Compass 3™

User Guide

Version: 1.0.0

Prepared for: Rock Mechanics Engineering Applications

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

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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.

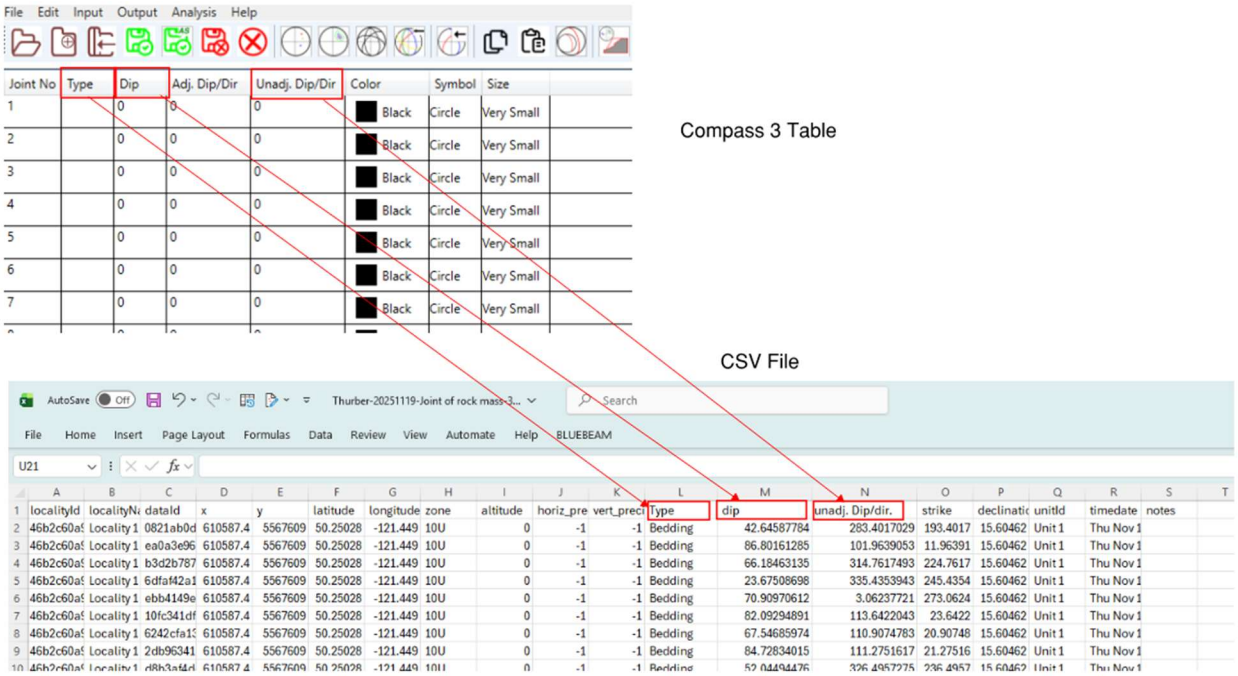
File → New File 

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.



File → Save Current State 

Saves the current project.

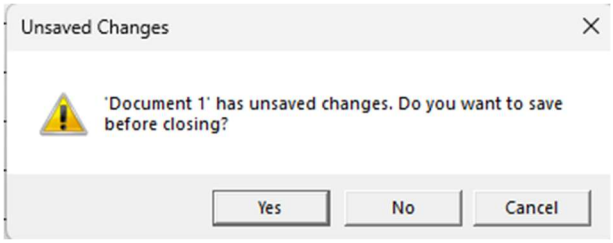
- If the file has been previously saved, it overwrites the existing file.
- Otherwise, the user is prompted to select a name and directory.
- If the Compass 3 logo does not appear on the file, right-click on the saved file, select **Properties**, and set the file to open with **Compass 3**. This step 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.

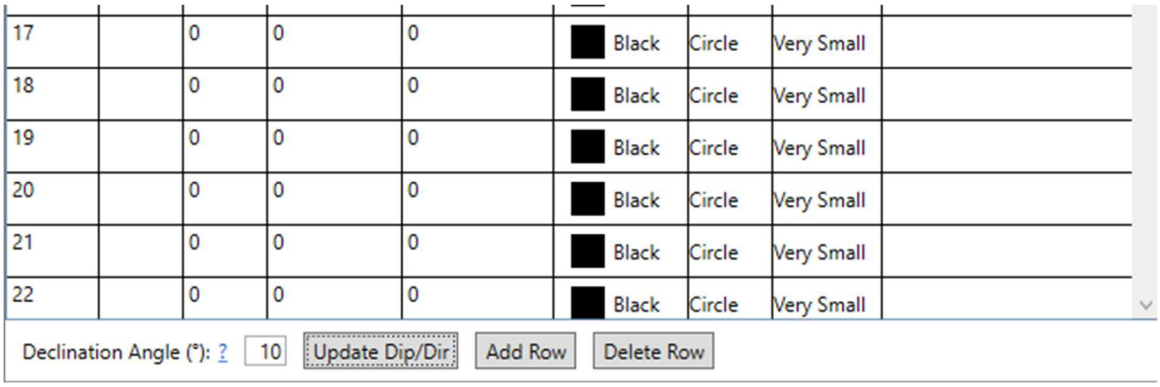


File → Close Window 

Closes the active window after warning and user approval.

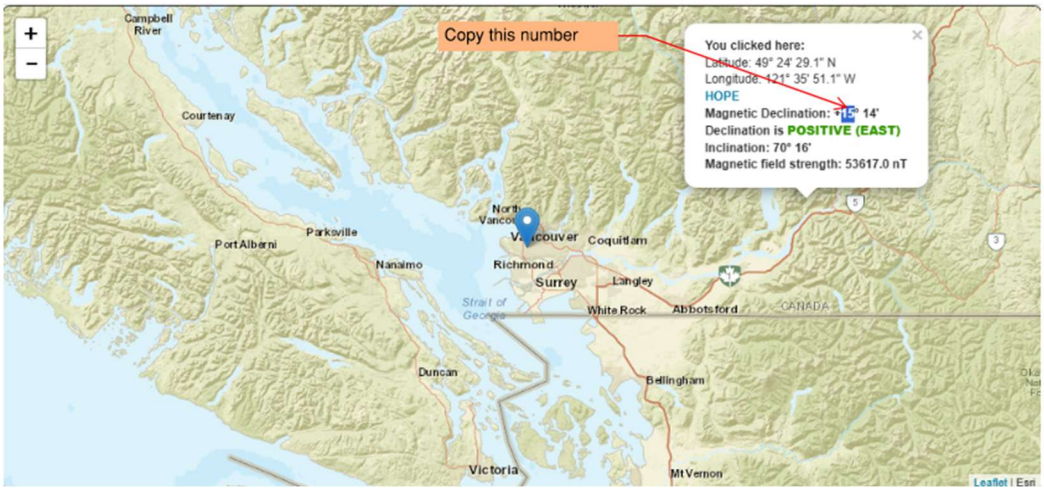
2.2. Table Menu

This menu is located below the table.



