

Compass 3™

User Guide

Version: 1.0.0

Prepared for: Rock Mechanics Engineering Applications

Author: Mehdi Amini, P.hD., P.Eng.

Date: *January 2026*

1. Introduction

This software is designed for stereonet-based rock mass characterization and kinematic analysis of rock slopes. It allows users to import joint data, visualize discontinuities, define slope geometries, and perform kinematic failure analyses including planar, wedge, and toppling modes.

2. Main Window

The Main Window is the primary workspace for importing joint data, visualizing stereonet plots, and preparing data for kinematic analysis.

2.1. File Menu



File > Open

Opens an existing project file. The software supports files with the **.pass** extension.



File > New File

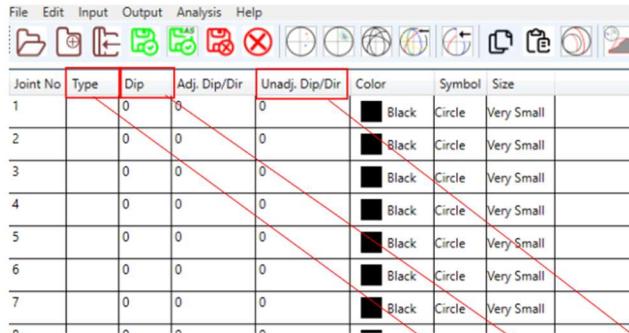
Creates a new project file. The software prompts the user to save the current workspace before clearing all data and opening a clean window.



File > Import Joint Specifications

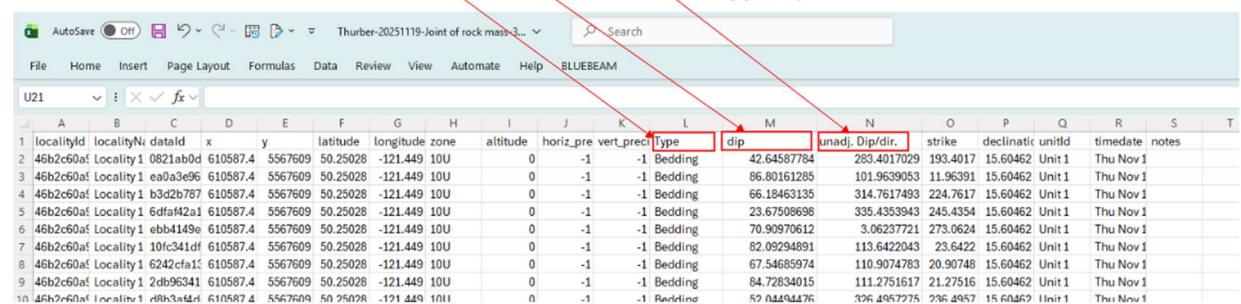
Imports joint data from a **CSV** file.

- The software automatically matches CSV column headers with internal table fields in Compass 3 table including Type, Dip, Unadj. Dip/Dir, Color, Symbol, and Size.
- The number of rows or columns is unrestricted.
- If a required column is not found, default values (e.g., zero, black color, small size) are applied automatically.



Joint No	Type	Dip	Adj. Dip/Dir	Unadj. Dip/Dir	Color	Symbol	Size
1	0	0	0	0	Black	Circle	Very Small
2	0	0	0	0	Black	Circle	Very Small
3	0	0	0	0	Black	Circle	Very Small
4	0	0	0	0	Black	Circle	Very Small
5	0	0	0	0	Black	Circle	Very Small
6	0	0	0	0	Black	Circle	Very Small
7	0	0	0	0	Black	Circle	Very Small

Compass 3 Table



Thurber-20251119-Joint of rock mass 3...																	Search		
File Home Insert Page Layout Formulas Data Review View Automate Help BLUEBEAM																			
U21																			
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	localityId	localityNr	dataId	x	y	latitude	longitude	zone	altitude	horiz_pre	vert_prec	Type	dip	unadj. Dip/Dir	strike	declinatıc	unitId	timedate	notes
2	46b2c60af	Locality1	0821ab0d	610587.4	5567609	50.25028	-121.449	10U	0	-1	-1	Bedding	42.64587784	283.4017029	193.4017	15.60462	Unit 1	Thu Nov 1	
3	46b2c60af	Locality1	ea0a3e9e	610587.4	5567609	50.25028	-121.449	10U	0	-1	-1	Bedding	86.80161285	101.9639053	11.96391	15.60462	Unit 1	Thu Nov 1	
4	46b2c60af	Locality1	b3d2b787	610587.4	5567609	50.25028	-121.449	10U	0	-1	-1	Bedding	66.18463135	314.7617493	224.7617	15.60462	Unit 1	Thu Nov 1	
5	46b2c60af	Locality1	6dfa42a1	610587.4	5567609	50.25028	-121.449	10U	0	-1	-1	Bedding	23.67508698	335.4353943	245.4354	15.60462	Unit 1	Thu Nov 1	
6	46b2c60af	Locality1	ebb4149e	610587.4	5567609	50.25028	-121.449	10U	0	-1	-1	Bedding	70.90970612	3.06237721	273.0624	15.60462	Unit 1	Thu Nov 1	
7	46b2c60af	Locality1	10fc341df	610587.4	5567609	50.25028	-121.449	10U	0	-1	-1	Bedding	82.09294891	113.6422043	23.6422	15.60462	Unit 1	Thu Nov 1	
8	46b2c60af	Locality1	6242cf1c	610587.4	5567609	50.25028	-121.449	10U	0	-1	-1	Bedding	67.54685974	110.9074783	20.90748	15.60462	Unit 1	Thu Nov 1	
9	46b2c60af	Locality1	2d96341	610587.4	5567609	50.25028	-121.449	10U	0	-1	-1	Bedding	84.72834015	111.2751617	21.27516	15.60462	Unit 1	Thu Nov 1	
10	46b2c60af	Locality1	dRb3nd4r1	610587.4	5567609	50.25028	-121.449	10U	0	-1	-1	Bedding	52.04494476	326.4957725	29.4957	15.60462	Unit 1	Thu Nov 1	



File > Save Current State

Saves the current project.

- If the file has been previously saved, it overwrites the existing file.
- Otherwise, the user is prompted to select a name and directory.
- If the Compass 3 logo does not appear on the file, right-click on the saved file, select **Properties**, and set the file to open with **Compass 3**. This step only needs to be done once. After that, your computer will recognize all Compass 3 files automatically in the future.



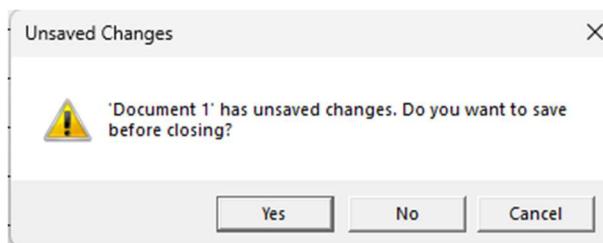
File > Save Current State As

Prompts the user to select a directory and filename to save the project.



