GEOTECHNICAL REPORT

Cheshire Short Plat
7615 East Mercer Way
Mercer Island, Washington

Project No. T-8264

Terra Associates, Inc.

Prepared for:

Mr. Derek Cheshire
Mercer Island, Washington

May 12, 2020
3rd Revision November 21, 2022

TERRA ASSOCIATES, Inc.
Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

May 12, 2020
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Mr. Derek Cheshire
7615 East Mercer Way
Mercer Island, Washington 98040

Subject: Geotechnical Report
Cheshire Short Plat
7615 East Mercer Way
Mercer Island, Washington

Dear Mr. Cheshire:

As requested, we have conducted a geotechnical engineering study for the subject project. The attached report presents our findings and recommendations for the geotechnical aspects of project design and construction.

In general, the soil conditions observed in the test boring consists of approximately 4 feet of dense fill material overlying 7 to 13 feet of medium dense to dense silty sand over medium dense to dense silt to the termination of the test borings. An approximately four-foot layer of sand with gravel was observed at a depth of 15 feet in Test Boring B-2. Groundwater seepage and wet soils were observed at depths of 7.5 to 25 feet below current site grades.

In our opinion, the soil conditions observed at the site will be suitable for support of the proposed development, provided the recommendations presented in this report are incorporated into project design and construction.

We trust the information presented in this report is sufficient for your current needs. If you have any questions or require additional information, please call.

Sincerely yours,
TERRA ASSOCIATES, INC.

CAROLYN S. DECKER
STATE OF WASHINGTON
47016
REGISTERED
PROFESSIONAL ENGINEER

11-21-2022

Carolyn S. Decker, P.E.
President

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7615 East Mercer Way
Mercer Island, Washington

1.0 PROJECT DESCRIPTION

The project consists of constructing a residential structure in the northeast corner of the existing tax parcel. The site is developed with a single-family residence and an accessory dwelling unit in the eastern portion of the site. The focus of this report is the northeast, undeveloped portion of the site. Based on the site plan prepared by CORE Design dated January 2020, the structure will be located in the approximate center of the new building lot with access from Southeast 76th Street. With finish floor elevations of 122 feet and 112 feet, grading will consist of cuts and fills from one to ten feet.

The structure constructed on the lot is expected to be two- to three- story building framed over a crawl space. Foundation loads should be relatively light, in the range of 4 to 6 kips per foot for bearing walls and 50 to 75 kips for isolated columns.

The recommendations in the following sections of this report are based on the design discussed above. If actual features vary or changes are made, we should review the plans in order to modify our recommendations, as required. We should review final design drawings and specifications to verify that our recommendations have been properly interpreted and incorporated into the project design.

2.0 SCOPE OF WORK

On June 27, 2022, we observed soil and groundwater conditions at 2 test borings drilling to depths of 30 and 40 feet below current site grades. Using this data along with laboratory testing, we performed analyses to develop geotechnical recommendations for project design and construction. Specifically, this report addresses the following:

- Soil and groundwater conditions.
- Seismic criteria per the current International Building Code (IBC).
- Geologic hazards per the City of Mercer Island Municipal Code.
- Site preparation and grading.
- Relative slope stability.
- Excavations
- Foundation support.

- Floor slab-on-grade support.
- Lateral earth pressures on below-grade walls.
- Drainage
- Utilities

It should be noted that recommendations outlined in this report regarding drainage are associated with soil strength, design earth pressures, erosion, and stability. Design and performance issues with respect to moisture as it relates to the structure environment are beyond Terra Associates' purview. A building envelope specialist or contractor should be consulted to address these issues, as needed.

3.0 SITE CONDITIONS

3.1 Surface

The project site consists of a single tax parcel totaling approximately 2 acres located at 7615 East Mercer Way in Mercer Island, Washington. The approximate site location is shown on Figure 1.

The site is currently developed with a single-family residence, an accessory dwelling unit, and associated access and landscaping in the eastern half of the site. The western half of the site is a steep slope that is covered with a moderate forest and associated understory. The focus of our study is the northeast corner of the site where the new development is proposed. Site topography in this portion of the site consists of a slope that descends from the west to the east with an overall relief of approximately 26 feet.

3.2 Subsurface

In general, the soil conditions at the site consisted of approximately 4 feet of dense fill material overlying 7 to 13 feet of medium dense to dense silty sand over medium dense to dense silt to the termination of the test borings. An approximately four-foot layer of sand with gravel was observed at a depth of 15 feet in Test Boring B-2.

The *Preliminary Geologic Map of Seattle and Vicinity, Washington,* by H.H. Waldron, B.A. Leisch, D.R. Mullineaux, and D.R. Crandell (1961) maps the site as pre-fraser glacial drift (Qgpc). This mapped description is consistent with the native soils observed in the test borings.

The preceding discussion is intended to be a general review of the soil conditions encountered. For more detailed descriptions, please refer to the Test Boring Logs in Appendix A. The approximate location of the Test Borings is shown on Figure 2.

3.3 Groundwater

Groundwater seepage and wet soils were noted at approximately 7.5 to 25 feet below current site grades within the sandier soils.

3.4 Geologic Hazards/Critical Areas Report

We evaluated site conditions for the presence of geologic hazards including erosion hazard areas, landslide hazard areas, and seismic hazard areas. In addition, we have reviewed Section 19.07.110 of the Mercer Island Municipal Code, Critical Area Study. Our findings are presented below.

3.4.1 Erosion Hazard Areas

Section 19.16.010 of the Mercer Island Municipal Code (MIMC) defines an erosion hazard as "areas greater than 15 percent slope and subject to a severe risk of erosion due to wind, rain, water, slope, and other natural agents including those soil types and/or areas identified by the U.S. Department of Agriculture's Natural Resources Conservation Service as having a "severe" or "very severe" rill and inter-rill erosion hazard."

The soils observed onsite are classified as Kitsap Silt Loam, 15 to 30 percent slopes (KpD) by the United States Department of Agriculture Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service. With the existing slope gradients, these soils will have a severe potential for erosion when exposed. Therefore, the site is categorized as an erosion hazard area per the MIMC.

Implementation of temporary and permanent Best Management Practices (BMPs) for preventing and controlling erosion will be required and will mitigate the erosion hazard. As a minimum, we recommend implementing the following erosion and sediment control BMPs prior to, during, and immediately following construction activities at the site.

Prevention

- Limit site clearing and grading activities to the relatively dry months (typically May through September).
- Limit disturbance to areas where construction is imminent.
- Locate temporary stockpiles of excavated soils no closer than ten feet from the crest of the slope.
- Provide temporary cover for cut slopes and soil stockpiles during periods of inactivity. Temporary cover may consist of durable plastic sheeting that is securely anchored to the ground surface or straw mulch.
- Establish permanent cover over exposed areas that will not be disturbed for a period of 30 days or more by seeding, in conjunction with a mulch cover or appropriate hydroseeding.

Containment

- Install a silt fence along site margins and downslope of areas that will be disturbed. The silt fence should be in place before clearing and grading is initiated.
- Intercept surface water flow and route the flow away from the slope to a stabilized discharge point. Surface water must not discharge at the top or onto the face of the steep slope.
- Provide onsite sediment retention for collected runoff.

The contractor should perform daily review and maintenance of all erosion and sedimentation control measures at the site.

3.4.2 Landslide Hazard Areas

Section 19.16.010 of the MIMC defines a landslide hazard as "areas subject to landslides based on a combination of geologic, topographic, and hydrologic factors, including:

1. Areas of historic failures.

2. Areas with all three of the following characteristics:

    a. Slopes steeper than 15 percent.

    b. Hillsides intersecting geologic contacts with relatively permeable sediment overlying a relatively impermeable sediment or bedrock.

    c. Springs or groundwater seepage.

3. Areas that have shown evidence of past movement or that are underlain or covered by mass wastage debris from past movements.

4. Areas potentially unstable because of rapid stream incision and stream bank erosion.

5. Steep Slope. Any slope of 40 percent or greater calculated by measuring the vertical rise over any 30-foot horizontal run."

None of these conditions exist on the site. Therefore, the site is not a landslide hazard as defined by the MIMC.

We completed a slope stability analysis through the site to determine if the proposed construction can alter the area without causing instability. Our analysis was completed at a location designated as Cross-Section A-A' using the computer program Slide 2. The approximate cross-section location is shown on Figure 2.

Our analysis considered both static and the pseudostatic (seismic) conditions. A horizontal acceleration of 0.31g was used in the pseudostatic analysis to simulate slope performance under earthquake loading. This acceleration is equal to one-half of the peak horizontal ground acceleration with a two percent in 50-year probability of exceedance as defined by the 2018 International Building Code. A groundwater table was also modeled.

Based on our field exploration, laboratory testing, and previous experience with similar soil types, we chose the following parameters for our analysis:

Table 1 – Slope Stability Analysis Soil Parameters

Soil Type	Unit Weight (pcf)	Friction Angle (Degrees)	Cohesion (psf)
Medium Dense SM	120	35	100
Medium Dense SP-SM	120	28	0
Medium Stiff ML	110	28	700
Stiff ML	110	28	1500

The results of our slope stability analysis, as shown by the lowest safety factors for each condition, are presented in the following table:

Table 2 – Slope Stability Analysis Results

Cross Section	**Minimum Safety Factors**	
	Existing Conditions	***Post Construction***
A-A'	2.52 (Seismic FS = 1.07)	1.70 (Seismic FS = 1.16)

Based on our analysis, the proposed project will increase the overall stability of the site and thereby the development has been designed so that the risk to the site and adjacent property is mitigated such that the site is determined to be safe. Therefore, per Section 19.07.160.3.b of the MICI and our opinion, the site can be constructed, as proposed. The results of our analysis are attached in Appendix B.

Per Section 19.07.110.C. of the MIMC "the critical area study requirement may be waived or modified if the applicant demonstrates that the development proposed will not have an impact on the critical area or its buffer in a manner contrary to the purposed and requirements of this chapter". The purpose of the critical area study from a geotechnical perspective is to determine if and how proposed construction will impact a geologic hazard. The geologic hazard present at this proposed site is the blocky soils that have been outlined on the boring logs. The presence of landslide debris typically indicates past instability. Therefore, a slope stability analysis should be completed based on the proposed construction. Based on the analysis completed above, the proposed construction will increase the overall stability of the site. Therefore, the critical area study should be waived as the proposed developed will not have a negative impact on the critical area or its buffer.

Lateral Spread Analysis

In addition to the slope stability analysis, the City of Mercer Island has requested that a lateral spread analysis be completed for the project. We completed our analysis following the Federal Highway Administration (FHWA) method for calculating lateral spread (FHWA-NHI-11-032, GEC No. 3, August 2011). Per the FHWA lateral spread displacements are determined by "employing the Newmark sliding block approach on an assumed dominant failure plane at the base of a liquified zone…. In this type of analysis, the yield acceleration of the slide mass is evaluated using the post-earthquake undrained residual shear strength of the soil and then the lateral displacement is calculated using this yield acceleration in a conventional Newmark analysis."

Following this procedure, we have completed the analysis using the same cross section for the slope stability analysis above. However, the post-construction slope stability analysis indicated the minimum factors of safety were located above the upslope retaining wall. The lateral spread would be expected to occur on the downslope portion of the property. Therefore, we have completed the analysis with the failure surfaces limited to the downslope section of the site.

In accordance with FHWA, the following table shows our post-earthquake undrained residual shear strengths for the site soils. The residual soil strengths were determined by reducing the soil strength in the slope stability analysis until the pseudostatic factor of safety was less than 1.0:

Table 3 – Lateral Spread Analysis Soil Parameters

Soil Type	Unit Weight (pcf)	Friction Angle (Degrees)	Cohesion (psf)
Medium Dense SM	120	24	0
Medium Dense SP-SM	120	24	0
Medium Stiff ML	110	24	0
Stiff ML	110	28	1500

The results of our slope stability and lateral spread analysis, as shown by the lowest safety factors for each condition, are presented in the following table:

Table 2 – Slope Stability Analysis Results

Cross Section	Minimum Safety Factors	
	Post Construction Residual Strength	***Lateral Spread Displacement (inches)***
A-A'	2.66 (Seismic FS = 0.94)	0.21 inches

Based on our analysis, the post construction, post-earthquake lateral spread would result in a displacement of approximately 0.21 inches. As the building will be supported on pipe piles, it is our opinion that this amount of displacement is not expected to structurally impact the building structure. The results of our analysis are attached in Appendix B.

If the proposed project changes, these analyses should be reviewed to determine if any additional analysis is required for the project.

3.4.3 Seismic Hazard Areas

Section 19.16.010 of the MIMC defines a seismic hazard area as "areas subject to severe risk of damage as a result of earthquake induced ground shaking, slope failure, settlement, soil liquefaction or surface faulting."

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in water pressure induced by vibrations. Liquefaction mainly affects geologically recent deposits of fine-grained sand that is below the groundwater table. Soils of this nature derive their strength from intergranular friction. The generated water pressure or pore pressure essentially separates the soil grains and eliminates this intergranular friction; thus, eliminating the soil's strength.

We completed a liquefaction analysis using the computer program LiquefyPro published by CivilTech Corporation. The analysis was completed using a ground acceleration value of 0.62g, which is the ground acceleration for the maximum considered earthquake (MCE) for an earthquake with a 2,500 return-period. The value was determined using the U.S. Geological Survey (USGS) web-based Unified Hazard Tool.

The results of our analysis indicate soil liquefaction could occur during the design earthquake event, resulting in total settlements approaching approximately 2.8 inches, with one-half of that settlement likely being differential in nature. Results of the analysis are attached to in Appendix C.

In our opinion, this amount of settlement would not structurally impact the building but would result in damage of a cosmetic nature. If the owner is not willing to accept the risk of cosmetic building damage requiring repair in the event of seismic-induced settlements occur, foundations would need to be supported on ground improved with stone columns or rammed aggregate piers. Based on our experience with similar sites and structures, structural design elements are also available to mitigate potential damage caused by the seismic-related soil settlements.

3.5 Seismic Design Parameters

Due to the site soils being subject to liquefaction, per the current International Building Code (IBC), the subsurface conditions would be assigned site class "F", which would require performing a site-specific seismic analysis to determine seismic forces for structural design. However, the current IBC allows for using code derived seismic values for the soil conditions indicated if the building's fundamental period is equal to or less than 0.5 seconds. We expect the single-family residence will fall into this category. In this case, based on soil conditions encountered and our knowledge of the area geology, site class "E" can be used to determine seismic design forces.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 General

Based on our study, there are no geotechnical considerations that would preclude development of the site, as currently planned. Due to the loose layer of material observed approximately 25 feet below current site grades, we recommend the building be supported on small diameter pipe piles that are driven to refusal. The floor slab can be support on competent inorganic native soils or on new structural fill placed and compacted above the competent soils.

The native soils encountered contain a sufficient amount of soil fines and will be difficult to compact as structural fill when too wet. The ability to use these native soils from site excavations as structural fill will depend on its moisture content and the prevailing weather conditions at the time of construction. If grading activities will take place during winter, the owner should be prepared to import clean granular material for use as structural fill and backfill.

The following sections provide detailed recommendations regarding the preceding issues and other geotechnical design and construction considerations. These recommendations should be incorporated into the final design drawings and construction specifications.

4.2 Site Preparation and Grading

To prepare the site for construction, all vegetation and organic surface soils should be stripped and removed from below the new construction/remodeling areas. Soil containing organic material will not be suitable for use as structural fill but may be used for limited depths in nonstructural areas.

Once stripping operations are complete, cut and fill operations can be initiated to establish desired grades. Prior to placing fill, all exposed bearing surfaces should be observed by a representative of Terra Associates, Inc. to verify soil conditions are as expected and suitable for support of building foundations or placement of structural fill. If unsuitable yielding areas are observed, they should be cut to firm bearing soil and filled to grade with structural fill. If depth of excavation to remove unstable soils is excessive, use of geotextile fabric such as Mirafi 500X or equivalent in conjunction with structural fill can be considered in order to limit the depth of removal. Our experience has shown that, in general, a minimum of 18 inches of a clean, granular structural fill placed and compacted over the geotextile fabric should establish a stable bearing surface.

Our study indicates that the site soils contain a sufficient percentage of fines, silt size particles that will make them difficult to compact as structural fill if they are too wet or too dry. The ability to use the native soils as structural fill will depend on their moisture content and the prevailing weather conditions when site grading activities take place. If wet soils are encountered, the contractor will need to dry the soils by aeration during dry weather conditions. Alternatively, the use of an additive such as Portland cement or lime to stabilize the soil moisture can be considered. If the soil is amended, additional Best Management Practices (BMPs) addressing the potential for elevated pH levels will need to be included in the Storm Water Pollution Prevention Program (SWPPP) prepared with the Temporary Erosion and Sedimentation Control (TESC) plan.

