GTS NX_線上課程

大地開挖分析(基礎課程)

台灣邁達斯

2024/04/30 10:00~11:30

Google會議室 https://meet.google.com/sgo-hhbz-qiy

註:範例相關參數使用假設條件。

Subject

- MIDAS Design & Simulation
- 基礎觀念介紹
  - Mohr-Coulomb Model
  - Ground Stress Initialization
  - Water Level
- Example1:2D-路堤施工階段分析
- Example2:2D-臨時建築物開挖考慮水位線變化

Mohr-Coulomb Model

GTS NX can simulate changes in **the modulus of elasticity and cohesion** with height for a Mohr-Coulomb model using equation (4.1.4).

$$E = E_{ref} + \left(y_{ref} - y\right)E_{inc} \qquad \left(y \le y_{ref}\right)$$
$$E = E_{ref} \qquad \left(y > y_{ref}\right) \qquad (4.1.4)$$

E_{ref} : Input modulus of elasticity

E_{inc} : Incremental slope of modulus of elasticity

y_{ref} : Depth where E_{ref} is measured

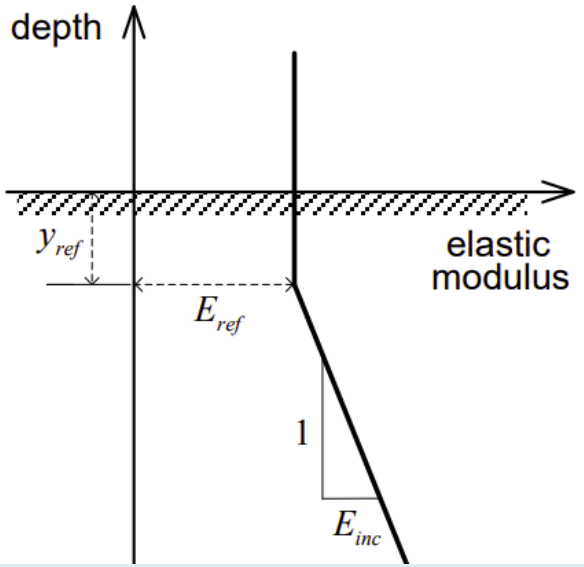
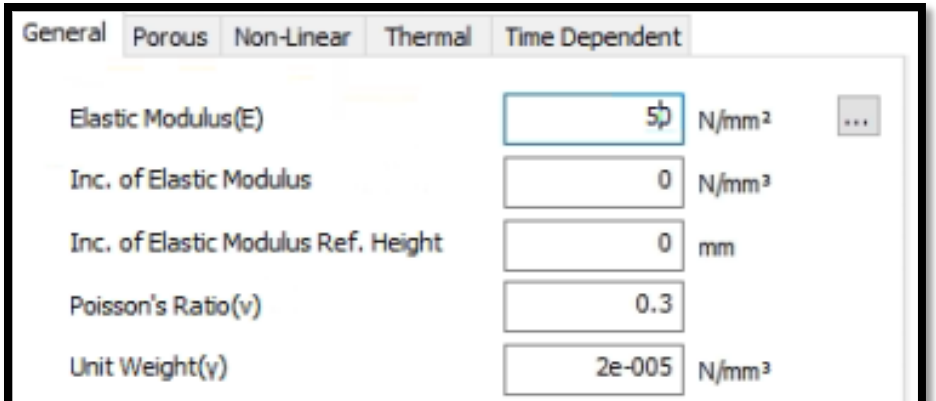


Figure :Concept diagram for incremental modulus of elasticity.



Mohr-Coulomb Model

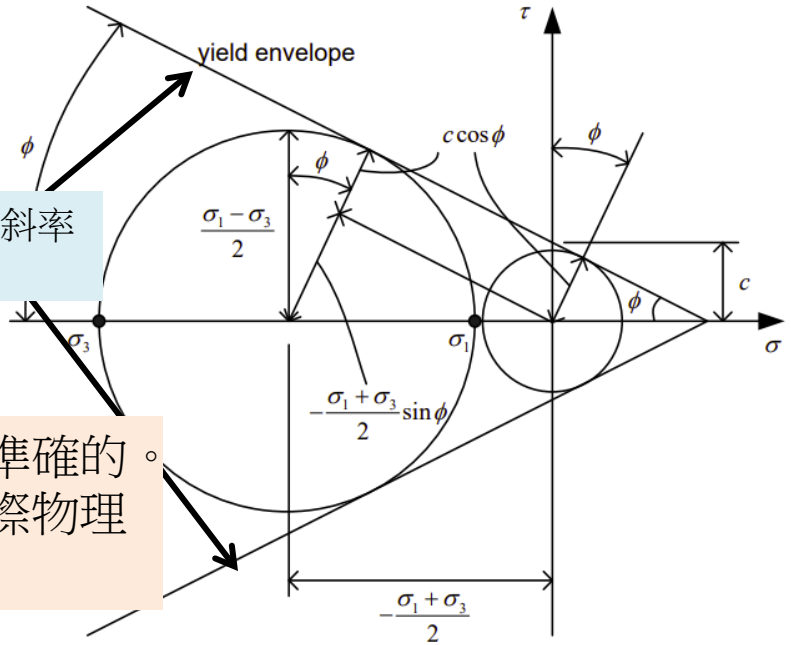
Mohr-Coulomb criterion is the most widely used method for ground materials due to its simplicity and accuracy. The limit shear stress τ of an arbitrary plane is only related to the normal stress σ_n of the same plane. The Mohr-Coulomb model is used to simulate most terrain and it displays sufficiently reliable results for general nonlinear analysis of the ground.

Mohr-Coulomb criterion

$$f = |\tau| + \sigma_n \tan\phi - c = 0$$

C: Cohesion/內聚力(N/mm²)

ϕ : Internal friction Angle/內摩擦角



Mohr-Coulomb破壞準則的破壞面的斜率不隨圍壓力(或靜水壓力)而變化

(1)圍壓應力在有限範圍內時，該準則是準確的。
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Reference

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Mohr-Coulomb Model

Mohr-Coulomb 模型中，可以根據兩種類型考慮拉伸強度：壓力和朗肯。

Pressure Type

The average of the principal stresses can not exceed the tensile strength.

$$\frac{\sigma_1 + \sigma_2 + \sigma_3}{3} < \sigma_t$$

Rankine type

The maximum principal stress should not exceed the tensile strength

$$\sigma_1 < \sigma_t$$

Ground Stress Initialization

The initial stress can also be calculated from self weight analysis, and the state at which the analysis ends is assumed as the initial state. General ground analysis uses the in-situ stress of the ground state as the initial values. GTS NX considers the calculation of in-situ stresses from self weight analysis to be the base.

(1) K0 method

K0法是利用自重分析，計算出的垂直應力來計算水平應力，適用於附加應力變化較小的情況。當地面形狀在水平方向上的變化不明顯時適用K0法。
如果地面不是水平的，則獲得的應力狀態與自重不平衡。

(2) Gravity loading method

地面水平情況重力加載法等同於 K0 法；地表非水平情況，因為存在水平應變，所以存在剪應力，結果將與 K0 法不同。重力加載法法適用於傾斜的地面。

Reference

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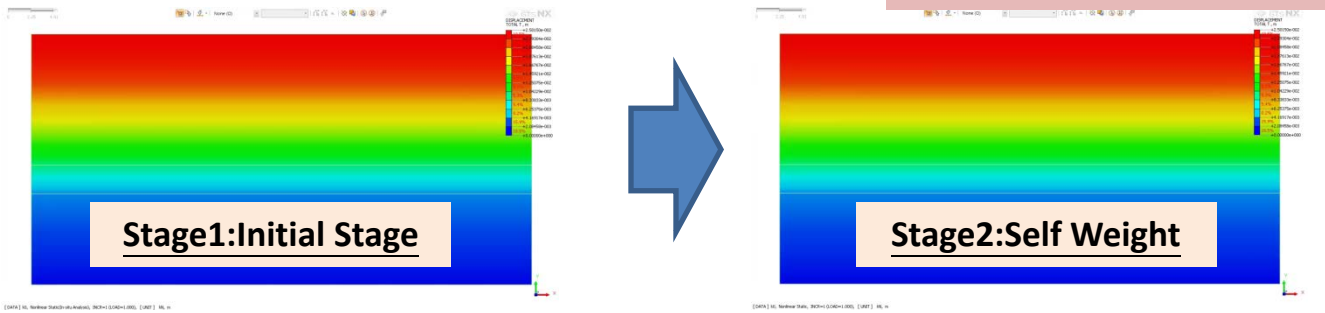
Ground Stress Initialization

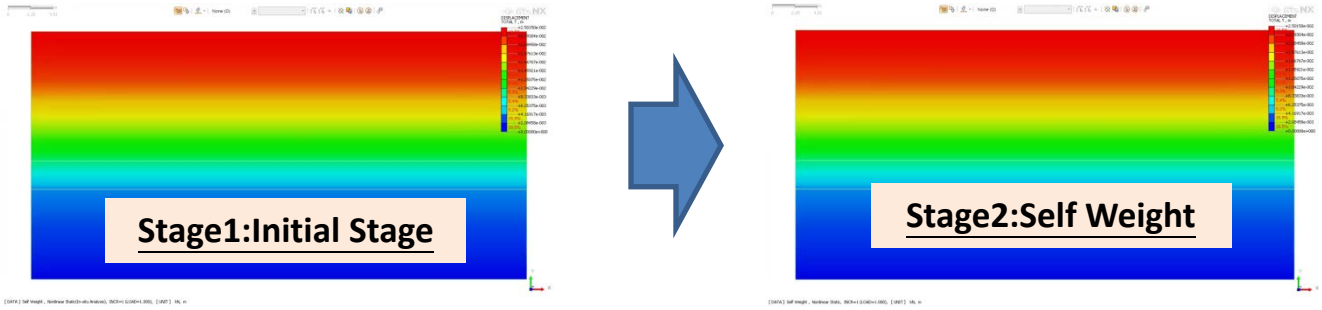
(水平地面)

方法1:K0 Method

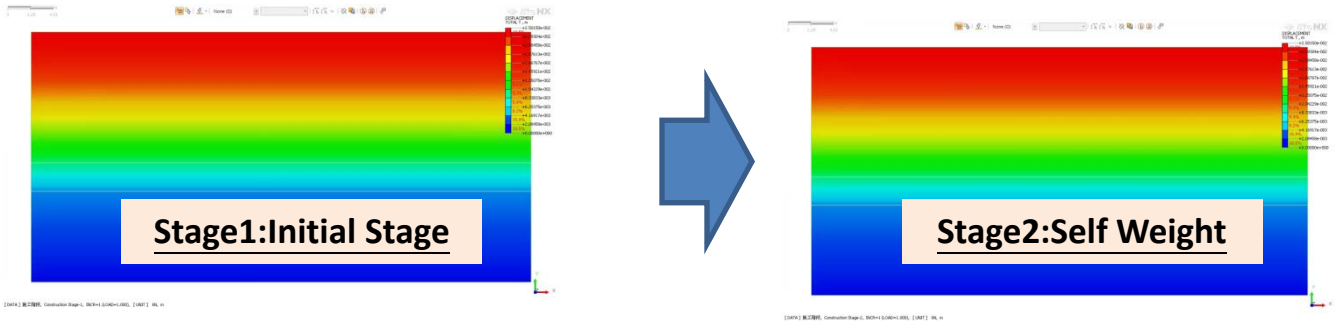
K0在地表非平情況適用



方法2(a): Gravity loading method



方法2(b):施工階段(Initial Stage Self Weight)



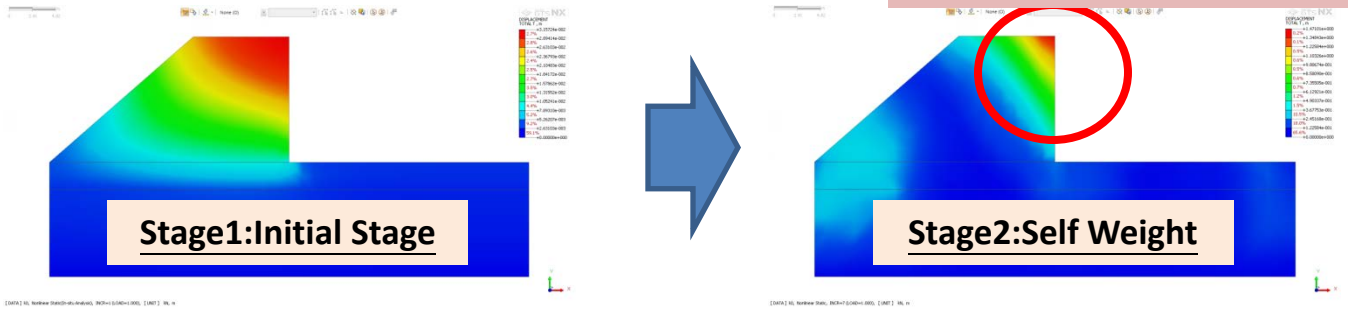
註:比對過程不清除初始位移量。

Ground Stress Initialization

(傾斜地面)

方法1:K0 Method

K0在地表非水平情況不適用



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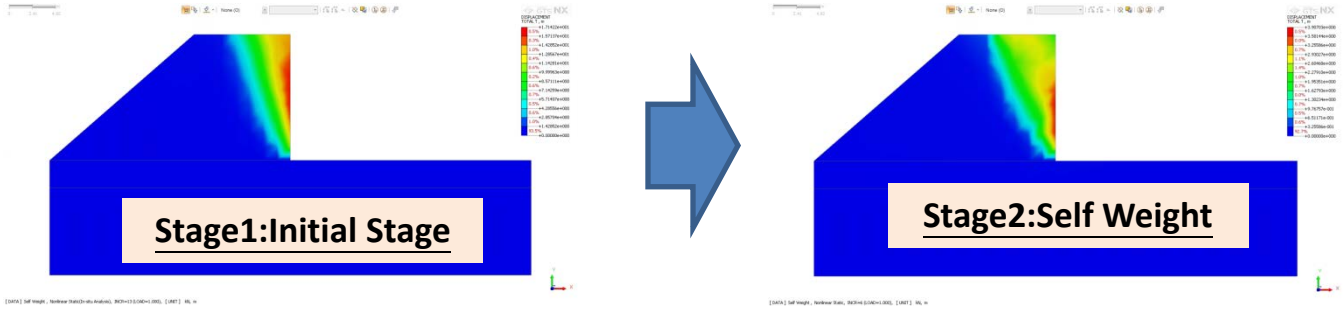
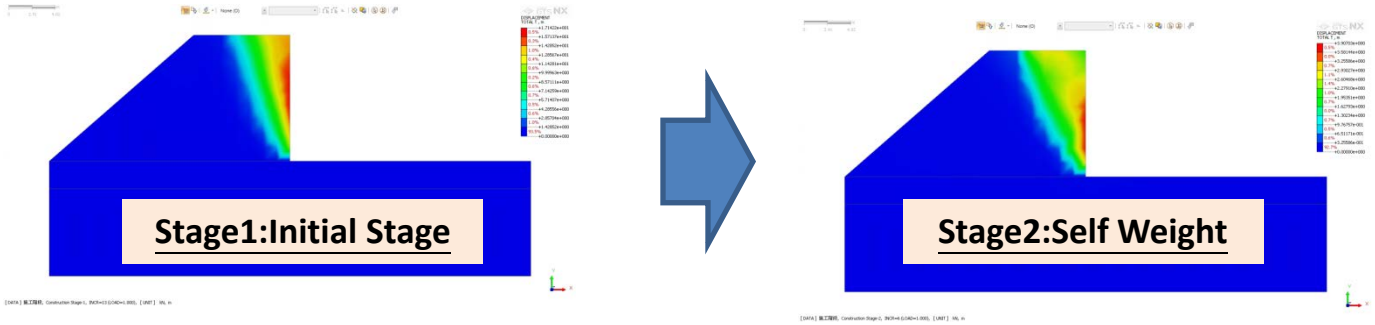


方法2(b):施工階段(Initial Stage Self Weight)



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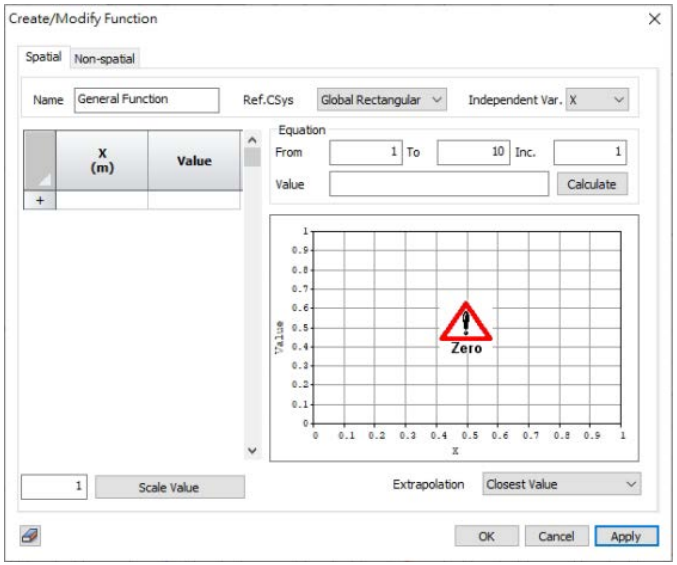
Water Level

Water level

Water level function



方式1.Water Level For Global

Input the groundwater level that changes according to the construction stage with respect to the GCS.
Click to set the ground water level function.
If the water level and function are both specified, the input water level is multiplied onto the function and applied on the analysis.

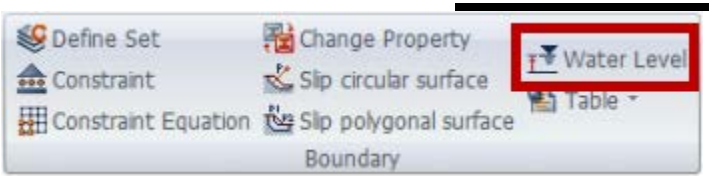
方式2.Water Level for Mesh Set

Define the groundwater level that changes according to the construction stage for each mesh set.
If the groundwater layer is surrounded by rocks or an impermeable clay layer (confined aquifer), the presence/absence of the groundwater level for each ground layer can be set for analysis.

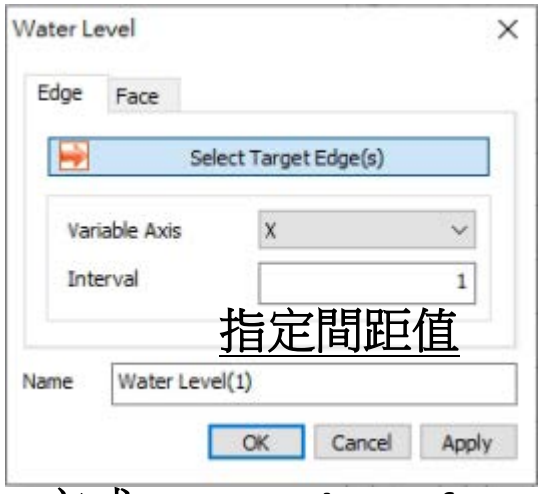
Reference

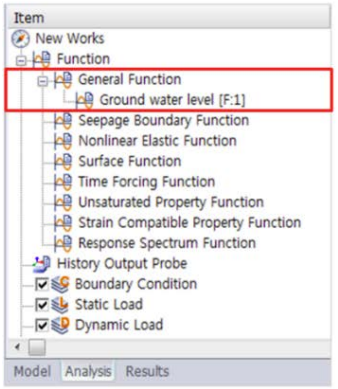
GTS NX & FEA NX Manual

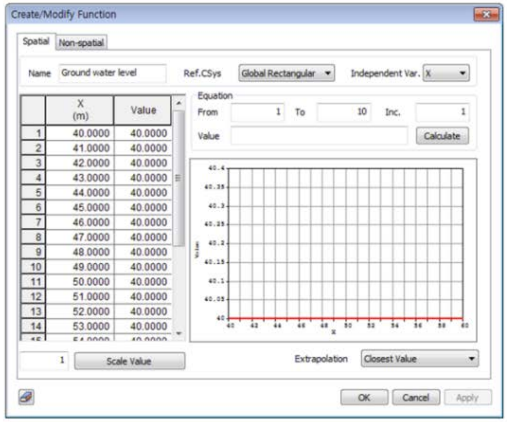
Water Level Function



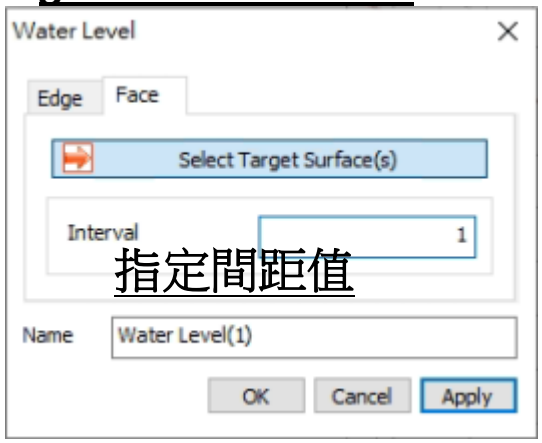
方式1.Edge:Create a changing groundwater level by selecting edges.

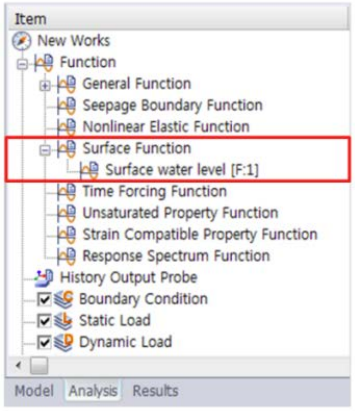


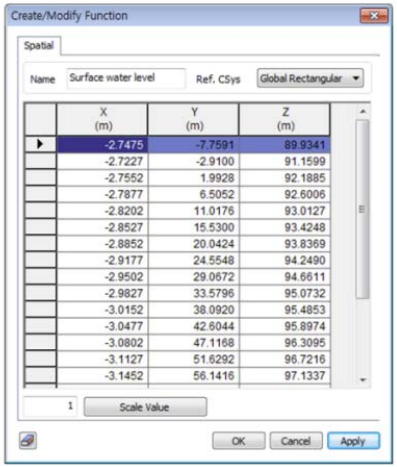




方式2.Face:Select a face and input the spacing value to create a changing groundwater level.







GTS NX_標準教學系列

2D路堤施工階段分析

台灣邁達斯

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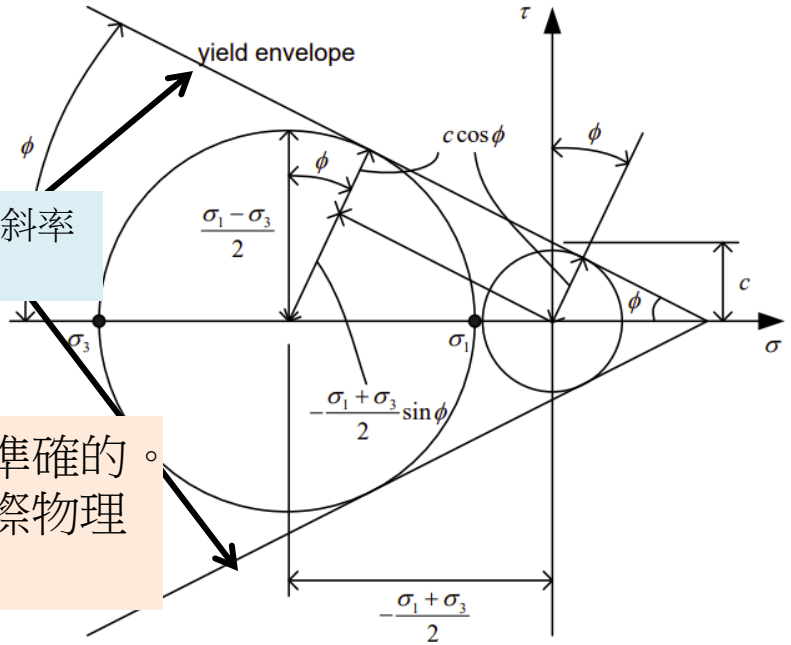

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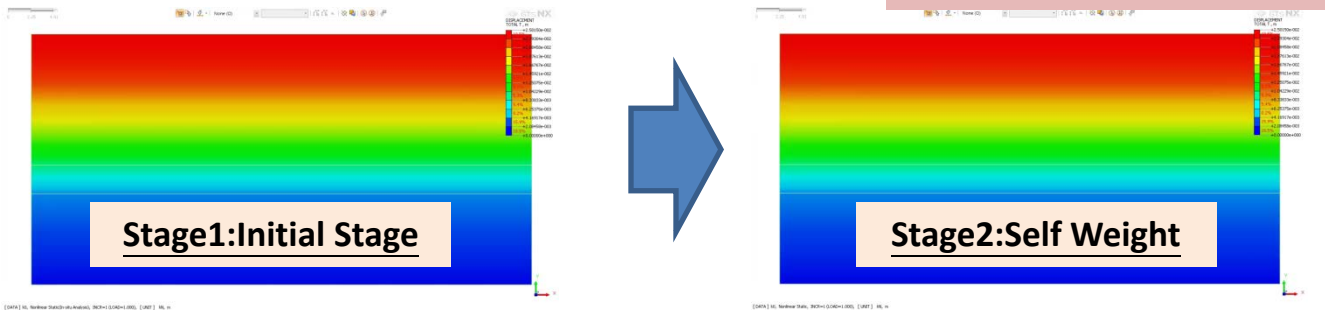

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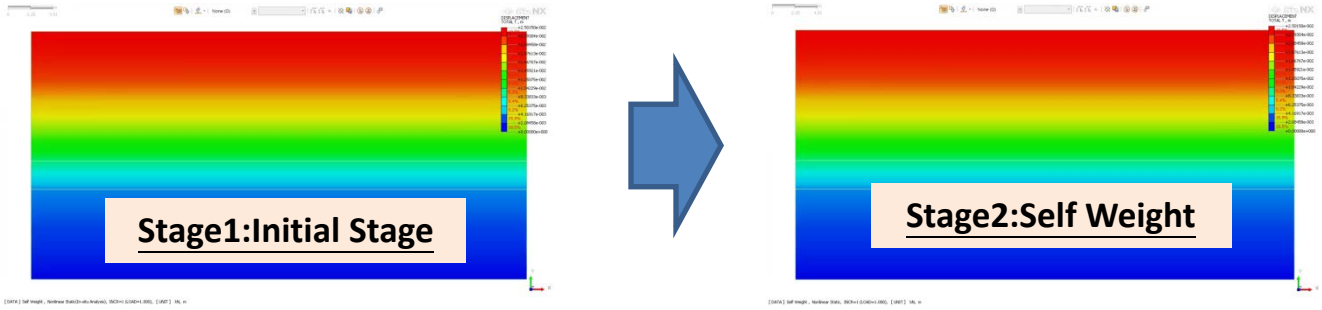

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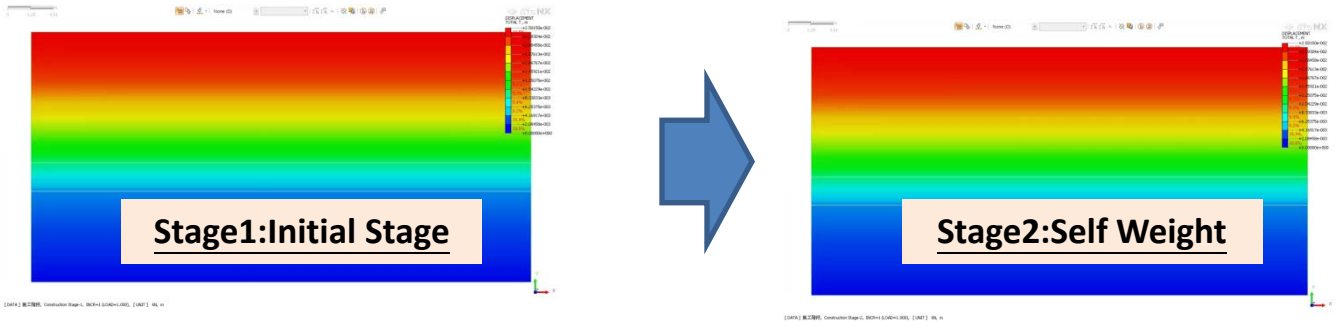

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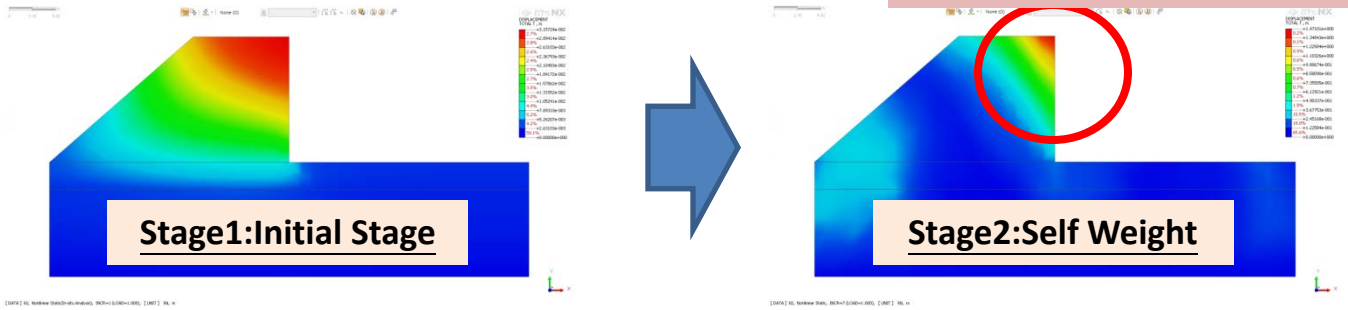

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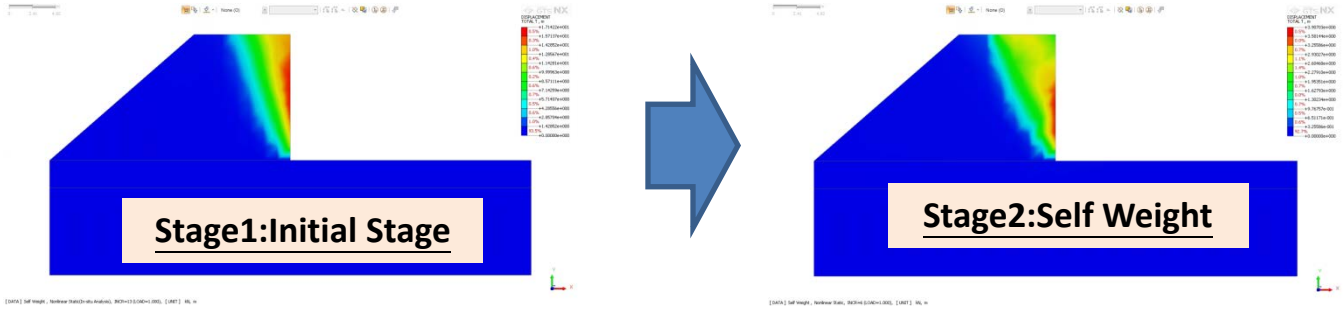

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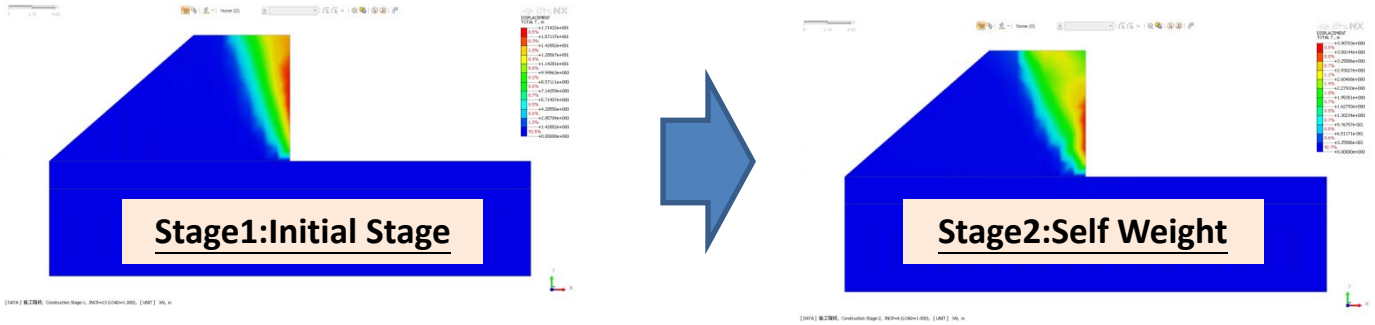

