

Multi Scenario Modelling

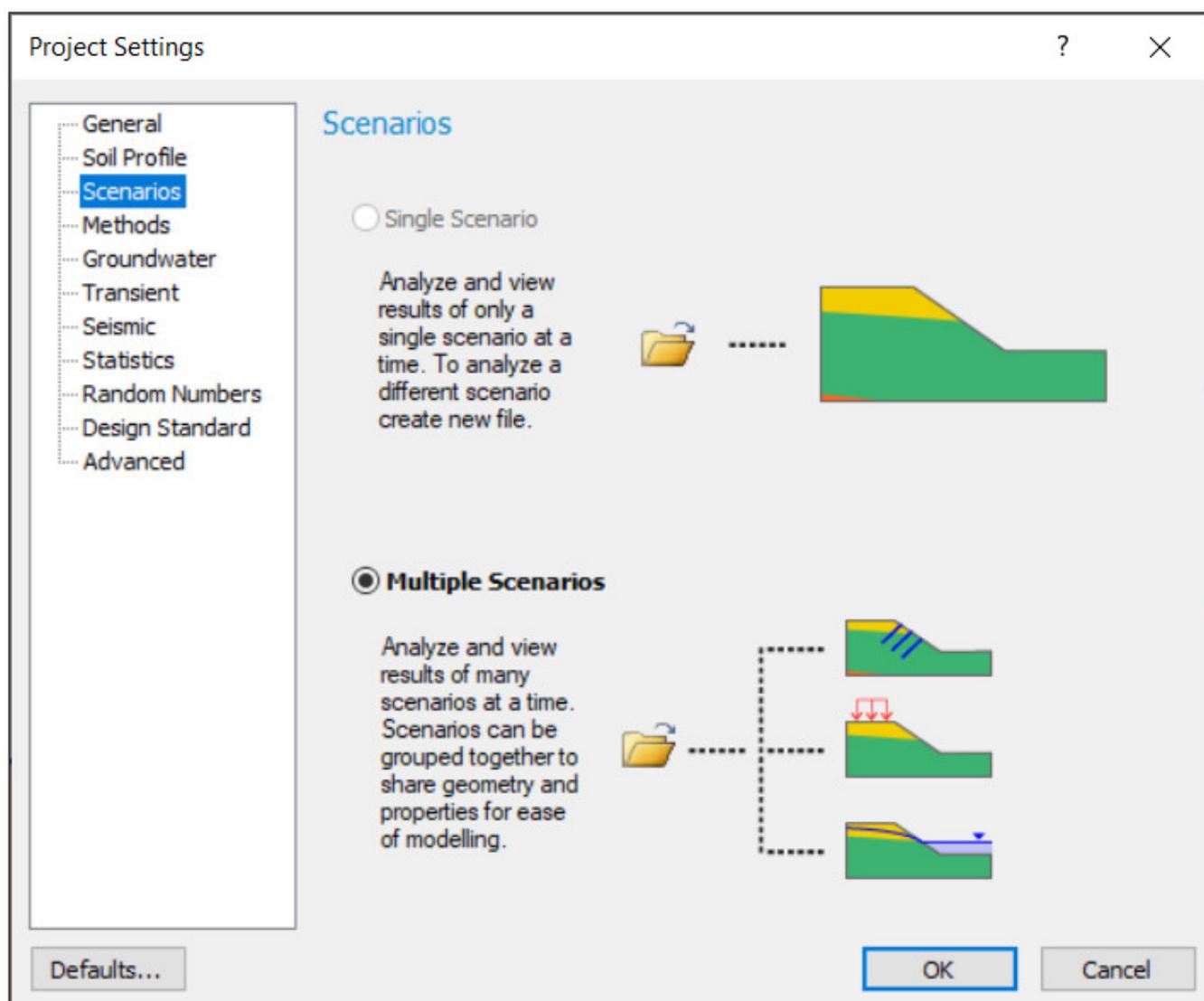
1. Introduction

One of the most important modelling features in Slide2 is Multi Scenario modelling. This allows you to create, edit and analyze multiple variations of a Slide2 model, all within a single document file. All scenarios can be saved and computed together with a single mouse click.

This tutorial will describe how the option works and demonstrate some examples of how it may be used.

2. Multi Scenario

The Scenarios option is accessed through the Project Settings dialog.



There are two options: Single Scenario and **Multiple Scenario**. The default selection is Multiple Scenario mode.

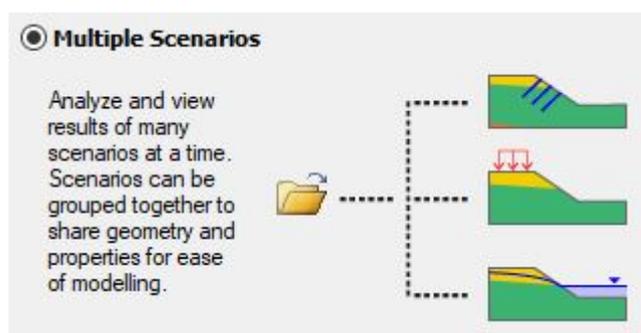
SINGLE SCENARIO

Single Scenario modelling simply means that your Slide2 file consists of a single model. This is exactly equivalent to the method in older versions of Slide2 (version 6.0 and earlier). In this case, your Slide2 file has one set of input parameters with constant boundary geometry. If you wish to analyze different input parameters or geometry, a new model must be created and computed for each change in input. If you read in a Slide2 file created in version 6.0 (or earlier), the file will automatically open as a Single Scenario mode file

Single scenario modelling has been maintained for backward compatibility with older Slide2 files, and for users who may not need to use multi-scenario models.

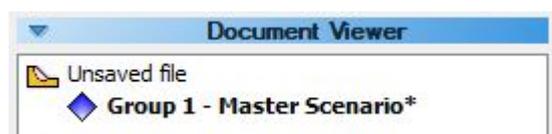
MULTI-SCENARIO MODELING

Multi-scenario modelling is a very flexible and powerful modelling option introduced in Slide2 version 7.0 and improved in Slide2. It allows you to create and analyze multiple variations of a Slide2 model, within a single document file, which can be saved and computed with a single click.



DOCUMENT VIEWER

When you enable Multiple Scenarios, the first thing you will notice is the Document Viewer pane which appears in the sidebar.



The Document Viewer allows you to create, name and organize the various models that you will be analyzing in Multi Scenario mode.

