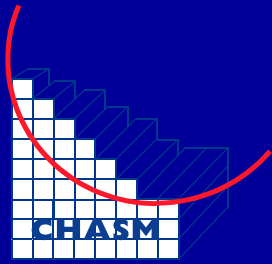


# CHASM™ *Quick start*

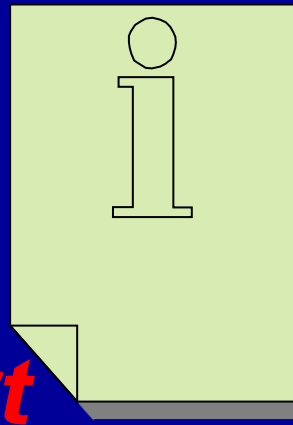
A guide to get you started with **CHASM™**

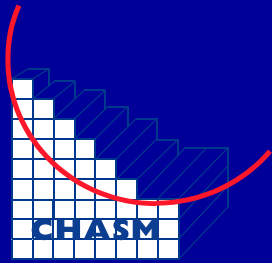
Malcolm Anderson, Liz Holcombe, J-P Renaud & Yu Wang



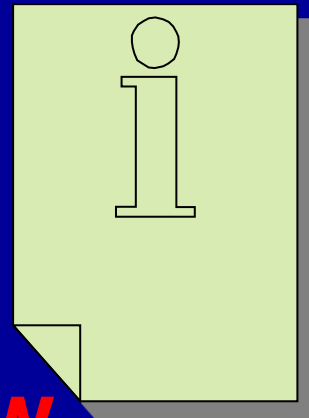
# CHASM™ *Quick start*

**Welcome to CHASM™ *Quick start***



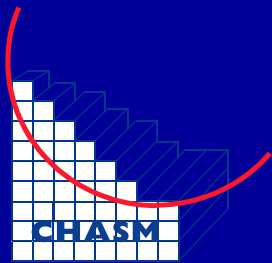


# CHASM™ *Quick start*



**CHASM™ *Quick start* contains 4 basic steps which show you how to:**

- **Create the slope geometry file**
- **Edit all slope input files**
- **Run CHASM™**
- **View output files**



# CHASM™ Quick start

Click on **Graphics/Define** in the hydrology dialogue box.

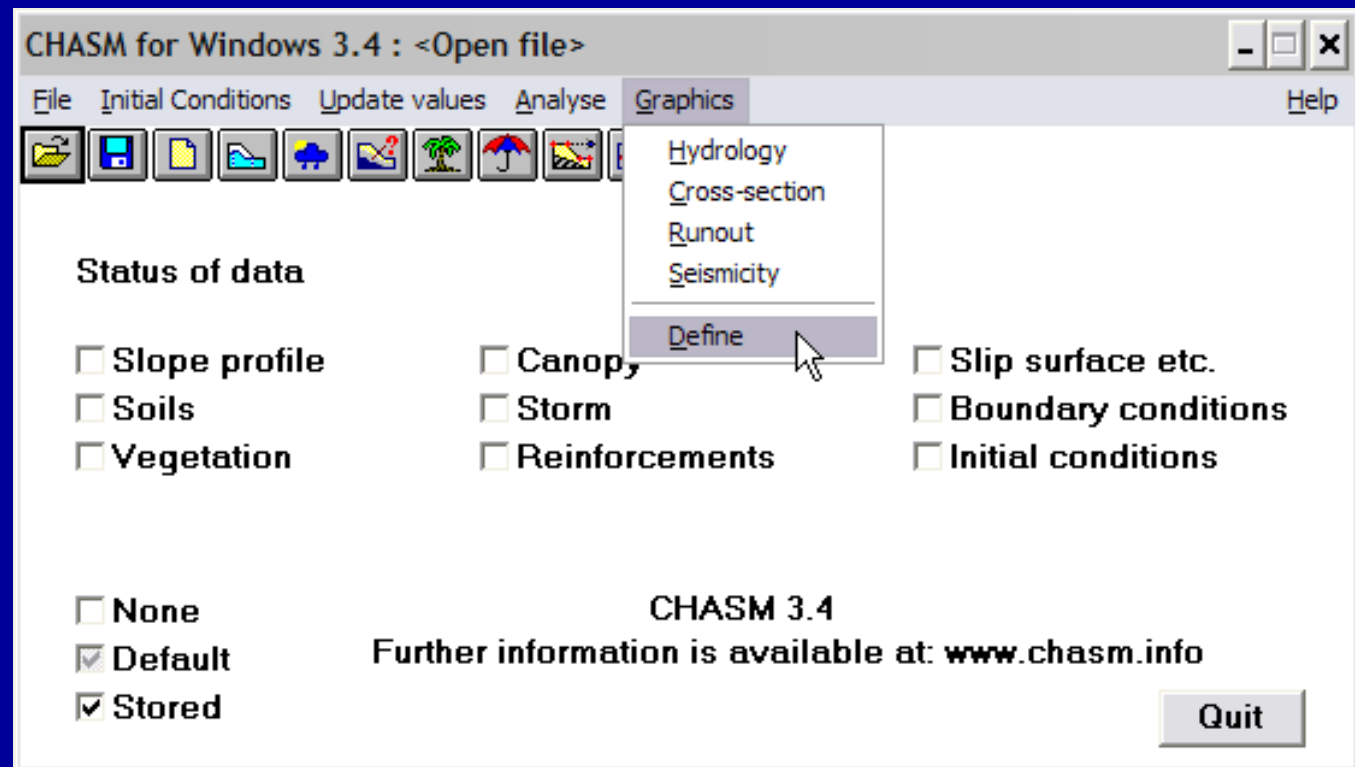
## •Geometry

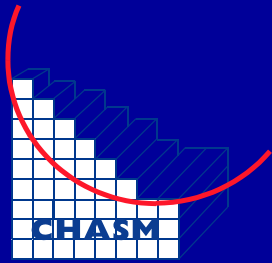
Soil strata

Definitions

Reinforcement

Draw cells





# CHASM™ *Quick start*

## •Geometry

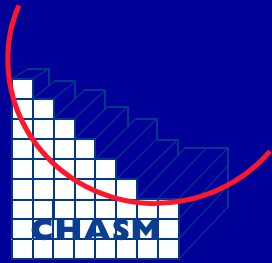
Soil strata

Definitions

Reinforcement

Draw cells

Click ***Change profile/Zoom*** to zoom in or out of the x and y-axes according to the size of the slope



# CHASM™ Quick start

To draw the slope click **left mouse button** then drag the mouse to the required point and left click again.

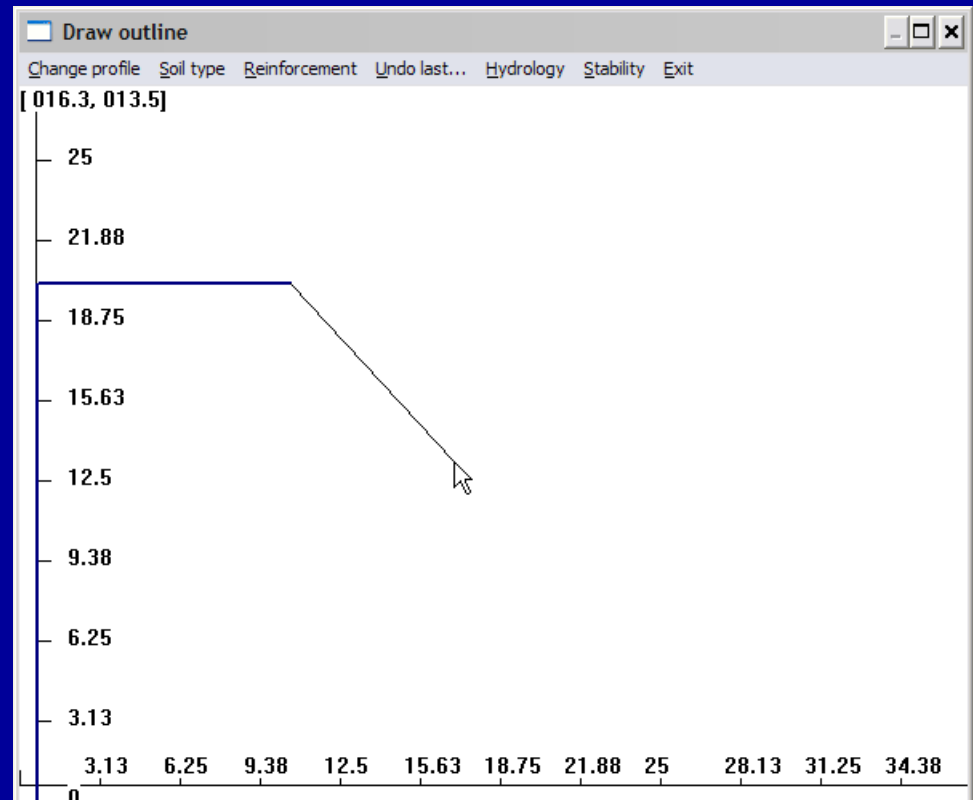
## •Geometry

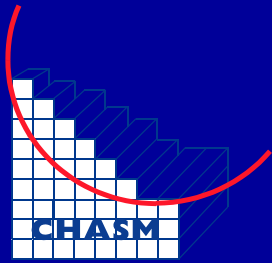
Soil strata

Definitions

Reinforcement

Draw cells





# CHASM™ Quick start

Repeat this until the slope geometry is defined.  
Click **right mouse button** to draw the vertical line through the x-axis.

