New in UniSettle 5.0

(2025.226.1.0)

1.0 Introduction

It has been more than 14 years since UniSettle 4.0 was released and much has evolved since. UniSettle was redesigned from the ground up to give it a fresh look and to incorporate many of the comments we have received over the years.

UniSettle is not meant to replace or compete with powerful finite element analysis software such as Plaxis. It was designed to provide users with a simpler, faster, and far less expensive alternative.

This document was developed for experienced users of UniSettle 4.0 to highlight new features and improvements. We recommend that first-time users consult the user manual.

2.0 Disclaimer

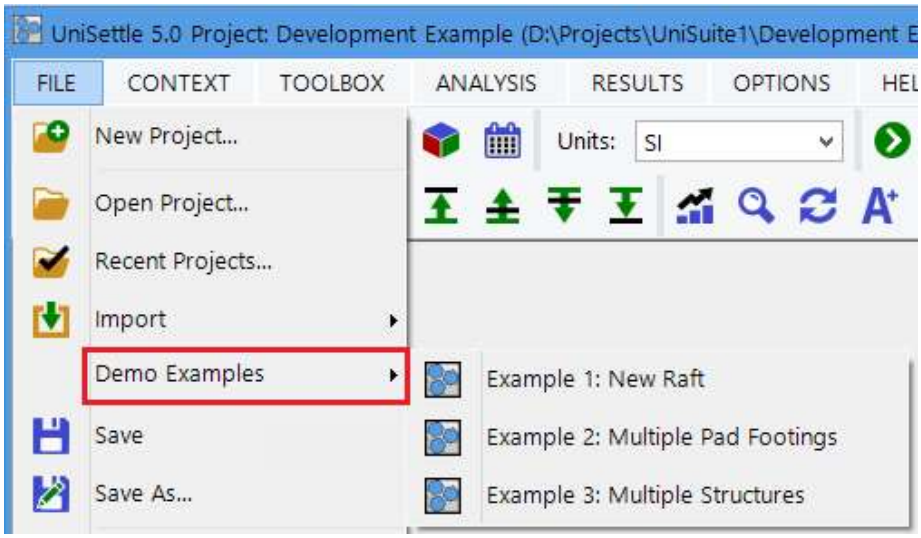
UniSoft Geotechnical Solutions Ltd does not endorse a specific theory or analysis method over another. The mathematical equations and methods used in this application were sourced from generally accepted technical papers and textbooks.

The analysis methods and equations used in UniSettle 5.0 were obtained from ‘Basics of Foundation Design’ by Bengt H. Fellenius, Dr. Tech., P.Eng. This textbook is available within the main HELP menu. Settlement computation is based on Terzaghi's One-Dimensional Consolidation Theory as described in ‘An Introduction to Geotechnical Engineering’ by Robert D. Holtz and William D. Kovacs.

UniSettle 5.0 is provided 'as is' without any warranties, express or implied. The developer and publisher assume no liability for any errors, damages, or losses arising from the use of this software. Users are solely responsible for verifying the accuracy of results and should consult with a qualified professional engineer before making any critical decisions based on the software results.

3.0 Example Files

UniSettle 5.0 comes with four example files. These may be opened by visiting 'Demo Examples' located within the main FILE menu. The purpose of these examples is to showcase the many features of UniSettle 5.0 and does not necessarily represent real site conditions. Most of the images presented in this document were produced from these example files.



Example 1: New Raft

This example computes the settlement of a new 25 m x 25 m raft placed on a new 1 m thick engineered fill. It includes the CPT data used to create the soil profile applicable to this site.

Example 2: Multiple Pad Footings

This example computes the settlement of 4 new 5 m x 5 m pad footings placed on top of a new 1 m thick engineered fill. It includes the two sets of CPT data used to create the two soil profiles applicable to this site.

Example 3: Multiple Structures

This example includes the removal of an existing road and construction of 4 new structures. It also includes the lowering of the G.W.T. 6 months into the construction.

Example 4: Vertical Drains and Stone Columns

This example describes a large raft with a series of vertical drains under one corner to accelerate settlement and another series of stone columns at another corner to provide ground improvement. The settlement is computed at all four corners of the raft.

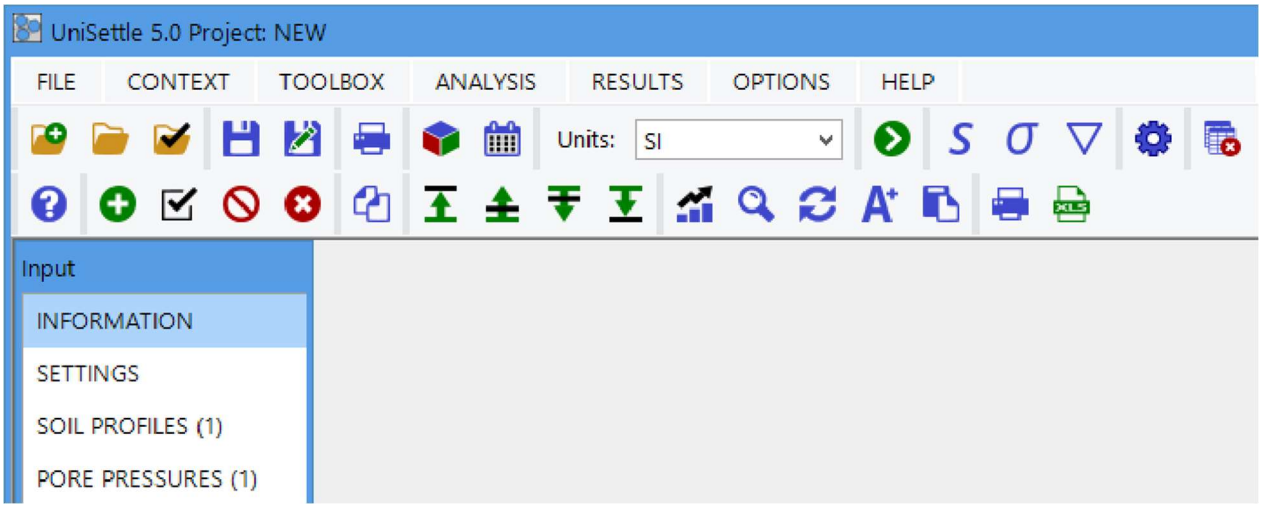
4.0 General Overview

Below is a partial list of the new features, which are discussed below.

- Redesigned interface and side menu
- Improved data entry
- Allow design notes throughout
- Improve the toolbox to include phase and compressibility relationships
- Specify multiple soil profiles
- Specify multiple CPT datasets
- Perform CPT data interpretation including soil classification as per Robertson and Eslami-Fellenius
- Build soil profile from results of CPT data interpretation
- Improve charting of all data and results
- Display soil layers and color in charts
- Specify fills separately from loads
- Improve analysis of vertical drains
- Specify stone columns used for ground improvement
- Compute consolidation assuming vertical drainage over the entire soil profile
- Compute consolidation using both the degree of consolidation (Uz) and the average degree of consolidation (Uavg)
- Compute pore pressure dissipation and excess pore pressure with time
- Produce a 3D view of the project data
- Preview data and results within Microsoft Word
- Export results directly to Microsoft Word

5.0 Interface

Although this represents a major update, attempts were made to retain the same look and feel as UniSettle 4.0. The main interface includes a main menu bar, two rows of toolbars, and a side menu listing of the application's various components.



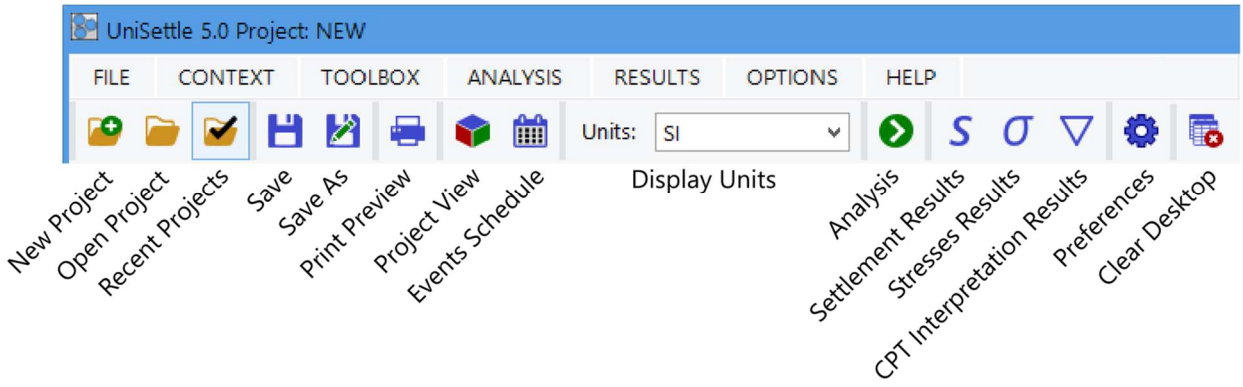
Context Sensitivity

As with UniSettle 4.0, this update is context sensitive. This means that some features will only be available when the correct context is selected. For example, the option to add a new soil layer will only be available if an existing soil profile or an existing soil layer is selected.

The term 'context' refers to the current data or results visible on the screen. If multiple entry forms and results tables are displayed on the screen, the form or window with the focus is considered as the current context. The current context dictates if a specific feature will be enabled or disabled (greyed out).

6.0 Main Menu

The main menu is comprised of seven items: FILE, CONTEXT, TOOLBOX, ANALYSIS, RESULTS, OPTIONS, and HELP. The most popular menu and sub-menu items are accessible via the buttons located within the first row of the toolbars (primary). The buttons should be self-explanatory but hovering the cursor over the toolbar button for a second will provide a short description.



File Menu

The main FILE menu is divided into a series of sub-menus and is designed to be consistent with other Microsoft Windows applications. Use the FILE menu to create a new project file, open an existing project file, access a list of recent projects, import older project data, import datasets, open the demo examples distributed with the application, and save project data.

New in UniSettle 5.0 is the ability to produce a 3D view of the project data and export all data, results, and charts to Microsoft Word for custom formatting and printing.

Context Menu

The main CONTEXT menu is dynamic and changes depending on the selected context. Understanding how the main CONTEXT menu works with the rest of the application is very important. Items related to this menu are discussed later in this document.

Toolbox Menu

The TOOLBOX menu is new in UniSettle 5.0. It offers a list of practical tools designed to help and support data entry. Tools are discussed later in this document.

Analysis Menu

The ANALYSIS menu is where you go to perform an analysis. The type of analyses available in UniSettle 5.0 are discussed later in this document.

Results Menu

A major change in UniSettle 5.0 is the manner in which results are accessed and presented. Rather than listing all available results within the main RESULTS menu, results are divided into groups. A group of results is subsequently subdivided into a drop-down list located within the first toolbar. For example, selecting 'Stresses…' from the main RESULTS menu provides the end user with the option to display stresses computed at various locations and times. Results are discussed later in this document.

Options Menu

The main OPTIONS menu is designed to replace the main ADMINISTRATION menu found in UniSettle 4.0. Use this menu to view and edit user's preferences, activate, and register your license, reset various interface settings, view the application.log file, and check for a new update.

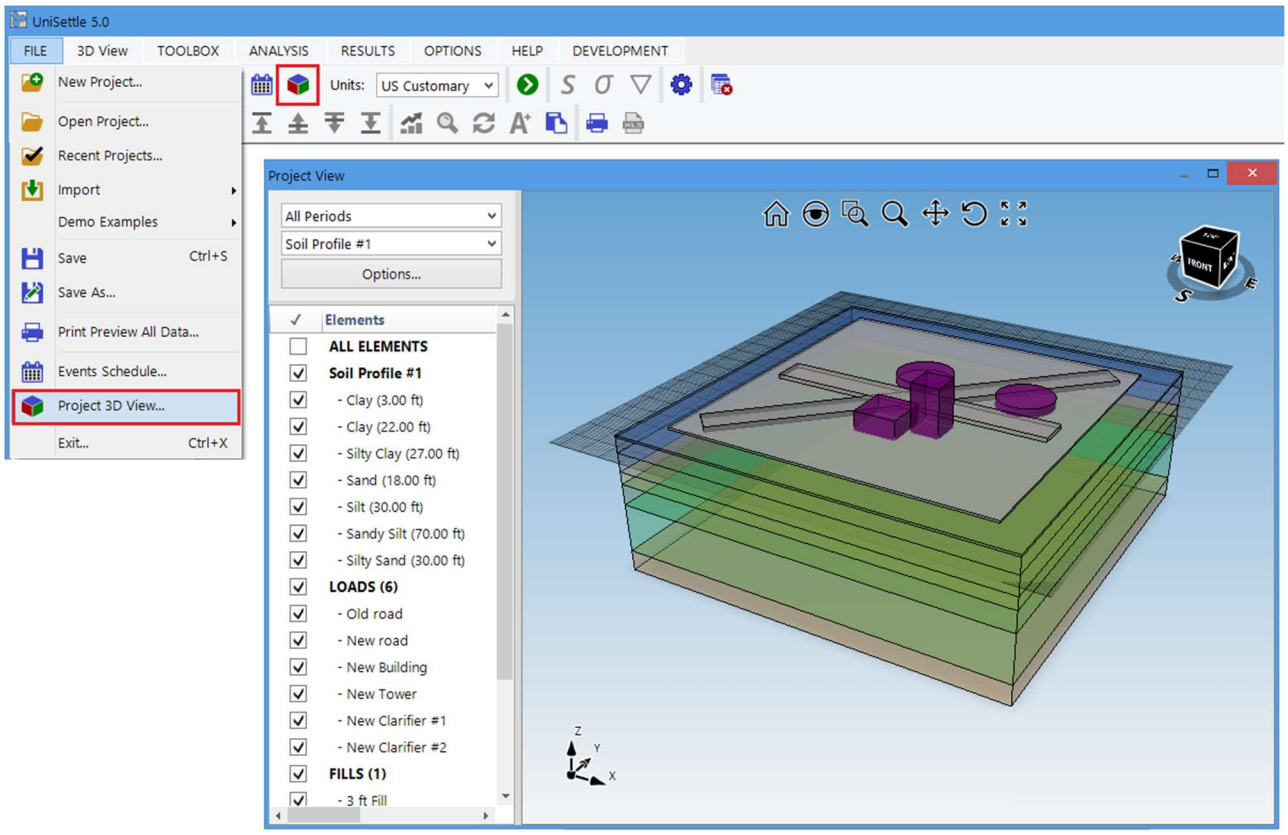
Help Menu

The main HELP menu is meant to access the About window, various documentation, our website, and the latest edition of 'Basics of Foundation Design' by Bengt H. Fellenius, Dr. Tech., P.Eng.

