

# Compass 3™

# User Guide

**Version:** 1.0.0

**Prepared for:** Rock Mechanics Engineering Applications

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## 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	Black	Circle	Very Small
2		0	0	0	Black	Circle	Very Small
3		0	0	0	Black	Circle	Very Small
4		0	0	0	Black	Circle	Very Small
5		0	0	0	Black	Circle	Very Small
6		0	0	0	Black	Circle	Very Small
7		0	0	0	Black	Circle	Very Small

Compass 3 Table

CSV File

Thurber-20251119-Joint of rock mass 3...																			
File Home Insert Page Layout Formulas Data Review View Automate Help BLUEBEAM																			
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	localityId	localityName	dataId	x	y	latitude	longitude	zone	altitude	horiz_pre	vert_pre	Type	dip	unadj. Dip/dir.	strike	declinatio	unitId	timedate	notes
2	46b2c60a	Locality 1	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	46b2c60a	Locality 1	ea0a3e96	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	46b2c60a	Locality 1	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	46b2c60a	Locality 1	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	46b2c60a	Locality 1	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	46b2c60a	Locality 1	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	46b2c60a	Locality 1	6242cfa1	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	46b2c60a	Locality 1	2db96341	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	46b2c60a	Locality 1	c8b3a4d4	610587.4	5567609	50.25028	-121.449	10U	0	-1	-1	Bedding	57.04494476	326.4957275	236.4957	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

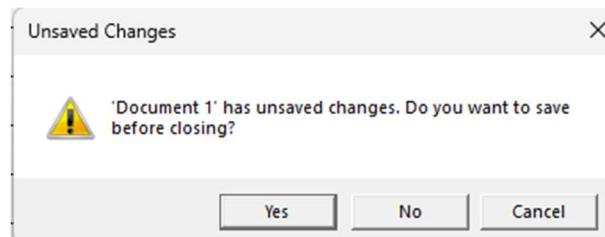


Prompts the user to select a directory and filename to save the project.

### 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

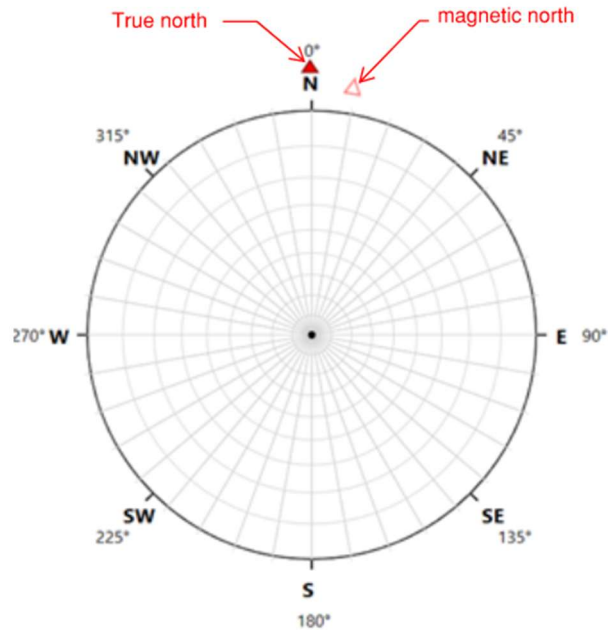
Declination Angle (°):

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.



### Update Dip/Dir

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 renumbers 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.