File > Cancel Changes and Close

Discards all unsaved changes and closes the window after user confirmation.





File → Close Window

Closes the active window after warning and user approval.

2.2. Table Menu

This menu is located below the table.

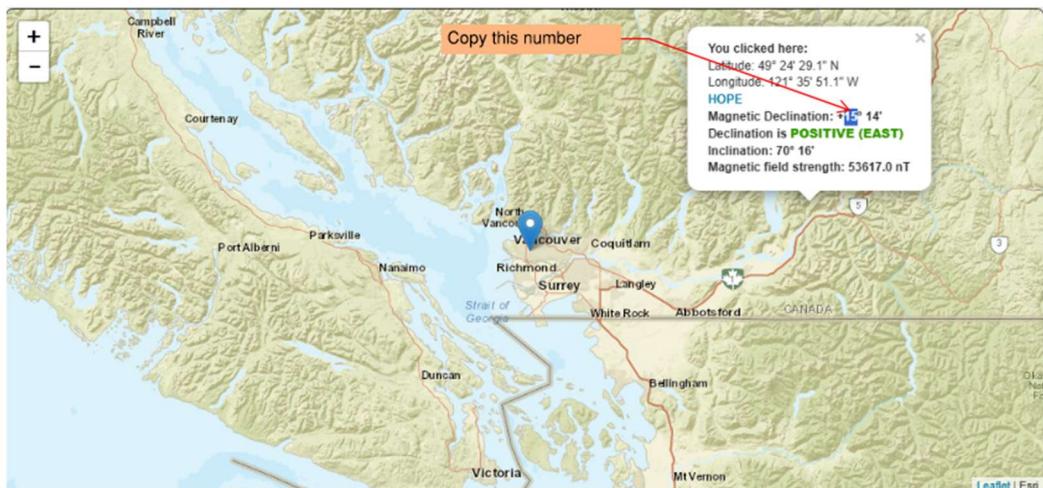
17	0	0	0		Black	Circle	Very Small	
18	0	0	0		Black	Circle	Very Small	
19	0	0	0		Black	Circle	Very Small	
20	0	0	0		Black	Circle	Very Small	
21	0	0	0		Black	Circle	Very Small	
22	0	0	0		Black	Circle	Very Small	

Declination Angle (°):

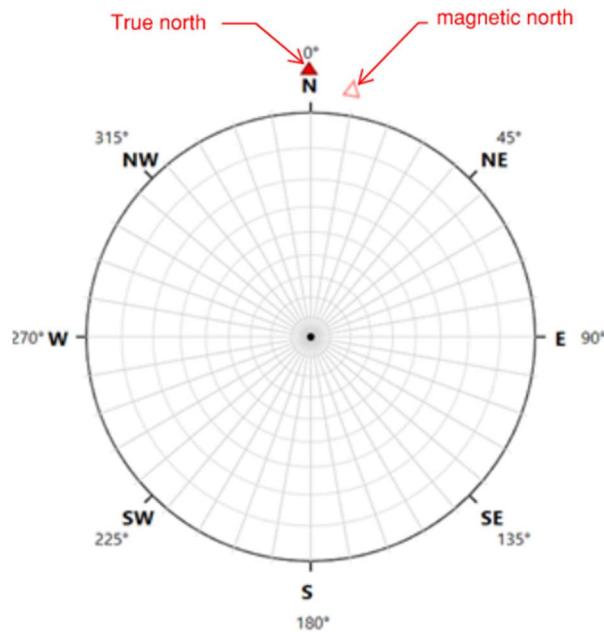
Declination Angle

Defines the declination angle (the difference between true north and magnetic north).

Enter the value in the text box based on the project location. If you do not know the value, click the question mark icon. This will direct you to a website where you can find the declination angle by locating your project area and left-clicking on the map. The declination angle will be displayed. Copy and paste the value into the text box. The maximum allowed input is two digits.

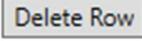


Adjusts the dip direction based on the entered declination angle and updates the values in the table. Two red triangles on the stereonet indicate the true north and magnetic north directions.



Add Row 

The table initially contains 100 rows. Clicking Add Row adds an additional row to the table.

Delete Row 

Deletes the selected row from the table and automatically renumeres the remaining rows.

2.3. Edit Menu



Edit > Copy

Copies joint specifications from the table. The copied data can be pasted into Excel.



Edit > Paste

Pastes joint specifications from Excel into the software table.

Required columns:

- Joint Type
- Dip
- Unadjusted Dip Direction
- Only copy the numbers not headers.
-



Edit > Reset View

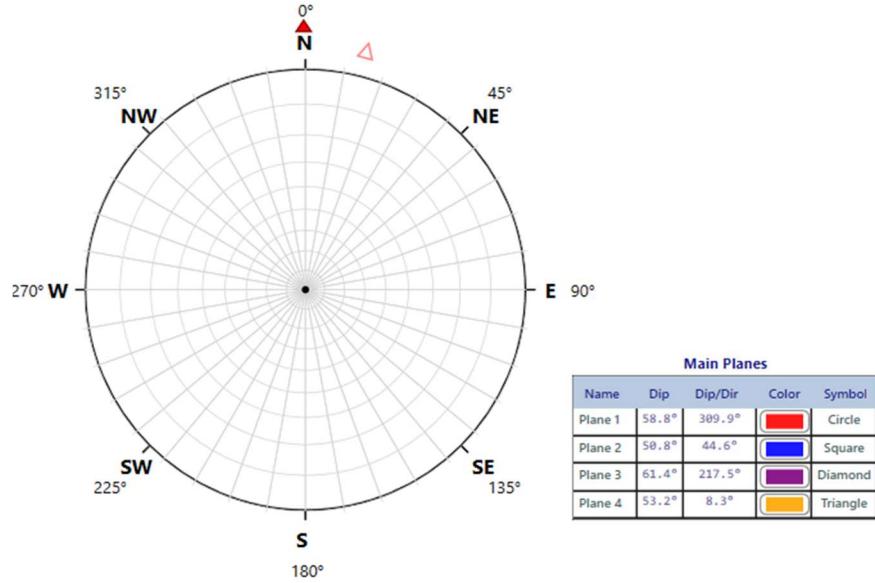
Resets the stereonet scale and position to its default state.

2.4. Input Menu

Input → Load Main Planes

Loads previously defined main planes from the Kinematic Analysis Window into the Main Window.

