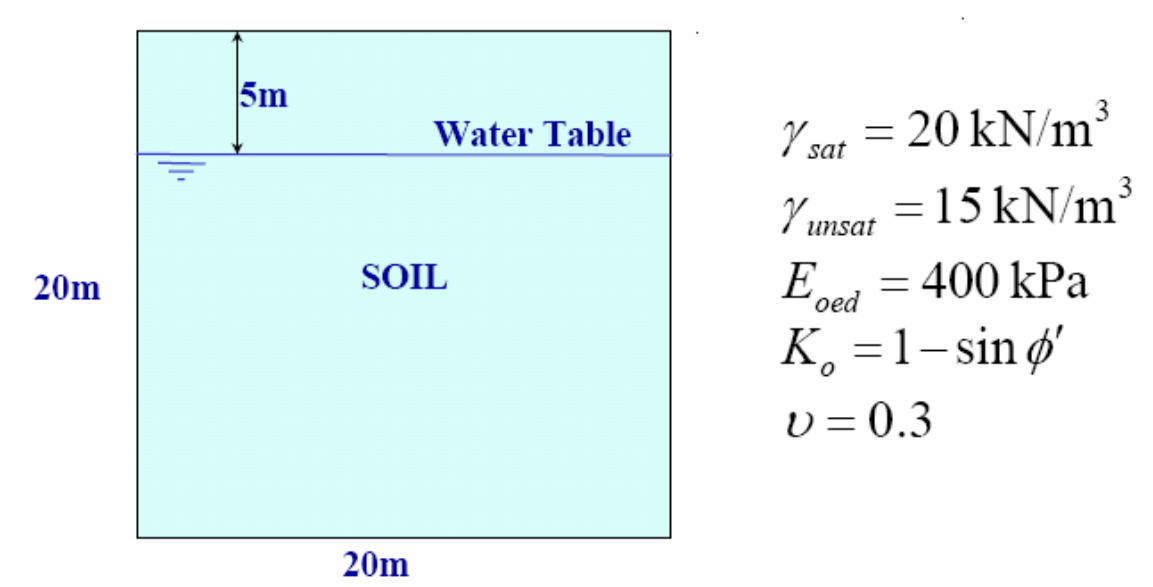
Phần 1 : PLAXIS INPUT



Dùng Plaxis để tính toán ứng suất trong đất .

Kết quả tính tay ta có :

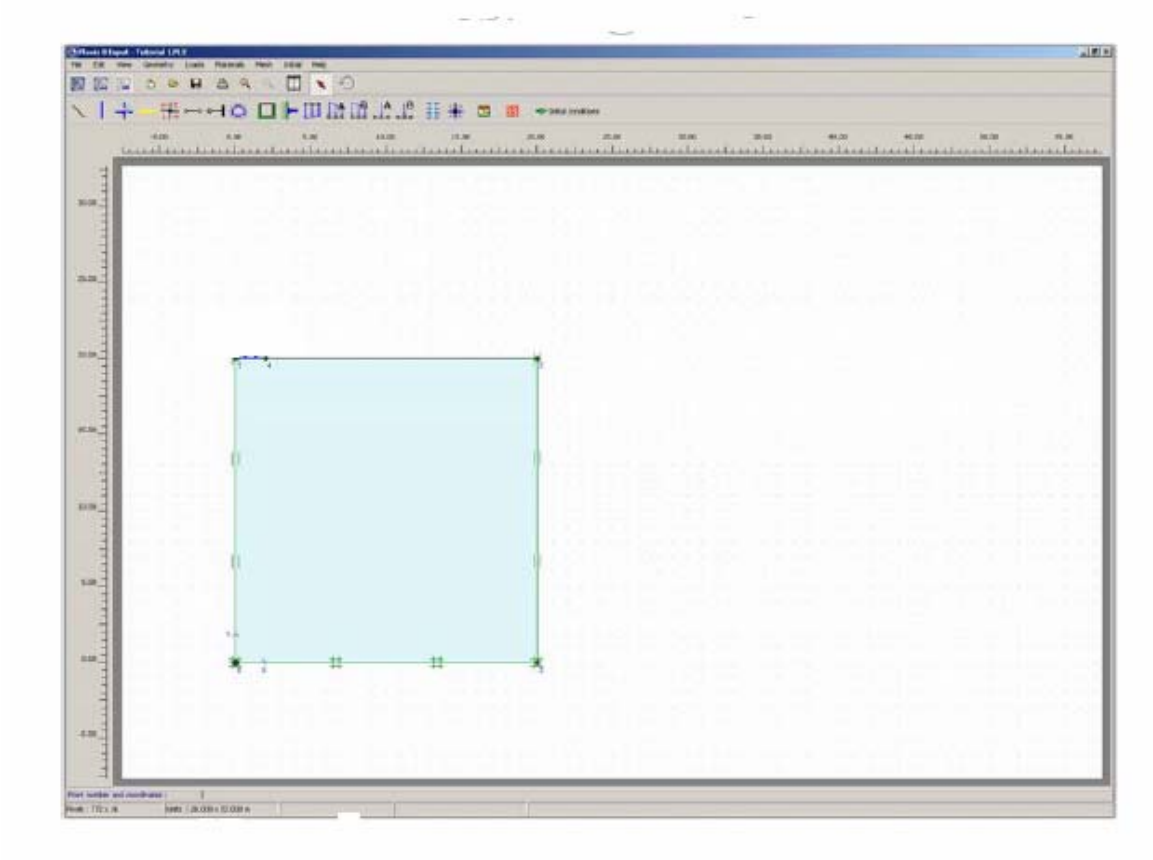
Ứng suất tổng

$$\sigma_v = 5m \times 15 + 15m \times 20 = 375\,\text{kPa}$$

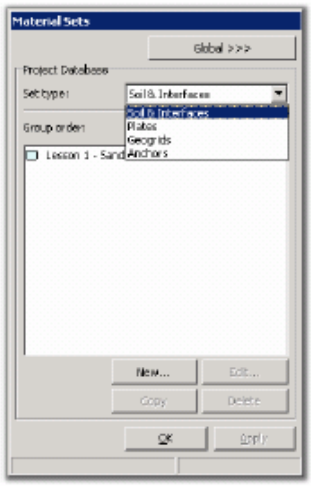
Ứng suất hữu hiệu

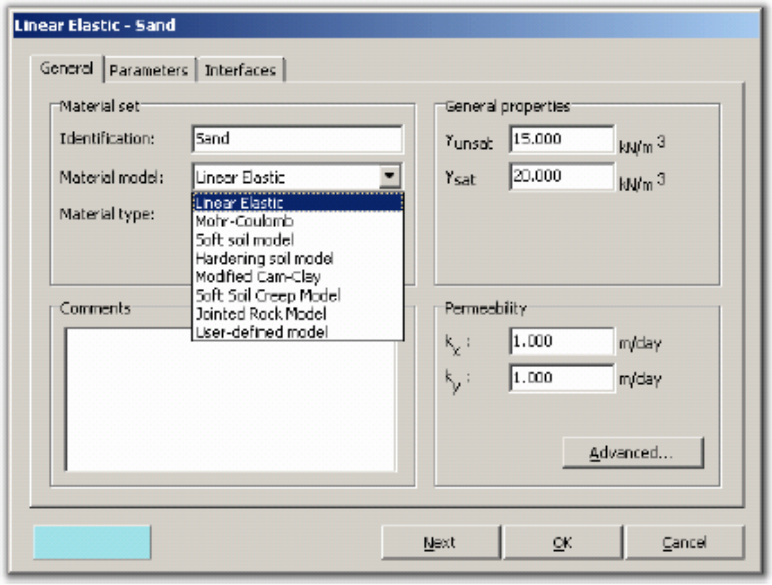
$$\sigma'_v = 5m \times 15 + 15m \times 20 - 15m \times 10 = 225\,\text{kPa}$$

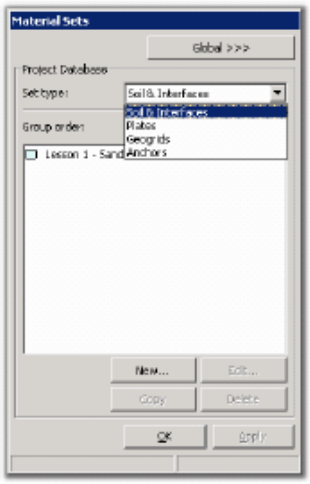
1. Tạo hình dạng bài toán và tạo biên của bài toán.

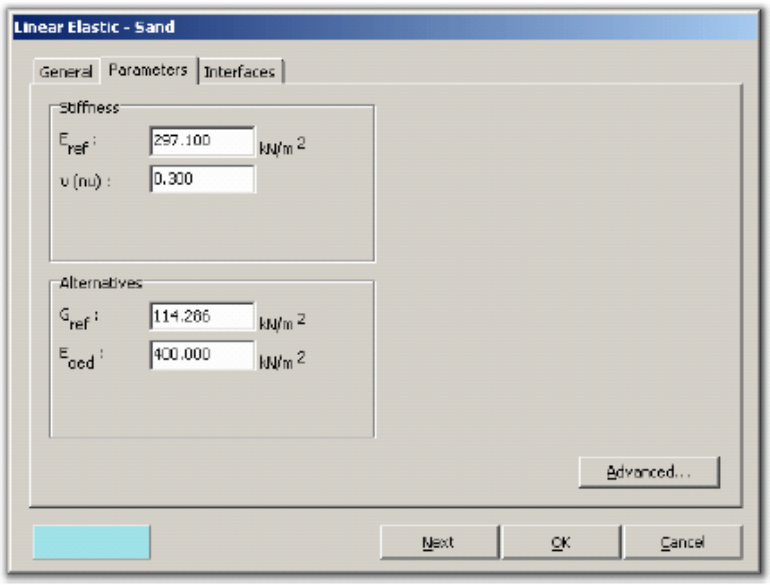


2. Khai báo các thông số của đất và gán cho bài toán

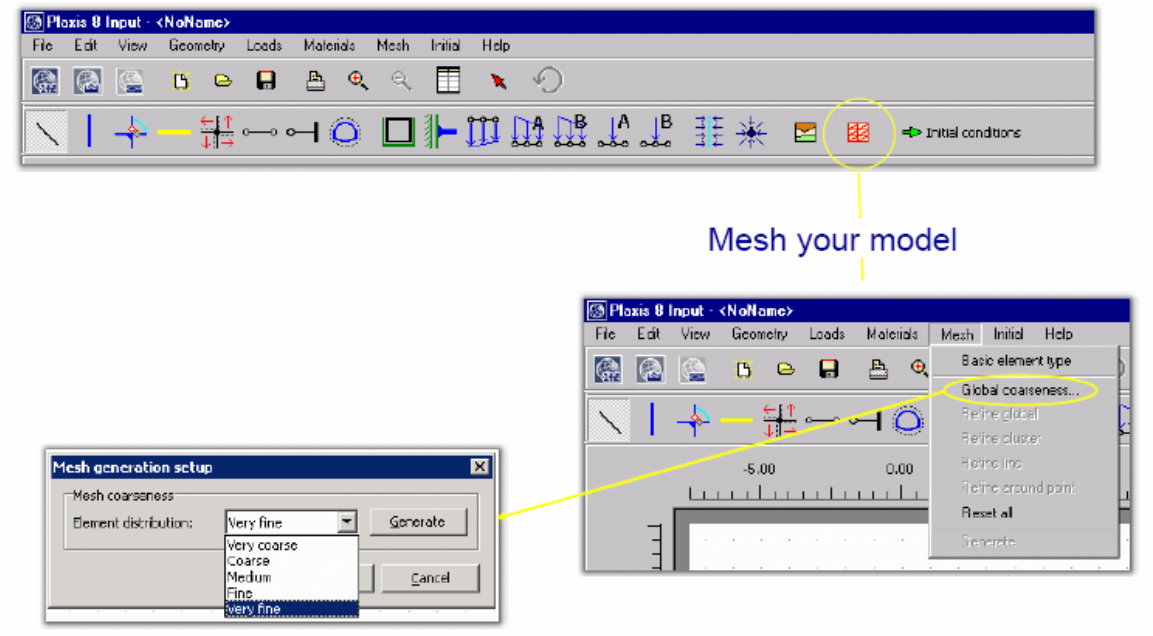


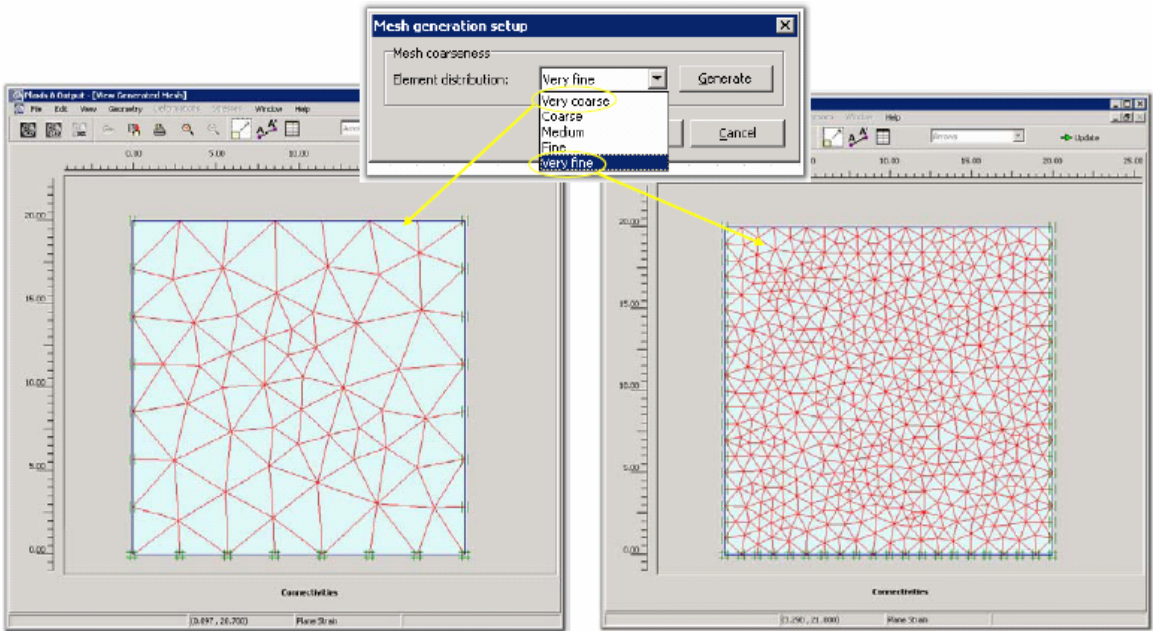




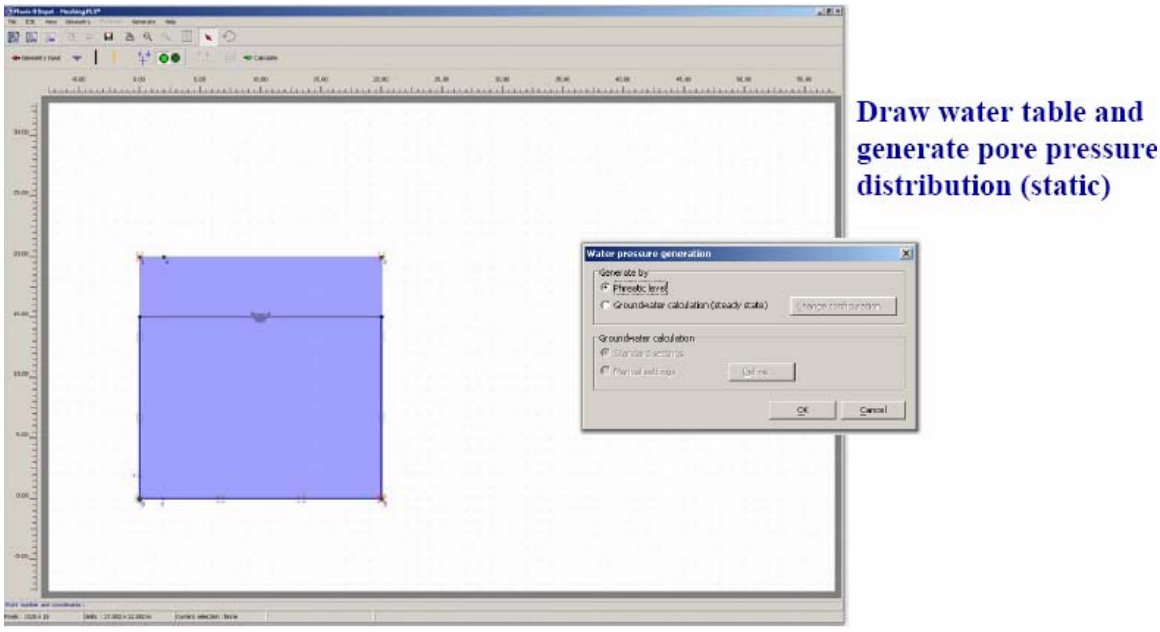


3. Chia lưới các phần tử

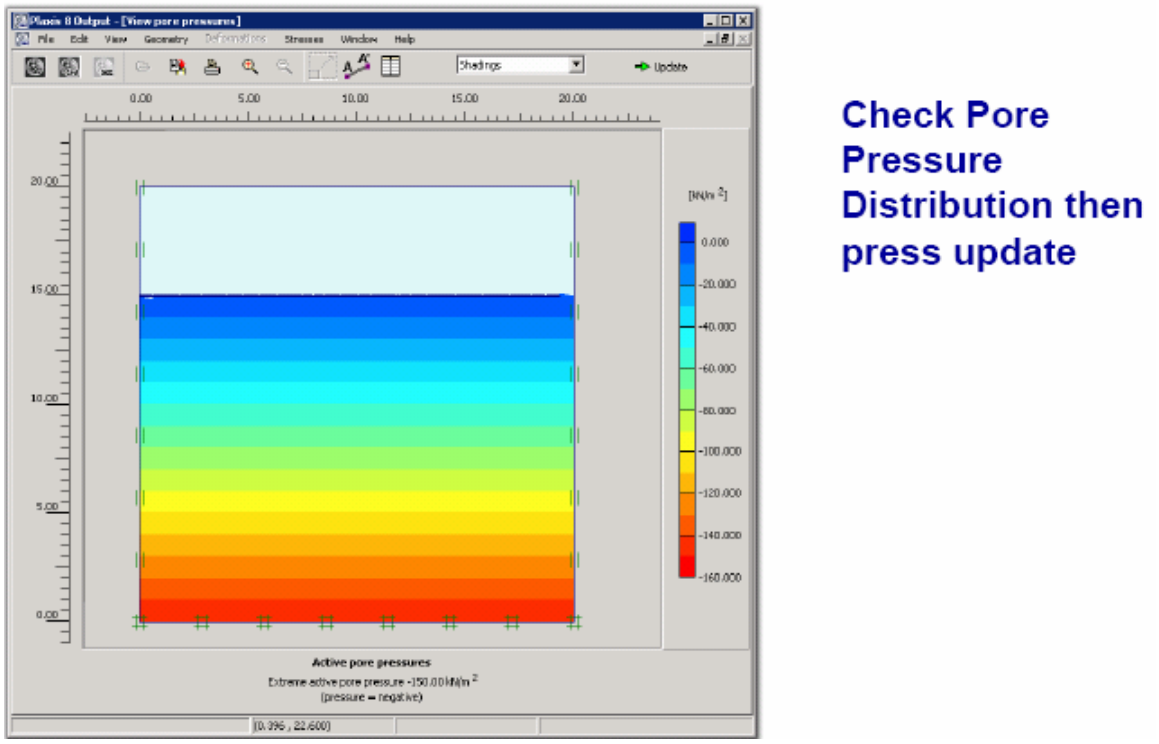




4. Gán mực nước ngầm

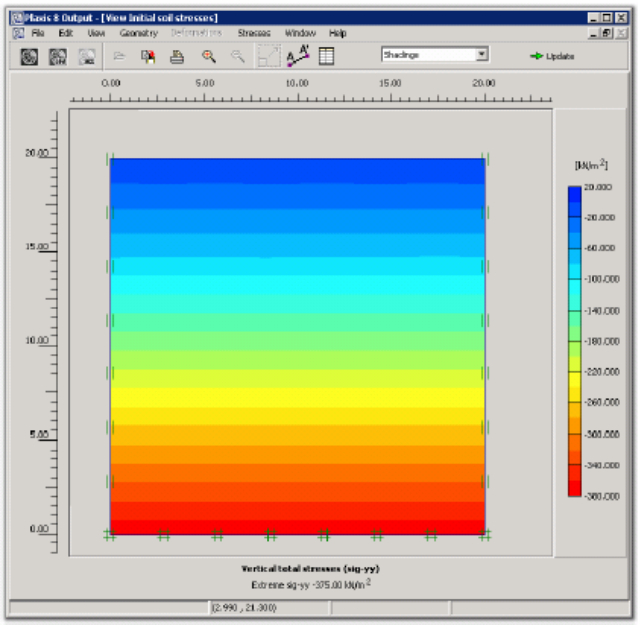


Draw water table and generate pore pressure distribution (static)



Check Pore Pressure Distribution then press update

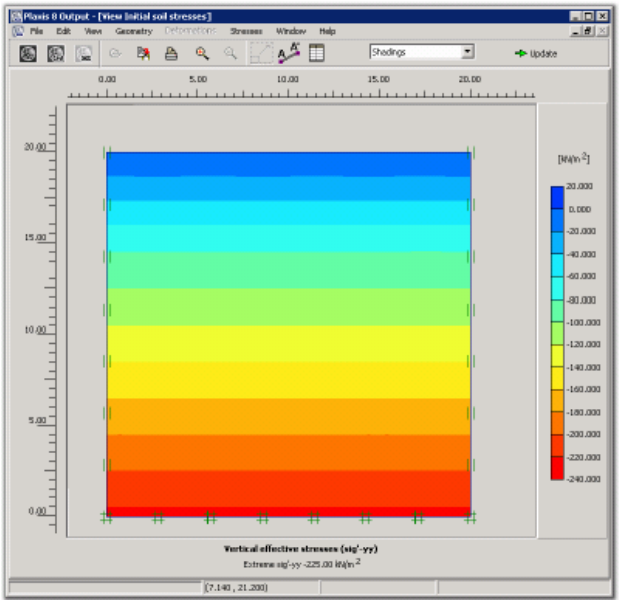
5. Tính toán ứng suất ban đầu



Vertical total stresses (sig-yy)
Extreme sig-yy -375.00 kN/m ^{2}

Check Total Vertical Stress Distribution

$$\sigma_v = 5m \times 15 + 15m \times 20 = 375\,\text{kPa}$$

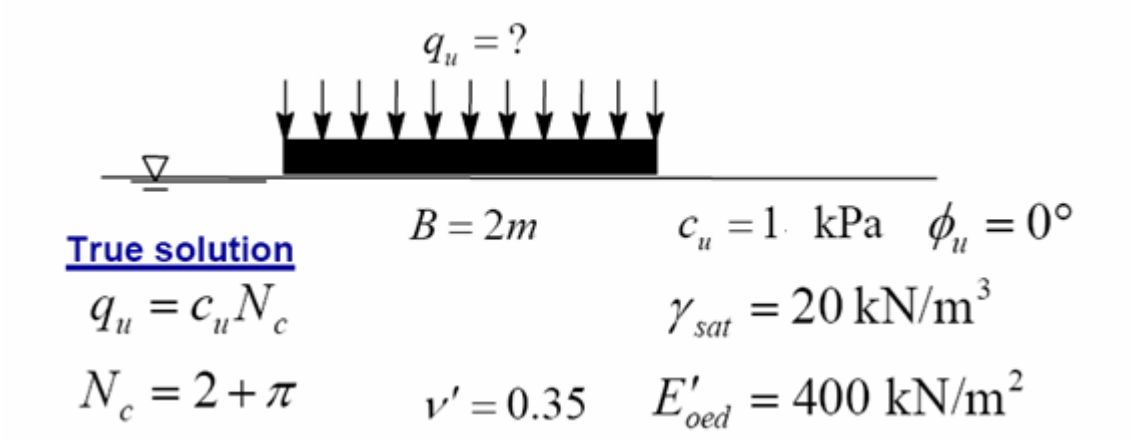


Vertical effective stresses (sig'-yy)
Extreme sig'-yy -225.00 kN/m ^{2}

Check Effective Vertical Stress Distribution

$$\sigma'_v = 5m \times 15 + 15m \times 20 - 15m \times 10 = 225\,\text{kPa}$$

Phần 2 : PLAXIS INPUT, CALCULATE,CURVES

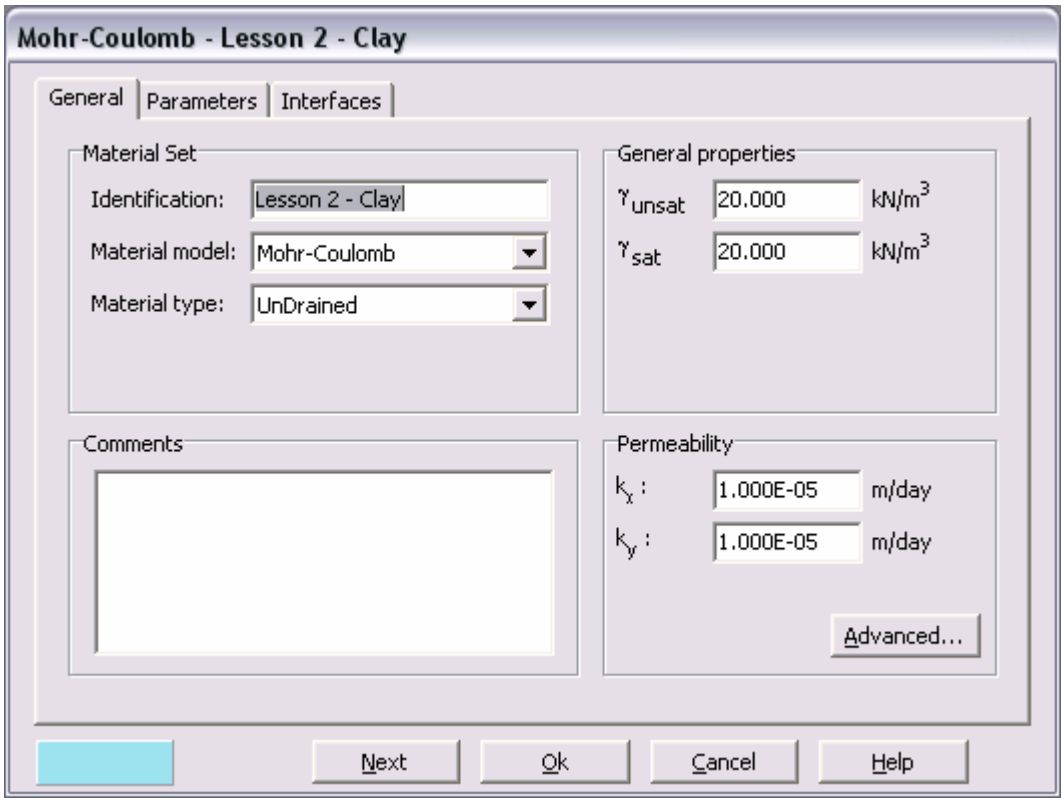


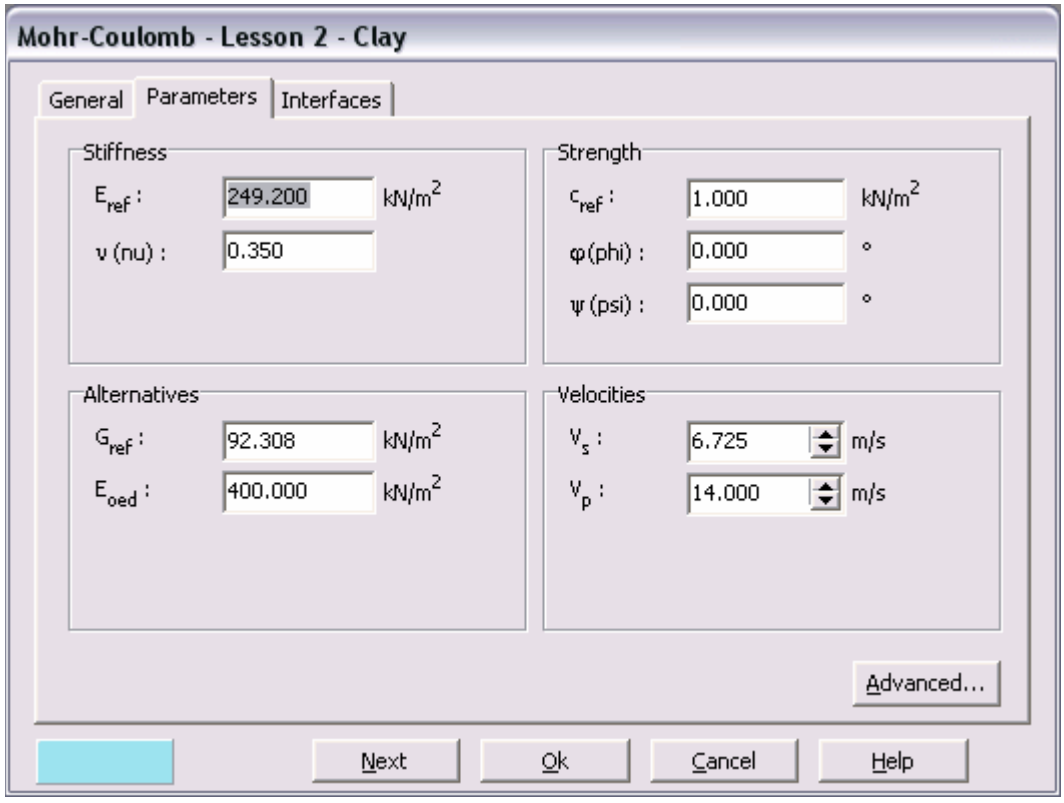
1. Tạo hình dạng bài toán

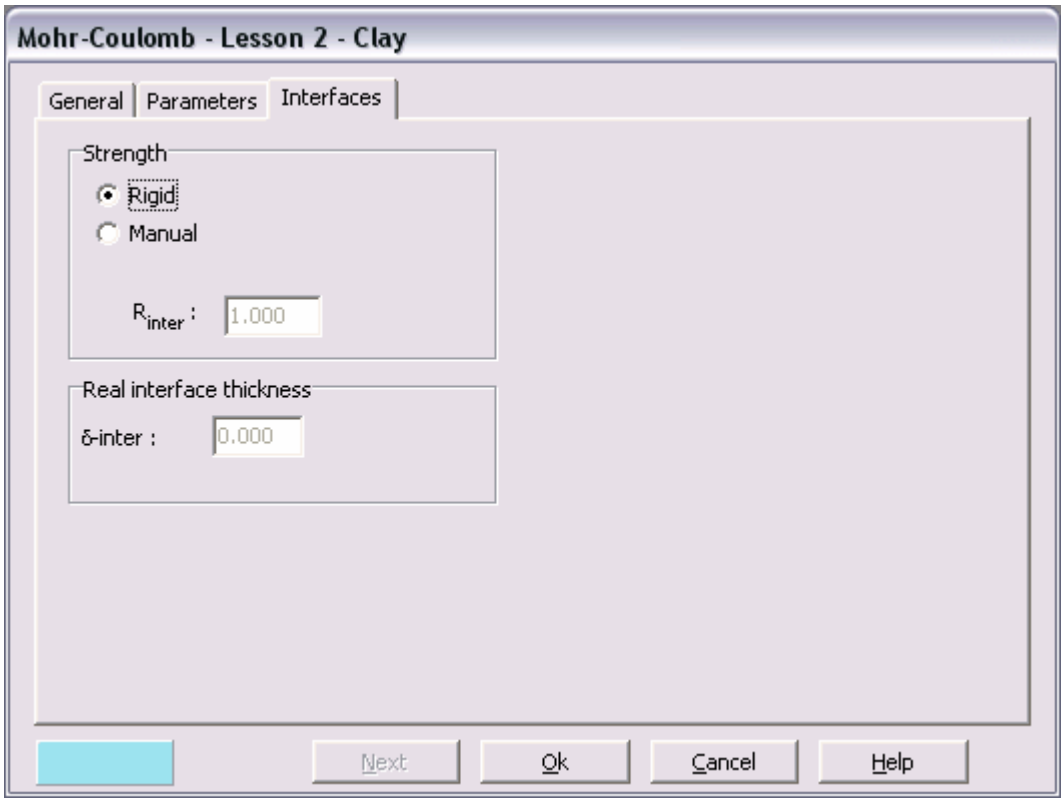
   Gán chuyển vị biết trước 

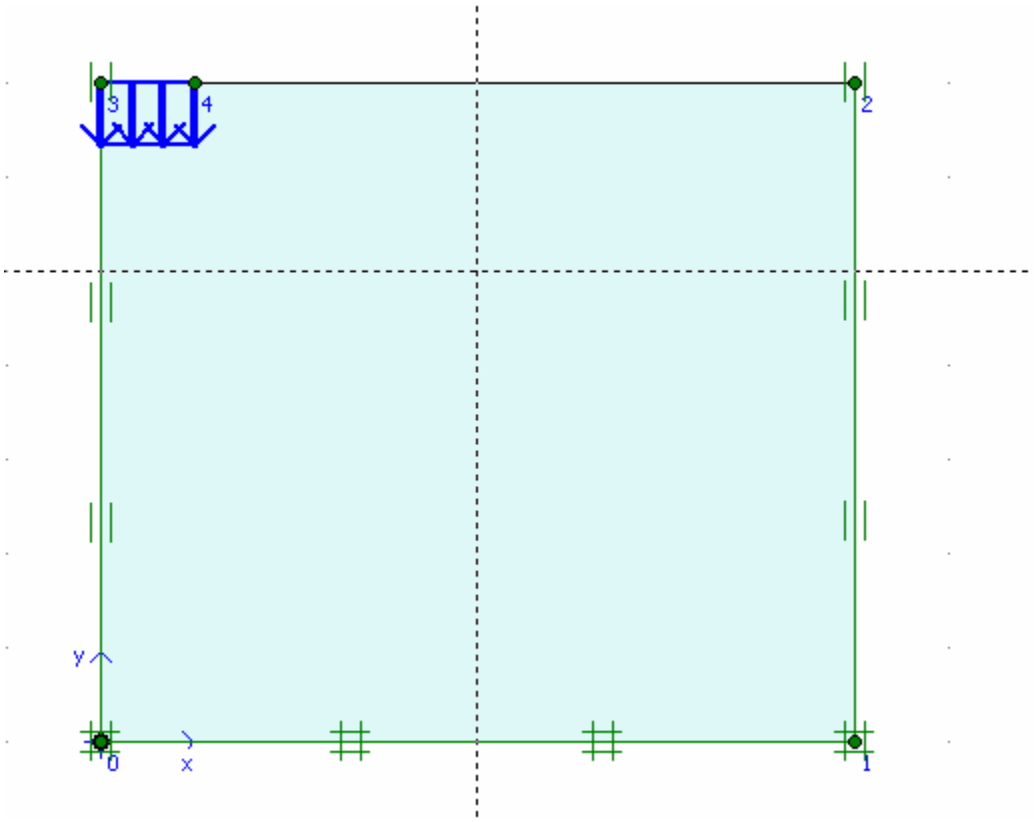
   Gán biên 

   Gán số liệu địa chất 

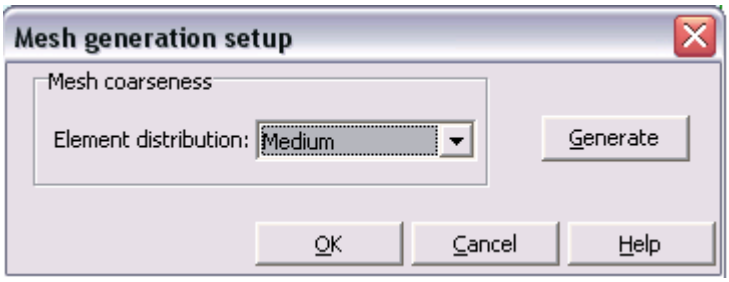

Mohr-Coulomb - Lesson 2 - Clay
General
Parameters
Interfaces
Material Set
Identification:
Lesson 2 - Clay
Material model:
Mohr-Coulomb
Material type:
UnDrained
General properties
γunsat
20.000
kN/m3
γsat
20.000
kN/m3
Comments
Permeability
kx :
1.000E-05
m/day
ky :
1.000E-05
m/day
Advanced...
Next
Ok
Cancel
Help

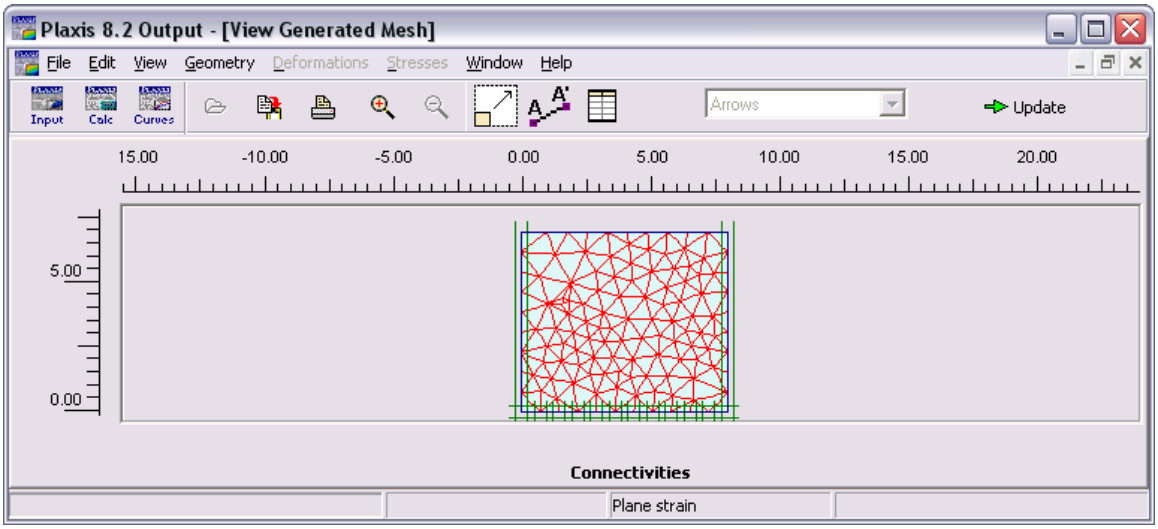

Mohr-Coulomb - Lesson 2 - Clay
General
Parameters
Interfaces
Stiffness
Eref :
249.200
kN/m2
ν (nu) :
0.350
Strength
cref :
1.000
kN/m2
φ (phi) :
0.000
°
ψ (psi) :
0.000
°
Alternatives
Gref :
92.308
kN/m2
Eoed :
400.000
kN/m2
Velocities
Vs :
6.725
m/s
Vp :
14.000
m/s
Advanced...
Next
Ok
Cancel
Help


Mohr-Coulomb - Lesson 2 - Clay
General
Parameters
Interfaces
Strength
Rigid
Manual
R inter :
1.000
Real interface thickness
δ-inter :
0.000
Next
Ok
Cancel
Help


3
4
2
y
0
x
1

2. Tạo lưới phần tử

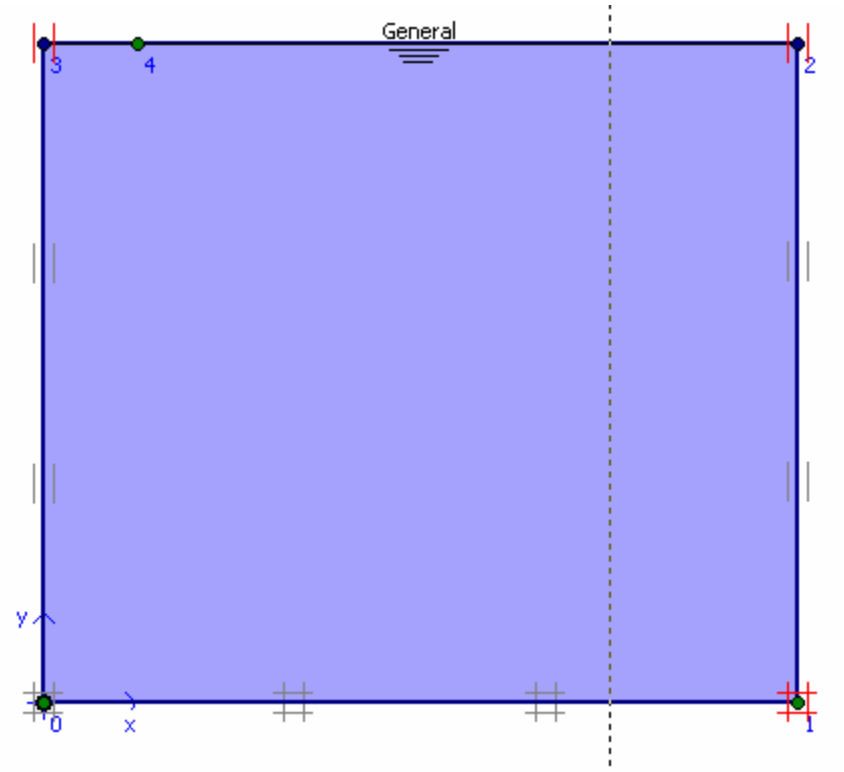




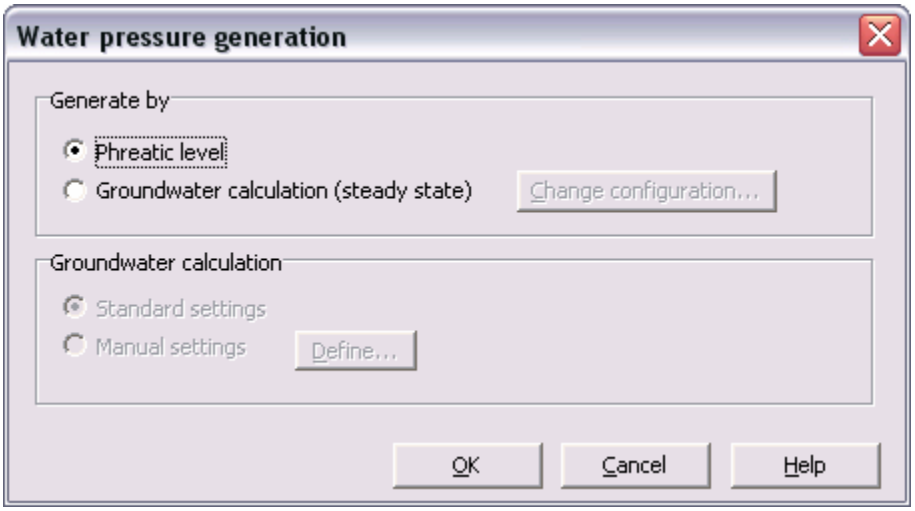
Update

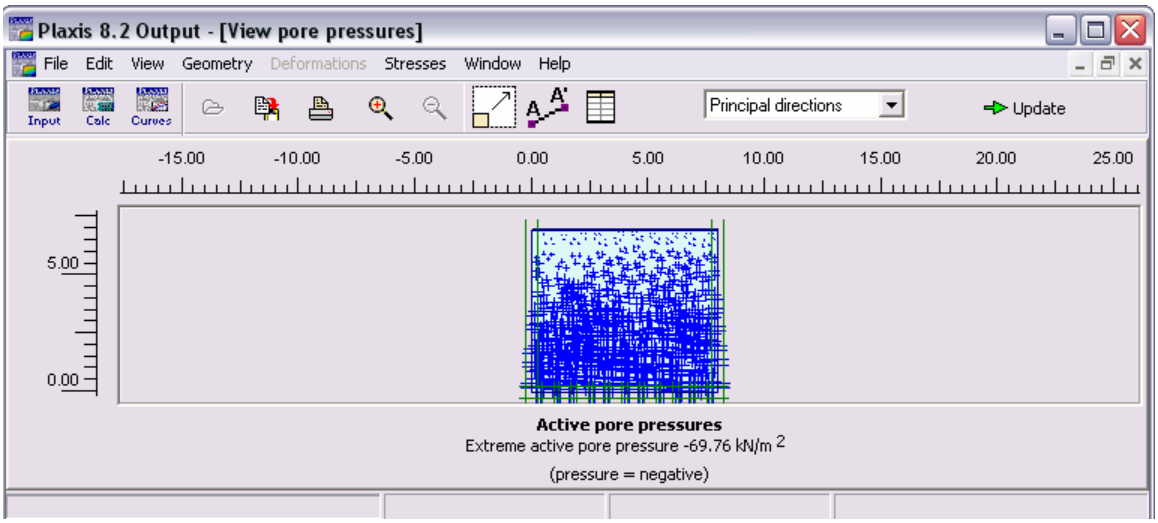
3. Tính toán điều kiện ban đầu

Gán mực nước ngầm

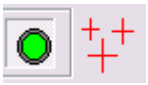


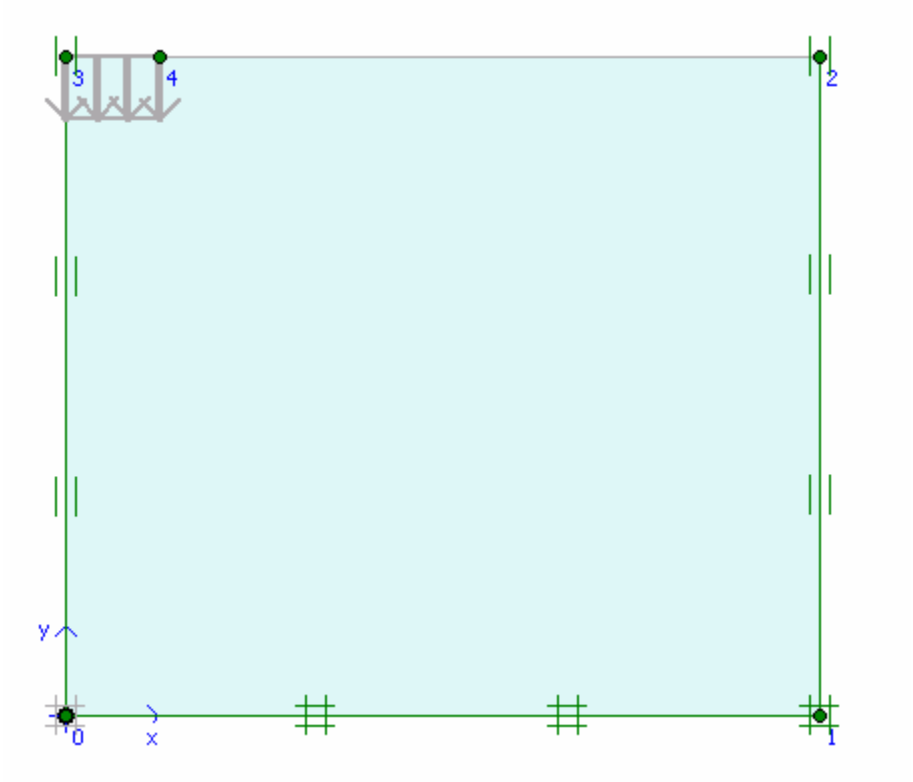
Tính toán áp lực nước 

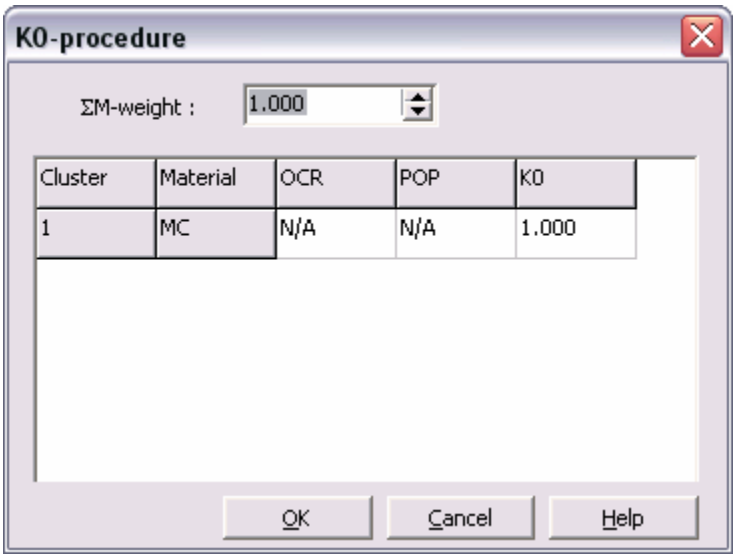


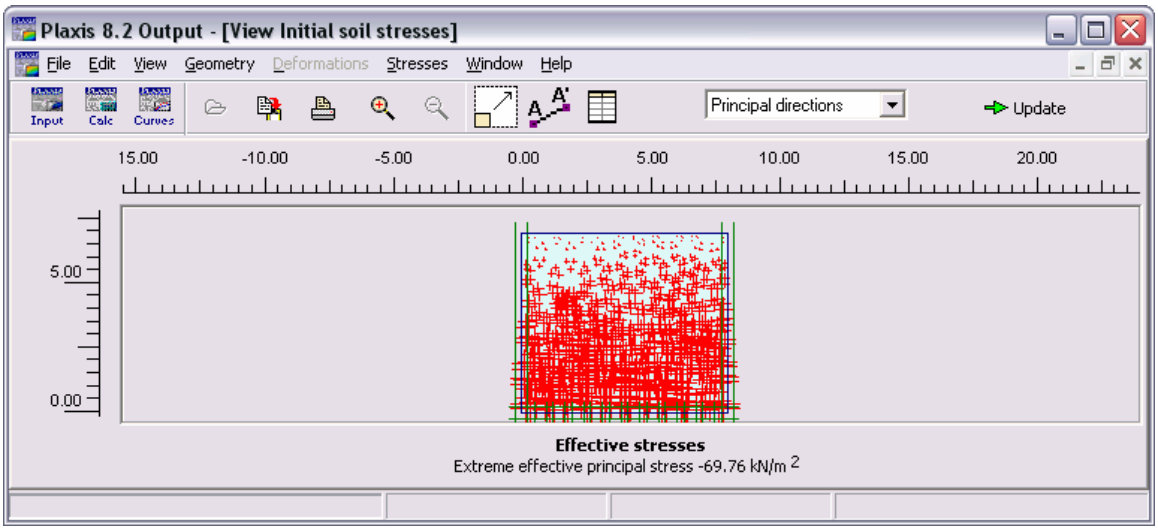


Update

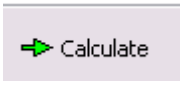
Tính toán áp lực đất 

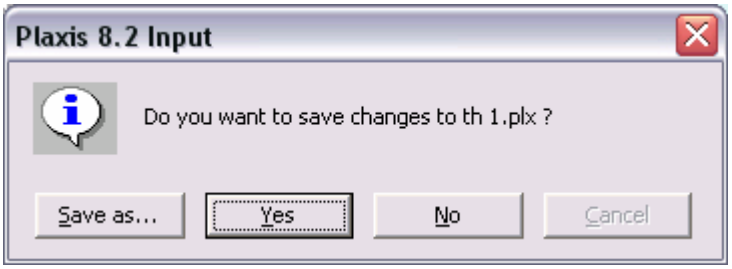


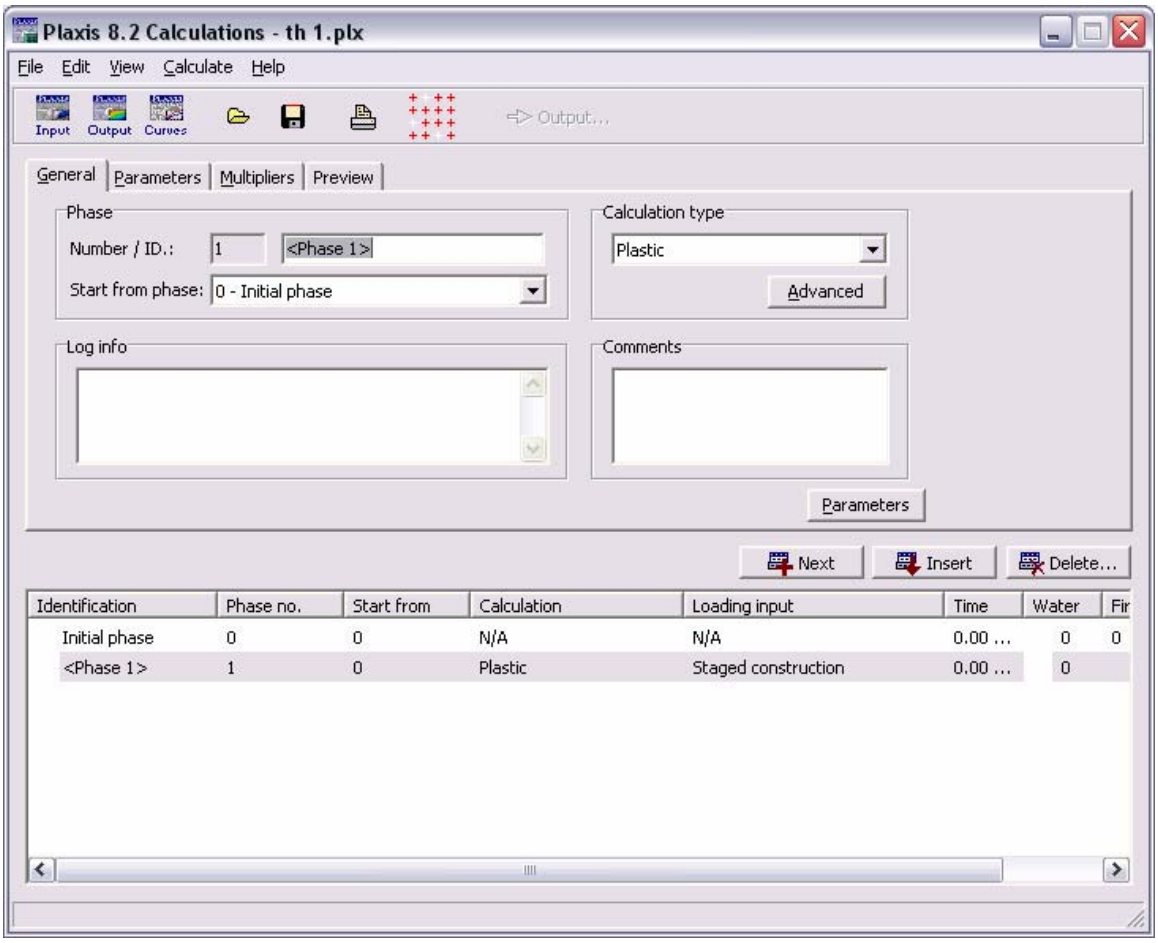




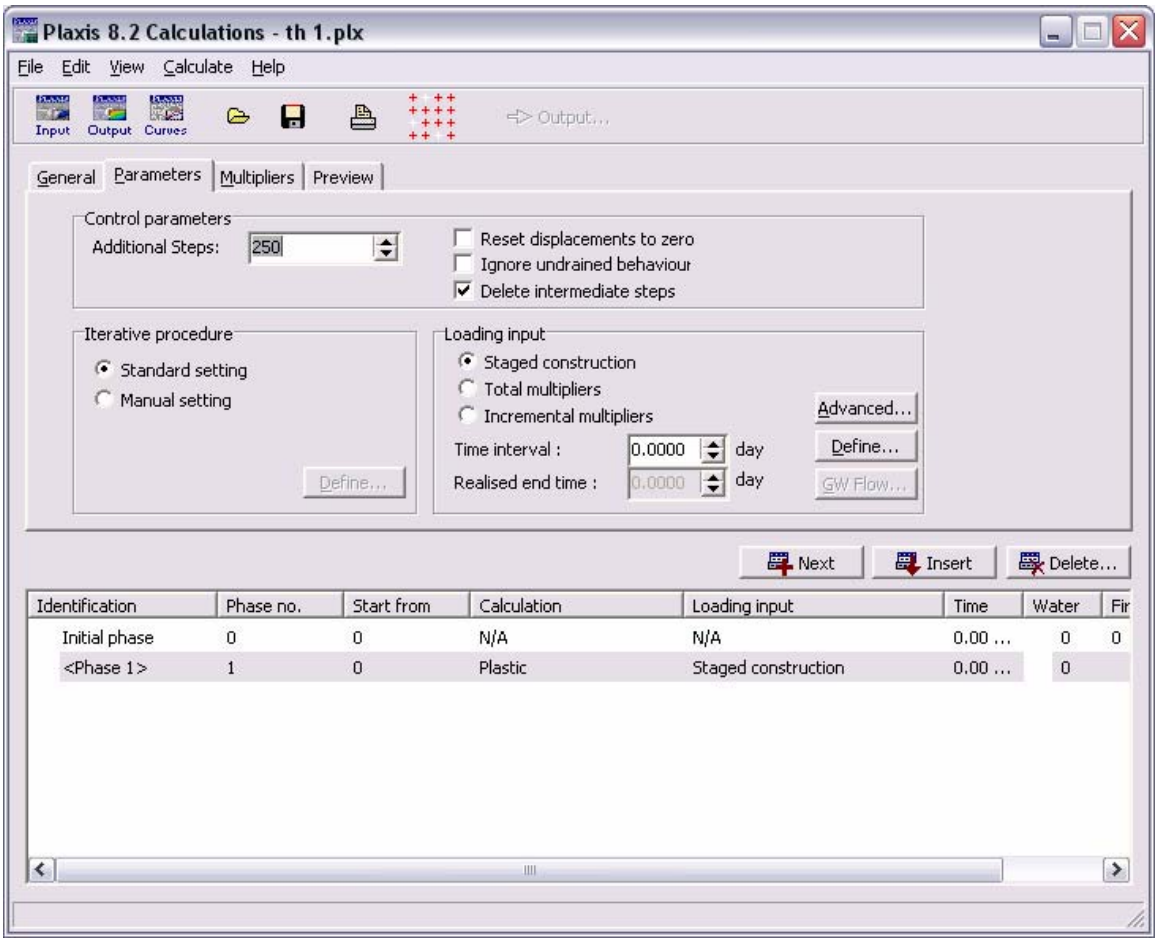
Update

4. Bắt đầu tính toán 

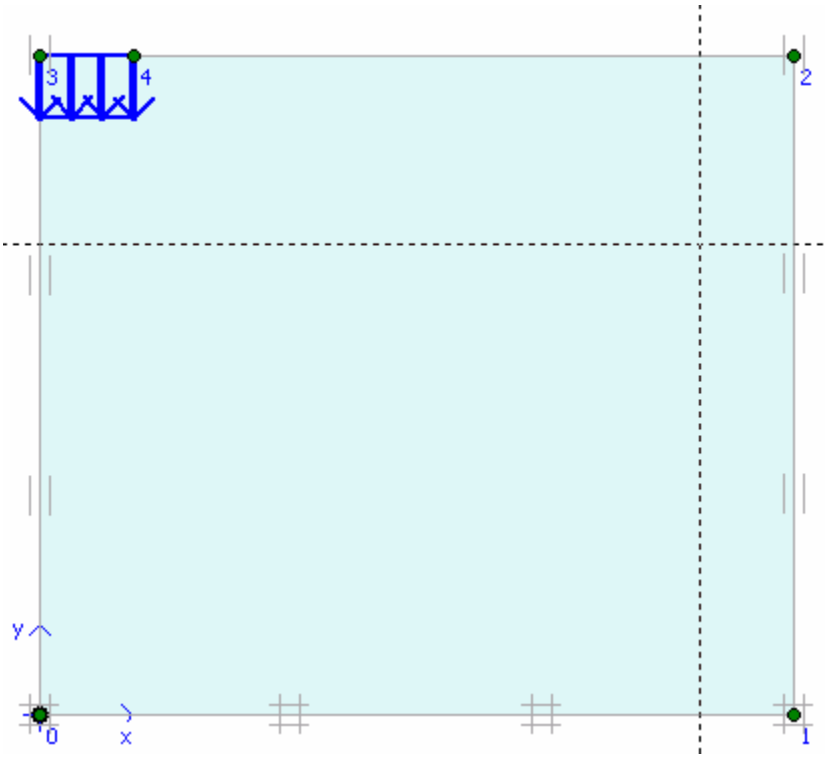



Plaxis 8.2 Calculations - th 1.plx
File Edit View Calculate Help
Input Output Curves
Output...
General Parameters Multipliers Preview
Phase
Number / ID.: 1 <Phase 1>
Start from phase: 0 - Initial phase
Calculation type
Plastic
Advanced
Log info
Comments
Parameters
Next Insert Delete...
Identification Phase no. Start from Calculation Loading input Time Water Fir
Initial phase 0 0 N/A N/A 0.00 ... 0 0
<Phase 1> 1 0 Plastic Staged construction 0.00 ... 0

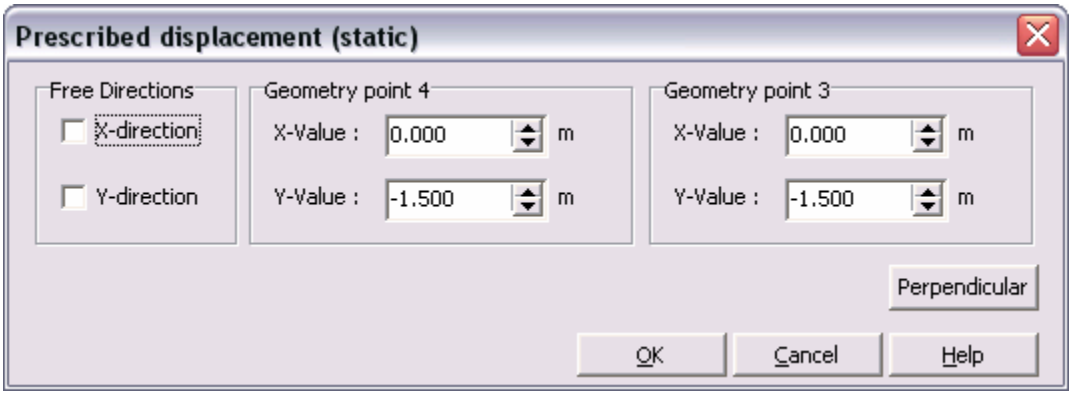
Parameters



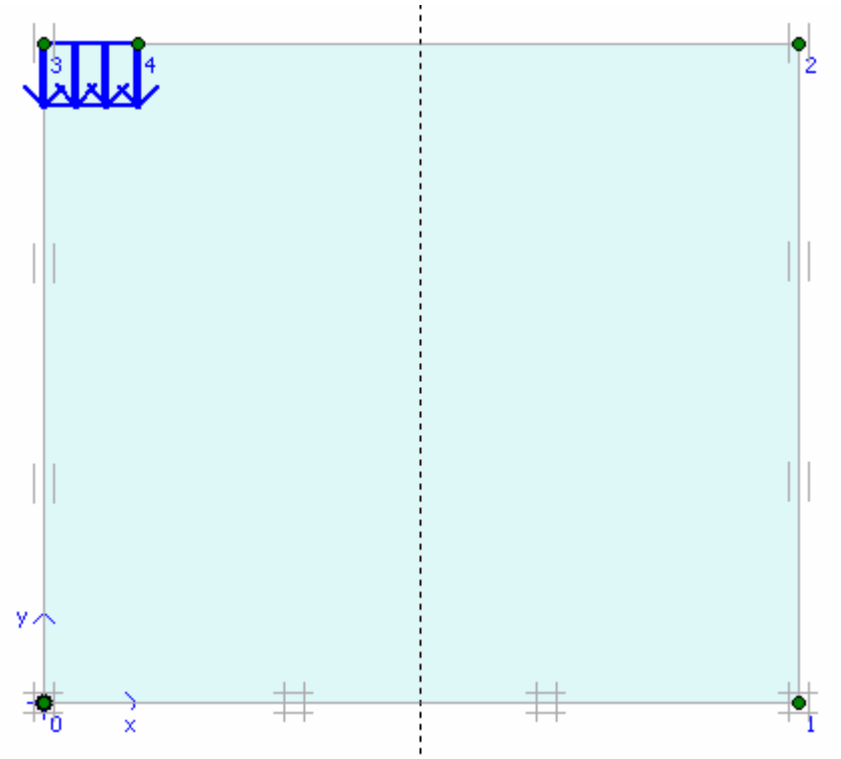
Nhấp vào Define và máy tự động
Trở về màn hình Input



Gán chuyển vị biết trước bằng cách nhấp vào chuyển vị trên hình



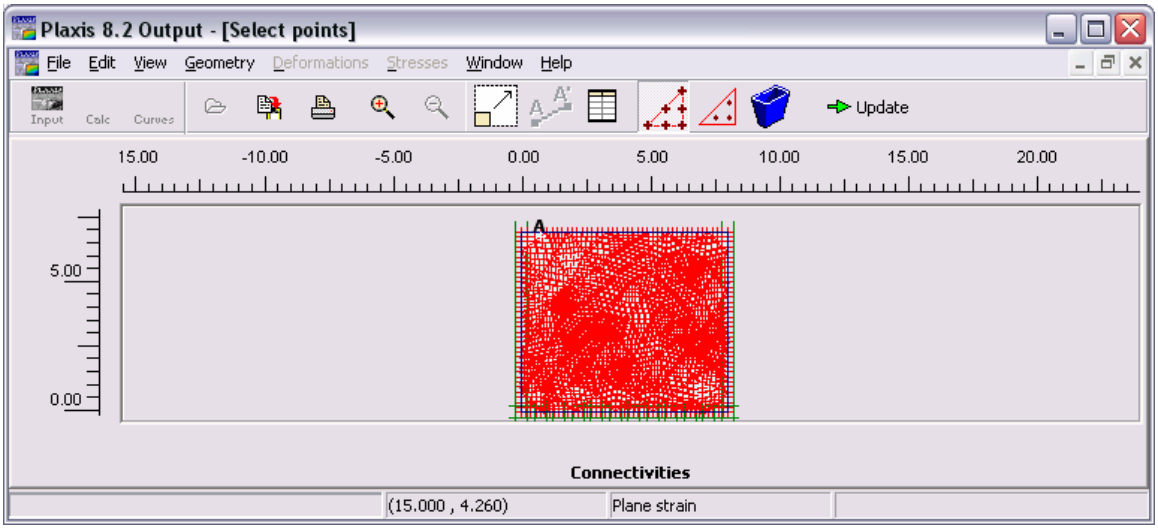
OK



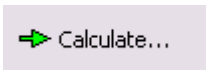
Update

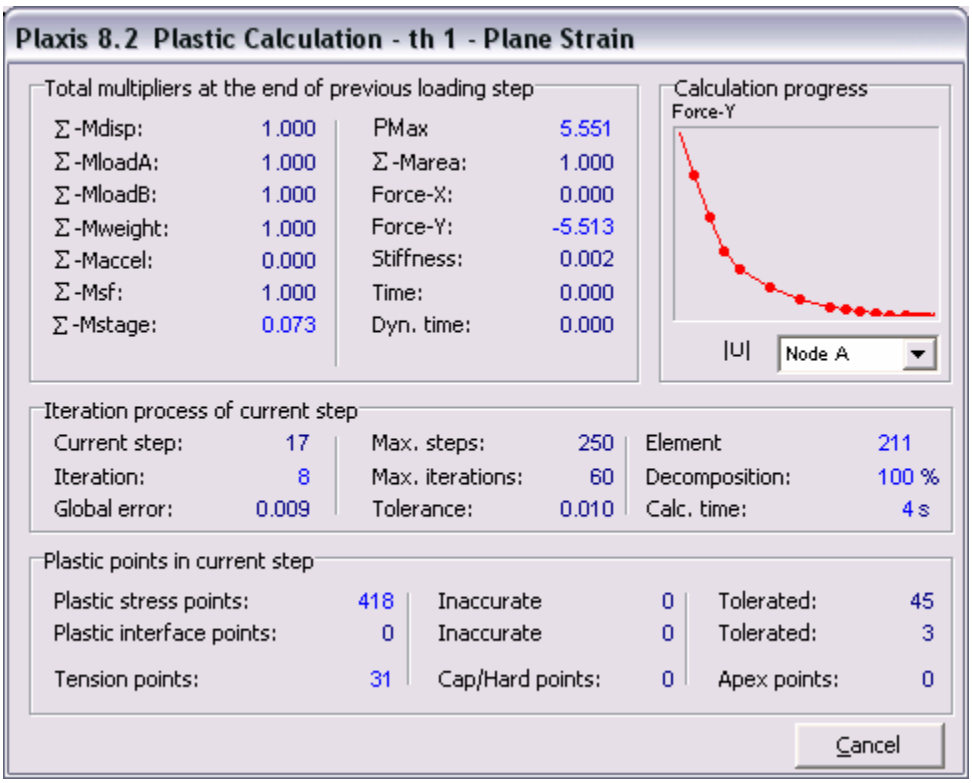
Dùng biểu tượng  để chọn điểm khảo sát

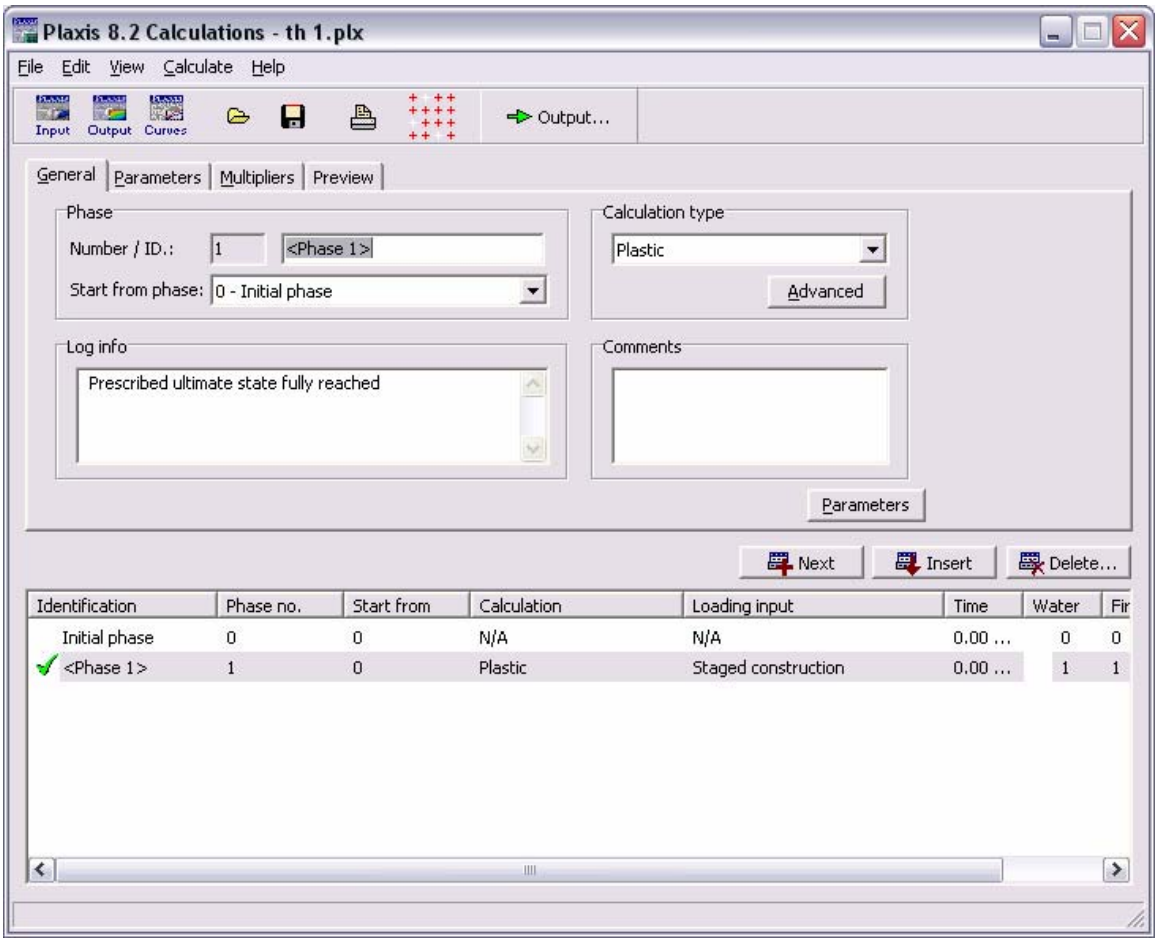
Ví dụ điểm A



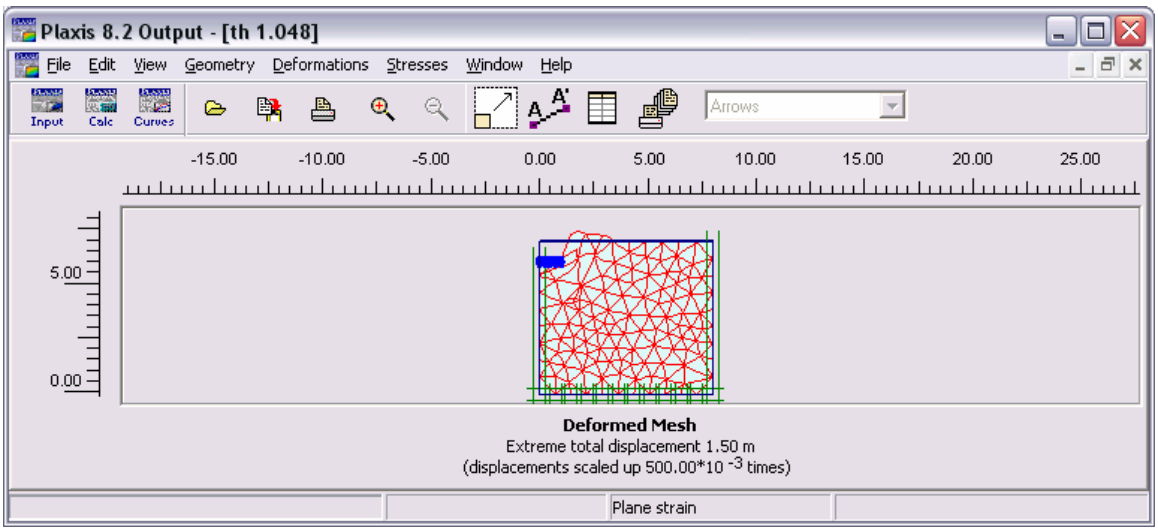
Update

Tính toán 
Calculate...

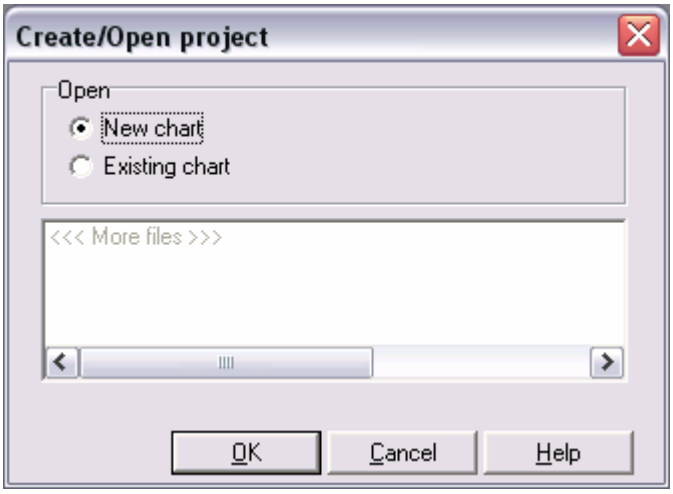

Plaxis 8.2 Plastic Calculation - th 1 - Plane Strain
Total multipliers at the end of previous loading step
Σ-Mdisp: 1.000
Σ-MloadA: 1.000
Σ-MloadB: 1.000
Σ-Mweight: 1.000
Σ-Maccel: 0.000
Σ-Msf: 1.000
Σ-Mstage: 0.073
PMax 5.551
Σ-Marea: 1.000
Force-X: 0.000
Force-Y: -5.513
Stiffness: 0.002
Time: 0.000
Dyn. time: 0.000
Calculation progress
Force-Y
|U|
Node A
Iteration process of current step
Current step: 17
Iteration: 8
Global error: 0.009
Max. steps: 250
Max. iterations: 60
Tolerance: 0.010
Element 211
Decomposition: 100 %
Calc. time: 4 s
Plastic points in current step
Plastic stress points: 418
Plastic interface points: 0
Tension points: 31
Inaccurate 0
Inaccurate 0
Cap/Hard points: 0
Tolerated: 45
Tolerated: 3
Apex points: 0
Cancel



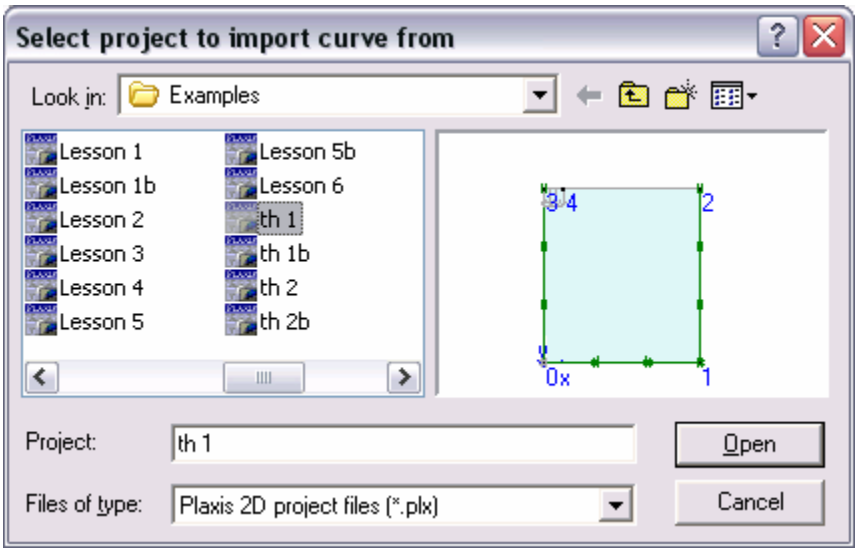
Đã tính toán xong , nhấp vào Output

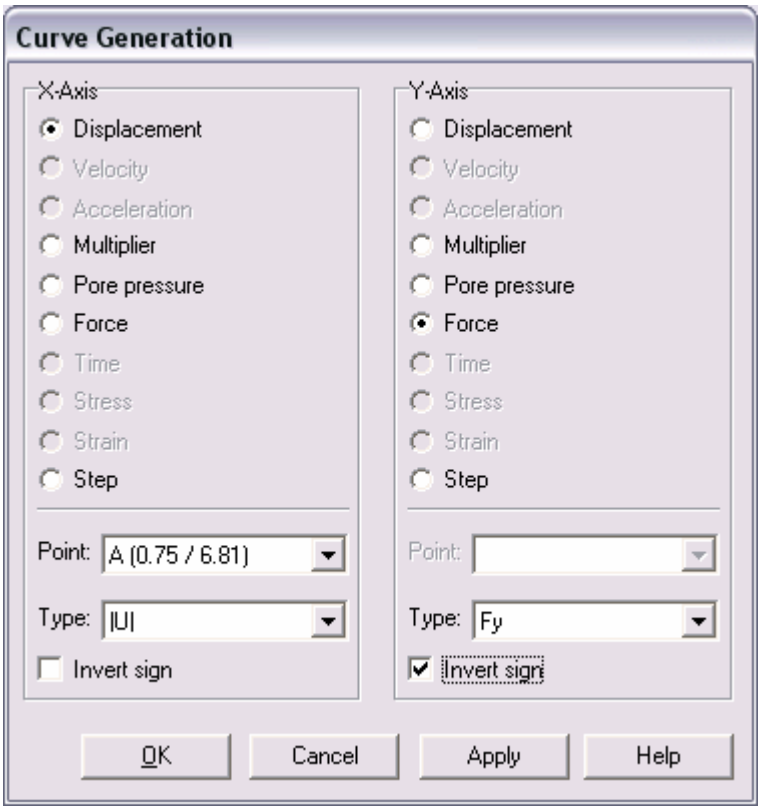


Dùng biểu tượng  để vẽ kết quả

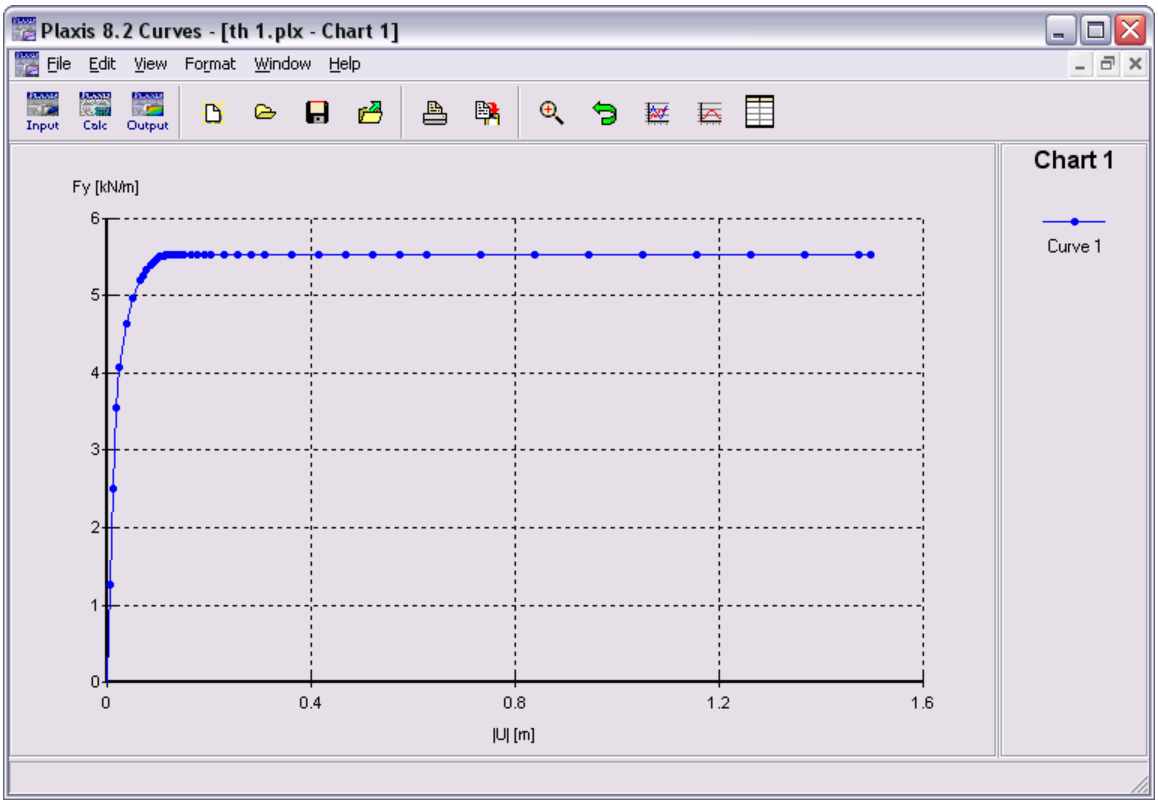

Create/Open project
Open
New chart
Existing chart
<<< More files >>>
OK
Cancel
Help

OK

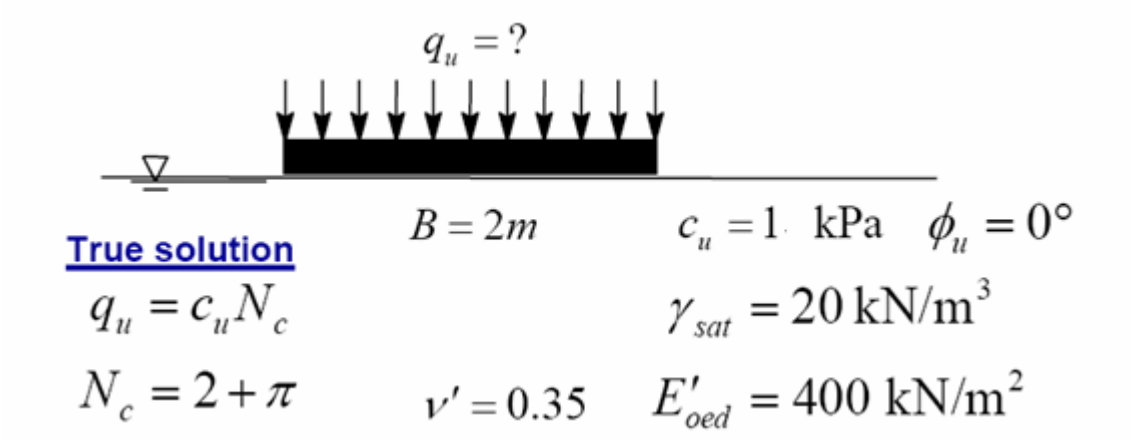

Select project to import curve from
Look in:
Examples
Lesson 1
Lesson 1b
Lesson 2
Lesson 3
Lesson 4
Lesson 5
Lesson 5b
Lesson 6
th 1
th 1b
th 2
th 2b
3
4
2
0x
1
Project:
th 1
Open
Files of type:
Plaxis 2D project files (*.plx)
Cancel


Curve Generation
X-Axis
Displacement
Velocity
Acceleration
Multiplier
Pore pressure
Force
Time
Stress
Strain
Step
Point: A (0.75 / 6.81)
Type: |U|
Invert sign
Y-Axis
Displacement
Velocity
Acceleration
Multiplier
Pore pressure
Force
Time
Stress
Strain
Step
Point:
Type: Fy
Invert sign
OK
Cancel
Apply
Help

Ok


Plaxis 8.2 Curves - [th 1.plx - Chart 1]
File Edit View Format Window Help
Input Calc Output
Chart 1
Curve 1
Fy [kN/m]
6
5
4
3
2
1
0
0
0.4
0.8
1.2
1.6
|U| [m]

Phần 2b : PLAXIS INPUT, CALCULATE,CURVES



5. Tạo hình dạng bài toán

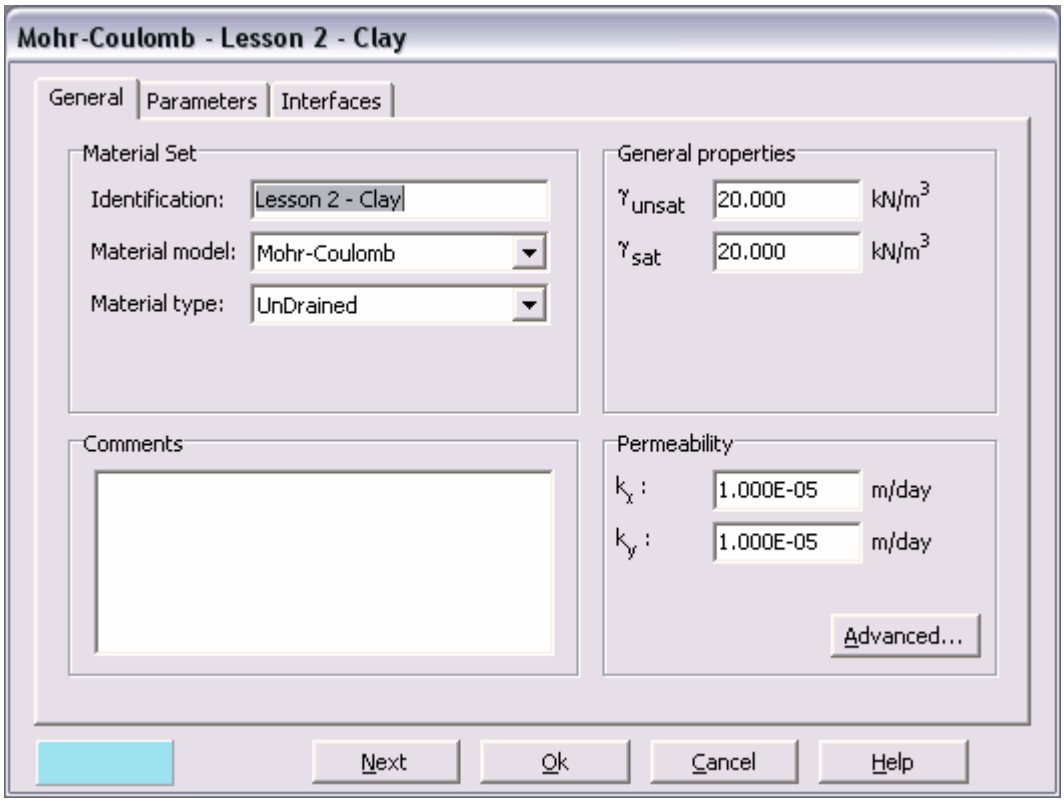
   Vẽ tấm (Plate) 

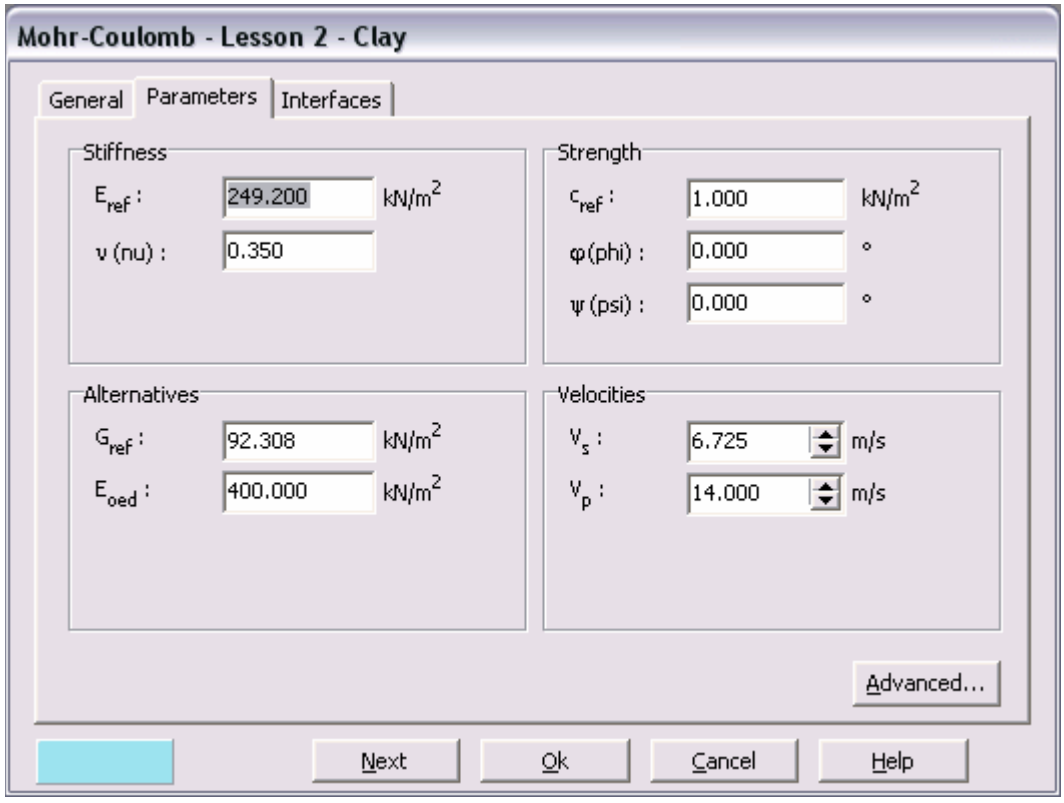
   Gán biểu tượng áp lực 

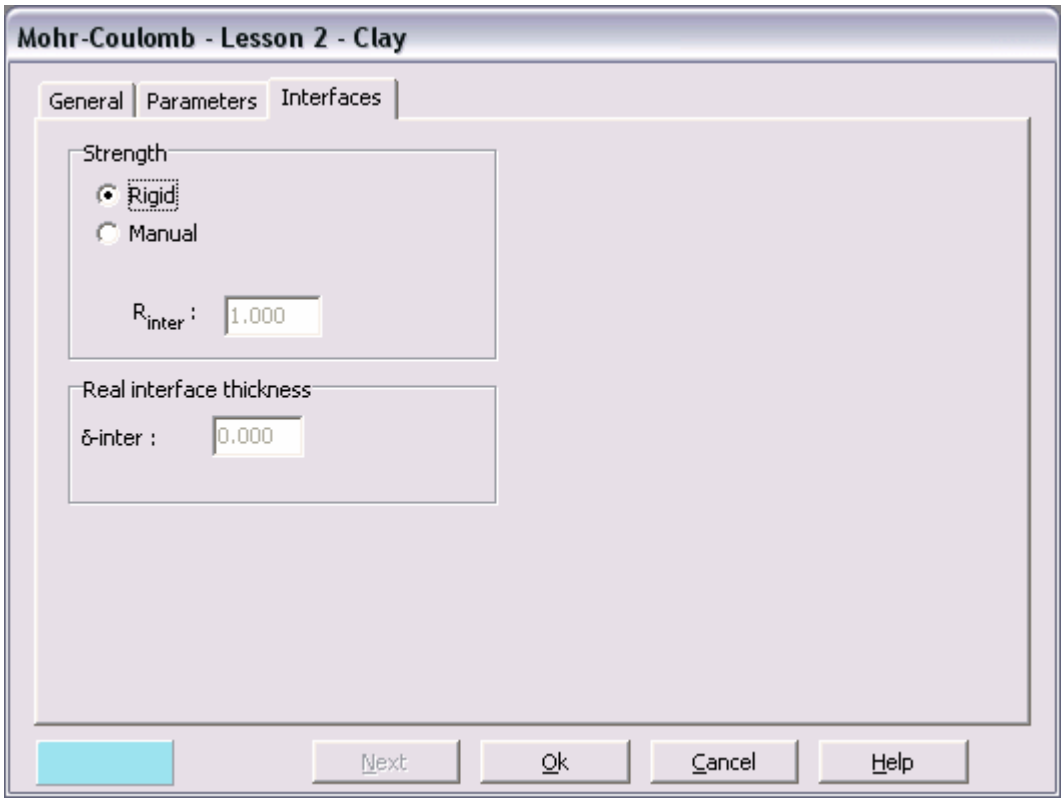
   Vẽ phần tử tiếp xúc 

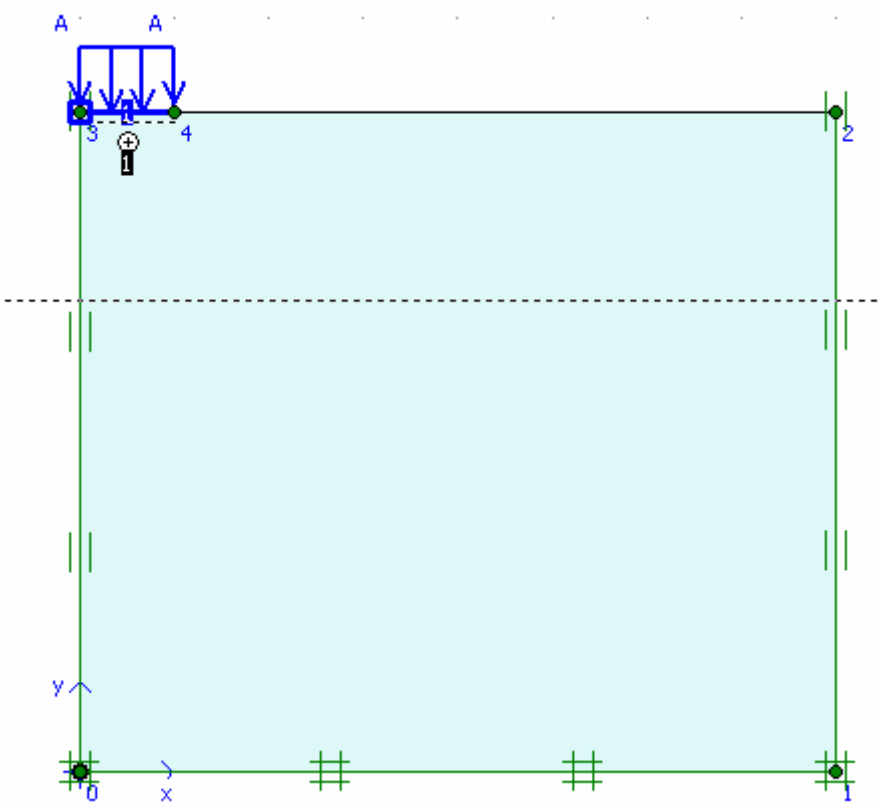
   Gán biên 

   Gán số liệu địa chất 

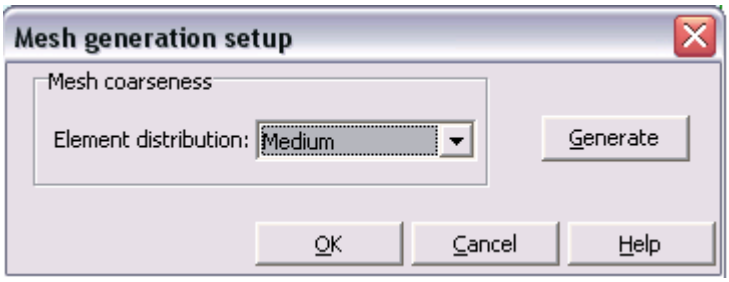

Mohr-Coulomb - Lesson 2 - Clay
General
Parameters
Interfaces
Material Set
Identification:
Lesson 2 - Clay
Material model:
Mohr-Coulomb
Material type:
UnDrained
General properties
γunsat
20.000
kN/m3
γsat
20.000
kN/m3
Comments
Permeability
kx :
1.000E-05
m/day
ky :
1.000E-05
m/day
Advanced...
Next
Ok
Cancel
Help

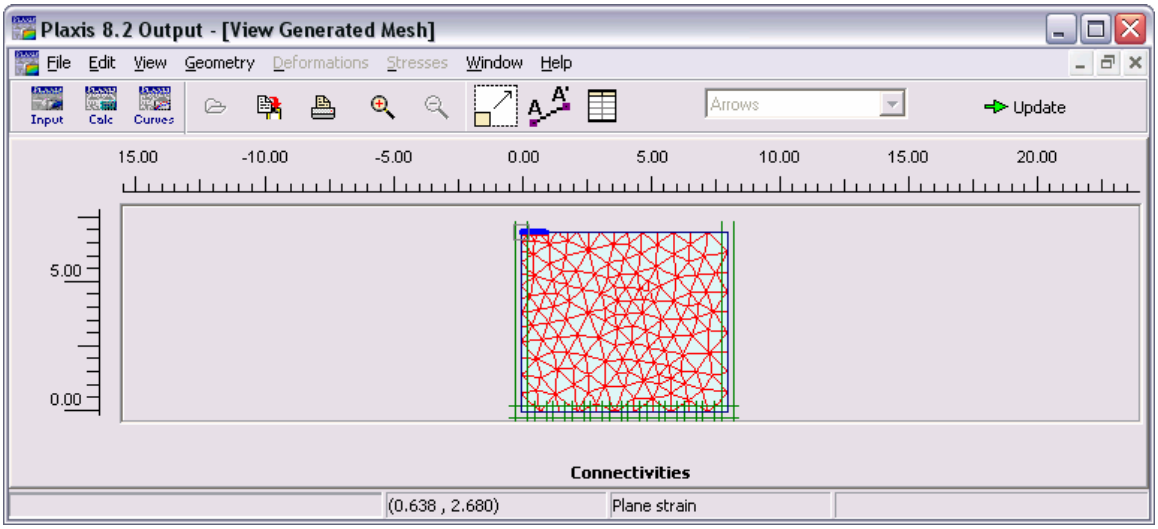

Mohr-Coulomb - Lesson 2 - Clay
General
Parameters
Interfaces
Stiffness
Eref :
249.200
kN/m2
ν (nu) :
0.350
Strength
cref :
1.000
kN/m2
φ (phi) :
0.000
°
ψ (psi) :
0.000
°
Alternatives
Gref :
92.308
kN/m2
Eoed :
400.000
kN/m2
Velocities
Vs :
6.725
m/s
Vp :
14.000
m/s
Advanced...
Next
Ok
Cancel
Help


Mohr-Coulomb - Lesson 2 - Clay
General
Parameters
Interfaces
Strength
Rigid
Manual
R inter :
1.000
Real interface thickness
δ-inter :
0.000
Next
Ok
Cancel
Help


A
A
3
4
2
1
y
0
x
1

6. Tạo lưới phần tử

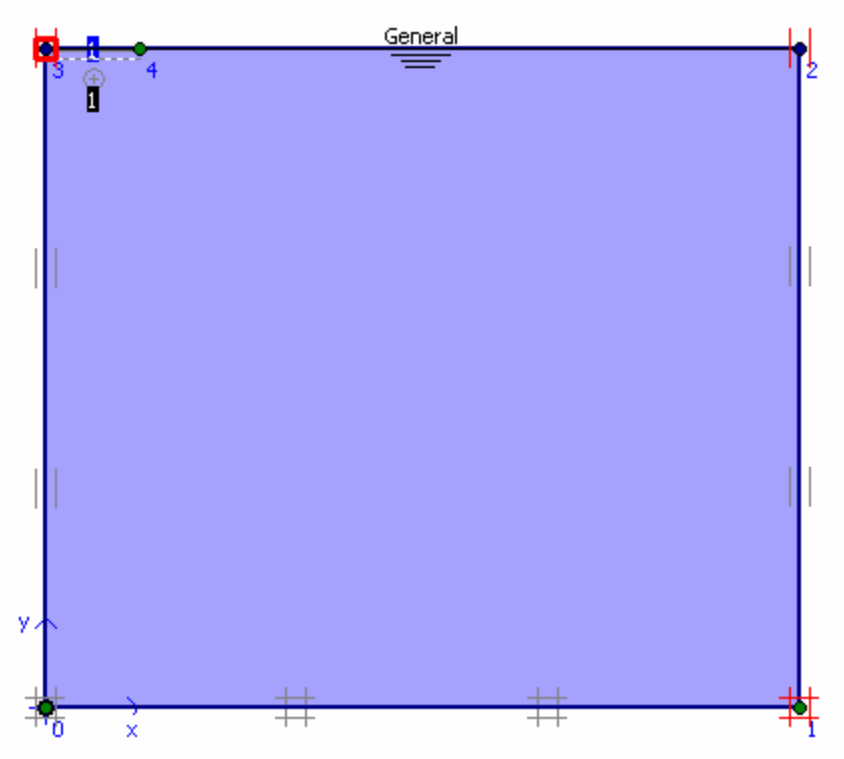




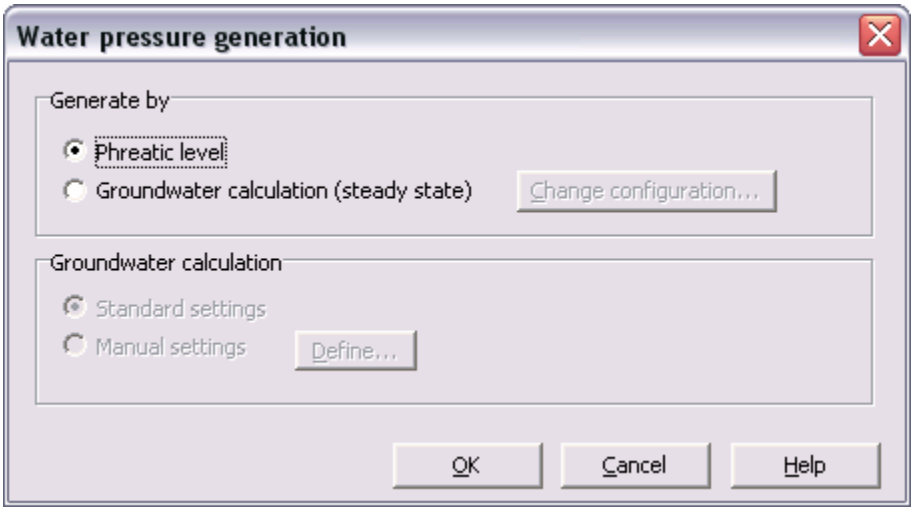
Update

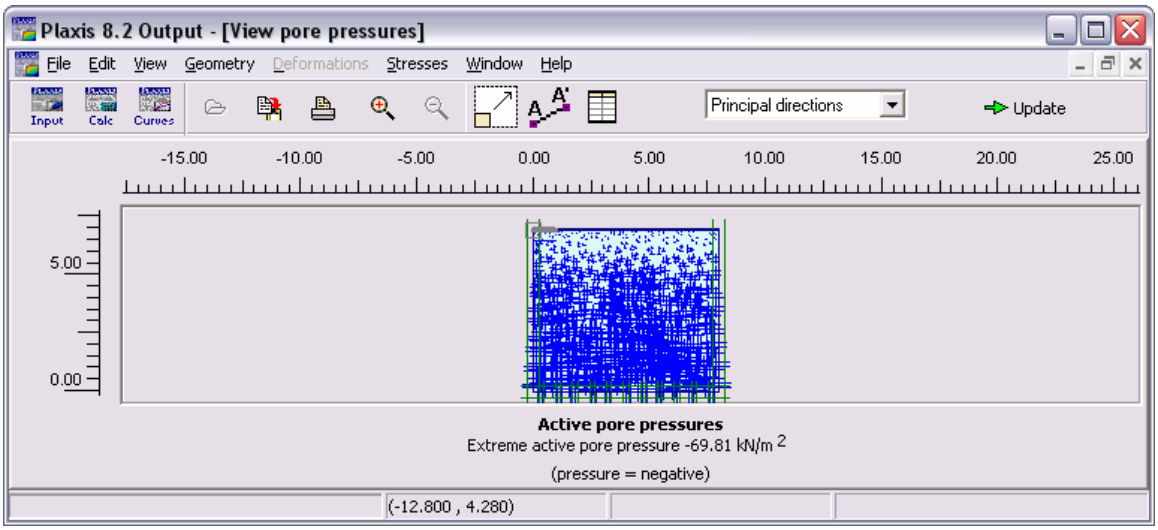
7. Tính toán điều kiện ban đầu

Gán mực nước ngầm

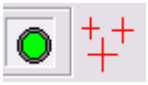


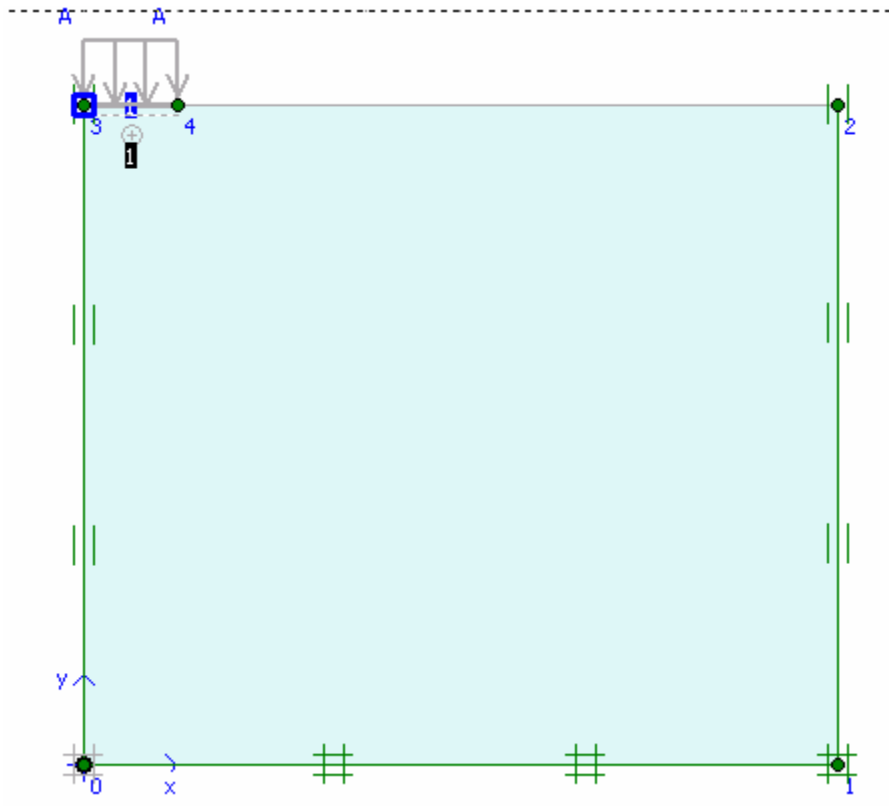
Tính toán áp lực nước 

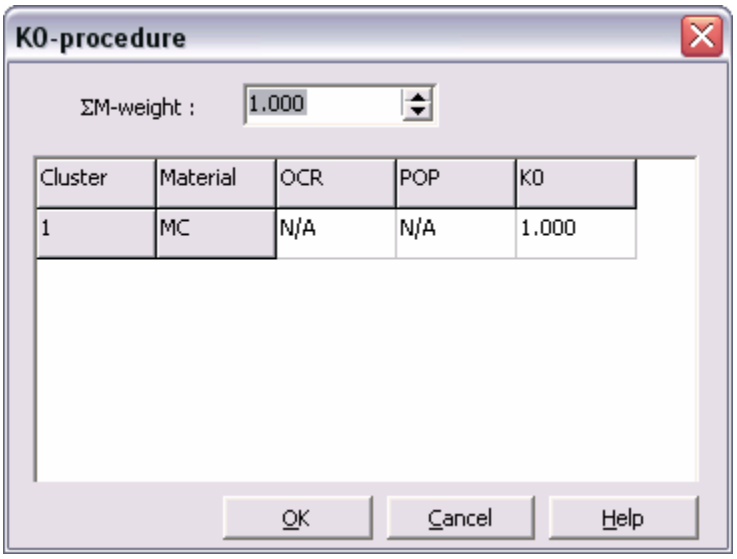


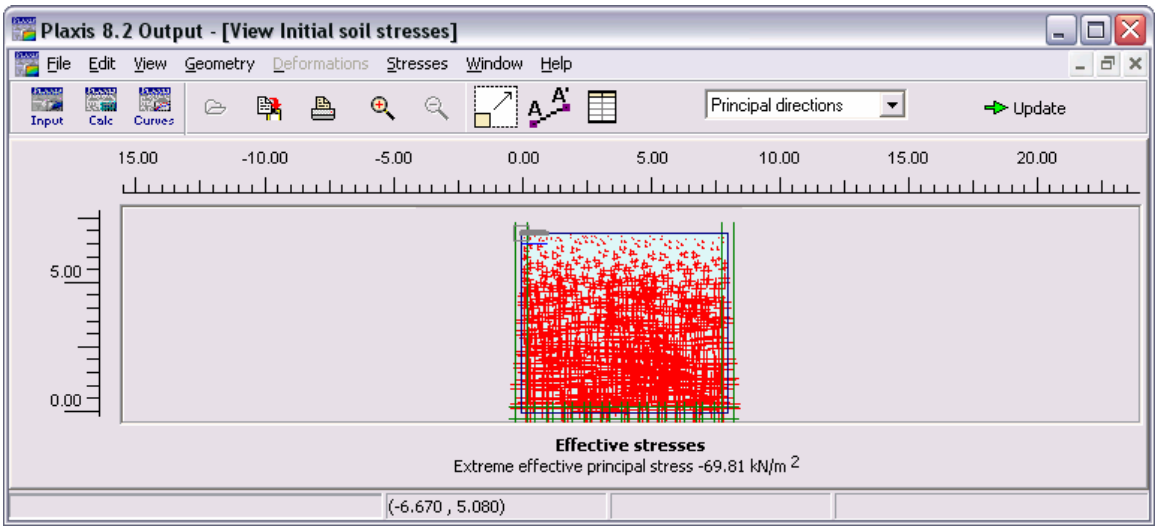


Update

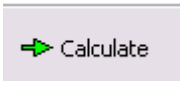
Tính toán áp lực đất 

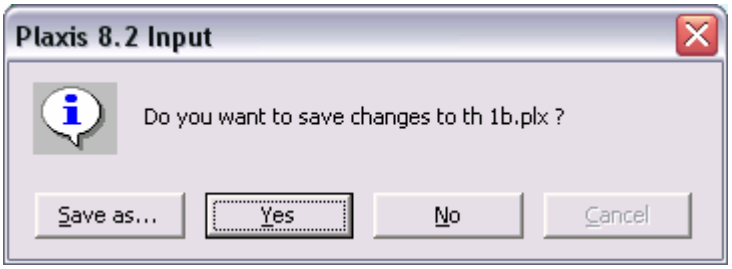


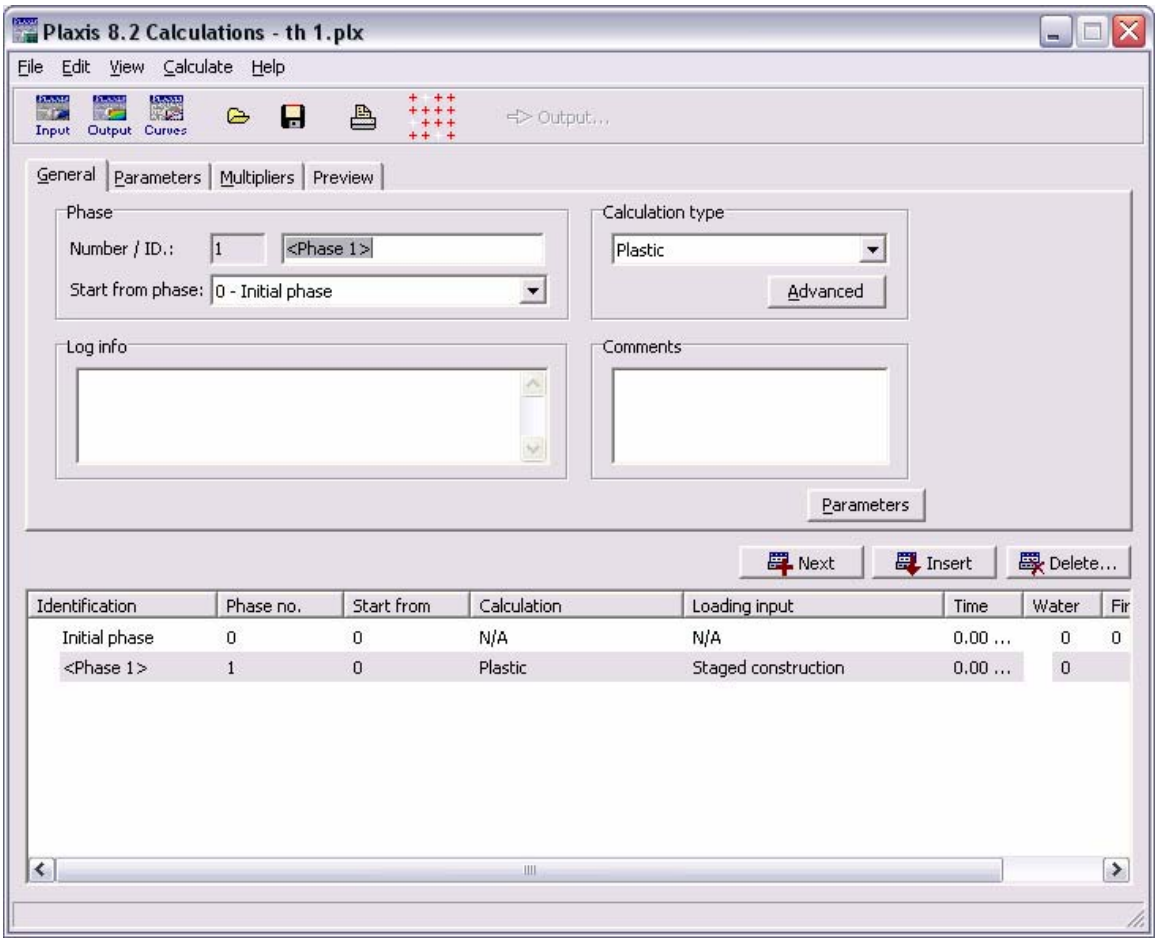




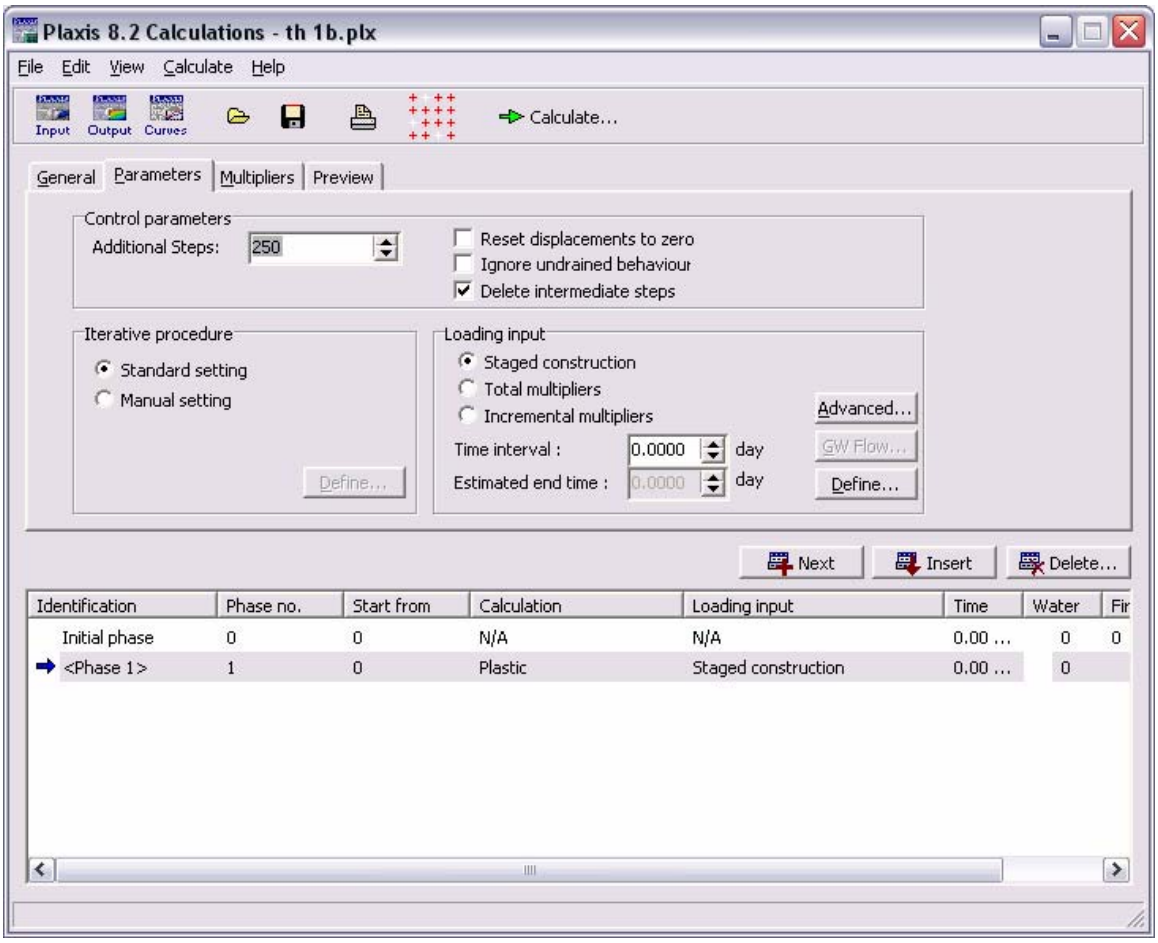
Update

8. Bắt đầu tính toán 

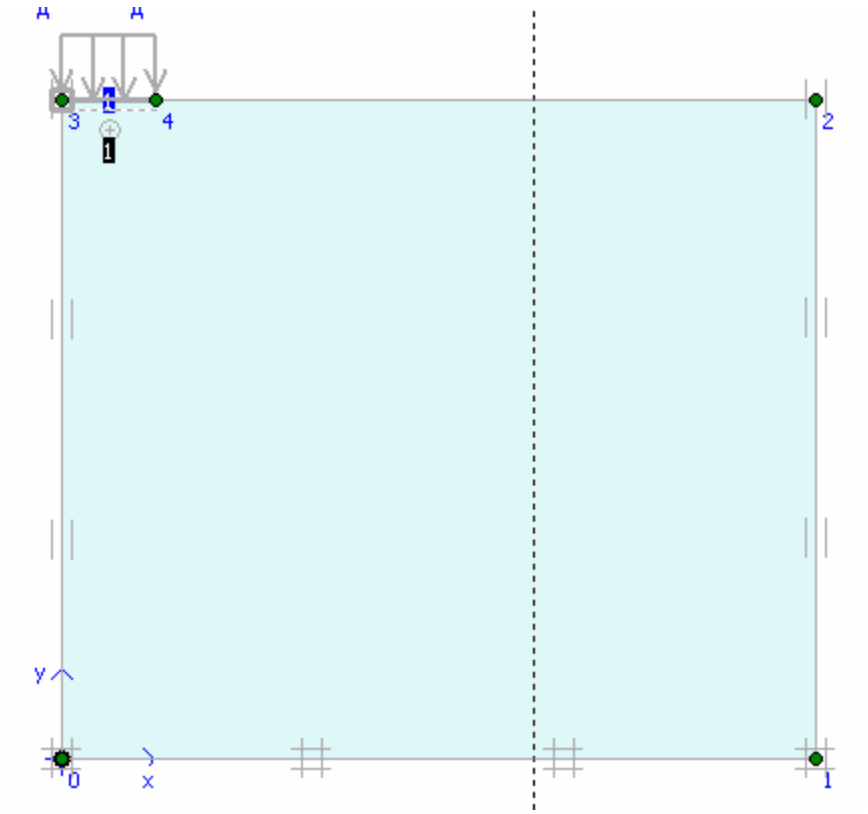



Plaxis 8.2 Calculations - th 1.plx
File Edit View Calculate Help
Input Output Curves
Output...
General Parameters Multipliers Preview
Phase
Number / ID.: 1 <Phase 1>
Start from phase: 0 - Initial phase
Calculation type
Plastic
Advanced
Log info
Comments
Parameters
Next Insert Delete...
Identification Phase no. Start from Calculation Loading input Time Water Fir
Initial phase 0 0 N/A N/A 0.00 ... 0 0
<Phase 1> 1 0 Plastic Staged construction 0.00 ... 0

