

# *User Manual*

# FS Calculator 1.0

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# *1. Introduction*

FS calculator is developed for the academic environment for the calculation of factor of safety. The software provides an easy interface to make the calculation quicker and reliable. It can be installed (currently) on windows system.

Following are the system requirements for FS Calculator to work efficiently:

Disk Space: 23 MB

RAM: 23 MB

Display: 1280x768 or more

OS: Windows 10, Windows 8, Windows 7,  
Windows XP.

The application has been tested on windows 10 rigorously and every attempt is made to make it reliable, however, unintentional errors or run time errors may occur. For such errors, authors and developers claim no warranty what so ever. Please see licence section for more information.

But if the user encounters an error, he/she can report the error to the developers. They will readily help to sort out the problem. Further more, any feedback regarding interface of the application or the functionality, is warmly welcome.

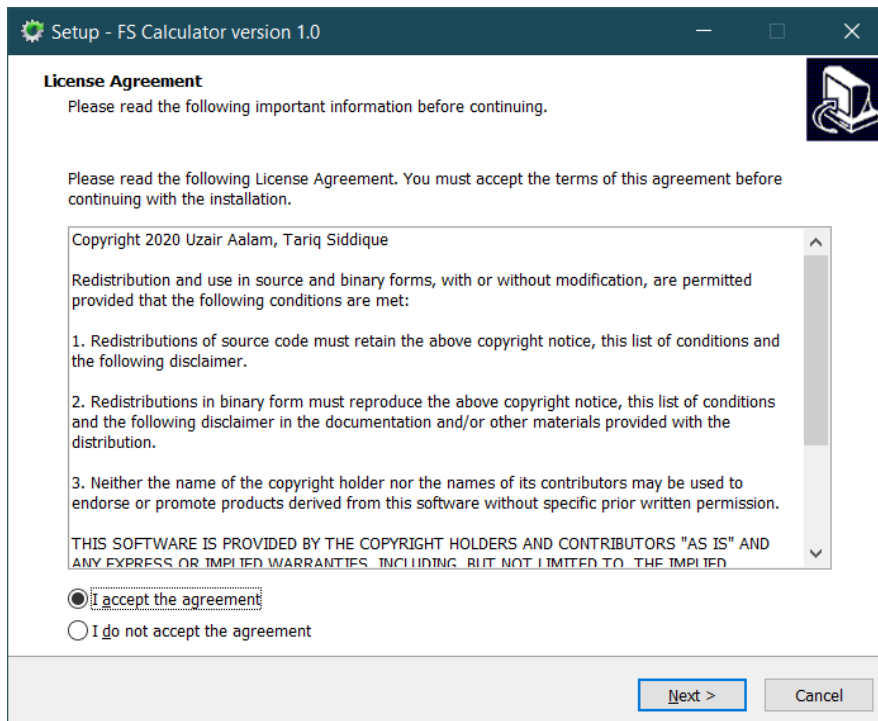
## 2. Installation

1. Double click the setup file.



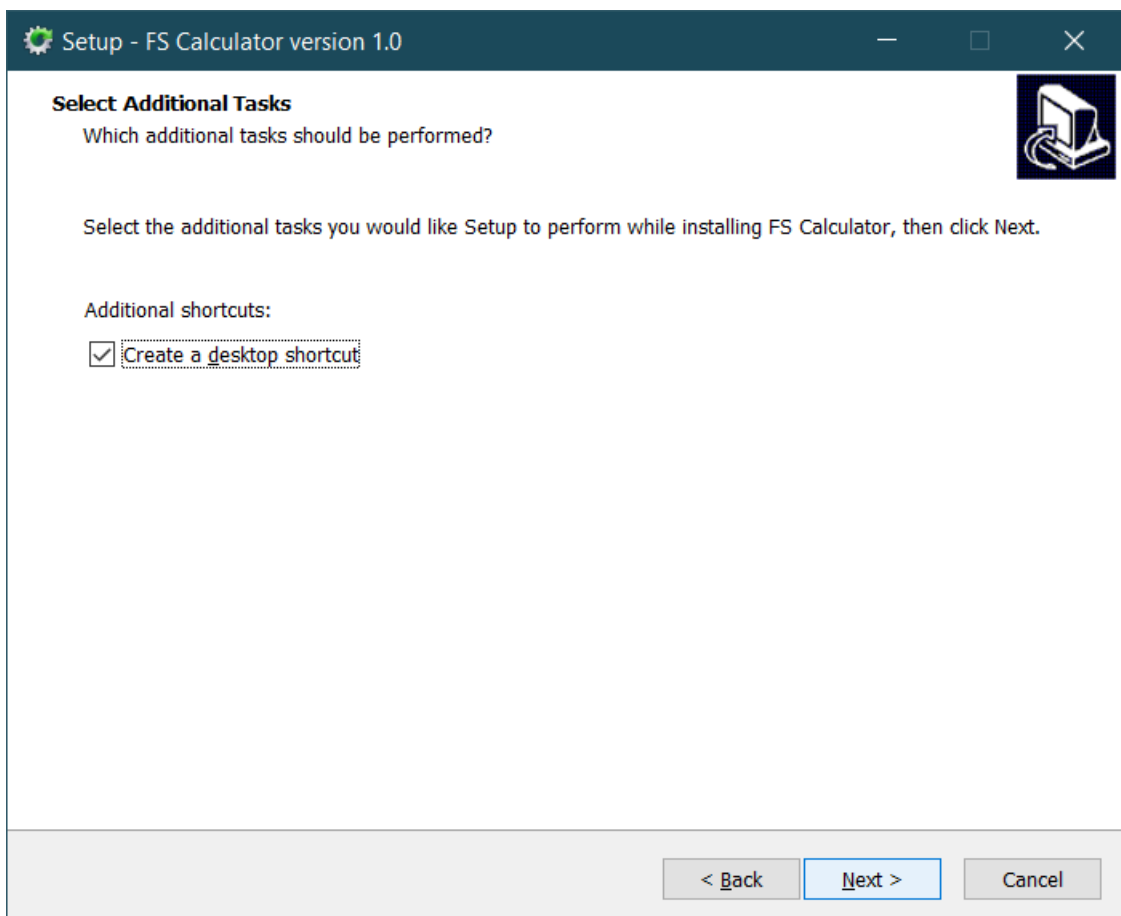
2. Windows may ask for the permission to install it. Click yes if it asks.

After this, you should see this dialog box



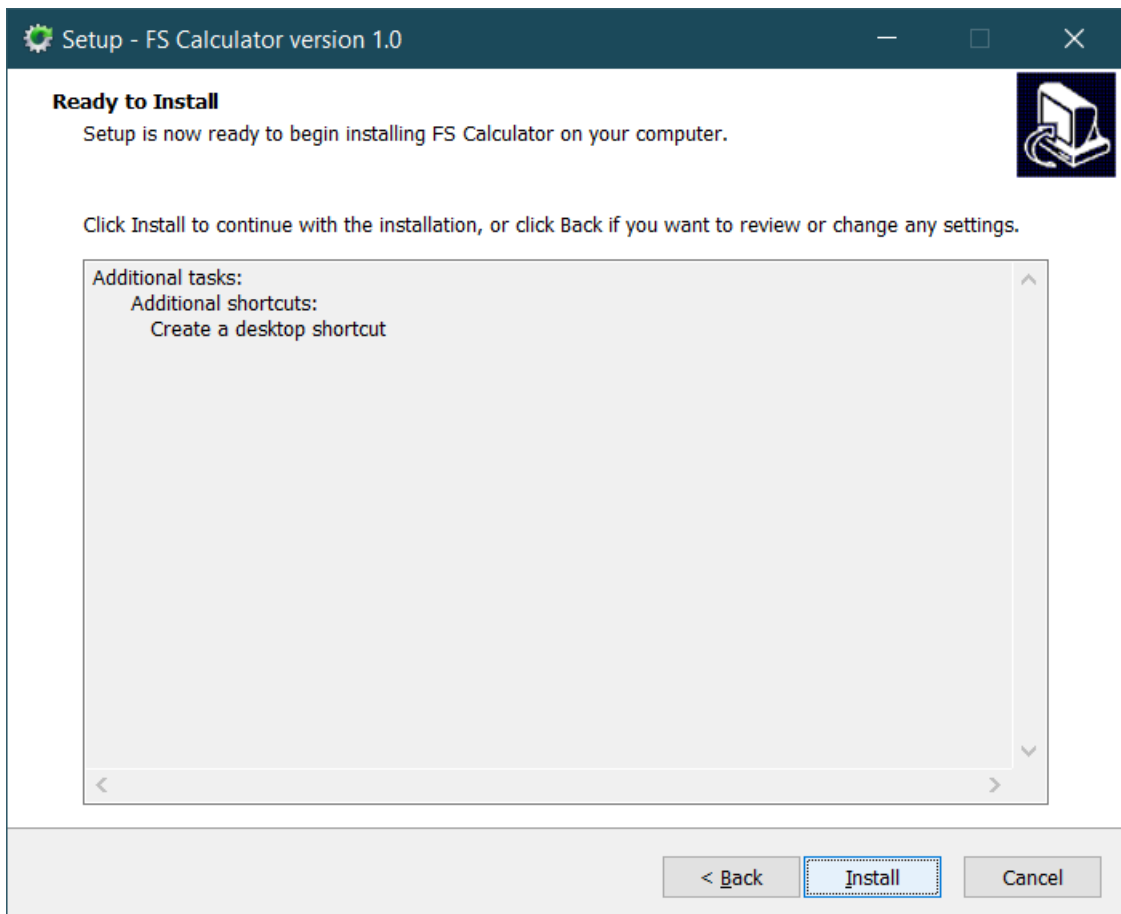
3. Choose “I accept the agreement” and click [Next](#).