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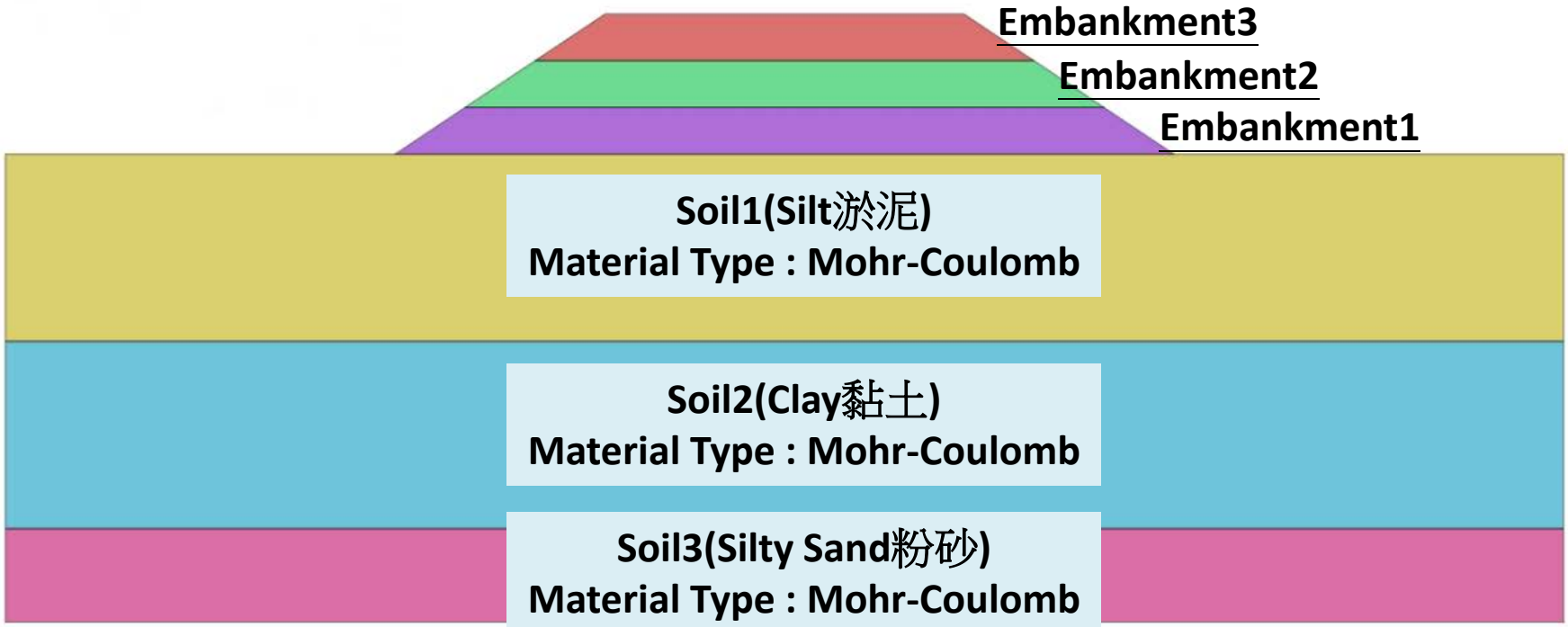
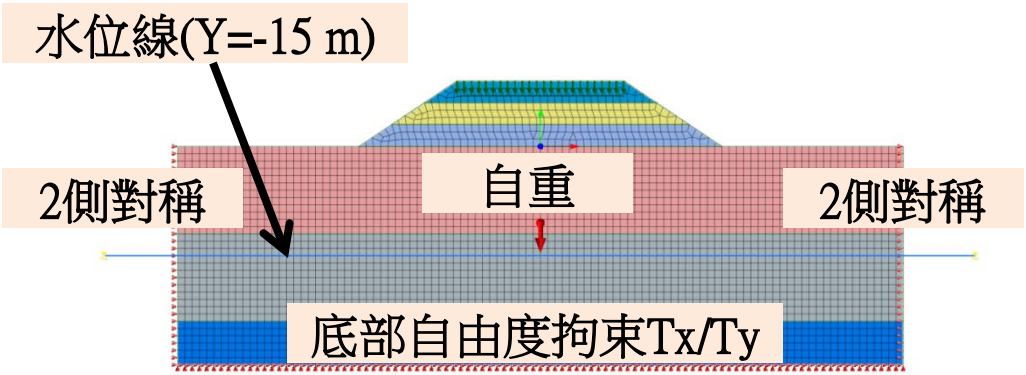
分析說明-材料模型

Embank1~Embank3(Sand砂)
Material Type : Mohr-Coulomb

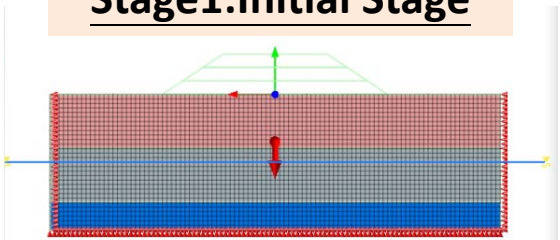


註:範例相關參數使用假設條件。

分析說明-施工流程

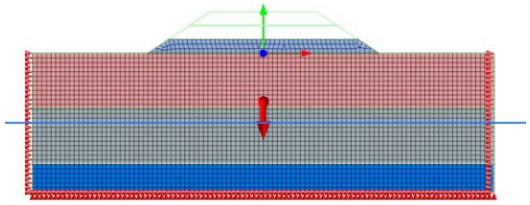


Stage1:Initial Stage



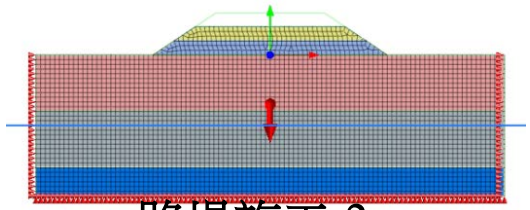
施加自重，計算地表現地情況。

Stage2:Embankment-1



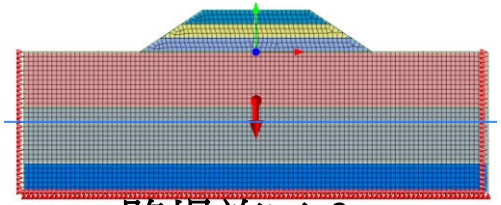
路堤施工-1 。

Stage3:Embankment-2



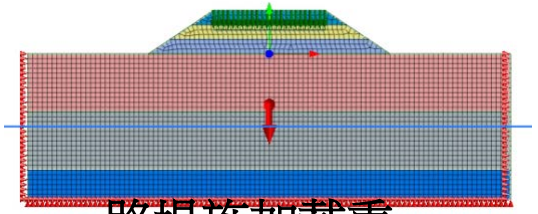
路堤施工-2 。

Stage4:Embankment-3



路堤施工-3 。

Stage5:Pressure

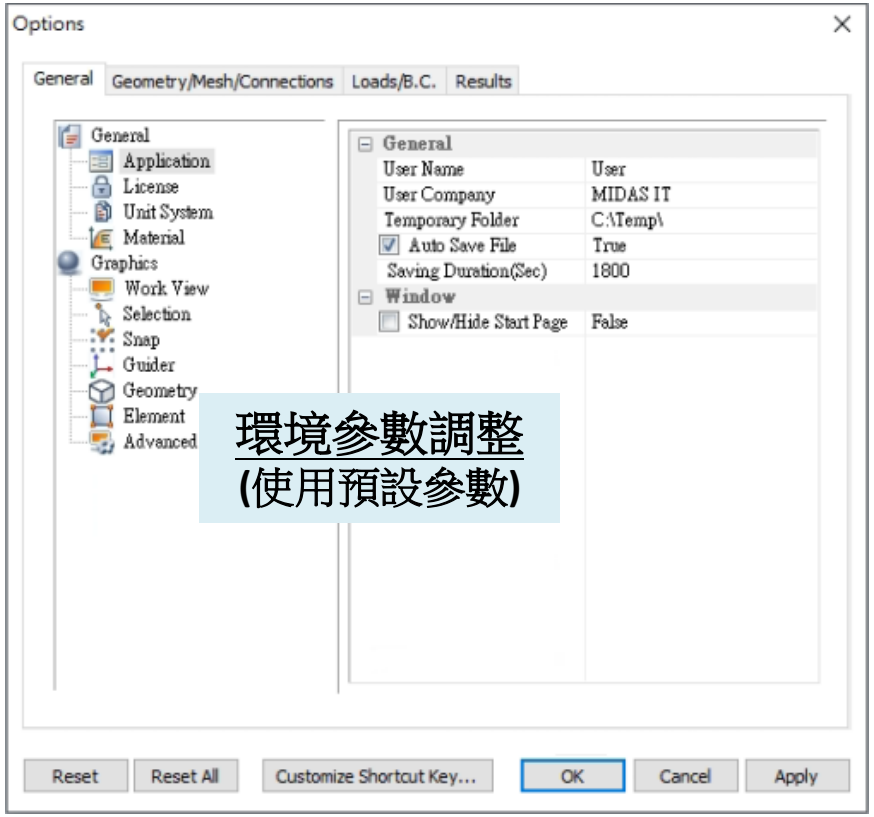


路堤施加載重。

註:範例相關參數使用假設條件。

環境

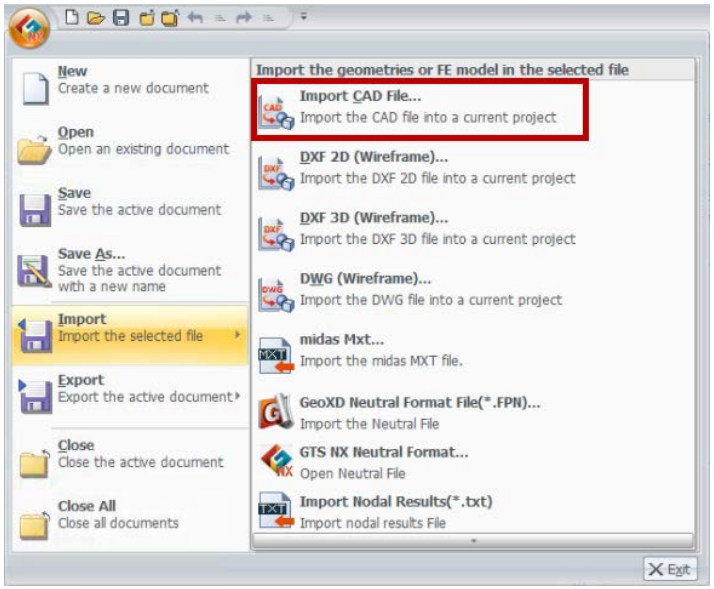
新文件

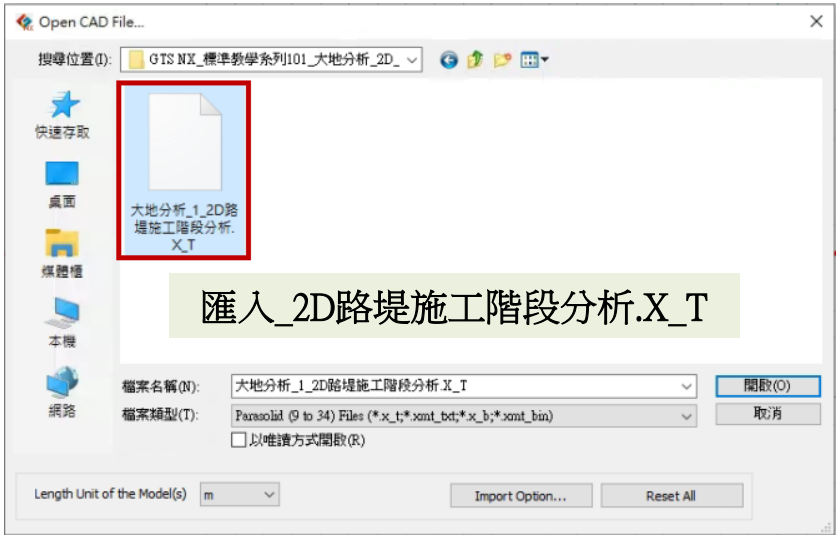


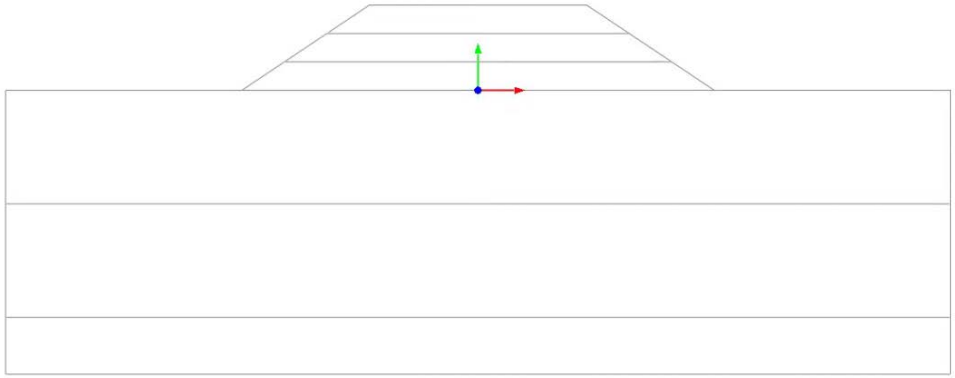
環境參數調整
(使用預設參數)

單位使用tonf/m/J/sec

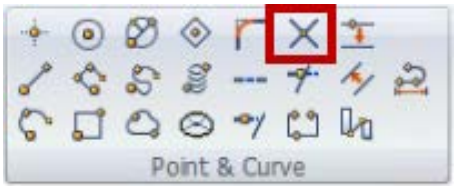
2D模型匯入

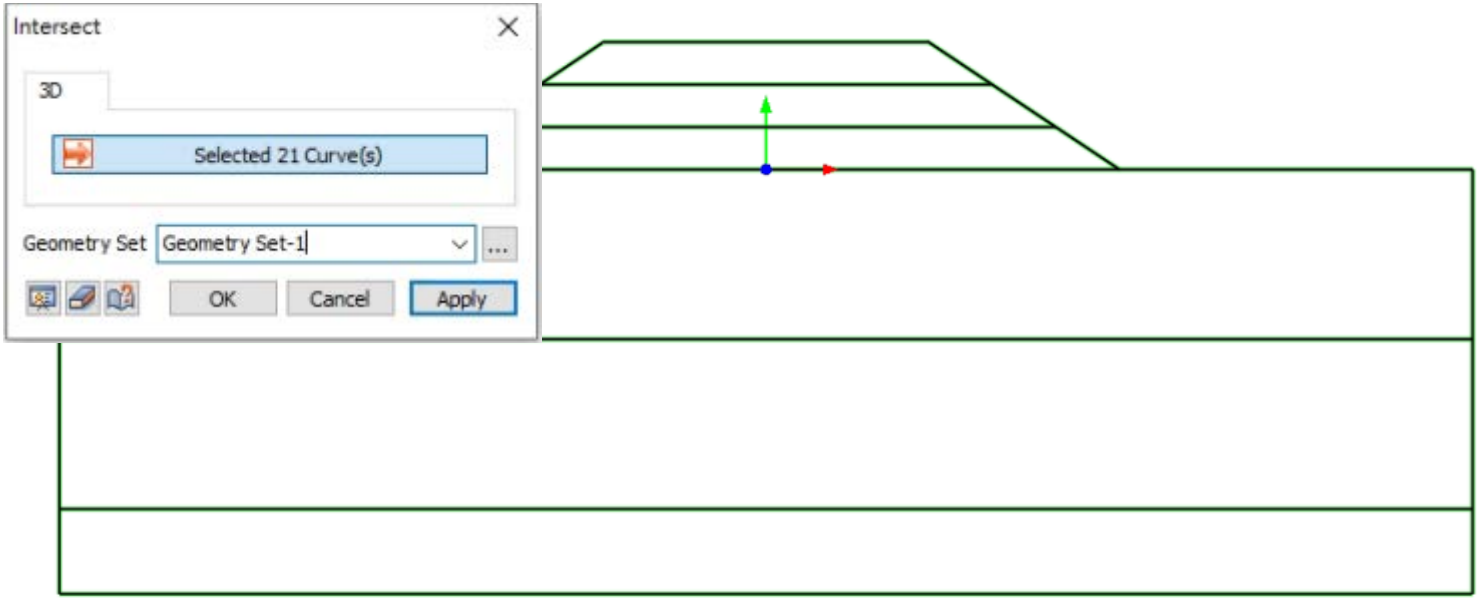

New
Create a new document
Open
Open an existing document
Save
Save the active document
Save As...
Save the active document with a new name
Import
Import the selected file
Export
Export the active document
Close
Close the active document
Close All
Close all documents
Import the geometries or FE model in the selected file
Import CAD File...
Import the CAD file into a current project
DXF 2D (Wireframe)...
Import the DXF 2D file into a current project
DXF 3D (Wireframe)...
Import the DXF 3D file into a current project
DWG (Wireframe)...
Import the DWG file into a current project
midas Mxt...
Import the midas MXT file.
GeoXD Neutral Format File(*.FPN)...
Import the Neutral File
GTS NX Neutral Format...
Open Neutral File
Import Nodal Results(*.txt)
Import nodal results File
Exit


Open CAD File...
搜尋位置(I):
GTS NX_標準教學系列101_大地分析_2D_
快速存取
桌面
媒體櫃
本機
網路
大地分析_1_2D路堤施工階段分析.X_T
匯入_2D路堤施工階段分析.X_T
檔案名稱(N):
大地分析_1_2D路堤施工階段分析.X_T
檔案類型(T):
Parasolid (9 to 34) Files (*.x_t;*.xmt_txt;*.x_b;*.xmt_bin)
以唯讀方式開啟(R)
開啟(O)
取消
Length Unit of the Model(s)
m
Import Option...
Reset All

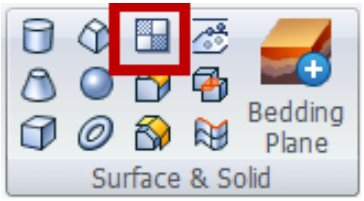


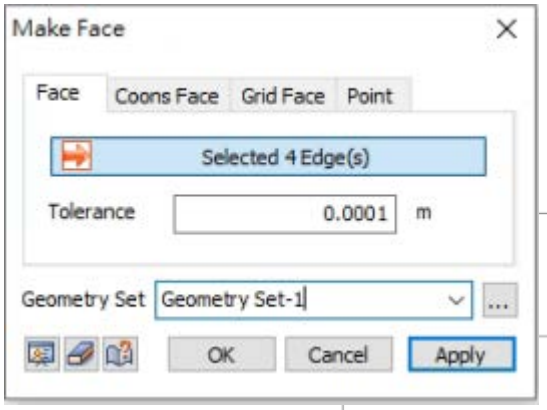
特徵線交叉


Point & Curve

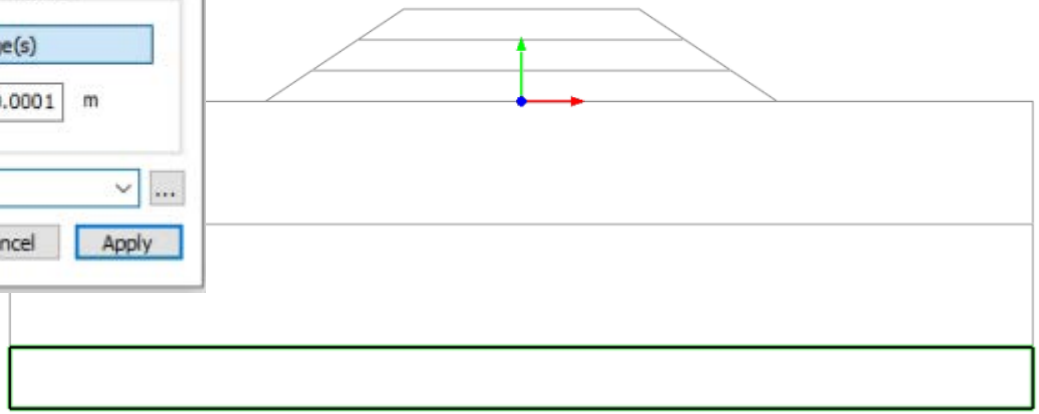

Intersect
3D
Selected 21 Curve(s)
Geometry Set
Geometry Set-1
OK
Cancel
Apply

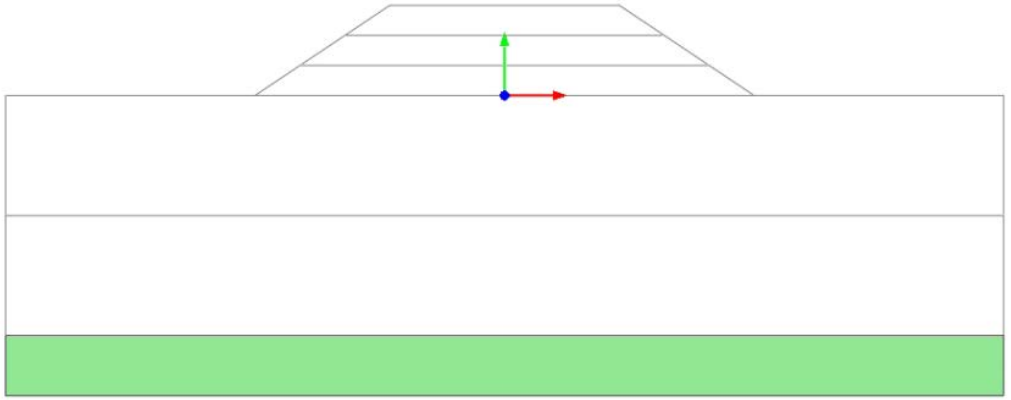
面特徵建立-1





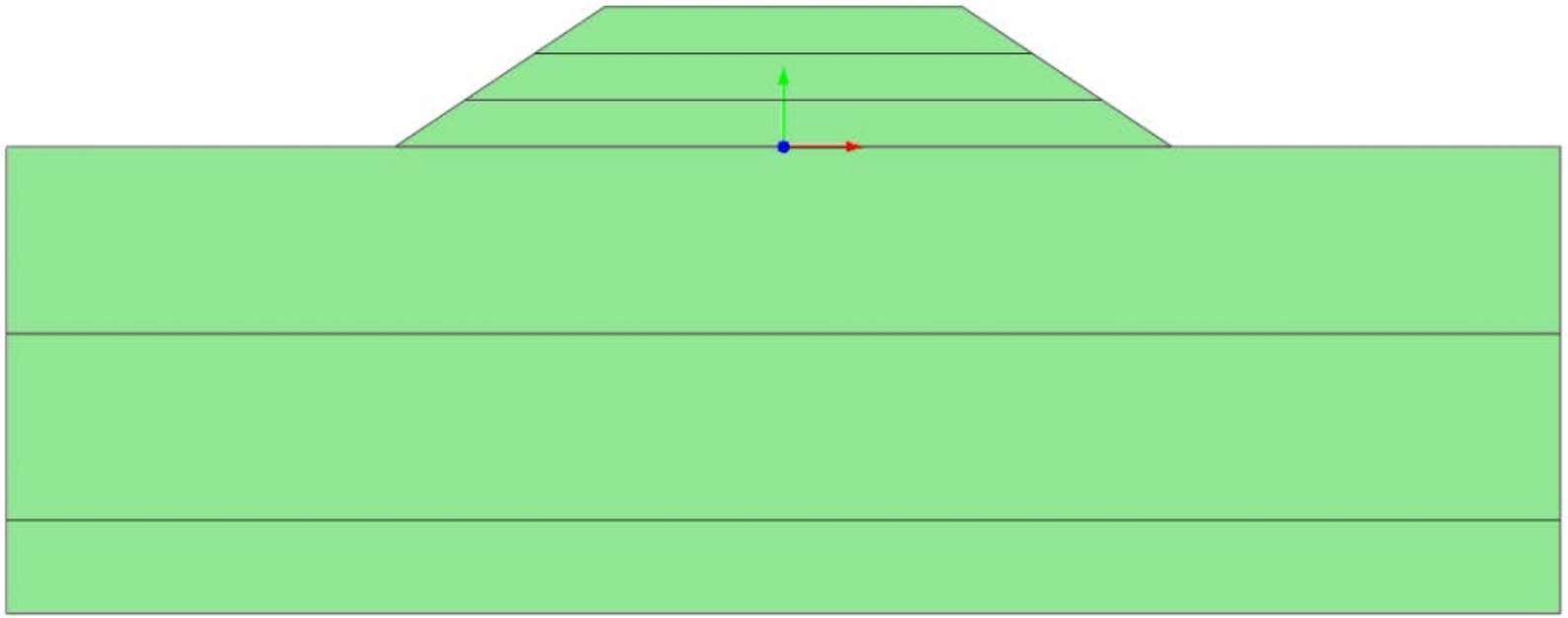
選擇封閉線特徵



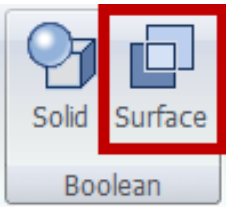


面特徵建立-2

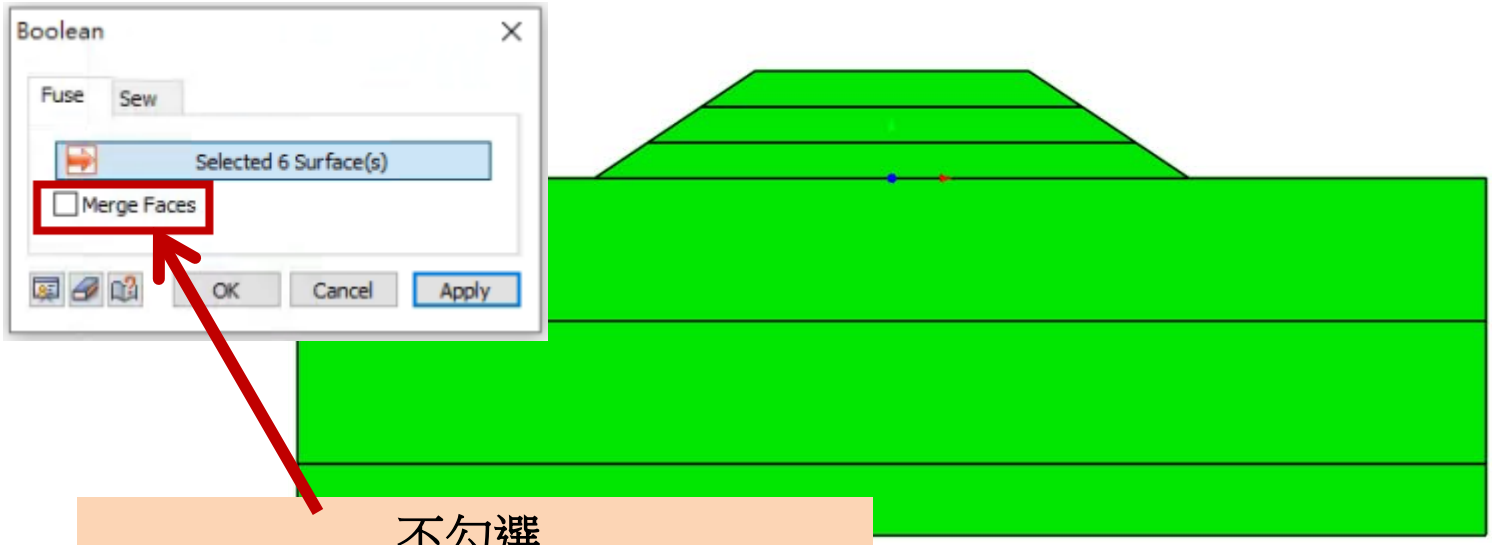
依序完成其它特徵面建立



合併面特徵

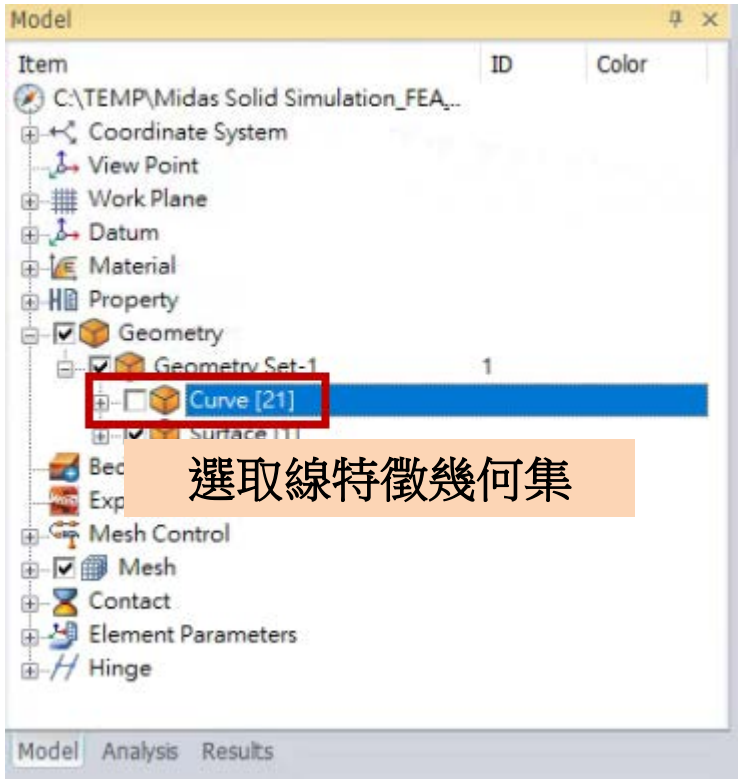


框選所有面特徵

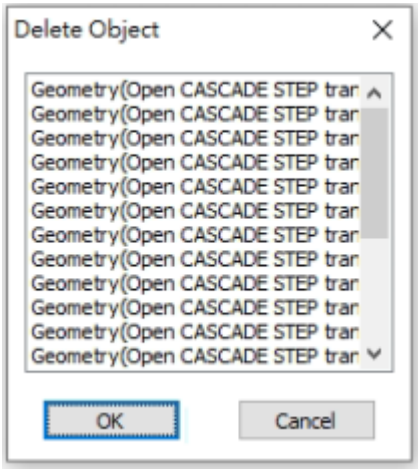


不勾選
(勾選Merge Faces,共線特徵不會保留)