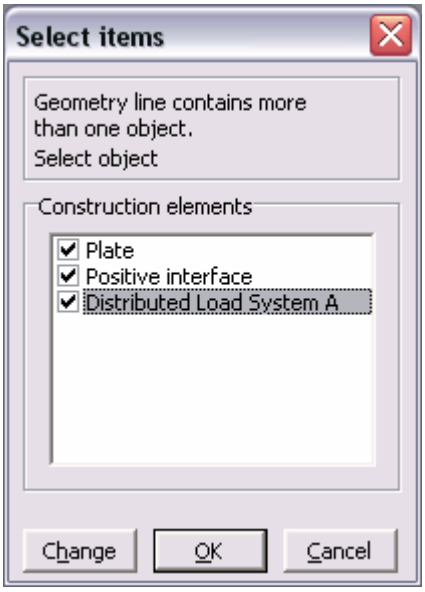
Parameters



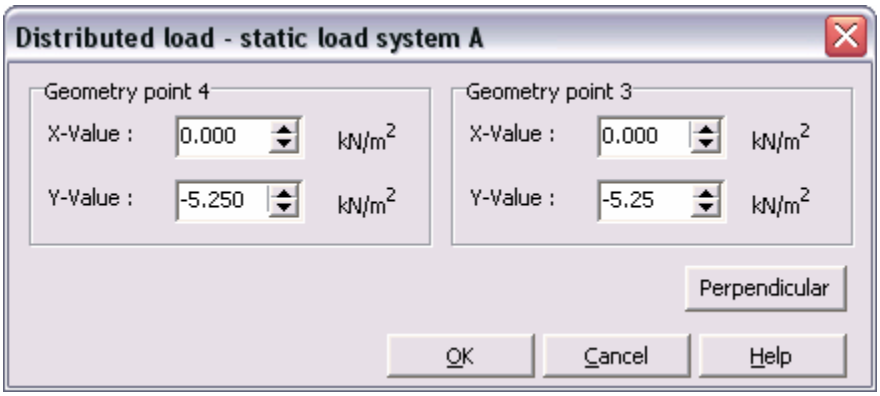
Nhấp vào Define và máy tự động
Trở về màn hình Input



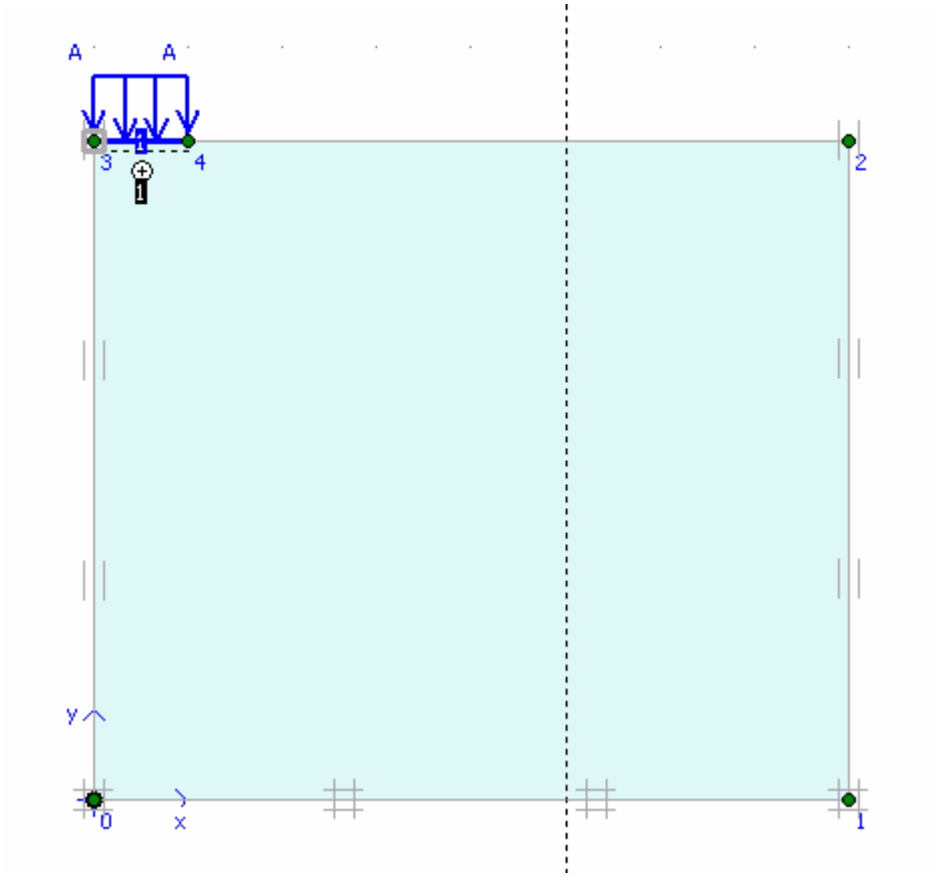
Gán giá trị tải bằng cách nhấp vào áp lực trên hình



Nhấp vào Change để nhập giá trị



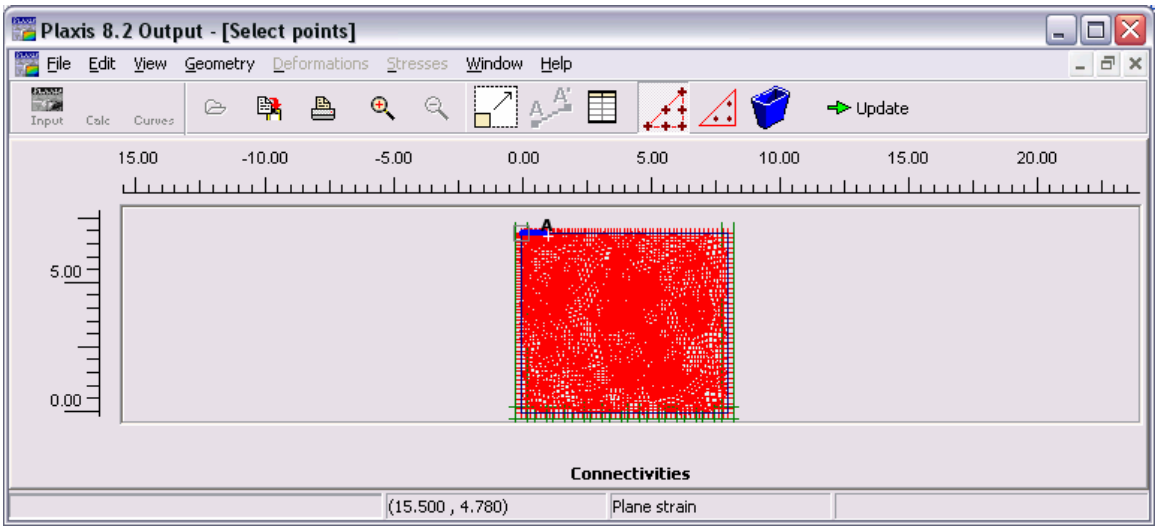
OK



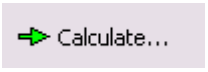
Update

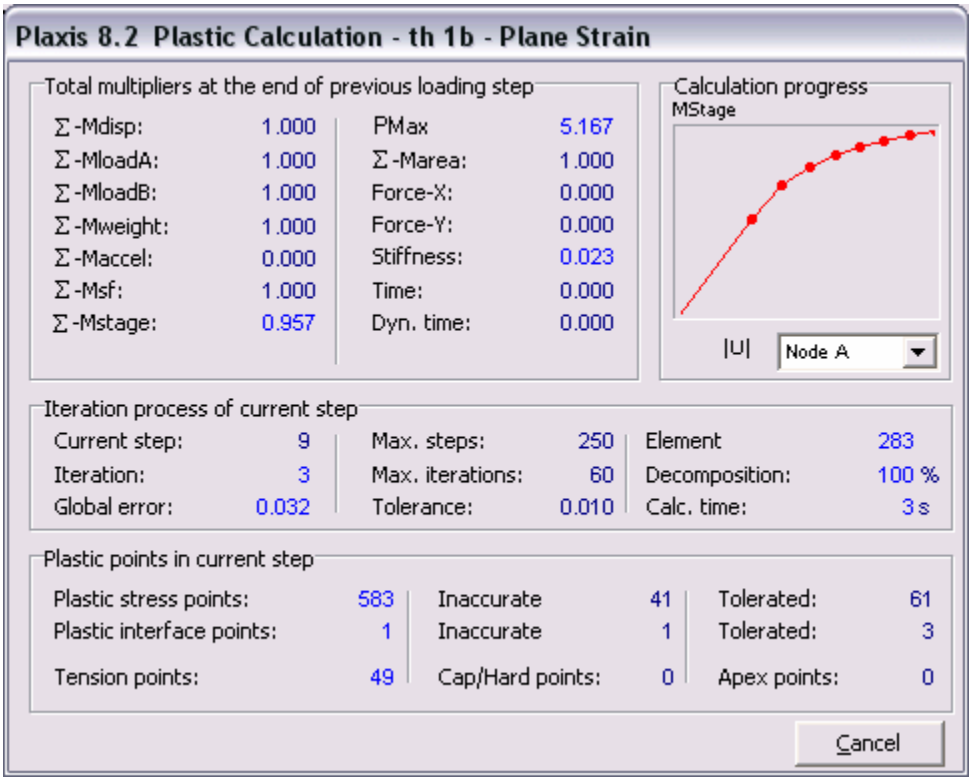
Dùng biểu tượng  để chọn điểm khảo sát

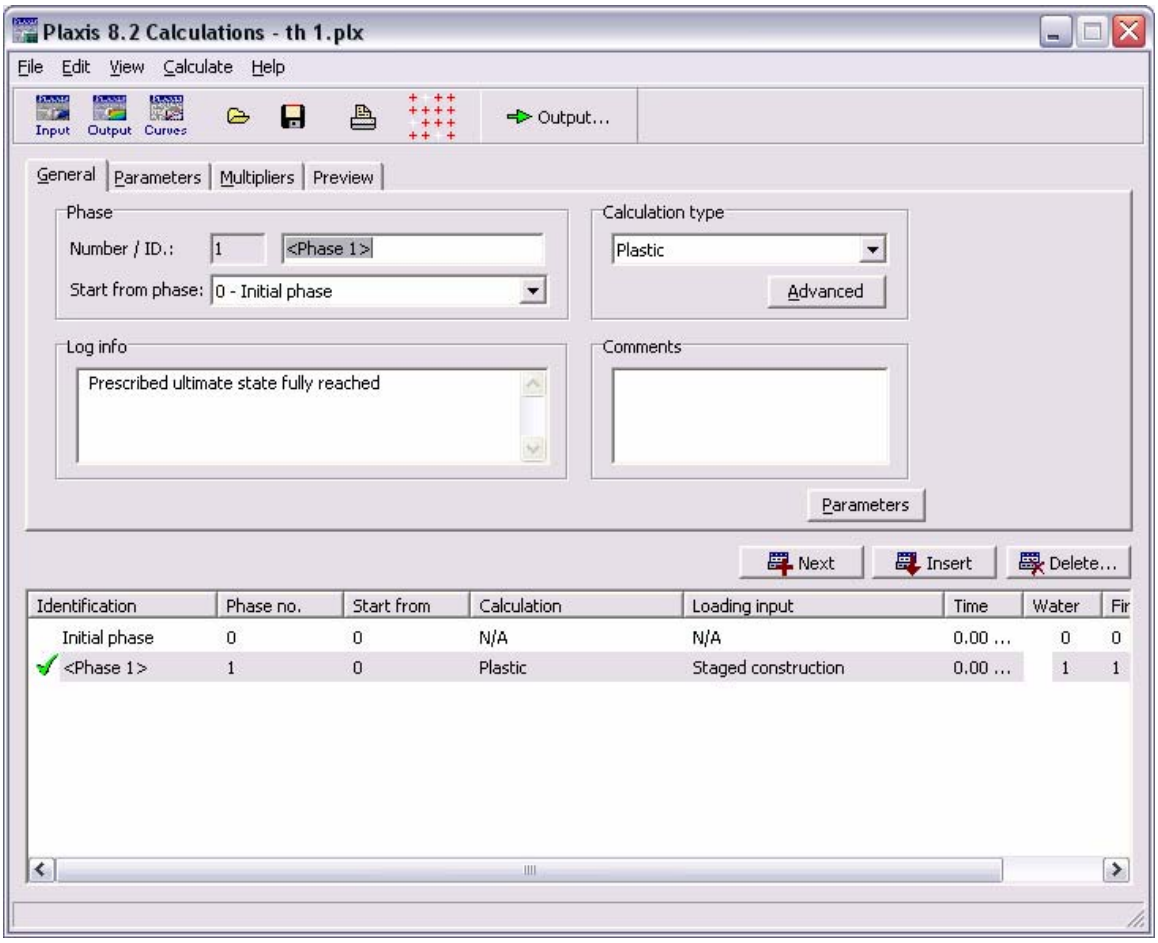
Ví dụ điểm A



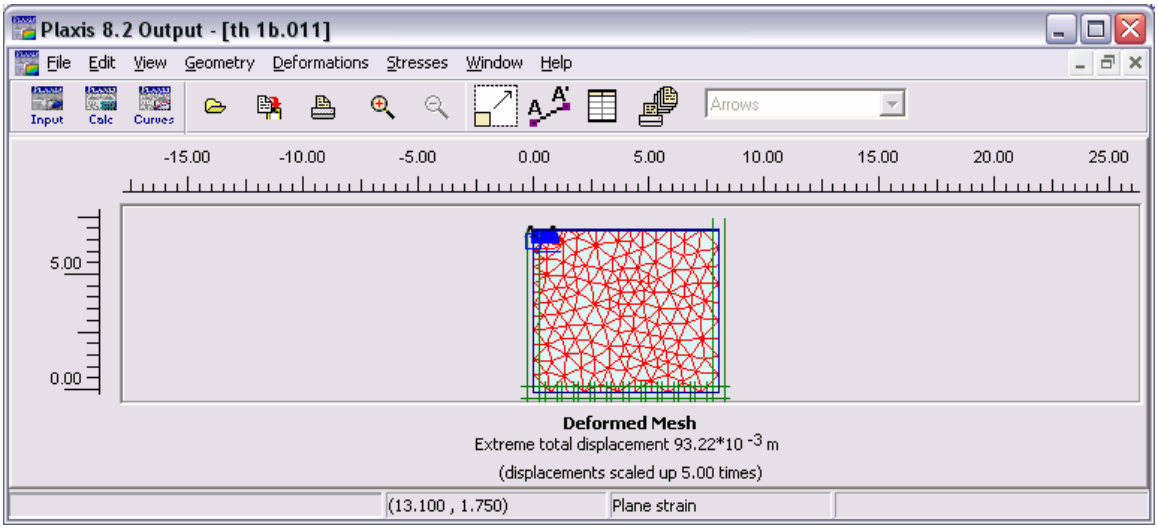
Update

Tính toán 



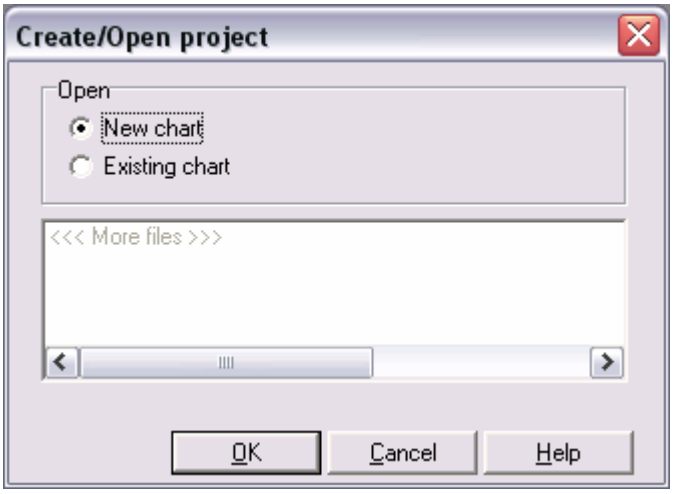


Đã tính toán xong , nhấp vào Output

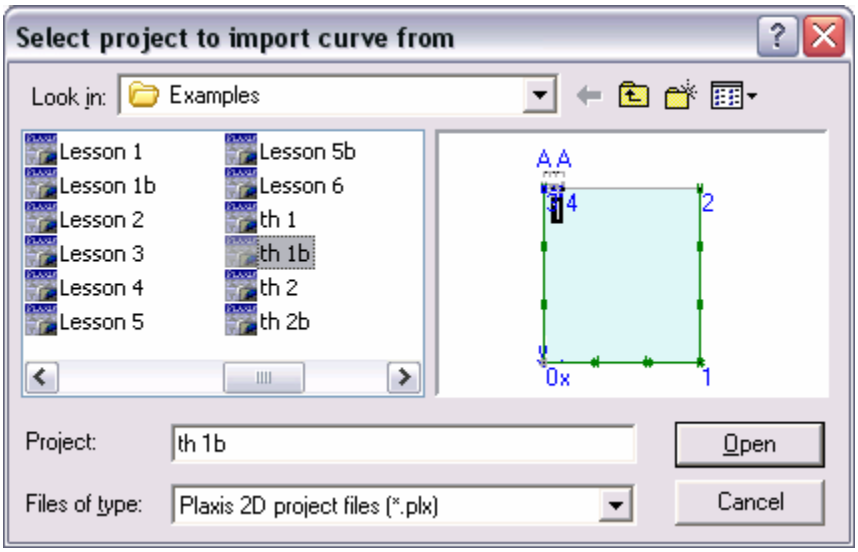


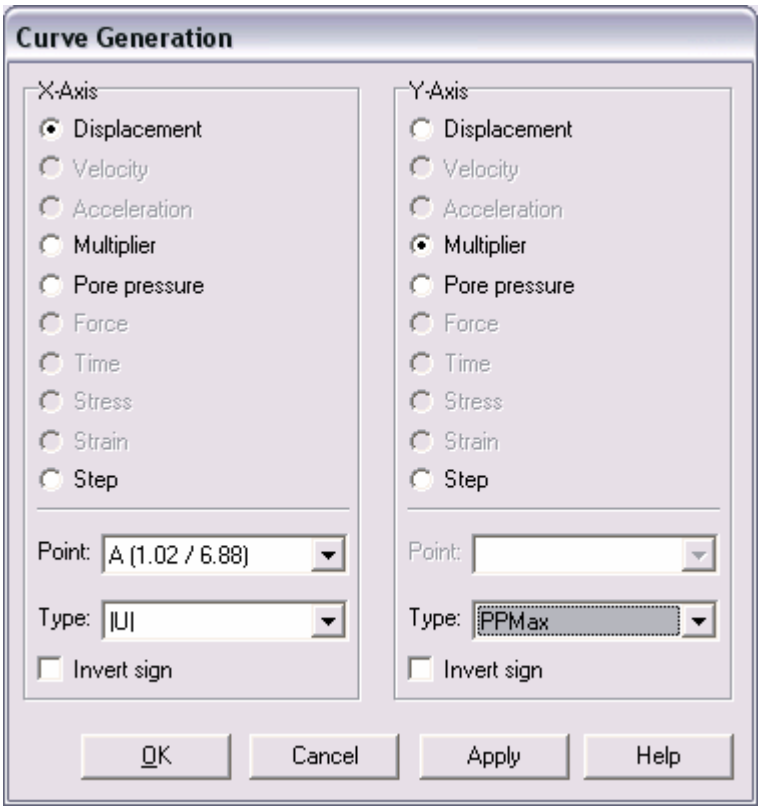
Dùng biểu tượng 

để vẽ kết quả

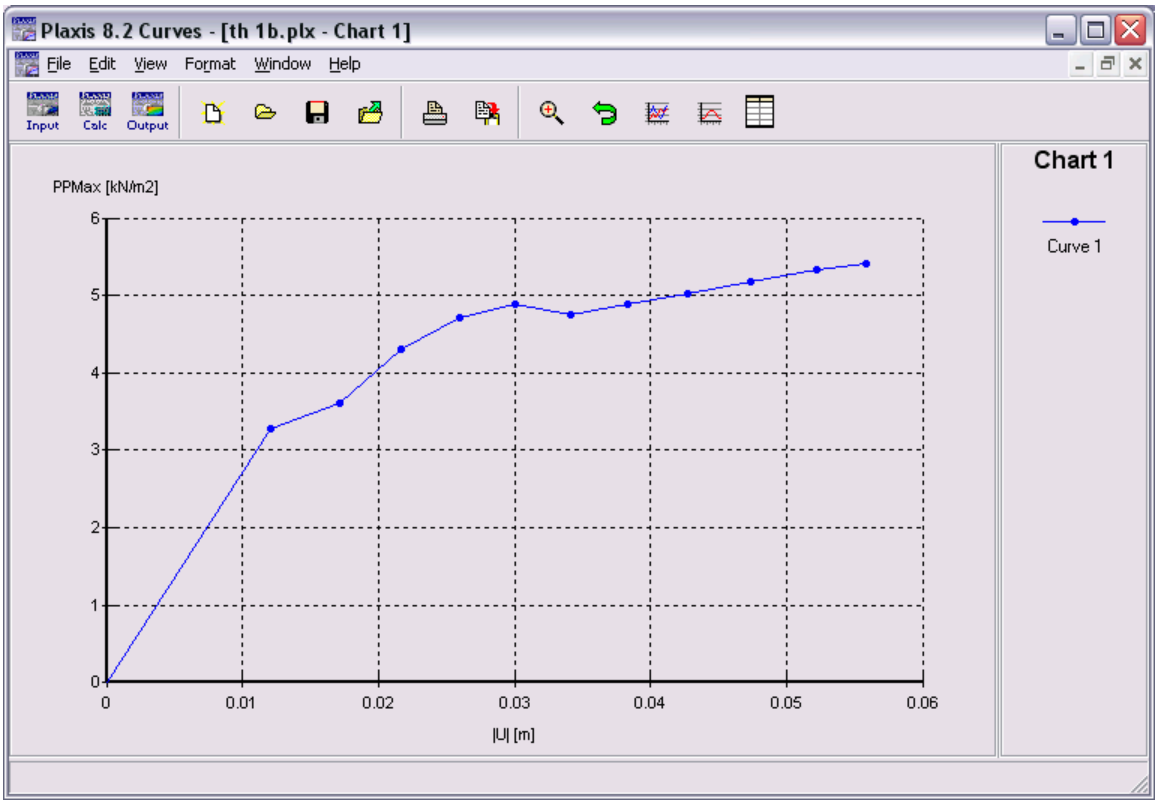

Create/Open project
Open
New chart
Existing chart
<<< More files >>>
OK
Cancel
Help

OK

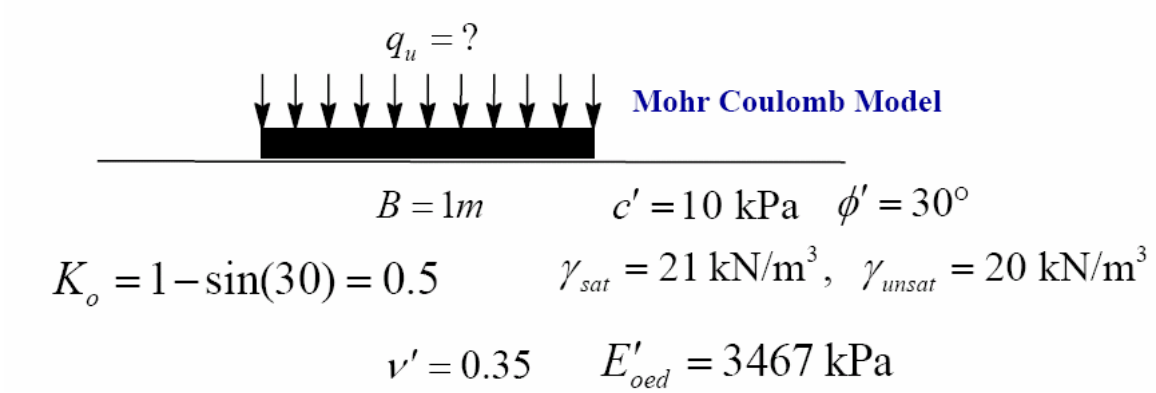

Select project to import curve from
Look in:
Examples
Lesson 1
Lesson 1b
Lesson 2
Lesson 3
Lesson 4
Lesson 5
Lesson 5b
Lesson 6
th 1
th 1b
th 2
th 2b
A
A
4
2
0x
1
Project:
th 1b
Open
Files of type:
Plaxis 2D project files (*.plx)
Cancel


Curve Generation
X-Axis
Displacement
Velocity
Acceleration
Multiplier
Pore pressure
Force
Time
Stress
Strain
Step
Point: A (1.02 / 6.88)
Type: |U|
Invert sign
Y-Axis
Displacement
Velocity
Acceleration
Multiplier
Pore pressure
Force
Time
Stress
Strain
Step
Point:
Type: PPMax
Invert sign
OK
Cancel
Apply
Help

Ok


Plaxis 8.2 Curves - [th 1b.plx - Chart 1]
File Edit View Format Window Help
Input Calc Output
PPMax [kN/m2]
6
5
4
3
2
1
0
0
0.01
0.02
0.03
0.04
0.05
0.06
|U| [m]
Chart 1
Curve 1

Phần 3 : PLAXIS INPUT, CALCULATE,CURVES

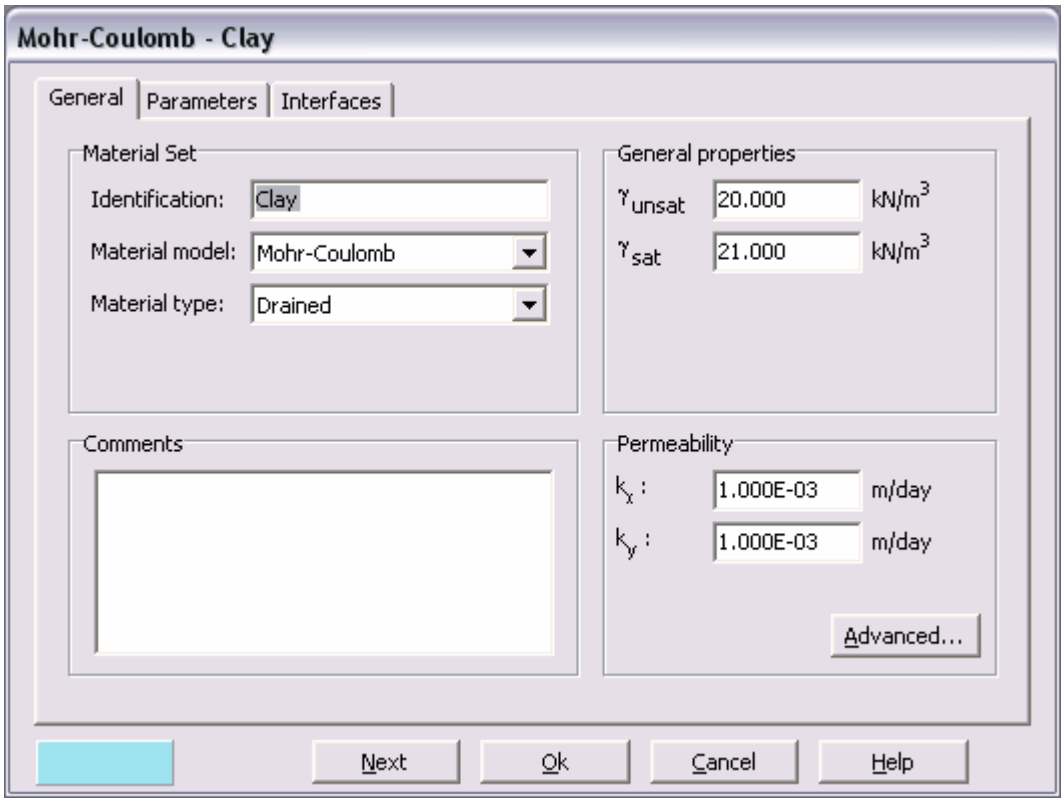


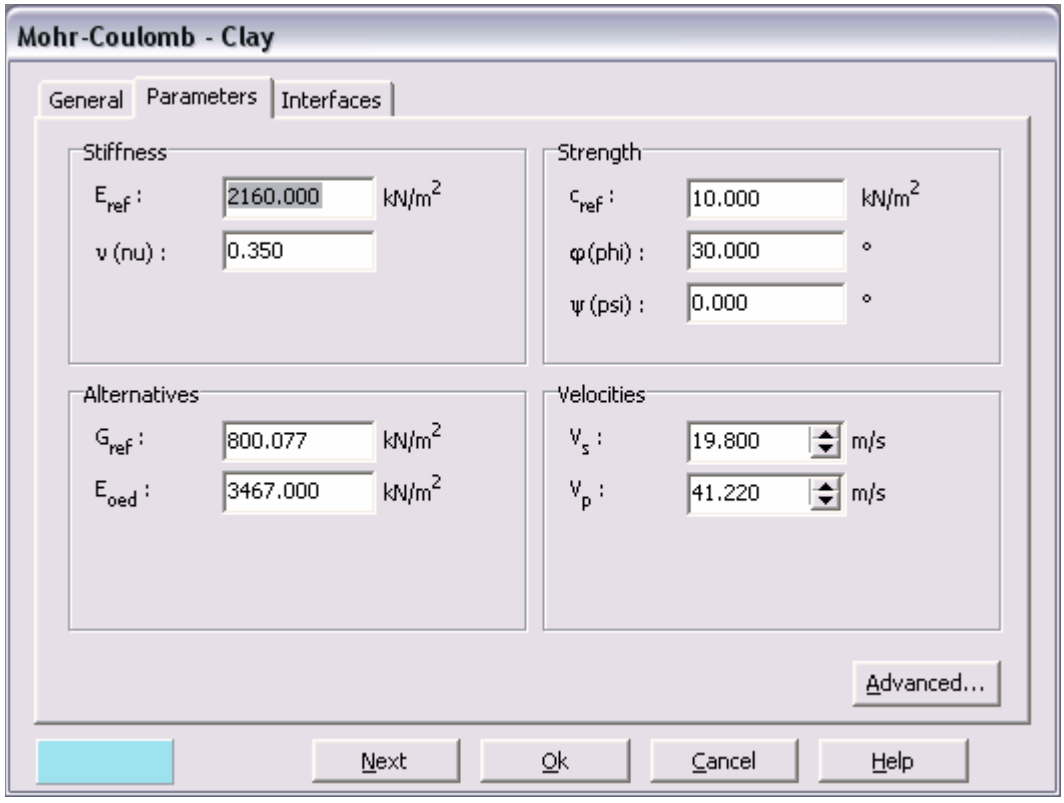
9. Tạo hình dạng bài toán

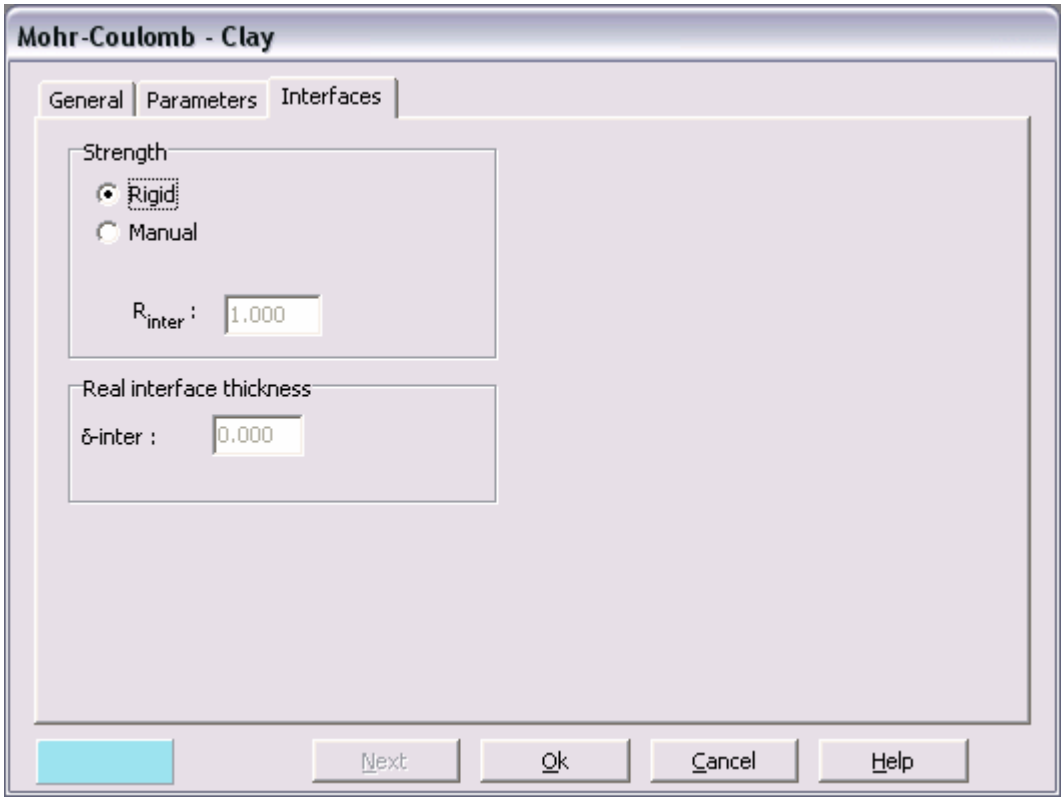
   Gán chuyển vị biết trước 

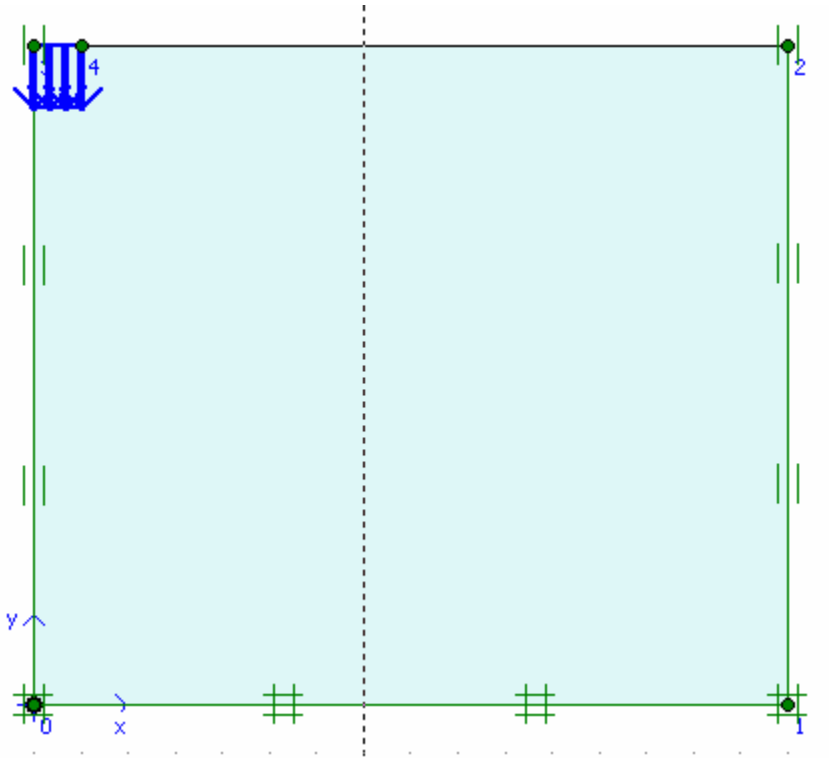
   Gán biên 

   Gán số liệu địa chất 

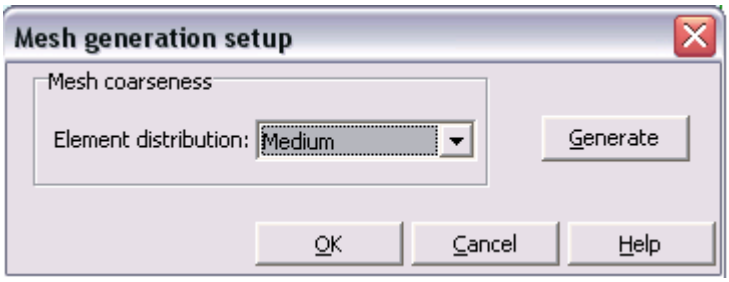

Mohr-Coulomb - Clay
General
Parameters
Interfaces
Material Set
Identification: Clay
Material model: Mohr-Coulomb
Material type: Drained
General properties
γunsat 20.000 kN/m3
γsat 21.000 kN/m3
Comments
Permeability
kx : 1.000E-03 m/day
ky : 1.000E-03 m/day
Advanced...
Next
Ok
Cancel
Help

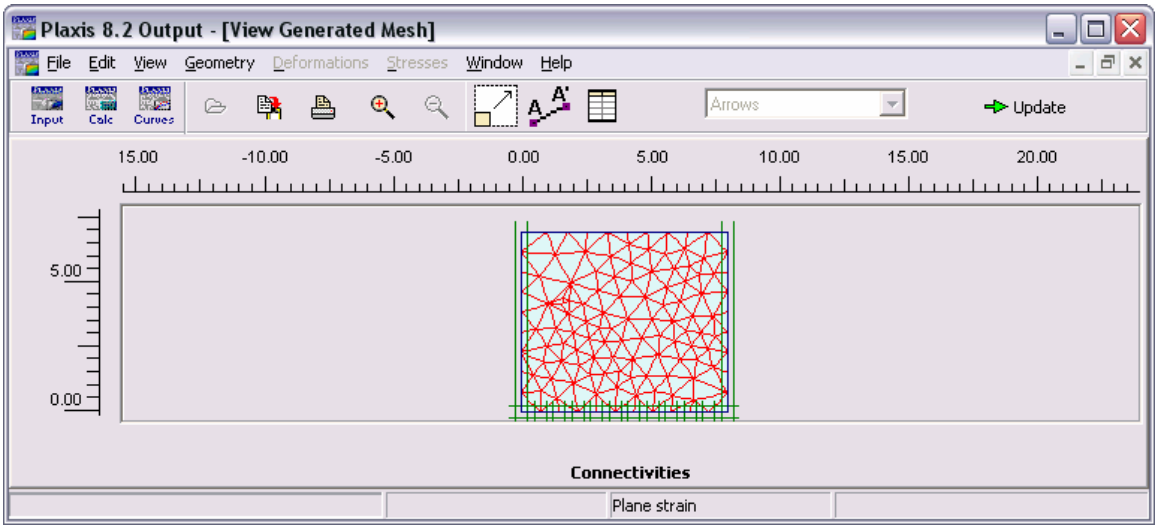

Mohr-Coulomb - Clay
General
Parameters
Interfaces
Stiffness
Eref : 2160.000 kN/m2
ν (nu) : 0.350
Strength
cref : 10.000 kN/m2
φ (phi) : 30.000 °
ψ (psi) : 0.000 °
Alternatives
Gref : 800.077 kN/m2
Eoed : 3467.000 kN/m2
Velocities
Vs : 19.800 m/s
Vp : 41.220 m/s
Advanced...
Next
Ok
Cancel
Help


Mohr-Coulomb - Clay
General
Parameters
Interfaces
Strength
Rigid
Manual
R inter :
1.000
Real interface thickness
δ-inter :
0.000
Next
Ok
Cancel
Help


4
2
y
0
x
1

10. Tạo lưới phần tử

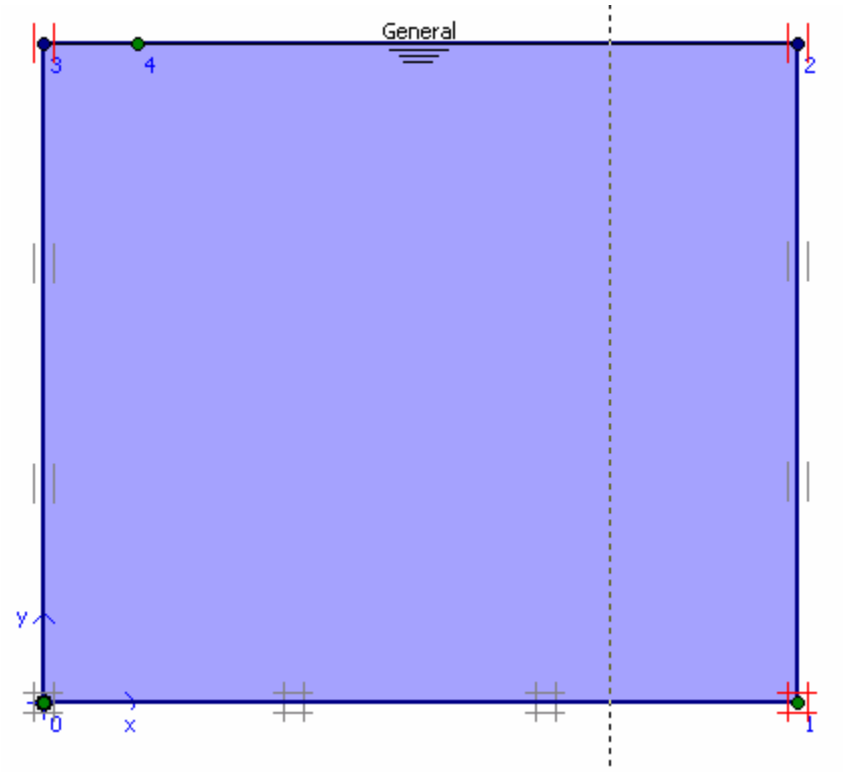




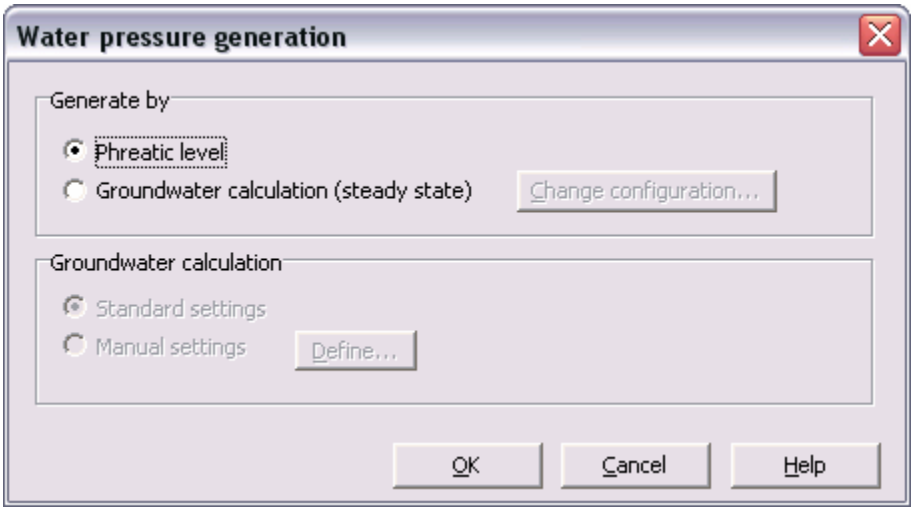
Update

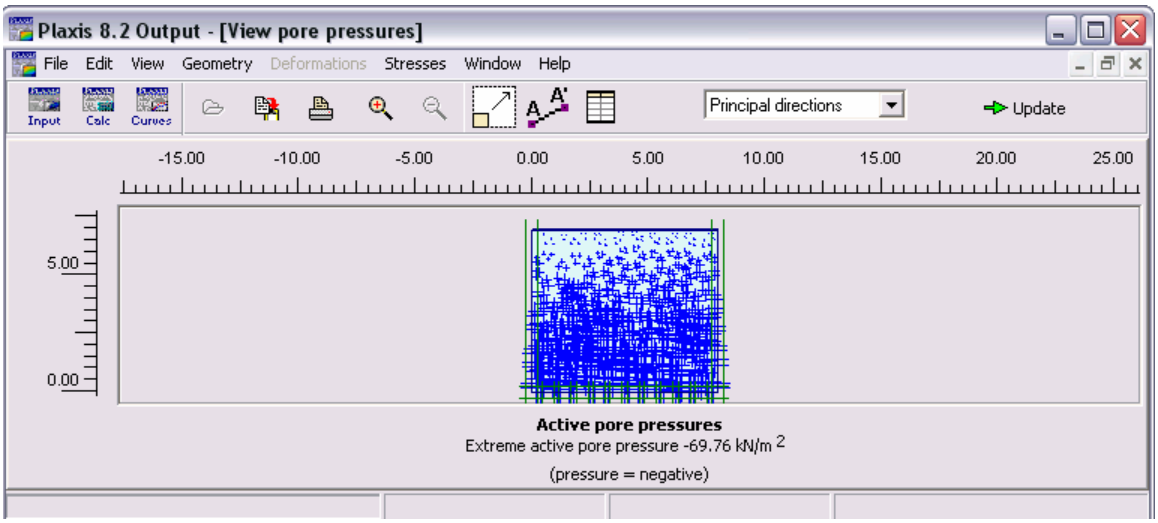
11. Tính toán điều kiện ban đầu

Gán mực nước ngầm

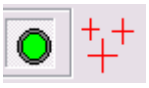


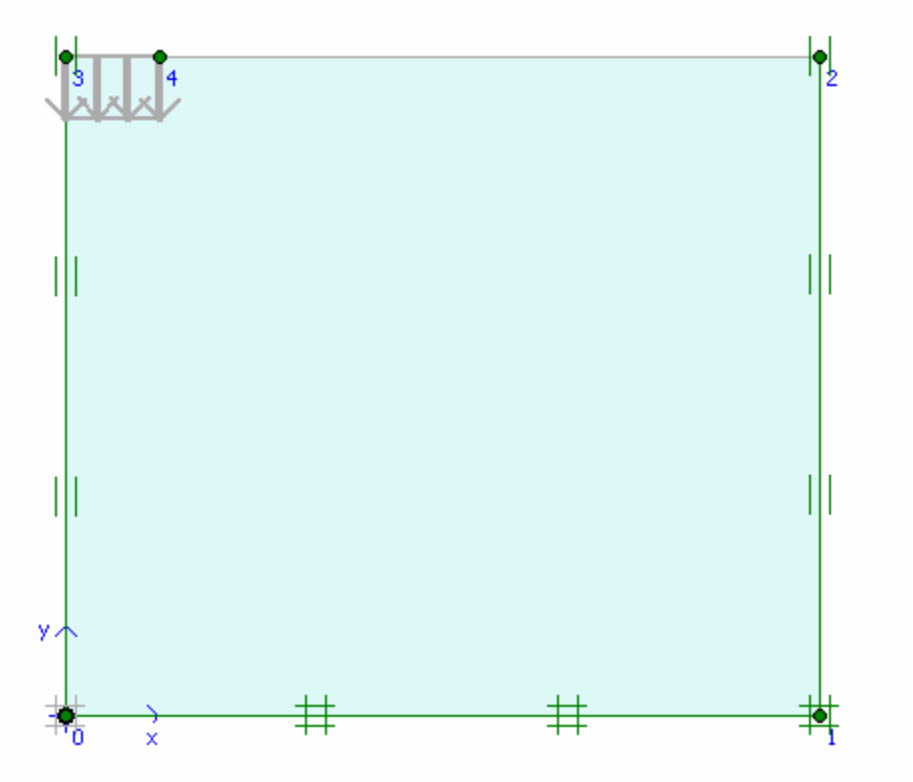
Tính toán áp lực nước 

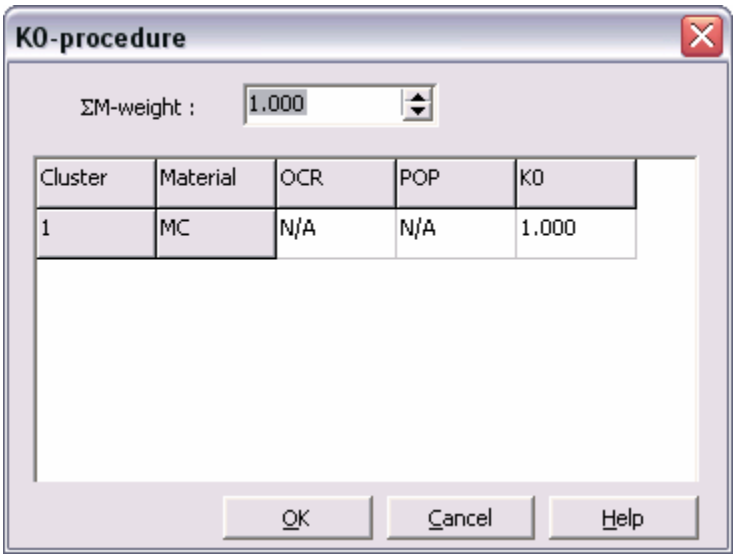


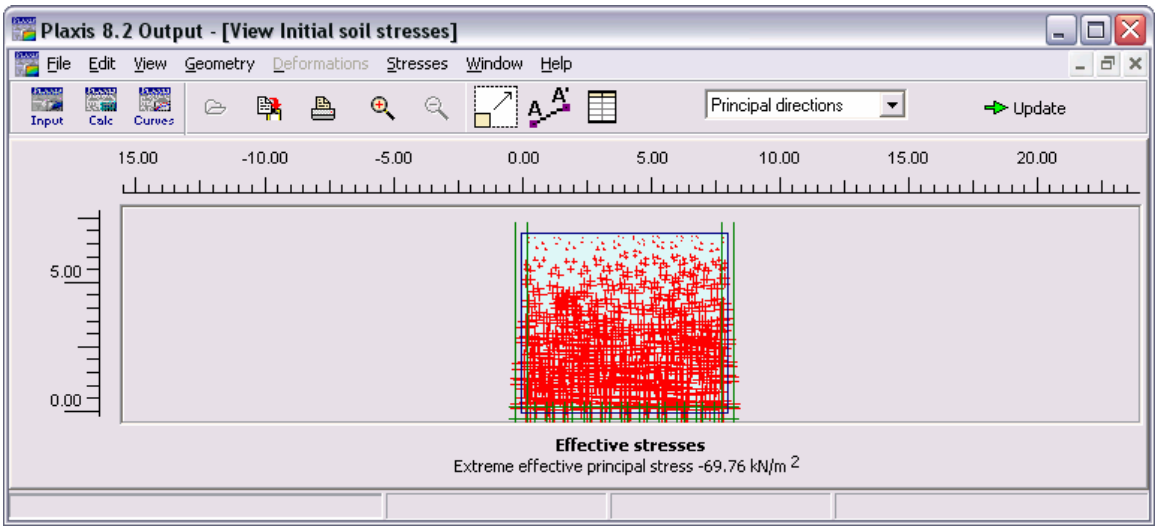


Update

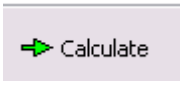
Tính toán áp lực đất 

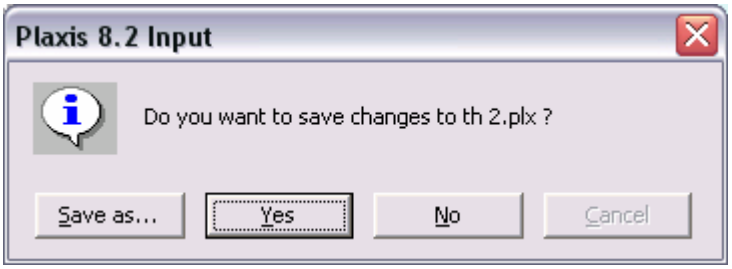


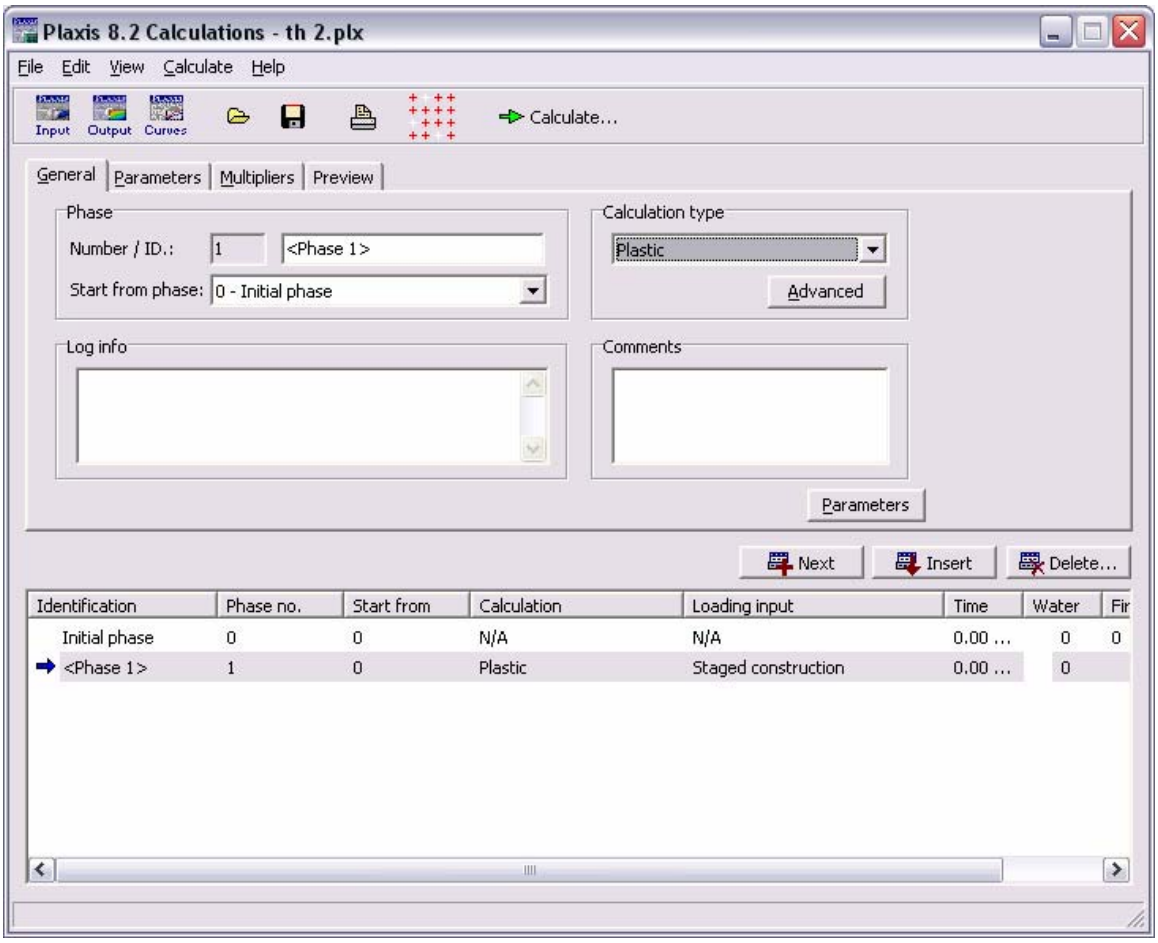




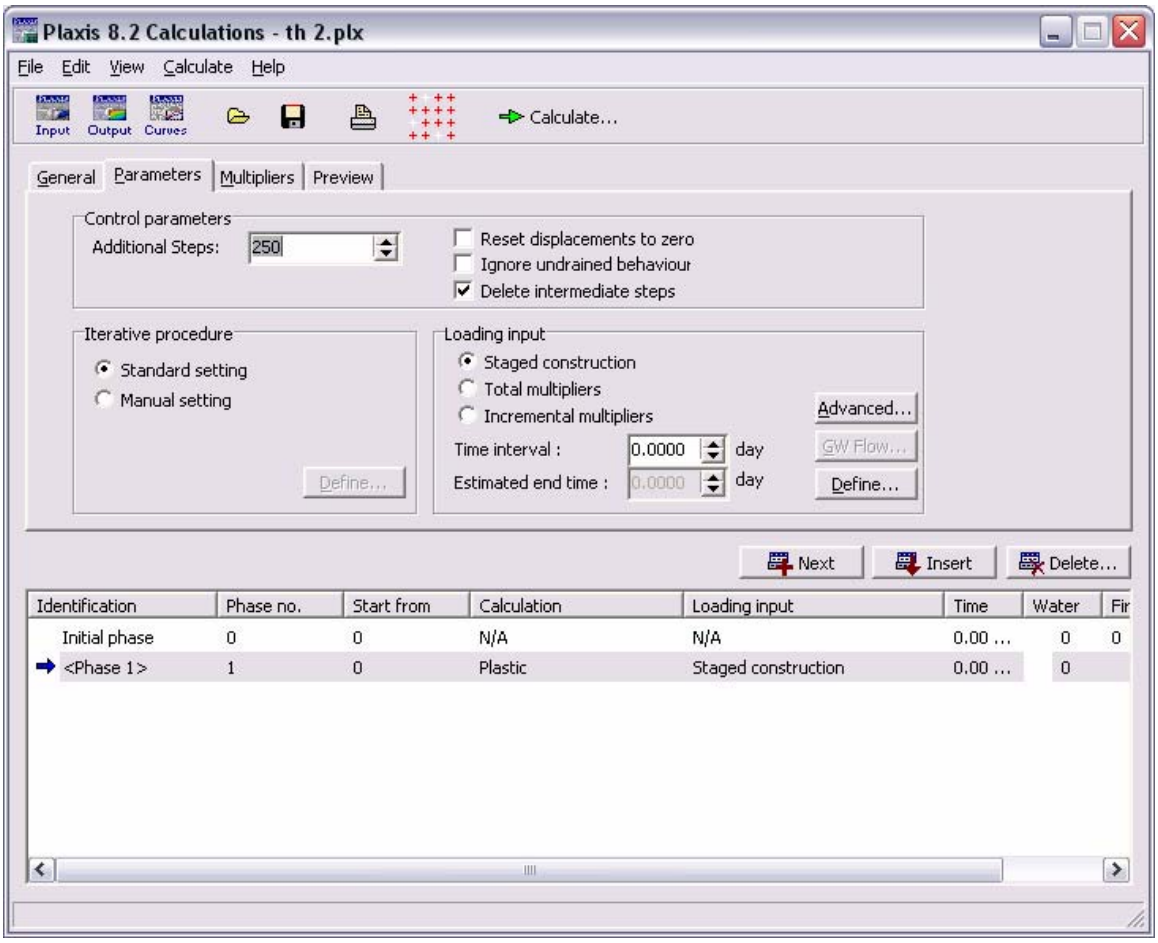
Update

12. Bắt đầu tính toán 



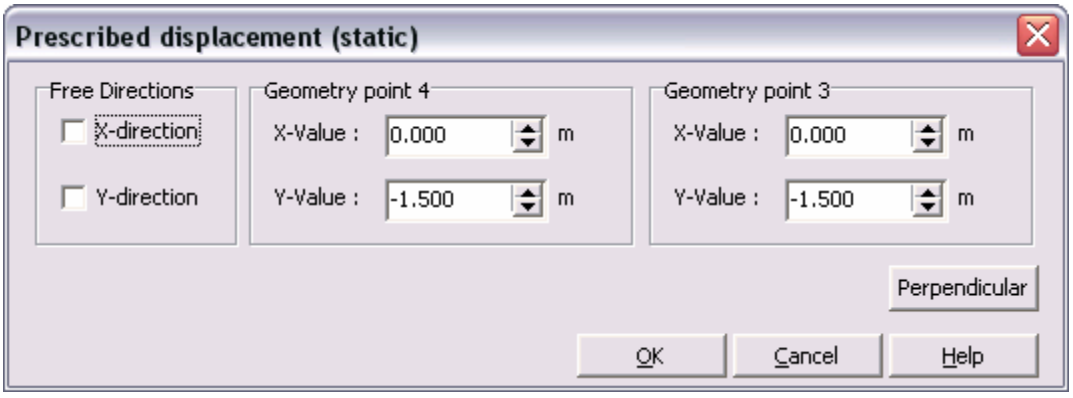

Plaxis 8.2 Calculations - th 2.plx
File Edit View Calculate Help
Input Output Curves
Calculate...
General Parameters Multipliers Preview
Phase
Number / ID.: 1 <Phase 1>
Start from phase: 0 - Initial phase
Calculation type
Plastic
Advanced
Log info
Comments
Parameters
Next Insert Delete...
Identification Phase no. Start from Calculation Loading input Time Water Fir
Initial phase 0 0 N/A N/A 0.00 ... 0 0
<Phase 1> 1 0 Plastic Staged construction 0.00 ... 0

Parameters

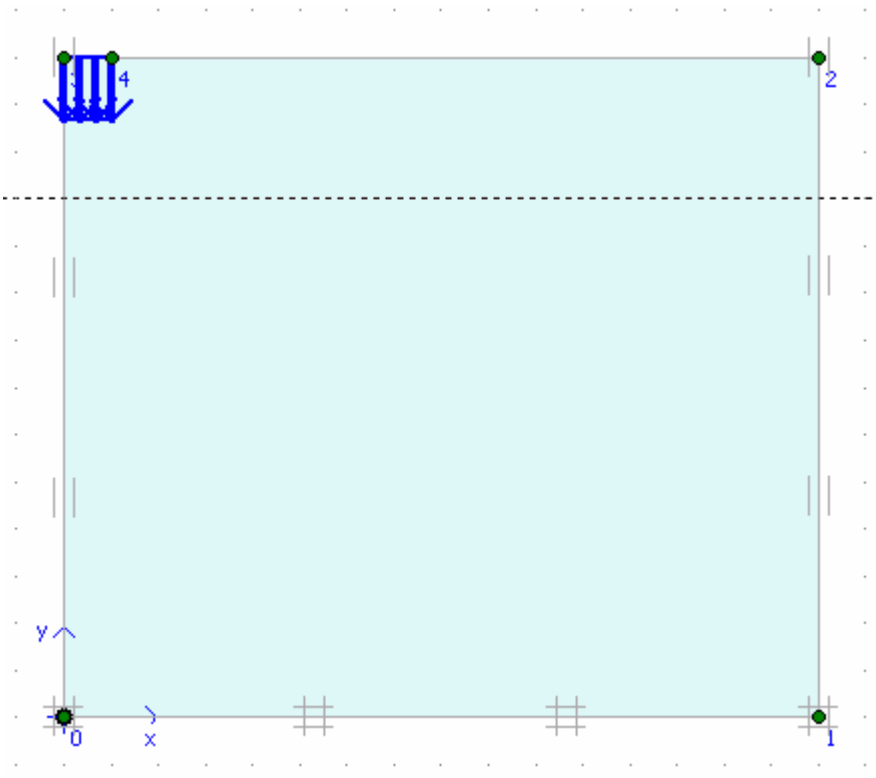


Nhấp vào Define và máy tự động
Trở về màn hình Input

Gán chuyển vị biết trước bằng cách nhấp vào chuyển vị trên hình



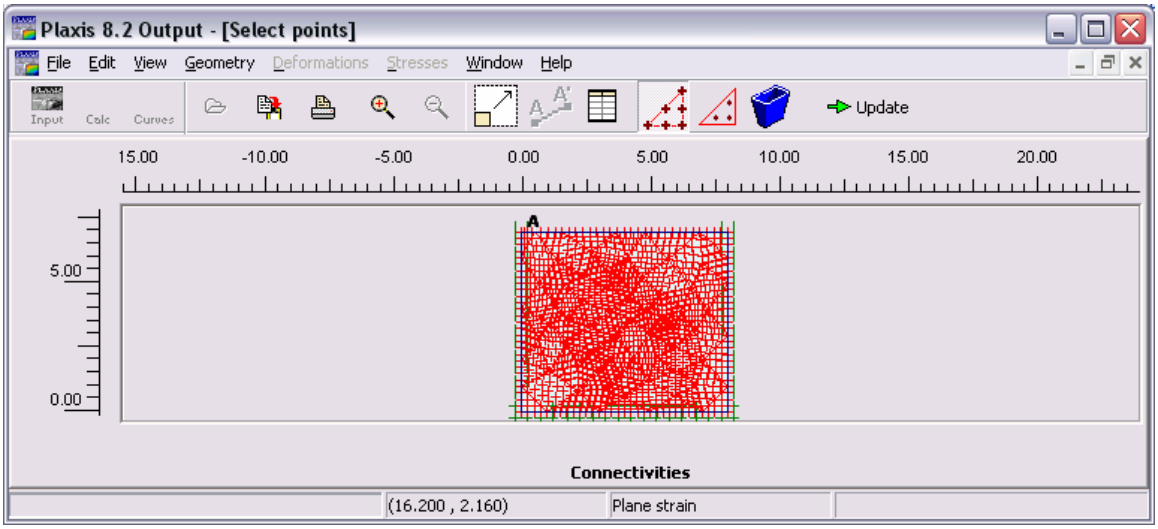
OK



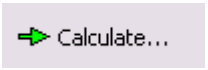
Update

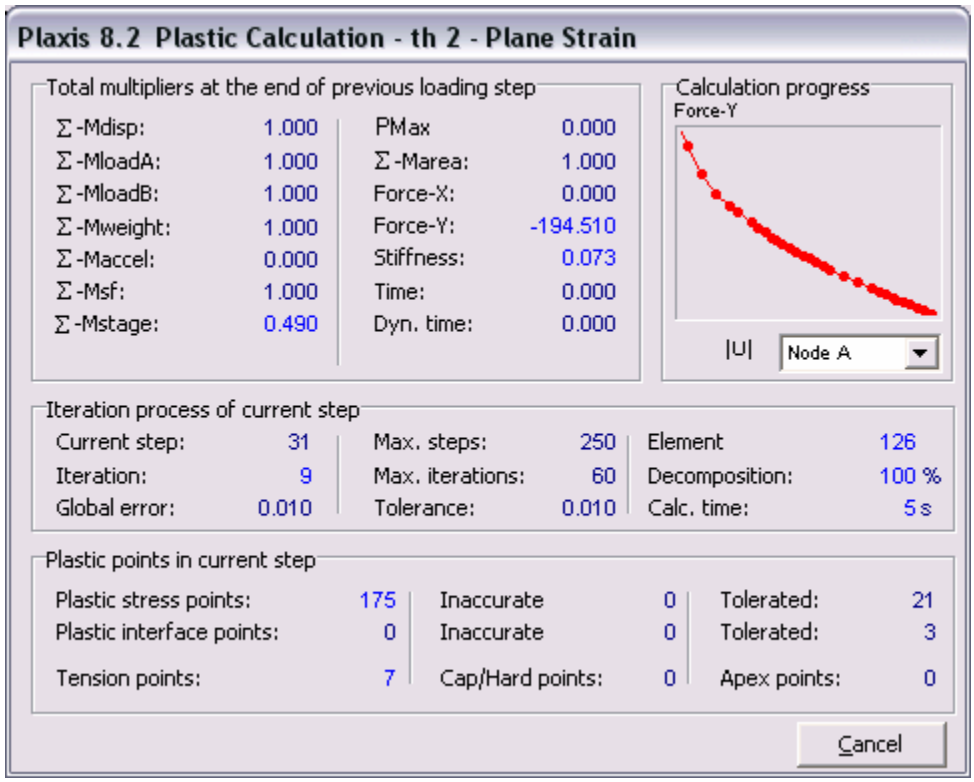
Dùng biểu tượng  để chọn điểm khảo sát

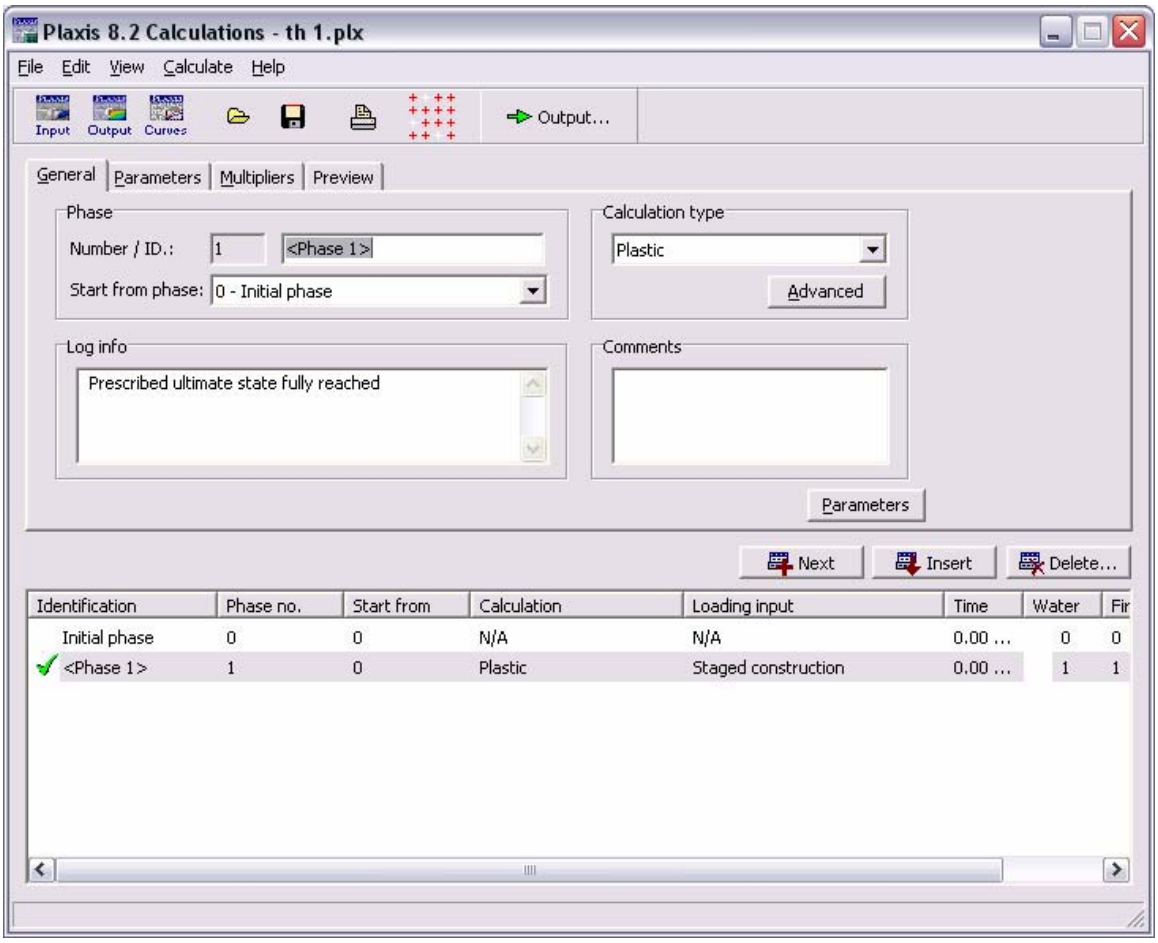
Ví dụ điểm A



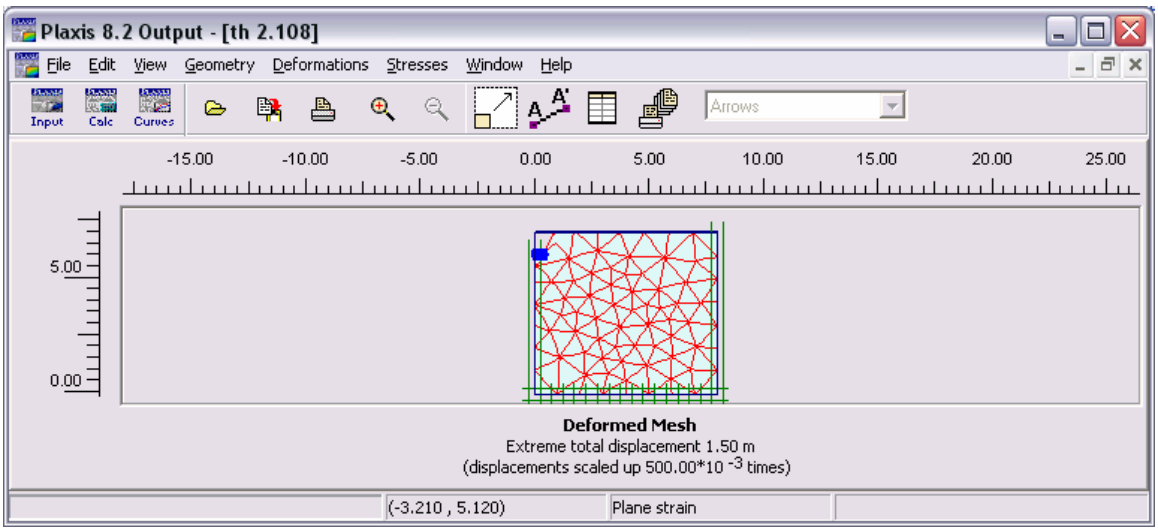
Update

Tính toán 
Calculate...


Plaxis 8.2 Plastic Calculation - th 2 - Plane Strain
Total multipliers at the end of previous loading step
Σ-Mdisp: 1.000
Σ-MloadA: 1.000
Σ-MloadB: 1.000
Σ-Mweight: 1.000
Σ-Maccel: 0.000
Σ-Msf: 1.000
Σ-Mstage: 0.490
PMax 0.000
Σ-Marea: 1.000
Force-X: 0.000
Force-Y: -194.510
Stiffness: 0.073
Time: 0.000
Dyn. time: 0.000
Calculation progress
Force-Y
|U|
Node A
Iteration process of current step
Current step: 31
Iteration: 9
Global error: 0.010
Max. steps: 250
Max. iterations: 60
Tolerance: 0.010
Element 126
Decomposition: 100 %
Calc. time: 5 s
Plastic points in current step
Plastic stress points: 175
Plastic interface points: 0
Tension points: 7
Inaccurate 0
Inaccurate 0
Cap/Hard points: 0
Tolerated: 21
Tolerated: 3
Apex points: 0
Cancel

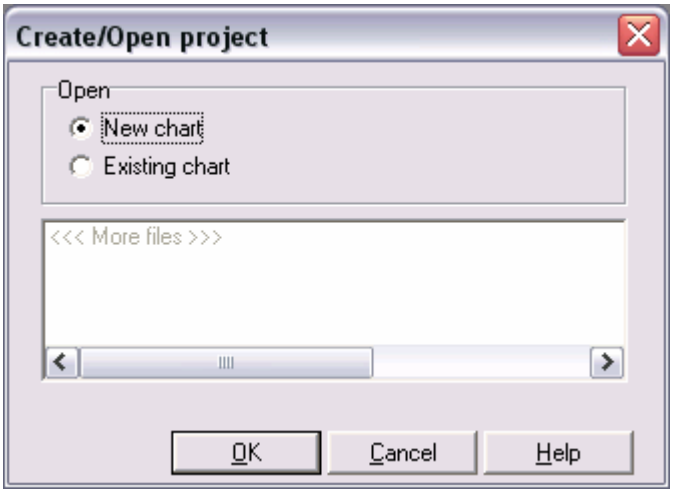


Đã tính toán xong , nhấp vào Output

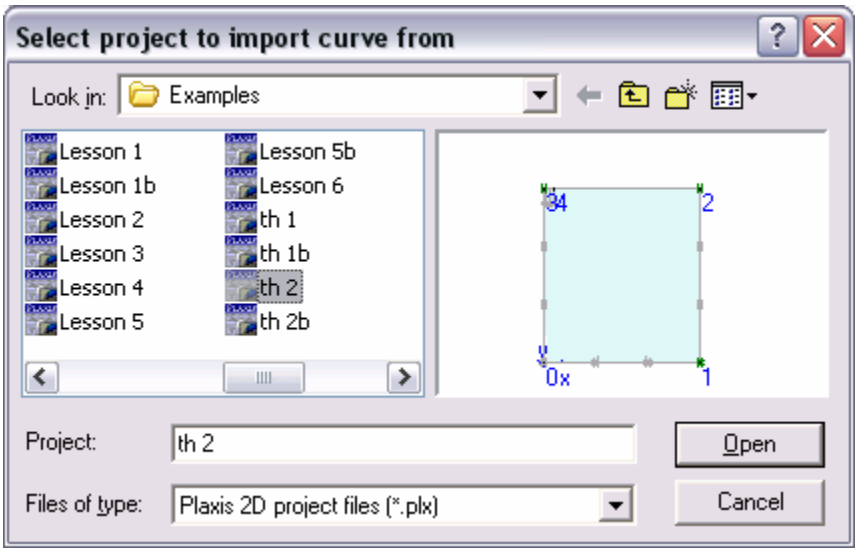


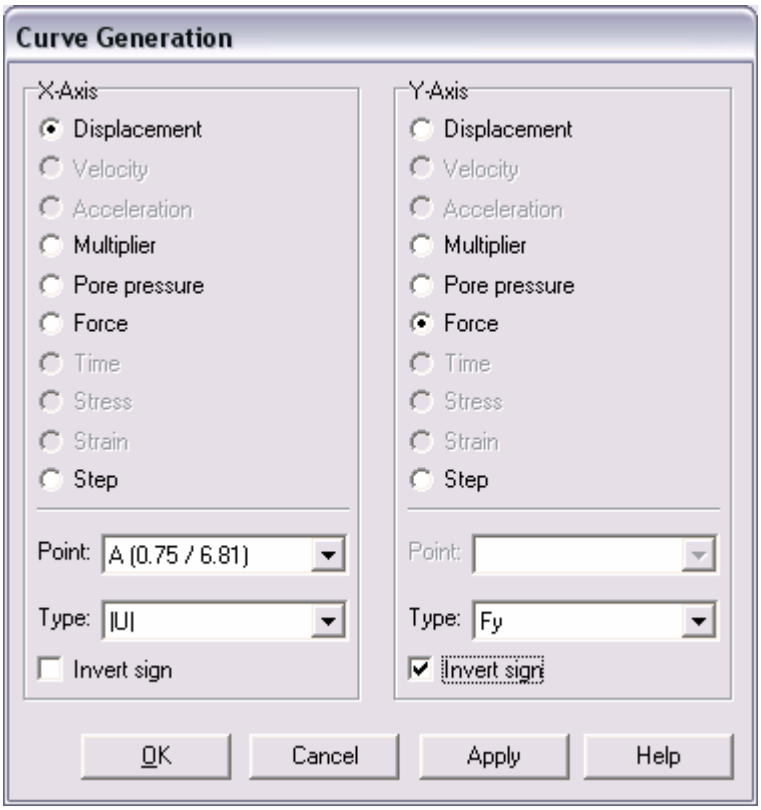
Dùng biểu tượng 

để vẽ kết quả

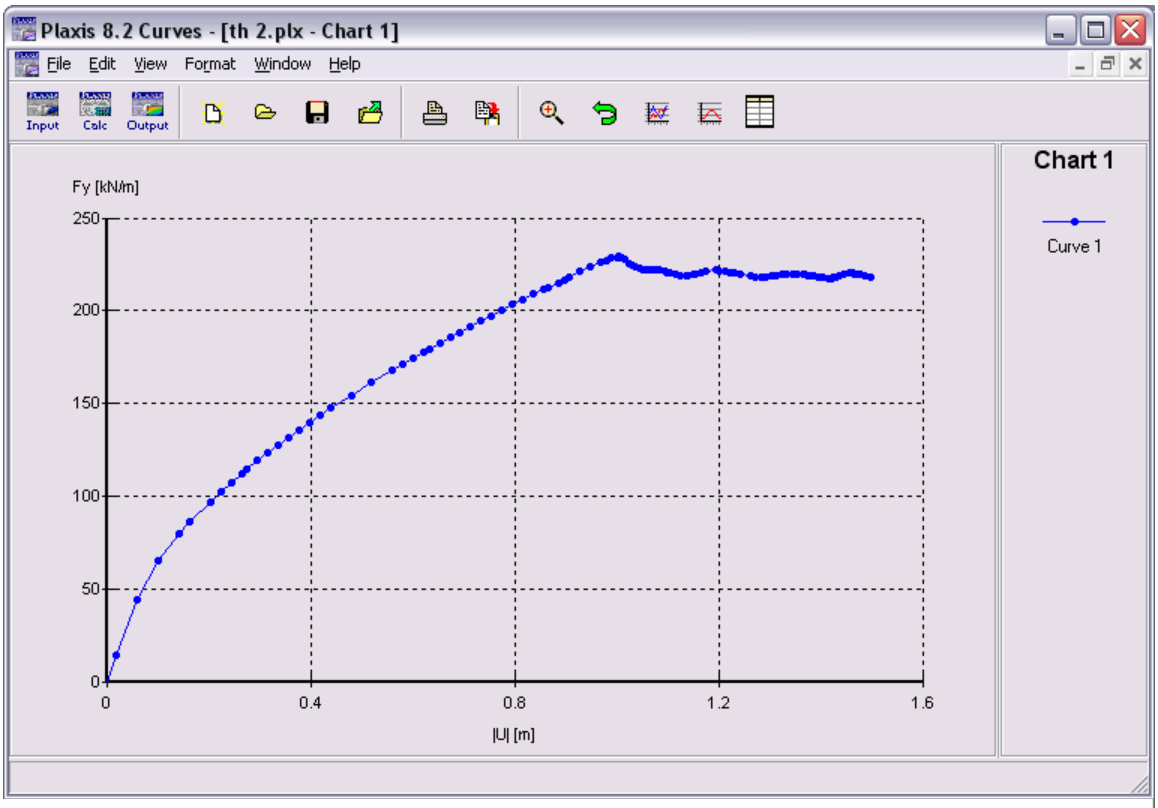

Create/Open project
Open
New chart
Existing chart
<<< More files >>>
OK
Cancel
Help

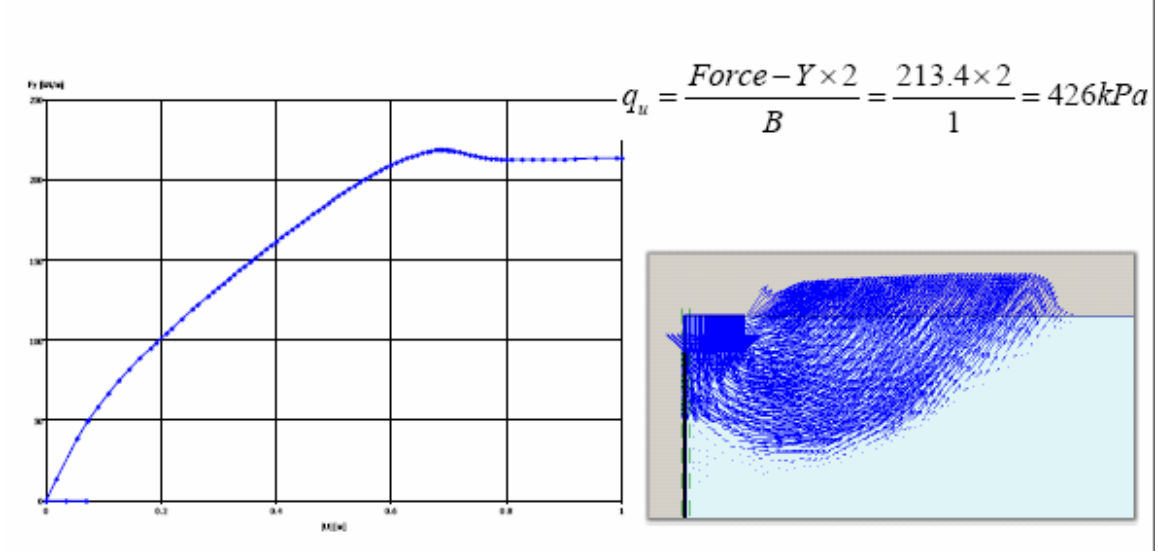
OK


Select project to import curve from
Look in:
Examples
Lesson 1
Lesson 1b
Lesson 2
Lesson 3
Lesson 4
Lesson 5
Lesson 5b
Lesson 6
th 1
th 1b
th 2
th 2b
34
2
0x
1
Project:
th 2
Open
Files of type:
Plaxis 2D project files (*.plx)
Cancel


Curve Generation
X-Axis
Displacement
Velocity
Acceleration
Multiplier
Pore pressure
Force
Time
Stress
Strain
Step
Point: A (0.75 / 6.81)
Type: |U|
Invert sign
Y-Axis
Displacement
Velocity
Acceleration
Multiplier
Pore pressure
Force
Time
Stress
Strain
Step
Point:
Type: Fy
Invert sign
OK
Cancel
Apply
Help

Ok





$$q_u = \frac{Force - Y \times 2}{B} = \frac{213.4 \times 2}{1} = 426kPa$$

$$q_u = cN_c F_{cs} F_{cd} F_{ci} + qN_q F_{qs} F_{qd} F_{qi} + \frac{1}{2}\gamma B N_\gamma F_{\gamma s} F_{\gamma d} F_{\gamma i}$$

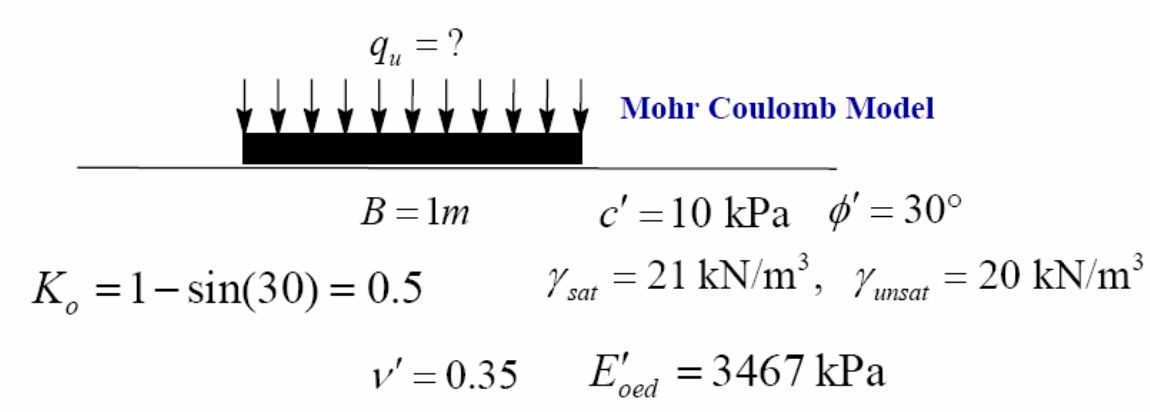
$$N_q = \tan^2\left(45 + \frac{\phi'}{2}\right)\exp^{\pi \tan\phi'} = 18.40$$

$$N_c = \cot\phi'\left(N_q - 1\right) = 30.1$$

$$N_\gamma = \left(N_q - 1\right)\tan 1.4\phi' = 15.66$$

$$q_u = 10(30.1) + 0.5(20)(1)(15.66) = 457.6kPa$$

Phần 3b : PLAXIS INPUT, CALCULATE,CURVES



13. Tạo hình dạng bài toán

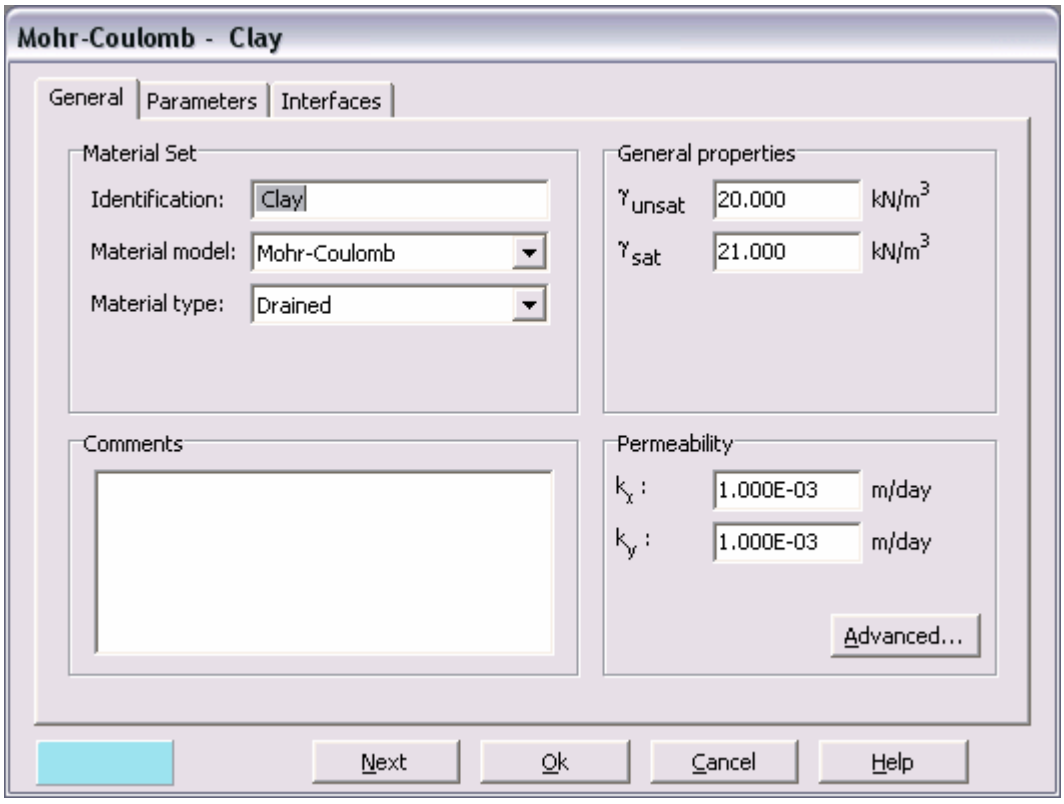
Vẽ tấm (Plate) 

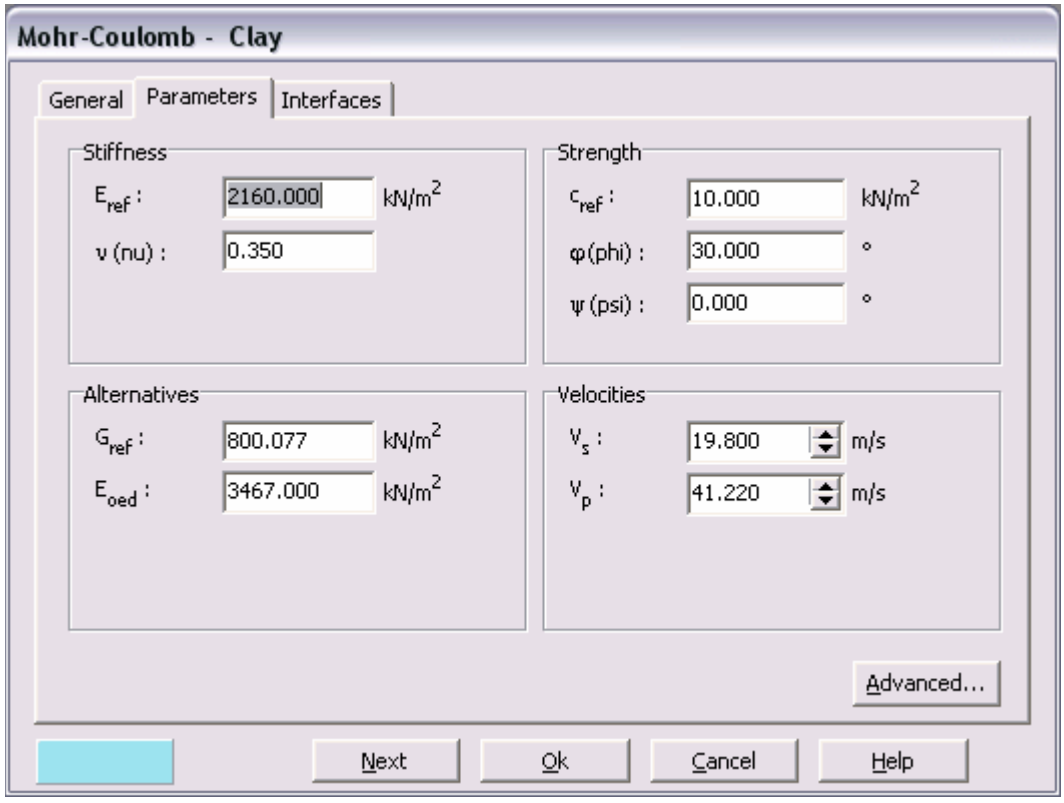
Gán biểu tượng áp lực 

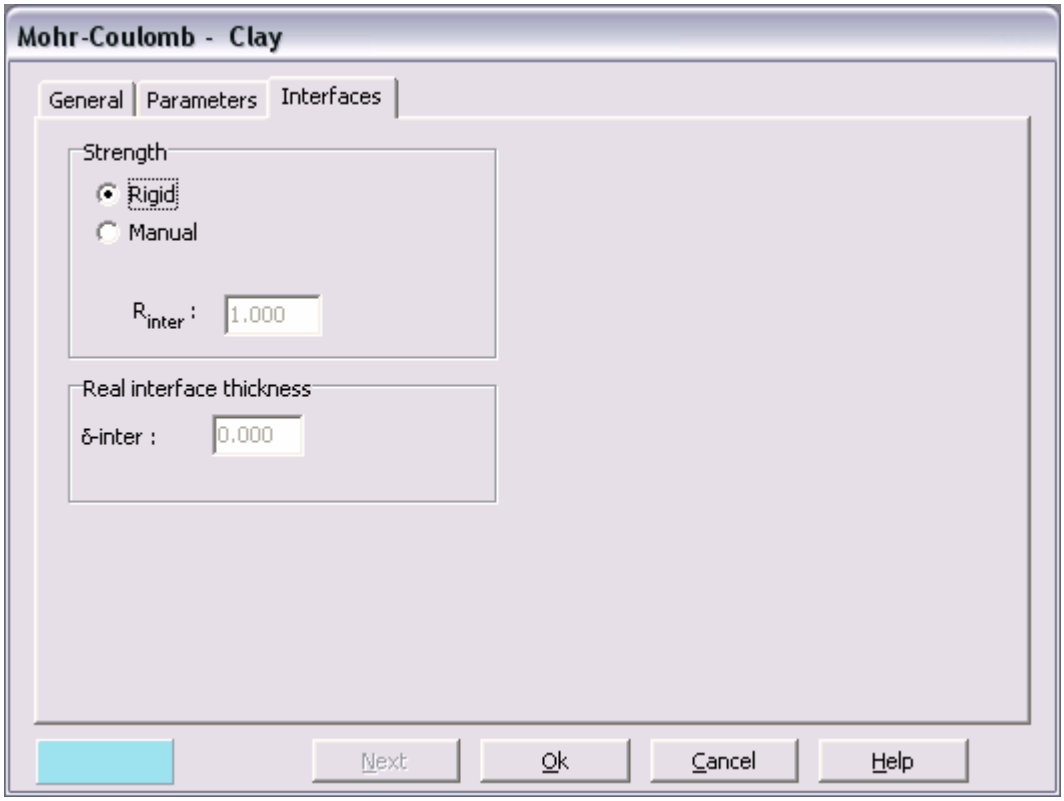
Vẽ phần tử tiếp xúc 

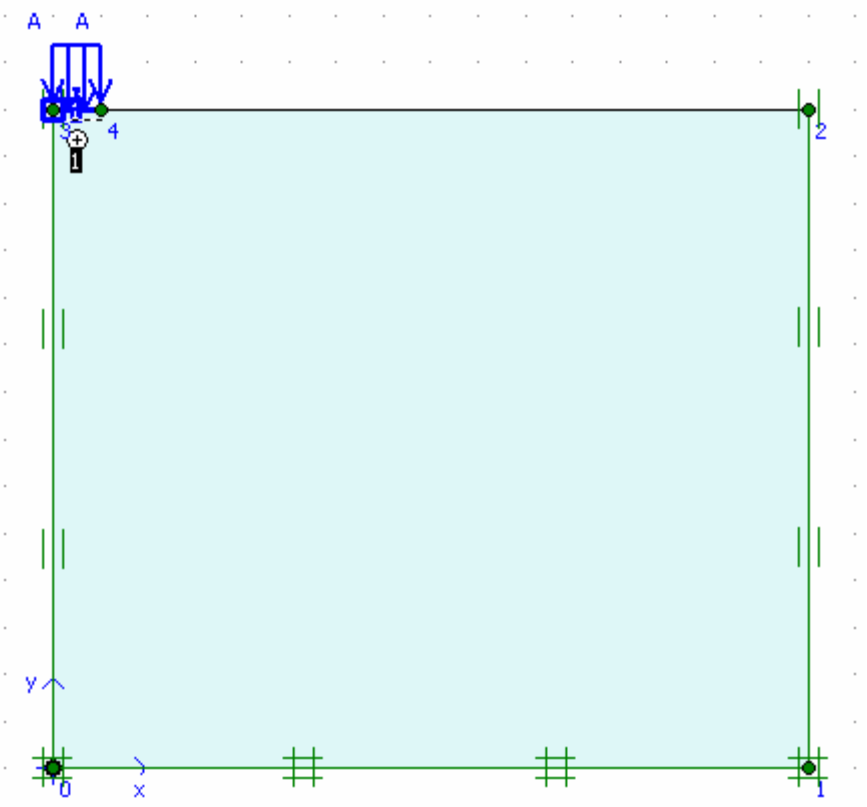
Gán biên 

Gán số liệu địa chất 

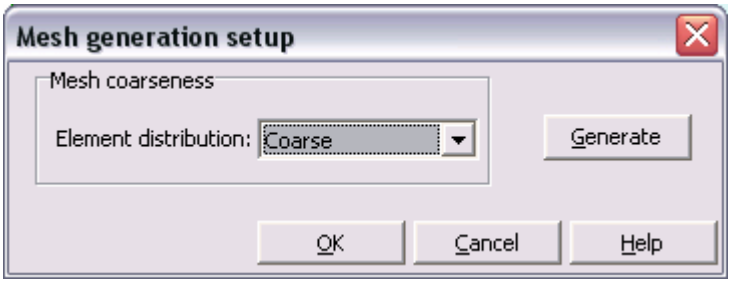

Mohr-Coulomb - Clay
General
Parameters
Interfaces
Material Set
Identification: Clay
Material model: Mohr-Coulomb
Material type: Drained
General properties
γunsat 20.000 kN/m3
γsat 21.000 kN/m3
Comments
Permeability
kx : 1.000E-03 m/day
ky : 1.000E-03 m/day
Advanced...
Next
Ok
Cancel
Help

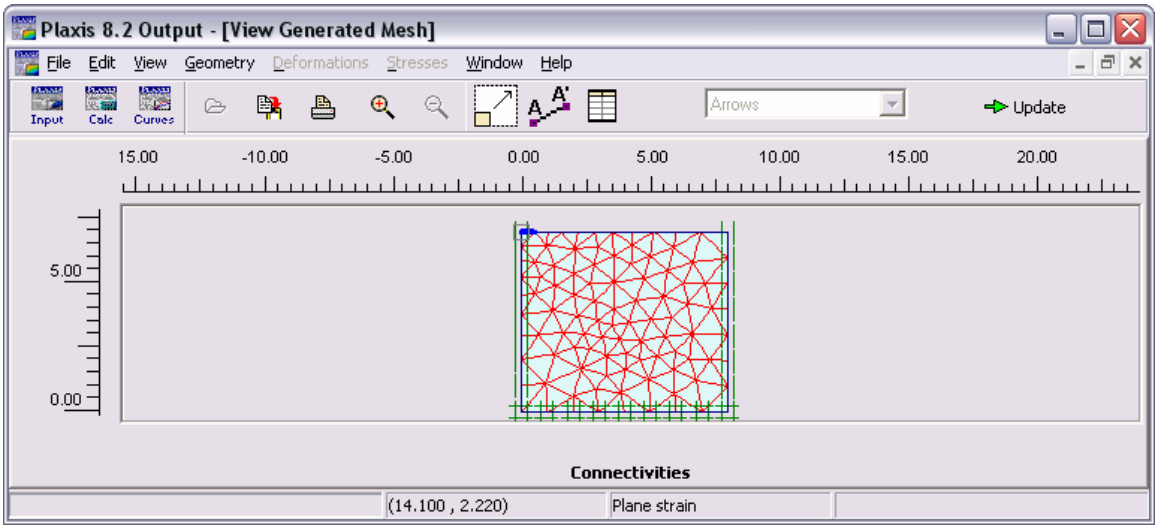

Mohr-Coulomb - Clay
General
Parameters
Interfaces
Stiffness
Eref : 2160.000 kN/m2
ν (nu) : 0.350
Strength
cref : 10.000 kN/m2
φ (phi) : 30.000 °
ψ (psi) : 0.000 °
Alternatives
Gref : 800.077 kN/m2
Eoed : 3467.000 kN/m2
Velocities
Vs : 19.800 m/s
Vp : 41.220 m/s
Advanced...
Next
Ok
Cancel
Help


Mohr-Coulomb - Clay
General
Parameters
Interfaces
Strength
Rigid
Manual
R inter :
1.000
Real interface thickness
δ-inter :
0.000
Next
Ok
Cancel
Help