Groups and Scenarios

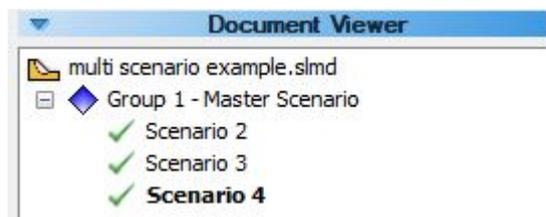
There are three "levels" within the Multi Scenario option:

1. Group
2. Master Scenario

3. Additional Scenarios

By default, when you initially start a file, one Group containing one Master Scenario will automatically be created. The definition of Group and Scenario is as follows:

- **Group** – a Group consists of a Master Scenario and any number of additional scenarios. By definition, all Scenarios in a Group have the same boundaries (e.g. External and Material boundaries). If you edit the boundaries for one scenario, the edits will automatically propagate to all scenarios in the same Group.
- **Master Scenario** - a Group always contains at least one scenario, the Master Scenario. Any edits to the Master Scenario are automatically propagated to all other scenarios in the Group. This includes ALL editing, not just boundaries. That is the primary purpose of the Master Scenario.
- **Scenario** – additional Scenarios in a Group, allow you to change input parameters for individual Scenarios (e.g. material assignments, groundwater, support, search methods) while maintaining constant geometry within a particular Group.



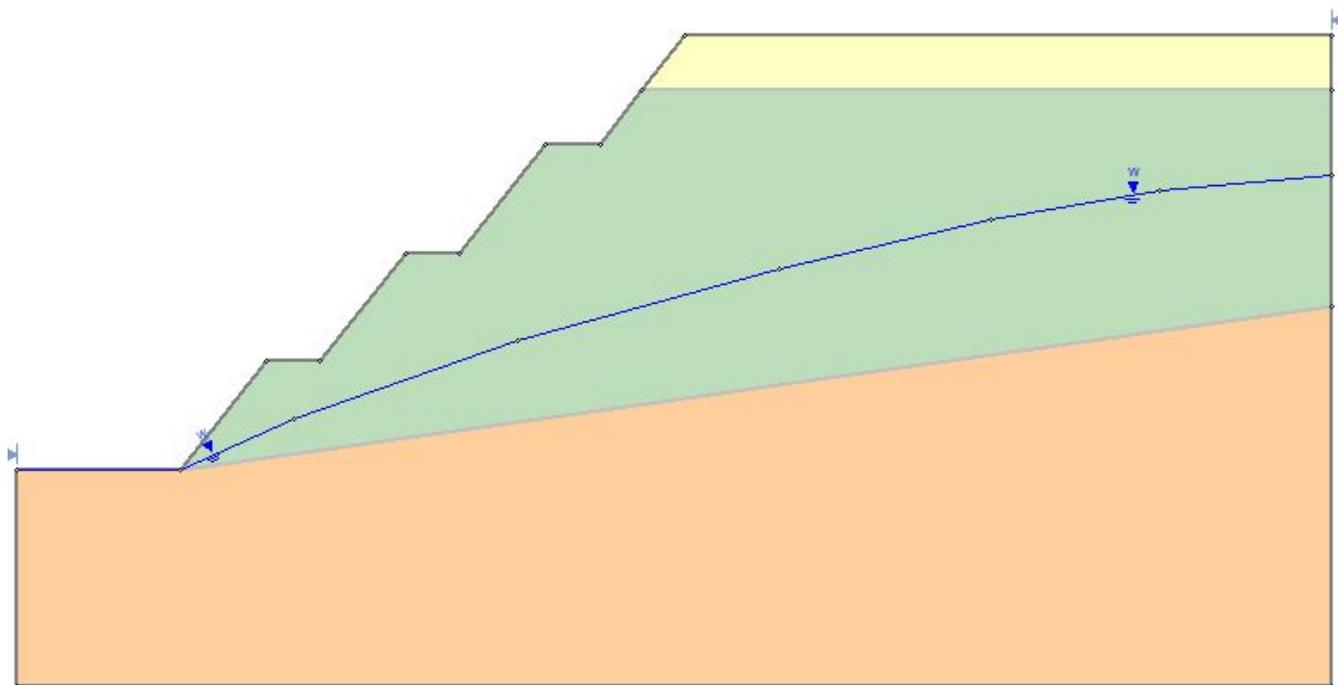
Other properties of Groups and Scenarios:

- There is no limit to the number of Groups or Scenarios. You can create any number of Scenarios per Group, and any number of Groups.
- Remember that each Scenario is really a separate Slide2 model.
- Groups allow you to group together multiple models (scenarios) that have the same boundaries or other common input parameter(s).

New groups or scenarios can be easily created, copied and edited as required. This is all done within the umbrella of a single (compressed zip) document which can be edited, saved and computed as a single file (file extension *.slmd).

3. Model

Select **File > Recent > Tutorials** and open the file *Tutorial 24 – starting file.slmd*. You should see the following:



In the sidebar document viewer, notice that the model consists of one scenario – the **Master Scenario** file in **Group 1**.

ADD SCENARIO

Let's add a new scenario. We will do this with a right-click shortcut. Right-click on Group 1 – Master Scenario, and select Add Scenario from the popup menu.

This will create Scenario 2, which is a copy of the Master Scenario. Select Save to save the file

