

The background of the slide features a complex network of interconnected nodes and lines, resembling a mesh or a molecular structure. The nodes are small circles, and the lines are thin, creating a web-like pattern. The background color transitions from a light green on the left to a bright yellow in the center, and finally to a deep orange on the right.

GTS NX

New eXperience of Geo-Technical analysis System

Slope Stability Check

Advanced Course Session 1

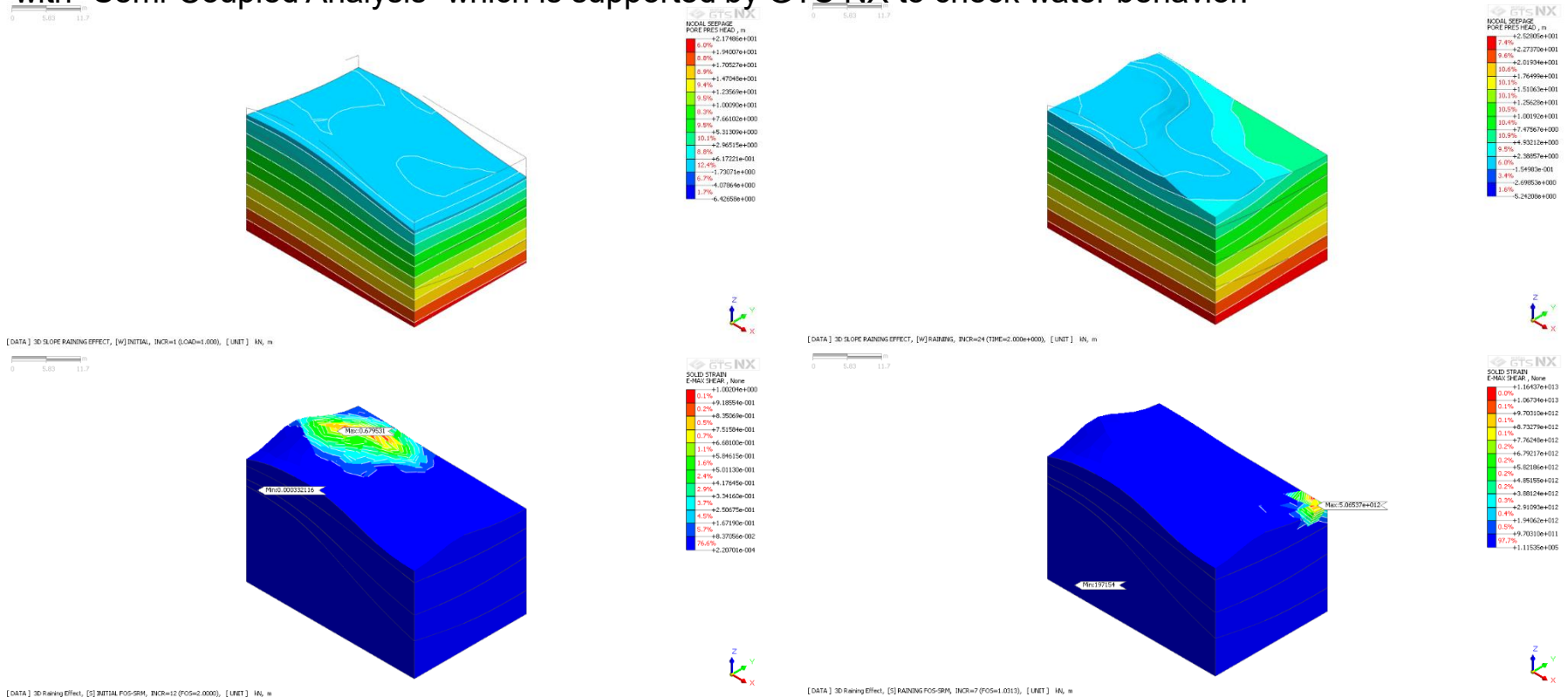
The MIDAS logo consists of the word "MIDAS" in a bold, sans-serif font. Above the letters "I" and "D" is a stylized, curved line that suggests a bridge or a structural element.

MIDAS

Modeling and Analysis Summary

The model is consisted of slope on the ground surface and water level below first of soil layer.

Tutorial is aiming on performing the analysis to check F.O.S considering raining effect and see the water level increasement using transient function to define the duration of raining. This tutorial will be carried out with “Semi-Coupled Analysis” which is supported by GTS NX to check water behavior.



Ground

[unit : kN, m]

Name	Fill	SVI	SV	SIV
Material	Isotropic	Isotropic	Isotropic	Isotropic
Model Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
General				
Elastic Modulus (E) [kN/m ²]	10,000	16,666	83,333	250,000
Poisson's Ratio (v)	0.3	0.3	0.3	0.3
Unit Weight (γ) [kN/m ³]	17	20	21	22
Ko	0.5	0.7	0.7	0.7
Porous				
Unit Weight (Saturated) [kN/m ³]	18	21	22	23
Drainage Parameters	Drained	Drained	Drained	Drained
Non-Linear				
Cohesion (c) [kN/m ²]	1	1	5	15
Frictional Angle (Φ) [deg]	30	30	32	34

The background of the slide features a complex network of thin, dark lines connecting numerous small, dark circular nodes. This network is overlaid on a color gradient that transitions from a light green on the left to a bright yellow in the center, and finally to a deep orange-red on the right. The overall effect is a sense of interconnectedness and digital structure.

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Geometry Modeling

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03 Geometry Modeling

Starting

Procedure

- 1 Open the start file

“SLOPE BASIC SESSION 1 START”

The main window is a Windows File Explorer titled 'SLOPE ADVANCED SESSION 1'. The address bar shows the path 'ED... > SLOPE...'. The left sidebar shows 'Quick access' with links to Desktop, Downloads, Documents, Pictures, 지반 사업 (Geotechnical Engineering), GTSNX, Dropbox, and OneDrive. The main pane displays a list of files:

Name	Date modified	Type	Size
Bedding Plane	6/29/2020 1:14 PM	Microsoft Excel W...	12 KB
Boring	6/29/2020 1:00 AM	AutoCAD LT Drawi...	204 KB
SLOPE ADVANCED SESSION 1 START	7/16/2020 4:10 PM	GTS NX Documen...	987 KB

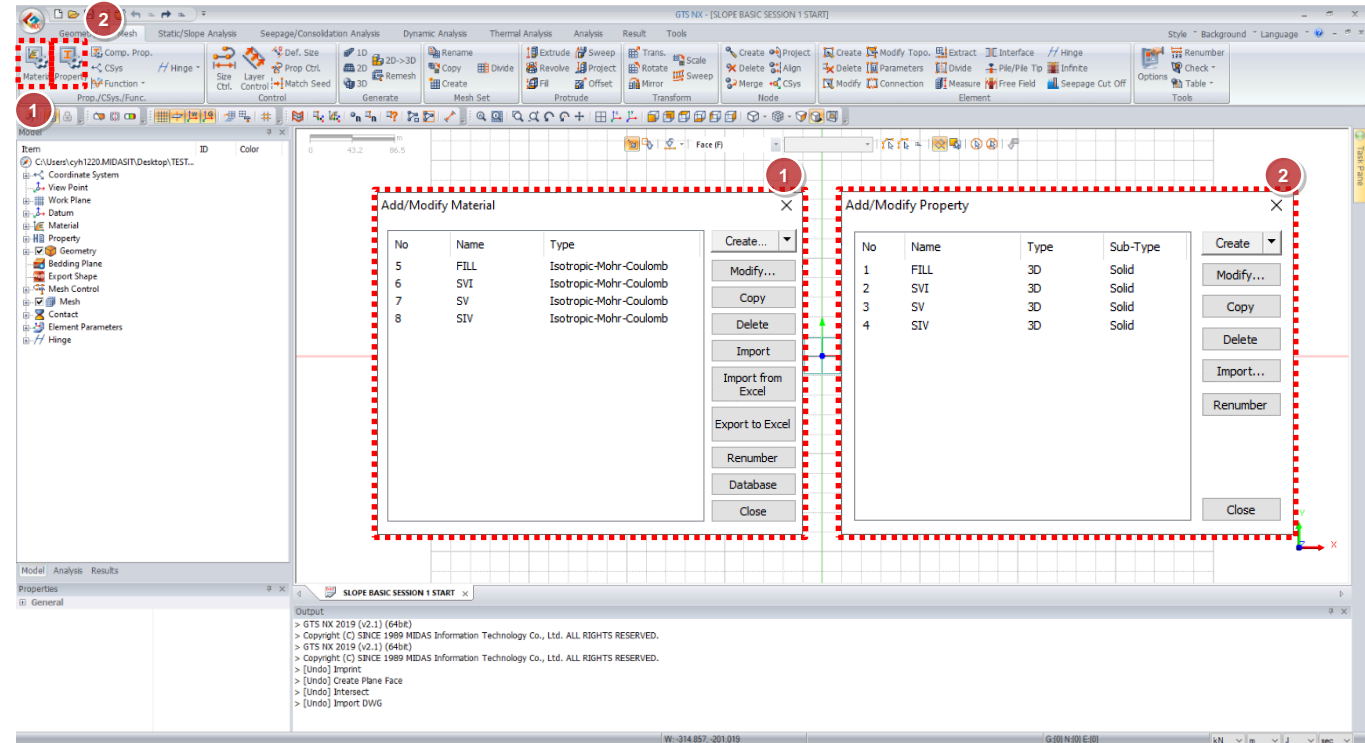
The file 'SLOPE ADVANCED SESSION 1 START' is highlighted with a red dashed border. An inset window shows the GTS NX software interface. The interface includes a menu bar, a toolbar, and a 3D model of a slope. The 3D model shows a blue wireframe of a slope face and a red line representing a failure surface. The status bar at the bottom of the GTS NX window displays the text: 'GTS NX 2019 (x64) Copyright (C) 2007-2019 WITAS Information Technology Co., Ltd. All RIGHTS RESERVED. GTS NX 2019 (x64) Copyright (C) 2007-2019 WITAS Information Technology Co., Ltd. All RIGHTS RESERVED.'

