Lehigh Hanson
HEIDELBERGCEMENT Group

24001 Stevens Creek Blvd.
Cupertino, CA 95014
(408) 996-4000

May 31, 2019

Roger Lee
Acting Director of Public Works
Public Works Department
City of Cupertino
City Hall
10300 Torre Avenue
Cupertino, CA 95014-3255

Re: Response to May 28, 2019 Administrative Citation and Notice of Violation

Dear Mr. Lee:

Lehigh Southwest Cement Company ("Lehigh") is providing the City of Cupertino ("City") with this response to the City's May 28, 2019 letter. The City's letter issued Lehigh an Administrative Citation and Notice of Violation for failing to provide notice to the City or obtain permits prior to modifications to the Utility Road, an existing unpaved road that extends approximately 500 feet into the City's jurisdiction.

The company is surprised by this letter, as we have been working cooperatively with City staff since November 2018 to resolve these issues, and have already completed many of the items marked as deficient in the City's letter, including submitting applications for grading and tree-removal permits. The following responds to the letter and updates the City on the status of the requested actions.

Violation A: Grading without a permit

The City's letter states Lehigh failed to obtain a grading permit prior to grading. The company submitted a grading permit application on February 22, 2019 and requested an assessment of fees due. To date the City has not responded with necessary fees required to process the permit or sent the company a letter of incompleteness. Enclosed please find a copy of the permit as submitted.

Violation B: Violation of design standards

The City's letter references design standards in the City's code. The code allows for an engineer's report in lieu of meeting certain prescribed design standards. Lehigh has submitted such a report to the City. The October 15, 2018 engineering evaluation completed by Stantec, which has been provided to the City, shows the existing road configuration to be stable and satisfies the City's design requirements.

At the Company's request, Stantec recently updated its geotechnical evaluation based on a revised Utility Road design that proposes to flatten the slopes adjacent to the Utility Road to 2.0H:1.0V in most areas and narrow the roadway to a 20-foot width. Stantec included a stability analysis that confirms the stability and safety of the revised road design and demonstrates that the design meets the City's standards. A copy of this report is attached.

Violation C: Lack of erosion control in violation of City Requirements

The City states there is no evidence that Lehigh used erosion control methods during or after construction. The Utility Road was modified during the dry season, however. It is the Company's practice, consistent with its stormwater discharge permit and County's conditions of approval, to ensure that disturbed areas are treated with erosion controls in advance of each wet season. Consistent with this accepted practice, in October 2018, the Company installed erosion control elements at the Utility Road for the upcoming wet season. These included straw waddles and silt fencing on slopes, hydro seeding all disturbed areas, installing a ditch to direct water on the inside of the road, and water bars across the rod to direct water in the ditch. All water was controlled in accordance to all applicable standards and rules.

Violation D: Unauthorized removal of protected trees

The City's letter indicates that a tree removal permit is necessary. Lehigh submitted a Retroactive Tree Removal Permit TR-2019-09 on February 22, 2019 and has been working with City staff since then to process the permit. Lehigh paid the associated fees to the City on March 28, 2019.

Corrective Action 1.

The City's letter requests the submittal of a grading permit application. As the City is aware, the Company submitted a grading permit to the City on February 22, 2019 and has neither received any comments from the City the permit application is missing required documentation nor been given an amount to pay for the grading permit. Accompanying this letter is an updated Geotechnical design for restoring the road per comments from the City given to Lehigh on an April 22, 2019 site visit. The restoration meets the City standards. Where the design deviates from prescribed standards, Lehigh has included an engineering analysis, as required by the CMC, to show the road is grossly stable in both static and psuedostatic conditions.

Corrective Action 2.

The Incomplete letter from the City received at 3:59 PM, Friday April 26, 2019 requested a modification to the legend on the planting plan. Lehigh provided the requested modification to the City Tuesday April 30, 2019.

On April 30, 2019, a following verbal conversation with City staff requested a modification to the distribution of trees in the planting plan. For clarification this follow up request was not included in the incomplete letter. Lehigh sent the requested distribution modification to the City on May 28, 2019.

Corrective Action 3.

Lehigh will prepare an additional check for the $100 administrative fee. To date Lehigh has paid the city for processing of the Retroactive Tree Removal Permit, and the fee for the Geotechnical Review of the Utility Road. The City has yet to give Lehigh the required amount for processing the grading permit and therefore the company cannot comply with this corrective action until such time the City provides this information.

Corrective Action 4.

Lehigh agrees to work with the City on appropriate timing of restoration work.

Lehigh appreciates the opportunity to provide this response and to provide any further information that may be requested. Please advise a time Lehigh and the City can meet to address the concerns in the letter and any other concerns the City has.

Sincerely,

Erika Guerra

Erika Guerra
Environmental and Land Resources Director
Lehigh Southwest Cement Company

cc:
Timm Borden - City of Cupertino
Heather Minner - Shute, Mihaly & Weinberger LLP

CUPERTINO

CITY HALL
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PHONE (408) 777-3354
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PUBLIC WORKS DEPARTMENT

Grading Permit

Date: February 1, 2019 File No: ________

PROJECT NAME: Lehigh ~~Lehgih~~ PG&E Access Road

LOCATION OF WORK: 24001 Stevens Creek Blvd NEAREST STREET: Permanente ~~Permanete~~ Road

TYPE OF WORK: ~~Placement of berm on outside edge and removal of loose material on the inside~~ edge

CONTRACTOR: Stevens Creek Quarry PHONE NO. ~~408-640-6160~~

PROPERTY OWNER: Hanson Permanete Cement Inc PHONE NO. ________

PERMITTEE: Lehigh Southwest Cement Inc PHONE NO. ________

ATTACHMENT: YES [X] NONE [ ]

SOILS ENGINEER: Stantec Consulting Services, Inc PHONE NO. (720) 889-6122

WORKER'S COMPENSATION: YES [X] NONE [ ] BOND: $________ FEE: $________

CONDITIONS:

1. Attached please find plans for grading.
2. No staging of trucks or storage of materials on City right-of-way is permitted without prior approval from the City.
3. All truck operations shall comply with Chapter 11.32 of the Cupertino Municipal Code, "Truck Traffic Routes".
4. Civil Engineer or Soils Engineer to review all grading for compliance to the approved plan and submit a final report to the City prior to occupancy.
5. No grading work shall be performed during the weekend.
6. Utilize Best Management Practices (BMP's), as required by the State Water Resources Control Board, for erosion control and construction activities.
7. Compaction reports and pad certification are required on all building pad work.
8. Contract Public Works, 777-3104, for drainage and final grade inspection.
9. Contractor is responsible for dust control and insuring the area adjacent to the work is left in a clean condition.
10. The Contractor shall review standard detail 6-4 on tree protection prior to accomplishing any work or removing any trees.
11. The Contractor must provide an approved Certificate of Insurance and Endorsement naming the City as Additional Insured prior to permit issuance.

APPROVED BY: ________________________ DATE: ________

INSPECTED BY: ________________________ Final Inspection DATE: ________

Distribution: Owner
P.W. Inspector
P.W. File

OWNERS SIGNATURE: [signature]

PERMIT VALID FOR 12 MONTHS

Revised 4/07

Stantec

To:	Talia Flagan Lehigh Hanson	From:	Paul Kos Denver CO Office
File:	Stevens Creek Quarry Access Road Stantec PN 233001289	Date:	October 15, 2018

Response to Notice of Violation Regarding Stevens Creek Quarry Haul Road

Background

Lehigh Hanson provided aggregate materials to the Stevens Creek Quarry via a roadway that climbs southerly from the Permanente aggregate plant and continues along a ridge toward the neighboring quarry site. The alignment has been in use for 50 plus years and does not represent an engineered design. This roadway began as a narrow, bulldozed exploration and utility access road, and recently was modified to allow for use by 45-ton off-highway haul trucks.

Lehigh Hanson recently received a Notice of Violation (NOV) from the County of Santa Clara, due to the road alignment crossing outside the Permanente Reclamation Plan Boundary and into the County. The NOV determined that the hauling activities are considered "mining-related".

Lehigh Hanson contracted Stantec to assess the road conditions, inspect the road, and to provide information requested by the County pursuant to the NOV.

Existing Conditions

The haul road was constructed following a pre-existing access road alignment. While the road appears to have been built without an engineering design, it is within typical mining industry standards for grading, slopes, and drainage controls. A key consideration of this road is the fact that it is an internal temporary road that cannot be accessed by the public and will remain as it serves the primary access to the southern property and an easement for PG&E. Roads such as this are typically constructed following existing site practices that have been proven to work at the site, thus little to no engineering is required. Photographs of the road are included below. **Figure 1** shows the observed current road cross section and presents the range of excavation heights. **Figure 2** shows the observed current fill profile.

Response to Notice of Violation Regarding Stevens Creek Quarry Haul Road

Figure 1: Observed Current Road Cross-Section

Figure 2: Observed Current Road Fill Profile

Response to Notice of Violation Regarding Stevens Creek Quarry Haul Road

The road is steep compared to public roads with grades up to 20%. These grades are common for mine haul roads and within the capabilities of the 45-ton off-highway haul trucks. The road is sloped towards the hillside, which causes water to collect on the inside of the road. Water flows either to the Aggregate plant at Permanente Quarry or Stevens Creek Quarry, where it enters one of the existing stormwater management systems. A safety berm was constructed on the outside edge of the haul road, consistent with MSHA requirements and standard safety practices. This configuration consisting of a berm on the outside and a ditch on the inside is a preferred design for haul roads, because it limits the potential for discharges to the environment. The cut slopes vary, but they are generally steep at approximately 1:1. The cut heights are up to 30 feet. The fill slopes are also steep at approximately 1.3:1, with fill slopes up to 50 feet high. Temporary internal mine roads are often constructed with cut and fill slopes in this range, and any erosion that occurs is managed by the site maintenance crews. Stantec personnel visited the haul road, and no cracking, slumping, or any other signs of slope movement were identified. An example of a current cross-section of the haul road, based on a recent LIDAR survey, is included as **Figure 3**.

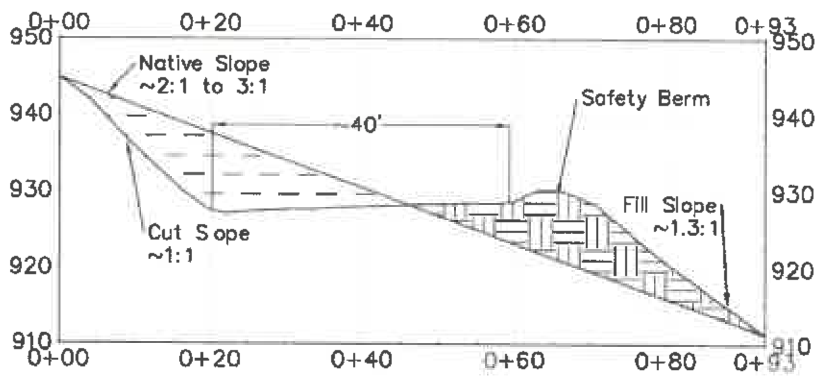


Figure 3: Typical Haul Road Configuration

Slope Stability Discussion

Comment 5 of the NOV requires Lehigh to submit slope stability calculations pursuant to California Code of Regulations, Title 14, § 3704(f). This regulation applies to final cut slopes and requires a slope stability factor of safety suitable with the proposed end land use. As discussed above, the haul road is a road that will be retained following mine reclamation for internal site access and will not be open for public use.

Slope Stability Evaluation

Stantec performed a geotechnical evaluation of the slope stability of the typical cut and fill slopes for the constructed road. The evaluated cross-section selected has greater cut and fill heights and steeper cut and fill slopes than other sections of the road and therefore provides a worst-case assessment of the road stability. The bedrock for the evaluation consists of greenstone, based on observation of the roadcuts by Stantec engineers. These road cuts appear to be stable with minor erosion.

The greenstone rock strength varies in the project area, depending on the amount of shearing and weathering that has occurred at each location. Low-quality rock is not known to be present in the immediate area of the road, and median strength parameters were used for this assessment. These parameters, listed in **Table 1** below, are consistent with previous analyses performed for roads and highwalls at the Lehigh property (Golder, 2011).

The fill material rock strength is consistent with the material strength parameters used for waste rock fill slope assessments at the Lehigh property (Golder, 2011). The waste rock at the property generally consists of greenstone, and Stantec feels the shear strength values are representative of the materials that will be encountered, albeit conservative due to no consideration for cohesion. There is a thin layer of residual soil between the greenstone and fill material, and Stantec used material strength parameters for soils that have previously been used for slope assessments at the Lehigh property (Golder, 2011). These parameters are listed in **Table 1** below.

Table 1: Shear Strength Values

Material	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)
Fill	125	35°	0
Soil	120	30°	200
Greenstone	165	23°	1,400

Stantec modeled the slope stability factors of safety for static and pseudo-static conditions using the Slope/W 2012 (Version 8.14) computer program. Slope/W performs a two-dimensional, limit-equilibrium analysis to calculate the factor of safety. The pseudo-static analysis used a seismic coefficient of 0.15, which is consistent with previous analyses at the Lehigh property (Golder, 2011).

The slope stability results present the minimum factors of safety for each analysis, and these results are included in **Table 2** below and in **Attachment 1**. The results indicate that the cut slopes are stable (FOS>1.0) during both the static and pseudo-static conditions. The fill slope is stable under static conditions, but the FOS is less than 1.0 for pseudo-static conditions. This suggests that some sloughing is likely to occur during a seismic event but mitigating the slope movements would be limited to grading and revegetating the slope. There is no infrastructure or any sort of facility below the road that can be impacted by potential slope movements.

Table 2: Slope Stability Results

Slope	Static FOS	Pseudo-Static FOS
Cut Slope	2.16	1.70
Fill Slope	1.06	0.78

The road was constructed following accepted mining practices and is stable for internal use. Any erosion or sloughing that occurs during a seismic event is expected to be minor and managed through routine inspections and maintenance.

Recommendations for Further Investigations

The foregoing is based on limited data. To the extent that a more refined analysis or verification is necessary at this time, Stantec recommends a further geologic and geotechnical investigation to evaluate the road configuration for slope stability, drainage, and practicality. This investigation should identify stable areas (i.e. solid rock) and determine if there are any areas along the alignment that have an increased potential for erosion or slope stability issues. The investigation should include an evaluation of soil type and depth, weathered bedrock locations and extent of weathering, shear zones, and rock type and structure. The existing roadcuts should provide adequate access and coverage of the area of interest, and no drilling should be expected. A significant database of laboratory strength testing exists, and the rock types can be compared to this existing data set. However, should conditions be outside the range of typical rock conditions, likely due to weathering or structure, Stantec recommends laboratory testing of the materials to obtain location specific strength parameters.

Recommendations for Future Actions

Stantec recommends several actions to improve the functionality of the road and minimize erosion and maintenance requirements. Foremost, the slopes should be seeded to establish vegetation, which will reduce erosion. The seeding should occur before the upcoming rainy season. Also, sections identified during any future geotechnical evaluation as having soil or weathered bedrock can be laid back or otherwise supported to improve the stability of the cut slope if possible. Unconsolidated and highly weathered material should be graded to a 2:1 slope where possible to promote slope stability and reduce erosion. These areas may be graded to a steeper slope where necessary to limit the disturbance area; however, this may result in an increase in maintenance requirements. Bedrock slopes should be monitored for erosion, and these areas graded if necessary. A typical road design is included as **Figure 4**.

Stantec also recommends monitoring the road and tracking maintenance requirements to help identify erosion locations and areas where additional grading may be required to minimize future erosion. The ditch along the length of the haul road should be evaluated for storm flows and armoring should be considered if peak flow velocities exceed the resisting strength of the channel material and/or erosion occurs.

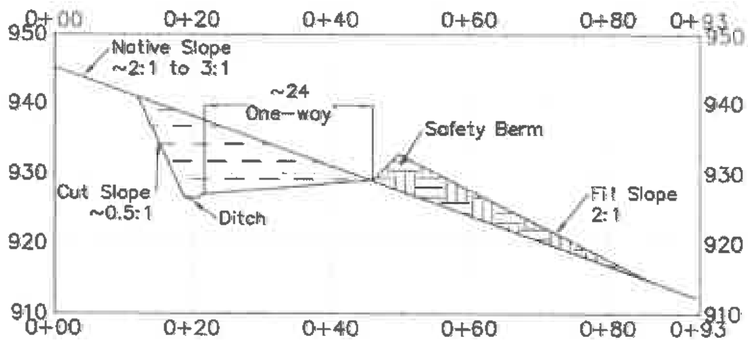


Figure 4: Typical Haul Road Design

Closure

This report has been prepared for Lehigh Hanson to provide them with a conceptual evaluation of the haul road used to transport aggregate material from the Permanente Quarry to the neighboring Stevens Creek Quarry based on site observations and provided data. Future studies are expected to verify the assumed conditions, and this should be confirmed prior to the commencement of any construction activities. As mutual protection to Lehigh, the public, and Stantec, this memorandum and its figures are submitted for exclusive use by Lehigh Hanson. We specifically disclaim any responsibility for losses or damages incurred through the use of our work for a purpose other than as described in this memorandum. Our memorandum and recommendations should not be reproduced, except in whole, without our express written permission.

Stantec Consulting Services Inc.

Paul J. Kos

Paul Kos, P.E.
Senior Geological Engineer

Phone: (720) 889-6122
paul.kos@stantec.com

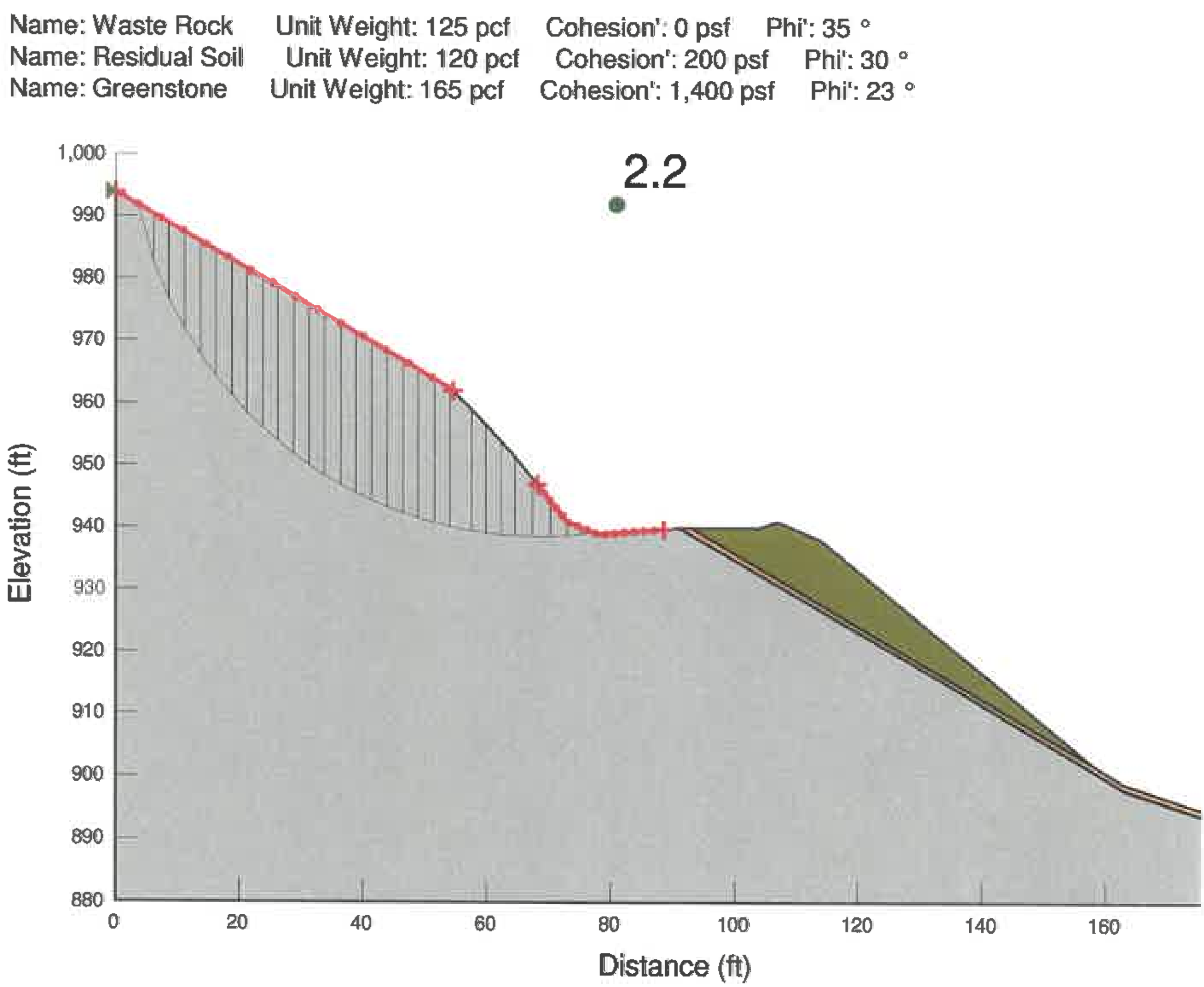
Attachment: Stevens Creek Quarry NOV Response
Stability Analysis Results

Reference: Golder, 2011. Geotechnical Evaluations and Design Recommendations (Revised), Permanente Quarry Reclamation Plan Update, Santa Clara County, California, Revision 1.1_12-7-11, November 2011.