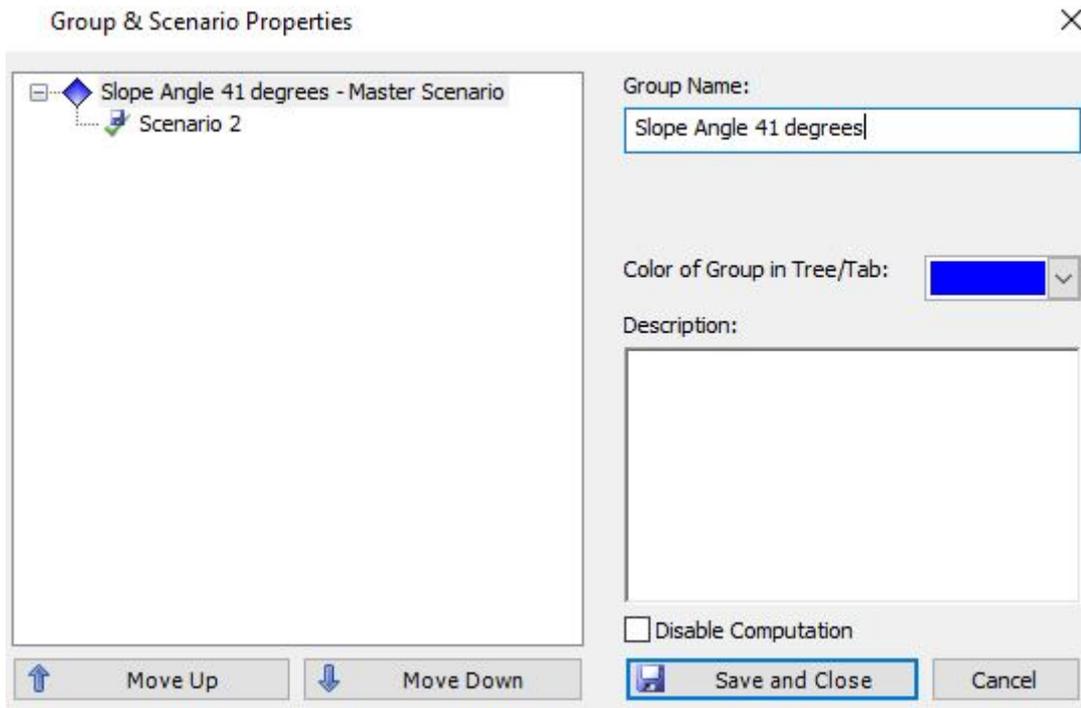
i Note

When working with multi-scenario files, it is recommended to save files frequently, while editing. This helps to ensure that changes to the files are synchronized.

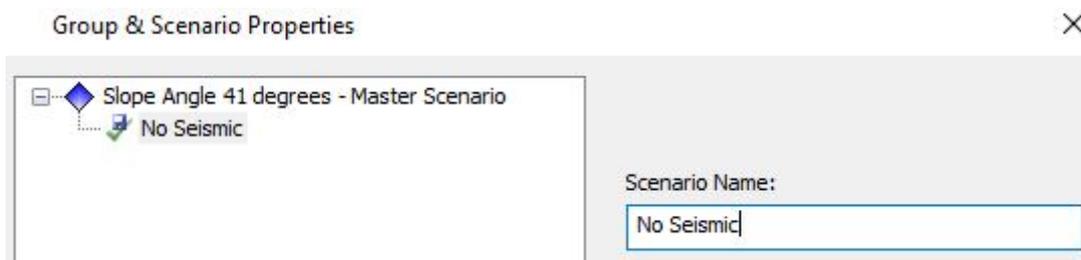
Let's rename the Group and Scenario. Right-click on Group 1 and select Edit Properties from the popup menu. In the Group & Scenario Properties dialog, click on the Group name at the left of the dialog, and rename the group "Slope Angle 41 degrees".

i Note

The Master Scenario name cannot be changed.



While still in this dialog, click on Scenario 2 at the left of the dialog, and rename the scenario "No Seismic". Select OK in the dialog



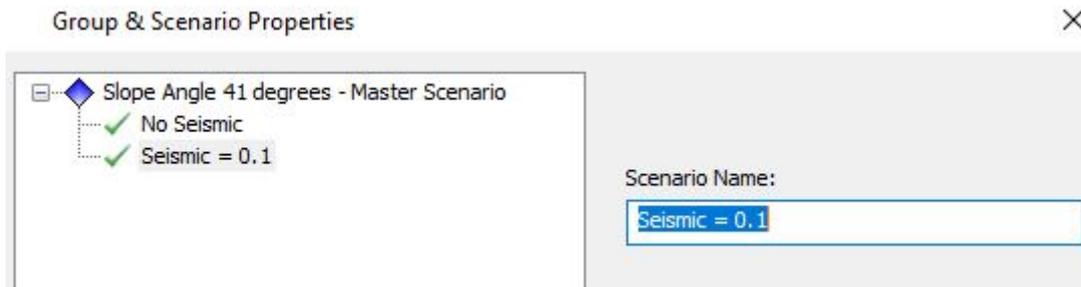
Now let's create one more scenario using the Duplicate option.

DUPLICATE SCENARIO

New scenarios can also be created with the **Duplicate** option.

To create new scenarios, we usually start with an existing scenario and make a copy. Creating a copy of an existing scenario is very simple. Right-click on the "No Seismic" scenario in the Document Viewer pane, and select Duplicate Scenario from the popup menu.

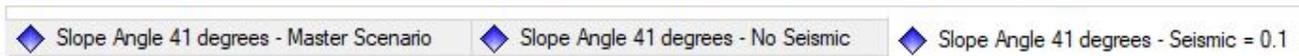
You should see a new scenario with the default name Scenario 3 in the Document Viewer. Select save to save the file. Right-click on "Scenario 3" in the Document Viewer pane, select Rename from the popup menu. Name the scenario "Seismic = 0.1", as shown below. Select OK in the dialog.



We will now edit the new scenario as described below.

Scenario Tabs

When you create multiple scenarios, notice that tabs will automatically be created at the lower-left corner of the view, so that you may easily switch between different scenarios by selecting the tabs. This is illustrated below.



You may switch between different scenarios by selecting the tabs, or by selecting the scenario name from the document viewer pane in the sidebar.

ADD SEISMIC LOAD

At this point, all three scenarios are identical (the Master Scenario and the two additional scenarios). We will add a seismic load to the third scenario.

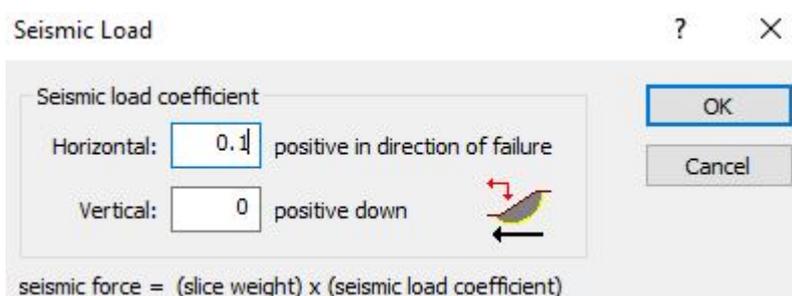
First, make sure you have selected the correct scenario – to select a scenario, you can:

- click on the scenario name in the Document Viewer pane, or
- click on the scenario tab at the bottom of the screen, or
- click directly in the desired scenario view (when views are tiled)

Select the **Seismic = 0.1 scenario**.