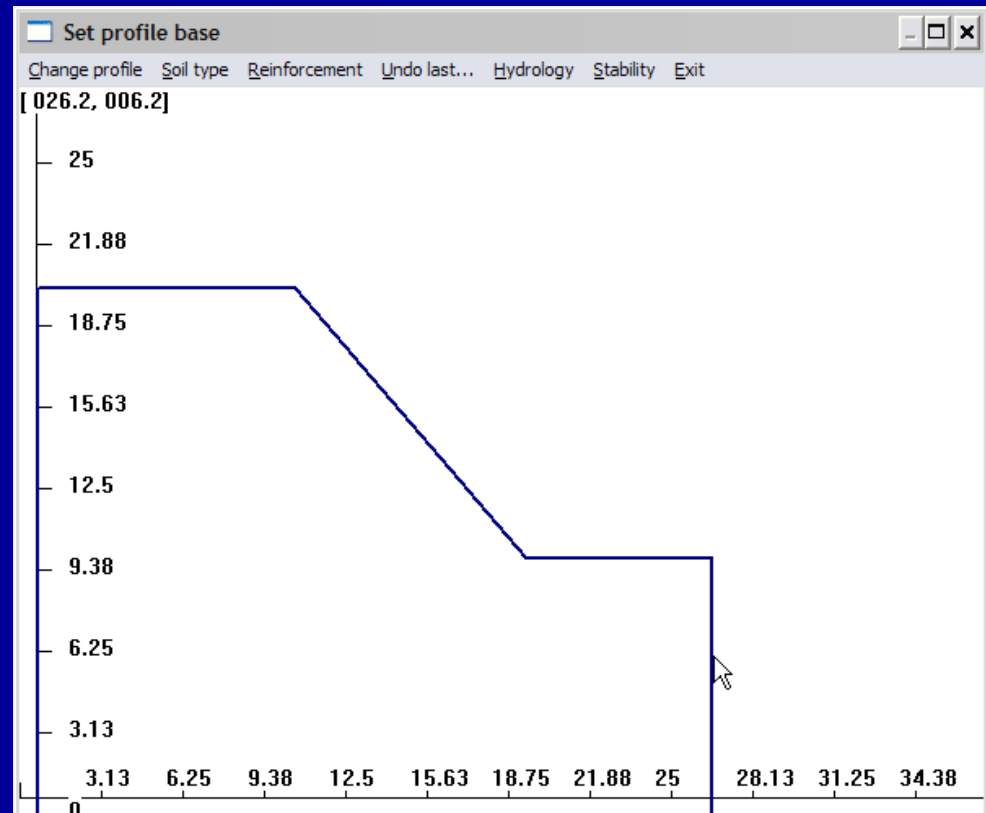
## •Geometry

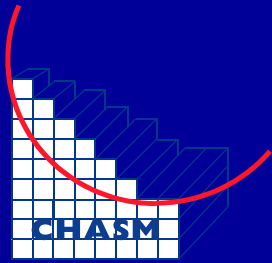
Soil strata

Definitions

Reinforcement

Draw cells





# CHASM™ Quick start

**Right** click again to define the base of the slope and intersect with the y-axis

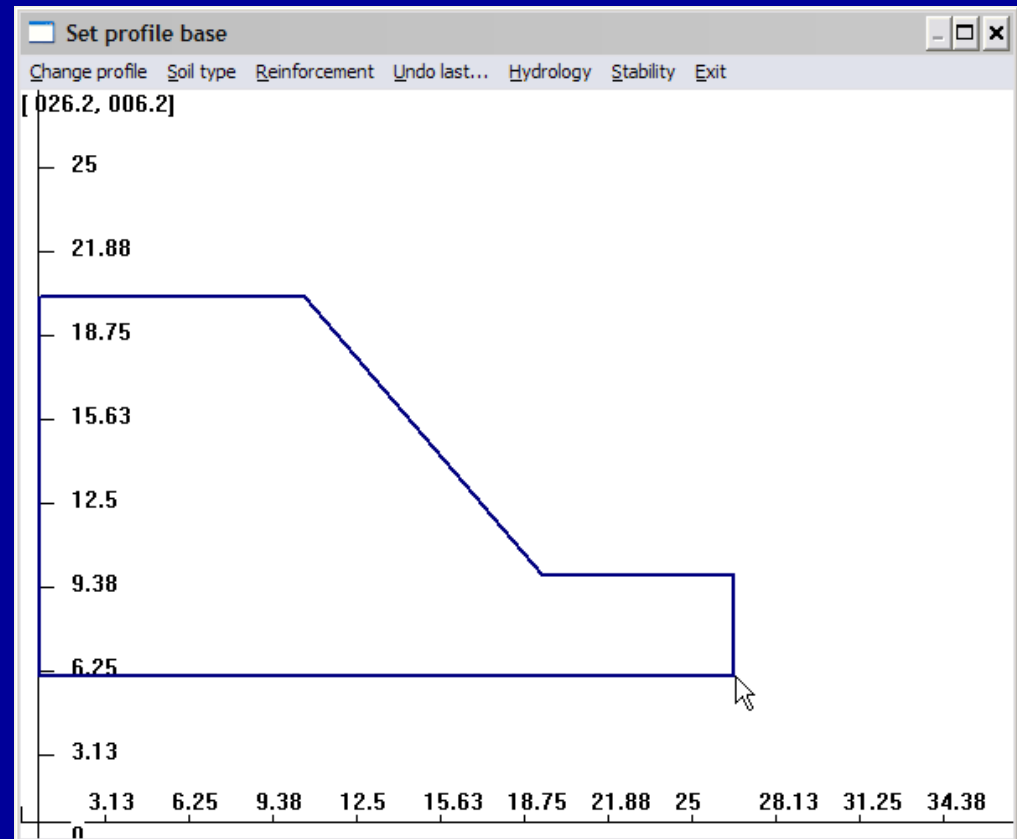
## •Geometry

Soil strata

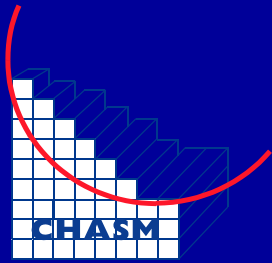
Definitions

Reinforcement

Draw cells







# CHASM™ Quick start

Access *Soil type/Strata* option

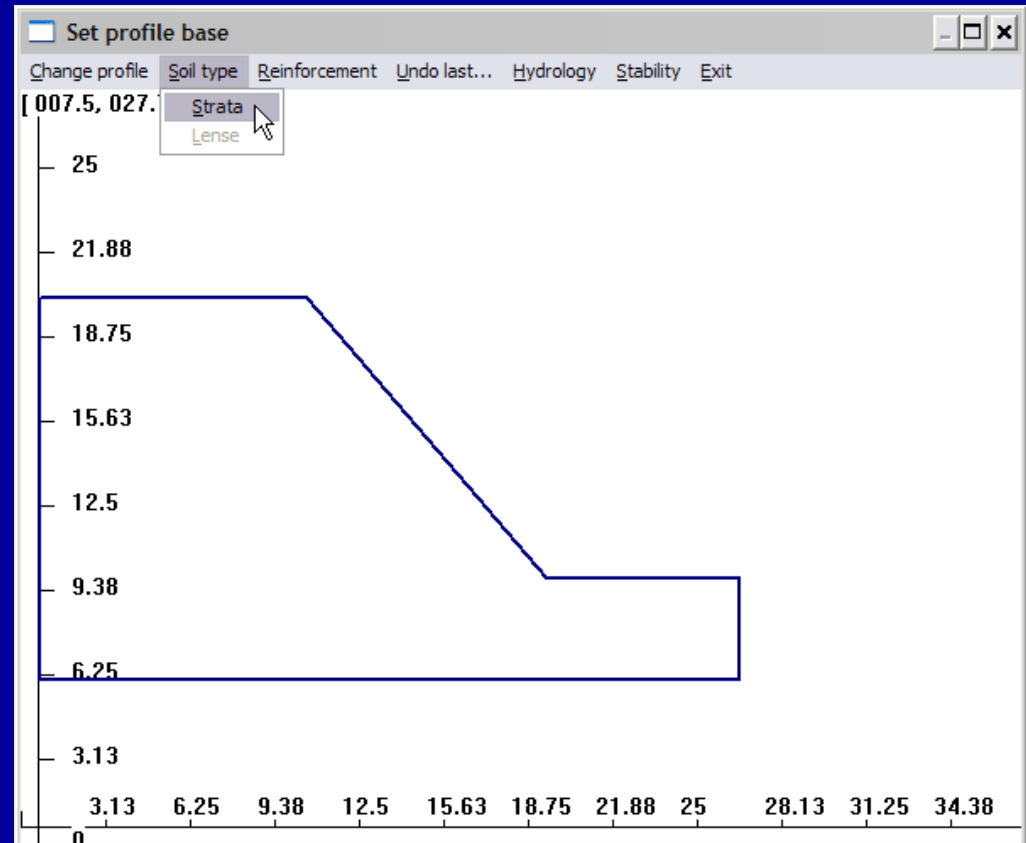
Geometry

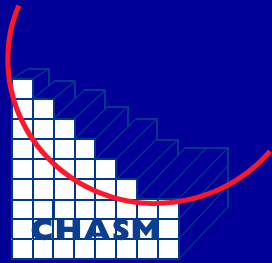
•Soil strata

Definitions

Reinforcement

Draw cells





# CHASM™ Quick start

Draw soil strata by clicking the left mouse button and dragging the cursor.

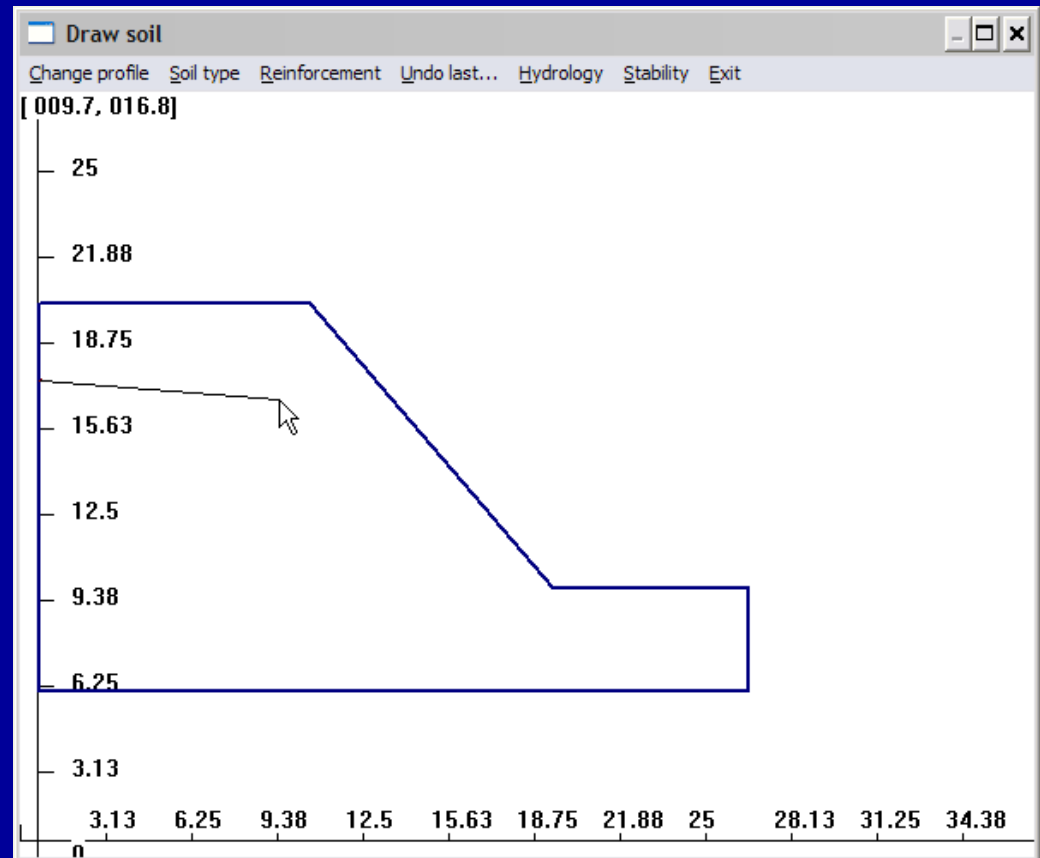
Geometry

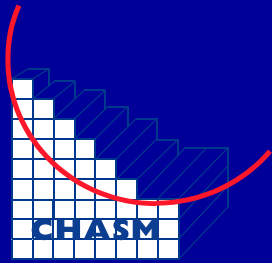
•Soil strata

Definitions

Reinforcement

Draw cells





# CHASM™ Quick start

Right click mouse to fix final point on profile

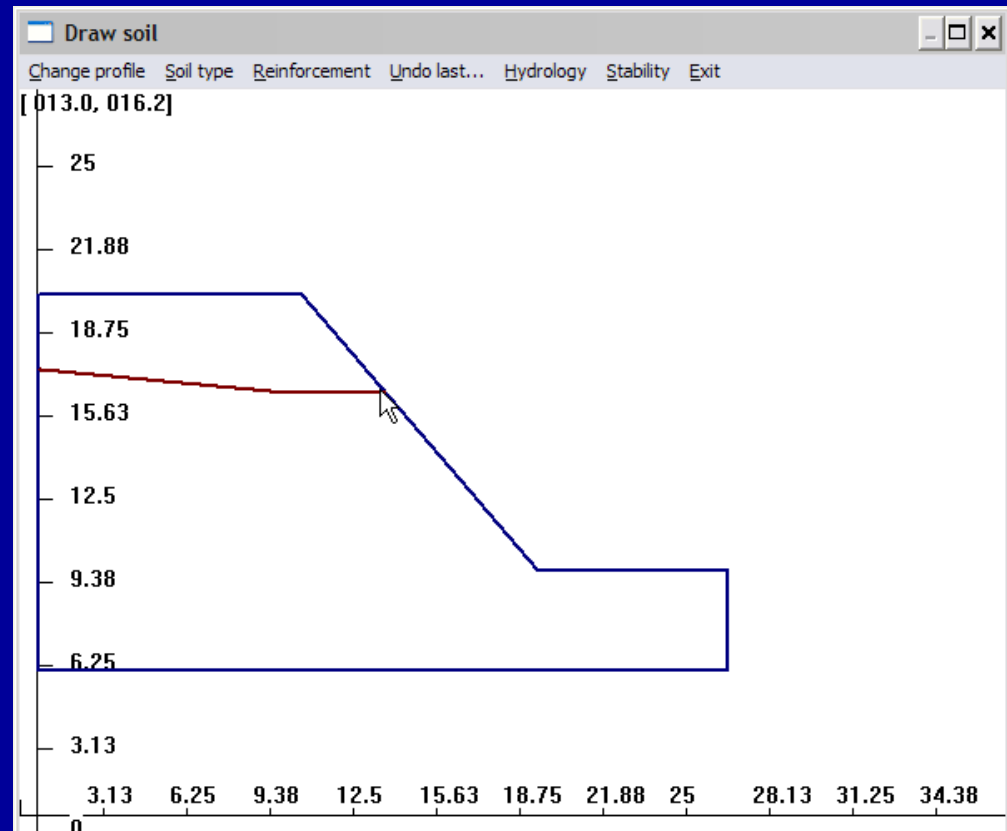
Geometry

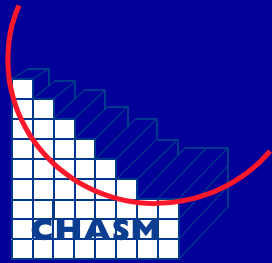
•Soil strata

Definitions

Reinforcement

Draw cells





# CHASM™ Quick start

To draw water table access *Hydrology/Water table* option

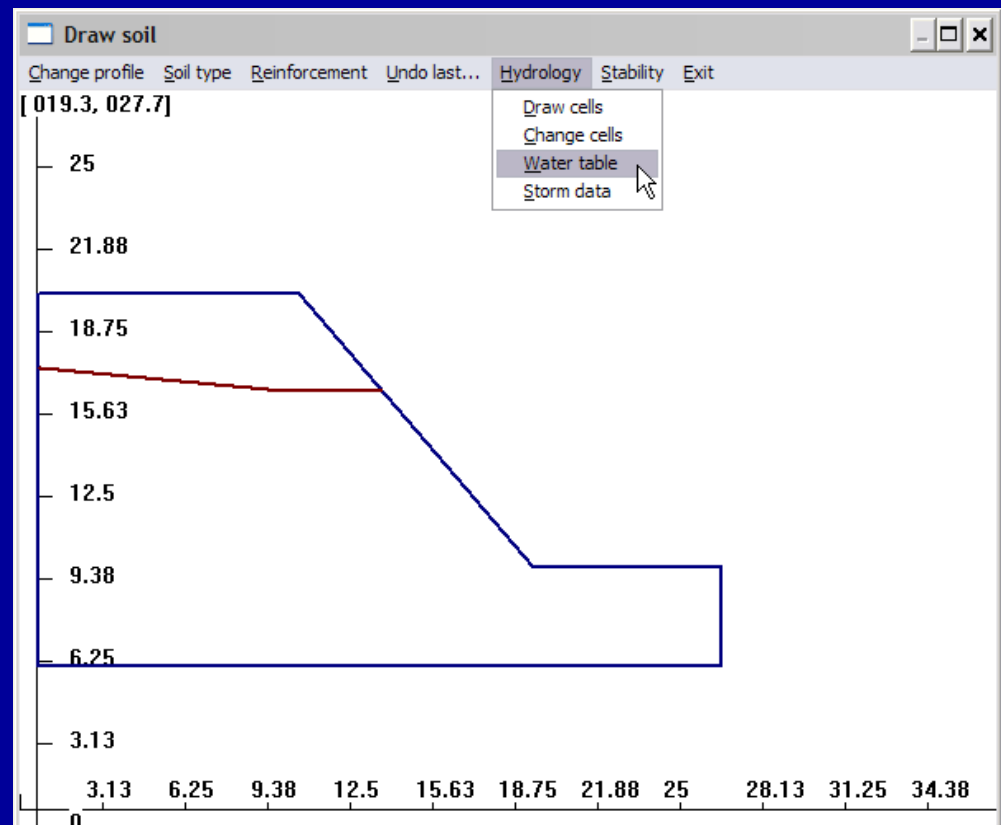
Geometry

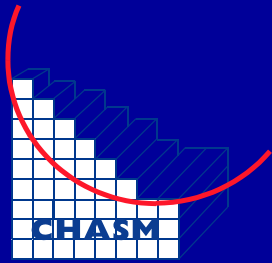
Soil strata

•Water table

Reinforcement

Draw cells





# CHASM™ Quick start

Draw water table by clicking the left mouse button and dragging the cursor.