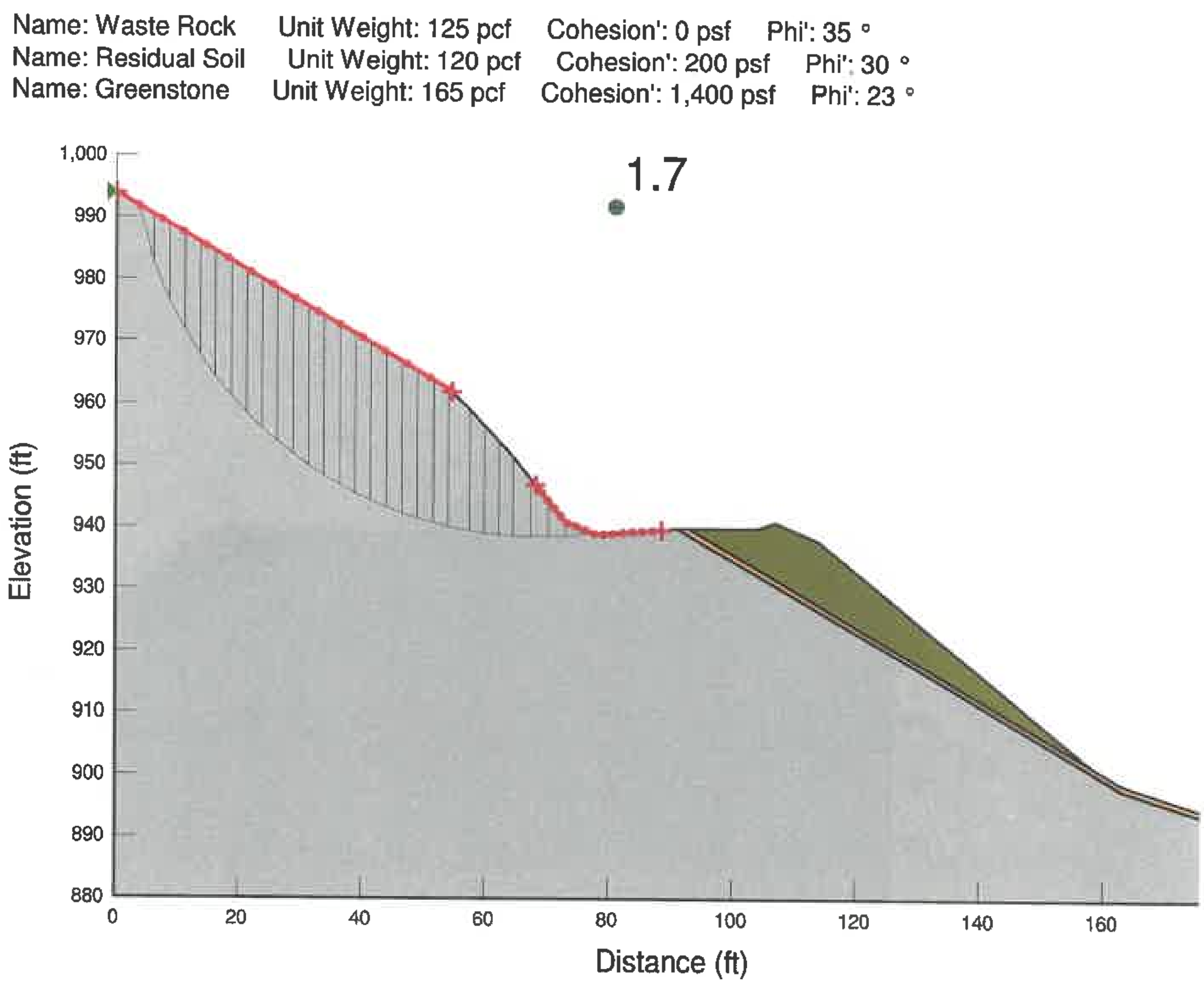
Attachment 1

Slope Stability Analysis Results

File Name: Existing Road.gsz
Name: 1. Cut Slope
Method: Spencer

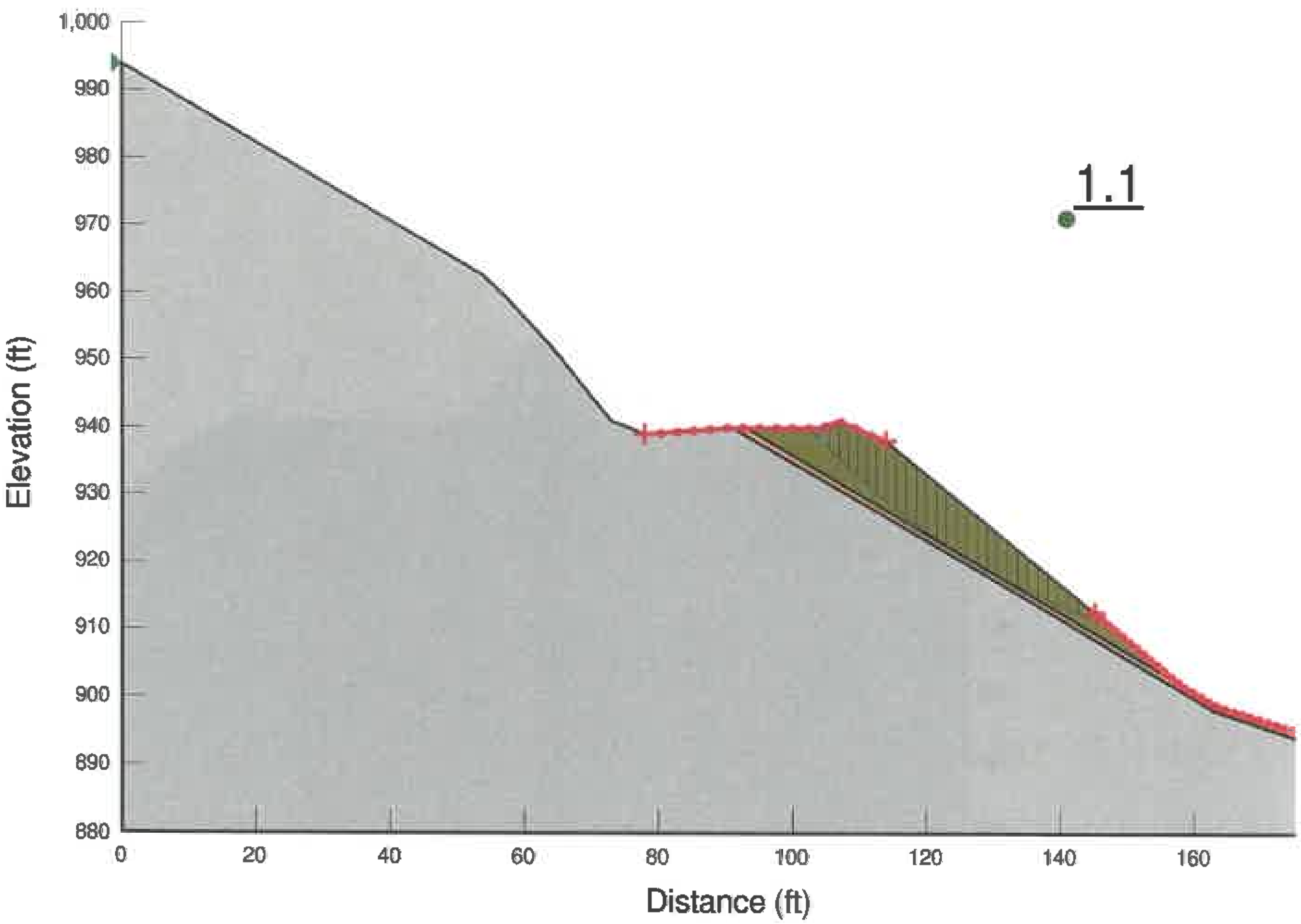


File Name: Existing Road.gsz
Name: 1. Cut Slope - Pseudo-static
Method: Spencer



File Name: Existing Road.gsz
Name: 2. Fill Slope
Method: Spencer

Name: Waste Rock Unit Weight: 125 pcf Cohesion': 0 psf Phi': 35 °
Name: Residual Soil Unit Weight: 120 pcf Cohesion': 200 psf Phi': 30 °
Name: Greenstone Unit Weight: 165 pcf Cohesion': 1,400 psf Phi': 23 °



File Name: Existing Road.gsz
Name: 2. Fill Slope - Pseudo-static
Method: Spencer

Name: Waste Rock Unit Weight: 125 pcf Cohesion': 0 psf Phi': 35 °
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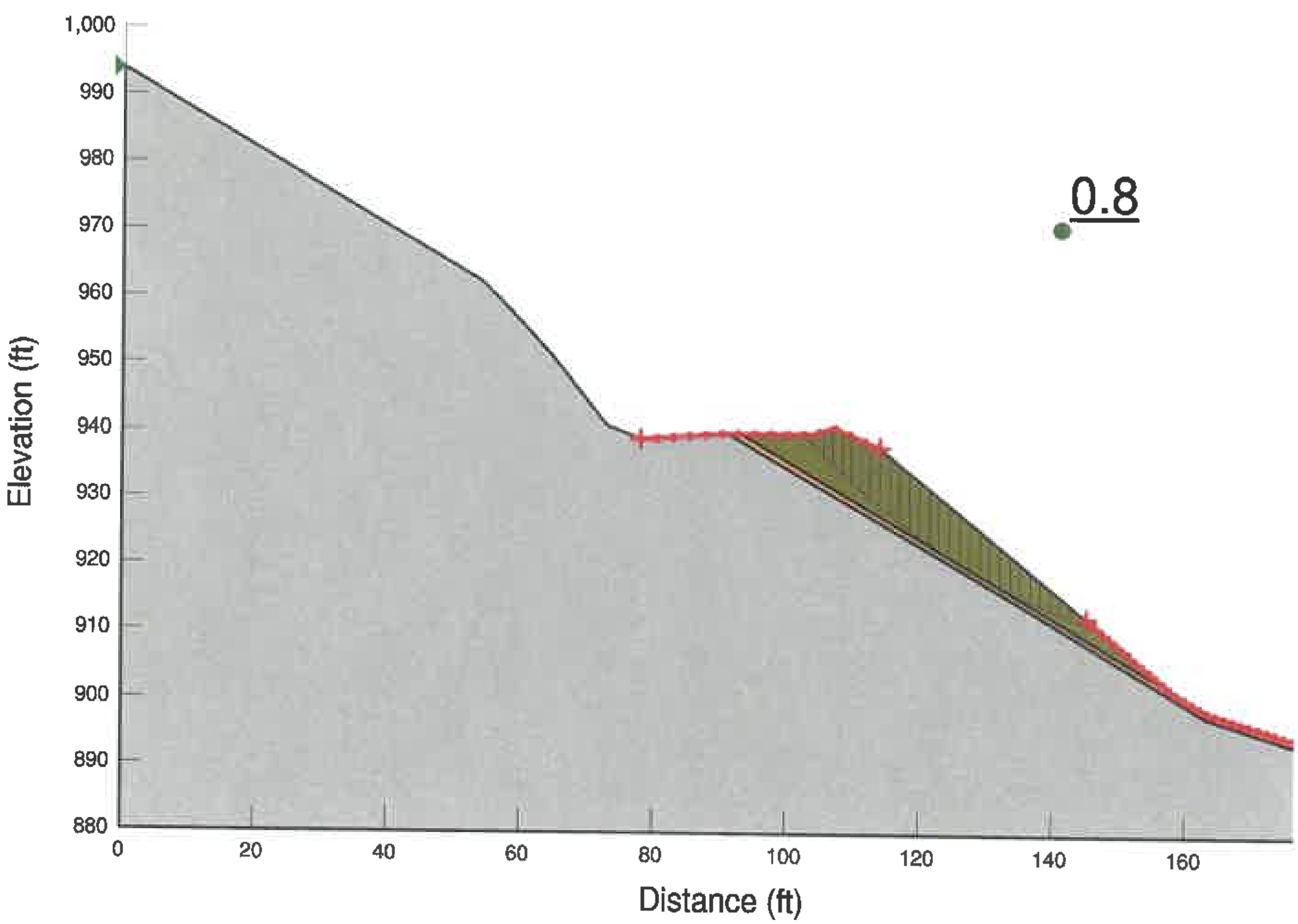
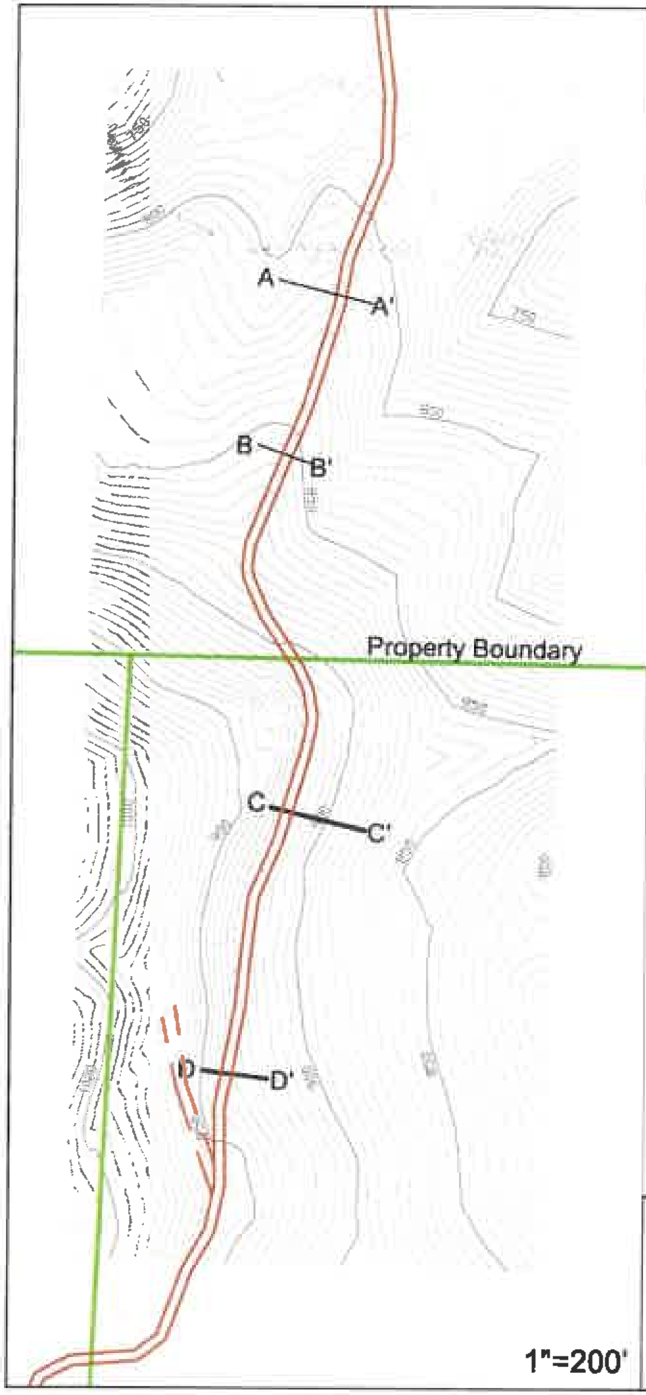
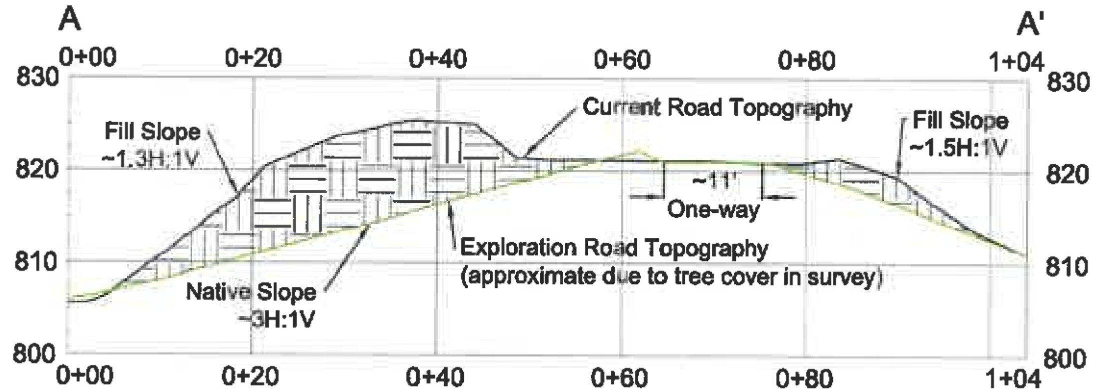




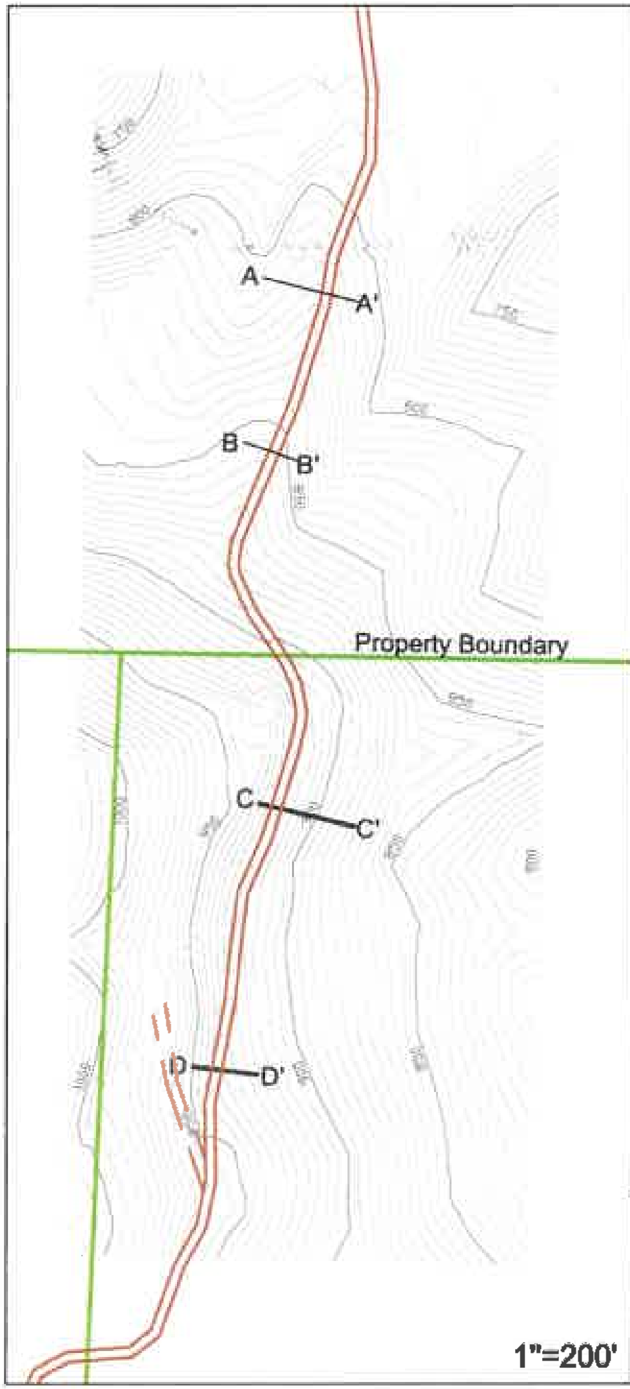


PREPARED BY:

Stantec
2000 South Colorado Boulevard
Suite 2-300
Denver CO 80222 stantec.com

PERMANENTE QUARRY
STEVENS CREEK QUARRY ROAD
CROSS-SECTION

FOR: LEHIGH HANSON	DATE: 10/30/18	SHEET 1 OF 1



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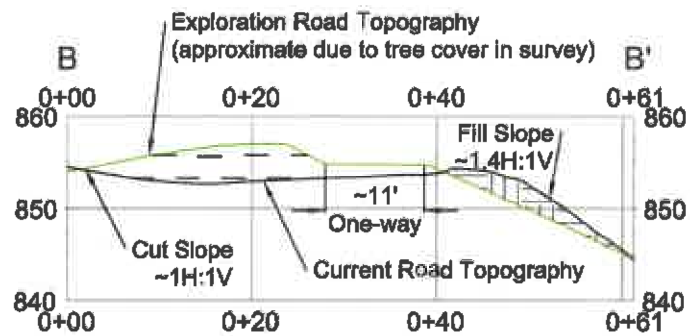

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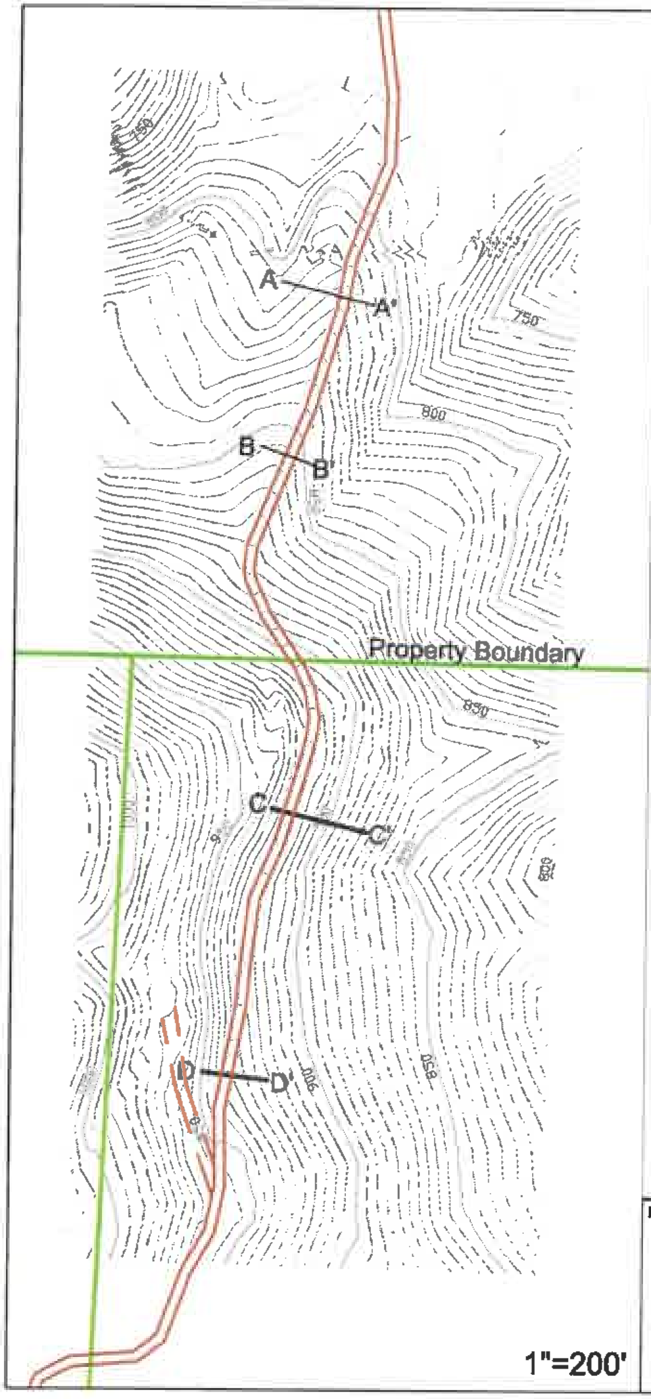
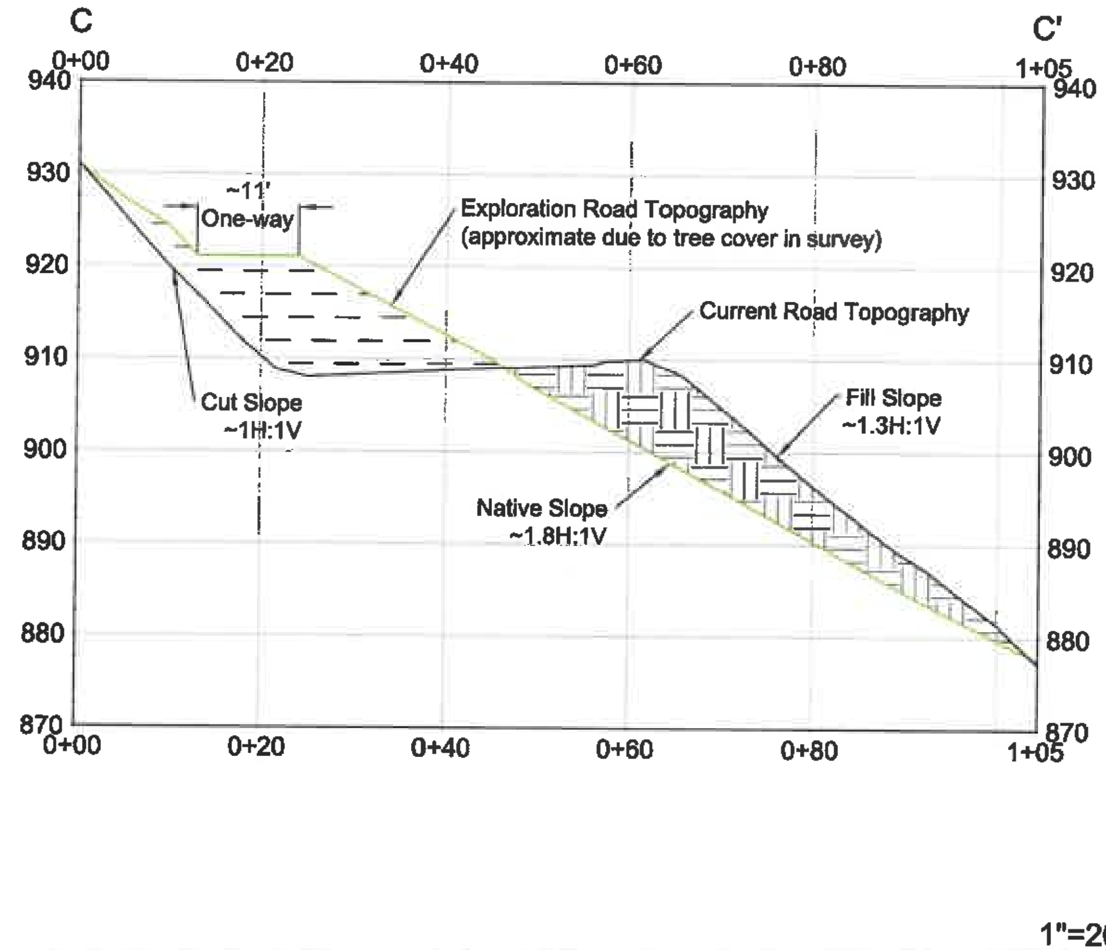
FOR: LEHIGH HANSON | DATE: 10/30/18 | SHEET 1 OF 1





