HOMESTAKE

GRANTS OFFICE

Alan D. Cox
Project Manager - Grants

18 July 2007
Via e-mail and UPS Overnight

Mr. Ron C. Linton
Senior Groundwater Hydrologist/Project Manager
U.S. Nuclear Regulatory Commission
Office of Federal and State Materials
and Environmental Management Programs
Mail Stop T-7E18
Washington, DC 20555-0001

RE: Homestake Mining Company of California
– **License SUA-1471**
Grants Reclamation Project
Responses to NRC Request for Additional Information (RAI) dated 6/13/07

Dear Mr. Linton:

Enclosed please find Homestake Mining Company of California's (HMCo) responses to your Request for Information (RAI) letter dated June 13 2007 regarding several specific details relating to the proposed 3rd Evaporation Pond (EP-3) for the Grants Reclamation Project. The attachment includes the specific request for information in each instance with our response following. We believe this will assist the reader in easily connecting the requested information with our associated responses.

If you or any members of the NRC staff have any questions, please feel free to contact me. I can be reached at (505) 287-4456 ext. 25 or via cell phone at (505) 400-2794. I can also be reached via e-mail at acox@barrick.com.

Sincerely yours,

Alan D. Cox

HOMESTAKE MINING COMPANY
OF CALIFORNIA
Alan D. Cox – Project Manager / RSO

Cc: Bob Evans – Region IV NRC, Arlington, TX
S. Appaji – Region VI EPA, Dallas, TX
J. Schoeppner – NMED, Santa Fe, NM

R. Chase – SLC (w/o attachment) D. Deisley – SLC (w/o attachment)
B. Ferdinand – SLC (w/o attachment)

HOMESTAKE MINING COMPANY RESPONSES TO
Request for Additional Information, Homestake Mining Company, Grants Reclamation Project From the Nuclear Regulatory Commission

July 2007

The following are the requests for information from NRC (in italics) and Homestake's responses in regular font.

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1. Action: Provide additional information related to the leak detection system for Evaporation Pond 3 (EP3).

Basis: NUREG-1620, Section 4.4.2 (9), indicates that surface impoundments constructed as part of the program need to meet the requirements of 10 CFR Part 40, Appendix A. 10 CFR Part 40, Appendix A, Criterion 5E (1) requires that a leak detection system be included with a synthetic liner system. Although the HMC design does include a leak detection system, the design report does not identify a number of factors related to the operation and performance of the liner/leak detection system. These are addressed in the discussion section below.

Discussion: Additional information should be provided that address the follow issues:

(1) A frequency for monitoring leakage in the leak detection sumps is not identified in the design report. If the sumps will be monitored, provide discussion on the monitoring frequency.

<u>HMC Response</u>: HMC will monitor leakage in the leak detection sumps twice weekly in each cell of EP3 from the start of initial pond filling until one week after the pond bottom is covered with water, then once weekly thereafter.

(2) The design report does not discuss methods that will be used to determine if the primary liner is leaking. One possible method is to establish an action leakage rate (ALR) for the leak detection system. If leakage through the primary liner is detected at rates above the ALR, some type of remedial action should be initiated. Examples of remedial action include: increased monitoring of liquid levels within the sump, performance of a forensic investigation to identify possible leak locations, or draining of EP3 for repair of the geomembrane. A discussion of an ALR approach, or an alternative method for determining leakage through the primary liner should be provided.

<u>HMC Response</u>: HMC will implement the same procedures that have been used successfully for leak detection and corrective action on EP2. To detect leakage to the sumps, a portable pump will be inserted into the bottom of each leak detection pipe, then operated long enough for any collected water in the sump to be removed and discharged through the pump discharge tube. If any water is pumped from the sump, this process will be repeated within one week. If water in excess of the ALR (775 gallons per acre per day, as for EP2) is collected in the sump, plans will be initiated within one week to survey for leakage and repair the liner as needed to stop leakage in excess of the ALR. If the pond level exceeds the limiting depth for leak detection crews to perform the survey safely in wading gear, the pond level will be lowered by transfer of water to the other cell or by evaporation until a safe operating pond water level has

been reached. Once repairs are complete, the sumps in which leaks were originally detected will be monitored twice weekly until no leakage is detected for two consecutive weeks. These methods of leak detection, location and repair were used successfully on EP2 during its initial filling.

(3) A management strategy for liquids collected in the leak detection sump should be identified. The strategy should indicate whether liquids from the sump will be added back to EP3 or disposed of in some other manner.

HMC Response: HMC will discharge all liquids collected in the leak detection sumps directly back into EP3.

(4) The primary geomembrane will be directly exposed to sunlight for approximately 10 to 1 2 years. The impacts of this duration of ultra-violet (IJV) exposure on the engineering properties of the geomembrane (tensile properties, tear strength, elongation at yield, thickness, etc.) should be addressed.

HMC Response: The HDPE material to be used for the EP3 liners is the current generation of the same material used for the EP2 liners. EP2 was constructed and placed in operation in 1994 (13 years ago) and has performed as specified with only minor maintenance. Note that Specification EP3.2 Section 2.1 requires that the HDPE material be compounded for both UV and ozone resistance. Therefore, the excellent performance of the EP2 HDPE liner supports high confidence in the UV durability of the EP3 liner.

(5) The primary geomembrane will be exposed to contaminated groundwater when EP3 is filled. A discussion of the chemical characteristics of the groundwater and the potential impacts on the engineering properties of the geomembrane should be provided.

HMC Response: The record of performance of the EP2 liner supports confidence in the durablility of the EP3 HDPE liner. The primary contaminants in the groundwater to be placed in EP3 are the same as those that are in the groundwater contained in EP1 and EP2 (chloride, sulfate, carbonate, various metals). There has been no deleterious effect of this water on either EP1 (operating since 1990) or EP2. HDPE is formulated to be non-reactive to extremes of pH, metals concentrations, etc, far greater than contained in the HMC groundwater.

(6) A sump at location N-7 is not listed on pages 6 of 15 and 11 of 15 of specification EP3.1. If one is intended, correct the specification; if one is not intended, provide discussion of why a sump at this location is not necessary for the leak detection system design.

HMC Response: A sump at location N-7 was inadvertently omitted from the specifications. However, the N-7 sump location is identified on Drawings EP3-2 and EP3-4. A revision to the specifications will be issued to include sump N-7.

2. *Action: Provide an appropriate stability analysis for the perimeter embankment.*

Basis: NUREG -1620, Section 4.4.2 (9), indicates that surface impoundments constructed as part of the program need to meet the requirements of 10 CFR Part 40, Appendix A. 10 CFR Part 40, Appendix A, Criterion 5A(5) requires that an evaporation pond be designed and constructed to prevent massive failure. The design report was prepared to address the requirements of New Mexico Administrative Code (NMAC), which does not require a stability analysis for a small dam with a low hazard potential (the classification for the perimeter embankment for EP3). However, *NRC does not provide any exceptions to the requirement to design, construct, and maintain a surface impoundment without causing a massive failure. NUREG-1620, Section 4.4.3 (9), indicates that any surface impoundments constructed as part of a corrective action program meet relevant guidance in Regulatory Guide 3.11 (NRC, 1977). Without a stability analysis, it cannot be demonstrated that the perimeter embankment has been designed to prevent massive failure. Therefore, a simple static and dynamic stability analysis is necessary.*

Discussion: A stability analysis should be prepared for the perimeter embankment for the critical cross section. The critical cross-section is likely to be where the embankment fill placed is the greatest. However, HMC will need to provide a basis for selection of whatever critical cross-section it analyzes. The stability analysis also should include a pseudo-static analysis to account for seismic loading. In addition, discuss why liquefaction is not a concern for this design.

HMC Response: A stability analysis has been prepared and is included as Exhibit A to this response. The analysis shows that even if the critical section of the embankment became fully saturated, a virtually impossible condition, the static factor of safety exceeds 1.4 and the pseudo-static factor of safety exceeds 1.0. Under more likely operating conditions, these factors of safety are substantially higher. Liquefaction is not a concern for the underlying soils because the water table is at least 40 feet deep (based on nearby monitor wells), the underlying soil is clay (CL) overlying medium sand and silty sand, and the double liner protects against saturation of shallow soils. Liquefaction of the earthfill embankment is not a concern because it will be an engineered fill (compacted to 95% maximum dry density per ASTM D1557 near optimum moisture) protected from saturation by the double liner system. Hence there will be no liquefiable soils.

3. *Action: Identify where additional Proctor/moisture-density testing, or other additional field and laboratory testing, is needed during construction.*

Basis: NUREG-1620, Section 4.4.2 (9), indicates that testing criteria, and quality assurance programs should be presented. Section 3.3 of specification EP3.1 discusses field and laboratory testing of fill during construction. The specification identifies that field density testing on compacted fill are to be performed at least once per 2,000 cubic yards (cy) and that fill material will be tested for Proctor/moisture-density and gradation/ classification at least once per 10,000 cy. Although situations requiring more frequent density tests on compacted fill are identified, situations that would require more frequent Proctor/moisture-density testing, such as a change in borrow soil for the fill, are not identified.

Discussion: A provision requiring additional borrow material testing for changes in soil type should be added.

HMC Response: The first paragraph of Section 3.3 of Specification EP3.1 will be revised as follows:

> Testing of fill materials and in-place density and moisture will be performed by a qualified materials testing service contracted by the Owner. Field density on compacted fill will be performed not less than once per 2000 c.y. by nuclear methods for density (ASTM D 2922-05) and moisture (ASTM D 3017-05). Additional tests will be required if the lift thickness is greater than was specified, if the fill material does not meet moisture content specifications, if the degree of compaction is questionable, or during adverse weather

conditions. The fill material will be tested for moisture-density relationships and gradation/classification at least once per 10,000 c.y. of borrow soil. Additional moisture-density and/or gradation/classification tests will be performed if the borrow soil type (USCS classification) is visibly different from the borrow soil previously identified and tested.

4. *Action: Identify where groundwater-monitoring will be located down gradient of EP3 for alternatives B & C.*

Basis: NUREG-1620, Section 4.4.2 (8), indicates that as part of a monitoring program, the number of monitoring wells and their locations should he included. In the Final Environmental Report, Section 4.8 Monitoring, the following statement is made: 'A groundwater-monitoring program associated with the EP3 site, should be implemented. Groundwater monitoring wells shall be installed down gradient of EP3. Baseline water quality will be established from samples collected prior to completion of construction

Discussion: The locations of monitoring wells down gradient of EP3 should be identified and the basis for their location, depth, and distance from one another should be provided. Additionally, a baseline monitoring schedule should he provided to ensure baseline samples are collected prior to EP3 becoming operational.

<u>HMC Response</u>: See Hydro-Engineering letter attached as Exhibit B.

5. *Action: Provide an archaeological monitoring plan for Alternative B.*

Basis: In the Final Environmental Report, Section 4.8 Monitoring, the following statement is made: "The design and implementation of an archaeological monitoring plan is recommended if the proposed pond is to be located in Alternative B."

Discussion: An archeological monitoring plan should be developed for the Alternative B location so that the Alternative B location can be properly evaluated.

<u>HMC Response</u>: An archeological monitoring plan has been developed for the Alternative B location and is attached as Exhibit C.

EXHIBIT A

KLEINFELDER
An employee owned company

July 12, 2007
File No. 16977.07-2-ALB07RP001

Mr. Dan Kump, Project Manager
Homestake Grants Project
P.O. Box 98
Grants, New Mexico 87020

SUBJECT: RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION, COMMENT #2 REGARDING EMBANKMENT SLOPE STABILITY OF EP3 EMBANKMENT

Dear Dan:

In response to the subject request by the NRC in their Request for Additional Information dated June 13, 2007, Kleinfelder has performed a stability analysis of the most critical section of the EP3 embankment. The attached analysis shows that the embankment has adequate factors of safety against slope failure even under extremely conservative conditions and using conservative soil properties. The minimum factors of safety are well above the 1.5 and 1.0 lower limits for static and pseudostatic conditions, respectively, required by the New Mexico State Engineer and used in standard practice.

Please contact me with any questions.

Respectfully submitted,
KLEINFELDER WEST, INC.

Alan K. Kuhn

Alan K. Kuhn, PhD, PE, PG
Senior Principal Consultant

ALAN K. KUHN
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Homestake Evaporation Pond Number 3: Response to NRC Request for Additional Information Comment No. 2

NRC Action:
Provide an appropriate slope stability analysis for the perimeter embankment.

Kleinfelder Response:

A slope stability analysis was performed on the southern-most corner of EP3. Results are shown on Figures 1 through 17, Attachment A. This location was chosen because it represents the area with the greatest amount of fill material and the corresponding largest embankment height of 12.2 feet. The in-situ soil thickness was determined from test pits SW-3 and SW-4 soil logs included in Attachment B of this response. These test pits are located near the southern corner of EP3; the test pit location map (Figure 17) is also reproduced in Attachment B. These logs show a surface lean clay (CL) layer thickness of 2 feet underlain by a poorly graded sand with silt (SP-SM) material.

The pond embankment will be composed of recompacted lean clay (CL) and poorly graded sand with silt (SP-SM) material. It is likely that the lean clay will be placed in a lift below the SP-SM soil as shown in Figure 1 located in Attachment A of this response. The thickness of the recompacted materials was determined from the embankment design section.

The unit weights of the in-situ CL and SP-SM material was assumed to be 114 pcf and 120 pcf, respectively, based on average values recommended in the Naval Facilities Engineering Command (NAVFAC) soil mechanics design manual (Reference 1). The unit weights for recompacted material will be not less than 95% of the unit weight obtained from Modified Proctor test results shown in Attachment C of this response.