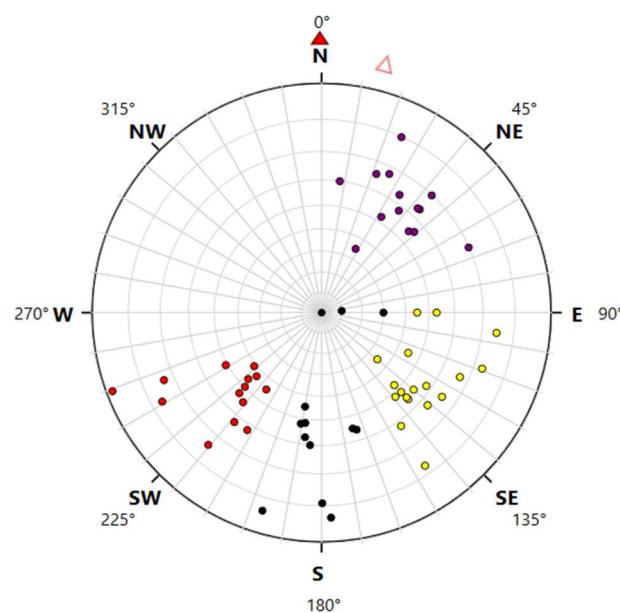
Main discontinuities must be defined and saved in the Kinematic Analysis Window before loading.



2.5. Output Menu

Output → Draw Poles

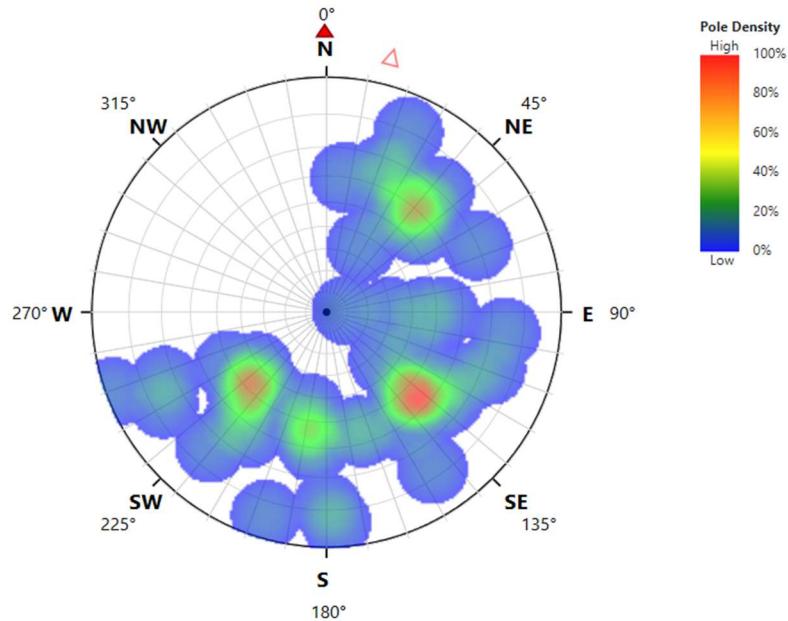
Plots joint poles on the stereonet.





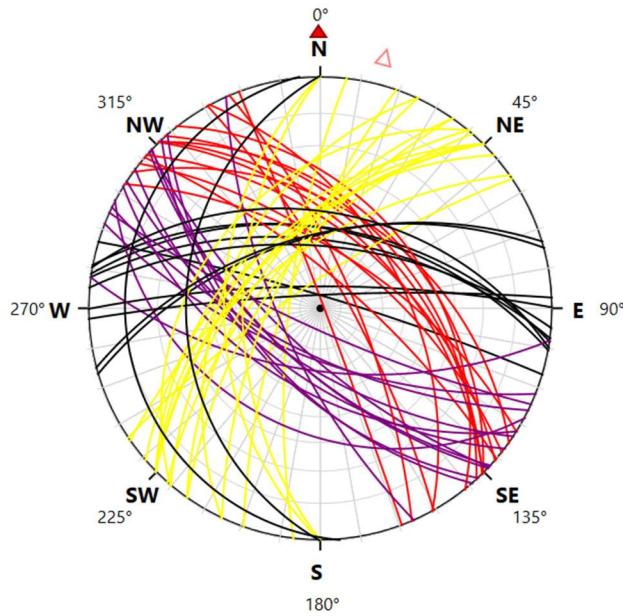
Output > Draw Contours

Generates contour plots of joint density on the stereonet.



Output > Draw Planes

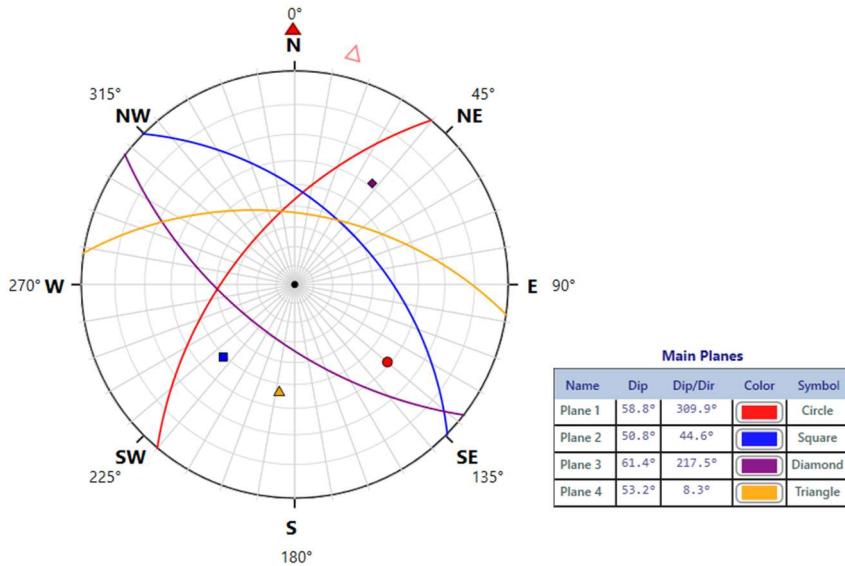
Draws great circles for all joint sets on the stereonet.





Output → Draw Main Loaded Planes

Draws great circles for the main rock mass discontinuities loaded using *Input → Load Main Planes*.



2.6. Analysis Menu



Analysis → Kinematic Analysis

Opens the Kinematic Analysis Window.



Analysis → Limit Equilibrium Analysis

Not available in this version. It is under development.



Analysis → Photogrammetry Menu

Not available in this version. It is under development.



3. Kinematic Analysis Window

The Kinematic Analysis Window is used for slope definition, 3D visualization, and kinematic failure evaluation.

3.1. File Menu



File → Save

Saves the current state of the Kinematic Analysis Window.

Note: Saved data persists only while the software remains open.



File → Cancel

Cancels all changes and closes the window after user confirmation.



File → Close Window

Closes the window after warning and user approval.

3.2. Edit Menu



Edit → Delete Selected Plane

Removes a selected plane or cross section from the tables and views.

3.3. Input Menu



Input → Load Stereonet

Loads joint poles and contours from the Main Window into the stereonet.