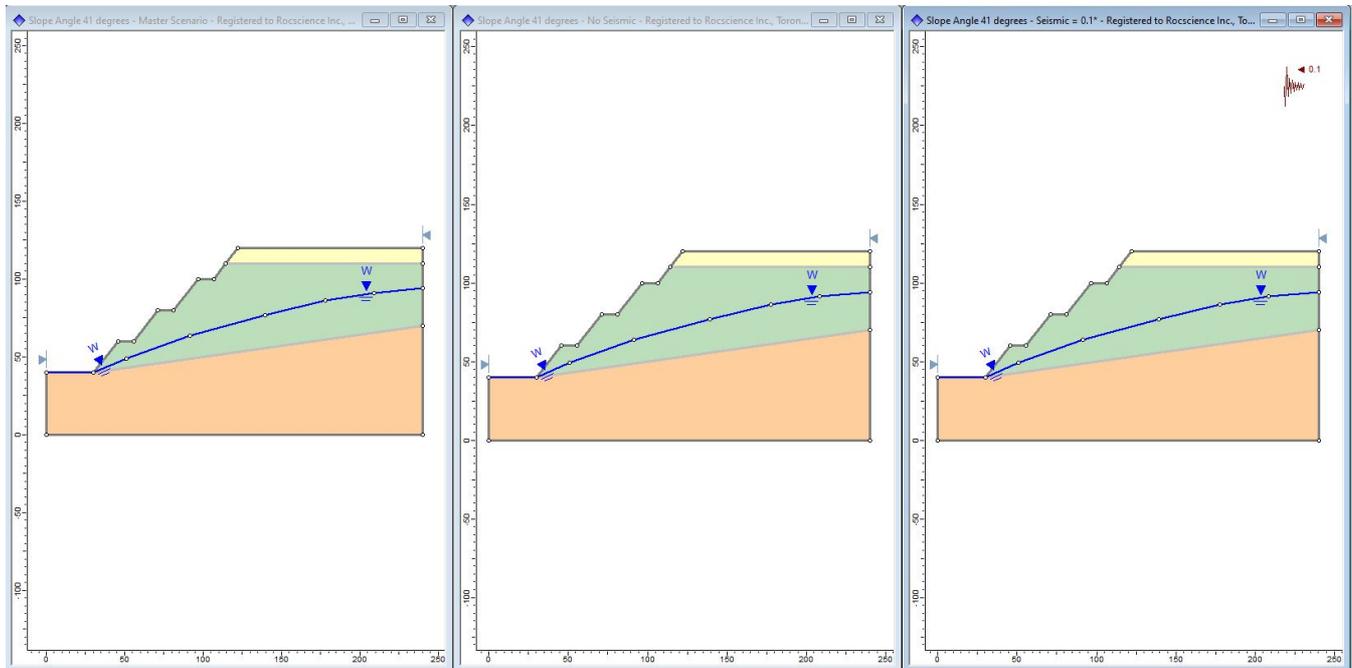
Select **Loading > Seismic Load** from the Loading menu.

In the Seismic Load dialog, enter a **Horizontal Coefficient = 0.1**. Select **OK**. This applies a simple pseudo-static load coefficient to the entire model.



Now tile the scenarios.

Notice the Seismic icon which appears in the upper right corner of the Seismic = 0.1 scenario. The icon indicates the direction and magnitude of the applied seismic load coefficient.



So we now have two scenarios created plus the Master Scenario. All models are identical, except that one scenario has a pseudo-static seismic load coefficient = 0.1 applied, and the other scenario has no seismic load applied.

4. Save

Before you analyze your model, save it as a file called **Tutorial 24.slmd**. (Slide2 multi-scenario model files have a .slmd filename extension).

Select: **File** → **Save**

Use the **Save As** dialog to save the file.

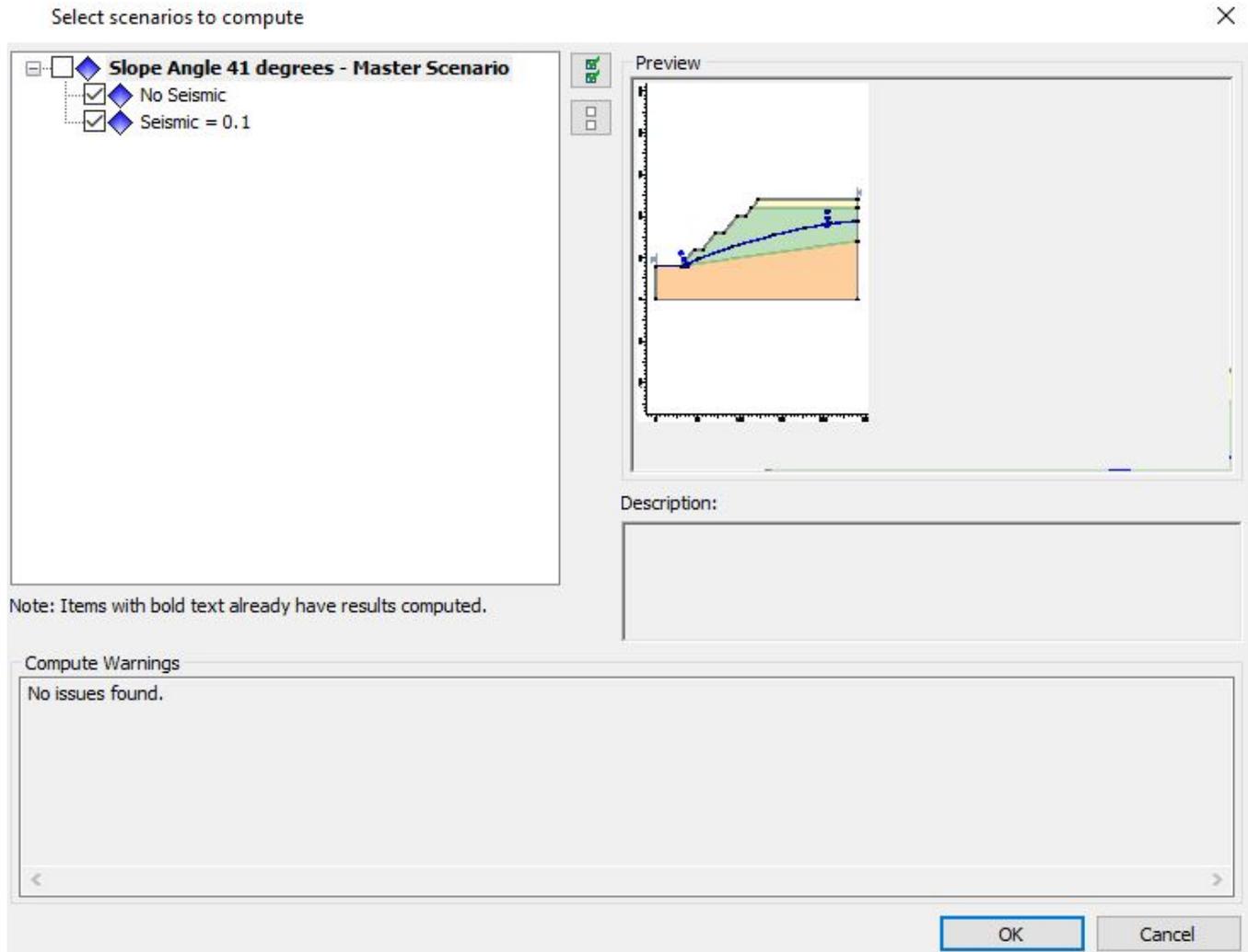
When you select Save for a Multi Scenario file, ALL (unsaved) scenarios will automatically be saved.