03 Geometry Modeling

Check the properties

Procedure

- 1 Check existing materials
(Mesh > Prop./CSys./Func. > Material)
- 2 Check existing properties
(Mesh > Prop./CSys./Func. > Property)

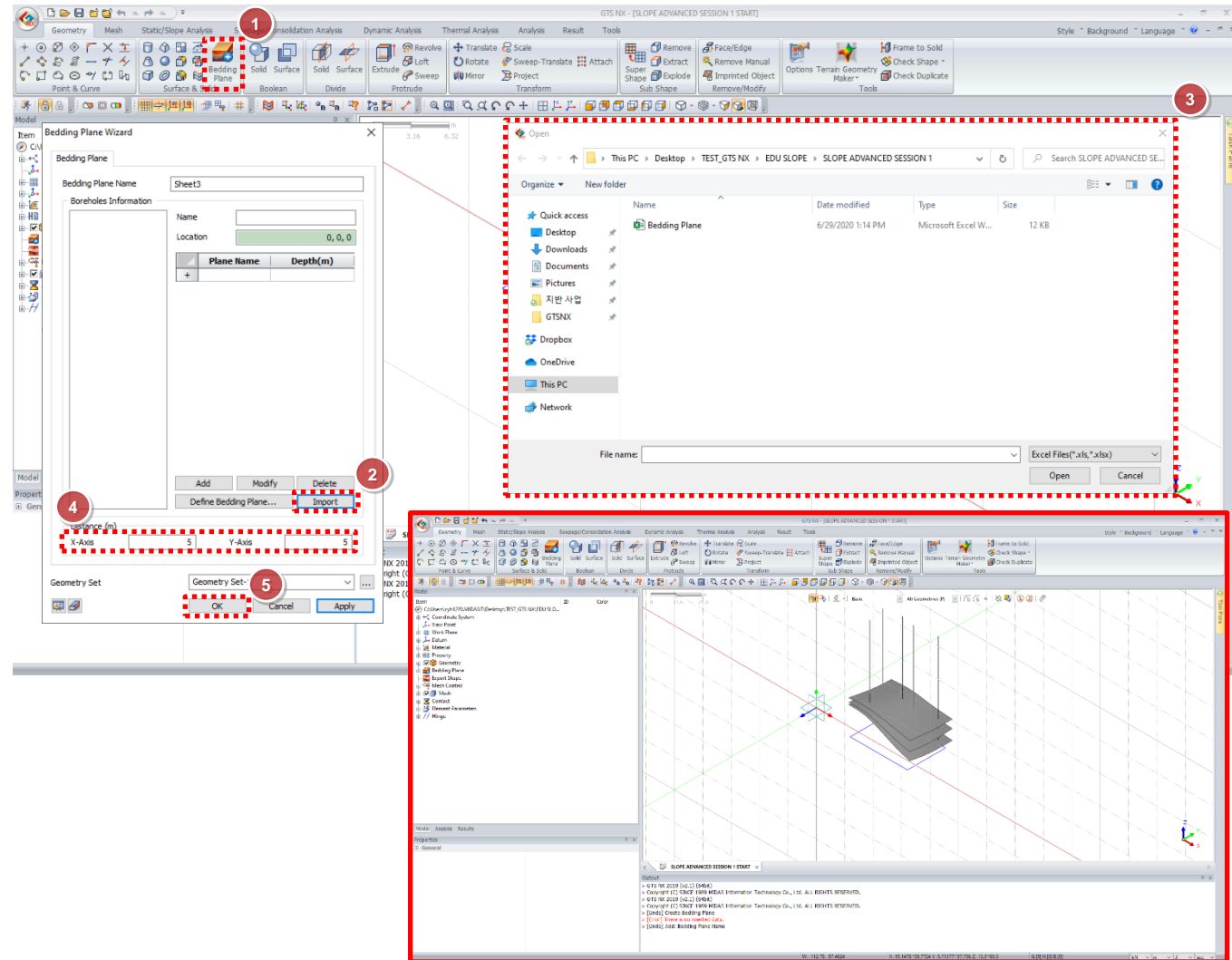


03 Geometry Modeling

Bedding Plane

Procedure

- 1 Click "Bedding Plane"
- 2 Click "Import"
- 3 Select "Bedding Plane"
Click "Open"
- 4 Distance (m)
X-Axis: 5
Y-Axis: 5
- 5 Click "OK"

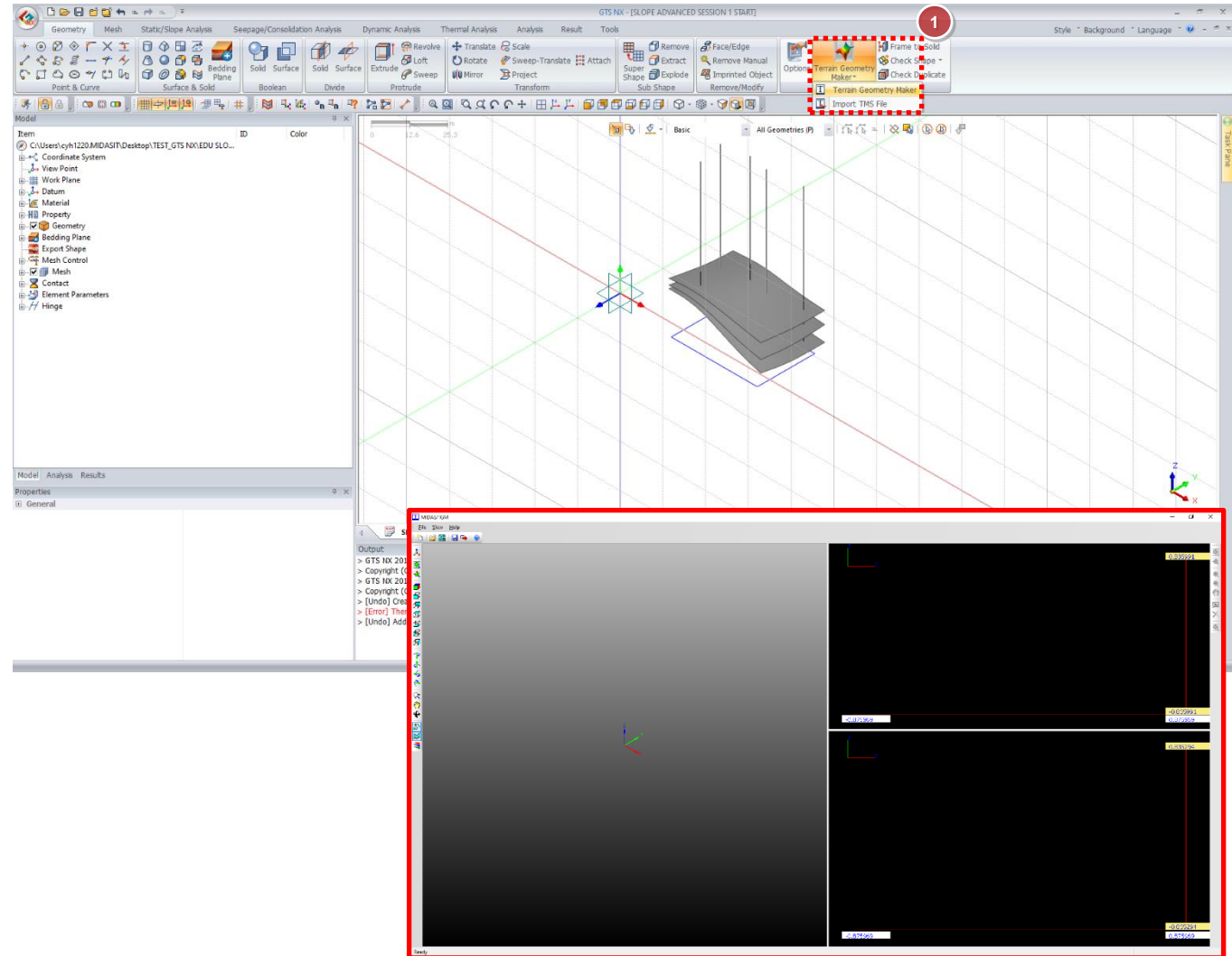


03 Geometry Modeling

Terrain Geometry Maker (Using 3D contour cad)

Procedure

- 1 Click "Terrain Geometry Maker"

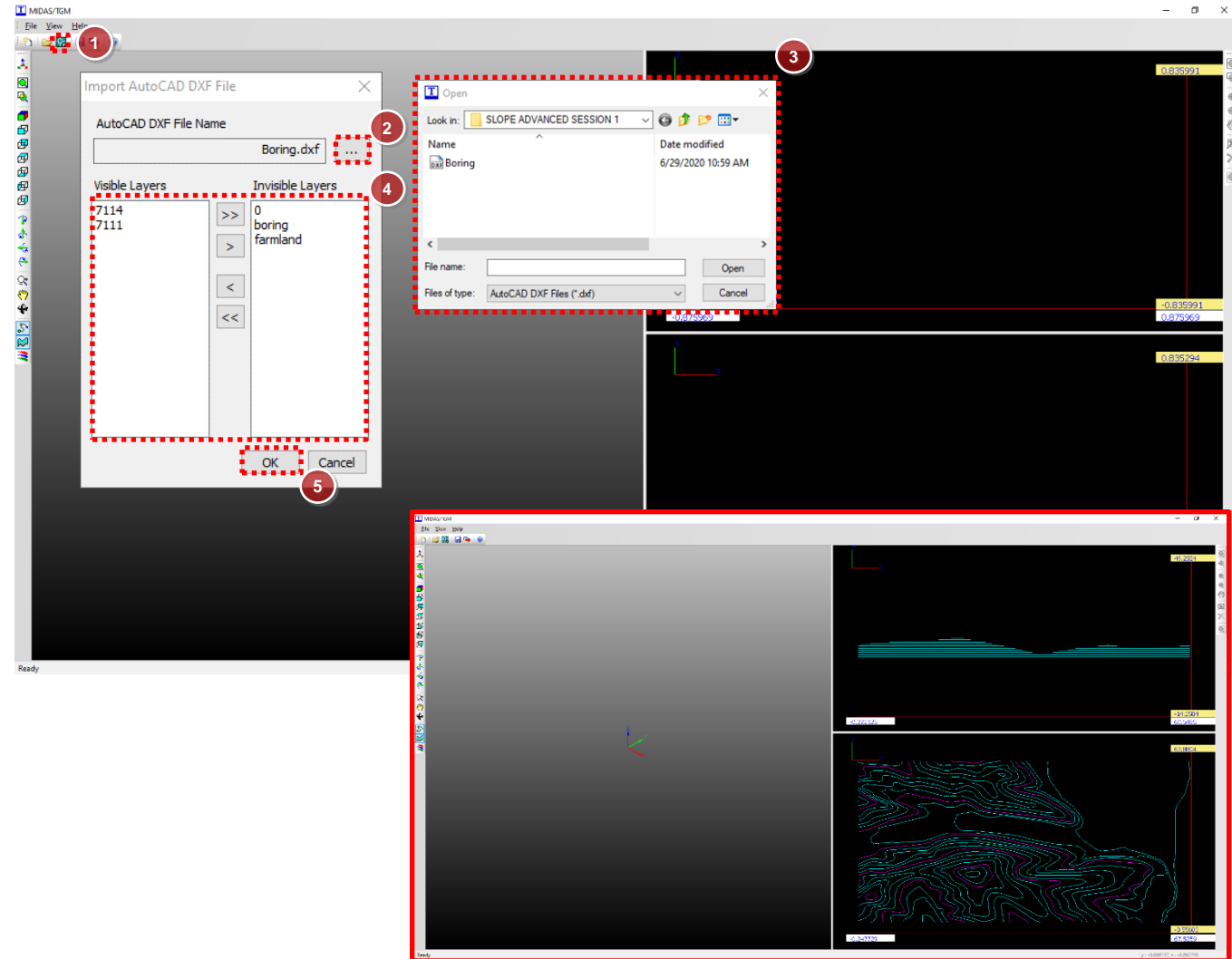


03 Geometry Modeling

Terrain Geometry Maker (Using 3D contour cad)