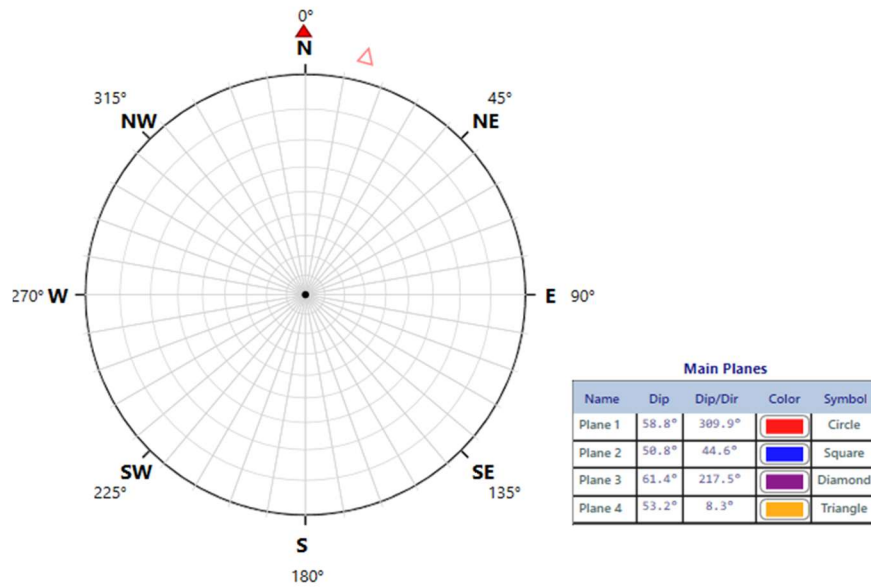
## 2.4. Input Menu



### 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.

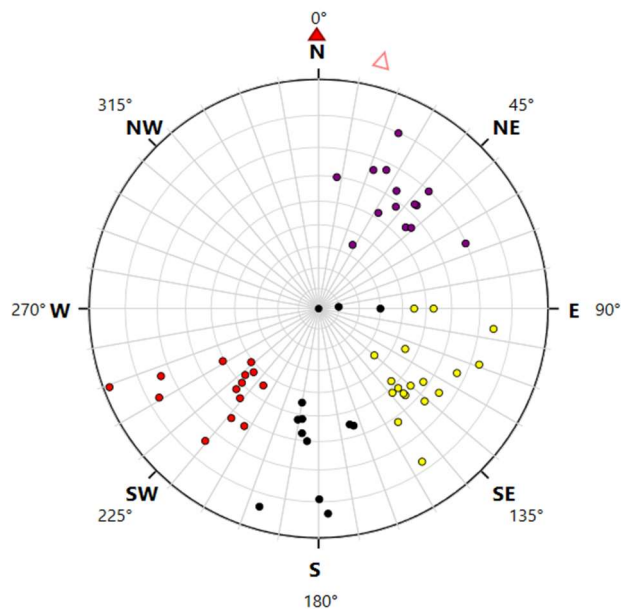


## 2.5. Output Menu



### Output → Draw Poles

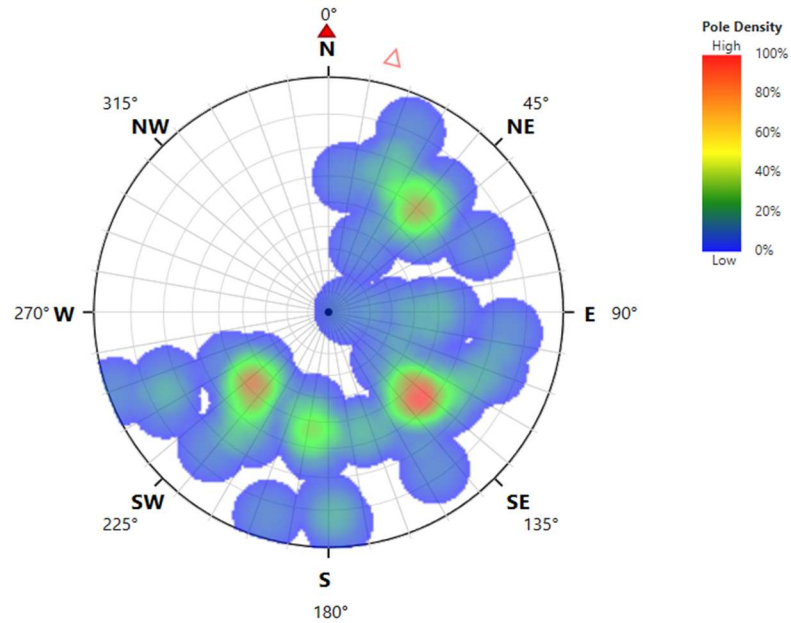
Plots joint poles on the stereonet.





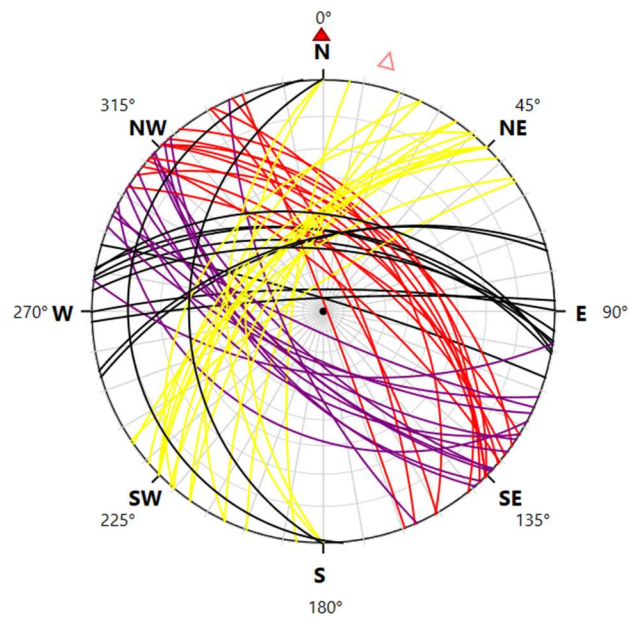
### Output → Draw Contours

Generates contour plots of joint density on the stereonet.



### Output → Draw Planes

Draws great circles for all joint sets on the stereonet.