5. Compute

You are now ready to run the analysis.

Select **Analysis > Compute**

When you compute a multi-scenario model, you will first see a dialog which allows you to choose which scenarios are computed.



Since the No Seismic scenario is a copy of the Master Scenario, it is not necessary to compute the Master Scenario for this example. Turn OFF the checkbox for the Master Scenario.

Make sure that the other two scenario checkboxes are selected, and select OK to Compute. When the analysis is completed, you are ready to view the results in Interpret.

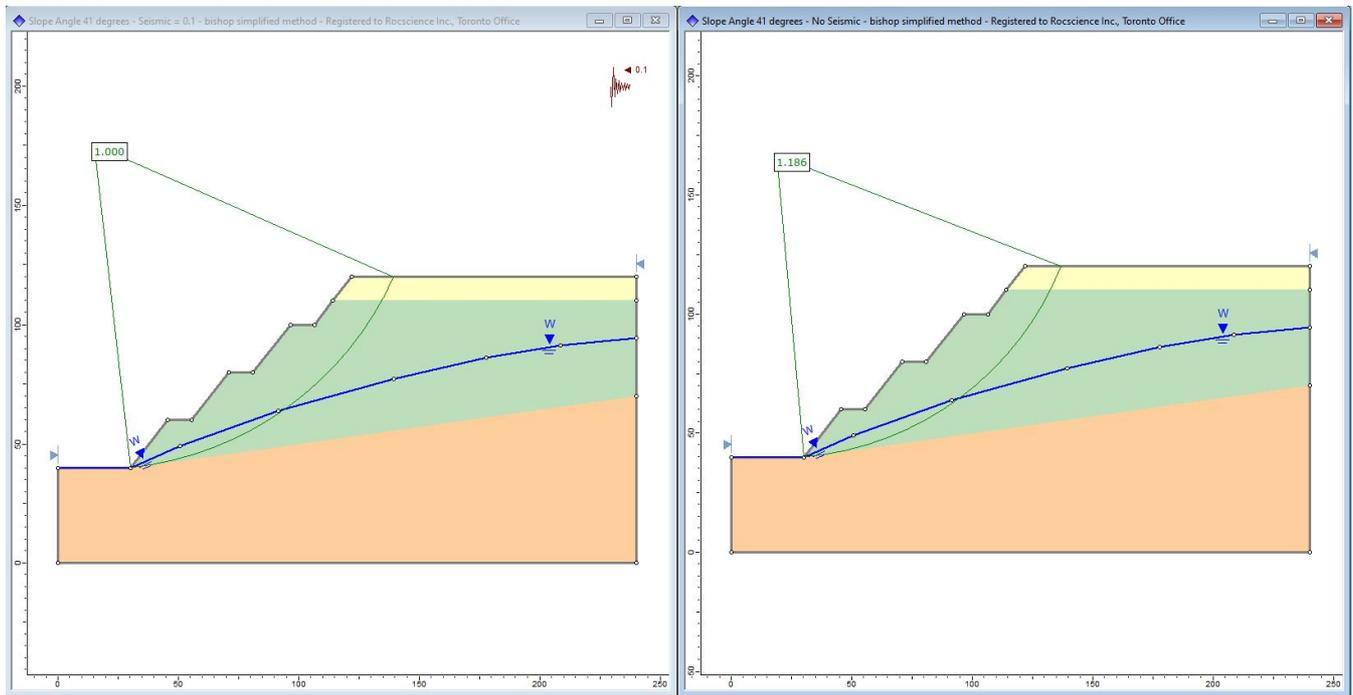
6. Interpret

To view the results of the analysis:

Select **Analysis > Interpret**

This will start the Slide2 Interpret program.

Tile the two scenario views, zoom all (or press F2) in each view and hide the legend in each view. You should see the Bishop analysis global minimum for each scenario, as shown below.

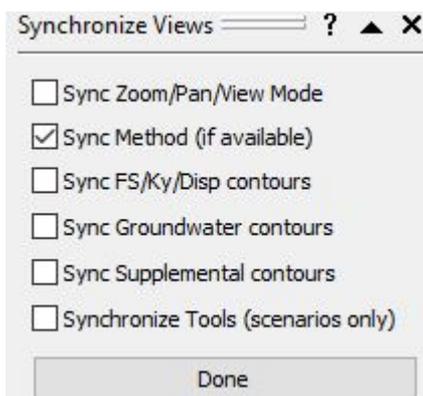


Notice that the Factor of Safety = 1.185 (with no seismic load) and 1.001 with the seismic coefficient of 0.1 applied. Also note, the search method used was the Auto Refine method for circular surfaces.

