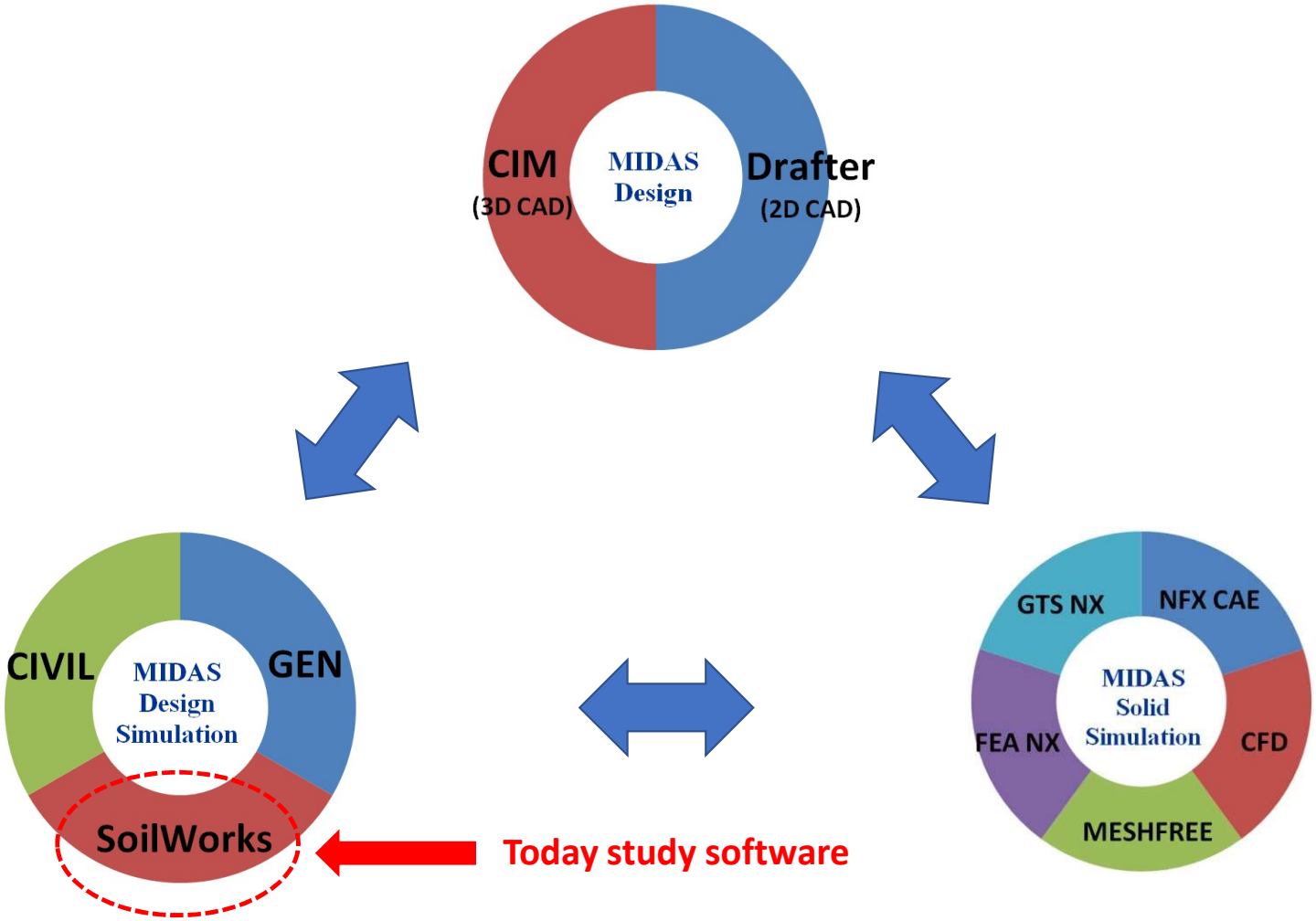
MIDAS SoilWorks
Geotechnical Solutions for Practical Design

Midas Taiwan

SOILWORKS INTRODUCTION

E-mail: support@midasuser.com
Date: 2025.07.04

Midas Package Integration Approach

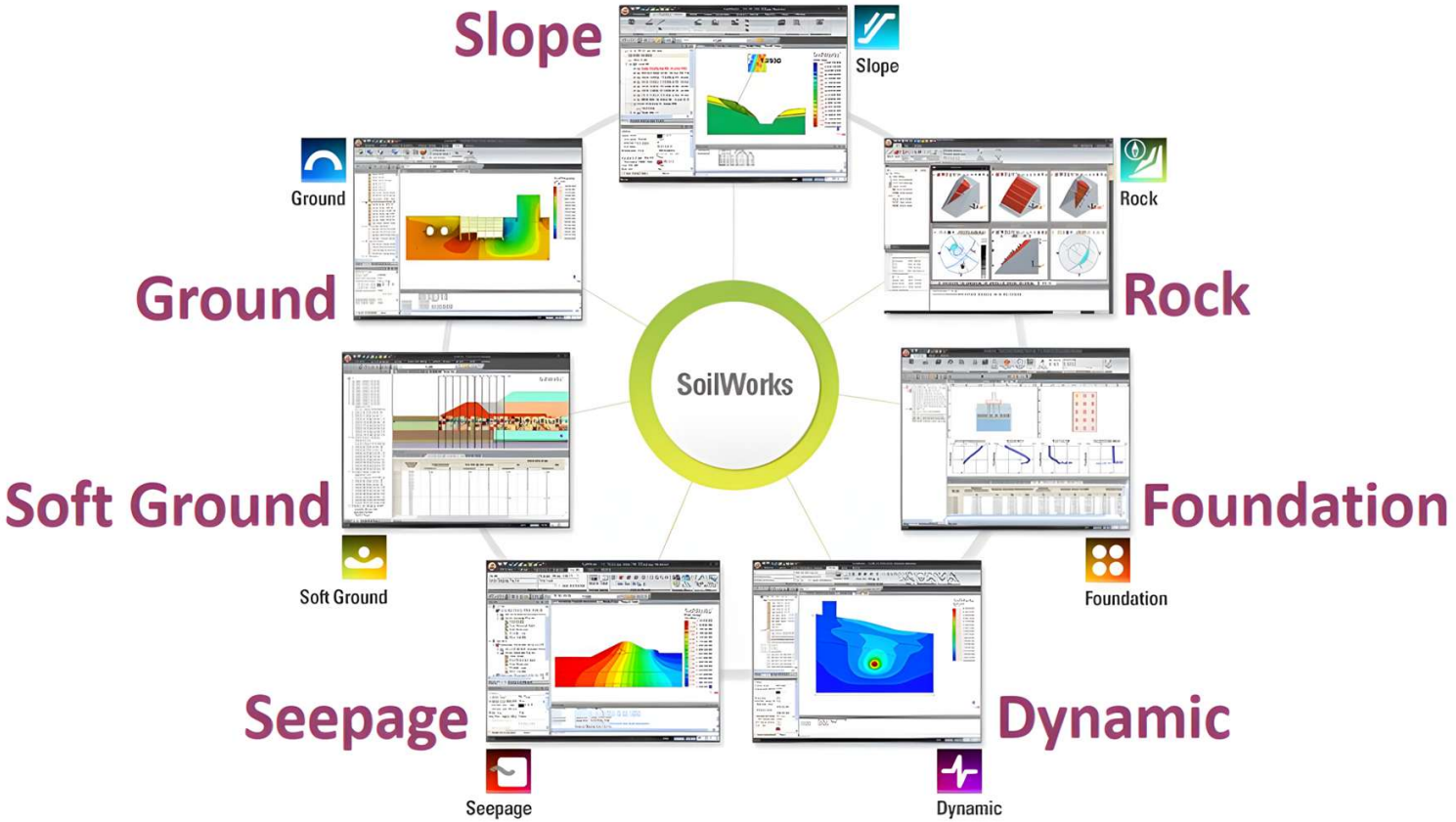


CONTENT

- ☑Overview of SoilWorks
- ☑SMART SoilWorks
- ☑Project application

Overview - Functionality

- 2D FEM and Analytical software
- Fully integrated Pre/Post and Solver



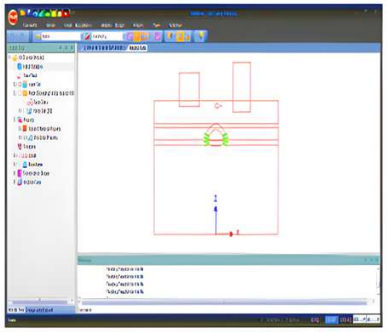
Overview – Work Flow

Structural & Geotechnical engineers

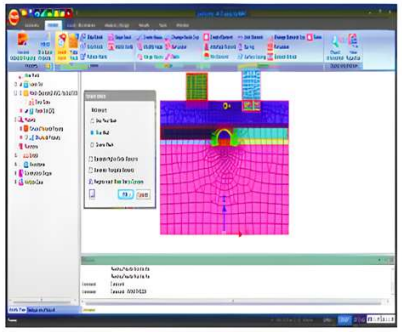
SoilWorks

- Complete FEM Software Package
- CAD based environment
- Intuitive
- Automation
- Robust

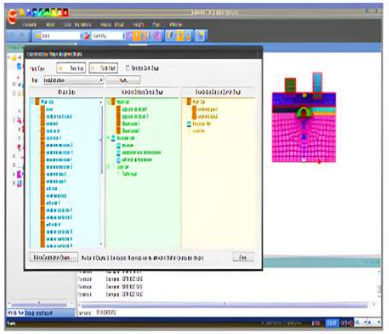
Work Flow



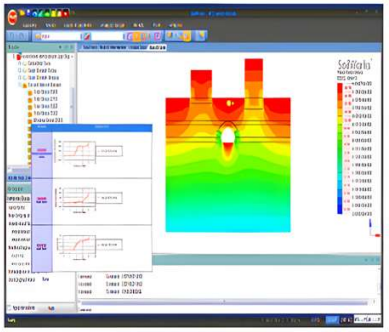
Geometry Modeling



Properties/ Meshing/ Loads/ Boundaries



Analysis

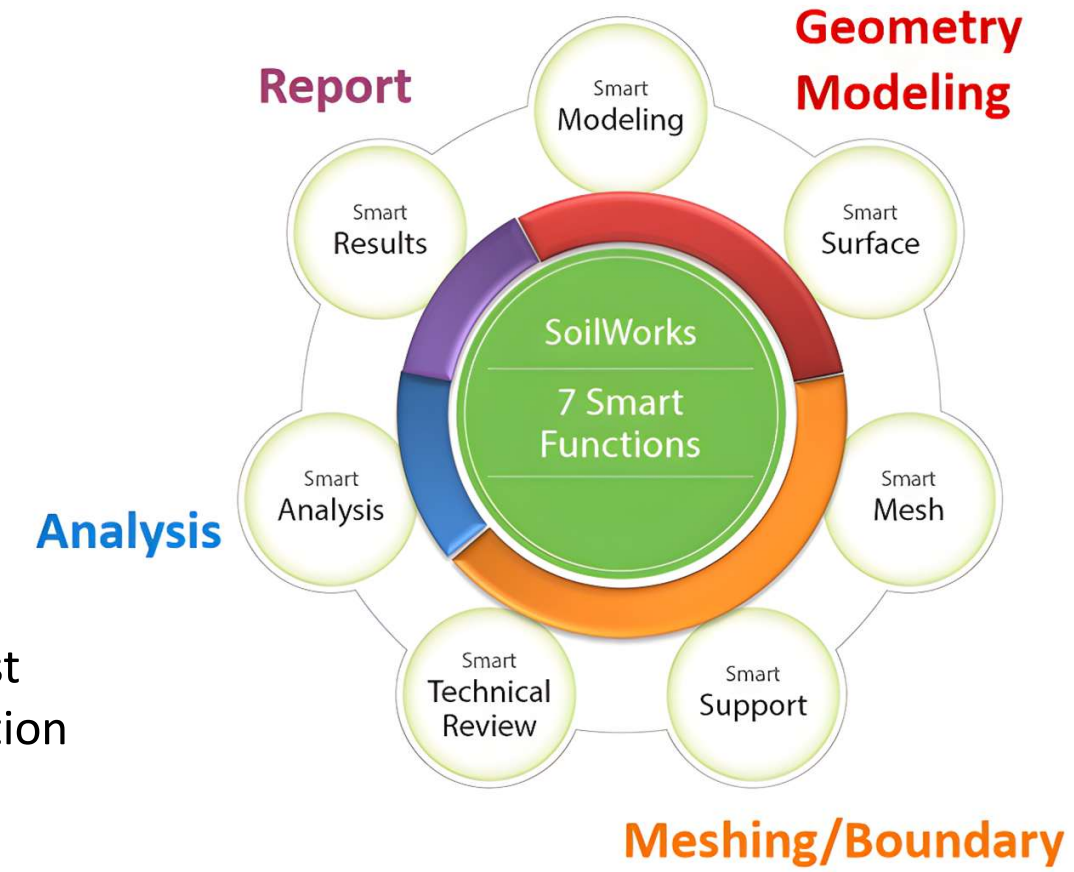


Post-Processing

SMART SoilWorks

How is it fast?