7.0 3D Project View

New in UniSettle 5.0 is the ability to produce a 3D perspective view of the entire site with a single click.

The 3D perspective view produced by UniSettle includes a list of all enabled elements defined in the project along with the ability to include or exclude them from the drawing; these can also be restricted based on their applicable periods.

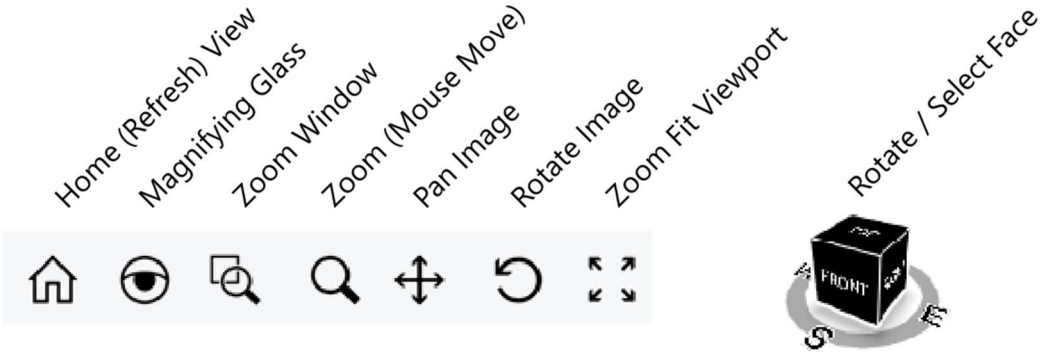


The list of the elements included in the project view includes soil layers, loads, fills, excavations, vertical drains, stone columns, and MeshXY. Only one soil profile can be displayed at a time. Another soil profile, if specified, may be selected from the dropdown list.

A raster image of the project view may be previewed in Word or exported to Windows memory (clipboard). Printing and exporting are discussed later in this document.

Elements are presented to scale. However, when loads are involved, the height of each load is assessed based on a stress/height ratio of 25 kPa/m (~0.16 ksf/ft) by default. A 50 kPa load, for example, will be displayed with a height of 2.0 m (a 1 ksf load will have a height of 6.25 ft). Alternatively, this display height can be override using the Stress/Height Ratio input for any specific load.

The 3D view can be zoomed, panned, and rotated in any direction using the icons appearing at the top of the window. The perspective cube located at the top right of the window may also be used to rotate the image in any direction around any three axes.



The default view is set to an orthographic projection of the top view (site plan). The default projection mode and the view type (and others) can be edited within the 'User preferences…" located under the main OPTIONS menu.

The colors used to display the soil layers and the various elements (loads, fills, excavations, etc.) can be edited and customized individually at the source. The defaults colors can also be edited within the 'User preferences…" located under the main OPTIONS menu.

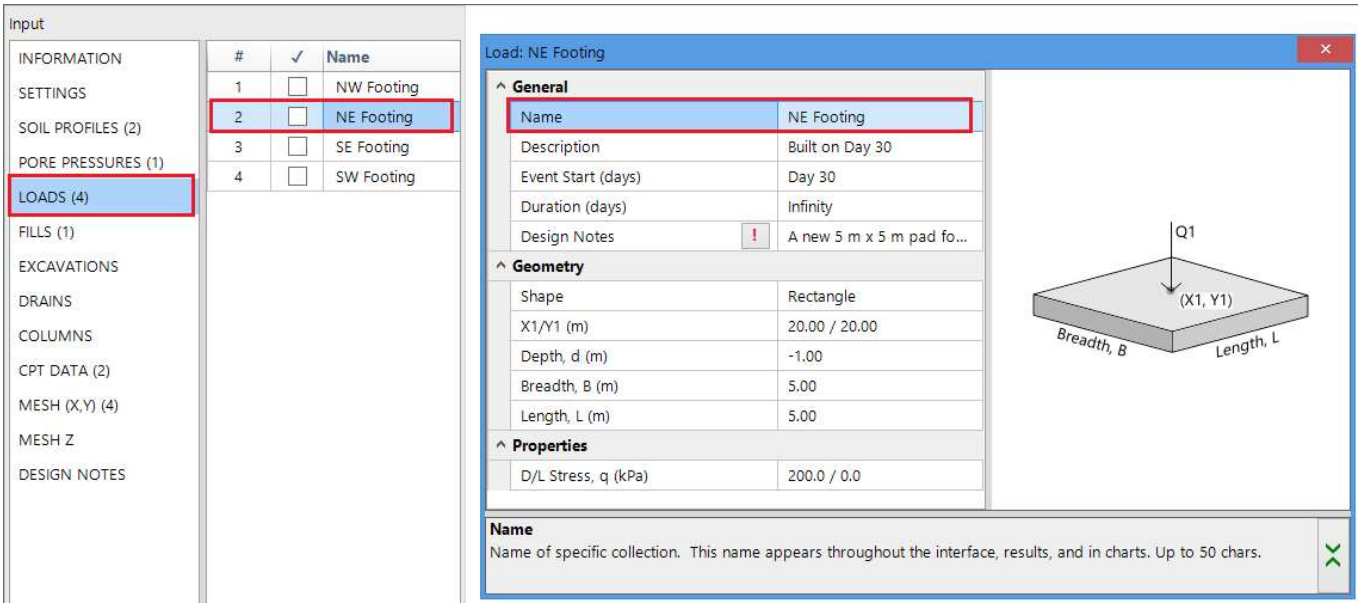
The soil layers and elements color are defined using the ARGB system, where A represents the level of transparency and RGB represents the red, green, and blue components of the color. An Alpha value of 255 represents a totally opaque color whereas an Alpha value of 0 represents a totally transparent color. Most of the default colors are set with an Alpha transparency of 100 to produce some level of transparency when drawing overlapping elements.

The current release of UniSettle 5.0 does not display elements labels and coordinates as part of the 3D View. We hope to have this feature available in a future release.

8.0 Side Menu

As with UniSettle 4.0, the interface displays a side menu listing the various components available to the project. If the component selected involves a single-entry form, such as INFORMATION, SETTINGS, or DESIGN NOTES, the side menu is comprised of a single panel. If the component selected is designed to hold multiple elements (i.e. Fills, Loads, Excavations, etc.), they will be listed in an adjacent panel.

The number in brackets next to each component represents the total number of elements associated with a specific component. LOADS (4) for example indicates that four loads have been specified.



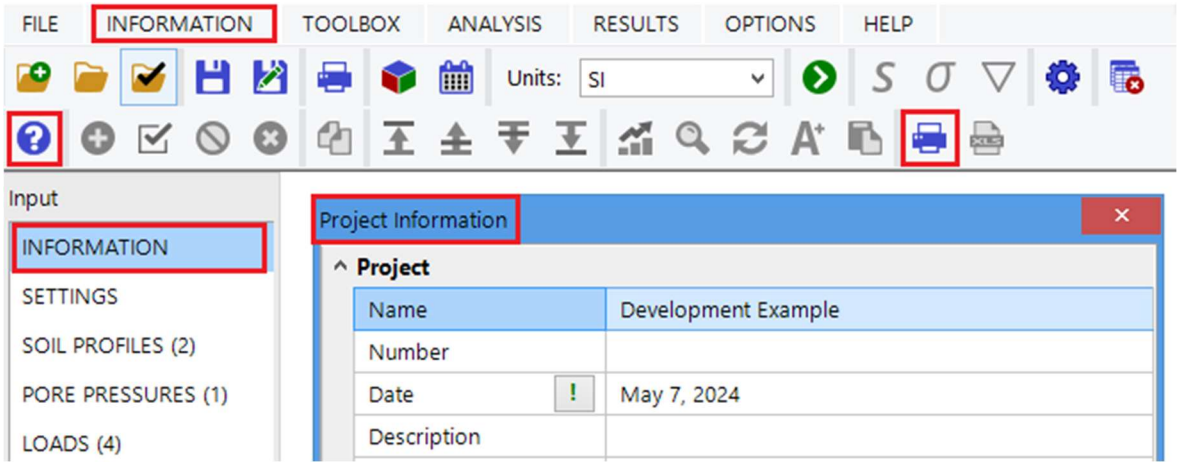
With a few exceptions, all data entry forms are accessible from the side menu. For example, selecting LOADS (4) from the first panel and 'NE Footing' from the second panel will display the entry form specific to 'NE Footing.

The components listed in the first panel of the side menu are fixed. However, the list of elements found in the second panel may be updated using the Add and Delete features located within the context menu (secondary toolbar).

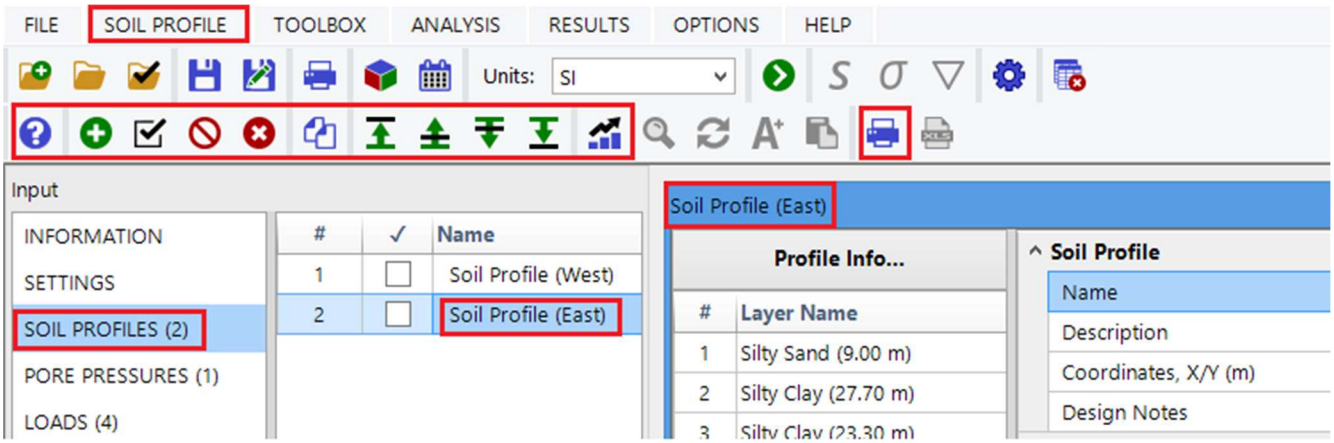
9.0 Context Menu

The main CONTEXT menu is dynamic and changes depending on the context that is currently selected. It works in concert with the content presented on the screen. The items listed within the main CONTEXT menu are also accessible from the secondary toolbar.

The availability of the options displayed within the CONTEXT menu depends on the context. If the focus is on the Project Information entry form, for example, the CONTEXT menu will read INFORMATION and most of the sub-menu items will be grayed out except for the Help and Print buttons indicating the only two options available for this component.



If the focus is on a specific Soil Profile entry form, for example, the CONTEXT menu will read SOIL PROFILE and options such as Add, Delete, Duplicate, etc. will be enabled.



The CONTEXT menu is comprised of 17 items. Their purpose is described below.

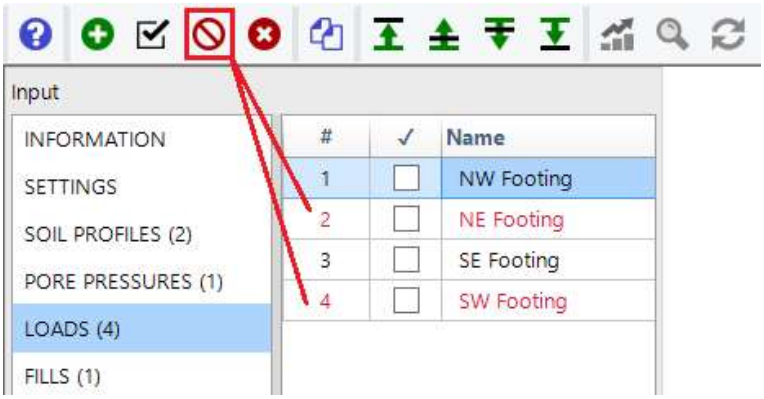
Help
To display help content related to the context on the screen.

Add
Use this option to add additional elements to the project. Elements can be anything from a soil profile, a soil layer, pore pressure, load, fill, excavations, drain, etc. When a new element is added to the project, it will be listed in the adjacent panel of the side menu.

Select/Deselect
This allows the user to select or deselect the entire list of elements. Functions such as Enable/Disable or Delete will only apply to the list of selected elements. If no element is selected, functions such as Enable/Disable or Delete will only apply to the highlighted element.

Enable/Disable
Use this feature to disable or enable elements from the list. When disabled, elements within the list will appear in red and will not be included in the analysis.

The image below shows a list of four loads, where Loads #2 (NE Footing) and #4 (SW Footing) were disabled. They will not be used during the analysis.



Delete
This allows the user to delete elements from the list. When deleted, all traces of these elements within the list will be removed from the project entirely. Deleted elements cannot be recovered.

Duplicate
Use this feature to duplicate a specific element from the list. When duplicating an element, a copy will be made and added to the bottom of the list automatically. New elements can be moved up or down the list using the four Move buttons.

Move buttons (4)
Depending on the number of items in the list of elements, these four buttons may be used to move and set the order of elements within the list.

View Chart
When available, use this option to produce a chart representation of the current data or results. UniSettle 5.0 automatically produces more than 50 charts. Charts and their features are discussed later in this document.

Chart Zooming (On/Off)
Use this feature to turn a chart's zooming axes On or Off. Zooming and other features related to charts are discussed later in this document.

Refresh Chart
This feature serves to redraw the chart to its full view after zooming.

Chart Font Size
The font size used to draw text on a chart will look different depending on the user's screen resolution. A 12pt font size on a high-resolution screen may look smaller than a 10pt font size on a lower-resolution screen. The appearance of images created from charts will also look different depending on how they are resized once they have been exported. Use this feature to switch between small, regular, medium, large, or extra-large font sizes on the fly. The font size selected should be based on output requirements.