If grading activities are planned during the wet winter months, or if they are initiated during the summer and extend into fall and winter, the owner should be prepared to import wet weather structural fill. For this purpose, we recommend importing a granular soil that meets the following grading requirements:

U.S. Sieve Size	Percent Passing
6 inches	100
No. 4	75 maximum
No. 200	5 maximum*

* Based on the ¾-inch fraction.

Prior to use, Terra Associates, Inc. should examine and test all materials imported to the site for use as structural fill.

Structural fill should be placed in uniform loose layers not exceeding 6 inches and compacted to a minimum of 95 percent of the soil's maximum dry density, as determined by American Society for Testing and Materials (ASTM) Test Designation D-698 (Standard Proctor). The moisture content of the soil at the time of compaction should be within two percent of its optimum, as determined by this ASTM standard. In nonstructural areas, the degree of compaction can be reduced to 90 percent.

4.3 Excavations

All excavations at the site associated with confined spaces, such as utility trenches, must be completed in accordance with local, state, and federal requirements. Based on regulations outlined in the Washington Industrial Safety and Health Act (WISHA), the on-site soils would be classified as Type C soil.

Accordingly, temporary excavations in Type C soils should have their slopes laid back at an inclination of 1.5:1 (Horizontal: Vertical) or flatter, from the toe to the crest of the slope. All exposed temporary slope faces that will remain open for an extended period of time should be covered with a durable reinforced plastic membrane during construction to prevent slope raveling and rutting during periods of precipitation.

Groundwater should be expected for excavations that extend ten feet below current site grades. The volume of water could be significant and may need to be dewatered depending on the final configuration of the grades. The contractor should be prepared to implement active dewatering for any excavation that extends 15 feet below current site grades.

The above information is provided solely for the benefit of the owner and other design consultants and should not be construed to imply that Terra Associates, Inc. assumes responsibility for job site safety. It is understood that job site safety is the sole responsibility of the project general contractor.

4.4 Foundation Support

Due to the loose soil layer observed in the test borings, we recommend supporting the building on two-inch diameter pipe piles. Piles used should consist of a pipe that is galvanized or otherwise coated to reduce corrosion impacts.

Two-inch pipe piles driven to refusal can be designed for an allowable vertical compressive axial load of four kips. Refusal would be considered as less than one inch of penetration following 30 seconds of driving using a hydraulic impact hammer weighting 125 pounds. Based on soil conditions observed in the test borings, pile lengths of 30 to 40 feet should be expected.

If the piles will be relied on to resist lateral loading, they would need to be driven at a batter.

For designing grade beams to resist lateral loads, passive earth pressures acting on the side of the grade beam can be considered. We recommend calculating this lateral resistance using an equivalent fluid weight of 300 pcf. We recommend not including the upper 12 inches of soil in this computation because they can be affected by weather or disturbed by future grading activity. This value assumes the grade beam will be constructed neat against competent native soil or backfilled with structural fill as described in Section 4.2 of this report. The value recommended includes a safety factor of 1.5.

4.5 Floor Slab-on-Grade

Slab-on-grade floors may be supported on a subgrade as recommended in Section 4.2. Immediately below the floor slab, we recommend placing a four-inch-thick capillary break layer composed of clean, coarse sand or fine gravel that has less than five percent passing the No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab.

The capillary break layer will not prevent moisture intrusion through the slab caused by water vapor transmission. Where moisture by vapor transmission is undesirable, such as covered floor areas, a common practice is to place a durable plastic membrane on the capillary break layer and then cover the membrane with a layer of clean sand or fine gravel to protect it from damage during construction, and to aid in uniform curing of the concrete slab. It should be noted that if the sand or gravel layer overlying the membrane is saturated prior to pouring the slab, it will not be effective in assisting uniform curing of the slab and can actually serve as a water supply for moisture bleeding through the slab, potentially affecting floor coverings. Therefore, in our opinion, covering the membrane with a layer of sand or gravel should be avoided if floor slab construction occurs during the wet winter months and the layer cannot be effectively drained. We recommend floor designers and contractors refer to the current American Concrete Institute (ACI) Manual of Concrete Practice for further information regarding vapor barrier installation below slab-on-grade floors.

4.6 Lateral Earth Pressures on Below-Grade Walls

The magnitude of earth pressure development on retaining walls will partly depend on the quality of the wall backfill. We recommend placing and compacting wall backfill as structural fill as described in Section 4.2 of this report. To guard against hydrostatic pressure development, drainage must be installed behind the wall. A typical wall drainage detail is shown on Figure 3.

With wall backfill placed and compacted as recommended, and drainage properly installed, we recommend designing unrestrained walls for an active earth pressure equivalent to a fluid weighing 40 pounds per cubic foot (pcf). For restrained walls, an additional uniform load of 100 psf should be added to the 40 pcf. For evaluation of wall performance under seismic loading, a uniform pressure equivalent to 8H psf, where H is the height of the below-grade portion of the wall should be applied in addition to the static lateral earth pressure. These values assume a horizontal backfill condition and that no other surcharge loading, sloping embankments, or adjacent buildings will act on the wall. If such conditions exist, then the imposed loading must be included in the wall design. Friction at the base of foundations and passive earth pressure will provide resistance to these lateral loads. Values for these parameters are provided in Section 4.4 of this report.

4.7 Infiltration Feasibility

Based on our study, it is our opinion that subsurface conditions are generally not favorable for infiltration of site stormwater. The native soils observed at the site contain a high percentage of soil fines that would impede any downward migration of site stormwater. Even low impact development (LID) techniques would likely fill up and overtop during rain events and cause minor local flooding. Based on these soil conditions, it is our opinion that the stormwater should be managed using a conventional system.

4.8 Drainage

Surface

Final exterior grades should promote free and positive drainage away from the site at all times. Water must not be allowed to pond or collect adjacent to foundations or within the immediate building areas. We recommend providing a positive drainage gradient away from the building perimeters. If this gradient cannot be provided, surface water should be collected adjacent to the structures and disposed to appropriate storm facilities.

Subsurface

We recommend installing perimeter foundation drains adjacent to exterior shallow foundations. The drains can be laid to grade at an invert elevation equivalent to the bottom of footing grade. The drains can consist of four-inch diameter perforated PVC pipe that is enveloped in washed pea gravel-sized drainage aggregate. The aggregate should extend six inches above and to the sides of the pipe. Roof and foundation drains should be tightlined separately to the storm drains. All drains should be provided with cleanouts at easily accessible locations.

4.9 Utilities

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) or local jurisdictional requirements. At minimum, trench backfill should be placed and compacted as structural fill as described in Section 4.2 of this report. As noted, soils excavated onsite should generally be suitable for use as backfill material during dry weather. However, the site soils are fine grained and moisture sensitive. Therefore, moisture conditioning may be necessary to facilitate proper compaction. If utility construction takes place during the winter, it may be necessary to import suitable wet weather fill for utility trench backfilling.

5.0 ADDITIONAL SERVICES

Terra Associates, Inc. should review the final design drawings and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and implemented in project design. We should also provide geotechnical service during construction to observe compliance with our design concepts, specifications, and recommendations. This will allow for design changes if subsurface conditions differ from those anticipated prior to the start of construction.

6.0 LIMITATIONS

We prepared this report in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made. This report is the copyrighted property of Terra Associates, Inc. and is intended for specific application to the Cheshire Short Plat project in Mercer Island, Washington. This report is for the exclusive use of Mr. Derek Cheshire and his authorized representatives.

The analyses and recommendations present in this report are based on data obtained from the subsurface explorations completed onsite. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, Terra Associates, Inc. should be requested to reevaluate the recommendations in this report prior to proceeding with construction.

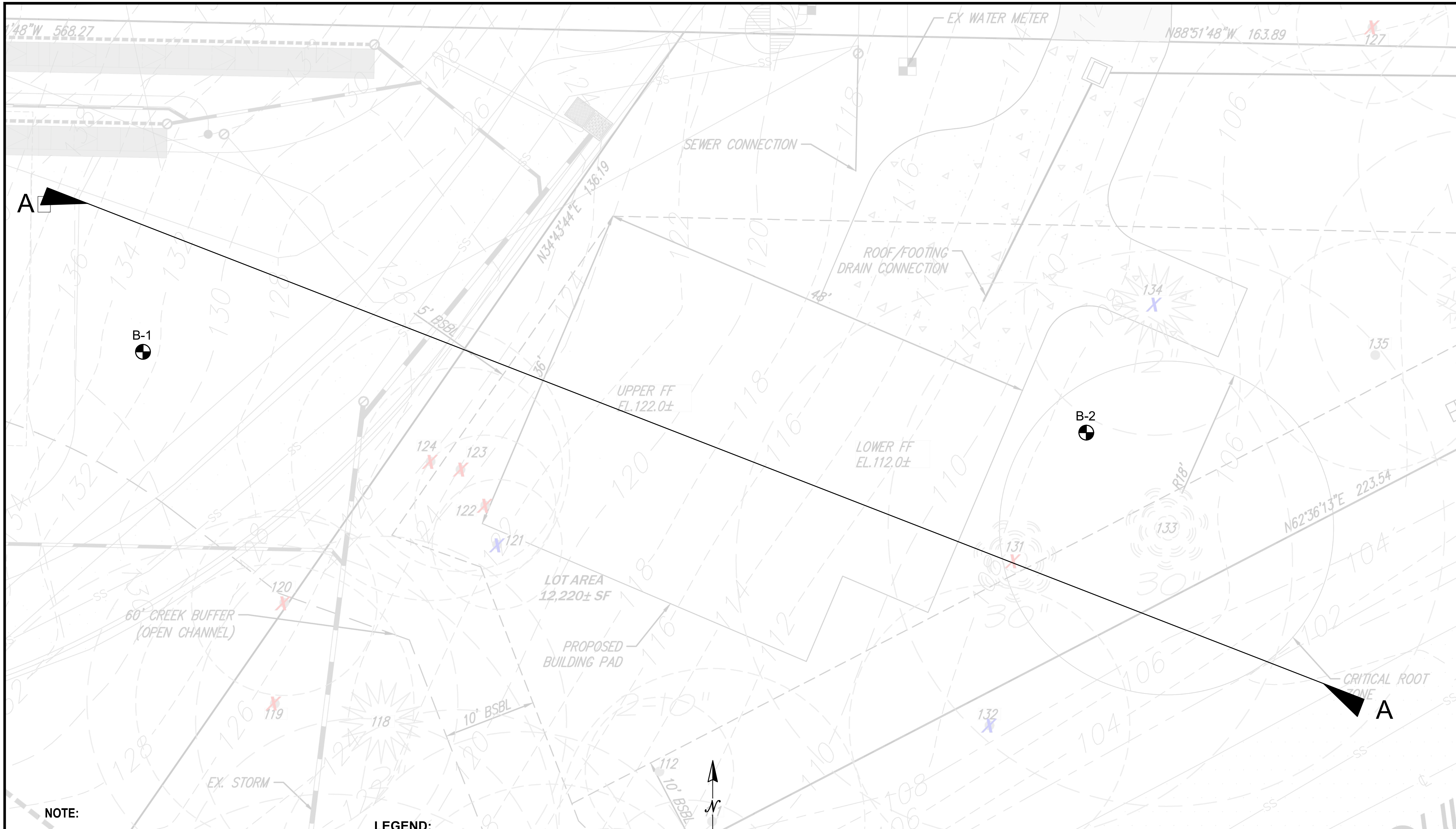
REFERENCE: https://www.bing.com/maps

ACCESSED 5/12/2020

Terra Associates, Inc.
Consultants in Geotechnical Engineering
Geology and
Environmental Earth Sciences

VICINITY MAP
CHESHIRTE SHORT PLAT
MERCER ISLAND, WASHINGTON

Proj.No. T-8264	Date: NOV 2022	Figure 1



NOTE:

THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE: SITE PLAN PROVIDED BY CORE DESIGN.

LEGEND:

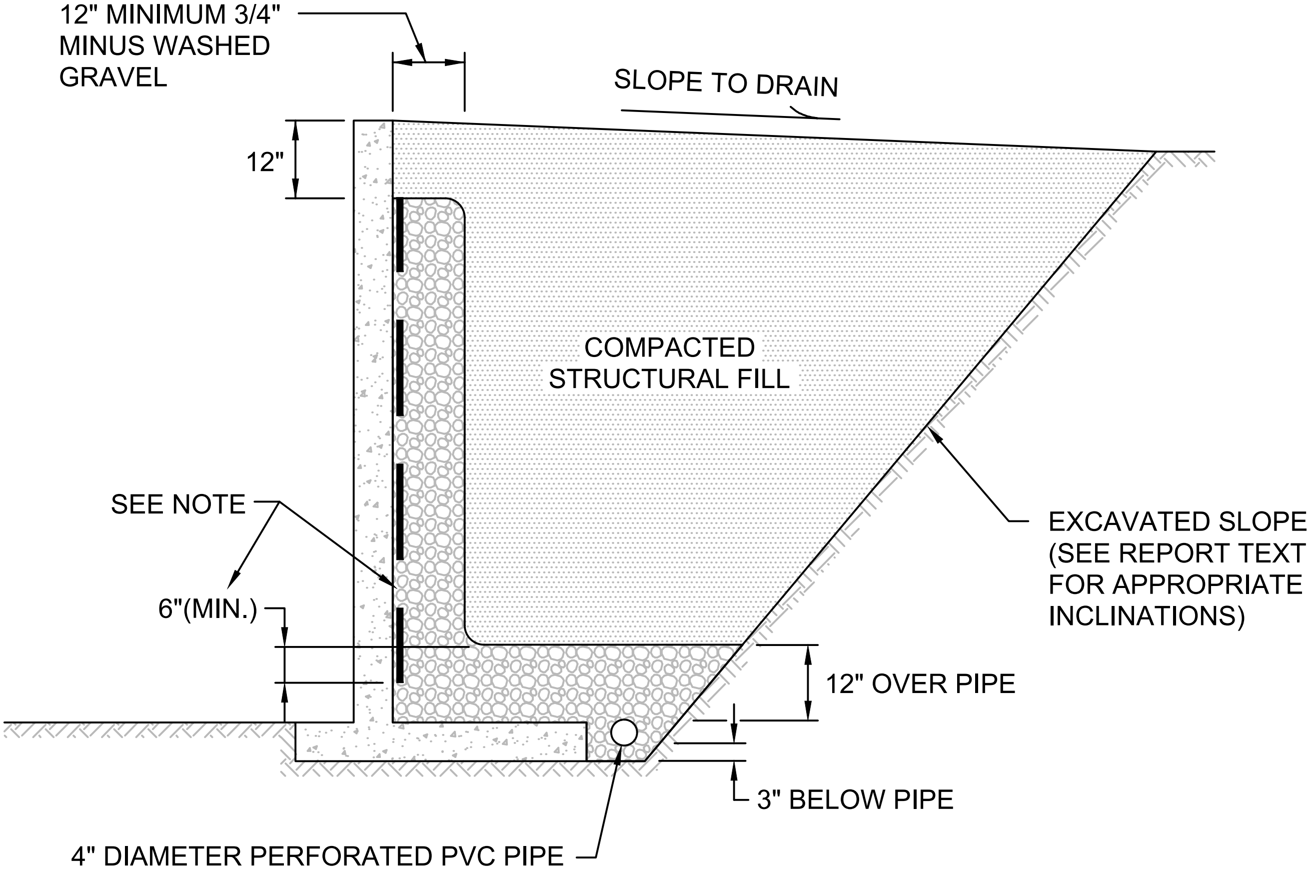
APPROXIMATE BORING LOCATION

APPROXIMATE CROSS SECTION LOCATION

Terra Associates, Inc.
Consultants in Geotechnical Engineering
Geology and
Environmental Earth Sciences

EXPLORATION LOCATION PLAN
CHESHIRE SHORT PLAT
MERCER ISLAND, WASHINGTON

Proj.No. T-8264 | Date: NOV 2022 | Figure 2



NOT TO SCALE

NOTE:

MIRADRAIN G100N PREFABRICATED DRAINAGE PANELS OR SIMILAR PRODUCT CAN BE SUBSTITUTED FOR THE 12-INCH WIDE GRAVEL DRAIN BEHIND WALL. DRAINAGE PANELS SHOULD EXTEND A MINIMUM OF SIX INCHES INTO 12-INCH THICK DRAINAGE GRAVEL LAYER OVER PERFORATED DRAIN PIPE.