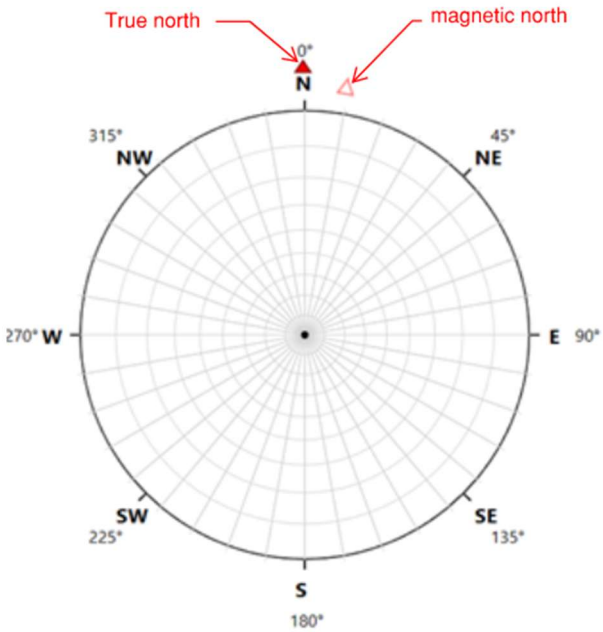
Declination Angle 

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.
-

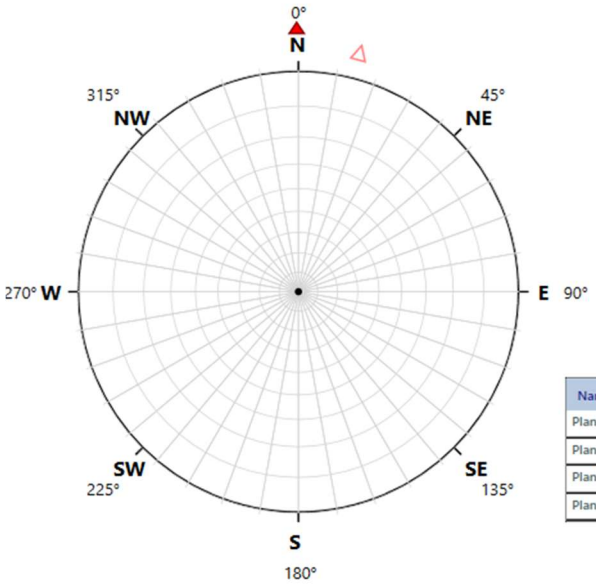
Edit → Reset View 
Resets the stereonet scale and position to its default state.

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.



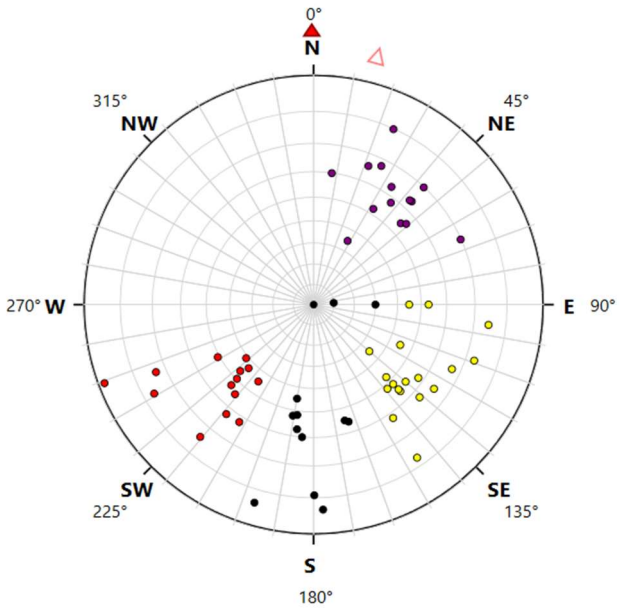
Main Planes

Name	Dip	Dip/Dir	Color	Symbol
Plane 1	58.8°	309.9°		Circle
Plane 2	50.8°	44.6°		Square
Plane 3	61.4°	217.5°		Diamond
Plane 4	53.2°	8.3°		Triangle

2.5. Output Menu

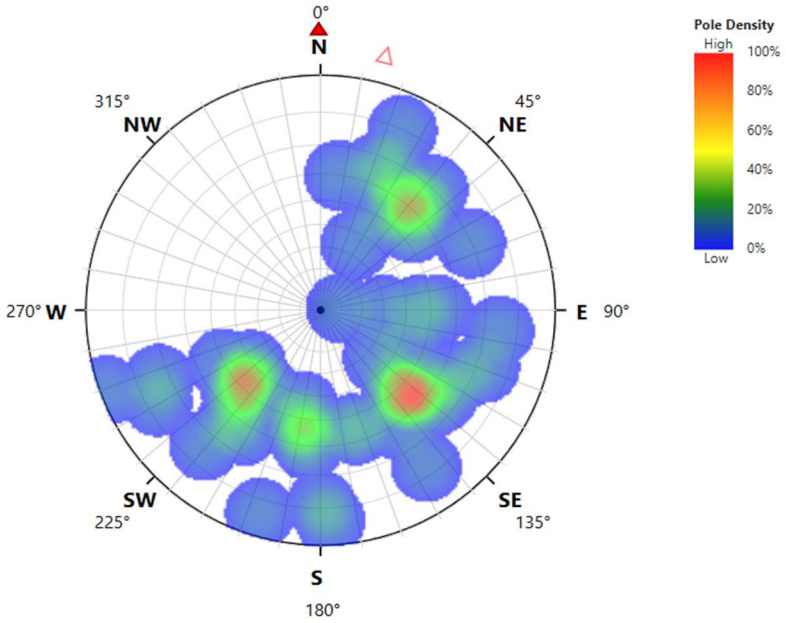
Output → Draw Poles 

Plots joint poles on the stereonet.