Copy Chart Image to Clipboard
Use this feature to copy a chart produced by UniSettle 5.0 into the Microsoft Windows clipboard (memory). Once in the computer memory, content can be pasted into most Microsoft Windows-compatible applications including Word and Excel.

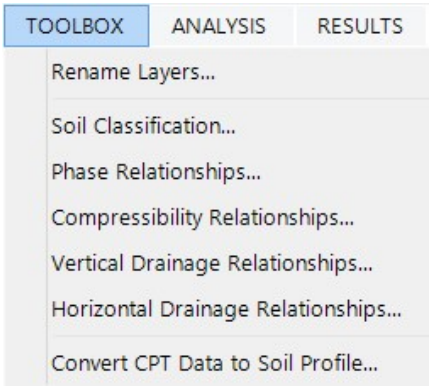
Preview in Word
Use this feature to produce a rich text format file (.rtf) version of the data, results, or chart currently on the screen and preview the content in Microsoft Word automatically. Once in Word, the content can be edited, saved, or sent to the device of your choice.

This feature is a simpler version of the 'Print Preview All Data...' located within the main FILE menu. Printing all data, charts, and results is discussed later in this document.

Preview in Excel
This feature is only available after an analysis has been performed and a set of results is displayed on the screen. It produces a higher-precision, comma-separated format file (.csv) version of the results and previews the content in Microsoft Excel automatically. Once in Excel, the content can be edited, saved, or sent to the device of your choice.

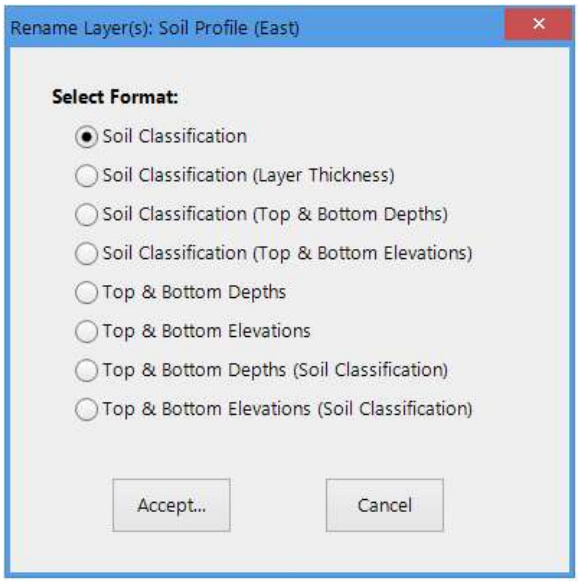
10.0 Toolbox Menu

This menu offers a list of tools designed to help with many data entries and to convert data based on various mathematical relationships. Many of the tools listed within this menu may also be accessed by using the ! button located next to a specific data entry. Below is a short description of these tools and how they can be used. The ! button is discussed later in this document.



Rename Layers

This tool renames all soil layers of a specific soil profile based on a set of pre-defined formats. This tool is only accessible (i.e., available) when the data related to a soil profile, or a soil layer are present on screen. All of the soil layers presented in the demo examples have been renamed using this tool.



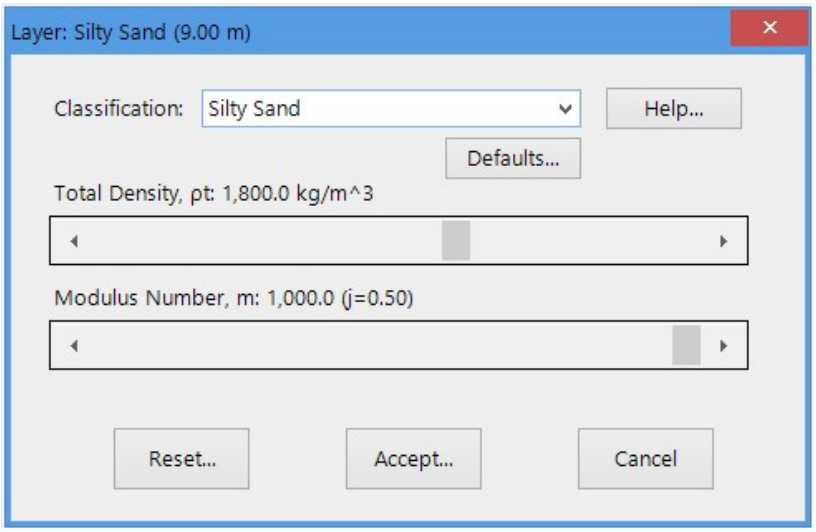
The name of individual soil layers does not affect the analysis itself. However, if named with consistency, this can make a project that much easier to understand. Technically the name of a soil layer can be any alpha-numeric value up to 50 characters in length.

Important:

The name of individual soil layers is used throughout the many tables and charts. The colors used to display soil layers in the charts and the 3D View can be edited at the source. The default colors can be edited within the 'Users Preferences…' located under the main OPTIONS menu.

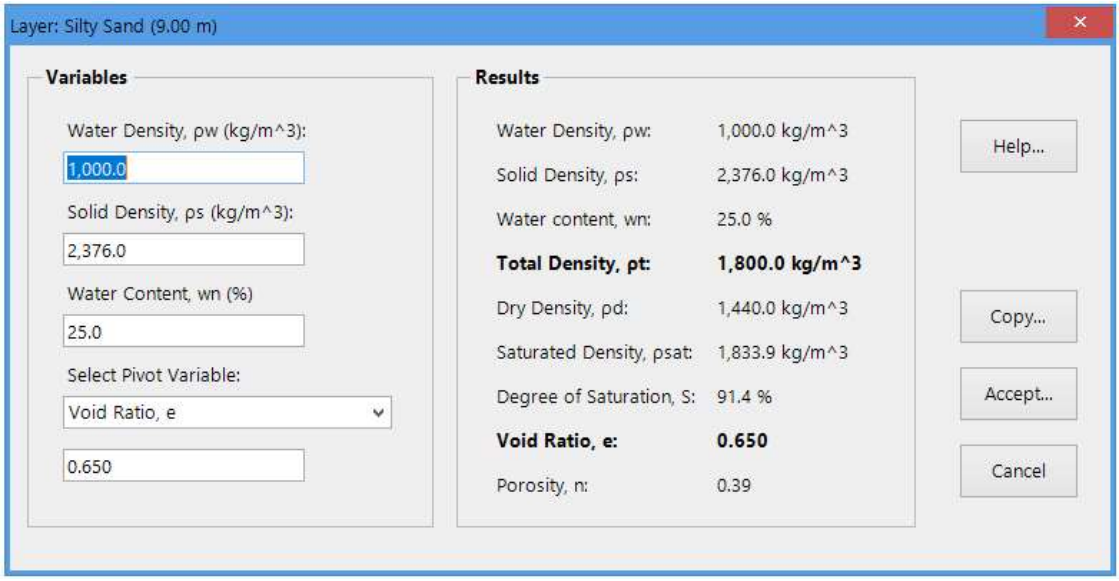
Soil Classification

The purpose of this tool is to provide an alternative way to specify certain data entries specific to a soil layer. It is only accessible (i.e., available) when the data related to a soil layer are present on screen.



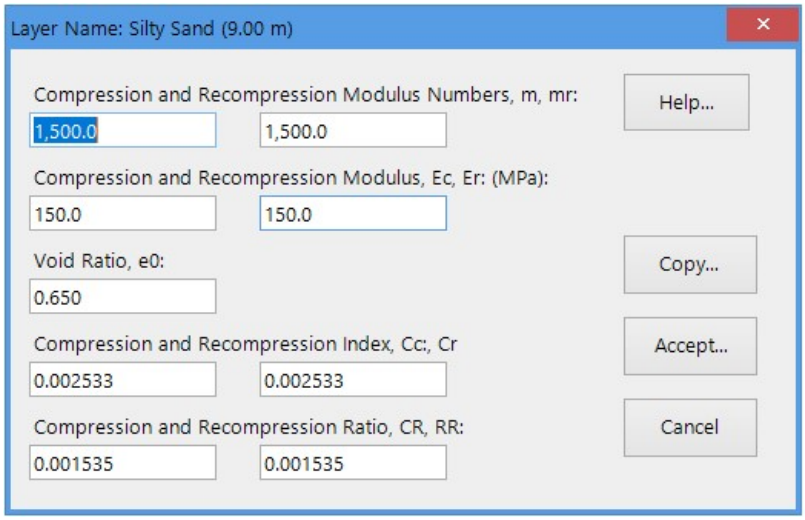
Phase Relationships

This tool computes phase relationships of soil between air, water, and solid. It can be used to compute the total density of the soil from other known values.



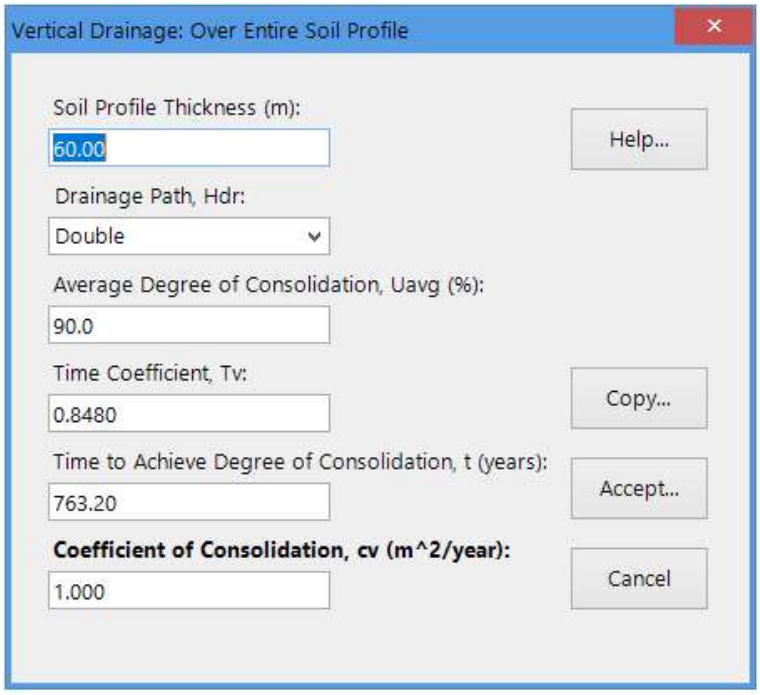
Compressibility Relationships

This tool computes the compressibility relationship between the Modulus Number, Young's Modulus, the Compression Index, and the Compression Ratio.



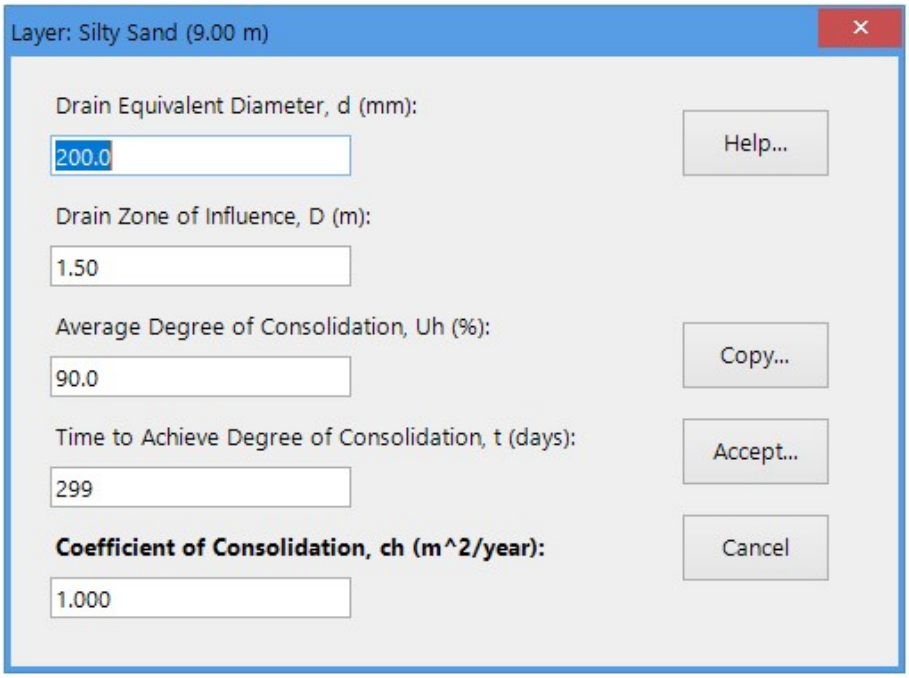
Vertical Drainage Relationships

This tool computes vertical drainage relationships between drainage thickness, Time Coefficient, Tv, and Coefficient of Consolidation, cv.



Horizontal Drainage Relationships

This tool computes horizontal drainage relationships between vertical drains' equivalent diameter, influence zone, average degree of consolidation, Uh, and Coefficient of Consolidation, ch.



Convert CPT Data to Soil Profile

This tool may be used to convert the results obtained from a CPT data interpretation to a soil profile compatible with UniSettle 5.0. CPT data interpretation is discussed later in this document.

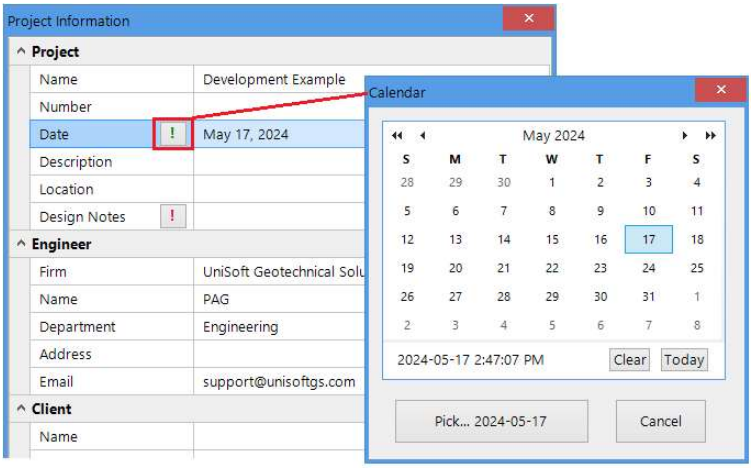
11.0 Data Entry

Most data entry forms are designed to look like Microsoft Excel rows and columns. In most cases, data are entered by typing within the cell itself. Pressing the 'Enter' key or moving the cursor to another cell will record the new value. In other cases, a value may be selected from a drop-down list that becomes available when the cell is accessed.