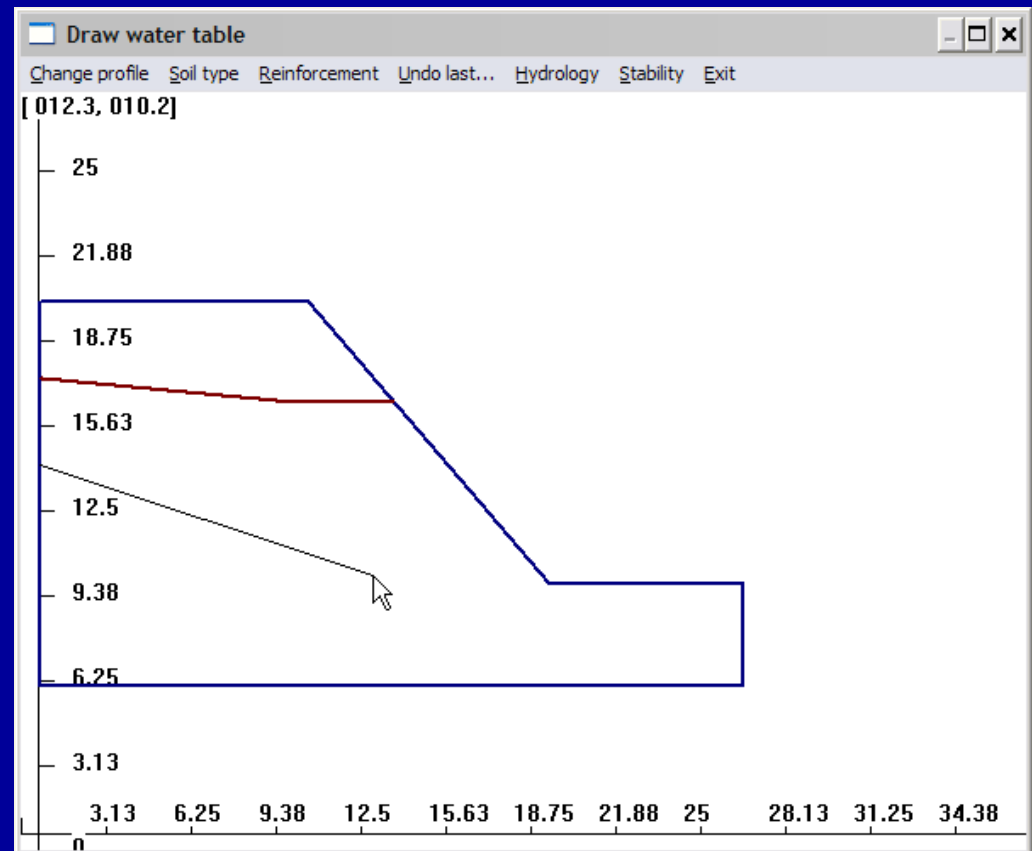
Geometry

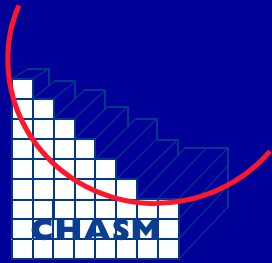
Soil strata

•Water table

Reinforcement

Draw cells





# CHASM™ Quick start

Geometry

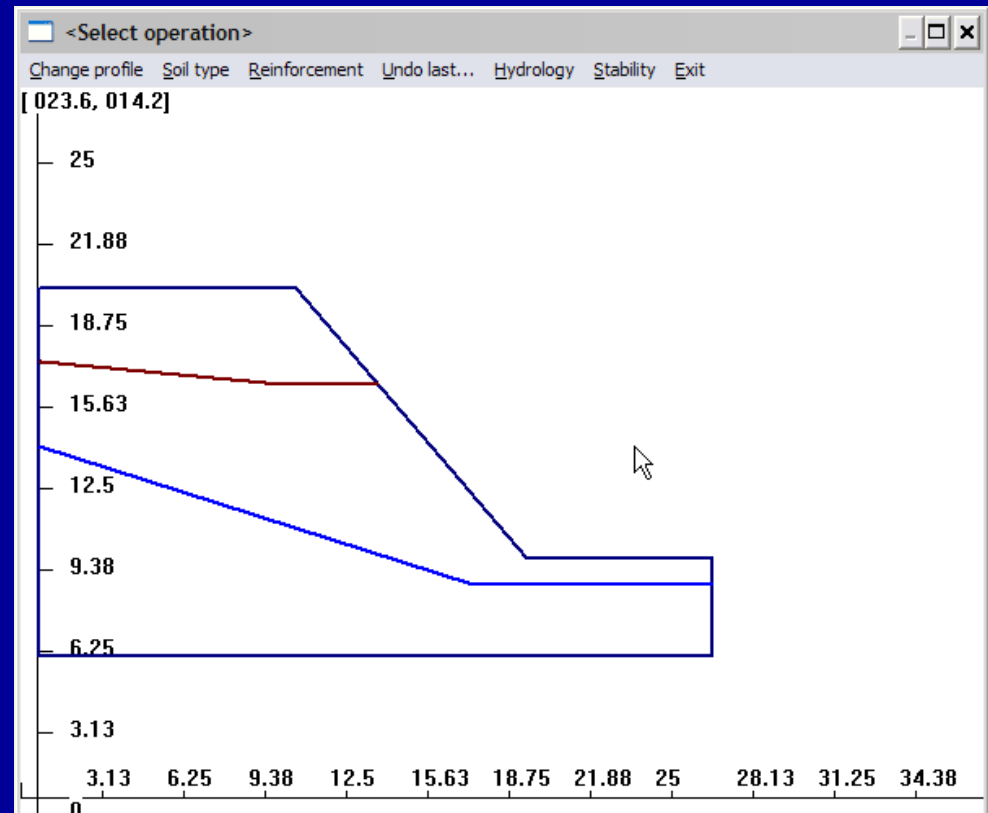
Soil strata

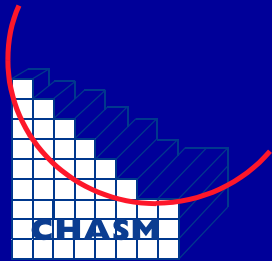
•Water table

Reinforcement

Draw cells

Right click mouse to fix final point on profile





# CHASM™ Quick start

Geotextiles & Earth nails may be included by accessing the *Reinforcement/Earth nail* option

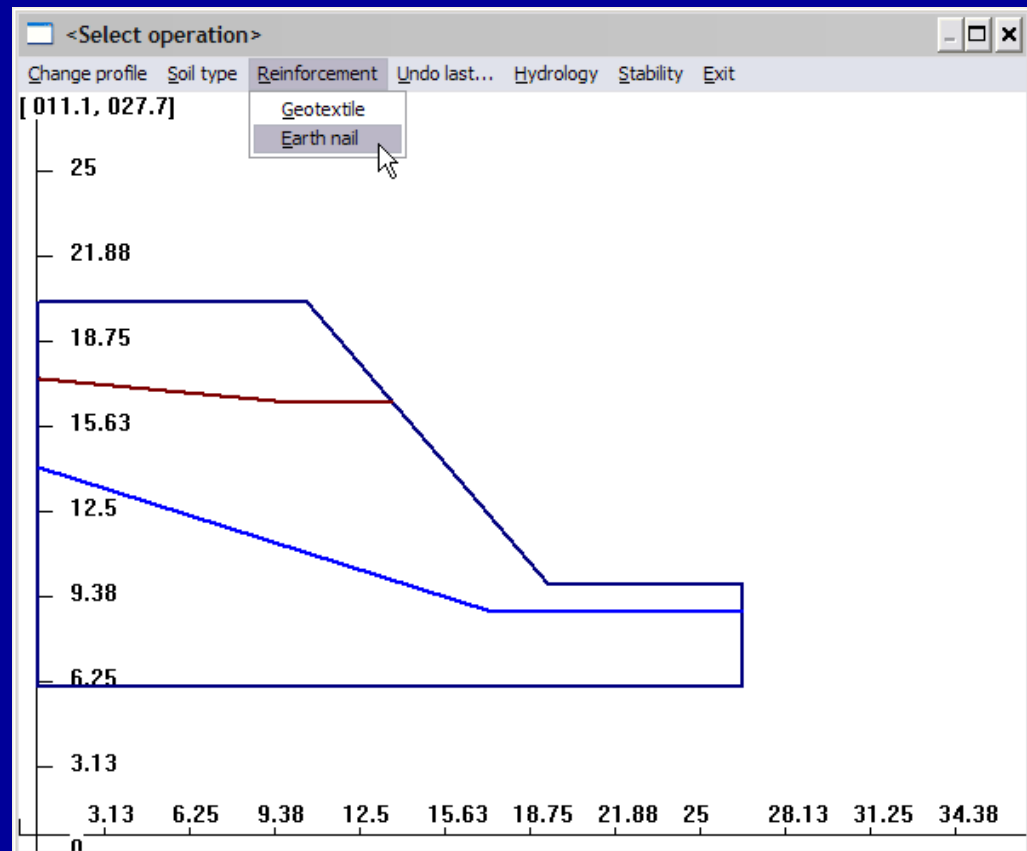
Geometry

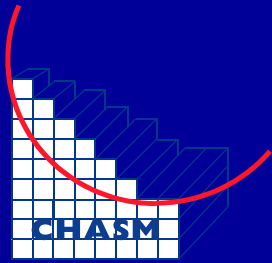
Soil strata

Water table

•Reinforcement

Draw cells





# CHASM™ Quick start

To draw the earth nail click **left mouse button** then drag the mouse to the required point and left click again.

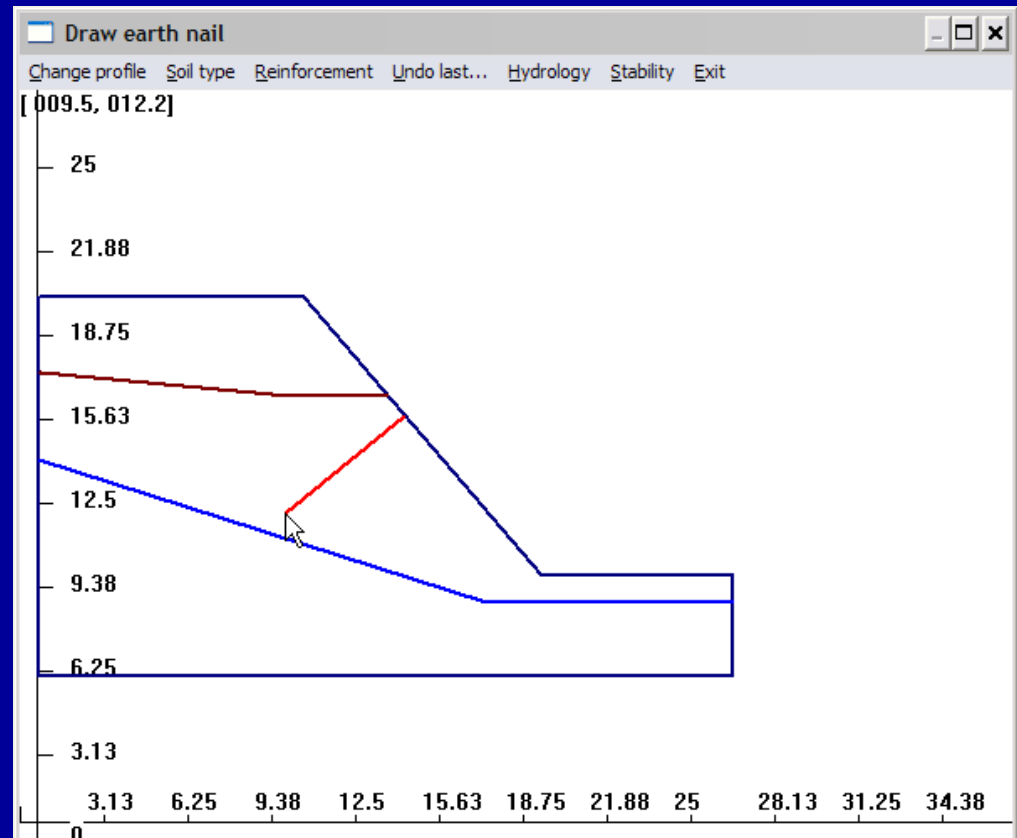
Geometry

Soil strata

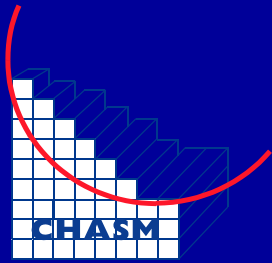
Water table

•Reinforcement

Draw cells







# CHASM™ Quick start

To draw the finite difference grid click  
***Hydrology/Draw cells*** to automatically define  
the grid..

