

14 January 2025
Revised 18 June 2025

Mark Hoffman
Garden Homes Management
820 Morris Turnpike, Suite 301
Short Hills, New Jersey 07078

**Re: Executive Summary of Global Stability Study for Eastern
Slope near Building D
West Essex – Highlands Development
West Orange, New Jersey
Langan Project No.: 101049801**

Dear Mr. Hoffman:

This letter serves as an executive summary of the enclosed report that documents the findings of subsurface investigations and global slope stability evaluations performed by Langan Engineering and Environmental Services, LLC (Langan) for the eastern portion (the "Study Area") of the proposed West Essex Highlands development site located in West Orange, New Jersey.

EXECUTIVE SUMMARY

Langan was requested by West Essex Highlands, Inc. ("WEHI") to perform a global slope stability evaluation in response to the comments made by the public during Planning Board hearings regarding the proposed location of Building D. As depicted on the "Overall Grading Plan" (Sheet SP-11) prepared by Anderson Consulting Services, LLC, Building D is proposed to be constructed near the eastern portion of the subject property, but west of the slope which descends towards the Rosemont Terrace and Mayfair Drive developments and a portion of Howell Drive to the east (the "Subject Slope").

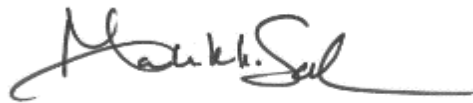
Langan's investigations summarized in the enclosed letter report evaluate the proposed construction of Building D from a geotechnical standpoint as it relates to the stability of the adjacent Subject Slope. As set forth therein, the subsurface investigations performed as part of this study consisted of soil borings and test pits and rock outcrop mapping that were performed in November and December 2024 and April through June 2025.

Based on our study, it is the professional opinion of the undersigned that the Subject Slope is stable under current conditions, would remain stable during the rock excavation to construct Building D foundations provided appropriate excavation and blasting

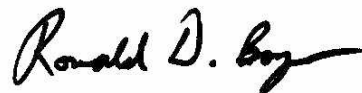
methods are utilized, and would be stable following the construction of Building D based on its anticipated structural loads and distance of Building D from the top of the slope.

It should be noted that Langan's study is based on the geotechnical subsurface data collected at accessible locations within the Study Area, the topographic survey data, currently existing site conditions and proposed building information made available to us. Any proposed changes in proposed structures (location, layout, loading, elevation) or existing slope conditions should be brought to our attention so that we can determine whether such changes affect our conclusions.

Sincerely,
**Langan Engineering and Environmental Services,
LLC**



Mark K. Seel, P.E.
Vice President



Ronald D. Boyer, P.E.
Senior Principal / Senior Vice President

Enclosure(s): Letter Report

cc: John Cote, Michael Vitello, Adam Yoda / Langan

NJ Certificate of Authorization No. 24GA27996400

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**Re: Global Stability Study for Eastern Slope near Building D
West Essex – Highlands Development
West Orange, New Jersey
Langan Project No.: 101049801**

Dear Mr. Hoffman:

This letter report documents the findings of subsurface investigations and global slope stability analysis performed by Langan Engineering and Environmental Services, LLC (Langan) for the eastern portion (the “Study Area”) of the proposed West Essex Highlands development site located in West Orange, New Jersey.

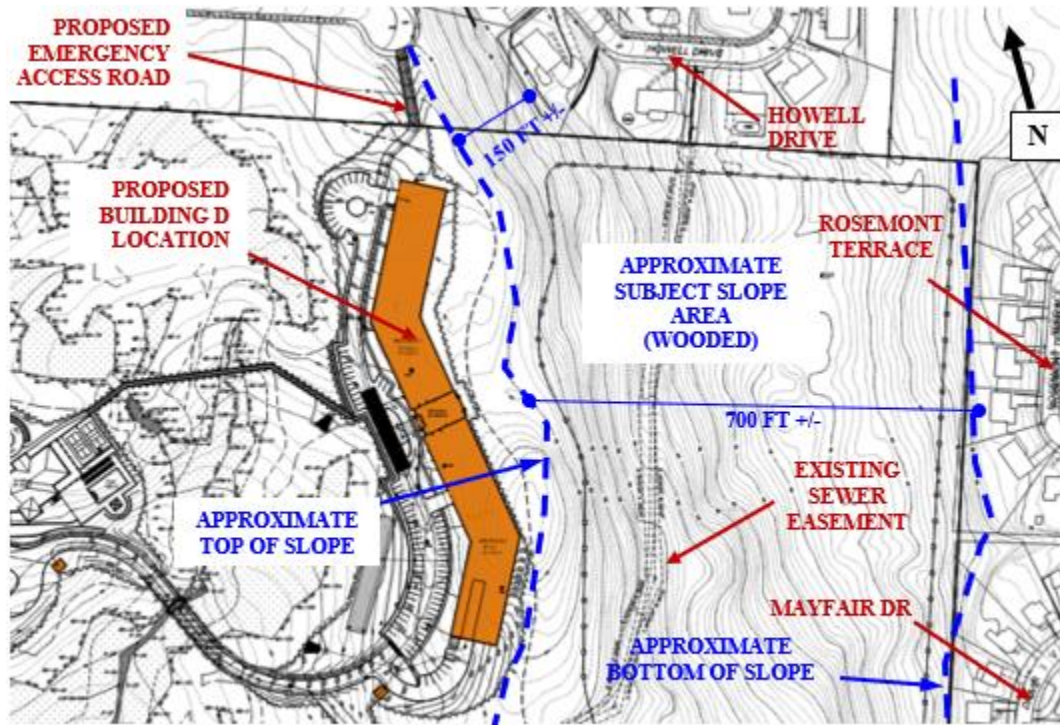
The purpose of the study is to address perceived slope stability concerns (the “Subject Slope”) raised by the public during previous Site Plan review meetings, related to the proposed construction of Building D on the West Essex Highlands Development.

This report provides an overview of the study and statements of our opinions in that regard. Details concerning our subsurface investigation, analysis, and evaluation are provided as Attachment A in support of the statements and opinions herein.

OVERVIEW DISCUSSION

Langan initially investigated the subsurface conditions within the Subject Slope/Study Area along two transects roughly 385 feet apart using a combination of drilled borings and test pit excavations. These findings were presented in a report dated 14 January 2025, and the undersigned provided testimony during a public hearing on 29 January 2025. Based on comments received from the public during that hearing, Langan performed additional investigation and analysis immediately north of the original study area. Those findings are presented in this report, and include two additional transects along which slope stability was evaluated. The locations of all transect lines and boring/test pit locations are shown on attached Figure 1. Soil and rock samples were collected and laboratory testing was performed to determine physical and strength parameters, which along with data from our logs of borings and test pits were utilized in our 2-dimensional slope stability analysis.

The Subject Slope descends about 150 feet in elevation to the east from the east side of proposed Building D at an overall slope of roughly 10 degrees (or roughly 17%) to the neighboring properties located on Rosemont Terrace and Mayfair Drive. The distance to the adjacent Rosemont Terrace and Mayfair Drive developments at the bottom of the slope is roughly 700 feet east of the proposed Building D. Immediately to the north of proposed Building D, the ground descends about 50 feet in elevation to the top of a 2 tiered timber and modular block retaining walls located on the property at 15 Howell Drive at a slope of roughly 19 degrees (roughly 35%). A site location map showing the approximate limits of the Study Area is provided below.



Proposed Study Area Site Map

As part of our supplemental investigation performed between April and June 2025, we mapped rock outcrops and boulders with the Study Area to account for variations in the slope. In general, the subsurface profile in the northernmost part of the study area (upslope from 15 Howell Drive) consists of a relatively thinner relatively dense soil overly hard basalt bedrock the upper 0.5 feet to 4 feet of which was found to be fractured and barely rippable using an excavator. The overburden soils thicken south of the 2-tiered retaining wall. Generalized subsurface conditions encountered in the borings and test pits, and from our mapping revealed the balance of the Study Area to consist of relatively shallow (outcrop to 15 feet deep) hard rock in and near the top of the slope where proposed Building D is to be located. Soils consisted of up to 2 feet of silty, sandy topsoil over relatively dense gravelly sandy soils overlying basalt bedrock at the top of the slope with similar dense sands over basalt and sedimentary bedrock at greater depths lower on the slope further to the east.

During our subsurface investigation, groundwater was observed in only one test pit (TP-1), at a depth of roughly 11 feet below existing grade, which is below the top of decomposed basalt. There was no indication of mottling of soils in the test pits that would suggest a seasonal water table. All test pits, excluding R-1B, excavated during the wet season in April, similarly did not encounter water nor did the soil exhibit mottling. Minimal water seepage was observed on top of the rock surface that was encountered approximately 2 feet below existing surface grade.

Geologic Hazard Review and Rock Outcrop Stability

The Subject Slope has a few scattered rock outcrops along the top and upper portions of the slope. No adverse / problematic jointing was observed. The potential for rock fall hazard is low and would be expected to ravel directly to the ground beneath the outcrops. A high-angle fault with no history of activity is mapped about 2,000 feet to the east of the site. A copy of the geologic mapping is provided as Figure 2. The seismic risk at the site is considered low based on our review of available New Jersey earthquake history in the area. Nonetheless, we included a seismic case in our slope stability analysis.

The state of New Jersey published a Landslide Susceptibility Map for Essex County dated 2001, which uses landslide classes from the HAZUS User Guide (FEMA) Table 9.5. One area, identified as Landslide Class B III, appears on the map which closely correlates to areas of outcropping shown in Figure 1. We evaluated global slope stability separately from rock stability, which is governed by rock jointing. Due to the typically favorable joint orientation in the outcrops, the rock is stable.

Global Stability of Slope

Our analysis included an evaluation of slope stability under both static and seismic (dynamic) design conditions. Building D is far enough from the top of the slope that there is no surcharge load that would impact the slope stability, nor will transient automobile loading on the emergency access road connecting the Howell Drive cul-de-sac to the development impact slope stability. Although no indication of a continuous groundwater table was observed in the test pits, we performed a sensitivity analysis to determine if changes in groundwater level would impact the stability of the subject slope.

Analysis Sections A-A' and B-B'

Our base case static and seismic analyses used the base groundwater level encountered in our one test pit. The results of the static case indicate the lowest factors of safety exceed 1.5, indicating stable slopes. The potential slip plane surface that resulted in the lowest factor of safety was limited in length to roughly 100 feet and occurred near the middle of the Subject Slope as a shallow surficial slip surface (i.e., within the upper 2 feet of soil). Similarly, the results of the dynamic (seismic) case indicate the lowest factors of safety to be greater than 1.2, indicating stable slopes during a potential earthquake. Factors of safety greater than 3.29 and 2.23 were computed where software-generated potential slip planes extend from the top of the Subject Slope to the downslope neighboring properties for the static and seismic cases,

respectively. In addition to the base cases described above, we analyzed groundwater at the the top of decomposed rock. Factors of safety greater than 1.5 resulted, indicating stability.

Analysis Sections C-C' and D-D'

Our base case static and seismic analyses used the base groundwater level encountered in our one test pit. The results of the static case indicate the lowest factors of safety exceed 1.5, indicating stable slopes. The potential slip plane surface that resulted in the lowest factor of safety was limited in length to roughly 100 feet to 125 feet and occurred east of the rock outcrop as a slip surface within the upper 6 feet of soil. Similarly, the results of the dynamic (seismic) case indicate the lowest factors of safety to be greater than 1.2, indicating stable slopes during a potential earthquake.

In addition to the base cases described above, we analyzed groundwater at the the top of decomposed rock. Factors of safety greater than 1.5 resulted, indicating stability.

Construction Related Blasting Impacts

We understand up to 25 feet of rock is expected to be excavated from one localized area at the top of the Subject Slope in order to reach design grades for Building D. If blasting is to be performed for construction, we recommend using controlled blasting techniques, which include but are not limited to line and/or channel drilling, limiting charge per delay, use of blasting mats, and performing vibration monitoring to assess the effects of blasting. Controlled blasting techniques thereby limit the amount of energy transmitted to the surrounding rock, generally limit the nuisance impacts of construction compared to conventional earth excavating methods (i.e., less time to excavate and haul off material), and limit the potential for impacts to neighboring properties.

OPINIONS

Based on our investigation and analysis, the Subject Slope is not at risk of failure under current conditions or from proper construction of Building D. Our analyses further indicate that there would be negligible impact on the global stability of the Subject Slope even if groundwater levels were to rise. However, direct precipitation and runoff can be expected to flow over the sloping ground surface with some lesser amount of infiltration, and the development is not expected to increase stormwater run off toward the Subject Slope.

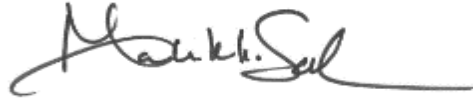
As part of the proposed development, we understand that appropriate drainage and conveyances will be provided to prevent site development stormwater from entering the Subject Slope.

LIMITATIONS

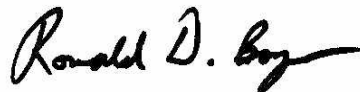
Our study is based on the geotechnical subsurface data collected at accessible locations within the Study Area, the topographic survey data, currently existing site conditions and proposed building information made available to us. Any proposed changes in proposed structures

(location, layout, loading, elevation) or existing slope conditions should be brought to our attention so that we can determine whether such changes affect our conclusions.

Sincerely,
Langan Engineering and Environmental Services, LLC



Mark K. Seel, P.E.
Vice President



Ronald D. Boyer, P.E.
Senior Principal / Senior Vice President

Enclosure(s): Figure 1, Figure 2, Attachment A

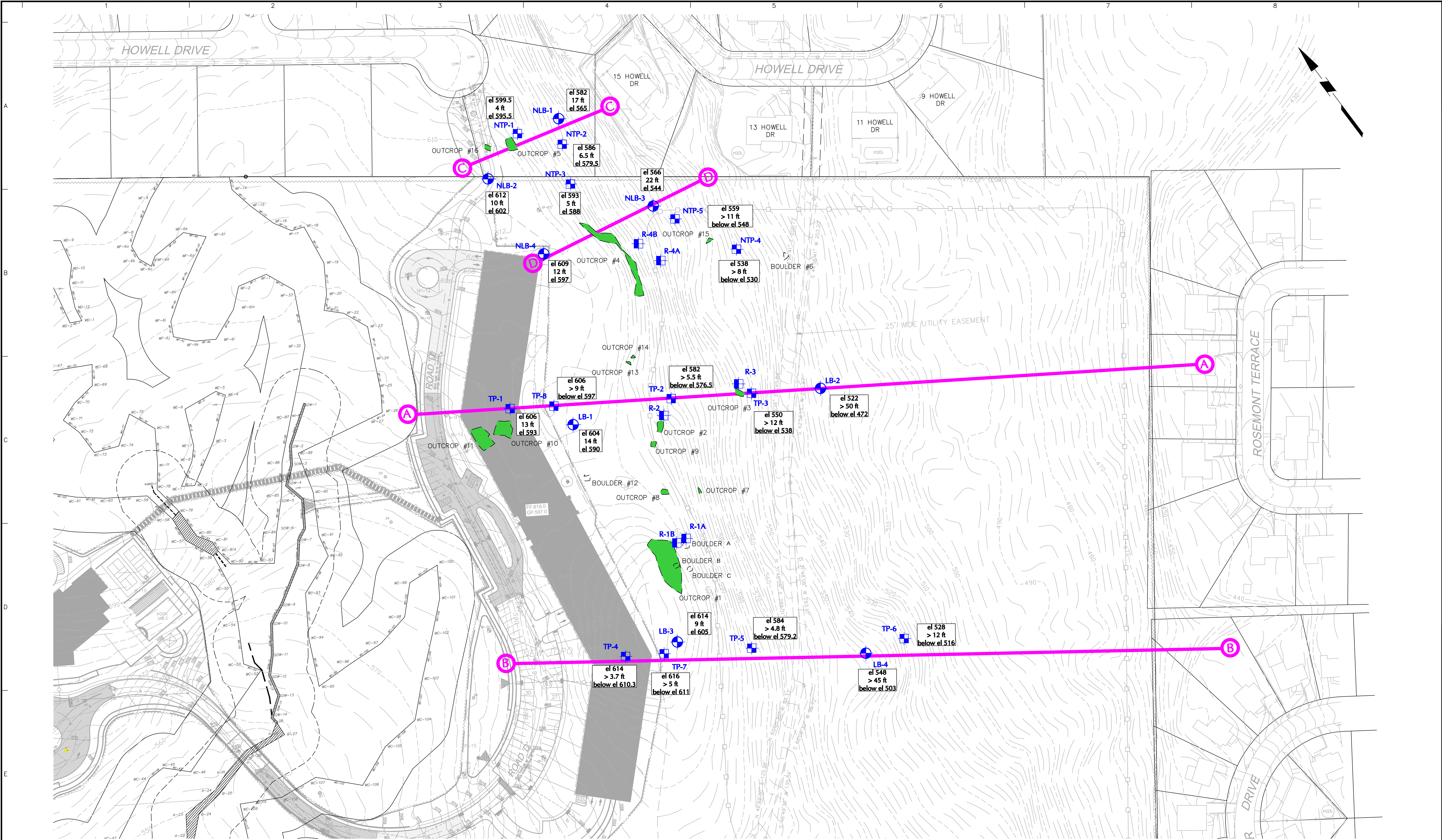
cc: John Cote, Michael Vitello, Adam Yoda / Langan

NJ Certificate of Authorization No. 24GA27996400

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FIGURES

Figure 1	Boring and Test Pit Location Plan with Building Sections
Figure 2	Geological Map



NOTES:

1. BASE PLAN OBTAINED FROM PLAN TITLED "OVERALL GRADING PLAN SP-11" DATED 1 OCTOBER 2024. PREPARED BY ANDERSON CONSULTING SERVICES LLC (ACS).

LEGEND:

- TP-1 NTP-1
- LB-1
- R-1A
- APPROXIMATE LOCATION OF LANGAN BORING
- APPROXIMATE LOCATION OF LANGAN TEST PIT
- APPROXIMATE LOCATION OF OUTCROP TEST PIT
- APPROXIMATE LOCATION OF GLOBAL SLOPE STABILITY ANALYSIS SECTION

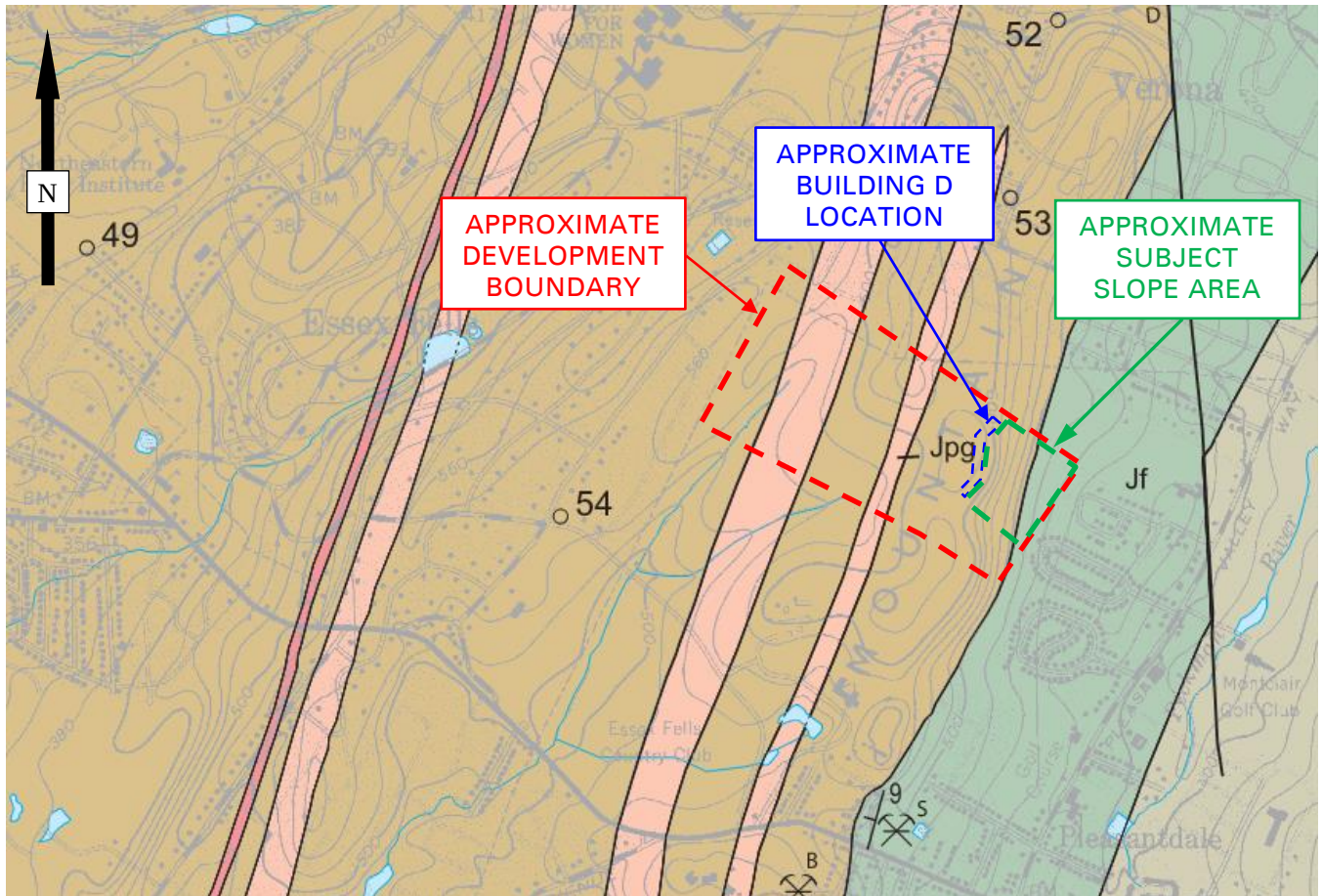
- APPROXIMATE LOCATION OF ROCK OUTCROP
- APPROXIMATE LOCATION OF BOULDER
- APPROXIMATE SURFACE ELEVATION
- APPROXIMATE OVERBURDEN SOIL AND DECOMPOSED ROCK THICKNESS
- APPROXIMATE TOP OF ROCK ELEVATION

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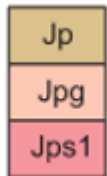
Project
West Essex Highlands
WEST ORANGE TWP
ESSEX COUNTY NEW JERSEY

Drawing Title
INVESTIGATION PLAN

Project No. 101049801	FIGURE 1
Date 6/18/2025	
Drawn By RLB	
Checked By AY	



LEGEND



Preakness Basalt – Dark-greenish-gray to black, fine-grained, dense, hard basalt



Feltville Formation – Reddish-brown or light-grayish-red, fine-to-coarse-grained sandstone, siltstone, shaly siltstone and silty mudstone.

Source: Bedrock Geologic Map of The Caldwell Quadrangle, Essex and Morris Counties, New Jersey by Richard A. Volkert (2006)

LANGAN

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Langan Engineering and Environmental Services, LLC.
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan International LLC
Collectively known as Langan

WEST ESSEX - HIGHLANDS

GEOLOGIC MAP

WEST ORANGE

NEW JERSEY

PROJECT NO.
1010498014

SCALE
N.T.S.

DATE
6/18/2025

FIGURE
2

ATTACHMENT A

SUPPORTING GLOBAL STABILITY STUDY MEMORANDUM BY LANGAN

300 Kimball Drive Parsippany, NJ 07054 T: 973.560.4900 F: 973.560.4901

To: Mark Hoffman / Garden Homes

From: Mark K. Seel / Langan
Ronald D. Boyer / Langan

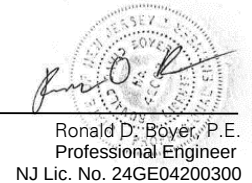
Info: Adam Yoda / Langan
John Cote / Langan
Michael Vitello / Langan

Date: 14 January 2025
Revised 18 June 2025

Re: **Global Slope Stability Study for Building D**
West Essex Highlands Project
West Orange, New Jersey
Langan Project No.: 101049801



Mark K. Seel, P.E.
Professional Engineer
NJ Lic. No. 24GE04229500



Ronald D. Boyer, P.E.
Professional Engineer
NJ Lic. No. 24GE04200300

This memorandum summarizes the subsurface investigations and global slope stability evaluations performed by Langan Engineering and Environmental Services, LLC (Langan) for the eastern portion of the proposed West Essex Highlands development site located in West Orange, New Jersey. The following sections provide a description of existing site conditions, proposed development, subsurface investigations performed, and conditions encountered, our global slope stability analysis and our evaluation regarding slope stability with respect to the associated building construction.

EXISTING CONDITIONS AND PROPOSED CONSTRUCTION

The subject project site is located on Lot 32, Block 179, and is bounded by Avon Drive and Howell Drive and residential properties to the north, and residential developments to the south, east and west. The focus of the investigations (the "Study Area") and subsequent global slope stability analysis is the easternmost portion of the site bounded by Howell Drive, Rosemont Terrace and Mayfair Drive to the east. The Study Area is heavily wooded and surface grades slope downward from west to east. There is a 25-foot-wide utility easement that bisects the subject area running in the north-south direction.

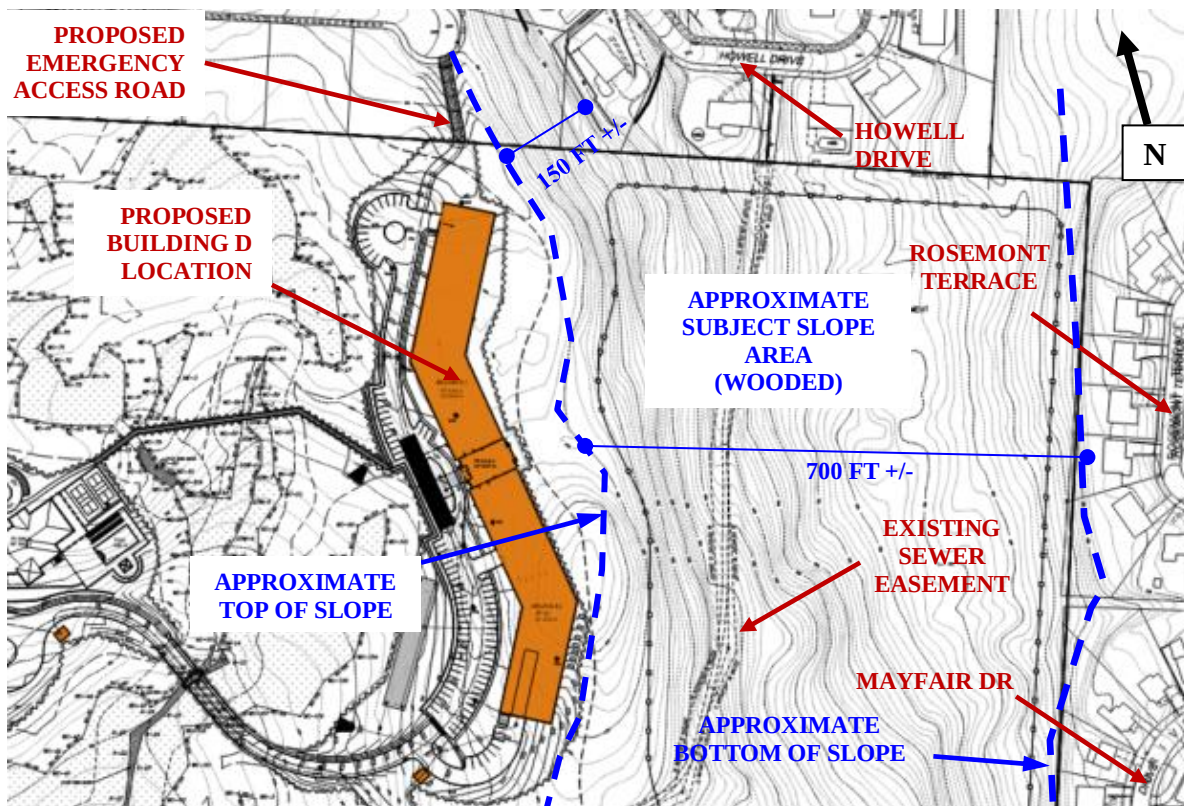
Site surface grades generally range from approximately elevation (el) 616 to el 450. Typically, the slope in the Study Area ranges from about 2 Horizontal (H): 1 Vertical (V) or approximately 26 degrees from horizontal at its steepest to approximately 6H:1V or approximately 10 degrees from horizontal east of the utility easement. Hard basalt rock outcrops locally, typically 2 feet (ft) to 15 ft tall, have nearly vertical faces.