Procedure

- 1 Click "Import DXF File"
- 2 Click "..."
- 3 Select "Boring" dxf. file and click "Open"
- 4 Move "0, boring, farmland" from visible layers to Invisible layers
- 5 Click "OK"



Terrain Geometry Maker (Using 3D contour cad)

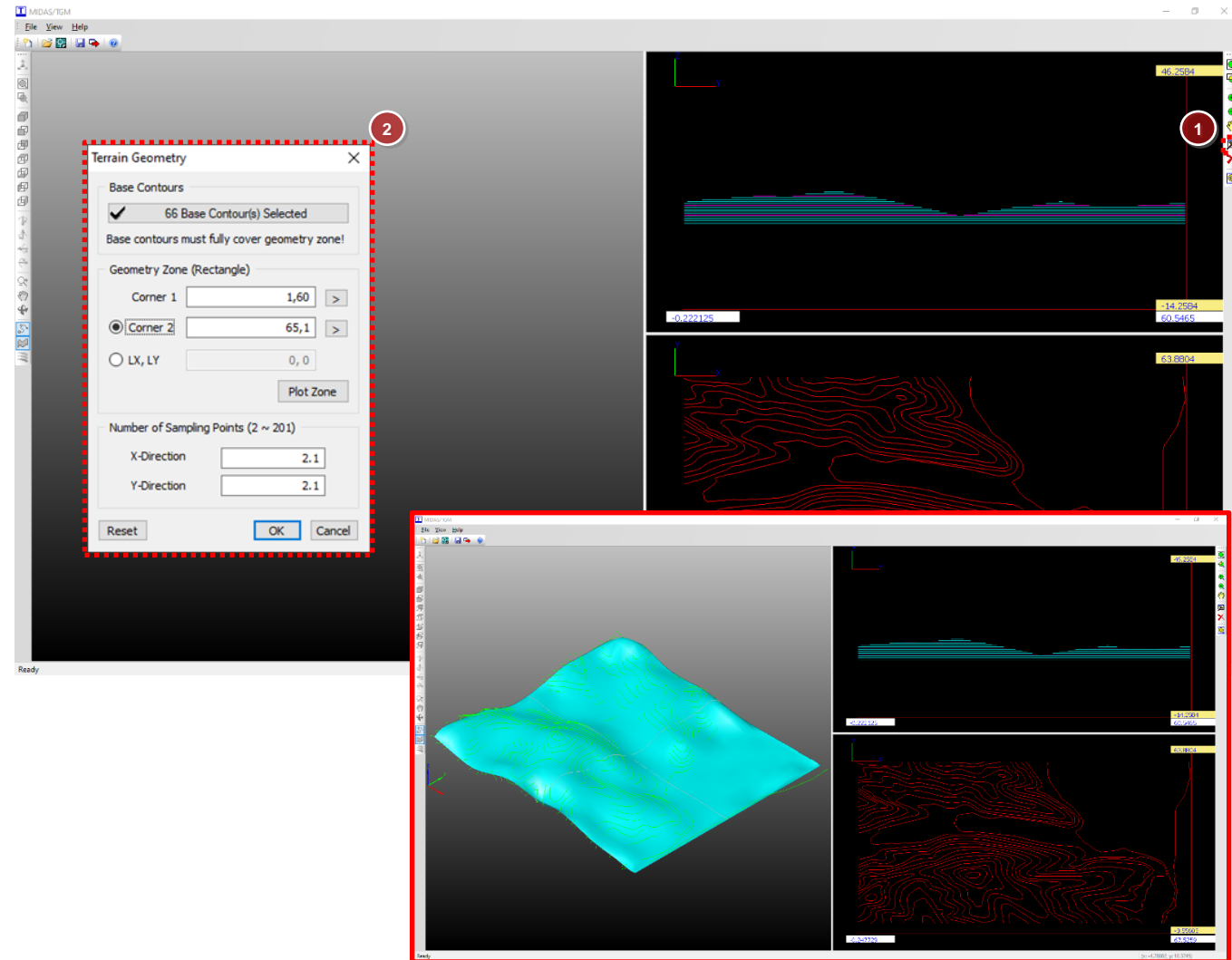
Procedure

- 1 Click "Terrain Geometry"
- 2 Select every contour lines
 Corner 1: 1,60
 Corner 2: 65,1
 X-Direction: 2.1
 Y-Direction: 2.1
 Click "OK"

[Information]

Select every line from below window on right hand side.

Please ignore the error message after click OK.

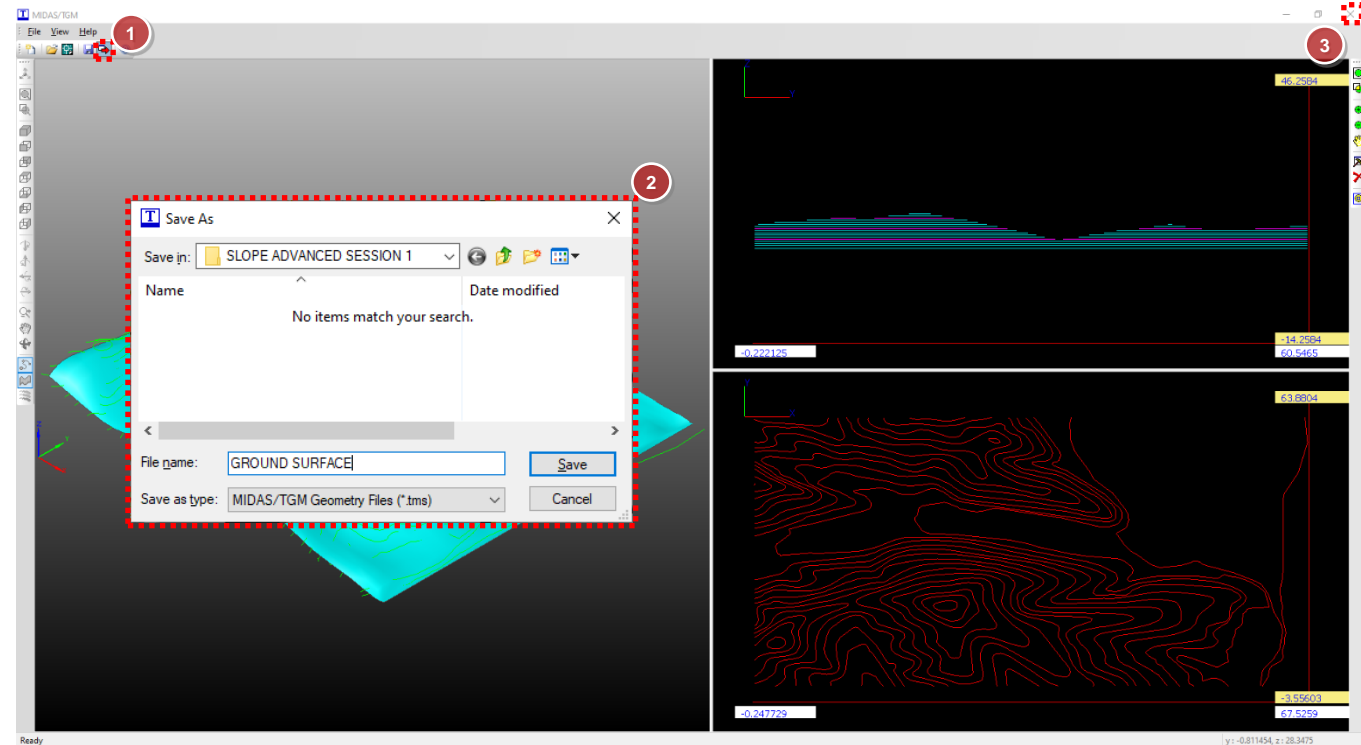


03 Geometry Modeling

Terrain Geometry Maker (Using 3D contour cad)

Procedure

- 1 Click "Export Surface"
- 2 File name:
GROUND SURFACE
Click "Save"
- 3 Close Terrain Geometry Maker
without saving

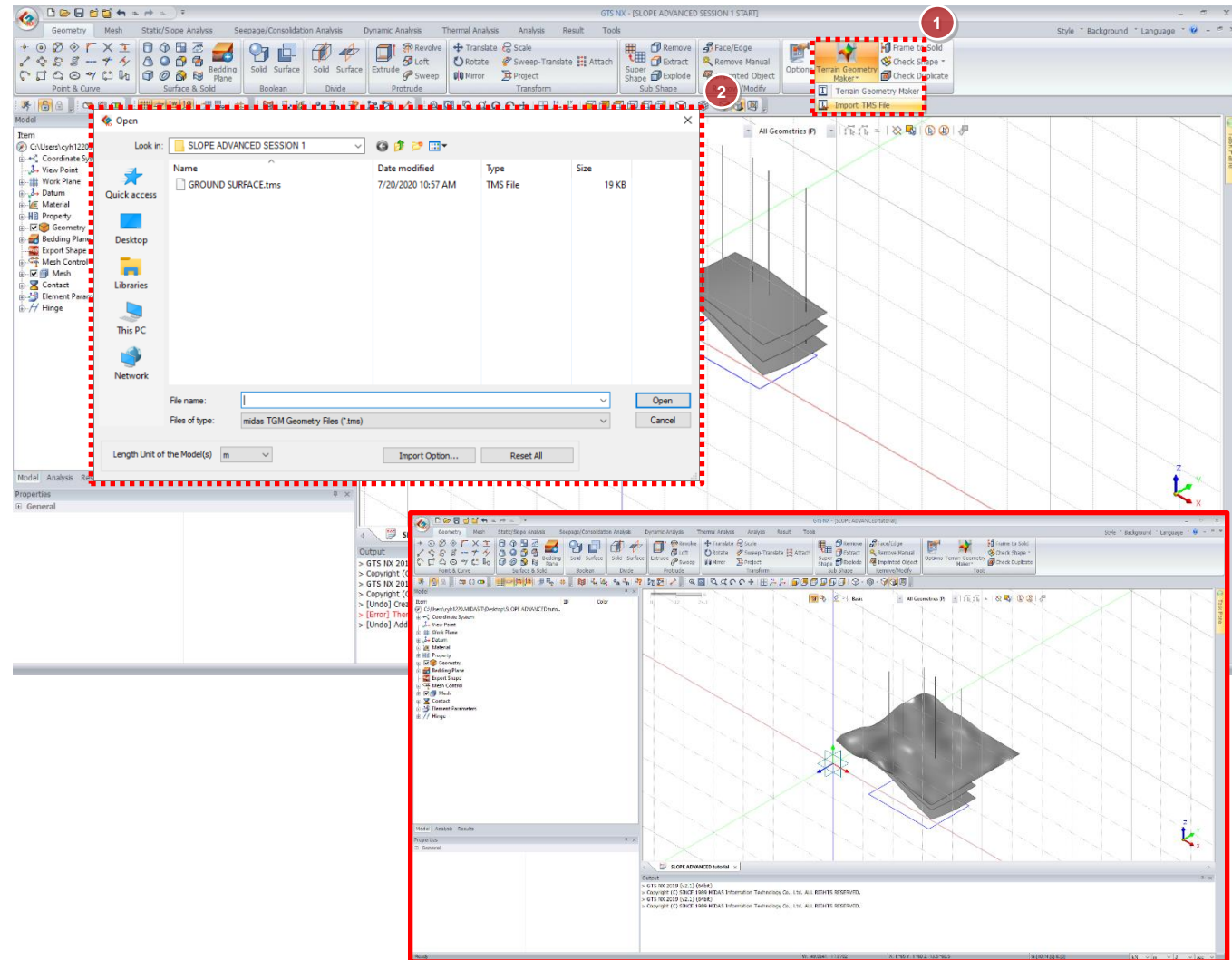


03 Geometry Modeling

Terrain Geometry Maker (Using 3D contour cad)