A
A
4
2
1
3
y
x
0
1

14. Tạo lưới phần tử

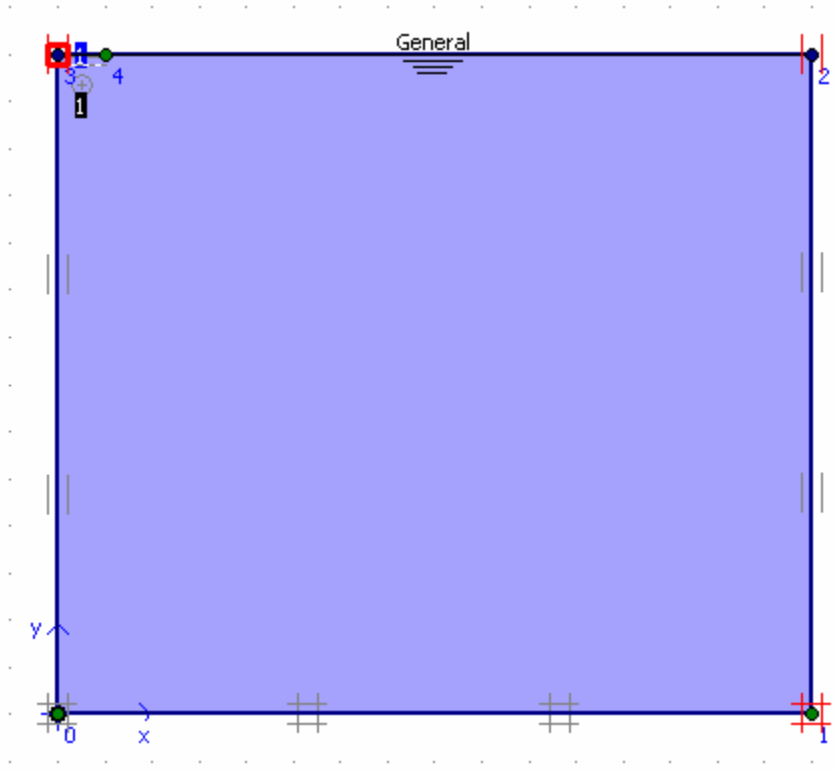




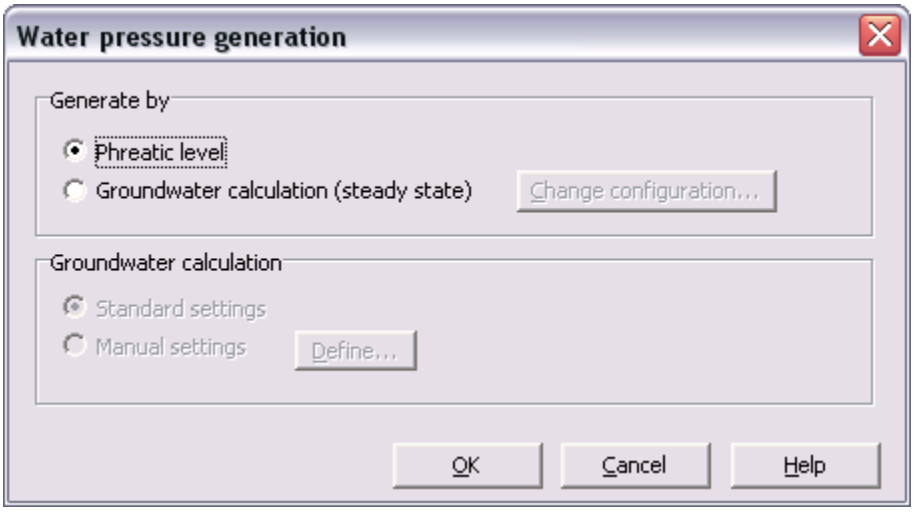
Update

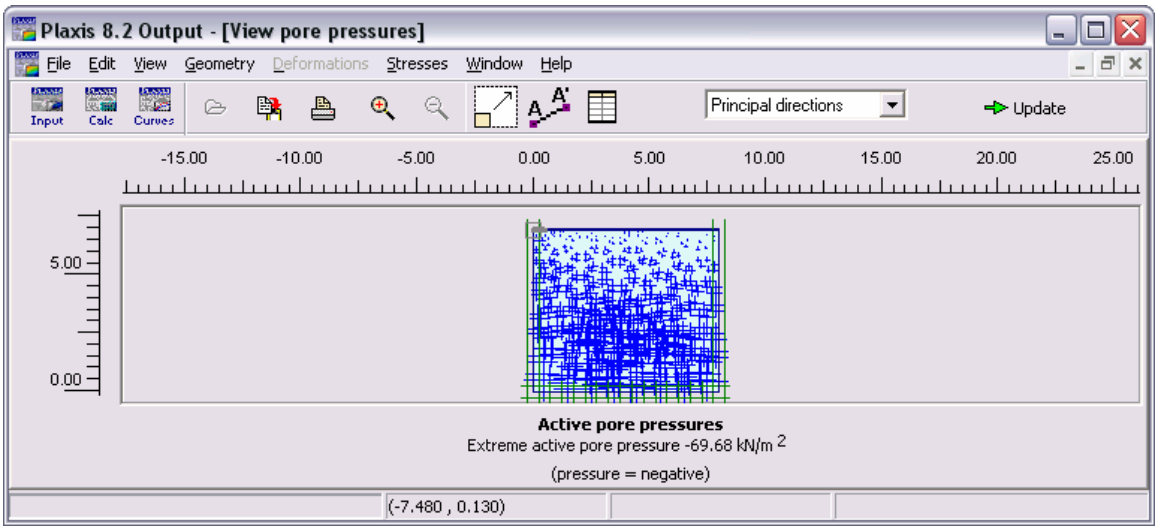
15. Tính toán điều kiện ban đầu

Gán mực nước ngầm

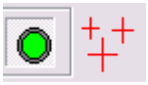


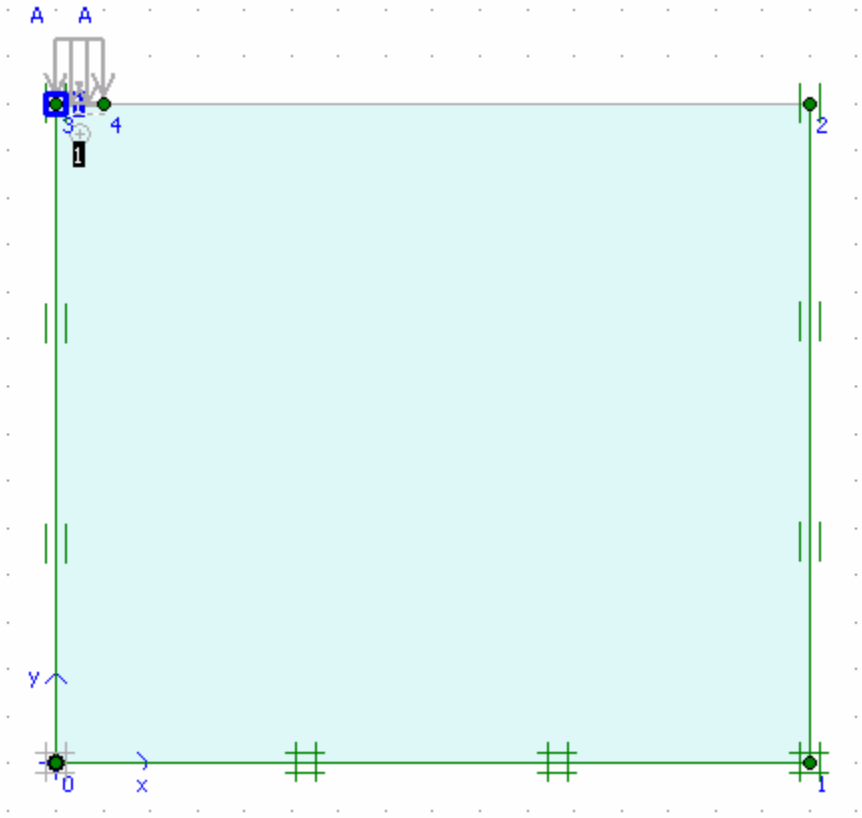
Tính toán áp lực nước 

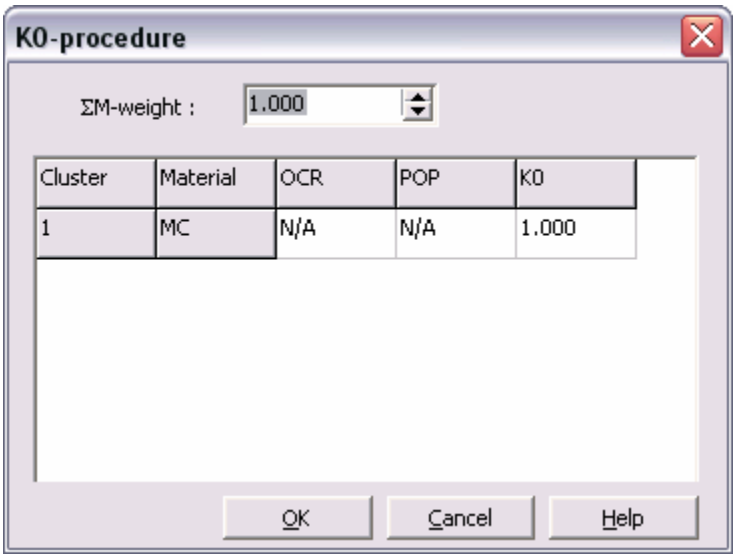


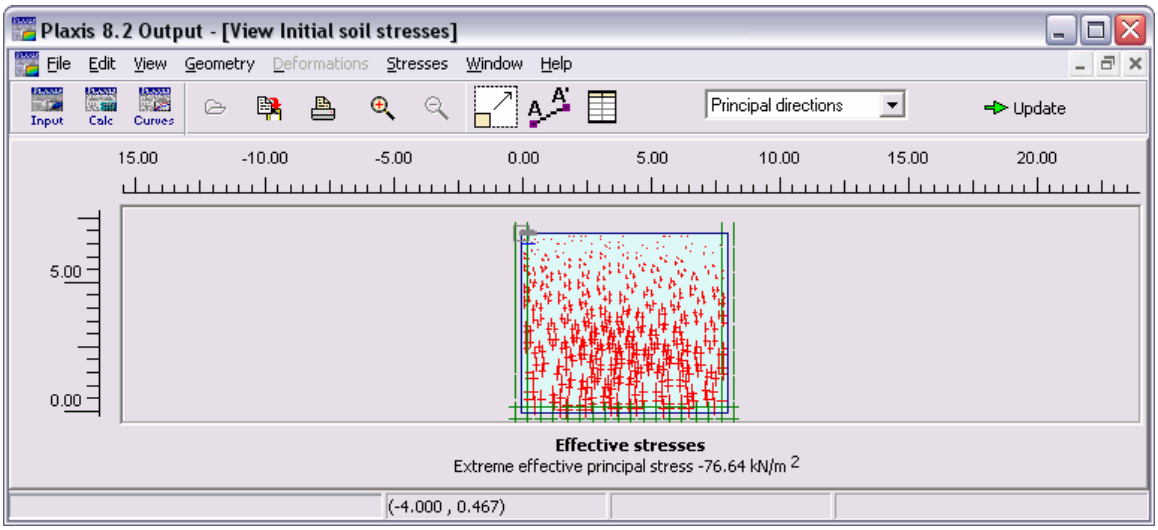


Update

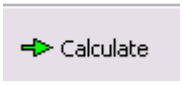
Tính toán áp lực đất 

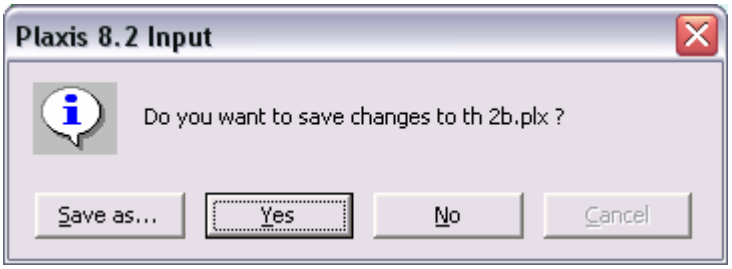


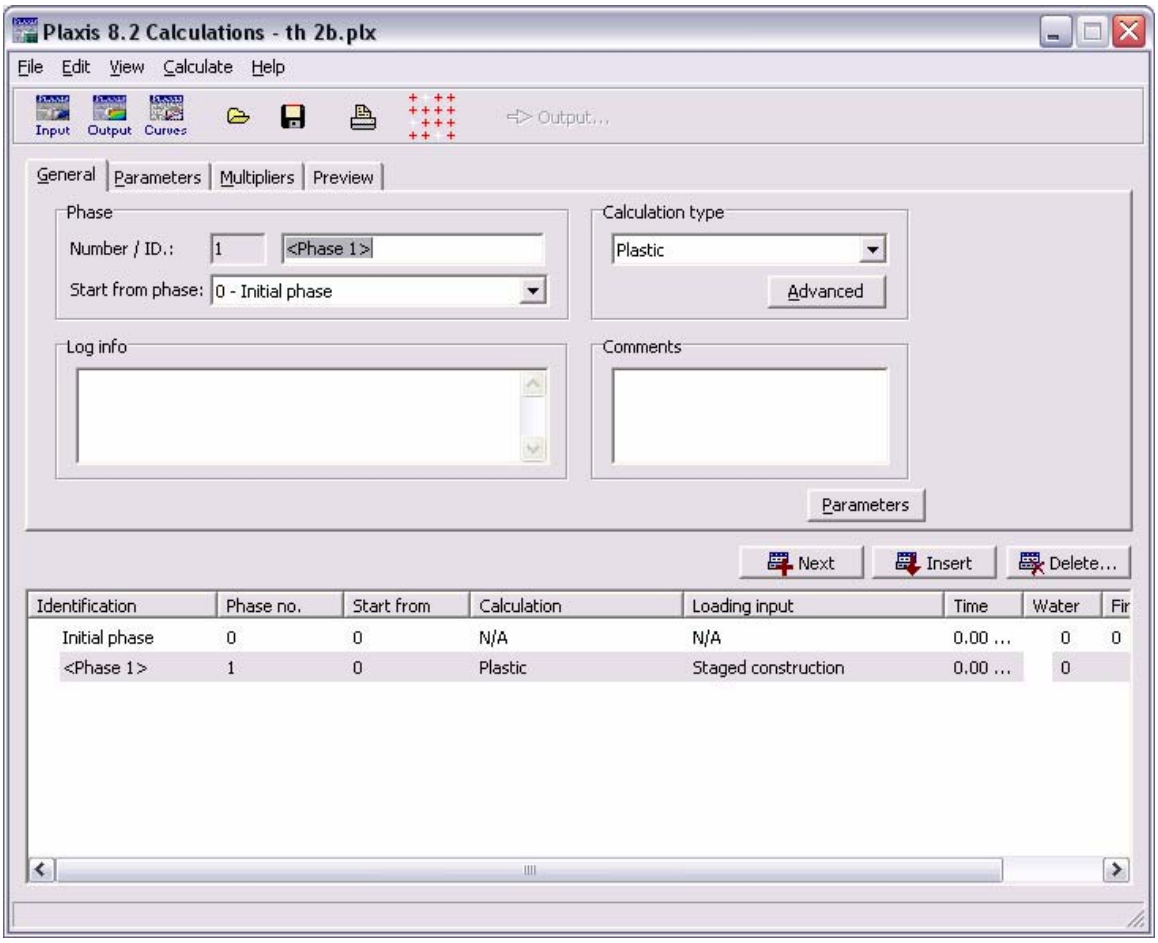




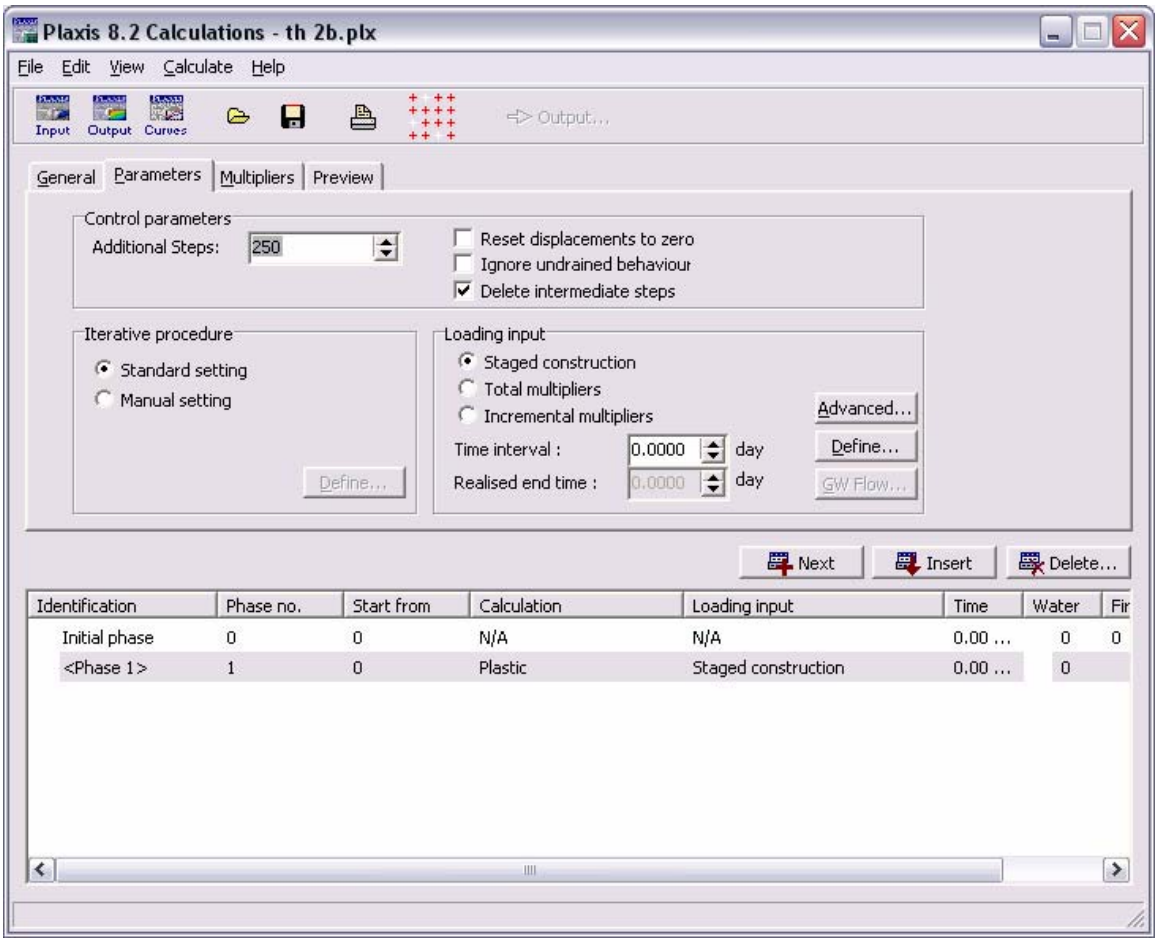
Update

16. Bắt đầu tính toán 

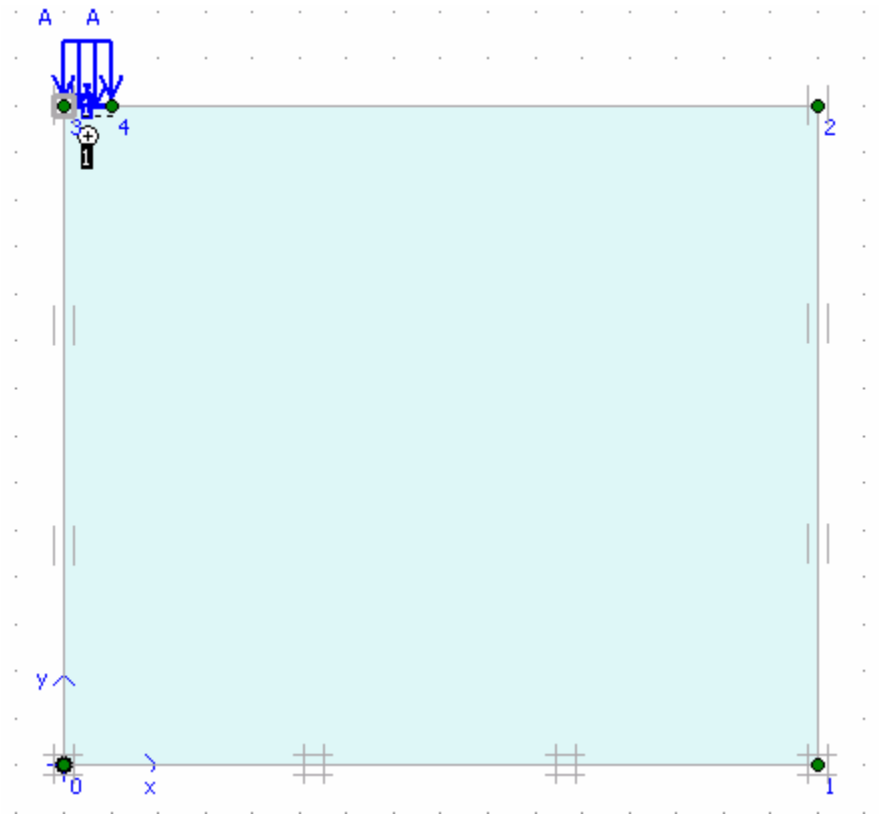



Plaxis 8.2 Calculations - th 2b.plx
File Edit View Calculate Help
Input Output Curves
Output...
General Parameters Multipliers Preview
Phase
Number / ID.: 1 <Phase 1>
Start from phase: 0 - Initial phase
Calculation type
Plastic
Advanced
Log info
Comments
Parameters
Next Insert Delete...
Identification Phase no. Start from Calculation Loading input Time Water Fir
Initial phase 0 0 N/A N/A 0.00 ... 0 0
<Phase 1> 1 0 Plastic Staged construction 0.00 ... 0

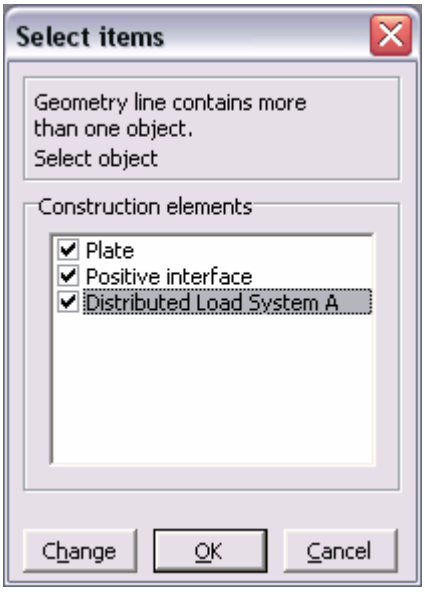
Parameters



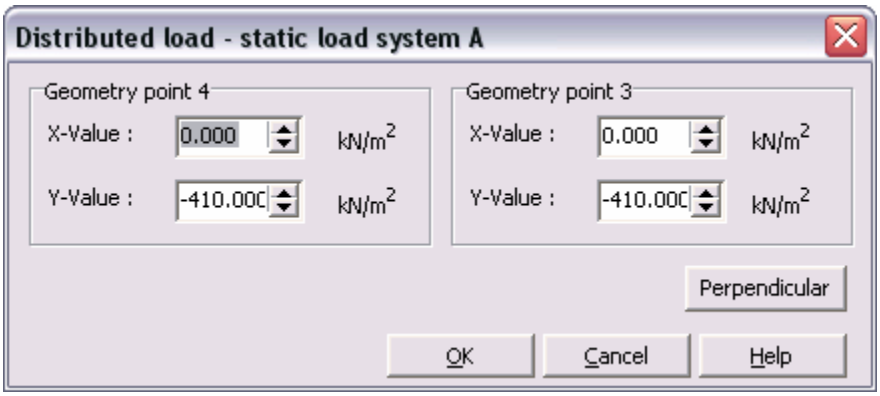
Nhấp vào Define và máy tự động
Trở về màn hình Input



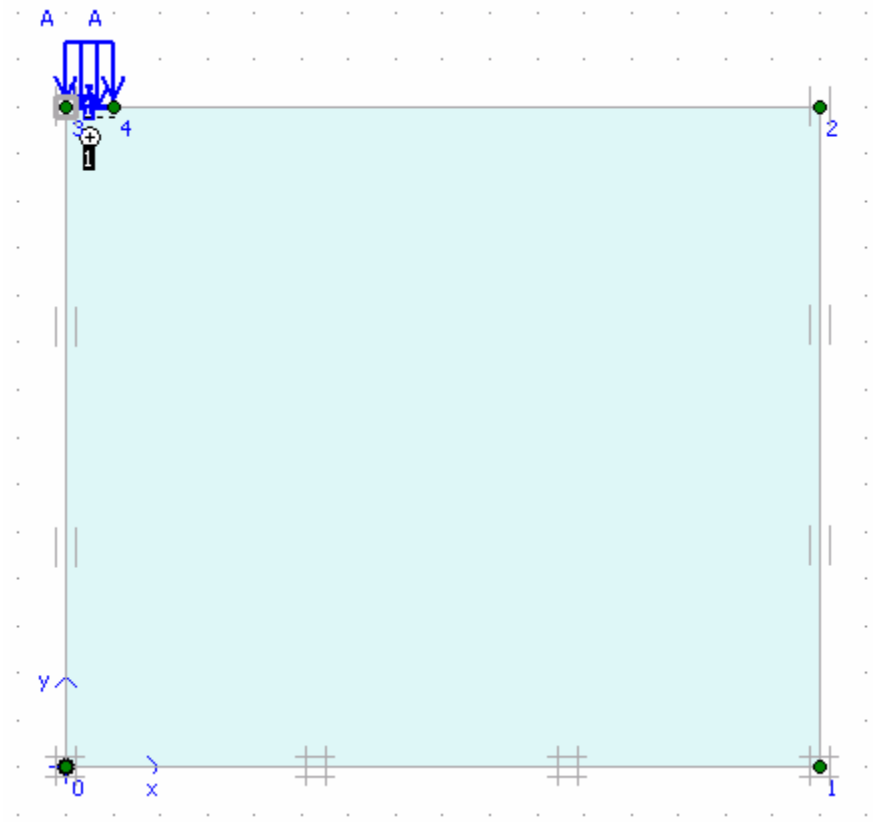
Gán giá trị tải bằng cách nhấp vào áp lực trên hình



Nhấp vào Change để nhập giá trị



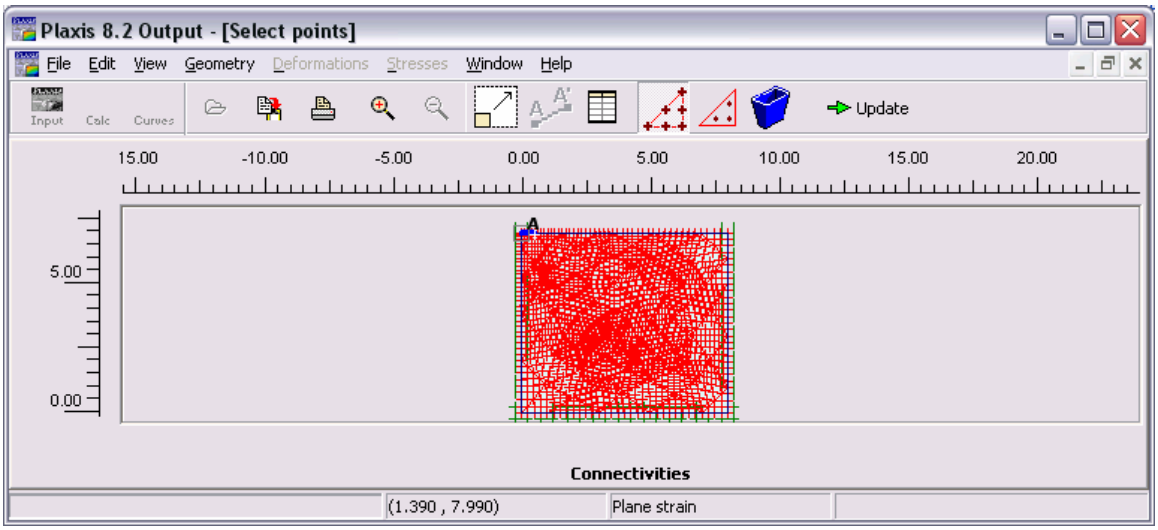
OK



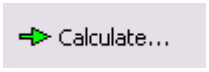
Update

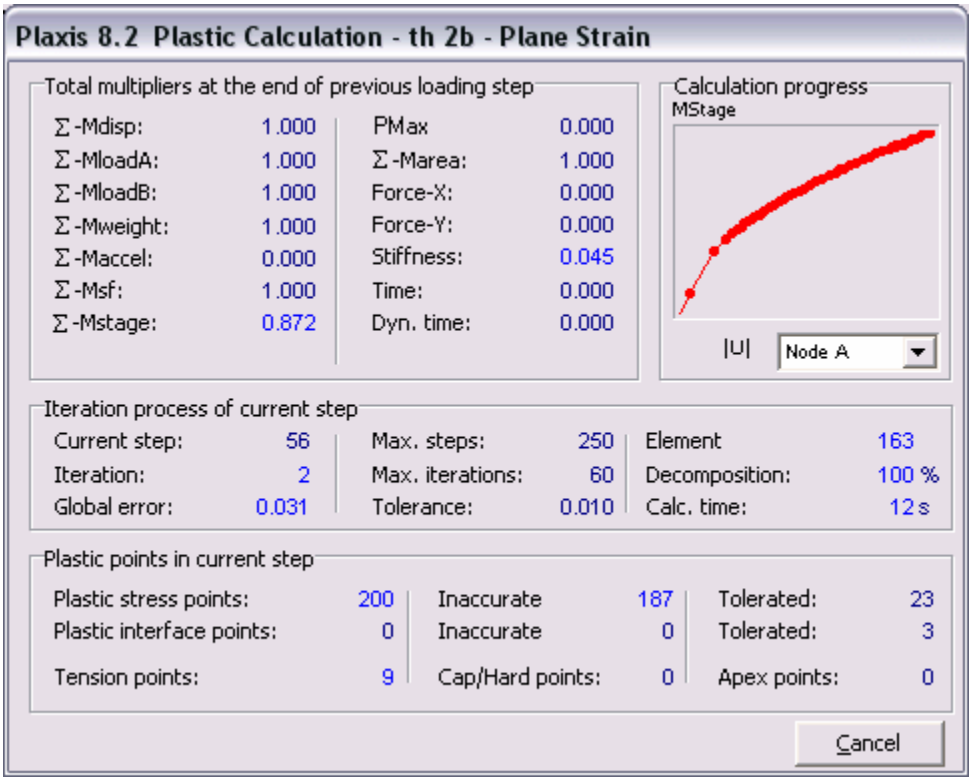
Dùng biểu tượng  để chọn điểm khảo sát

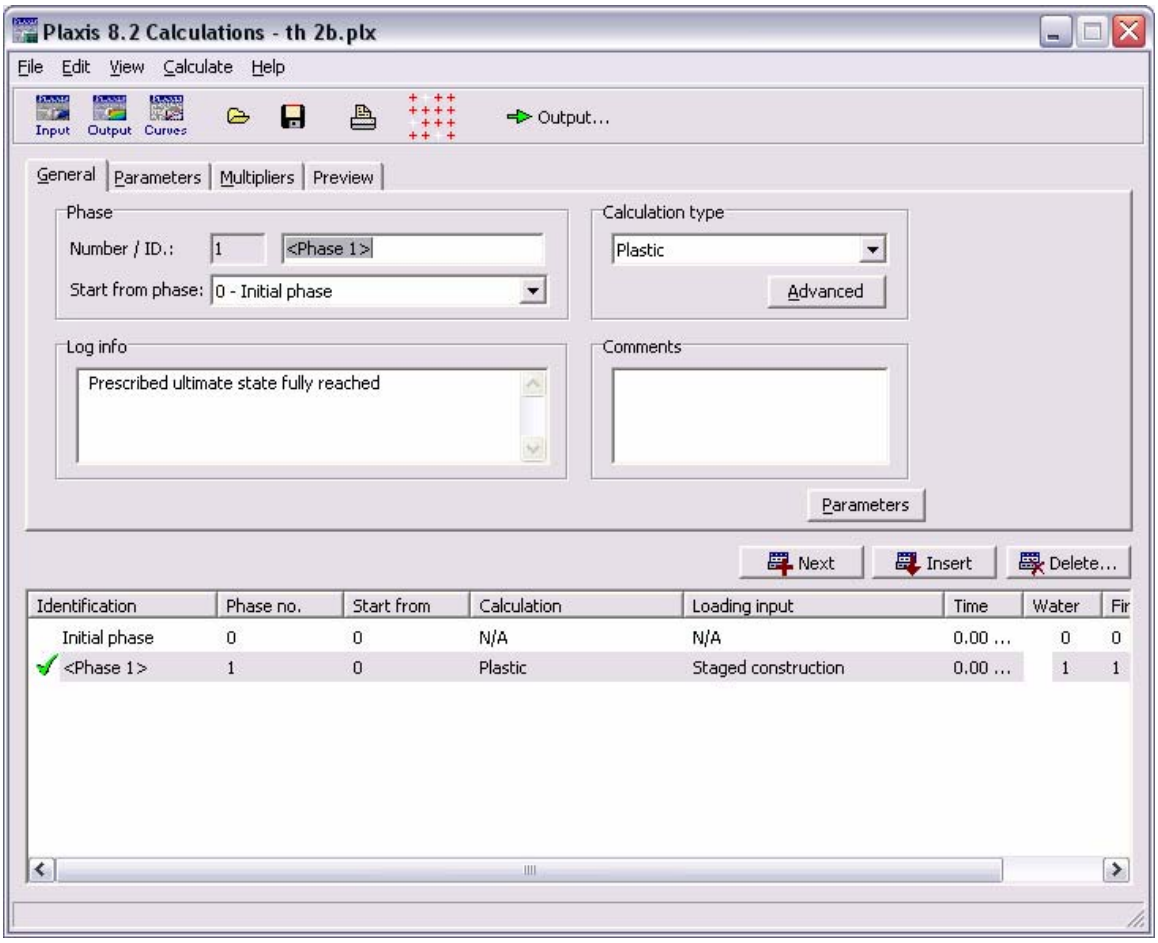
Ví dụ điểm A



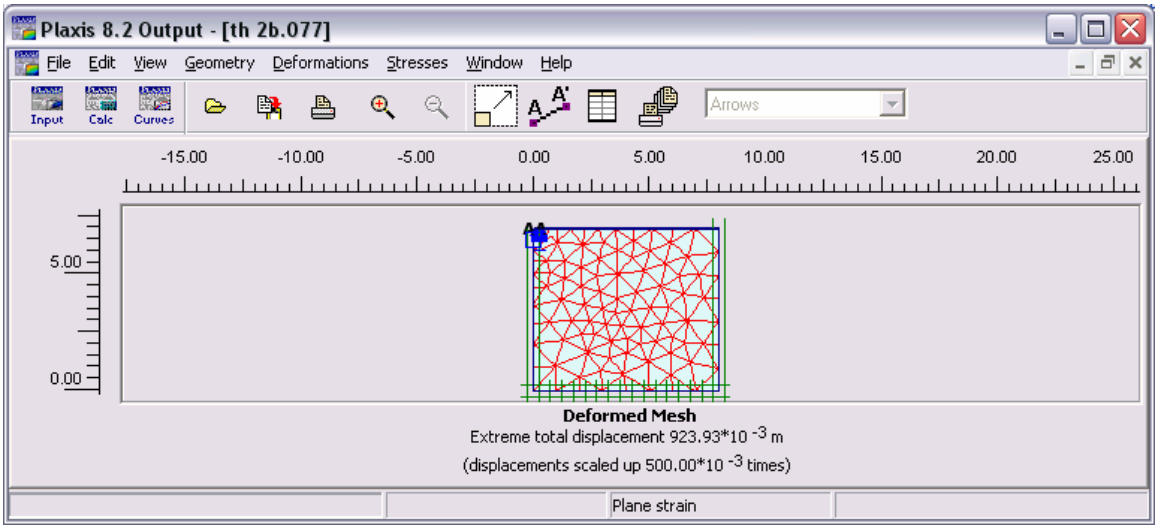
Update

Tính toán 



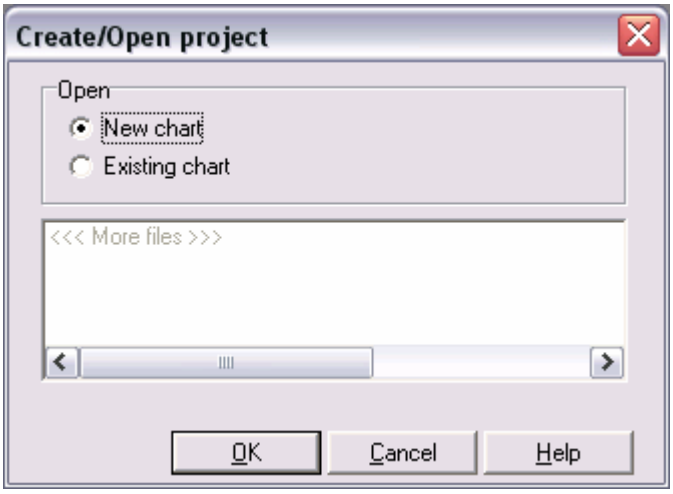


Đã tính toán xong , nhấp vào Output

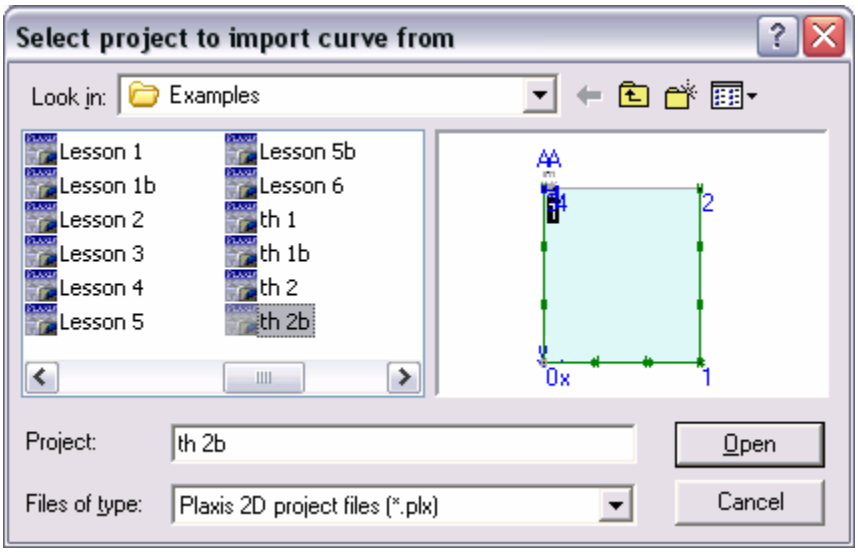


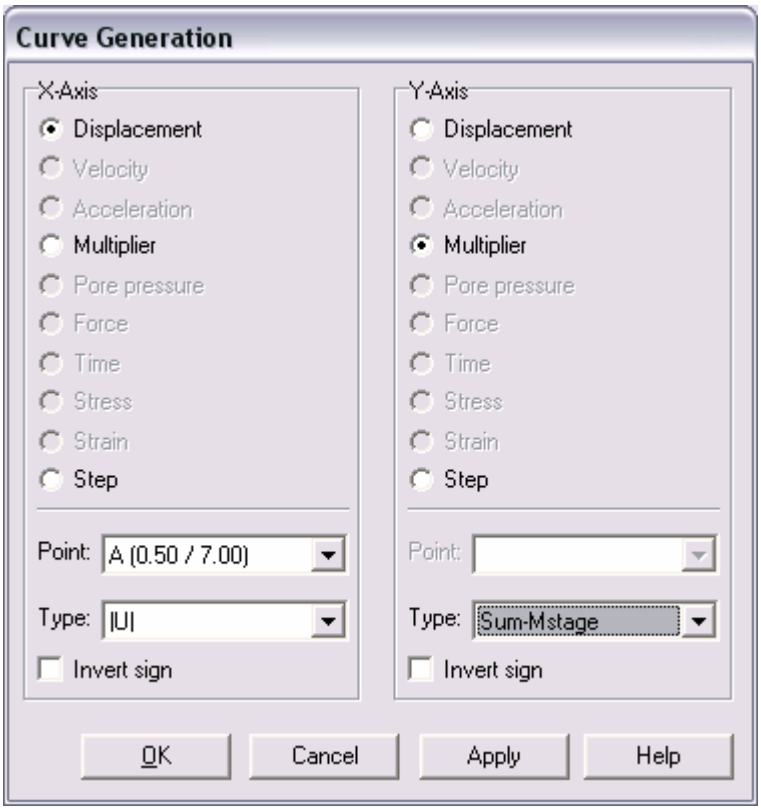
Dùng biểu tượng 

để vẽ kết quả

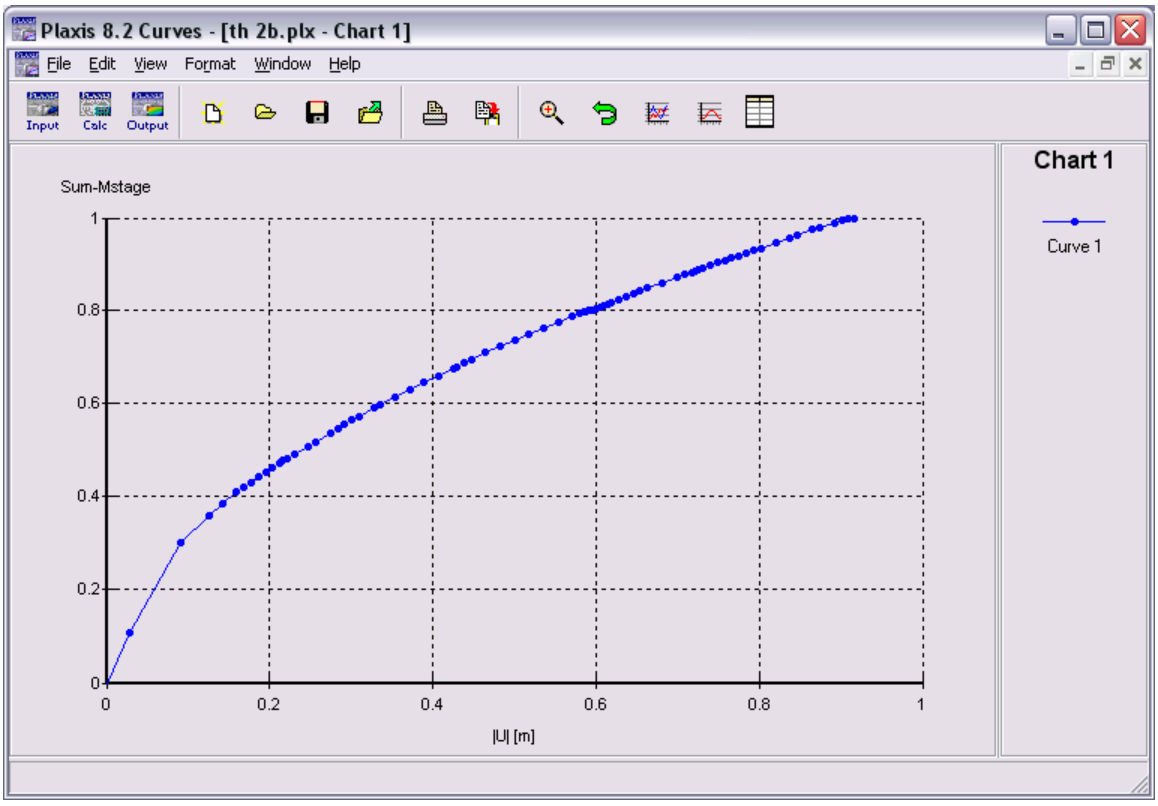

Create/Open project
Open
New chart
Existing chart
<<< More files >>>
OK
Cancel
Help

OK

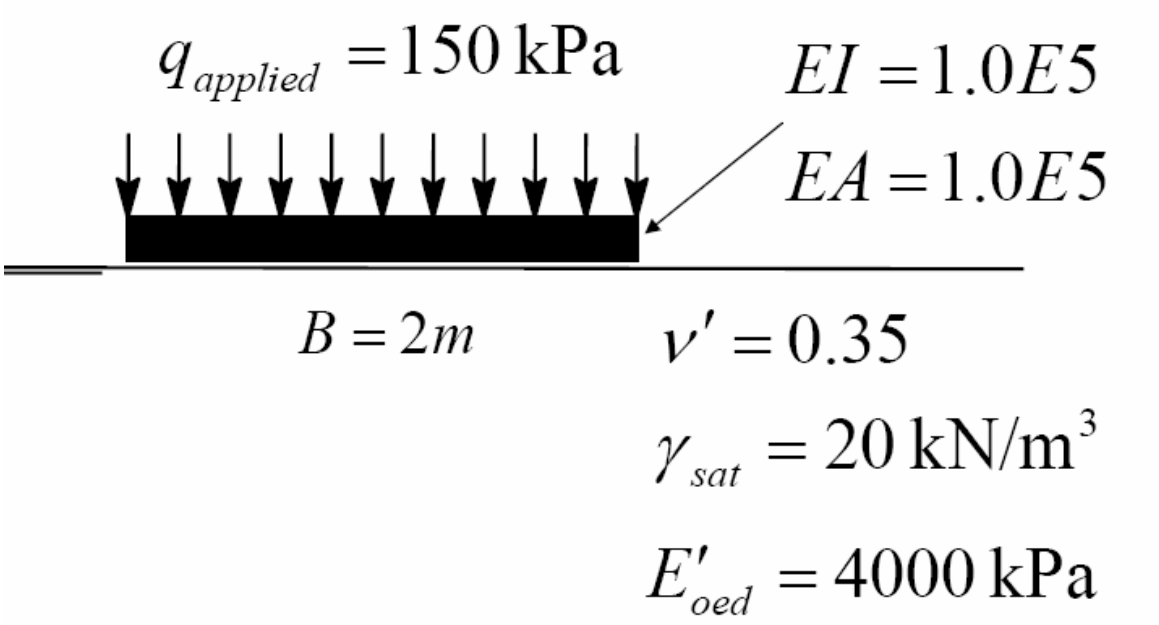

Select project to import curve from
Look in:
Examples
Lesson 1
Lesson 1b
Lesson 2
Lesson 3
Lesson 4
Lesson 5
Lesson 5b
Lesson 6
th 1
th 1b
th 2
th 2b
AA
2
0x
1
Project:
th 2b
Open
Files of type:
Plaxis 2D project files (*.plx)
Cancel


Curve Generation
X-Axis
Displacement
Velocity
Acceleration
Multiplier
Pore pressure
Force
Time
Stress
Strain
Step
Point: A (0.50 / 7.00)
Type: |U|
Invert sign
Y-Axis
Displacement
Velocity
Acceleration
Multiplier
Pore pressure
Force
Time
Stress
Strain
Step
Point:
Type: Sum-Mstage
Invert sign
OK
Cancel
Apply
Help

Ok


Plaxis 8.2 Curves - [th 2b.plx - Chart 1]
File Edit View Format Window Help
Input Calc Output
Sum-Mstage
1
0.8
0.6
0.4
0.2
0
0 0.2 0.4 0.6 0.8 1
|U| [m]
Chart 1
Curve 1

Phần 4 : PLAXIS INPUT,CALCULATE SETTLEMENT



ELASTIC – UNDRAINE – t = 0

17. Tạo hình dạng bài toán

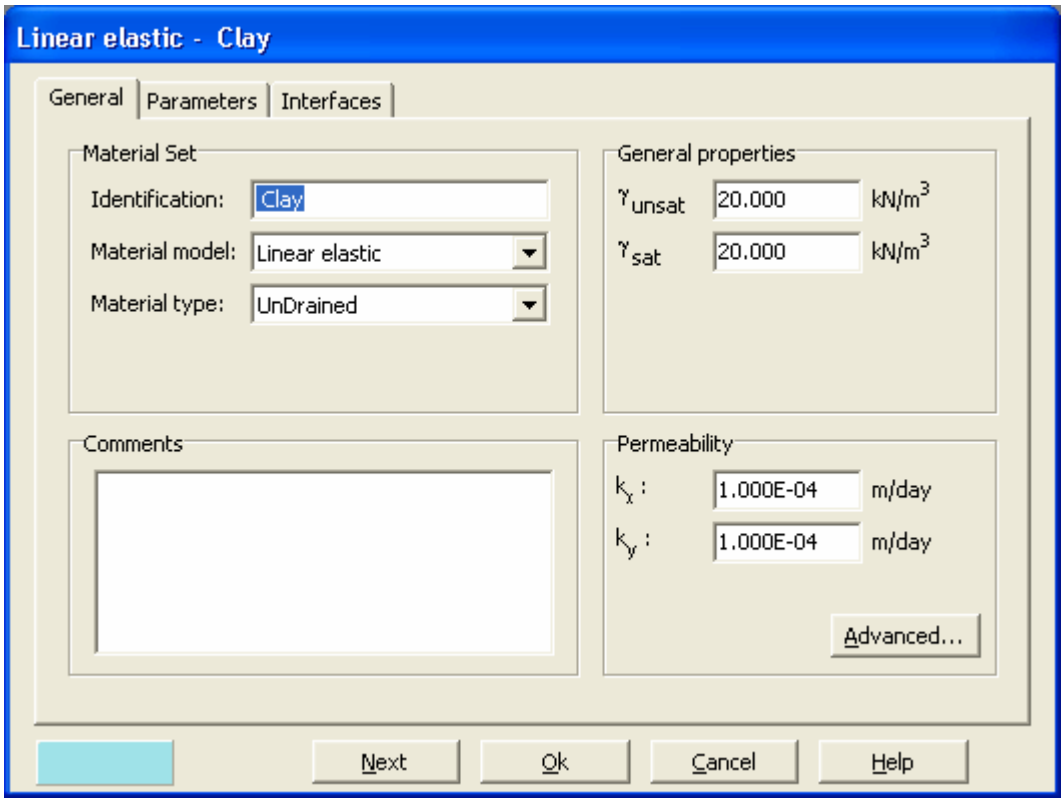
Vẽ tấm (Plate)

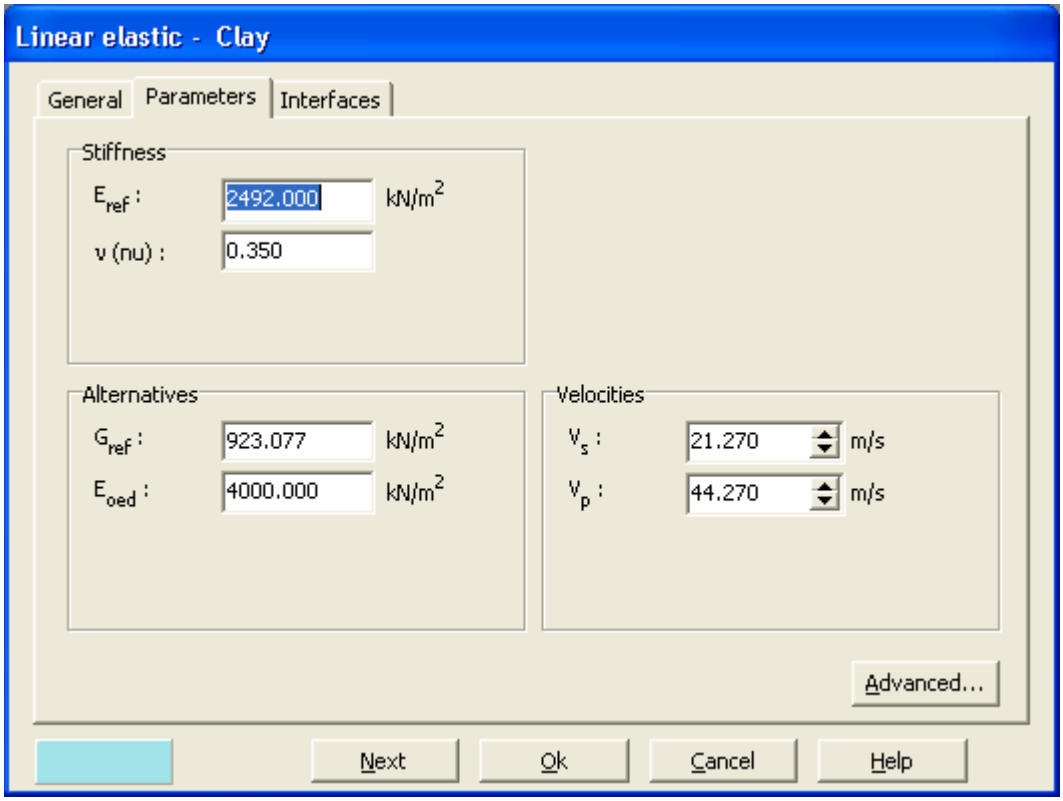
Gán biểu tượng áp lực

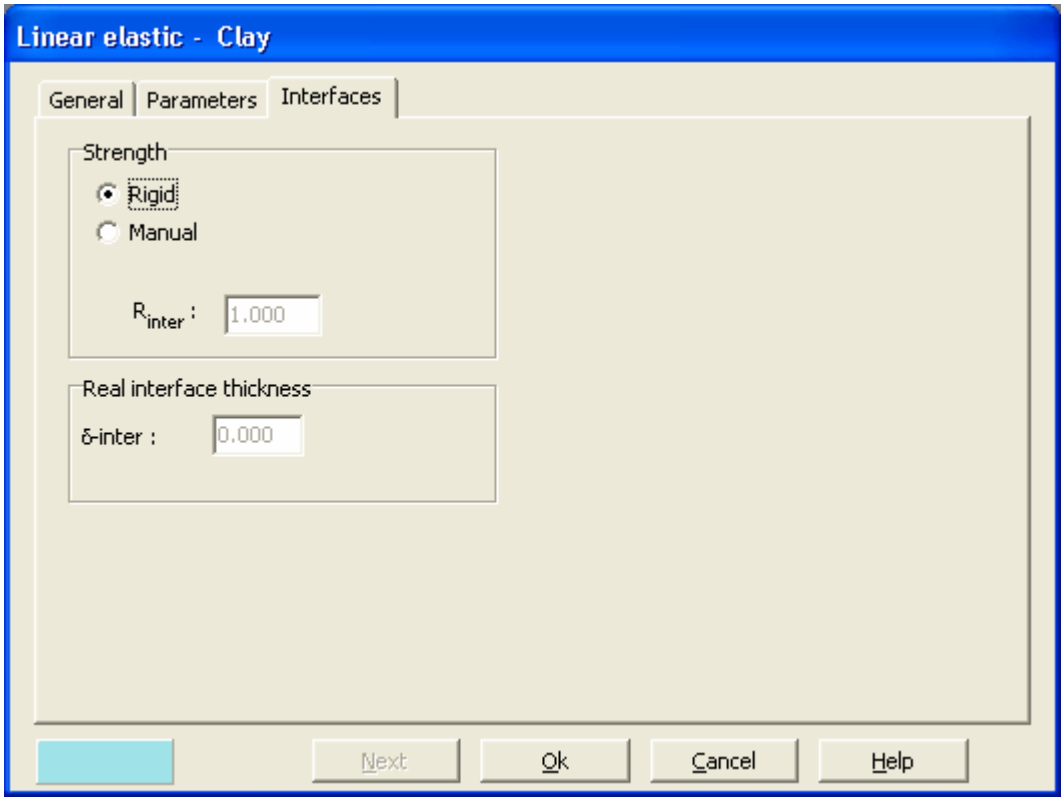
Vẽ phần tử tiếp xúc

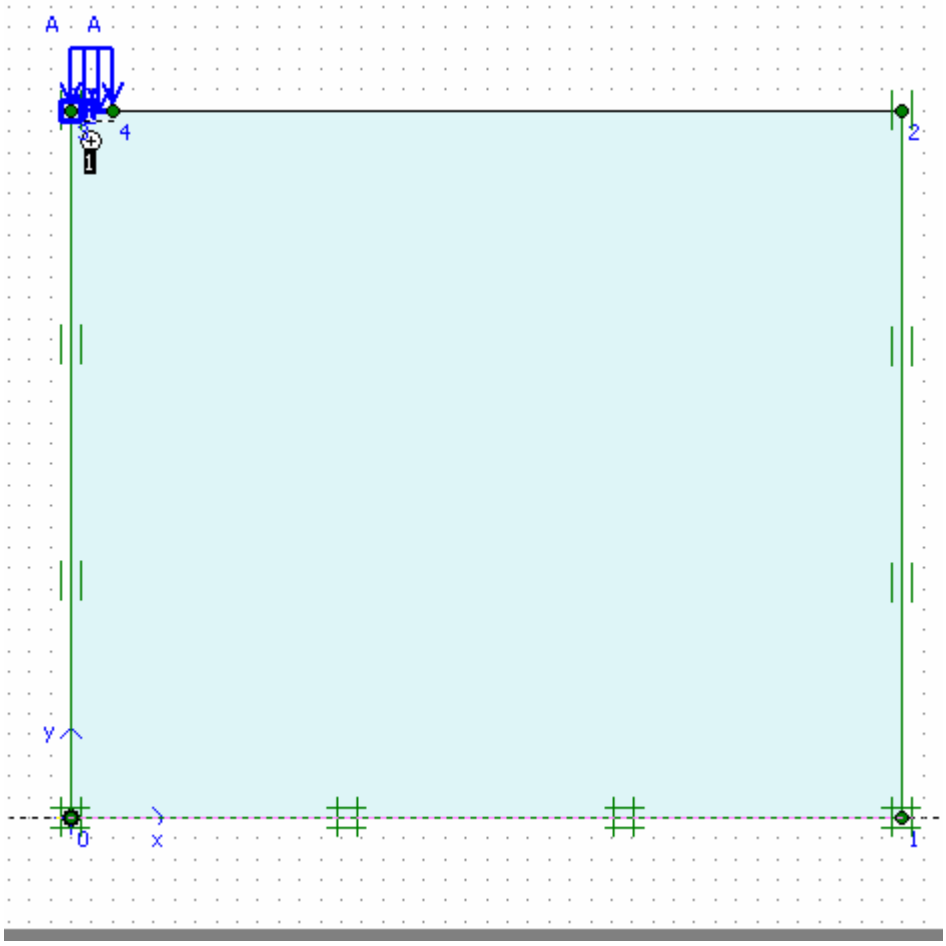
Gán biên

Gán số liệu địa chất

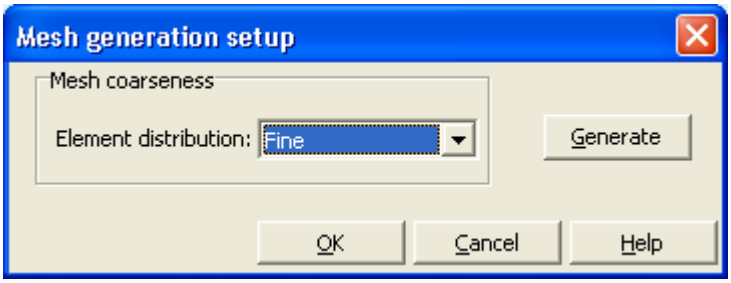

Linear elastic - Clay
General
Parameters
Interfaces
Material Set
Identification: Clay
Material model: Linear elastic
Material type: UnDrained
General properties
γunsat 20.000 kN/m3
γsat 20.000 kN/m3
Comments
Permeability
kx : 1.000E-04 m/day
ky : 1.000E-04 m/day
Advanced...
Next
Ok
Cancel
Help

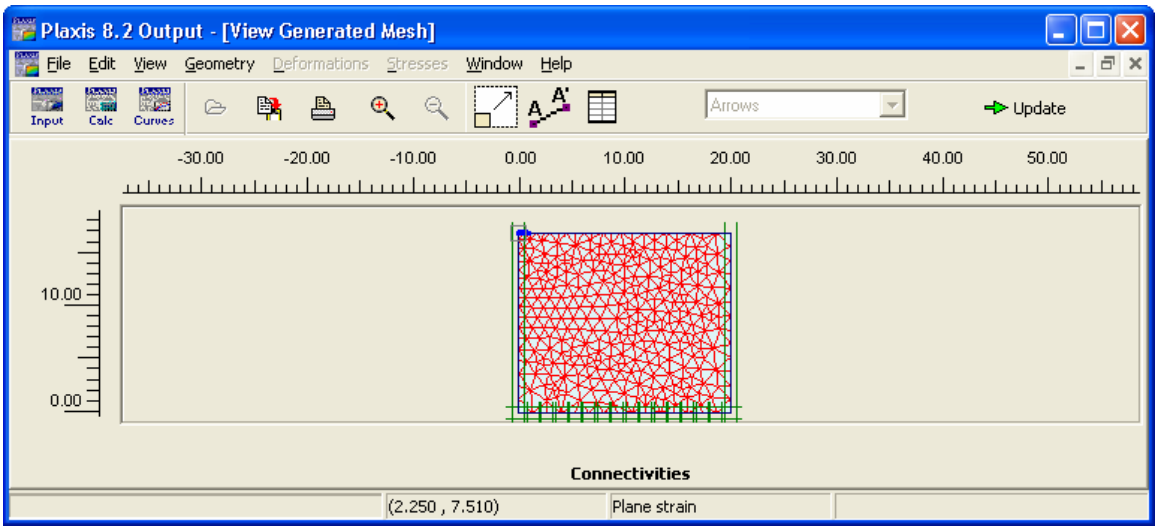

Linear elastic - Clay
General
Parameters
Interfaces
Stiffness
Eref : 2492.000 kN/m2
ν (nu) : 0.350
Alternatives
Gref : 923.077 kN/m2
Eoed : 4000.000 kN/m2
Velocities
Vs : 21.270 m/s
Vp : 44.270 m/s
Advanced...
Next
Ok
Cancel
Help


Linear elastic - Clay
General
Parameters
Interfaces
Strength
Rigid
Manual
R inter :
1.000
Real interface thickness
δ-inter :
0.000
Next
Ok
Cancel
Help



18. Tạo lưới phần tử

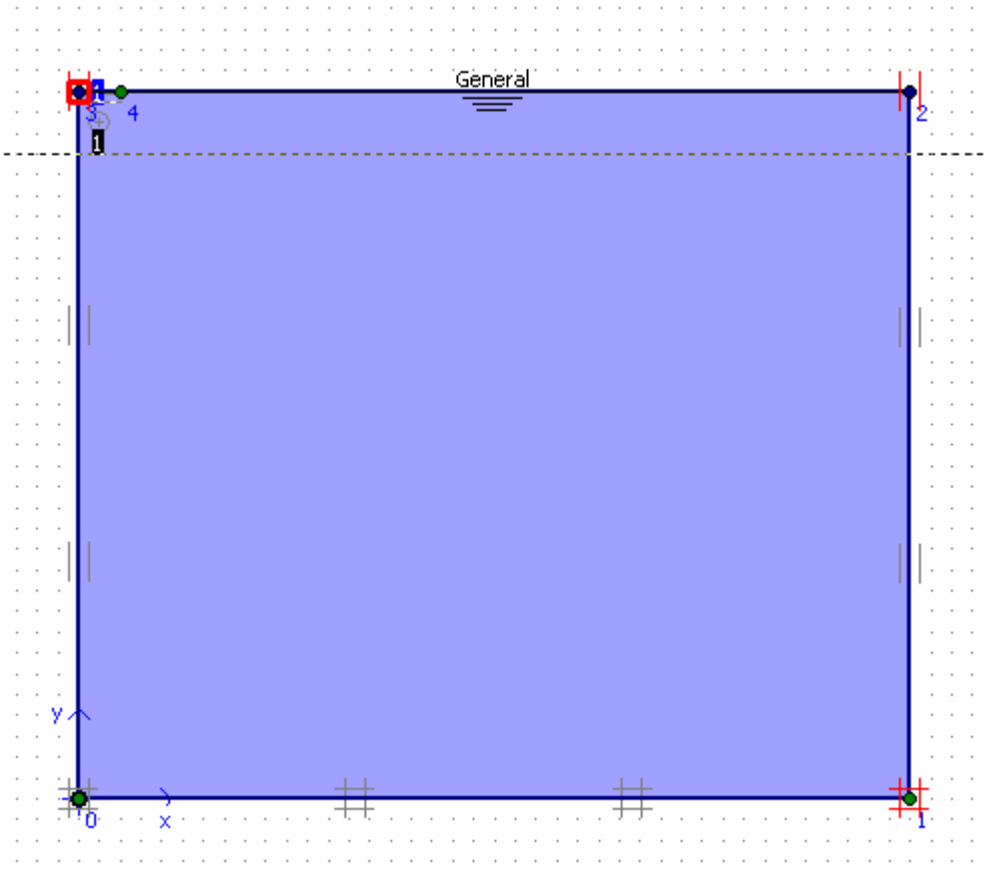




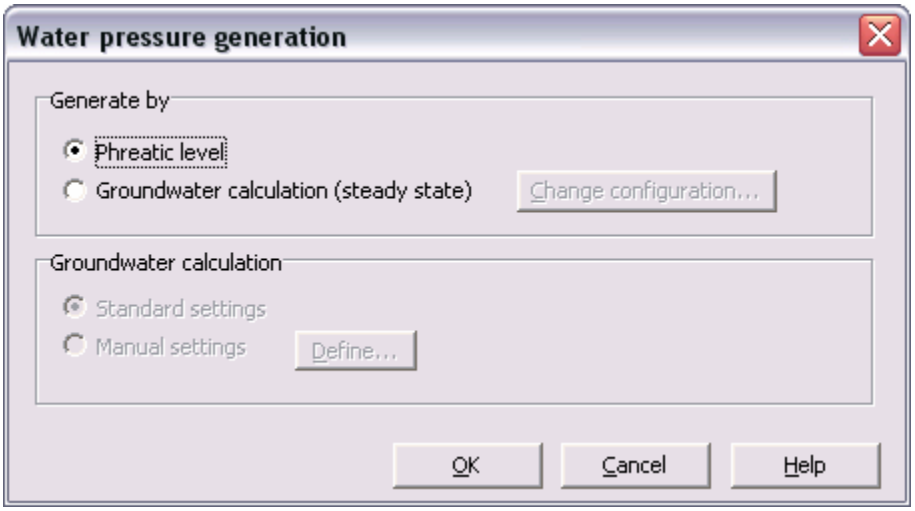
Update

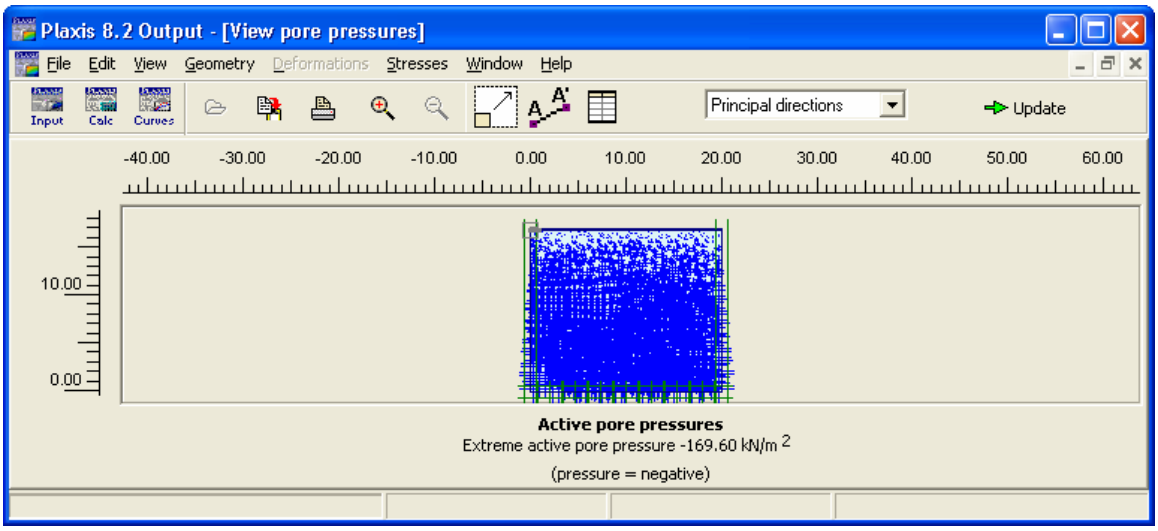
19. Tính toán điều kiện ban đầu

Gán mực nước ngầm

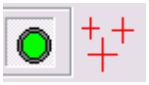


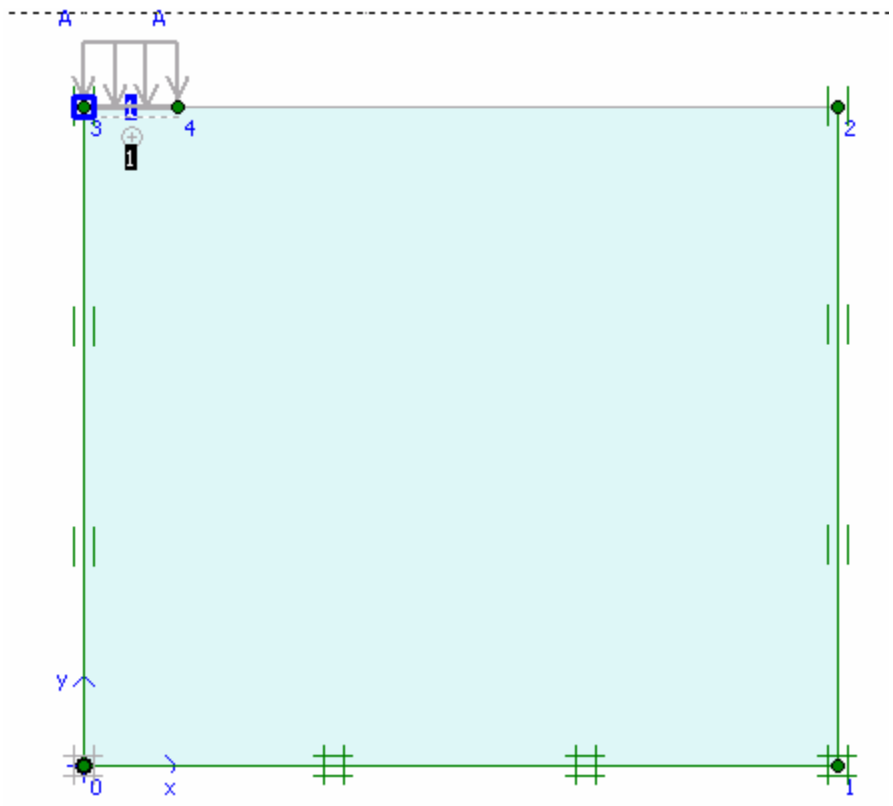
Tính toán áp lực nước 

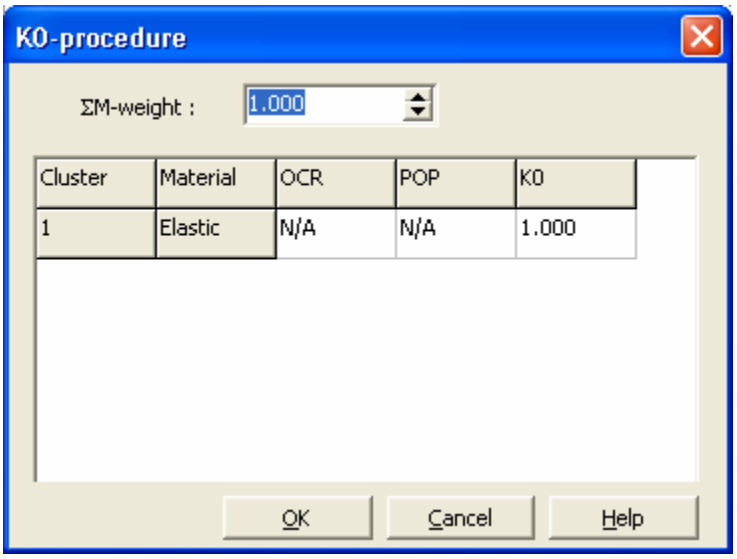


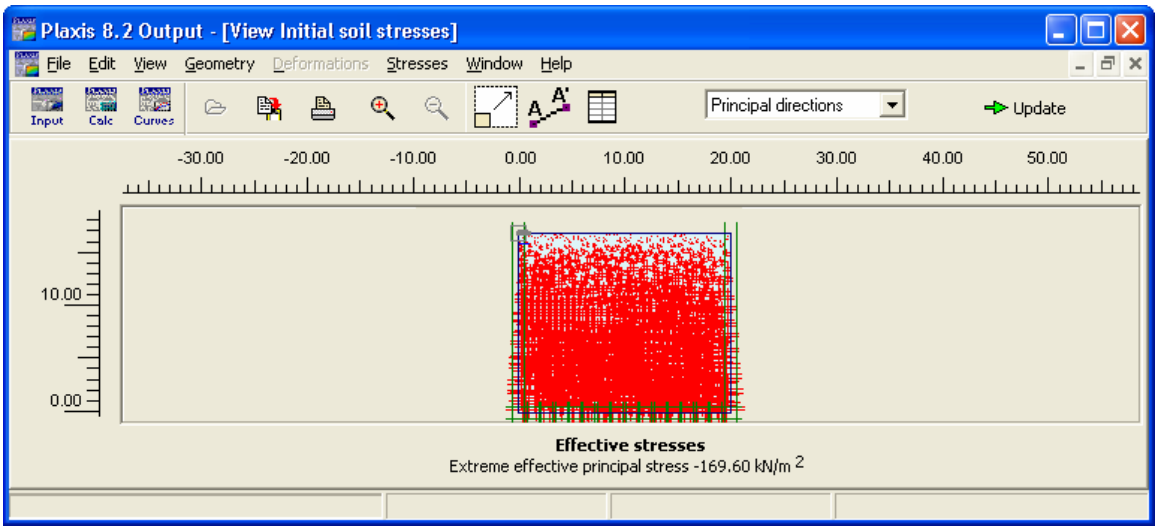


Update

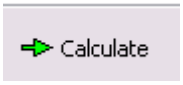
Tính toán áp lực đất 

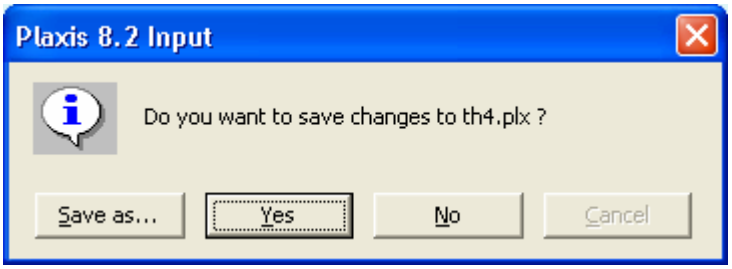


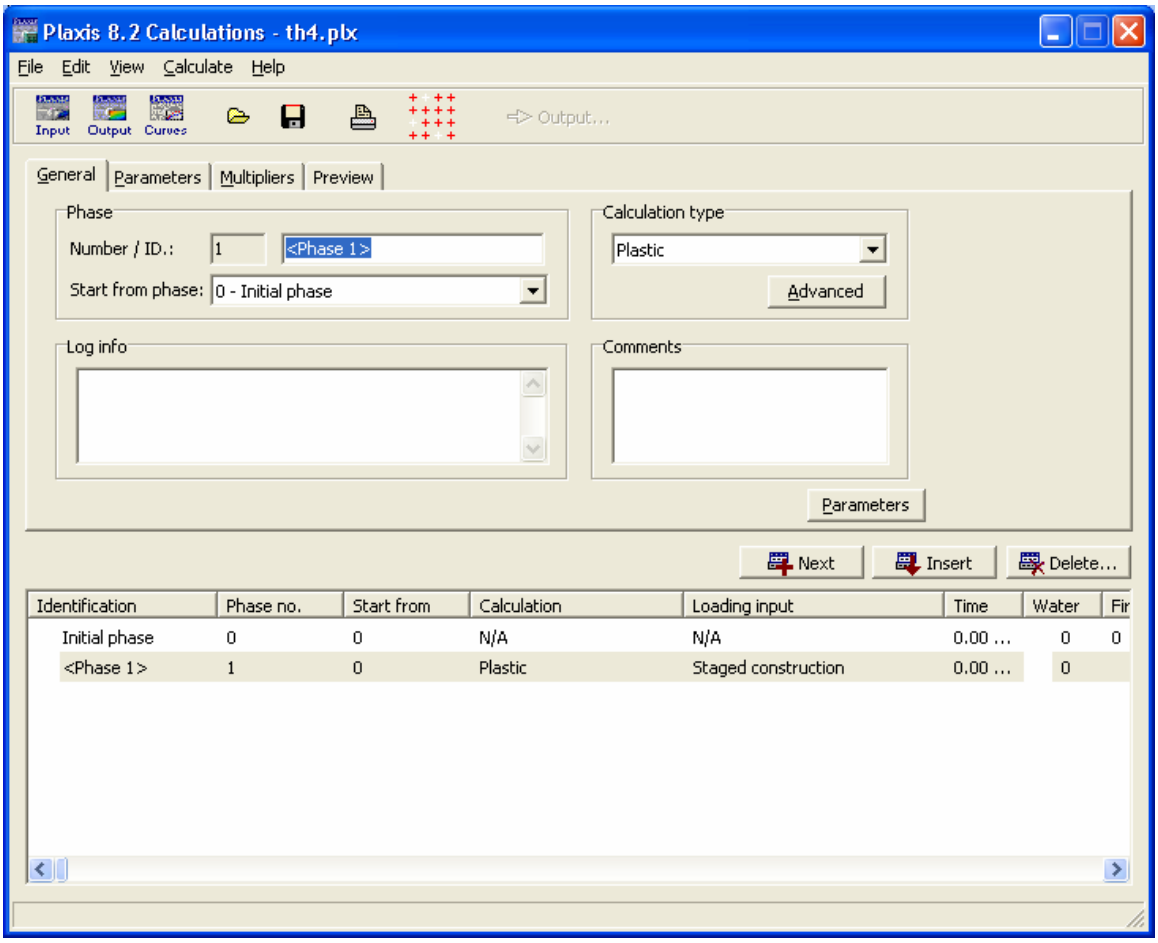




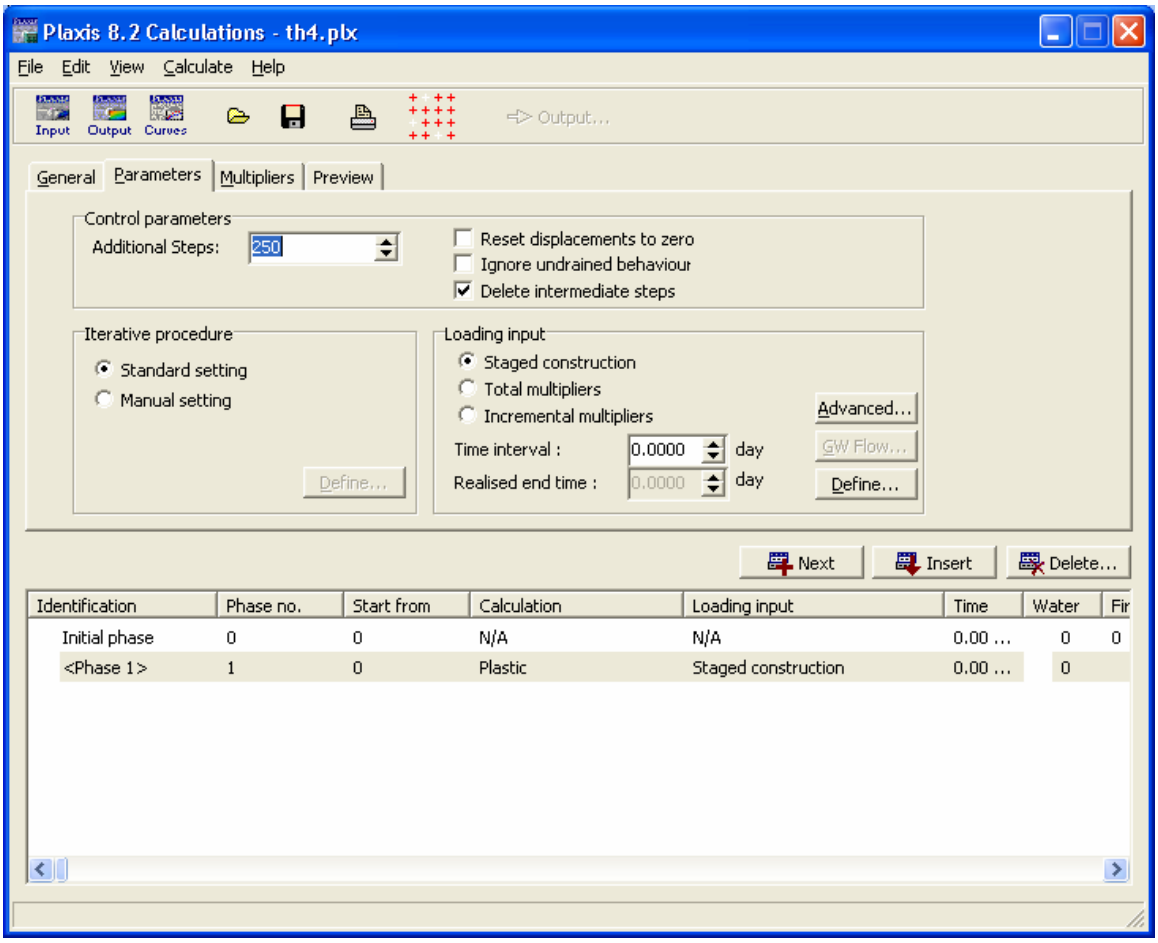
Update

20. Bắt đầu tính toán 

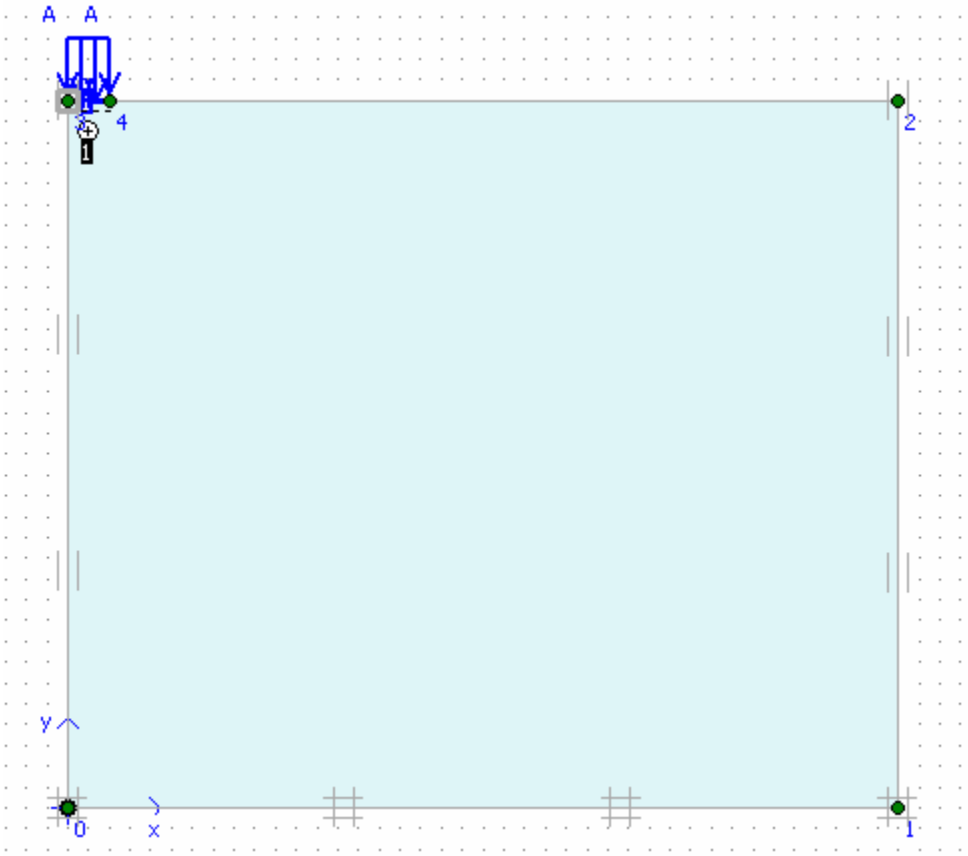



Plaxis 8.2 Calculations - th4.plx
File Edit View Calculate Help
Input Output Curves
Output...
General Parameters Multipliers Preview
Phase
Number / ID.: 1 <Phase 1>
Start from phase: 0 - Initial phase
Calculation type
Plastic
Advanced
Log info
Comments
Parameters
Next Insert Delete...
Identification Phase no. Start from Calculation Loading input Time Water Fir
Initial phase 0 0 N/A N/A 0.00 ... 0 0
<Phase 1> 1 0 Plastic Staged construction 0.00 ... 0

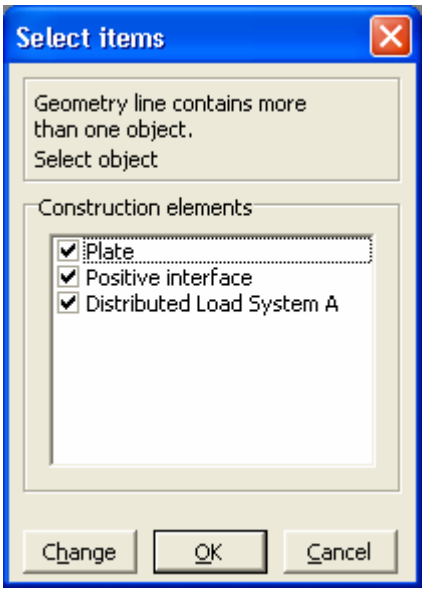
Parameters



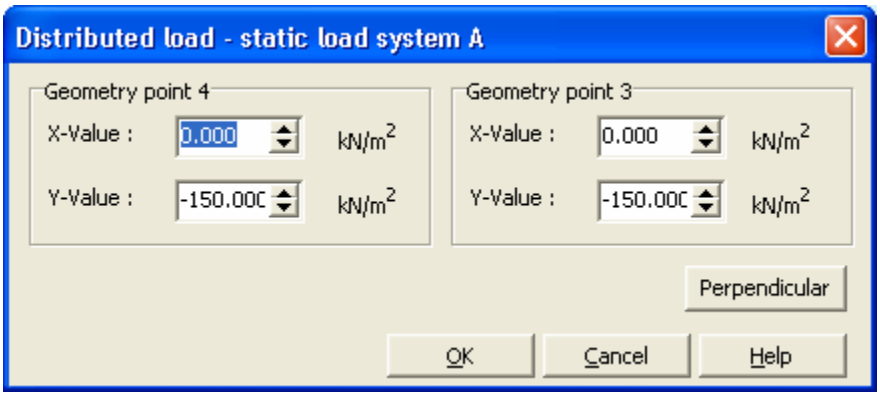
Nhấp vào Define và máy tự động
Trở về màn hình Input



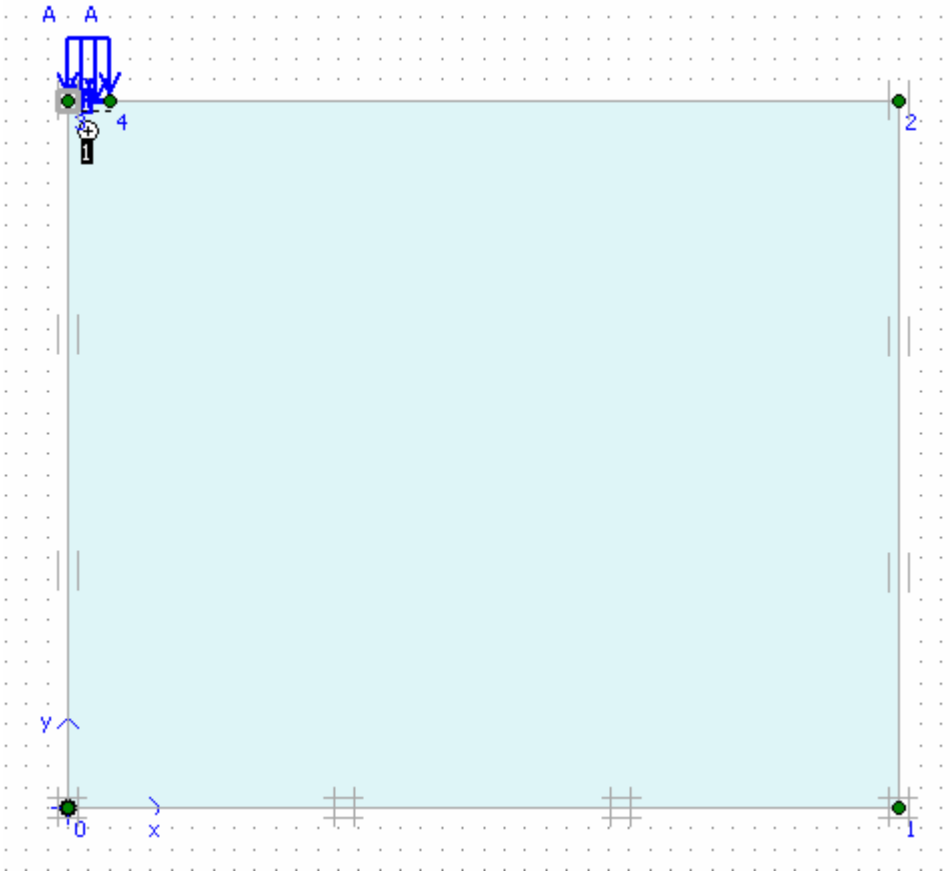
Gán giá trị tải bằng cách nhấp vào áp lực trên hình



Nhấp vào Change để nhập giá trị



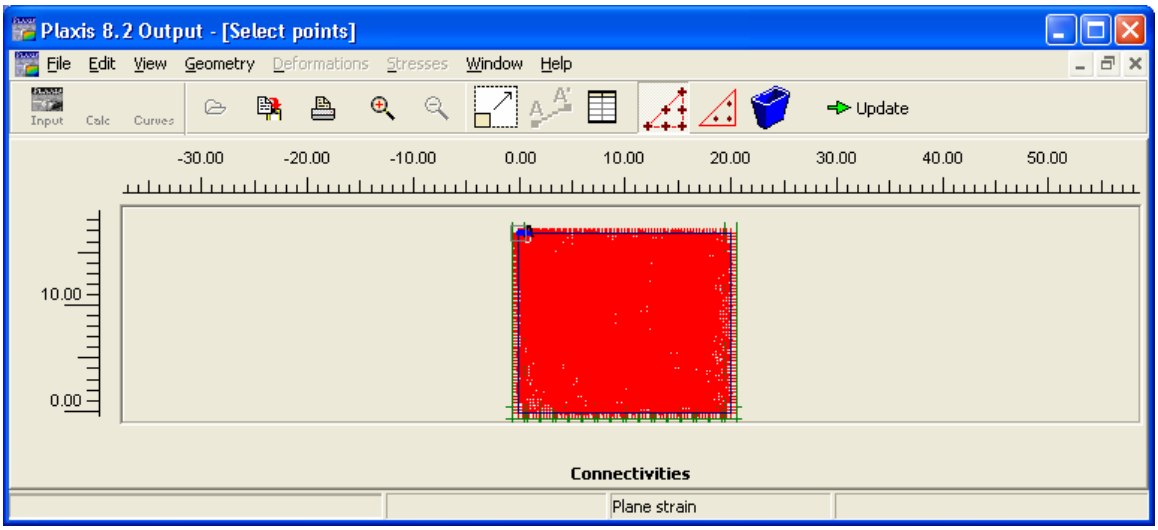
OK



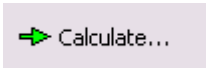
Update

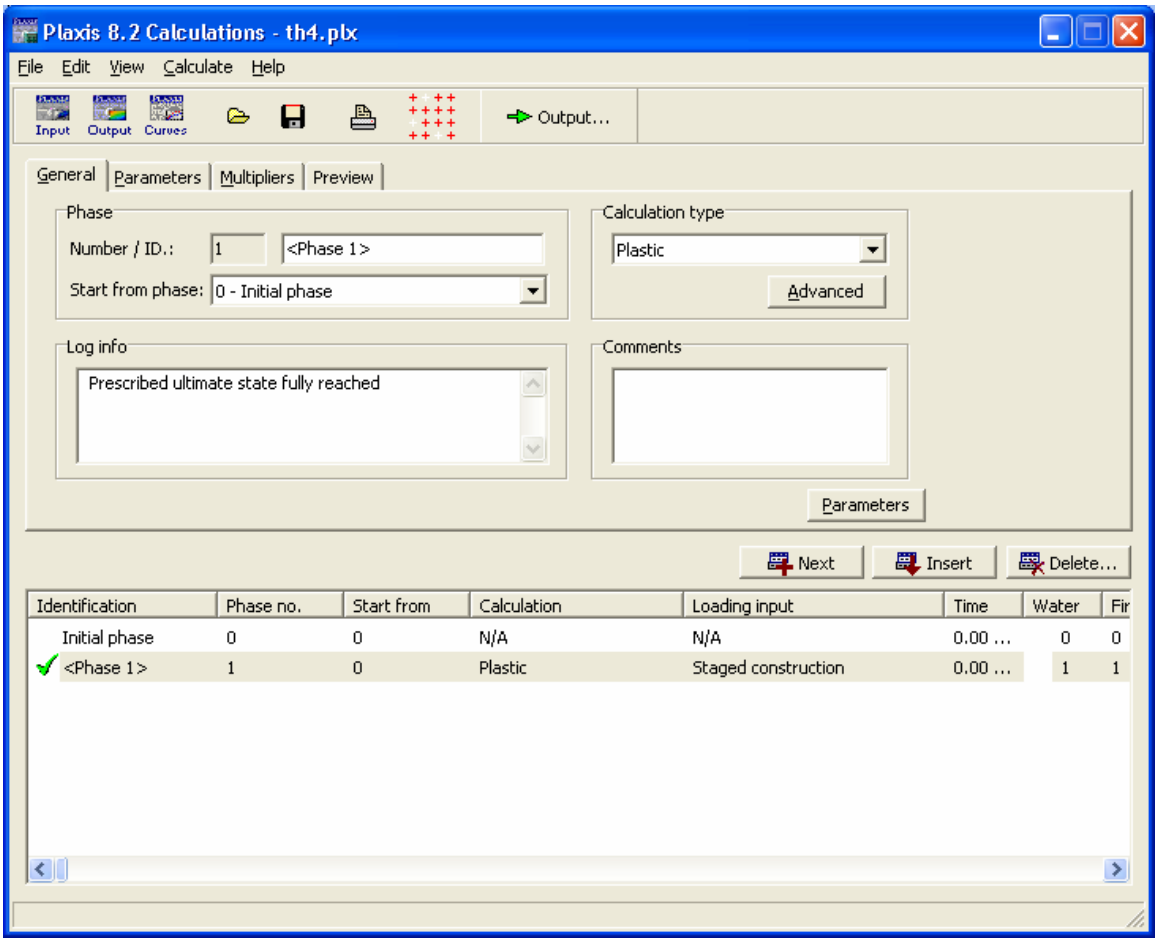
Dùng biểu tượng  để chọn điểm khảo sát

Ví dụ điểm A

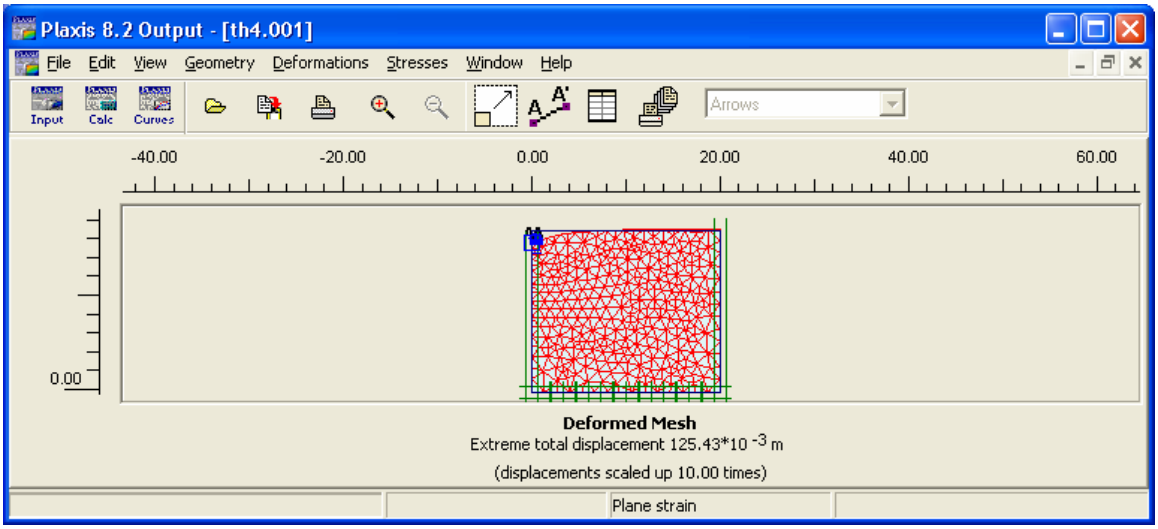


Update

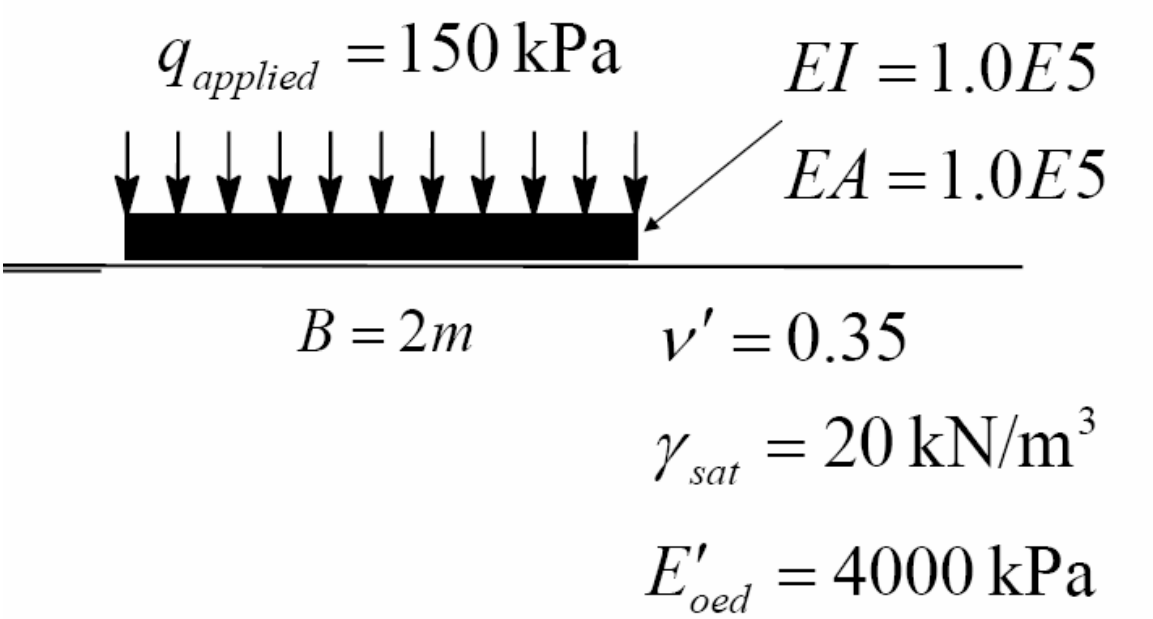
Tính toán 



Đã tính toán xong , nhấp vào Output



Phần 4b : PLAXIS INPUT, CALCULATE SETTLEMENT



ELASTIC – DRAINE – t = ∞

21. Tạo hình dạng bài toán

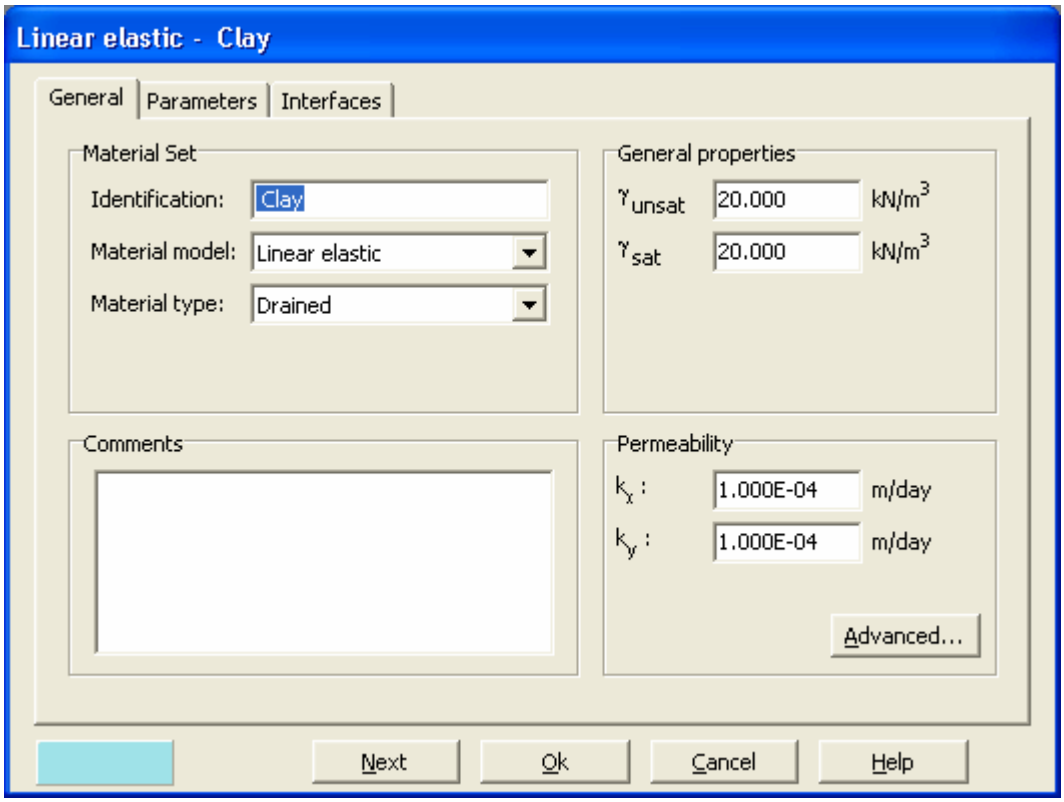
Vẽ tấm (Plate)

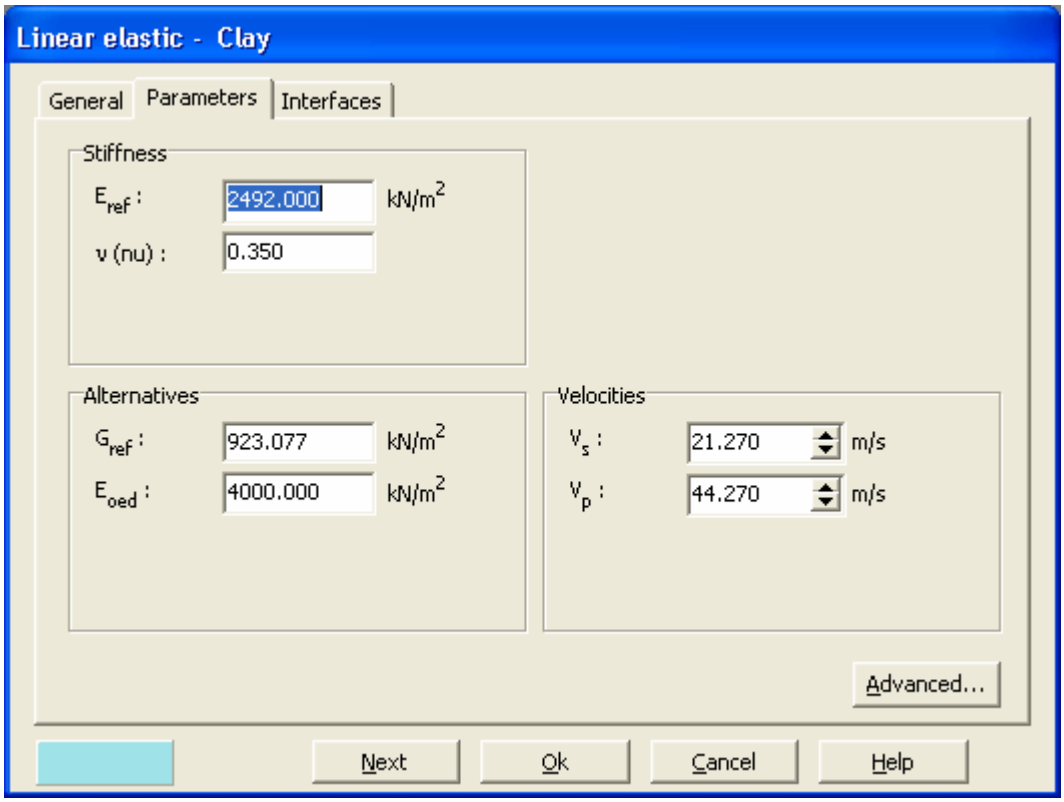
Gán biểu tượng áp lực

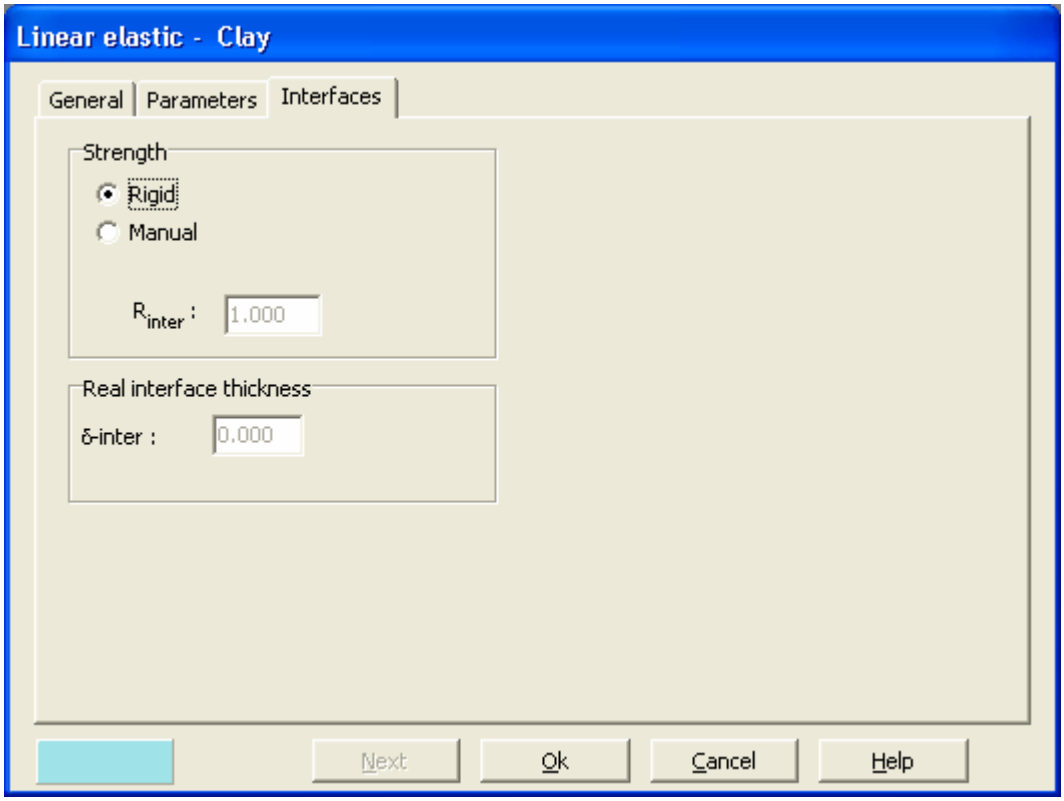
Vẽ phần tử tiếp xúc

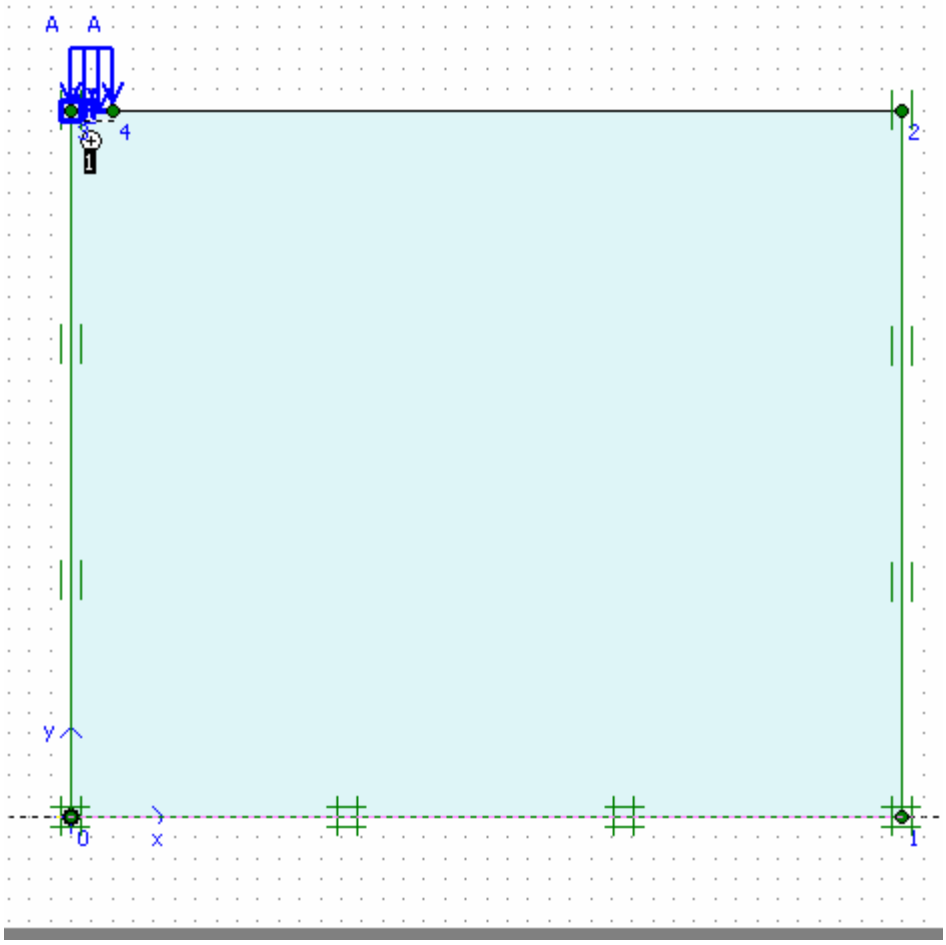
Gán biên

Gán số liệu địa chất

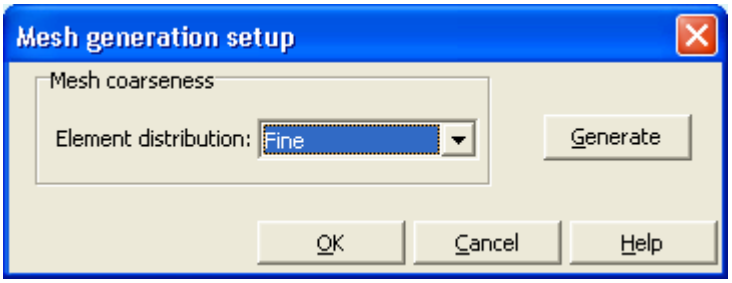

Linear elastic - Clay
General
Parameters
Interfaces
Material Set
Identification:
Clay
Material model:
Linear elastic
Material type:
Drained
General properties
γunsat
20.000
kN/m3
γsat
20.000
kN/m3
Comments
Permeability
kx :
1.000E-04
m/day
ky :
1.000E-04
m/day
Advanced...
Next
Ok
Cancel
Help

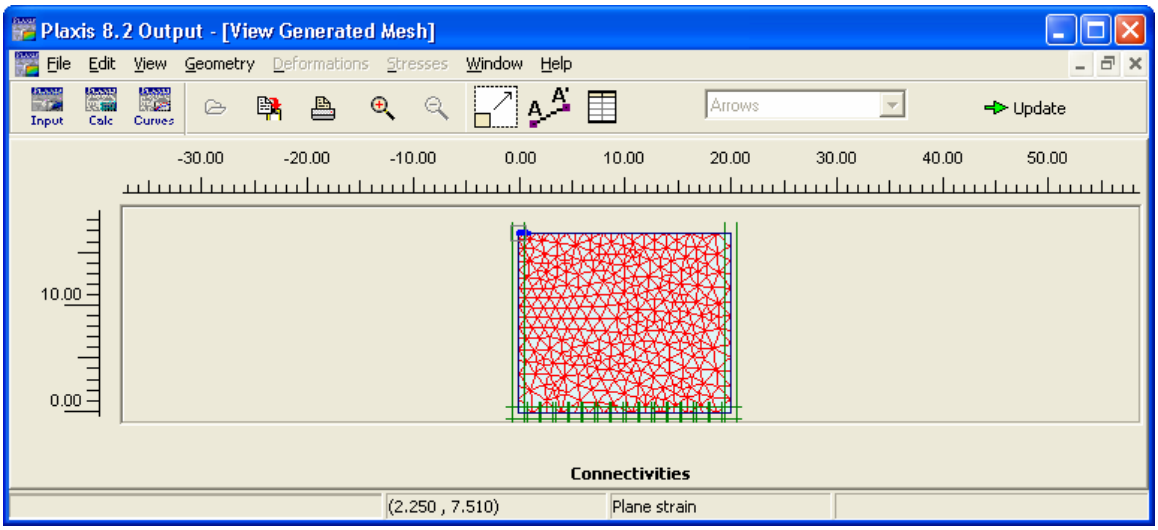

Linear elastic - Clay
General
Parameters
Interfaces
Stiffness
E ref : 2492.000 kN/m2
ν (nu) : 0.350
Alternatives
G ref : 923.077 kN/m2
E oed : 4000.000 kN/m2
Velocities
V s : 21.270 m/s
V p : 44.270 m/s
Advanced...
Next
Ok
Cancel
Help