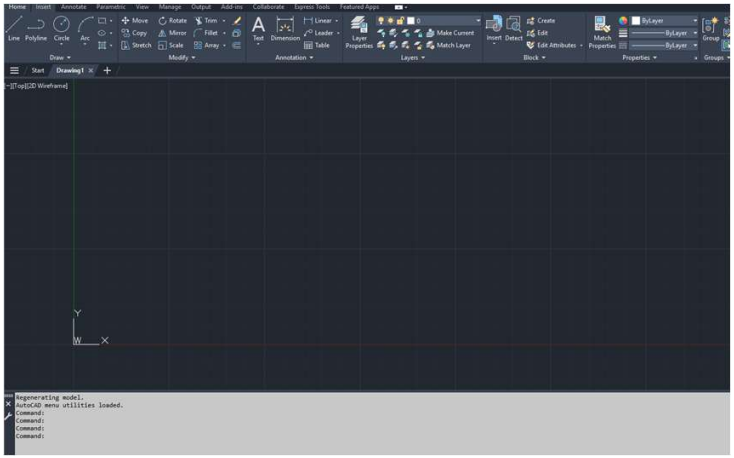
- Innovative features
- Reduced steps for engineers
- Elimination of repetitive process
- **7 SMART Automated Features** for fast modeling, analysis and results extraction

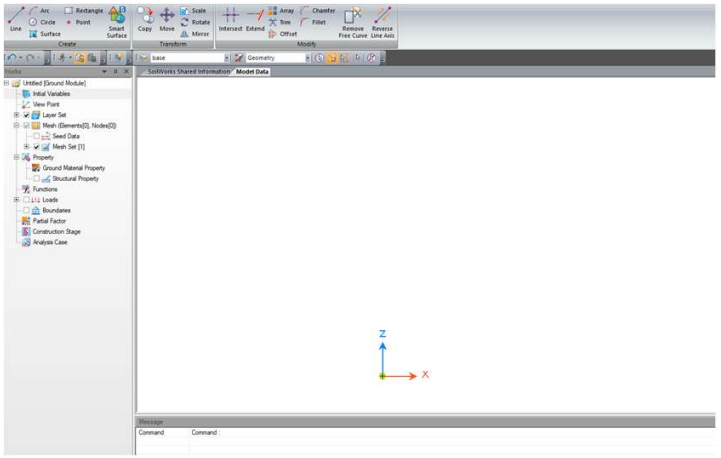


1. SMART modeling

Easy to create geometry

CAD based operating environment





AutoCAD

SoilWorks

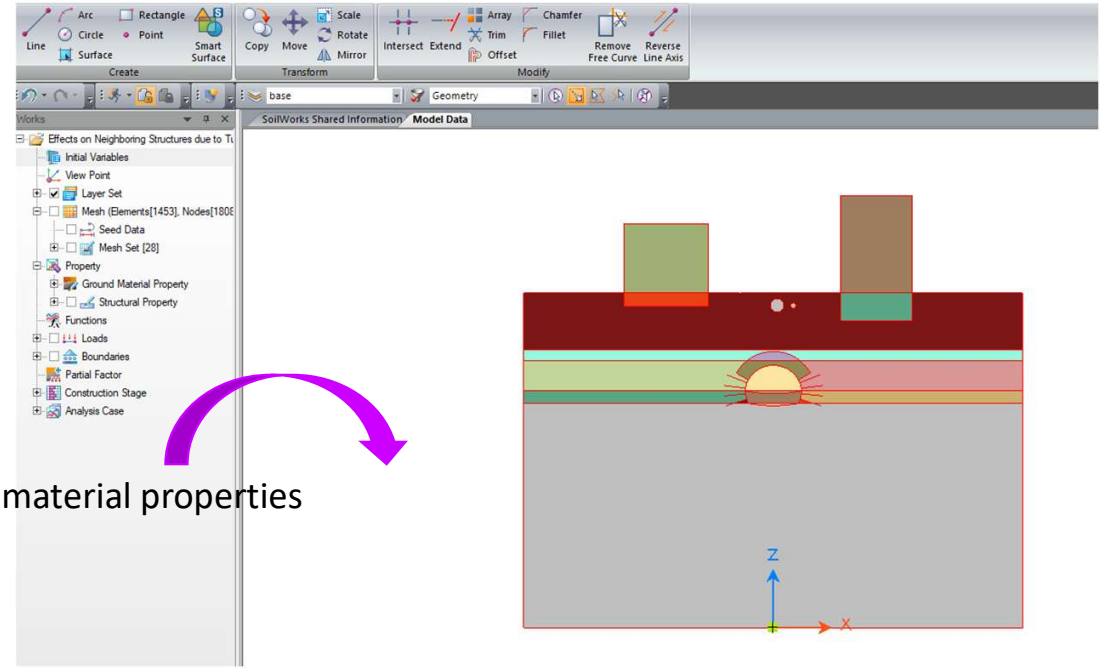
CAD based environment

- Use a CAD file function
- CAD command line
- Simple and convenient
- Shortens modeling time

2. SMART surface

Auto-generated surfaces

Enclosed domains by surfaces automatically



Drag & Drop material properties

- Automatic surface creation
- Drag and drop material properties

3. SMART mesh

Easy to meshing

No need for in-depth knowledge of FEM to Meshing

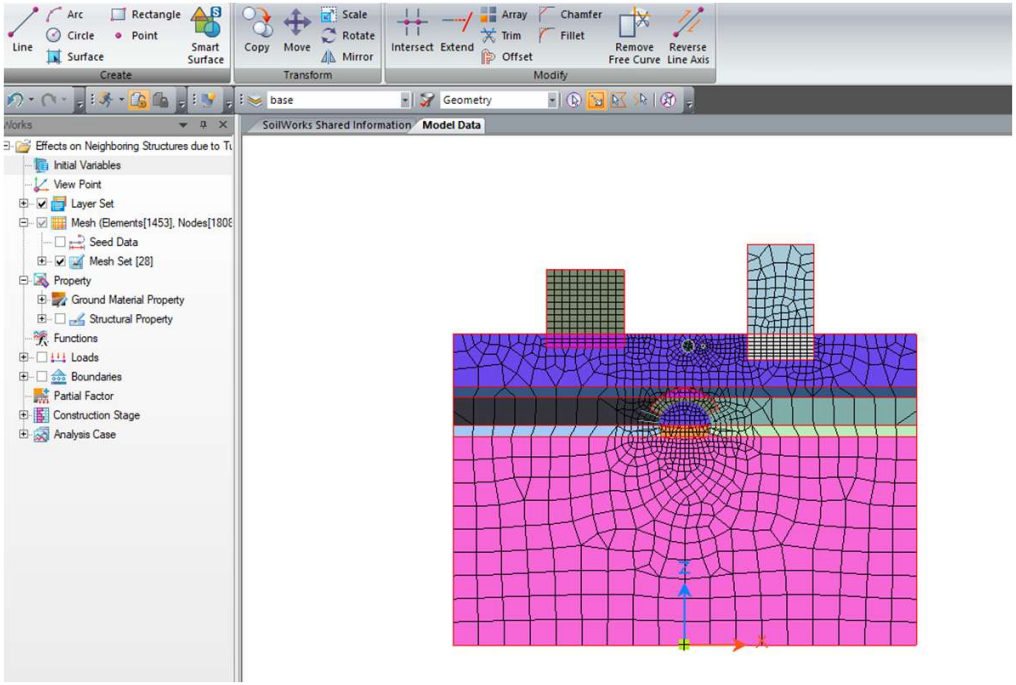
Auto Mesh	Map Mesh	Grid Mesh	Pattern Mesh
Generate (unstructured) Auto-mesh for a closed domain	Generate structured mesh for a closed domain	Generate orthogonal mesh for a closed domain using Quadrilateral and Triangular Element	Generate mesh for 2D elements by pre-defined mesh pattern