Procedure

- 1 Click "Terrain Geometry Maker"
Click "Import TMS File"
- 2 Select
"GROUND SURFACE.tms"
Click "Open"

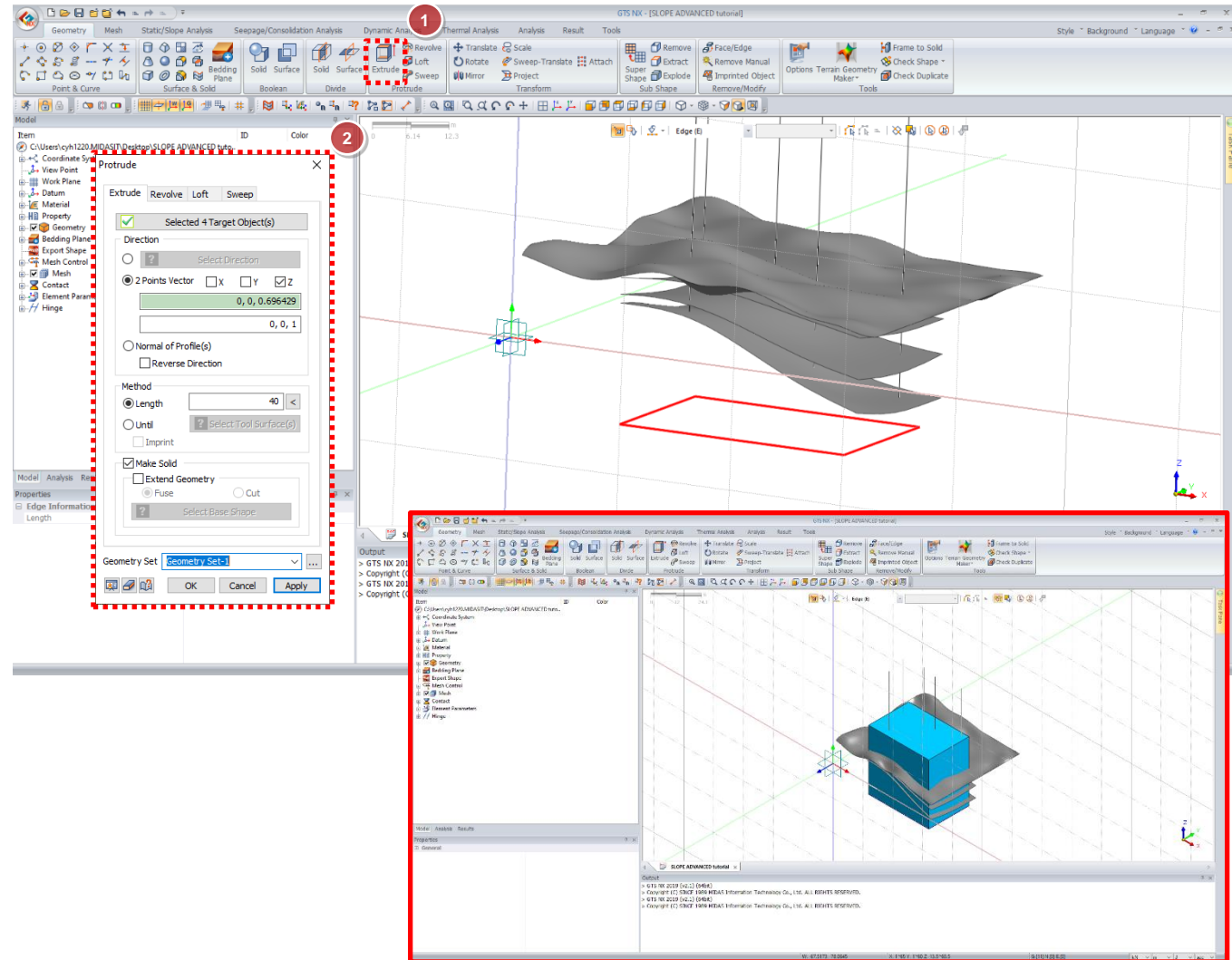


03 Geometry Modeling

Create solid for ground

Procedure

- 1 Click "Extrude"
- 2 Select 4 lines
2 Points Vector Select "z" only
Length: 40
Click "OK"

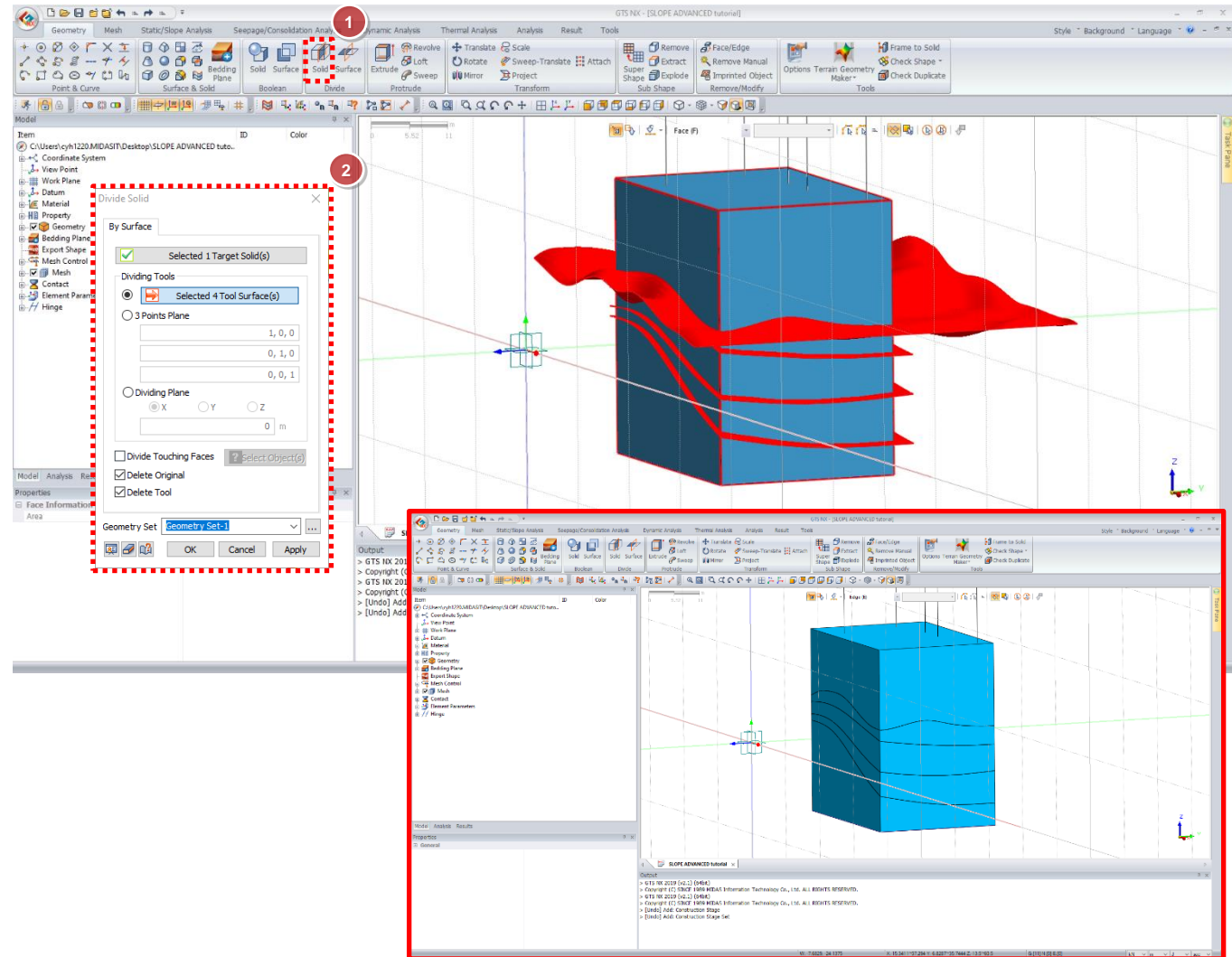


03 Geometry Modeling

Cut solid for soil layer

Procedure

- 1 Click "Solid"
- 2 Select Solid
Select 4 faces
Click "OK"



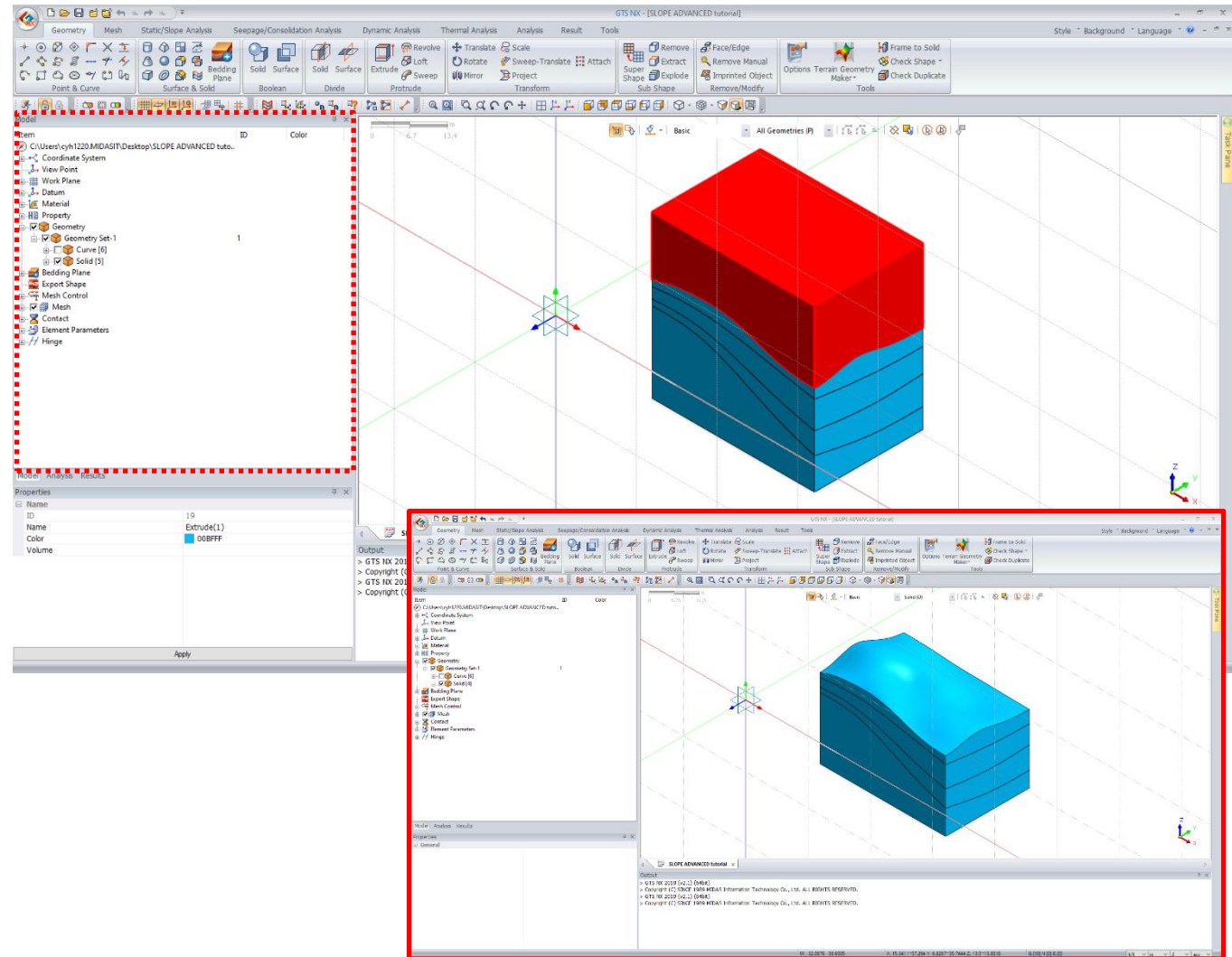
03 Geometry Modeling

Delete solid

Procedure

<Geometry>
Hide all lines

Delete solid which is located on
the top.