The proposed residential development will consist of the construction of new 4-story structures over structured parking. Based on available site drawings prepared by Anderson Consulting

MEMO

Services, LLC. (ACS), the closest building to the subject slope is proposed Building D, which is to be located at the top of the slope within the study area approximately 700 ft west of the eastern property line and approximately 150 ft southwest of the northernmost residence on Howell Drive. We understand that no site improvements are proposed in the wooded subject area located approximately 20 ft east of the proposed eastern building line of Building D. An emergency access road connected to the existing Howell Drive cul-de-sac is also proposed as part of the construction.

Based on the proposed grading plans, we understand the proposed construction of Building D and the associated access road will not include any grade changes from the existing conditions immediately east. The lowest proposed level will range from elevation (el) 607 to el 582 which will require cuts up to about 25 ft from existing surface grade in some isolated areas. The lower structured parking level for Building D will be nested into the eastern slope with adjacent grades east of the proposed building remaining unchanged. The building will be supported on shallow foundations bearing on natural soils or rock. A site location map showing the approximate limits of the study area and proposed Building D is provided below and as Figure 1.



Proposed Study Area Site Map

REGIONAL GEOLOGY

According to the available geological maps we reviewed, the upper portion of the subject slope is underlain by the Preakness Basalt, which is a hard fine-grained igneous rock. The lower portion

of the slope is mapped as the Feltville Formation, which consists of sandstone, siltstone or mudstone. A high-angle fault with no history of activity is mapped about 2,000 ft to the east of the site. An abandoned sandstone rock quarry is also identified about 1,000 ft southeast of the site. A copy of the geologic map is provided as Figure 2.

SUBSURFACE INVESTIGATION

A targeted subsurface investigation for the global slope stability study consisting of borings and test pits was completed between November and December 2024. A supplemental subsurface investigation for the global slope stability study located at the northern portion of the subject area consisting of borings, test pits and a rock outcrop and boulder evaluation was completed between April and June 2025. Both investigations were performed under full-time supervision by Langan. The borings and test pits were performed at accessible areas along four cross-sections running in the east-west direction through the subject area. The locations of the borings, test pits and cross-sections are shown on Figure 1. Logs of the borings and test pits are provided in Appendix A and Appendix B, respectively.

Borings

Eight (8) borings, identified as LB-1 through LB-4 and NLB-1 through NLB-4, were drilled within the subject area by Craig Geotechnical Drilling Co. Inc. (Craig). The borings were performed using a track-mounted drill rig and mud-rotary drilling techniques. Borings extended approximately 19 ft to 50 ft below existing surface grades.

Borings NLB-2, NLB-4, LB-1 and LB-3 were performed at the higher portion of the slope near the proposed Building D footprint. Borings NLB-1 and NLB-3 were performed at the lower portion of the slope near the northeastern property line. Borings LB-2 and LB-4 were performed east of the existing sewer easement located at the lower portion of the slope.

Soil samples were collected, and Standard Penetration Tests (SPT) were performed using a standard 2-inch outside-diameter split-spoon sampler driven by a 140-pound automatic hammer in accordance with ASTM D1586. Soil sampling and SPTs were typically performed continuously in the upper 12 ft and at 5 ft intervals thereafter. Recovered soil samples were visually examined and classified in the field in accordance with the Unified Soil Classification System (USCS). Where encountered, rock was cored for a minimum of 10 ft using an NQ-sized core barrel.

Test Pits

Eight (8) test pits, identified as TP-1 through TP-8, were excavated by Frank Semeraro Construction Co., Inc. (Semeraro) using a John Deere 75G excavator during the initial subsurface investigation. Five (5) test pits, identified as NTP-1 through NTP-5, were excavated at the northeastern portion of the subject slope area by Semeraro using a CAT 308 Excavator or Hitachi 7X85 excavator during the supplemental subsurface investigation. The test pits extended approximately 3.5 ft to 13 ft below existing surface grades. Upon completion, the test pits were backfilled with excavated materials and the backfill was compacted with the excavator bucket.

Rock Outcrop and Boulder Mapping

As part of the supplemental investigation, exposed rock outcrops and boulders along the subject slope were located using handheld survey equipment and evaluated from a slope stability perspective. Six (6) shallow test pits, identified as R-series test pits, were performed at exposed rock outcrop areas or boulders observed on the slope to gather further information for our evaluation. The approximate location of the rock outcrops and boulder and select photographs are provided on Figure 3. Logs of the R-series test pits are provided in Appendix C. A discussion of observations is presented in the following section and findings are presented in the "Geological Hazard Review" section of this memorandum.

Geotechnical Laboratory Testing

Soil and rock samples collected during the subsurface investigation were classified and examined in the field by a Langan geotechnical engineer. Representative rock samples were tested by a geotechnical laboratory to determine the unconfined compressive strength of the rock. The results of the laboratory tests are included in Appendix D.

SUBSURFACE CONDITIONS

The generalized subsurface conditions consisted of surficial materials (topsoil) underlain by natural sand and silt overlying a decomposed rock and rock strata. Detailed descriptions of the subsurface conditions are given below.

Surficial Materials

Surficial materials at the test locations generally consisted of topsoil. The thickness of the topsoil was observed to vary from 6 inches to 24 inches. Boulders and cobbles as well as rock outcrops were also visible at the surface throughout the subject area. It should be noted it was difficult to differentiate between deeply buried boulders and a rock outcrop during our evaluation.

Rock Outcrops: Rock outcrops and boulders were identified on or near the subject eastern slope. Generally, the rock outcrops had exposed faces less than 15 ft high with the majority of the outcrops having exposed faces less than 2 ft high. In general, the larger exposed rock outcrops (Outcrop #1 and #4 identified in Figure 3) with two principal joint sets, one near vertical that is oriented perpendicular to the rock face and one dipping 10 degrees to 20 degrees out of the face. The near vertical jointing pattern for these outcrops was generally observed to be spaced 1 inch to 12 inches apart with the horizontal jointing pattern typically spaced 2 ft to 4 ft apart. The exposed outcrop faces typically dip eastward (downslope) between 60 degrees and 85 degrees from horizontal. Separated rock pieces that originated from the parent rock outcrop were observed to be generally less than 6-inch-thick sheets and located immediately in front of the exposed face at Outcrop #4. The joint surfaces are typically rough and slightly irregular.

Exposed Boulders: Boulders with varying sizes were observed along the subject slope. Larger boulders were observed on top of or in close proximity to Outcrop #1. The dimensions of a large

boulder resting directly on Outcrop #1 were approximately 8 ft long by 5 ft wide by 6 ft high. The contact surface of this boulder and the underlying rock outcrop was observed to be rough and had a generally flat slope of 15 degrees from horizontal sloping downward to the east. Other boulders, similar in size, were also observed in the area and appeared to be partially buried in the existing soil slope.

Natural Overburden Soils

Natural sandy and silty soils were encountered below the topsoil in all test pits and borings. The natural sand was typically described as brown to reddish brown fine to coarse silty sand or sandy silt with varying amounts of clay, gravel and roots. Boulders and cobbles were encountered in several test pits and borings at varying depths.

The top of the natural soils was first encountered at depths ranging from the existing surface grade to approximately 2 ft, corresponding to elevation (el) 614 to el 522. The thickness of the natural soil varied typically between 7 ft and 12 ft in the borings located at the higher portion of the slope near the proposed building D footprint and proposed access road.

At the lower portion of the slope, the thickness of the natural soil layer was approximately 43 ft in boring LB-2. Boring LB-4 was terminated in natural sand at approximately 45 ft below surface grade or at approximately el 503. The thickness of the natural soil layer was approximately 8 ft and 20 ft in borings NLB-1 and NLB-3, respectively.

The recorded N-values in this stratum typically ranged from 11 bl/ft to split-spoon refusal values, indicative of medium dense to very dense materials and the presence of cobbles and boulders. The recorded N-values typically increased with depth.

Decomposed Rock

A decomposed rock stratum was encountered in borings LB-1, LB-2, LB-3 and test pits TP-1, NTP-1, NTP-2, R-3, R-4A and R-4B. The thickness of this decomposed rock layer ranged from 0.5 ft to 7 ft. This decomposed rock was in the form of a mixture of brown sand with silt, clay, gravel and rock fragments. All recorded SPT N-values in this decomposed zone were split-spoon sampler refusals. It should be noted that it is difficult to differentiate between the very dense soils and the decomposed rock stratum with the limited split-spoon sample recovery.

Bedrock

Bedrock consisting of gray basalt was encountered in borings LB-1, LB-3, NLB-1, NLB-2, NLB-3 and NLB-4 below the overburden soils and decomposed rock stratum between approximately 10 ft and 25 ft below existing surface grade or between approximately el 605 and el 544. The top of rock was determined by rock coring in these borings. The recorded rock recovery (REC) values typically varied from 75% to 100% and the rock quality designation (RQD) values varied typically from 42% to 93%, indicative of fair to good quality rock. Low RQD values of 0% and 23% were

recorded in boring NLB-1. As previously stated, some basalt rock outcrops were visible at the subject eastern slope and within the proposed building footprint.

Bedrock was not encountered at the termination depths of borings LB-2 and LB-4, which are located at the lower slope approximately 420 ft and 350 ft east of proposed Building D, respectively. Boring LB-2 was terminated at about 50 ft below existing surface grade or at approximately el 472. Boring LB-4 was terminated at about 45 ft below existing surface grade or at approximately el 503.

The top of rock contours are expected to vary considerably between investigation locations. Therefore, it should be noted that the top of rock elevations given herein are approximate and the reported conditions refer to the conditions at the specific investigation locations. Variations in the top of rock elevations, rock quality and weathering should be expected across the site.

Laboratory Testing: Unconfined compressive tests were performed on 2 rock core samples taken from boring LB-3 located at the upper portion of the slope. The tests suggest that the unconfined compressive strength of the basalt rock samples varied between approximately 2,200 pounds per square inch (psi) and 3,500 psi or approximately 316,800 pounds per square foot (psf) and 504,000 psf.

Groundwater

A site-wide static groundwater table was not encountered. Water seepage at approximately 11 ft below existing surface grade in the decomposed rock layer was observed in test pit TP-1. Limited water seepage was observed approximately 2 ft below existing surface grade on top of the rock surface exposed in test pit R-1B. Water seepage or indications of mottling were not observed in any other test pit. Surface water flowing over the sloping rock surface should be expected, especially during wet seasons. Groundwater levels are subject to seasonal fluctuations.

GLOBAL SLOPE STABILITY ANALYSIS

As requested, Langan performed a global stability analysis of the subject area slope. The purpose of such a study is to evaluate if the slope is stable, with an adequate factor of safety, in the existing condition and in the proposed building or roadway loading condition.

The analysis consisted of performing two-dimensional Limit Equilibrium Method (LEM) analyses for representative slope cross-sections to evaluate the global slope stability. During our study and analyses, we performed the following key tasks:

1. We reviewed the available geotechnical subsurface information along with our targeted subsurface investigation results for the subject slope area.
2. We reviewed the soil and rock geometry in the cross-sections along with the proposed building gravity building loads. We chose two sections (section A and section B) across

the proposed Building D footprint and down the subject area slope to the eastern residences for our slope stability analyses. We also chose two additional sections (section C and section D) across the northeastern portion of the subject area and down the subject area slope near the northeastern residences on Howell Drive. The locations of the sections are shown on Figure 1.

3. We estimated strength parameters for the soil based on visual observation and the collected N-value results obtained during sampling.
4. We estimated strength parameters for the rock based on laboratory testing results and rock recovery and rock quality designation values obtained in the rock cores.
5. We analyzed the global slope stability using LEM for the estimated proposed Building D load and access road load and we calculated factors of safety with respect to global stability for the static condition.
6. We analyzed the slope stability using the LEM for the combined service and seismic loads and we calculated factors of safety with respect to global stability for the maximum considered earthquake.

We used the computer software SLOPE/W for the LEM analyses. An overview of our analyses and a summary of our results are presented below.

Model Parameters

Model Geometry

For our two-dimensional global stability analyses, we selected two representative cross-sections (section A and section B) across the proposed Building D footprint extending to the eastern property line in the subject area. The eastern property line is approximately 900 ft east of the proposed Building D footprint. We also selected two representative cross-sections (section C and section D) across the northern portion of the proposed Building D footprint and proposed access road north of the Howell Drive cul-de-sac extending to the northeastern property line. The northeastern property line is approximately 200 ft and 250 ft east of the proposed access road and proposed Building D footprint, respectively.

The soil and rock elevations used in the model are based upon the results of available subsurface investigation information, which was collected from the accessible explored areas of the site.

Material Properties

The generalized subsurface conditions consisted of surficial materials (topsoil) underlain by natural sand and silt over decomposed rock and rock strata. No subsurface investigation was performed beyond the northeastern property line as part of the supplemental investigation.

We estimated the material parameters including friction angle (ϕ'), of the surficial fill, natural soil and decomposed rock layers based on in-situ test data. The soil parameters utilized in our analyses are presented in Table 1 provided below.

Table 1: Soil Strength Properties

Soil/Rock	Unit Weight (pcf)	Friction Angle, ϕ' (deg.)	Cohesion, c (psf)
Topsoil	115	30	0
Medium Dense Sand	120	32	0
Dense Sand	125	34	0
Decomposed Rock/Very Dense Granular Soil	135	38	0

The rock encountered and cored during the investigation at the upper portion of the slope was classified as basalt. Rock properties were estimated using values recommended in the SLOPE/W manual and a Geologic Strength Index (GSI) of 65, an intact rock parameter (m_i) of 17, a disturbance factor (D) of 1 and an unconfined compressive strength (UCS) of 316,800 psf (lowest laboratory value) were used in the analyses.

Groundwater

It should be noted that our original subsurface investigation was performed during a time of drought and not during the wet season. The supplemental investigation was performed at the end of the wet season as defined by the latest NJDEP stormwater best management practices manual and groundwater was not encountered in the test pits. Therefore, our primary analysis excludes groundwater, and our secondary analysis assumes a high groundwater level to be at the top of the decomposed rock / very dense granular soil layer.

Proposed Building D Loading

Proposed Building D will be 4-stories above structured parking. A total uniform service load of 1,000 psf was applied to the eastern slope to simulate the effect of the proposed building. This service load estimate was derived from live loads specified in the New Jersey UCC Building Subcode 2021 and an approximate estimation of the dead loads. A total uniform load of 250 psf was applied to the slope to simulate the effect of the proposed access road.

LEM Analyses and Results (Service Loads)

The LEM analyses were performed to represent the pre-construction condition and post-construction condition after the construction of the structure. We used the Morgenstern-Price LEM for our analysis, which satisfies the equilibrium of forces and moments.

To consider the effect of the proposed construction on slope stability, the critical slip surfaces for

the existing and proposed gravity (static) loading conditions for Sections A, B, C and D are provided in the tables below. LEM analysis results under gravity loading (static) condition satisfy a minimum acceptable factor of safety of 1.5, and are presented in Appendix E.

Table 2A - LEM Factors of Safety against Sliding for Service Loads – Section A

Condition	Critical Slip Surface	Critical Slip Surface That Reaches the Downslope Building
Existing	2.20	3.29
Proposed	2.20	3.29

Table 2B - LEM Factors of Safety against Sliding for Service Loads – Section B

Condition	Critical Slip Surface	Critical Slip Surface That Reaches the Downslope Building
Existing	1.67	6.46
Proposed	1.67	6.45

Table 2C - LEM Factors of Safety against Sliding for Service Loads – Section C

Condition	Critical Slip Surface To Upper Tier Retaining Wall
Existing	1.59
Proposed	1.59

Table 2D - LEM Factors of Safety against Sliding for Service Loads – Section D

Condition	Critical Slip Surface within Site Limits
Existing	1.94
Proposed	1.94

Seismic Slope Stability Analyses

Seismic slope stability analyses have traditionally been performed by using pseudo-static limit equilibrium analyses. These analyses consist of applying a lateral force to the slope equal to the product of a seismic coefficient (k_h) and the weight of the slope. The seismic coefficient is based on the actual anticipated level of acceleration in the failure mass and corresponds to some

fraction of the anticipated peak acceleration (a_{max}). Hynes-Griffin and Franklin (1984)¹ seismic coefficient equation $k_h = 0.5a_{max}/g$ is considered appropriate to use for most slopes (Kramer, 1996)². For this site, we utilized the Hynes-Griffin and Franklin (1984) criteria that resulted in $k_h = 0.0875$.

To consider the effect of the proposed construction on slope stability, the critical slip surfaces for the existing and proposed seismic loading conditions for Sections A, B, C and D are provided in the tables below. LEM analysis results under seismic conditions satisfy a minimum acceptable factor of safety of 1.15 and are presented in Appendix F.

Table 3A: LEM Factors of Safety against Sliding for Seismic Loads – Section A

Condition	Critical Slip Surface	Critical Slip Surface That Reaches the Downslope Building
Existing	1.65	2.23
Proposed	1.65	2.23

Table 3B: LEM Factors of Safety against Sliding for Seismic Loads – Section B

Condition	Critical Slip Surface	Critical Slip Surface That Reaches the Downslope Building
Existing	1.29	4.59
Proposed	1.30	4.59

Table 3C: LEM Factors of Safety against Sliding for Seismic Loads – Section C

Condition	Critical Slip Surface To Upper Tier Retaining Wall
Existing	1.26
Proposed	1.26

Table 3D: LEM Factors of Safety against Sliding for Seismic Loads – Section D

Condition	Critical Slip Surface within Site Limits
Existing	1.47
Proposed	1.47

¹ Hynes-Griffin Mary E; Franklin Arley G (2007). "Rationalizing the Seismic Coefficient Method". Department of the Army.

² Steven L Kramer. "Geotechnical Earthquake Engineering" 1996.

Analysis due to Groundwater

We analyzed the impact of a continuous groundwater level on the slope stability for the static loading condition. The estimated resulting factors of safety are provided in Table 4A.

Table 4A: LEM Factors of Safety against Sliding for Gravity Loads with Groundwater

Groundwater Level	Section A (Critical Slip Surface)	Section B (Critical Slip Surface)	Section C (Critical Slip Surface)	Section D (Critical Slip Surface)
Top of Decomposed Rock / Very Dense Granular Soil	2.20	1.67	1.59*	1.94

*This factor of safety is based on using dense sand below the topsoil layer in the analysis, which is the condition indicated by the borings.

We also performed an infinite slope analysis for the high groundwater case. The estimated resulting factors of safety from this analysis are provided in Table 4B. In all cases the factor of safety is greater than 1.5.

Table 4B: LEM Factors of Safety against Sliding for Gravity Loads with Groundwater (Infinite Slope Analysis)

Groundwater Level/Critical Slip Surface Location	Section A	Section B	Section C	Section D
Top of Decomposed Rock / Very Dense Granular Soil	3.94	3.87	1.81	2.23

EVALUATION

We utilized the NAVFAC Design Manual 7.1 "Soil Mechanics" (NAVFAC 1986) reference in the evaluation of the factors of safety calculated in our global slope stability evaluation for the static and seismic design loading conditions. This manual indicates that a factor of safety of no less than 1.5 should be utilized for permanent or sustained (static) loading conditions of slopes, and a factor of safety of no less than 1.15 should be utilized for seismic loading conditions of slopes due to earthquakes.

Geologic Hazard Review

Based on rock maps and our subsurface findings, hard igneous basalt rock is near the surface at the upper portion of the slope with a few several rock outcrops identified in the upper portion of the slope. The lower portion of the slope is anticipated to consist of sedimentary rock as part of

the Feltville Formation at depth greater than 50 ft from existing surface grade based on the subsurface investigation.

Our mapping indicates the predominance of vertical jointing oriented approximately E-W, which is perpendicular to the direction of the eastern slope. The joint spacing varies from a few inches to several feet. The orientation and dip of the slab-like features formed by the joints are favorable with respect to stability. A secondary set of joints, oriented approximately orthogonal to the primary vertical set, typically dips to the east (out of the rockface) between 10 degrees and 20 degrees. The joint surfaces are typically rough and slightly irregular thereby effectively increasing the resistance to movement along the joint. A design rock-on-rock (joint) friction angle for a tightly jointed (low to no aperture) basalt is 35 degrees, excluding the irregularities (asperities) along the jointing. The blocks in the outcrops and boulders bearing on rock outcrop result in kinematically stable configurations, meaning the rock is stable.

Based on a review of the New Jersey earthquake history provided by the New Jersey Department of Environmental Protection (NJDEP), the seismic risk of the site appears to be low.

We reviewed the available Landslide Susceptibility Map for Essex County dated 2001 for the site vicinity. The map indicates that the subject eastern slope has a Landslide Class of B III – weakly cemented rock and soils with a slope angle of 10-15 degrees. Landslide susceptibility as defined by the author means “susceptible” to a landslide depending on many factors, which we have accounted for in our study. The classification was developed as a risk tool, not as a site-specific analysis of a particular condition. A copy of the map is provided as Figure 4.

We also reviewed the USGS online database to identify any recordable landslides or rockfall incidents within the site vicinity. A recorded minor debris flow landslide incident was identified at a residence on Nestro Road located about 500 ft southeast of the site in 1998. The approximate location of the incident is shown as Figure 5.

Stability for Gravity Loading Condition

Our evaluation of global slope stability provided in the previous sections of this memorandum indicates that the factor of safety values for the gravity loading (static) condition for both the existing and proposed conditions is greater than the minimum required safety factor of 1.5, indicating stable slopes. The proposed construction of Building D and the associated roadway will have a negligible impact on the global stability of the eastern slope as shown in Tables 2A through 2D.

Stability for Seismic Loading Condition

Our evaluation of global slope stability provided in the previous sections of this memorandum indicates that the factor of safety values for the seismic loading (dynamic) condition for both the existing and proposed conditions is greater than the minimum required safety factor of 1.15, indicating stable slopes. Additionally, the proposed construction of Building D and the associated

MEMO

roadway will have a negligible impact on the global stability of the eastern slope as shown in Tables 3A and 3D.

Groundwater Impacts

Our analysis assuming a continuous groundwater level develops in the future indicates stable slopes.

As part of the proposed development, we understand that appropriate drainage conveyances will be provided to prevent site development stormwater from entering the eastern slope. As such, the proposed construction of Building D will not have an impact on increasing groundwater levels at the eastern slope.

LIMITATIONS

Our evaluation is based on the geotechnical subsurface data collected at the subject area (at accessible areas), the topographic survey data, currently existing site conditions and proposed building information made available to us. Any proposed changes in proposed structures (location, layout, loading, elevation) or existing slope conditions should be brought to our attention so that we can determine whether such changes affect our conclusions.

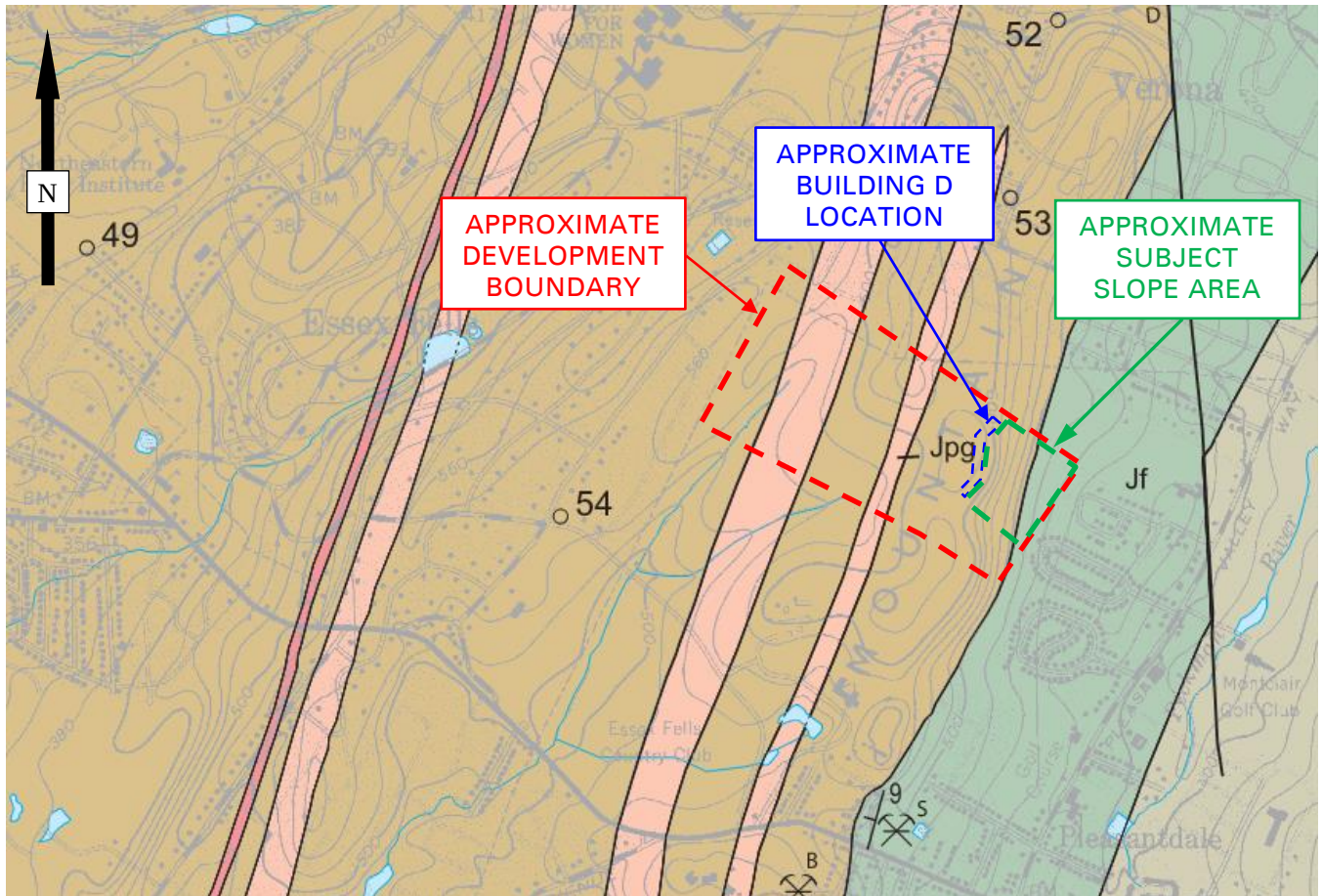
CLOSURE

This memorandum summarized our global slope stability analyses and results associated with the proposed eastern slope of the West Essex Highlands project site located in West Orange, New Jersey.

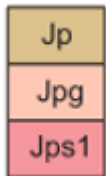
\\Langan.com\data\PAR\data8\101049801\Project Data\Discipline\Geotechnical\Reports\Slope Stability\Additional Investigation\2025-06-18 - Attachment A - Slope Stability Analysis Memo Revised.docx

FIGURES

Figure 1	Investigation Location Plan with Sections A, B, C and D
Figure 2	Geological Map
Figure 3	Outcrop Plan
Figure 4	Landslide Susceptibility Map
Figure 5	USGS Recorded Landslide Map



LEGEND



Preakness Basalt – Dark-greenish-gray to black, fine-grained, dense, hard basalt



Feltville Formation – Reddish-brown or light-grayish-red, fine-to-coarse-grained sandstone, siltstone, shaly siltstone and silty mudstone.