The following friction angles were used in the analysis:

- The friction angle of the in-situ and recompacted CL soil was assumed to be 10 degrees. This value represents a conservative estimate based on average values for CL soils (Reference 2, pg 49).
- For the fully saturated condition with the phreatic surface at the ground surface the friction angle of the in-situ and recompacted CL soil was assumed to be 28 degrees.
- The friction angle of the in-situ SP-SM material was assumed to be 30 degrees based on average values for SP-SM soils (Reference 2, pg 42).
- The friction angle of the recompacted SP-SM material was assumed to be 35 degrees based on Reference 2.

The following cohesion values were used in the analysis:

- The cohesion of both in-situ and recompacted SP-SM soil was assumed to be zero as a conservative estimate.

- The cohesion of the in-situ and recompacted CL material was assumed to be 500 pounds per square foot and 750 pounds per square foot, respectively, based on a soft to medium consistency and values recommended in Reference 3.
- For the fully saturated condition with the phreatic surface at the ground surface the cohesion was assumed to be zero for the in-situ and recompacted CL material (representing complete loss of soil suction).

Soil properties used in slope stability analysis are summarized in Table 1 of this response.

Table 1. General EP3 Soil Profile Properties

Soil Type	Unit Weight, pcf (1)	Friction Angle, degrees (2)	Cohesion, psf (3)
SP-SM	120	30	0
CL	114.4	10	500
CL (recompacted)	116.7	10	750
SP-SM (recompacted)	118.6	35	0
CL fully saturated	114.4	28	0
CL (recompacted) fully saturated	116.7	28	0

Notes:

(1) Unit weights of in-situ material were determined based on average values from Reference 1. The unit weights of the recompacted soils were determined using 95% of the optimum density from Modified Proctor tests.

(2) A friction angle of 10 degrees was assumed for CL soils based on Reference 2. Friction angles of 30 and 35 degrees were used for SP-SM material based on average values recommended in Reference 2.

(3) Cohesion values for both in-situ and recompacted SP-SM material were assumed to be zero. Cohesion values of 500 psf and 750 psf were assumed for in-situ and recompacted CL material, respectively, based on soft to medium material consistency and Reference 3.

(4) Zero cohesion was assumed for the CL materials in the case of full saturation to model complete loss of soil suction. An effective stress friction angle of 28° was chosen for this case.

Static Slope Stability Analysis

Slope stability analysis was performed using the SLIDE program (Reference 4) to determine a minimum static factor of safety for the EP3 embankment. The Simplified Bishop and corrected Janbu methods were used in the analysis, and a circular failure plane was assumed. The failure initiation limits were confined to the water surface intersection with the inslope and the outer crest of the embankment. The failure termination limits were confined to the outslope toe and 50 feet beyond the toe. These limits were assigned in order to confine the analysis to failure surfaces that would cause loss of pond water containment. Termination limits are shown in Figures 2 through 4. A total of 960 trial failure surfaces were searched within these limits.

Slope stability analysis was performed assuming three phreatic surface variations as shown in Figures 2 through 4 of this response. The first phreatic surface represents a completely saturated embankment. The second phreatic surface represents a water level equal to the maximum allowable water height, namely, a freeboard of 2 feet with saturation extending to the slope. The third scenario also represents a freeboard height of 2 feet but has the phreatic surface extending to the outslope toe. A minimum factor of safety for each scenario was determined using SLIDE. Results of the static slope stability analysis are presented in Table 2 and Figures 5 through 10 and figure 17.

The scenario where the embankment becomes fully saturated and all cohesion is lost in the clay is presented in Figure 17 and represents a complete loss of soil suction.

Table 2. Static SLIDE Analysis Summary of Results

Phreatic Surface	Minimum Factor of Safety Simplifed Bishop Method	Minimum Factor of Safety Corrected Janbu Method
1	2.02	1.96
2	2.08	2.04
3	2.46	2.40
1 (fully saturated, no cohesion)	1.42	1.41

Pseudo-Static Slope Stability Analysis

Slope stability analysis was also performed considering a seismic load applied to the EP3 embankment. This seismic load was obtained from USGS national and regional seismic hazard maps (Reference 5). A 10% probability of exceedance in 50 Years (475 Year return) peak ground acceleration value of g = 0.062 was used in the analysis. The three phreatic surfaces described in the previous section were added to the pseudo-static analysis, and a minimum factor of safety for each scenario was determined. Results are shown in Table 3 and Figures 11 through 18.

Table 3. Pseudo-Static SLIDE Analysis Summary of Results

Phreatic Surface	Minimum Factor of Safety Simplifed Bishop Method	Minimum Factor of Safety Corrected Janbu Method
1	1.51	1.47
2	1.56	1.52
3	1.82	1.78
1 (fully saturated, no cohesion)	1.06	1.05

Results and Conclusions

The minimum factor of safety of the EP3 embankment for static load conditions was 1.4 assuming completely saturated conditions (phreatic surface 1) and a complete loss of soil suction (considered to be impossible in this location). The minimum factor of safety for the pseudo-static analysis was 1.05 for fully saturated conditions where the c => O but the Φ would probably be between 25° and 30°. Completely saturated conditions represent the worst-case scenario for the EP3 pond. Due to the relatively high factors of safety obtained for saturated conditions, it is our opinion that the risk of failure of the EP3 embankment through slope failure is very low and that the embankment design provides adequate protection against slope failure.

References

1. Naval Facilities Engineering Command (NAVFAC), June 8, 2005, Unified Facilities Criteria UFC 3-220-10N, "Soil Mechanics", pg. 7.1-22.
2. Duncan, J.M. and Wright, S.G., 2005, "Soil Strength and Slope Stability". John Wiley and Sons, Inc., Hoboken, New Jersey.
3. Coduto, D.P., 2001. "Foundation Design: Principles and Practices", 2nd Edition, Prentice-Hall, New Jersey.
4. Rocscience Inc. (2002), "Slide: 2D Limit Equilibrium Slope Stability for Soil and Rock Slopes User's Guide," Toronto, Ontario, pp 199.
5. United States Geological Survey, Earthquake Hazards Program, 2002 Seismic Hazard Maps, http://earthquake.usgs.gov/research/hazmaps/products_data/48_States/index.php