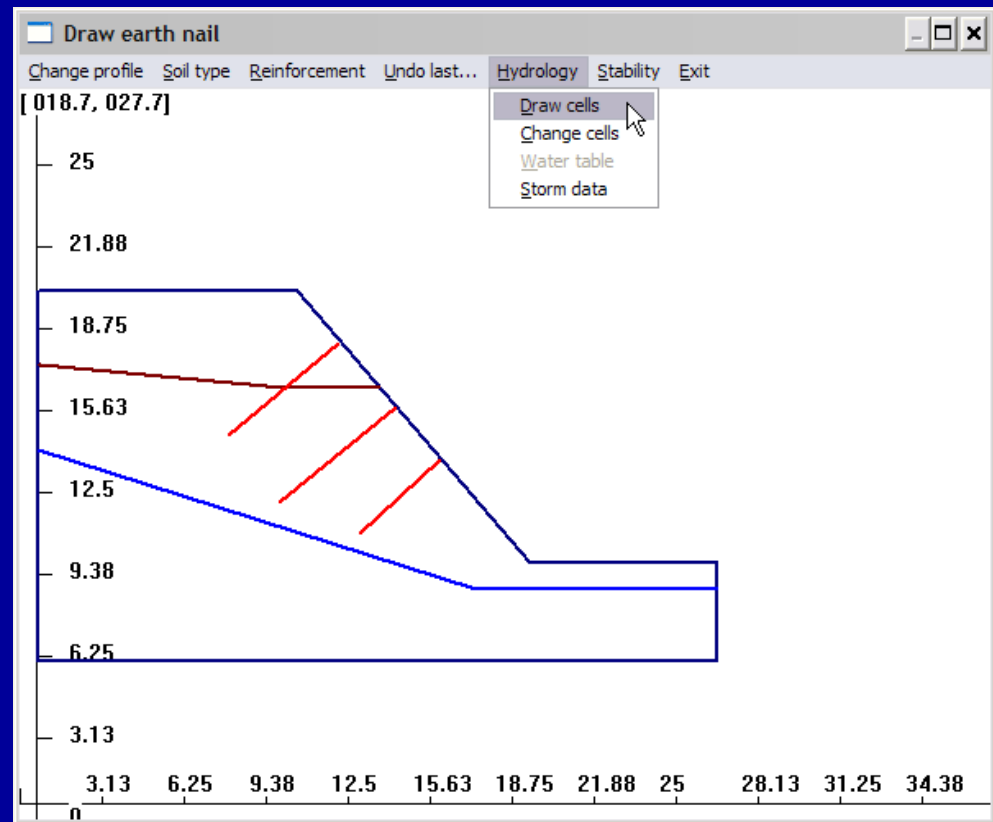
Geometry

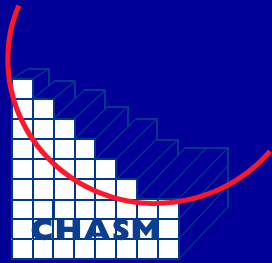
Soil strata

Water table

Reinforcement

•Draw cells





# CHASM™ Quick start

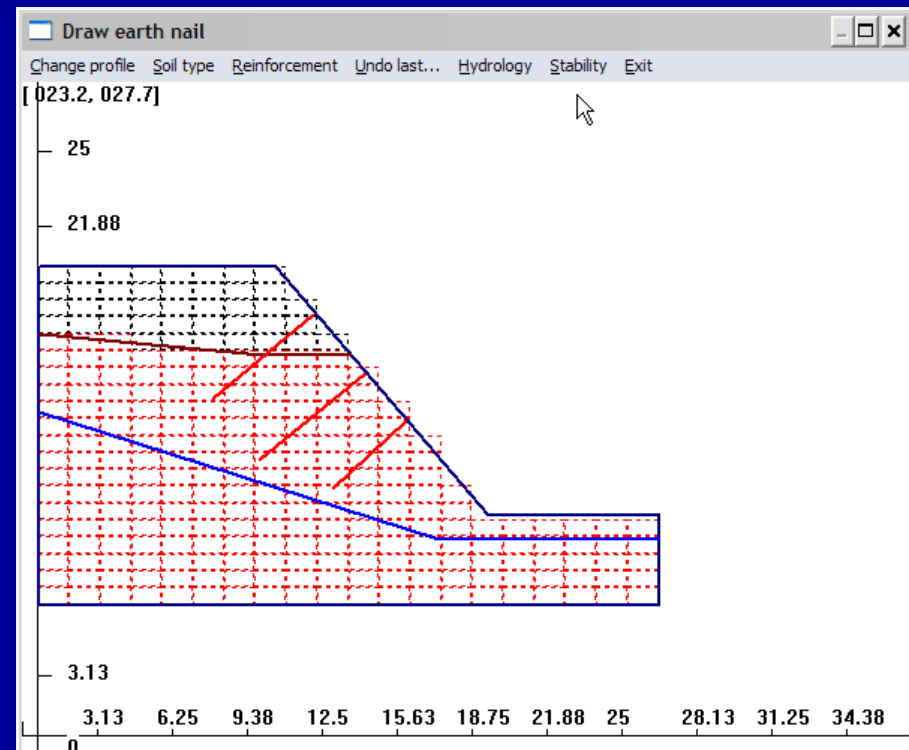
Geometry

Soil strata

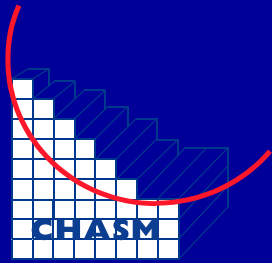
Water table

Reinforcement

•Draw cells



Grid dimensions may be changed by selecting *Hydrology/Change cells*.



# CHASM™ Quick start

Place the slip grid by clicking **Stability/Slip grid location**. Click on the diagram to place the default grid. Ideal placement should be towards the top right of the defined slope.

Geometry

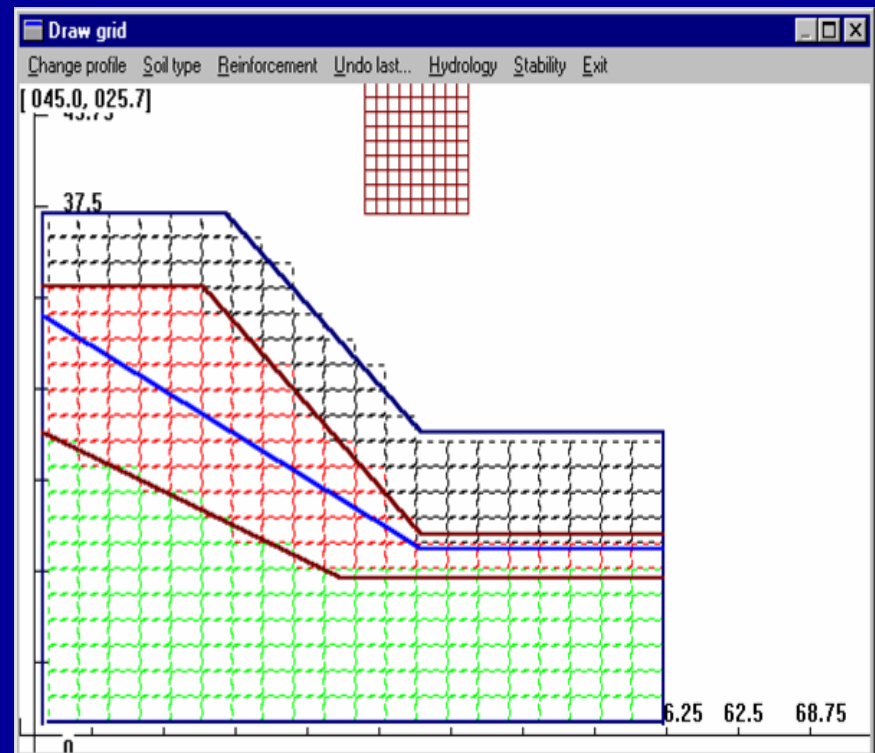
Soil strata

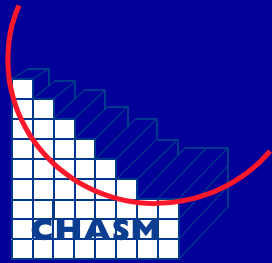
Water table

Reinforcement

•Stability grid

Draw cells





# CHASM™ Quick start

Geometry

The default grid may be edited by accessing ***Stability/Define grid..***

Soil strata

Water table

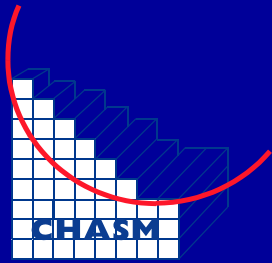
Reinforcement

•**Stability grid**

For computational purposes the ***initial radius*** and ***radius increment*** should be changed so that the slip circle intersects with the slope after only a few searches.

Draw cells

In conjunction with this, the ***grid increment*** should be changed for both the x and y axes until the slip grid is approximately a quarter the size of the defined slope



# CHASM™ Quick start

Geometry

Soil strata

Water table

Reinforcement

• **Stability grid**

Draw cells

**Bishop's method of slices**

	X	Y
Grid start	10.01 m	12.01 m
Grid increment	1 m	1 m
Number points	10	10

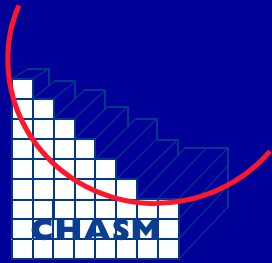
Slip circle

Initial radius: 5 m  
Radius increment: 0.5 m

Profile

Number points: 5  
Current point: 1  
X: -13 m  
Y: 16 m

OK Cancel Help



# CHASM™ Quick start

Click *Exit* to return to the *Main Dialogue Box*

Geometry

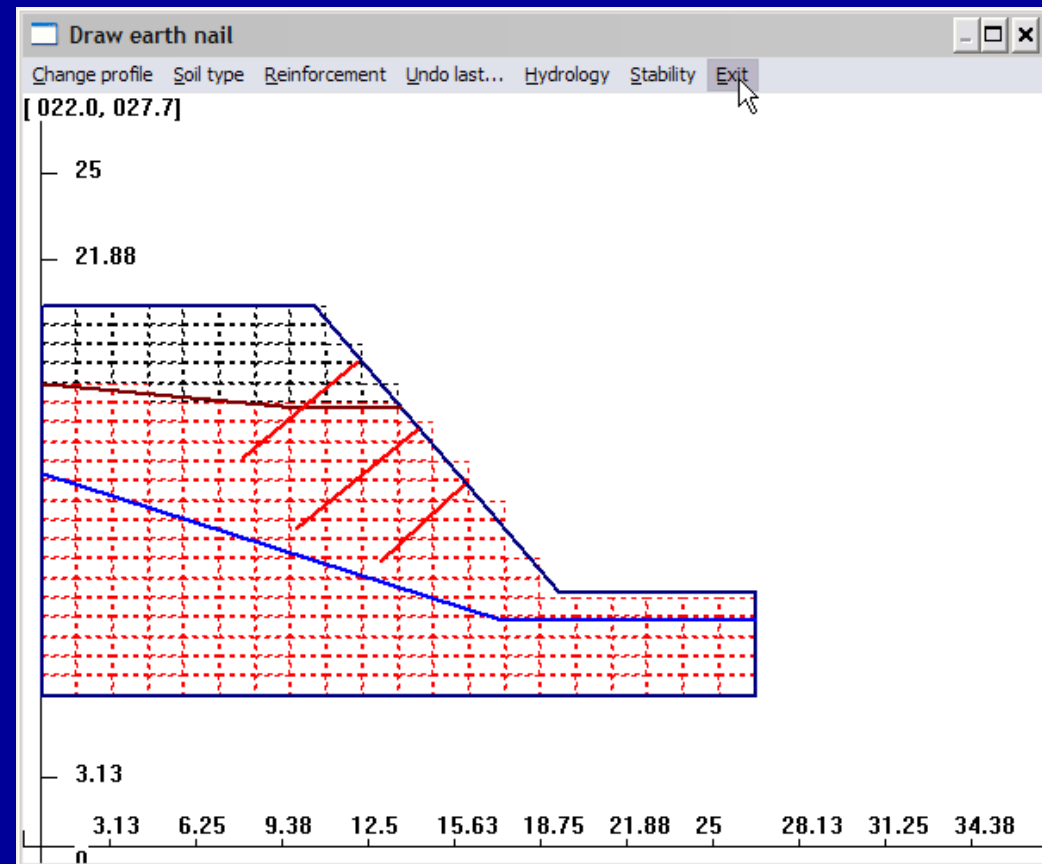
Soil strata

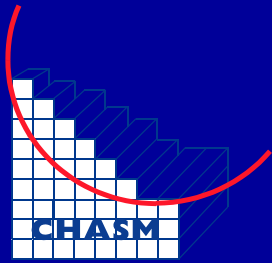
Water table

Reinforcement

Stability grid

•Draw cells

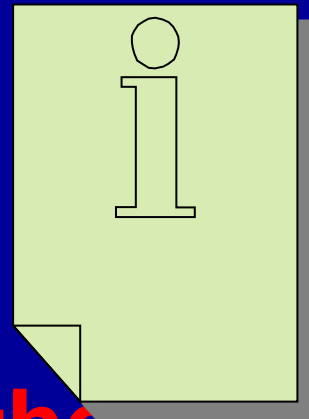


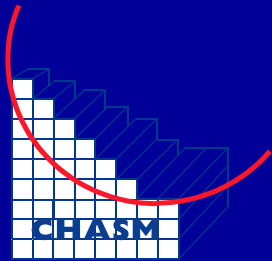


# CHASM™ *Quick start*

- Geometry
- Soil strata
- Water table
- Reinforcement
- Stability grid
- Draw cells

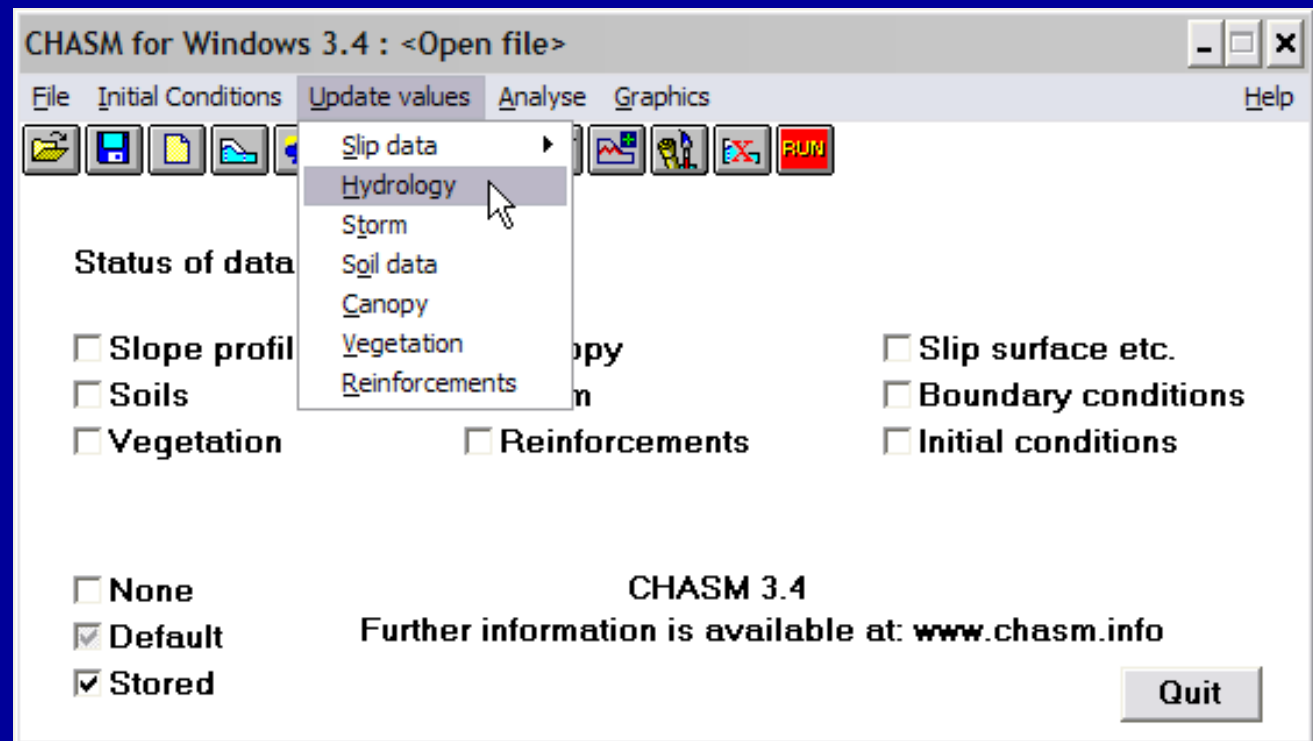
**You have now  
completed the  
geometry file for the  
slope**



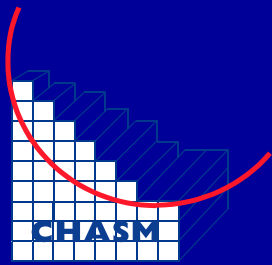


# CHASM™ Quick start

Click *Exit* to return to the Main Dialogue Box where you can now edit 7 slope properties....click on *Update values/ hydrology*







# CHASM™ Quick start

Import geometry

•Hydrology

Storm


Soil data

Canopy

Vegetation

Reinforcement

Boundary conditions

Edit 'Slope' and 'Column' properties as required & click  to return to the **Main Dialogue Box**