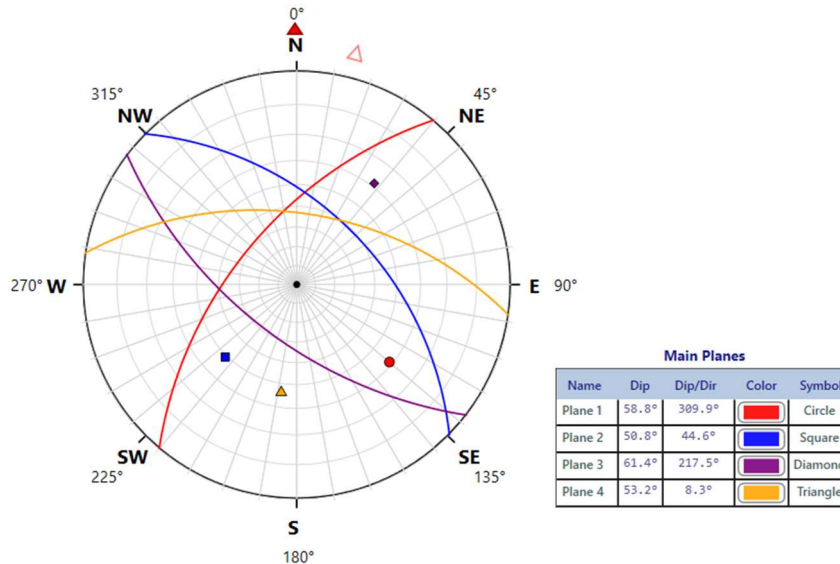




### Output → Draw Main Loaded Planes



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.

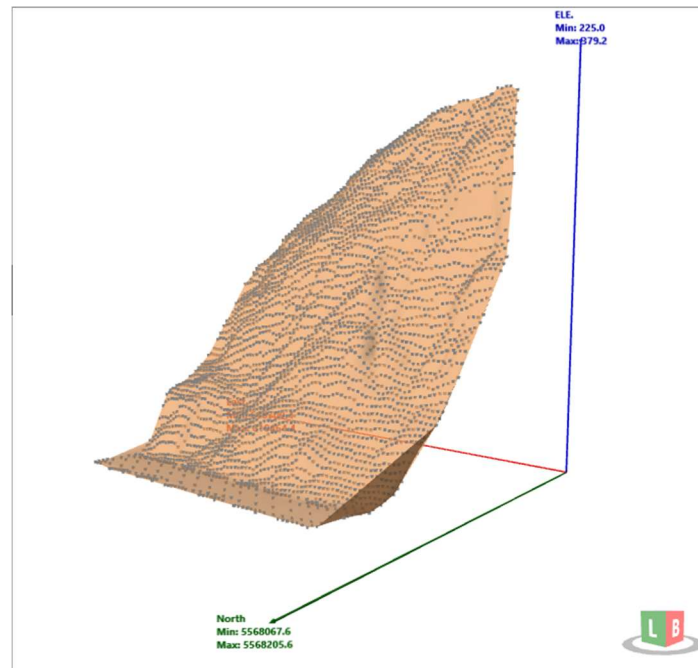
**Input → Load Ground Surface**



Imports ground surface data from:

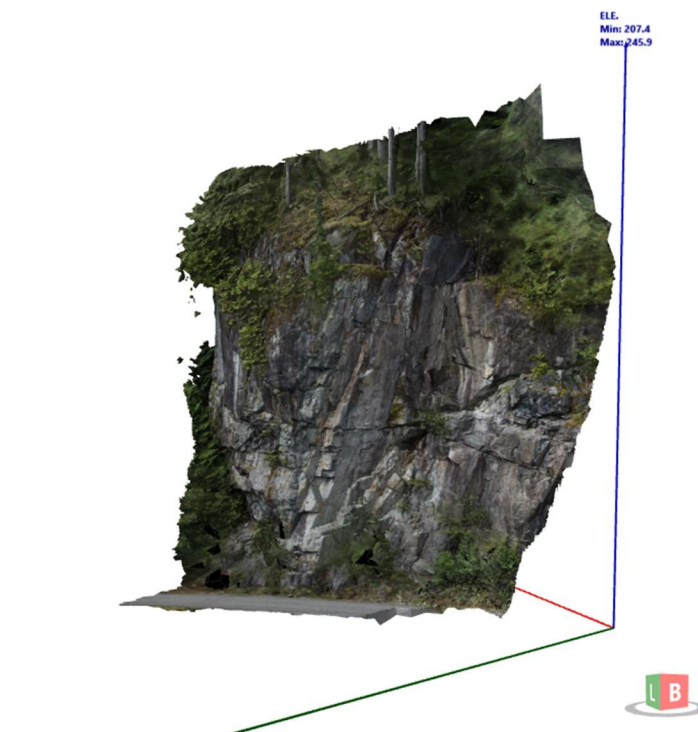
- CSV file (in x, y, z format with no header and notes)

	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

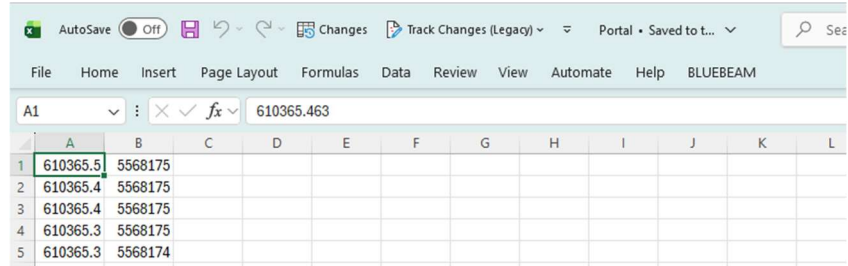
Imports photogrammetry model in and OBJ format