刪除線幾何特徵

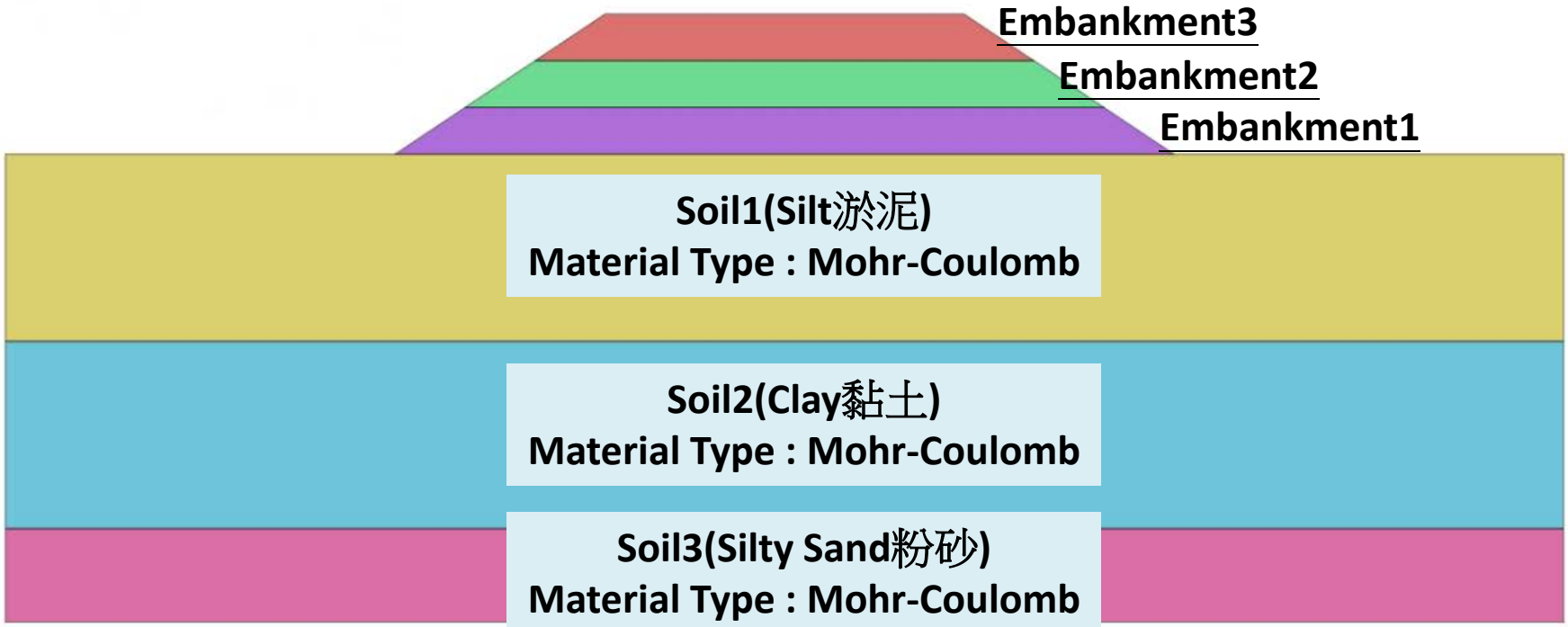


鍵盤DELETE

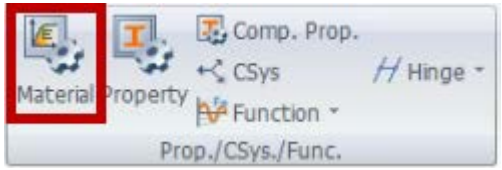


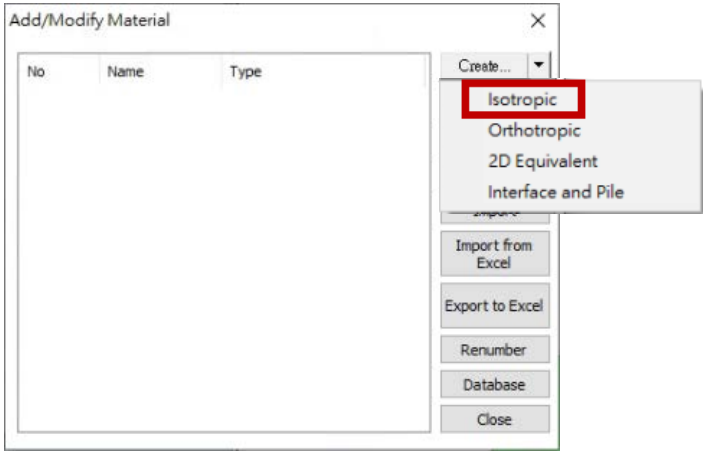
分析說明-材料模型

Embank1~Embank3(Sand砂)
Material Type : Mohr-Coulomb

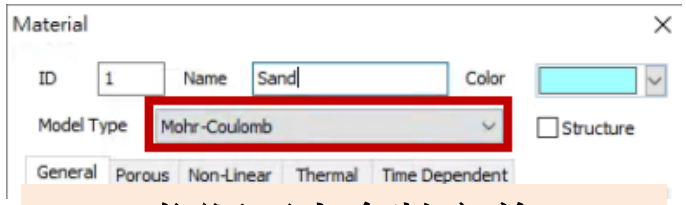


材料





Model Type : Mohr-Coulomb
不勾選Structure

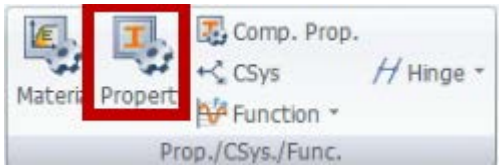


依照下表參數定義
General/Porous/Non-linear

	Modulus of Elasticity(E) ($tonf/m^2$)	Poisson's Ratio(ν)	Unit Weight(γ) ($tonf/m^3$)	K0	Unit Weight (Saturated) (KN/m^3)	Cohesion(C) (KN/m^2)	Friction Angle(ϕ)	Tensile Strength ($tonf/m^2$)
Sand	3000	0.3	1.8	1	1.9	1.0	33	1.0
Silt	1000	0.35	1.7	1	1.8	2.0	20	2.0
Clay	600	0.35	1.6	1	1.7	3.0	10	3.0
Silty Sand	2000	0.3	1.8	1	1.9	1.0	30	1.0

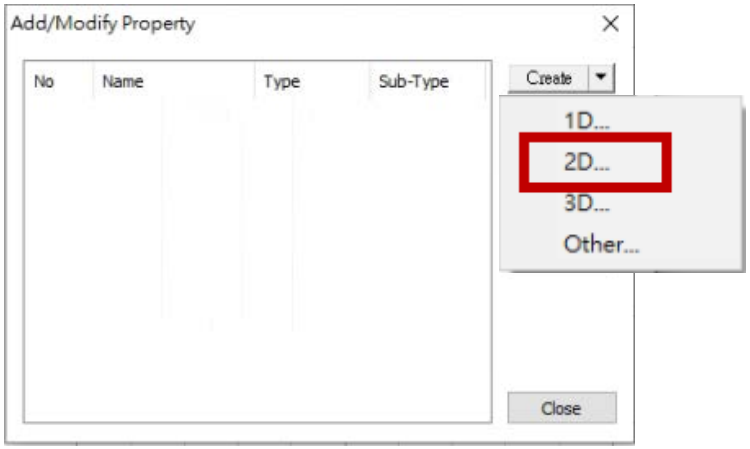
註:範例相關參數使用假設條件。

屬性-2D Plane Strain

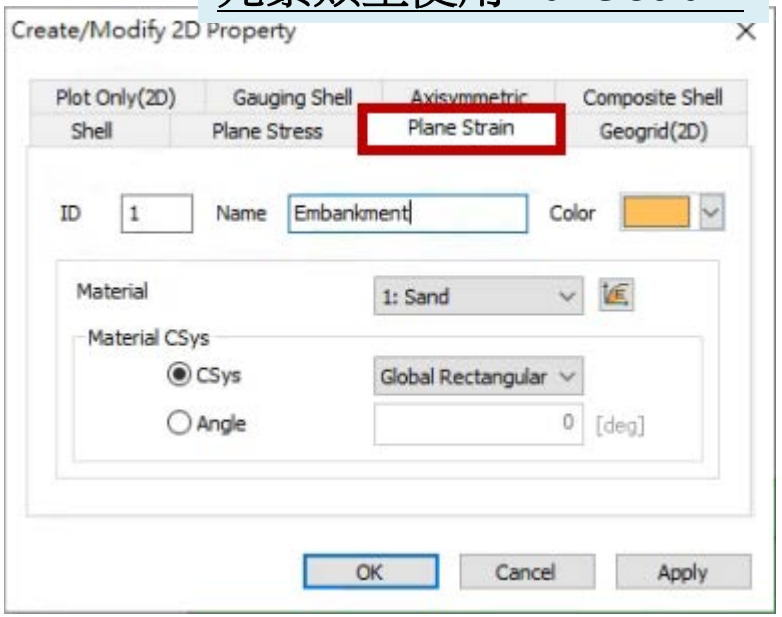


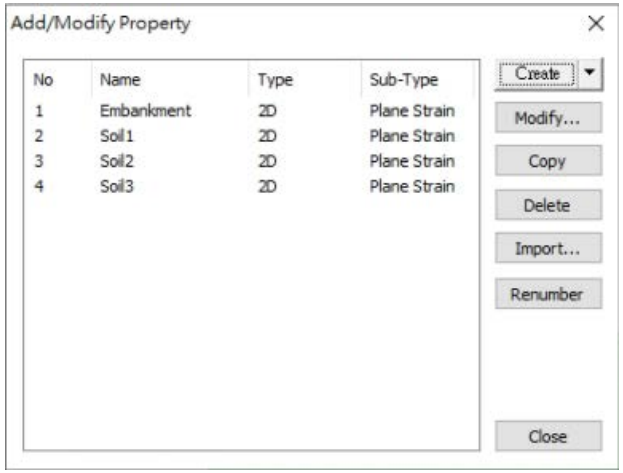
依序新增

Embankment/Material: Sand
Soil1/Material: Silt
Soil2/Material: Clay
Soil3/Material: Silty Sand

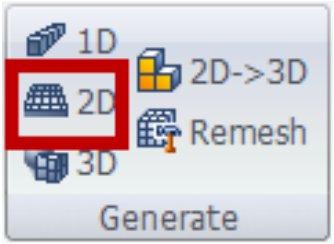


元素類型使用**Plane Strain**

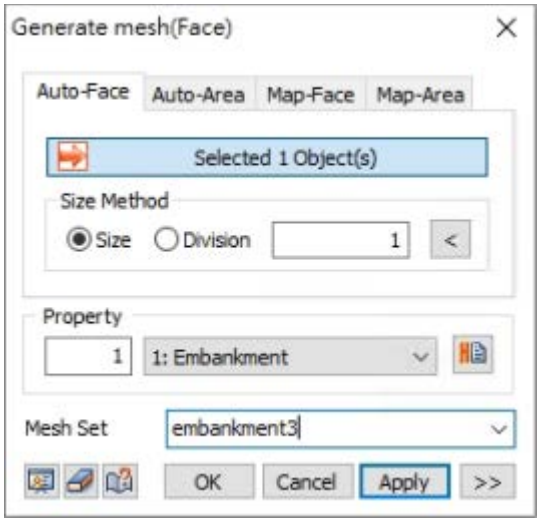




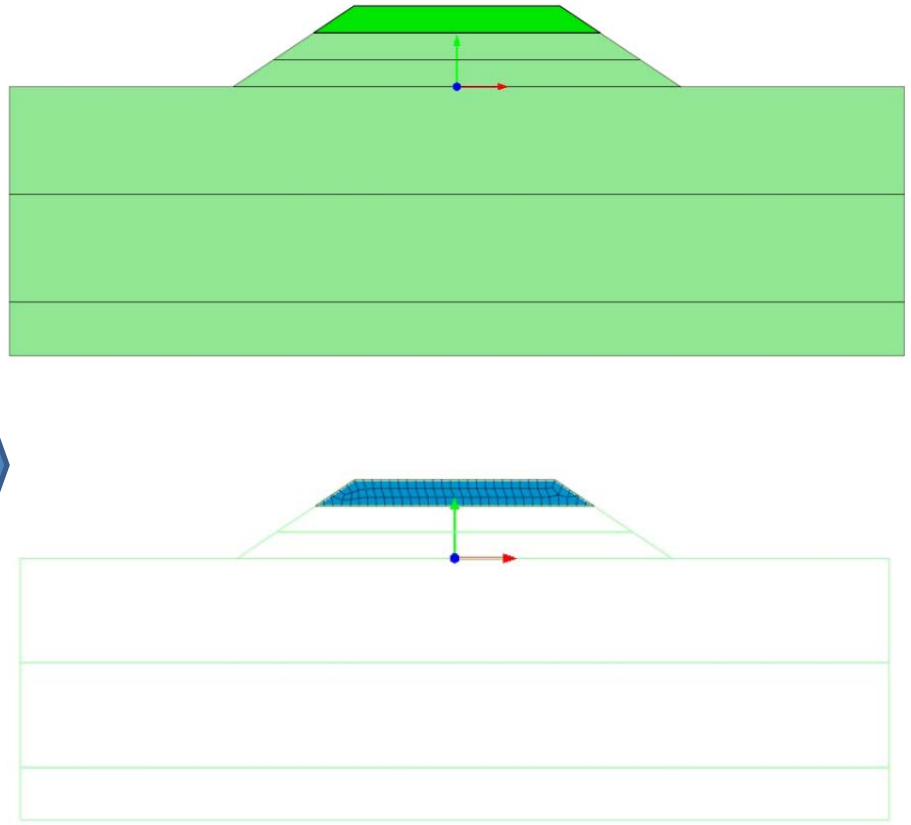
2D網格生成-1



網格尺寸: 1/屬性-Embankment



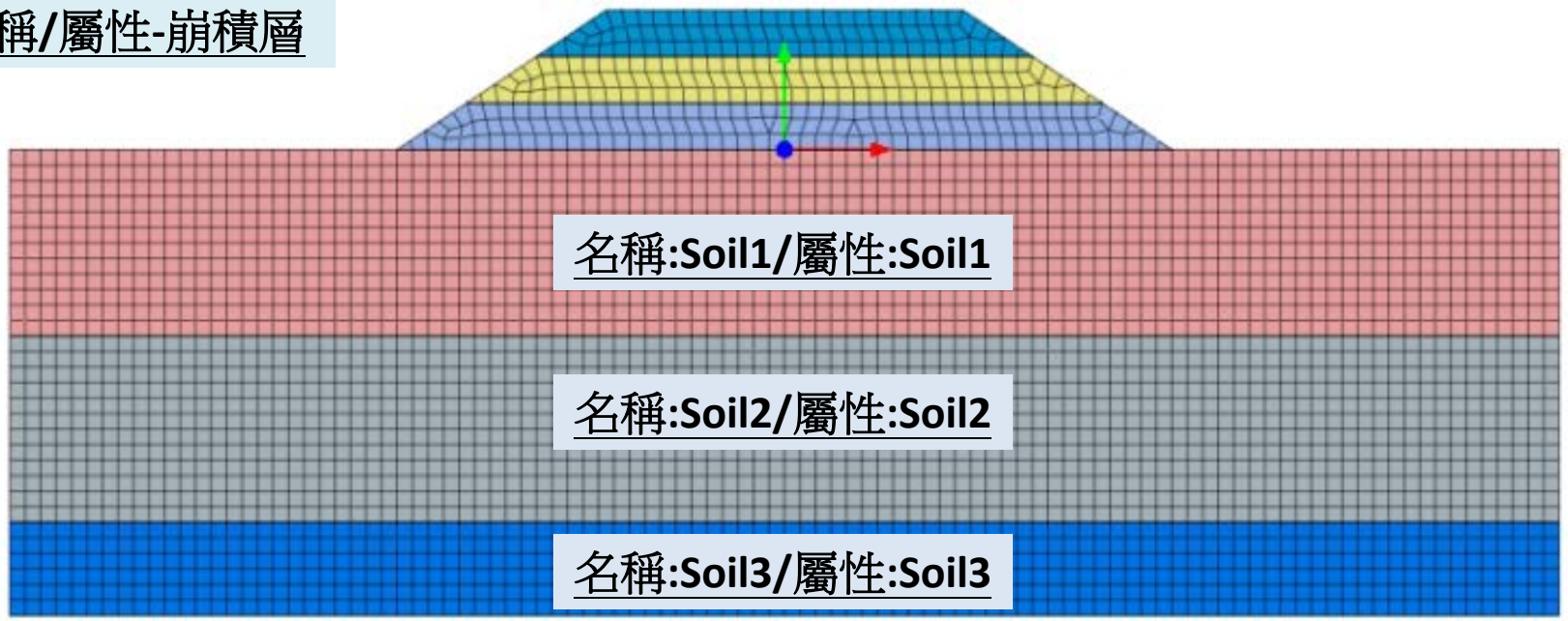
自訂網格集名稱-Embankment3



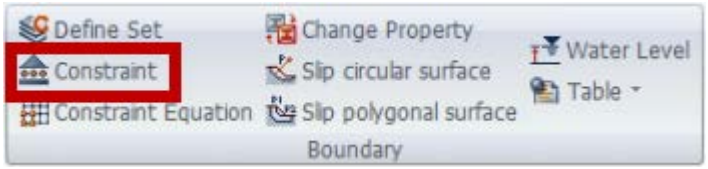
2D網格生成-2

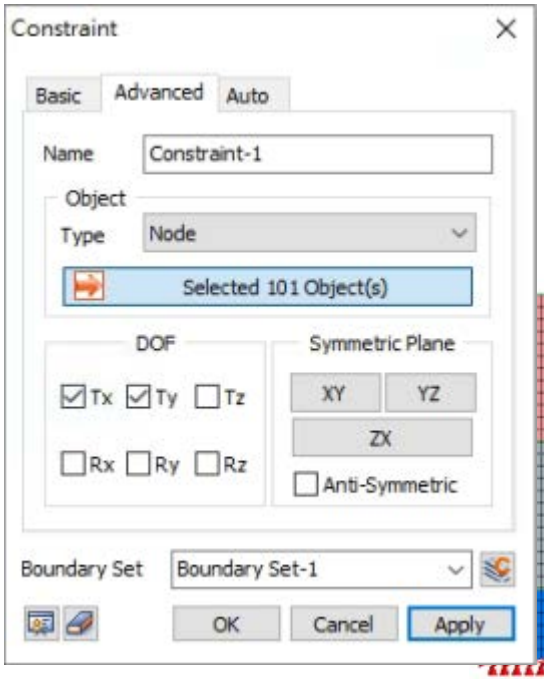
依序完成其它特徵網格生成/網格尺寸: 1

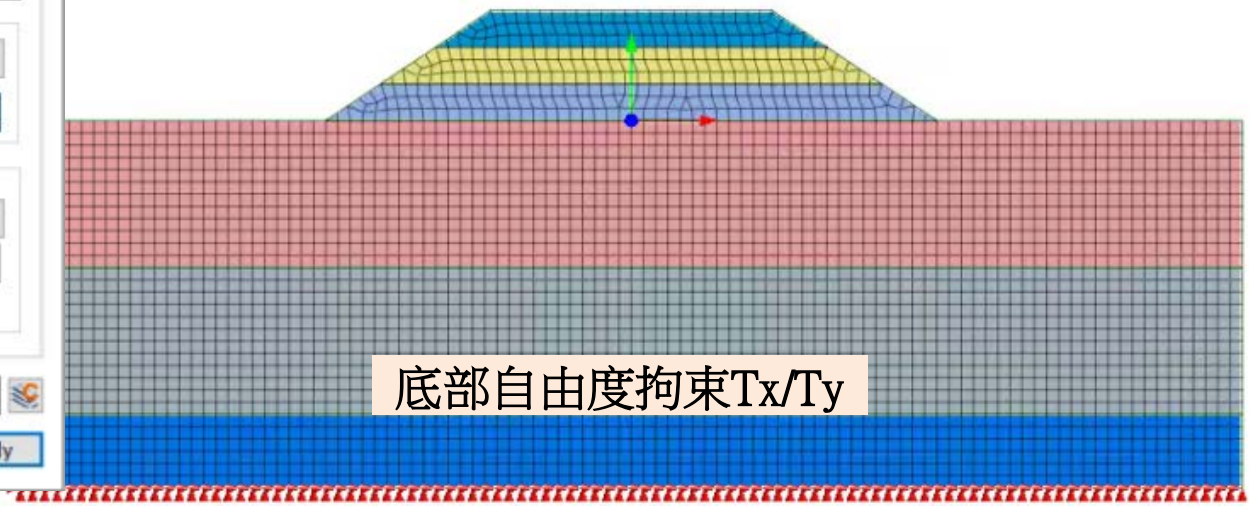
名稱/屬性-崩積層

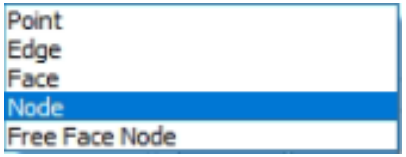


底部邊界



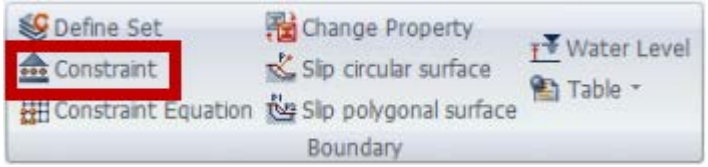


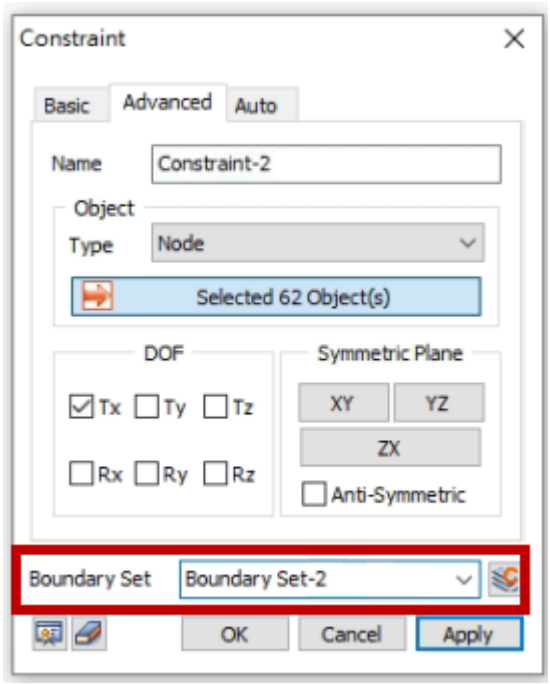


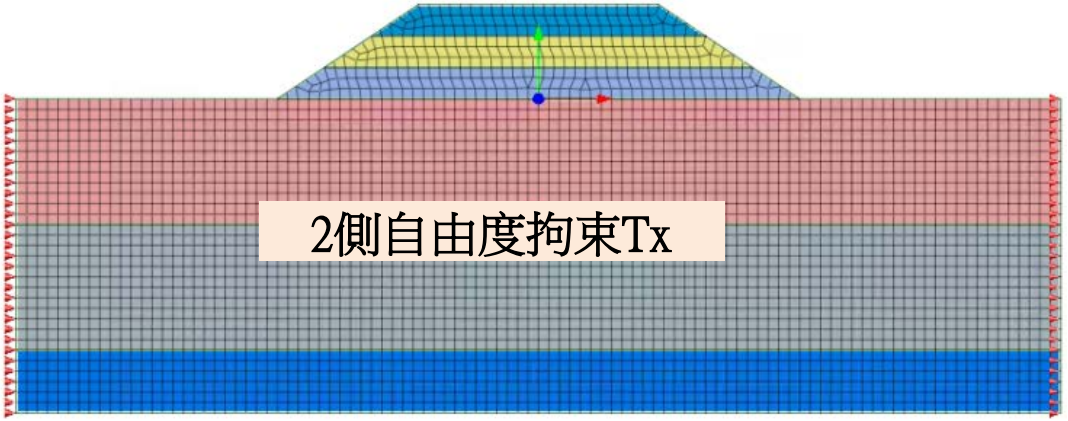


補充:元素和幾何特徵關聯性存在，邊界可以施加幾何特徵或節點。

對稱邊界



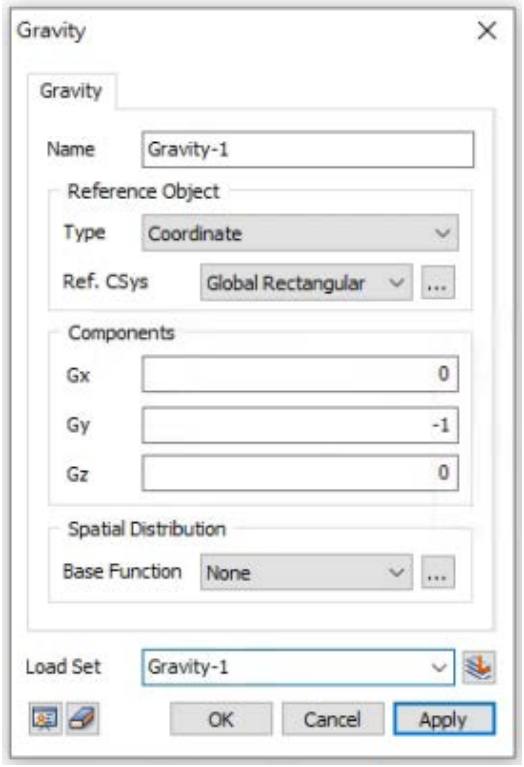


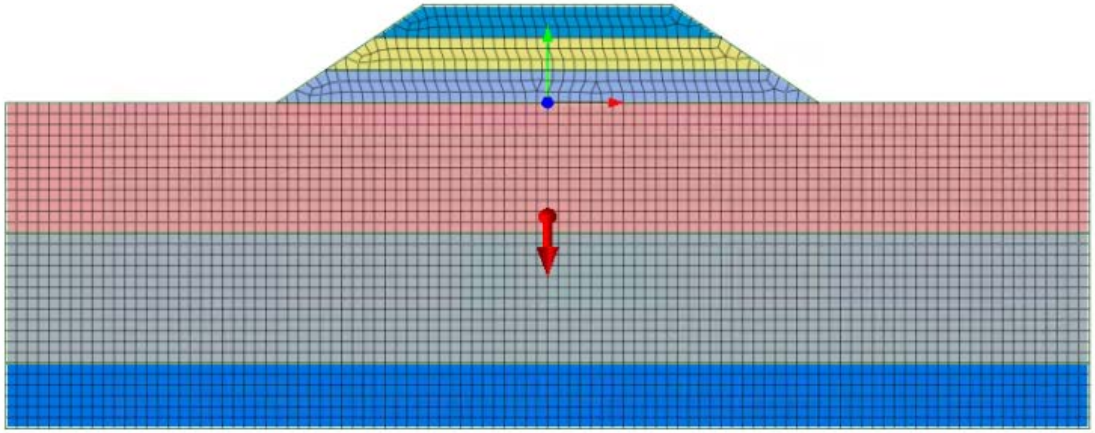


補充:建議不同邊界集使用不同邊界集名稱

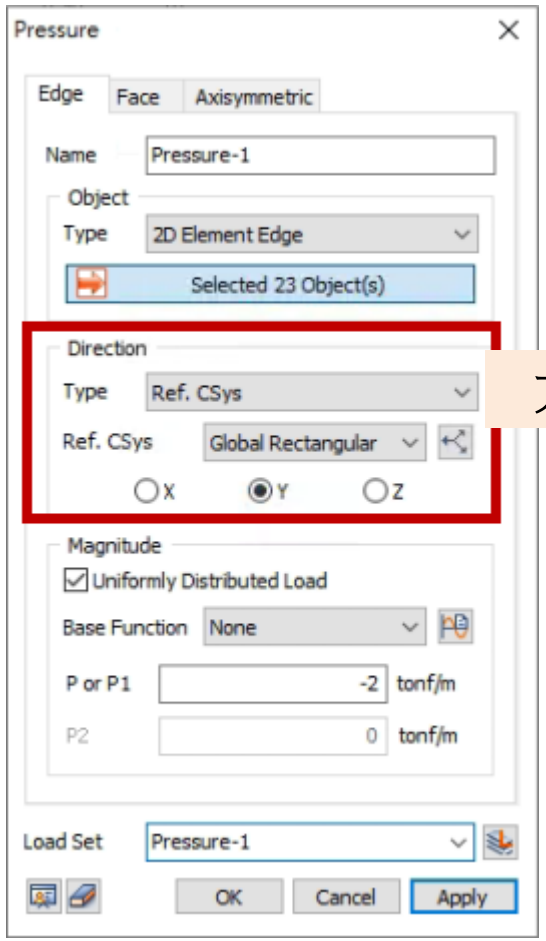
初始應力-自重


Self Weight
Force
Moment
Disp.
Press.
Water Pressure
Arbitrary Load
Beam Load
Nodal Temperature
Element Temperature
Temperature Gradient
Prestress
Initial Equilibrium Force
Define Set
Comb. Set
From Results
Contraction
Prescribed strain
Table
Load

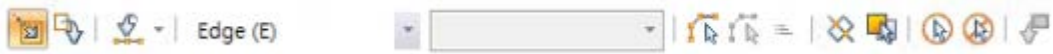

Gravity
Gravity
Name
Gravity-1
Reference Object
Type
Coordinate
Ref. CSys
Global Rectangular
Components
Gx
0
Gy
-1
Gz
0
Spatial Distribution
Base Function
None
Load Set
Gravity-1
OK
Cancel
Apply



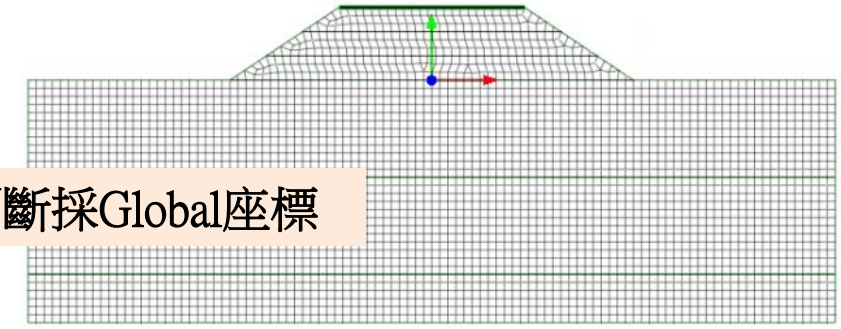
壓力荷載

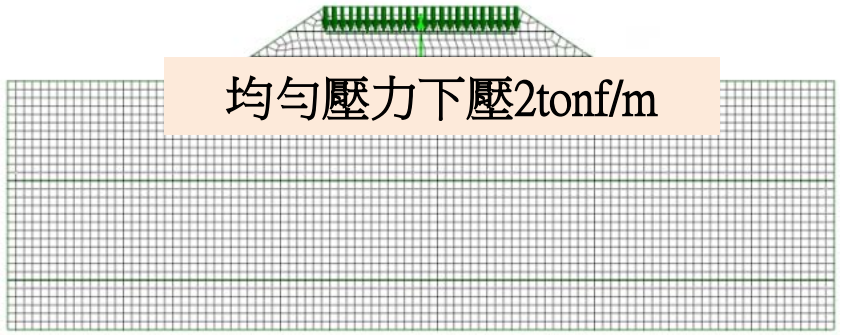


補充:建議使用線特徵選取**2D Element Edge**



方向判斷採Global座標

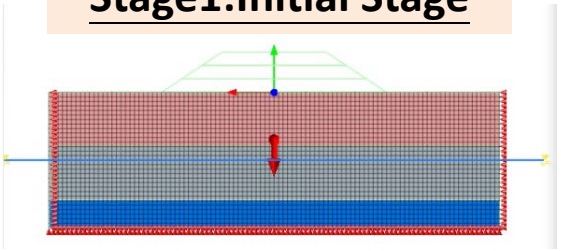




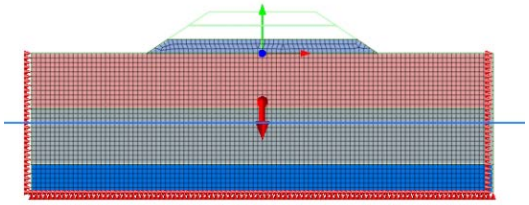
均勻壓力下壓2tonf/m

分析說明-施工流程

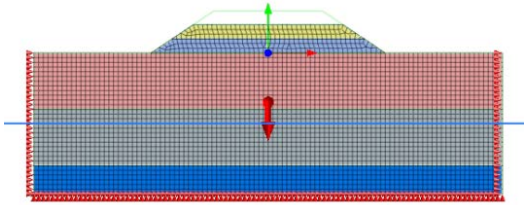
Stage1:Initial Stage



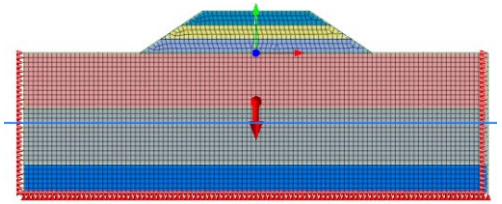
Stage2:Embankment-1



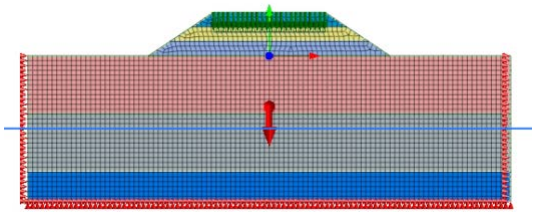
Stage3:Embankment-2



Stage4:Embankment-3

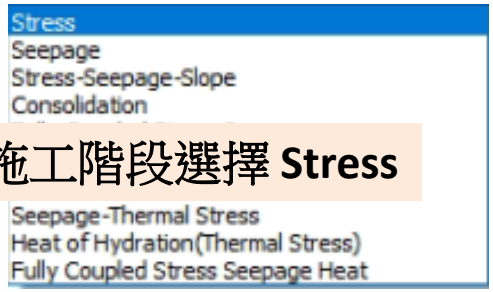


Stage5:Pressure

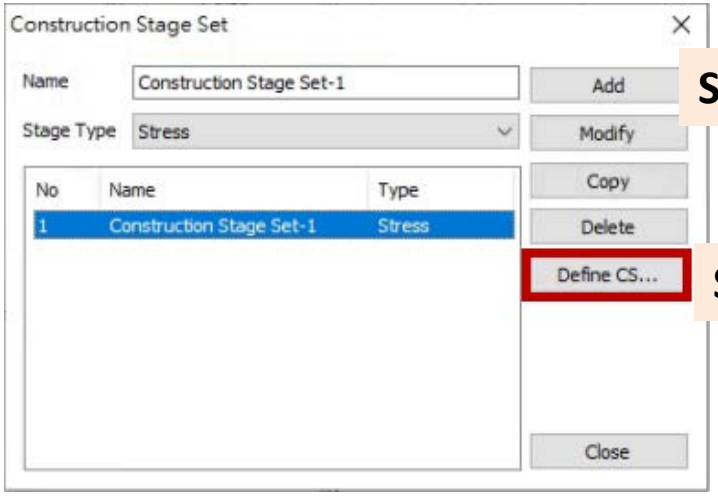


施工階段定義-1
(新增施工階段計算類型)