SYNCHRONIZE VIEWS

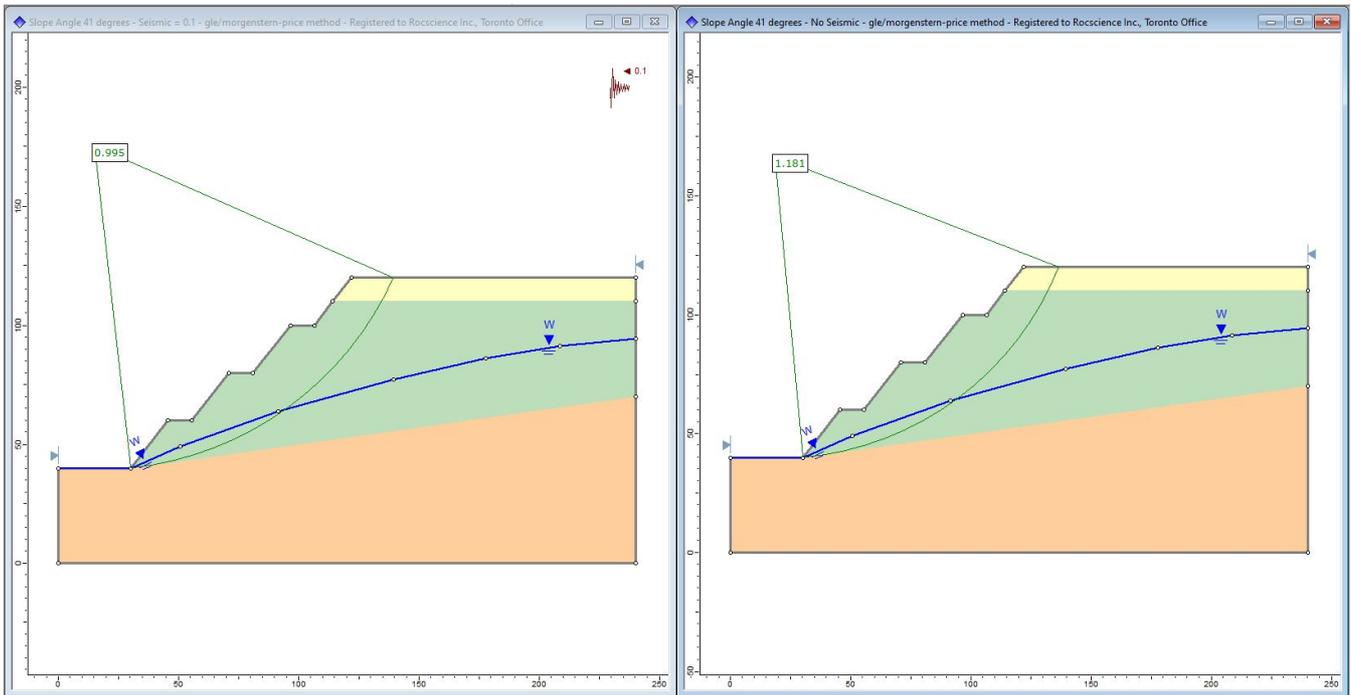
In the Interpret sidebar, select the **Synchronize Views** button.

You will see a dialog which allows you to synchronize various viewing options when you have multiple views open



Select the **Sync Method** checkbox, and select Done. The “Method” refers to the limit equilibrium analysis methods which have been computed.

Select different analysis methods from the drop-list in the toolbar (e.g. Janbu, Spencer, GLE), and note that the corresponding Global Minimum slip surface is updated for BOTH scenarios. This is very useful and saves you the trouble of having to set viewing options in each individual view.



GLE results displayed for both scenarios using Synchronize Views

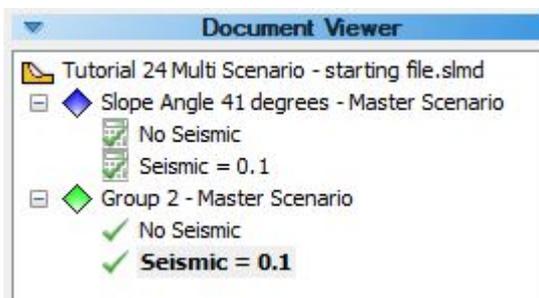
7. Model

Return to the Slide2 Model program, and we will demonstrate how to use the Multi Scenario option to analyze different model geometries, by creating another **Group**.

DUPLICATE GROUP

In the **Document Viewer** pane, right-click on the **Slope Angle 41 degrees** group, and select **Duplicate Group** from the popup menu.

This will create a new group of two scenarios, identical to the original group.



For the new group, we want to modify the slope angle. We will use the Change Slope Angle option.

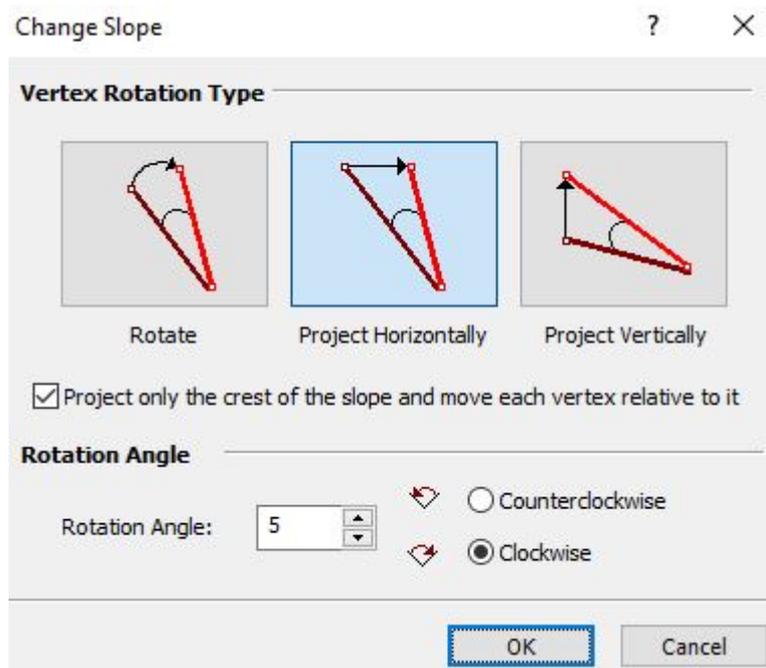
CHANGE SLOPE ANGLE

First, make sure you have selected one of the two scenarios in the new group (it doesn't matter which one). Use the document viewer or the tabs at the bottom of the screen.

If necessary press **F2** to Zoom All.