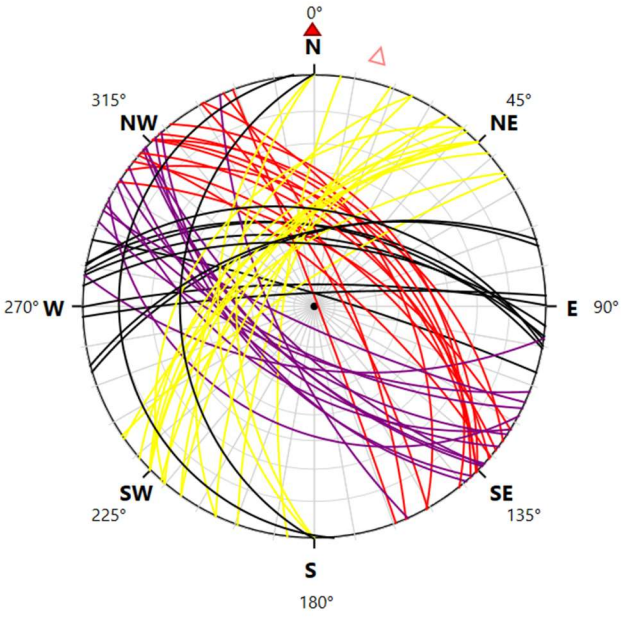
Output → Draw Contours 

Generates contour plots of joint density on the stereonet.



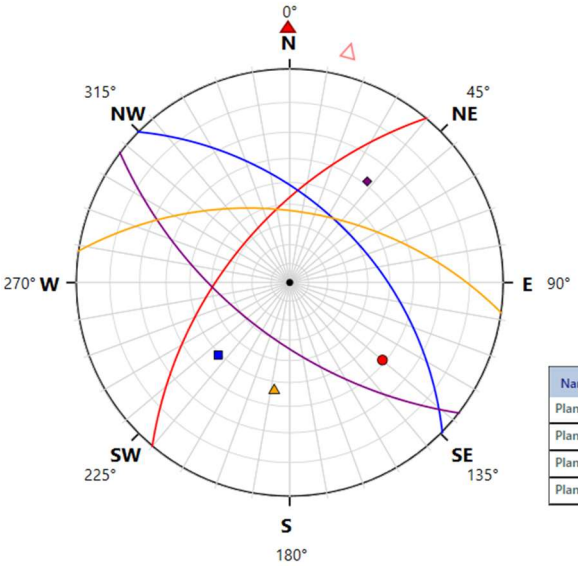
Output → Draw Planes 

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*.



Main Planes

Name	Dip	Dip/Dir	Color	Symbol
Plane 1	58.8°	309.9°		Circle
Plane 2	50.8°	44.6°		Square
Plane 3	61.4°	217.5°		Diamond
Plane 4	53.2°	8.3°		Triangle

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

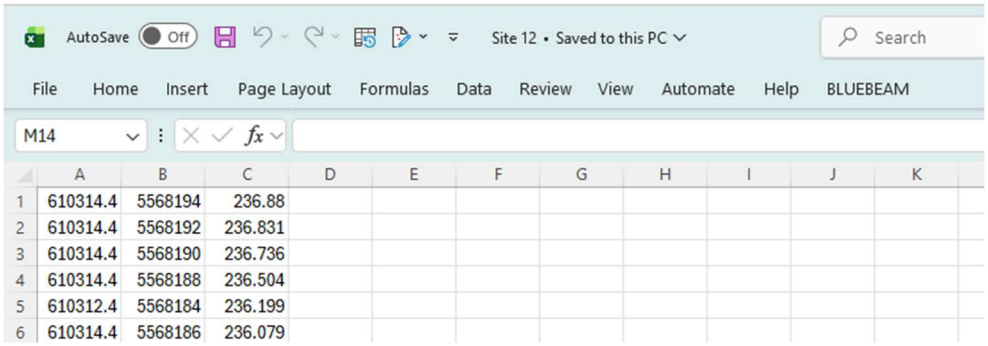
Input → Load Stereonet 

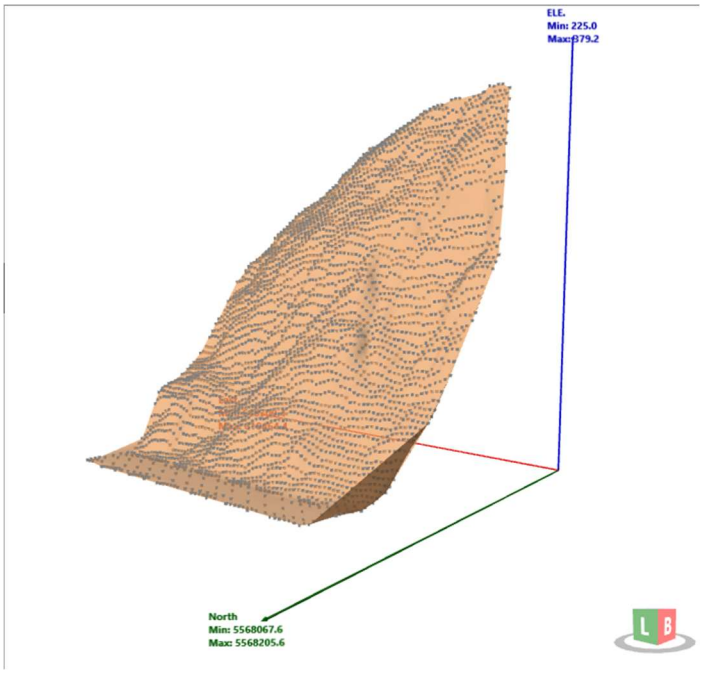
Loads joint poles and contours from the Main Window into the stereonet.