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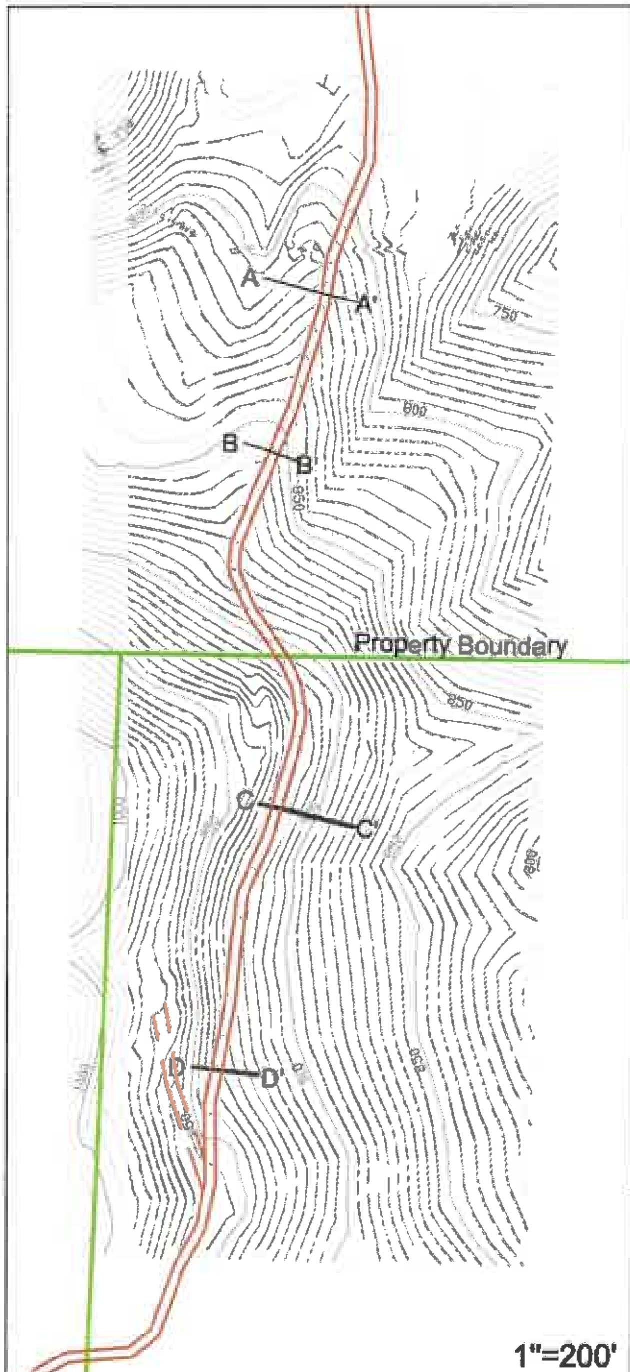
FOR: LEHIGH HANSON	DATE: 10/30/18	SHEET 1 OF 1



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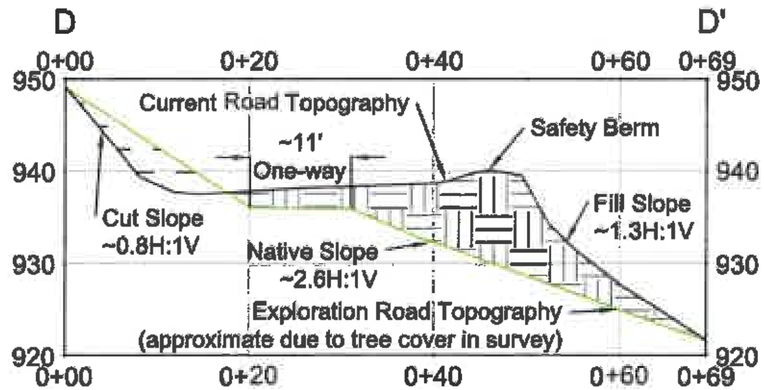

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PERMANENTE QUARRY
STEVENS CREEK QUARRY ROAD
CROSS-SECTION

FOR: LEHIGH HANSON	DATE: 10/30/18	SHEET 1 OF 1

Stantec

Memo

To:	Talia Flagan Lehigh Hanson	From:	Paul Kos Stantec
File:	File Name	Date:	December 20, 2018

Reference: Response to County Comments on Stevens Creek Quarry (SCQ) Road Design

This memorandum provides responses to comments provided by Santa Clara County on December 5, 2018 regarding the proposed Reclamation Plan Minor Amendment (RPA) submitted by Lehigh Hanson on November 19, 2018. For each of the four comments provided, the Santa Clara County's comment is included followed by Stantec's response to the comment.

Santa Clara County Comment 1. Possible Existing Landslides: *Using the topographic contours derived from 2006 LiDAR, I have inferred the possible extent of several landslides on the slope where the plan proposes grading for a new haul road. (I recognize that the thick vegetation in that area makes details of the topography less reliable than ground survey data would be.) In-the-field evaluation by an engineering geologist is needed to verify whether or not such landslides actually exist in that area. If they do, additional geotechnical engineering analysis will be needed to determine the full extent of grading necessary to assure long-term stability of the proposed cut and fill slopes.*

Response: Stantec observed geologic features between SCQ and Lehigh's North Pit in October 2018 and conducted a supplemental investigation of the SCQ Road alignment in December 2018 to evaluate and respond to the County's comments. While making these observations, no signs of instability or landslides were observed in the SCQ Road proposed alignment. While the area is obscured by vegetation, no scarps or over steepened areas were identified in the field. Also, tree trunks, phone poles, and power poles are vertical in the area. The presence of an existing landslide typically causes these types of features to lean at an angle less than vertical. The stability assessment used the rock strength for a weak greenstone bedrock material to be conservative. Should limestone or competent greenstone be encountered, the rock strength and corresponding factor of safety for stability would be considerably higher than those presented in the original submittal. The road design also requires Lehigh to verify the geologic conditions as part of actual construction.

Santa Clara County Comment 2. Ground Cracks and Unstable Fill: *We have observed several cracks in the graded surfaces within the Stevens Creek Quarry property (APN 351-10-019) that seem to indicate on-going ground movement toward the main pit. The plan shows the proposed haul road and an associated retaining wall (up to 15 feet tall) will cross some of the ground cracks. The reconfigured SCQ perimeter road is also shown as crossing some of the ground cracks (and the fill that appears to be unstable). That requires evaluation to verify the long-term stability of the proposed new roads and retaining wall.*

Response: Stantec investigated the proposed haul road and SCQ perimeter road intersection in December 2018, and no cracks were observed at that time. SCQ will be responsible for assuring stability of the portions of the road on its property. As the County is aware, SCQ is required to buttress its cut slopes with fill as part of its reclamation, and Stantec observed that this buttress is being placed. Therefore long term stability of the road would not be at risk.

Santa Clara County Comment 3. Mapped Fault Trace: *The surface trace of the Berrocal Fault has been mapped as crossing through the area of the proposed grading on several published maps. The bedding planes in the Santa Clara Formation mapped on the northeastern side of the fault are shown as dipping*

Reference: **Response to County Comments on Stevens Creek Quarry (SCQ) Road Design**

toward the northeast, in the same direction as the ground surface. This potential "dip slope" condition needs to be considered in the slope stability analysis. The possible effects of groundwater damming and localized seepage need to be considered as well in the stability analyses.

Response: Stantec geologists observed shear zones in the Permanente and Stevens Creek Quarry area in October 2018, using aerial photographic interpretation methods followed by a field investigation, and the SCQ Road may cross a shear zone. The geologists also observed that multiple shear zones intercept the pitwalls without impacting the remaining highwall stability. The pitwall slope failures typically occurred on southeast to east facing walls with steep (~40°) slopes. The designed cut slopes are northeast facing at 30° slopes, and there have not been slope issues in areas with this orientation and slope regardless of the presence of shear zones.

The geologists also mapped dip slopes in the limestone units of the Franciscan Formation and determined them to be nearly horizontal in this area. Thus, the dip slopes have no impact on the slope stability. The stability assessment used the rock strength for a weak greenstone bedrock material to be conservative. The design also requires Lehigh to verify the geologic conditions. Should limestone or competent greenstone be encountered, the rock strength and corresponding factor of safety for stability would be considerably higher than those presented in the original submittal.

Groundwater interception is not expected due to the relatively shallow depths of the excavation. However, should groundwater be encountered, seepage will be conveyed to the stormwater management system. Groundwater damming is highly unlikely considering the fractured nature of the bedrock in this area.

Santa Clara County Comment 4. Fate of the Existing Haul Road (on APN 351-10-033): *The "corrections" needed to achieve long-term stability along that portion of the recently reconfigured haul road located north of the County/City Boundary are not indicated on the plan. Changes to increase the long-term stability of those slopes to an acceptable level need to be indicated on a plan. Given that surface runoff flows northward along the existing road, co-ordination with the City of Cupertino's requirements for "correcting" the past grading within APN 351-10-017 would seem to be necessary.*

Response: The existing haul road is a result of widening a pre-existing utility access road that likely was not engineered. The haul road will be reclaimed by grading and revegetating. Fill slopes will be graded so that all slopes are 2:1 or shallower. Disturbed areas will be reclaimed by scarifying and reseeding following the techniques in the approved Reclamation Plan. These practices will leave stable reclamation slopes and provide the necessary utility access.

Stantec Consulting Services Inc.

Paul Kos

Paul Kos
Senior Geological Engineer

Phone: 720 889 6122
paul.kos@stantec.com

To:	Talia Flagan Lehigh Hanson	From:	Paul Kos Denver, Colorado Office
File:	Lehigh Utility Road Geotech Review Stantec PN 233001289	Date:	May 21, 2019

Utility Road Grading Plan and Geotechnical Analysis

BACKGROUND

Lehigh Hanson (Lehigh) improved an approximately 800-foot long portion of an existing utility road that climbs southerly from the Permanente aggregate plant and continues along a ridge toward the neighboring quarry site (**Figure 1**). The alignment has been in use for 50 plus years and does not represent an engineered design. This roadway began as a narrow, bulldozed exploration and utility access road. It was subsequently used as a maintenance road to access this portion of the property, and by Pacific Gas and Electric Company (PG&E) to access power lines in the area. The road was improved in 2018 to allow for off-site materials transport. Lehigh plans to grade the utility road to decrease slope gradients while continuing to allow access by site personnel for maintenance and exploration purposes, PG&E maintenance vehicles, and potentially emergency response vehicles. No further hauling is planned for the road.

Figure 1 Utility Road Location

EXISTING CONDITIONS

The utility road was improved along its preexisting alignment. While the road contains steep slopes and grades, it is within typical mining industry standards for grading, slopes, and drainage controls. A key consideration of this road is that it is an internal road that cannot be accessed by the public. It must remain serviceable as it serves the primary access to the southern property and as an easement for PG&E utility lines. Roads such as this are typically constructed following existing site practices that have been proven to work at the site. Photographs of the improved road are included below. **Figure 2** shows the road cross-section and presents the range of excavation heights. **Figure 3** shows the fill profile. It should be noted that the slopes pictured have been revegetated since these photographs were taken.

Figure 2 Utility Road Cross-Section

Figure 3 Utility Road Fill Profile

The road is steep compared to typical public roads, with grades up to 20%. These grades are common for unpaved mine access roads which are not intended for public use. These grades are also consistent with the grades for retained roads in the currently approved Reclamation Plan Amendment for the Permanente Quarry. The road is sloped toward the hillside, which directs stormwater to the inside of the road. Water flows either to the aggregate plant at Permanente Quarry to the north or Stevens Creek Quarry to the south, where it enters one of the existing stormwater management systems.

The utility road was constructed by placing a key at the toe of the fill slope. The key included excavating material from the toe of the fill area and backfilling it with compacted fill. Water was added to the fill to achieve optimal moisture content, and it was compacted with a vibratory sheep's foot roller. Once the key was constructed, the utility road was improved by cutting material from the uphill slope and placing compacted fill on the downhill slope above the key. The fill slope was cleared and grubbed, but the surface soil was not removed, except where the key was placed. The cut slopes vary, but they are generally steep at approximately 1:1 (45°), with cut heights are up to 30 feet. The fill slopes are also steep at approximately 1.2:1 (39°), with fill slopes up to 50 feet high. Internal mine roads are often constructed with cut and fill slopes in this range, and any erosion that occurs is managed by the site maintenance crews. A safety berm was constructed on the outside edge of the utility road, consistent with Mine Safety and Health Administration (MSHA) requirements and standard safety practices, which improves the safety of maintenance or utility worker use. This configuration consisting of a berm on the outside and a ditch on the inside is a preferred design for site roads, because it limits the potential for discharges to the environment.

A Stantec Certified Engineering Geologist (CEG) inspected the utility road in May 2019 to evaluate the lithology along the road cut. The inspection confirmed the road was constructed primarily in the Santa Clara Formation; however, the southern section (including C-C') was constructed in Franciscan Limestone and Greenstone. The limestone is not present at the two areas where a geotechnical assessment is required (see below). **Figures 4** and **5** show the Santa Clara Formation at the road cut at cross-section B-B' and Greenstone at the road cut at cross-section C-C', respectively. **Drawing 1** includes the cross-section locations, and the cross-sections are included as **Drawing 2**.

Figure 4 Road Cut at Cross-Section B-B'

Figure 5 Road Cut at Cross-Section C-C'

SURVEY DATA

Lehigh provided Stantec with survey data from before and after the road improvements. The pre-construction survey was performed in April 2007, and the existing conditions survey was performed in September 2018. These surfaces were used to create the grading plan and to create the cross-sections used to analyze the slope stability. Stantec believes the April 2007 survey was impacted by dense vegetation in the vicinity of the utility road, and the survey appears to present the top of vegetation in several areas rather than the ground surface. To compensate for these differences in elevation, Stantec adjusted the original ground topography in the cross-sections based on known facts. These include the extents of cutting and filling from the road improvement – the 2007 topography and 2018 topography should match outside this area. Also, aerial photographs available from Google Earth were used to determine the distances from the original road, key road, and current road edges and centerlines to confirm extents of disturbances. The 2007 topography, while showing the top of vegetation, likely represents the original slope, and the surface was lowered to match the extents of disturbance.

PROPOSED GRADING

Stantec recommends grading the road to reduce fill slope gradients to comply with local rules and regulations. City and County grading regulations require slope gradients be 2h:1v, or the design be certified by a Certified Engineering Geologist. The grading design is based on a minimum 20-foot road width, which includes sufficient space for one-way travel, a ditch, and a berm. Road widths for retained roads, in the currently approved Reclamation Plan Amendment for the Permanente Quarry, vary and are as narrow as 12 feet. Wherever practical, the road will be wider than 20 feet to provide turn-off locations. The grading plan has an overall road gradient of approximately 12%, with short sections that exceed 20% gradient. These grades are consistent with the original utility road and other roads that will be retained during reclamation per the currently approved Reclamation Plan Amendment for the Permanente Quarry.

The road can be graded to 2h:1v slopes the entire length of the road, except for two areas as shown on **Drawing 1**. Both sections where steeper slopes are required are approximately 100 feet long. The grading for both areas includes narrowing the road width to 16 feet and increasing the slope gradient to the necessary slope that does not increase the disturbance area beyond the existing area. Narrowing the road to 16 feet allows the slope gradient to be decreased closer to the 2h:1v target, while maintaining sufficient road width for the potential traffic. The northern section requires a maximum gradient of 1.70h:1v, and the southern section requires a maximum gradient of 1.76h:1v. These gradients follow the pre-construction topography; therefore, the entire length of road will be graded to 2h:1v slopes or to pre-construction topography. This grading requires excavating and hauling away approximately 9,000 cubic yards of material. The material will be placed on the Permanente Quarry property in accordance with the current Reclamation Plan.

Cross-sections of the proposed utility road through a typical 2h:1v slope and the two areas requiring slope gradients steeper than 2h:1v are included as **Drawing 2**. These figures present the original topography based on the 2007 pre-improvement survey, current topography based on the September 2018 survey, and the design topography.

SLOPE STABILITY DISCUSSION

Lehigh is required to submit slope stability calculations pursuant to California Code of Regulations, Title 14, § 3704(f). This regulation applies to final cut slopes and requires a slope stability factor of safety suitable with the proposed end land use. As discussed above, the utility road will be retained following mine reclamation for internal site access, PG&E access, and emergency vehicle use. The road will not be open for public use.

SLOPE STABILITY EVALUATION

Stantec performed a geotechnical evaluation of the slope stability for the two sections where fill slopes must be steeper than 2h:1v. Stantec evaluated both the cut and fill slopes. The slope stability analyses were modeled using the software Slope-W® 2018 R2 version 9.1 by GeoStudio, released in 2018. The software used limit equilibrium on slices of potential failure surface to calculate factor of safety (FoS). The models are evaluated under static and pseudo-static conditions, with horizontal ground acceleration, using the Spencer method. The minimum acceptable factors of safety for the analyses are 1.3 for static conditions, and 1.0 for pseudo-static conditions based on mining industry standards. For the pseudo-static model conditions, a horizontal seismic coefficient of 0.15 times the force of gravity (g) was applied to the static condition models to be consistent with previous studies (Golder 2011) and to follow recommendations for earthquakes with magnitudes up to 8-1/4 (Seed 1982).

Site-specific geotechnical information on the backfill materials is available for the overburden fill, bedrock, and native soils. Strength parameters for the material have been established in previous geotechnical analyses of the Lehigh property and are based on laboratory testing, back-calculation, and published values for material properties (Golder 2011). These strength parameters are listed in **Table 1** below.

The fill material rock strength is consistent with the material strength parameters used for waste rock fill slope assessments at the Lehigh property (Golder 2011). Stantec feels the shear strength values are representative of the materials used for the fill, albeit conservative due to no consideration for cohesion, considering the existing fill slopes were placed at a gradient of approximately 39 degrees.

There is a thin layer of residual soil between the bedrock and fill material, and Stantec used material strength parameters for soils that are based on laboratory testing results and published strength values for Sandy Clay/Clayey Sand/Clayey Gravel/Silty Sand material. The laboratory results included values for cohesion; however, the stability analysis assumed a cohesionless material to be conservative. These strength values are representative of native soils above the Santa Clara Formation and have previously been used for slope assessments at the Lehigh property (Golder 2011).

The Santa Clara Formation is present in the road cut at cross-sections A-A' and B-B' and occurs as both fine- and coarse-grained materials. The fine-grained material at cross-section A-A' is primarily a medium to high plasticity clay with gravel, sand, and some silt. The coarse-grained material at cross-section B-B' is a well-graded gravel with clay and sand, with fine to coarse, rounded to sub-rounded gravels. Strength values for the Santa Clara Formation are provide by California Geological Survey for the Cupertino 7.5-minute Quadrangle (CGS 2002). Values for both "favorable bedding conditions" (coarse-grained) and "adverse bedding conditions" (fine -grained) were used in the stability analysis considering both are present in the project area. The unit weight for the Santa Clara Formation was assumed to be the same as the Greenstone and Limestone bedrock.

Weathered Greenstone and Limestone are present along the road cut at cross-section C-C'. Site specific geotechnical information is available for the Greenstone and Limestone rock types, and strength parameters for the material have been established in previous geotechnical analyses (Golder 2011 and Stantec 2019). These strength parameters are based on laboratory testing, back-calculation, rock mass rating (RMR) calculations, and back-analysis of landslide areas. The strength parameters, from RMR classification, were provided to estimate Mohr-Coulomb strength parameters. RocLab (1.0) free software from Roc Science were used to do the calculation. The calculations were based "General" application for failure envelope range. The disturbance factor of D = 0 was used.

Table 1 Shear Strength Values

Material	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)
Soil	120	30	200
Fill	125	35	0
Santa Clara (favorable bedding conditions)	165	33	550
Santa Clara (adverse bedding conditions)	165	24	820
Greenstone	165	23	1,400
Limestone	165	30	12,500

Stantec modeled the slope stability factors of safety for static and pseudo-static conditions using Slope/W 2012 (Version 8.14) software. Slope/W performs a two-dimensional, limit-equilibrium analysis to calculate the factor of safety. The pseudo-static analysis used a seismic coefficient of 0.15, which is consistent with previous analyses at the Lehigh property (Golder 2011).

The slope stability results identify the minimum factors of safety for each analysis, and these results are summarized in **Table 2** below and the model reports are included in **Attachment 1**. The results indicate that the cut and fill slopes are stable (FOS>1.0) during both the static and pseudo-static conditions. There is no infrastructure or any sort of facility below the road that can be impacted by potential slope movements. Stantec recognizes that the location of the pre-construction topography is approximate, and a sensitivity analysis was performed to assess the fill slope stability if the entire road bench is fill material. This sensitivity demonstrates that the slope is stable in this unlikely scenario. Stantec also recognizes that the strength of the Santa Clara Formation may not be uniform along the road cut, and a sensitivity analysis was performed using published strengths for fine-grained sections of the formation with “adverse bedding conditions” (CGS 2002). The sensitivity also demonstrates that the slope is stable if there is fine-grained Santa Clara Formation present; see **Attachment 1**.

Table 2 Slope Stability Results

Section	Slope	Static FOS	Pseudo-Static FOS
A-A’	Cut Slope (coarse-grained)	1.88	1.46
	Cut Slope (fine-grained)	1.87	1.41
	Fill Slope	2.06	1.52
B-B’	Cut Slope (coarse-grained)	1.87	1.45
	Cut Slope (fine-grained)	1.88	1.45
	Fill Slope	1.93	1.52
C-C’	Cut Slope	2.86	2.44
	Fill Slope	2.67	1.94

Recommendations for Future Actions

Stantec recommends several actions to improve the functionality of the road and minimize erosion and maintenance requirements. Foremost, the slopes should continue to be seeded to establish vegetation, which will reduce erosion. Similar to what was completed in 2018, the seeding should occur before each rainy season, as necessary.

Stantec also recommends maintaining the road and repairing any areas where erosion may occur.

Closure

This report has been prepared for Lehigh Hanson to provide a geotechnical evaluation of proposed grading activities to further improve to the existing utility road based on site observations and provided data. As mutual protection to Lehigh, the public, and Stantec, this memorandum and its figures are submitted for exclusive use by Lehigh Hanson. We specifically disclaim any responsibility for losses or damages incurred through the use of our work for a purpose other than as described in this memorandum. Our memorandum and recommendations should not be reproduced, except in whole, without our express written permission.

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Attachments:

Drawing 1 Utility Road Grading Plan
Drawing 2 Utility Road Cross-Sections
Slope Stability Analysis Results

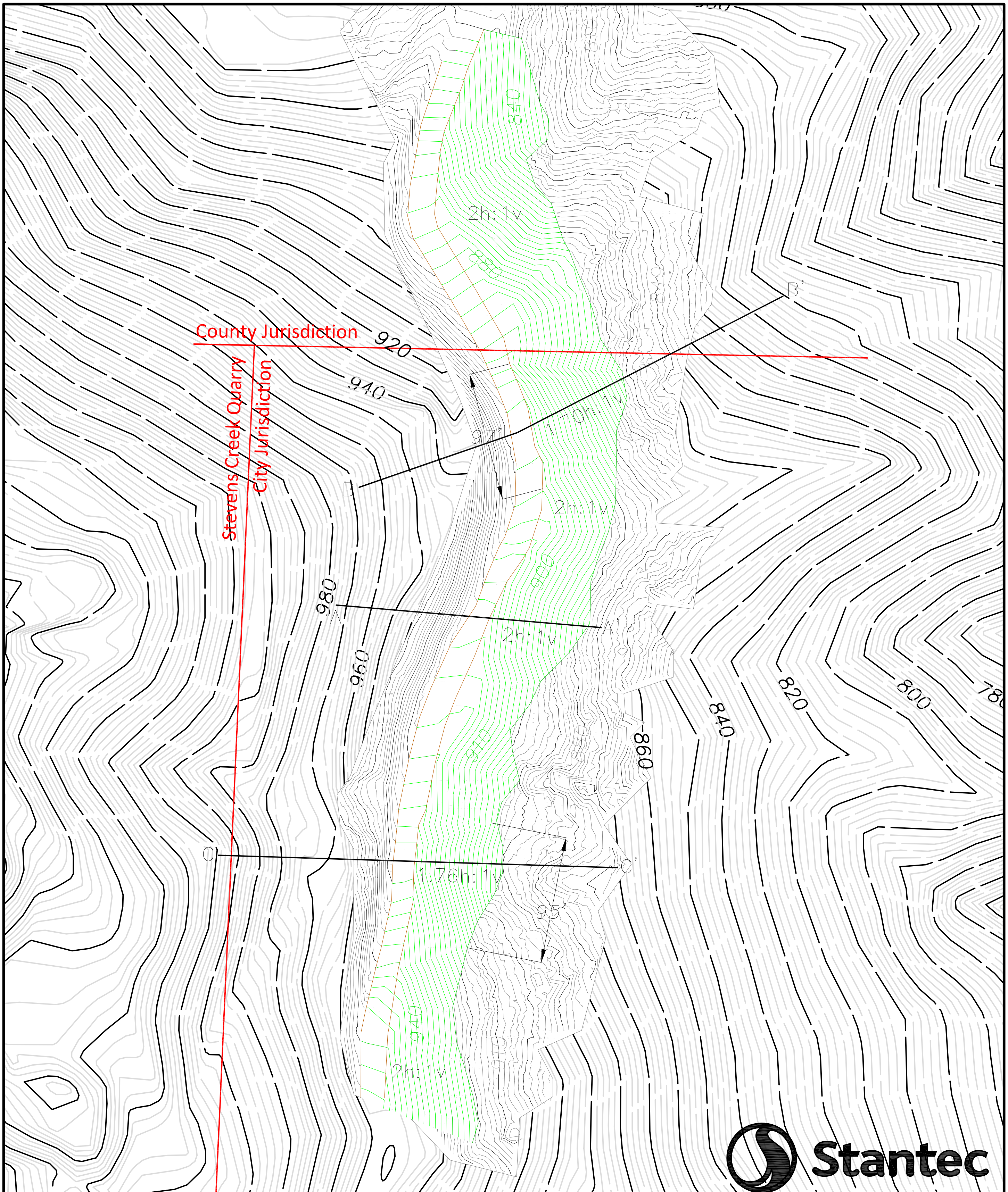
References:

CGS, 2002. Seismic Hazard Zone Report for the Cupertino 7.5-Minute Quadrangle, Santa Clara County, California. Seismic Hazard Zone Report 068. Department of Conservation, California Geological Survey. 2002.