Select: **Boundaries > Change Slope Angle**

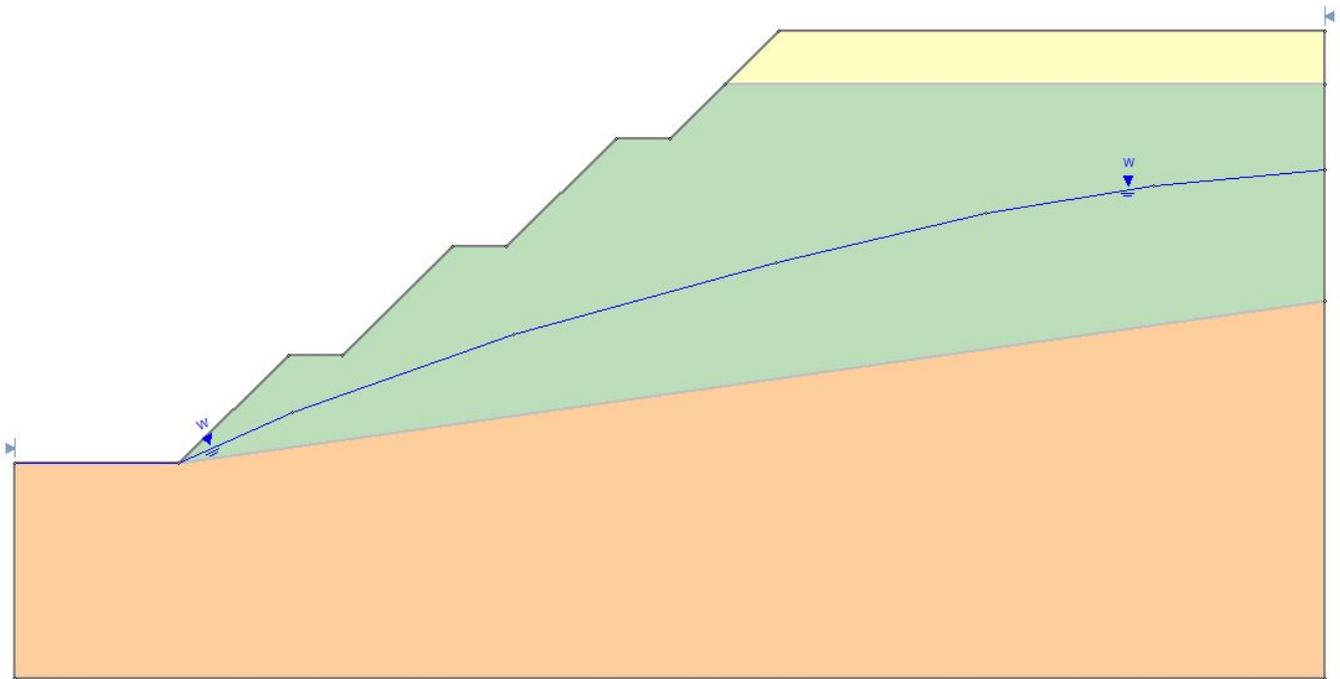
- You will be prompted to pick the vertex at the toe of the slope. Click on the vertex at (30,40).
- You will be prompted to pick the vertex at the crest of the slope. Click on the vertex at (122,120).
- In the Change Slope dialog, choose the Project Horizontally option, use a Rotation Angle of 5 degrees and choose Clockwise. Select OK



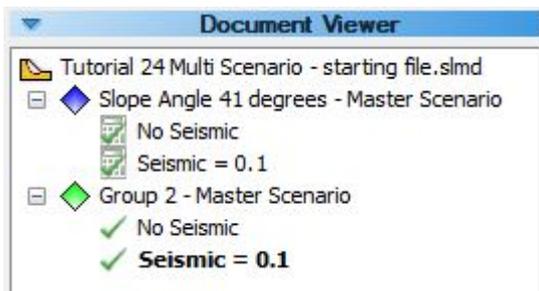
You should see the overall slope angle decreased by 5 degrees, as shown below.

Note

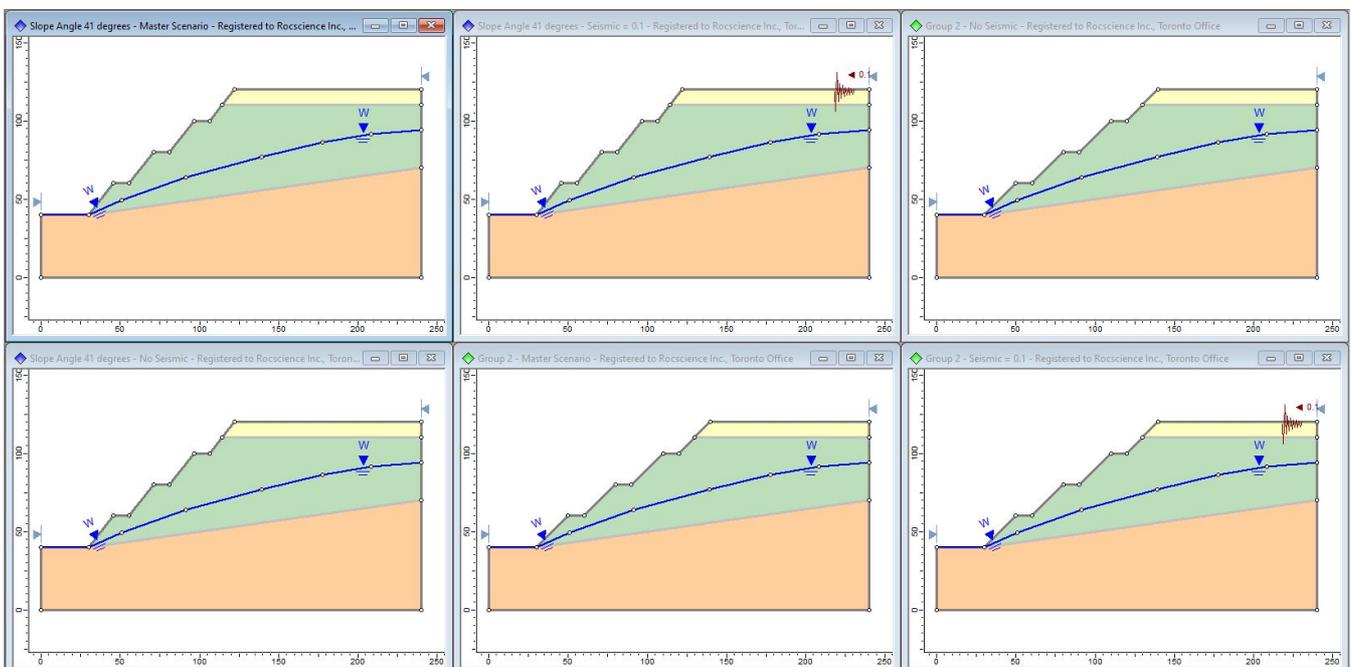
When you change the geometry for one scenario, the geometry change will **AUTOMATICALLY PROPAGATE TO ALL OTHER SCENARIOS IN THE SAME GROUP**. Verify this by selecting the other scenario in the new group, and you will see that the slope angle has been modified for both scenarios.