Linear elastic - Clay
General
Parameters
Interfaces
Strength
Rigid
Manual
R inter : 1.000
Real interface thickness
δ-inter : 0.000
Next
Ok
Cancel
Help



22. Tạo lưới phần tử

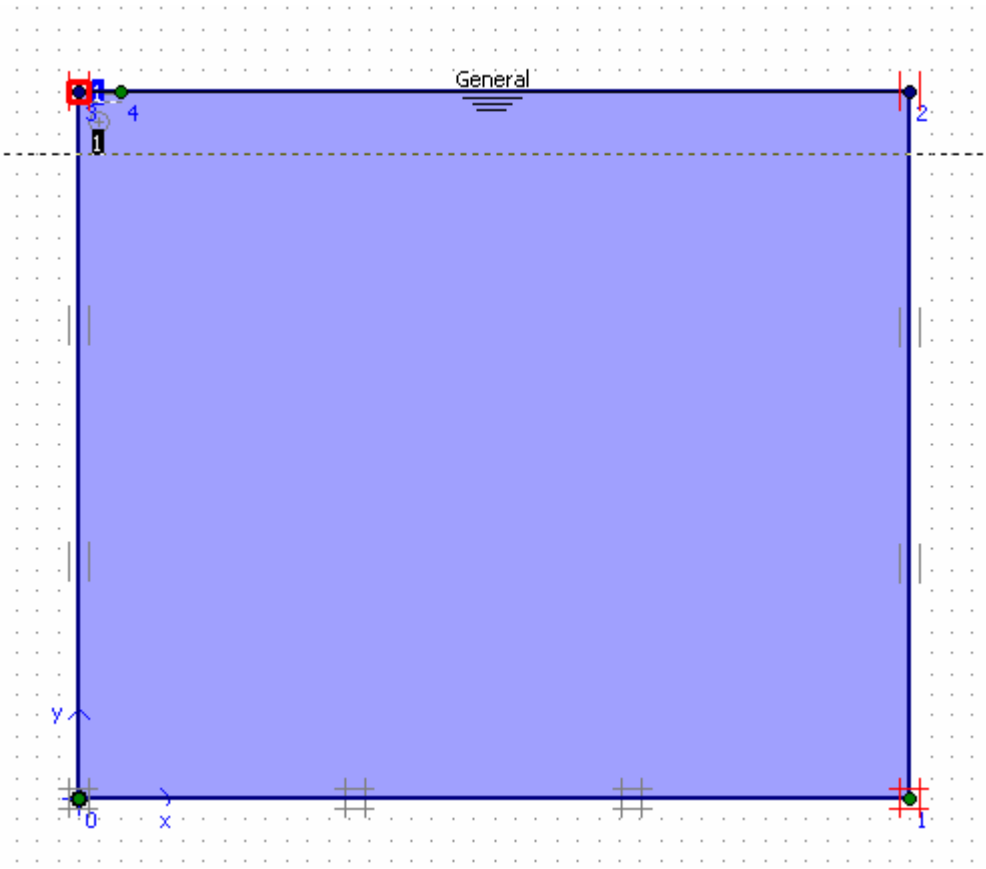




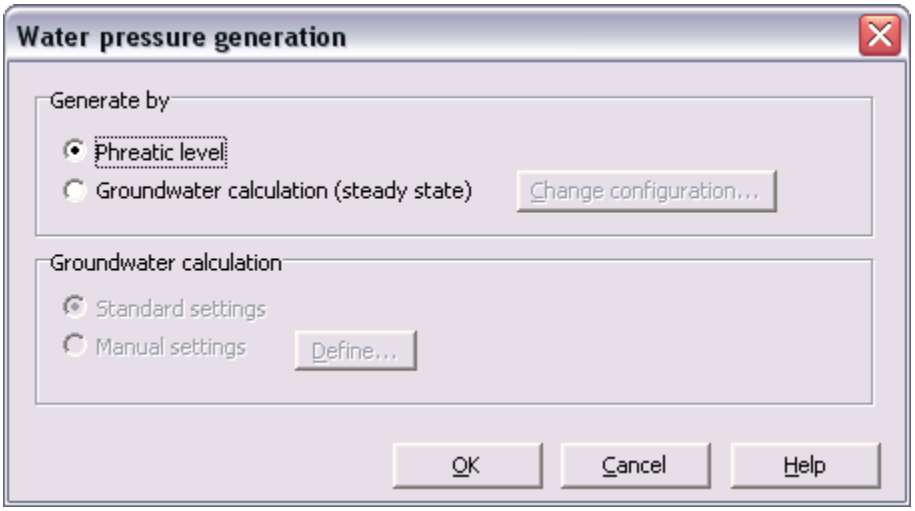
Update

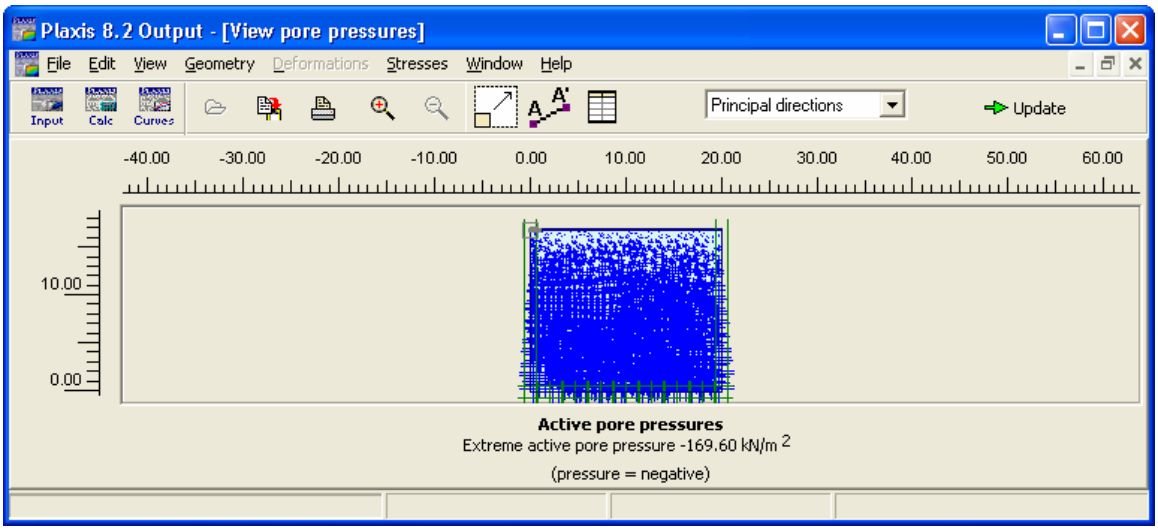
23. Tính toán điều kiện ban đầu

Gán mực nước ngầm

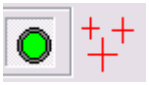


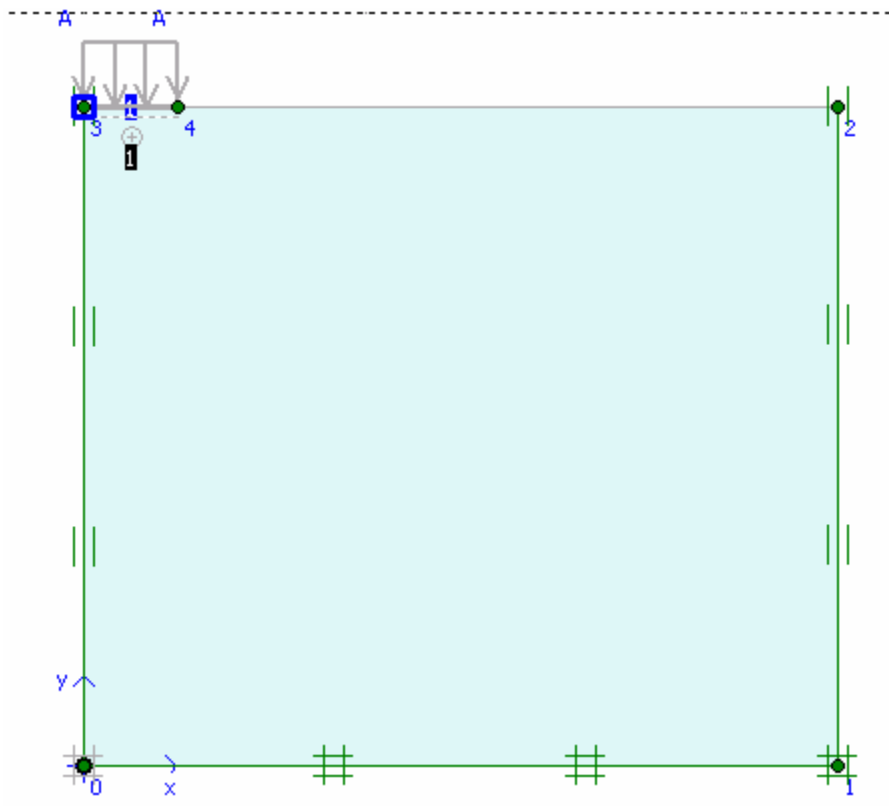
Tính toán áp lực nước 

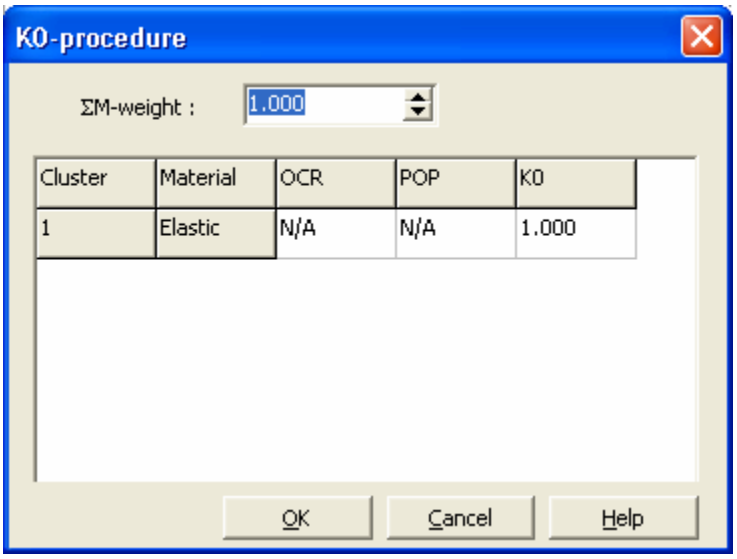


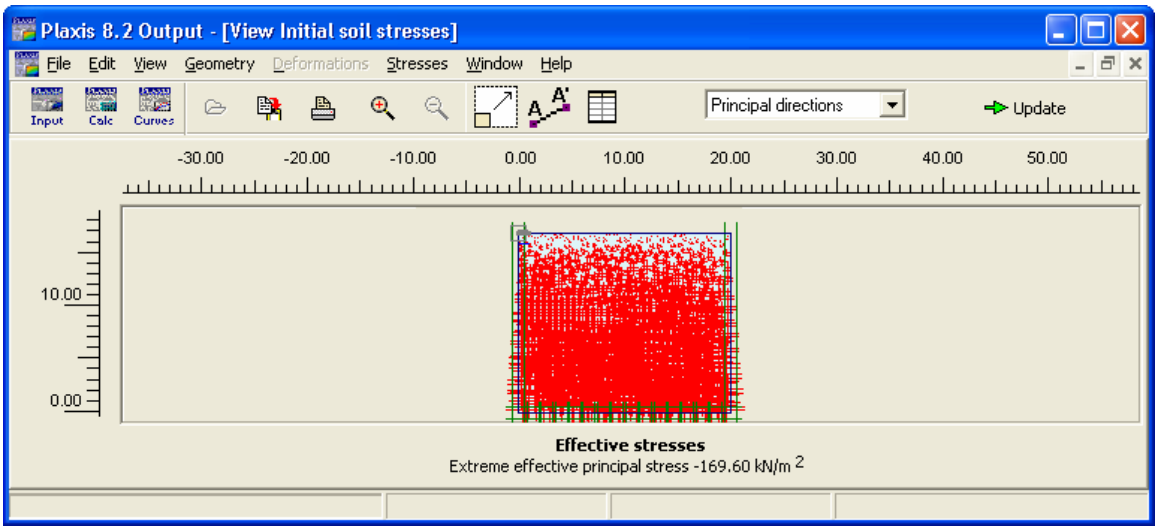


Update

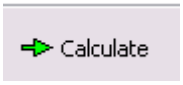
Tính toán áp lực đất 

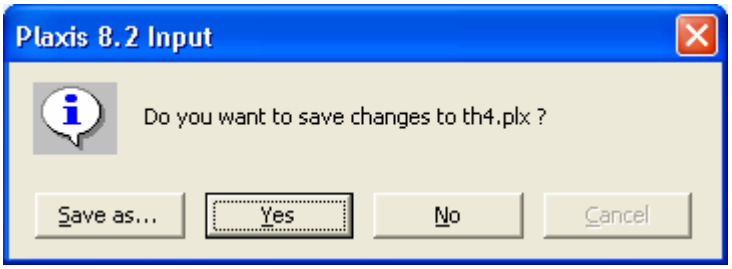


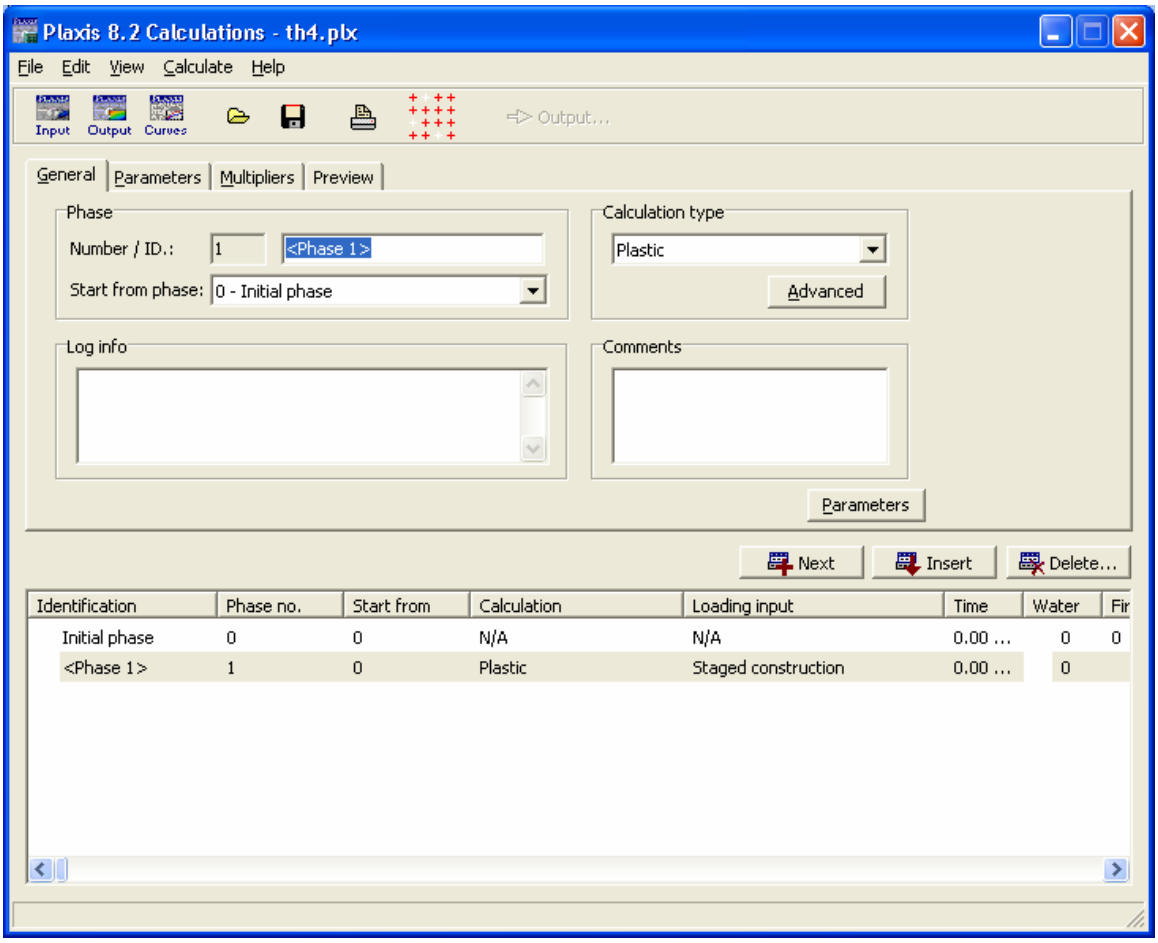




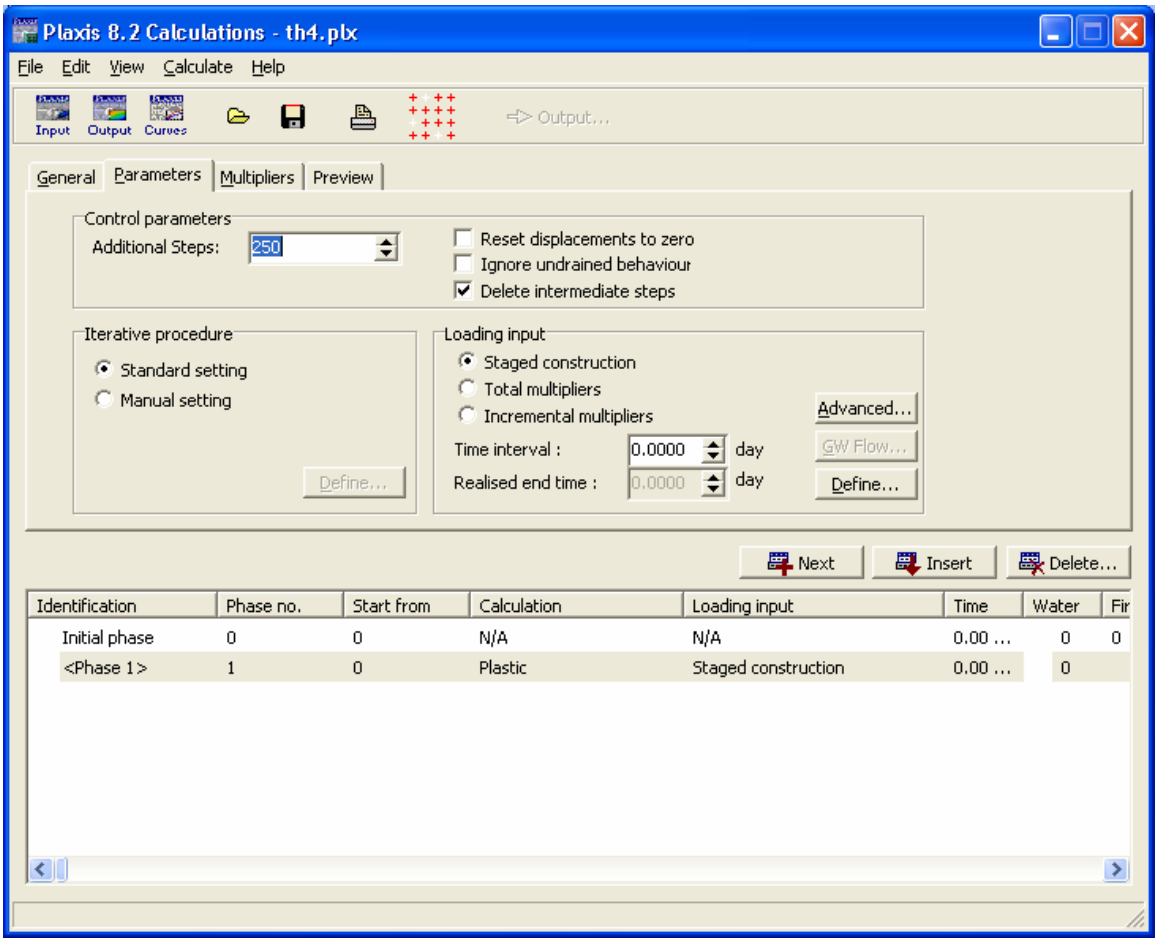
Update

24. Bắt đầu tính toán 

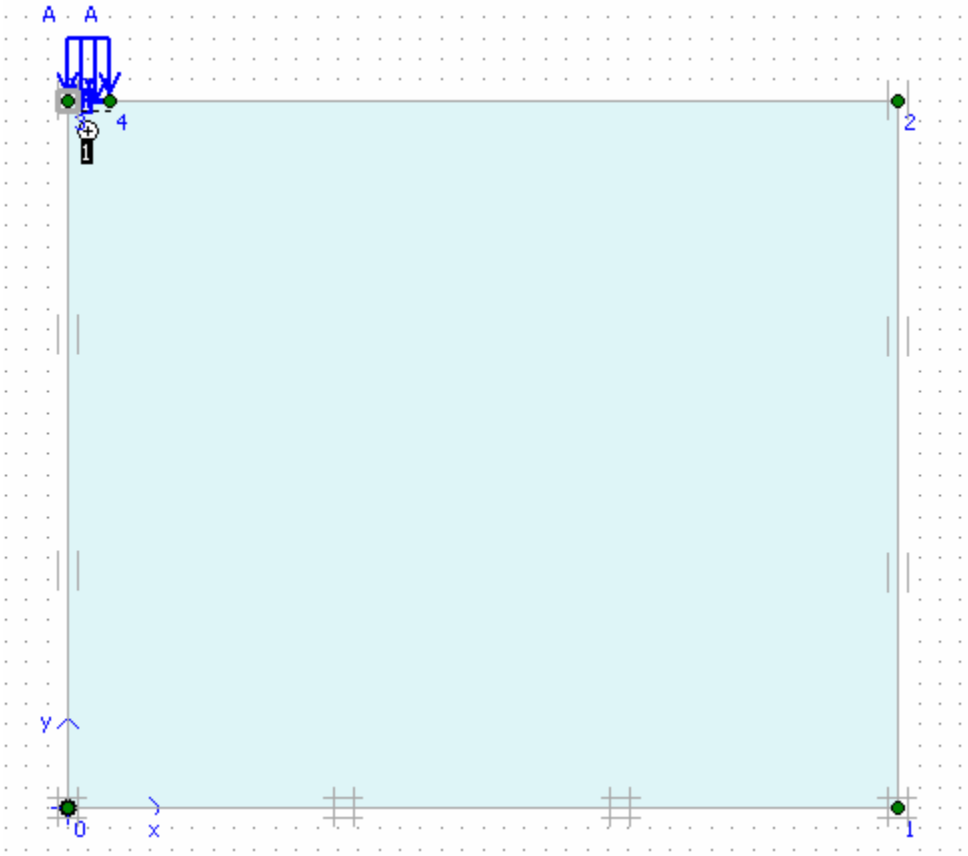



Plaxis 8.2 Calculations - th4.plx
File Edit View Calculate Help
Input Output Curves
Output...
General Parameters Multipliers Preview
Phase
Number / ID.: 1 <Phase 1>
Start from phase: 0 - Initial phase
Calculation type
Plastic
Advanced
Log info
Comments
Parameters
Next Insert Delete...
Identification Phase no. Start from Calculation Loading input Time Water Fir
Initial phase 0 0 N/A N/A 0.00 ... 0 0
<Phase 1> 1 0 Plastic Staged construction 0.00 ... 0

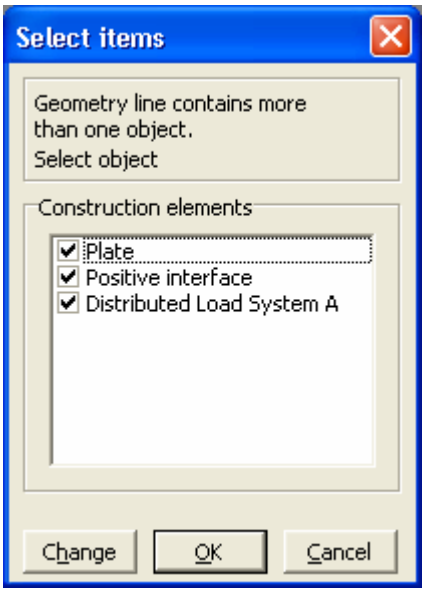
Parameters



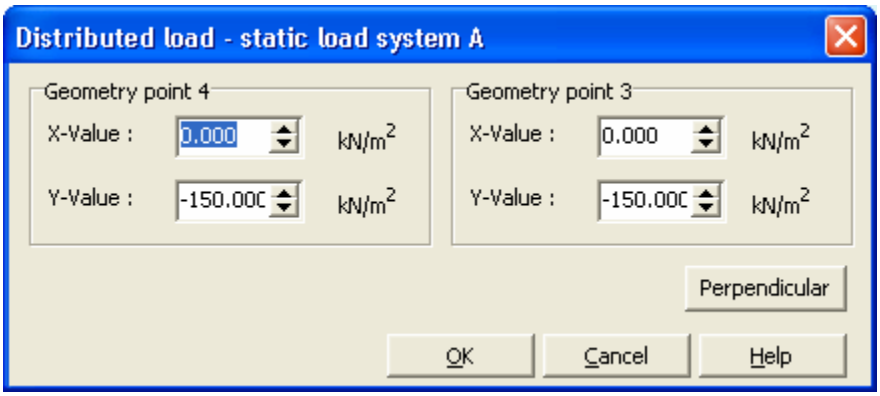
Nhấp vào Define và máy tự động
Trở về màn hình Input



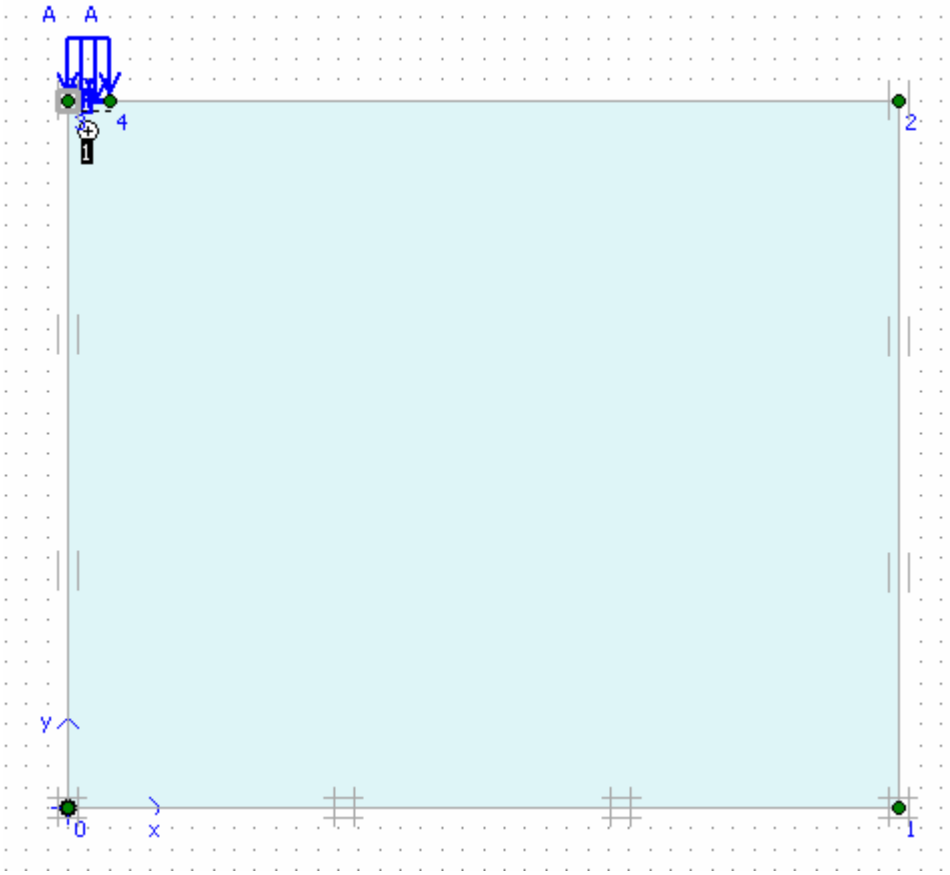
Gán giá trị tải bằng cách nhấp vào áp lực trên hình



Nhấp vào Change để nhập giá trị



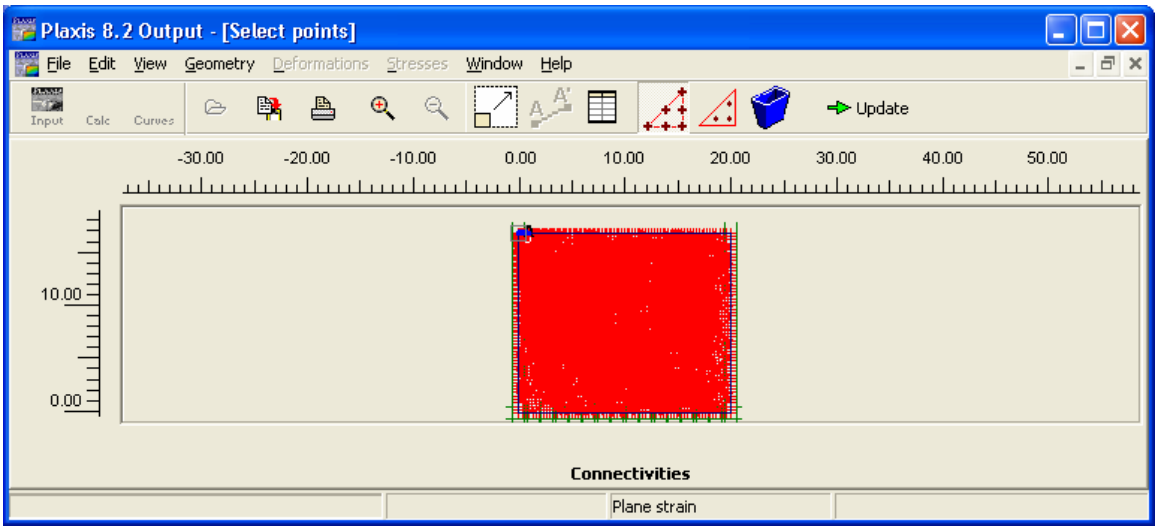
OK



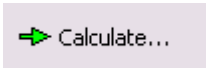
Update

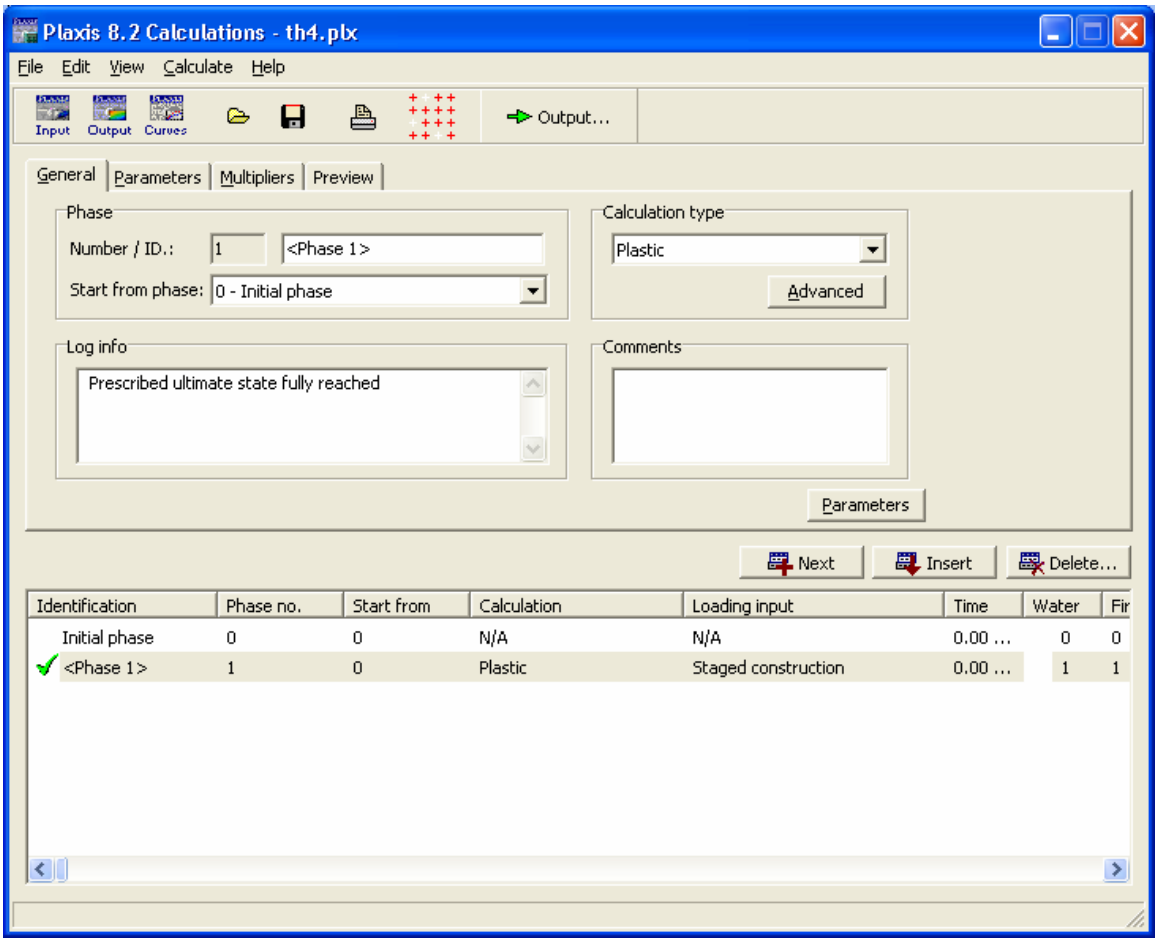
Dùng biểu tượng  để chọn điểm khảo sát

Ví dụ điểm A

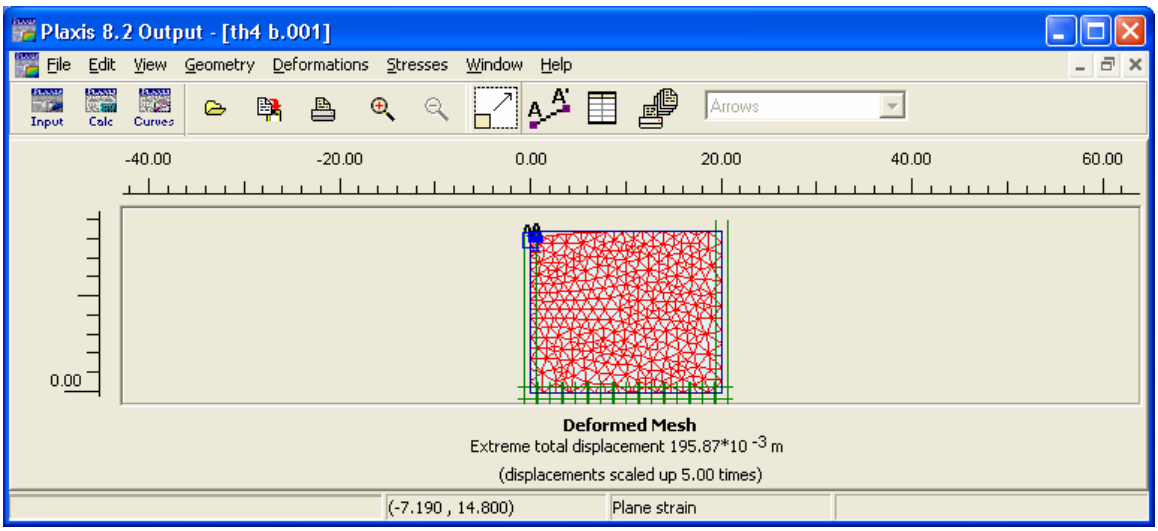


Update

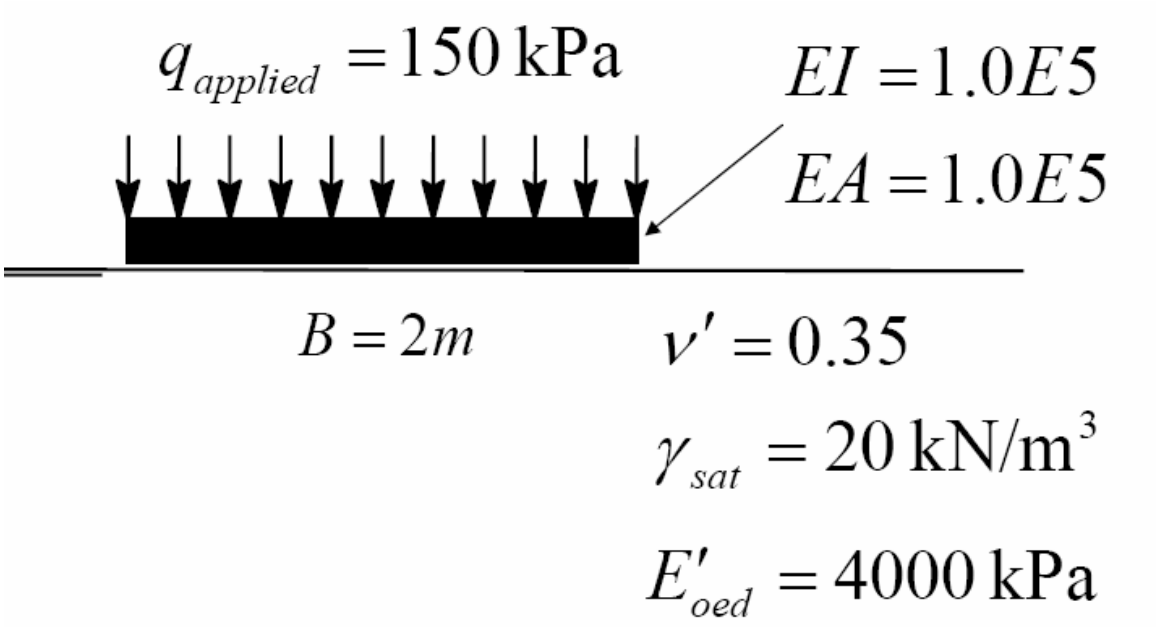
Tính toán 



Đã tính toán xong , nhấp vào Output



Phần 5 : PLAXIS INPUT,CALCULATE SETTLEMENT



ELASTOPLASTIC MC MODEL UNDRAINE – t = 0 Cu = 50 Kpa

25. Tạo hình dạng bài toán

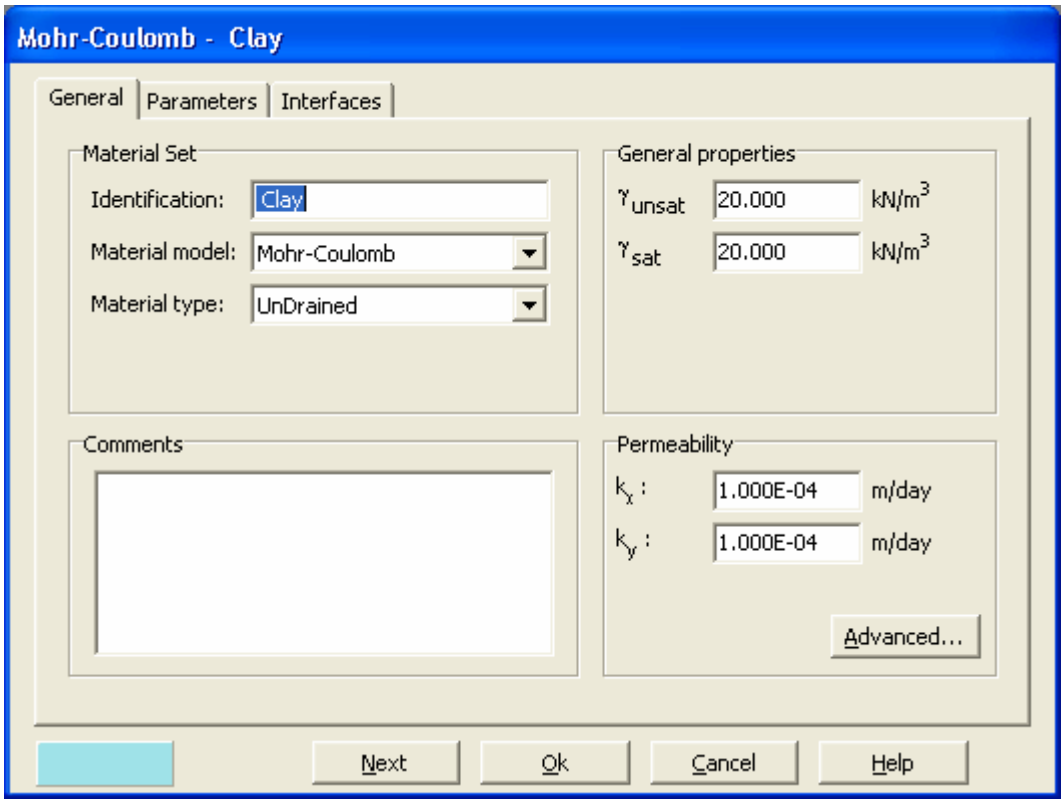
Vẽ tấm (Plate) 

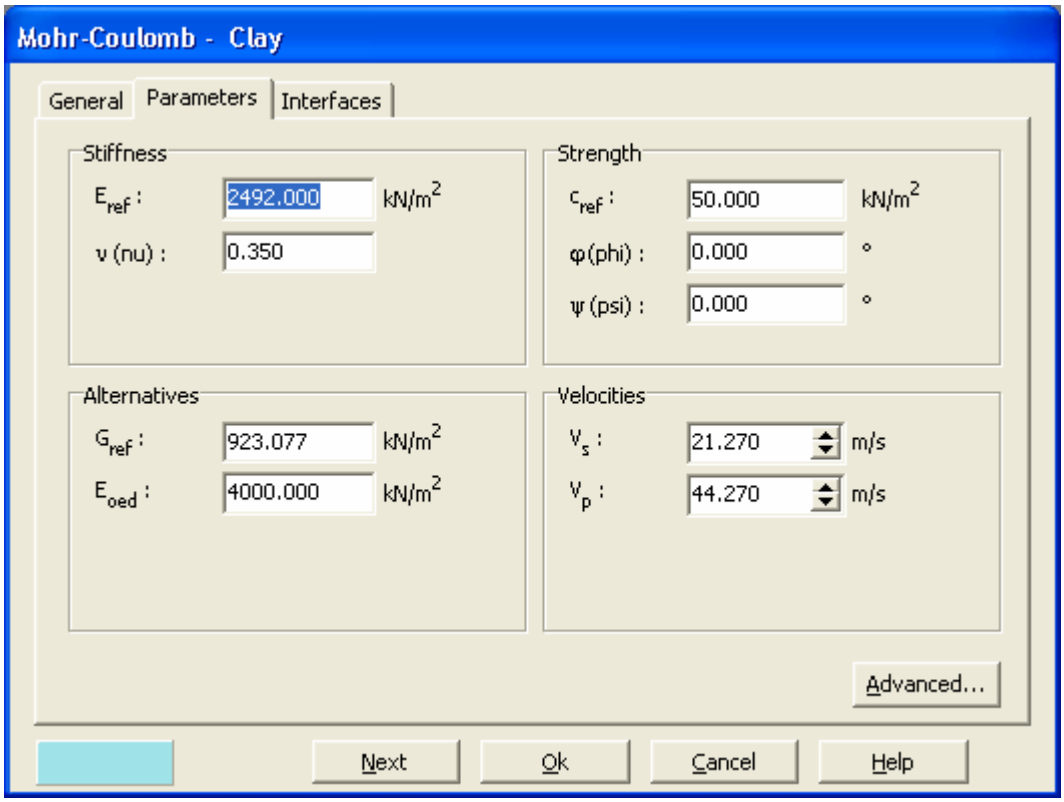
Gán biểu tượng áp lực 

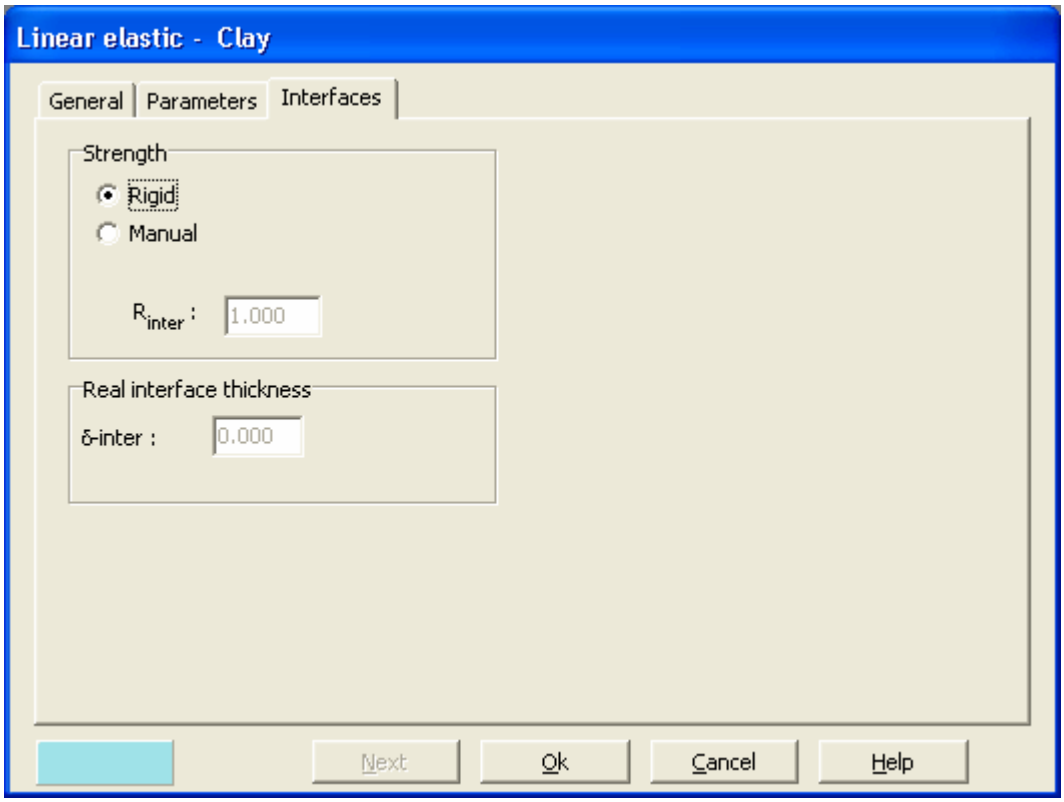
Vẽ phần tử tiếp xúc 

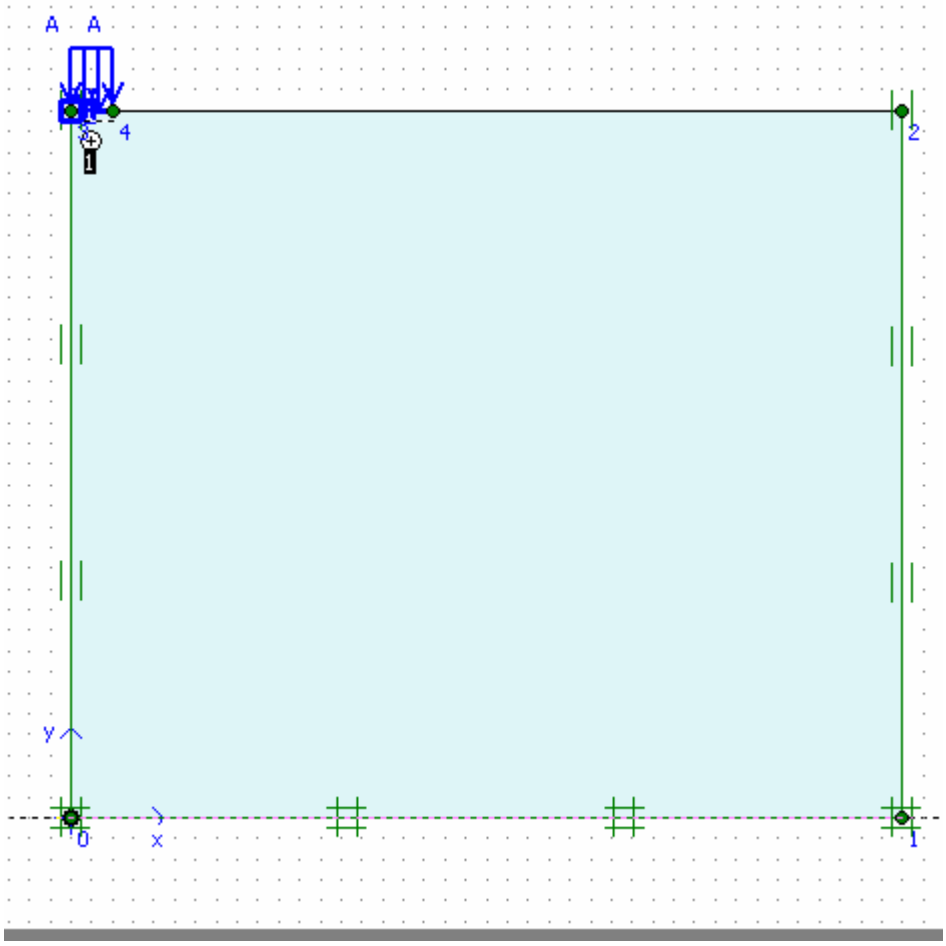
Gán biên 

Gán số liệu địa chất 

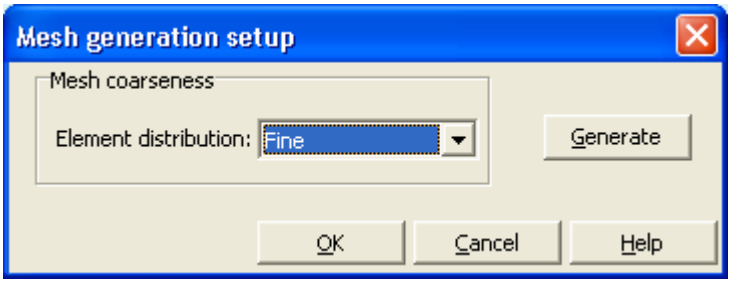

Mohr-Coulomb - Clay
General
Parameters
Interfaces
Material Set
Identification:
Clay
Material model:
Mohr-Coulomb
Material type:
UnDrained
General properties
γunsat
20.000
kN/m3
γsat
20.000
kN/m3
Comments
Permeability
kx :
1.000E-04
m/day
ky :
1.000E-04
m/day
Advanced...
Next
Ok
Cancel
Help

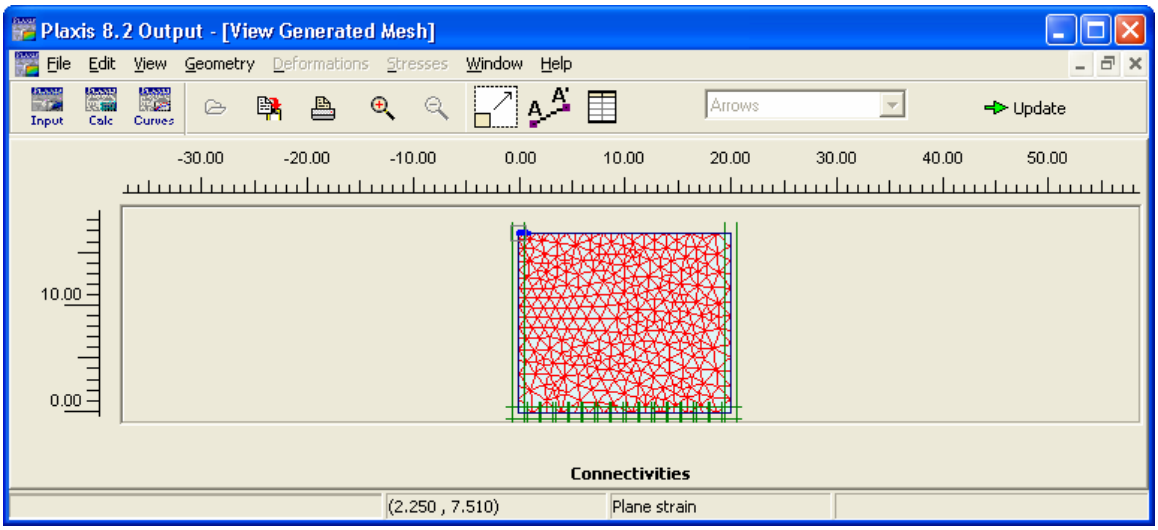

Mohr-Coulomb - Clay
General
Parameters
Interfaces
Stiffness
E ref : 2492.000 kN/m2
ν (nu) : 0.350
Strength
c ref : 50.000 kN/m2
φ (phi) : 0.000 °
ψ (psi) : 0.000 °
Alternatives
G ref : 923.077 kN/m2
E oed : 4000.000 kN/m2
Velocities
V s : 21.270 m/s
V p : 44.270 m/s
Advanced...
Next
Ok
Cancel
Help


Linear elastic - Clay
General
Parameters
Interfaces
Strength
Rigid
Manual
R inter :
1.000
Real interface thickness
δ-inter :
0.000
Next
Ok
Cancel
Help



26. Tạo lưới phần tử

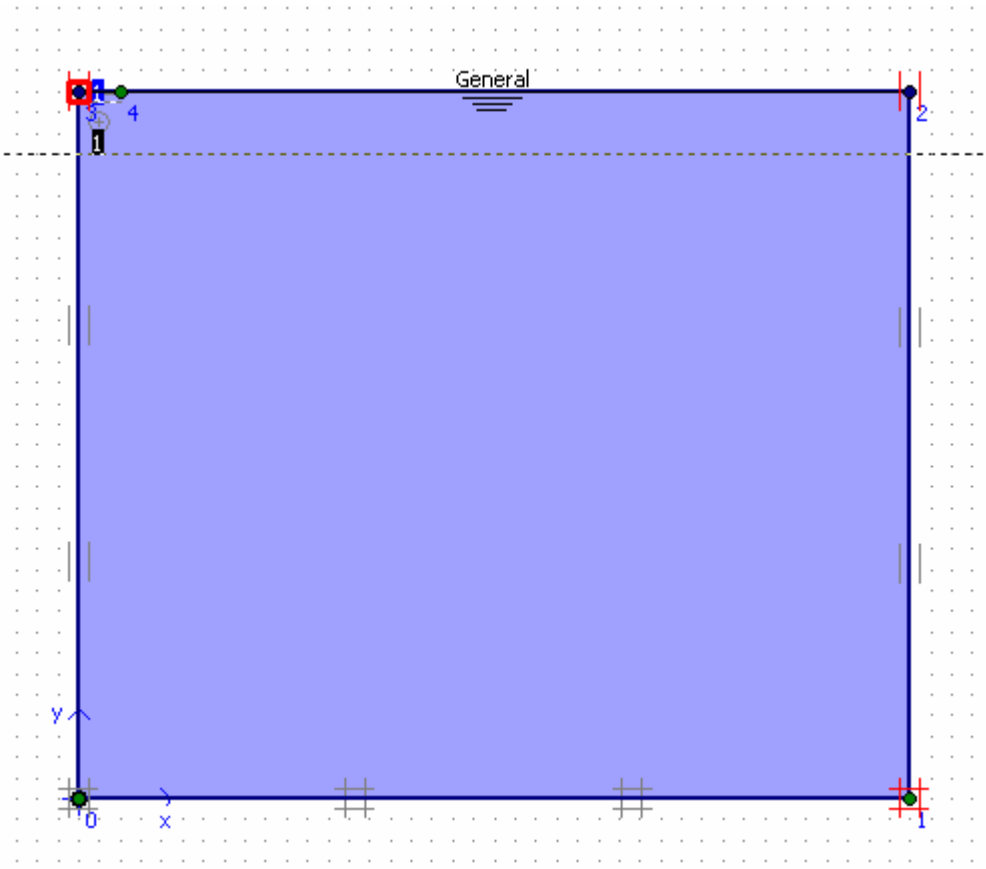




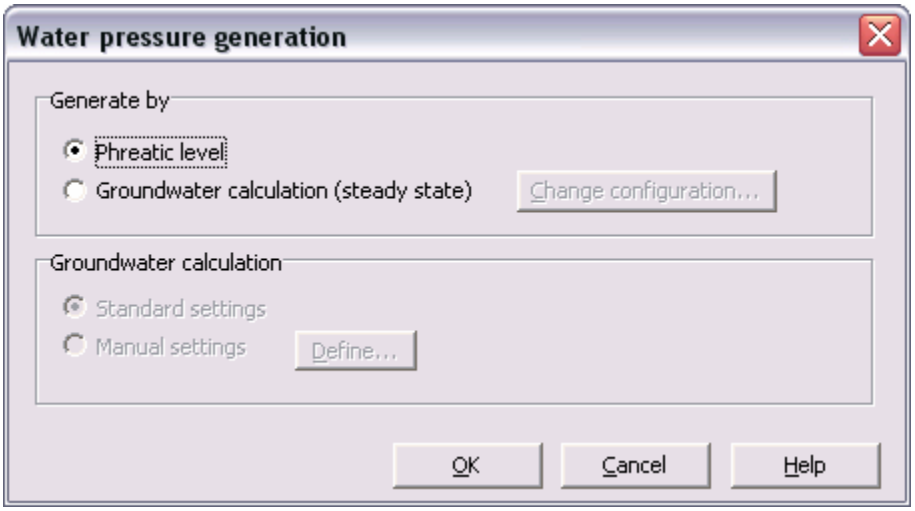
Update

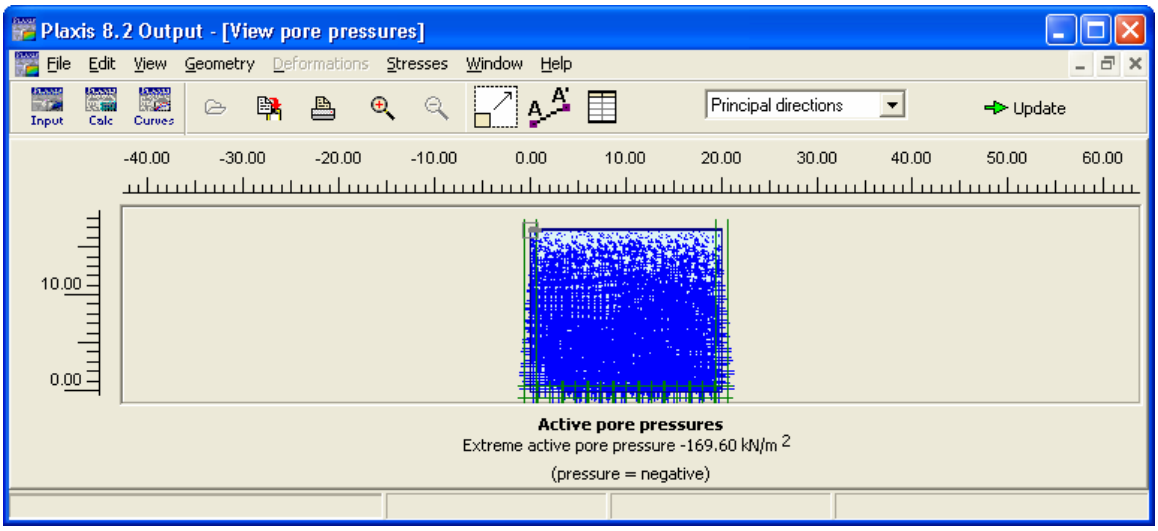
27. Tính toán điều kiện ban đầu

Gán mực nước ngầm

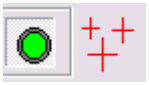


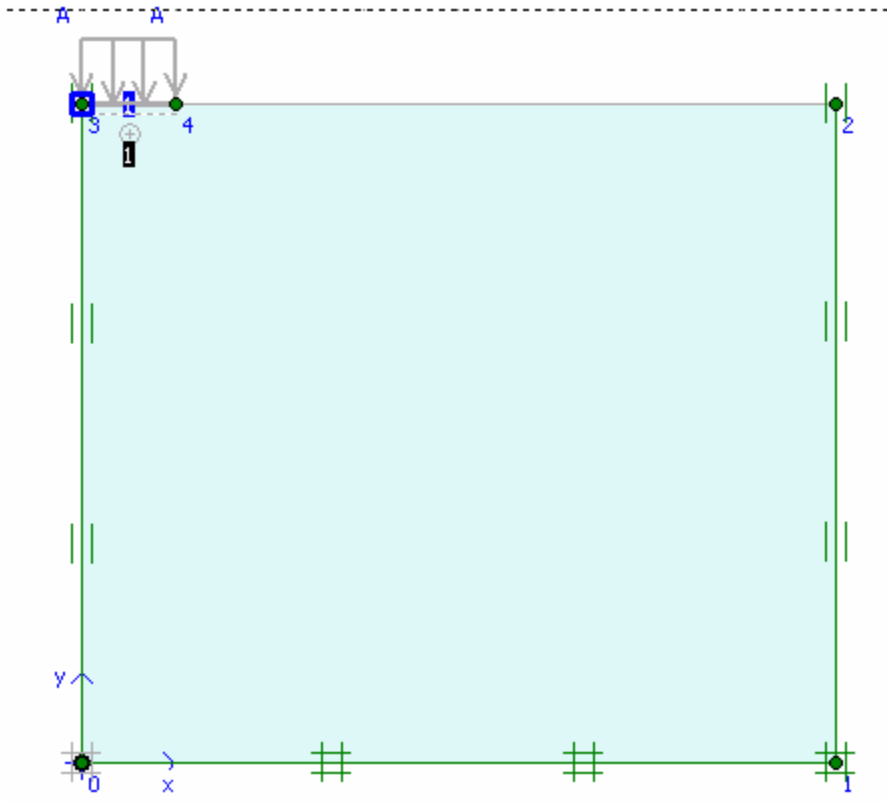
Tính toán áp lực nước 

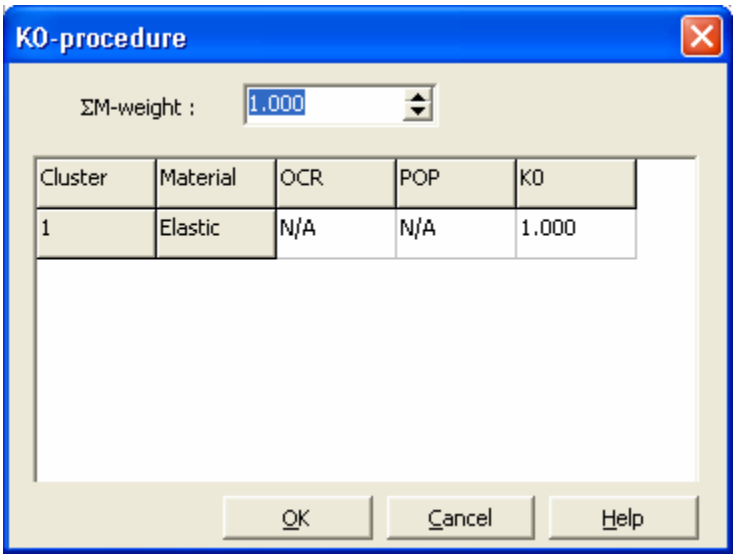


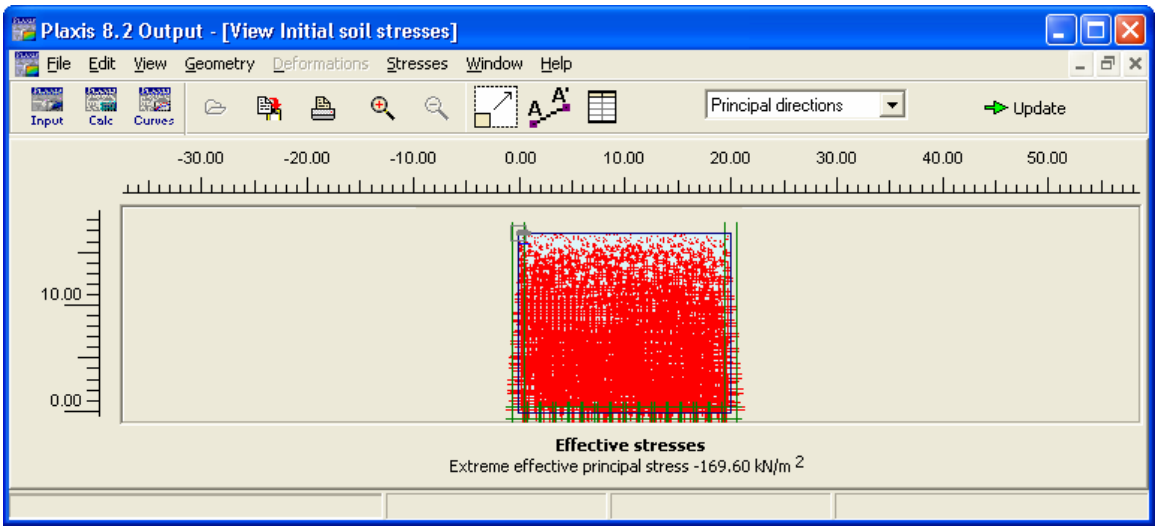


Update

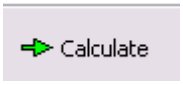
Tính toán áp lực đất 

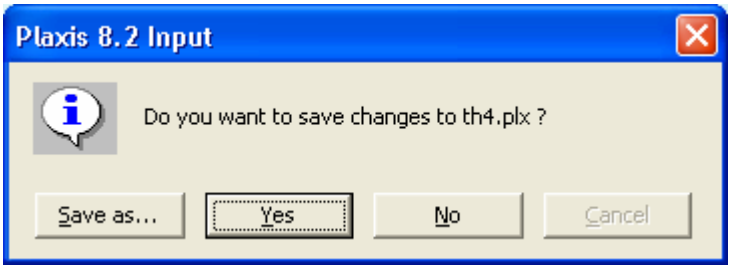


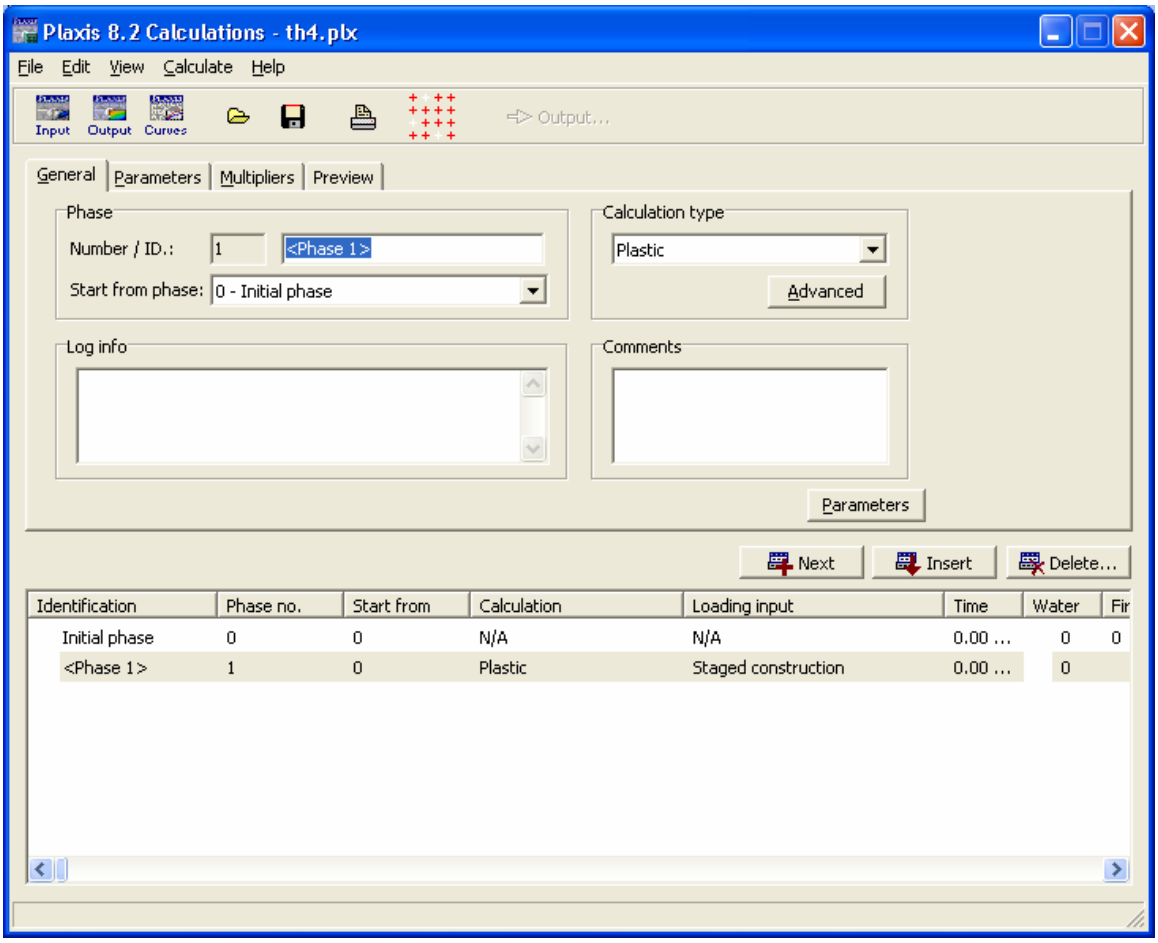




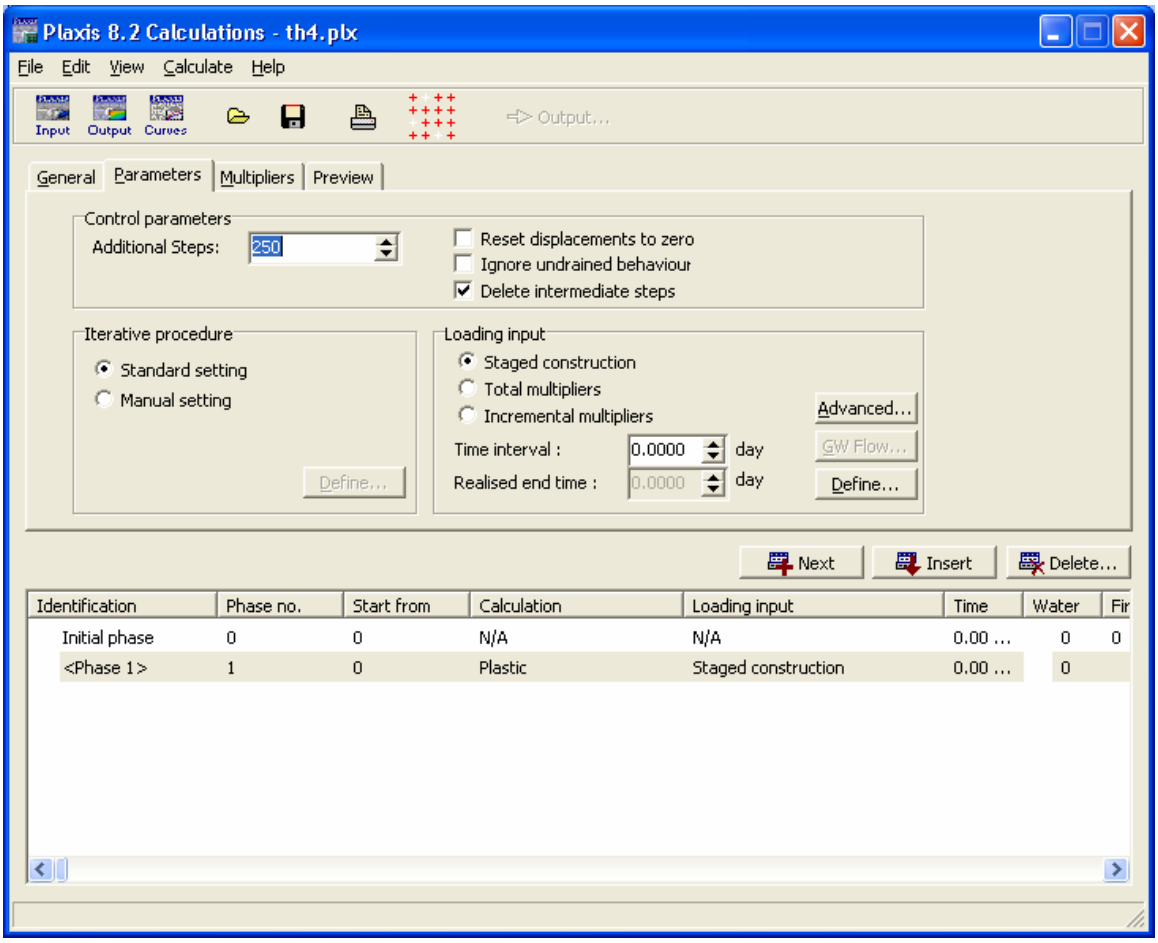
Update

28. Bắt đầu tính toán 

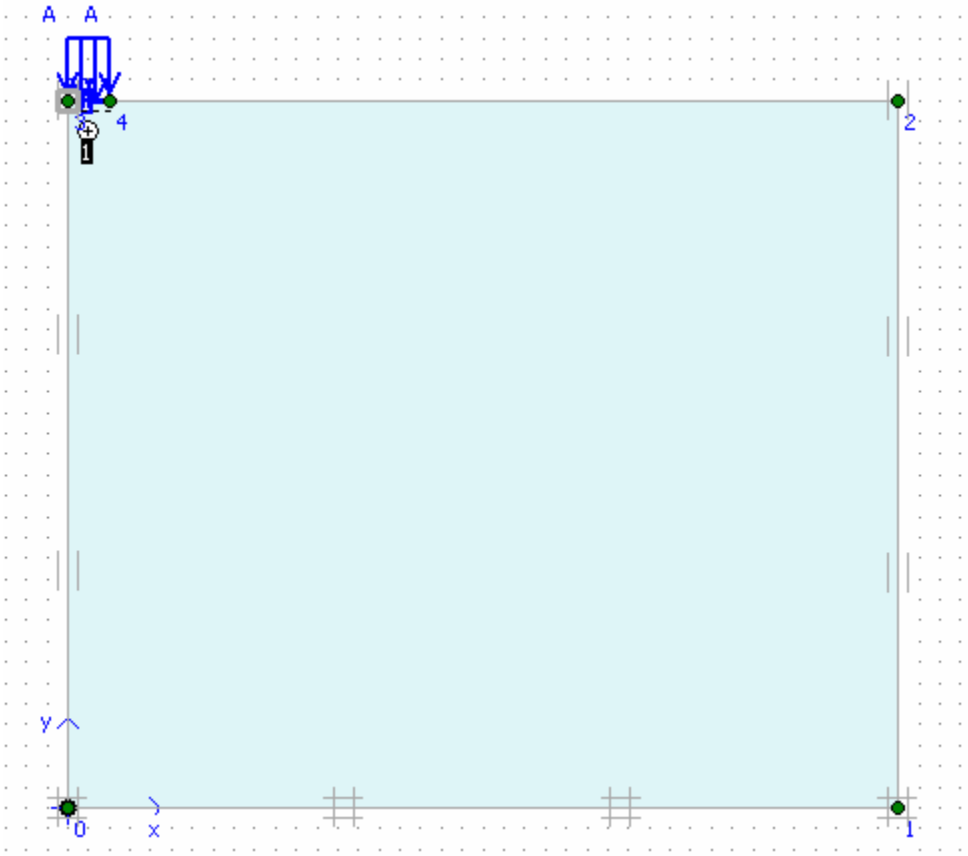



Plaxis 8.2 Calculations - th4.plx
File Edit View Calculate Help
Input Output Curves
Output...
General Parameters Multipliers Preview
Phase
Number / ID.: 1 <Phase 1>
Start from phase: 0 - Initial phase
Calculation type
Plastic
Advanced
Log info
Comments
Parameters
Next Insert Delete...
Identification Phase no. Start from Calculation Loading input Time Water Fir
Initial phase 0 0 N/A N/A 0.00 ... 0 0
<Phase 1> 1 0 Plastic Staged construction 0.00 ... 0

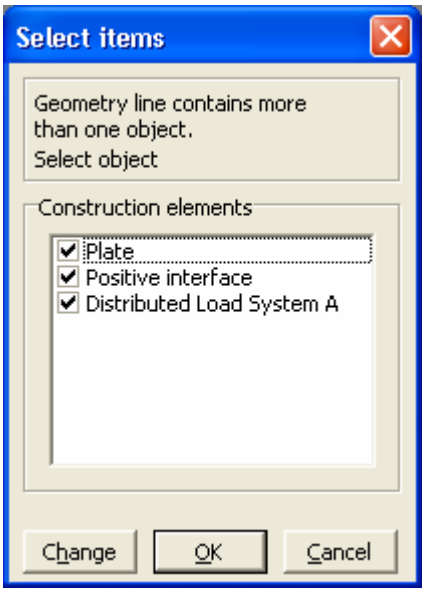
Parameters



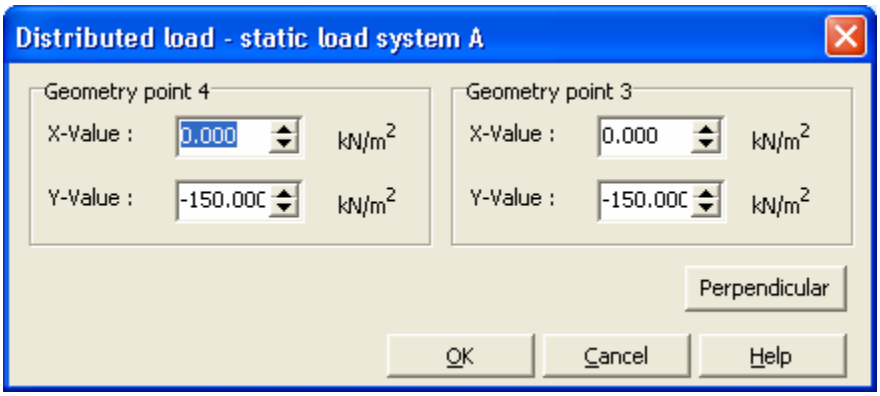
Nhấp vào Define và máy tự động
Trở về màn hình Input



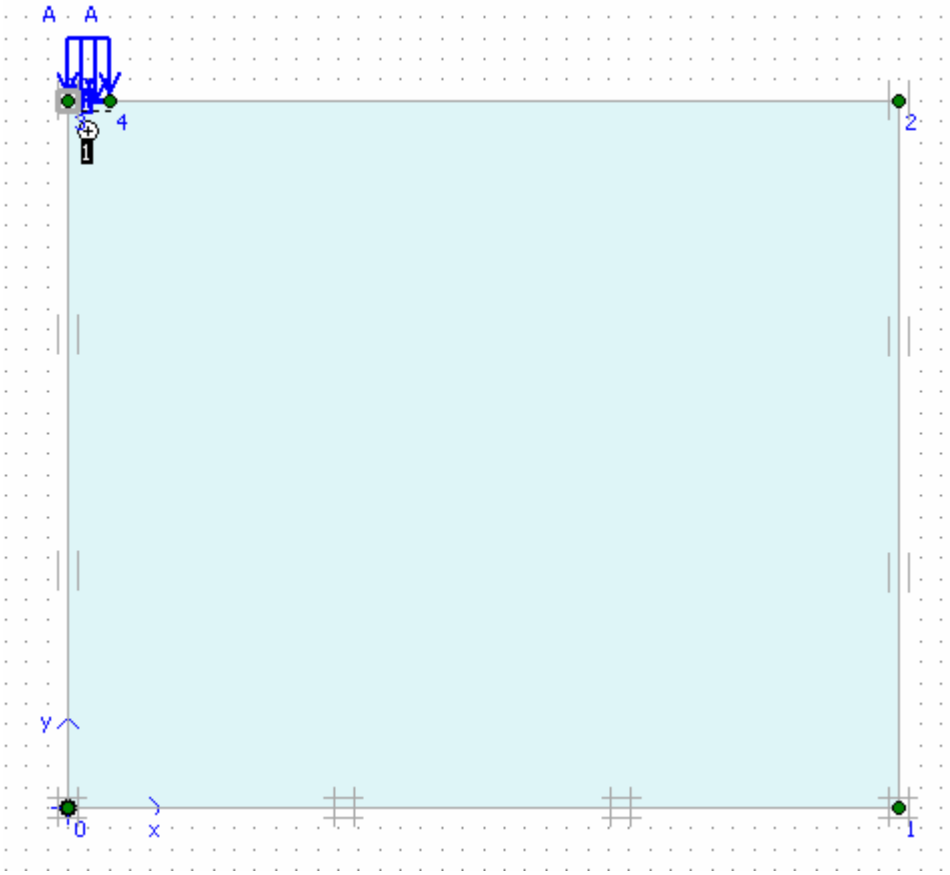
Gán giá trị tải bằng cách nhấp vào áp lực trên hình



Nhấp vào Change để nhập giá trị



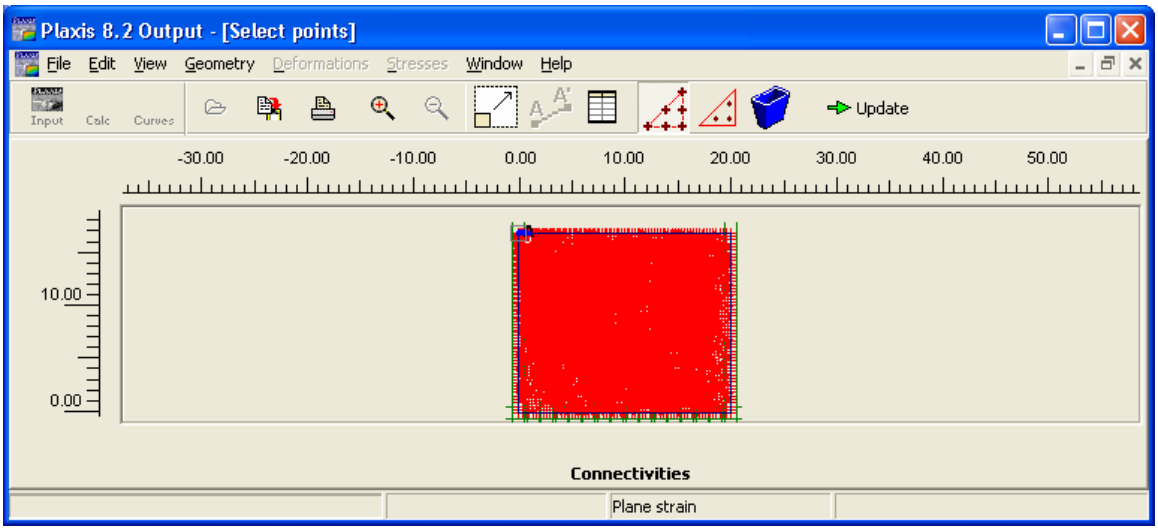
OK



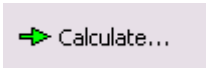
Update

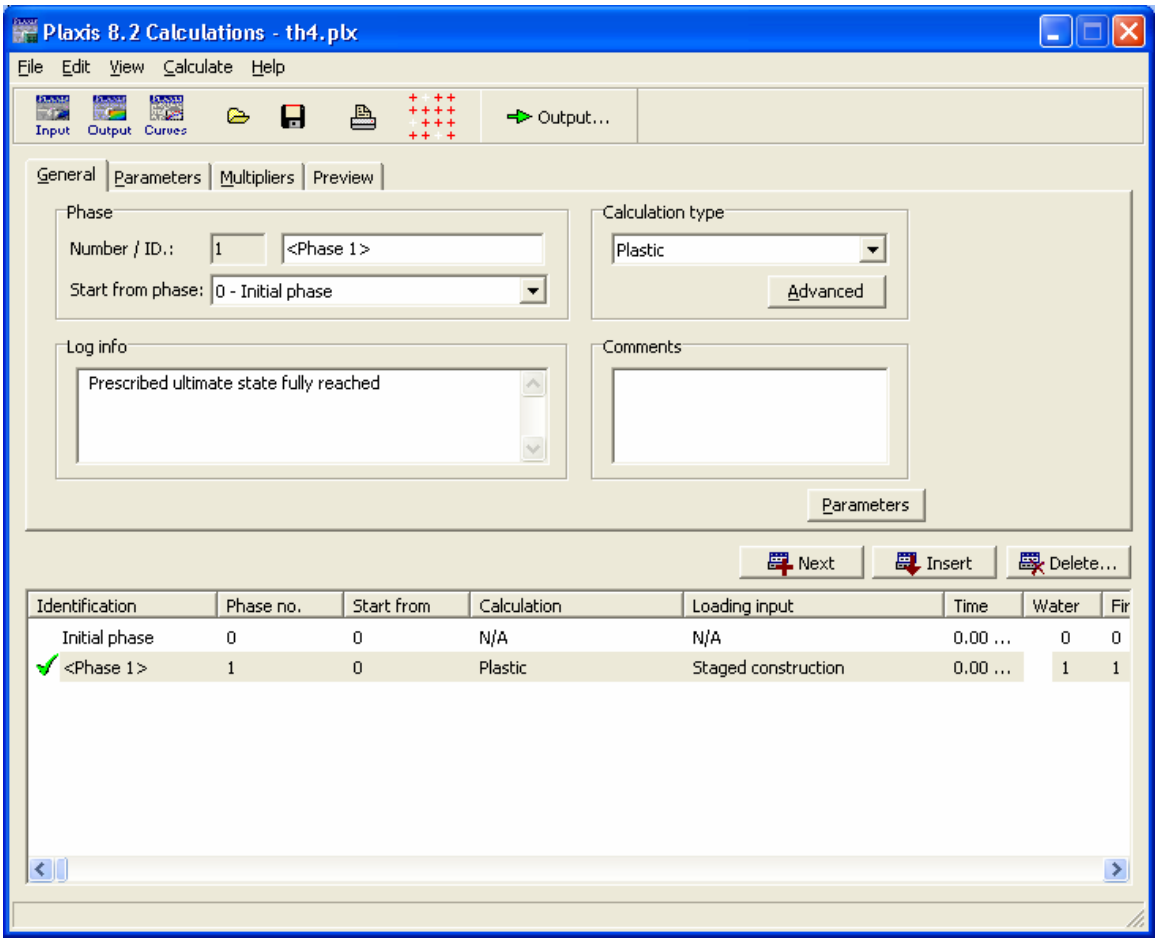
Dùng biểu tượng  để chọn điểm khảo sát

Ví dụ điểm A

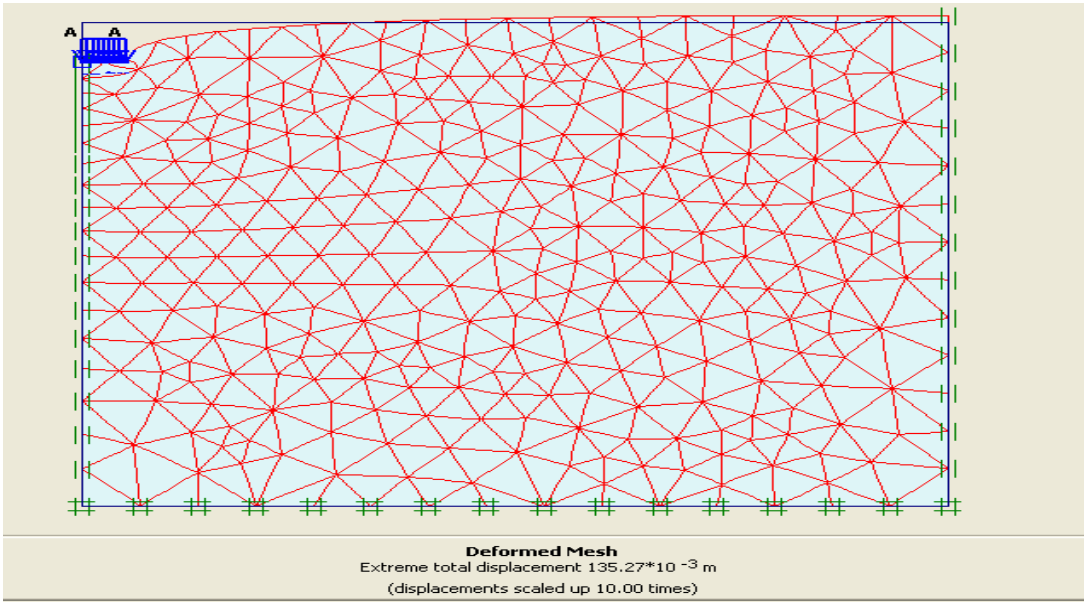


Update

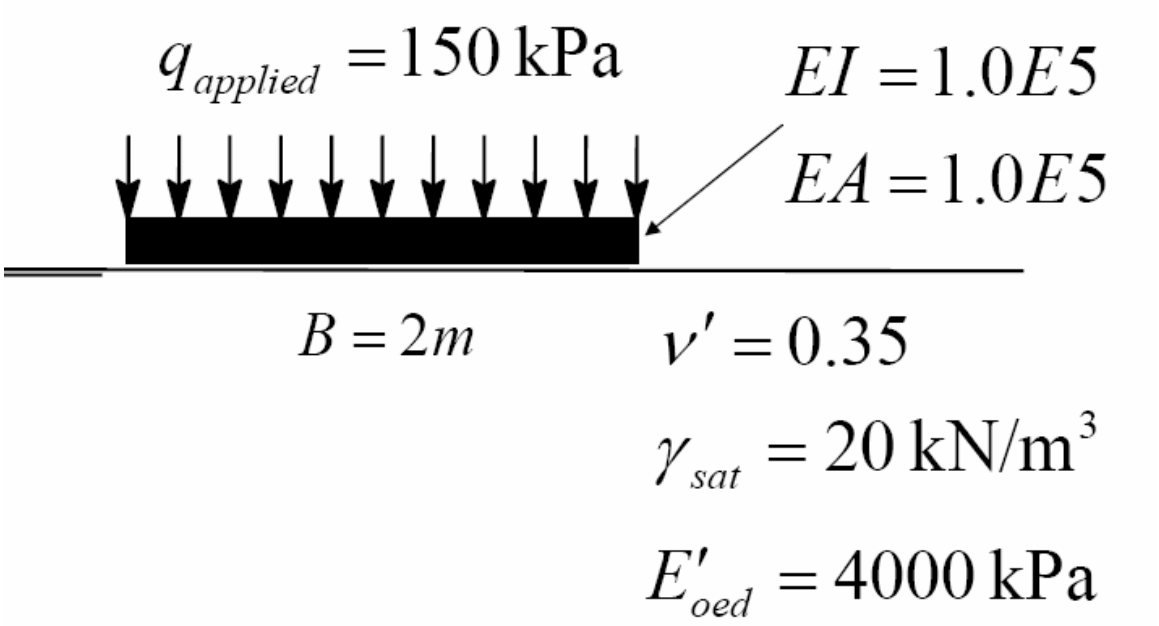
Tính toán 



Đã tính toán xong , nhấp vào Output



Phần 5b : PLAXIS INPUT,CALCULATE SETTLEMENT



ELASTOPLASTIC MC MODEL DRAINE t = ∞ Cu = 50 Kpa

29. Tạo hình dạng bài toán

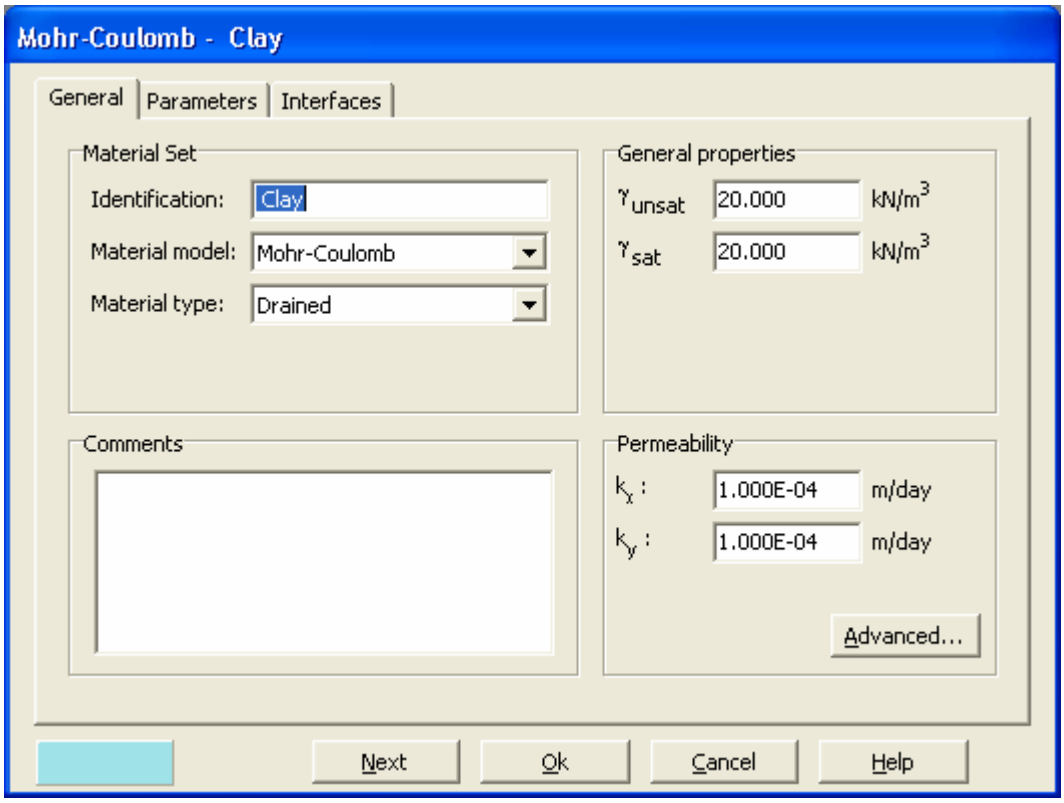
Vẽ tấm (Plate)

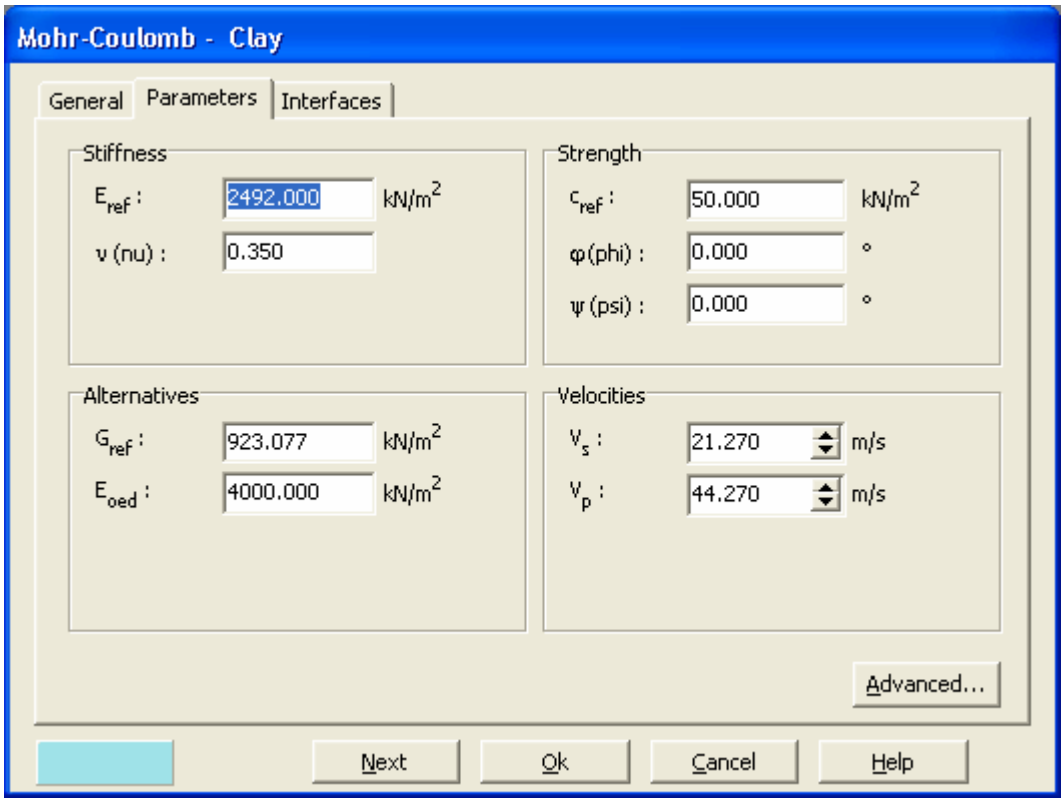
Gán biểu tượng áp lực

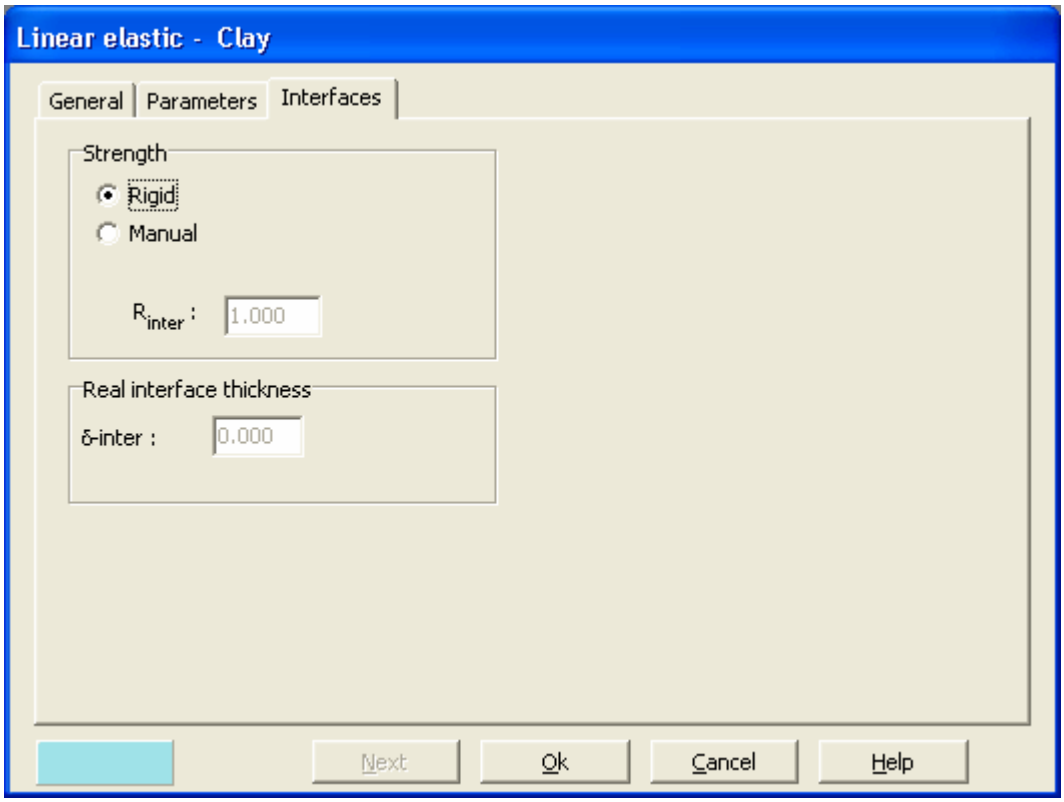
Vẽ phần tử tiếp xúc

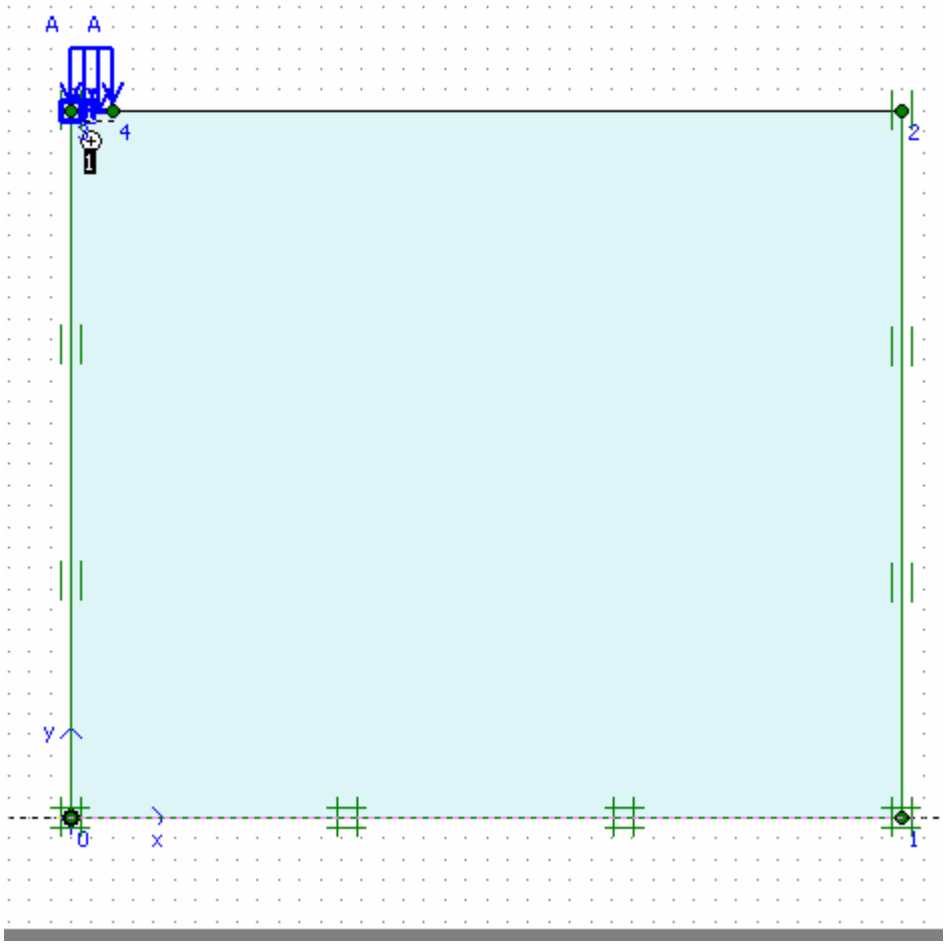
Gán biên

Gán số liệu địa chất 

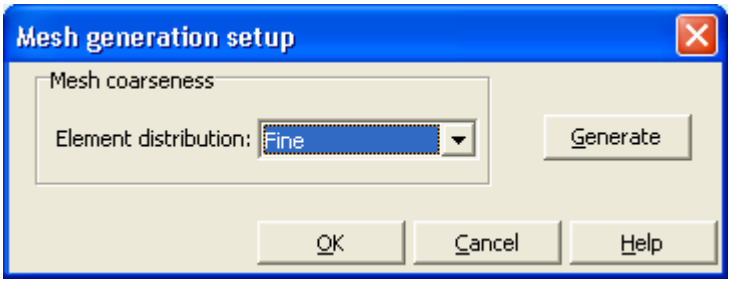


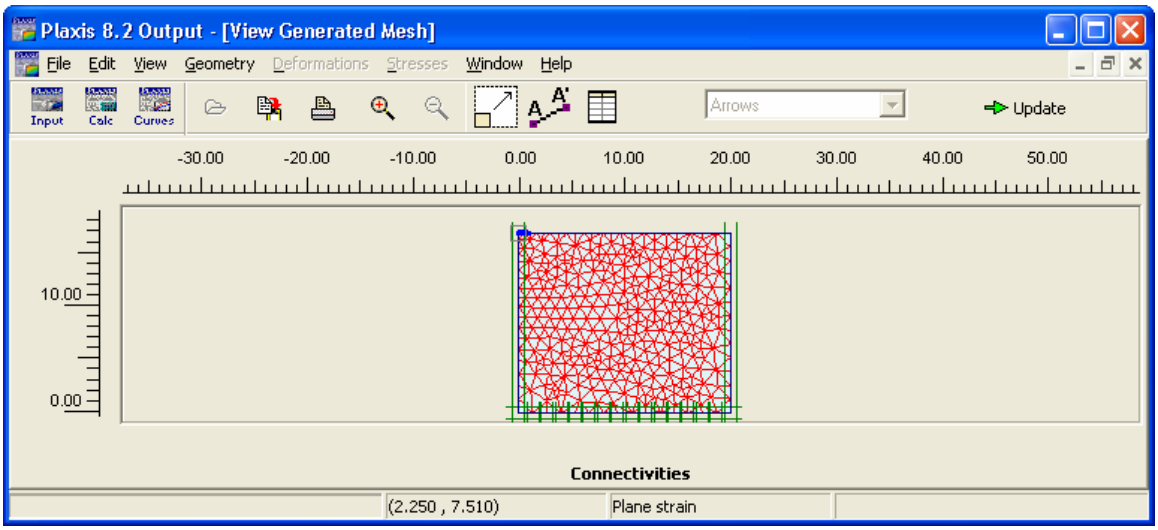

Mohr-Coulomb - Clay
General
Parameters
Interfaces
Stiffness
E ref : 2492.000 kN/m2
ν (nu) : 0.350
Strength
c ref : 50.000 kN/m2
φ (phi) : 0.000 °
ψ (psi) : 0.000 °
Alternatives
G ref : 923.077 kN/m2
E oed : 4000.000 kN/m2
Velocities
V s : 21.270 m/s
V p : 44.270 m/s
Advanced...
Next
Ok
Cancel
Help


Linear elastic - Clay
General
Parameters
Interfaces
Strength
Rigid
Manual
R inter :
1.000
Real interface thickness
δ-inter :
0.000
Next
Ok
Cancel
Help