Input → Load Ground Surface 

Imports ground surface data from:

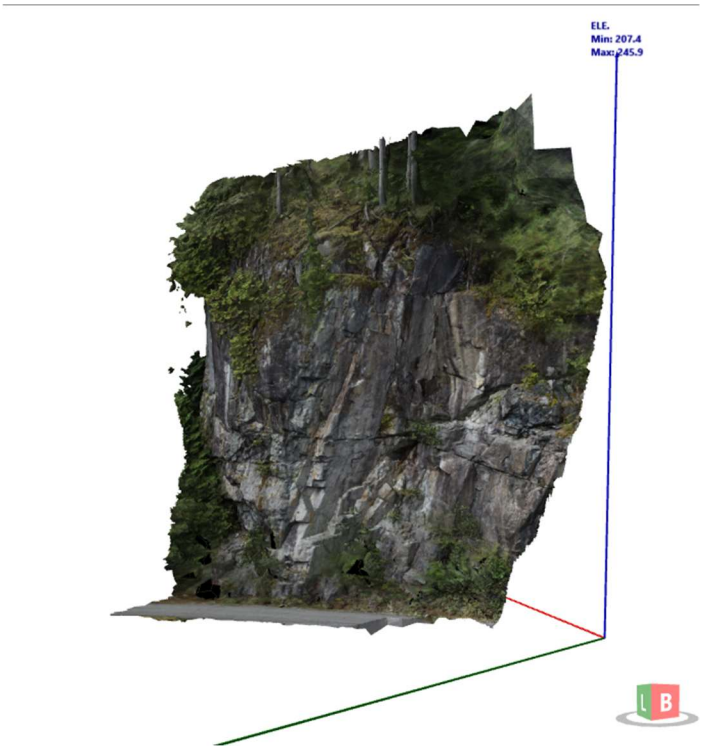
- CSV file (in x, y, z format with no header and notes)





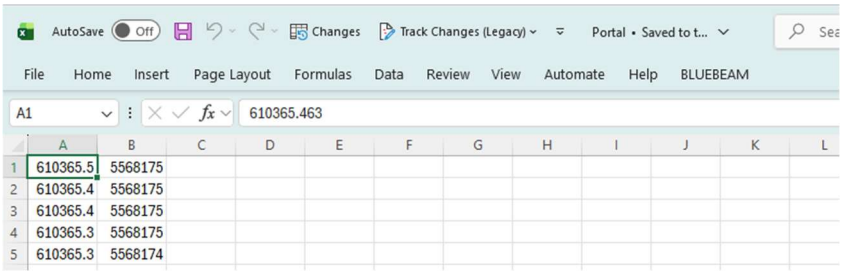
Input → Load Photogrammetry Model 

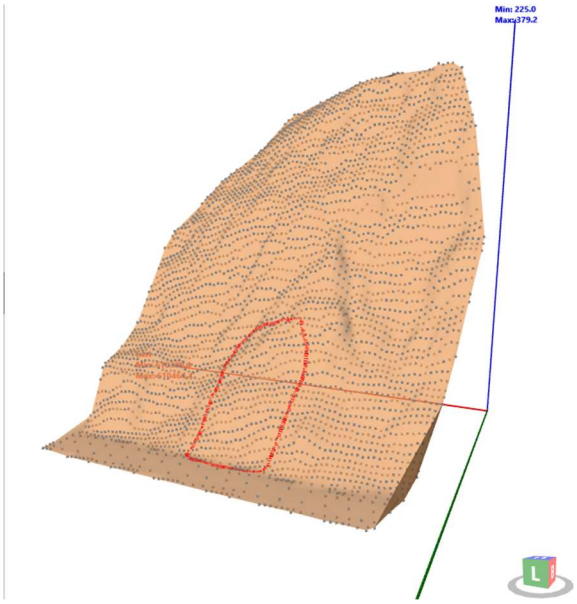
Imports photogrammetry model in and OBJ format



Input → Load New Features 

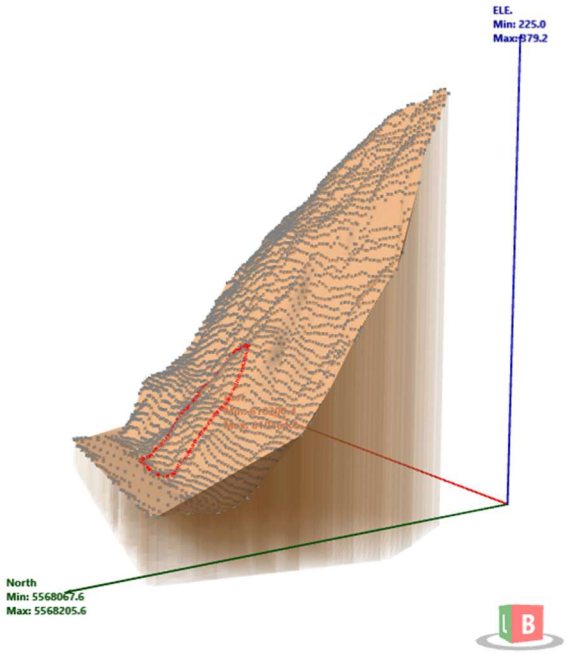
Adds linear features to the ground surface using a CSV file containing x and y coordinates only. The software automatically offsets the feature onto the surface. Make sure you have enough points to form a good feature.





Input → Add Boundary 

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



Input → Delete Boundary 

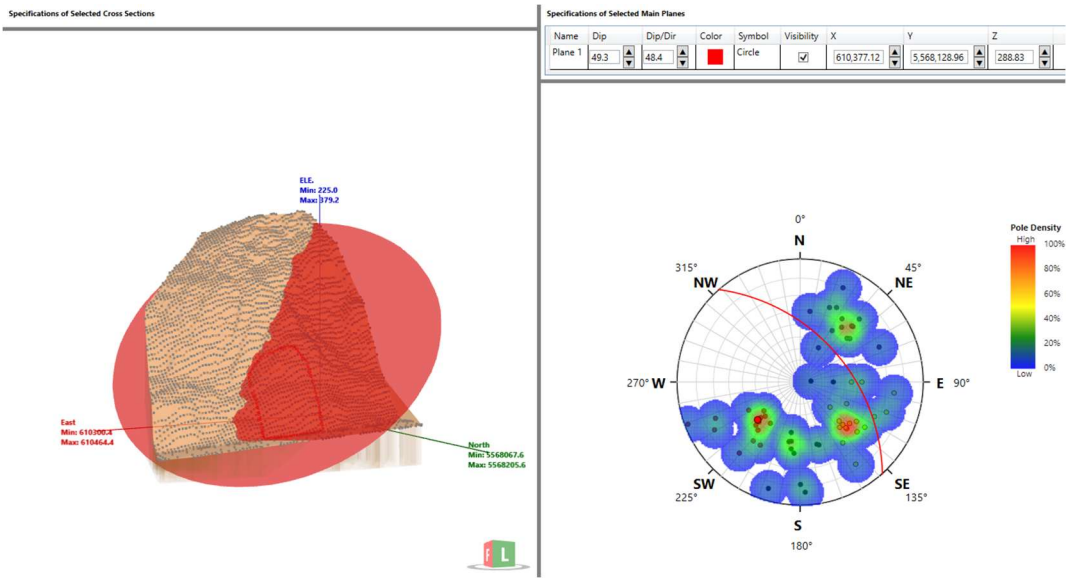
Removes the extruded boundary and displays only the ground surface.

