

Updated Factual Geotechnical Report:

Proposed Wetland
SE ¼ Sec. 10 – T98N – R22W
Fertile Township, Worth County, Iowa
CVT# 24387.24.IAM

Prepared for:

Mr. Brandon Short
Bolton & Menk, Inc.

Certification:

	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.
	
	_____ (signature)
	_____ (date)
	Printed or typed name: <u>Matthew J. Reisdorfer, PE.</u> License number: <u>22234</u> My license renewal date is <u>December 31, 2025</u> Pages or sheets covered by this seal:

TABLE OF CONTENTS

A. Introduction	2
A.1. Purpose	2
A.2. Scope	2
A.3. Boring Locations and Elevation.....	3
A.4. Geologic Background	3
B. Subsurface Data	3
B.1. Stratification.....	3
B.2. Penetration Test Results.....	4
B.3. Groundwater Data	5
F. Slope Stability Analysis.....	5
C. Level of Care	5
Appendix.....	6

Soil Boring Location Sketch

Log of Boring # B1-B10 and HA1-HA4

Slope Stability Cross Sections

Legend to Soil Description

Chosen Valley Testing, Inc.

Geotechnical Engineering and Testing • 421 N Georgia Avenue • Mason City, IA 50401 • Telephone (641) 201-1050 • masoncity@cvtesting.com

Mr. Brandon Short
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Bolton & Menk, Inc.
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April 21, 2025

**Re: Factual Geotechnical Evaluation
Proposed Wetland
SE ¼ Sec. 10 – T98N – R22W
Fertile Township, Worth County, Iowa
CVT Proposal Number: 24387.24.IAM**

Dear Mr. Short:

This factual report was prepared for the proposed wetland located in Fertile Township, Worth County, Iowa. Our services were authorized by Mr. Brandon Short, Design Engineer for Bolton & Menk, Inc.

A. Introduction

The intent of this report is to present our results to the client in the same logical sequence that led us to arrive at the opinions and recommendations expressed. Since our services must often be completed before the design, assumptions are sometimes needed to prepare a proper evaluation and to analyze the data. A complete and thorough review of this entire document, including the assumptions and the appendices, should be undertaken immediately upon receipt.

A.1. Purpose

This factual report was prepared for the proposed wetland located in Fertile Township, Worth County, Iowa. Our services were authorized by Mr. Brandon Short, Design Engineer for Bolton & Menk, Inc.

A.2. Scope

To obtain data for analysis, our services included ten penetration test borings. The borings were drilled to depths of about 15 feet below the surface. Additional services consisting of hand auger drilling and slope stability analysis were also authorized. Our engineering scope consisted of providing a factual discussion of the soils and materials encountered during our exploration.

A.3. Boring Locations and Elevation

The desired boring locations were indicated to Chosen Valley Testing based on on-site staking provided by the client. The Boring Location Sketch in the Appendix shows the approximate location drilled. Elevations at the borings were provided by the client.

A.4. Geologic Background

A geotechnical report is based on subsurface data collected for the specific structure or problem. Available geologic data from the region can help interpretation of the data and is briefly summarized in this section.

Area geologic maps indicate that the natural upper soils are primarily alluvium (water deposited) consisting of clay, silt, sand and gravel mixtures. Bedrock was expected to be within 50 to 100 feet below the surface and consists of limestone, dolomite, and shale of the Shell Rock Formation.

B. Subsurface Data

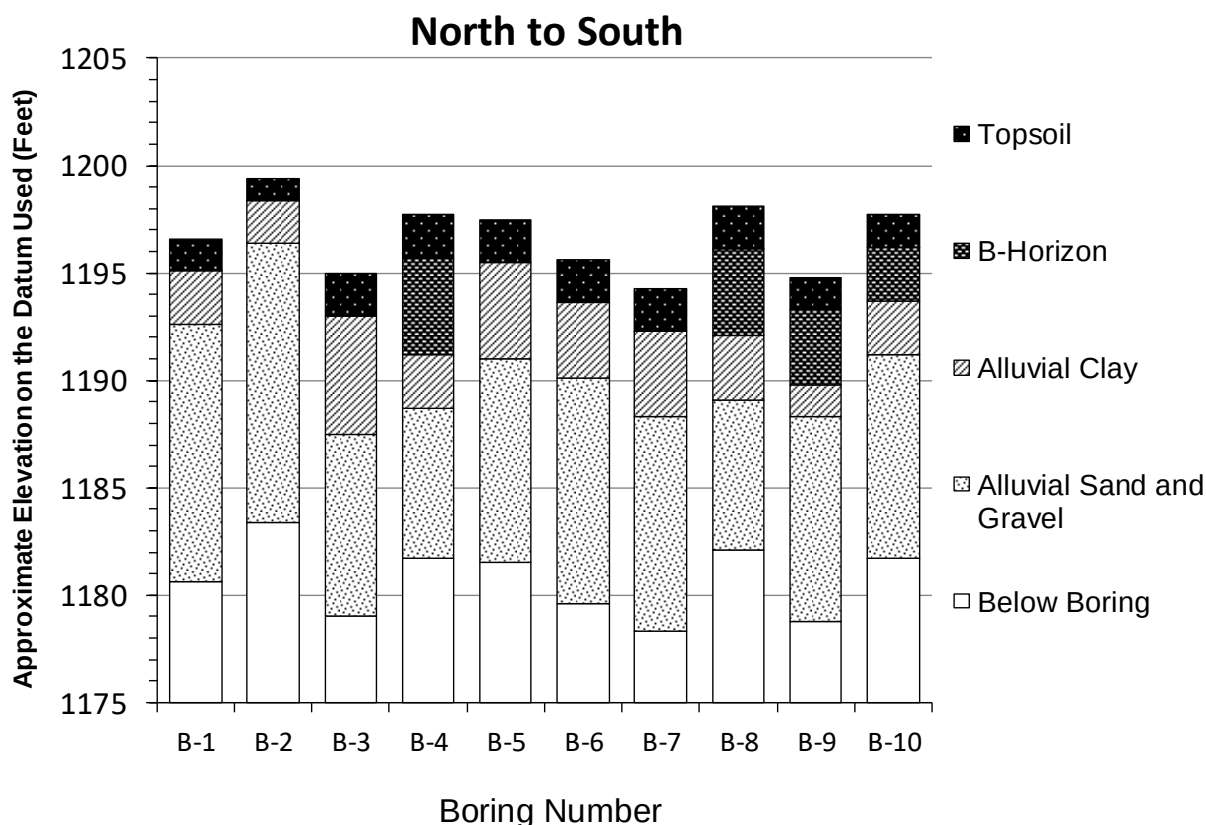
B.1. Stratification

At the surface, the borings met topsoil consisting mostly of slightly organic-to-organic lean clay to depths of about 1 to 2 feet below the surface. Below the topsoil, Borings B-4, B-8, B-9 and B-10 met B-Horizon consisting of mostly lean clay and sandy clay to depths of about 4 to 6 ½ feet below the surface. B-Horizon soils are similar in color and characteristics to that of topsoil but are less organic.

Alluvial clay was met below the B-Horizon and below the topsoil in Borings B-1, B-2, B-3, B-5, B-6 and B-7 to depths of about 3 to 9 feet below the surface.

Alluvial sand and gravel followed the alluvial clay in all borings. The borings terminated in alluvial sand and gravel at depths of about 16 feet below the surface.

The following simplified cross-section summarizes the boring data. For more detailed information, please refer to the Log of Boring sheets in the Appendix.



B.2. Penetration Test Results

The number of blows needed for the hammer to advance the penetration test sampler is an indicator of soil characteristics. The results tend to be more meaningful for natural mineral soils, than for fill soils. In fill soils, compaction tests are more meaningful.

Penetration resistance values ("N" Values) of 2 to 13 Blows per Foot (BPF) were recorded in the alluvial clays, indicating they were soft to stiff. The alluvial sands returned N-Values of 3 to 34 BPF, indicating they were very loose to dense. The B-Horizon clays returned N-Values of 2 to 7 BPF, indicating they were soft to medium.

A pocket penetrometer was used to provide additional data on the compressive strength of cohesive soils. The alluvial clays returned values of 1 ¼ to 3 ¾ tons per square foot (tsf). The B-Horizon clays returned values of 1 ¼ to 4 ¼ tsf.

A key to descriptors used to qualify the relative density of soil (such as *soft*, *stiff*, *loose*, and *dense*) can be found on the Legend to Soil Description in the Appendix.

B.3. Groundwater Data

During the drilling operation, the drillers may note the presence of moisture on the sampling instrument, in the cuttings, or within the borehole. These observations are recorded on the boring logs. The water level may vary with weather; time of year and other factors and the presence or absence of water during the drilling is subject to interpretation and is not always conclusive.

Water was encountered in most of the borings at depths of about 7 to 14 feet below the surface during drilling. The observed water levels correspond to an elevation of about 1180 ½ to 1188 feet on the datum used to locate the borings. Elevated moisture contents were recorded in the near surface clay samples as well. Groundwater levels at the site are expected to fluctuate seasonally with nearby creeks and rivers, as well as with local weather patterns.

F. Slope Stability Analysis

Slope stability analyses were performed along the drainage ditch embankment near STA 2+40, STA 9+10, STA 13+25 and STA 14+00 using the elevation data provided by Bolton & Menk, Inc. and the computer software Slide that employs both Janbu's and Bishops' Methods of Analysis. Data from our boring logs and hand auger exploration were used in our analysis. Design slopes ranging from 1.6:1 to 1.9:1 were provided by Bolton & Menk, Inc.

The following table provides further detail on the short term and long term stability safety factors at each of the four stations that were analyzed:

Station	Short Term Stability Safety Factor (West Bank/East Bank)	Long Term Stability Safety Factor (West Bank/East Bank)
STA 2+40	1.973 / 1.556	1.568 / 1.227
STA 9+10	2.393 / 1.925	1.793 / 1.496
STA 13+25	3.089 / 2.157	2.982 / 1.994
STA 14+00	1.850 / 1.419	1.496 / 1.244

A minimum safety factor of 1.2 is normally desired for slopes not near structures or not where they may pose a threat to human life. All safety factors from our analysis exceeded the minimum safety factor.

It should be noted that exposed slopes will be prone to surface erosion and shallow failures. Therefore, we recommend protecting surfaces with vegetation or other erosion control methods.

C. Level of Care

The services provided for this project have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area, under similar budget and time constraints. This is our professional responsibility. No other warranty, expressed or implied, is made.

Appendix

Soil Boring Location Sketch

Log of Boring: B1-B10 and HA1-HA4

Slope Stability Cross Sections

Legend to Soil Description

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM Factual Geotechnical Evaluation Proposed Wetland SE 1/4 Sec. 10 - T98N - R22W Fertile Township, Worth County, Iowa				BORING: B-01		
				LOCATION: See attached sketch		
				DATE: 11/6/2024		SCALE: 1" = 2'
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1196.6	0.0	OL	<u>ORGANIC CLAY</u> trace of roots, black, wet. (Topsoil)			Elevations provided by Bolton & Menk, Inc. MC = 38.1%
1195.1	1.5	CL	<u>LEAN CLAY with SAND</u> trace of gravel, trace of iron staining, light grey, wet, rather stiff. (Alluvium)	10		
1192.6	4.0	SP SC	<u>POORLY-GRADED SAND to CLAYEY SAND</u> mostly medium grained, trace of gravel, trace of iron staining, brown, moist, medium dense. (Alluvium)	18		PP = 2.75 tsf
1190.1	6.5	SP	<u>POORLY-GRADED SAND</u> mostly medium grained, trace of gravel, brown, moist, medium dense. (Alluvium)	20		
1187.6	9.0	GP	<u>POORLY-GRADED GRAVEL with SAND</u> mostly coarse grained, brown, moist, loose. (Alluvium)	10		Water encountered at about 12 feet during drilling.
1185.1	11.5	SP	<u>POORLY-GRADED SAND</u> mostly medium grained, trace of gravel, grey, moist to waterbearing, loose. (Alluvium)	7	▽	
1180.6	16.0		End of boring. Boring sealed upon completion.	8		

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND) GP3 LOG A GNNIN06.GDT 3/28/25

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM Factual Geotechnical Evaluation Proposed Wetland SE 1/4 Sec. 10 - T98N - R22W Fertile Township, Worth County, Iowa				BORING: B-02		
				LOCATION: See attached sketch		
				DATE: 11/6/2024		SCALE: 1" = 2'
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1199.4	0.0	CL OL	Slightly Organic LEAN CLAY trace of roots, black, wet. (Topsoil)			Elevations provided by Bolton & Menk, Inc.
-1198.4	1.0	CL	SANDY LEAN CLAY trace of gravel, trace of iron staining, light grey, wet, rather stiff. (Alluvium)			
-1196.4	3.0	SC SM	CLAYEY SAND to SILTY SAND mostly fine grained, trace of gravel, light brown, moist, loose to medium dense. (Alluvium)			
-1192.9	6.5	SP	POORLY-GRADED SAND mostly medium grained, trace of gravel, light brown to grey, moist to waterbearing, loose to medium dense. (Alluvium)			
			Trace of clay below about 9 feet to about 11.5 feet.	11		Water encountered at about 12 feet during drilling.
				8		
				9		
-1183.4	16.0		End of boring. Boring sealed upon completion.			