Golder, 2011. Geotechnical Evaluations and Design Recommendations (Revised), Permanente Quarry Reclamation Plan Update, Santa Clara County, California, Revision 1.1_12-7-11. November 2011.

Seed, H. B., 1979. “Considerations in the Earthquake-Resistant Design of Earth and Rockfill Dams,” Geotechnique, vol. 29, No. 3, pp. 215-263.

Stantec, 2019. North Highwall Reserve Geotechnical Evaluation, Permanente Quarry. Prepared for Lehigh Southwest Cement. April 5, 2019.



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Legend

- 2007 Topography
- 2018 Topography
- Proposed Topography
- Proposed Utility Road
- Property Boundary
- Extent of Fill
- Cross-Section

N

0 100' 200'

Client/Project

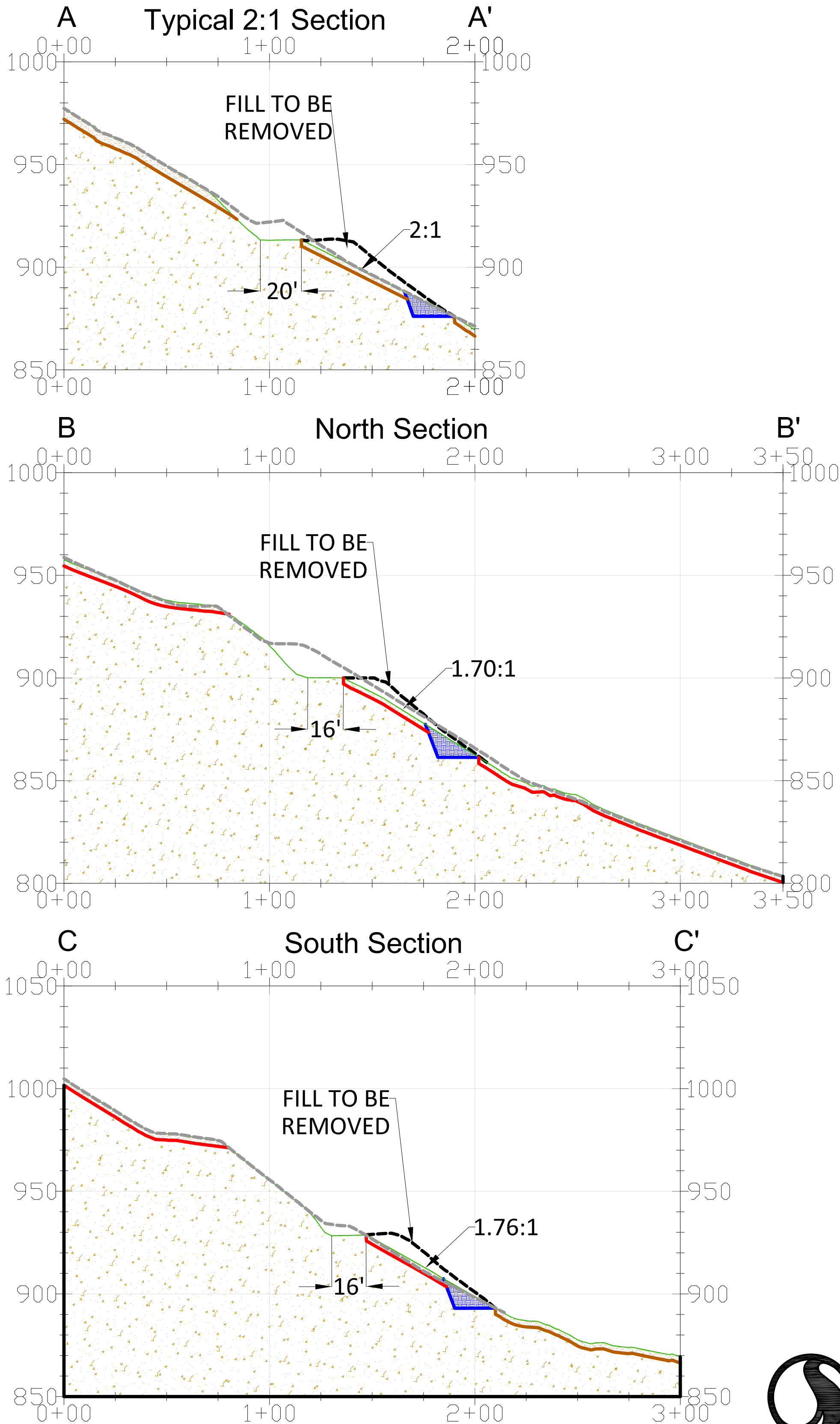
Lehigh Southwest Cement Company
Permanente Quarry

Drawing

1

Title

Utility Road Grading Plan



Stantec

Legend

- PROPOSED SURFACE
- EXISTING SURFACE
- ORIGINAL SURFACE
- COMPACTED KEY
- SOIL LAYER

0 80' 160'

Client/Project

Lehigh Southwest Cement Company
Permanente Quarry

Drawing

2

Title

Utility Road Cross-Sections

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Attachment 1

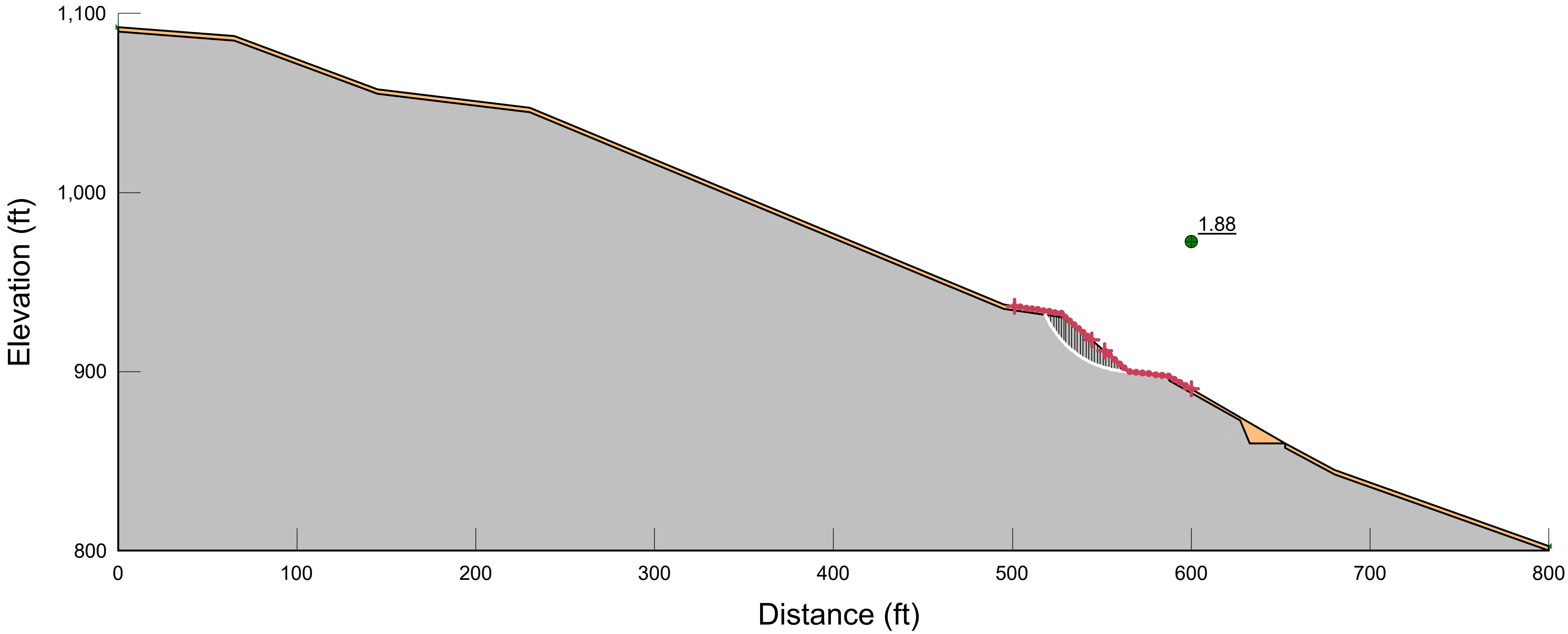
Slope Stability Analysis Results

Title: Stevens Creek Road (Section A)
Date: 05/20/2019
File Name: 233001328 SCQ Road Section A (20190516).gsz

Parent: 1. Cut Slope (Local)
Name: 1a. Static Analysis

Factor of Safety: 1.88

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33

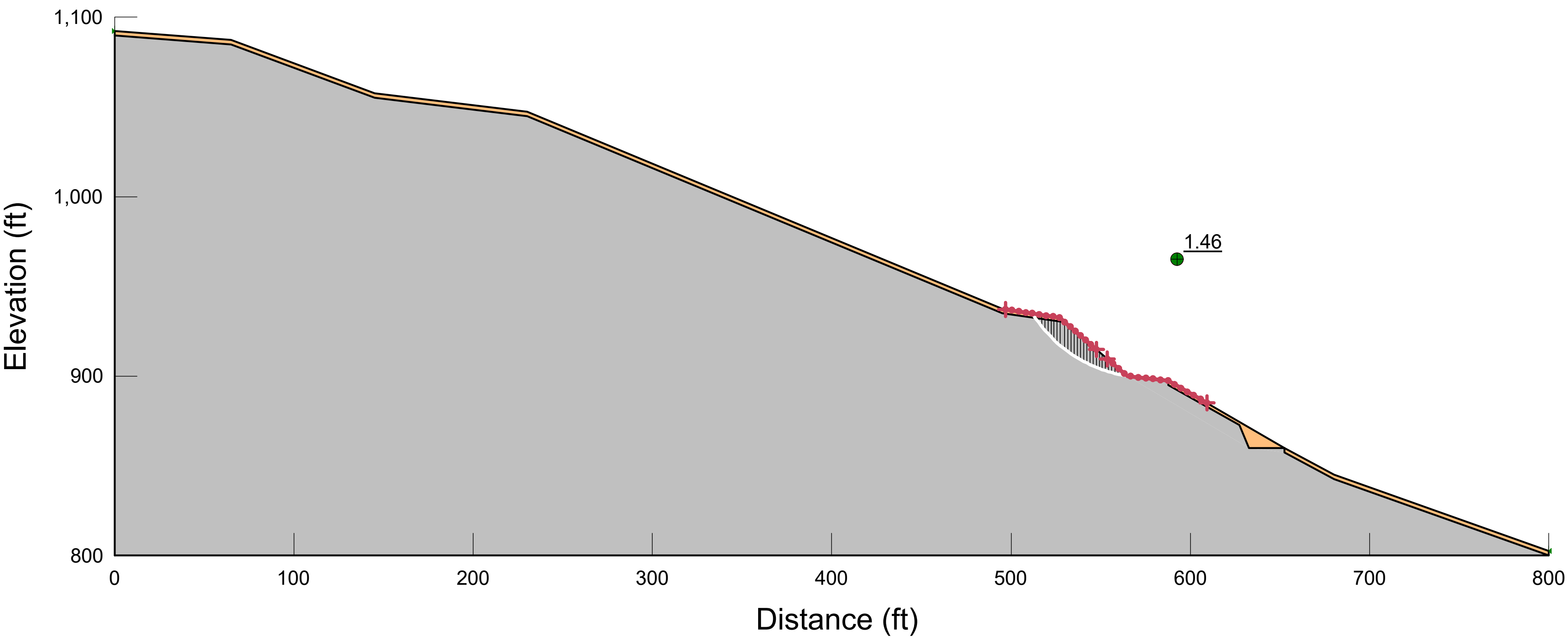


Title: Stevens Creek Road (Section A)
Date: 05/20/2019
File Name: 233001328 SCQ Road Section A (20190516).gsz

Parent: 1. Cut Slope (Local)
Name: 1b. Pseudostatic Analysis

Factor of Safety: 1.46

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33

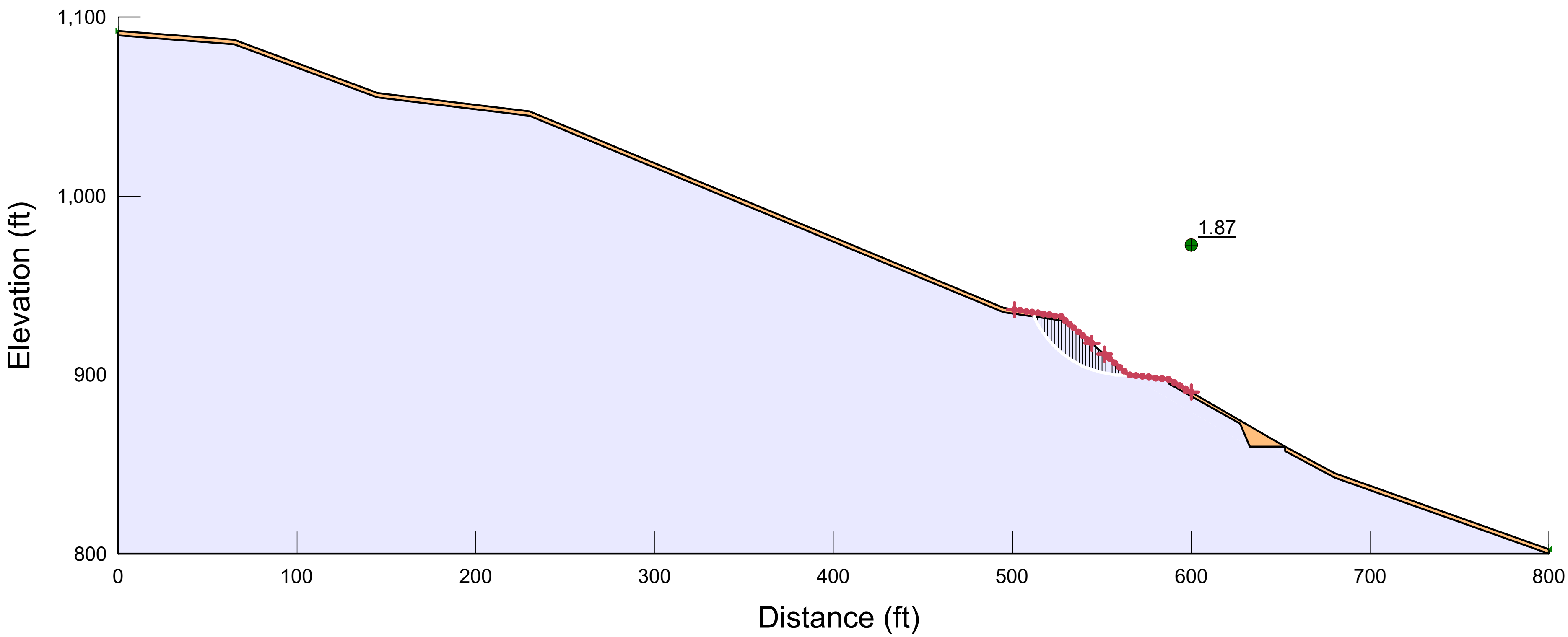


Title: Stevens Creek Road (Section A)
Date: 05/20/2019
File Name: 233001328 SCQ Road Section A (20190516).gsz

Parent: 1. Cut Slope (Local)
Name: 1c. Static Analysis (Sensitivity)

Factor of Safety: 1.87

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara (Sensitivity)	Mohr-Coulomb	165	820	24

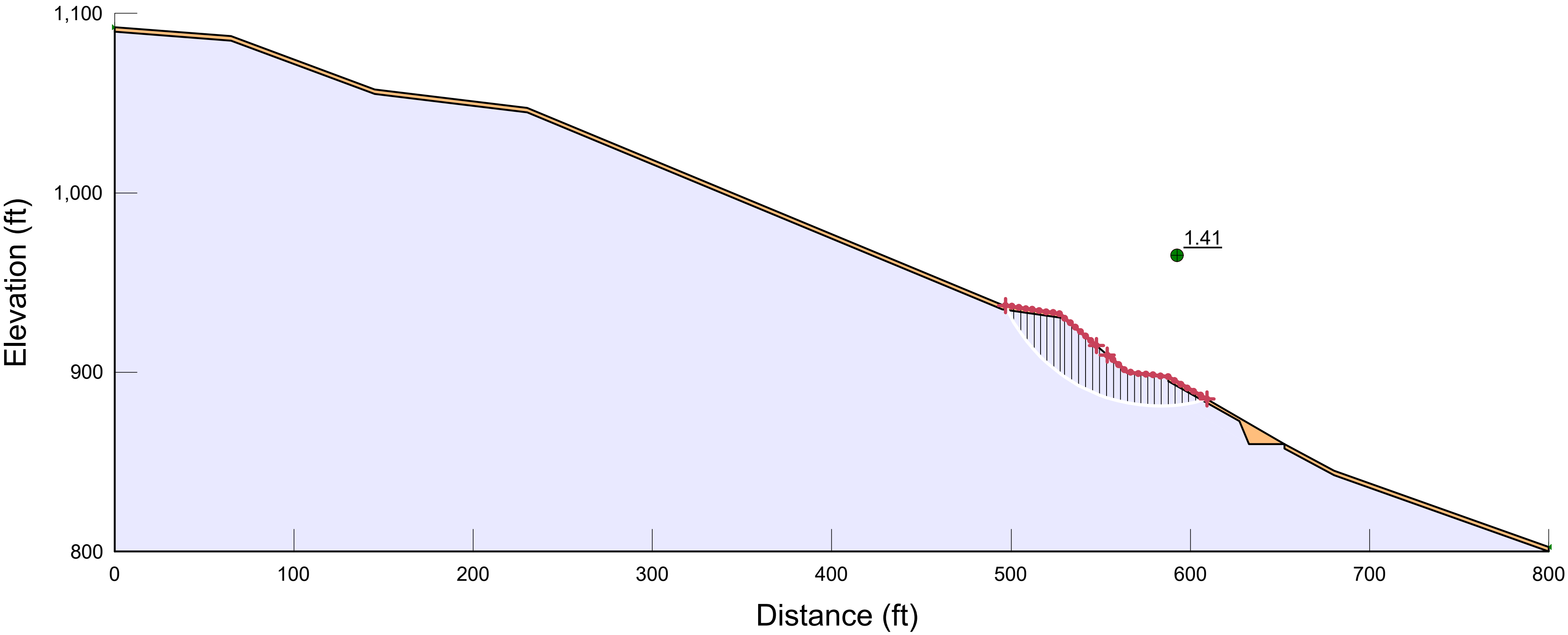


Title: Stevens Creek Road (Section A)
Date: 05/20/2019
File Name: 233001328 SCQ Road Section A (20190516).gsz

Parent: 1. Cut Slope (Local)
Name: 1d. Pseudostatic Analysis (Sensitivity)

Factor of Safety: 1.41

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara (Sensitivity)	Mohr-Coulomb	165	820	24

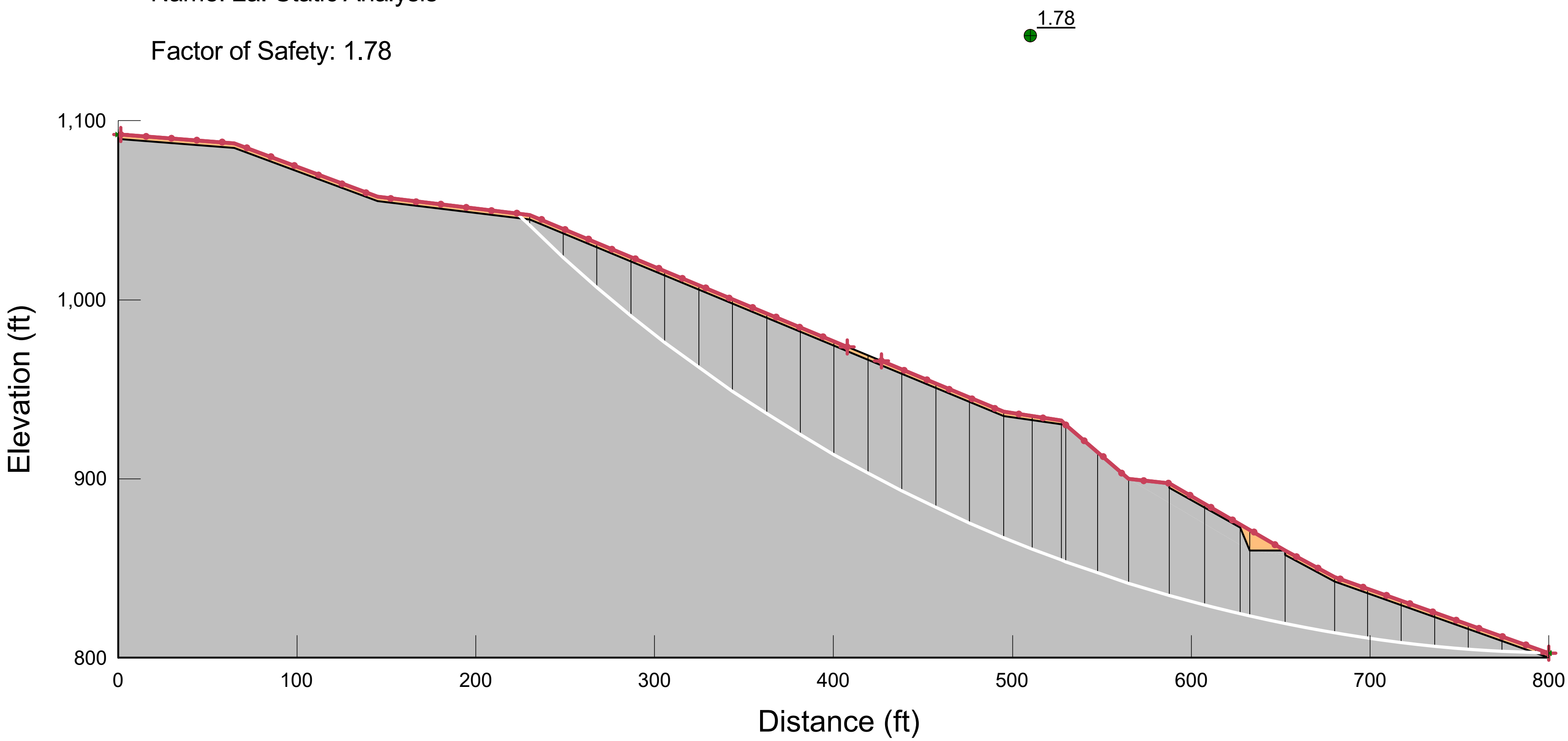


Title: Stevens Creek Road (Section A)
Date: 05/20/2019
File Name: 233001328 SCQ Road Section A (20190516).gsz

