163
10	163
15	163
25	163
33	161
85	148
95	148
120	148

Material Boundary

X	Y
0	169
10	169
15	169
25	169
41	165
57	161
85	154
95	154
120	154

Material Boundary

X	Y
95	154
95	156

Material Boundary

X	Y
15	169
15	171

Material Boundary

X	Y
15	163
15	165
15	168
15	169

Material Boundary

X	Y
95	148
95	153
95	154

Material Boundary

X	Y
10	169
10	171

Material Boundary

X		Y	
10		163	
10		165	
10		169	

Material Boundary

X		Y	
15		168	
25		168	
37		165	
53		161	
85		153	
95		153	



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 1, Rapid Drawdown - Effective Stress Local Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:44:53 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.447s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:44:53 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:10116

Random Number Generation Method:Park and Miller v.3

Surface Options

Surface Type:Circular

Search Method:Grid Search

Radius Increment:20

Composite Surfaces:Disabled

Reverse Curvature:Invalid Surfaces

Minimum Elevation:Not Defined

Minimum Depth:Not Defined

Minimum Area:Not Defined

Minimum Weight:Not Defined

Seismic Loading

Advanced seismic analysis:No

Staged pseudostatic analysis:No

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

W. Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	110
Friction Angle [deg]	21
Water Surface	Water Table
Hu Value	1

Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

W. Fat Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	85
Friction Angle [deg]	18
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.348200
Center:	69.440, 220.939
Radius:	66.777
Left Slip Surface Endpoint:	25.151, 170.962
Right Slip Surface Endpoint:	85.000, 156.000
Resisting Moment:	767317 lb-ft
Driving Moment:	569143 lb-ft
Total Slice Area:	314.113 ft2
Surface Horizontal Width:	59.8495 ft
Surface Average Height:	5.24838 ft

Method: janbu simplified

FS	1.299920
Center:	67.997, 218.226
Radius:	63.867
Left Slip Surface Endpoint:	25.000, 171.000
Right Slip Surface Endpoint:	83.710, 156.322
Resisting Horizontal Force:	10633.8 lb
Driving Horizontal Force:	8180.33 lb
Total Slice Area:	311.274 ft ²
Surface Horizontal Width:	58.7104 ft
Surface Average Height:	5.30186 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	16098
Number of Invalid Surfaces:	1983

Error Codes

Error Code -101 reported for 254 surfaces
 Error Code -102 reported for 2 surfaces
 Error Code -106 reported for 16 surfaces
 Error Code -108 reported for 30 surfaces
 Error Code -1000 reported for 1681 surfaces

Method: janbu simplified

Number of Valid Surfaces:	16072
Number of Invalid Surfaces:	2009

Error Codes

Error Code -101 reported for 254 surfaces
 Error Code -102 reported for 2 surfaces
 Error Code -106 reported for 16 surfaces
 Error Code -108 reported for 56 surfaces
 Error Code -1000 reported for 1681 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

- 101 = Only one (or zero) surface / slope intersections.
- 102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
- 106 = Average slice width is less than $0.0001 \times (\text{maximum horizontal extent of soil region})$. This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
- 108 = Total driving moment or total driving force < 0.1 . This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.3482

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.23772	56.4882	-40.8454	W. Sandy Lean Clay	110	21	70.4843	95.0269	-15.2756	23.7307	-39.0063	45.6623	21.9316
2	1.23772	165.648	-39.4557	W. Sandy Lean Clay	110	21	80.9248	109.103	67.255	69.592	-2.33699	133.859	64.2674
3	1.23772	267.395	-38.0933	W. Sandy Lean Clay	110	21	90.8471	122.48	144.85	112.339	32.5112	216.066	103.727
4	1.23772	362.143	-36.7558	W. Sandy Lean Clay	110	21	100.264	135.176	217.732	152.145	65.5868	292.619	140.474
5	1.23772	450.258	-35.4413	W. Sandy Lean Clay	110	21	109.189	147.208	286.096	189.165	96.9311	363.811	174.646
6	1.23772	532.065	-34.1479	W. Sandy Lean Clay	110	21	117.632	158.592	350.121	223.534	126.587	429.907	206.373
7	1.23772	607.856	-32.874	W. Sandy Lean Clay	110	21	125.605	169.341	409.965	255.376	154.589	491.142	235.766
8	1.23772	677.889	-31.6182	W. Sandy Lean Clay	110	21	133.118	179.469	465.772	284.799	180.973	547.725	262.926
9	1.23772	742.401	-30.3792	W. Sandy Lean Clay	110	21	140.178	188.988	517.673	311.903	205.77	599.847	287.944
10	1.23772	801.602	-29.1556	W. Sandy Lean Clay	110	21	146.795	197.909	565.786	336.775	229.011	647.677	310.902
11	1.23772	855.683	-27.9465	W. Sandy Lean Clay	110	21	152.976	206.243	610.216	359.496	250.72	691.372	331.876
12	1.23772	904.819	-26.7508	W. Sandy Lean Clay	110	21	158.729	213.998	651.062	380.139	270.923	731.071	350.932
13	1.18413	907.249	-25.5928	W. Fat Clay	85	18	135.988	183.339	701.065	398.409	302.656	766.199	367.79
14	1.18413	943.769	-24.4714	W. Fat Clay	85	18	139.907	188.623	733.364	414.446	318.918	797.039	382.593
15	1.18413	976.33	-23.3599	W. Fat Clay	85	18	143.497	193.463	762.559	428.745	333.814	824.537	395.792
16	1.18413	1005.03	-22.2576	W. Fat Clay	85	18	146.762	197.864	788.715	441.35	347.365	848.779	407.429
17	1.18413	1029.97	-21.164	W. Fat Clay	85	18	149.706	201.833	811.877	452.301	359.576	869.836	417.535
18	1.18413	1051.23	-20.0783	W. Fat Clay	85	18	152.331	205.373	832.106	461.636	370.47	887.787	426.151
19	1.18413	1068.88	-19.0002	W. Fat Clay	85	18	154.642	208.488	849.444	469.389	380.055	902.692	433.303
20	1.18413	1083.01	-17.929	W. Fat Clay	85	18	156.64	211.182	863.94	475.591	388.349	914.62	439.029
21	1.18413	1093.66	-16.8642	W. Fat Clay	85	18	158.328	213.458	875.628	480.272	395.356	923.624	443.352
22	1.18413	1100.92	-15.8054	W. Fat Clay	85	18	159.708	215.318	884.536	483.457	401.079	929.745	446.288
23	1.18413	1104.82	-14.7521	W. Fat Clay	85	18	160.781	216.765	890.704	485.171	405.533	933.04	447.869
24	1.18413	1105.42	-13.7039	W. Fat Clay	85	18	161.549	217.801	894.156	485.435	408.721	933.549	448.114
25	1.18413	1102.77	-12.6603	W. Fat Clay	85	18	162.013	218.426	894.914	484.271	410.643	931.307	447.036
26	1.18413	1096.91	-11.621	W. Fat Clay	85	18	162.173	218.641	893.003	481.695	411.308	926.354	444.659
27	1.18413	1087.86	-10.5856	W. Fat Clay	85	18	162.029	218.448	888.439	477.725	410.714	918.72	440.995
28	1.18413	1075.68	-9.55362	W. Fat Clay	85	18	161.583	217.846	881.233	472.375	408.858	908.429	436.054
29	1.18413	1060.39	-8.52478	W. Fat Clay	85	18	160.832	216.834	871.402	465.658	405.744	895.51	429.852
30	1.18413	1042.01	-7.49871	W. Fat Clay	85	18	159.777	215.412	858.958	457.587	401.371	879.989	422.402
31	1.18413	1020.56	-6.47506	W. Fat Clay	85	18	158.418	213.579	843.899	448.17	395.729	861.878	413.708

32	1.18413	996.079	-5.45347	W. Fat Clay	85	18	156.752	211.333	826.232	437.418	388.814	841.197	403.779
33	1.18413	968.569	-4.43362	W. Fat Clay	85	18	154.779	208.673	805.963	425.337	380.626	817.964	392.627
34	1.18413	938.048	-3.41518	W. Fat Clay	85	18	152.496	205.595	783.087	411.934	371.153	792.188	380.254
35	1.18413	904.527	-2.39782	W. Fat Clay	85	18	149.901	202.097	757.601	397.213	360.388	763.878	366.665
36	1.18413	868.013	-1.38121	W. Fat Clay	85	18	146.992	198.175	729.497	381.179	348.318	733.041	351.862
37	1.18413	828.513	-0.365038	W. Fat Clay	85	18	143.767	193.826	698.765	363.833	334.932	699.681	335.848
38	1.18413	786.028	0.651019	W. Fat Clay	85	18	140.221	189.046	665.396	345.176	320.22	663.802	318.626
39	1.18413	740.558	1.66728	W. Fat Clay	85	18	136.351	183.828	629.371	325.208	304.163	625.402	300.194
40	1.18413	692.101	2.68407	W. Fat Clay	85	18	132.153	178.169	590.674	303.928	286.746	584.478	280.55
41	1.18413	640.649	3.7017	W. Fat Clay	85	18	127.624	172.062	549.283	281.334	267.949	541.026	259.692
42	1.18413	586.194	4.72051	W. Fat Clay	85	18	122.757	165.5	505.176	257.421	247.755	495.039	237.618
43	1.18413	528.724	5.74081	W. Fat Clay	85	18	117.547	158.477	458.322	232.183	226.139	446.505	214.322
44	1.18413	468.225	6.76294	W. Fat Clay	85	18	111.989	150.984	408.693	205.615	203.078	395.412	189.797
45	1.18413	404.678	7.78725	W. Fat Clay	85	18	106.077	143.012	356.253	177.709	178.544	341.746	164.037
46	1.18413	338.063	8.81406	W. Fat Clay	85	18	99.802	134.553	300.965	148.456	152.509	285.49	137.034
47	1.18413	268.355	9.84374	W. Fat Clay	85	18	93.1581	125.596	242.785	117.844	124.941	226.621	108.777
48	1.18413	195.528	10.8766	W. Fat Clay	85	18	86.1364	116.129	181.668	85.8626	95.8059	165.118	79.255
49	1.18413	119.548	11.9131	W. Fat Clay	85	18	78.7279	106.141	117.562	52.4971	65.065	100.953	48.4556
50	1.18413	40.3835	12.9536	W. Fat Clay	85	18	70.9226	95.6179	50.411	17.7325	32.6785	34.0978	16.3653

Global Minimum Query (janbu simplified) - Safety Factor: 1.29992

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.21988	56.9068	-41.5843	W. Sandy Lean Clay	110	21	72.2959	93.9789	-17.4804	24.2561	-41.7365	46.6714	22.4153
2	1.21988	166.777	-40.1369	W. Sandy Lean Clay	110	21	83.2726	108.248	66.5254	71.0905	-4.56507	136.739	65.6488
3	1.21988	269.001	-38.7198	W. Sandy Lean Clay	110	21	93.7015	121.805	145.417	114.666	30.7513	220.54	105.874
4	1.21988	364.033	-37.3303	W. Sandy Lean Clay	110	21	103.597	134.668	219.437	155.175	64.2623	298.444	143.269
5	1.21988	452.272	-35.9661	W. Sandy Lean Clay	110	21	112.973	146.856	288.802	192.789	96.0126	370.779	177.99
6	1.21988	534.071	-34.6251	W. Sandy Lean Clay	110	21	121.842	158.384	353.703	227.658	126.045	437.835	210.177
7	1.21988	609.743	-33.3054	W. Sandy Lean Clay	110	21	130.215	169.269	414.315	259.914	154.401	499.867	239.953
8	1.21988	679.565	-32.0054	W. Sandy Lean Clay	110	21	138.103	179.523	470.791	289.678	181.113	557.105	267.427
9	1.21988	743.79	-30.7235	W. Sandy Lean Clay	110	21	145.516	189.159	523.271	317.055	206.216	609.753	292.698
10	1.21988	802.642	-29.4586	W. Sandy Lean Clay	110	21	152.463	198.19	571.883	342.142	229.741	657.997	315.855
11	1.21988	856.323	-28.2092	W. Sandy Lean Clay	110	21	158.952	206.625	616.74	365.024	251.716	702.002	336.978
12	1.21988	905.016	-26.9742	W. Sandy Lean Clay	110	21	164.99	214.474	657.944	385.781	272.163	741.918	356.137
13	1.15979	901.223	-25.7825	W. Fat Clay	85	18	141.536	183.985	708.715	404.07	304.645	777.083	373.013
14	1.15979	936.86	-24.6324	W. Fat Clay	85	18	145.621	189.296	741.039	420.048	320.991	807.81	387.762

15	1.15979	968.593	-23.4929	W. Fat Clay	85	18	149.365	194.163	770.246	434.275	335.971	835.17	400.895
16	1.15979	996.524	-22.3631	W. Fat Clay	85	18	152.772	198.592	796.399	446.798	349.601	859.252	412.454
17	1.15979	1020.75	-21.2424	W. Fat Clay	85	18	155.846	202.587	819.557	457.659	361.898	880.138	422.479
18	1.15979	1041.35	-20.1301	W. Fat Clay	85	18	158.59	206.154	839.77	466.896	372.874	897.9	431.004
19	1.15979	1058.41	-19.0258	W. Fat Clay	85	18	161.007	209.296	857.089	474.545	382.544	912.609	438.064
20	1.15979	1072	-17.9287	W. Fat Clay	85	18	163.099	212.016	871.557	480.637	390.92	924.327	443.69
21	1.15979	1082.18	-16.8384	W. Fat Clay	85	18	164.871	214.319	883.202	485.204	397.998	933.1	447.896
22	1.15979	1089.02	-15.7543	W. Fat Clay	85	18	166.323	216.206	892.076	488.271	403.805	938.997	450.726
23	1.15979	1092.57	-14.676	W. Fat Clay	85	18	167.456	217.679	898.206	489.863	408.343	942.062	452.199
24	1.15979	1092.89	-13.6029	W. Fat Clay	85	18	168.272	218.74	901.615	490.003	411.612	942.334	452.331
25	1.15979	1090.01	-12.5347	W. Fat Clay	85	18	168.772	219.39	902.319	488.712	413.607	939.842	451.13
26	1.15979	1083.97	-11.471	W. Fat Clay	85	18	168.957	219.631	900.362	486.007	414.355	934.647	448.64
27	1.15979	1074.83	-10.4112	W. Fat Clay	85	18	168.827	219.462	895.734	481.906	413.828	926.754	444.848
28	1.15979	1062.6	-9.355	W. Fat Clay	85	18	168.382	218.883	888.475	476.423	412.052	916.214	439.791
29	1.15979	1047.32	-8.30201	W. Fat Clay	85	18	167.62	217.893	878.575	469.572	409.003	903.034	433.462
30	1.15979	1029.01	-7.25184	W. Fat Clay	85	18	166.543	216.493	866.057	461.364	404.693	887.249	425.885
31	1.15979	1007.7	-6.20412	W. Fat Clay	85	18	165.148	214.679	850.921	451.809	399.112	868.873	417.064
32	1.15979	983.407	-5.15847	W. Fat Clay	85	18	163.434	212.451	833.171	440.917	392.254	847.925	407.008
33	1.15979	956.145	-4.11454	W. Fat Clay	85	18	161.399	209.806	812.808	428.694	384.114	824.419	395.725
34	1.15979	925.929	-3.07198	W. Fat Clay	85	18	159.042	206.742	789.829	415.146	374.683	798.364	383.218
35	1.15979	892.768	-2.03044	W. Fat Clay	85	18	156.359	203.254	764.228	400.279	363.949	769.771	369.492
36	1.15979	856.67	-0.989567	W. Fat Clay	85	18	153.348	199.34	735.997	384.094	351.903	738.646	354.552
37	1.15979	817.64	0.0509773	W. Fat Clay	85	18	150.005	194.995	705.125	366.594	338.531	704.992	338.398
38	1.15979	775.677	1.09154	W. Fat Clay	85	18	146.328	190.215	671.598	347.78	323.818	668.81	321.03
39	1.15979	730.781	2.13246	W. Fat Clay	85	18	142.311	184.993	635.397	327.65	307.747	630.098	302.448
40	1.15979	682.947	3.17409	W. Fat Clay	85	18	137.95	179.324	596.503	306.204	290.299	588.853	282.649
41	1.15979	632.168	4.21677	W. Fat Clay	85	18	133.24	173.202	554.893	283.436	271.457	545.069	261.633
42	1.15979	578.433	5.26085	W. Fat Clay	85	18	128.176	166.618	510.539	259.344	251.195	498.737	239.393
43	1.15979	521.729	6.30668	W. Fat Clay	85	18	122.751	159.566	463.411	233.92	229.491	449.845	215.925
44	1.15979	462.039	7.35463	W. Fat Clay	85	18	116.958	152.036	413.474	207.158	206.316	398.378	191.22
45	1.15979	399.344	8.40506	W. Fat Clay	85	18	110.791	144.019	360.691	179.048	181.643	344.321	165.273
46	1.15979	333.621	9.45835	W. Fat Clay	85	18	104.241	135.505	305.018	149.58	155.438	287.652	138.072
47	1.15979	264.843	10.5149	W. Fat Clay	85	18	97.2991	126.481	246.408	118.743	127.665	228.349	109.606
48	1.15979	192.98	11.575	W. Fat Clay	85	18	89.9562	116.936	184.811	86.5227	98.2884	166.387	79.864
49	1.15979	117.999	12.6392	W. Fat Clay	85	18	82.2018	106.856	120.169	52.9044	67.265	101.736	48.8316
50	1.15979	39.8623	13.7079	W. Fat Clay	85	18	74.0243	96.2257	52.4202	17.871	34.5492	34.3643	16.4933

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.3482

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.1505	170.962	0	0	0
2	26.3882	169.892	-103.552	0	0
3	27.626	168.874	-135.164	0	0
4	28.8637	167.903	-107.022	0	0
5	30.1014	166.979	-29.7933	0	0
6	31.3391	166.098	87.1474	0	0
7	32.5768	165.258	235.536	0	0
8	33.8145	164.459	408.07	0	0
9	35.0522	163.697	598.286	0	0
10	36.29	162.971	800.454	0	0
11	37.5277	162.281	1009.5	0	0
12	38.7654	161.624	1220.91	0	0
13	40.0031	161	1430.71	0	0
14	41.1872	160.433	1667.36	0	0
15	42.3714	159.894	1896.98	0	0
16	43.5555	159.382	2117.12	0	0
17	44.7396	158.898	2325.63	0	0
18	45.9238	158.439	2520.62	0	0
19	47.1079	158.007	2700.47	0	0
20	48.292	157.599	2863.77	0	0
21	49.4761	157.216	3009.35	0	0
22	50.6603	156.857	3136.25	0	0
23	51.8444	156.522	3243.7	0	0
24	53.0285	156.21	3331.11	0	0
25	54.2127	155.921	3398.07	0	0
26	55.3968	155.655	3444.34	0	0
27	56.5809	155.412	3469.84	0	0
28	57.765	155.19	3474.66	0	0
29	58.9492	154.991	3459.02	0	0
30	60.1333	154.813	3423.32	0	0
31	61.3174	154.658	3368.07	0	0
32	62.5016	154.523	3293.97	0	0
33	63.6857	154.41	3201.83	0	0
34	64.8698	154.318	3092.62	0	0
35	66.0539	154.248	2967.45	0	0
36	67.2381	154.198	2827.58	0	0
37	68.4222	154.17	2674.42	0	0
38	69.6063	154.162	2509.52	0	0
39	70.7905	154.175	2334.59	0	0
40	71.9746	154.21	2151.5	0	0
41	73.1587	154.265	1962.28	0	0
42	74.3428	154.342	1769.14	0	0
43	75.527	154.44	1574.44	0	0
44	76.7111	154.559	1380.74	0	0
45	77.8952	154.699	1190.79	0	0
46	79.0794	154.861	1007.54	0	0
47	80.2635	155.045	834.144	0	0
48	81.4476	155.25	673.991	0	0
49	82.6317	155.478	530.699	0	0
50	83.8159	155.728	408.141	0	0
51	85	156	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.29992

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25	171	0	0	0
2	26.2199	169.918	-107.084	0	0
3	27.4398	168.889	-140.205	0	0
4	28.6596	167.911	-112.252	0	0
5	29.8795	166.981	-34.4375	0	0
6	31.0994	166.095	83.4414	0	0
7	32.3193	165.253	232.794	0	0
8	33.5392	164.452	406.064	0	0
9	34.759	163.689	596.595	0	0
10	35.9789	162.964	798.51	0	0
11	37.1988	162.275	1006.62	0	0
12	38.4187	161.621	1216.35	0	0
13	39.6386	161	1423.64	0	0
14	40.7984	160.44	1656.59	0	0
15	41.9581	159.908	1881.83	0	0
16	43.1179	159.404	2096.95	0	0
17	44.2777	158.927	2299.84	0	0
18	45.4375	158.476	2488.64	0	0
19	46.5973	158.051	2661.77	0	0
20	47.7571	157.651	2817.87	0	0
21	48.9169	157.276	2955.82	0	0
22	50.0766	156.925	3074.68	0	0
23	51.2364	156.597	3173.73	0	0
24	52.3962	156.294	3252.41	0	0
25	53.556	156.013	3310.35	0	0
26	54.7158	155.755	3347.34	0	0
27	55.8756	155.52	3363.35	0	0
28	57.0354	155.307	3358.49	0	0
29	58.1951	155.116	3333.03	0	0
30	59.3549	154.946	3287.38	0	0
31	60.5147	154.799	3222.11	0	0
32	61.6745	154.673	3137.92	0	0
33	62.8343	154.568	3035.67	0	0
34	63.9941	154.485	2916.36	0	0
35	65.1539	154.422	2781.13	0	0
36	66.3136	154.381	2631.27	0	0
37	67.4734	154.361	2468.22	0	0
38	68.6332	154.362	2293.58	0	0
39	69.793	154.384	2109.09	0	0
40	70.9528	154.428	1916.65	0	0
41	72.1126	154.492	1718.35	0	0
42	73.2724	154.577	1516.42	0	0
43	74.4322	154.684	1313.3	0	0
44	75.5919	154.812	1111.58	0	0
45	76.7517	154.962	914.086	0	0
46	77.9115	155.133	723.825	0	0
47	79.0713	155.327	544.036	0	0
48	80.2311	155.542	378.185	0	0
49	81.3909	155.779	229.99	0	0
50	82.5507	156.039	103.433	0	0
51	83.7104	156.322	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	171
25	171
85	156
120	156

External Boundary

X	Y
0	171
0	169
0	165
0	163
0	161
0	141
120	141
120	148
120	154
120	156
95	156
85	156
65	161
49	165
25	171
15	171
10	171

Material Boundary

X	Y
0	165
10	165
15	165
37	165
41	165
49	165

Material Boundary

X	Y
0	161
33	161
53	161
57	161
65	161

Material Boundary

X	Y
0	163
10	163
15	163
25	163
33	161
85	148
95	148
120	148

Material Boundary

X	Y
0	169
10	169
15	169
25	169
41	165
57	161
85	154
95	154
120	154

Material Boundary

X	Y
95	154
95	156

Material Boundary

X	Y
15	169
15	171

Material Boundary

X	Y
15	163
15	165
15	168
15	169

Material Boundary

X	Y
95	148
95	153
95	154

Material Boundary

X	Y
10	169
10	171

Material Boundary

X		Y	
10		163	
10		165	
10		169	

Material Boundary

X		Y	
15		168	
25		168	
37		165	
53		161	
85		153	
95		153	



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 2, Short-Term Saturated Global Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:16:19 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.676s
Author:	JNH
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:16:19 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:10116

Random Number Generation Method:Park and Miller v.3

Surface Options

Surface Type:Circular

Search Method:Grid Search

Radius Increment:10

Composite Surfaces:Disabled

Reverse Curvature:Invalid Surfaces

Minimum Elevation:Not Defined

Minimum Depth [ft]:1

Minimum Area:Not Defined

Minimum Weight:Not Defined

Seismic Loading

Advanced seismic analysis:No

Staged pseudostatic analysis:No

Loading

1 Distributed Load present

Distributed Load 1

Distribution:Constant

Magnitude [psf]:250

Orientation:Normal to boundary

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	1500
Friction Angle [deg]	0
Water Surface	Water Table
Hu Value	1

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	1000
Friction Angle [deg]	0
Water Surface	Water Table
Hu Value	1

Global Miniums

Method: bishop simplified

FS	2.437150
Center:	60.096, 205.215
Radius:	64.690
Left Slip Surface Endpoint:	7.183, 168.000
Right Slip Surface Endpoint:	98.283, 153.000
Resisting Moment:	4.51227e+06 lb-ft
Driving Moment:	1.85146e+06 lb-ft
Total Slice Area:	1266.8 ft2
Surface Horizontal Width:	91.1007 ft
Surface Average Height:	13.9055 ft

Method: janbu simplified

FS	2.385900
Center:	60.096, 199.949
Radius:	61.493
Left Slip Surface Endpoint:	7.554, 168.000
Right Slip Surface Endpoint:	99.810, 153.000
Resisting Horizontal Force:	62506.6 lb
Driving Horizontal Force:	26198.4 lb
Total Slice Area:	1415.69 ft2
Surface Horizontal Width:	92.256 ft
Surface Average Height:	15.3452 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	11856
Number of Invalid Surfaces:	2340

Error Codes

Error Code -103 reported for 1934 surfaces
Error Code -115 reported for 406 surfaces

Method: janbu simplified

Number of Valid Surfaces:	11608
Number of Invalid Surfaces:	2588

Error Codes

Error Code -103 reported for 1934 surfaces
Error Code -108 reported for 58 surfaces
Error Code -111 reported for 190 surfaces
Error Code -115 reported for 406 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

- 103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
- 108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 111 = Safety factor equation did not converge
- 115 = Surface too shallow, below the minimum depth.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.43715

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.82158	269.281	-53.523	Sandy Lean Clay	1500	0	615.473	1500	-434.476	76.8688	-511.345	397.985	321.116
2	1.82158	783.429	-50.8871	Sandy Lean Clay	1500	0	615.473	1500	-76.7673	223.64	-300.407	680.223	456.583
3	1.82158	1252.48	-48.3933	Sandy Lean Clay	1500	0	615.473	1500	244.649	357.54	-112.891	937.709	580.169
4	1.82158	1682.96	-46.0166	Sandy Lean Clay	1500	0	615.473	1500	536.305	480.424	55.8806	1174.02	693.591
5	1.82158	2079.75	-43.7383	Sandy Lean Clay	1500	0	615.473	1500	802.889	593.695	209.194	1391.84	798.141
6	1.82158	2446.67	-41.5438	Sandy Lean Clay	1500	0	615.473	1500	1047.89	698.439	349.455	1593.26	894.82
7	1.82207	2787.53	-39.4214	Silty Sand	0	32	208.452	508.029	1608.55	795.53	813.018	1779.9	984.373
8	1.82207	3103.36	-37.3615	Silty Sand	0	32	228.909	557.885	1778.47	885.665	892.803	1953.24	1067.57
9	1.82207	3396.79	-35.3568	Silty Sand	0	32	248.357	605.283	1938.06	969.404	968.656	2114.28	1144.87
10	1.82207	3667.07	-33.4008	Silty Sand	0	32	254.499	620.253	2039.84	1047.23	992.608	2207.65	1160.42
11	1.82207	3851.14	-31.4879	Silty Sand	0	32	224.819	547.918	1975.92	1099.07	876.854	2113.63	1014.56
12	1.82207	3986.77	-29.6135	Silty Sand	0	32	235.035	572.815	2054.48	1137.78	916.697	2188.07	1050.29
13	1.82207	4105.3	-27.7733	Silty Sand	0	32	244.304	595.406	2124.46	1171.61	952.846	2253.12	1081.51
14	1.82207	4207.61	-25.9637	Silty Sand	0	32	252.658	615.765	2186.23	1200.8	985.435	2309.27	1108.47
15	1.82207	4294.45	-24.1817	Silty Sand	0	32	260.12	633.952	2240.12	1225.59	1014.53	2356.93	1131.34
16	1.82207	4366.5	-22.4242	Silty Sand	0	32	266.714	650.023	2286.41	1246.15	1040.26	2396.47	1150.32
17	1.82207	4424.33	-20.6886	Silty Sand	0	32	272.458	664.022	2325.31	1262.65	1062.66	2428.2	1165.55
18	1.82207	4468.44	-18.9728	Silty Sand	0	32	277.369	675.99	2357.06	1275.24	1081.82	2452.41	1177.17
19	1.82207	4499.27	-17.2744	Silty Sand	0	32	281.459	685.958	2381.8	1284.04	1097.76	2469.33	1185.29
20	1.82207	4517.2	-15.5916	Silty Sand	0	32	284.739	693.952	2399.71	1289.16	1110.55	2479.17	1190.01
21	1.82207	4522.57	-13.9225	Silty Sand	0	32	287.218	699.994	2410.91	1290.69	1120.22	2482.11	1191.42
22	1.82207	4515.66	-12.2654	Silty Sand	0	32	288.902	704.098	2415.51	1288.72	1126.79	2478.32	1189.6
23	1.82207	4496.71	-10.6186	Silty Sand	0	32	289.795	706.275	2413.59	1283.31	1130.28	2467.92	1184.61
24	1.82207	4465.94	-8.98065	Silty Sand	0	32	289.9	706.53	2405.22	1274.53	1130.69	2451.03	1176.5
25	1.82207	4423.51	-7.35008	Silty Sand	0	32	289.216	704.863	2390.44	1262.42	1128.02	2427.74	1165.32
26	1.82207	4369.58	-5.72548	Silty Sand	0	32	287.741	701.268	2369.29	1247.03	1122.26	2398.14	1151.11
27	1.82207	4304.25	-4.10549	Silty Sand	0	32	285.472	695.737	2341.8	1228.39	1113.41	2362.29	1133.9
28	1.82207	4227.61	-2.48879	Silty Sand	0	32	282.401	688.253	2307.95	1206.51	1101.44	2320.22	1113.71
29	1.82207	4139.71	-0.874068	Silty Sand	0	32	278.521	678.797	2267.73	1181.43	1086.3	2271.98	1090.55
30	1.82207	4040.58	0.739959	Silty Sand	0	32	273.821	667.343	2221.11	1153.14	1067.97	2217.57	1064.43
31	1.82207	3930.22	2.35457	Silty Sand	0	32	268.288	653.858	2168.03	1121.64	1046.39	2157	1035.36
32	1.82207	3808.6	3.97107	Silty Sand	0	32	261.906	638.305	2108.44	1086.93	1021.51	2090.25	1003.32
33	1.82207	3675.67	5.59073	Silty Sand	0	32	254.658	620.639	2042.23	1049	993.226	2017.3	968.298
34	1.82207	3531.36	7.21489	Silty Sand	0	32	246.52	600.806	1969.3	1007.81	961.492	1938.09	930.284
35	1.82207	3375.55	8.84491	Silty Sand	0	32	237.469	578.747	1889.53	963.343	926.189	1852.58	889.236
36	1.82207	3208.1	10.4822	Silty Sand	0	32	227.475	554.39	1802.76	915.554	887.207	1760.67	845.12
37	1.82207	3028.84	12.1282	Silty Sand	0	32	216.505	527.654	1708.82	864.395	844.421	1662.29	797.895
38	1.82207	2837.56	13.7844	Silty Sand	0	32	204.521	498.448	1607.49	809.807	797.687	1557.32	747.511
39	1.82207	2634.03	15.4525	Silty Sand	0	32	191.48	466.665	1498.54	751.721	746.823	1445.61	693.892
40	1.82207	2417.95	17.1341	Silty Sand	0	32	177.331	432.183	1381.69	690.056	691.638	1327.02	636.968
41	1.82207	2189.01	18.8311	Silty Sand	0	32	162.018	394.861	1256.63	624.719	631.912	1201.38	576.659
42	1.82207	1946.82	20.5454	Silty Sand	0	32	145.472	354.536	1122.98	555.601	567.375	1068.45	512.854
43	1.82207	1695.15	22.2792	Silty Sand	0	32	128.276	312.628	982.891	482.579	500.312	930.336	447.757
44	1.82207	1499.63	24.0347	Silty Sand	0	32	114.364	278.722	874.025	427.976	446.049	823.024	395.048
45	1.82207	1314.44	25.8147	Silty Sand	0	32	101.35	247.004	770.412	375.124	395.288	721.386	346.262
46	1.82207	1113.84	27.6218	Silty Sand	0	32	86.888	211.759	656.762	317.877	338.885	611.296	293.419
47	1.82207	897.094	29.4593	Silty Sand	0	32	70.852	172.677	532.361	256.02	276.341	492.341	236.321
48	1.82207	663.321	31.3308	Silty Sand	0	32	53.0874	129.382	396.358	189.303	207.055	364.041	174.738
49	1.82207	411.509	33.2403	Silty Sand	0	32	33.4078	81.4198	247.738	117.439	130.299	225.843	108.404
50	1.82207	140.479	35.1925	Silty Sand	0	32	11.5828	28.229	85.2656	40.0896	45.176	77.0971	37.0075

Global Minimum Query (janbu simplified) - Safety Factor: 2.3859

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.90635	336.588	-57.0639	Sandy Lean Clay	1500	0	628.694	1500	-543.277	91.8104	-635.087	427.192	335.382
2	1.90635	972.437	-53.9219	Sandy Lean Clay	1500	0	628.694	1500	-102.182	265.253	-367.435	760.664	495.411
3	1.90635	1540.99	-51.0022	Sandy Lean Clay	1500	0	628.694	1500	282.417	420.338	-137.921	1058.85	638.511
4	1.90635	2054.64	-48.2567	Sandy Lean Clay	1500	0	628.694	1500	623.689	560.448	63.2413	1328.25	767.799
5	1.90635	2522.07	-45.6521	Sandy Lean Clay	1500	0	628.694	1500	930.234	687.951	242.283	1573.4	885.451
6	1.83832	2837.63	-43.2064	Silty Sand	0	32	208.314	497.017	1598.07	802.671	795.394	1793.73	991.058
7	1.83832	3203.71	-40.8983	Silty Sand	0	32	231.971	553.459	1791.94	906.223	885.719	1992.87	1086.65
8	1.83832	3541.6	-38.6682	Silty Sand	0	32	254.386	606.939	1973.11	1001.8	971.306	2176.68	1174.88
9	1.83832	3853.93	-36.5058	Silty Sand	0	32	275.632	657.63	2142.58	1090.15	1052.43	2346.58	1256.43
10	1.83832	4118.39	-34.4022	Silty Sand	0	32	255.491	609.576	2141.82	1166.29	975.527	2316.77	1150.48
11	1.83832	4289.01	-32.3504	Silty Sand	0	32	251.593	600.276	2173.86	1213.22	960.642	2333.22	1120
12	1.83832	4434.76	-30.3441	Silty Sand	0	32	262.977	627.438	2258.56	1254.45	1004.11	2412.5	1158.05
13	1.83832	4561.61	-28.3783	Silty Sand	0	32	273.302	652.071	2333.86	1290.33	1043.53	2481.5	1191.17
14	1.83832	4670.62	-26.4483	Silty Sand	0	32	282.604	674.265	2400.21	1321.17	1079.04	2540.8	1219.63
15	1.83832	4762.73	-24.5501	Silty Sand	0	32	290.917	694.099	2458.01	1347.22	1110.79	2590.9	1243.68
16	1.83832	4838.7	-22.6803	Silty Sand	0	32	298.269	711.639	2507.57	1368.71	1138.86	2632.22	1263.51
17	1.83832	4899.22	-20.8357	Silty Sand	0	32	304.683	726.942	2549.18	1385.83	1163.35	2665.14	1279.31
18	1.83832	4944.88	-19.0134	Silty Sand	0	32	310.179	740.056	2583.08	1398.74	1184.34	2689.97	1291.23
19	1.83832	4976.18	-17.211	Silty Sand	0	32	314.774	751.019	2609.48	1407.6	1201.88	2706.98	1299.38
20	1.83832	4993.55	-15.4259	Silty Sand	0	32	318.481	759.865	2628.55	1412.51	1216.04	2716.43	1303.92
21	1.83832	4997.38	-13.6561	Silty Sand	0	32	321.312	766.618	2640.44	1413.6	1226.84	2718.51	1304.91
22	1.83832	4987.99	-11.8995	Silty Sand	0	32	323.273	771.296	2645.27	1410.94	1234.33	2713.39	1302.45
23	1.83832	4965.65	-10.1541	Silty Sand	0	32	324.369	773.912	2643.14	1404.62	1238.52	2701.23	1296.61
24	1.83832	4930.59	-8.41826	Silty Sand	0	32	324.604	774.472	2634.12	1394.7	1239.42	2682.16	1287.46
25	1.83832	4883	-6.69016	Silty Sand	0	32	323.976	772.974	2618.26	1381.24	1237.02	2656.26	1275.02
26	1.83832	4823.03	-4.96816	Silty Sand	0	32	322.484	769.415	2595.6	1364.28	1231.32	2623.63	1259.35
27	1.83832	4750.79	-3.25065	Silty Sand	0	32	320.122	763.78	2566.15	1343.84	1222.31	2584.33	1240.49
28	1.83832	4666.36	-1.53607	Silty Sand	0	32	316.883	756.052	2529.9	1319.96	1209.94	2538.39	1218.43
29	1.83832	4569.79	0.177142	Silty Sand	0	32	312.757	746.206	2486.82	1292.64	1194.18	2485.86	1193.22
30	1.83832	4461.09	1.89051	Silty Sand	0	32	307.728	734.209	2436.88	1261.9	1174.98	2426.72	1164.82
31	1.83832	4340.24	3.60557	Silty Sand	0	32	301.783	720.023	2379.99	1227.71	1152.28	2360.97	1133.26
32	1.83832	4207.18	5.32388	Silty Sand	0	32	294.899	703.6	2316.07	1190.07	1126	2288.59	1098.52
33	1.83832	4061.84	7.04701	Silty Sand	0	32	287.055	684.885	2245	1148.96	1096.04	2209.52	1060.56
34	1.83832	3904.09	8.77658	Silty Sand	0	32	278.222	663.81	2166.66	1104.34	1062.32	2123.7	1019.36
35	1.83832	3733.77	10.5142	Silty Sand	0	32	268.369	640.301	2080.86	1056.16	1024.7	2031.05	974.89
36	1.83832	3550.69	12.2618	Silty Sand	0	32	257.458	614.268	1987.41	1004.37	983.035	1931.45	927.08
37	1.83832	3354.6	14.021	Silty Sand	0	32	245.445	585.608	1886.07	948.906	937.168	1824.78	875.876
38	1.83832	3145.23	15.7938	Silty Sand	0	32	232.282	554.202	1776.59	889.683	886.908	1710.89	821.206
39	1.83832	2922.25	17.5822	Silty Sand	0	32	217.91	519.911	1658.64	826.607	832.03	1589.59	762.979
40	1.83832	2685.25	19.3886	Silty Sand	0	32	202.261	482.574	1531.85	759.57	772.282	1460.67	701.1
41	1.83832	2433.8	21.2153	Silty Sand	0	32	185.257	442.004	1395.8	688.442	707.356	1323.89	635.443
42	1.83832	2167.53	23.0649	Silty Sand	0	32	166.831	398.042	1250.08	613.078	637	1179.04	565.961
43	1.83832	1941.73	24.9403	Silty Sand	0	32	151.186	360.715	1126.52	549.25	577.267	1056.21	506.959
44	1.83832	1744.81	26.8447	Silty Sand	0	32	137.538	328.151	1018.7	493.549	525.15	949.089	455.54
45	1.83832	1530.8	28.7818	Silty Sand	0	32	122.262	291.706	899.843	433.013	466.83	832.679	399.666
46	1.83832	1298.76	30.7556	Silty Sand	0	32	105.2	250.997	769.053	367.375	401.678	706.451	339.076
47	1.83832	1047.57	32.7708	Silty Sand	0	32	86.1537	205.554	625.277	296.323	328.954	569.817	273.494
48	1.83832	775.949	34.8328	Silty Sand	0	32	64.8799	154.797	467.217	219.489	247.728	422.069	202.58
49	1.83832	482.347	36.9479	Silty Sand	0	32	41.0704	97.9899	293.255	136.439	156.816	262.365	125.926
50	1.83832	164.921	39.1236	Silty Sand	0	32	14.3288	34.187	101.36	46.6492	54.7107	89.7055	43.0563

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.43715

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	7.18273	168	0	0	0
2	9.00432	165.536	-2191.39	0	0
3	10.8259	163.296	-3484.31	0	0
4	12.6475	161.245	-4103.4	0	0
5	14.4691	159.357	-4212.11	0	0
6	16.2907	157.614	-3933.54	0	0
7	18.1122	156	-3363.07	0	0
8	19.9343	154.502	-1333.53	0	0
9	21.7564	153.111	723.563	0	0
10	23.5785	151.818	2776.67	0	0
11	25.4005	150.617	4763.85	0	0
12	27.2226	149.501	6559.5	0	0
13	29.0447	148.465	8259.04	0	0
14	30.8668	147.505	9852.58	0	0
15	32.6888	146.618	11332.1	0	0
16	34.5109	145.8	12691	0	0
17	36.333	145.048	13924.3	0	0
18	38.155	144.36	15028	0	0
19	39.9771	143.734	15999.2	0	0
20	41.7992	143.167	16836	0	0
21	43.6213	142.659	17537.4	0	0
22	45.4433	142.207	18103.1	0	0
23	47.2654	141.811	18533.7	0	0
24	49.0875	141.469	18830.2	0	0
25	50.9096	141.181	18994.7	0	0
26	52.7316	140.946	19029.7	0	0
27	54.5537	140.764	18938.3	0	0
28	56.3758	140.633	18724.5	0	0
29	58.1979	140.554	18392.9	0	0
30	60.0199	140.526	17948.5	0	0
31	61.842	140.549	17397.4	0	0
32	63.6641	140.624	16746.2	0	0
33	65.4861	140.751	16002.4	0	0
34	67.3082	140.929	15174.2	0	0
35	69.1303	141.16	14270.9	0	0
36	70.9524	141.443	13302.6	0	0
37	72.7744	141.78	12280.4	0	0
38	74.5965	142.172	11216.9	0	0
39	76.4186	142.619	10125.8	0	0
40	78.2407	143.123	9022.14	0	0
41	80.0627	143.684	7922.96	0	0
42	81.8848	144.306	6846.95	0	0
43	83.7069	144.989	5815.07	0	0
44	85.5289	145.735	4847.65	0	0
45	87.351	146.548	3929.11	0	0
46	89.1731	147.429	3065.43	0	0
47	90.9952	148.383	2280.96	0	0
48	92.8172	149.412	1604	0	0
49	94.6393	150.521	1067.66	0	0
50	96.4614	151.715	710.958	0	0
51	98.2835	153	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 2.3859

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	7.55354	168	0	0	0
2	9.45989	165.057	-2796.43	0	0
3	11.3662	162.441	-4261.51	0	0
4	13.2726	160.087	-4794.34	0	0
5	15.1789	157.95	-4659.63	0	0
6	17.0853	156	-4043.18	0	0
7	18.9236	154.273	-1666.53	0	0
8	20.7619	152.681	760.62	0	0
9	22.6002	151.21	3195.91	0	0
10	24.4385	149.849	5604.66	0	0
11	26.2769	148.591	7831.47	0	0
12	28.1152	147.426	9900.5	0	0
13	29.9535	146.35	11847.9	0	0
14	31.7918	145.357	13663.5	0	0
15	33.6301	144.442	15339.3	0	0
16	35.4684	143.603	16868.8	0	0
17	37.3068	142.834	18247.3	0	0
18	39.1451	142.135	19471	0	0
19	40.9834	141.501	20537.5	0	0
20	42.8217	140.932	21445.1	0	0
21	44.66	140.425	22193.4	0	0
22	46.4983	139.978	22782.4	0	0
23	48.3367	139.591	23213.2	0	0
24	50.175	139.261	23487.6	0	0
25	52.0133	138.989	23607.9	0	0
26	53.8516	138.774	23577.3	0	0
27	55.6899	138.614	23399.6	0	0
28	57.5282	138.51	23079.4	0	0
29	59.3666	138.46	22622	0	0
30	61.2049	138.466	22033.3	0	0
31	63.0432	138.527	21320.1	0	0
32	64.8815	138.642	20490	0	0
33	66.7198	138.814	19551.4	0	0
34	68.5581	139.041	18513.9	0	0
35	70.3965	139.325	17387.9	0	0
36	72.2348	139.666	16184.9	0	0
37	74.0731	140.066	14917.9	0	0
38	75.9114	140.525	13601.1	0	0
39	77.7497	141.045	12250.6	0	0
40	79.588	141.627	10884.1	0	0
41	81.4264	142.274	9521.46	0	0
42	83.2647	142.988	8185.08	0	0
43	85.103	143.77	6900.06	0	0
44	86.9413	144.625	5659.27	0	0
45	88.7796	145.556	4458.8	0	0
46	90.6179	146.566	3325.47	0	0
47	92.4563	147.66	2290.92	0	0
48	94.2946	148.843	1392.69	0	0
49	96.1329	150.122	675.829	0	0
50	97.9712	151.505	194.908	0	0
51	99.8095	153	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	168
25	168
85	153
120	153

Drawdown Line

X	Y
0	168
25	168
85	153
120	153

Distributed Load

X	Y
25	168
15	168
0	168

External Boundary

X	Y
0	168
0	166
0	160
0	156
0	138
120	138
120	145
120	151
120	153
95	153
85	153
73	156
25	168
15	168

Material Boundary

X	Y
0	156
41	156
65	156
73	156

Material Boundary

X	Y
0	160
25	160

Material Boundary

X	Y
25	160
41	156
85	145
120	145

Material Boundary

X	Y
15	168
15	166
25	166
65	156
85	151
95	151
95	153



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 2, Short-Term Saturated Local Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:16:19 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.354s
Author:	JNH
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:16:19 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:10116

Random Number Generation Method:Park and Miller v.3

Surface Options

Surface Type: Circular

Search Method: Grid Search

Radius Increment: 10

Composite Surfaces: Disabled

Reverse Curvature: Invalid Surfaces

Minimum Elevation: Not Defined

Minimum Depth [ft]: 1

Minimum Area: Not Defined

Minimum Weight: Not Defined

Seismic Loading

Advanced seismic analysis: No

Staged pseudostatic analysis: No

Loading

1 Distributed Load present

Distributed Load 1	
Distribution:	Constant
Magnitude [psf]:	250
Orientation:	Normal to boundary

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	1500
Friction Angle [deg]	0
Water Surface	Water Table
Hu Value	1

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	1000
Friction Angle [deg]	0
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	3.195250
Center:	60.269, 181.143
Radius:	37.465
Left Slip Surface Endpoint:	25.205, 167.949
Right Slip Surface Endpoint:	85.000, 153.000
Resisting Moment:	1.81194e+06 lb-ft
Driving Moment:	567074 lb-ft
Total Slice Area:	698.812 ft2
Surface Horizontal Width:	59.7955 ft
Surface Average Height:	11.6867 ft

Method: janbu simplified

FS	3.455580
Center:	60.269, 181.143
Radius:	37.465
Left Slip Surface Endpoint:	25.205, 167.949
Right Slip Surface Endpoint:	85.000, 153.000
Resisting Horizontal Force:	35736.2 lb
Driving Horizontal Force:	10341.6 lb
Total Slice Area:	698.812 ft2
Surface Horizontal Width:	59.7955 ft
Surface Average Height:	11.6867 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	8418
Number of Invalid Surfaces:	5778

Error Codes

Error Code -101 reported for 282 surfaces
Error Code -103 reported for 8 surfaces
Error Code -106 reported for 20 surfaces
Error Code -112 reported for 192 surfaces
Error Code -114 reported for 61 surfaces
Error Code -115 reported for 490 surfaces
Error Code -1000 reported for 4725 surfaces

Method: janbu simplified

Number of Valid Surfaces:	7459
Number of Invalid Surfaces:	6737

Error Codes

Error Code -101 reported for 282 surfaces
Error Code -103 reported for 8 surfaces
Error Code -106 reported for 20 surfaces
Error Code -108 reported for 2 surfaces
Error Code -111 reported for 957 surfaces
Error Code -112 reported for 192 surfaces
Error Code -114 reported for 61 surfaces
Error Code -115 reported for 490 surfaces
Error Code -1000 reported for 4725 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

- 101 = Only one (or zero) surface / slope intersections.
- 103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
- 106 = Average slice width is less than $0.0001 * (\text{maximum horizontal extent of soil region})$. This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
- 108 = Total driving moment or total driving force < 0.1 . This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 111 = Safety factor equation did not converge
- 112 = The coefficient $M\text{-Alpha} = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F) < 0.2$ for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
- 114 = Surface with Reverse Curvature.
- 115 = Surface too shallow, below the minimum depth.
- 1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 3.19525

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.21496	186.522	-67.0011	Sandy Lean Clay	1500	0	469.447	1500	-952.421	79.8294	-1032.25	153.585	73.7557
2	1.21496	521.792	-62.6033	Sandy Lean Clay	1500	0	469.447	1500	-476.26	223.324	-699.584	429.522	206.198
3	1.21496	794.586	-58.7907	Sandy Lean Clay	1500	0	469.447	1500	-120.82	340.079	-460.899	654.044	313.965
4	1.21496	1024.7	-55.3627	Sandy Lean Clay	1500	0	469.447	1500	163.883	438.567	-274.684	843.439	404.872
5	1.21496	1222.85	-52.2117	Sandy Lean Clay	1500	0	469.447	1500	401.068	523.376	-122.308	1006.53	483.153
6	1.21496	1395.66	-49.2713	Sandy Lean Clay	1500	0	469.447	1500	603.531	597.338	6.19299	1148.76	551.423
7	1.20576	1535.35	-46.5076	Silty Sand	0	32	99.1015	316.654	1168.89	662.136	506.75	1273.34	611.209
8	1.20576	1667.59	-43.8885	Silty Sand	0	32	109.269	349.143	1277.92	719.168	558.748	1383.03	663.858
9	1.20576	1784.74	-41.3802	Silty Sand	0	32	118.524	378.715	1375.76	769.689	606.072	1480.18	710.492
10	1.20576	1888.53	-38.9654	Silty Sand	0	32	126.946	405.625	1463.58	814.448	649.133	1566.25	751.805
11	1.20576	1980.32	-36.6306	Silty Sand	0	32	134.6	430.082	1542.31	854.035	688.276	1642.39	788.35
12	1.20576	2061.21	-34.3646	Silty Sand	0	32	141.541	452.258	1612.68	888.92	723.764	1709.47	820.551
13	1.20576	2132.09	-32.1584	Silty Sand	0	32	147.812	472.297	1675.32	919.487	755.832	1768.25	848.765
14	1.20576	2193.69	-30.0045	Silty Sand	0	32	153.453	490.32	1730.73	946.053	784.677	1819.34	873.289
15	1.20576	2246.63	-27.8965	Silty Sand	0	32	158.494	506.429	1779.34	968.883	810.455	1863.24	894.361
16	1.20576	2291.42	-25.8289	Silty Sand	0	32	162.964	520.71	1821.5	988.198	833.306	1900.39	912.187
17	1.20576	2328.49	-23.7968	Silty Sand	0	32	166.884	533.236	1857.54	1004.19	853.351	1931.13	926.945
18	1.20576	2358.23	-21.796	Silty Sand	0	32	170.275	544.071	1887.71	1017.01	870.7	1955.8	938.792
19	1.20576	2380.94	-19.8229	Silty Sand	0	32	173.153	553.266	1912.22	1026.81	885.406	1974.63	947.823
20	1.20576	2396.9	-17.874	Silty Sand	0	32	175.531	560.867	1931.26	1033.69	897.57	1987.87	954.177
21	1.20576	2406.34	-15.9462	Silty Sand	0	32	177.422	566.909	1945	1037.76	907.242	1995.7	957.937
22	1.20576	2409.46	-14.0369	Silty Sand	0	32	178.835	571.423	1953.57	1039.11	914.462	1998.28	959.173
23	1.20576	2406.42	-12.1433	Silty Sand	0	32	179.777	574.434	1957.08	1037.8	919.282	1995.76	957.965
24	1.20576	2397.37	-10.2632	Silty Sand	0	32	180.255	575.96	1955.62	1033.89	921.73	1988.26	954.368
25	1.20576	2382.42	-8.39414	Silty Sand	0	32	180.272	576.013	1949.26	1027.45	921.81	1975.86	948.411
26	1.20576	2361.67	-6.53406	Silty Sand	0	32	179.83	574.603	1938.05	1018.5	919.549	1958.65	940.147
27	1.20576	2335.19	-4.68088	Silty Sand	0	32	178.932	571.731	1922.04	1007.07	914.967	1936.69	929.618
28	1.20576	2303.03	-2.8326	Silty Sand	0	32	177.575	567.396	1901.23	993.206	908.024	1910.02	916.81
29	1.20576	2265.23	-0.987273	Silty Sand	0	32	175.758	561.591	1875.64	976.906	898.737	1878.67	901.766
30	1.20576	2221.81	0.857031	Silty Sand	0	32	173.478	554.305	1845.25	958.182	887.071	1842.66	884.476
31	1.20576	2172.78	2.70223	Silty Sand	0	32	170.728	545.52	1810.05	937.033	873.014	1801.99	864.956
32	1.20576	2118.1	4.55023	Silty Sand	0	32	167.503	535.214	1769.97	913.454	856.52	1756.64	843.189
33	1.20576	2057.75	6.403	Silty Sand	0	32	163.793	523.358	1724.98	887.428	837.547	1706.59	819.166
34	1.20576	1991.68	8.26252	Silty Sand	0	32	159.586	509.917	1674.98	858.934	816.042	1651.8	792.867
35	1.20576	1919.81	10.1309	Silty Sand	0	32	154.871	494.85	1619.86	827.939	791.925	1592.19	764.252
36	1.20576	1842.05	12.0102	Silty Sand	0	32	149.63	478.106	1559.53	794.403	765.128	1527.7	733.295
37	1.20576	1758.28	13.9027	Silty Sand	0	32	143.847	459.626	1493.83	758.278	735.555	1458.23	699.95
38	1.20576	1668.37	15.8109	Silty Sand	0	32	137.498	439.342	1422.6	719.504	703.096	1383.66	664.16
39	1.20576	1572.15	17.7372	Silty Sand	0	32	130.56	417.172	1345.62	678.008	667.614	1303.86	625.853
40	1.20576	1469.43	19.6845	Silty Sand	0	32	123.001	393.02	1262.67	633.706	628.967	1218.67	584.963
41	1.20576	1359.97	21.6558	Silty Sand	0	32	114.788	366.775	1173.46	586.501	586.959	1127.88	541.382
42	1.20576	1243.51	23.6545	Silty Sand	0	32	105.877	338.305	1077.67	536.275	541.398	1031.3	495.021
43	1.20576	1119.73	25.6843	Silty Sand	0	32	96.2213	307.451	974.917	482.895	492.022	928.641	445.746
44	1.20576	988.267	27.7493	Silty Sand	0	32	85.7607	274.027	864.733	426.2	438.533	819.613	393.413
45	1.20576	848.689	29.8542	Silty Sand	0	32	74.4248	237.806	746.573	366.006	380.567	703.856	337.85
46	1.20576	700.487	32.0047	Silty Sand	0	32	62.1266	198.51	619.774	302.091	317.683	580.946	278.855
47	1.20576	543.054	34.2069	Silty Sand	0	32	48.7589	155.797	483.524	234.197	249.327	450.379	216.182
48	1.20576	375.666	36.4684	Silty Sand	0	32	34.1873	109.237	336.824	162.009	174.815	311.556	149.547
49	0.931798	169.131	38.5258	Clay Liner	1000	0	312.965	1000	430.669	94.3841	336.285	181.496	87.1123
50	0.931798	57.3157	40.3718	Clay Liner	1000	0	312.965	1000	327.584	31.9841	295.6	61.4956	29.5115