Terra Associates, Inc. Consultants in Geotechnical Engineering Geology and Environmental Earth Sciences	TYPICAL WALL DRAINAGE DETAIL CHESHIRE SHORT PLAT MERCER ISLAND, WASHINGTON
Proj.No. T-8264	Date: NOV 2022 — Figure 3

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

Cheshire Short Plat
Mercer Island, Washington

On June 27, 2022, we completed our site exploration by observing soil conditions at 2 test borings drilled to depths of approximately 30 to 40 feet below existing site grades. Test boring locations were determined in the field by measuring from existing site features. The approximate location of the test borings is shown on the attached Exploration Location Plan, Figure 2. Test Boring Logs are presented on Figures A-2 and A-3.

An engineering geologist from our office conducted the field exploration. Our representative classified the soil conditions encountered, maintained a log of each test boring, obtained representative soil samples, and recorded water levels observed during drilling. During drilling, continuous soil samples were obtained during drilling in general accordance with ASTM Test Designation D-6914. Using this procedure, an eight-inch (outside diameter) hollow coring barrel is vibrated into the subsurface at five-foot intervals. A five-foot, continuous section of soil is then emptied into a sampling bag. In addition, Standard Penetration Test (SPT) soil samples were obtained every five-feet in general accordance with ASTM Test Designation D-1586. Using this procedure, a 2-inch (outside diameter) split-barrel sampler is driven into the ground 18 inches using a 140-pound hammer free falling from a height of 30 inches. The number of blows required to drive the sampler 12 inches after an initial 6-inch set is referred to as the Standard Penetration Resistance value or N value. This is an index related to the consistency of cohesive soils and relative density of cohesionless materials. N values obtained for each sampling interval are recorded on the Test Boring Logs, Figures A-2 and A-3. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS) described on Figure A-1.

Representative soil samples obtained from the test borings were placed in sealed plastic bags and taken to our laboratory for further examination and testing. The moisture content of selected samples was measured and is reported on the corresponding Test Boring Logs. Grain size analyses were also performed on select samples. The results are shown on Figure A-4.

MAJOR DIVISIONS				LETTER SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS	More than 50% material larger than No. 200 sieve size	**GRAVELS** More than 50% of coarse fraction is larger than No. 4 sieve	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
				GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.
			Gravels with fines	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
				GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
		SANDS More than 50% of coarse fraction is smaller than No. 4 sieve	Clean Sands (less than 5% fines)	SW	Well-graded sands, sands with gravel, little or no fines.
				SP	Poorly-graded sands, sands with gravel, little or no fines.
			Sands with fines	SM	Silty sands, sand-silt mixtures, non-plastic fines.
				SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS	More than 50% material smaller than No. 200 sieve size	**SILTS AND CLAYS** Liquid Limit is less than 50%		ML	Inorganic silts, rock flour, clayey silts with slight plasticity.
				CL	Inorganic clays of low to medium plasticity. (Lean clay)
				OL	Organic silts and organic clays of low plasticity.
		SILTS AND CLAYS Liquid Limit is greater than 50%		MH	Inorganic silts, elastic.
				CH	Inorganic clays of high plasticity. (Fat clay)
				OH	Organic clays of high plasticity.
HIGHLY ORGANIC SOILS				PT	Peat.

DEFINITION OF TERMS AND SYMBOLS

COHESIONLESS

Density	Standard Penetration Resistance in Blows/Foot
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	>50

COHESIVE

Consistancy	Standard Penetration Resistance in Blows/Foot
Very Soft	0-2
Soft	2-4
Medium Stiff	4-8
Stiff	8-16
Very Stiff	16-32
Hard	>32

Symbol	Definition
I	2" OUTSIDE DIAMETER SPILT SPOON SAMPLER
II	2.4" INSIDE DIAMETER RING SAMPLER OR SHELBY TUBE SAMPLER
▼	WATER LEVEL (Date)
Tr	TORVANE READINGS, tsf
Pp	PENETROMETER READING, tsf
DD	DRY DENSITY, pounds per cubic foot
LL	LIQUID LIMIT, percent
PI	PLASTIC INDEX
N	STANDARD PENETRATION, blows per foot

Terra Associates, Inc.
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Geology and
Environmental Earth Sciences

UNIFIED SOIL CLASSIFICATION SYSTEM
CHESHIRE SHORT PLAT
MERCER ISLAND, WASHINGTON

Proj.No. T-8264 | Date: NOV 2022 | Figure A-1

LOG OF BORING NO. 1

Figure No. A-2

Project: Cheshire Short Plat **Project No:** T-8264 **Date Drilled:** June 27, 2022

Client: Mr. Derek Cheshire **Driller:** Boretec **Logged By:** JCS

Location: Mercer Island, Washington **Depth to Groundwater:** 12.5 ft, 25 ft **Approx. Elev:** NA

Depth (ft)	Soil Description	Consistency/ Relative Density	SPT (N) Blows/foot	Moisture Content (%)
0	Fill: Brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, moist. (GM)	Dense	35	6.8
5	Gray-brown silty SAND with gravel, fine sand, fine to coarse gravel, moist. (SM) (Possible fill)		30	6.6
	Brown to gray-brown silty SAND with gravel, fine sand, fine to coarse gravel, dry to moist. (SM/SP-SM)	Medium Dense	21	5.7
10		Dense	39	5.0
	Gray silty SAND with gravel, fine sand, fine to coarse gravel, moist (wet below 12.5 feet). (SM)		16	32.0
15	Gray clayey SILT, moist, scattered randomly-oriented, iron-oxide stained fractures. (ML) (Pp=4.5 tons/sf) (LL=49, PI=15)	Very Stiff	23	28.4
	Gray SILT to SILT with sand, fine sand, trace of fine to coarse gravel, moist, nonplastic to low plasticity, trace of brown silty sand pockets, scattered blocky zones. (ML)	Medium Dense		
20		Dense	37	28.3
	Gray SILT, moist, nonplastic to low plasticity. (ML)			
25	- Wet with scattered blocky zones below 25 feet.	Medium Dense	20	34.3
30	- Scattered high-angle sheared seams with hard, angular silt/clay clasts between 30 and 36.5 feet. (LL=30. PI=4)		12	33.6
35			14	33.5
40			21	30.2
45	Boring terminated at 41.5 feet. Groundwater encountered between 12.5 and 12.6 feet and below 25 feet.			

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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LOG OF BORING NO. 2

Figure No. A-3

Project: Cheshire Short Plat **Project No:** T-8264 **Date Drilled:** June 27, 2022

Client: Mr. Derek Cheshire **Driller:** Boretec **Logged By:** JCS

Location: Mercer Island, Washington **Depth to Groundwater:** 7.5 ft **Approx. Elev:** NA

Depth (ft)	Soil Description	Consistency/ Relative Density	SPT (N) Blows/foot	Moisture Content (%)
2.5	No sample recovery at 2.5 feet.	Medium Dense	16	
5	Brown silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist to wet (wet below 7.5 feet). (SM)	Medium Dense	14	13.0
7.5		Medium Dense	15	13.3
10	No sample recovery at 10 feet.	Medium Dense	19	
12.5	Gray silty SAND with gravel, fine sand, fine to coarse gravel, wet. (SM)	Medium Dense	12	17.8
15	Gray SAND with gravel, fine to coarse sand, fine to coarse gravel, wet. (SP)	Medium Dense	10	13.7
18	Gray SILT, moist to wet, nonplastic to low plasticity. (ML)	Medium Dense		
20		Medium Dense	19	30.5
25	- Wet with scattered blocky zones between 25 and 26.5 feet. (LL=29, PI=3)	Loose	9	32.5
30		Medium Dense	24	31.4
31.5	Boring terminated at 31.5 feet. Groundwater encountered below 7.5 feet			

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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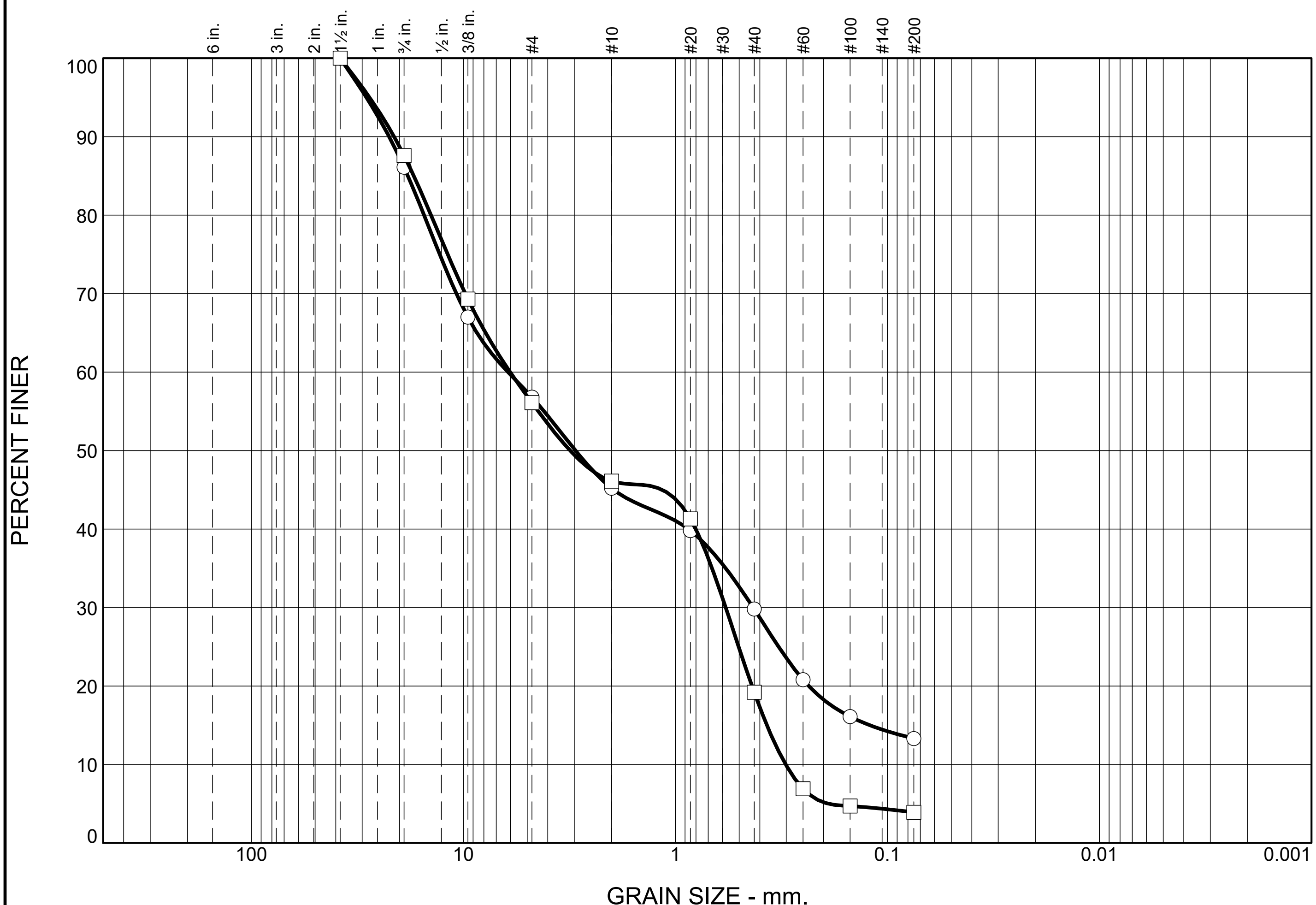
Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	13.9	29.3	11.6	15.4	16.5	13.3	
□	0.0	12.4	31.5	10.0	26.9	15.3	3.9	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			18.2740	6.1594	2.9592	0.4298	0.1212			
□			17.1334	6.0179	3.1361	0.5789	0.3702	0.3018	0.18	19.94

Material Description	USCS	AASHTO
○ silty SAND with gravel	SM	
□ SAND with gravel	SP	

Project No. T-8264 **Client:** Derek Cheshire

Project: Cheshire Short Plat

Mercer Island, Washington

○ **Location:** B-1 **Depth:** 7.5'

□ **Location:** B-2 **Depth:** 15'

Terra Associates, Inc.

Kirkland, WA

Remarks:

○ Tested July 6, 2022

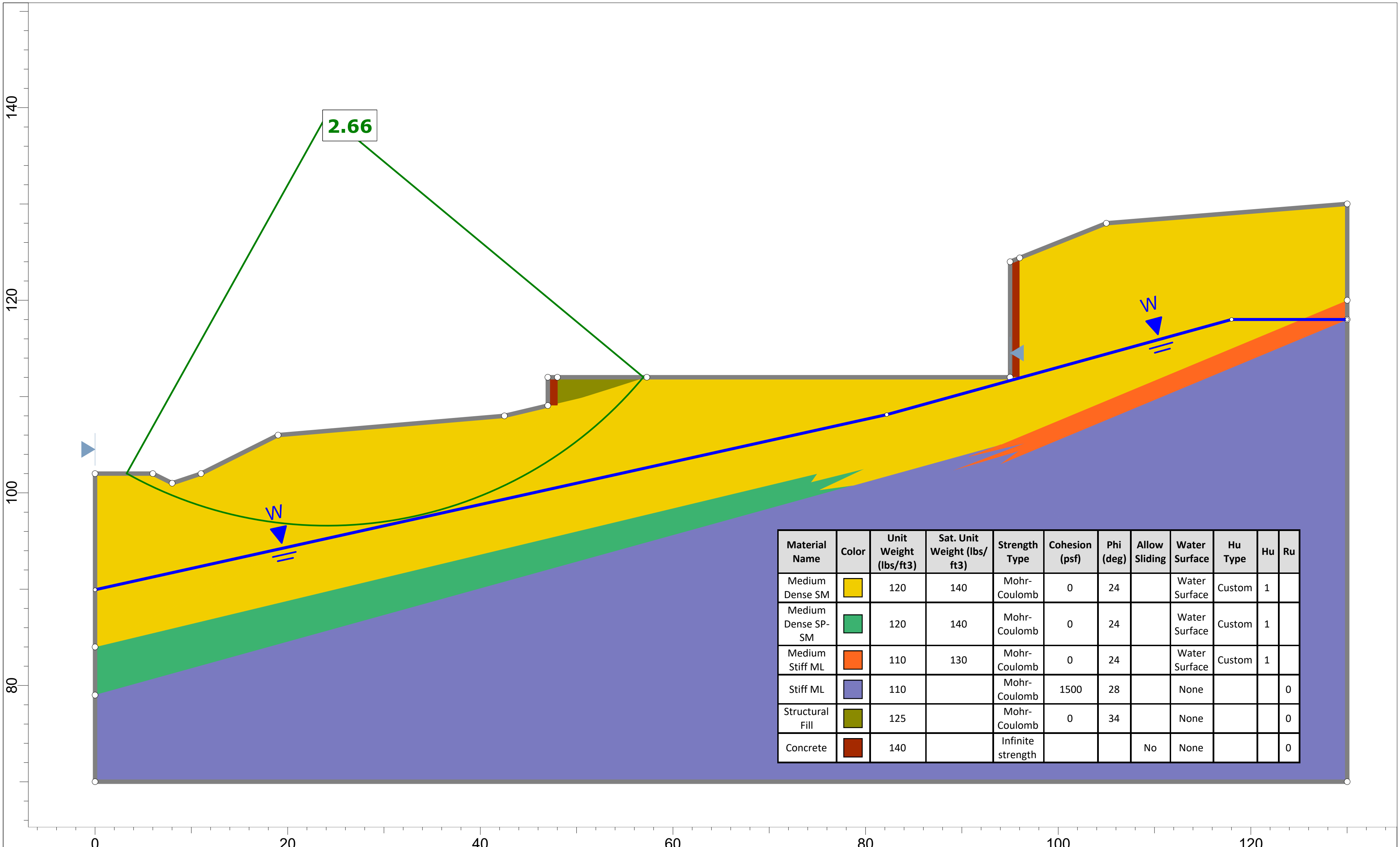
□ Tested July 6, 2022

Figure A-4

Tested By: KJ

APPENDIX B

RELATIVE SLOPE STABILITY RESULTS

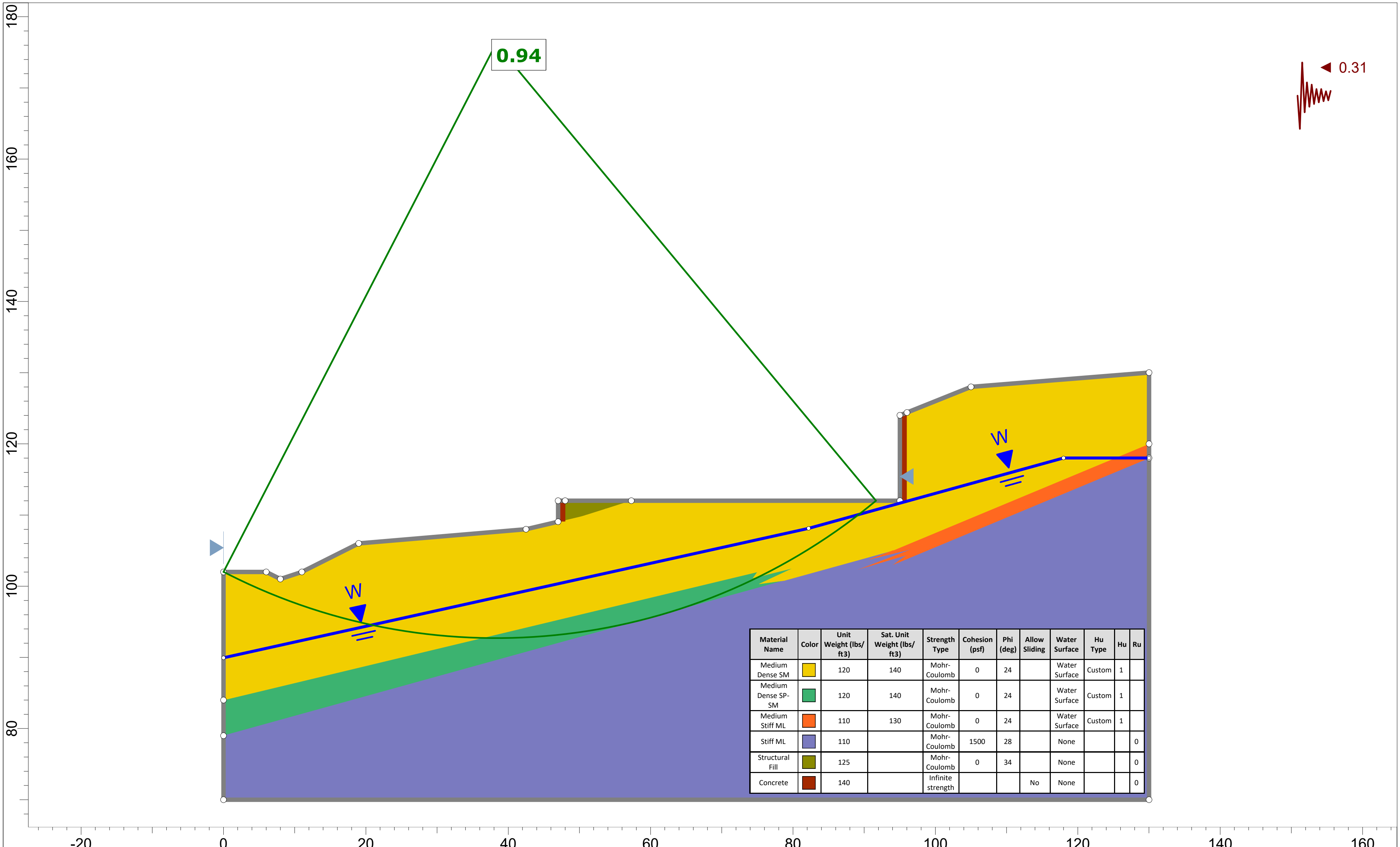


Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Allow Sliding	Water Surface	Hu Type	Hu	Ru
Medium Dense SM		120	140	Mohr-Coulomb	0	24		Water Surface	Custom	1	
Medium Dense SP-SM		120	140	Mohr-Coulomb	0	24		Water Surface	Custom	1	
Medium Stiff ML		110	130	Mohr-Coulomb	0	24		Water Surface	Custom	1	
Stiff ML		110		Mohr-Coulomb	1500	28		None			0
Structural Fill		125		Mohr-Coulomb	0	34		None			0
Concrete		140		Infinite strength			No	None			0

rocscience

SLIDEINTERPRET 9.024

Project	Cheshire Short Plat		
Group	Post Construction	*Scenario*	Master Scenario
Drawn By	C. Decker	*Company*	Terra Associates, Inc.
Date	November 21, 2022	*File Name*	Cross Section A-A' Lateral Spread.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Allow Sliding	Water Surface	Hu Type	Hu	Ru
Medium Dense SM		120	140	Mohr-Coulomb	0	24		Water Surface	Custom	1	
Medium Dense SP-SM		120	140	Mohr-Coulomb	0	24		Water Surface	Custom	1	
Medium Stiff ML		110	130	Mohr-Coulomb	0	24		Water Surface	Custom	1	
Stiff ML		110		Mohr-Coulomb	1500	28		None			0
Structural Fill		125		Mohr-Coulomb	0	34		None			0
Concrete		140		Infinite strength			No	None			0

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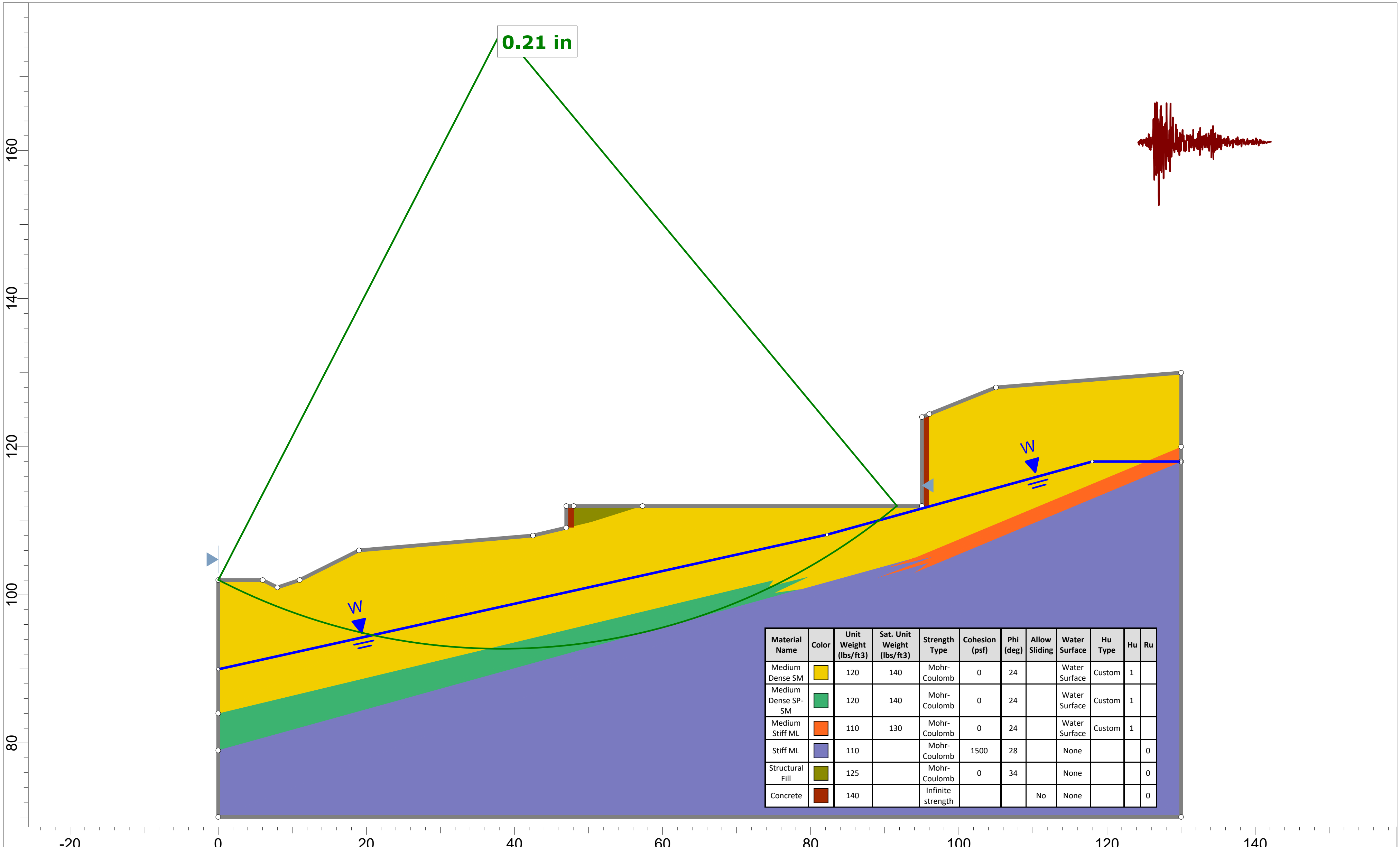
SLIDEINTERPRET 9.024

Project	Cheshire Short Plat		
Group	Post Construction	*Scenario*	Seismic
Drawn By	C. Decker	*Company*	Terra Associates, Inc.
Date	November 21, 2022	*File Name*	Cross Section A-A' Lateral Spread.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Allow Sliding	Water Surface	Hu Type	Hu	Ru
Medium Dense SM		120	140	Mohr-Coulomb	0	24		Water Surface	Custom	1	
Medium Dense SP-SM		120	140	Mohr-Coulomb	0	24		Water Surface	Custom	1	
Medium Stiff ML		110	130	Mohr-Coulomb	0	24		Water Surface	Custom	1	
Stiff ML		110		Mohr-Coulomb	1500	28		None			0
Structural Fill		125		Mohr-Coulomb	0	34		None			0
Concrete		140		Infinite strength			No	None			0

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SLIDEINTERPRET 9.024

Project	Cheshire Short Plat		
Group	Lateral Spread Analysis	*Scenario*	Master Scenario
Drawn By	C. Decker	*Company*	Terra Associates, Inc.
Date	November 21, 2022	*File Name*	Cross Section A-A' Lateral Spread.slmd

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Cross Section A-A' Lateral Spread
Cheshire Short Plat
Terra Associates, Inc.
Date Created: November 21, 2022
Software Version: 9.024

Table of Contents

Slide2 Analysis Information

Cross Section A-A' Lateral Spread

Project Summary

File Name:	Cross Section A-A' Lateral Spread.slmd
Slide2 Modeler Version:	9.024
Project Title:	Cheshire Short Plat
Analysis:	Cross Section A-A'
Author:	C. Decker
Company:	Terra Associates, Inc.
Date Created:	November 21, 2022

Currently Open Scenarios

Group Name	Scenario Name	Global Minimum	Compute Time
Post Construction	Master Scenario	Bishop Simplified: 2.660390 Janbu Simplified: 2.392430	00h:00m:00.483s
	Seismic	Bishop Simplified: 0.941190 Janbu Simplified: 0.867798	00h:00m:00.560s
Lateral Spread Analysis	Master Scenario	Bishop Simplified: 0.205188 Janbu Simplified: 0.397331	00h:00m:05.687s

General Settings

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

Analysis Options

All Open Scenarios

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

All Open Scenarios

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

All Open Scenarios

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

Surface Options

All Open Scenarios

Surface Type:	Circular
Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth [ft]:	10
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Post Construction - Master Scenario

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Post Construction - Seismic

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.31

Lateral Spread Analysis

Advanced seismic analysis:	Yes
Locate surface with minimum critical horizontal seismic acceleration (Ky):	No
Using Newmark analysis:	Yes
Seismic record used:	Cape Mendocino 1992: RIO-270
Scaling records:	No Scaling
Displacement computed using:	Maximum positive/negative
Analysis type	Rigid
Displacement direction:	Downslope only
Staged pseudostatic analysis:	No

Materials

Medium Dense SM	
Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [lbs/ft3]	120
Saturated Unit Weight [lbs/ft3]	140
Cohesion [psf]	0
Friction Angle [deg]	24
Water Surface	Assigned per scenario
Hu Value	1
Medium Dense SP-SM	
Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [lbs/ft3]	120
Saturated Unit Weight [lbs/ft3]	140
Cohesion [psf]	0
Friction Angle [deg]	24
Water Surface	Assigned per scenario
Hu Value	1
Medium Stiff ML	
Color	
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [lbs/ft3]	110
Saturated Unit Weight [lbs/ft3]	130
Cohesion [psf]	0
Friction Angle [deg]	24
Water Surface	Assigned per scenario
Hu Value	1
Stiff ML	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	110
Cohesion [psf]	1500
Friction Angle [deg]	28
Water Surface	Assigned per scenario
Ru Value	0
Structural Fill	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	125
Cohesion [psf]	0
Friction Angle [deg]	34
Water Surface	Assigned per scenario
Ru Value	0
Concrete	
Color	
Strength Type	Infinite strength
Unit Weight [lbs/ft3]	140
Allow Sliding Along Boundary	No
Water Surface	Assigned per scenario
Ru Value	0

Materials In Use

Material		Post Construction	Seismic	Lateral Spread Analysis
Medium Dense SM		✓	✓	✓
Medium Dense SP-SM		✓	✓	✓
Medium Stiff ML		✓	✓	✓
Stiff ML		✓	✓	✓
Structural Fill		✓	✓	✓
Concrete		✓	✓	✓

Global Minimums

Post Construction - Master Scenario

Method: bishop simplified

FS	2.660390
Center:	24.090, 139.293
Radius:	42.708
Left Slip Surface Endpoint:	3.276, 102.000
Right Slip Surface Endpoint:	56.939, 112.000
Resisting Moment:	850287 lb-ft
Driving Moment:	319610 lb-ft
Total Slice Area:	359.266 ft2
Surface Horizontal Width:	53.663 ft
Surface Average Height:	6.69484 ft

Method: janbu simplified

FS	2.392430
Center:	24.174, 139.274
Radius:	42.681
Left Slip Surface Endpoint:	3.381, 102.000
Right Slip Surface Endpoint:	57.004, 112.000
Resisting Horizontal Force:	18619.2 lb
Driving Horizontal Force:	7782.57 lb
Total Slice Area:	359.541 ft2
Surface Horizontal Width:	53.6229 ft
Surface Average Height:	6.705 ft

Post Construction - Seismic

Method: bishop simplified

FS	0.941190
Center:	38.277, 176.209
Radius:	83.497
Left Slip Surface Endpoint:	0.004, 102.000
Right Slip Surface Endpoint:	91.653, 112.000
Resisting Moment:	3.97997e+06 lb-ft
Driving Moment:	4.22866e+06 lb-ft
Total Slice Area:	1016.47 ft2
Surface Horizontal Width:	91.6482 ft
Surface Average Height:	11.0909 ft

Method: janbu simplified

FS	0.867798
Center:	38.285, 176.207
Radius:	83.495
Left Slip Surface Endpoint:	0.013, 102.000
Right Slip Surface Endpoint:	91.659, 112.000
Resisting Horizontal Force:	45895.1 lb
Driving Horizontal Force:	52886.9 lb
Total Slice Area:	1016.51 ft2
Surface Horizontal Width:	91.6465 ft
Surface Average Height:	11.0916 ft

Lateral Spread Analysis

Method: bishop simplified

Newmark Displacement (in)	0.205188
Center:	38.279, 176.204
Radius:	83.491
Left Slip Surface Endpoint:	0.010, 102.000
Right Slip Surface Endpoint:	91.651, 112.000
Resisting Moment:	3.98505e+06 lb-ft
Driving Moment:	3.98505e+06 lb-ft
Total Slice Area:	1016.36 ft2
Surface Horizontal Width:	91.6415 ft
Surface Average Height:	11.0906 ft

Method: janbu simplified

Newmark Displacement (in)	0.397331
Center:	38.279, 176.204
Radius:	83.491
Left Slip Surface Endpoint:	0.010, 102.000
Right Slip Surface Endpoint:	91.651, 112.000
Resisting Horizontal Force:	46014.6 lb
Driving Horizontal Force:	46014.6 lb
Total Slice Area:	1016.36 ft2
Surface Horizontal Width:	91.6415 ft
Surface Average Height:	11.0906 ft