GTS NX提供多種施工階段類型

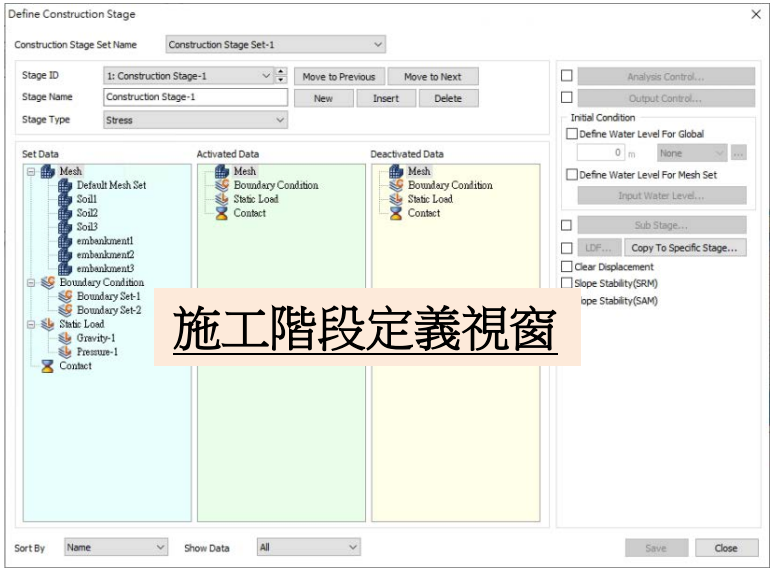


施工階段選擇 Stress



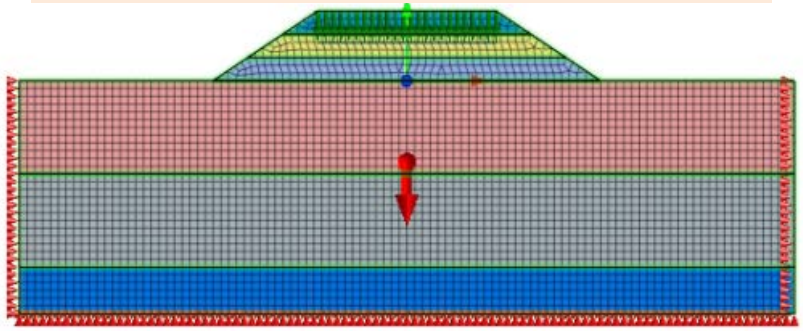
Step1.新增

Step2.編輯定義



施工階段定義視窗

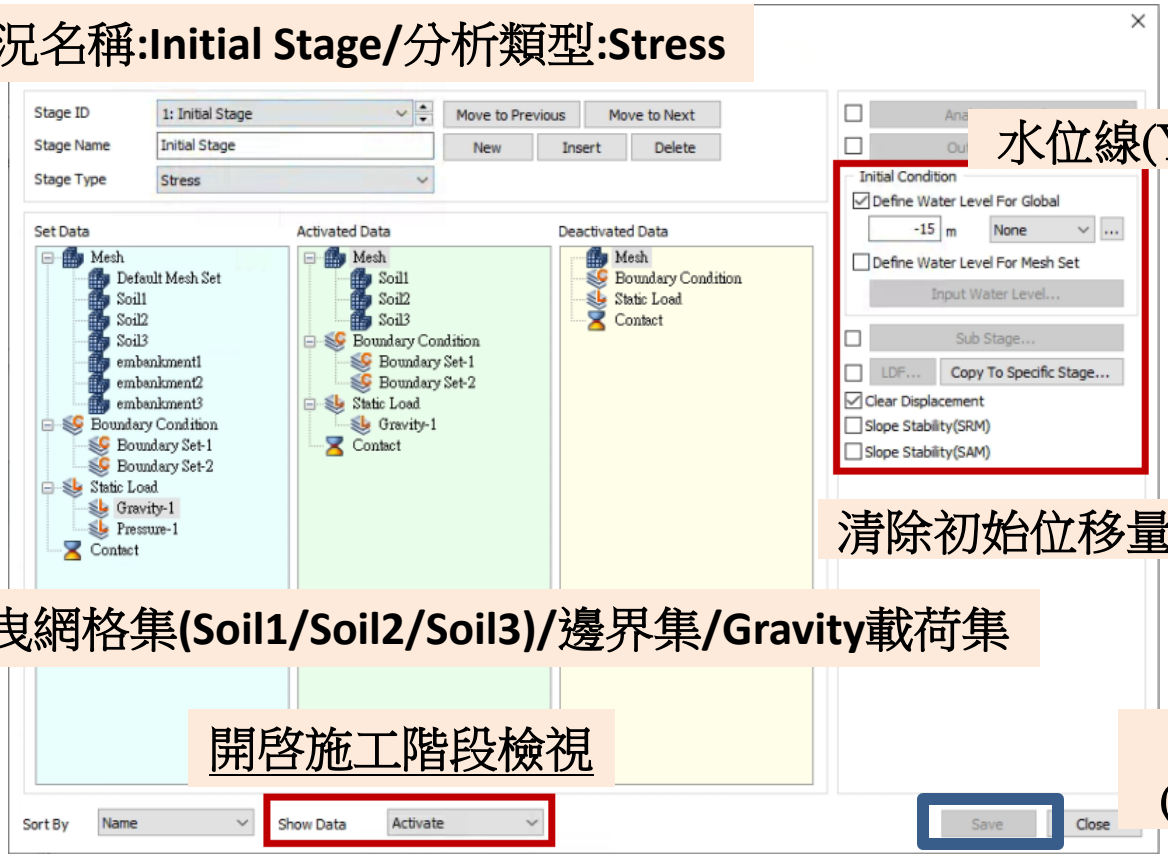
施工階段提供同步檢視
(顯示所有網格集/邊界集/載荷集)



施工階段定義-2

(施工階段1:Initial Stage)

訂義工況名稱:Initial Stage/分析類型:Stress



水位線(Y=-15 m)

清除初始位移量

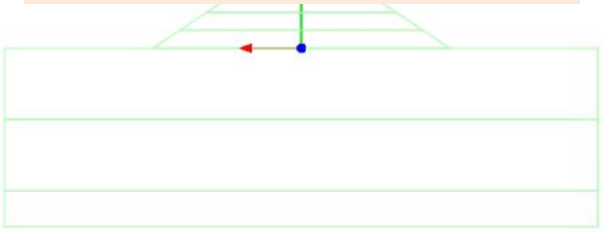
拖曳網格集(Soil1/Soil2/Soil3)/邊界集/Gravity載荷集

開啓施工階段檢視

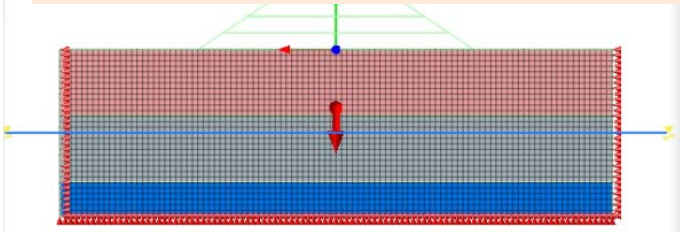
儲存

(定義後務必儲存)

操作畫面-未施加條件前



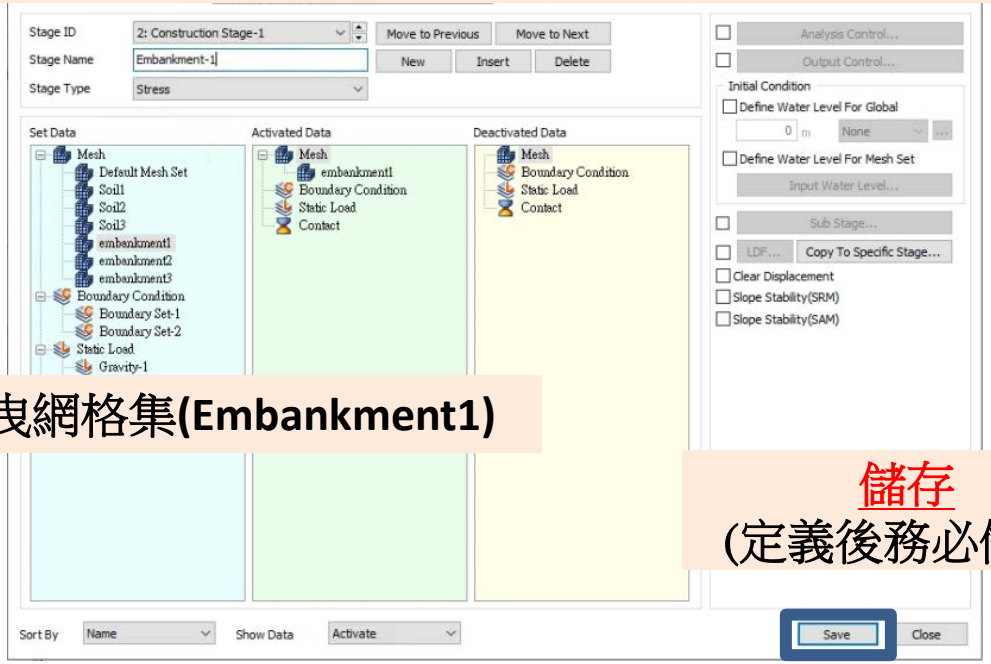
操作畫面-Initial Stage施工階段



施工階段定義-3

(施工階段2:Embankment-1)

新增分析類型:Stress/訂義工況名稱:Embankment-1

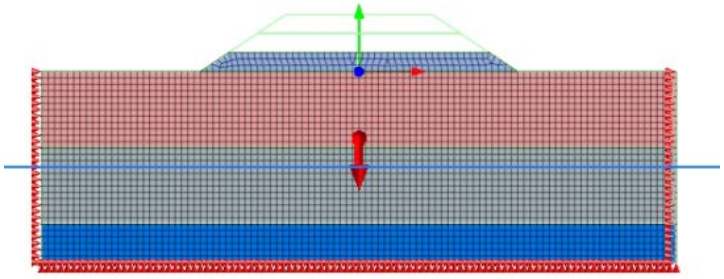


拖曳網格集(Embankment1)

儲存

(定義後務必儲存)

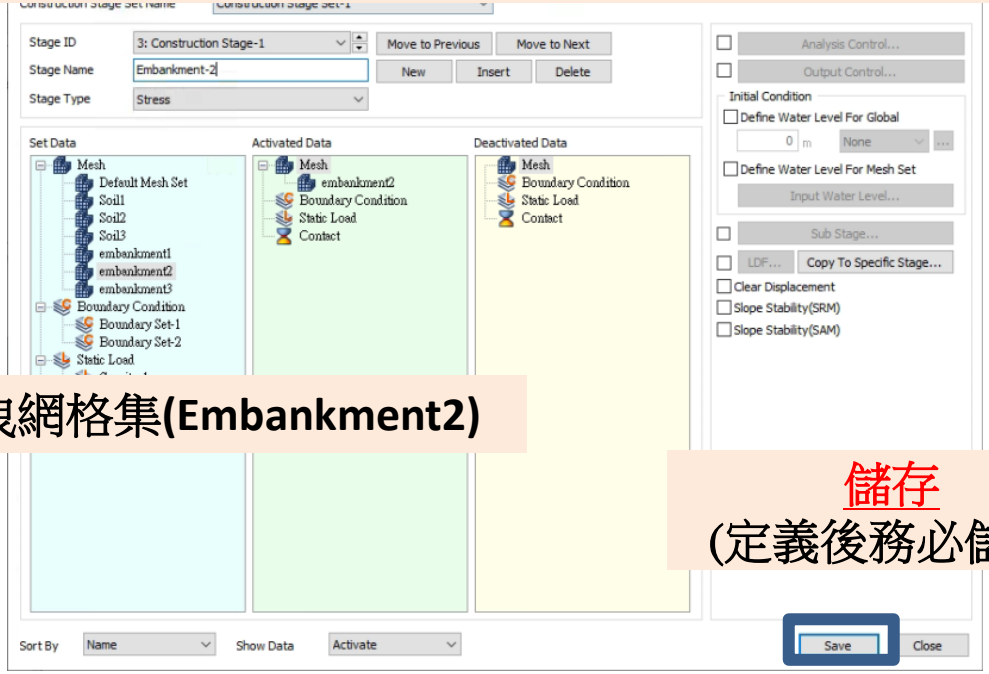
操作畫面-Embankment-1施工階段



施工階段定義-4

(施工階段3:Embankment-2)

新增分析類型:Stress/訂義工況名稱:Embankment-2

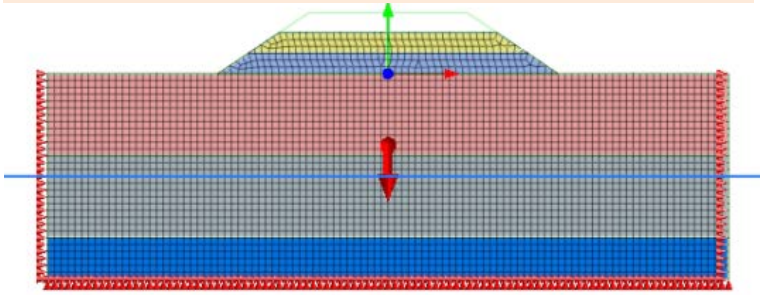


拖曳網格集(Embankment2)

儲存

(定義後務必儲存)

操作畫面-Embankment-2施工階段



施工階段定義-5

(施工階段4:Embankment-3)

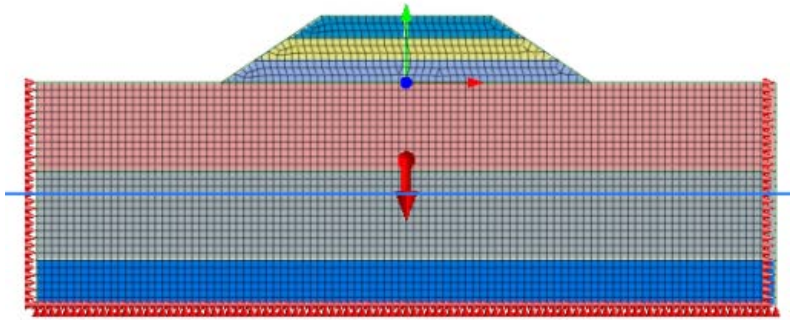
新增分析類型:Stress/訂義工況名稱:Embankment-3

拖曳網格集(Embankment3)

儲存

(定義後務必儲存)

操作畫面-Embankment-3施工階段



施工階段定義-6

(施工階段5:Pressure)

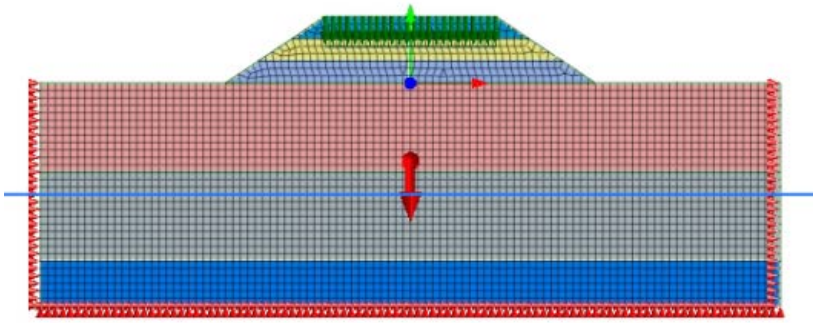
新增分析類型:Stress/訂義工況名稱:Pressure

拖曳載荷集 (Pressure)

儲存

(定義後務必儲存)

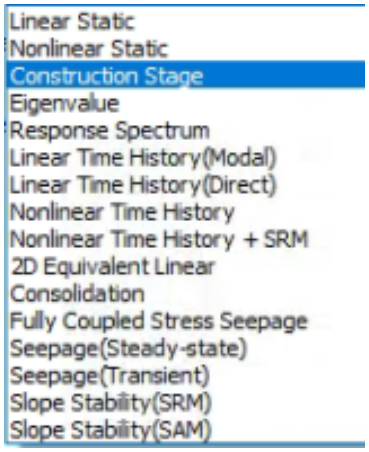
操作畫面-Pressure施工階段

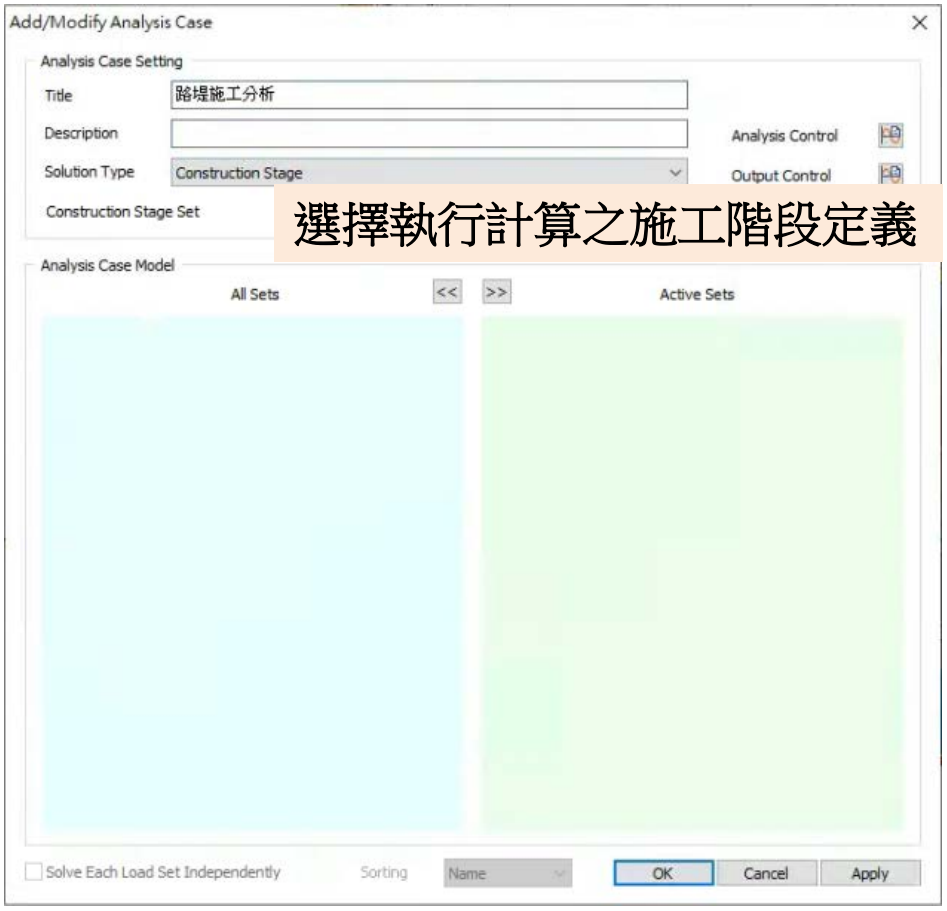


分析定義
(路堤施工分析)

分析名稱:路堤施工分析/分析類型:**Construction Stage**

Construction Stage

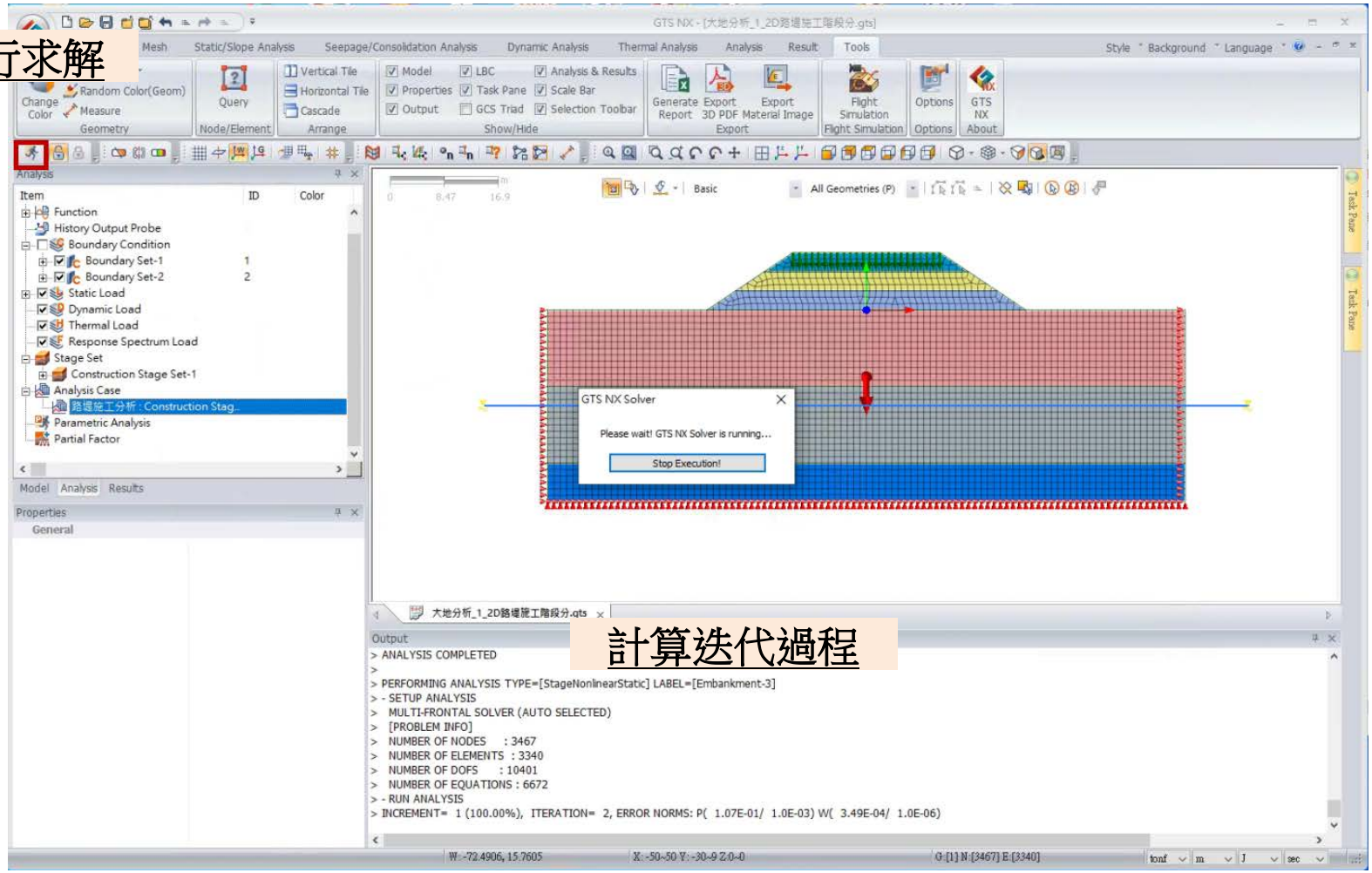




選擇執行計算之施工階段定義

計算

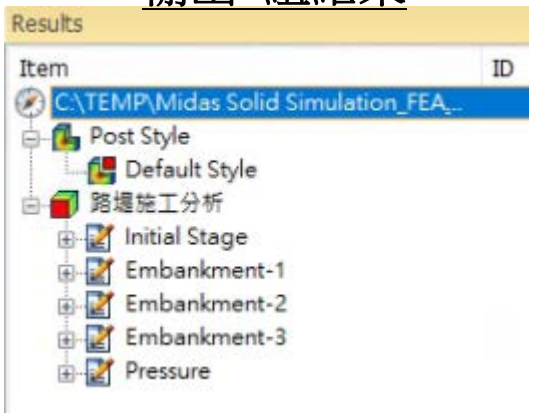
執行求解

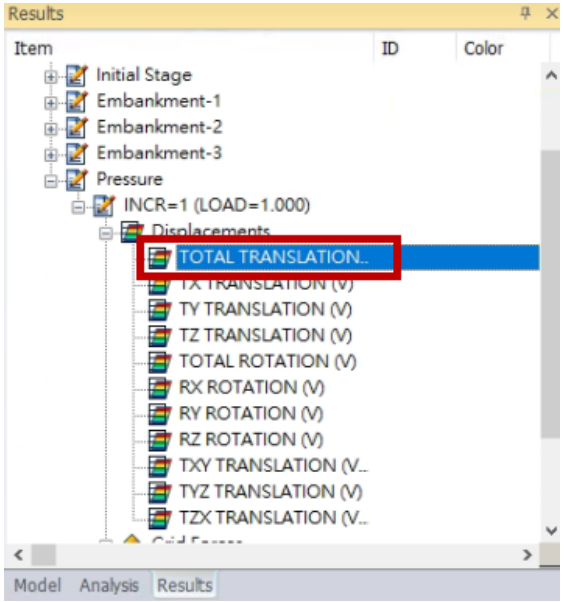


計算迭代過程

分析結果-1

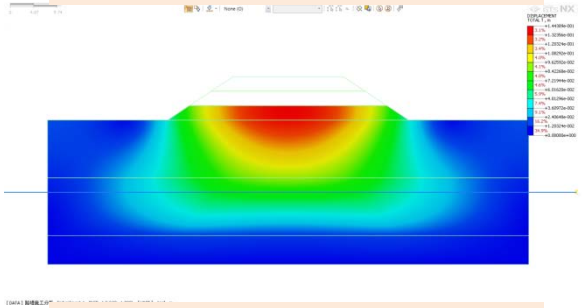
依照施工階段定義順序
輸出5組結果



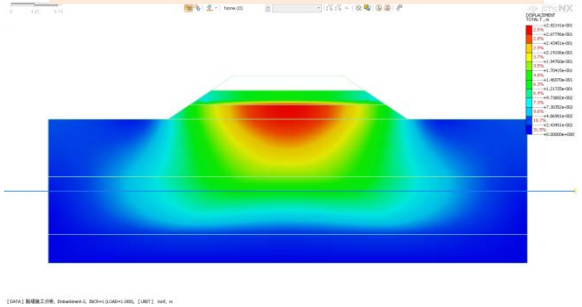


Stage1:Initial Stage

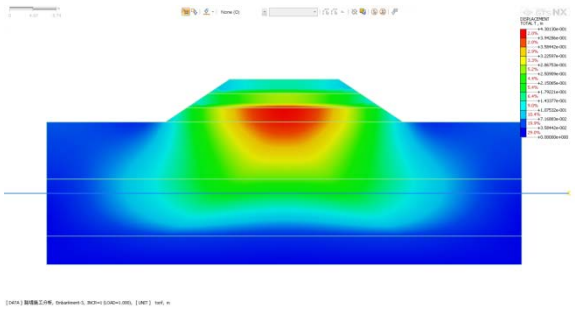
Stage2:Embankment-1



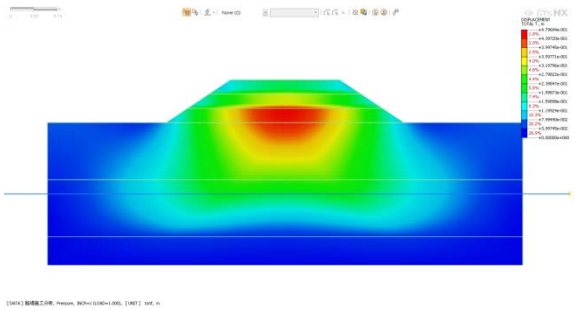
Stage3:Embankment-2



Stage4:Embankment-3



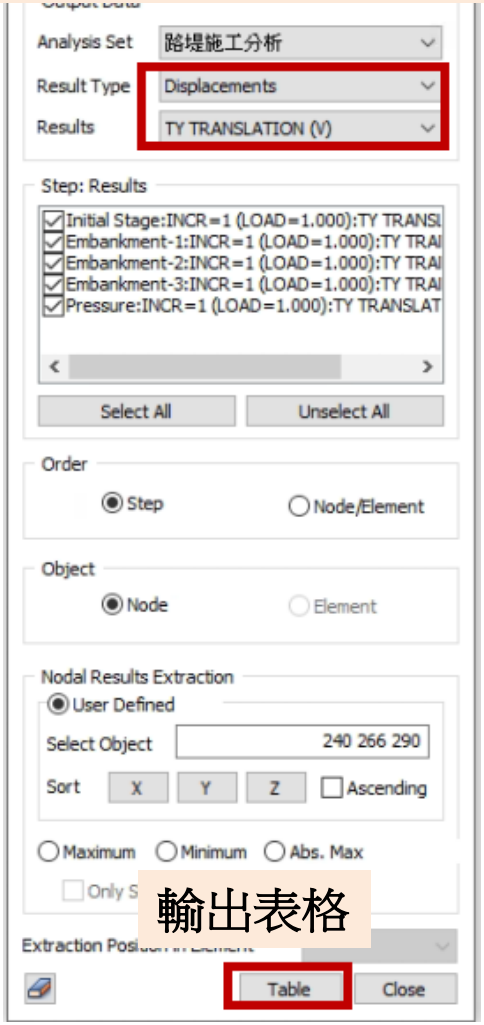
Stage5:Pressure



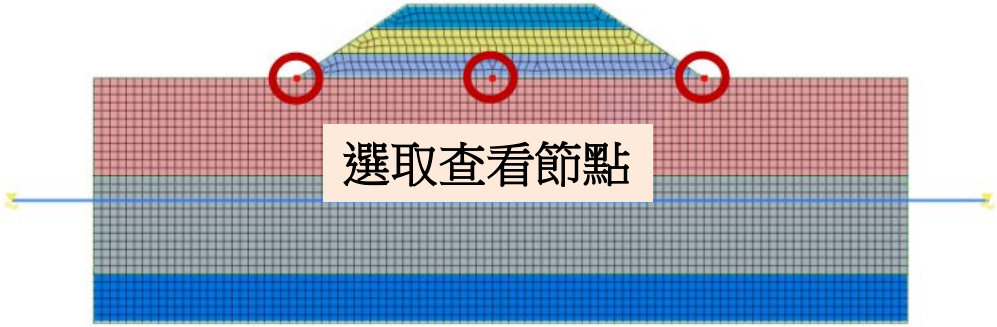
播放動畫 (施工階段)

分析結果-2

查看施工階段下沉量變化(Ty)

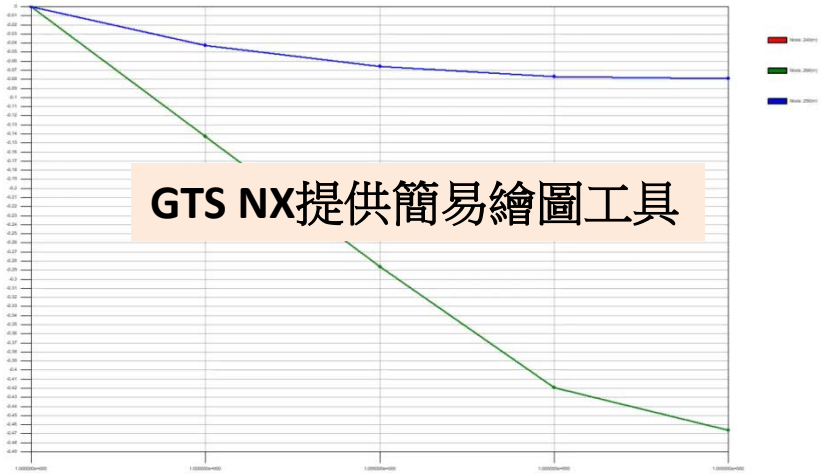


輸出表格



選取查看節點

No	Step	Step Value	Node: 240 TY TRANSLATION (V) (m)	Node: 266 TY TRANSLATION (V) (m)	Node: 290 TY TRANSLATION (V) (m)
1	Initial Stage:INCR=1 (LOAD=1.000)	1.000000e+000	0.000000e+000	0.000000e+000	0.000000e+000
2	Embankment-1:INCR=1 (LOAD=1.00	1.000000e+000	-4.273482e-002	-1.428486e-001	-4.273681e-002
3	Embankment-2:INCR=1 (LOAD=1.00	1.000000e+000	-6.598049e-002	-2.865233e-001	-6.597487e-002
4	Embankment-3:INCR=1 (LOAD=1.00	1.000000e+000	-7.697330e-002	-4.192248e-001	-7.697084e-002
5	Pressure:INCR=1 (LOAD=1.000)	1.000000e+000	-7.899832e-002	-4.663430e-001	-7.900134e-002



GTS NX提供簡易繪圖工具

GTS NX_標準教學系列

2D臨時建築物開挖考慮水位線變化

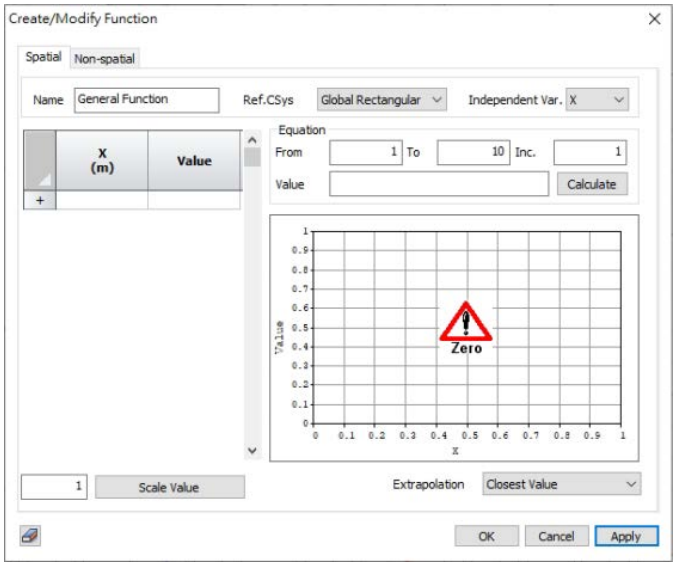
台灣邁達斯

註:範例相關參數使用假設條件。

Water Level

Water level

Water level function



方式1.Water Level For Global

Input the groundwater level that changes according to the construction stage with respect to the GCS.
Click to set the ground water level function.
If the water level and function are both specified, the input water level is multiplied onto the function and applied on the analysis.