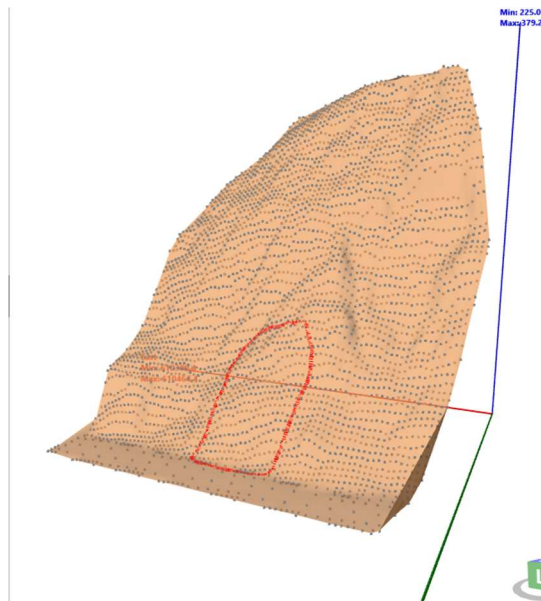
### Input → Load New Features

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.



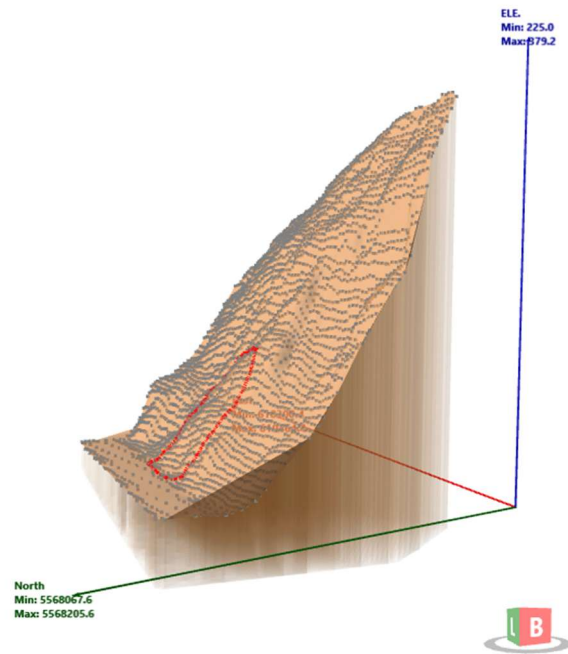
The screenshot shows the BLUEBEAM software interface with a spreadsheet open. The spreadsheet has columns A through L and rows 1 through 5. The data in the spreadsheet is as follows:

	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

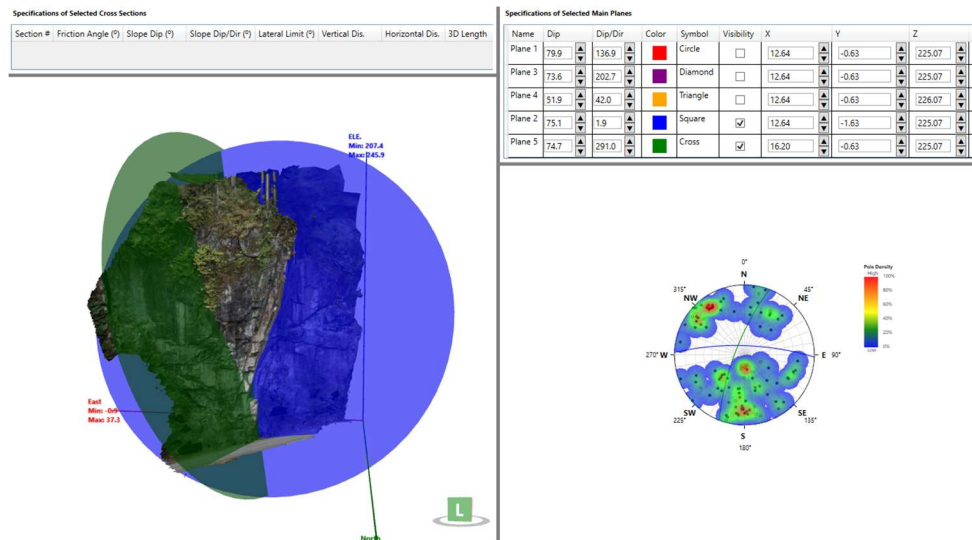
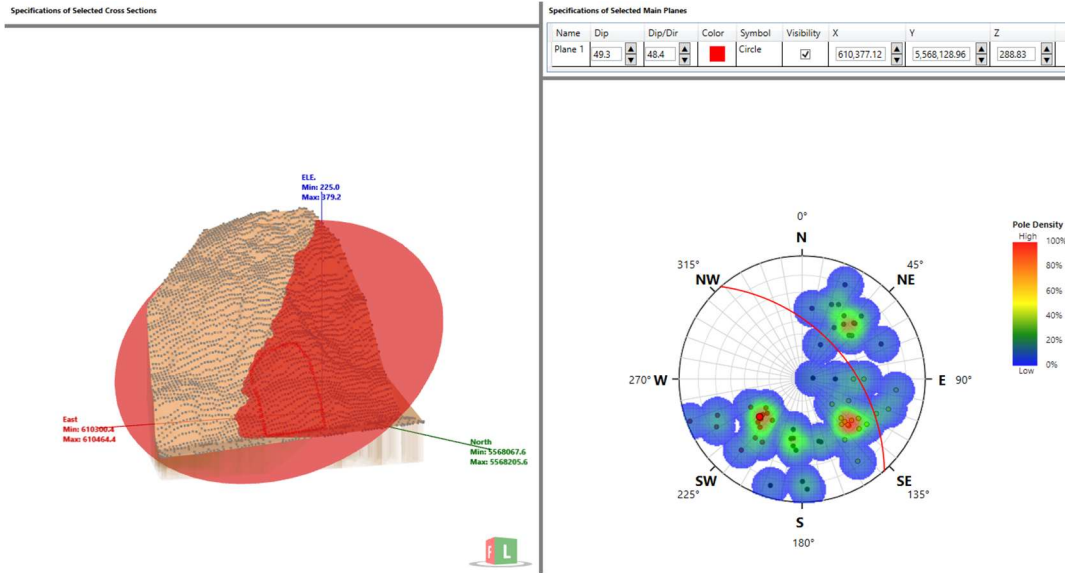
Removes the extruded boundary and displays only the ground surface.