Global Minimum Support Data

All Open Scenarios

No Supports Present

Valid and Invalid Surfaces

Post Construction - Master Scenario

Method: bishop simplified

Number of Valid Surfaces:	4394
Number of Invalid Surfaces:	628

Error Codes

Error Code -112 reported for 628 surfaces

Method: janbu simplified

Number of Valid Surfaces:	5016
Number of Invalid Surfaces:	6

Error Codes

Error Code -108 reported for 3 surfaces
Error Code -111 reported for 3 surfaces

Post Construction - Seismic

Method: bishop simplified

Number of Valid Surfaces:	6749
Number of Invalid Surfaces:	20

Error Codes

Error Code -112 reported for 20 surfaces

Method: janbu simplified

Number of Valid Surfaces:	6714
Number of Invalid Surfaces:	55

Error Codes

Error Code -112 reported for 55 surfaces

Lateral Spread Analysis

Method: bishop simplified

Number of Valid Surfaces:	5003
Number of Invalid Surfaces:	0

Method: janbu simplified

Number of Valid Surfaces:	5003
Number of Invalid Surfaces:	0

Slice Data

Post Construction - Master Scenario

Global Minimum Query (bishop simplified) - Safety Factor: 2.66039

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	1.09261	38.6214	-28.3335	Medium Dense SM	0	24	6.5013	17.296	38.8475	0	38.8475	35.342	35.342
2	1.09261	113.237	-26.6806	Medium Dense SM	0	24	18.9342	50.3724	113.138	0	113.138	103.623	103.623
3	1.09261	173.501	-25.0513	Medium Dense SM	0	24	28.8262	76.6889	172.246	0	172.246	158.772	158.772
4	1.09261	175.114	-23.4434	Medium Dense SM	0	24	28.9172	76.9311	172.79	0	172.79	160.251	160.251
5	1.09261	190.601	-21.8548	Medium Dense SM	0	24	31.2911	83.2466	186.975	0	186.975	174.424	174.424
6	1.09261	287.311	-20.2838	Medium Dense SM	0	24	46.9036	124.782	280.265	0	280.265	262.93	262.93
7	1.09261	385.82	-18.7285	Medium Dense SM	0	24	62.6446	166.659	374.321	0	374.321	353.082	353.082
8	1.09261	490.355	-17.1874	Medium Dense SM	0	24	79.2008	210.705	473.25	0	473.25	448.753	448.753
9	1.09261	604.159	-15.6591	Medium Dense SM	0	24	97.0861	258.287	580.122	0	580.122	552.907	552.907
10	1.09261	713.913	-14.1421	Medium Dense SM	0	24	114.155	303.698	682.118	0	682.118	653.355	653.355
11	1.09261	819.644	-12.6352	Medium Dense SM	0	24	130.43	346.995	779.363	0	779.363	750.124	750.124
12	1.09261	921.429	-11.1371	Medium Dense SM	0	24	145.935	388.245	872.013	0	872.013	843.283	843.283
13	1.09261	1019.33	-9.64666	Medium Dense SM	0	24	160.694	427.51	960.201	0	960.201	932.887	932.887
14	1.09261	1113.41	-8.16281	Medium Dense SM	0	24	174.728	464.845	1044.06	0	1044.06	1018.99	1018.99
15	1.09261	1192.69	-6.68446	Medium Dense SM	0	24	186.332	495.716	1113.4	0	1113.4	1091.56	1091.56
16	1.09261	1224.35	-5.21057	Medium Dense SM	0	24	190.435	506.631	1137.91	0	1137.91	1120.55	1120.55
17	1.09261	1247.75	-3.74013	Medium Dense SM	0	24	193.229	514.065	1154.61	0	1154.61	1141.98	1141.98
18	1.09261	1267.47	-2.27215	Medium Dense SM	0	24	195.434	519.931	1167.78	0	1167.78	1160.03	1160.03
19	1.09261	1283.51	-0.805666	Medium Dense SM	0	24	197.059	524.253	1177.49	0	1177.49	1174.72	1174.72
20	1.09261	1295.89	0.66029	Medium Dense SM	0	24	198.109	527.048	1183.77	0	1183.77	1186.05	1186.05
21	1.09261	1304.59	2.12668	Medium Dense SM	0	24	198.592	528.333	1186.65	0	1186.65	1194.03	1194.03
22	1.09261	1309.62	3.59446	Medium Dense SM	0	24	198.512	528.119	1186.18	0	1186.18	1198.65	1198.65
23	1.09261	1310.97	5.06462	Medium Dense SM	0	24	197.871	526.415	1182.34	0	1182.34	1199.88	1199.88
24	1.09261	1308.6	6.53812	Medium Dense SM	0	24	196.673	523.227	1175.18	0	1175.18	1197.72	1197.72
25	1.09261	1302.5	8.01599	Medium Dense SM	0	24	194.918	518.558	1164.7	0	1164.7	1192.15	1192.15
26	1.09261	1292.62	9.49924	Medium Dense SM	0	24	192.606	512.407	1150.89	0	1150.89	1183.12	1183.12
27	1.09261	1278.92	10.989	Medium Dense SM	0	24	189.736	504.773	1133.74	0	1133.74	1170.58	1170.58
28	1.09261	1261.34	12.4862	Medium Dense SM	0	24	186.307	495.648	1113.24	0	1113.24	1154.5	1154.5
29	1.09261	1239.82	13.9922	Medium Dense SM	0	24	182.313	485.025	1089.39	0	1089.39	1134.82	1134.82

30	1.09261	1214.29	15.5082	Medium Dense SM	0	24	177.753	472.891	1062.13	0	1062.13	1111.45	1111.45
31	1.09261	1184.66	17.0353	Medium Dense SM	0	24	172.618	459.23	1031.45	0	1031.45	1084.34	1084.34
32	1.09261	1150.83	18.5751	Medium Dense SM	0	24	166.903	444.026	997.3	0	997.3	1053.39	1053.39
33	1.09261	1112.7	20.1289	Medium Dense SM	0	24	160.598	427.254	959.625	0	959.625	1018.49	1018.49
34	1.09261	1070.14	21.6983	Medium Dense SM	0	24	153.696	408.89	918.38	0	918.38	979.538	979.538
35	1.09261	1023	23.285	Medium Dense SM	0	24	146.183	388.904	873.491	0	873.491	936.402	936.402
36	1.09261	971.246	24.8909	Medium Dense SM	0	24	138.063	367.302	824.973	0	824.973	889.033	889.033
37	1.09261	927.279	26.518	Medium Dense SM	0	24	131.102	348.783	783.379	0	783.379	848.795	848.795
38	1.09261	886.89	28.1685	Medium Dense SM	0	24	124.69	331.723	745.062	0	745.062	811.832	811.832
39	1.09261	841.146	29.8448	Medium Dense SM	0	24	117.568	312.778	702.511	0	702.511	769.966	769.966
40	1.09261	789.778	31.5499	Medium Dense SM	0	24	109.715	291.886	655.586	0	655.586	722.951	722.951
41	1.09261	1154.78	33.2867	Medium Dense SM	0	24	159.393	424.048	952.428	0	952.428	1057.08	1057.08
42	1.09261	1018.55	35.0589	Medium Dense SM	0	24	139.64	371.496	834.395	0	834.395	932.385	932.385
43	1.09261	913.159	36.8704	Medium Dense SM	0	24	124.294	330.67	742.696	0	742.696	835.918	835.918
44	1.09261	800.569	38.7261	Medium Dense SM	0	24	108.136	287.683	646.147	0	646.147	732.86	732.86
45	1.09261	679.886	40.6313	Medium Dense SM	0	24	91.081	242.311	544.24	0	544.24	622.392	622.392
46	1.09261	550.679	42.5927	Medium Dense SM	0	24	73.1175	194.521	436.9	0	436.9	504.118	504.118
47	1.09261	412.253	44.6179	Medium Dense SM	0	24	54.2082	144.215	323.911	0	323.911	377.401	377.401
48	1.09261	263.622	46.7167	Medium Dense SM	0	24	34.2952	91.2385	204.925	0	204.925	241.34	241.34
49	1.09261	103.56	48.9007	Medium Dense SM	0	24	13.3126	35.4166	79.5471	0	79.5471	94.8079	94.8079
50	0.125295	1.17542	50.1468	Structural Fill	0	34	1.82509	4.85545	7.19849	0	7.19849	9.3849	9.3849

Global Minimum Query (janbu simplified) - Safety Factor: 2.39243

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	1.09227	38.5785	-28.3217	Medium Dense SM	0	24	7.30726	17.4821	39.2656	0	39.2656	35.3274	35.3274
2	1.09227	113.11	-26.6684	Medium Dense SM	0	24	21.2629	50.8699	114.256	0	114.256	103.577	103.577
3	1.09227	169.514	-25.0388	Medium Dense SM	0	24	31.6373	75.6901	170.002	0	170.002	155.224	155.224
4	1.09227	168.05	-23.4305	Medium Dense SM	0	24	31.1493	74.5226	167.38	0	167.38	153.881	153.881
5	1.09227	191.671	-21.8416	Medium Dense SM	0	24	35.2945	84.4397	189.655	0	189.655	175.508	175.508
6	1.09227	291.403	-20.2701	Medium Dense SM	0	24	53.3207	127.566	286.518	0	286.518	266.825	266.825
7	1.09227	389.819	-18.7145	Medium Dense SM	0	24	70.8949	169.611	380.953	0	380.953	356.937	356.937
8	1.09227	496.426	-17.173	Medium Dense SM	0	24	89.7523	214.726	482.282	0	482.282	454.546	454.546
9	1.09227	610.177	-15.6443	Medium Dense SM	0	24	109.688	262.422	589.411	0	589.411	558.694	558.694
10	1.09227	719.822	-14.1269	Medium Dense SM	0	24	128.681	307.861	691.466	0	691.466	659.079	659.079
11	1.09227	825.447	-12.6196	Medium Dense SM	0	24	146.765	351.126	788.642	0	788.642	755.783	755.783
12	1.09227	927.128	-11.121	Medium Dense SM	0	24	163.973	392.294	881.106	0	881.106	848.873	848.873
13	1.09227	1024.93	-9.63021	Medium Dense SM	0	24	180.331	431.43	969.003	0	969.003	938.405	938.405
14	1.09227	1118.9	-8.14594	Medium Dense SM	0	24	195.865	468.593	1052.47	0	1052.47	1024.44	1024.44
15	1.09227	1194.53	-6.66715	Medium Dense SM	0	24	208.056	497.76	1117.99	0	1117.99	1093.67	1093.67
16	1.09227	1224.25	-5.19282	Medium Dense SM	0	24	212.181	507.628	1140.15	0	1140.15	1120.86	1120.86
17	1.09227	1247.59	-3.72192	Medium Dense SM	0	24	215.173	514.786	1156.23	0	1156.23	1142.23	1142.23
18	1.09227	1267.25	-2.25349	Medium Dense SM	0	24	217.508	520.373	1168.78	0	1168.78	1160.22	1160.22
19	1.09227	1283.23	-0.786527	Medium Dense SM	0	24	219.196	524.412	1177.85	0	1177.85	1174.84	1174.84
20	1.09227	1295.55	0.679916	Medium Dense SM	0	24	220.247	526.925	1183.49	0	1183.49	1186.1	1186.1
21	1.09227	1304.2	2.1468	Medium Dense SM	0	24	220.666	527.927	1185.74	0	1185.74	1194.02	1194.02
22	1.09227	1309.18	3.6151	Medium Dense SM	0	24	220.459	527.433	1184.64	0	1184.64	1198.56	1198.56
23	1.09227	1310.47	5.08578	Medium Dense SM	0	24	219.632	525.453	1180.19	0	1180.19	1199.74	1199.74
24	1.09227	1308.05	6.55984	Medium Dense SM	0	24	218.186	521.994	1172.41	0	1172.41	1197.5	1197.5
25	1.09227	1301.9	8.03827	Medium Dense SM	0	24	216.124	517.062	1161.34	0	1161.34	1191.86	1191.86
26	1.09227	1291.97	9.52211	Medium Dense SM	0	24	213.447	510.657	1146.95	0	1146.95	1182.75	1182.75
27	1.09227	1278.21	11.0124	Medium Dense SM	0	24	210.154	502.779	1129.26	0	1129.26	1170.15	1170.15
28	1.09227	1260.58	12.5103	Medium Dense SM	0	24	206.243	493.422	1108.24	0	1108.24	1154.01	1154.01
29	1.09227	1239.01	14.017	Medium Dense SM	0	24	201.712	482.581	1083.9	0	1083.9	1134.25	1134.25
30	1.09227	1213.43	15.5336	Medium Dense SM	0	24	196.555	470.245	1056.19	0	1056.19	1110.82	1110.82
31	1.09227	1183.75	17.0615	Medium Dense SM	0	24	190.768	456.4	1025.09	0	1025.09	1083.64	1083.64
32	1.09227	1149.87	18.602	Medium Dense SM	0	24	184.344	441.03	990.571	0	990.571	1052.62	1052.62
33	1.09227	1111.69	20.1565	Medium Dense SM	0	24	177.274	424.115	952.576	0	952.576	1017.65	1017.65

34	1.09227	1069.07	21.7268	Medium Dense SM	0	24	169.548	405.632	911.067	0	911.067	978.63	978.63
35	1.09227	1021.88	23.3144	Medium Dense SM	0	24	161.156	385.554	865.969	0	865.969	935.421	935.421
36	1.09227	970.326	24.9211	Medium Dense SM	0	24	152.141	363.987	817.529	0	817.529	888.219	888.219
37	1.09227	927.857	26.5492	Medium Dense SM	0	24	144.613	345.977	777.077	0	777.077	849.334	849.334
38	1.09227	887.392	28.2007	Medium Dense SM	0	24	137.449	328.838	738.583	0	738.583	812.285	812.285
39	1.09227	841.569	29.8782	Medium Dense SM	0	24	129.511	309.846	695.925	0	695.925	770.331	770.331
40	1.09227	819.649	31.5844	Medium Dense SM	0	24	125.287	299.74	673.228	0	673.228	750.258	750.258
41	1.09227	1155.98	33.3225	Medium Dense SM	0	24	175.445	419.741	942.755	0	942.755	1058.1	1058.1
42	1.09227	1015.68	35.096	Medium Dense SM	0	24	153.002	366.046	822.154	0	822.154	929.669	929.669
43	1.09227	910.211	36.909	Medium Dense SM	0	24	136.029	325.441	730.952	0	730.952	833.119	833.119
44	1.09227	797.518	38.7662	Medium Dense SM	0	24	118.183	282.744	635.054	0	635.054	729.961	729.961
45	1.09227	676.71	40.6733	Medium Dense SM	0	24	99.3739	237.745	533.983	0	533.983	619.378	619.378
46	1.09227	547.391	42.6366	Medium Dense SM	0	24	79.5977	190.432	427.718	0	427.718	501.005	501.005
47	1.09227	408.836	44.664	Medium Dense SM	0	24	58.8172	140.716	316.054	0	316.054	374.185	374.185
48	1.09227	260.054	46.7652	Medium Dense SM	0	24	36.9746	88.4592	198.683	0	198.683	238.009	238.009
49	1.09227	99.8129	48.9521	Medium Dense SM	0	24	14.0066	33.5097	75.2639	0	75.2639	91.3494	91.3494
50	0.101729	0.775635	50.1752	Structural Fill	0	34	1.60567	3.84146	5.6952	0	5.6952	7.62069	7.62069

Post Construction - Seismic

Global Minimum Query (bishop simplified) - Safety Factor: 0.94119

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	1.89431	107.608	-26.5555	Medium Dense SM	0	24	35.1762	33.1075	74.3607	0	74.3607	56.78	56.78
2	1.89431	316.123	-25.1111	Medium Dense SM	0	24	101.387	95.4247	214.327	0	214.327	166.81	166.81
3	1.89431	511.469	-23.6835	Medium Dense SM	0	24	161.102	151.628	340.563	0	340.563	269.899	269.899
4	1.89431	619.044	-22.2714	Medium Dense SM	0	24	191.666	180.394	405.172	0	405.172	326.676	326.676
5	1.89431	685.866	-20.8735	Medium Dense SM	0	24	208.904	196.618	441.61	0	441.61	361.949	361.949
6	1.89431	980.317	-19.4884	Medium Dense SM	0	24	293.941	276.654	621.373	0	621.373	517.35	517.35
7	1.89431	1319.02	-18.1151	Medium Dense SM	0	24	389.589	366.677	823.569	0	823.569	696.119	696.119
8	1.89431	1669.57	-16.7525	Medium Dense SM	0	24	486.034	457.45	1027.45	0	1027.45	881.149	881.149
9	1.89431	2008.99	-15.3995	Medium Dense SM	0	24	576.72	542.803	1219.16	0	1219.16	1060.31	1060.31
10	1.89431	2337.5	-14.0554	Medium Dense SM	0	24	662.009	623.076	1399.45	0	1399.45	1233.72	1233.72
11	1.89431	2570.87	-12.719	Medium Dense SM	0	24	718.613	676.351	1519.11	0	1519.11	1356.91	1356.91
12	1.72741	2469.57	-11.448	Medium Dense SM	0	24	735.878	692.601	1578.44	22.8376	1555.61	1429.42	1406.58
13	1.72741	2593.29	-10.241	Medium Dense SM	0	24	741.603	697.989	1635.05	67.3382	1567.71	1501.07	1433.73
14	1.72741	2707.93	-9.03858	Medium Dense SM	0	24	745.806	701.945	1686.09	109.498	1576.6	1567.45	1457.96
15	1.72741	2813.6	-7.84017	Medium Dense SM	0	24	748.542	704.52	1731.72	149.342	1582.38	1628.65	1479.31
16	1.72741	2910.37	-6.64519	Medium Dense SM	0	24	749.859	705.76	1772.05	186.891	1585.16	1684.69	1497.8
17	1.72741	2998.32	-5.45311	Medium Dense SM	0	24	749.804	705.708	1807.21	222.165	1585.05	1735.63	1513.47
18	1.72741	3077.51	-4.2634	Medium Dense SM	0	24	748.417	704.403	1837.29	255.177	1582.12	1781.5	1526.32
19	1.72741	3147.99	-3.07552	Medium Dense SM	0	24	745.736	701.879	1862.39	285.94	1576.45	1822.32	1536.38
20	1.72741	3209.78	-1.88897	Medium Dense SM	0	24	741.795	698.17	1882.57	314.462	1568.11	1858.11	1543.65
21	1.76109	3326.97	-0.691676	Medium Dense SP-SM	0	24	736.56	693.243	1898.04	340.985	1557.05	1889.14	1548.16
22	1.76109	3373.03	0.516879	Medium Dense SP-SM	0	24	730.041	687.107	1908.73	365.467	1543.27	1915.32	1549.85
23	1.76109	3409.93	1.72566	Medium Dense SP-SM	0	24	722.299	679.821	1914.53	387.63	1526.9	1936.3	1548.67
24	1.76109	3445.49	2.93522	Medium Dense SP-SM	0	24	715.419	673.345	1919.83	407.472	1512.36	1956.51	1549.04
25	1.76109	3513.74	4.14609	Medium Dense SP-SM	0	24	718.2	675.963	1943.22	424.986	1518.24	1995.28	1570.3
26	1.76109	3578.93	5.35881	Medium Dense SP-SM	0	24	721.17	678.758	1964.68	440.163	1524.52	2032.33	1592.16
27	1.76109	4267.13	6.57395	Medium Dense SP-SM	0	24	883.805	831.828	2321.31	452.992	1868.32	2423.16	1970.17
28	1.76109	4194.37	7.79207	Medium Dense SP-SM	0	24	852.327	802.202	2265.23	463.455	1801.77	2381.86	1918.41