Then, the next dialog box will ask about creating a shortcut of *FS Calculator* on the desktop. User can click the check box if he/she wishes.



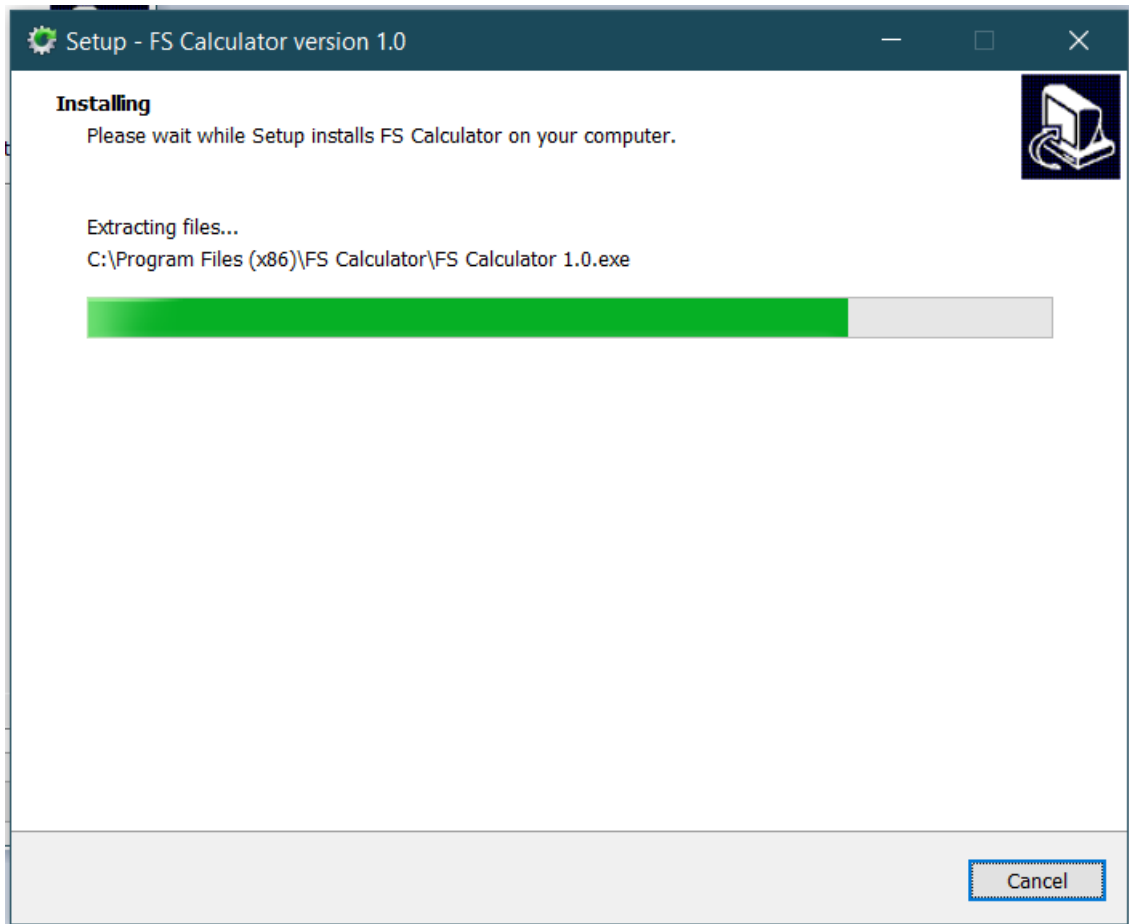
4. Click on the [Next](#) button once more.

The following dialog box appears to confirm the actions to be performed.