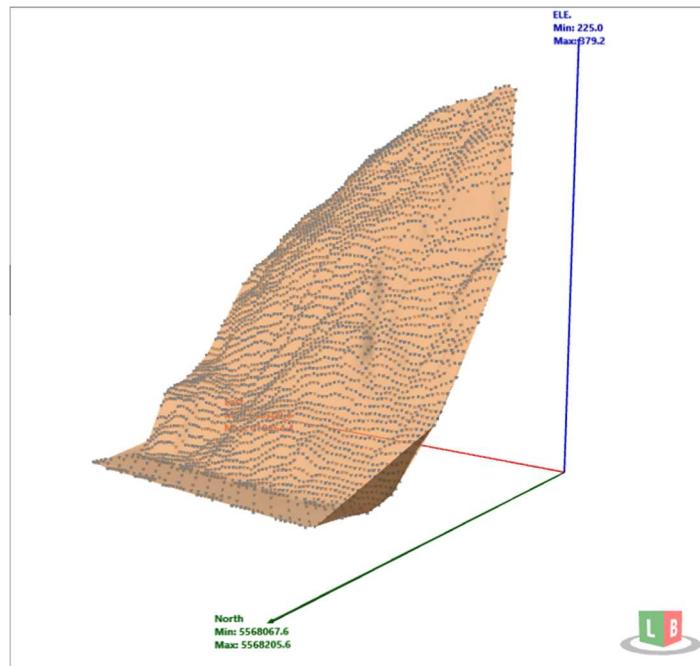


Input → Load Ground Surface

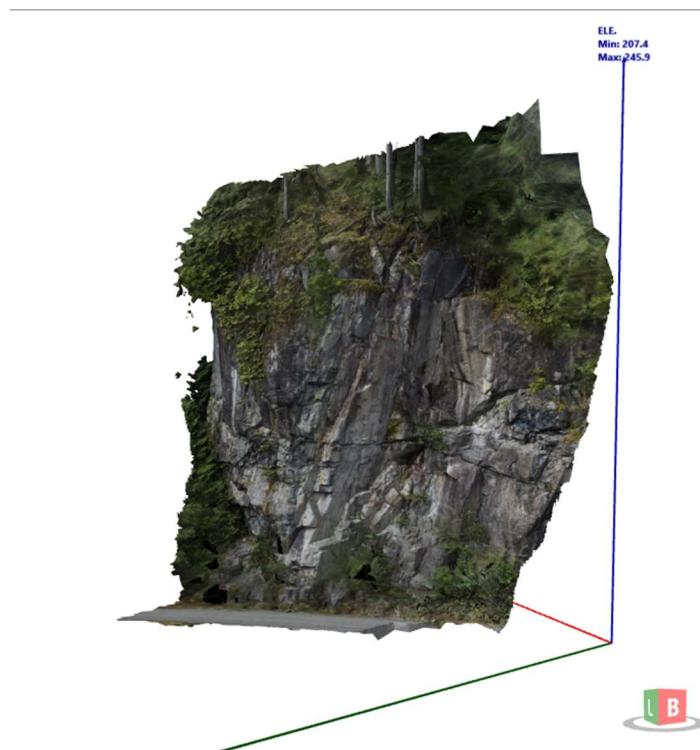
Imports ground surface data from:

- CSV file (in x, y, z format with no header and notes)

	A	B	C	D	E	F	G	H	I	J	K
1	610314.4	5568194	236.88								
2	610314.4	5568192	236.831								
3	610314.4	5568190	236.736								
4	610314.4	5568188	236.504								
5	610312.4	5568184	236.199								
6	610314.4	5568186	236.079								



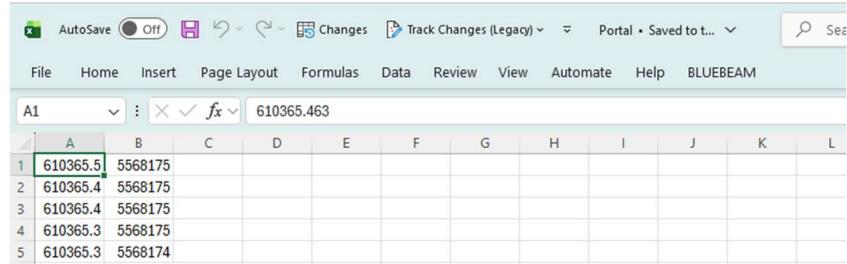
Input → Load Photogrammetry Model
Imports photogrammetry model in and OBJ format



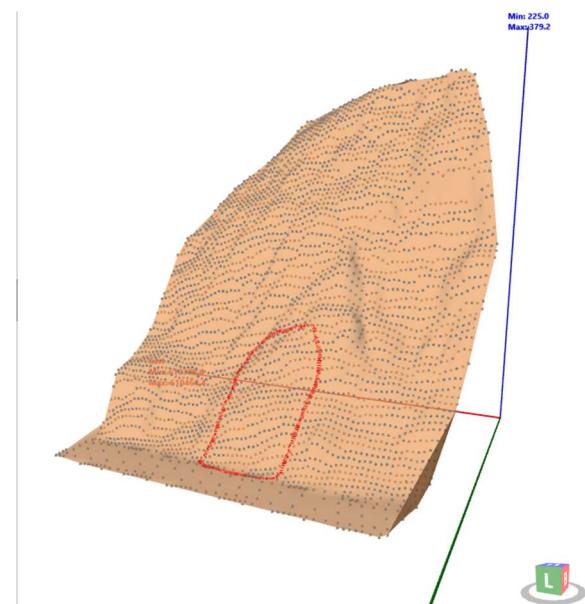


Input > Load New Features

Adds linear features to the ground surface using a CSV file containing x and y coordinates only. The software automatically offsets the feature onto the surface. Make sure you have enough points to form a good feature.

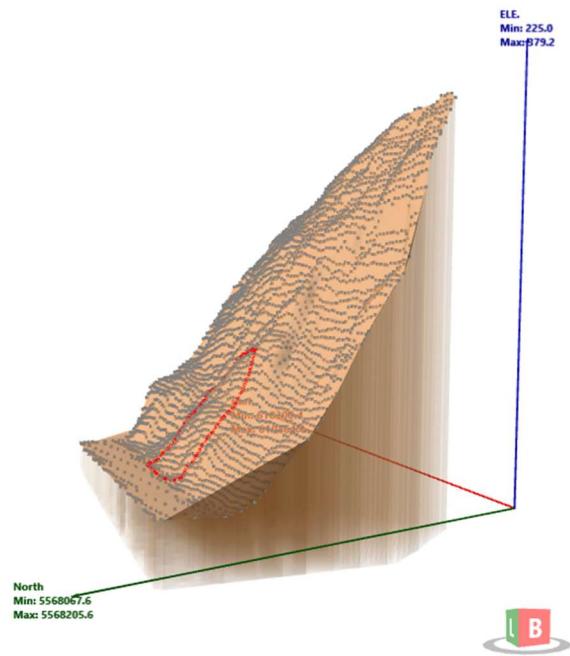


	A	B	C	D	E	F	G	H	I	J	K	L
1	610365.5	5568175										
2	610365.4	5568175										
3	610365.4	5568175										
4	610365.3	5568175										
5	610365.3	5568174										



Input > Add Boundary

Extrudes the ground surface to create a transparent 3D volume or slice.