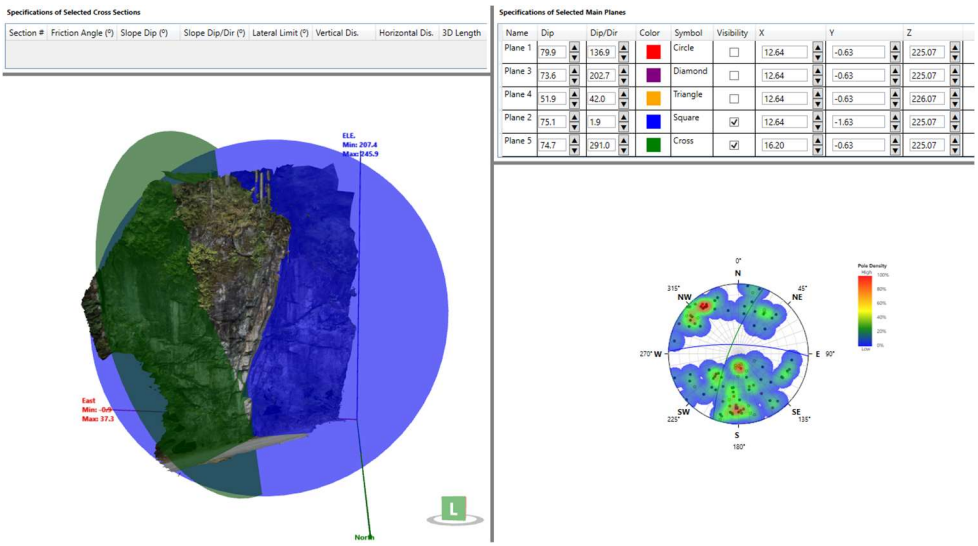
3.4. Output Menu

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).

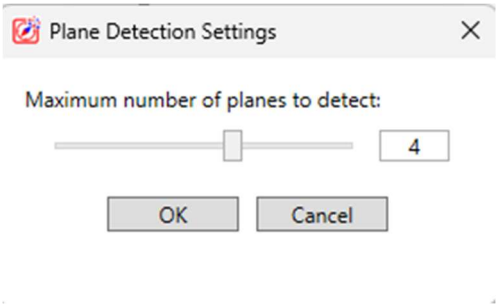


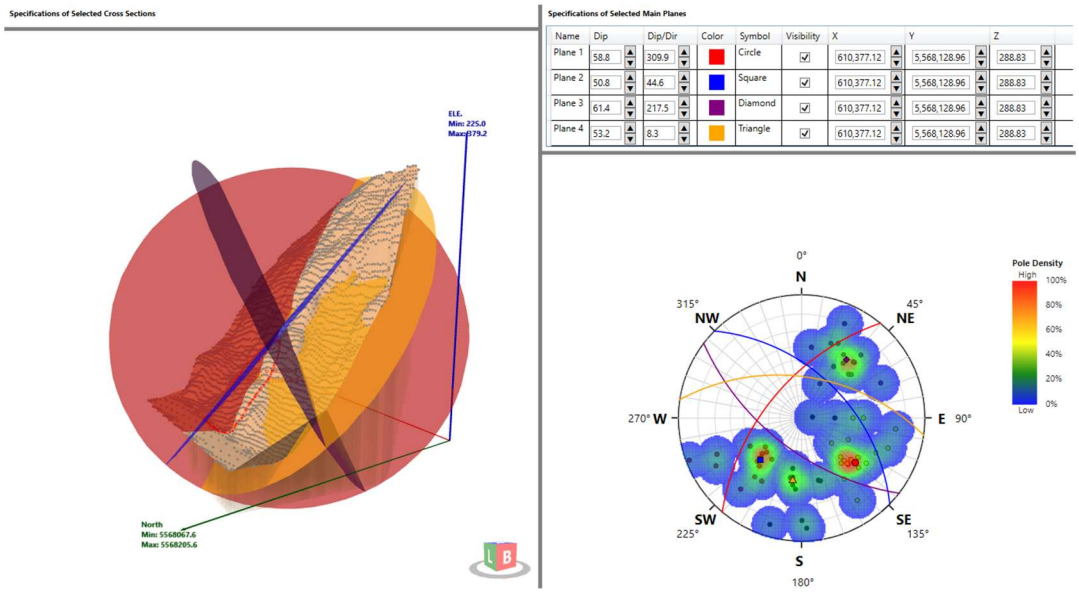


Output → Detect Main Planes 

Automatically detects dominant discontinuity sets.

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



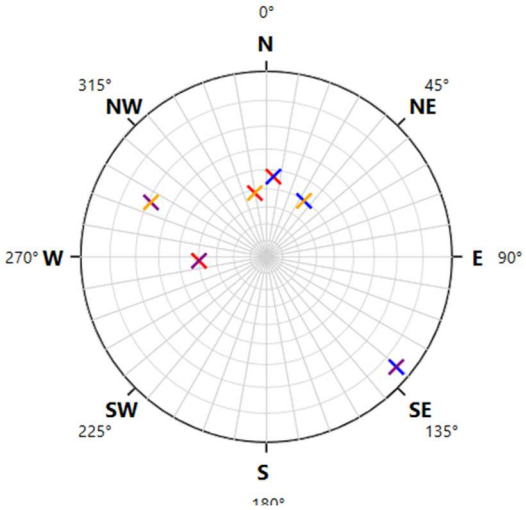


Output → Main Planes Intersections 

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		Circle	☑	610,377.12	5,568,128.96	288.83
Plane 2	50.8	44.6		Square	☑	610,377.12	5,568,128.96	288.83
Plane 3	61.4	217.5		Diamond	☑	610,377.12	5,568,128.96	288.83
Plane 4	53.2	8.3		Triangle	☑	610,377.12	5,568,128.96	288.83