SMART Mesh

4. SMART support

Auto-generated boundary conditions

Auto-generation of boundary conditions

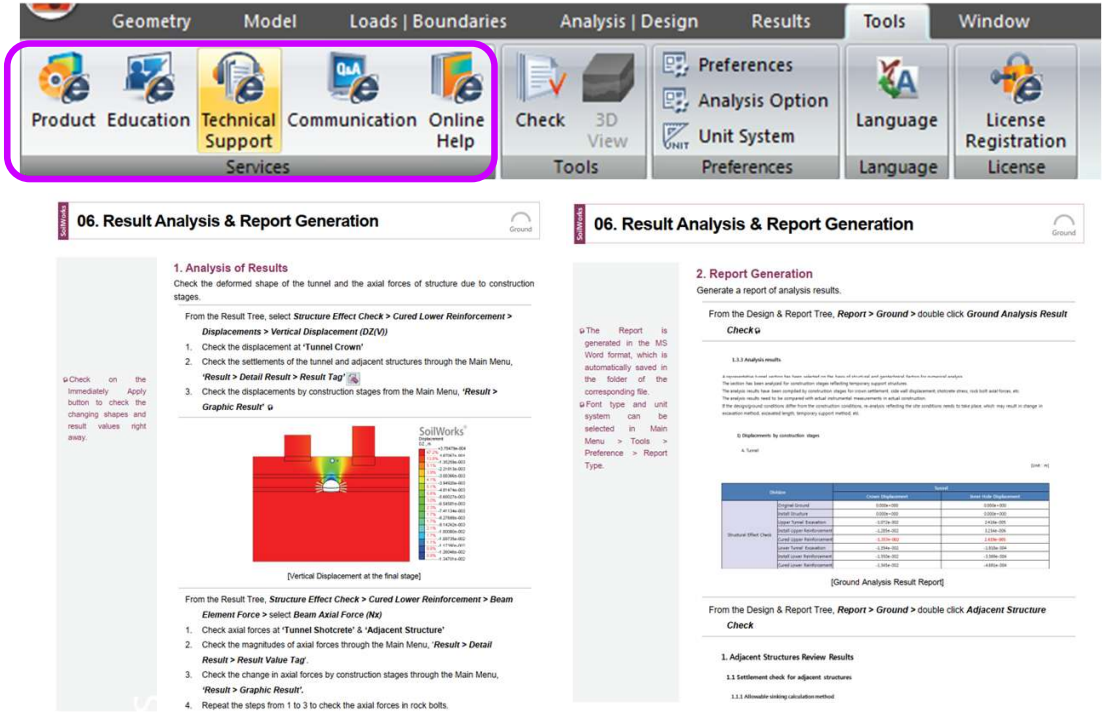


- Automatic boundary generation
- Intuitive checking

5. SMART Technical Review

Easy to practice

Technical review to prevent analysis errors

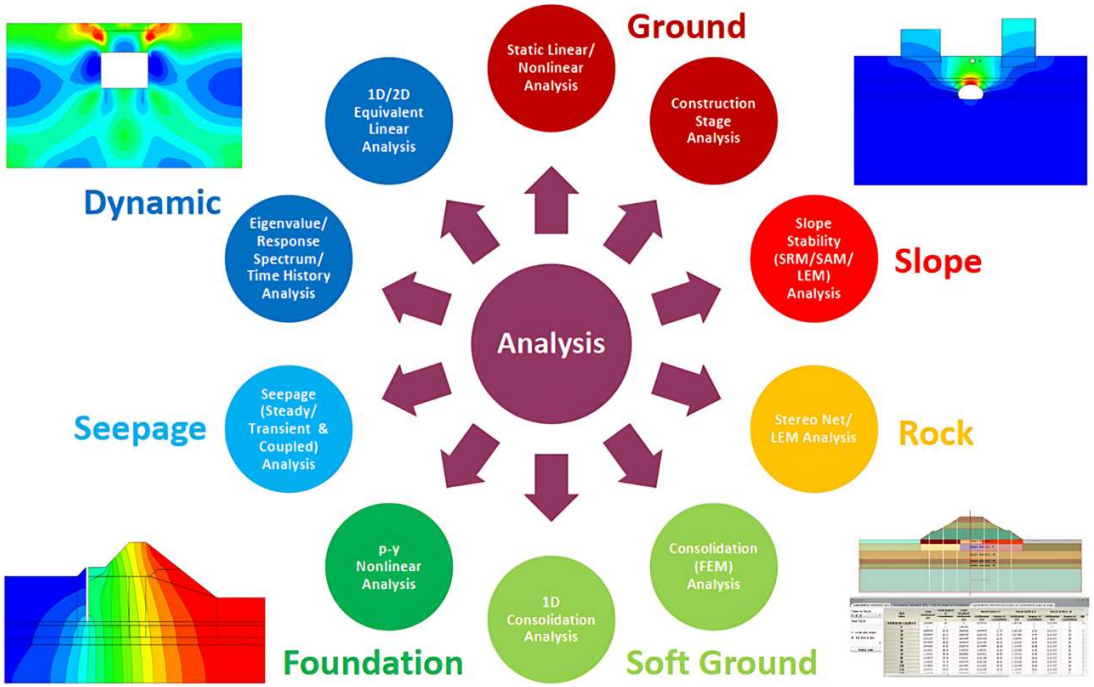


- Check errors
- Enhance analytical skills

6. SMART Analysis

Various analysis type

Robust parametric analysis capability and data interface between modules

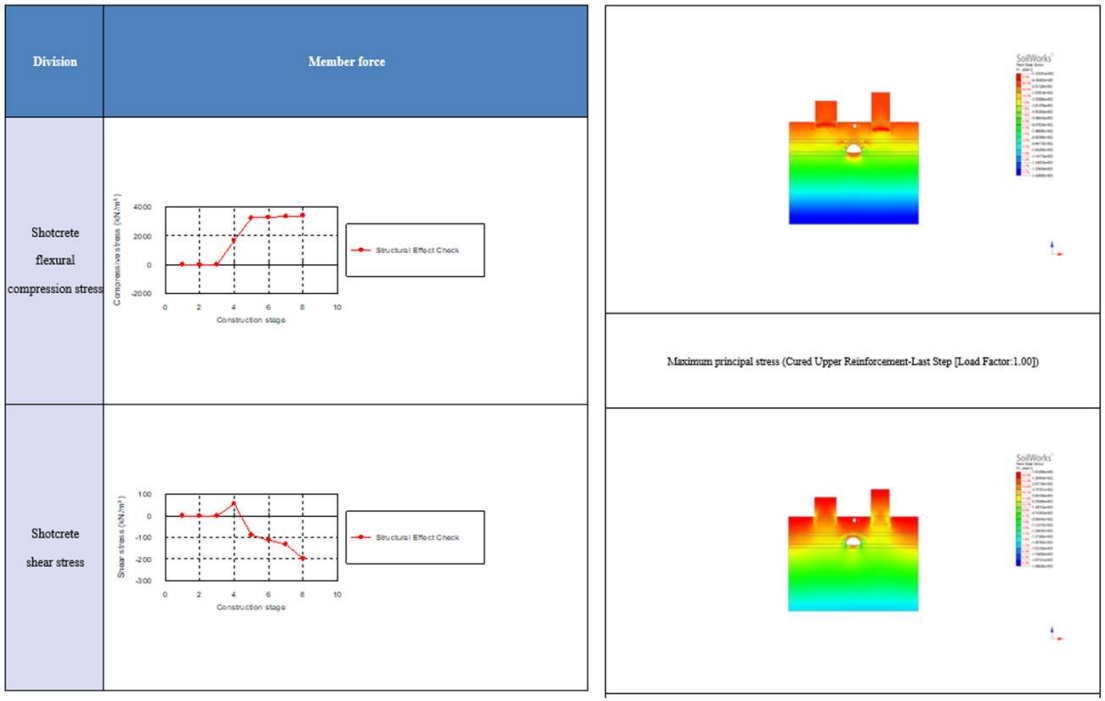


- Robust parametric analysis
- Coupled analysis

7. SMART Results

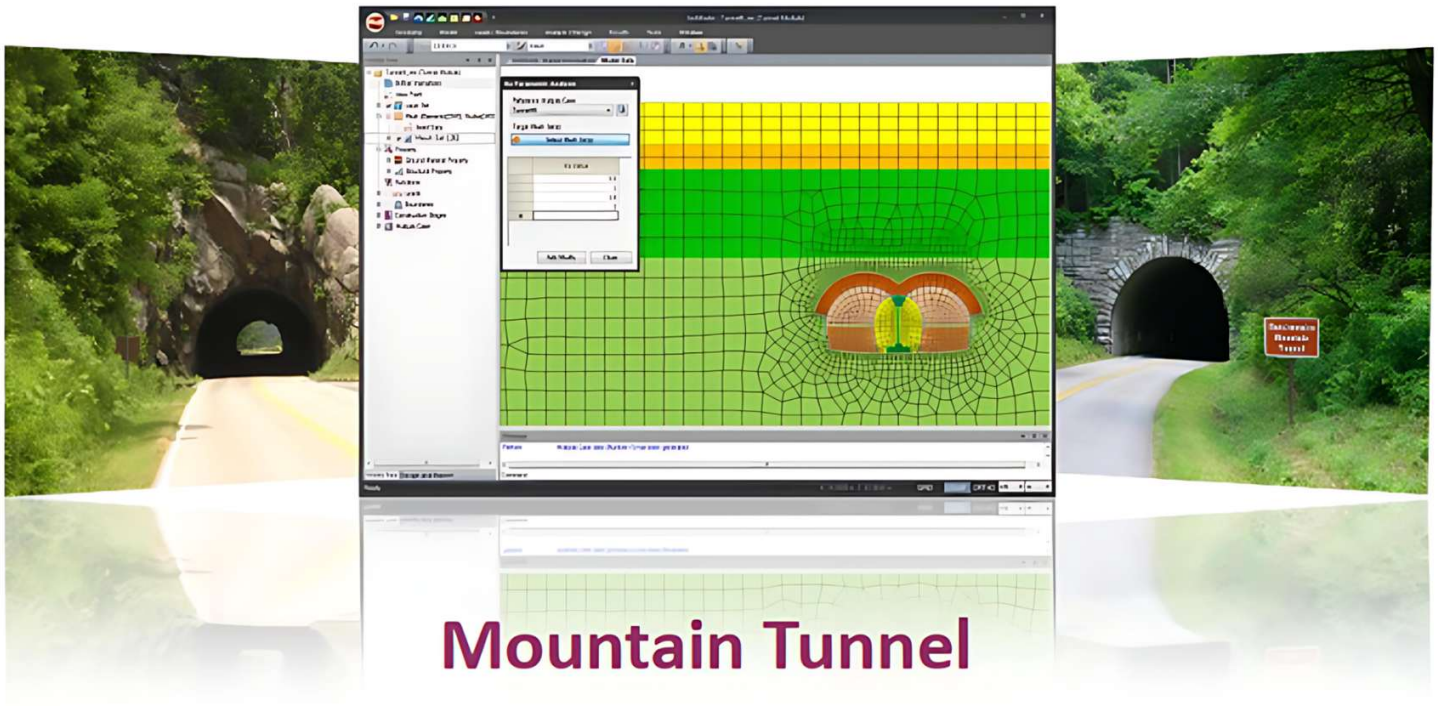
Easy for observing results

Auto-generation of high quality reports



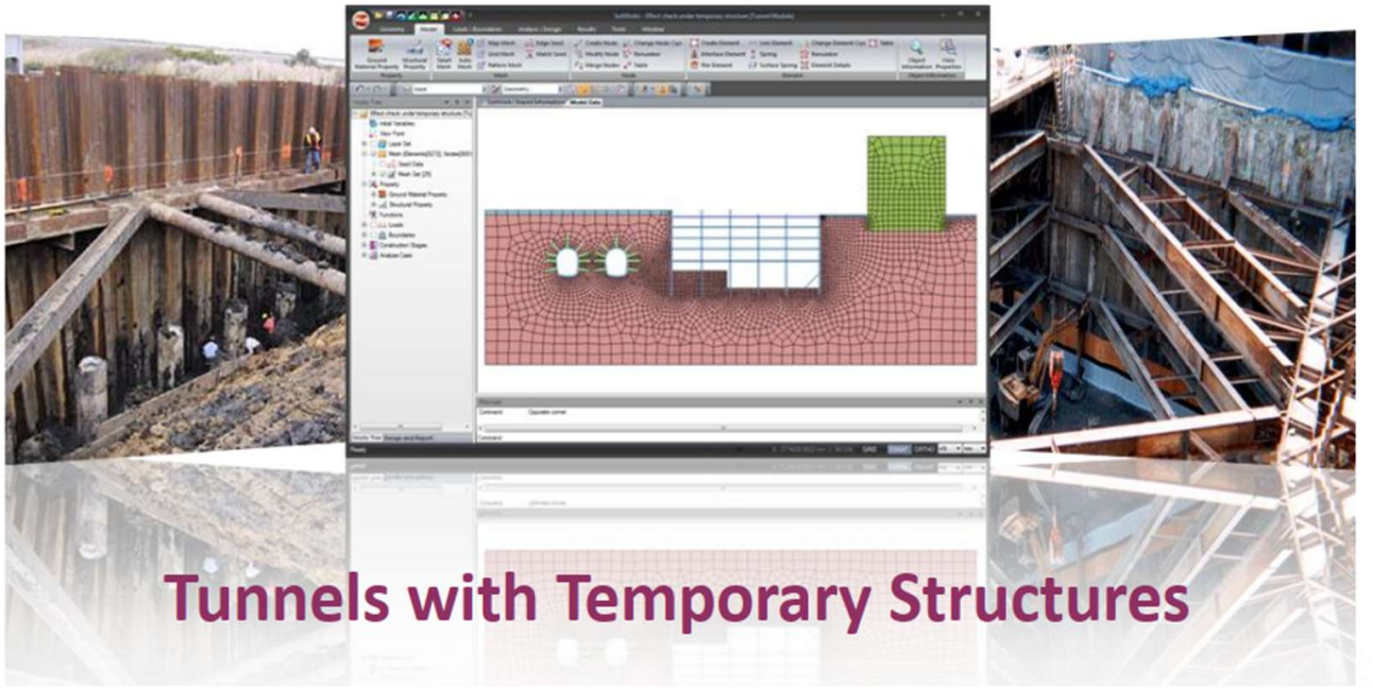
- High quality report generation
- Simplify work process
- Increase productivity

Project application



- Stress & deformation check through change in K0
- Stability check for central pillar
- Considering the reinforced zone

Project application



- Check the differential settlement of the adjacent building
- Tunnel stability check during the excavation work
- Excavation analysis considering temporary structures

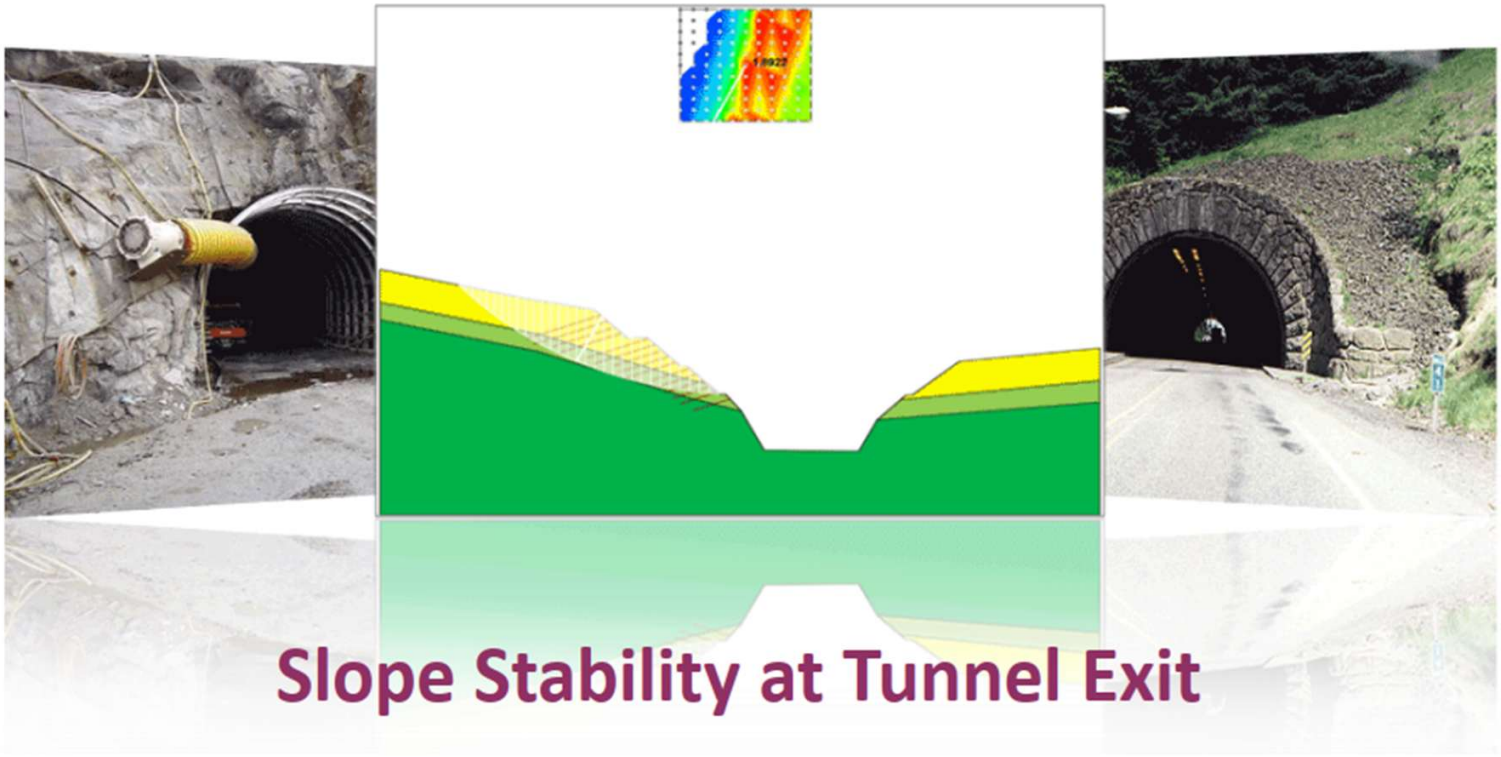
Project application

- Check the differential settlement of the adjacent building
- Stability check for the existing sewer pipes
- Shallow tunnel stability check considering reinforced zone

Project application

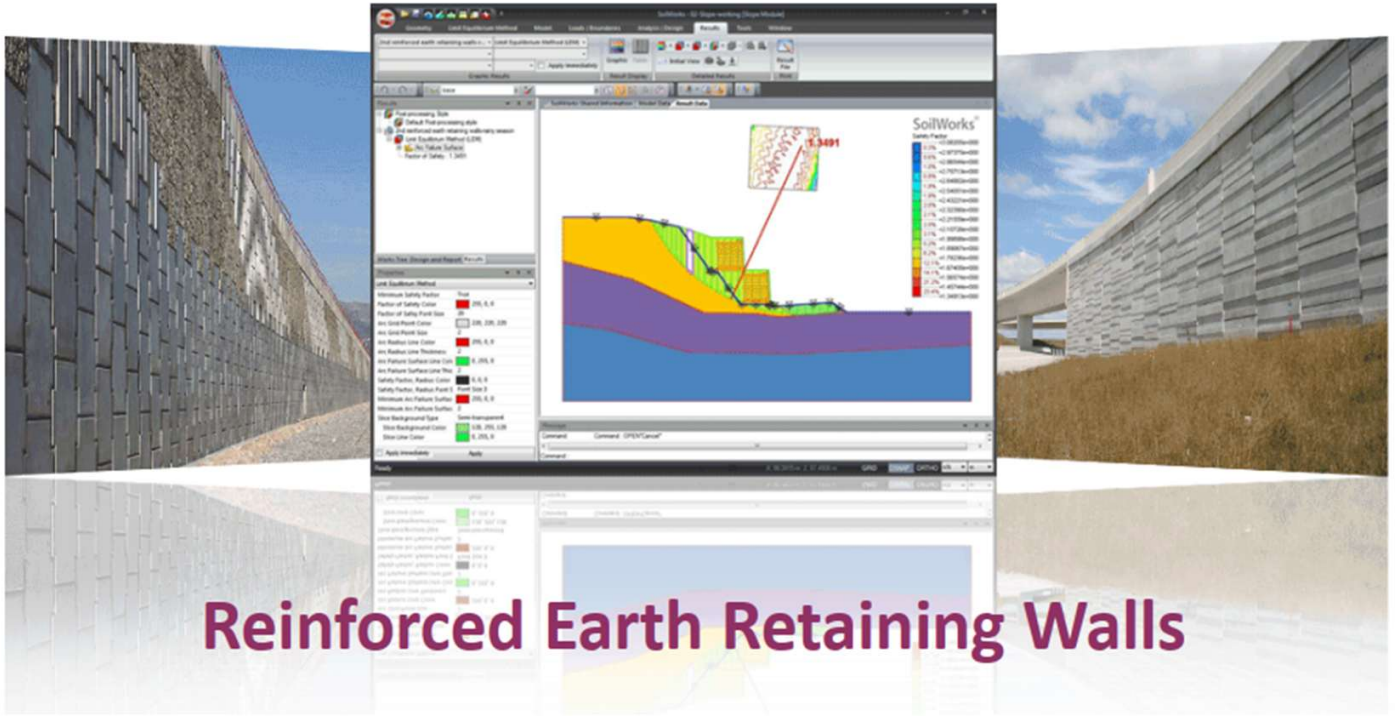
- Simultaneous analysis of reinforced/ unreinforced slopes
- Considering dry/ rainy seasons conditions
- Stability check reflecting the rainfall intensity