Attachment A

Figures

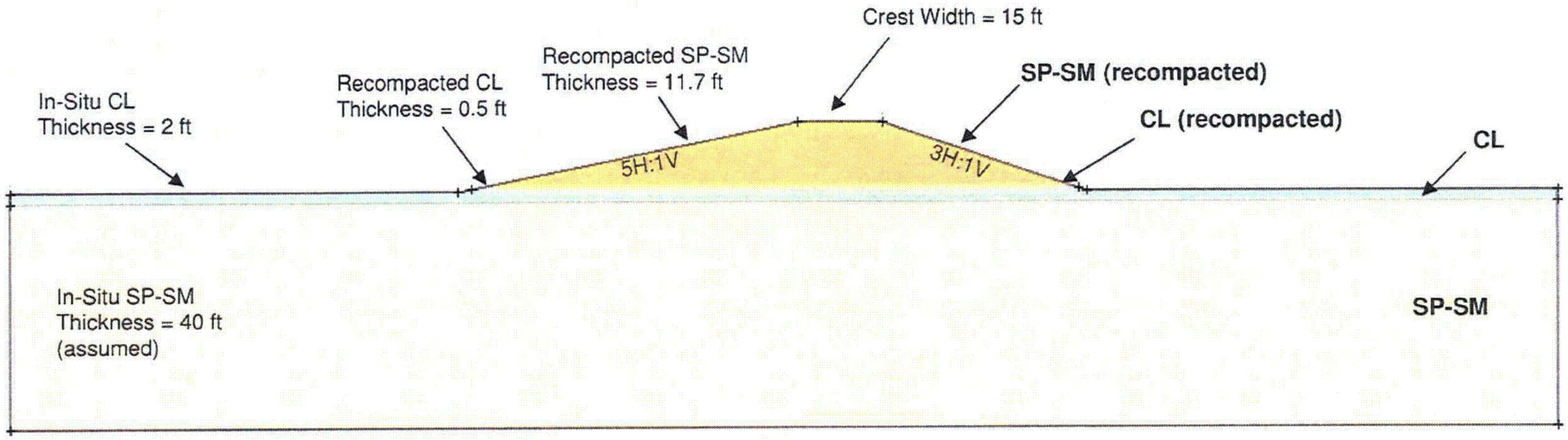


Figure 1. General EP3 Soil Profile for SLIDE Analysis

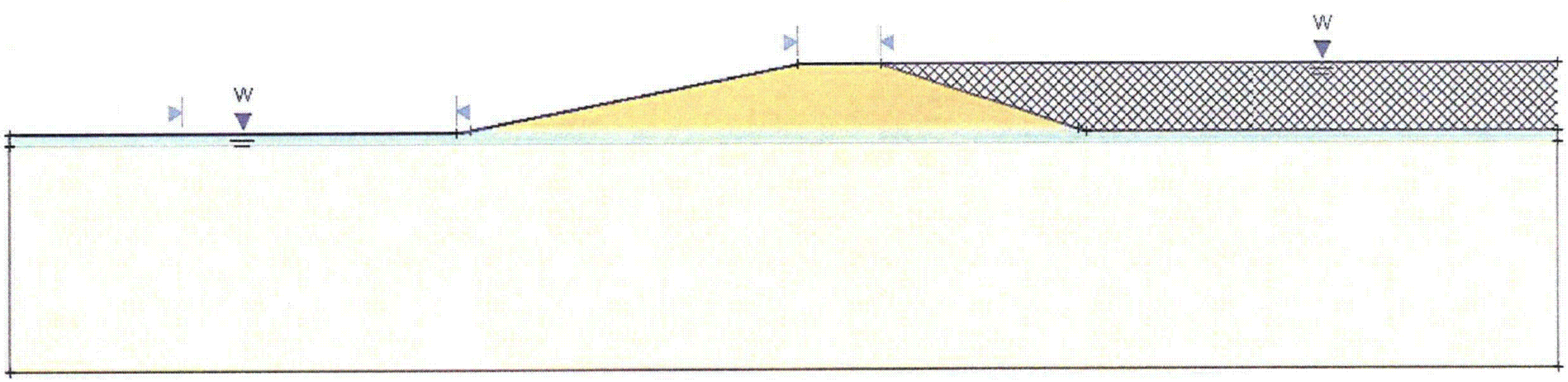


Figure 2. Phreatic Surface 1

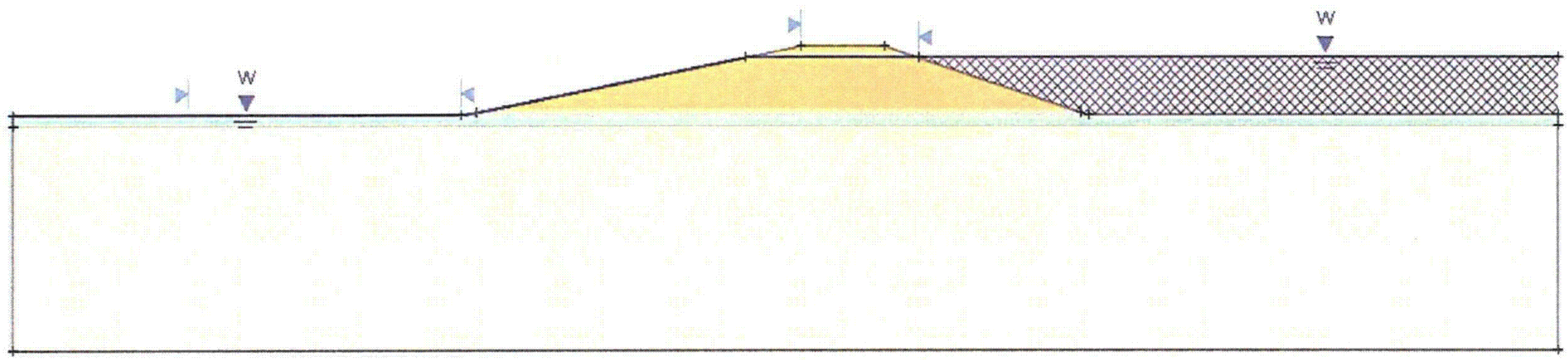


Figure 3. Phreatic Surface 2

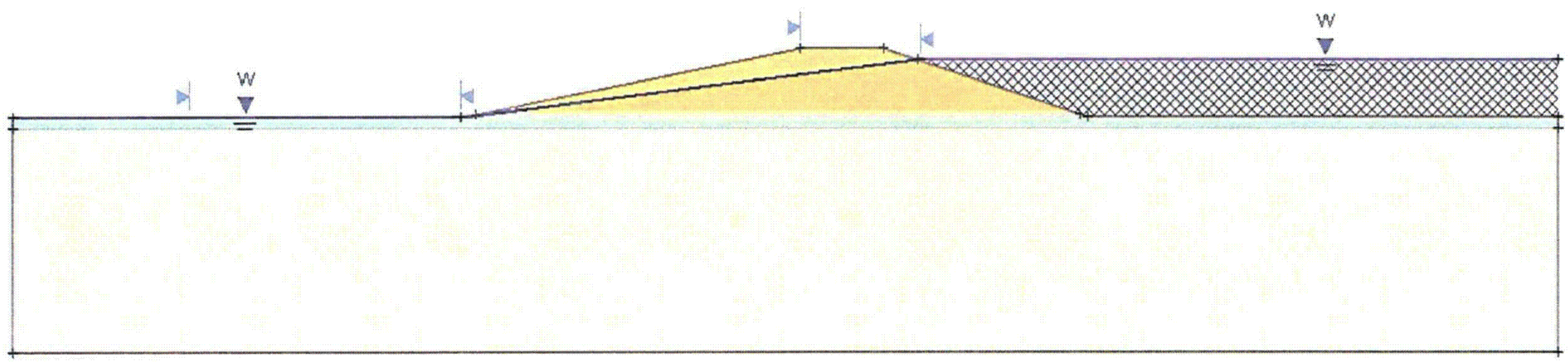


Figure 4. Phreatic Surface 3

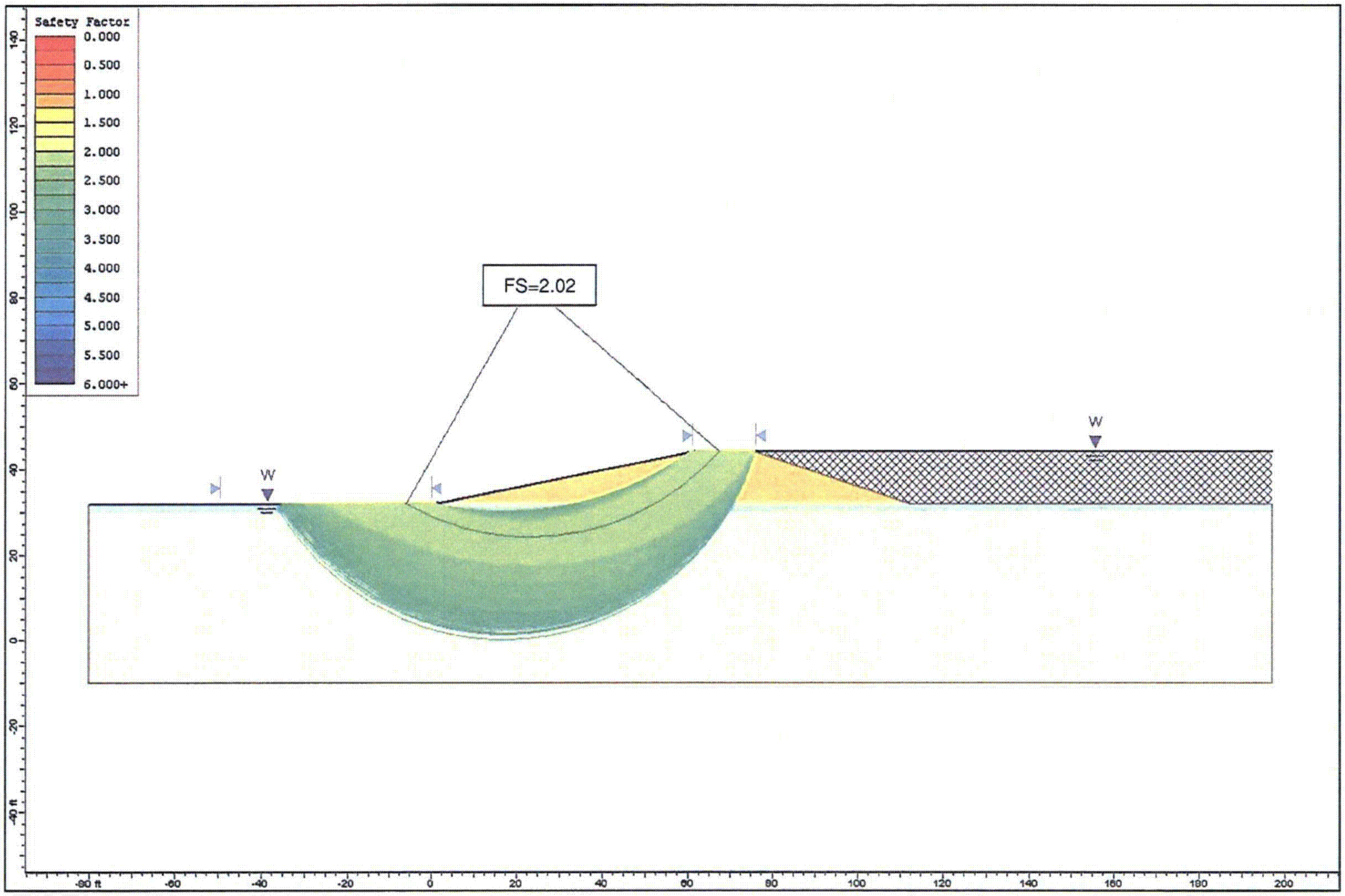


Figure 5. Static Analysis: Phreatic Surface 1, Simplified Bishop Method

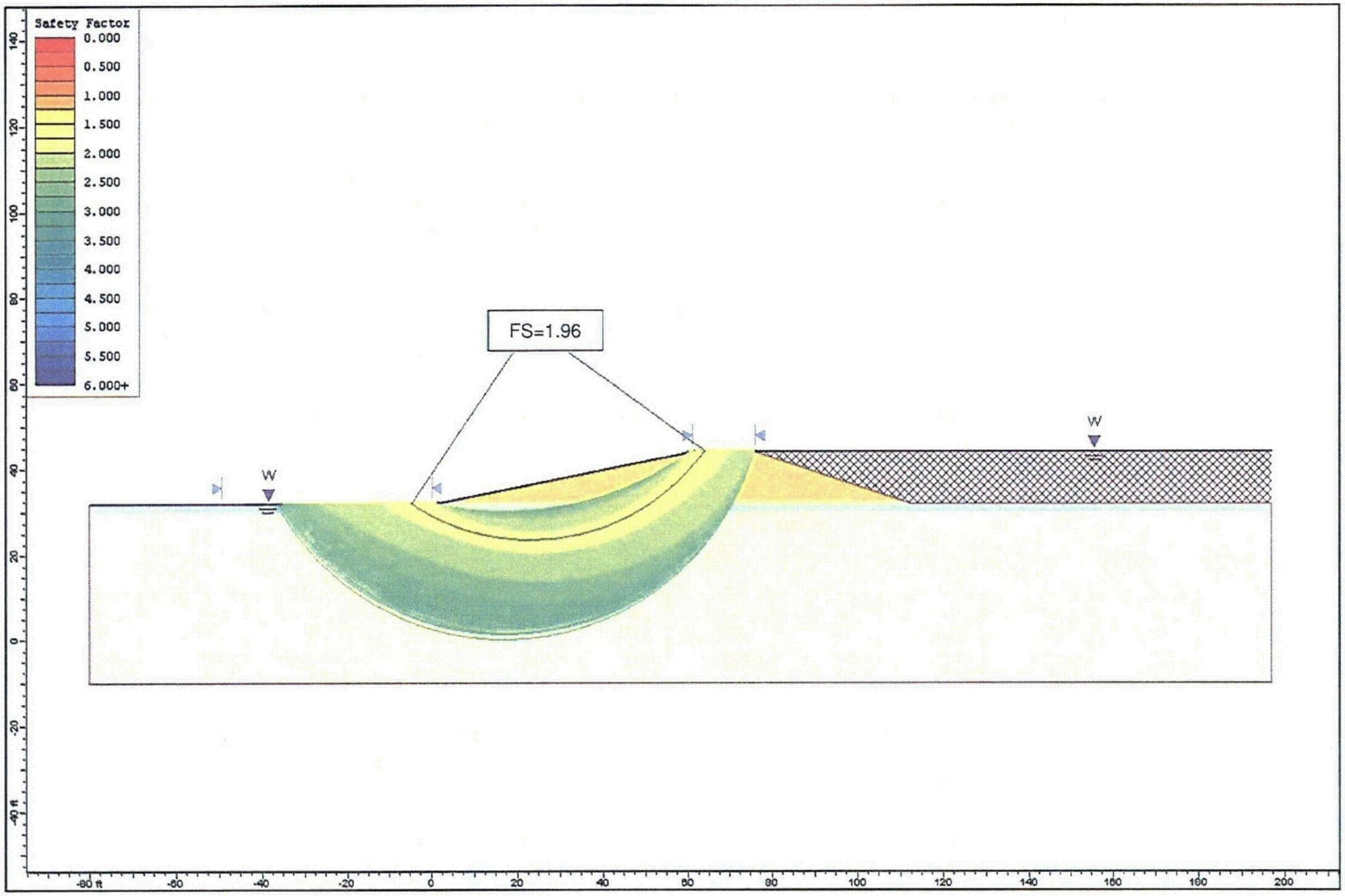


Figure 6. Static Analysis: Phreatic Surface 1, Corrected Janbu Method

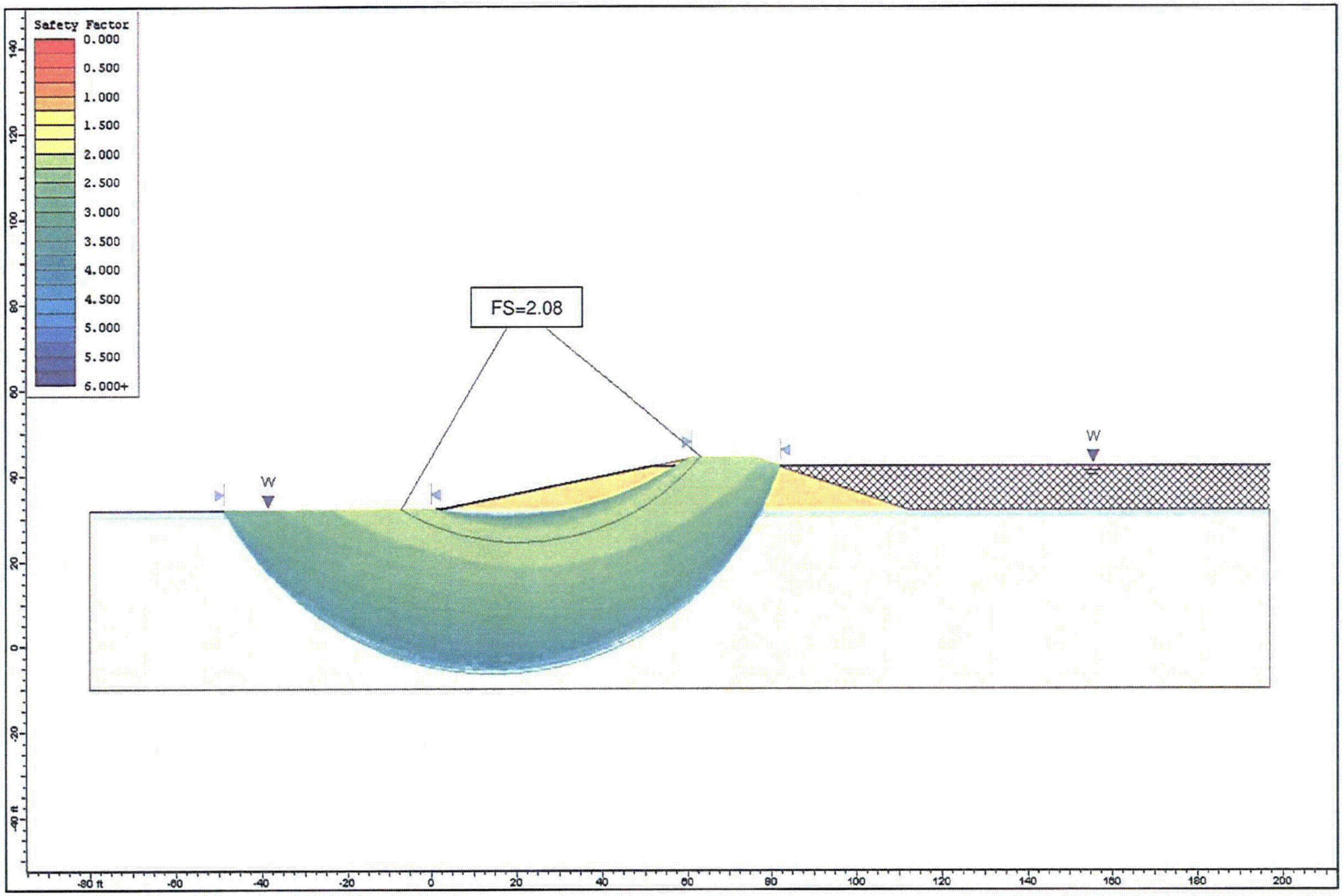