**Hydrology Inputs**

**Slope**

Number of columns: 20

Detention capacity: 10 mm

Maximum evaporation: 0.0005 mm/hr

Number of soils: 2

**Column**

Current column: 1

Number of cells: 20

Column width: 1.29375 m

Column breadth: 1 m

Initial suction: -2 m

Water table height: 12 cells

**Cell**

Current cell: 1

Cell depth: 0.70625 m

3D graphics

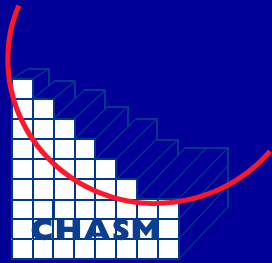
Change soil

Vegetation

Storm event

Boundary Conditions

OK Cancel Help



# CHASM™ Quick start

Import geometry

Hydrology

•Storm

Soil data

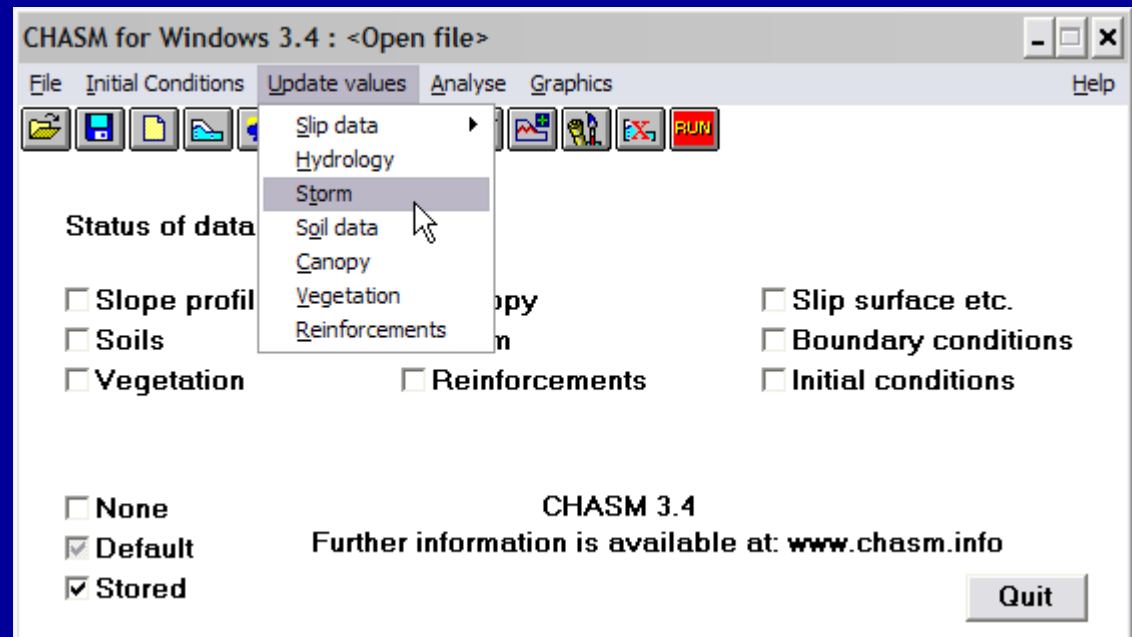
Canopy

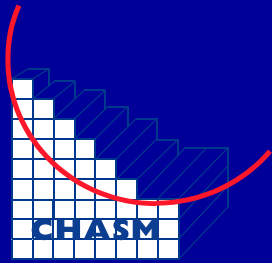
Vegetation

Reinforcement

Boundary conditions

Click **Storm** to edit storm data





# CHASM™ Quick start

Import geometry

Hydrology

•Storm


Soil data

Canopy

Vegetation



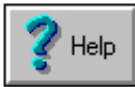
Reinforcement

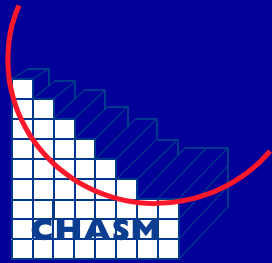
Boundary conditions

Edit 'Storm data' as required & click  to return to the **Main Dialogue Box**

Storm data

Time		Rainfall	
Length of simulation	10 hrs	Precipitation	20 mm/hr
Iteration period	60 secs	<input checked="" type="radio"/> No interception model	
Storm start time	2 hrs	<input type="radio"/> Using canopy model	
Storm stop time	5 hrs	<input type="radio"/> Using vegetation	
Storm Hour	4	Effective ppt (grass)	11 mm/hr
		Effective ppt (tree)	18 mm/hr

Buttons:   



# CHASM™ Quick start

Import geometry

Hydrology

Storm

•Soil data

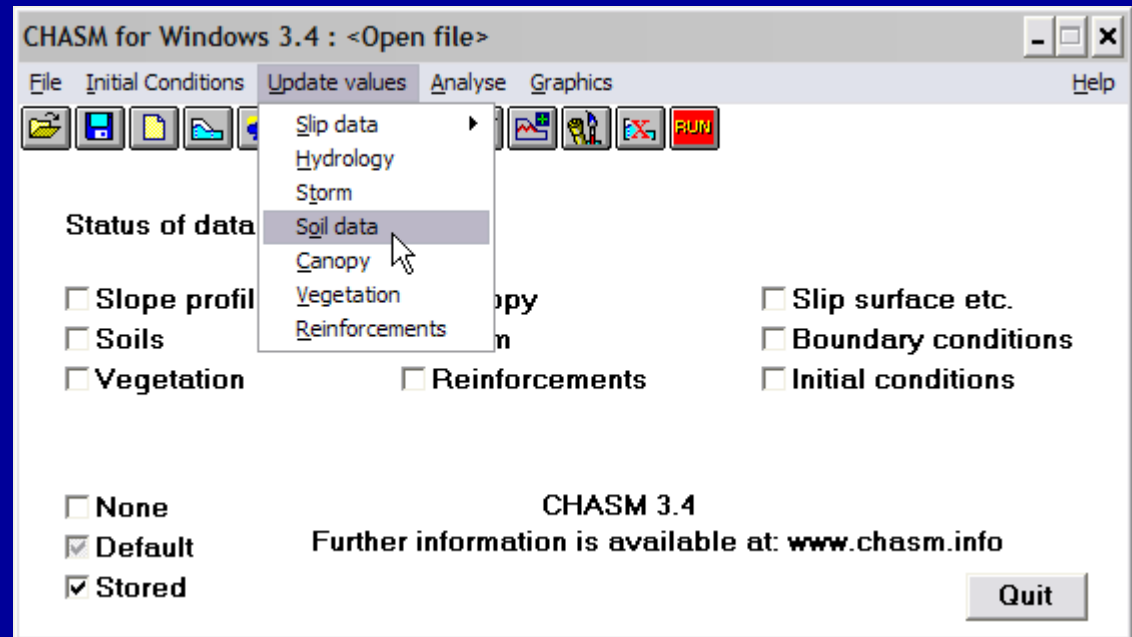
Canopy

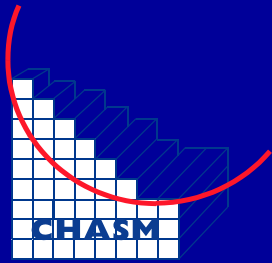
Vegetation

Reinforcement

Boundary conditions

Click **Soil data** to edit soil data





# CHASM™ Quick start

Import geometry

*Edit 'Soil data' as required*

Hydrology

Storm

•Soil data

Canopy

Vegetation

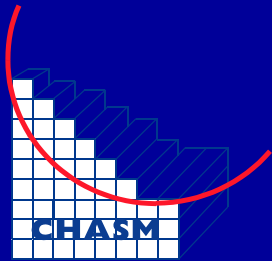
Reinforcement

Boundary conditions

The screenshot shows the 'Define Soils' dialog box with the following settings:

Property	Value	Unit
Current soil	Soil 1	
Number of soils	2	
Hydrological		
Saturated moisture content	43	%
Permeability	1e-05	m/s
Suction moisture relationship	[SMC icon]	
Physical properties		
Saturated bulk density	19	kN/m <sup>3</sup>
Unsaturated bulk density	18	kN/m <sup>3</sup>
Cohesion	0	kPa
Friction angle	33	deg.

Buttons: OK, Cancel, Help



# CHASM™ Quick start

Import geometry

Hydrology

Storm

•Soil data

Canopy

Vegetation

Reinforcement

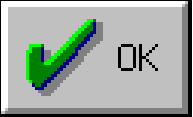
Boundary conditions

Check and Edit 'suction moisture' curve as required as required & click





to return to the *Main Dialogue Box*

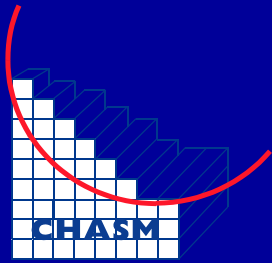
Suction - Moisture - Conductivity Relationship ✕

2 

Current point	5	
Number of points	5	
Suction	6	m
Moisture	26.7	%
Conductivity	1.078e-06	m/s







# CHASM™ Quick start

Import geometry

Click **Canopy** to edit canopy data

Hydrology

Storm

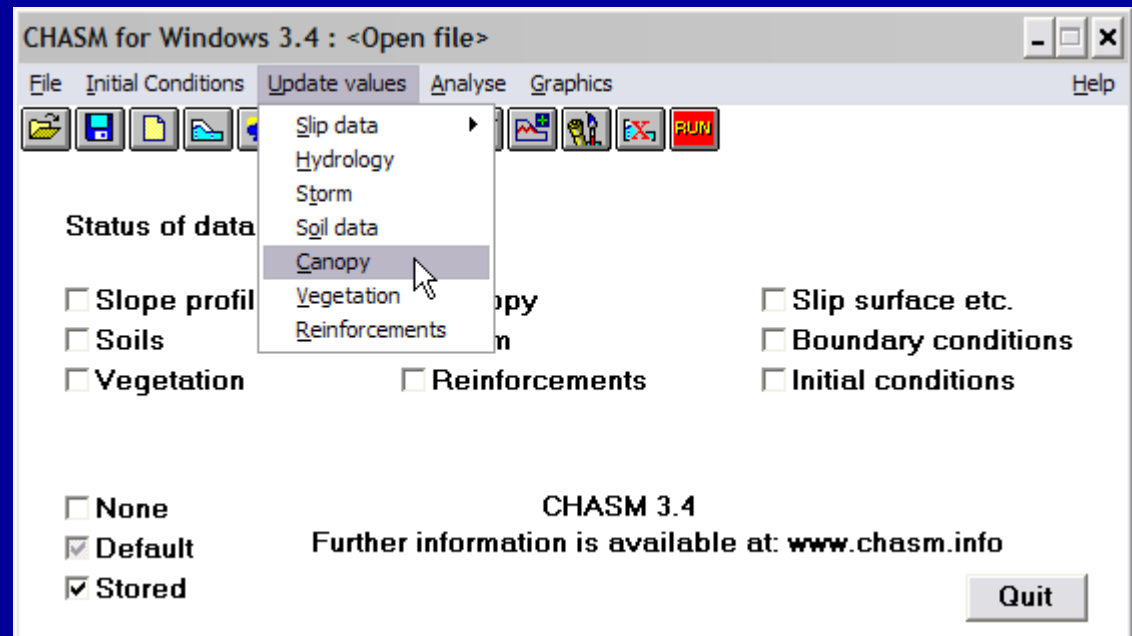
Soil data

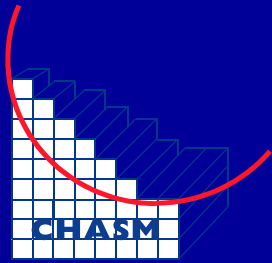
•Canopy

Vegetation

Reinforcement

Boundary conditions





# CHASM™ Quick start

Import geometry

Hydrology

Storm

Soil data

•Canopy

Vegetation

Reinforcement

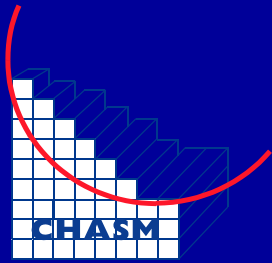
Boundary conditions

*Edit 'Canopy data' as required & click*



*to return to the **Main Dialogue Box***





# CHASM™ Quick start

Import geometry

Hydrology

Storm

Soil data

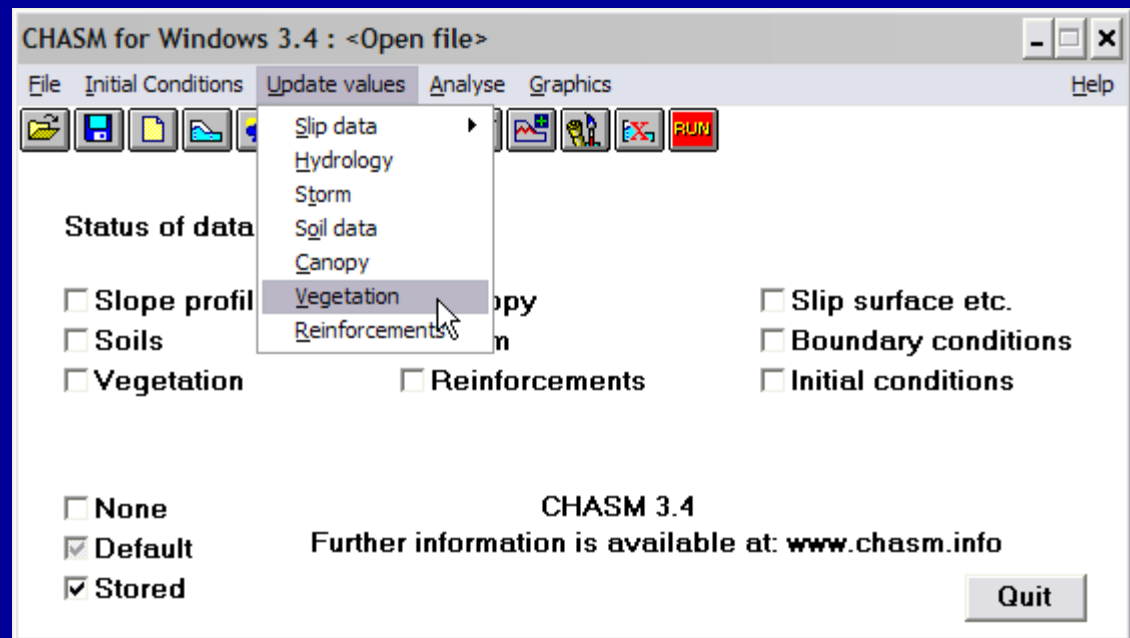
Canopy

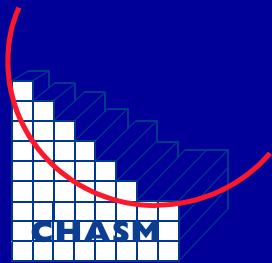
•Vegetation

Reinforcement

Boundary conditions

Click 'Vegetation' to edit vegetation data





# CHASM™ Quick start

Import geometry

Hydrology

•Storm

Soil data

Canopy

Vegetation

Reinforcement

Boundary conditions

Select column and depth of vegetation root zone....