Global Minimum Query (janbu simplified) - Safety Factor: 3.45558

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.21496	186.522	-67.0011	Sandy Lean Clay	1500	0	434.081	1500	-868.378	79.8294	-948.208	154.306	74.4764
2	1.21496	521.792	-62.6033	Sandy Lean Clay	1500	0	434.081	1500	-407.428	223.324	-630.752	430.115	206.791
3	1.21496	794.586	-58.7907	Sandy Lean Clay	1500	0	434.081	1500	-61.9388	340.079	-402.018	654.55	314.471
4	1.21496	1024.7	-55.3627	Sandy Lean Clay	1500	0	434.081	1500	215.522	438.567	-223.045	843.883	405.316
5	1.21496	1222.85	-52.2117	Sandy Lean Clay	1500	0	434.081	1500	447.076	523.376	-76.3	1006.92	483.548
6	1.21496	1395.66	-49.2713	Sandy Lean Clay	1500	0	434.081	1500	644.963	597.338	47.6253	1149.12	551.78
7	1.20576	1535.35	-46.5076	Silty Sand	0	32	92.8414	320.821	1175.56	662.136	513.423	1273.42	611.283
8	1.20576	1667.59	-43.8885	Silty Sand	0	32	102.268	353.395	1284.72	719.168	565.55	1383.09	663.925
9	1.20576	1784.74	-41.3802	Silty Sand	0	32	110.833	382.992	1382.61	769.689	612.917	1480.25	710.561
10	1.20576	1888.53	-38.9654	Silty Sand	0	32	118.613	409.878	1470.39	814.448	655.942	1566.32	751.875
11	1.20576	1980.32	-36.6306	Silty Sand	0	32	125.672	434.271	1549.01	854.035	694.978	1642.45	788.414
12	1.20576	2061.21	-34.3646	Silty Sand	0	32	132.061	456.348	1619.23	888.92	730.309	1709.53	820.613
13	1.20576	2132.09	-32.1584	Silty Sand	0	32	137.823	476.259	1681.66	919.487	762.172	1768.31	848.824
14	1.20576	2193.69	-30.0045	Silty Sand	0	32	142.995	494.13	1736.83	946.053	790.774	1819.4	873.347
15	1.20576	2246.63	-27.8965	Silty Sand	0	32	147.606	510.065	1785.16	968.883	816.275	1863.3	894.417
16	1.20576	2291.42	-25.8289	Silty Sand	0	32	151.683	524.154	1827.02	988.198	838.823	1900.44	912.244
17	1.20576	2328.49	-23.7968	Silty Sand	0	32	155.248	536.473	1862.72	1004.19	858.534	1931.19	926.997
18	1.20576	2358.23	-21.796	Silty Sand	0	32	158.32	547.086	1892.53	1017.01	875.521	1955.84	938.832
19	1.20576	2380.94	-19.8229	Silty Sand	0	32	160.913	556.049	1916.67	1026.81	889.861	1974.68	947.866
20	1.20576	2396.9	-17.874	Silty Sand	0	32	163.042	563.406	1935.33	1033.69	901.635	1987.9	954.215
21	1.20576	2406.34	-15.9462	Silty Sand	0	32	164.719	569.198	1948.67	1037.76	910.91	1995.73	957.975
22	1.20576	2409.46	-14.0369	Silty Sand	0	32	165.95	573.455	1956.82	1039.11	917.712	1998.31	959.202
23	1.20576	2406.42	-12.1433	Silty Sand	0	32	166.745	576.202	1959.91	1037.8	922.111	1995.79	957.99
24	1.20576	2397.37	-10.2632	Silty Sand	0	32	167.11	577.461	1958.02	1033.89	924.129	1988.28	954.387
25	1.20576	2382.42	-8.39414	Silty Sand	0	32	167.047	577.244	1951.23	1027.45	923.779	1975.88	948.429
26	1.20576	2361.67	-6.53406	Silty Sand	0	32	166.56	575.561	1939.58	1018.5	921.082	1958.66	940.159
27	1.20576	2335.19	-4.68088	Silty Sand	0	32	165.65	572.416	1923.14	1007.07	916.066	1936.7	929.63
28	1.20576	2303.03	-2.8326	Silty Sand	0	32	164.317	567.809	1901.89	993.206	908.686	1910.02	916.816
29	1.20576	2265.23	-0.987273	Silty Sand	0	32	162.559	561.735	1875.87	976.906	898.961	1878.67	901.762
30	1.20576	2221.81	0.857031	Silty Sand	0	32	160.373	554.181	1845.05	958.182	886.872	1842.66	884.473
31	1.20576	2172.78	2.70223	Silty Sand	0	32	157.755	545.134	1809.43	937.033	872.401	1801.99	864.955
32	1.20576	2118.1	4.55023	Silty Sand	0	32	154.698	534.572	1768.95	913.454	855.495	1756.64	843.183
33	1.20576	2057.75	6.403	Silty Sand	0	32	151.195	522.467	1723.55	887.428	836.121	1706.58	819.154
34	1.20576	1991.68	8.26252	Silty Sand	0	32	147.236	508.787	1673.16	858.934	814.228	1651.78	792.847
35	1.20576	1919.81	10.1309	Silty Sand	0	32	142.81	493.492	1617.69	827.939	789.753	1592.17	764.236
36	1.20576	1842.05	12.0102	Silty Sand	0	32	137.903	476.534	1557.02	794.403	762.613	1527.68	733.276
37	1.20576	1758.28	13.9027	Silty Sand	0	32	132.498	457.857	1491	758.278	732.721	1458.2	699.925
38	1.20576	1668.37	15.8109	Silty Sand	0	32	126.576	437.394	1419.48	719.504	699.976	1383.64	664.133
39	1.20576	1572.15	17.7372	Silty Sand	0	32	120.115	415.067	1342.26	678.008	664.249	1303.84	625.829
40	1.20576	1469.43	19.6845	Silty Sand	0	32	113.088	390.786	1259.1	633.706	625.39	1218.64	584.933
41	1.20576	1359.97	21.6558	Silty Sand	0	32	105.465	364.444	1169.73	586.501	583.229	1127.85	541.353
42	1.20576	1243.51	23.6545	Silty Sand	0	32	97.2089	335.913	1073.85	536.275	537.577	1031.27	494.997
43	1.20576	1119.73	25.6843	Silty Sand	0	32	88.2761	305.045	971.068	482.895	488.173	928.613	445.718
44	1.20576	988.267	27.7493	Silty Sand	0	32	78.6149	271.66	860.945	426.2	434.745	819.585	393.385
45	1.20576	848.689	29.8542	Silty Sand	0	32	68.1631	235.543	742.955	366.006	376.949	703.832	337.826
46	1.20576	700.487	32.0047	Silty Sand	0	32	56.8449	196.432	616.448	302.091	314.357	580.921	278.83
47	1.20576	543.054	34.2069	Silty Sand	0	32	44.5665	154.003	480.653	234.197	246.456	450.358	216.161
48	1.20576	375.666	36.4684	Silty Sand	0	32	31.211	107.852	334.609	162.009	172.6	311.541	149.532
49	0.931798	169.131	38.5258	Clay Liner	1000	0	289.387	1000	411.735	94.3841	317.351	181.334	86.9496
50	0.931798	57.3157	40.3718	Clay Liner	1000	0	289.387	1000	307.364	31.9841	275.38	61.3219	29.3378

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 3.19525

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.2045	167.949	0	0	0
2	26.4195	165.086	-3296.57	0	0
3	27.6344	162.742	-4983.35	0	0
4	28.8494	160.737	-5795.97	0	0
5	30.0644	158.978	-6078.07	0	0
6	31.2793	157.411	-6019.94	0	0
7	32.4943	156	-5738.63	0	0
8	33.7001	154.729	-4372.51	0	0
9	34.9058	153.569	-3022.05	0	0
10	36.1116	152.507	-1703.51	0	0
11	37.3173	151.532	-429.275	0	0
12	38.5231	150.635	791.085	0	0
13	39.7289	149.811	1950.1	0	0
14	40.9346	149.053	3041.93	0	0
15	42.1404	148.356	4061.98	0	0
16	43.3462	147.718	5006.68	0	0
17	44.5519	147.134	5873.3	0	0
18	45.7577	146.603	6659.79	0	0
19	46.9635	146.12	7364.69	0	0
20	48.1692	145.686	7987.06	0	0
21	49.375	145.297	8526.39	0	0
22	50.5808	144.952	8982.57	0	0
23	51.7865	144.651	9355.86	0	0
24	52.9923	144.392	9646.87	0	0
25	54.1981	144.173	9856.49	0	0
26	55.4038	143.995	9985.97	0	0
27	56.6096	143.857	10036.8	0	0
28	57.8153	143.758	10010.8	0	0
29	59.0211	143.699	9910.14	0	0
30	60.2269	143.678	9737.21	0	0
31	61.4326	143.696	9494.76	0	0
32	62.6384	143.753	9185.91	0	0
33	63.8442	143.849	8814.1	0	0
34	65.0499	143.984	8383.21	0	0
35	66.2557	144.159	7897.52	0	0
36	67.4615	144.375	7361.79	0	0
37	68.6672	144.631	6781.33	0	0
38	69.873	144.93	6162.05	0	0
39	71.0788	145.271	5510.54	0	0
40	72.2845	145.657	4834.15	0	0
41	73.4903	146.088	4141.19	0	0
42	74.6961	146.567	3440.98	0	0
43	75.9018	147.095	2744.15	0	0
44	77.1076	147.675	2062.79	0	0
45	78.3133	148.309	1410.84	0	0
46	79.5191	149.001	804.424	0	0
47	80.7249	149.755	262.467	0	0
48	81.9306	150.575	-192.642	0	0
49	83.1364	151.466	-534.037	0	0
50	84.0682	152.208	-1145.14	0	0
51	85	153	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 3.45558

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.2045	167.949	0	0	0
2	26.4195	165.086	-3012.66	0	0
3	27.6344	162.742	-4494.75	0	0
4	28.8494	160.737	-5145.95	0	0
5	30.0644	158.978	-5293.89	0	0
6	31.2793	157.411	-5120.32	0	0
7	32.4943	156	-4737.2	0	0
8	33.7001	154.729	-3354.99	0	0
9	34.9058	153.569	-1988.1	0	0
10	36.1116	152.507	-652.923	0	0
11	37.3173	151.532	638.099	0	0
12	38.5231	150.635	1875.34	0	0
13	39.7289	149.811	3051.3	0	0
14	40.9346	149.053	4160.09	0	0
15	42.1404	148.356	5197.12	0	0
16	43.3462	147.718	6158.79	0	0
17	44.5519	147.134	7042.35	0	0
18	45.7577	146.603	7845.76	0	0
19	46.9635	146.12	8567.54	0	0
20	48.1692	145.686	9206.74	0	0
21	49.375	145.297	9762.85	0	0
22	50.5808	144.952	10235.7	0	0
23	51.7865	144.651	10625.7	0	0
24	52.9923	144.392	10933.3	0	0
25	54.1981	144.173	11159.4	0	0
26	55.4038	143.995	11305.3	0	0
27	56.6096	143.857	11372.5	0	0
28	57.8153	143.758	11362.8	0	0
29	59.0211	143.699	11278.3	0	0
30	60.2269	143.678	11121.4	0	0
31	61.4326	143.696	10894.9	0	0
32	62.6384	143.753	10601.9	0	0
33	63.8442	143.849	10245.8	0	0
34	65.0499	143.984	9830.37	0	0
35	66.2557	144.159	9360.01	0	0
36	67.4615	144.375	8839.41	0	0
37	68.6672	144.631	8273.86	0	0
38	69.873	144.93	7669.22	0	0
39	71.0788	145.271	7032.05	0	0
40	72.2845	145.657	6369.66	0	0
41	73.4903	146.088	5690.28	0	0
42	74.6961	146.567	5003.2	0	0
43	75.9018	147.095	4318.92	0	0
44	77.1076	147.675	3649.45	0	0
45	78.3133	148.309	3008.58	0	0
46	79.5191	149.001	2412.28	0	0
47	80.7249	149.755	1879.25	0	0
48	81.9306	150.575	1431.59	0	0
49	83.1364	151.466	1095.78	0	0
50	84.0682	152.208	520.886	0	0
51	85	153	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	168
25	168
85	153
120	153

Drawdown Line

X	Y
0	168
25	168
85	153
120	153

Distributed Load

X	Y
25	168
15	168
0	168

External Boundary

X	Y
0	168
0	166
0	160
0	156
0	138
120	138
120	145
120	151
120	153
95	153
85	153
73	156
25	168
15	168

Material Boundary

X	Y
0	156
41	156
65	156
73	156

Material Boundary

X	Y
0	160
25	160

Material Boundary

X	Y
25	160
41	156
85	145
120	145

Material Boundary

X	Y
15	168
15	166
25	166
65	156
85	151
95	151
95	153



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 2, Long-Term Local Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:16:19 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.314s
Author:	JNH
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:16:19 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Loading

1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	250
Orientation:	Normal to boundary

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Weathered Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	2.341730
Center:	49.175, 210.279
Radius:	54.248
Left Slip Surface Endpoint:	15.184, 168.000
Right Slip Surface Endpoint:	64.287, 158.178
Resisting Moment:	937936 lb-ft
Driving Moment:	400531 lb-ft
Total Slice Area:	254.965 ft2
Surface Horizontal Width:	49.1025 ft
Surface Average Height:	5.19251 ft

Method: janbu simplified

FS		2.168180
Center:	66.653, 202.177	
Radius:	57.907	
Left Slip Surface Endpoint:	19.907, 168.000	
Right Slip Surface Endpoint:	97.228, 153.000	
Resisting Horizontal Force:	41580.8 lb	
Driving Horizontal Force:	19177.8 lb	
Total Slice Area:	781.984 ft2	
Surface Horizontal Width:	77.3214 ft	
Surface Average Height:	10.1134 ft	

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	8489
Number of Invalid Surfaces:	772
Error Codes	
Error Code -103 reported for 772 surfaces	

Method: janbu simplified

Number of Valid Surfaces:	8489
Number of Invalid Surfaces:	772
Error Codes	
Error Code -103 reported for 772 surfaces	

Error Code Descriptions

The following errors were encountered during the computation:
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.34173

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	0.982049	45.4351	-38.1386	Weathered Sandy Lean Clay	100	20	79.113	185.261	234.254	0	234.254	296.373	296.373

2	0.982049	134.208	-36.8312	Weathered Sandy Lean Clay	100	20	92.099	215.671	317.803	0	317.803	386.78	386.78
3	0.982049	218.891	-35.5459	Weathered Sandy Lean Clay	100	20	104.607	244.962	398.278	0	398.278	473.021	473.021
4	0.982049	299.68	-34.2808	Weathered Sandy Lean Clay	100	20	116.653	273.169	475.777	0	475.777	555.295	555.295
5	0.982049	376.752	-33.0345	Weathered Sandy Lean Clay	100	20	128.249	300.324	550.387	0	550.387	633.782	633.782
6	0.982049	450.266	-31.8056	Weathered Sandy Lean Clay	100	20	139.409	326.458	622.189	0	622.189	708.645	708.645
7	0.982049	520.363	-30.5929	Weathered Sandy Lean Clay	100	20	150.144	351.597	691.258	0	691.258	780.027	780.027
8	0.982049	587.174	-29.3951	Weathered Sandy Lean Clay	100	20	160.466	375.767	757.662	0	757.662	848.062	848.062
9	0.982049	650.815	-28.2113	Weathered Sandy Lean Clay	100	20	170.382	398.989	821.466	0	821.466	912.868	912.868
10	0.982049	711.392	-27.0405	Weathered Sandy Lean Clay	100	20	179.722	420.86	881.556	0	881.556	973.289	973.289
11	0.982049	754.39	-25.8818	Weathered Sandy Lean Clay	100	20	150.751	353.019	695.164	0	695.164	768.306	768.306
12	0.982049	780.19	-24.7343	Weathered Sandy Lean Clay	100	20	155.097	363.196	723.124	0	723.124	794.574	794.574
13	0.982049	803.192	-23.5974	Weathered Sandy Lean Clay	100	20	159.044	372.438	748.517	0	748.517	817.993	817.993
14	0.982049	823.47	-22.4702	Weathered Sandy Lean Clay	100	20	162.599	380.762	771.386	0	771.386	838.638	838.638
15	0.982049	841.092	-21.3521	Weathered Sandy Lean Clay	100	20	165.767	388.182	791.774	0	791.774	856.578	856.578
16	0.982049	856.12	-20.2425	Weathered Sandy Lean Clay	100	20	168.556	394.713	809.717	0	809.717	871.875	871.875
17	0.982049	868.61	-19.1408	Weathered Sandy Lean Clay	100	20	170.97	400.366	825.249	0	825.249	884.59	884.59
18	0.982049	878.614	-18.0464	Weathered Sandy Lean Clay	100	20	173.014	405.153	838.4	0	838.4	894.771	894.771
19	0.982049	886.181	-16.9587	Weathered Sandy Lean Clay	100	20	174.693	409.083	849.2	0	849.2	902.471	902.471
20	0.982049	891.352	-15.8773	Weathered Sandy Lean Clay	100	20	176.009	412.166	857.669	0	857.669	907.731	907.731
21	0.982049	894.169	-14.8017	Weathered Sandy Lean Clay	100	20	176.967	414.409	863.831	0	863.831	910.593	910.593
22	0.982049	894.666	-13.7314	Weathered Sandy Lean Clay	100	20	177.569	415.819	867.705	0	867.705	911.095	911.095
23	0.982049	892.878	-12.666	Weathered Sandy Lean Clay	100	20	177.818	416.401	869.305	0	869.305	909.267	909.267
24	0.982049	888.833	-11.605	Weathered Sandy Lean Clay	100	20	177.715	416.161	868.647	0	868.647	905.142	905.142
25	0.982049	882.558	-10.548	Weathered Sandy Lean Clay	100	20	177.263	415.103	865.739	0	865.739	898.746	898.746
26	0.982049	874.078	-9.49461	Weathered Sandy Lean Clay	100	20	176.464	413.23	860.593	0	860.593	890.106	890.106

27	0.982049	863.414	-8.44448	Weathered Sandy Lean Clay	100	20	175.317	410.544	853.213	0	853.213	879.241	879.241
28	0.982049	850.584	-7.3972	Weathered Sandy Lean Clay	100	20	173.823	407.047	843.603	0	843.603	866.171	866.171
29	0.982049	835.606	-6.3524	Weathered Sandy Lean Clay	100	20	171.983	402.738	831.767	0	831.767	850.913	850.913
30	0.982049	818.493	-5.30972	Weathered Sandy Lean Clay	100	20	169.797	397.619	817.701	0	817.701	833.481	833.481
31	0.982049	799.258	-4.2688	Weathered Sandy Lean Clay	100	20	167.264	391.687	801.403	0	801.403	813.888	813.888
32	0.982049	777.909	-3.22928	Weathered Sandy Lean Clay	100	20	164.383	384.941	782.869	0	782.869	792.144	792.144
33	0.982049	754.455	-2.19084	Weathered Sandy Lean Clay	100	20	161.154	377.378	762.092	0	762.092	768.257	768.257
34	0.982049	728.901	-1.15311	Weathered Sandy Lean Clay	100	20	157.574	368.995	739.059	0	739.059	742.23	742.23
35	0.982049	701.25	-0.11576	Weathered Sandy Lean Clay	100	20	153.642	359.787	713.758	0	713.758	714.068	714.068
36	0.982049	671.503	0.921552	Weathered Sandy Lean Clay	100	20	149.355	349.748	686.176	0	686.176	683.774	683.774
37	0.982049	639.661	1.95917	Weathered Sandy Lean Clay	100	20	144.71	338.872	656.294	0	656.294	651.344	651.344
38	0.982049	605.719	2.99742	Weathered Sandy Lean Clay	100	20	139.705	327.151	624.093	0	624.093	616.778	616.778
39	0.982049	569.672	4.03667	Weathered Sandy Lean Clay	100	20	134.336	314.578	589.549	0	589.549	580.069	580.069
40	0.982049	531.515	5.07724	Weathered Sandy Lean Clay	100	20	128.599	301.143	552.636	0	552.636	541.211	541.211
41	0.982049	491.237	6.1195	Weathered Sandy Lean Clay	100	20	122.489	286.836	513.327	0	513.327	500.194	500.194
42	0.982049	448.828	7.1638	Weathered Sandy Lean Clay	100	20	116.001	271.643	471.587	0	471.587	457.007	457.007
43	0.982049	404.273	8.21049	Weathered Sandy Lean Clay	100	20	109.13	255.554	427.382	0	427.382	411.636	411.636
44	0.982049	357.557	9.25995	Weathered Sandy Lean Clay	100	20	101.871	238.554	380.672	0	380.672	364.063	364.063
45	0.982049	308.661	10.3126	Weathered Sandy Lean Clay	100	20	94.215	220.626	331.416	0	331.416	314.273	314.273
46	0.982049	257.564	11.3687	Weathered Sandy Lean Clay	100	20	86.156	201.754	279.566	0	279.566	262.243	262.243
47	0.982049	204.244	12.4288	Weathered Sandy Lean Clay	100	20	77.6855	181.918	225.069	0	225.069	207.948	207.948
48	0.982049	148.673	13.4932	Weathered Sandy Lean Clay	100	20	68.7952	161.1	167.87	0	167.87	151.362	151.362
49	0.982049	90.8237	14.5624	Weathered Sandy Lean Clay	100	20	59.4753	139.275	107.908	0	107.908	92.4572	92.4572
50	0.982049	30.6626	15.6367	Weathered Sandy Lean Clay	100	20	49.7155	116.42	45.1143	0	45.1143	31.1991	31.1991

Global Minimum Query (janbu simplified) - Safety Factor: 2.16818

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.55989	190.675	-52.5594	Weathered Sandy Lean Clay	100	20	89.0789	193.139	255.897	0	255.897	372.237	372.237
2	1.55989	555.88	-50.0871	Weathered Sandy Lean Clay	100	20	123.189	267.096	459.092	0	459.092	606.356	606.356
3	1.55989	891.063	-47.7367	Weathered Sandy Lean Clay	100	20	155.295	336.707	650.346	0	650.346	821.232	821.232
4	1.55989	1180.51	-45.4883	Weathered Sandy Lean Clay	100	20	157.409	341.292	662.942	0	662.942	823.057	823.057
5	1.55989	1396.29	-43.3265	Weathered Sandy Lean Clay	100	20	169.54	367.593	735.204	0	735.204	895.119	895.119
6	1.33483	1348.91	-41.3854	Sandy Lean Clay	150	22	221.175	479.548	815.658	0	815.658	1010.55	1010.55
7	1.33483	1478.25	-39.6475	Sandy Lean Clay	150	22	238.69	517.523	909.652	0	909.652	1107.45	1107.45
8	1.33483	1596.76	-37.9523	Sandy Lean Clay	150	22	255.028	552.946	997.325	0	997.325	1196.23	1196.23
9	1.45538	1864.07	-36.2223	Silty Sand	0	32	304.788	660.835	1057.56	0	1057.56	1280.81	1280.81
10	1.45538	1980.82	-34.4565	Silty Sand	0	32	327.488	710.052	1136.32	0	1136.32	1361.03	1361.03
11	1.45538	2086.15	-32.7273	Silty Sand	0	32	348.55	755.72	1209.4	0	1209.4	1433.4	1433.4
12	1.55868	2338.71	-30.972	Silty Sand	0	32	361.488	783.77	1283.48	29.1865	1254.3	1500.45	1471.26
13	1.55868	2434.75	-29.1893	Silty Sand	0	32	366.523	794.687	1357.31	85.5415	1271.77	1562.06	1476.52
14	1.55868	2518.97	-27.4372	Silty Sand	0	32	370.555	803.431	1423.71	137.956	1285.76	1616.09	1478.14
15	1.55868	2591.96	-25.7124	Silty Sand	0	32	373.62	810.075	1483.01	186.622	1296.39	1662.93	1476.3
16	1.55868	2654.21	-24.0123	Silty Sand	0	32	375.745	814.683	1535.47	231.703	1303.77	1702.86	1471.16
17	1.55868	2706.15	-22.3344	Silty Sand	0	32	376.957	817.31	1581.31	273.347	1307.97	1736.18	1462.83
18	1.55868	2748.16	-20.6765	Silty Sand	0	32	377.275	818	1620.75	311.679	1309.07	1763.13	1451.45
19	1.55868	2780.59	-19.0365	Silty Sand	0	32	376.719	816.794	1653.95	346.812	1307.14	1783.94	1437.13
20	1.55868	2803.72	-17.4126	Silty Sand	0	32	375.303	813.724	1681.08	378.843	1302.23	1798.78	1419.94
21	1.55868	2817.8	-15.8029	Silty Sand	0	32	373.04	808.817	1702.23	407.858	1294.38	1807.82	1399.96
22	1.55868	2823.08	-14.206	Silty Sand	0	32	369.938	802.092	1717.55	433.933	1283.62	1811.2	1377.27
23	1.55868	2819.73	-12.6203	Silty Sand	0	32	366.006	793.566	1727.1	457.133	1269.97	1809.05	1351.92
24	1.55868	2807.94	-11.0444	Silty Sand	0	32	361.248	783.25	1730.98	477.513	1253.46	1801.49	1323.97
25	1.55868	2787.84	-9.47692	Silty Sand	0	32	355.667	771.149	1729.22	495.123	1234.09	1788.59	1293.46
26	1.55868	2759.56	-7.91655	Silty Sand	0	32	349.263	757.264	1721.88	510.003	1211.87	1770.44	1260.44
27	1.55868	2723.2	-6.36207	Silty Sand	0	32	342.034	741.591	1708.98	522.188	1186.79	1747.12	1224.93
28	1.55868	2678.84	-4.81229	Silty Sand	0	32	333.976	724.121	1690.54	531.704	1158.83	1718.66	1186.95
29	1.55868	2626.54	-3.26603	Silty Sand	0	32	325.085	704.842	1666.55	538.573	1127.98	1685.1	1146.53
30	1.55868	2566.36	-1.72214	Silty Sand	0	32	315.349	683.734	1637.01	542.811	1094.2	1646.49	1103.68
31	1.55868	2498.31	-0.179513	Silty Sand	0	32	304.76	660.774	1601.89	544.425	1057.46	1602.84	1058.42
32	1.55868	2422.42	1.36299	Silty Sand	0	32	293.303	635.933	1561.12	543.42	1017.7	1554.14	1010.72
33	1.55868	2338.66	2.90648	Silty Sand	0	32	280.961	609.175	1514.68	539.794	974.885	1500.41	960.62
34	1.55868	2247.03	4.45209	Silty Sand	0	32	267.717	580.459	1462.47	533.539	928.93	1441.62	908.086
35	1.55868	2147.47	6.00095	Silty Sand	0	32	253.548	549.737	1404.41	524.64	879.766	1377.75	853.112
36	1.55868	2039.93	7.55423	Silty Sand	0	32	238.427	516.952	1340.38	513.079	827.298	1308.76	795.679
37	1.55868	1924.33	9.11312	Silty Sand	0	32	222.325	482.04	1270.25	498.829	771.425	1234.59	735.762
38	1.55868	1800.58	10.6788	Silty Sand	0	32	205.208	444.927	1193.89	481.858	712.033	1155.2	673.337
39	1.55868	1668.55	12.2527	Silty Sand	0	32	187.037	405.529	1111.11	462.126	648.981	1070.49	608.363
40	1.55868	1528.11	13.836	Silty Sand	0	32	167.766	363.747	1021.71	439.588	582.117	980.386	540.798
41	1.55868	1379.09	15.4302	Silty Sand	0	32	147.345	319.471	925.445	414.188	511.257	884.776	470.588
42	1.55868	1221.3	17.0367	Silty Sand	0	32	125.715	272.573	822.074	385.863	436.211	783.551	397.688
43	1.55868	1068.2	18.6571	Silty Sand	0	32	105.608	228.978	720.982	354.541	366.441	685.324	330.783
44	1.55868	959.608	20.2932	Silty Sand	0	32	95.3265	206.685	650.903	320.139	330.764	615.654	295.515
45	1.55868	846.969	21.9468	Silty Sand	0	32	85.0469	184.397	577.658	282.561	295.097	543.389	260.828
46	1.55868	724.487	23.6198	Silty Sand	0	32	73.5723	159.518	496.981	241.699	255.282	464.808	223.109
47	1.55868	591.793	25.3145	Silty Sand	0	32	60.8132	131.854	408.441	197.43	211.011	379.676	182.246
48	1.55868	448.463	27.0333	Silty Sand	0	32	46.6649	101.178	311.531	149.613	161.918	287.72	138.107
49	1.25193	249.182	28.6045	Clay Liner	100	20	68.4234	148.354	236.35	103.498	132.852	199.037	95.5393
50	2.22825	176.116	30.5907	Silty Sand	0	32	13.1798	28.5761	86.8292	41.0981	45.7311	79.0376	37.9395

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.34173

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	15.1845	168	0	0	0
2	16.1665	167.229	103.072	0	0
3	17.1486	166.493	246.527	0	0
4	18.1306	165.792	423.437	0	0
5	19.1127	165.122	627.573	0	0
6	20.0947	164.484	853.315	0	0
7	21.0768	163.875	1095.58	0	0
8	22.0588	163.294	1349.74	0	0
9	23.0409	162.741	1611.6	0	0
10	24.0229	162.214	1877.33	0	0
11	25.005	161.713	2143.02	0	0
12	25.987	161.236	2326.45	0	0
13	26.9691	160.784	2501.55	0	0
14	27.9511	160.355	2666.74	0	0
15	28.9332	159.949	2820.65	0	0
16	29.9152	159.565	2962.12	0	0
17	30.8973	159.203	3090.11	0	0
18	31.8793	158.862	3203.78	0	0
19	32.8614	158.542	3302.43	0	0
20	33.8434	158.242	3385.47	0	0
21	34.8255	157.963	3452.49	0	0
22	35.8075	157.704	3503.16	0	0
23	36.7896	157.464	3537.3	0	0
24	37.7716	157.243	3554.83	0	0
25	38.7537	157.041	3555.79	0	0
26	39.7357	156.858	3540.32	0	0
27	40.7178	156.694	3508.67	0	0
28	41.6998	156.548	3461.19	0	0
29	42.6819	156.421	3398.34	0	0
30	43.6639	156.311	3320.67	0	0
31	44.646	156.22	3228.84	0	0
32	45.628	156.147	3123.6	0	0
33	46.61	156.091	3005.83	0	0
34	47.5921	156.054	2876.47	0	0
35	48.5741	156.034	2736.6	0	0
36	49.5562	156.032	2587.39	0	0
37	50.5382	156.048	2430.13	0	0
38	51.5203	156.082	2266.22	0	0
39	52.5023	156.133	2097.16	0	0
40	53.4844	156.202	1924.61	0	0
41	54.4664	156.29	1750.32	0	0
42	55.4485	156.395	1576.19	0	0
43	56.4305	156.518	1404.26	0	0
44	57.4126	156.66	1236.71	0	0
45	58.3946	156.82	1075.89	0	0
46	59.3767	156.999	924.303	0	0
47	60.3587	157.196	784.637	0	0
48	61.3408	157.413	659.765	0	0
49	62.3228	157.648	552.763	0	0
50	63.3049	157.903	466.927	0	0
51	64.2869	158.178	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 2.16818

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	19.9068	168	0	0	0
2	21.4667	165.963	382.378	0	0
3	23.0266	164.098	1046.31	0	0
4	24.5865	162.381	1920.4	0	0
5	26.1464	160.795	2726.76	0	0
6	27.7063	159.323	3544.03	0	0
7	29.0411	158.147	4208.18	0	0
8	30.3759	157.041	4895.77	0	0
9	31.7108	156	5593.66	0	0
10	33.1662	154.934	6277.49	0	0
11	34.6215	153.935	6935.64	0	0
12	36.0769	153	7559.55	0	0
13	37.6356	152.064	8196.82	0	0
14	39.1943	151.194	8807.39	0	0
15	40.753	150.385	9381.93	0	0
16	42.3116	149.634	9912.66	0	0
17	43.8703	148.94	10393.2	0	0
18	45.429	148.299	10818.2	0	0
19	46.9877	147.711	11183.6	0	0
20	48.5464	147.173	11485.9	0	0
21	50.105	146.684	11722.7	0	0
22	51.6637	146.243	11892.2	0	0
23	53.2224	145.849	11993.3	0	0
24	54.7811	145.5	12025.6	0	0
25	56.3398	145.195	11989.1	0	0
26	57.8984	144.935	11884.7	0	0
27	59.4571	144.718	11713.5	0	0
28	61.0158	144.545	11477.4	0	0
29	62.5745	144.413	11178.7	0	0
30	64.1332	144.325	10820.2	0	0
31	65.6918	144.278	10405.4	0	0
32	67.2505	144.273	9938.19	0	0
33	68.8092	144.31	9423.13	0	0
34	70.3679	144.389	8865.34	0	0
35	71.9266	144.51	8270.57	0	0
36	73.4852	144.674	7645.26	0	0
37	75.0439	144.881	6996.57	0	0
38	76.6026	145.131	6332.44	0	0
39	78.1613	145.425	5661.69	0	0
40	79.72	145.763	4994.05	0	0
41	81.2786	146.147	4340.34	0	0
42	82.8373	146.577	3712.53	0	0
43	84.396	147.055	3123.94	0	0
44	85.9547	147.581	2579.89	0	0
45	87.5134	148.158	2056.15	0	0
46	89.072	148.786	1560.79	0	0
47	90.6307	149.467	1107.36	0	0
48	92.1894	150.205	711.446	0	0
49	93.7481	151	390.942	0	0
50	95	151.683	143.924	0	0
51	97.2282	153	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	153
85	153
120	153

Distributed Load

X	Y
25	168
0	168

External Boundary

X	Y
0	168
0	166
0	160
0	156
0	138
120	138
120	145
120	151
120	153
95	153
85	153
73	156
25	168
15	168

Material Boundary

X	Y
0	156
41	156
65	156
73	156

Material Boundary

X	Y
0	160
15	160
25	160

Material Boundary

X	Y
25	160
41	156
85	145
120	145

Material Boundary

X		Y	
15		168	
15		166	
25		166	
65		156	
85		151	
95		151	
95		153	

Material Boundary

X		Y	
15		160	
15		166	



TISD HCFC Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 2, Long-Term Global Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:16:19 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.426s
Author:	JNH
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:16:19 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:10116

Random Number Generation Method:Park and Miller v.3

Surface Options

Surface Type:Circular

Search Method:Grid Search

Radius Increment:10

Composite Surfaces:Disabled

Reverse Curvature:Invalid Surfaces

Minimum Elevation:Not Defined

Minimum Depth [ft]:1

Minimum Area:Not Defined

Minimum Weight:Not Defined

Seismic Loading

Advanced seismic analysis:No

Staged pseudostatic analysis:No

Loading

1 Distributed Load present

Distributed Load 1

Distribution:Constant

Magnitude [psf]:250

Orientation:Normal to boundary

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Weathered Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	2.556430
Center:	67.364, 208.758
Radius:	58.481
Left Slip Surface Endpoint:	25.564, 167.859
Right Slip Surface Endpoint:	85.000, 153.000
Resisting Moment:	1.42498e+06 lb-ft
Driving Moment:	557409 lb-ft
Total Slice Area:	359.34 ft2
Surface Horizontal Width:	59.4361 ft
Surface Average Height:	6.04582 ft

Method: janbu simplified

FS	2.360340
Center:	62.655, 189.922
Radius:	43.157
Left Slip Surface Endpoint:	25.564, 167.859
Right Slip Surface Endpoint:	85.000, 153.000
Resisting Horizontal Force:	30909.4 lb
Driving Horizontal Force:	13095.4 lb
Total Slice Area:	538.417 ft2
Surface Horizontal Width:	59.4361 ft
Surface Average Height:	9.05875 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	5367
Number of Invalid Surfaces:	3894

Error Codes

Error Code -101 reported for 148 surfaces
Error Code -103 reported for 6 surfaces
Error Code -106 reported for 20 surfaces
Error Code -114 reported for 82 surfaces
Error Code -115 reported for 320 surfaces
Error Code -1000 reported for 3318 surfaces

Method: janbu simplified

Number of Valid Surfaces:	5367
Number of Invalid Surfaces:	3894

Error Codes

Error Code -101 reported for 148 surfaces
Error Code -103 reported for 6 surfaces
Error Code -106 reported for 20 surfaces
Error Code -114 reported for 82 surfaces
Error Code -115 reported for 320 surfaces
Error Code -1000 reported for 3318 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

-101 = Only one (or zero) surface / slope intersections.

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.

-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.

-114 = Surface with Reverse Curvature.

-115 = Surface too shallow, below the minimum depth.

-1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.55643

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.18355	62.472	-44.8071	Weathered Sandy Lean Clay	100	20	40.8554	104.444	12.21	0	12.21	52.7913	52.7913
2	1.18355	182.843	-43.1946	Weathered Sandy Lean Clay	100	20	53.9074	137.811	103.884	0	103.884	154.497	154.497
3	1.18355	294.414	-41.6236	Weathered Sandy Lean Clay	100	20	66.1644	169.145	189.974	0	189.974	248.766	248.766
4	1.18355	397.824	-40.0901	Weathered Sandy Lean Clay	100	20	77.6664	198.549	270.761	0	270.761	336.139	336.139
5	1.18355	493.622	-38.5904	Weathered Sandy Lean Clay	100	20	88.4495	226.115	346.497	0	346.497	417.081	417.081
6	1.18355	582.284	-37.1215	Weathered Sandy Lean Clay	100	20	98.5448	251.923	417.406	0	417.406	491.993	491.993
7	1.18355	664.226	-35.6805	Weathered Sandy Lean Clay	100	20	107.982	276.049	483.691	0	483.691	561.228	561.228
8	1.18355	739.812	-34.2652	Weathered Sandy Lean Clay	100	20	116.787	298.557	545.53	0	545.53	625.092	625.092
9	1.18355	809.365	-32.8733	Weathered Sandy Lean Clay	100	20	124.981	319.506	603.086	0	603.086	683.858	683.858
10	1.18355	873.169	-31.5029	Weathered Sandy Lean Clay	100	20	132.587	338.949	656.508	0	656.508	737.767	737.767
11	1.18355	931.479	-30.1523	Weathered Sandy Lean Clay	100	20	139.623	356.936	705.927	0	705.927	787.034	787.034
12	1.18355	984.522	-28.82	Weathered Sandy Lean Clay	100	20	146.106	373.51	751.46	0	751.46	831.849	831.849
13	1.18355	1032.5	-27.5046	Weathered Sandy Lean Clay	100	20	152.051	388.709	793.219	0	793.219	872.387	872.387
14	1.18355	1075.61	-26.2047	Weathered Sandy Lean Clay	100	20	157.474	402.57	831.304	0	831.304	908.807	908.807
15	1.26575	1192.61	-24.875	Silty Sand	0	32	206.866	528.839	846.319	0	846.319	942.233	942.233
16	1.26575	1230.94	-23.5153	Silty Sand	0	32	214.861	549.277	879.03	0	879.03	972.522	972.522
17	1.26575	1263.88	-22.1695	Silty Sand	0	32	221.966	567.44	908.096	0	908.096	998.541	998.541
18	1.26575	1291.57	-20.8365	Silty Sand	0	32	228.192	583.357	933.566	0	933.566	1020.41	1020.41

19	1.26575	1314.16	-19.5152	Silty Sand	0	32	233.55	597.055	955.489	0	955.489	1038.26	1038.26
20	1.26575	1331.78	-18.2046	Silty Sand	0	32	238.049	608.556	973.896	0	973.896	1052.18	1052.18
21	1.16655	1238.87	-16.9544	Silty Sand	0	32	239.062	611.144	989.125	11.0942	978.031	1062.01	1050.91
22	1.16655	1245.98	-15.7632	Silty Sand	0	32	236.804	605.373	1001.26	32.4639	968.797	1068.11	1035.64
23	1.16655	1249.44	-14.5789	Silty Sand	0	32	234.156	598.604	1010.17	52.2039	957.97	1071.07	1018.87
24	1.16655	1249.31	-13.401	Silty Sand	0	32	231.121	590.844	1015.89	70.3416	945.545	1070.95	1000.61
25	1.16655	1245.63	-12.2288	Silty Sand	0	32	227.699	582.097	1018.46	86.9013	931.554	1067.81	980.904
26	1.16655	1238.46	-11.0618	Silty Sand	0	32	223.894	572.369	1017.89	101.905	915.981	1061.66	959.752
27	1.16655	1227.85	-9.89936	Silty Sand	0	32	219.705	561.66	1014.21	115.372	898.842	1052.56	937.184
28	1.16655	1213.83	-8.74108	Silty Sand	0	32	215.133	549.972	1007.46	127.32	880.14	1040.54	913.218
29	1.16655	1196.43	-7.58639	Silty Sand	0	32	210.178	537.305	997.631	137.764	859.867	1025.62	887.86
30	1.16655	1175.69	-6.43478	Silty Sand	0	32	204.839	523.656	984.741	146.716	838.025	1007.84	861.128
31	1.16655	1151.63	-5.28579	Silty Sand	0	32	199.114	509.022	968.794	154.188	814.606	987.215	833.027
32	1.16655	1124.27	-4.13892	Silty Sand	0	32	193.003	493.399	949.788	160.189	789.599	963.755	803.566
33	1.16655	1093.62	-2.99372	Silty Sand	0	32	186.502	476.779	927.73	164.727	763.003	937.484	772.757
34	1.16655	1059.7	-1.84971	Silty Sand	0	32	179.609	459.157	902.613	167.805	734.808	908.414	740.609
35	1.16655	1022.52	-0.706433	Silty Sand	0	32	172.319	440.522	874.412	169.43	704.982	876.537	707.107
36	1.16655	982.08	0.436558	Silty Sand	0	32	164.63	420.864	843.124	169.601	673.523	841.869	672.268
37	1.16655	938.382	1.57972	Silty Sand	0	32	156.535	400.17	808.725	168.32	640.405	804.409	636.089
38	1.16655	891.421	2.72352	Silty Sand	0	32	148.029	378.426	771.194	165.585	605.609	764.152	598.567
39	1.16655	841.191	3.8684	Silty Sand	0	32	139.107	355.617	730.499	161.392	569.107	721.092	559.7
40	1.16655	787.68	5.01483	Silty Sand	0	32	129.761	331.724	686.608	155.737	530.871	675.221	519.484
41	1.16655	730.873	6.16328	Silty Sand	0	32	119.983	306.728	639.481	148.613	490.868	626.524	477.911
42	1.16655	670.751	7.31422	Silty Sand	0	32	109.765	280.606	589.075	140.011	449.064	574.986	434.975
43	1.16655	607.289	8.46814	Silty Sand	0	32	99.0964	253.333	535.338	129.921	405.417	520.584	390.663
44	1.16655	540.461	9.62553	Silty Sand	0	32	87.9672	224.882	478.216	118.33	359.886	463.297	344.967
45	1.16655	470.232	10.7869	Silty Sand	0	32	76.3651	195.222	417.644	105.223	312.421	403.095	297.872
46	1.16655	396.566	11.9528	Silty Sand	0	32	64.2779	164.322	353.553	90.5834	262.97	339.946	249.363
47	1.16655	319.42	13.1237	Silty Sand	0	32	51.6904	132.143	285.866	74.3929	211.473	273.814	199.421
48	1.25836	253.954	14.3468	Clay Liner	100	20	62.1594	158.906	217.709	55.8658	161.843	201.811	145.945
49	1.25836	155.582	15.6232	Clay Liner	100	20	53.9048	137.804	138.71	34.8453	103.865	123.636	88.7908
50	1.25836	52.6311	16.9076	Clay Liner	100	20	45.3346	115.895	55.6028	11.9324	43.6704	41.8226	29.8902

Global Minimum Query (janbu simplified) - Safety Factor: 2.36034

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.18314	112.279	-57.7812	Weathered Sandy Lean Clay	100	20	45.7952	108.092	22.2334	0	22.2334	94.902	94.902
2	1.18314	323.246	-54.9406	Weathered Sandy Lean Clay	100	20	69.2747	163.512	174.497	0	174.497	273.214	273.214
3	1.18314	509.564	-52.2891	Weathered Sandy Lean Clay	100	20	90.6929	214.066	313.394	0	313.394	430.691	430.691
4	1.18314	675.545	-49.7885	Weathered Sandy Lean Clay	100	20	110.296	260.335	440.516	0	440.516	570.98	570.98
5	1.18314	824.272	-47.4113	Weathered Sandy Lean Clay	100	20	128.278	302.779	557.13	0	557.13	696.686	696.686
6	1.18314	958.044	-45.1372	Weathered Sandy Lean Clay	100	20	144.797	341.77	664.258	0	664.258	809.75	809.75
7	1.18314	1078.63	-42.9507	Weathered Sandy Lean Clay	100	20	159.983	377.615	762.74	0	762.74	911.669	911.669
8	1.06455	1063.95	-40.9421	Sandy Lean Clay	150	22	204.293	482.2	822.222	0	822.222	999.449	999.449
9	1.06455	1144.19	-39.096	Sandy Lean Clay	150	22	217.306	512.917	898.249	0	898.249	1074.82	1074.82
10	1.0838	1239.86	-37.2812	Silty Sand	0	32	252.061	594.949	952.115	0	952.115	1144	1144
11	1.0838	1308.53	-35.4933	Silty Sand	0	32	268.874	634.635	1015.63	0	1015.63	1207.37	1207.37
12	1.0838	1370.63	-33.7444	Silty Sand	0	32	284.491	671.495	1074.62	0	1074.62	1264.67	1264.67
13	1.0838	1426.57	-32.0306	Silty Sand	0	32	298.954	705.632	1129.25	0	1129.25	1316.28	1316.28
14	1.20642	1646.54	-30.2548	Silty Sand	0	32	307.954	726.877	1185.2	21.9537	1163.25	1364.83	1342.88
15	1.20642	1701.07	-28.4171	Silty Sand	0	32	311.63	735.552	1241.4	64.2755	1177.13	1410.02	1345.75
16	1.20642	1748.4	-26.6107	Silty Sand	0	32	314.553	742.451	1291.67	103.5	1188.17	1449.26	1345.76
17	1.20642	1788.9	-24.8325	Silty Sand	0	32	316.751	747.641	1336.25	139.775	1196.47	1482.83	1343.05
18	1.20642	1822.86	-23.0796	Silty Sand	0	32	318.249	751.176	1375.36	173.233	1202.13	1510.97	1337.74
19	1.20642	1850.54	-21.3492	Silty Sand	0	32	319.067	753.106	1409.21	203.984	1205.22	1533.92	1329.94
20	1.20642	1872.17	-19.639	Silty Sand	0	32	319.222	753.473	1437.94	232.129	1205.81	1551.85	1319.73
21	1.20642	1887.96	-17.9469	Silty Sand	0	32	318.73	752.31	1461.7	257.752	1203.95	1564.93	1307.18
22	1.20642	1898.07	-16.2708	Silty Sand	0	32	317.602	749.648	1480.62	280.929	1199.69	1573.32	1292.39
23	1.20642	1902.65	-14.6089	Silty Sand	0	32	315.848	745.509	1494.79	301.726	1193.06	1577.12	1275.39
24	1.20642	1901.85	-12.9595	Silty Sand	0	32	313.477	739.913	1504.31	320.199	1184.11	1576.45	1256.25
25	1.20642	1895.76	-11.321	Silty Sand	0	32	310.495	732.874	1509.24	336.396	1172.84	1571.4	1235
26	1.20642	1884.5	-9.69179	Silty Sand	0	32	306.906	724.403	1509.64	350.36	1159.28	1562.06	1211.7
27	1.20642	1868.13	-8.07048	Silty Sand	0	32	302.713	714.505	1505.58	362.126	1143.45	1548.5	1186.37
28	1.20642	1846.73	-6.45566	Silty Sand	0	32	297.916	703.182	1497.05	371.722	1125.33	1530.76	1159.04
29	1.20642	1820.35	-4.84597	Silty Sand	0	32	292.513	690.431	1484.09	379.172	1104.92	1508.89	1129.72
30	1.20642	1789.04	-3.24011	Silty Sand	0	32	286.504	676.246	1466.71	384.494	1082.22	1482.93	1098.44
31	1.20642	1752.81	-1.6368	Silty Sand	0	32	279.882	660.617	1444.91	387.701	1057.2	1452.9	1065.2
32	1.20642	1711.7	-0.0347734	Silty Sand	0	32	272.643	643.529	1418.66	388.799	1029.86	1418.83	1030.03
33	1.20642	1665.7	1.56723	Silty Sand	0	32	264.777	624.963	1387.94	387.792	1000.15	1380.7	992.903
34	1.20642	1614.81	3.17046	Silty Sand	0	32	256.274	604.894	1352.71	384.678	968.029	1338.51	953.834
35	1.20642	1559.01	4.77618	Silty Sand	0	32	247.122	583.293	1312.91	379.448	933.466	1292.27	912.818
36	1.20642	1498.28	6.38567	Silty Sand	0	32	237.308	560.127	1268.48	372.09	896.391	1241.92	869.832
37	1.20642	1432.57	8.00024	Silty Sand	0	32	226.812	535.354	1219.33	362.588	856.744	1187.45	824.867
38	1.20642	1361.83	9.62124	Silty Sand	0	32	215.616	508.927	1165.37	350.917	814.453	1128.82	777.902
39	1.20642	1285.99	11.2501	Silty Sand	0	32	203.696	480.791	1106.47	337.049	769.424	1065.96	728.907
40	1.20642	1204.98	12.8882	Silty Sand	0	32	191.025	450.883	1042.51	320.949	721.565	998.805	677.856
41	1.20642	1118.69	14.537	Silty Sand	0	32	177.572	419.13	973.324	302.576	670.748	927.278	624.702
42	1.20642	1027.01	16.1983	Silty Sand	0	32	163.302	385.448	898.726	281.881	616.845	851.288	569.407
43	1.20642	929.818	17.8738	Silty Sand	0	32	148.173	349.739	818.509	258.809	559.7	770.725	511.916
44	1.20642	826.958	19.5652	Silty Sand	0	32	132.139	311.893	732.426	233.293	499.133	685.464	452.171
45	1.20642	718.256	21.2745	Silty Sand	0	32	115.144	271.778	640.195	205.26	434.935	595.361	390.101
46	1.20642	603.515	23.004	Silty Sand	0	32	97.1224	229.242	541.487	174.623	366.864	500.253	325.63
47	1.20642	482.508	24.7559	Silty Sand	0	32	78.0002	184.107	435.918	141.286	294.632	399.95	258.664
48	1.20642	354.974	26.533	Silty Sand	0	32	57.6875	136.162	323.041	105.135	217.906	294.237	189.102
49	1.23261	223.833	28.3579	Clay Liner	100	20	65.7259	155.135	217.067	65.5838	151.483	181.591	116.007
50	1.23261	75.9199	30.2348	Clay Liner	100	20	53.1886	125.543	92.5912	22.4124	70.1788	61.5914	39.179