03 Geometry Modeling

Using Auto-Connect function

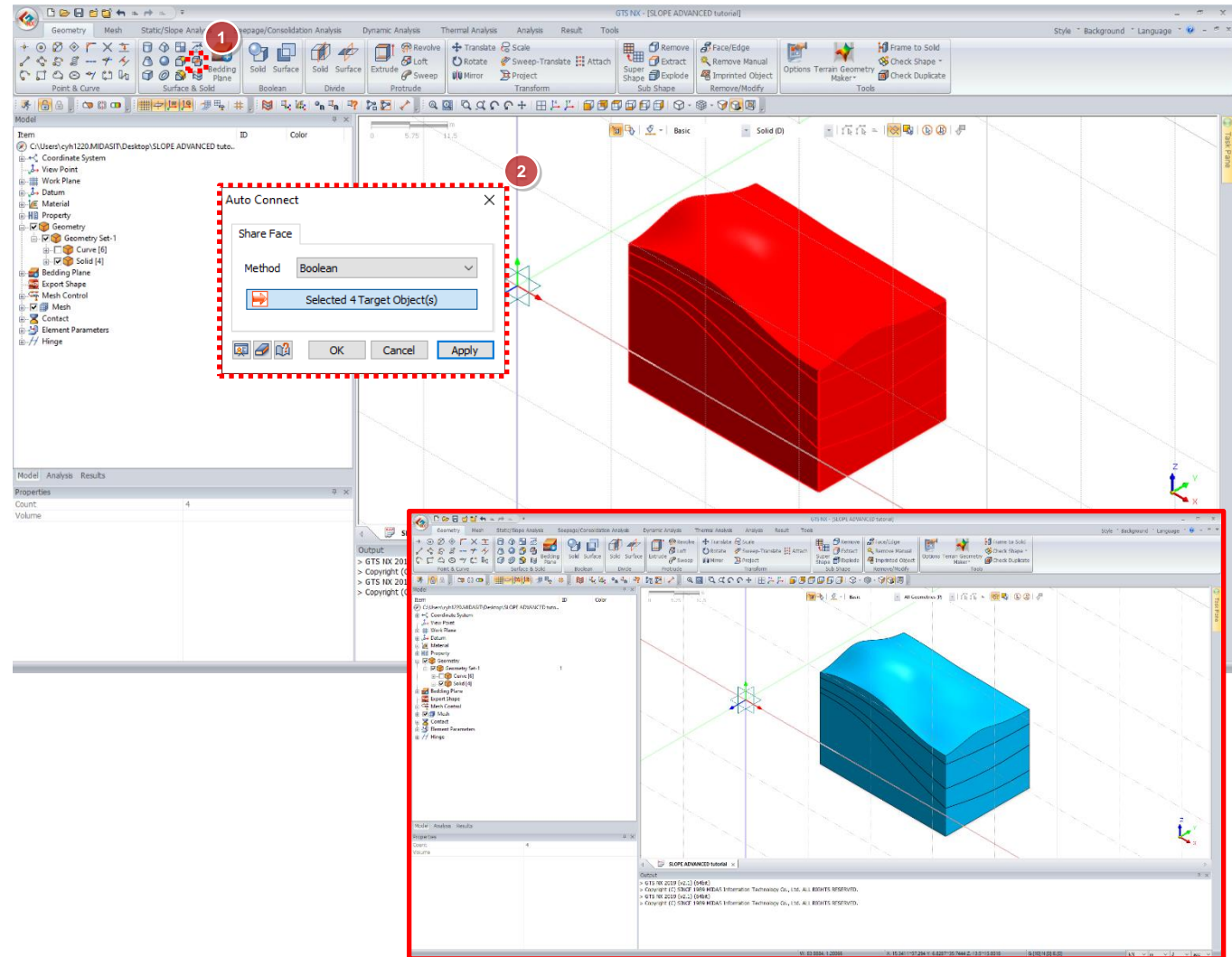
Procedure

1 Click “Auto-Connect”

2 Method: Boolean
Select every solid
Click “OK”

[Information]

Using “Auto connect” function to connect the solids. Then, the nodes will be shared each solid when you generate the mesh



The background of the slide is a complex, interconnected mesh of lines and dots, resembling a finite element analysis (FEA) model. The mesh is composed of numerous small, irregular polygons, primarily triangles and quadrilaterals, which vary in size and orientation. The dots, representing nodes, are small black circles. The overall color scheme is a gradient from light green on the left to bright orange on the right, with the mesh lines and nodes appearing in a dark brown or black color.

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Mesh Generation

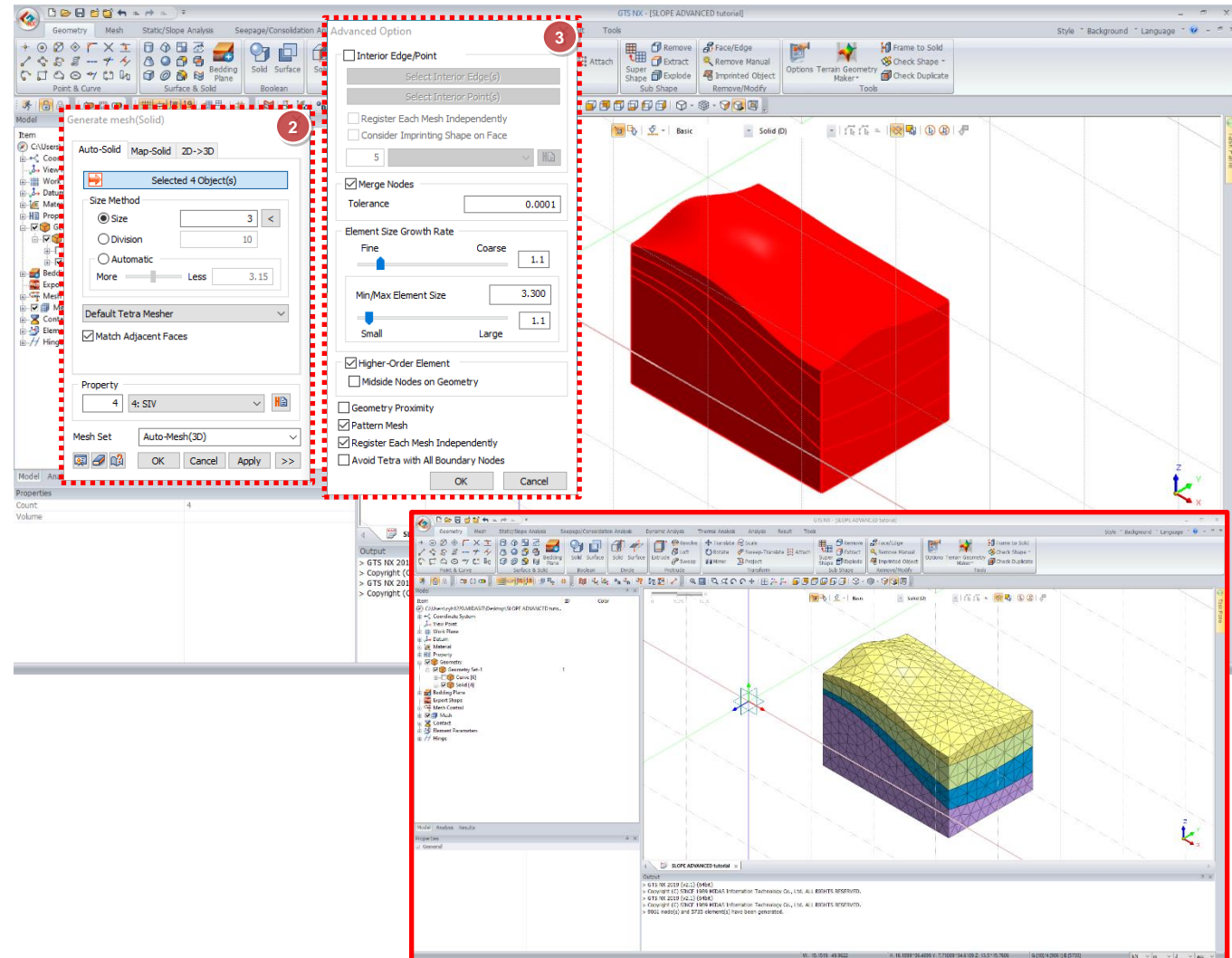
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04 Mesh Generation

Generate the mesh for ground

Procedure

- 1 Select every solid
Right click from mouse
Click "Generate Mesh"
 - 2 Size Method: 3 m
Property: SIV
Click ">>"
 - 3 Check "Higher-Order Element"
Click "OK"
- Click "OK"