Source: Bedrock Geologic Map of The Caldwell Quadrangle, Essex and Morris Counties, New Jersey by Richard A. Volkert (2006)

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WEST ESSEX - HIGHLANDS

GEOLOGIC MAP

WEST ORANGE

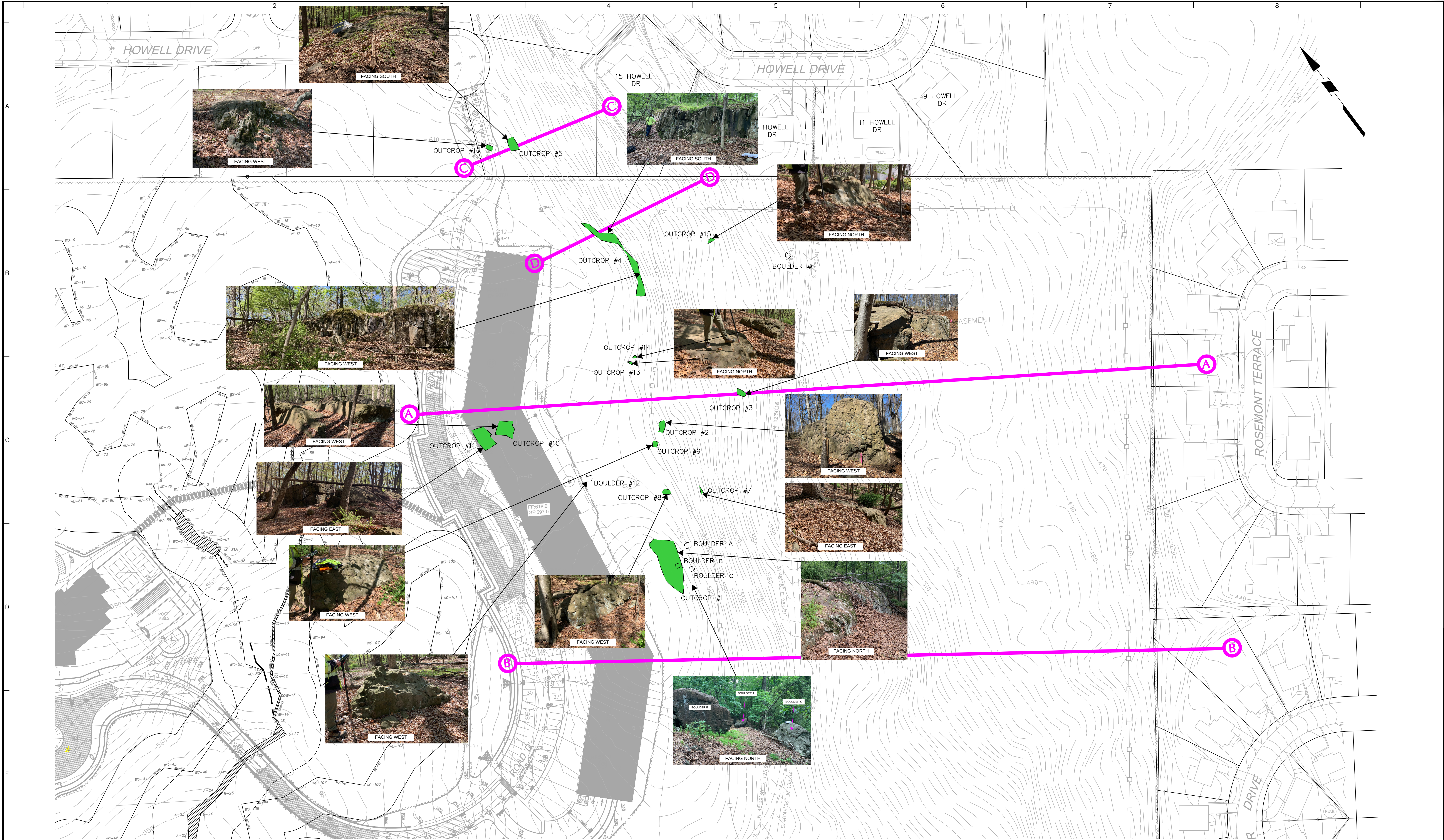
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PROJECT NO.
1010498014

SCALE
N.T.S.

DATE
6/18/2025

FIGURE
2



NOTES:

1. BASE PLAN OBTAINED FROM PLAN TITLED "OVERALL GRADING PLAN SP-11" DATED 1 OCTOBER 2024 PREPARED BY ANDERSON CONSULTING SERVICES LLC (ACS).

LEGEND:

- APPROXIMATE LOCATION OF ROCK OUTCROP
- APPROXIMATE LOCATION OF BOULDER



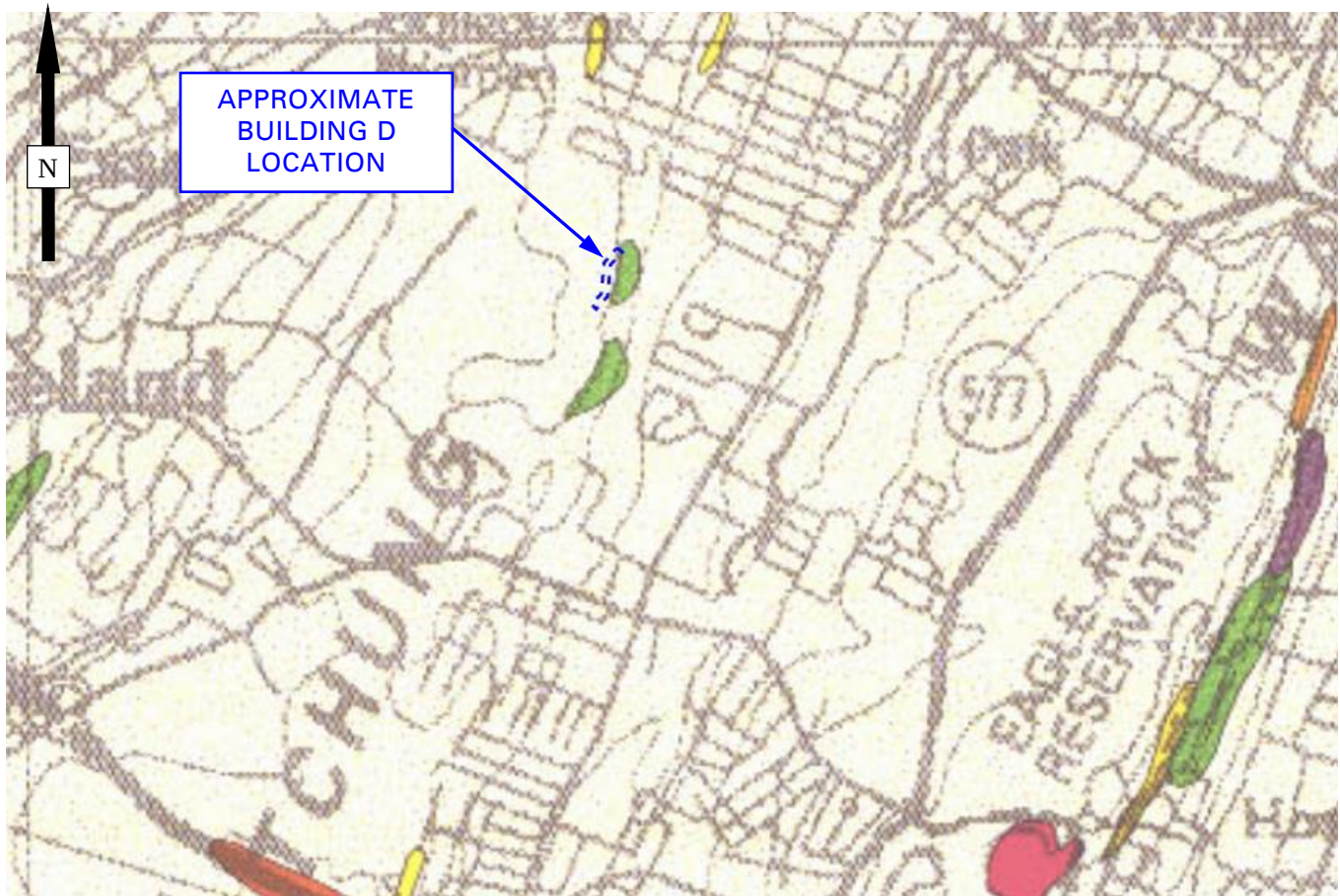
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NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

Project
West Essex Highlands
WEST ORANGE TWP
ESSEX COUNTY NEW JERSEY

Drawing Title
OUTCROP PLAN

Project No.
101049801
Date
6/18/2025
Drawn By
RLB
Checked By
AY

FIGURE
3



LEGEND

	None--HAZUS number 0
	Landslide Class A I--strongly cemented rock, slope angle 15-20 degrees (HAZUS number 1)
	Landslide Class A II--strongly cemented rock, slope angle 20-30 degrees (HAZUS number 2)
	Landslide Class A IV--strongly cemented rock, slope angle 30-40 degrees (HAZUS number 5)
	Landslide Class A VI--strongly cemented rock, slope angle > 40 degrees (HAZUS number 7)
	Landslide Class B III--weakly cemented rock and soil, slope angle 10-15 degrees (HAZUS number 3)
	Landslide Class B IV--weakly cemented rock and soil, slope angle 15-20 degrees (HAZUS number 4)
	Landslide Class B V--weakly cemented rock and soil, slope angle 20-30 degrees (HAZUS number 7)

Landslide classes are from the HAZUS User's Manual, Table 9.2 (National Institute of Building Sciences, 1997). Slope angles were measured from the following U. S. Geological Survey 7.5 minute quadrangles: Caldwell, Orange, Pompton Plains, and Roselle (all with 20-foot contour interval), and Paterson and Elizabeth (10-foot contour interval). Slope materials are from Salisbury (1895) and Stanford (1991, 1998, 2000).

Source: **Landslide Susceptibility for Essex County, New Jersey by Scott D. Stanford, New Jersey Geological Survey (2001)**

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WEST ESSEX - HIGHLANDS

LANDSLIDE SUSCEPTIBILITY MAP

WEST ORANGE

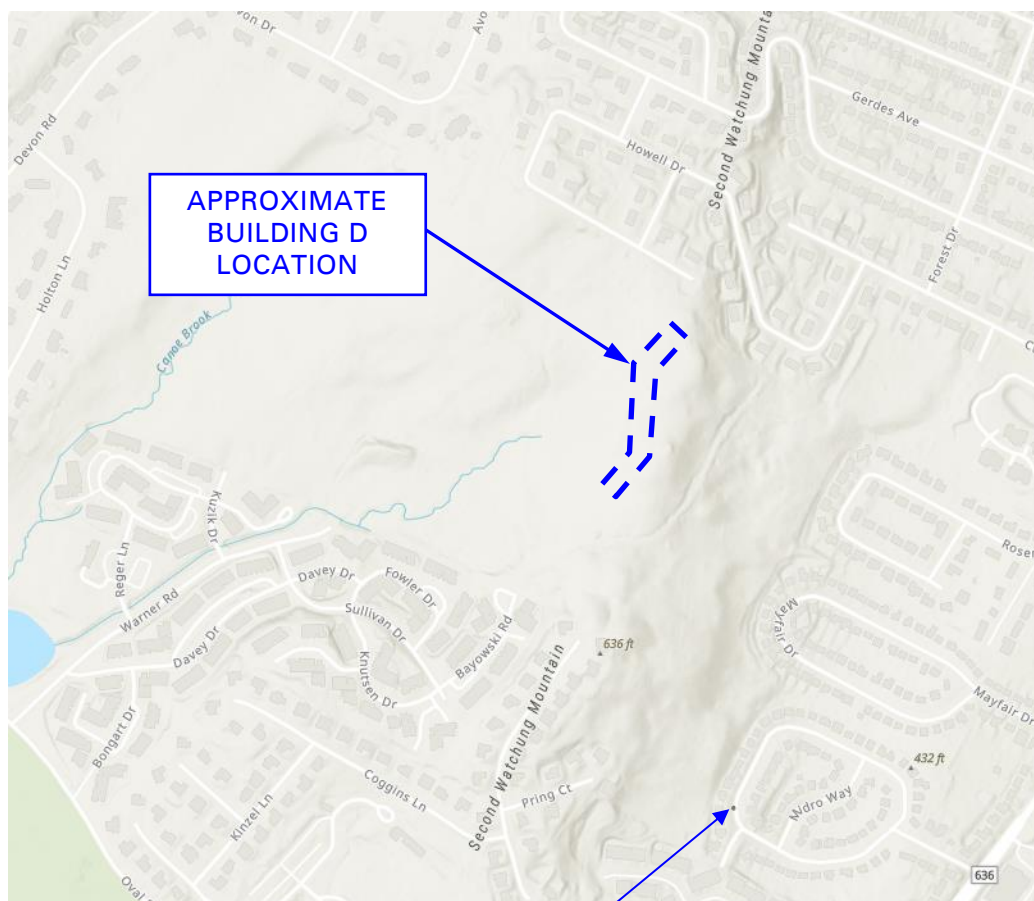
NEW JERSEY

PROJECT NO.
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SCALE
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DATE
6/18/2025

FIGURE
4



6/13/1998, Afternoon	
Date	6/13/1998, Afternoon
Fatalities	0
Confidence	5
Inventory Link	More info
Source	Dumenigo and Genovese, 1998
Notes	Debris flow. GPS. Heavy rain. Report of a minor debris flow of mud down a hill into into a house after heavy rain, estimated location.

Source: USGS Online Database

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WEST ESSEX - HIGHLANDS
USGS LANDSLIDE MAP

WEST ORANGE

NEW JERSEY

PROJECT NO.
101049801

SCALE
N.T.S.

DATE
6/18/2025

FIGURE
5

APPENDIX A

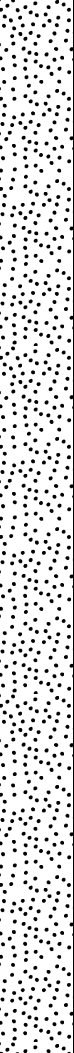
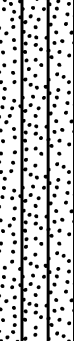
LOGS OF LANGAN BORINGS

Project West Essex Highlands				Project No. 101049801								
Location West Orange, New Jersey				Elevation and Datum Approx. el. 604.0 (NAVD 88)								
Drilling Company Craig Geotechnical Drilling Co., Inc.				Date Started 12/12/2024		Date Finished 12/12/2024						
Drilling Equipment ATV Rig				Completion Depth 24.0 ft		Rock Depth 12.0 ft						
Size and Type of Bit 3-7/8in Tricone Roller Bit				Number of Samples Disturbed 5		Undisturbed 0 Core 2						
Casing Diameter (in) 4" diameter steel			Casing Depth (ft) 9.0	Water Level (ft.) First ▽ -		Completion ▴ -	24 HR. ▴ -					
Casing Hammer Automatic		Weight (lbs) 140		Drop (in) 30		Drilling Foreman Matt Michelotti						
Sampler 2in OD Split Spoon				Field Engineer Rebecca Blocker								
Sampler Hammer Automatic		Weight (lbs) 140		Drop (in) 30								
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data						Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)	
					Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft) 10 20 30 40			
	+604.0	Brown fine to coarse SAND, some silt, trace clay, root fragments (moist) [TOPSOIL]		0								Began drilling 12/12/2024 at 8:19 AM G-1 at 0 ft
	+602.0	Brown fine to medium SAND, trace silt, some gravel (dry) [SP]		1	G-1	GRAB						Hand auger to 2 ft. Refusal on possible boulder. S-1 at 2 ft
				2								
				3	S-1	SS	6	45			70	
+599.0	Reddish brown Silty SAND, trace clay, trace gravel (moist) [SM]		4									
			5								Drove casing to 5 ft. Drilled to 5 ft. S-2 at 5 ft	
			6	S-2	SS	6	25			40		
+597.0	Reddish brown Sandy SILT, some clay, some gravel (moist) [ML]		7	S-3	SS	6	54				S-3 at 7 ft	
			8							50/2"	Spoon bouncing.	
+595.0	[DECOMPOSED ROCK]		9	S-4	SS	0	50/2"				50/2"	Drove casing to 9 ft. Drilled to 9 ft. S-4 at 9 ft
			10									
			11									
			12								Very hard drilling. Rig chatter.	
+590.0	Gray BASALT [BEDROCK]		13									
			14								C-1 at 14 ft	
			15									
			16									

Project West Essex Highlands				Project No. 101049801						
Location New Jersey, West Orange				Elevation and Datum Approx. el. 604.0 (NAVD 88)						
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
					Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft)	
	+588.0	Gray BASALT [BEDROCK]		16	C-1	NQ	REC=58"/60"=97%	RQD=35"/60"=58%		C-2 at 19 ft
	02:35		17							
	01:38		18							
	01:21		19	C-2	NQ	REC=58"/60"=97%	RQD=49"/60"=82%			
	02:05		20							
	02:10		21							
	02:37		22							
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Project West Essex Highlands				Project No. 101049801						
Location West Orange, New Jersey				Elevation and Datum Approx. el. 522.0 (NAVD 88)						
Drilling Company Craig Geotechnical Drilling Co., Inc.				Date Started 12/17/2024		Date Finished 12/17/2024				
Drilling Equipment ATV Rig				Completion Depth 50.1 ft		Rock Depth Not Encountered				
Size and Type of Bit 3-7/8in Tricone Roller Bit				Number of Samples Disturbed 14		Undisturbed 0	Core 0			
Casing Diameter (in) 4" diameter steel			Casing Depth (ft) 15.0		Water Level (ft.) First ▽ -	Completion ▾ -	24 HR. ▾ -			
Casing Hammer Automatic		Weight (lbs) 140	Drop (in) 30		Drilling Foreman Matt Michelotti					
Sampler 2in OD Split Spoon										
Sampler Hammer Automatic		Weight (lbs) 140	Drop (in) 30		Field Engineer Rebecca Blocker					
Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)	
				Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft) 10 20 30 40		
	+522.0	Dark brown Silty fine to medium SAND, trace clay, with root pieces (moist) [TOPSOIL]	0				1			Began drilling 12/17/2024 at 10:41 AM. S-1 at 0 ft
			1	S-1	SS	5	2			4
	+520.0	Light brown SILT, some fine to coarse sand, some clay, trace gravel (moist) [ML]	2	S-2	SS	10	6			S-2 at 2 ft
	+519.0	[POSSIBLE COBBLES]	3							50/2"
			4							Hard drilling, rig chattering.
	+517.0	Light brown Silty SAND, some gravel, trace clay (moist) [SM]	5				15			Drove casing to 5 ft. Drilled to 5 ft. S-3 at 5 ft
			6	S-3	SS	2	26			50
		Light brown Silty SAND, some gravel, trace clay (moist) [SM]	7	S-4	SS	7	40			50/2"
			8							S-4 at 7 ft
			9							Hard drilling, rig chattering.
		Light brown Silty SAND, some gravel, trace clay (moist) [SM]	10				21			Drove casing to 10 ft. Drilled to 10 ft. S-5 at 10 ft
			11	S-5	SS	2	20			40
		Light brown to gray fine to coarse SAND, some silt, some gravel (dry) [SM]	12				19			S-6 at 12 ft
			13	S-6	SS	12	39			78
			14				32			
	+507.0	Brown fine to coarse SAND, some gravel, trace silt (moist) [SP]	15				18			Drove casing to 15 ft. Drilled to 15 ft. S-7 at 15 ft
			16				25			

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Project			Project No.							
West Essex Highlands			101049801							
Location			Elevation and Datum							
New Jersey, West Orange			Approx. el. 522.0 (NAVD 88)							
Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)	
				Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft)		
	+506.0	No Recovery	16	S-7		19	28			Drilled to 20 ft. S-8 at 20 ft
	17						29			
	18									
	19									
	20				15					
	21		S-8	SS		0	10			
	22					12				
	23									
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	+492.0	Light reddish brown fine to medium SAND, trace silt (moist) [SP]	26	S-9	SS		20	18		Drilled to 25 ft. S-9 at 25 ft
	27					27				
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	31		S-10	SS		20	24			
	32					38				
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		Reddish brown Silty fine to coarse SAND, trace gravel, trace clay (moist) [SM]	36							Drilled to 30 ft S-10 at 30 ft
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		Reddish brown Silty fine to coarse SAND, some clay, trace fine to coarse gravel (moist) [SM]	46							Drilled to 35 ft. S-11 at 35 ft. Spoon bouncing.
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Project West Essex Highlands			Project No. 101049801																
Location New Jersey, West Orange			Elevation and Datum Approx. el. 522.0 (NAVD 88)																
Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)										
				Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft) 10 20 30 40											
	+486.0	No Recovery	36																
			37																
			38																
			39																
			40	S-12	SS	0	50/1"												
			41																
			42																
			43																
			44																
			45	S-13	SS	0	50/1"												
	+477.0	No Recovery [POSSIBLE DECOMPOSED ROCK]	46																
			47																
			48																
			49																
			50	S-14	SS	0	50/1"												
			51																
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	+471.9	No Recovery [POSSIBLE DECOMPOSED ROCK] End of Boring at 50.1ft.	56																

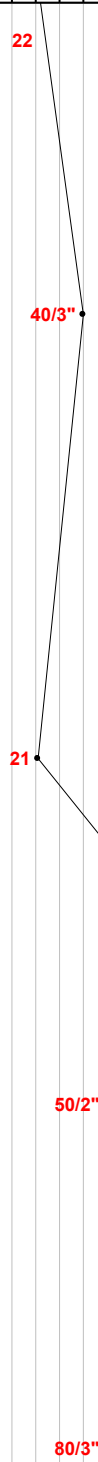
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Project West Essex Highlands				Project No. 101049801						
Location West Orange, New Jersey				Elevation and Datum Approx. el. 614.0 (NAVD 88)						
Drilling Company Craig Geotechnical Drilling Co., Inc.				Date Started 12/12/2024		Date Finished 12/13/2024				
Drilling Equipment ATV Rig				Completion Depth 19.0 ft		Rock Depth 9.0 ft				
Size and Type of Bit 3-7/8in Tricone Roller Bit				Number of Samples Disturbed 4		Undisturbed 0 Core 2				
Casing Diameter (in) 4" diameter steel			Casing Depth (ft) 9.0	Water Level (ft.) First ▽ -		Completion ▼ -	24 HR. ▽ -			
Casing Hammer Automatic		Weight (lbs) 140		Drop (in) 30		Drilling Foreman Matt Michelotti				
Sampler 2in OD Split Spoon				Field Engineer Brian McGlew						
Sampler Hammer Automatic		Weight (lbs) 140		Drop (in) 30						
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
					Number	Type	Recov. (in)	Penetr- resist BL6in	N-Value (Blows/ft) 10 20 30 40	
	+614.0	Tannish brown SILT, some fine to coarse sand, trace clay (moist) [TOPSOIL]		0				5		Began drilling 12/12/2024 at 11:51 AM. S-1 at 0 ft
	+612.0	Light brown fine to coarse SAND, some fine to coarse gravel, trace silt (dry) [SP]		1	S-1	SS	15	3	6	
				2			20	4		S-2 at 2 ft
				3	S-2	SS	24	28	53	Rig Chattering from 3 ft to 4 ft .
	+607.0	Brown Gravelly fine to coarse SAND, trace silt (dry) [SP]		4				29		
				5				13		Drove casing to 5 ft. Drilled to 5 ft . S-3 at 5 ft
				6	S-3	SS	15	18	35	
				7	S-4	SS	4	70	70	S-4 at 7 ft
	+605.0	Decomposed Rock in form, brown to gray fine to coarse GRAVEL, some fine to coarse sand, trace silt (moist) [DECOMPOSED ROCK]		8						Rig Chattering. Stopped drilling for the day at 1:50 pm on 12/12/2024. Resumed drilling at 7:25 am on 12/13/24.
				9						Drove casing to 9 ft. Drilled to 9 ft. C-1 at 9 ft
				10						
				11						Brownish gray wash.
	+605.0	Gray BASALT [BEDROCK]	02:18							
			03:01							
			02:03	C-1	NQ					
			01:35							
			01:43							
			01:28							C-2 at 14 ft
			02:35							

Project				Project No.									
West Essex Highlands				101049801									
Location				Elevation and Datum									
New Jersey, West Orange				Approx. el. 614.0 (NAVD 88)									
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data						Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)		
					Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft)				
	+598.0		02:01	16	C-2	NQ	REC=52"/60"=87%	ROD=40"/60"=67%					Light gray wash.
				17									
				18									
				19									
	+595.0	End of Boring at 19.0ft.		19					Stopped drilling on 12/13/2024 at 9:15 AM. Upon completion, borehole backfilled with cuttings and hole plug.				
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Project West Essex Highlands				Project No. 101049801							
Location West Orange, New Jersey				Elevation and Datum Approx. el. 548.0 (NAVD 88)							
Drilling Company Craig Geotechnical Drilling Co., Inc.				Date Started 12/13/2024		Date Finished 12/17/2024					
Drilling Equipment ATV Rig				Completion Depth 45.1 ft		Rock Depth Not Encountered					
Size and Type of Bit 3-7/8in Tricone Roller Bit				Number of Samples Disturbed 13		Undisturbed 0 Core 1					
Casing Diameter (in) 4" diameter steel			Casing Depth (ft) 25.0	Water Level (ft.) First ▽ -		Completion ▽ -	24 HR. ▽ -				
Casing Hammer Automatic		Weight (lbs) 140	Drop (in) 30	Drilling Foreman Matt Michelotti							
Sampler 2in OD Split Spoon				Field Engineer Rebecca Blocker							
Sampler Hammer Automatic		Weight (lbs) 140	Drop (in) 30								
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)	
					Number	Type	Recov. (in)	Penetr- resist BL6/in	N-Value (Blows/ft) 10 20 30 40		
	+548.0	Tannish brown SILT, some fine to coarse sand, trace coarse gravel (moist) [TOPSOIL]		0				2		Began drilling 12/13/2024 at 10:23 AM. S-1 at 0 ft	
	+546.0	Brown Gravelly fine to medium SAND, trace silt (moist) [SP]		1	S-1	SS	5	3	5		
				2					11		S-2 at 2 ft
				3	S-2	SS	12	27	47		Rig Chattering from 3 ft to 4 ft.
				4					53		
		Brown fine to coarse SAND, trace silt, some fine gravel (moist) [SP]		5				7			Drove casing to 5 ft. Drilled to 5 ft. S-3 at 5 ft
				6	S-3	SS	14	13	23		
				7					18		S-4 at 7 ft. Rig Chattering from 7 ft to 9 ft. Brown wash.
				8	S-4	SS	12	26	56		
	+536.0	No Recovery		9					26		Dark brown wash.
				10					40		Drove casing to 10 ft. Drilled to 10 ft. S-5 at 10 ft
				11	S-5	SS	0	60	116		Rig chattering from 11 ft to 15 ft. Spoon bouncing.
				12					15		S-6 at 12 ft
	+533.0	Reddish brown fine to coarse SAND, some silt, some fine to coarse gravel (moist) [SM]		13	S-6	SS	5	23	52		
				14					19		
				15					11		Drove casing to 15 ft. Drilled to 15 ft. S-7 at 15 ft
				16					10		

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Project				Project No.								
West Essex Highlands				101049801								
Location				Elevation and Datum								
New Jersey, West Orange				Approx. el. 548.0 (NAVD 88)								
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)		
					Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft)			
	+532.0			16	S-7		1	12				
				17				15				
				18								
				19								
	+528.0 +527.8	No Recovery SANDSTONE [BOULDER]	02:08	20	S-8		0	40/3"		40/3"	Drove casing to 20 ft. Drilled to 20 ft. S-8 at 20 ft Spoon bouncing. Drove casing to 20 ft. Drilled to 20 ft. C-1 at 20.25 ft	
21												
	+525.0	Reddish brown fine to medium SAND, some silt (moist) [SM]	01:49	22	C-1	NQ	REC=8%	ROD=0%			Drop while coring. Stop core run.	
23												
24												
25												
			00:48	26	S-9		7	9		21	Drove casing to 25 ft. Drilled to 25 ft. S-9 at 25 ft	
				27				18				
				28								
				29								
				30								
				31	S-10		12	39 88 50/2"	50/2"	Drilled to 30 ft. S-10 at 30 ft		
				32								
				33								
				34								
				35	S-11		2	80/3"	80/3"			Drilled to 35 ft. S-11 at 35 ft
				36								

Project West Essex Highlands				Project No. 101049801							
Location New Jersey, West Orange				Elevation and Datum Approx. el. 548.0 (NAVD 88)							
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)	
					Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft) 10 20 30 40		
	+512.0	Reddish brown fine to medium SAND, some silt (moist) [SM]		36							Drilled to 40 ft. S-12 at 40 ft
				37							
				38							
				39							
				40	S-12	SS	4	120/5"	120/5"		
				41							
				42							
				43							
				44							
				45	S-13	SS	0	50/1"	50/1"		
				46							
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				55							
56											
	+503.0 +502.9	No Recovery End of Boring at 45.1ft.									Drilled to 45 ft. S-13 at 45 ft Stopped drilling 12/17/2024 at 10:08 AM. Upon completion, borehole backfilled with soil cuttings and hole plug.

