Haae, Glenn

From: Haae, Glenn
Sent: Monday, February 10, 2020 10:27 AM
To: Sage Kiyonaga
Cc: Ichinotsubo, Lene K; Moore, Caleb; Becerra, Virginia
Subject: Molokai ISWMF Renewal w/ Modification Application (Phase V, Phase VI) Comments/Questions

Sage,

Please see below for our comments on the Molokai ISWMF Application:

Tetra Tech Site Inspection/Design Review
Tetra Tech performed a site inspection of the Molokai ISWMF on November 07, 2019, following are the observations from that inspection:

- Lysimeter is actually a leachate trench; therefore, the permit will indicate that the lysimeter is actually leachate trench.
- Need plans on new leachate outfall as described in the field. Will new outfall be discharged to new sump or outside containment tank/sump. What will the protocols and/or control systems be to ensure that a maximum head of 30 cm will not occur over the liner if no automatic discharge equipment is installed?
- How will the Phase 2 leachate (lysimeter) riser be abandoned?
- Please submit information on the closure of the existing green waste operation; and of the proposed green waste operation, including design and operation.
- How will assurance be provided that all organics will be removed such that remaining surface conditions are suitable for landfill construction. Will this be done during green waste closure or landfill construction?

Tetra Tech General Comments on HAR Requirements Checklist

- Current permit includes Molokai Metals (salvage yard) and the redemption center/recycling operation. The County has expressed a desire to obtain separate coverage for these operations and remove them from the permit, however, no documentation in the application is provided to request this removal.
- 58.1-04, #1: Clean Air – no permit is noted in documentation. Is there a current permit?
- 58.1-14, #1: MSWLF Design Criteria, Information was not included in the Design Report for the liner design. Current proposed liner design for Phases 5 and 6 is same as Phases 3 and 4 which is not prescriptive as it includes a low-perm soil layer at 1x10-6 and prescriptive is 1x10-7. The landfill is currently exempt (small community landfill), however, if the County anticipates no longer meeting this exemption, justification for the alternative liner may be provided in the current application but is optional.
- 58.1-15, #2: Cover Material, Alternative Daily Cover - Tarps are currently approved. The County is requesting use of green waste mulch as ADC, however, DOH recommends that materials that are compostable be recycled and reused rather than being placed in a landfill.
- 58.1-15, #7: Run-on and run-off control systems: Ops Section 4.10, Design Report Section 5.2, Appendix D. Propose channels along the west side of proposed Phases 5 and 6. During construction of Phase 5 the existing basin will be enlarged by approx. 200% (Figure 3). There are calculations supporting channel capacity for peak flows in the channel. There are no calculations provided supporting the basin routing capacity. Please provide these calculations.
- 58.1-16, #4: Sampling and Analysis Requirements: Ops Section 4.11.2, Appendix D. Leachate monitoring at 5 locations. Plan should be updated to include monitoring for Phases 5 and 6 upon construction. The plan should include how background groundwater data will be collected; DOH prefers this data prior to waste placement.
- 58.1-17, #2: Written Closure Plan: Closure and Post-Closure Plan Section 5.3.2 Appendix A. ET cover, 1' vegetative soil and 2' of compacted soil. A demonstration of equivalency will be provided in a future revision of this Closure Plan.

- 58.1-18, #6: Financial Assurance for Corrective Action (CA): no discussion of CA financial assurance in any of the submittals. Please provide.

Tetra Tech General Comments on Seismic Stability Analysis, Molokai Integrated Solid Waste Facility, May 2019, A-Mehr (Appendix C of the October 2019 Design Report)

Overall, the methodology, input data, and results of slope stability analyses are acceptable. The following comments are provided for the Consultant's consideration:

- Please clarify how the estimated peak ground acceleration of 0.31g was obtained for the design earthquake (i.e., an earthquake with a 2,475-year return period or 2% probability of exceedance in 50 years). The report referred to Figure 1 for the estimated design PGA. However, it appears Figure 1 shows the grading plan and cross-section locations for the facility. Note, the reviewer estimated the design PGA using the USGS Unified Hazard Tool and ASCE 7 Hazard Tool, and the adopted PGA of 0.31g is acceptable.
- The Consultant used a seismic coefficient of 0.16g, which is about 50 percent of the design PGA, in accordance with the recommendations presented in EPA (1995). The current standard of practice for seismic slope stability evaluation is to estimate the seismic coefficient based on the seismic deformation design criteria (typically 6 to 12 inches for the landfill liner system) using the procedures outlined by Bray and Travasarou (2011).
- A friction angle of 18 degrees was assigned to the base liner, which is conservative. Per the database by Koerner (2005), a peak shear strength with a friction angle of up to 25 degrees may be considered for the critical base liner interface between low permeability soil layer and 80 mil textured HDPE geomembrane.
- In Table 2, no cohesion value was assigned to the liner system. However, it appears that a cohesion of 50 psf was assigned to the base liner as shown in the computer output sheets for each cross-section. Please clarify.
- Please verify / confirm that the Spencer's Method was used to calculate the critical static and pseudostatic Factor of Safety for cross-section 1-1. The "Modified Bishop Method" was labelled in the computer output sheets for the static FS =- 2.39 and pseudostatic FS = 1.35.
- Please verify / confirm the yield acceleration of 0.16g as indicated in the Table for Final Analysis – Spencer's method of slices. It appears that the 0.16g is the seismic coefficient used for pseudostatic analyses, and it is not the calculated yield acceleration. Please include the calculated yield acceleration for each cross-section as appropriate.
- Please clarify the groundwater conditions in the report text or in the computer output sheets in Appendix B. In the output sheets, the piezometer surface is designated as "W1". However, the surface "W1" was not presented in the cross-sections.

Please let me know if you have any questions.

Regards,

Glenn Haae
Solid & Hazardous Waste Branch
Department of Health
2827 Waimano Home Road #100 |Pearl City, Hawaii 96782
Ph: (808) 586-4226 |E-mail: glenn.haae@doh.hawaii.gov

A-Mehr Inc.

Professional Engineers and Scientists Specializing in Landfills

23016 Mill Creek Drive
Laguna Hills, CA 92653

Phone (949) 206-0157
Fax (949) 206-9157

April 20, 2020

Mr. Sage Kiyonaga, P.E.
Department of Environmental Management
Solid Waste Division
County of Maui
2200 Main Street, Suite 225
Wailuku, Hawaii 96793

SUBJECT: RESPONSE TO COMMENTS, PHASE 5 & 6 SWFP APPLICATION
MOLOKAI INTEGRATED SOLID WASTE MANAGEMENT FACILITY
SOLID WASTE MANAGEMENT PERMIT LF-0070-09

Dear Mr. Kiyonaga:

A-Mehr, Inc., at the request of the County of Maui, has reviewed comments received via email on February 10, 2020 from Mr. Glenn Haae of the Department of Health (DOH), Solid Waste Section. The comments pertained to the Phase 5 & 6 SWFP Application and were a compilation of comments from DOH and their consultant Tetra Tech.

This letter and attachments are submitted in response to these comments. The responses reflect and follow the order of the comments as they were received in the February 10, 2020 DOH email.

<u>Tetra Tech Site Inspection/Design Review</u>

Tetra Tech performed a site inspection of the Molokai ISWMF on November 07, 2019, following are the observations from that inspection:

- Lysimeter is actually a leachate trench; therefore, the permit will indicate that the lysimeter is actually leachate trench.

  <u>Response:</u>
  It is our understanding the comment pertains to the existing Phase 2 lysimeter. Comment noted.

- Need plans on new leachate outfall as described in the field. Will new outfall be discharged to new sump or outside containment tank/sump. What will the protocols and/or control systems be to ensure that a maximum head of 30 cm will not occur over the liner if no automatic discharge equipment is installed?

  <u>Response:</u>
  The new Phase 5 LCRS sump located in the south corner of the Phase 5 lined area is described in Section 3.2, page 2, Design Report and the details of construction are illustrated in Design Drawings 4, 8, 12,

and 12A. This new sump will service the new lined areas of Phase 5 and Phase 6, and will also receive leachate flows from Phase 1 and Phase 2 as discussed on Section 3.2, page 3, Design Report.

Leachate levels are regularly monitored at each LCRS sump as discussed in Sections 8 and 14, Operations Plan. Monitoring of the leachate levels in the Phase 5 LCRS sump will be similar to the existing LCRS collection points, which has proved to be reliable in preventing leachate levels in excess of 30 cm on the liner, and is discussed in Section 8.1.4, Operations Plan.

Like the existing Phase 1 wet well and the Phase 3 sump, a submersible electric pump will be installed in the Phase 5 vertical riser and used to remove leachate periodically as needed to prevent leachate levels on the liner outside the limits of the LCRS sump from exceeding 30 cm. Leachate will be pumped from the sump into a tanker truck and transported to the County wastewater treatment plant for final disposal.

- How will the Phase 2 leachate (lysimeter) riser be abandoned?

  Response:
  Figure 7, Operations Plan illustrates the as-built condition of the Phase 2 lysimeter. When the Phase 6 liner is constructed, the lysimeter will be excavated to expose the edge of the Phase 2 compacted soil liner and the lysimeter riser pipe will be exposed and removed at this time. The remaining horizontal section of the lysimeter will be fitted with a temporary end cap with a drain line discharging to a temporary storage tank to prevent buildup or spillage of leachate. The Phase 6 compacted soil and geomembrane liners will be tied into the Phase 2 liners. A gravel filled LCRS trench equipped with a perforated 8-inch diameter HDPE pipe will be extended from the Phase 5 LCRS sump to the Phase 2 lysimeter. The perforated HDPE pipe will be connected to the end of the horizontal section of the Phase 2 lysimeter, and the drainage rock in the Phase 6 trench will be joined with the drainage rock in the Phase 2 lysimeter. Upon completion of the connection of the Phase 6 LCRS trench/pipe to the Phase 2 lysimeter trench/pipe, all leachate generated within Phase 2 will drain to the Phase 5 LCRS sump.

- Please submit information on the closure of the existing green waste operation; and of the proposed green waste operation, including design and operation.

  Response:
  The County, under a submittal independent of this application process, will submit a Closure Plan for the existing greenwaste operational area.

- How will assurance be provided that all organics will be removed such that remaining surface conditions are suitable for landfill construction. Will this be done during green waste closure or landfill construction?

  Response:
  The greenwaste operation has only received and processed clean greenwaste (yard trimmings, tree trimmings, etc.) and clean pallets. Composting has not been conducted at the facility. Therefore, soil contamination is not expected to be a significant concern.

  Construction of the Phase 5 and Phase 6 liner areas requires excavation of approximately 65,000 cy, which represents an average cut below the existing surface of approximately 6 feet. Approximately 500 cy of excavated soil will be utilized for structural fill in construction of the lined area. The balance of the excavated soils will be utilized for cover soil in the landfill operation.

During the initial excavation, the soil will be monitored for staining or discoloration and such soils will be transported to the active landfill area and stockpiled for use as daily cover. Only soils located below any staining or discoloration horizon will be utilized for structural fill.

Tetra Tech General Comments on HAR Requirements Checklist

- Current permit includes Molokai Metals (salvage yard) and the redemption center/recycling operation. The County has expressed a desire to obtain separate coverage for these operations and remove them from the permit, however, no documentation in the application is provided to request this removal.

  Response:
  The County has not made a final determination on the question of seeking separate permit coverage for the subject operations.

- 58.1-04, #1: Clean Air – no permit is noted in documentation. Is there a current permit?

  Response:
  HAR 11-60.1-62 exempts operating municipal waste landfills with a design capacity equal to or greater than 1,500,000 metric tons from the requirement to obtain an air permit. The volumetric design capacity of the MISWMF landfill is 837,200 cy (Section 5.1, Operations Plan). Density of landfilled waste at the MISWMF landfill has averaged approximately 583 lbs/cy for the period of April 16, 2013 through April 17, 2019 (Section 4.7, Operations Plan). Applying this average density to the landfill volumetric design capacity results in a design capacity of approximately 221,900 metric tons; which is substantially below the referenced threshold for requiring a permit.

- 58.1-14, #1: MSWLF Design Criteria, Information was not included in the Design Report for the liner design. Current proposed liner design for Phases 5 and 6 is same as Phases 3 and 4 which is not prescriptive as it includes a low-perm soil layer at $1x10^{-6}$ and prescriptive is $1x10^{-7}$. The landfill is currently exempt (small community landfill), however, if the County anticipates no longer meeting this exemption, justification for the alternative liner may be provided in the current application but is optional.

  Response:
  Comment noted. The Site-Specific Groundwater and Leachate Monitoring Plan, Appendix D, Operations Plan, discusses the contaminant fate and transport modeling conducted to demonstrate the liner design used for Phases 3 and 4, and proposed for Phase 5 and 6, provides protection of the underlying groundwater resources and satisfies the point of compliance criteria. The results of this evaluation indicate the liner design provides protections to the underlying groundwater in a manner that is equivalent to or exceeds that of the prescriptive liner as defined in HAR 11-58.1-3.

- 58.1-15, #2: Cover Material, Alternative Daily Cover - Tarps are currently approved. The County is requesting use of green waste mulch as ADC, however, DOH recommends that materials that are compostable be recycled and reused rather than being placed in a landfill.

  Response:
  Comment noted. The County concurs with the DOH recommendation to recycle greenwaste to the maximum extent possible and avoid placing the material in the landfill. However, the supply of greenwaste mulch product oftentimes exceeds the demand for the product and results in an

accumulation of product on site. In addition to giving mulch away to residents free of charge, the County beneficially utilizes mulch as an erosion control blanket on the interim landfill slopes, but the County respectively maintains their request for authority to utilize greenwaste mulch as ADC.

- 58.1-15, #7: Run-on and run-off control systems: Ops Section 4.10, Design Report Section 5.2, Appendix D. Propose channels along the west side of proposed Phases 5 and 6. During construction of Phase 5 the existing basin will be enlarged by approx. 200% (Figure 3). There are calculations supporting channel capacity for peak flows in the channel. There are no calculations provided supporting the basin routing capacity. Please provide these calculations.

  <u>Response:</u>
  The new expanded stormwater basin capacity of 6,861 cy (approximately 4.25 acre-feet) represents approximately 2.09 times the total run-off from the design storm event and is adequately sized. Attachment A provides an addendum to the Hydrology Report, Appendix D, Design Report with a calculation supporting the capacity of the new stormwater basin improvements.

- 58.1-16, #4: Sampling and Analysis Requirements: Ops Section 4.11.2, Appendix D. Leachate monitoring at 5 locations. Plan should be updated to include monitoring for Phases 5 and 6 upon construction. The plan should include how background groundwater data will be collected; DOH prefers this data prior to waste placement.

  <u>Response:</u>
  Attachment B provides an edited page 4-10, Operations Plan noting the leachate monitoring locations will change over time as Phase 5 and Phase 6 are constructed.

  In regards to the collection of background groundwater data, the MISWMF is exempt from groundwater monitoring requirements as discussed in Section 4.11.1, Operations Plan. In the event that groundwater monitoring is required in the future, the County will install upgradient and downgradient wells consistent with applicable regulations and site-specific conditions.

  In the Site-Specific Groundwater and Leachate Monitoring Plan, Appendix D, Operations Plan it is documented that impacts to groundwater related to the landfill will most likely originate from the LCRS sumps. Therefore, the LCRS system design includes pan lysimeters under the sumps for early groundwater monitoring. If there are issues with the lysimeters then the County will install groundwater wells if required.

- 58.1-17, #2: Written Closure Plan: Closure and Post-Closure Plan Section 5.3.2 Appendix A. ET cover, 1' vegetative soil and 2' of compacted soil. A demonstration of equivalency will be provided in a future revision of this Closure Plan.

  <u>Response:</u>
  Comment noted. Equivalency demonstration will be submitted at a future date as noted.

- 58.1-18, #6: Financial Assurance for Corrective Action (CA): no discussion of CA financial assurance in any of the submittals. Please provide.

  <u>Response:</u>
  MISWMF is a publicly owned County landfill and financial assurance documentation is submitted annually. Attachment C contains the most recent financial assurance documentation.

Tetra Tech General Comments on Seismic Stability Analysis, Molokai Integrated Solid Waste Facility, May 2019, A-Mehr (Appendix C of the October 2019 Design Report)

Overall, the methodology, input data, and results of slope stability analyses are acceptable. The following comments are provided for the Consultant's consideration:

- Please clarify how the estimated peak ground acceleration of 0.31g was obtained for the design earthquake (i.e., an earthquake with a 2,475-year return period or 2% probability of exceedance in 50 years). The report referred to Figure 1 for the estimated design PGA. However, it appears Figure 1 shows the grading plan and cross-section locations for the facility. Note, the reviewer estimated the design PGA using the USGS Unified Hazard Tool and ASCE 7 Hazard Tool, and the adopted PGA of 0.31g is acceptable.

  Response:
  An update to the Appendix B, Operations Plan is attached (Attachment D) which incorporates and references Figure 1A and which was used to estimate the PGA for the project location.

- The Consultant used a seismic coefficient of 0.16g, which is about 50 percent of the design PGA, in accordance with the recommendations presented in EPA (1995). The current standard of practice for seismic slope stability evaluation is to estimate the seismic coefficient based on the seismic deformation design criteria (typically 6 to 12 inches for the landfill liner system) using the procedures outlined by Bray and Travasarou (2011).

  Response:
  Based on our slope stability analysis, the project will be stable during the design seismic event. Further, based on the EPA approved analyses procedures no seismic deformation is expected for this project, and therefore, the seismic deformation analysis procedures are not applicable for the project.

- A friction angle of 18 degrees was assigned to the base liner, which is conservative. Per the database by Koerner (2005), a peak shear strength with a friction angle of up to 25 degrees may be considered for the critical base liner interface between low permeability soil layer and 80 mil textured HDPE geomembrane.

  Response:
  During the design stage, we prefer to be more conservative with our analysis and use lower shear strength values.

- In Table 2, no cohesion value was assigned to the liner system. However, it appears that a cohesion of 50 psf was assigned to the base liner as shown in the computer output sheets for each cross-section. Please clarify.

  Response:
  Table 2 of the updated Appendix B, Operations Plan (Attachment D) is revised to include the cohesion of 50 psf assigned to the liner system as shown in the computer output sheets.

- Please verify/confirm that the Spencer's Method was used to calculate the critical static and pseudostatic Factor of Safety for cross-section 1-1. The "Modified Bishop Method" was labelled in the computer output sheets for the static FS = 2.39 and pseudostatic FS = 1.35.

Response:
The lowest safety factor using Spencer's Method resulted in static FS= 2.38 and pseudostatic FS= 1.32 for cross-section 1-1. The summary of analysis results presented in the attached Appendix B, Operations Plan (Attachment D) is updated to include the method of slope stability analyses and these results.

- Please verify/confirm the yield acceleration of 0.16g as indicated in the Table for Final Analysis – Spencer's method of slices. It appears that the 0.16g is the seismic coefficient used for pseudostatic analyses, and it is not the calculated yield acceleration. Please include the calculated yield acceleration for each cross-section as appropriate.

  Response:
  The slope stability analyses presented in Appendix B, Operations Plan (Attachment D) meets the industry standards and the regulatory requirements. The slope stability analyses indicate that Molokai Landfill meets and exceeds the State and Federal regulations. The 0.16g is the seismic coefficient used for pseudostatic analyses. As requested we calculated yield acceleration for the critical failure surfaces for the cross sections 1-1, 2-2, and 3-3 to be 0.26g, 0.27g, and 0.18g respectively (see Attachment E) and these values inherently should be and are higher than the required design seismic coefficient of 0.16g.

- Please clarify the groundwater conditions in the report text or in the computer output sheets in Appendix B. In the output sheets, the piezometer surface is designated as "W1". However, the surface "W1" was not presented in the cross-sections.

  Response:
  Groundwater below the landfill is estimated to be at least 175 feet below the liner grades and in the hard bedrock. The output file default print out includes this generic information

Should you have any questions, please contact me at 949-206-0157.

Sincerely,

A-Mehr, Inc.
M. Ali Mehrazarin, P.E.
Principal Engineer

Attachment A

STORMWATER BASIN SIZING EVALUATION

February 2020

ADDENDUM TO:

HYDROLOGY STUDY
MOLOKAI INTEGRATED WASTE MANAGEMENT FACILITY
August 2017

The existing stormwater basin is located immediately to the south/southeast of the Phases 5 and 6 development area. As part of the development of Phases 5 and 6, the stormwater basin will be expanded. The expanded stormwater basin will have a capacity of approximately 6,861 cubic yards (cy).

The required basin capacity (VS) to retain the design storm event is calculated as the total peak run-off flow (Q Total) into the basin (160 cfs; WinTR-55 output) multiplied by the maximum Time of Concentration (Tc) (0.154 hours; Win Tr-55 output).

VS = Q Total x Tc
= (160 cfs x 0.154 hours x 60 min/hour x 60 sec/min) ÷ 27 cf/cy
= 3,285 cy (approximately 2.04 acre-feet)

The expanded stormwater basin capacity of 6,861 cy (approximately 4.25 acre-feet) represents approximately 2.09 times the total run-off from the design storm event, and is adequately sized.

Attachment B

In order to develop the liner grades for Phase 6, the current Phase 2 lysimeter sampling port will be removed and the lysimeter will be converted to drain onto the adjacent Phase 6 liner. Drainage from the Phase 2 lysimeter will be collected in the Phase 5 sump.

- **Phase 3 Leachate Collection Sump.** The elevation at the bottom of the double-lined sump in Phase 3 is 216 ft. amsl, and the elevation at the liner system adjacent to the sump edge is 221.5 feet. The compliance elevation, at which the adjacent liner system has no more than one foot of hydraulic head above it, is 222.5 feet amsl.

- **Phase 3 Sump Lysimeter.** The sump lysimeter is constructed below the clay liner in the bottom of the sump. Any significant volume of liquid in the lysimeter is to be investigated as potential indication of a release of leachate from the sump.

- **Phase 3 Pan Lysimeter.** The pan lysimeter is constructed below the lowest area of liner outside the Phase 3 sump. Any significant volume of liquid detected in the pan lysimeter is to be investigated as potential indication of a release of leachate from the liner system.

Phase 5 will be constructed with a sump, a sump lysimeter, and a pan lysimeter similar to those constructed in Phase 3. Compliance levels for leachate head in the LCRS sump will be calculated after completion of construction and based on documented as-built elevations of the sump floor and the adjacent floor liner.

With construction of Phase 5, the Phase 1 Wet Well will be decommissioned and removed from above the outlined list of leachate monitoring locations, and the Phase 5 Leachate Collection Sump and the Phase 5 Sump Lysimeter will be added to the list; making a total of 6 monitoring locations.

With construction of Phase 6, the Phase 2 Lysimeter will be decommissioned and removed from the list of leachate monitoring locations; making a total of 5 monitoring locations.

4.11.3 Surface Water

No special facilities are required for surface water monitoring. Surface water runoff samples are to be collected at the outfall or overflow of the sedimentation basin or as otherwise required by HDOH. Sampling procedures are described in the Stormwater Pollution Prevention Program contained in Appendix E.

4.11.4 Landfill Gas

In compliance with HAR 11-58.1-15(d) quarterly landfill gas monitoring is conducted to ensure that landfill gas does not exceed 25% of the lower explosive limit.

The present network of gas monitoring wells at the MISWMF, as shown in Figure 2, consists of 5 perimeter probes installed in 2011. Gas probes GP-2 through GP-5 are located near the site property line with the fifth probe, GP-1, located between the landfill and entrance area. The gas probes provide early warning of any gas migration towards the property boundary or the entrance facility structures.

Attachment C

MICHAEL P. VICTORINO
Mayor

ERIC A. NAKAGAWA, P.E.
Acting Director

SHAYNE R. AGAWA, P.E.
Deputy Director

MICHAEL P. RATTE
Solid Waste Division

SCOTT R. ROLLINS, P.E.
Wastewater Reclamation Division

TAMARA FARNSWORTH
Environmental Protection &
Sustainability Division

COUNTY OF MAUI
DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT
2050 MAIN STREET, SUITE 2B
WAILUKU, MAUI, HAWAII 96793

April 22, 2019

Ms. Lene Ichinotsubo, P.E., (Acting) Chief
Environmental Management Division
Solid and Hazardous Waste Branch
State of Hawaii Department of Health
2827 Waimano Home Road
Pearl City, HI 96782

Dear Ms. Ichinotsubo:

I Scott Teruya, Director of Finance for the County of Maui, 200 South High Street, 2nd Floor, Wailuku, Hawaii 96793 submit this letter to demonstrate and certify financial responsibility for closure, post-closure, and corrective action costs related to the following municipal solid waste landfills (MSWLFs) owned and operated by the County of Maui:

- Central Maui Landfill
- Molokai Integrated Solid Waste Facility
- Lanai Landfill
- Hana Landfill

The total amount of costs to be assured as of June 30, 2018 is approximately $51.7 million for MSWLF costs.[1] The maximum amount that the County of Maui can assure under federal rules is limited to 43% of total annual revenues or approximately $231.3 million as of June 30, 2018. Details of the cost estimates and the calculation of the maximum assurance amount are shown on Schedule 1 attached to this letter.

The County of Maui is a local government entity. The County's annual financial statements are provided in its Comprehensive Annual Financial Report (CAFR). The most recent CAFR reports the County's financial condition for the fiscal year concluding June 30, 2018 and is published for public inspection on the county website at www.co.maui.hi.us via the link for the department of finance (documents). The County's A-133 Single Audit report for the same period is also available at the same location. I certify that the financial statements of the County of Maui as of June 30, 2018 were prepared in conformity with Generally Accepted Accounting Principles for governments. The CAFR for the fiscal year concluding June 30, 2018 was audited by N&K CPAs, Inc. as independent certified public accountants.

[1] Estimated accrued cost of $36.3M and future costs of $15.4M as accounted and reported in County of Maui CAFR, June 30, 2018, Page 76.

[2] Total annual revenues for County of Maui governmental activities was $537.8M as reported in County of Maui CAFR, June 30, 2018, Page 44.

As of June 30, 2018, the County of Maui had bond ratings of "Aa1", "AA+", and "AA+" by Moody's, Standard & Poor's, and Fitch, respectively.

I further certify that:

a) The County of Maui is not currently in default on any outstanding general obligation bonds;

b) The County of Maui does not have any outstanding general obligation bonds rated lower than Baa as issued by Moody's or BBB as issued by Standard and Poor's;

c) The County of Maui has not operated at a deficit equal to five percent or more of annual revenue in each of the past two fiscal years; and

d) The County of Maui has not received an adverse opinion, disclaimer of opinion, or other qualified opinion from independent certified public accountants in either of the past two fiscal years.

I certify that the County of Maui has complied with the requirements of Government Accounting Standards Board Statement (GASB) No. 18 and including information on closure and post-closure costs in its CAFR as of June 30, 2018. Copies of the CAFR are available at the County of Maui website at www.co.maui.hi.us via the link for the department of finance (documents). Information on any corrective action taken in the future will be placed in the operating record of the appropriate MSWLF facility until the next available CAFR is prepared.

I certify that the County of Maui conforms with the requirements of 40 CFR Part 258, Section 258.70(f)(4), relating to the calculation of costs to be assured and the maximum amount of assurance possible through this financial assurance mechanism. Details of the calculations areSchedule 1 attached to this letter.

Dated at Wailuku, Hawaii, April 22, 2019.

Submitted for your consideration.

SCOTT TERUYA, Director
Department of Finance

Attachments
cc: Sage Kiyonaga, SWD

Schedule 1

County of Maui
Local Government Financial Test Worksheet Fiscal Year Ended June 30, 2018
(Amounts in Millions)

Audited	2018
Calculation of costs to be assured:	
Total annual revenue	537.8
Maximum assurance (43% of Total Annual Revenue)	231.3
Costs to be assured at June 30, 2018:	
Central Maui Landfill	22.2
Molokai Landfill	6.7
Lanai Landfill	12.4
Hana Landfill	10.4
Costs to be assured at June 30, 2018:	**51.7**

Attachment D

Seismic Stability Analysis
Molokai Integrated Solid Waste Facility
February 2020

Introduction

Molokai Integrated Solid Waste Facility (MISWF) is located within a "seismic impact zone", defined by Hawaii Administrative Rules (HAR) Section 11-58.1-13(e), as an area with a ten percent or greater probability of experiencing a horizontal acceleration, due to seismic shaking, of more than 0.10 g in a 250 year period. The United States Geological Survey (USGS) has classified the island of Molokai in UBC Seismic Zone 2B, defined as having a ten percent probability of exceeding a peak ground acceleration of 0.15 g in 50 years. (USGS, 2004a) USGS earthquake hazard maps estimate the peak horizontal ground acceleration in central Molokai to be 0.31 g with a 2% probability of occurrence in 50 years (See Figure 1A). A probability of exceedance of 2% in 50 years is approximately equivalent to a probability of 10% in 250 years (USGS, 2004b), and represents an event expected to occur one time in approximately 2,400 years. (USGS, 1996)

HAR 1.58.1-13(e) prohibits municipal solid waste landfills to be constructed or expanded in a seismic impact zone unless the landfill operator or owner demonstrates that the containment structures of the landfill are designed to withstand the maximum horizontal acceleration due to an earthquake. A-Mehr, Inc. has prepared the following analysis to make the required demonstration.

Methodology

The analysis is based on a slope stability analysis of the landfill at the time when the landfill has reached its maximum permitted elevation, with design final grades at no steeper than 3:1 (horizontal: vertical) slope ratio as shown on Figure 1. A-Mehr, Inc. used the slope stability analysis computer program STABL6H to compute the static factor of safety and yield acceleration for three critical cross-sections, as shown on Figures 1 - 6. The program uses the Modified Bishop and Modified Janbu methods, to determine the location of the lowest factor of safety for failure planes through the liner system for static and pseudostatic conditions. The location with the lowest factor of safety was then analyzed using the more rigorous Spencer's Method of Slices, which produces more realistic results than the Modified Bishop and Janbu screening procedures.

The analysis was conducted according to procedures specified in the document "RCRA Subtitle D (248) Seismic Design Guidance for Municipal Solid Waste Facilities (U.S. Environmental Protection Agency, April 1995). The document provides a straightforward procedure for evaluating the seismic stability[1] of refuse slopes, as follows:

- Establish cross-sections and assign appropriate shear strength parameters.
- Conduct static stability analyses, using appropriate programs to search for the most critical locations in the cross-section to determine the lowest static factor of safety.
- Determine the seismic coefficient, k_s. The recommended value for k_s is 50% of the peak horizontal acceleration during the design earthquake.

[1] Seismic stability as evaluated in this report refers to stability against potential movements of significant volumes of refuse or soil, as distinguished from minor slippage of surface materials.

- Conduct pseudo-static stability analyses of the most critical locations for each cross-section, applying a horizontal load equivalent to the selected seismic coefficient $k_{s.}$.
- If the resulting pseudo-static factor of safety is greater than 1.0, the seismic stability analysis is complete.

Input Data

The analysis requires shear strength properties to be assigned to each material in the system. Table 1 lists the components form the liner – waste system. Due to the shallow excavation of the landfill base grades (approximately 5 feet), liner components are the same on the floor and side slopes, except for the presence of leachate collection gravel on the floor. Table 2 lists the properties for each component and interface.

The seismic coefficient used in the pseudo-static stability analysis is 50% of the peak horizontal acceleration as recommended by USEPA (1995), and the design earthquake is 0.5 x 0.31 = 0.155g.

Table 1
System Components – From Bottom to Top

Prepared subgrade
One (1) foot of low permeability soil liner
80 mil HDPE textured (both sides) geomembrane
16 ounce/square yard nonwoven geotextile
12 inches leachate collection sand or gravel
16 ounce/square yard nonwoven geotextile
2 ft. sandy clay soil (operations layer)
Solid waste

The analysis were conducted for the most critical conditions, assuming a maximum slope ratio of 3:1 (horizontal: vertical). The analysis evaluated the cross-sections illustrated on Figure 1, with shear strength properties typical of solid waste and the soil and liner materials present at the landfill, including a refuse mass unit weight of 85 pounds per cubic foot (pcf) based on site-specific waste compaction and soil use data for MISWF, which is a conservatively high maximum weight typically used in the industry.