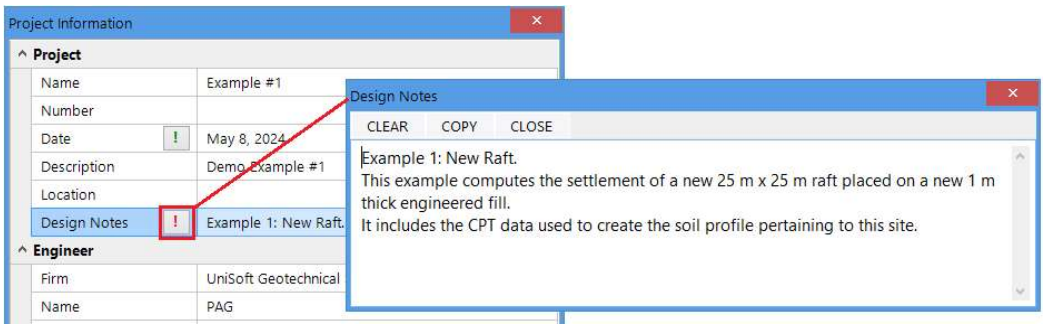
! Button

New in UniSettle 5.0 is a type of entry that can be accessed via a separate cell button. When available, this button will open a secondary entry form providing further options and input. This button comes in two colors (Red and Green). The green button represents an optional selection, meaning that the content of the cell may be specified without having to use the ! button. The red one represents a mandatory entry, meaning that it must be clicked to enter and/or edit the content of the cell.

The ! button next to the 'Date' field, for example, will open a calendar that can be used to select a specific date.



The ! button next to 'Design Notes', for example, is required to add and/or edit design notes related to the current project.



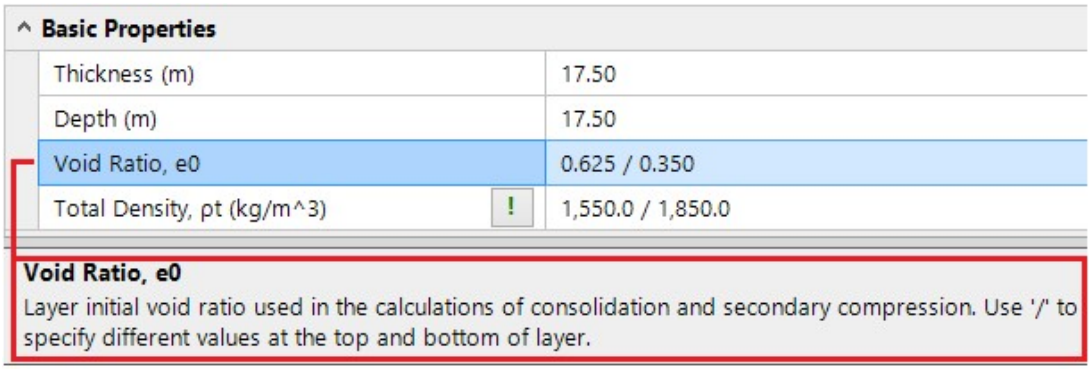
The ! button next to the 'Total Density' field, for example, will open the 'Phase Relationships' edit tool from the main TOOLBOX menu.

Combined Entries with "/"

Also new in UniSettle 5.0 is the ability of some cells to accept two values by separating them with a forward slash, "/". The purpose of combining two entries in the same cell is to save time and screen space. For example, Cartesian coordinates are now specified in this manner.

Coordinates, X/Y (m)	-25.00 / 34.50

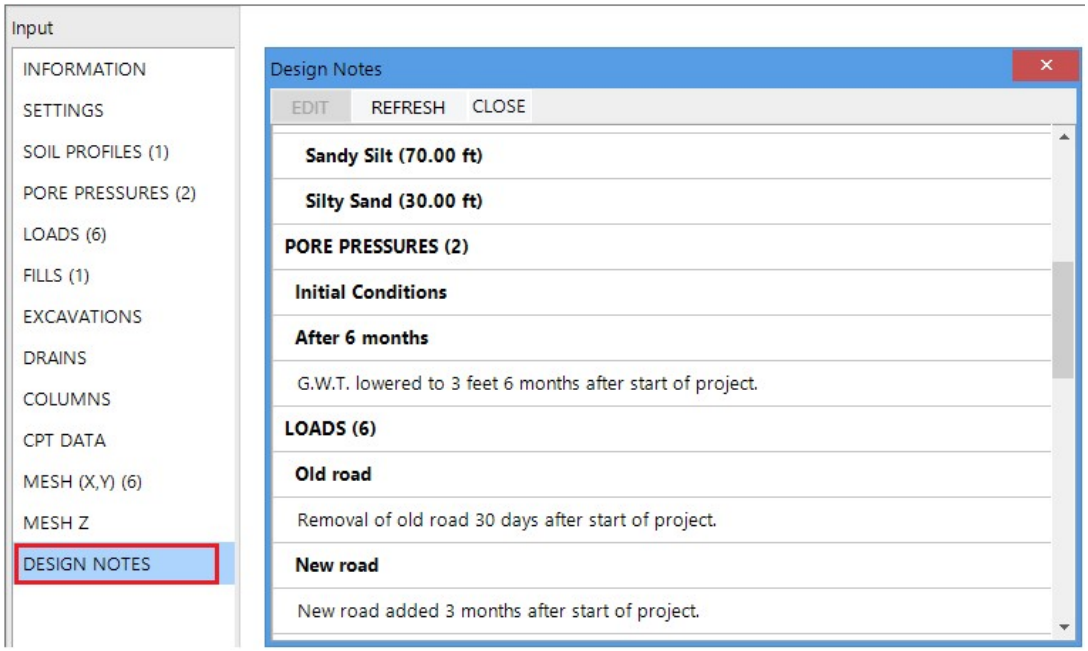
In some cases, the need to provide a second value is optional. For example, the soil density for a soil layer may be constant throughout, thus requiring a single entry. Alternatively, you may specify a soil density varying with depth by specifying the density at the top and the bottom of the cell. The image below shows the void ratio and total density of a 17.5 m thick soil layer varying from top to bottom.



The option to specify a second value within a cell is also noted with the definition of the cell located at the bottom of all entry forms.

Design Notes

Extensive design notes may be included as part of the project file. Every data entry form now includes a 'Design Notes' cell that can be accessed via the **!** button. Design notes can be up to 30,000 characters in length. A summary of all the design notes for the entire project is available at the bottom of the side menu. The example files distributed with the application make use of the design notes throughout.



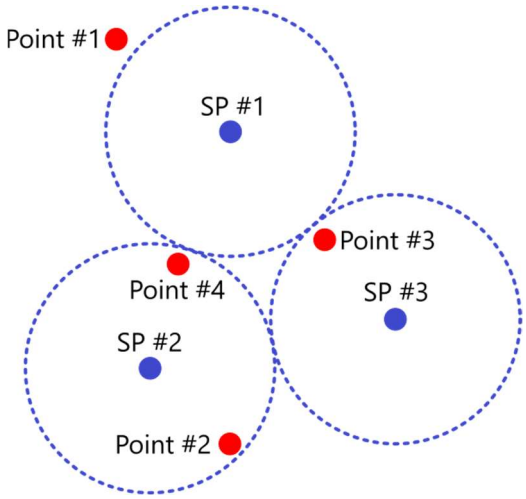
Ground Elevation

New in UniSettle 5.0 is the ability to specify the project's ground (or datum) elevation within the 'Project Settings' entry form. The ground elevation is used throughout the results to display the elevation scale next to the depth scale. Where appropriate, charts may also be set to show elevations rather than depth.

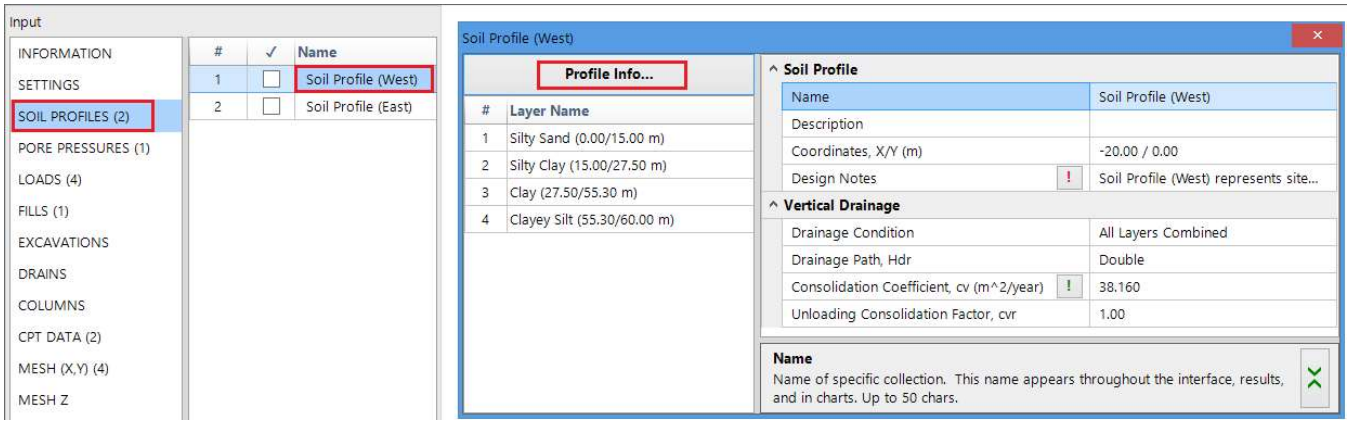
Soil Profiles

UniSettle 5.0 is able to handle multiple soil profiles within the same project or site. Each soil profile must be associated with a unique set of cartesian coordinates. If more than one soil profile is defined and enabled, the soil properties of the soil profile closest to the mesh point under analysis will be used. Soil properties and parameters used during an analysis are never interpolated. In case of equidistance, the soil properties of the first listed soil profile will be used.

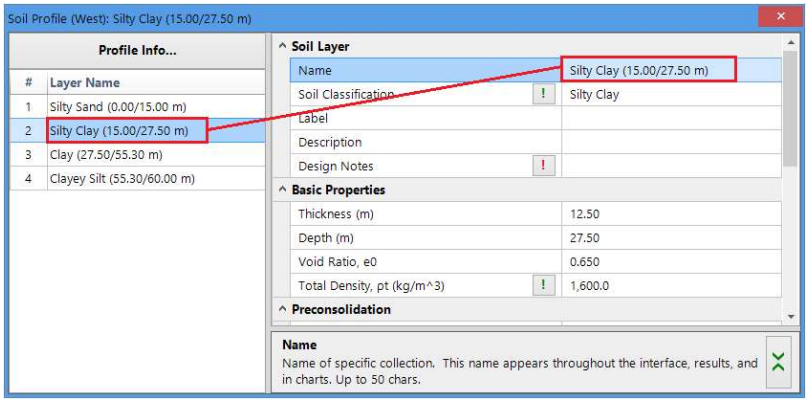
In the image below, for example, the Soil Profile SP#1 will be used to analyze Point #1. Soil Profile SP#2 will be used to analyze Points #2 and #4. Soil Profile SP#3 will be used to analyze Point #3.



The soil profile entry form is divided into two sections. One lists the layers available to a specific soil profile, the other is to enter data specific to the soil profile itself or individual soil layers within the profile. The image below displays the soil profile properties for a 60 m thick soil profile consisting of 4 soil layers.

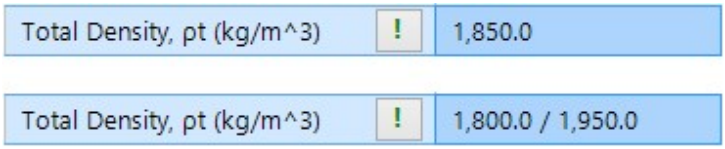


Within the ‘Soil Profile’ entry form, parameters related to an individual soil layer may be accessed by selecting it from the list. The entries relating to the soil profile in general may be accessed once again via the ‘Profile Info…’ button located at the top left of the form.



Unlike soil profiles, soil layers cannot be disabled from the analysis.

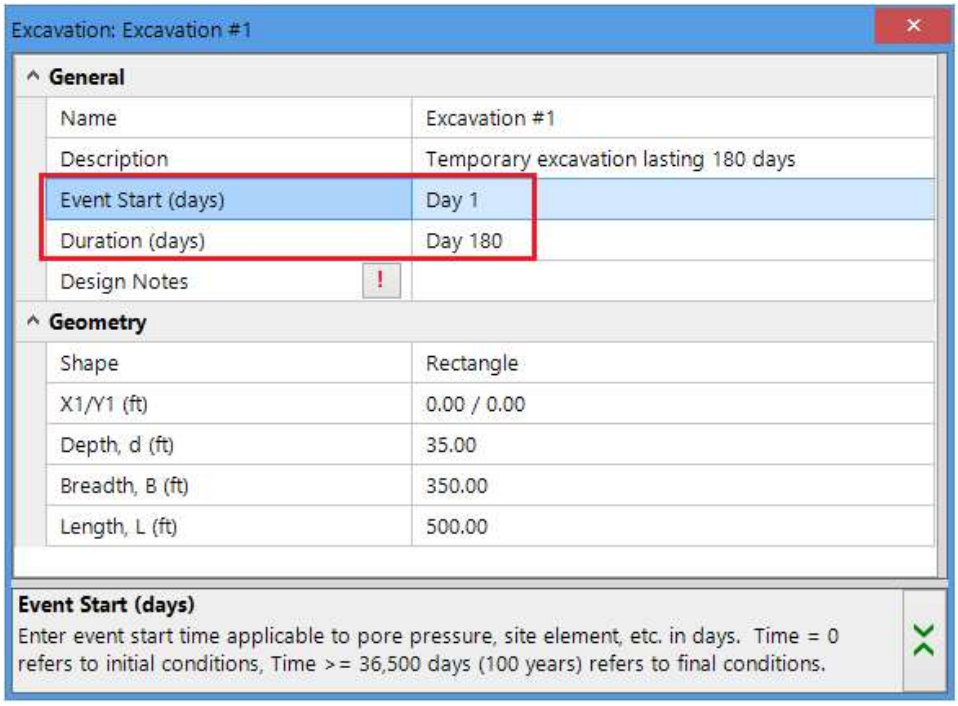
Also new in UniSettle 5.0 is how the top and bottom properties and parameters of soil layers are specified. In UniSettle 4.0, the only way to provide variable soil parameters within the same layer was to set the 'Layer Interpolation' value to 'Interpolate between top and bottom'. This is no longer the case. Where available, top and bottom property values may be defined by separating both values with "/". The first image below indicates a constant soil total density of 1,850 kg/m^3 used throughout the layer. The second image describes a soil layer of varying soil density between 1,800 kg/m^3 (at the top) and 1,950 kg/m^3 (at the bottom).