Output → Cross Section 

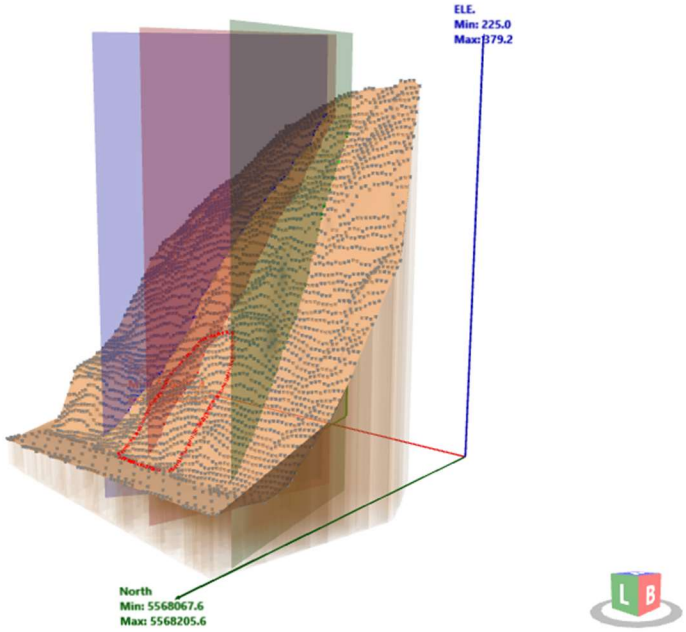
Creates a cross section by selecting two points on the ground surface.
Make sure the first point is higher than the second.

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

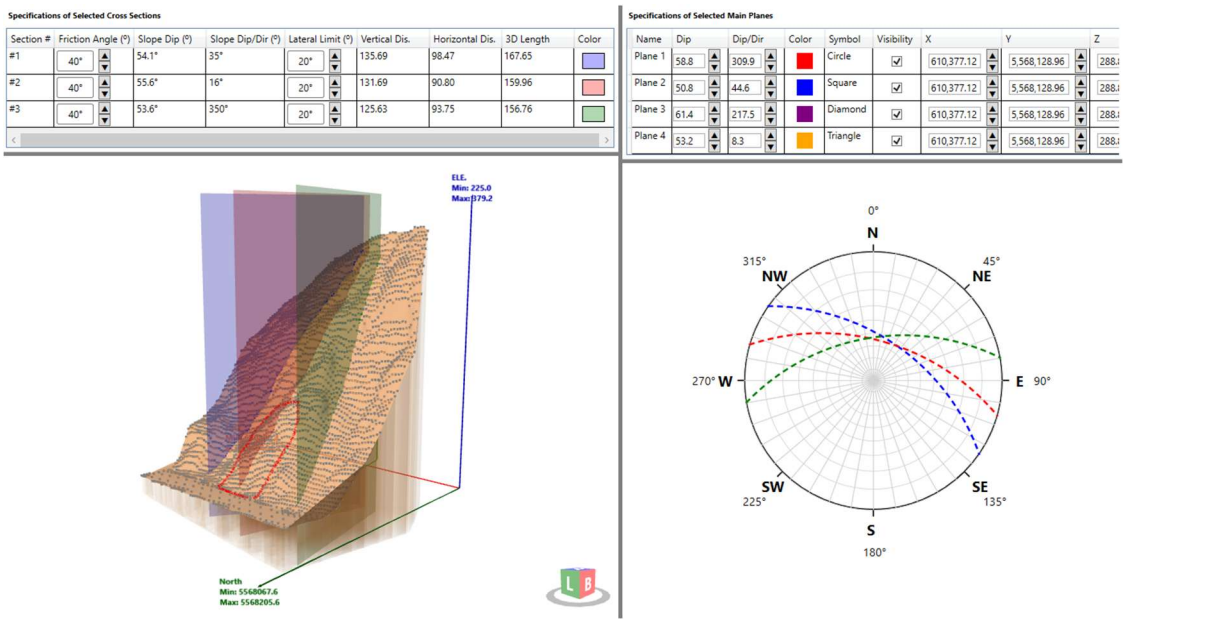
Specifications of Selected Cross Sections

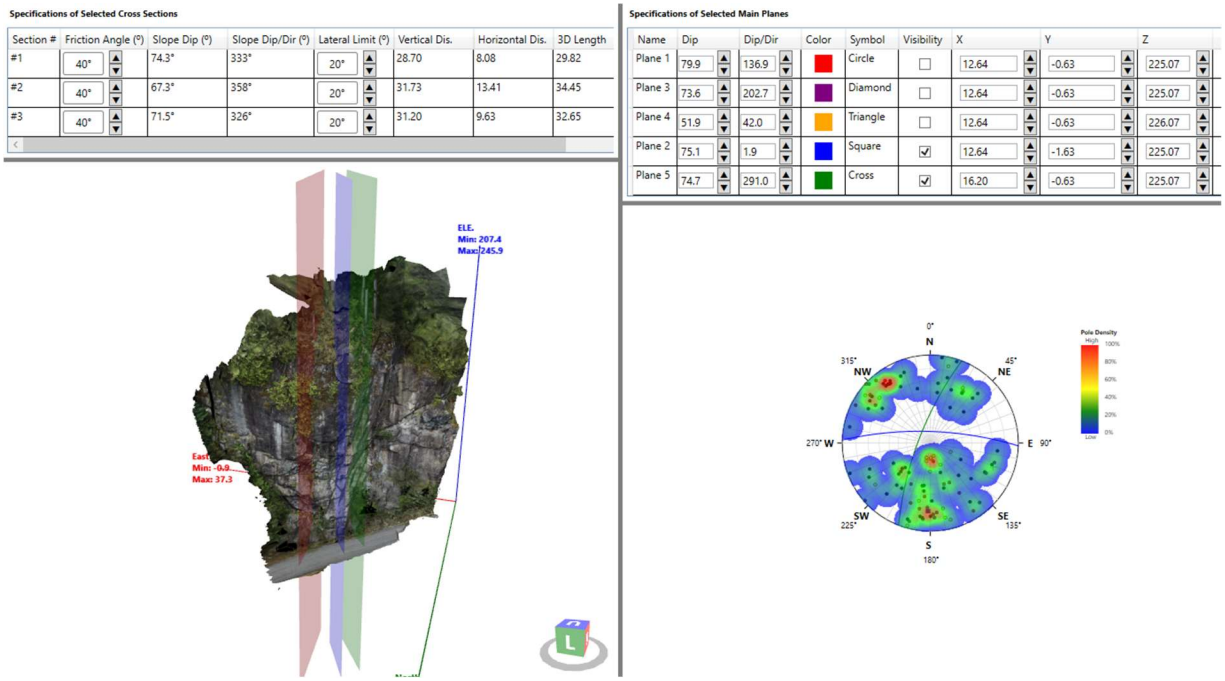
Section #	Friction Angle (°)	Slope Dip (°)	Slope Dip/Dir (°)	Lateral Limit (°)	Vertical Dis.	Horizontal Dis.	3D Length	Color
#1	40°	54.1°	35°	20°	135.69	98.47	167.65	
#2	40°	55.6°	16°	20°	131.69	90.80	159.96	
#3	40°	53.6°	350°	20°	125.63	93.75	156.76	