Appendix A presents the data and calculations used to estimate the site-specific refuse mass unit weight of 85 pcf. Table 2 summarizes the input values for the stability analyses.

Table 2
Shear Strength Properties for Gross Slope Stability Analysis

Material	Friction angle (degrees)	Cohesion (lb./sq. ft.)	Unit Weight (lb./cu. ft.)
Low permeability soil liner	25	250	126
Solid Waste	33	0	85
Liner System Low permeability soil liner vs. textured HDPE liner interface	18	50	63

Results

The computer output sheets for the STABL6H stability analyses are presented in Appendix B. The results are summarized in the following discussion.

Static Factor of Safety:

Each of the three cross-sections was evaluated for the analytical case using the material properties listed in Table 2. The liner system was assigned the properties of the most critical interface, the low permeability soil liner / textured HDPE interface.

All cross-sections were determined to have static factors of safety (FS) equal to or greater than 1.5 for all cases. As shown in Table 3, the lowest FS determined by Spencer's Method of analysis for each was:

Cross-section 1-1 2.38
Cross-section 2-2 2.06
Cross-section 3-3 1.80

Pseudostatic Analysis:

All cross-sections were determined to have pseudo-static factors of safety (FS) in excess of 1.0 when analyzed using the seismic coefficient k_s = 0.16g. As shown in Table 3, the lowest seismic FS values for each cross-section are:

Cross-section 1-1 1.32
Cross-section 2-2 1.29
Cross-section 3-3 1.06

Table 3
Stability Analysis Results
Static and Pseudo-static Factors of Safety

Refuse Unit Weight (pcf)	Minimum Static Factor of Safety			Minimum Pseudo-static Factor of Safety		
	Cross-Section 1	Cross-Section 2	Cross-Section 3	Cross-Section 1	Cross-Section 2	Cross-Section 3
85	2.38	2.06	1.80	1.32	1.29	1.06

It should be noted that the analysis of gross slope stability was conducted using the interface shear strength of the textured HDPE against low-permeability soil liner, with a friction angle of 18 degrees for the lined areas of Phases 3, 4, 5 and 6. The unlined areas of Phases 1 and 2 were evaluated using parameters for low permeability soil, with a friction angle of 25 degrees and cohesion of 250 psf as indicated in Table 2. With seismic factors of safety greater than 1.0, it can be concluded there will be no permanent deformation of the liner system during the design seismic event.

Based on this analysis, we conclude that the containment system for the landfill is designed to resist the maximum horizontal acceleration from the design earthquake, and therefore meets the requirements of HAR 11-58.1-13(e).

Respectfully Submitted,

A-MEHR, INC.
M. Ali Mehrazarin, P.E.
Principal Engineer

References

EPA, 1995. RCRA Subtitle D (258) Seismic Design Guidance for Municipal Solid Waste Landfill Facilities. EPA/600/R/95/051. U.S. Environmental Protection Agency, April 1995.

Parametrix, 1998. Value Incentive Engineering Proposal, Phase IV Waste Cell Expansion, Molokai Integrated Solid Waste Facility. Parametrix, Inc., January 1998.

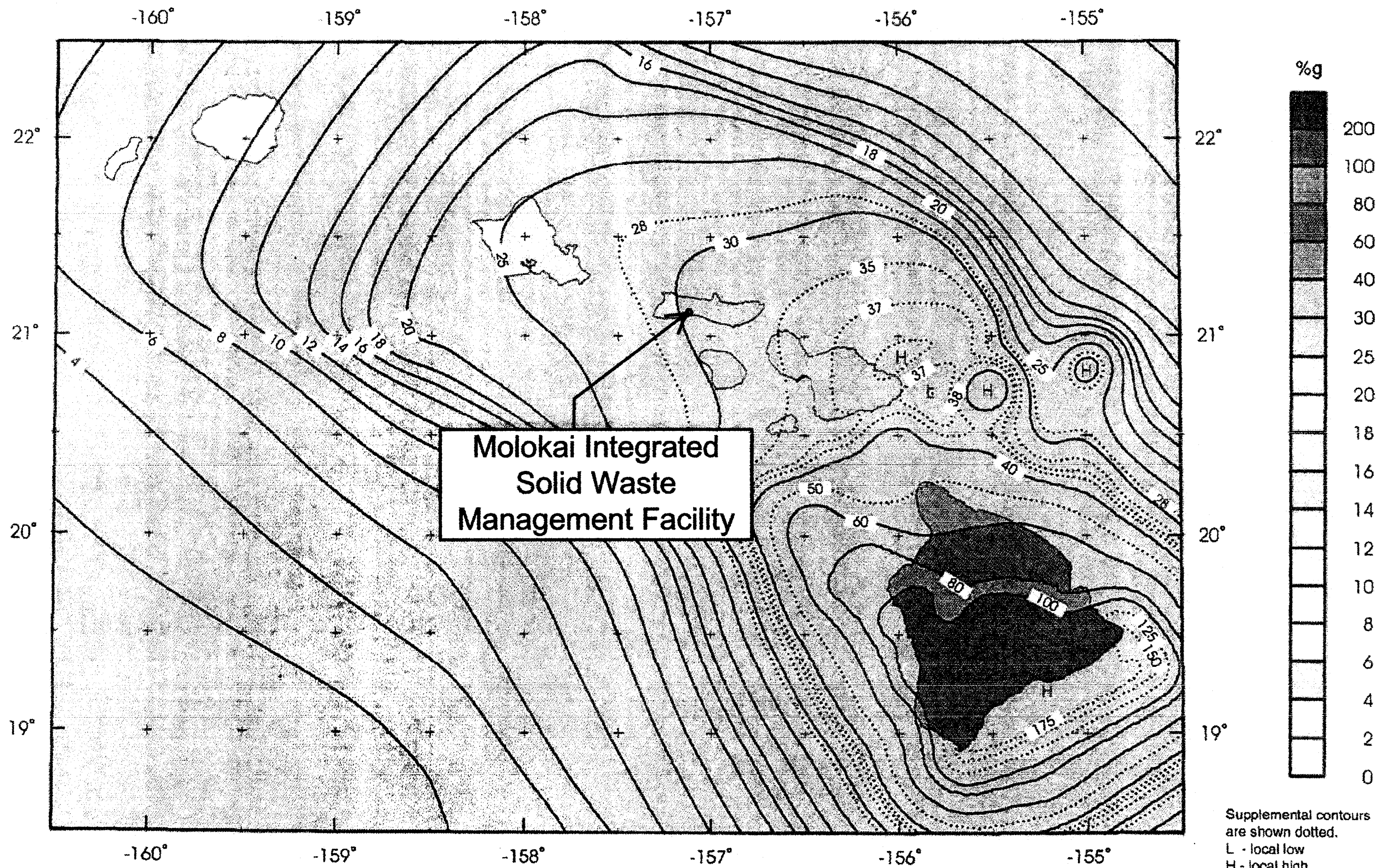
USGS, 1999. Keep Molokai's 1938 Earthquake in Mind. http//hvo.usgs.gov/volcanowatch/1999/. April 8, 1999. United States Geological Survey website.

USGS, 2004a. Earthquake Hazards and Zoning in Hawaii. http://hvo.wr.usgs.gov/earthquakes/hazards/. June 2004.

USGS, 2004b. Frequently Asked Questions (FAQ) About Return Periods. http://equhazmaps.usgs.gov/faq/. United States Geological Survey website accessed September 2004.

USGS, 1996. Hawaii Hazard Maps 1996. http://eqhazmaps.usgs.gov/html/his.html. United States Geological Survey website accessed June 2004

FIGURES

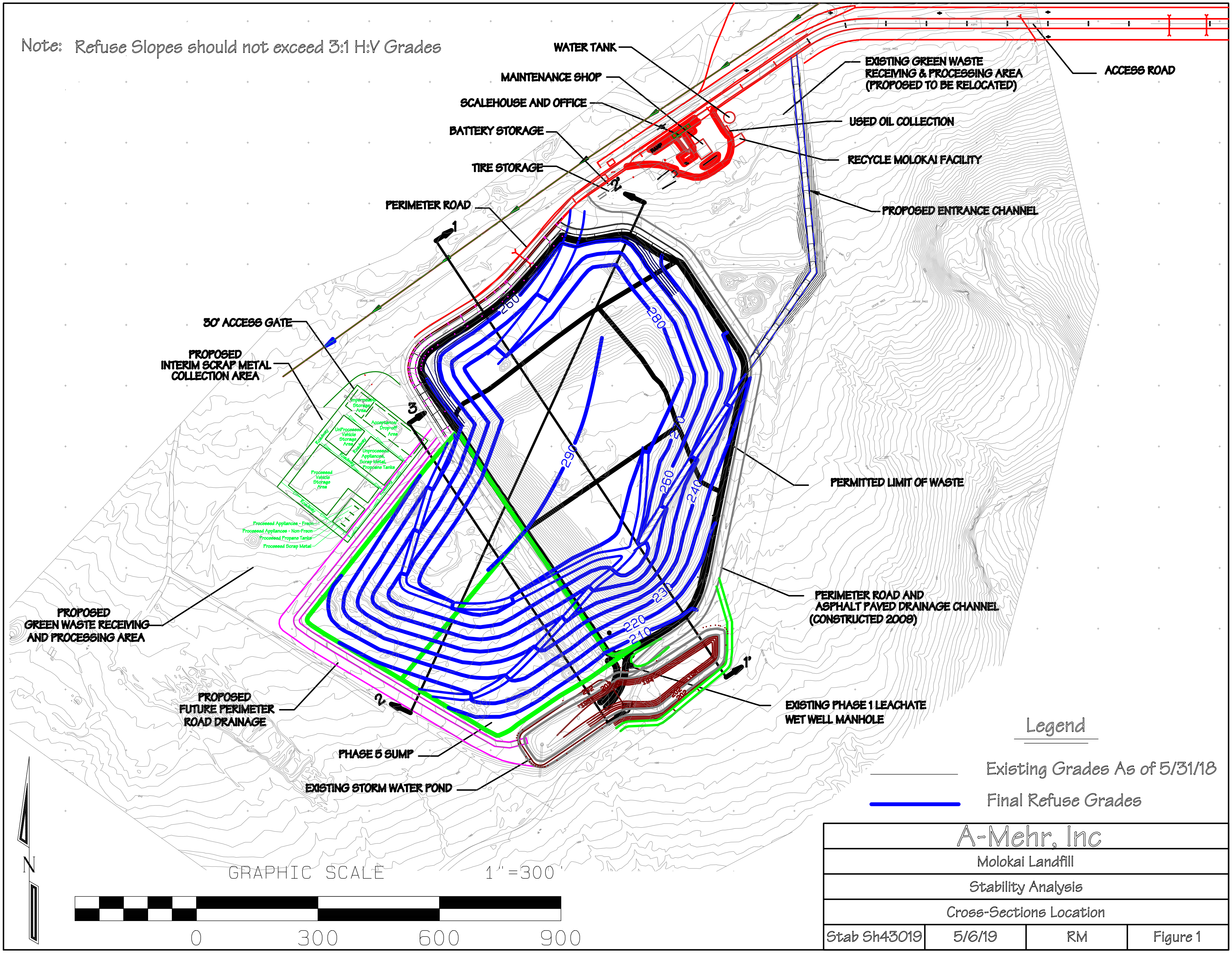


U.S. Geological Survey
National Seismic Hazard Mapping Project
Based on:
1. USGS Open-File Report - in progress
2. USGS Open-File Report - in progress

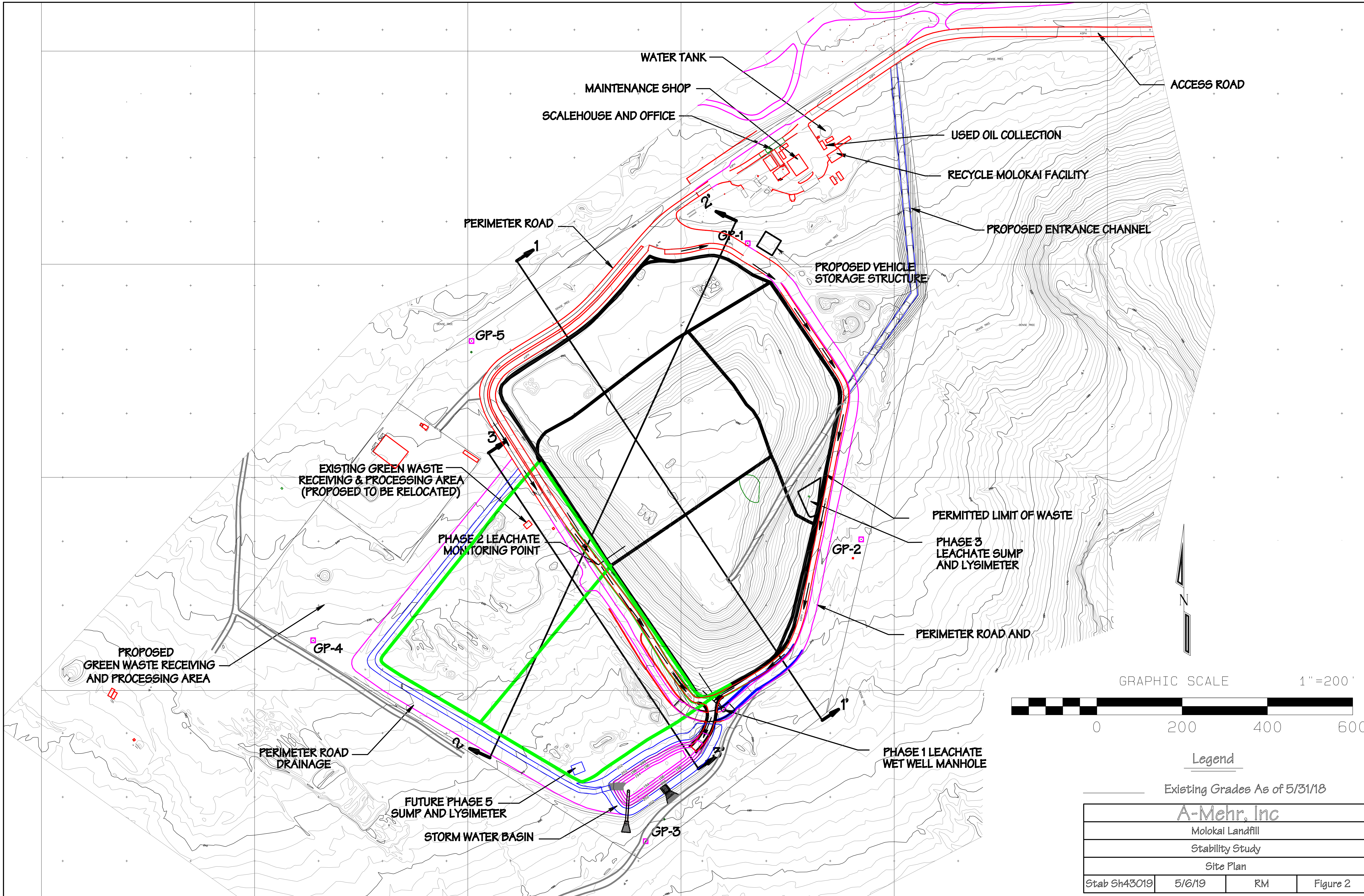
km
0 50 100
miles
0 50 100
Scale - 1:3750000
Albers Equal-Area Conic Projection
Standard Parallels 8.0°N and 18.0°N

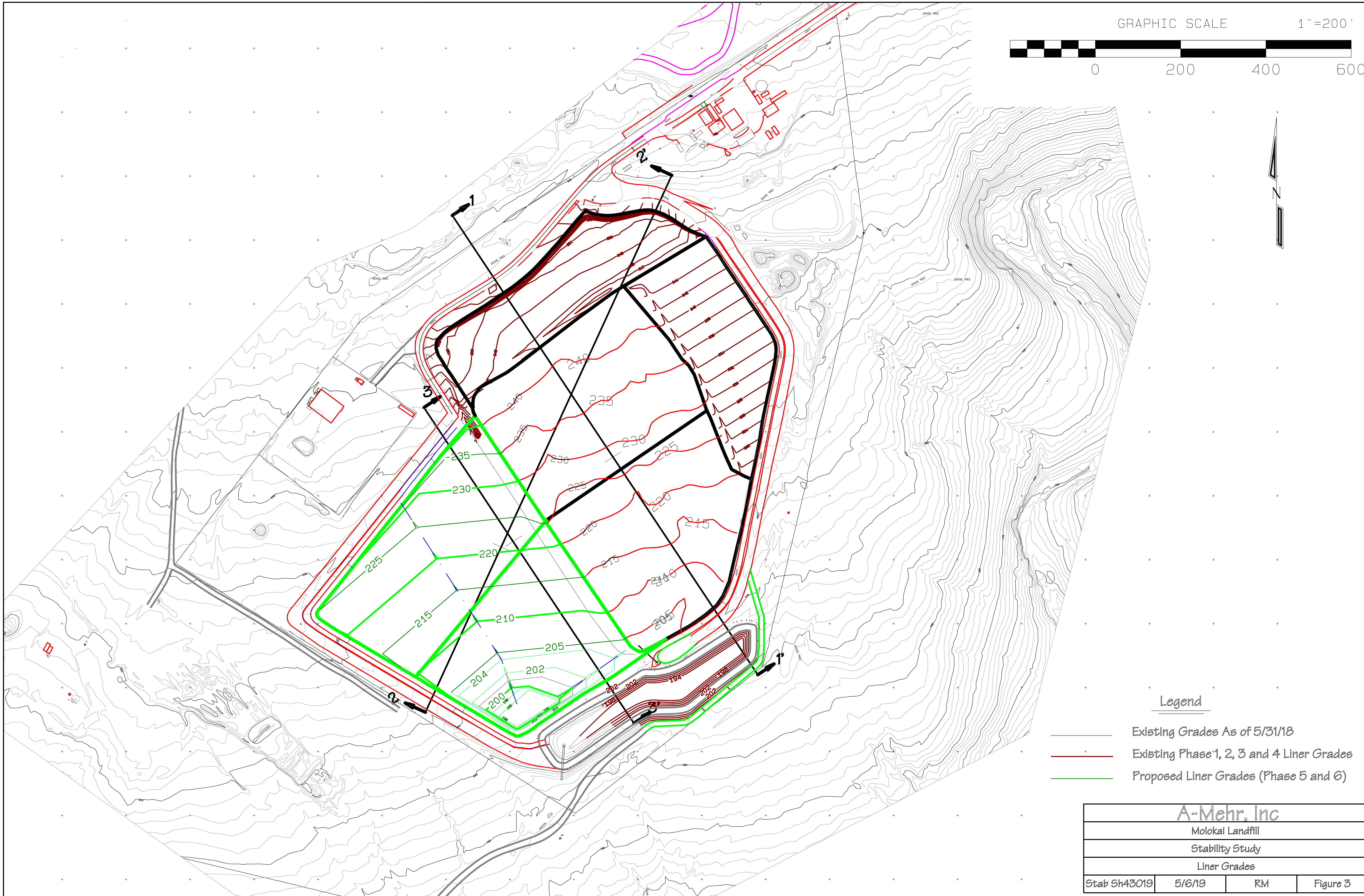
Horizontal Ground Acceleration (%g)
With 2% Probability of Exceedance in 50 Years
Firm Rock - 760 m/sec shear wave velocity

Figure 1A

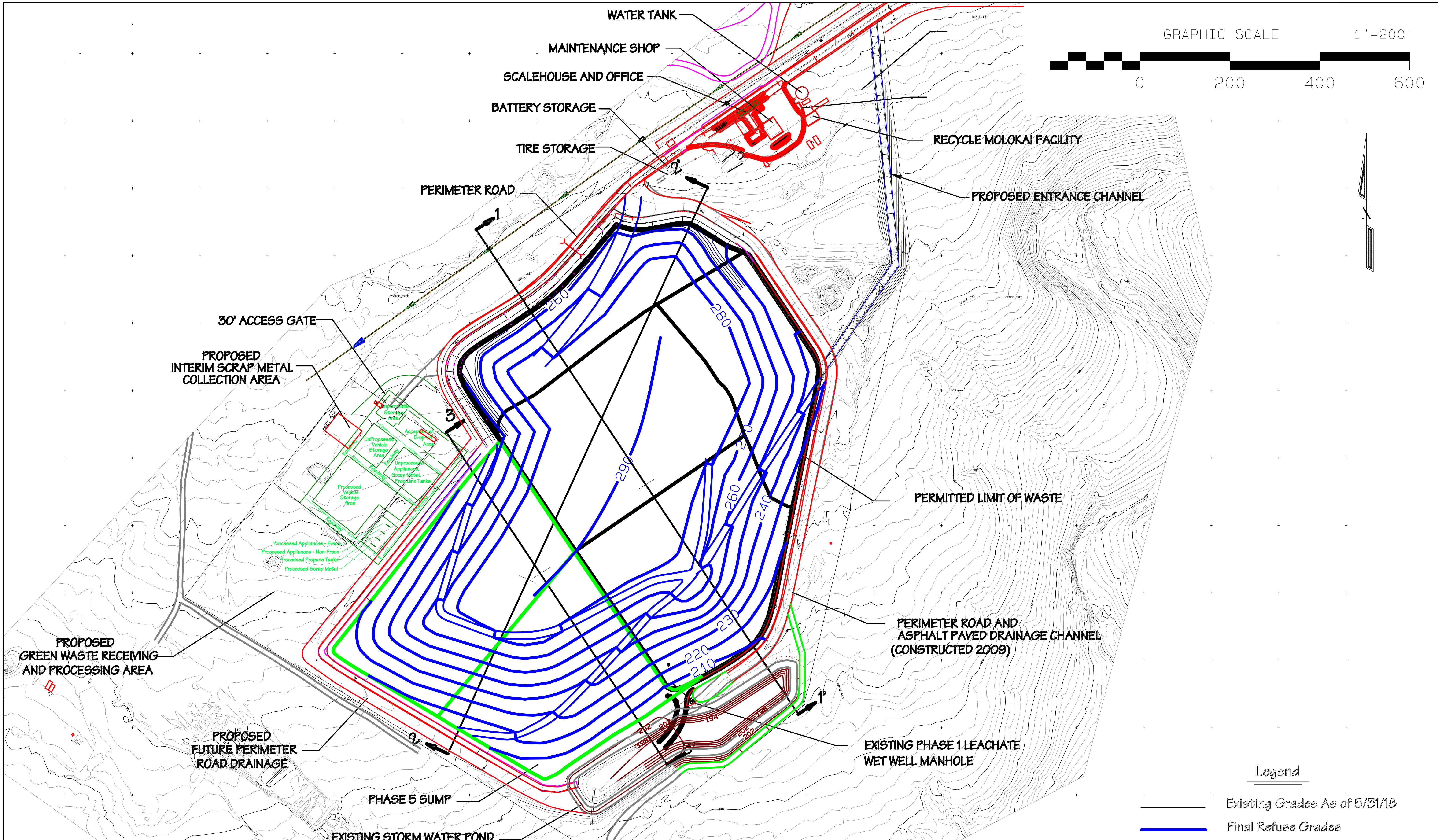


Note: Refuse Slopes should not exceed 3:1 H:V Grades
WATER TANK
MAINTENANCE SHOP
SCALEHOUSE AND OFFICE
BATTERY STORAGE
TIRE STORAGE
PERIMETER ROAD
ACCESS ROAD
EXISTING GREEN WASTE RECEIVING & PROCESSING AREA (PROPOSED TO BE RELOCATED)
USED OIL COLLECTION
RECYCLE MOLOKAI FACILITY
PROPOSED ENTRANCE CHANNEL
30' ACCESS GATE
PROPOSED INTERIM SCRAP METAL COLLECTION AREA
PERMITTED LIMIT OF WASTE
PERIMETER ROAD AND ASPHALT PAVED DRAINAGE CHANNEL (CONSTRUCTED 2009)
PROPOSED GREEN WASTE RECEIVING AND PROCESSING AREA
PROPOSED FUTURE PERIMETER ROAD DRAINAGE
EXISTING PHASE 1 LEACHATE WET WELL MANHOLE
PHASE 5 SUMP
EXISTING STORM WATER POND
1
1'
2
2'
3
260
280
290
270
260
240
230
220
210
Legend
Existing Grades As of 5/31/18
Final Refuse Grades
N
GRAPHIC SCALE 1"=300'
0
300
600
900
A-Mehr, Inc
Molokai Landfill
Stability Analysis
Cross-Sections Location
Stab Sh43019
5/6/19
RM
Figure 1

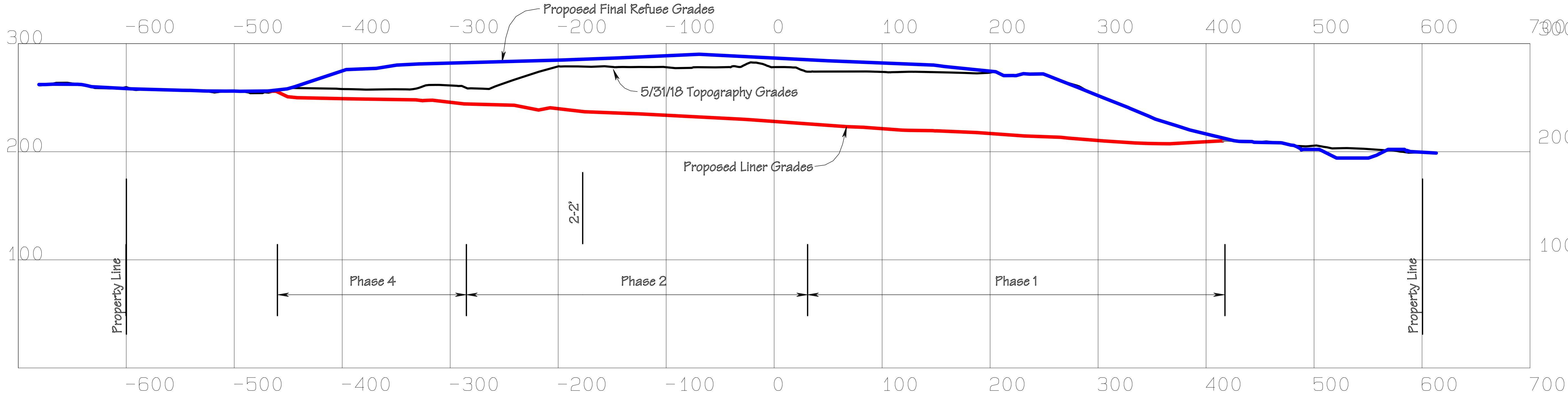

WATER TANK
MAINTENANCE SHOP
SCALEHOUSE AND OFFICE
ACCESS ROAD
USED OIL COLLECTION
RECYCLE MOLOKAI FACILITY
PROPOSED ENTRANCE CHANNEL
PERIMETER ROAD
PROPOSED VEHICLE STORAGE STRUCTURE
GP-1
GP-5
GP-2
GP-4
GP-3
EXISTING GREEN WASTE RECEIVING & PROCESSING AREA (PROPOSED TO BE RELOCATED)
PHASE 2 LEACHATE MONITORING POINT
PERMITTED LIMIT OF WASTE
PHASE 3 LEACHATE SUMP AND LYSIMETER
PERIMETER ROAD AND
PROPOSED GREEN WASTE RECEIVING AND PROCESSING AREA
PERIMETER ROAD DRAINAGE
FUTURE PHASE 5 SUMP AND LYSIMETER
STORM WATER BASIN
PHASE 1 LEACHATE WET WELL MANHOLE
1
1'
2
2'
3
3'
N
GRAPHIC SCALE 1"=200'
0
200
400
600
Legend
Existing Grades As of 5/31/18
A-Mehr, Inc
Molokai Landfill
Stability Study
Site Plan
Stab Sh43019
5/6/19
RM
Figure 2



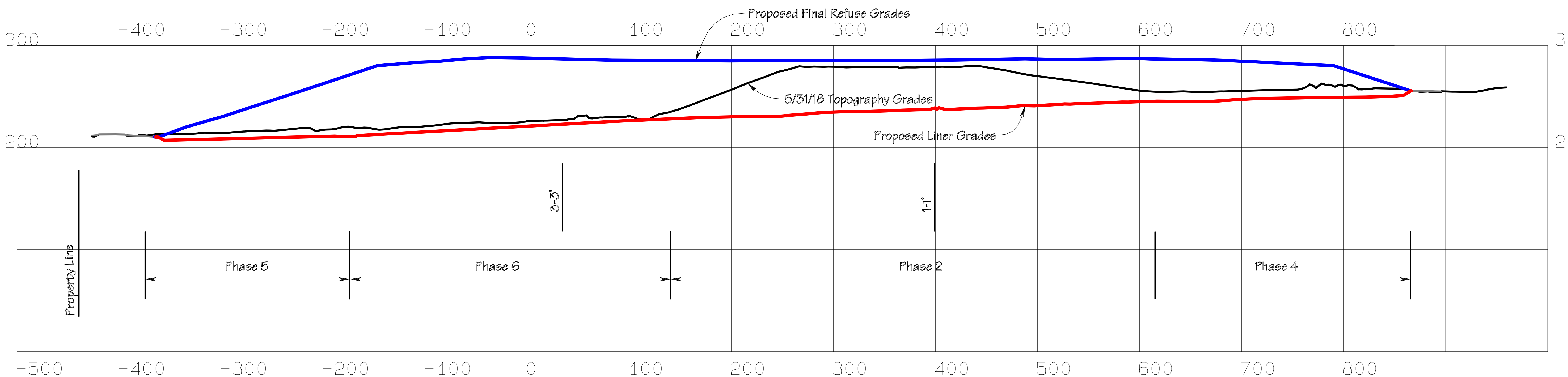
GRAPHIC SCALE 1"=200'
0
200
400
600
N
Legend
Existing Grades As of 5/31/18
Existing Phase 1, 2, 3 and 4 Liner Grades
Proposed Liner Grades (Phase 5 and 6)
A-Mehr, Inc
Molokai Landfill
Stability Study
Liner Grades
Stab Sh43019
5/6/19
RM
Figure 3



A-Mehr, Inc			
Molokai Landfill			
Stability Study			
Final Refuse Grades			
Stab Sh43019	5/6/19	RM	Figure 4

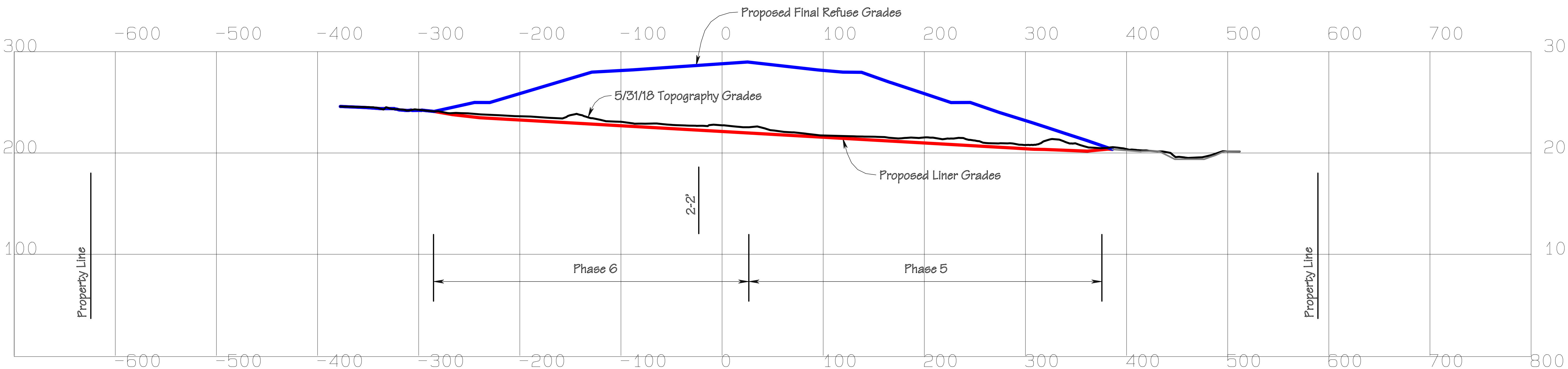


Cross-Section 1-1



Cross-Section 2-2

A-Mehr, Inc			
Molokai Landfill			
Stability Study			
Cross-Section 1-1' & 2-2'			
Stab Sh43019	5/6/19	RM	Figure 5



Cross-Section 3-3

A-Mehr, Inc			
Molokai Landfill			
Stability Study			
Cross-Section 3-3'			
Stab Sh43019	5/6/19	RM	Figure 6

APPENDIX A

SITE-SPECIFIC REFUSE MASS UNIT WEIGHT

MOLOKAI LANDFILL
SITE-SPECIFIC REFUSE MASS UNIT WEIGHT

Field Variables

AUF = Airspace Utilization Factor, pounds solid waste placed per cubic yard of landfill volume used (lb/cy)

Rs = Refuse:Soil Ratio, cubic yards of refuse placed per cubic yard of soil placed in the landfill

Ds = Density (unit weight) of soil, pounds/cubic foot (pcf)

Working Equations

Ww = pounds of waste per cubic foot of landfill volume used

Ww = AUF/27, pcf

Vs = volume fraction of soil in landfill refuse mass

Vs = (1/RS/[(1+RS)/RS] = 1/(1+RS) cf/cf

Ws = weight of soil per cubic foot of landfill refuse mass

Ws = Ds x Vs, pcf

Wr = total unit weight of waste and soil per cubic foot of landfill refuse mass

Wr = Ww + Ws

Therefore: **Wr = AUF/27 + Ds[1/(1+RS)]**

Data and Results

Data for AUF and SR is presented for three time periods in the Molokai Landfill Master Plan (A-Mehr, Inc., November 2009). The calculate refused mass unit weight (Wr) is calculated for each period as follows:

Period	AUF (lb/cy)	Rs	Ws (pcf)	Wr (pcf)
7/23/06 – 5/14/09	577	0.99:1	126	84
5/14/09 – 4/2/09	294	1.51:1	126	61
7/23/06 – 4/2/09	450	1.2:1	126	74

The calculated unit weight of 74 pcf for the combined three-year time period from July 2006 to April 2009 is a reasonable average for the site.