29	1.76109	4139.98	9.01374	Medium Dense SP-SM	0	24	827.02	778.383	2219.81	471.534	1748.28	2351	1879.47
30	1.76109	4075.17	10.2396	Medium Dense SP-SM	0	24	800.585	753.503	2169.6	477.207	1692.4	2314.22	1837.02
31	1.76109	4000.69	11.4701	Medium Dense SP-SM	0	24	773.247	727.772	2115.05	480.447	1634.6	2271.95	1791.5
32	1.76109	3916.52	12.7061	Medium Dense SP-SM	0	24	745.034	701.219	2056.19	481.223	1574.97	2224.17	1742.95
33	1.76109	3825.53	13.9481	Medium Dense SP-SM	0	24	716.676	674.528	1994.52	479.502	1515.01	2172.51	1693.01
34	2.50138	5259.49	15.4612	Medium Dense SP-SM	0	24	681.527	641.446	1914.4	473.694	1440.71	2102.91	1629.22
35	1.90274	3849.51	17.0345	Medium Dense SP-SM	0	24	644.171	606.287	1826.07	464.321	1361.74	2023.43	1559.11
36	1.90274	3703.55	18.4054	Medium Dense SP-SM	0	24	610.65	574.738	1743.53	452.648	1290.88	1946.73	1494.08
37	1.90274	3544.06	19.7872	Medium Dense SP-SM	0	24	576.1	542.22	1655.65	437.806	1217.85	1862.92	1425.11
38	1.90274	3370.71	21.1812	Medium Dense SP-SM	0	24	540.526	508.738	1562.36	419.714	1142.64	1771.81	1352.1
39	1.90274	3183.09	22.5884	Medium Dense SP-SM	0	24	503.929	474.293	1463.56	398.283	1065.28	1673.21	1274.92
40	1.90274	2980.79	24.0102	Medium Dense SP-SM	0	24	466.312	438.888	1359.17	373.412	985.757	1566.88	1193.47
41	1.90274	2763.33	25.4479	Medium Dense SP-SM	0	24	427.677	402.525	1249.07	344.988	904.086	1452.59	1107.6
42	1.76743	2358.46	26.8506	Medium Dense SM	0	24	389.486	366.58	1137.51	314.158	823.352	1334.69	1020.53
43	1.76743	2144.24	28.2185	Medium Dense SM	0	24	351.782	331.094	1024.7	281.053	743.648	1213.47	932.418
44	1.76743	1916.49	29.6042	Medium Dense SM	0	24	313.208	294.788	906.637	244.533	662.104	1084.59	840.061
45	1.76743	1674.63	31.0092	Medium Dense SM	0	24	273.764	257.664	783.179	204.457	578.722	947.733	743.276
46	1.76743	1419.73	32.4353	Medium Dense SM	0	24	232.728	219.041	655.593	163.619	491.974	803.487	639.868
47	1.76743	1151.15	33.8843	Medium Dense SM	0	24	190.106	178.926	523.825	121.952	401.873	651.495	529.543
48	1.76743	866.36	35.3584	Medium Dense SM	0	24	146.673	138.047	386.257	76.1993	310.058	490.332	414.133
49	1.76743	564.486	36.8599	Medium Dense SM	0	24	102.441	96.4162	242.691	26.1371	216.554	319.494	293.357
50	2.40996	278.951	38.677	Medium Dense SM	0	24	39.7317	37.3951	83.9908	0	83.9908	115.796	115.796

Global Minimum Query (janbu simplified) - Safety Factor: 0.867798

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	1.89394	107.565	-26.5554	Medium Dense SM	0	24	39.1863	34.0058	76.3785	0	76.3785	56.7936	56.7936
2	1.89394	315.998	-25.1113	Medium Dense SM	0	24	112.7	97.8008	219.664	0	219.664	166.845	166.845
3	1.89394	511.27	-23.684	Medium Dense SM	0	24	178.717	155.09	348.339	0	348.339	269.947	269.947
4	1.89394	618.1	-22.2722	Medium Dense SM	0	24	211.98	183.956	413.171	0	413.171	326.352	326.352
5	1.89394	685.807	-20.8744	Medium Dense SM	0	24	230.968	200.434	450.182	0	450.182	362.102	362.102
6	1.89394	980.492	-19.4896	Medium Dense SM	0	24	324.534	281.63	632.552	0	632.552	517.694	517.694
7	1.89394	1319.27	-18.1165	Medium Dense SM	0	24	429.467	372.691	837.079	0	837.079	696.571	696.571
8	1.89394	1669.7	-16.7542	Medium Dense SM	0	24	534.926	464.208	1042.63	0	1042.63	881.594	881.594
9	1.89394	2009	-15.4015	Medium Dense SM	0	24	633.796	550.007	1235.34	0	1235.34	1060.74	1060.74
10	1.89394	2337.39	-14.0575	Medium Dense SM	0	24	726.512	630.466	1416.05	0	1416.05	1234.14	1234.14
11	1.89394	2570.23	-12.7214	Medium Dense SM	0	24	787.462	683.358	1534.85	0	1534.85	1357.08	1357.08
12	1.72709	2469	-11.4506	Medium Dense SM	0	24	805.428	698.949	1592.7	22.836	1569.87	1429.56	1406.72
13	1.72709	2592.69	-10.2438	Medium Dense SM	0	24	810.819	703.627	1647.71	67.3338	1580.37	1501.18	1433.84
14	1.72709	2707.31	-9.04154	Medium Dense SM	0	24	814.565	706.878	1697.16	109.492	1587.67	1567.54	1458.05
15	1.72709	2812.96	-7.84331	Medium Dense SM	0	24	816.729	708.756	1741.23	149.334	1591.89	1628.72	1479.38
16	1.72709	2909.73	-6.64852	Medium Dense SM	0	24	817.369	709.311	1780.02	186.883	1593.14	1684.75	1497.86
17	1.72709	2997.67	-5.45663	Medium Dense SM	0	24	816.534	708.587	1813.67	222.157	1591.51	1735.67	1513.51
18	1.72709	3076.86	-4.26711	Medium Dense SM	0	24	814.274	706.625	1842.28	255.17	1587.11	1781.52	1526.35
19	1.72709	3147.33	-3.07942	Medium Dense SM	0	24	810.63	703.463	1865.94	285.934	1580	1822.33	1536.39
20	1.72709	3209.13	-1.89306	Medium Dense SM	0	24	805.64	699.133	1884.74	314.459	1570.28	1858.11	1543.65
21	1.75345	3312.4	-0.698466	Medium Dense SP-SM	0	24	799.282	693.615	1898.82	340.934	1557.88	1889.07	1548.14
22	1.75345	3358.13	0.504869	Medium Dense SP-SM	0	24	791.57	686.923	1908.18	365.328	1542.85	1915.16	1549.83
23	1.75345	3394.82	1.70843	Medium Dense SP-SM	0	24	782.574	679.116	1912.74	387.423	1525.32	1936.08	1548.66
24	1.75345	3429.82	2.91274	Medium Dense SP-SM	0	24	774.419	672.039	1916.64	407.217	1509.42	1956.04	1548.83
25	1.75345	3497.29	4.11835	Medium Dense SP-SM	0	24	776.712	674.029	1938.59	424.703	1513.89	1994.52	1569.82
26	1.75345	3562.15	5.32578	Medium Dense SP-SM	0	24	779.325	676.297	1958.86	439.873	1518.99	2031.51	1591.64
27	1.75345	4233.69	6.53559	Medium Dense SP-SM	0	24	950.627	824.952	2305.59	452.714	1852.87	2414.5	1961.78
28	1.75345	4177.93	7.74834	Medium Dense SP-SM	0	24	920.54	798.843	2257.44	463.212	1794.23	2382.7	1919.48
29	1.75345	4124.4	8.96459	Medium Dense SP-SM	0	24	892.714	774.695	2211.34	471.347	1740	2352.17	1880.82

30	1.75345	4060.56	10.1849	Medium Dense SP-SM	0	24	863.725	749.539	2160.59	477.097	1683.49	2315.76	1838.67
31	1.75345	3987.18	11.41	Medium Dense SP-SM	0	24	833.816	723.584	2105.63	480.436	1625.2	2273.91	1793.47
32	1.75345	3904.21	12.6403	Medium Dense SP-SM	0	24	803.019	696.858	2046.51	481.335	1565.17	2226.59	1745.26
33	1.75345	3814.32	13.8766	Medium Dense SP-SM	0	24	772.066	669.997	1984.6	479.76	1504.84	2175.33	1695.57
34	2.71031	5698.16	15.4612	Medium Dense SP-SM	0	24	731.787	635.043	1900	473.67	1426.33	2102.41	1628.74
35	1.88881	3814.29	17.1042	Medium Dense SP-SM	0	24	689.255	598.134	1807.32	463.895	1343.43	2019.42	1555.53
36	1.88881	3669.83	18.4655	Medium Dense SP-SM	0	24	652.985	566.659	1724.9	452.16	1272.74	1942.95	1490.79
37	1.88881	3512.13	19.8377	Medium Dense SP-SM	0	24	615.686	534.291	1637.34	437.299	1200.04	1859.46	1422.16
38	1.88881	3340.85	21.2219	Medium Dense SP-SM	0	24	577.362	501.034	1544.57	419.233	1125.34	1768.77	1349.54
39	1.88881	3155.61	22.6192	Medium Dense SP-SM	0	24	538.02	466.893	1446.53	397.873	1048.66	1670.7	1272.83
40	1.88881	2956	24.0309	Medium Dense SP-SM	0	24	497.664	431.872	1343.12	373.121	970	1565.02	1191.9
41	1.88881	2741.54	25.4583	Medium Dense SP-SM	0	24	456.299	395.975	1234.24	344.868	889.374	1451.48	1106.61
42	1.76705	2357.2	26.8557	Medium Dense SM	0	24	415.342	360.433	1123.68	314.132	809.546	1333.99	1019.86
43	1.76705	2143.03	28.2234	Medium Dense SM	0	24	374.83	325.277	1011.61	281.022	730.584	1212.78	931.763
44	1.76705	1915.32	29.6088	Medium Dense SM	0	24	333.451	289.368	894.43	244.498	649.932	1083.92	839.427
45	1.76705	1673.53	31.0136	Medium Dense SM	0	24	291.208	252.71	772.014	204.42	567.594	947.084	742.664
46	1.76705	1418.72	32.4395	Medium Dense SM	0	24	247.326	214.629	645.686	163.621	482.065	802.883	639.262
47	1.76705	1150.21	33.8883	Medium Dense SM	0	24	201.838	175.155	515.356	121.952	393.404	650.926	528.974
48	1.76705	865.503	35.3621	Medium Dense SM	0	24	155.564	134.998	379.409	76.1984	303.211	489.808	413.609
49	1.76705	563.719	36.8634	Medium Dense SM	0	24	108.519	94.1727	237.652	26.1366	211.515	319.022	292.885
50	2.4061	278.076	38.6788	Medium Dense SM	0	24	42.0318	36.4751	81.9246	0	81.9246	115.573	115.573

Lateral Spread Analysis

Global Minimum Query (bishop simplified) - Newmark Displacement (in): 0.205188

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	1.89416	107.587	-26.5549	Medium Dense SM	0	24	32.5264	32.5264	73.0554	0	73.0554	56.7994	56.7994
2	1.89416	316.062	-25.1105	Medium Dense SM	0	24	93.8807	93.8807	210.86	0	210.86	166.862	166.862
3	1.89416	511.371	-23.683	Medium Dense SM	0	24	149.369	149.369	335.488	0	335.488	269.973	269.973
4	1.89416	618.457	-22.2709	Medium Dense SM	0	24	177.788	177.788	399.319	0	399.319	326.508	326.508
5	1.89416	685.873	-20.873	Medium Dense SM	0	24	194.185	194.185	436.146	0	436.146	362.099	362.099
6	1.89416	980.502	-19.4879	Medium Dense SM	0	24	273.574	273.574	614.458	0	614.458	517.646	517.646
7	1.89416	1319.29	-18.1146	Medium Dense SM	0	24	362.969	362.969	815.24	0	815.24	696.501	696.501
8	1.89416	1669.78	-16.752	Medium Dense SM	0	24	453.226	453.226	1017.96	0	1017.96	881.54	881.54
9	1.89416	2009.13	-15.3991	Medium Dense SM	0	24	538.261	538.261	1208.95	0	1208.95	1060.7	1060.7
10	1.89416	2337.59	-14.055	Medium Dense SM	0	24	618.385	618.385	1388.91	0	1388.91	1234.1	1234.1
11	1.89416	2570.56	-12.7187	Medium Dense SM	0	24	671.719	671.719	1508.7	0	1508.7	1357.1	1357.1
12	1.72746	2469.55	-11.4476	Medium Dense SM	0	24	688.387	688.387	1568.98	22.8379	1546.14	1429.58	1406.74
13	1.72746	2593.26	-10.2405	Medium Dense SM	0	24	694.236	694.236	1626.62	67.339	1559.28	1501.2	1433.86
14	1.72746	2707.91	-9.03794	Medium Dense SM	0	24	698.652	698.652	1678.7	109.499	1569.2	1567.57	1458.07
15	1.72746	2813.58	-7.8394	Medium Dense SM	0	24	701.682	701.682	1725.35	149.343	1576.01	1628.74	1479.4
16	1.72746	2910.35	-6.64431	Medium Dense SM	0	24	703.372	703.372	1766.69	186.892	1579.8	1684.76	1497.87
17	1.72746	2998.3	-5.45212	Medium Dense SM	0	24	703.763	703.763	1802.84	222.164	1580.68	1735.67	1513.51
18	1.72746	3077.49	-4.26229	Medium Dense SM	0	24	702.892	702.892	1833.9	255.176	1578.72	1781.51	1526.34
19	1.72746	3147.96	-3.0743	Medium Dense SM	0	24	700.793	700.793	1859.94	285.937	1574.01	1822.31	1536.37
20	1.72746	3209.74	-1.88763	Medium Dense SM	0	24	697.495	697.495	1881.06	314.458	1566.6	1858.07	1543.61
21	1.76413	3332.6	-0.689191	Medium Dense SP-SM	0	24	692.968	692.968	1897.43	341	1556.43	1889.1	1548.1
22	1.76413	3378.8	0.521532	Medium Dense SP-SM	0	24	687.214	687.214	1909.03	365.517	1543.51	1915.28	1549.76
23	1.76413	3415.78	1.73249	Medium Dense SP-SM	0	24	680.292	680.292	1915.67	387.708	1527.96	1936.24	1548.53
24	1.76413	3451.66	2.94422	Medium Dense SP-SM	0	24	674.227	674.227	1921.91	407.569	1514.34	1956.59	1549.02
25	1.76413	3520.28	4.15727	Medium Dense SP-SM	0	24	677.264	677.264	1946.25	425.093	1521.16	1995.48	1570.39
26	1.76413	3585.6	5.37219	Medium Dense SP-SM	0	24	680.421	680.421	1968.52	440.273	1528.25	2032.51	1592.23
27	1.76413	4281.95	6.58954	Medium Dense SP-SM	0	24	835.949	835.949	2330.67	453.095	1877.57	2427.23	1974.14
28	1.76413	4200.64	7.80989	Medium Dense SP-SM	0	24	804.635	804.635	2270.78	463.544	1807.24	2381.14	1917.6