### 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

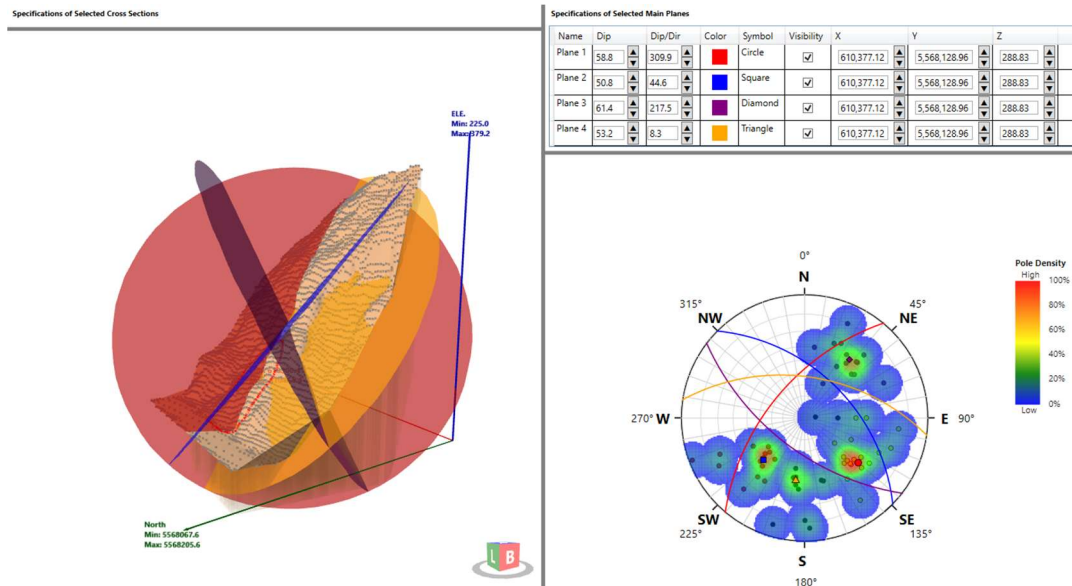
Automatically detects dominant discontinuity sets.

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

**Plane Detection Settings** ✕

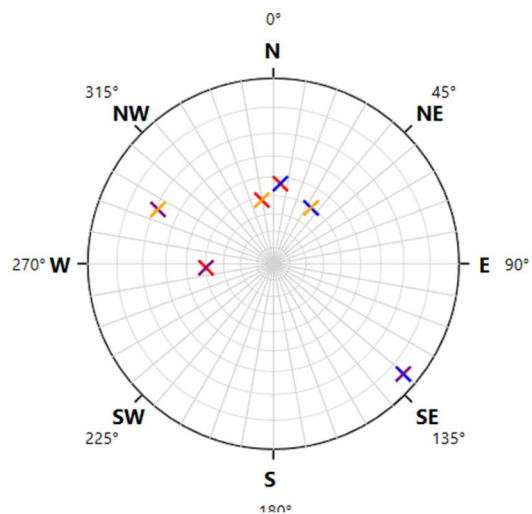
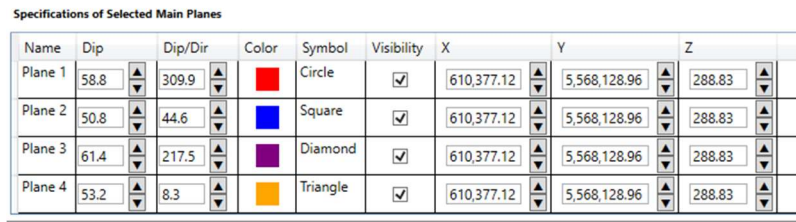
Maximum number of planes to detect:

OK Cancel



### Output → Main Planes Intersections

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





### Output → Cross Section

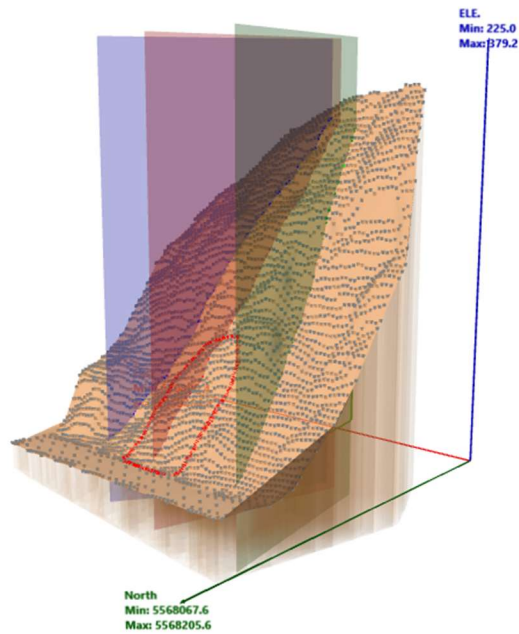
Creates a cross section by selecting two points on the ground surface.  
Make sure the first point is higher than the second.

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	



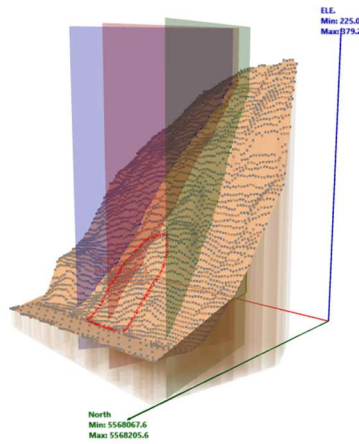
### Output → Draw Rock Slopes

Draws great circles of cross sections on the stereonet.



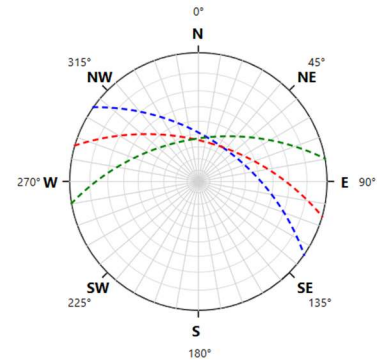
Specifications of Selected Cross Sections

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



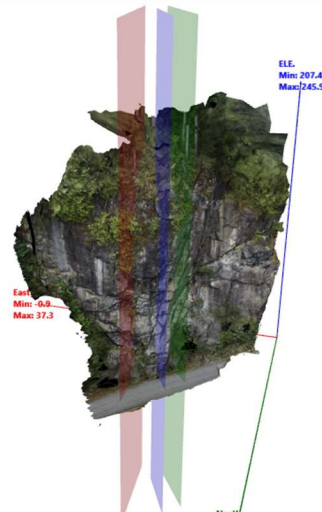
Specifications of Selected Main Planes

Name	Dip	Dip/Dir	Color	Symbol	Visibility	X	Y	Z
Plane 1	58.8	309.9	Red	Circle	<input checked="" type="checkbox"/>	610,377.12	5,568,128.96	288.1
Plane 2	50.8	44.6	Blue	Square	<input checked="" type="checkbox"/>	610,377.12	5,568,128.96	288.1
Plane 3	61.4	217.5	Purple	Diamond	<input checked="" type="checkbox"/>	610,377.12	5,568,128.96	288.1
Plane 4	53.2	8.3	Yellow	Triangle	<input checked="" type="checkbox"/>	610,377.12	5,568,128.96	288.1



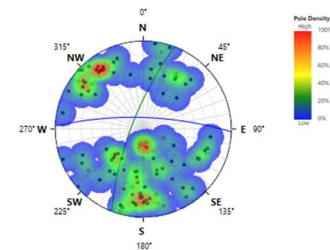
Specifications of Selected Cross Sections

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



Specifications of Selected Main Planes

Name	Dip	Dip/Dir	Color	Symbol	Visibility	X	Y	Z
Plane 1	79.9	136.9	Red	Circle	<input type="checkbox"/>	12.64	-0.63	225.07
Plane 3	73.6	202.7	Purple	Diamond	<input type="checkbox"/>	12.64	-0.63	225.07
Plane 4	51.9	42.0	Yellow	Triangle	<input type="checkbox"/>	12.64	-0.63	226.07
Plane 2	75.1	1.9	Blue	Square	<input checked="" type="checkbox"/>	12.64	-1.63	225.07
Plane 5	74.7	291.0	Green	Cross	<input checked="" type="checkbox"/>	16.20	-0.63	225.07