Events and Duration

New in UniSettle 5.0 is how events are handled. In UniSettle 4.0, the terms ‘Time, t’, or ‘Period’ were meant to define when a specific load or excavation would apply. UniSettle 4.0 assumed that once a load was applied, it would remain for the entire length of the project. The only way to define a temporary load or excavation was to include a negative effect to describe its removal.

In UniSettle 5.0, ‘Time, t’ has been replaced with the ‘Event Start’ entry and a new ‘Duration’ entry has been added to define its duration. For greater precision, events now deal in days rather than months. The image below, for example, represents a temporary excavation applicable on day one of the project and lasting 180 days.



Loads

New in UniSettle 5.0 is the ability to specify dead and live loads separately. The effect of live loads is now included in the computation of the immediate settlement. Live loads, however, are not included in the computation of the consolidation settlement. Separating dead and live loads also provides full compatibility with UniPile 6.0 project files.

The ability to define ring and cone-type loads is also included. The entries used to define embankment-type loads are improved and offer much flexibility.

Fills

New in UniSettle 5.0 is the ability to handle fills as separate entities rather than as separate loads. Fills are assumed to be engineered and will not report compression.

Excavations

The ability to specify trench-type excavations has been added. Although UniSettle 5.0 can handle multiple excavations, the application will check and inform users if excavations are overlapping in space or time.

Drains

Vertical drains are now handled like other elements such as loads and excavations. This means that the depth of vertical drains no longer needs to match the soil layer boundaries. Similar to loads, vertical drains may overlap, cover different areas, and apply at different times during the project.

Stone Columns

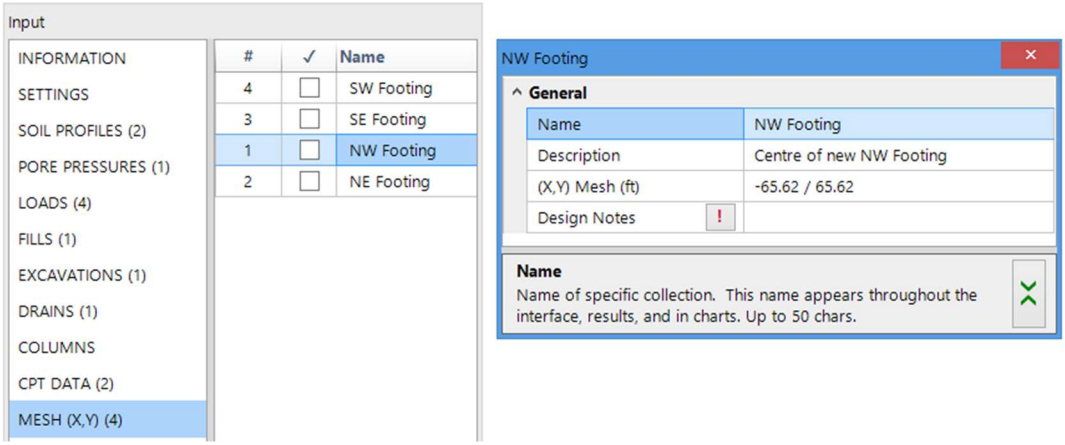
New in UniSettle 5.0 is the ability to specify stone columns used as a ground improvement technique. Similar to loads and excavations, columns may cover different areas and apply at different times.

CPT Data

New in UniSettle 5.0 is the ability to import multiple sets of CPT data for analysis and charting. Soil profiles based on the CPT data interpretation can be produced. CPT data interpretation is discussed later in this document.

Mesh (X, Y)

Mesh is a list of cartesian coordinates representing the (X, Y) location where stresses and settlements are computed. Unless additional mesh points are specified, the analysis will be performed for a single (0,0). In UniSettle 4.0, it was possible to include the analysis of mesh points within individual loads. This is no longer the case. All mesh points are defined at a single location. Similar to loads and excavations, mesh points can be added, deleted, and disabled (i.e., not included in the analysis). The order in which the mesh points are listed will be reflected in the results.



Mesh Z

The depths at which the analysis is performed are dictated by the precision level noted in the 'Project Settings' entry form. However, Mesh Z may be used to include additional depth. Precision Level is discussed later in this document.

12.0 Project Settings

This window is where various methods and other constants used throughout the analysis are set.

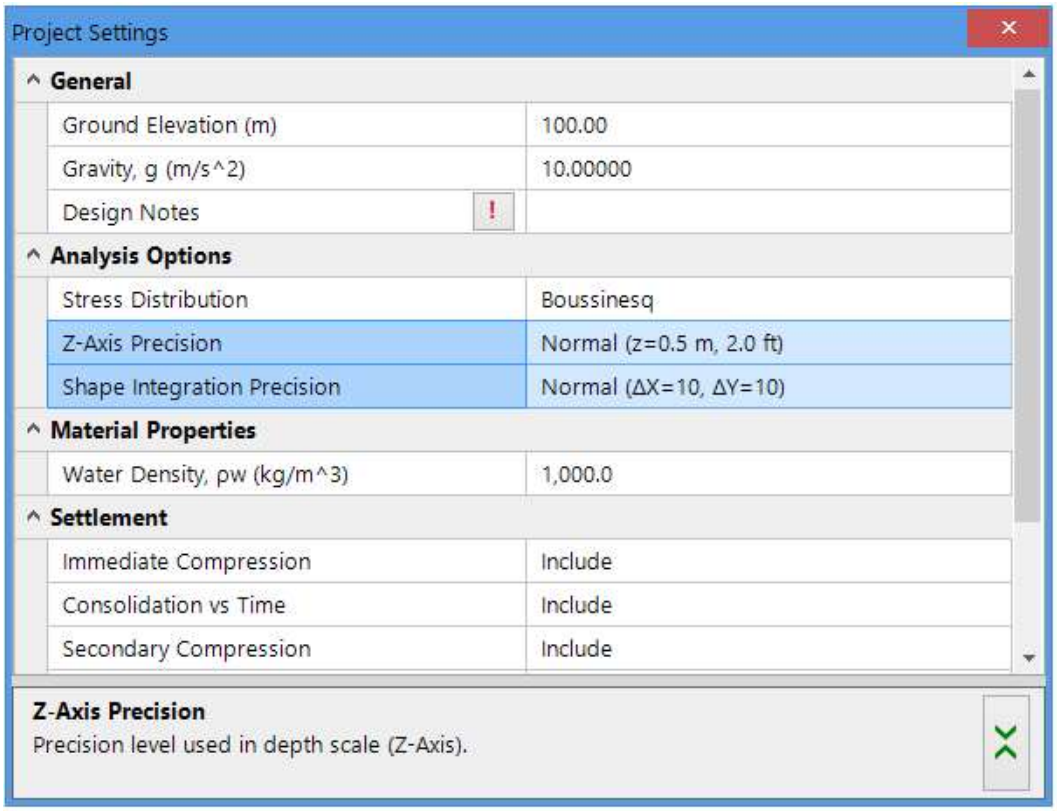
Stress Distribution

Stress distribution imposed by various loads can still be performed using Boussinesq, Westergaard, or 2H:1H Distribution. For performance and memory reasons, UniSettle 5.0 no longer performs an analysis encapsulating all 3 methods simultaneously.

Precision Level

In UniSettle 4.0, the depth spacing used during the computations were set for every soil layer via the 'Z Steps' value. The precision used to perform the integration of shapes was defined for every load and/or excavation.

In UniSettle 5.0, the precision used throughout the computations are defined in the Project Settings portion of the application. The depth spacing is defined using the 'Z-Axis Precision' value. The level of precision used during the integration of shapes is defined using the 'Shape Integration Precision' value.



The table below describes the precision values available for the Z-Axis Precision.

Z-Axis Precision	Z-Axis (Depth)
Lowest	1.5 m / 5.0 ft
Low	1.0 m / 3.0 ft
Normal	0.5 m / 2.0 ft
High	0.25 m / 1.0 ft
Higher	0.1 m / 0.5 ft
Highest	0.05 m / 0.25 ft
Custom	User Defined

The table below describes the precision values available for the Shape Integration Precision. ΔX and ΔY represents the number of strips used during integration.

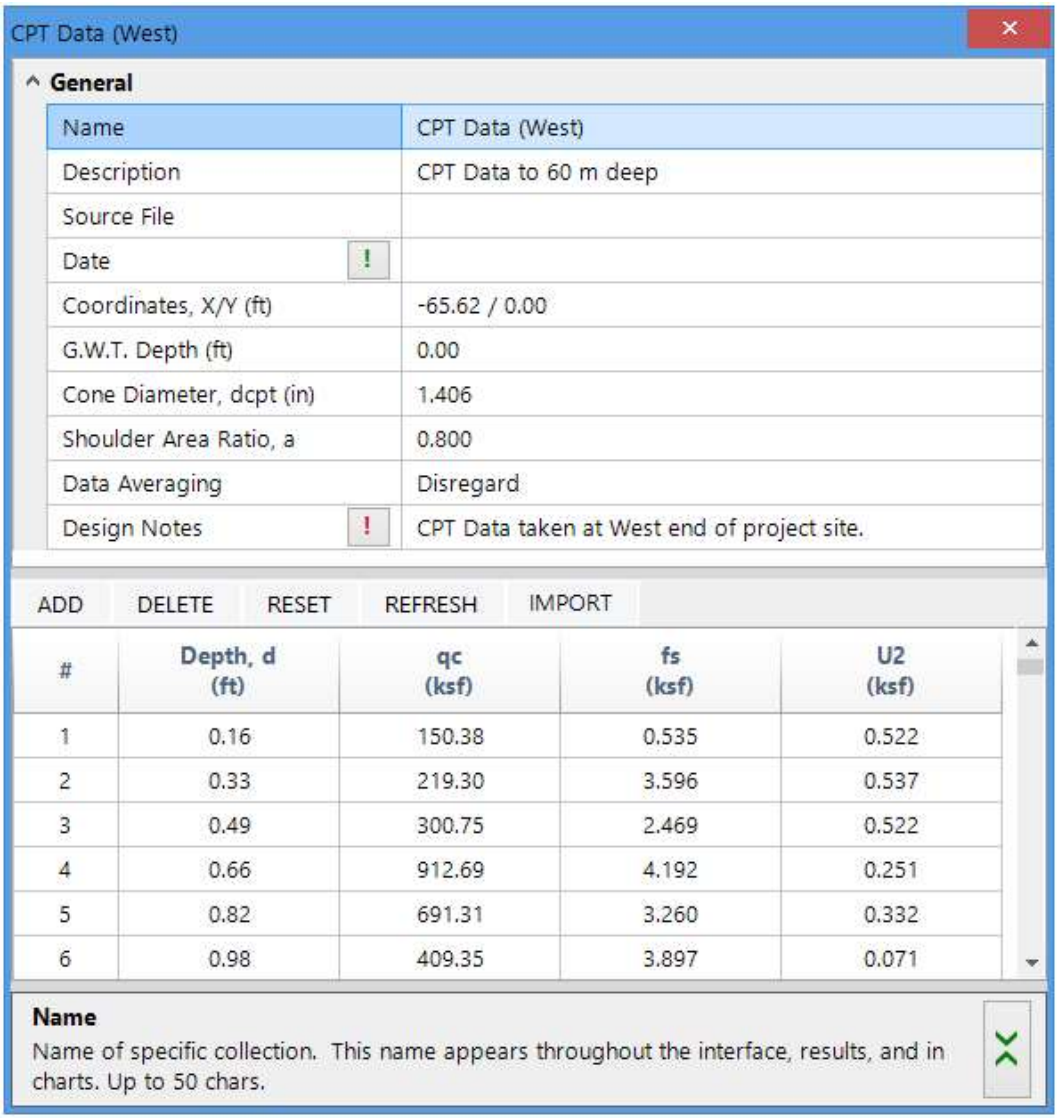
Shape Integration Precision	X-Axis	Y-Axis
Low	ΔX=5	ΔY=5
Normal	ΔX=10	ΔY=10
High	ΔX=25	ΔY=25
Highest	ΔX=50	ΔY=50
Custom	User Defined	User Defined

For example, selecting 'Normal' precision, will perform the computation at every 0.5 m depth (or 2.0 feet if using US customary units). Geometric shapes will be integrated by dividing the dimensions along both the X-axis and the Y-axis by a factor of 10. As an alternative, the precision level may be customized using the 'Custom' level.

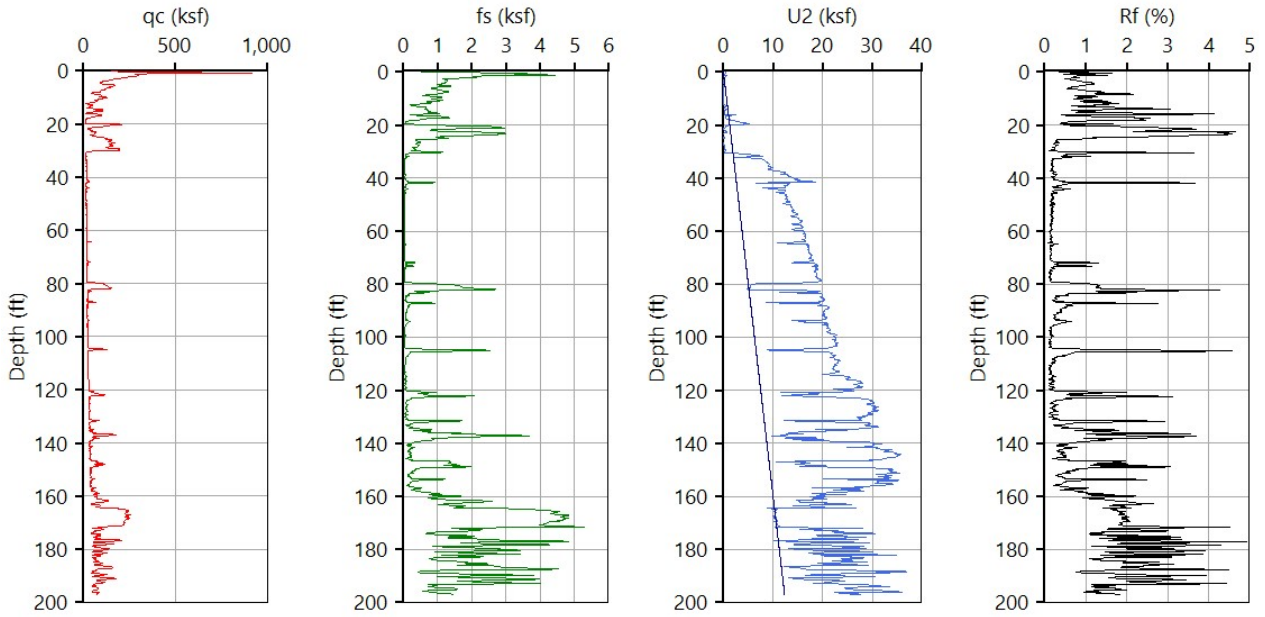
In most cases, selecting the ‘Normal’ level should produce a precision level well within the precision of the specified soil parameters. Obviously, the higher the precision, the longer it will take to perform an analysis.