Figure 7. Static Analysis: Phreatic Surface 2, Simplified Bishop Method

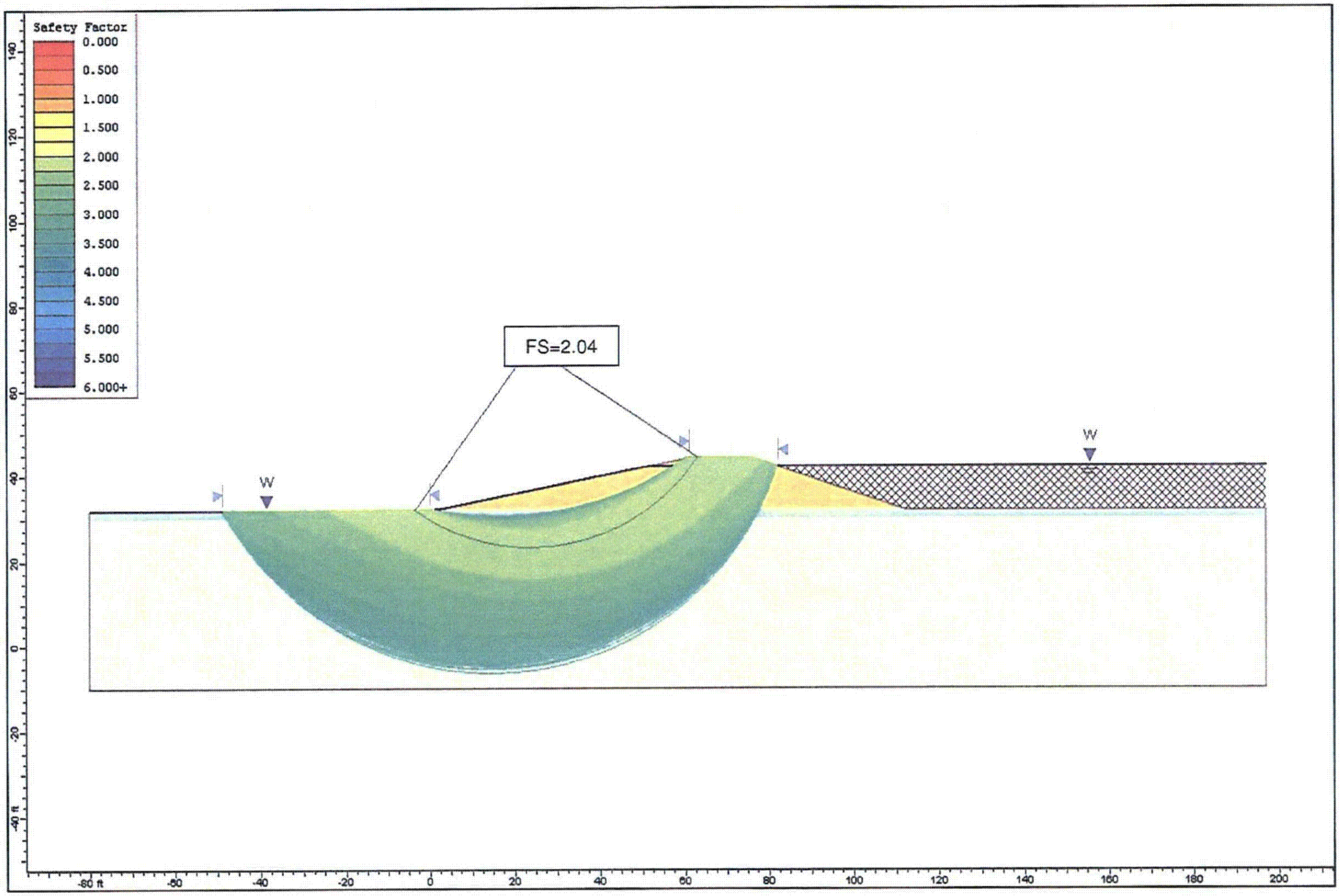


Figure 8. Static Analysis: Phreatic Surface 2, Corrected Janbu Method

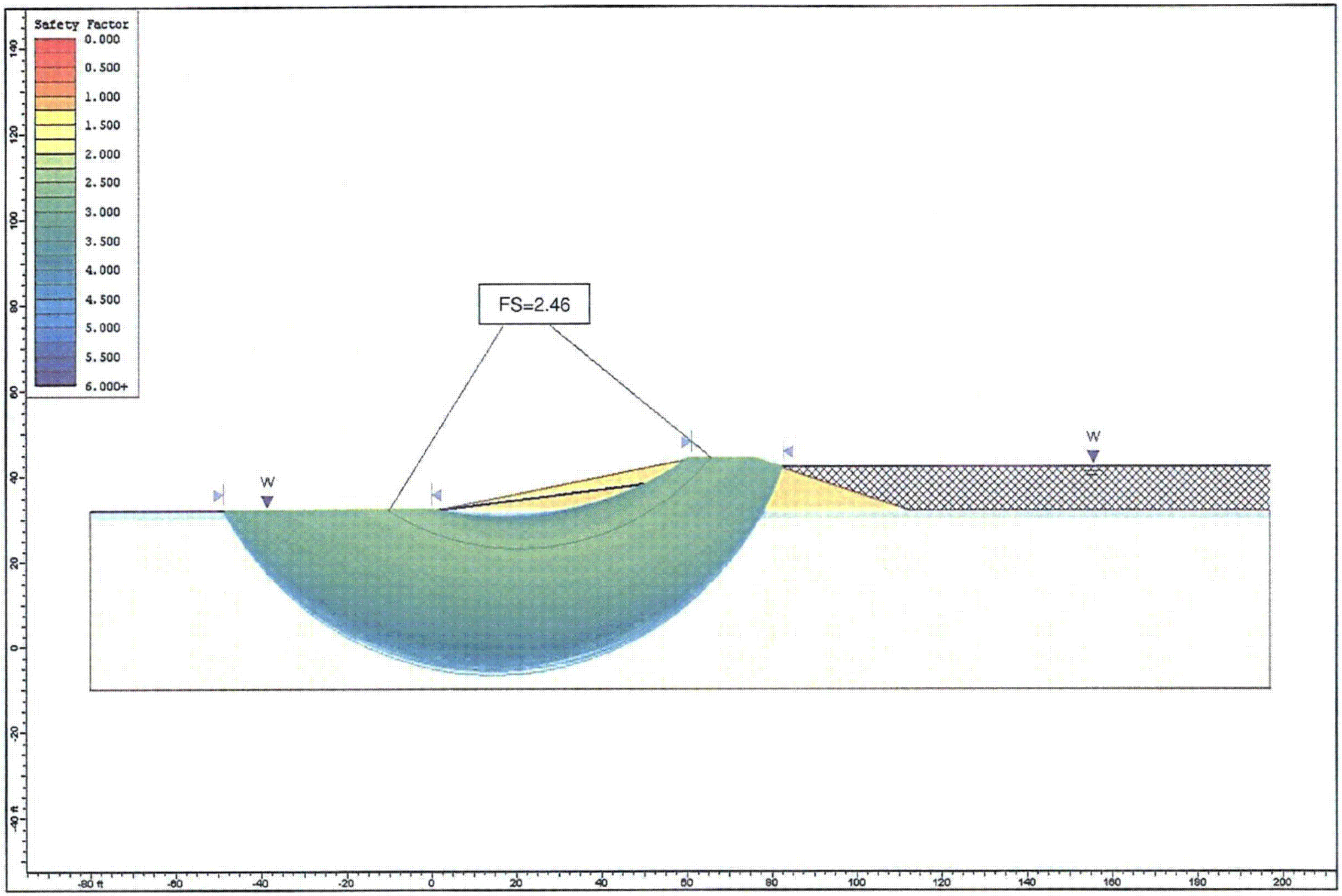


Figure 9. Static Analysis: Phreatic Surface 3, Simplified Bishop Method

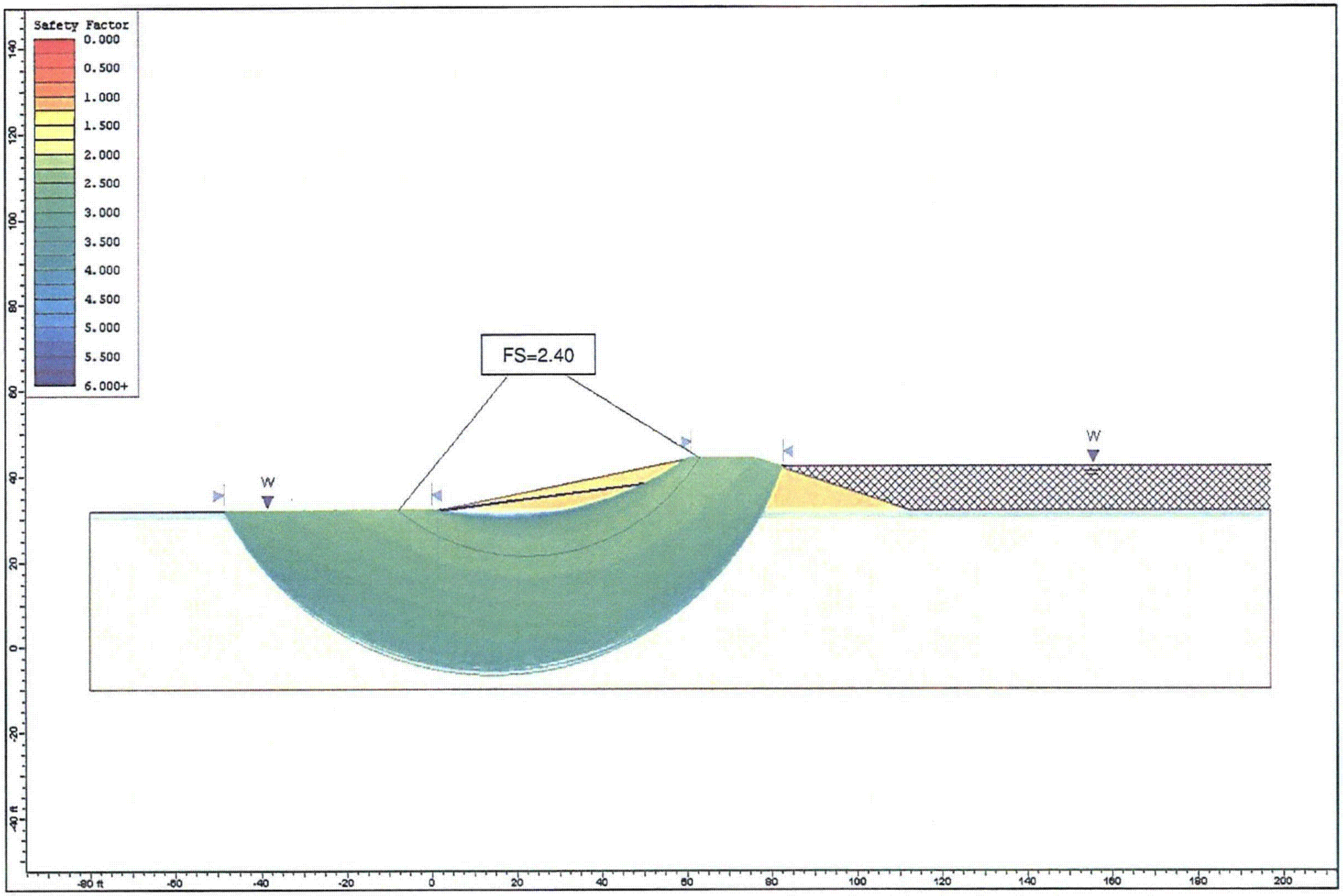


Figure 10. Static Analysis: Phreatic Surface 3, Corrected Janbu Method

Psuedo Static

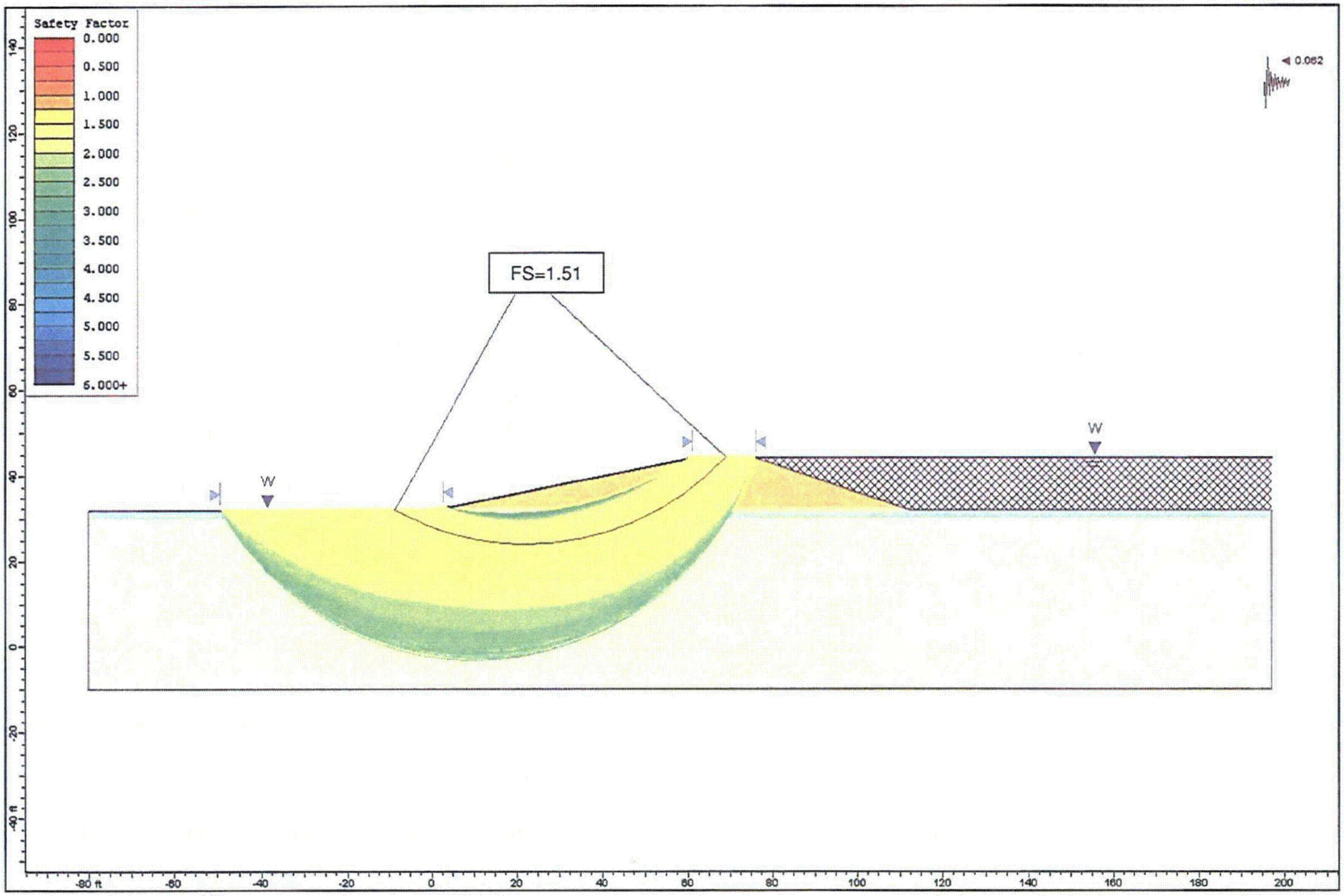


Figure 11. Pseudo-Static Analysis: Phreatic Surface 1, Simplified Bishop Method

g = 6.2 % (10% Probability of Exceedance in 50 Years, or 475 Year Return)