## Output → Kinematic Projection Boundaries

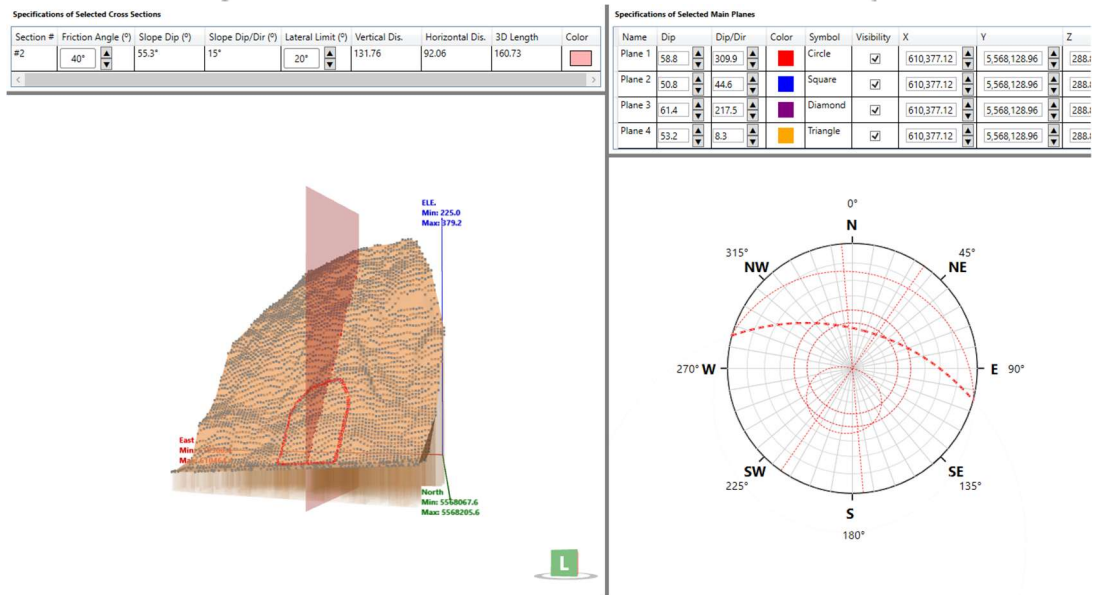
Adds friction cones, lateral limits, daylight envelopes, and fictitious great circles after user confirmation.

**Kinematic Projection Boundar...**

☒ Daylight  
☒ Friction Cone  
☒ Lateral Limit Lines  
☒ Fictitious Great Circles

Select All    Deselect All

OK    Cancel



## Output → Kinematic Projection

Generates kinematic failure envelopes based on selected failure modes:

- Planar
- Wedge
- Toppling

**Kinematic Analysis Options**

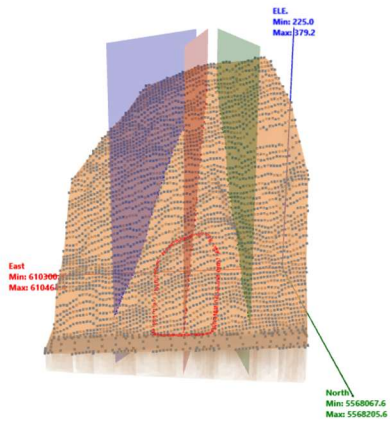
☒ Plane Failure  
☒ Wedge Failure  
☒ Toppling Failure

Select All    Deselect All

OK    Cancel

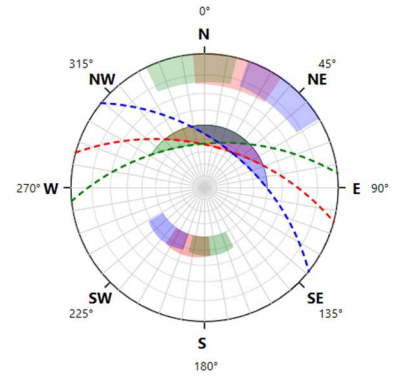
Specifications of Selected Cross Sections

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



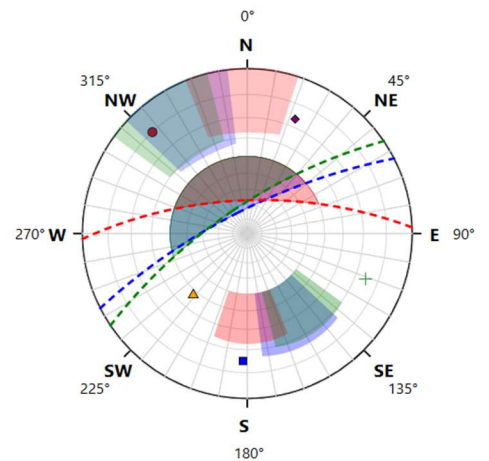
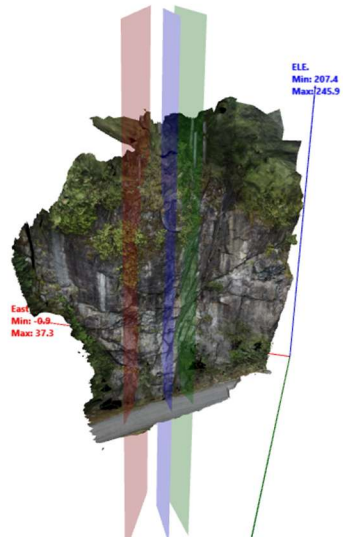
Specifications of Selected Main Planes