Parent: 2. Cut Slope (Global)
Name: 2a. Static Analysis

Factor of Safety: 1.78

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33



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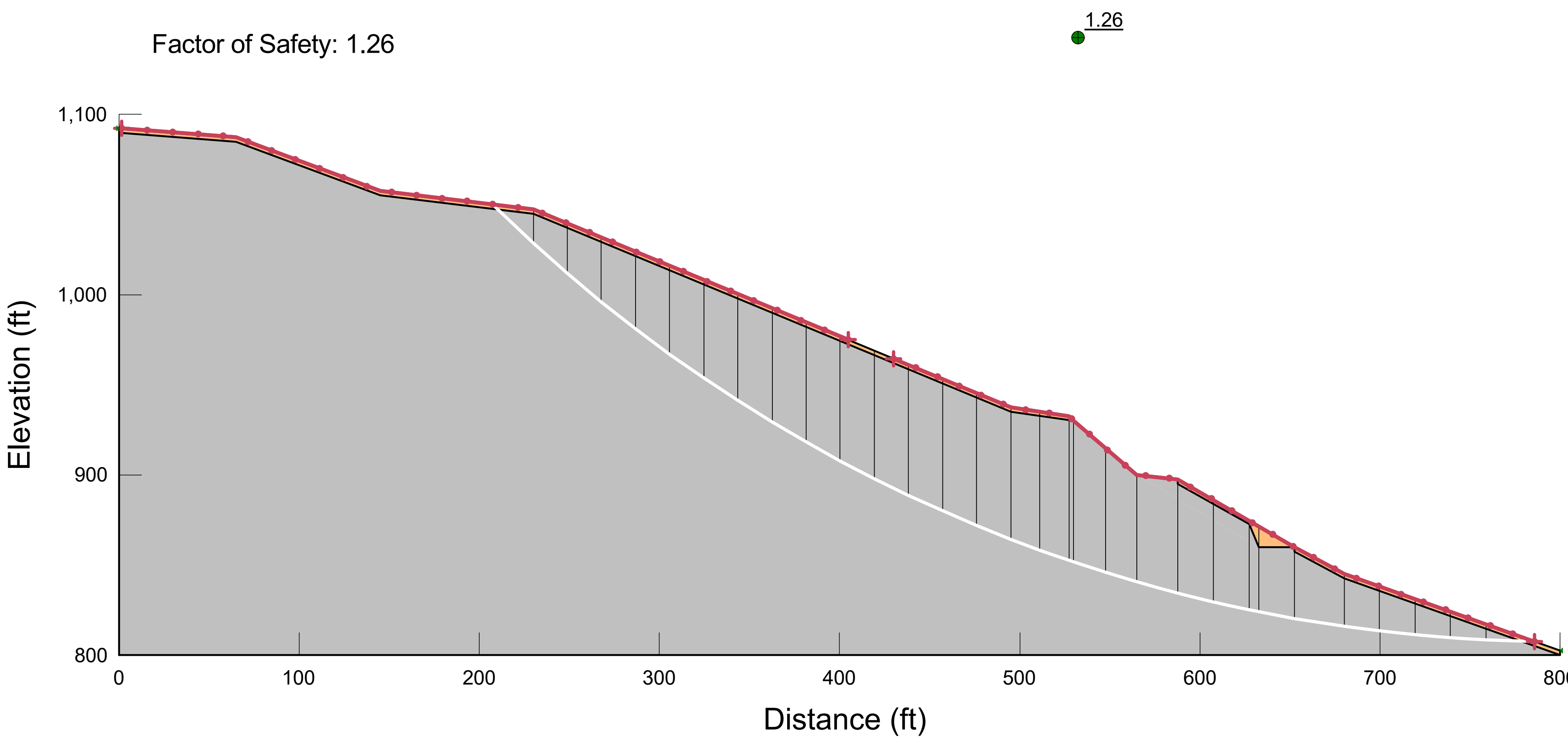
Date: 05/20/2019
File Name: 233001328 SCQ Road Section A (20190516).gsz

Parent: 2. Cut Slope (Global)
Name: 2b. Pseudostatic Analysis

Factor of Safety: 1.26

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33

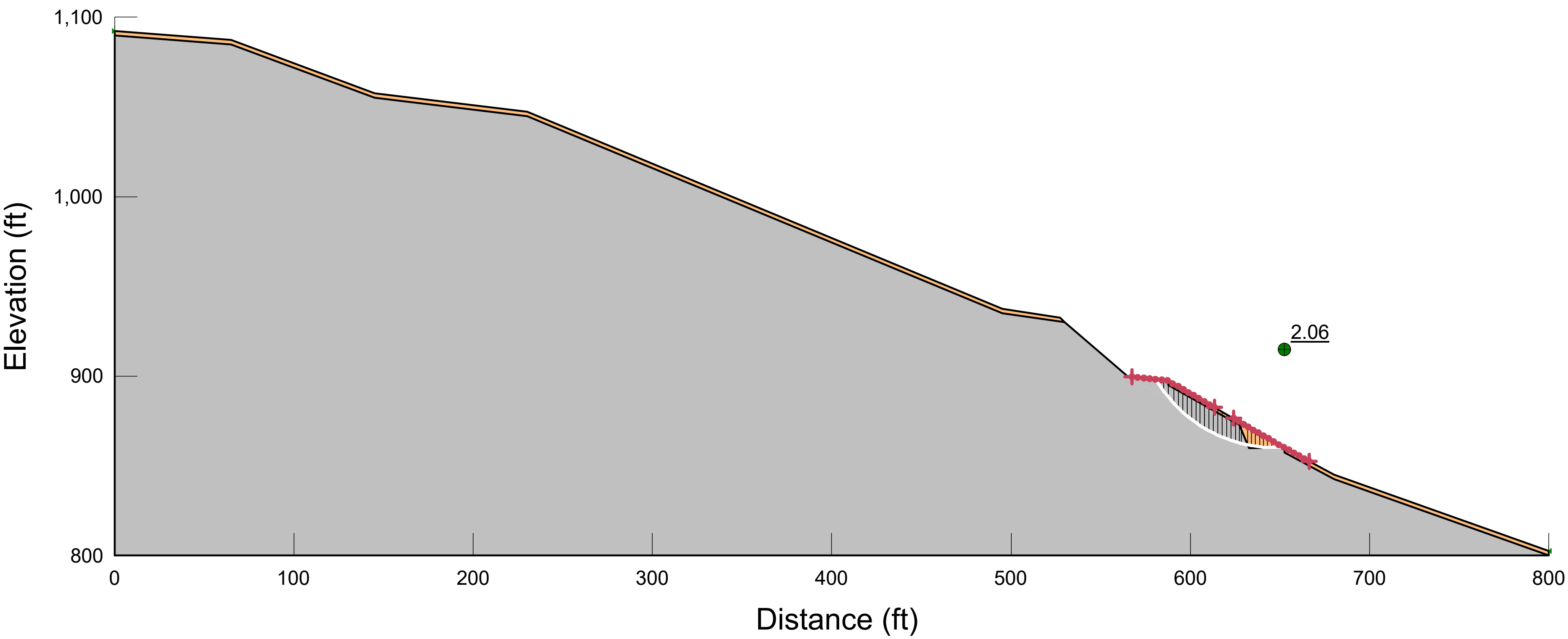


Title: Stevens Creek Road (Section A)
Date: 05/20/2019
File Name: 233001328 SCQ Road Section A (20190516).gsz

Parent: 3. Fill Slope
Name: 3a. Static Analysis

Factor of Safety: 2.06

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33



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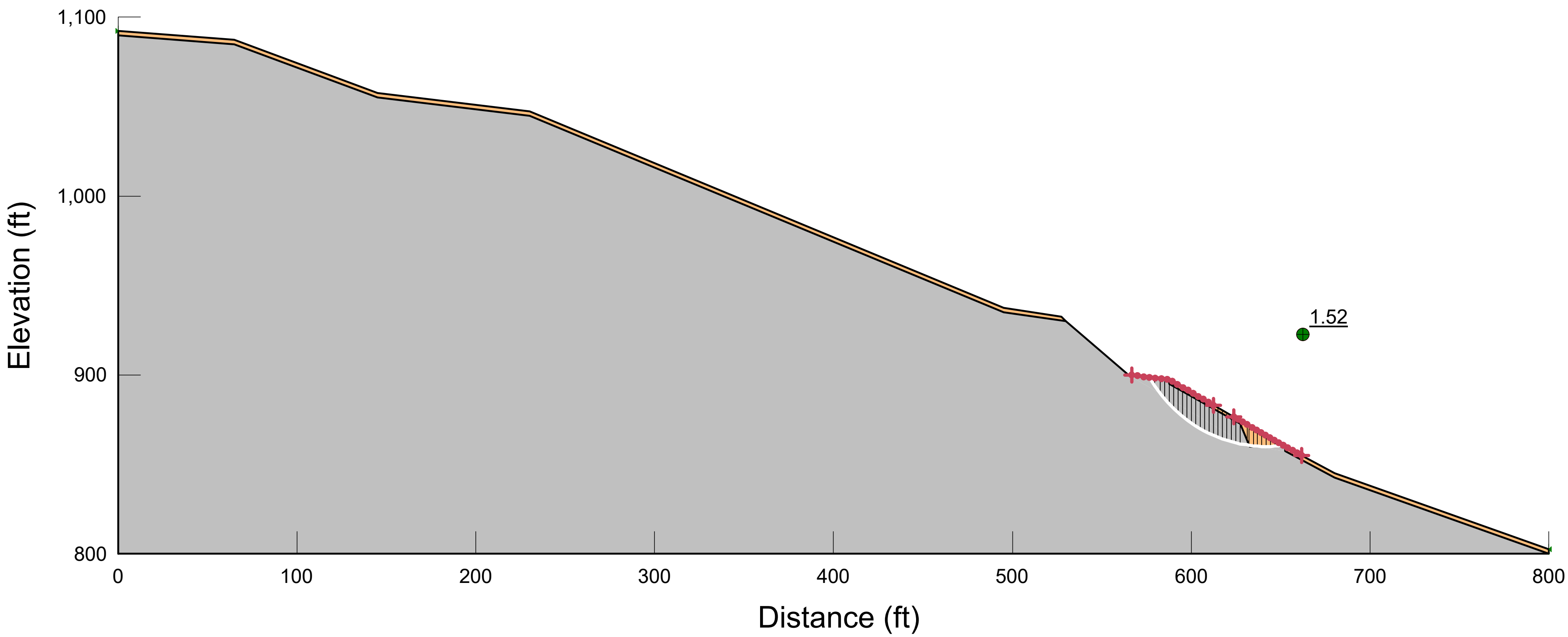
Date: 05/20/2019
File Name: 233001328 SCQ Road Section A (20190516).gsz

Parent: 3. Fill Slope
Name: 3b. Pseudostatic Analysis

Factor of Safety: 1.52

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33

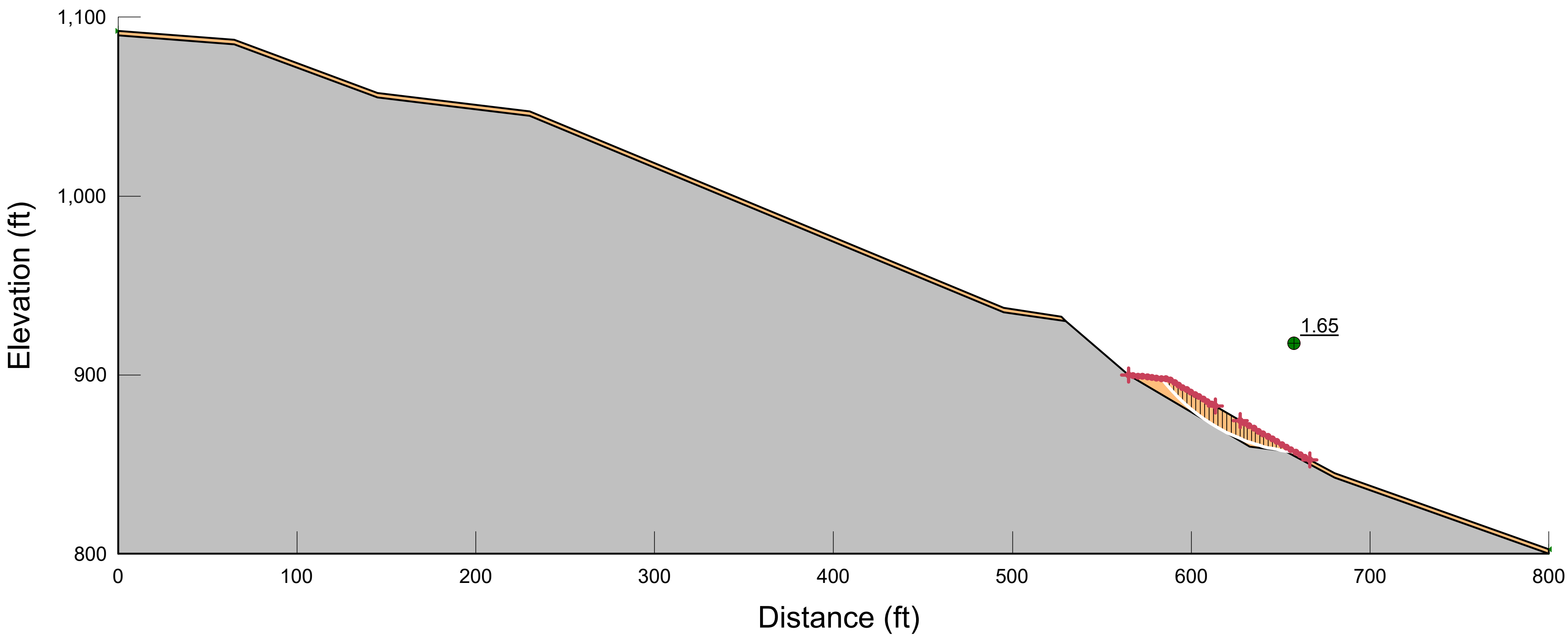


Title: Stevens Creek Road (Section A)
Date: 05/20/2019
File Name: 233001328 SCQ Road Section A (20190516).gsz

Parent: 4. Fill Slope (Sensitivity)
Name: 4a. Static Analysis

Factor of Safety: 1.65

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33



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Date: 05/20/2019
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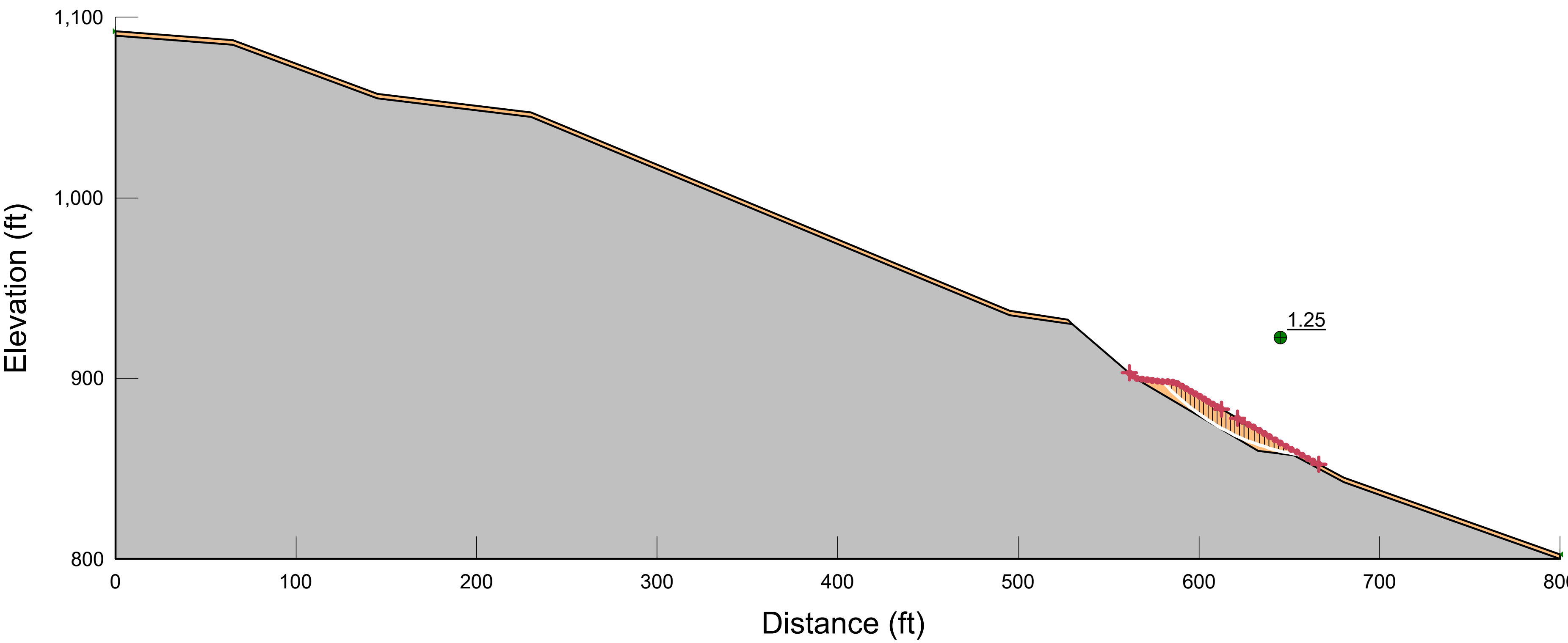
Parent: 4. Fill Slope (Sensitivity)
Name: 4b. Pseudostatic Analysis

Factor of Safety: 1.25

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33



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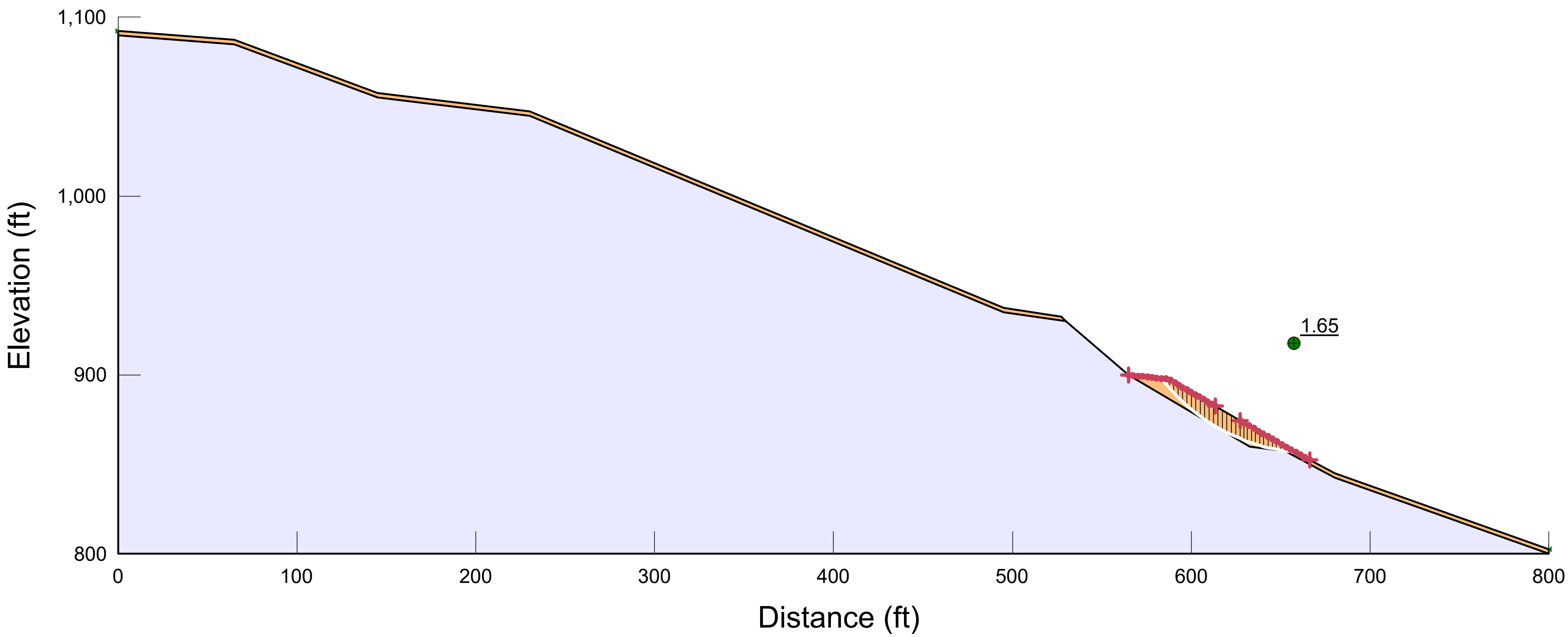
Date: 05/20/2019
File Name: 233001328 SCQ Road Section A (20190516).gsz

Parent: 5. Santa Clara (Sensitivity)
Name: 5a. Static Analysis

Factor of Safety: 1.65

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara (Sensitivity)	Mohr-Coulomb	165	820	24



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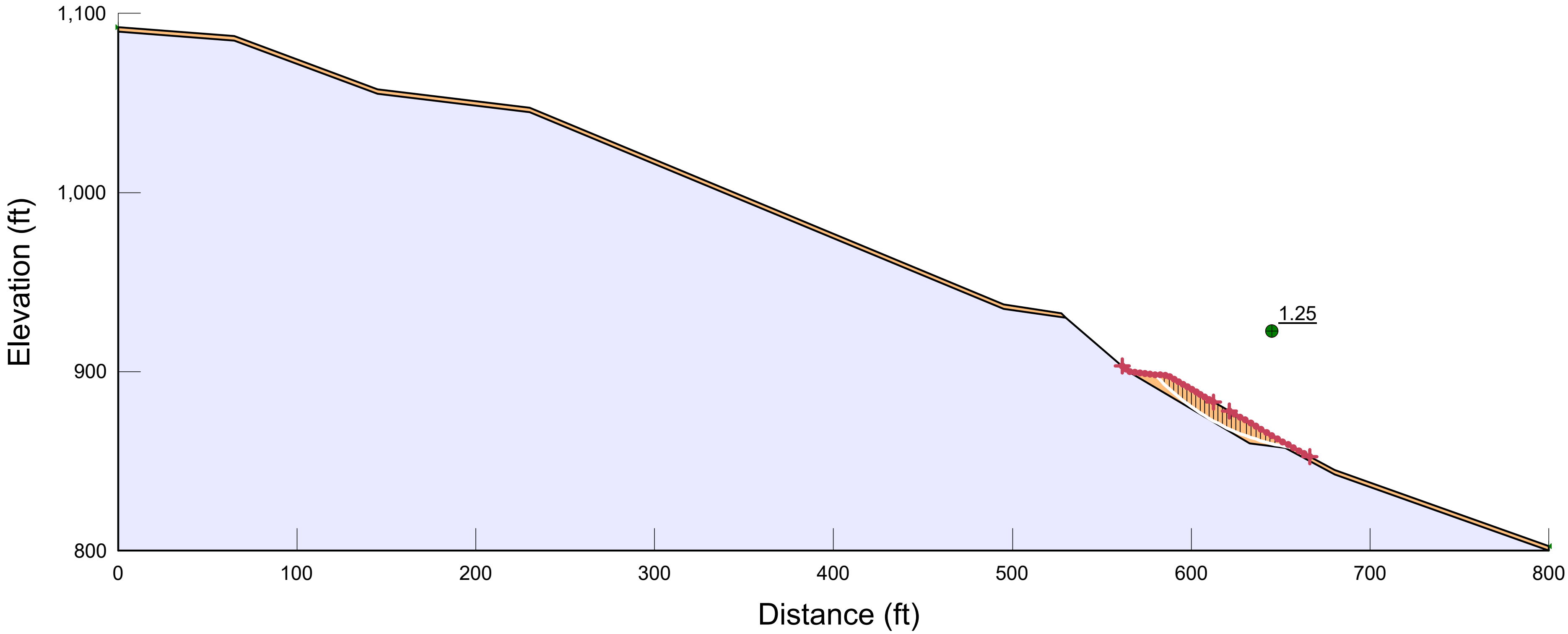
Date: 05/20/2019
File Name: 233001328 SCQ Road Section A (20190516).gsz

Parent: 5. Santa Clara (Sensitivity)
Name: 5b. Pseudostatic Analysis

Factor of Safety: 1.25

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara (Sensitivity)	Mohr-Coulomb	165	820	24