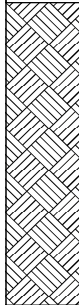
Project West Essex Highlands				Project No. 101049801						
Location West Orange, New Jersey				Elevation and Datum Approx. el. 582.0 (NAVD 88)						
Drilling Company Craig Geotechnical Drilling Co., Inc.				Date Started 5/1/2025		Date Finished 5/2/2025				
Drilling Equipment ATV Rig				Completion Depth 26.0 ft		Rock Depth 17.0 ft				
Size and Type of Bit 3-7/8in Tricone Roller Bit				Number of Samples Disturbed 7		Undisturbed 0 Core 2				
Casing Diameter (in) 4" diameter steel			Casing Depth (ft) 15.0		Water Level (ft.) First ∇ -		Completion $\blacktriangledown$ - 24 HR. $\blacktriangledown$ -			
Casing Hammer Automatic		Weight (lbs) 140		Drop (in) 30		Drilling Foreman Mark Aquino				
Sampler 2in OD Split Spoon				Field Engineer Rebecca Blocker						
Sampler Hammer Automatic		Weight (lbs) 140		Drop (in) 30						
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
					Number	Type	Recov. (in)	Penet- resist BL/6in	N-Value (Blows/ft) 10 20 30 40	
	+582.0	Dark brown SILT, trace fine to coarse sand, trace clay with roots and leaves (dry) [TOPSOIL]		0				1		Started drilling at 1:45 PM on 5/1/2025. S-1 at 0 ft
				1	S-1	SS	5	4	6	
	+580.0	No Recovery		2				10		S-2 at 2 ft
				3	S-2	SS	0	36	56	
		Orangish brown to gray Silty fine to coarse SAND, some gravel (moist) [SM]		4				19		Drove casing to 4 ft. Drilled to 4 ft. S-3 at 4 ft
				5	S-3	SS	14	15	27	
		Orangish brown to gray Silty fine to coarse SAND, some gravel (moist) [SM]		6				12		S-4 at 6 ft
				7	S-4	SS	18	35	65	
		Orangish brown to gray Silty fine to coarse SAND, some gravel, trace clay (moist) [SM]		8				22		Drove casing to 8 ft. Drilled to 8 ft. S-5 at 8 ft
				9	S-5	SS	8	100	100	
	+572.0	No Recovery		10				50/1"		Stopped drilling at 2:30 PM on 5/1/2025. Started drilling at 7:15 AM on 5/2/2025.
				11	S-6	SS	0	50/1"	50/1"	
				12						
				13						
				14						
				15	S-7	SS	0	50/1"	50/1"	
		No Recovery		16						Drove casing to 15 ft. Drilled to 15ft. S-7 at 15 ft

Template: Log-BH; Strip: BH-GEO; Printed on 06/17/2025

Project West Essex Highlands				Project No. 101049801								
Location West Orange, New Jersey				Elevation and Datum Approx. el. 582.0 (NAVD 88)								
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data						Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)	
					Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft)			
	+566.0			16						10 20 30 40		
	+565.0	Gray BASALT [BEDROCK]	05:20	17	C-1	NQ	REC=47"/60"=78%	RQD=0"/60"=0%			Drilled to 17 ft. Hard drilling. Rig chattering. C-1 at 17 ft	
				18								11:14
				19								09:09
				20								06:04
				21								14:15
				22	C-2	NQ	REC=48"/48"=100%	RQD=11"/48"=23%			C-2 at 22 ft	
				23								12:42
				24								06:53
				25								04:57
				26								09:15
	+556.0	End of Boring at 26.0ft.		27							Core barrel clogging during coring. Stopped drilling at 10:30 AM on 5/2/2025. Upon completion, borehole backfilled to grade with soil cuttings.	
				28								
				29								
				30								
				31								
				32								
				33								
				34								
				35								
				36								

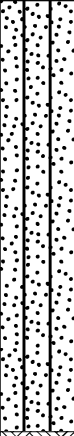
Template: Log-BH; Strip: BH-GEO; Printed on 06/17/2025

Project West Essex Highlands				Project No. 101049801								
Location West Orange, New Jersey				Elevation and Datum Approx. el. 612.0 (NAVD 88)								
Drilling Company Craig Geotechnical Drilling				Date Started 4/30/2025		Date Finished 4/30/2025						
Drilling Equipment ATV Rig				Completion Depth 20.0 ft		Rock Depth 10.0 ft						
Size and Type of Bit 3-7/8in Tricone Roller Bit				Number of Samples		Disturbed 5						
Casing Diameter (in) 4" diameter steel		Casing Depth (ft) 8.0		Water Level (ft.) First ▽ -		Undisturbed 0						
Casing Hammer Automatic		Weight (lbs) 140		Drop (in) 30		Core 2						
Sampler 2in OD Split Spoon				Drilling Foreman Mark Aquino								
Sampler Hammer Automatic				Field Engineer Rebecca Blocker								
Sampler Hammer Automatic		Weight (lbs) 140		Drop (in) 30								
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)		
					Number	Type	Recov. (in)	Penetr- resist BL6in	N-Value (Blows/ft) 10 20 30 40			
	+612.0	Brown Silty fine to coarse SAND, some gravel, trace clay (moist) [SM]		0				1			Started drilling at 9:18 AM on 4/30/2025. S-1 at 0 ft	
				1	S-1	SS	18	3	4			
				2					6			S-2 at 2 ft
			Dark brown Silty fine to coarse SAND, some gravel, trace clay with root hairs (moist) [SM]		3	S-2	SS	3	10	18		
			No Recovery		4				12			Drove casing to 4 ft. Drilled to 4 ft. S-3 at 4 ft
					5	S-3	SS	0	10	29		
					6				4			S-4 at 6 ft
			Brown Clayey fine to coarse SAND, some silt, trace gravel (wet) [SM]		7	S-4	SS	6	12	25		
					8	S-5	SS	6	4 50/1"	50/1"		Drove casing to 8 ft. Drilled to 8 ft. S-5 at 8 ft
					9							
	+602.0	Gray BASALT [BEDROCK]		10							Drilled to 10 ft. Hard drilling. Rig chattering. C-1 at 10 ft	
			07:15	11								
			03:30	12								
			04:14	13	C-1	NQ						
			04:19	14								
			06:19	15								
			04:45	16								C-2 at 15 ft

Project West Essex Highlands				Project No. 101049801																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
Location West Orange, New Jersey				Elevation and Datum Approx. el. 612.0 (NAVD 88)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
					Number	Type	Recov. (in)	Penetr- resist BL/ft	N-Value (Blows/ft)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	+596.0		01:52	16	C-2	NQ	REC=56"/60"=93%	RQD=56"/60"=93%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		

Project				Project No.							
West Essex Highlands				101049801							
Location				Elevation and Datum							
West Orange, New Jersey				Approx. el. 566.0 (NAVD 88)							
Drilling Company				Date Started		Date Finished					
Craig Geotechnical Drilling Co., Inc.				5/5/2025		5/5/2025					
Drilling Equipment				Completion Depth		Rock Depth					
ATV Rig				32.0 ft		22.0 ft					
Size and Type of Bit				Number of Samples		Disturbed					
3-7/8in Tricone Roller Bit				8		Undisturbed					
				0		Core					
				2							
Casing Diameter (in)			Casing Depth (ft)	Water Level (ft.)		First					
4" diameter steel			20.0	-		Completion					
				-		24 HR.					
				-		-					
Casing Hammer				Drilling Foreman							
Automatic				Mark Aquino							
Weight (lbs)				Field Engineer							
140				Rebecca Blocker							
Drop (in)											
30											
Sampler											
2in OD Split Spoon											
Sampler Hammer											
Automatic											
Weight (lbs)											
140											
Drop (in)											
30											
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)	
					Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft)		
	+566.0			0					2		Started drilling at 7:33 AM on 5/5/2025. S-1 at 0 ft
				1	S-1	SS	4	3	6		
				2					2		S-2 at 2 ft
	+564.0	Brown Silty fine to coarse SAND, trace gravel (moist) [SM]		3	S-2	SS	18	4	9		
		Orangish brown Silty fine to coarse SAND, some gravel, trace clay (moist) [SM]		4					7		Drove casing to 4 ft. Drilled to 4 ft. S-3 at 4 ft
				5	S-3	SS	12	6	11		
		Orangish brown Silty fine to coarse SAND, trace gravel, trace clay (moist) [SM]		6					12		S-4 at 6 ft
				7	S-4	SS	19	16	35		
		Orangish brown Silty fine to coarse SAND, trace gravel, trace clay (moist) [SM]		8					13		Drove casing to 8 ft. Drilled to 8 ft. S-5 at 8 ft
				9	S-5	SS	15	28	50		
		Orangish brown Silty fine to coarse SAND, some gravel, trace clay (wet) [SM]		10					27		S-6 at 10 ft
				11	S-6	SS	8	56	109		
				12					66		
				13							
				14							
		Orangish brown Silty fine to coarse SAND, some gravel, trace clay (wet) [SM]		15					18		Drove casing to 15 ft. Drilled to 15 ft. S-7 at 15 ft
				16	S-7	SS	17	20	43		

Template: Log-BH; Strin: BH-GEO; Printed on 06/17/2025

Project				Project No.							
West Essex Highlands				101049801							
Location				Elevation and Datum							
West Orange, New Jersey				Approx. el. 566.0 (NAVD 88)							
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)	
					Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft)		
	+549.8	No Recovery		16.2							Drove casing to 20 ft. Drilled to 20 ft. S-8 at 20 ft
	17								17		
18											
19											
20											
				20	S-8	SS	0	50/1"	50/1"		
				21							
	+544.0	Gray BASALT [BEDROCK]		22							Drilled to 22 ft. Hard drilling. Rig chattering. C-1 at 22 ft
			06:10	23							
			05:33	24							
			07:10	25	C-1	NQ	REC=60"/60"=100%	RQD=25"/60"=42%			
			15:37	26							
			09:32	27							
		Gray BASALT [BEDROCK]		28							
			06:22	29							
			11:11	30	C-2	NQ	REC=45"/60"=75%	RQD=29"/60"=48%			
			06:28	31							
			08:42	32							
			08:18	33							
	+534.0	End of Boring at 32.0ft.		34							Stopped drilling at 11:54 AM on 5/5/2025. Upon completion, borehole backfilled to grade with soil cuttings.
				35							
				36							

Project West Essex Highlands				Project No. 101049801									
Location West Orange, New Jersey				Elevation and Datum Approx. el. 609.0 (NAVD 88)									
Drilling Company Craig Geotechnical Drilling Co., Inc.				Date Started 5/1/2025		Date Finished 5/1/2025							
Drilling Equipment ATV Rig				Completion Depth 22.0 ft		Rock Depth 12.0 ft							
Size and Type of Bit 3-7/8in Tricone Roller Bit				Number of Samples Disturbed 5		Undisturbed 0 Core 3							
Casing Diameter (in) 4" diameter steel			Casing Depth (ft) 10.0	Water Level (ft.) First ▽ -		Completion ▼ -	24 HR. ▽ -						
Casing Hammer Automatic		Weight (lbs) 140		Drop (in) 30		Drilling Foreman Mark Aquino							
Sampler 2in OD Split Spoon				Field Engineer Rebecca Blocker									
Sampler Hammer Automatic		Weight (lbs) 140		Drop (in) 30									
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data						Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)		
					Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft) 10 20 30 40				
	+609.0	Brown Silty fine to coarse SAND, trace gravel with roots (moist) [TOPSOIL]		0				1					Started drilling at 7:52 AM on 5/1/2025. S-1 at 0 ft
		1		S-1	SS		10	1	2				
		2						4					
		3		S-2	SS		20	10	20				
	+607.0	Brown Silty fine to coarse SAND, trace gravel, trace clay (moist) [SM]		4				12					Drove casing to 4 ft. Drilled to 4 ft. S-3 at 4 ft
		5		S-3	SS		4	10	16				
		6		S-4	SS		1	100/4"	100/4"				
		7											
	+603.0	Brown Clayey fine to coarse SAND, some silt, trace gravel (moist) [SM]		8									Drove casing to 7 ft. Hard drilling. Rig chattering.
		9											
		10											
		11											
	+601.0	Gray GRAVEL, in spoon tip (wet) [GP]		12									Drove casing to 10 ft. Drilled to 10 ft. S-5 at 10 ft
		13											
		14											
		15											
	+600.0	BOULDER	03:30	16	C-1	NQ		REC=50%	ROD=50%				Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		17											
		18											
		19											
	+597.0	Brown GRAVEL, some silt, some fine to coarse sand (wet) [GM]		20	S-5	SS		10	21	100/4"	100/4"		Drove casing to 10 ft. Drilled to 10 ft. S-5 at 10 ft
		21					6	100/4"					
		22											
		23											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	24									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		25											
		26											
		27											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	28									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		29											
		30											
		31											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	32									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		33											
		34											
		35											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	36									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		37											
		38											
		39											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	40									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		41											
		42											
		43											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	44									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		45											
		46											
		47											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	48									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		49											
		50											
		51											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	52									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		53											
		54											
		55											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	56									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		57											
		58											
		59											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	60									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		61											
		62											
		63											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	64									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		65											
		66											
		67											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	68									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		69											
		70											
		71											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	72									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		73											
		74											
		75											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	76									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		77											
		78											
		79											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	80									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		81											
		82											
		83											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	84									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		85											
		86											
		87											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	88									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		89											
		90											
		91											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	92									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		93											
		94											
		95											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	96									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		97											
		98											
		99											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	100									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		101											
		102											
		103											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	104									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		105											
		106											
		107											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	108									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		109											
		110											
		111											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	112									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		113											
		114											
		115											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	116									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		117											
		118											
		119											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	120									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		121											
		122											
		123											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	124									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		125											
		126											
		127											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	128									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		129											
		130											
		131											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	132									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		133											
		134											
		135											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	136									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		137											
		138											
		139											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	140									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		141											
		142											
		143											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	144									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		145											
		146											
		147											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	148									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		149											
		150											
		151											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	152									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		153											
		154											
		155											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	156									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		157											
		158											
		159											
	+597.0	Gray BASALT [BEDROCK]	08:54 06:37 05:32 04:40	160									Drove casing to 12 ft. Hard drilling. C-2 at 12 ft
		161											
		162											
		163											
	+597.0	Gray BASALT [BEDROCK]											

Project				Project No.						
West Essex Highlands				101049801						
Location				Elevation and Datum						
West Orange, New Jersey				Approx. el. 609.0 (NAVD 88)						
Material Symbol	Elev. (ft)	Sample Description	Coring (min)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
					Number	Type	Recov. (in)	Penetr- resist BL/6in	N-Value (Blows/ft)	
	+593.0	Gray BASALT [BEDROCK]	08:46	16						C-3 at 17 ft
	07:11		17							
	05:47		18							
	06:23		19	C-3	NQ	REC=58"/60"=97%	ROD=50"/60"=83%			
	13:31		20							
	12:20		21							
	+587.0		End of Boring at 22.0ft.		22					
			23							
			24							
			25							
			26							
			27							
			28							
			29							
			30							
			31							
			32							
			33							
			34							
			35							
			36							

APPENDIX B

LOGS OF LANGAN TEST PITS

Project		West Essex Highlands		Project No.		101049801		Date		11/15/2024													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 606.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		13.0 ft		Water Level - First		11 ▽		Water Level - Completion		11 ▼					
Excavation Equipment				John Deere 75G				Excavation Foreman				Roy Westervelt				Field Engineer				Jordy Moina			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+606.0		0			Began excavating 11/15/2024 at 7:15 AM.
	+605.3	Topsoil (Approx. 8") [TOPSOIL]	1			Cobbles and boulders (12" to 60") observed on the surface.
		Light Brown fine SAND, some silt, some fine to coarse gravel, some cobbles with roots (dry) [SM]	2			Roots 1" to 1.5" in diameter extend to 2 ft bgs.
			3			Fine roots extend to 3 ft bgs.
	+602.2	Reddish brown fine to medium SAND, some fine to coarse gravel, trace silt, trace clay (moist) [SP]	4			
			5			
			6			
			7			
	+597.3	Reddish brown to Dark reddish brown SILT, some clay, some fine to coarse sand, some fine to coarse gravel (wet) [DECOMPOSED ROCK]	8			
			9			Boulders extend to 9 ft bgs.
			10			
	+594.9	Gray ROCK FRAGMENTS some f-c sand, some silt, trace clay (wet) [DECOMPOSED ROCK]	11			Water seepage observed at 11 ft bgs.
			12			
	+593.0	End of Test Pit at 13.0ft.	13			Max reach of excavator at 13 ft.
			14			End of test pit 11/15/2024 at 8:07 AM.
			15			
			16			
			17			
			18			
			19			
			20			

Project		West Essex Highlands		Project No.		101049801		Date		11/15/2024													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 582.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		5.5 ft		Water Level - First		-		Water Level - Completion		-					
Excavation Equipment				John Deere 75G				Excavation Foreman				Roy Westervelt				Field Engineer				Jordy Moina			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+582.0		0			Began excavating 11/15/2024 at 8:20 AM.
	+581.0	Topsoil (Approx. 12") [TOPSOIL]	1			Thick roots observed at 1 ft bgs.
		Light brown fine SAND, some silt, some fine to coarse gravel with roots (dry) [SM]	2			
			3			Fine roots observed to 32" bgs.
	+578.0		4			Cobbles and boulders observed to 3.5 ft bgs.
		Reddish brown BOULDER, some fine to medium sand, some silt (dry) [BOULDER]	5			
	+576.5		6			Bucket refusal at 5.5 ft.
		End of Test Pit at 5.5ft.	7			
			8			
			9			
			10			
			11			
			12			
			13			
			14			
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			16			
			17			
			18			
			19			
			20			

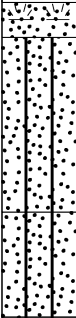
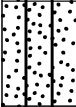
Project		West Essex Highlands		Project No.		101049801		Date		11/15/2024													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 550.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		12.0 ft		Water Level - First		- ▽		Water Level - Completion		- ▼					
Excavation Equipment				John Deere 75G				Excavation Foreman				Roy Westervelt				Field Engineer				Jordy Moina			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+550.0		0			Began excavating 11/15/2024 at 1:00 PM.
	+549.5	Brown SILT, some fine to medium sand, some fine to coarse gravel, with roots (dry) [TOPSOIL]	1	S-1	GRAB	S-1 at 1 ft
		Light brown fine to medium SAND, some silt, some fine to coarse gravel, with roots (dry) [SM]	2			
	+547.3	Light reddish brown fine to medium SAND, some fine to coarse gravel, trace silt (dry) [SP]	3			Cobbles and boulders observed to 40" bgs.
			4	S-2	GRAB	S-2 at 3.5 ft
	+542.0	Light brownish gray SILT, some fine sand, some fine to coarse gravel with fine roots (dry) [ML]	8			Fine roots observed to 8 ft bgs.
			9	S-3	GRAB	S-3 at 8.5 ft
	+538.0	End of Test Pit at 12.0ft.	12			Excavator max reach at 12 ft bgs.
			13			End of test pit 11/15/2024 at 1:41 PM.
			14			
			15			
			16			
			17			
			18			
			19			
			20			

Project		West Essex Highlands		Project No.		101049801		Date		11/15/2024													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 614.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		3.7 ft		Water Level - First		- ▽		Water Level - Completion		- ▼					
Excavation Equipment				John Deere 75G				Excavation Foreman				Roy Westervelt				Field Engineer				Jordy Moina			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+614.0		0			Began excavating 11/15/2024 at 2:00 PM.
	+613.5	Topsoil (Approx. 6") [TOPSOIL]				Thick roots observed to 1 ft bgs.
		Light brown fine to medium SAND, some fine to coarse gravel, trace silt, with fine roots (dry) [SP]	1			
			2			
			3			
	+610.5			S-1	GRAB	S-1 at 3.2 ft
	+610.3	Reddish brown BOULDER mixed with some fine to coarse sand, trace silt (dry) [BOULDER]	4			Cobbles and boulders observed to 3.5 ft bgs.
		End of Test Pit at 3.7ft.	5			Hard excavating
			6			Excavator bucket refusal at 3.66 ft.
			7			End of test pit 11/15/2024 at 2:50 PM.
			8			
			9			
			10			
			11			
			12			
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			14			
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			16			
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			18			
			19			
			20			

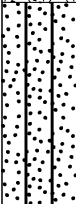
Project		West Essex Highlands		Project No.		101049801		Date		11/18/2024													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 584.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		4.8 ft		Water Level - First		-		Water Level - Completion		-					
Excavation Equipment				John Deere 75G				Excavation Foreman				Roy Westervelt				Field Engineer				Jordy Moina			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+584.0		0			Began excavating 11/18/2024 at 9:30 AM.
	+583.5	Topsoil [TOPSOIL]				
		Light brown fine to medium SAND, some silt, some fine to coarse gravel (dry) [SM]	1			
			2			
	+581.0		3			Fine to thick roots observed to 3 ft bgs.
		Light reddish brown fine to medium SAND, some silt, some fine to coarse gravel (dry) [SM]	4			
	+579.5		5			Cobbles and boulders (up to 18") observed to 52" bgs.
	+579.2	Reddish brown BOULDER mixed with some fine to medium sand, some silt [BOULDER]	6			
		End of Test Pit at 4.8ft.	7			Bucket refusal at 4.8 ft bgs. End of test pit 11/18/2024 at 10:05 AM.
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

Project		West Essex Highlands		Project No.		101049801		Date		11/18/2024													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 528.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		12.0 ft		Water Level - First		-		Water Level - Completion		-					
Excavation Equipment				John Deere 75G				Excavation Foreman				Roy Westervelt				Field Engineer				Jordy Moina			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+528.0		0			Began excavation 11/18/2024 at 7:40 AM.
	+527.3	Topsoil (Approx. 8") [TOPSOIL]	1			
		Yellow brown fine to medium SAND, some fine to coarse gravel, trace silt (dry) [SP]	2			
			3			Fine roots observed to 2.5 ft bgs.
			4			
	+523.0	Reddish brown fine to medium SAND, some fine to coarse gravel, trace silt (dry) [SP]	5			
			6			
			7			
			8			
			9			
		Reddish brown fine to medium SAND, some fine to coarse gravel, trace silt (moist)	10			
			11			
	+516.0	End of Test Pit at 12.0ft.	12			Cobbles and boulders (6" to 20" diameter) observed to 12 ft bgs. Excavator max reach at 12 ft bgs.
			13			End of test pit 11/18/2024 at 8:12 AM.
			14			
			15			
			16			
			17			
			18			
			19			
			20			

Project		West Essex Highlands		Project No.		101049801		Date		11/18/2024													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 616.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		5.0 ft		Water Level - First		- ▽		Water Level - Completion		- ▼					
Excavation Equipment				John Deere 75G				Excavation Foreman				Roy Westervelt				Field Engineer				Jordy Moina			

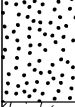
SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+616.0		0			Began excavating 11/18/2024 at 11:45 AM.
	+615.2	Topsoil (Approx. 10") [TOPSOIL]	1			Hard excavating. Cobbles and boulder (up to 30" diameter) observed to 40" bgs.
		Light brown to light reddish brown fine to medium SAND, some silt, some fine to coarse gravel (dry) [SM]	2			
	+612.2	Reddish brown fine to medium sand, some silt (dry) [SP]	3			
		Reddish brown fine to medium sand, some silt (dry) [SP]	4			
	+611.0	POSSIBLE BOULDER @ 5 ft	5			Excavator bucket refusal at 5 ft bgs.
		End of Test Pit at 5.0ft.	6			End of test pit 11/18/2024 at 11:58 AM.
			7			
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			
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			18			
			19			
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Project		West Essex Highlands		Project No.		101049801		Date		11/18/2024													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 606.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		9.0 ft		Water Level - First		- ▽		Water Level - Completion		- ▼					
Excavation Equipment				John Deere 75G				Excavation Foreman				Roy Westervelt				Field Engineer				Jordy Moina			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+606.0		0			Began excavating 11/18/2024 at 12:14 PM.
	+605.5	Topsoil (Approx 6") [TOPSOIL]				
		Light orange brown fine to medium SAND, some silt, some fine to coarse gravel (dry) [SM]	1			
			2			
			3			
			4			
	+601.4	Reddish brown fine to coarse SAND, some fine to coarse gravel, some silt, trace clay (moist) [SP]	5			
			6			
	+599.0	BOULDER	7			
			8			
	+597.0	End of Test Pit at 9.0ft.	9			Approx. 5 ft diameter boulder encountered.
			10			Cobbles and boulder observed to 9 ft bgs.
			11			Stopped excavating at 9 ft bgs due to large boulders in test pit.
			12			End of test pit 11/18/2024 at 1:02 PM.
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

Project		West Essex Highlands		Project No.		101049801		Date		4/10/2025													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 599.5 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		4.0 ft		Water Level - First		-		Water Level - Completion		-					
Excavation Equipment				CAT Excavator 308				Excavation Foreman				Roy Westervelt				Field Engineer				Bhumi Peer			
SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS																	
				Number	Type																		
	+599.5		0			Began excavating 4/10/2025 at 9:40 AM. Rock fragments observed at 6" bgs. Roots extend to 2 ft bgs.																	
	+599.0	Topsoil (Approx. 6") [TOPSOIL]																					
		Brown fine to coarse SAND, some silt, some gravel with cobbles (moist) [SM]																					
	+595.5	End of Test Pit at 4.0ft.	4	G-1	GRAB	Excavator bucket refusal at 4 ft. No water seepage or mottling observed in test pit. End of test pit 4/10/2025 at 9:50 AM. Test pit backfilled with excavated soil and area leveled. Top of Rock Encountered at 4 ft.																	
			5																				
			6																				
			7																				
			8																				
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			20																				

Project		West Essex Highlands		Project No.		101049801		Date		4/10/2025													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 586.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		6.5 ft		Water Level - First		- ▽		Water Level - Completion		- ▼					
Excavation Equipment				CAT Excavator 308				Excavation Foreman				Roy Westervelt				Field Engineer				Bhumi Peer			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+586.0	Topsoil (Approx. 12") [TOPSOIL]	0			Began excavating 4/10/2025 at 10:07 AM.
	+585.0	Brown fine to coarse SAND, some gravel, some silt with cobbles and roots (moist) [SM]	1			Roots greater than 1" in diameter extend to 1 ft bgs. Roots 1/2" to 1" in diameter extend to 1.5 ft bgs.
			2			Roots less than 1/2" in diameter extend to 2 ft bgs.
	+583.0	Brown Gravelly fine to coarse SAND, some silt with cobbles and boulders (moist) [SP]	3			
			4			
	+581.5	DECOMPOSED ROCK	5			Excavator started scraping hard material at 4.5 ft.
			6			
	+579.5	End of Test Pit at 6.5ft.	7	G-1	GRAB	Excavator bucket refusal at 6.5 ft. No water seepage or mottling observed in test pit.
			8	G-2	GRAB	End of test pit 4/10/2025 at 10:20 AM. Test pit backfilled with excavated material and area leveled.
			9			Top of Rock Encountered at 6.5 ft.
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

Project		West Essex Highlands		Project No.		101049801		Date		4/10/2025													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 593.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		5.0 ft		Water Level - First		- ▽		Water Level - Completion		- ▼					
Excavation Equipment				CAT Excavator 308				Excavation Foreman				Roy Westervelt				Field Engineer				Bhumi Peer			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+593.0		0			Began excavating 4/10/2025 at 10:55 AM.
	+592.3	Topsoil (Approx. 8") [TOPSOIL]	1			Roots greater than 1" in diameter extend to 1 ft bgs. Roots 1/2" to 1" in diameter extend to 1.5 ft bgs.
		Brown fine to coarse SAND, some silt, some gravel with cobbles and roots (moist) [SM]	2			Roots less than 1/2" in diameter extend to 2 ft bgs.
			3			
	+589.0	Orangish brown Clayey fine to coarse SAND, some gravel (moist) [SC]	4	G-1	GRAB	Hard excavating starting at 4 ft bgs.
	+588.0	End of Test Pit at 5.0ft.	5	G-2	GRAB	Excavator bucket refusal at 5 ft bgs. No water seepage or mottling observed in test pit.
			6			End of test pit 4/10/2025 at 11:10 AM. Test pit backfilled with excavated material and area leveled.
			7			Top of Rock Encountered at 5 ft.
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

Project		West Essex Highlands		Project No.		101049801		Date		4/9/2025													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 538.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		8.0 ft		Water Level - First		- ▽		Water Level - Completion		- ▼					
Excavation Equipment				Hitachi Excavator 7X85				Excavation Foreman				Roy Westervelt				Field Engineer				Bhumi Peer			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+538.0	Topsoil (Approx. 8") [TOPSOIL]	0			Began excavating 4/09/2025 at 1:10 PM. Roots greater than 1" in diameter extend to 6" bgs.
	+537.3	Brown fine to coarse SAND, some gravel, trace silt, trace clay with roots (moist) [SM]	1			
2					Roots less than 1/2" in diameter extend to 2 ft bgs.	
3	G-1	GRAB	Boulder with 1 ft diameter encountered at 3 ft.			
4						
5						
6		Brown Silty fine to coarse SAND, trace gravel, trace clay with cobbles and boulders (moist) [SM]	6	G-2	GRAB	Boulders with greater than 1.5 ft diameter encountered 6 ft bgs.
7						
+530.0	End of Test Pit at 8.0ft.	8			No water seepage or mottling observed in test pit. End of test pit 4/09/2025 at 1:40 PM. Test pit backfilled with excavated material and area leveled. Top of Rock not Encountered.	
		9				
		10				
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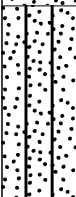
Project		West Essex Highlands		Project No.		101049801		Date		4/9/2025													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 559.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		11.0 ft		Water Level - First		- ▽		Water Level - Completion		- ▼					
Excavation Equipment				Hitachi Excavator 7X85				Excavation Foreman				Roy Westervelt				Field Engineer				Bhumi Peer			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+559.0		0			Began excavating 4/09/2025 at 2:20 PM.
	+558.7	Topsoil (Approx. 4") [TOPSOIL]	1			Roots greater than 1/2" in diameter extend to 1 ft bgs.
		Brown fine to coarse SAND, some silt, some gravel with cobbles and boulders and trace roots (moist) [SM]	2			Roots less than 1/2" in diameter extend to 1.5 ft bgs.
			3			Boulder with 1.5 ft diameter encountered 2 ft bgs.
			4			
			5			
			6			
			7			
		Brown Gravelly fine to coarse SAND, some silt with cobbles (moist) [SM]	8	G-1	GRAB	
			9			
			10			
	+548.0	End of Test Pit at 11.0ft.	11			No water seepage or mottling observed in test pit.
			12			End of test pit 4/09/2025 at 2:50 PM. Test pit backfilled with excavated material and area leveled.
			13			Top of Rock not Encountered.
			14			
			15			
			16			
			17			
			18			
			19			
			20			