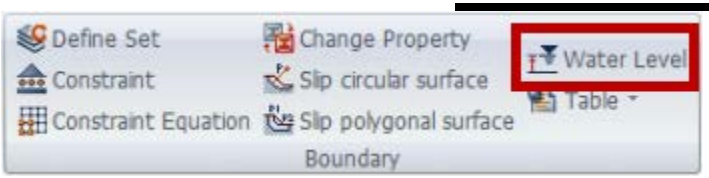
方式2.Water Level for Mesh Set

Define the groundwater level that changes according to the construction stage for each mesh set.
If the groundwater layer is surrounded by rocks or an impermeable clay layer (confined aquifer), the presence/absence of the groundwater level for each ground layer can be set for analysis.

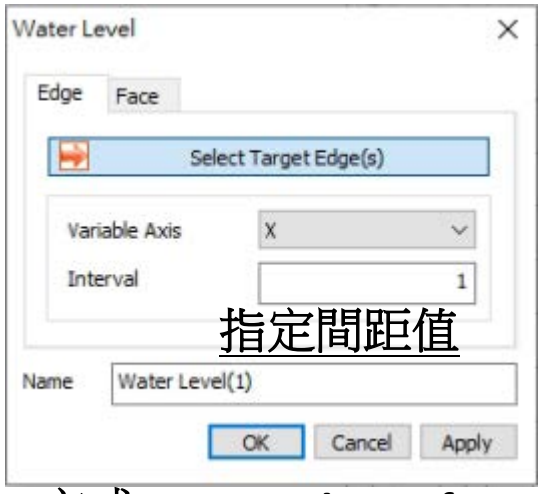
Reference

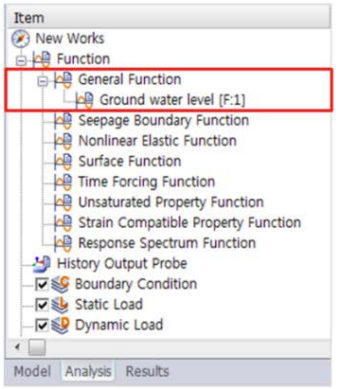
GTS NX & FEA NX Manual

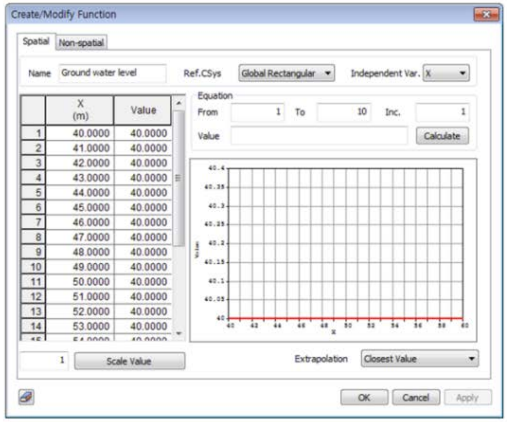
Water Level Function



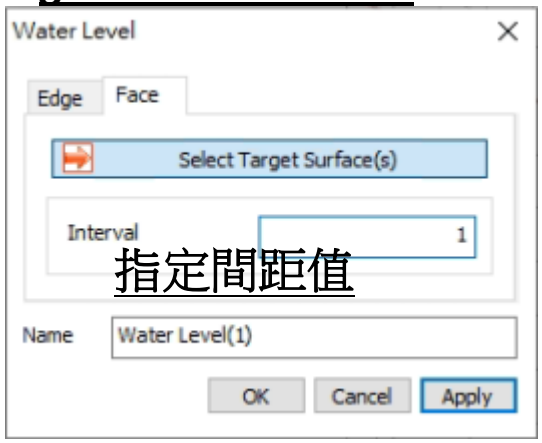
方式1.Edge:Create a changing groundwater level by selecting edges.

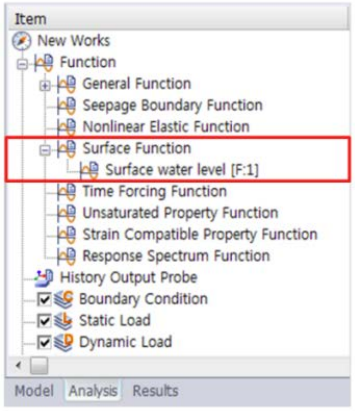


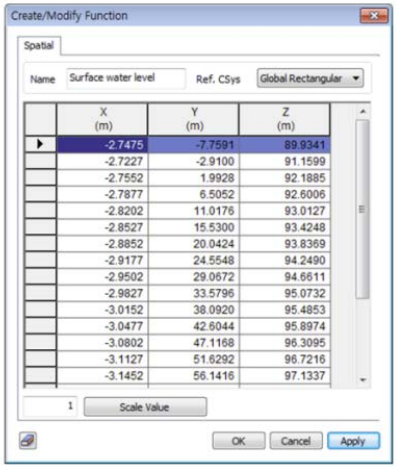




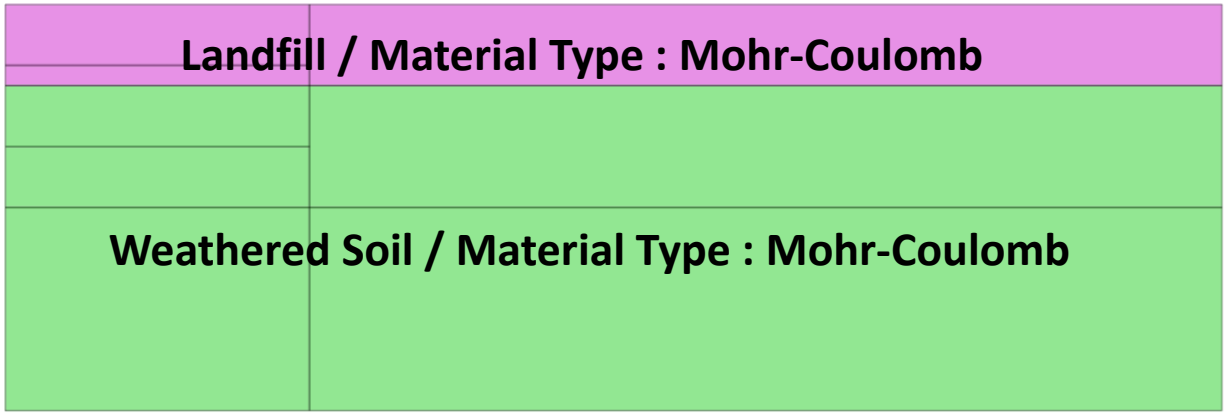
方式2.Face:Select a face and input the spacing value to create a changing groundwater level.

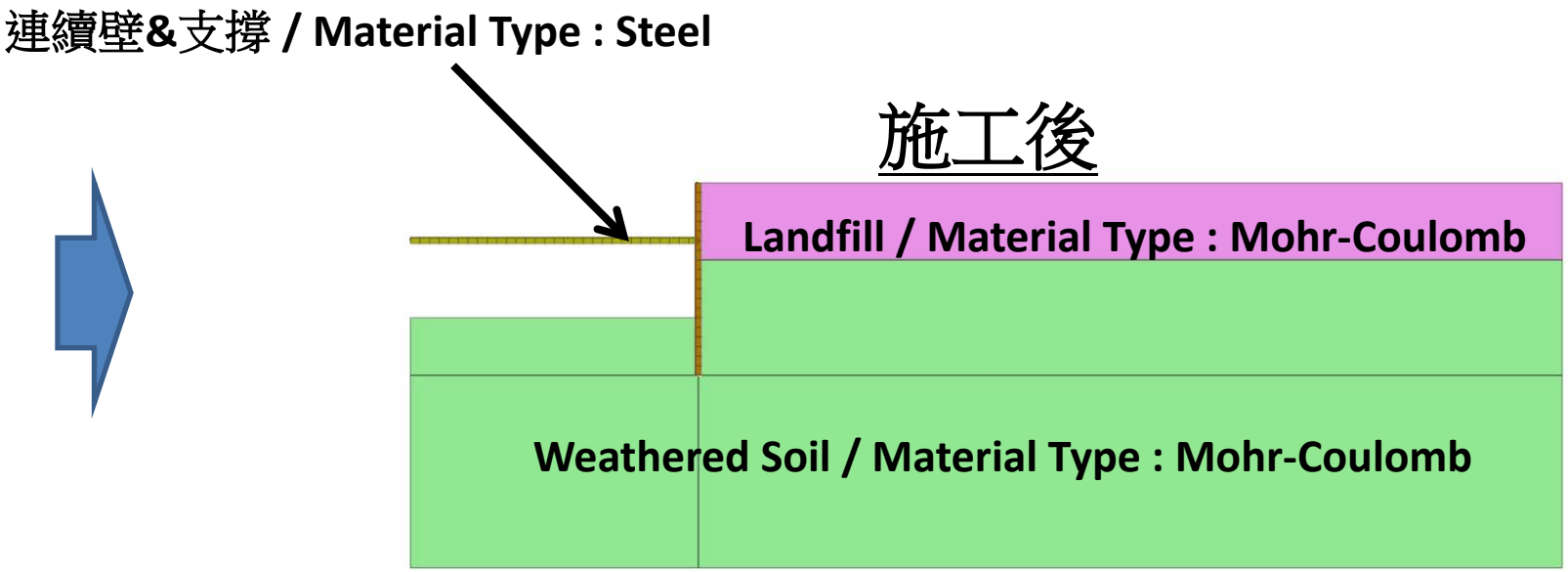






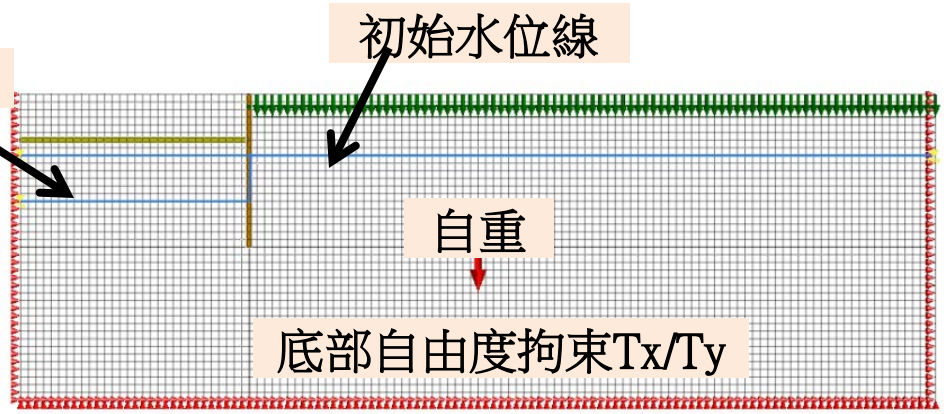
分析說明-材料模型



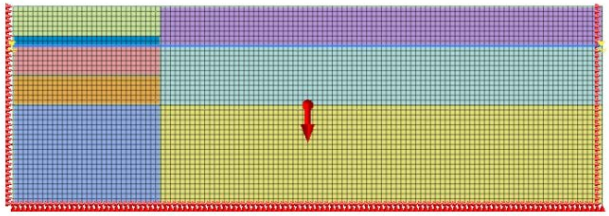


註:範例相關參數使用假設條件。

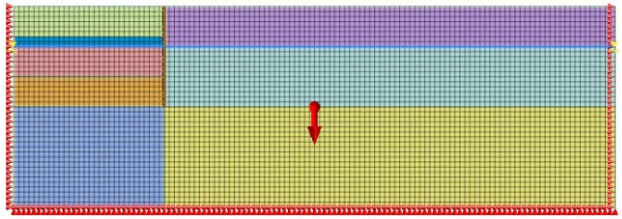
分析說明-施工流程



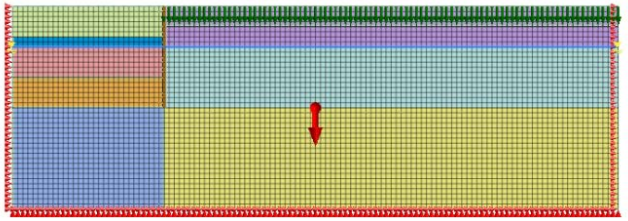
Stage1:Initial Stage



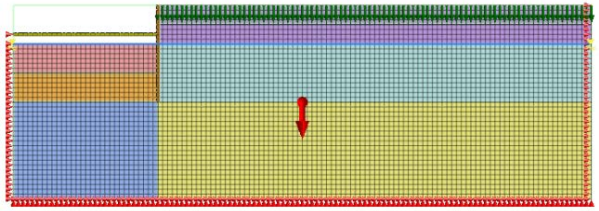
Stage2:連續壁



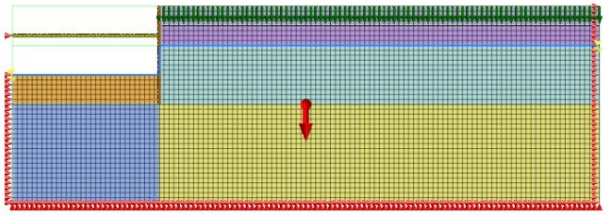
Stage3:地表壓力



Stage4:開挖1和支撐



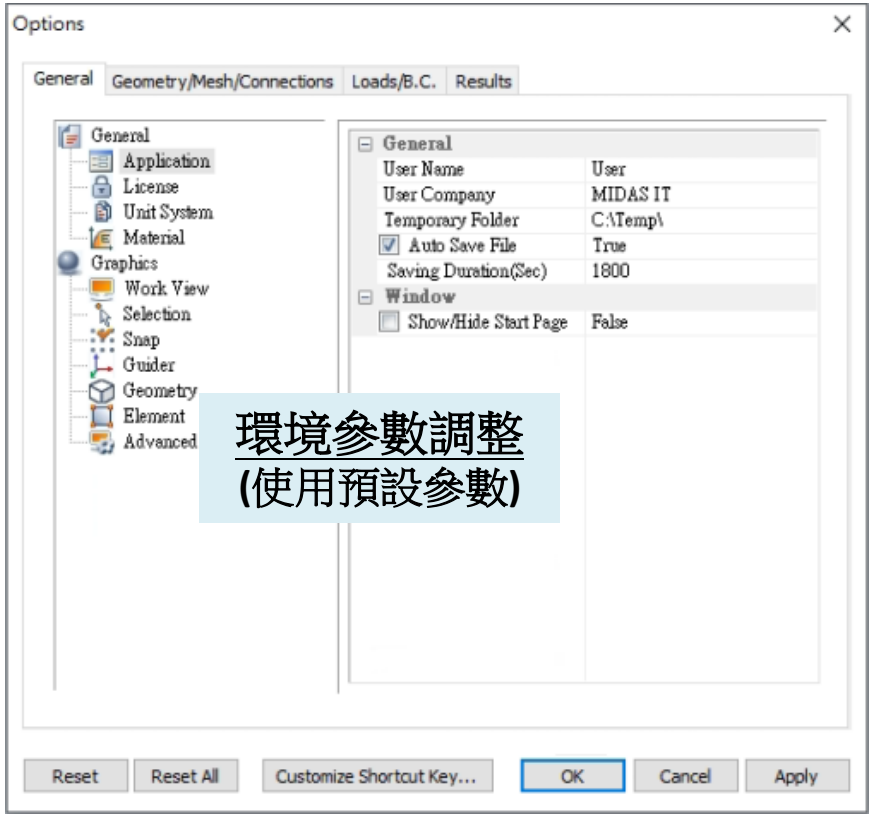
Stage5:開挖2



註:範例相關參數使用假設條件。

環境

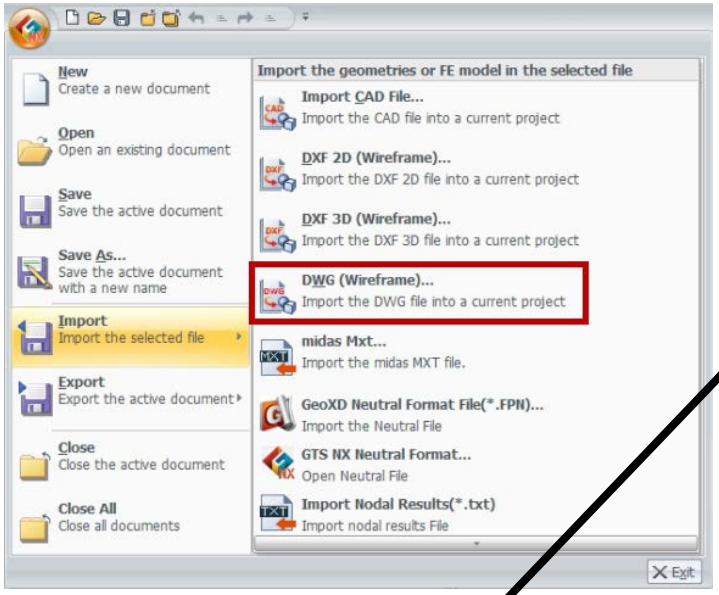
新文件

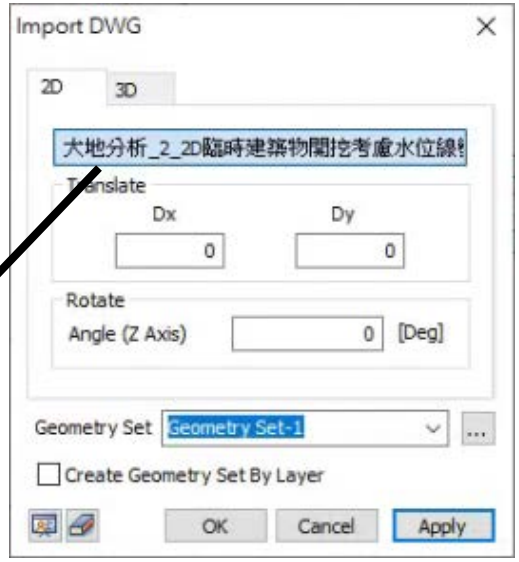


環境參數調整
(使用預設參數)

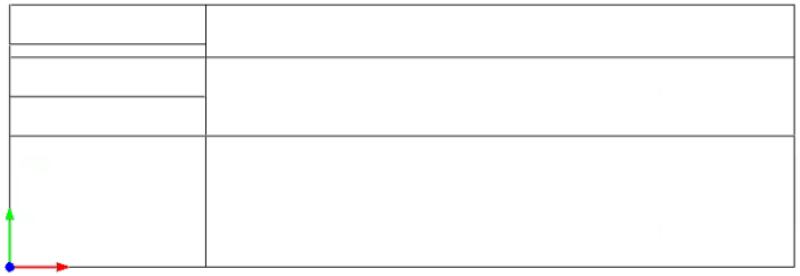
單位使用tonf/m/J/sec

DWG模型匯入

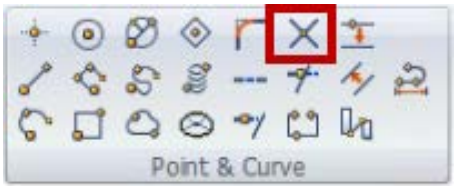


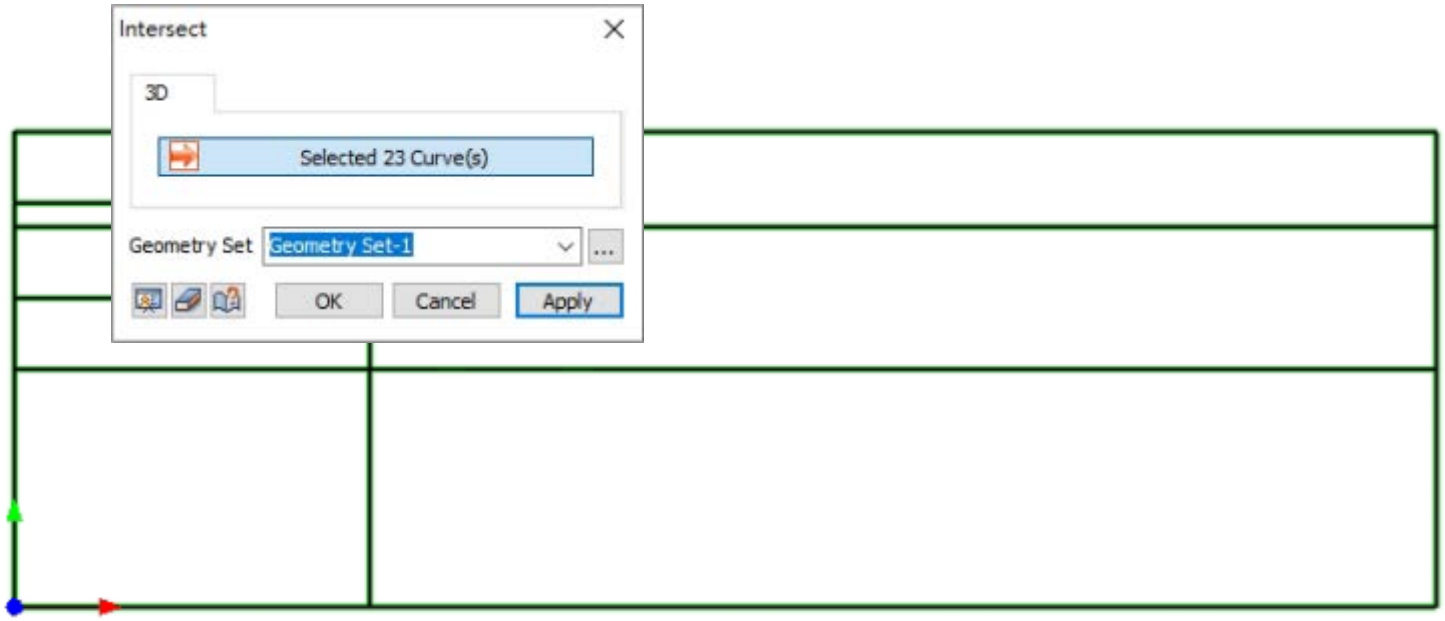


匯入_2D臨時建築物開挖考慮水位線變化.dwg

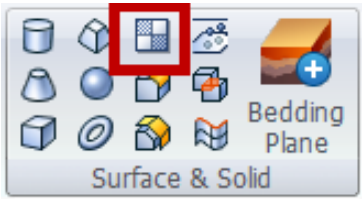


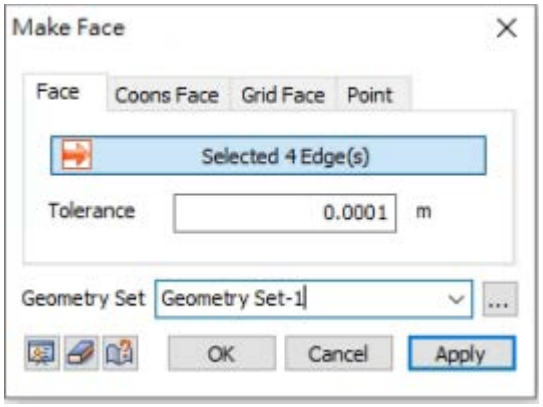
特徵線交叉


Point & Curve

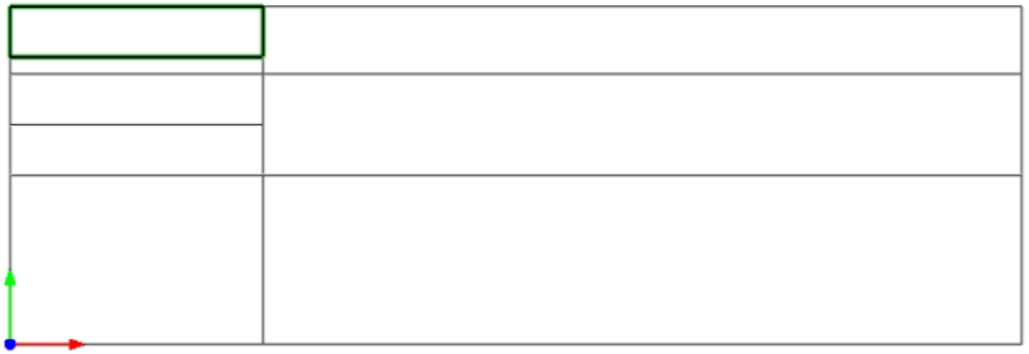

Intersect
3D
Selected 23 Curve(s)
Geometry Set
Geometry Set-1
OK
Cancel
Apply

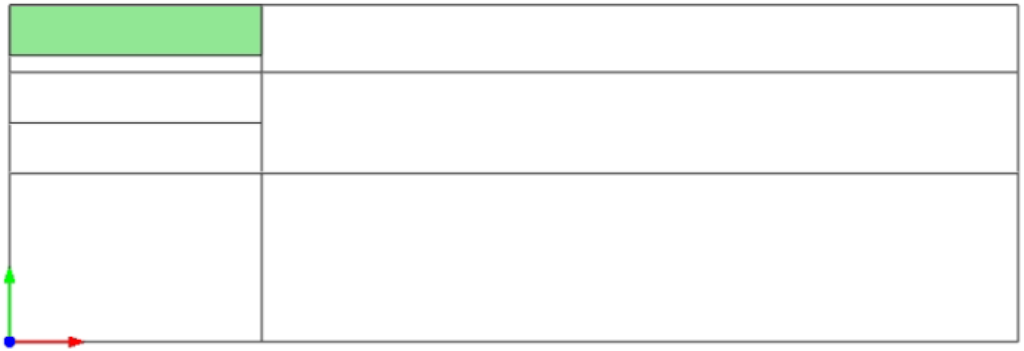
面特徵建立-1





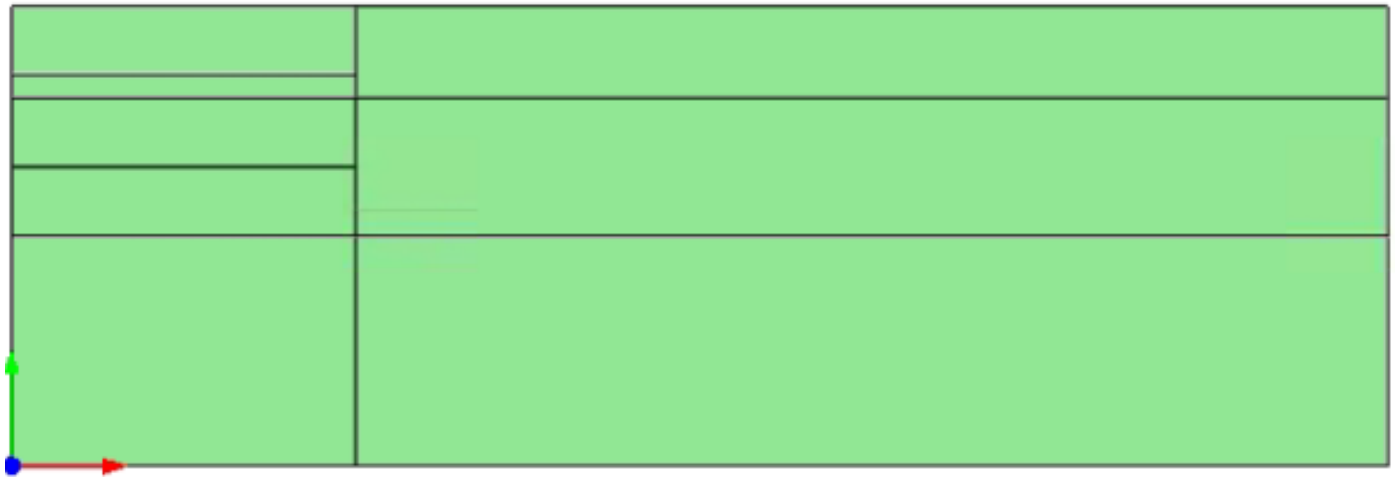
選擇封閉線特徵



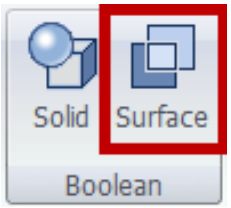


面特徵建立-2

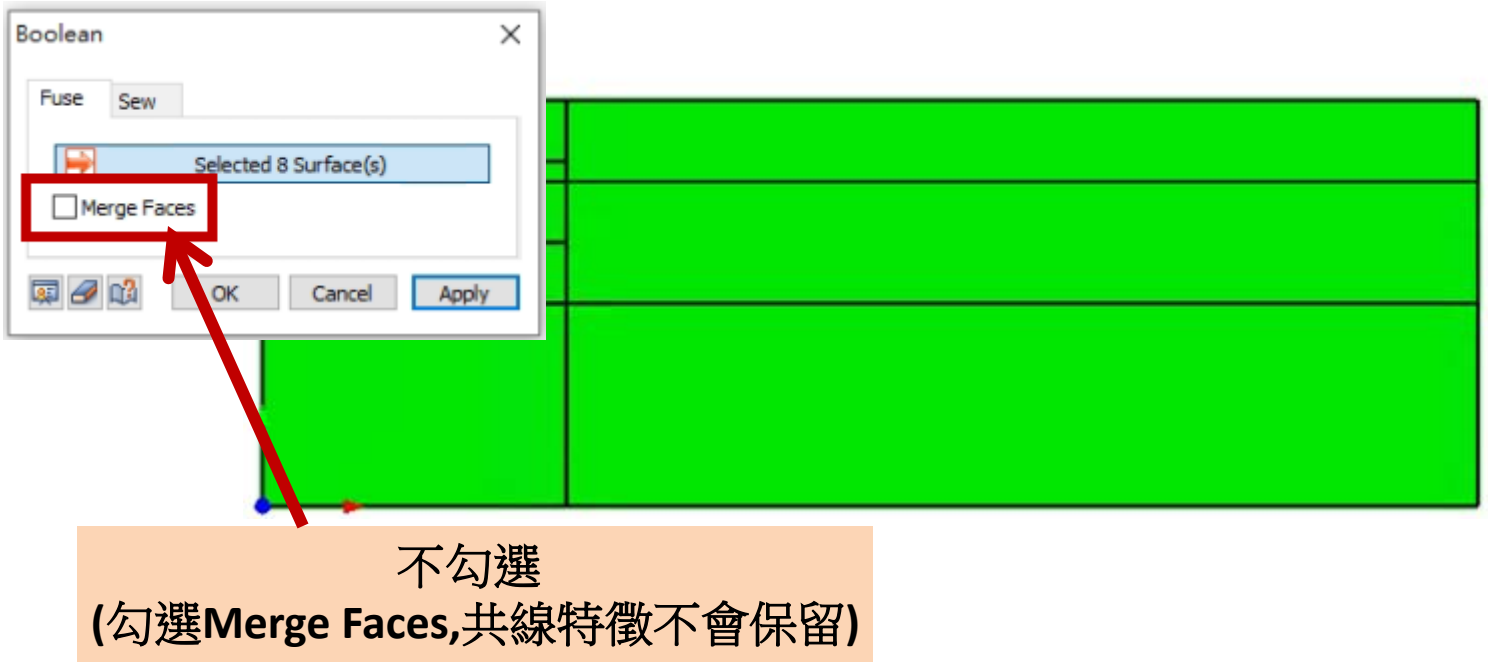
依序完成其它特徵面建立



合併面特徵

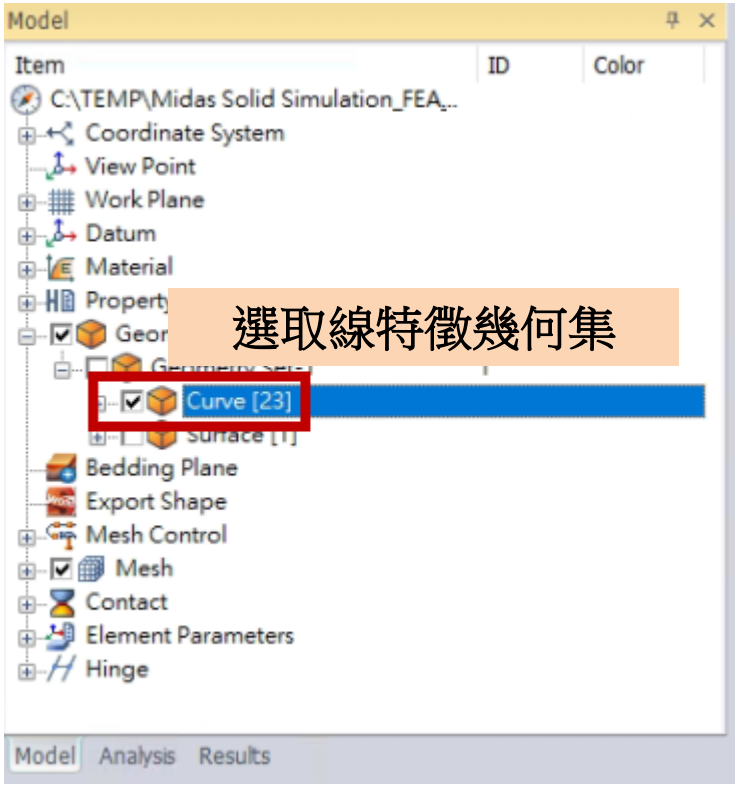


框選所有面特徵

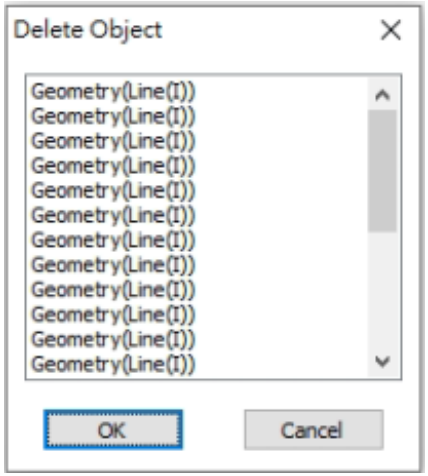


不勾選
(勾選Merge Faces,共線特徵不會保留)