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Date: 05/16/2019
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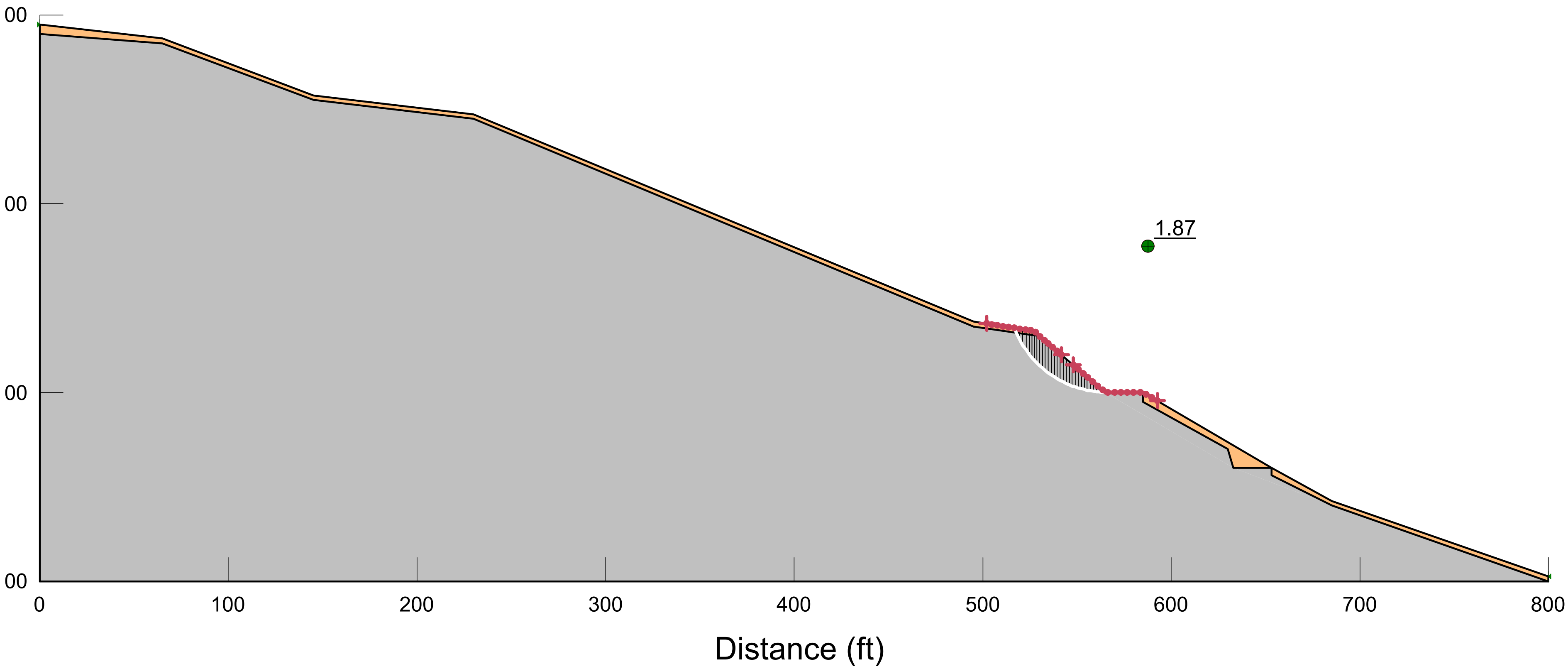
Parent: 1. Cut Slope (Local)
Name: 1a. Static Analysis

Factor of Safety: 1.87

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33



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Date: 05/16/2019
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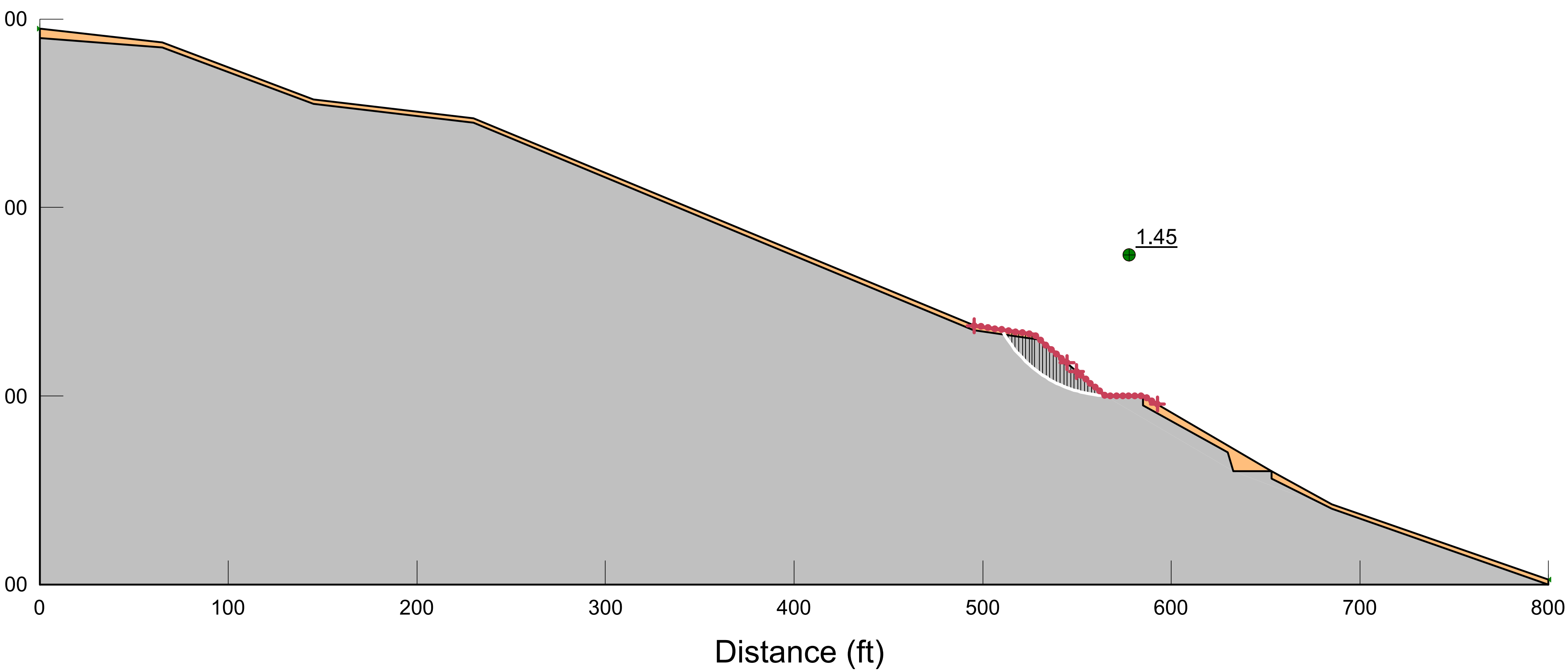
Parent: 1. Cut Slope (Local)
Name: 1b. Pseudostatic Analysis

Factor of Safety: 1.45

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33

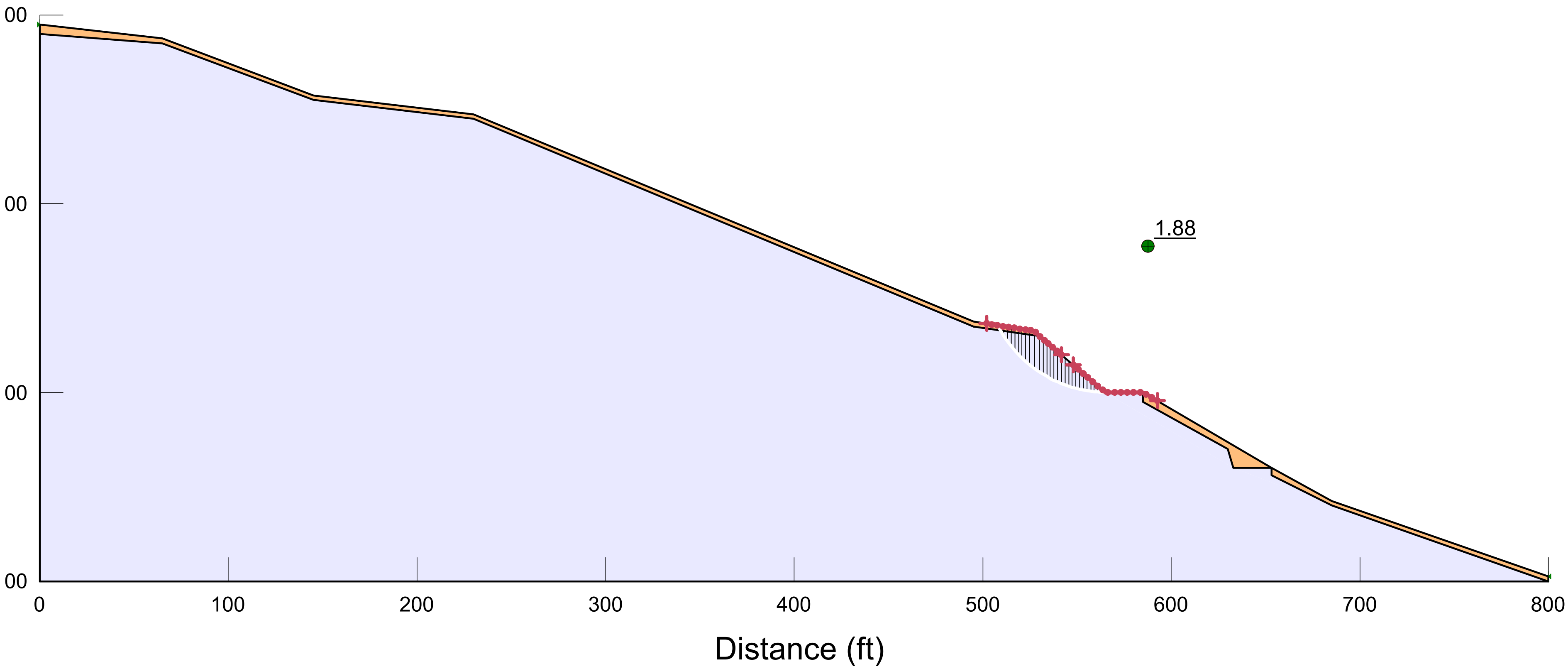


Title: Stevens Creek Road (Section B)
Date: 05/20/2019
File Name: 233001328 SCQ Road Section B (20190516).gsz

Parent: 1. Cut Slope (Local)
Name: 1c. Static Analysis (Sensitivity)

Factor of Safety: 1.88

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara (Sensitivity)	Mohr-Coulomb	165	820	24



Title: Stevens Creek Road (Section B)
Date: 05/20/2019
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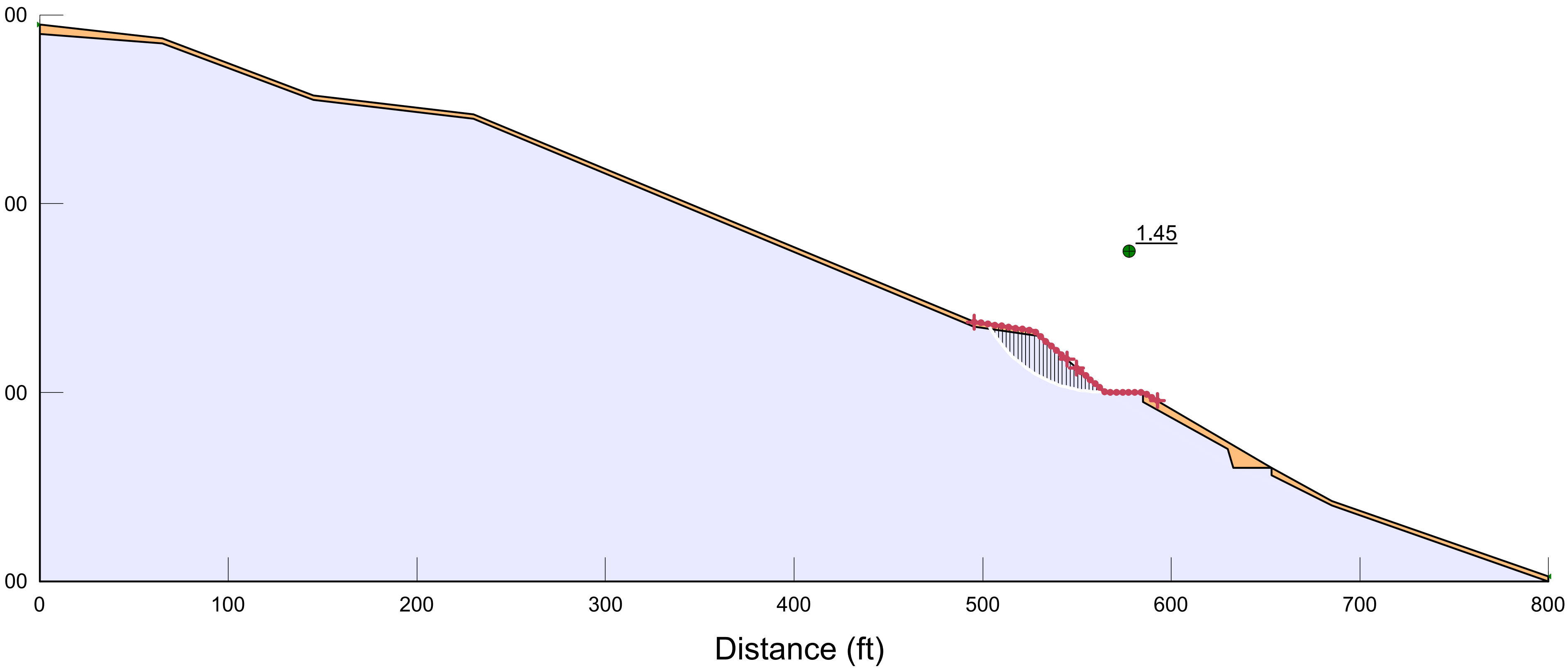
Parent: 1. Cut Slope (Local)
Name: 1d. Pseudostatic Analysis (Sensitivity)

Factor of Safety: 1.45

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara (Sensitivity)	Mohr-Coulomb	165	820	24

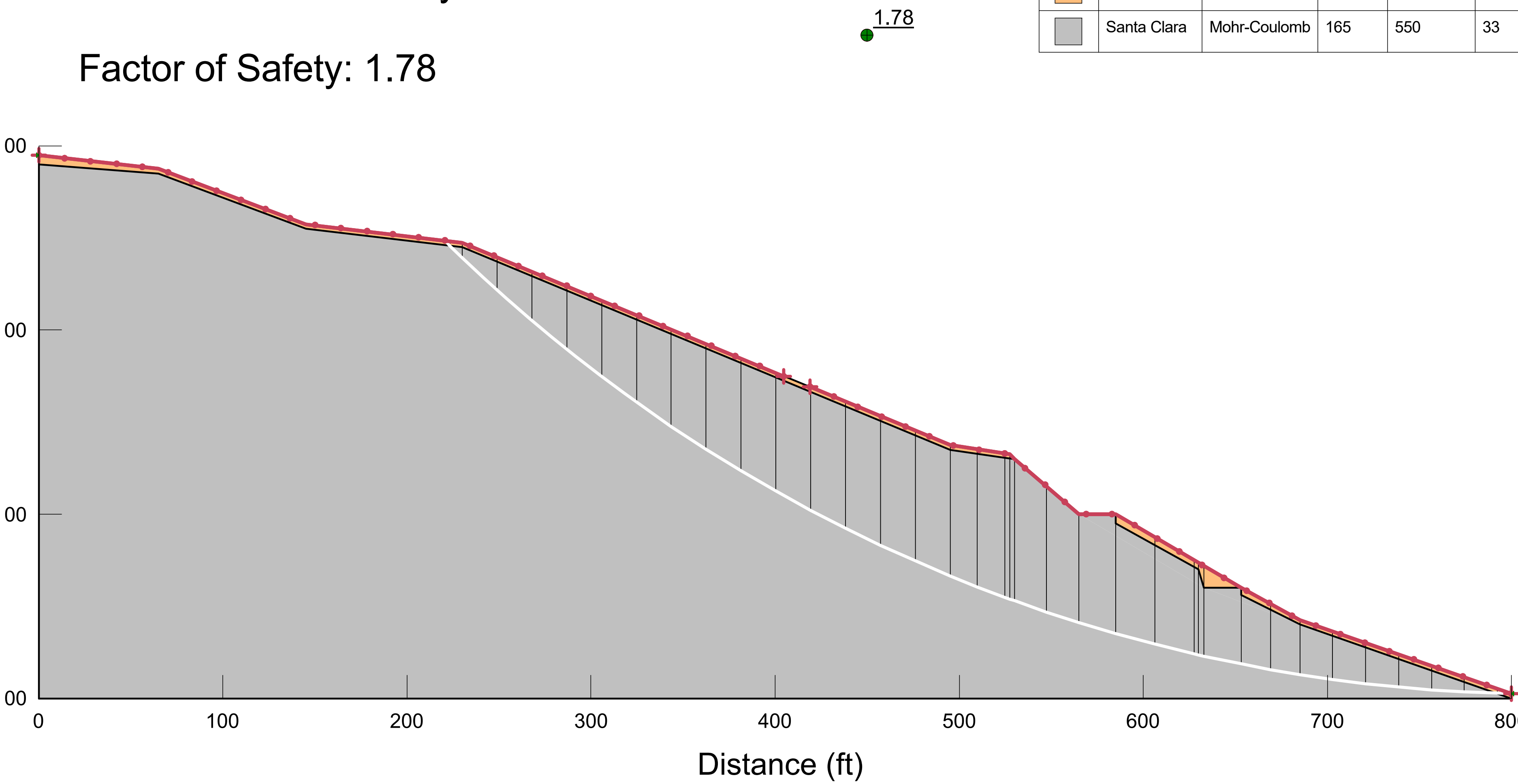


Title: Stevens Creek Road (Section B)
Date: 05/16/2019
File Name: 233001328 SCQ Road Section B (20190516).gsz

Parent: 2. Cut Slope (Global)
Name: 2a. Static Analysis

Factor of Safety: 1.78

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33

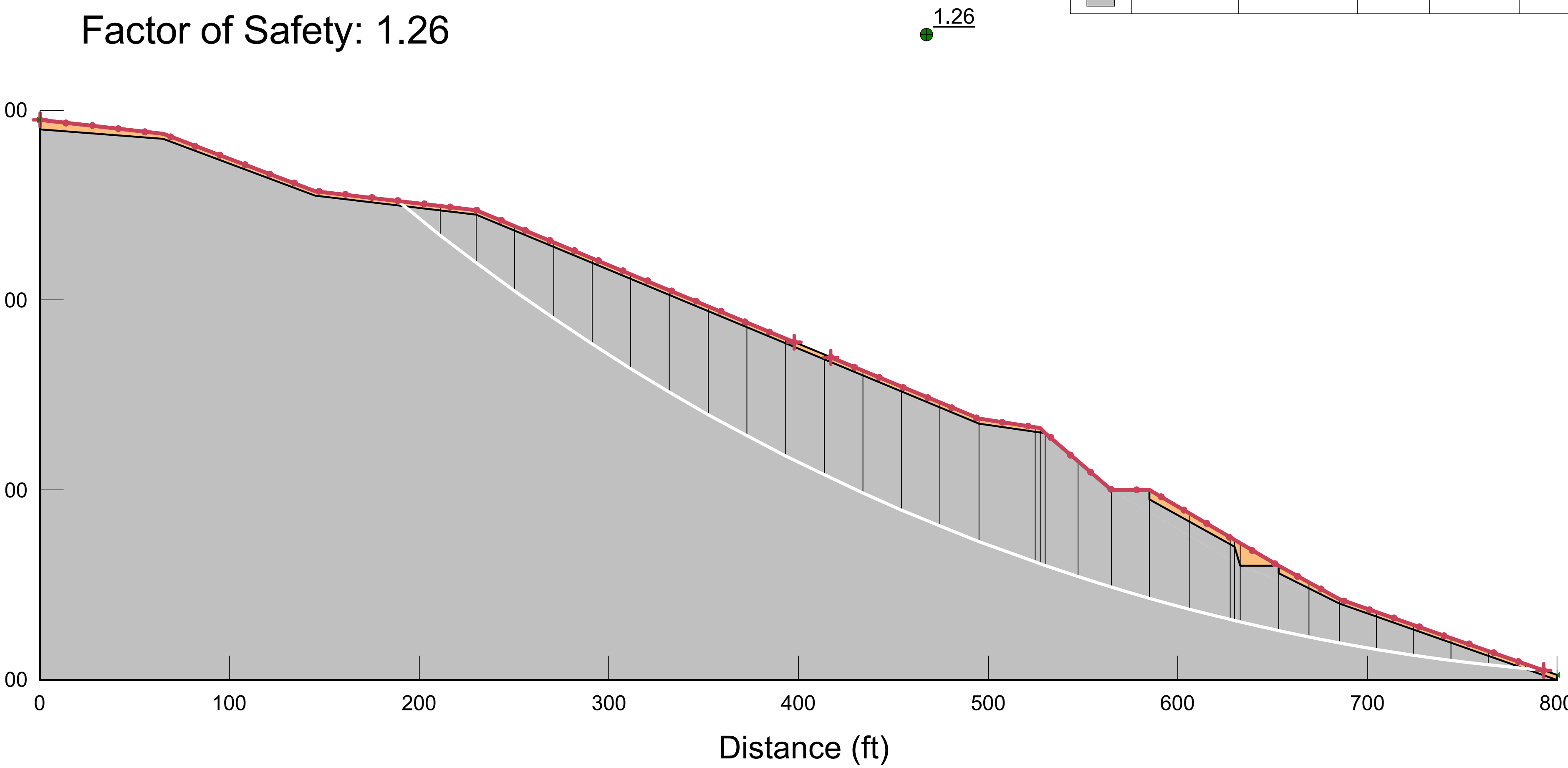


Title: Stevens Creek Road (Section B)
Date: 05/16/2019
File Name: 233001328 SCQ Road Section B (20190516).gsz

Parent: 2. Cut Slope (Global)
Name: 2b. Pseudostatic Analysis

Factor of Safety: 1.26

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33

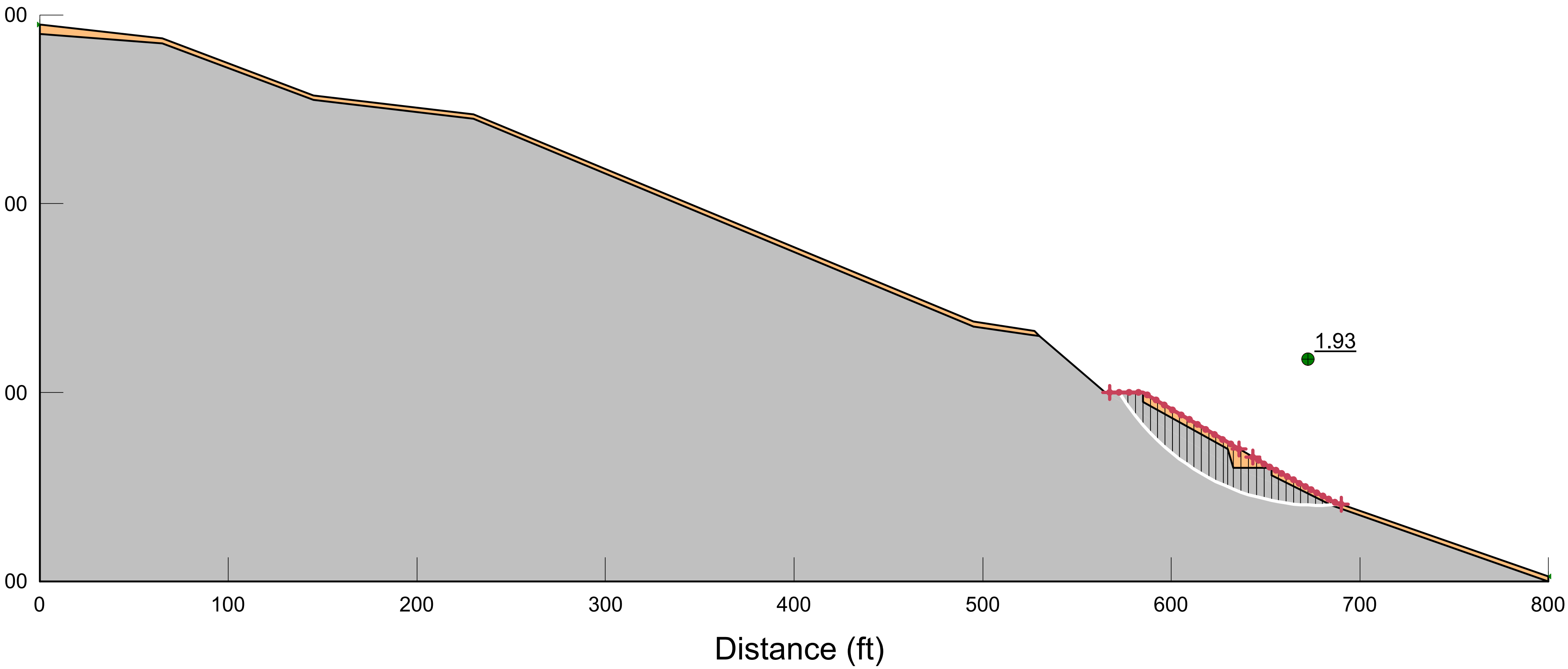


Title: Stevens Creek Road (Section B)
Date: 05/16/2019
File Name: 233001328 SCQ Road Section B (20190516).gsz