Project application



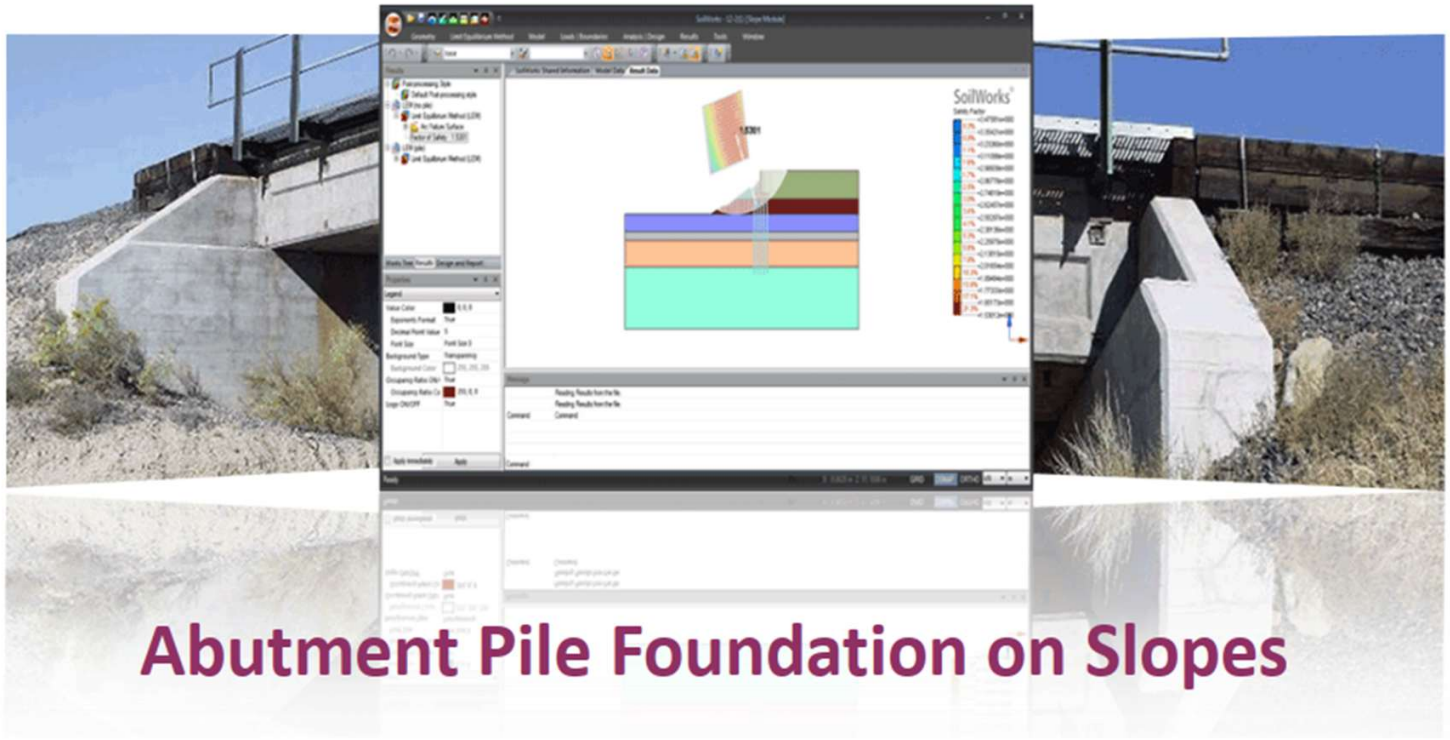
- Stability check for the both side of slopes
- Calculation of safety factors by SRM as well as LEM
- Pseudo static analysis considering seismic loading condition

Project application



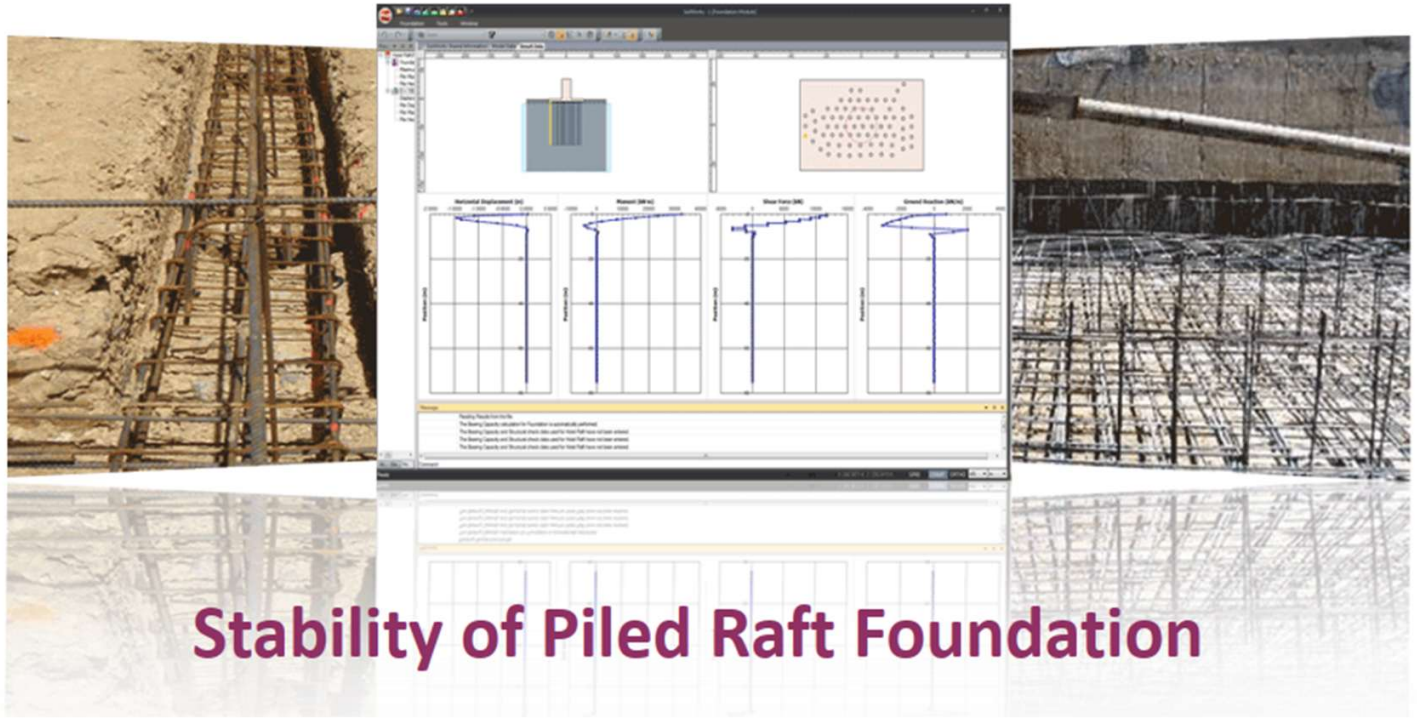
- Stability check reflecting multiple arc failure surfaces
- Reflecting various practical reinforcement materials
- Considering dry/ rainy season conditions

Project application



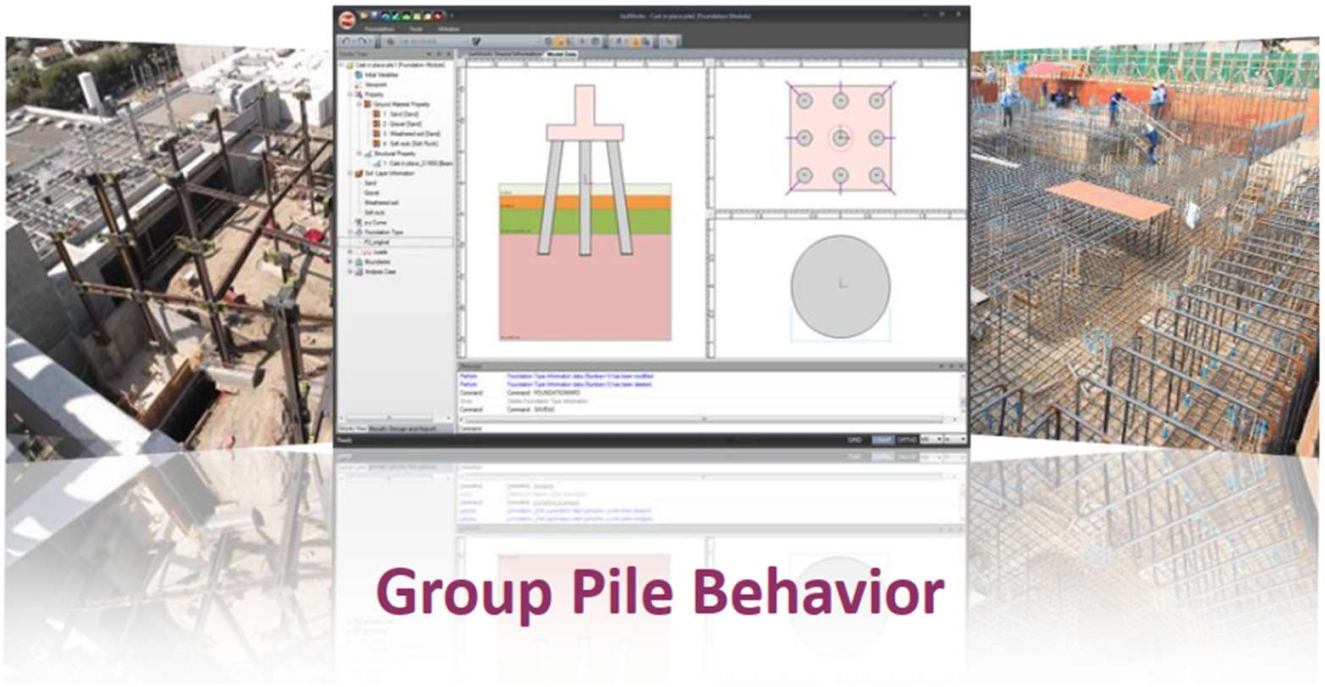
- Lateral displacements of an abutment foundation system
- P-y analysis for pile foundations
- Construction stage analysis reflecting excavation and backfill

Project application



- Stability check for the building foundation system
- Group pile analysis for 76 cast-in-place piles
- Considering horizontal and vertical loading conditions

Project application

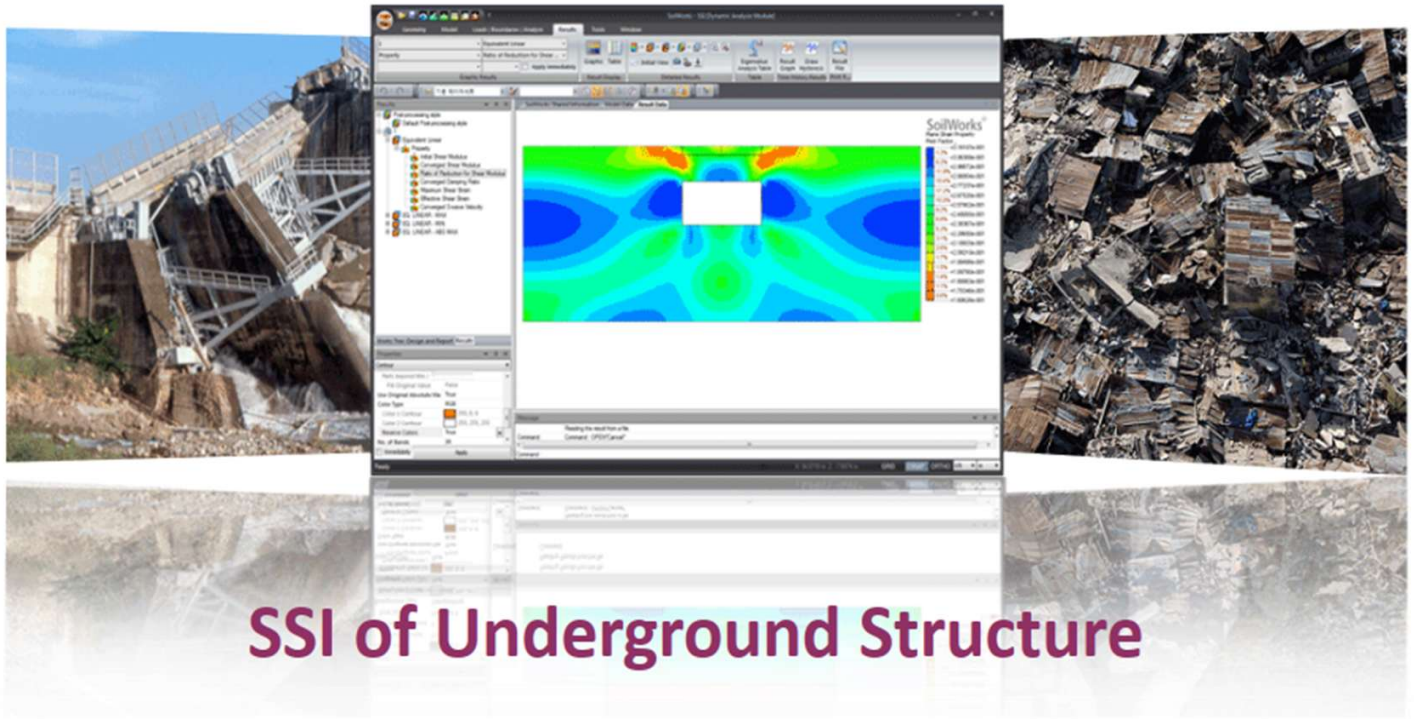


- Vertical and horizontal displacements check for the battered pile
- Checking member forces for determining pile type/ shape/ size
- Results comparison with 3D FEM analysis