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.55643

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.5639	167.859	0	0	0
2	26.7475	166.683	-33.9911	0	0
3	27.931	165.572	17.6566	0	0
4	29.1146	164.521	139.154	0	0
5	30.2981	163.524	317.007	0	0
6	31.4817	162.58	539.608	0	0
7	32.6652	161.684	796.915	0	0
8	33.8488	160.834	1080.21	0	0
9	35.0323	160.028	1381.88	0	0
10	36.2159	159.263	1695.28	0	0
11	37.3994	158.537	2014.6	0	0
12	38.583	157.85	2334.72	0	0
13	39.7666	157.199	2651.18	0	0
14	40.9501	156.583	2960.07	0	0
15	42.1337	156	3257.97	0	0
16	43.3994	155.413	3492.86	0	0
17	44.6652	154.862	3705.09	0	0
18	45.9309	154.347	3892.54	0	0
19	47.1967	153.865	4053.5	0	0
20	48.4624	153.416	4186.57	0	0
21	49.7282	153	4290.72	0	0
22	50.8947	152.644	4363.67	0	0
23	52.0613	152.315	4417.19	0	0
24	53.2278	152.012	4450.57	0	0
25	54.3943	151.734	4463.36	0	0
26	55.5609	151.481	4455.28	0	0
27	56.7274	151.253	4426.29	0	0
28	57.894	151.049	4376.52	0	0
29	59.0605	150.87	4306.31	0	0
30	60.2271	150.715	4216.17	0	0
31	61.3936	150.583	4106.82	0	0
32	62.5602	150.475	3979.15	0	0
33	63.7267	150.391	3834.22	0	0
34	64.8933	150.33	3673.3	0	0
35	66.0598	150.292	3497.82	0	0
36	67.2264	150.278	3309.42	0	0
37	68.3929	150.286	3109.92	0	0
38	69.5595	150.319	2901.33	0	0
39	70.726	150.374	2685.88	0	0
40	71.8926	150.453	2466.02	0	0
41	73.0591	150.555	2244.39	0	0
42	74.2256	150.681	2023.9	0	0
43	75.3922	150.831	1807.67	0	0
44	76.5587	151.005	1599.12	0	0
45	77.7253	151.203	1401.91	0	0
46	78.8918	151.425	1220.02	0	0
47	80.0584	151.672	1057.74	0	0
48	81.2249	151.944	919.704	0	0
49	82.4833	152.266	771.432	0	0
50	83.7416	152.618	654.803	0	0
51	85	153	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 2.36034

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.5639	167.859	0	0	0
2	26.7471	165.982	-12.4383	0	0
3	27.9302	164.296	199.802	0	0
4	29.1133	162.765	572.063	0	0
5	30.2965	161.366	1058.07	0	0
6	31.4796	160.079	1623.43	0	0
7	32.6628	158.89	2241.8	0	0
8	33.8459	157.789	2892.61	0	0
9	34.9105	156.865	3434.47	0	0
10	35.975	156	3980.14	0	0
11	37.0588	155.175	4492.54	0	0
12	38.1426	154.402	4986.1	0	0
13	39.2264	153.678	5455.82	0	0
14	40.3102	153	5897.5	0	0
15	41.5166	152.296	6360.02	0	0
16	42.723	151.644	6794.43	0	0
17	43.9295	151.039	7195.67	0	0
18	45.1359	150.481	7559.55	0	0
19	46.3423	149.967	7882.66	0	0
20	47.5487	149.495	8162.27	0	0
21	48.7551	149.065	8396.22	0	0
22	49.9615	148.674	8582.88	0	0
23	51.168	148.322	8721.08	0	0
24	52.3744	148.007	8810.08	0	0
25	53.5808	147.73	8849.55	0	0
26	54.7872	147.488	8839.5	0	0
27	55.9936	147.282	8780.3	0	0
28	57.2	147.111	8672.67	0	0
29	58.4065	146.975	8517.64	0	0
30	59.6129	146.872	8316.55	0	0
31	60.8193	146.804	8071.1	0	0
32	62.0257	146.77	7783.27	0	0
33	63.2321	146.769	7455.4	0	0
34	64.4385	146.802	7090.17	0	0
35	65.645	146.869	6690.62	0	0
36	66.8514	146.969	6260.15	0	0
37	68.0578	147.104	5802.61	0	0
38	69.2642	147.274	5322.25	0	0
39	70.4706	147.479	4823.8	0	0
40	71.677	147.719	4312.55	0	0
41	72.8835	147.995	3794.33	0	0
42	74.0899	148.307	3275.62	0	0
43	75.2963	148.658	2763.65	0	0
44	76.5027	149.047	2266.46	0	0
45	77.7091	149.476	1793.02	0	0
46	78.9155	149.945	1353.39	0	0
47	80.122	150.458	958.875	0	0
48	81.3284	151.014	622.27	0	0
49	82.5348	151.616	358.09	0	0
50	83.7674	152.282	132.665	0	0
51	85	153	0	0	0

Discharge Sections

Entity Information

Water Table

X		Y	
0		153	
85		153	
120		153	

Distributed Load

X		Y	
25		168	
0		168	

External Boundary

X		Y	
0		168	
0		166	
0		160	
0		156	
0		138	
120		138	
120		145	
120		151	
120		153	
95		153	
85		153	
73		156	
25		168	
15		168	

Material Boundary

X		Y	
0		156	
41		156	
65		156	
73		156	

Material Boundary

X		Y	
0		160	
15		160	
25		160	

Material Boundary

X		Y	
25		160	
41		156	
85		145	
120		145	

Material Boundary

X		Y	
15		168	
15		166	
25		166	
65		156	
85		151	
95		151	
95		153	

Material Boundary

X		Y	
15		160	
15		166	



TISD HCFC Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 2, Rapid Drawdown - Total Stress Global Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:16:19 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.525s
Author:	JNH
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:16:19 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	175
Friction Angle [deg]	15
Water Surface	Water Table
Hu Value	1

Weathered Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	115
Friction Angle [deg]	14
Water Surface	Water Table
Hu Value	1

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	125
Friction Angle [deg]	16
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.394960
Center:	67.781, 236.377
Radius:	84.734
Left Slip Surface Endpoint:	17.736, 168.000
Right Slip Surface Endpoint:	84.091, 153.227
Resisting Moment:	1.18087e+06 lb-ft
Driving Moment:	846524 lb-ft
Total Slice Area:	378.804 ft2
Surface Horizontal Width:	66.3542 ft
Surface Average Height:	5.70882 ft

Method: janbu simplified

FS	1.347750
Center:	67.781, 218.606
Radius:	67.273
Left Slip Surface Endpoint:	23.457, 168.000
Right Slip Surface Endpoint:	83.863, 153.284
Resisting Horizontal Force:	11823.2 lb
Driving Horizontal Force:	8772.54 lb
Total Slice Area:	330.537 ft2
Surface Horizontal Width:	60.4067 ft
Surface Average Height:	5.47187 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	9243
Number of Invalid Surfaces:	18
Error Codes	
Error Code -103 reported for 18 surfaces	

Method: janbu simplified

Number of Valid Surfaces:	9233
Number of Invalid Surfaces:	28
Error Codes	
Error Code -103 reported for 18 surfaces	
Error Code -108 reported for 10 surfaces	

Error Code Descriptions

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.39496

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]

1	1.35894	79.4291	-35.6347	Weathered Sandy Lean Clay	115	14	77.5257	108.145	2.89904	30.392	-27.493	58.4731	28.0811
2	1.35894	235.045	-34.5118	Weathered Sandy Lean Clay	115	14	86.6362	120.854	113.417	89.9385	23.4789	172.987	83.0486
3	1.35894	384.304	-33.4039	Weathered Sandy Lean Clay	115	14	95.4552	133.156	219.873	147.053	72.8199	282.823	135.77
4	1.35894	527.45	-32.3099	Weathered Sandy Lean Clay	115	14	103.99	145.061	322.396	201.827	120.569	388.161	186.334
5	1.35894	664.705	-31.229	Weathered Sandy Lean Clay	115	14	112.245	156.578	421.108	254.348	166.76	489.163	234.815
6	1.35894	784.391	-30.1603	Weathered Sandy Lean Clay	115	14	119.345	166.481	507.888	301.408	206.48	577.237	275.829
7	1.35894	858.355	-29.103	Weathered Sandy Lean Clay	115	14	124.271	173.352	562.487	328.448	234.039	631.664	303.216
8	1.35894	923.689	-28.0565	Weathered Sandy Lean Clay	115	14	128.517	179.276	611.244	353.448	257.796	679.741	326.293
9	1.35894	983.849	-27.0202	Weathered Sandy Lean Clay	115	14	132.482	184.807	656.449	376.469	279.98	724.011	347.542
10	1.35894	1038.98	-25.9933	Weathered Sandy Lean Clay	115	14	136.171	189.953	698.186	397.565	300.621	764.581	367.016
11	1.35894	1089.21	-24.9752	Weathered Sandy Lean Clay	115	14	139.588	194.72	736.53	416.787	319.743	801.547	384.76
12	1.35894	1134.68	-23.9656	Weathered Sandy Lean Clay	115	14	142.739	199.115	771.55	434.183	337.367	834.998	400.815
13	1.35894	1175.48	-22.9638	Weathered Sandy Lean Clay	115	14	145.626	203.142	803.317	449.796	353.521	865.023	415.227
14	1.35894	1211.73	-21.9694	Weathered Sandy Lean Clay	115	14	148.254	206.808	831.89	463.666	368.224	891.696	428.03
15	1.35894	1243.52	-20.9819	Weathered Sandy Lean Clay	115	14	150.625	210.116	857.324	475.831	381.493	915.089	439.258
16	1.35894	1270.94	-20.0008	Weathered Sandy Lean Clay	115	14	152.744	213.072	879.665	486.324	393.341	935.262	448.938
17	1.35894	1294.08	-19.0259	Weathered Sandy Lean Clay	115	14	154.612	215.678	898.976	495.178	403.798	952.291	457.113
18	0.120792	116.034	-18.4968	Sandy Lean Clay	175	15	201.103	280.531	893.368	499.517	393.851	960.644	461.127
19	1.3689	1324.17	-17.9672	Silty Sand	0	32	181.619	253.351	908.458	503.008	405.45	967.355	464.347
20	1.3689	1338.78	-16.9967	Silty Sand	0	32	184.969	258.025	921.484	508.559	412.925	978.024	469.465
21	1.3689	1349.24	-16.0312	Silty Sand	0	32	187.77	261.932	931.71	512.531	419.179	985.663	473.132
22	1.3689	1355.6	-15.0704	Silty Sand	0	32	190.018	265.067	939.143	514.948	424.195	990.309	475.361
23	1.3689	1357.93	-14.1139	Silty Sand	0	32	191.71	267.428	943.808	515.833	427.975	992.011	476.178
24	1.3689	1356.27	-13.1613	Silty Sand	0	32	192.842	269.007	945.709	515.204	430.505	990.802	475.598
25	1.3689	1350.68	-12.2125	Silty Sand	0	32	193.411	269.801	944.85	513.08	431.77	986.711	473.631
26	1.3689	1341.2	-11.2671	Silty Sand	0	32	193.413	269.803	941.254	509.478	431.776	979.786	470.308
27	1.3689	1327.87	-10.3247	Silty Sand	0	32	192.841	269.005	934.911	504.412	430.499	970.042	465.63
28	1.3689	1310.72	-9.38517	Silty Sand	0	32	191.691	267.401	925.83	497.897	427.933	957.513	459.616
29	1.3689	1289.78	-8.44818	Silty Sand	0	32	189.956	264.981	914.002	489.945	424.057	942.216	452.271
30	1.3689	1265.09	-7.51346	Silty Sand	0	32	187.63	261.737	899.431	480.567	418.864	924.177	443.61
31	1.3689	1236.68	-6.58075	Silty Sand	0	32	184.706	257.658	882.113	469.772	412.341	903.421	433.649
32	1.3689	1204.55	-5.64979	Silty Sand	0	32	181.177	252.734	862.03	457.57	404.46	879.953	422.383
33	1.3689	1168.74	-4.72032	Silty Sand	0	32	177.032	246.953	839.173	443.967	395.206	853.791	409.824
34	1.3689	1129.26	-3.79209	Silty Sand	0	32	172.264	240.301	813.529	428.97	384.559	824.946	395.976
35	1.3689	1086.13	-2.86486	Silty Sand	0	32	166.861	232.765	785.089	412.583	372.506	793.439	380.856
36	1.3689	1039.34	-1.93838	Silty Sand	0	32	160.815	224.33	753.811	394.811	359	759.254	364.443
37	1.3689	988.917	-1.01241	Silty Sand	0	32	154.112	214.98	719.697	375.656	344.041	722.42	346.764
38	1.3689	934.858	-0.0867061	Silty Sand	0	32	146.741	204.698	682.706	355.121	327.585	682.928	327.807
39	1.3689	877.165	0.838978	Silty Sand	0	32	138.688	193.464	642.812	333.205	309.607	640.781	307.576

40	1.3689	815.838	1.76488	Silty Sand	0	32	129.938	181.259	599.984	309.909	290.075	595.98	286.071
41	1.3689	750.872	2.69125	Silty Sand	0	32	120.477	168.061	554.185	285.231	268.954	548.521	263.29
42	1.3689	682.261	3.61832	Silty Sand	0	32	110.287	153.846	505.374	259.168	246.206	498.4	239.232
43	1.3689	609.995	4.54634	Silty Sand	0	32	99.3512	138.591	453.507	231.716	221.791	445.607	213.891
44	1.3689	534.061	5.47555	Silty Sand	0	32	87.6484	122.266	398.538	202.871	195.667	390.136	187.265
45	1.3689	454.443	6.40622	Silty Sand	0	32	75.1591	104.844	340.413	172.627	167.786	331.974	159.347
46	1.3689	371.123	7.33858	Silty Sand	0	32	61.8609	86.2935	279.075	140.976	138.099	271.108	130.132
47	1.20056	254.029	8.21534	Clay Liner	125	16	113.864	158.835	228.024	110.026	117.998	211.585	101.559
48	1.20056	184.549	9.03645	Clay Liner	125	16	108.315	151.095	170.938	79.9322	91.0056	153.712	73.7795
49	1.20056	112.525	9.85945	Clay Liner	125	16	102.517	143.008	111.536	48.7361	62.8003	93.719	44.9829
50	1.20056	37.9369	10.6845	Clay Liner	125	16	96.4661	134.566	49.7918	16.43	33.3618	31.5914	15.1614

Global Minimum Query (janbu simplified) - Safety Factor: 1.34775

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.23159	77.7946	-40.524	Weathered Sandy Lean Clay	115	14	78.5239	105.831	-3.93195	32.8448	-36.7768	63.1906	30.3458
2	1.23159	217.009	-39.1576	Weathered Sandy Lean Clay	115	14	87.6592	118.143	104.843	92.2392	12.6042	176.228	83.9893
3	1.23159	317.713	-37.8173	Weathered Sandy Lean Clay	115	14	94.6495	127.564	184.533	134.143	50.39	257.996	123.853
4	1.23159	410.191	-36.5009	Weathered Sandy Lean Clay	115	14	101.072	136.219	258.294	173.189	85.1051	333.086	159.897
5	1.23159	496.247	-35.2065	Weathered Sandy Lean Clay	115	14	107.129	144.383	327.371	209.523	117.848	402.96	193.437
6	1.23159	576.188	-33.9325	Weathered Sandy Lean Clay	115	14	112.832	152.07	391.955	243.276	148.679	467.868	224.592
7	1.23159	650.289	-32.6773	Weathered Sandy Lean Clay	115	14	118.194	159.296	452.223	274.563	177.66	528.036	253.473
8	1.23159	718.799	-31.4394	Weathered Sandy Lean Clay	115	14	123.222	166.073	508.331	303.489	204.842	583.663	280.174
9	1.23159	781.938	-30.2178	Weathered Sandy Lean Clay	115	14	127.927	172.414	560.421	330.147	230.274	634.929	304.782
10	1.23159	839.91	-29.0111	Weathered Sandy Lean Clay	115	14	132.316	178.329	608.622	354.624	253.998	682	327.376
11	1.23159	892.896	-27.8183	Weathered Sandy Lean Clay	115	14	136.397	183.829	653.052	376.996	276.056	725.021	348.025
12	1.23159	941.063	-26.6386	Weathered Sandy Lean Clay	115	14	140.176	188.922	693.817	397.333	296.484	764.13	366.797
13	1.23159	984.561	-25.4709	Weathered Sandy Lean Clay	115	14	143.66	193.617	731.016	415.699	315.317	799.449	383.75
14	1.23159	1023.53	-24.3144	Weathered Sandy Lean Clay	115	14	146.854	197.923	764.733	432.151	332.582	831.085	398.934
15	1.23159	1058.09	-23.1684	Weathered Sandy Lean Clay	115	14	149.764	201.845	795.057	446.744	348.313	859.149	412.405
16	1.23159	1088.36	-22.0321	Weathered Sandy Lean Clay	115	14	152.394	205.389	822.06	459.526	362.534	883.731	424.205
17	1.21227	1096.8	-20.9137	Silty Sand	0	32	171.054	230.538	839.404	470.467	368.937	904.77	434.303
18	1.21227	1118.17	-19.8123	Silty Sand	0	32	175.902	237.072	859.027	479.635	379.392	922.398	442.763
19	1.21227	1135.73	-18.7185	Silty Sand	0	32	180.197	242.861	875.825	487.166	388.659	936.883	449.717
20	1.21227	1149.54	-17.6317	Silty Sand	0	32	183.938	247.902	889.818	493.091	396.727	948.279	455.188
21	1.21227	1159.68	-16.5514	Silty Sand	0	32	187.12	252.191	901.033	497.442	403.591	956.643	459.201
22	1.21227	1166.21	-15.4772	Silty Sand	0	32	189.743	255.726	909.488	500.244	409.244	962.027	461.783
23	1.21227	1169.2	-14.4085	Silty Sand	0	32	191.802	258.501	915.209	501.523	413.686	964.486	462.963
24	1.21227	1168.68	-13.3449	Silty Sand	0	32	193.294	260.512	918.204	501.301	416.903	964.057	462.756
25	1.21227	1164.71	-12.286	Silty Sand	0	32	194.214	261.752	918.486	499.599	418.887	960.782	461.183

26	1.21227	1157.33	-11.2313	Silty Sand	0	32	194.557	262.214	916.065	496.435	419.63	954.699	458.264
27	1.21227	1146.59	-10.1805	Silty Sand	0	32	194.318	261.892	910.941	491.826	419.115	945.836	454.01
28	1.21227	1132.51	-9.13309	Silty Sand	0	32	193.489	260.775	903.118	485.787	417.331	934.225	448.438
29	1.21227	1115.13	-8.08878	Silty Sand	0	32	192.065	258.855	892.588	478.332	414.256	919.885	441.553
30	1.21227	1094.48	-7.04717	Silty Sand	0	32	190.035	256.12	879.348	469.472	409.876	902.84	433.368
31	1.21227	1070.57	-6.00789	Silty Sand	0	32	187.394	252.56	863.397	459.217	404.18	883.119	423.902
32	1.21227	1043.43	-4.97059	Silty Sand	0	32	184.13	248.161	844.718	447.575	397.143	860.732	413.157
33	1.21227	1013.08	-3.93493	Silty Sand	0	32	180.234	242.91	823.293	434.555	388.738	835.69	401.135
34	1.21227	979.521	-2.90055	Silty Sand	0	32	175.694	236.792	799.108	420.162	378.946	808.01	387.848
35	1.21227	942.775	-1.86712	Silty Sand	0	32	170.498	229.789	772.139	404.4	367.739	777.697	373.297
36	1.21227	902.846	-0.834294	Silty Sand	0	32	164.633	221.884	742.361	387.272	355.089	744.758	357.486
37	1.21227	859.737	0.198259	Silty Sand	0	32	158.083	213.057	709.744	368.781	340.963	709.197	340.416
38	1.21227	813.449	1.23088	Silty Sand	0	32	150.834	203.287	674.254	348.926	325.328	671.013	322.087
39	1.21227	763.981	2.2639	Silty Sand	0	32	142.869	192.552	635.853	327.706	308.147	630.205	302.499
40	1.21227	711.327	3.29765	Silty Sand	0	32	134.168	180.825	594.501	305.121	289.38	586.77	281.649
41	1.21227	655.478	4.33248	Silty Sand	0	32	124.712	168.08	550.149	281.164	268.985	540.7	259.536
42	1.21227	596.423	5.36873	Silty Sand	0	32	114.477	154.287	502.744	255.833	246.911	491.986	236.153
43	1.21227	534.148	6.40675	Silty Sand	0	32	103.442	139.414	452.23	229.12	223.11	440.614	211.494
44	1.21227	468.634	7.44688	Silty Sand	0	32	91.58	123.427	398.542	201.018	197.524	386.572	185.554
45	1.21227	399.859	8.48949	Silty Sand	0	32	78.8618	106.286	341.611	171.517	170.094	329.84	158.323
46	1.21227	327.799	9.53493	Silty Sand	0	32	65.2579	87.9514	281.359	140.607	140.752	270.398	129.791
47	1.0833	229.304	10.5276	Clay Liner	125	16	119.07	160.477	233.791	110.068	123.723	211.663	101.595
48	1.0833	166.728	11.4676	Clay Liner	125	16	113.356	152.775	176.895	80.0302	96.8645	153.899	73.8688
49	1.0833	101.743	12.4107	Clay Liner	125	16	107.364	144.7	117.537	48.8363	68.7009	93.9108	45.0745
50	1.0833	34.3223	13.3572	Clay Liner	125	16	101.088	136.241	55.677	16.4736	39.2034	31.6742	15.2006

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.39496

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	17.7363	168	0	0	0
2	19.0953	167.026	-102.484	0	0
3	20.4542	166.091	-114.19	0	0
4	21.8132	165.195	-46.8049	0	0
5	23.1721	164.336	89.0126	0	0
6	24.5311	163.512	283.512	0	0
7	25.89	162.722	522.459	0	0
8	27.2489	161.966	779.161	0	0
9	28.6079	161.241	1047.3	0	0
10	29.9668	160.548	1322.28	0	0
11	31.3258	159.886	1599.93	0	0
12	32.6847	159.253	1876.51	0	0
13	34.0437	158.649	2148.69	0	0
14	35.4026	158.073	2413.44	0	0
15	36.7615	157.525	2668.11	0	0
16	38.1205	157.004	2910.3	0	0
17	39.4794	156.509	3137.94	0	0
18	40.8384	156.04	3349.19	0	0
19	40.9592	156	3361	0	0
20	42.3281	155.556	3515.77	0	0
21	43.6969	155.138	3648.25	0	0
22	45.0658	154.744	3757.8	0	0
23	46.4347	154.376	3843.96	0	0
24	47.8036	154.032	3906.49	0	0
25	49.1725	153.711	3945.34	0	0
26	50.5414	153.415	3960.64	0	0
27	51.9103	153.142	3952.68	0	0
28	53.2792	152.893	3921.96	0	0
29	54.6481	152.667	3869.15	0	0
30	56.017	152.463	3795.06	0	0
31	57.3859	152.283	3700.71	0	0
32	58.7548	152.125	3587.28	0	0
33	60.1237	151.99	3456.11	0	0
34	61.4926	151.877	3308.73	0	0
35	62.8615	151.786	3146.84	0	0
36	64.2304	151.717	2972.3	0	0
37	65.5993	151.671	2787.18	0	0
38	66.9682	151.647	2593.72	0	0
39	68.3371	151.645	2394.34	0	0
40	69.706	151.665	2191.69	0	0
41	71.0749	151.707	1988.59	0	0
42	72.4438	151.771	1788.08	0	0
43	73.8127	151.858	1593.42	0	0
44	75.1816	151.967	1408.12	0	0
45	76.5505	152.098	1235.89	0	0
46	77.9194	152.252	1080.73	0	0
47	79.2883	152.428	946.884	0	0
48	80.4888	152.601	770.718	0	0
49	81.6894	152.792	608.097	0	0
50	82.89	153.001	461.799	0	0
51	84.0905	153.227	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.34775

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	23.4567	168	0	0	0
2	24.6883	166.947	-100.813	0	0
3	25.9199	165.944	-103.582	0	0
4	27.1515	164.988	-43.7106	0	0
5	28.3831	164.077	67.2546	0	0
6	29.6147	163.208	219.85	0	0
7	30.8462	162.379	405.715	0	0
8	32.0778	161.589	617.447	0	0
9	33.3094	160.837	848.481	0	0
10	34.541	160.119	1092.98	0	0
11	35.7726	159.436	1345.77	0	0
12	37.0042	158.786	1602.23	0	0
13	38.2358	158.169	1858.27	0	0
14	39.4674	157.582	2110.27	0	0
15	40.699	157.025	2355.02	0	0
16	41.9305	156.498	2589.68	0	0
17	43.1621	156	2811.77	0	0
18	44.3744	155.537	2993.34	0	0
19	45.5867	155.1	3155.34	0	0
20	46.7989	154.689	3296.74	0	0
21	48.0112	154.304	3416.67	0	0
22	49.2235	153.944	3514.54	0	0
23	50.4357	153.608	3589.89	0	0
24	51.648	153.297	3642.5	0	0
25	52.8603	153.009	3672.31	0	0
26	54.0725	152.745	3679.45	0	0
27	55.2848	152.504	3664.2	0	0
28	56.4971	152.287	3627.03	0	0
29	57.7094	152.092	3568.56	0	0
30	58.9216	151.919	3489.6	0	0
31	60.1339	151.77	3391.09	0	0
32	61.3462	151.642	3274.15	0	0
33	62.5584	151.537	3140.08	0	0
34	63.7707	151.453	2990.32	0	0
35	64.983	151.392	2826.49	0	0
36	66.1952	151.352	2650.39	0	0
37	67.4075	151.335	2463.99	0	0
38	68.6198	151.339	2269.44	0	0
39	69.832	151.365	2069.1	0	0
40	71.0443	151.413	1865.49	0	0
41	72.2566	151.483	1661.38	0	0
42	73.4688	151.574	1459.72	0	0
43	74.6811	151.688	1263.72	0	0
44	75.8934	151.824	1076.81	0	0
45	77.1056	151.983	902.677	0	0
46	78.3179	152.164	745.296	0	0
47	79.5302	152.367	608.923	0	0
48	80.6135	152.569	432.915	0	0
49	81.6968	152.789	271.286	0	0
50	82.7801	153.027	127.001	0	0
51	83.8634	153.284	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	168
25	168
85	153
120	153

External Boundary

X	Y
0	168
0	166
0	160
0	156
0	138
120	138
120	145
120	151
120	153
95	153
85	153
73	156
25	168
15	168

Material Boundary

X	Y
0	156
41	156
65	156
73	156

Material Boundary

X	Y
0	160
15	160
25	160

Material Boundary

X	Y
25	160
41	156
85	145
120	145

Material Boundary

X		Y	
15		168	
15		166	
25		166	
65		156	
85		151	
95		151	
95		153	

Material Boundary

X		Y	
15		160	
15		166	



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 2, Rapid Drawdown - Total Stress Local Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:16:19 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.646s
Author:	JNH
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:16:19 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	175
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

Weathered Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	115
Friction Angle [deg]	14
Water Surface	Water Table
Hu Value	1

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	125
Friction Angle [deg]	16
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.423010
Center:	67.046, 209.231
Radius:	58.888
Left Slip Surface Endpoint:	25.000, 168.000
Right Slip Surface Endpoint:	84.742, 153.064
Resisting Moment:	805510 lb-ft
Driving Moment:	566062 lb-ft
Total Slice Area:	362.257 ft2
Surface Horizontal Width:	59.7421 ft
Surface Average Height:	6.06368 ft

Method: janbu simplified

FS	1.346870
Center:	67.046, 207.895
Radius:	57.757
Left Slip Surface Endpoint:	25.370, 167.907
Right Slip Surface Endpoint:	85.000, 153.000
Resisting Horizontal Force:	12976.5 lb
Driving Horizontal Force:	9634.61 lb
Total Slice Area:	368.648 ft ²
Surface Horizontal Width:	59.6296 ft
Surface Average Height:	6.18229 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	8819
Number of Invalid Surfaces:	442

Error Codes

Error Code -101 reported for 306 surfaces
 Error Code -102 reported for 4 surfaces
 Error Code -106 reported for 20 surfaces
 Error Code -108 reported for 28 surfaces
 Error Code -1000 reported for 84 surfaces

Method: janbu simplified

Number of Valid Surfaces:	8783
Number of Invalid Surfaces:	478

Error Codes

Error Code -101 reported for 306 surfaces
 Error Code -102 reported for 4 surfaces
 Error Code -106 reported for 20 surfaces
 Error Code -108 reported for 64 surfaces
 Error Code -1000 reported for 84 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

- 101 = Only one (or zero) surface / slope intersections.
- 102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
- 106 = Average slice width is less than $0.0001 \times$ (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
- 108 = Total driving moment or total driving force < 0.1 . This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.42301

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.20431	64.4676	-44.736	Weathered Sandy Lean Clay	115	14	72.702	103.456	-18.4671	27.8345	-46.3016	53.5679	25.7334
2	1.20431	188.638	-43.1086	Weathered Sandy Lean Clay	115	14	80.7511	114.91	81.0862	81.4491	-0.362883	156.675	75.2255
3	1.20431	303.639	-41.5236	Weathered Sandy Lean Clay	115	14	88.3235	125.685	173.96	131.105	42.8554	252.167	121.062
4	1.20431	410.14	-39.9764	Weathered Sandy Lean Clay	115	14	95.4435	135.817	260.583	177.09	83.4929	340.603	163.513
5	1.20431	508.718	-38.4636	Weathered Sandy Lean Clay	115	14	102.132	145.335	341.323	219.654	121.669	422.457	202.803
6	1.20431	599.869	-36.9819	Weathered Sandy Lean Clay	115	14	108.409	154.268	416.506	259.012	157.494	498.145	239.133
7	1.20431	684.028	-35.5286	Weathered Sandy Lean Clay	115	14	114.292	162.638	486.417	295.35	191.067	568.027	272.677
8	1.20431	761.575	-34.1011	Weathered Sandy Lean Clay	115	14	119.795	170.469	551.307	328.834	222.473	632.418	303.584
9	1.20431	832.846	-32.6973	Weathered Sandy Lean Clay	115	14	124.932	177.779	611.4	359.607	251.793	691.597	331.99
10	1.20431	898.138	-31.3153	Weathered Sandy Lean Clay	115	14	129.716	184.587	666.896	387.799	279.097	745.812	358.013
11	1.20431	957.716	-29.9533	Weathered Sandy Lean Clay	115	14	134.157	190.907	717.972	413.524	304.448	795.282	381.758
12	1.20431	1011.82	-28.6098	Weathered Sandy Lean Clay	115	14	138.267	196.755	764.79	436.885	327.905	840.206	403.321
13	1.20431	1060.65	-27.2832	Weathered Sandy Lean Clay	115	14	142.054	202.144	807.488	457.971	349.517	880.755	422.784
14	1.20431	1104.42	-25.9722	Weathered Sandy Lean Clay	115	14	145.526	207.085	846.202	476.868	369.334	917.092	440.224
15	1.18483	1124.52	-24.6861	Silty Sand	0	32	166.465	236.882	872.616	493.528	379.088	949.133	455.605
16	1.18483	1157.61	-23.4236	Silty Sand	0	32	173.034	246.229	902.098	508.052	394.046	977.061	469.009
17	1.18483	1186.32	-22.173	Silty Sand	0	32	179.021	254.748	928.327	520.649	407.678	1001.29	480.637
18	1.18483	1210.75	-20.9334	Silty Sand	0	32	184.425	262.438	951.359	531.372	419.987	1021.91	490.535
19	1.18483	1231.02	-19.704	Silty Sand	0	32	189.247	269.301	971.24	540.268	430.972	1039.02	498.747
20	1.18483	1247.23	-18.484	Silty Sand	0	32	193.489	275.337	988.015	547.381	440.634	1052.7	505.315
21	1.18483	1259.46	-17.2726	Silty Sand	0	32	197.148	280.544	1001.72	552.75	448.966	1063.02	510.267
22	1.18483	1267.8	-16.0691	Silty Sand	0	32	200.223	284.92	1012.38	556.409	455.967	1070.05	513.642
23	1.18483	1272.31	-14.8728	Silty Sand	0	32	202.712	288.461	1020.02	558.391	461.631	1073.86	515.465
24	1.18483	1273.08	-13.6832	Silty Sand	0	32	204.611	291.164	1024.69	558.725	465.963	1074.5	515.778
25	1.18483	1270.14	-12.4996	Silty Sand	0	32	205.918	293.023	1026.37	557.437	468.931	1072.02	514.58
26	1.18483	1263.56	-11.3213	Silty Sand	0	32	206.626	294.031	1025.09	554.55	470.545	1066.46	511.912
27	1.18483	1253.39	-10.1479	Silty Sand	0	32	206.732	294.182	1020.87	550.084	470.79	1057.88	507.793
28	1.18483	1239.66	-8.97875	Silty Sand	0	32	206.228	293.465	1013.7	544.058	469.644	1046.29	502.229
29	1.18483	1222.41	-7.81338	Silty Sand	0	32	205.109	291.872	1003.58	536.488	467.093	1031.73	495.238
30	1.18483	1201.67	-6.65125	Silty Sand	0	32	203.365	289.39	990.507	527.388	463.119	1014.22	486.834
31	1.18483	1177.48	-5.49187	Silty Sand	0	32	200.987	286.007	974.478	516.77	457.708	993.802	477.032
32	1.18483	1149.85	-4.33474	Silty Sand	0	32	197.967	281.709	955.469	504.643	450.826	970.474	465.831
33	1.18483	1118.79	-3.17938	Silty Sand	0	32	194.292	276.48	933.476	491.015	442.461	944.269	453.254
34	1.18483	1084.34	-2.02531	Silty Sand	0	32	189.951	270.302	908.47	475.892	432.578	915.188	439.296
35	1.18483	1046.48	-0.872069	Silty Sand	0	32	184.93	263.157	880.417	459.279	421.138	883.232	423.953

36	1.18483	1005.24	0.280823	Silty Sand	0	32	179.213	255.022	849.298	441.177	408.121	848.42	407.243
37	1.18483	960.601	1.43383	Silty Sand	0	32	172.785	245.875	815.069	421.587	393.482	810.744	389.157
38	1.18483	912.571	2.58742	Silty Sand	0	32	165.628	235.69	777.69	400.507	377.183	770.206	369.699
39	1.18483	861.141	3.74205	Silty Sand	0	32	157.721	224.439	737.113	377.936	359.177	726.797	348.861
40	1.18483	806.299	4.89822	Silty Sand	0	32	149.043	212.09	693.282	353.867	339.415	680.509	326.642
41	1.18483	748.028	6.05638	Silty Sand	0	32	139.571	198.611	646.137	328.293	317.844	631.328	303.035
42	1.18483	686.31	7.21704	Silty Sand	0	32	129.277	183.963	595.607	301.206	294.401	579.237	278.031
43	1.18483	621.12	8.38068	Silty Sand	0	32	118.133	168.105	541.62	272.596	269.024	524.216	251.62
44	1.18483	552.429	9.54782	Silty Sand	0	32	106.108	150.993	484.088	242.448	241.64	466.24	223.792
45	1.18483	480.202	10.719	Silty Sand	0	32	93.1666	132.577	422.917	210.749	212.168	405.281	194.532
46	1.18483	404.401	11.8947	Silty Sand	0	32	79.27	112.802	358.002	177.482	180.52	341.305	163.823
47	1.18483	324.981	13.0755	Silty Sand	0	32	64.3754	91.6069	289.227	142.626	146.601	274.276	131.65
48	1.26075	254.428	14.3002	Clay Liner	125	16	113.172	161.044	230.639	104.938	125.701	201.792	96.8538
49	1.26075	155.86	15.5699	Clay Liner	125	16	105.733	150.459	153.071	64.2834	88.7879	123.61	59.3266
50	1.26075	52.7221	16.8474	Clay Liner	125	16	97.8551	139.249	71.4354	21.7438	49.6916	41.8028	20.059

Global Minimum Query (janbu simplified) - Safety Factor: 1.34687

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.16593	62.2059	-45.3605	Weathered Sandy Lean Clay	115	14	75.9041	102.233	-23.4639	27.7419	-51.2058	53.4015	25.6596
2	1.16593	182.066	-43.737	Weathered Sandy Lean Clay	115	14	84.3307	113.582	75.5133	81.1989	-5.68556	156.206	75.0068
3	1.16593	293.174	-42.1564	Weathered Sandy Lean Clay	115	14	92.2716	124.278	167.964	130.752	37.2119	251.503	120.751
4	1.16593	396.181	-40.6144	Weathered Sandy Lean Clay	115	14	99.7514	134.352	254.31	176.693	77.6173	339.851	163.158
5	1.16593	491.646	-39.1073	Weathered Sandy Lean Clay	115	14	106.792	143.835	334.921	219.27	115.651	421.731	202.461
6	1.16593	580.051	-37.6317	Weathered Sandy Lean Clay	115	14	113.413	152.752	410.115	258.698	151.417	497.555	238.857
7	1.16593	661.817	-36.1849	Weathered Sandy Lean Clay	115	14	119.632	161.128	480.175	295.165	185.01	567.684	272.519
8	1.16593	737.311	-34.7644	Weathered Sandy Lean Clay	115	14	125.464	168.983	545.35	328.835	216.515	632.434	303.599
9	1.16593	806.858	-33.3679	Weathered Sandy Lean Clay	115	14	130.923	176.336	605.86	359.853	246.007	692.083	332.23
10	1.16593	870.747	-31.9936	Weathered Sandy Lean Clay	115	14	136.023	183.205	661.902	388.347	273.555	746.878	358.531
11	1.16593	929.231	-30.6395	Weathered Sandy Lean Clay	115	14	140.774	189.605	713.653	414.431	299.222	797.038	382.607
12	1.16593	982.542	-29.3041	Weathered Sandy Lean Clay	115	14	145.188	195.549	761.271	438.207	323.064	842.76	404.553
13	1.16593	1030.88	-27.986	Weathered Sandy Lean Clay	115	14	149.272	201.05	804.897	459.766	345.131	884.22	424.454
14	1.16593	1074.44	-26.6839	Weathered Sandy Lean Clay	115	14	153.037	206.121	844.657	479.191	365.466	921.572	442.381
15	1.20019	1146.61	-25.3777	Silty Sand	0	32	174.395	234.887	872.68	496.781	375.899	955.406	458.625
16	1.20019	1182.99	-24.0668	Silty Sand	0	32	181.845	244.922	904.502	512.546	391.956	985.719	473.173
17	1.20019	1214.65	-22.7692	Silty Sand	0	32	188.661	254.102	932.909	526.264	406.645	1012.1	485.832
18	1.20019	1241.73	-21.4838	Silty Sand	0	32	194.844	262.43	957.973	537.996	419.977	1034.66	496.664
19	1.20019	1264.35	-20.2097	Silty Sand	0	32	200.394	269.905	979.733	547.796	431.937	1053.5	505.706
20	1.20019	1282.62	-18.9459	Silty Sand	0	32	205.311	276.527	998.245	555.712	442.533	1068.72	513.011
21	1.20019	1296.64	-17.6916	Silty Sand	0	32	209.592	282.293	1013.55	561.788	451.76	1080.4	518.616
22	1.20019	1306.51	-16.446	Silty Sand	0	32	213.236	287.201	1025.68	566.063	459.62	1088.63	522.564
23	1.20019	1312.31	-15.2084	Silty Sand	0	32	216.24	291.247	1034.67	568.573	466.095	1093.45	524.88
24	1.20019	1314.1	-13.978	Silty Sand	0	32	218.599	294.425	1040.53	569.351	471.175	1094.94	525.589

25	1.20019	1311.96	-12.7541	Silty Sand	0	32	220.311	296.73	1043.29	568.425	474.869	1093.16	524.736
26	1.20019	1305.95	-11.5361	Silty Sand	0	32	221.367	298.153	1042.97	565.821	477.146	1088.15	522.329
27	1.20019	1296.12	-10.3234	Silty Sand	0	32	221.764	298.687	1039.56	561.562	477.996	1079.95	518.391
28	1.20019	1282.52	-9.1154	Silty Sand	0	32	221.491	298.32	1033.08	555.668	477.409	1068.62	512.947
29	1.20019	1265.18	-7.91143	Silty Sand	0	32	220.542	297.042	1023.52	548.157	475.366	1054.17	506.014
30	1.20019	1244.15	-6.71097	Silty Sand	0	32	218.906	294.838	1010.89	539.044	471.843	1036.65	497.601
31	1.20019	1219.45	-5.51347	Silty Sand	0	32	216.573	291.696	995.156	528.341	466.815	1016.06	487.72
32	1.20019	1191.1	-4.31837	Silty Sand	0	32	213.531	287.598	976.313	516.061	460.252	992.437	476.376
33	1.20019	1159.14	-3.12516	Silty Sand	0	32	209.765	282.526	954.342	502.21	452.132	965.795	463.585
34	1.20019	1123.56	-1.9333	Silty Sand	0	32	205.261	276.46	929.221	486.795	442.426	936.15	449.355
35	1.20019	1084.38	-0.742284	Silty Sand	0	32	200.003	269.378	900.913	469.821	431.092	903.504	433.683
36	1.20019	1041.61	0.448415	Silty Sand	0	32	193.972	261.255	869.384	451.291	418.093	867.866	416.575
37	1.20019	995.247	1.63931	Silty Sand	0	32	187.149	252.065	834.591	431.203	403.388	829.235	398.032
38	1.20019	945.286	2.83091	Silty Sand	0	32	179.511	241.778	796.483	409.556	386.927	787.606	378.05
39	1.20019	891.718	4.02374	Silty Sand	0	32	171.034	230.361	755.003	386.348	368.655	742.972	356.624
40	1.20019	834.532	5.21832	Silty Sand	0	32	161.693	217.779	710.089	361.571	348.518	695.322	333.751
41	1.20019	773.707	6.41518	Silty Sand	0	32	151.455	203.99	661.67	335.217	326.453	644.641	309.424
42	1.20019	709.22	7.61486	Silty Sand	0	32	140.29	188.953	609.666	307.278	302.388	590.91	283.632
43	1.20019	641.044	8.81791	Silty Sand	0	32	128.162	172.618	553.987	277.74	276.247	534.105	256.365
44	1.20019	569.145	10.0249	Silty Sand	0	32	115.032	154.933	494.533	246.588	247.945	474.199	227.611
45	1.20019	493.482	11.2364	Silty Sand	0	32	100.855	135.838	431.193	213.806	217.387	411.157	197.351
46	1.20019	414.012	12.453	Silty Sand	0	32	85.5821	115.268	363.842	179.375	184.467	344.943	165.568
47	1.20019	330.683	13.6753	Silty Sand	0	32	69.1601	93.1497	292.342	143.271	149.071	275.514	132.243
48	1.23338	248.871	14.9212	Clay Liner	125	16	120.246	161.955	233.802	104.924	128.878	201.759	96.8354
49	1.23338	152.409	16.1913	Clay Liner	125	16	112.378	151.359	156.18	64.2549	91.9252	123.55	59.2947
50	1.23338	51.5441	17.4697	Clay Liner	125	16	104.046	140.136	74.5152	21.7297	52.7855	41.7701	20.0404

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.42301

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25	168	0	0	0
2	26.2043	166.807	-109.547	0	0
3	27.4086	165.679	-115.336	0	0
4	28.6129	164.613	-36.1447	0	0
5	29.8172	163.603	112.079	0	0
6	31.0215	162.647	315.688	0	0
7	32.2258	161.74	562.932	0	0
8	33.4301	160.88	843.646	0	0
9	34.6345	160.064	1148.99	0	0
10	35.8388	159.291	1471.27	0	0
11	37.0431	158.559	1803.75	0	0
12	38.2474	157.865	2140.54	0	0
13	39.4517	157.208	2476.48	0	0
14	40.656	156.587	2807.05	0	0
15	41.8603	156	3128.32	0	0
16	43.0451	155.455	3406.43	0	0
17	44.23	154.942	3664.57	0	0
18	45.4148	154.459	3900.83	0	0
19	46.5996	154.006	4113.62	0	0
20	47.7845	153.582	4301.63	0	0
21	48.9693	153.186	4463.82	0	0
22	50.1541	152.817	4599.39	0	0
23	51.339	152.476	4707.8	0	0
24	52.5238	152.161	4788.7	0	0
25	53.7086	151.873	4841.98	0	0
26	54.8935	151.61	4867.72	0	0
27	56.0783	151.373	4866.19	0	0
28	57.2632	151.161	4837.87	0	0
29	58.448	150.974	4783.42	0	0
30	59.6328	150.811	4703.69	0	0
31	60.8177	150.673	4599.72	0	0
32	62.0025	150.559	4472.71	0	0
33	63.1873	150.469	4324.09	0	0
34	64.3722	150.403	4155.44	0	0
35	65.557	150.361	3968.56	0	0
36	66.7418	150.343	3765.44	0	0
37	67.9267	150.349	3548.28	0	0
38	69.1115	150.379	3319.49	0	0
39	70.2963	150.432	3081.71	0	0
40	71.4812	150.51	2837.81	0	0
41	72.666	150.611	2590.91	0	0
42	73.8508	150.737	2344.4	0	0
43	75.0357	150.887	2101.95	0	0
44	76.2205	151.062	1867.51	0	0
45	77.4053	151.261	1645.38	0	0
46	78.5902	151.485	1440.19	0	0
47	79.775	151.735	1256.97	0	0
48	80.9598	152.01	1101.15	0	0
49	82.2206	152.331	884.42	0	0
50	83.4813	152.683	697.413	0	0
51	84.7421	153.064	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.34687

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.3704	167.907	0	0	0
2	26.5364	166.727	-116.147	0	0
3	27.7023	165.611	-130.164	0	0
4	28.8682	164.555	-60.3775	0	0
5	30.0342	163.556	77.6612	0	0
6	31.2001	162.608	270.657	0	0
7	32.366	161.709	507.168	0	0
8	33.532	160.856	777.298	0	0
9	34.6979	160.047	1072.44	0	0
10	35.8638	159.279	1385.11	0	0
11	37.0298	158.551	1708.72	0	0
12	38.1957	157.86	2037.56	0	0
13	39.3616	157.206	2366.56	0	0
14	40.5276	156.586	2691.32	0	0
15	41.6935	156	3007.97	0	0
16	42.8937	155.431	3295.63	0	0
17	44.0939	154.895	3562.36	0	0
18	45.2941	154.391	3806.04	0	0
19	46.4943	153.919	4024.86	0	0
20	47.6945	153.477	4217.36	0	0
21	48.8946	153.065	4382.37	0	0
22	50.0948	152.682	4519	0	0
23	51.295	152.328	4626.62	0	0
24	52.4952	152.001	4704.84	0	0
25	53.6954	151.703	4753.5	0	0
26	54.8956	151.431	4772.68	0	0
27	56.0958	151.186	4762.66	0	0
28	57.296	150.967	4723.94	0	0
29	58.4962	150.775	4657.22	0	0
30	59.6964	150.608	4563.4	0	0
31	60.8966	150.467	4443.6	0	0
32	62.0968	150.351	4299.12	0	0
33	63.297	150.26	4131.49	0	0
34	64.4972	150.195	3942.43	0	0
35	65.6973	150.154	3733.87	0	0
36	66.8975	150.139	3507.99	0	0
37	68.0977	150.148	3267.17	0	0
38	69.2979	150.182	3014.03	0	0
39	70.4981	150.242	2751.45	0	0
40	71.6983	150.326	2482.56	0	0
41	72.8985	150.436	2210.79	0	0
42	74.0987	150.571	1939.84	0	0
43	75.2989	150.731	1673.74	0	0
44	76.4991	150.917	1416.88	0	0
45	77.6993	151.13	1173.98	0	0
46	78.8995	151.368	950.201	0	0
47	80.0997	151.633	751.117	0	0
48	81.2999	151.925	582.792	0	0
49	82.5332	152.254	357.734	0	0
50	83.7666	152.612	163.284	0	0
51	85	153	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	168
25	168
85	153
120	153

External Boundary

X	Y
0	168
0	166
0	160
0	156
0	138
120	138
120	145
120	151
120	153
95	153
85	153
73	156
25	168
15	168

Material Boundary

X	Y
0	156
41	156
65	156
73	156

Material Boundary

X	Y
0	160
15	160
25	160

Material Boundary

X	Y
25	160
41	156
85	145
120	145

Material Boundary

X		Y	
15		168	
15		166	
25		166	
65		156	
85		151	
95		151	
95		153	

Material Boundary

X		Y	
15		160	
15		166	



TISD HCFC Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 2, Rapid Drawdown - Effective Stress Global Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:16:19 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.324s
Author:	JNH
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:16:19 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:10116

Random Number Generation Method:Park and Miller v.3

Surface Options

Surface Type:Circular

Search Method:Grid Search

Radius Increment:10

Composite Surfaces:Disabled

Reverse Curvature:Invalid Surfaces

Minimum Elevation:Not Defined

Minimum Depth:Not Defined

Minimum Area:Not Defined

Minimum Weight:Not Defined

Seismic Loading

Advanced seismic analysis:No

Staged pseudostatic analysis:No

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

Weathered Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.412730
Center:	66.702, 215.647
Radius:	64.541
Left Slip Surface Endpoint:	23.167, 168.000
Right Slip Surface Endpoint:	83.587, 153.353
Resisting Moment:	851197 lb-ft
Driving Moment:	602519 lb-ft
Total Slice Area:	348.299 ft2
Surface Horizontal Width:	60.42 ft
Surface Average Height:	5.76464 ft

Method: janbu simplified

FS	1.344200
Center:	66.702, 212.726
Radius:	61.999
Left Slip Surface Endpoint:	23.767, 168.000
Right Slip Surface Endpoint:	84.113, 153.222
Resisting Horizontal Force:	12723.7 lb
Driving Horizontal Force:	9465.66 lb
Total Slice Area:	359.504 ft2
Surface Horizontal Width:	60.3461 ft
Surface Average Height:	5.95736 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	8429
Number of Invalid Surfaces:	832

Error Codes

Error Code -103 reported for 832 surfaces

Method: janbu simplified

Number of Valid Surfaces:	8429
Number of Invalid Surfaces:	832

Error Codes

Error Code -103 reported for 832 surfaces

Error Code Descriptions

The following errors were encountered during the computation:
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.41273

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.1801	74.4908	-41.7166	Weathered Sandy Lean Clay	100	20	63.9202	90.302	6.17706	32.8221	-26.645	63.1611	30.339

2	1.1801	215.751	-40.3277	Weathered Sandy Lean Clay	100	20	76.2556	107.729	118.135	96.9013	21.2339	182.868	85.9668
3	1.1801	318.89	-38.9669	Weathered Sandy Lean Clay	100	20	86.2431	121.838	200.514	140.514	60.0002	270.27	129.756
4	1.1801	409.117	-37.6317	Weathered Sandy Lean Clay	100	20	94.8333	133.974	273.615	180.272	93.3426	346.73	166.458
5	1.1801	493.184	-36.3202	Weathered Sandy Lean Clay	100	20	102.977	145.479	342.269	217.316	124.953	417.97	200.654
6	1.1801	571.404	-35.0303	Weathered Sandy Lean Clay	100	20	110.687	156.371	406.662	251.783	154.879	484.253	232.47
7	1.1801	644.053	-33.7606	Weathered Sandy Lean Clay	100	20	117.974	166.665	466.956	283.795	183.161	545.816	262.021
8	1.1801	711.379	-32.5093	Weathered Sandy Lean Clay	100	20	124.847	176.376	523.302	313.462	209.84	602.868	289.406
9	1.1801	773.606	-31.2753	Weathered Sandy Lean Clay	100	20	131.317	185.516	575.834	340.881	234.953	655.598	314.717
10	1.1801	830.936	-30.0572	Weathered Sandy Lean Clay	100	20	137.391	194.097	624.672	366.143	258.529	704.178	338.035
11	1.1801	883.549	-28.8539	Weathered Sandy Lean Clay	100	20	143.078	202.131	669.928	389.327	280.601	748.761	359.434
12	1.1801	931.612	-27.6644	Weathered Sandy Lean Clay	100	20	148.384	209.627	711.703	410.505	301.198	789.489	378.984
13	1.1801	975.274	-26.4878	Weathered Sandy Lean Clay	100	20	153.317	216.595	750.086	429.744	320.342	826.486	396.742
14	1.1801	1014.67	-25.323	Weathered Sandy Lean Clay	100	20	157.881	223.043	785.165	447.105	338.06	859.873	412.768
15	1.1801	1049.93	-24.1694	Weathered Sandy Lean Clay	100	20	162.083	228.979	817.009	462.641	354.368	889.748	427.107
16	1.1801	1081.16	-23.026	Weathered Sandy Lean Clay	100	20	165.927	234.41	845.687	476.403	369.284	916.208	439.805
17	1.20725	1134.25	-21.8794	Silty Sand	0	32	169.404	239.322	871.551	488.557	382.994	939.58	451.023
18	1.20725	1158.74	-20.729	Silty Sand	0	32	174.577	246.63	893.795	499.104	394.691	959.863	460.759
19	1.20725	1179.23	-19.5872	Silty Sand	0	32	179.198	253.159	913.071	507.929	405.142	976.835	468.906
20	1.20725	1195.8	-18.4535	Silty Sand	0	32	183.266	258.906	929.401	515.067	414.334	990.556	475.489
21	1.20725	1208.54	-17.3273	Silty Sand	0	32	186.781	263.871	942.838	520.555	422.283	1001.11	480.556
22	1.20725	1217.52	-16.2079	Silty Sand	0	32	189.739	268.05	953.391	524.421	428.97	1008.54	484.123
23	1.20725	1222.8	-15.0948	Silty Sand	0	32	192.139	271.44	961.09	526.696	434.394	1012.91	486.218
24	1.20725	1224.45	-13.9875	Silty Sand	0	32	193.978	274.038	965.96	527.405	438.555	1014.28	486.874
25	1.20725	1222.51	-12.8856	Silty Sand	0	32	195.252	275.838	968.003	526.571	441.432	1012.67	486.099
26	1.20725	1217.04	-11.7884	Silty Sand	0	32	195.957	276.834	967.241	524.216	443.025	1008.14	483.921
27	1.20725	1208.08	-10.6957	Silty Sand	0	32	196.088	277.019	963.679	520.358	443.321	1000.71	480.356
28	1.20725	1195.68	-9.60684	Silty Sand	0	32	195.64	276.386	957.326	515.015	442.311	990.44	475.425
29	1.20725	1179.86	-8.5215	Silty Sand	0	32	194.605	274.925	948.173	508.2	439.973	977.332	469.132
30	1.20725	1160.66	-7.43923	Silty Sand	0	32	192.98	272.628	936.224	499.929	436.295	961.422	461.493
31	1.20725	1138.1	-6.35962	Silty Sand	0	32	190.753	269.482	921.476	490.212	431.264	942.736	452.524
32	1.20725	1112.21	-5.28228	Silty Sand	0	32	187.917	265.476	903.911	479.06	424.851	921.285	442.225
33	1.20725	1083	-4.2068	Silty Sand	0	32	184.463	260.596	883.519	466.48	417.039	897.088	430.608
34	1.20725	1050.49	-3.13281	Silty Sand	0	32	180.38	254.828	860.291	452.479	407.812	870.163	417.684
35	1.20725	1014.7	-2.05992	Silty Sand	0	32	175.656	248.155	834.193	437.062	397.131	840.511	403.449
36	1.20725	975.631	-0.987757	Silty Sand	0	32	170.28	240.56	805.21	420.233	384.977	808.146	387.913
37	1.20725	933.287	0.0840634	Silty Sand	0	32	164.238	232.024	773.31	401.994	371.316	773.069	371.075
38	1.20725	887.671	1.15591	Silty Sand	0	32	157.514	222.525	738.459	382.346	356.113	735.281	352.935
39	1.20725	838.78	2.22817	Silty Sand	0	32	150.092	212.04	700.622	361.287	339.335	694.782	333.495
40	1.20725	786.61	3.3012	Silty Sand	0	32	141.956	200.545	659.754	338.816	320.938	651.566	312.75
41	1.20725	731.152	4.3754	Silty Sand	0	32	133.084	188.012	615.811	314.928	300.883	605.628	290.7
42	1.20725	672.392	5.45114	Silty Sand	0	32	123.457	174.411	568.736	289.619	279.117	556.954	267.335
43	1.20725	610.316	6.52881	Silty Sand	0	32	113.051	159.711	518.472	262.88	255.592	505.534	242.654
44	1.20725	544.903	7.60881	Silty Sand	0	32	101.843	143.876	464.954	234.705	230.249	451.35	216.645
45	1.20725	476.13	8.69154	Silty Sand	0	32	89.802	126.866	408.111	205.082	203.029	394.382	189.3