APPENDIX C

LOGS OF LANGAN OUTCROP TEST PITS

Project		West Essex Highlands		Project No.		101049801		Date		4/9/2025													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 598.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		4.0 ft		Water Level - First		- ▽		Water Level - Completion		- ▼					
Excavation Equipment				Hitachi Excavator 7X85				Excavation Foreman				Roy Westervelt				Field Engineer				Bhumi Peer			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+598.0	Topsoil (Approx. 15") [TOPSOIL]	0			Began excavating 4/09/2025 at 9:17 AM.
	+596.8	Brown Silty fine to coarse SAND, some gravel with cobbles (moist) [SM]	1			Roots greater than 1/2" in diameter extend to 2 ft bgs. Roots less than 1/2" in diameter extend to 2.5 ft bgs.
			2			
	+594.0	End of Test Pit at 4.0ft.	3	G-1	GRAB	Possible bottom of boulder at 3 ft.
			4			Hit obstruction at 4 ft and excavator bucket refusal at 4 ft. No water seepage or mottling observed in test pit.
			5			End of test pit 4/09/2025 at 9:45 AM. Test pit backfilled with excavated material and area leveled.
			6			
			7			
			8			
			9			
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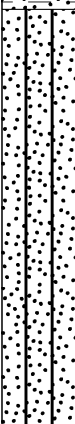
Project		West Essex Highlands		Project No.		101049801		Date		4/9/2025													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 601.0 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		2.0 ft		Water Level - First		2.0 ▽		Water Level - Completion		- ▼					
Excavation Equipment				Hitachi Excavator 7X85				Excavation Foreman				Roy Westervelt				Field Engineer				Bhumi Peer			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+601.0	Topsoil (Approx. 12") [TOPSOIL]	0			Began excavating 4/09/2025 at 9:50 AM.
	+600.0	Brown Silty fine to coarse SAND, some gravel with cobbles and root hairs (moist) [SM]	1	G-1	GRAB	Roots extend to 2 ft bgs.
	+599.0	End of Test Pit at 2.0ft.	2			Very slow water seepage at 2 ft. No mottling. Excavator bucket refusal at 2 ft.
			3			End of test pit 4/09/2025 at 10:04 AM. Test pit backfilled with excavated material and area leveled.
			4			Top of Rock Encountered at 2 ft.
			5			
			6			
			7			
			8			
			9			
			10			
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			12			
			13			
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			15			
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			17			
			18			
			19			
		20				

Project West Essex Highlands		Project No. 101049801		Date 4/9/2025	
Location West Orange, New Jersey		Elevation and Datum Approx. el. 585.5 (NAVD 88)			
Excavation Company Frank Semeraro Construction		Depth 6.0 ft	Water Level - First - ▽		Water Level - Completion - ▼
Excavation Equipment Hitachi Excavator 7X85		Excavation Foreman Roy Westervelt		Field Engineer Bhumi Peer	

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+585.5	Topsoil (Approx. 12") [TOPSOIL]	0			Began excavating 4/09/2025 at 10:10 AM.
	+584.5	Brown Silty fine to coarse SAND, some gravel with trace roots (moist) [SM]	1			Roots greater than 1/2" in diameter extend to 1.5 ft bgs. Roots less than 1/2" in diameter extend to 2.5 ft bgs.
	+579.5	End of Test Pit at 6.0ft.	6	G-1	GRAB	Boulder with diameter of 1 ft encountered at 5 ft bgs. Obstruction at 6 ft bgs and excavator bucket refusal. No water seepage or mottling observed in test pit. End of test pit 4/09/2025 at 10:25 AM. Test pit backfilled with excavated material and area leveled.
			7			
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

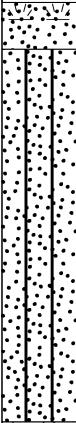
Project		West Essex Highlands		Project No.		101049801		Date		4/9/2025													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 553.5 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		9.0 ft		Water Level - First		- ▽		Water Level - Completion		- ▼					
Excavation Equipment				Hitachi Excavator 7X85				Excavation Foreman				Roy Westervelt				Field Engineer				Bhumi Peer			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+553.5	Topsoil (Approx. 12") [TOPSOIL]	0			Began excavating 4/09/2025 at 10:45 AM.
	+552.5	Brown Silty fine to coarse SAND, trace gravel with cobbles and boulders and roots (moist) [SM]	1			Roots greater than 1/2" in diameter extend 1 ft bgs.
			2			Roots less than 1/2" in diameter extend 2 ft bgs.
			3	G-1	GRAB	Boulder with diameter of 1 ft encountered at 1.5 ft bgs.
			4			
			5			
			6			
		Brown Silty fine to coarse SAND, some gravel with cobbles (moist) [SM]	6	G-2	GRAB	
	+546.5	POSSIBLE DECOMPOSED ROCK	7			Hard digging from 7 ft.
			8			
			9			No water seepage or mottling observed in test pit.
	+544.5	End of Test Pit at 9.0ft.	9			End of test pit 4/09/2025 at 11:10 AM. Test pit backfilled with excavated material and area leveled.
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

Project West Essex Highlands		Project No. 101049801		Date 4/10/2025	
Location West Orange, New Jersey		Elevation and Datum Approx. el. 570.0 (NAVD 88)			
Excavation Company Frank Semeraro Construction		Depth 7.0 ft	Water Level - First - ▽		Water Level - Completion - ▼
Excavation Equipment CAT Excavator 308		Excavation Foreman Roy Westervelt		Field Engineer Bhumi Peer	

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+570.0		0			Began excavating 4/10/2025 at 7:38 AM.
	+569.5	Topsoil (Approx. 6") [TOPSOIL]	1			Roots greater than 1/2" in diameter extend to 1 ft bgs.
		Brown fine to coarse SAND, some silt, some gravel with cobbles and roots (moist) [SM]	2			Roots less than 1/2" in diameter extend to 2 ft bgs.
		3			Boulder with diameter of 1 ft encountered at 3 ft bgs.	
		Brown Gravelly fine to coarse SAND, some silt with cobbles and boulders (moist) [SM]	4	G-1	GRAB	
			5			
	+564.0	DECOMPOSED ROCK	6	G-2	GRAB	Rock fragments encountered at 6 ft bgs.
	+563.0	End of Test Pit at 7.0ft.	7			Excavator bucket refusal at 7 ft. No water seepage or mottling observed in test pit.
			8			End of test pit 4/10/2025 at 8:00 AM. Test pit backfilled with excavated material and area leveled.
			9			Top of Rock Encountered at 7 ft.
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

Project		West Essex Highlands		Project No.		101049801		Date		4/10/2025													
Location				West Orange, New Jersey				Elevation and Datum				Approx. el. 577.5 (NAVD 88)											
Excavation Company				Frank Semeraro Construction				Depth		6.5 ft		Water Level - First		- ▽		Water Level - Completion		- ▼					
Excavation Equipment				CAT Excavator 308				Excavation Foreman				Roy Westervelt				Field Engineer				Bhumi Peer			

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE		REMARKS
				Number	Type	
	+577.5		0			Began excavating 4/10/2025 at 8:26 AM. Large boulder at 6" bgs (3 ft diameter).
	+576.8	Topsoil (Approx. 8") [TOPSOIL]	1			Roots greater than 1" in diameter extend to 6" bgs.
		Brown fine to coarse SAND, some gravel, some silt with cobbles and boulders and roots (moist) [SM]	2			Roots between 1/2" to 1" in diameter extend to 1 ft bgs.
			3			Roots less than 1/2" in diameter extend to 3 ft bgs.
			4			
	+571.5	Brown Gravelly fine to coarse SAND, some silt with cobbles and boulders (moist) [SM]	5	G-1	GRAB	
	+571.0	DECOMPOSED ROCK	6	G-2	GRAB	Rock fragments at 6 ft bgs.
		End of Test Pit at 6.5ft.	7			Excavator bucket refusal at 6.5 ft. No water seepage or mottling observed in test pit.
			8			End of test pit 4/10/2025 at 8:47 AM. Test pit backfilled with excavated material and area leveled.
			9			Top of Rock Encountered at 6.5 ft.
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

APPENDIX D

LABORATORY TESTING RESULTS



GEOLAB

• NEW JERSEY
1017 GREELEY AVE SOUTH
UNION, NJ 07083
908.964.0786

• SOUTH CAROLINA
49 BROWNS COVE ROAD SUITE 6
RIDGELAND, SC 29936
848.316.9950

Letter of Transmittal

Date: 1-8-25

Job No.: 869

Lab Log: 25-3966

Attention: A. Yoda
Langan Engineering & Environmental Services

CC: R. Blocker

Re: West Essex Highlands, West Orange, NJ
Project#101049801

Sample(s) ID: **LB-3 C-1**

Dear A. Yoda,

Please find attached results for the samples referenced above. The following lab testing was performed:

- ASTM D7012 Unconfined Compression of Rock Cores (2 tests)

Regards,
RSA Geolab, LLC

Remarks: If you have any questions, please call 908-964-0786.

Signed: _____

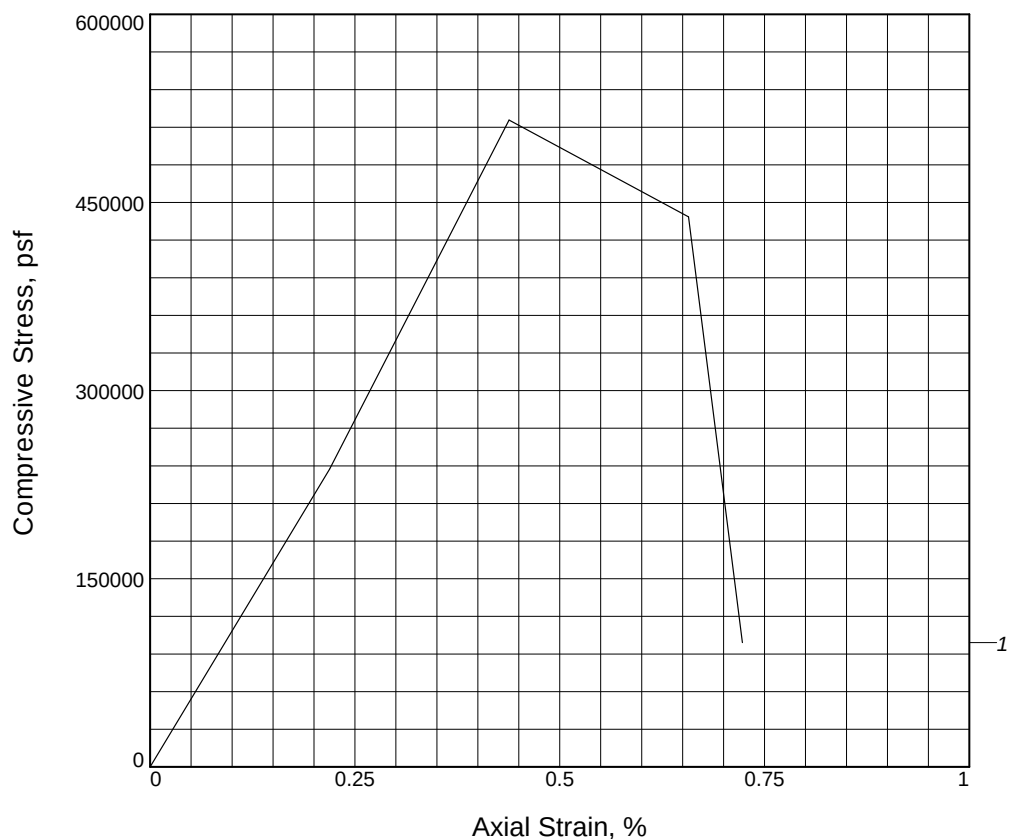
Dr. Raza S. Ahmed
President RSA Geolab, LLC

<https://www.rsageolab.com/>
email: rsa@rsageolab.com

RSA's Geolab's Geotechnical Laboratory testing was performed and results reported in accordance with ASTM standards and accepted industry standards. No other representations or warranties either express or implied are given. RSA Geolab, LLC neither accepts responsibility for nor makes claim to the final use and purpose of the material tested.

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UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	515719			
Undrained shear strength, psf	257859			
Failure strain, %	0.4			
Strain rate, in./min.	0.050			
Water content, %	N/A			
Wet density, pcf	182.8			
Dry density, pcf	N/A			
Saturation, %	N/A			
Void ratio	N/A			
Specimen diameter, in.	1.98			
Specimen height, in.	4.57			
Height/diameter ratio	2.31			

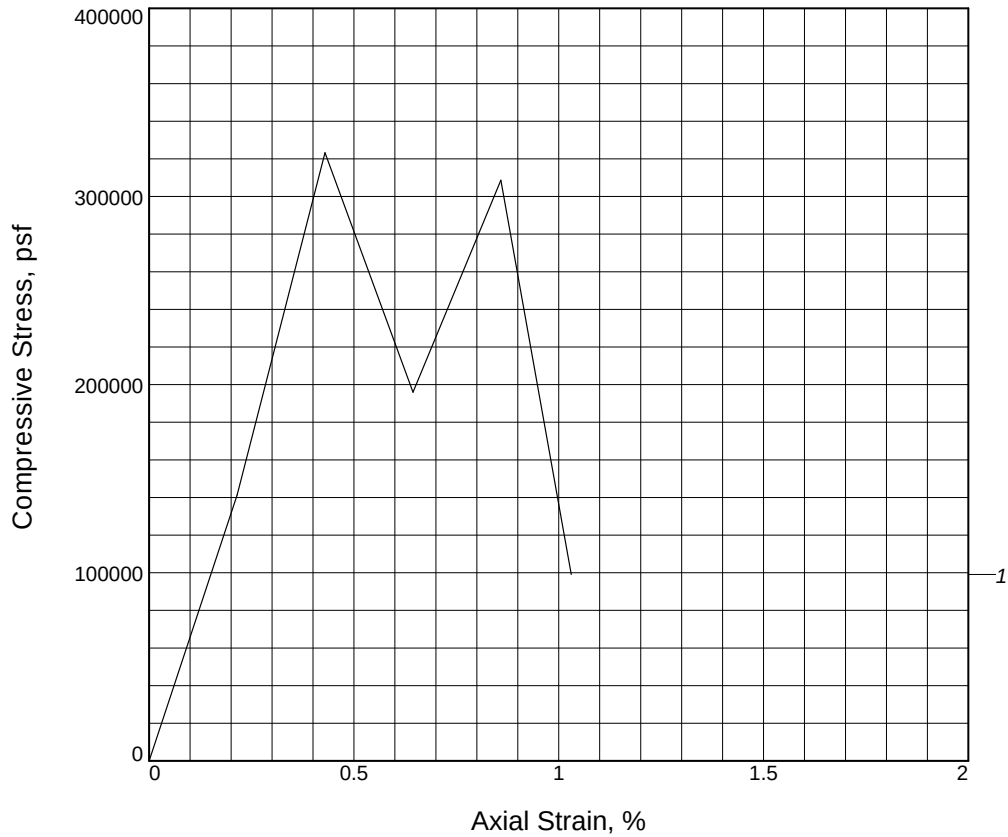
Description: Gray Rock Core

LL =	PL =	PI =	Assumed GS= 2.7	Type: ASTM D7012
-------------	-------------	-------------	------------------------	-------------------------

Project No.: 869 Date Sampled: 1-8-25 Remarks: Figure _____	Client: Langan Engineering Project: West Essex Highlands, West Orange, NJ Project#101049801 Sample Number: LB-3 C-1A 8.5-10.5'
	UNCONFINED COMPRESSION TEST RSA Geolab Union, New Jersey

Tested By: SP _____ **Checked By:** KP _____

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	323263			
Undrained shear strength, psf	161632			
Failure strain, %	0.4			
Strain rate, in./min.	0.050			
Water content, %	N/A			
Wet density, pcf	182.3			
Dry density, pcf	N/A			
Saturation, %	N/A			
Void ratio	N/A			
Specimen diameter, in.	1.98			
Specimen height, in.	4.66			
Height/diameter ratio	2.35			

Description: Gray Rock Core

LL =	PL =	PI =	Assumed GS= 2.7	Type: ASTM D7012
-------------	-------------	-------------	------------------------	-------------------------

Project No.: 869 Date Sampled: 1-8-25 Remarks: Figure _____	Client: Langan Engineering Project: West Essex Highlands, West Orange, NJ Project#101049801 Sample Number: LB-3 C-1B 8.5-10.5'
	UNCONFINED COMPRESSION TEST RSA Geolab Union, New Jersey

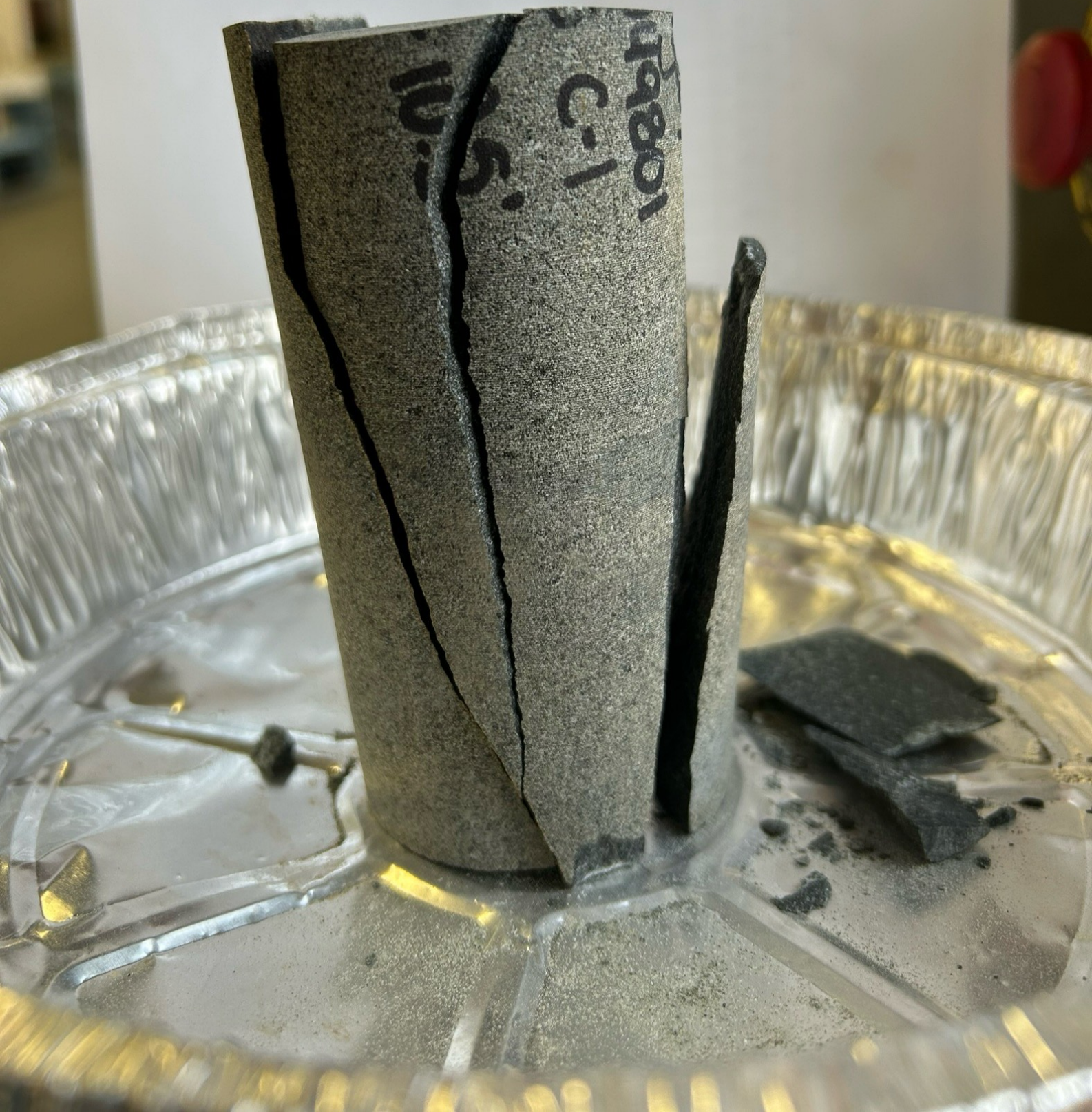
Tested By: SP _____ **Checked By:** KP _____

L#25-3966
LB-3 C-1 A



L#25-3966

LB-3 C-1 A



L#25-3966

LB-3 C-1 B



L#25-3966
LB-3 C-1 B

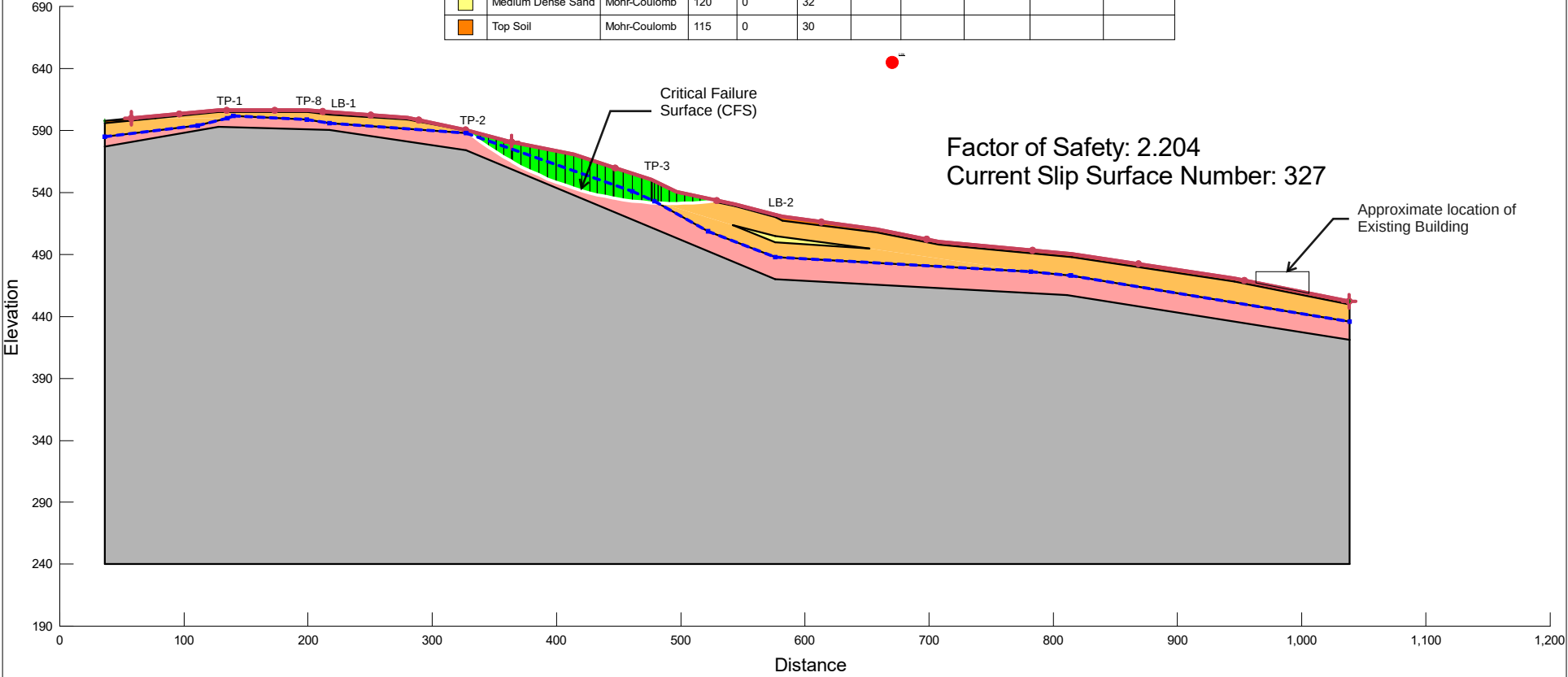


APPENDIX E

RESULTS OF LEM ANALYSIS FOR STATIC CONDITION

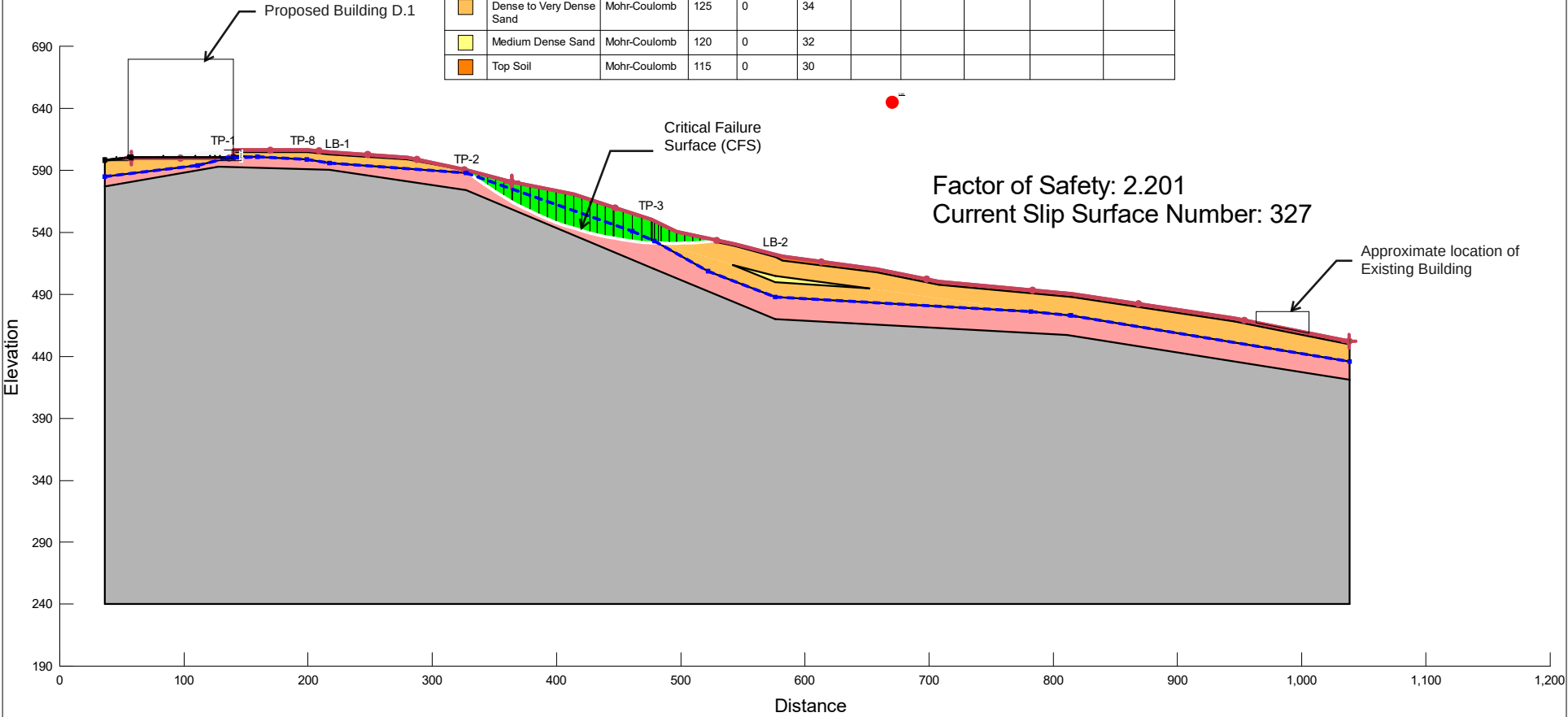
Cross Section A (Static Condition)