APPENDIX B

STABILITY ANALYSIS COMPUTER RESULTS

MOLOKAI INTEGRATED WASTE MANAGEMENT FACILITY
SLOPE STABILITY ANALYSIS RESULTS
PHASES 1-6 – MAY 2019
Revised February 2020
FINAL ANALYSIS

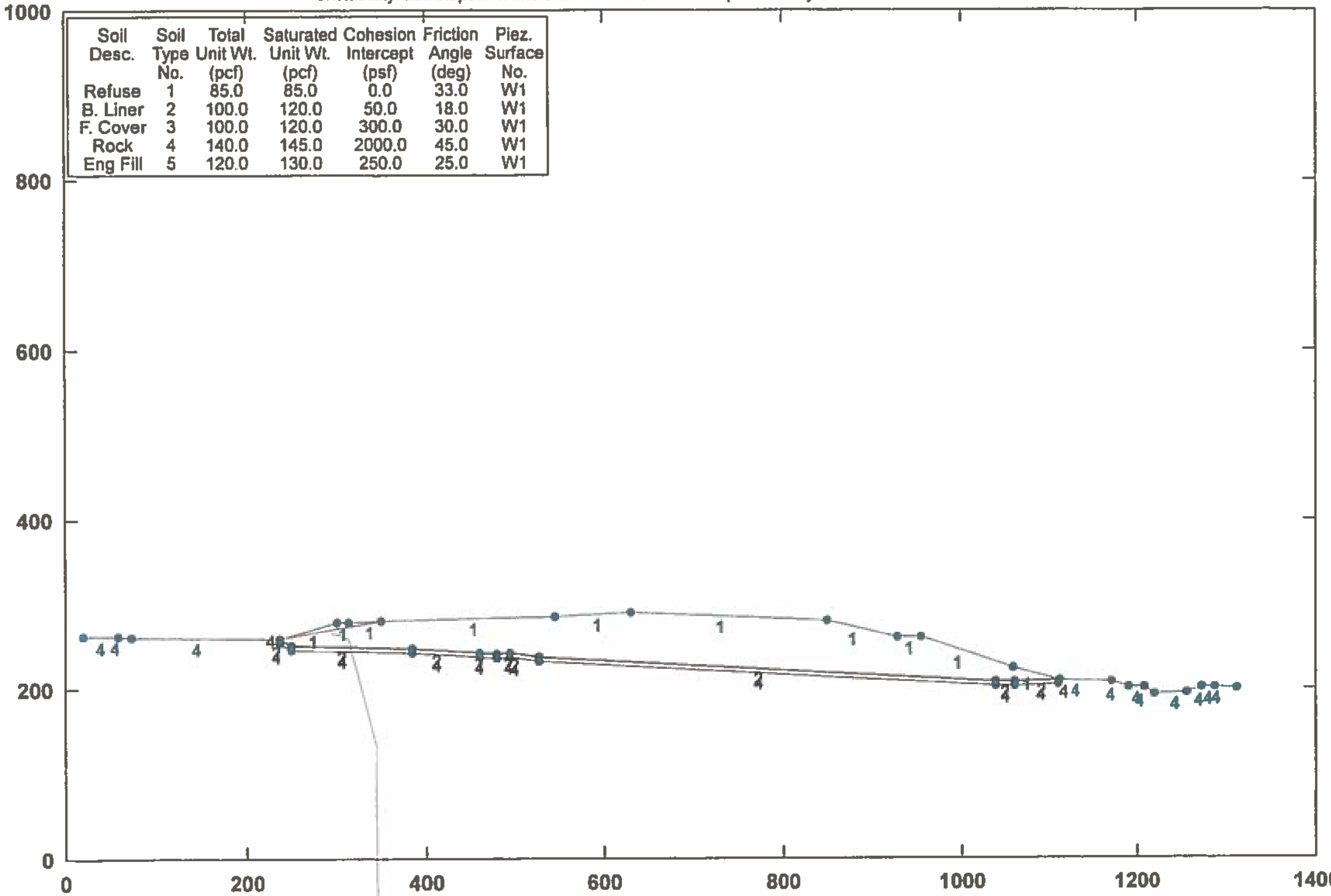
REFUSE UNIT WEIGHT (PCF)	RUN NO.	CROSS-SECTION	STATIC ANALYSIS	PSEUDO-STATIC ANALYSIS		
			MINIMUM STATIC FACTOR OF SAFETY	MINIMUM FACTOR OF SAFETY	SEISMIC COEFFICIENT (g)	METHOD OF ANALYSIS
85	Molf11-1cs	1-1'	3.53	-	-	SPENCER
85	Molf11-1ce	1-1'	-	1.83	0.16	BISHOP
85	Molf11-1	1-1'	>10	-	-	JANBU
85	Molf11-1e	1-1'	-	3.29	0.16	JANBU
85	Molf11-2	1-1'	>10	-	-	JANBU
85	Molf11-2e	1-1'	-	3.25	0.16	JANBU
85	Molf11-3s	1-1'	9.35	-	-	SPENCER
85	Molf11-3e	1-1'	-	2.02	0.16	SPENCER
85	Molf11-4	1-1'	6.83	-	-	JANBU
85	Molf11-4e	1-1'	-	2.77	0.16	JANBU
85	Molf11-5	1-1'	6.66	-	-	JANBU
85	Molf11-5e	1-1'	-	2.18	0.16	BISHOP
85	Molf11-6	1-1'	6.17	-	-	JANBU
85	Molf11-6e	1-1'	-	1.90	0.16	JANBU
85	Molf11-7	1-1'	4.52	-	-	JANBU
85	Molf11-7e	1-1'	-	1.75	0.16	JANBU
85	Molf11-8s	1-1'	3.11	-	-	SPENCER
85	Molf11-8e	1-1'	-	1.63	0.16	JANBU
85	Molf11-9	1-1'	5.54	-	-	JANBU
85	Molf11-9e	1-1'	-	3.60	0.16	JANBU
85	Molf11r-1c	1'-1	2.38	-	-	SPENCER
85	Molf11r-1ce	1'-1	-	1.32	0.16	SPENCER
85	Molf11r-1s	1'-1	8.95	-	-	SPENCER
85	Molf11r-1e	1'-1	-	2.29	0.16	JANBU
85	Molf11r-2	1'-1	7.18	-	-	JANBU
85	Molf11r-2e	1'-1	-	2.22	0.16	JANBU
85	Molf11r-3	1'-1	6.68	-	-	JANBU
85	Molf11r-3e	1'-1	-	2.22	0.16	JANBU
85	Molf11r-4	1'-1	6.49	-	-	JANBU
85	Molf11r-4e	1'-1	-	2.30	0.16	BISHOP
85	Molf11r-5s	1'-1	6.42	-	-	SPENCER
85	Molf11r-5e	1'-1	-	2.18	0.16	JANBU
85	Molf11r-6s	1'-1	6.10	-	-	SPENCER
85	Molf11r-6e	1'-1	-	2.15	0.16	JANBU
85	Molf11r-7s	1'-1	2.43	-	-	SPENCER
85	Molf11r-7e	1'-1	-	1.40	0.16	SPENCER
85	Molf11r-8s	1'-1	2.62	-	-	SPENCER
85	Molf11r-8e	1'-1	-	1.91	0.16	BISHOP
85	Molf11r-9	1'-1	2.81	-	-	JANBU
85	Molf11r-9e	1'-1	-	1.76	0.16	SPENCER
85	Molf11r-10	1'-1	2.81	-	-	JANBU
85	Molf11r-10e	1'-1	-	1.76	0.16	SPENCER
85	Molf22-1c	2-2'	2.17	-	-	BISHOP
85	Molf22-1ce	2-2'	-	1.29	0.16	SPENCER
85	Molf22-1	2-2'	8.48	-	-	JANBU
85	Molf22-1e	2-2'	-	1.71	0.16	SPENCER

85	Molf22-2	2-2'	7.97	-	-	JANBU
85	Molf22-2e	2-2'	-	2.02	0.16	SPENCER
85	Molf22-3	2-2'	7.62	-	-	JANBU
85	Molf22-3e	2-2'	-	2.15	0.16	SPENCER
85	Molf22-4s	2-2'	3.65	-	-	SPENCER
85	Molf22-4e	2-2'	-	1.41	0.16	SPENCER
85	Molf22-5s	2-2'	2.16	-	-	SPENCER
85	Molf22-5e	2-2'	-	1.37	0.16	SPENCER
85	Molf22-6s	2-2'	2.06	-	-	SPENCER
85	Molf22-6e	2-2'	-	1.34	0.16	SPENCER
85	Molf22-7	2-2'	4.58	-	-	JANBU
85	Molf22-7e	2-2'	-	4.67	0.16	SPENCER
85	Molf22r-1c	2'-2	5.71	-	-	BISHOP
85	Molf22r-1ce	2-2'	-	1.95	0.16	SPENCER
85	Molf22r-1	2'-2	>10	-	-	JANBU
85	Molf22r- 1e	2'-2	-	2.90	0.16	SPENCER
85	Molf22r-2	2'-2	>10	-	-	JANBU
85	Molf22r-2e	2'-2	-	2.61	0.16	JANBU
85	Molf22r-3	2'-2	>10	-	-	JANBU
85	Molf22r-3e	2'-2	-	2.11	0.16	SPENCER
85	Molf22r-4s	2'-2	5.86	-	-	SPENCER
85	Molf22r-4e	2'-2	-	1.83	0.16	SPENCER
85	Molf22r-5s	2'-2	5.64	-	-	SPENCER
85	Molf22r-5e	2'-2	-	1.79	0.16	SPENCER
85	Molf22r-6s	2'-2	2.83	-	-	SPENCER
85	Molf22r-6e	2'-2	-	1.66	0.16	SPENCER
85	Molf22r-7	2'-2	6.23	-	-	JANBU
85	Molf22r-7e	2'-2	-	4.12	0.16	JANBU
85	Molf33-1c	3-3'	2.38	-	-	BISHOP
85	Molf33-1ce	3-3'	-	1.44	0.16	SPENCER
85	Molf33-1	3-3'	>10	-	-	JANBU
85	Molf33-1e	3-3'	-	3.53	0.16	JANBU
85	Molf33-2	3-3'	>10	-	-	JANBU
85	Molf33-2e	3-3'	-	3.22	0.16	JANBU
85	Molf33-3s	3-3'	2.71	-	-	SPENCER
85	Molf33-3e	3-3'	-	1.58	0.16	SPENCER
85	Molf33-4	3-3'	3.42	-	-	JANBU
85	Molf33-4e	3-3'	-	2.08	0.16	JANBU
85	Molf33r-1c	3'-3	1.95	-	-	BISHOP
85	Molf33r-1ce	3'-3	-	1.15	0.16	SPENCER
85	Molf33r-1	3'-3	6.07	-	-	JANBU
85	Molf33r-1e	3'-3	-	1.56	0.16	JANBU
85	Molf33r-2s	3'-3	5.95	-	-	SPENCER
85	Molf33r-2e	3'-3	-	1.54	0.16	SPENCER
85	Molf33r-3s	3'-3	1.80	-	-	SPENCER
85	Molf33r-3e	3'-3	-	1.06	0.16	SPENCER
85	Molf33r-4s	3'-3	1.87	-	-	SPENCER
85	Molf33r-4e	3'-3	-	1.10	0.16	SPENCER
85	Molf33r-5s	3'-3	2.83	-	-	SPENCER
85	Molf33r-5e	3'-3	-	1.57	0.16	SPENCER

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-1cs.plt Run By: Username 5/2/2019 07:27AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

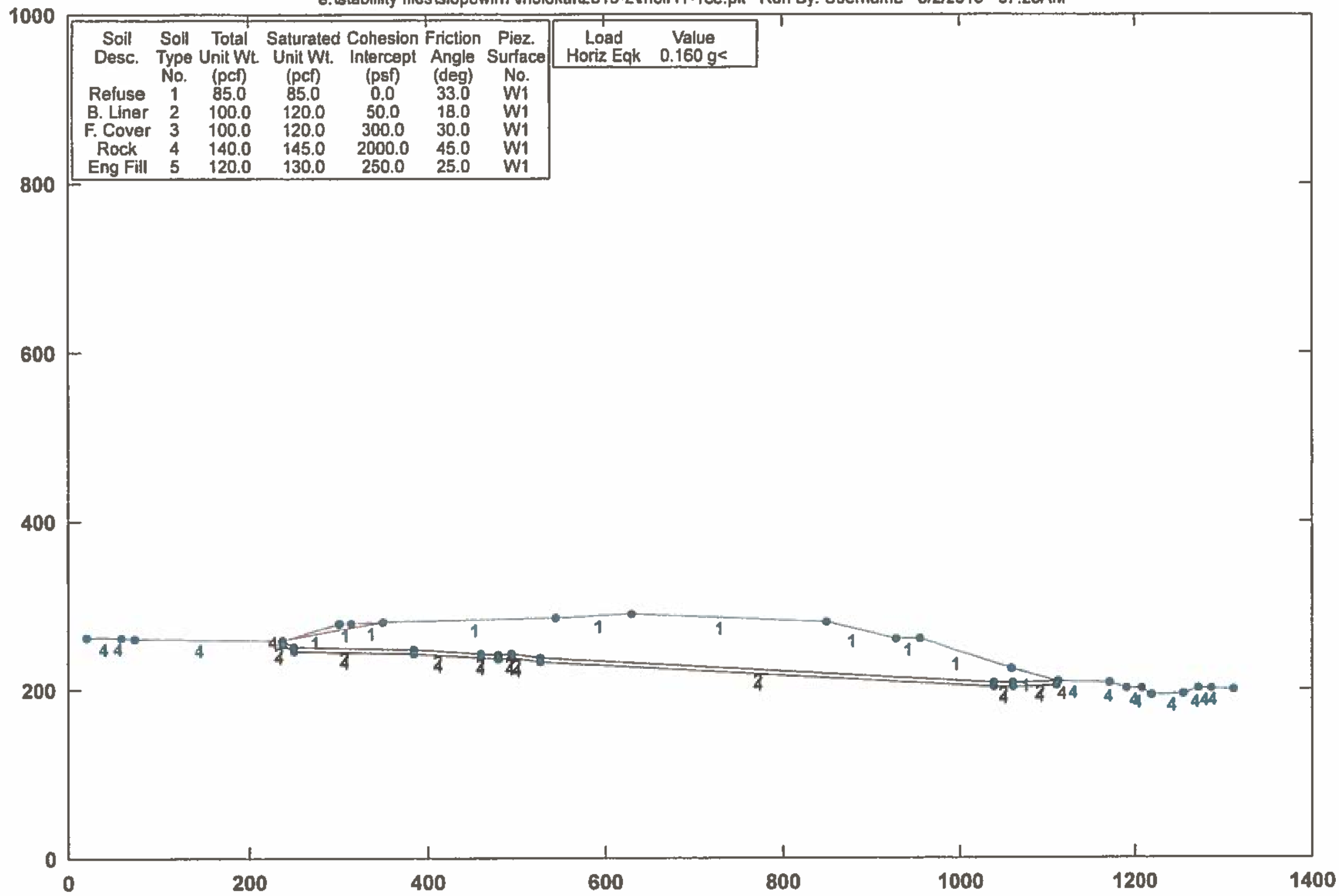


PCSTABL5M/si FSmin=3.53
Factor Of Safety Is Calculated By Spencer's Method of Slices

STED

MOLF - Slope Stability Section 1-1 Static

e:\stability files\slopewin7\molokai\2019-2\molf11-1ce.plt Run By: Username 5/2/2019 07:25AM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<

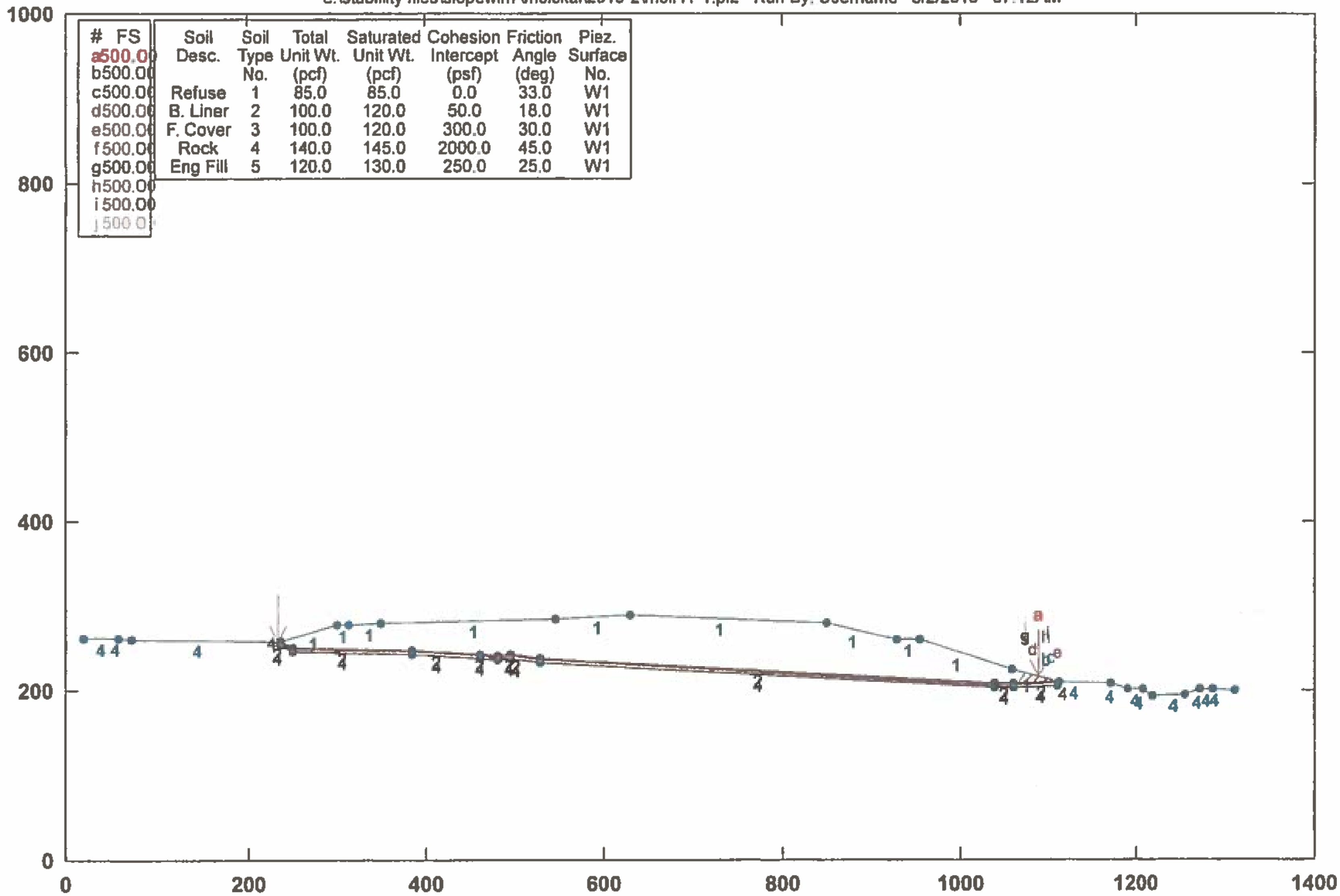
PCSTABL5M/si FSmin=1.83

Factor Of Safety Is Calculated By The Modified Bishop Method

STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-1.pl2 Run By: Username 5/2/2019 07:12AM



PCSTABL5M/si FSmin=500.00
Safety Factors Are Calculated By The Modified Janbu Method

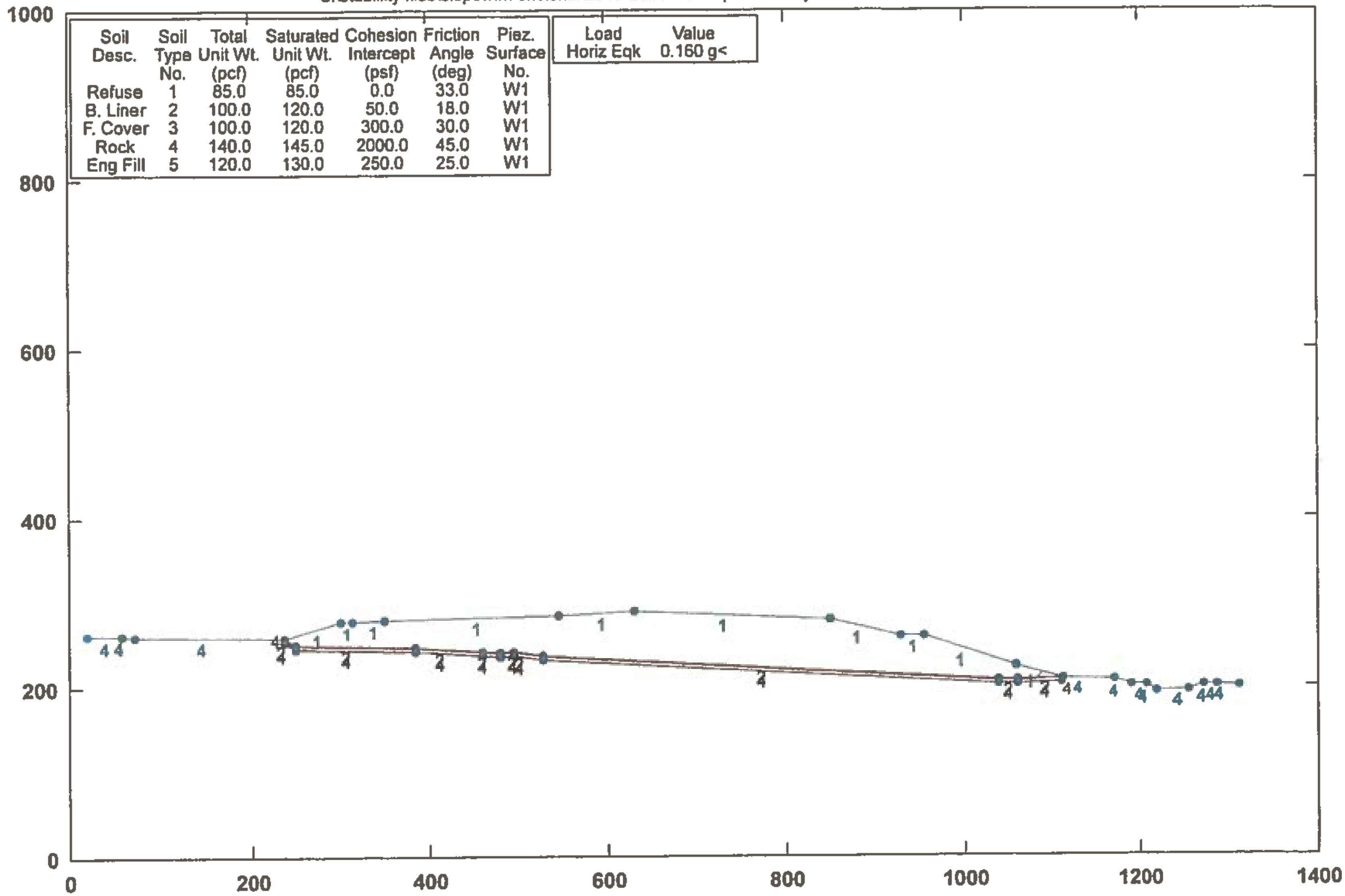
STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-1e.plt Run By: Username 5/2/2019 07:28AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<

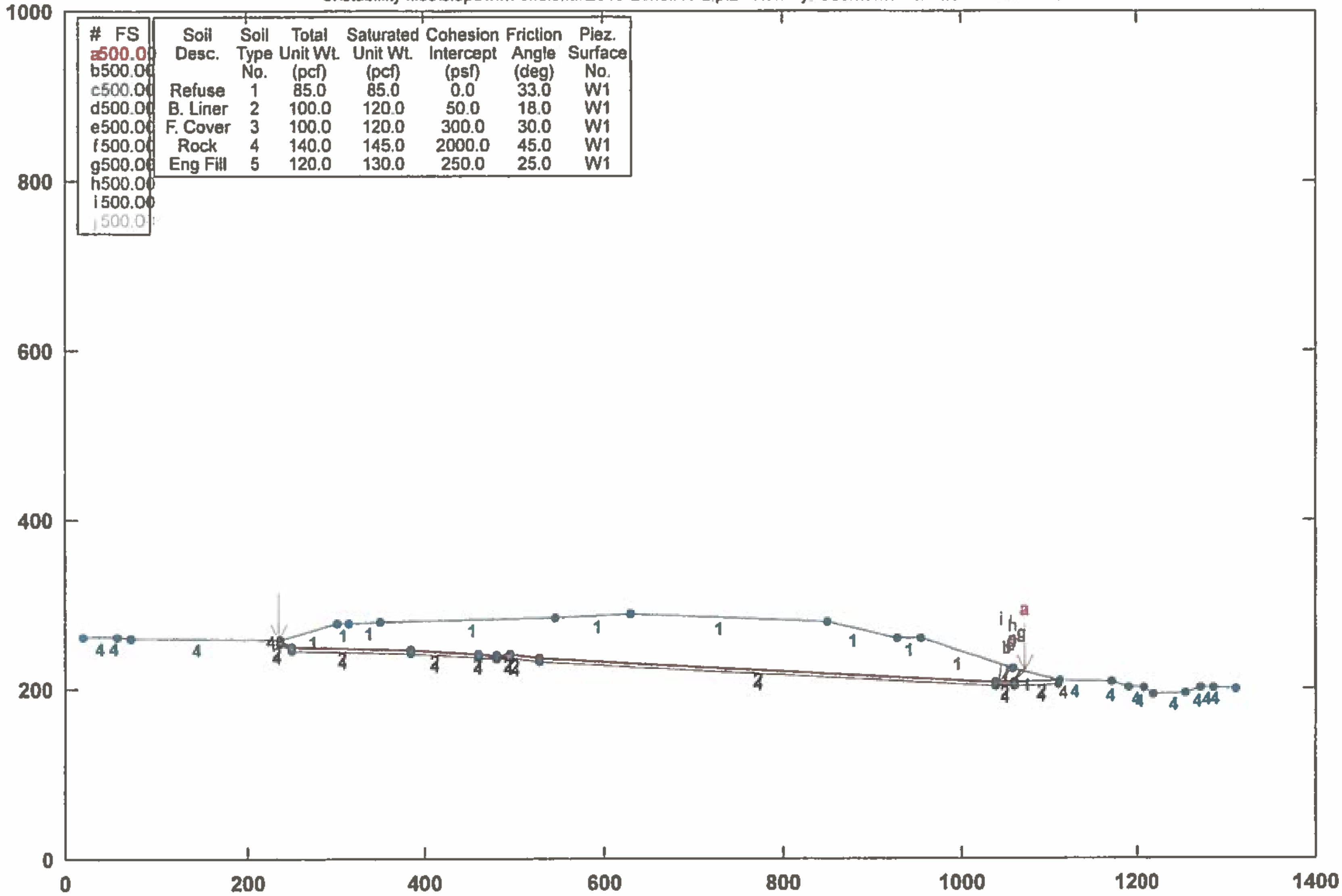


PCSTABL5M/si FSmin=3.29
Factors of Safety Calculated by Janbu Method

STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-2.pl2 Run By: Username 5/2/2019 07:22AM



PCSTABL5M/si FSmin=500.00

Safety Factors Are Calculated By The Modified Janbu Method

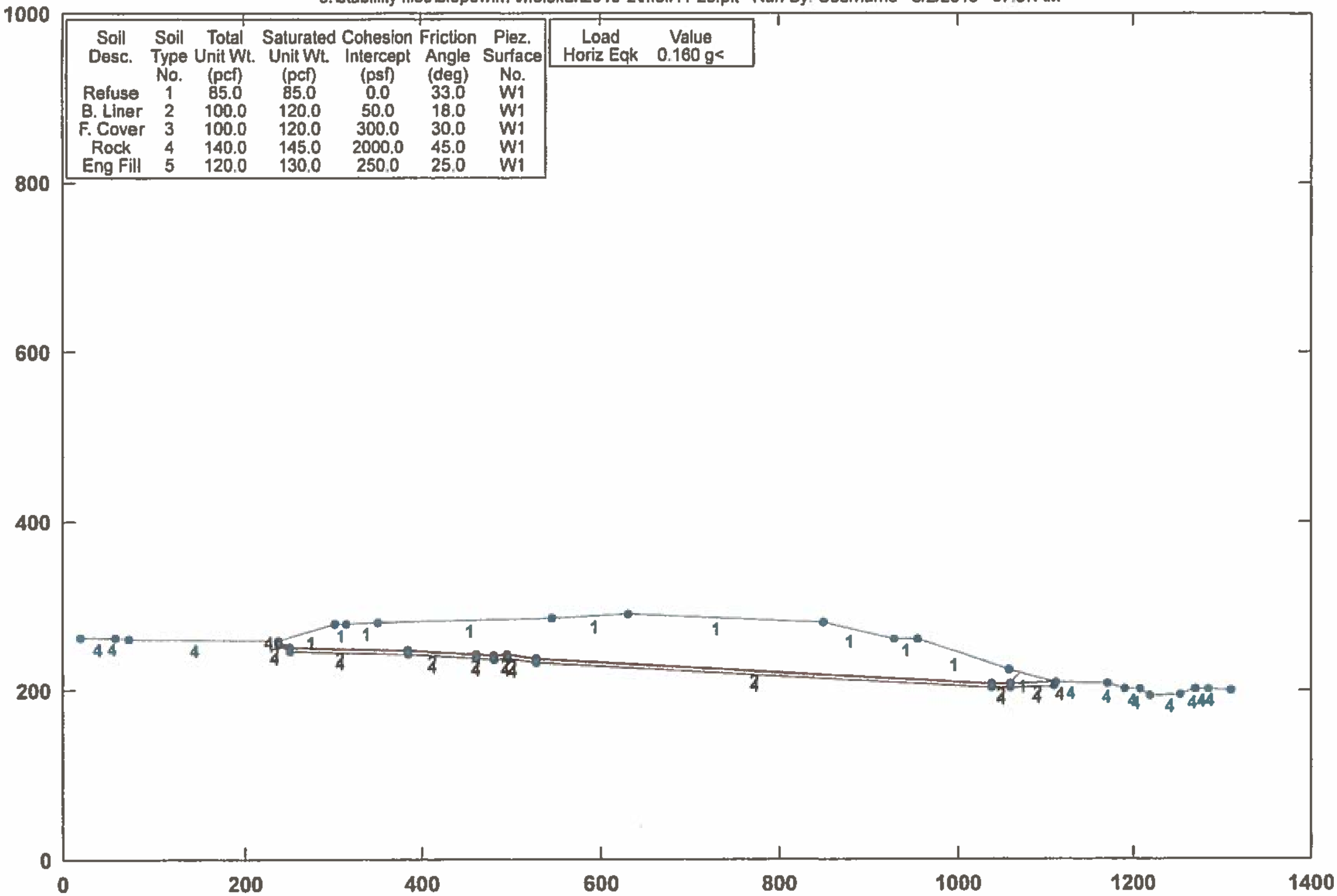
STED

MOLF - Slope Stability Section 1-1 Pesudo-Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-2e.plt Run By: Username 5/2/2019 07:37AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