Vegetation cover

Entire slope

Detention capacity: 10 mm

Maximum evaporation: 0.0005 mm/hr

No interception model

Using canopy model

Using vegetation

Change soil

Properties at top of column

Column: 3

Depth: 0 cells

Soil type: 0

Effective permeability: 2 m/s

Cover type: Acacia

Thatch effect

Storm start: 0 hr

Storm stop: 1 hr

Current hour: 1

Precipitation per hour: 20 mm

Effective precipitation: 20 mm

Storm event

Strength parameters

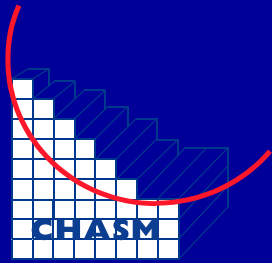
Root tensile strength: 30 kPa

Root area ratio: 6 %

Effective cohesion: 0 kPa

Friction angle: 33 deg.

OK Cancel Help



# CHASM™ Quick start

Import geometry

Hydrology

Storm


Soil data

Canopy

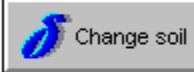




•Vegetation

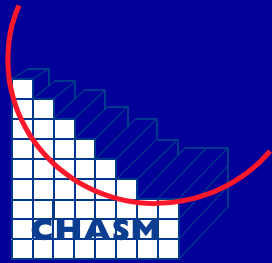
Reinforcement

Boundary conditions

Select Cover type as required & click  to return to the *Main Dialogue Box*

Vegetation cover

<b>Entire slope</b>		<b>Properties at top of column</b>				
Detention capacity	10 mm	Column	3	Depth	2	cells
Maximum evaporation	0.0005 mm/hr	Soil type	0			
<input checked="" type="radio"/> No interception model		Effective permeability	1e-05 m/s			
<input type="radio"/> Using canopy model						
<input type="radio"/> Using vegetation						
<b>Thatch effect</b>		Cover type	Acacia			
Storm start	0 hr	Storm stop	1 hr			
Current hour	1		Strength para	Radiata Pine		
Precipitation per hour	20 mm		Root tensile	User defined grass		
Effective precipitation	20 mm		Root area ratio	6 %		
		Effective cohesion	0 kPa			
		Friction angle	33 deg.			
						



# CHASM™ Quick start

Import geometry

Hydrology

•Storm

Soil data

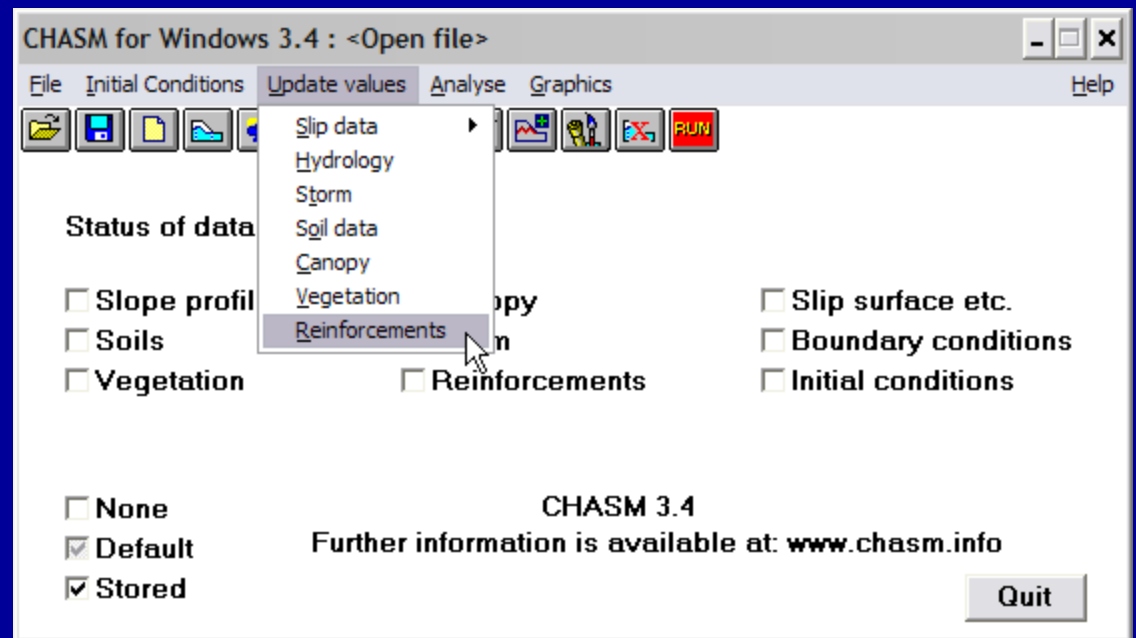
Canopy

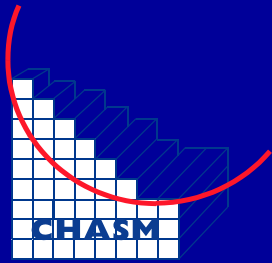
Vegetation

•Reinforcement

Boundary conditions

Click 'Reinforcement' to edit reinforcement





# CHASM™ Quick start

Import geometry

Hydrology

•Storm

Soil data

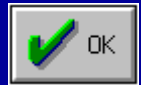
Canopy

Vegetation

•**Reinforcement**

Boundary conditions

*Edit 'reinforcements' as required & click*



*to return to the **Main Dialogue Box***

Reinforcements

No reinforcement

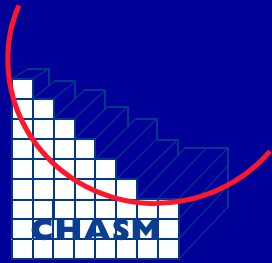
**Geo-textiles**

Number  Inclination  deg  
Current  Length  m  
Start X  m  
Start Y  m  
Strength  Nm  
Factor of Safety   
Interaction

**Earth nails**

Number  Inclination  deg  
Current  Length  m  
 Start X  m  
 Start Y  m  
 Strength  Nm  
Factor of Safety   
Interaction

OK  
 Cancel  
 Help



# CHASM™ Quick start

Import geometry

Hydrology

Storm

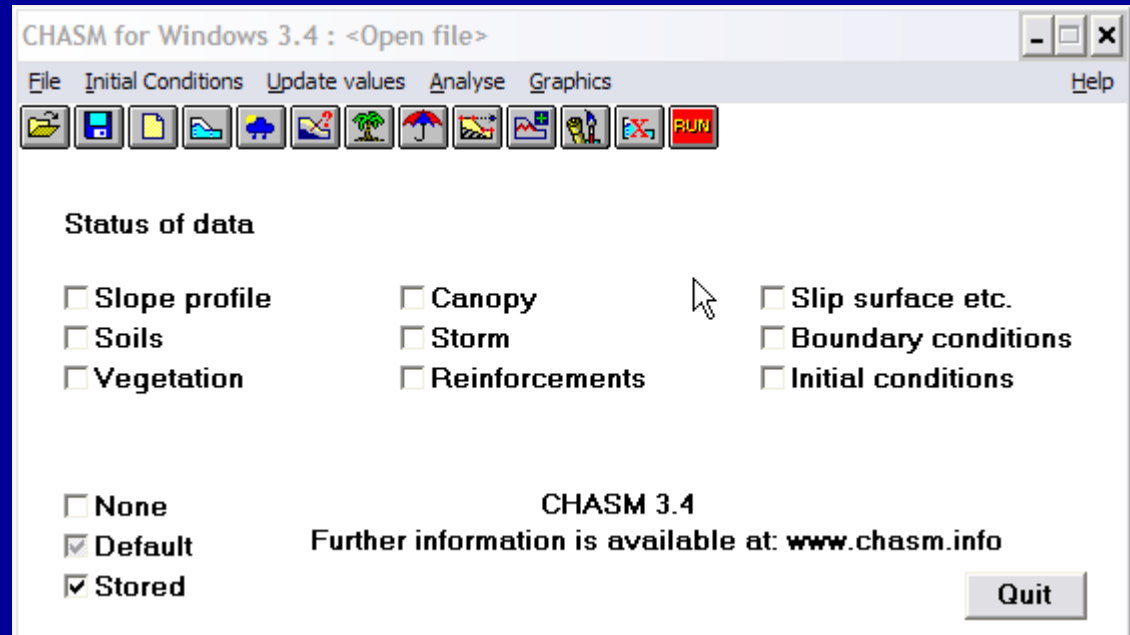
Soil data

Canopy

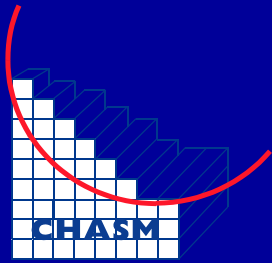
Vegetation

Reinforcement

•**Boundary conditions**



Click on  to obtain hydrology window



# CHASM™ Quick start

Import geometry

Hydrology

Storm

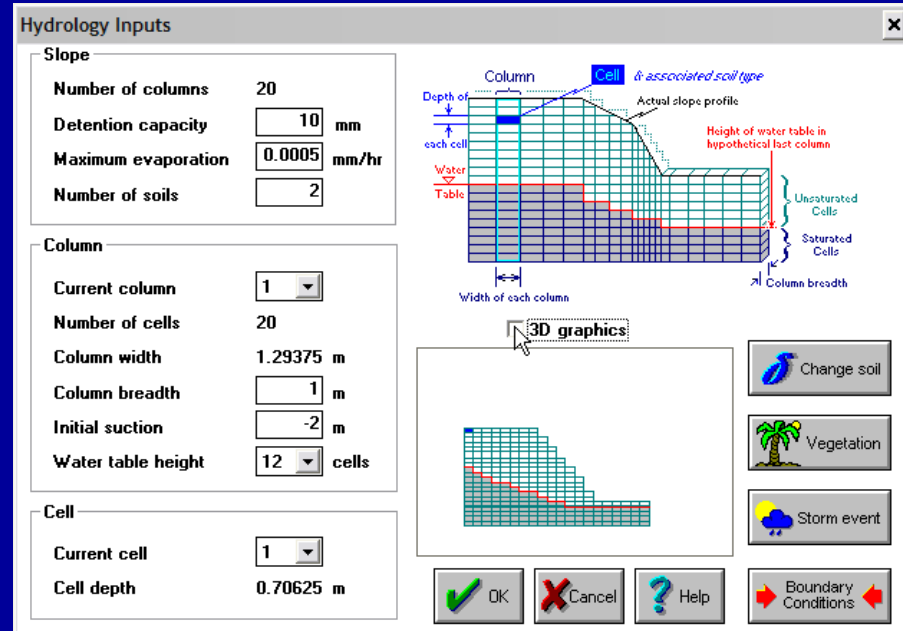
Soil data

Canopy

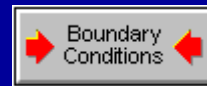
Vegetation

Reinforcement

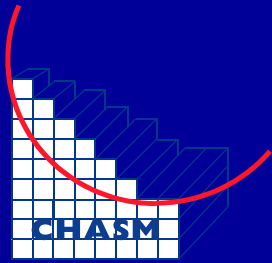
•Boundary conditions



Click on



to edit boundary conditions



# CHASM™ Quick start

Import geometry

Hydrology

Storm

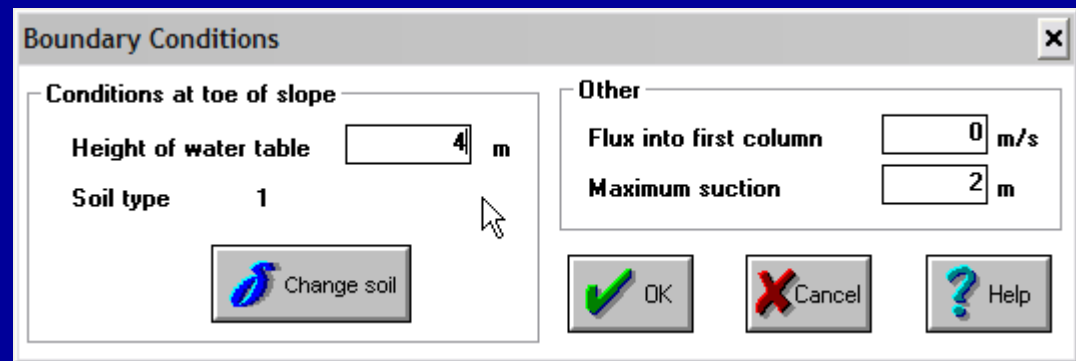
Soil data

Canopy

Vegetation

Reinforcement

•**Boundary conditions**



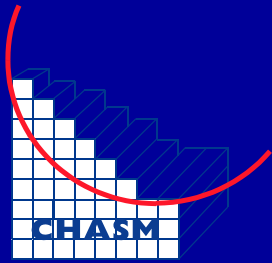
Click  to return to the hydrology

window.....