30. Tạo lưới phần tử

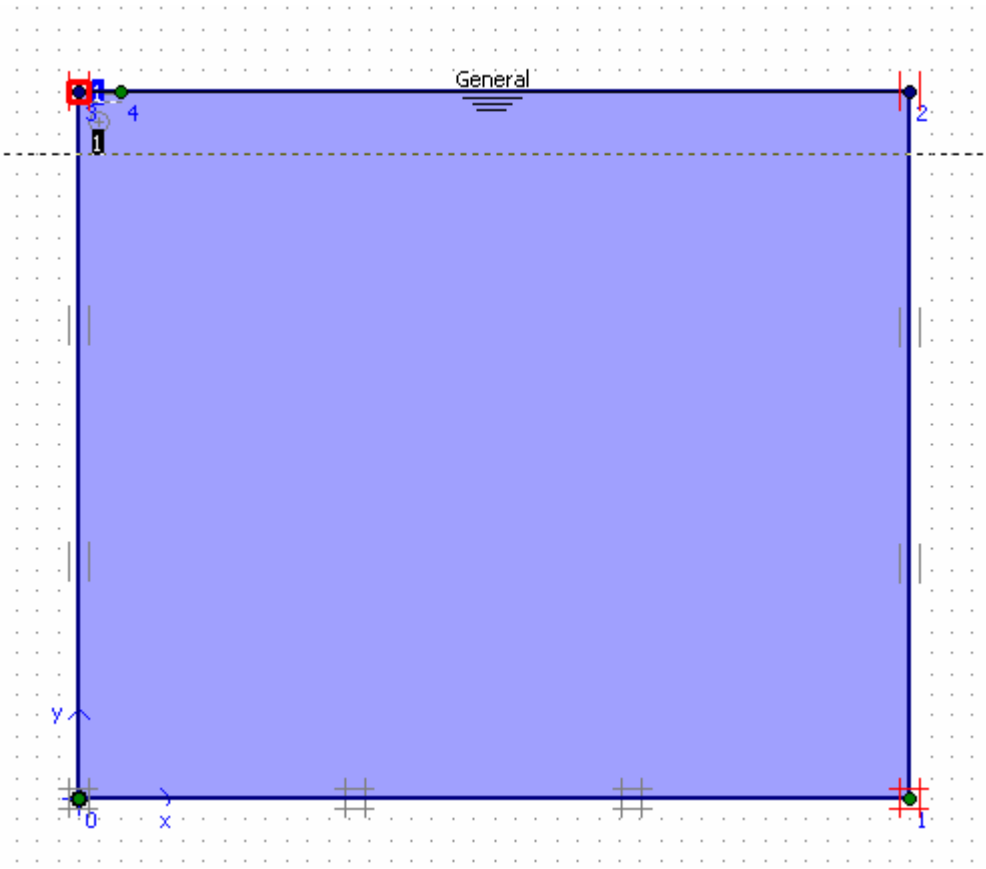




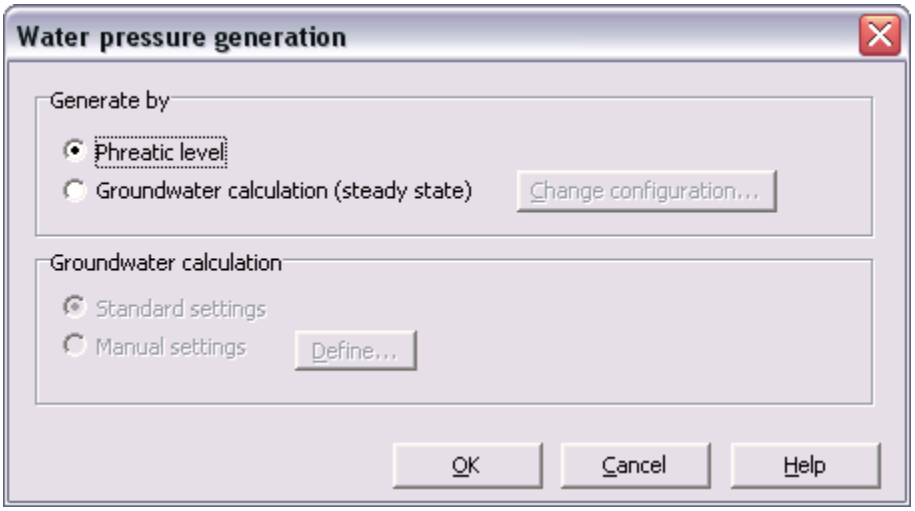
Update

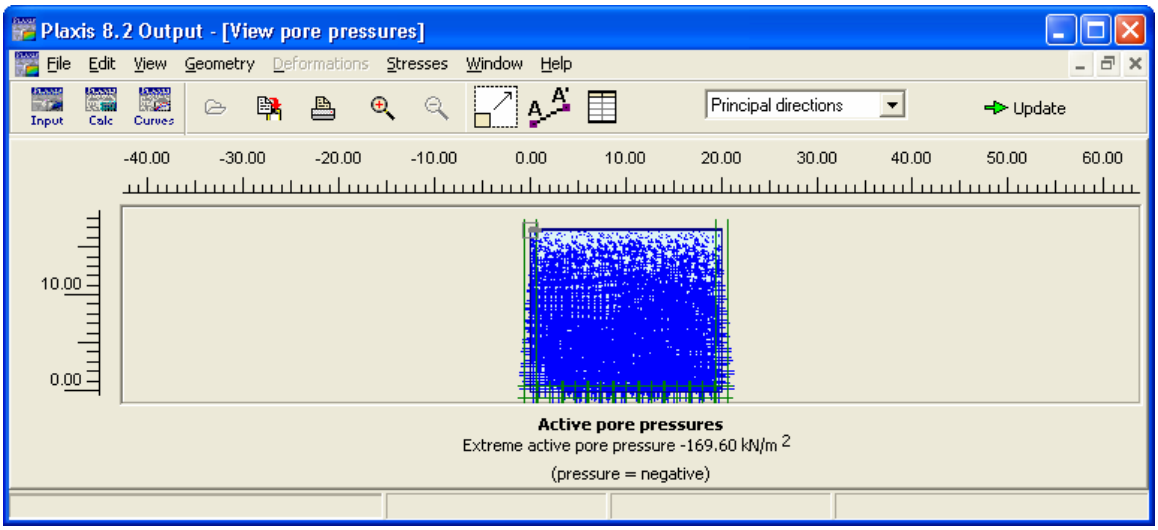
31. Tính toán điều kiện ban đầu

Gán mực nước ngầm

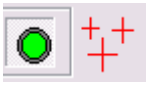


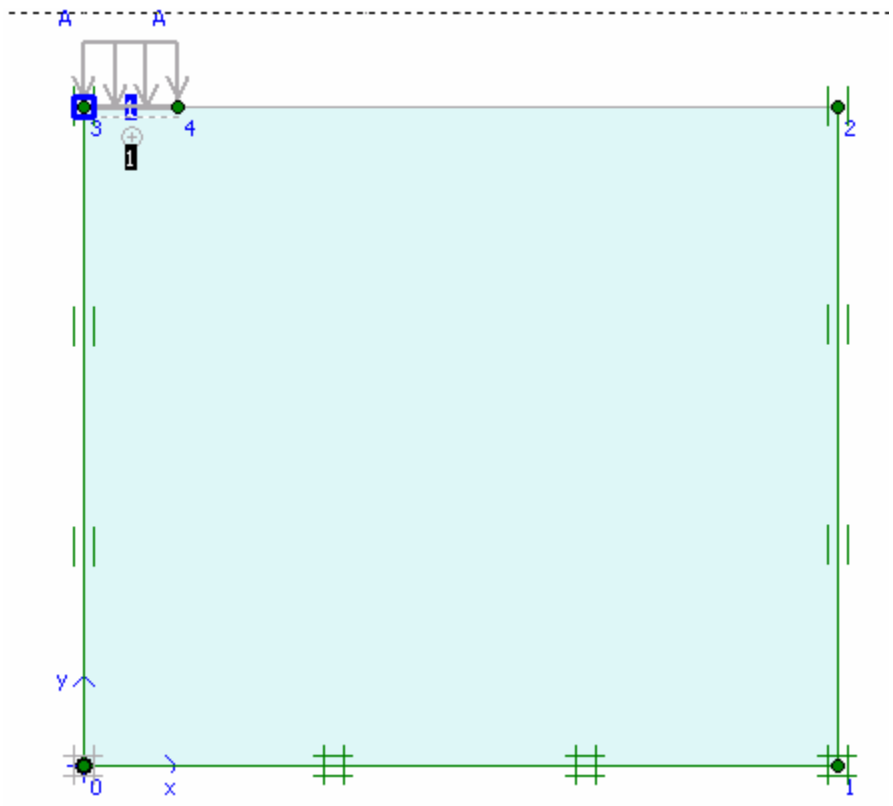
Tính toán áp lực nước 

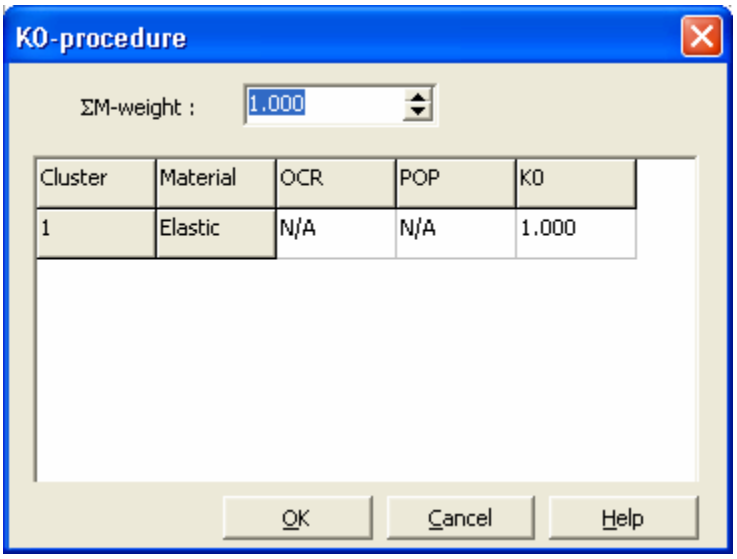


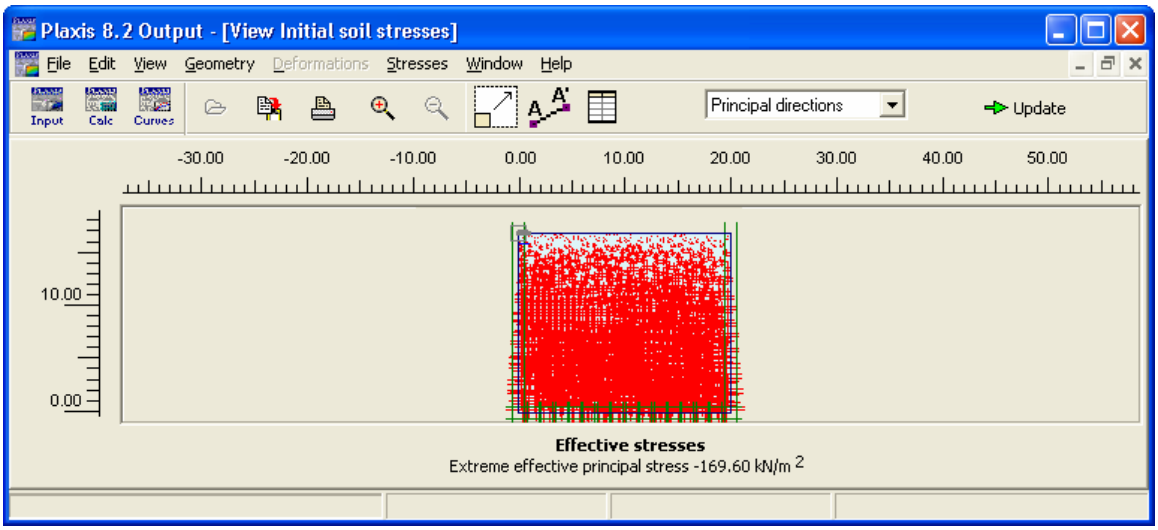


Update

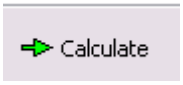
Tính toán áp lực đất 

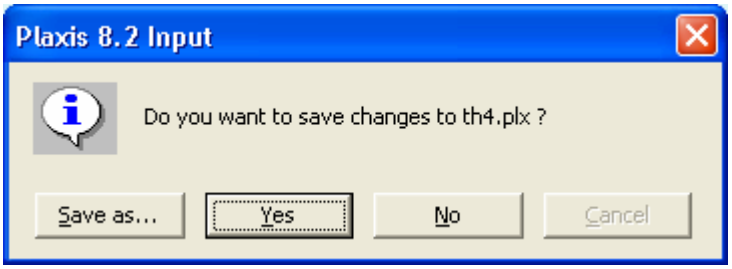


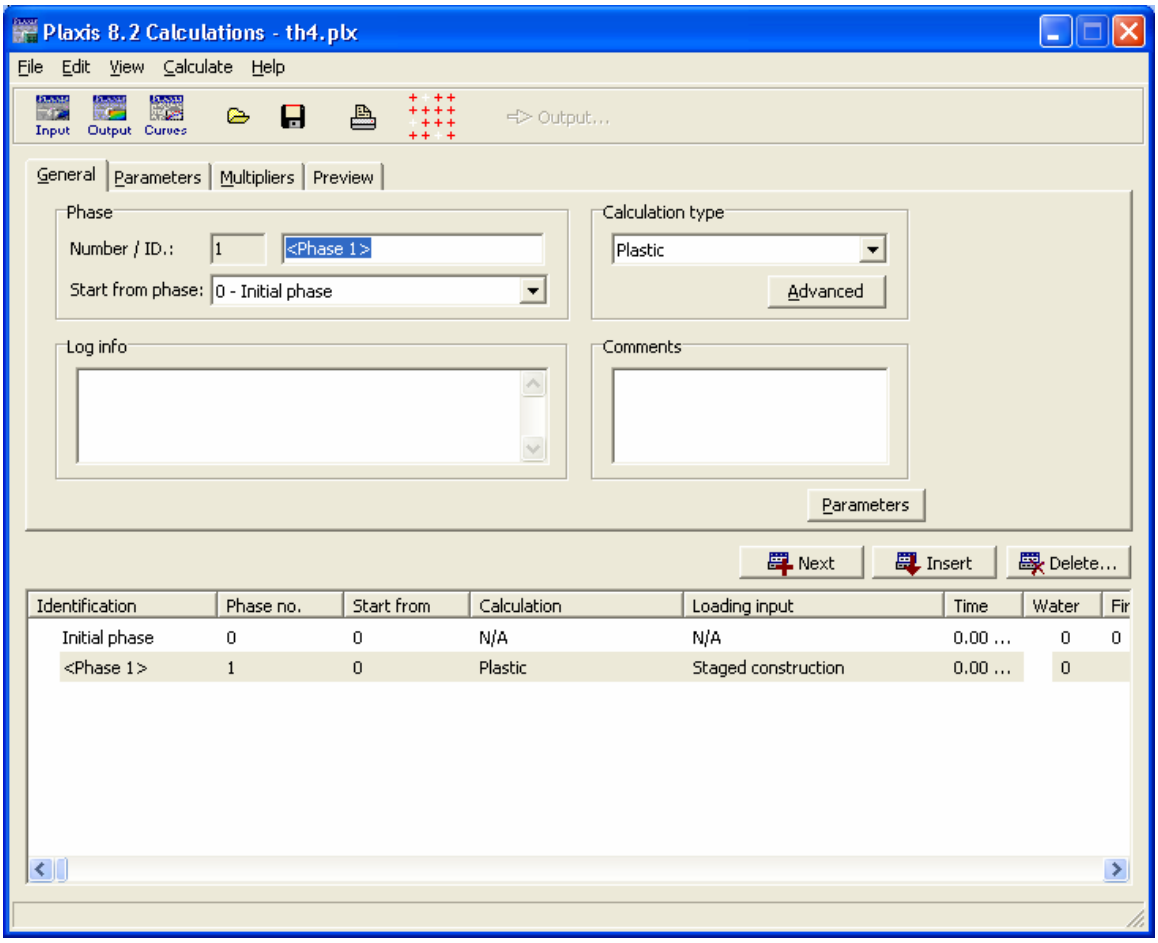




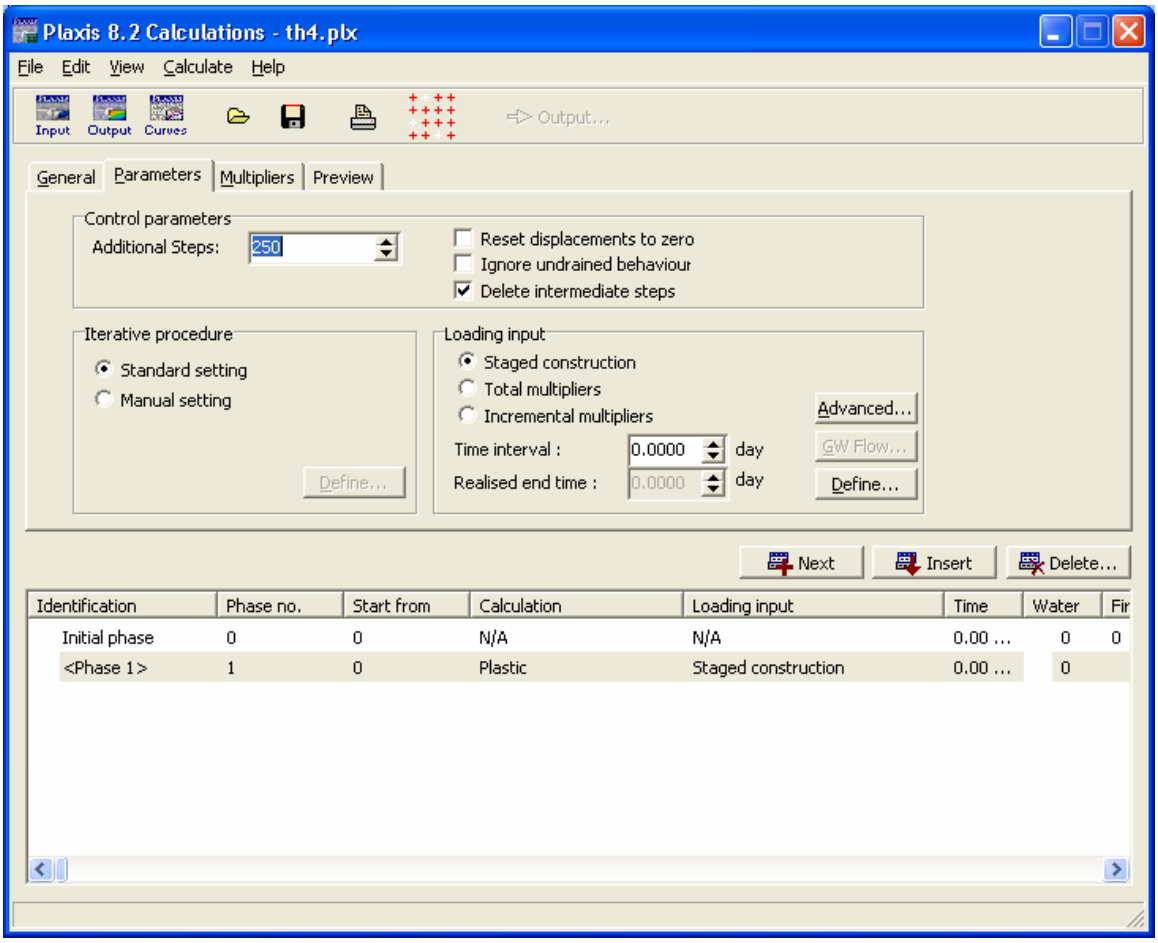
Update

32. Bắt đầu tính toán 

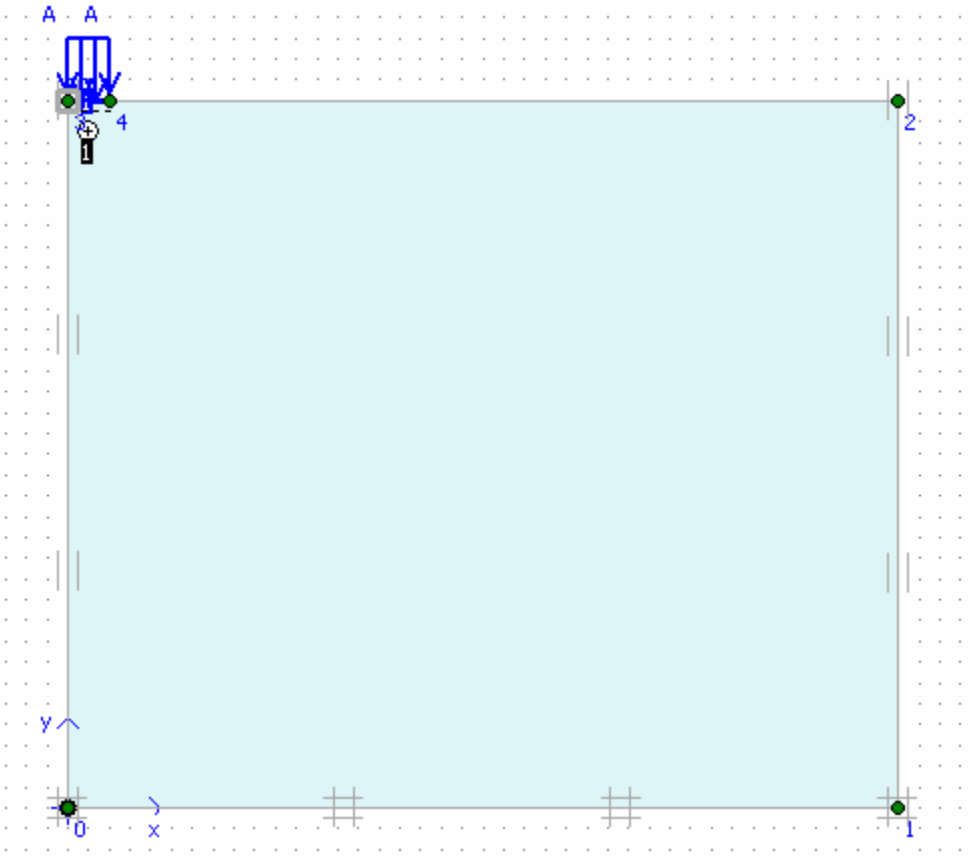



Plaxis 8.2 Calculations - th4.plx
File Edit View Calculate Help
Input Output Curves
Output...
General Parameters Multipliers Preview
Phase
Number / ID.: 1 <Phase 1>
Start from phase: 0 - Initial phase
Calculation type
Plastic
Advanced
Log info
Comments
Parameters
Next Insert Delete...
Identification Phase no. Start from Calculation Loading input Time Water Fir
Initial phase 0 0 N/A N/A 0.00 ... 0 0
<Phase 1> 1 0 Plastic Staged construction 0.00 ... 0

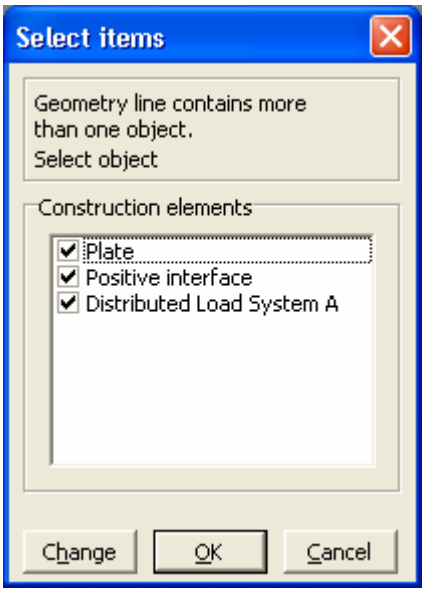
Parameters



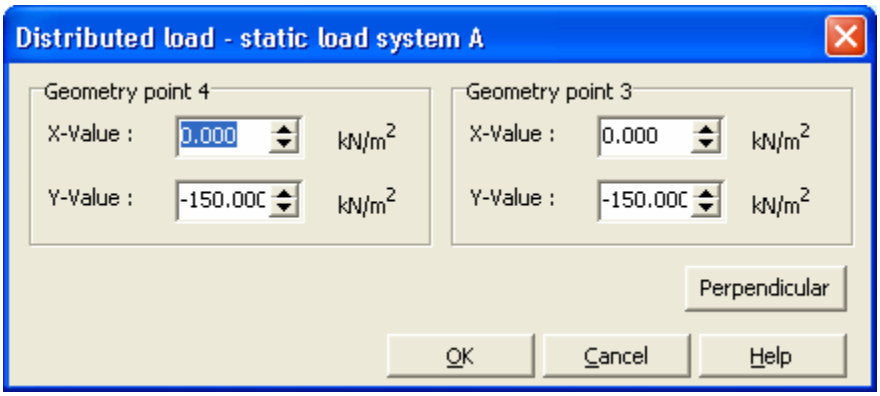
Nhấp vào Define và máy tự động
Trở về màn hình Input



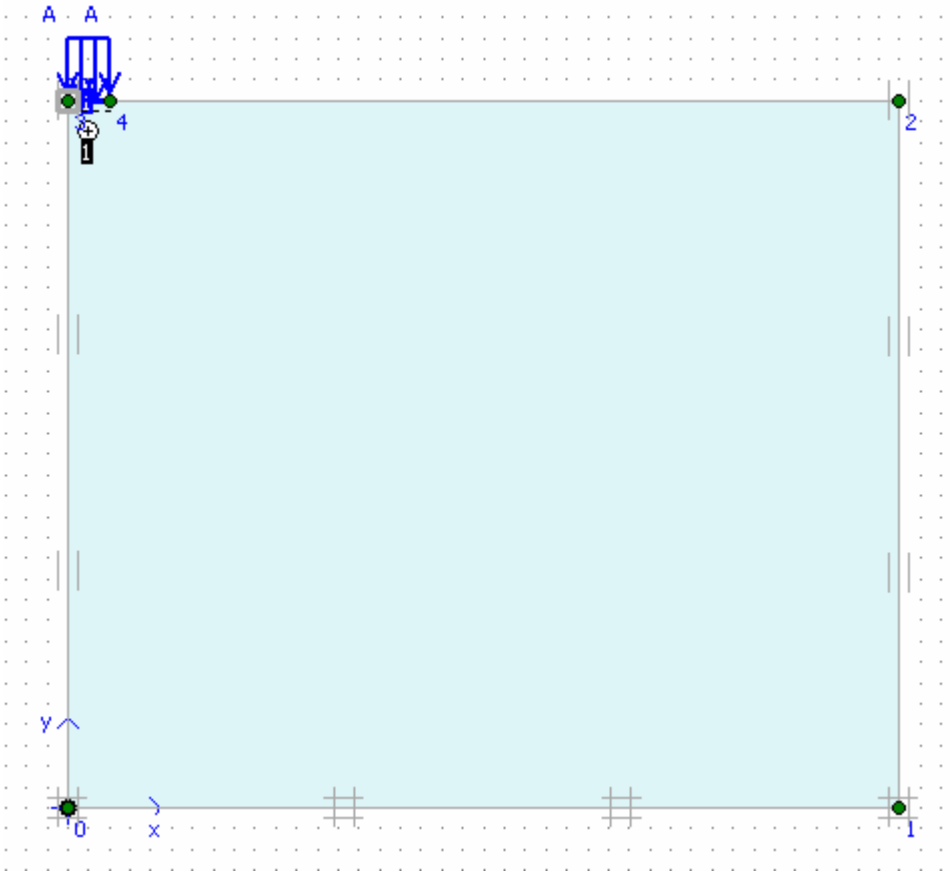
Gán giá trị tải bằng cách nhấp vào áp lực trên hình



Nhấp vào Change để nhập giá trị



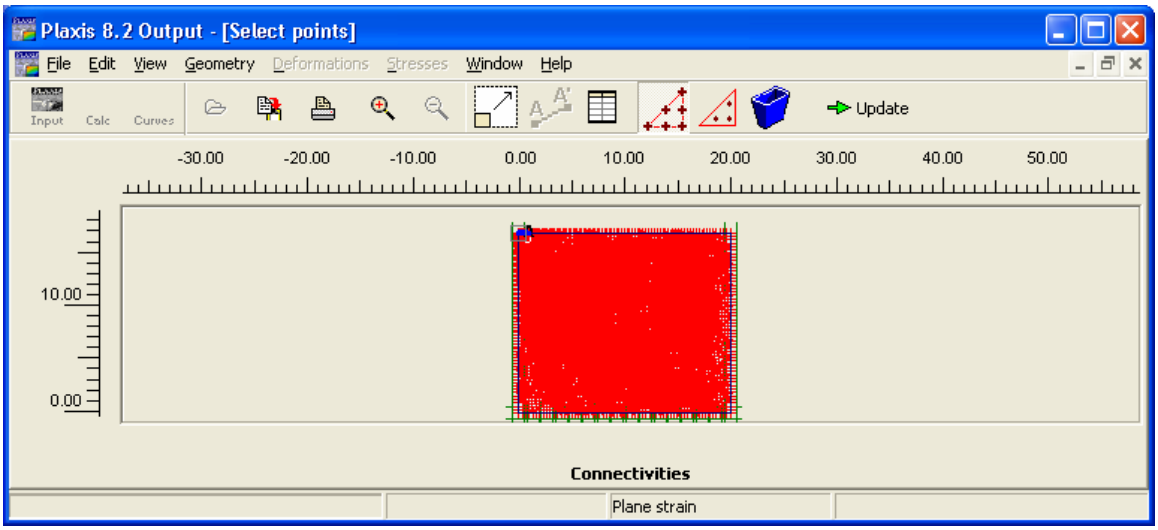
OK



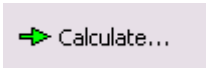
Update

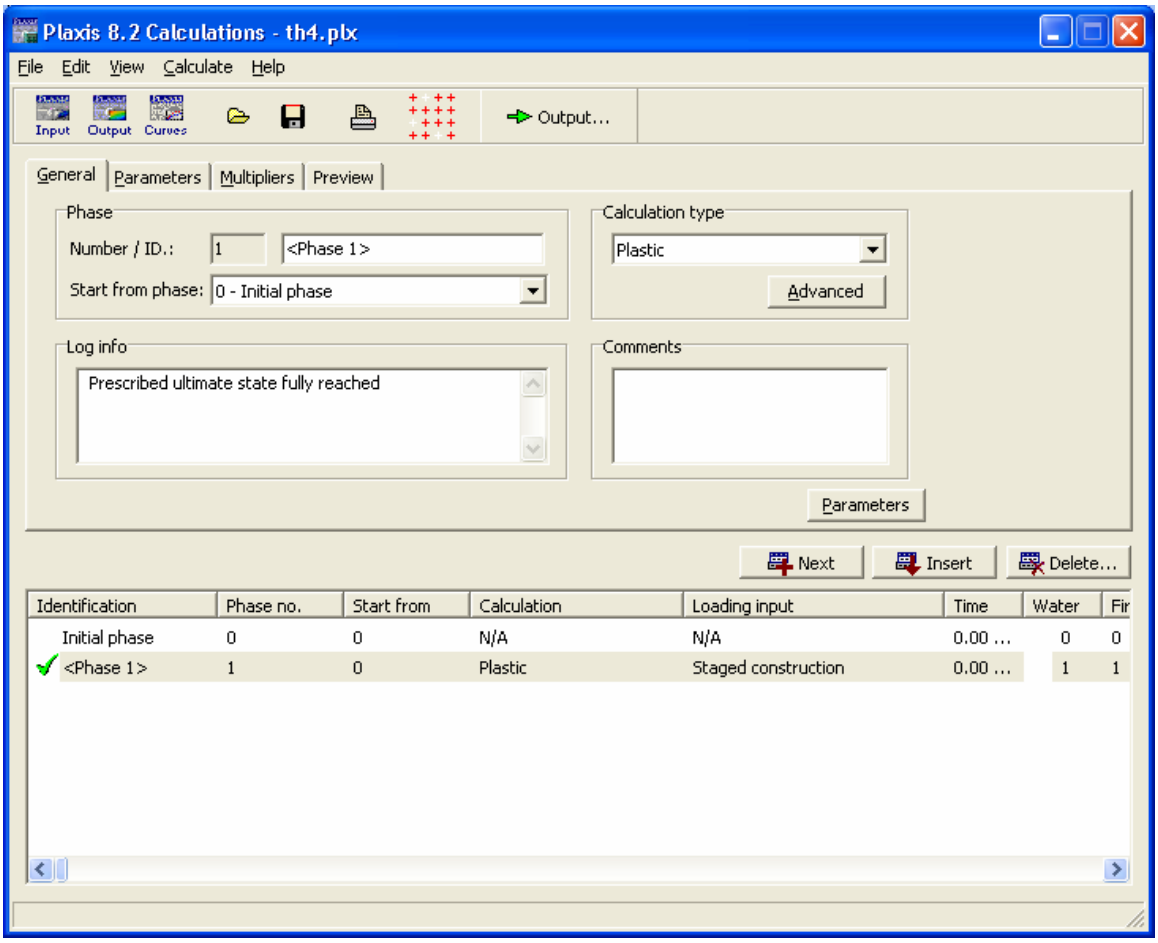
Dùng biểu tượng  để chọn điểm khảo sát

Ví dụ điểm A

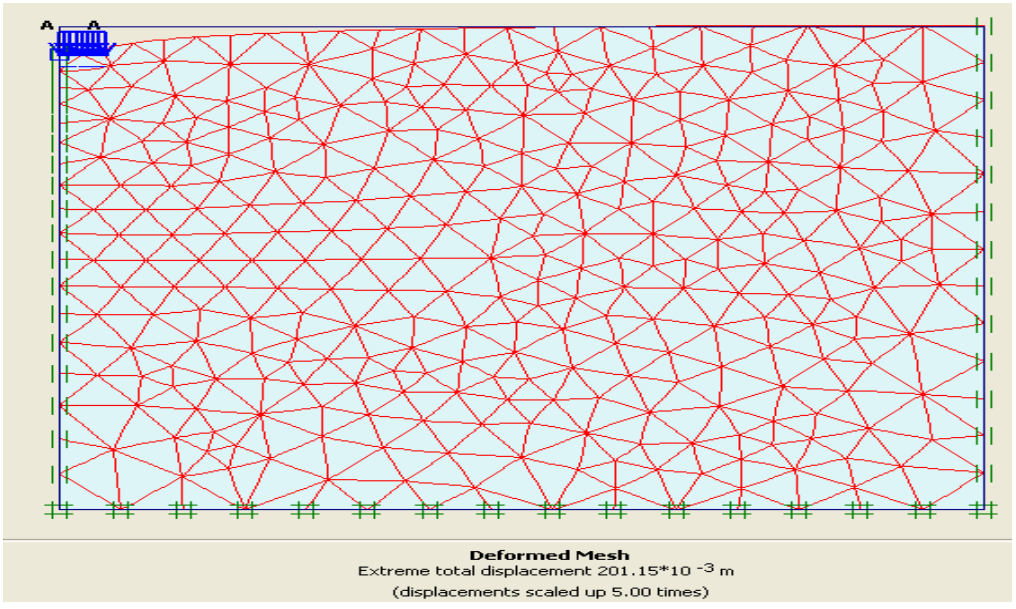


Update

Tính toán 



Đã tính toán xong , nhấp vào Output



Summary

Initial settlement based on elastic theory

$\delta = 128mm$

$t = 0$

Initial settlement based o elastoplastic MC theory

$\delta = 139mm$

$t = 0$

Total final settlement based on elastic theory

$\delta = 192mm$

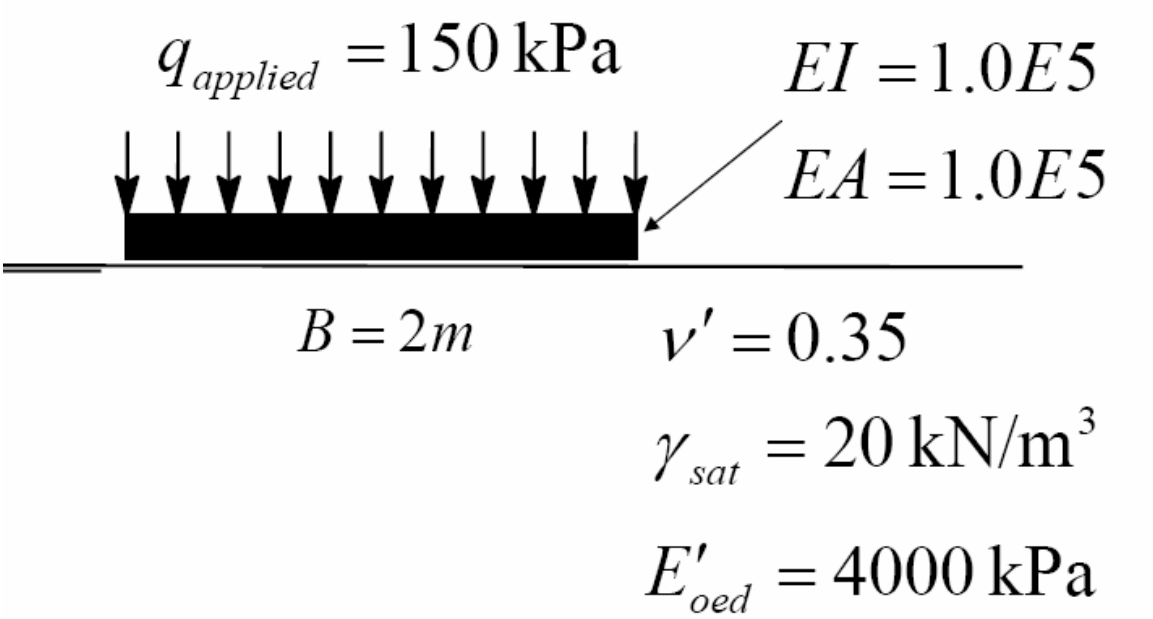
$t = \infty$

Initial settlement based or elastoplastic MC theory

$\delta = 202mm$

$t = \infty$

Phần 6 : PLAXIS INPUT,CALCULATE CONSOLUDATION



ELASTOPLASTIC MC MODEL UNDRAINE – Cu = 50 Kpa

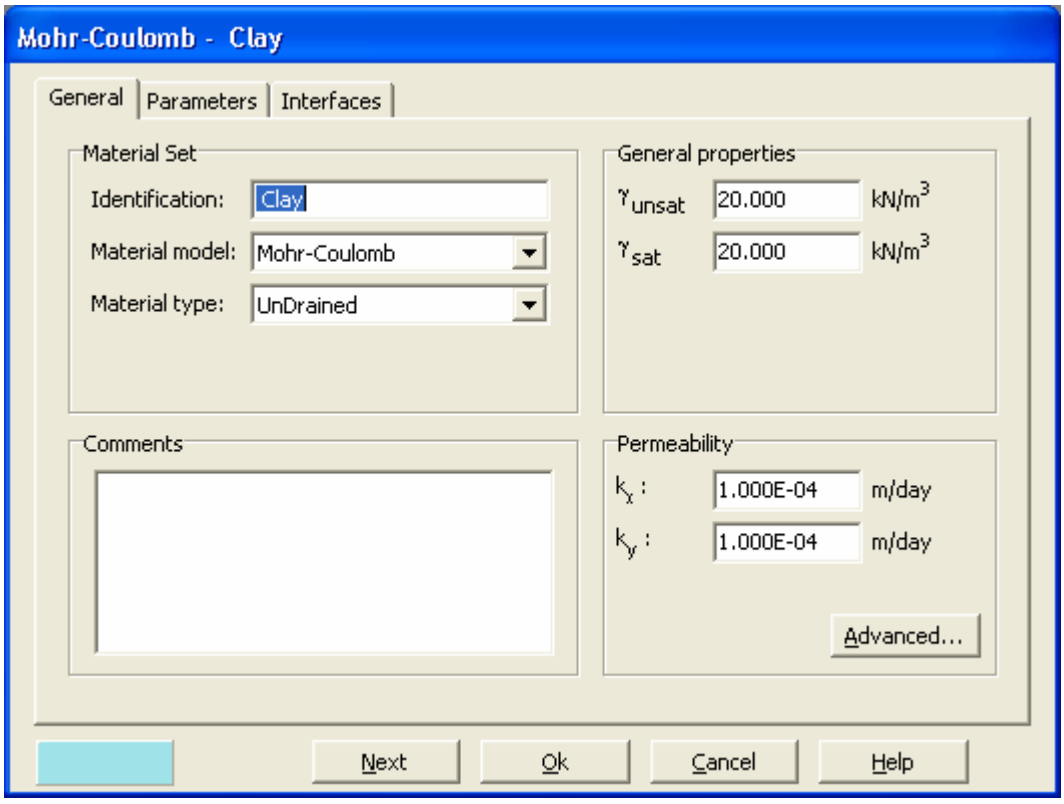
33. Tạo hình dạng bài toán

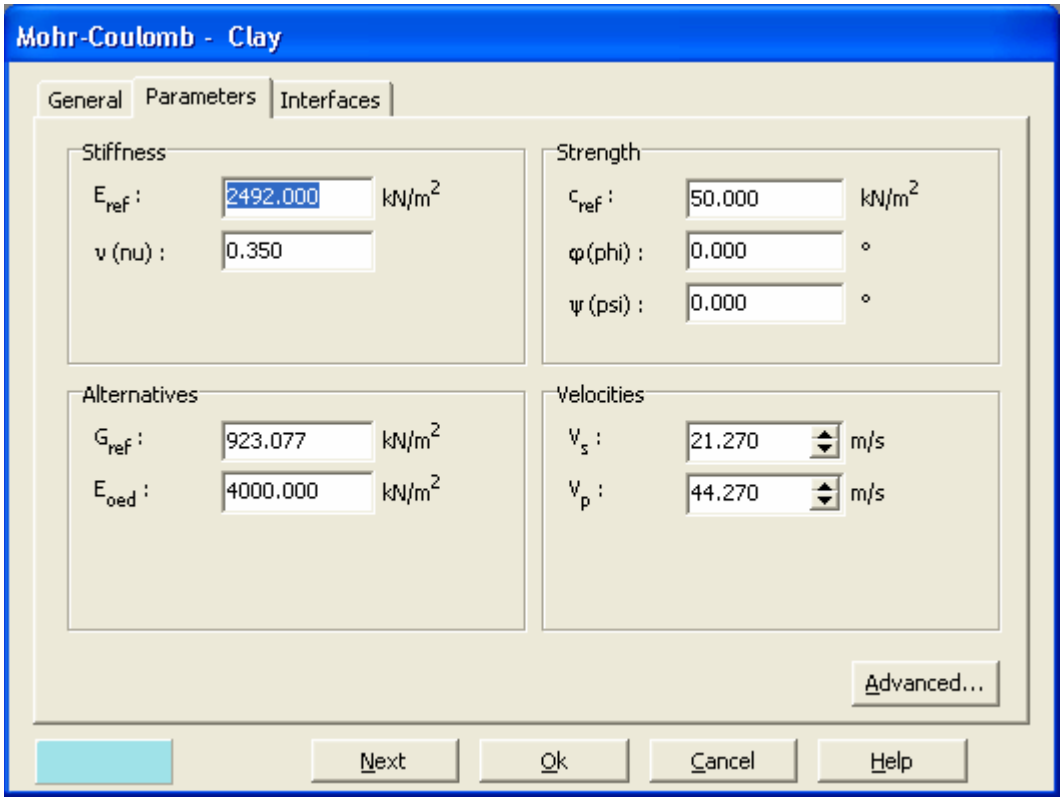
Vẽ tấm (Plate) 

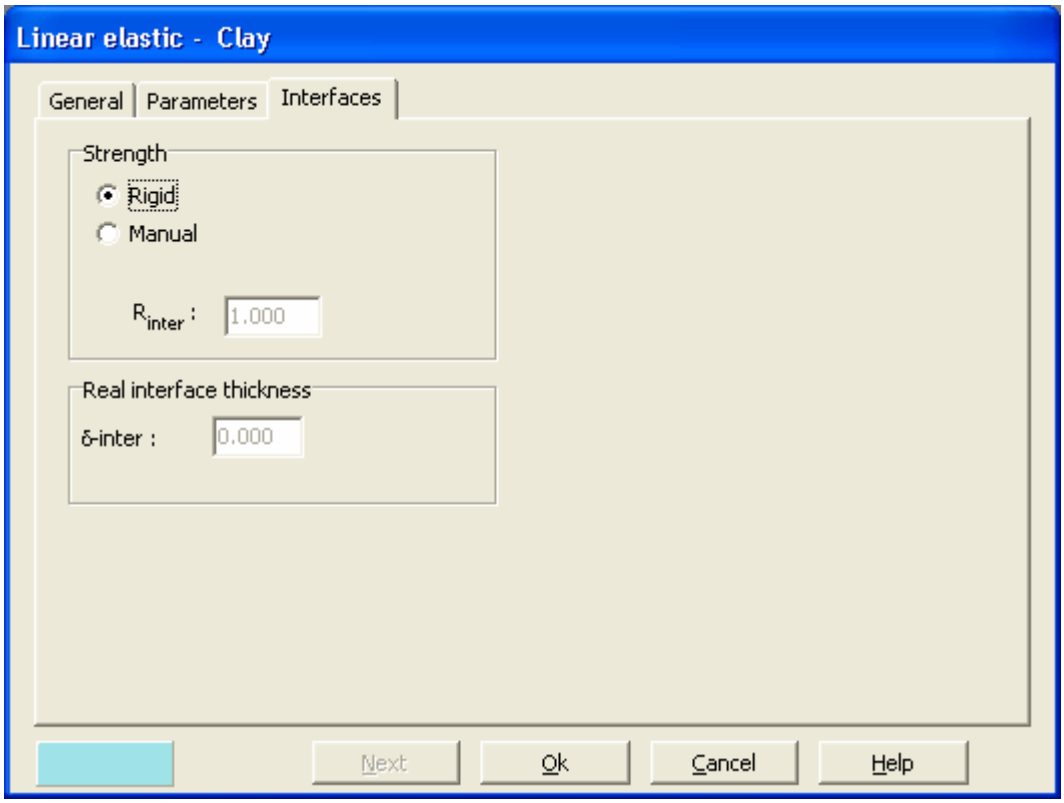
Gán biểu tượng áp lực 

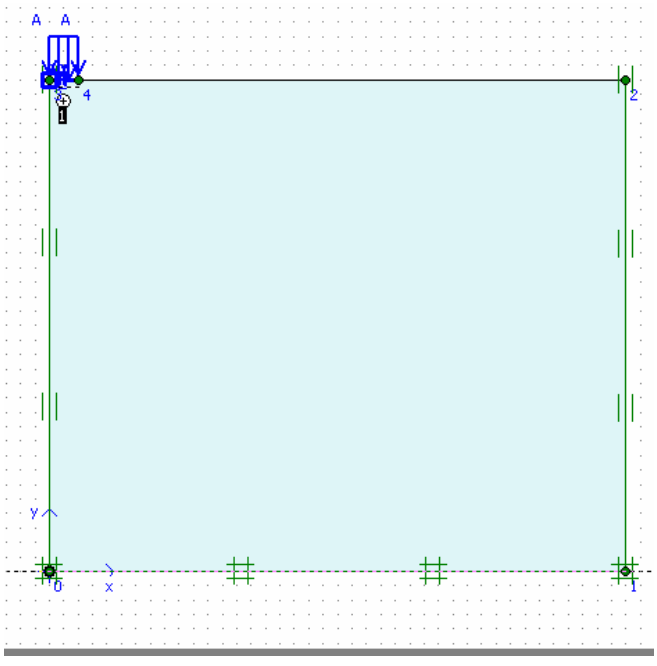
Gán biên 

Gán số liệu địa chất 

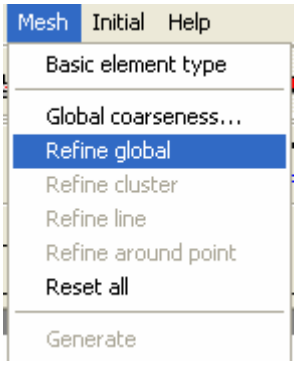

Mohr-Coulomb - Clay
General
Parameters
Interfaces
Material Set
Identification: Clay
Material model: Mohr-Coulomb
Material type: UnDrained
General properties
γunsat 20.000 kN/m3
γsat 20.000 kN/m3
Comments
Permeability
kx : 1.000E-04 m/day
ky : 1.000E-04 m/day
Advanced...
Next
Ok
Cancel
Help

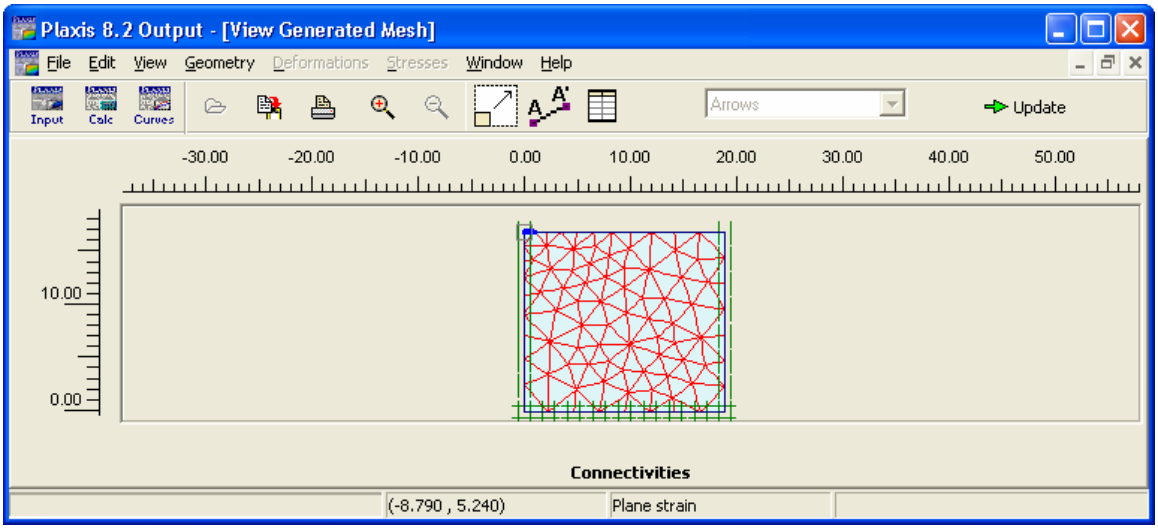

Mohr-Coulomb - Clay
General
Parameters
Interfaces
Stiffness
Eref : 2492.000 kN/m2
ν (nu) : 0.350
Strength
cref : 50.000 kN/m2
φ (phi) : 0.000 °
ψ (psi) : 0.000 °
Alternatives
Gref : 923.077 kN/m2
Eoed : 4000.000 kN/m2
Velocities
Vs : 21.270 m/s
Vp : 44.270 m/s
Advanced...
Next
Ok
Cancel
Help





34. Tạo lưới phần tử

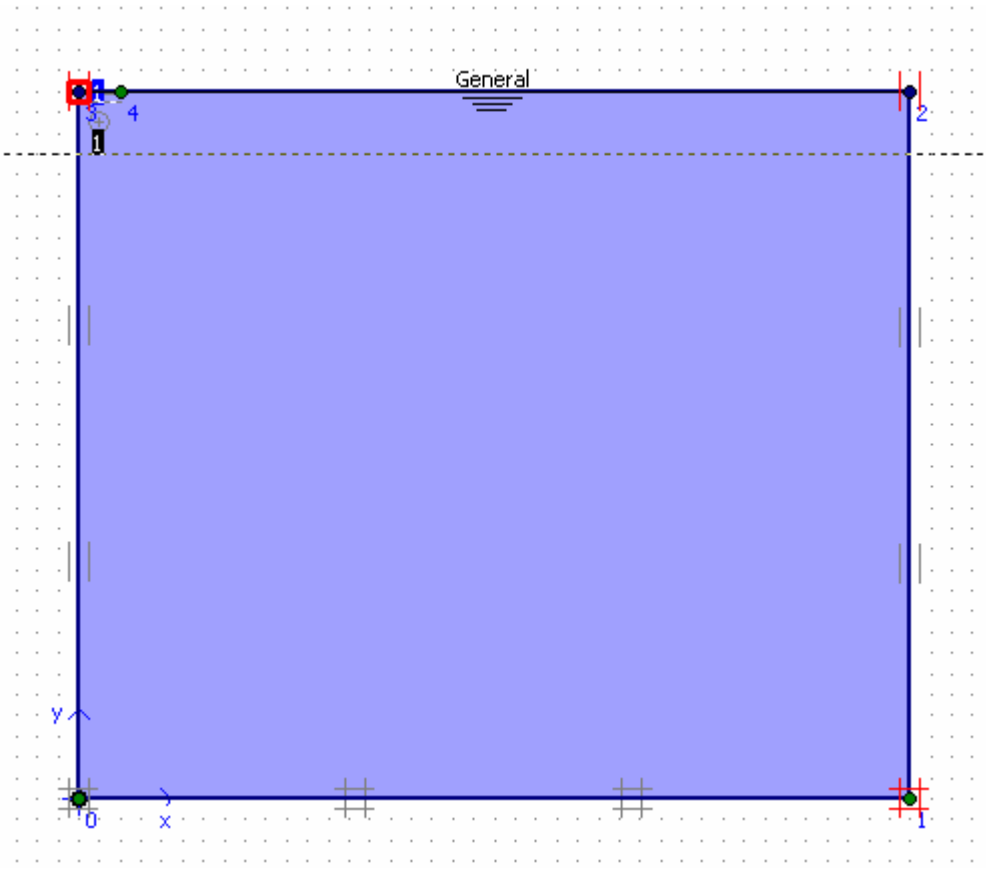




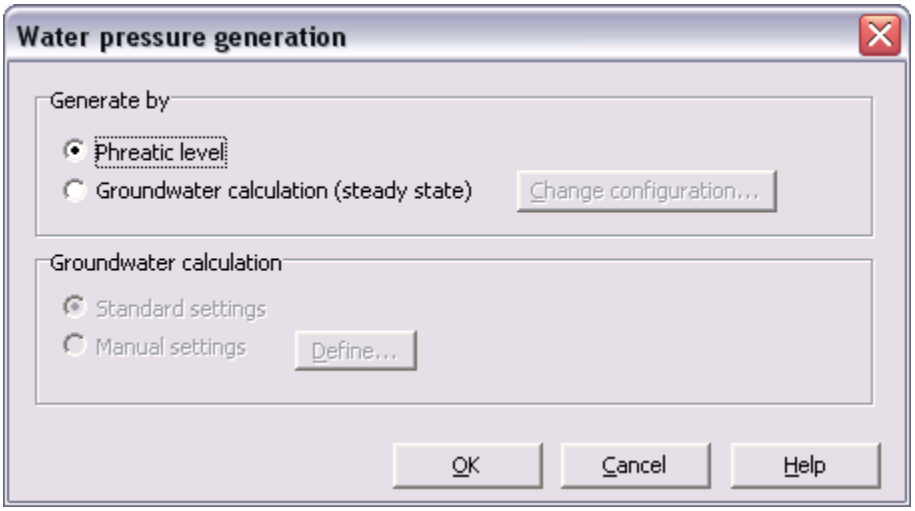
Update

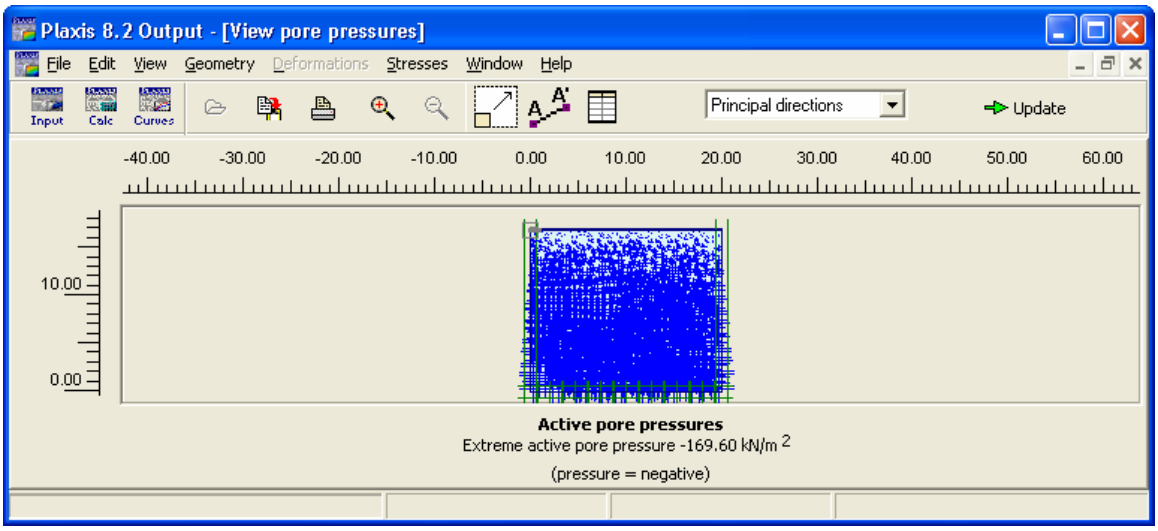
35. Tính toán điều kiện ban đầu

Gán mực nước ngầm

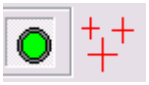


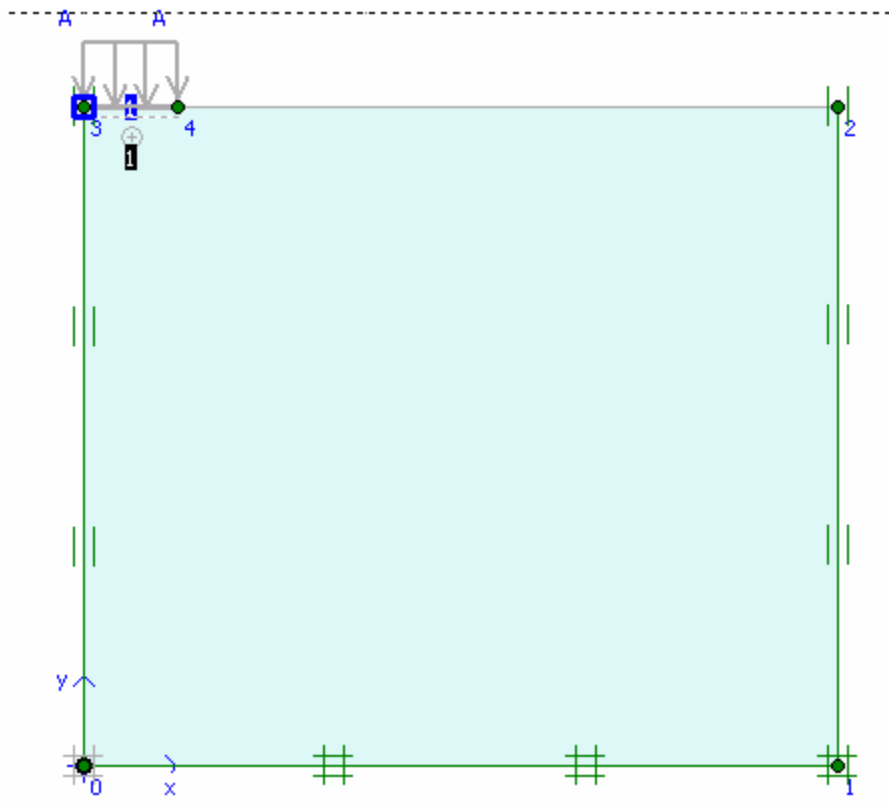
Tính toán áp lực nước 

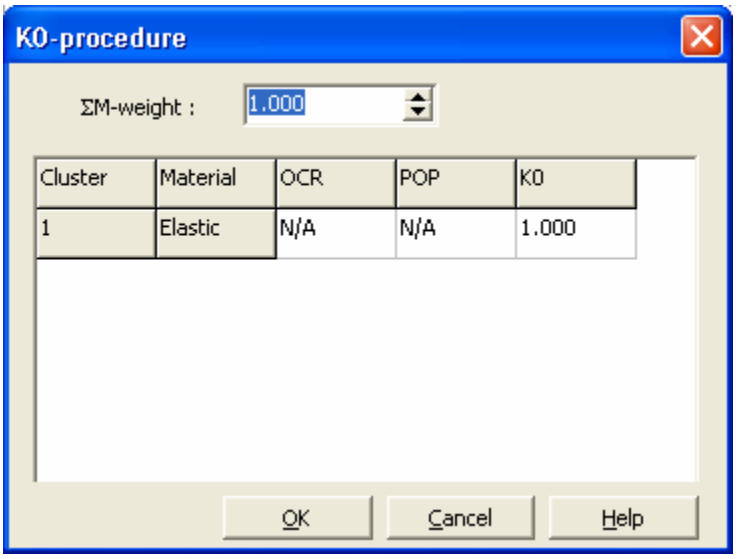


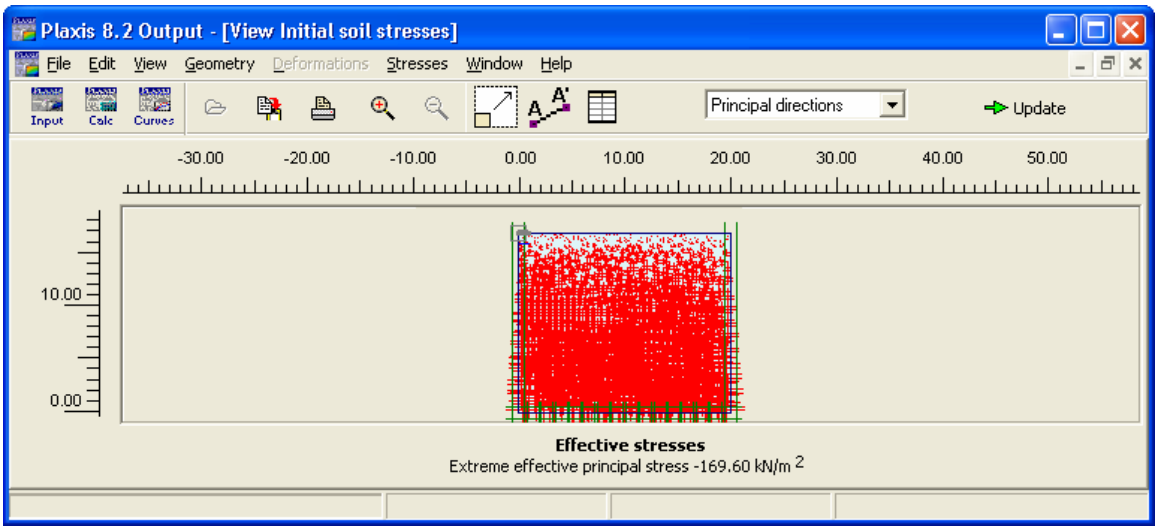


Update

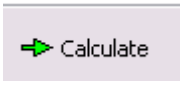
Tính toán áp lực đất 

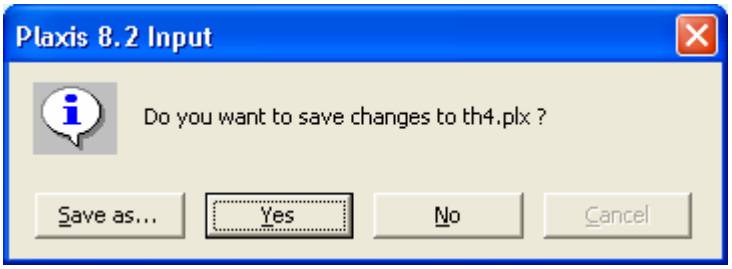


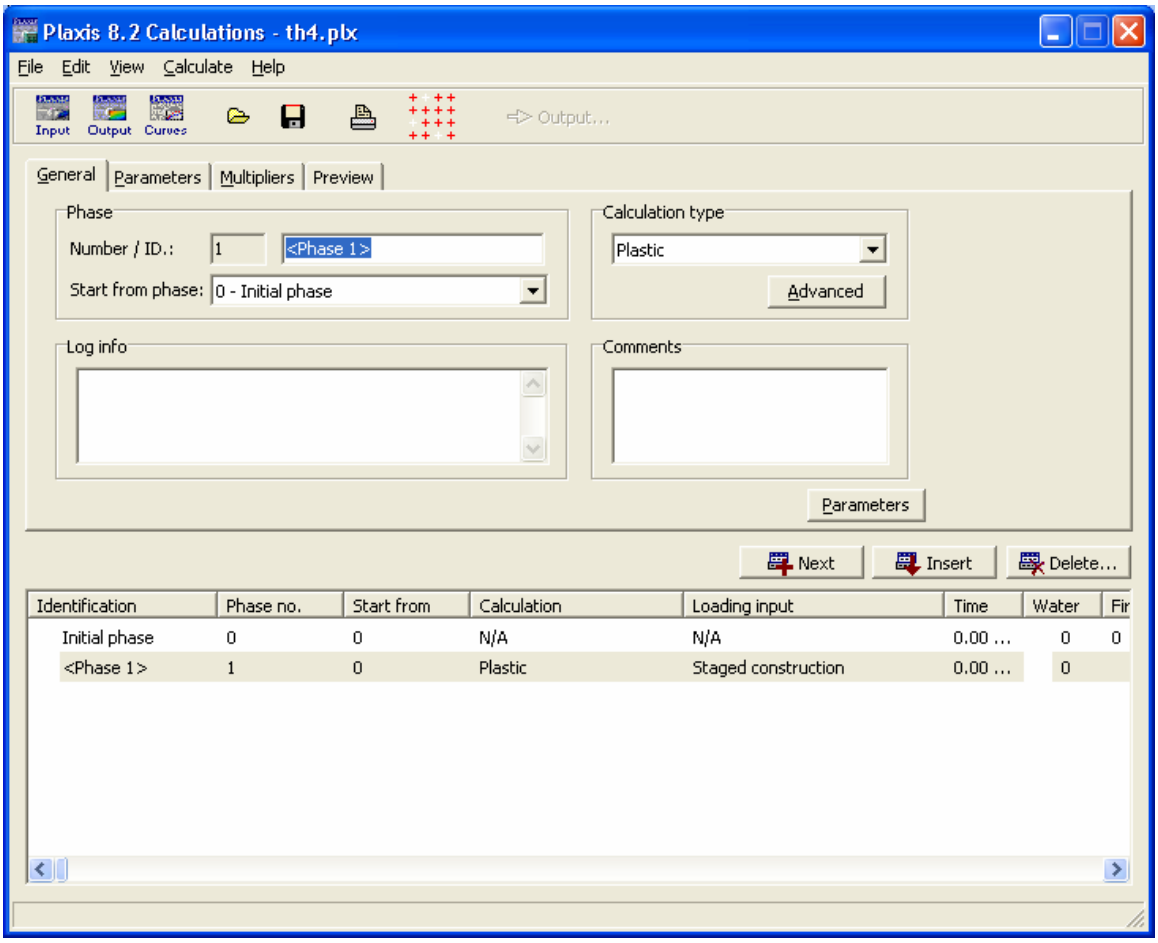




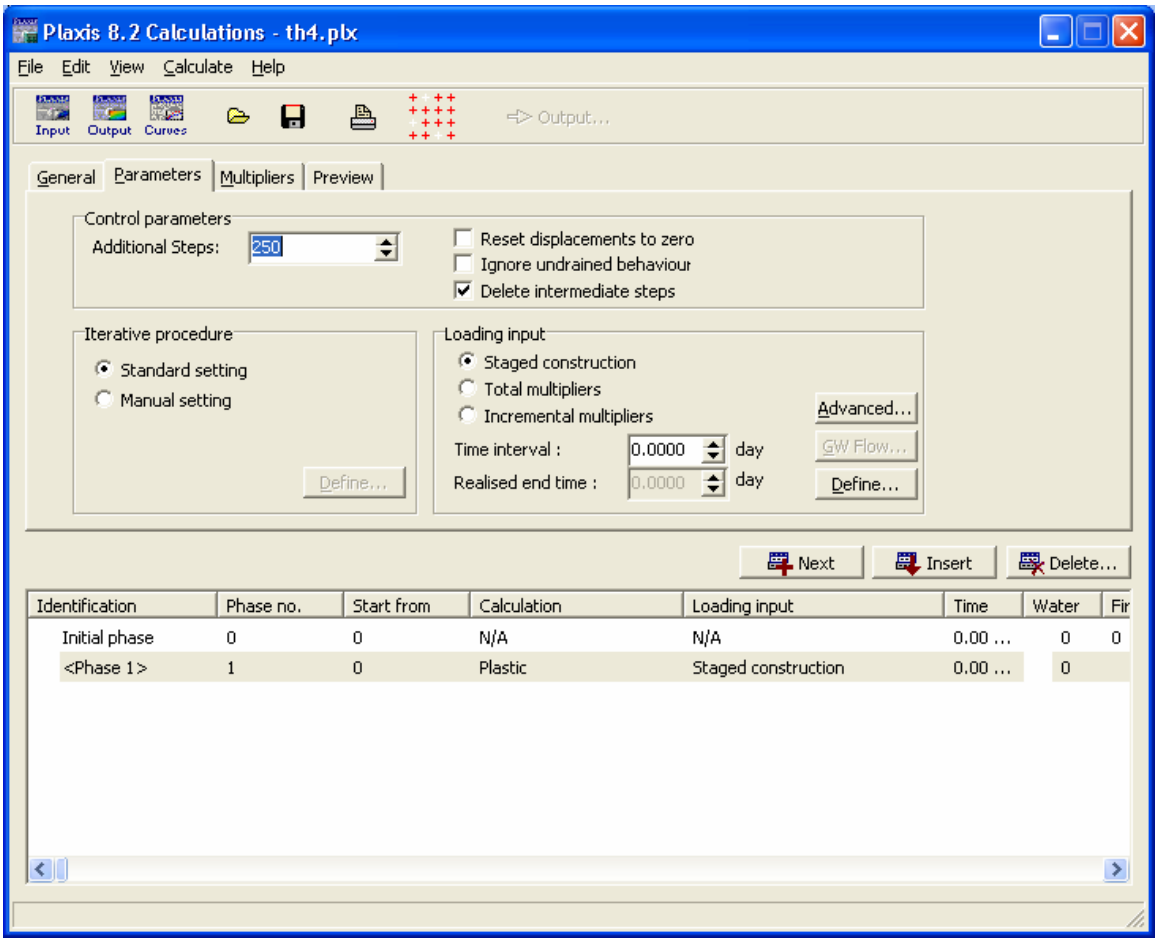
Update

36. Bắt đầu tính toán 

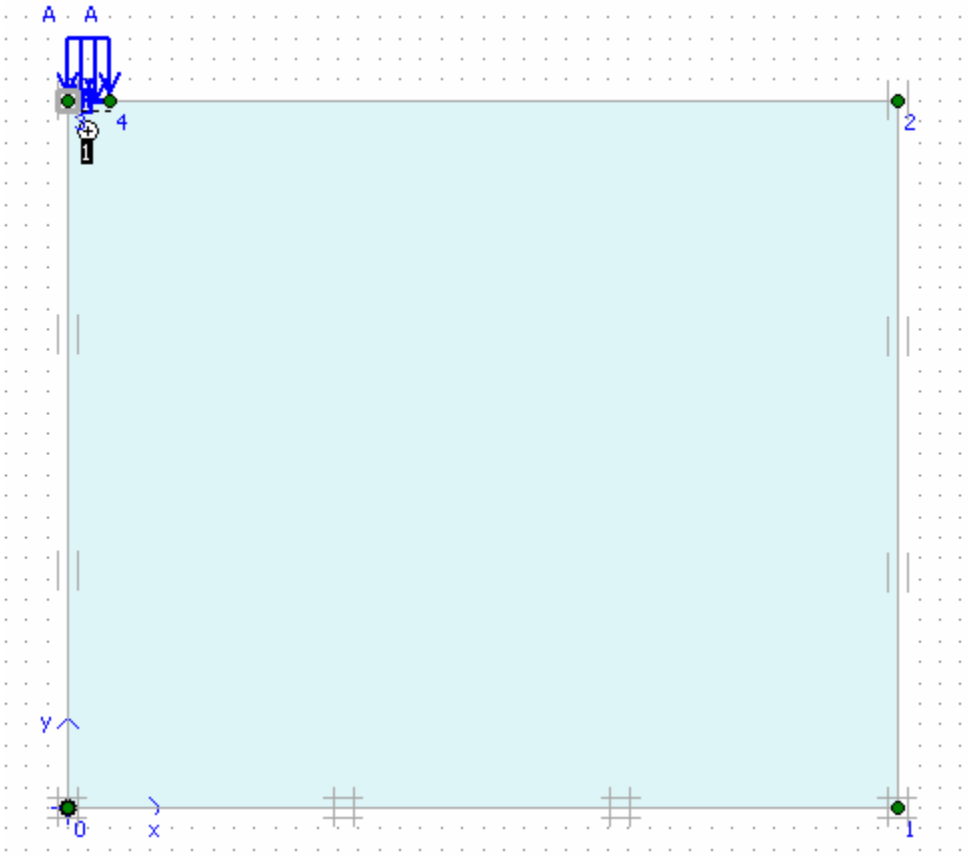



Plaxis 8.2 Calculations - th4.plx
File Edit View Calculate Help
Input Output Curves
Output...
General Parameters Multipliers Preview
Phase
Number / ID.: 1 <Phase 1>
Start from phase: 0 - Initial phase
Calculation type
Plastic
Advanced
Log info
Comments
Parameters
Next Insert Delete...
Identification Phase no. Start from Calculation Loading input Time Water Fir
Initial phase 0 0 N/A N/A 0.00 ... 0 0
<Phase 1> 1 0 Plastic Staged construction 0.00 ... 0

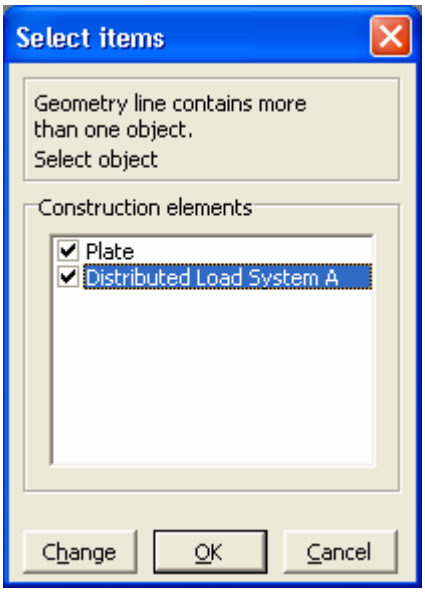
Parameters



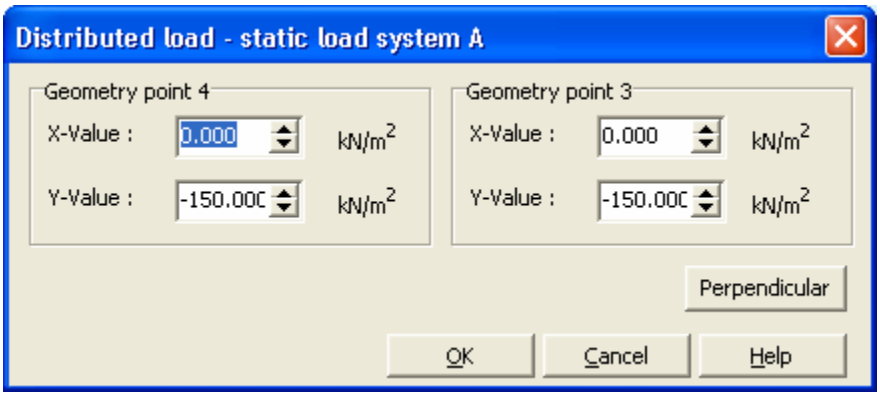
Nhấp vào Define và máy tự động
Trở về màn hình Input



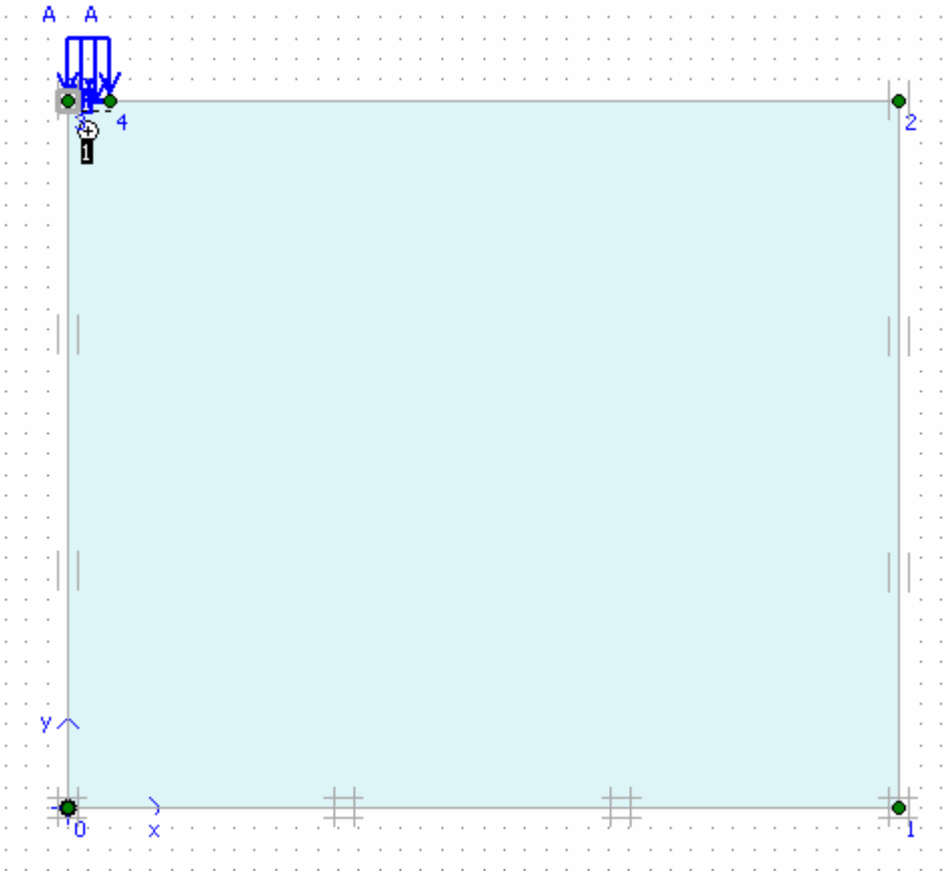
Gán giá trị tải bằng cách nhấp vào áp lực trên hình



Nhấp vào Change để nhập giá trị



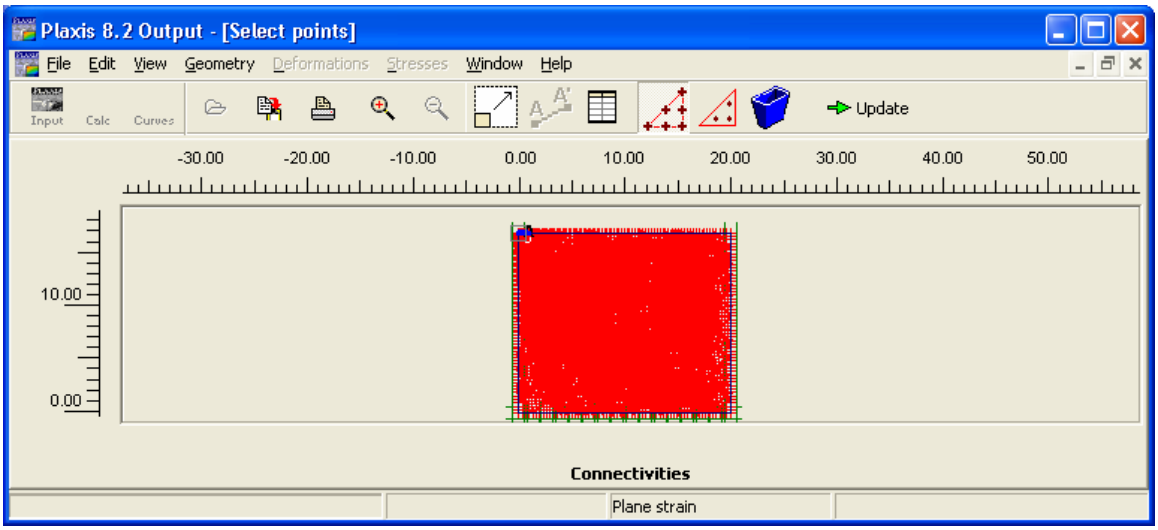
OK



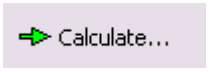
Update

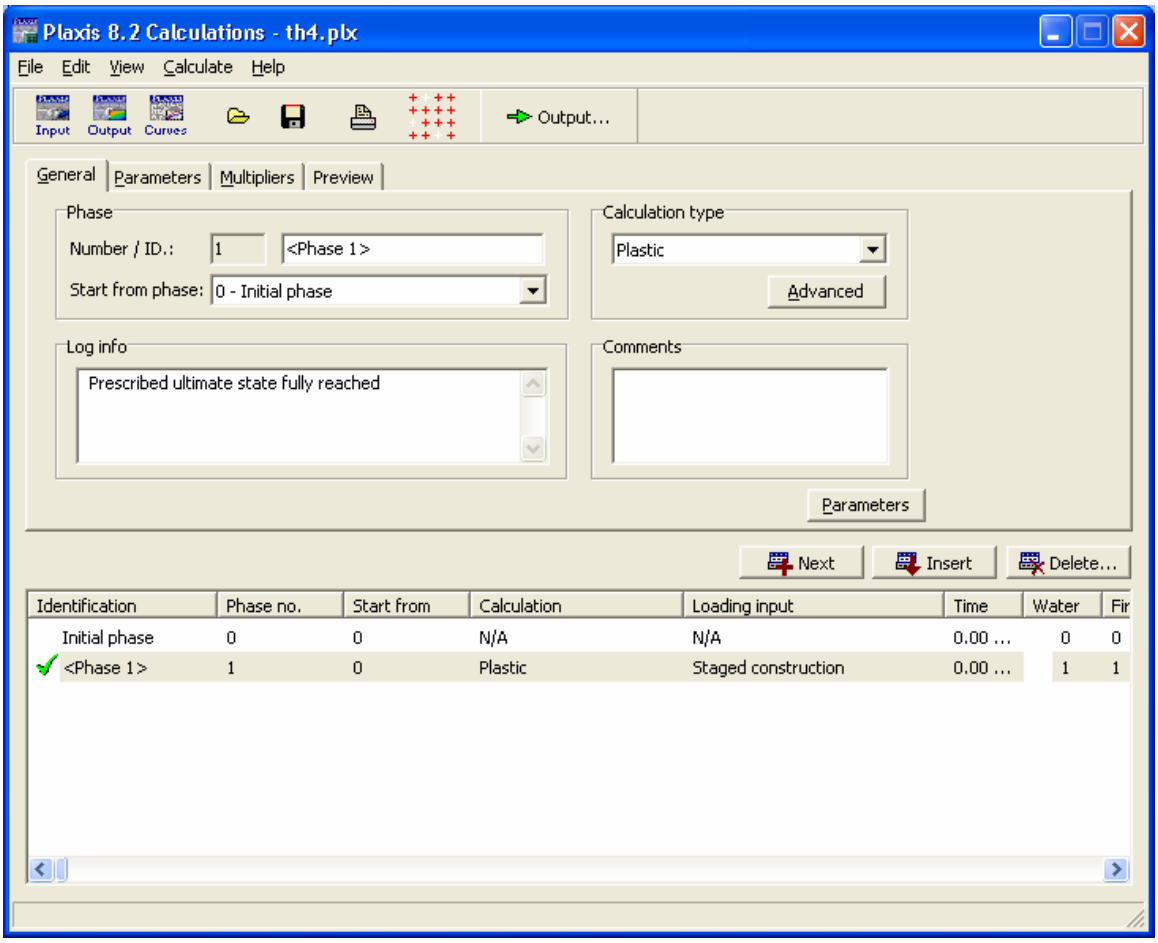
Dùng biểu tượng  để chọn điểm khảo sát

Ví dụ điểm A

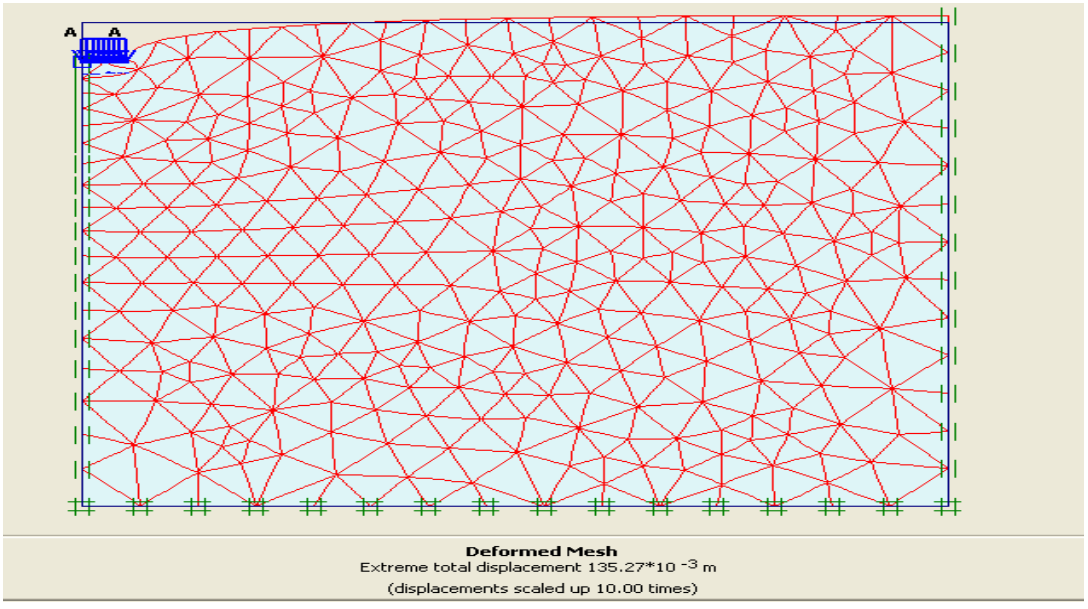


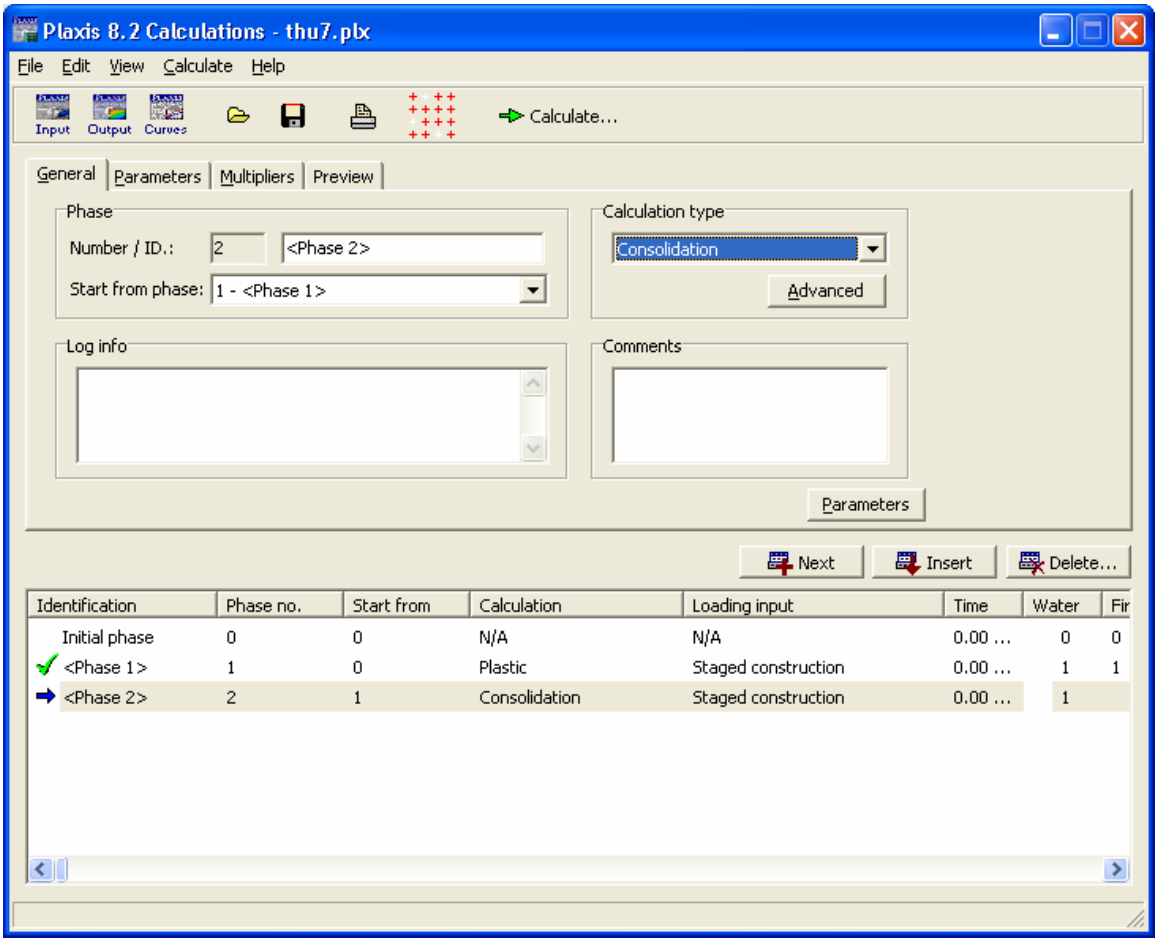
Update

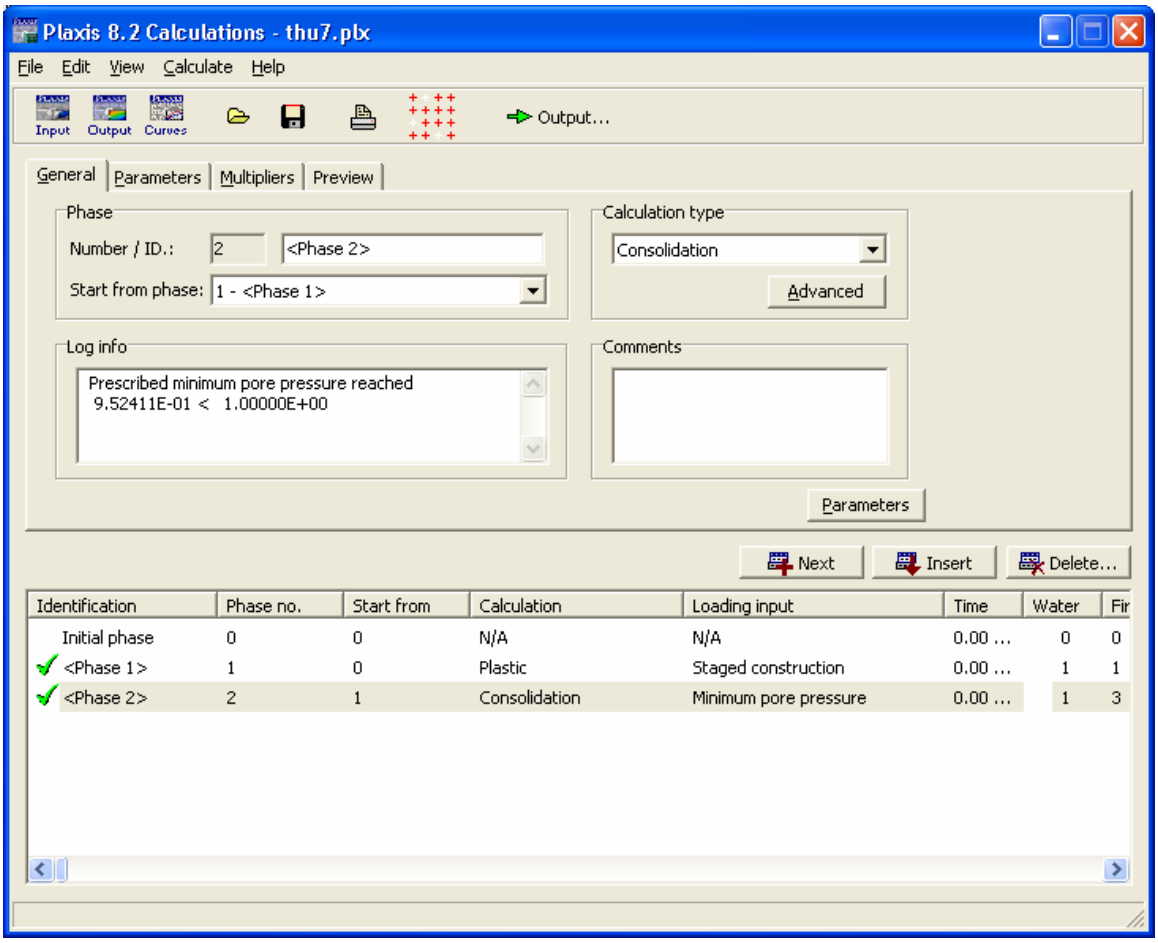
Tính toán 



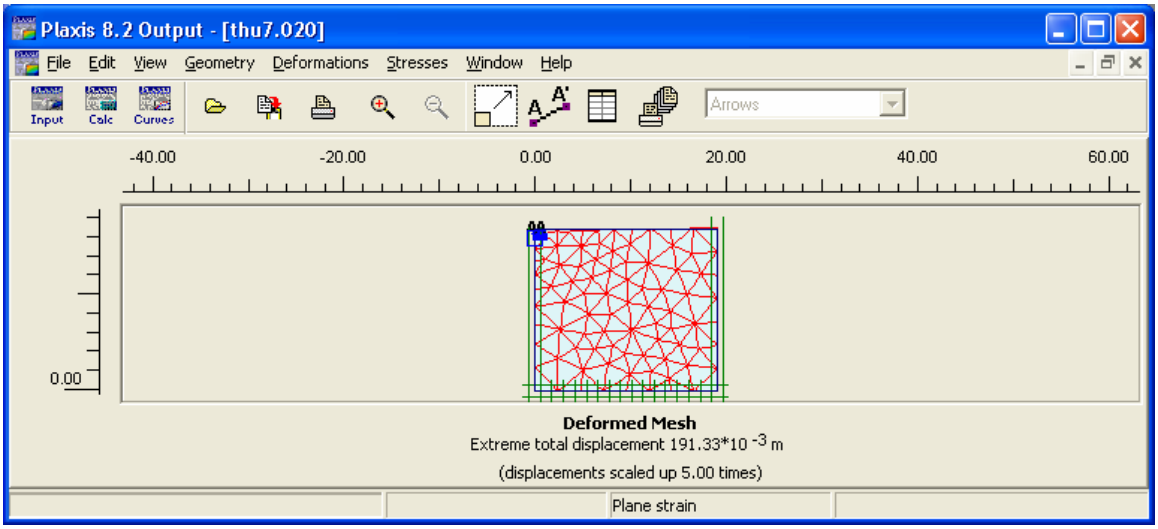
Đã tính toán xong , nhấp vào Output



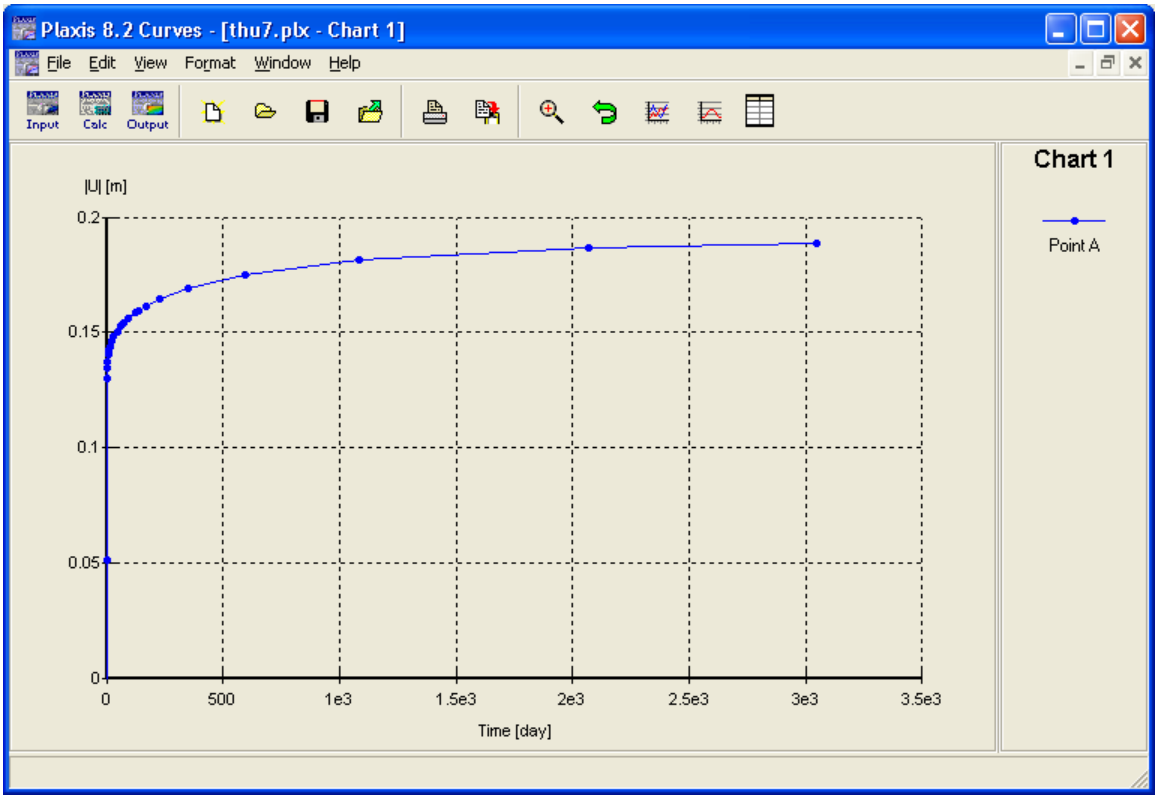

Plaxis 8.2 Calculations - thu7.plx
File Edit View Calculate Help
Input Output Curves
Calculate...
General Parameters Multipliers Preview
Phase
Number / ID.: 2 <Phase 2>
Start from phase: 1 - <Phase 1>
Calculation type
Consolidation
Advanced
Log info
Comments
Parameters
Next Insert Delete...
Identification Phase no. Start from Calculation Loading input Time Water Fir
Initial phase 0 0 N/A N/A 0.00 ... 0 0
<Phase 1> 1 0 Plastic Staged construction 0.00 ... 1 1
<Phase 2> 2 1 Consolidation Staged construction 0.00 ... 1


Plaxis 8.2 Calculations - thu7.plx
File Edit View Calculate Help
Input Output Curves
Output...
General Parameters Multipliers Preview
Phase
Number / ID.: 2 <Phase 2>
Start from phase: 1 - <Phase 1>
Calculation type
Consolidation
Advanced
Log info
Prescribed minimum pore pressure reached
9.52411E-01 < 1.00000E+00
Comments
Parameters
Next Insert Delete...
Identification Phase no. Start from Calculation Loading input Time Water Fir
Initial phase 0 0 N/A N/A 0.00 ... 0 0
<Phase 1> 1 0 Plastic Staged construction 0.00 ... 1 1
<Phase 2> 2 1 Consolidation Minimum pore pressure 0.00 ... 1 3

Output


Plaxis 8.2 Output - [thu7.020]
File Edit View Geometry Deformations Stresses Window Help
Input Calc Curves
Arrows
-40.00 -20.00 0.00 20.00 40.00 60.00
0.00
Deformed Mesh
Extreme total displacement 191.33*10 -3 m
(displacements scaled up 5.00 times)
Plane strain

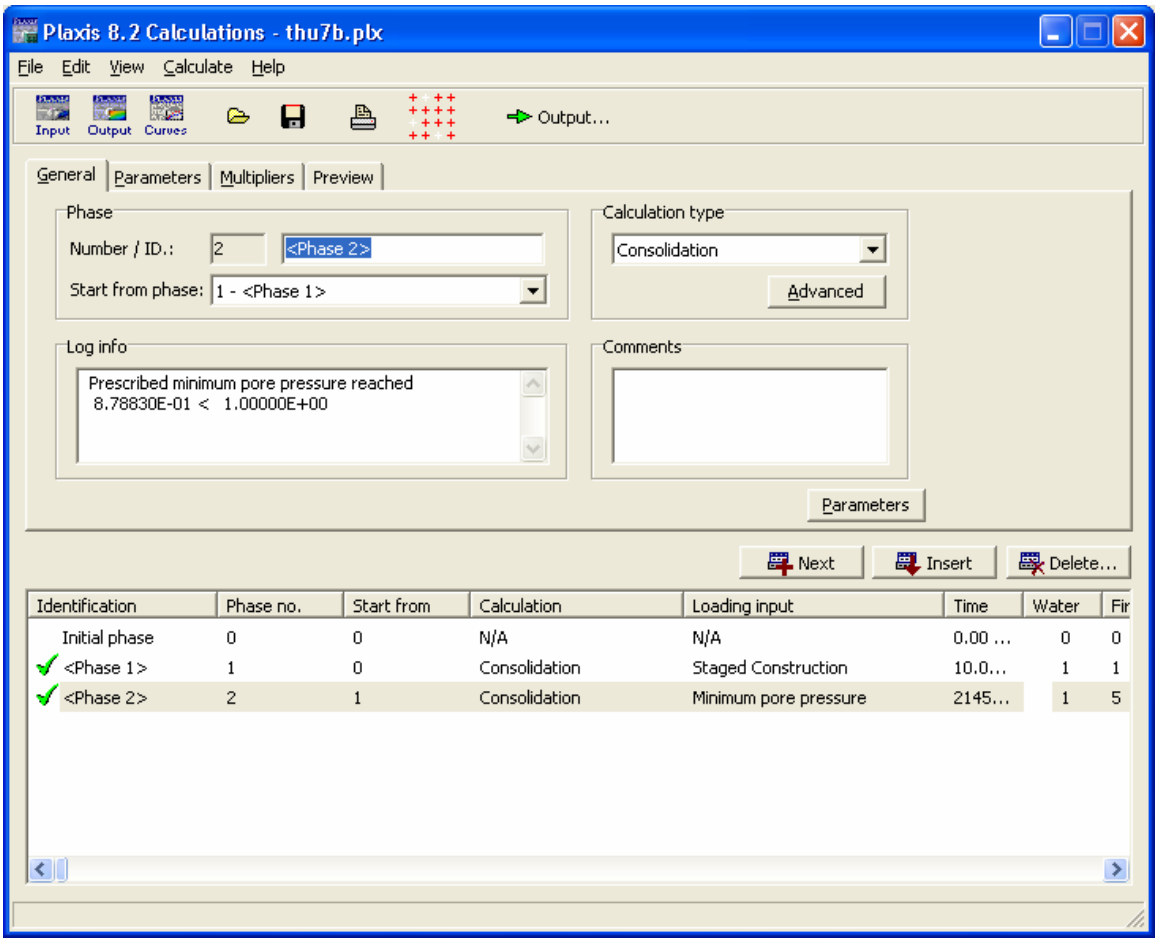
Curvres



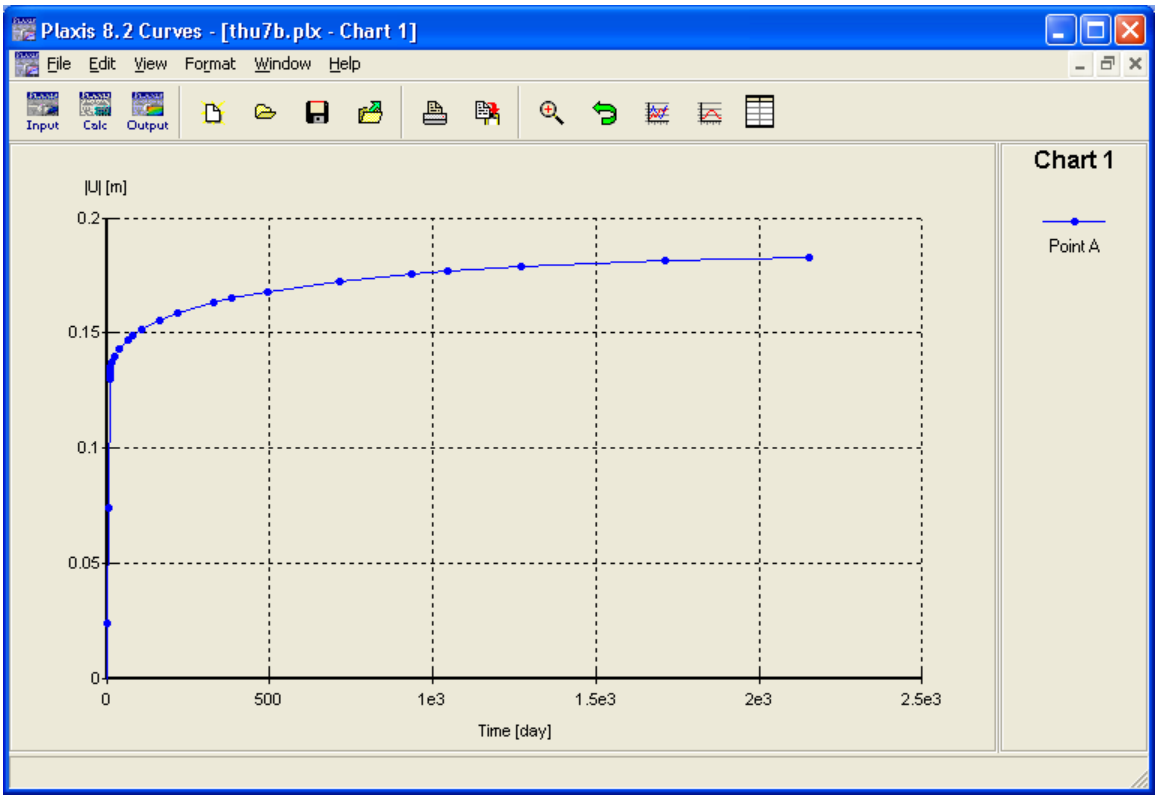
TRƯỜNG HỢP 2:

Phase 1 : Tính toán cố kết sau 10 ngày

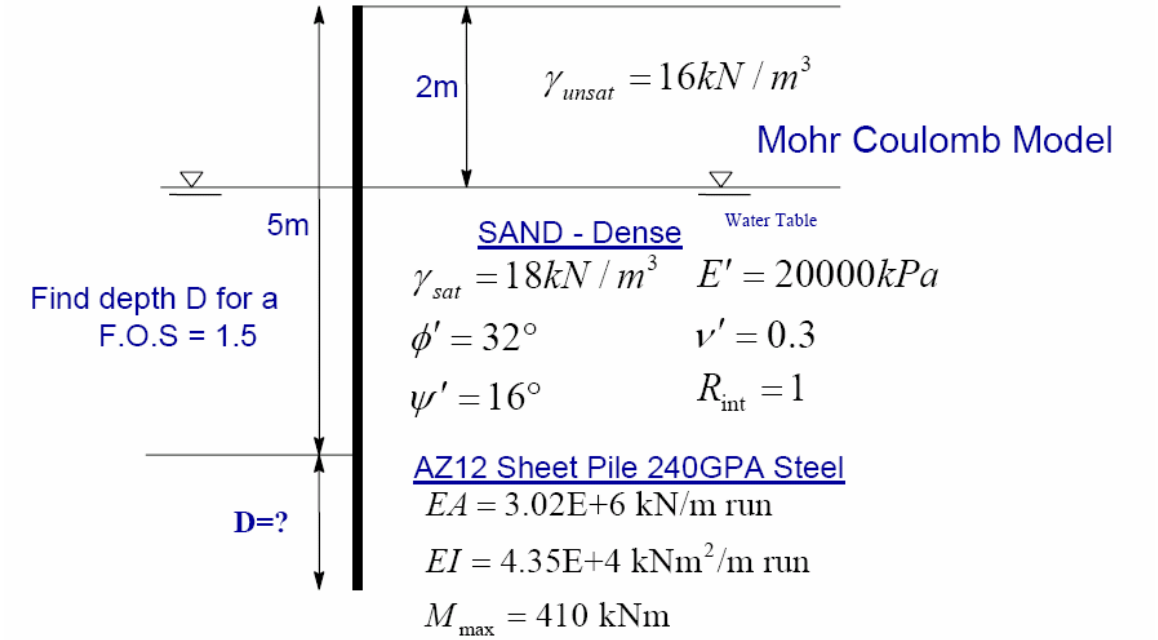
Phase 2 : Tính toán cố kết sau 2064 ngày



Kết quả như sau :


Plaxis 8.2 Curves - [thu7b.plx - Chart 1]
File Edit View Format Window Help
Input Calc Output
Chart 1
Point A
|U| [m]
0.2
0.15
0.1
0.05
0
0
500
1e3
1.5e3
2e3
2.5e3
Time [day]

Phần 7 : PLAXIS INPUT,CALCULATE SHEET PILE WALLS

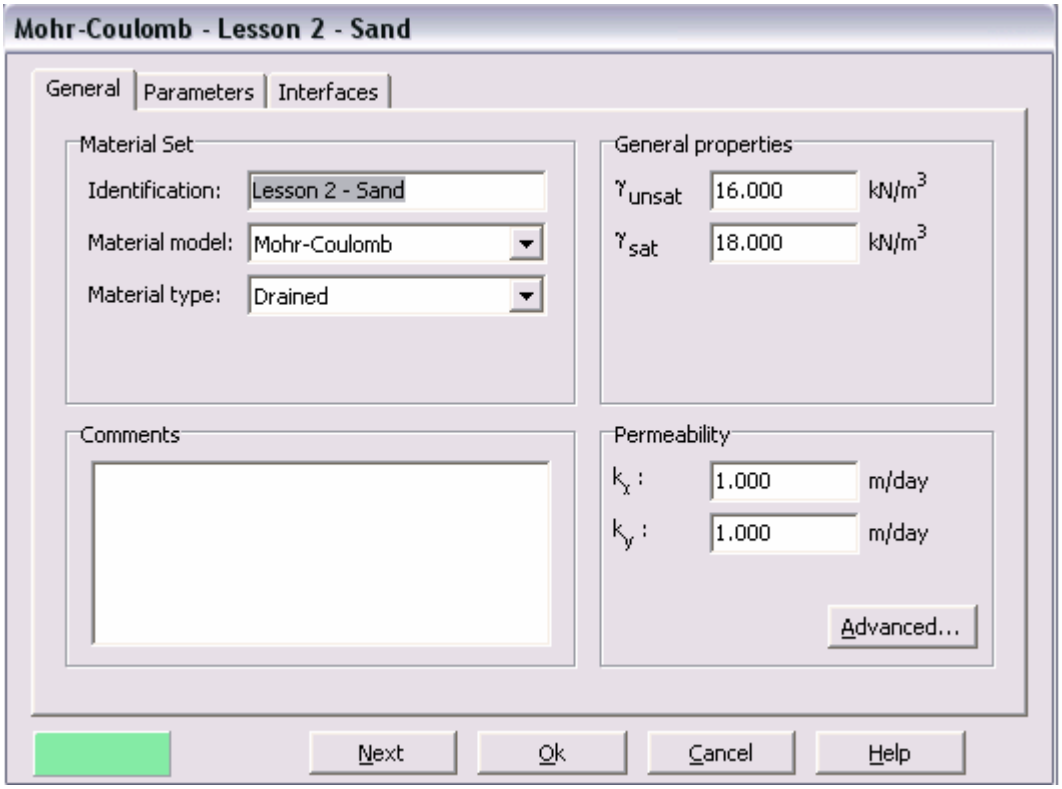


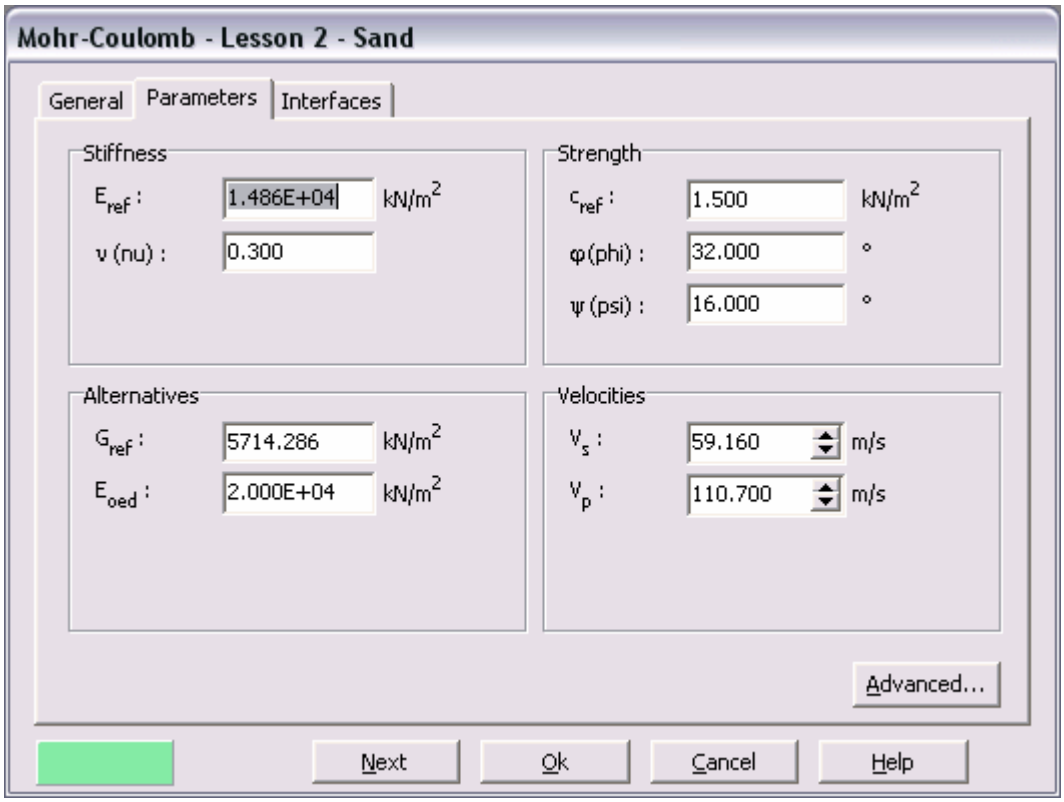
37. Tạo hình dạng bài toán

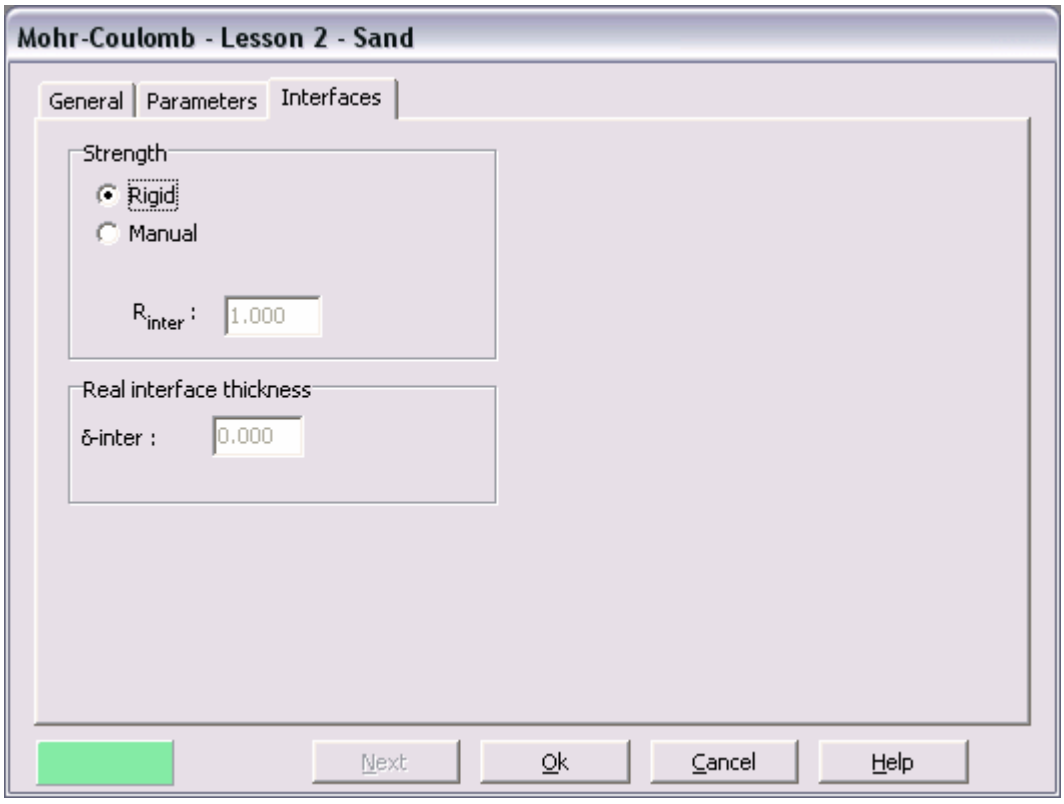
Vẽ tấm (Plate)