刪除線幾何特徵

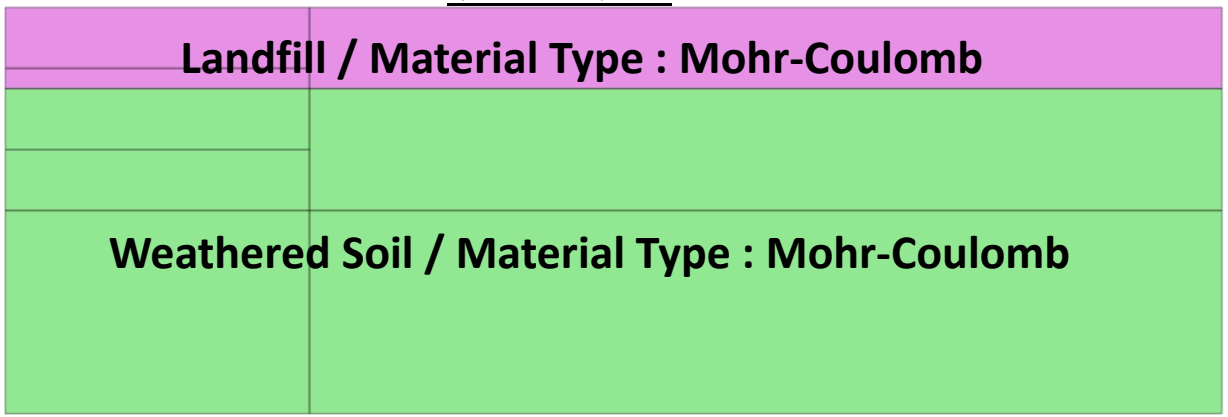


鍵盤DELETE



分析說明-材料模型

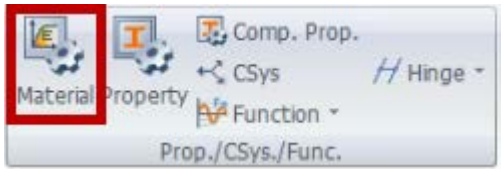
施工前

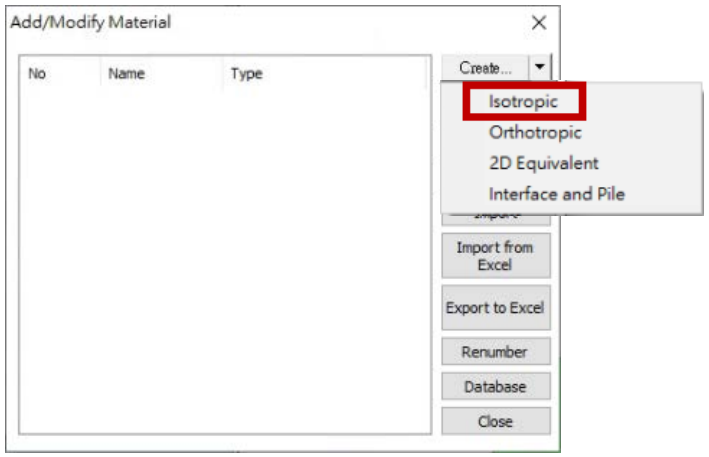


連續壁&支撐 / Material Type : Steel

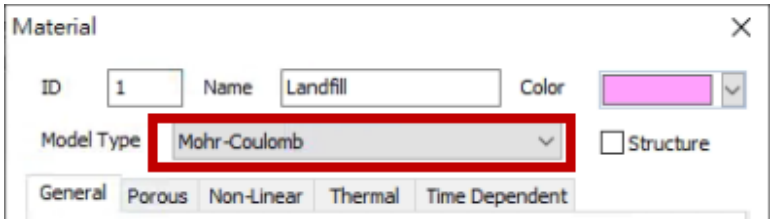
施工後

材料-Soil





Model Type : Mohr-Coulomb
不勾選Structure

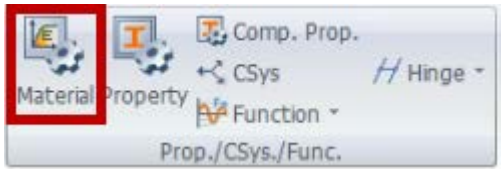


依照下表參數定義
General/Porous/Non-linear

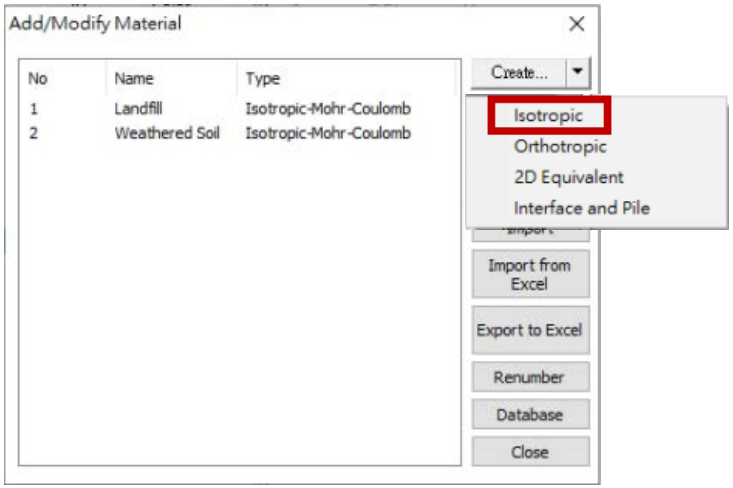
	Modulus of Elasticity(E) ($tonf/m^2$)	Poisson's Ratio(v)	Unit Weight(γ) ($tonf/m^3$)	Unit Weight (Saturated) (KN/m^3)	Cohesion(C) (KN/m^2)	Friction Angle(ϕ)
Landfill	**2000**	**0.4**	**1.7**	**1.8**	**0.5**	**30**
Weathered Soil	**5000**	**0.35**	**1.8**	**1.9**	**1.5**	**32**

註:範例相關參數使用假設條件。

材料-Structure



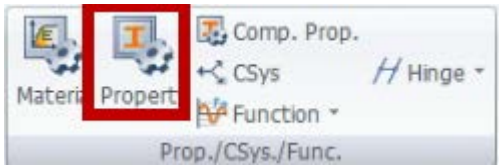
Model Type : Elastic
勾選Structure



	Modulus of Elasticity(E) (tonf/m²)	Poisson's Ratio(v)	Unit Weight(γ) (tonf/m³)
Steel	**21,000,000**	**0.3**	**8**

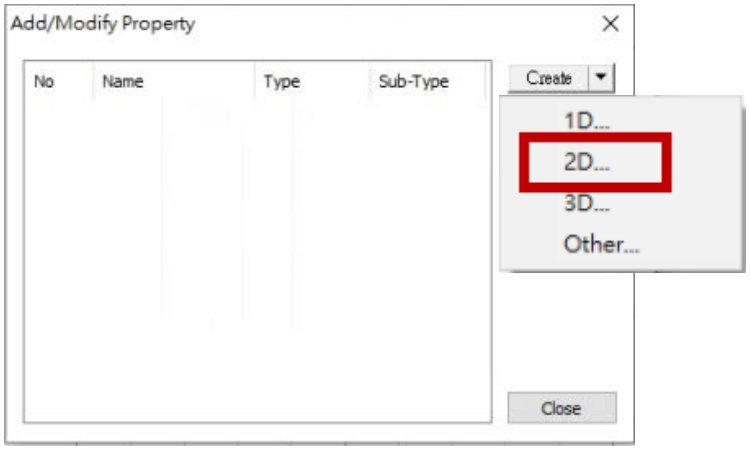
註1:範例相關參數使用假設條件。
註2:GTS NX/FEA NX Beam Element只支援Elastic Material Type

屬性-2D Plane Strain

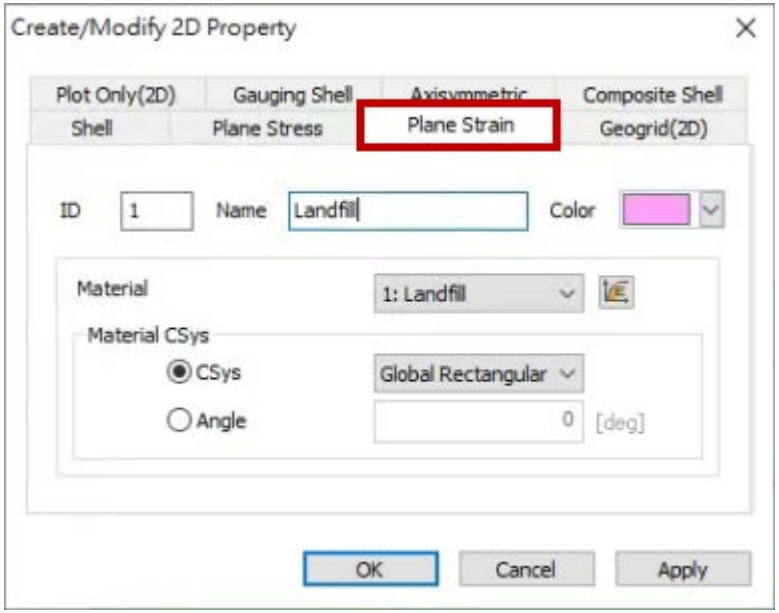


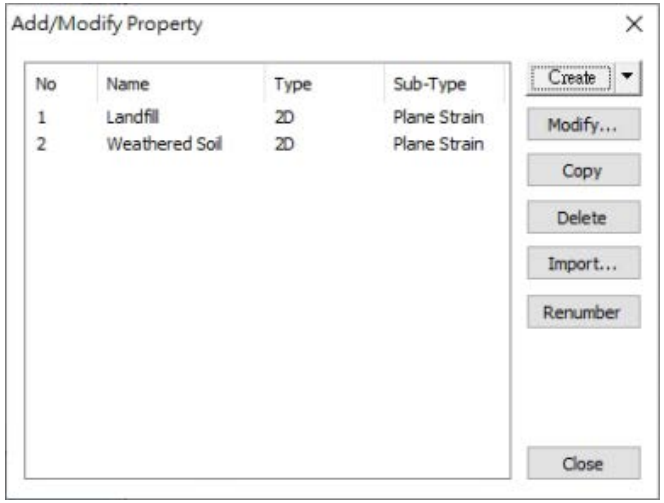
依序新增

Landfill / Material: Landfill
Weathered Soil/ Material: Weathered Soil

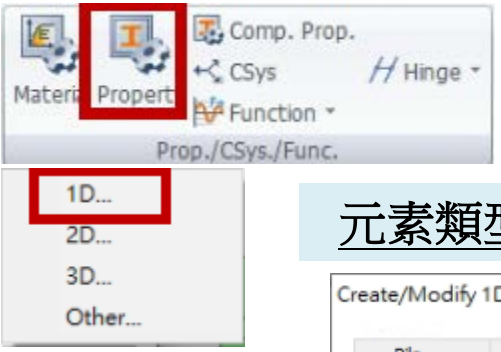


元素類型使用**Plane Strain**



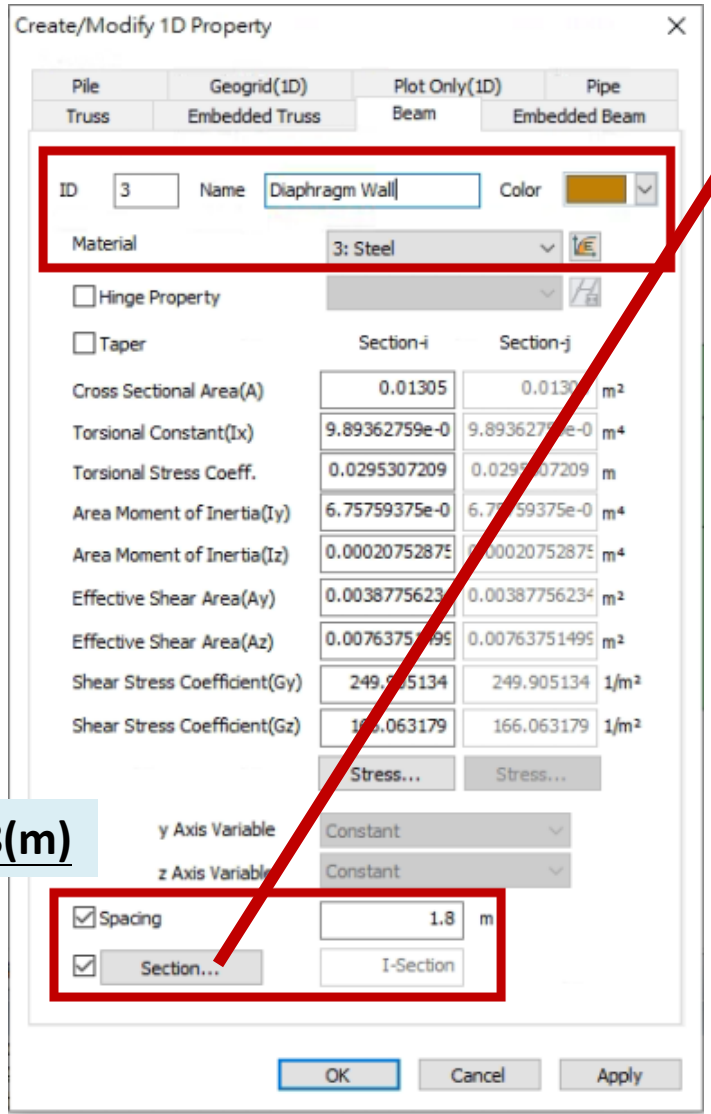


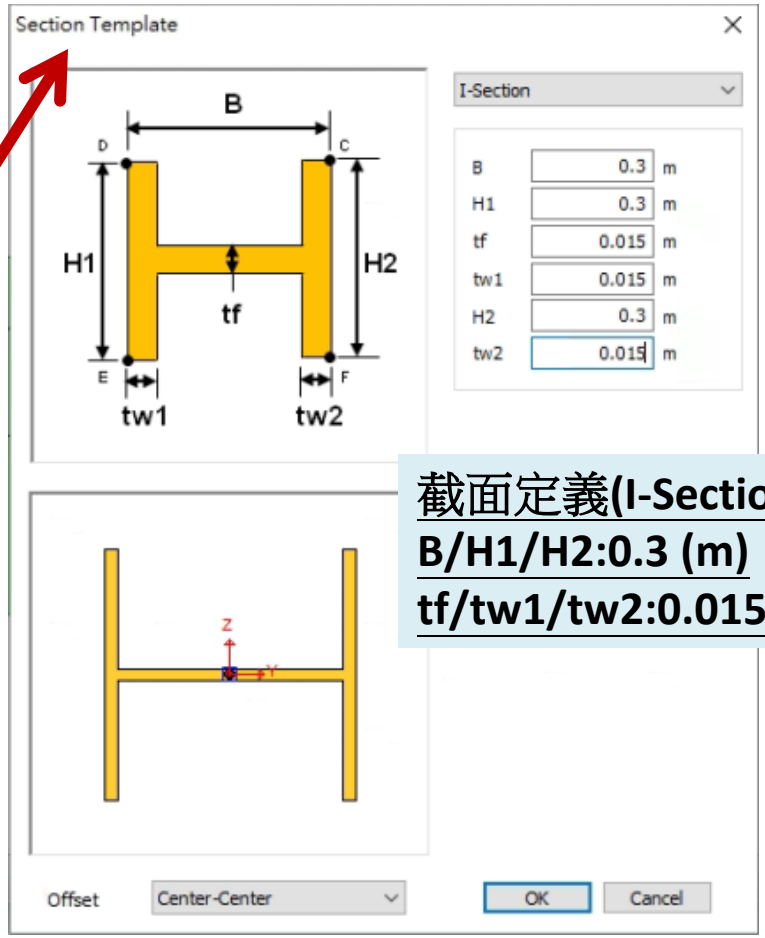
屬性-1D Beam
(Diaphragm Wall)



元素類型使用Beam

Name : Diaphragm Wall / Material: Steel

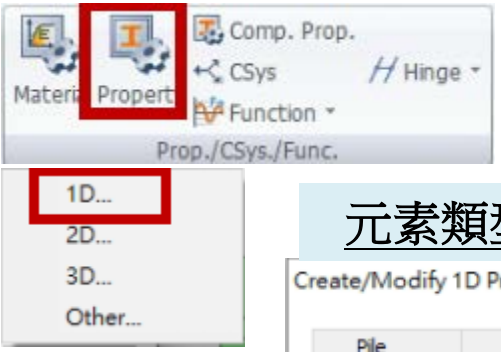




截面定義(I-Section)
B/H1/H2:0.3 (m)
tf/tw1/tw2:0.015

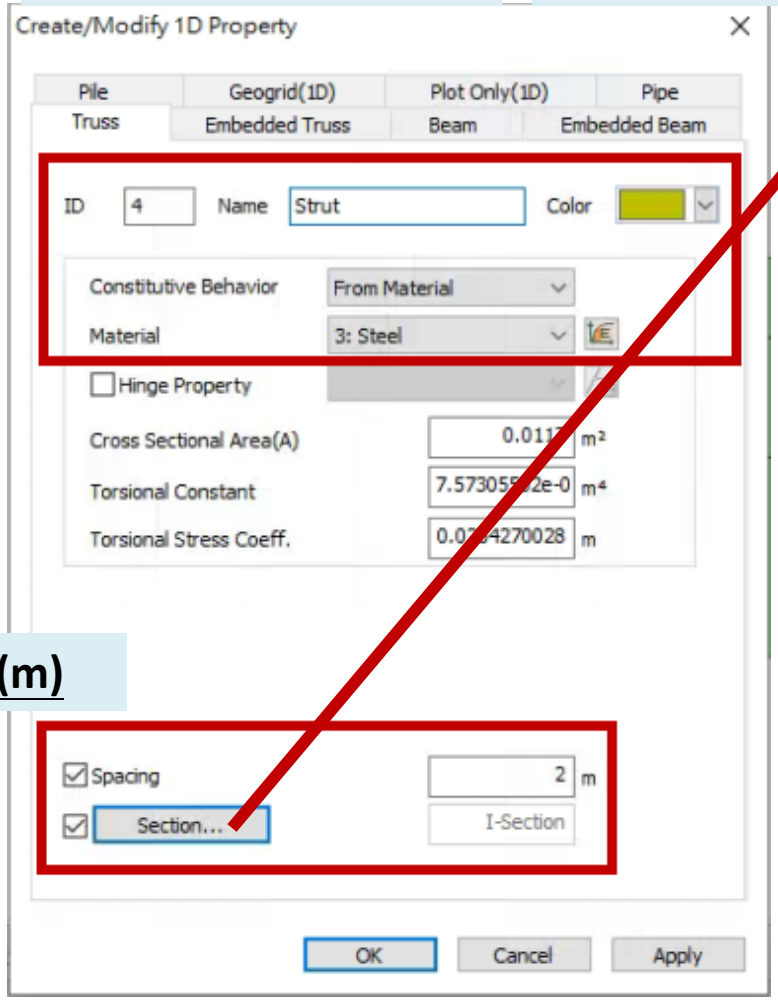
間距:1.8(m)

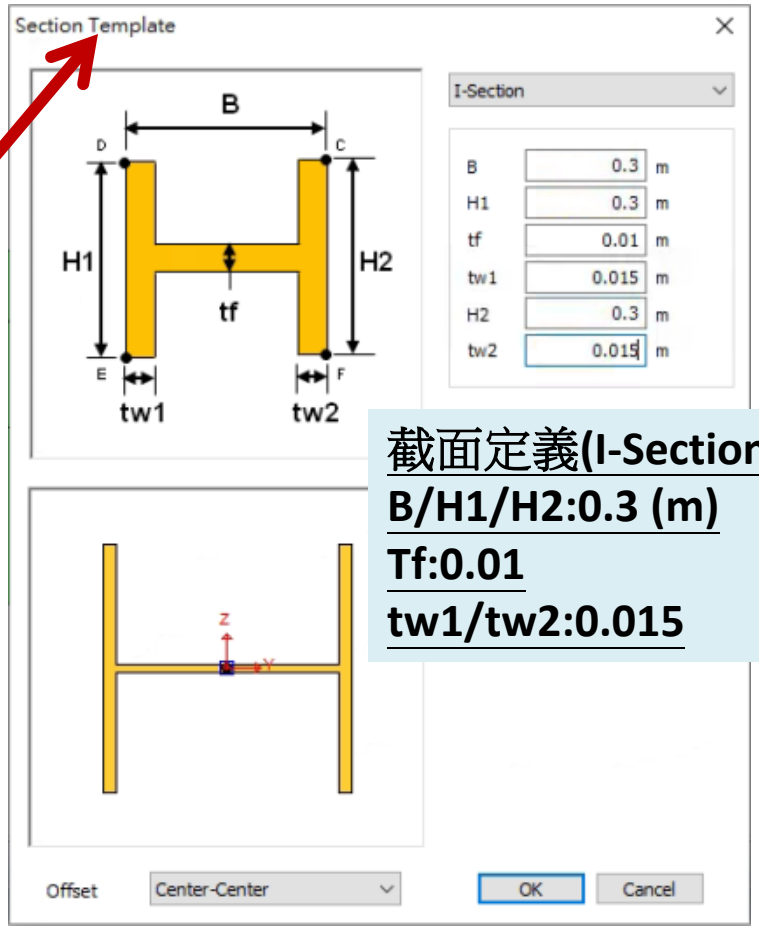
屬性-1D Truss
(Strut)



元素類型使用Truss

Name : Strut / Material: Steel

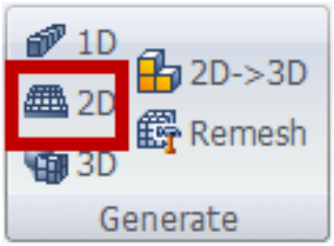




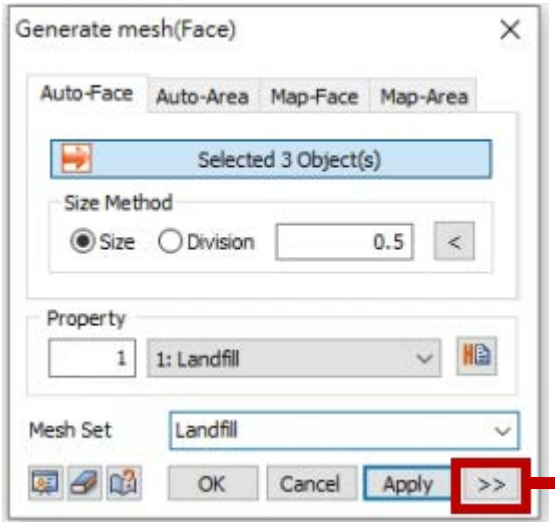
間距:2(m)

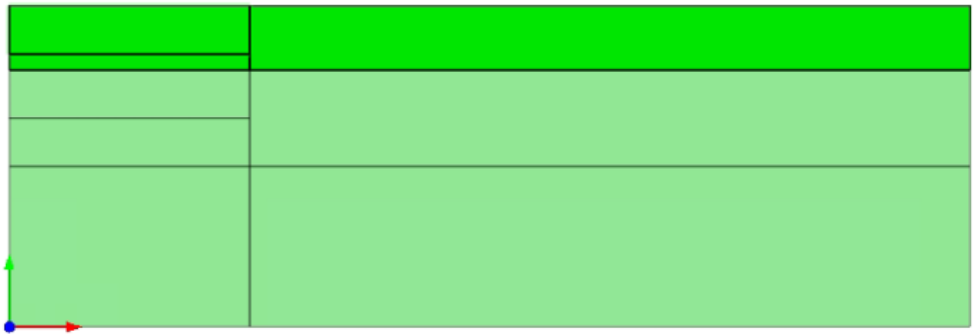
截面定義(I-Section)
B/H1/H2:0.3 (m)
Tf:0.01
tw1/tw2:0.015

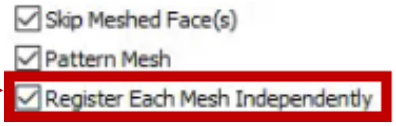
2D網格生成-1
(Landfill)

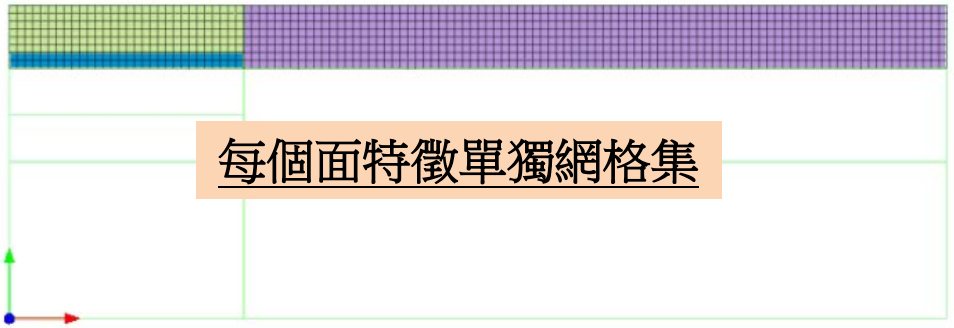


自訂網格集名稱-Landfill / 網格尺寸: 0.5 / 屬性-Landfill

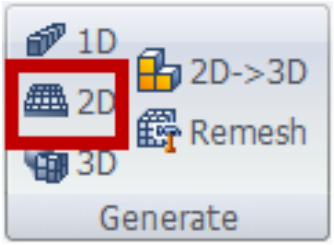






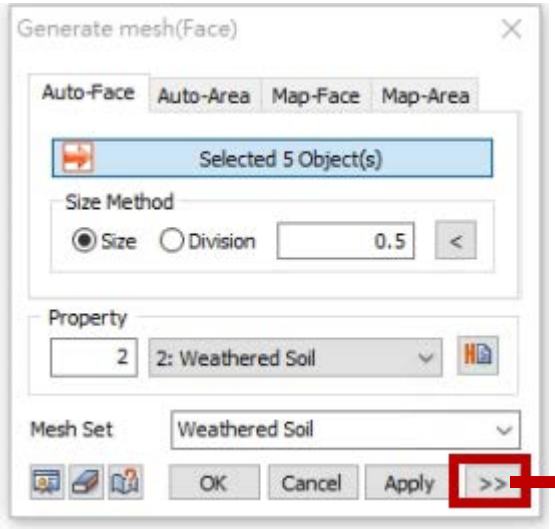


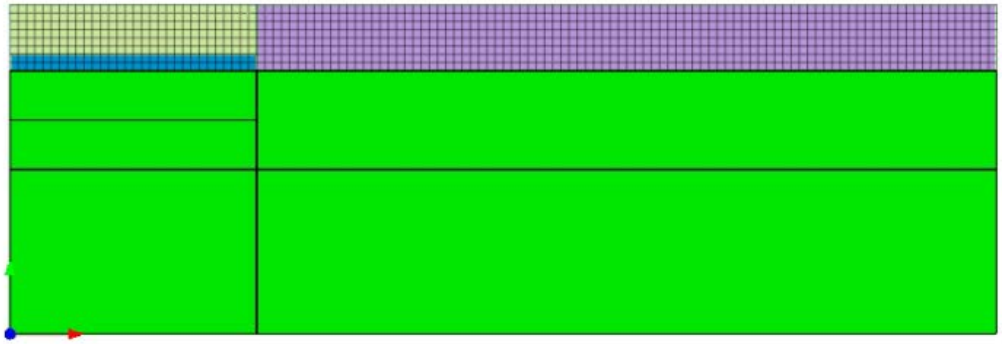
每個面特徵單獨網格集

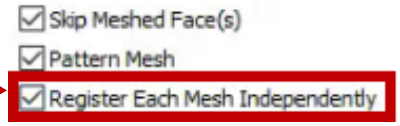


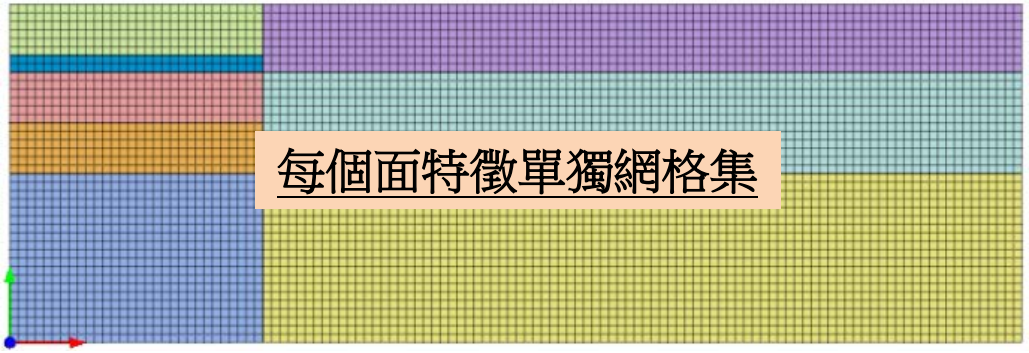
2D網格生成-2
(Weathered Soil)

自訂網格集名稱-weathered Soil/ 網格尺寸: 0.5 / 屬性-Weathered Soil





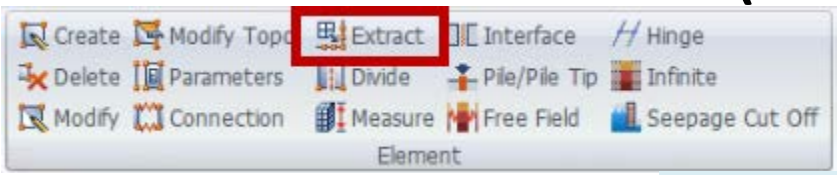




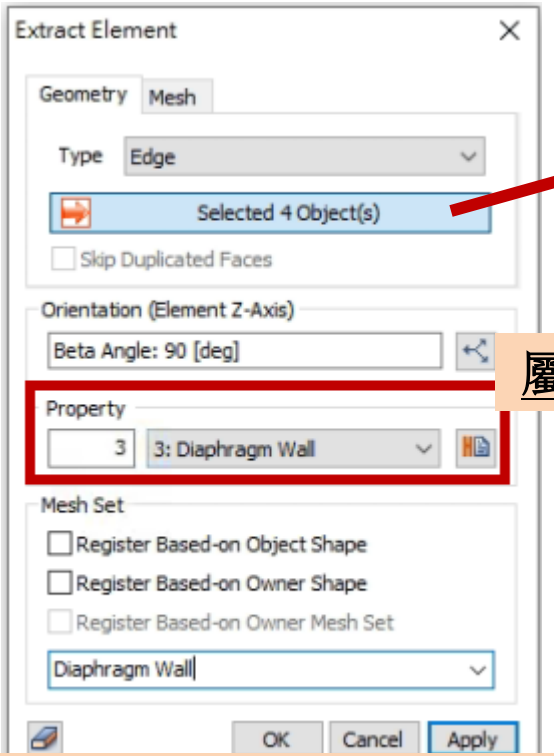
每個面特徵單獨網格集

1D網格提取生成-1

(Diaphragm Wall)