Project application

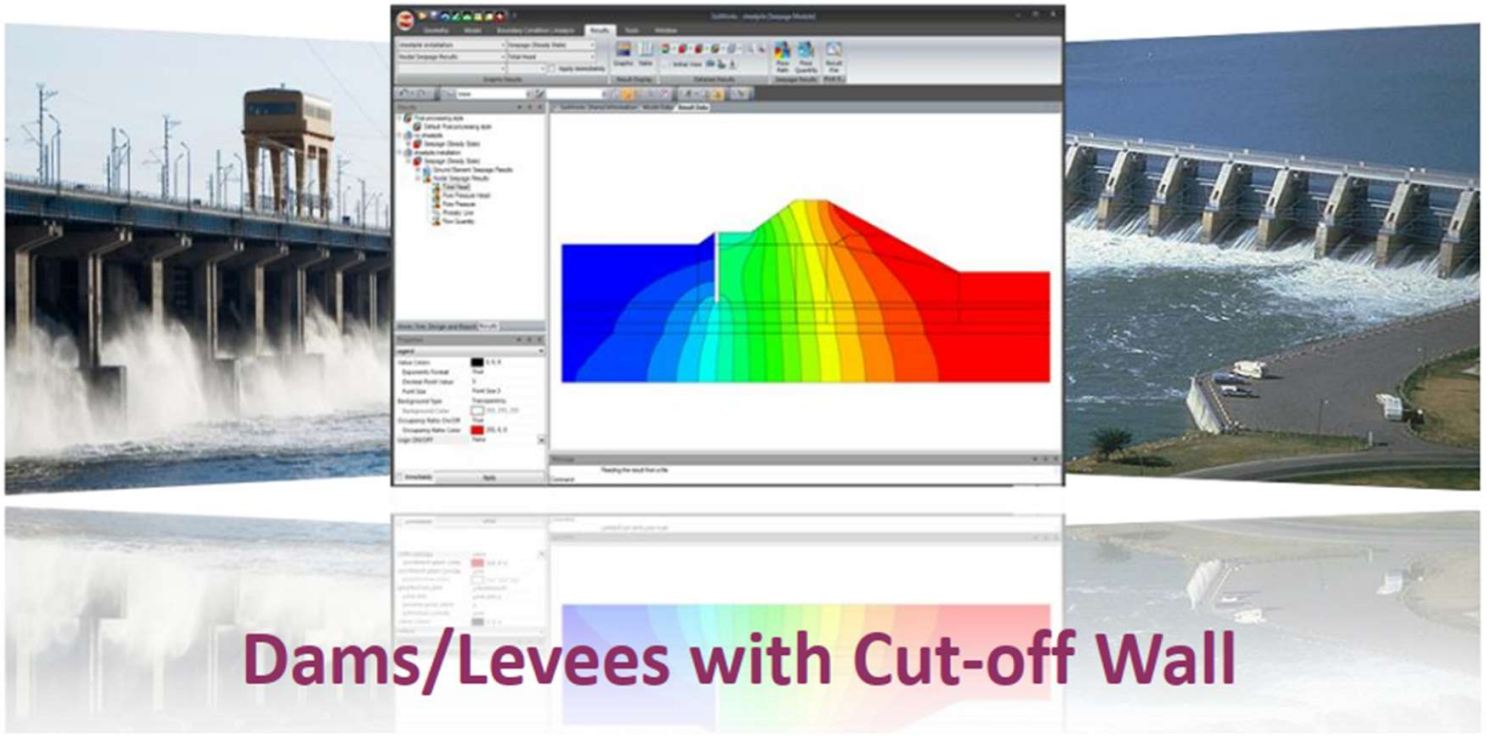
- Calculation of primary & secondary consolidation settlements
- Parametric analysis for drainage types and spacing
- Check through the 1-D theoretical & finite element analysis

Project application



- Checking the stability of structures under the seismic condition
- Applying the historical seismic waves and artificial waves
- Considering dynamic nonlinear properties of ground

Project application



- Checking the optimal embedded depth of a sheet pile
- Checking the outflow speed at the protected side
- Seepage-stress coupled analysis

Why SoilWorks?

7 smart features

- Save modeling and learning time
- Practical results
- Report generation

Engineer support

- Engineer: easy to use with no in-depth FEM knowledge
- Senior engineer: simple design works

7-in-1 software

- Requires only 1 software for all geotechnical work


Thank you!
MIDAS
www.midasuser.com.tw

Reference: *Construction Stage Analysis of Shored Excavation – SoilWorks Tutorials*

SoilWorks – Ground Module

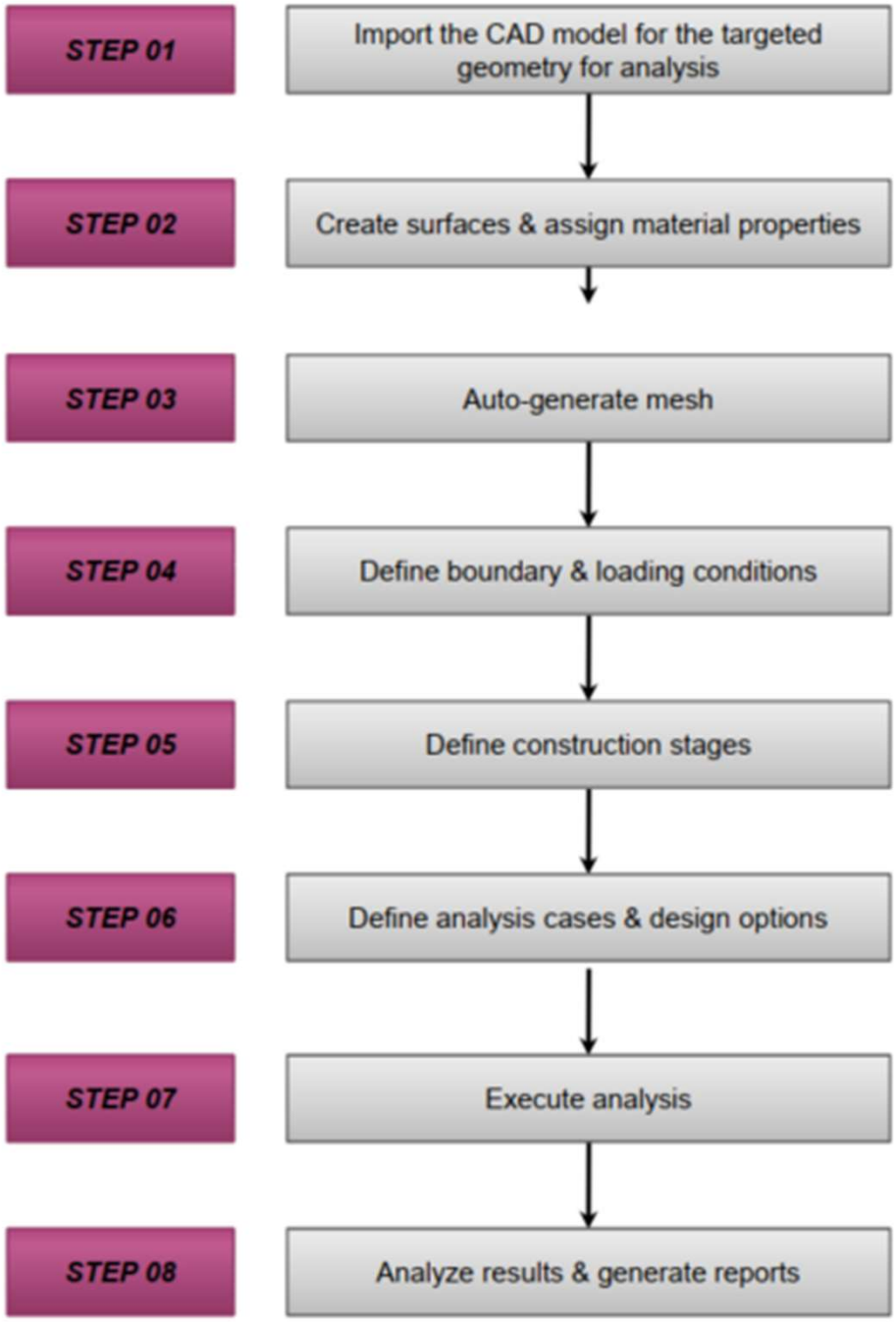
Analysis of Shored Excavation

Midas e-mail: support@midasuser.com
My e-mail: tam@midasuser.com.tw

DATE: 2025.07.20

Learning Objective

- Review of the effects on underground structures due to shored excavation
- Learn various basic functions and the workflow of SoilWorks in the process
- Understand result analysis and report generation



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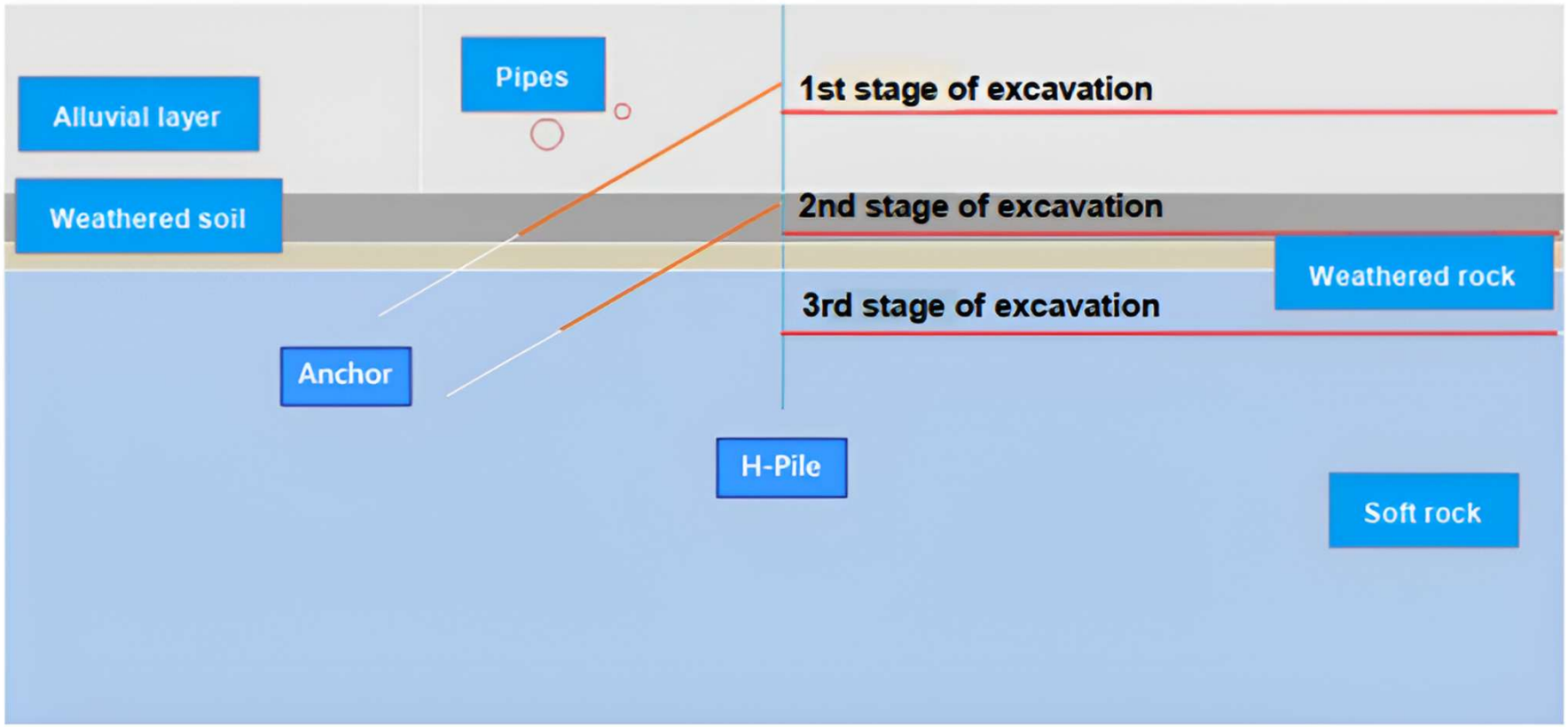
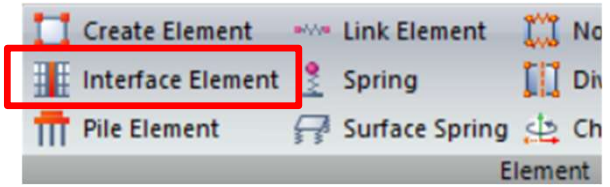
Overview

- Investigating soil-structure displacements
- Stress distribution and the effects on adjacent structures



Fig, Model configuration

Interface Wizard



▶ **Interface Wizard equation from Midas SoilWorks manual:**

$K_n = E_{oed,i} / t_v$

$K_t = G_i / t_v$

$C_i = R \times C_{soil}$

Here,

$E_{oed,i} = 2 \times G_i \times (1-v_i)/(1-2 \times v_i)$

$G_i = R^2 \times G_{soil}$

$G_{soil} = E/(2(1+v_{soil}))$

Where,

K_n: Normal Stiffness Modulus

K_t: Shear Stiffness Modulus

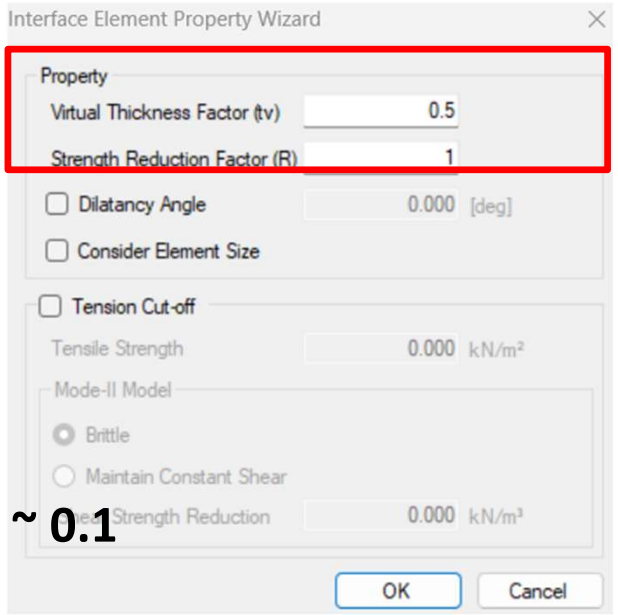
t_v: Virtual Thickness Factor

R: Strength Reduction Factor

C_i: Interface Cohesion

Kn (Normal stiffness modulus) is the elasticity modulus for **bonding and un-bonding behavior** in the normal direction to the interface element

Kt (Shear stiffness modulus) is the elasticity modulus for **slip behavior** in the normal direction to the interface element