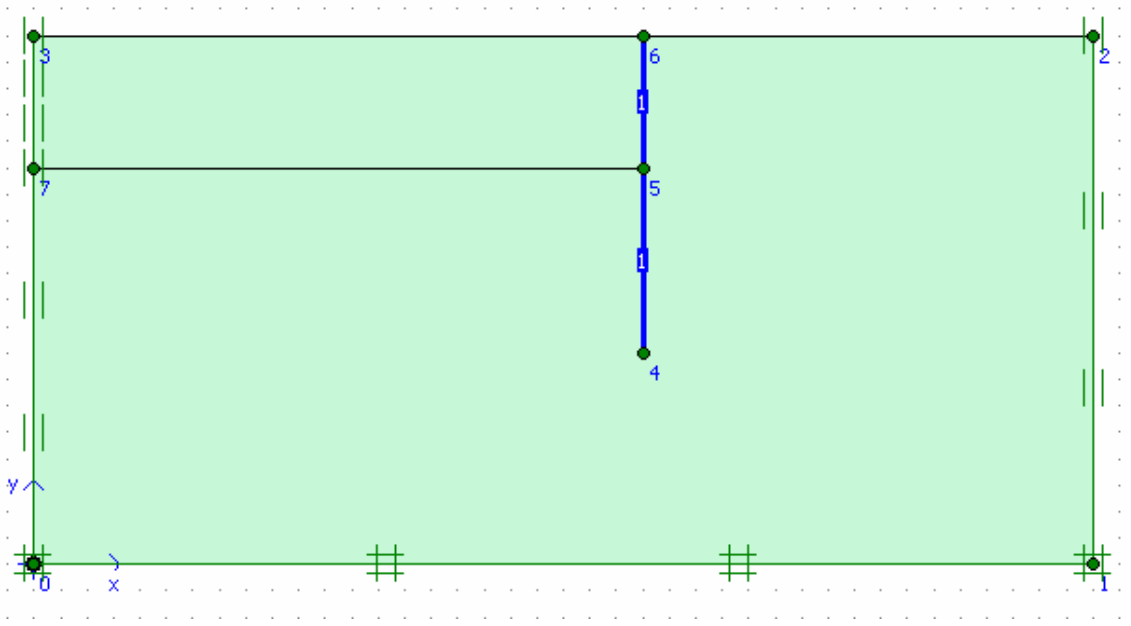
Gán biên

Gán số liệu địa chất

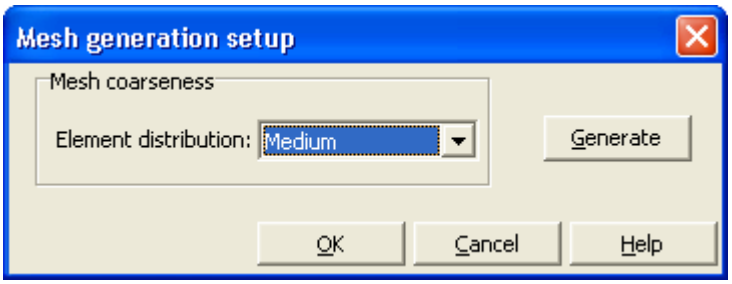


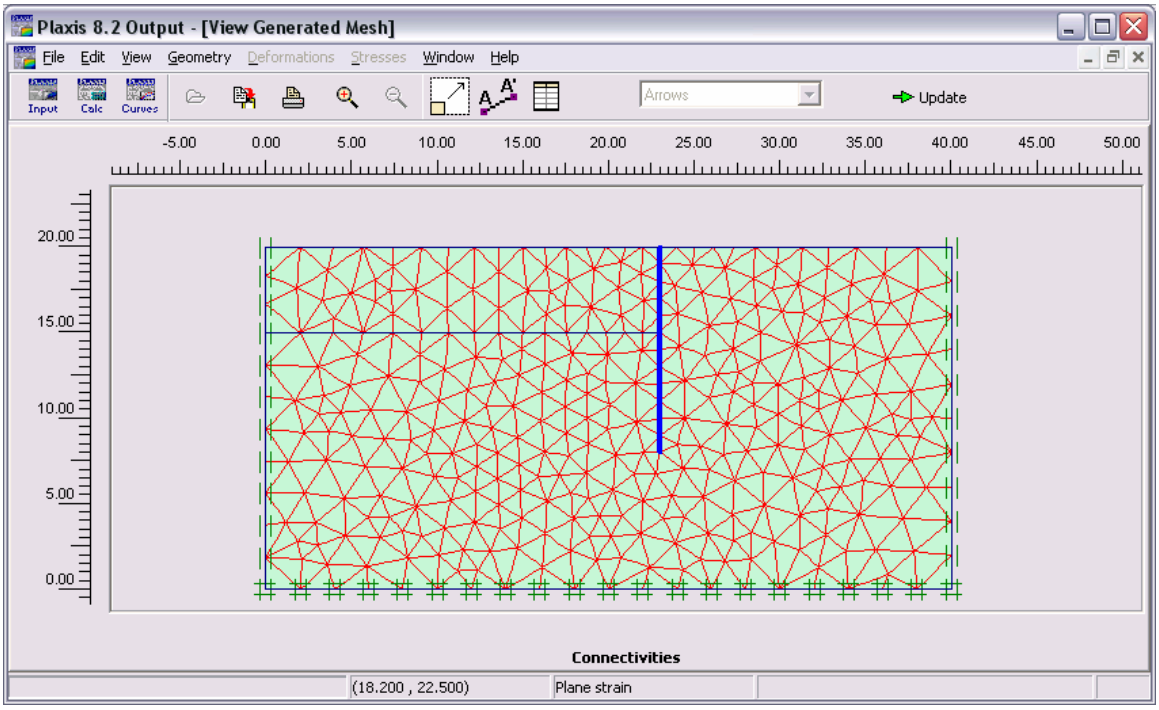

Mohr-Coulomb - Lesson 2 - Sand
General
Parameters
Interfaces
Stiffness
E ref : 1.486E+04 kN/m2
ν (nu) : 0.300
Strength
c ref : 1.500 kN/m2
φ (phi) : 32.000 °
ψ (psi) : 16.000 °
Alternatives
G ref : 5714.286 kN/m2
E oed : 2.000E+04 kN/m2
Velocities
V s : 59.160 m/s
V p : 110.700 m/s
Advanced...
Next
Ok
Cancel
Help





38. Tạo lưới phần tử

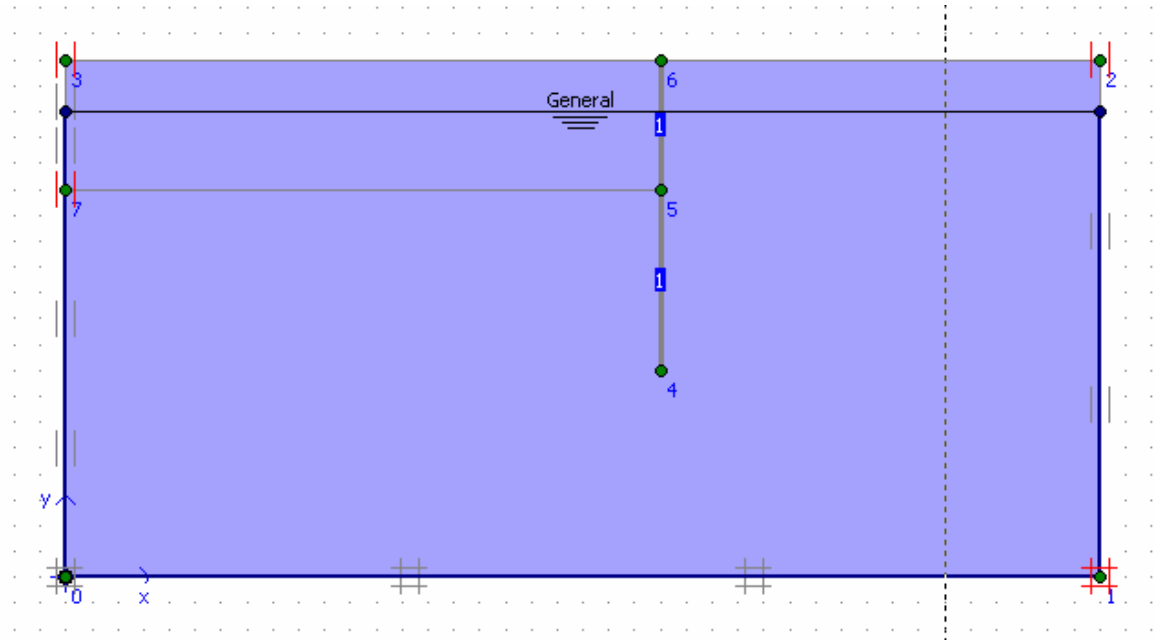




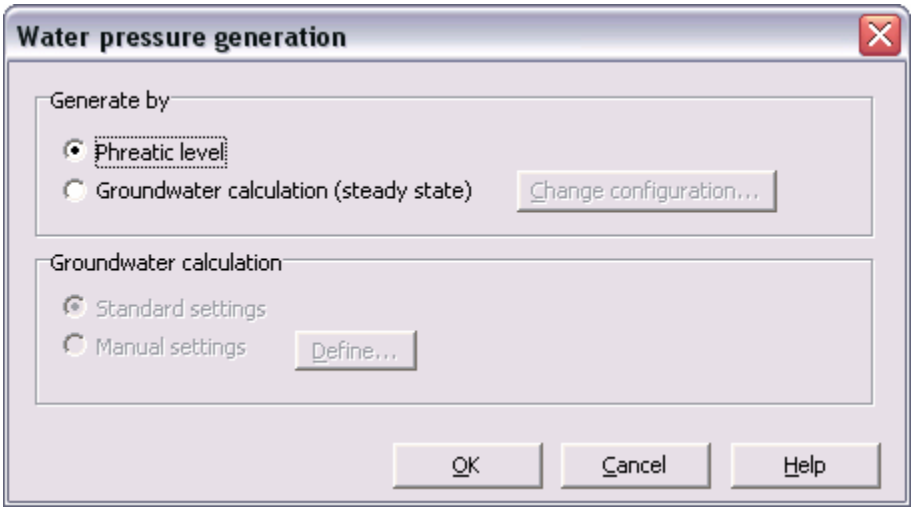
Update

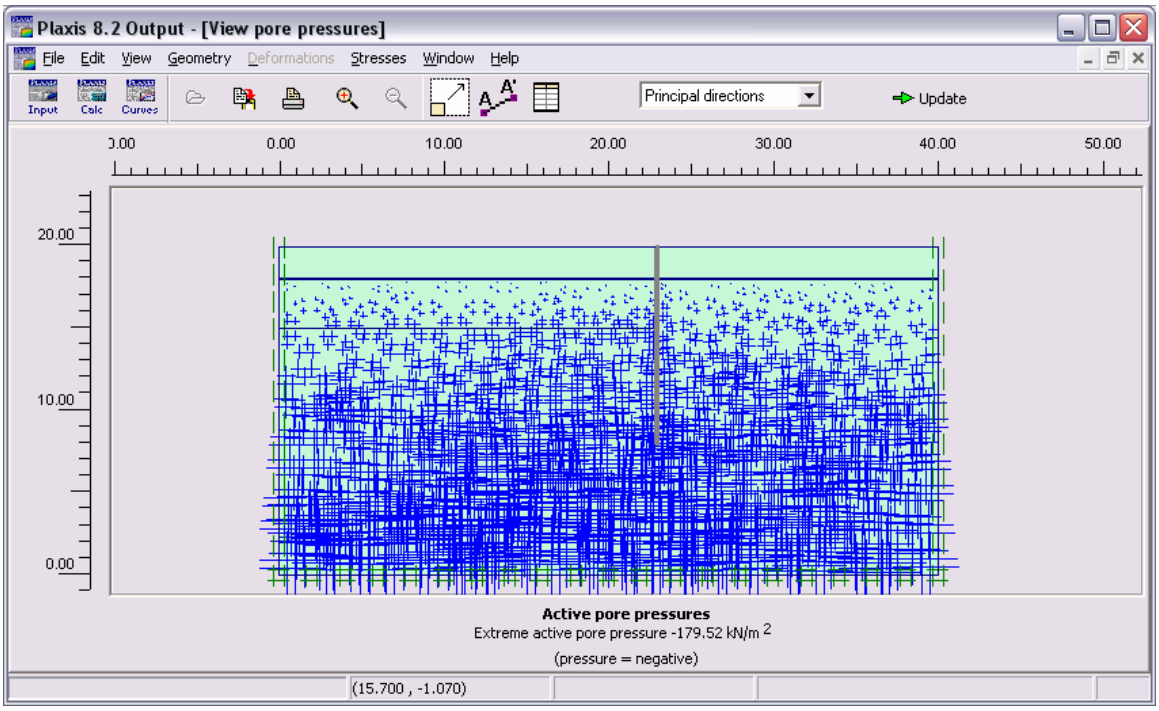
39. Tính toán điều kiện ban đầu

Gán mực nước ngầm

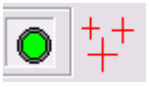


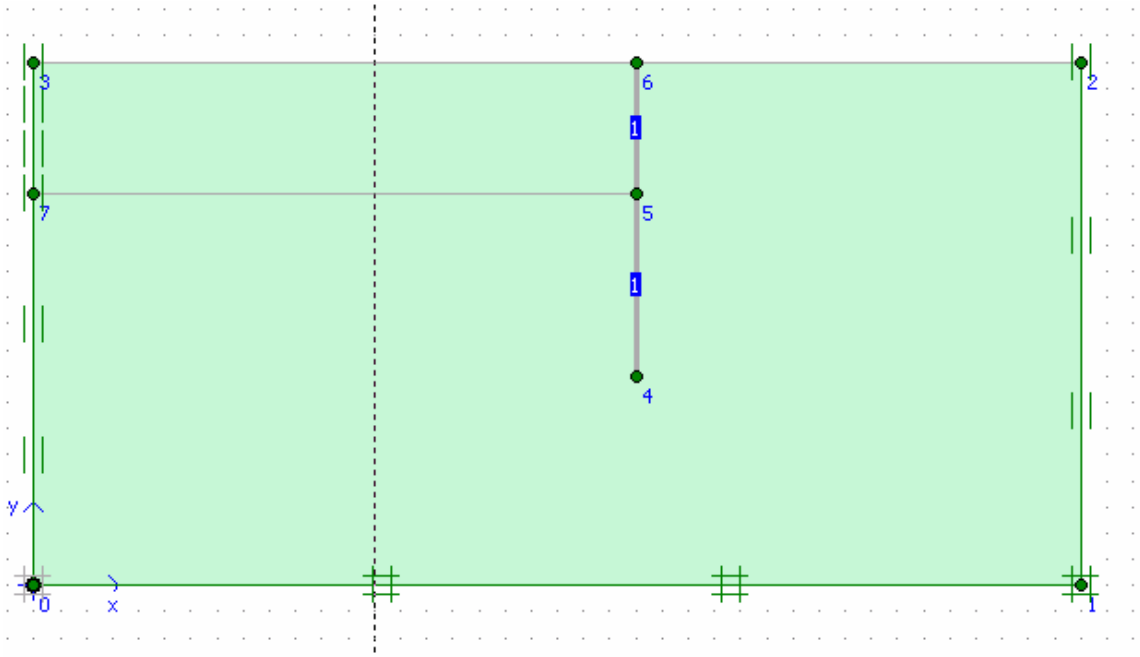
Tính toán áp lực nước 

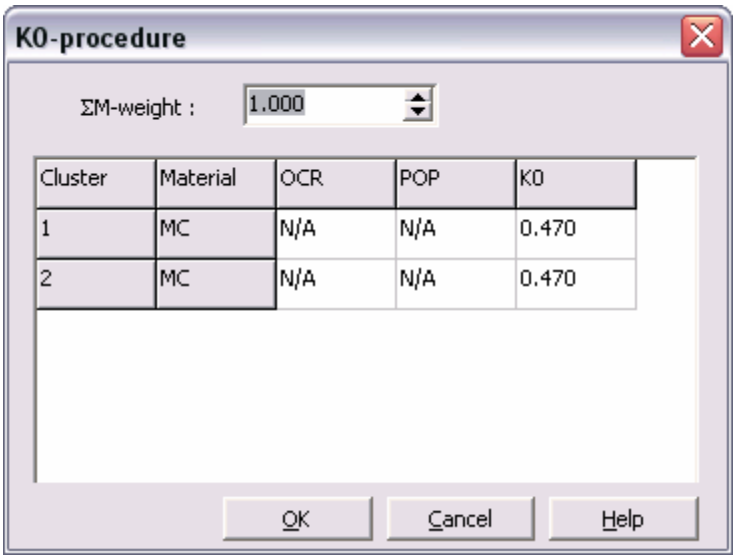


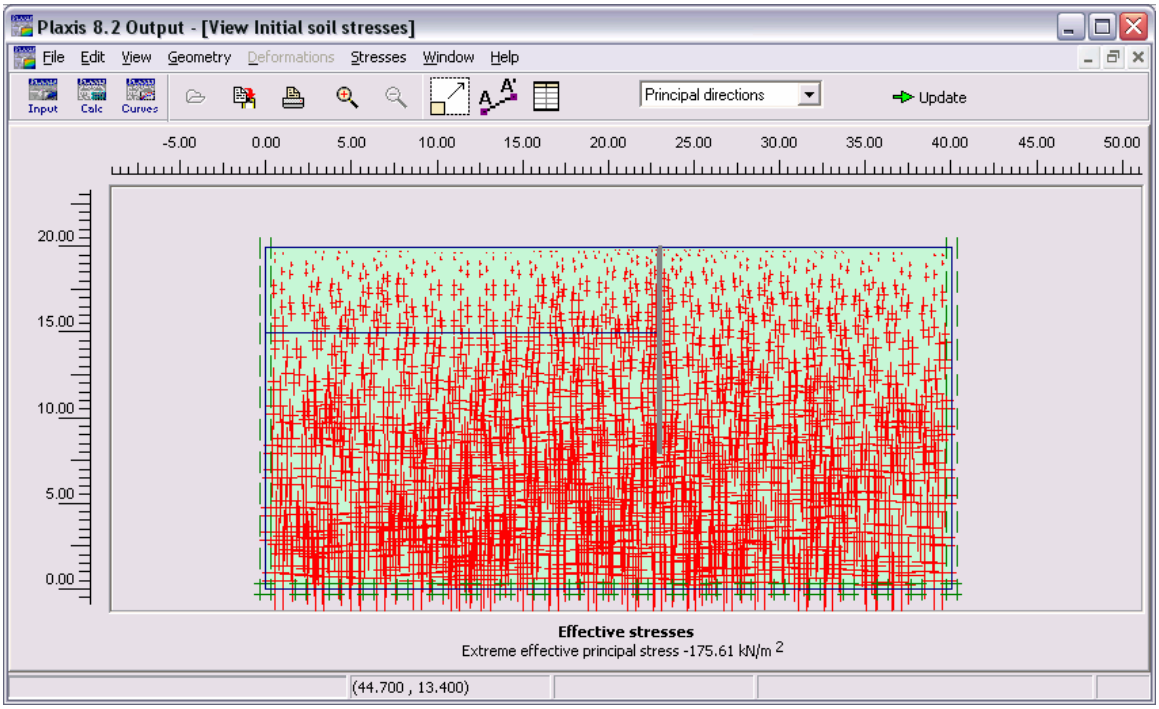


Update

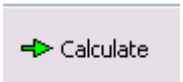
Tính toán áp lực đất 

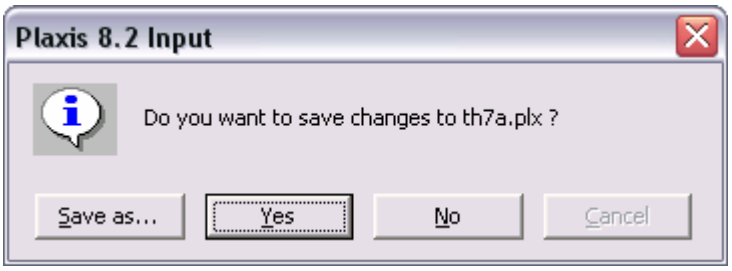






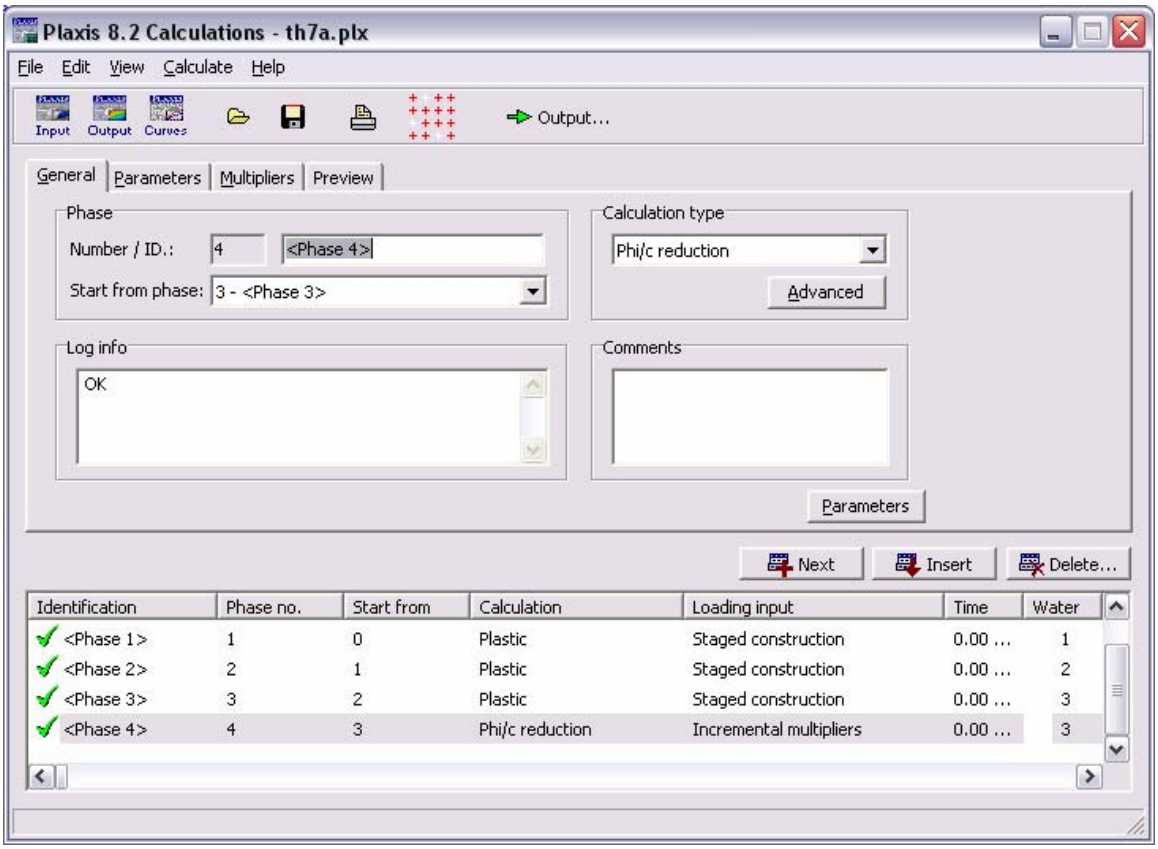
Update

40. Bắt đầu tính toán 

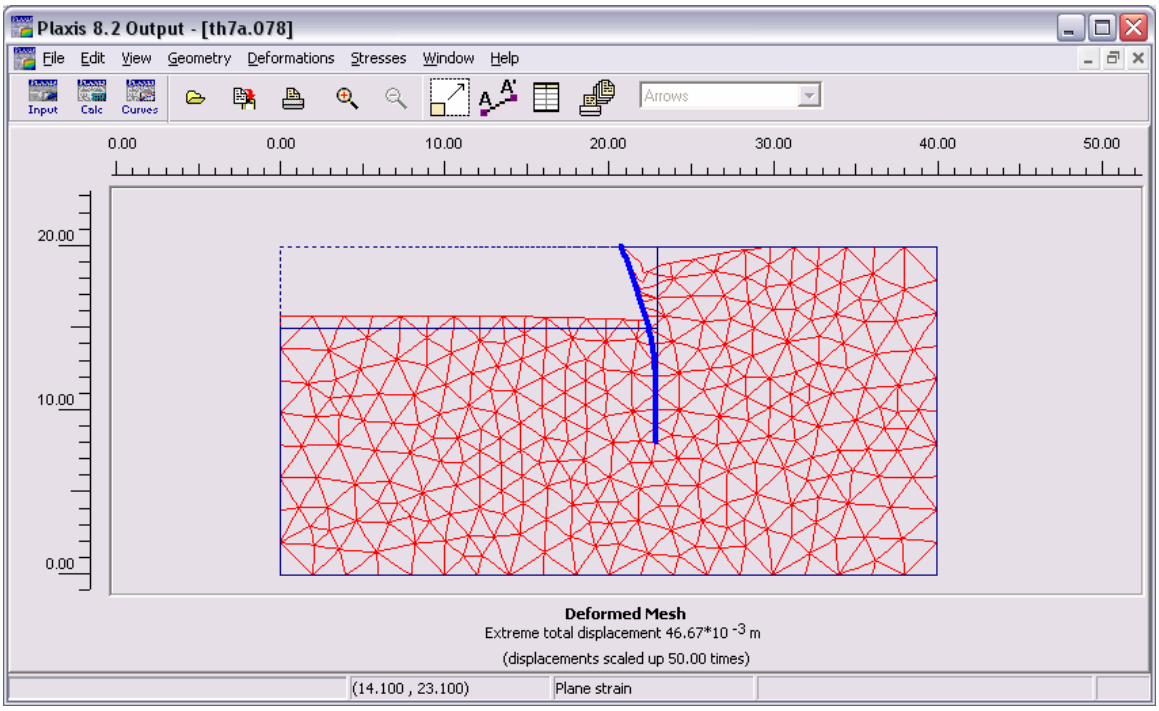


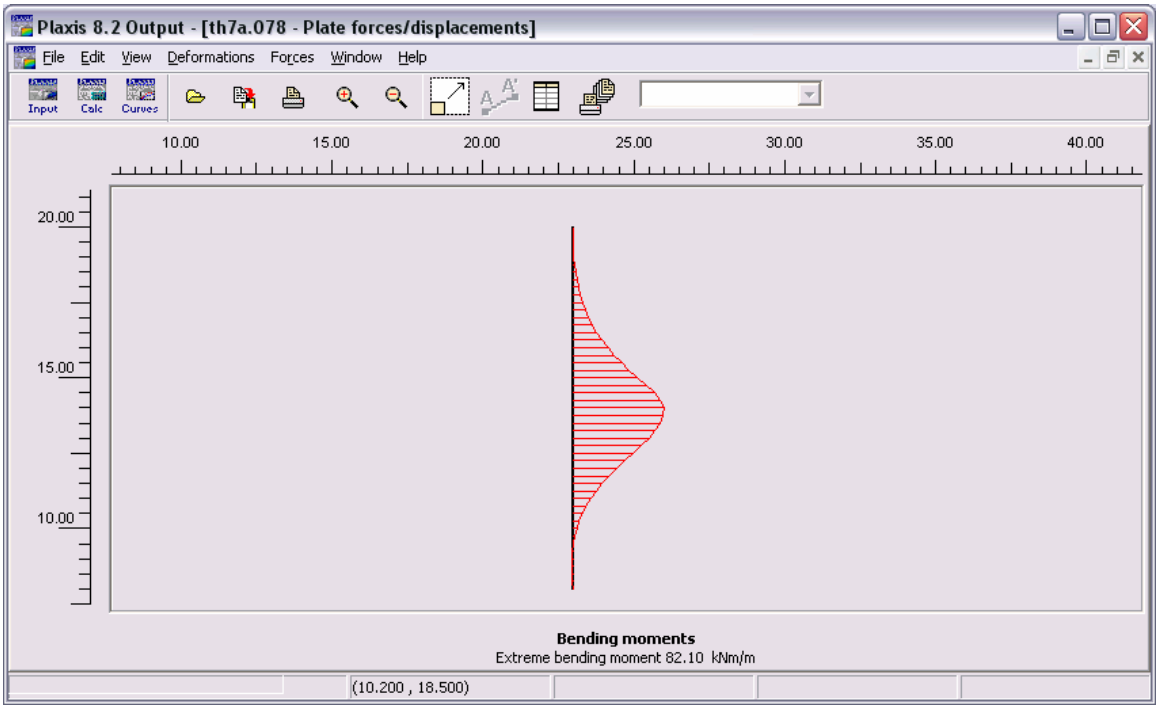
Tính toán cho 4 phase :

1. Ban đầu
2. Có sheet pile
3. Bỏ đất
4. Tính ổn định Phi/C

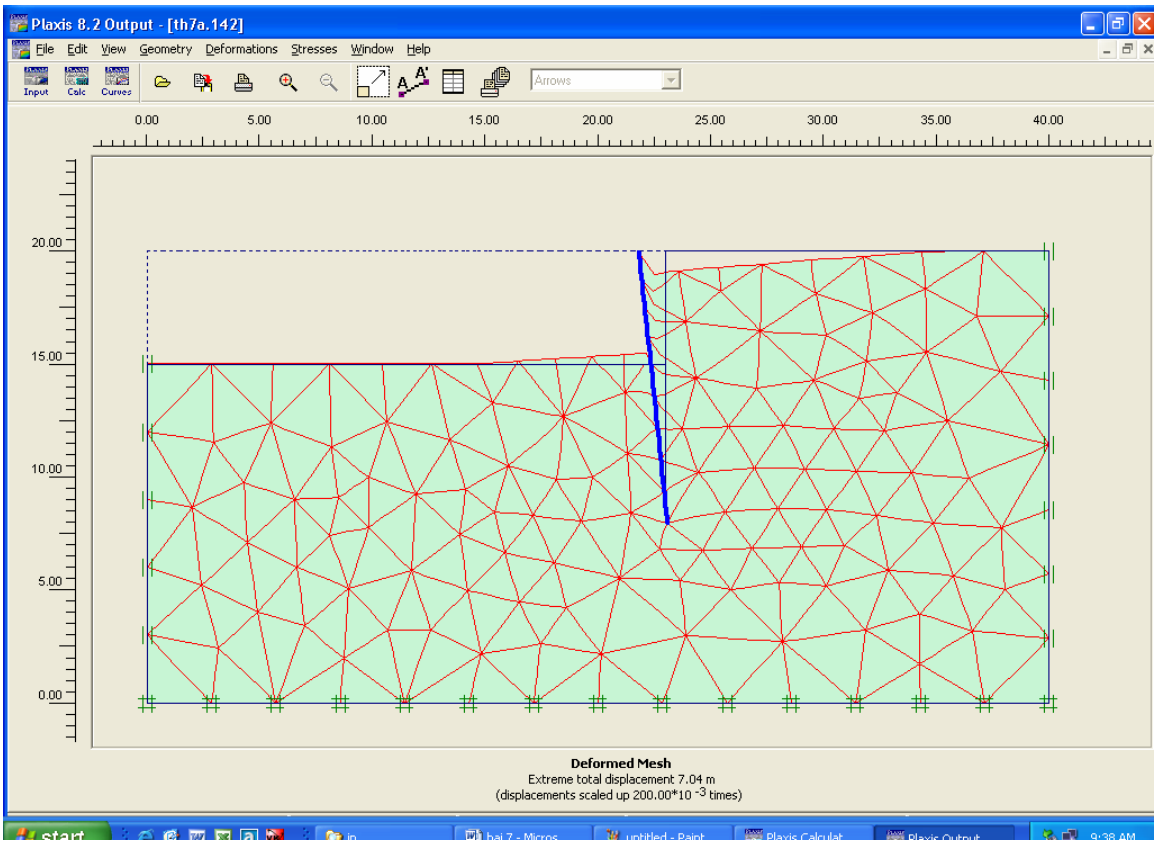


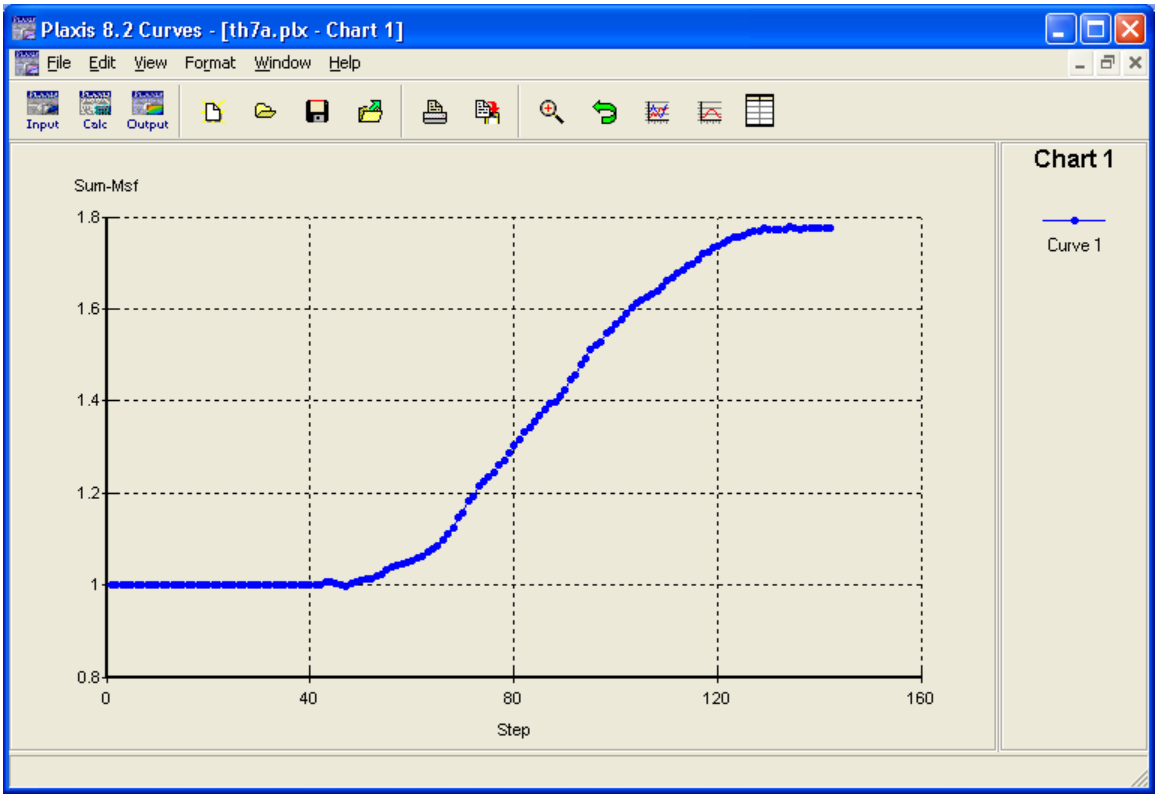
Kết quả phase 3

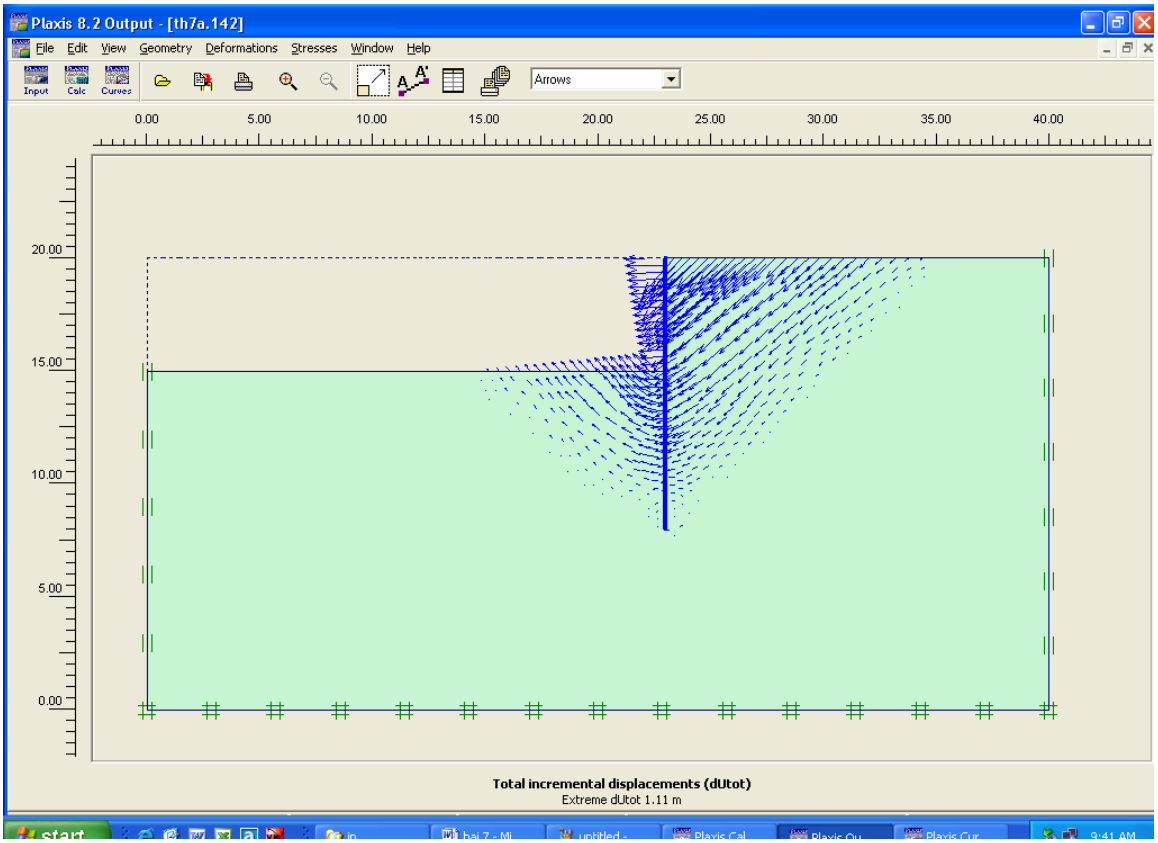




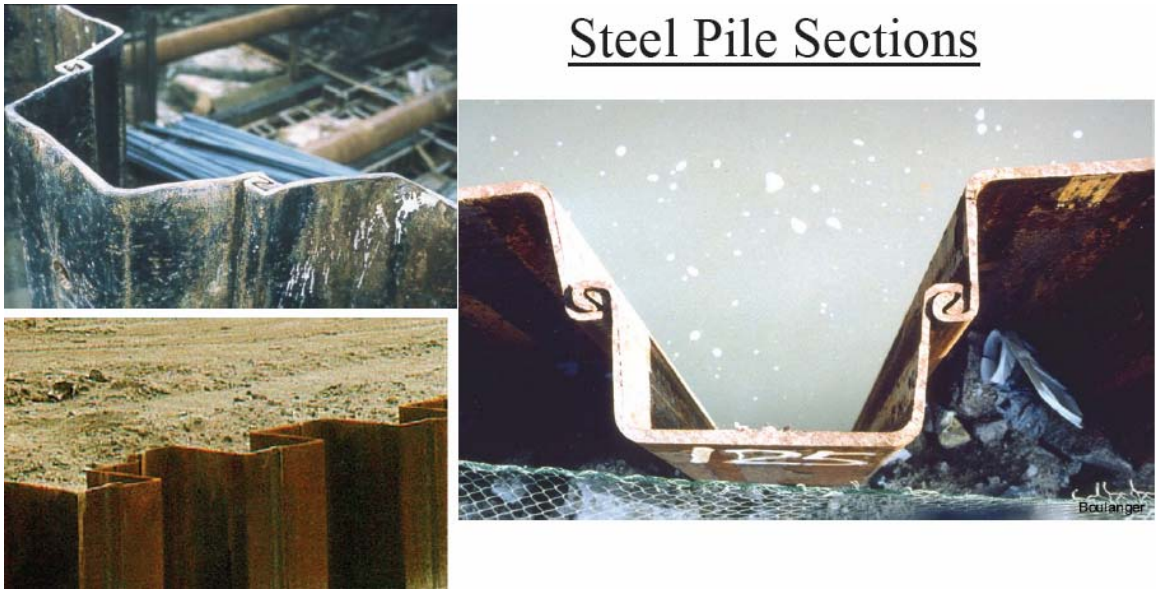
Kết quả phase 4

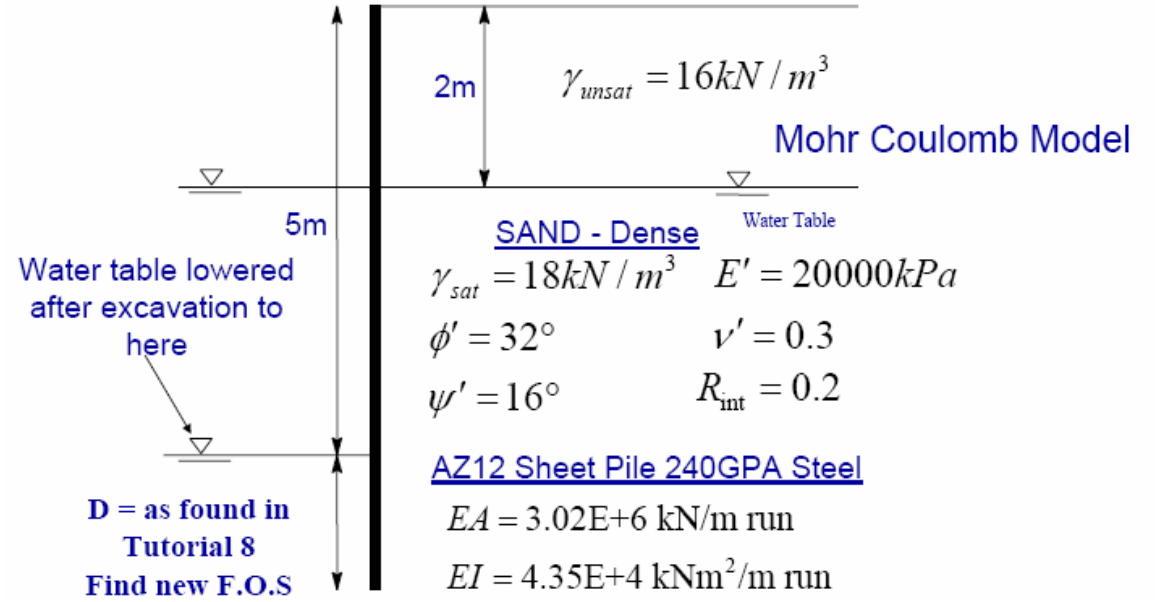

Plaxis 8.2 Output - [th7a.142]
File Edit View Geometry Deformations Stresses Window Help
Input Calc Curves
Arrows
0.00 5.00 10.00 15.00 20.00 25.00 30.00 35.00 40.00
20.00 15.00 10.00 5.00 0.00
Deformed Mesh
Extreme total displacement 7.04 m
(displacements scaled up 200.00*10 -3 times)


Plaxis 8.2 Curves - [th7a.plx - Chart 1]
File Edit View Format Window Help
Input Calc Output
Chart 1
Curve 1
Sum-Msf
1.8 1.6 1.4 1.2 1 0.8
0 40 80 120 160
Step


Plaxis 8.2 Output - [th7a.142]
File Edit View Geometry Deformations Stresses Window Help
Input Calc Curves
Arrows
0.00 5.00 10.00 15.00 20.00 25.00 30.00 35.00 40.00
20.00
15.00
10.00
5.00
0.00
Total incremental displacements (dUtot)
Extreme dUtot 1.11 m

Phần 8 : PLAXIS INPUT,CALCULATE SHEET PILE WALLS





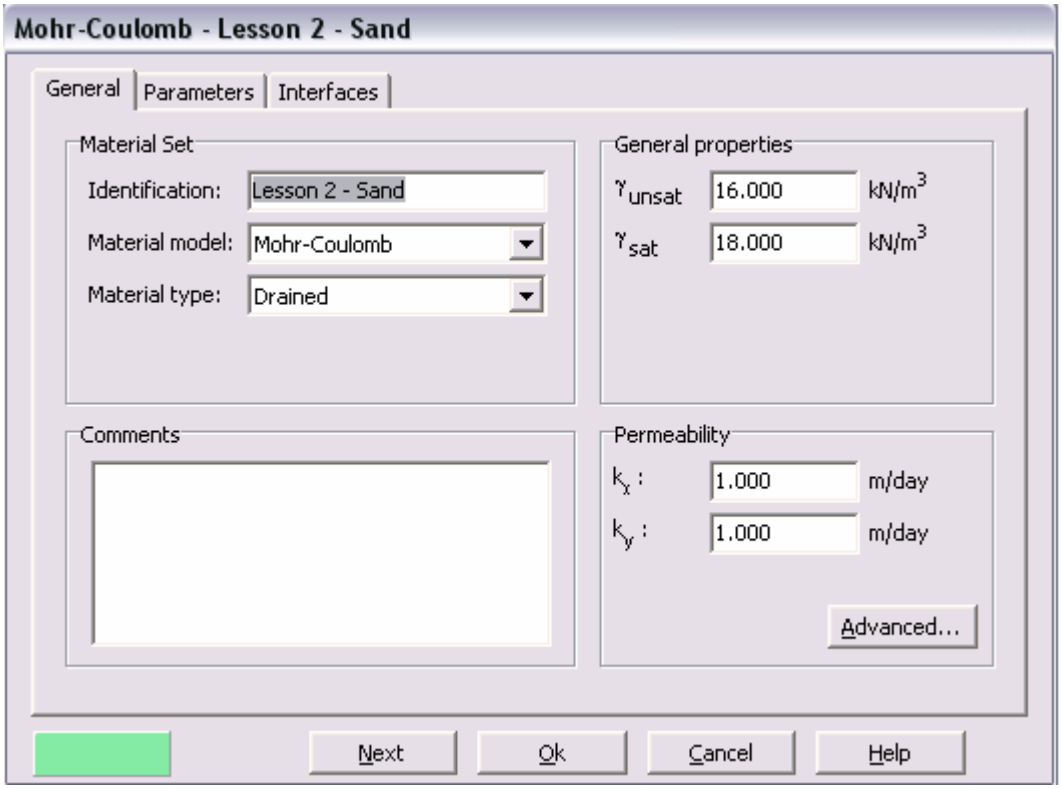
41. Tạo hình dạng bài toán

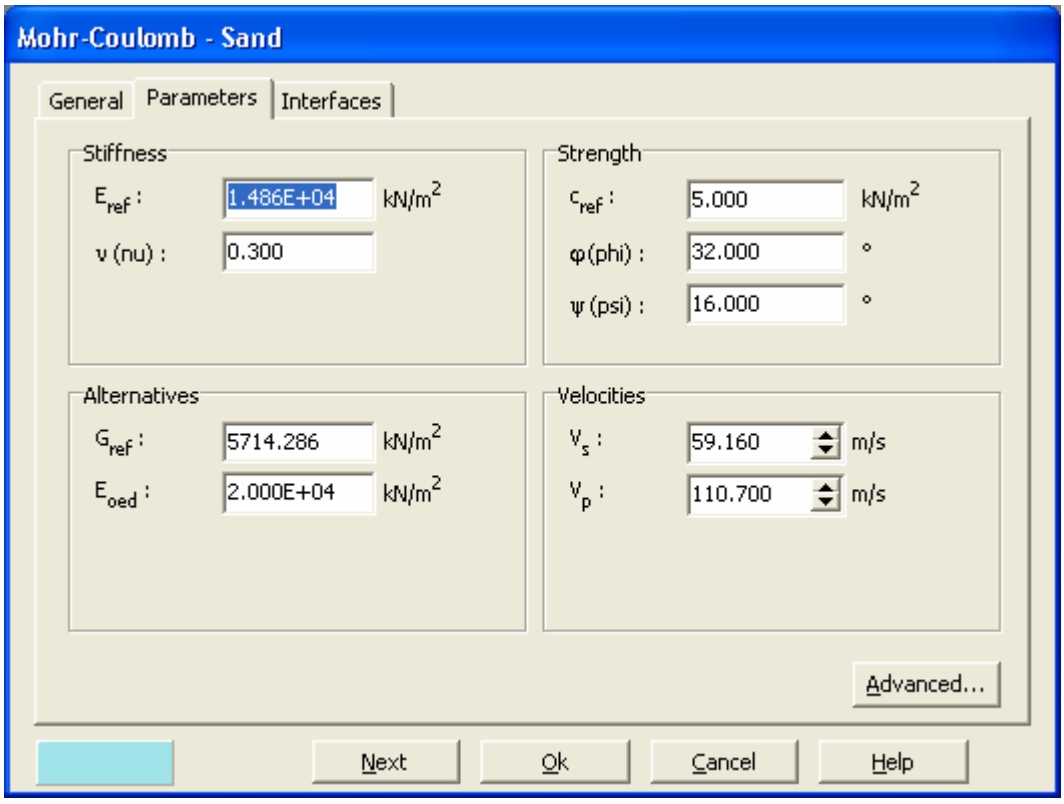
Vẽ tấm (Plate)

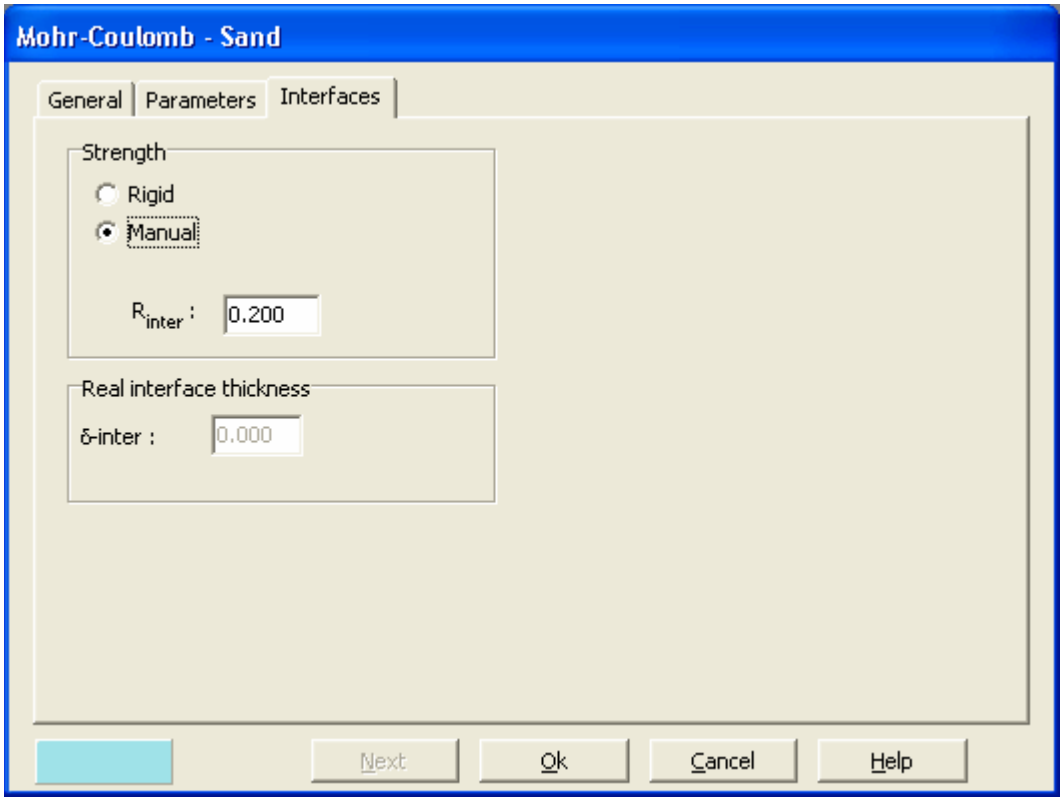
Vẽ phần tử tiếp xúc 

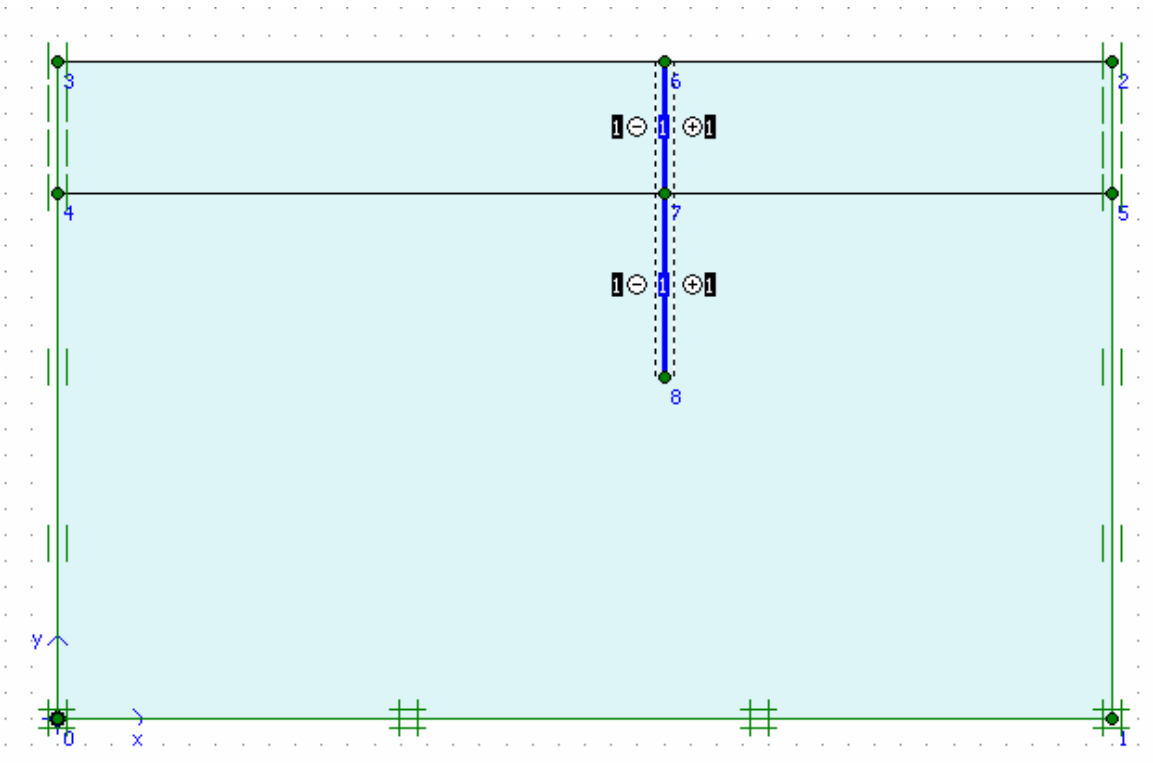
Gán biên 

Gán số liệu địa chất 

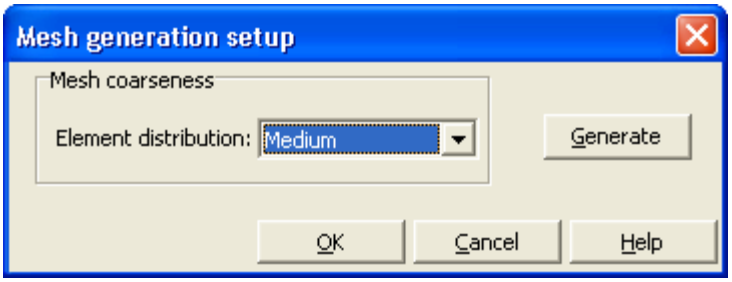


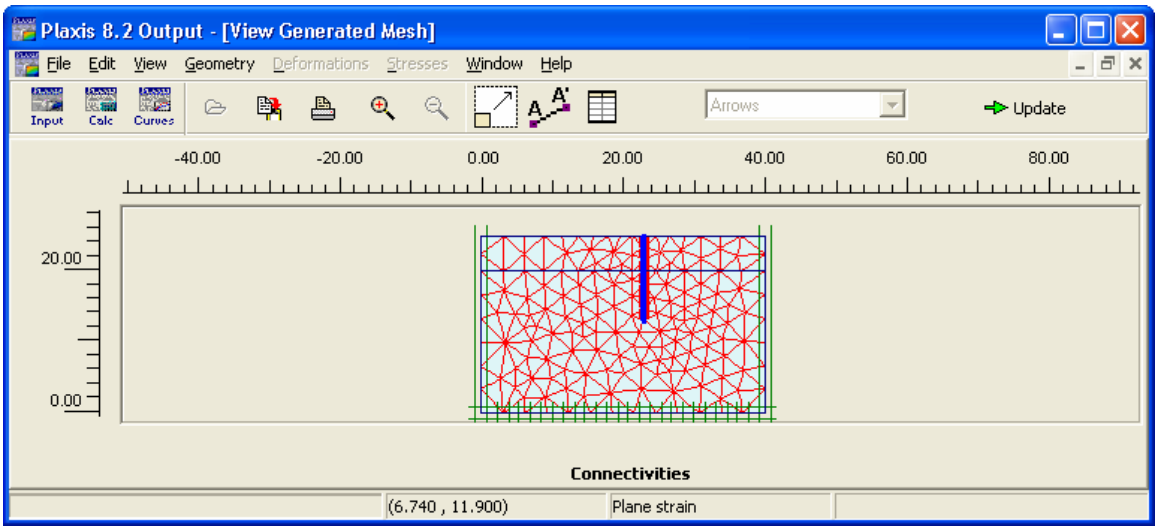

Mohr-Coulomb - Sand
General
Parameters
Interfaces
Stiffness
E ref : 1.486E+04 kN/m2
ν (nu) : 0.300
Strength
c ref : 5.000 kN/m2
φ (phi) : 32.000 °
ψ (psi) : 16.000 °
Alternatives
G ref : 5714.286 kN/m2
E oed : 2.000E+04 kN/m2
Velocities
V s : 59.160 m/s
V p : 110.700 m/s
Advanced...
Next
Ok
Cancel
Help


Mohr-Coulomb - Sand
General
Parameters
Interfaces
Strength
Rigid
Manual
R inter : 0.200
Real interface thickness
δ-inter : 0.000
Next
Ok
Cancel
Help



42. Tạo lưới phần tử

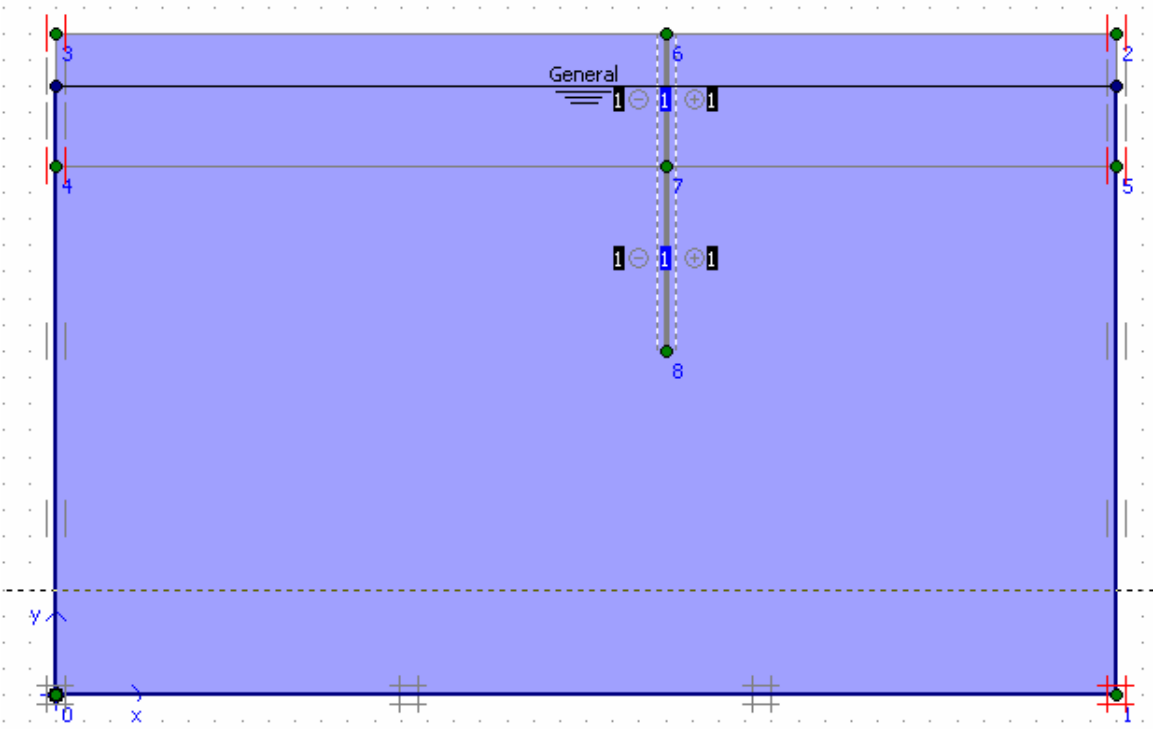




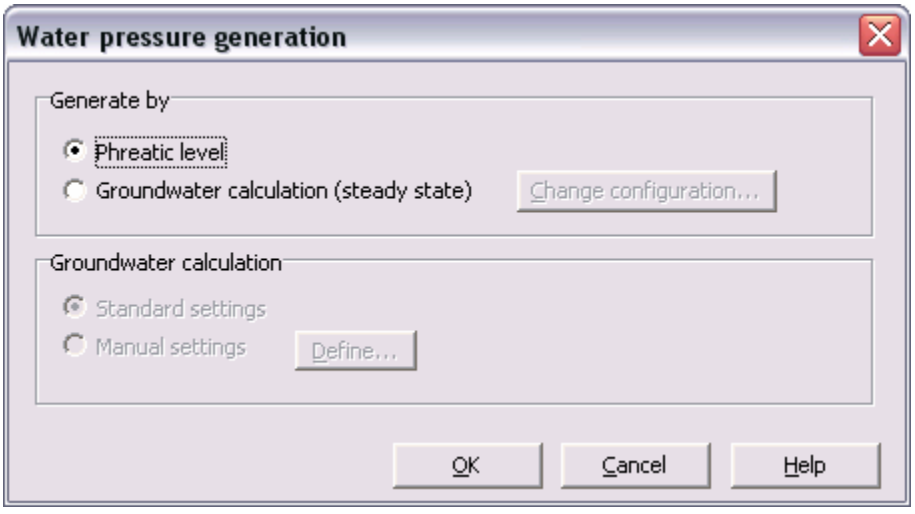
Update

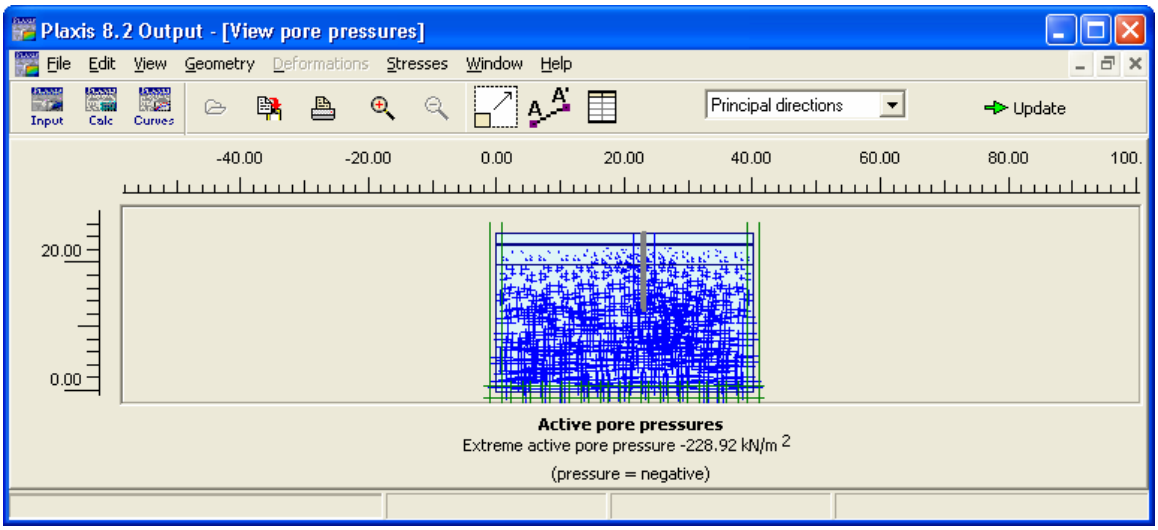
43. Tính toán điều kiện ban đầu

Gán mực nước ngầm

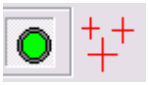


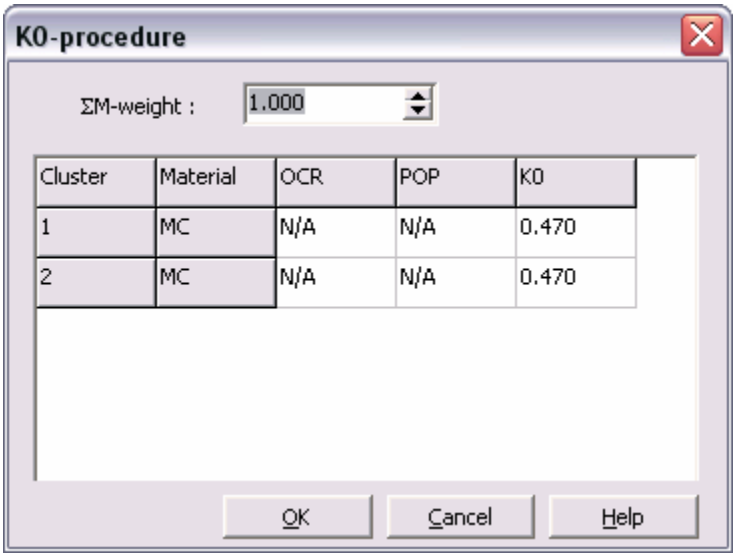
Tính toán áp lực nước 

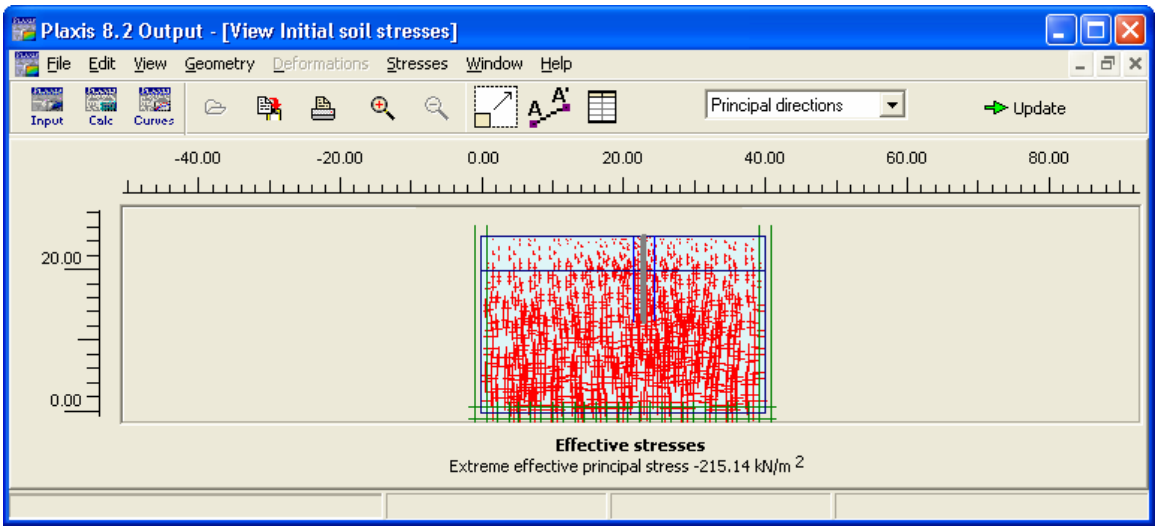




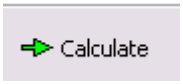
Update

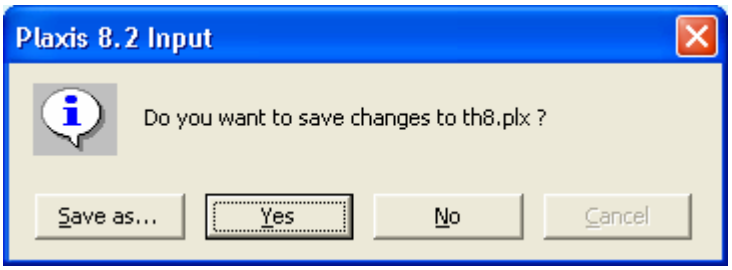
Tính toán áp lực đất 





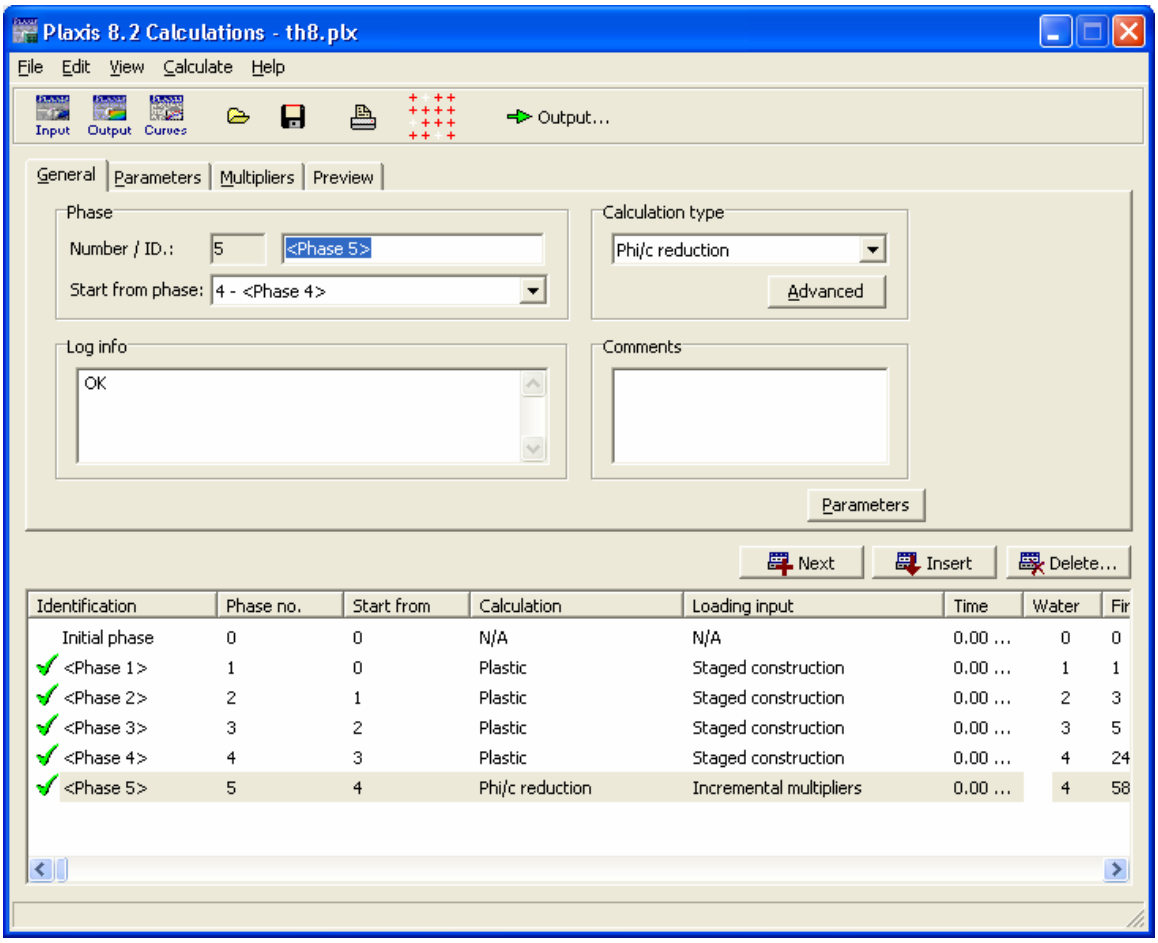
Update

44. Bắt đầu tính toán 

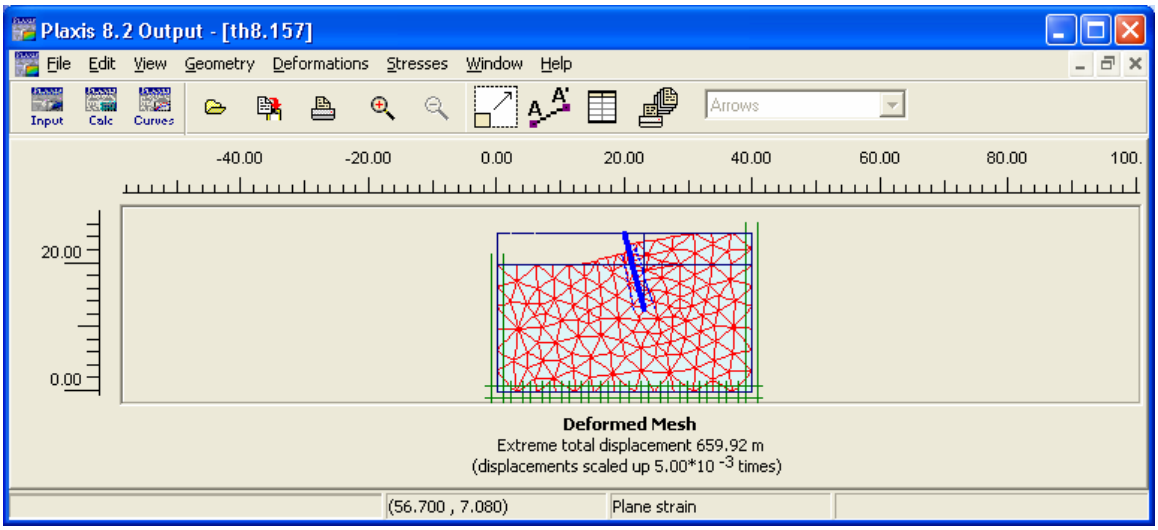


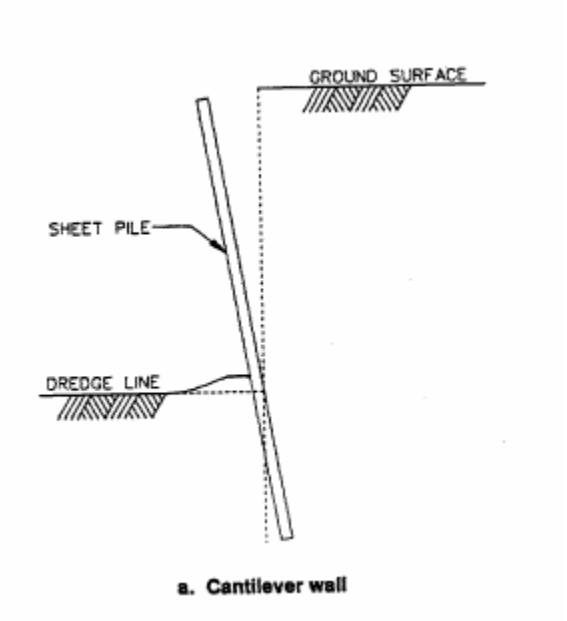
Tính toán cho 5 phase :

5. Ban đầu
6. Có sheet pile
7. Bỏ đất
8. Hạ thấp mực nước GWF
9. Tính ổn định Phi/C

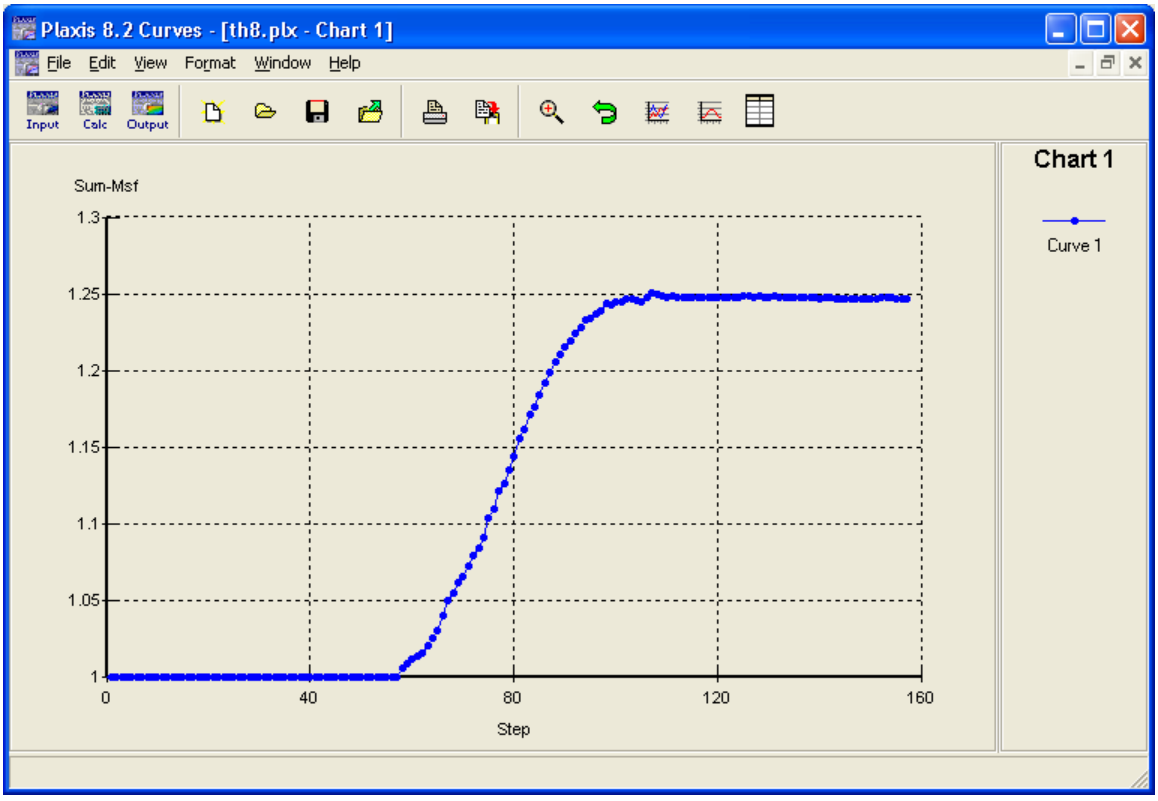


Kết quả phase cuối cùng

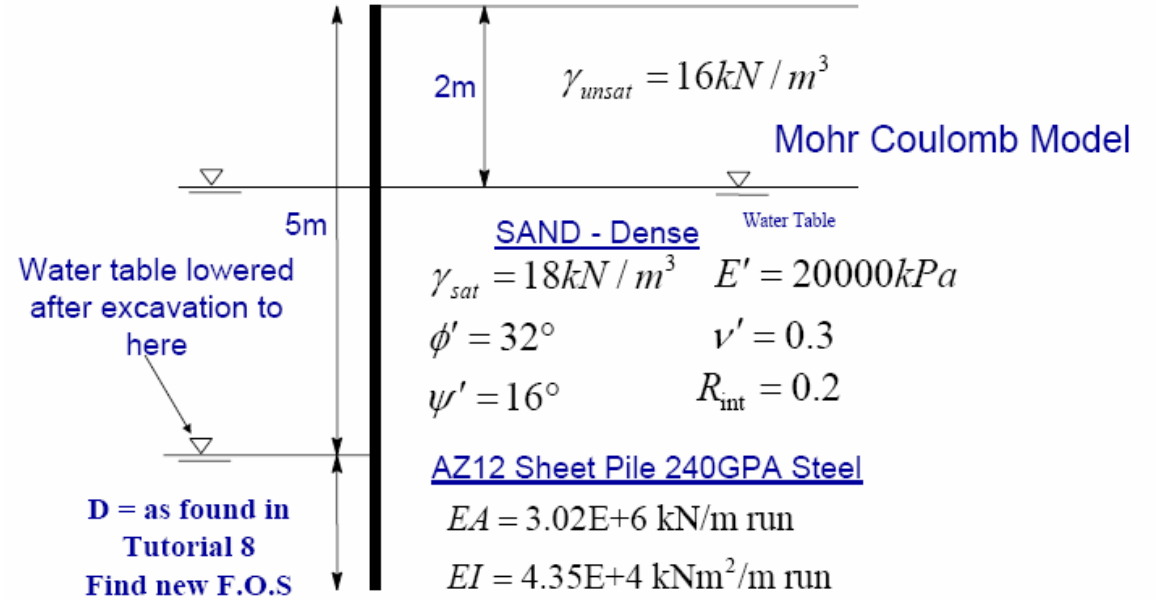




a. Cantilever wall

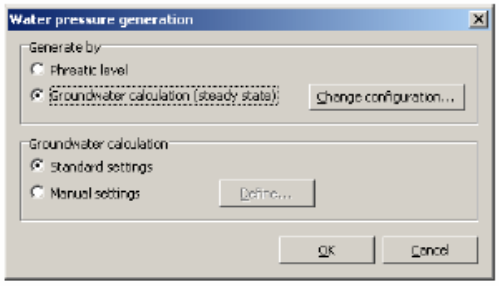


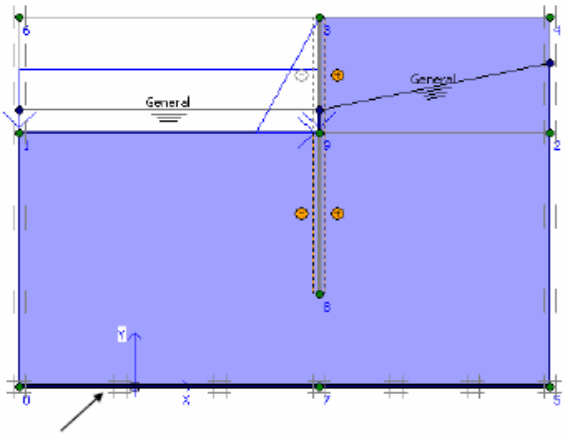
Phần 9 : PLAXIS INPUT,CALCULATE SHEET PILE WALLS



Now redo the problem but now conducting a ground water flow GWF analysis. Set permeability k=1 m/day

$$k = 1 \text{ m/day}$$





Insert "No Flow" boundary condition here
i.e impermeable base

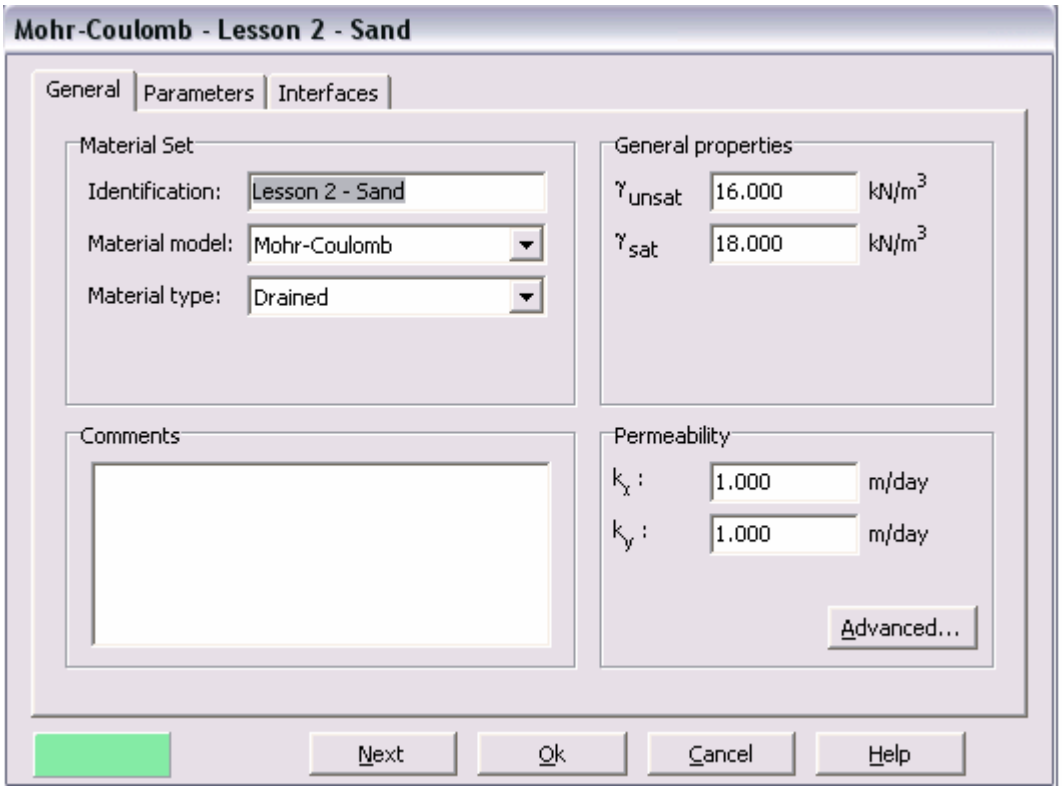
45. Tạo hình dạng bài toán

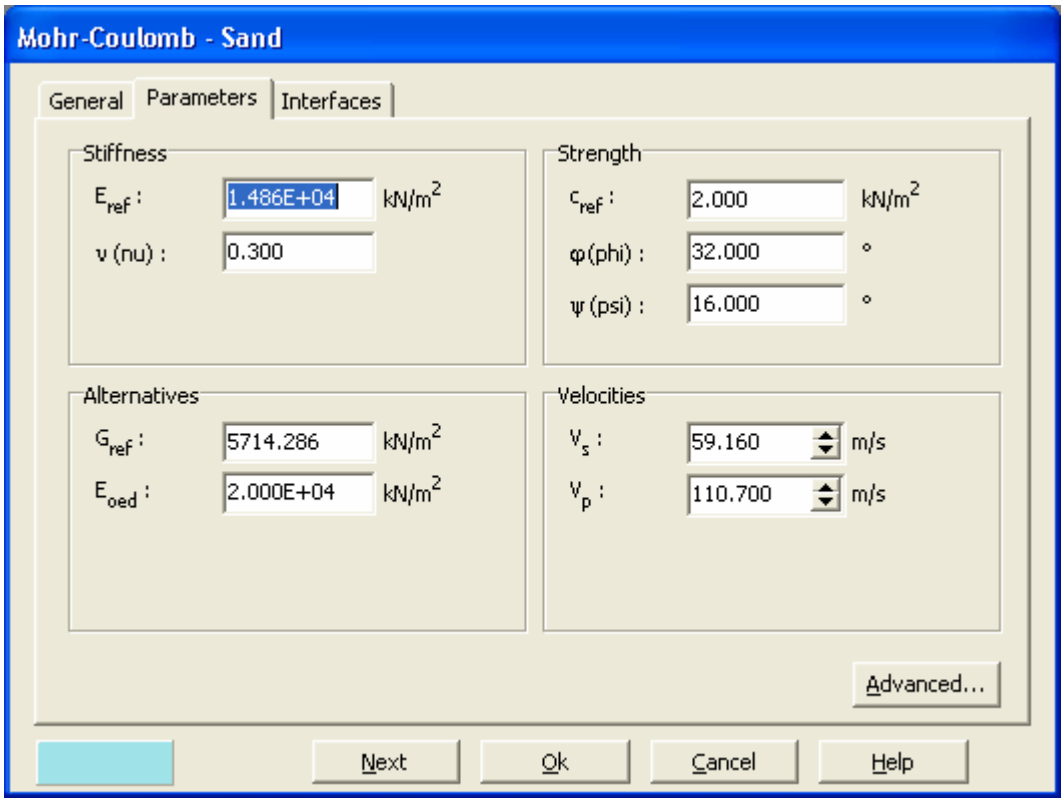
Vẽ tấm (Plate)

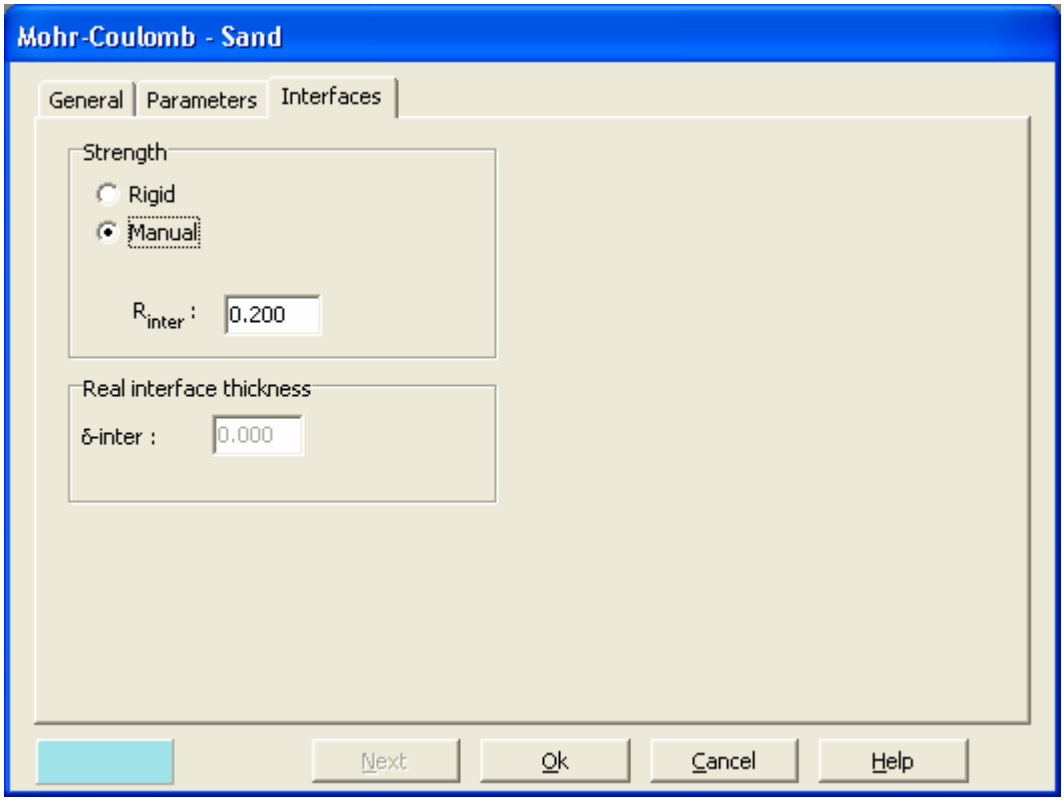
Vẽ phần tử tiếp xúc

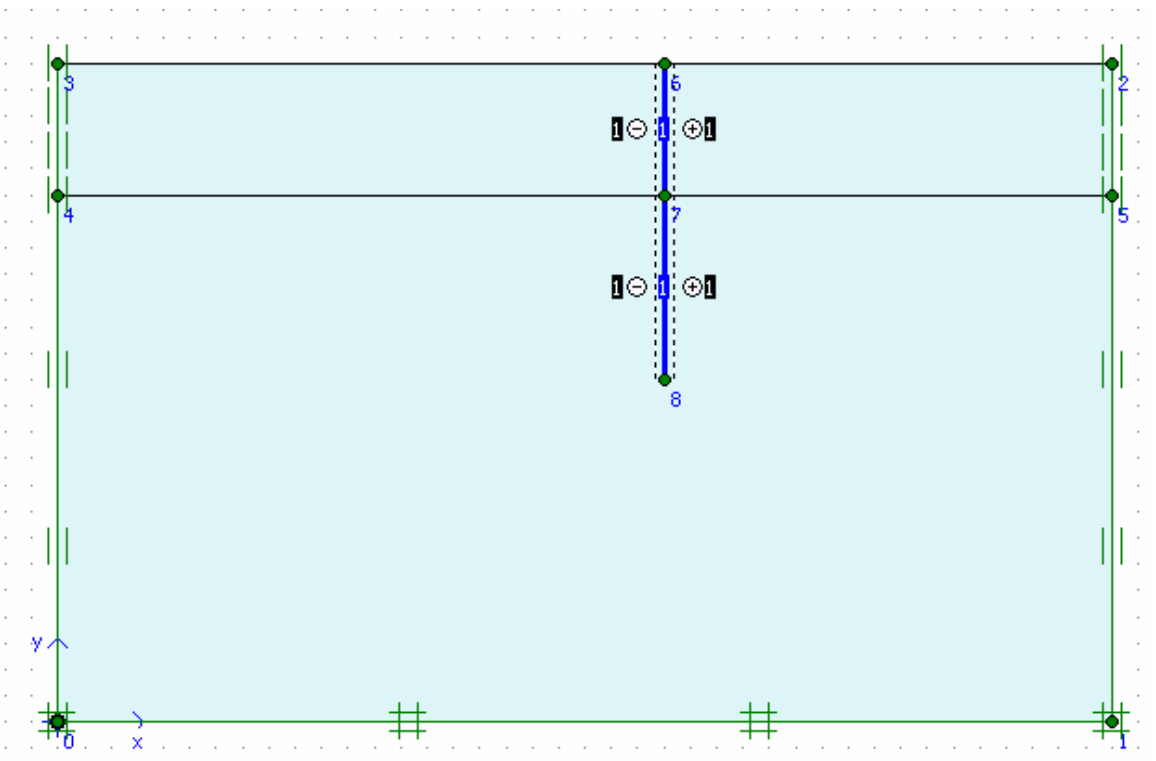
Gán biên

Gán số liệu địa chất

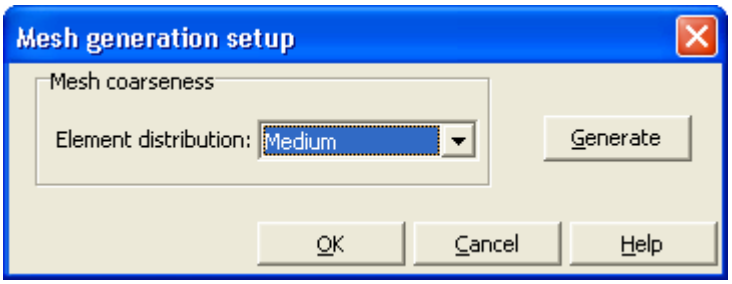

Mohr-Coulomb - Lesson 2 - Sand
General
Parameters
Interfaces
Material Set
Identification:
Lesson 2 - Sand
Material model:
Mohr-Coulomb
Material type:
Drained
General properties
γunsat
16.000
kN/m3
γsat
18.000
kN/m3
Comments
Permeability
kx :
1.000
m/day
ky :
1.000
m/day
Advanced...
Next
Ok
Cancel
Help

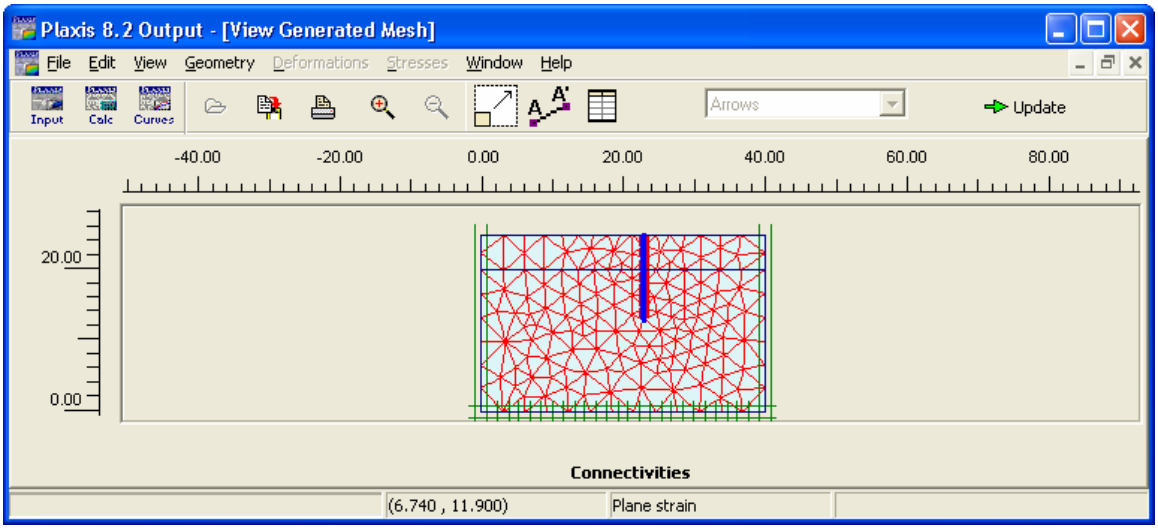

Mohr-Coulomb - Sand
General
Parameters
Interfaces
Stiffness
E_{ref} : 1.486E+04 kN/m^2
ν (nu) : 0.300
Strength
c_{ref} : 2.000 kN/m^2
φ(phi) : 32.000 °
ψ (psi) : 16.000 °
Alternatives
G_{ref} : 5714.286 kN/m^2
E_{oed} : 2.000E+04 kN/m^2
Velocities
V_s : 59.160 m/s
V_p : 110.700 m/s
Advanced...
Next
Ok
Cancel
Help


Mohr-Coulomb - Sand
General
Parameters
Interfaces
Strength
Rigid
Manual
R_{inter} : 0.200
Real interface thickness
δ-inter : 0.000
Next
Ok
Cancel
Help



46. Tạo lưới phần tử

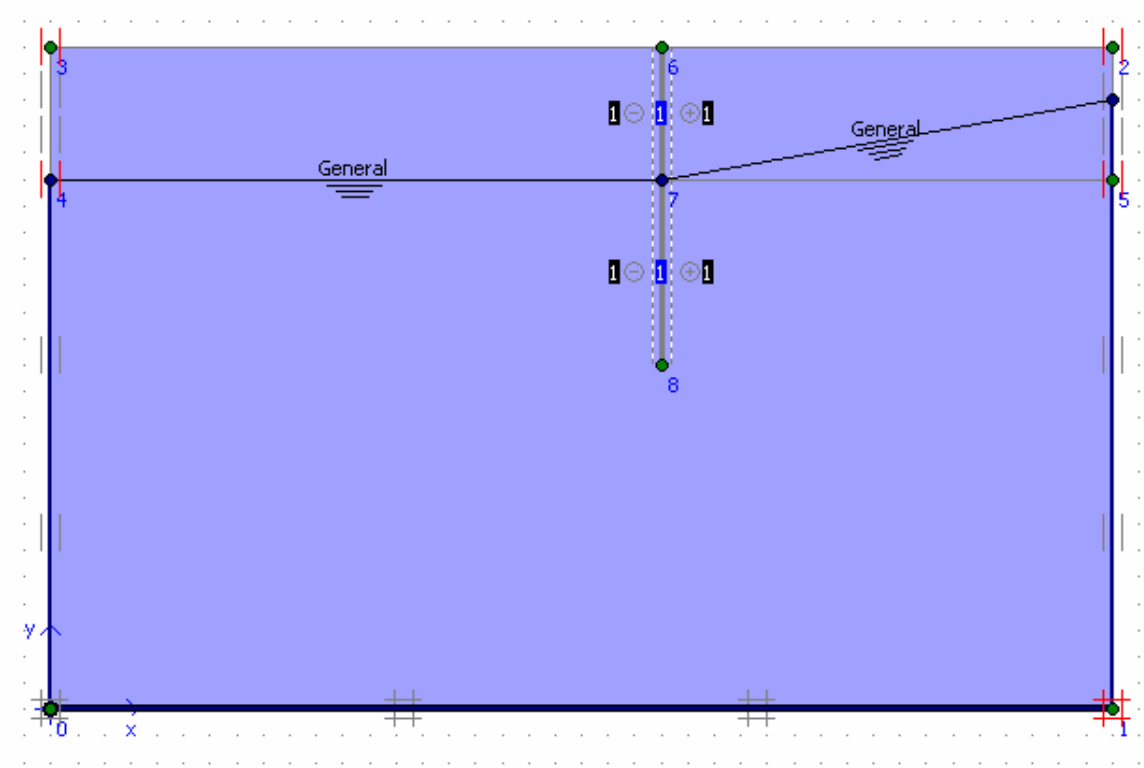




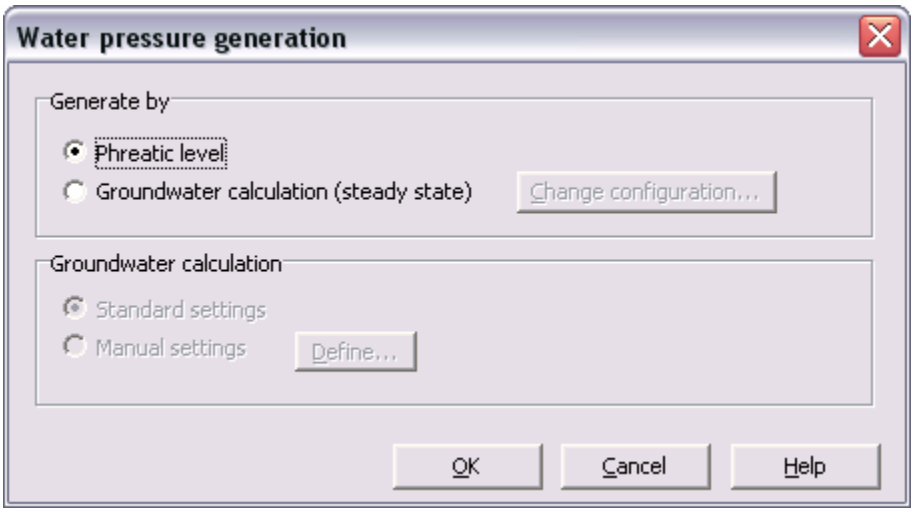
Update

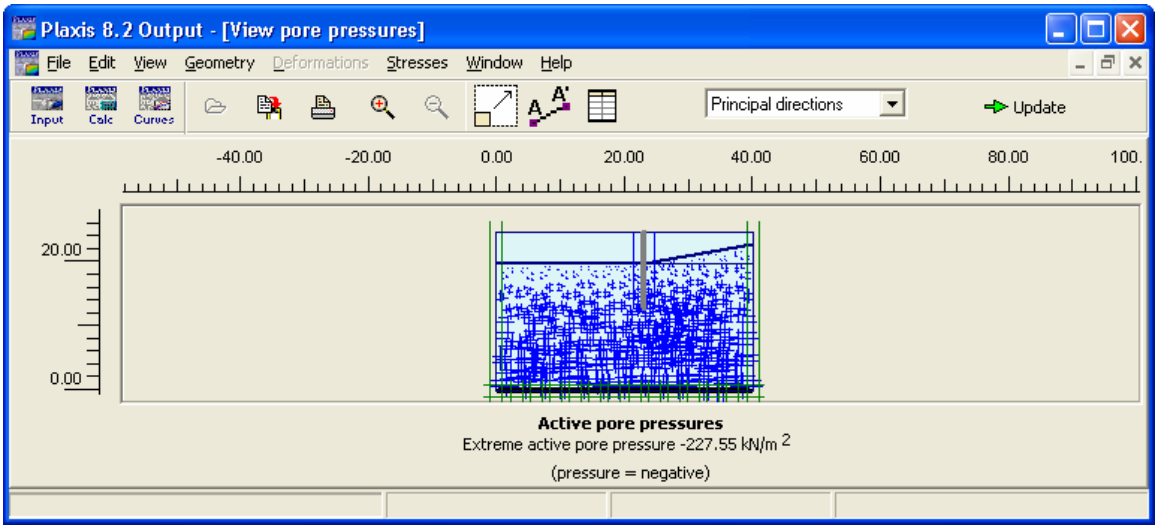
47. Tính toán điều kiện ban đầu

Gán mực nước ngầm

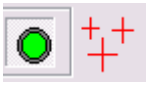


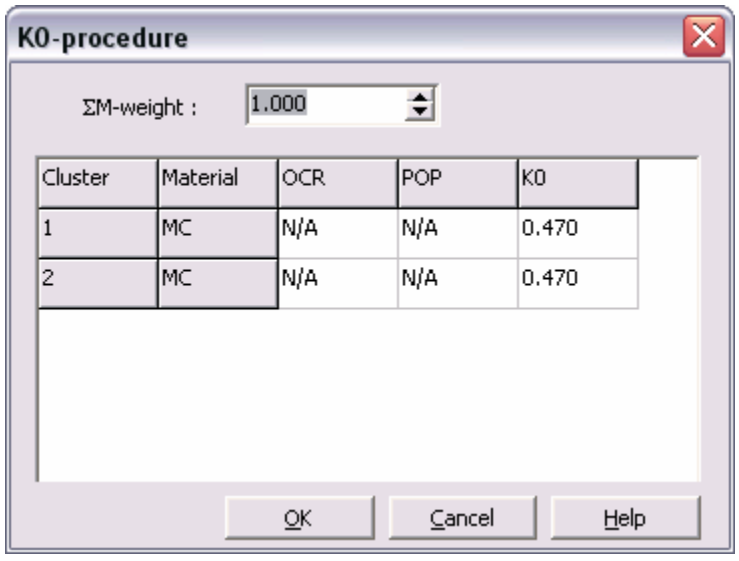
Tính toán áp lực nước 

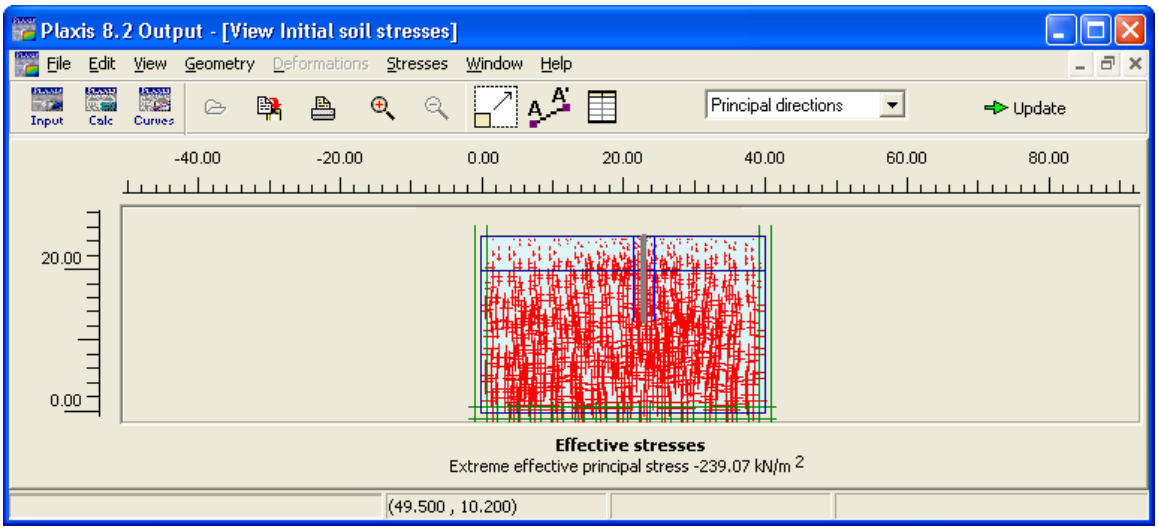




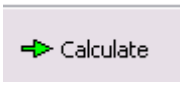
Update

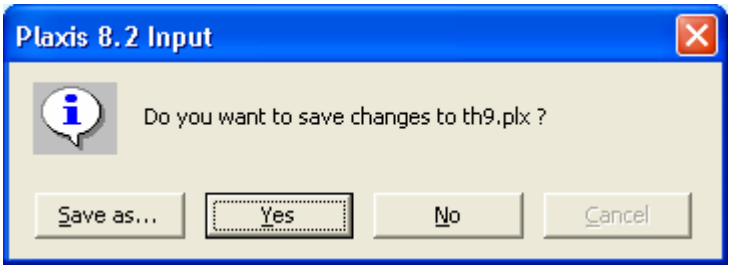
Tính toán áp lực đất 





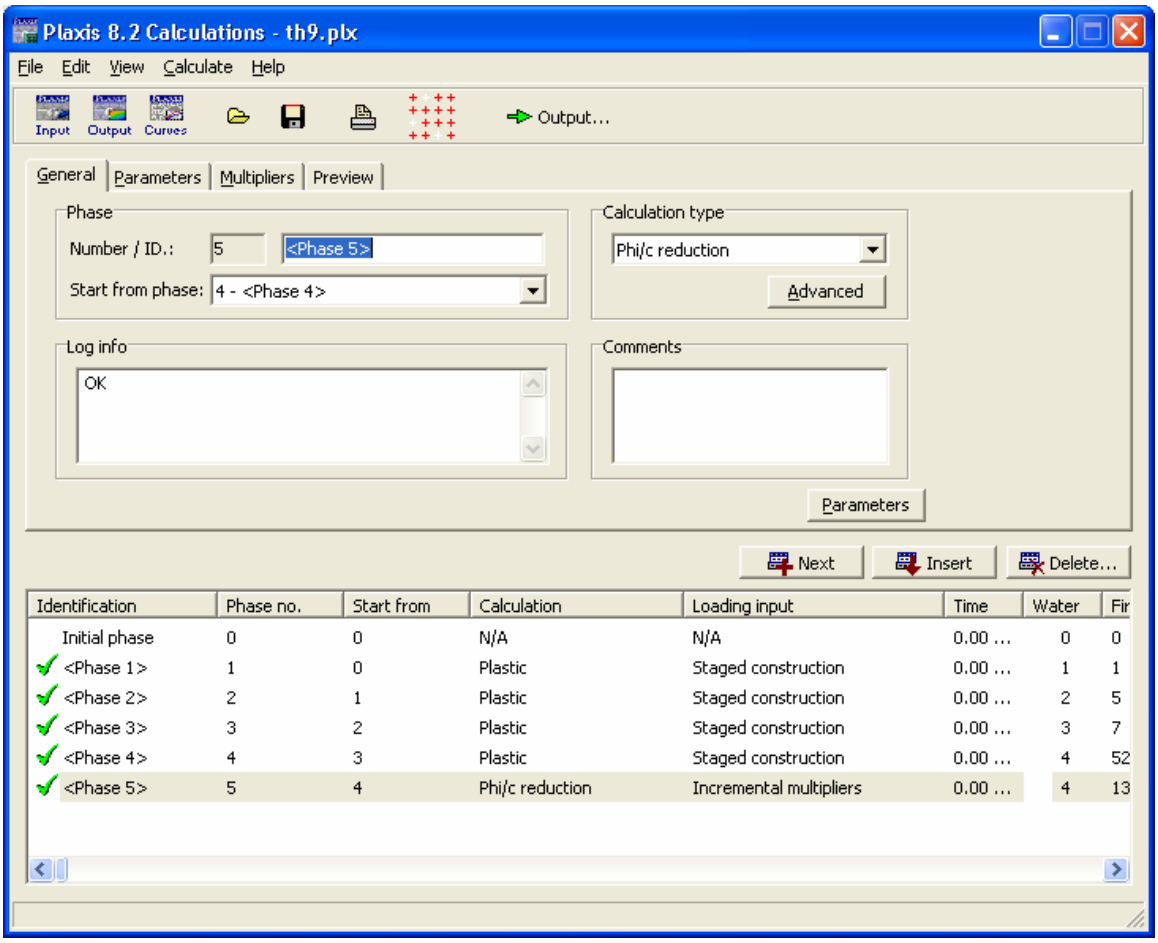
Update

48. Bắt đầu tính toán 

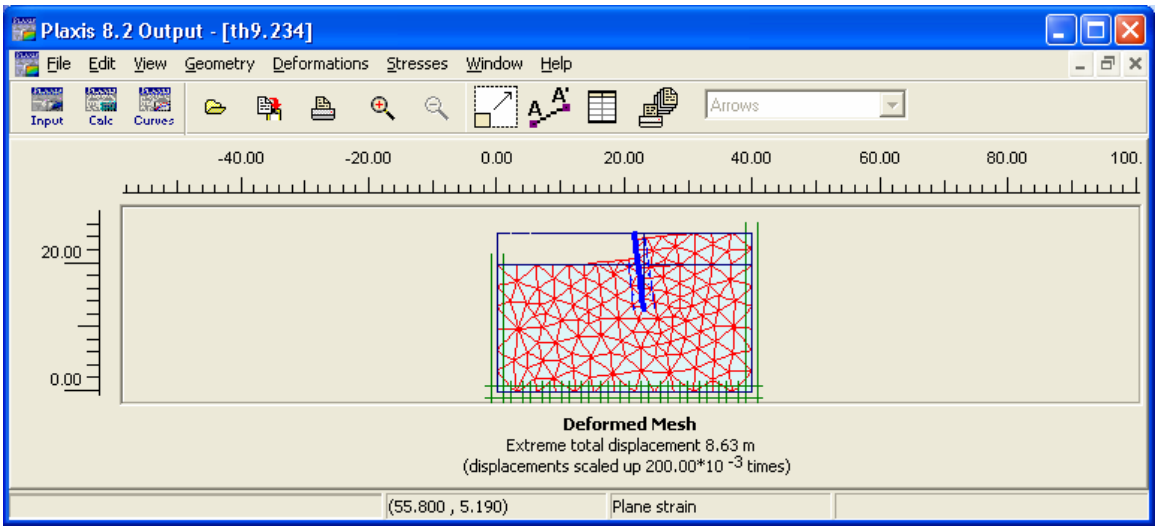


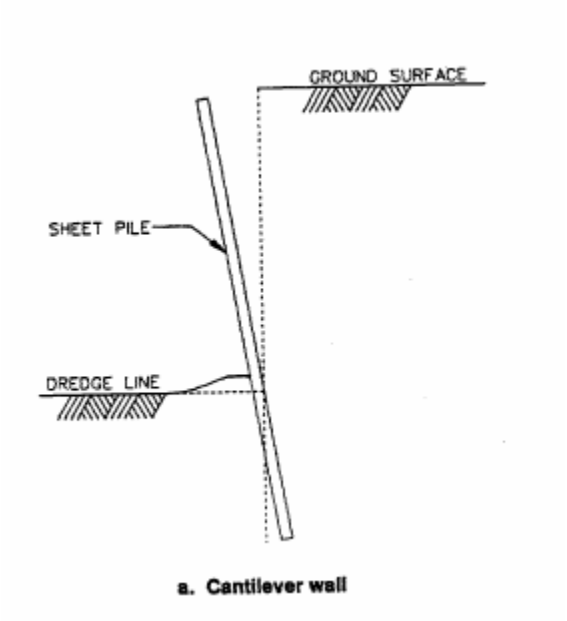
Tính toán cho 5 phase :