46	1.20725	403.969	9.7774	Silty Sand	0	32	76.9015	108.641	347.862	174	173.862	334.61	160.61
47	1.20725	328.389	10.8668	Silty Sand	0	32	63.1069	89.153	284.12	141.446	142.674	272.006	130.56
48	1.37121	276.837	12.0348	Clay Liner	100	20	101.313	143.128	223.477	104.982	118.495	201.878	96.8955
49	1.37121	169.748	13.2825	Clay Liner	100	20	91.6656	129.499	145.418	64.3711	81.0469	123.779	59.4075
50	1.37121	57.4562	14.5367	Clay Liner	100	20	81.4015	114.998	62.9949	21.7873	41.2076	41.8874	20.1001

Global Minimum Query (janbu simplified) - Safety Factor: 1.3442

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.19431	80.0159	-43.0746	Weathered Sandy Lean Clay	100	20	66.3176	89.1441	5.01076	34.8371	-29.8263	67.0146	32.1775
2	1.19431	215.946	-41.5813	Weathered Sandy Lean Clay	100	20	78.9335	106.102	110.797	94.0307	16.7662	180.831	86.8007
3	1.19431	321.235	-40.1218	Weathered Sandy Lean Clay	100	20	89.0401	119.688	193.955	139.863	54.0919	268.992	129.129
4	1.19431	419.114	-38.6931	Weathered Sandy Lean Clay	100	20	98.6213	132.567	271.956	182.48	89.4765	350.947	168.467
5	1.19431	510.049	-37.2923	Weathered Sandy Lean Clay	100	20	107.697	144.767	345.068	222.072	122.996	427.088	205.016
6	1.19431	594.426	-35.9172	Weathered Sandy Lean Clay	100	20	116.282	156.306	413.511	258.81	154.701	497.738	238.928
7	1.19431	672.589	-34.5656	Weathered Sandy Lean Clay	100	20	124.389	167.204	477.484	292.842	184.642	563.185	270.343
8	1.19431	744.841	-33.2356	Weathered Sandy Lean Clay	100	20	132.031	177.477	537.165	324.3	212.865	623.681	299.381
9	1.19431	811.453	-31.9256	Weathered Sandy Lean Clay	100	20	139.219	187.138	592.713	353.303	239.41	679.456	326.153
10	1.19431	872.667	-30.6339	Weathered Sandy Lean Clay	100	20	145.963	196.203	644.272	379.956	264.316	730.711	350.755
11	1.19431	928.701	-29.3594	Weathered Sandy Lean Clay	100	20	152.272	204.684	691.969	404.353	287.616	777.628	373.275
12	1.19431	979.751	-28.1006	Weathered Sandy Lean Clay	100	20	158.155	212.592	735.923	426.58	309.343	820.372	393.792
13	1.19431	1025.99	-26.8564	Weathered Sandy Lean Clay	100	20	163.619	219.937	776.238	446.714	329.524	859.09	412.376
14	1.19431	1067.59	-25.6257	Weathered Sandy Lean Clay	100	20	168.673	226.73	813.015	464.825	348.19	893.923	429.098
15	1.19431	1104.69	-24.4076	Weathered Sandy Lean Clay	100	20	173.321	232.978	846.329	480.977	365.352	924.979	444.002
16	1.20278	1145.58	-23.1969	Silty Sand	0	32	177.228	238.23	876.518	495.27	381.248	952.466	457.196
17	1.20278	1174.43	-21.9928	Silty Sand	0	32	183.444	246.586	902.364	507.744	394.62	976.454	468.71
18	1.20278	1199.06	-20.7989	Silty Sand	0	32	189.07	254.148	925.113	518.391	406.722	996.929	478.538
19	1.20278	1219.56	-19.6144	Silty Sand	0	32	194.103	260.913	944.804	527.256	417.548	1013.98	486.72
20	1.20278	1236.03	-18.4385	Silty Sand	0	32	198.542	266.88	961.476	534.377	427.099	1027.67	493.293
21	1.20278	1248.56	-17.2706	Silty Sand	0	32	202.387	272.048	975.162	539.792	435.37	1038.08	498.292
22	1.20278	1257.22	-16.1101	Silty Sand	0	32	205.633	276.412	985.887	543.535	442.352	1045.28	501.744
23	1.20278	1262.07	-14.9563	Silty Sand	0	32	208.279	279.968	993.678	545.635	448.043	1049.32	503.68
24	1.20278	1263.19	-13.8087	Silty Sand	0	32	210.32	282.712	998.552	546.119	452.433	1050.25	504.127
25	1.20278	1260.64	-12.6668	Silty Sand	0	32	211.752	284.637	1000.53	545.014	455.514	1048.12	503.105
26	1.20278	1254.45	-11.5299	Silty Sand	0	32	212.57	285.736	999.611	542.34	457.271	1042.97	500.635
27	1.20278	1244.69	-10.3976	Silty Sand	0	32	212.767	286.001	995.816	538.117	457.699	1034.86	496.74
28	1.20278	1231.38	-9.26942	Silty Sand	0	32	212.336	285.422	989.136	532.365	456.771	1023.79	491.426
29	1.20278	1214.57	-8.14485	Silty Sand	0	32	211.271	283.99	979.579	525.097	454.482	1009.82	484.719
30	1.20278	1194.28	-7.02342	Silty Sand	0	32	209.562	281.693	967.126	516.328	450.798	992.944	476.616
31	1.20278	1170.56	-5.9047	Silty Sand	0	32	207.199	278.517	951.785	506.069	445.716	973.214	467.145
32	1.20278	1143.4	-4.78823	Silty Sand	0	32	204.173	274.449	933.539	494.33	439.209	950.641	456.311

33	1.20278	1112.85	-3.67358	Silty Sand	0	32	200.47	269.472	912.365	481.119	431.246	925.236	444.117
34	1.20278	1078.9	-2.56032	Silty Sand	0	32	196.079	263.57	888.247	466.443	421.804	897.015	430.572
35	1.20278	1041.58	-1.44803	Silty Sand	0	32	190.986	256.724	861.149	450.307	410.842	865.977	415.67
36	1.20278	1000.88	-0.336284	Silty Sand	0	32	185.175	248.912	831.056	432.712	398.344	832.143	399.431
37	1.20278	956.815	0.775335	Silty Sand	0	32	178.629	240.113	797.923	413.661	384.262	795.505	381.844
38	1.20278	909.38	1.88725	Silty Sand	0	32	171.329	230.301	761.712	393.154	368.558	756.067	362.913
39	1.20278	858.571	2.99987	Silty Sand	0	32	163.255	219.448	722.378	371.187	351.191	713.822	342.635
40	1.20278	804.38	4.11363	Silty Sand	0	32	154.386	207.526	679.87	347.758	332.112	668.766	321.008
41	1.20278	746.793	5.22894	Silty Sand	0	32	144.697	194.502	634.13	322.862	311.268	620.887	298.025
42	1.20278	685.796	6.34625	Silty Sand	0	32	134.162	180.34	585.095	296.491	288.604	570.174	273.683
43	1.20278	621.367	7.46599	Silty Sand	0	32	122.75	165.001	532.693	268.636	264.057	516.606	247.97
44	1.20278	553.482	8.5886	Silty Sand	0	32	110.431	148.442	476.845	239.287	237.558	460.166	220.879
45	1.20278	482.113	9.71455	Silty Sand	0	32	97.1716	130.618	417.464	208.432	209.032	400.828	192.396
46	1.20278	407.225	10.8443	Silty Sand	0	32	82.9304	111.475	354.453	176.055	178.398	338.567	162.512
47	1.20278	328.782	11.9783	Silty Sand	0	32	67.667	90.958	287.705	142.142	145.563	273.349	131.207
48	1.31421	265.254	13.1702	Clay Liner	100	20	107.432	144.41	226.967	104.953	122.014	201.829	96.8756
49	1.31421	162.543	14.4209	Clay Liner	100	20	97.2375	130.707	148.678	64.3127	84.3656	123.674	59.3615
50	1.31421	54.9942	15.6786	Clay Liner	100	20	86.3973	116.135	66.0896	21.7583	44.3313	41.8392	20.0809

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.41273

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	23.1666	168	0	0	0
2	24.3467	166.948	-68.8825	0	0
3	25.5268	165.946	-40.4653	0	0
4	26.7069	164.992	49.2185	0	0
5	27.887	164.082	186.327	0	0
6	29.0671	163.214	361.807	0	0
7	30.2472	162.387	567.683	0	0
8	31.4273	161.598	796.906	0	0
9	32.6074	160.846	1043.24	0	0
10	33.7875	160.129	1301.14	0	0
11	34.9676	159.446	1565.7	0	0
12	36.1477	158.796	1832.57	0	0
13	37.3278	158.178	2097.86	0	0
14	38.5079	157.59	2358.15	0	0
15	39.688	157.031	2610.4	0	0
16	40.8681	156.502	2851.95	0	0
17	42.0482	156	3080.43	0	0
18	43.2554	155.515	3298.59	0	0
19	44.4627	155.058	3496.33	0	0
20	45.6699	154.629	3672.37	0	0
21	46.8772	154.226	3825.69	0	0
22	48.0844	153.849	3955.46	0	0
23	49.2917	153.498	4061.12	0	0
24	50.4989	153.173	4142.27	0	0
25	51.7062	152.872	4198.73	0	0
26	52.9134	152.596	4230.52	0	0
27	54.1207	152.344	4237.81	0	0
28	55.3279	152.116	4220.98	0	0
29	56.5352	151.911	4180.57	0	0
30	57.7424	151.731	4117.31	0	0
31	58.9497	151.573	4032.07	0	0
32	60.1569	151.438	3925.93	0	0
33	61.3642	151.327	3800.11	0	0
34	62.5714	151.238	3656.03	0	0
35	63.7787	151.172	3495.25	0	0
36	64.9859	151.128	3319.56	0	0
37	66.1932	151.108	3130.89	0	0
38	67.4004	151.109	2931.38	0	0
39	68.6076	151.134	2723.36	0	0
40	69.8149	151.181	2509.37	0	0
41	71.0221	151.25	2292.17	0	0
42	72.2294	151.343	2074.73	0	0
43	73.4366	151.458	1860.26	0	0
44	74.6439	151.596	1652.24	0	0
45	75.8511	151.757	1454.39	0	0
46	77.0584	151.942	1270.73	0	0
47	78.2656	152.15	1105.59	0	0
48	79.4729	152.382	963.609	0	0
49	80.8441	152.674	759.451	0	0
50	82.2153	152.998	586.771	0	0
51	83.5865	153.353	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.3442

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	23.7667	168	0	0	0
2	24.961	166.883	-73.5868	0	0
3	26.1553	165.824	-50.4245	0	0
4	27.3496	164.817	38.475	0	0
5	28.5439	163.861	180.872	0	0
6	29.7382	162.951	366.146	0	0
7	30.9325	162.086	585.028	0	0
8	32.1268	161.263	829.403	0	0
9	33.3211	160.481	1092.14	0	0
10	34.5155	159.736	1366.98	0	0
11	35.7098	159.029	1648.37	0	0
12	36.9041	158.357	1931.46	0	0
13	38.0984	157.72	2211.94	0	0
14	39.2927	157.115	2486.02	0	0
15	40.487	156.542	2750.38	0	0
16	41.6813	156	3002.11	0	0
17	42.8841	155.485	3240.79	0	0
18	44.0869	154.999	3458.56	0	0
19	45.2896	154.542	3653.86	0	0
20	46.4924	154.113	3825.44	0	0
21	47.6952	153.712	3972.26	0	0
22	48.898	153.338	4093.56	0	0
23	50.1007	152.991	4188.79	0	0
24	51.3035	152.67	4257.61	0	0
25	52.5063	152.374	4299.91	0	0
26	53.7091	152.104	4315.76	0	0
27	54.9118	151.858	4305.42	0	0
28	56.1146	151.638	4269.36	0	0
29	57.3174	151.441	4208.2	0	0
30	58.5202	151.269	4122.79	0	0
31	59.723	151.121	4014.11	0	0
32	60.9257	150.997	3883.37	0	0
33	62.1285	150.896	3731.91	0	0
34	63.3313	150.819	3561.32	0	0
35	64.5341	150.765	3373.31	0	0
36	65.7368	150.734	3169.85	0	0
37	66.9396	150.727	2953.05	0	0
38	68.1424	150.744	2725.27	0	0
39	69.3452	150.783	2489.07	0	0
40	70.5479	150.846	2247.23	0	0
41	71.7507	150.933	2002.78	0	0
42	72.9535	151.043	1758.99	0	0
43	74.1563	151.177	1519.4	0	0
44	75.359	151.334	1287.83	0	0
45	76.5618	151.516	1068.42	0	0
46	77.7646	151.722	865.618	0	0
47	78.9674	151.952	684.231	0	0
48	80.1701	152.207	529.448	0	0
49	81.4843	152.515	318.501	0	0
50	82.7986	152.853	140.502	0	0
51	84.1128	153.222	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	168
25	168
85	153
120	153

External Boundary

X	Y
0	168
0	166
0	160
0	156
0	138
120	138
120	145
120	151
120	153
95	153
85	153
73	156
25	168
15	168

Material Boundary

X	Y
0	156
41	156
65	156
73	156

Material Boundary

X	Y
0	160
15	160
25	160

Material Boundary

X	Y
25	160
41	156
85	145
120	145

Material Boundary

X		Y	
15		168	
15		166	
25		166	
65		156	
85		151	
95		151	
95		153	

Material Boundary

X		Y	
15		160	
15		166	



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 2, Rapid Drawdown - Effective Stress Local Analysis
Terracon Consultants Inc.
Date Created: 9/12/2022, 1:16:19 PM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.501s
Author:	JNH
Company:	Terracon Consultants Inc.
Date Created:	9/12/2022, 1:16:19 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	22
Water Surface	Water Table
Hu Value	1

Weathered Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.423030
Center:	68.667, 214.263
Radius:	63.403
Left Slip Surface Endpoint:	25.426, 167.893
Right Slip Surface Endpoint:	85.000, 153.000
Resisting Moment:	798748 lb-ft
Driving Moment:	561301 lb-ft
Total Slice Area:	328.792 ft2
Surface Horizontal Width:	59.5736 ft
Surface Average Height:	5.51909 ft

Method: janbu simplified

FS	1.349000
Center:	67.131, 208.053
Radius:	57.880
Left Slip Surface Endpoint:	25.458, 167.886
Right Slip Surface Endpoint:	85.000, 153.000
Resisting Horizontal Force:	12912.6 lb
Driving Horizontal Force:	9572.03 lb
Total Slice Area:	365.964 ft ²
Surface Horizontal Width:	59.5423 ft
Surface Average Height:	6.14629 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	7337
Number of Invalid Surfaces:	1924

Error Codes

Error Code -101 reported for 288 surfaces
 Error Code -106 reported for 22 surfaces
 Error Code -108 reported for 18 surfaces
 Error Code -1000 reported for 1596 surfaces

Method: janbu simplified

Number of Valid Surfaces:	7317
Number of Invalid Surfaces:	1944

Error Codes

Error Code -101 reported for 288 surfaces
 Error Code -106 reported for 22 surfaces
 Error Code -108 reported for 38 surfaces
 Error Code -1000 reported for 1596 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

- 101 = Only one (or zero) surface / slope intersections.
- 106 = Average slice width is less than $0.0001 \times$ (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
- 108 = Total driving moment or total driving force < 0.1 . This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.42303

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.21562	58.3932	-42.258	Weathered Sandy Lean Clay	100	20	61.8156	87.9655	-8.08753	24.977	-33.0645	48.0775	23.1005
2	1.21562	171.127	-40.7903	Weathered Sandy Lean Clay	100	20	71.7355	102.082	78.9205	73.2006	5.71988	140.82	67.6192
3	1.21562	276.013	-39.3545	Weathered Sandy Lean Clay	100	20	81.1416	115.467	160.562	118.067	42.4954	227.105	109.038
4	1.21562	373.534	-37.9476	Weathered Sandy Lean Clay	100	20	90.0502	128.144	237.108	159.783	77.3255	307.331	147.548
5	1.21562	464.112	-36.5672	Weathered Sandy Lean Clay	100	20	98.4761	140.134	308.798	198.53	110.268	381.845	183.315
6	1.21562	548.12	-35.211	Weathered Sandy Lean Clay	100	20	106.433	151.457	375.843	234.465	141.378	450.954	216.489
7	1.21562	625.888	-33.8771	Weathered Sandy Lean Clay	100	20	113.933	162.131	438.434	267.731	170.703	514.928	247.197
8	1.21562	697.708	-32.5638	Weathered Sandy Lean Clay	100	20	120.989	172.171	496.742	298.454	198.288	574.01	275.556
9	1.21562	763.844	-31.2694	Weathered Sandy Lean Clay	100	20	127.61	181.593	550.92	326.744	224.176	628.415	301.671
10	1.21562	824.531	-29.9926	Weathered Sandy Lean Clay	100	20	133.807	190.411	601.107	352.704	248.403	678.337	325.633
11	1.21562	879.98	-28.732	Weathered Sandy Lean Clay	100	20	139.588	198.637	647.427	376.423	271.004	723.951	347.528
12	1.21562	930.384	-27.4865	Weathered Sandy Lean Clay	100	20	144.96	206.283	689.995	397.984	292.011	765.413	367.429
13	1.21562	975.914	-26.2549	Weathered Sandy Lean Clay	100	20	149.933	213.359	728.912	417.46	311.452	802.867	385.407
14	1.21562	1016.73	-25.0362	Weathered Sandy Lean Clay	100	20	154.511	219.874	764.271	434.919	329.352	836.44	401.521
15	1.21562	1052.97	-23.8295	Weathered Sandy Lean Clay	100	20	158.702	225.838	796.158	450.422	345.736	866.252	415.83
16	1.16187	1036.22	-22.6601	Silty Sand	0	32	158.876	226.085	825.574	463.763	361.811	891.903	428.14
17	1.16187	1061.49	-21.5269	Silty Sand	0	32	164.153	233.594	848.899	475.071	373.828	913.649	438.578
18	1.16187	1083.07	-20.4024	Silty Sand	0	32	168.911	240.366	869.391	484.728	384.663	932.217	447.489
19	1.16187	1101.04	-19.2861	Silty Sand	0	32	173.152	246.401	887.094	492.771	394.323	947.684	454.913
20	1.16187	1115.47	-18.1773	Silty Sand	0	32	176.875	251.698	902.036	499.233	402.803	960.112	460.879
21	1.16187	1126.45	-17.0756	Silty Sand	0	32	180.077	256.255	914.237	504.146	410.091	969.551	465.405
22	1.16187	1134.03	-15.9803	Silty Sand	0	32	182.759	260.071	923.74	507.537	416.203	976.077	468.54
23	1.16187	1138.26	-14.891	Silty Sand	0	32	184.916	263.141	930.549	509.432	421.117	979.72	470.288
24	1.16187	1139.21	-13.8071	Silty Sand	0	32	186.547	265.462	934.687	509.855	424.832	980.531	470.676
25	1.16187	1136.91	-12.7283	Silty Sand	0	32	187.648	267.029	936.159	508.827	427.332	978.545	469.718
26	1.16187	1131.41	-11.6541	Silty Sand	0	32	188.215	267.836	934.994	506.366	428.628	973.814	467.448
27	1.16187	1122.76	-10.584	Silty Sand	0	32	188.244	267.877	931.182	502.492	428.69	966.357	463.865
28	1.16187	1110.97	-9.51759	Silty Sand	0	32	187.73	267.146	924.744	497.218	427.526	956.218	459
29	1.16187	1096.09	-8.45452	Silty Sand	0	32	186.666	265.632	915.662	490.558	425.104	943.408	452.85
30	1.16187	1078.14	-7.39439	Silty Sand	0	32	185.048	263.329	903.94	482.526	421.414	927.955	445.429
31	1.16187	1057.15	-6.33679	Silty Sand	0	32	182.867	260.225	889.578	473.131	416.447	909.886	436.755
32	1.16187	1033.14	-5.28136	Silty Sand	0	32	180.115	256.309	872.564	462.382	410.182	889.214	426.832
33	1.16187	1006.11	-4.22772	Silty Sand	0	32	176.784	251.569	852.882	450.288	402.594	865.951	415.663
34	1.16187	976.095	-3.17551	Silty Sand	0	32	172.865	245.992	830.523	436.853	393.67	840.113	403.26
35	1.16187	943.095	-2.12438	Silty Sand	0	32	168.346	239.562	805.463	422.084	383.379	811.708	389.624

36	1.16187	907.12	-1.07396	Silty Sand	0	32	163.217	232.263	777.682	405.983	371.699	780.742	374.759
37	1.16187	868.174	-0.0238971	Silty Sand	0	32	157.466	224.079	747.154	388.553	358.601	747.219	358.666
38	1.16187	826.258	1.02615	Silty Sand	0	32	151.078	214.989	713.848	369.793	344.055	711.142	341.349
39	1.16187	781.372	2.07655	Silty Sand	0	32	144.04	204.973	677.73	349.704	328.026	672.507	322.803
40	1.16187	733.511	3.12765	Silty Sand	0	32	136.334	194.008	638.762	328.284	310.478	631.312	303.028
41	1.16187	682.667	4.1798	Silty Sand	0	32	127.945	182.07	596.902	305.529	291.373	587.551	282.022
42	1.16187	628.831	5.23336	Silty Sand	0	32	118.853	169.131	552.1	281.434	270.666	541.214	259.78
43	1.16187	571.988	6.2887	Silty Sand	0	32	109.036	155.162	504.306	255.994	248.312	492.29	236.296
44	1.16187	512.121	7.34619	Silty Sand	0	32	98.4744	140.132	453.458	229.2	224.258	440.763	211.563
45	1.16187	449.211	8.40621	Silty Sand	0	32	87.1422	124.006	399.495	201.044	198.451	386.617	185.573
46	1.16187	383.233	9.46913	Silty Sand	0	32	75.0125	106.745	342.344	171.516	170.828	329.832	158.316
47	1.16187	314.162	10.5353	Silty Sand	0	32	62.0565	88.3082	281.925	140.603	141.322	270.384	129.781
48	1.38646	280.012	11.7091	Clay Liner	100	20	100.385	142.851	222.752	105.019	117.733	201.946	96.9272
49	1.38646	171.83	12.9918	Clay Liner	100	20	90.8453	129.276	144.878	64.4441	80.4341	123.919	59.4745
50	1.38646	58.1927	14.2812	Clay Liner	100	20	80.6744	114.802	62.4923	21.8239	40.6684	41.9568	20.1329

Global Minimum Query (janbu simplified) - Safety Factor: 1.349

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.16882	62.1455	-45.233	Weathered Sandy Lean Clay	100	20	63.696	85.9259	-11.0218	27.6466	-38.6684	53.1944	25.5478
2	1.16882	181.89	-43.6125	Weathered Sandy Lean Clay	100	20	75.0097	101.188	84.1849	80.9203	3.2646	155.647	74.7265
3	1.16882	292.891	-42.0345	Weathered Sandy Lean Clay	100	20	85.7367	115.659	173.326	130.304	43.0221	250.617	120.313
4	1.16882	395.795	-40.4948	Weathered Sandy Lean Clay	100	20	95.8984	129.367	256.771	176.085	80.6858	338.661	162.576
5	1.16882	491.158	-38.9898	Weathered Sandy Lean Clay	100	20	105.515	142.339	334.838	218.512	116.326	420.251	201.739
6	1.16882	579.459	-37.5161	Weathered Sandy Lean Clay	100	20	114.604	154.6	407.81	257.796	150.014	495.8	238.004
7	1.16882	661.116	-36.071	Weathered Sandy Lean Clay	100	20	123.182	166.173	475.933	294.125	181.808	565.663	271.538
8	1.16882	736.496	-34.652	Weathered Sandy Lean Clay	100	20	131.265	177.076	539.427	327.661	211.766	630.156	302.495
9	1.16882	805.923	-33.2569	Weathered Sandy Lean Clay	100	20	138.866	187.33	598.487	358.549	239.938	689.555	331.006
10	1.16882	869.681	-31.8837	Weathered Sandy Lean Clay	100	20	145.998	196.952	653.287	386.915	266.372	744.105	357.19
11	1.16882	928.028	-30.5307	Weathered Sandy Lean Clay	100	20	152.672	205.955	703.982	412.873	291.109	794.024	381.151
12	1.16882	981.189	-29.1964	Weathered Sandy Lean Clay	100	20	158.9	214.356	750.715	436.524	314.191	839.508	402.984
13	1.16882	1029.37	-27.8792	Weathered Sandy Lean Clay	100	20	164.689	222.166	793.61	457.96	335.65	880.732	422.772
14	1.16882	1072.76	-26.5778	Weathered Sandy Lean Clay	100	20	170.049	229.396	832.773	477.261	355.512	917.845	440.584
15	1.1958	1137.57	-25.2764	Silty Sand	0	32	173.566	234.141	869.382	494.678	374.704	951.339	456.661
16	1.1958	1173.34	-23.9741	Silty Sand	0	32	180.914	244.053	900.8	510.231	390.569	981.25	471.019
17	1.1958	1204.46	-22.6848	Silty Sand	0	32	187.635	253.119	928.835	523.763	405.072	1007.27	483.503
18	1.1958	1231.06	-21.4076	Silty Sand	0	32	193.729	261.341	953.562	535.33	418.232	1029.51	494.183
19	1.1958	1253.26	-20.1414	Silty Sand	0	32	199.197	268.717	975.023	544.986	430.037	1048.08	503.096
20	1.1958	1271.18	-18.8854	Silty Sand	0	32	204.038	275.247	993.27	552.779	440.491	1063.07	510.291
21	1.1958	1284.91	-17.6388	Silty Sand	0	32	208.251	280.93	1008.33	558.75	449.583	1074.55	515.799
22	1.1958	1294.55	-16.4007	Silty Sand	0	32	211.832	285.762	1020.26	562.94	457.315	1082.6	519.664
23	1.1958	1300.17	-15.1705	Silty Sand	0	32	214.781	289.74	1029.07	565.382	463.684	1087.3	521.92
24	1.1958	1301.84	-13.9474	Silty Sand	0	32	217.093	292.858	1034.78	566.11	468.67	1088.7	522.585

25	1.1958	1299.63	-12.7307	Silty Sand	0	32	218.762	295.11	1037.43	565.15	472.275	1086.85	521.699
26	1.1958	1293.6	-11.5199	Silty Sand	0	32	219.784	296.489	1037.01	562.529	474.48	1081.8	519.275
27	1.1958	1283.81	-10.3143	Silty Sand	0	32	220.153	296.986	1033.54	558.268	475.274	1073.61	515.339
28	1.1958	1270.28	-9.11322	Silty Sand	0	32	219.86	296.591	1027.04	552.388	474.647	1062.3	509.915
29	1.1958	1253.08	-7.9162	Silty Sand	0	32	218.898	295.293	1017.47	544.906	472.566	1047.91	503.004
30	1.1958	1232.22	-6.72266	Silty Sand	0	32	217.256	293.078	1004.86	535.837	469.022	1030.47	494.631
31	1.1958	1207.75	-5.53204	Silty Sand	0	32	214.924	289.933	989.182	525.194	463.988	1010	484.804
32	1.1958	1179.68	-4.34381	Silty Sand	0	32	211.891	285.841	970.427	512.987	457.44	986.522	473.535
33	1.1958	1148.03	-3.15745	Silty Sand	0	32	208.142	280.784	948.574	499.224	449.35	960.056	460.832
34	1.1958	1112.82	-1.97245	Silty Sand	0	32	203.664	274.743	923.595	483.913	439.682	930.609	446.696
35	1.1958	1074.06	-0.788288	Silty Sand	0	32	198.44	267.696	895.457	467.057	428.4	898.188	431.131
36	1.1958	1031.75	0.395535	Silty Sand	0	32	192.453	259.619	864.137	448.658	415.479	862.808	414.15
37	1.1958	985.889	1.57953	Silty Sand	0	32	185.682	250.485	829.577	428.717	400.86	824.457	395.74
38	1.1958	936.482	2.76419	Silty Sand	0	32	178.107	240.266	791.738	407.233	384.505	783.139	375.906
39	1.1958	883.518	3.95005	Silty Sand	0	32	169.703	228.929	750.564	384.2	366.364	738.846	354.646
40	1.1958	826.981	5.1376	Silty Sand	0	32	160.444	216.439	705.991	359.615	346.376	691.566	331.951
41	1.1958	766.856	6.32736	Silty Sand	0	32	150.302	202.758	657.95	333.469	324.481	641.284	307.815
42	1.1958	703.118	7.51988	Silty Sand	0	32	139.245	187.842	606.363	305.753	300.61	587.982	282.229
43	1.1958	635.742	8.71568	Silty Sand	0	32	127.239	171.645	551.143	276.454	274.689	531.637	255.183
44	1.1958	564.693	9.91532	Silty Sand	0	32	114.243	154.114	492.193	245.558	246.635	472.223	226.665
45	1.1958	489.935	11.1194	Silty Sand	0	32	100.216	135.192	429.402	213.049	216.353	409.705	196.656
46	1.1958	411.423	12.3284	Silty Sand	0	32	85.1112	114.815	362.65	178.908	183.742	344.049	165.141
47	1.1958	329.107	13.5431	Silty Sand	0	32	68.8749	92.9122	291.803	143.112	148.691	275.213	132.101
48	1.23913	250.043	14.7862	Clay Liner	100	20	107.947	145.621	230.27	104.928	125.342	201.777	96.8492
49	1.23913	153.143	16.0588	Clay Liner	100	20	97.7218	131.827	151.707	64.2645	87.443	123.578	59.3132
50	1.23913	51.7958	17.3395	Clay Liner	100	20	86.8568	117.17	68.9082	21.7345	47.1737	41.7896	20.0551

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.42303

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.4264	167.893	0	0	0
2	26.642	166.789	-84.021	0	0
3	27.8576	165.74	-88.3768	0	0
4	29.0733	164.743	-26.8751	0	0
5	30.2889	163.795	88.5083	0	0
6	31.5045	162.893	247.337	0	0
7	32.7201	162.036	440.477	0	0
8	33.9357	161.219	659.912	0	0
9	35.1514	160.443	898.585	0	0
10	36.367	159.705	1150.28	0	0
11	37.5826	159.003	1409.49	0	0
12	38.7982	158.337	1671.39	0	0
13	40.0138	157.704	1931.69	0	0
14	41.2295	157.105	2186.62	0	0
15	42.4451	156.537	2432.88	0	0
16	43.6607	156	2667.56	0	0
17	44.8226	155.515	2883.57	0	0
18	45.9844	155.057	3082.04	0	0
19	47.1463	154.624	3261.64	0	0
20	48.3082	154.218	3421.27	0	0
21	49.4701	153.836	3560.04	0	0
22	50.6319	153.48	3677.26	0	0
23	51.7938	153.147	3772.43	0	0
24	52.9557	152.838	3845.23	0	0
25	54.1176	152.552	3895.54	0	0
26	55.2794	152.29	3923.37	0	0
27	56.4413	152.05	3928.91	0	0
28	57.6032	151.833	3912.52	0	0
29	58.765	151.638	3874.7	0	0
30	59.9269	151.466	3816.11	0	0
31	61.0888	151.315	3737.57	0	0
32	62.2507	151.186	3640.04	0	0
33	63.4125	151.078	3524.64	0	0
34	64.5744	150.993	3392.65	0	0
35	65.7363	150.928	3245.49	0	0
36	66.8981	150.885	3084.75	0	0
37	68.06	150.863	2912.19	0	0
38	69.2219	150.863	2729.73	0	0
39	70.3838	150.884	2539.47	0	0
40	71.5456	150.926	2343.69	0	0
41	72.7075	150.989	2144.85	0	0
42	73.8694	151.074	1945.62	0	0
43	75.0313	151.18	1748.88	0	0
44	76.1931	151.308	1557.72	0	0
45	77.355	151.458	1375.46	0	0
46	78.5169	151.63	1205.7	0	0
47	79.6787	151.824	1052.27	0	0
48	80.8406	152.04	919.3	0	0
49	82.2271	152.327	716.214	0	0
50	83.6135	152.647	544.011	0	0
51	85	153	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.349

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.4577	167.886	0	0	0
2	26.6266	166.707	-87.4077	0	0
3	27.7954	165.594	-81.3039	0	0
4	28.9642	164.54	1.15527	0	0
5	30.133	163.542	145.389	0	0
6	31.3018	162.596	338.915	0	0
7	32.4706	161.698	570.979	0	0
8	33.6395	160.847	832.271	0	0
9	34.8083	160.039	1114.7	0	0
10	35.9771	159.273	1411.2	0	0
11	37.1459	158.546	1715.6	0	0
12	38.3147	157.856	2022.5	0	0
13	39.4835	157.203	2327.16	0	0
14	40.6524	156.585	2625.44	0	0
15	41.8212	156	2913.71	0	0
16	43.017	155.435	3197.14	0	0
17	44.2128	154.904	3459.89	0	0
18	45.4086	154.404	3699.88	0	0
19	46.6044	153.935	3915.35	0	0
20	47.8002	153.496	4104.87	0	0
21	48.996	153.087	4267.29	0	0
22	50.1918	152.707	4401.75	0	0
23	51.3876	152.355	4507.63	0	0
24	52.5834	152.031	4584.55	0	0
25	53.7792	151.734	4632.36	0	0
26	54.975	151.464	4651.13	0	0
27	56.1708	151.22	4641.16	0	0
28	57.3666	151.002	4602.92	0	0
29	58.5624	150.811	4537.12	0	0
30	59.7582	150.644	4444.64	0	0
31	60.954	150.503	4326.59	0	0
32	62.1498	150.388	4184.25	0	0
33	63.3456	150.297	4019.11	0	0
34	64.5414	150.231	3832.88	0	0
35	65.7372	150.19	3627.47	0	0
36	66.933	150.173	3405	0	0
37	68.1288	150.181	3167.82	0	0
38	69.3246	150.214	2918.52	0	0
39	70.5204	150.272	2659.91	0	0
40	71.7162	150.355	2395.08	0	0
41	72.912	150.462	2127.39	0	0
42	74.1078	150.595	1860.49	0	0
43	75.3036	150.753	1598.33	0	0
44	76.4994	150.936	1345.2	0	0
45	77.6952	151.145	1105.76	0	0
46	78.891	151.38	885.043	0	0
47	80.0868	151.641	688.528	0	0
48	81.2826	151.929	522.149	0	0
49	82.5217	152.256	313.124	0	0
50	83.7609	152.613	137.968	0	0
51	85	153	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	168
25	168
85	153
120	153

External Boundary

X	Y
0	168
0	166
0	160
0	156
0	138
120	138
120	145
120	151
120	153
95	153
85	153
73	156
25	168
15	168

Material Boundary

X	Y
0	156
41	156
65	156
73	156

Material Boundary

X	Y
0	160
15	160
25	160

Material Boundary

X	Y
25	160
41	156
85	145
120	145

Material Boundary

X		Y	
15		168	
15		166	
25		166	
65		156	
85		151	
95		151	
95		153	

Material Boundary

X		Y	
15		160	
15		166	



TISD HCFC Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 3, Short-Term Saturated Global Analysis
Terracon Consultants Inc.
Date Created: 9/13/2022, 9:47:40 AM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.465s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/13/2022, 9:47:40 AM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft ³]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:

Random Number Generation Method:

10116

Park and Miller v.3

Surface Options

Surface Type:

Search Method:

Radius Increment:

Composite Surfaces:

Reverse Curvature:

Minimum Elevation:

Minimum Depth [ft]:

Minimum Area:

Minimum Weight:

Circular

Grid Search

10

Disabled

Invalid Surfaces

Not Defined

1

Not Defined

Not Defined

Seismic Loading

Advanced seismic analysis:

Staged pseudostatic analysis:

No

No

Loading

1 Distributed Load present

Distributed Load 1

Distribution:

Magnitude [psf]:

Orientation:

Constant

250

Normal to boundary

Materials

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	1000
Friction Angle [deg]	0
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	1000
Friction Angle [deg]	0
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	3.147410
Center:	51.998, 192.141
Radius:	57.861
Left Slip Surface Endpoint:	1.442, 164.000
Right Slip Surface Endpoint:	90.557, 149.000
Resisting Moment:	5.67123e+06 lb-ft
Driving Moment:	1.80187e+06 lb-ft
Total Slice Area:	1501.34 ft2
Surface Horizontal Width:	89.1152 ft
Surface Average Height:	16.8472 ft

Method: janbu simplified

FS	2.773990
Center:	51.998, 187.016
Radius:	52.946
Left Slip Surface Endpoint:	4.316, 164.000
Right Slip Surface Endpoint:	88.851, 149.000
Resisting Horizontal Force:	81794.3 lb
Driving Horizontal Force:	29486.1 lb
Total Slice Area:	1445.54 ft ²
Surface Horizontal Width:	84.5342 ft
Surface Average Height:	17.1 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	8203
Number of Invalid Surfaces:	1058

Error Codes

Error Code -103 reported for 832 surfaces
Error Code -115 reported for 226 surfaces

Method: janbu simplified

Number of Valid Surfaces:	8177
Number of Invalid Surfaces:	1084

Error Codes

Error Code -103 reported for 832 surfaces
Error Code -108 reported for 26 surfaces
Error Code -115 reported for 226 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

- 103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
- 108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 115 = Surface too shallow, below the minimum depth.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 3.14741

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.92089	369.165	-59.0489	Silty Sand	0	32	51.0486	160.671	357.064	99.9347	257.129	442.187	342.253
2	1.92089	1060.68	-55.5192	Silty Sand	0	32	79.3246	249.667	686.684	287.135	399.549	802.186	515.051
3	1.77653	1524.97	-52.3974	Sandy Lean Clay	1000	0	317.722	1000	695.877	446.366	249.511	1108.41	662.042
4	1.77653	1993.33	-49.5985	Sandy Lean Clay	1000	0	317.722	1000	998.742	583.458	415.284	1372.04	788.586
5	1.77653	2418.55	-46.9526	Sandy Lean Clay	1000	0	317.722	1000	1271.25	707.922	563.324	1611.4	903.474
6	1.77653	2806.93	-44.4321	Sandy Lean Clay	1000	0	317.722	1000	1518.53	821.602	696.927	1830.01	1008.41
7	1.77653	3163.18	-42.0162	Sandy Lean Clay	1000	0	317.722	1000	1744.3	925.878	818.422	2030.54	1104.66
8	1.77653	3490.93	-39.6891	Sandy Lean Clay	1000	0	317.722	1000	1951.36	1021.81	929.548	2215.03	1193.22
9	1.77653	3793.06	-37.4382	Sandy Lean Clay	1000	0	317.722	1000	2141.85	1110.25	1031.6	2385.1	1274.85
10	1.77653	4071.88	-35.2532	Sandy Lean Clay	1000	0	317.722	1000	2317.48	1191.86	1125.62	2542.05	1350.19
11	1.77653	4329.29	-33.1256	Sandy Lean Clay	1000	0	317.722	1000	2479.62	1267.21	1212.41	2686.94	1419.73
12	1.77653	4566.86	-31.0486	Sandy Lean Clay	1000	0	317.722	1000	2629.39	1336.74	1292.65	2820.67	1483.93
13	1.77653	4785.89	-29.016	Sandy Lean Clay	1000	0	317.722	1000	2767.73	1400.86	1366.87	2943.96	1543.1
14	1.77653	4949.02	-27.0227	Sandy Lean Clay	1000	0	317.722	1000	2648.34	1448.74	1199.6	2810.38	1361.64
15	1.77653	5039.94	-25.0642	Sandy Lean Clay	1000	0	317.722	1000	2688.37	1475.22	1213.15	2836.96	1361.74
16	1.77653	5114.73	-23.1365	Sandy Lean Clay	1000	0	317.722	1000	2743.3	1497.11	1246.19	2879.06	1381.95
17	1.77653	5174.55	-21.2363	Sandy Lean Clay	1000	0	317.722	1000	2789.27	1514.62	1274.65	2912.73	1398.11
18	1.77653	5219.99	-19.3602	Sandy Lean Clay	1000	0	317.722	1000	2826.67	1527.92	1298.75	2938.31	1410.39
19	1.77653	5251.57	-17.5055	Sandy Lean Clay	1000	0	317.722	1000	2855.88	1537.16	1318.72	2956.09	1418.93
20	1.77653	5269.74	-15.6696	Sandy Lean Clay	1000	0	317.722	1000	2877.18	1542.48	1334.7	2966.31	1423.83
21	1.77653	5274.86	-13.8501	Sandy Lean Clay	1000	0	317.722	1000	2890.86	1543.98	1346.88	2969.2	1425.22
22	1.77653	5267.27	-12.0447	Sandy Lean Clay	1000	0	317.722	1000	2897.13	1541.76	1355.37	2964.93	1423.17
23	1.77653	5247.24	-10.2514	Sandy Lean Clay	1000	0	317.722	1000	2896.19	1535.9	1360.29	2953.65	1417.75
24	1.77653	5215	-8.46819	Sandy Lean Clay	1000	0	317.722	1000	2888.2	1526.46	1361.74	2935.5	1409.04
25	1.77653	5170.74	-6.69322	Sandy Lean Clay	1000	0	317.722	1000	2873.3	1513.5	1359.8	2910.59	1397.09
26	1.77653	5114.59	-4.92469	Sandy Lean Clay	1000	0	317.722	1000	2851.6	1497.07	1354.53	2878.98	1381.91
27	1.77653	5046.69	-3.16085	Sandy Lean Clay	1000	0	317.722	1000	2823.21	1477.19	1346.02	2840.76	1363.57
28	1.77653	4967.09	-1.40001	Sandy Lean Clay	1000	0	317.722	1000	2788.18	1453.89	1334.29	2795.95	1342.06
29	1.77653	4875.85	0.359504	Sandy Lean Clay	1000	0	317.722	1000	2746.59	1427.19	1319.4	2744.59	1317.4
30	1.77653	4772.97	2.11936	Sandy Lean Clay	1000	0	317.722	1000	2698.44	1397.07	1301.37	2686.68	1289.61
31	1.77653	4658.43	3.88122	Sandy Lean Clay	1000	0	317.722	1000	2643.76	1363.55	1280.21	2622.21	1258.66
32	1.77653	4532.18	5.64677	Sandy Lean Clay	1000	0	317.722	1000	2582.56	1326.59	1255.97	2551.14	1224.55
33	1.77653	4394.12	7.41772	Sandy Lean Clay	1000	0	317.722	1000	2514.79	1286.18	1228.61	2473.43	1187.25
34	1.77653	4244.13	9.19583	Sandy Lean Clay	1000	0	317.722	1000	2440.44	1242.28	1198.16	2389	1146.72
35	1.77653	4082.04	10.9829	Sandy Lean Clay	1000	0	317.722	1000	2359.42	1194.84	1164.58	2297.76	1102.92
36	1.77653	3907.66	12.7809	Sandy Lean Clay	1000	0	317.722	1000	2271.68	1143.79	1127.89	2199.6	1055.81

37	1.77653	3720.72	14.5918	Sandy Lean Clay	1000	0	317.722	1000	2177.09	1089.07	1088.02	2094.38	1005.31
38	1.77653	3520.95	16.4178	Sandy Lean Clay	1000	0	317.722	1000	2075.54	1030.6	1044.94	1981.92	951.321
39	1.77653	3307.99	18.2611	Sandy Lean Clay	1000	0	317.722	1000	1966.88	968.264	998.618	1862.05	893.781
40	1.77653	3081.43	20.1242	Sandy Lean Clay	1000	0	317.722	1000	1850.94	901.951	948.993	1734.52	832.572
41	1.77653	2840.82	22.0097	Sandy Lean Clay	1000	0	317.722	1000	1727.51	831.522	895.988	1599.08	767.557
42	1.77653	2585.59	23.9208	Sandy Lean Clay	1000	0	317.722	1000	1596.35	756.816	839.534	1455.42	698.601
43	1.77653	2315.13	25.8606	Sandy Lean Clay	1000	0	317.722	1000	1457.18	677.649	779.53	1303.17	625.522
44	1.77653	2028.68	27.8328	Sandy Lean Clay	1000	0	317.722	1000	1309.68	593.804	715.875	1141.93	548.127
45	1.77653	1725.39	29.8416	Sandy Lean Clay	1000	0	317.722	1000	1153.47	505.029	648.446	971.208	466.179
46	1.77653	1404.24	31.8917	Sandy Lean Clay	1000	0	317.722	1000	988.139	411.028	577.111	790.438	379.41
47	1.77653	1064.83	33.9886	Sandy Lean Clay	1000	0	317.722	1000	813.598	311.454	502.144	599.383	287.929
48	1.77653	762.871	36.1387	Sandy Lean Clay	1000	0	317.722	1000	661.428	223.295	438.133	429.412	206.117
49	1.77653	474.772	38.3496	Sandy Lean Clay	1000	0	317.722	1000	518.609	138.967	379.642	267.241	128.274
50	1.77653	162.478	40.6303	Sandy Lean Clay	1000	0	317.722	1000	364.065	47.5566	316.508	91.4531	43.8965

Global Minimum Query (janbu simplified) - Safety Factor: 2.77399

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.69725	328.656	-62.2603	Silty Sand	0	32	54.0871	150.037	340.8	100.692	240.108	443.648	342.956
2	1.69725	939.664	-58.5277	Silty Sand	0	32	84.9278	235.589	664.911	287.892	377.019	803.651	515.759
3	1.69041	1463.48	-55.1669	Sandy Lean Clay	1000	0	360.492	1000	597.753	450.189	147.564	1115.79	665.605
4	1.69041	1929.91	-52.077	Sandy Lean Clay	1000	0	360.492	1000	929.029	593.672	335.357	1391.72	798.046
5	1.69041	2348.51	-49.1891	Sandy Lean Clay	1000	0	360.492	1000	1221.88	722.442	499.434	1639.35	916.907
6	1.69041	2727.49	-46.4616	Sandy Lean Clay	1000	0	360.492	1000	1484.17	839.022	645.146	1863.54	1024.52
7	1.69041	3072.71	-43.8649	Sandy Lean Clay	1000	0	360.492	1000	1721.27	945.217	776.053	2067.75	1122.54
8	1.69041	3388.53	-41.3772	Sandy Lean Clay	1000	0	360.492	1000	1937.02	1042.37	894.651	2254.58	1212.21
9	1.69041	3678.3	-38.9815	Sandy Lean Clay	1000	0	360.492	1000	2134.28	1131.51	1002.77	2426.01	1294.5
10	1.69041	3944.68	-36.6645	Sandy Lean Clay	1000	0	360.492	1000	2315.23	1213.45	1101.78	2583.58	1370.13
11	1.69041	4189.77	-34.4154	Sandy Lean Clay	1000	0	360.492	1000	2481.59	1288.84	1192.75	2728.57	1439.73
12	1.69041	4415.3	-32.2254	Sandy Lean Clay	1000	0	360.492	1000	2634.75	1358.22	1276.53	2861.99	1503.77
13	1.69041	4597.15	-30.087	Sandy Lean Clay	1000	0	360.492	1000	2567.63	1414.84	1152.79	2776.49	1361.65
14	1.69041	4704.12	-27.994	Sandy Lean Clay	1000	0	360.492	1000	2591.21	1447.07	1144.14	2782.84	1335.77
15	1.69041	4792.93	-25.9409	Sandy Lean Clay	1000	0	360.492	1000	2660.01	1474.39	1185.62	2835.38	1360.99
16	1.69041	4866.67	-23.9231	Sandy Lean Clay	1000	0	360.492	1000	2719.08	1497.07	1222.01	2879	1381.93
17	1.69041	4926.05	-21.9363	Sandy Lean Clay	1000	0	360.492	1000	2768.94	1515.34	1253.6	2914.12	1398.78
18	1.69041	4971.7	-19.977	Sandy Lean Clay	1000	0	360.492	1000	2810.09	1529.38	1280.71	2941.13	1411.75
19	1.69041	5004.14	-18.0418	Sandy Lean Clay	1000	0	360.492	1000	2842.9	1539.36	1303.54	2960.32	1420.96
20	1.69041	5023.84	-16.1276	Sandy Lean Clay	1000	0	360.492	1000	2867.73	1545.42	1322.31	2971.97	1426.55

21	1.69041	5031.18	-14.2318	Sandy Lean Clay	1000	0	360.492	1000	2884.88	1547.68	1337.2	2976.31	1428.63
22	1.69041	5026.48	-12.3518	Sandy Lean Clay	1000	0	360.492	1000	2894.59	1546.23	1348.36	2973.53	1427.3
23	1.69041	5010.03	-10.4853	Sandy Lean Clay	1000	0	360.492	1000	2897.08	1541.17	1355.91	2963.8	1422.63
24	1.69041	4982.06	-8.62989	Sandy Lean Clay	1000	0	360.492	1000	2892.54	1532.57	1359.97	2947.25	1414.68
25	1.69041	4942.75	-6.7836	Sandy Lean Clay	1000	0	360.492	1000	2881.11	1520.47	1360.64	2923.99	1403.52
26	1.69041	4892.25	-4.94438	Sandy Lean Clay	1000	0	360.492	1000	2862.93	1504.94	1357.99	2894.12	1389.18
27	1.69041	4830.67	-3.11025	Sandy Lean Clay	1000	0	360.492	1000	2838.1	1486	1352.1	2857.69	1371.69
28	1.69041	4758.09	-1.27931	Sandy Lean Clay	1000	0	360.492	1000	2806.71	1463.67	1343.04	2814.76	1351.09
29	1.69041	4674.55	0.550319	Sandy Lean Clay	1000	0	360.492	1000	2768.8	1437.97	1330.83	2765.33	1327.36
30	1.69041	4580.05	2.38051	Sandy Lean Clay	1000	0	360.492	1000	2724.41	1408.9	1315.51	2709.43	1300.53
31	1.69041	4474.57	4.21314	Sandy Lean Clay	1000	0	360.492	1000	2673.58	1376.45	1297.13	2647.03	1270.58
32	1.69041	4358.04	6.0501	Sandy Lean Clay	1000	0	360.492	1000	2616.3	1340.61	1275.69	2578.09	1237.48
33	1.69041	4230.38	7.89334	Sandy Lean Clay	1000	0	360.492	1000	2552.55	1301.34	1251.21	2502.57	1201.23
34	1.69041	4091.44	9.74484	Sandy Lean Clay	1000	0	360.492	1000	2482.28	1258.6	1223.68	2420.37	1161.77
35	1.69041	3941.05	11.6067	Sandy Lean Clay	1000	0	360.492	1000	2405.45	1212.34	1193.11	2331.41	1119.07
36	1.69041	3779.01	13.4811	Sandy Lean Clay	1000	0	360.492	1000	2321.97	1162.49	1159.48	2235.55	1073.06
37	1.69041	3605.06	15.3703	Sandy Lean Clay	1000	0	360.492	1000	2231.74	1108.98	1122.76	2132.64	1023.66
38	1.69041	3418.88	17.2768	Sandy Lean Clay	1000	0	360.492	1000	2134.62	1051.71	1082.91	2022.5	970.792
39	1.69041	3220.11	19.2033	Sandy Lean Clay	1000	0	360.492	1000	2030.48	990.562	1039.92	1904.92	914.356
40	1.69041	3008.34	21.1526	Sandy Lean Clay	1000	0	360.492	1000	1919.12	925.415	993.703	1779.64	854.221
41	1.69041	2783.04	23.128	Sandy Lean Clay	1000	0	360.492	1000	1800.33	856.111	944.216	1646.36	790.245
42	1.69041	2543.66	25.133	Sandy Lean Clay	1000	0	360.492	1000	1673.86	782.472	891.392	1504.74	722.272
43	1.69041	2289.49	27.1715	Sandy Lean Clay	1000	0	360.492	1000	1539.42	704.287	835.138	1354.38	650.097
44	1.69041	2019.76	29.248	Sandy Lean Clay	1000	0	360.492	1000	1396.68	621.311	775.372	1194.81	573.503
45	1.69041	1733.5	31.3676	Sandy Lean Clay	1000	0	360.492	1000	1245.24	533.254	711.986	1025.47	492.221
46	1.69041	1429.62	33.5362	Sandy Lean Clay	1000	0	360.492	1000	1084.64	439.775	644.861	845.704	405.929
47	1.69041	1106.79	35.7608	Sandy Lean Clay	1000	0	360.492	1000	914.345	340.465	573.88	654.725	314.26
48	1.69041	766.709	38.0496	Sandy Lean Clay	1000	0	360.492	1000	735.688	234.833	500.855	453.539	218.706
49	1.69041	464.195	40.4125	Sandy Lean Clay	1000	0	360.492	1000	581.516	142.793	438.723	274.578	131.785
50	1.69041	159.108	42.8618	Sandy Lean Clay	1000	0	360.492	1000	428.638	48.9428	379.696	94.0968	45.154