13.0 CPT Data Interpretation

New in UniSettle 5.0 is the ability to import multiple CPT datasets. CPT data may be charted and interpreted to produce a compatible soil profile. CPT data may be imported by visiting the 'Import' option located within the main FILE menu. CPT data may also be imported or appended to an existing set of CPT data.

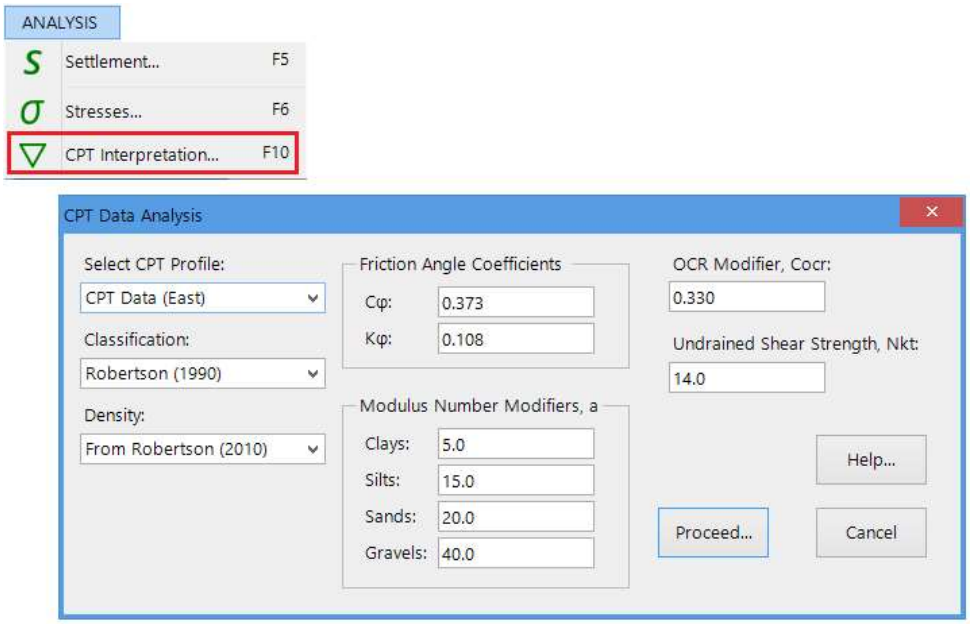


Once imported into UniSettle 5.0, CPT data may be added, deleted, or edited manually. Raw data may also be charted using the 'View Chart…" feature. The image below represents a typical presentation of CPT data.



Similar to soil profiles and other elements (loads, excavations, etc.) multiple CPT datasets may be imported into a single project file. To avoid potential conflicts, CPT data must have a unique set of cartesian (X, Y) coordinates.

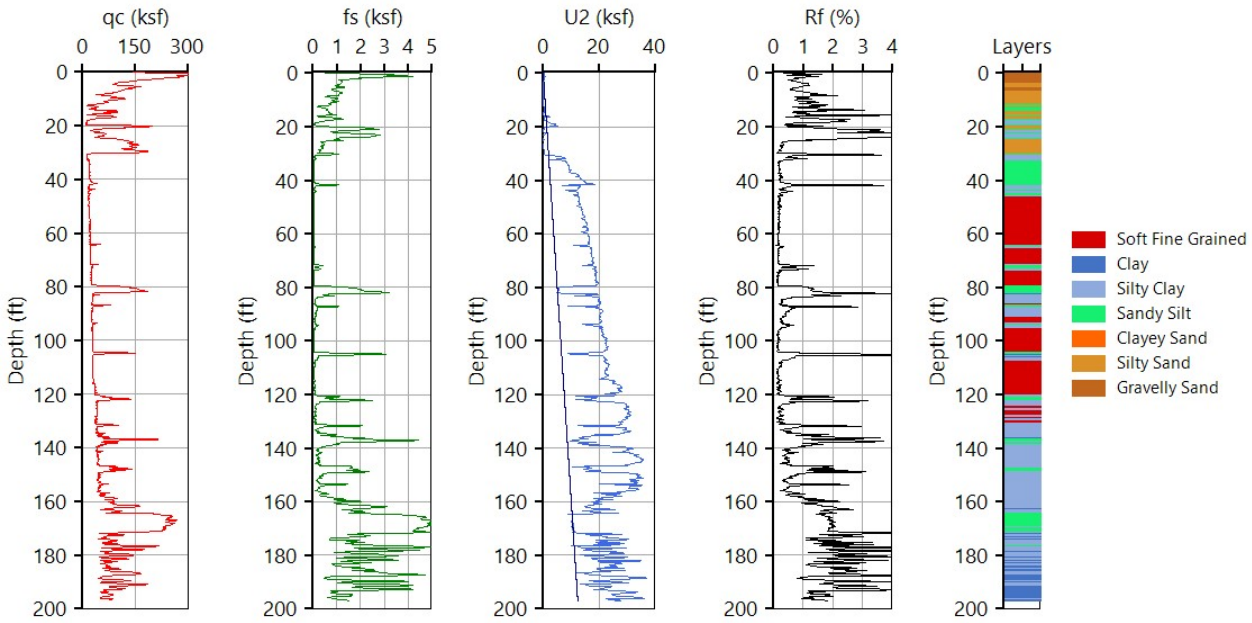
Interpretation of CPT data is performed via the 'CPT Interpretation (F10)" option located within the main ANALYSIS menu (with F10 representing a shortcut).



The main purpose of interpreting CPT data is to obtain a soil classification representing the dataset. UniSettle 5.0 can analyze the data based on the three most popular soil classifications: Robertson (1986), Robertson (1990), and Eslami-Fellenius (1996). In addition to soil classification, the analysis will produce other useful values such as soil behavior type (SBT) and indices (Isbt and Ic), friction angle (for sand), the modulus number, m, and much more.

Important:
Do not confuse CPT data interpretation with the ability to compute the pile resistance using CPT data in UniPile 6.0. The ability to chart and interpret CPT data is found in both UniSettle 5.0 and UniPile 6.0. The ability to compute pile resistance is only available in UniPile 6.0.

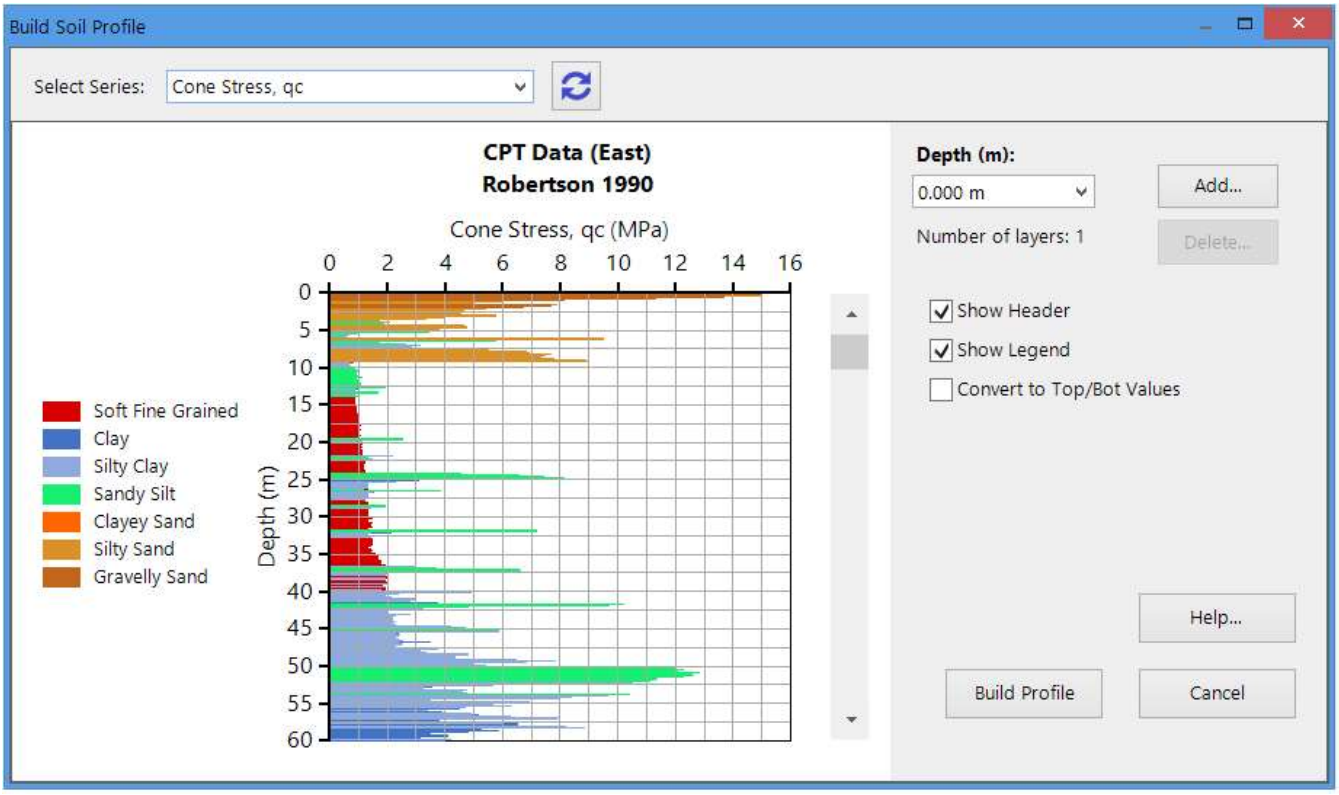
Once CPT data are interpreted, UniSettle 5.0 produces a series of tables and charts capable of displaying the soil strata based on classification.



Results obtained from the interpretation of the CPT data may also be used to build a soil profile compatible with both UniSettle 5.0 and UniPile 6.0. This feature can be accessed via the 'Convert CPT Data to Soil Profile…' located within the main TOOLBOX menu.

Building a soil profile compatible with UniSettle 5.0 is simply a matter of moving the vertical scrollbar cursor located at the right of the chart to indicate a layer boundary and clicking 'Add…'. Additional layer boundaries

may be added by repeating the process. Once all layer boundaries are defined, select 'Build Profile' to build the specific soil profile. The image below shows a set of CPT data defined with three boundaries (four layers).



14.0 Stress and Settlement Analysis

Soil Compression

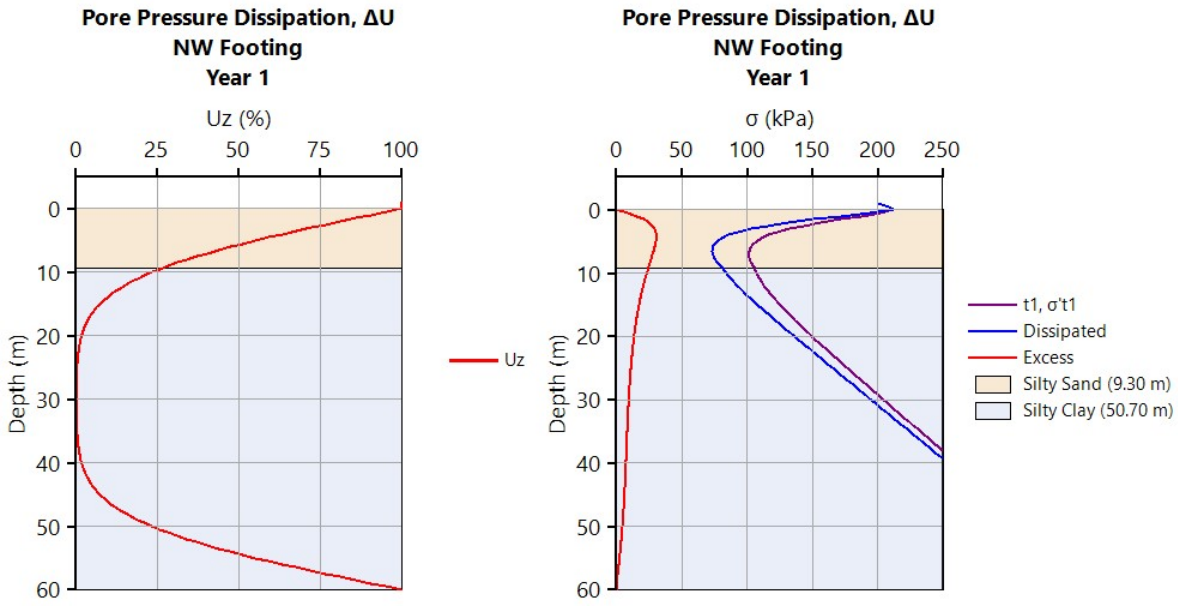
New in UniSettle 5.0 is the ability to disregard the immediate compression and secondary compression within the 'Project Settings' entry form. Also note that if specified, the effect of live loads will be included in the computation of immediate settlement.

Consolidation with Time

A major improvement to UniSettle is how consolidation with time is computed. In UniSettle 4.0, consolidation was computed assuming that vertical drainage was performed on a layer-per-layer basis. Furthermore, the compression of each layer was assumed to be equal throughout as it was based on the average degree of consolidation (Uavg).

New in UniSettle 5.0 is the ability to compute consolidation assuming vertical drainage over the entire soil profile (by combining all layers) and using the degree of consolidation varying with depth (Uz rather than Uavg). As a result, the true pore pressure dissipation and compression within each layer or the entire soil profile can be obtained.