and in the hydrology window click 

to return to the main dialogue window





# CHASM™ *Quick start*

Import geometry

Hydrology

Storm

Soil data

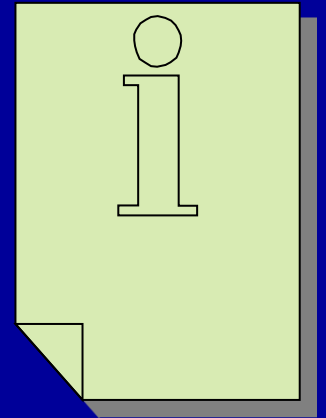
Canopy

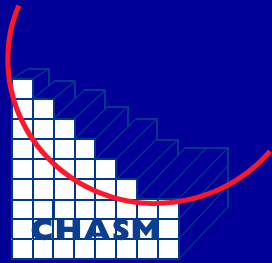
Vegetation

Reinforcement

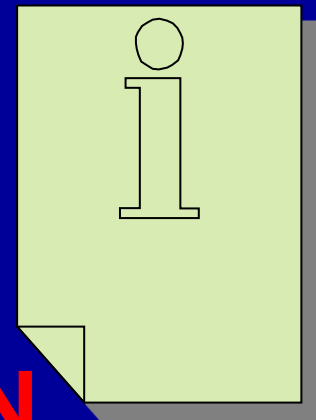
Boundary conditions

**You have now  
completed  
editing all the  
slope data files**

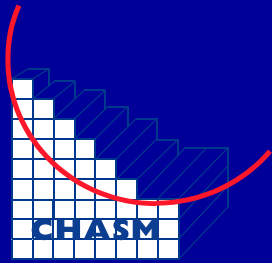




# CHASM™ *Quick start*

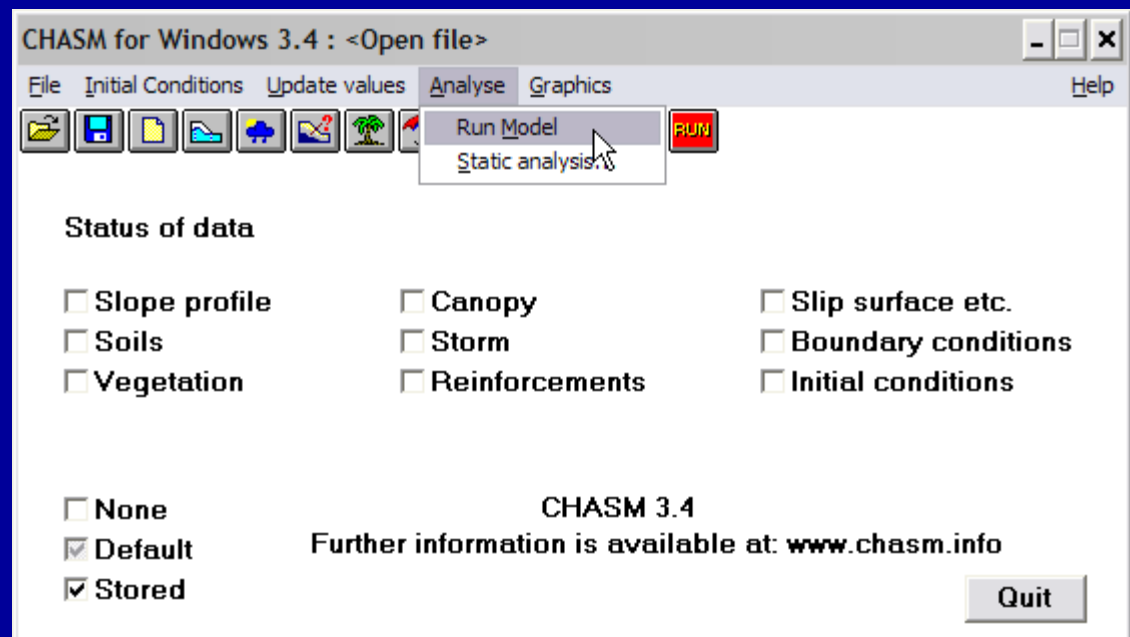


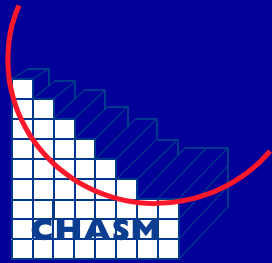
**You are now ready to RUN  
CHASM™ in both dynamic  
and static modes**



# CHASM™ Quick start

To **RUN CHASM™** dynamically,  
select *Analyse/Run Model*





# CHASM™ Quick start

FIVE forms of output analysis are available:

A Runtime Output file will appear automatically.....

## •Runtime output

Hydrology

Cross section

Runout

Seismicity

Output

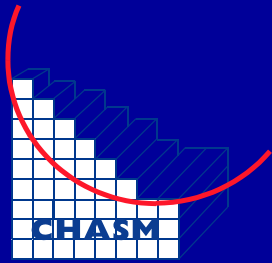
File

Input file :  
10 hour simulation

Hour	FOS	X	Y	Radius	Mass	Runout
Hour 1	1.2	16 m	14 m	6.5 m	214.53 Kg	3.82 m
Hour 2	1.21	16 m	13 m	6.5 m	323.89 Kg	3.82 m
Hour 3	1.22	16 m	13 m	6.5 m	323.89 Kg	3.82 m
Hour 4	1.22	16 m	13 m	6.5 m	323.89 Kg	3.82 m
Hour 5	1.22	16 m	13 m	6.5 m	323.89 Kg	3.82 m
Hour 6	1.22	16 m	13 m	6.5 m	323.89 Kg	3.82 m
Hour 7	1.23	16 m	13 m	6.5 m	323.89 Kg	3.82 m
Hour 8	1.2	16 m	13 m	10 m	1.32e+03 Kg	3.82 m
Hour 9	1.2	16 m	13 m	10 m	1.32e+03 Kg	3.82 m
Hour 10	1.22	16 m	13 m	10 m	1.32e+03 Kg	3.82 m

Finish !

....additionally you can view graphical representations of other result files.....



# CHASM™ Quick start

Graphical forms of output analysis are available:

To view pore pressure distribution select  
*Graphics/Hydrology*

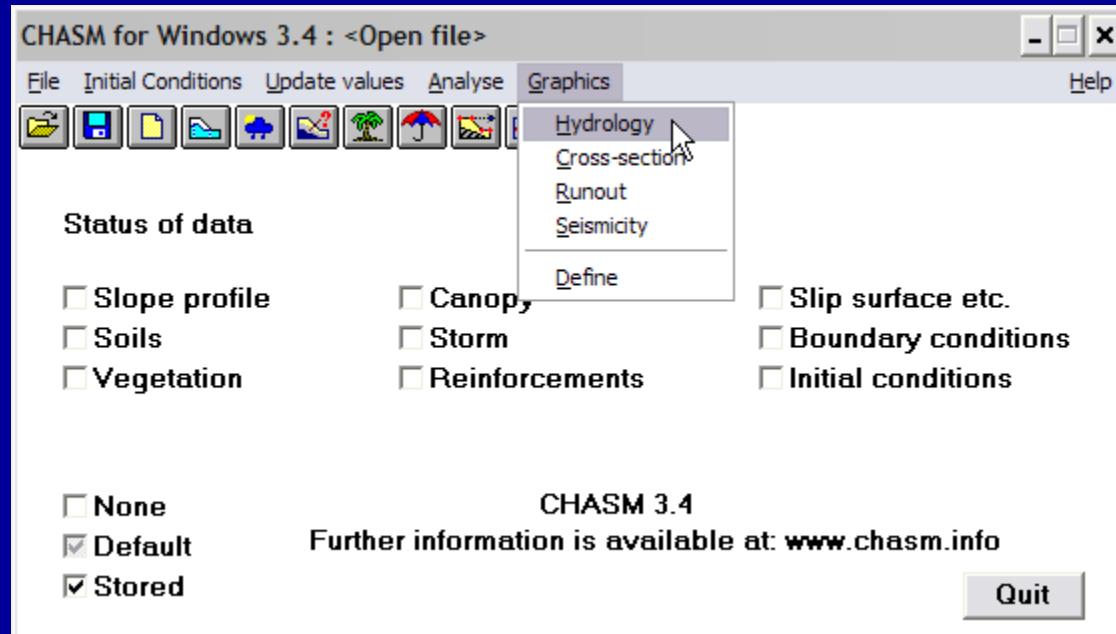
Runtime output

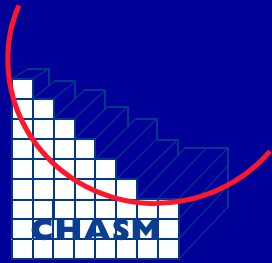
•Hydrology

Cross section

Runout

Seismicity





# CHASM™ Quick start

Click on any location to display pore pressure & scroll through simulation by clicking on 'Next'

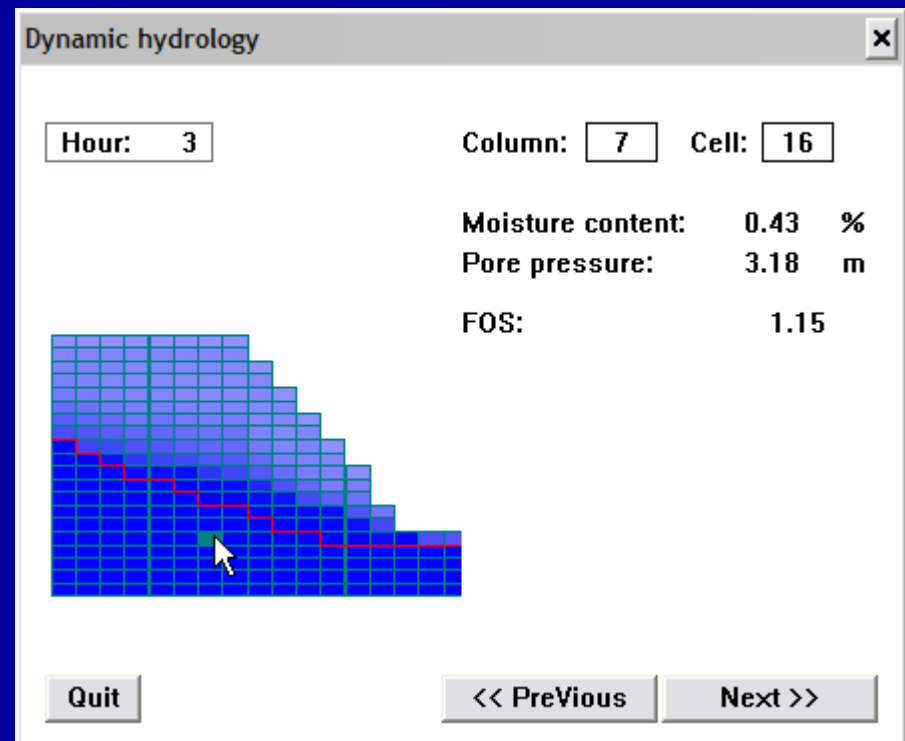
Runtime output

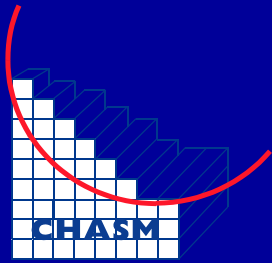
•Hydrology

Cross section

Runout

Seismicity





# CHASM™ Quick start

Runtime output

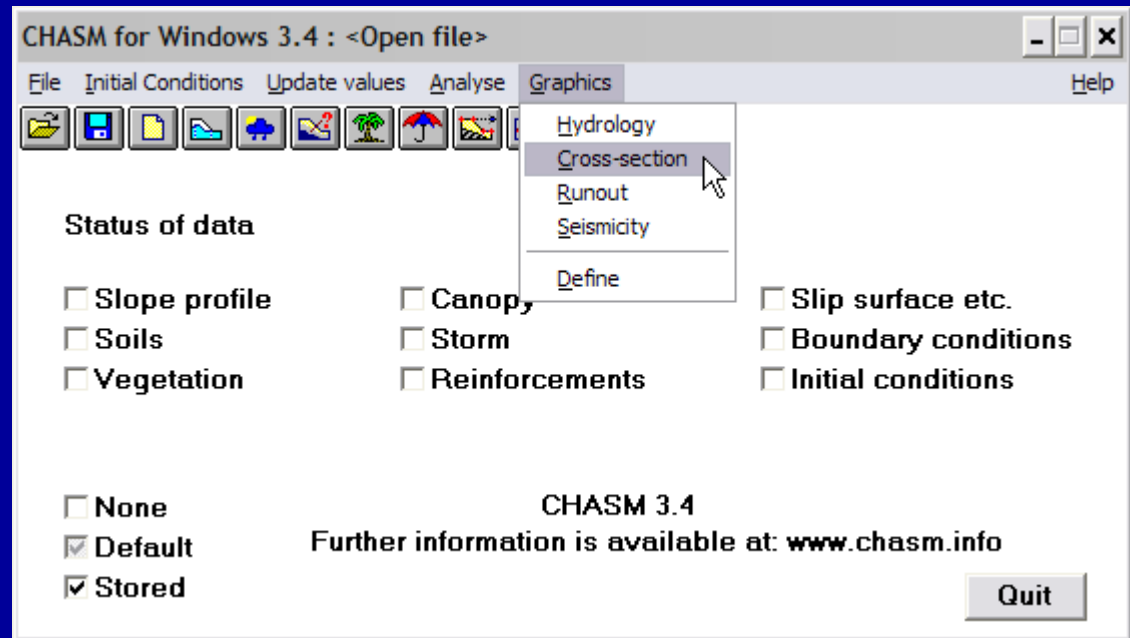
Hydrology

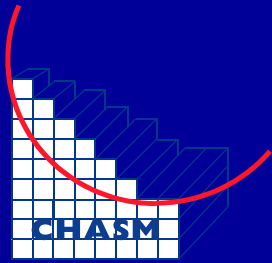
•Cross section

Runout

Seismicity

To view slip surface location select *Cross Section*





# CHASM™ Quick start

Scroll through simulation by clicking on 'Next' to view changing Factor of Safety

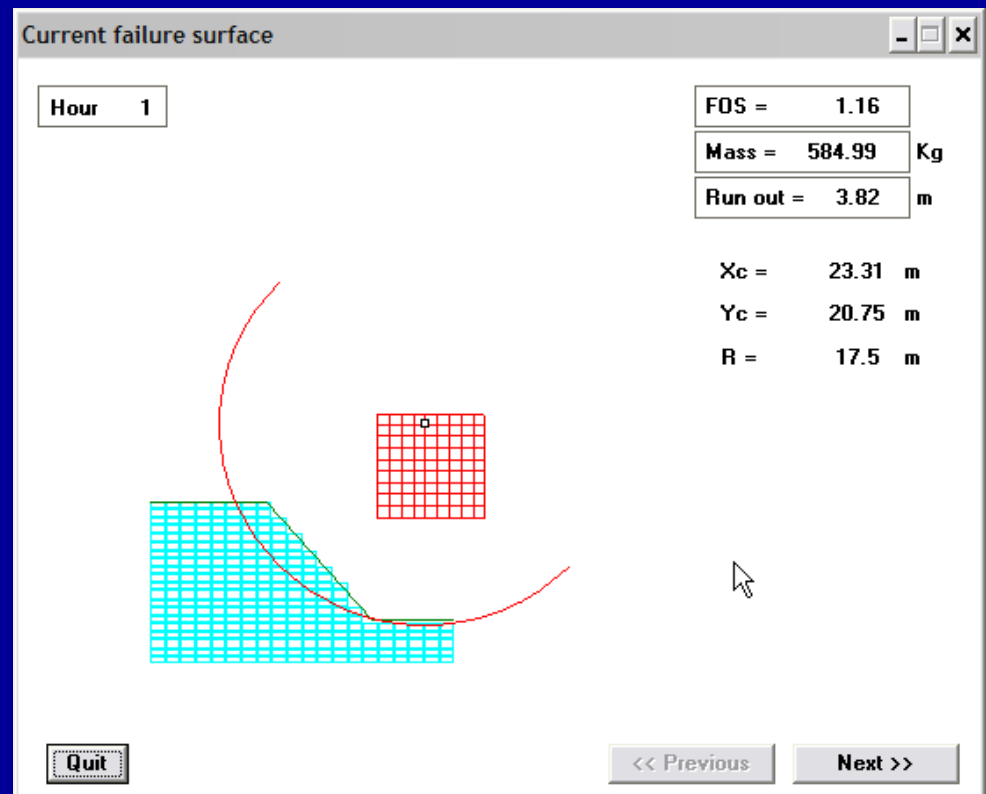
Runtime output

Hydrology

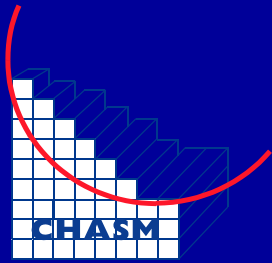
•Cross section

Runout

Seismicity







# CHASM™ Quick start

To view landslide runout distance click on 'Runout'