Parent: 3. Fill Slope
Name: 3a. Static Analysis

Factor of Safety: 1.93

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33

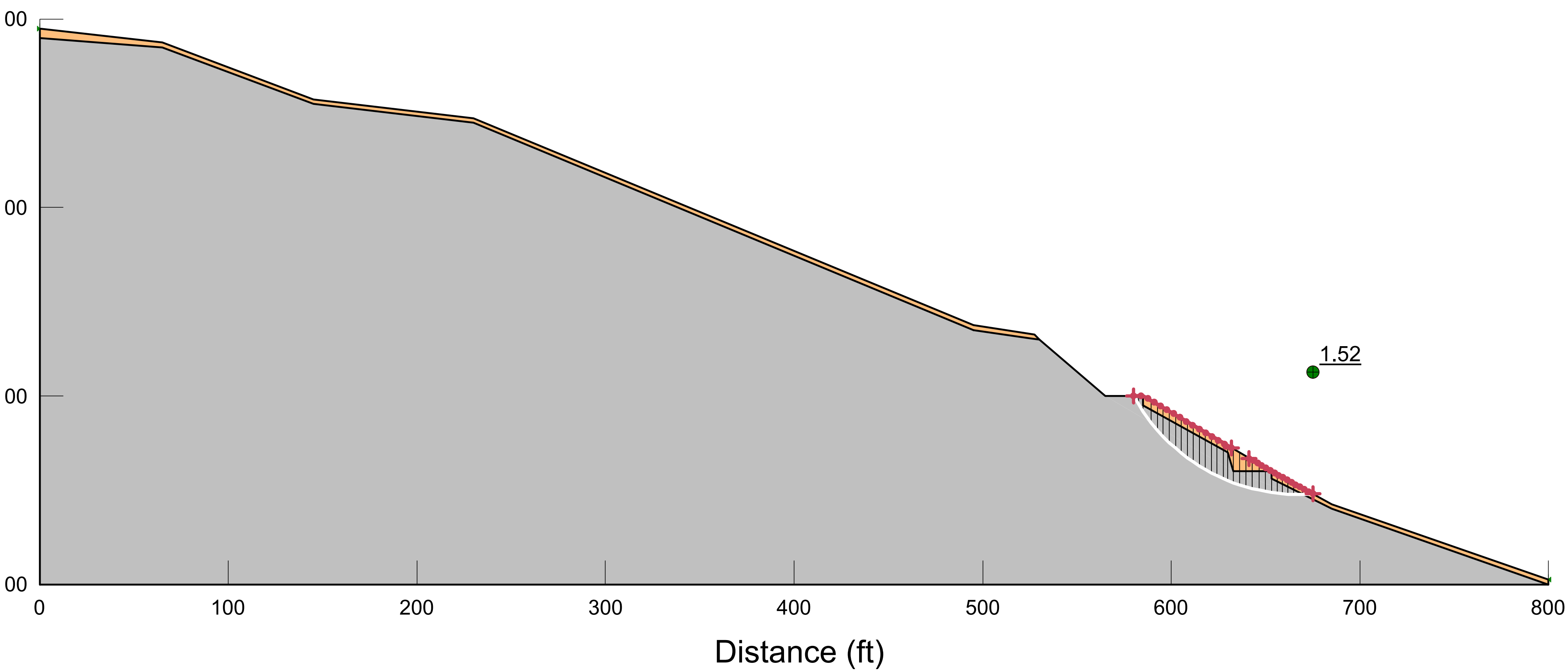


Title: Stevens Creek Road (Section B)
Date: 05/16/2019
File Name: 233001328 SCQ Road Section B (20190516).gsz

Parent: 3. Fill Slope
Name: 3b. Pseudostatic Analysis

Factor of Safety: 1.52

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33

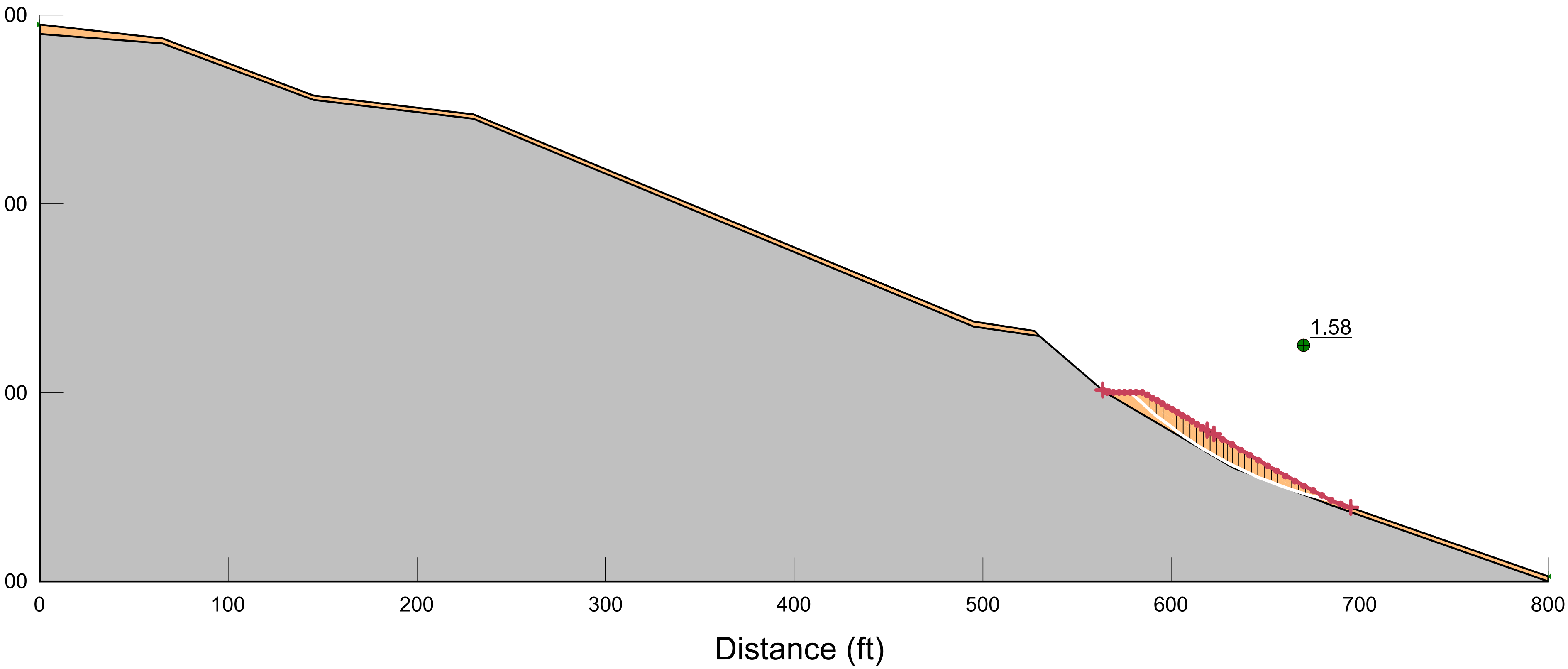


Title: Stevens Creek Road (Section B)
Date: 05/16/2019
File Name: 233001328 SCQ Road Section B (20190516).gsz

Parent: 4. Fill Slope (Sensitivity)
Name: 4a. Static Analysis

Factor of Safety: 1.58

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33

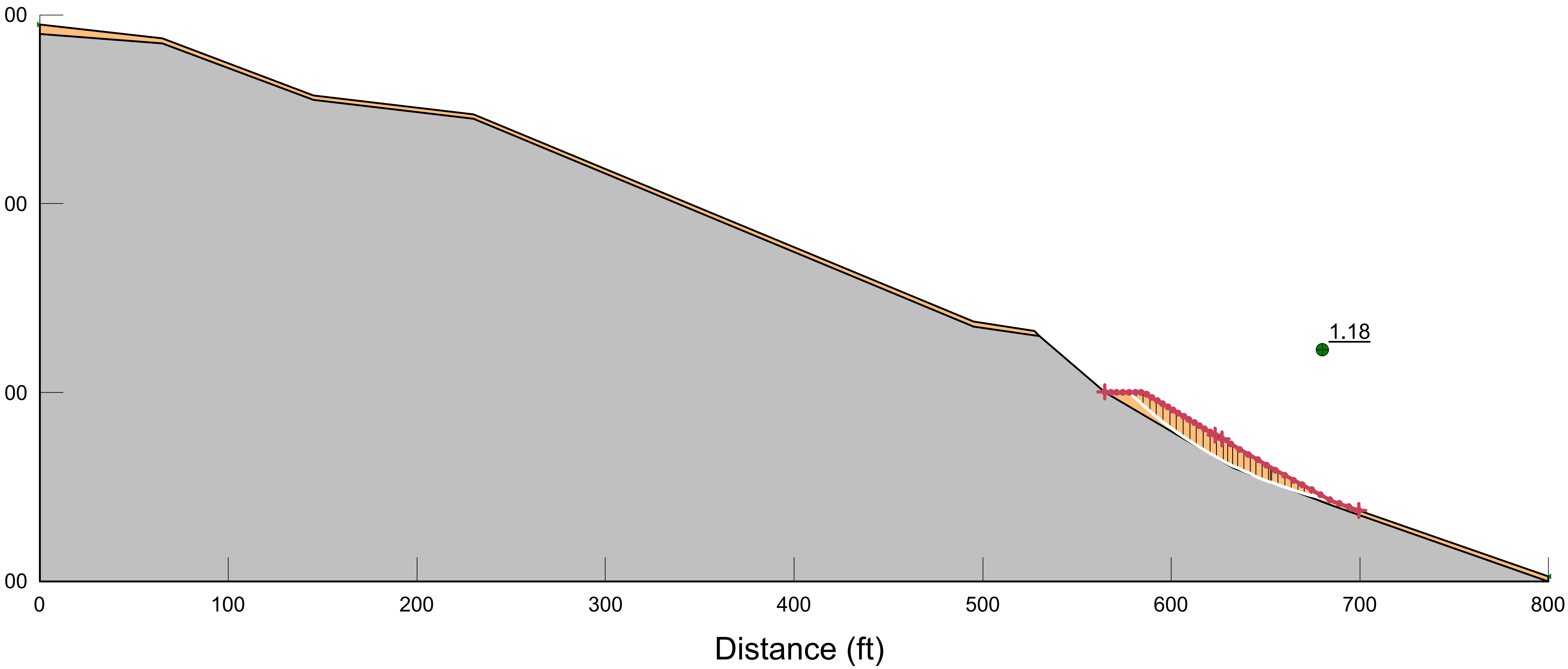


Title: Stevens Creek Road (Section B)
Date: 05/16/2019
File Name: 233001328 SCQ Road Section B (20190516).gsz

Parent: 4. Fill Slope (Sensitivity)
Name: 4b. Pseudostatic Analysis

Factor of Safety: 1.18

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara	Mohr-Coulomb	165	550	33

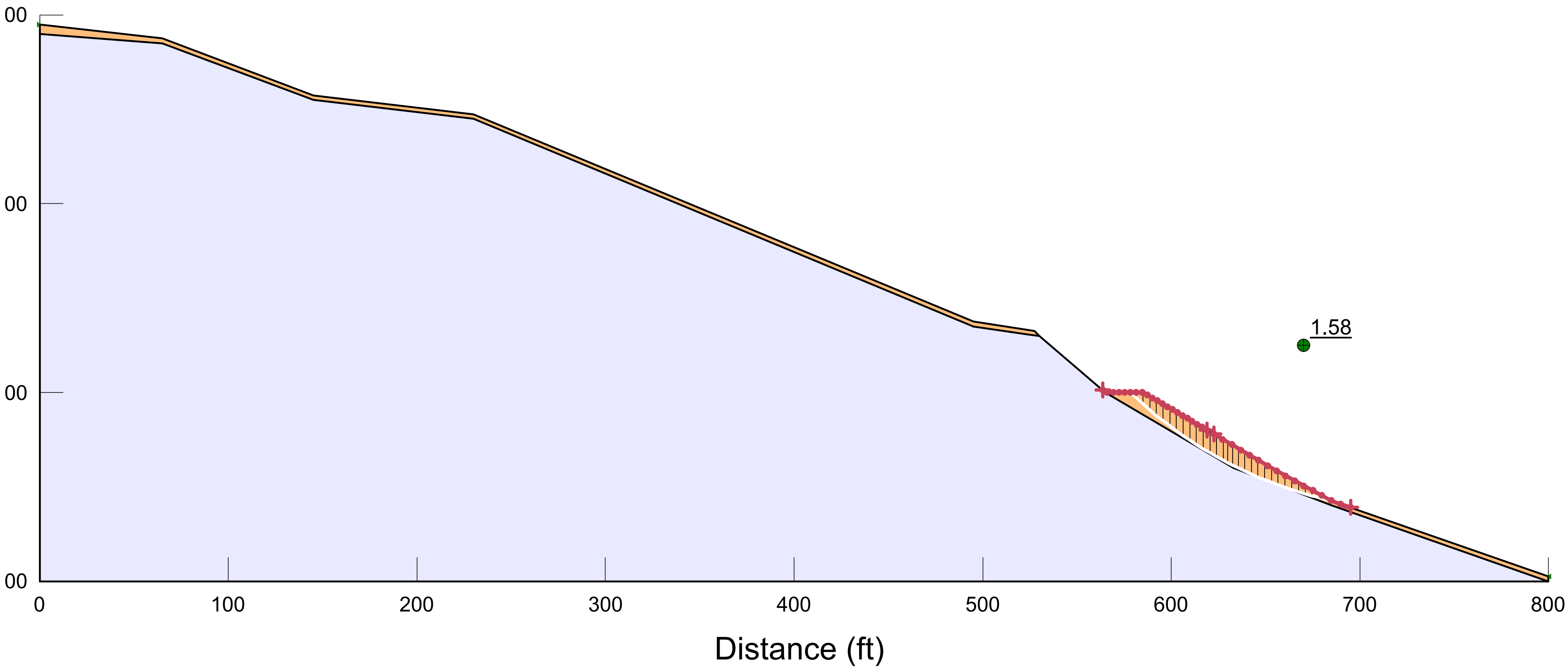


Title: Stevens Creek Road (Section B)
Date: 05/20/2019
File Name: 233001328 SCQ Road Section B (20190516).gsz

Parent: 5. Santa Clara (Sensitivity)
Name: 5a. Static Analysis

Factor of Safety: 1.58

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara (Sensitivity)	Mohr-Coulomb	165	820	24

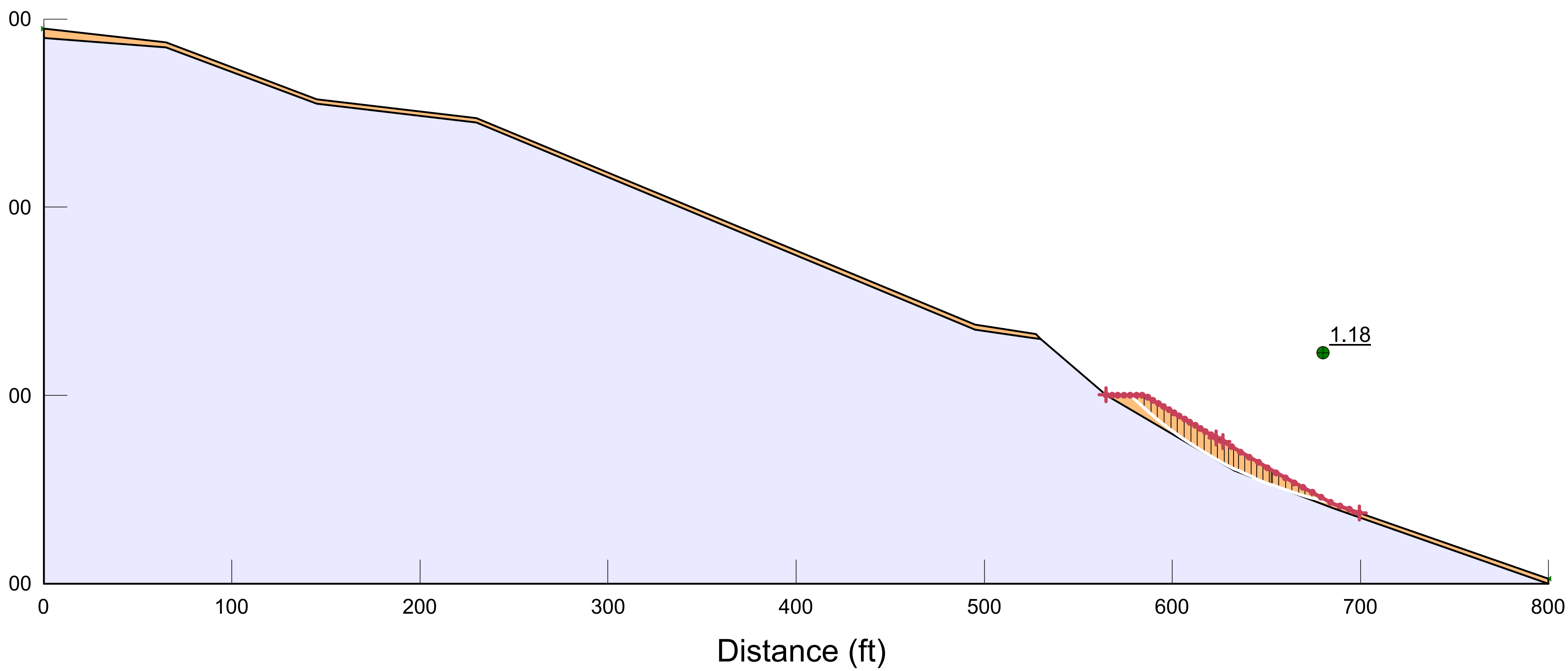


Title: Stevens Creek Road (Section B)
Date: 05/20/2019
File Name: 233001328 SCQ Road Section B (20190516).gsz

Parent: 5. Santa Clara (Sensitivity)
Name: 5b. Pseudostatic Analysis

Factor of Safety: 1.18

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Residual Soil	Mohr-Coulomb	120	200	30
	Santa Clara (Sensitivity)	Mohr-Coulomb	165	820	24

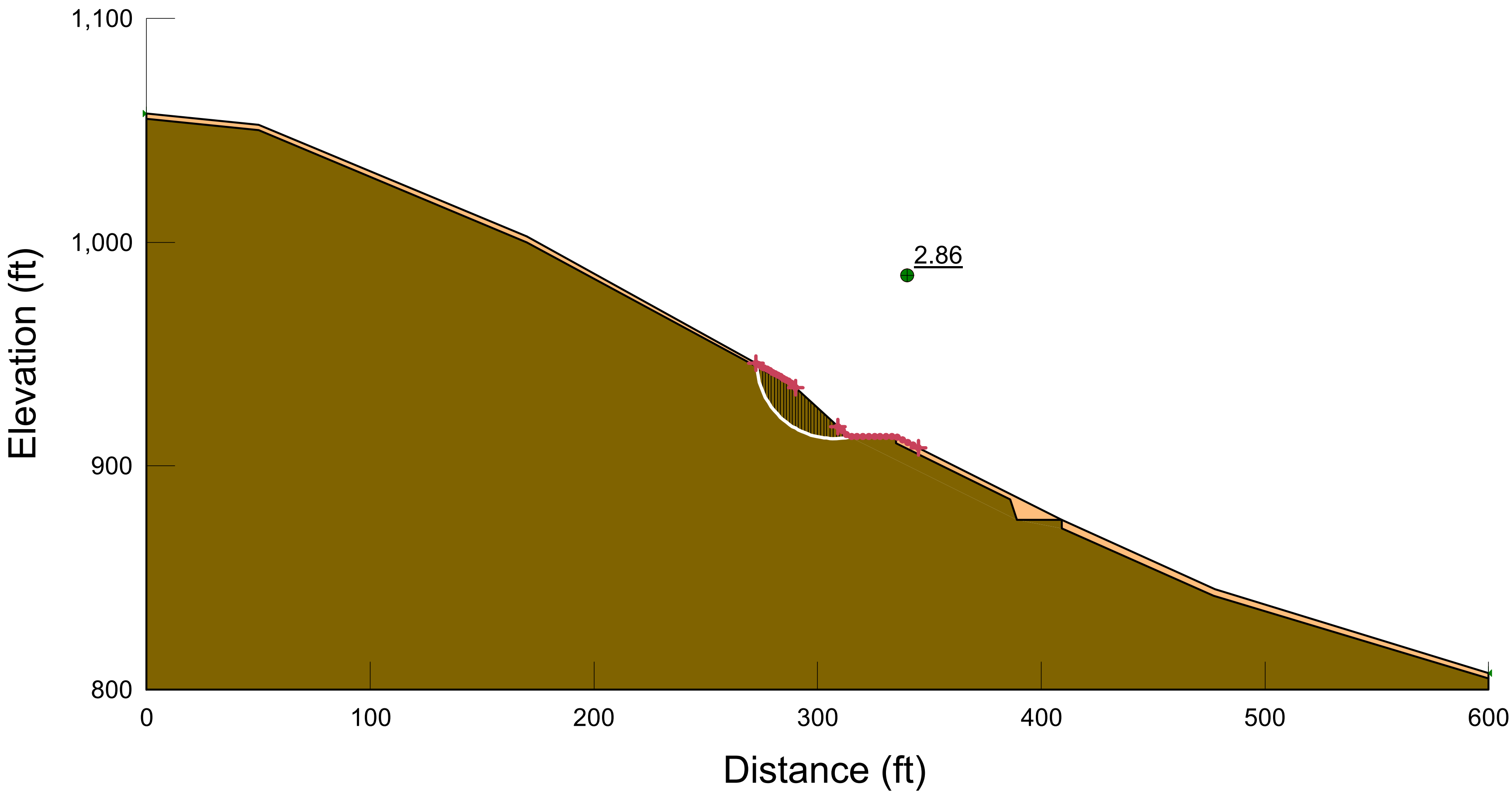


Title: Stevens Creek Road (Section C)
Date: 05/21/2019
File Name: 233001328 SCQ Road Section C (20190521).gsz

Parent: 1. Cut Slope (Local)
Name: 1a. Static Analysis

Factor of Safety: 2.86

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Greenstone	Mohr-Coulomb	165	1,400	23
	Residual Soil	Mohr-Coulomb	120	200	30