Input → Delete Boundary

Removes the extruded boundary and displays only the ground surface.

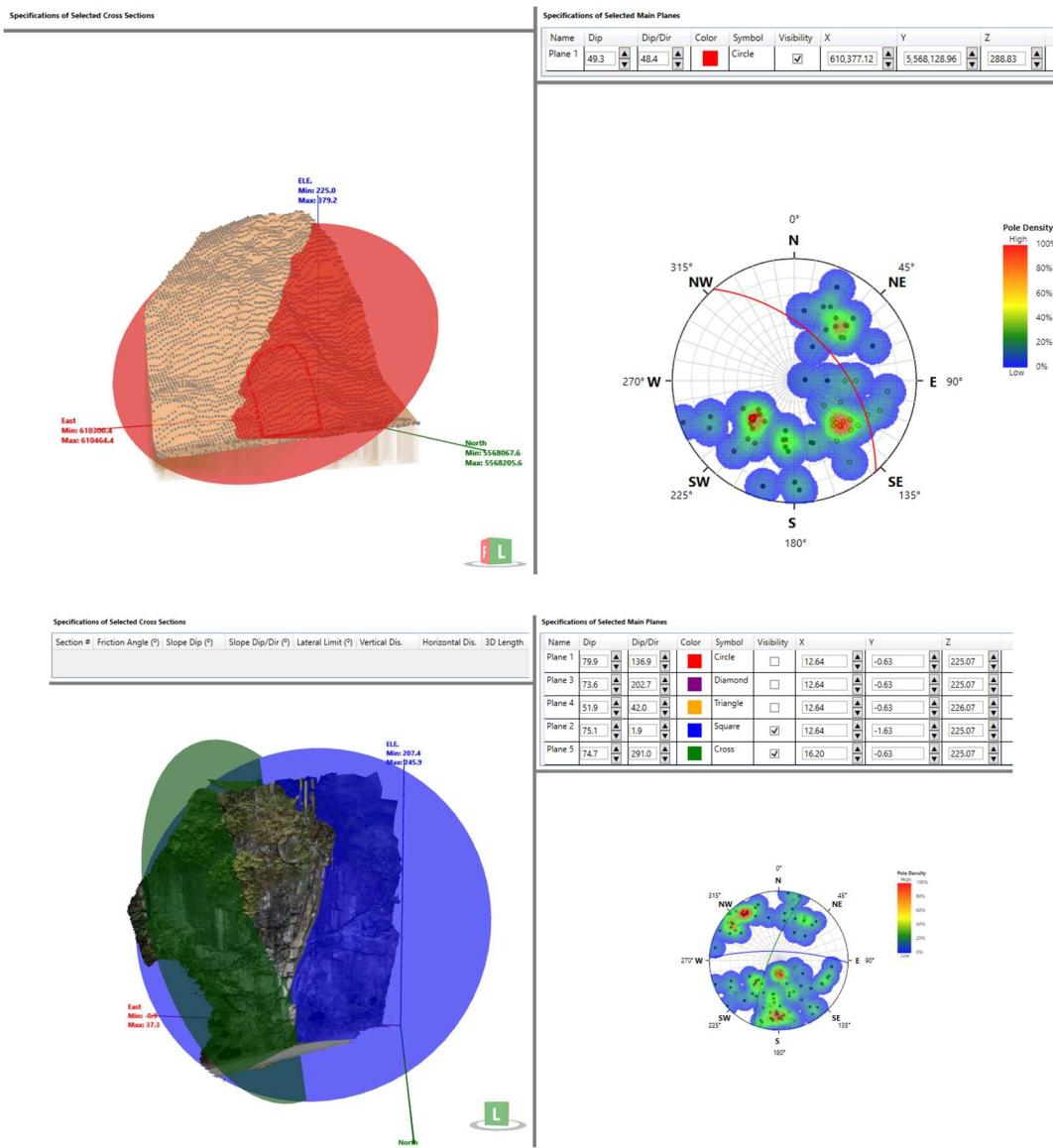
3.4. Output Menu



Output → Select Main Planes

Allows manual selection of planes directly on the stereonet.

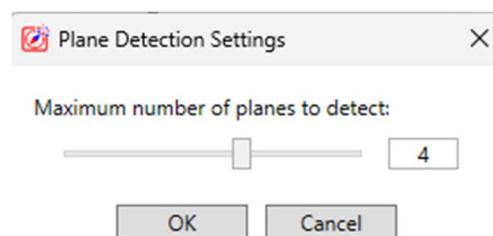
- Clicking adds a pole, great circle, and corresponding 3D plane.
- Plane location and orientation can be edited from the table (dip, dip direction, x, y, z).

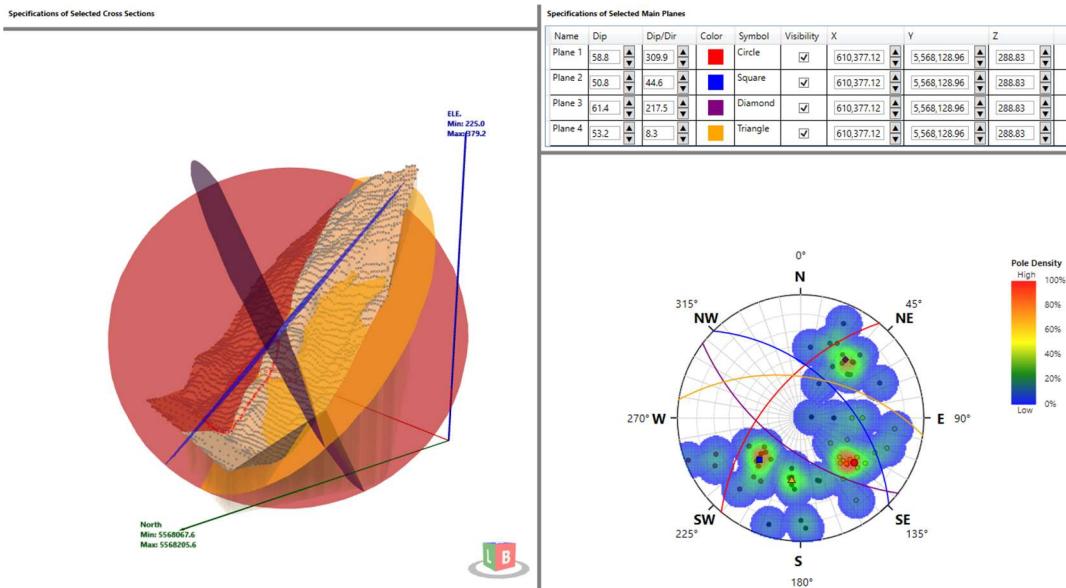


Output → Detect Main Planes

Automatically detects dominant discontinuity sets.

- User selects the number of planes (1–6, default = 4).
- Detected planes can be edited or deleted.