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 3.14741

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	1.44163	164	0	0	0
2	3.36251	160.797	1045.64	0	0
3	5.2834	158	2813.88	0	0
4	7.05993	155.693	3854.59	0	0
5	8.83646	153.606	5374.83	0	0
6	10.613	151.704	7228.24	0	0
7	12.3895	149.962	9308.56	0	0
8	14.166	148.362	11535.9	0	0
9	15.9426	146.888	13848.4	0	0
10	17.7191	145.527	16197.2	0	0
11	19.4956	144.272	18542.7	0	0
12	21.2722	143.113	20852.8	0	0
13	23.0487	142.043	23100.5	0	0
14	24.8252	141.058	25263.4	0	0
15	26.6017	140.152	27098.5	0	0
16	28.3783	139.321	28767.7	0	0
17	30.1548	138.562	30285.6	0	0
18	31.9313	137.871	31646.8	0	0
19	33.7079	137.247	32846.9	0	0
20	35.4844	136.687	33882.7	0	0
21	37.2609	136.188	34752.1	0	0
22	39.0375	135.75	35453.8	0	0
23	40.814	135.371	35987.6	0	0
24	42.5905	135.05	36353.7	0	0
25	44.367	134.786	36553.2	0	0
26	46.1436	134.577	36587.8	0	0
27	47.9201	134.424	36459.9	0	0
28	49.6966	134.326	36172.4	0	0
29	51.4732	134.282	35729	0	0
30	53.2497	134.294	35134	0	0
31	55.0262	134.359	34392.1	0	0
32	56.8027	134.48	33509.1	0	0
33	58.5793	134.656	32491	0	0
34	60.3558	134.887	31344.9	0	0
35	62.1323	135.174	30078.6	0	0
36	63.9089	135.519	28700.7	0	0
37	65.6854	135.922	27220.8	0	0
38	67.4619	136.385	25649.5	0	0
39	69.2385	136.908	23998.6	0	0
40	71.015	137.494	22281.2	0	0
41	72.7915	138.145	20511.9	0	0
42	74.568	138.863	18706.9	0	0
43	76.3446	139.651	16884.5	0	0
44	78.1211	140.513	15065.3	0	0
45	79.8976	141.451	13272.4	0	0
46	81.6742	142.47	11532.4	0	0
47	83.4507	143.575	9875.66	0	0
48	85.2272	144.773	8336.72	0	0
49	87.0037	146.07	6914.21	0	0
50	88.7803	147.476	5620.86	0	0
51	90.5568	149	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 2.77399

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	4.31649	164	0	0	0
2	6.01373	160.773	1008.09	0	0
3	7.71098	158	2707.53	0	0
4	9.40139	155.571	3550.26	0	0
5	11.0918	153.401	4956.58	0	0
6	12.7822	151.444	6739.2	0	0
7	14.4726	149.665	8770.11	0	0
8	16.163	148.04	10957.4	0	0
9	17.8534	146.551	13232.5	0	0
10	19.5439	145.183	15542.8	0	0
11	21.2343	143.924	17846.8	0	0
12	22.9247	142.766	20111.5	0	0
13	24.6151	141.701	22309.6	0	0
14	26.3055	140.721	24215	0	0
15	27.9959	139.823	25934	0	0
16	29.6863	139.001	27512.1	0	0
17	31.3767	138.251	28941.8	0	0
18	33.0672	137.57	30217.5	0	0
19	34.7576	136.955	31335	0	0
20	36.448	136.405	32291	0	0
21	38.1384	135.916	33083.4	0	0
22	39.8288	135.487	33710.9	0	0
23	41.5192	135.117	34173.1	0	0
24	43.2096	134.804	34470.1	0	0
25	44.9	134.548	34602.8	0	0
26	46.5904	134.347	34572.8	0	0
27	48.2809	134.2	34382.2	0	0
28	49.9713	134.108	34033.5	0	0
29	51.6617	134.071	33530.2	0	0
30	53.3521	134.087	32875.9	0	0
31	55.0425	134.157	32075.1	0	0
32	56.7329	134.282	31132.8	0	0
33	58.4233	134.461	30054.8	0	0
34	60.1137	134.695	28847.2	0	0
35	61.8041	134.986	27517.2	0	0
36	63.4946	135.333	26072.7	0	0
37	65.185	135.738	24522.5	0	0
38	66.8754	136.203	22876.1	0	0
39	68.5658	136.728	21144.5	0	0
40	70.2562	137.317	19339.7	0	0
41	71.9466	137.971	17475.1	0	0
42	73.637	138.693	15565.9	0	0
43	75.3274	139.486	13629.2	0	0
44	77.0179	140.354	11684.1	0	0
45	78.7083	141.301	9752.68	0	0
46	80.3987	142.331	7860.11	0	0
47	82.0891	143.452	6035.56	0	0
48	83.7795	144.669	4313.1	0	0
49	85.4699	145.992	2730.41	0	0
50	87.1603	147.431	1284.11	0	0
51	88.8507	149	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	164
25	164
85	149
120	149

Distributed Load

X	Y
25	164
0	164

External Boundary

X	Y
0	164
0	158
0	134
120	134
120	149
85	149
49	158
25	164
15	164

Material Boundary

X	Y
0	158
40.4761	158
49	158

Material Boundary

X	Y
15	164
15	162
25	162
40.4761	158



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 3, Short-Term Saturated Local Analysis
Terracon Consultants Inc.
Date Created: 9/13/2022, 9:47:40 AM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.574s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/13/2022, 9:47:40 AM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes
Eliminate vertical segments in non-circular search	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft ³]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:10116

Random Number Generation Method:Park and Miller v.3

Surface Options

Surface Type:Circular

Search Method:Grid Search

Radius Increment:10

Composite Surfaces:Disabled

Reverse Curvature:Invalid Surfaces

Minimum Elevation:Not Defined

Minimum Depth:Not Defined

Minimum Area:Not Defined

Minimum Weight:Not Defined

Seismic Loading

Advanced seismic analysis:No

Staged pseudostatic analysis:No

Loading

1 Distributed Load present

Distributed Load 1	
Distribution:	Constant
Magnitude [psf]:	250
Orientation:	Normal to boundary

Materials

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	1000
Friction Angle [deg]	0
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	1000
Friction Angle [deg]	0
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	4.449740
Center:	59.218, 172.397
Radius:	34.815
Left Slip Surface Endpoint:	25.459, 163.885
Right Slip Surface Endpoint:	85.000, 149.000
Resisting Moment:	2.48971e+06 lb-ft
Driving Moment:	559518 lb-ft
Total Slice Area:	802.459 ft2
Surface Horizontal Width:	59.541 ft
Surface Average Height:	13.4774 ft

Method: janbu simplified

FS	3.971950
Center:	59.218, 172.397
Radius:	34.815
Left Slip Surface Endpoint:	25.459, 163.885
Right Slip Surface Endpoint:	85.000, 149.000
Resisting Horizontal Force:	58237.9 lb
Driving Horizontal Force:	14662.3 lb
Total Slice Area:	802.459 ft2
Surface Horizontal Width:	59.541 ft
Surface Average Height:	13.4774 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	6001
Number of Invalid Surfaces:	3260
Error Codes	
Error Code -101 reported for 160 surfaces	
Error Code -103 reported for 12 surfaces	
Error Code -106 reported for 20 surfaces	
Error Code -108 reported for 66 surfaces	
Error Code -112 reported for 376 surfaces	
Error Code -114 reported for 85 surfaces	
Error Code -1000 reported for 2541 surfaces	

Method: janbu simplified

Number of Valid Surfaces:	5951
Number of Invalid Surfaces:	3310
Error Codes	
Error Code -101 reported for 160 surfaces	
Error Code -103 reported for 12 surfaces	
Error Code -106 reported for 20 surfaces	
Error Code -108 reported for 108 surfaces	
Error Code -111 reported for 8 surfaces	
Error Code -112 reported for 376 surfaces	
Error Code -114 reported for 85 surfaces	
Error Code -1000 reported for 2541 surfaces	

Error Code Descriptions

The following errors were encountered during the computation:

- 101 = Only one (or zero) surface / slope intersections.
- 103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
- 106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
- 108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 111 = Safety factor equation did not converge
- 112 = The coefficient $M\text{-}\alpha = \cos(\alpha)(1 + \tan(\alpha)\tan(\phi)/F) < 0.2$ for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
- 114 = Surface with Reverse Curvature.
- 1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 4.44974

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	0.620769	74.8326	-73.9962	Clay Liner	1000	0	224.732	1000	-662.983	62.6836	-725.667	120.552	57.8688
2	1.43887	637.085	-68.8586	Silty Sand	0	32	21.8944	97.4244	386.151	230.238	155.913	442.77	212.532
3	1.19753	921.861	-63.3748	Sandy Lean Clay	1000	0	224.732	1000	321.519	400.296	-78.7771	769.806	369.51
4	1.19753	1195.09	-59.248	Sandy Lean Clay	1000	0	224.732	1000	620.26	518.941	101.319	997.971	479.03
5	1.19753	1422.24	-55.5771	Sandy Lean Clay	1000	0	224.732	1000	859.722	617.577	242.145	1187.65	570.077
6	1.19753	1615.81	-52.2249	Sandy Lean Clay	1000	0	224.732	1000	1059.3	701.627	357.678	1349.29	647.66
7	1.19753	1783.18	-49.1105	Sandy Lean Clay	1000	0	224.732	1000	1229.52	774.305	455.214	1489.05	714.748
8	1.19753	1929.2	-46.1817	Sandy Lean Clay	1000	0	224.732	1000	1376.78	837.709	539.074	1610.98	773.273
9	1.19753	2057.22	-43.402	Sandy Lean Clay	1000	0	224.732	1000	1505.35	893.3	612.054	1717.89	824.588
10	1.19753	2169.7	-40.7449	Sandy Lean Clay	1000	0	224.732	1000	1618.21	942.141	676.067	1811.81	869.674
11	1.19753	2268.49	-38.1903	Sandy Lean Clay	1000	0	224.732	1000	1717.52	985.039	732.485	1894.31	909.271
12	1.19753	2355.03	-35.7226	Sandy Lean Clay	1000	0	224.732	1000	1804.96	1022.62	782.337	1966.58	943.958
13	1.19753	2430.47	-33.3293	Sandy Lean Clay	1000	0	224.732	1000	1881.79	1055.38	826.411	2029.58	974.198
14	1.19753	2495.74	-31.0002	Sandy Lean Clay	1000	0	224.732	1000	1949.04	1083.72	865.325	2084.08	1000.36
15	1.19753	2551.58	-28.7268	Sandy Lean Clay	1000	0	224.732	1000	2007.53	1107.96	899.569	2130.7	1022.74
16	1.19753	2598.62	-26.5019	Sandy Lean Clay	1000	0	224.732	1000	2057.93	1128.39	929.541	2169.99	1041.6
17	1.19753	2637.39	-24.3193	Sandy Lean Clay	1000	0	224.732	1000	2100.8	1145.22	955.578	2202.36	1057.14
18	1.19753	2668.32	-22.1738	Sandy Lean Clay	1000	0	224.732	1000	2136.59	1158.66	977.933	2228.19	1069.53
19	1.19753	2691.78	-20.0606	Sandy Lean Clay	1000	0	224.732	1000	2165.72	1168.85	996.871	2247.79	1078.94

20	1.19753	2708.1	-17.9755	Sandy Lean Clay	1000	0	224.732	1000	2188.49	1175.93	1012.56	2261.41	1085.48
21	1.19753	2717.53	-15.9148	Sandy Lean Clay	1000	0	224.732	1000	2205.21	1180.02	1025.19	2269.29	1089.27
22	1.19753	2720.29	-13.875	Sandy Lean Clay	1000	0	224.732	1000	2216.08	1181.23	1034.85	2271.59	1090.36
23	1.19753	2716.58	-11.853	Sandy Lean Clay	1000	0	224.732	1000	2221.33	1179.62	1041.71	2268.5	1088.88
24	1.19753	2706.55	-9.84596	Sandy Lean Clay	1000	0	224.732	1000	2221.12	1175.26	1045.86	2260.12	1084.86
25	1.19753	2690.33	-7.85103	Sandy Lean Clay	1000	0	224.732	1000	2215.59	1168.22	1047.37	2246.57	1078.35
26	1.19753	2668.01	-5.86565	Sandy Lean Clay	1000	0	224.732	1000	2204.85	1158.52	1046.33	2227.93	1069.41
27	1.19753	2639.68	-3.88732	Sandy Lean Clay	1000	0	224.732	1000	2189	1146.22	1042.78	2204.27	1058.05
28	1.19753	2605.38	-1.91363	Sandy Lean Clay	1000	0	224.732	1000	2168.12	1131.33	1036.79	2175.63	1044.3
29	1.19753	2565.14	0.0577832	Sandy Lean Clay	1000	0	224.732	1000	2142.25	1113.85	1028.4	2142.03	1028.18
30	1.19753	2518.98	2.02927	Sandy Lean Clay	1000	0	224.732	1000	2111.45	1093.81	1017.64	2103.49	1009.68
31	1.19753	2466.89	4.00317	Sandy Lean Clay	1000	0	224.732	1000	2075.72	1071.19	1004.53	2059.99	988.801
32	1.19753	2408.83	5.98184	Sandy Lean Clay	1000	0	224.732	1000	2035.05	1045.98	989.069	2011.5	965.521
33	1.19753	2344.75	7.96771	Sandy Lean Clay	1000	0	224.732	1000	1989.45	1018.15	971.296	1957.99	939.841
34	1.19753	2274.57	9.96327	Sandy Lean Clay	1000	0	224.732	1000	1938.87	987.68	951.188	1899.39	911.71
35	1.19753	2198.19	11.9711	Sandy Lean Clay	1000	0	224.732	1000	1883.26	954.514	928.743	1835.61	881.093
36	1.19753	2115.48	13.9941	Sandy Lean Clay	1000	0	224.732	1000	1822.55	918.599	903.95	1766.54	847.942
37	1.19753	2026.28	16.035	Sandy Lean Clay	1000	0	224.732	1000	1756.65	879.867	876.778	1692.06	812.189
38	1.19753	1930.41	18.097	Sandy Lean Clay	1000	0	224.732	1000	1685.44	838.238	847.201	1612	773.76
39	1.19753	1827.64	20.1837	Sandy Lean Clay	1000	0	224.732	1000	1608.79	793.612	815.179	1526.18	732.566
40	1.19753	1717.7	22.2987	Sandy Lean Clay	1000	0	224.732	1000	1526.53	745.873	780.66	1434.37	688.497
41	1.19753	1600.28	24.4462	Sandy Lean Clay	1000	0	224.732	1000	1438.48	694.884	743.595	1336.32	641.434
42	1.19753	1474.99	26.6311	Sandy Lean Clay	1000	0	224.732	1000	1344.39	640.482	703.906	1231.7	591.216
43	1.19753	1341.41	28.8587	Sandy Lean Clay	1000	0	224.732	1000	1243.99	582.475	661.516	1120.14	537.668
44	1.19753	1198.99	31.1352	Sandy Lean Clay	1000	0	224.732	1000	1136.98	520.633	616.342	1001.22	480.587
45	1.19753	1047.11	33.4678	Sandy Lean Clay	1000	0	224.732	1000	1022.95	454.682	568.273	874.389	419.707
46	1.19753	884.998	35.8651	Sandy Lean Clay	1000	0	224.732	1000	901.494	384.289	517.205	739.023	354.734
47	1.19753	711.724	38.3375	Sandy Lean Clay	1000	0	224.732	1000	772.051	309.049	463.002	594.329	285.28
48	1.19753	526.129	40.8977	Sandy Lean Clay	1000	0	224.732	1000	633.997	228.458	405.539	439.344	210.886
49	1.19753	326.751	43.5614	Sandy Lean Clay	1000	0	224.732	1000	486.574	141.883	344.691	272.854	130.971
50	1.19753	111.706	46.349	Sandy Lean Clay	1000	0	224.732	1000	328.851	48.5042	280.347	93.2793	44.7751

Global Minimum Query (janbu simplified) - Safety Factor: 3.97195

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	0.620769	74.8326	-73.9962	Clay Liner	1000	0	251.766	1000	-758.085	62.6836	-820.768	119.703	57.0197
2	1.43887	637.085	-68.8586	Silty Sand	0	32	23.7599	94.373	381.265	230.238	151.027	442.708	212.47
3	1.19753	921.861	-63.3748	Sandy Lean Clay	1000	0	251.766	1000	267.109	400.296	-133.187	769.321	369.025

Tomball ISD HCFC Drains

Monday, January 15, 2024

4	1.19753	1195.09	-59.248	Sandy Lean Clay	1000	0	251.766	1000	574.415	518.941	55.4741	997.561	478.62
5	1.19753	1422.24	-55.5771	Sandy Lean Clay	1000	0	251.766	1000	819.918	617.577	202.341	1187.3	569.721
6	1.19753	1615.81	-52.2249	Sandy Lean Clay	1000	0	251.766	1000	1024.11	701.627	322.48	1348.97	647.345
7	1.19753	1783.18	-49.1105	Sandy Lean Clay	1000	0	251.766	1000	1198.02	774.305	423.711	1488.77	714.466
8	1.19753	1929.2	-46.1817	Sandy Lean Clay	1000	0	251.766	1000	1348.36	837.709	510.651	1610.73	773.022
9	1.19753	2057.22	-43.402	Sandy Lean Clay	1000	0	251.766	1000	1479.56	893.3	586.257	1717.66	824.356
10	1.19753	2169.7	-40.7449	Sandy Lean Clay	1000	0	251.766	1000	1594.71	942.141	652.564	1811.6	869.46
11	1.19753	2268.49	-38.1903	Sandy Lean Clay	1000	0	251.766	1000	1696.07	985.039	711.03	1894.12	909.081
12	1.19753	2355.03	-35.7226	Sandy Lean Clay	1000	0	251.766	1000	1785.34	1022.62	762.724	1966.41	943.787
13	1.19753	2430.47	-33.3293	Sandy Lean Clay	1000	0	251.766	1000	1863.85	1055.38	808.473	2029.42	974.037
14	1.19753	2495.74	-31.0002	Sandy Lean Clay	1000	0	251.766	1000	1932.65	1083.72	848.933	2083.93	1000.21
15	1.19753	2551.58	-28.7268	Sandy Lean Clay	1000	0	251.766	1000	1992.58	1107.96	884.623	2130.57	1022.61
16	1.19753	2598.62	-26.5019	Sandy Lean Clay	1000	0	251.766	1000	2044.33	1128.39	915.94	2169.87	1041.48
17	1.19753	2637.39	-24.3193	Sandy Lean Clay	1000	0	251.766	1000	2088.47	1145.22	943.251	2202.25	1057.03
18	1.19753	2668.32	-22.1738	Sandy Lean Clay	1000	0	251.766	1000	2125.48	1158.66	966.821	2228.09	1069.43
19	1.19753	2691.78	-20.0606	Sandy Lean Clay	1000	0	251.766	1000	2155.76	1168.85	986.909	2247.7	1078.85
20	1.19753	2708.1	-17.9755	Sandy Lean Clay	1000	0	251.766	1000	2179.65	1175.93	1003.72	2261.33	1085.4
21	1.19753	2717.53	-15.9148	Sandy Lean Clay	1000	0	251.766	1000	2197.43	1180.02	1017.41	2269.21	1089.19
22	1.19753	2720.29	-13.875	Sandy Lean Clay	1000	0	251.766	1000	2209.34	1181.23	1028.11	2271.53	1090.3
23	1.19753	2716.58	-11.853	Sandy Lean Clay	1000	0	251.766	1000	2215.6	1179.62	1035.98	2268.44	1088.82
24	1.19753	2706.55	-9.84596	Sandy Lean Clay	1000	0	251.766	1000	2216.38	1175.26	1041.12	2260.07	1084.81
25	1.19753	2690.33	-7.85103	Sandy Lean Clay	1000	0	251.766	1000	2211.82	1168.22	1043.6	2246.54	1078.32
26	1.19753	2668.01	-5.86565	Sandy Lean Clay	1000	0	251.766	1000	2202.05	1158.52	1043.53	2227.91	1069.39
27	1.19753	2639.68	-3.88732	Sandy Lean Clay	1000	0	251.766	1000	2187.15	1146.22	1040.93	2204.26	1058.04
28	1.19753	2605.38	-1.91363	Sandy Lean Clay	1000	0	251.766	1000	2167.21	1131.33	1035.88	2175.62	1044.29
29	1.19753	2565.14	0.0577832	Sandy Lean Clay	1000	0	251.766	1000	2142.29	1113.85	1028.44	2142.03	1028.18
30	1.19753	2518.98	2.02927	Sandy Lean Clay	1000	0	251.766	1000	2112.41	1093.81	1018.6	2103.49	1009.68
31	1.19753	2466.89	4.00317	Sandy Lean Clay	1000	0	251.766	1000	2077.63	1071.19	1006.44	2060.01	988.817
32	1.19753	2408.83	5.98184	Sandy Lean Clay	1000	0	251.766	1000	2037.91	1045.98	991.934	2011.53	965.554
33	1.19753	2344.75	7.96771	Sandy Lean Clay	1000	0	251.766	1000	1993.27	1018.15	975.117	1958.03	939.878
34	1.19753	2274.57	9.96327	Sandy Lean Clay	1000	0	251.766	1000	1943.65	987.68	955.975	1899.43	911.748
35	1.19753	2198.19	11.9711	Sandy Lean Clay	1000	0	251.766	1000	1889.04	954.514	934.527	1835.66	881.145
36	1.19753	2115.48	13.9941	Sandy Lean Clay	1000	0	251.766	1000	1829.35	918.599	910.748	1766.6	848.003
37	1.19753	2026.28	16.035	Sandy Lean Clay	1000	0	251.766	1000	1764.49	879.867	884.619	1692.13	812.261
38	1.19753	1930.41	18.097	Sandy Lean Clay	1000	0	251.766	1000	1694.35	838.238	856.114	1612.08	773.839
39	1.19753	1827.64	20.1837	Sandy Lean Clay	1000	0	251.766	1000	1618.82	793.612	825.203	1526.27	732.653
40	1.19753	1717.7	22.2987	Sandy Lean Clay	1000	0	251.766	1000	1537.72	745.873	791.847	1434.47	688.598

41	1.19753	1600.28	24.4462	Sandy Lean Clay	1000	0	251.766	1000	1450.88	694.884	755.994	1336.43	641.543
42	1.19753	1474.99	26.6311	Sandy Lean Clay	1000	0	251.766	1000	1358.06	640.482	717.582	1231.82	591.336
43	1.19753	1341.41	28.8587	Sandy Lean Clay	1000	0	251.766	1000	1259.03	582.475	676.552	1120.28	537.807
44	1.19753	1198.99	31.1352	Sandy Lean Clay	1000	0	251.766	1000	1153.45	520.633	632.817	1001.36	480.732
45	1.19753	1047.11	33.4678	Sandy Lean Clay	1000	0	251.766	1000	1040.99	454.682	586.308	874.553	419.871
46	1.19753	884.998	35.8651	Sandy Lean Clay	1000	0	251.766	1000	921.207	384.289	536.918	739.192	354.903
47	1.19753	711.724	38.3375	Sandy Lean Clay	1000	0	251.766	1000	793.62	309.049	484.571	594.52	285.471
48	1.19753	526.129	40.8977	Sandy Lean Clay	1000	0	251.766	1000	657.623	228.458	429.165	439.555	211.097
49	1.19753	326.751	43.5614	Sandy Lean Clay	1000	0	251.766	1000	512.514	141.883	370.631	273.085	131.202
50	1.19753	111.706	46.349	Sandy Lean Clay	1000	0	251.766	1000	357.443	48.5042	308.939	93.5337	45.0295

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 4.44974

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.459	163.885	0	0	0
2	26.0798	161.721	-1574.42	0	0
3	27.5187	158	-169.096	0	0
4	28.7162	155.611	329.821	0	0
5	29.9137	153.599	1309.09	0	0
6	31.1113	151.851	2542.29	0	0
7	32.3088	150.306	3910.03	0	0
8	33.5063	148.923	5341.31	0	0
9	34.7038	147.675	6790.37	0	0
10	35.9014	146.542	8226.1	0	0
11	37.0989	145.511	9626.44	0	0
12	38.2964	144.569	10975.3	0	0
13	39.494	143.707	12260.6	0	0
14	40.6915	142.92	13473.4	0	0
15	41.889	142.2	14606.8	0	0
16	43.0865	141.544	15655.3	0	0
17	44.2841	140.947	16615	0	0
18	45.4816	140.406	17482.8	0	0
19	46.6791	139.918	18256.5	0	0
20	47.8766	139.48	18934.4	0	0
21	49.0742	139.092	19515.6	0	0
22	50.2717	138.75	19999.5	0	0
23	51.4692	138.455	20385.9	0	0
24	52.6668	138.203	20675	0	0
25	53.8643	137.995	20867.6	0	0
26	55.0618	137.83	20964.3	0	0
27	56.2593	137.707	20966.4	0	0
28	57.4569	137.626	20875.4	0	0
29	58.6544	137.586	20693	0	0
30	59.8519	137.587	20421.3	0	0
31	61.0494	137.629	20062.6	0	0
32	62.247	137.713	19619.5	0	0
33	63.4445	137.839	19095.1	0	0
34	64.642	138.006	18492.5	0	0
35	65.8396	138.217	17815.5	0	0
36	67.0371	138.471	17068.2	0	0
37	68.2346	138.769	16255.1	0	0
38	69.4321	139.113	15381.4	0	0
39	70.6297	139.505	14452.7	0	0
40	71.8272	139.945	13475.4	0	0
41	73.0247	140.436	12456.6	0	0
42	74.2223	140.98	11404.3	0	0
43	75.4198	141.581	10327.9	0	0
44	76.6173	142.241	9237.84	0	0
45	77.8148	142.964	8146.23	0	0
46	79.0124	143.756	7067.28	0	0
47	80.2099	144.622	6017.68	0	0
48	81.4074	145.569	5017.41	0	0
49	82.6049	146.606	4090.68	0	0
50	83.8025	147.745	3267.42	0	0
51	85	149	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 3.97195

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.459	163.885	0	0	0
2	26.0798	161.721	-1797.18	0	0
3	27.5187	158	-412.743	0	0
4	28.7162	155.611	-76.4625	0	0
5	29.9137	153.599	777.878	0	0
6	31.1113	151.851	1908.86	0	0
7	32.3088	150.306	3189.55	0	0
8	33.5063	148.923	4544.6	0	0
9	34.7038	147.675	5925.53	0	0
10	35.9014	146.542	7299.38	0	0
11	37.0989	145.511	8642.8	0	0
12	38.2964	144.569	9938.77	0	0
13	39.494	143.707	11174.6	0	0
14	40.6915	142.92	12340.6	0	0
15	41.889	142.2	13429.4	0	0
16	43.0865	141.544	14435.5	0	0
17	44.2841	140.947	15354.4	0	0
18	45.4816	140.406	16182.9	0	0
19	46.6791	139.918	16918.5	0	0
20	47.8766	139.48	17559.4	0	0
21	49.0742	139.092	18104.5	0	0
22	50.2717	138.75	18553	0	0
23	51.4692	138.455	18904.8	0	0
24	52.6668	138.203	19159.8	0	0
25	53.8643	137.995	19318.7	0	0
26	55.0618	137.83	19382.1	0	0
27	56.2593	137.707	19351.3	0	0
28	57.4569	137.626	19227.5	0	0
29	58.6544	137.586	19012.4	0	0
30	59.8519	137.587	18708	0	0
31	61.0494	137.629	18316.6	0	0
32	62.247	137.713	17840.7	0	0
33	63.4445	137.839	17283.2	0	0
34	64.642	138.006	16647.3	0	0
35	65.8396	138.217	15936.6	0	0
36	67.0371	138.471	15155.2	0	0
37	68.2346	138.769	14307.5	0	0
38	69.4321	139.113	13398.4	0	0
39	70.6297	139.505	12433.5	0	0
40	71.8272	139.945	11419.1	0	0
41	73.0247	140.436	10362.1	0	0
42	74.2223	140.98	9270.5	0	0
43	75.4198	141.581	8153.21	0	0
44	76.6173	142.241	7020.54	0	0
45	77.8148	142.964	5884.34	0	0
46	79.0124	143.756	4758.45	0	0
47	80.2099	144.622	3659.12	0	0
48	81.4074	145.569	2605.76	0	0
49	82.6049	146.606	1621.86	0	0
50	83.8025	147.745	736.394	0	0
51	85	149	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	164
25	164
85	149
120	149

Distributed Load

X	Y
25	164
0	164

External Boundary

X	Y
0	164
0	158
0	134
120	134
120	149
85	149
49	158
25	164
15	164

Material Boundary

X	Y
0	158
40.4761	158
49	158

Material Boundary

X	Y
15	164
15	162
25	162
40.4761	158



TISD HCFC Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 3, Long-Term Global Analysis
Terracon Consultants Inc.
Date Created: 9/13/2022, 9:47:40 AM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.551s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/13/2022, 9:47:40 AM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:10116

Random Number Generation Method:Park and Miller v.3

Surface Options

Surface Type:Circular

Search Method:Grid Search

Radius Increment:10

Composite Surfaces:Disabled

Reverse Curvature:Invalid Surfaces

Minimum Elevation:Not Defined

Minimum Depth:Not Defined

Minimum Area:Not Defined

Minimum Weight:Not Defined

Seismic Loading

Advanced seismic analysis:No

Staged pseudostatic analysis:No

Loading

1 Distributed Load present

Distributed Load 1

Distribution:Constant

Magnitude [psf]:250

Orientation:Normal to boundary

Materials

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	125
Friction Angle [deg]	21
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	2.036870
Center:	62.947, 199.203
Radius:	60.328
Left Slip Surface Endpoint:	13.955, 164.000
Right Slip Surface Endpoint:	96.399, 149.000
Resisting Moment:	2.87148e+06 lb-ft
Driving Moment:	1.40976e+06 lb-ft
Total Slice Area:	972.446 ft2
Surface Horizontal Width:	82.4435 ft
Surface Average Height:	11.7953 ft

Method: janbu simplified

FS	1.801050
Center:	61.288, 186.929
Radius:	51.336
Left Slip Surface Endpoint:	15.357, 164.000
Right Slip Surface Endpoint:	95.883, 149.000
Resisting Horizontal Force:	46481.9 lb
Driving Horizontal Force:	25808.3 lb
Total Slice Area:	1156.58 ft2
Surface Horizontal Width:	80.5262 ft
Surface Average Height:	14.3627 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	7449
Number of Invalid Surfaces:	1812

Error Codes

Error Code -103 reported for 1812 surfaces

Method: janbu simplified

Number of Valid Surfaces:	7449
Number of Invalid Surfaces:	1812

Error Codes

Error Code -103 reported for 1812 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.03687

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.04476	88.3999	-53.4669	Silty Sand	0	32	72.6256	147.929	236.736	0	236.736	334.766	334.766
2	0.456183	93.3407	-52.2793	Clay Liner	100	20	105.902	215.709	317.908	0	317.908	454.827	454.827
3	1.71278	625.677	-50.6426	Silty Sand	0	32	137.435	279.937	447.992	0	447.992	615.561	615.561
4	1.71278	1036.74	-48.141	Silty Sand	0	32	195.54	398.289	637.396	0	637.396	855.642	855.642

5	1.76878	1466	-45.7189	Sandy Lean Clay	125	21	221.872	451.925	851.67	0	851.67	1079.18	1079.18
6	1.76878	1835.76	-43.3604	Sandy Lean Clay	125	21	258.198	525.916	1044.42	0	1044.42	1288.25	1288.25
7	1.76878	2176.72	-41.0905	Sandy Lean Clay	125	21	292.423	595.627	1226.03	0	1226.03	1481.04	1481.04
8	1.76878	2478.13	-38.8967	Sandy Lean Clay	125	21	301.294	613.697	1273.1	0	1273.1	1516.18	1516.18
9	1.76878	2685.88	-36.7688	Sandy Lean Clay	125	21	304.699	620.633	1291.17	0	1291.17	1518.86	1518.86
10	1.76878	2862.27	-34.6985	Sandy Lean Clay	125	21	324.109	660.167	1394.16	0	1394.16	1618.57	1618.57
11	1.67261	2851.11	-32.7326	Sandy Lean Clay	125	21	335.689	683.754	1489.15	33.5428	1455.6	1704.93	1671.38
12	1.67261	2975.39	-30.863	Sandy Lean Clay	125	21	339.876	692.283	1576.1	98.2736	1477.82	1779.21	1680.94
13	1.67261	3084.93	-29.0292	Sandy Lean Clay	125	21	343.257	699.169	1654.18	158.422	1495.76	1844.68	1686.26
14	1.67261	3180.53	-27.2275	Sandy Lean Clay	125	21	345.868	704.489	1723.86	214.235	1509.62	1901.82	1687.58
15	1.67261	3262.87	-25.4545	Sandy Lean Clay	125	21	347.744	708.309	1785.5	265.926	1519.57	1951.02	1685.1
16	1.67261	3332.55	-23.7073	Sandy Lean Clay	125	21	348.912	710.688	1839.45	313.682	1525.77	1992.67	1678.98
17	1.67261	3390.09	-21.9832	Sandy Lean Clay	125	21	349.396	711.674	1886.01	357.664	1528.34	2027.05	1669.39
18	1.67261	3435.95	-20.2798	Sandy Lean Clay	125	21	349.218	711.312	1925.41	398.014	1527.39	2054.45	1656.43
19	1.67261	3470.52	-18.595	Sandy Lean Clay	125	21	348.395	709.636	1957.88	434.854	1523.03	2075.09	1640.24
20	1.67261	3494.15	-16.9266	Sandy Lean Clay	125	21	346.944	706.68	1983.62	468.293	1515.33	2089.2	1620.91
21	1.67261	3507.14	-15.273	Sandy Lean Clay	125	21	344.877	702.469	2002.79	498.425	1504.36	2096.96	1598.53
22	1.67261	3509.76	-13.6323	Sandy Lean Clay	125	21	342.204	697.026	2015.51	525.331	1490.18	2098.5	1573.17
23	1.67261	3502.22	-12.0029	Sandy Lean Clay	125	21	338.937	690.37	2021.92	549.082	1472.84	2093.98	1544.9
24	1.67261	3484.74	-10.3833	Sandy Lean Clay	125	21	335.08	682.515	2022.12	569.739	1452.38	2083.51	1513.78
25	1.67261	3457.47	-8.7721	Sandy Lean Clay	125	21	330.641	673.472	2016.17	587.354	1428.82	2067.19	1479.84
26	1.67261	3420.55	-7.16784	Sandy Lean Clay	125	21	325.622	663.249	2004.15	601.969	1402.19	2045.1	1443.13
27	1.67261	3374.1	-5.56922	Sandy Lean Clay	125	21	320.026	651.851	1986.12	613.621	1372.49	2017.32	1403.7
28	1.67261	3318.21	-3.97494	Sandy Lean Clay	125	21	313.853	639.278	1962.08	622.336	1339.74	1983.89	1361.55
29	1.67261	3252.93	-2.38374	Sandy Lean Clay	125	21	307.104	625.53	1932.06	628.134	1303.93	1944.84	1316.71
30	1.67261	3178.32	-0.794376	Sandy Lean Clay	125	21	299.774	610.601	1896.06	631.03	1265.03	1900.22	1269.19
31	1.67261	3094.39	0.794376	Sandy Lean Clay	125	21	291.861	594.483	1854.07	631.03	1223.04	1850.03	1219
32	1.67261	3001.14	2.38374	Sandy Lean Clay	125	21	283.359	577.166	1806.07	628.134	1177.93	1794.27	1166.14
33	1.67261	2898.56	3.97494	Sandy Lean Clay	125	21	274.261	558.633	1751.99	622.336	1129.65	1732.93	1110.6
34	1.67261	2786.6	5.56922	Sandy Lean Clay	125	21	264.556	538.866	1691.78	613.621	1078.15	1665.98	1052.36
35	1.67261	2665.2	7.16784	Sandy Lean Clay	125	21	254.235	517.843	1625.36	601.969	1023.39	1593.38	991.416
36	1.67261	2534.26	8.7721	Sandy Lean Clay	125	21	243.283	495.536	1552.64	587.354	965.282	1515.1	927.741
37	1.67261	2393.67	10.3833	Sandy Lean Clay	125	21	231.687	471.916	1473.49	569.739	903.748	1431.03	861.296
38	1.67261	2243.3	12.0029	Sandy Lean Clay	125	21	219.427	446.944	1387.78	549.082	838.694	1341.12	792.042
39	1.67261	2082.97	13.6323	Sandy Lean Clay	125	21	206.483	420.579	1295.34	525.331	770.007	1245.26	719.93
40	1.67261	1912.5	15.273	Sandy Lean Clay	125	21	192.831	392.772	1195.99	498.425	697.57	1143.34	644.915
41	1.67261	1731.65	16.9266	Sandy Lean Clay	125	21	178.443	363.466	1089.52	468.293	621.225	1035.21	566.919

42	1.67261	1540.16	18.595	Sandy Lean Clay	125	21	163.289	332.598	975.665	434.854	540.811	920.728	485.874
43	1.67261	1337.73	20.2798	Sandy Lean Clay	125	21	147.33	300.092	854.143	398.014	456.129	799.703	401.689
44	1.67261	1151.89	21.9832	Sandy Lean Clay	125	21	133.924	272.785	742.657	357.664	384.993	688.594	330.93
45	1.67261	1008.98	23.7073	Sandy Lean Clay	125	21	126.38	257.42	658.65	313.682	344.968	603.154	289.472
46	1.67261	855.372	25.4545	Sandy Lean Clay	125	21	118.218	240.795	567.584	265.926	301.658	511.312	245.386
47	1.67261	689.103	27.2275	Sandy Lean Clay	125	21	109.211	222.449	468.098	214.235	253.863	411.905	197.67
48	1.67261	509.577	29.0292	Sandy Lean Clay	125	21	99.2976	202.256	359.682	158.422	201.26	304.574	146.152
49	1.67261	316.108	30.863	Sandy Lean Clay	125	21	88.4061	180.072	241.741	98.2736	143.467	188.908	90.6346
50	1.67261	107.897	32.7326	Sandy Lean Clay	125	21	76.4511	155.721	113.573	33.5428	80.0306	64.4314	30.8886

Global Minimum Query (janbu simplified) - Safety Factor: 1.80105

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.05403	126.484	-62.21	Clay Liner	100	20	94.1837	169.63	191.306	0	191.306	370.017	370.017
2	1.23404	451.834	-59.5878	Silty Sand	0	32	134.36	241.989	387.263	0	387.263	616.162	616.162
3	1.23404	748.004	-56.964	Silty Sand	0	32	193.702	348.867	558.303	0	558.303	856.168	856.168
4	1.56282	1328.49	-54.2093	Sandy Lean Clay	125	21	234.537	422.412	774.784	0	774.784	1100.09	1100.09
5	1.56282	1714.81	-51.3222	Sandy Lean Clay	125	21	281.585	507.149	995.533	0	995.533	1347.29	1347.29
6	1.56282	2064.14	-48.6074	Sandy Lean Clay	125	21	325.488	586.221	1201.52	0	1201.52	1570.81	1570.81
7	1.56282	2382.07	-46.032	Sandy Lean Clay	125	21	362.926	653.647	1377.17	0	1377.17	1753.42	1753.42
8	1.56282	2630.92	-43.5719	Sandy Lean Clay	125	21	356.02	641.21	1344.78	0	1344.78	1683.48	1683.48
9	1.64738	2983.19	-41.1471	Sandy Lean Clay	125	21	375.806	676.845	1482.52	44.9105	1437.61	1810.9	1765.99
10	1.64738	3174.73	-38.7474	Sandy Lean Clay	125	21	386.163	695.498	1617.27	131.07	1486.2	1927.17	1796.1
11	1.64738	3344.15	-36.426	Sandy Lean Clay	125	21	395.111	711.614	1738.43	210.248	1528.18	2030.01	1819.76
12	1.64738	3493.44	-34.1721	Sandy Lean Clay	125	21	402.771	725.41	1847.2	283.072	1564.12	2120.63	1837.56
13	1.64738	3624.23	-31.9771	Sandy Lean Clay	125	21	409.239	737.06	1944.53	350.054	1594.47	2200.02	1849.97
14	1.64738	3737.85	-29.8335	Sandy Lean Clay	125	21	414.596	746.709	2031.22	411.619	1619.61	2268.99	1857.37
15	1.64738	3835.43	-27.7349	Sandy Lean Clay	125	21	418.91	754.477	2107.96	468.119	1639.84	2328.22	1860.1
16	1.64738	3917.91	-25.6762	Sandy Lean Clay	125	21	422.234	760.465	2175.3	519.854	1655.45	2378.29	1858.44
17	1.64738	3986.1	-23.6524	Sandy Lean Clay	125	21	424.618	764.758	2233.7	567.075	1666.63	2419.68	1852.6
18	1.64738	4040.66	-21.6595	Sandy Lean Clay	125	21	426.1	767.428	2283.58	609.998	1673.58	2452.8	1842.8
19	1.64738	4082.19	-19.6939	Sandy Lean Clay	125	21	426.715	768.535	2325.27	648.807	1676.46	2478.01	1829.2
20	1.64738	4111.19	-17.7521	Sandy Lean Clay	125	21	426.49	768.13	2359.07	683.659	1675.41	2495.61	1811.95
21	1.64738	4128.08	-15.8311	Sandy Lean Clay	125	21	425.449	766.255	2385.21	714.688	1670.53	2505.85	1791.17
22	1.64738	4133.22	-13.9283	Sandy Lean Clay	125	21	423.612	762.947	2403.92	742.009	1661.91	2508.97	1766.96
23	1.64738	4126.91	-12.0411	Sandy Lean Clay	125	21	420.994	758.232	2415.35	765.72	1649.63	2505.15	1739.43
24	1.64738	4109.43	-10.167	Sandy Lean Clay	125	21	417.609	752.135	2419.64	785.901	1633.74	2494.53	1708.63
25	1.64738	4080.99	-8.30393	Sandy Lean Clay	125	21	413.465	744.671	2416.92	802.62	1614.3	2477.27	1674.65
26	1.64738	4041.74	-6.44963	Sandy Lean Clay	125	21	408.568	735.852	2407.25	815.932	1591.32	2453.44	1637.51

27	1.64738	3991.84	-4.6021	Sandy Lean Clay	125	21	402.923	725.684	2390.72	825.88	1564.84	2423.15	1597.27
28	1.64738	3931.38	-2.75936	Sandy Lean Clay	125	21	396.53	714.17	2367.34	832.494	1534.84	2386.45	1553.95
29	1.64738	3860.43	-0.91947	Sandy Lean Clay	125	21	389.387	701.306	2337.13	835.796	1501.33	2343.38	1507.58
30	1.64738	3779.01	0.91947	Sandy Lean Clay	125	21	381.491	687.084	2300.07	835.796	1464.28	2293.95	1458.15
31	1.64738	3687.13	2.75936	Sandy Lean Clay	125	21	372.833	671.49	2256.15	832.494	1423.66	2238.18	1405.69
32	1.64738	3584.76	4.6021	Sandy Lean Clay	125	21	363.402	654.505	2205.29	825.88	1379.41	2176.04	1350.16
33	1.64738	3471.83	6.44963	Sandy Lean Clay	125	21	353.186	636.106	2147.41	815.932	1331.48	2107.48	1291.55
34	1.64738	3348.24	8.30393	Sandy Lean Clay	125	21	342.168	616.262	2082.4	802.62	1279.78	2032.46	1229.84
35	1.64738	3213.86	10.167	Sandy Lean Clay	125	21	330.327	594.936	2010.13	785.901	1224.23	1950.89	1164.99
36	1.64738	3068.51	12.0411	Sandy Lean Clay	125	21	317.638	572.082	1930.41	765.72	1164.69	1862.66	1096.94
37	1.64738	2911.98	13.9283	Sandy Lean Clay	125	21	304.072	547.648	1843.04	742.009	1101.04	1767.63	1025.63
38	1.64738	2744.01	15.8311	Sandy Lean Clay	125	21	289.592	521.57	1747.79	714.688	1033.1	1665.67	950.985
39	1.64738	2564.29	17.7521	Sandy Lean Clay	125	21	274.16	493.775	1644.35	683.659	960.691	1556.58	872.921
40	1.64738	2372.46	19.6939	Sandy Lean Clay	125	21	257.724	464.173	1532.38	648.807	883.575	1440.13	791.328
41	1.64738	2168.1	21.6595	Sandy Lean Clay	125	21	240.227	432.661	1411.48	609.998	801.486	1316.08	706.084
42	1.64738	1950.7	23.6524	Sandy Lean Clay	125	21	221.602	399.116	1281.17	567.075	714.096	1184.11	617.039
43	1.64738	1719.69	25.6762	Sandy Lean Clay	125	21	201.766	363.391	1140.88	519.854	621.027	1043.88	524.027
44	1.64738	1489.34	27.7349	Sandy Lean Clay	125	21	182.802	329.235	1000.17	468.119	532.05	904.054	435.935
45	1.64738	1304.03	29.8335	Sandy Lean Clay	125	21	171.325	308.564	889.818	411.619	478.199	791.567	379.948
46	1.64738	1108.99	31.9771	Sandy Lean Clay	125	21	159.494	287.257	772.748	350.054	422.694	673.173	323.119
47	1.64738	896.787	34.1721	Sandy Lean Clay	125	21	146.256	263.415	643.655	283.072	360.583	544.364	261.292
48	1.64738	666.078	36.426	Sandy Lean Clay	125	21	131.44	236.73	501.317	210.248	291.069	404.319	194.071
49	1.64738	415.24	38.7474	Sandy Lean Clay	125	21	114.83	206.815	344.205	131.07	213.135	252.053	120.983
50	1.64738	142.283	41.1471	Sandy Lean Clay	125	21	96.1442	173.161	170.373	44.9105	125.462	86.3614	41.4509

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.03687

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	13.9552	164	0	0	0
2	15	162.59	258.09	0	0
3	15.4562	162	397.354	0	0
4	17.169	159.912	1097.89	0	0
5	18.8817	158	1981.98	0	0
6	20.6505	156.186	3134.85	0	0
7	22.4193	154.516	4423.4	0	0
8	24.1881	152.973	5798.11	0	0
9	25.9568	151.546	7082.8	0	0
10	27.7256	150.225	8251.25	0	0
11	29.4944	149	9386.29	0	0
12	31.167	147.925	10426.7	0	0
13	32.8396	146.925	11434.6	0	0
14	34.5122	145.997	12396.8	0	0
15	36.1848	145.136	13302.8	0	0
16	37.8574	144.34	14143.6	0	0
17	39.53	143.606	14912	0	0
18	41.2027	142.931	15602	0	0
19	42.8753	142.313	16208.8	0	0
20	44.5479	141.75	16728.7	0	0
21	46.2205	141.241	17159	0	0
22	47.8931	140.784	17497.8	0	0
23	49.5657	140.378	17743.9	0	0
24	51.2383	140.023	17896.9	0	0
25	52.9109	139.716	17957.1	0	0
26	54.5835	139.458	17925.3	0	0
27	56.2561	139.248	17803.1	0	0
28	57.9287	139.085	17592.5	0	0
29	59.6014	138.969	17296.5	0	0
30	61.274	138.899	16918.1	0	0
31	62.9466	138.876	16461.5	0	0
32	64.6192	138.899	15931.1	0	0
33	66.2918	138.969	15332.1	0	0
34	67.9644	139.085	14670.5	0	0
35	69.637	139.248	13952.7	0	0
36	71.3096	139.458	13186.3	0	0
37	72.9822	139.716	12379.3	0	0
38	74.6548	140.023	11540.8	0	0
39	76.3274	140.378	10680.8	0	0
40	78.0001	140.784	9810.55	0	0
41	79.6727	141.241	8942.28	0	0
42	81.3453	141.75	8089.69	0	0
43	83.0179	142.313	7267.96	0	0
44	84.6905	142.931	6494.02	0	0
45	86.3631	143.606	5768.93	0	0
46	88.0357	144.34	5074.11	0	0
47	89.7083	145.136	4424.8	0	0
48	91.3809	145.997	3839.56	0	0
49	93.0535	146.925	3339.86	0	0
50	94.7261	147.925	2950.59	0	0
51	96.3988	149	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.80105

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	15.3568	164	0	0	0
2	16.4109	162	283.348	0	0
3	17.6449	159.898	931.721	0	0
4	18.8789	158	1752.17	0	0
5	20.4418	155.832	3065.13	0	0
6	22.0046	153.88	4568.64	0	0
7	23.5674	152.107	6190.47	0	0
8	25.1302	150.487	7854.58	0	0
9	26.6931	149	9297.64	0	0
10	28.3404	147.561	10812.7	0	0
11	29.9878	146.238	12314.7	0	0
12	31.6352	145.023	13777.2	0	0
13	33.2826	143.904	15179.7	0	0
14	34.93	142.876	16505.5	0	0
15	36.5773	141.931	17741.5	0	0
16	38.2247	141.065	18877.4	0	0
17	39.8721	140.273	19904.6	0	0
18	41.5195	139.551	20816.9	0	0
19	43.1668	138.897	21608.9	0	0
20	44.8142	138.308	22277.1	0	0
21	46.4616	137.78	22818.8	0	0
22	48.109	137.313	23232.2	0	0
23	49.7564	136.905	23516.5	0	0
24	51.4037	136.553	23671.8	0	0
25	53.0511	136.258	23698.7	0	0
26	54.6985	136.017	23598.8	0	0
27	56.3459	135.831	23374.1	0	0
28	57.9933	135.698	23027.4	0	0
29	59.6406	135.619	22562.2	0	0
30	61.288	135.593	21982.6	0	0
31	62.9354	135.619	21293.4	0	0
32	64.5828	135.698	20500.1	0	0
33	66.2302	135.831	19609	0	0
34	67.8775	136.017	18627.4	0	0
35	69.5249	136.258	17563	0	0
36	71.1723	136.553	16425.1	0	0
37	72.8197	136.905	15223.5	0	0
38	74.4671	137.313	13969.6	0	0
39	76.1144	137.78	12676.2	0	0
40	77.7618	138.308	11357.4	0	0
41	79.4092	138.897	10029.3	0	0
42	81.0566	139.551	8710.12	0	0
43	82.704	140.273	7420.71	0	0
44	84.3513	141.065	6184.79	0	0
45	85.9987	141.931	5017.35	0	0
46	87.6461	142.876	3894.49	0	0
47	89.2935	143.904	2837.01	0	0
48	90.9409	145.023	1876.24	0	0
49	92.5882	146.238	1050.28	0	0
50	94.2356	147.561	406.074	0	0
51	95.883	149	0	0	0

Discharge Sections

Entity Information

Water Table

X		Y	
0		149	
85		149	
120		149	

Distributed Load

X		Y	
25		164	
0		164	

External Boundary

X		Y	
0		164	
0		158	
0		134	
120		134	
120		149	
95		149	
85		149	
49		158	
25		164	
15		164	

Material Boundary

X		Y	
0		158	
41		158	
49		158	

Material Boundary

X		Y	
15		164	
15		162	
25		162	
41		158	
85		147	
95		147	
95		149	



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 3, Long-Term Local Analysis
Terracon Consultants Inc.
Date Created: 9/13/2022, 9:47:40 AM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.331s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/13/2022, 9:47:40 AM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:10116

Random Number Generation Method:Park and Miller v.3

Surface Options

Surface Type:Circular

Search Method:Grid Search

Radius Increment:10

Composite Surfaces:Disabled

Reverse Curvature:Invalid Surfaces

Minimum Elevation:Not Defined

Minimum Depth:Not Defined

Minimum Area:Not Defined

Minimum Weight:Not Defined

Seismic Loading

Advanced seismic analysis:No

Staged pseudostatic analysis:No

Loading

1 Distributed Load present

Distributed Load 1

Distribution:Constant

Magnitude [psf]:250

Orientation:Normal to boundary

Materials

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	125
Friction Angle [deg]	21
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	2.266750
Center:	62.632, 186.123
Radius:	43.342
Left Slip Surface Endpoint:	25.425, 163.894
Right Slip Surface Endpoint:	85.000, 149.000
Resisting Moment:	1.27183e+06 lb-ft
Driving Moment:	561079 lb-ft
Total Slice Area:	539.331 ft2
Surface Horizontal Width:	59.5747 ft
Surface Average Height:	9.05302 ft

Method: janbu simplified

FS	1.989850
Center:	60.125, 177.623
Radius:	37.674
Left Slip Surface Endpoint:	25.000, 164.000
Right Slip Surface Endpoint:	84.706, 149.073
Resisting Horizontal Force:	30289.9 lb
Driving Horizontal Force:	15222.2 lb
Total Slice Area:	687.416 ft ²
Surface Horizontal Width:	59.7064 ft
Surface Average Height:	11.5133 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	8851
Number of Invalid Surfaces:	410

Error Codes

Error Code -101 reported for 322 surfaces
 Error Code -102 reported for 2 surfaces
 Error Code -106 reported for 20 surfaces
 Error Code -108 reported for 24 surfaces
 Error Code -1000 reported for 42 surfaces

Method: janbu simplified

Number of Valid Surfaces:	8827
Number of Invalid Surfaces:	434

Error Codes

Error Code -101 reported for 322 surfaces
 Error Code -102 reported for 2 surfaces
 Error Code -106 reported for 20 surfaces
 Error Code -108 reported for 48 surfaces
 Error Code -1000 reported for 42 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

- 101 = Only one (or zero) surface / slope intersections.
- 102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
- 106 = Average slice width is less than $0.0001 \times (\text{maximum horizontal extent of soil region})$. This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
- 108 = Total driving moment or total driving force < 0.1 . This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.26675