▶ **Strength Reduction factor (R)**

- Sandy soil/ Steel material: R= 0.6 ~ 0.7
- Clay/ Steel material: R= 0.5
- Sandy soil/ Concrete: R= 1.0 ~ 0.8
- Clay/ Concrete: R= 1.0 ~ 0.7

The general **Virtual Thickness Factor range is 0.01 ~ 0.1**
(If the stiffness is high, use a smaller value)

Learning Objective

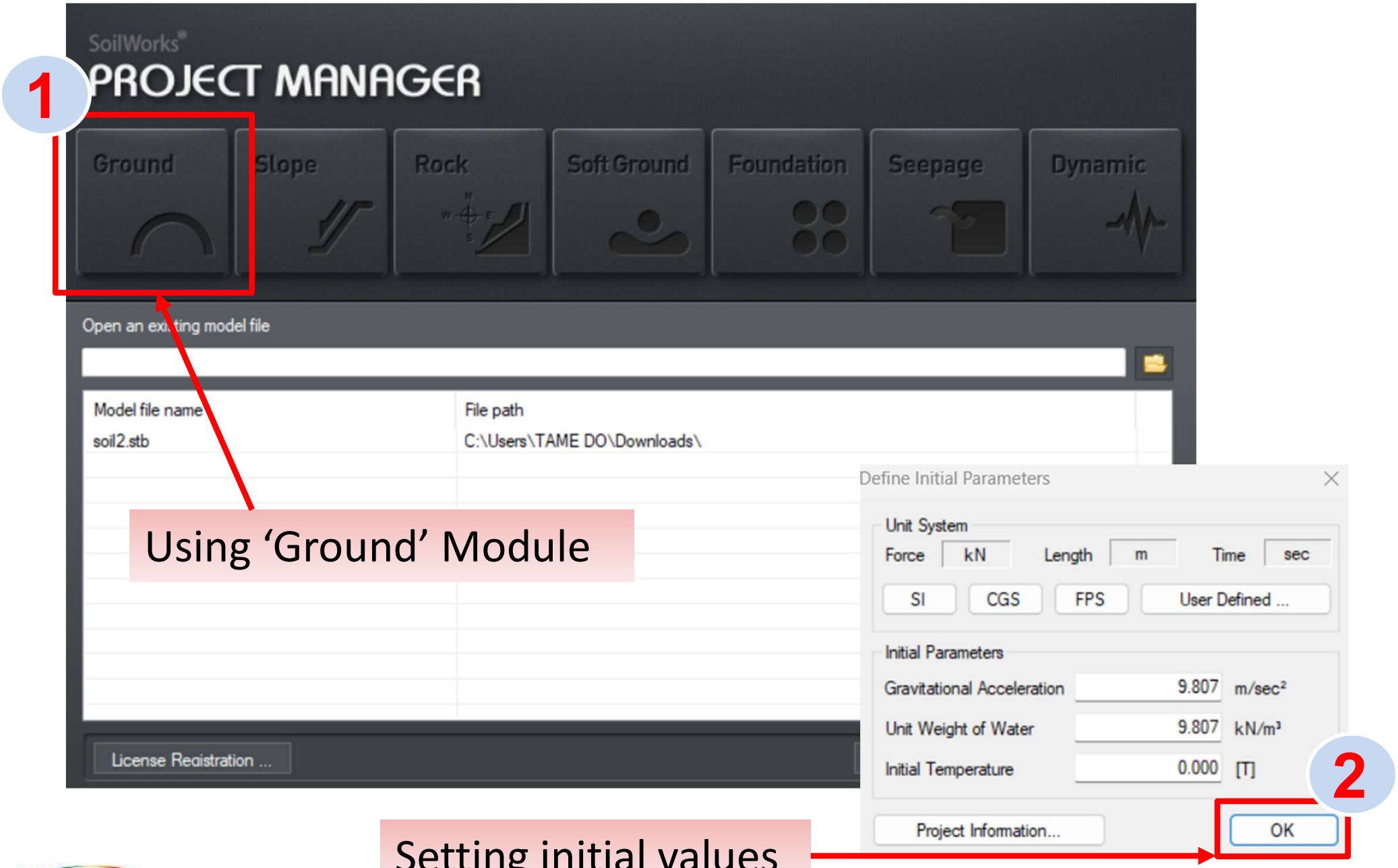
▶ Ground properties

No	Ground Type	Model Type	Modulus of Elasticity (kN/m^2)	Unit Weight (kN/m^3)	Saturated Unit Weight (kN/m^3)	Poisson's Ratio	Cohesion (kN/m^2)	Internal Friction Angle (degree)
1	Alluvial layer	Mohr Coulomb	8,000	17	18	0.35	15	20
2	Weathered soil	Mohr Coulomb	36,500	18.5	19.5	0.33	17.5	31
3	Weathered rock	Mohr Coulomb	150,000	21	22	0.3	50	33
4	Soft rock	Mohr Coulomb	1,850,000	24	25	0.28	180	35.5

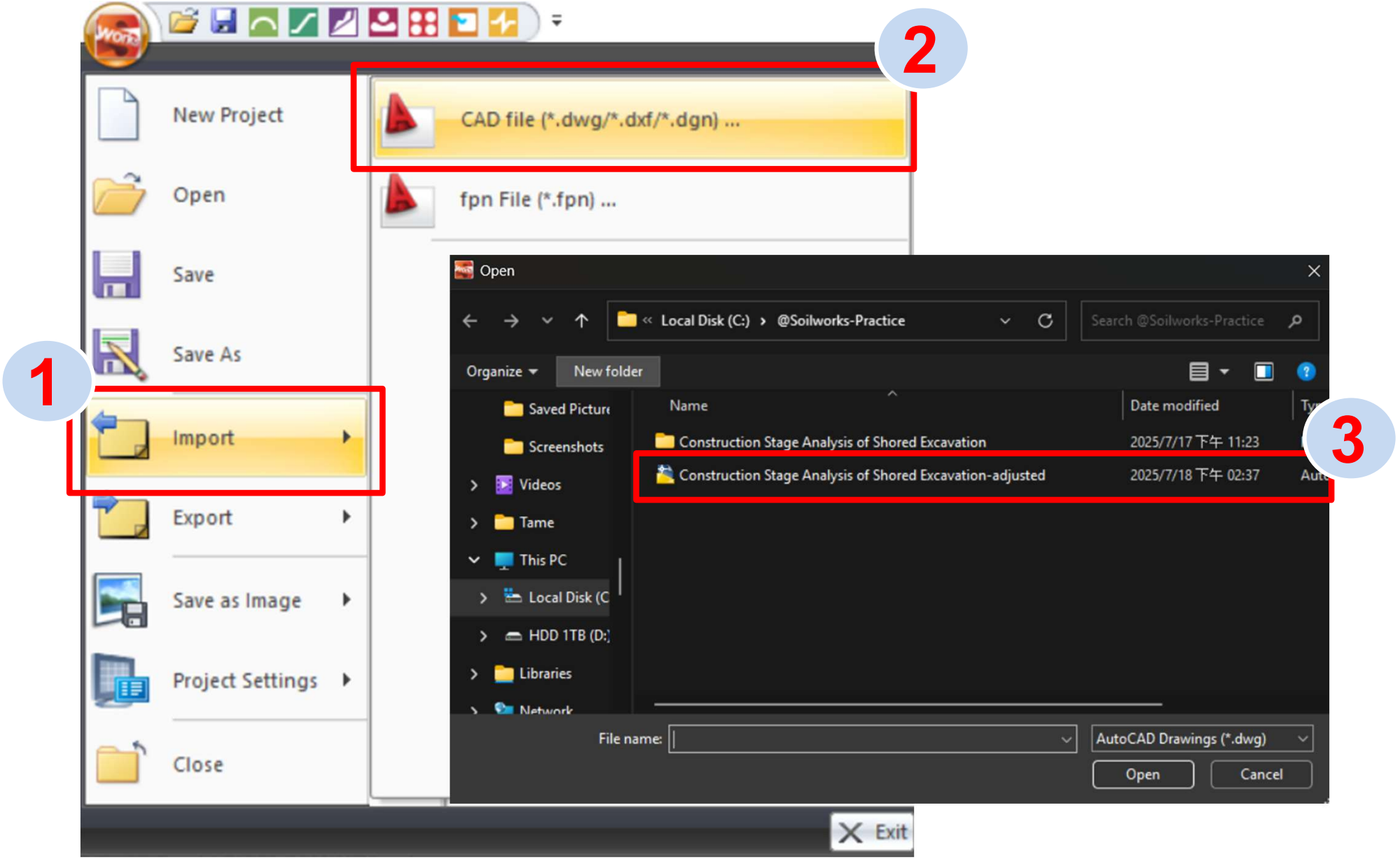
▶ Structural properties

No	Structure Type	Model Type	Modulus of Elasticity (kN/m^2)	Poisson's Ratio	Unit Weight (kN/m^3)	Horizontal spacing (m)	Section (m)	Design Strength (kN/m^2)
1	Pipe	Beam	230,000,000	0.3	24	1	Rectangle H: 0.03 m, B : 1 m	
2	H-Pile	Beam	210,000,000	0.3	77	1.8	H: 298x201x9/14(mm)	Yield: 240,000
3	Anchor	Embedded Truss	200,000,000	0.3	77	2.7	Area: 0.00039484(m^2)	Yield: 1,570,000

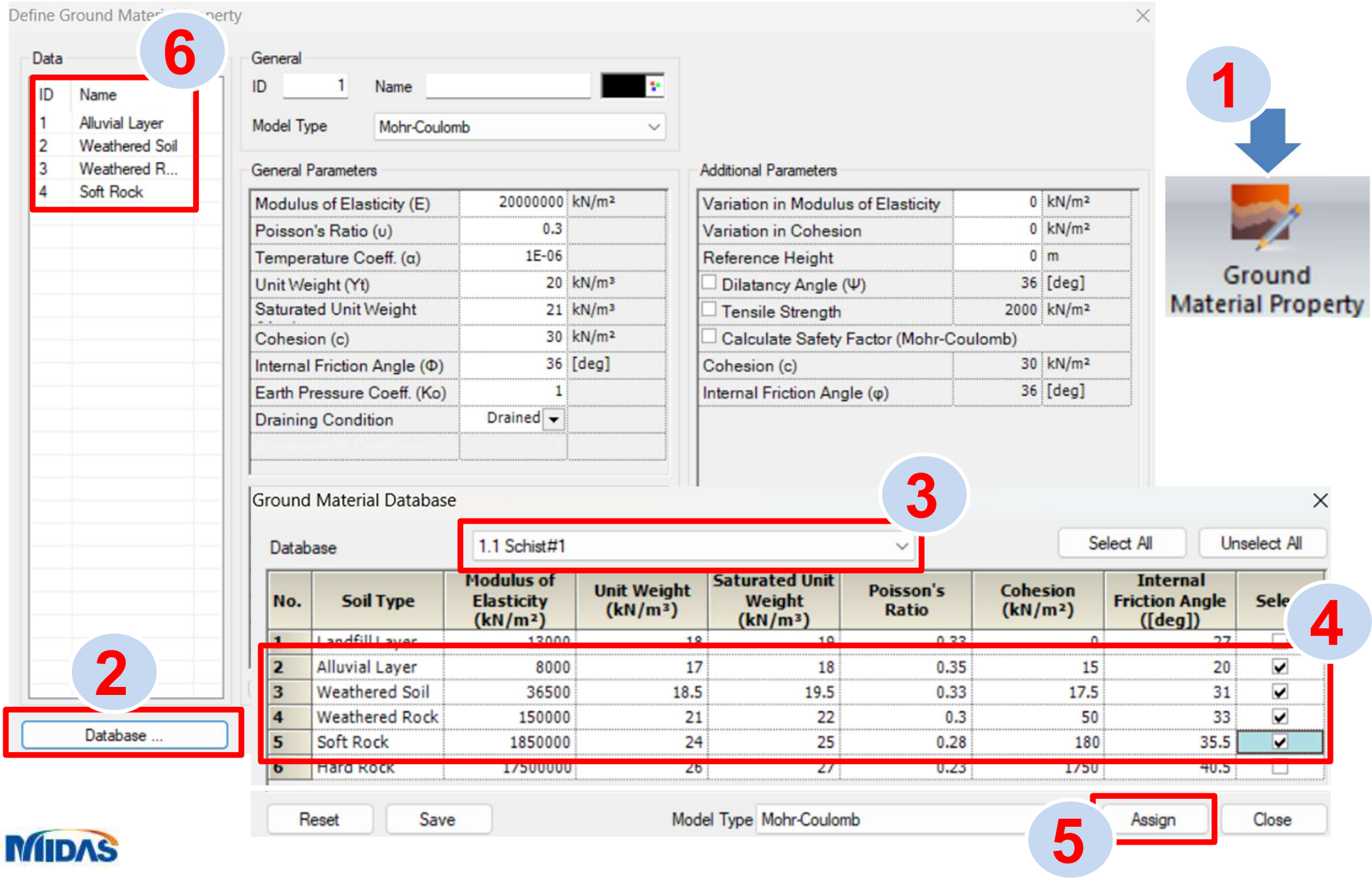
Start SoilWorks



Import File


1
2
3
New Project
Open
Save
Save As
Import
Export
Save as Image
Project Settings
Close
CAD file (*.dwg/*.dxf/*.dgn) ...
fpn File (*.fpn) ...
Exit
Open
Local Disk (C:) › @Soilworks-Practice
Search @Soilworks-Practice
Organize
New folder
Saved Picture
Screenshots
Videos
Tame
This PC
Local Disk (C
HDD 1TB (D:)
Libraries
Network
Name
Date modified
Construction Stage Analysis of Shored Excavation
2025/7/17 下午 11:23
Construction Stage Analysis of Shored Excavation-adjusted
2025/7/18 下午 02:37
File name:
AutoCAD Drawings (*.dwg)
Open
Cancel