In the Document Viewer pane, right-click on the Group 2 name, select Rename from the popup menu, and change the name to Slope Angle 36 degrees.



Now tile the views, and select Zoom All or F2 in each view.



Multi scenario file with two groups and four scenarios

As you can see, the Multi Scenario file now contains four different scenarios (models):

- The 41-degree overall slope, with and without seismic load
- The 36-degree overall slope, with and without seismic load.

Select **Save** to save all scenarios.

8. Compute

When you select **Compute**, notice that only the newly created scenarios require computing, since we did not make any changes to the original group/scenarios.

Make sure the checkboxes are selected for the new group/scenarios, and select **OK**.

Select scenarios to compute

- Slope Angle 41 degrees - Master Scenario**
 - No Seismic**
 - Seismic = 0.1**
- Slope Angle 36 degrees - Master Scenario
 - No Seismic
 - Seismic = 0.1

Note: Items with bold text already have results computed.

Compute Warnings
No issues found.

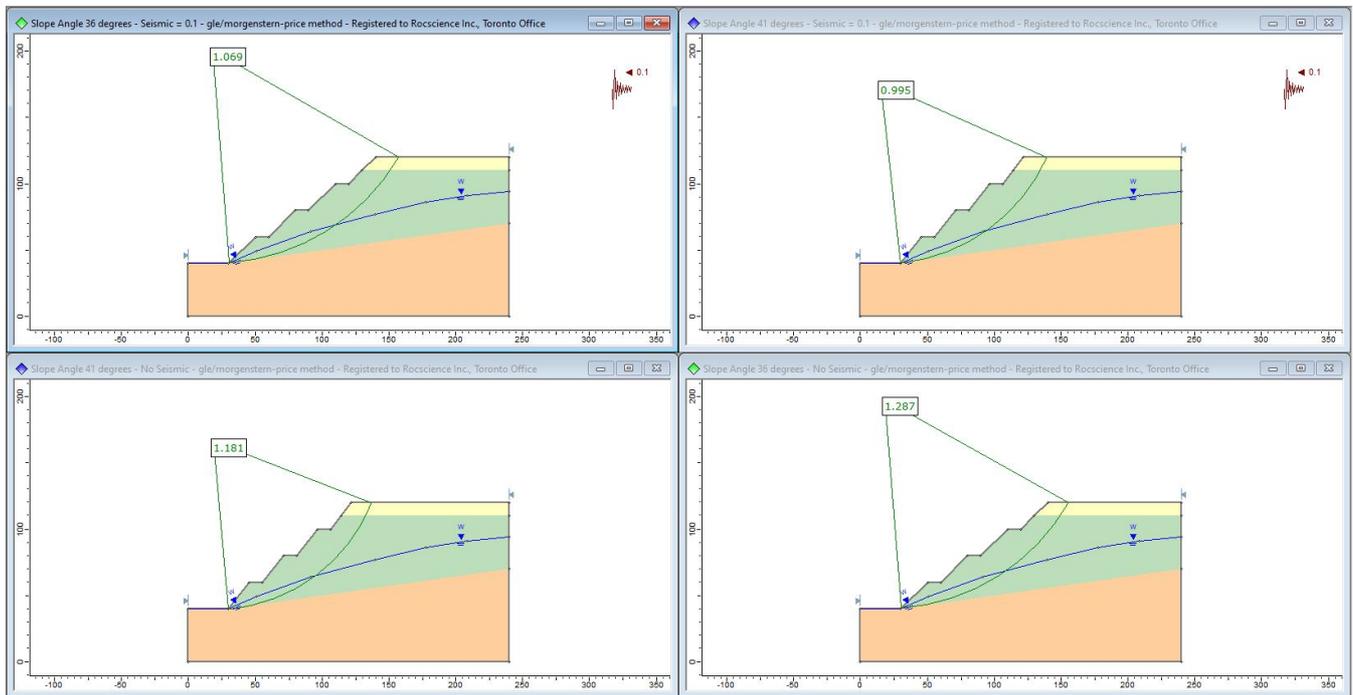
Preview

Description:

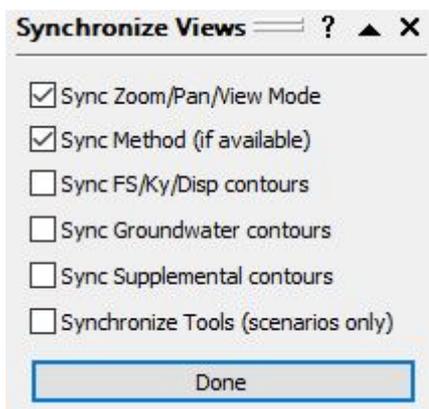
OK Cancel

9. Interpret

In Interpret, tile the views. You should see the Bishop results for all four scenarios.



Select **Synchronize Views**, and select the checkboxes for **Zoom/Pan** and **Methods**



Use Zoom and Pan and notice that all views are zoomed/panned together. Change the analysis method (e.g. Janbu, Spencer) and notice that the results are changed for all scenarios.

10. Summary

That concludes this introduction to the **Multi Scenario** modelling option. You are encouraged to experiment with the capabilities of this feature. The simple example presented here is just a small demonstration of the potential uses of the option.

Just remember:

- Groups allow you to change the model geometry between different groups.
- Scenarios allow you to change nearly any input parameters (e.g. material assignments, search methods, loading, groundwater) while maintaining constant geometry for all scenarios within a group.
- Groups also allow you to create groupings based on any other input parameters, not necessarily geometry.

- Material properties are shared across all groups and scenarios.

11. Soil Profile Option + Multi Scenario

The **Soil Profile** option, discussed in Tutorial 25, is most useful in conjunction with the Multi Scenario option since it allows you to test different model geometries while maintaining constant Soil Profile boundaries. See [Tutorial 25](#) for more information.