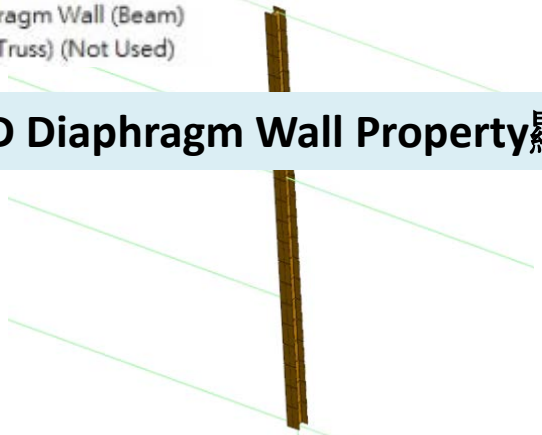


提取Edge特徵上節點作為連續壁1d 元素



屬性-Diaphragm Wall

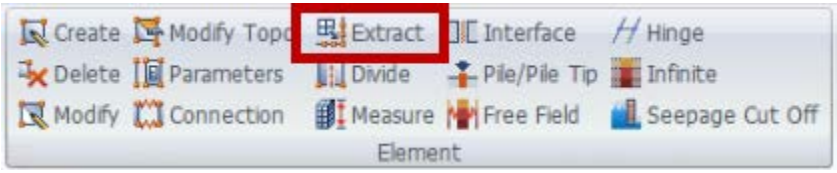
勾選1D Diaphragm Wall Property顯示截面



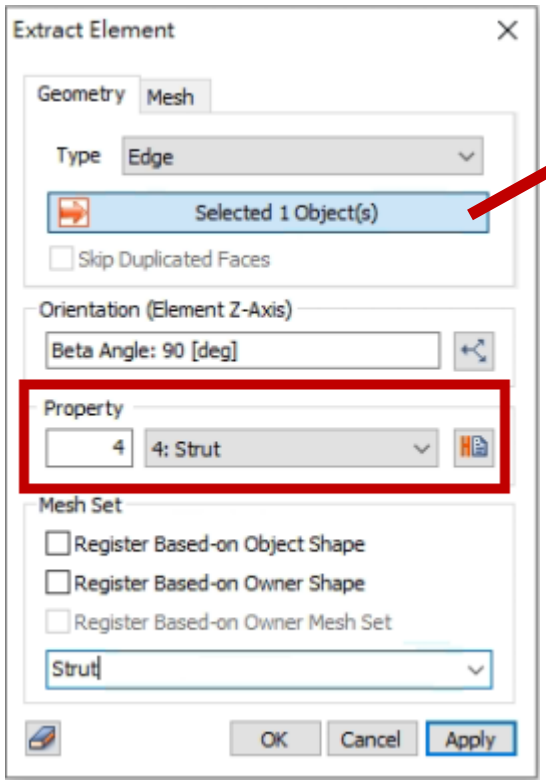
自訂網格集名稱-Diaphragm Wall

1D網格提取生成-2

(Strut)

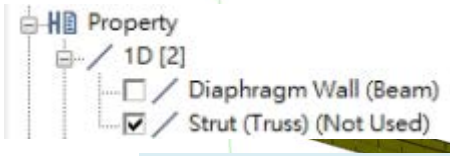


提取Edge特徵上節點作為支撐1d 元素



自訂網格集名稱-Strut

屬性-Strut



勾選1D Strut Property顯示截面

網格集編輯名稱

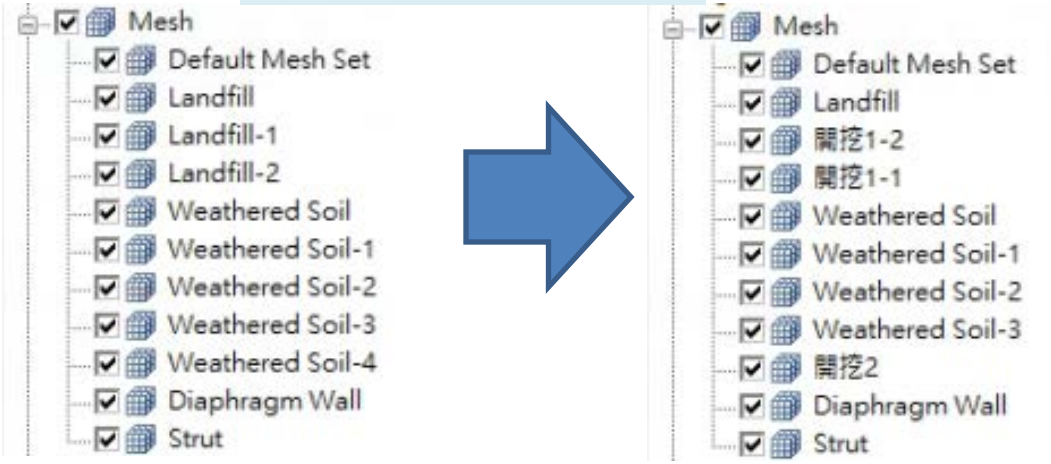
補充:可以直接使用網格集選取

開挖1-1

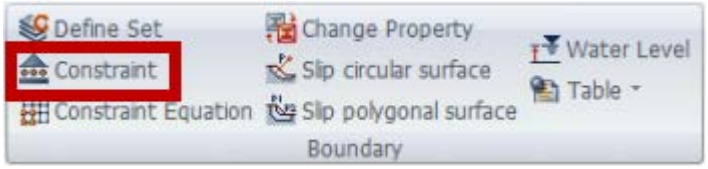
開挖1-2

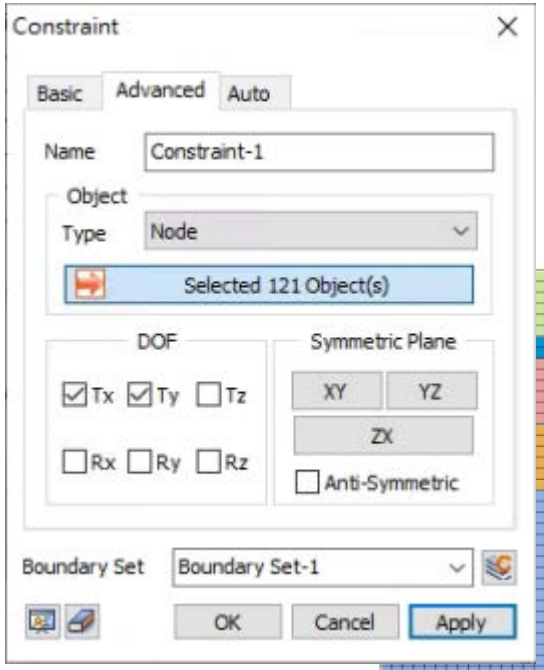
開挖2

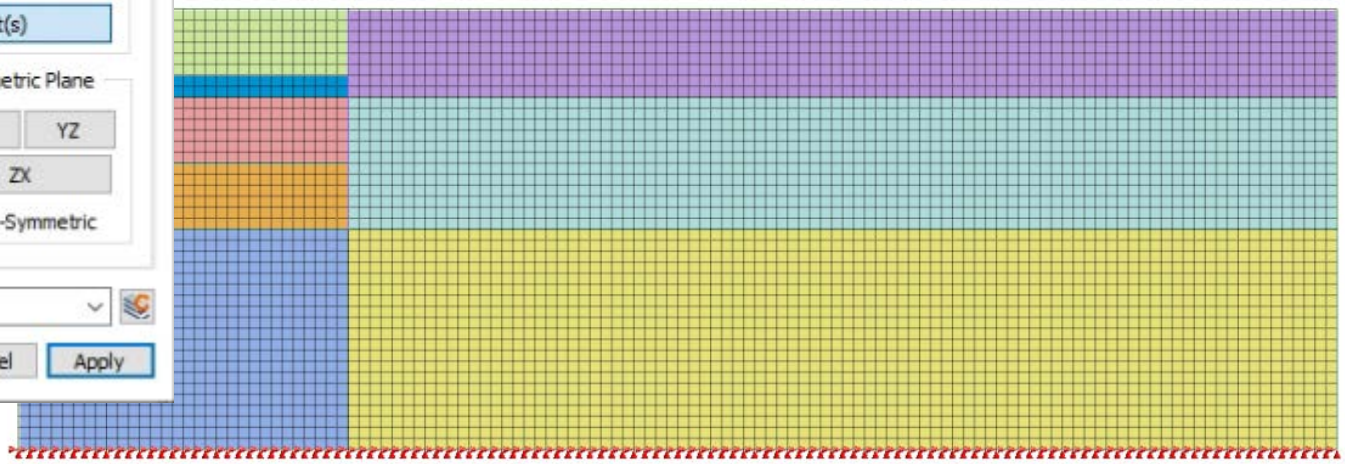
鍵盤F2編輯名稱



底部邊界

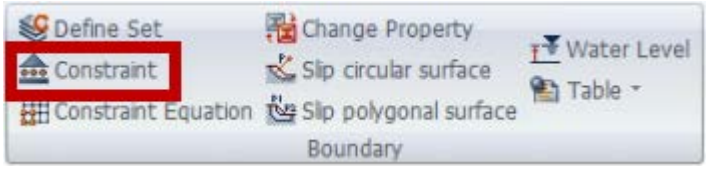


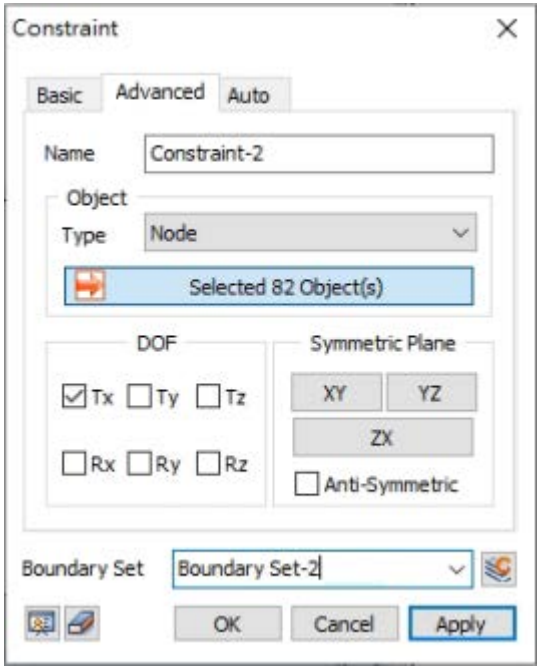


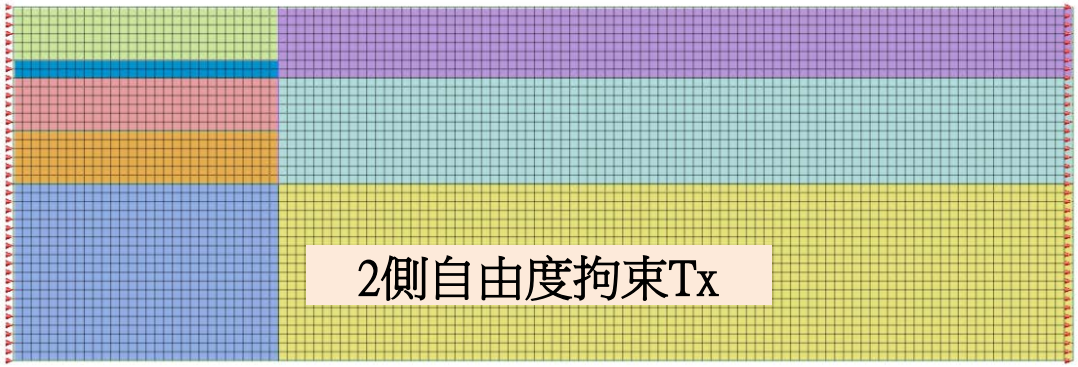


底部自由度拘束Tx/Ty

對稱邊界

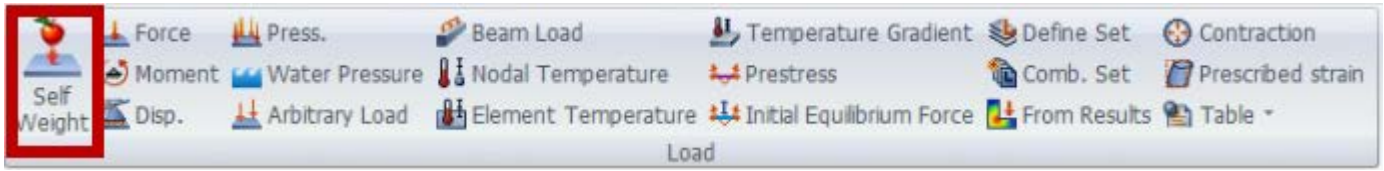


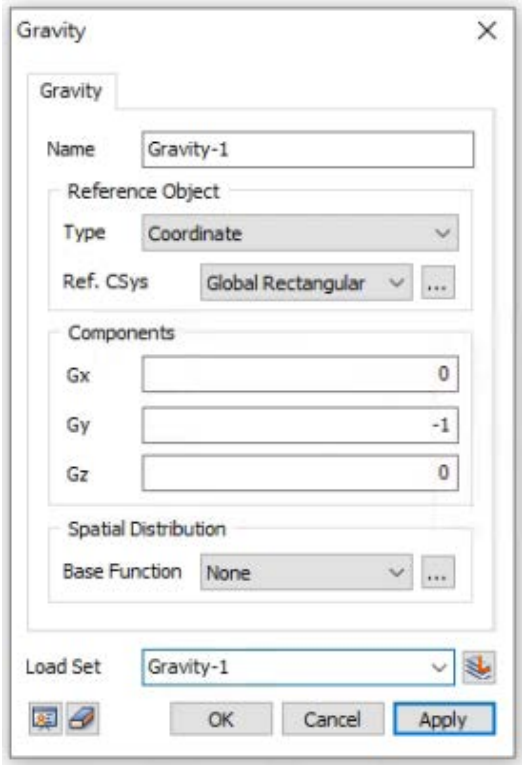


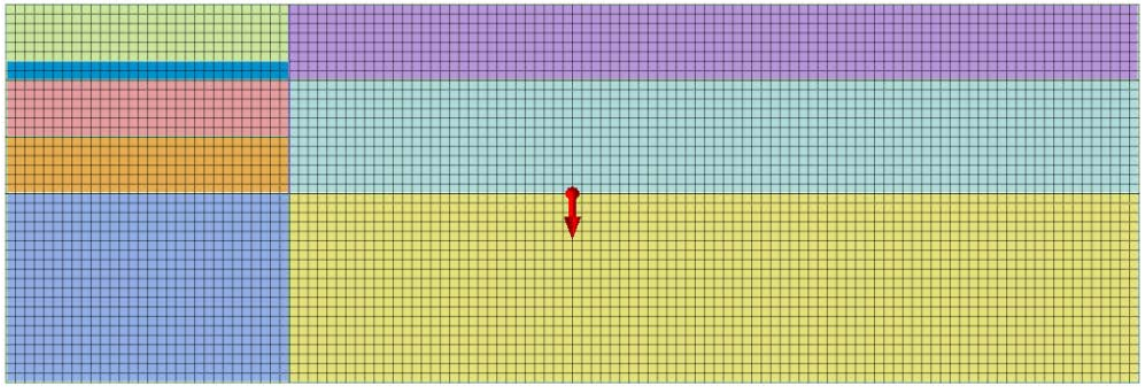


補充:建議不同邊界集使用不同邊界集名稱

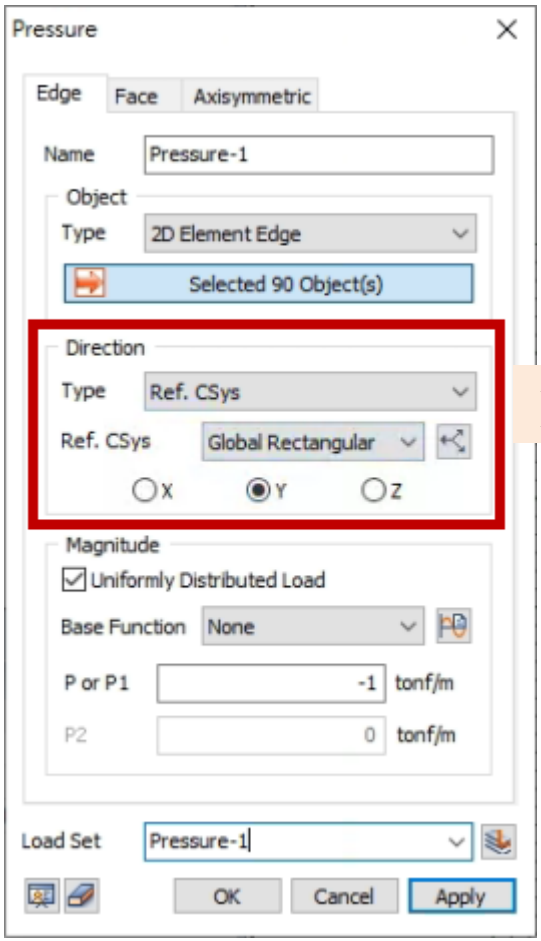
初始應力-自重


Self Weight
Force
Moment
Disp.
Press.
Water Pressure
Arbitrary Load
Beam Load
Nodal Temperature
Element Temperature
Temperature Gradient
Prestress
Initial Equilibrium Force
Define Set
Comb. Set
From Results
Contraction
Prescribed strain
Table
Load

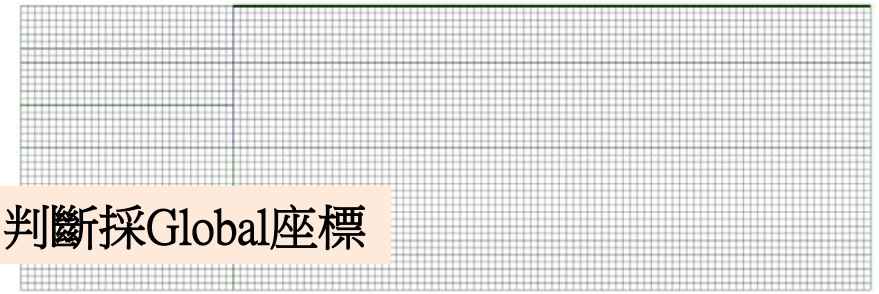

Gravity
Gravity
Name
Gravity-1
Reference Object
Type
Coordinate
Ref. CSys
Global Rectangular
Components
Gx
0
Gy
-1
Gz
0
Spatial Distribution
Base Function
None
Load Set
Gravity-1
OK
Cancel
Apply



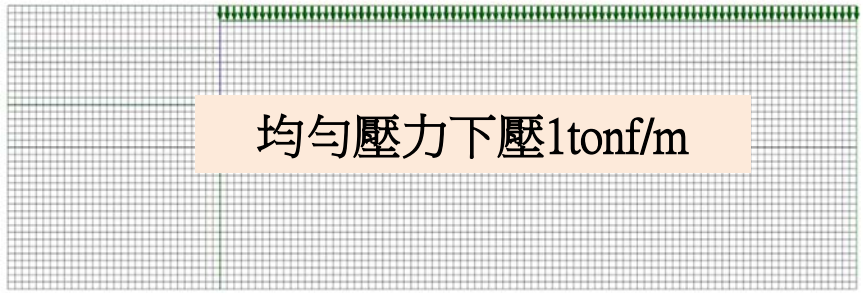
壓力荷載



補充:建議使用線特徵選取**2D Element Edge**

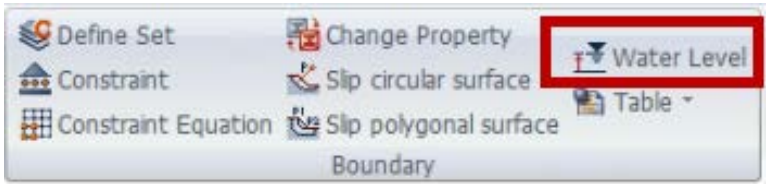


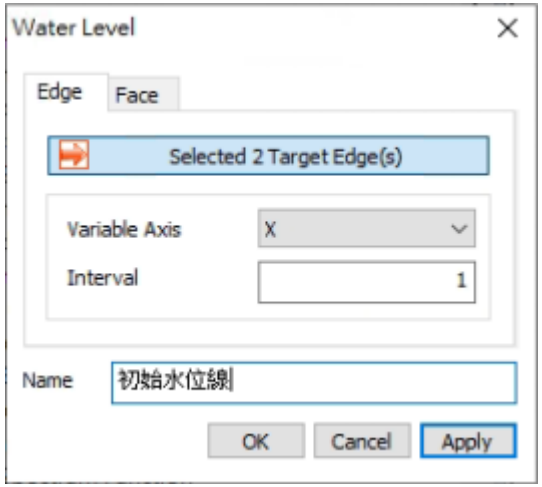
方向判斷採Global座標



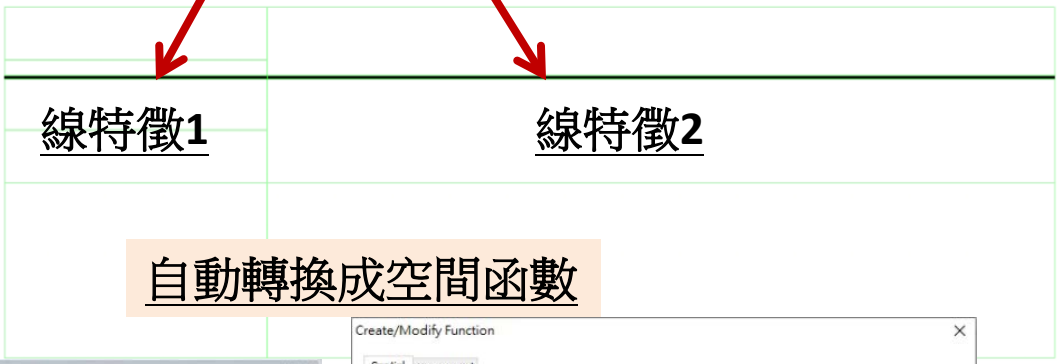
均勻壓力下壓1tonf/m

初始水位線函數

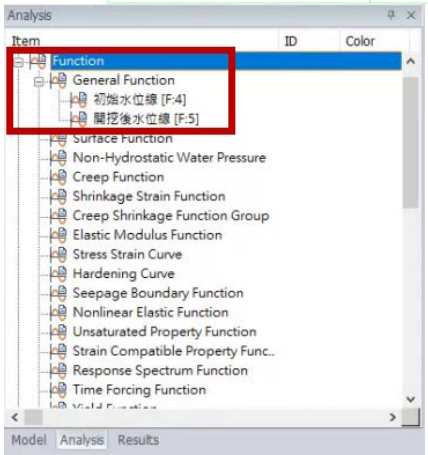


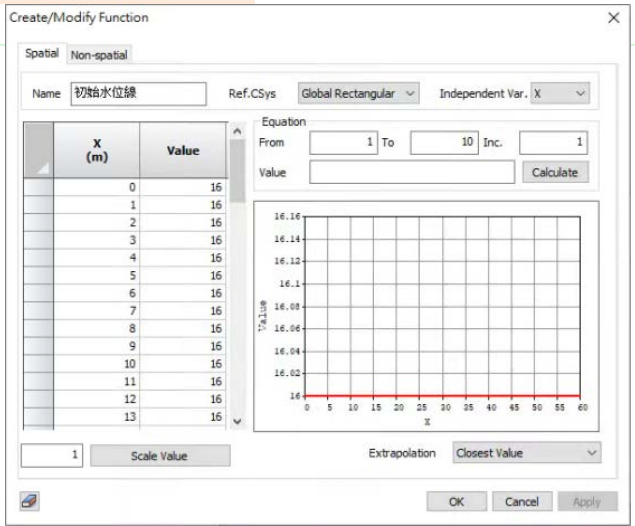


選取線特徵

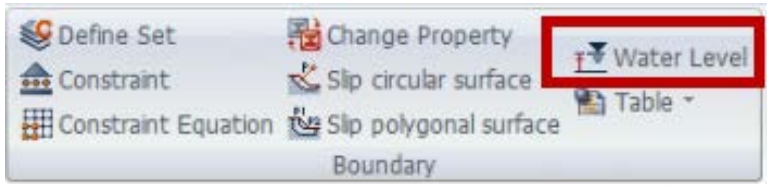


自動轉換成空間函數

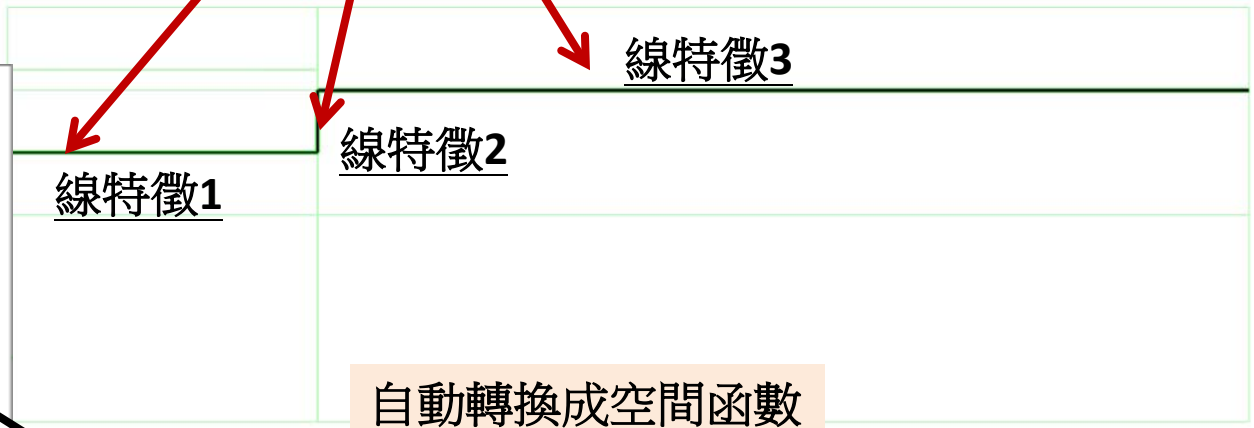


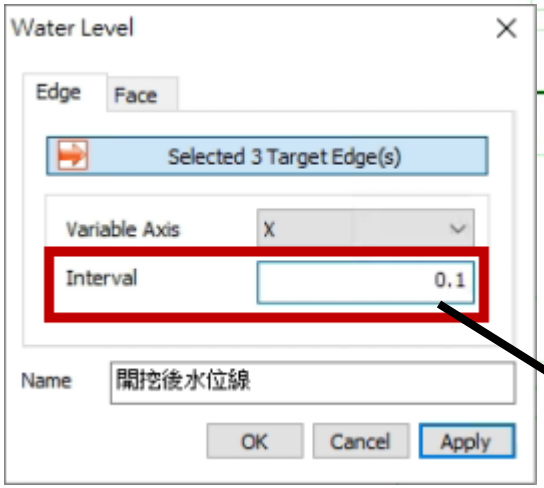


開挖後水位線函數

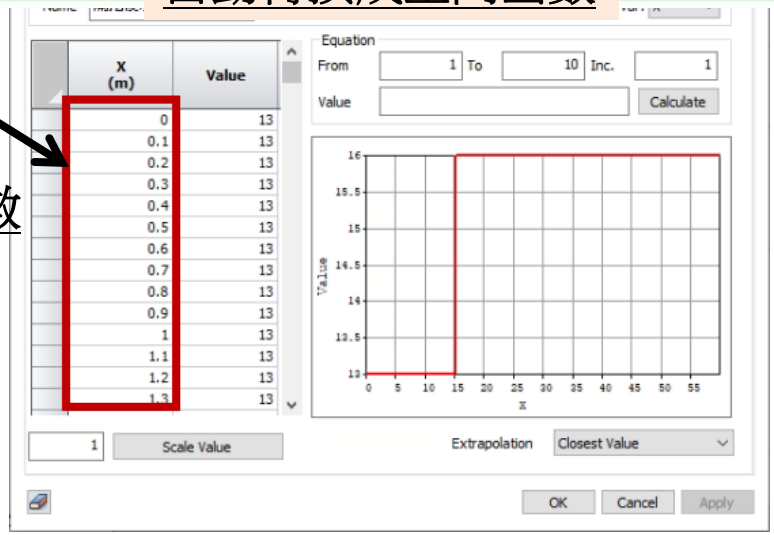


選取線特徵





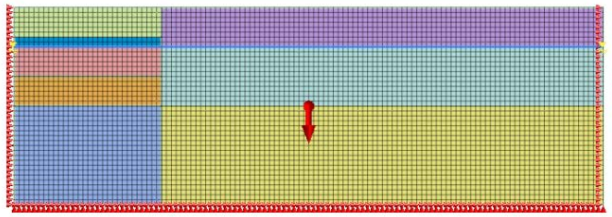
自動轉換成空間函數



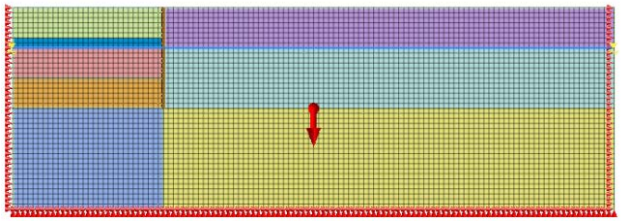
每0.1(m)間距距離產生一組水位線函數

分析說明-施工流程

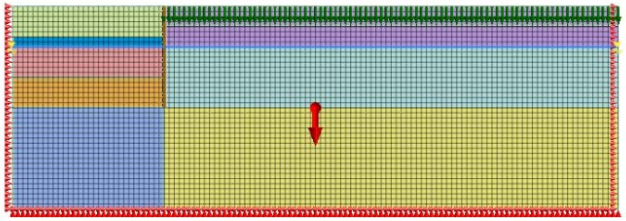
Stage1:Initial Stage



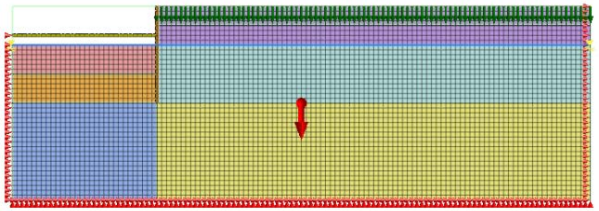
Stage2:連續壁



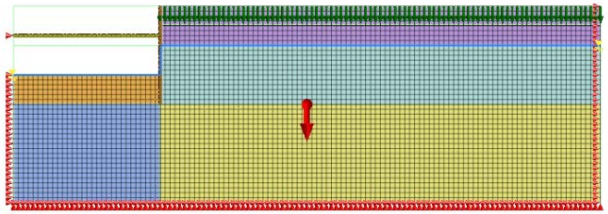
Stage3:地表壓力



Stage4:開挖1和支撐

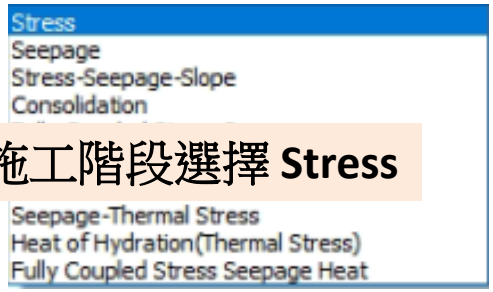


Stage5:開挖2

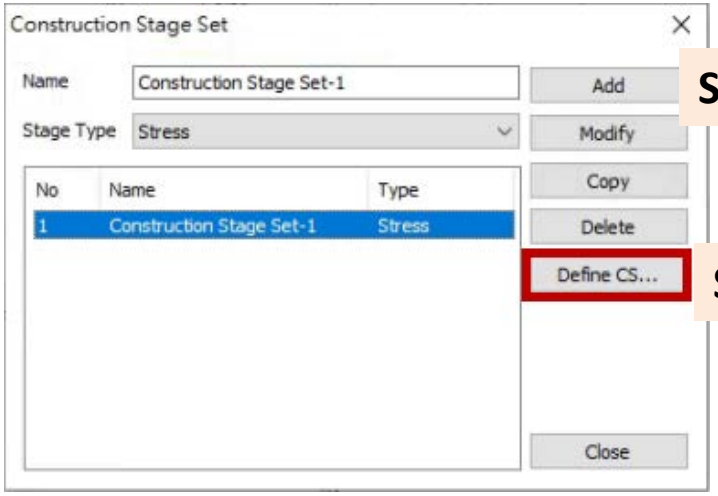


施工階段定義-1
(新增施工階段計算類型)