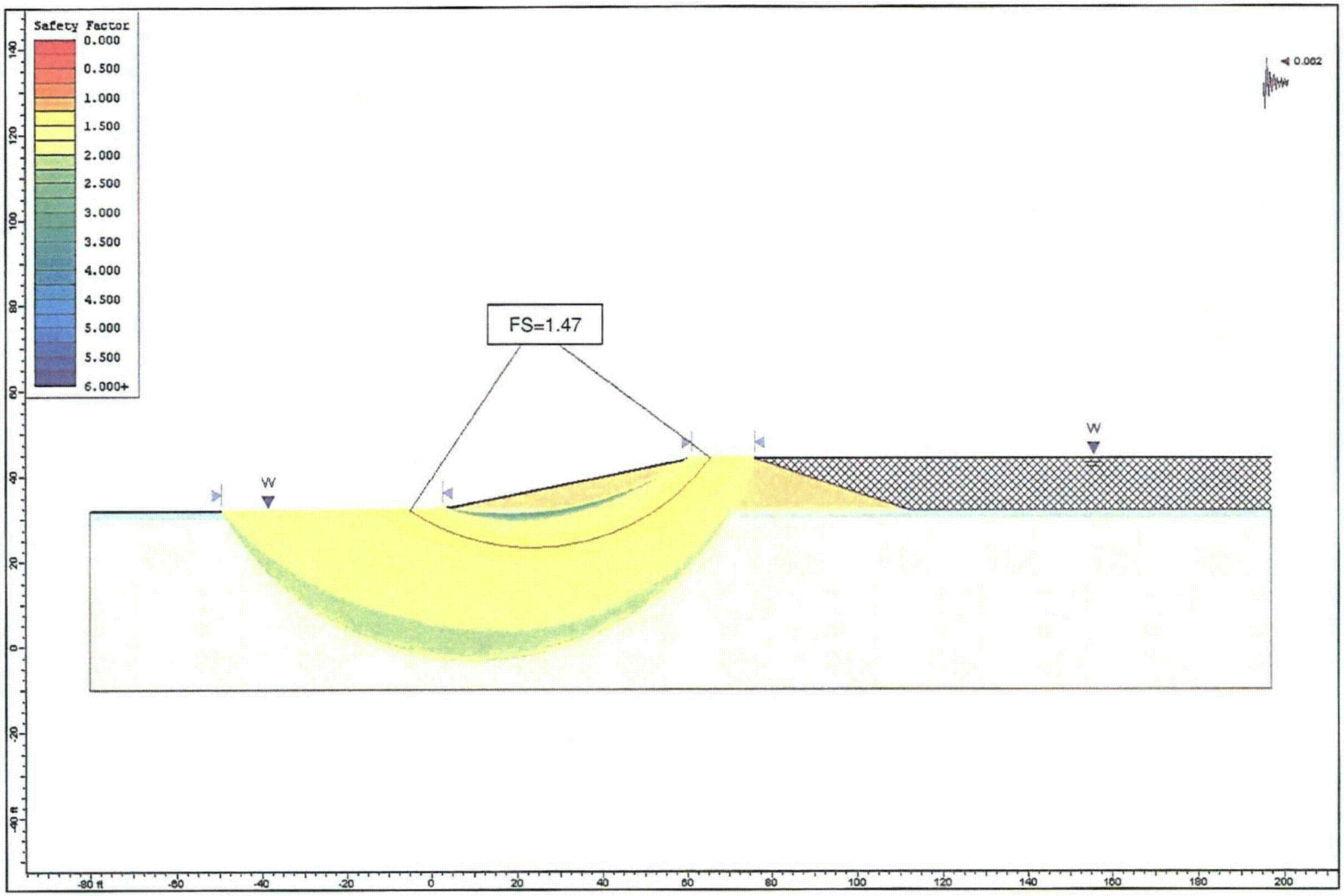


Figure 12. Pseudo-Static Analysis: Phreatic Surface 1, Corrected Janbu Method

g = 6.2 % (10% Probability of Exceedance in 50 Years, or 475 Year Return)

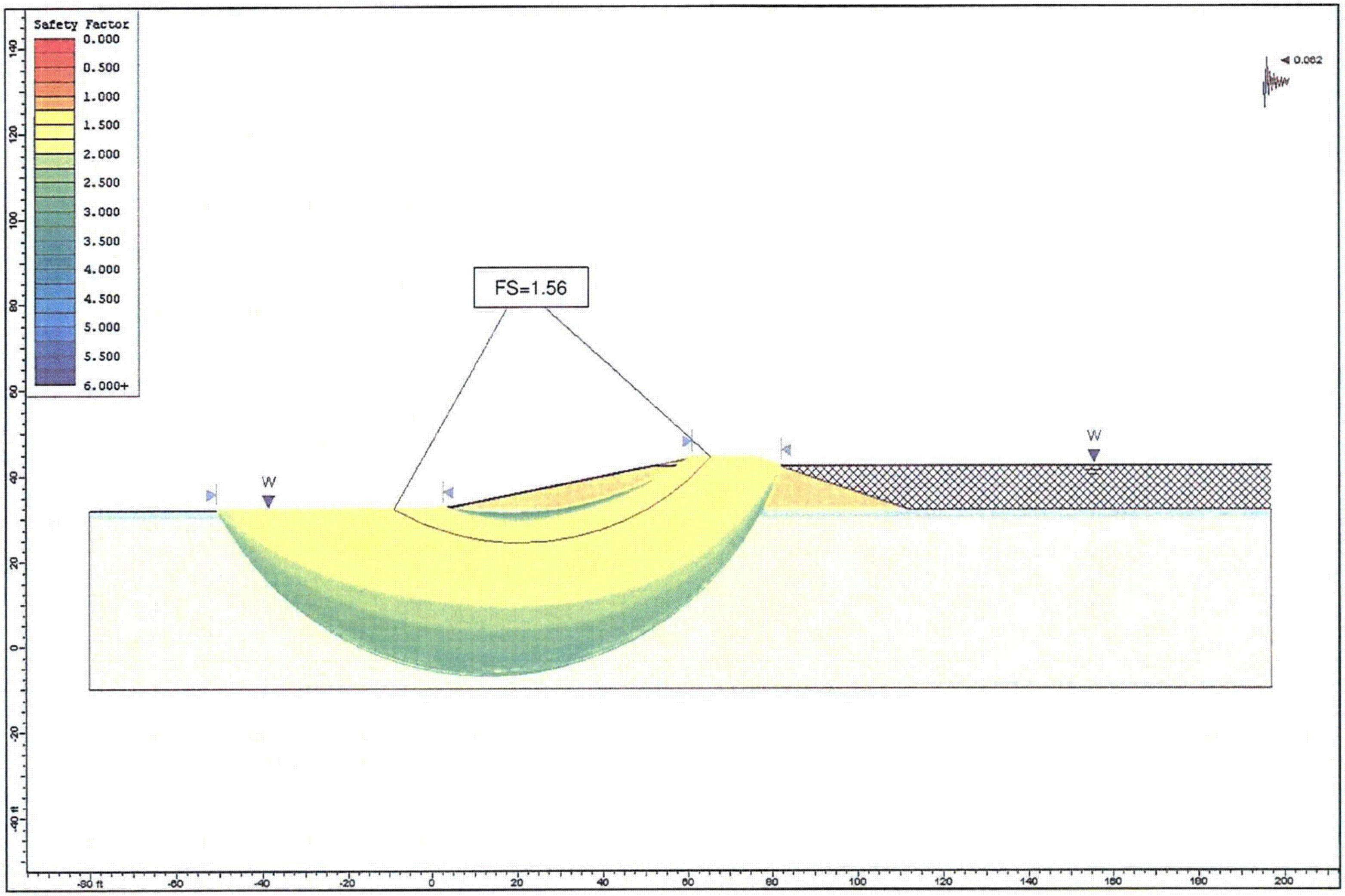


Figure 13. Pseudo-Static Analysis: Phreatic Surface 2, Simplified Bishop Method

g = 6.2 % (10% Probability of Exceedance in 50 Years, or 475 Year Return)

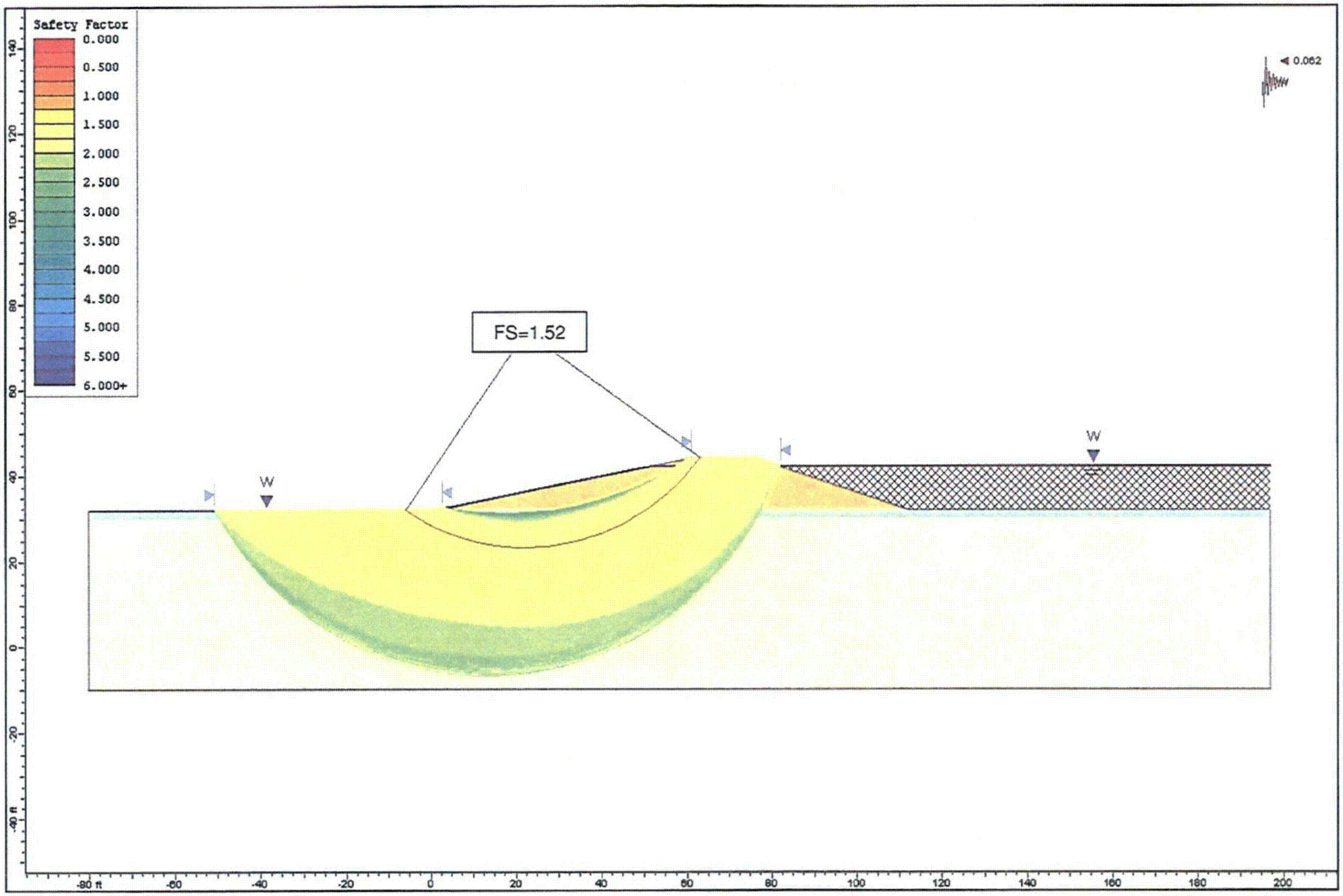


Figure 14. Pseudo-Static Analysis: Phreatic Surface 2, Corrected Janbu Method

g = 6.2 % (10% Probability of Exceedance in 50 Years, or 475 Year Return)