Output → Draw Rock Slopes 

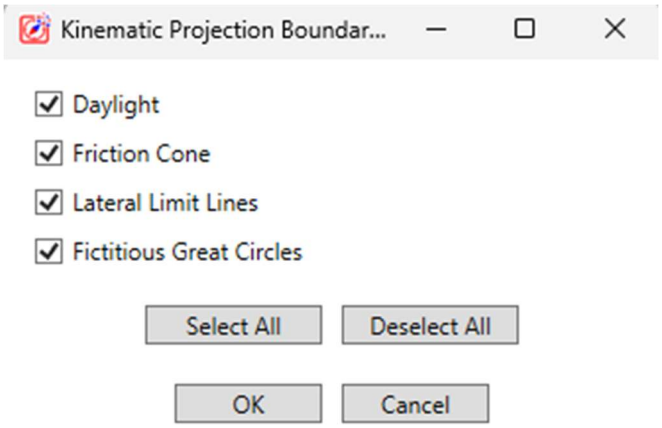
Draws great circles of cross sections on the stereonet.

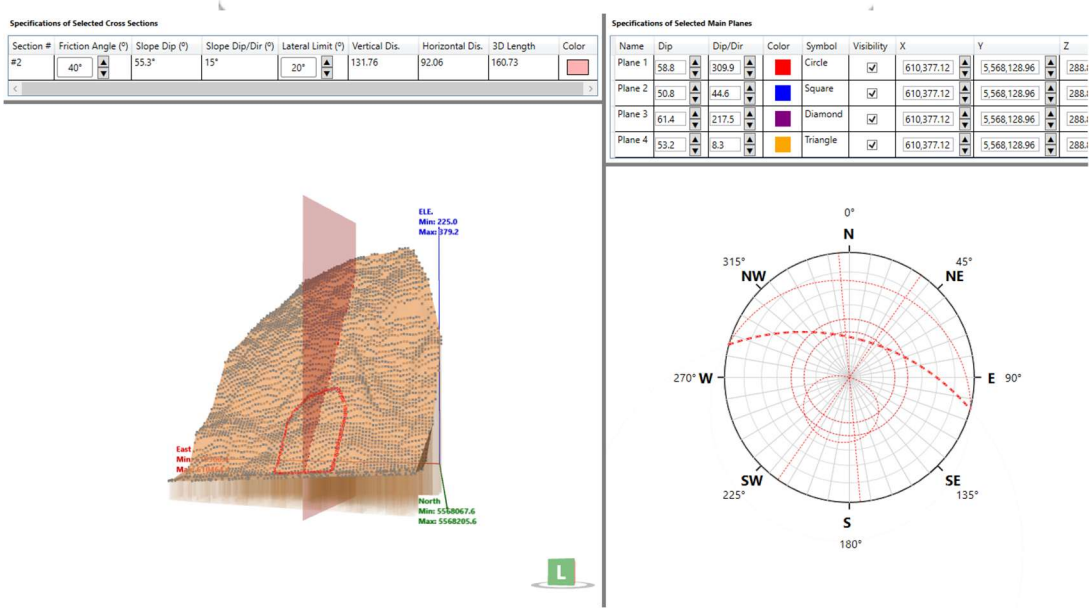




Output → Kinematic Projection Boundaries

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

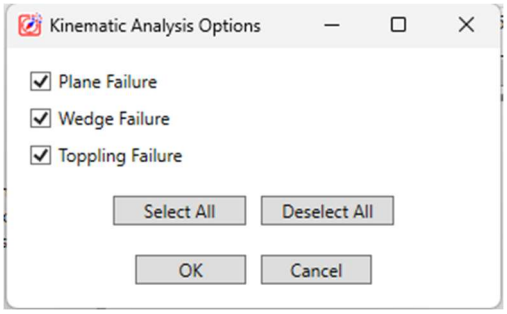


