

Settle^{3D} version 4.0 Beta

The version 4.0 Beta is due to be released in late Fall 2016. Make sure to sign up and give us your feedback!

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New features include:

- **Non-horizontal ground surface**
- **Horizontal loading**
- **Ability to model ground improvement**
- **CPT analysis tool**
- **CPT soil profiling**
- **Updated liquefaction analysis module**
- **Staged material properties**
- **Enhanced results interpretation options**

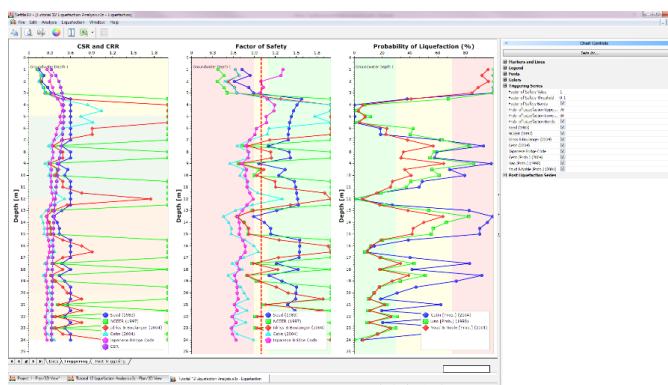
The new staged material properties options gives users the ability to account for modulus degradation. Practically any material property can be staged, and new datum dependency options have also been added.

Updated Liquefaction Analysis Module

The following additions have been made to the liquefaction analysis capabilities of Settle^{3D} v4:

- Post-triggering analyses for CPT and VST
- Pre-defined Triggering calculation methods for SPT

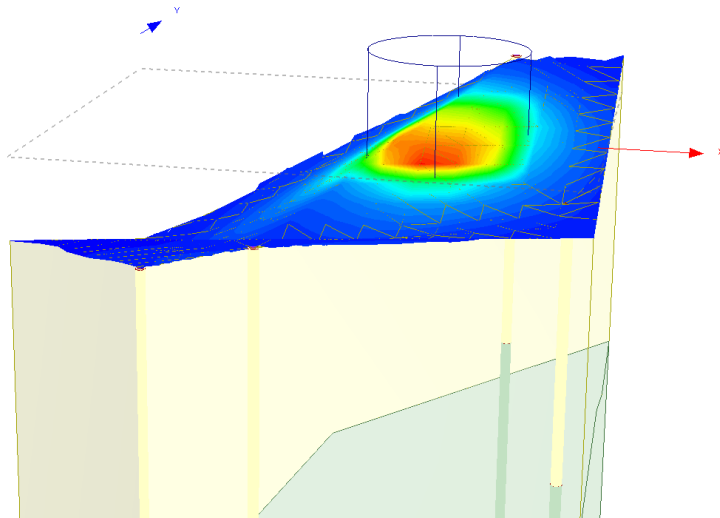
- Youd et al. (2001)
- Idriss and Boulanger (2008)
- Cetin et al. – Deterministic (2004)
- Cetin et al. – Probabilistic (2004)
- Incorporation of ground profile in LDI calculations



Non-Horizontal Ground Surface

Users can now define a non-horizontal ground surface using boreholes. By defining a top elevation for each borehole, a ground surface is interpolated. Results can be viewed using the existing query point, query line, and field point grid options, or on the **new 3D surface contour**.

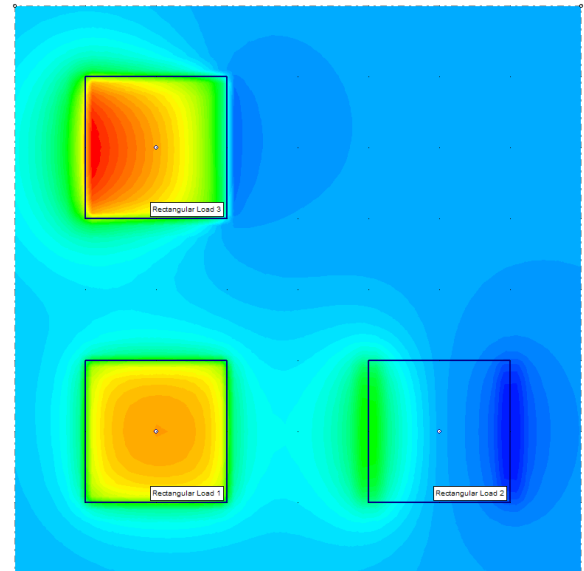
The ability to define the soil profile by Depth from Ground Surface or by Elevation is another new soil profile features.