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND).GP3 LOG A GNNIN06.GDT 3/28/25

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM Factual Geotechnical Evaluation Proposed Wetland SE 1/4 Sec. 10 - T98N - R22W Fertile Township, Worth County, Iowa				BORING: B-03		
				LOCATION: See attached sketch		
				DATE: 11/6/2024	SCALE: 1" = 2'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1195.0	0.0	CL OL	Slightly Organic LEAN CLAY trace of roots, black, wet. (Topsoil)			Elevations provided by Bolton & Menk, Inc.
1193.0	2.0	CL	SANDY LEAN CLAY trace of gravel, trace of iron staining, dark grey, wet, soft to rather soft. (Alluvium)	2		PP = 1.75 tsf, MC = 29.9%
				5		
1187.5	7.5	SP	POORLY-GRADED SAND mostly medium grained, trace of gravel, grey, waterbearing, very loose to loose. (Alluvium)	3		Water encountered at about 7 feet during drilling.
1186.0	9.0	SP SC	POORLY-GRADED SAND to CLAYEY SAND mostly medium grained, trace of gravel, grey, waterbearing, loose. (Alluvium)	4		
1183.5	11.5	SP	POORLY-GRADED SAND with GRAVEL mostly coarse grained, brown, moist, loose. (Alluvium)	5		
1179.0	16.0		End of boring. Boring sealed upon completion.			

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND) GP3 LOG A GNNIN06.GDT 3/28/25

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM Factual Geotechnical Evaluation Proposed Wetland SE 1/4 Sec. 10 - T98N - R22W Fertile Township, Worth County, Iowa				BORING: B-04		
				LOCATION: See attached sketch		
				DATE: 11/6/2024		SCALE: 1" = 2'
Elev. 1197.7	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
		CL OL	<u>Slightly Organic LEAN CLAY</u> trace of roots, black, wet. (Topsoil)			Elevations provided by Bolton & Menk, Inc.
1195.7	2.0	CL	<u>SANDY LEAN CLAY</u> trace of gravel, black, wet, soft to medium. (B-Horizon)	6		PP = 4.25 tsf, MC = 19.8%
				3		PP = 3.0 tsf, MC = 25.4%
1191.2	6.5	CL	<u>LEAN CLAY with SAND</u> trace of iron staining, dark brown, wet, rather soft. (Alluvium)	4		PP = 1.25 tsf
1188.7	9.0	SP SC	<u>POORLY-GRADED SAND to CLAYEY SAND</u> <u>with GRAVEL</u> mostly medium grained, grey, moist, loose. (Alluvium)	9		
1186.2	11.5	SP	<u>POORLY-GRADED SAND</u> mostly medium grained, trace of gravel, grey, moist, loose. (Alluvium)	10		
				10		
1181.7	16.0		End of boring. Boring sealed upon completion.			

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND).GP3 LOG A GNNIN06.GDT 3/28/25

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM
Factual Geotechnical Evaluation
Proposed Wetland
SE 1/4 Sec. 10 - T98N - R22W
Fertile Township, Worth County, Iowa

BORING: **B-05**

LOCATION:
See attached sketch

DATE: 11/6/2024

SCALE: 1" = 2'

Elev. 1197.5	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
		CL OL	Slightly Organic LEAN CLAY trace of roots, black, wet. (Topsoil)			Elevations provided by Bolton & Menk, Inc.
1195.5	2.0	CL	LEAN CLAY with SAND trace of gravel, trace of iron staining, dark brown to grey, wet, rather soft to medium. (Alluvium)	5		MC = 44.2%
				6		PP = 1.25 tsf, MC = 30.3%
1191.0	6.5	SP	POORLY-GRADED SAND mostly medium grained, trace of gravel, grey to brown, moist to waterbearing, loose to medium dense. (Alluvium)	4		
				8	▽	Water encountered at about 10 feet during drilling.
			Trace of clay below about 11.5 feet to about 14 feet.	11		
				10		
1181.5	16.0		End of boring. Boring sealed upon completion.			

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND).GP3 LOG A GNNIN06.GDT 3/28/25

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM
Factual Geotechnical Evaluation
Proposed Wetland
SE 1/4 Sec. 10 - T98N - R22W
Fertile Township, Worth County, Iowa

BORING: **B-06**

LOCATION:
See attached sketch

DATE: 11/4/2024

SCALE: 1" = 2'

Elev. 1195.6	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
		CL OL	<u>Slightly Organic LEAN CLAY</u> trace of roots, black, wet. (Topsoil)			Elevations provided by Bolton & Menk, Inc.
1193.6	2.0	CL	<u>SANDY LEAN CLAY</u> trace of gravel, trace of iron staining, light grey, wet, rather stiff to stiff. (Alluvium)	13		MC = 14.5%
1190.1	5.5	SP	<u>POORLY-GRADED SAND</u> mostly medium to coarse grained, trace of gravel, light brown to grey, moist to waterbearing, loose to medium dense. (Alluvium)	12		
				6		
				6	▽	Water encountered at about 10 feet during drilling.
				17		
			Trace of silt below about 14 feet.	21		
1179.6	16.0		End of boring. Boring sealed upon completion.			

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND).GPJ LOG A GNNIN06.GDT 3/28/25

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM Factual Geotechnical Evaluation Proposed Wetland SE 1/4 Sec. 10 - T98N - R22W Fertile Township, Worth County, Iowa				BORING: B-07		
				LOCATION: See attached sketch		
				DATE: 11/4/2024		SCALE: 1" = 2'
Elev. 1194.3	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
		CL OL	<u>Slightly Organic LEAN CLAY</u> trace of roots, black, wet. (Topsoil)			Elevations provided by Bolton & Menk, Inc.
-1192.3	2.0	CL	<u>SANDY LEAN CLAY</u> trace of gravel, grey, wet, rather stiff. (Alluvium)	12		MC = 16.3%
-1190.3	4.0	CL	<u>LEAN CLAY with SAND</u> trace of iron staining, light grey, wet, rather stiff. (Alluvium)	10		PP = 3.75 tsf
-1188.3	6.0	SP	<u>POORLY-GRADED SAND</u> mostly medium grained, trace of gravel, grey, moist to waterbearing, loose to medium dense. (Alluvium)	4		
				4	▽	Water encountered at about 10 feet during drilling.
				18		
			Trace of clay below about 14 feet.	20		
-1178.3	16.0		End of boring. Boring sealed upon completion.			

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND) GPJ LOG A GNNIN06.GDT 3/28/25

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM
Factual Geotechnical Evaluation
Proposed Wetland
SE 1/4 Sec. 10 - T98N - R22W
Fertile Township, Worth County, Iowa

BORING: **B-08**

LOCATION:
See attached sketch

DATE: 11/4/2024

SCALE: 1" = 2'

Elev. 1198.1	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
		CL OL	Slightly Organic LEAN CLAY trace of roots, black, wet. (Topsoil)			Elevations provided by Bolton & Menk, Inc.
1196.1	2.0	CL	SANDY LEAN CLAY trace of gravel, black, wet, soft to medium. (B-Horizon)	7		PP = 2.5 tsf, MC = 25.7%
				2		PP = 1.5 tsf
1192.1	6.0					PP = 1.25 tsf
1191.6	6.5	CL	LEAN CLAY trace of iron staining, brown, wet, soft. (Alluvium)			
		SC CL	CLAYEY SAND to SANDY LEAN CLAY mostly medium grained, trace of gravel, trace of roots, trace of wood, grey, moist, loose. (Alluvium)	5		
1189.1	9.0	SP	POORLY-GRADED SAND mostly medium grained, trace of gravel, trace of clay, grey, moist, dense. (Alluvium)	34		
1186.6	11.5	SP SC	POORLY-GRADED SAND to CLAYEY SAND mostly medium grained, trace of gravel, brown, moist, medium dense. (Alluvium)	17		
1184.1	14.0	SP	POORLY-GRADED SAND mostly medium grained, trace of gravel, trace of clay, grey, moist, medium dense. (Alluvium)	17		
1182.1	16.0		End of boring. Boring sealed upon completion.			

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND) GP3 LOG A GNNIN06.GDT 3/28/25

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM Factual Geotechnical Evaluation Proposed Wetland SE 1/4 Sec. 10 - T98N - R22W Fertile Township, Worth County, Iowa				BORING: B-09		
				LOCATION: See attached sketch		
				DATE: 11/4/2024		SCALE: 1" = 2'
Elev. 1194.8	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
— 						

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND) GP3 LOG A GNNIN06.GDT 3/28/25

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM
Factual Geotechnical Evaluation
Proposed Wetland
SE 1/4 Sec. 10 - T98N - R22W
Fertile Township, Worth County, Iowa

BORING: **B-10**

LOCATION:
See attached sketch

DATE: 11/4/2024

SCALE: 1" = 2'

Elev. 1197.7	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
		CL	Slightly Organic LEAN CLAY trace of roots, black, wet. (Topsoil)			Elevations provided by Bolton & Menk, Inc.
1196.2	1.5	CL	SANDY LEAN CLAY trace of gravel, black, wet, medium. (B-Horizon)	6		PP = 2.25 tsf, MC = 26.6%
1193.7	4.0	CL	LEAN CLAY trace of gravel, trace of iron staining, trace of sand, grey to dark grey, wet, rather soft. (Alluvium)	4		PP = 1.25 tsf, MC = 29.8%
1191.2	6.5	SC	CLAYEY SAND mostly medium grained, trace of gravel, brown, moist, loose. (Alluvium)	7		
1188.7	9.0	SP SC	POORLY-GRADED SAND to CLAYEY SAND mostly medium grained, trace of gravel, brown to grey, moist, medium dense to dense. (Alluvium)	30		
			With GRAVEL below about 11.5 feet.	17		
1183.7	14.0	SP	POORLY-GRADED SAND with GRAVEL mostly medium graiend, grey, moist to waterbearing, medium dense. (Alluvium)	16	▽	Water encountered at about 14 feet during drilling.
1181.7	16.0		End of boring. Boring sealed upon completion.			

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND).GP3 LOG A GNNIN06.GDT 3/28/25

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM Factual Geotechnical Evaluation Proposed Wetland SE 1/4 Sec. 10 - T98N - R22W Fertile Township, Worth County, Iowa				BORING: HA-1		
				LOCATION: See attached sketch		
				DATE: 3/21/2025	SCALE: 1" = 2'	
Elev.	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
	1.0	CL OL	<u>Slightly Organic SANDY LEAN CLAY</u> trace of gravel, black, wet.			Elevations estimated from Iowa DNR LiDAR.
	3.0	CL	<u>SANDY LEAN CLAY</u> trace of gravel, black, wet. (B-Horizon) Trace of roots below about 2 feet.			
	5.0	CL	<u>SANDY LEAN CLAY</u> trace of gravel, dark brown, wet. (Alluvium) Trace of iron staining below about 4 feet.			
	6.0	SC SM	<u>CLAYEY SAND to SILTY SAND</u> mostly fine grained, trace of gravel, light brown to light grey, moist. (Alluvium)			
			End of boring. Boring sealed upon completion.			