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	Hoek-Brown	180			323,263	17	65	1	1
Light Red	Decomposed Rock/Very Dense Granular Soil	Mohr-Coulomb	135	0	38					1
Orange	Dense to Very Dense Sand	Mohr-Coulomb	125	0	34					
Yellow	Medium Dense Sand	Mohr-Coulomb	120	0	32					
Dark Orange	Top Soil	Mohr-Coulomb	115	0	30					



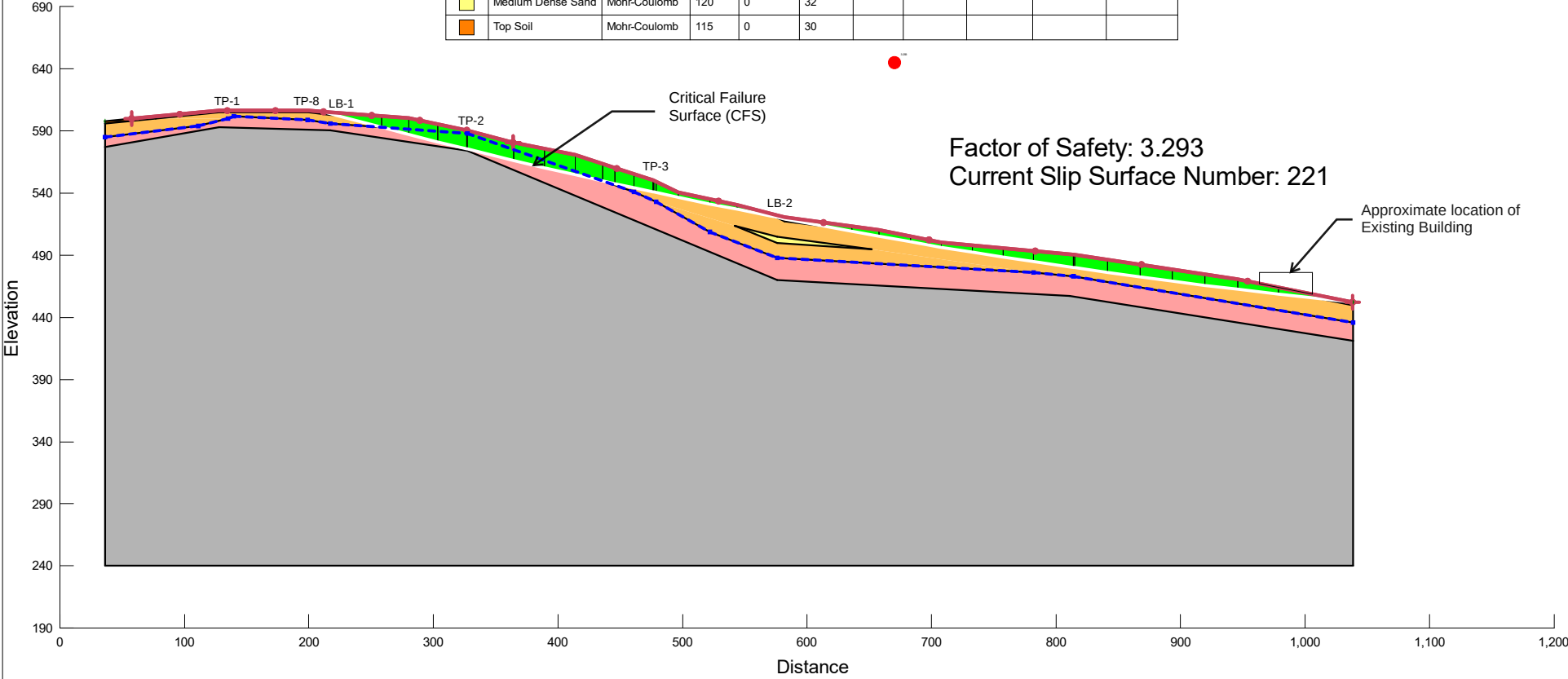
Cross Section A_Existing Condition

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	Hoek-Brown	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	Mohr-Coulomb	135	0	38					1
Orange	Dense to Very Dense Sand	Mohr-Coulomb	125	0	34					
Yellow	Medium Dense Sand	Mohr-Coulomb	120	0	32					
Light Orange	Top Soil	Mohr-Coulomb	115	0	30					



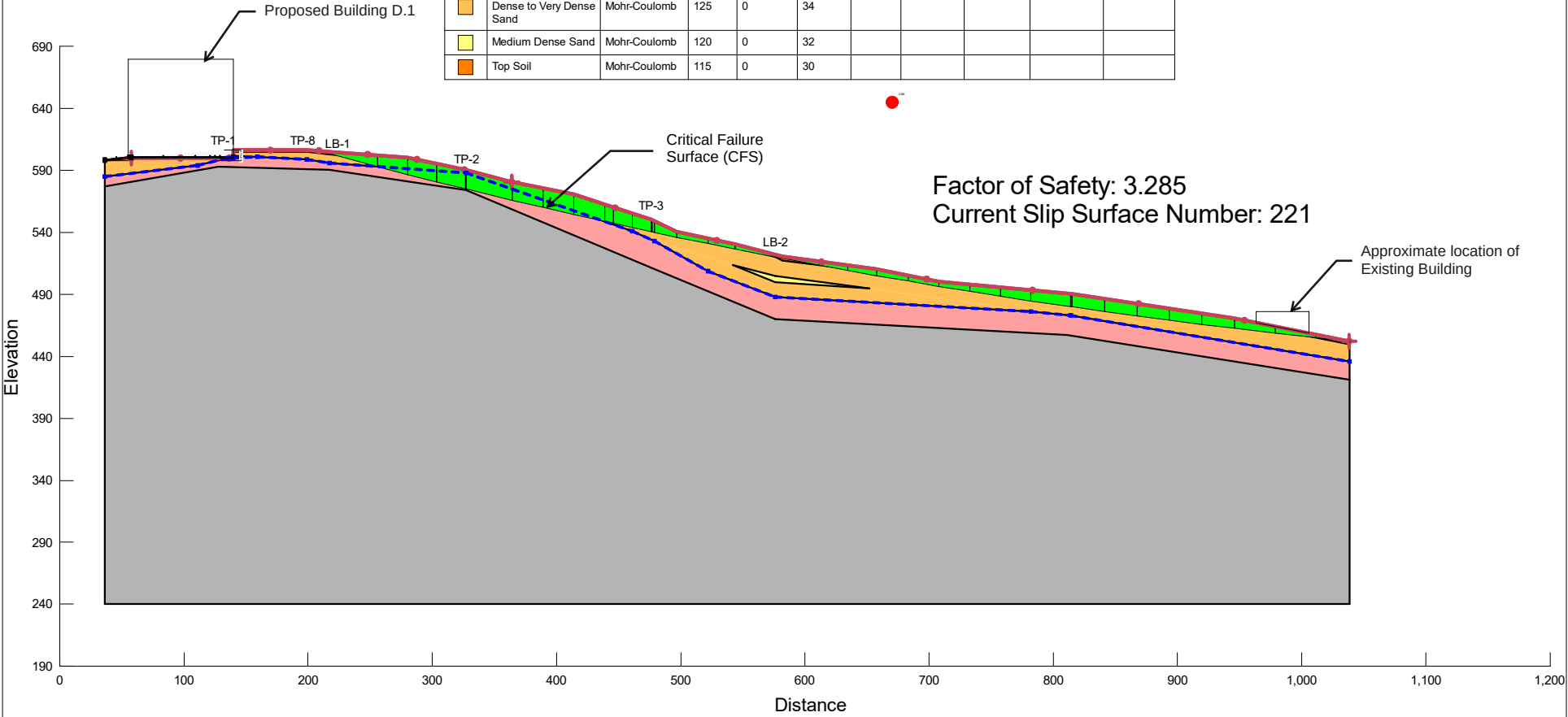
Cross Section A_Proposed Condition

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	Hoek-Brown	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	Mohr-Coulomb	135	0	38					1
Orange	Dense to Very Dense Sand	Mohr-Coulomb	125	0	34					
Yellow	Medium Dense Sand	Mohr-Coulomb	120	0	32					
Dark Orange	Top Soil	Mohr-Coulomb	115	0	30					



Cross Section A_Existing Condition

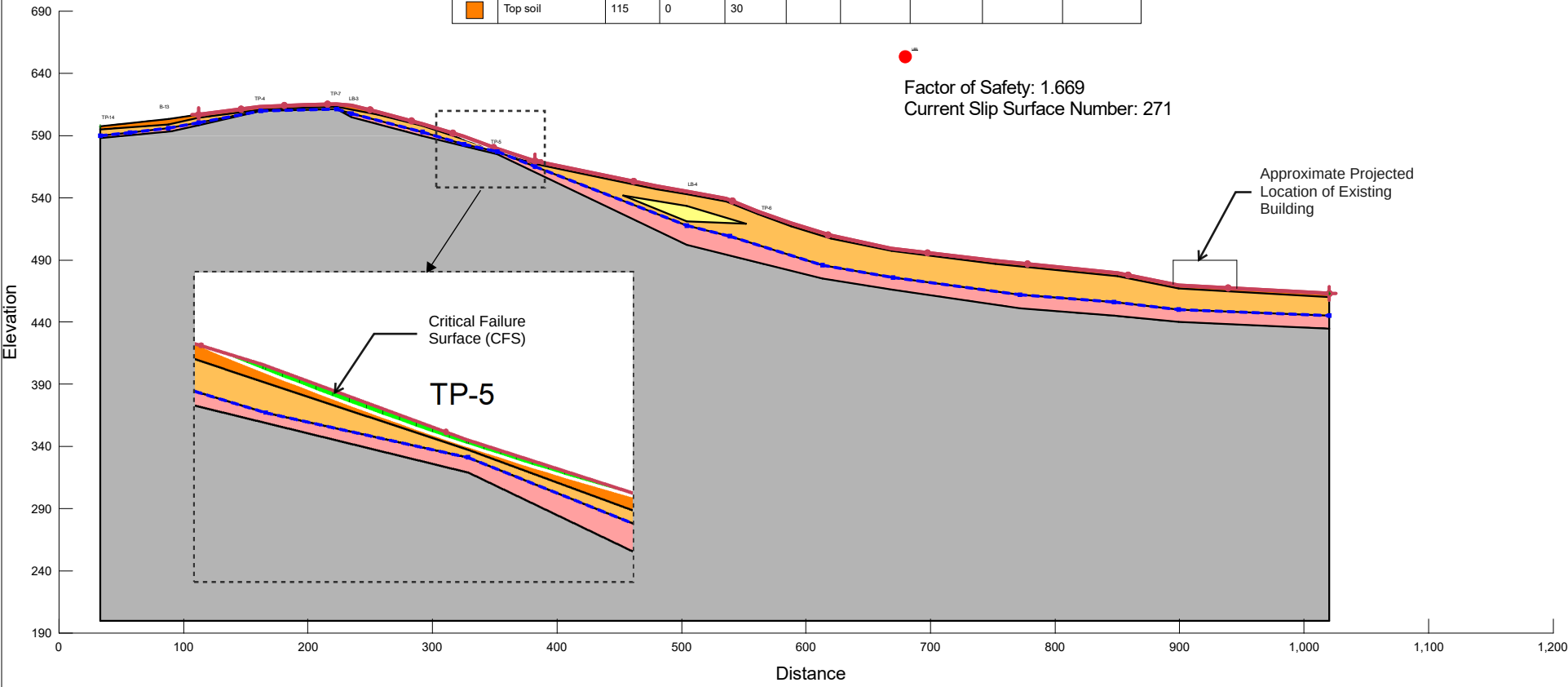
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Gray	Bedrock	Hoek-Brown	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	Mohr-Coulomb	135	0	38					1
Orange	Dense to Very Dense Sand	Mohr-Coulomb	125	0	34					
Yellow	Medium Dense Sand	Mohr-Coulomb	120	0	32					
Dark Orange	Top Soil	Mohr-Coulomb	115	0	30					



Cross Section A_Proposed Condition

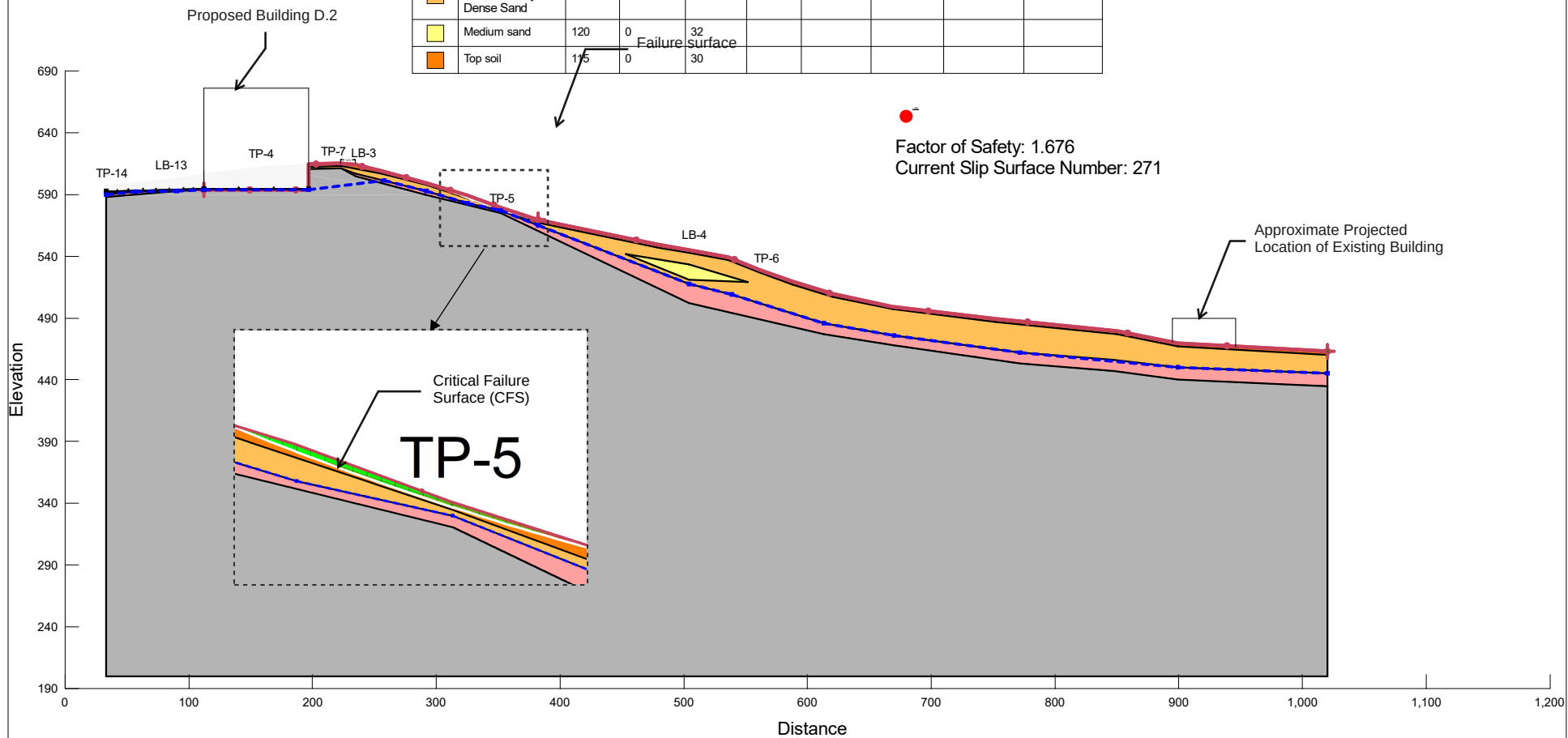
Cross Section B (Static Condition)

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Orange	Dense to Very Dense Sand	125	0	34					
Yellow	Medium sand	120	0	32					
Dark Orange	Top soil	115	0	30					



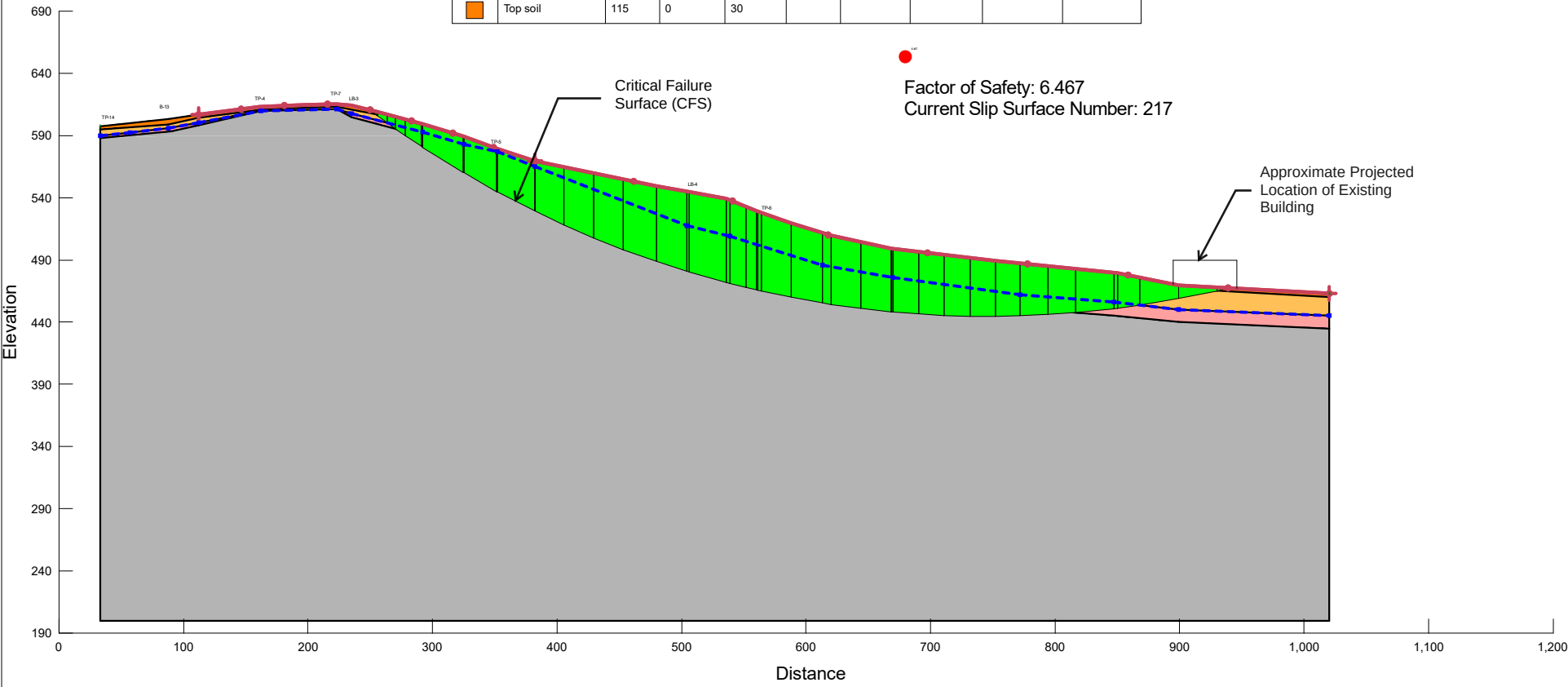
Cross Section B_Existing Condition

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Pink	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Orange	Dense to Very Dense Sand	125	0	34					
Yellow	Medium sand	120	0	32					
Dark Orange	Top soil	115	0	30					



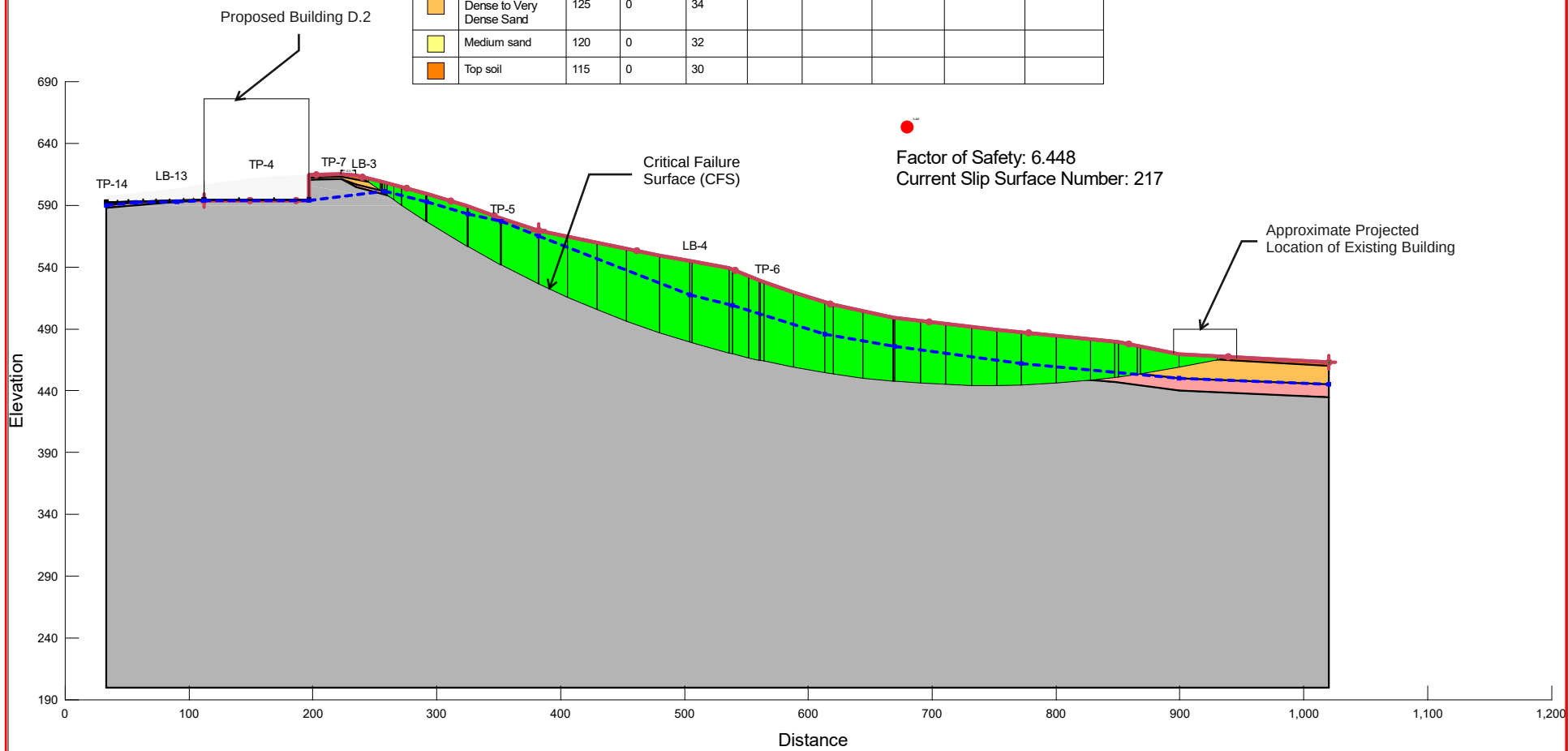
Cross Section B_Proposed Condition

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Grey	Bedrock	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Orange	Dense to Very Dense Sand	125	0	34					
Yellow	Medium sand	120	0	32					
Dark Orange	Top soil	115	0	30					



Cross Section B_Existing Condition

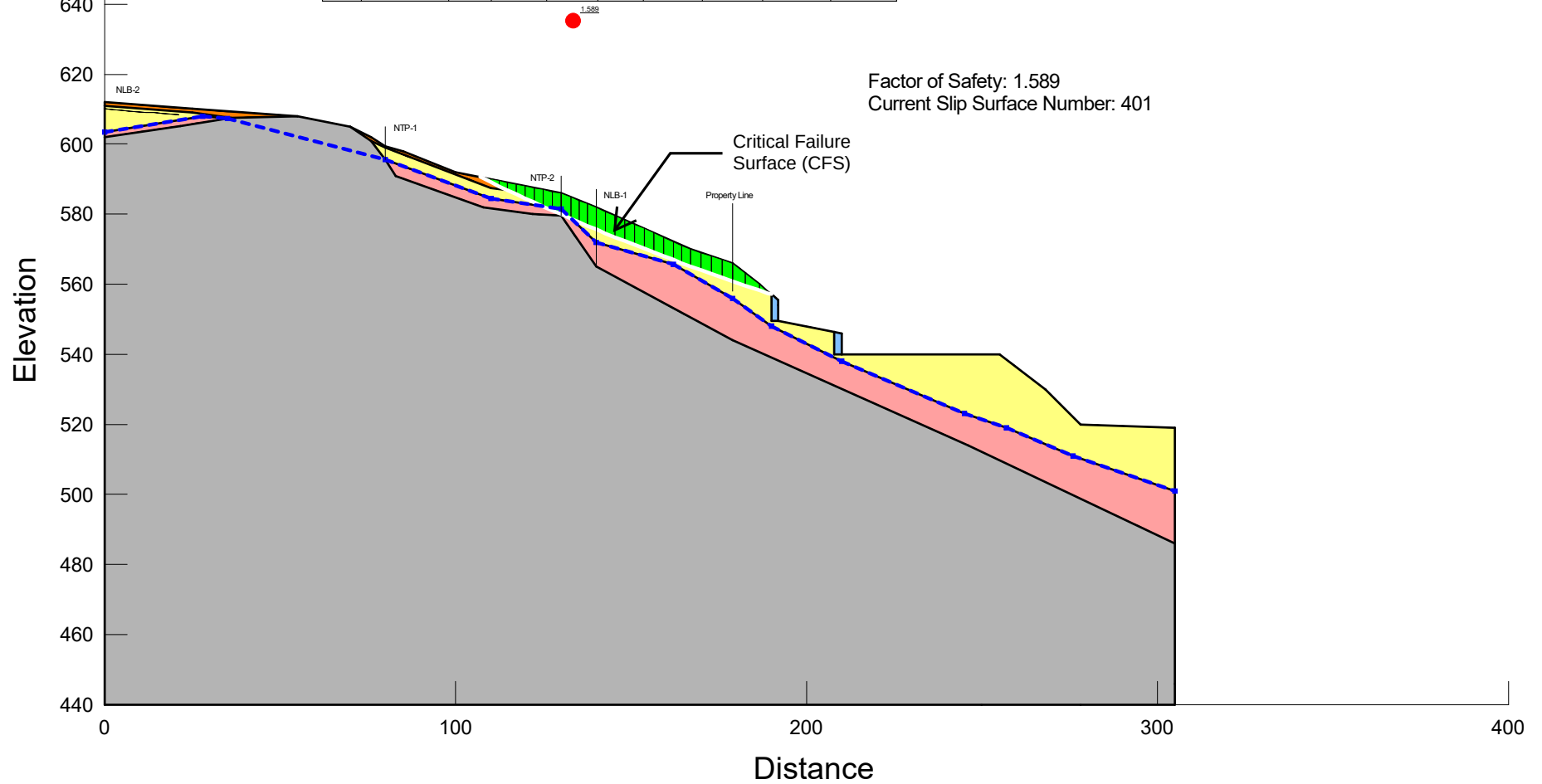
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Light Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Orange	Dense to Very Dense Sand	125	0	34					
Yellow	Medium sand	120	0	32					
Dark Orange	Top soil	115	0	30					