5. Click **Install** to start installation process.

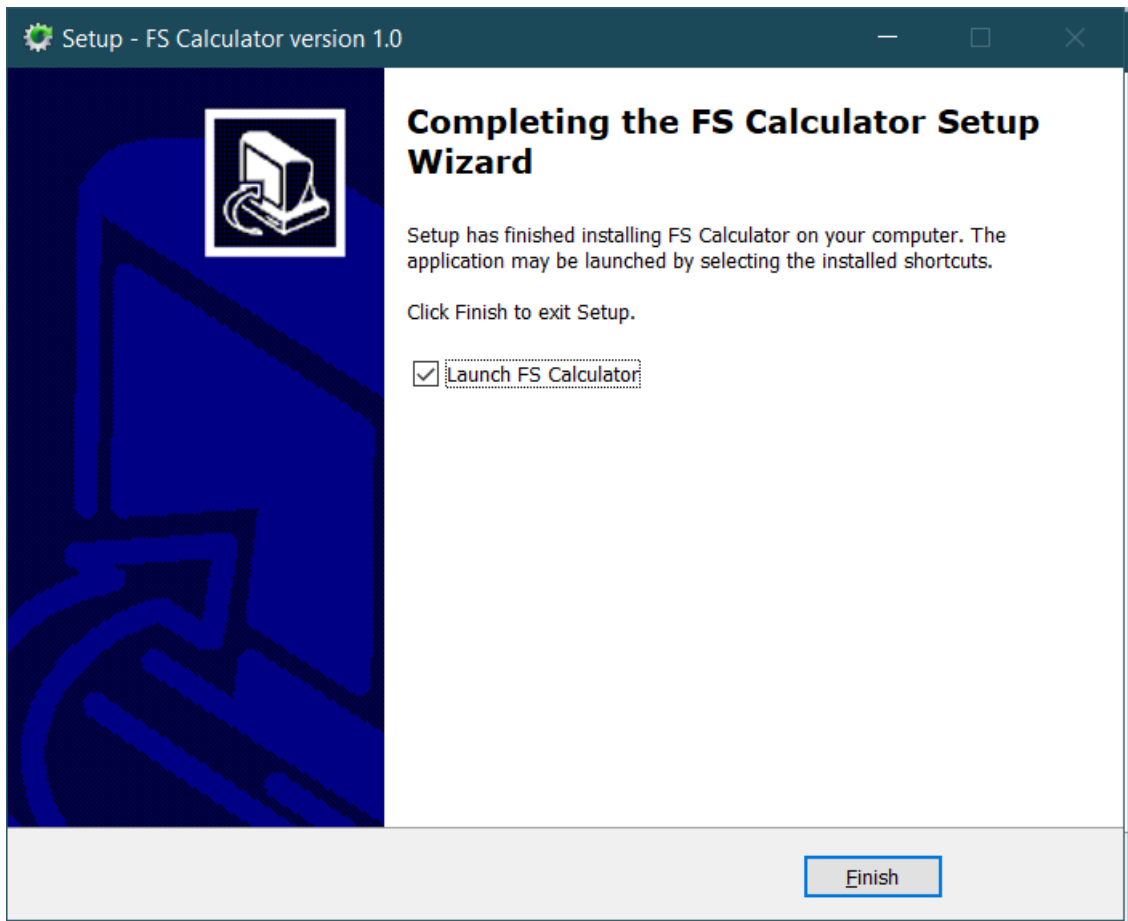
The Installation progress will be displayed on the screen, through a progress bar, as shown in the figure below.



When the installation is finished, the following dialog box confirms the installation and ask whether the user wants to start the *FS Calculator* right now.

Check or uncheck the “Launch FS Calculator” button as per the requirement.