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND).GPJ LOG A GNNIN06.GDT 3/28/25

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM Factual Geotechnical Evaluation Proposed Wetland SE 1/4 Sec. 10 - T98N - R22W Fertile Township, Worth County, Iowa					BORING: HA-2	
					LOCATION: See attached sketch	
					DATE: 3/21/2025	SCALE: 1" = 2'

Elev.	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
	1.0	CL OL	Slightly Organic SANDY LEAN CLAY trace of gravel, black, wet. (Topsoil)			Elevations estimated from Iowa DNR LiDAR.
	2.0	SC	CLAYEY SAND mostly medium grained, trace of gravel, brown to dark brown, moist. (Alluvium)			
	3.0	SP SC	POORLY-GRADED SAND to CLAYEY SAND mostly medium grained, trace of gravel, brown, moist. (Alluvium)			
	4.0	SP	POORLY-GRADED SAND mostly medium grained, trace of gravel, trace of clay, brown, moist. (Alluvium)			
			End of boring. Boring sealed upon completion.			

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND).GPJ LOG A GNNIN06.GDT 3/28/25

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM
Factual Geotechnical Evaluation
Proposed Wetland
SE 1/4 Sec. 10 - T98N - R22W
Fertile Township, Worth County, Iowa

BORING: **HA-3**

LOCATION:
See attached sketch

DATE: 3/21/2025

SCALE: 1" = 2'

Elev.	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
	1.0	CL OL	Slightly Organic LEAN CLAY black, wet. (Topsoil)			Elevations estimated from Iowa DNR LiDAR.
	2.5	SC	CLAYEY SAND mostly medium grained, dark brown, moist. (Alluvium)			
	5.0	SP SC	POORLY-GRADED SAND to CLAYEY SAND mostly medium grained, dark brown, moist. (Alluvium)			
			End of boring. Boring sealed upon completion.			

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 24387.24.IAM Factual Geotechnical Evaluation Proposed Wetland SE 1/4 Sec. 10 - T98N - R22W Fertile Township, Worth County, Iowa				BORING: HA-4	
				LOCATION: See attached sketch	
				DATE: 3/21/2025	SCALE: 1" = 2'

Elev.	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
	1.0	CL OL	Slightly Organic LEAN CLAY black, wet to very wet. (Topsoil)			Elevations estimated from Iowa DNR LiDAR.
	2.0	CL	SANDY LEAN CLAY trace of roots, black, wet. (B-Horizon)			
	4.0	SC SM	CLAYEY SAND to SILTY SAND mostly fine grained, trace of gravel, brown to dark brown, moist. (Alluvium)			
	5.0	SC	CLAYEY SAND mostly fine grained, trace of gravel, brown, moist. (Alluvium)			
			End of boring. Boring sealed upon completion.			