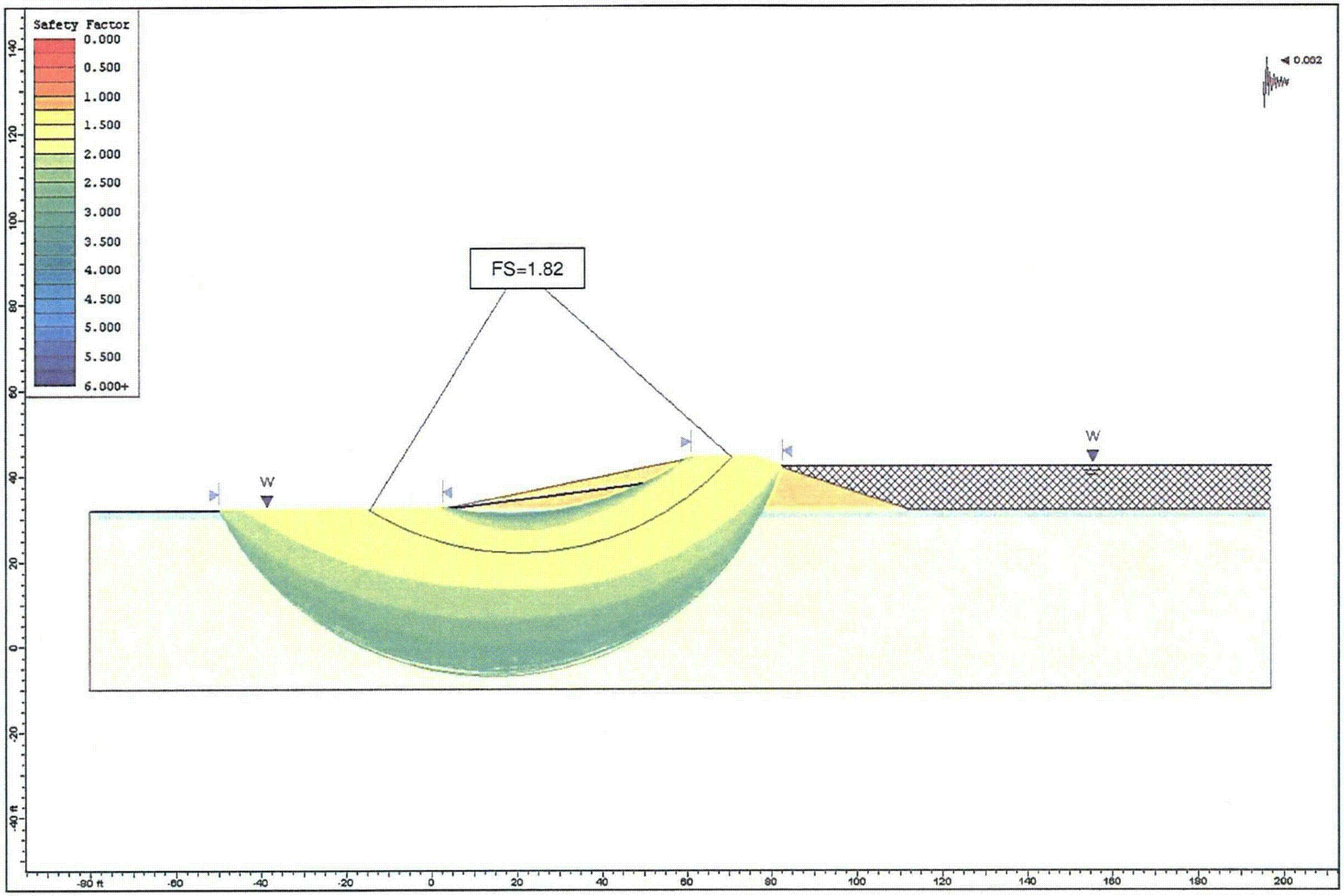


Figure 15. Pseudo-Static Analysis: Phreatic Surface 3, Simplified Bishop Method

g = 6.2 % (10% Probability of Exceedance in 50 Years, or 475 Year Return)

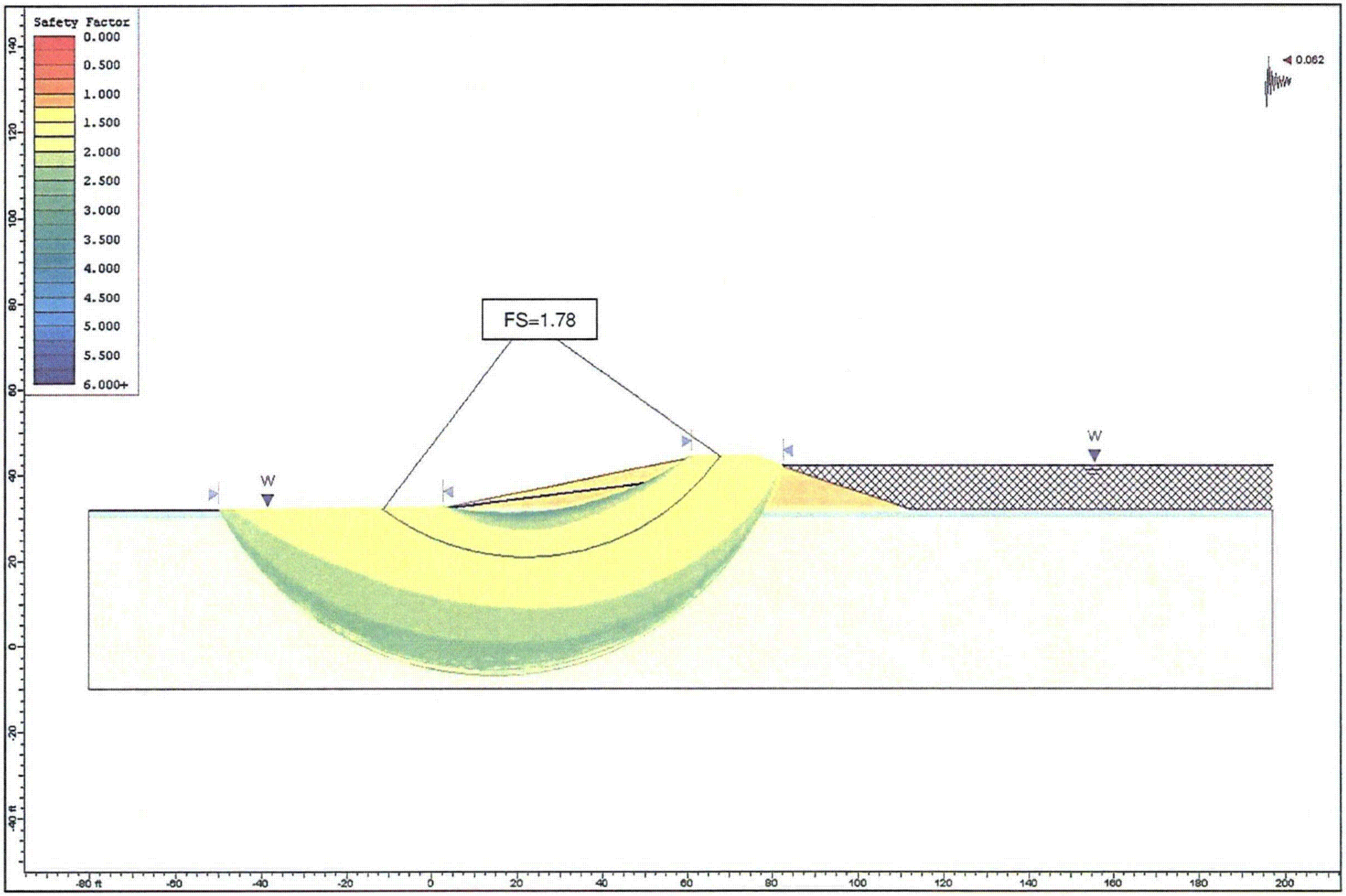
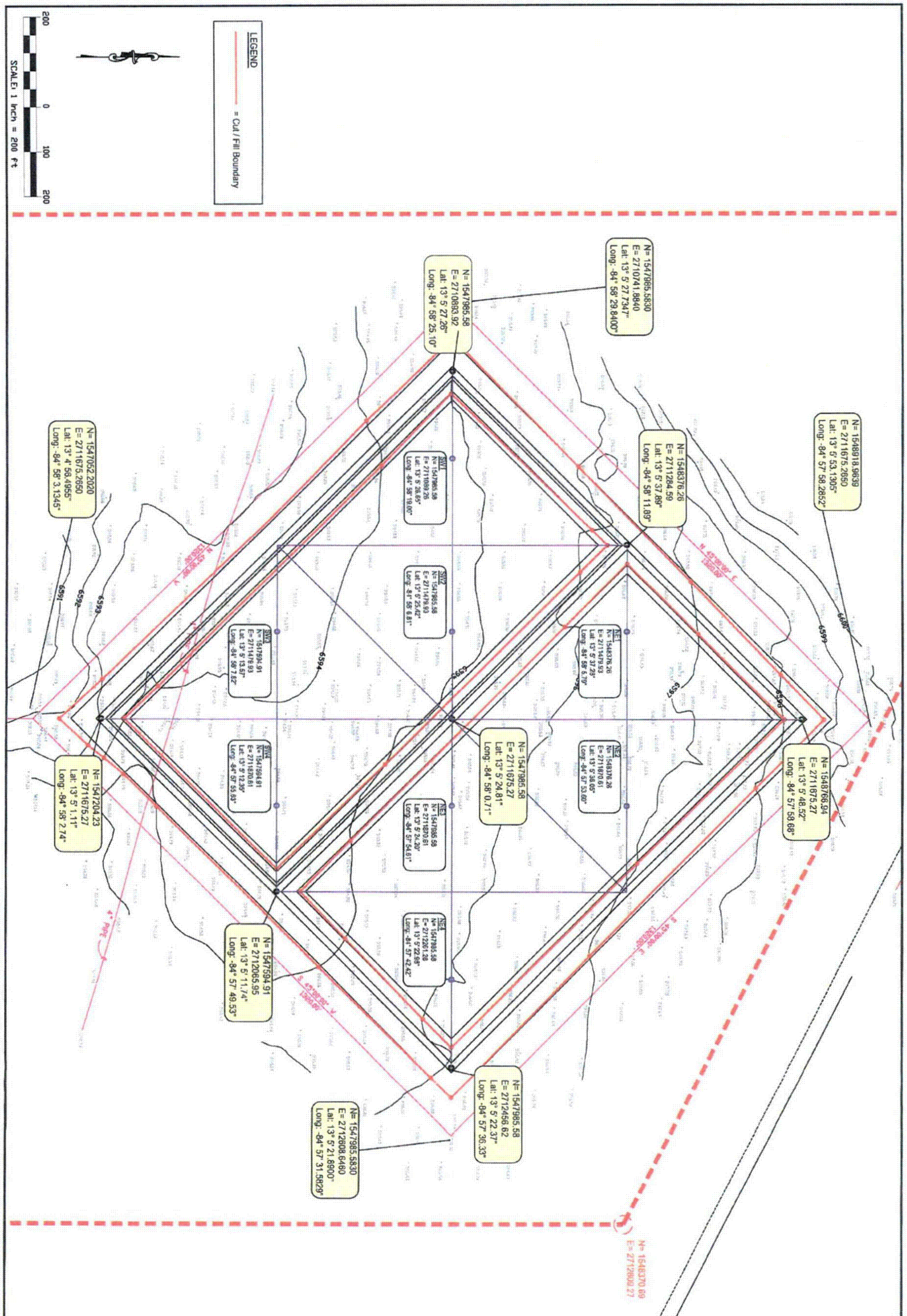


Figure 16. Pseudo-Static Analysis: Phreatic Surface 3, Corrected Janbu Method

g = 6.2 % (10% Probability of Exceedance in 50 Years, or 475 Year Return)

Attachment B

Test Pit Location Map and Soil Logs



KLEINFELDER

Originator:	Drawn By: C. Landon	Date: August 2006	Site Map - Test Pit Locations Alternative B Pond Location Homestake Mining
Checked By:	Project No: 16977	Filename: 16977_07_0.dwg	Cibola County, New Mexico
Approved By:	Scale: 1" = 200'	Revision: -	

Figure

2

KLEINFELDER

Boring Log

Date		Project Number	Project	Boring No.
Started: 7/18/2006	Completed: 7/18/2006	16977	Homestake Grants	SW-3
Backfilled: 7/18/2006		Rig Type: Backhoe	Surface Elevation:6593.7'	Logged By: C. Bhongir
Northing: 238679		Easting: 3904942	Location: See Site Plan	

Sample Type:
- CORE - Continuous Core
- A - Auger Cuttings
- CS - 3.5" I.D. Continuous Sampler
- SPT - 2" O.D. 1.38" I.D. Spoon Sample
- U - 3" O.D. 2.42" I.D. Ring Sample
- ST - Shelby Tube Sample

Groundwater

Depth (ft)	Hour	Date
None		7/18/2006

Groundwater Depth (ft.)	Depth (ft.)	Graphical Log	Sample Taken	Sample Type	Penetration Resistance (Blows per foot)	Moisture Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	Percent Passing No. 200 Sieve	Visual Classification
	0										CLAY (CL) - light brown, moist, some sand, trace gravel, low plasticity
				G		8.6		40	21	77	
	2.0'										El. 6591.7'
											SAND (SP-SM) - fine to medium, light brown, dry, trace to some silt, poorly graded
				G							
	5										5.0' El. 6588.7'

Total Depth 5.0'

KLEINFELDER

Boring Log

Date		Project Number	Project	Boring No.
	Started: 7/18/2006	Project Number 16977	Project Homestake Grants	Boring No. SW-4
	Completed: 7/18/2006			
	Backfilled: 7/18/2006	Rig Type: Backhoe	Surface Elevation:6594.3'	Logged By: C. Bhongir
Northing: 238798		Easting: 3904939	Location: See Site Plan	

Sample Type:
CORE - Continuous Core
A - Auger Cuttings
CS - 3.5" I.D. Continuous Sampler
SPT - 2" O.D. 1.38" I.D. Spoon Sample
U - 3 " O.D. 2.42" I.D. Ring Sample
ST - Shelby Tube Sample