Define Ground Properties



Define Strutural Properties

1

General

ID 1

Name Pipe

Element Type Beam

2

Standard NONE

Horizontal Spacing 1.000 m

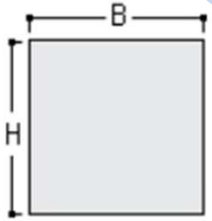
Section

Shape Rectangle

Tapered Section

3

Sub-Shapes U Type



Section User Defined

Section-2 User Defined

Material

Material Type User Defined

Concrete User Defined

Steel Grade User Defined

4

Section Data | Material Data

Section | Section-2

5

Section		
H	0.3	m
B	1	m
Stiffness Calculation		
Area	0.3	m²
Iy	0.00225	m^4
Zy	0.015	m³
Ry	0.086603	m

6

Section Data | Material Data

User Defined | Steel

7

Properties		
Modulus of Elasticity	230000000	kN/m²
Poisson's Ratio	0.3	
Unit Weight	24	kN/m³
Thermal Coefficient	5.5E-06	
Design Strength		
Allowable Comp.	9600	kN/m²
Allowable Tens. Stress	640	kN/m²
Allowable Shear	400	kN/m²

Define: ‘Pile Property’

8

Add | Modify | Delete | Close

MIDAS

Define Ground Properties

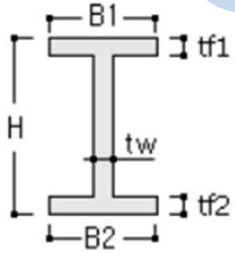
1

General
ID 1
Name H-Pile
Element Type Beam
andard NONE
Horizontal Spacing 1.8 m

2

Section
Shape H
Tapered Section
Sub-Shapes U Type

3



Section User Defined
Section-2 User Defined

Material

4

Material Type Steel
Concrete User Defined
SteelGrade User Defined

5

Section Data
Data

Section
Section-2

6

Section		
H	0.298	m
B1	0.201	m
tw	0.009	m
tf1	0.014	m
B2	0	m
tf2	0	m

Stiffness Calculation		
Area	0.008058	m²
Iy	0.000128	m^
Zy	0.000861	m³
Ry	0.126201	m

7

Section Data
Material Data
User Defined
Steel

Properties		
Modulus of Elasticity	230000000	kN/m²
Poisson's Ratio	0.3	
Unit Weight	24	kN/m³
Thermal Coefficient	0.000006	
Design Strength		
Yield Strength	240000	kN/m²

8

9

Add
Modify
Delete
Close

MIDAS

Define Ground Properties

1

2

3

4

5

6

7

8

9

General

ID 3

Name Anchor

Element Type Embedded Truss

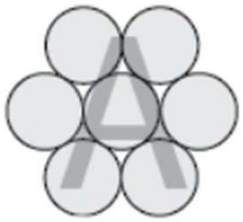
Standard NONE

Horizontal Spacing 2.7 m

Section

Shape Strand Tapered Sec

Sub-Shapes U Type



Section User Defined

Section-2 User Defined

Material

Material Type Strand

Concrete User Defined

StrandGrade User Defined

Section Data | Material Data

Section | Section-2

Stiffness

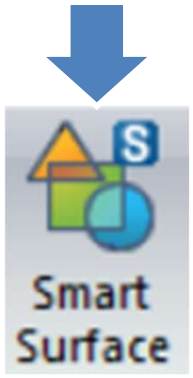
Area 0.00039484 m²

Section Data | Material Data

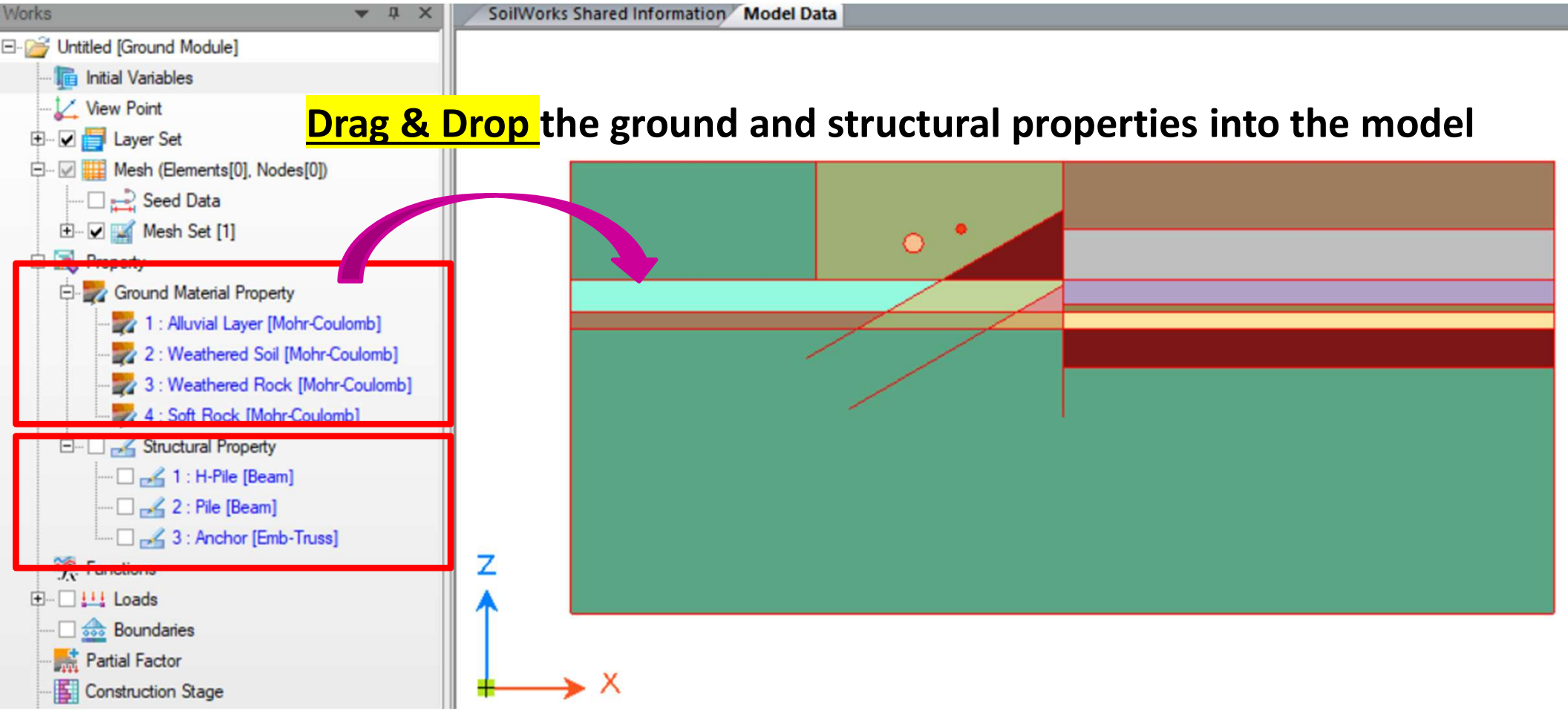
User Defined | Steel Wire

Properties		
Modulus of Elasticity	200000000	kN/m²
Poisson's Ratio	0.3	
Unit Weight	77	kN/m³
Thermal Coefficient	5.5E-06	
Design Strength		
Yield Strength	240000	kN/m²