04 Mesh Generation

Assign property for each layer

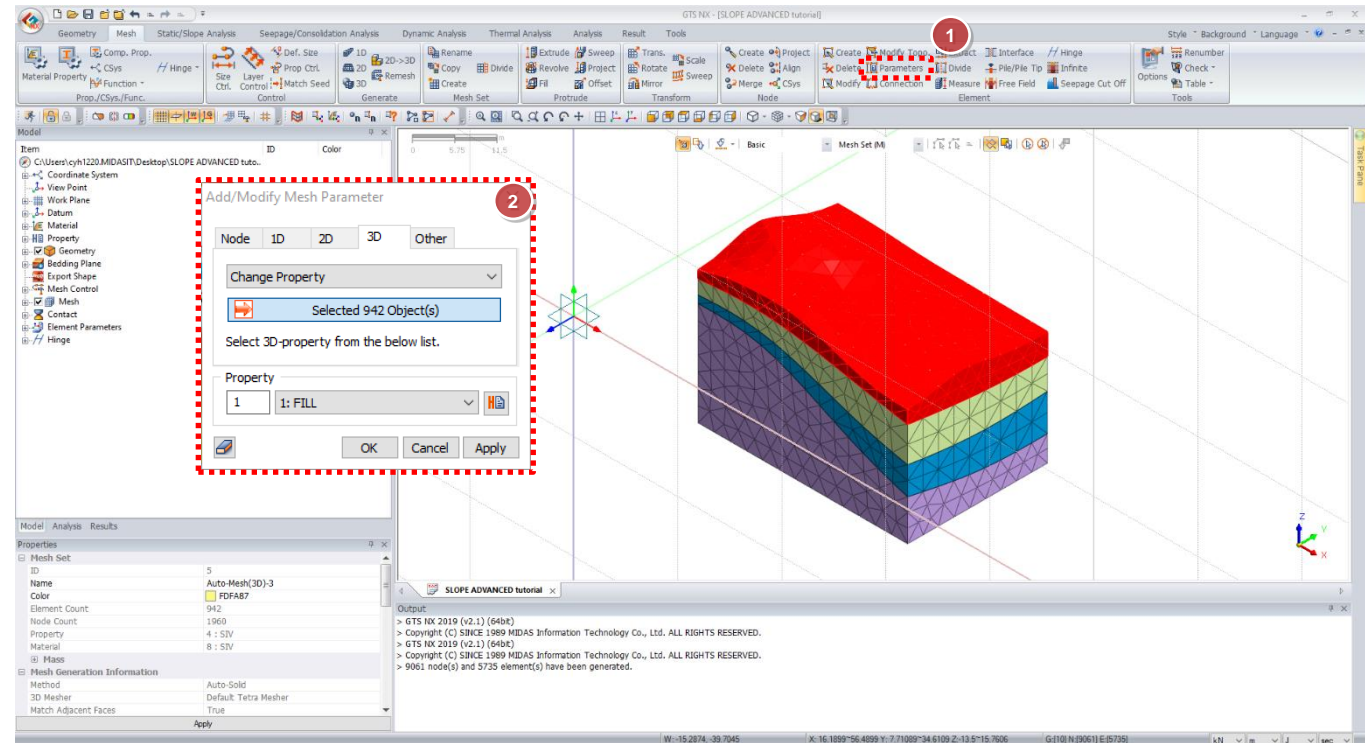
Procedure

1 Click "Parameters" from mesh tab

2 Go to 3D tab
Property: FILL
Select first layer of mesh
Click "Apply"

[Information]

It is better to change selection method to Mesh set (short cut key, m)



04 Mesh Generation

Assign property for each layer

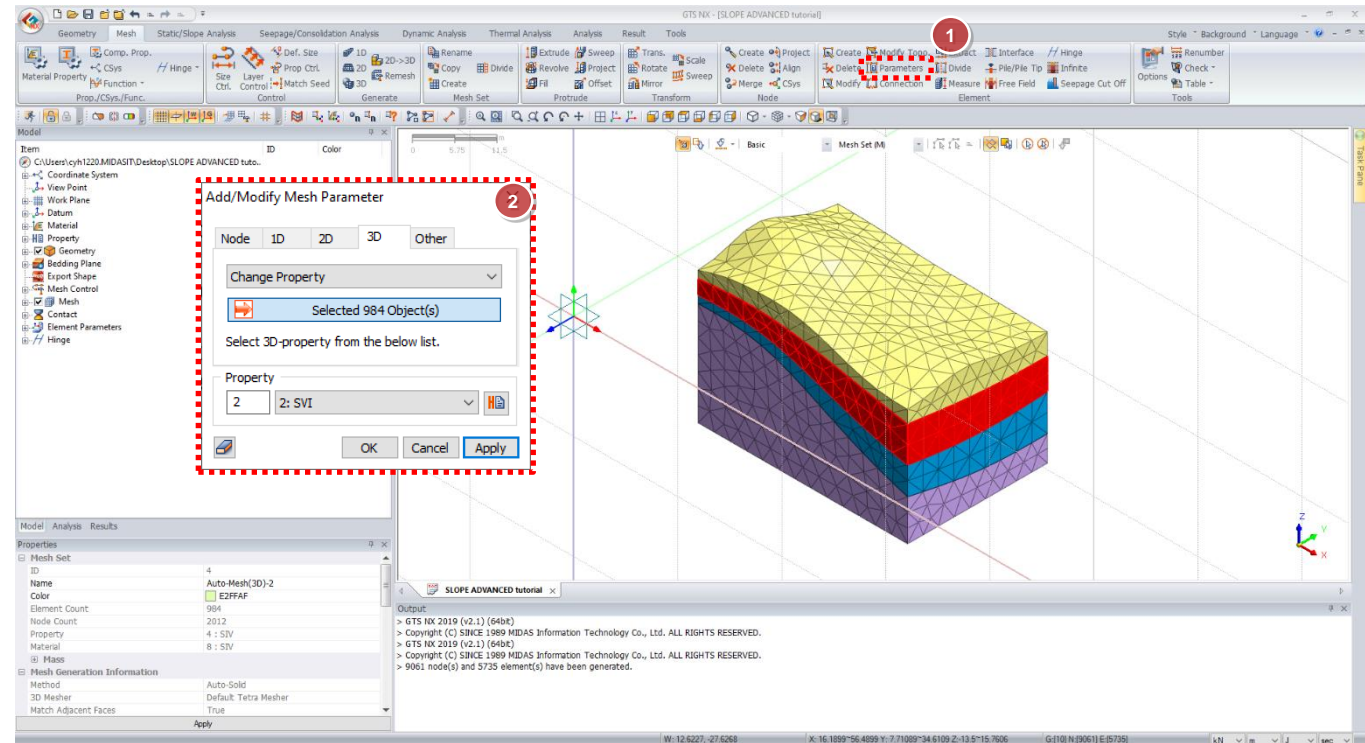
Procedure

1 Click "Parameters" from mesh tab

2 Go to 3D tab
Property: SVI
Select first layer of mesh
Click "Apply"

[Information]

It is better to change selection method to Mesh set (short cut key, m)



04 Mesh Generation

Assign property for each layer

Procedure

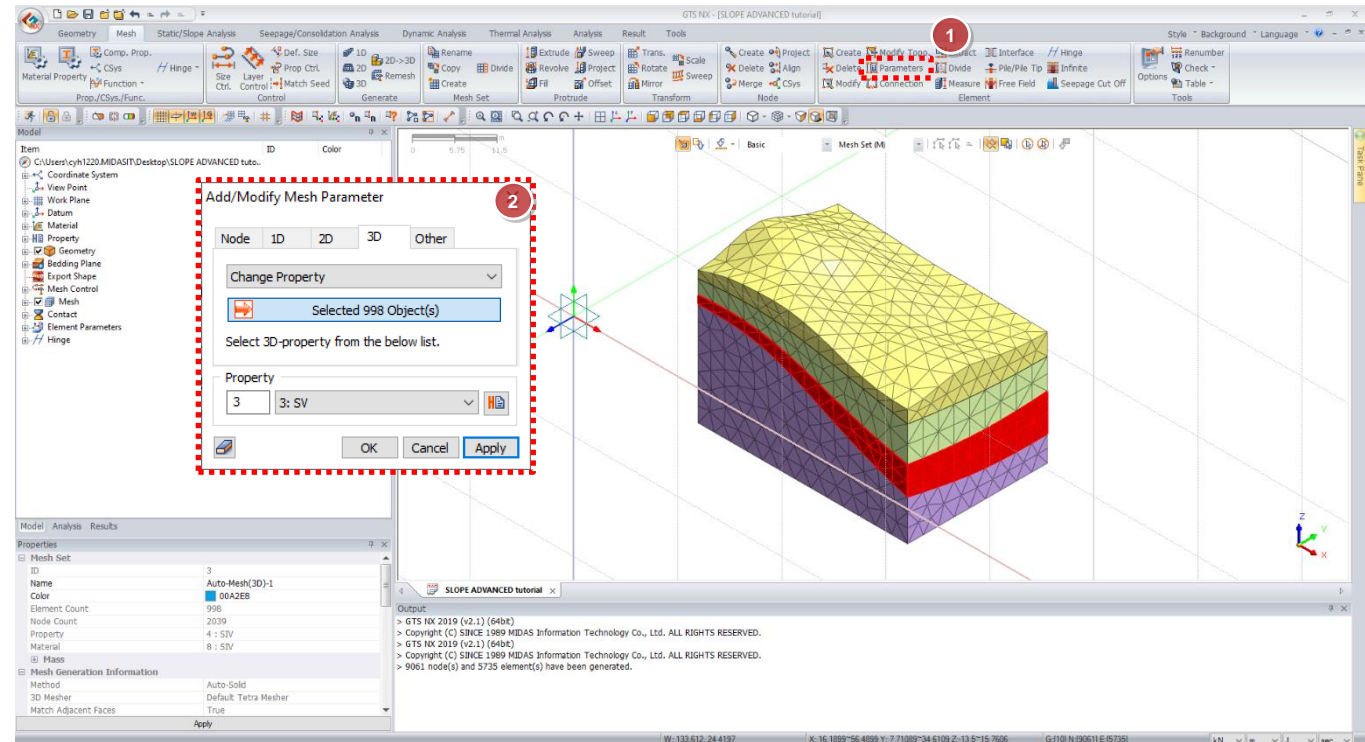
1 Click "Parameters" from mesh tab

2 Go to 3D tab
Property: SV
Select first layer of mesh
Click "OK"

[Information]

It is better to change selection method to Mesh set (short cut key, m)

It has selected SIV for all mesh set when you generate mesh so that you don't need to change property from last layer