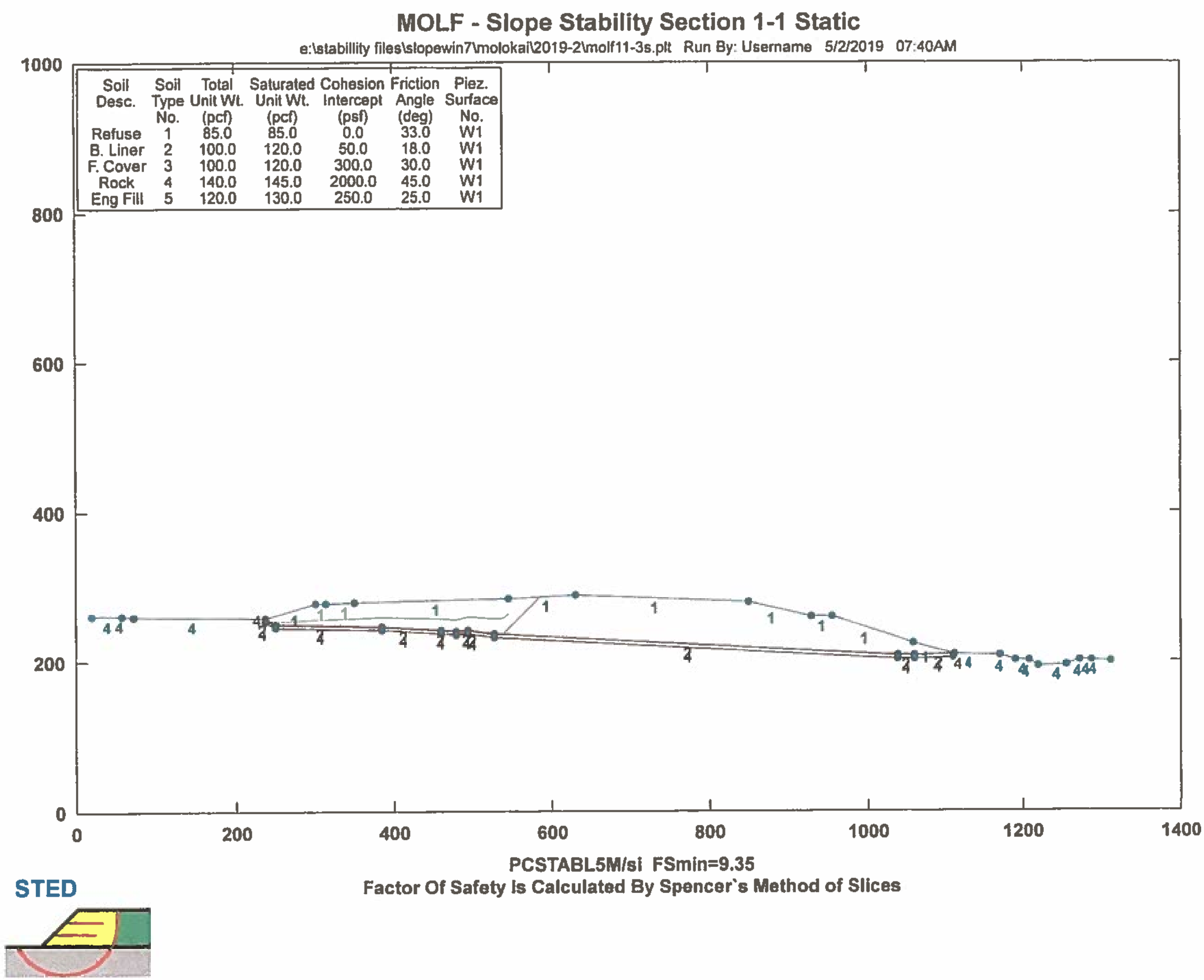
Load	Value
Horiz Eqk	0.160 g<



PCSTABL5M/si FSmin=3.25

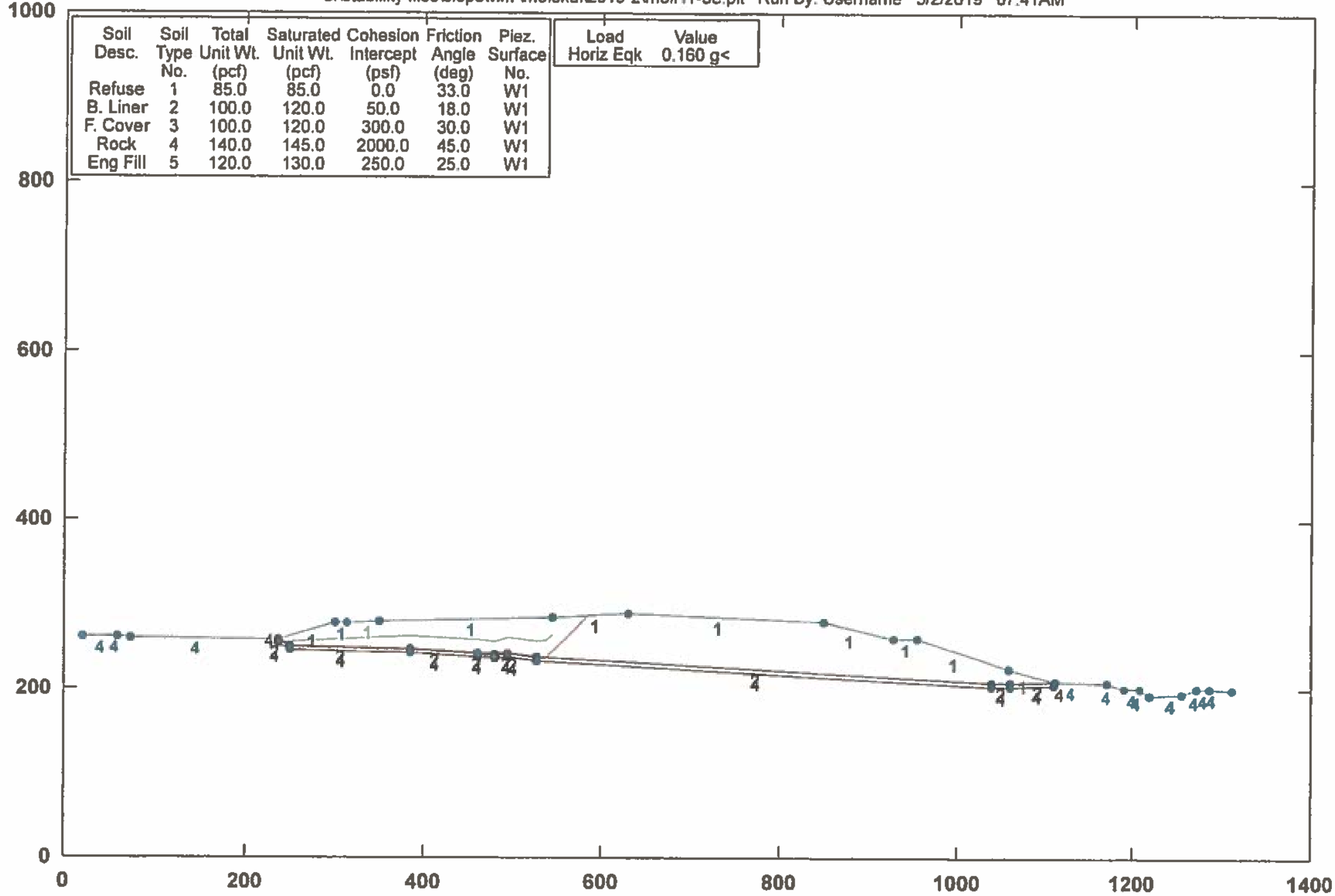
Factors of Safety Calculated by Janbu Method

STED


MOLF - Slope Stability Section 1-1 Static
e:\stabillity files\slopewin7\molokai\2019-2\molf11-3s.plt Run By: Username 5/2/2019 07:40AM
Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Piez. Surface No.
Refuse 1 85.0 85.0 0.0 33.0 W1
B. Liner 2 100.0 120.0 50.0 18.0 W1
F. Cover 3 100.0 120.0 300.0 30.0 W1
Rock 4 140.0 145.0 2000.0 45.0 W1
Eng Fill 5 120.0 130.0 250.0 25.0 W1
1000
800
600
400
200
0
0
200
400
600
800
1000
1200
1400
PCSTABL5M/si FSmin=9.35
Factor Of Safety Is Calculated By Spencer's Method of Slices
STED

MOLF - Slope Stability Section 1-1 Pesudo-Static

e:\stability files\slopewin7\molokai\2019-2\molf11-3e.plt Run By: Username 5/2/2019 07:41AM



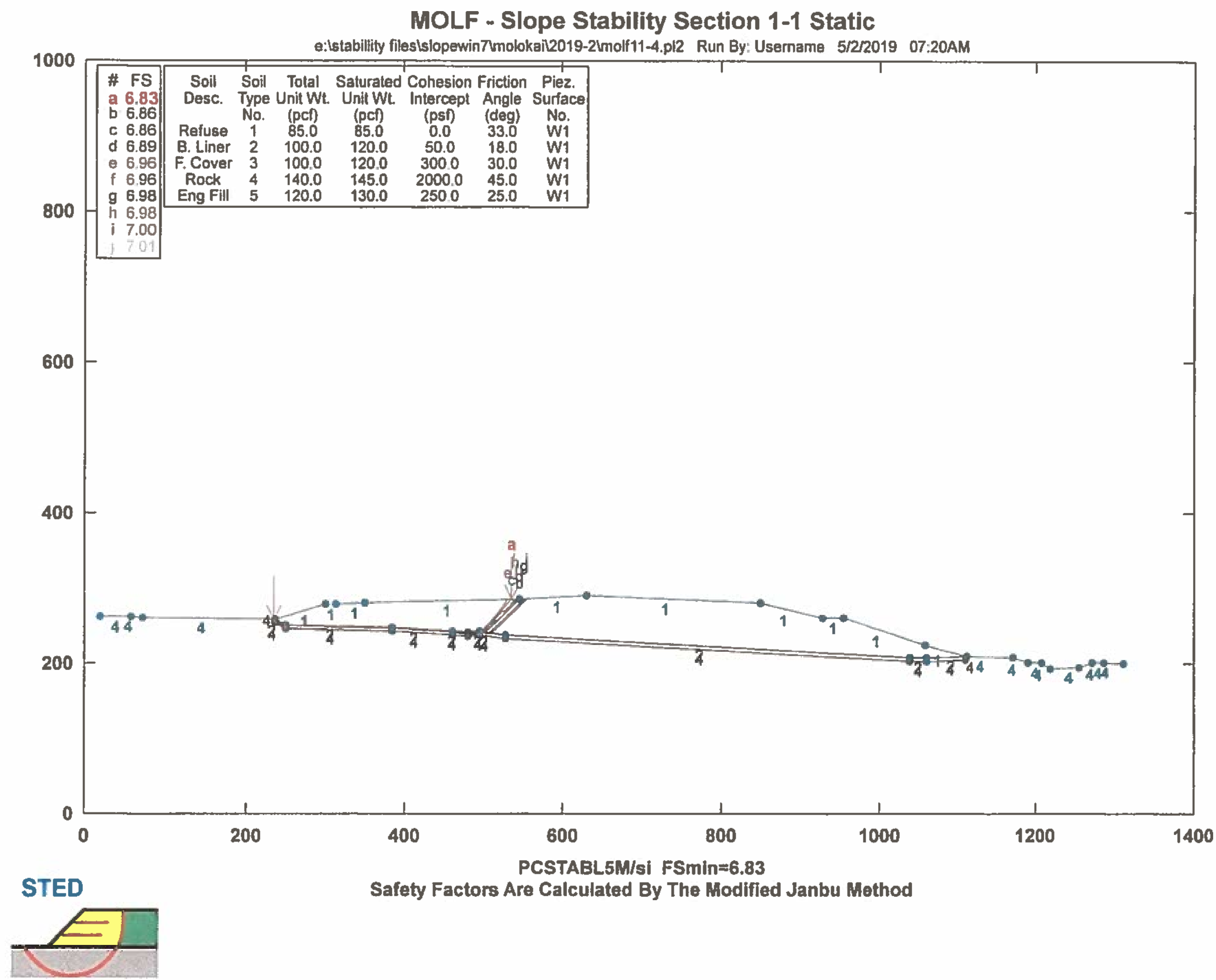
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<

PCSTABL5M/si FSmin=2.02

Factor Of Safety Is Calculated By Spencer's Method of Slices

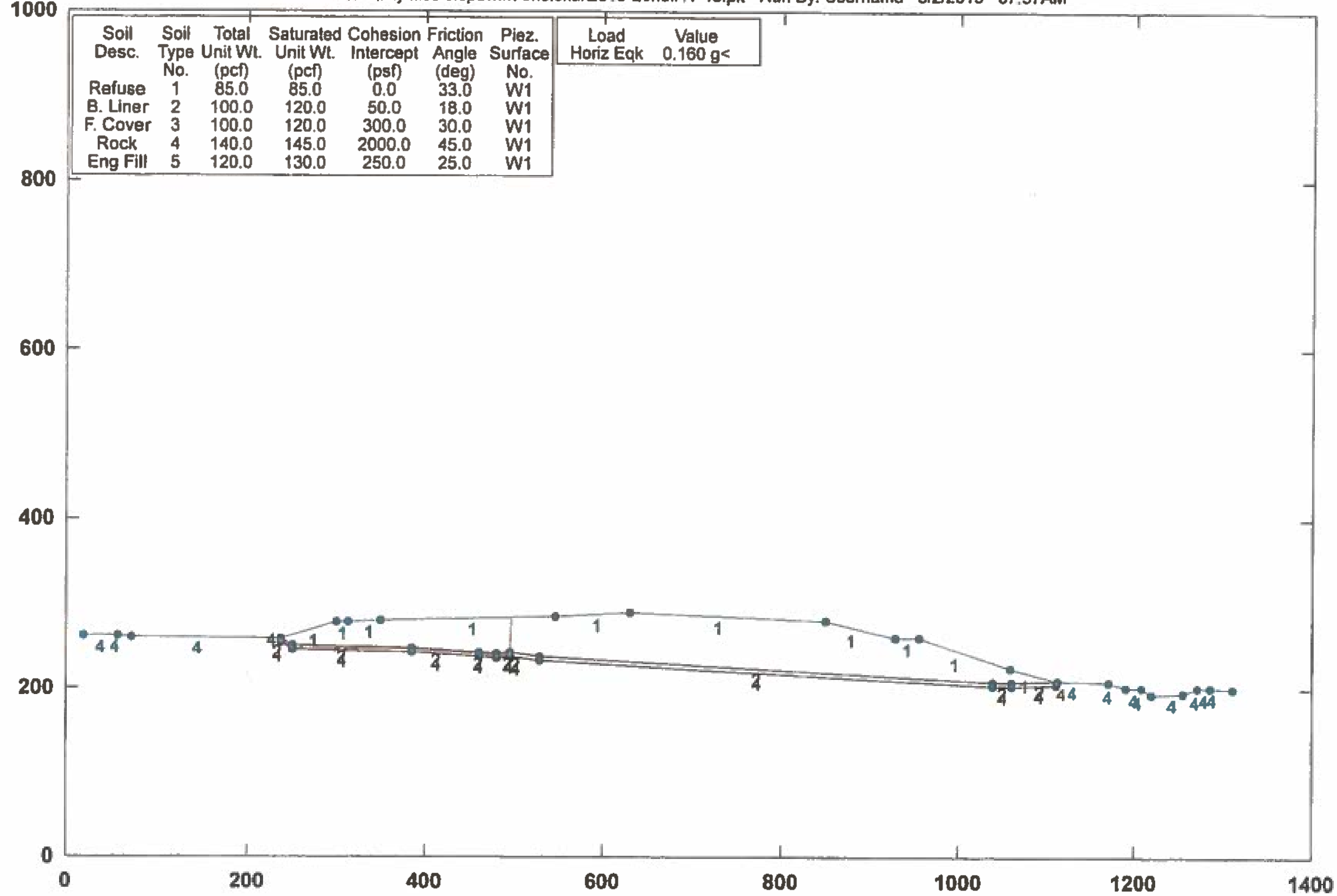
STED



MOLF - Slope Stability Section 1-1 Static
e:\stability files\slopewin7\molokai\2019-2\molf11-4.pl2 Run By: Username 5/2/2019 07:20AM
FS
a 6.83
b 6.86
c 6.86
d 6.89
e 6.96
f 6.96
g 6.98
h 6.98
i 7.00
j 7.01
Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Piez. Surface No.
Refuse | 1 | 85.0 | 85.0 | 0.0 | 33.0 | W1
B. Liner | 2 | 100.0 | 120.0 | 50.0 | 18.0 | W1
F. Cover | 3 | 100.0 | 120.0 | 300.0 | 30.0 | W1
Rock | 4 | 140.0 | 145.0 | 2000.0 | 45.0 | W1
Eng Fill | 5 | 120.0 | 130.0 | 250.0 | 25.0 | W1
1000
800
600
400
200
0
0
200
400
600
800
1000
1200
1400
PCSTABL5M/si FSmin=6.83
Safety Factors Are Calculated By The Modified Janbu Method
STED

MOLF - Slope Stability Section 1-1 Pesudo-Static

e:\stability files\slopewin7\molokai\2019-2\molf11-4e.plt Run By: Username 5/2/2019 07:57AM

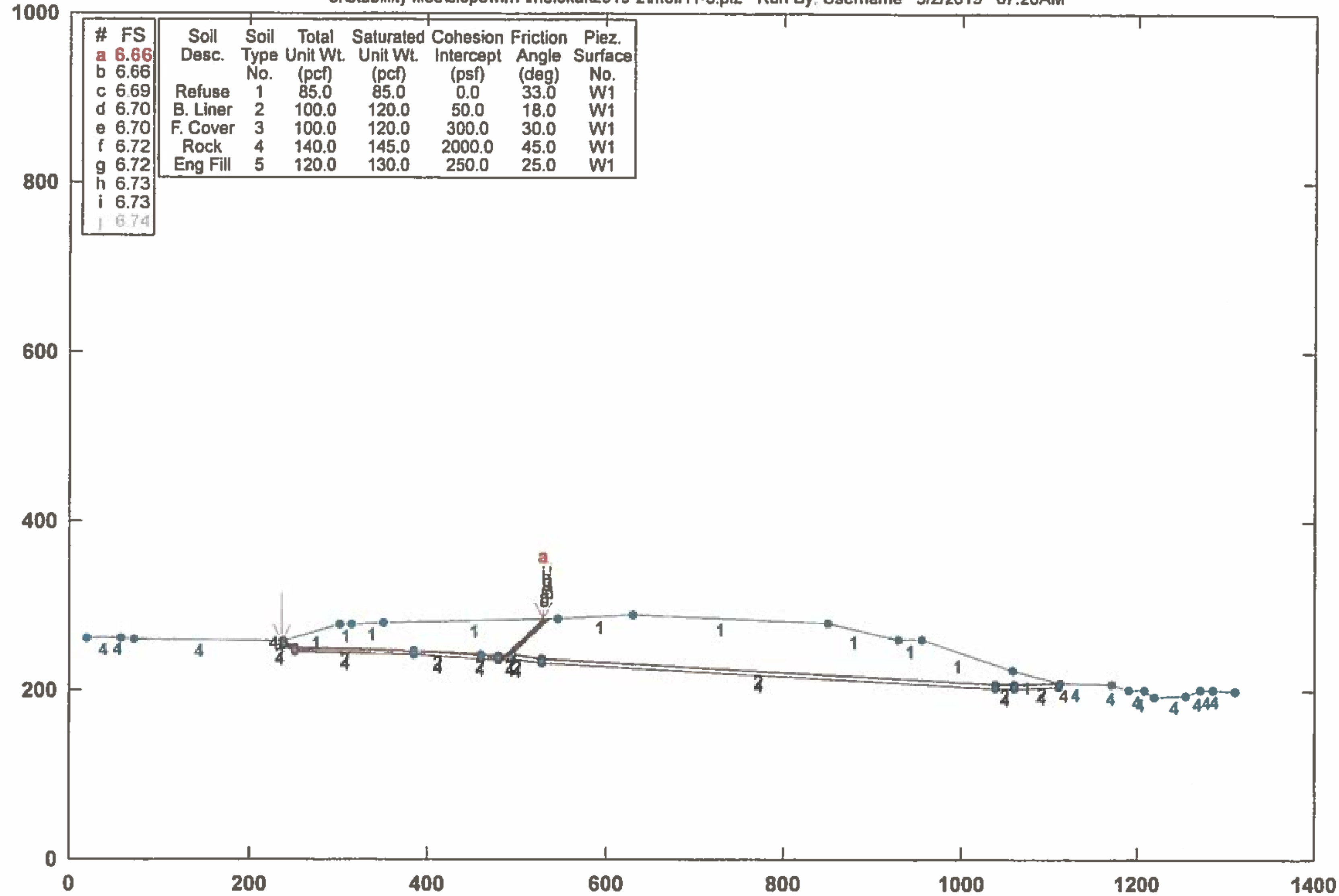


PCSTABL5M/si FSmin=2.77
Factors of Safety Calculated by Janbu Method

STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-5.pl2 Run By: Username 5/2/2019 07:20AM

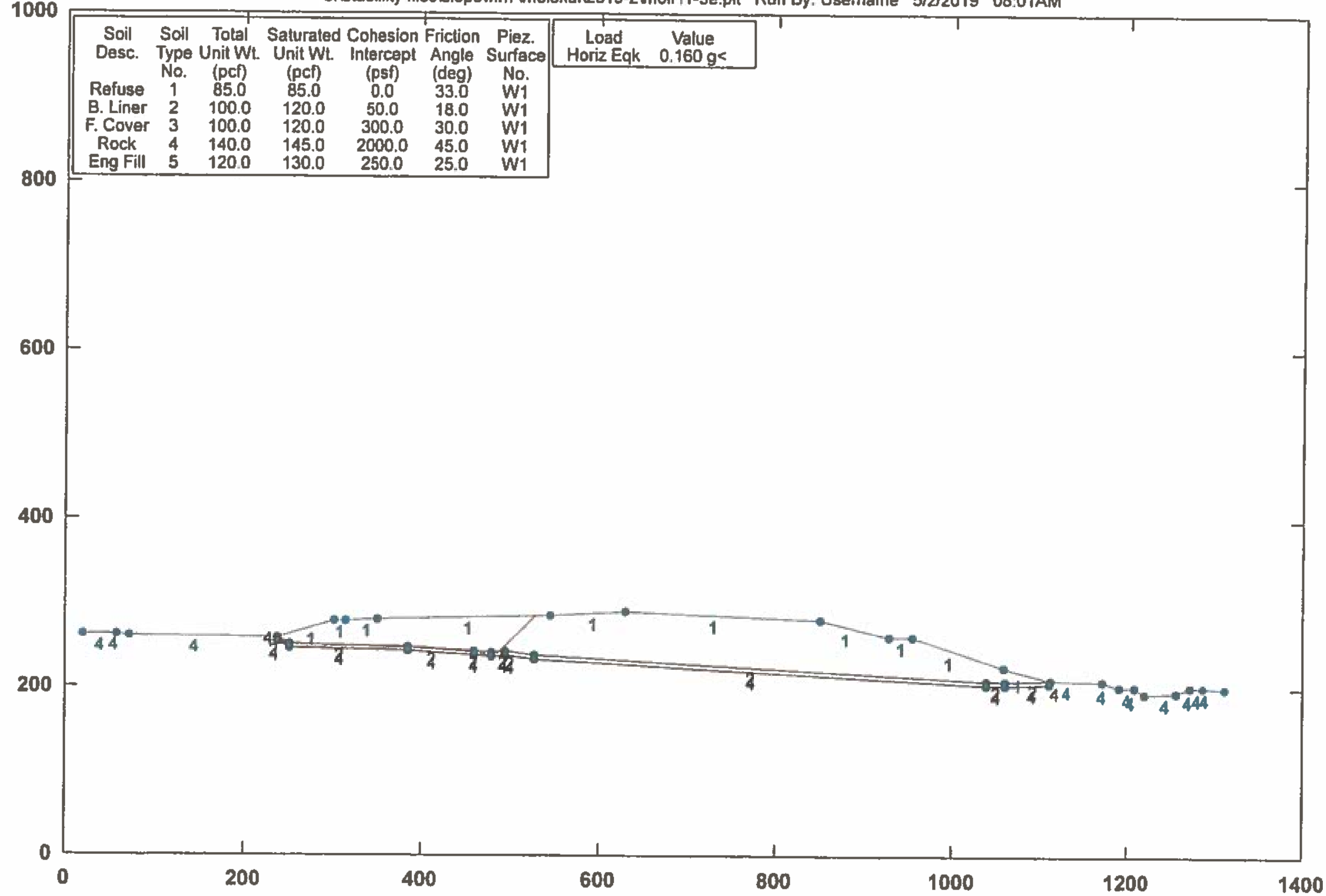


PCSTABL5M/si FSmin=6.66
Safety Factors Are Calculated By The Modified Janbu Method

STED

MOLF - Slope Stability Section 1-1 Pesudo-Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-5e.plt Run By: Username 5/2/2019 08:01AM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<

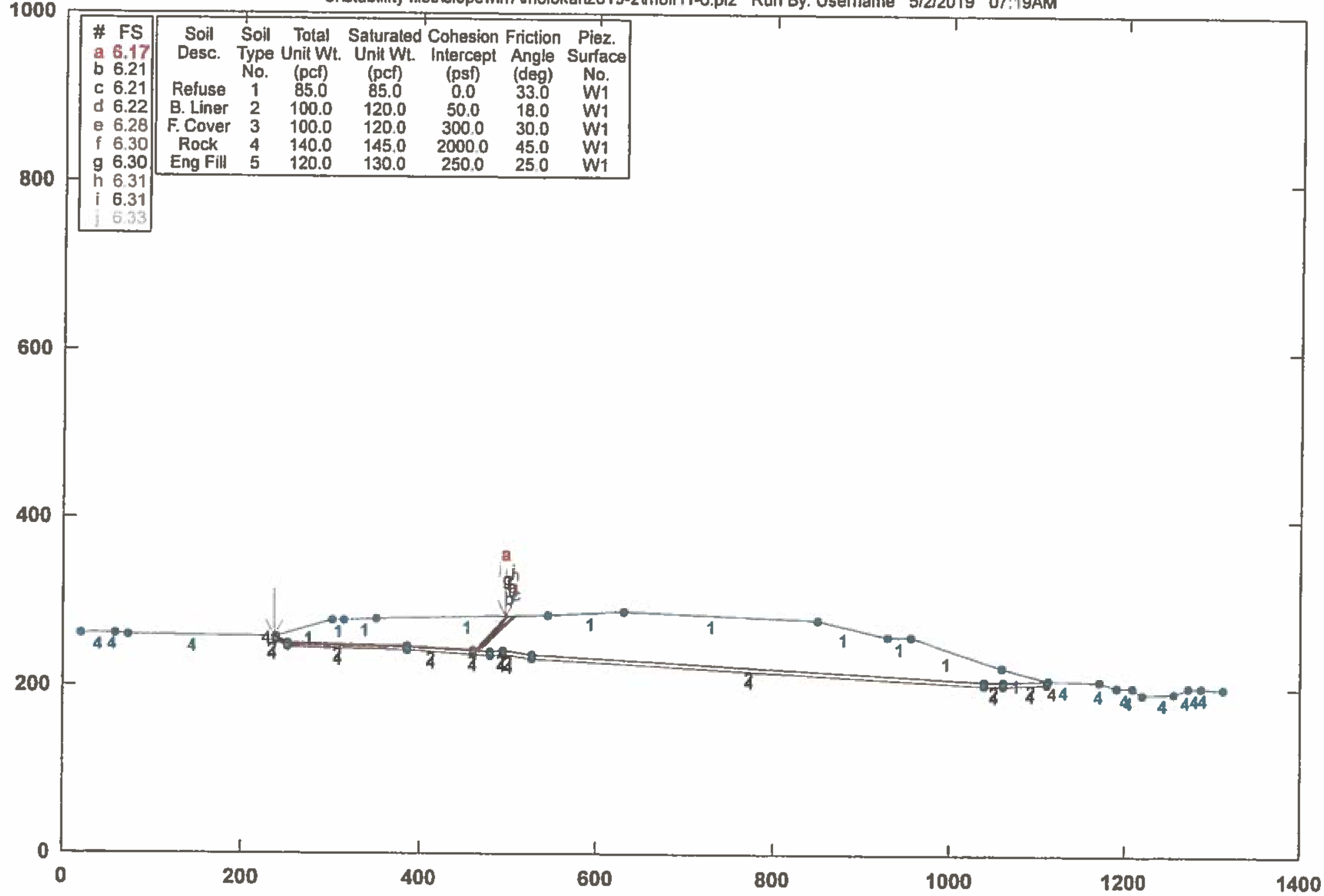
PCSTABL5M/si FSmin=2.18

Factor Of Safety Is Calculated By The Modified Bishop Method

STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-6.pl2 Run By: Username 5/2/2019 07:19AM



PCSTABL5M/si FSmin=6.17

Safety Factors Are Calculated By The Modified Janbu Method

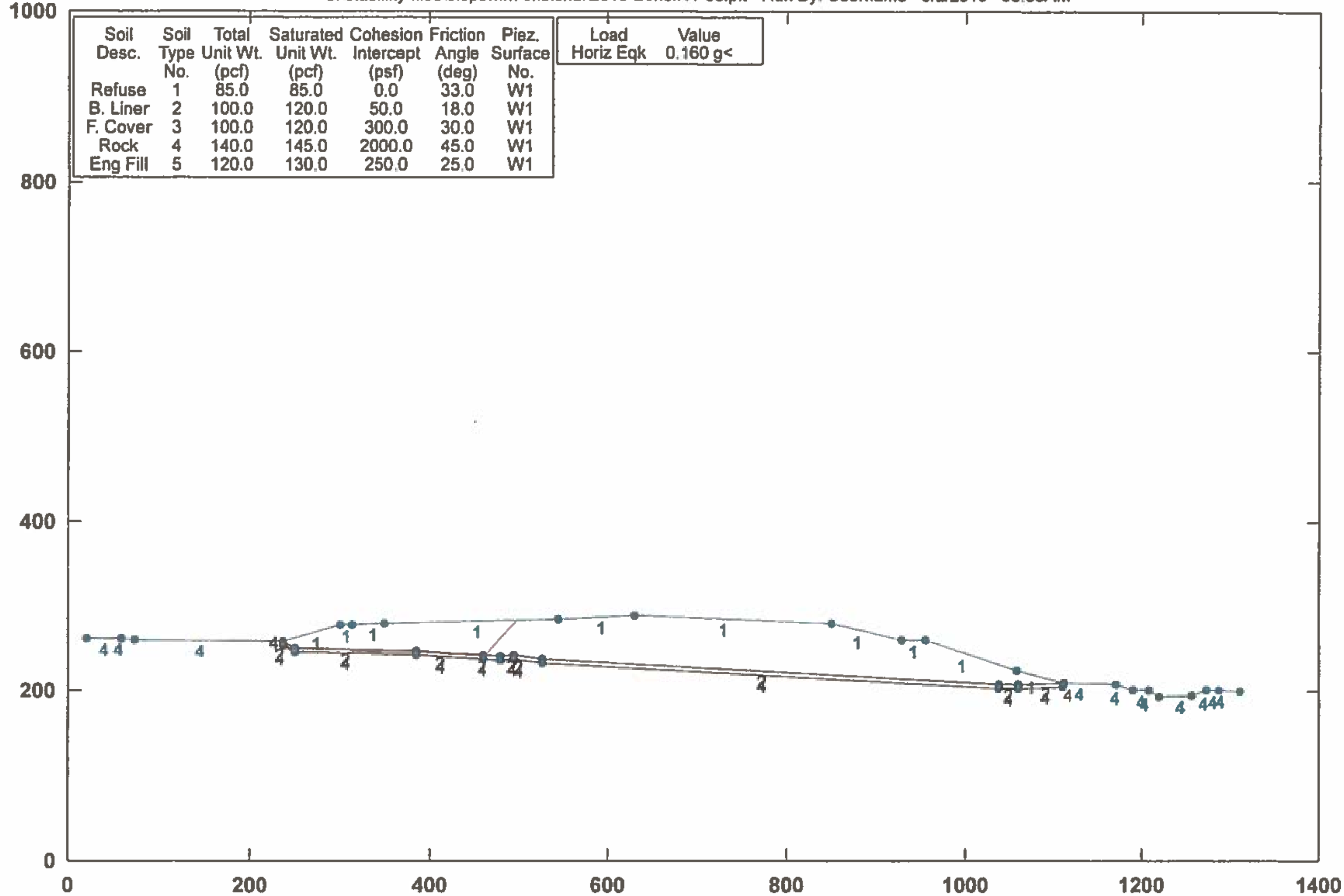
STED

MOLF - Slope Stability Section 1-1 Pesudo-Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-6e.plt Run By: Username 5/2/2019 08:05AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<