10. Ban đầu
11. Có sheet pile
12. Bỏ đất
13. Hạ thấp mực nước GWF
14. Tính ổn định Phi/C

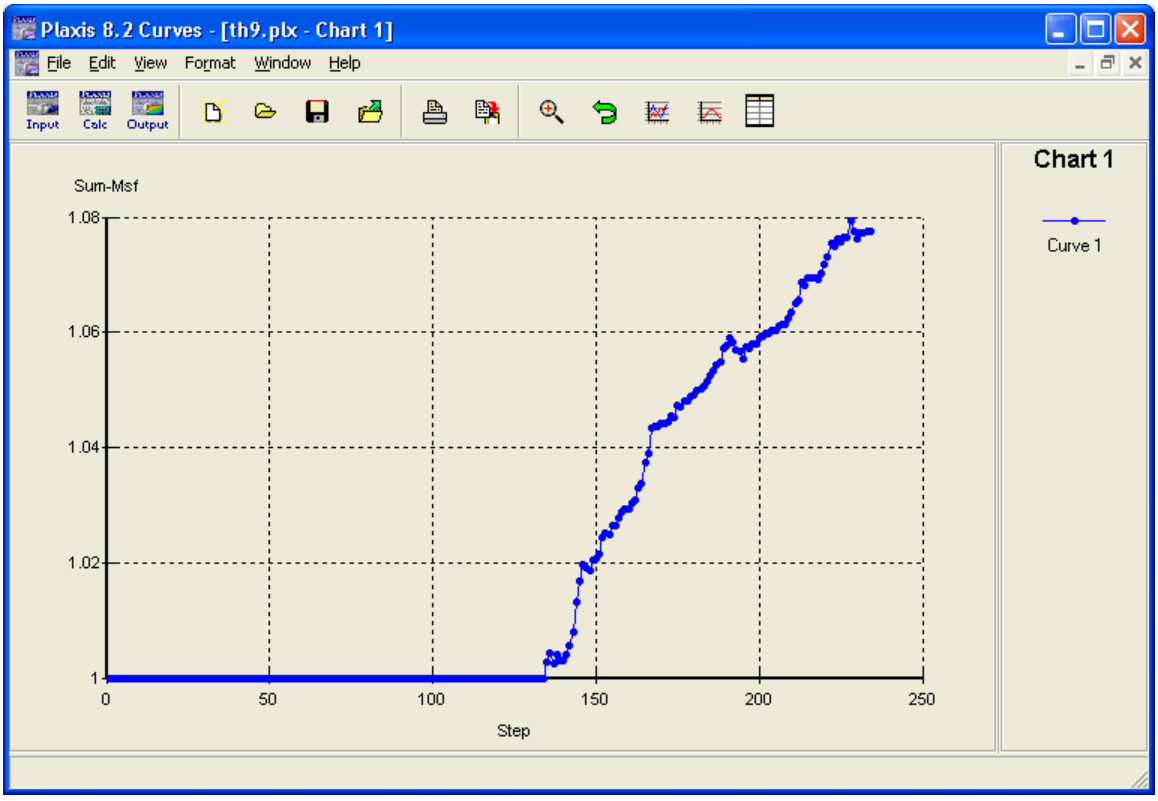


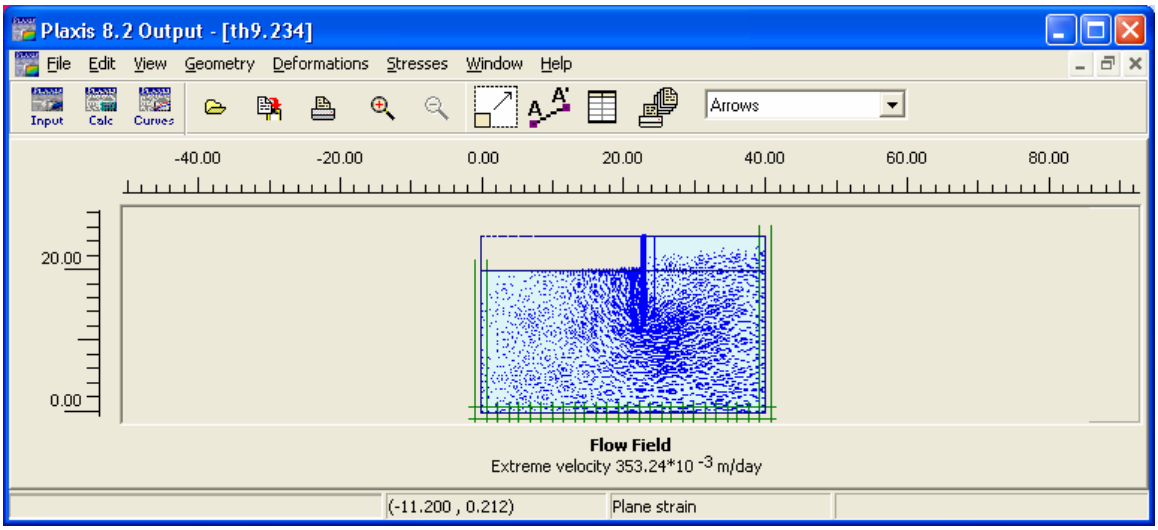
Kết quả phase cuối cùng

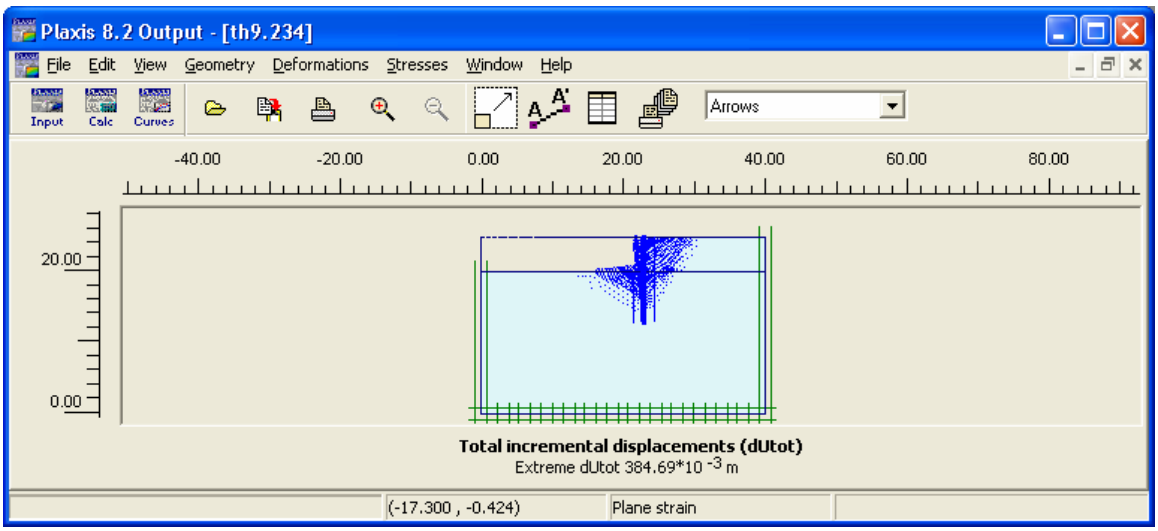


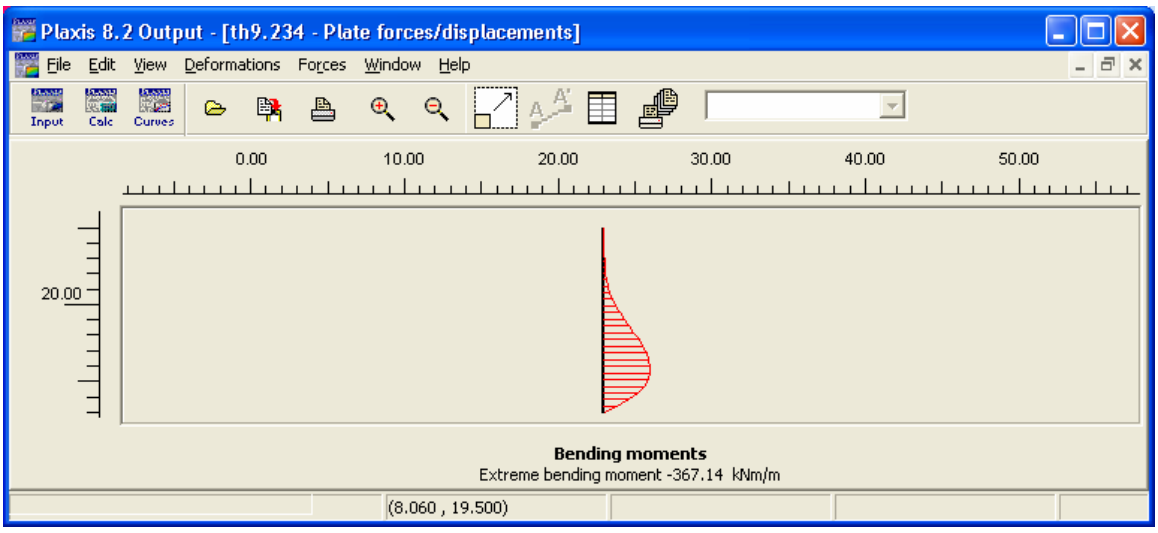


a. Cantilever wall

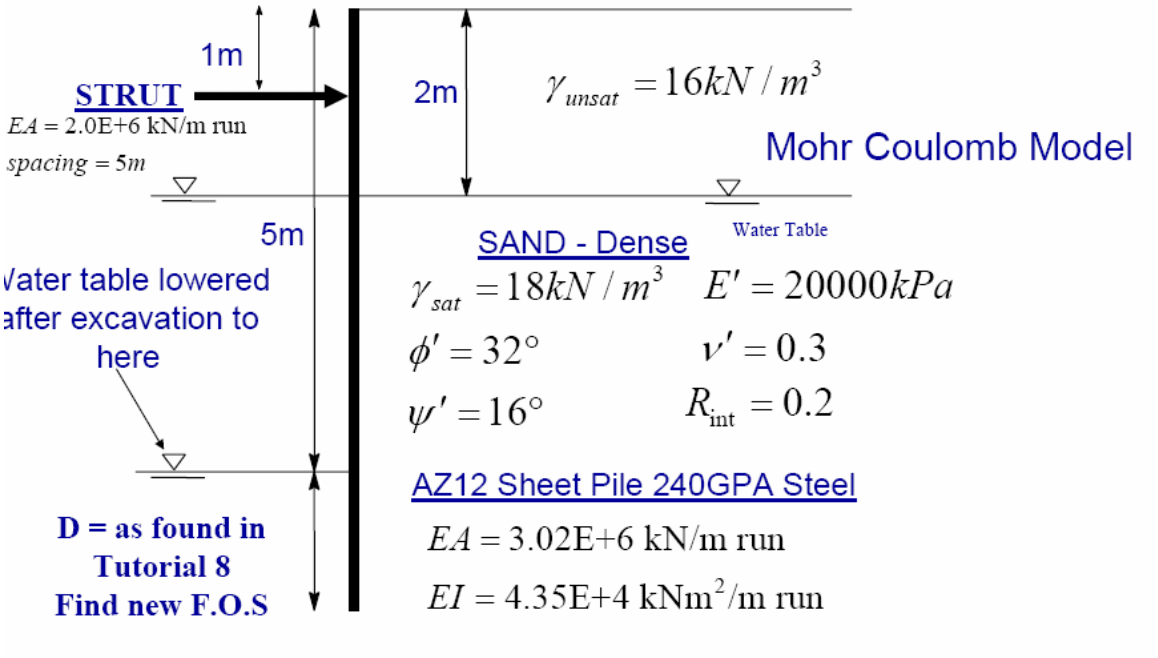



Plaxis 8.2 Output - [th9.234]
File Edit View Geometry Deformations Stresses Window Help
Input Calc Curves
Arrows
-40.00 -20.00 0.00 20.00 40.00 60.00 80.00
20.00
0.00
Flow Field
Extreme velocity 353.24*10 -3 m/day
(-11.200 , 0.212)
Plane strain


Plaxis 8.2 Output - [th9.234]
File Edit View Geometry Deformations Stresses Window Help
Input Calc Curves
Arrows
-40.00 -20.00 0.00 20.00 40.00 60.00 80.00
20.00
0.00
Total incremental displacements (dUtot)
Extreme dUtot 384.69*10 -3 m
(-17.300 , -0.424)
Plane strain


Plaxis 8.2 Output - [th9.234 - Plate forces/displacements]
File Edit View Deformations Forces Window Help
Input Calc Curves
0.00 10.00 20.00 30.00 40.00 50.00
20.00
Bending moments
Extreme bending moment -367.14 kNm/m
(8.060 , 19.500)

Phần 10 : PLAXIS INPUT,CALCULATE SHEET PILE WALLS



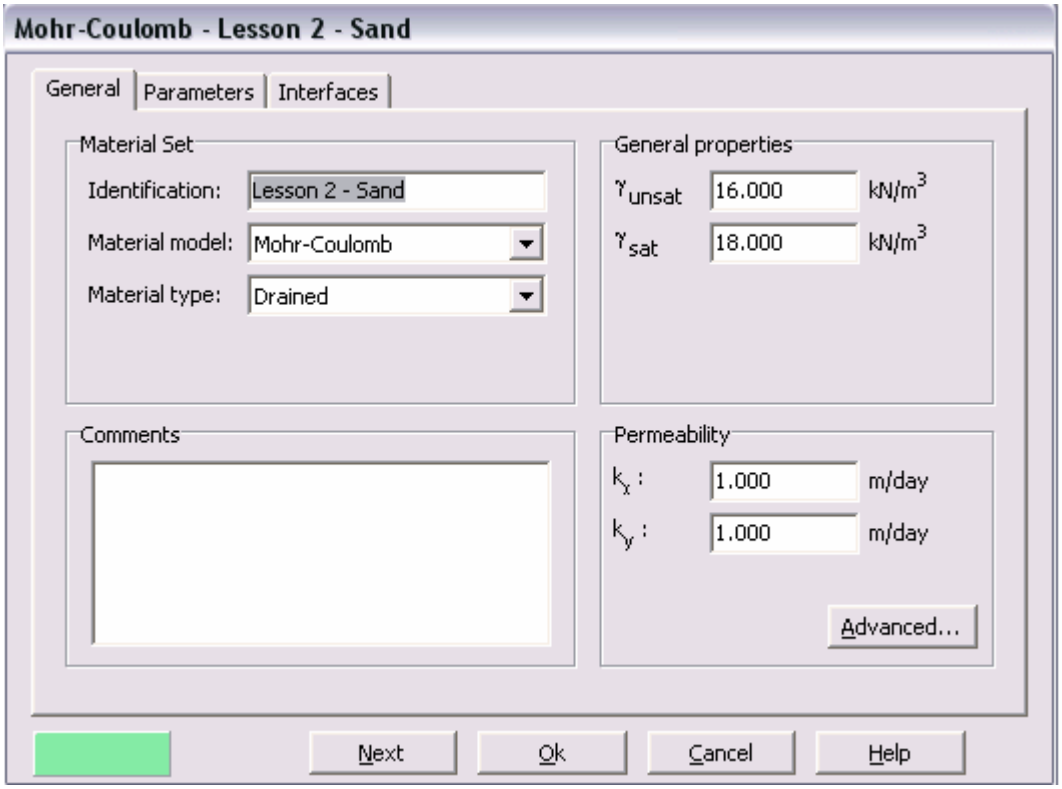
49. Tạo hình dạng bài toán

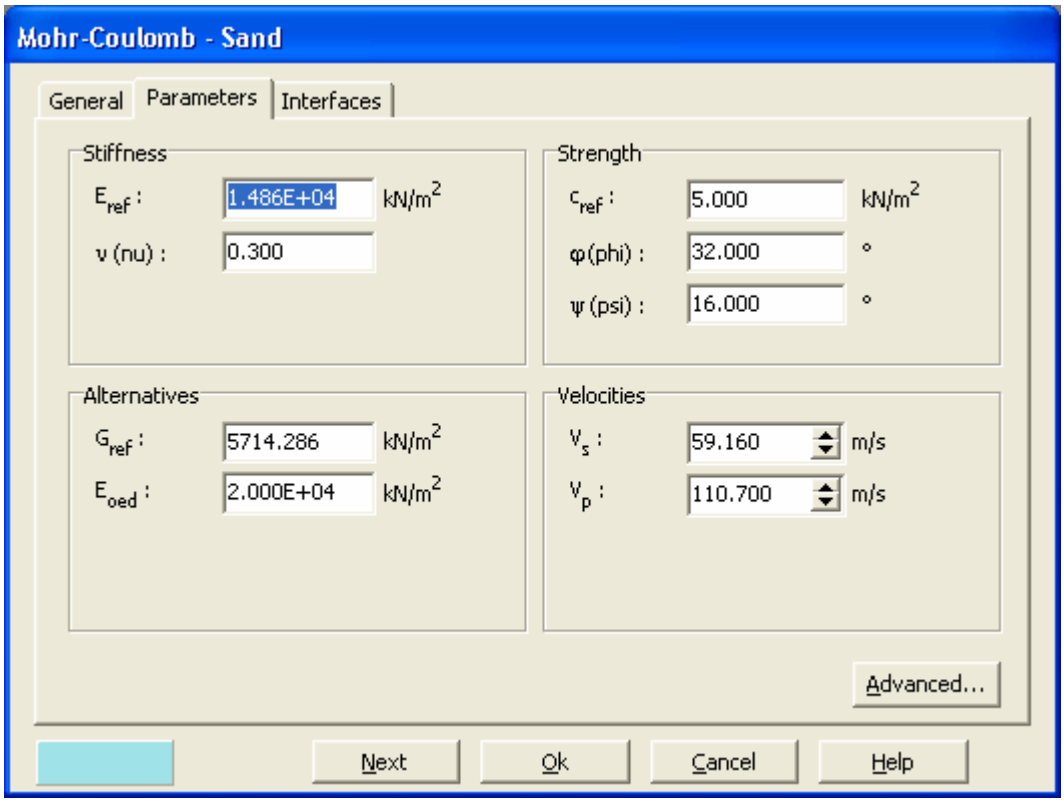
Vẽ tấm (Plate) 

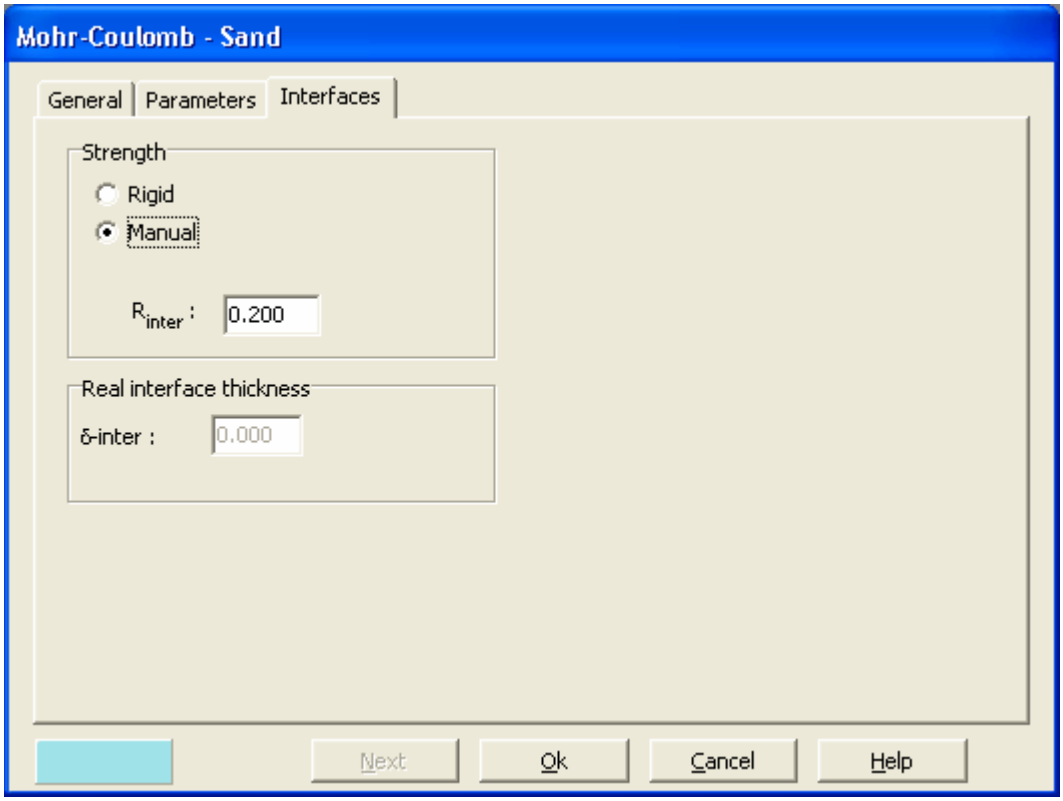
Vẽ phần tử tiếp xúc 

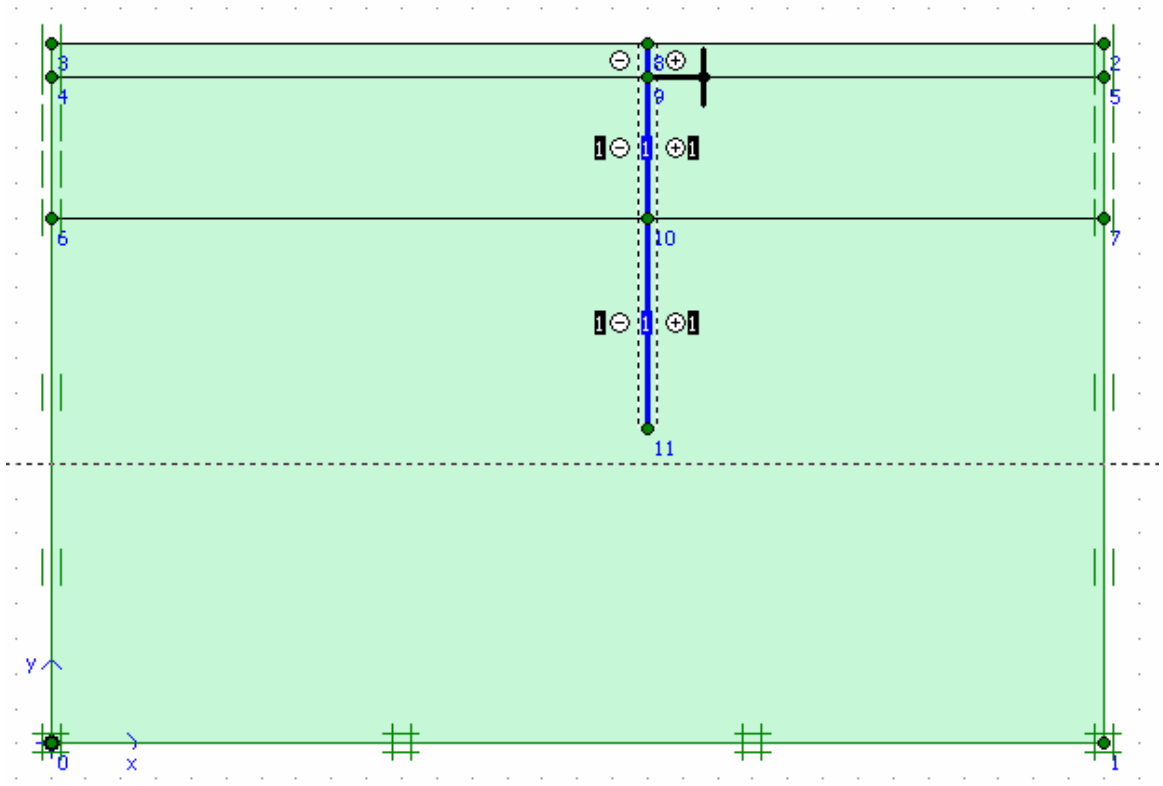
Gán biên 

Gán số liệu địa chất 

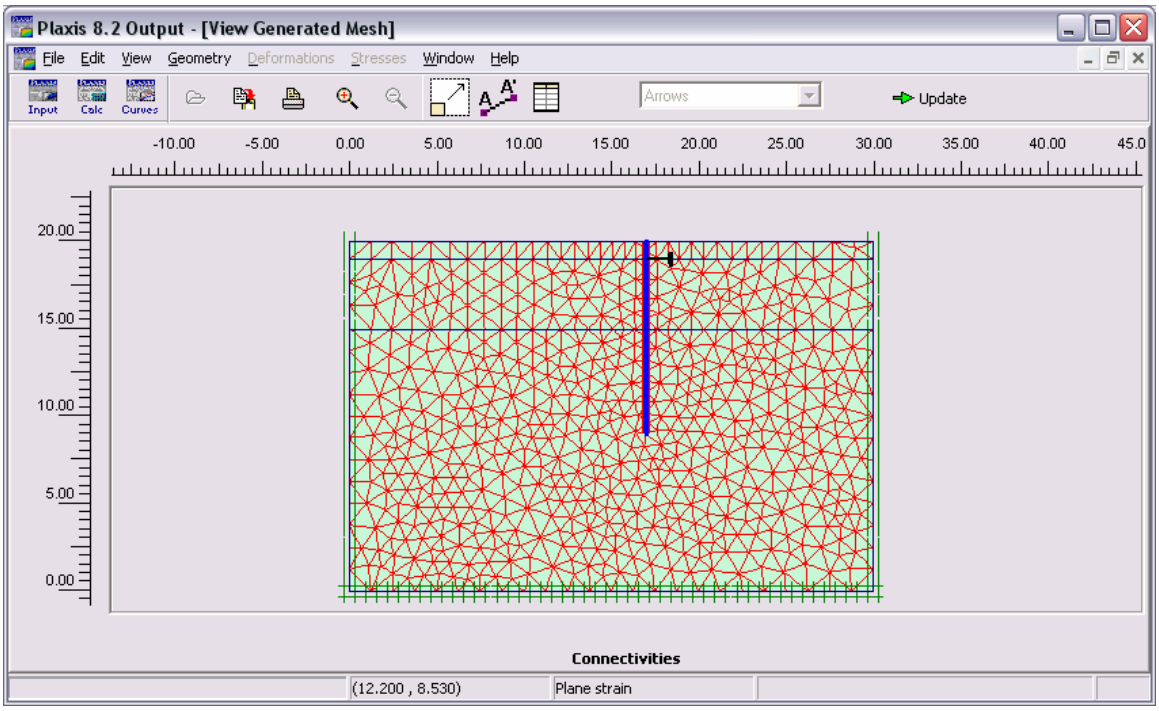



Mohr-Coulomb - Sand
General
Parameters
Interfaces
Stiffness
E_{ref} : 1.486E+04 kN/m^2
ν (nu) : 0.300
Strength
c_{ref} : 5.000 kN/m^2
φ(phi) : 32.000 °
ψ (psi) : 16.000 °
Alternatives
G_{ref} : 5714.286 kN/m^2
E_{oed} : 2.000E+04 kN/m^2
Velocities
V_s : 59.160 m/s
V_p : 110.700 m/s
Advanced...
Next
Ok
Cancel
Help


Mohr-Coulomb - Sand
General
Parameters
Interfaces
Strength
Rigid
Manual
R_{inter} : 0.200
Real interface thickness
δ-inter : 0.000
Next
Ok
Cancel
Help



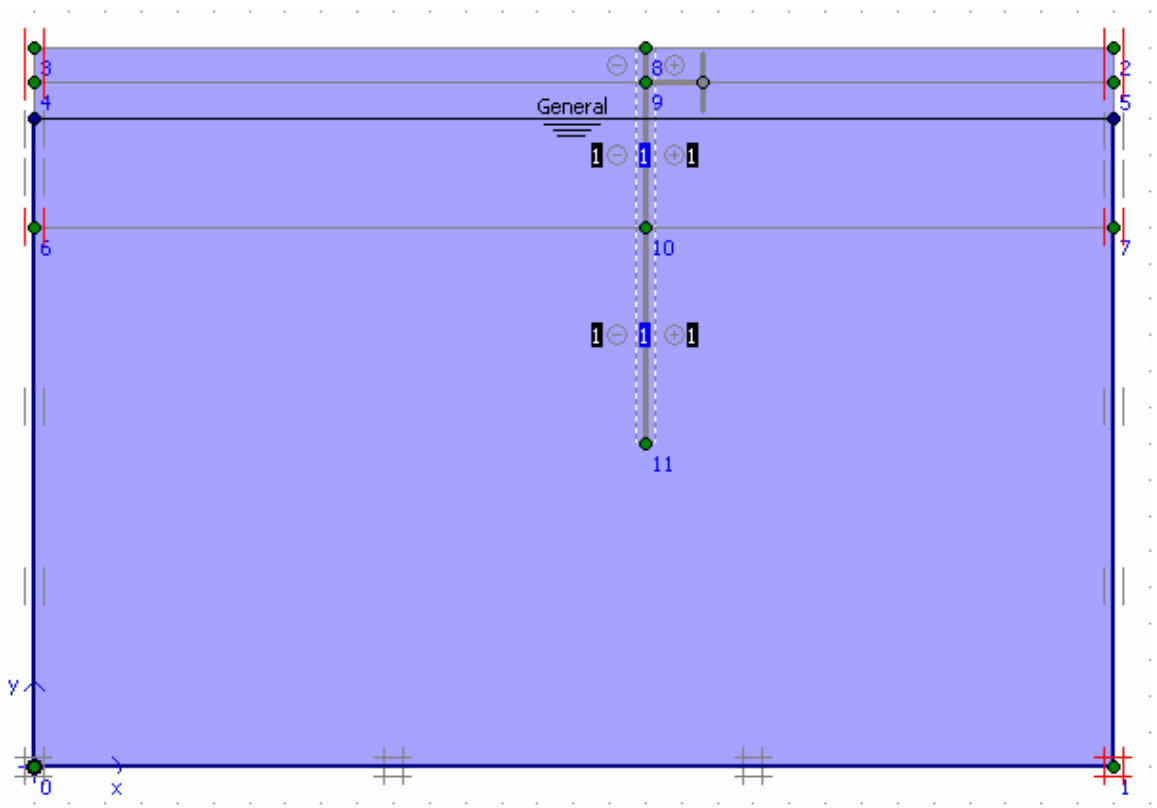
50. Tạo lưới phần tử



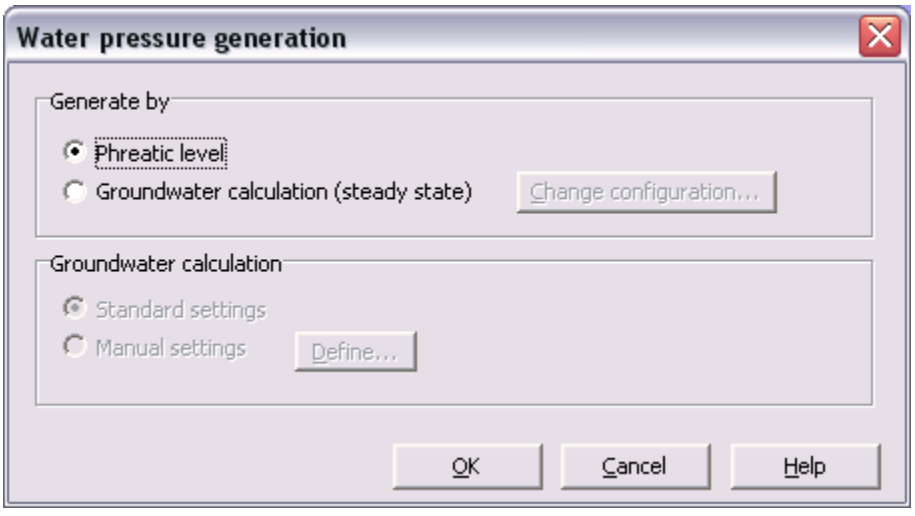
Update

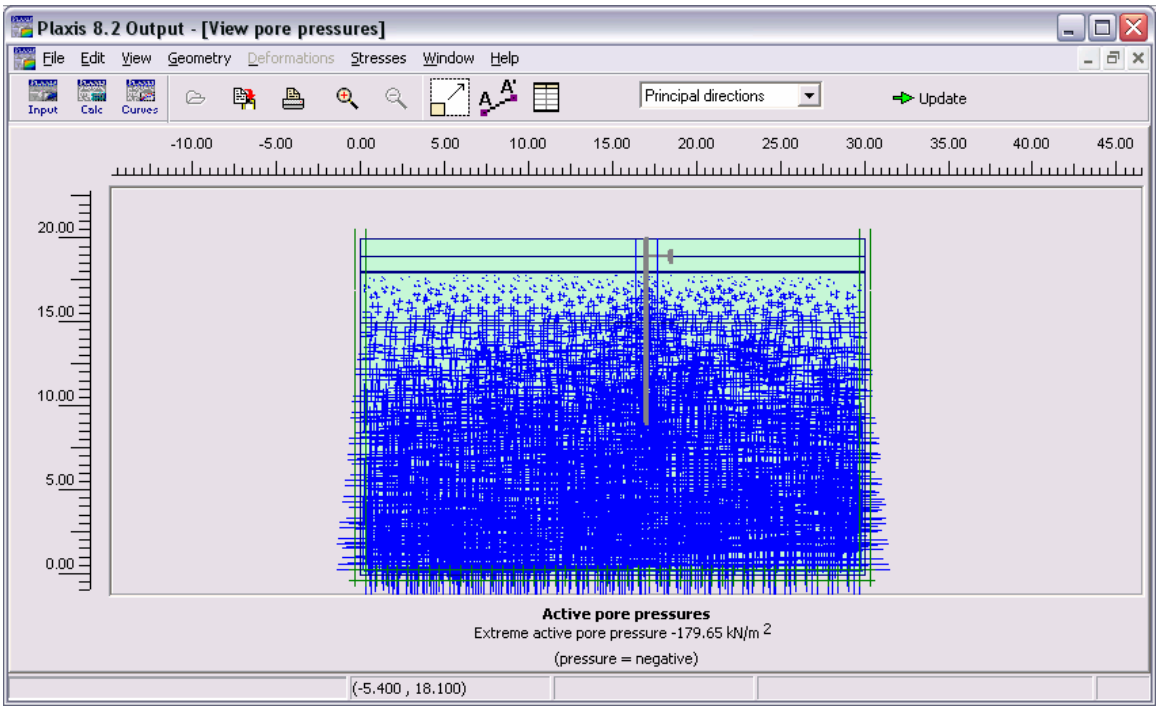
51. Tính toán điều kiện ban đầu

Gán mực nước ngầm

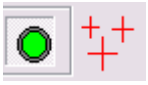


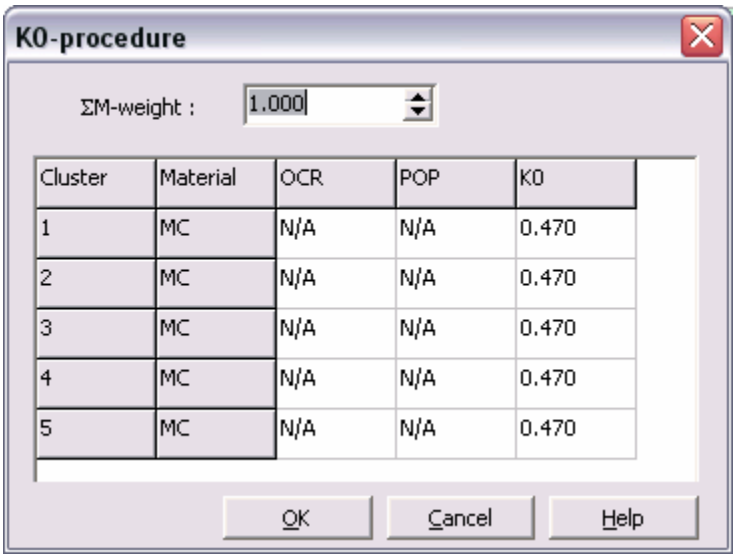
Tính toán áp lực nước 



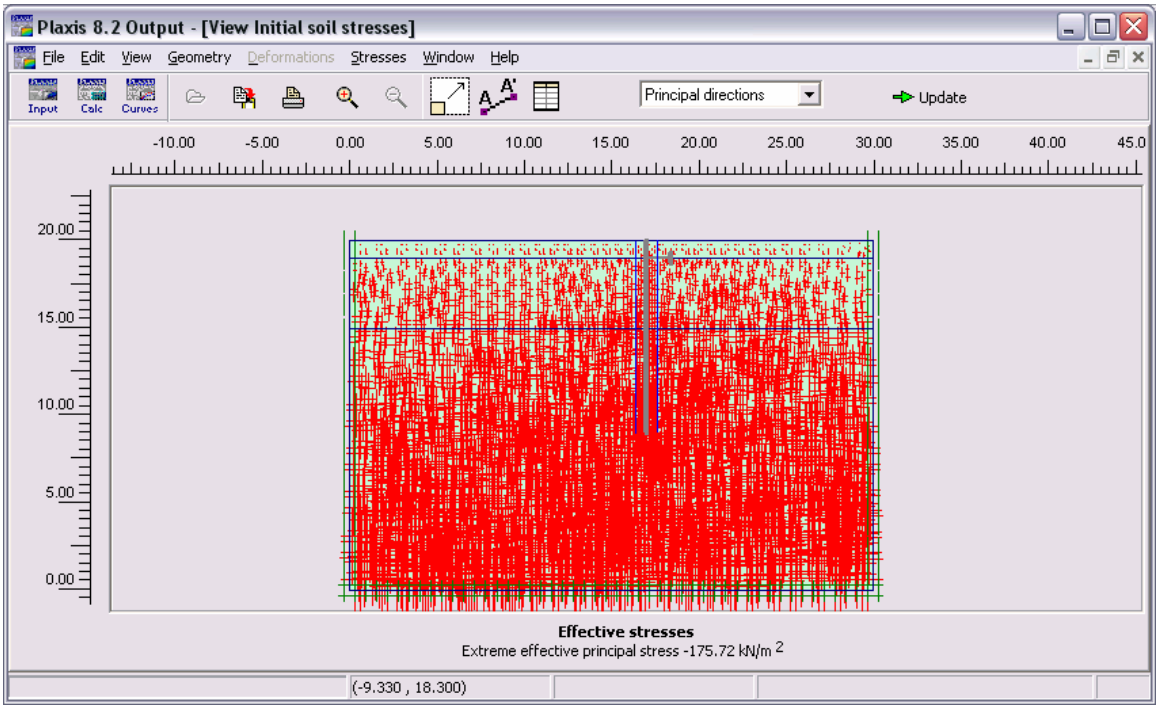


Update

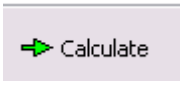
Tính toán áp lực đất 

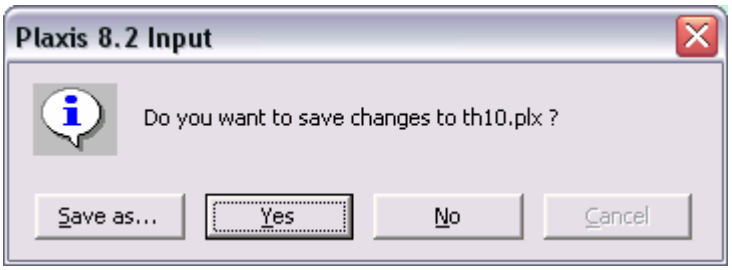


Cluster	Material	OCR	POP	K0
1	MC	N/A	N/A	0.470
2	MC	N/A	N/A	0.470
3	MC	N/A	N/A	0.470
4	MC	N/A	N/A	0.470
5	MC	N/A	N/A	0.470



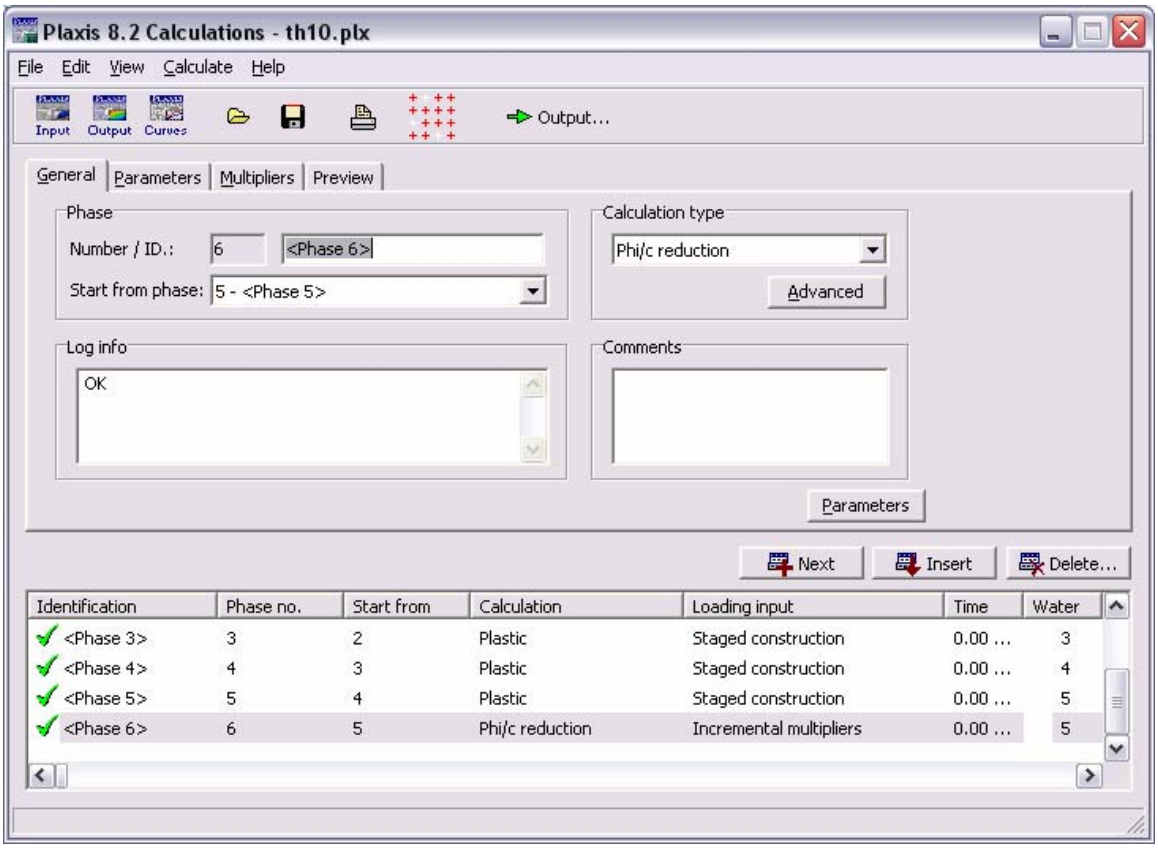
Update

52. Bắt đầu tính toán 

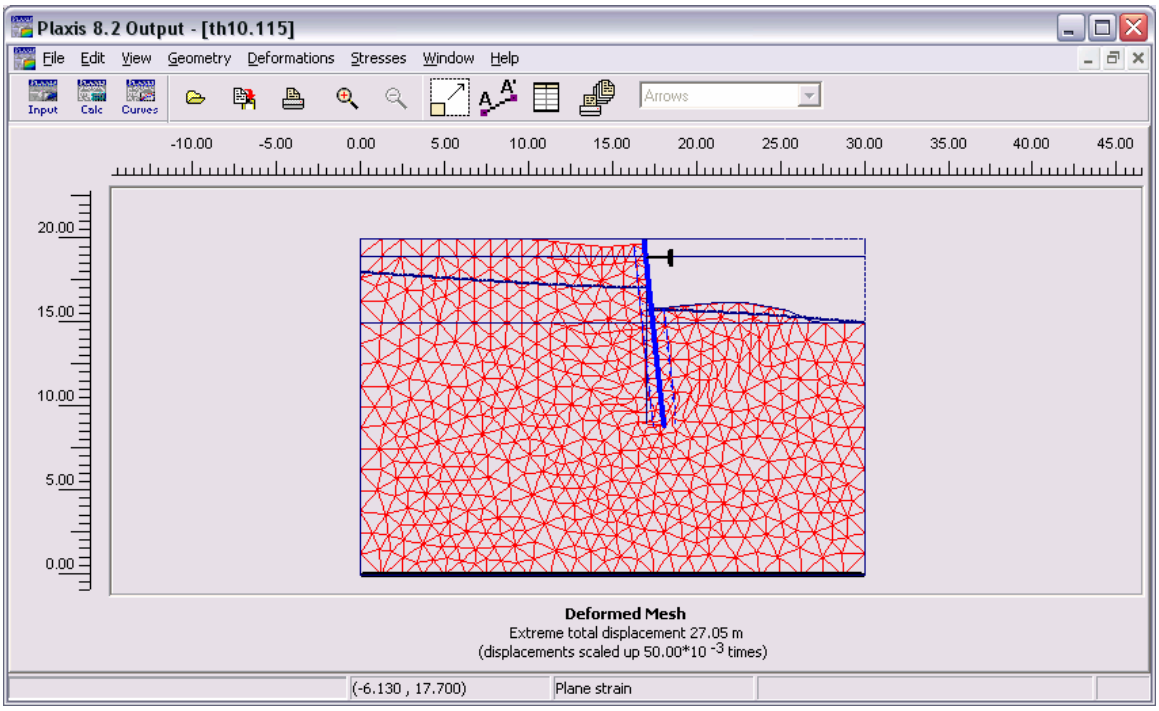


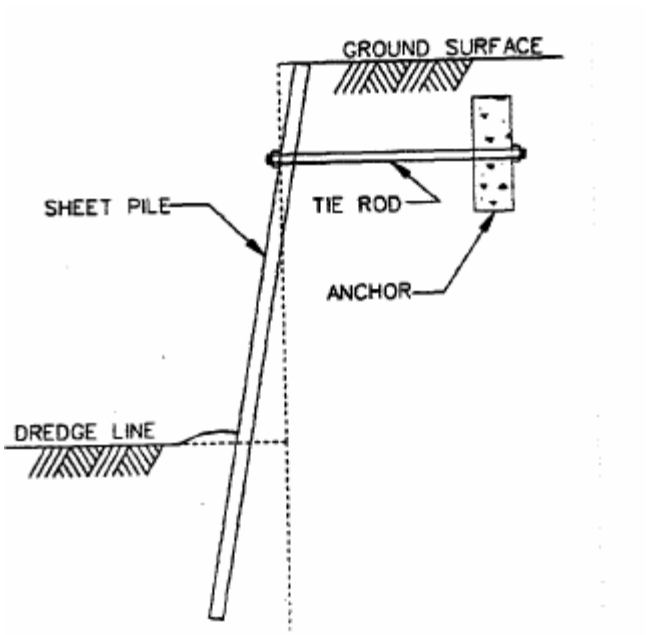
Tính toán cho 5 phase :

15. Ban đầu
16. Có sheet pile
17. Bỏ đất lớp trên
18. Hạ thấp mực nước GWF và có neo
19. Bỏ đất lớp dưới
20. Tính ổn định Phi/C

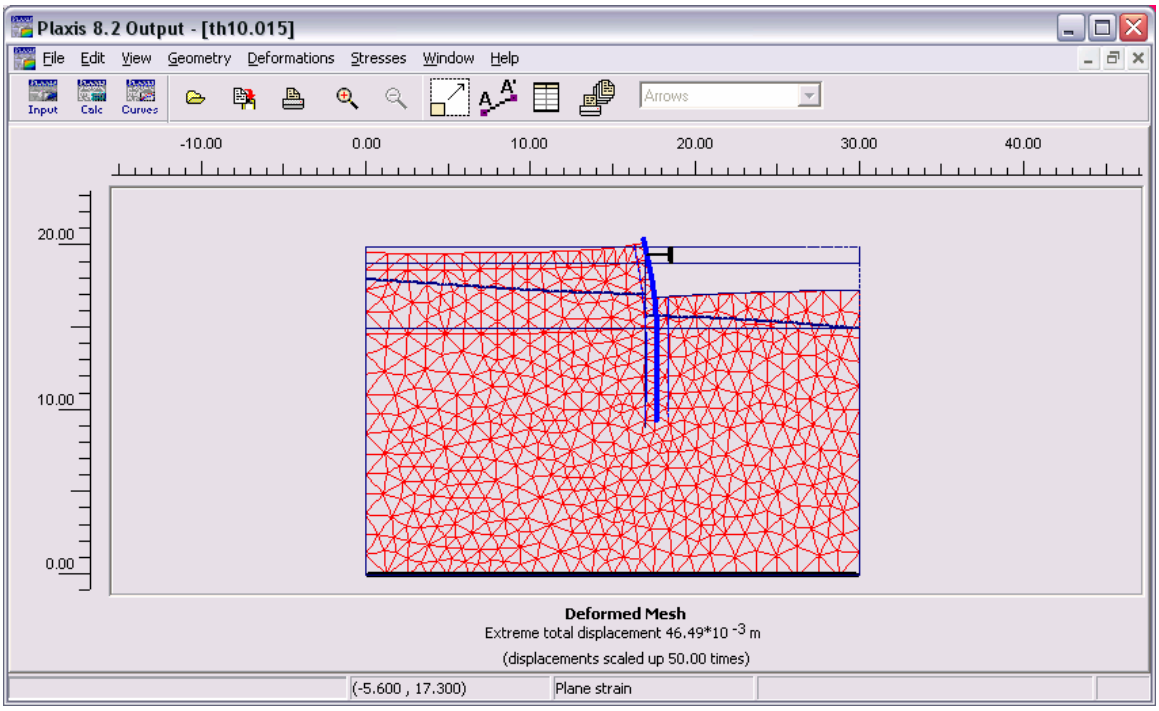


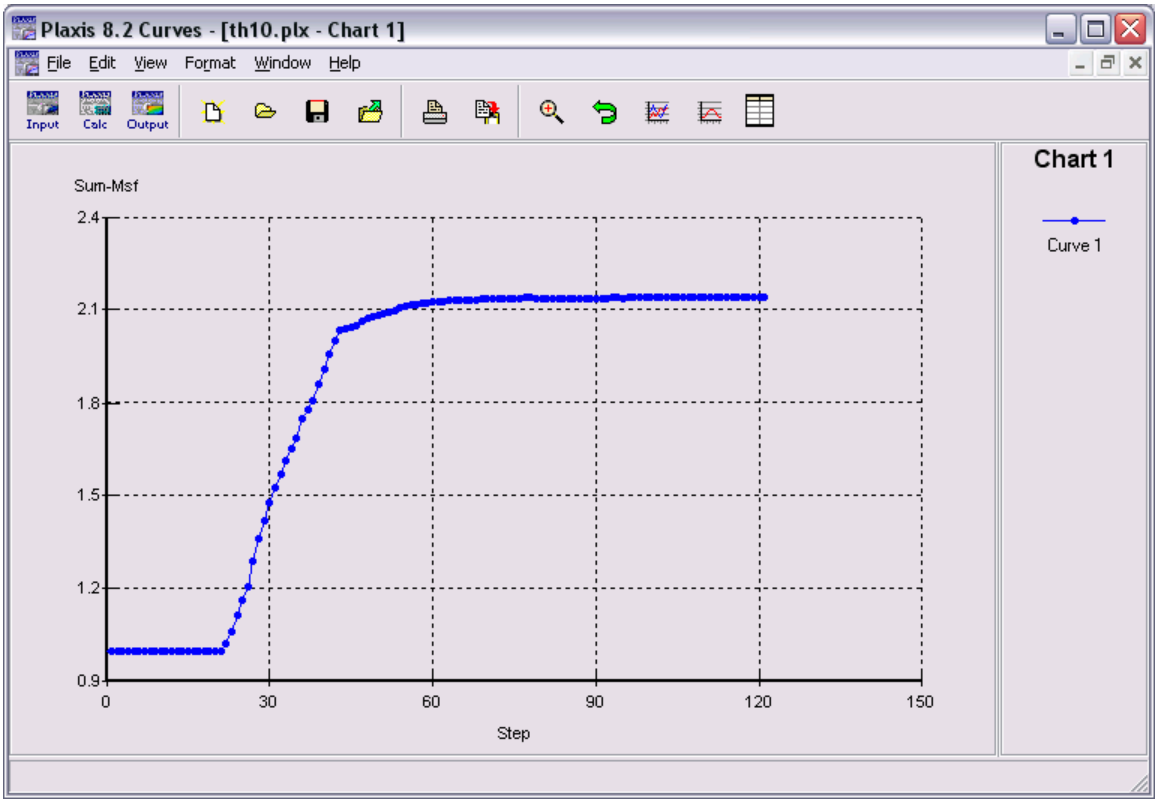
Kết quả phase cuối cùng





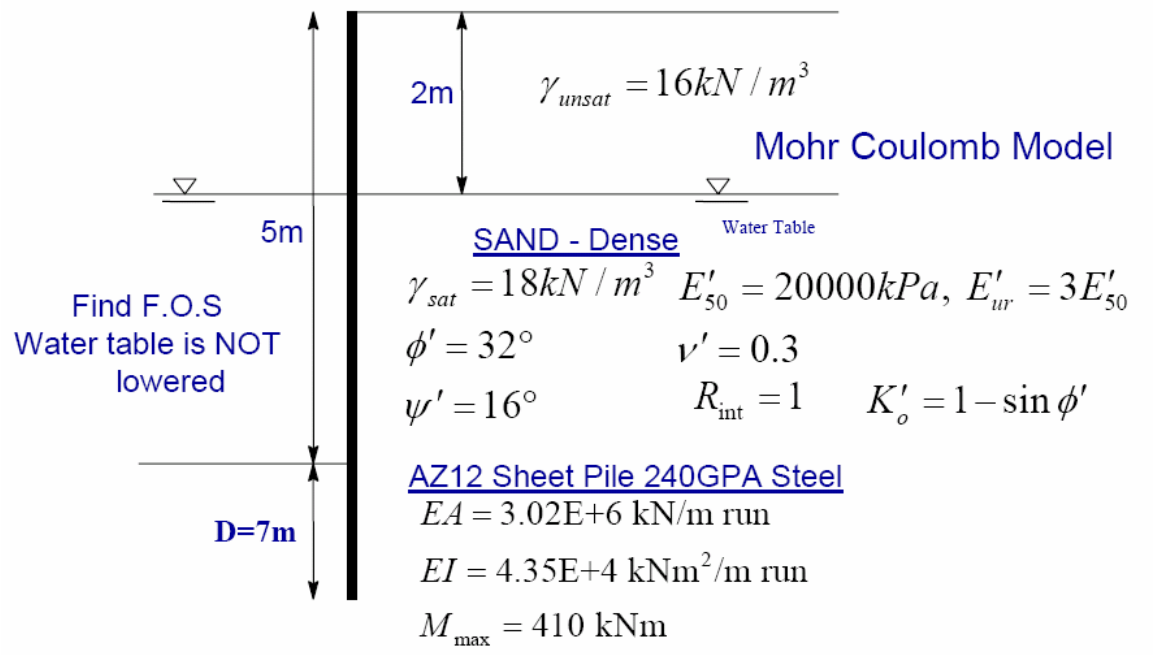
b. Anchored wall


Plaxis 8.2 Output - [th10.015]
File Edit View Geometry Deformations Stresses Window Help
Input Calc Curves
Arrows
-10.00 0.00 10.00 20.00 30.00 40.00
20.00
10.00
0.00
Deformed Mesh
Extreme total displacement 46.49*10 -3 m
(displacements scaled up 50.00 times)
(-5.600 , 17.300)
Plane strain


Plaxis 8.2 Curves - [th10.plx - Chart 1]
File Edit View Format Window Help
Input Calc Output
Chart 1
Curve 1
Sum-Msf
2.4
2.1
1.8
1.5
1.2
0.9
0
30
60
90
120
150
Step

Phần 11 : PLAXIS INPUT,CALCULATE SHEET PILE WALLS

Hardening Soil Model

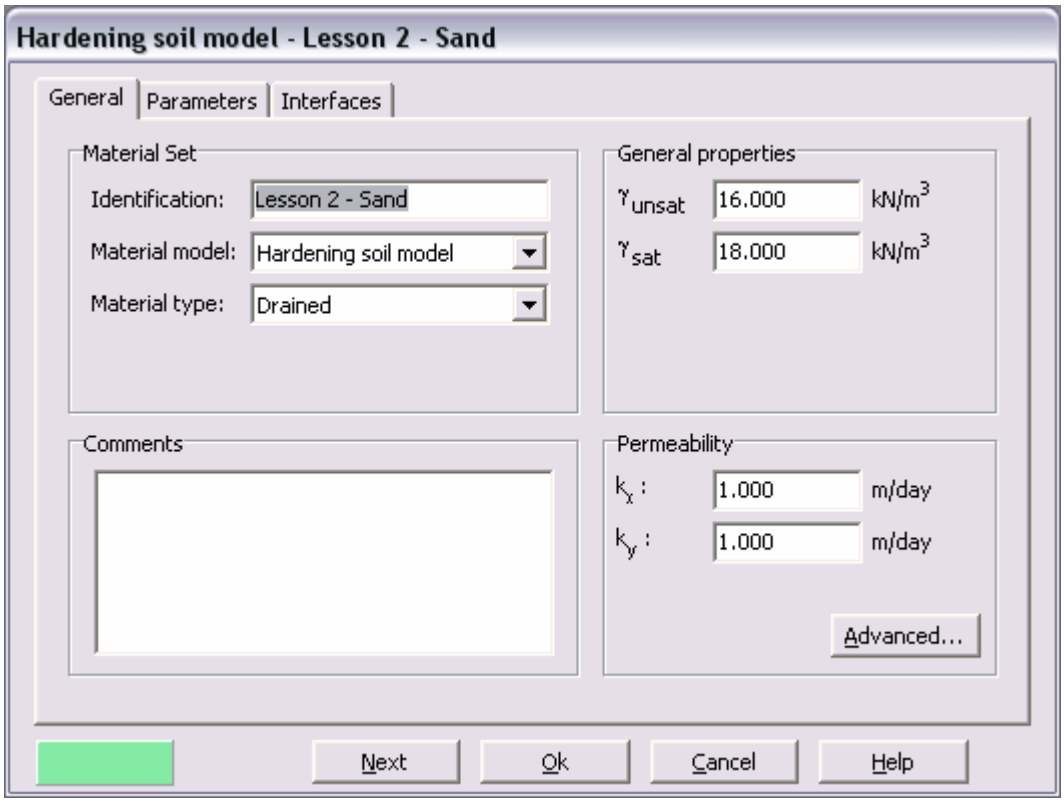


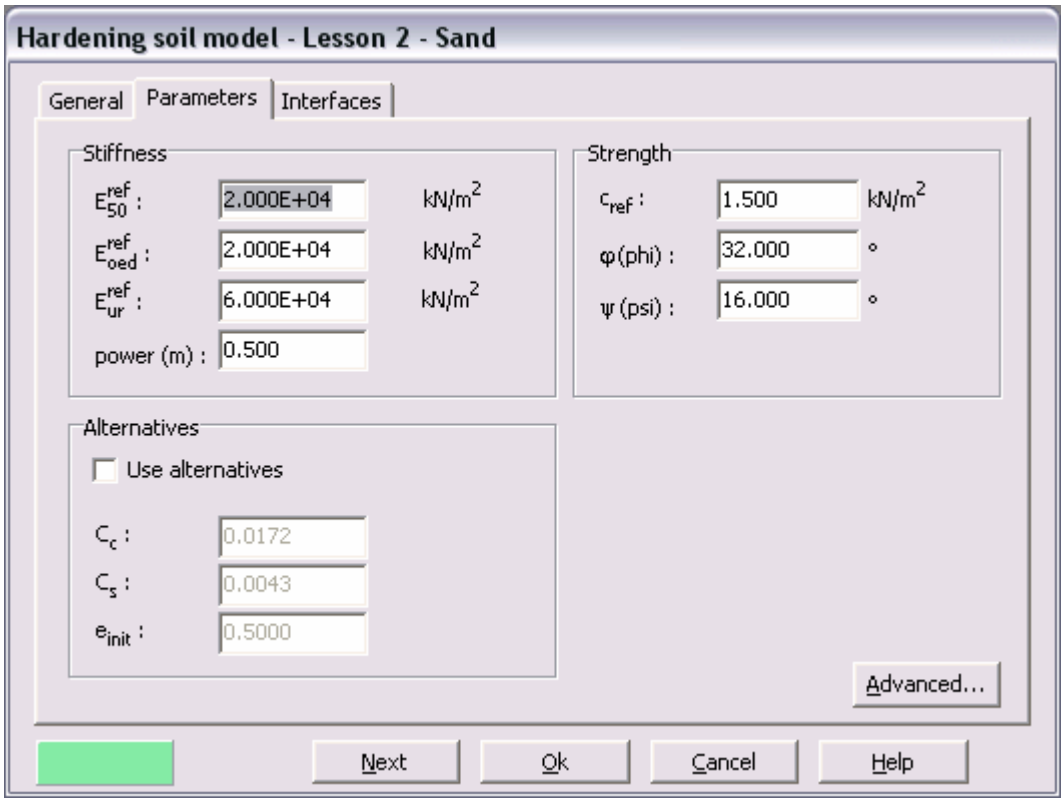
53. Tạo hình dạng bài toán

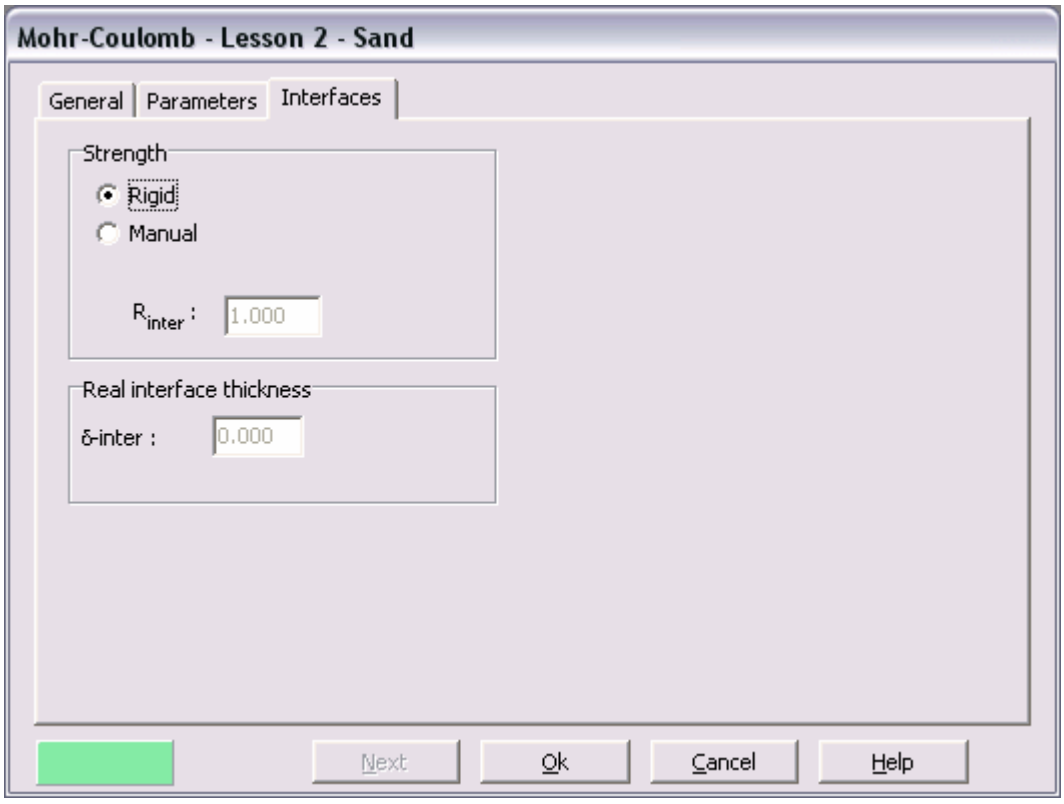
Vẽ tấm (Plate)

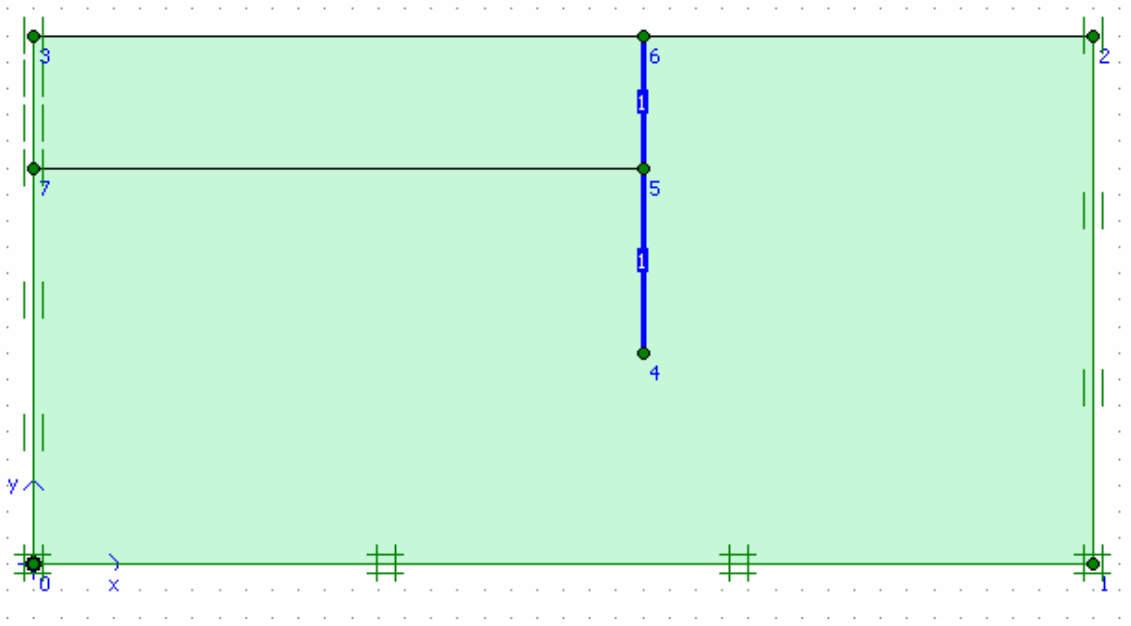
Gán biên

Gán số liệu địa chất

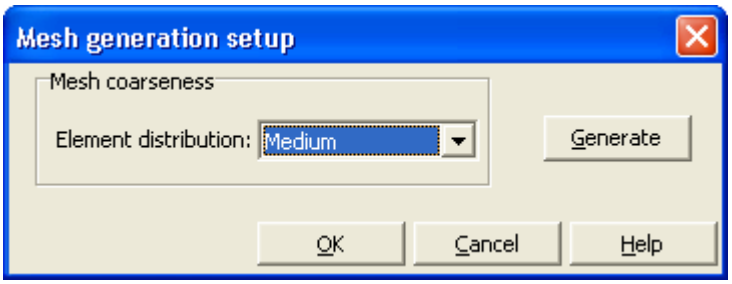

Hardening soil model - Lesson 2 - Sand
General
Parameters
Interfaces
Material Set
Identification:
Lesson 2 - Sand
Material model:
Hardening soil model
Material type:
Drained
General properties
γunsat
16.000
kN/m3
γsat
18.000
kN/m3
Comments
Permeability
kx :
1.000
m/day
ky :
1.000
m/day
Advanced...
Next
Ok
Cancel
Help

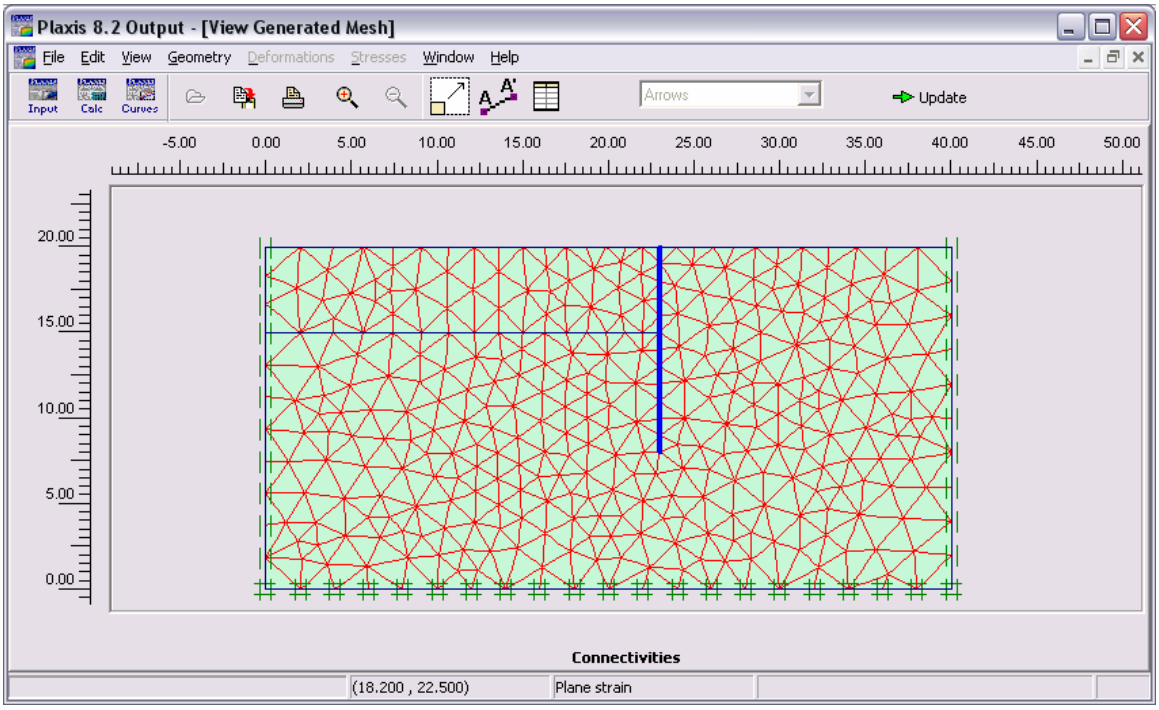

Hardening soil model - Lesson 2 - Sand
General
Parameters
Interfaces
Stiffness
E_{50}^{ref} : 2.000E+04 kN/m²
E_{oed}^{ref} : 2.000E+04 kN/m²
E_{ur}^{ref} : 6.000E+04 kN/m²
power (m) : 0.500
Strength
c_{ref} : 1.500 kN/m²
φ(phi) : 32.000 °
ψ (psi) : 16.000 °
Alternatives
Use alternatives
C_c : 0.0172
C_s : 0.0043
e_{init} : 0.5000
Advanced...
Next
Ok
Cancel
Help





54. Tạo lưới phần tử

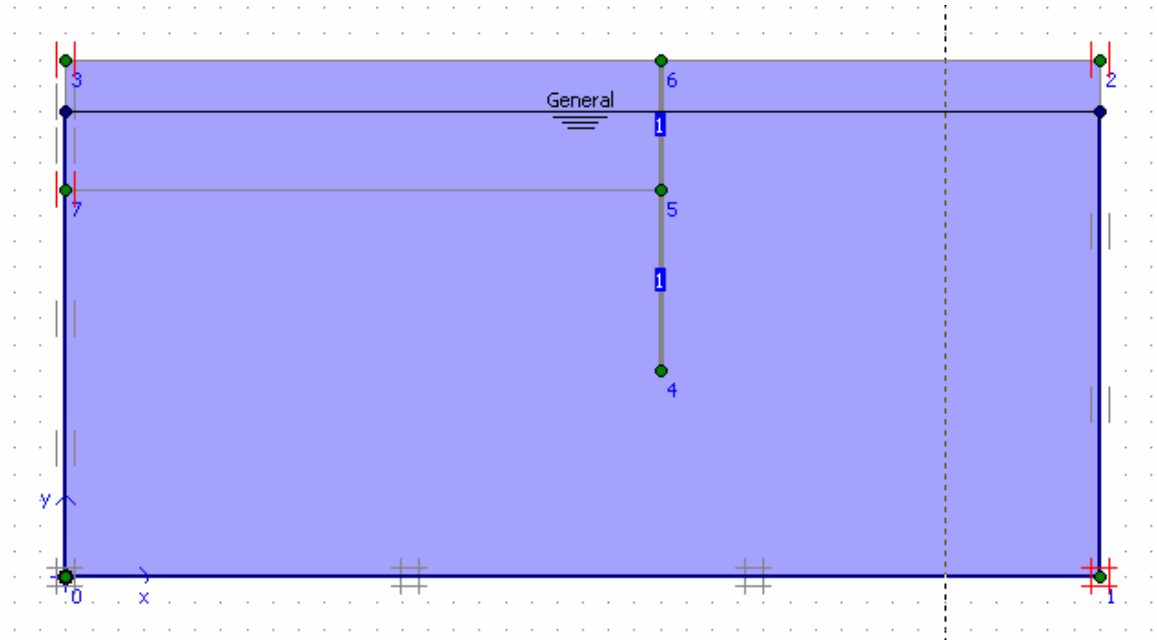




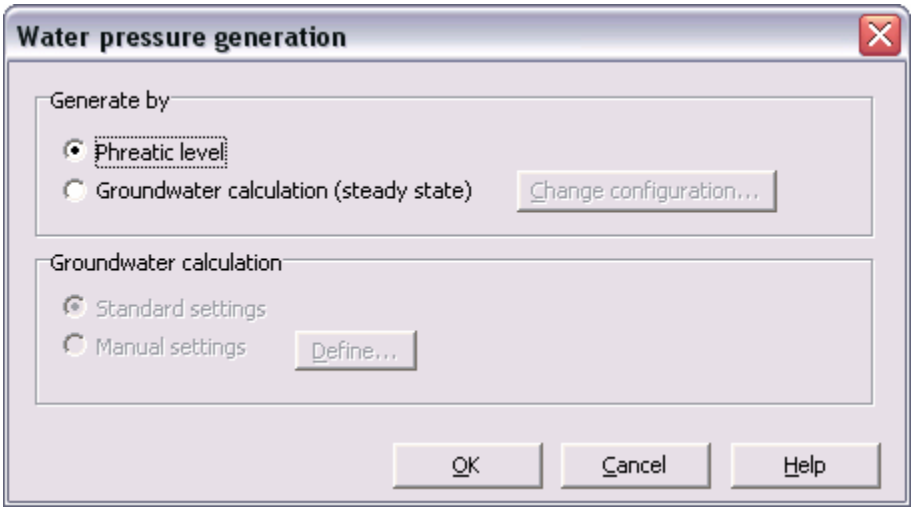
Update

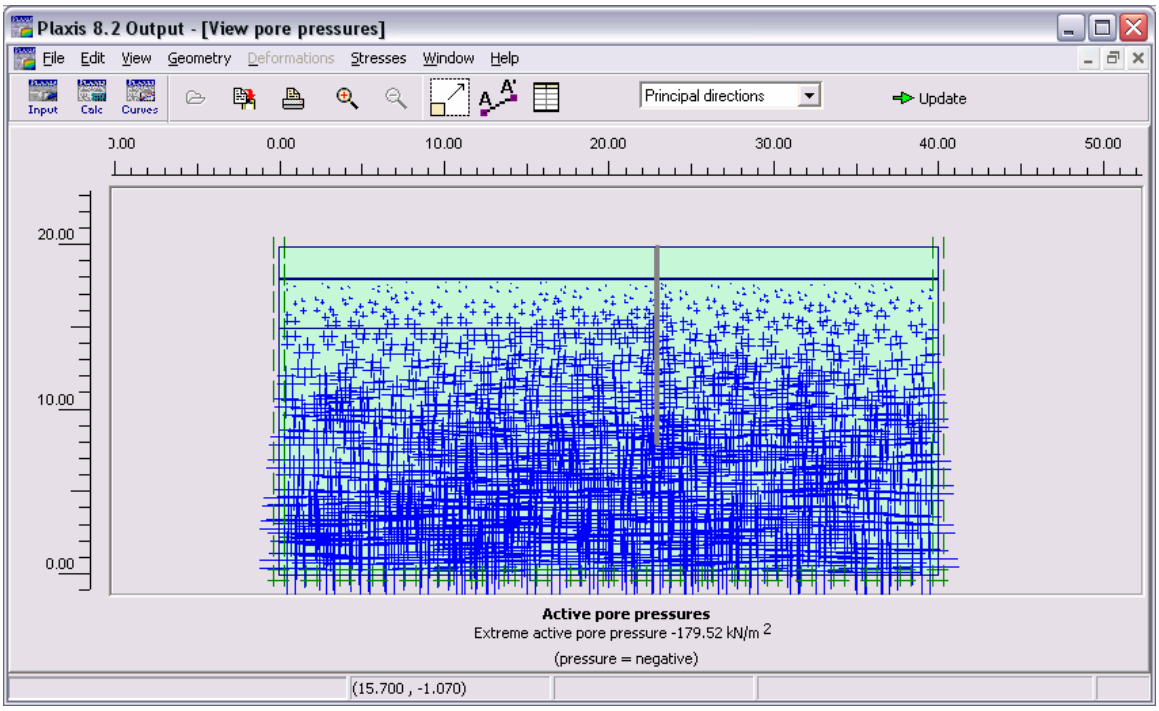
55. Tính toán điều kiện ban đầu

Gán mực nước ngầm

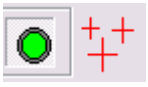


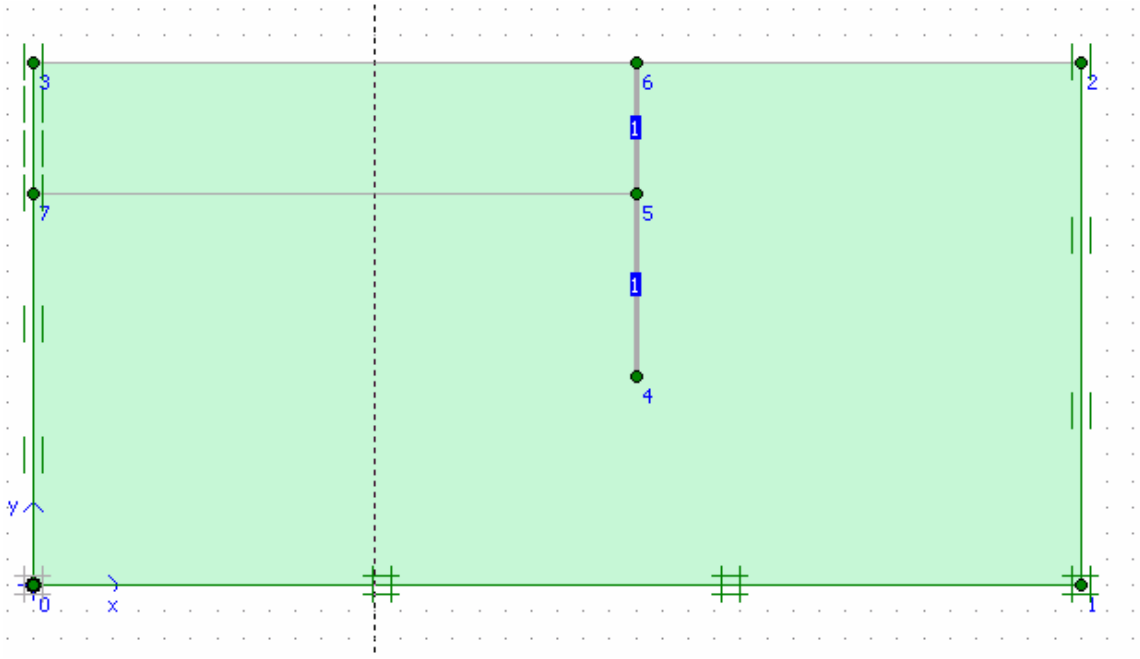
Tính toán áp lực nước 

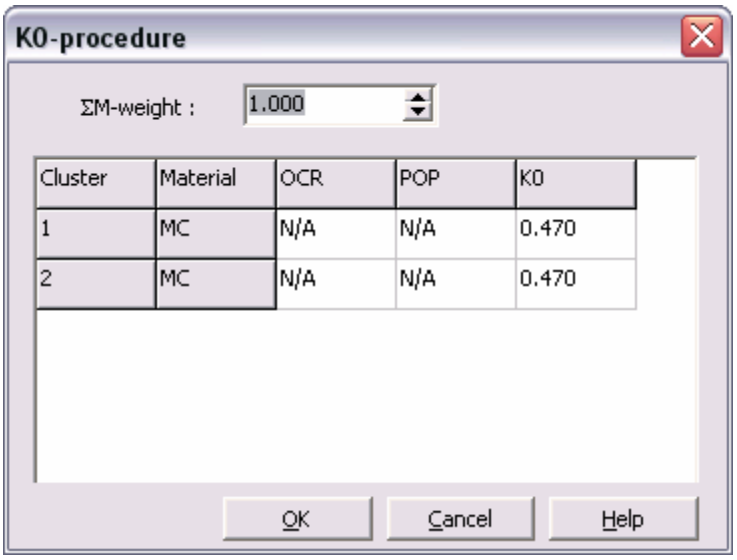


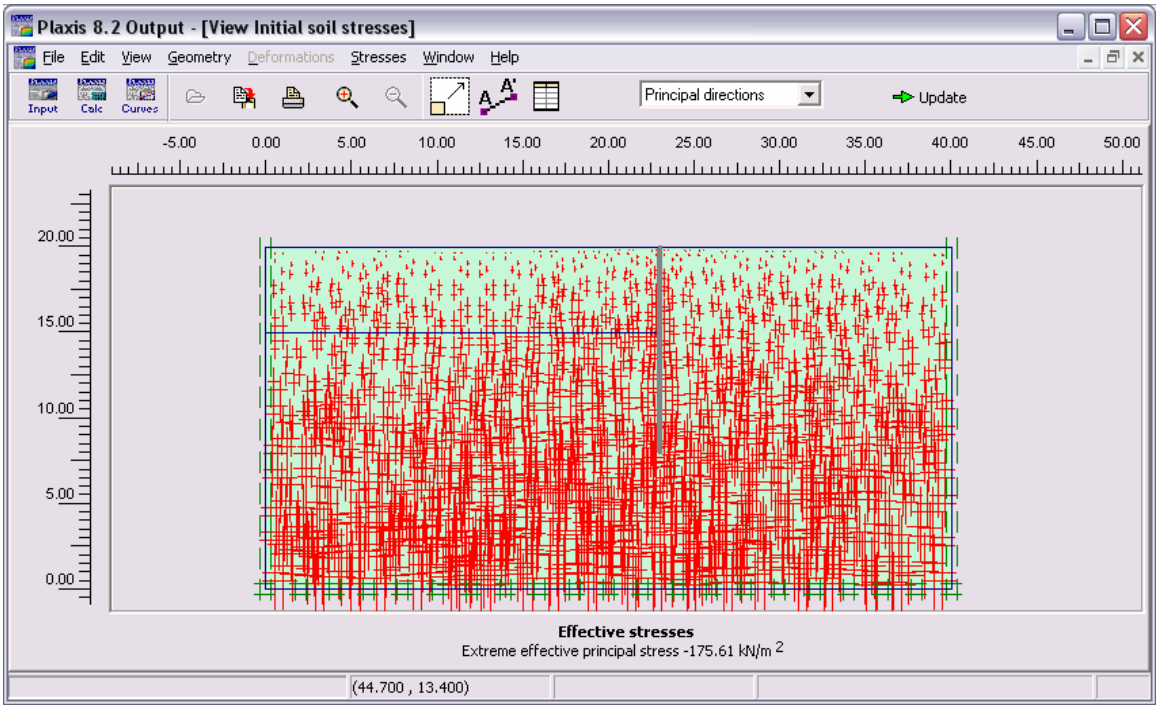


Update

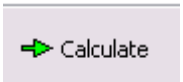
Tính toán áp lực đất 

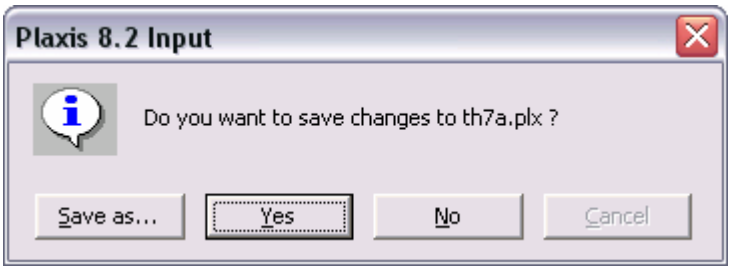






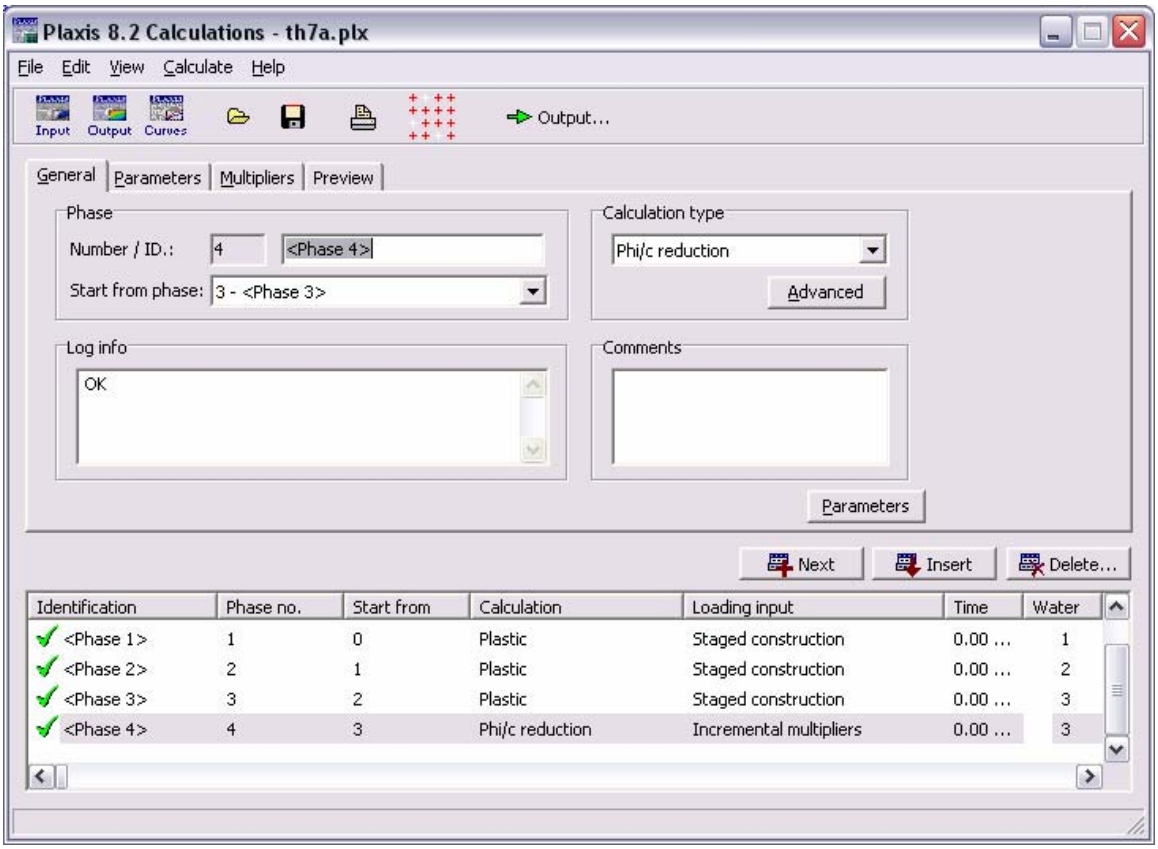
Update

56. Bắt đầu tính toán 

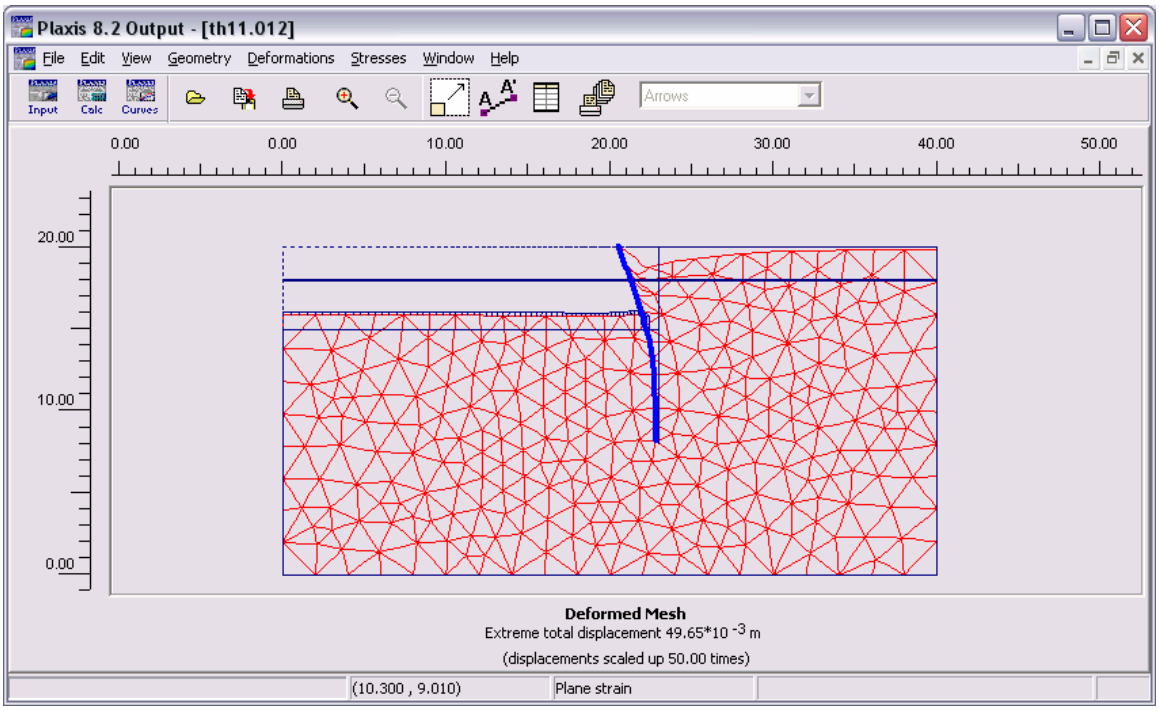


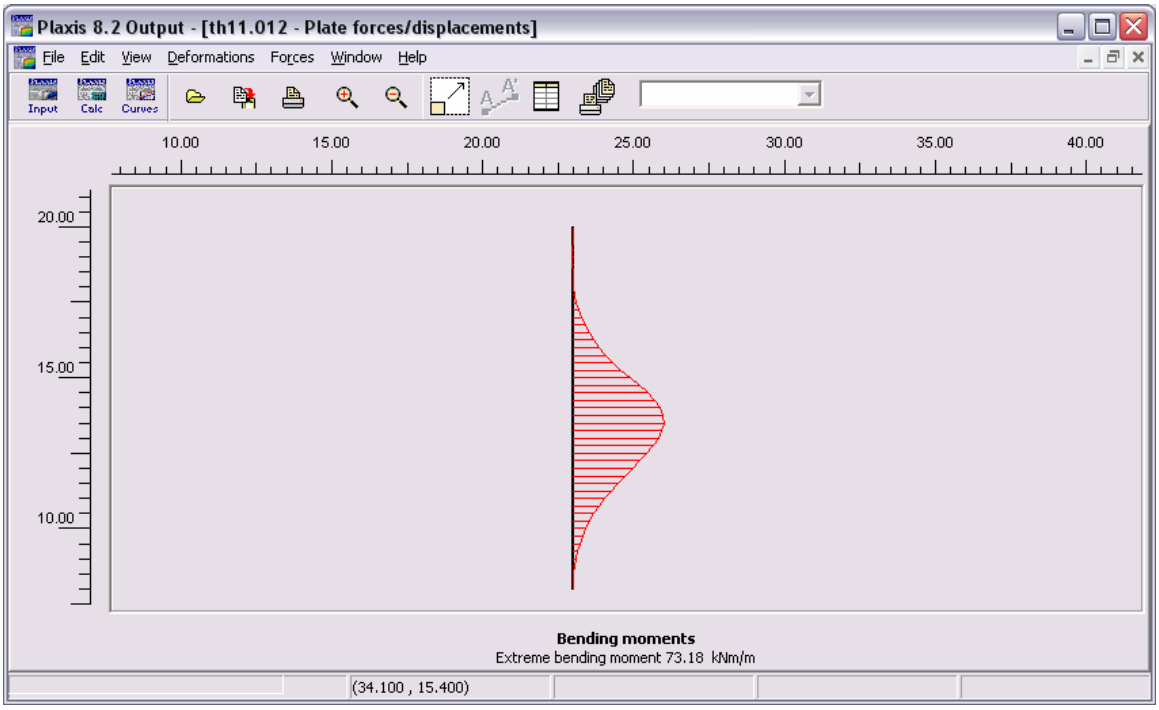
Tính toán cho 4 phase :

21. Ban đầu
22. Có sheet pile
23. Bỏ đất
24. Tính ổn định Phi/C

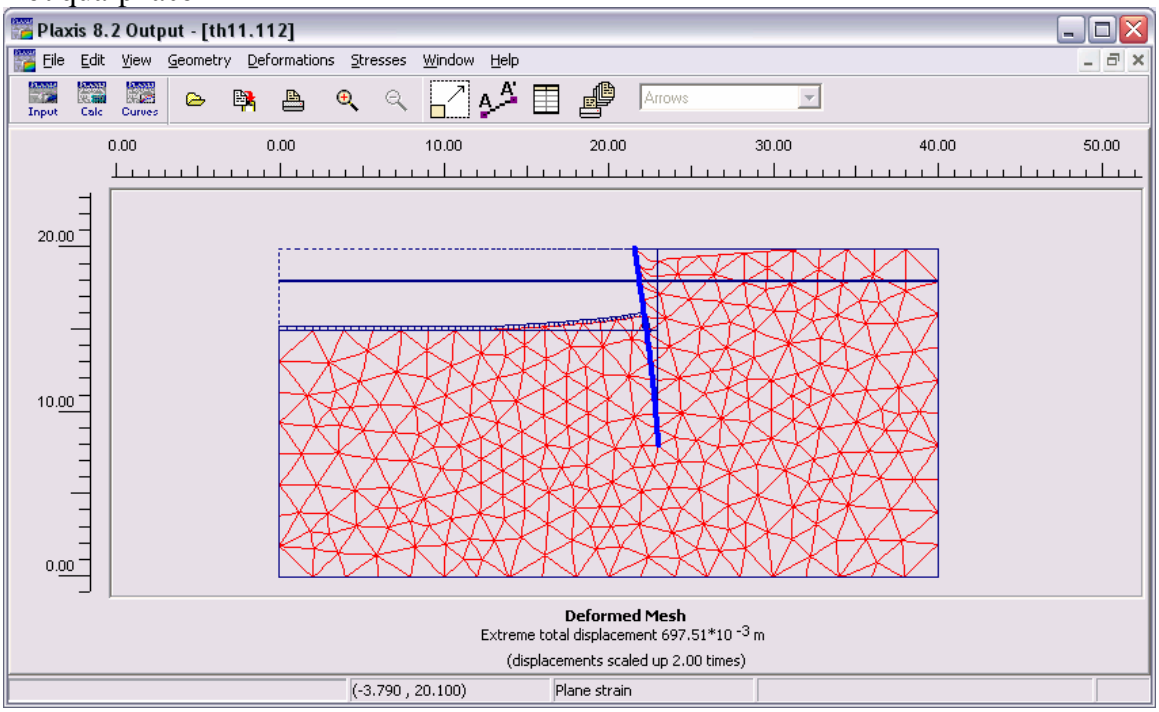


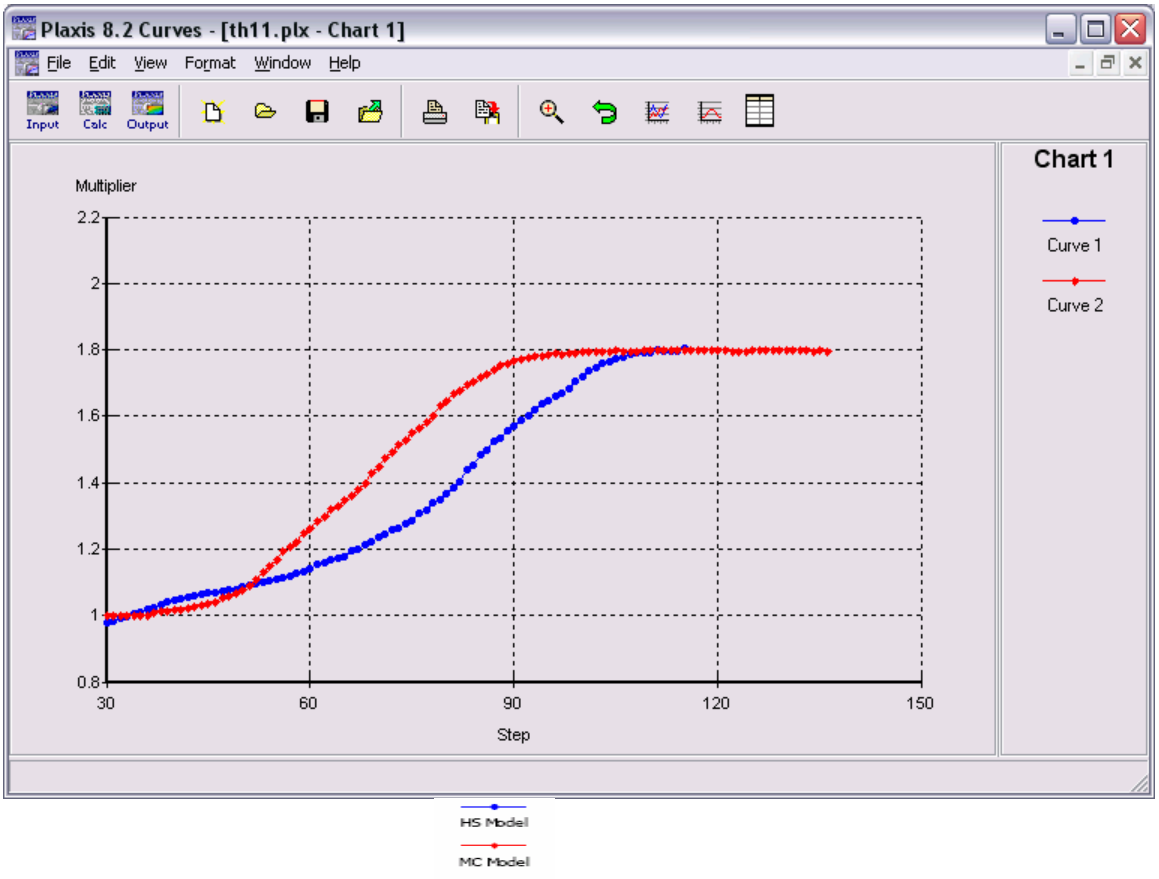
Kết quả phase 3


Plaxis 8.2 Output - [th11.012]
File Edit View Geometry Deformations Stresses Window Help
Input Calc Curves
Arrows
0.00 0.00 10.00 20.00 30.00 40.00 50.00
20.00
10.00
0.00
Deformed Mesh
Extreme total displacement 49.65*10 -3 m
(displacements scaled up 50.00 times)
(10.300 , 9.010)
Plane strain


Plaxis 8.2 Output - [th11.012 - Plate forces/displacements]
File Edit View Deformations Forces Window Help
Input Calc Curves
10.00 15.00 20.00 25.00 30.00 35.00 40.00
20.00
15.00
10.00
Bending moments
Extreme bending moment 73.18 kNm/m
(34.100 , 15.400)

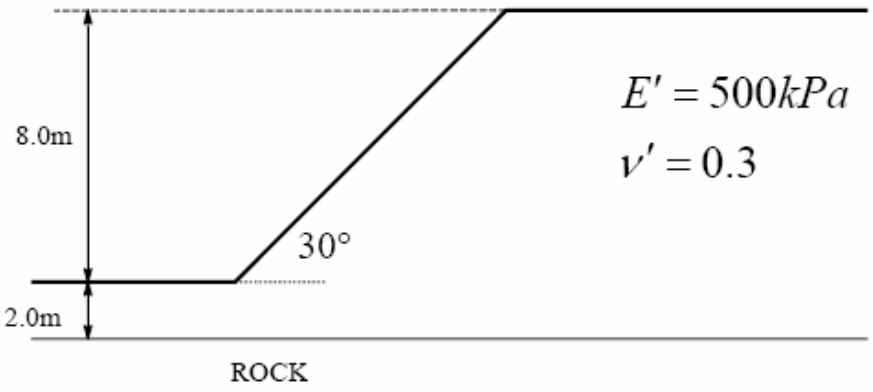
Kết quả phase 4





Phần 12 : PLAXIS INPUT,CALCULATE SLOPE STABILITY

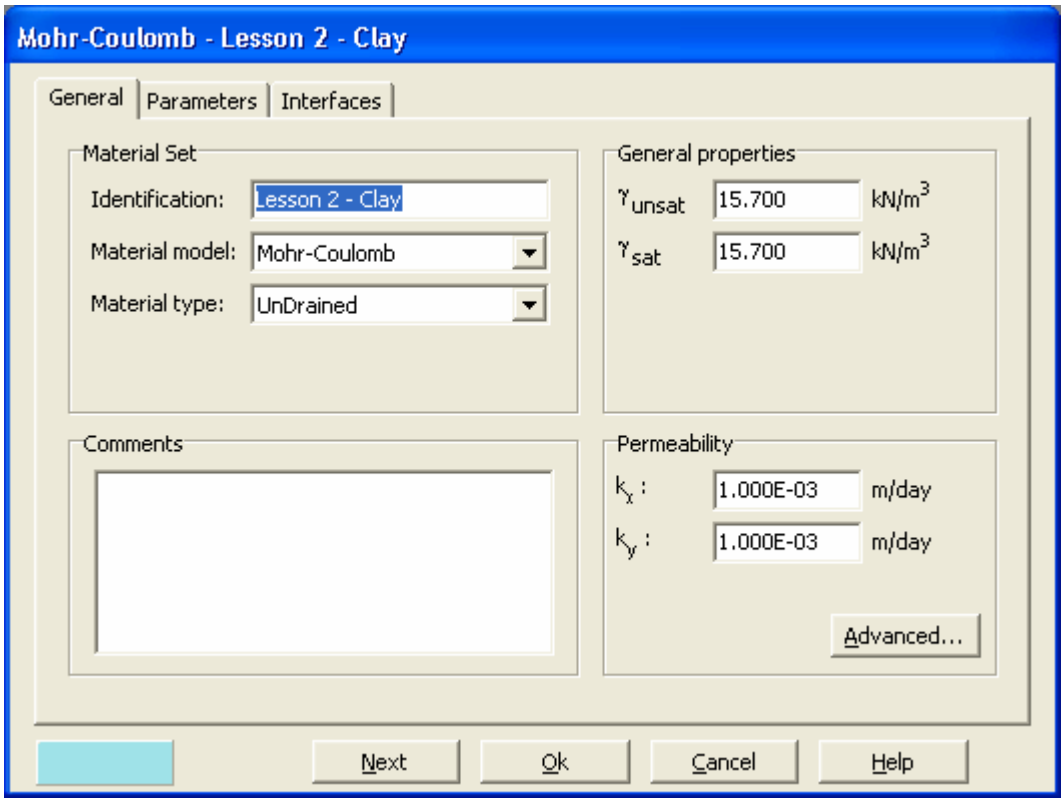
A slope has an inclination of 30° and is 8 m high. The soil properties are $c_u = 50kPa$, $\phi_u = 0°$, $\gamma_{sat} = 15.7kN/m^3$. Determine the short term factor of safety if the clay deposit overlies rock which lies 2 m below the base of the slope.