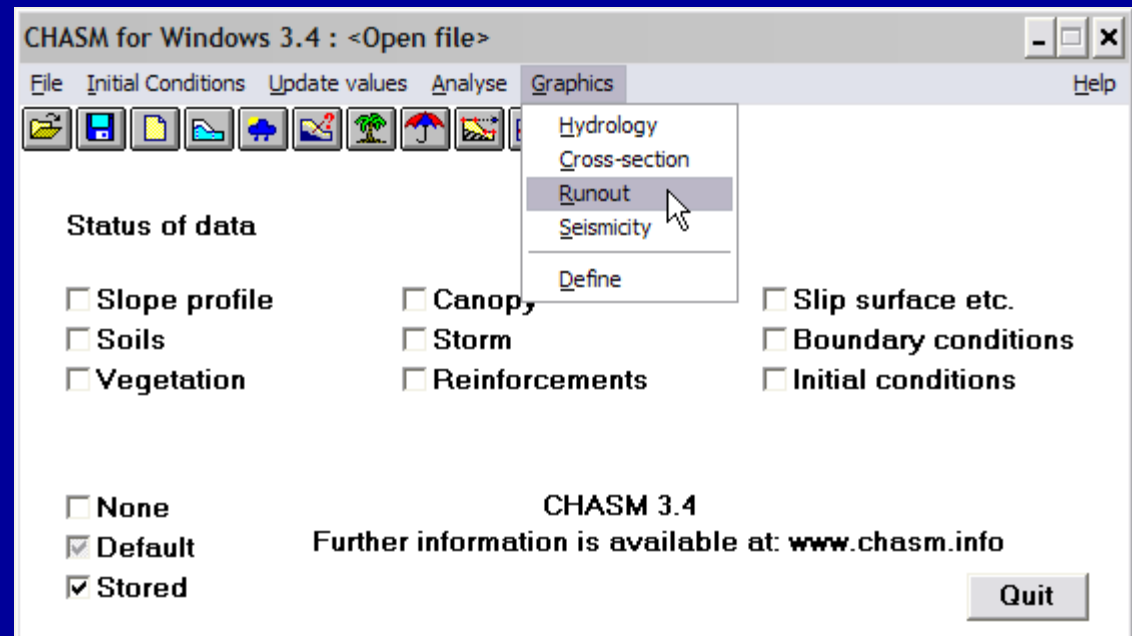
Runtime output

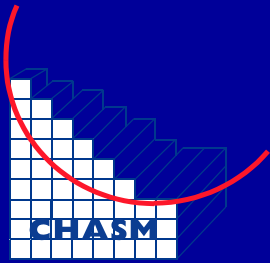
Hydrology

Cross section

•Runout

Seismicity





# CHASM™ Quick start

Scroll through the simulation by clicking on 'Next' to view predicted runout at each time step

Runtime output

Hydrology

Cross section

•Runout

Seismicity

Current failure surface

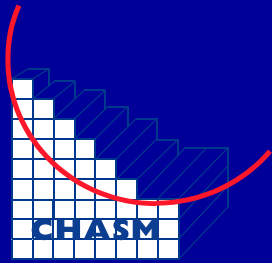
Hour 5 FOS = 1.26

Run out (R) :

Mean =	2.72	m
Upper 95% confidence =	6.61	m
Lower 95% confidence =	-0.44	m

For interpretation of the result shown here,  
please refer to the documentation at :  
[www.chasm.info](http://www.chasm.info)

Quit << Previous Next >>



# CHASM™ Quick start

To view predicted seismic acceleration to cause instability click on 'Seismicity'

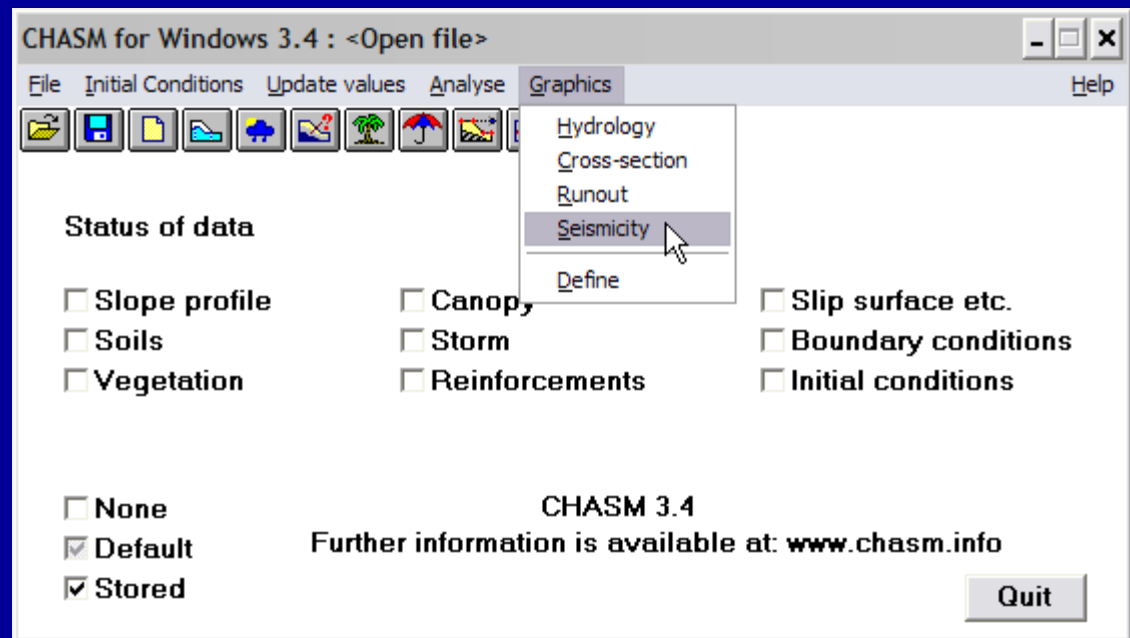
Runtime output

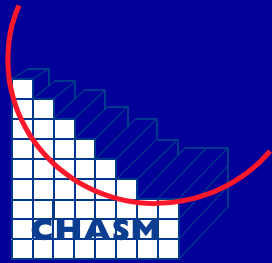
Hydrology

Cross section

Runout

•Seismicity





# CHASM™ *Quick start*

Scroll through the simulation by clicking on 'next' to view predicted seismic acceleration required for instability at each time step

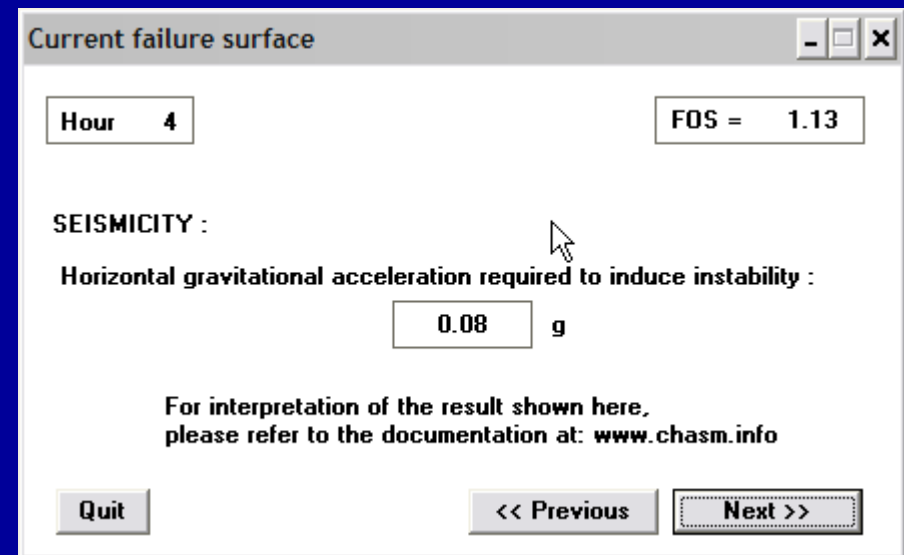
Runtime output

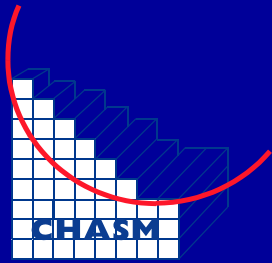
Hydrology

Cross section

Runout

•Seismicity

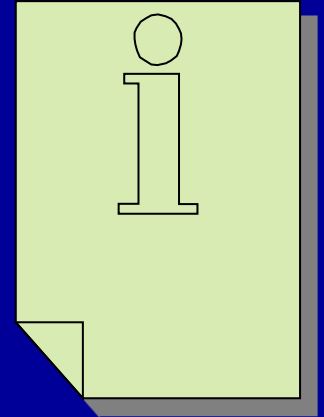


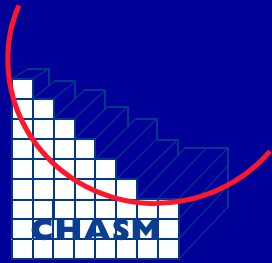


# CHASM™ *Quick start*

- Runtime output
- Hydrology
- Cross section
- Runout
- Seismicity

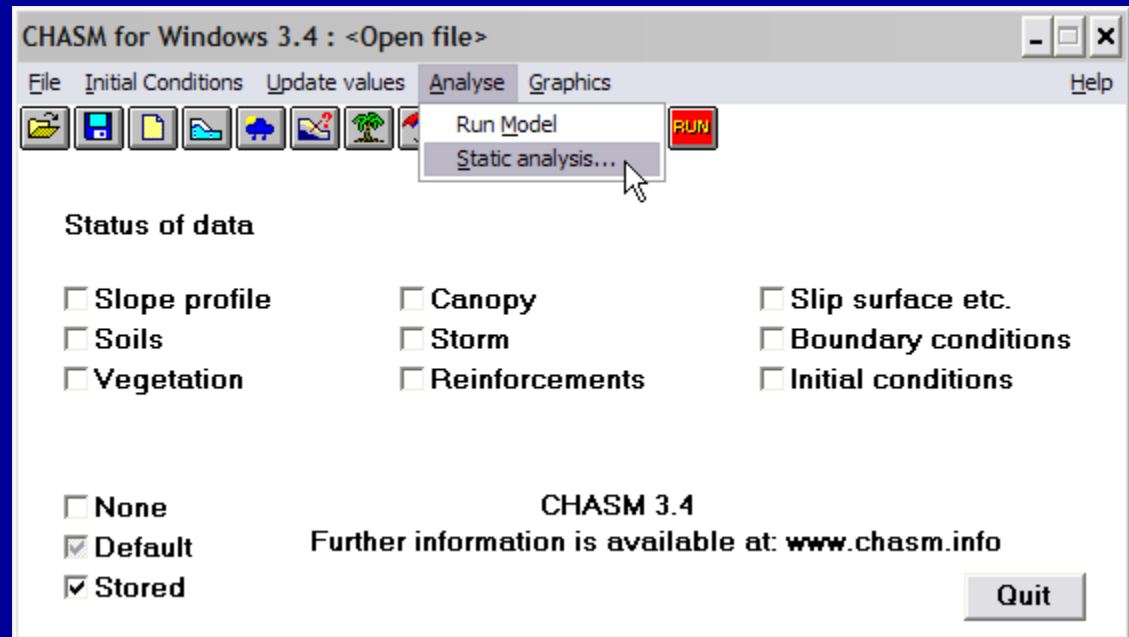
**You have now  
viewed the 5  
forms of output  
available from  
*dynamic runs of*  
CHASM™**

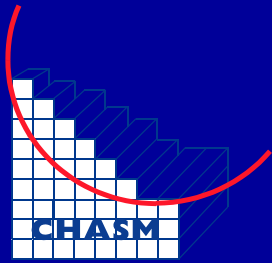




# CHASM™ Quick start

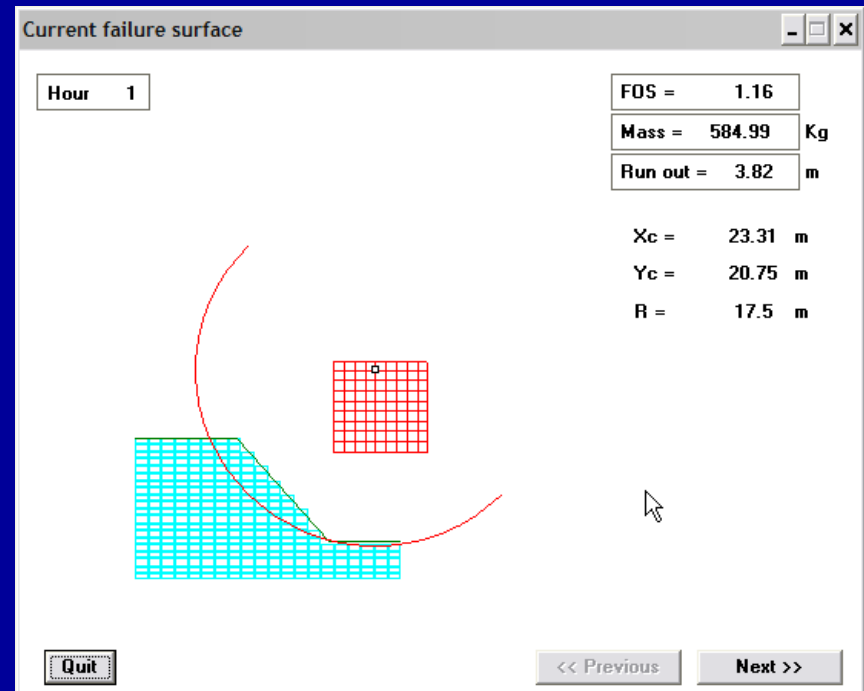
To **RUN CHASMTM** for static conditions,  
select *Analyse/Static analysis*

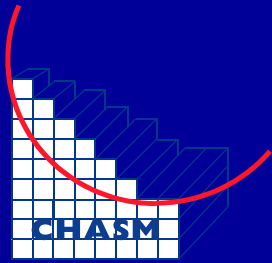




# CHASM™ Quick start

Output graphic shows factor of safety assuming no dynamic pore pressure changes





# CHASM™ *Quick start*

**You can find further  
details of CHASM™ in  
the user manual and at  
[www.chasm.info](http://www.chasm.info)**