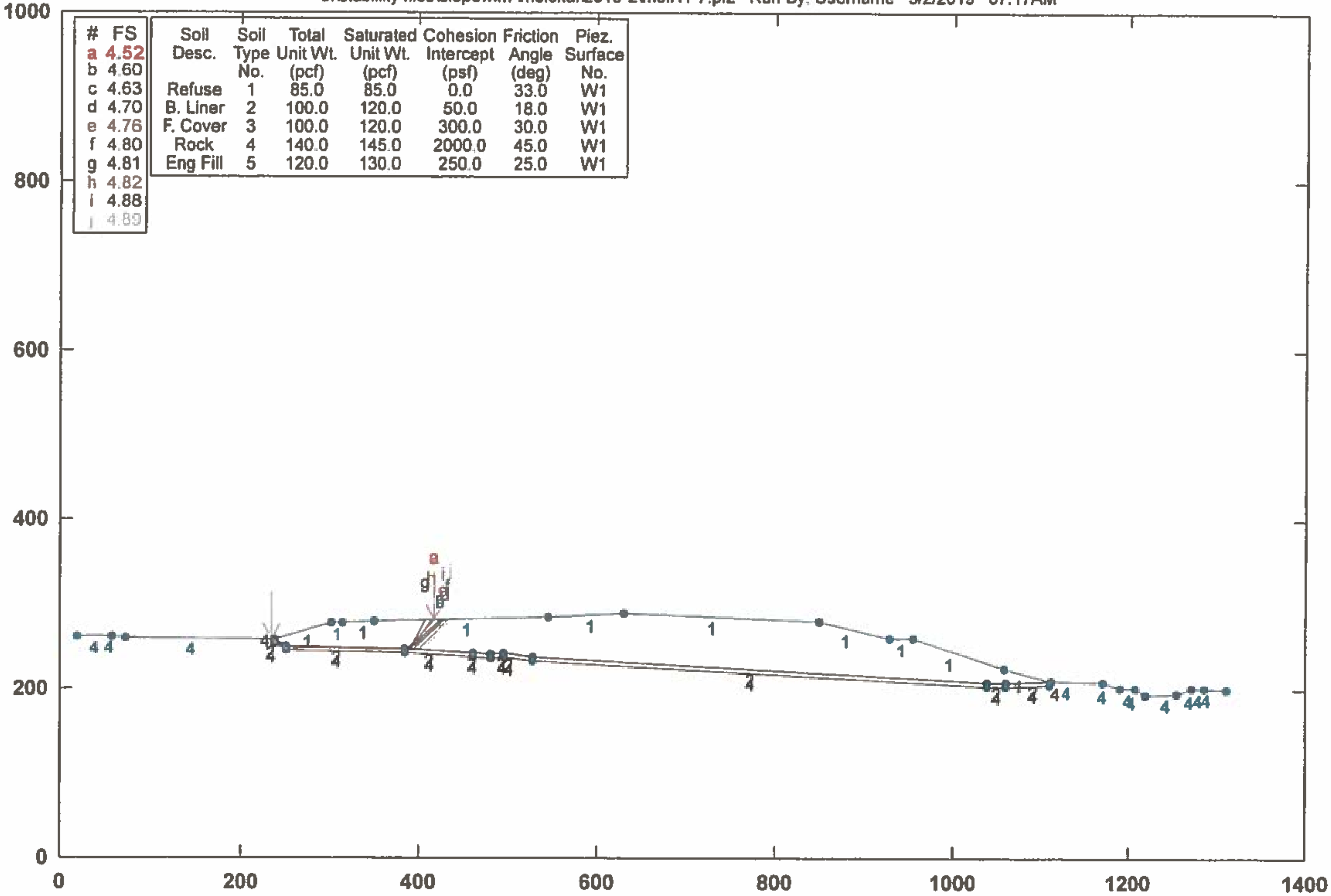
PCSTABL5M/si FSmin=1.90

Factors of Safety Calculated by Janbu Method

STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-7.pl2 Run By: Username 5/2/2019 07:17AM

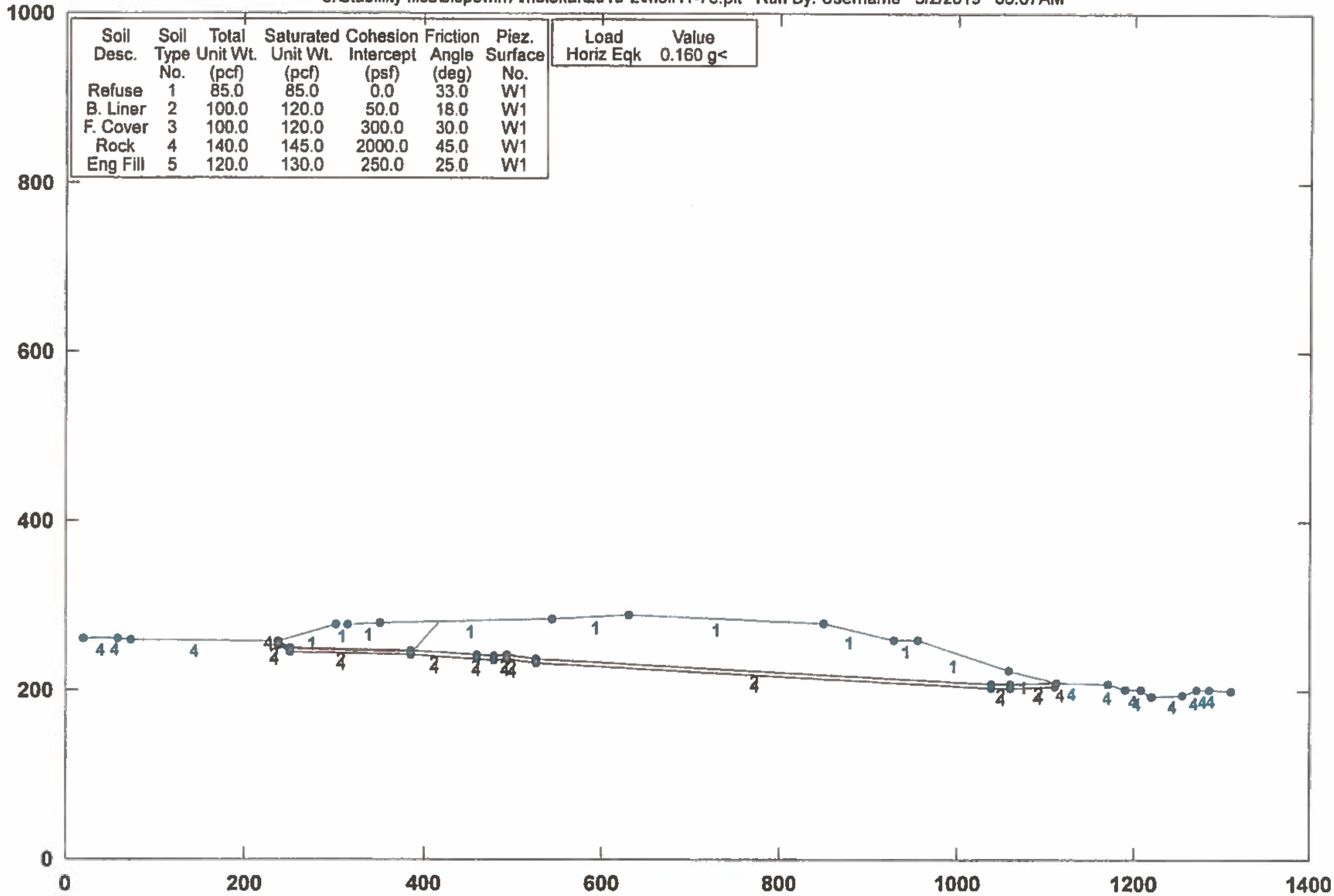


PCSTABL5M/si FSmin=4.52

Safety Factors Are Calculated By The Modified Janbu Method

MOLF - Slope Stability Section 1-1 Pesudo-Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-7e.plt Run By: Username 5/2/2019 08:07AM

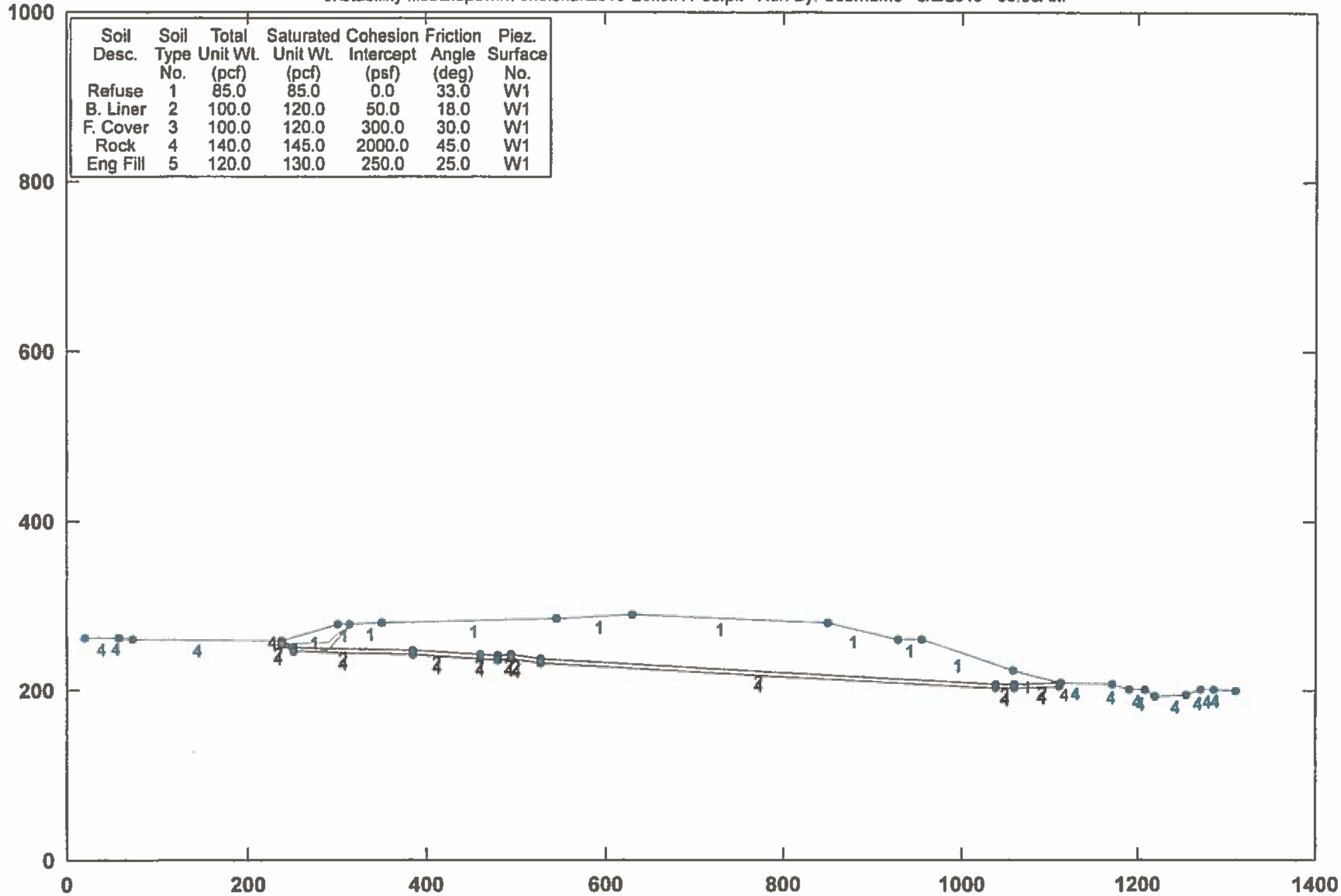


PCSTABL5M/si FSmin=1.75
Factors of Safety Calculated by Janbu Method

STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-8s.plt Run By: Username 5/2/2019 08:08AM



PCSTABL5M/si FSmin=3.11

Factor Of Safety Is Calculated By Spencer`s Method of Slices

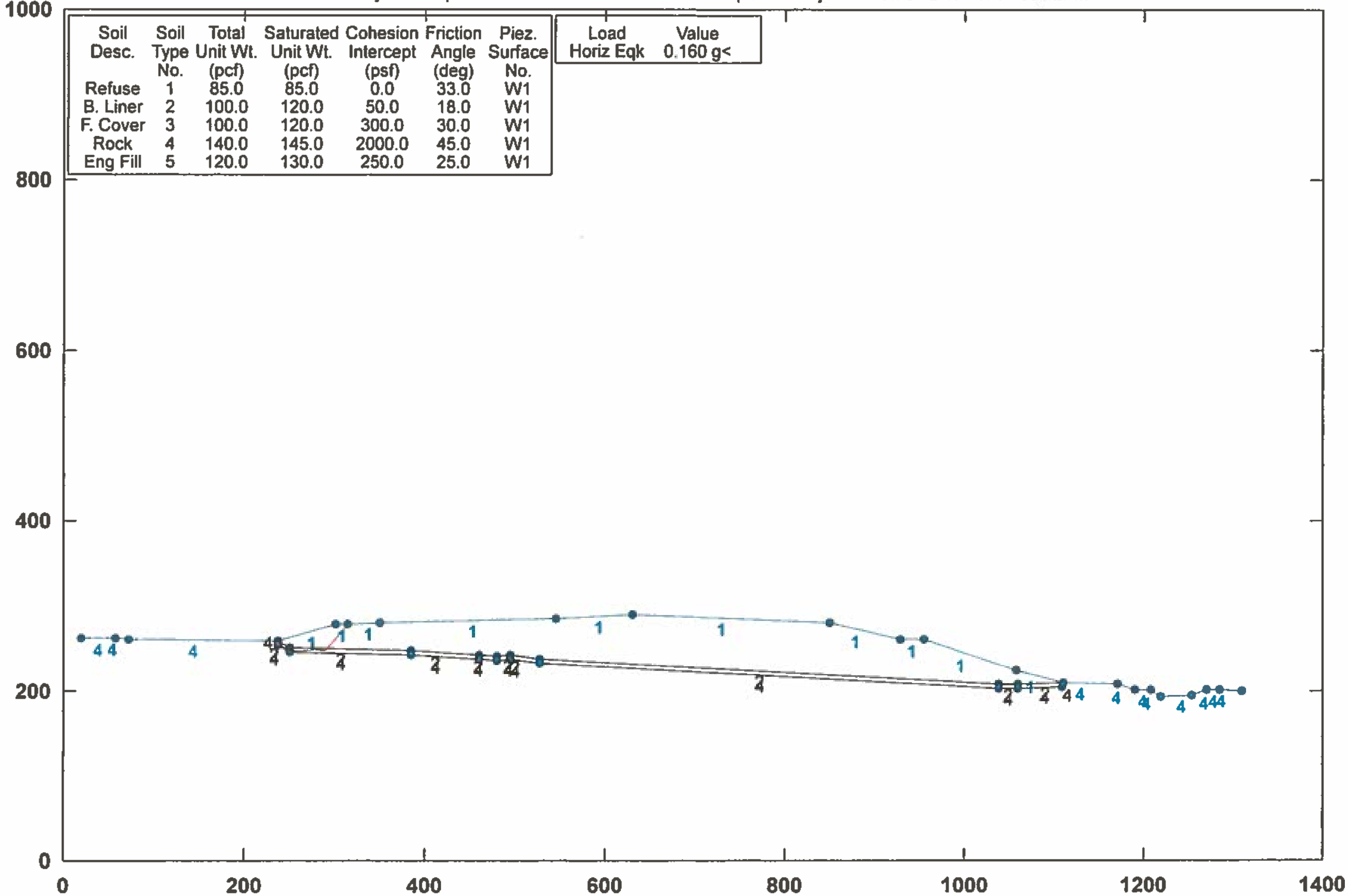
STED

MOLF - Slope Stability Section 1-1 Pesudo-Static

e:\stabillity files\slopewin7\molokai\2019-2 85\molf11-8e.plt Run By: Username 2/17/2020 03:42PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<

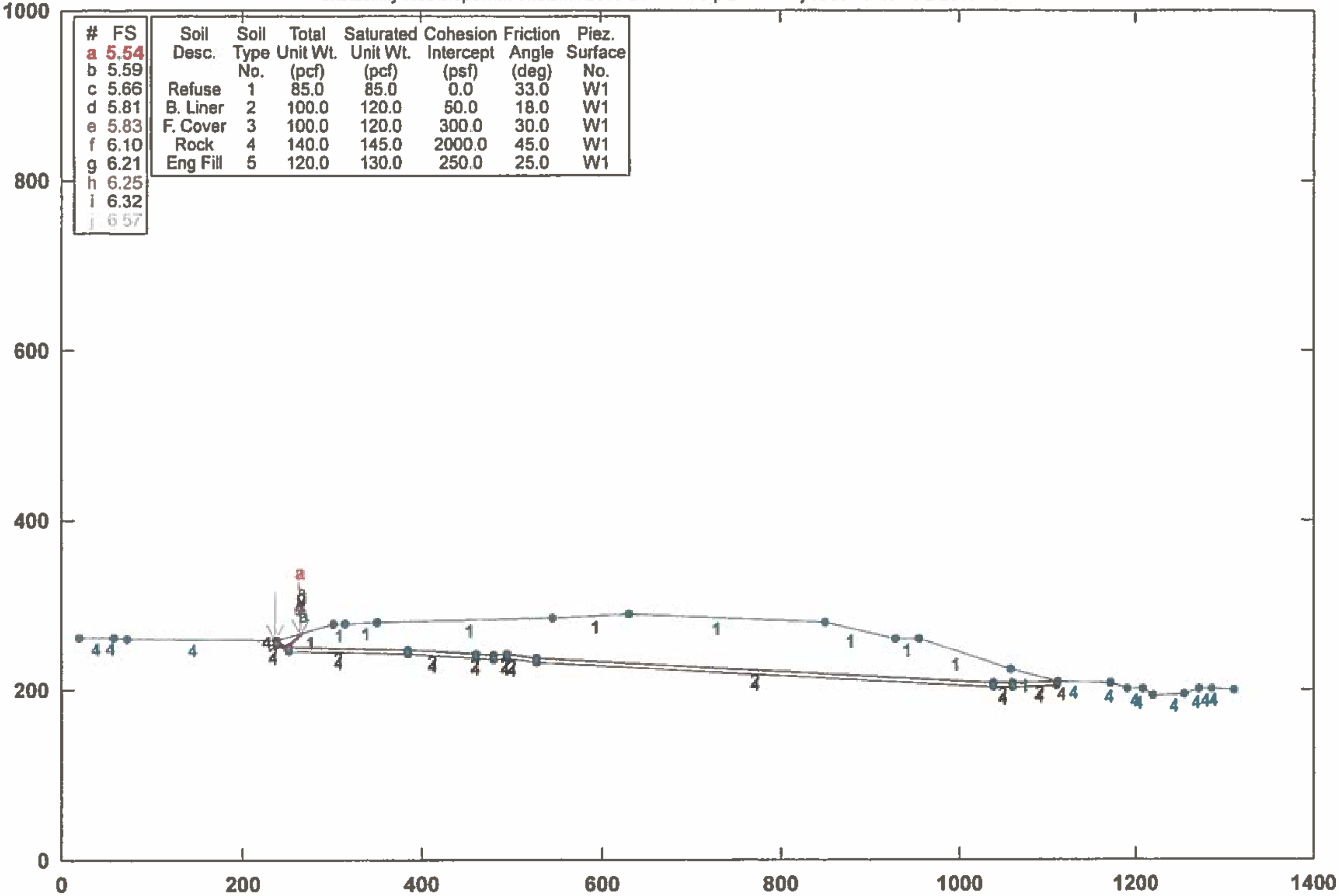


PCSTABL5M/si FSmin=1.63
Factors of Safety Calculated by Janbu Method

STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-9.pl2   Run By: Username   5/2/2019   07:13AM



PCSTABL5M/si FSmin=5.54
Safety Factors Are Calculated By The Modified Janbu Method

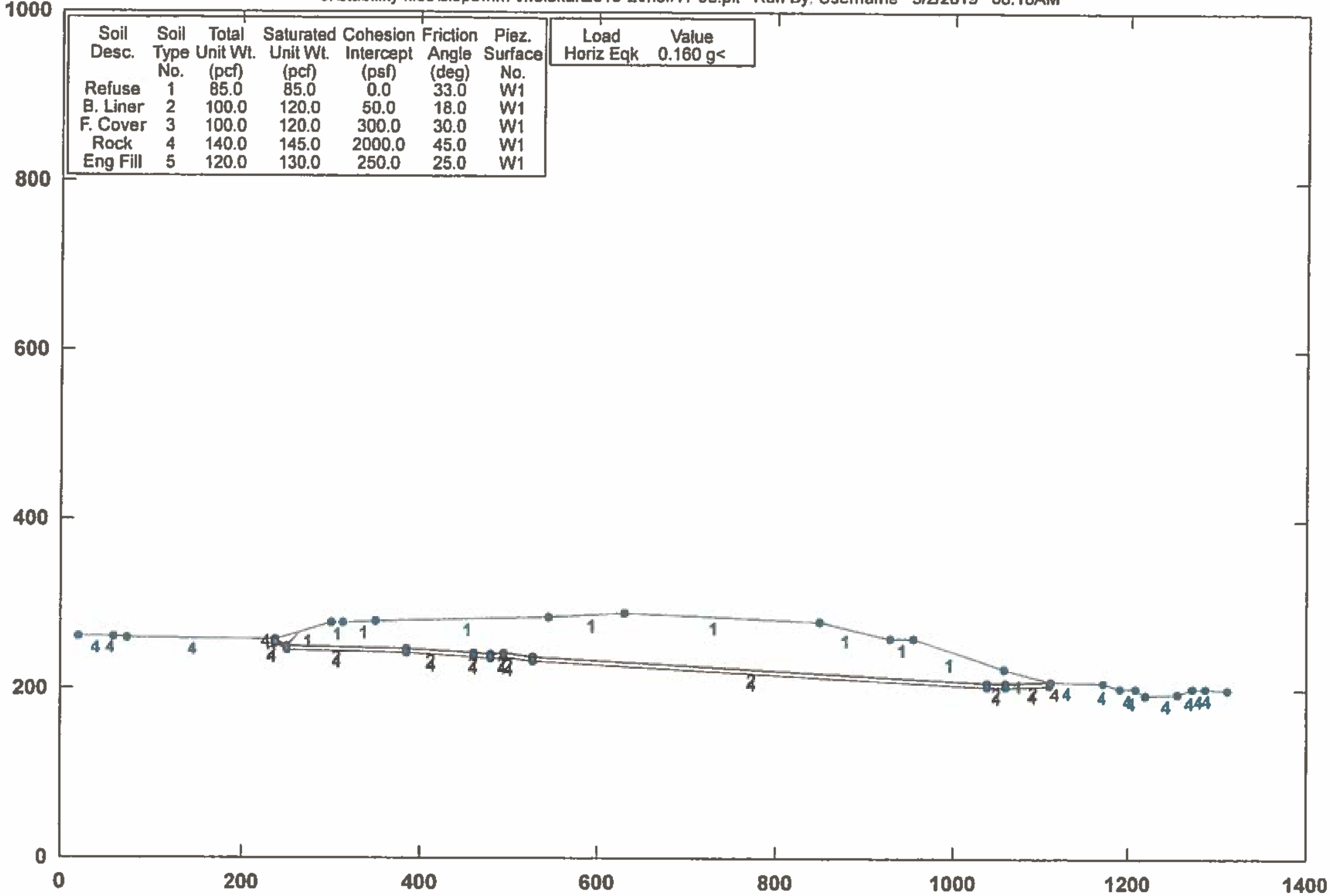
STED

MOLF - Slope Stability Section 1-1 Pesudo-Static

e:\stabillity files\slopewin7\molokai\2019-2\molf11-9e.plt Run By: Username 5/2/2019 08:16AM

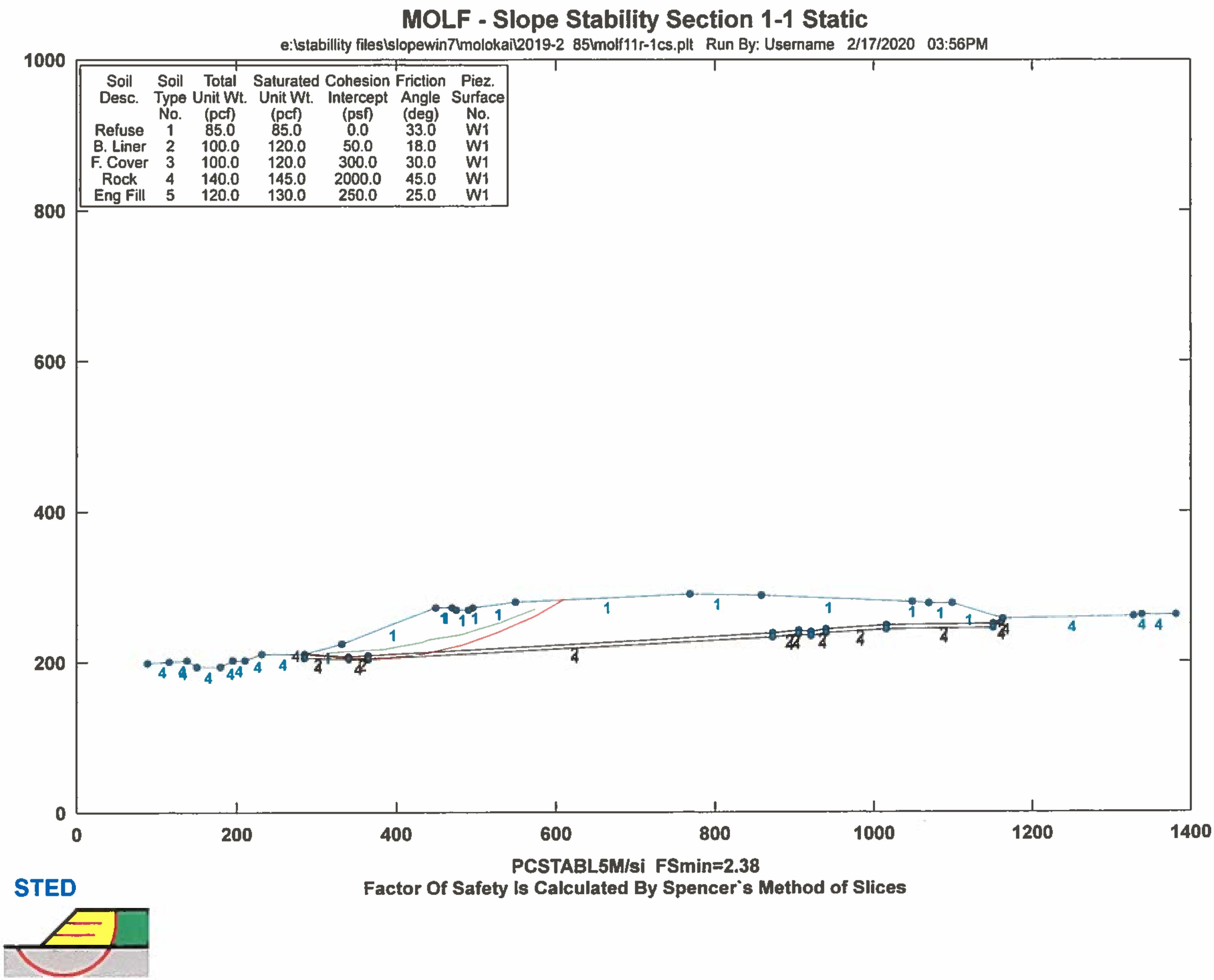
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<



PCSTABL5M/si FSmin=3.60
Factors of Safety Calculated by Janbu Method

STED

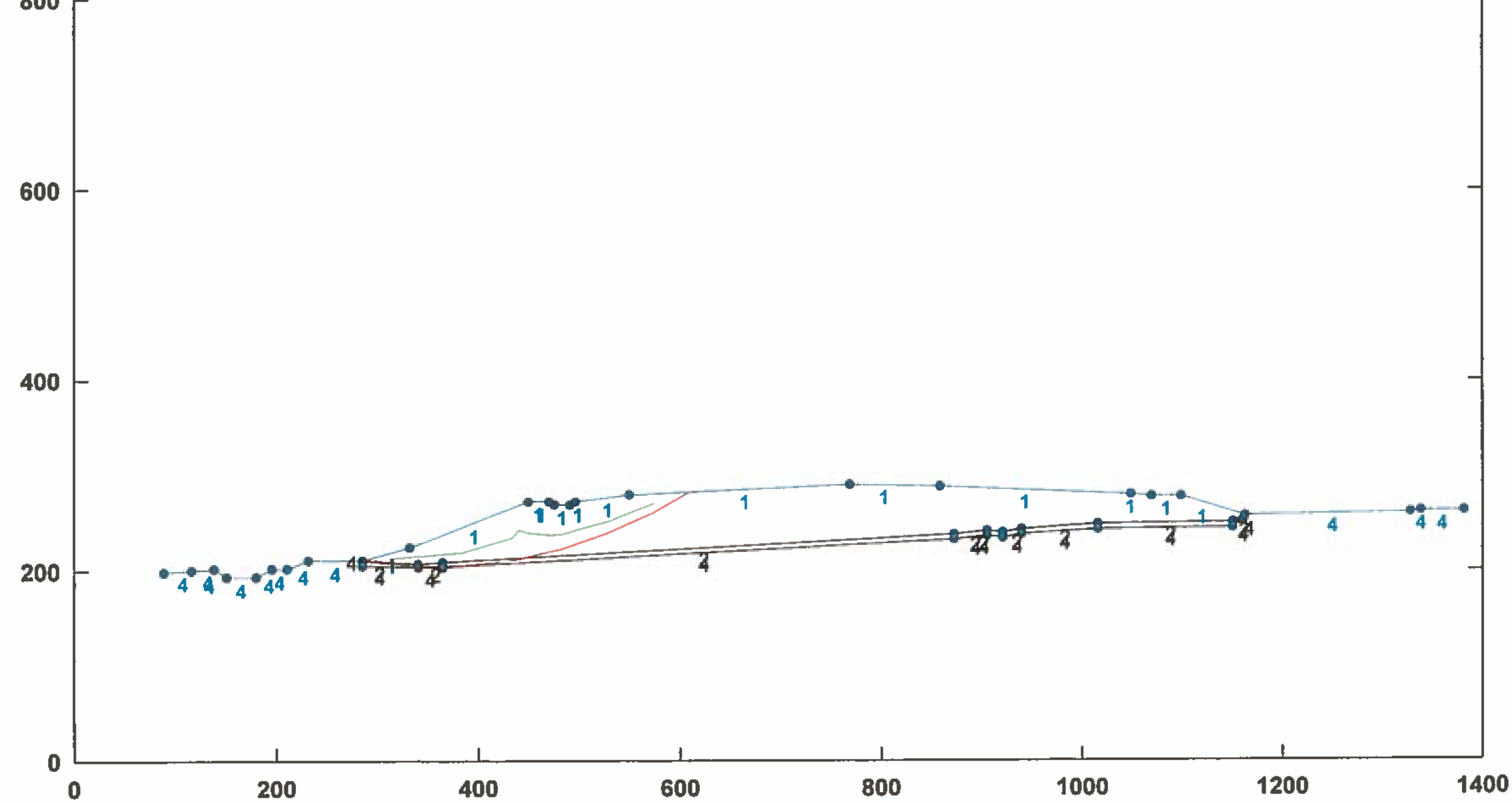

MOLF - Slope Stability Section 1-1 Static
e:\stabillity files\slopewin7\molokai\2019-2 85\molf11r-1cs.plt Run By: Username 2/17/2020 03:56PM
Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Piez. Surface No.
Refuse 1 85.0 85.0 0.0 33.0 W1
B. Liner 2 100.0 120.0 50.0 18.0 W1
F. Cover 3 100.0 120.0 300.0 30.0 W1
Rock 4 140.0 145.0 2000.0 45.0 W1
Eng Fill 5 120.0 130.0 250.0 25.0 W1
1000
800
600
400
200
0
0
200
400
600
800
1000
1200
1400
PCSTABL5M/si FSmin=2.38
Factor Of Safety Is Calculated By Spencer`s Method of Slices
STED