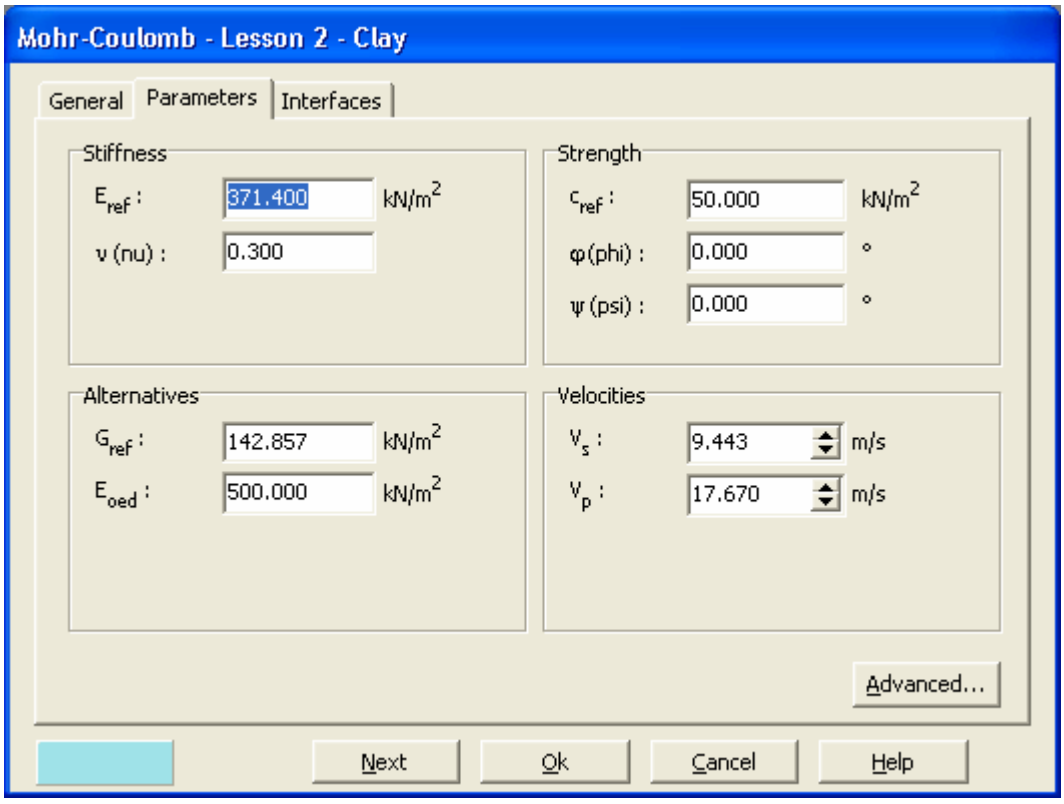


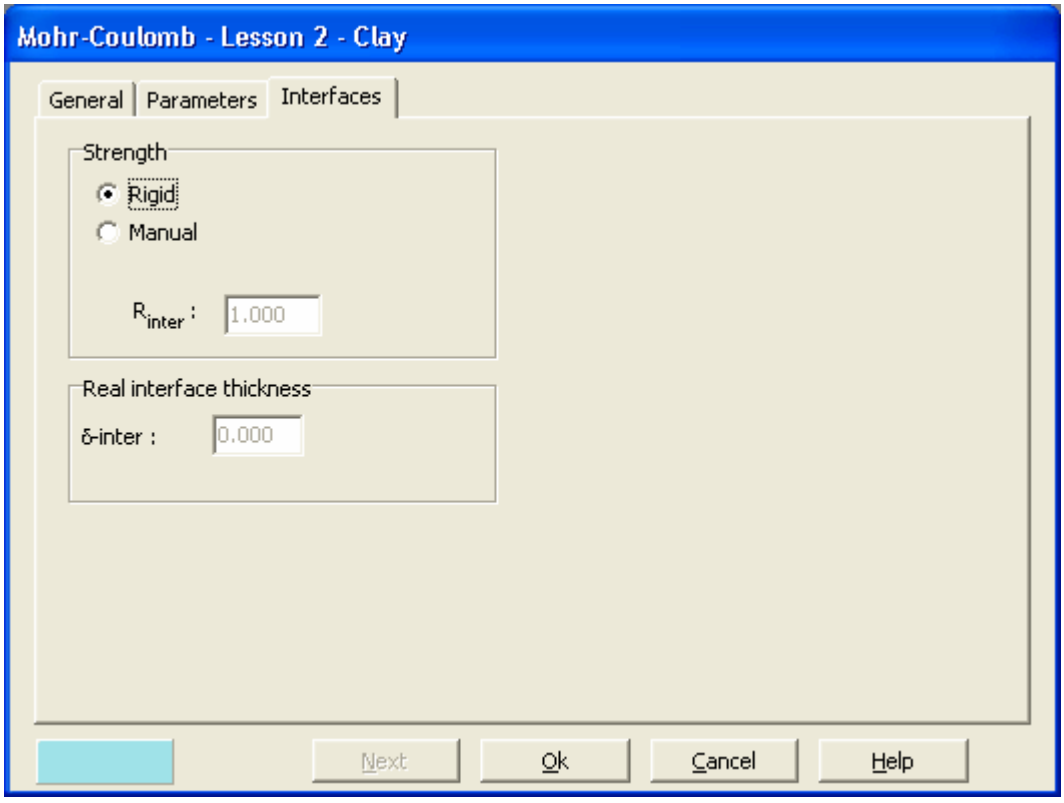
57. Tạo hình dạng bài toán

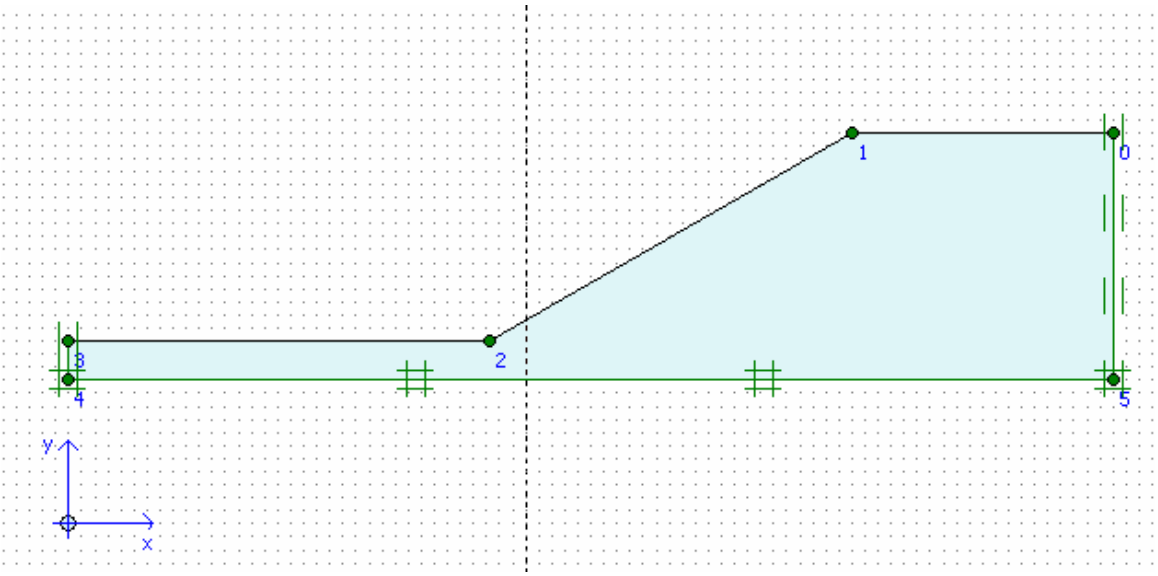
Gán biên 

Gán số liệu địa chất 

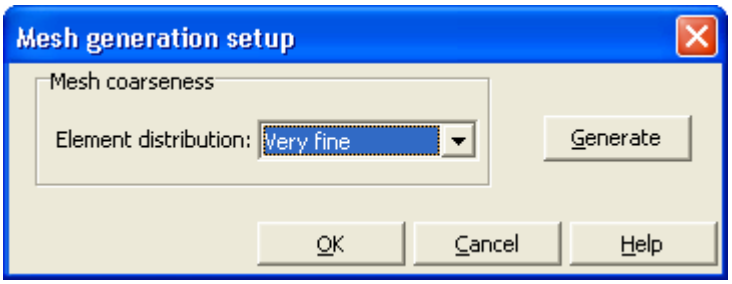

Mohr-Coulomb - Lesson 2 - Clay
General
Parameters
Interfaces
Material Set
Identification:
Lesson 2 - Clay
Material model:
Mohr-Coulomb
Material type:
UnDrained
General properties
γunsat
15.700
kN/m3
γsat
15.700
kN/m3
Comments
Permeability
kx :
1.000E-03
m/day
ky :
1.000E-03
m/day
Advanced...
Next
Ok
Cancel
Help

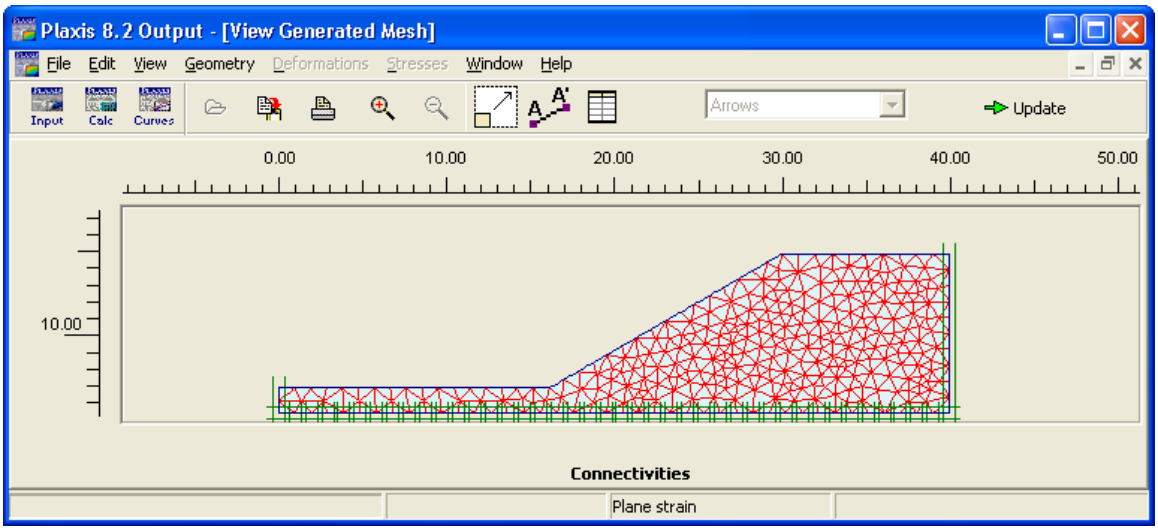

Mohr-Coulomb - Lesson 2 - Clay
General
Parameters
Interfaces
Stiffness
E ref : 371.400 kN/m2
ν (nu) : 0.300
Strength
c ref : 50.000 kN/m2
φ (phi) : 0.000 °
ψ (psi) : 0.000 °
Alternatives
G ref : 142.857 kN/m2
E oed : 500.000 kN/m2
Velocities
V s : 9.443 m/s
V p : 17.670 m/s
Advanced...
Next
Ok
Cancel
Help


Mohr-Coulomb - Lesson 2 - Clay
General
Parameters
Interfaces
Strength
Rigid
Manual
R inter : 1.000
Real interface thickness
δ-inter : 0.000
Next
Ok
Cancel
Help



58. Tạo lưới phần tử

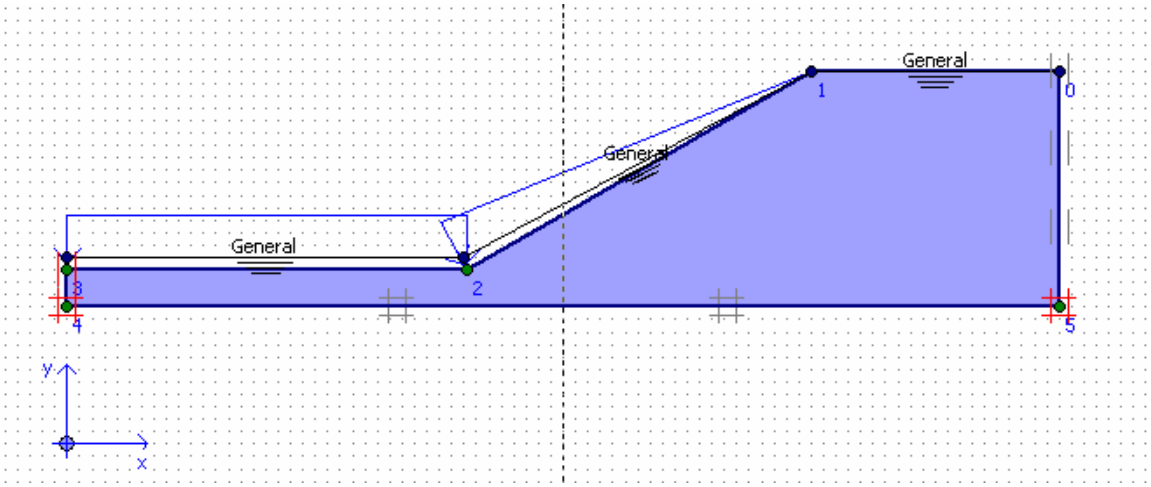




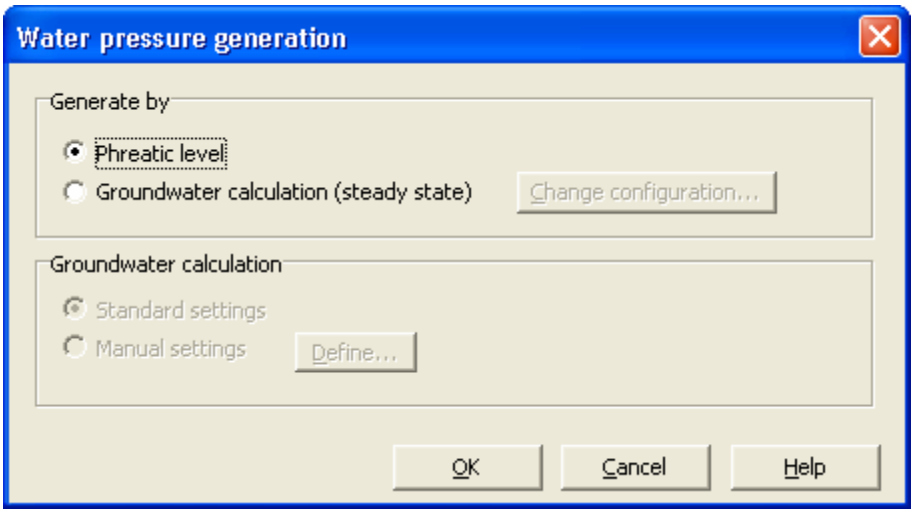
Update

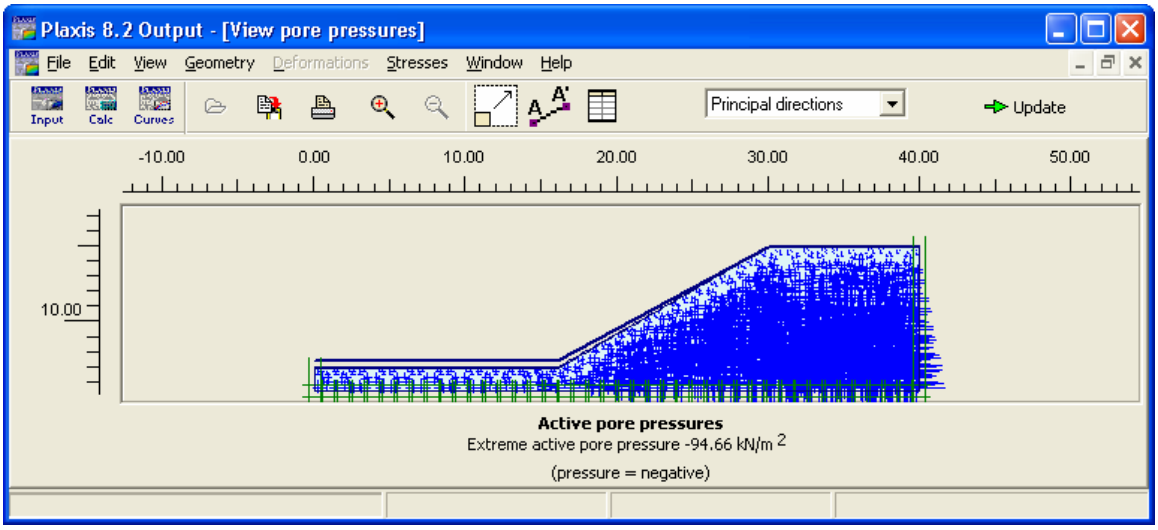
59. Tính toán điều kiện ban đầu

Gán mực nước ngầm

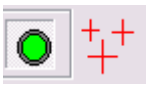


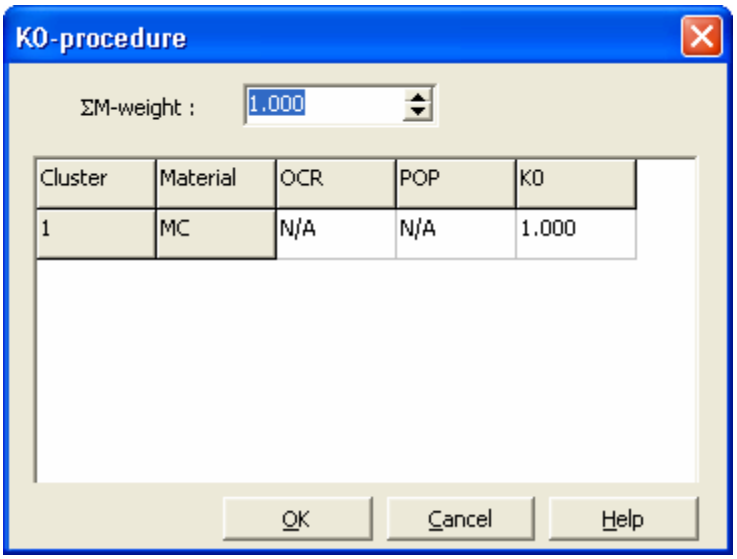
Tính toán áp lực nước 

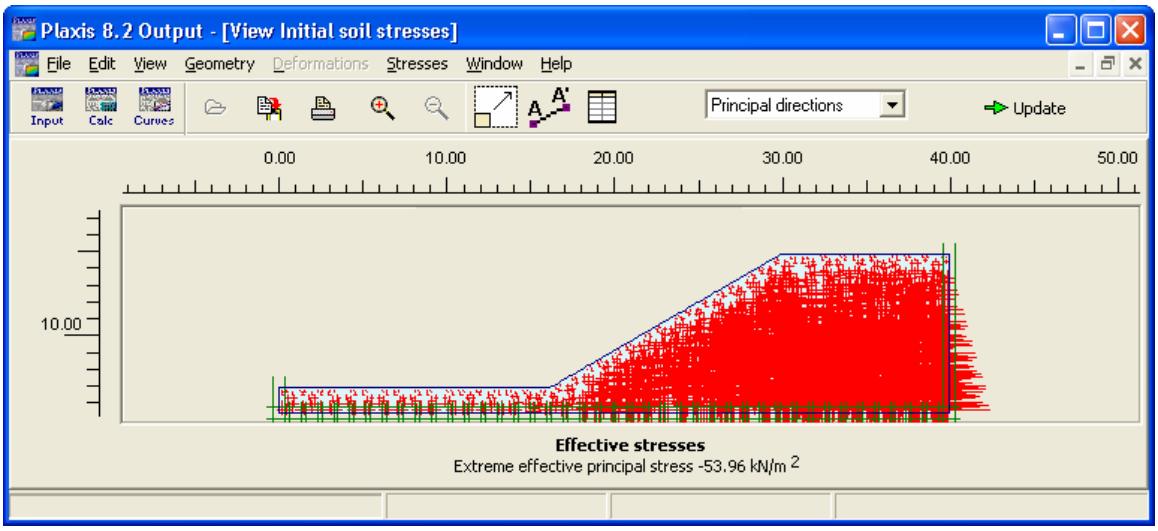

Water pressure generation
Generate by
Phreatic level
Groundwater calculation (steady state)
Change configuration...
Groundwater calculation
Standard settings
Manual settings
Define...
OK
Cancel
Help


Plaxis 8.2 Output - [View pore pressures]
File Edit View Geometry Deformations Stresses Window Help
Input Calc Curves
Principal directions
Update
-10.00 0.00 10.00 20.00 30.00 40.00 50.00
10.00
Active pore pressures
Extreme active pore pressure -94.66 kN/m 2
(pressure = negative)

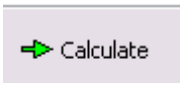
Update

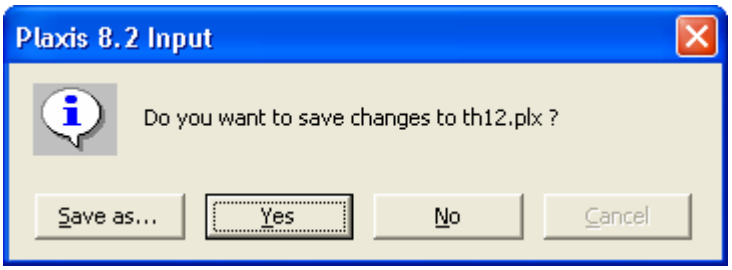
Tính toán áp lực đất 





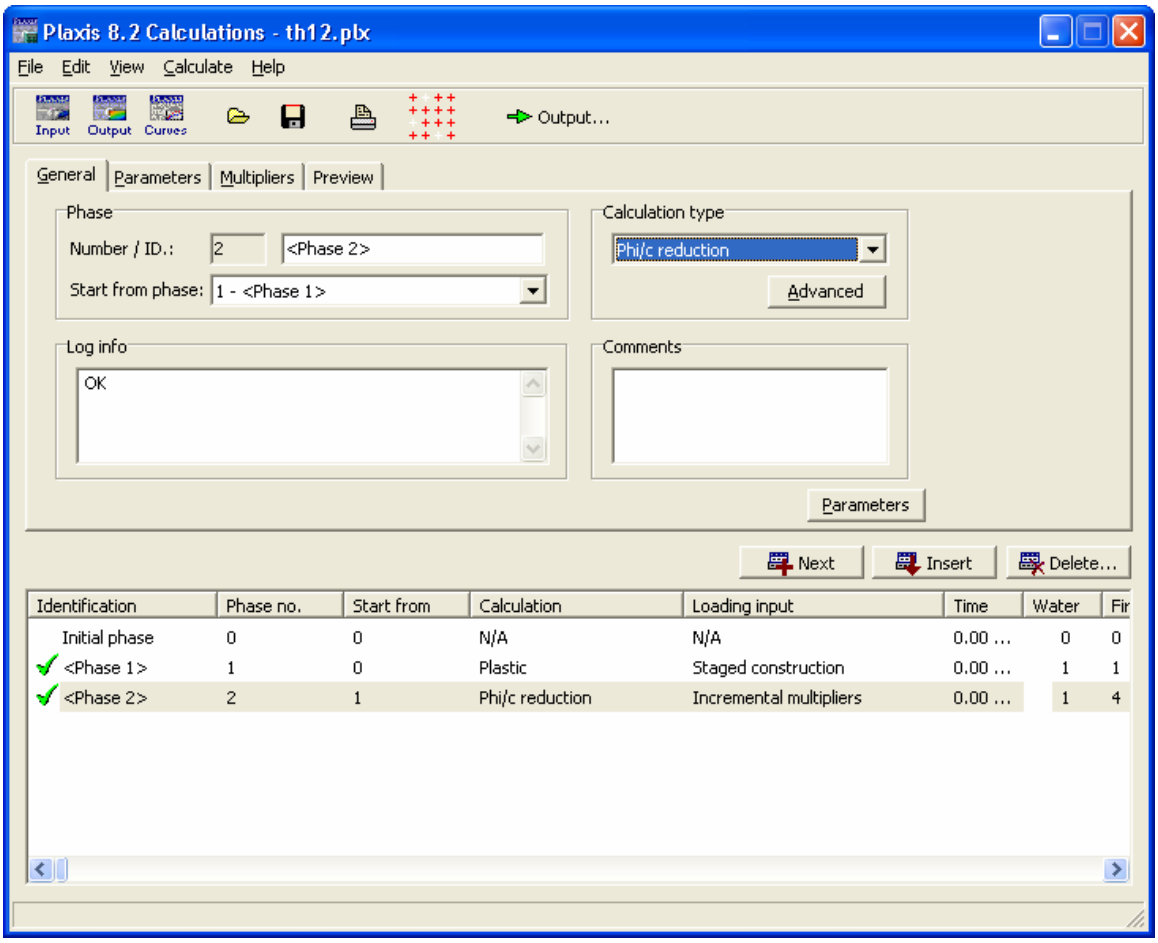
Update

60. Bắt đầu tính toán 

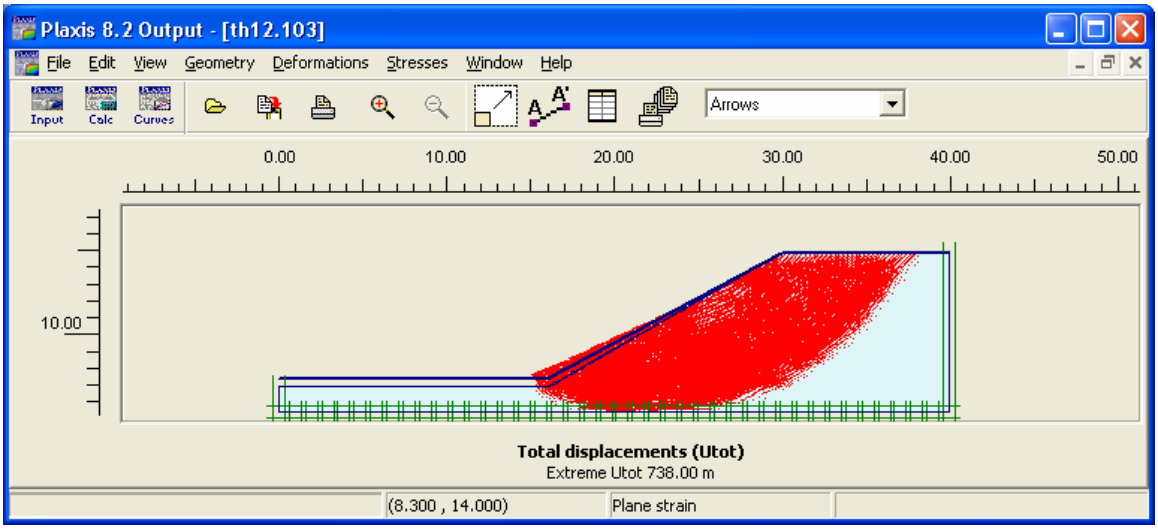


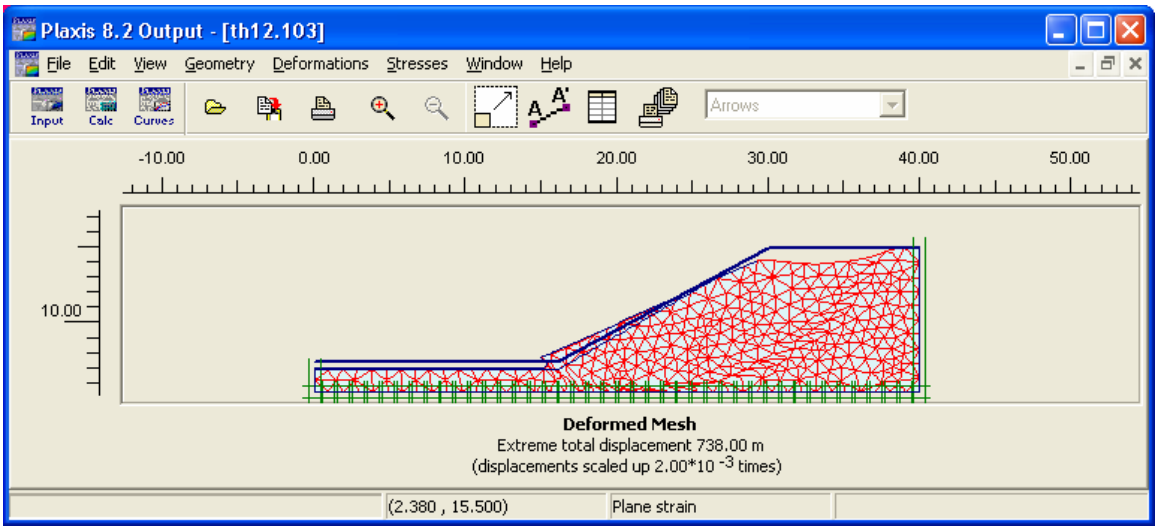
Tính toán cho 3 phase :

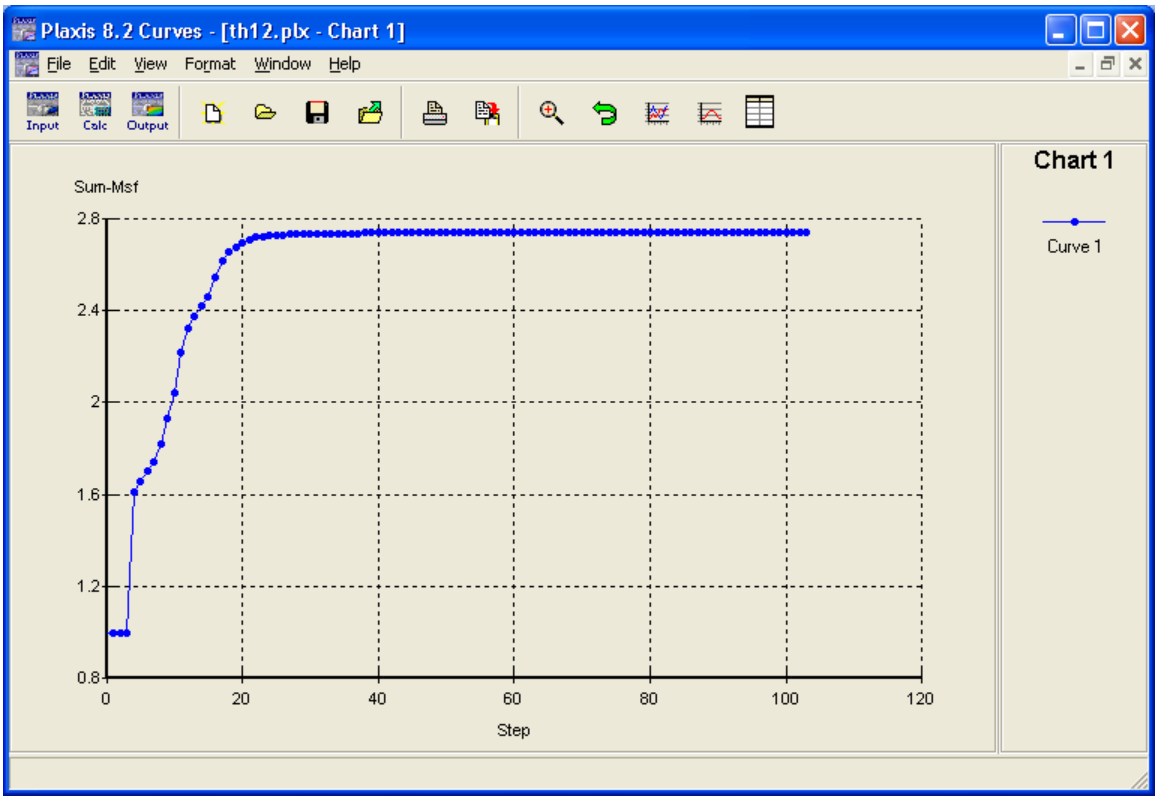
25. Ban đầu
26. Tính trọng lượng bản thân
27. Tính ổn định mái dốc



Kết quả phase cuối cùng

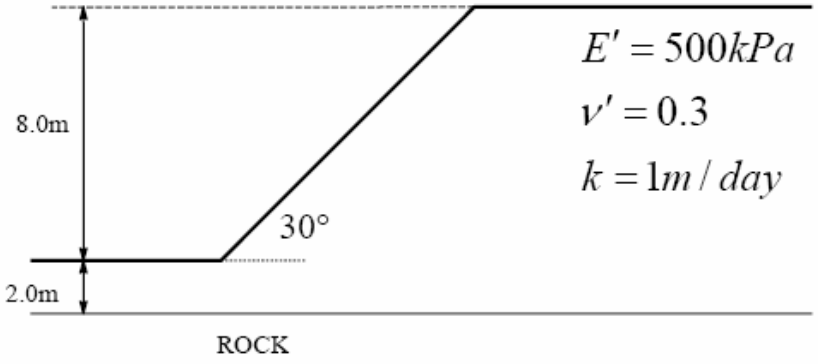



Plaxis 8.2 Output - [th12.103]
File Edit View Geometry Deformations Stresses Window Help
Input Calc Curves
Arrows
-10.00 0.00 10.00 20.00 30.00 40.00 50.00
10.00
Deformed Mesh
Extreme total displacement 738.00 m
(displacements scaled up 2.00*10 -3 times)
(2.380 , 15.500)
Plane strain


Plaxis 8.2 Curves - [th12.plx - Chart 1]
File Edit View Format Window Help
Input Calc Output
Sum-Msf
2.8
2.4
2
1.6
1.2
0.8
0 20 40 60 80 100 120
Step
Chart 1
Curve 1

Phần 13 : PLAXIS INPUT,CALCULATE SLOPE STABILITY

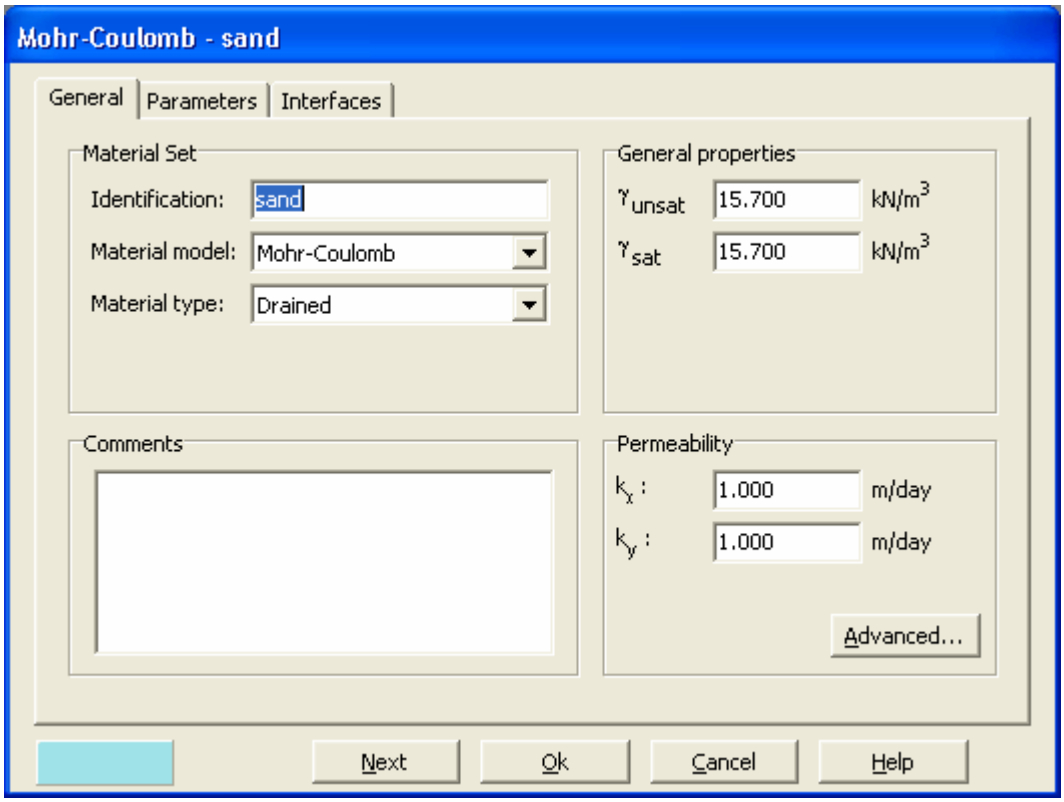
A slope has an inclination of 30° and is 8 m high. The soil properties are $c' = 25kPa$, $\phi' = 40°, \psi' = 12°$, $\gamma_{sat} = 15.7kN/m^3$. Determine the long term factor of safety if the clay deposit overlies rock which lies 2 m below the base of the slope. The water table follows the slope and you must perform a steady state groundwater flow calculation.

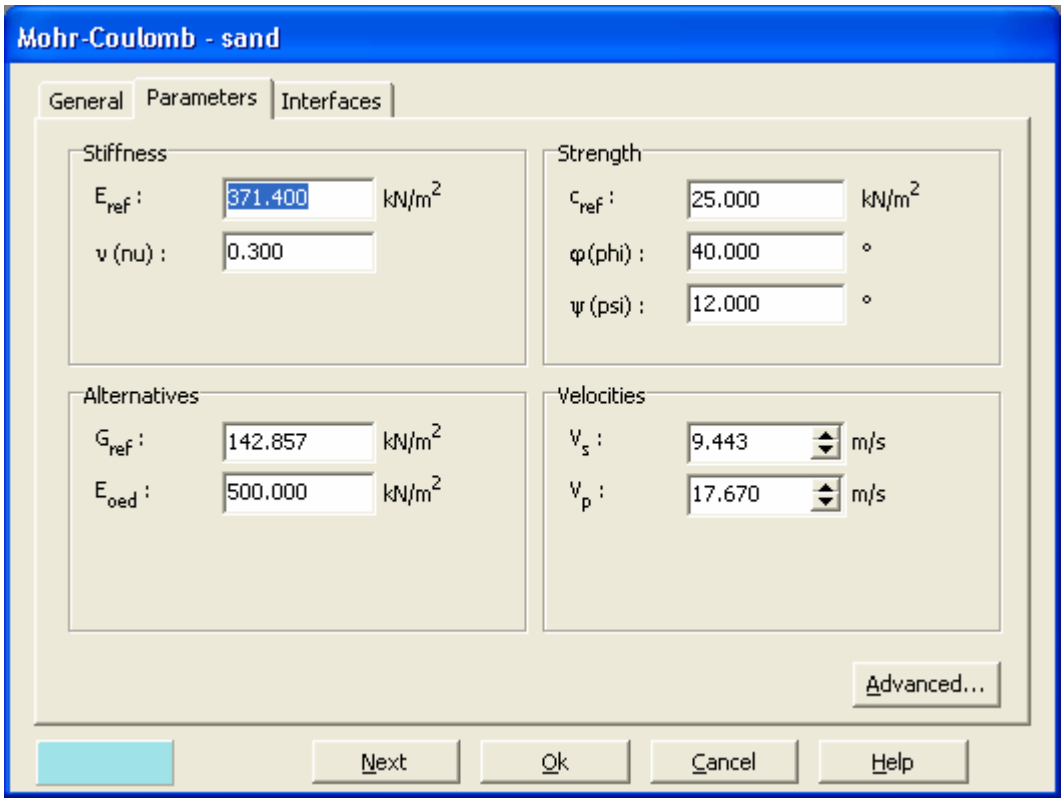


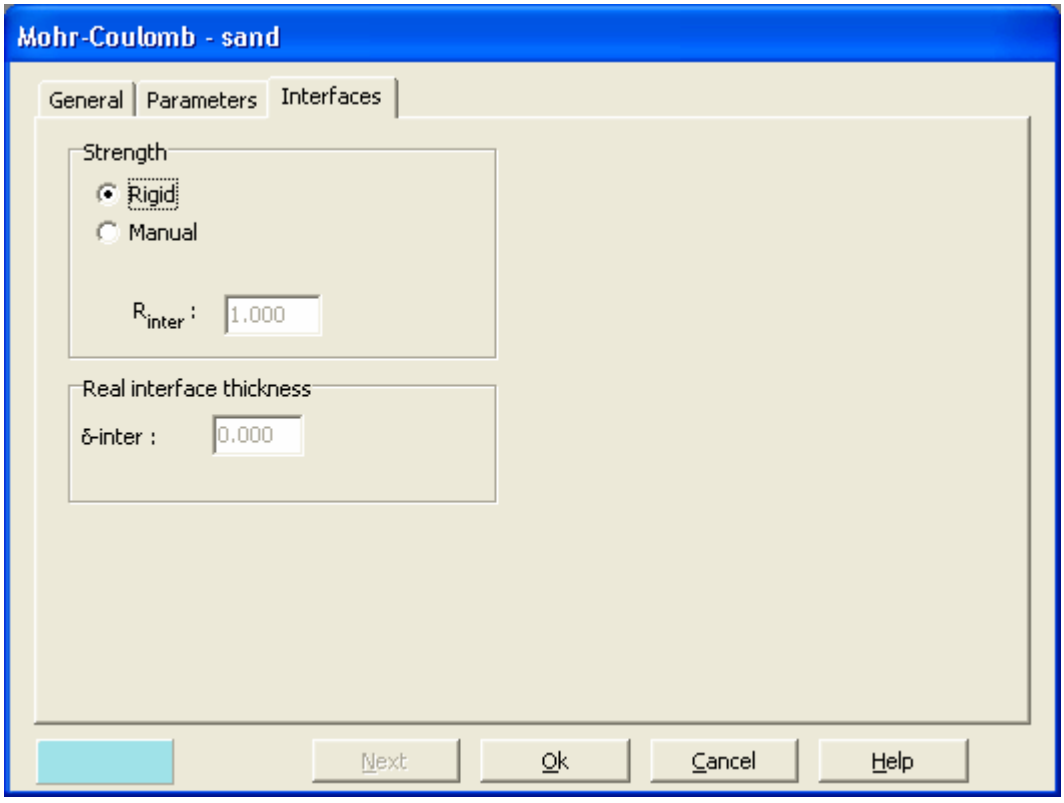
61. Tạo hình dạng bài toán

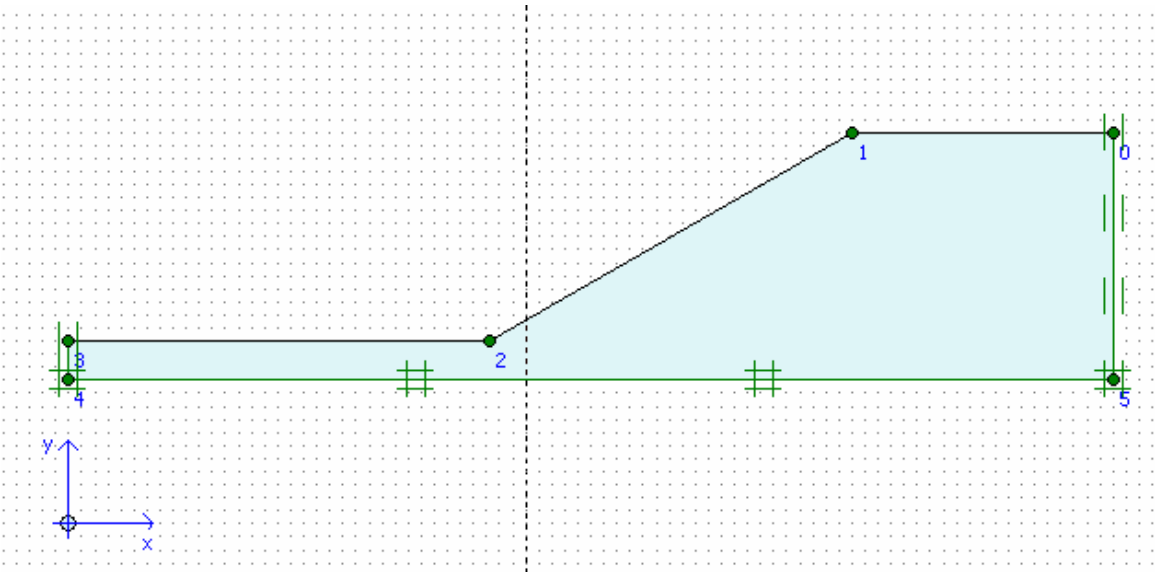
Gán biên 

Gán số liệu địa chất 

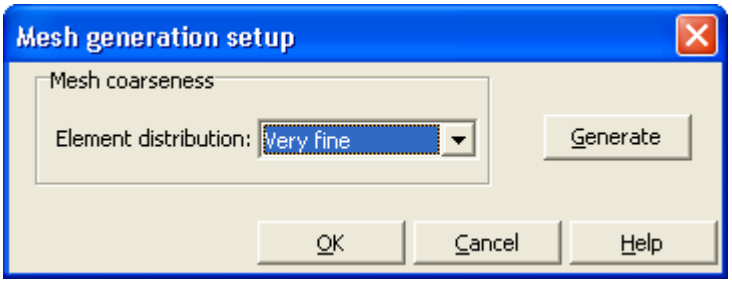

Mohr-Coulomb - sand
General
Parameters
Interfaces
Material Set
Identification:
sand
Material model:
Mohr-Coulomb
Material type:
Drained
General properties
γunsat
15.700
kN/m3
γsat
15.700
kN/m3
Comments
Permeability
kx :
1.000
m/day
ky :
1.000
m/day
Advanced...
Next
Ok
Cancel
Help

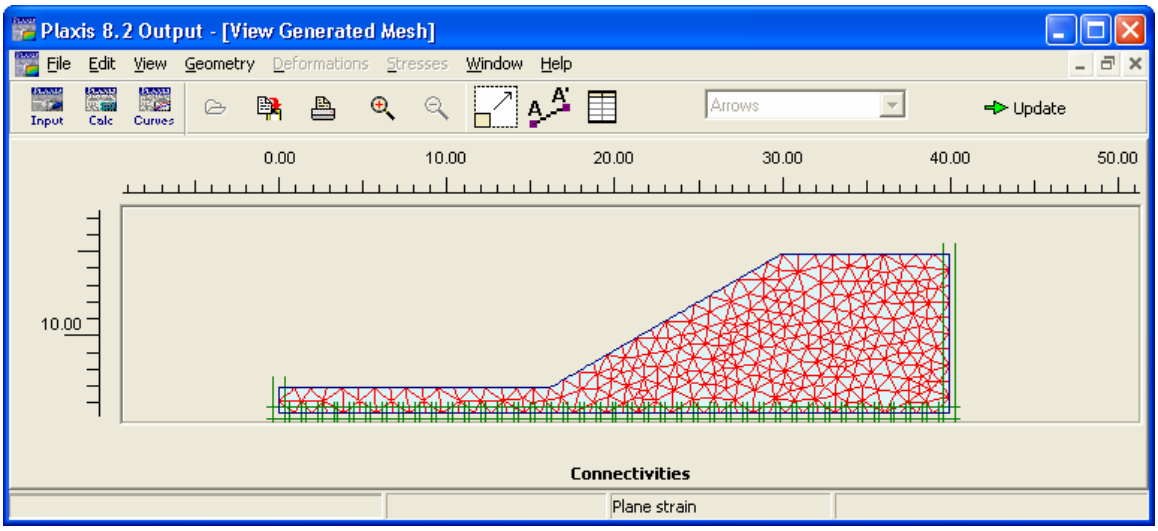

Mohr-Coulomb - sand
General
Parameters
Interfaces
Stiffness
E_{ref} : 371.400 kN/m^2
ν (nu) : 0.300
Strength
c_{ref} : 25.000 kN/m^2
φ(phi) : 40.000 °
ψ (psi) : 12.000 °
Alternatives
G_{ref} : 142.857 kN/m^2
E_{oed} : 500.000 kN/m^2
Velocities
V_s : 9.443 m/s
V_p : 17.670 m/s
Advanced...
Next
Ok
Cancel
Help


Mohr-Coulomb - sand
General
Parameters
Interfaces
Strength
Rigid
Manual
R_{inter} : 1.000
Real interface thickness
δ-inter : 0.000
Next
Ok
Cancel
Help



62. Tạo lưới phần tử

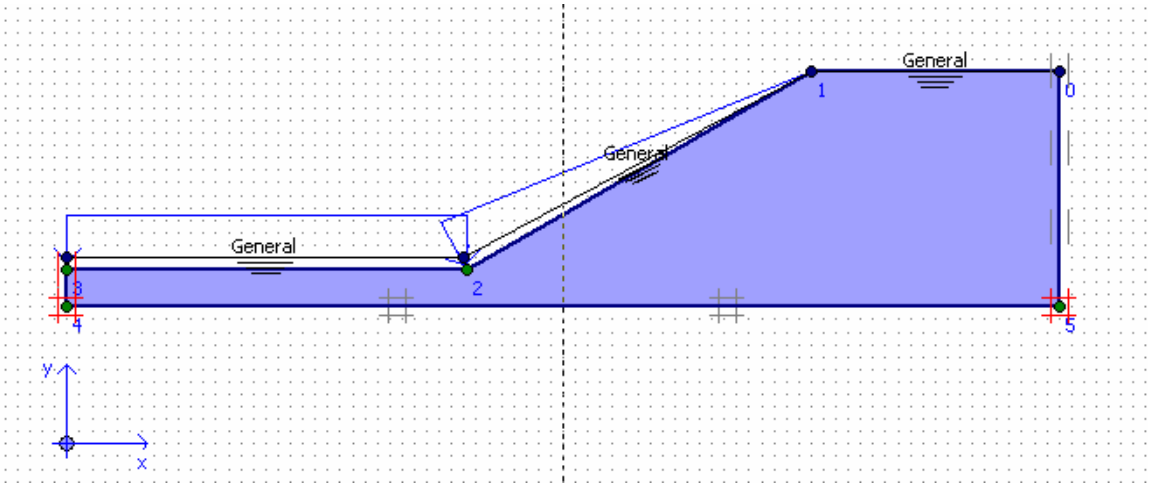




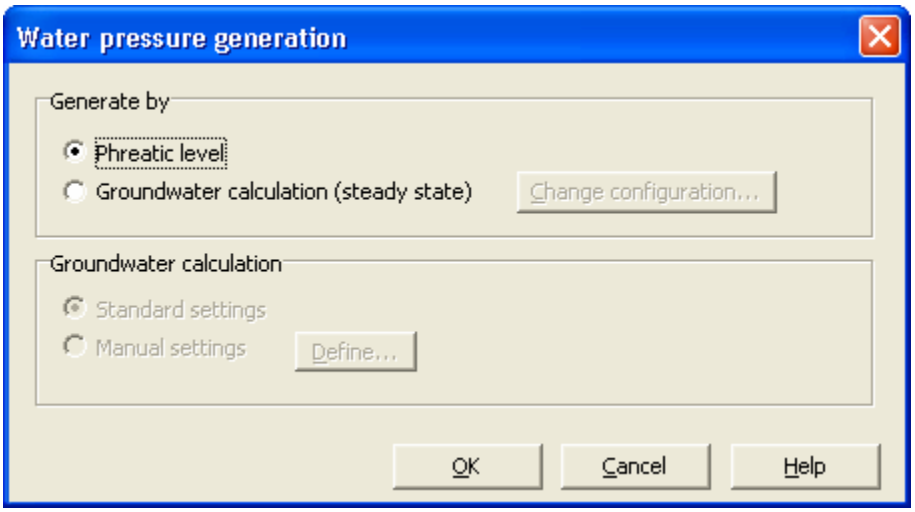
Update

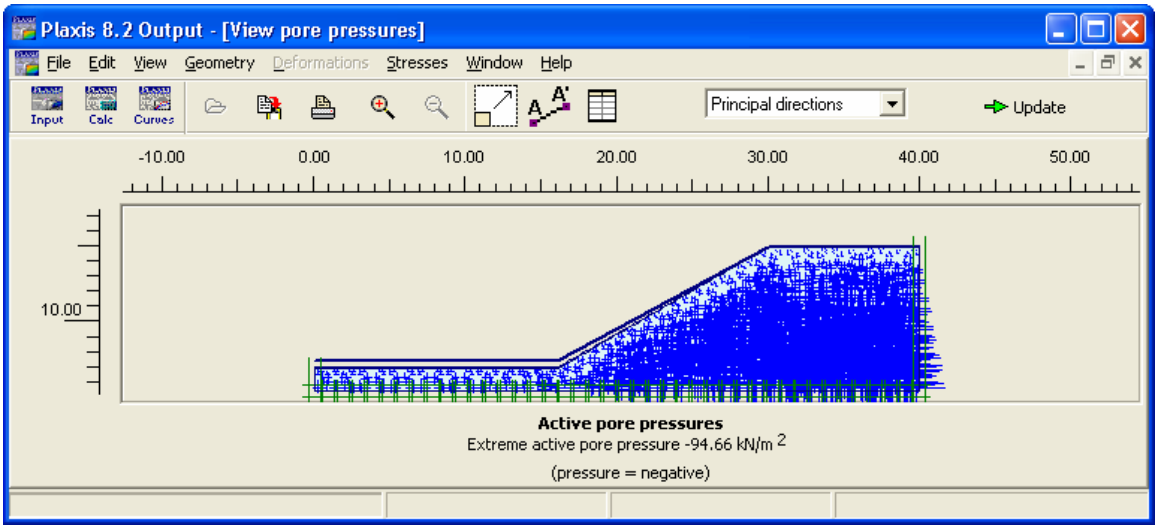
63. Tính toán điều kiện ban đầu

Gán mực nước ngầm

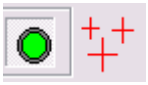


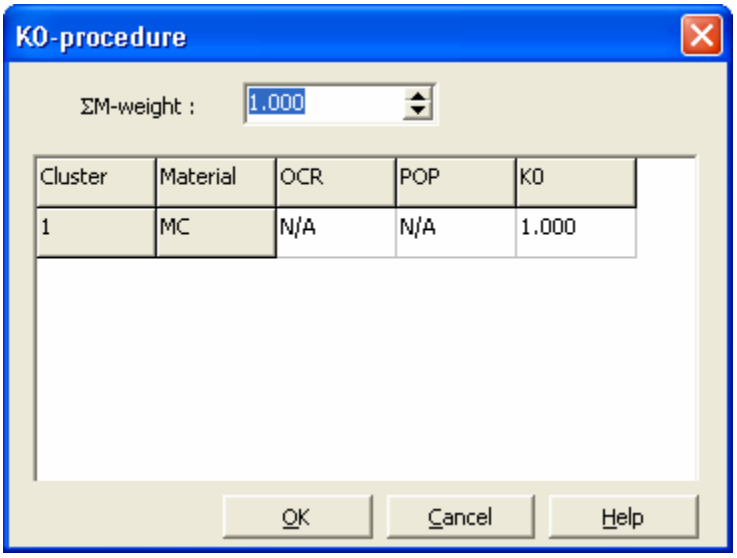
Tính toán áp lực nước 

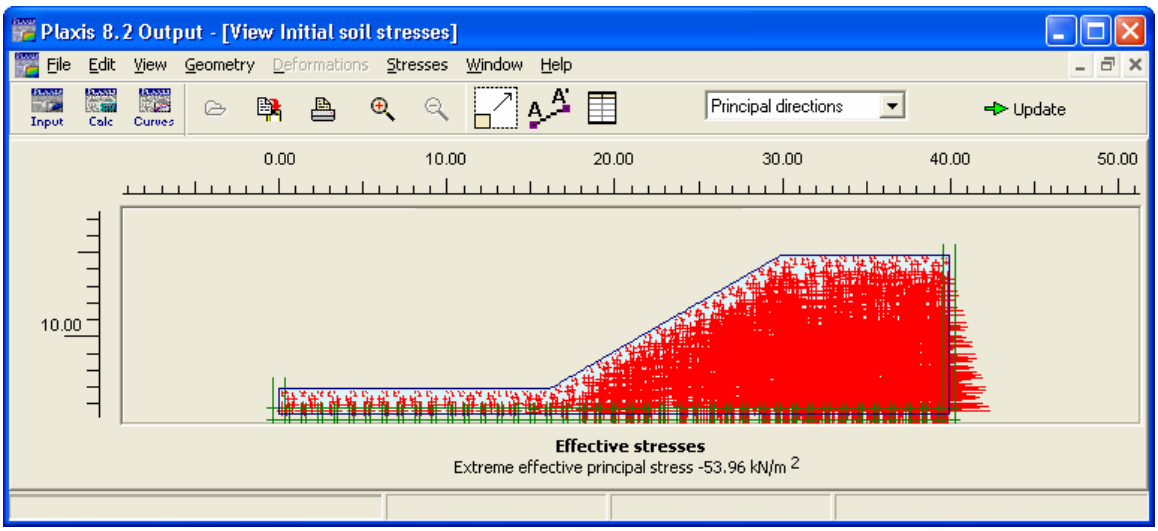




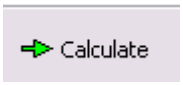
Update

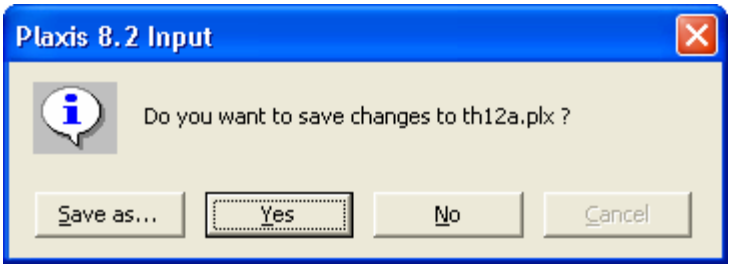
Tính toán áp lực đất 





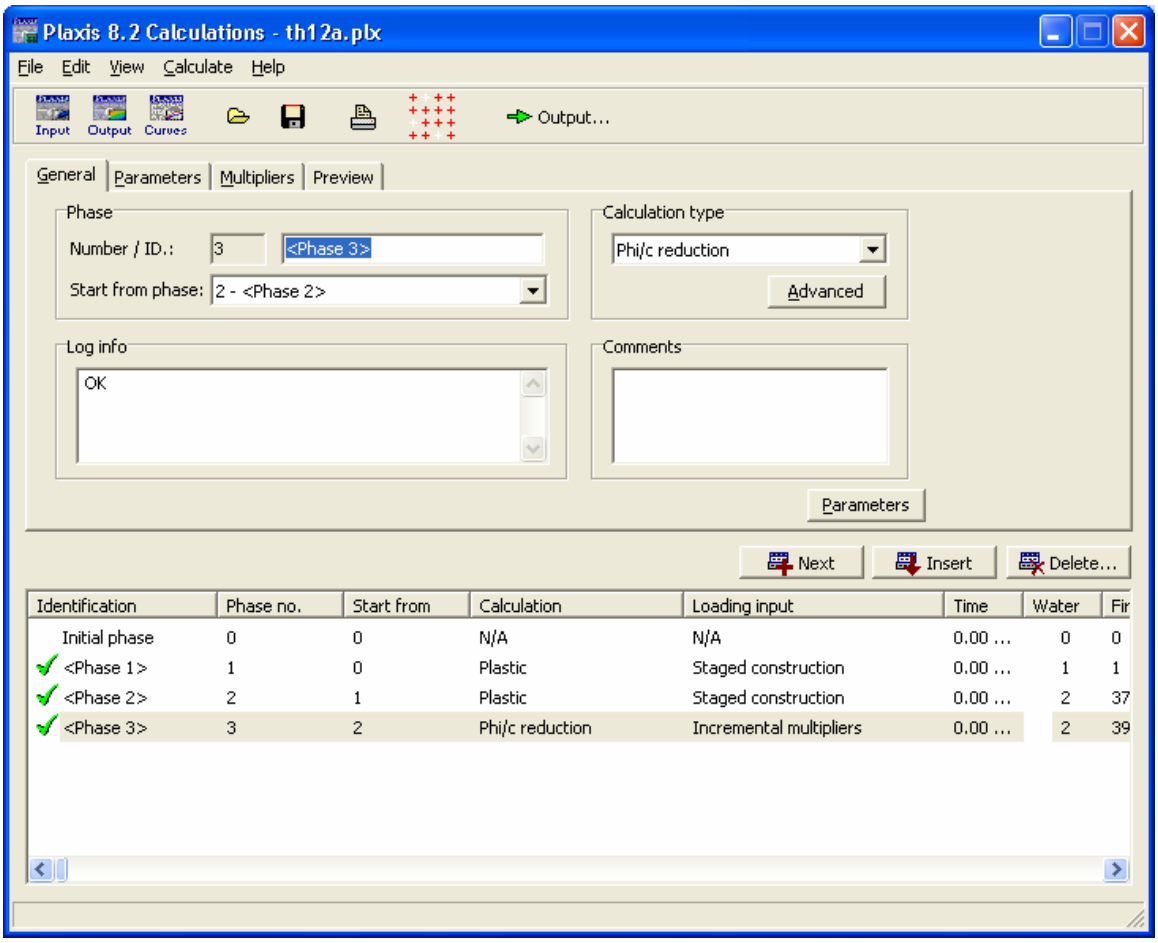
Update

64. Bắt đầu tính toán 

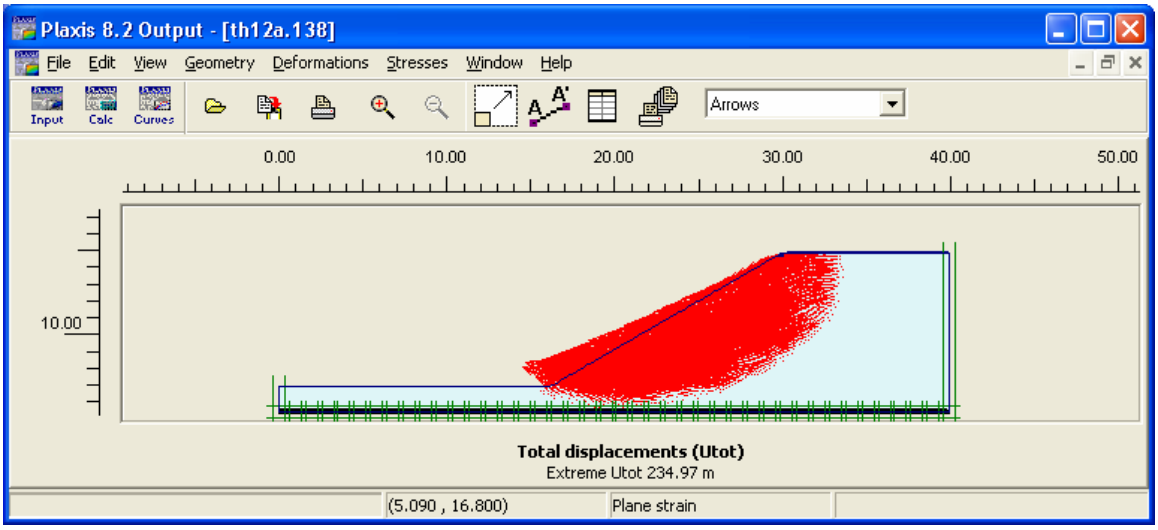


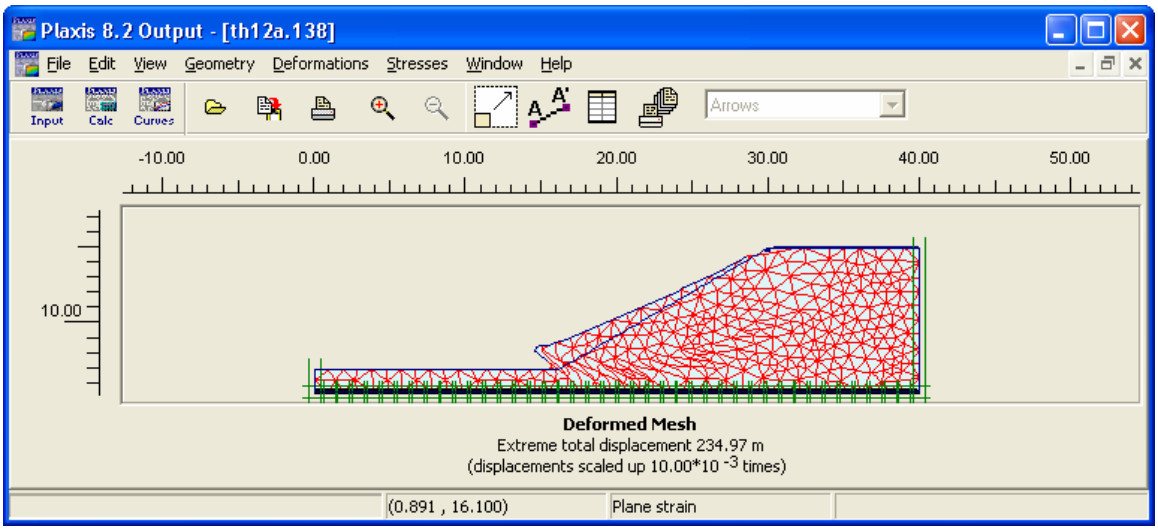
Tính toán cho 4 phase :

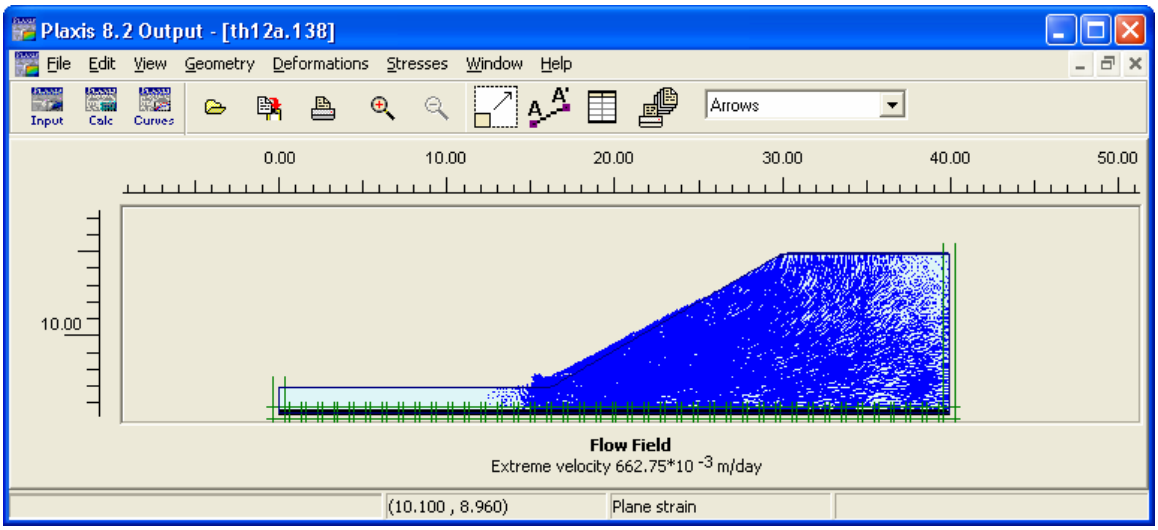
28. Ban đầu
29. Tính trọng lượng bản thân
30. Xét đến GWF
31. Tính ổn định mái dốc

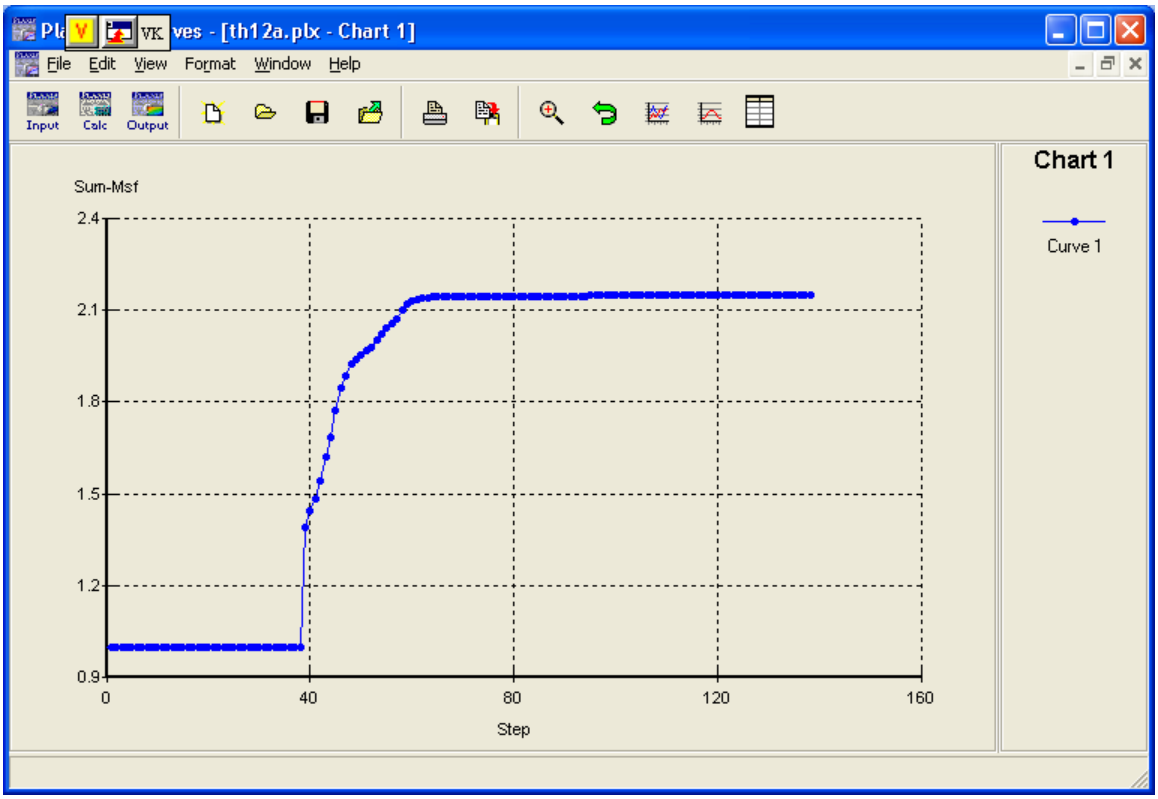


Kết quả phase cuối cùng

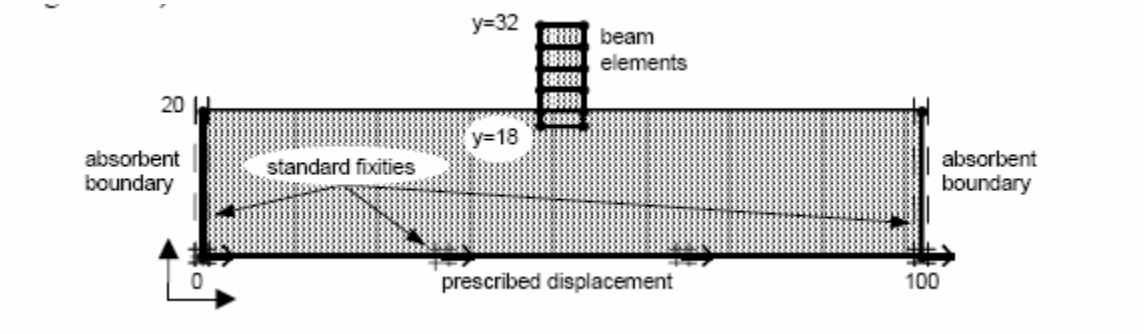


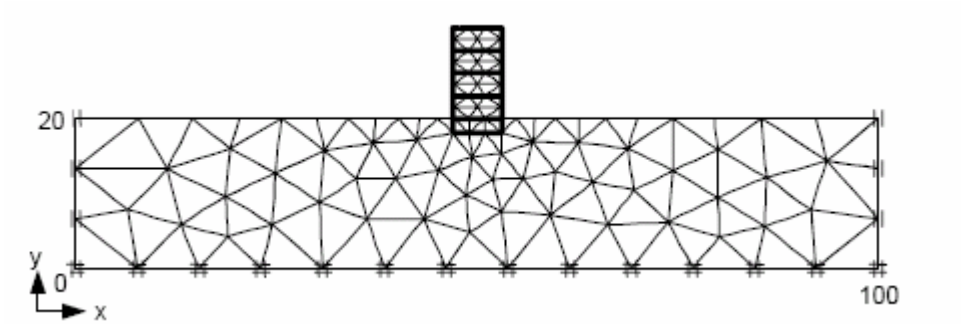

Plaxis 8.2 Output - [th12a.138]
File Edit View Geometry Deformations Stresses Window Help
Input Calc Curves
Arrows
-10.00 0.00 10.00 20.00 30.00 40.00 50.00
10.00
Deformed Mesh
Extreme total displacement 234.97 m
(displacements scaled up 10.00*10 -3 times)
(0.891 , 16.100)
Plane strain


Plaxis 8.2 Output - [th12a.138]
File Edit View Geometry Deformations Stresses Window Help
Input Calc Curves
Arrows
0.00 10.00 20.00 30.00 40.00 50.00
10.00
Flow Field
Extreme velocity 662.75*10 -3 m/day
(10.100 , 8.960)
Plane strain


ves - [th12a.plx - Chart 1]
File Edit View Format Window Help
Input Calc Output
Chart 1
Curve 1
Sum-Msf
2.4
2.1
1.8
1.5
1.2
0.9
0
40
80
120
160
Step

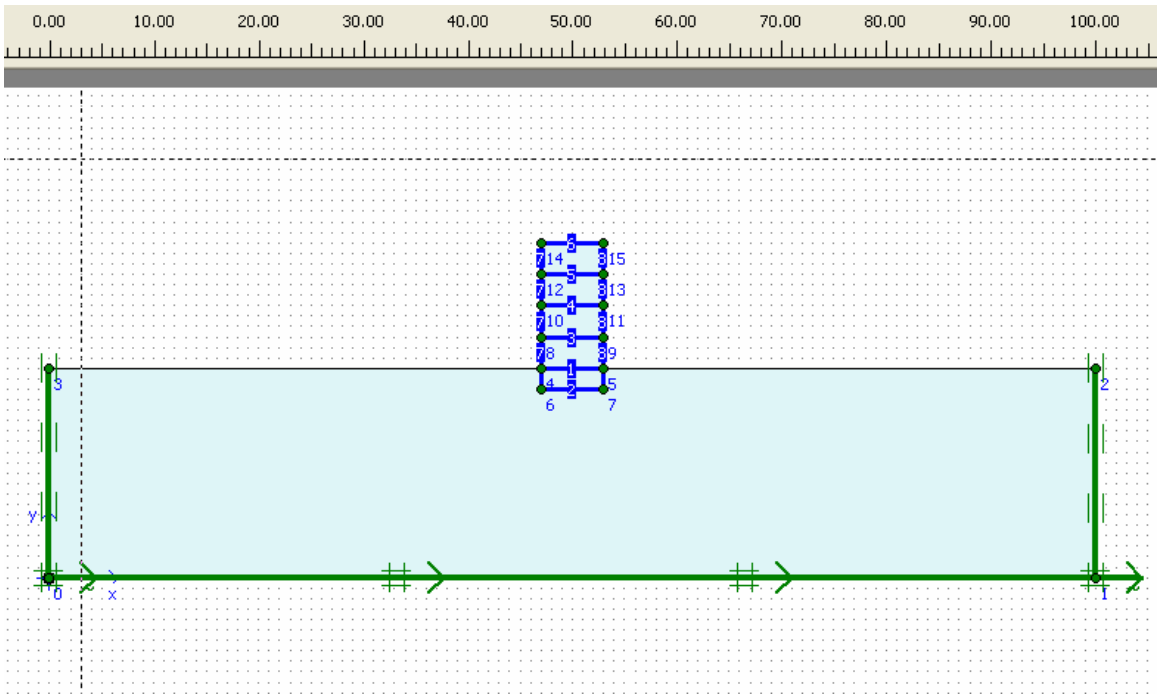
Phần 14 : PLAXIS INPUT,CALCULATE DYNAMICS





Parameter	Name	Value	Unit
Material model	Model	Elastic	-
Type of material behaviour	Type	Drained	-
Unit soil weight	γ	17.0	kN/m^3
Young's modulus (constant)	E_{ref}	30000	kN/m^2
Poisson's ratio	ν	0.2	-
Rayleigh damping	α and β	0.01	

Parameter	Name	Floors / Walls	Unit
Material model	Model	Elastic	-
Normal stiffness	EA	$5 \cdot 10^6$	kN/m
Flexural rigidity	EI	9000	kNm^2/m
Weight	w	5.0	kN/m/m
Poisson's ratio	ν	0.0	-
Rayleigh damping	α and β	0.01	



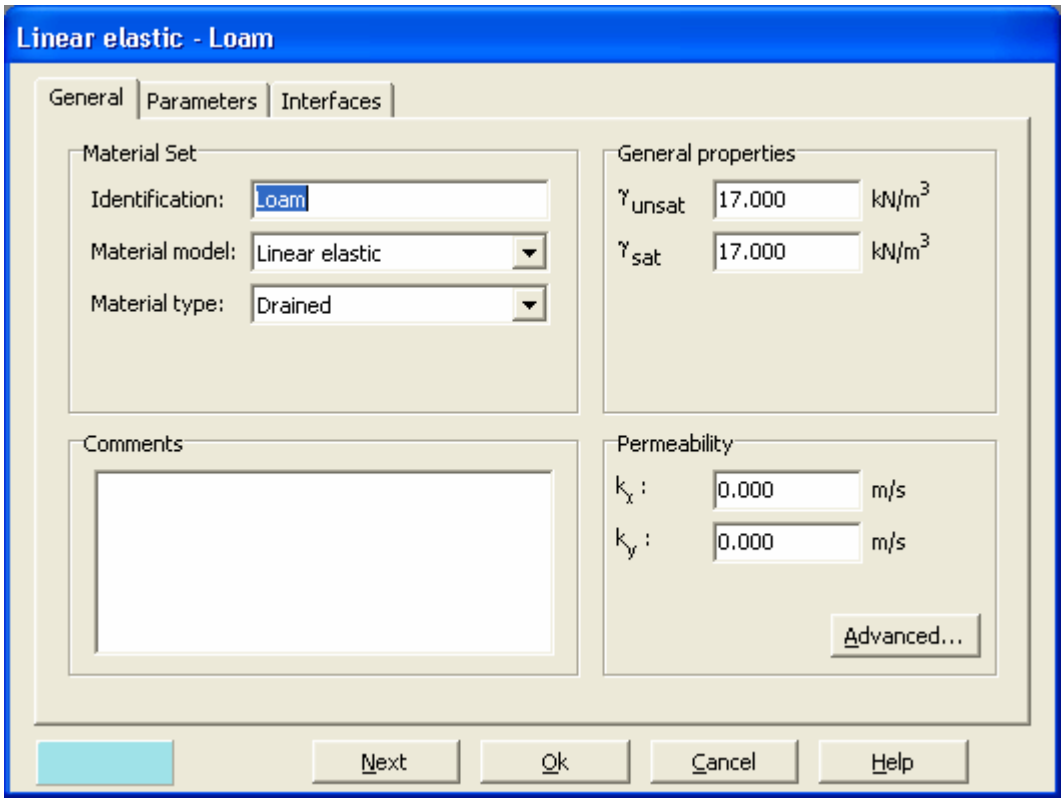
65. Tạo hình dạng bài toán

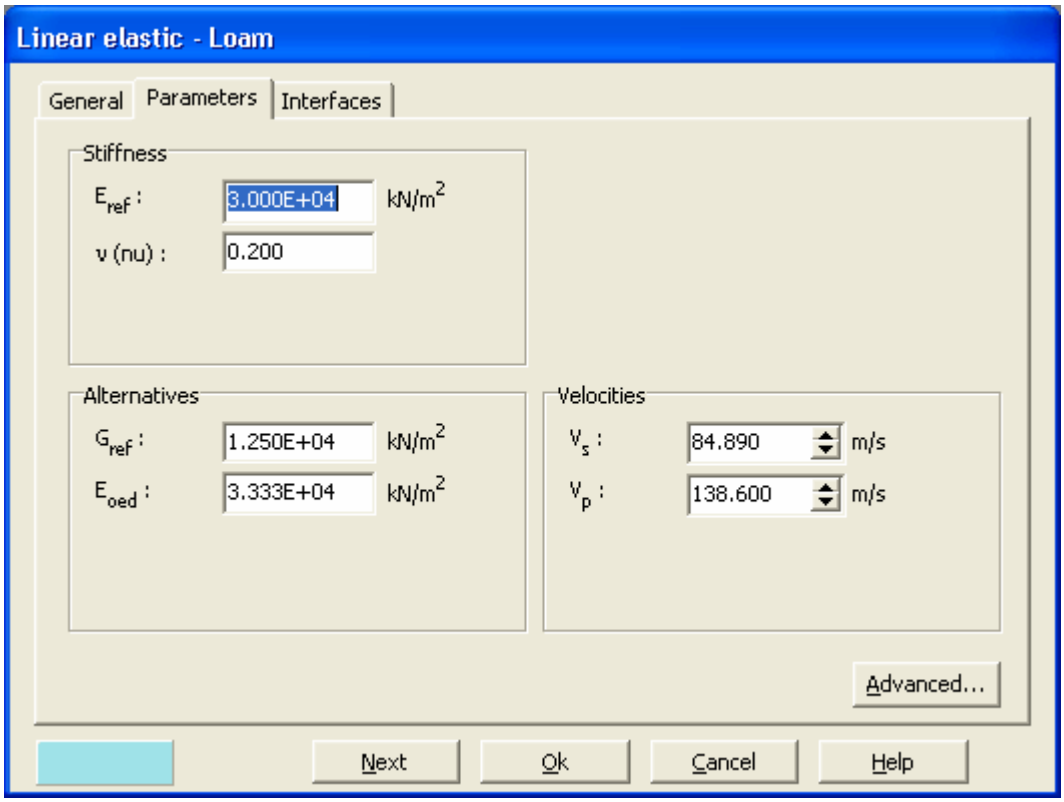
Gán chuyển vị biết trước 

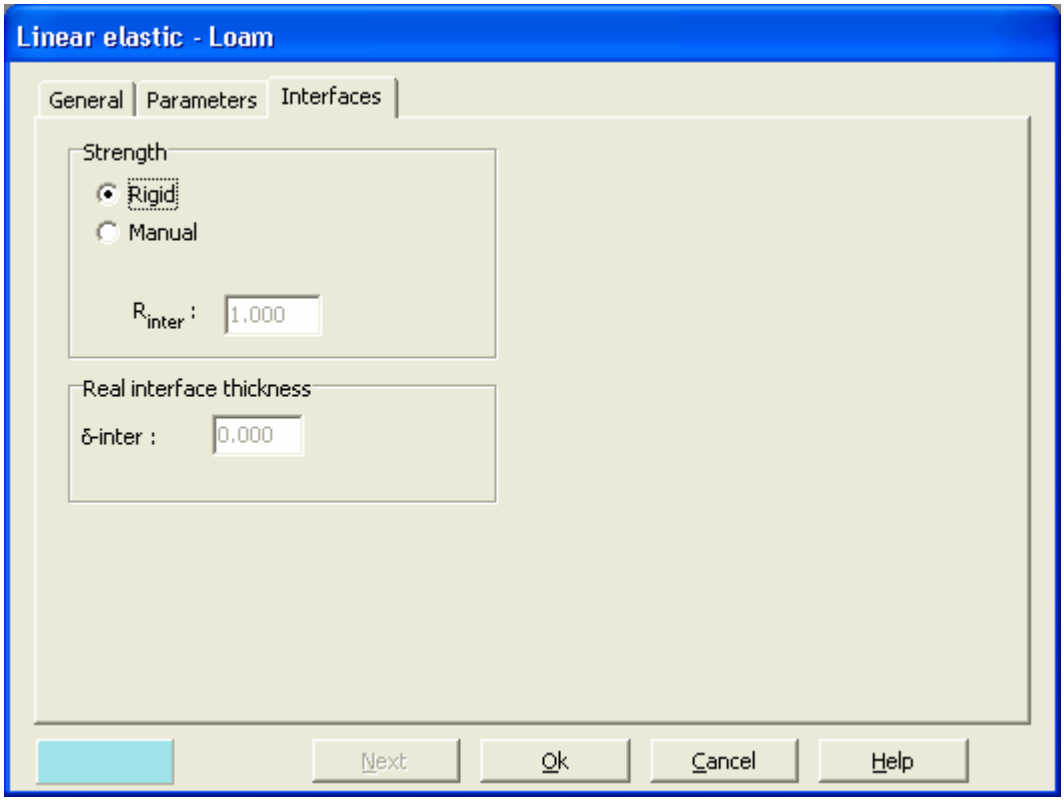
Sữa lại với chuyển vị x = 0.01 để vectơ nằm ngang
Tại Load set Dynamic Load system chọn Prescribed displacements
Tại Load chọn Absorbend boundaries

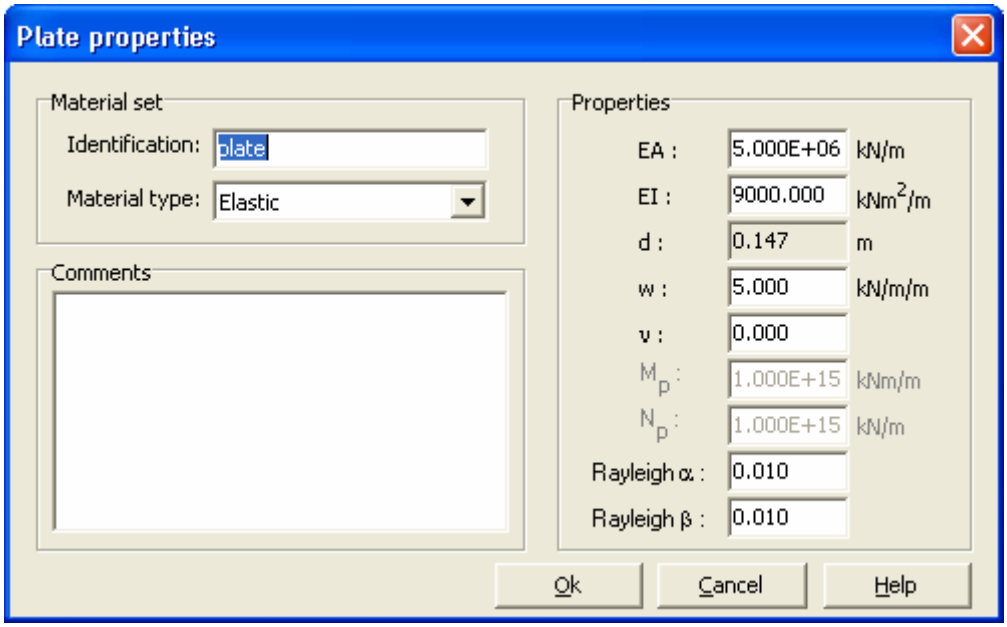
Gán biên 

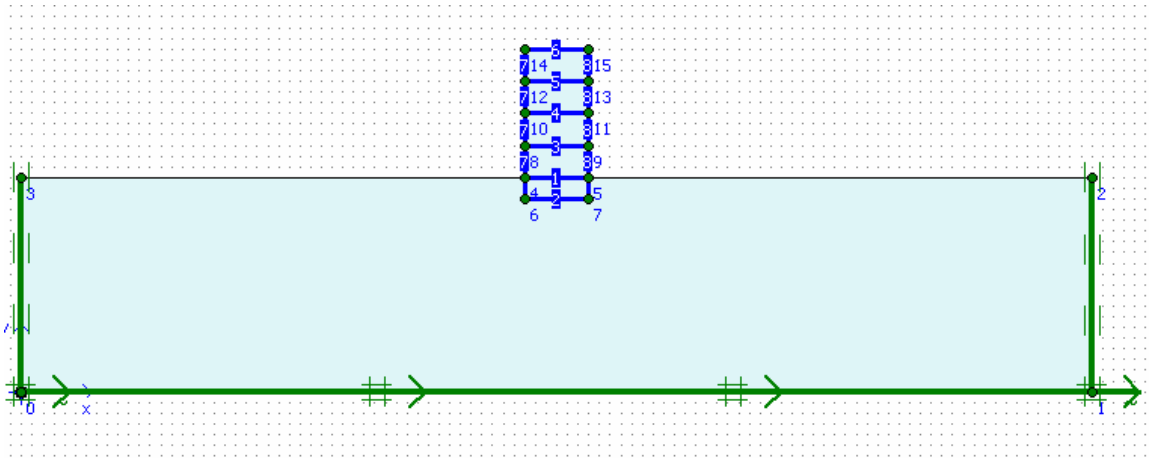
Gán số liệu địa chất 


Linear elastic - Loam
General
Parameters
Interfaces
Material Set
Identification:
Loam
Material model:
Linear elastic
Material type:
Drained
General properties
γunsat
17.000
kN/m3
γsat
17.000
kN/m3
Comments
Permeability
kx :
0.000
m/s
ky :
0.000
m/s
Advanced...
Next
Ok
Cancel
Help

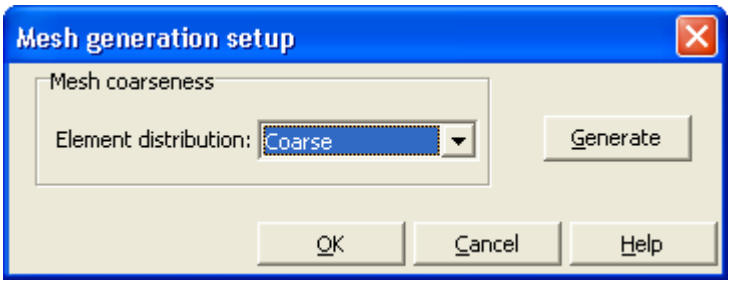

Linear elastic - Loam
General
Parameters
Interfaces
Stiffness
E ref : 3.000E+04 kN/m2
ν (nu) : 0.200
Alternatives
G ref : 1.250E+04 kN/m2
E oed : 3.333E+04 kN/m2
Velocities
V s : 84.890 m/s
V p : 138.600 m/s
Advanced...
Next
Ok
Cancel
Help

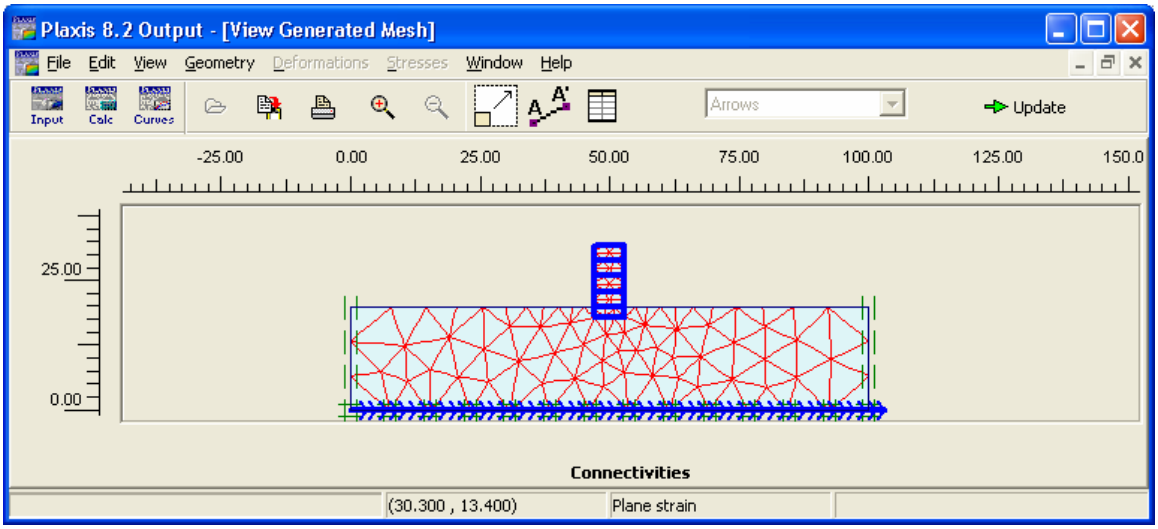

Linear elastic - Loam
General
Parameters
Interfaces
Strength
Rigid
Manual
R inter : 1.000
Real interface thickness
δ-inter : 0.000
Next
Ok
Cancel
Help





66. Tạo lưới phần tử

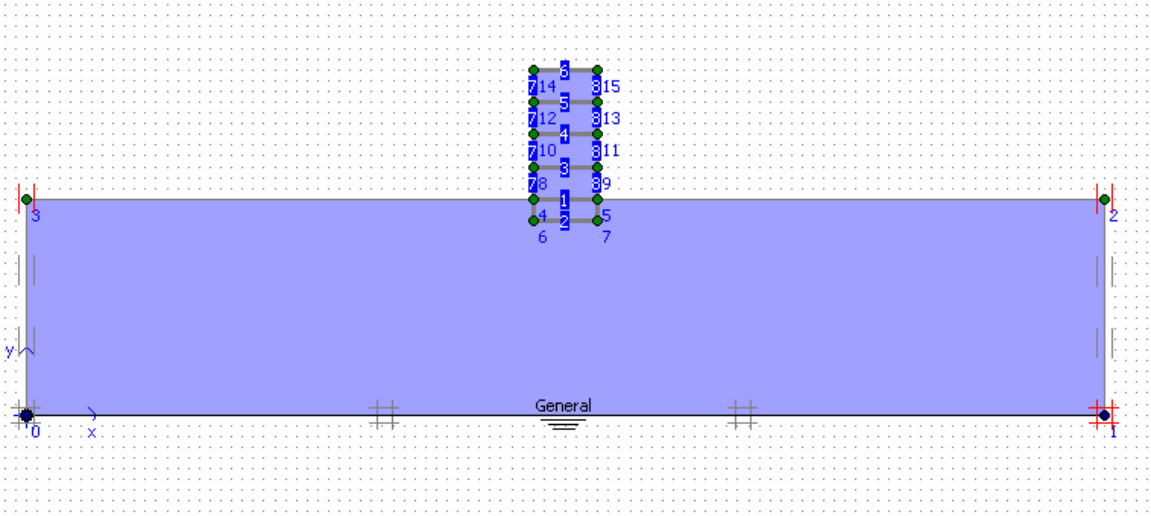




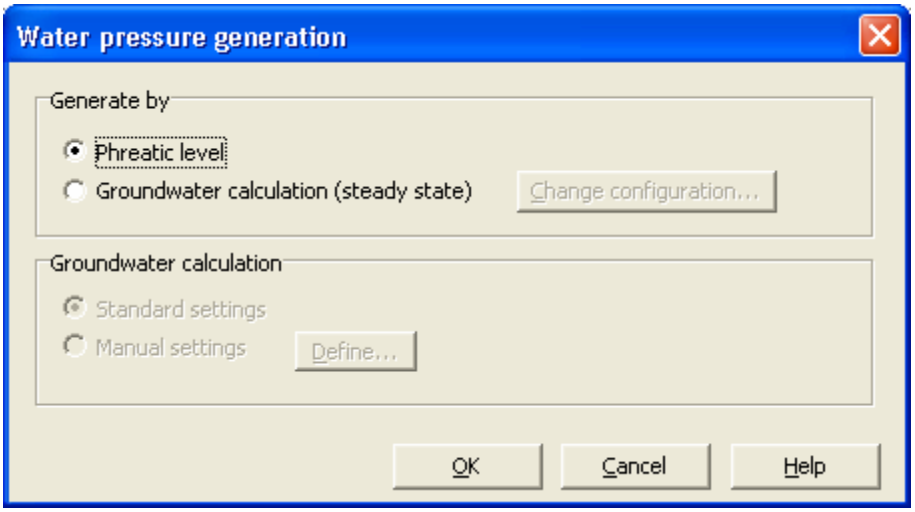
Update

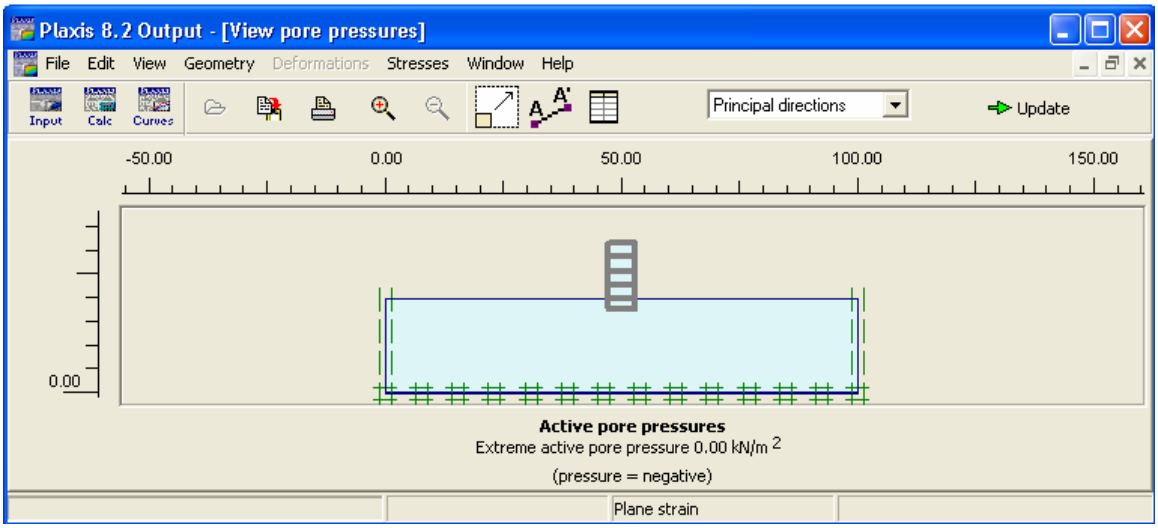
67. Tính toán điều kiện ban đầu

Gán mực nước ngầm

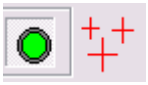


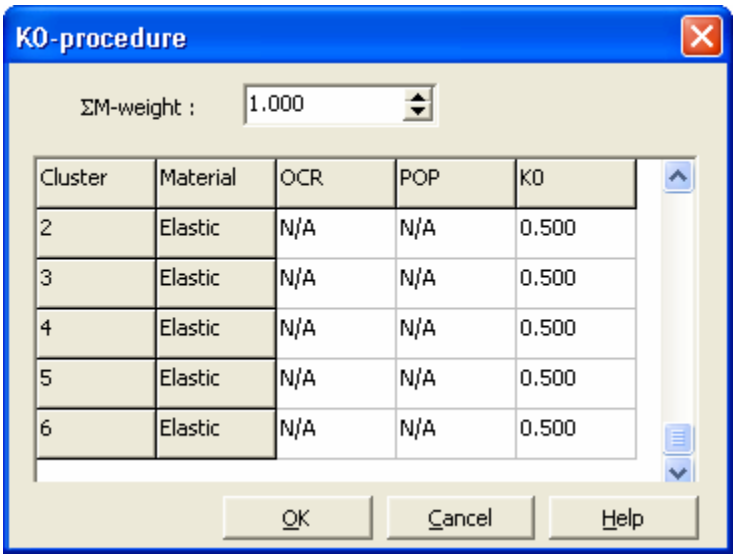
Tính toán áp lực nước 

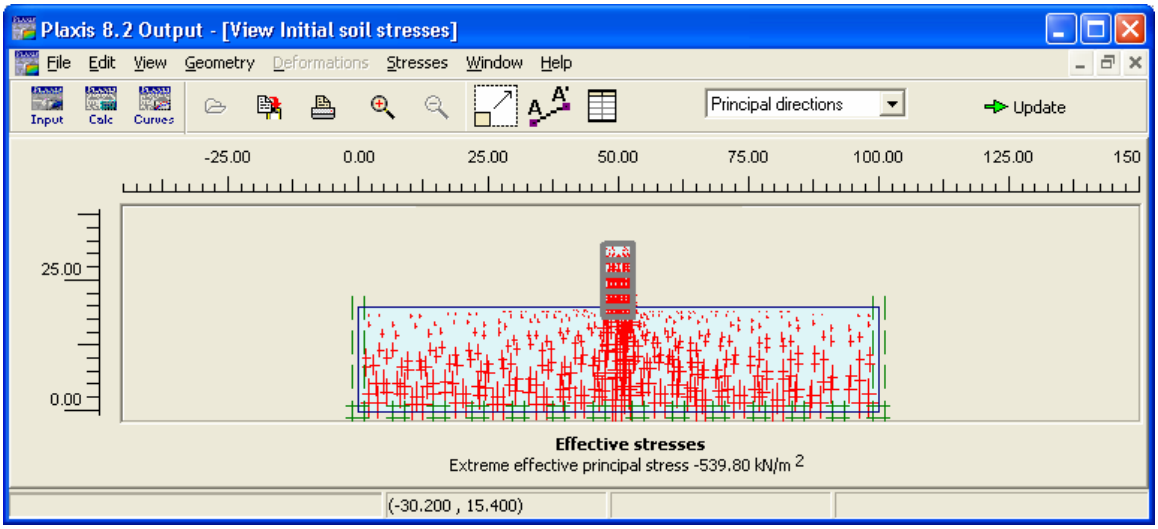




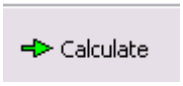
Update

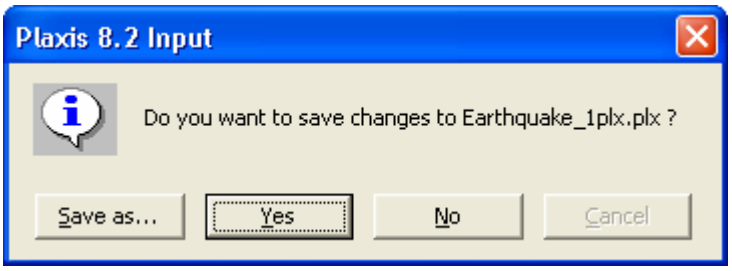
Tính toán áp lực đất 





Update

68. Bắt đầu tính toán 



Tính toán cho 2 phase :

32. Ban đầu :

Phase 1:

1. Select *Plastic calculation* in the *General* tab sheet.
2. Select *Staged construction* as the loading input in the *Parameters* tab-sheet and click *Define*.
3. Activate the plates of the building and de-activate the soil cluster in the basement. All clusters inside the building should now be inactive.
4. Make sure the prescribed displacement used for modelling the earthquake acceleration is switched on.

33. Tính động học

Phase 2:

1. Select *Dynamic analysis* for the calculation type in the *General* tab sheet.
2. Set the number of *Additional steps* to 250 in the *Parameters* tab-sheet.
3. Select *Reset the displacements to zero*.
4. Set the *Time interval* to 10 sec in the loading input box.
5. Select *Manual setting* for the Iterative procedure. Set *Dynamic sub step* to 1.
6. Click *Define*.
7. Select the *Multiplier* tab sheet.
8. Click  next to the Σ-*Mdisp* multiplier.
9. Select the option *Load multiplier from data file*.
10. Select the appropriate SMC file (225A.smc). This file can be found in the PLAXIS program directory. The data provided in this file is an accelerogram, thus the option *Acceleration* has to be selected from the *File contents* box (See Figure 2.20).

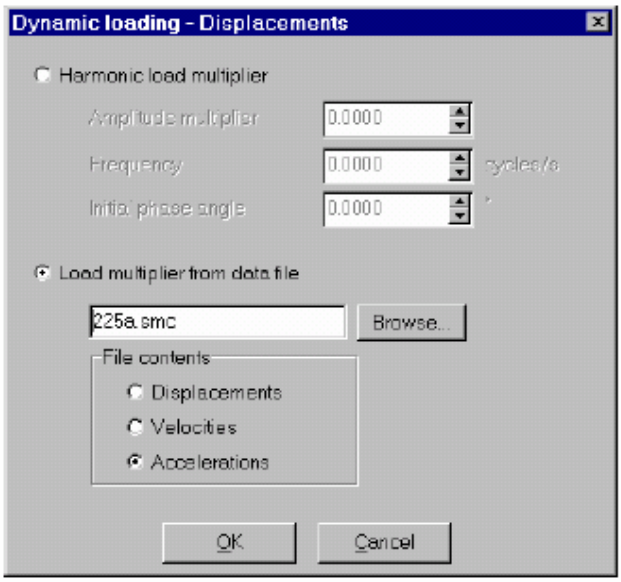
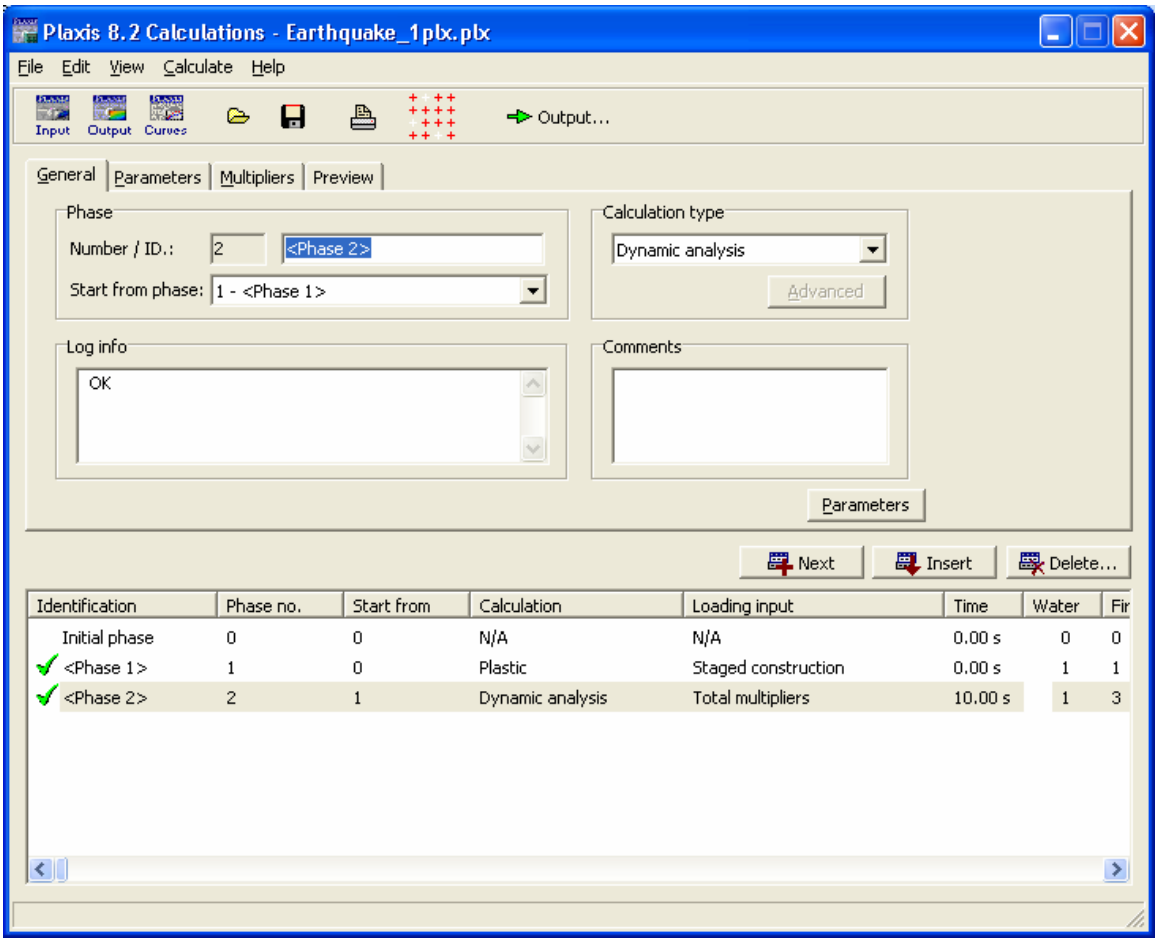


Figure 2.20 Selection of SMC file.

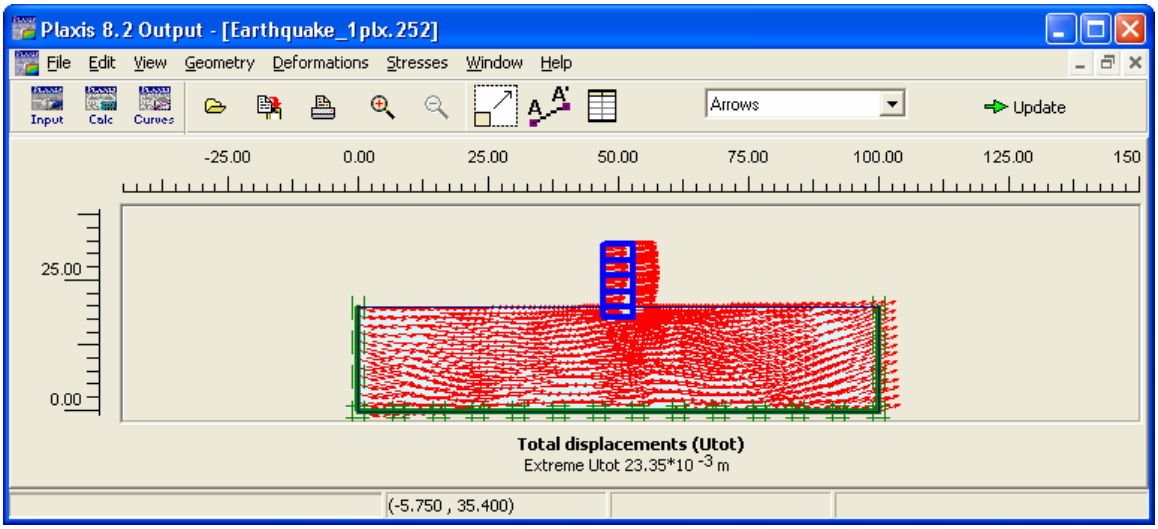
11. Click *OK*.
12. Select points for load displacement curves at the top of the building, at the bottom of the basement and at the bottom of the mesh. You may now start the calculation.

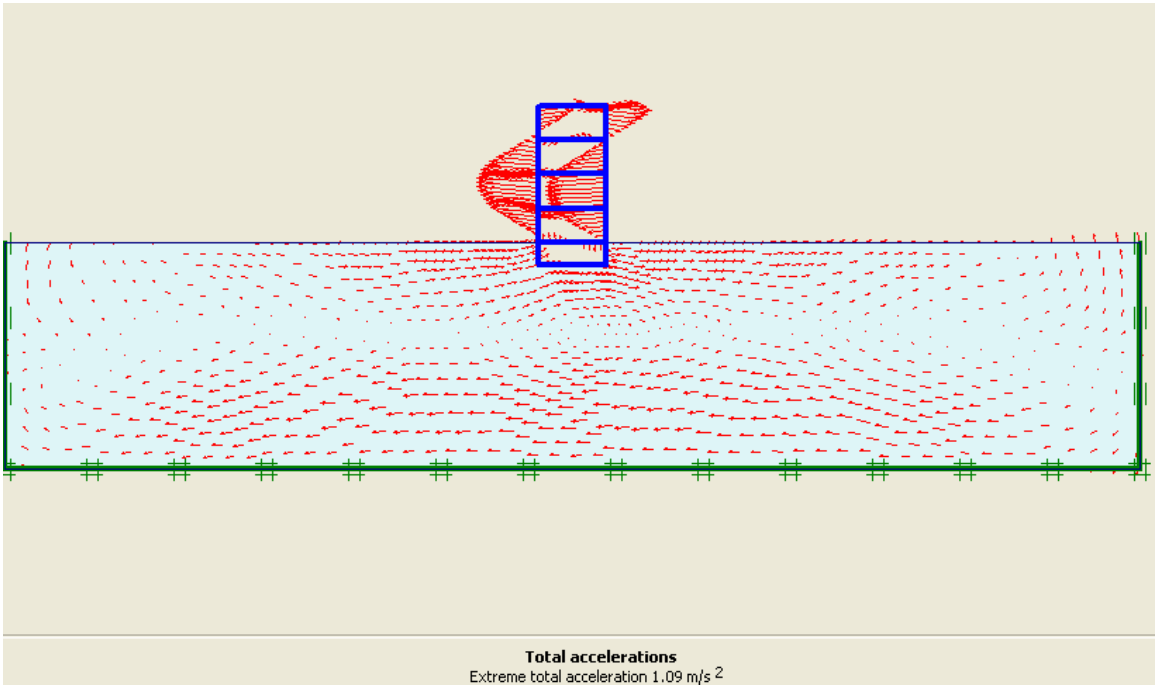
Hint: Plaxis assumes the data file is located in the current project directory when no directory is specified in the *Dynamic loading* window.

> In the SMC files, data is given for each 0.005 s (200 values per second). The calculation step size does not correspond with the data given in the file, but the calculation program will interpolate a proper value for the actual time of each step.



Kết quả phase cuối cùng


Plaxis 8.2 Output - [Earthquake_1plx.252]
File Edit View Geometry Deformations Stresses Window Help
Input Calc Curves
Arrows
Update
-25.00 0.00 25.00 50.00 75.00 100.00 125.00 150
25.00
0.00
Total displacements (Utot)
Extreme Utot 23.35*10 -3 m
(-5.750 , 35.400)


Total accelerations
Extreme total acceleration 1.09 m/s 2

The maximum horizontal displacement at the top of the building is 75 mm and occurs at t=4.8 s. Figure 2.21 shows the deformed mesh at that time.

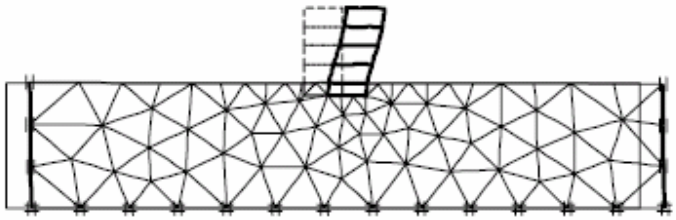


Figure 2.21 Deformed mesh at at t = 4.80 s (step 121). Maximum horizontal deformation at the top: u_x = 75 mm

The output program also provides data on velocities and accelerations. The maximum horizontal acceleration at the top of the building is 3.44 m/s^2 (0.34 G) and occurs at t=2.88 s (see Figure 2.22).

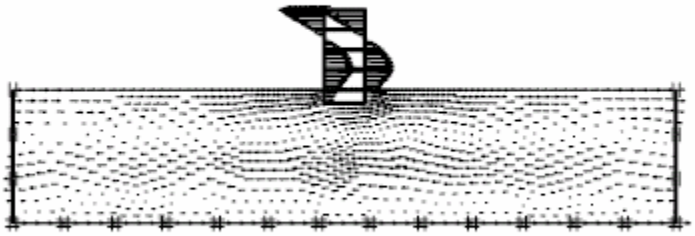


Figure 2.22 Horizontal accelerations at t = 2.88 s (step 73). Maximum value at the top: a_x = 3.44 m/s^2

Figure 2.23 and Figure 2.24 show, respectively, time-displacement curves and time-acceleration curves at the bottom of the mesh, the basement and the top of the building. From Figure 2.24 it can be seen that the maximum accelerations at the top of the building are much larger than the accelerations from the earthquake itself.

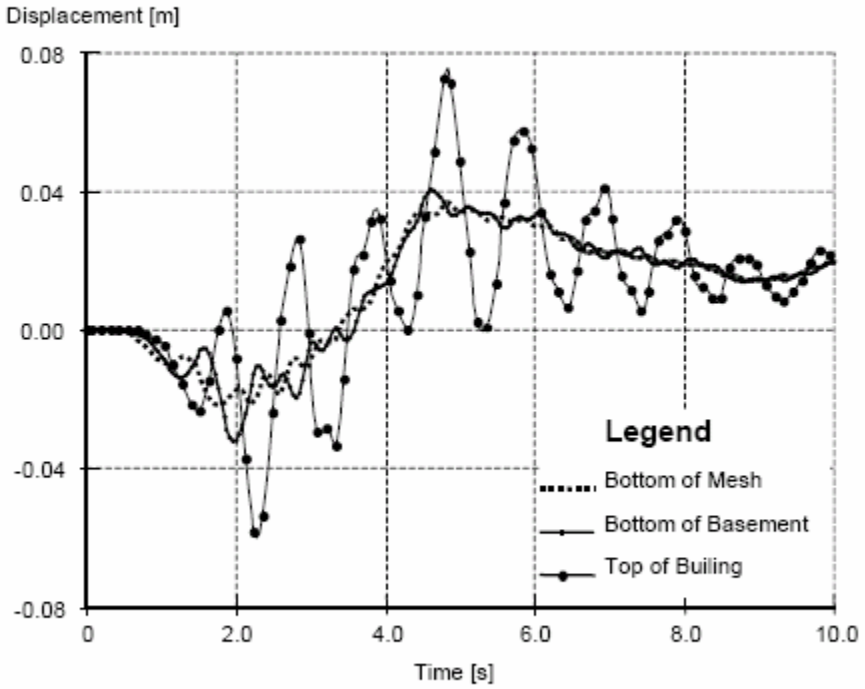


Figure 2.23 Time-displacement curve for the mesh bottom, basement and top of building

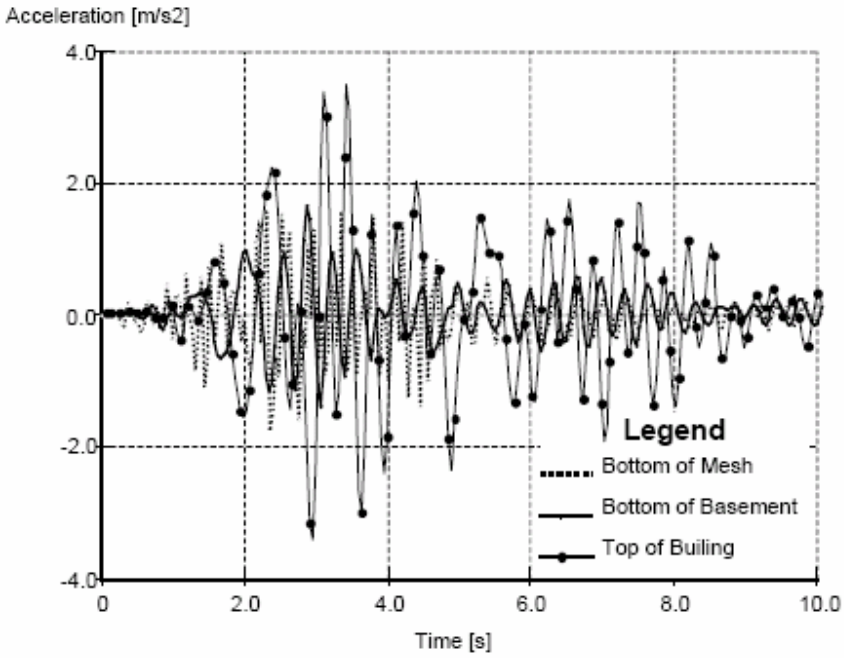


Figure 2.24 Time-acceleration curve for the mesh bottom, basement and top of building.