Total Settlement Contours for circular load on non-horizontal ground surface

Horizontal Loading

Horizontal loads (i.e. wind turbine loads) can now be entered in *Settle*^{3D}. Both horizontal and vertical loads can be defined for the Boussinesq and Westergaard stress computation methods.



Total Settlement contours from different loading types (top: horizontal and vertical; bottom left: vertical; bottom right: horizontal).

In addition to the ability to model horizontal loading, a number of new results are now calculated in *Settle*^{3D}:

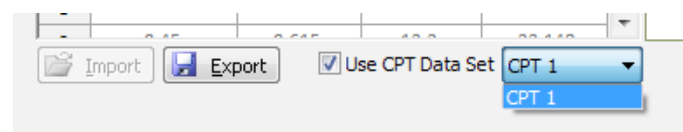
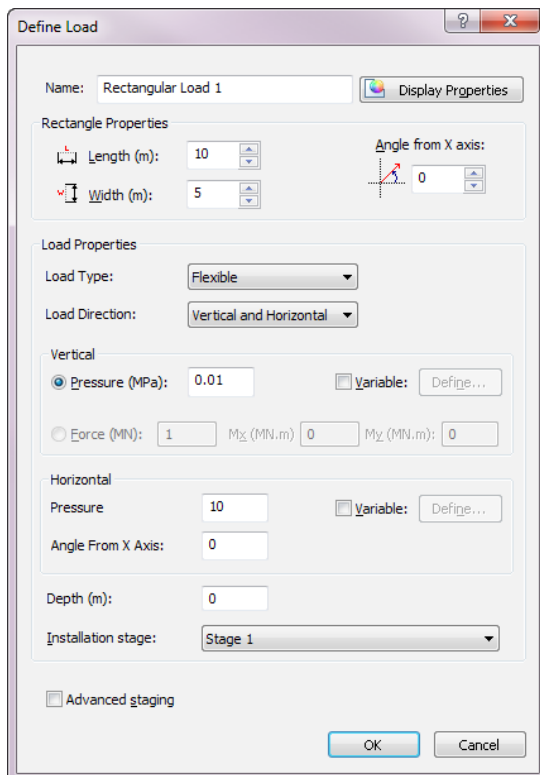
- Loading Stress in X and Y directions
- Effective Stress in X and Y directions
- and many more.

Cone Penetration Test Analysis and Interpretation

The Cone Penetration Test (CPT) allows for a continuous soil profile and can collect up to 5 independent readings in a single sounding. *Settle*^{3D} v4 features a CPT analysis module based on:

- Cone tip resistance (q_c)
- Sleeve friction (f_s)
- Penetration pore water pressure (u_2)

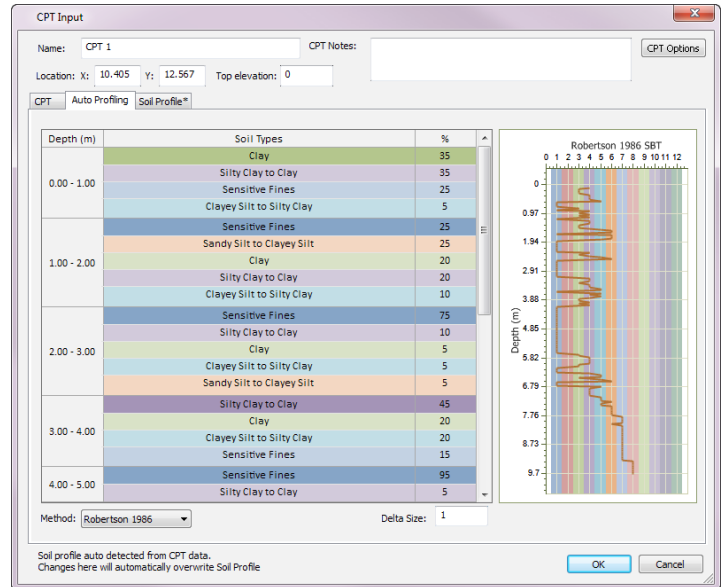
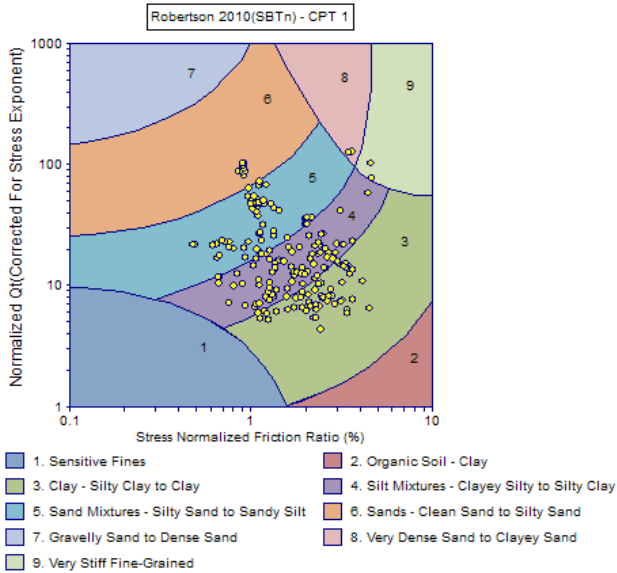
The new CPT analysis module could be used on its own as a fully-functional CPT interpretation software. In addition to this, the CPT analysis feature can be used in conjunction with the liquefaction analysis module, or in conjunction with the Boreholes function to model a non-horizontal soil profile.