29	1.76413	4145.9	9.03381	Medium Dense SP-SM	0	24	781.079	781.079	2225.94	471.6	1754.34	2350.12	1878.52
30	1.76413	4080.7	10.2619	Medium Dense SP-SM	0	24	756.429	756.429	2176.21	477.241	1698.96	2313.15	1835.91
31	1.76413	4005.77	11.4948	Medium Dense SP-SM	0	24	730.893	730.893	2122.05	480.439	1641.61	2270.69	1790.25
32	1.76413	3921.13	12.7331	Medium Dense SP-SM	0	24	704.505	704.505	2063.51	481.165	1582.34	2222.7	1741.54
33	1.76413	3829.69	13.9775	Medium Dense SP-SM	0	24	677.964	677.964	2002.12	479.384	1522.73	2170.87	1691.49
34	2.41538	5078.62	15.4612	Medium Dense SP-SM	0	24	645.723	645.723	1924.01	473.692	1450.32	2102.61	1628.92
35	1.90837	3863.6	17.0059	Medium Dense SP-SM	0	24	611.343	611.343	1837.58	464.485	1373.1	2024.56	1560.07
36	1.90837	3717.04	18.3807	Medium Dense SP-SM	0	24	579.804	579.804	1755.1	452.838	1302.26	1947.76	1494.92
37	1.90837	3556.83	19.7666	Medium Dense SP-SM	0	24	547.25	547.25	1667.15	438.005	1229.14	1863.81	1425.8
38	1.90837	3382.64	21.1646	Medium Dense SP-SM	0	24	513.681	513.681	1573.65	419.903	1153.75	1772.53	1352.62
39	1.90837	3194.06	22.5759	Medium Dense SP-SM	0	24	479.1	479.1	1474.52	398.444	1076.08	1673.72	1275.27
40	1.90837	2990.67	24.0019	Medium Dense SP-SM	0	24	443.507	443.507	1369.66	373.525	996.131	1567.14	1193.61
41	1.90837	2771.99	25.4439	Medium Dense SP-SM	0	24	406.902	406.902	1258.95	345.033	913.917	1452.54	1107.51
42	1.76755	2358.77	26.8488	Medium Dense SM	0	24	370.724	370.724	1146.83	314.164	832.663	1334.49	1020.33
43	1.76755	2144.54	28.2169	Medium Dense SM	0	24	335.019	335.019	1033.52	281.061	752.462	1213.29	932.225
44	1.76755	1916.77	29.6028	Medium Dense SM	0	24	298.447	298.447	914.865	244.542	670.323	1084.43	839.884
45	1.76755	1674.9	31.0079	Medium Dense SM	0	24	261.009	261.009	790.703	204.468	586.235	947.583	743.115
46	1.76755	1419.97	32.4342	Medium Dense SM	0	24	222.015	222.015	662.276	163.622	498.654	803.357	639.735
47	1.76755	1151.36	33.8834	Medium Dense SM	0	24	181.464	181.464	529.526	121.955	407.571	651.389	529.434
48	1.76755	866.551	35.3576	Medium Dense SM	0	24	140.092	140.092	390.854	76.2014	314.652	490.256	414.055
49	1.76755	564.646	36.8593	Medium Dense SM	0	24	97.9099	97.9099	246.047	26.1379	219.909	319.451	293.313
50	2.41065	279.11	38.6769	Medium Dense SM	0	24	38.0046	38.0046	85.3599	0	85.3599	115.782	115.782

Global Minimum Query (janbu simplified) - Newmark Displacement (in): 0.397331

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	1.89416	107.587	-26.5549	Medium Dense SM	0	24	32.5264	32.5264	73.0554	0	73.0554	56.7994	56.7994
2	1.89416	316.062	-25.1105	Medium Dense SM	0	24	93.8807	93.8807	210.86	0	210.86	166.862	166.862
3	1.89416	511.371	-23.683	Medium Dense SM	0	24	149.369	149.369	335.488	0	335.488	269.973	269.973
4	1.89416	618.457	-22.2709	Medium Dense SM	0	24	177.788	177.788	399.319	0	399.319	326.508	326.508
5	1.89416	685.873	-20.873	Medium Dense SM	0	24	194.185	194.185	436.146	0	436.146	362.099	362.099
6	1.89416	980.502	-19.4879	Medium Dense SM	0	24	273.574	273.574	614.458	0	614.458	517.646	517.646
7	1.89416	1319.29	-18.1146	Medium Dense SM	0	24	362.969	362.969	815.24	0	815.24	696.501	696.501
8	1.89416	1669.78	-16.752	Medium Dense SM	0	24	453.226	453.226	1017.96	0	1017.96	881.54	881.54
9	1.89416	2009.13	-15.3991	Medium Dense SM	0	24	538.261	538.261	1208.95	0	1208.95	1060.7	1060.7
10	1.89416	2337.59	-14.055	Medium Dense SM	0	24	618.385	618.385	1388.91	0	1388.91	1234.1	1234.1
11	1.89416	2570.56	-12.7187	Medium Dense SM	0	24	671.719	671.719	1508.7	0	1508.7	1357.1	1357.1
12	1.72746	2469.55	-11.4476	Medium Dense SM	0	24	688.387	688.387	1568.98	22.8379	1546.14	1429.58	1406.74
13	1.72746	2593.26	-10.2405	Medium Dense SM	0	24	694.236	694.236	1626.62	67.339	1559.28	1501.2	1433.86
14	1.72746	2707.91	-9.03794	Medium Dense SM	0	24	698.652	698.652	1678.7	109.499	1569.2	1567.57	1458.07
15	1.72746	2813.58	-7.8394	Medium Dense SM	0	24	701.682	701.682	1725.35	149.343	1576.01	1628.74	1479.4
16	1.72746	2910.35	-6.64431	Medium Dense SM	0	24	703.372	703.372	1766.69	186.892	1579.8	1684.76	1497.87
17	1.72746	2998.3	-5.45212	Medium Dense SM	0	24	703.763	703.763	1802.84	222.164	1580.68	1735.67	1513.51
18	1.72746	3077.49	-4.26229	Medium Dense SM	0	24	702.892	702.892	1833.9	255.176	1578.72	1781.51	1526.34
19	1.72746	3147.96	-3.0743	Medium Dense SM	0	24	700.793	700.793	1859.94	285.937	1574.01	1822.31	1536.37
20	1.72746	3209.74	-1.88763	Medium Dense SM	0	24	697.495	697.495	1881.06	314.458	1566.6	1858.07	1543.61
21	1.76413	3332.6	-0.689191	Medium Dense SP-SM	0	24	692.968	692.968	1897.43	341	1556.43	1889.1	1548.1
22	1.76413	3378.8	0.521532	Medium Dense SP-SM	0	24	687.214	687.214	1909.03	365.517	1543.51	1915.28	1549.76
23	1.76413	3415.78	1.73249	Medium Dense SP-SM	0	24	680.292	680.292	1915.67	387.708	1527.96	1936.24	1548.53
24	1.76413	3451.66	2.94422	Medium Dense SP-SM	0	24	674.227	674.227	1921.91	407.569	1514.34	1956.59	1549.02
25	1.76413	3520.28	4.15727	Medium Dense SP-SM	0	24	677.264	677.264	1946.25	425.093	1521.16	1995.48	1570.39
26	1.76413	3585.6	5.37219	Medium Dense SP-SM	0	24	680.421	680.421	1968.52	440.273	1528.25	2032.51	1592.23
27	1.76413	4281.95	6.58954	Medium Dense SP-SM	0	24	835.949	835.949	2330.67	453.095	1877.57	2427.23	1974.14
28	1.76413	4200.64	7.80989	Medium Dense SP-SM	0	24	804.635	804.635	2270.78	463.544	1807.24	2381.14	1917.6
29	1.76413	4145.9	9.03381	Medium Dense SP-SM	0	24	781.079	781.079	2225.94	471.6	1754.34	2350.12	1878.52

30	1.76413	4080.7	10.2619	Medium Dense SP-SM	0	24	756.429	756.429	2176.21	477.241	1698.96	2313.15	1835.91
31	1.76413	4005.77	11.4948	Medium Dense SP-SM	0	24	730.893	730.893	2122.05	480.439	1641.61	2270.69	1790.25
32	1.76413	3921.13	12.7331	Medium Dense SP-SM	0	24	704.505	704.505	2063.51	481.165	1582.34	2222.7	1741.54
33	1.76413	3829.69	13.9775	Medium Dense SP-SM	0	24	677.964	677.964	2002.12	479.384	1522.73	2170.87	1691.49
34	2.41538	5078.62	15.4612	Medium Dense SP-SM	0	24	645.723	645.723	1924.01	473.692	1450.32	2102.61	1628.92
35	1.90837	3863.6	17.0059	Medium Dense SP-SM	0	24	611.343	611.343	1837.58	464.485	1373.1	2024.56	1560.07
36	1.90837	3717.04	18.3807	Medium Dense SP-SM	0	24	579.804	579.804	1755.1	452.838	1302.26	1947.76	1494.92
37	1.90837	3556.83	19.7666	Medium Dense SP-SM	0	24	547.25	547.25	1667.15	438.005	1229.14	1863.81	1425.8
38	1.90837	3382.64	21.1646	Medium Dense SP-SM	0	24	513.681	513.681	1573.65	419.903	1153.75	1772.53	1352.62
39	1.90837	3194.06	22.5759	Medium Dense SP-SM	0	24	479.1	479.1	1474.52	398.444	1076.08	1673.72	1275.27
40	1.90837	2990.67	24.0019	Medium Dense SP-SM	0	24	443.507	443.507	1369.66	373.525	996.131	1567.14	1193.61
41	1.90837	2771.99	25.4439	Medium Dense SP-SM	0	24	406.902	406.902	1258.95	345.033	913.917	1452.54	1107.51
42	1.76755	2358.77	26.8488	Medium Dense SM	0	24	370.724	370.724	1146.83	314.164	832.663	1334.49	1020.33
43	1.76755	2144.54	28.2169	Medium Dense SM	0	24	335.019	335.019	1033.52	281.061	752.462	1213.29	932.225
44	1.76755	1916.77	29.6028	Medium Dense SM	0	24	298.447	298.447	914.865	244.542	670.323	1084.43	839.884
45	1.76755	1674.9	31.0079	Medium Dense SM	0	24	261.009	261.009	790.703	204.468	586.235	947.583	743.115
46	1.76755	1419.97	32.4342	Medium Dense SM	0	24	222.015	222.015	662.276	163.622	498.654	803.357	639.735
47	1.76755	1151.36	33.8834	Medium Dense SM	0	24	181.464	181.464	529.526	121.955	407.571	651.389	529.434
48	1.76755	866.551	35.3576	Medium Dense SM	0	24	140.092	140.092	390.854	76.2014	314.652	490.256	414.055
49	1.76755	564.646	36.8593	Medium Dense SM	0	24	97.9099	97.9099	246.047	26.1379	219.909	319.451	293.313
50	2.41065	279.11	38.6769	Medium Dense SM	0	24	38.0046	38.0046	85.3599	0	85.3599	115.782	115.782

Interslice Data

Post Construction - Master Scenario

Global Minimum Query (bishop simplified) - Safety Factor: 2.66039

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	3.27623	102	0	0	0
2	4.36884	101.411	29.9778	0	0
3	5.46144	100.862	112.75	0	0
4	6.55405	100.351	232.156	0	0
5	7.64666	99.8773	345.565	0	0
6	8.73926	99.4391	461.633	0	0
7	9.83187	99.0353	625.97	0	0
8	10.9245	98.6649	832.962	0	0
9	12.0171	98.3269	1079.29	0	0
10	13.1097	98.0206	1362.86	0	0
11	14.2023	97.7453	1675.17	0	0
12	15.2949	97.5004	2008.33	0	0
13	16.3875	97.2853	2355.07	0	0
14	17.4801	97.0996	2708.68	0	0
15	18.5727	96.9429	3062.89	0	0
16	19.6653	96.8148	3408.71	0	0
17	20.7579	96.7152	3729.81	0	0
18	21.8505	96.6437	4023.04	0	0
19	22.9432	96.6004	4286.84	0	0
20	24.0358	96.585	4519.88	0	0
21	25.1284	96.5976	4721.06	0	0
22	26.221	96.6382	4889.54	0	0
23	27.3136	96.7068	5024.65	0	0
24	28.4062	96.8037	5125.99	0	0
25	29.4988	96.9289	5193.36	0	0
26	30.5914	97.0828	5226.76	0	0
27	31.684	97.2656	5226.44	0	0
28	32.7766	97.4777	5192.86	0	0
29	33.8692	97.7197	5126.73	0	0
30	34.9618	97.9919	5028.99	0	0
31	36.0544	98.2951	4900.87	0	0
32	37.147	98.6299	4743.84	0	0
33	38.2397	98.9971	4559.71	0	0
34	39.3323	99.3975	4350.59	0	0
35	40.4249	99.8323	4118.96	0	0
36	41.5175	100.303	3867.68	0	0
37	42.6101	100.809	3600.05	0	0
38	43.7027	101.355	3315.97	0	0
39	44.7953	101.94	3016.05	0	0
40	45.8879	102.567	2703.91	0	0
41	46.9805	103.237	2383.77	0	0
42	48.0731	103.955	1874.41	0	0
43	49.1657	104.722	1386.98	0	0
44	50.2583	105.541	913.934	0	0
45	51.3509	106.417	465.756	0	0
46	52.4435	107.355	54.8723	0	0
47	53.5362	108.359	-304.216	0	0
48	54.6288	109.437	-594.307	0	0
49	55.7214	110.597	-794.638	0	0
50	56.814	111.85	-879.75	0	0
51	56.9393	112	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 2.39243

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	3.38116	102	0	0	0
2	4.47343	101.411	31.1114	0	0
3	5.5657	100.863	117.063	0	0
4	6.65797	100.353	238.428	0	0
5	7.75023	99.8792	351.75	0	0
6	8.8425	99.4414	473.407	0	0
7	9.93477	99.038	647.343	0	0
8	11.027	98.6679	865.893	0	0
9	12.1193	98.3304	1126.91	0	0
10	13.2116	98.0245	1427.25	0	0
11	14.3038	97.7496	1758.17	0	0
12	15.3961	97.5051	2111.65	0	0
13	16.4884	97.2904	2480.29	0	0
14	17.5806	97.105	2857.24	0	0
15	18.6729	96.9487	3236.15	0	0
16	19.7652	96.821	3606.59	0	0
17	20.8575	96.7217	3951.99	0	0
18	21.9497	96.6507	4269.63	0	0
19	23.042	96.6077	4557.92	0	0
20	24.1343	96.5927	4815.47	0	0
21	25.2265	96.6057	5041.18	0	0
22	26.3188	96.6466	5234.13	0	0
23	27.4111	96.7156	5393.66	0	0
24	28.5033	96.8128	5519.3	0	0
25	29.5956	96.9384	5610.83	0	0
26	30.6879	97.0927	5668.22	0	0
27	31.7801	97.2759	5691.68	0	0
28	32.8724	97.4885	5681.65	0	0
29	33.9647	97.7308	5638.77	0	0
30	35.0569	98.0035	5563.98	0	0
31	36.1492	98.3071	5458.43	0	0
32	37.2415	98.6423	5323.58	0	0
33	38.3337	99.0099	5161.17	0	0
34	39.426	99.4109	4973.26	0	0
35	40.5183	99.8461	4762.27	0	0
36	41.6106	100.317	4531.01	0	0
37	42.7028	100.824	4282.61	0	0
38	43.7951	101.37	4016.79	0	0
39	44.8874	101.956	3734.64	0	0
40	45.9796	102.583	3439.67	0	0
41	47.0719	103.255	3124.67	0	0
42	48.1642	103.973	2639.7	0	0
43	49.2564	104.741	2176.11	0	0
44	50.3487	105.561	1725.33	0	0
45	51.441	106.438	1297.64	0	0
46	52.5332	107.377	905.194	0	0
47	53.6255	108.382	562.16	0	0
48	54.7178	109.462	285.341	0	0
49	55.81	110.624	94.9909	0	0
50	56.9023	111.878	15.9096	0	0
51	57.004	112	0	0	0