CVT STANDARD 24387.24.IAM (WORTH COUNTY WETLAND).GPJ LOG A GNNIN06.GDT 3/28/25



Boring Location Sketch

Proposed Wetland

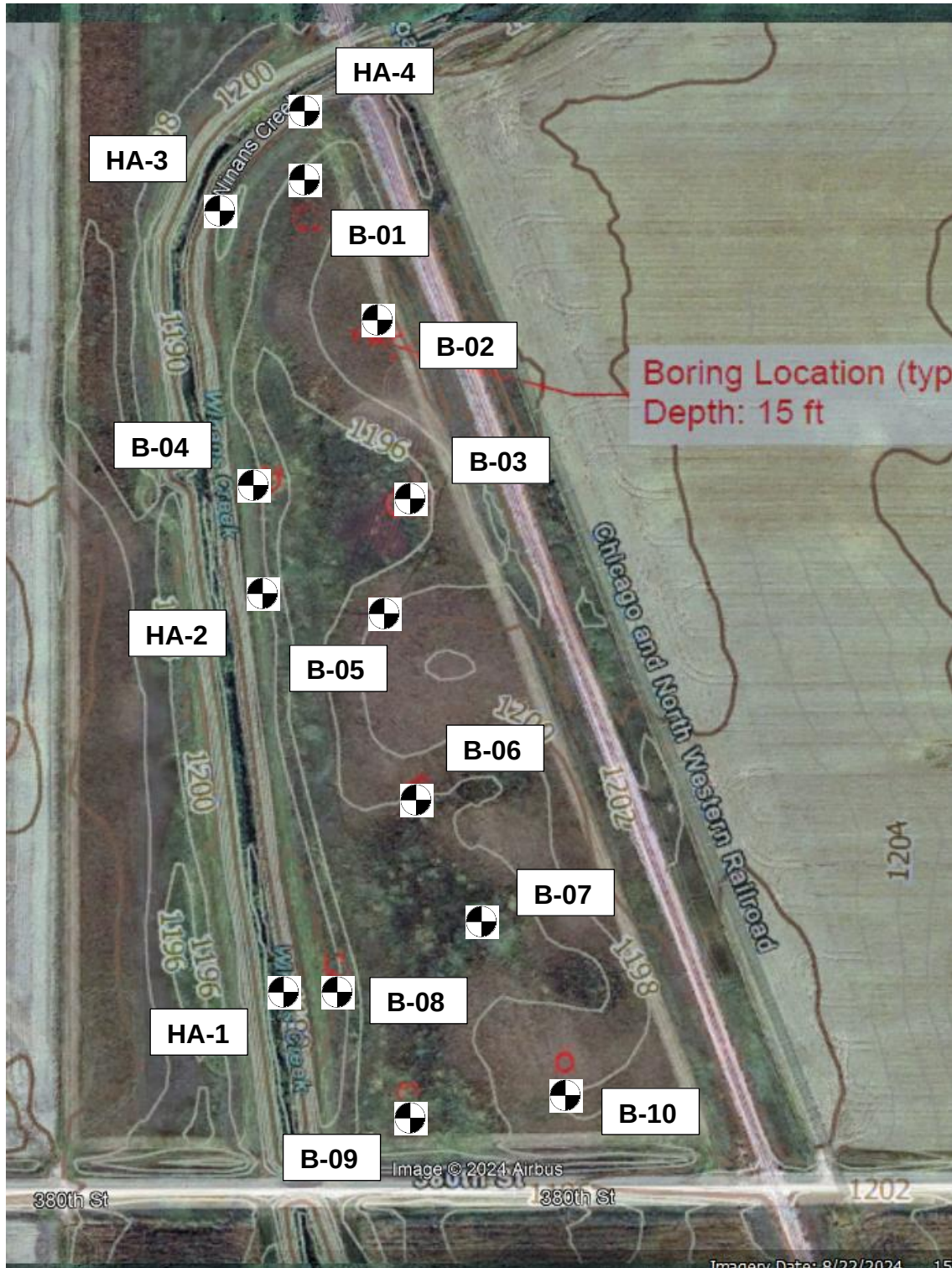
SE ¼ Sec. 10 – T98N – R22W

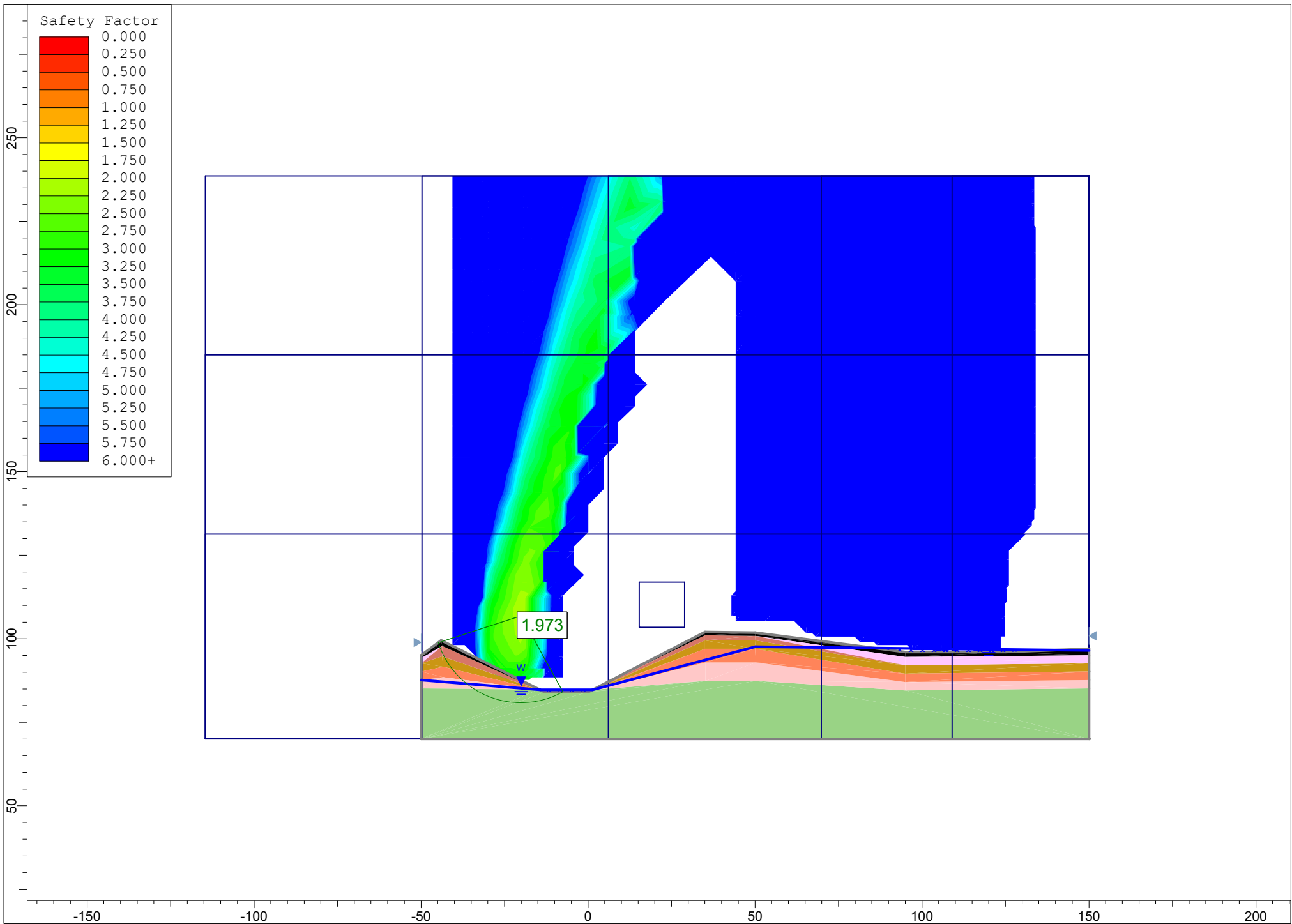
Fertile Township, Worth County, Iowa

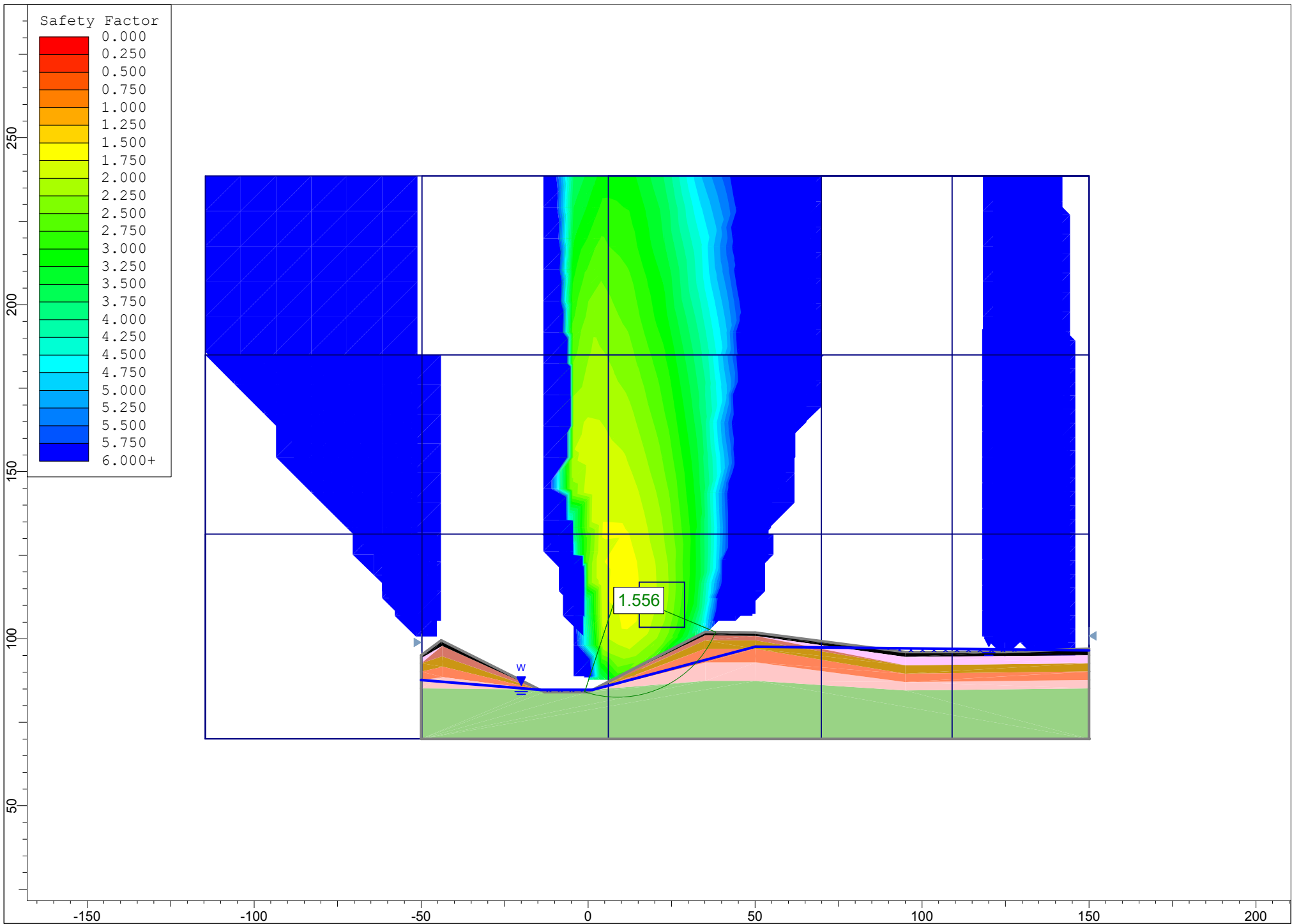
24387.24.IAM

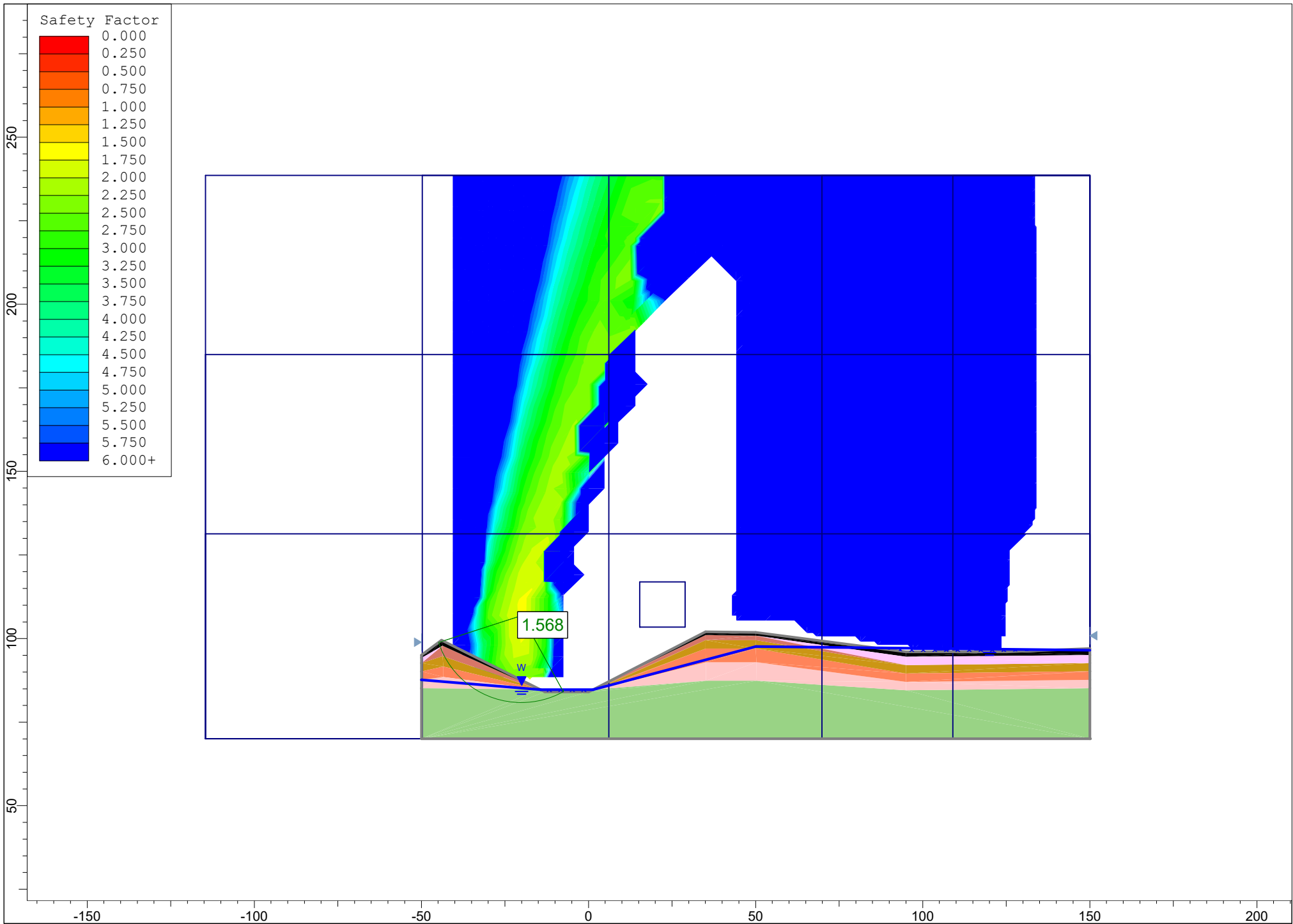
Legend

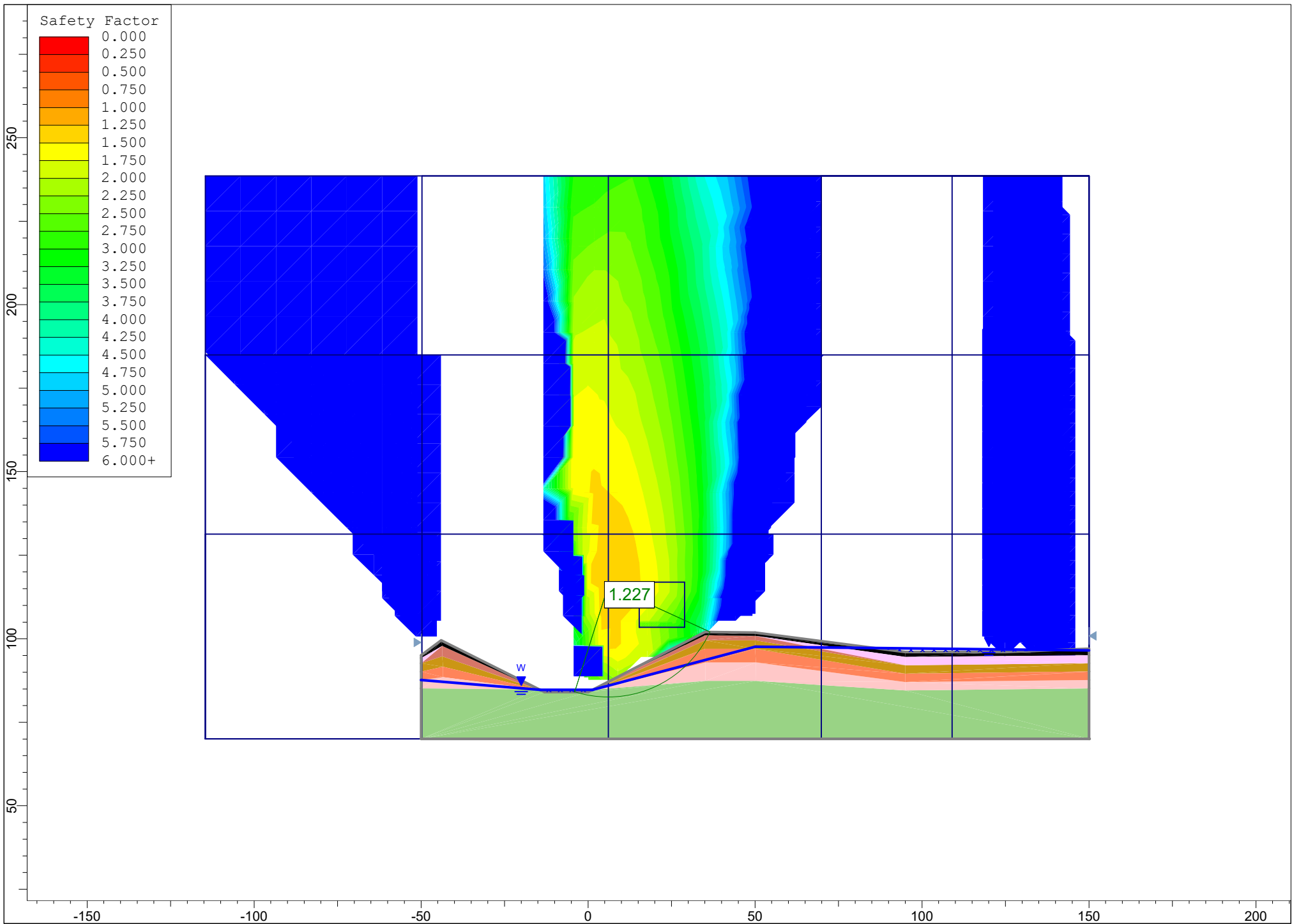
 Boring Location

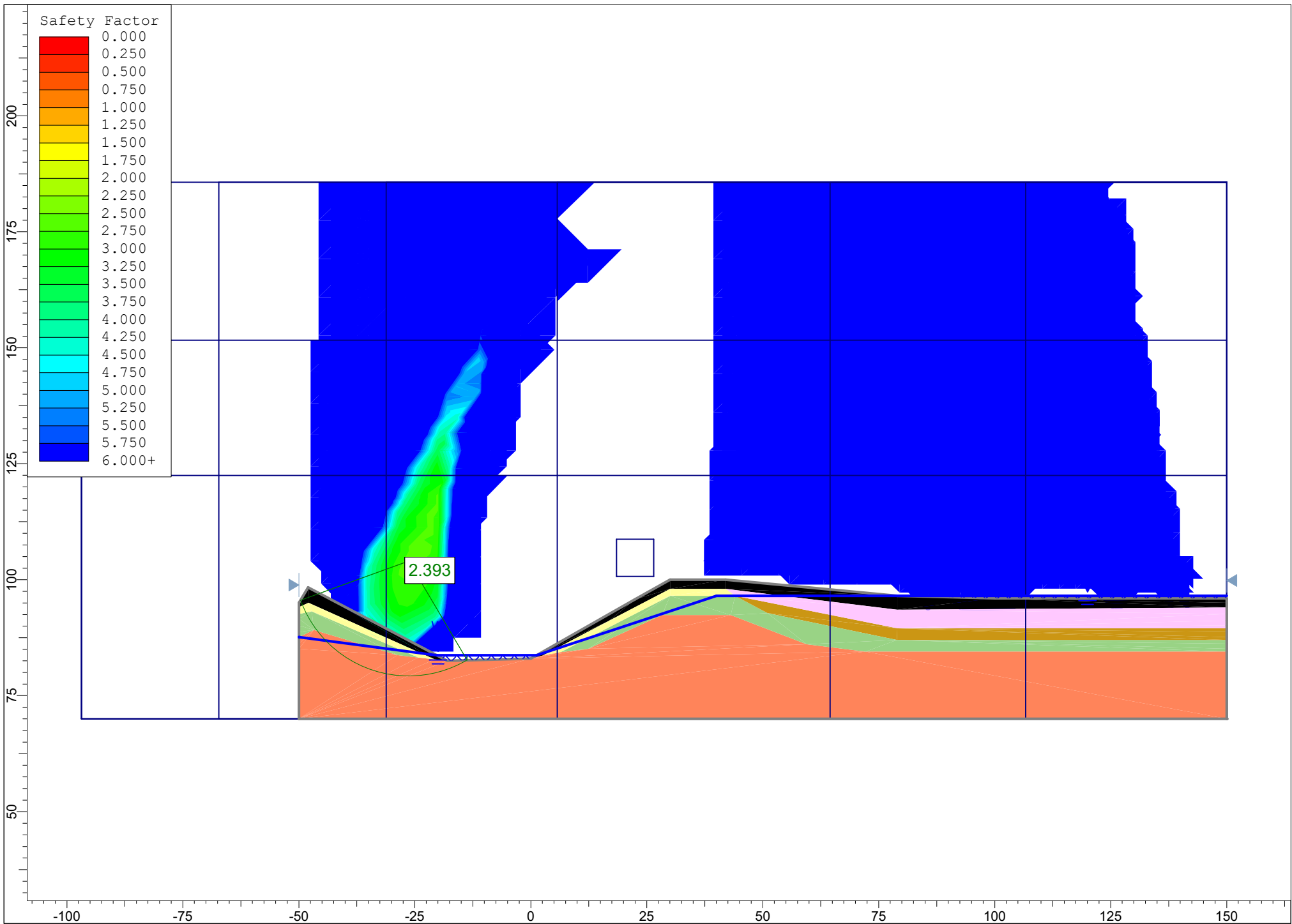


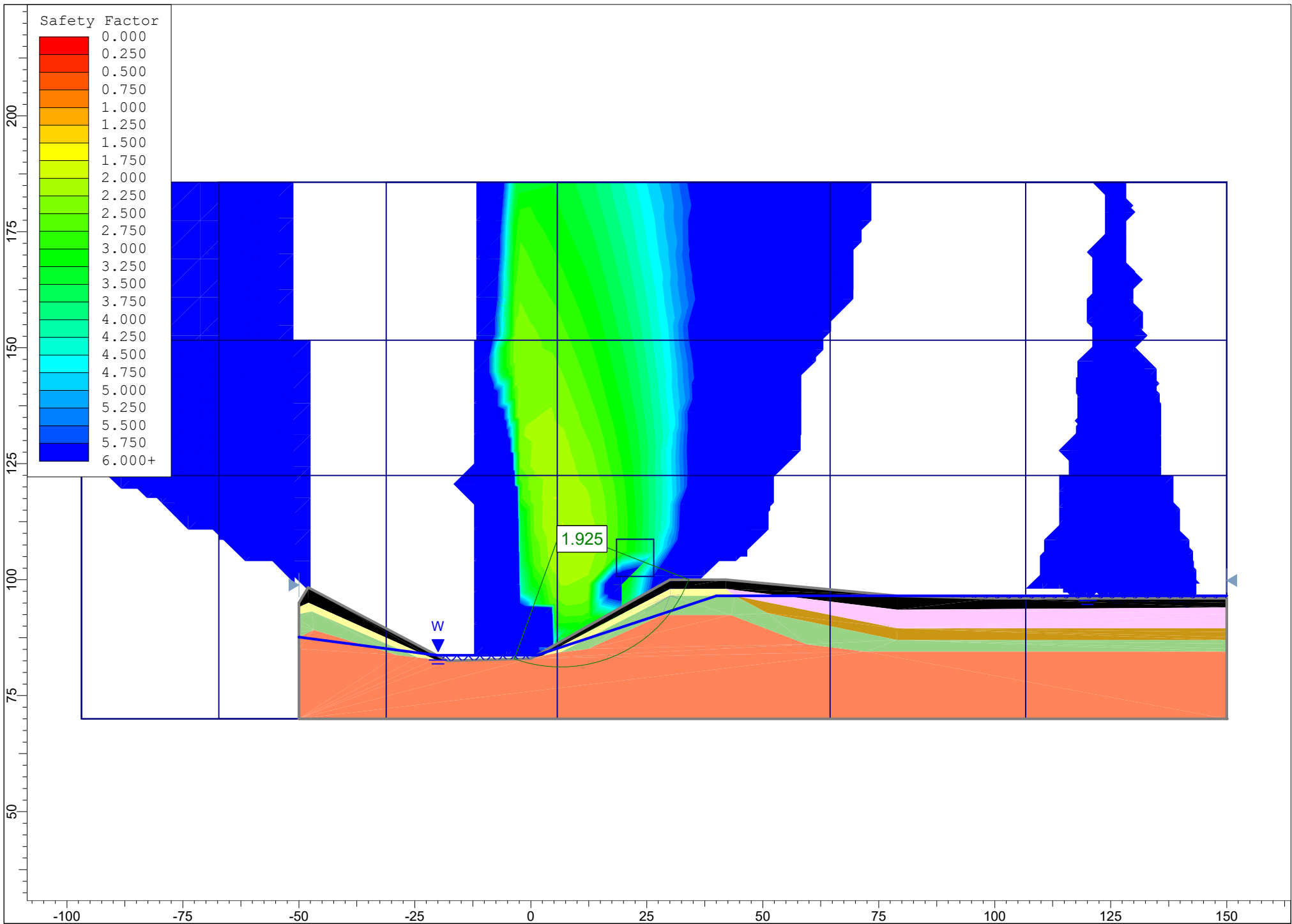


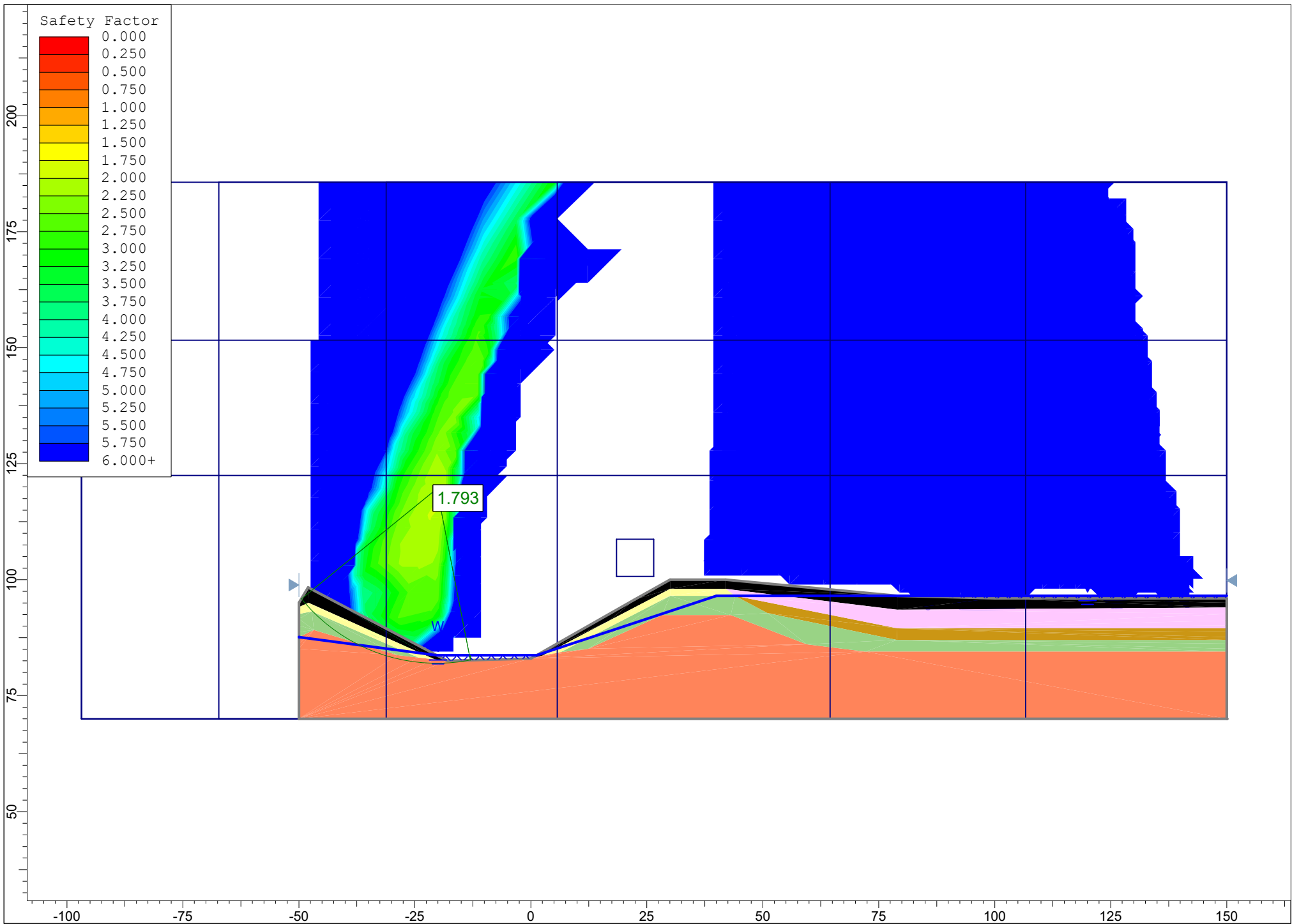


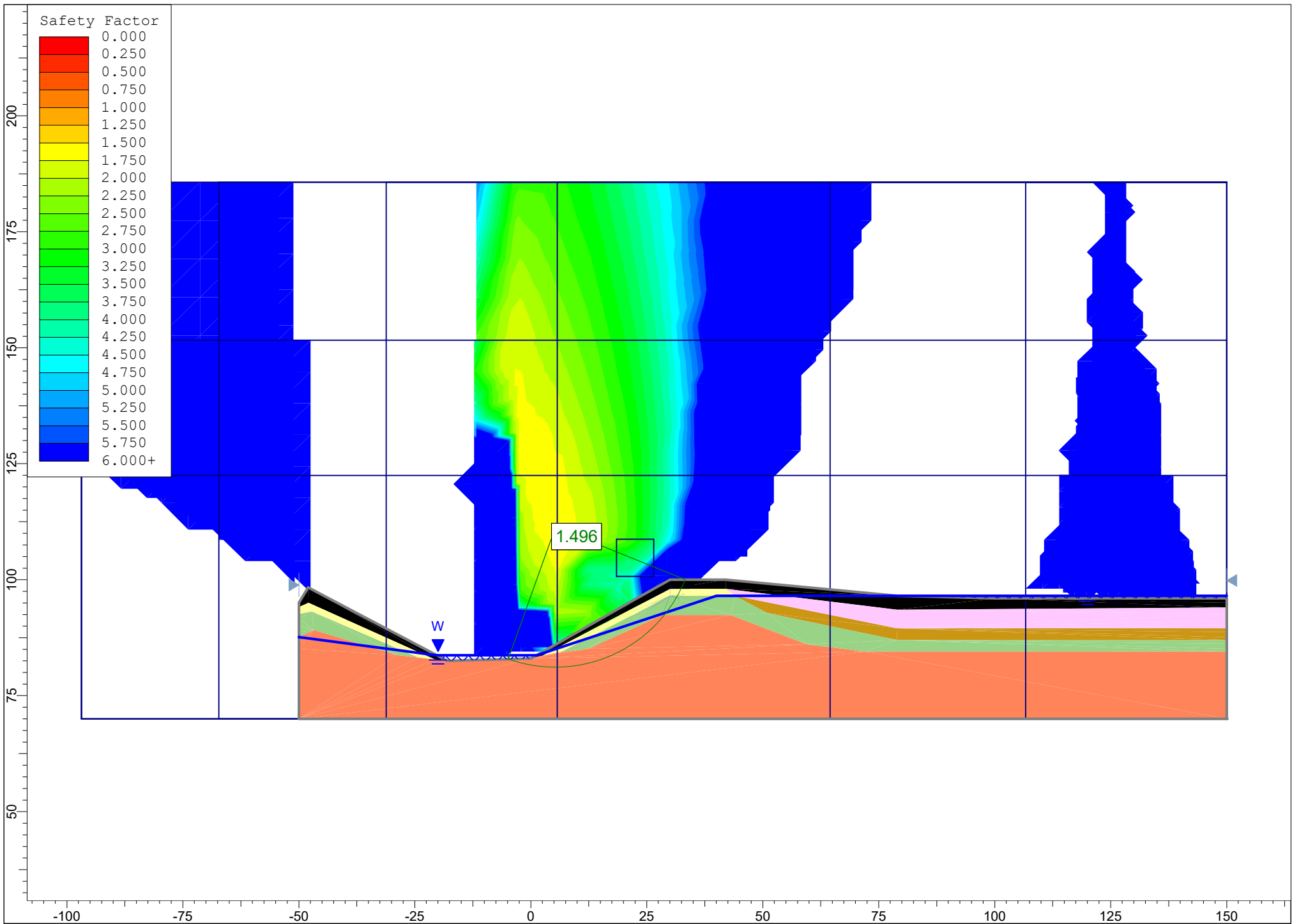


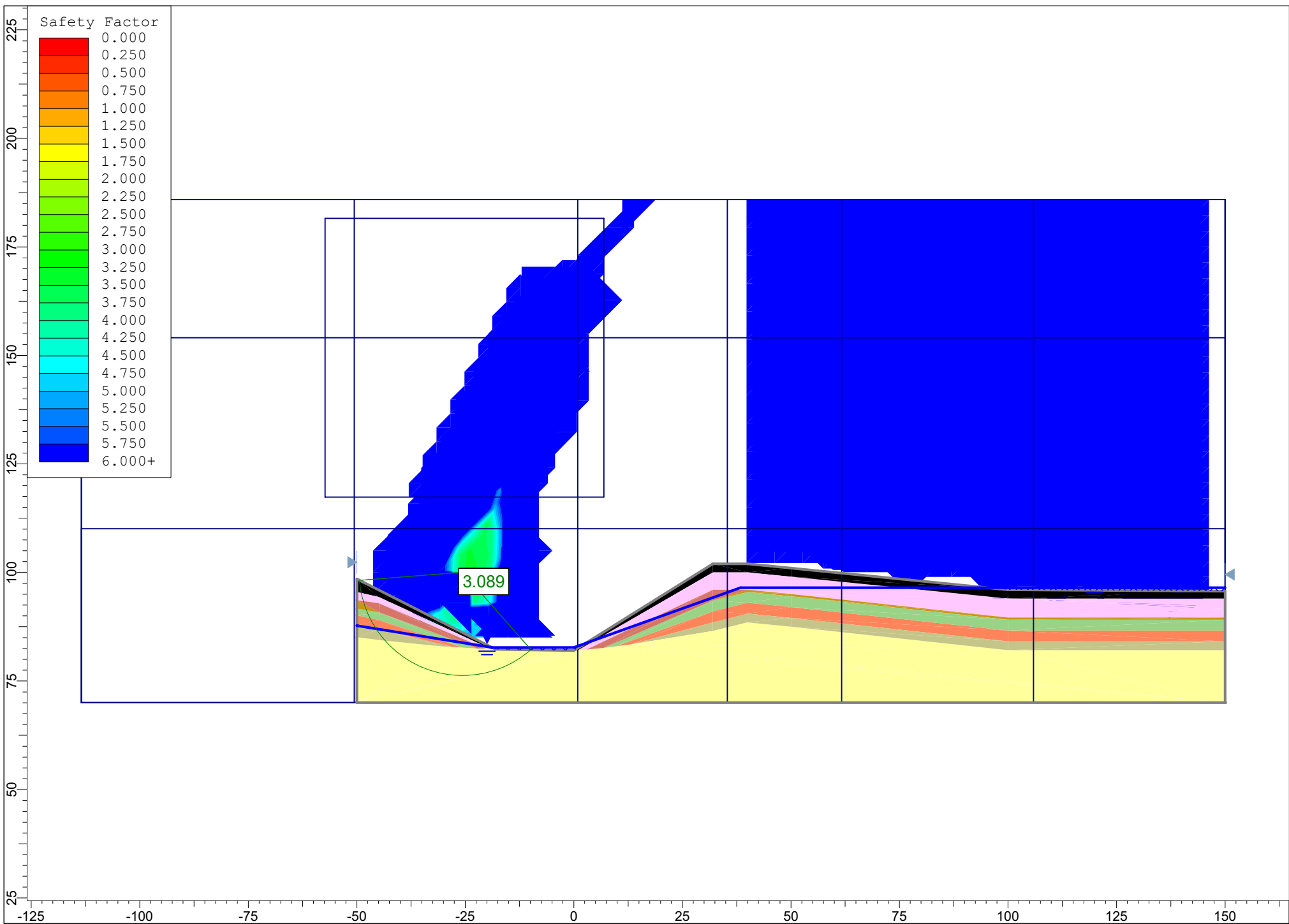


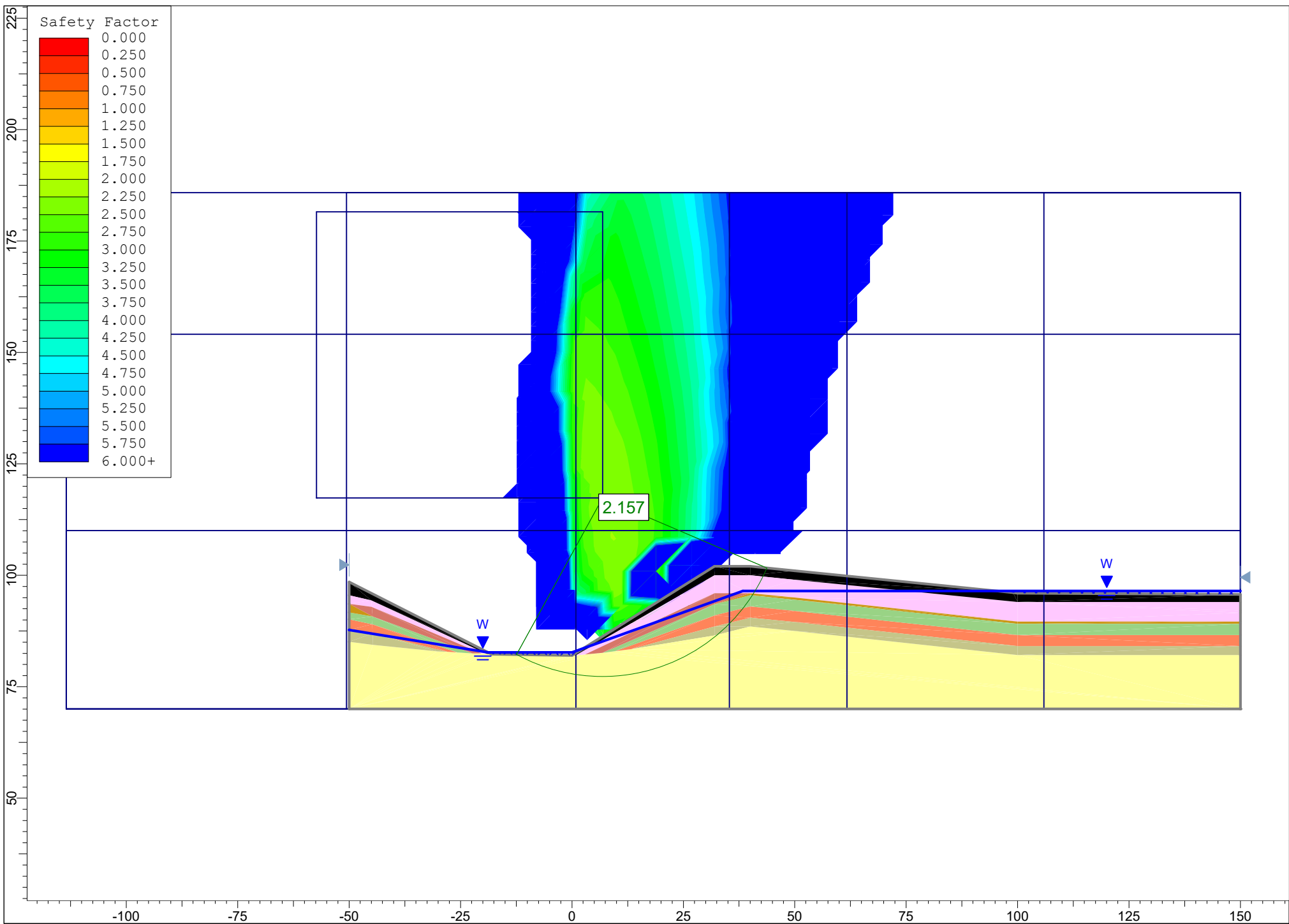