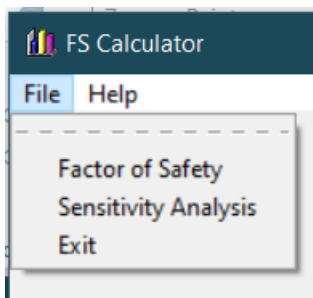
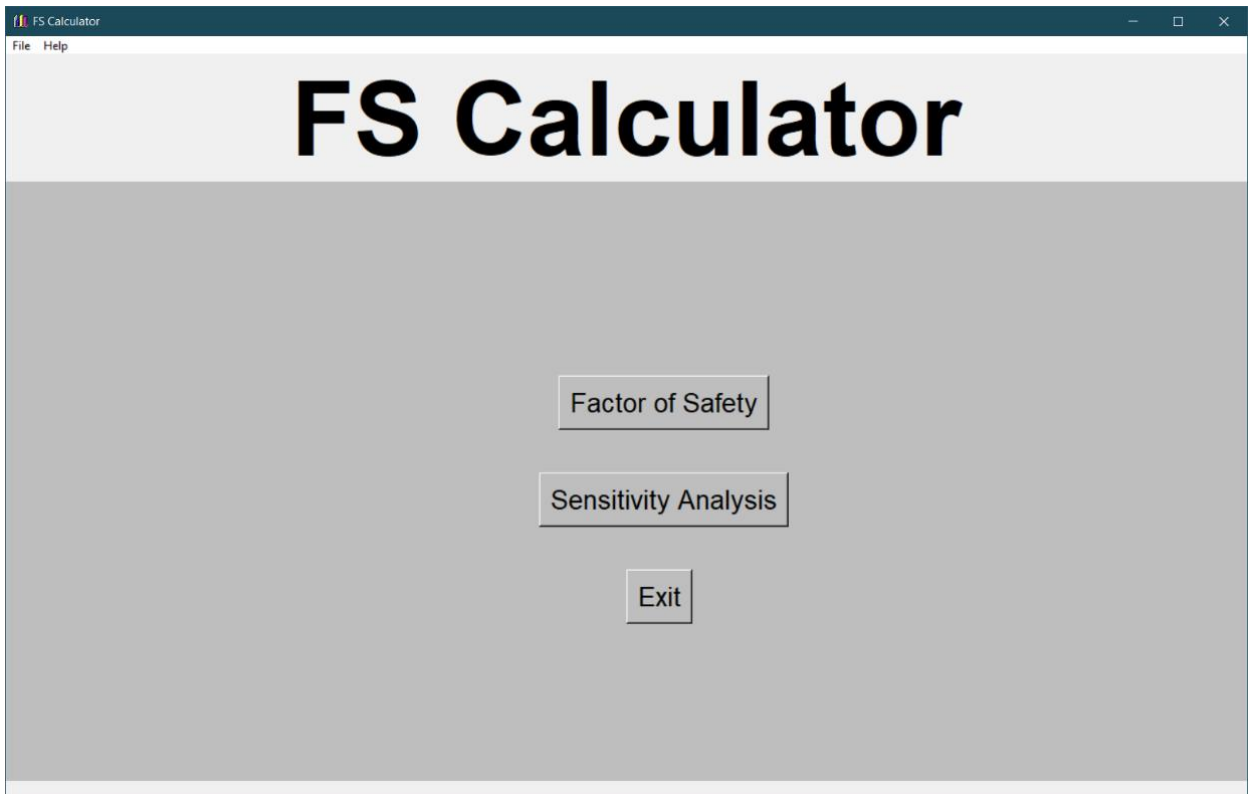
6. Click **Finish** to close this dialog box.  
The *FS Calculator* is now installed on the system.





### 3. *Factor of Safety Calculation*

1. Launch The *FS Calculator*.



2. In the main window click “[Factor of Safety](#)” button. Alternatively, go to the [File](#) menu and click [Factor of Safety](#) command.

It will open another window where various parameters are entered in their respective text boxes.

Following window will appear. Here, all the parameters are filled.

FS Calculator

Enter numerical values of various parameters

Geomechanical Parameters:

Cohesion (in kPa):

Friction Angle :  
(in degrees)

Density :  
(in kN per meter cube)

Next

Back

Geomemetrical Parameters:

Height (in m):

Slope Angle:  
(in degrees)

3. Then, clicking the **Next** button, opens up the window showing the slope conditions.

Slope Drain Condition

Select appropriate slope condition by clicking the relevent diagram

Fully drained slope

Surface water 8x slope height behind toe of slope

Surface water 4x slope height behind toe of slope

Surface water 2x slope height behind toe of slope

Saturated slope subjected to heavy surface recharge

Calculate

Back

4. Choosing the appropriate slope condition by clicking the image on the left panel and clicking the **Calculate** button shows the results.



The result consists of factor of safety as calculated from x and y axes of circular failure charts and their average.