Groundwater

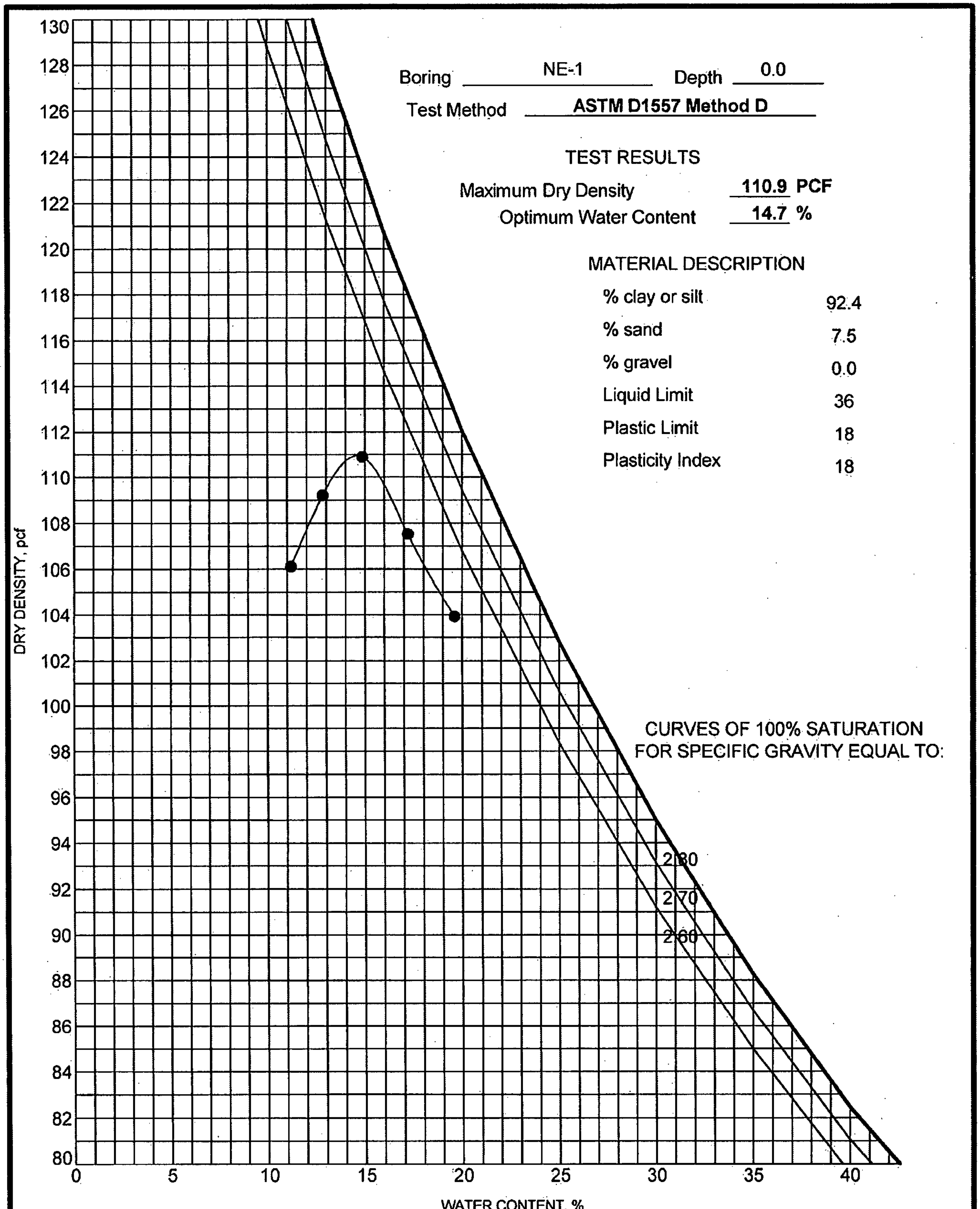
Depth (ft)	Hour	Date
None		7/18/2006

Groundwater Depth (ft.)	Depth (ft.)	Graphical Log	Sample Taken	Sample Type	Penetration Resistance (Blows per foot)	Moisture Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	Percent Passing No. 200 Sieve	Visual Classification
	0										CLAY (CL) - light brown, low plasticity
				G							
	2.0'										El. 6592.3'
											SAND (SM) - fine to medium, light brown, dry, some silt, poorly graded
				G		2.5				14	
	5										
	5.5'										El. 6588.8'

Total Depth 5.5'

Attachment C

Modified Proctor Test Results



Boring NE-1 Depth 0.0

Test Method ASTM D1557 Method D

TEST RESULTS

Maximum Dry Density **110.9 PCF**

Optimum Water Content **14.7 %**

MATERIAL DESCRIPTION

% clay or silt	92.4
% sand	7.5
% gravel	0.0
Liquid Limit	36
Plastic Limit	18
Plasticity Index	18

KLEINFELDER

MOISTURE-DENSITY RELATIONSHIP

Project: Homestake Grants

Location: Grants, NM

Project Number: 16977

Figure C.5

Boring NE-2 Depth 2.5

Test Method **ASTM D1557 Method D**

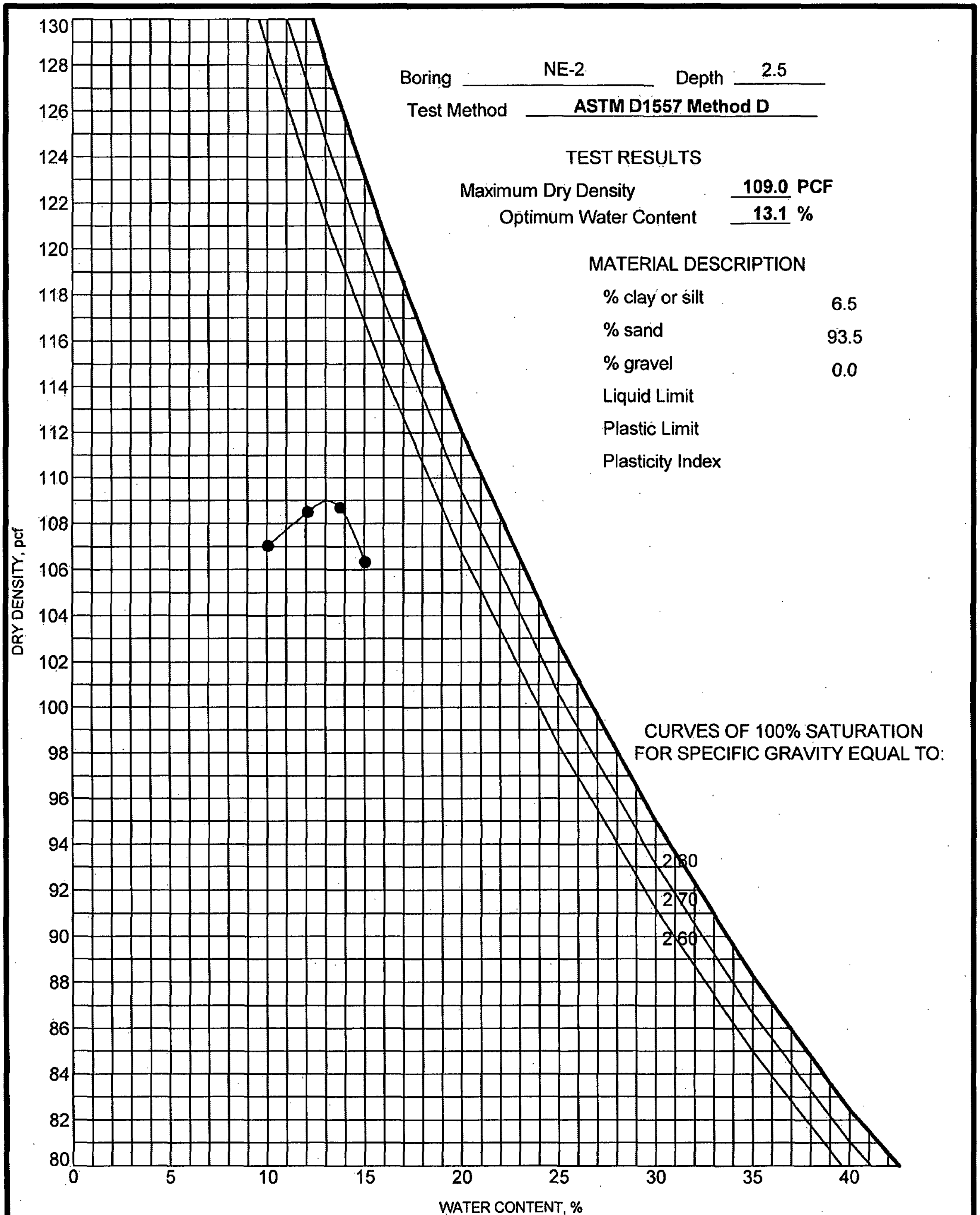
TEST RESULTS

Maximum Dry Density **109.0** PCF

Optimum Water Content **13.1** %

MATERIAL DESCRIPTION

% clay or silt	6.5
% sand	93.5
% gravel	0.0
Liquid Limit	
Plastic Limit	
Plasticity Index	