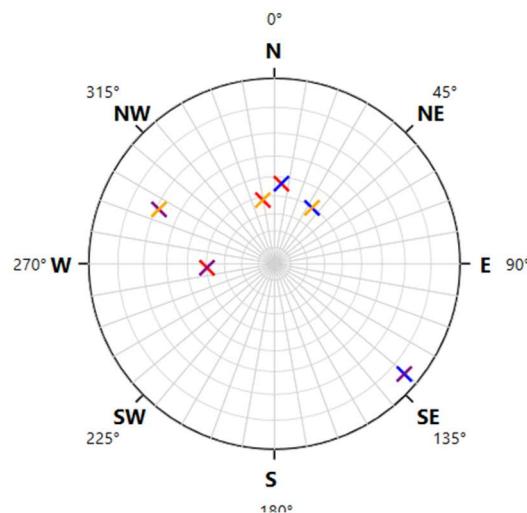


Output → Main Planes Intersections

Displays intersections of main discontinuities as color-coded crosses on the stereonet.

Specifications of Selected Main Planes

Name	Dip	Dip/Dir	Color	Symbol	Visibility	X	Y	Z
Plane 1	58.8	309.9	Red	Circle	<input checked="" type="checkbox"/>	610,377.12	5,568,128.96	288.83
Plane 2	50.8	44.6	Blue	Square	<input checked="" type="checkbox"/>	610,377.12	5,568,128.96	288.83
Plane 3	61.4	217.5	Magenta	Diamond	<input checked="" type="checkbox"/>	610,377.12	5,568,128.96	288.83
Plane 4	53.2	8.3	Yellow	Triangle	<input checked="" type="checkbox"/>	610,377.12	5,568,128.96	288.83





Output → Cross Section

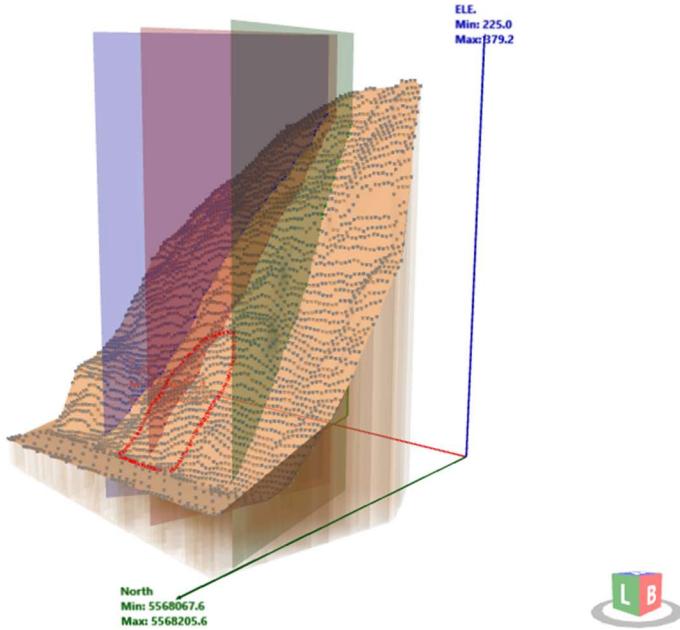
Creates a cross section by selecting two points on the ground surface.
Make sure the first point is higher than the second.

The table displays:

- Average slope angle
- Dip direction of the slope
- Vertical distance between two points
- Horizontal distance between two points
- 3D length between two points
- Friction angle
- Lateral limits

Specifications of Selected Cross Sections

Section #	Friction Angle (°)	Slope Dip (°)	Slope Dip/Dir (°)	Lateral Limit (°)	Vertical Dis.	Horizontal Dis.	3D Length	Color
#1	40°	54.1°	35°	20°	135.69	98.47	167.65	■
#2	40°	55.6°	16°	20°	131.69	90.80	159.96	■
#3	40°	53.6°	350°	20°	125.63	93.75	156.76	■

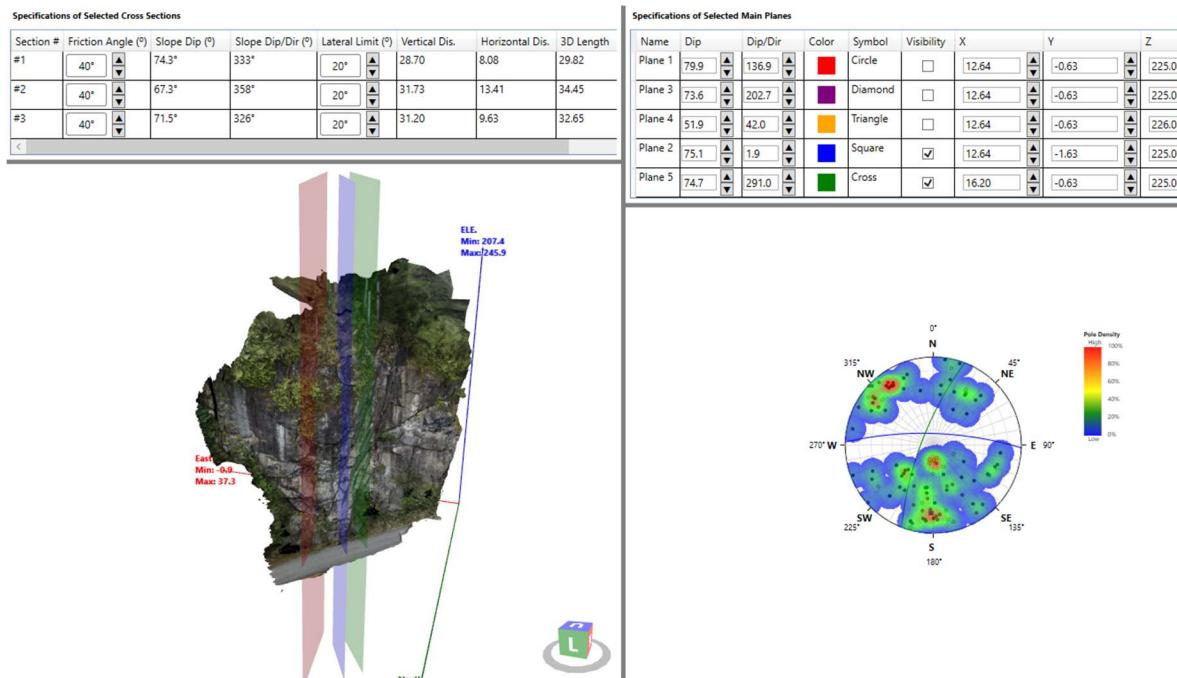
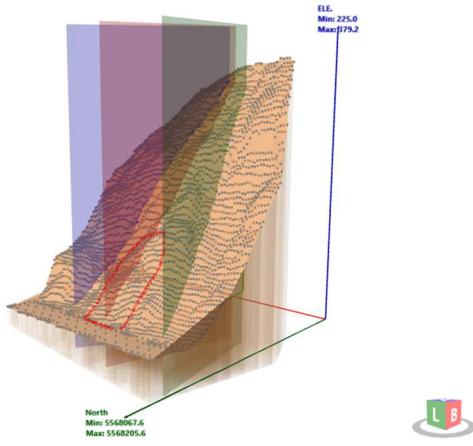


Output → Draw Rock Slopes

Draws great circles of cross sections on the stereonet.