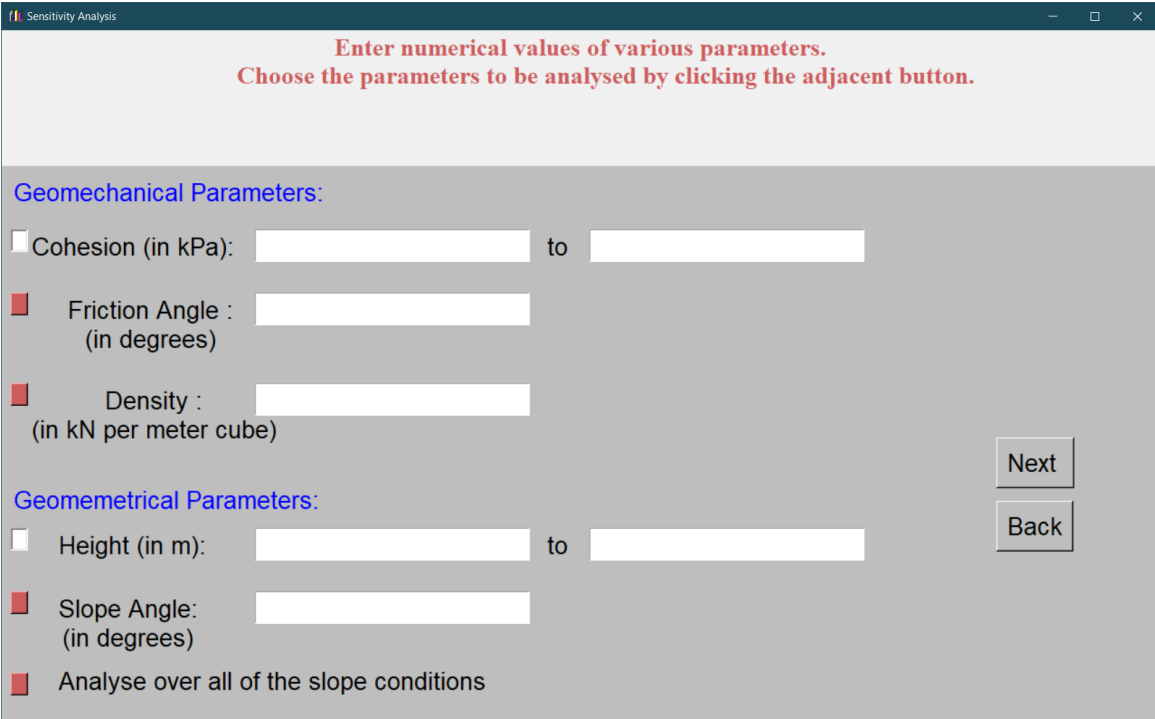
**Tip:** If you close this window and choose a different slope condition and click again on **Calculate** button you will get different result without entering all the values again.

## 4. Sensitivity Analysis

1. In the main window click “Sensitivity Analysis” button. Alternatively, go to the File menu and click Sensitivity Analysis command.

It will open another window where various parameters are entered in their respective text boxes.

The parameters whose variation is to be studied are selected by clicking the toggle buttons on the very left of the window and the range of them is filled.



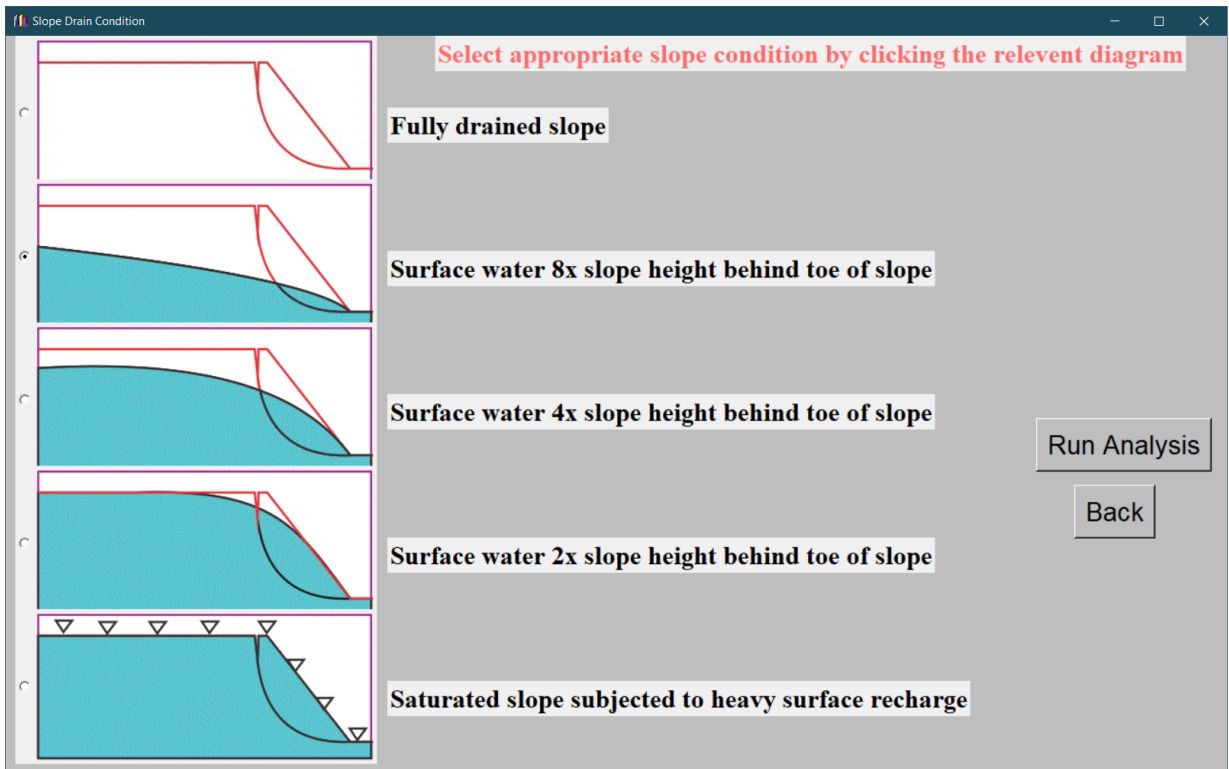
The screenshot shows a window titled "Sensitivity Analysis". At the top, there is a red instruction: "Enter numerical values of various parameters. Choose the parameters to be analysed by clicking the adjacent button." Below this, the window is divided into two sections: "Geomechanical Parameters:" and "Geometrical Parameters:". In the "Geomechanical Parameters:" section, there are three rows, each with a red square toggle button on the left and a text input field on the right. The first row is "Cohesion (in kPa):" with a range "to" and another input field. The second row is "Friction Angle : (in degrees)". The third row is "Density : (in kN per meter cube)". In the "Geometrical Parameters:" section, there are three rows. The first row is "Height (in m):" with a range "to" and another input field. The second row is "Slope Angle: (in degrees)". The third row is "Analyse over all of the slope conditions". On the right side of the window, there are two buttons: "Next" and "Back".