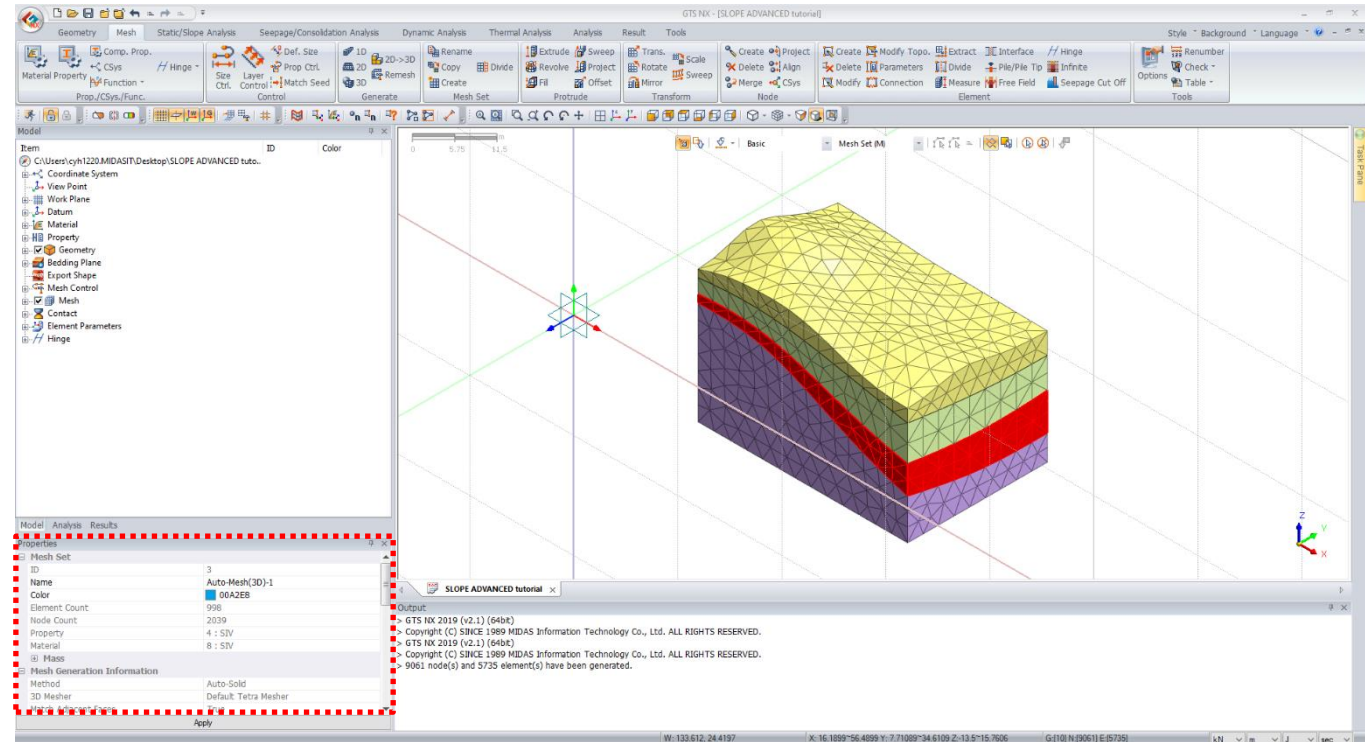
04 Mesh Generation

Assign property for each layer

Procedure

[Information]

You can check your assigned property from property window which is selected mesh set



The background of the slide features a complex network diagram. It consists of numerous small, dark circular nodes connected by thin, light-colored lines, forming a web-like structure. The background color transitions from a light green on the left to a bright yellow in the center, and finally to a deep orange on the right. The network diagram is overlaid on this gradient, with some areas appearing more dense than others.

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Load & Boundary Condition

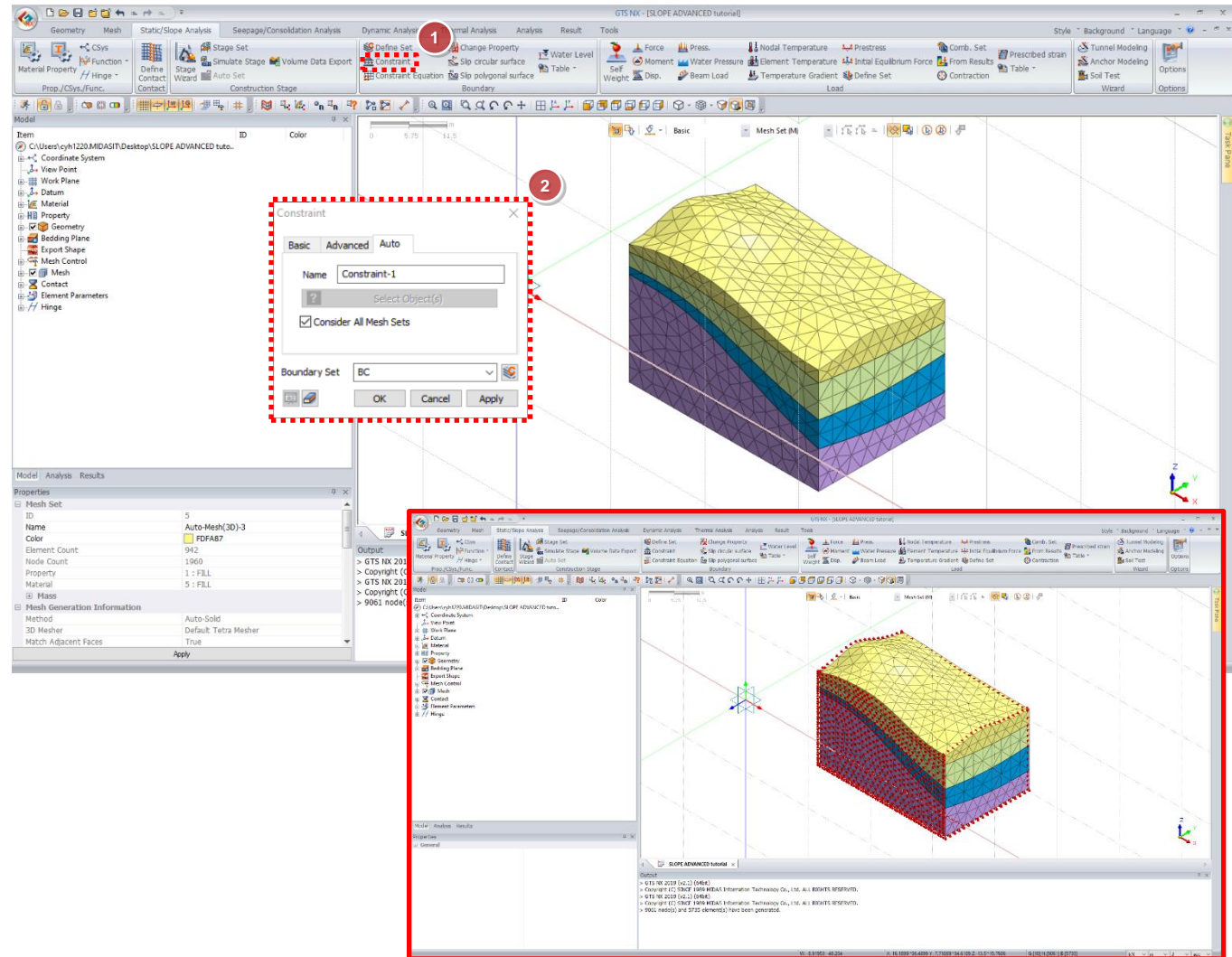
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05 Load & Boundary Condition

Make boundary condition to ground

Procedure

- 1 Click "Constraint"
- 2 Go to "Auto" tab
Boundary Set name "BC"
Click "OK"

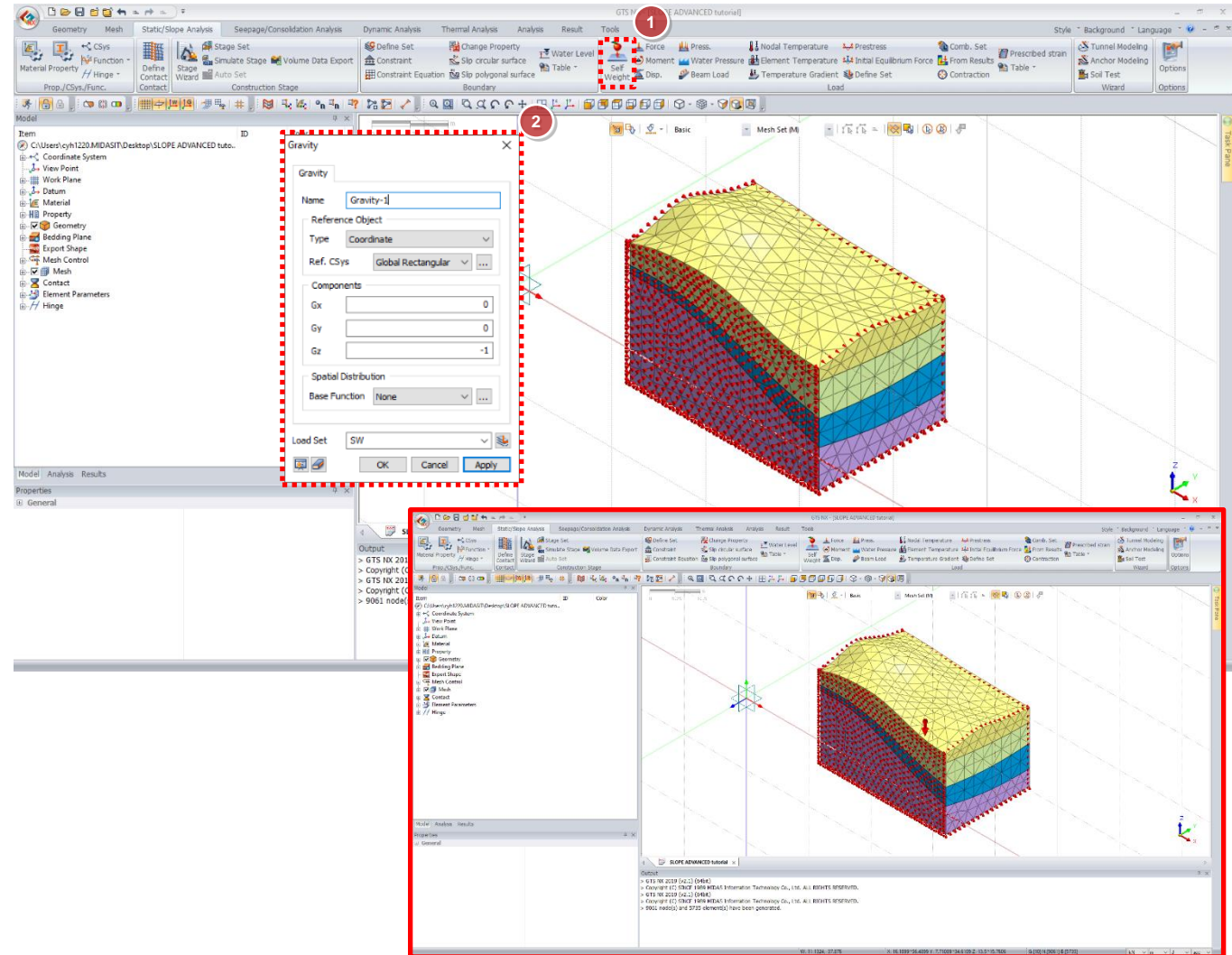


05 Load & Boundary Condition

Make self weight

Procedure

- 1 Click "Self Weight"
- 2 Load Set name "SW"
Click "OK"