MOLF - Slope Stability Section 1-1 Pesudo-Static

e:\stabillity files\slopewin7\molokai\2019-2 85\molf11r-1ces.plt Run By: Username 2/17/2020 03:59PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<



PCSTABL5M/si FSmin=1.32

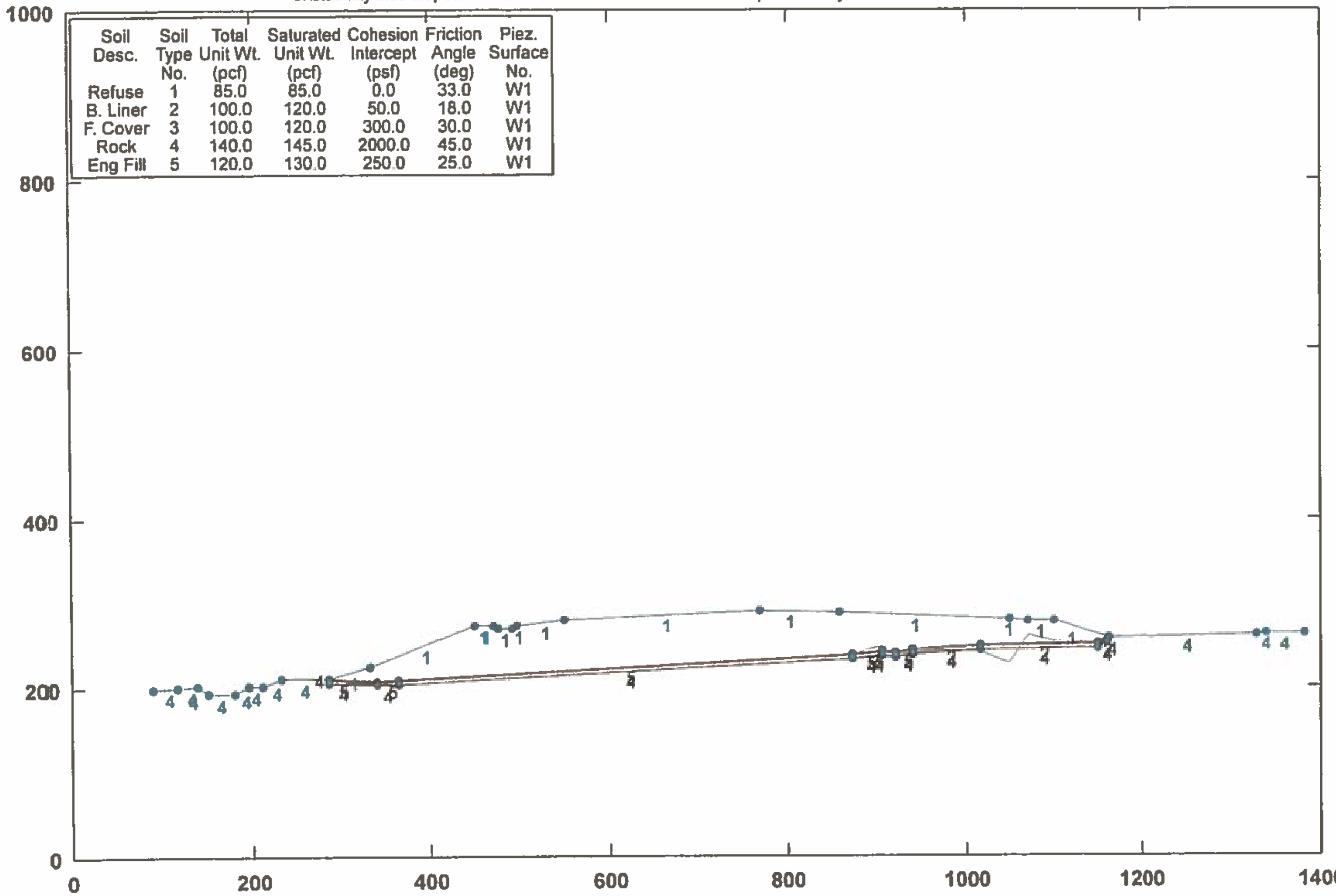
Factor Of Safety Is Calculated By Spencer`s Method of Slices

STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-3 85\11r\molf11r-1s.plt Run By: Username 5/6/2019 07:12AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1



PCSTABL5M/si FSmin=8.95

Factor Of Safety Is Calculated By Spencer's Method of Slices

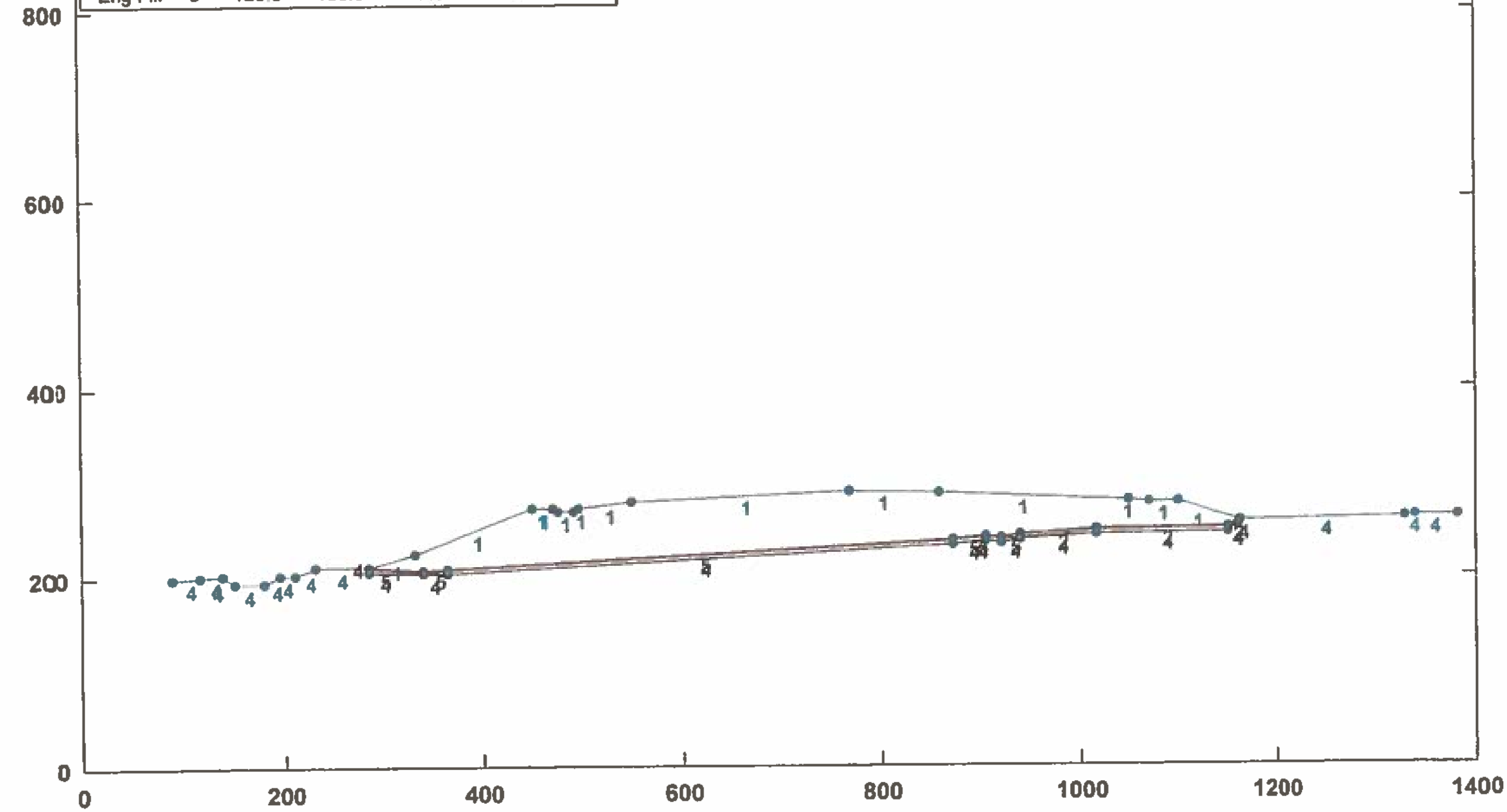
STED

MOLF - Slope Stability Section 1-1 Pseudo-Static

e:\stability files\slopewin7\molokai\2019-3 85\11r\molf11r-1e.plt Run By: Username 5/6/2019 07:10AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<

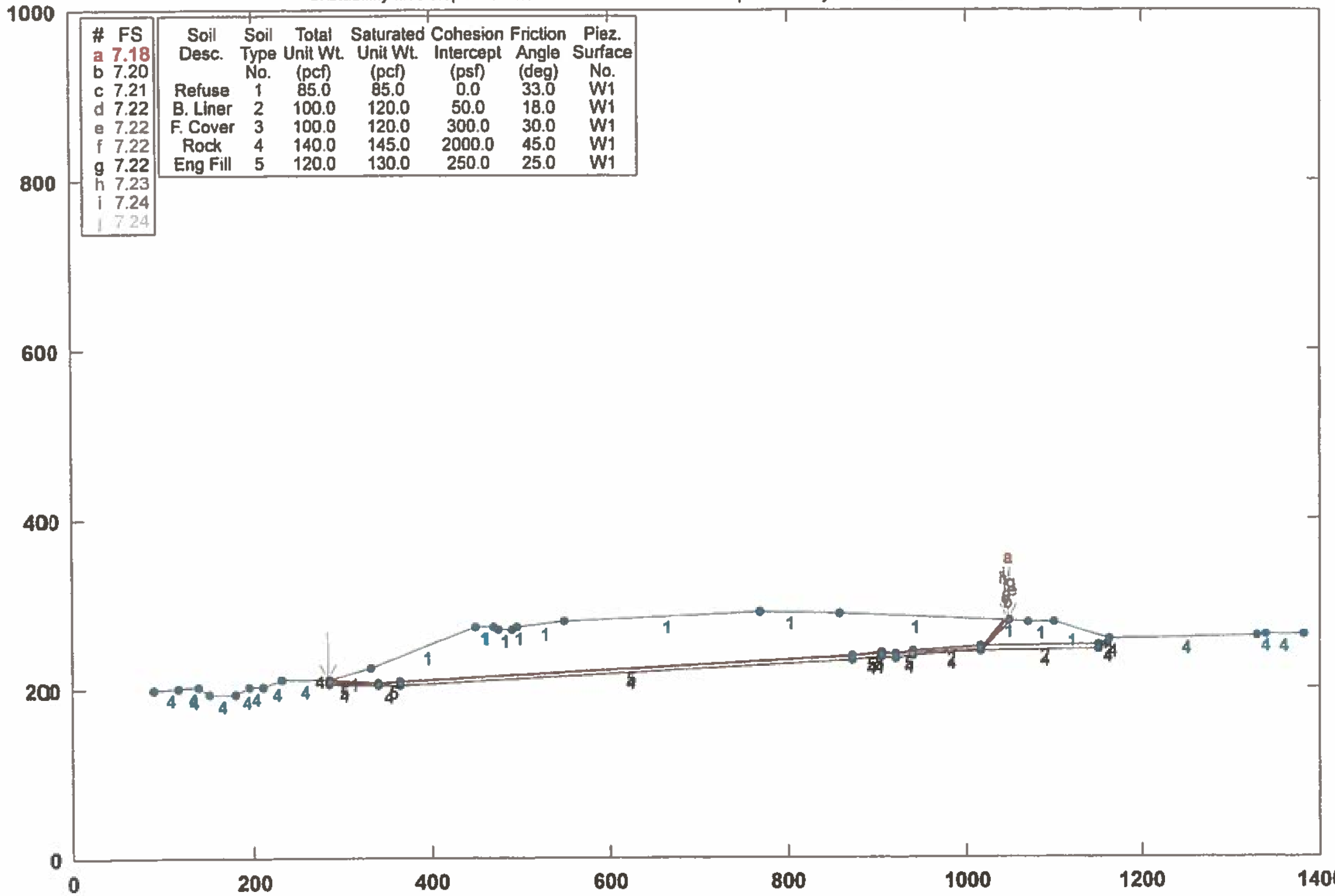


PCSTABL5M/si FSmin=2.29
Factors of Safety Calculated by Janbu Method

STED

MOLF - Slope Stability Section 1-1 Static

e:\stability files\slopewin7\molokai\2019-3 85\molf11r-2.pl2 Run By: Username 5/3/2019 04:25PM



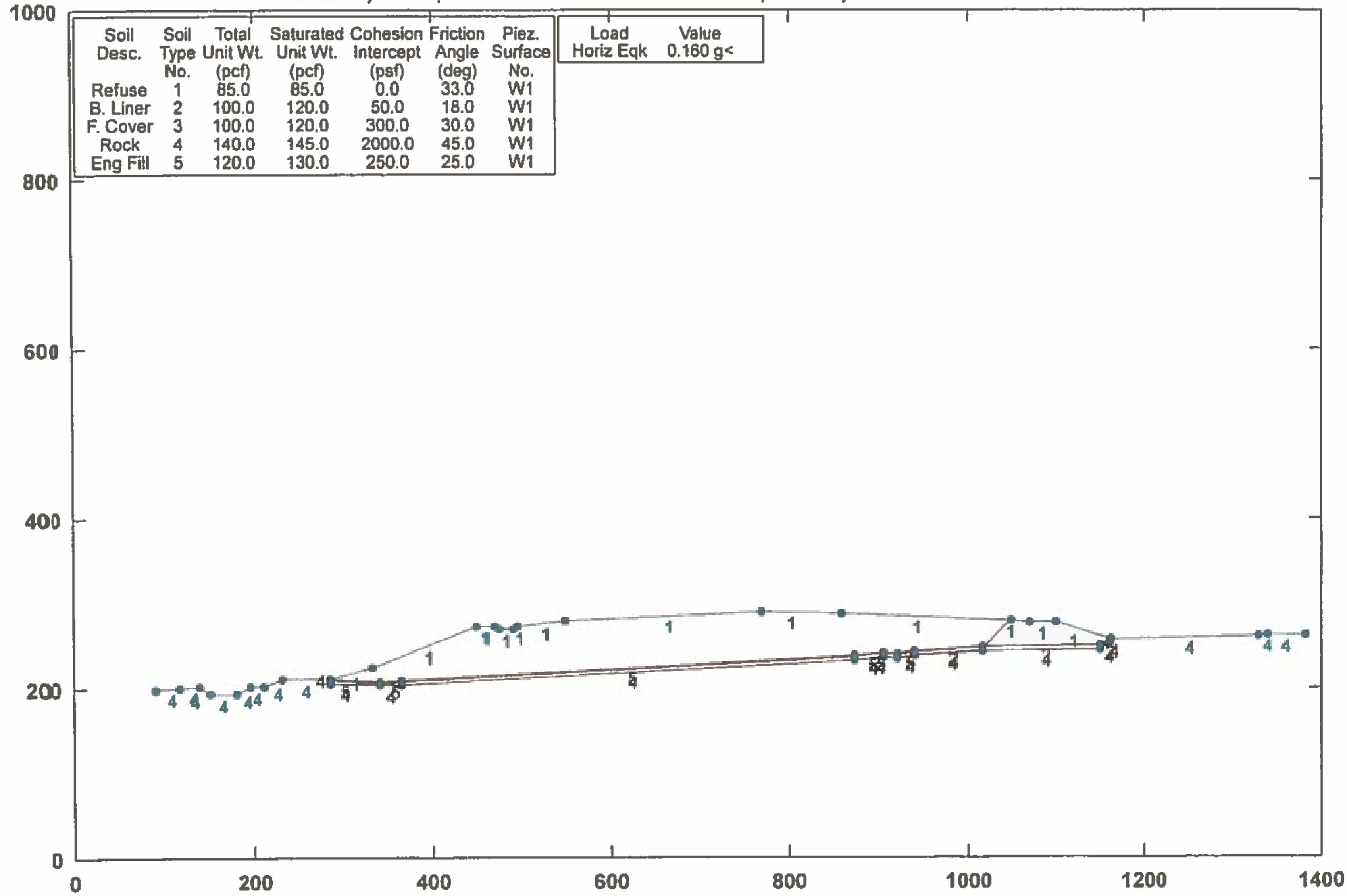
PCSTABL5M/si FSmin=7.18

Safety Factors Are Calculated By The Modified Janbu Method

STED

MOLF - Slope Stability Section 1-1 Pseudo-Static

e:\stability files\slopewin7\molokai\2019-3 85\11r\molf11r-2e.plt Run By: Username 5/6/2019 07:17AM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

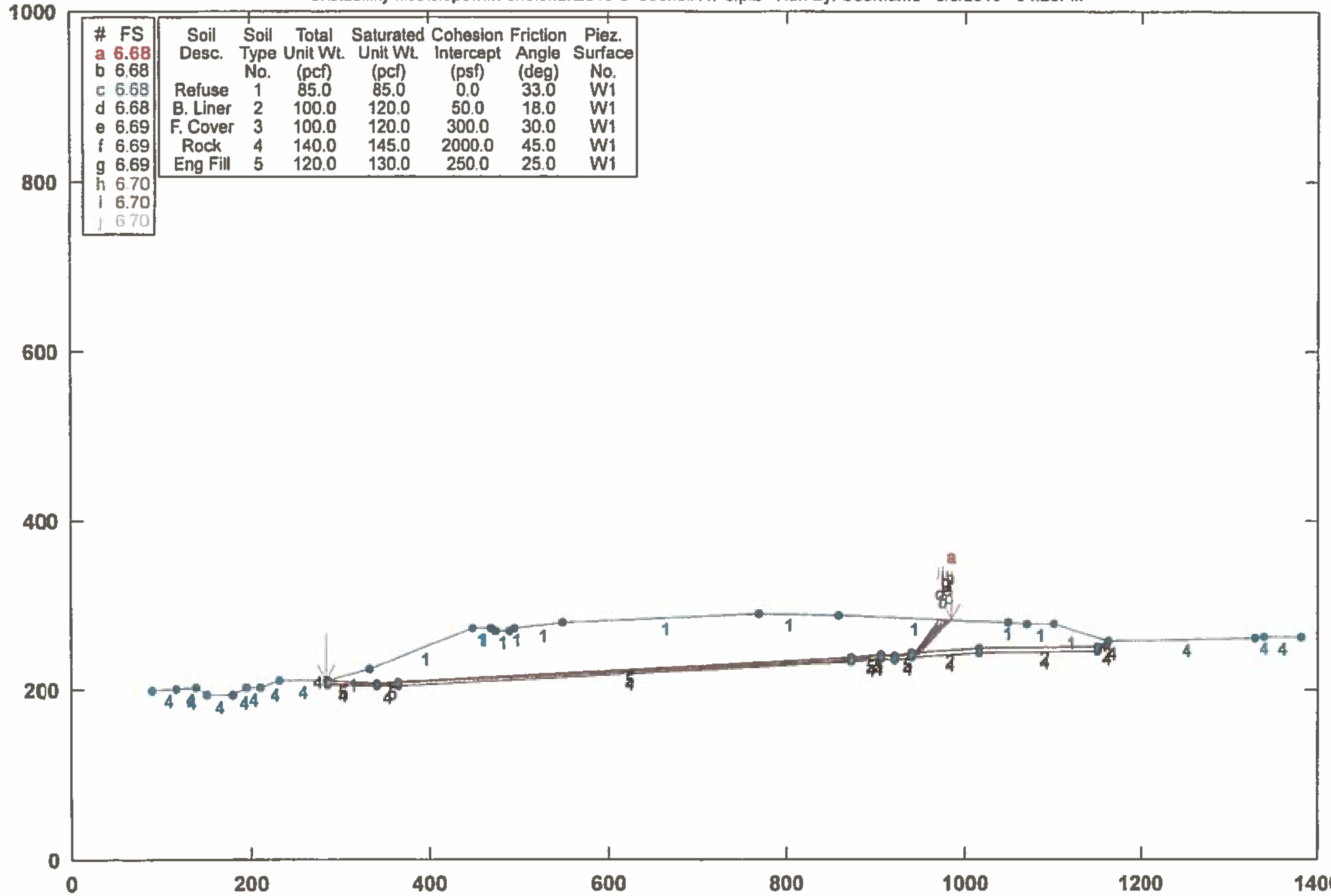
Load	Value
Horiz Eqk	0.160 g<

PCSTABL5M/si FSmin=2.22
Factors of Safety Calculated by Janbu Method

STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-3 85\molf11r-3.pl2 Run By: Username 5/3/2019 04:26PM



PCSTABL5M/si FSmin=6.68
Safety Factors Are Calculated By The Modified Janbu Method

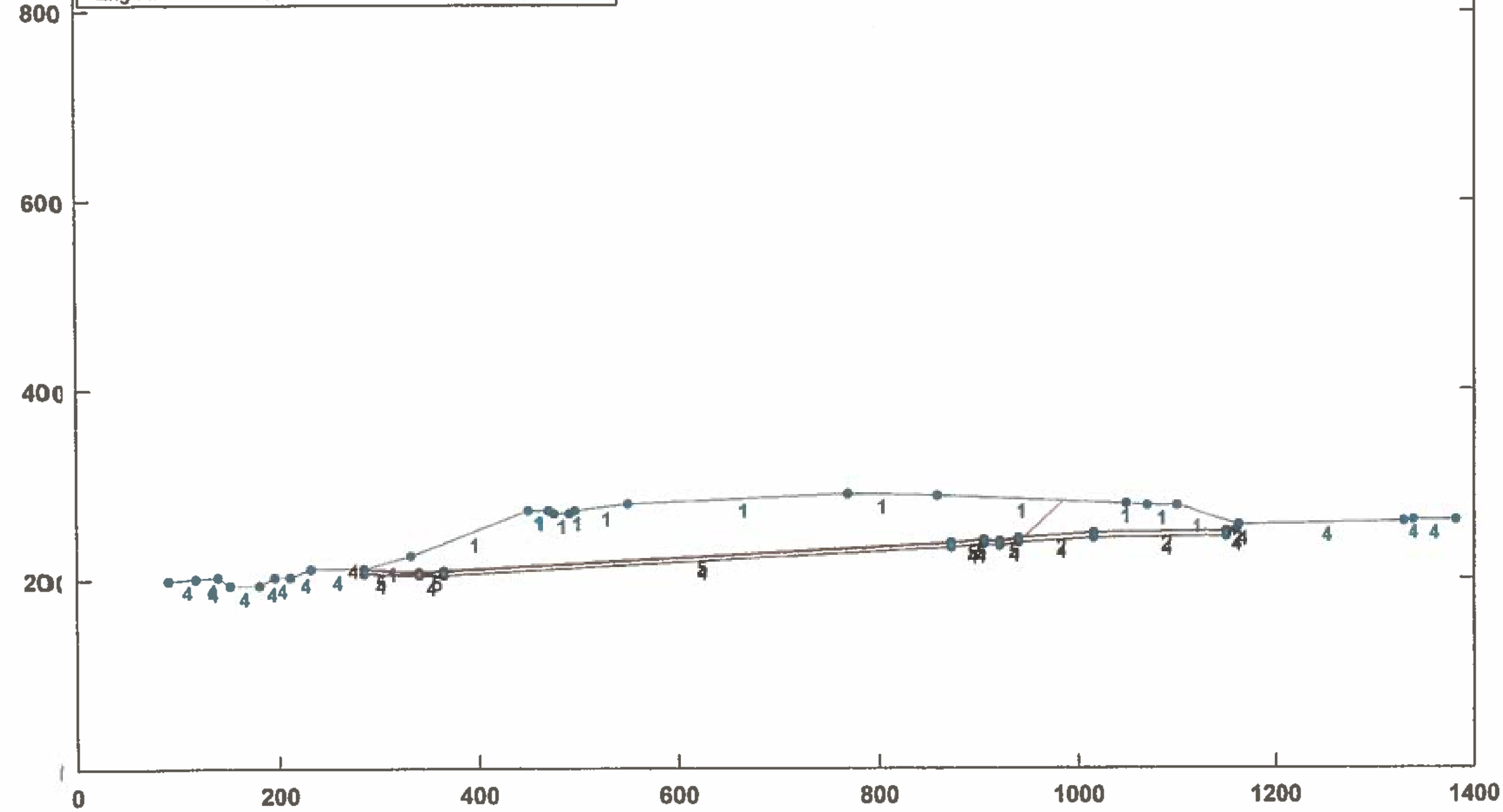
STED

MOLF - Slope Stability Section 1-1 Pseudo-Static

e:\stability files\slopewin7\molokai\2019-3 85\11r\molf11r-3e.plt Run By: Username 5/6/2019 07:20AM

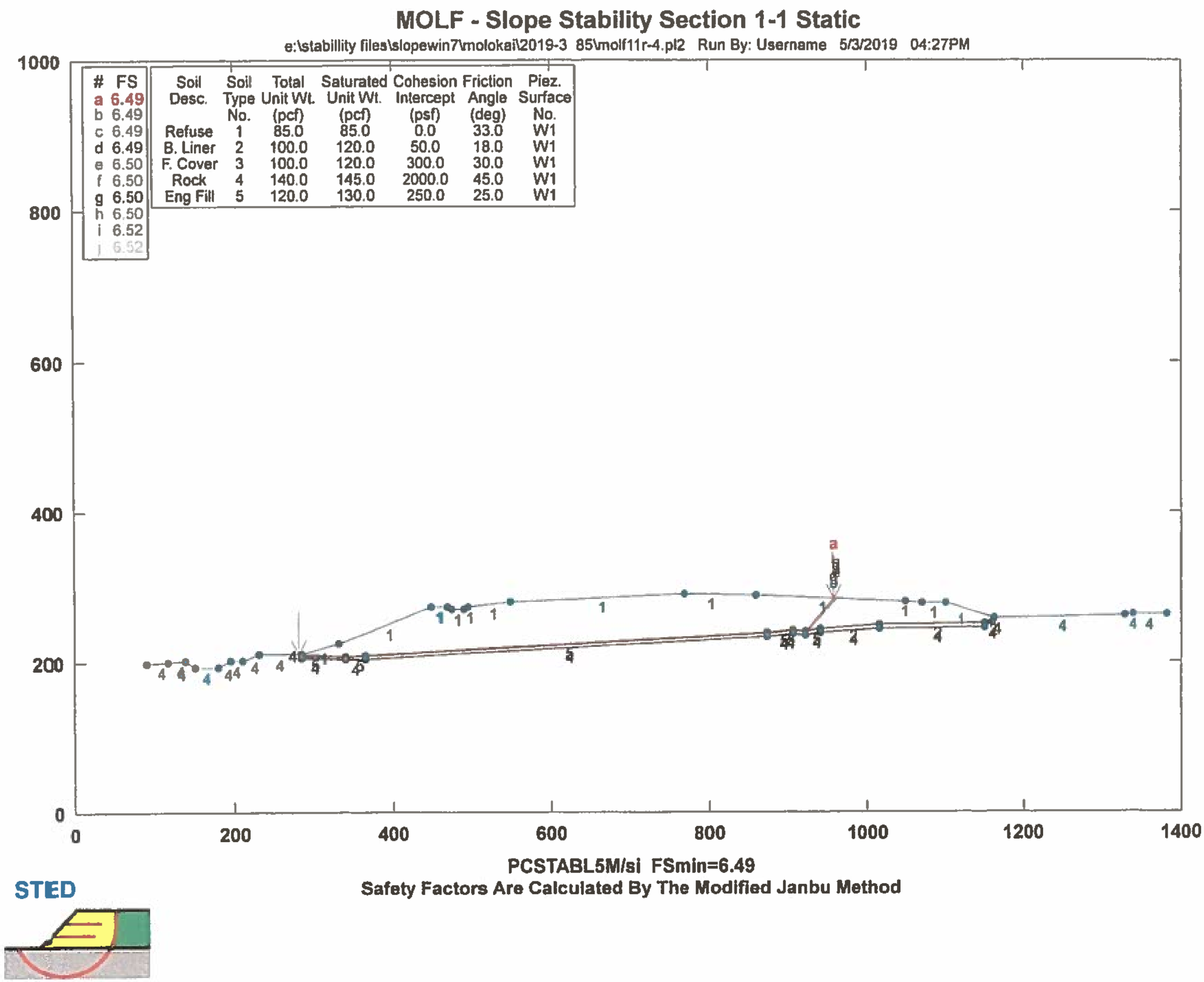
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<



PCSTABL5M/si FSmin=2.22
Factors of Safety Calculated by Janbu Method

STED


MOLF - Slope Stability Section 1-1 Static
e:\stabillity files\slopewin7\molokai\2019-3 85\molf11r-4.pl2 Run By: Username 5/3/2019 04:27PM