GTS NX提供多種施工階段類型

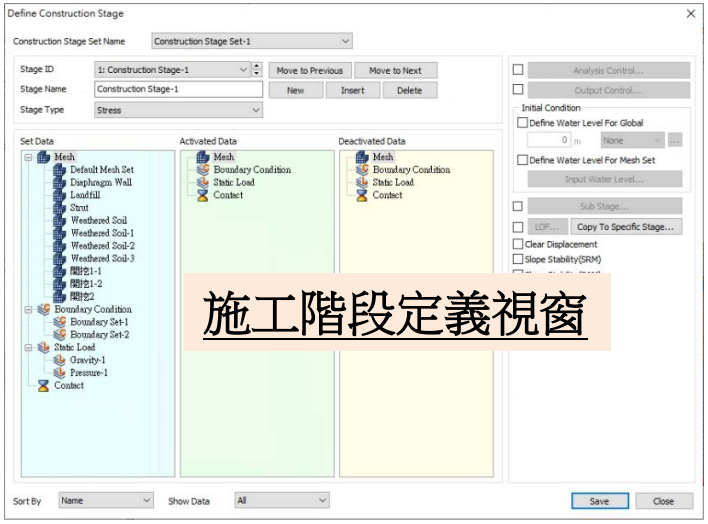


施工階段選擇 Stress



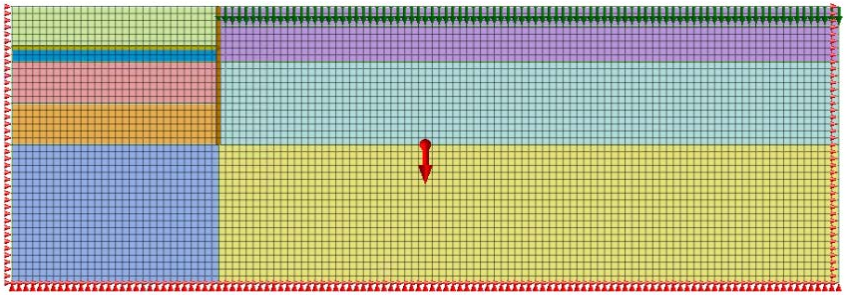
Step1.新增

Step2.編輯定義



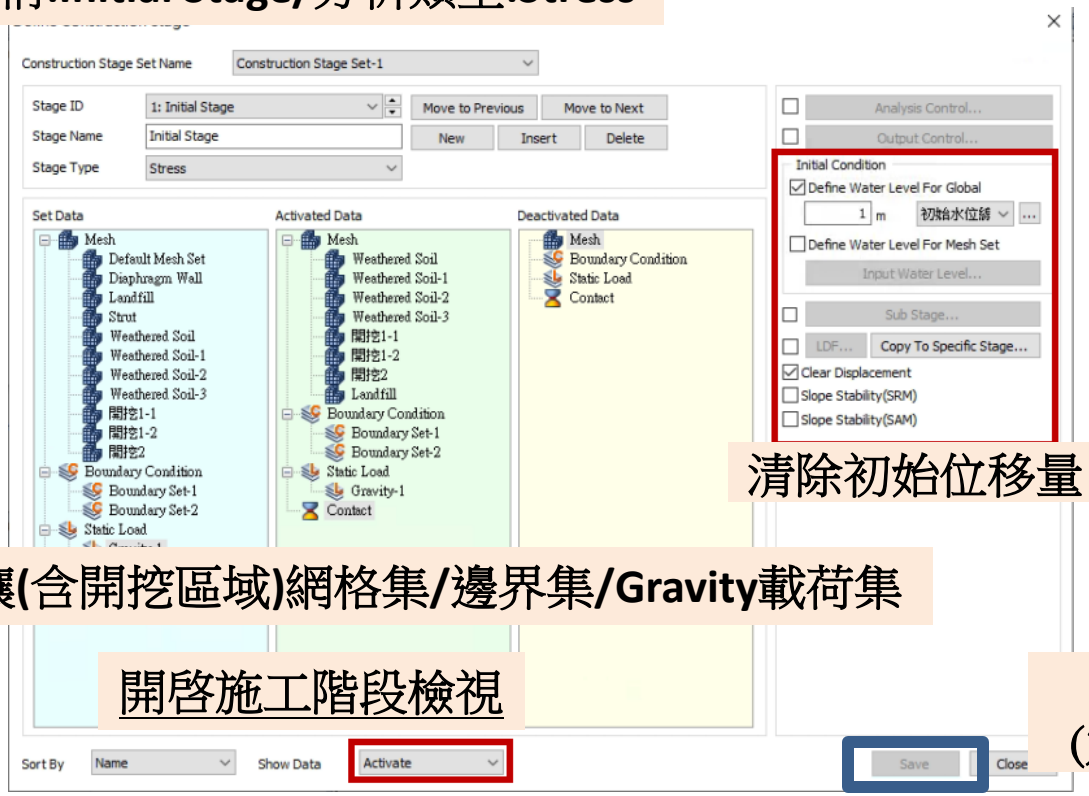
施工階段定義視窗

施工階段提供同步檢視
(顯示所有網格集/邊界集/載荷集)



施工階段定義-2
(施工階段1:Initial Stage)

訂義工況名稱:Initial Stage/分析類型:Stress



選擇初始水位線函數

清除初始位移量

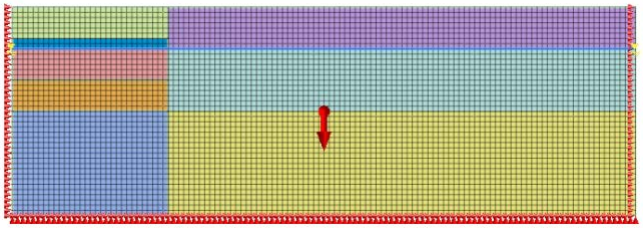
拖曳全部土壤(含開挖區域)網格集/邊界集/Gravity載荷集

開啓施工階段檢視

儲存
(定義後務必儲存)

操作畫面-未施加條件前

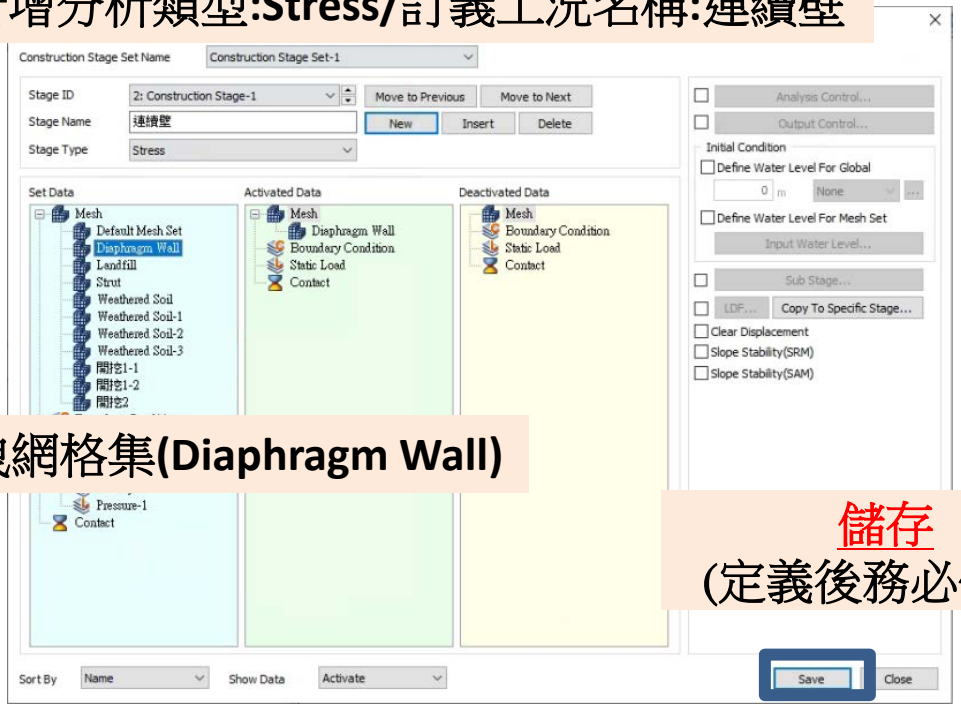
操作畫面-Initial Stage施工階段



施工階段定義-3

(施工階段2:連續壁)

新增分析類型:Stress/訂義工況名稱:連續壁

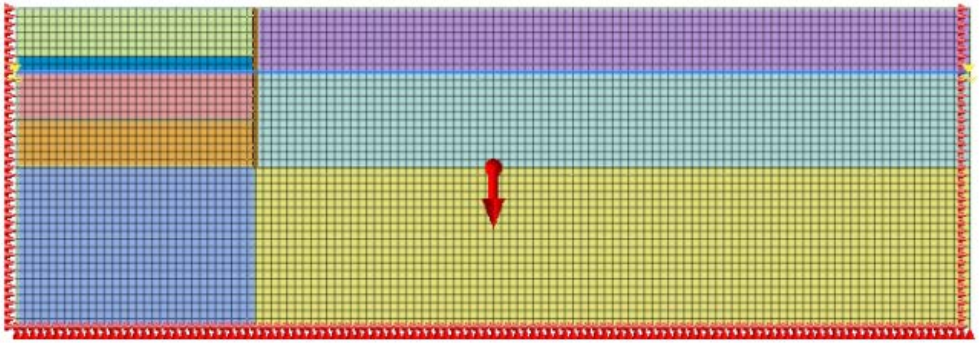


拖曳網格集(Diaphragm Wall)

儲存

(定義後務必儲存)

操作畫面-連續壁施工階段



施工階段定義-4

(施工階段3:地表壓力)

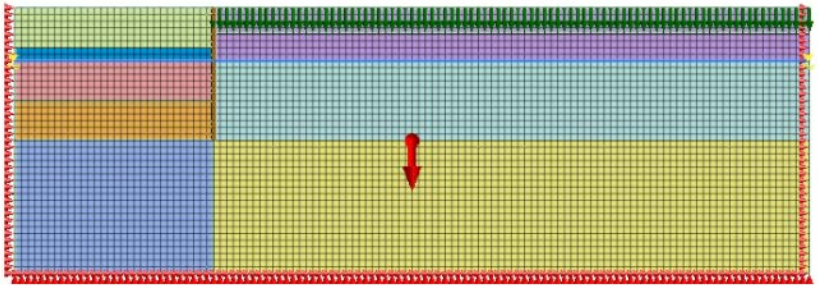
新增分析類型:Stress/訂義工況名稱:地表壓力

拖曳載荷集(Pressure)

儲存

(定義後務必儲存)

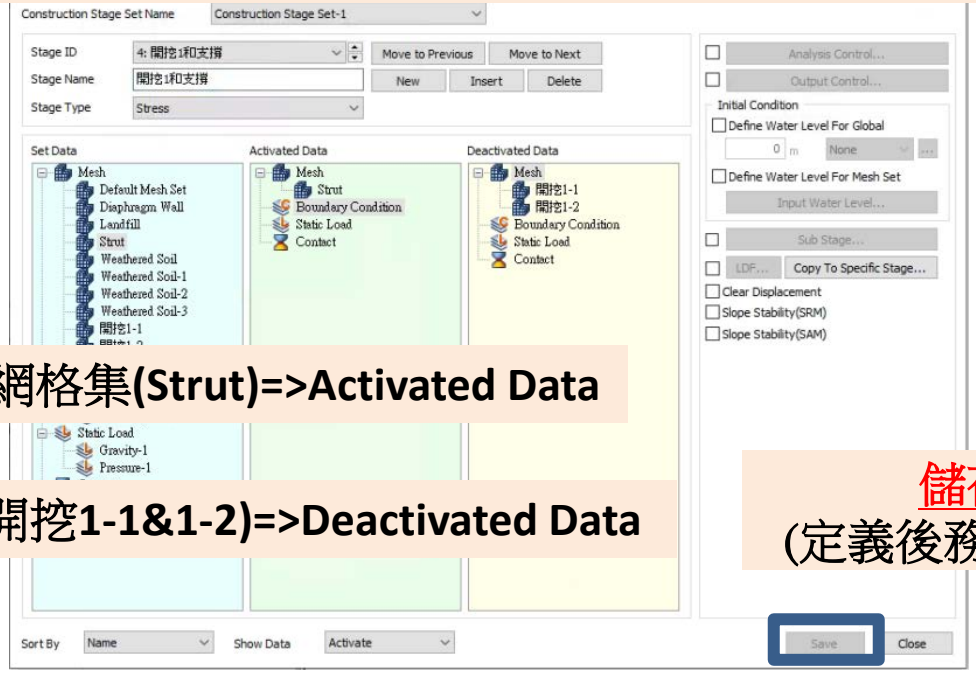
操作畫面-地表壓力施工階段



施工階段定義-5

(施工階段4:開挖1和支撐)

新增分析類型:Stress/訂義工況名稱:開挖1和支撐



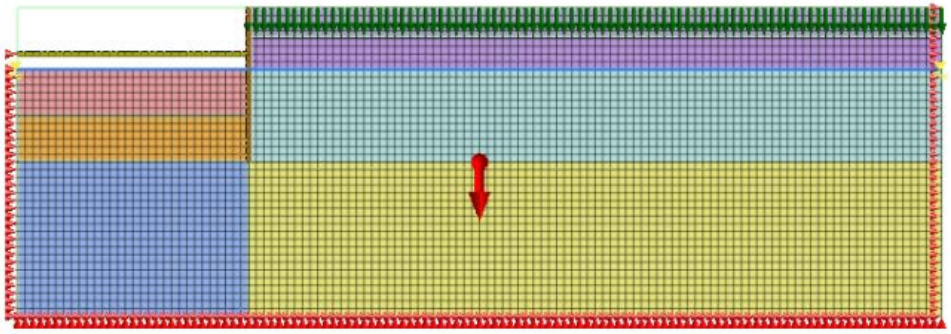
拖曳網格集(Strut)=>Activated Data

拖曳網格集(開挖1-1&1-2)=>Deactivated Data

儲存

(定義後務必儲存)

操作畫面-開挖1和支撐施工階段



施工階段定義-6

(施工階段5:開挖2)

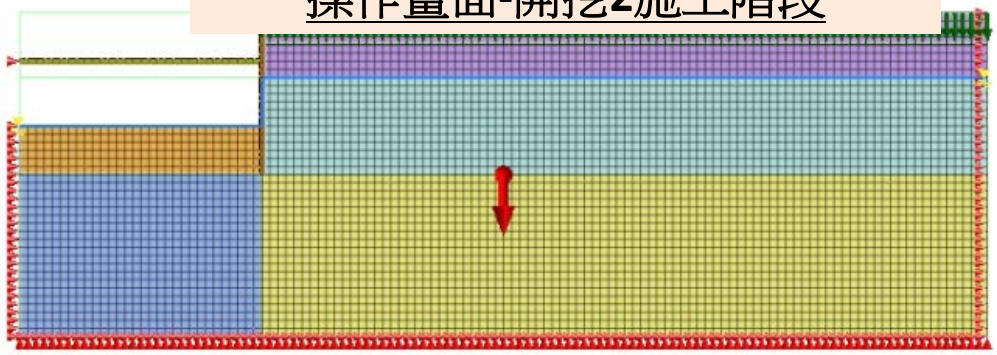
新增分析類型:Stress/訂義工況名稱:開挖2

拖曳網格集(開挖2)=>Deactivated Data

儲存

(定義後務必儲存)

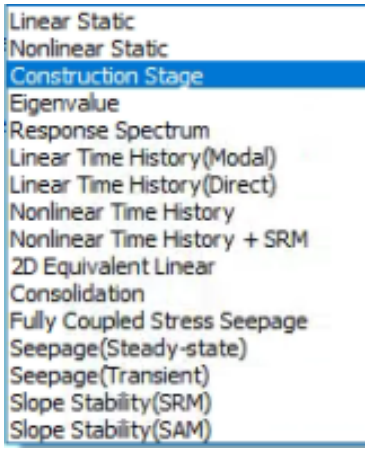
操作畫面-開挖2施工階段

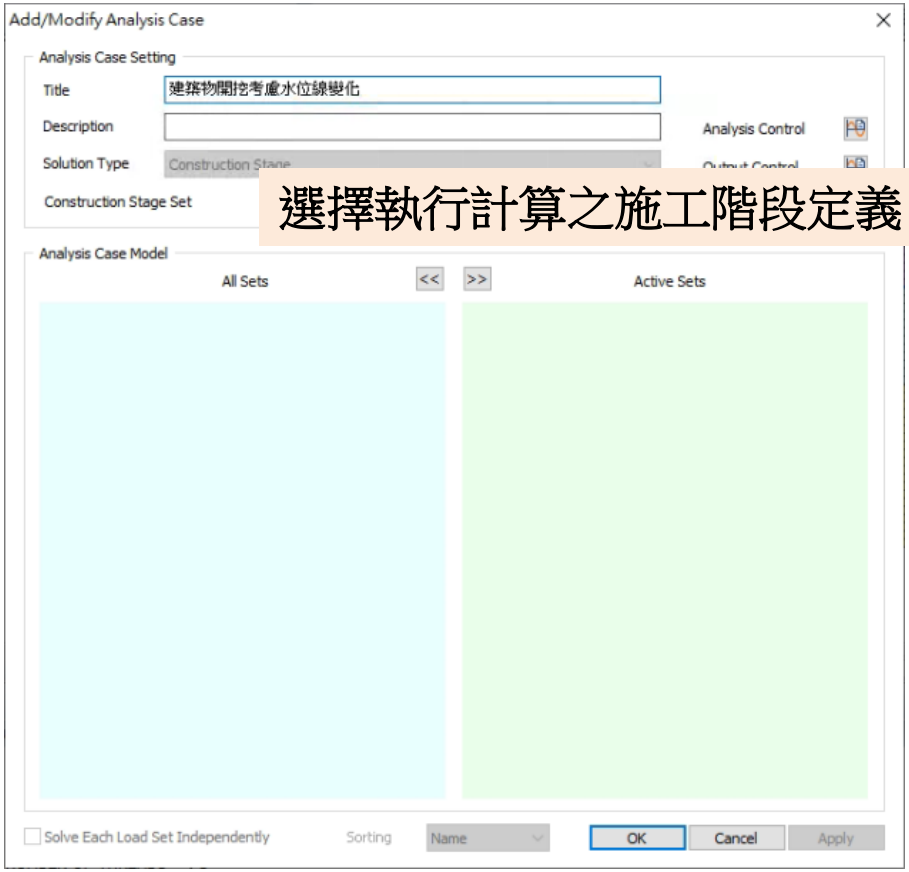


分析定義
(建築物開挖考慮水位線變化)

分析名稱:建築物開挖考慮水位線變化/分析類型:**Construction Stage**

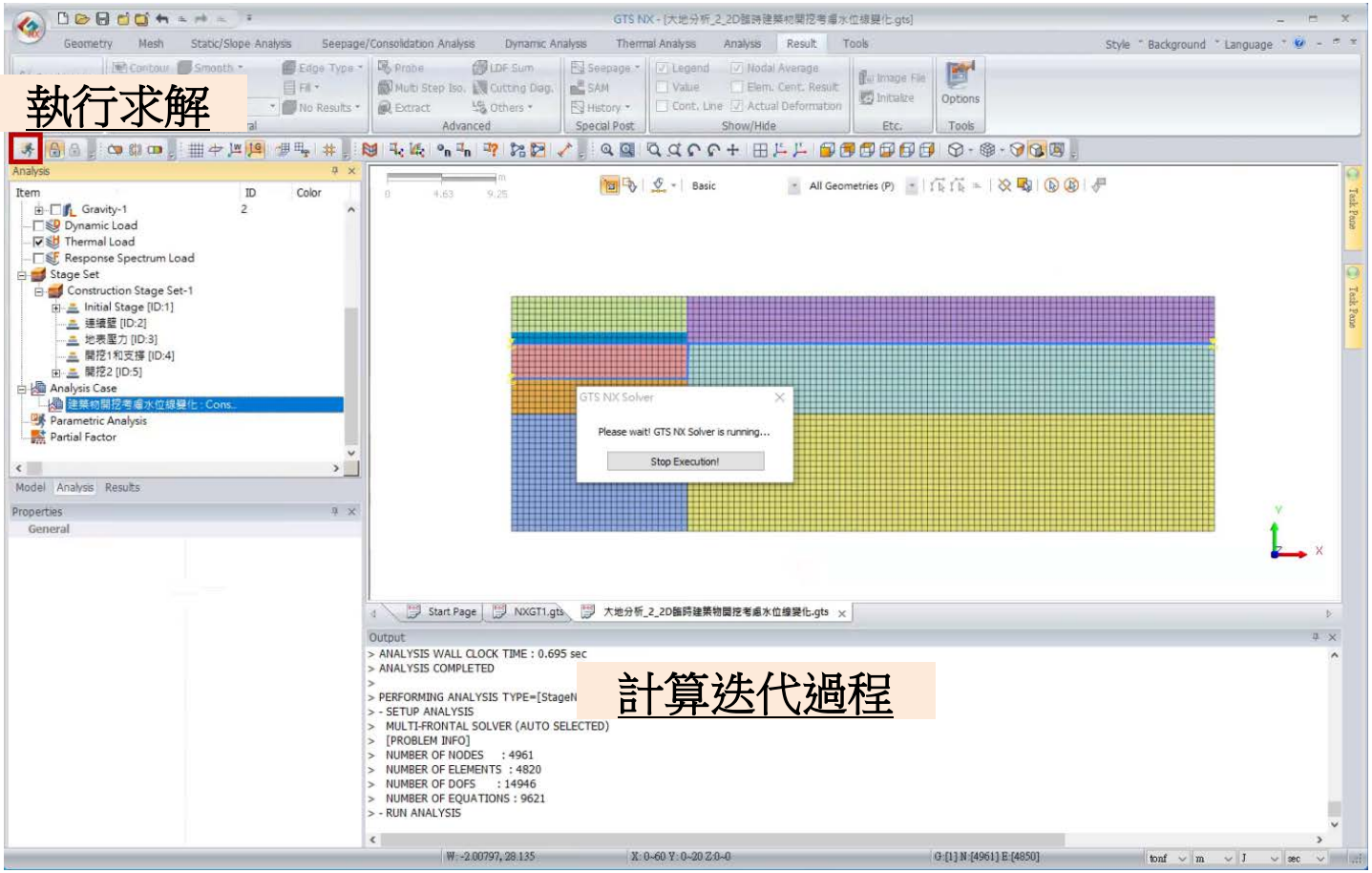
Construction Stage





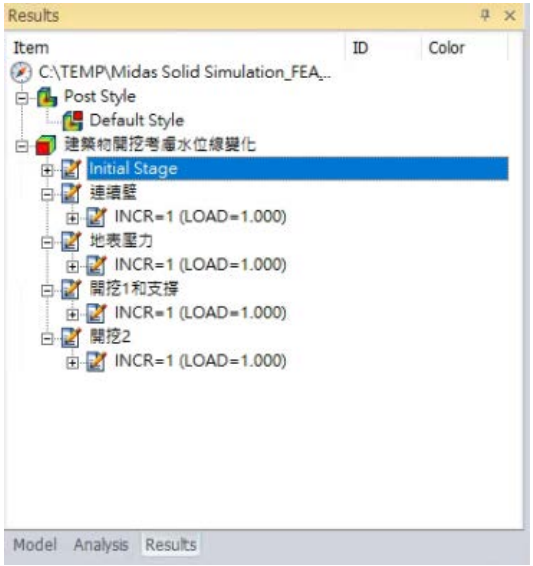
選擇執行計算之施工階段定義

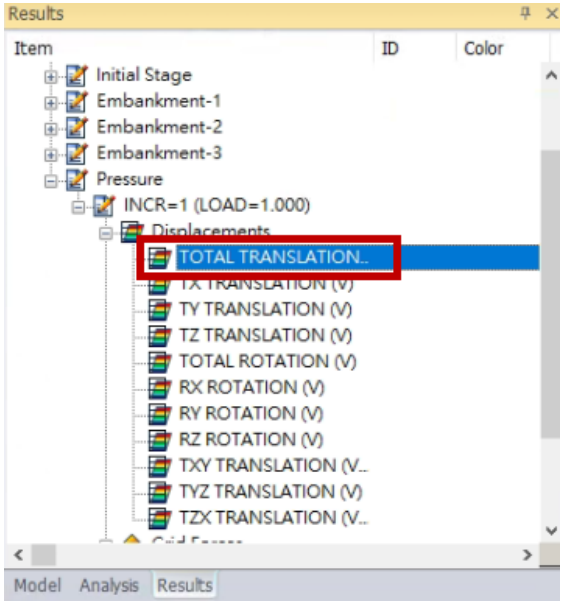
計算


執行求解
GTS NX Solver
Please wait! GTS NX Solver is running...
Stop Execution!
計算迭代過程

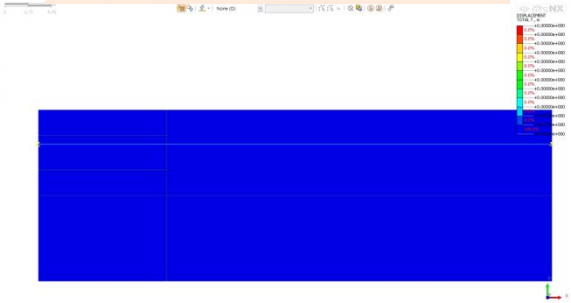
分析結果-1

依照施工階段定義順序
輸出5組結果

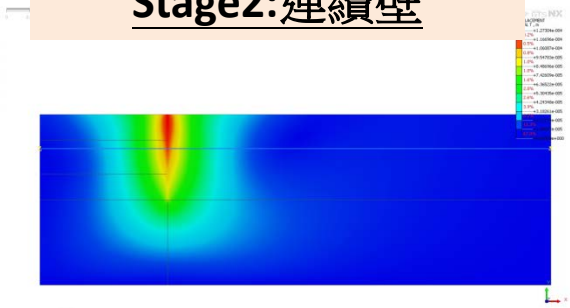




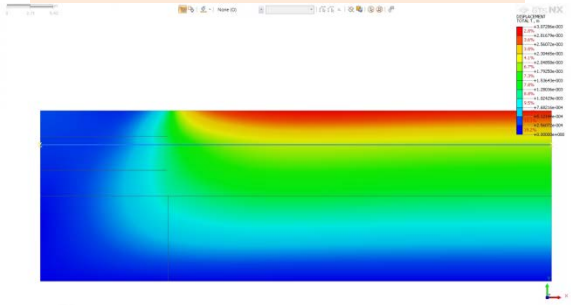
Stage1:Initial Stage



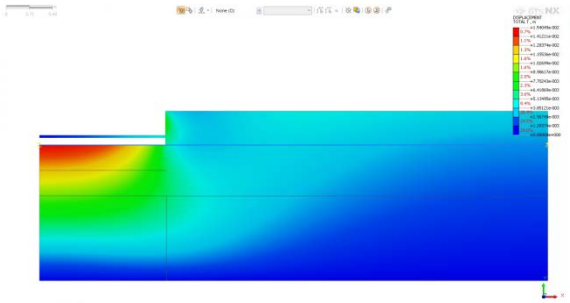
Stage2:連續壁



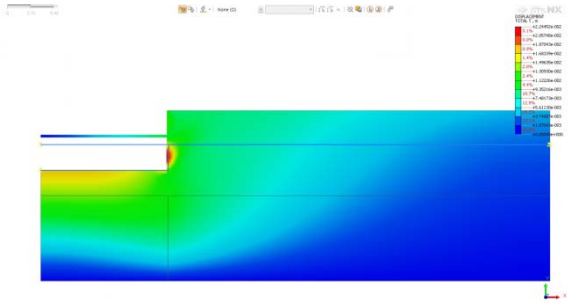
Stage3:地表壓力



Stage4:開挖1和支撐



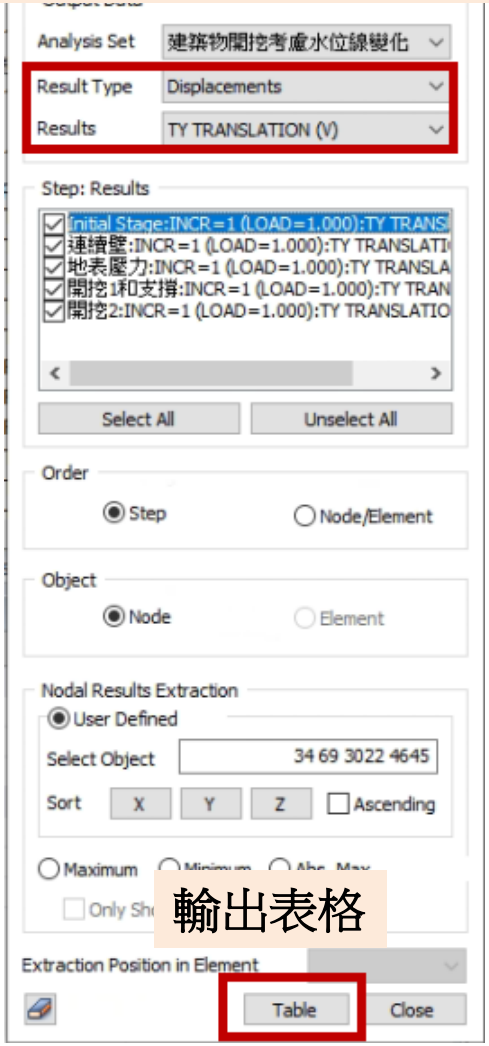
Stage5:開挖2



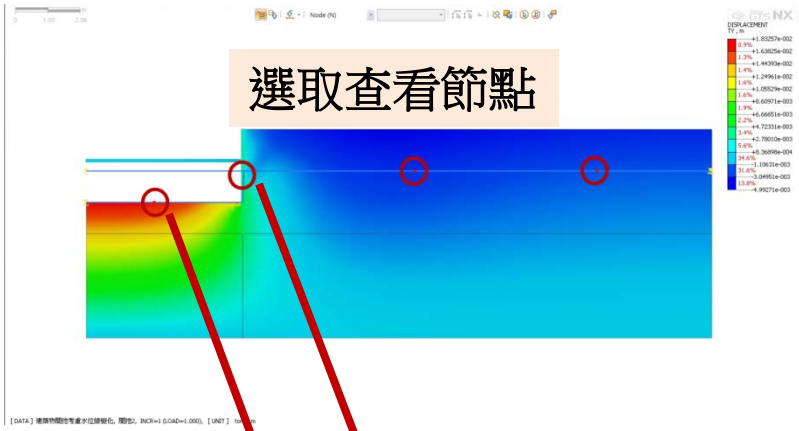
播放動畫 (施工階段)

分析結果-2

查看施工階段下沉量變化(Ty)

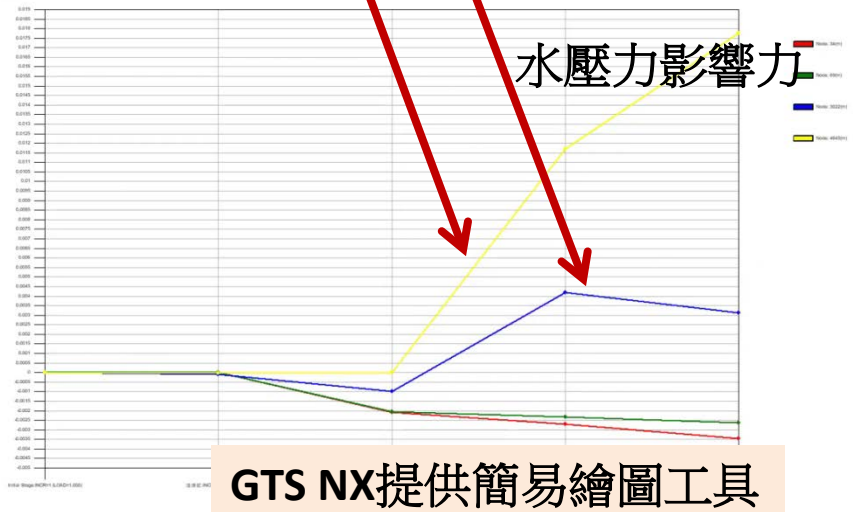


輸出表格



選取查看節點

No	Step	Step Value	Node: 34 TY TRANSLATION (V) (m)	Node: 69 TY TRANSLATION (V) (m)	Node: 3022 TY TRANSLATION (V) (m)	Node: 4645 TY TRANSLATION (V) (m)
1	Initial Stage:INCR=1 (LOAD=1.000)	1.000000e+000	0.000000e+000	0.000000e+000	0.000000e+000	0.000000e+000
2	連續壁:INCR=1 (LOAD=1.000)	1.000000e+000	1.409928e-006	1.730658e-006	-1.140064e-004	-1.471773e-005
3	地表壓力:INCR=1 (LOAD=1.000)	1.000000e+000	-2.088763e-003	-2.045125e-003	-9.776569e-004	1.585196e-005
4	開挖1和支撐:INCR=1 (LOAD=1.00	1.000000e+000	-2.705676e-003	-2.328100e-003	4.181398e-003	1.171322e-002
5	開挖2:INCR=1 (LOAD=1.000)	1.000000e+000	-3.452261e-003	-2.641285e-003	3.124713e-003	1.777844e-002



水壓力影響力

GTS NX提供簡易繪圖工具