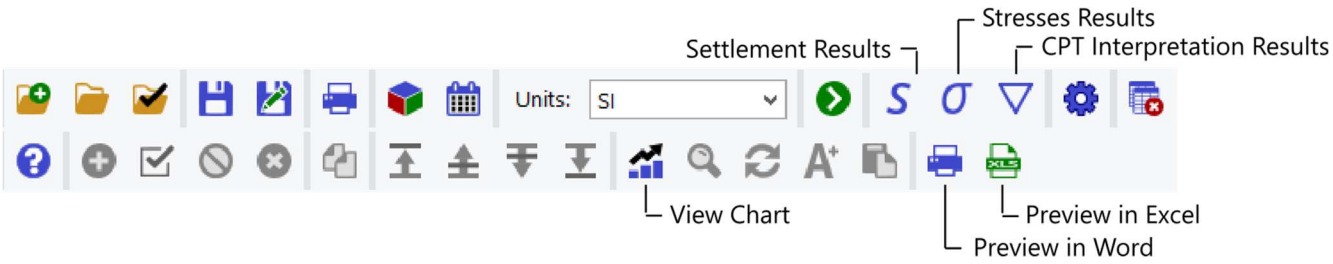
The image below, for example, shows the amount of pore pressure (dissipated and in excess) after Year 1.



Computing more precise pore pressure dissipation at any given time generates more realistic results when the soil is subjected to unloading and reloading over a long period. Note that soil compression is highly sensitive to the consolidation coefficient, cv.

15.0 Results

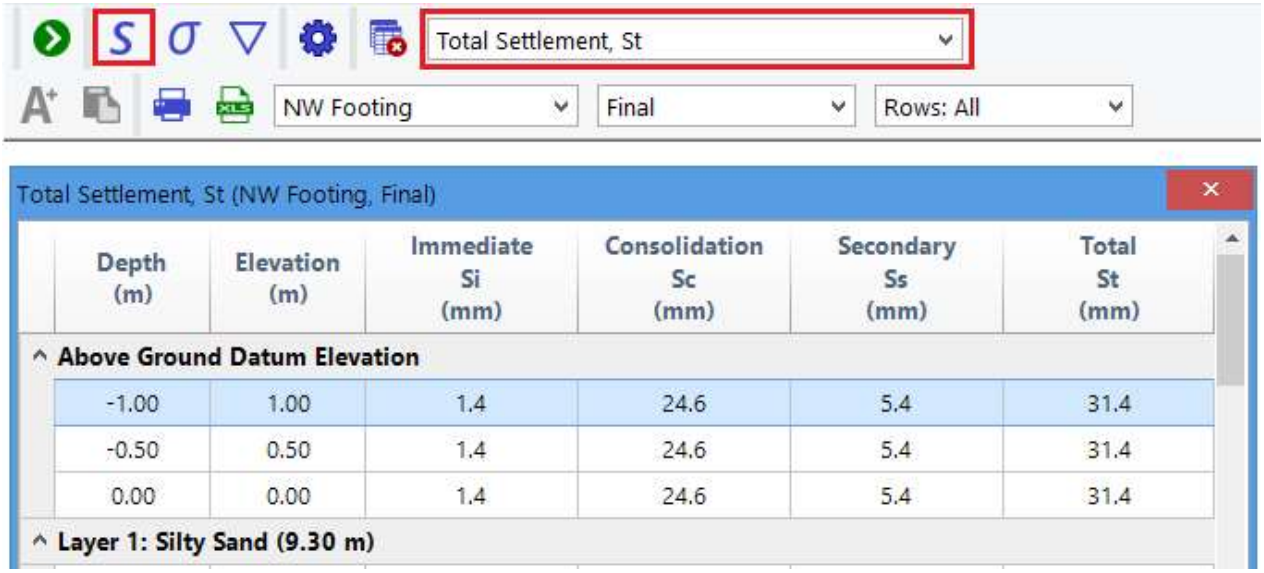
Upon completion of an analysis, the top menu and toolbars will be updated to show the various results that are available for review. The ability to review certain results depends on the type of analysis that was just performed.



Results can be viewed in chart format. They can also be viewed in Microsoft Word and Excel for further manipulation.

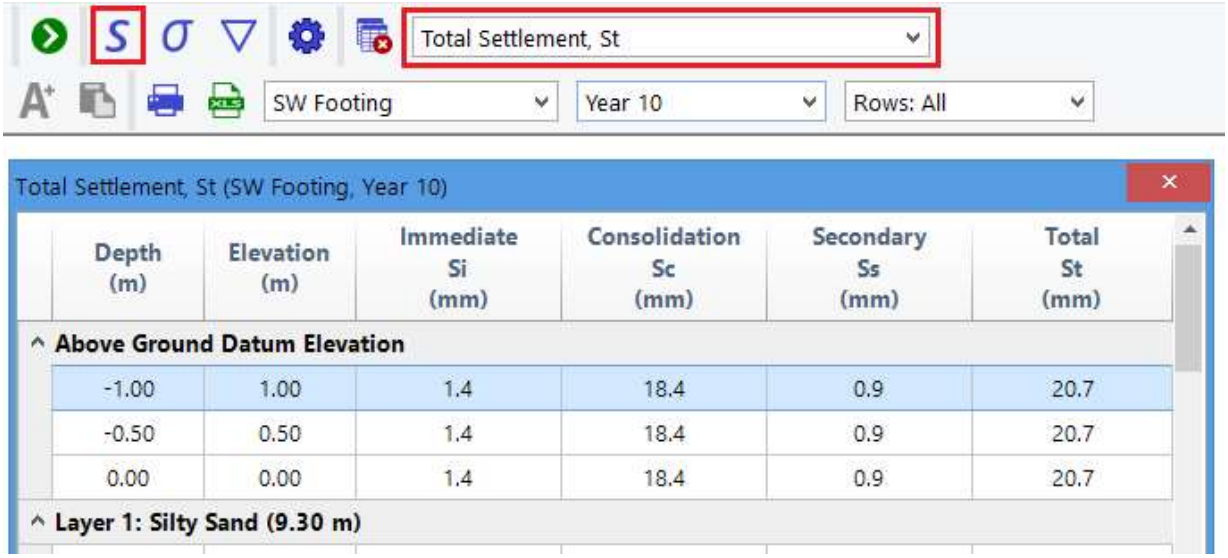
Settlement Results

Selecting 'Settlement…' from the main RESULTS menu or the primary toolbar updates the interface and displays a list of results related to settlement. The secondary toolbar is updated to include various options specific to the results presented on the screen. The image below shows the dropdown settings to display the Total Settlement, St', of the 'NW Footing'.



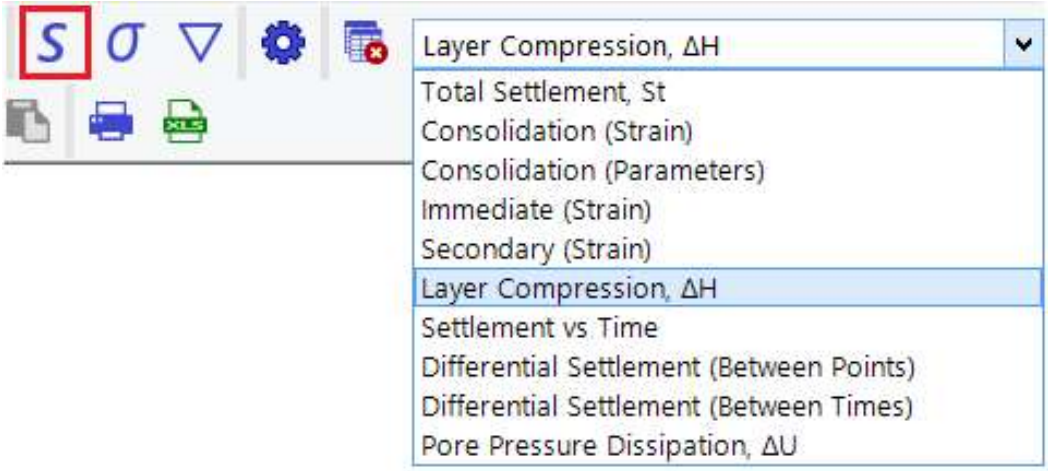
Depth (m)	Elevation (m)	Immediate Si (mm)	Consolidation Sc (mm)	Secondary Ss (mm)	Total St (mm)
Above Ground Datum Elevation					
-1.00	1.00	1.4	24.6	5.4	31.4
-0.50	0.50	1.4	24.6	5.4	31.4
0.00	0.00	1.4	24.6	5.4	31.4
Layer 1: Silty Sand (9.30 m)					

The dropdown settings below represent the same 'Total Settlement, St' of the 'SW Footing' at Year 10.

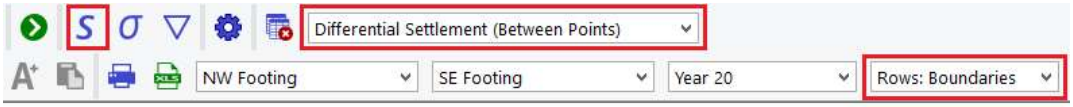


Depth (m)	Elevation (m)	Immediate Si (mm)	Consolidation Sc (mm)	Secondary Ss (mm)	Total St (mm)
Above Ground Datum Elevation					
-1.00	1.00	1.4	18.4	0.9	20.7
-0.50	0.50	1.4	18.4	0.9	20.7
0.00	0.00	1.4	18.4	0.9	20.7
Layer 1: Silty Sand (9.30 m)					

Depending on the analysis, UniSettle 5.0 may produce up to ten tables. Specific results are available inside the dropdown located within the primary toolbar.



The image below shows the dropdown settings to display 'Differential Settlement' between the 'NW Footing' and the 'SE Footing' at Year 20. Results are condensed to show only the depths at soil layer boundaries.

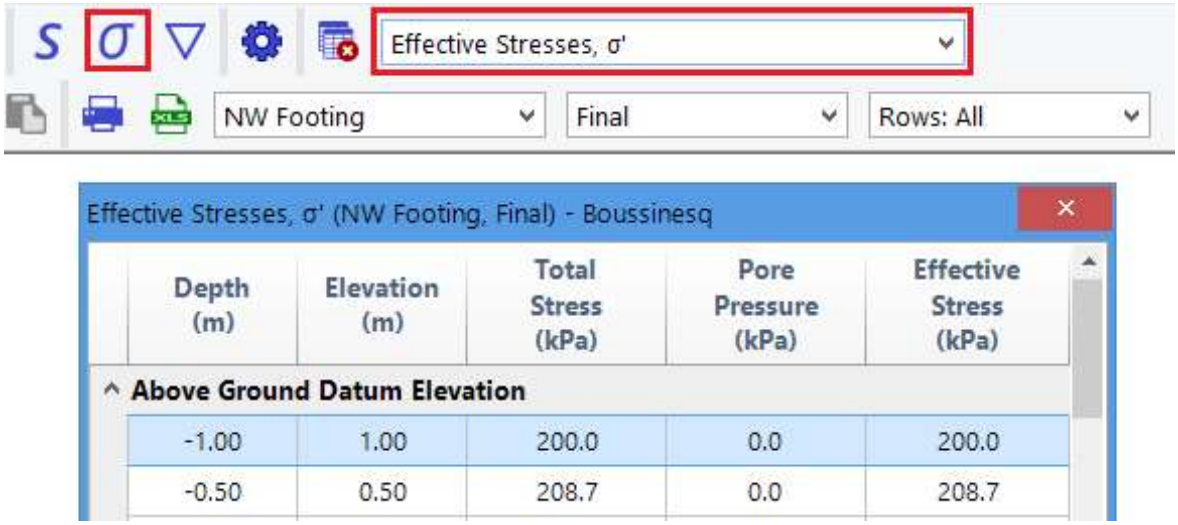


Differential Settlement, ΔSt (NW Footing - SE Footing) - Year 20

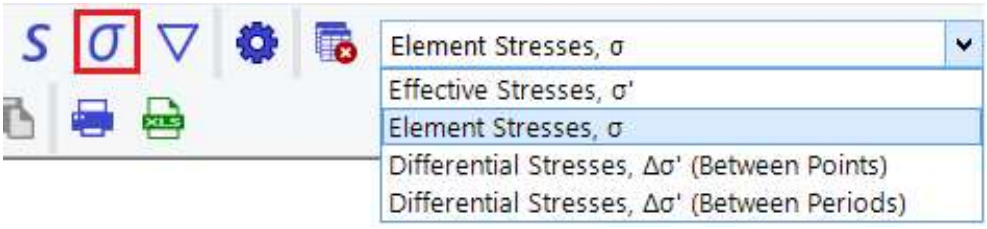
Depth (m)	Elevation (m)	NW Footing St1 (mm)	SE Footing St2 (mm)	Differential ΔSt (mm)
Above Ground Datum Elevation				
-1.00	1.00	25.4	7.6	17.8
0.00	0.00	25.4	7.6	17.8
Layer 1: Silty Sand (9.30 m)				
0.00	0.00	25.4	7.6	17.8
9.30	-9.30	16.4	1.6	14.8
Layer 2: Silty Clay (50.70 m)				
9.30	-9.30	16.4	1.6	14.8
60.00	-60.00	0.0	0.0	0.0

Stress Results

Selecting 'Stresses…' from the main RESULTS menu or the primary toolbar updates the interface and displays a list of the results related to stresses. The secondary toolbar is updated to include various options specific to the results presented on the screen. The image below shows the dropdown settings to display the 'Effective Stresses, σ' at 'NW Footing', at 'Final' period.

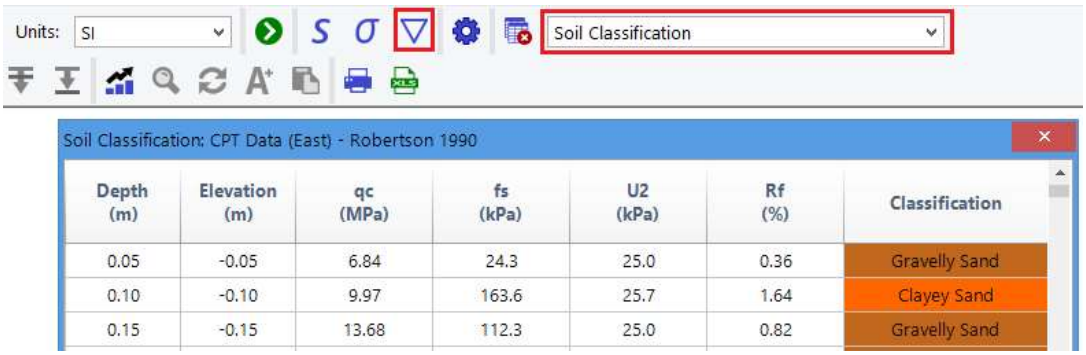


Stress results produced by UniSettle 5.0 are divided into four separate tables. Specific results are available inside the dropdown located within the primary toolbar.