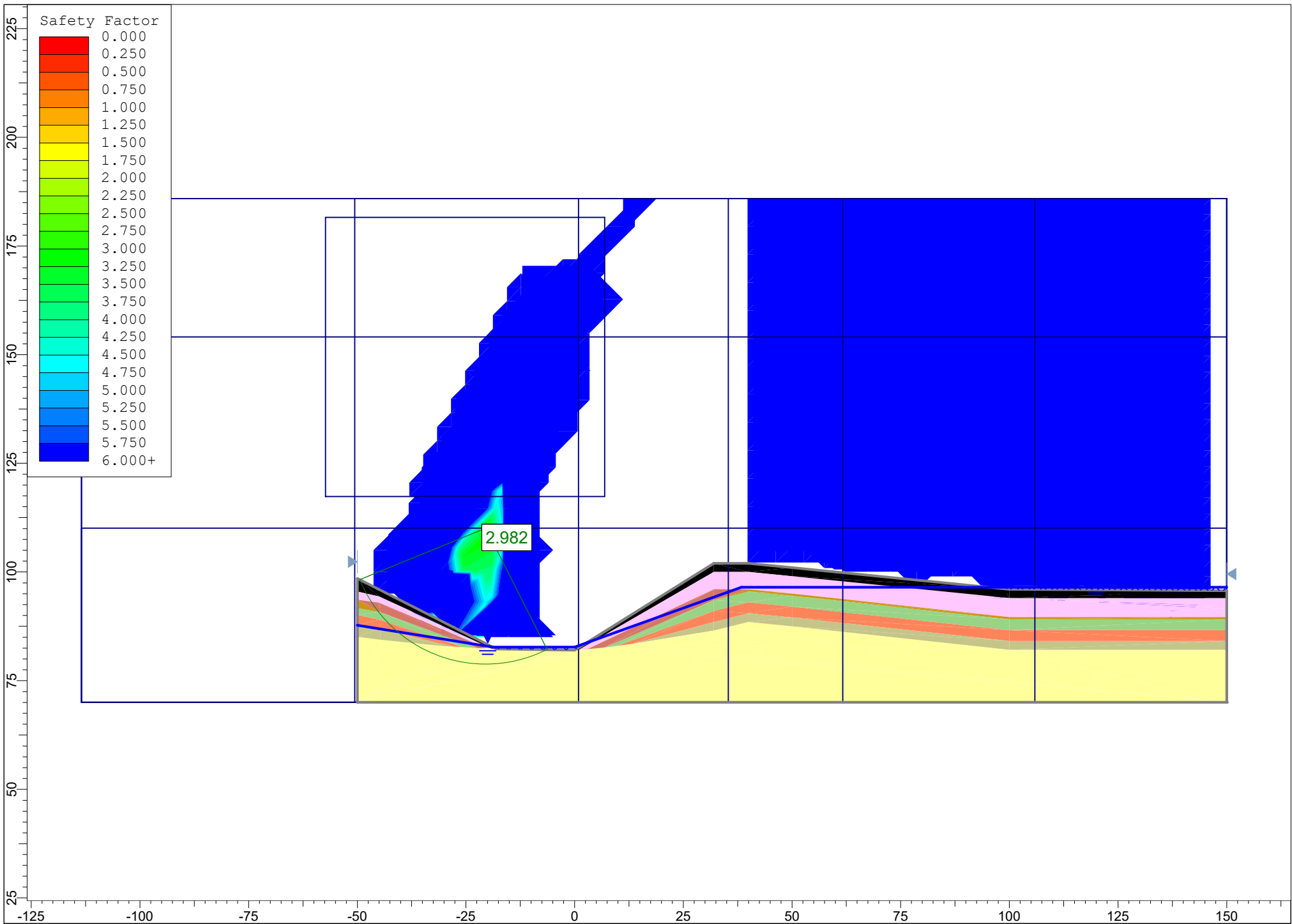


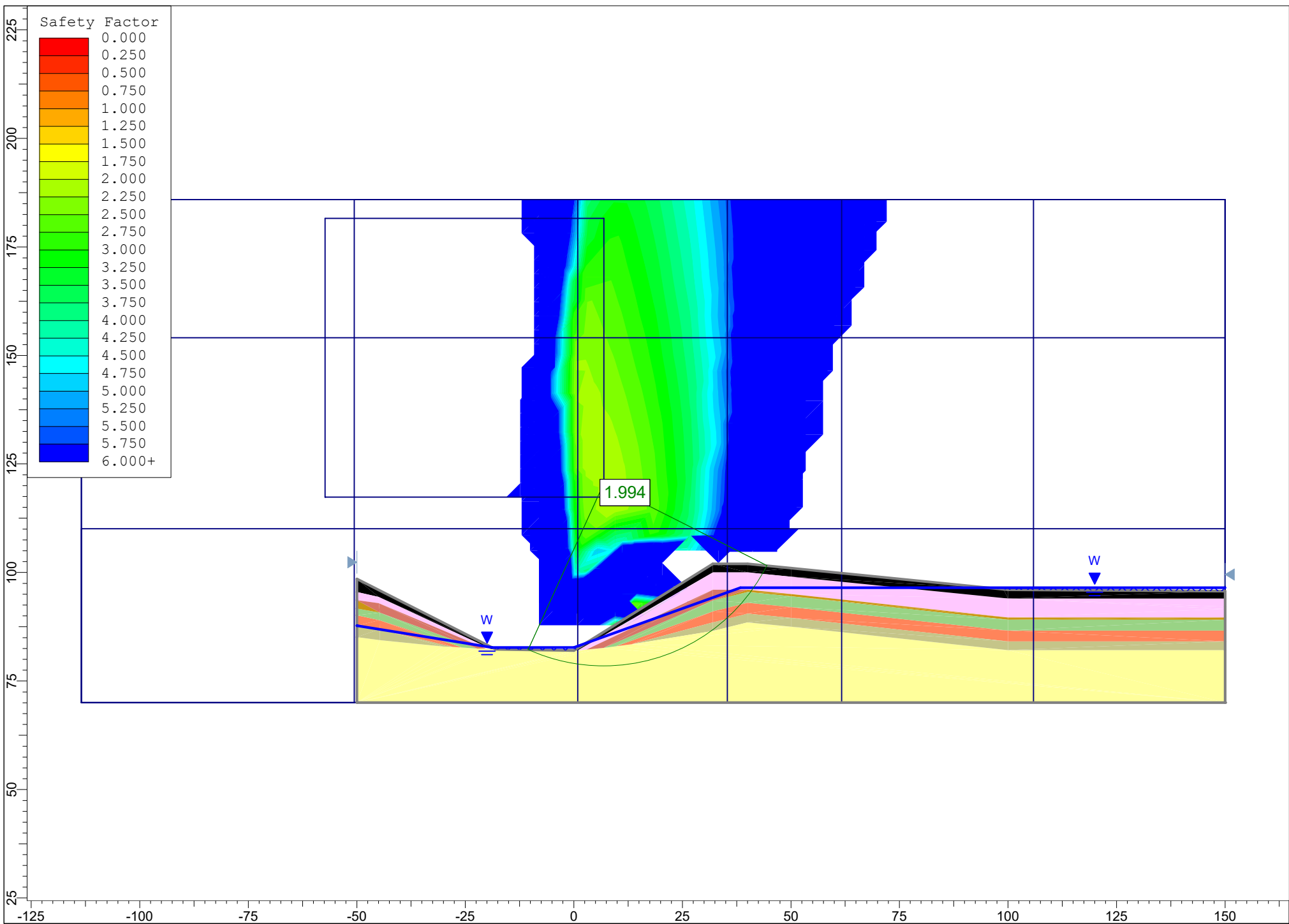


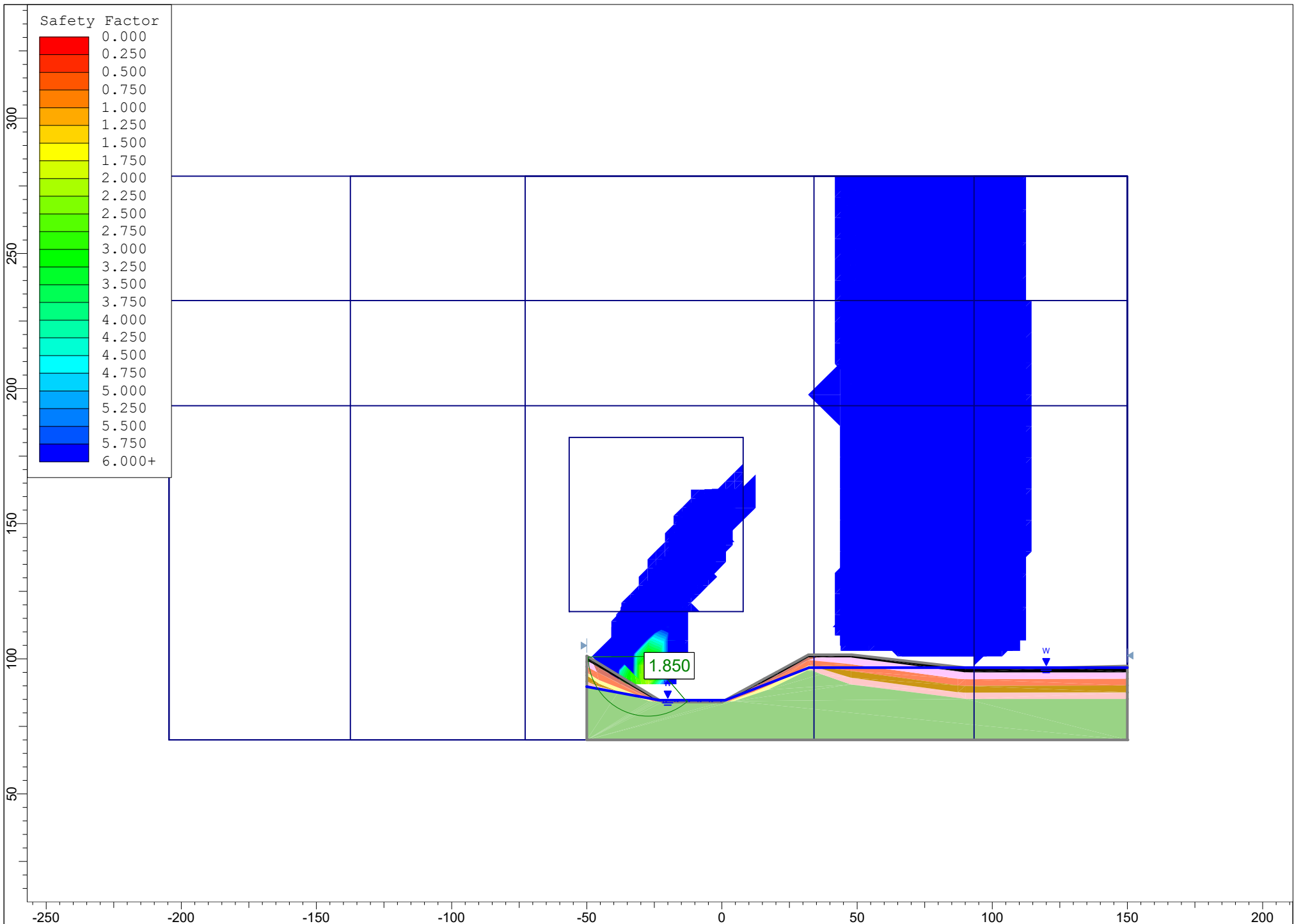


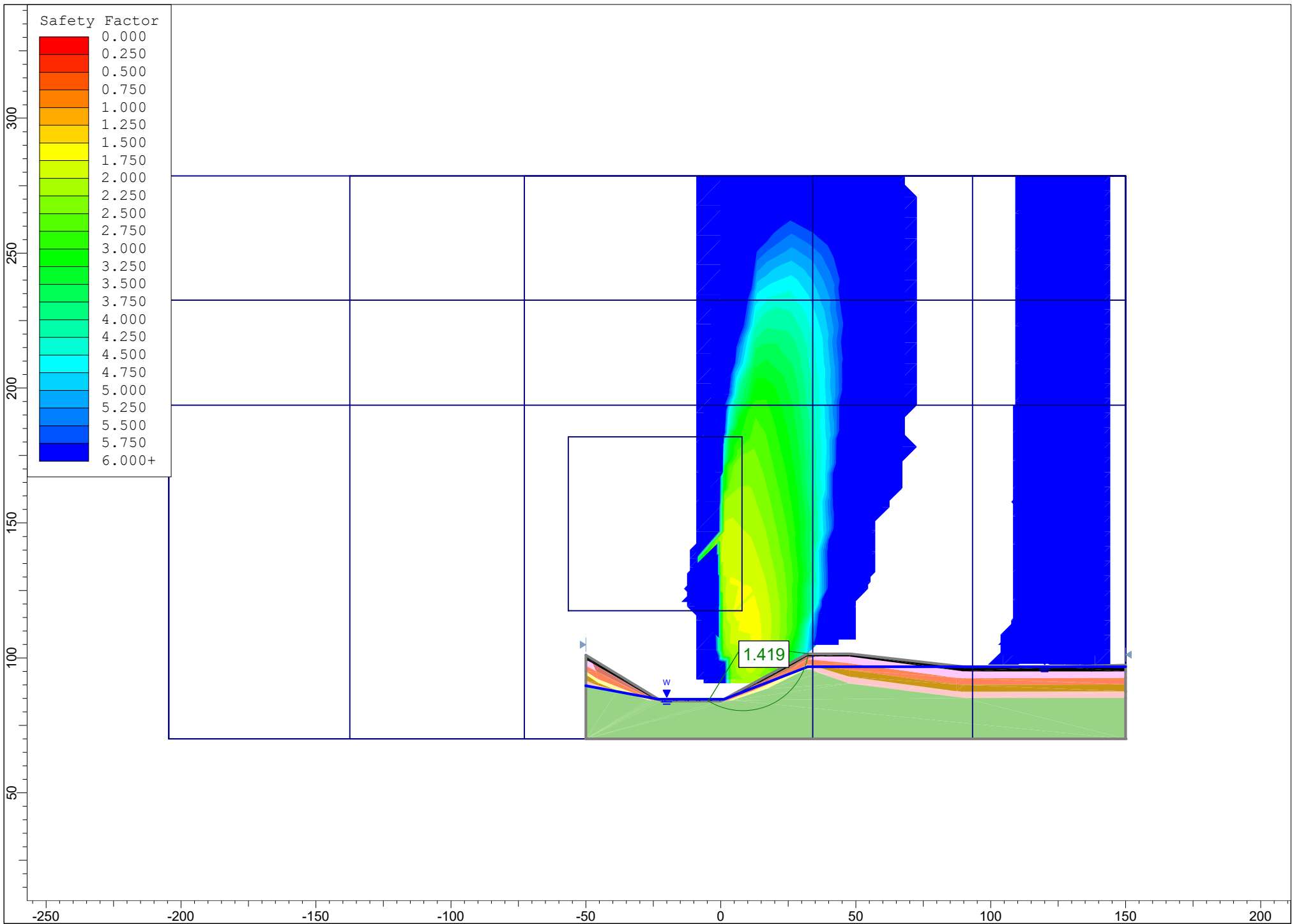


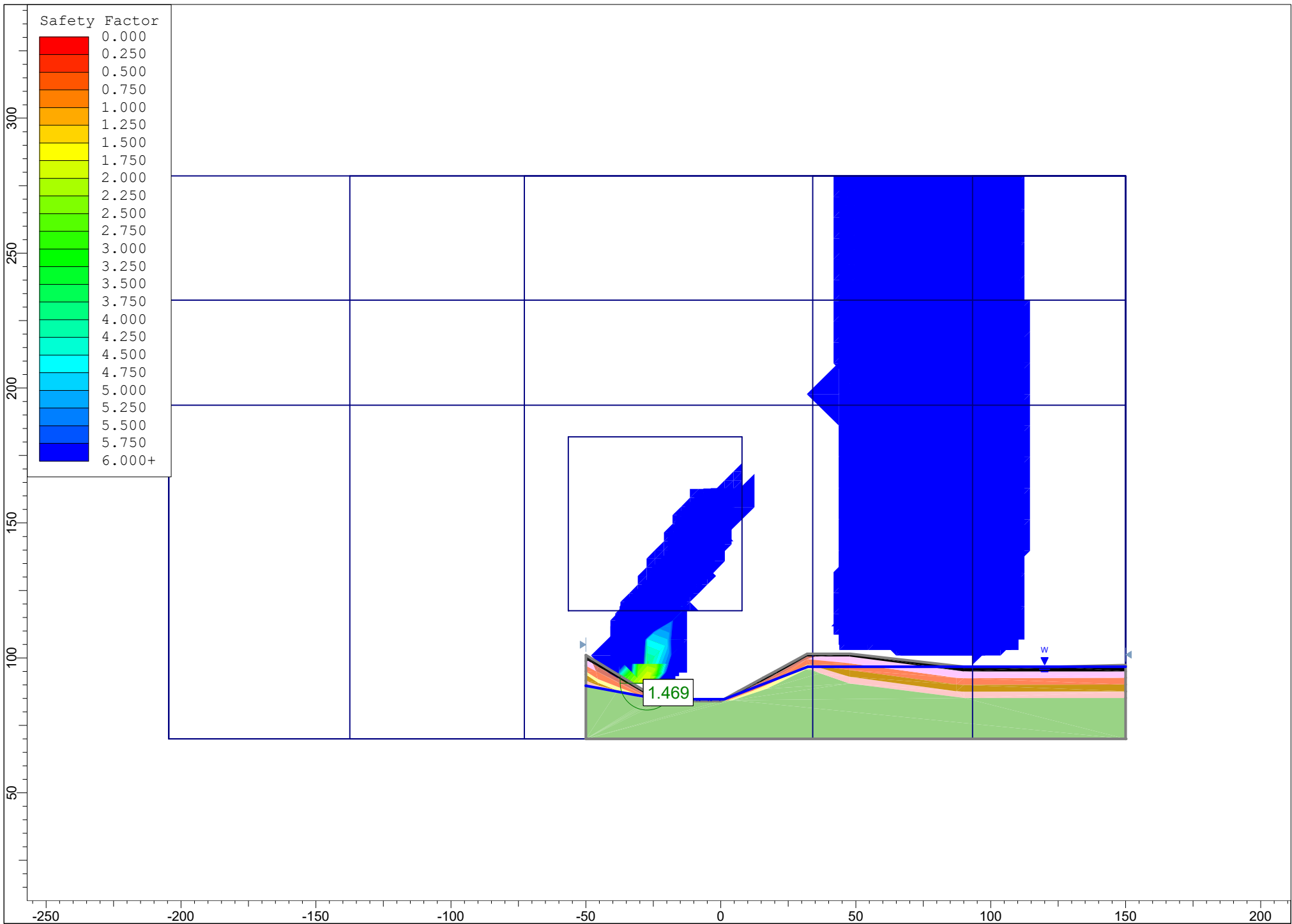


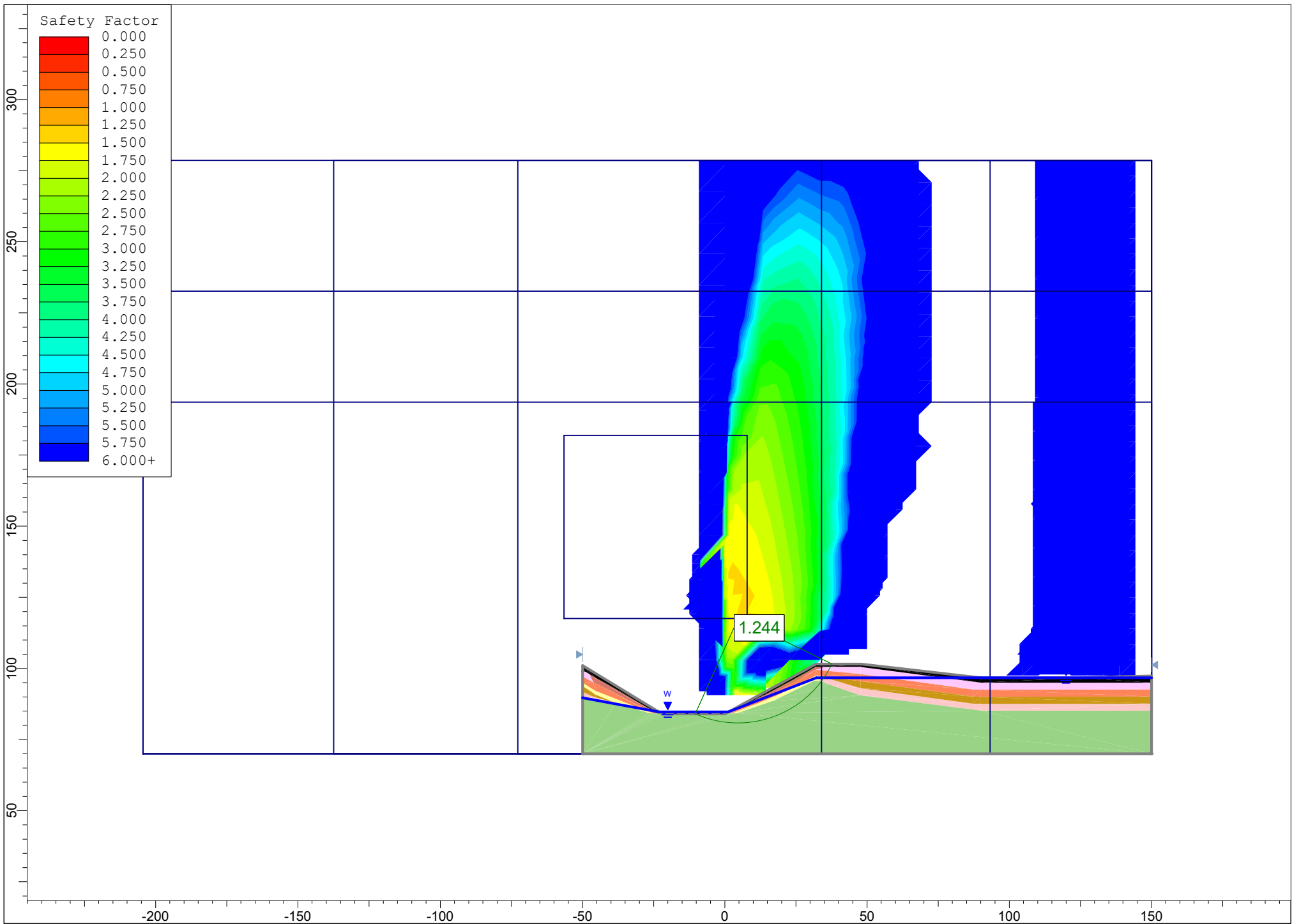












UNIFIED SOIL CLASSIFICATION (ASTM D-2487/2488)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND	
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	Cu>4 AND 1<Cc<3	GW	WELL-GRADED GRAVEL	
			Cu>4 AND 1>Cc>3	GP	POORLY-GRADED GRAVEL	
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL	
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL	
	SANDS >50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	Cu>6 AND 1<Cc<3	SW	WELL-GRADED SAND	