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Water Level & Raining

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06 Water Level

Define water levels for each excavation stage

Procedure

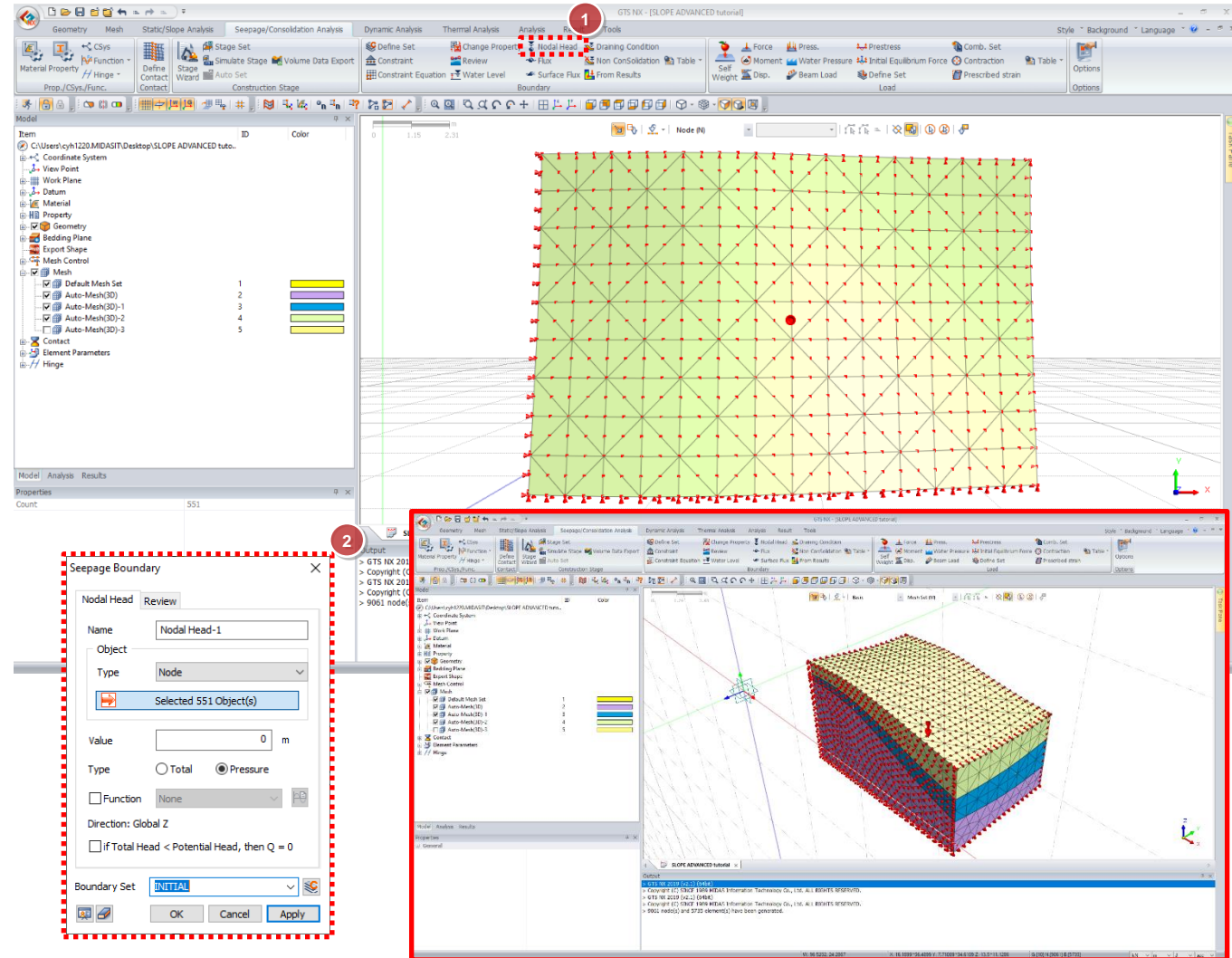
<Mesh set>

Hide first layer(Fill layer) of mesh set

- 1 Click "Nodal Head"
- 2 Select the nodes on surface of second layer
Value: 0
Select "Pressure"
Boundary Set: INITIAL
Click "OK"

[Information]

Go to top view and check on
"Perspective view" and
"Front Selection Only"



Define raining

Procedure

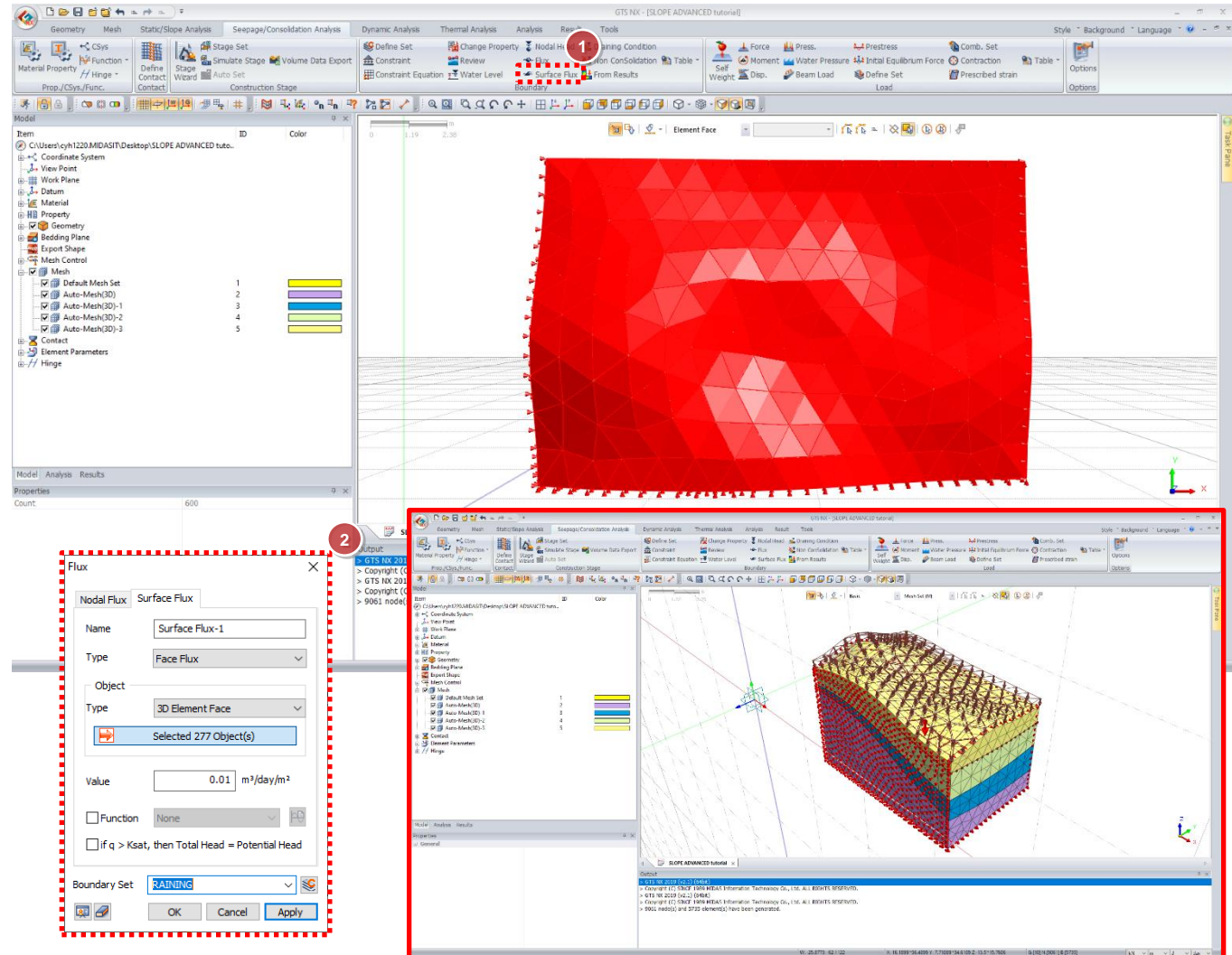
<Mesh set>

Show every mesh set

- 1 Click "Surface Flux"
- 2 Object Type: 3D Element Face
Select surface of first layer
Value: 0.01 m/day
Boundary Set: RAINING
Click "OK"

[Information]

You need to check your unit system when you key-in the value for raining.



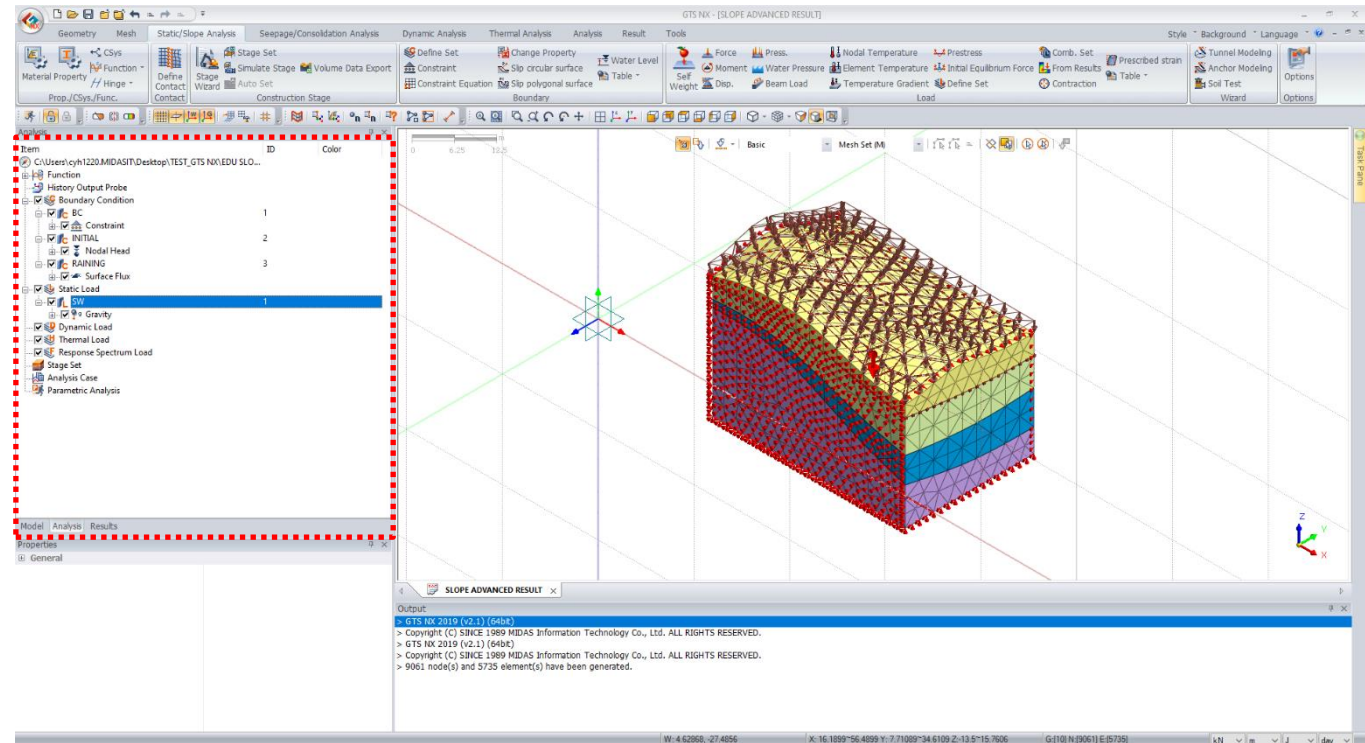
06 Water Level

Define raining

Procedure

[Information]

You can find your created water and rain condition from analysis tab.



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Thank you!

The MIDAS logo consists of the word "MIDAS" in a bold, white, sans-serif font. Above the letters "I" and "D" is a white, curved line that arches over them, resembling a stylized bridge or a protective shield.

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