Liquefaction dialog – option to use CPT data as input

| Auto Detected Soil Layers | | Global Soil Profile Layers | | Merged Soil Layers | | |
|---------------------------|--|----------------------------|--------------------|--------------------|--|-----------|
| # | Name | # | Name | # | Name | Thickness |
| 1 | Sands - Clean Sand to Silty Sand | 1 | Clay | 1 | Clay | 0 |
| 2 | Sand Mixtures - Silty Sand to Sandy Silt | 2 | Sensitive Fines | 2 | Sensitive Fines | 0 |
| | | 3 | Silty Clay to Clay | 3 | Silty Clay to Clay | 0 |
| | | 4 | Sensitive Fines | 4 | Sensitive Fines | 0 |
| | | | | 5 | Sands - Clean Sand to Silty Sand | 1 |
| | | | | 6 | Sand Mixtures - Silty Sand to Sandy Silt | 4 |

Creating a global soil profile from two CPT boreholes



CPT Input Dialog: Soil Profiling tools allows you to easily define the soil profile with depth based on the CPT input.

The CPT analysis module is a major addition to *Settle^{3D}*. For each set of CPT data, over 25 different parameters are calculated, and five SBT options are available:

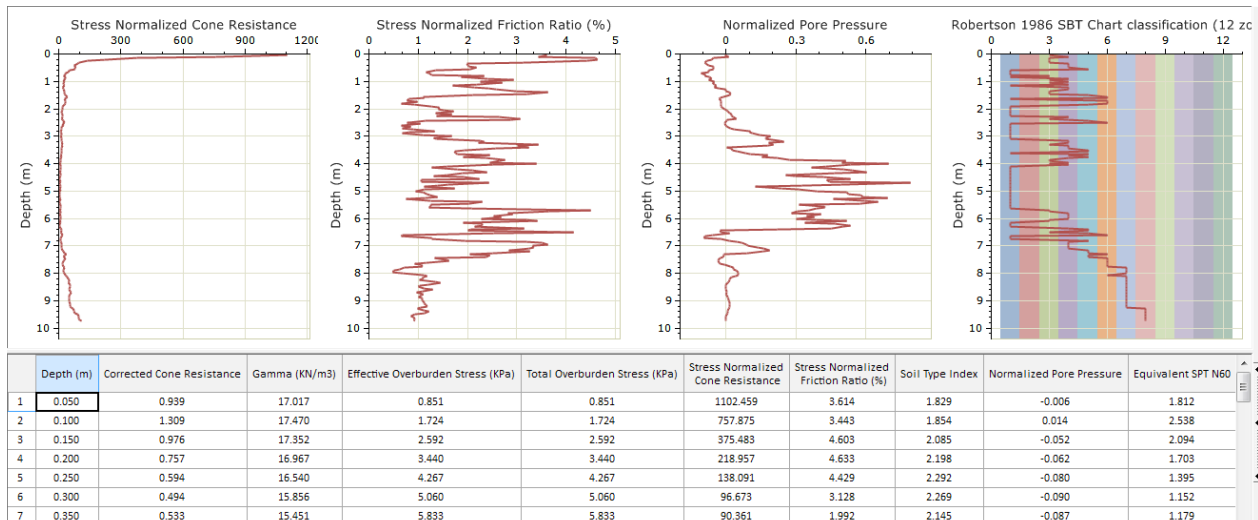
- Robertson 1986
- Robertson 1990
- Robertson 2010
- Schneider 2008 I
- Schneider 2008 II

Improved Results Interpretation Options

One of the new results calculated in *Settle^{3D}* v4 is the Subgrade Reaction Modulus. The subgrade reaction modulus is calculated as:

$$k = \frac{\text{structural load}}{\text{settlement}}$$

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CPT interpretation results – over 25 different parameters are calculated