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.53153	183.783	-57.2703	Clay Liner	100	20	50.7341	115.001	41.2164	0	41.2164	120.153	120.153
2	1.34842	445.87	-53.8853	Silty Sand	0	32	66.1921	150.041	240.115	0	240.115	330.838	330.838
3	1.34842	675.365	-50.9579	Silty Sand	0	32	103.095	233.691	373.983	0	373.983	501.104	501.104
4	1.17888	757.187	-48.3697	Sandy Lean Clay	125	21	137.724	312.185	487.635	0	487.635	642.592	642.592
5	1.17888	895.884	-46.0734	Sandy Lean Clay	125	21	156.395	354.508	597.89	0	597.89	760.258	760.258
6	1.17888	1020.92	-43.8692	Sandy Lean Clay	125	21	173.594	393.495	699.457	0	699.457	866.331	866.331
7	1.17888	1133.79	-41.7439	Sandy Lean Clay	125	21	189.442	429.417	793.032	0	793.032	962.079	962.079
8	1.17888	1235.7	-39.6868	Sandy Lean Clay	125	21	204.036	462.498	879.211	0	879.211	1048.53	1048.53
9	1.17888	1327.63	-37.6895	Sandy Lean Clay	125	21	217.462	492.931	958.491	0	958.491	1126.5	1126.5
10	1.17888	1410.38	-35.7446	Sandy Lean Clay	125	21	229.791	520.878	1031.3	0	1031.3	1196.69	1196.69
11	1.17888	1484.62	-33.8463	Sandy Lean Clay	125	21	241.084	546.477	1097.99	0	1097.99	1259.66	1259.66
12	1.17888	1550.93	-31.9892	Sandy Lean Clay	125	21	251.396	569.851	1158.88	0	1158.88	1315.9	1315.9
13	1.17727	1607.56	-30.1704	Sandy Lean Clay	125	21	257.473	583.626	1216.11	21.351	1194.76	1365.78	1344.43
14	1.17727	1659.26	-28.3857	Sandy Lean Clay	125	21	259.526	588.281	1269.44	62.5519	1206.89	1409.68	1347.13
15	1.17727	1704.32	-26.6306	Sandy Lean Clay	125	21	261.102	591.852	1317.01	100.819	1216.19	1447.94	1347.12
16	1.17727	1743.04	-24.9021	Sandy Lean Clay	125	21	262.219	594.386	1359.08	136.288	1222.79	1480.81	1344.52
17	1.17727	1775.71	-23.1976	Sandy Lean Clay	125	21	262.897	595.921	1395.87	169.081	1226.79	1508.54	1339.46
18	1.17727	1802.54	-21.5145	Sandy Lean Clay	125	21	263.149	596.494	1427.59	199.301	1228.28	1531.32	1332.02
19	1.17727	1823.77	-19.8507	Sandy Lean Clay	125	21	262.99	596.133	1454.38	227.041	1227.34	1549.33	1322.28
20	1.17727	1839.56	-18.2041	Sandy Lean Clay	125	21	262.431	594.865	1476.42	252.381	1224.04	1562.72	1310.34
21	1.17727	1850.08	-16.573	Sandy Lean Clay	125	21	261.481	592.712	1493.83	275.392	1218.43	1571.64	1296.25
22	1.17727	1855.46	-14.9557	Sandy Lean Clay	125	21	260.15	589.695	1506.71	296.135	1210.57	1576.2	1280.06
23	1.17727	1855.83	-13.3504	Sandy Lean Clay	125	21	258.444	585.828	1515.16	314.663	1200.5	1576.49	1261.83
24	1.17727	1851.29	-11.7558	Sandy Lean Clay	125	21	256.37	581.126	1519.27	331.024	1188.25	1572.62	1241.6
25	1.17727	1841.93	-10.1703	Sandy Lean Clay	125	21	253.931	575.599	1519.11	345.257	1173.85	1564.66	1219.41
26	1.17727	1827.84	-8.59269	Sandy Lean Clay	125	21	251.134	569.257	1514.72	357.397	1157.33	1552.67	1195.28
27	1.17727	1809.07	-7.02161	Sandy Lean Clay	125	21	247.979	562.107	1506.17	367.471	1138.7	1536.72	1169.25
28	1.17727	1785.67	-5.45583	Sandy Lean Clay	125	21	244.469	554.151	1493.48	375.504	1117.98	1516.83	1141.33
29	1.17727	1757.7	-3.89413	Sandy Lean Clay	125	21	240.606	545.394	1476.67	381.512	1095.16	1493.05	1111.54
30	1.17727	1725.17	-2.33533	Sandy Lean Clay	125	21	236.389	535.835	1455.77	385.51	1070.26	1465.41	1079.9
31	1.17727	1688.11	-0.778251	Sandy Lean Clay	125	21	231.817	525.472	1430.77	387.507	1043.27	1433.92	1046.42
32	1.17727	1646.53	0.778251	Sandy Lean Clay	125	21	226.89	514.302	1401.68	387.507	1014.17	1398.59	1011.09

33	1.17727	1600.43	2.33533	Sandy Lean Clay	125	21	221.603	502.318	1368.46	385.51	982.948	1359.42	973.911
34	1.17727	1549.8	3.89413	Sandy Lean Clay	125	21	215.954	489.514	1331.1	381.512	949.591	1316.4	934.891
35	1.17727	1494.62	5.45583	Sandy Lean Clay	125	21	209.938	475.877	1289.57	375.504	914.069	1269.52	894.017
36	1.17727	1434.85	7.02161	Sandy Lean Clay	125	21	203.55	461.397	1243.82	367.471	876.347	1218.75	851.276
37	1.17727	1370.47	8.59269	Sandy Lean Clay	125	21	196.783	446.057	1193.78	357.397	836.382	1164.04	806.648
38	1.17727	1301.4	10.1703	Sandy Lean Clay	125	21	189.628	429.839	1139.39	345.257	794.135	1105.37	760.117
39	1.17727	1227.6	11.7558	Sandy Lean Clay	125	21	182.077	412.722	1080.57	331.024	749.544	1042.68	711.653
40	1.17727	1148.98	13.3504	Sandy Lean Clay	125	21	174.118	394.682	1017.2	314.663	702.542	975.883	661.22
41	1.17727	1065.45	14.9557	Sandy Lean Clay	125	21	165.739	375.689	949.201	296.135	653.066	904.928	608.793
42	1.17727	976.912	16.573	Sandy Lean Clay	125	21	156.926	355.713	876.421	275.392	601.029	829.72	554.328
43	1.17727	883.237	18.2041	Sandy Lean Clay	125	21	147.663	334.714	798.705	252.381	546.324	750.145	497.764
44	1.17727	784.288	19.8507	Sandy Lean Clay	125	21	137.929	312.651	715.889	227.041	488.848	666.093	439.052
45	1.17727	679.905	21.5145	Sandy Lean Clay	125	21	127.704	289.473	627.769	199.301	428.468	577.427	378.126
46	1.17727	569.907	23.1976	Sandy Lean Clay	125	21	116.963	265.125	534.118	169.081	365.037	483.993	314.912
47	1.17727	454.086	24.9021	Sandy Lean Clay	125	21	105.675	239.539	434.672	136.288	298.384	385.614	249.326
48	1.17727	332.204	26.6306	Sandy Lean Clay	125	21	93.8081	212.64	329.128	100.819	228.309	282.089	181.27
49	1.17727	203.989	28.3857	Sandy Lean Clay	125	21	81.3225	184.338	217.132	62.5519	154.58	173.188	110.636
50	1.17727	69.1314	30.1704	Sandy Lean Clay	125	21	68.1717	154.528	98.2748	21.351	76.9238	58.6451	37.2941

Global Minimum Query (janbu simplified) - Safety Factor: 1.98985

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	0.95223	114.268	-66.9516	Clay Liner	100	20	50.5008	100.489	1.34333	0	1.34333	120.037	120.037
2	1.00621	347.576	-63.3932	Silty Sand	0	32	66.6834	132.69	212.349	0	212.349	345.473	345.473
3	1.00621	544.321	-60.1472	Silty Sand	0	32	109.812	218.509	349.688	0	349.688	541.021	541.021
4	1.27733	931.396	-56.8341	Sandy Lean Clay	125	21	157.119	312.644	488.829	0	488.829	729.245	729.245
5	1.27733	1164.19	-53.428	Sandy Lean Clay	125	21	189.408	376.893	656.205	0	656.205	911.503	911.503
6	1.27733	1365.02	-50.2776	Sandy Lean Clay	125	21	218.303	434.39	805.987	0	805.987	1068.72	1068.72
7	1.27733	1540.07	-47.3244	Sandy Lean Clay	125	21	244.308	486.136	940.792	0	940.792	1205.77	1205.77
8	1.27733	1693.6	-44.5288	Sandy Lean Clay	125	21	267.795	532.871	1062.54	0	1062.54	1325.97	1325.97
9	1.27733	1828.67	-41.8619	Sandy Lean Clay	125	21	289.047	575.16	1172.71	0	1172.71	1431.71	1431.71
10	1.22481	1865.42	-39.353	Sandy Lean Clay	125	21	302.711	602.35	1274.88	31.3353	1243.54	1523.11	1491.78
11	1.22481	1962.01	-36.9825	Sandy Lean Clay	125	21	309.283	615.426	1369.05	91.4501	1277.6	1601.97	1510.52
12	1.22481	2047.07	-34.6838	Sandy Lean Clay	125	21	314.918	626.639	1453.49	146.673	1306.82	1671.42	1524.74
13	1.22481	2121.58	-32.4473	Sandy Lean Clay	125	21	319.694	636.143	1528.99	197.413	1331.58	1732.24	1534.83
14	1.22481	2186.33	-30.2652	Sandy Lean Clay	125	21	323.676	644.066	1596.22	244.008	1352.22	1785.1	1541.09
15	1.22481	2241.97	-28.1306	Sandy Lean Clay	125	21	326.915	650.512	1655.75	286.738	1369.01	1830.53	1543.79
16	1.22481	2289.06	-26.0378	Sandy Lean Clay	125	21	329.455	655.567	1708.01	325.838	1382.18	1868.97	1543.13
17	1.22481	2328.07	-23.9818	Sandy Lean Clay	125	21	331.334	659.305	1753.42	361.507	1391.91	1900.81	1539.31

18	1.22481	2359.4	-21.9581	Sandy Lean Clay	125	21	332.582	661.789	1792.3	393.913	1398.38	1926.39	1532.47
19	1.22481	2383.38	-19.9629	Sandy Lean Clay	125	21	333.226	663.069	1824.92	423.201	1401.72	1945.96	1522.76
20	1.22481	2400.3	-17.9927	Sandy Lean Clay	125	21	333.287	663.191	1851.53	449.493	1402.04	1959.77	1510.28
21	1.22481	2410.41	-16.0442	Sandy Lean Clay	125	21	332.784	662.191	1872.32	472.893	1399.43	1968.03	1495.13
22	1.22481	2413.93	-14.1147	Sandy Lean Clay	125	21	331.734	660.1	1887.48	493.492	1393.98	1970.89	1477.4
23	1.22481	2411.02	-12.2014	Sandy Lean Clay	125	21	330.147	656.943	1897.12	511.364	1385.76	1968.51	1457.15
24	1.22481	2401.84	-10.3018	Sandy Lean Clay	125	21	328.036	652.742	1901.39	526.573	1374.82	1961.01	1434.44
25	1.22481	2386.51	-8.41357	Sandy Lean Clay	125	21	325.407	647.512	1900.36	539.171	1361.19	1948.49	1409.32
26	1.22481	2365.13	-6.53455	Sandy Lean Clay	125	21	322.268	641.265	1894.12	549.201	1344.92	1931.03	1381.83
27	1.22481	2337.77	-4.66256	Sandy Lean Clay	125	21	318.622	634.009	1882.71	556.695	1326.01	1908.69	1352
28	1.22481	2304.5	-2.79556	Sandy Lean Clay	125	21	314.47	625.749	1866.17	561.677	1304.49	1881.53	1319.85
29	1.22481	2265.36	-0.931524	Sandy Lean Clay	125	21	309.815	616.485	1844.53	564.165	1280.36	1849.57	1285.4
30	1.22481	2220.35	0.931524	Sandy Lean Clay	125	21	304.654	606.215	1817.77	564.165	1253.6	1812.82	1248.65
31	1.22481	2169.49	2.79556	Sandy Lean Clay	125	21	298.982	594.93	1785.89	561.677	1224.21	1771.29	1209.61
32	1.22481	2112.75	4.66256	Sandy Lean Clay	125	21	292.796	582.621	1748.84	556.695	1192.14	1724.96	1168.26
33	1.22481	2050.09	6.53455	Sandy Lean Clay	125	21	286.088	569.273	1706.57	549.201	1157.37	1673.8	1124.6
34	1.22481	1981.47	8.41357	Sandy Lean Clay	125	21	278.848	554.866	1659.01	539.171	1119.84	1617.76	1078.59
35	1.22481	1906.79	10.3018	Sandy Lean Clay	125	21	271.064	539.377	1606.06	526.573	1079.48	1556.79	1030.22
36	1.22481	1825.96	12.2014	Sandy Lean Clay	125	21	262.721	522.776	1547.61	511.364	1036.25	1490.8	979.437
37	1.22481	1738.86	14.1147	Sandy Lean Clay	125	21	253.803	505.029	1483.5	493.492	990.013	1419.68	926.193
38	1.22481	1645.34	16.0442	Sandy Lean Clay	125	21	244.287	486.094	1413.58	472.893	940.684	1343.32	870.431
39	1.22481	1545.21	17.9927	Sandy Lean Clay	125	21	234.149	465.921	1337.62	449.493	888.13	1261.58	812.083
40	1.22481	1438.28	19.9629	Sandy Lean Clay	125	21	223.36	444.452	1255.4	423.201	832.2	1174.27	751.068
41	1.22481	1324.29	21.9581	Sandy Lean Clay	125	21	211.884	421.617	1166.62	393.913	772.71	1081.2	687.283
42	1.22481	1202.96	23.9818	Sandy Lean Clay	125	21	199.68	397.334	1070.97	361.507	709.459	982.138	620.631
43	1.22481	1073.94	26.0378	Sandy Lean Clay	125	21	186.701	371.506	968.007	325.838	642.169	876.794	550.956
44	1.22481	936.839	28.1306	Sandy Lean Clay	125	21	172.884	344.014	857.289	286.738	570.551	764.858	478.12
45	1.22481	791.188	30.2652	Sandy Lean Clay	125	21	158.161	314.716	738.233	244.008	494.225	645.94	401.932
46	1.22481	636.434	32.4473	Sandy Lean Clay	125	21	142.441	283.436	610.153	197.413	412.74	519.592	322.179
47	1.22481	471.916	34.6838	Sandy Lean Clay	125	21	125.617	249.958	472.2	146.673	325.527	385.272	238.599
48	1.22481	296.841	36.9825	Sandy Lean Clay	125	21	107.55	214.009	323.325	91.4501	231.875	242.332	150.882
49	1.22481	110.242	39.353	Sandy Lean Clay	125	21	88.0643	175.235	162.201	31.3353	130.866	89.9853	58.65
50	0.0855024	0.486194	40.6433	Sandy Lean Clay	125	21	76.5959	152.414	71.4168	0	71.4168	5.66584	5.66584

Interslice Data

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.4253	163.894	0	0	0
2	26.9568	161.511	20.6633	0	0
3	28.3052	159.663	375.35	0	0
4	29.6536	158	858.409	0	0
5	30.8325	156.674	1343.16	0	0
6	32.0114	155.45	1890.9	0	0
7	33.1903	154.316	2479.31	0	0
8	34.3692	153.264	3090.65	0	0
9	35.548	152.286	3710.69	0	0
10	36.7269	151.375	4327.82	0	0
11	37.9058	150.527	4932.51	0	0
12	39.0847	149.736	5516.89	0	0
13	40.2636	149	6074.42	0	0
14	41.4409	148.316	6604.17	0	0
15	42.6181	147.679	7106.81	0	0
16	43.7954	147.089	7577.47	0	0
17	44.9727	146.543	8012.14	0	0
18	46.1499	146.038	8407.48	0	0
19	47.3272	145.574	8760.8	0	0
20	48.5045	145.149	9069.93	0	0
21	49.6818	144.762	9333.19	0	0
22	50.859	144.411	9549.33	0	0
23	52.0363	144.097	9717.47	0	0
24	53.2136	143.818	9837.12	0	0
25	54.3909	143.573	9908.1	0	0
26	55.5681	143.361	9930.56	0	0
27	56.7454	143.184	9904.94	0	0
28	57.9227	143.039	9831.97	0	0
29	59.1	142.926	9712.65	0	0
30	60.2772	142.846	9548.27	0	0
31	61.4545	142.798	9340.41	0	0
32	62.6318	142.782	9090.91	0	0
33	63.8091	142.798	8801.9	0	0
34	64.9863	142.846	8475.81	0	0
35	66.1636	142.926	8115.4	0	0
36	67.3409	143.039	7723.72	0	0
37	68.5182	143.184	7304.19	0	0
38	69.6954	143.361	6860.61	0	0
39	70.8727	143.573	6397.16	0	0
40	72.05	143.818	5918.49	0	0
41	73.2273	144.097	5429.7	0	0
42	74.4045	144.411	4936.46	0	0
43	75.5818	144.762	4445.01	0	0
44	76.7591	145.149	3962.28	0	0
45	77.9364	145.574	3495.95	0	0
46	79.1136	146.038	3054.56	0	0
47	80.2909	146.543	2647.66	0	0
48	81.4682	147.089	2285.93	0	0
49	82.6455	147.679	1981.41	0	0
50	83.8227	148.316	1747.73	0	0
51	85	149	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.98985

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25	164	0	0	0
2	25.9522	161.762	-45.0669	0	0
3	26.9584	159.753	314.413	0	0
4	27.9646	158	817.023	0	0
5	29.242	156.045	1571.82	0	0
6	30.5193	154.324	2459.73	0	0
7	31.7966	152.786	3420.05	0	0
8	33.074	151.401	4411.47	0	0
9	34.3513	150.145	5404.59	0	0
10	35.6287	149	6377.72	0	0
11	36.8535	147.996	7287.54	0	0
12	38.0783	147.073	8171.62	0	0
13	39.3031	146.226	9017.98	0	0
14	40.5279	145.447	9817.17	0	0
15	41.7527	144.732	10561.7	0	0
16	42.9775	144.077	11245.6	0	0
17	44.2023	143.479	11864.3	0	0
18	45.4271	142.934	12414	0	0
19	46.6519	142.44	12891.8	0	0
20	47.8767	141.995	13295.7	0	0
21	49.1015	141.598	13624.1	0	0
22	50.3263	141.245	13876.1	0	0
23	51.5511	140.937	14051.3	0	0
24	52.7759	140.673	14149.5	0	0
25	54.0008	140.45	14171.1	0	0
26	55.2256	140.269	14116.9	0	0
27	56.4504	140.129	13988.1	0	0
28	57.6752	140.029	13786	0	0
29	58.9	139.969	13512.6	0	0
30	60.1248	139.949	13170	0	0
31	61.3496	139.969	12760.8	0	0
32	62.5744	140.029	12287.9	0	0
33	63.7992	140.129	11754.7	0	0
34	65.024	140.269	11164.9	0	0
35	66.2488	140.45	10523	0	0
36	67.4736	140.673	9833.52	0	0
37	68.6984	140.937	9101.96	0	0
38	69.9232	141.245	8334.3	0	0
39	71.148	141.598	7537.29	0	0
40	72.3728	141.995	6718.5	0	0
41	73.5977	142.44	5886.49	0	0
42	74.8225	142.934	5050.96	0	0
43	76.0473	143.479	4222.94	0	0
44	77.2721	144.077	3415.11	0	0
45	78.4969	144.732	2642.05	0	0
46	79.7217	145.447	1920.76	0	0
47	80.9465	146.226	1271.22	0	0
48	82.1713	147.073	717.183	0	0
49	83.3961	147.996	287.27	0	0
50	84.6209	149	16.5287	0	0
51	84.7064	149.073	0	0	0

Discharge Sections

Entity Information

Water Table

X		Y	
0		149	
85		149	
120		149	

Distributed Load

X		Y	
25		164	
0		164	

External Boundary

X		Y	
0		164	
0		158	
0		134	
120		134	
120		149	
95		149	
85		149	
49		158	
25		164	
15		164	

Material Boundary

X		Y	
0		158	
41		158	
49		158	

Material Boundary

X		Y	
15		164	
15		162	
25		162	
41		158	
85		147	
95		147	
95		149	



TISD HCFC Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 3, Rapid Drawdown - Total Stress Global Analysis
Terracon Consultants Inc.
Date Created: 9/13/2022, 9:47:40 AM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.693s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/13/2022, 9:47:40 AM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	15
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	125
Friction Angle [deg]	16
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.309700
Center:	60.087, 199.760
Radius:	58.968
Left Slip Surface Endpoint:	13.200, 164.000
Right Slip Surface Endpoint:	90.097, 149.000
Resisting Moment:	1.48557e+06 lb-ft
Driving Moment:	1.13428e+06 lb-ft
Total Slice Area:	849.75 ft2
Surface Horizontal Width:	76.897 ft
Surface Average Height:	11.0505 ft

Method: janbu simplified

FS	1.165690
Center:	57.602, 190.357
Radius:	51.100
Left Slip Surface Endpoint:	13.824, 164.000
Right Slip Surface Endpoint:	87.615, 149.000
Resisting Horizontal Force:	24067.5 lb
Driving Horizontal Force:	20646.5 lb
Total Slice Area:	925.86 ft ²
Surface Horizontal Width:	73.791 ft
Surface Average Height:	12.5471 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	8301
Number of Invalid Surfaces:	960

Error Codes

Error Code -103 reported for 960 surfaces

Method: janbu simplified

Number of Valid Surfaces:	8301
Number of Invalid Surfaces:	960

Error Codes

Error Code -103 reported for 960 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.3097

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.75149	229.801	-51.3063	Silty Sand	0	32	18.8314	24.6635	107.694	68.2239	39.4699	131.205	62.9806
2	1.75149	668.798	-48.6568	Silty Sand	0	32	56.7026	74.2634	317.404	198.558	118.846	381.849	183.291
3	1.75149	1069.53	-46.1403	Silty Sand	0	32	93.4512	122.393	513.4	317.532	195.868	610.647	293.115
4	1.52431	1231.59	-43.8847	Sandy Lean Clay	150	15	161.999	212.171	652.163	420.14	232.023	807.975	387.835

5	1.52431	1490.6	-41.8627	Sandy Lean Clay	150	15	177.942	233.05	818.444	508.498	309.946	977.893	469.395
6	1.52431	1732.1	-39.9029	Sandy Lean Clay	150	15	193.088	252.888	974.866	590.883	383.983	1136.33	545.447
7	1.52431	1957.59	-37.9978	Sandy Lean Clay	150	15	207.486	271.745	1122.16	667.806	454.358	1284.26	616.451
8	1.52431	2150.94	-36.141	Sandy Lean Clay	150	15	220.021	288.162	1250.42	734.794	515.624	1411.1	676.308
9	1.52431	2281.26	-34.3272	Sandy Lean Clay	150	15	229.446	300.506	1339.92	778.223	561.698	1496.6	718.376
10	1.52431	2395.74	-32.5518	Sandy Lean Clay	150	15	237.818	311.47	1419.89	817.277	602.615	1571.7	754.424
11	1.52431	2498.17	-30.8109	Sandy Lean Clay	150	15	245.519	321.556	1492.47	852.219	640.253	1638.89	786.675
12	1.52431	2589.2	-29.1011	Sandy Lean Clay	150	15	252.577	330.8	1558.03	883.275	674.752	1698.62	815.341
13	1.52431	2669.42	-27.4193	Sandy Lean Clay	150	15	259.017	339.234	1616.87	910.64	706.229	1751.24	840.601
14	1.52431	2739.32	-25.7627	Sandy Lean Clay	150	15	264.859	346.886	1669.27	934.485	734.789	1797.1	862.614
15	1.52431	2799.34	-24.1289	Sandy Lean Clay	150	15	270.123	353.78	1715.48	954.961	760.516	1836.47	881.512
16	1.52431	2849.87	-22.5157	Sandy Lean Clay	150	15	274.825	359.938	1755.7	972.199	783.502	1869.63	897.426
17	1.52431	2891.25	-20.9212	Sandy Lean Clay	150	15	278.979	365.379	1790.12	986.316	803.804	1896.77	910.454
18	1.52431	2923.78	-19.3435	Sandy Lean Clay	150	15	282.598	370.118	1818.91	997.413	821.492	1918.11	920.698
19	1.52431	2947.73	-17.7809	Sandy Lean Clay	150	15	285.692	374.171	1842.2	1005.58	836.62	1933.82	928.241
20	1.52431	2963.32	-16.2319	Sandy Lean Clay	150	15	288.271	377.548	1860.12	1010.9	849.224	1944.05	933.149
21	1.52431	2970.76	-14.695	Sandy Lean Clay	150	15	290.342	380.261	1872.79	1013.44	859.346	1948.93	935.489
22	1.52431	2970.23	-13.1688	Sandy Lean Clay	150	15	291.913	382.318	1880.28	1013.26	867.024	1948.58	935.324
23	1.52431	2961.9	-11.6521	Sandy Lean Clay	150	15	292.988	383.726	1882.69	1010.41	872.283	1943.11	932.702
24	1.52431	2945.88	-10.1436	Sandy Lean Clay	150	15	293.571	384.49	1880.08	1004.95	875.131	1932.6	927.655
25	1.52431	2922.31	-8.64226	Sandy Lean Clay	150	15	293.666	384.615	1872.51	996.909	875.599	1917.14	920.233
26	1.52431	2891.27	-7.14683	Sandy Lean Clay	150	15	293.276	384.103	1860	986.322	873.682	1896.78	910.454
27	1.52431	2852.85	-5.65628	Sandy Lean Clay	150	15	292.399	382.955	1842.62	973.216	869.401	1871.58	898.361
28	1.52431	2807.12	-4.16957	Sandy Lean Clay	150	15	291.036	381.17	1820.35	957.614	862.737	1841.57	883.954
29	1.52431	2754.12	-2.68566	Sandy Lean Clay	150	15	289.187	378.748	1793.24	939.533	853.702	1806.8	867.268
30	1.52431	2693.88	-1.20356	Sandy Lean Clay	150	15	286.848	375.685	1761.26	918.984	842.272	1767.28	848.298
31	1.52431	2626.43	0.277741	Sandy Lean Clay	150	15	284.018	371.978	1724.41	895.973	828.434	1723.03	827.058
32	1.52431	2551.76	1.75922	Sandy Lean Clay	150	15	280.689	367.619	1682.66	870.503	812.162	1674.04	803.541
33	1.52431	2469.88	3.24189	Sandy Lean Clay	150	15	276.858	362.601	1636.01	842.569	793.44	1620.33	777.758
34	1.52431	2380.75	4.72673	Sandy Lean Clay	150	15	272.518	356.917	1584.39	812.164	772.225	1561.86	749.692
35	1.52431	2284.34	6.21476	Sandy Lean Clay	150	15	267.66	350.554	1527.75	779.273	748.477	1498.6	719.331
36	1.52431	2180.58	7.70701	Sandy Lean Clay	150	15	262.274	343.5	1466.03	743.879	722.149	1430.53	686.656
37	1.52431	2069.42	9.20455	Sandy Lean Clay	150	15	256.35	335.741	1399.15	705.957	693.195	1357.61	651.655
38	1.52431	1950.76	10.7085	Sandy Lean Clay	150	15	249.873	327.259	1327.01	665.478	661.537	1279.76	614.284
39	1.52431	1824.5	12.2199	Sandy Lean Clay	150	15	242.831	318.036	1249.52	622.405	627.115	1196.93	574.525
40	1.52431	1690.51	13.74	Sandy Lean Clay	150	15	235.206	308.049	1166.55	576.697	589.849	1109.03	532.338
41	1.52431	1548.66	15.27	Sandy Lean Clay	150	15	226.978	297.273	1077.94	528.306	549.63	1015.97	487.664

42	1.52431	1398.77	16.8113	Sandy Lean Clay	150	15	218.127	285.681	983.545	477.174	506.371	917.641	440.467
43	1.52431	1240.67	18.3653	Sandy Lean Clay	150	15	208.628	273.24	883.176	423.237	459.939	813.915	390.678
44	1.52431	1074.12	19.9333	Sandy Lean Clay	150	15	198.453	259.914	776.626	366.422	410.204	704.656	338.234
45	1.52431	898.893	21.5171	Sandy Lean Clay	150	15	187.569	245.659	663.65	306.645	357.005	589.7	283.055
46	1.52431	714.707	23.1184	Sandy Lean Clay	150	15	175.941	230.43	543.98	243.812	300.168	468.868	225.056
47	1.52431	525.369	24.739	Sandy Lean Clay	150	15	164.136	214.969	420.285	177.816	242.469	344.655	166.839
48	1.52431	376.98	26.3811	Sandy Lean Clay	150	15	154.493	202.339	323.934	128.601	195.333	247.307	118.706
49	1.52431	233.561	28.0469	Sandy Lean Clay	150	15	145.427	190.466	230.696	79.675	151.021	153.218	73.5433
50	1.52431	79.6441	29.7389	Sandy Lean Clay	150	15	135.497	177.46	129.652	27.1681	102.484	52.2441	25.076

Global Minimum Query (janbu simplified) - Safety Factor: 1.16569

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.17562	131.249	-57.715	Silty Sand	0	32	15.548	18.1242	87.0577	58.0529	29.0048	111.667	53.6137
2	0.092582	21.446	-56.3872	Clay Liner	125	16	98.2573	114.538	83.9663	120.453	-36.4867	231.784	111.331
3	1.47977	541.753	-54.8523	Silty Sand	0	32	53.504	62.3691	290.185	190.374	99.8112	366.179	175.805
4	1.47977	896.898	-52.0616	Silty Sand	0	32	92.4457	107.763	487.631	315.174	172.457	606.219	291.045
5	1.51224	1248.96	-49.409	Sandy Lean Clay	150	15	173.345	202.066	623.778	429.464	194.314	826.088	396.624
6	1.51224	1555.55	-46.8658	Sandy Lean Clay	150	15	194.5	226.726	821.236	534.89	286.346	1028.83	493.944
7	1.51224	1836.55	-44.4383	Sandy Lean Clay	150	15	214.397	249.92	1004.42	631.515	372.907	1214.66	583.14
8	1.51224	2095.12	-42.108	Sandy Lean Clay	150	15	233.149	271.779	1174.91	720.425	454.489	1385.64	665.214
9	1.51224	2328.06	-39.8606	Sandy Lean Clay	150	15	250.129	291.573	1330.83	802.465	528.36	1539.67	737.208
10	1.51224	2492.13	-37.6847	Sandy Lean Clay	150	15	263.724	307.421	1444.45	856.942	587.503	1648.16	791.22
11	1.51224	2627.65	-35.571	Sandy Lean Clay	150	15	275.198	320.795	1540.96	903.541	637.416	1737.77	834.228
12	1.51224	2748.03	-33.5118	Sandy Lean Clay	150	15	285.728	333.07	1628.16	944.935	683.228	1817.37	872.431
13	1.51224	2854.37	-31.5005	Sandy Lean Clay	150	15	295.369	344.309	1706.67	981.501	725.169	1887.68	906.175
14	1.51224	2947.58	-29.5317	Sandy Lean Clay	150	15	304.167	354.564	1777	1013.55	763.445	1949.31	935.757
15	1.51224	3028.44	-27.6006	Sandy Lean Clay	150	15	312.159	363.881	1839.57	1041.36	798.214	2002.77	961.41
16	1.51224	3097.61	-25.7029	Sandy Lean Clay	150	15	319.381	372.299	1894.78	1065.14	829.636	2048.5	983.363
17	1.51224	3155.67	-23.8351	Sandy Lean Clay	150	15	325.859	379.851	1942.92	1085.11	857.813	2086.88	1001.77
18	1.51224	3203.1	-21.9938	Sandy Lean Clay	150	15	331.621	386.567	1984.3	1101.42	882.881	2118.24	1016.82
19	1.51224	3240.34	-20.1762	Sandy Lean Clay	150	15	336.686	392.471	2019.13	1114.22	904.913	2142.85	1028.63
20	1.51224	3267.74	-18.3795	Sandy Lean Clay	150	15	341.072	397.584	2047.64	1123.64	923.999	2160.96	1037.32
21	1.51224	3285.63	-16.6014	Sandy Lean Clay	150	15	344.795	401.924	2069.99	1129.8	940.188	2172.79	1042.99
22	1.51224	3294.29	-14.8396	Sandy Lean Clay	150	15	347.867	405.505	2086.33	1132.77	953.558	2178.5	1045.73
23	1.51224	3293.95	-13.0921	Sandy Lean Clay	150	15	350.3	408.341	2096.8	1132.65	964.148	2178.26	1045.61
24	1.51224	3284.81	-11.3568	Sandy Lean Clay	150	15	352.101	410.441	2101.49	1129.51	971.983	2172.21	1042.7
25	1.51224	3267.05	-9.63211	Sandy Lean Clay	150	15	353.277	411.812	2100.5	1123.41	977.09	2160.46	1037.05
26	1.51224	3240.81	-7.91617	Sandy Lean Clay	150	15	353.832	412.459	2093.89	1114.38	979.511	2143.09	1028.71

27	1.51224	3206.21	-6.20736	Sandy Lean Clay	150	15	353.771	412.387	2081.72	1102.48	979.243	2120.2	1017.72
28	1.51224	3163.33	-4.50407	Sandy Lean Clay	150	15	353.091	411.595	2064.03	1087.74	976.285	2091.84	1004.1
29	1.51224	3112.26	-2.80477	Sandy Lean Clay	150	15	351.794	410.083	2040.82	1070.18	970.64	2058.05	987.875
30	1.51224	3053.03	-1.10793	Sandy Lean Clay	150	15	349.877	407.848	2012.11	1049.81	962.299	2018.88	969.066
31	1.51224	2985.67	0.587931	Sandy Lean Clay	150	15	347.334	404.884	1977.89	1026.65	951.239	1974.33	947.675
32	1.51224	2910.18	2.28431	Sandy Lean Clay	150	15	344.161	401.185	1938.13	1000.69	937.435	1924.4	923.707
33	1.51224	2826.55	3.9827	Sandy Lean Clay	150	15	340.348	396.74	1892.78	971.934	920.849	1869.09	897.153
34	1.51224	2734.73	5.6846	Sandy Lean Clay	150	15	335.885	391.538	1841.8	940.361	901.434	1808.36	868
35	1.51224	2634.66	7.39155	Sandy Lean Clay	150	15	330.759	385.563	1785.09	905.953	879.135	1742.18	836.226
36	1.51224	2526.27	9.10514	Sandy Lean Clay	150	15	324.957	378.799	1722.57	868.679	853.891	1670.49	801.812
37	1.51224	2409.43	10.827	Sandy Lean Clay	150	15	318.459	371.225	1654.13	828.503	825.624	1593.22	764.719
38	1.51224	2284.01	12.5588	Sandy Lean Clay	150	15	311.245	362.815	1579.61	785.378	794.237	1510.28	724.9
39	1.51224	2149.86	14.3024	Sandy Lean Clay	150	15	303.291	353.543	1498.88	739.247	759.63	1421.56	682.309
40	1.51224	2006.77	16.0596	Sandy Lean Clay	150	15	294.568	343.375	1411.73	690.045	721.686	1326.93	636.888
41	1.51224	1854.52	17.8325	Sandy Lean Clay	150	15	285.044	332.273	1317.94	637.694	680.25	1226.25	588.554
42	1.51224	1692.85	19.6232	Sandy Lean Clay	150	15	274.681	320.193	1217.27	582.103	635.171	1119.34	537.236
43	1.51224	1521.46	21.4341	Sandy Lean Clay	150	15	263.436	307.085	1109.41	523.167	586.247	1005.99	482.827
44	1.51224	1339.98	23.2679	Sandy Lean Clay	150	15	251.256	292.887	994.024	460.764	533.26	885.983	425.219
45	1.51224	1148.02	25.1272	Sandy Lean Clay	150	15	238.083	277.531	870.706	394.756	475.95	759.042	364.286
46	1.51224	945.098	27.0153	Sandy Lean Clay	150	15	223.843	260.932	738.985	324.98	414.005	624.856	299.876
47	1.51224	730.674	28.9358	Sandy Lean Clay	150	15	208.455	242.994	598.307	251.248	347.059	483.064	231.816
48	1.51224	504.114	30.8926	Sandy Lean Clay	150	15	191.815	223.597	448.011	173.343	274.668	333.245	159.902
49	1.51224	282.93	32.8903	Sandy Lean Clay	150	15	175.598	204.693	300.542	96.4235	204.119	186.985	90.5612
50	1.51224	95.8428	34.9342	Sandy Lean Clay	150	15	161.593	188.367	176.142	32.9549	143.187	63.27	30.3151

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.3097

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	13.2001	164	0	0	0
2	14.9516	161.813	202.514	0	0
3	16.7031	159.823	735.047	0	0
4	18.4546	158	1507.12	0	0
5	19.9789	156.534	2216.34	0	0
6	21.5032	155.168	3063.03	0	0
7	23.0275	153.893	4011.34	0	0
8	24.5518	152.703	5031.39	0	0
9	26.0761	151.589	6088.02	0	0
10	27.6004	150.548	7132.98	0	0
11	29.1247	149.575	8152.09	0	0
12	30.649	148.666	9134.63	0	0
13	32.1734	147.818	10071.6	0	0
14	33.6977	147.027	10955.4	0	0
15	35.222	146.291	11779.7	0	0
16	36.7463	145.609	12539.2	0	0
17	38.2706	144.977	13229.7	0	0
18	39.7949	144.394	13847.7	0	0
19	41.3192	143.859	14390.2	0	0
20	42.8435	143.37	14855.3	0	0
21	44.3678	142.926	15241.4	0	0
22	45.8921	142.527	15547.5	0	0
23	47.4164	142.17	15773.2	0	0
24	48.9407	141.856	15918.4	0	0
25	50.4651	141.583	15983.7	0	0
26	51.9894	141.351	15969.9	0	0
27	53.5137	141.16	15878.4	0	0
28	55.038	141.009	15710.9	0	0
29	56.5623	140.898	15469.6	0	0
30	58.0866	140.826	15157	0	0
31	59.6109	140.794	14776.2	0	0
32	61.1352	140.802	14330.6	0	0
33	62.6595	140.849	13824	0	0
34	64.1838	140.935	13260.7	0	0
35	65.7081	141.061	12645.7	0	0
36	67.2325	141.227	11984.1	0	0
37	68.7568	141.433	11281.9	0	0
38	70.2811	141.68	10545.6	0	0
39	71.8054	141.969	9782.24	0	0
40	73.3297	142.299	8999.62	0	0
41	74.854	142.671	8206.34	0	0
42	76.3783	143.088	7411.79	0	0
43	77.9026	143.548	6626.36	0	0
44	79.4269	144.054	5861.44	0	0
45	80.9512	144.607	5129.64	0	0
46	82.4755	145.208	4444.92	0	0
47	83.9998	145.859	3822.75	0	0
48	85.5242	146.561	3277.38	0	0
49	87.0485	147.317	2797	0	0
50	88.5728	148.129	2387.99	0	0
51	90.0971	149	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.16569

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	13.8244	164	0	0	0
2	15	162.139	143.729	0	0
3	15.0926	162	146.336	0	0
4	16.5724	159.898	677.142	0	0
5	18.0521	158	1466.11	0	0
6	19.5644	156.235	2305.14	0	0
7	21.0766	154.621	3336.84	0	0
8	22.5889	153.138	4502.37	0	0
9	24.1011	151.771	5756	0	0
10	25.6133	150.509	7058.49	0	0
11	27.1256	149.34	8347.38	0	0
12	28.6378	148.259	9598.16	0	0
13	30.1501	147.258	10796.9	0	0
14	31.6623	146.331	11932.3	0	0
15	33.1746	145.474	12995.1	0	0
16	34.6868	144.684	13977.8	0	0
17	36.1991	143.956	14874.5	0	0
18	37.7113	143.288	15680.2	0	0
19	39.2235	142.677	16391.2	0	0
20	40.7358	142.121	17004.5	0	0
21	42.248	141.619	17518.1	0	0
22	43.7603	141.168	17930.5	0	0
23	45.2725	140.767	18240.8	0	0
24	46.7848	140.415	18449	0	0
25	48.297	140.112	18555.4	0	0
26	49.8093	139.855	18560.7	0	0
27	51.3215	139.645	18466.4	0	0
28	52.8337	139.48	18274.4	0	0
29	54.346	139.361	17986.8	0	0
30	55.8582	139.287	17606.5	0	0
31	57.3705	139.258	17136.8	0	0
32	58.8827	139.273	16581.3	0	0
33	60.395	139.334	15944.4	0	0
34	61.9072	139.439	15230.9	0	0
35	63.4195	139.59	14446.2	0	0
36	64.9317	139.786	13596.3	0	0
37	66.4439	140.028	12687.9	0	0
38	67.9562	140.317	11728.4	0	0
39	69.4684	140.654	10726	0	0
40	70.9807	141.04	9689.92	0	0
41	72.4929	141.475	8630.32	0	0
42	74.0052	141.961	7558.53	0	0
43	75.5174	142.501	6487.21	0	0
44	77.0297	143.094	5430.57	0	0
45	78.5419	143.745	4404.59	0	0
46	80.0541	144.454	3427.33	0	0
47	81.5664	145.225	2519.37	0	0
48	83.0786	146.061	1704.23	0	0
49	84.5909	146.966	1009.08	0	0
50	86.1031	147.944	449.866	0	0
51	87.6154	149	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	164
25	164
85	149
120	149

External Boundary

X	Y
0	164
0	162
0	158
0	134
120	134
120	147
120	149
95	149
85	149
49	158
25	164
15	164

Material Boundary

X	Y
0	158
41	158
49	158

Material Boundary

X	Y
15	164
15	162
25	162
41	158
85	147
95	147
95	149



TISD HCFCF Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 3, Rapid Drawdown - Total Stress Local Analysis
Terracon Consultants Inc.
Date Created: 9/13/2022, 9:47:40 AM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.367s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/13/2022, 9:47:40 AM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:

Random Number Generation Method:

10116

Park and Miller v.3

Surface Options

Surface Type:

Search Method:

Radius Increment:

Composite Surfaces:

Reverse Curvature:

Minimum Elevation:

Minimum Depth:

Minimum Area:

Minimum Weight:

Circular

Grid Search

10

Disabled

Invalid Surfaces

Not Defined

Not Defined

Not Defined

Not Defined

Seismic Loading

Advanced seismic analysis:

Staged pseudostatic analysis:

No

No

Materials

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	150
Friction Angle [deg]	15
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	125
Friction Angle [deg]	16
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.386140
Center:	62.028, 184.401
Radius:	42.201
Left Slip Surface Endpoint:	25.099, 163.975
Right Slip Surface Endpoint:	85.000, 149.000
Resisting Moment:	790565 lb-ft
Driving Moment:	570334 lb-ft
Total Slice Area:	572.854 ft2
Surface Horizontal Width:	59.901 ft
Surface Average Height:	9.56334 ft

Method: janbu simplified

FS	1.202070
Center:	59.543, 174.998
Radius:	36.251
Left Slip Surface Endpoint:	25.000, 164.000
Right Slip Surface Endpoint:	84.846, 149.038
Resisting Horizontal Force:	19650.4 lb
Driving Horizontal Force:	16347.1 lb
Total Slice Area:	749.236 ft ²
Surface Horizontal Width:	59.8464 ft
Surface Average Height:	12.5193 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	8848
Number of Invalid Surfaces:	413

Error Codes

Error Code -101 reported for 304 surfaces
 Error Code -102 reported for 2 surfaces
 Error Code -106 reported for 20 surfaces
 Error Code -108 reported for 24 surfaces
 Error Code -1000 reported for 63 surfaces

Method: janbu simplified

Number of Valid Surfaces:	8830
Number of Invalid Surfaces:	431

Error Codes

Error Code -101 reported for 304 surfaces
 Error Code -102 reported for 2 surfaces
 Error Code -106 reported for 20 surfaces
 Error Code -108 reported for 42 surfaces
 Error Code -1000 reported for 63 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

- 101 = Only one (or zero) surface / slope intersections.
- 102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
- 106 = Average slice width is less than $0.0001 \times$ (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
- 108 = Total driving moment or total driving force < 0.1 . This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
- 1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.38614

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.40137	168.164	-59.1949	Clay Liner	125	16	75.7993	105.068	-7.11132	62.3985	-69.5098	120.017	57.6188
2	1.30211	436.571	-55.7656	Silty Sand	0	32	43.6419	60.4938	271.154	174.344	96.8102	335.288	160.944
3	1.30211	668.908	-52.7342	Silty Sand	0	32	69.8055	96.7602	421.977	267.128	154.849	513.723	246.595
4	1.18926	789.808	-50.0177	Sandy Lean Clay	150	15	138.023	191.319	499.544	345.338	154.206	664.137	318.799
5	1.18926	941.394	-47.5646	Sandy Lean Clay	150	15	149.96	207.865	627.573	411.619	215.954	791.597	379.978
6	1.18926	1077.3	-45.2218	Sandy Lean Clay	150	15	160.921	223.06	743.706	471.044	272.662	905.878	434.834
7	1.18926	1199.45	-42.9722	Sandy Lean Clay	150	15	171.005	237.037	849.28	524.453	324.827	1008.59	484.136
8	1.18926	1309.33	-40.8021	Sandy Lean Clay	150	15	180.289	249.905	945.348	572.498	372.85	1100.98	528.483
9	1.18926	1408.15	-38.701	Sandy Lean Clay	150	15	188.837	261.754	1032.78	615.704	417.075	1184.07	568.368
10	1.18926	1496.87	-36.6601	Sandy Lean Clay	150	15	196.704	272.659	1112.26	654.496	457.767	1258.67	604.173
11	1.18926	1576.3	-34.6719	Sandy Lean Clay	150	15	203.933	282.68	1184.39	689.227	495.166	1325.46	636.228
12	1.18926	1647.11	-32.7305	Sandy Lean Clay	150	15	210.565	291.872	1249.66	720.189	529.475	1385	664.814
13	1.18926	1709.87	-30.8305	Sandy Lean Clay	150	15	216.63	300.279	1308.48	747.631	560.851	1437.78	690.144
14	1.18926	1765.06	-28.9675	Sandy Lean Clay	150	15	222.156	307.94	1361.2	771.765	589.435	1484.18	712.414
15	1.18926	1813.11	-27.1375	Sandy Lean Clay	150	15	227.169	314.888	1408.14	792.77	615.371	1524.58	731.806
16	1.18926	1854.35	-25.3369	Sandy Lean Clay	150	15	231.689	321.153	1449.55	810.805	638.75	1559.26	748.451
17	1.18926	1889.11	-23.5629	Sandy Lean Clay	150	15	235.733	326.759	1485.68	826.003	659.674	1588.48	762.482
18	1.18926	1917.65	-21.8125	Sandy Lean Clay	150	15	239.318	331.728	1516.7	838.483	678.221	1612.48	774.001
19	1.18926	1940.21	-20.0832	Sandy Lean Clay	150	15	242.457	336.08	1542.8	848.347	694.457	1631.45	783.104
20	1.18926	1956.99	-18.3729	Sandy Lean Clay	150	15	245.162	339.829	1564.13	855.685	708.447	1645.56	789.873
21	1.18926	1968.17	-16.6794	Sandy Lean Clay	150	15	247.443	342.99	1580.82	860.573	720.25	1654.96	794.389
22	1.18926	1973.91	-15.0007	Sandy Lean Clay	150	15	249.307	345.575	1592.98	863.081	729.899	1659.79	796.704
23	1.18926	1974.33	-13.3352	Sandy Lean Clay	150	15	250.764	347.594	1600.7	863.267	737.43	1660.14	796.87
24	1.18926	1969.56	-11.681	Sandy Lean Clay	150	15	251.818	349.055	1604.07	861.181	742.884	1656.13	794.946
25	1.18926	1959.7	-10.0367	Sandy Lean Clay	150	15	252.474	349.965	1603.14	856.866	746.276	1647.83	790.961
26	1.18926	1944.82	-8.40069	Sandy Lean Clay	150	15	252.736	350.328	1598	850.361	747.634	1635.32	784.958
27	1.18926	1925	-6.77157	Sandy Lean Clay	150	15	252.607	350.148	1588.65	841.694	746.959	1618.65	776.954
28	1.18926	1900.29	-5.14793	Sandy Lean Clay	150	15	252.086	349.427	1575.16	830.89	744.272	1597.87	766.983
29	1.18926	1870.73	-3.52843	Sandy Lean Clay	150	15	251.177	348.166	1557.54	817.968	739.569	1573.02	755.056
30	1.18926	1836.37	-1.91174	Sandy Lean Clay	150	15	249.877	346.364	1535.78	802.942	732.842	1544.12	741.183
31	1.18926	1797.21	-0.296586	Sandy Lean Clay	150	15	248.186	344.02	1509.91	785.82	724.094	1511.2	725.379
32	1.18926	1753.27	1.31834	Sandy Lean Clay	150	15	246.1	341.129	1479.91	766.606	713.304	1474.25	707.641

33	1.18926	1704.53	2.93431	Sandy Lean Clay	150	15	243.616	337.686	1445.75	745.297	700.457	1433.27	687.969
34	1.18926	1651	4.55262	Sandy Lean Clay	150	15	240.73	333.686	1407.42	721.888	685.531	1388.25	666.362
35	1.18926	1592.63	6.17459	Sandy Lean Clay	150	15	237.437	329.121	1364.85	696.367	668.485	1339.16	642.797
36	1.18926	1529.39	7.80154	Sandy Lean Clay	150	15	233.727	323.979	1318.01	668.717	649.297	1285.99	617.274
37	1.18926	1461.23	9.43485	Sandy Lean Clay	150	15	229.594	318.25	1266.83	638.914	627.92	1228.68	589.768
38	1.18926	1388.09	11.0759	Sandy Lean Clay	150	15	225.028	311.92	1211.23	606.932	604.296	1167.18	560.245
39	1.18926	1309.88	12.7263	Sandy Lean Clay	150	15	220.015	304.972	1151.1	572.737	578.364	1101.41	528.675
40	1.18926	1226.51	14.3875	Sandy Lean Clay	150	15	214.545	297.389	1086.35	536.286	550.066	1031.32	495.03
41	1.18926	1137.88	16.0611	Sandy Lean Clay	150	15	208.6	289.149	1016.85	497.532	519.316	956.792	459.26
42	1.18926	1043.86	17.749	Sandy Lean Clay	150	15	202.164	280.227	942.436	456.421	486.015	877.727	421.306
43	1.18926	944.293	19.4529	Sandy Lean Clay	150	15	195.215	270.595	862.953	412.886	450.067	794.004	381.118
44	1.18926	839.018	21.1749	Sandy Lean Clay	150	15	187.731	260.221	778.205	366.855	411.35	705.484	338.629
45	1.18926	727.838	22.9173	Sandy Lean Clay	150	15	179.683	249.066	687.962	318.242	369.72	611.997	293.755
46	1.18926	610.531	24.6824	Sandy Lean Clay	150	15	171.041	237.087	591.964	266.95	325.014	513.358	246.408
47	1.18926	486.84	26.4728	Sandy Lean Clay	150	15	161.768	224.234	489.911	212.867	277.044	409.352	196.485
48	1.18926	356.473	28.2916	Sandy Lean Clay	150	15	151.821	210.446	381.451	155.865	225.586	299.732	143.867
49	1.18926	219.091	30.1421	Sandy Lean Clay	150	15	141.149	195.653	266.173	95.7948	170.378	184.213	88.4178
50	1.18926	74.2999	32.028	Sandy Lean Clay	150	15	129.692	179.771	143.593	32.4857	111.107	62.4645	29.9788

Global Minimum Query (janbu simplified) - Safety Factor: 1.20207

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	0.777038	93.2446	-70.4998	Clay Liner	125	16	70.3044	84.5108	-78.8042	62.3985	-141.203	119.727	57.3281
2	1.74651	772.212	-65.349	Silty Sand	0	32	51.6911	62.1363	329.353	229.915	99.4385	441.991	212.076
3	1.19423	897.105	-60.142	Sandy Lean Clay	150	15	147.72	177.57	493.517	390.623	102.894	750.848	360.225
4	1.19423	1132.84	-56.5344	Sandy Lean Clay	150	15	169.159	203.341	692.337	493.267	199.07	948.241	454.974
5	1.19423	1334.08	-53.2453	Sandy Lean Clay	150	15	188.094	226.103	864.915	580.893	284.022	1116.76	535.868
6	1.19423	1508.55	-50.1937	Sandy Lean Clay	150	15	205.025	246.455	1016.84	656.862	359.974	1262.86	605.998
7	1.19423	1661.26	-47.3269	Sandy Lean Clay	150	15	220.288	264.801	1151.8	723.359	428.44	1390.75	667.388
8	1.19423	1795.71	-44.6087	Sandy Lean Clay	150	15	234.119	281.428	1272.4	781.9	490.495	1503.34	721.438
9	1.19423	1914.41	-42.0126	Sandy Lean Clay	150	15	246.7	296.551	1380.52	833.588	546.936	1602.75	769.165
10	1.19423	2019.3	-39.5188	Sandy Lean Clay	150	15	258.166	310.334	1477.63	879.257	598.375	1690.59	811.334
11	1.19423	2111.84	-37.1118	Sandy Lean Clay	150	15	268.625	322.906	1564.85	919.554	645.293	1768.09	848.54
12	1.19423	2193.23	-34.7792	Sandy Lean Clay	150	15	278.164	334.373	1643.08	954.992	688.089	1836.26	881.269
13	1.19423	2264.41	-32.5109	Sandy Lean Clay	150	15	286.854	344.818	1713.06	985.985	727.07	1895.88	909.893
14	1.19423	2326.16	-30.2986	Sandy Lean Clay	150	15	294.751	354.311	1775.38	1012.87	762.506	1947.6	934.734
15	1.19423	2379.13	-28.1352	Sandy Lean Clay	150	15	301.904	362.91	1830.53	1035.94	794.595	1991.98	956.035
16	1.19423	2423.87	-26.0147	Sandy Lean Clay	150	15	308.356	370.666	1878.96	1055.42	823.535	2029.45	974.029