Post Construction - Seismic

Global Minimum Query (bishop simplified) - Safety Factor: 0.94119

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	0.00431821	102	0	0	0
2	1.89863	101.053	103.581	0	0
3	3.79295	100.165	387.643	0	0
4	5.68726	99.3345	816.792	0	0
5	7.58157	98.5587	1301.77	0	0
6	9.47589	97.8364	1803.3	0	0
7	11.3702	97.166	2471.96	0	0
8	13.2645	96.5463	3310.37	0	0
9	15.1588	95.9761	4298.01	0	0
10	17.0531	95.4543	5402.23	0	0
11	18.9475	94.98	6593.51	0	0
12	20.8418	94.5525	7805.34	0	0
13	22.5692	94.2027	8861.23	0	0
14	24.2966	93.8906	9846.77	0	0
15	26.024	93.6158	10757	0	0
16	27.7514	93.3779	11587.9	0	0
17	29.4788	93.1767	12335.7	0	0
18	31.2062	93.0118	12997.6	0	0
19	32.9336	92.883	13571.1	0	0
20	34.661	92.7902	14054.3	0	0
21	36.3884	92.7332	14446.1	0	0
22	38.1495	92.712	14750.3	0	0
23	39.9106	92.7279	14958.1	0	0
24	41.6717	92.7809	15069.6	0	0
25	43.4328	92.8712	15086.3	0	0
26	45.1939	92.9989	15011.9	0	0
27	46.955	93.1641	14846	0	0
28	48.716	93.367	14606.3	0	0
29	50.4771	93.608	14259	0	0
30	52.2382	93.8874	13809.8	0	0
31	53.9993	94.2055	13264.1	0	0
32	55.7604	94.5628	12627.8	0	0
33	57.5215	94.9599	11907.4	0	0
34	59.2826	95.3973	11109.4	0	0
35	61.7839	96.0892	9856.68	0	0
36	63.6867	96.6722	8822.67	0	0
37	65.5894	97.3053	7730.86	0	0
38	67.4921	97.9899	6593.39	0	0
39	69.3949	98.7272	5423.51	0	0
40	71.2976	99.5187	4235.66	0	0
41	73.2004	100.366	3045.61	0	0
42	75.1031	101.272	1870.58	0	0
43	76.8705	102.166	809.051	0	0
44	78.638	103.115	-206.677	0	0
45	80.4054	104.119	-1158.48	0	0
46	82.1728	105.181	-2026.49	0	0
47	83.9403	106.305	-2792.23	0	0
48	85.7077	107.492	-3435.33	0	0
49	87.4751	108.746	-3929.46	0	0
50	89.2426	110.071	-4245.25	0	0
51	91.6525	112	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 0.867798

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	0.0129546	102	0	0	0
2	1.90689	101.053	113.165	0	0
3	3.80083	100.166	423.625	0	0
4	5.69477	99.335	892.977	0	0
5	7.58871	98.5593	1423.31	0	0
6	9.48265	97.8371	1973.28	0	0
7	11.3766	97.1668	2707.94	0	0
8	13.2705	96.5472	3631	0	0
9	15.1645	95.977	4720.93	0	0
10	17.0584	95.4553	5942.96	0	0
11	18.9523	94.981	7265.81	0	0
12	20.8463	94.5535	8616.61	0	0
13	22.5734	94.2036	9799.38	0	0
14	24.3005	93.8915	10910.2	0	0
15	26.0276	93.6167	11944.1	0	0
16	27.7547	93.3788	12896.9	0	0
17	29.4818	93.1775	13764.8	0	0
18	31.2088	93.0125	14544.9	0	0
19	32.9359	92.8836	15234.8	0	0
20	34.663	92.7907	15832.4	0	0
21	36.3901	92.7336	16336.5	0	0
22	38.1436	92.7123	16751.7	0	0
23	39.897	92.7277	17069.1	0	0
24	41.6505	92.78	17288.8	0	0
25	43.4039	92.8692	17412.4	0	0
26	45.1574	92.9955	17445.4	0	0
27	46.9108	93.1589	17387.3	0	0
28	48.6643	93.3598	17278.5	0	0
29	50.4177	93.5984	17058.8	0	0
30	52.1712	93.875	16733.9	0	0
31	53.9246	94.19	16308.9	0	0
32	55.6781	94.5439	15789.7	0	0
33	57.4315	94.9371	15182.6	0	0
34	59.185	95.3703	14494.2	0	0
35	61.8953	96.12	13286.7	0	0
36	63.7841	96.7012	12355.6	0	0
37	65.6729	97.3319	11363.3	0	0
38	67.5617	98.0133	10321.7	0	0
39	69.4505	98.7468	9243.67	0	0
40	71.3393	99.5338	8143.2	0	0
41	73.2282	100.376	7035.65	0	0
42	75.117	101.275	5937.72	0	0
43	76.884	102.17	4935.47	0	0
44	78.6511	103.118	3974.02	0	0
45	80.4181	104.123	3071.3	0	0
46	82.1851	105.185	2246.93	0	0
47	83.9522	106.308	1518.96	0	0
48	85.7192	107.495	907.373	0	0
49	87.4863	108.749	438.157	0	0
50	89.2533	110.074	140.272	0	0
51	91.6594	112	0	0	0

Lateral Spread Analysis

Global Minimum Query (bishop simplified) - Newmark Displacement (in): 0.205188

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	0.00971598	102	0	0	0
2	1.90387	101.053	100.16	0	0
3	3.79803	100.166	375.245	0	0
4	5.69219	99.3348	791.411	0	0
5	7.58635	98.5591	1261.98	0	0
6	9.48051	97.8368	1749.68	0	0
7	11.3747	97.1665	2400.79	0	0
8	13.2688	96.5469	3218.13	0	0
9	15.163	95.9767	4181.94	0	0
10	17.0571	95.455	5260.6	0	0
11	18.9513	94.9808	6425.48	0	0
12	20.8455	94.5533	7611.49	0	0
13	22.5729	94.2035	8646.89	0	0
14	24.3004	93.8914	9616	0	0
15	26.0278	93.6166	10513.7	0	0
16	27.7553	93.3788	11335.8	0	0
17	29.4828	93.1776	12078.3	0	0
18	31.2102	93.0127	12738.2	0	0
19	32.9377	92.8839	13313	0	0
20	34.6651	92.7912	13800.5	0	0
21	36.3926	92.7342	14199.3	0	0
22	38.1567	92.713	14513.9	0	0
23	39.9209	92.7291	14734.3	0	0
24	41.685	92.7824	14860.4	0	0
25	43.4491	92.8732	14893.5	0	0
26	45.2132	93.0014	14837.1	0	0
27	46.9774	93.1673	14690.8	0	0
28	48.7415	93.3711	14472.3	0	0
29	50.5056	93.613	14147.2	0	0
30	52.2697	93.8935	13721.3	0	0
31	54.0339	94.2129	13199.7	0	0
32	55.798	94.5716	12588.2	0	0
33	57.5621	94.9703	11892.8	0	0
34	59.3262	95.4094	11120.1	0	0
35	61.7416	96.0775	9949.5	0	0
36	63.65	96.6611	8944.42	0	0
37	65.5584	97.2952	7880.45	0	0
38	67.4667	97.981	6769.54	0	0
39	69.3751	98.7199	5624.77	0	0
40	71.2835	99.5133	4460.4	0	0
41	73.1918	100.363	3292.07	0	0
42	75.1002	101.271	2136.88	0	0
43	76.8677	102.166	1094.95	0	0
44	78.6353	103.114	96.7602	0	0
45	80.4028	104.118	-839.777	0	0
46	82.1704	105.181	-1694.98	0	0
47	83.9379	106.304	-2450.42	0	0
48	85.7055	107.491	-3085.79	0	0
49	87.473	108.745	-3574.9	0	0
50	89.2406	110.07	-3888.53	0	0
51	91.6512	112	0	0	0

Global Minimum Query (janbu simplified) - Newmark Displacement (in): 0.397331

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	0.00971598	102	0	0	0
2	1.90387	101.053	103.542	0	0
3	3.79803	100.166	388.563	0	0
4	5.69219	99.3348	820.804	0	0
5	7.58635	98.5591	1310.81	0	0
6	9.48051	97.8368	1820.08	0	0
7	11.3747	97.1665	2502.01	0	0
8	13.2688	96.5469	3360.82	0	0
9	15.163	95.9767	4377.12	0	0
10	17.0571	95.455	5518.94	0	0
11	18.9513	94.9808	6757.3	0	0
12	20.8455	94.5533	8024.11	0	0
13	22.5729	94.2035	9137.15	0	0
14	24.3004	93.8914	10187.8	0	0
15	26.0278	93.6166	11170.6	0	0
16	27.7553	93.3788	12081.1	0	0
17	29.4828	93.1776	12915.1	0	0
18	31.2102	93.0127	13669.3	0	0
19	32.9377	92.8839	14340.8	0	0
20	34.6651	92.7912	14927.3	0	0
21	36.3926	92.7342	15427	0	0
22	38.1567	92.713	15846.4	0	0
23	39.9209	92.7291	16173	0	0
24	41.685	92.7824	16406.5	0	0
25	43.4491	92.8732	16548	0	0
26	45.2132	93.0014	16602.3	0	0
27	46.9774	93.1673	16568.7	0	0
28	48.7415	93.3711	16484.8	0	0
29	50.5056	93.613	16291.8	0	0
30	52.2697	93.8935	15996.2	0	0
31	54.0339	94.2129	15602.9	0	0
32	55.798	94.5716	15117.2	0	0
33	57.5621	94.9703	14545.2	0	0
34	59.3262	95.4094	13892.9	0	0
35	61.7416	96.0775	12881.9	0	0
36	63.65	96.6611	11998.2	0	0
37	65.5584	97.2952	11051.1	0	0
38	67.4667	97.981	10052	0	0
39	69.3751	98.7199	9013.58	0	0
40	71.2835	99.5133	7949.62	0	0
41	73.1918	100.363	6875.3	0	0
42	75.1002	101.271	5807.25	0	0
43	76.8677	102.166	4839.47	0	0
44	78.6353	103.114	3908.69	0	0
45	80.4028	104.118	3032.41	0	0
46	82.1704	105.181	2229.86	0	0
47	83.9379	106.304	1519.06	0	0
48	85.7055	107.491	919.88	0	0
49	87.473	108.745	458.007	0	0
50	89.2406	110.07	162.123	0	0
51	91.6512	112	0	0	0

Discharge Sections

Entity Information

Post Construction

Shared Entities

Type	Coordinates (x,y)
External Boundary	47, 109.059 42.5, 108 19, 106 11, 102 8, 101 6, 102 0, 102 0, 84 0, 79 0, 70 130, 70 130, 118 130, 120 130, 130 105, 128 96, 124.4 95, 124 95, 112 57.2857, 112 48, 112 47, 112
Material Boundary	0, 84 75, 102
Material Boundary	0, 79 78.7617, 100.785 94, 105 130, 120
Material Boundary	94, 103 130, 118
Material Boundary	94, 103 95.866, 104.343 89.141, 102.356 96.443, 105.148 90.765, 103.766 94, 105
Material Boundary	75, 102 74.342, 101.083 79.786, 102.433 75.265, 100.313 78.7617, 100.785
Material Boundary	47, 109.059 48, 109.294 51, 110 53.7003, 110.859 57.2857, 112
Material Boundary	95, 112 96, 112 96, 124.4
Material Boundary	47, 109.059 48, 109.059 48, 109.294 48, 112

Scenario-based Entities

Type	Coordinates (x,y)	Master Scenario	Seismic
Water Table	0, 89.9411 82.189, 108.126 118, 118 130, 118	Assigned to: Medium Dense SM Medium Dense SP-SM Medium Stiff ML	Assigned to: Medium Dense SM Medium Dense SP-SM Medium Stiff ML

Lateral Spread Analysis

Shared Entities

Type	Coordinates (x,y)
External Boundary	47, 109.059 42.5, 108 19, 106 11, 102 8, 101 6, 102 0, 102 0, 84 0, 79 0, 70 130, 70 130, 118 130, 120 130, 130 105, 128 96, 124.4 95, 124 95, 112 57.2857, 112 48, 112 47, 112
Material Boundary	0, 84 75, 102
Material Boundary	0, 79 78.7617, 100.785 94, 105 130, 120
Material Boundary	94, 103 130, 118
Material Boundary	94, 103 95.866, 104.343 89.141, 102.356 96.443, 105.148 90.765, 103.766 94, 105
Material Boundary	75, 102 74.342, 101.083 79.786, 102.433 75.265, 100.313 78.7617, 100.785
Material Boundary	47, 109.059 48, 109.294 51, 110 53.7003, 110.859 57.2857, 112
Material Boundary	95, 112 96, 112 96, 124.4
Material Boundary	47, 109.059 48, 109.059 48, 109.294 48, 112

Scenario-based Entities

Type	Coordinates (x,y)	Master Scenario
Water Table	0, 89.9411 82.189, 108.126 118, 118 130, 118	Assigned to: Medium Dense SM Medium Dense SP-SM Medium Stiff ML

APPENDIX C

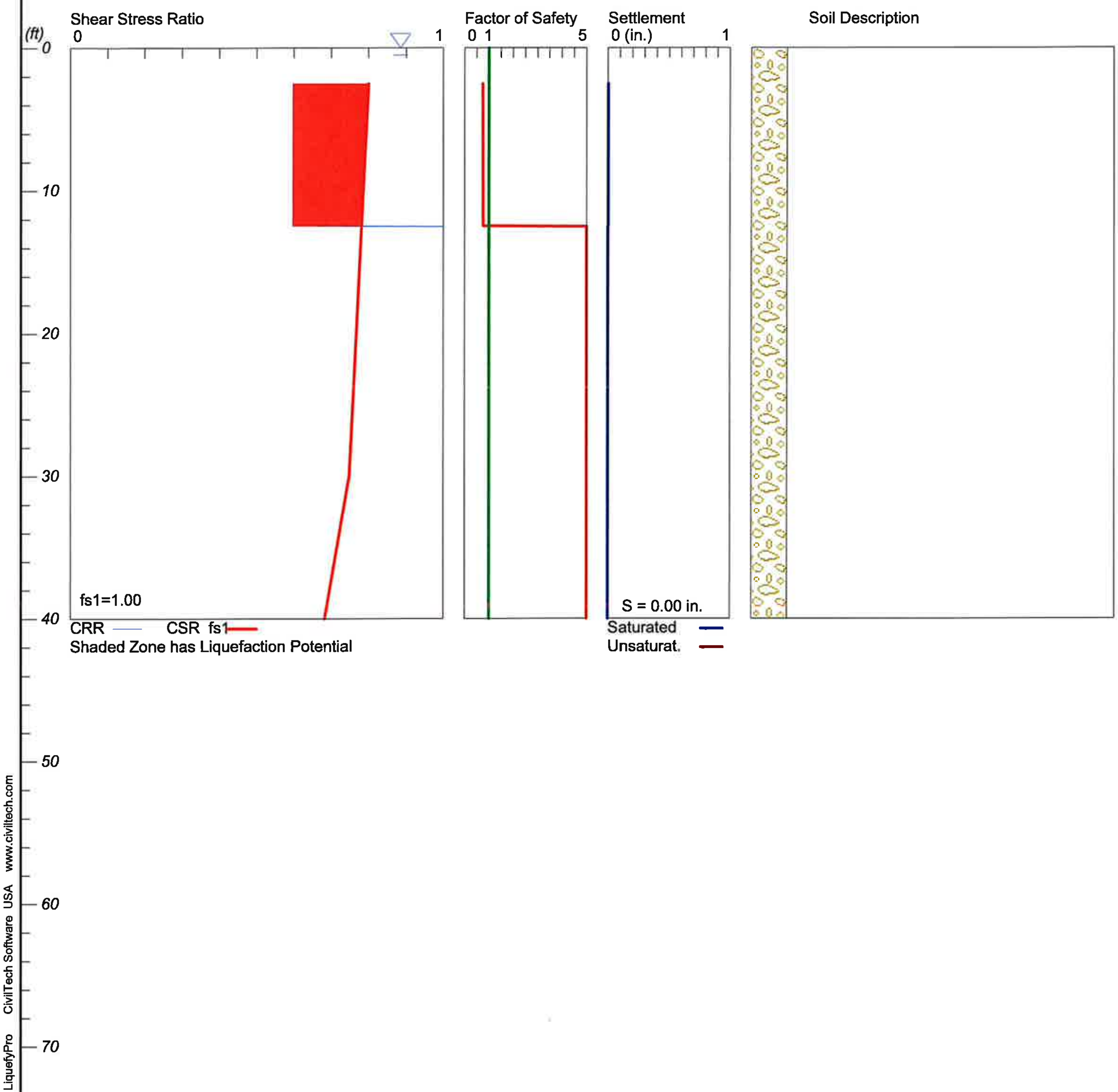
LIQUEFACTION RESULTS

LIQUEFACTION ANALYSIS

Mercer Island Short Plat

Hole No.=B-1

Magnitude=7
Acceleration=0.62g



LIQUEFACTION ANALYSIS

Mercer Island Short Plat

Hole No.=B-2   Water Depth=5 ft

Magnitude=7
Acceleration=0.62g