Name	Dip	Dip/Dir	Color	Symbol	Visibility	X	Y	Z
Plane 1	58.8	309.9	Red	Circle	<input checked="" type="checkbox"/>	610,377.12	5,568,128.96	288.
Plane 2	50.8	44.6	Blue	Square	<input checked="" type="checkbox"/>	610,377.12	5,568,128.96	288.
Plane 3	61.4	217.5	Purple	Diamond	<input checked="" type="checkbox"/>	610,377.12	5,568,128.96	288.
Plane 4	53.2	8.3	Orange	Triangle	<input checked="" type="checkbox"/>	610,377.12	5,568,128.96	288.



Specifications of Selected Cross Sections

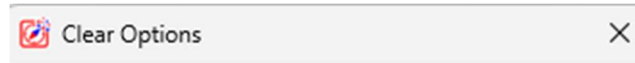
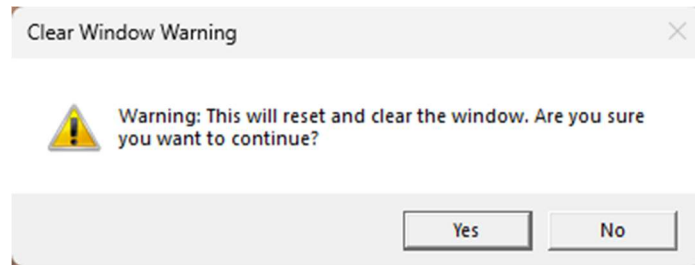
Section #	Friction Angle (°)	Slope Dip (°)	Slope Dip/Dir (°)	Lateral Limit (°)	Vertical Dis.	Horizontal Dis.	3D Length
#1	40°	74.3°	333°	20°	28.70	8.08	29.82
#2	40°	67.3°	358°	20°	31.73	13.41	34.45
#3	40°	71.5°	326°	20°	31.20	9.63	32.65



**Output → Reset the Window**

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





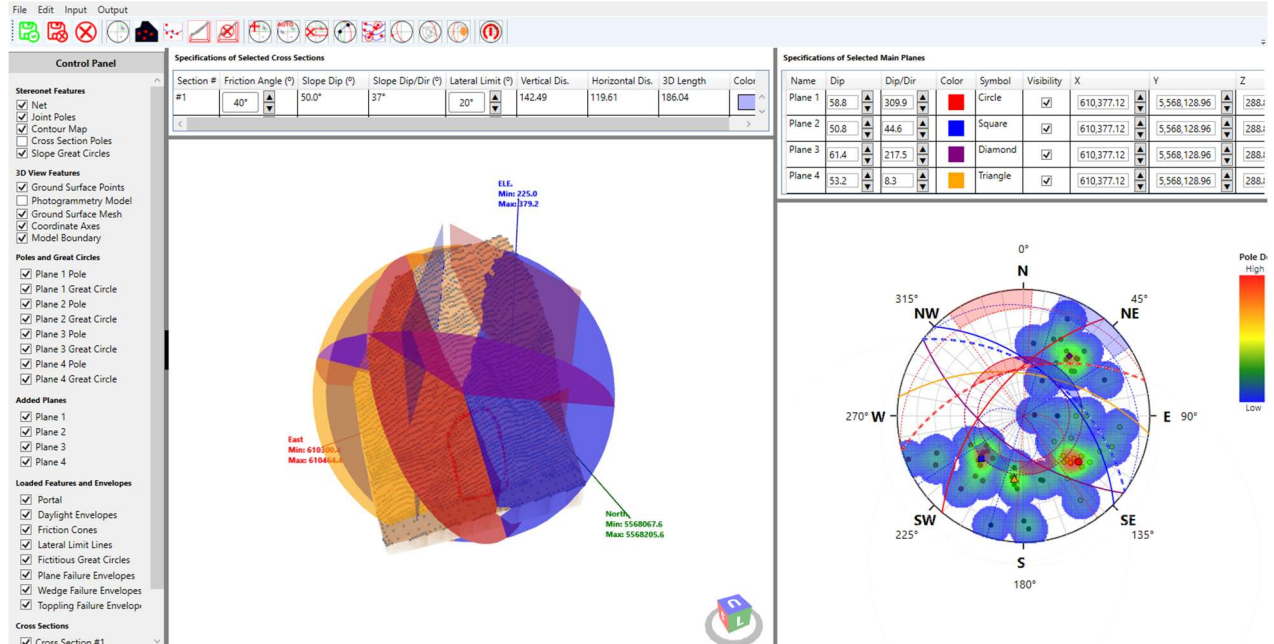
Select the Win:

- ☐ Reset the Stereonet Win
- ☐ Reset the 3D View Win



#### 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.