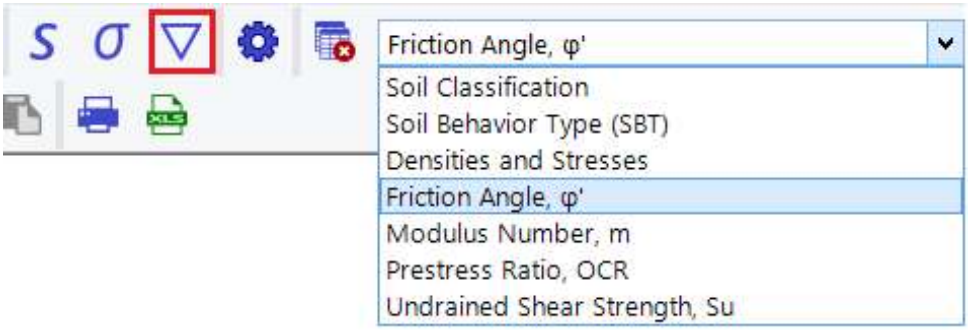


CPT Interpretation Results

Selecting 'CPT Interpretation...' from the main RESULTS menu or the primary toolbar updates the interface and displays a list of the results related to CPT data interpretation. The image below shows the dropdown settings to display the 'Soil Classification' obtained from a set of CPT data.



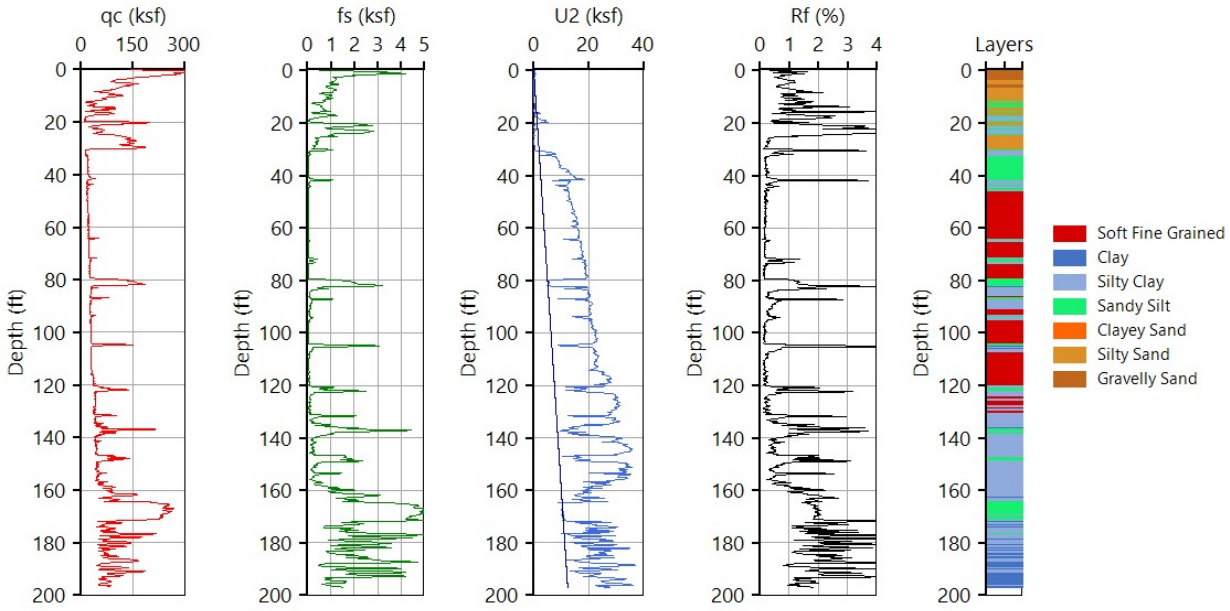
CPT data interpretation produces seven tables. Specific results are available inside the dropdown located within the primary toolbar.



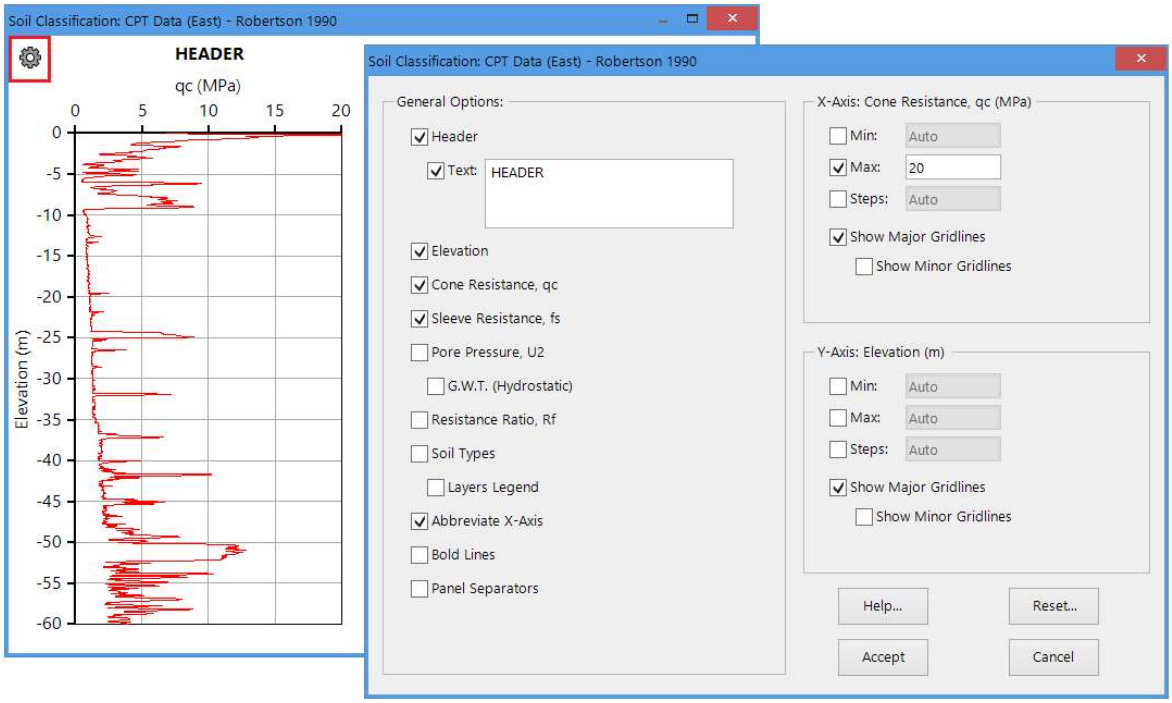
16.0 Charting Data and Results

Where available, data and results may be presented in graphical form by using the 'View Chart…' button located within the secondary toolbar or the main CONTEXT menu. Depending on the data and the type of analysis performed, more than 50 types of charts may be produced with a single click.

Also new in UniSettle 5.0 is the ability to produce up to five side-by-side charts. The chart below was produced using the 'Soil Classification' feature of a CPT data interpretation.



The appearance of charts and series may be customized by selecting the 'Chart Settings…" button located at the top left corner of every chart.



Next is a list of the many options and features that may apply to a single or group of charts. The list varies depending on what the chart is meant to represent.

- The chart header may be edited or hidden
- When dealing with depth, the depth axis may be revised to display elevation
- When multiple charts appear side-by-side, they may be hidden
- Lines may be bolded
- Symbols may be turned On/Off
- Soil profile with or without color may be turned On/Off
- Individual series may be turned On/Off
- Series legends may be turned On/Off
- X and Y axis settings may be set manually
- Major and minor gridlines may be turned On/Off

Manual zooming of a section of a chart may be performed by drawing a rectangle while holding your main (usually left) mouse button.

An image of the chart(s) as it appears on the screen may be viewed in Word using the "Preview in Word…" button located within the secondary toolbar. An image copy of the chart can also be copied to Windows memory (clipboard) and pasted into other applications capable of accepting Portable Network Graphic images (.png). The size of the image being copied is based on its size on the screen and the screen resolution. The larger its appearance on the screen, the larger the image in memory will be. Depending on the intended purpose, you may use the 'Chart Font Size…" feature located within the secondary toolbar to adjust the font size to suit your needs.

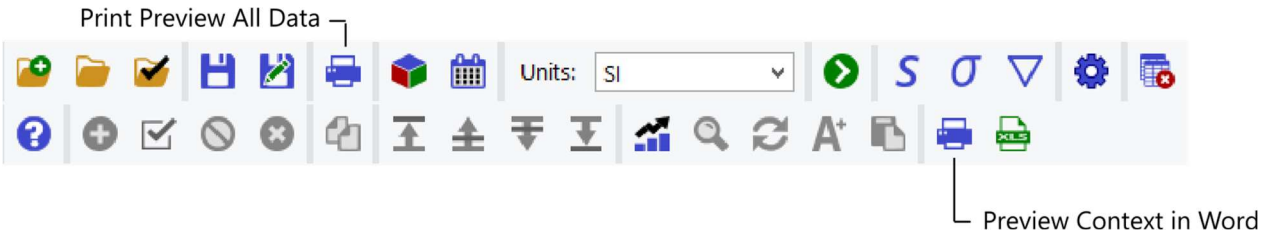
17.0 Printing Data, Results, and Charts

When selecting the Print command, a temporary Rich Text Format (.rtf) file is created and automatically previewed in Microsoft Word. Having Microsoft Word handle all printing means that the format and content can be edited by the end user without any limits. It also means that all outputs may be copied and pasted into engineering reports.

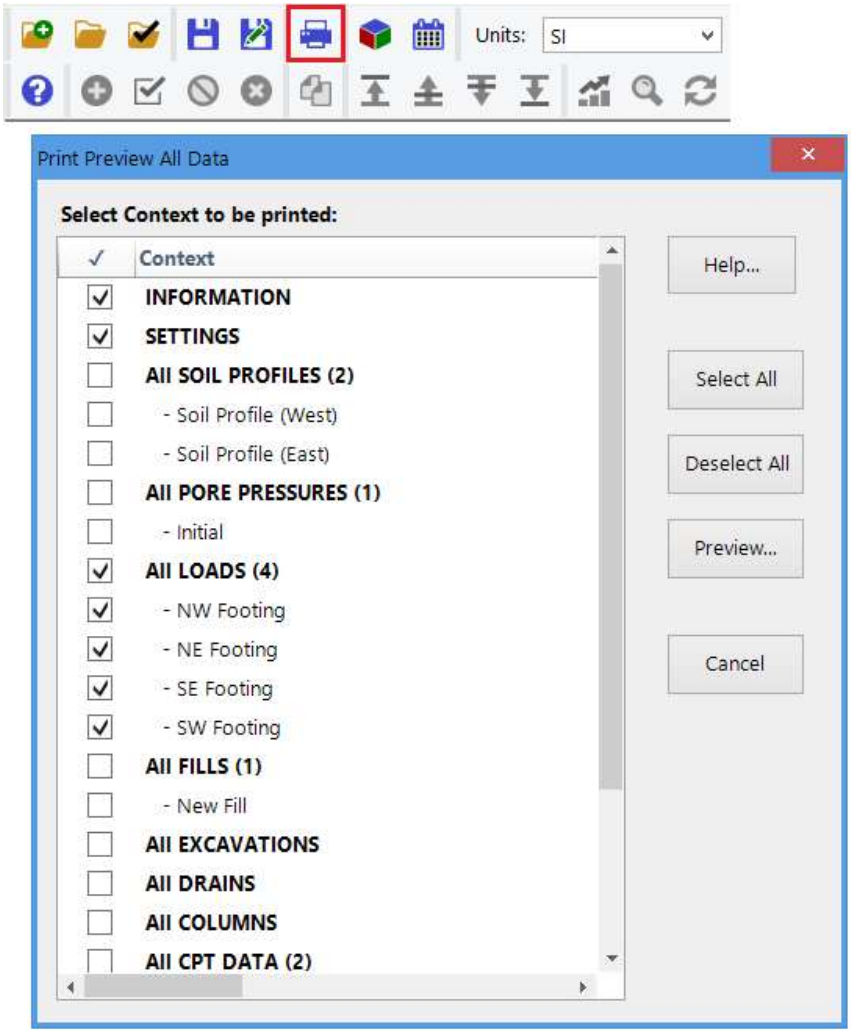
By default, all temporary files produced by UniSettle 5.0 are recorded in the Users\AppData\Local\Temp\UniSoft GS\UniSettle5 folder. This output folder may be changed by visiting the User Preferences located within the main OPTIONS menu.

Printing can be achieved in two ways:

- From the 'Print Preview All Data…' located within the main FILE menu (and primary toolbar)
- From the 'Preview in Word…' located within the main CONTEXT menu (and secondary toolbar)



The 'Print Preview All Data…' opens a window allowing the selection of one or multiple sets of input data. Depending on the size of the project, previewing all data may produce hundreds of pages and may take a few minutes. This is particularly the case when CPT datasets are included.



Using the 'Preview in Word…' option located within the secondary toolbar bypasses the above window and previews the data, results, or chart currently on the screen.

Important:

Due to the extremely large amount of results being produced by UniSettle 5.0, it is not possible to print all available results using a single action. Only the results currently visible on the screen may be printed or exported.

18.0 Exporting Results

Individual results may be exported to a temporary comma-separated format file (.csv) and automatically previewed in Microsoft Excel using the 'Preview in Excel…' button located within the secondary toolbar. Having the ability to view the raw data within Microsoft Excel means that the format and content can be manipulated by the end user without any limits. It also means that custom charts and graphs can be produced.

By default, all temporary files produced by UniSettle 5.0 are recorded in the Users\AppData\Local\Temp\UniSoft GS\UniSettle5 folder. This output folder may be changed by visiting the User Preferences located within the main OPTIONS menu.