MOISTURE-DENSITY RELATIONSHIP

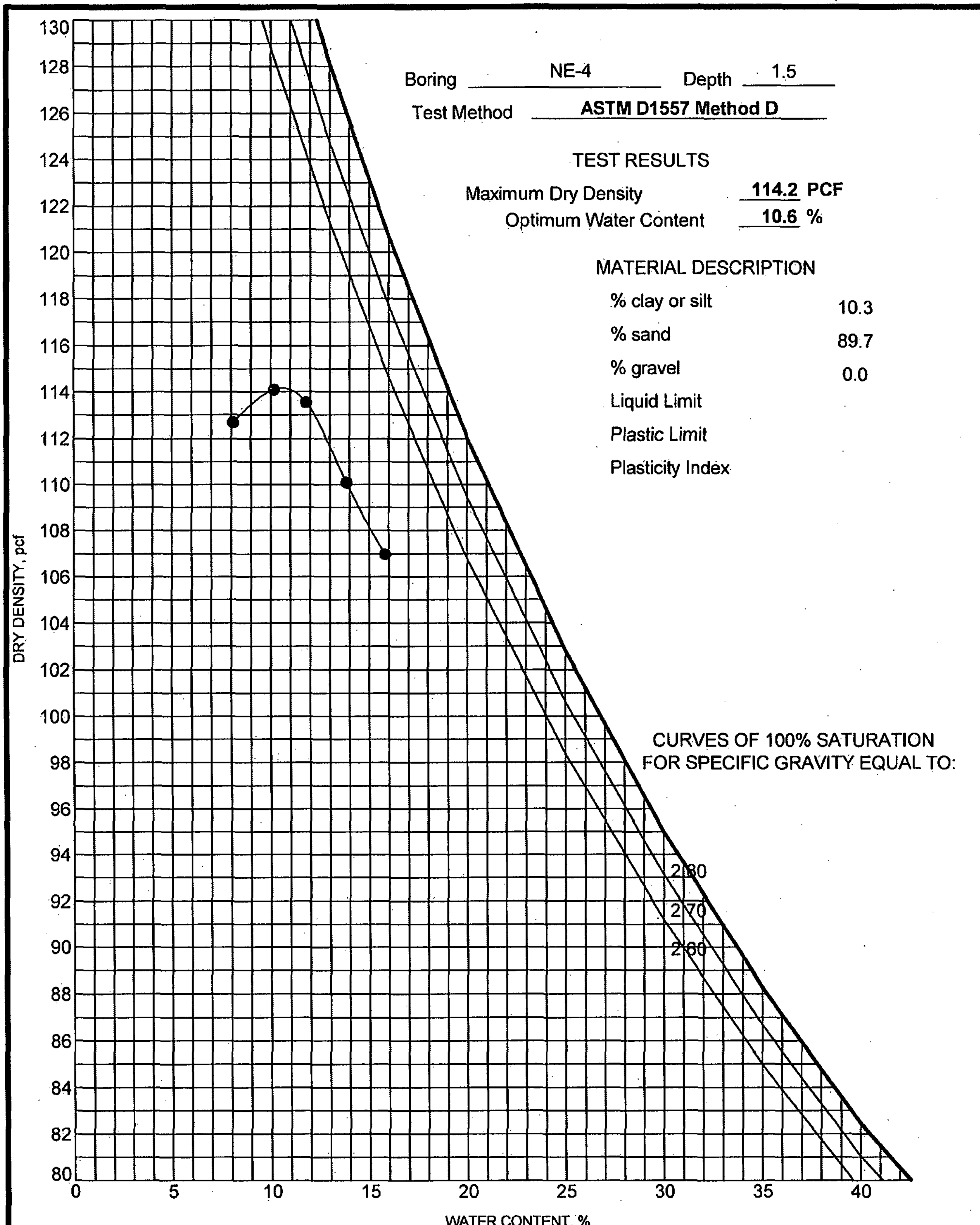
KLEINFELDER

Project: Homestake Grants

Location: Grants, NM

Project Number: 16977

Figure C.6



MOISTURE-DENSITY RELATIONSHIP

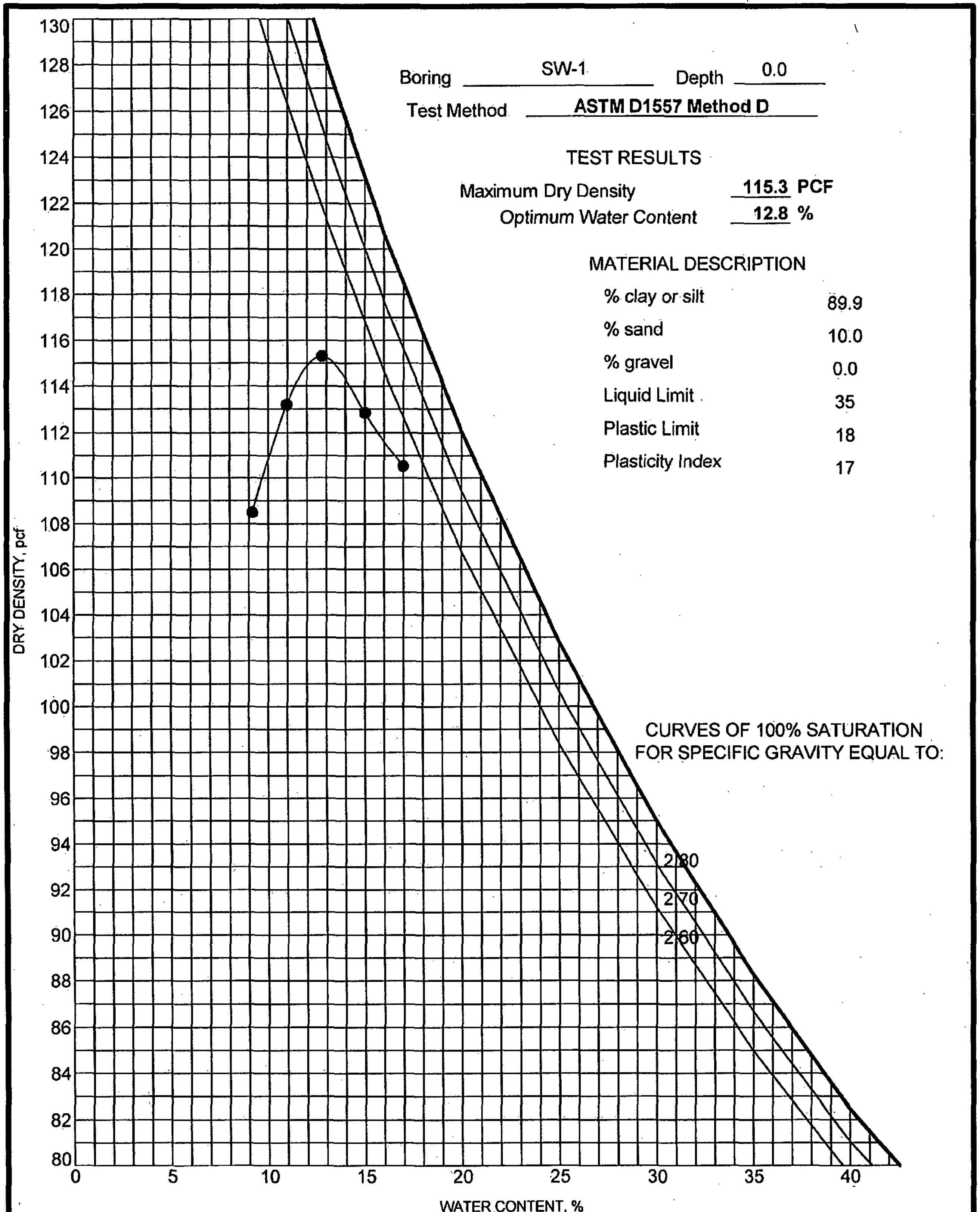
KLEINFELDER

Project: Homestake Grants

Location: Grants, NM

Project Number: 16977

Figure C.7



MOISTURE-DENSITY RELATIONSHIP

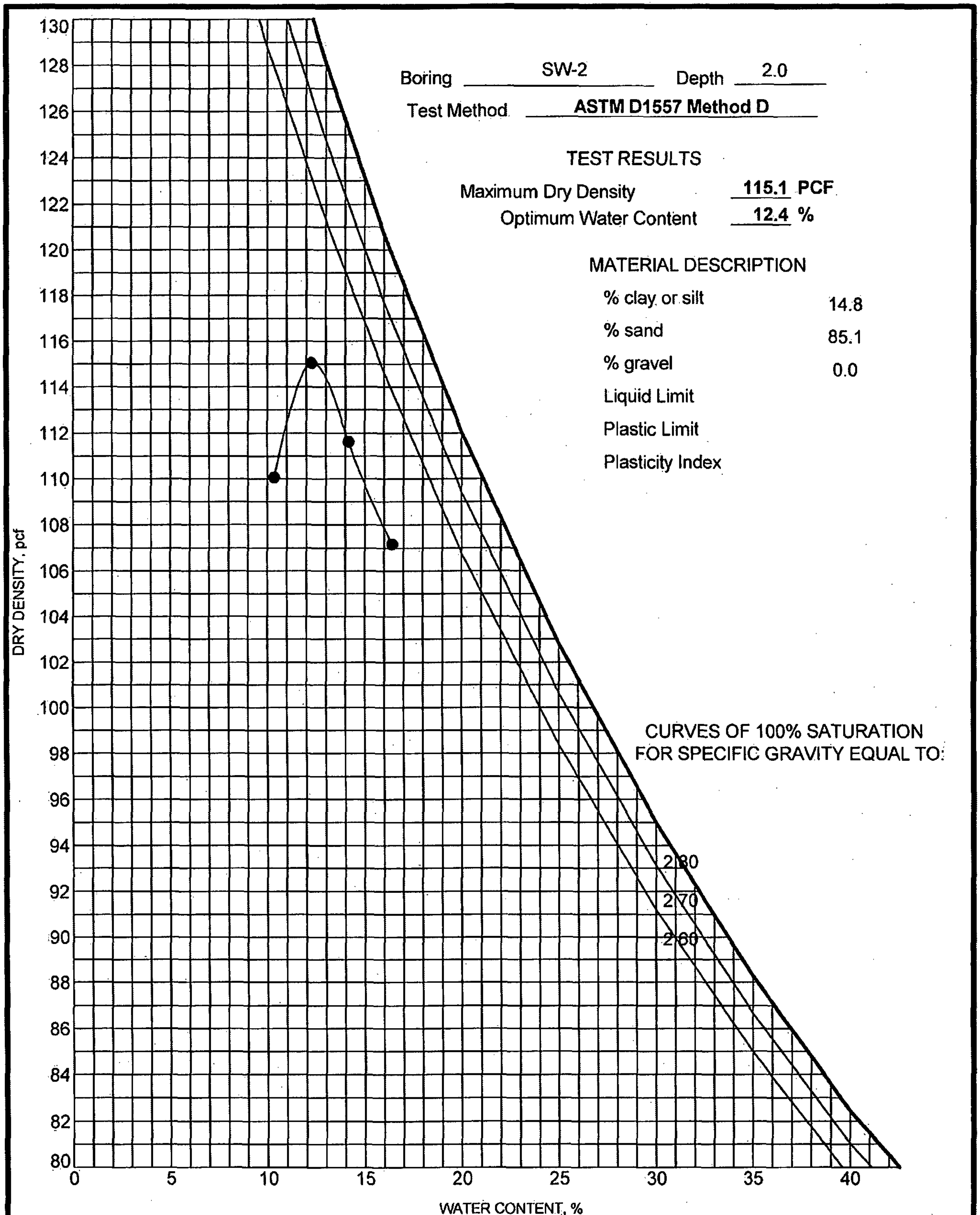
KLEINFELDER

Project: Homestake Grants

Location: Grants, NM

Project Number: 16977

Figure C.8



Boring SW-2 Depth 2.0

Test Method ASTM D1557 Method D

TEST RESULTS

Maximum Dry Density 115.1 PCF

Optimum Water Content 12.4 %

MATERIAL DESCRIPTION

% clay or silt	14.8
% sand	85.1
% gravel	0.0
Liquid Limit	
Plastic Limit	
Plasticity Index	

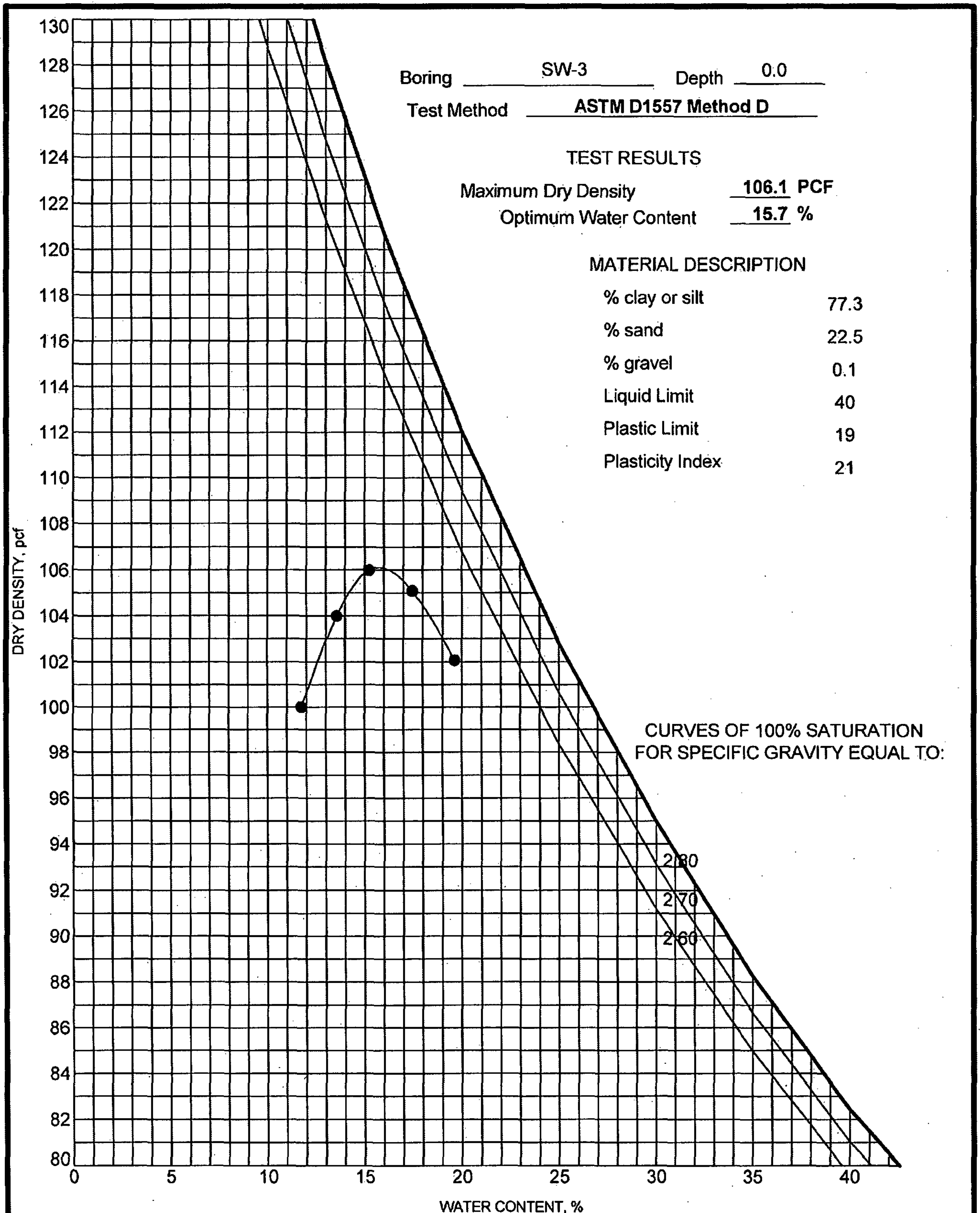
KLEINFELDER

MOISTURE-DENSITY RELATIONSHIP

Project: Homestake Grants

Location: Grants, NM

Project Number: 16977



KLEINFELDER

MOISTURE-DENSITY RELATIONSHIP

Project: Homestake Grants

Location: Grants, NM

Project Number: 16977

Figure C.10

EXHIBIT B

HYDRO-ENGINEERING, LLC

4685 EAST MAGNOLIA
CASPER, WYOMING 82604
Ph: (307) 266-6597
Fax: (307) 237-8565
E-mail: hydro@alluretech.net

July 12, 2007

Al Cox
Homestake Mining Company
P.O. Box 98 – San Mateo Road
Grants, NM 87020

RE: Groundwater Monitoring Wells for Evaporation Pond 3

Dear Al,

The alluvial monitoring adjacent to Evaporation Pond 3 (EP-3) is appropriate because the alluvial aquifer is the uppermost aquifer at the Grants site. Monitoring well DD exists very near the south corner of Alternative B for EP-3. The flow in the alluvial aquifer in this area is mainly to the south. The western limit of the alluvial aquifer exists just west of well DD. Therefore a monitoring well on the southwest side of Alternative B location would result in a dry well. A second well is proposed to be located near the middle of the southeast side of EP-3 for Alternative B. The new well and well DD should very adequately monitor the alluvial aquifer downgradient of Alternative B site. The natural concentration in the alluvial aquifer upgradient of the Grants tailings has been very adequately defined therefore sampling of the new well needs to be started just prior to the initiation of operations of EP-3.

Existing alluvial monitoring wells O and NC are adequate monitoring wells for Alternative C for EP-3. Alluvial well O exists just south of the Alternative C location while well NC is located to the southwest of the site. The groundwater movement in this area of the alluvial aquifer is mainly to the southwest.

Please give me a call if you have any questions relative to the locations of the proposed monitoring wells for Alternatives B and C for Evaporation Pond 3.

Sincerely,

George L. Hoffman, P.E.
Hydrologist

GLH/bjm