17	1.19423	2460.82	-23.932	Sandy Lean Clay	150	15	314.14	377.618	1920.99	1071.51	849.481	2060.41	988.899
18	1.19423	2490.38	-21.8823	Sandy Lean Clay	150	15	319.283	383.801	1956.94	1084.38	872.557	2085.17	1000.79
19	1.19423	2512.88	-19.8617	Sandy Lean Clay	150	15	323.813	389.246	1987.05	1094.18	892.875	2104.03	1009.85
20	1.19423	2528.59	-17.8666	Sandy Lean Clay	150	15	327.748	393.976	2011.55	1101.02	910.529	2117.2	1016.18
21	1.19423	2537.75	-15.8937	Sandy Lean Clay	150	15	331.107	398.014	2030.61	1105.01	925.601	2124.89	1019.88
22	1.19423	2540.57	-13.94	Sandy Lean Clay	150	15	333.904	401.376	2044.38	1106.23	938.15	2127.26	1021.03
23	1.19423	2537.22	-12.0027	Sandy Lean Clay	150	15	336.151	404.077	2053	1104.78	948.223	2124.47	1019.69
24	1.19423	2527.84	-10.0792	Sandy Lean Clay	150	15	337.858	406.129	2056.58	1100.69	955.888	2116.63	1015.94
25	1.19423	2512.54	-8.16714	Sandy Lean Clay	150	15	339.032	407.54	2055.18	1094.03	961.151	2103.84	1009.81
26	1.19423	2491.43	-6.26422	Sandy Lean Clay	150	15	339.679	408.318	2048.89	1084.84	964.052	2086.18	1001.34
27	1.19423	2464.58	-4.36822	Sandy Lean Clay	150	15	339.801	408.465	2037.74	1073.14	964.605	2063.7	990.562
28	1.19423	2432.03	-2.47701	Sandy Lean Clay	150	15	339.402	407.985	2021.79	1058.97	962.816	2036.47	977.498
29	1.19423	2393.82	-0.5885	Sandy Lean Clay	150	15	338.48	406.877	2001.01	1042.34	958.673	2004.49	962.15
30	1.19423	2349.98	1.29937	Sandy Lean Clay	150	15	337.034	405.139	1975.44	1023.24	952.199	1967.79	944.555
31	1.19423	2300.48	3.18866	Sandy Lean Clay	150	15	335.06	402.766	1945.03	1001.69	943.341	1926.36	924.674
32	1.19423	2245.32	5.08143	Sandy Lean Clay	150	15	332.552	399.751	1909.75	977.675	932.08	1880.18	902.509
33	1.19423	2184.45	6.97978	Sandy Lean Clay	150	15	329.502	396.085	1869.57	951.17	918.399	1829.23	878.059
34	1.19423	2117.81	8.88587	Sandy Lean Clay	150	15	325.9	391.755	1824.4	922.153	902.243	1773.44	851.291
35	1.19423	2045.32	10.8019	Sandy Lean Clay	150	15	321.735	386.748	1774.14	890.589	883.555	1712.76	822.169
36	1.19423	1966.88	12.7303	Sandy Lean Clay	150	15	316.99	381.044	1718.7	856.432	862.264	1647.08	790.651
37	1.19423	1882.35	14.6735	Sandy Lean Clay	150	15	311.647	374.622	1657.93	819.628	838.303	1576.33	756.698
38	1.19423	1791.6	16.6342	Sandy Lean Clay	150	15	305.686	367.456	1591.67	780.11	811.556	1500.34	720.229
39	1.19423	1694.42	18.6151	Sandy Lean Clay	150	15	299.081	359.516	1519.72	737.798	781.923	1418.98	681.183
40	1.19423	1590.62	20.6194	Sandy Lean Clay	150	15	291.802	350.766	1441.87	692.598	749.268	1332.07	639.474
41	1.19423	1479.93	22.6504	Sandy Lean Clay	150	15	283.813	341.163	1357.83	644.4	713.432	1239.4	594.999
42	1.19423	1362.05	24.712	Sandy Lean Clay	150	15	275.073	330.657	1267.29	593.075	674.219	1140.7	547.63
43	1.19423	1236.65	26.8084	Sandy Lean Clay	150	15	265.531	319.187	1169.88	538.47	631.412	1035.7	497.234
44	1.19423	1103.3	28.9444	Sandy Lean Clay	150	15	255.128	306.682	1065.15	480.405	584.744	924.053	443.648
45	1.19423	961.517	31.1255	Sandy Lean Clay	150	15	243.79	293.053	952.551	418.67	533.881	805.34	386.67
46	1.19423	810.727	33.358	Sandy Lean Clay	150	15	231.429	278.194	831.435	353.012	478.423	679.079	326.067
47	1.19423	650.234	35.6494	Sandy Lean Clay	150	15	217.932	261.97	701.002	283.128	417.874	544.693	261.565
48	1.19423	479.198	38.0087	Sandy Lean Clay	150	15	203.159	244.211	560.255	208.655	351.6	401.48	192.825
49	1.19423	296.589	40.4468	Sandy Lean Clay	150	15	186.927	224.699	407.923	129.142	278.781	248.572	119.43
50	1.19423	101.125	42.9771	Sandy Lean Clay	150	15	168.993	203.141	242.357	44.031	198.326	84.8947	40.8637

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.38614

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.099	163.975	0	0	0
2	26.5004	161.625	-122.922	0	0
3	27.8025	159.711	339.118	0	0
4	29.1046	158	970.4	0	0
5	30.2939	156.582	1514.73	0	0
6	31.4831	155.281	2152.76	0	0
7	32.6724	154.082	2852.75	0	0
8	33.8617	152.975	3590.34	0	0
9	35.0509	151.948	4346.48	0	0
10	36.2402	150.995	5105.98	0	0
11	37.4294	150.11	5856.61	0	0
12	38.6187	149.287	6588.43	0	0
13	39.808	148.523	7293.27	0	0
14	40.9972	147.813	7964.44	0	0
15	42.1865	147.155	8596.4	0	0
16	43.3758	146.545	9184.62	0	0
17	44.565	145.982	9725.36	0	0
18	45.7543	145.463	10215.6	0	0
19	46.9436	144.988	10652.9	0	0
20	48.1328	144.553	11035.5	0	0
21	49.3221	144.158	11361.8	0	0
22	50.5113	143.801	11630.8	0	0
23	51.7006	143.483	11842	0	0
24	52.8899	143.201	11995.1	0	0
25	54.0791	142.955	12090	0	0
26	55.2684	142.744	12127.3	0	0
27	56.4577	142.569	12107.4	0	0
28	57.6469	142.428	12031.3	0	0
29	58.8362	142.32	11900.4	0	0
30	60.0255	142.247	11715.9	0	0
31	61.2147	142.207	11479.7	0	0
32	62.404	142.201	11193.9	0	0
33	63.5933	142.229	10860.8	0	0
34	64.7825	142.29	10483	0	0
35	65.9718	142.384	10063.4	0	0
36	67.161	142.513	9605.48	0	0
37	68.3503	142.676	9112.8	0	0
38	69.5396	142.874	8589.43	0	0
39	70.7288	143.106	8039.87	0	0
40	71.9181	143.375	7469.08	0	0
41	73.1074	143.68	6882.55	0	0
42	74.2966	144.022	6286.34	0	0
43	75.4859	144.403	5687.2	0	0
44	76.6752	144.823	5092.59	0	0
45	77.8644	145.284	4510.85	0	0
46	79.0537	145.787	3951.29	0	0
47	80.2429	146.333	3424.37	0	0
48	81.4322	146.925	2941.86	0	0
49	82.6215	147.565	2517.15	0	0
50	83.8107	148.256	2165.5	0	0
51	85	149	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.20207

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25	164	0	0	0
2	25.777	161.806	-227.621	0	0
3	27.5235	158	935.411	0	0
4	28.7178	155.92	1785.45	0	0
5	29.912	154.113	2833.96	0	0
6	31.1062	152.514	3992.01	0	0
7	32.3005	151.081	5203.99	0	0
8	33.4947	149.786	6432.58	0	0
9	34.6889	148.608	7651.52	0	0
10	35.8831	147.532	8841.61	0	0
11	37.0774	146.547	9988.5	0	0
12	38.2716	145.643	11081.2	0	0
13	39.4658	144.814	12111.3	0	0
14	40.66	144.053	13072.1	0	0
15	41.8543	143.355	13958.5	0	0
16	43.0485	142.716	14766.4	0	0
17	44.2427	142.133	15492.8	0	0
18	45.437	141.603	16135.3	0	0
19	46.6312	141.124	16692.1	0	0
20	47.8254	140.692	17162.1	0	0
21	49.0196	140.307	17544.5	0	0
22	50.2139	139.967	17839	0	0
23	51.4081	139.671	18045.7	0	0
24	52.6023	139.417	18165	0	0
25	53.7965	139.205	18197.5	0	0
26	54.9908	139.033	18144.3	0	0
27	56.185	138.902	18006.7	0	0
28	57.3792	138.811	17786.2	0	0
29	58.5734	138.759	17484.8	0	0
30	59.7677	138.747	17104.6	0	0
31	60.9619	138.774	16648	0	0
32	62.1561	138.841	16117.9	0	0
33	63.3504	138.947	15517.4	0	0
34	64.5446	139.093	14850	0	0
35	65.7388	139.28	14119.7	0	0
36	66.933	139.508	13330.7	0	0
37	68.1273	139.777	12487.9	0	0
38	69.3215	140.09	11596.8	0	0
39	70.5157	140.447	10663.3	0	0
40	71.7099	140.849	9694.33	0	0
41	72.9042	141.299	8697.49	0	0
42	74.0984	141.797	7681.42	0	0
43	75.2926	142.346	6655.98	0	0
44	76.4869	142.95	5632.45	0	0
45	77.6811	143.61	4623.86	0	0
46	78.8753	144.332	3645.41	0	0
47	80.0695	145.118	2714.98	0	0
48	81.2638	145.974	1853.92	0	0
49	82.458	146.908	1088.07	0	0
50	83.6522	147.926	449.241	0	0
51	84.8464	149.038	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	164
25	164
85	149
120	149

External Boundary

X	Y
0	164
0	162
0	158
0	134
120	134
120	147
120	149
95	149
85	149
49	158
25	164
15	164

Material Boundary

X	Y
0	158
41	158
49	158

Material Boundary

X	Y
15	164
15	162
25	162
41	158
85	147
95	147
95	149



TISD HCFC Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 3, Rapid Drawdown - Effective Stress Global Analysis
Terracon Consultants Inc.
Date Created: 9/13/2022, 9:47:40 AM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.447s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/13/2022, 9:47:40 AM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:10116

Random Number Generation Method:Park and Miller v.3

Surface Options

Surface Type:Circular

Search Method:Grid Search

Radius Increment:10

Composite Surfaces:Disabled

Reverse Curvature:Invalid Surfaces

Minimum Elevation:Not Defined

Minimum Depth:Not Defined

Minimum Area:Not Defined

Minimum Weight:Not Defined

Seismic Loading

Advanced seismic analysis:No

Staged pseudostatic analysis:No

Materials

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	125
Friction Angle [deg]	21
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.484080
Center:	61.946, 202.724
Radius:	59.791
Left Slip Surface Endpoint:	16.389, 164.000
Right Slip Surface Endpoint:	88.189, 149.000
Resisting Moment:	1.4301e+06 lb-ft
Driving Moment:	963627 lb-ft
Total Slice Area:	669.202 ft2
Surface Horizontal Width:	71.7995 ft
Surface Average Height:	9.32042 ft

Method: janbu simplified

FS		1.339540
Center:	60.703, 194.496	
Radius:	53.089	
Left Slip Surface Endpoint:	17.247, 164.000	
Right Slip Surface Endpoint:	88.062, 149.000	
Resisting Horizontal Force:	23785.3 lb	
Driving Horizontal Force:	17756.3 lb	
Total Slice Area:	743.349 ft2	
Surface Horizontal Width:	70.8153 ft	
Surface Average Height:	10.497 ft	

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	8401
Number of Invalid Surfaces:	860

Error Codes

Error Code -103 reported for 860 surfaces

Method: janbu simplified

Number of Valid Surfaces:	8401
Number of Invalid Surfaces:	860

Error Codes

Error Code -103 reported for 860 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.48408

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.77866	213.44	-48.3523	Clay Liner	100	20	63.8939	94.8237	48.1768	62.3985	-14.2217	120.022	57.6231
2	1.36508	443.91	-46.126	Silty Sand	0	32	45.7104	67.8379	277.66	169.097	108.563	325.204	156.107
3	1.36508	669.19	-44.2689	Silty Sand	0	32	70.2509	104.258	421.76	254.913	166.847	490.24	235.327
4	1.36508	880.52	-42.4687	Silty Sand	0	32	94.1061	139.661	558.918	335.414	223.504	645.056	309.642

5	1.43317	1137.79	-40.6765	Sandy Lean Clay	125	21	149.558	221.956	665.406	412.827	252.579	793.939	381.112
6	1.43317	1342.86	-38.8888	Sandy Lean Clay	125	21	165.928	246.251	803.193	487.322	315.871	937.027	449.705
7	1.43317	1499.5	-37.1451	Sandy Lean Clay	125	21	179.055	265.732	910.685	544.067	366.618	1046.32	502.258
8	1.43317	1618.95	-35.4407	Sandy Lean Clay	125	21	189.585	281.36	994.737	587.407	407.33	1129.67	542.264
9	1.43317	1727.46	-33.7717	Sandy Lean Clay	125	21	199.397	295.921	1072.04	626.777	445.266	1205.39	578.608
10	1.43317	1825.66	-32.1347	Sandy Lean Clay	125	21	208.516	309.454	1142.93	662.409	480.52	1273.91	611.498
11	1.43317	1914.12	-30.5266	Sandy Lean Clay	125	21	216.965	321.993	1207.69	694.505	513.188	1335.63	641.125
12	1.43317	1993.33	-28.9447	Sandy Lean Clay	125	21	224.766	333.57	1266.59	723.244	543.343	1390.89	667.649
13	1.43317	2063.71	-27.3866	Sandy Lean Clay	125	21	231.936	344.212	1319.85	748.781	571.067	1440	691.222
14	1.43317	2125.64	-25.8501	Sandy Lean Clay	125	21	238.493	353.942	1367.67	771.252	596.413	1483.21	711.962
15	1.43317	2179.46	-24.3334	Sandy Lean Clay	125	21	244.449	362.782	1410.23	790.78	619.445	1520.77	729.99
16	1.43317	2225.47	-22.8347	Sandy Lean Clay	125	21	249.818	370.75	1447.68	807.472	640.204	1552.87	745.396
17	1.43317	2263.92	-21.3523	Sandy Lean Clay	125	21	254.612	377.864	1480.16	821.423	658.734	1579.69	758.271
18	1.43317	2295.05	-19.8848	Sandy Lean Clay	125	21	258.838	384.137	1507.8	832.72	675.078	1601.42	768.698
19	1.43317	2319.08	-18.4307	Sandy Lean Clay	125	21	262.507	389.582	1530.7	841.437	689.259	1618.18	776.74
20	1.43317	2336.18	-16.9888	Sandy Lean Clay	125	21	265.625	394.209	1548.95	847.642	701.311	1630.11	782.464
21	1.43317	2346.52	-15.558	Sandy Lean Clay	125	21	268.197	398.026	1562.65	851.395	711.258	1637.32	785.928
22	1.43317	2350.26	-14.137	Sandy Lean Clay	125	21	270.229	401.042	1571.86	852.749	719.116	1639.93	787.179
23	1.43317	2347.51	-12.7249	Sandy Lean Clay	125	21	271.724	403.26	1576.65	851.751	724.894	1638.01	786.254
24	1.43317	2338.39	-11.3206	Sandy Lean Clay	125	21	272.685	404.686	1577.05	848.443	728.607	1631.64	783.196
25	1.43317	2323	-9.92316	Sandy Lean Clay	125	21	273.113	405.321	1573.12	842.859	730.259	1620.9	778.039
26	1.43317	2301.43	-8.53166	Sandy Lean Clay	125	21	273.009	405.167	1564.89	835.033	729.862	1605.85	770.817
27	1.43317	2273.75	-7.14521	Sandy Lean Clay	125	21	272.372	404.222	1552.39	824.989	727.397	1586.53	761.541
28	1.43317	2240.01	-5.76296	Sandy Lean Clay	125	21	271.201	402.484	1535.62	812.749	722.872	1562.99	750.243
29	1.43317	2200.28	-4.38406	Sandy Lean Clay	125	21	269.494	399.951	1514.6	798.333	716.272	1535.27	736.933
30	1.43317	2154.58	-3.00771	Sandy Lean Clay	125	21	267.247	396.616	1489.34	781.753	707.583	1503.38	721.625
31	1.43317	2102.95	-1.6331	Sandy Lean Clay	125	21	264.455	392.473	1459.81	763.02	696.79	1467.35	704.33
32	1.43317	2045.41	-0.259423	Sandy Lean Clay	125	21	261.114	387.514	1426.01	742.14	683.87	1427.19	685.052
33	1.43317	1981.95	1.1141	Sandy Lean Clay	125	21	257.216	381.729	1387.92	719.115	668.801	1382.91	663.799
34	1.43317	1912.58	2.48827	Sandy Lean Clay	125	21	252.753	375.106	1345.49	693.945	651.545	1334.51	640.561
35	1.43317	1837.28	3.86387	Sandy Lean Clay	125	21	247.716	367.631	1298.7	666.625	632.073	1281.97	615.342
36	1.43317	1756.03	5.24171	Sandy Lean Clay	125	21	242.095	359.288	1247.48	637.145	610.339	1225.27	588.129
37	1.43317	1668.8	6.62259	Sandy Lean Clay	125	21	235.876	350.059	1191.79	605.494	586.298	1164.41	558.912
38	1.43317	1575.54	8.00736	Sandy Lean Clay	125	21	229.047	339.924	1131.55	571.655	559.898	1099.33	527.677
39	1.43317	1476.19	9.39685	Sandy Lean Clay	125	21	221.591	328.859	1066.68	535.607	531.071	1030.01	494.4
40	1.43317	1370.68	10.7919	Sandy Lean Clay	125	21	213.491	316.838	997.08	497.327	499.753	956.386	459.059
41	1.43317	1258.94	12.1935	Sandy Lean Clay	125	21	204.728	303.833	922.656	456.784	465.872	878.417	421.633

42	1.43317	1140.87	13.6026	Sandy Lean Clay	125	21	195.279	289.809	843.288	413.944	429.344	796.036	382.092
43	1.43317	1016.36	15.0201	Sandy Lean Clay	125	21	185.119	274.731	758.831	368.769	390.062	709.159	340.39
44	1.43317	885.296	16.4471	Sandy Lean Clay	125	21	174.219	258.555	669.136	321.213	347.923	617.705	296.492
45	1.43317	747.528	17.8846	Sandy Lean Clay	125	21	162.549	241.235	574.03	271.226	302.804	521.576	250.35
46	1.43317	602.901	19.3339	Sandy Lean Clay	125	21	150.072	222.719	473.316	218.751	254.565	420.662	201.911
47	1.43317	451.239	20.7962	Sandy Lean Clay	125	21	136.747	202.944	366.774	163.723	203.051	314.839	151.116
48	1.43317	293.897	22.2729	Sandy Lean Clay	125	21	122.844	182.31	255.367	106.069	149.298	205.053	98.984
49	1.43317	170.642	23.7652	Sandy Lean Clay	125	21	111.732	165.819	168.25	61.913	106.337	119.052	57.1387
50	1.43317	58.1884	25.275	Sandy Lean Clay	125	21	101.683	150.906	88.598	21.1111	67.4869	40.5871	19.476

Global Minimum Query (janbu simplified) - Safety Factor: 1.33954

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.4746	176.952	-53.5987	Clay Liner	100	20	66.0228	88.4402	30.6381	62.3985	-31.7604	120.185	57.7865
2	1.71334	627.121	-50.7949	Silty Sand	0	32	52.1795	69.8965	302.188	190.33	111.858	366.155	175.825
3	1.71334	1038.32	-47.9515	Silty Sand	0	32	89.5016	119.891	506.997	315.13	191.867	606.229	291.099
4	1.40243	1129.8	-45.4913	Sandy Lean Clay	125	21	158.125	211.815	645.074	418.911	226.163	805.935	387.024
5	1.40243	1361.33	-43.3706	Sandy Lean Clay	125	21	178.589	239.227	802.331	504.759	297.572	971.041	466.282
6	1.40243	1548.99	-41.3218	Sandy Lean Clay	125	21	195.967	262.506	932.569	574.354	358.215	1104.86	530.509
7	1.40243	1690.48	-39.3356	Sandy Lean Clay	125	21	209.921	281.198	1033.72	626.805	406.911	1205.75	578.947
8	1.40243	1818.43	-37.4044	Sandy Lean Clay	125	21	222.921	298.611	1126.52	674.245	452.271	1296.98	622.734
9	1.40243	1933.9	-35.5218	Sandy Lean Clay	125	21	235.016	314.814	1211.55	717.062	494.483	1379.32	662.254
10	1.40243	2037.79	-33.6824	Sandy Lean Clay	125	21	246.25	329.862	1289.26	755.582	533.682	1453.38	697.801
11	1.40243	2130.84	-31.8817	Sandy Lean Clay	125	21	256.657	343.802	1360.08	790.082	570.001	1519.72	729.642
12	1.40243	2213.68	-30.1155	Sandy Lean Clay	125	21	266.268	356.676	1424.34	820.801	603.537	1578.78	757.983
13	1.40243	2286.88	-28.3804	Sandy Lean Clay	125	21	275.111	368.522	1482.34	847.942	634.396	1630.97	783.027
14	1.40243	2350.92	-26.6733	Sandy Lean Clay	125	21	283.208	379.369	1534.34	871.685	662.653	1676.61	804.927
15	1.40243	2406.2	-24.9914	Sandy Lean Clay	125	21	290.583	389.248	1580.57	892.184	688.391	1716.02	823.839
16	1.40243	2453.1	-23.3322	Sandy Lean Clay	125	21	297.252	398.181	1621.23	909.575	711.658	1749.45	839.873
17	1.40243	2491.95	-21.6935	Sandy Lean Clay	125	21	303.231	406.19	1656.5	923.977	732.525	1777.13	853.155
18	1.40243	2523.01	-20.0733	Sandy Lean Clay	125	21	308.533	413.292	1686.52	935.495	751.026	1799.26	863.769
19	1.40243	2546.54	-18.4696	Sandy Lean Clay	125	21	313.169	419.503	1711.43	944.221	767.205	1816.03	871.805
20	1.40243	2562.77	-16.8809	Sandy Lean Clay	125	21	317.151	424.836	1731.34	950.236	781.102	1827.58	877.344
21	1.40243	2571.87	-15.3054	Sandy Lean Clay	125	21	320.485	429.302	1746.35	953.611	792.735	1834.05	880.442
22	1.40243	2574.02	-13.7416	Sandy Lean Clay	125	21	323.177	432.908	1756.54	954.408	802.127	1835.57	881.158
23	1.40243	2569.36	-12.1883	Sandy Lean Clay	125	21	325.231	435.66	1761.98	952.681	809.298	1832.23	879.546
24	1.40243	2558.02	-10.644	Sandy Lean Clay	125	21	326.652	437.564	1762.74	948.478	814.26	1824.13	875.651
25	1.40243	2540.12	-9.10748	Sandy Lean Clay	125	21	327.441	438.62	1758.85	941.838	817.011	1811.34	869.502
26	1.40243	2515.73	-7.57755	Sandy Lean Clay	125	21	327.598	438.83	1750.35	932.795	817.553	1793.93	861.134

27	1.40243	2484.94	-6.05305	Sandy Lean Clay	125	21	327.121	438.191	1737.27	921.378	815.89	1771.96	850.578
28	1.40243	2447.8	-4.53284	Sandy Lean Clay	125	21	326.007	436.699	1719.61	907.609	812.006	1745.46	837.851
29	1.40243	2404.37	-3.01582	Sandy Lean Clay	125	21	324.252	434.349	1697.39	891.505	805.881	1714.47	822.964
30	1.40243	2354.68	-1.50091	Sandy Lean Clay	125	21	321.852	431.134	1670.59	873.079	797.508	1679.02	805.942
31	1.40243	2298.74	0.0129415	Sandy Lean Clay	125	21	318.798	427.043	1639.19	852.338	786.85	1639.12	786.778
32	1.40243	2236.56	1.5268	Sandy Lean Clay	125	21	315.081	422.063	1603.16	829.284	773.874	1594.76	765.476
33	1.40243	2168.14	3.04174	Sandy Lean Clay	125	21	310.689	416.181	1562.47	803.915	758.555	1545.96	742.045
34	1.40243	2093.46	4.5588	Sandy Lean Clay	125	21	305.612	409.379	1517.05	776.223	740.832	1492.69	716.464
35	1.40243	2012.48	6.07908	Sandy Lean Clay	125	21	299.833	401.638	1466.86	746.196	720.666	1434.93	688.734
36	1.40243	1925.15	7.60367	Sandy Lean Clay	125	21	293.334	392.933	1411.81	713.817	697.99	1372.65	658.832
37	1.40243	1831.42	9.13369	Sandy Lean Clay	125	21	286.097	383.238	1351.8	679.063	672.733	1305.8	626.735
38	1.40243	1731.21	10.6703	Sandy Lean Clay	125	21	278.098	372.524	1286.73	641.906	644.82	1234.33	592.422
39	1.40243	1624.42	12.2148	Sandy Lean Clay	125	21	269.313	360.755	1216.47	602.312	614.161	1158.17	555.861
40	1.40243	1510.96	13.7683	Sandy Lean Clay	125	21	259.711	347.893	1140.9	560.24	580.658	1077.26	517.019
41	1.40243	1390.68	15.3322	Sandy Lean Clay	125	21	249.258	333.891	1059.83	515.644	544.182	991.486	475.842
42	1.40243	1263.45	16.9079	Sandy Lean Clay	125	21	237.918	318.701	973.074	468.469	504.605	900.753	432.284
43	1.40243	1129.1	18.4969	Sandy Lean Clay	125	21	225.646	302.262	880.438	418.653	461.785	804.951	386.298
44	1.40243	987.431	20.1008	Sandy Lean Clay	125	21	212.392	284.507	781.658	366.124	415.534	703.93	337.806
45	1.40243	838.228	21.7214	Sandy Lean Clay	125	21	198.099	265.361	676.456	310.802	365.654	597.538	286.736
46	1.40243	681.242	23.3604	Sandy Lean Clay	125	21	182.699	244.733	564.508	252.593	311.915	485.597	233.004
47	1.40243	516.19	25.0199	Sandy Lean Clay	125	21	166.116	222.519	445.441	191.395	254.046	367.909	176.514
48	1.40243	343.746	26.7023	Sandy Lean Clay	125	21	148.497	198.918	319.648	127.085	192.563	244.954	117.869
49	1.40243	200.897	28.4098	Sandy Lean Clay	125	21	133.702	179.1	215.422	74.4882	140.934	143.1	68.6116
50	1.40243	68.5319	30.1454	Sandy Lean Clay	125	21	119.96	160.691	118.388	25.4091	92.9792	48.7227	23.3136

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.48408

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	16.389	164	0	0	0
2	18.1676	162	-17.2583	0	0
3	19.5327	160.58	314.59	0	0
4	20.8978	159.249	779.948	0	0
5	22.2629	158	1349.89	0	0
6	23.696	156.768	1955.19	0	0
7	25.1292	155.612	2645.92	0	0
8	26.5624	154.527	3378.08	0	0
9	27.9955	153.507	4121.12	0	0
10	29.4287	152.548	4862.88	0	0
11	30.8619	151.648	5593.03	0	0
12	32.295	150.803	6302.79	0	0
13	33.7282	150.01	6984.67	0	0
14	35.1614	149.268	7632.3	0	0
15	36.5945	148.573	8240.26	0	0
16	38.0277	147.925	8804.01	0	0
17	39.4609	147.322	9319.71	0	0
18	40.894	146.762	9784.21	0	0
19	42.3272	146.243	10195	0	0
20	43.7604	145.766	10549.9	0	0
21	45.1935	145.328	10847.6	0	0
22	46.6267	144.929	11086.8	0	0
23	48.0599	144.568	11267.1	0	0
24	49.493	144.244	11388	0	0
25	50.9262	143.957	11449.8	0	0
26	52.3594	143.707	11452.9	0	0
27	53.7925	143.492	11398.2	0	0
28	55.2257	143.312	11286.9	0	0
29	56.6589	143.167	11120.4	0	0
30	58.092	143.057	10900.7	0	0
31	59.5252	142.982	10630	0	0
32	60.9584	142.941	10310.7	0	0
33	62.3915	142.935	9945.89	0	0
34	63.8247	142.963	9538.69	0	0
35	65.2579	143.025	9092.76	0	0
36	66.691	143.122	8612.14	0	0
37	68.1242	143.253	8101.27	0	0
38	69.5573	143.42	7565.01	0	0
39	70.9905	143.621	7008.72	0	0
40	72.4237	143.858	6438.24	0	0
41	73.8568	144.132	5859.98	0	0
42	75.29	144.441	5280.92	0	0
43	76.7232	144.788	4708.7	0	0
44	78.1563	145.173	4151.66	0	0
45	79.5895	145.596	3618.95	0	0
46	81.0227	146.058	3120.58	0	0
47	82.4558	146.561	2667.57	0	0
48	83.889	147.105	2272.01	0	0
49	85.3222	147.692	1946.11	0	0
50	86.7553	148.323	1679.85	0	0
51	88.1885	149	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.33954

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	17.2472	164	0	0	0
2	18.7218	162	-35.8797	0	0
3	20.4351	159.9	509.613	0	0
4	22.1484	158	1319.68	0	0
5	23.5509	156.573	2018.7	0	0
6	24.9533	155.248	2831.73	0	0
7	26.3557	154.015	3707.33	0	0
8	27.7581	152.866	4601.61	0	0
9	29.1606	151.794	5497.71	0	0
10	30.563	150.793	6381.73	0	0
11	31.9654	149.858	7242.15	0	0
12	33.3678	148.986	8069.36	0	0
13	34.7703	148.172	8855.37	0	0
14	36.1727	147.414	9593.46	0	0
15	37.5751	146.71	10278.1	0	0
16	38.9776	146.056	10904.6	0	0
17	40.38	145.451	11469.3	0	0
18	41.7824	144.893	11969.1	0	0
19	43.1848	144.381	12401.6	0	0
20	44.5873	143.913	12765	0	0
21	45.9897	143.487	13058	0	0
22	47.3921	143.103	13279.7	0	0
23	48.7945	142.76	13429.8	0	0
24	50.197	142.457	13508.4	0	0
25	51.5994	142.194	13515.8	0	0
26	53.0018	141.969	13453	0	0
27	54.4042	141.782	13321	0	0
28	55.8067	141.634	13121.6	0	0
29	57.2091	141.522	12856.5	0	0
30	58.6115	141.449	12528.1	0	0
31	60.0139	141.412	12139.1	0	0
32	61.4164	141.412	11692.4	0	0
33	62.8188	141.449	11191.5	0	0
34	64.2212	141.524	10640.2	0	0
35	65.6237	141.636	10042.9	0	0
36	67.0261	141.785	9404.17	0	0
37	68.4285	141.972	8729.33	0	0
38	69.8309	142.198	8024.13	0	0
39	71.2334	142.462	7294.92	0	0
40	72.6358	142.766	6548.7	0	0
41	74.0382	143.109	5793.16	0	0
42	75.4406	143.494	5036.81	0	0
43	76.8431	143.92	4289.01	0	0
44	78.2455	144.389	3560.14	0	0
45	79.6479	144.903	2861.72	0	0
46	81.0503	145.461	2206.54	0	0
47	82.4528	146.067	1608.91	0	0
48	83.8552	146.722	1084.86	0	0
49	85.2576	147.427	651.546	0	0
50	86.6601	148.186	301.007	0	0
51	88.0625	149	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	164
25	164
85	149
120	149

External Boundary

X	Y
0	164
0	162
0	158
0	134
120	134
120	147
120	149
95	149
85	149
49	158
25	164
15	164

Material Boundary

X	Y
0	158
41	158
49	158

Material Boundary

X	Y
15	164
15	162
25	162
41	158
85	147
95	147
95	149



TISD HCFC Unit No.: L109-00-00 Precinct No.4, Key Map No. 326 G & L
Soil Profile 3, Rapid Drawdown - Effective Stress Local Analysis
Terracon Consultants Inc.
Date Created: 9/13/2022, 9:47:40 AM
Software Version: 9.021

Project Summary

Slide2 Modeler Version:	9.021
Compute Time:	00h:00m:00.613s
Author:	Jonathan Han, EIT
Company:	Terracon Consultants Inc.
Date Created:	9/13/2022, 9:47:40 AM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:10116

Random Number Generation Method:Park and Miller v.3

Surface Options

Surface Type:Circular

Search Method:Grid Search

Radius Increment:10

Composite Surfaces:Disabled

Reverse Curvature:Invalid Surfaces

Minimum Elevation:Not Defined

Minimum Depth [ft]:1

Minimum Area:Not Defined

Minimum Weight:Not Defined

Seismic Loading

Advanced seismic analysis:No

Staged pseudostatic analysis:No

Materials

Silty Sand

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	32
Water Surface	Water Table
Hu Value	1

Sandy Lean Clay

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	125
Friction Angle [deg]	21
Water Surface	Water Table
Hu Value	1

Clay Liner

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	100
Friction Angle [deg]	20
Water Surface	Water Table
Hu Value	1

Global Minimums

Method: bishop simplified

FS	1.528920
Center:	63.441, 190.339
Radius:	46.599
Left Slip Surface Endpoint:	25.000, 164.000
Right Slip Surface Endpoint:	84.965, 149.009
Resisting Moment:	874907 lb-ft
Driving Moment:	572240 lb-ft
Total Slice Area:	496.438 ft2
Surface Horizontal Width:	59.9647 ft
Surface Average Height:	8.27884 ft

Method: janbu simplified

FS	1.356220
Center:	60.956, 179.760
Radius:	39.043
Left Slip Surface Endpoint:	25.265, 163.934
Right Slip Surface Endpoint:	85.000, 149.000
Resisting Horizontal Force:	20531 lb
Driving Horizontal Force:	15138.4 lb
Total Slice Area:	645.188 ft ²
Surface Horizontal Width:	59.7347 ft
Surface Average Height:	10.8009 ft

Global Minimum Support Data

No Supports Present

Valid and Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	8245
Number of Invalid Surfaces:	1016

Error Codes

Error Code -101 reported for 276 surfaces
 Error Code -102 reported for 2 surfaces
 Error Code -106 reported for 20 surfaces
 Error Code -115 reported for 676 surfaces
 Error Code -1000 reported for 42 surfaces

Method: janbu simplified

Number of Valid Surfaces:	8245
Number of Invalid Surfaces:	1016

Error Codes

Error Code -101 reported for 276 surfaces
 Error Code -102 reported for 2 surfaces
 Error Code -106 reported for 20 surfaces
 Error Code -115 reported for 676 surfaces
 Error Code -1000 reported for 42 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

- 101 = Only one (or zero) surface / slope intersections.
- 102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
- 106 = Average slice width is less than $0.0001 \times$ (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
- 115 = Surface too shallow, below the minimum depth.
- 1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.52892

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.79856	215.828	-53.7133	Clay Liner	100	20	59.7517	91.3556	38.6481	62.3985	-23.7504	120.03	57.6314
2	1.03061	309.668	-50.8413	Silty Sand	0	32	39.2536	60.0156	252.288	156.244	96.0444	300.489	144.245
3	1.03061	429.046	-48.8745	Silty Sand	0	32	55.6367	85.0641	352.608	216.477	136.131	416.328	199.851
4	1.03061	538.468	-46.9823	Silty Sand	0	32	71.2856	108.99	446.108	271.687	174.421	522.505	250.818
5	1.19727	750.922	-45.0123	Sandy Lean Clay	125	21	125.765	192.285	501.424	326.141	175.283	627.243	301.102
6	1.19727	874.068	-42.9652	Sandy Lean Clay	125	21	137.579	210.347	601.962	379.626	222.336	730.1	350.474
7	1.19727	985.893	-40.9842	Sandy Lean Clay	125	21	148.594	227.188	694.401	428.194	266.207	823.499	395.305
8	1.19727	1087.41	-39.0611	Sandy Lean Clay	125	21	158.857	242.879	779.375	472.286	307.089	908.295	436.009
9	1.19727	1179.46	-37.1892	Sandy Lean Clay	125	21	168.409	257.484	857.396	512.266	345.13	985.175	472.909
10	1.19727	1262.76	-35.3626	Sandy Lean Clay	125	21	177.285	271.055	928.931	548.441	380.49	1054.75	506.306
11	1.19727	1337.88	-33.5765	Sandy Lean Clay	125	21	185.517	283.641	994.343	581.07	413.273	1117.49	536.42
12	1.19727	1405.35	-31.8266	Sandy Lean Clay	125	21	193.131	295.282	1053.97	610.374	443.599	1173.84	563.47
13	1.19727	1465.61	-30.1094	Sandy Lean Clay	125	21	200.15	306.014	1108.1	636.544	471.559	1224.17	587.626
14	1.19727	1519.02	-28.4215	Sandy Lean Clay	125	21	206.597	315.87	1156.97	659.744	497.231	1268.78	609.038
15	1.19727	1565.94	-26.7602	Sandy Lean Clay	125	21	212.487	324.876	1200.81	680.119	520.692	1307.96	627.842
16	1.19727	1606.63	-25.1229	Sandy Lean Clay	125	21	217.839	333.058	1239.8	697.795	542.007	1341.95	644.157
17	1.19727	1641.37	-23.5072	Sandy Lean Clay	125	21	222.665	340.437	1274.11	712.882	561.232	1370.96	658.083
18	1.19727	1670.37	-21.9111	Sandy Lean Clay	125	21	226.979	347.032	1303.89	725.477	578.41	1395.18	669.706
19	1.19727	1693.83	-20.3327	Sandy Lean Clay	125	21	230.789	352.858	1329.26	735.667	593.59	1414.78	679.112
20	1.19727	1711.93	-18.7703	Sandy Lean Clay	125	21	234.106	357.93	1350.33	743.527	606.804	1429.89	686.365
21	1.19727	1724.81	-17.2222	Sandy Lean Clay	125	21	236.938	362.26	1367.21	749.124	618.082	1440.65	691.527
22	1.19727	1732.63	-15.6871	Sandy Lean Clay	125	21	239.291	365.857	1379.97	752.516	627.451	1447.17	694.654
23	1.19727	1735.48	-14.1634	Sandy Lean Clay	125	21	241.17	368.73	1388.7	753.756	634.943	1449.56	695.804
24	1.19727	1733.49	-12.6498	Sandy Lean Clay	125	21	242.58	370.886	1393.45	752.89	640.555	1447.89	695
25	1.19727	1726.73	-11.1452	Sandy Lean Clay	125	21	243.524	372.328	1394.27	749.956	644.312	1442.25	692.289
26	1.19727	1715.29	-9.64835	Sandy Lean Clay	125	21	244.002	373.06	1391.2	744.988	646.214	1432.68	687.696
27	1.19727	1699.24	-8.15811	Sandy Lean Clay	125	21	244.018	373.084	1384.3	738.016	646.283	1419.28	681.264
28	1.19727	1678.63	-6.67342	Sandy Lean Clay	125	21	243.57	372.399	1373.56	729.064	644.498	1402.06	672.997
29	1.19727	1653.51	-5.19321	Sandy Lean Clay	125	21	242.659	371.006	1359.02	718.153	640.869	1381.08	662.924
30	1.19727	1623.91	-3.71648	Sandy Lean Clay	125	21	241.281	368.899	1340.68	705.297	635.378	1356.35	651.051
31	1.19727	1589.86	-2.24221	Sandy Lean Clay	125	21	239.434	366.076	1318.54	690.509	628.027	1327.91	637.402
32	1.19727	1551.38	-0.769435	Sandy Lean Clay	125	21	237.114	362.529	1292.58	673.795	618.782	1295.76	621.966
33	1.19727	1508.47	0.702835	Sandy Lean Clay	125	21	234.316	358.251	1262.81	655.161	607.645	1259.93	604.77

34	1.19727	1461.15	2.17557	Sandy Lean Clay	125	21	231.034	353.233	1229.17	634.607	594.565	1220.4	585.789
35	1.19727	1409.39	3.64975	Sandy Lean Clay	125	21	227.26	347.462	1191.66	612.128	579.536	1177.17	565.04
36	1.19727	1353.18	5.12635	Sandy Lean Clay	125	21	222.985	340.926	1150.23	587.716	562.511	1130.22	542.507
37	1.19727	1292.5	6.60637	Sandy Lean Clay	125	21	218.199	333.609	1104.81	561.362	543.444	1079.53	518.173
38	1.19727	1227.31	8.09084	Sandy Lean Clay	125	21	212.89	325.492	1055.35	533.048	522.302	1025.09	492.038
39	1.19727	1157.57	9.58081	Sandy Lean Clay	125	21	207.045	316.555	1001.78	502.755	499.021	966.828	464.073
40	1.19727	1083.21	11.0773	Sandy Lean Clay	125	21	200.648	306.775	944.002	470.459	473.543	904.719	434.26
41	1.19727	1004.17	12.5816	Sandy Lean Clay	125	21	193.683	296.126	881.925	436.131	445.794	838.697	402.566
42	1.19727	920.373	14.0947	Sandy Lean Clay	125	21	186.128	284.575	815.445	399.737	415.708	768.711	368.974
43	1.19727	831.732	15.6179	Sandy Lean Clay	125	21	177.962	272.09	744.422	361.238	383.184	694.674	333.436
44	1.19727	738.141	17.1525	Sandy Lean Clay	125	21	169.16	258.632	668.712	320.589	348.123	616.502	295.913
45	1.19727	639.48	18.7	Sandy Lean Clay	125	21	159.691	244.155	588.149	277.739	310.41	534.096	256.357
46	1.19727	535.615	20.2617	Sandy Lean Clay	125	21	149.524	228.61	502.541	232.628	269.913	447.344	214.716
47	1.19727	426.393	21.8393	Sandy Lean Clay	125	21	138.62	211.938	411.672	185.191	226.481	356.118	170.927
48	1.19727	311.641	23.4346	Sandy Lean Clay	125	21	126.935	194.073	315.293	135.351	179.942	260.273	124.922
49	1.19727	191.161	25.0493	Sandy Lean Clay	125	21	114.42	174.939	213.119	83.024	130.095	159.644	76.6204
50	1.19727	64.7318	26.6856	Sandy Lean Clay	125	21	101.016	154.446	104.822	28.1129	76.7088	54.0475	25.9346

Global Minimum Query (janbu simplified) - Safety Factor: 1.35622

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.09797	131.756	-64.232	Clay Liner	100	20	57.297	77.7074	1.15006	62.3985	-61.2484	119.844	57.4453
2	1.08838	370.323	-60.7441	Silty Sand	0	32	41.2644	55.9636	266.491	176.93	89.5605	340.156	163.226
3	1.08838	573.741	-57.6184	Silty Sand	0	32	67.4876	91.5281	420.593	274.118	146.475	527.013	252.895
4	1.20128	837.558	-54.6051	Sandy Lean Clay	125	21	133.602	181.194	508.945	362.554	146.391	696.976	334.422
5	1.20128	1025.61	-51.6619	Sandy Lean Clay	125	21	153.242	207.83	659.737	443.956	215.781	853.51	409.554
6	1.20128	1191.05	-48.8998	Sandy Lean Clay	125	21	171.239	232.238	794.937	515.573	279.364	991.231	475.658
7	1.20128	1337.57	-46.2833	Sandy Lean Clay	125	21	187.782	254.674	916.808	578.994	337.814	1113.2	534.202
8	1.20128	1467.82	-43.7867	Sandy Lean Clay	125	21	203.02	275.34	1027.03	635.377	391.648	1221.62	586.247
9	1.20128	1583.83	-41.3906	Sandy Lean Clay	125	21	217.072	294.398	1126.89	685.594	441.293	1318.2	632.605
10	1.20128	1687.16	-39.08	Sandy Lean Clay	125	21	230.034	311.977	1217.42	730.324	487.093	1404.23	673.903
11	1.20128	1779.06	-36.8429	Sandy Lean Clay	125	21	241.986	328.186	1299.42	770.103	529.32	1480.73	710.631
12	1.20128	1860.52	-34.6696	Sandy Lean Clay	125	21	252.993	343.114	1373.58	805.369	568.209	1548.56	743.191
13	1.20128	1932.39	-32.552	Sandy Lean Clay	125	21	263.112	356.838	1440.44	836.477	603.958	1608.39	771.915
14	1.20128	1995.34	-30.4834	Sandy Lean Clay	125	21	272.389	369.419	1500.46	863.725	636.733	1660.8	797.076
15	1.20128	2049.94	-28.4578	Sandy Lean Clay	125	21	280.864	380.913	1554.04	887.362	666.679	1706.27	818.908
16	1.20128	2096.69	-26.4705	Sandy Lean Clay	125	21	288.571	391.366	1601.5	907.599	693.906	1745.2	837.596
17	1.20128	2136	-24.5169	Sandy Lean Clay	125	21	295.539	400.816	1643.14	924.615	718.527	1777.93	853.317
18	1.20128	2168.23	-22.5933	Sandy Lean Clay	125	21	301.793	409.298	1679.19	938.565	740.626	1804.77	866.209

19	1.20128	2193.68	-20.6962	Sandy Lean Clay	125	21	307.354	416.84	1709.85	949.581	760.271	1825.97	876.387
20	1.20128	2212.61	-18.8226	Sandy Lean Clay	125	21	312.24	423.466	1735.3	957.777	777.528	1841.74	883.96
21	1.20128	2225.25	-16.9697	Sandy Lean Clay	125	21	316.466	429.197	1755.7	963.249	792.456	1852.28	889.026
22	1.20128	2231.8	-15.1349	Sandy Lean Clay	125	21	320.042	434.047	1771.18	966.084	805.095	1857.74	891.658
23	1.20128	2232.42	-13.3159	Sandy Lean Clay	125	21	322.98	438.032	1781.83	966.352	815.479	1858.28	891.923
24	1.20128	2227.25	-11.5105	Sandy Lean Clay	125	21	325.286	441.16	1787.74	964.116	823.624	1853.98	889.867
25	1.20128	2216.42	-9.7166	Sandy Lean Clay	125	21	326.968	443.441	1788.99	959.426	829.563	1844.98	885.55
26	1.20128	2200.02	-7.93228	Sandy Lean Clay	125	21	328.027	444.877	1785.63	952.326	833.305	1831.34	879.011
27	1.20128	2178.13	-6.15568	Sandy Lean Clay	125	21	328.465	445.471	1777.7	942.851	834.853	1813.13	870.279
28	1.20128	2150.81	-4.38501	Sandy Lean Clay	125	21	328.282	445.222	1765.23	931.027	834.206	1790.41	859.38
29	1.20128	2118.12	-2.61853	Sandy Lean Clay	125	21	327.474	444.127	1748.23	916.875	831.352	1763.2	846.328
30	1.20128	2080.08	-0.854539	Sandy Lean Clay	125	21	326.038	442.179	1726.69	900.409	826.278	1731.55	831.141
31	1.20128	2036.71	0.908641	Sandy Lean Clay	125	21	323.967	439.37	1700.59	881.633	818.96	1695.45	813.821
32	1.20128	1988	2.67268	Sandy Lean Clay	125	21	321.252	435.689	1669.92	860.549	809.37	1654.92	794.373
33	1.20128	1933.94	4.43927	Sandy Lean Clay	125	21	317.883	431.119	1634.62	837.15	797.47	1609.94	772.791
34	1.20128	1874.51	6.2101	Sandy Lean Clay	125	21	313.846	425.644	1594.62	811.422	783.2	1560.47	749.049
35	1.20128	1809.65	7.98691	Sandy Lean Clay	125	21	309.124	419.24	1549.86	783.345	766.516	1506.49	723.144
36	1.20128	1739.3	9.77149	Sandy Lean Clay	125	21	303.698	411.881	1500.24	752.892	747.352	1447.94	695.05
37	1.20128	1663.37	11.5657	Sandy Lean Clay	125	21	297.546	403.538	1445.64	720.027	725.616	1384.75	664.724
38	1.20128	1581.78	13.3715	Sandy Lean Clay	125	21	290.641	394.173	1385.92	684.708	701.216	1316.84	632.128
39	1.20128	1494.4	15.191	Sandy Lean Clay	125	21	282.952	383.745	1320.93	646.882	674.05	1244.1	597.222
40	1.20128	1401.08	17.0263	Sandy Lean Clay	125	21	274.443	372.205	1250.48	606.488	643.992	1166.44	559.948
41	1.20128	1301.66	18.8798	Sandy Lean Clay	125	21	265.072	359.496	1174.33	563.453	610.879	1083.68	520.229
42	1.20128	1195.95	20.754	Sandy Lean Clay	125	21	254.789	345.55	1092.25	517.692	574.554	995.695	478.003
43	1.20128	1083.71	22.6519	Sandy Lean Clay	125	21	243.536	330.288	1003.9	469.108	534.789	902.264	433.156
44	1.20128	964.69	24.5764	Sandy Lean Clay	125	21	231.243	313.616	908.948	417.586	491.362	803.192	385.606
45	1.20128	838.573	26.5309	Sandy Lean Clay	125	21	217.829	295.424	806.96	362.994	443.966	698.208	335.214
46	1.20128	705.004	28.5194	Sandy Lean Clay	125	21	203.194	275.576	697.438	305.175	392.263	587.024	281.849
47	1.20128	563.567	30.5462	Sandy Lean Clay	125	21	187.217	253.908	579.768	243.951	335.817	469.285	225.334
48	1.20128	413.771	32.6162	Sandy Lean Clay	125	21	169.75	230.219	453.214	179.109	274.105	344.586	165.477
49	1.20128	255.039	34.7354	Sandy Lean Clay	125	21	150.607	204.256	316.867	110.398	206.469	212.444	102.046
50	1.20128	86.6801	36.9106	Sandy Lean Clay	125	21	129.549	175.697	169.59	37.5199	132.07	72.2847	34.7648

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.52892

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25	164	0	0	0
2	26.7986	161.55	-12.7532	0	0
3	27.8292	160.285	266.08	0	0
4	28.8598	159.105	624.96	0	0
5	29.8904	158	1044.25	0	0
6	31.0877	156.802	1494.33	0	0
7	32.2849	155.687	2000.92	0	0
8	33.4822	154.647	2545.39	0	0
9	34.6795	153.675	3112.54	0	0
10	35.8767	152.767	3689.86	0	0
11	37.074	151.917	4266.97	0	0
12	38.2713	151.122	4835.2	0	0
13	39.4685	150.379	5387.27	0	0
14	40.6658	149.685	5917.07	0	0
15	41.8631	149.037	6419.47	0	0
16	43.0603	148.433	6890.14	0	0
17	44.2576	147.872	7325.48	0	0
18	45.4549	147.351	7722.5	0	0
19	46.6521	146.87	8078.76	0	0
20	47.8494	146.426	8392.28	0	0
21	49.0467	146.019	8661.54	0	0
22	50.2439	145.648	8885.37	0	0
23	51.4412	145.312	9062.99	0	0
24	52.6385	145.01	9193.93	0	0
25	53.8357	144.741	9278.04	0	0
26	55.033	144.505	9315.46	0	0
27	56.2303	144.301	9306.6	0	0
28	57.4275	144.13	9252.15	0	0
29	58.6248	143.99	9153.05	0	0
30	59.8221	143.881	9010.51	0	0
31	61.0193	143.803	8826.01	0	0
32	62.2166	143.756	8601.26	0	0
33	63.4139	143.74	8338.26	0	0
34	64.6111	143.755	8039.27	0	0
35	65.8084	143.8	7706.86	0	0
36	67.0057	143.877	7343.86	0	0
37	68.2029	143.984	6953.44	0	0
38	69.4002	144.123	6539.1	0	0
39	70.5975	144.293	6104.69	0	0
40	71.7948	144.495	5654.44	0	0
41	72.992	144.729	5193.02	0	0
42	74.1893	144.997	4725.55	0	0
43	75.3866	145.297	4257.66	0	0
44	76.5838	145.632	3795.52	0	0
45	77.7811	146.001	3345.95	0	0
46	78.9784	146.407	2916.48	0	0
47	80.1756	146.849	2515.42	0	0
48	81.3729	147.329	2151.98	0	0
49	82.5702	147.847	1836.44	0	0
50	83.7674	148.407	1580.25	0	0
51	84.9647	149.009	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.35622

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	25.2653	163.934	0	0	0
2	26.3632	161.659	-60.3772	0	0
3	27.4516	159.716	412.435	0	0
4	28.54	158	1060.72	0	0
5	29.7412	156.309	1760.48	0	0
6	30.9425	154.79	2578.29	0	0
7	32.1438	153.413	3466.98	0	0
8	33.3451	152.157	4392.91	0	0
9	34.5464	151.005	5331.27	0	0
10	35.7476	149.947	6263.23	0	0
11	36.9489	148.971	7174.18	0	0
12	38.1502	148.071	8052.68	0	0
13	39.3515	147.24	8889.62	0	0
14	40.5527	146.473	9677.71	0	0
15	41.754	145.766	10411.1	0	0
16	42.9553	145.115	11085.1	0	0
17	44.1566	144.517	11695.9	0	0
18	45.3579	143.969	12240.7	0	0
19	46.5591	143.469	12717.1	0	0
20	47.7604	143.015	13123.3	0	0
21	48.9617	142.606	13458.3	0	0
22	50.163	142.239	13721.3	0	0
23	51.3642	141.915	13911.8	0	0
24	52.5655	141.63	14029.9	0	0
25	53.7668	141.386	14076	0	0
26	54.9681	141.18	14050.7	0	0
27	56.1693	141.012	13955	0	0
28	57.3706	140.883	13790.2	0	0
29	58.5719	140.791	13557.9	0	0
30	59.7732	140.736	13260.1	0	0
31	60.9745	140.718	12898.8	0	0
32	62.1757	140.737	12476.7	0	0
33	63.377	140.793	11996.7	0	0
34	64.5783	140.886	11461.9	0	0
35	65.7796	141.017	10875.9	0	0
36	66.9808	141.186	10242.8	0	0
37	68.1821	141.392	9567.16	0	0
38	69.3834	141.638	8853.87	0	0
39	70.5847	141.924	8108.51	0	0
40	71.786	142.25	7337.3	0	0
41	72.9872	142.618	6547.17	0	0
42	74.1885	143.029	5745.89	0	0
43	75.3898	143.484	4942.21	0	0
44	76.5911	143.985	4145.99	0	0
45	77.7923	144.535	3368.47	0	0
46	78.9936	145.134	2622.49	0	0
47	80.1949	145.787	1922.81	0	0
48	81.3962	146.496	1286.61	0	0
49	82.5974	147.265	734.024	0	0
50	83.7987	148.098	288.945	0	0
51	85	149	0	0	0

Discharge Sections

Entity Information

Water Table

X	Y
0	164
25	164
85	149
120	149

External Boundary

X	Y
0	164
0	162
0	158
0	134
120	134
120	147
120	149
95	149
85	149
49	158
25	164
15	164

Material Boundary

X	Y
0	158
41	158
49	158

Material Boundary

X	Y
15	164
15	162
25	162
41	158
85	147
95	147
95	149

Geotechnical Engineering Report

Tomball ISD HCFCD Unit No.: L 109-00-00 ■ Precinct No. 4

Key Map No.: 326G and L ■ Cypress, Texas

January 25, 2024 ■ Terracon Project No. 92225364.Revision2



APPENDIX D – INFORMATION PROVIDED BY CLIENT

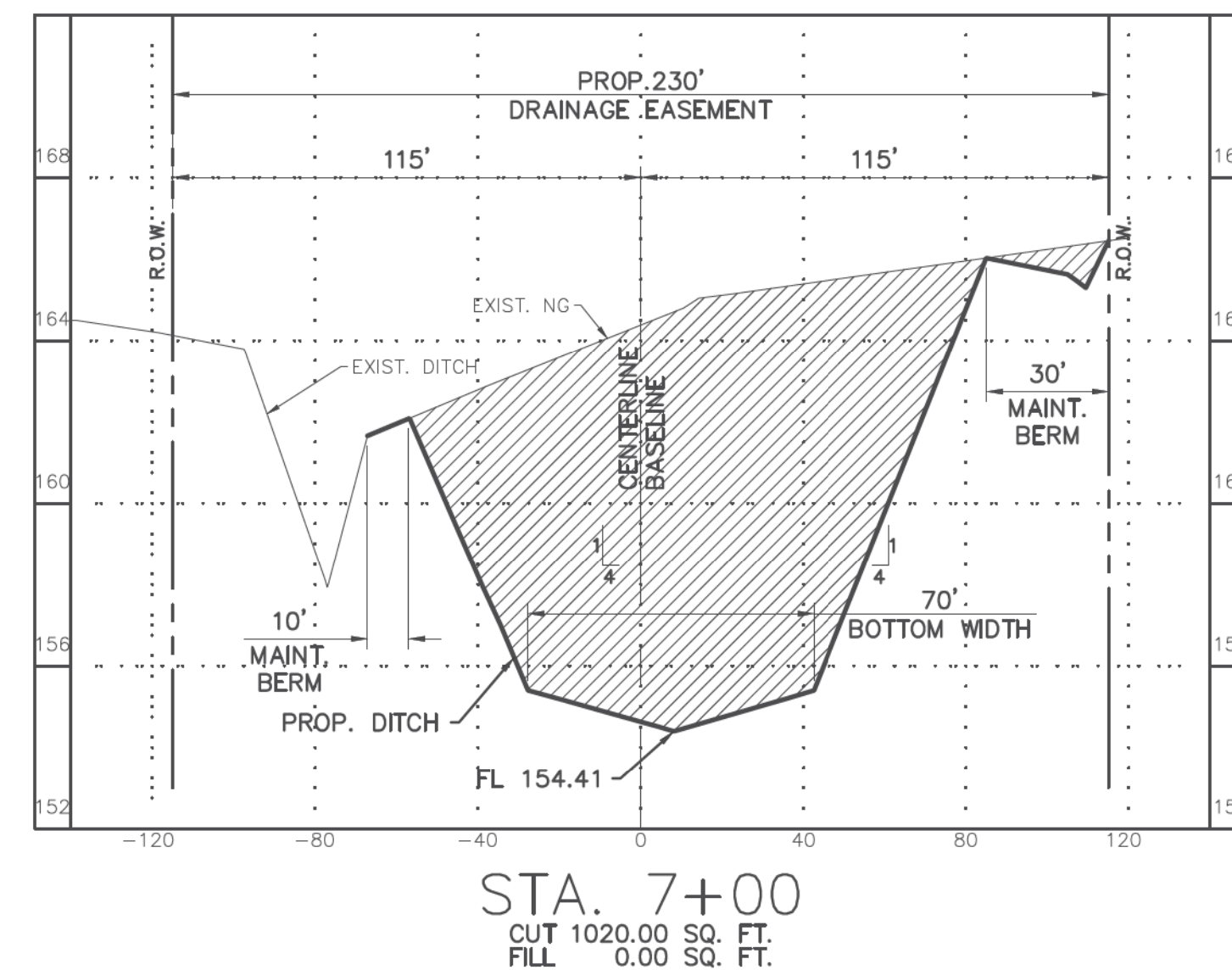
Contents:

Exhibits D-1 to D-4

Exhibits D-5 to D-7

Plans Provided by Brooks and Sparks, Inc.