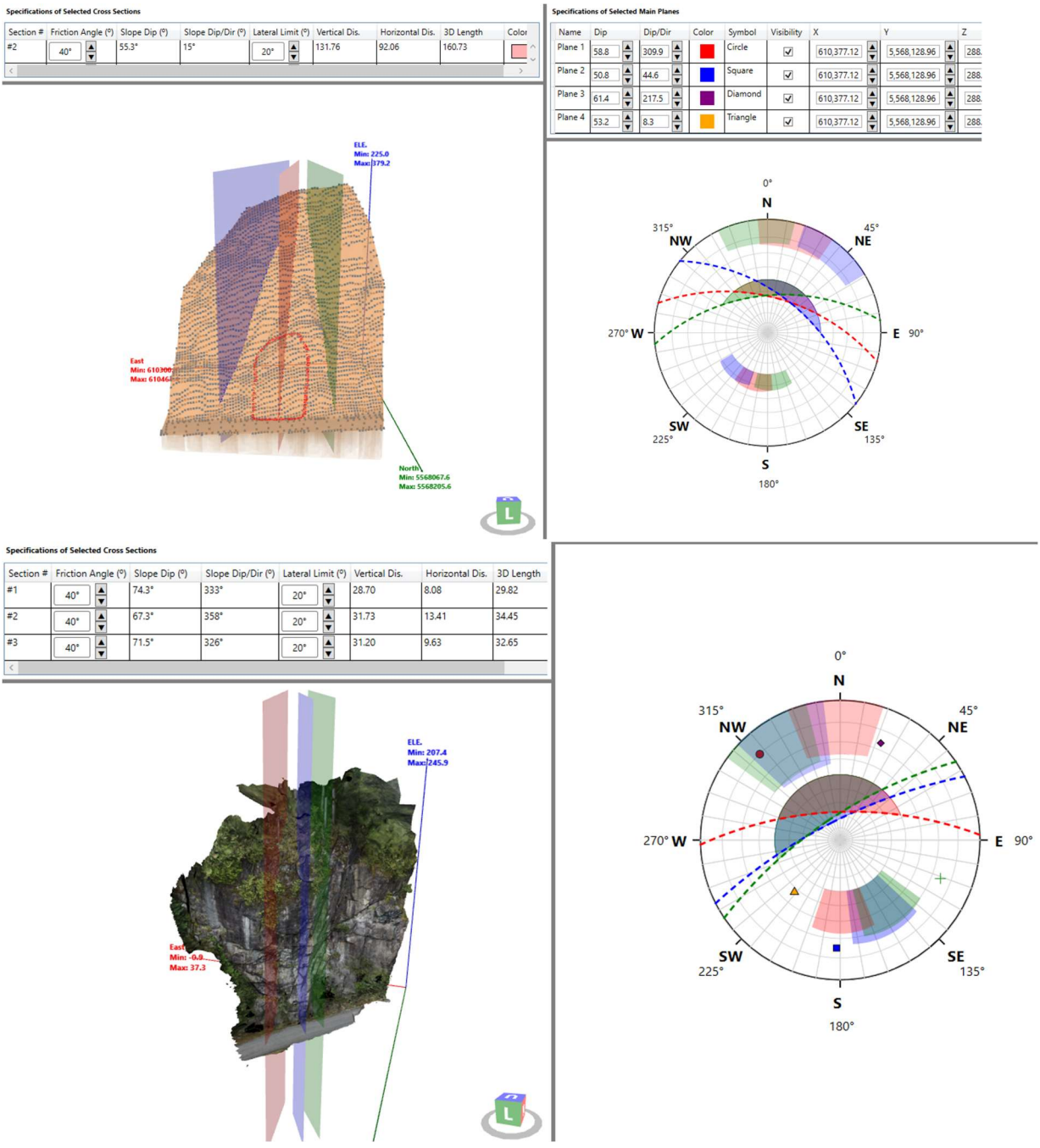


Output → Kinematic Projection 

Generates kinematic failure envelopes based on selected failure modes:

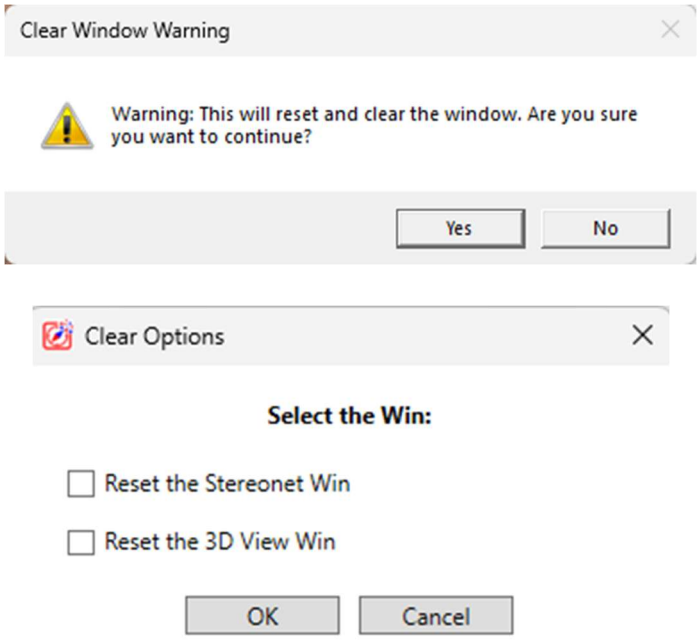
- Planar
- Wedge
- Toppling





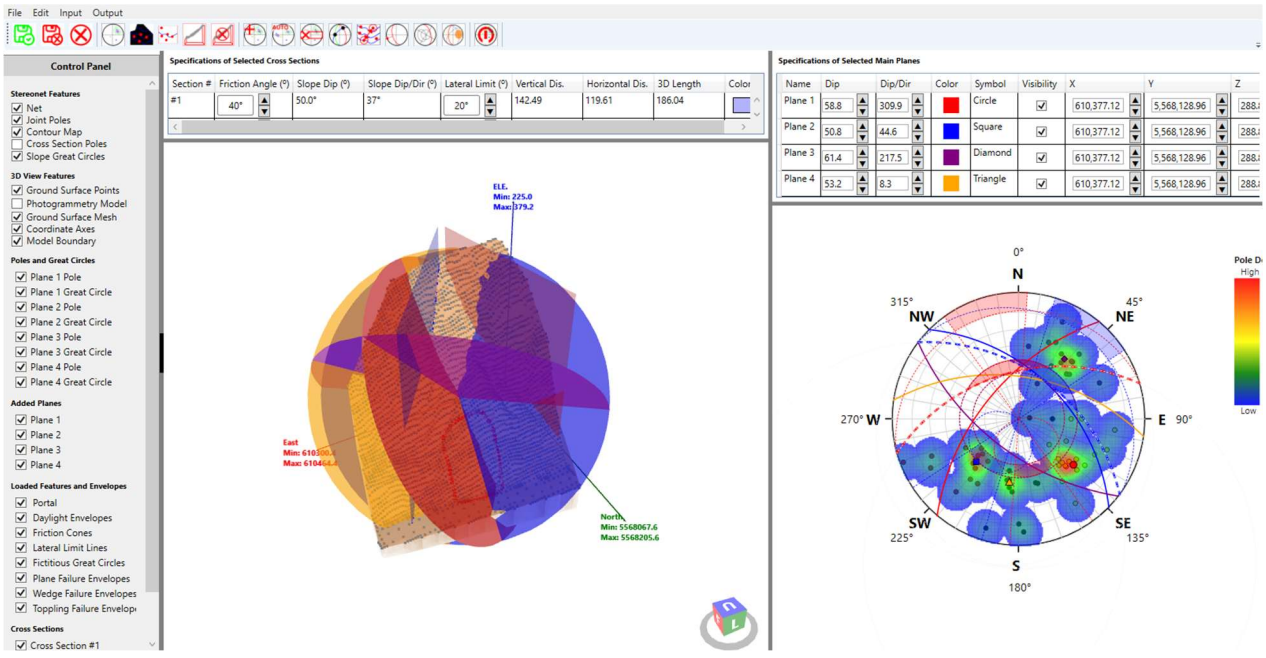
Output → Reset the Window

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.