			Cu>6 AND 1>Cc>3	SP	POORLY-GRADED SAND	
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR CL	SM	SILTY SAND	
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND	
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT<50	INORGANIC	PI>7 AND PLOTS>"A" LINE	CL	LEAN CLAY	
			PI>4 AND PLOTS<"A" LINE	ML	SILT	
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OL	ORGANIC CLAY OR SILT	
	SILTS AND CLAYS LIQUID LIMIT>50	INORGANIC	PI PLOTS >"A" LINE	CH	FAT CLAY	
			PI PLOTS <"A" LINE	MH	ELASTIC SILT	
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OH	ORGANIC CLAY OR SILT	
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT	

Relative Proportions of Sand and Gravel	
TERM	PERCENT
Trace	< 15
With	15 - 29
Modifier	> 30
Relative Proportions of Fines	
TERM	PERCENT
Trace	< 5
With	5 - 12
Modifier	> 12
Grain Size Terminology	
TERM	SIZE
Boulder	< 12 in.
Cobble	3 in. - 12 in.
Gravel	#4 sieve to 3 in.
Sand	#200 sieve to #4 sieve
Silt or Clay	Passing #200 sieve

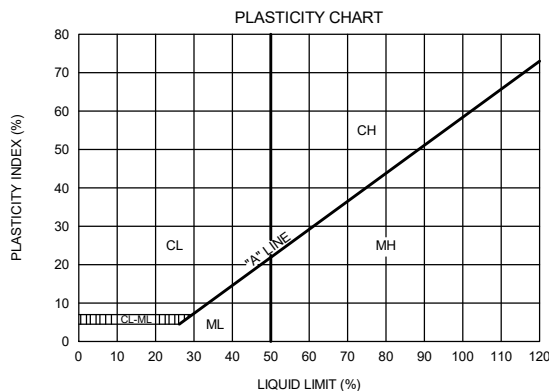
SAMPLE TYPES

- Hollow Stem
 Standard Penetration Test

TEST SYMBOLS

- | | |
|-----------------------------|--|
| MC - MOISTURE CONTENT | LL - LIQUID LIMIT |
| OC - ORGANIC CONTENT | PI - PLASTISITY INDEX |
| CN - CONSOLIDATION | SW - SWELL TEST |
| DD - DRY DENSITY | UU - Unconsolidated Undrained triaxial |
| PP - POCKET PENETROMETER | |
| RV - R-VALUE | |
| SA - SIEVE ANALYSIS | |
| P200 - % PASSING #200 SIEVE | |

- WATER LEVEL (WITH TIME OF MEASUREMENT)



PENETRATION RESISTANCE (RECORDED AS BLOWS / 0.5 FT)				
SAND & GRAVEL		SILT & CLAY		
RELATIVE DENSITY	BLOWS/FOOT*	CONSISTENCY	BLOWS/FOOT*	COMPRESSIVE STRENGTH (TSF)
VERY LOOSE	0 - 4	VERY SOFT	0 - 1	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 3	0.25 - 0.50
MEDIUM DENSE	10 - 30	RATHER SOFT	4 - 5	0.50 - 1.0
DENSE	30 - 50	MEDIUM	6 - 8	
VERY DENSE	OVER 50	RATHER STIFF	9 - 12	1.0 - 2.0
		STIFF	13 - 16	2.0 - 4.0
		VERY STIFF	17 - 30	OVER 4.0
		HARD	OVER 30	

* NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).

Chosen Valley Testing

Job No. 24387.24.IAM

LEGEND TO SOIL DESCRIPTIONS