Cross Section B_Proposed Condition

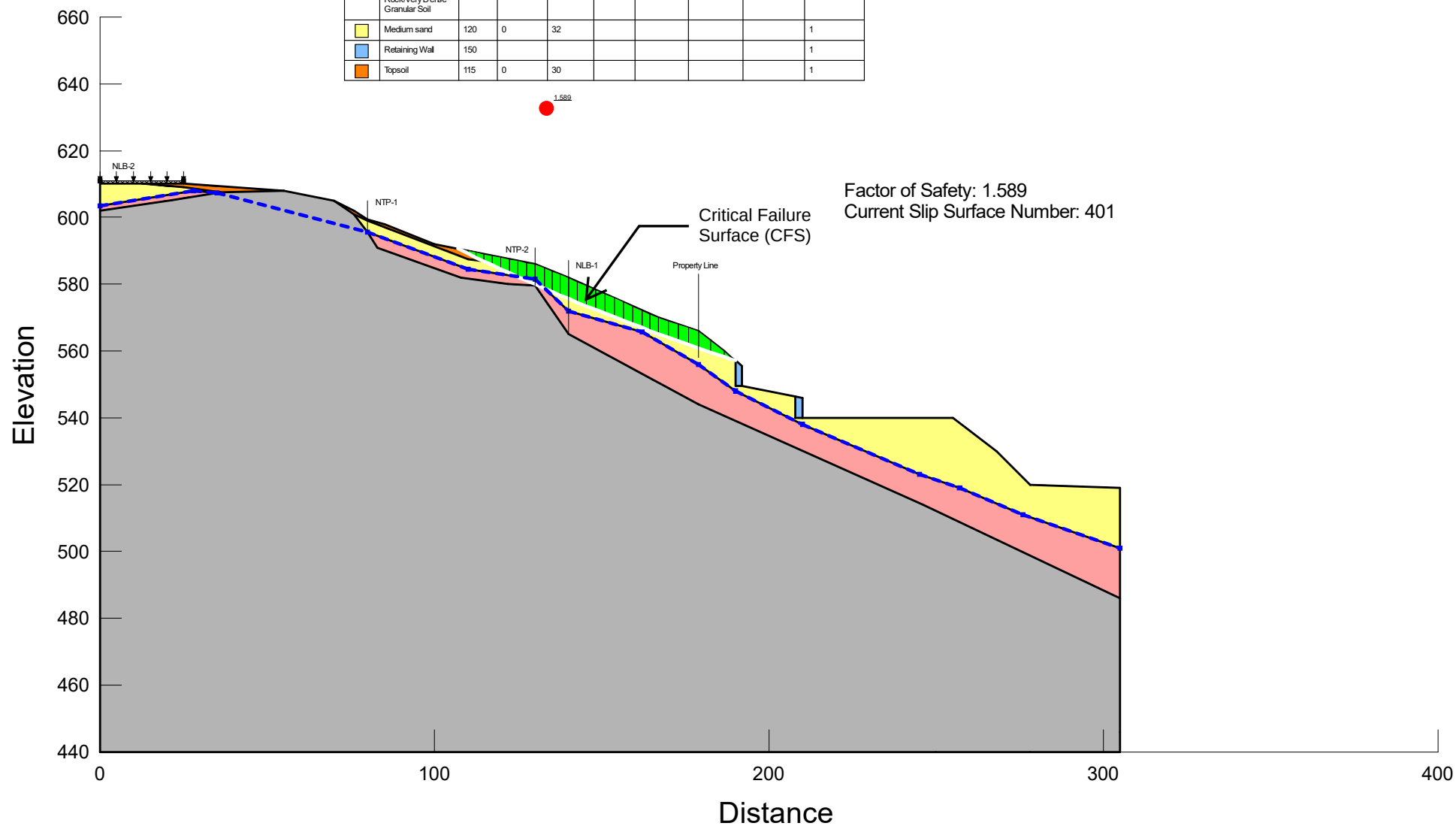
Cross Section C (Static Condition)

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Grey	Bedrock	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Yellow	Medium sand	120	0	32					1
Blue	Retaining Wall	150							1
Orange	Topsail	115	0	30					1



Cross Section C_Existing Condition

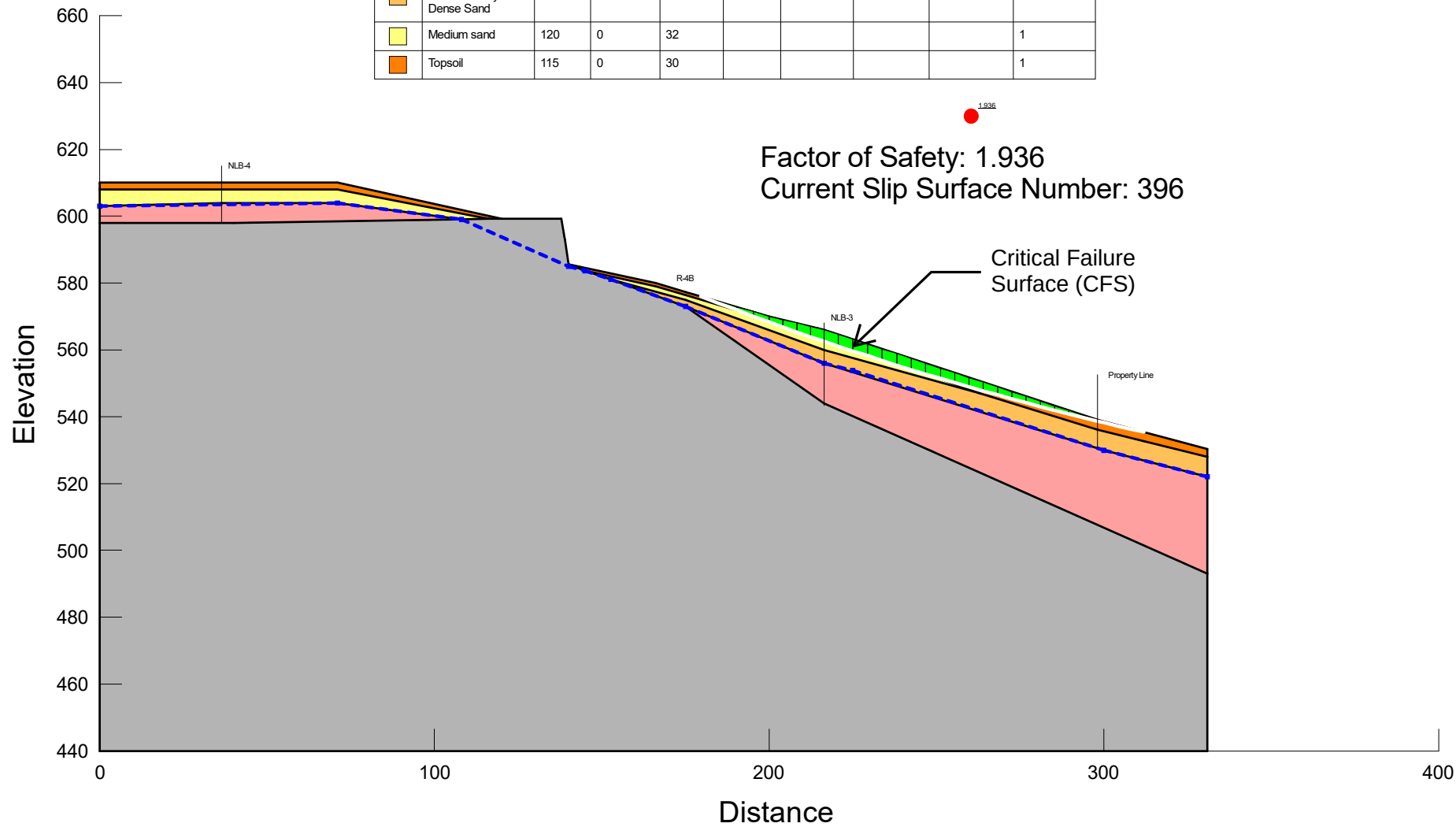
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Yellow	Medium sand	120	0	32					1
Blue	Retaining Wall	150							1
Orange	Topsoil	115	0	30					1



Cross Section C_Proposed Condition

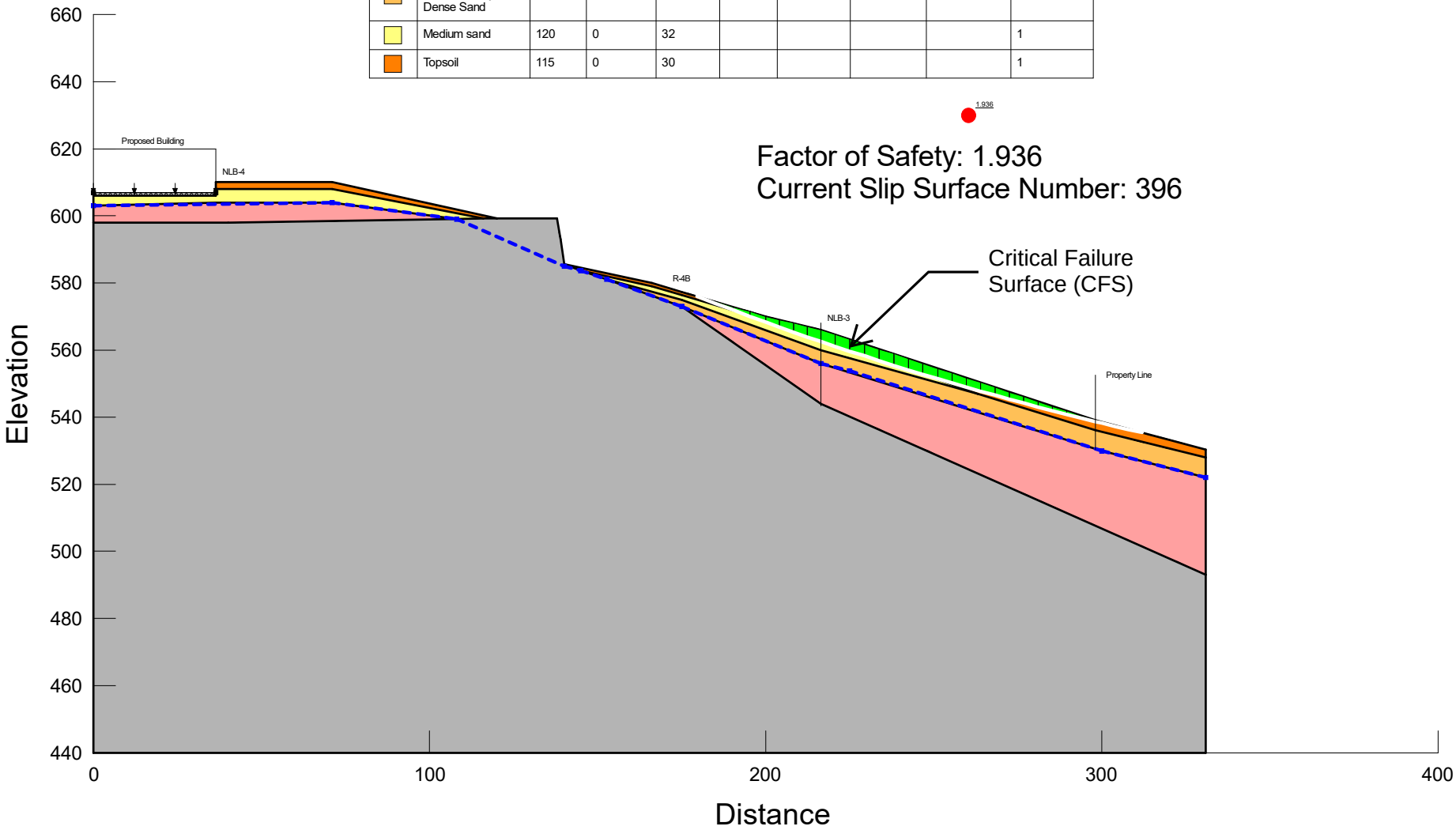
Cross Section D (Static Condition)

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Light Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Orange	Dense to Very Dense Sand	125	0	34					1
Yellow	Medium sand	120	0	32					1
Dark Orange	Topsoil	115	0	30					1



Cross Section D_Existing Condition

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Orange	Dense to Very Dense Sand	125	0	34					1
Yellow	Medium sand	120	0	32					1
Dark Orange	Topsoil	115	0	30					1



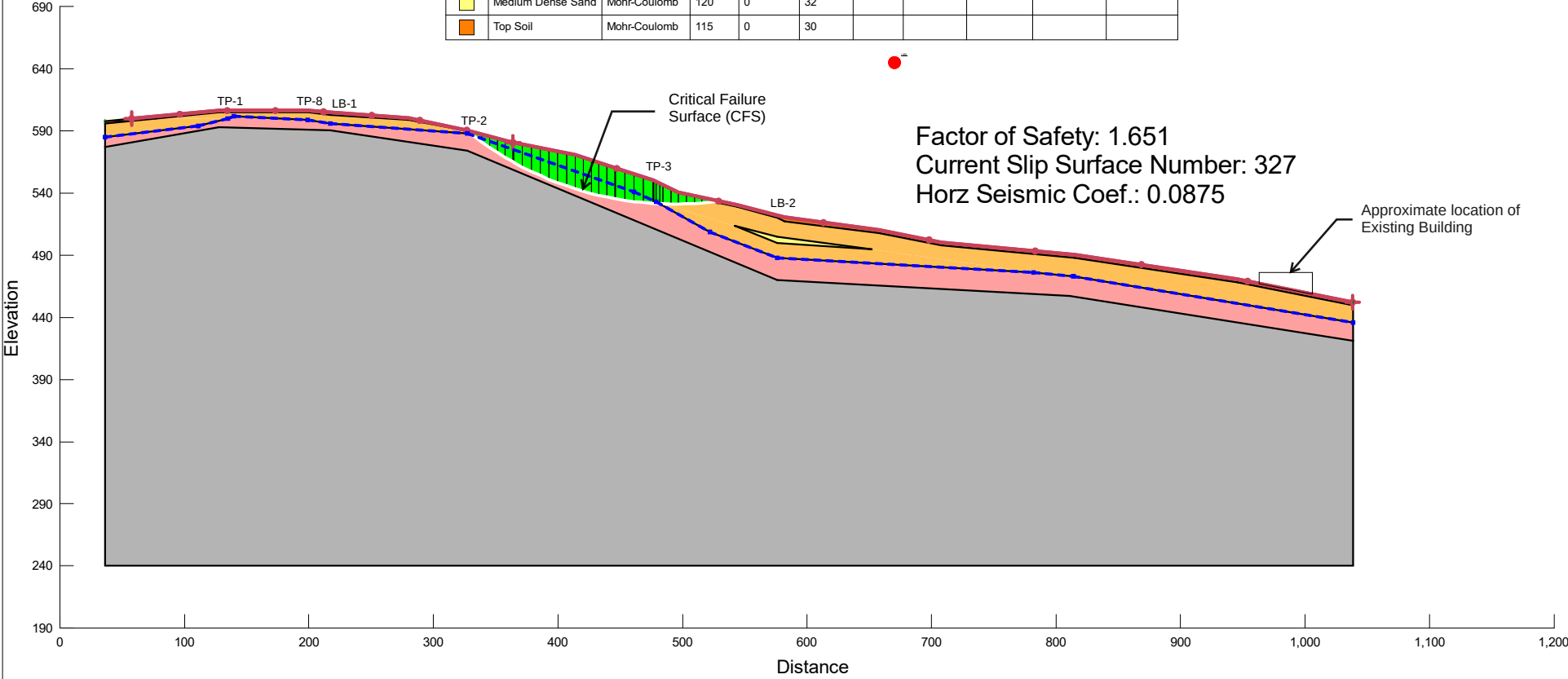
Cross Section D_Proposed Condition

APPENDIX F

RESULTS OF LEM ANALYSIS FOR SEISMIC CONDITION

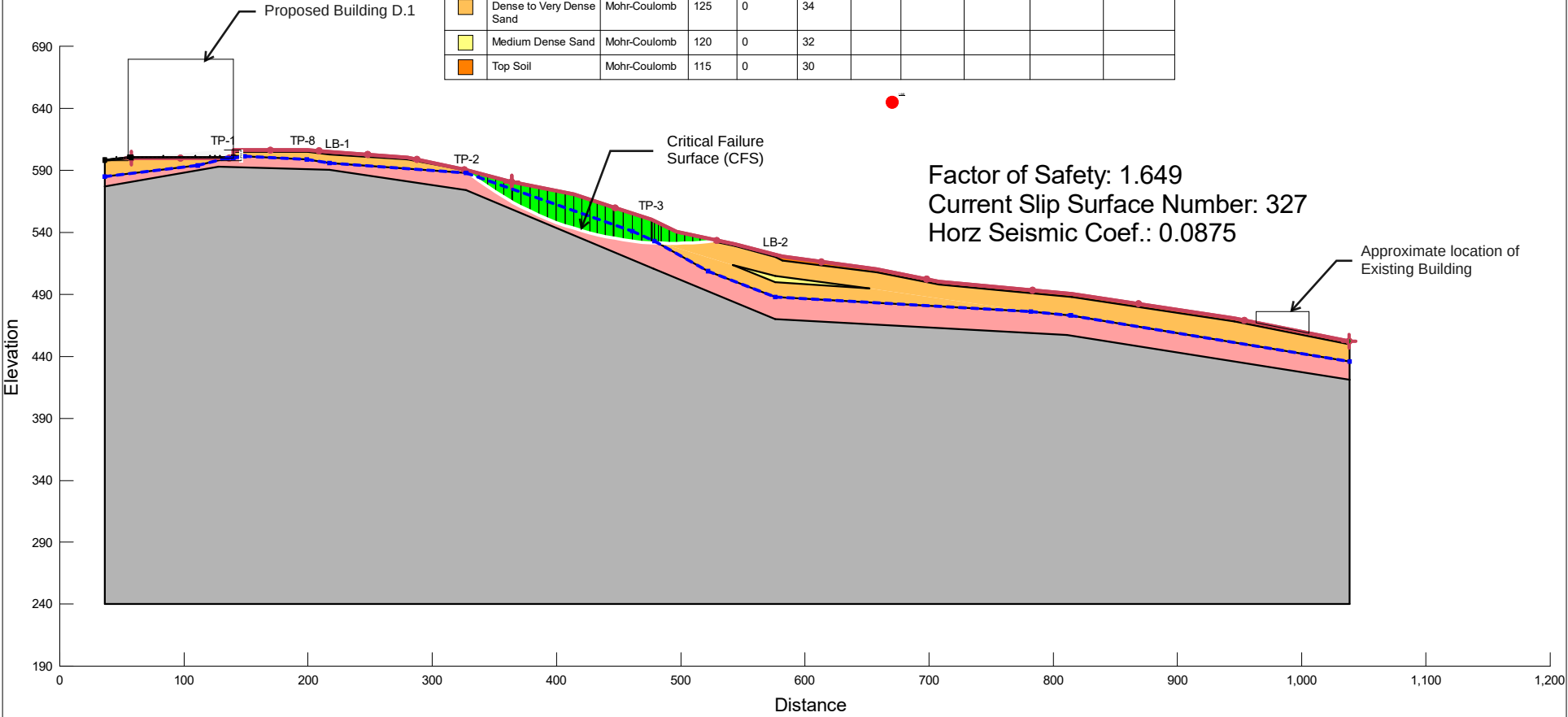
Cross Section A (Seismic Condition)

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
■	Bedrock	Hoek-Brown	180			323,263	17	65	1	1
■	Decomposed Rock/Very Dense Granular Soil	Mohr-Coulomb	135	0	38					1
■	Dense to Very Dense Sand	Mohr-Coulomb	125	0	34					
■	Medium Dense Sand	Mohr-Coulomb	120	0	32					
■	Top Soil	Mohr-Coulomb	115	0	30					



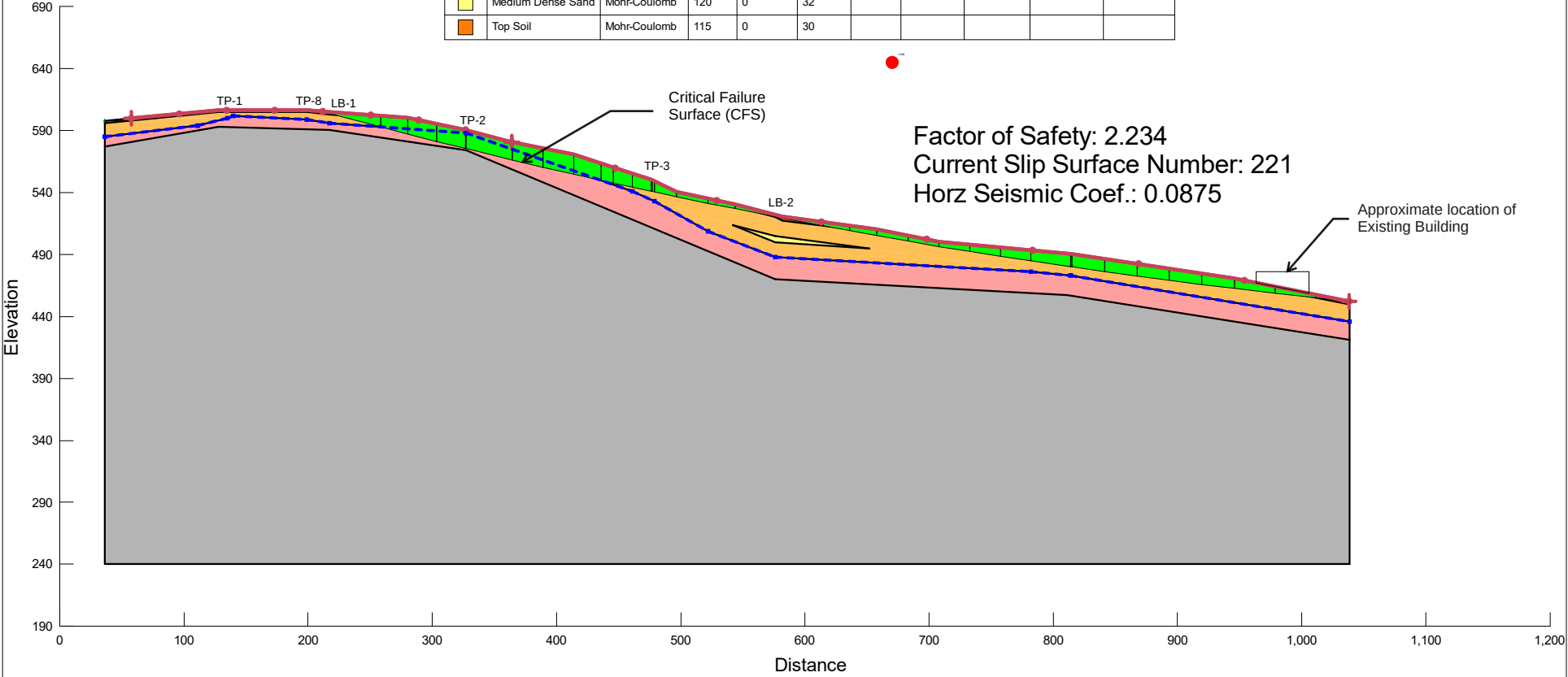
Cross Section A_Existing Condition

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	Hoek-Brown	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	Mohr-Coulomb	135	0	38					1
Orange	Dense to Very Dense Sand	Mohr-Coulomb	125	0	34					
Yellow	Medium Dense Sand	Mohr-Coulomb	120	0	32					
Light Orange	Top Soil	Mohr-Coulomb	115	0	30					



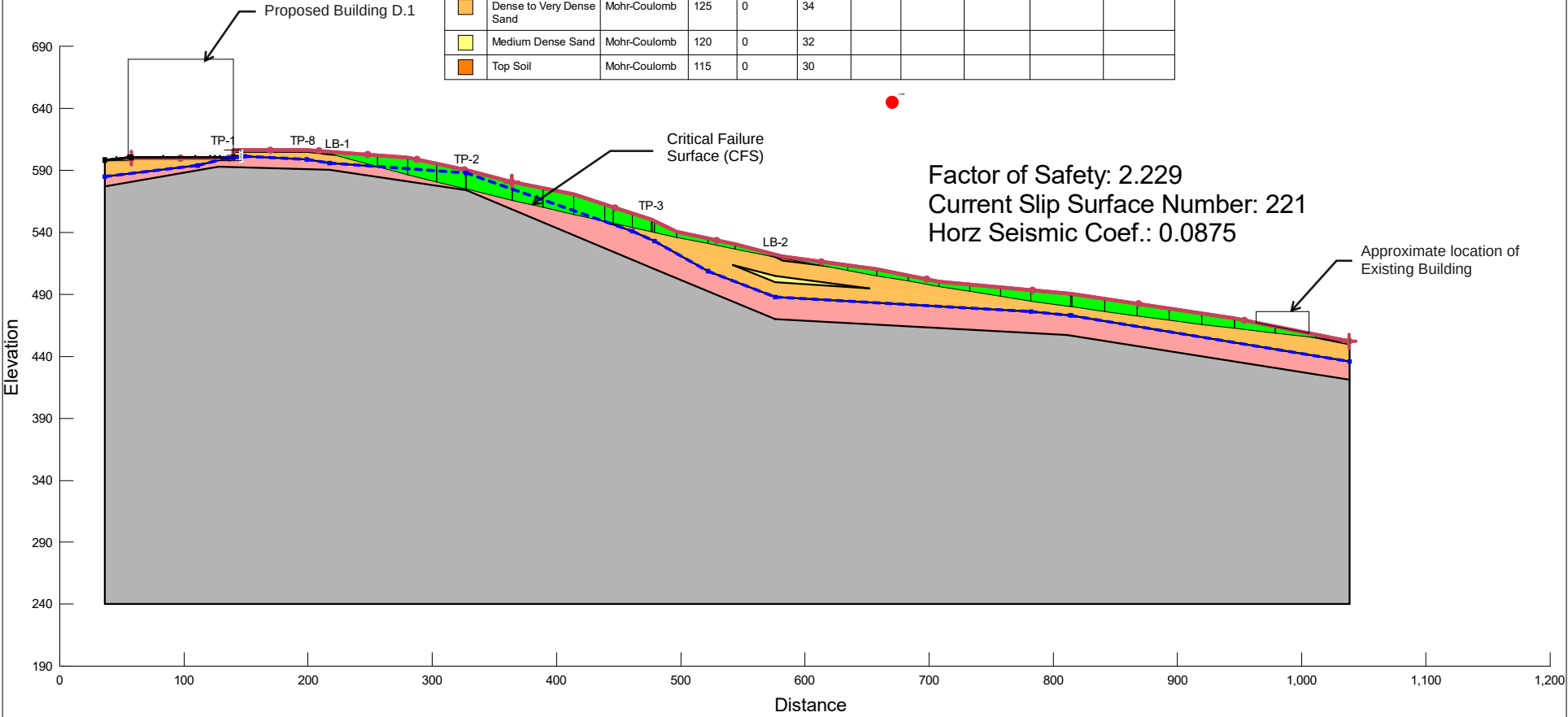
Cross Section A_Proposed Condition

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	Hoek-Brown	180			323,263	17	65	1	1
Light Red	Decomposed Rock/Very Dense Granular Soil	Mohr-Coulomb	135	0	38					1
Orange	Dense to Very Dense Sand	Mohr-Coulomb	125	0	34					
Yellow	Medium Dense Sand	Mohr-Coulomb	120	0	32					
Dark Orange	Top Soil	Mohr-Coulomb	115	0	30					



Cross Section A_Existing Condition

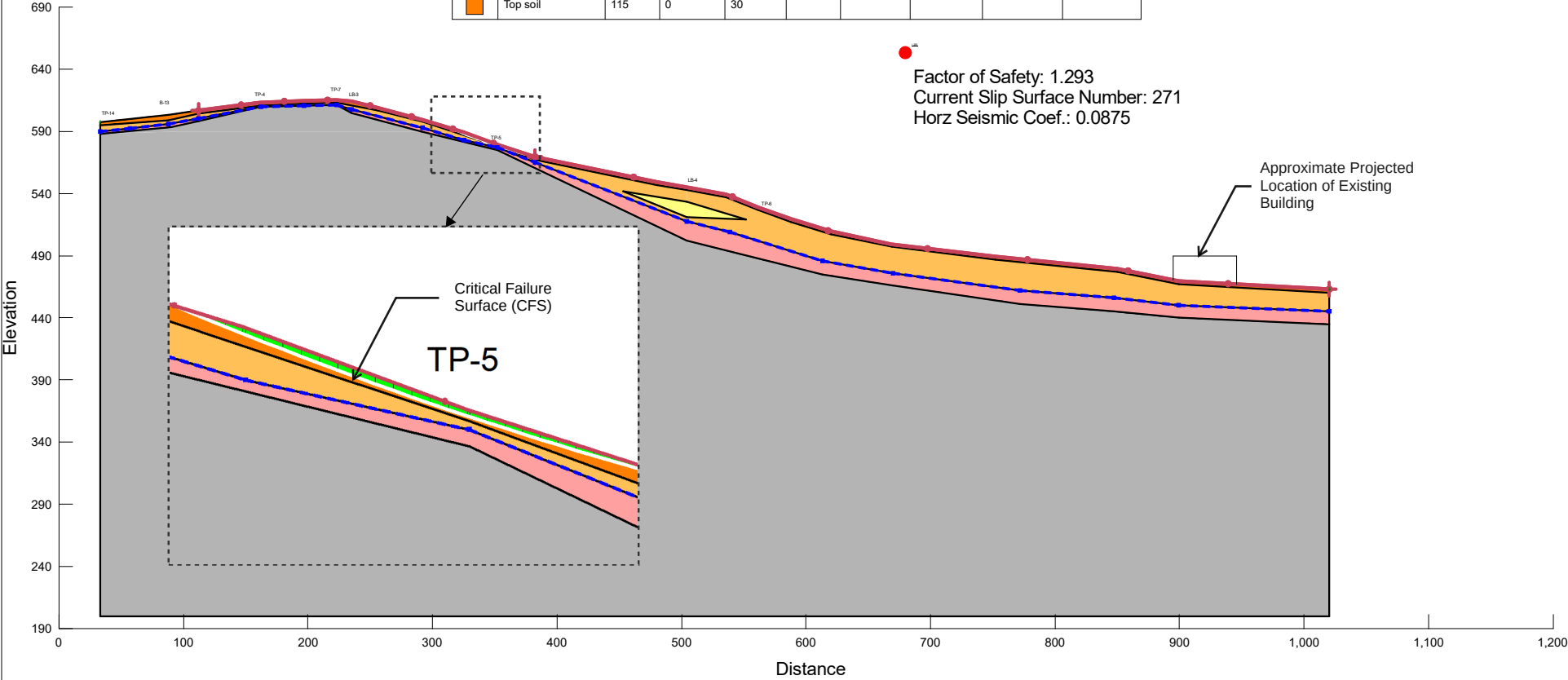
Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	Hoek-Brown	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	Mohr-Coulomb	135	0	38					1
Orange	Dense to Very Dense Sand	Mohr-Coulomb	125	0	34					
Yellow	Medium Dense Sand	Mohr-Coulomb	120	0	32					
Dark Orange	Top Soil	Mohr-Coulomb	115	0	30					