2. Then, the Next button is clicked.

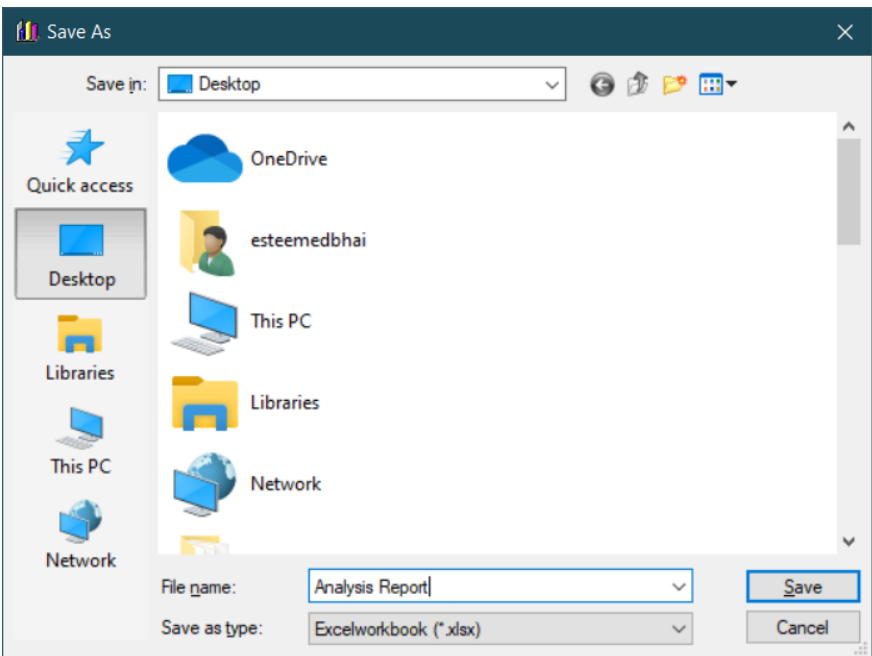
In the next window, again the slope conditions will be presented to choose from.

If “Analyse over all of the slope conditions” is chosen then Run Analysis button will be shown instead of Next button and the slope condition need not be selected.