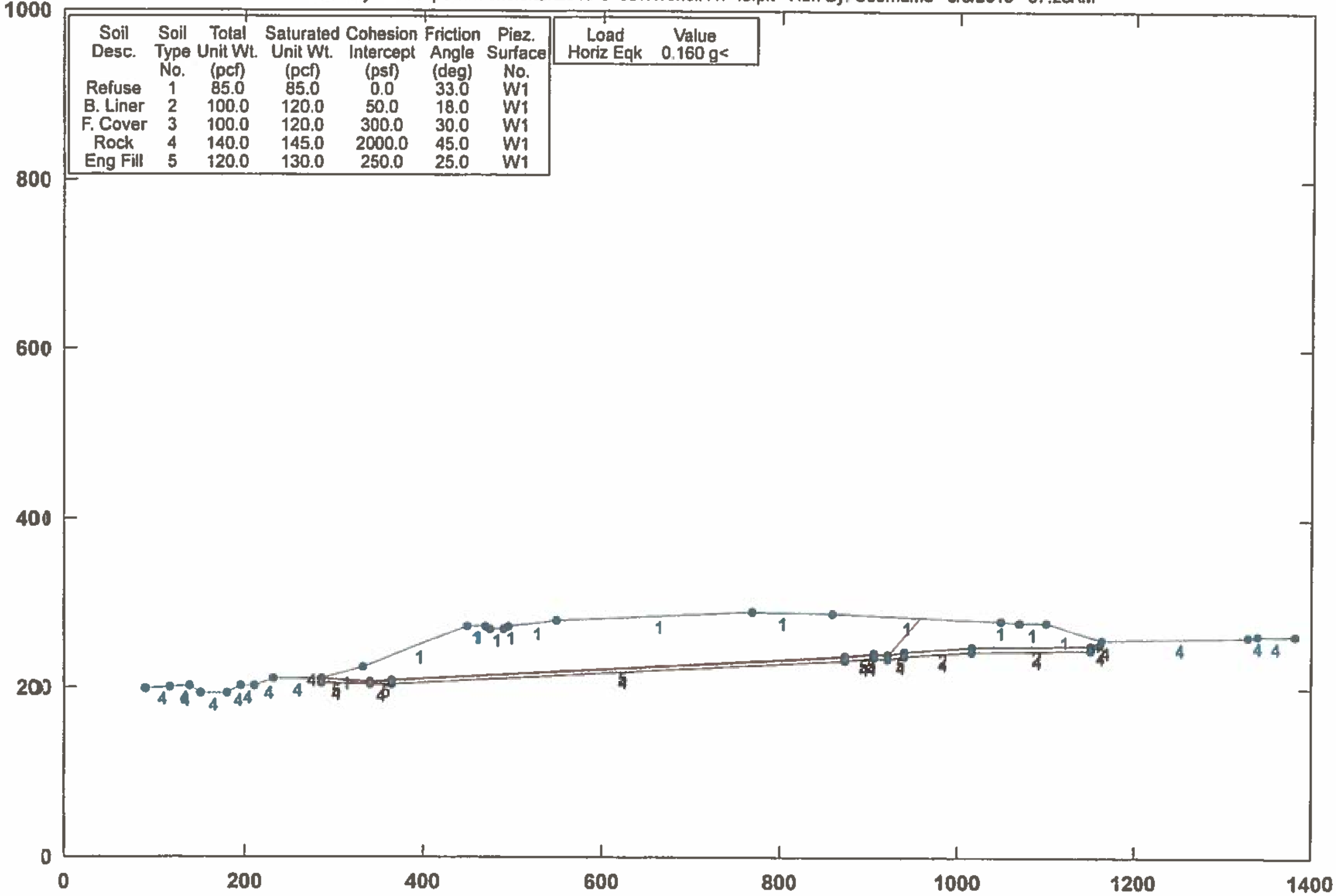
#	FS
a	6.49
b	6.49
c	6.49
d	6.49
e	6.50
f	6.50
g	6.50
h	6.50
i	6.52
j	6.52

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

1000
800
600
400
200
0
0
200
400
600
800
1000
1200
1400
PCSTABL5M/si FSmin=6.49
Safety Factors Are Calculated By The Modified Janbu Method
STED

MOLF - Slope Stability Section 1-1 Pseudo-Static

e:\stability files\slopewin7\molokai\2019-3 85\11r\molf11r-4e.plt Run By: Username 5/6/2019 07:25AM

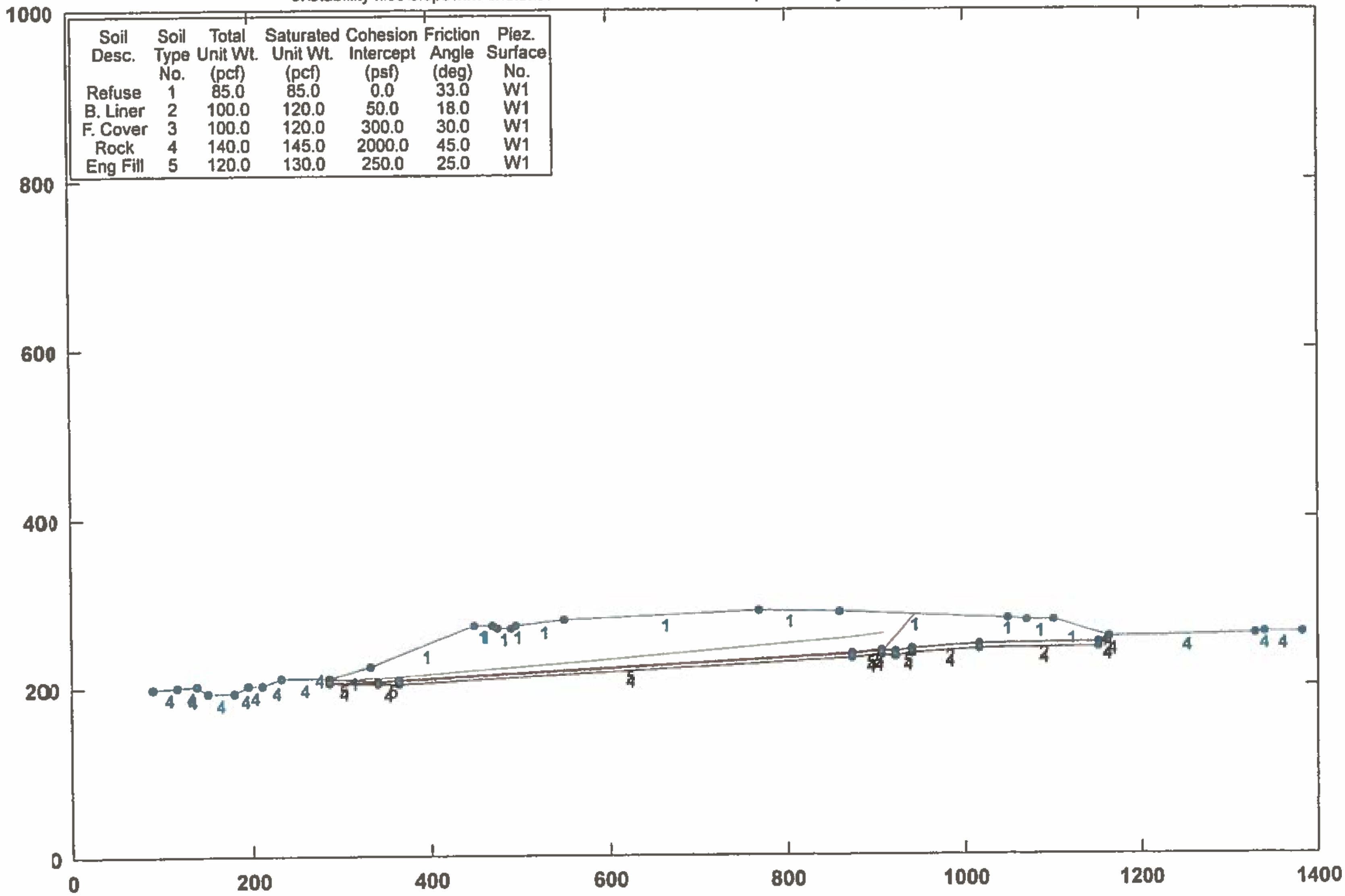


PCSTABL5M/si FSmin=2.30
Factor Of Safety Is Calculated By The Modified Bishop Method

STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-3 85\11r\molf11r-5s.plt Run By: Username 5/6/2019 07:27AM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

PCSTABL5M/si FSmin=6.42

Factor Of Safety Is Calculated By Spencer`s Method of Slices

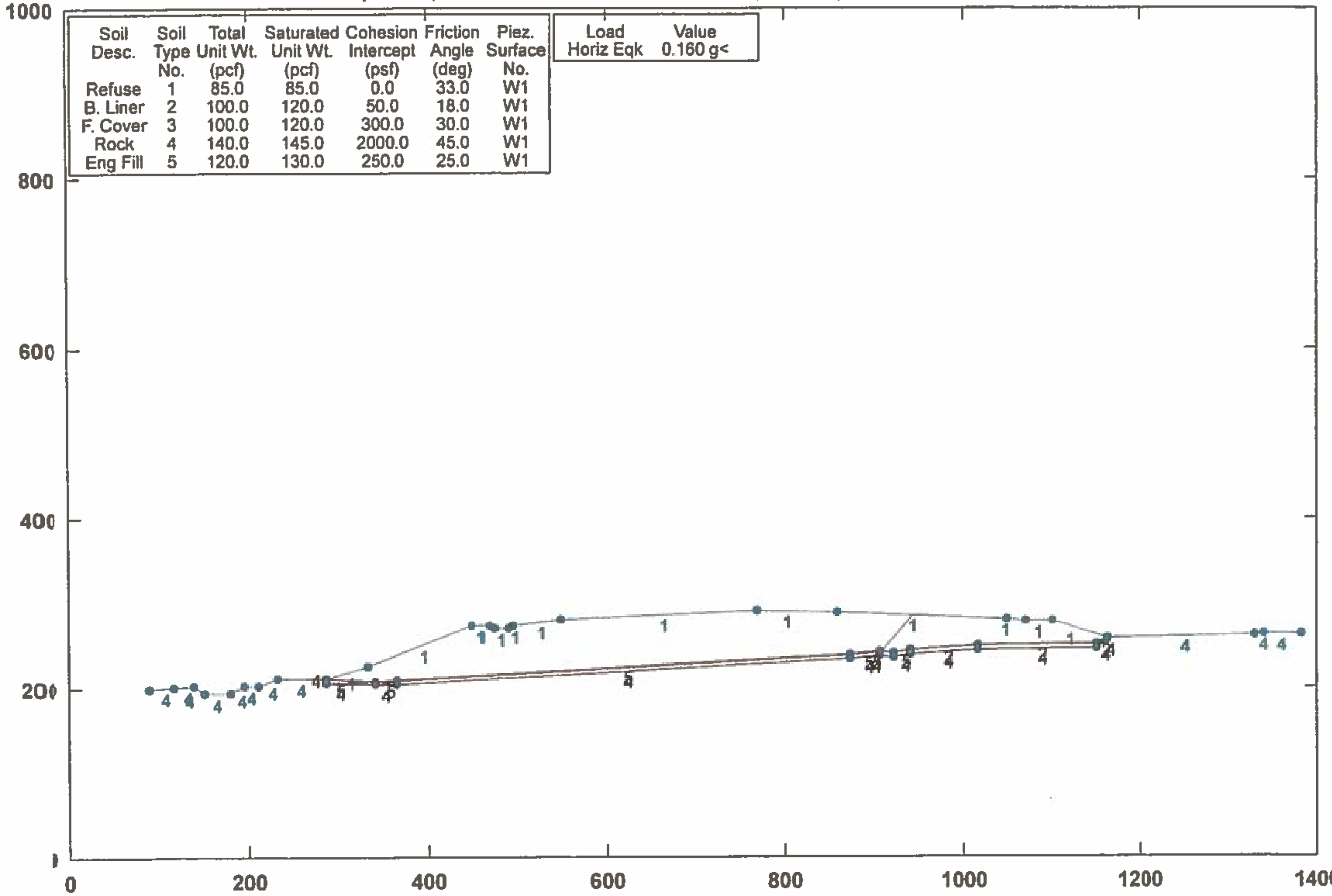
STED

MOLF - Slope Stability Section 1-1 Pseudo-Static

e:\stabillity files\slopewin7\molokai\2019-3 85\11r\molf11r-5e.plt Run By: Username 5/6/2019 07:27AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<

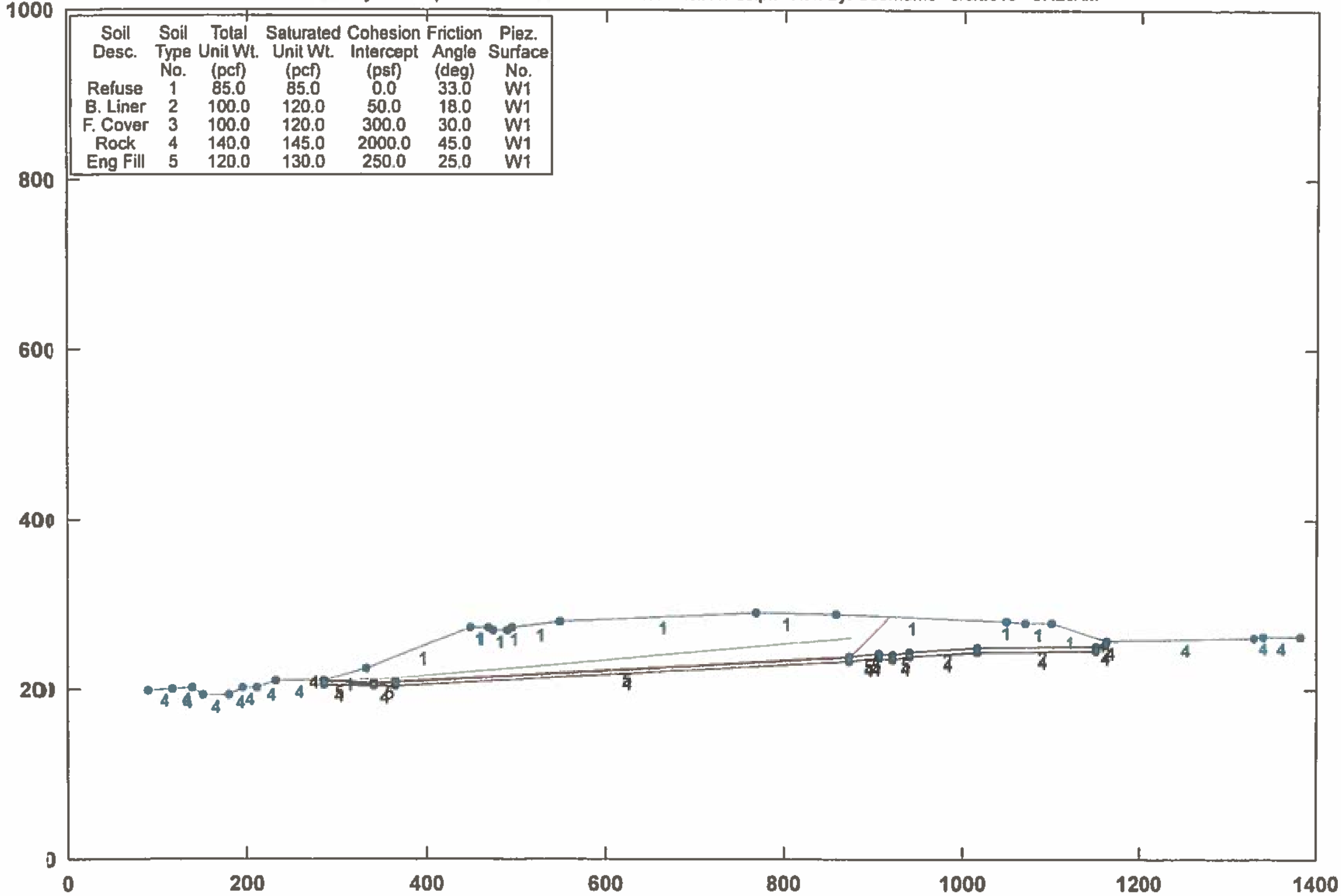


PCSTABL5M/si FSmin=2.18
Factors of Safety Calculated by Janbu Method

STED

MOLF - Slope Stability Section 1-1 Static

e:\stability files\slopewin7\molokai\2019-3 85\11r\molf11r-6s.plt Run By: Username 5/6/2019 07:29AM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

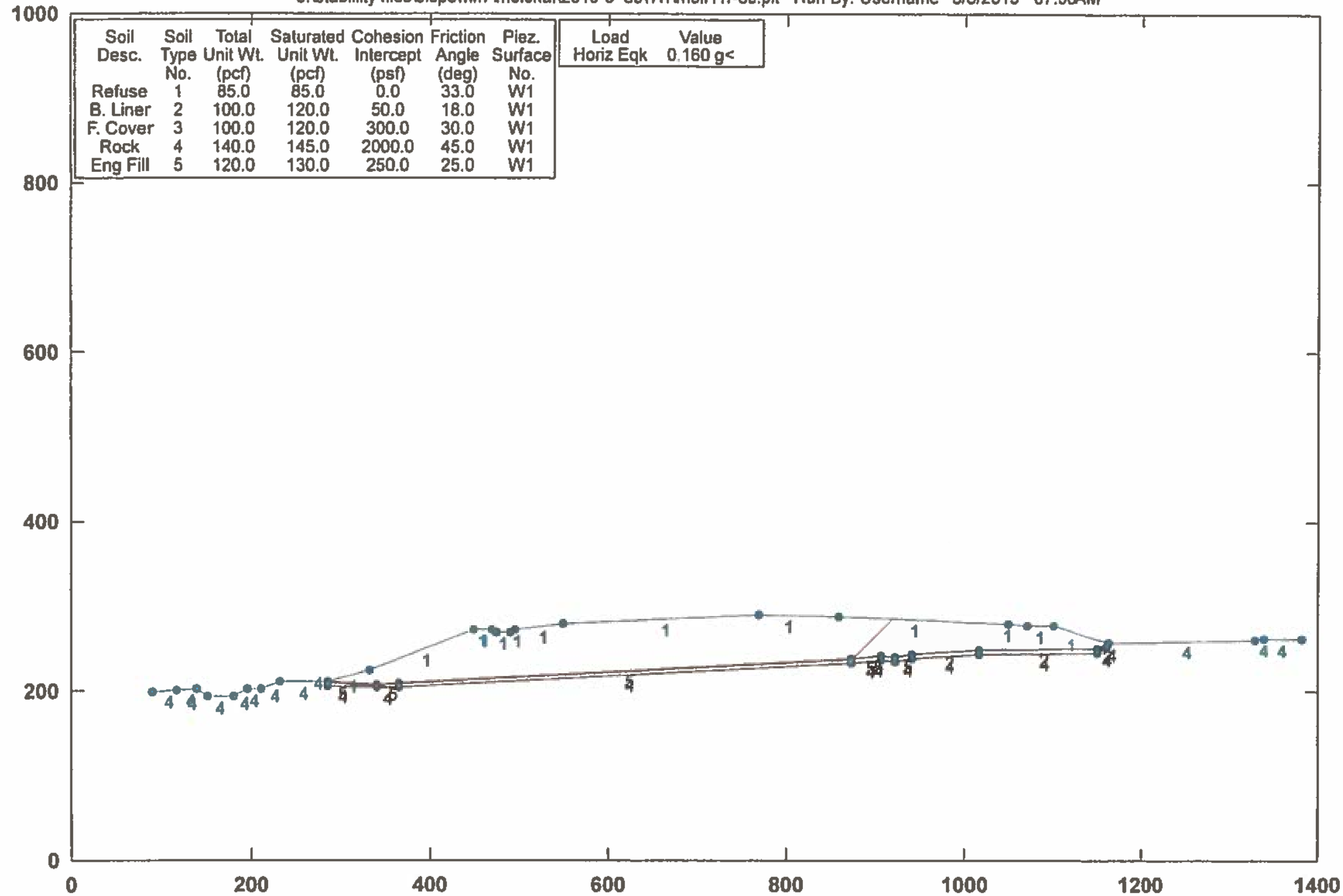
PCSTABL5M/si FSmin=6.10

Factor Of Safety Is Calculated By Spencer`s Method of Slices

STED

MOLF - Slope Stability Section 1-1 Pseudo-Static

e:\stabillity files\slopewin7\molokai\2019-3 85\11r\molf11r-6e.plt Run By: Username 5/6/2019 07:30AM



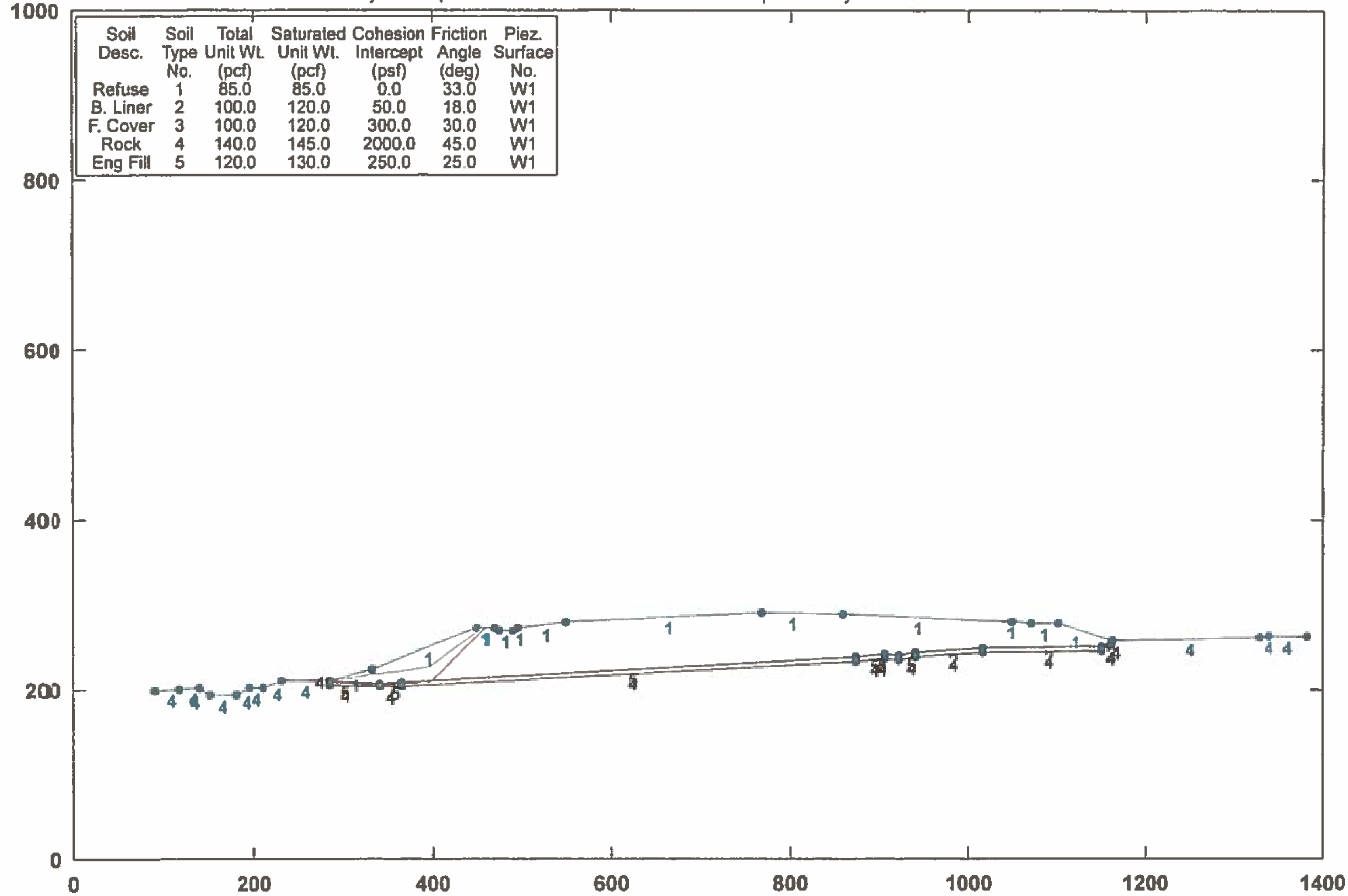
PCSTABL5M/si FSmin=2.15

Factors of Safety Calculated by Janbu Method

STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-3 85\11r\molf11r-7s.plt Run By: Username 5/6/2019 07:31AM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

PCSTABL5M/si FSmin=2.43

Factor Of Safety Is Calculated By Spencer`s Method of Slices

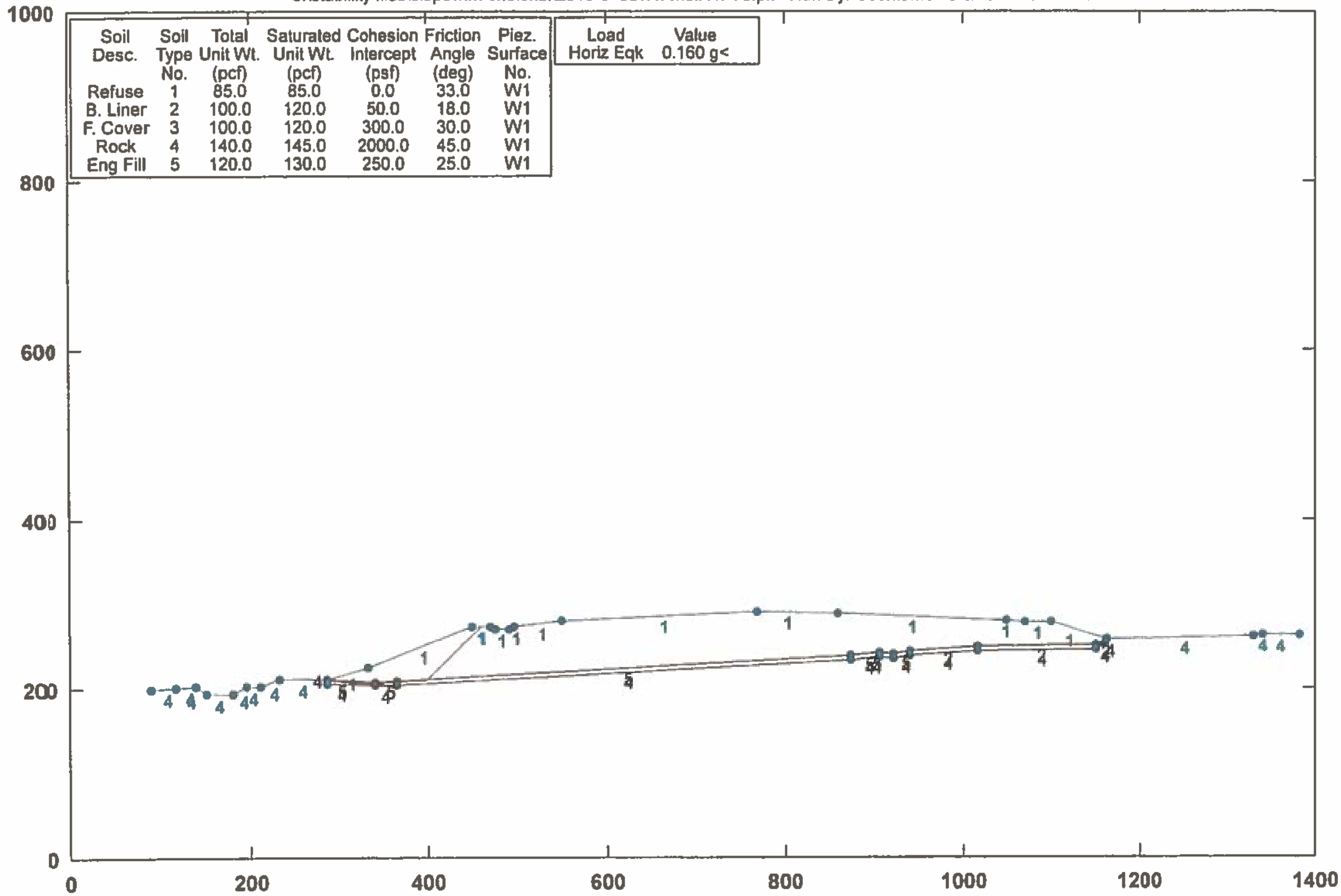
STED

MOLF - Slope Stability Section 1-1 Pseudo-Static

e:\stabillity files\slopewin7\molokai\2019-3 85\11r\molf11r-7e.plt Run By: Username 5/6/2019 07:33AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<



PCSTABL5M/si FSmin=1.40

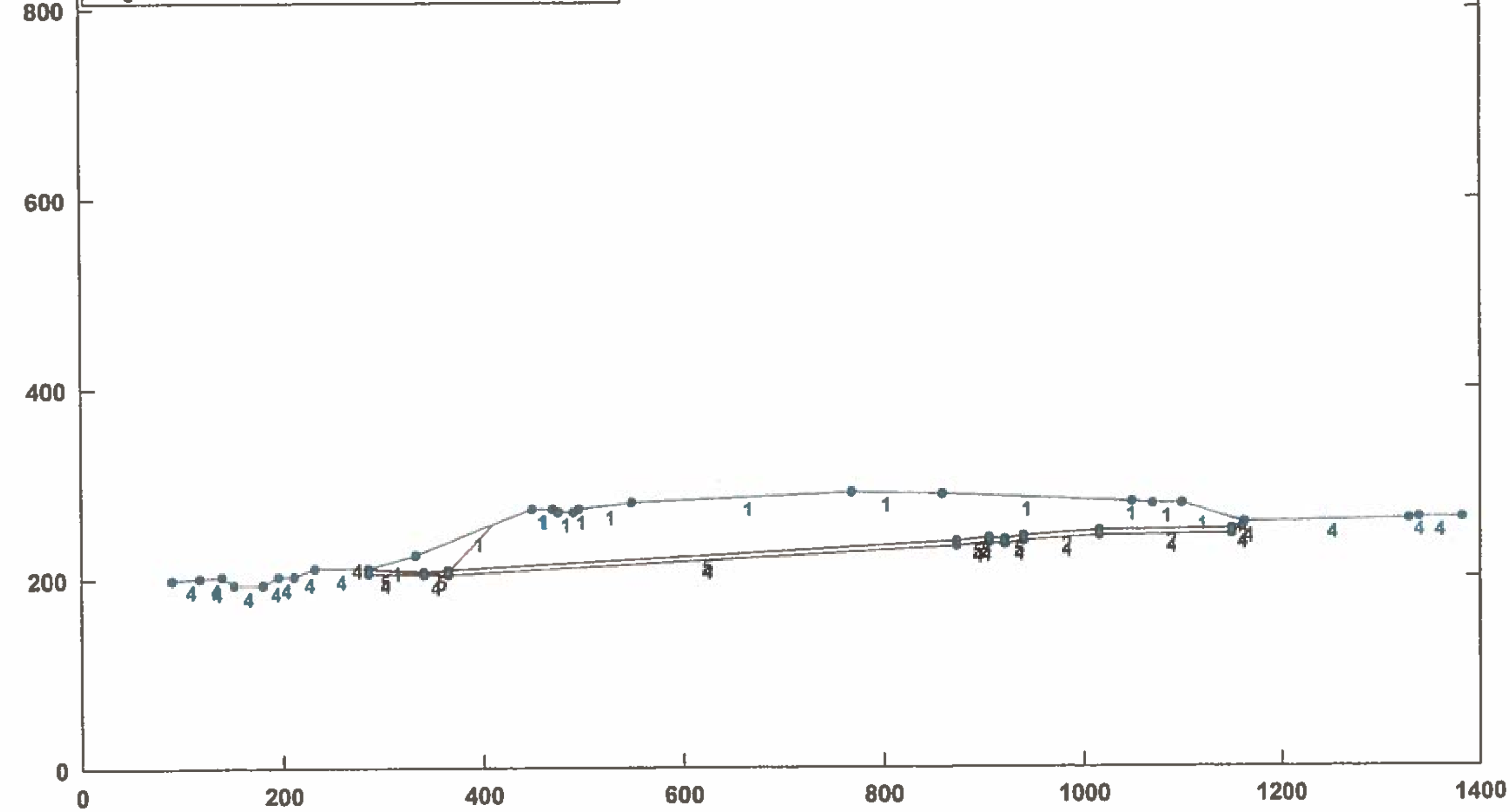
Factor Of Safety Is Calculated By Spencer`s Method of Slices

STED

MOLF - Slope Stability Section 1-1 Static

e:\stabillity files\slopewin7\molokai\2019-3 85\11r\molf11r-8s.plt Run By: Username 5/6/2019 07:38AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