Cross Section A_Proposed Condition

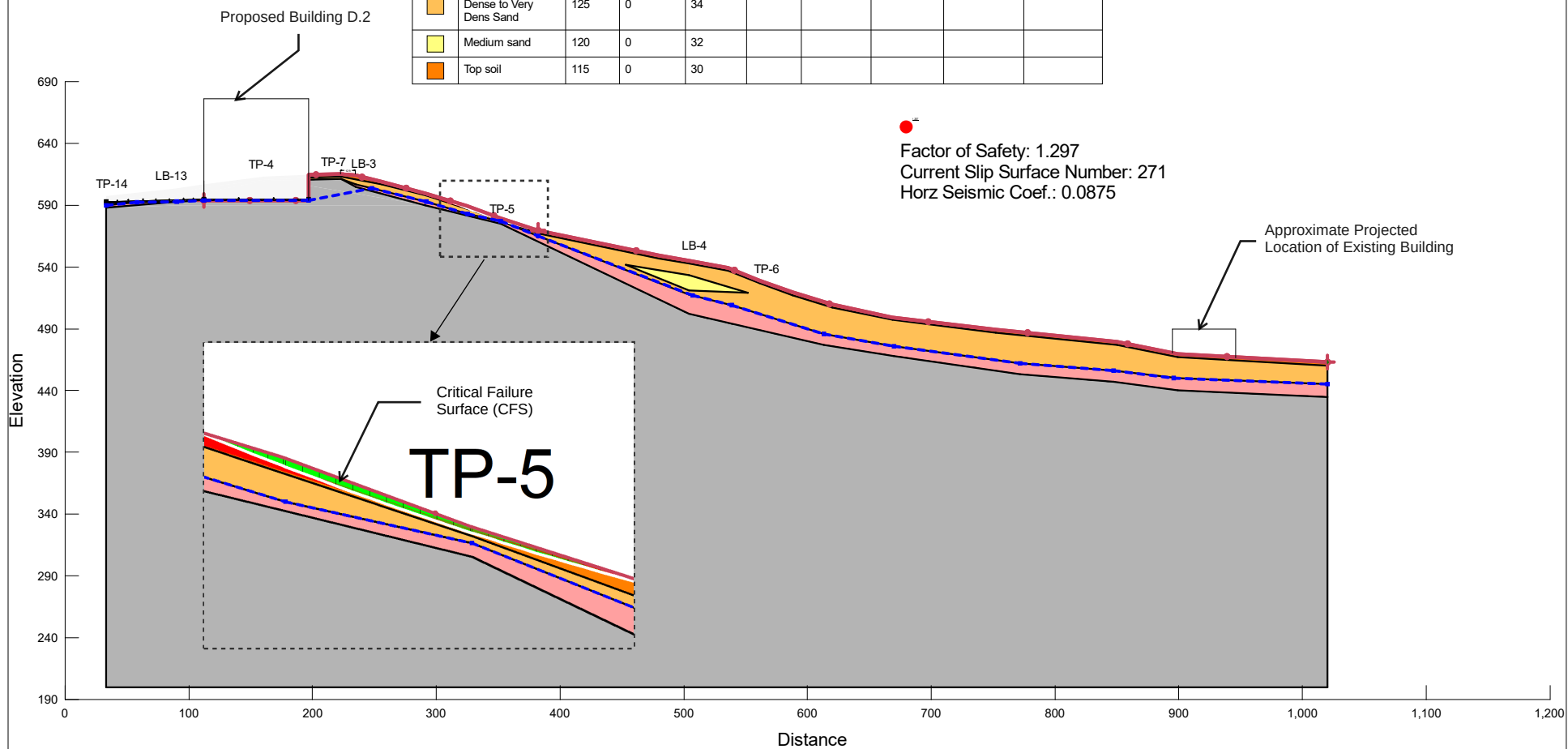
Cross Section B (Seismic Condition)

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Orange	Dense to Very Dense Sand	125	0	34					
Yellow	Medium sand	120	0	32					
Dark Orange	Top soil	115	0	30					



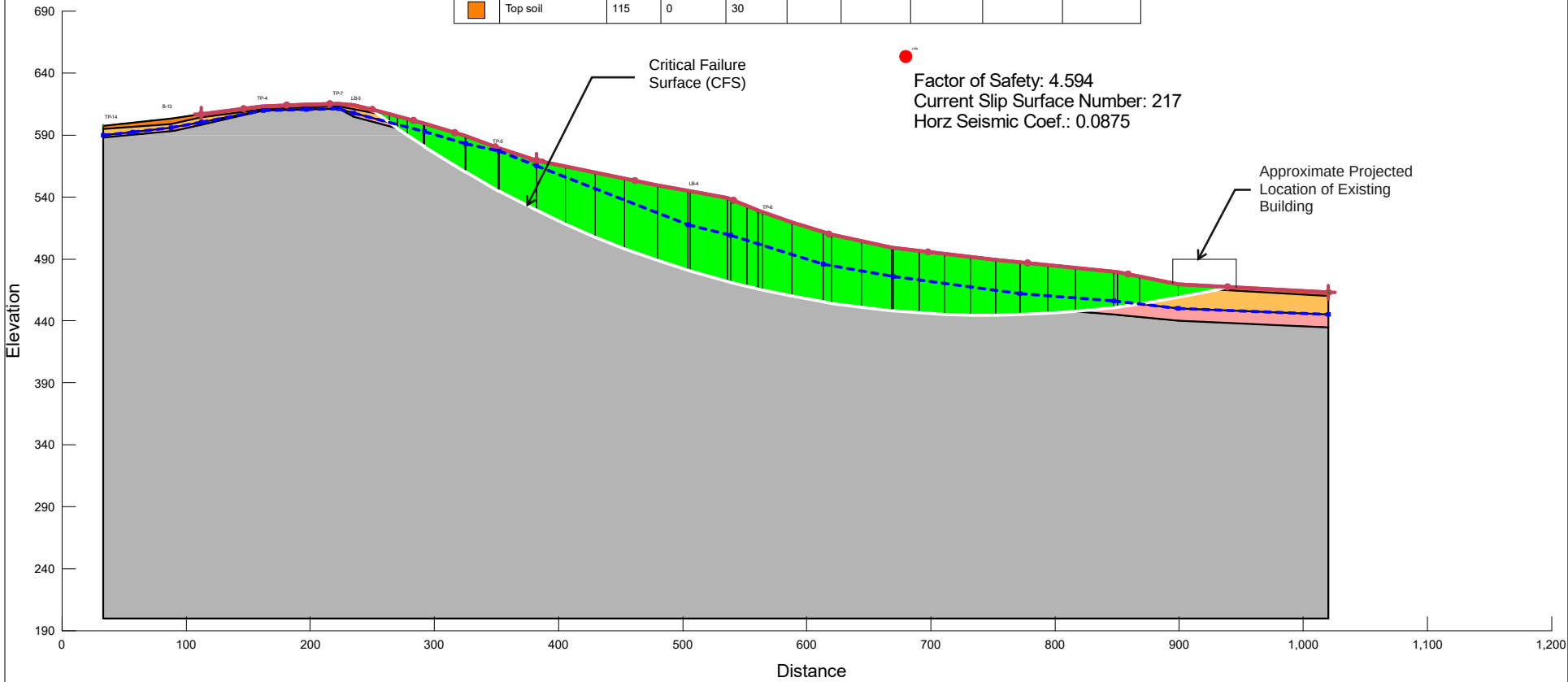
Cross Section B_Existing Condition

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Pink	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Orange	Dense to Very Dense Sand	125	0	34					
Yellow	Medium sand	120	0	32					
Dark Orange	Top soil	115	0	30					



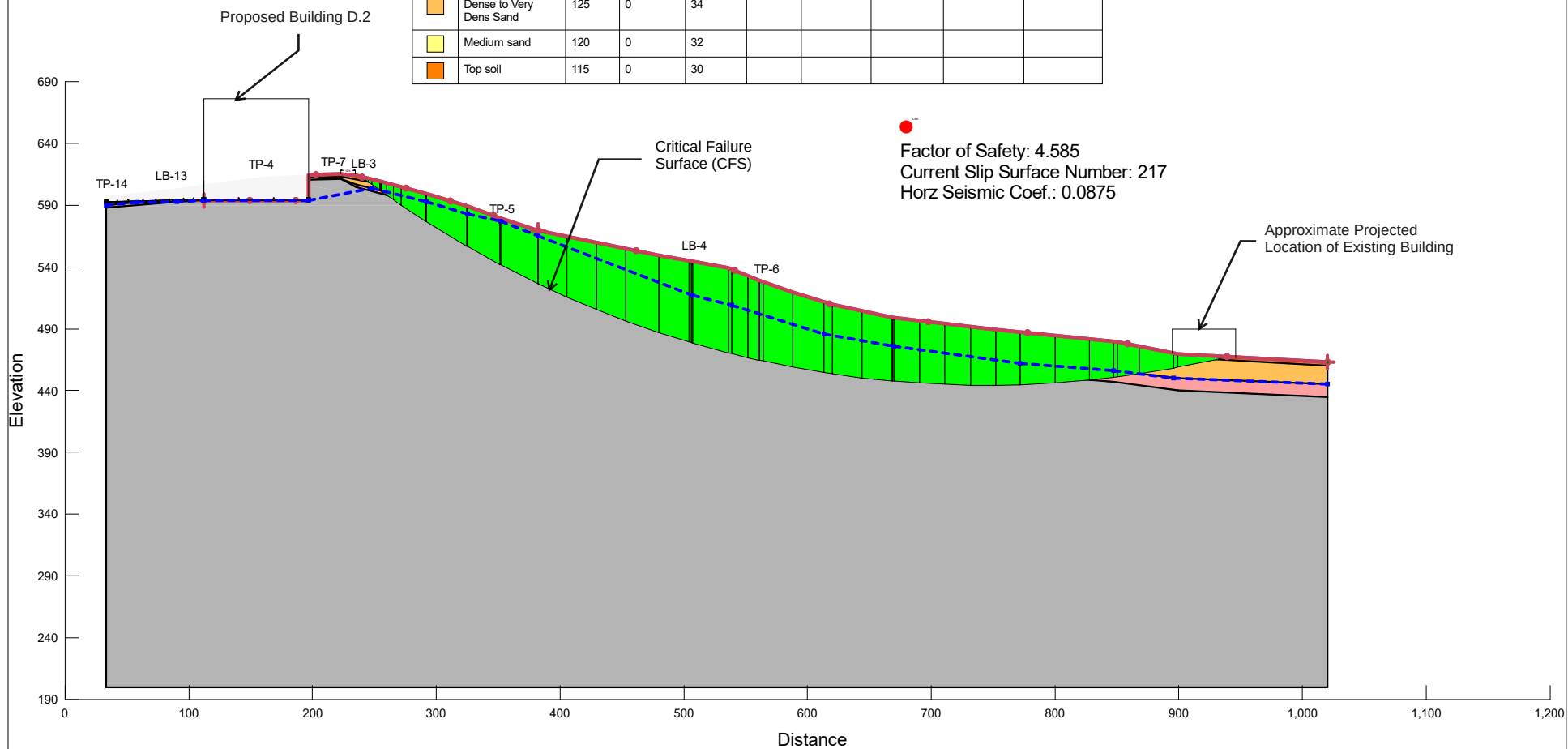
Cross Section B_Proposed Condition

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Orange	Dense to Very Dens Sand	125	0	34					
Yellow	Medium sand	120	0	32					
Dark Orange	Top soil	115	0	30					



Cross Section B_Existing Condition

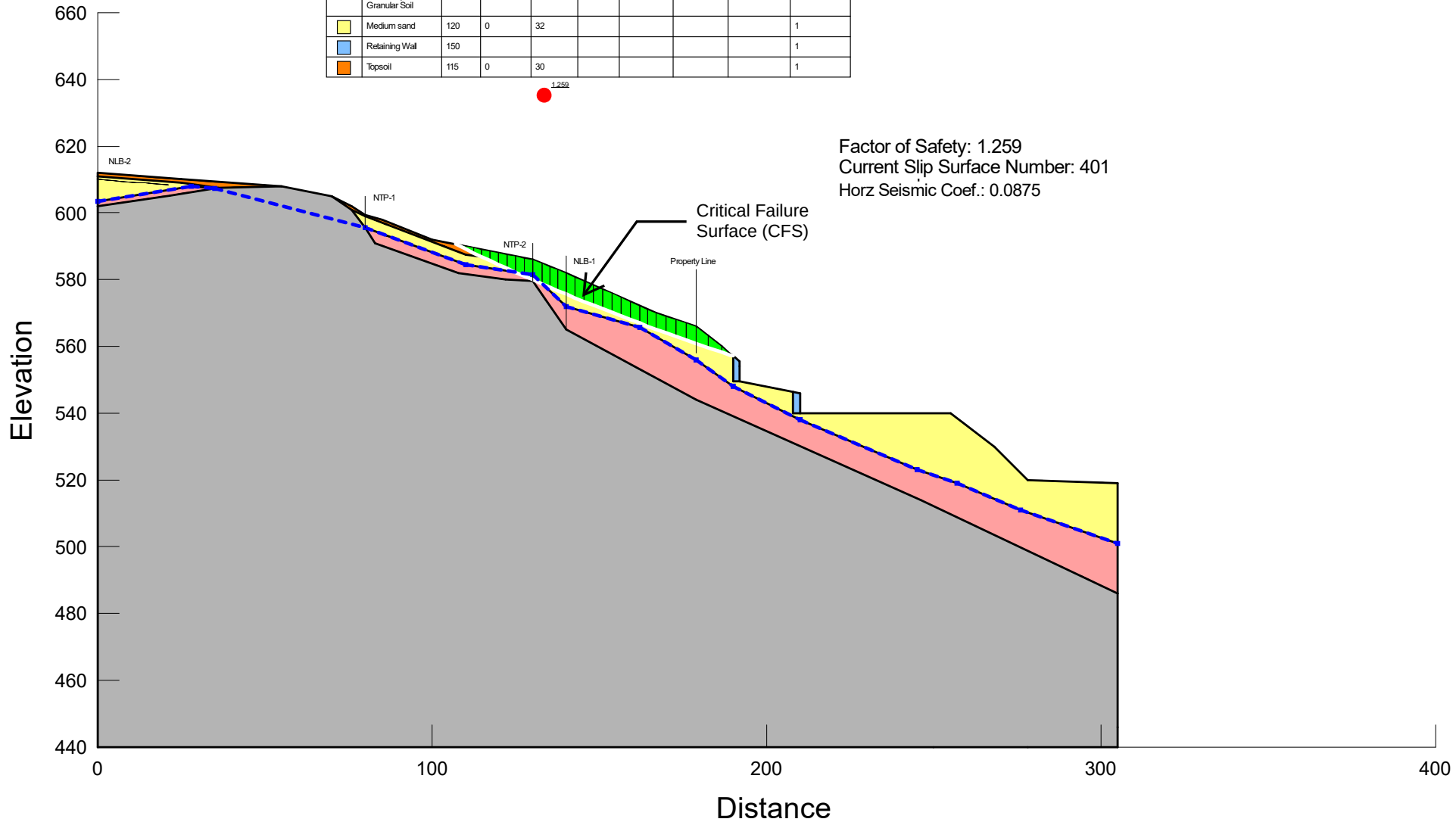
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Light Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Orange	Dense to Very Dense Sand	125	0	34					
Yellow	Medium sand	120	0	32					
Dark Orange	Top soil	115	0	30					



Cross Section B_Proposed Condition

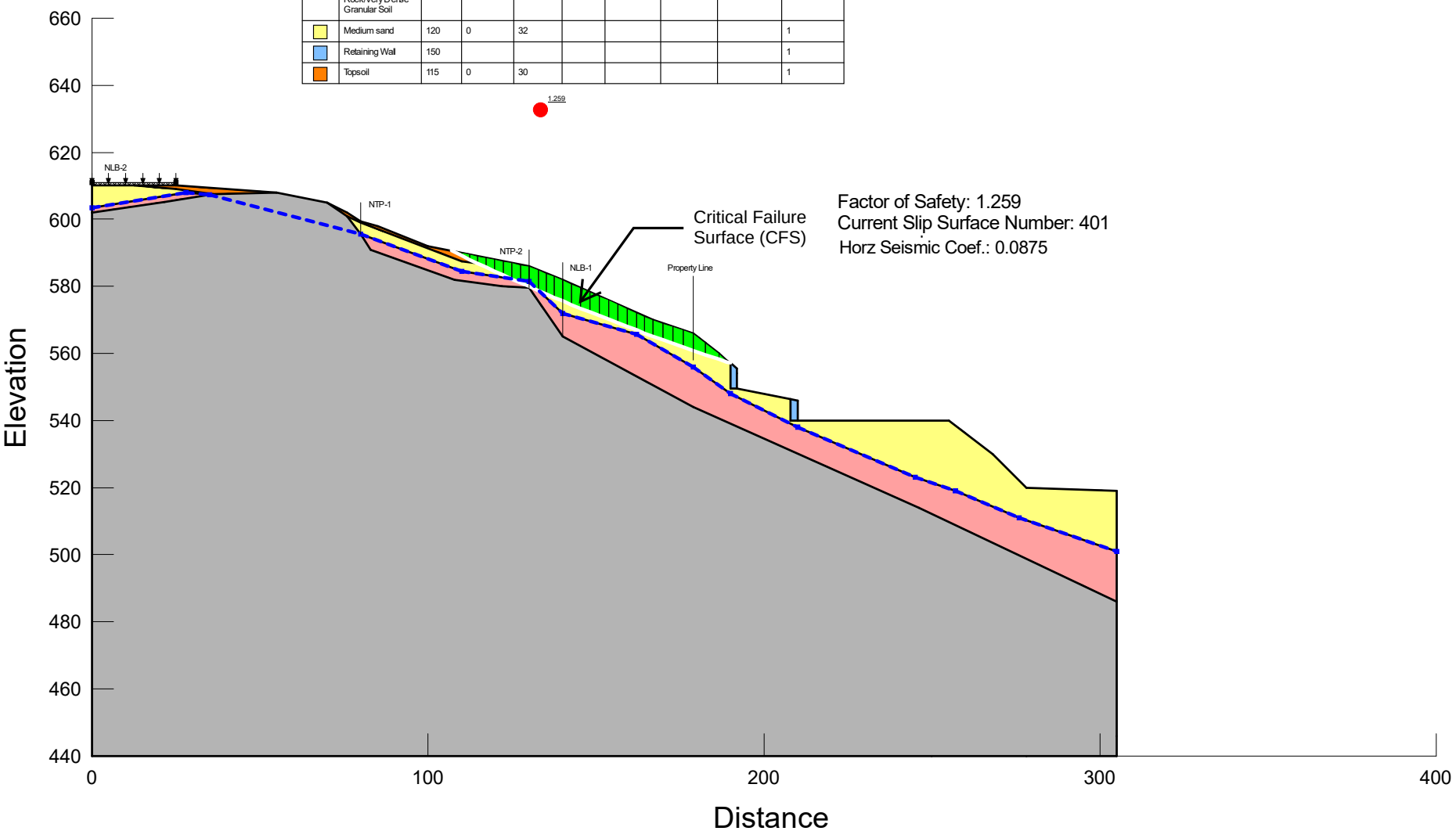
Cross Section C (Seismic Condition)

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Yellow	Medium sand	120	0	32					1
Blue	Retaining Wall	150							1
Orange	Topsoil	115	0	30					1



Cross Section C_Existing Condition

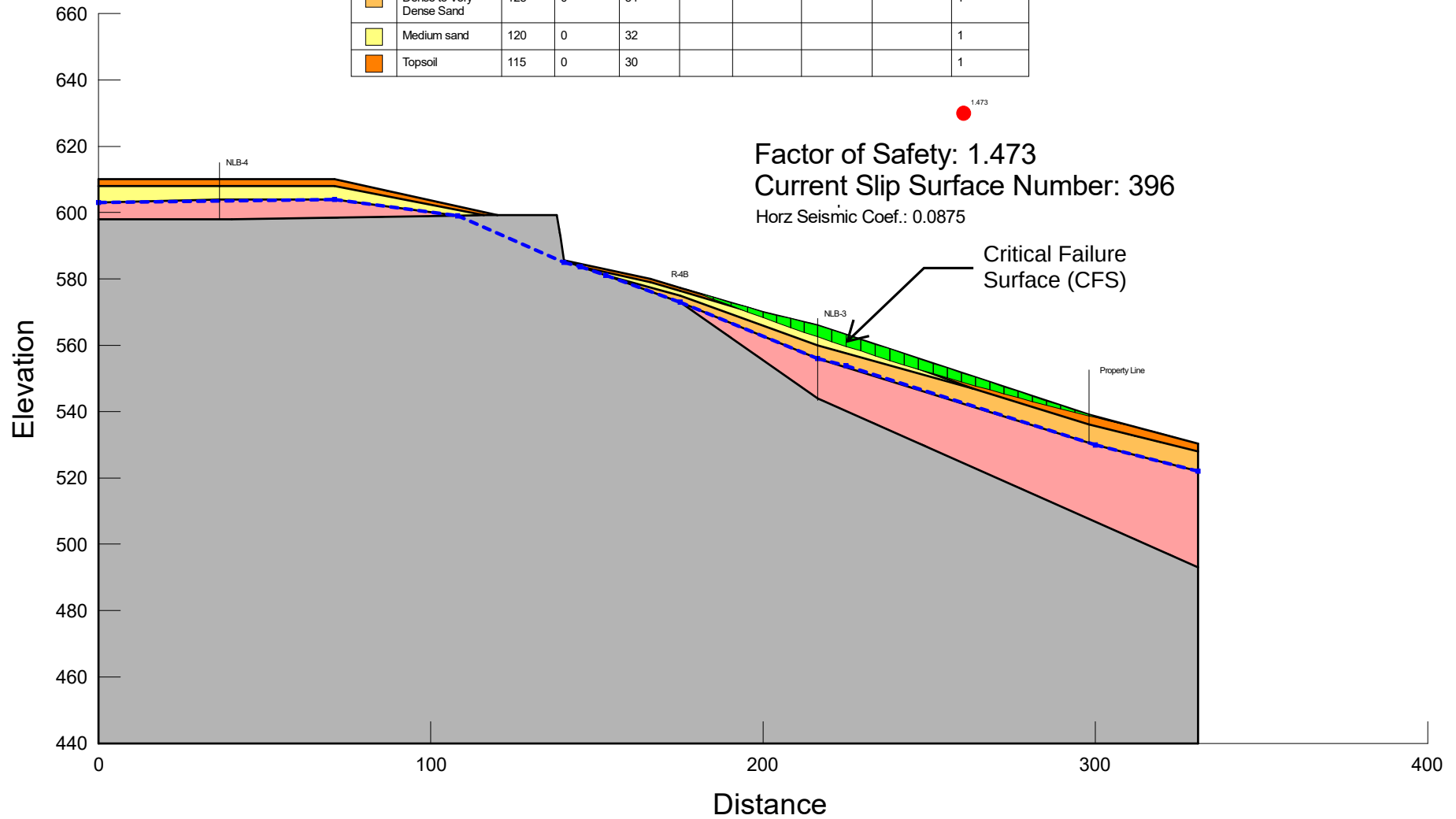
Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Yellow	Medium sand	120	0	32					1
Blue	Retaining Wall	150							1
Orange	Topsoil	115	0	30					1



Cross Section C_Proposed Condition

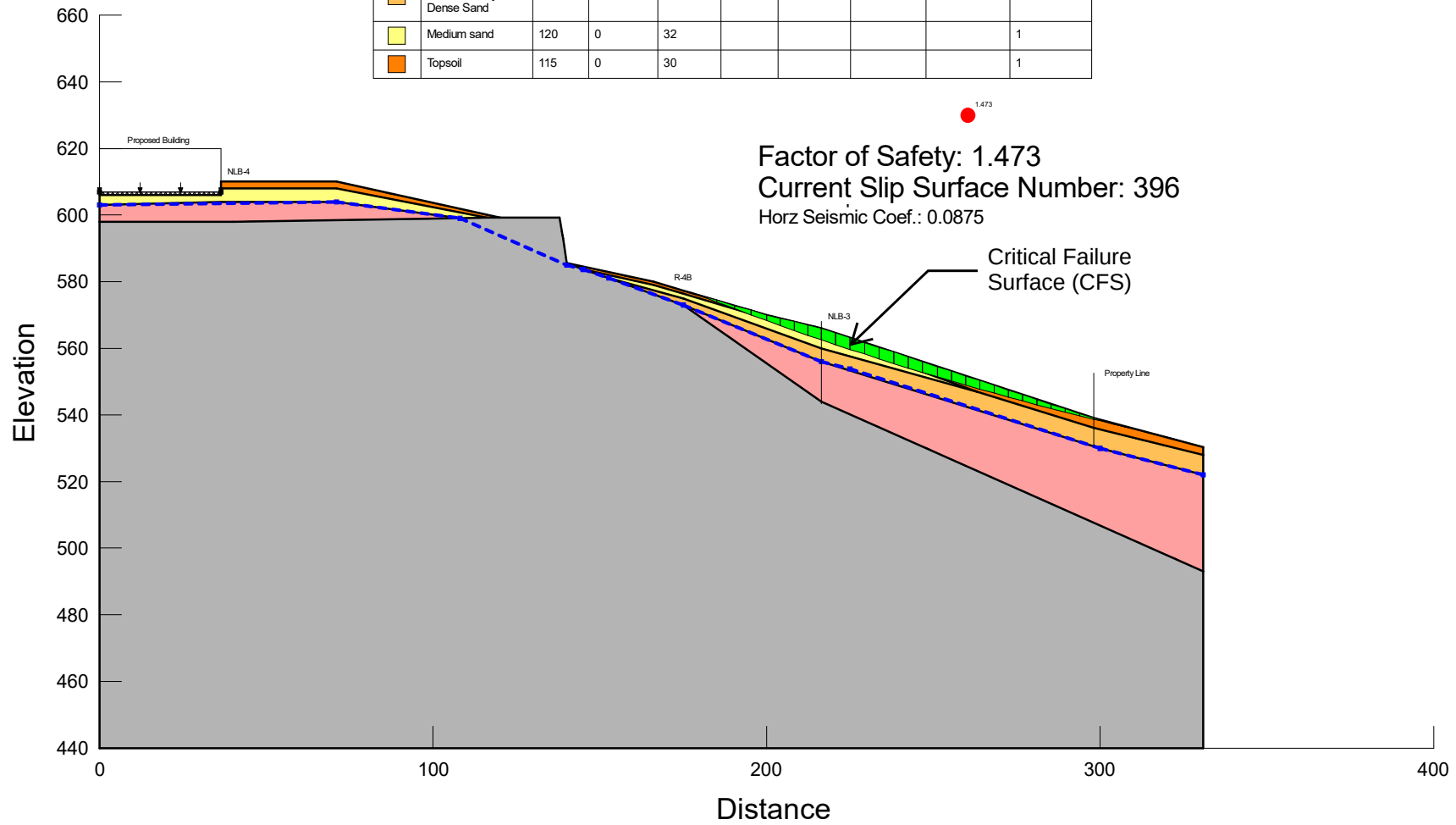
Cross Section D (Seismic Condition)

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Orange	Dense to Very Dense Sand	125	0	34					1
Yellow	Medium sand	120	0	32					1
Dark Orange	Topsoil	115	0	30					1



Cross Section D_Existing Condition

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	UCS Intact (psf)	Intact Rock Parameter mi	Geological Strength Index GSI	Disturbance Factor D	Piezometric Surface
Gray	Bedrock	180			323,263	17	65	1	1
Red	Decomposed Rock/Very Dense Granular Soil	135	0	38					1
Orange	Dense to Very Dense Sand	125	0	34					1
Yellow	Medium sand	120	0	32					1
Dark Orange	Topsoil	115	0	30					1



Cross Section D_Proposed Condition