3. The appropriate slope condition is chosen and **Run Analysis** button is clicked.

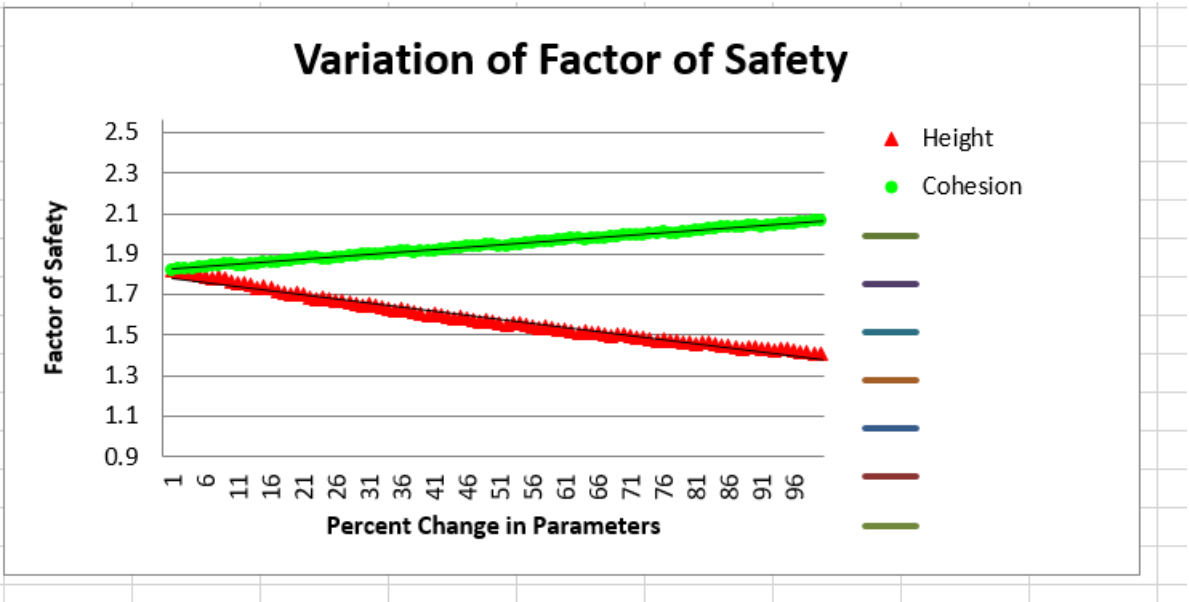
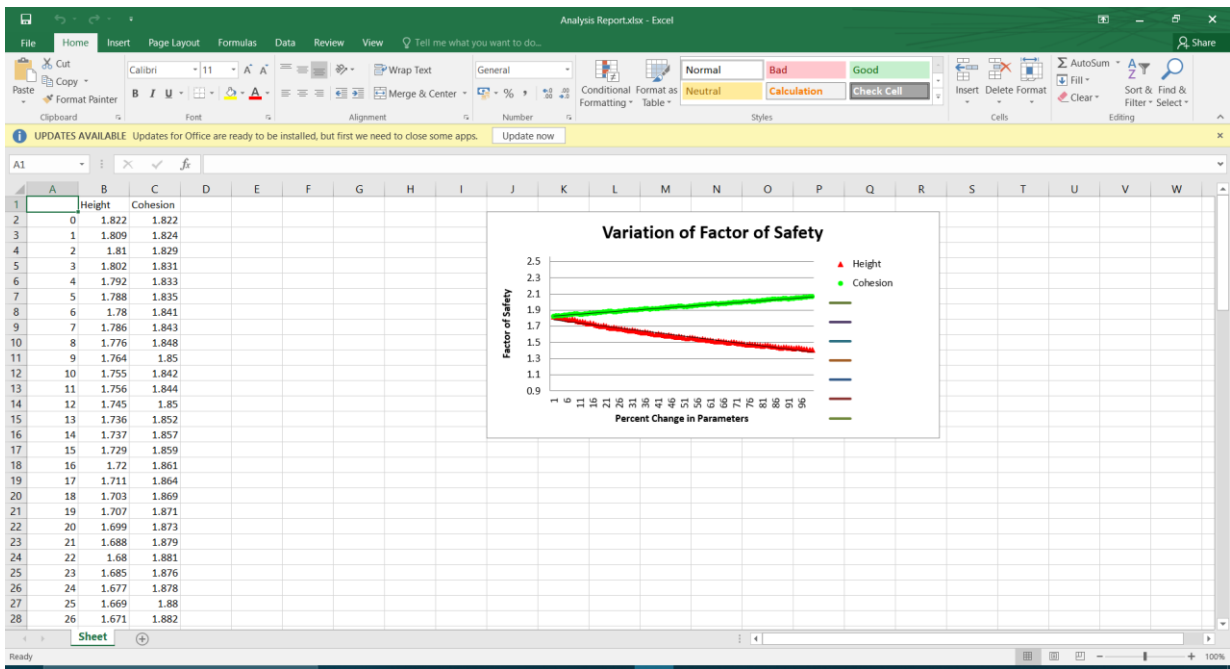


4. When the analysis is over, a file “ Save As” dialog box appears.



5. Browse to the desired folder and enter the file name.  
The file will be saved as MS Excel worksheet with extension .xlsx.

6. The excel file can be opened to see the graph and data.



This graph can be modified with the usual excel tools to suit the requirement.

# *5. Licence Agreement*

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