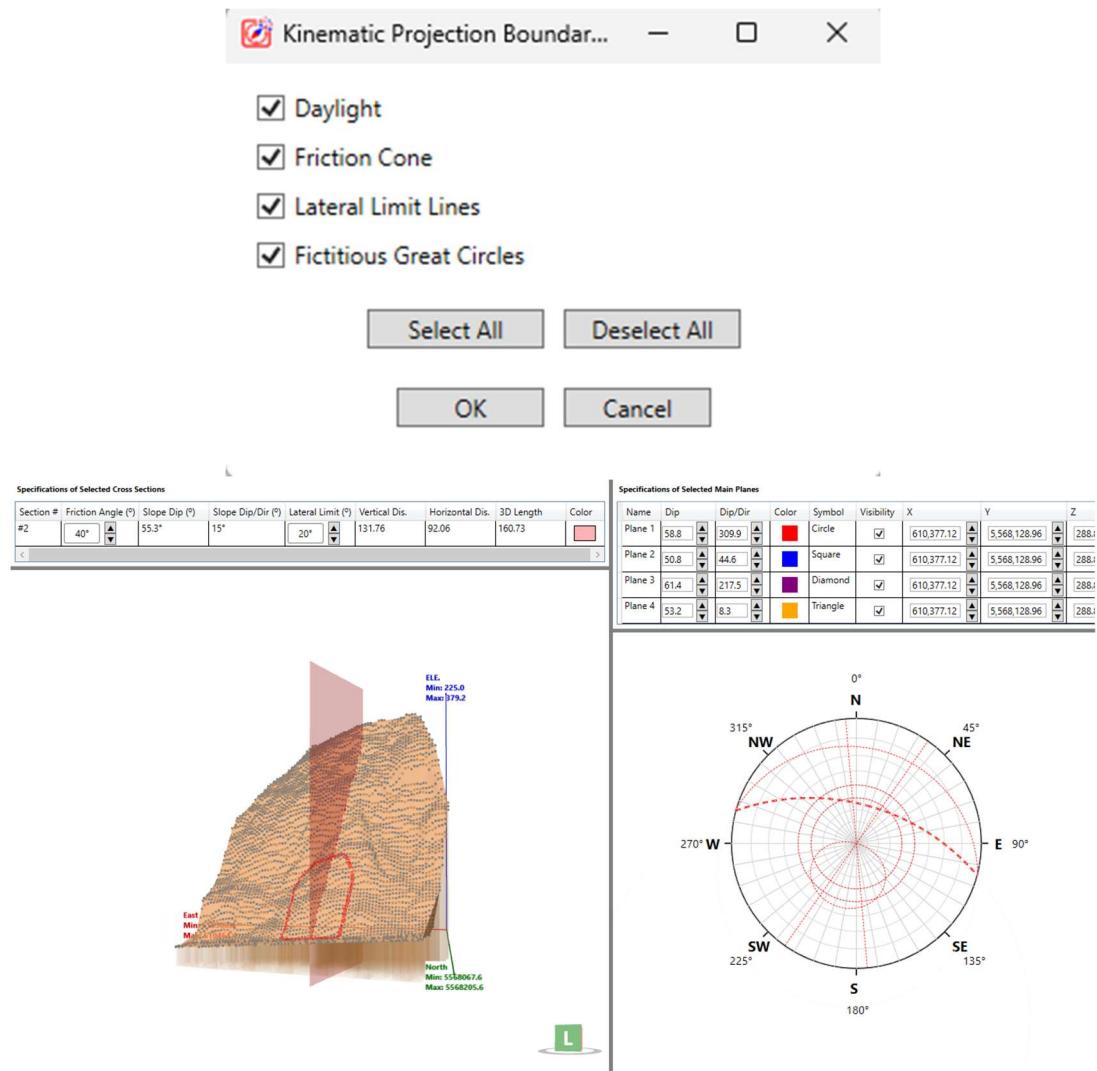
Specifications of Selected Cross Sections								
Section #	Friction Angle (°)	Slope Dip (°)	Slope Dip/Dir (°)	Lateral Limit (°)	Vertical Dis.	Horizontal Dis.	3D Length	Color
#1	40°	54.1°	35°	20°	135.69	98.47	167.65	Blue
#2	40°	55.6°	16°	20°	131.69	90.80	159.96	Red
#3	40°	53.6°	350°	20°	125.63	93.75	156.76	Green

Specifications of Selected Main Planes							
Name	Dip	Dip/Dir	Color	Symbol	Visibility	X	Z
Plane 1	58.8	309.9	Red	Circle	✓	610.377.12	5,568.128.96
Plane 2	50.8	44.6	Blue	Square	✓	610.377.12	5,568.128.96
Plane 3	61.4	217.5	Magenta	Diamond	✓	610.377.12	5,568.128.96
Plane 4	53.2	8.3	Yellow	Triangle	✓	610.377.12	5,568.128.96



Output → Kinematic Projection Boundaries

Adds friction cones, lateral limits, daylight envelopes, and fictitious great circles after user confirmation.



Output → Kinematic Projection



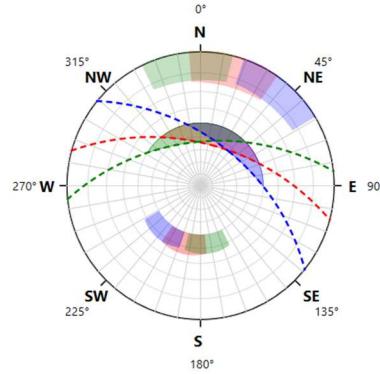
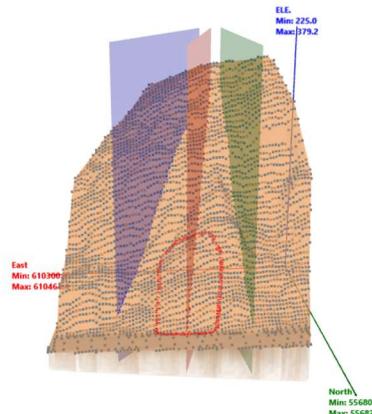
Generates kinematic failure envelopes based on selected failure modes:

- Planar
- Wedge
- Toppling

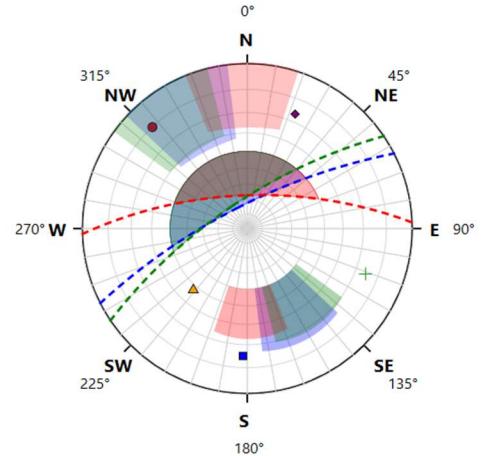
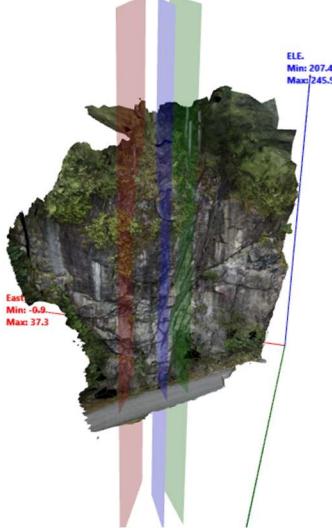
Kinematic Analysis Options							
<input checked="" type="checkbox"/>	Plane Failure	<input checked="" type="checkbox"/>	Wedge Failure	<input checked="" type="checkbox"/>	Toppling Failure	<input type="button" value="Select All"/>	<input type="button" value="Deselect All"/>
< >							
<input type="button" value="OK"/> <input type="button" value="Cancel"/>							

Specifications of Selected Cross Sections							
Section #	Friction Angle (°)	Slope Dip (°)	Slope Dip/Dir (°)	Lateral Limit (°)	Vertical Dis.	Horizontal Dis.	3D Length
#2	40°	55.3°	15°	20°	131.76	92.06	160.73

Specifications of Selected Main Planes							
Name	Dip	Dip/Dir	Color	Symbol	Visibility	X	Y
Plane 1	58.8	309.9	Red	Circle	✓	610.377.12	5,568.128.96
Plane 2	50.8	44.6	Blue	Square	✓	610.377.12	5,568.128.96
Plane 3	61.4	217.5	Magenta	Diamond	✓	610.377.12	5,568.128.96
Plane 4	53.2	8.3	Yellow	Triangle	✓	610.377.12	5,568.128.96

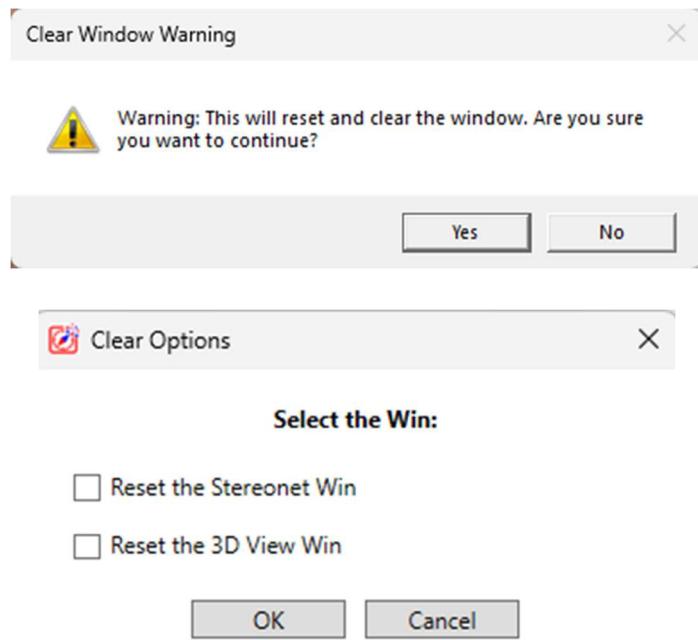


Specifications of Selected Cross Sections							
Section #	Friction Angle (°)	Slope Dip (°)	Slope Dip/Dir (°)	Lateral Limit (°)	Vertical Dis.	Horizontal Dis.	3D Length
#1	40°	74.3°	333°	20°	28.70	8.08	29.82
#2	40°	67.3°	358°	20°	31.73	13.41	34.45
#3	40°	71.5°	326°	20°	31.20	9.63	32.65



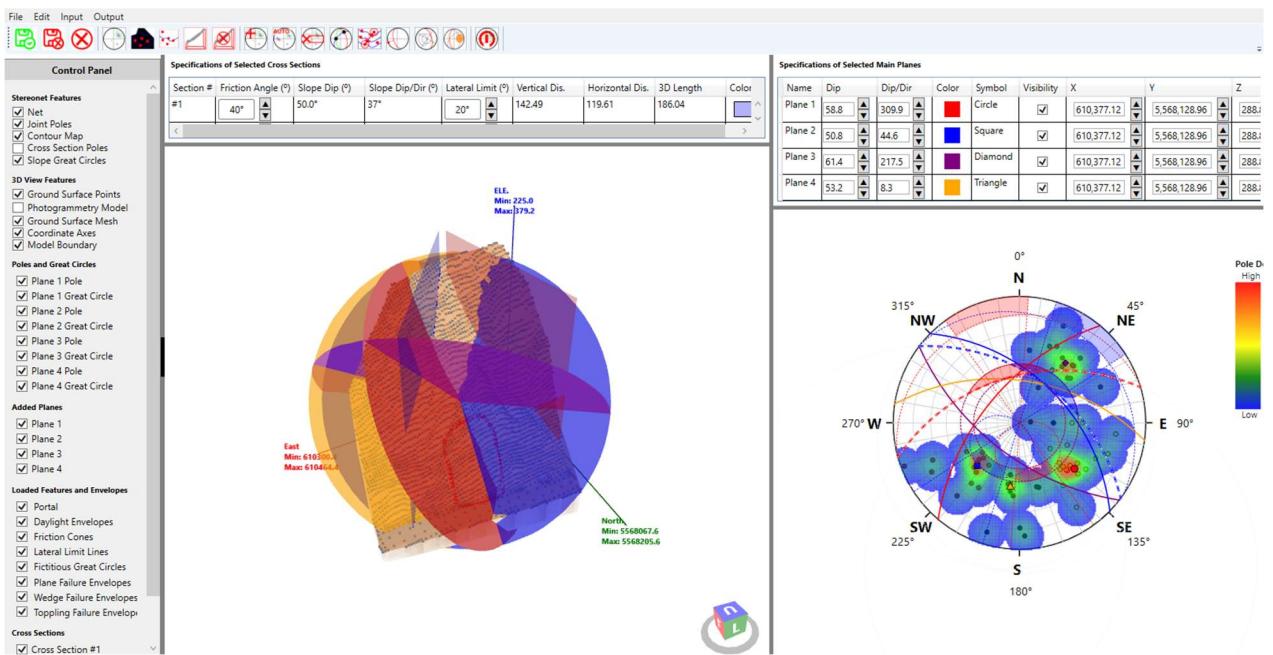
Output → Reset the Window

Resets either the stereonet or 3D view after user approval.



4. Control Panel

The Control Panel allows users to toggle visibility of all features using checkboxes. Each element (planes, surfaces, features, boundaries) can be turned on or off independently.



5. Notes and Limitations

- Limit Equilibrium and Photogrammetry modules are not available in the current version.