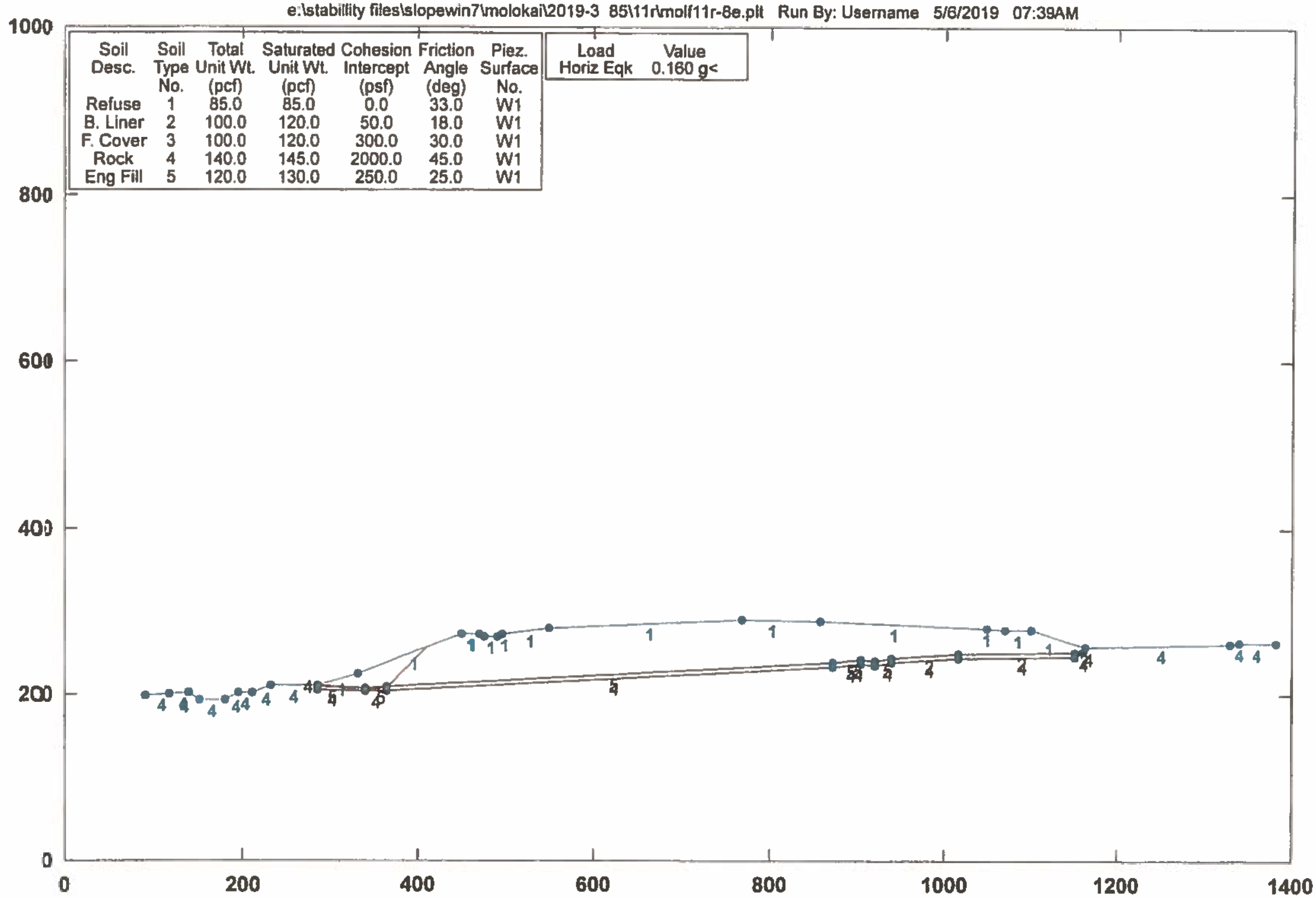


PCSTABL5M/si FSmin=2.62
Factor Of Safety Is Calculated By Spencer's Method of Slices

STED

MOLF - Slope Stability Section 1-1 Pseudo-Static

e:\stability files\slopewin7\molokai\2019-3 85\11r\molf11r-8e.plt Run By: Username 5/6/2019 07:39AM



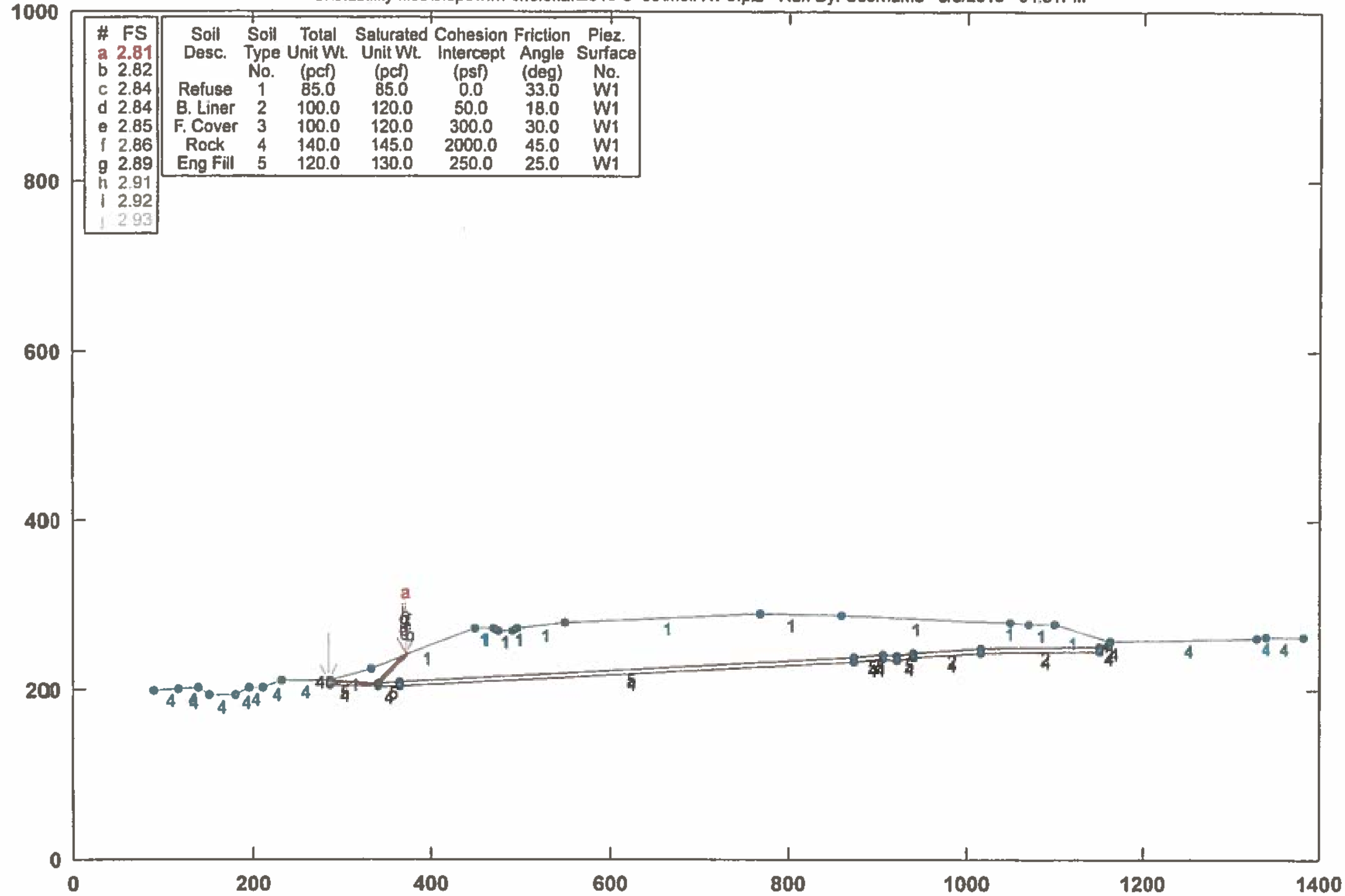
PCSTABL5M/si FSmin=1.91

Factor Of Safety Is Calculated By The Modified Bishop Method

STED

MOLF - Slope Stability Section 1-1 Static

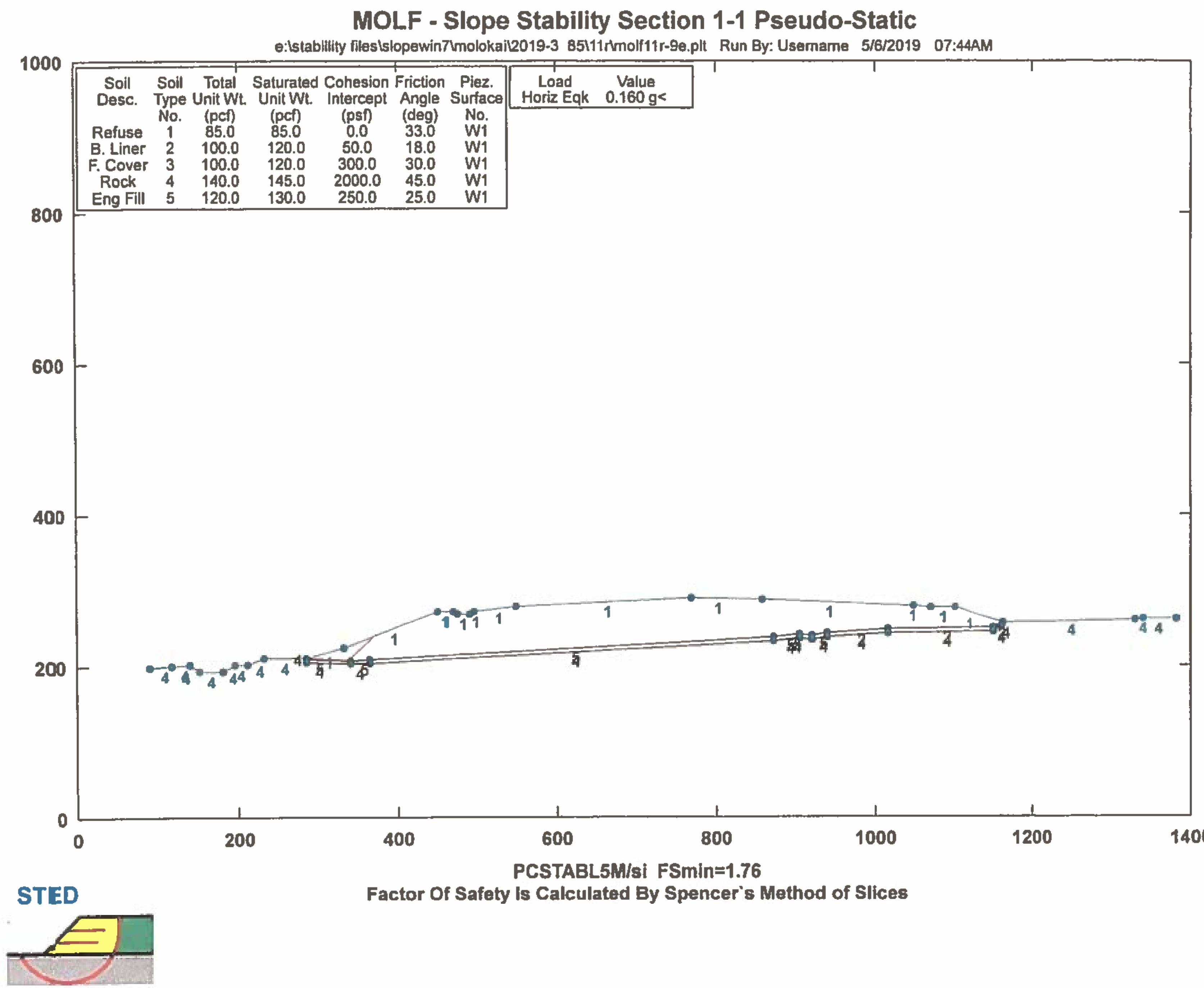
e:\stability files\slopewin7\molokai\2019-3 85\molf11r-9.pl2 Run By: Username 5/3/2019 04:31PM



PCSTABL5M/si FSmin=2.81

Safety Factors Are Calculated By The Modified Janbu Method

STED



MOLF - Slope Stability Section 1-1 Pseudo-Static
e:\stability files\slopewin7\molokai\2019-3 85\11r\molf11r-9e.plt Run By: Username 5/6/2019 07:44AM

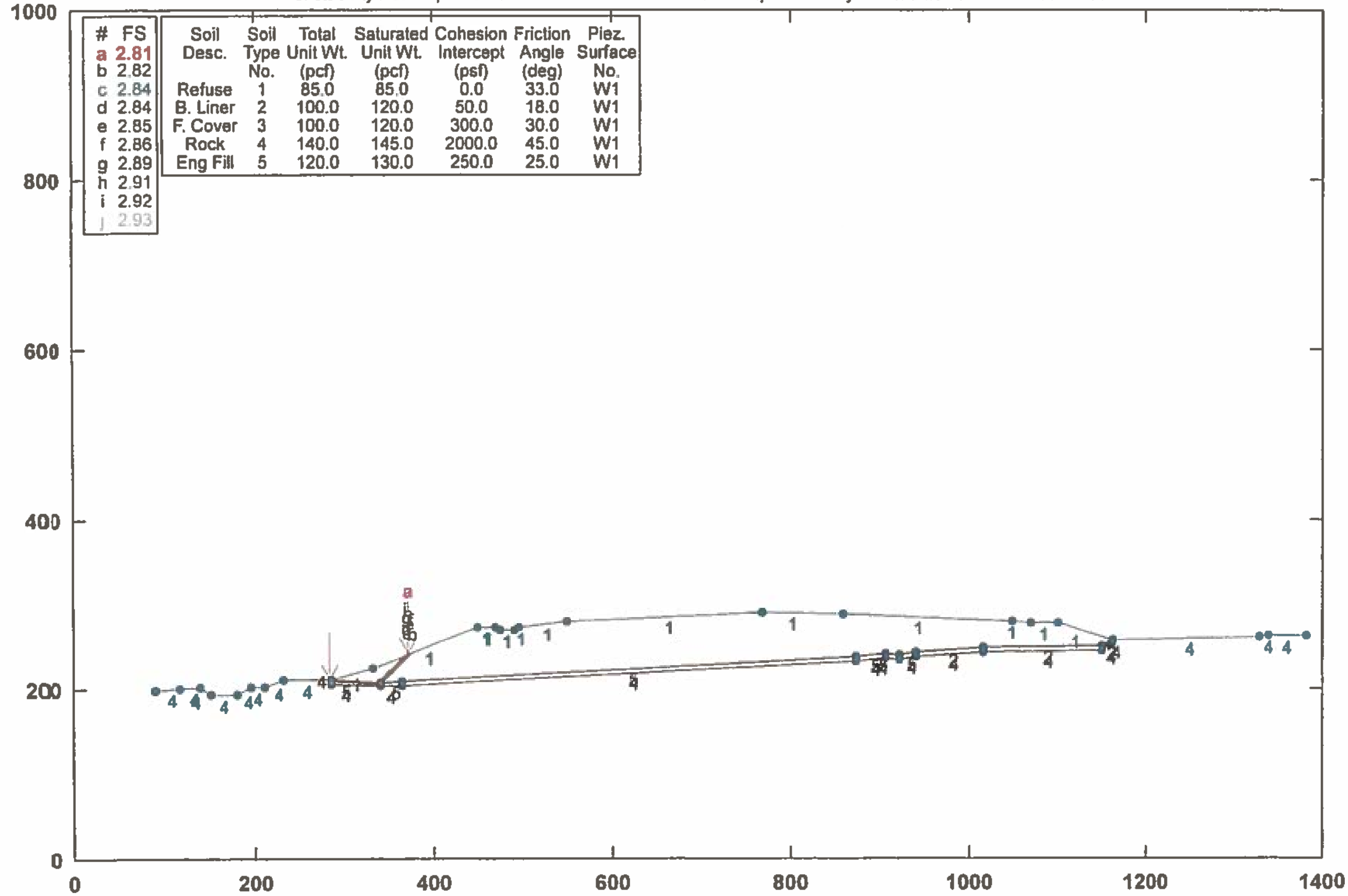
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<

0
200
400
600
800
1000
1200
1400
PCSTABL5M/si FSmin=1.76
Factor Of Safety Is Calculated By Spencer's Method of Slices
STED

MOLF - Slope Stability Section 1-1 Static

e:\stability files\slopewin7\molokai\2019-3 85\11r\molf11r-10.pl2 Run By: Username 5/3/2019 03:45PM



#	FS
a	2.81
b	2.82
c	2.84
d	2.84
e	2.85
f	2.86
g	2.89
h	2.91
i	2.92
j	2.93

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

PCSTABL5M/si FSmin=2.81

Safety Factors Are Calculated By The Modified Janbu Method

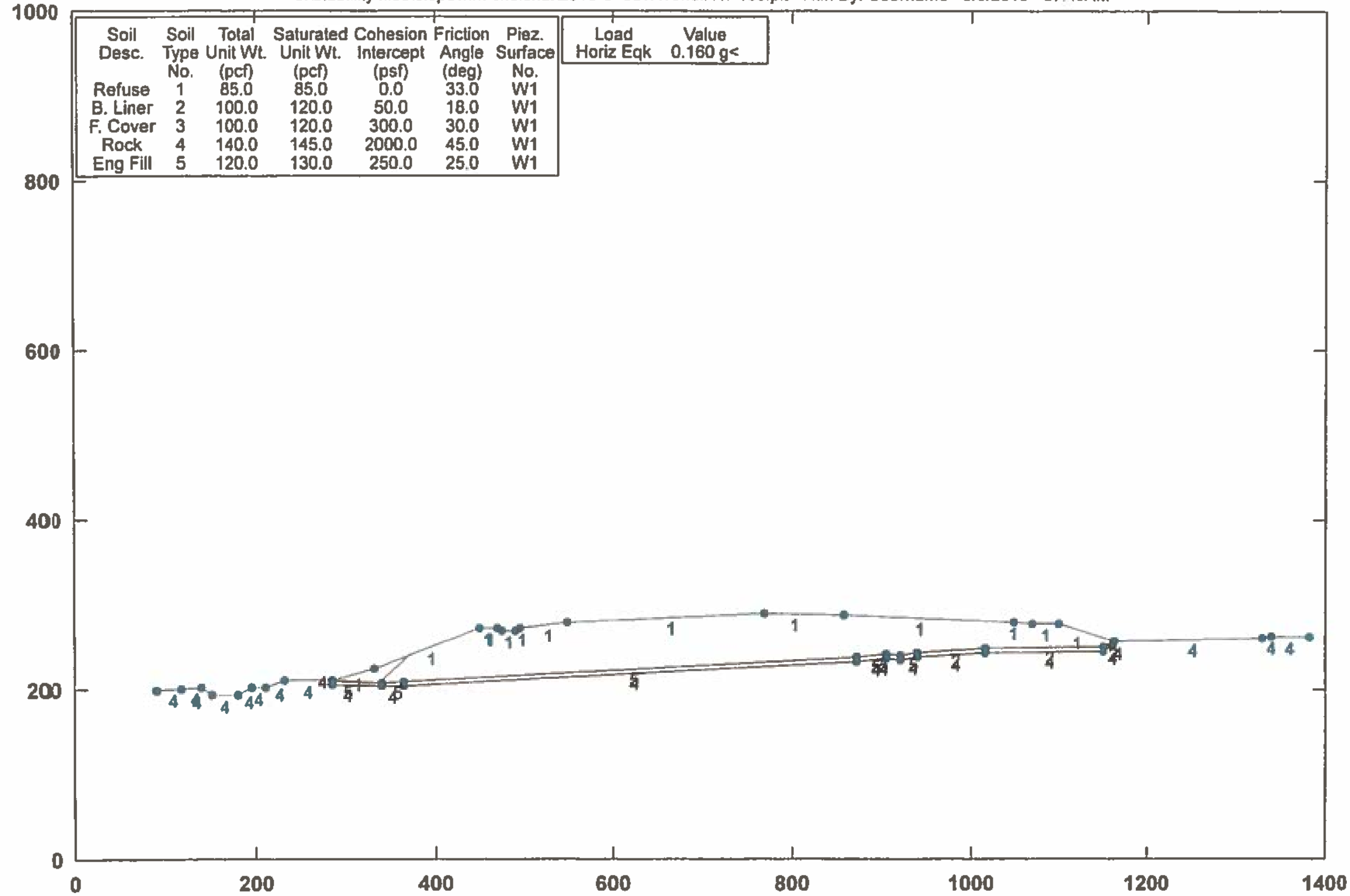
STED

MOLF - Slope Stability Section 1-1 Pseudo-Static

e:\stabillity files\slopewin7\molokai\2019-3 85\11r\molf11r-10e.plt Run By: Username 5/6/2019 07:49AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.160 g<



PCSTABL5M/si FSmin=1.76

Factor Of Safety Is Calculated By Spencer`s Method of Slices

STED

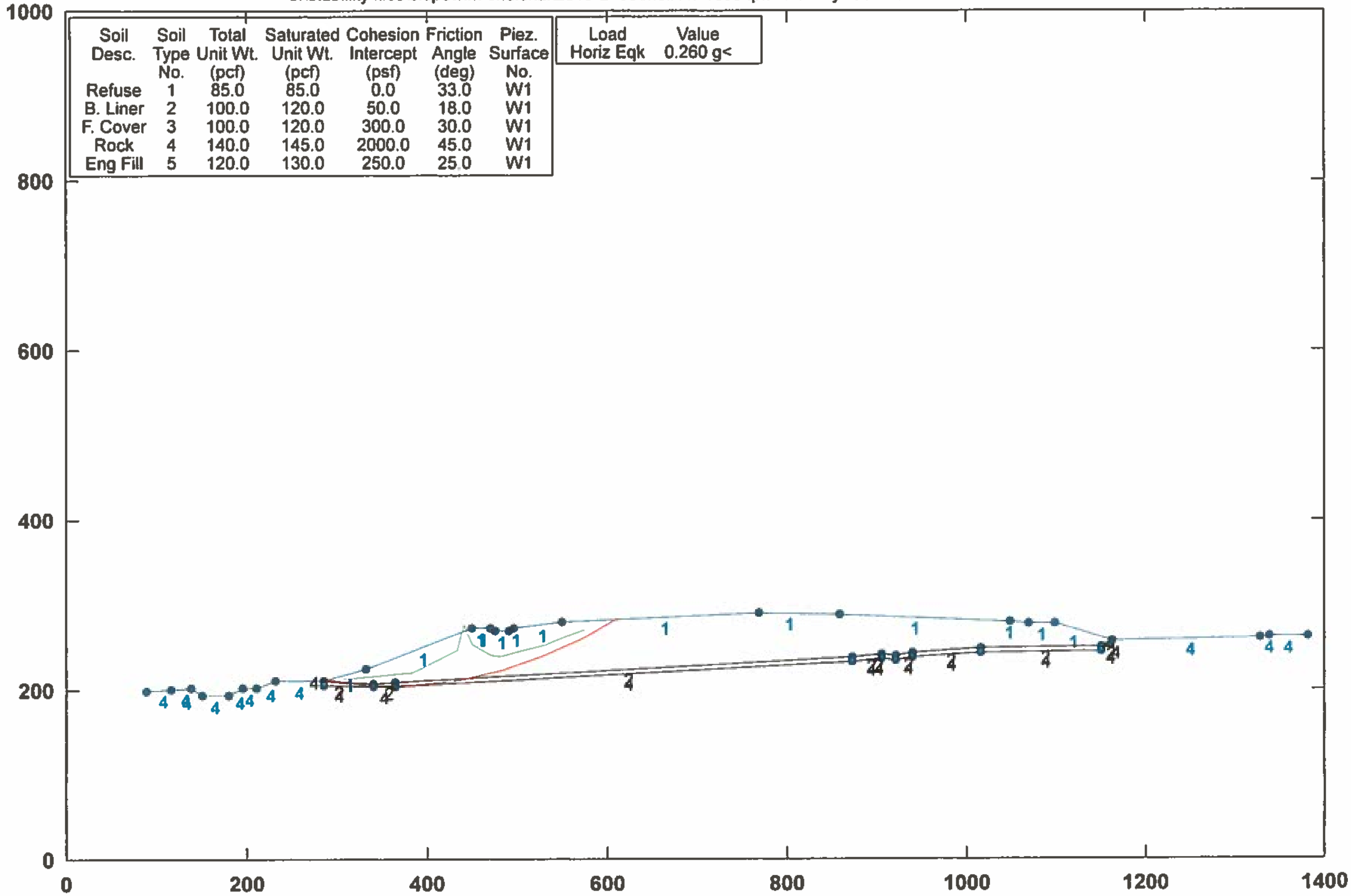
Attachment E

MOLF - Slope Stability Section 1-1 Pesudo-Static

e:\stabillity files\slopewin7\molokai\2019-2 85\molf11r-1ces-.plt Run By: Username 2/18/2020 07:26AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.260 g<



PCSTABL5M/si FSmin=1.01

Factor Of Safety Is Calculated By Spencer`s Method of Slices

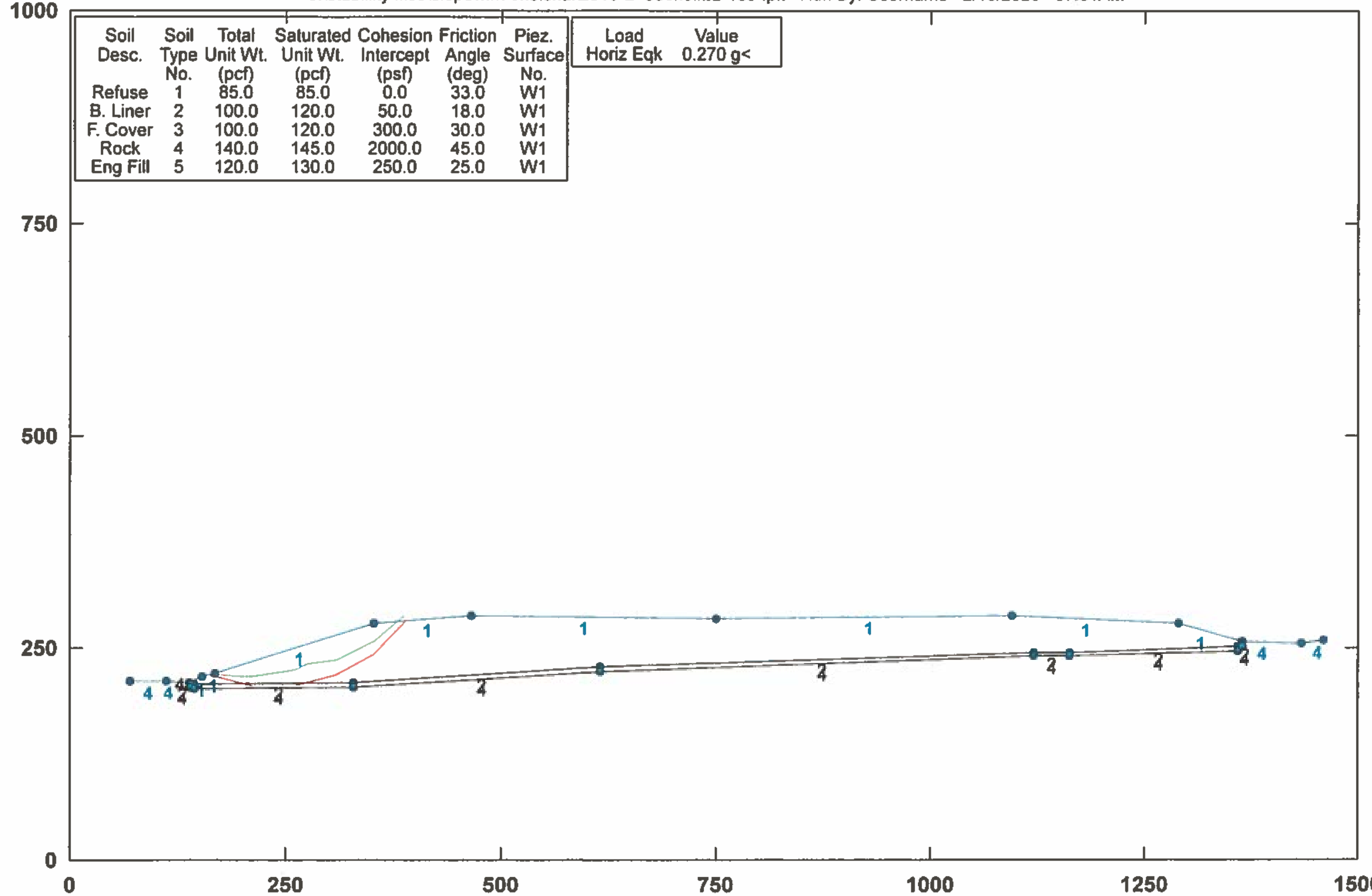
STED

MOLF - Slope Stability Section 2-2 Pesudo-Static

e:\stabillity files\slopewin7\molokai\2019-2 85\molf22-1ce-.plt Run By: Username 2/18/2020 07:31AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.270 g<



PCSTABL5M/si FSmin=1.00
Factor Of Safety Is Calculated By Spencer`s Method of Slices

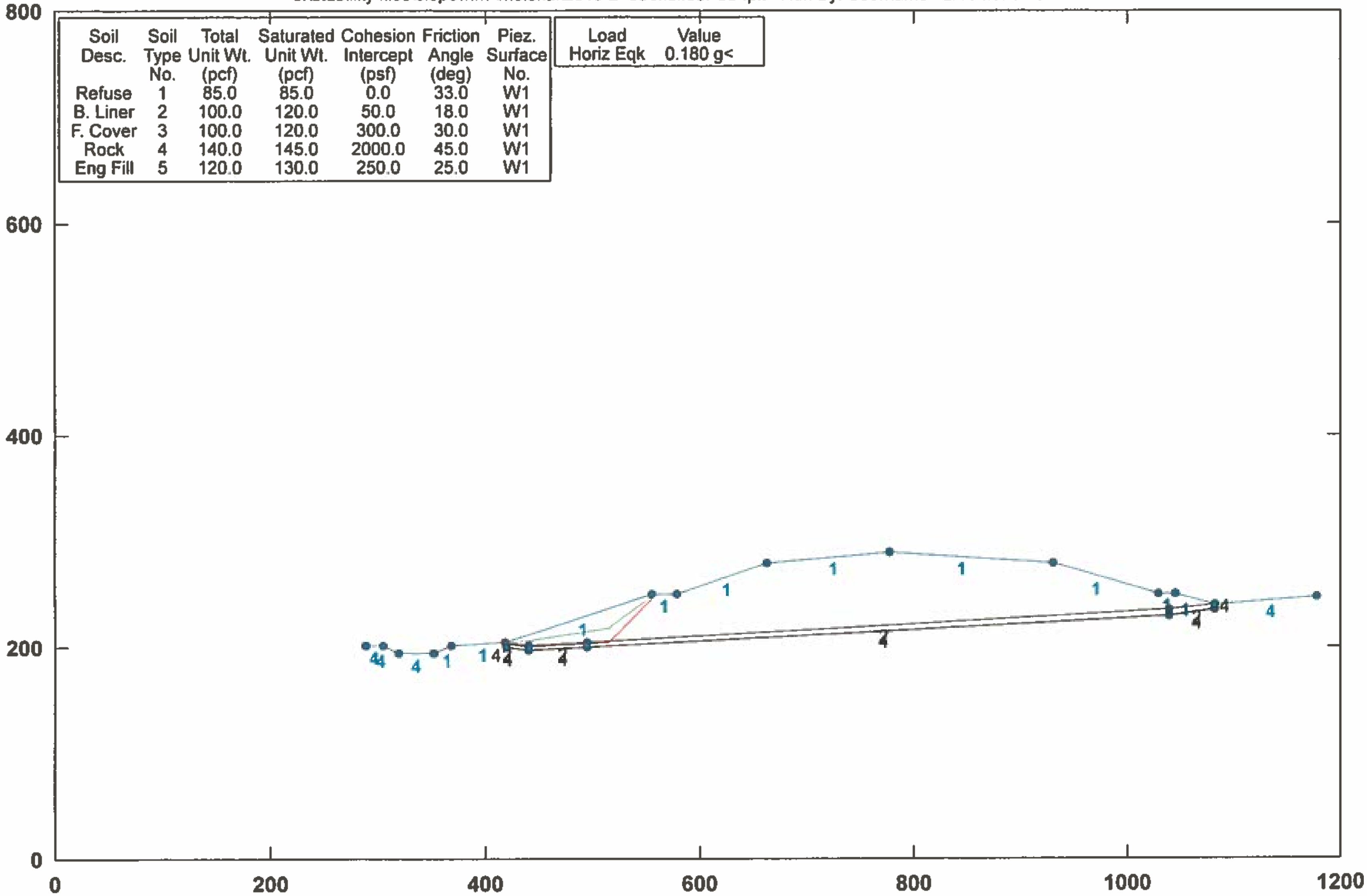
STED

MOLF - Slope Stability Section 3-3 Pesudo-Static

e:\stabillity files\slopewin7\molokai\2019-2 85\molf33r-3e-.plt Run By: Username 2/18/2020 07:37AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Refuse	1	85.0	85.0	0.0	33.0	W1
B. Liner	2	100.0	120.0	50.0	18.0	W1
F. Cover	3	100.0	120.0	300.0	30.0	W1
Rock	4	140.0	145.0	2000.0	45.0	W1
Eng Fill	5	120.0	130.0	250.0	25.0	W1

Load	Value
Horiz Eqk	0.180 g<



PCSTABL5M/si FSmin=1.01
Factor Of Safety Is Calculated By Spencer`s Method of Slices

STED