Plans Provided by West Belt Surveying, Inc.



RM111050 - ALUMINUM ROD WITH LOGO CAP
STAMPED "111050" LOCATED ON THE NORTH SIDE
OF BAUER-HOCKLEY ROAD $\pm 75'$ EAST OF ITS
INTERSECTION WITH ANGELI DRIVE AND $\pm 120'$ WEST
OF A POWER POLE IN KEY MAP 326B IN THE
CYPRESS CREEK WATERSHED.
ELEVATION = 176.30' (NAVD 88, 2001 ADJ.)

TBM "A" - BOX CUT ON "BB" INLET LOCATED ON THE EAST SIDE OF MUESCHKE ROAD $\pm 50'$ SOUTH OF THE MOST NORTHERLY SOUTHWEST CORNER OF THE SUBJECT TRACT.
ELEVATION = 169.64'

CONTRACTOR TO CALL
BEFORE DIGGING !!!!
PHONE:
HOUSTON (713) 223-4567
(STATEWIDE OUTSIDE
HOUSTON)
1-(800)-545-6005

NOTE: THE LOCATIONS OF THE PRIVATE UTILITY LINES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE ALSO ACCEPTS FULL RESPONSIBILITY FOR ANY AND ALL DAMAGES INCURRED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UTILITIES.

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT ENERGY AT 713-207-2222

NOTICE:

FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

Date: _____

CenterPoint Energy/Natural Gas Facilities Verification ONLY. (This Signature verifies that you have shown CNP Natural Gas lines correctly. Not to be used for conflict verification.) (Gas service lines are not shown.)
Signature Valid for six months.

Date: _____

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This Signature verifies that existing underground facilities, Not to be used for conflict verification.) Signature Valid for six months.

APPROVED FOR AT&T TEXAS/SWB T UNDERGROUND CONDUIT FACILITIES ONLY.
Signature valid for one year.

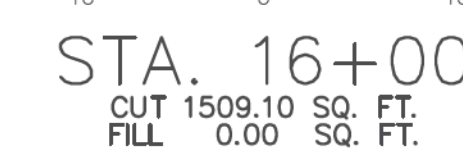
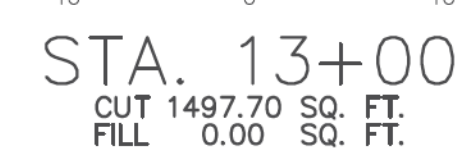
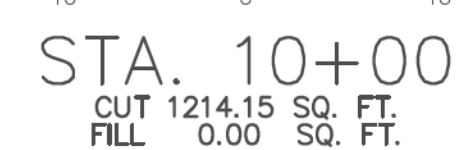
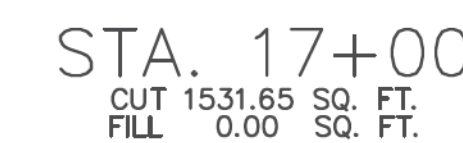
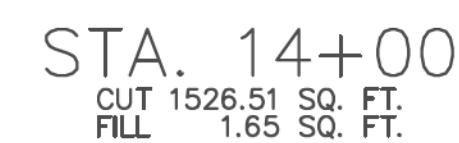
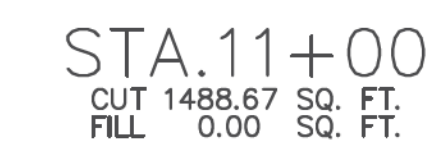
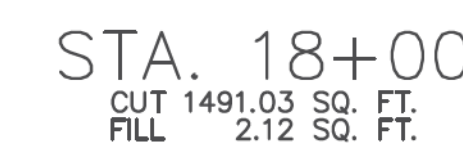
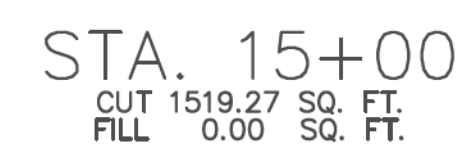
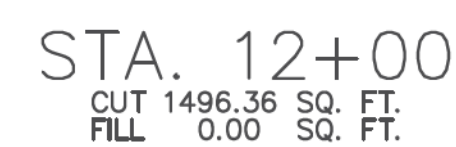
BROOKS & SPARKS, INC.
F-880



TOMBALL ISD
L109-00-00 TO SERVE
JUERGEN ROAD EDUCATIONAL
CAMPUS

L109-00-00
CROSS SECTIONS
STA. 10+00 TO STA. 18+00

NO.	DATE	REVISIONS	BY
DRAWN BY: RV		CHECKED BY: CSM, JAE	
DESIGNED BY: CSM		APPROVED BY: FEB	
PROJECT NO. 866-0018		JULY 2023	
SCALE: H: 1"=40', V: 1"=4'		SHEET 15 OF 23	



RM111050 - ALUMINUM ROD WITH LOGO CAP
STAMPED "111050" LOCATED ON THE NORTH SIDE
OF BAUER-HOCKLEY ROAD $\pm 75'$ EAST OF ITS
INTERSECTION WITH ANGELI DRIVE AND $\pm 120'$ WEST
OF A POWER POLE IN KEY MAP 326B IN THE
CYPRESS CREEK WATERSHED.
ELEVATION = 176.30' (NAVD 88, 2001 ADJ.)

TBM "A" - BOX CUT ON "BB" INLET LOCATED ON THE EAST SIDE OF MUESCHKE ROAD $\pm 50'$ SOUTH OF THE MOST NORTHERLY SOUTHWEST CORNER OF THE SUBJECT TRACT.
ELEVATION = 169.64'

CONTRACTOR TO CALL
BEFORE DIGGING !!!!
PHONE:
HOUSTON (713) 223-4567
(STATEWIDE OUTSIDE
HOUSTON)
1-(800)-545-6005

NOTE: THE LOCATIONS OF THE PRIVATE UTILITY LINES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE ALSO ACCEPTS FULL RESPONSIBILITY FOR ANY AND ALL DAMAGES INCURRED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UTILITIES.

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT ENERGY AT 713-207-2222

NOTICE:

FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

Date: _____

CenterPoint Energy/Natural Gas Facilities Verification ONLY. (This Signature verifies that you have shown CNP Natural Gas lines correctly. Not to be used for conflict verification.) (Gas service lines are not shown.)
Signature Valid for six months.

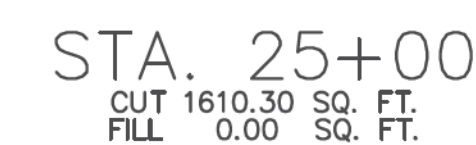
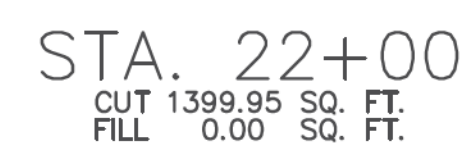
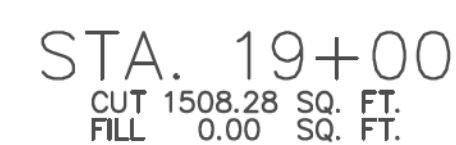
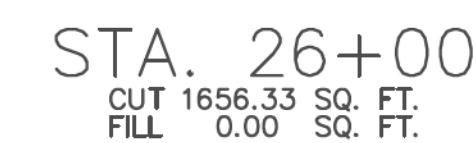
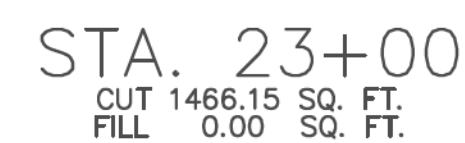
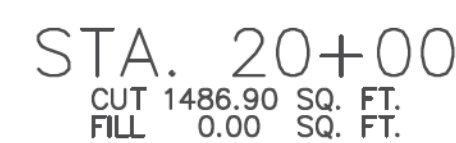
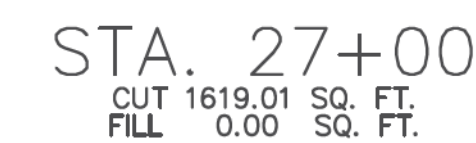
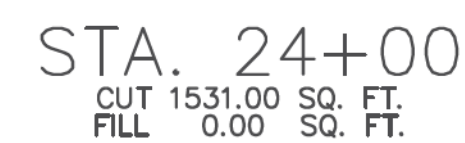
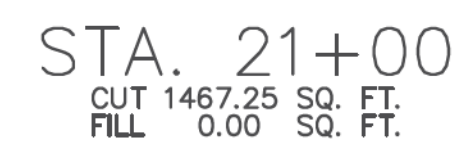
Date: _____

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This Signature verifies that existing underground facilities, Not to be used for conflict verification.) Signature Valid for six months.

APPROVED FOR AT&T TEXAS/SWB T UNDERGROUND CONDUIT FACILITIES ONLY.
Signature valid for one year.

L109-00-00
CROSS SECTIONS
STA. 19+00 TO STA. 27+00

NO.	DATE	REVISIONS	BY
DRAWN BY: RV		CHECKED BY: CSM, JAE	
DESIGNED BY: CSM		APPROVED BY: FEB	
PROJECT NO. 866-0018		JULY 2023	
SCALE: H: 1"=40', V: 1"=4'		SHEET 16 OF 23	



LEGEND

 CUT

 FILL

CONTRACTOR TO CALL
BEFORE DIGGING !!!!
PHONE:
HOUSTON (713) 223-4567
(STATEWIDE OUTSIDE
HOUSTON)
1-(800)-545-6005

NOTE: THE LOCATIONS OF THE PRIVATE UTILITY LINES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE ALSO ACCEPTS FULL RESPONSIBILITY FOR ANY AND ALL DAMAGES INCURRED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UTILITIES.

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT ENERGY AT 713-207-2222.

NOTICE:

FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

Date: _____

CenterPoint Energy/Nohard Gas Facilities Verification ONLY. (This Signature verifies that you have shown CNP Nohard Gas lines correctly. Not to be used for conflict verification.) (Gas service lines are not shown.) Signature Valid for six months.

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. (This Signature verifies that existing underground facilities. Not to be used for conflict verification.) Signature Valid for six months.

Date: _____

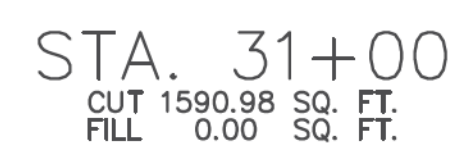
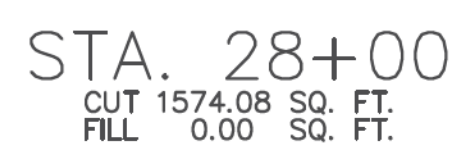
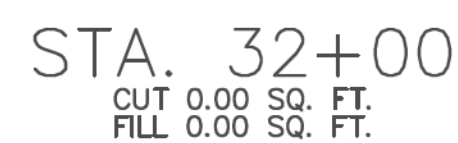
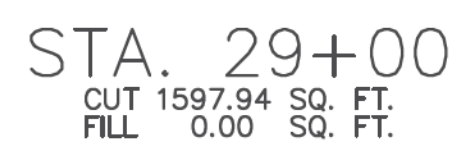
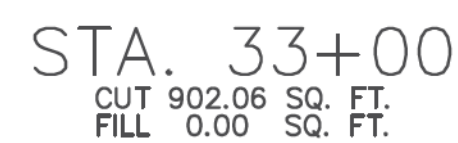
APPROVED FOR AT&T TEXAS/SWB T UNDERGROUND CONDUIT FACILITIES ONLY.
Signature valid for one year.

BROOKS & SPARKS, INC.
F-880



L109-00-00
CROSS SECTIONS
STA. 28+00 TO STA. 33+00

NO.	DATE	REVISIONS	BY
DRAWN BY: RV		CHECKED BY: CSM, JAE	
DESIGNED BY: CSM		APPROVED BY: FEB	
PROJECT NO. 866-0018		JULY 2023	
SCALE: H: 1"=40', V: 1"=4'		SHEET 17 OF 23	



MARGARET L. KITZMAN
H.C.C.F. NO. V878235

CALLLED 10.5543 ACRES
JERRY C. SHANKLIN, TRUSTEE
H.C.C.F. NO. RP-2017-51138

CALLLED 10.4110 ACRES
HARDIAL MANGAT AND SURINDER MANGAT
H.C.C.F. NO. 20140506608

CALLLED 8.289 ACRES
TEXLA PROPERTIES, LLC
H.C.C.F. NO. RP-2017-241157

CALLLED 5.1546 ACRES
BRUCE A. BAZZELL
H.C.C.F. NO. 20080405554

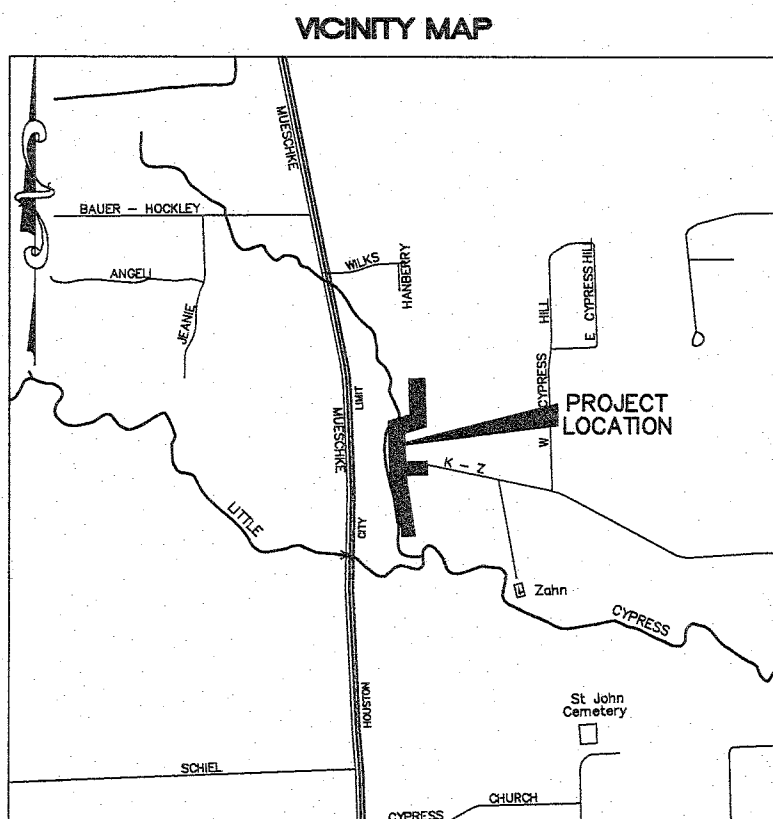
CALLLED 5.00 ACRES
BRUCE A. BAZZELL AND
KAREN P. BAZZELL
H.C.C.F. NO. V978966

CALLLED 5.011 ACRES
ROBERT SMELEK AND WIFE,
ANNA SMELEK
H.C.C.F. NO. RP-2021-588128

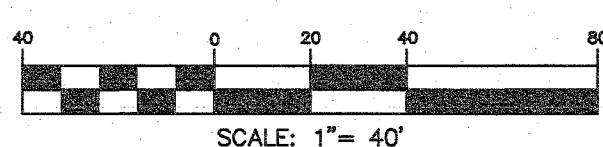
TRACT "
CALLLED 4.9999
TERRY R. BRAZENE
YVONNE S. BR
H.C.C.F. NO. F

BOREHOLE 1
ELEV.=171.43'
X 3005948.97
Y 13936341.69

BOREHOLE 2
ELEV.=170.21'
X 3005975.19
Y 13935740.21



KEY MAP 326G&L
SCALE 1" = 3000'

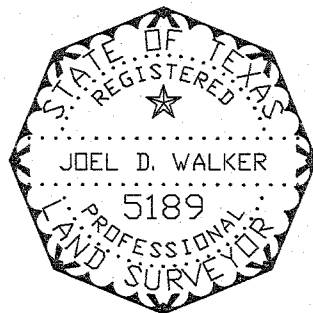
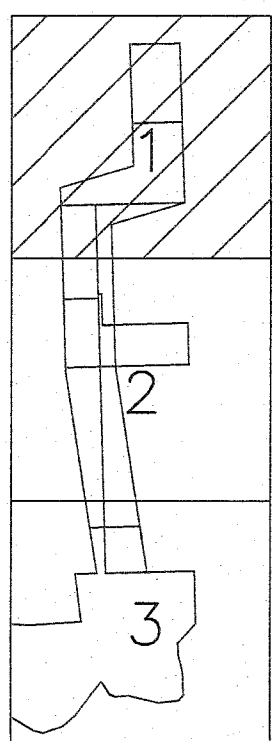


LEGEND

- "BB" INLET
- BENCHMARK
- BORE HOLE
- INLET
- MAILBOX
- MANHOLE
- PEDESTAL
- POWER POLE

ABBREVIATIONS

- B.L.-BUILDING LINE
- CBC-CONCRETE BOX CULVERT
- FC-FILM CODE
- FL-FLOW LINE
- FND.-FOUND
- H.C.C.F.-HARRIS COUNTY CLERK'S FILE
- H.C.M.R.-HARRIS COUNTY MAP RECORDS
- I.R.-IRON ROD
- MH-MANHOLE
- OHE-OVERHEAD ELECTRIC
- PVC-POLYVINYL CHLORIDE PIPE
- ROP-REINFORCED CONCRETE PIPE
- R.O.W.-RIGHT-OF-WAY
- STM-STORM
- SWR-SEWER
- TG-TOP OF GRATE
- TR-TOP OF RIM



TO: TOMBALL INDEPENDENT SCHOOL DISTRICT

THIS SURVEY SUBSTANTIALLY COMPLIES WITH THE CURRENT TEXAS SOCIETY OF PROFESSIONAL SURVEYORS STANDARDS AND SPECIFICATIONS FOR A CATEGORY 6, CONDITION II SURVEY AND THE CURRENT MINIMUM REQUIREMENTS OF THE PROFESSIONAL LAND SURVEYING ACT.

12/2/22
DATE
JOEL D. WALKER
JOEL D. WALKER, R.P.L.S.
TEXAS REGISTRATION NO. 5189

SURVEYOR'S NOTES:

1. THE CAD FILE OF THE DRAWING SHOWN HEREIN IS BASED ON TEXAS SOUTH CENTRAL ZONE NO. 4204, STATE PLANE SURFACE VALUE (NAD83) AND MAY BE CONVERTED TO GRID BY SCALING THE DRAWING BY THE FOLLOWING COMBINED SCALE FACTOR OF 0.999933828773.
2. ACCORDING TO F.I.R.M. MAP NO. 4820100215L (COMMUNITY-PANEL NO. 48202870215L), MAP REVISED DATE: JUNE 18, 2007, THE SUBJECT PROPERTY LIES WITHIN THE AREAS DESIGNATED AS ZONE "X" UNSHADED, DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD, ZONE "X" SHADED, AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD, ZONE AE. BASE FLOOD ELEVATIONS DETERMINED, AND FLOODWAY, THE FLOODWAY IS THE CHANNEL OF A STREAM PLUS ANY ADJACENT FLOODPLAIN AREAS THAT MUST BE KEPT FREE OF ENCROACHMENT SO THAT THE 1% ANNUAL CHANCE FLOOD CAN BE CARRIED WITHOUT SUBSTANTIAL INCREASES IN FLOOD HEIGHTS.

THIS STATEMENT IS BASED ON SCALING THE LOCATION OF THE SUBJECT TRACT ON THE ABOVE REFERENCED MAP. THIS INFORMATION IS TO DETERMINE FLOOD INSURANCE RATES ONLY AND IS NOT INTENDED TO IDENTIFY SPECIFIC FLOODING CONDITIONS.

3. ALL UTILITIES SHOWN HEREON ARE LOCATED USING "APPARENT & VISIBLE" EVIDENCE BY ON-SITE OBSERVATION UNLESS OTHERWISE NOTED.

4. THE SUBJECT TRACT IS AFFECTED BY THE CITY OF HOUSTON ORDINANCE NO. 85-1878, AMENDED BY ORDINANCE NO. 1999-262.

5. THIS SURVEY DOES NOT PROVIDE ANY DETERMINATION CONCERNING WETLANDS, FAULT LINES, TOXIC WASTE OR ANY OTHER ENVIRONMENTAL ISSUE. SUCH MATTERS SHOULD BE DIRECTED BY THE CLIENT OR PROSPECTIVE PURCHASER TO AN EXPERT CONSULTANT.

6. -I- INDICATES AN UNDERGROUND SEWER LINE WITH UNKNOWN DIRECTION, SIZE OR LOCATION OR A POSSIBLE STUB-OUT.

7. HARRIS COUNTY FLOOD CONTROL BOUNDARY BASED OFF OF A CAD FILE PROVIDED BY BROOKS & SPARKS INC. AND AS STAKED ON THE GROUND.

REFERENCE BENCHMARK:

RM111050 - ALUMINUM ROD WITH LOGO CAP STAMPED "111050" LOCATED ON THE NORTH SIDE OF BAUER-HOCKLEY ROAD ±75' EAST OF ITS INTERSECTION WITH ANGELI DRIVE AND ±120' WEST OF A POWER POLE IN KEY MAP 326B IN THE CYPRESS CREEK WATERSHED. ELEVATION = 176.30' (NAVD 88, 2001 ADJ.)

TEMPORARY BENCHMARKS:

TBM "A" - BOX CUT ON "BB" INLET LOCATED ON THE EAST SIDE OF MUESCHKE ROAD ±50' SOUTH OF THE MOST NORTHERLY SOUTHWEST CORNER OF THE SUBJECT TRACT. ELEVATION = 169.64'

TBM "B" - COTTON SPINDLE WITH SHINER STAMPED "WEST BELT SURVEYING" IN A 20' OAK TREE LOCATED ±1480' EAST OF THE EAST R.O.W. OF MUESCHKE ROAD AND ±215' NORTH OF THE SOUTH PROPERTY LINE AT AN INTERIOR CORNER OF THE SUBJECT TRACT. ELEVATION = 175.11'

TBM "C" - BOX CUT ON THE EAST END OF A 42" ROP CULVERT LOCATED ON THE SOUTH SIDE OF JUERGEN ROAD ±390' WEST OF THE NORTHEAST CORNER OF THE SUBJECT TRACT AND ±760' EAST OF THE CENTERLINE OF WILLOWBEND DRIVE. ELEVATION = 183.18'

TBM "R" - COTTON SPINDLE WITH SHINER STAMPED "WEST BELT SURVEYING" IN ASPHALT LOCATED ON THE NORTH SIDE OF THE INTERSECTION OF JUERGEN ROAD AND WILLOWBEND DRIVE ±8' SOUTH OF THE BULLNOSE OF THE MEDIAN. ELEVATION = 183.81'

TOMBALL
INDEPENDENT
SCHOOL DISTRICT

TOPOGRAPHIC SURVEY

HARRIS COUNTY
FLOOD CONTROL DITCH
OUT OF THE
WILLIAM SETTLE SURVEY
ABSTRACT NO. 705 &
CHARLES BAHR SURVEY
ABSTRACT NO. 153
HARRIS COUNTY, TEXAS

WEST BELT
SURVEYING, INC.

21020 PARK ROW
KATY, TX 77449
PHONE: (281) 590-8288
FAX: (281) 452-0620
CERTIFIED FIRM NO. 10078800

NO.	DATE	REVISIONS	BY
1	12/2/22	ADDITIONAL TOPO	MDL
DRAWN BY:	DB	CHECKED BY:	MDL
SCALE:	1"=40'	APPROVED BY:	JDW
PROJECT NO.	S866-00350	DATE:	SEPTEMBER 30, 2022

MATCH LINE SHEET # 1

CALLLED 8.289 ACRES
TEXLA PROPERTIES, LLC
H.C.C.F. NO. RP-2017-241157

CALLLED 6.00 ACRES
MARION HARPER LAROSE
H.C.C.F. NO. M096422

CALLLED 21.2894 ACRES
ERLINE SCHOENFELDT
H.C.C.F. NO. 20140257947

BOREHOLE 3
ELEV.=168.29'
X 3005605.65
Y 13935388.65

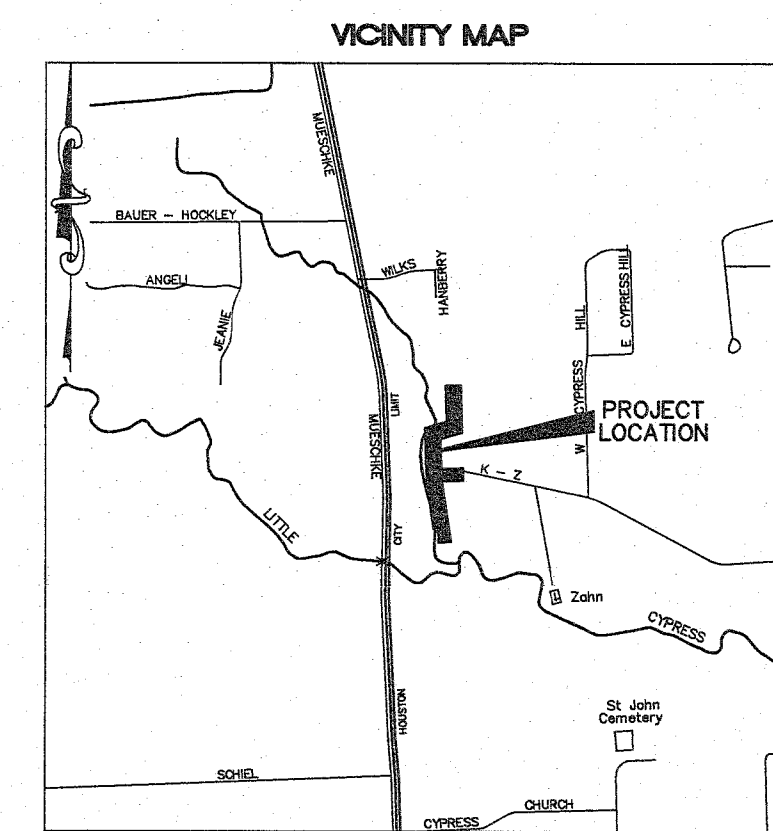
CALLLED 5.1546 ACRES
BRUCE A. BAZZELL
H.C.C.F. NO. 20080405554

TRACT III
CALLLED 7.00 ACRES
LYNETTE KAY FEHRLE McCORMICK
H.C.C.F. NO. Z048063

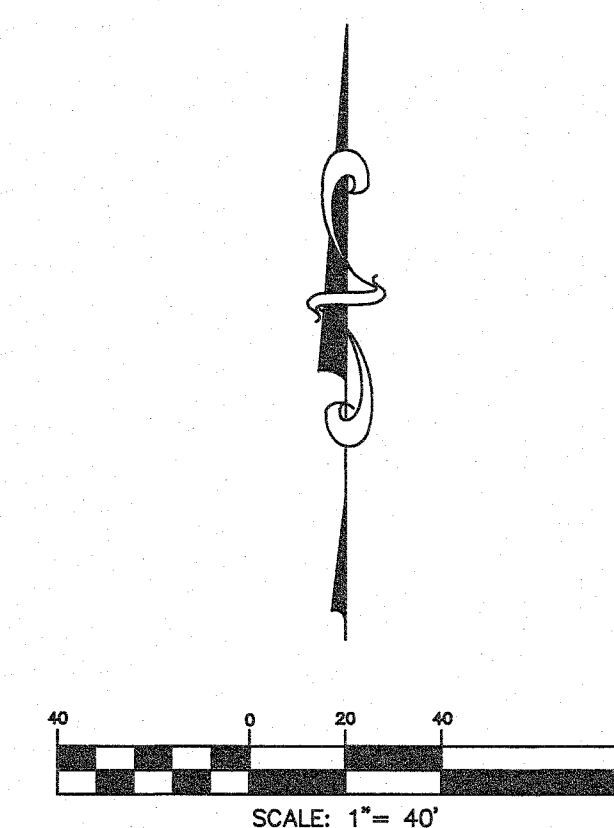
TRACT I
CALLLED 6.9391 ACRES
LYNETTE KAY FEHRLE McCORMICK
H.C.C.F. NO. Z048063

CALLLED 5.00 ACRES
BRUCE A. BAZZELL AND KAREN P. BAZZELL
H.C.C.F. NO. V978968

KZ ROAD
(50' R.O.W.)



KEY MAP 326&L
SCALE 1" = 3000'

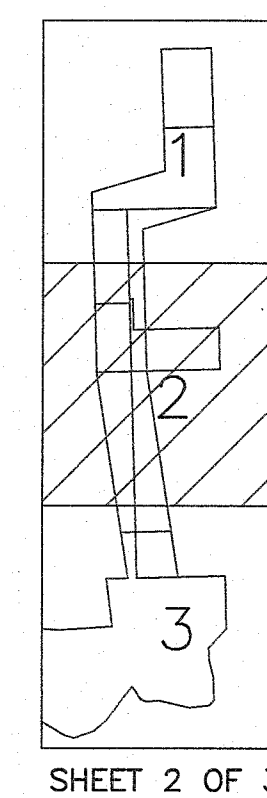


LEGEND

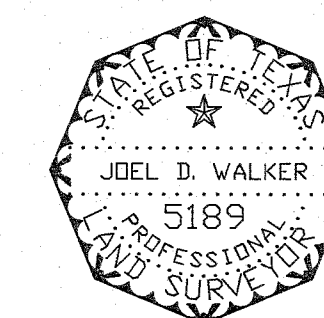
- "BB" INLET
- BENCHMARK
- BORE HOLE
- INLET
- MAILBOX
- MANHOLE
- PEDESTAL
- POWER POLE

ABBREVIATIONS

B.L.—BUILDING LINE
CBC—CONCRETE BOX CULVERT
FC—FILM CODE
FL—FLOW LINE
FND.—FOUND
H.C.C.F.—HARRIS COUNTY CLERK'S FILE
H.C.M.R.—HARRIS COUNTY MAP RECORDS
I.R.—IRON ROD
MH—MANHOLE
OHE—OVERHEAD ELECTRIC
PVC—POLYVINYL CHLORIDE PIPE
RCP—REINFORCED CONCRETE PIPE
R.O.W.—RIGHT-OF-WAY
STM.—STORM
SWR.—SEWER
TG—TOP OF GRATE
TR—TOP OF RIM



SHEET 2 OF 3



TO: TOMBALL INDEPENDENT SCHOOL DISTRICT

THIS SURVEY SUBSTANTIALLY COMPLIES WITH THE CURRENT TEXAS SOCIETY OF PROFESSIONAL SURVEYORS STANDARDS AND SPECIFICATIONS FOR A CATEGORY 6, CONDITION II SURVEY AND THE CURRENT MINIMUM REQUIREMENTS OF THE PROFESSIONAL LAND SURVEYING ACT.

12/2/22
DATE

JOEL D. WALKER
TEXAS REGISTRATION NO. 5189

SURVEYOR'S NOTES:

- THE CAD FILE OF THE DRAWING SHOWN HEREIN IS BASED ON TEXAS SOUTH CENTRAL ZONE NO. 4204, STATE PLANE SURFACE VALUE (NAD83) AND MAY BE CONVERTED TO GRID BY SCALING THE DRAWING BY THE FOLLOWING COMBINED SCALE FACTOR OF 0.999933628773.
- ACCORDING TO F.I.R.M. MAP NO. 48201C0215L (COMMUNITY-PANEL NO. 48202870215L), MAP REVISED DATE: JUNE 18, 2007, THE SUBJECT PROPERTY LIES WITHIN THE AREAS DESIGNATED AS ZONE "X" UNSHADED, DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD, ZONE X SHADED, AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD, ZONE AE. BASE FLOOD ELEVATIONS DETERMINED, AND FLOODWAY, THE FLOODWAY IS THE CHANNEL OF A STREAM PLUS ANY ADJACENT FLOODPLAIN AREAS THAT MUST BE KEPT FREE OF ENCROACHMENT SO THAT THE 1% ANNUAL CHANCE FLOOD CAN BE CARRIED WITHOUT SUBSTANTIAL INCREASES IN FLOOD HEIGHTS.
- THIS STATEMENT IS BASED ON SCALING THE LOCATION OF THE SUBJECT TRACT ON THE ABOVE REFERENCED MAP. THIS INFORMATION IS TO DETERMINE FLOOD INSURANCE RATES ONLY AND IS NOT INTENDED TO IDENTIFY SPECIFIC FLOODING CONDITIONS.
- ALL UTILITIES SHOWN HEREON ARE LOCATED USING "APPARENT & VISIBLE" EVIDENCE BY ON-SITE OBSERVATION UNLESS OTHERWISE NOTED.
- THE SUBJECT TRACT IS AFFECTED BY THE CITY OF HOUSTON ORDINANCE NO. 85-1878, AMENDED BY ORDINANCE NO. 1999-262.
- THIS SURVEY DOES NOT PROVIDE ANY DETERMINATION CONCERNING WETLANDS, FAULT LINES, TOXIC WASTE OR ANY OTHER ENVIRONMENTAL ISSUE. SUCH MATTERS SHOULD BE DIRECTED BY THE CLIENT OR PROSPECTIVE PURCHASER TO AN EXPERT CONSULTANT.
- S—INDICATES AN UNDERGROUND SEWER LINE WITH UNKNOWN DIRECTION, SIZE OR LOCATION OR A POSSIBLE STUB-OUT.
- HARRIS COUNTY FLOOD CONTROL BOUNDARY BASED OFF OF A CAD FILE PROVIDED BY BROOKS & SPARKS INC. AND AS STAKED ON THE GROUND.

REFERENCE BENCHMARK:

RM111050 — ALUMINUM ROD WITH LOGO CAP STAMPED "111050" LOCATED ON THE NORTH SIDE OF BAUER-HOCKLEY ROAD ±75' EAST OF ITS INTERSECTION WITH ANGELI DRIVE AND ±120' WEST OF A POWER POLE IN KEY MAP 326B IN THE CYPRESS CREEK WATERSHED. ELEVATION = 176.30' (NAVD 88, 2001 ADJ.)

TEMPORARY BENCHMARKS:

TBM "A" — BOX CUT ON "BB" INLET LOCATED ON THE EAST SIDE OF MUESCHKE ROAD ±50' SOUTH OF THE MOST NORTHERLY SOUTHWEST CORNER OF THE SUBJECT TRACT. ELEVATION = 169.64'

TBM "B" — COTTON SPINDLE WITH SHINER STAMPED "WEST BELT SURVEYING" IN A 20' OAK TREE LOCATED ±1480' EAST OF THE EAST R.O.W. OF MUESCHKE ROAD AND ±215' NORTH OF THE SOUTH PROPERTY LINE AT AN INTERIOR CORNER OF THE SUBJECT TRACT. ELEVATION = 175.11'

TBM "O" — BOX CUT ON THE EAST END OF A 42" RCP CULVERT LOCATED ON THE SOUTH SIDE OF JUERGEN ROAD ±390' WEST OF THE NORTHEAST CORNER OF THE SUBJECT TRACT AND ±760' EAST OF THE CENTERLINE OF WILLOWBEND DRIVE. ELEVATION = 183.18'

TBM "R" — COTTON SPINDLE WITH SHINER STAMPED "WEST BELT SURVEYING" IN ASPHALT LOCATED ON THE NORTH SIDE OF THE INTERSECTION OF JUERGEN ROAD AND WILLOWBEND DRIVE ±8' SOUTH OF THE BULLNOSE OF THE MEDIAN. ELEVATION = 183.81'

TOMBALL
INDEPENDENT
SCHOOL DISTRICT

TOPOGRAPHIC SURVEY

HARRIS COUNTY
FLOOD CONTROL DITCH
OUT OF THE
WILLIAM SETTLE SURVEY
ABSTRACT NO. 705 &
CHARLES BAHR SURVEY
ABSTRACT NO. 153
HARRIS COUNTY, TEXAS

WEST BELT
SURVEYING, INC.

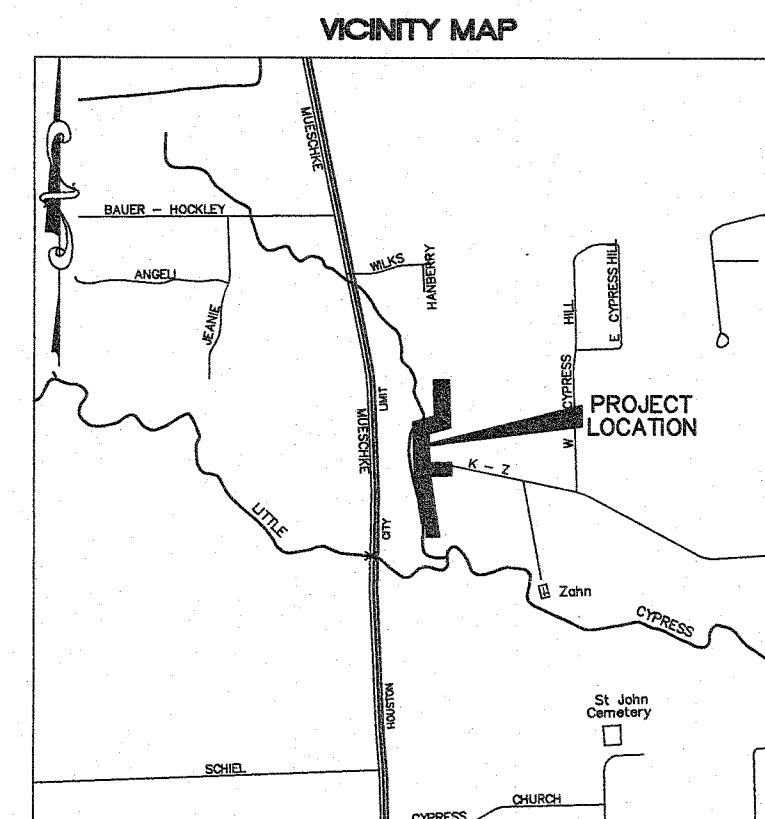
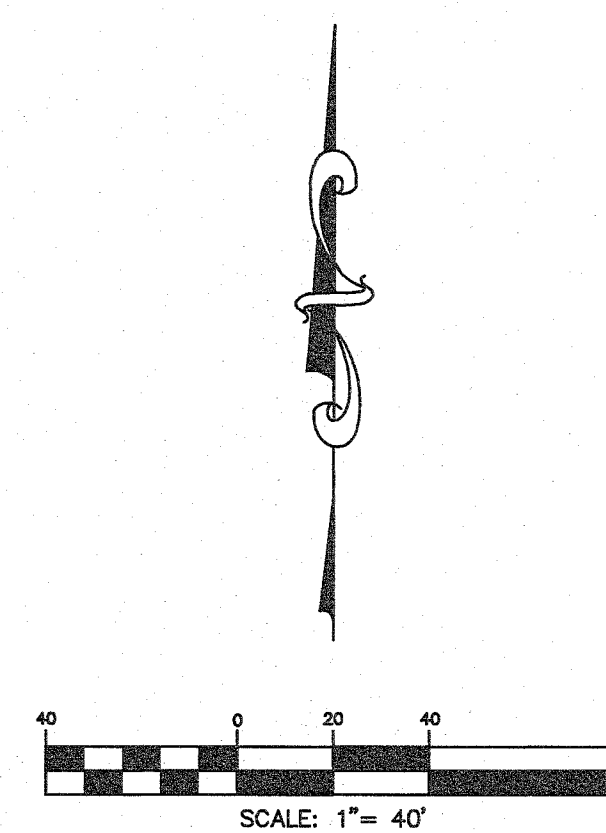
21020 PARK ROW PHONE: (281) 590-8288
KATY, TX 77459 FAX: (281) 462-0620
CERTIFIED FIRM NO. 10078800

NO.	DATE	REVISIONS	BY
1	12/2/22	ADDITIONAL TOPO	MDL
DRAWN BY:	DB	CHECKED BY:	MDL
SCALE:	1"=40'	APPROVED BY:	JDW
PROJECT NO.	S866-00350	DATE:	SEPTEMBER 30, 2022

MATCH LINE SHEET # 3

Exhibit D-6

MATCH LINE SHEET # 2

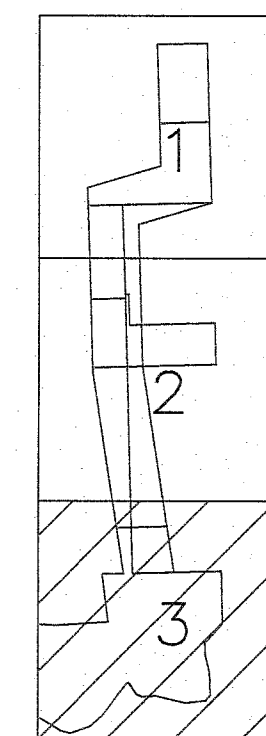
KEY MAP 326B&L
SCALE 1" = 3000'

LEGEND

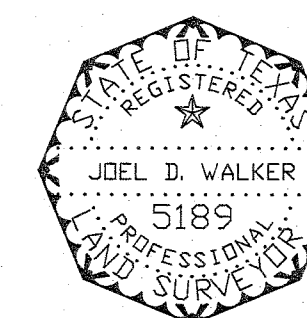
- BB" INLET
- BENCHMARK
- BORE HOLE
- INLET
- MAILBOX
- MANHOLE
- PEDESTAL
- POWER POLE

ABBREVIATIONS

- B.L.-BUILDING LINE
- CBC-CONCRETE BOX CULVERT
- FC-FILM CODE
- FL-FLOW LINE
- FND.-FOUND
- H.C.C.F.-HARRIS COUNTY CLERK'S FILE
- H.C.M.R.-HARRIS COUNTY MAP RECORDS
- I.R.-IRON ROD
- MH-MANHOLE
- OHE-OVERHEAD ELECTRIC
- PVC-POLYVINYL CHLORIDE PIPE
- ROP-REINFORCED CONCRETE PIPE
- R.O.W.-RIGHT-OF-WAY
- STM.-STORM
- SWR.-SEWER
- TG-TOP OF GRATE
- TR-TOP OF RIM



SHEET 3 OF 3



TO: TOMBALL INDEPENDENT SCHOOL DISTRICT

THIS SURVEY SUBSTANTIALLY COMPLIES WITH THE CURRENT TEXAS SOCIETY OF PROFESSIONAL SURVEYORS STANDARDS AND SPECIFICATIONS FOR A CATEGORY 6, CONDITION II SURVEY AND THE CURRENT MINIMUM REQUIREMENTS OF THE PROFESSIONAL LAND SURVEYING ACT.

12/2/22
DATEJOEL D. WALKER, R.P.L.S.
TEXAS REGISTRATION NO. 5189

SURVEYOR'S NOTES:

1. THE CAD FILE OF THE DRAWING SHOWN HEREIN IS BASED ON TEXAS SOUTH CENTRAL ZONE NO. 4204, STATE PLANE SURFACE VALUE (NAD83) AND MAY BE CONVERTED TO GRID BY SCALING THE DRAWING BY THE FOLLOWING COMBINED SCALE FACTOR OF 0.999933828773.
2. ACCORDING TO F.I.R.M. MAP NO. 4820100215L (COMMUNITY-PANEL NO. 4802870215L), MAP REVISED DATE: JUNE 18, 2007, THE SUBJECT PROPERTY LIES WITHIN THE AREAS DESIGNATED AS ZONE "X" UNSHADED, DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD, ZONE X SHADED, AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD, ZONE AE. BASE FLOOD ELEVATIONS DETERMINED, AND FLOODWAY, THE FLOODWAY IS THE CHANNEL OF A STREAM PLUS ANY ADJACENT FLOODPLAIN AREAS THAT MUST BE KEPT FREE OF ENCROACHMENT SO THAT THE 1% ANNUAL CHANCE FLOOD CAN BE CARRIED WITHOUT SUBSTANTIAL INCREASES IN FLOOD HEIGHTS.

THIS STATEMENT IS BASED ON SCALING THE LOCATION OF THE SUBJECT TRACT ON THE ABOVE REFERENCED MAP. THIS INFORMATION IS TO DETERMINE FLOOD INSURANCE RATES ONLY AND IS NOT INTENDED TO IDENTIFY SPECIFIC FLOODING CONDITIONS.

3. ALL UTILITIES SHOWN HEREON ARE LOCATED USING "APPARENT & VISIBLE" EVIDENCE BY ON-SITE OBSERVATION UNLESS OTHERWISE NOTED.

4. THE SUBJECT TRACT IS AFFECTED BY THE CITY OF HOUSTON ORDINANCE NO. 85-1878, AMENDED BY ORDINANCE NO. 1999-262.

5. THIS SURVEY DOES NOT PROVIDE ANY DETERMINATION CONCERNING WETLANDS, FAULT LINES, TOXIC WASTE OR ANY OTHER ENVIRONMENTAL ISSUE. SUCH MATTERS SHOULD BE DIRECTED BY THE CLIENT OR PROSPECTIVE PURCHASER TO AN EXPERT CONSULTANT.

6. INDICATES AN UNDERGROUND SEWER LINE WITH UNKNOWN DIRECTION, SIZE OR LOCATION OR A POSSIBLE STUB-OUT.

7. HARRIS COUNTY FLOOD CONTROL BOUNDARY BASED OFF OF A CAD FILE PROVIDED BY BROOKS & SPARKS INC. AND AS STAKED ON THE GROUND.

REFERENCE BENCHMARK:

RM111050 - ALUMINUM ROD WITH LOGO CAP STAMPED "111050" LOCATED ON THE NORTH SIDE OF BAUER-HOCKLEY ROAD ±75' EAST OF ITS INTERSECTION WITH ANGELI DRIVE AND ±120' WEST OF A POWER POLE IN KEY MAP 326B IN THE CYPRESS CREEK WATERSHED. ELEVATION = 176.30' (NAVD 88, 2001 ADJ.)

TEMPORARY BENCHMARKS:

TBM "A" - BOX CUT ON "BB" INLET LOCATED ON THE EAST SIDE OF MUESCHKE ROAD ±50' SOUTH OF THE MOST NORTHERLY SOUTHWEST CORNER OF THE SUBJECT TRACT. ELEVATION = 169.64'

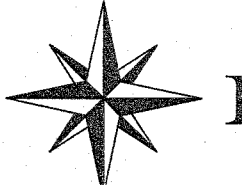
TBM "B" - COTTON SPINDLE WITH SHINER STAMPED "WEST BELT SURVEYING" IN A 20' OAK TREE LOCATED ±1480' EAST OF THE EAST R.O.W. OF MUESCHKE ROAD AND ±215' NORTH OF THE SOUTH PROPERTY LINE AT AN INTERIOR CORNER OF THE SUBJECT TRACT. ELEVATION = 175.11'

TBM "O" - BOX CUT ON THE EAST END OF A 42" ROP CULVERT LOCATED ON THE SOUTH SIDE OF JUERGEN ROAD ±390' WEST OF THE NORTHEAST CORNER OF THE SUBJECT TRACT AND ±760' EAST OF THE CENTERLINE OF WILLOWBEND DRIVE. ELEVATION = 183.18'

TBM "R" - COTTON SPINDLE WITH SHINER STAMPED "WEST BELT SURVEYING" IN ASPHALT LOCATED ON THE NORTH SIDE OF THE INTERSECTION OF JUERGEN ROAD AND WILLOWBEND DRIVE ±8' SOUTH OF THE BULLNOSE OF THE MEDIAN. ELEVATION = 183.81'

TOMBALL
INDEPENDENT
SCHOOL DISTRICT

TOPOGRAPHIC SURVEY

HARRIS COUNTY
FLOOD CONTROL DITCH
OUT OF THE
WILLIAM SETTLE SURVEY
ABSTRACT NO. 705 &
CHARLES BAHR SURVEY
ABSTRACT NO. 153
HARRIS COUNTY, TEXASWEST  BELT
SURVEYING, INC.21020 PARK ROW PHONE: (281) 560-8288
KATY, TX 77459 FAX: (281) 482-0920

CERTIFIED FIRM NO. 10073800

NO.	DATE	REVISIONS	BY
1	12/2/22	ADDITIONAL TOPO	MDL
DRAWN BY: DB		CHECKED BY: MDL	
SCALE: 1"=40'		APPROVED BY: JDW	
PROJECT NO. S866-00350		DATE: SEPTEMBER 30, 2022	