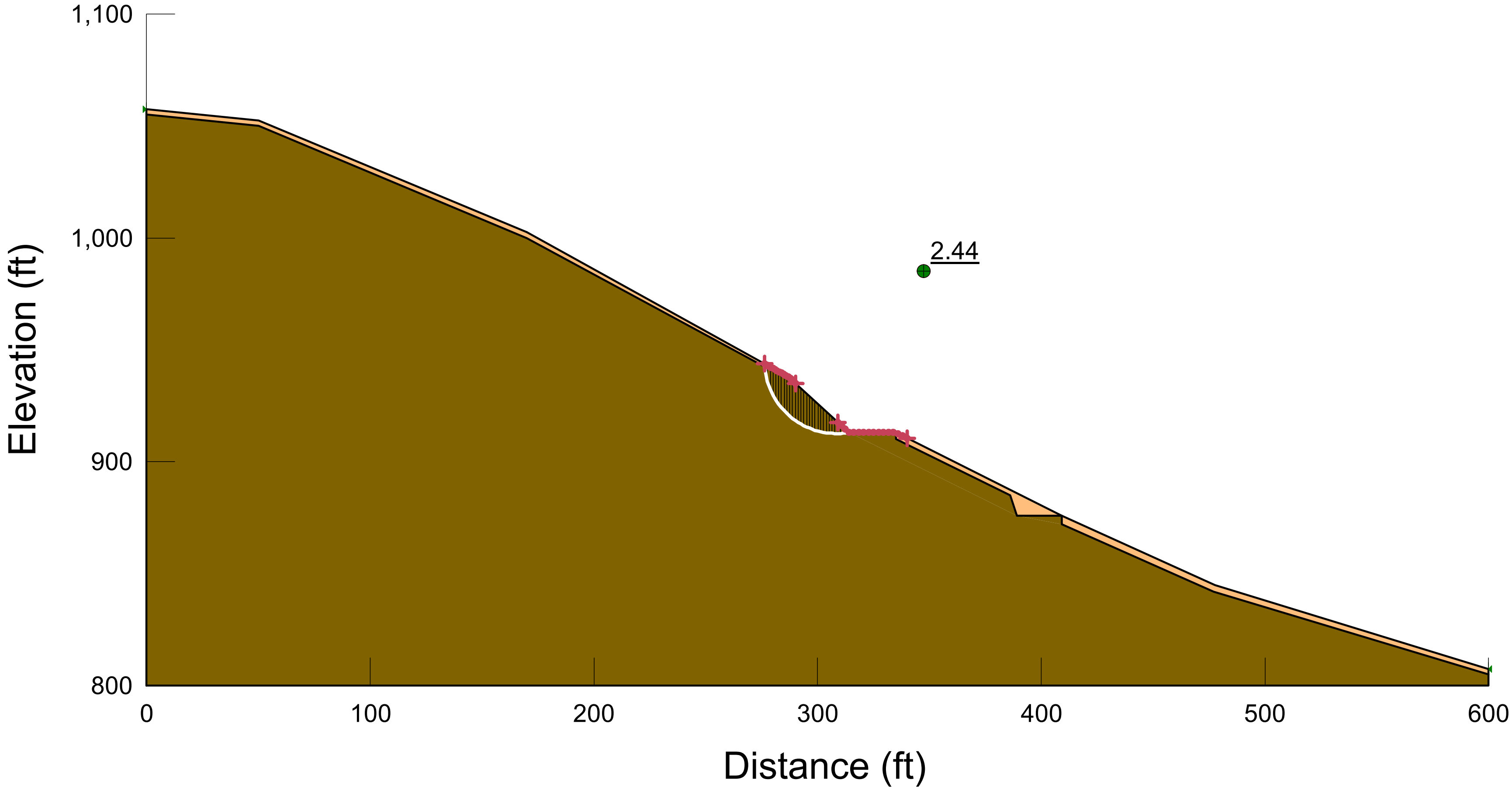


Title: Stevens Creek Road (Section C)
Date: 05/21/2019
File Name: 233001328 SCQ Road Section C (20190521).gsz

Parent: 1. Cut Slope (Local)
Name: 1b. Pseudostatic Analysis

Factor of Safety: 2.44

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Greenstone	Mohr-Coulomb	165	1,400	23
	Residual Soil	Mohr-Coulomb	120	200	30

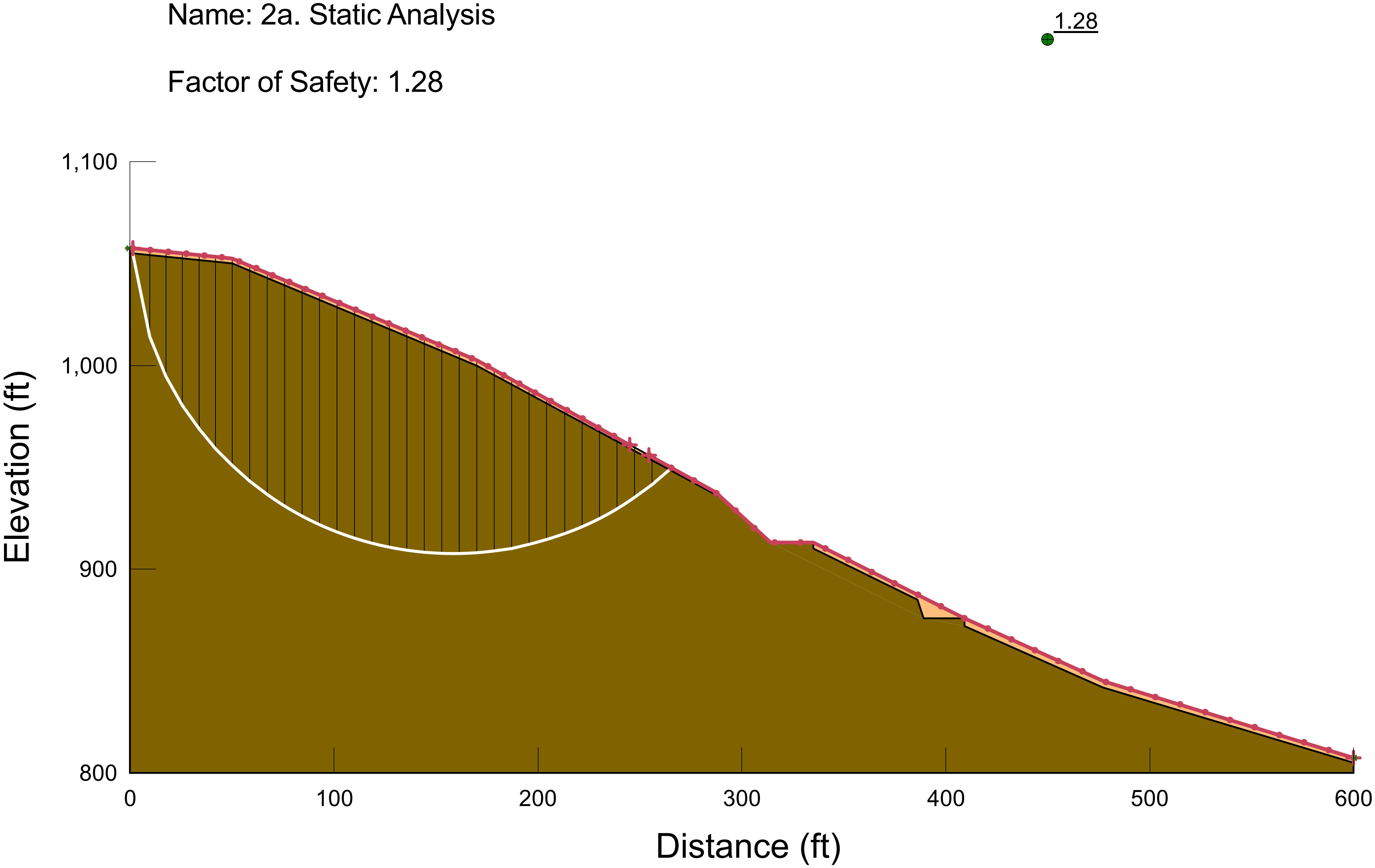


Title: Stevens Creek Road (Section C)
Date: 05/21/2019
File Name: 233001328 SCQ Road Section C (20190521).gsz

Parent: 2. Cut Slope (Global)
Name: 2a. Static Analysis

Factor of Safety: 1.28

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Greenstone	Mohr-Coulomb	165	1,400	23
	Residual Soil	Mohr-Coulomb	120	200	30



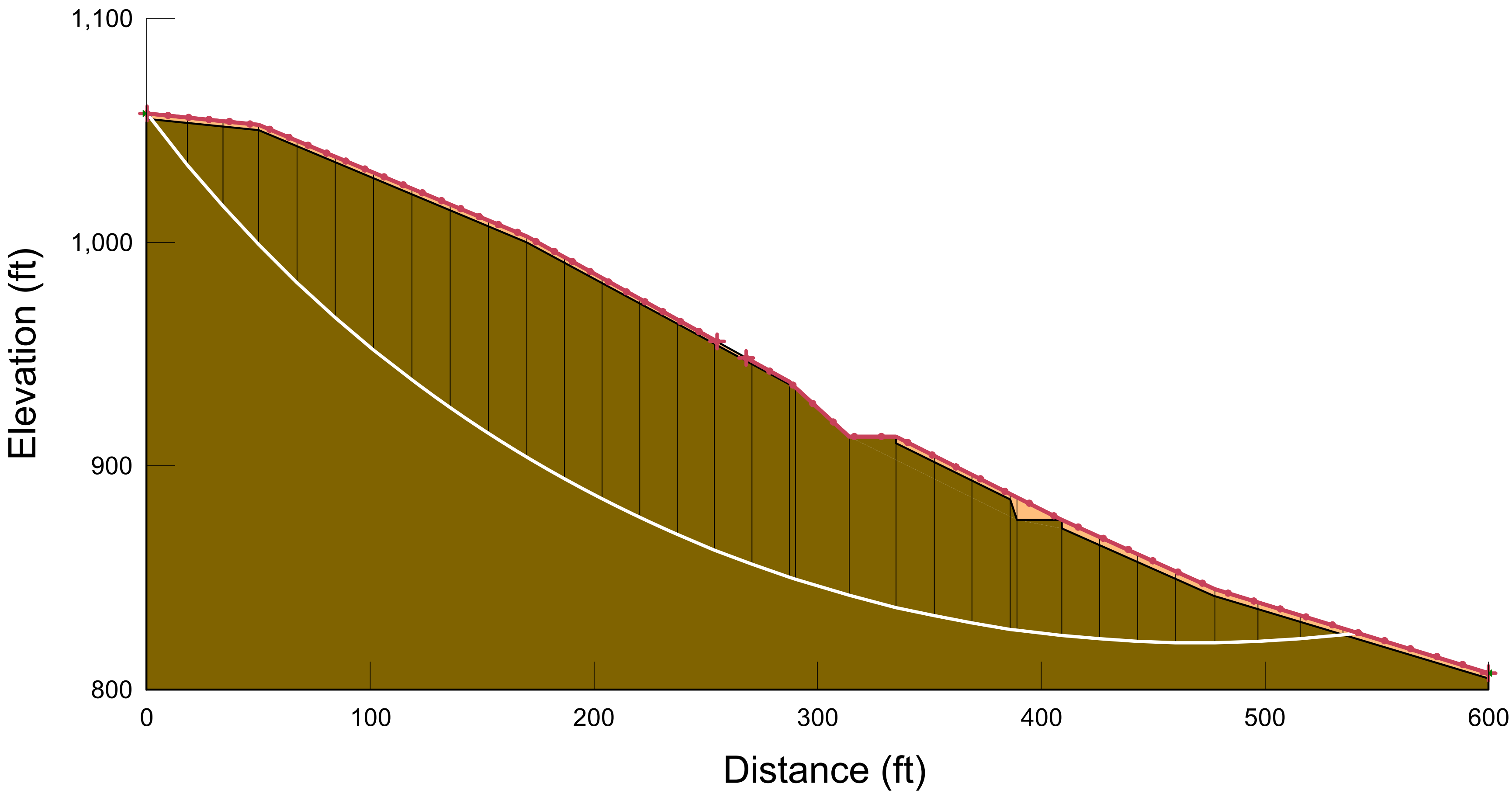
Title: Stevens Creek Road (Section C)
Date: 05/21/2019
File Name: 233001328 SCQ Road Section C (20190521).gsz

Parent: 2. Cut Slope (Global)
Name: 2b. Pseudostatic Analysis

Factor of Safety: 1.02

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Greenstone	Mohr-Coulomb	165	1,400	23
	Residual Soil	Mohr-Coulomb	120	200	30

1.02

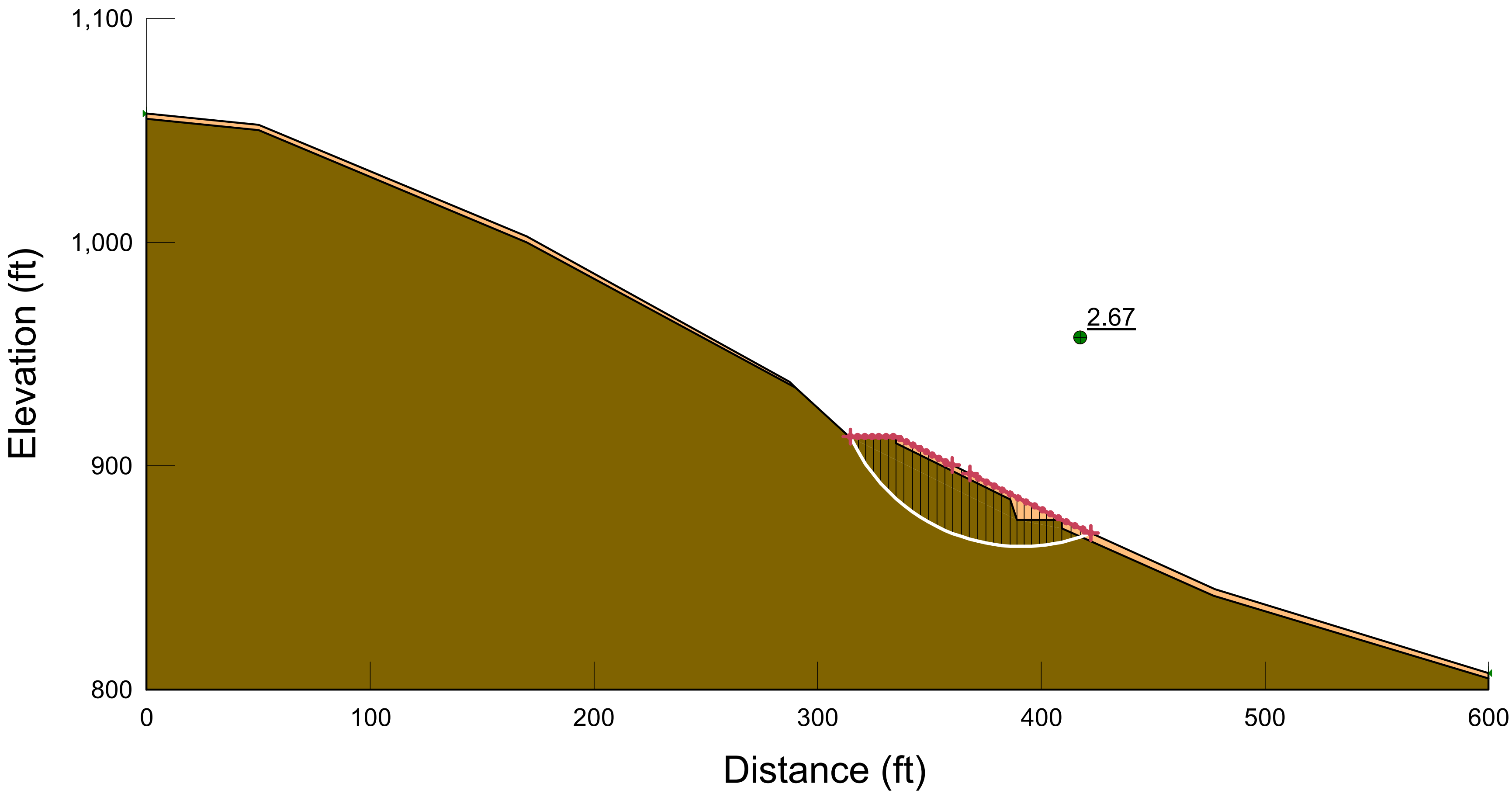


Title: Stevens Creek Road (Section C)
Date: 05/21/2019
File Name: 233001328 SCQ Road Section C (20190521).gsz

Parent: 3. Fill Slope
Name: 3a. Static Analysis

Factor of Safety: 2.67

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Greenstone	Mohr-Coulomb	165	1,400	23
	Residual Soil	Mohr-Coulomb	120	200	30

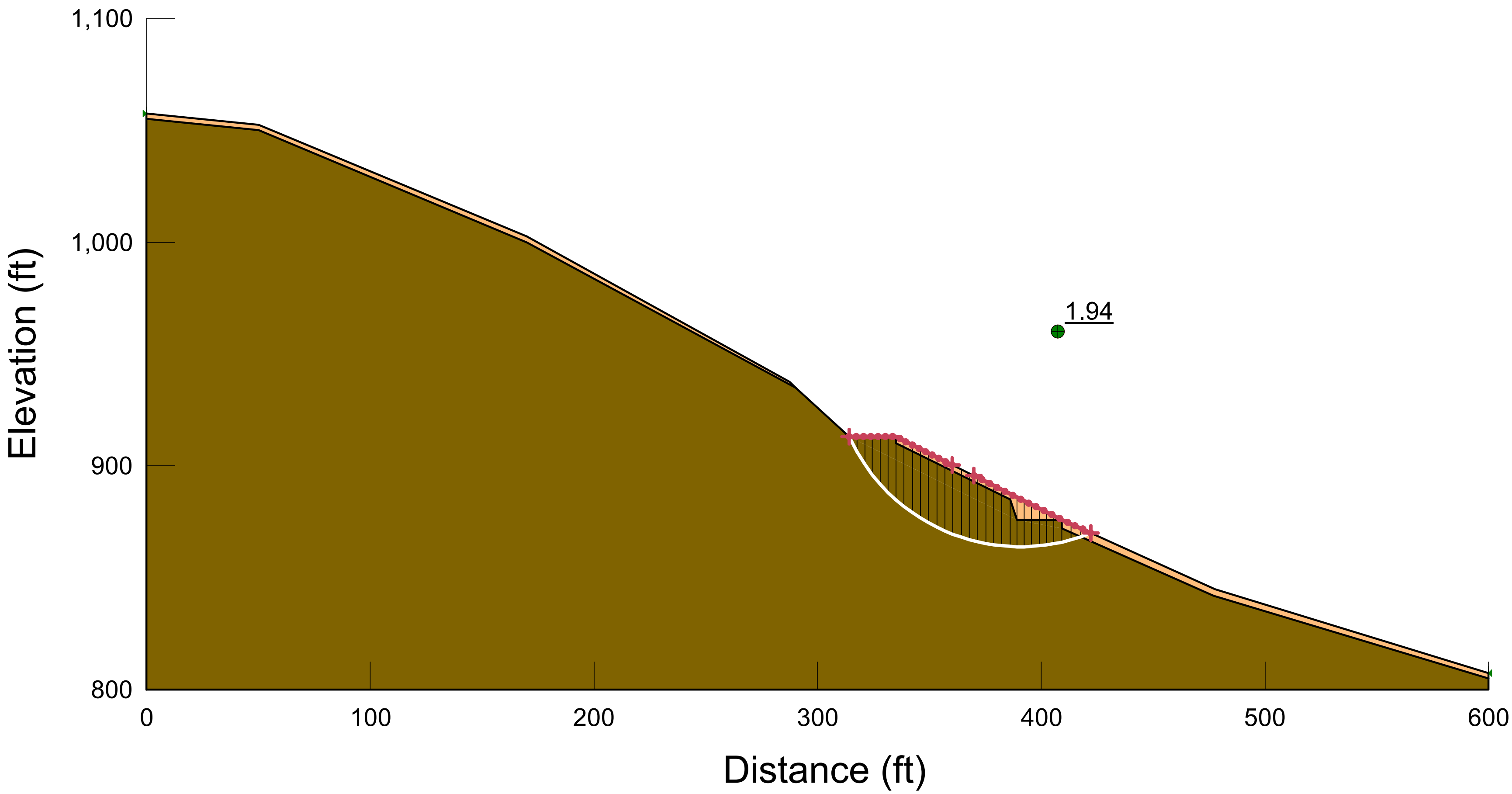


Title: Stevens Creek Road (Section C)
Date: 05/21/2019
File Name: 233001328 SCQ Road Section C (20190521).gsz

Parent: 3. Fill Slope
Name: 3b. Pseudostatic Analysis

Factor of Safety: 1.94

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Greenstone	Mohr-Coulomb	165	1,400	23
	Residual Soil	Mohr-Coulomb	120	200	30

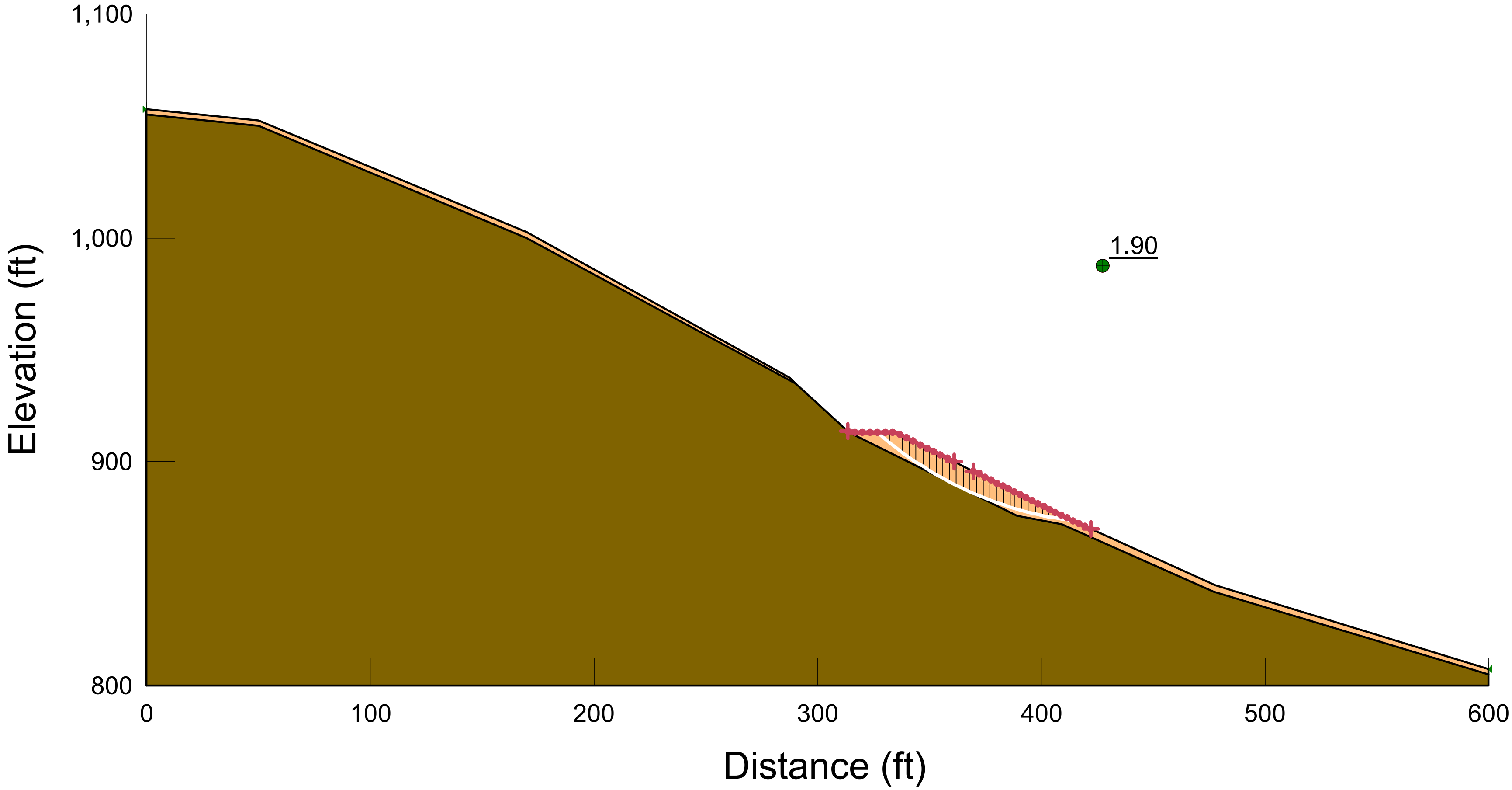


Title: Stevens Creek Road (Section C)
Date: 05/21/2019
File Name: 233001328 SCQ Road Section C (20190521).gsz

Parent: 4. Fill Slope (Sensitivity)
Name: 4a. Static Analysis

Factor of Safety: 1.90

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Greenstone	Mohr-Coulomb	165	1,400	23
	Residual Soil	Mohr-Coulomb	120	200	30



Title: Stevens Creek Road (Section C)
Date: 05/21/2019
File Name: 233001328 SCQ Road Section C (20190521).gsz

Parent: 4. Fill Slope (Sensitivity)
Name: 4b. Pseudostatic Analysis

Factor of Safety: 1.38

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Greenstone	Mohr-Coulomb	165	1,400	23
	Residual Soil	Mohr-Coulomb	120	200	30