Add | Modify | Delete | Close

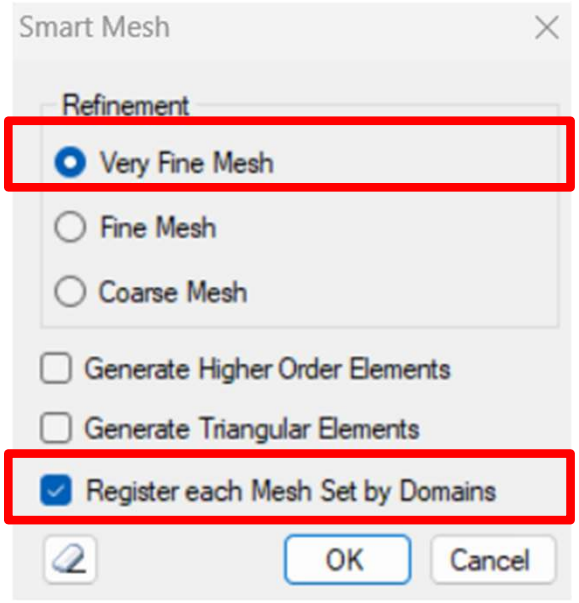


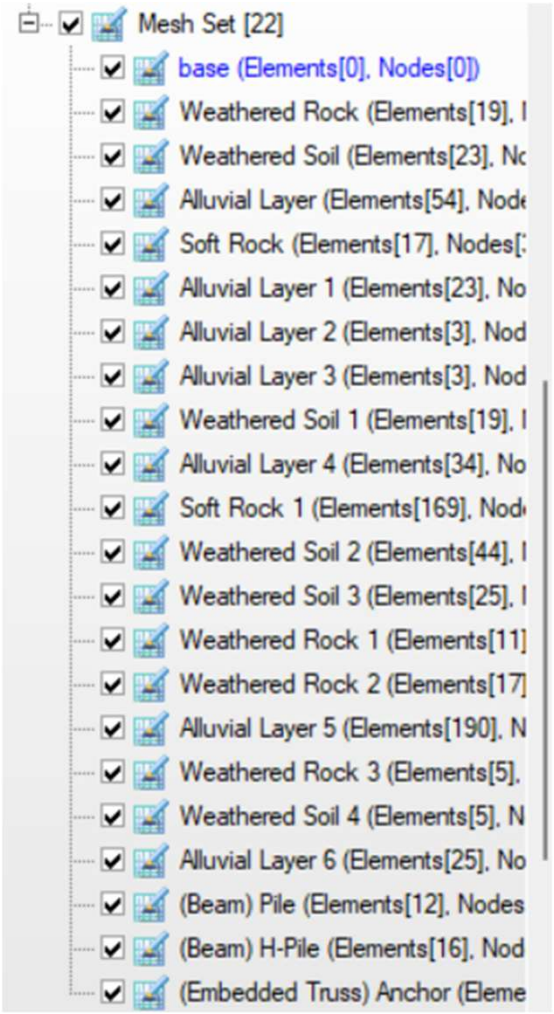
Smart Surfaces

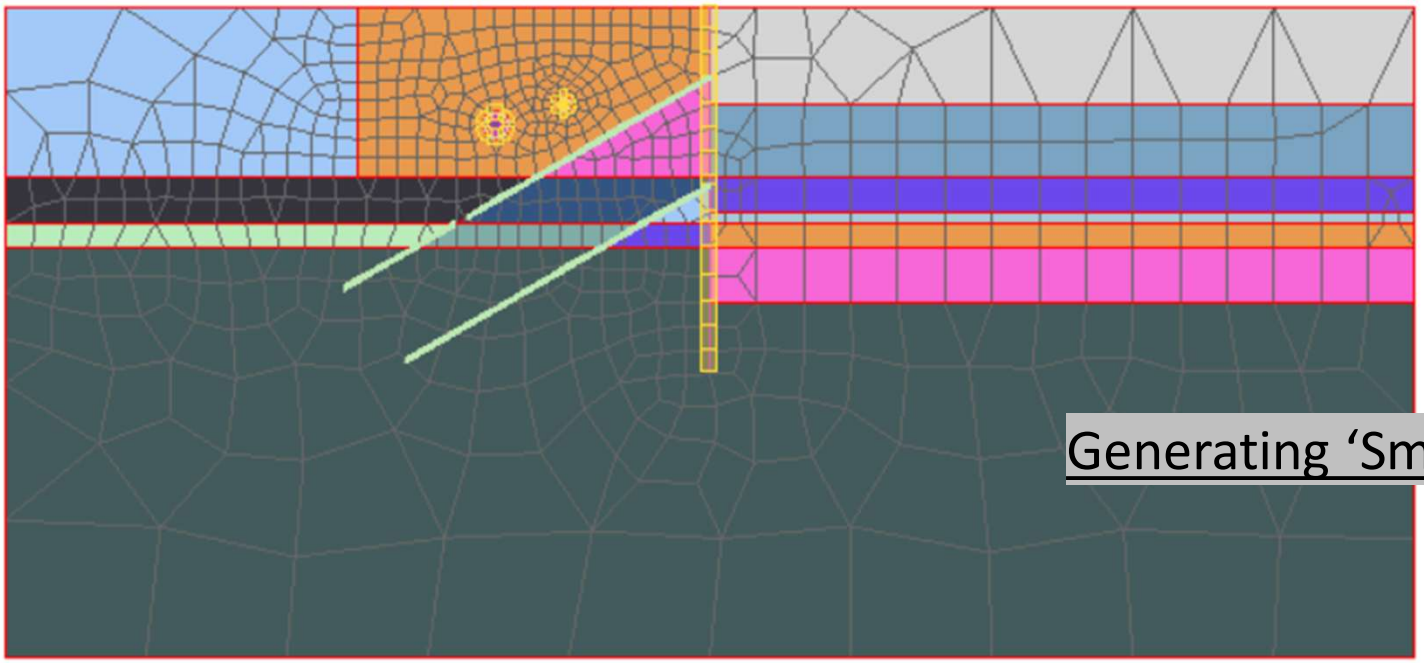


Fig, Creating ‘Smart Surfaces’ automatically

Smart Mesh



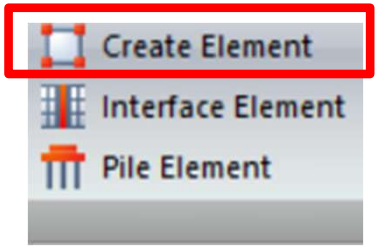


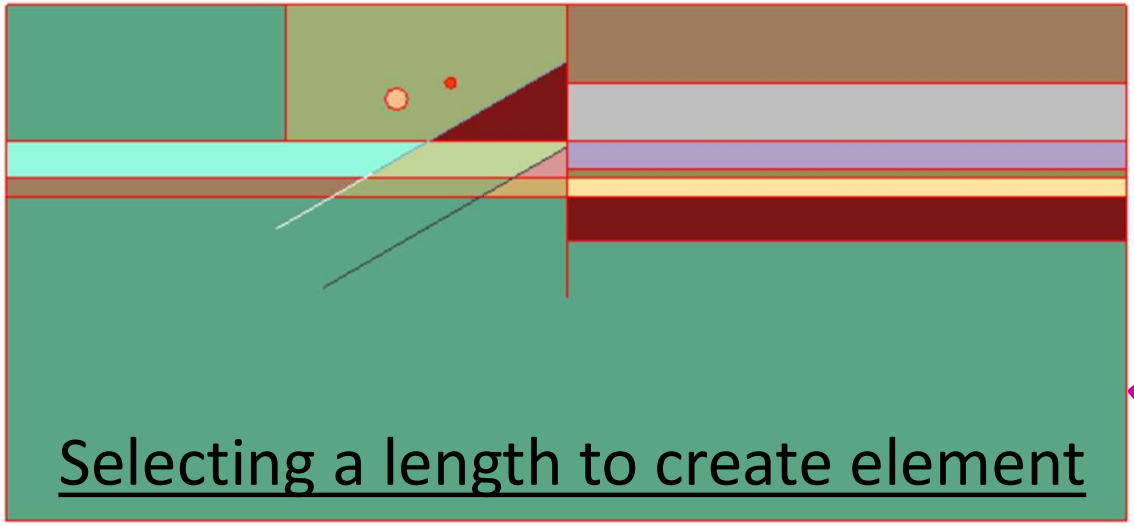


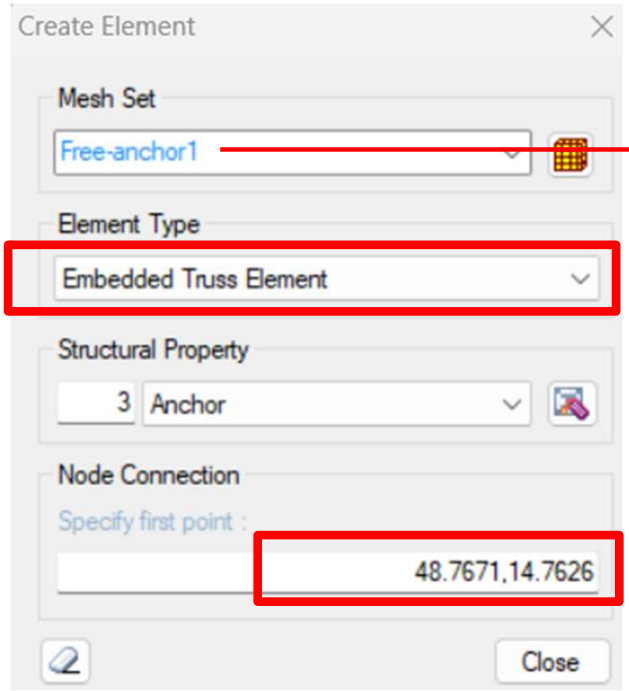
Generating ‘Smart Mesh’ automatically

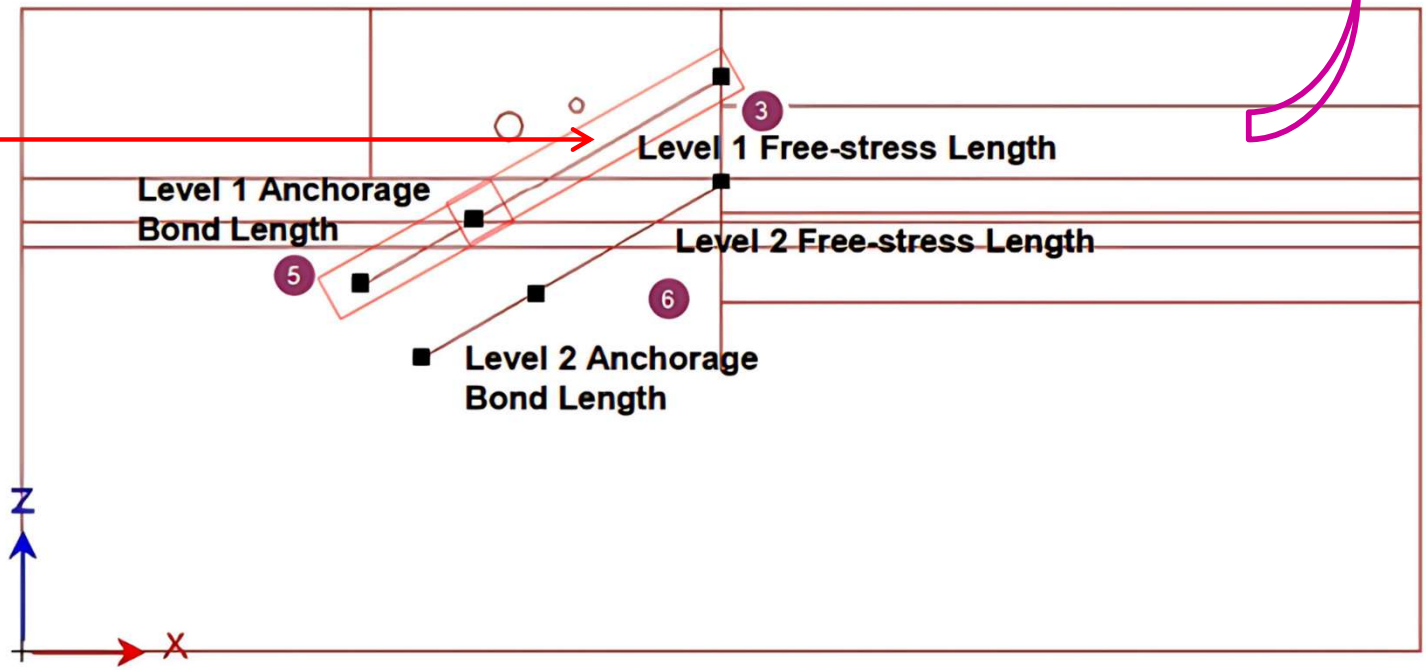
MIDAS

Create Anchor Elements



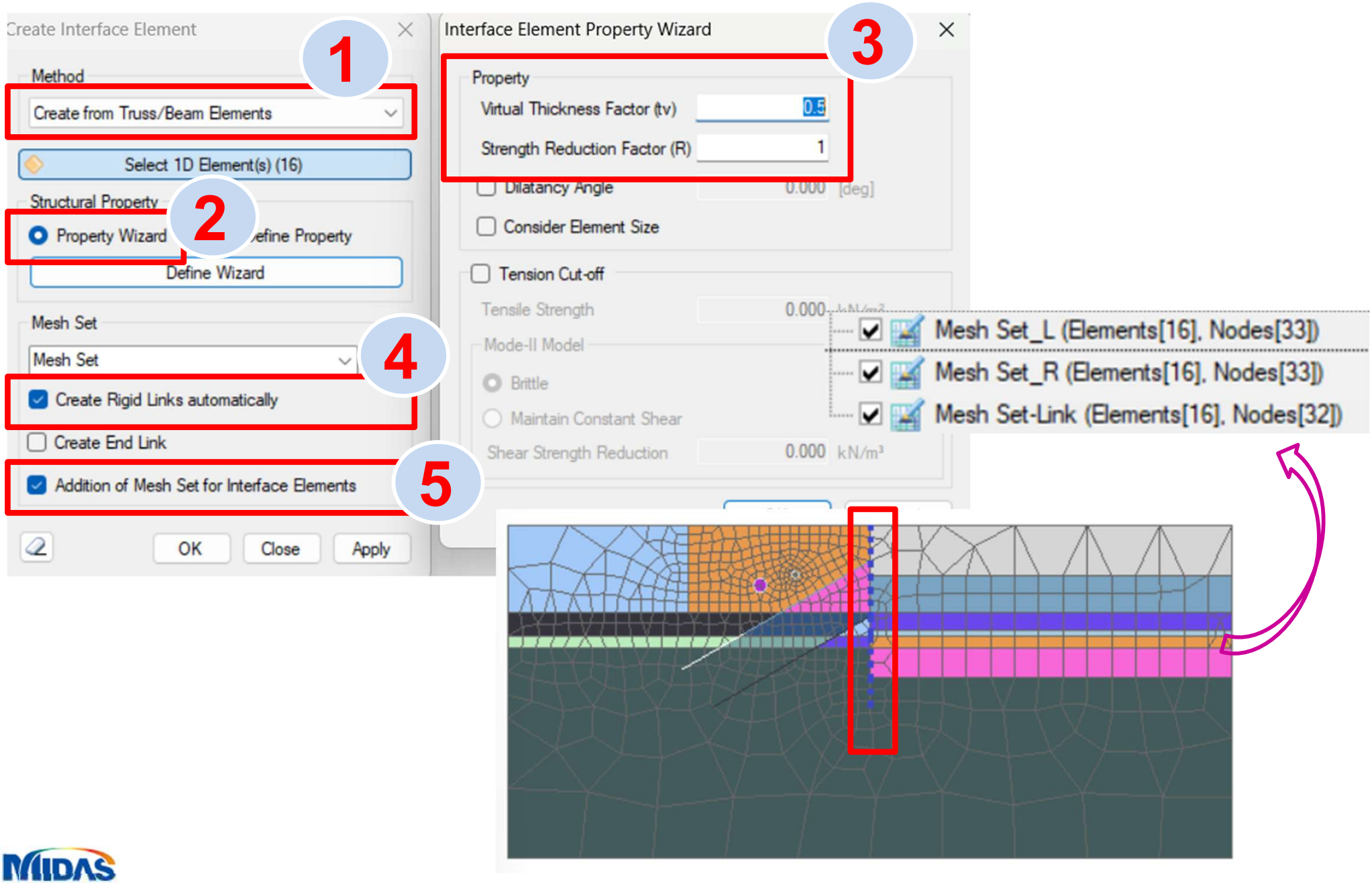






Fig, Generating mesh

Create Interface Elements



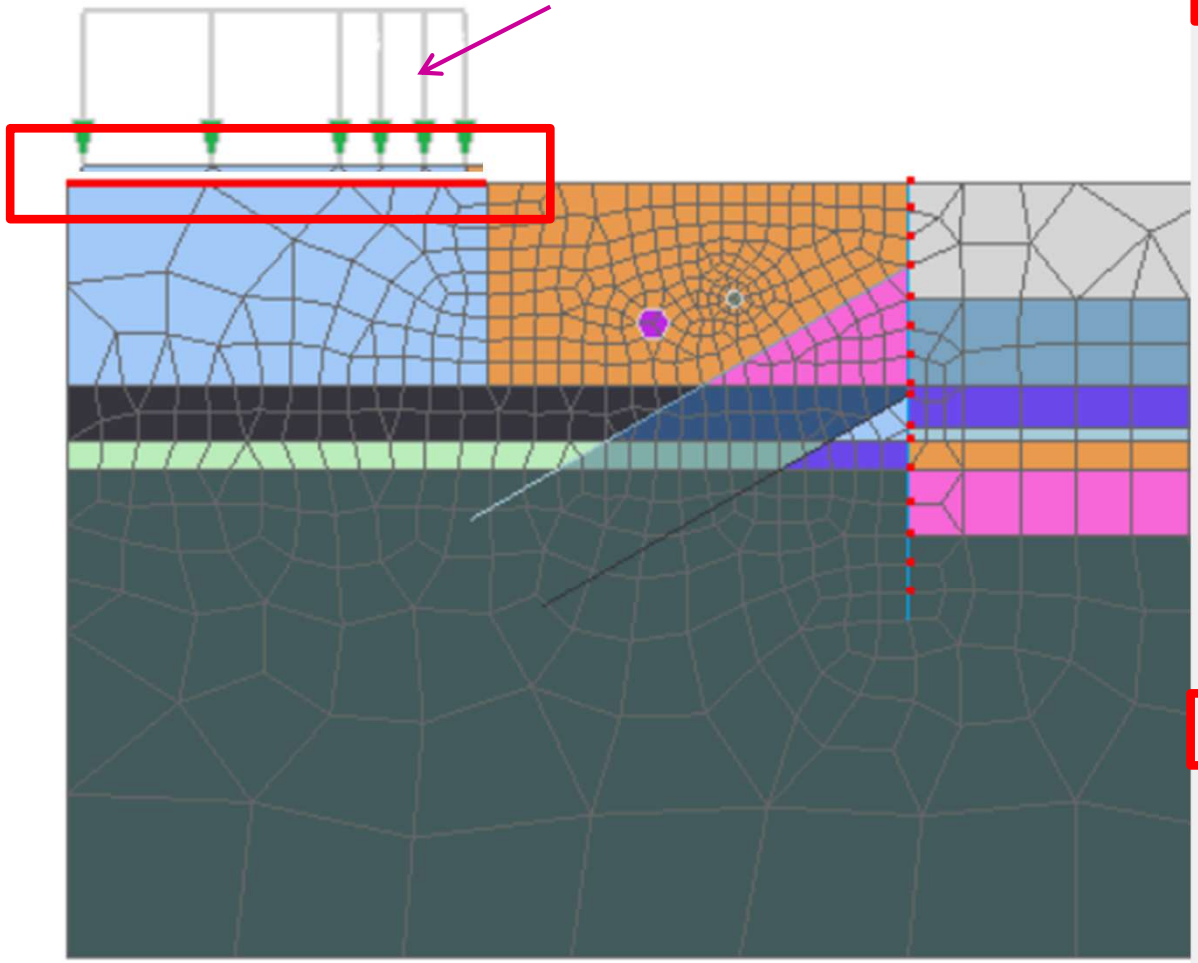
Define Loading Conditions

Nodal Load

Pressure Load

Beam Load

Assign pressure: 13 kPa



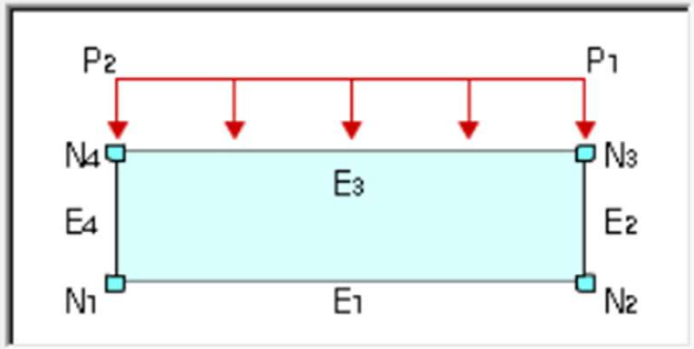
Define Pressure Load

Load Set: Overburden load

Select Object(s)

Type: Element Boundary Curve

Select Element Boundary Curve(s) (5)



Direction: Normal Direction

Load Value

Uniform Linear

P1: 13 kN/m²

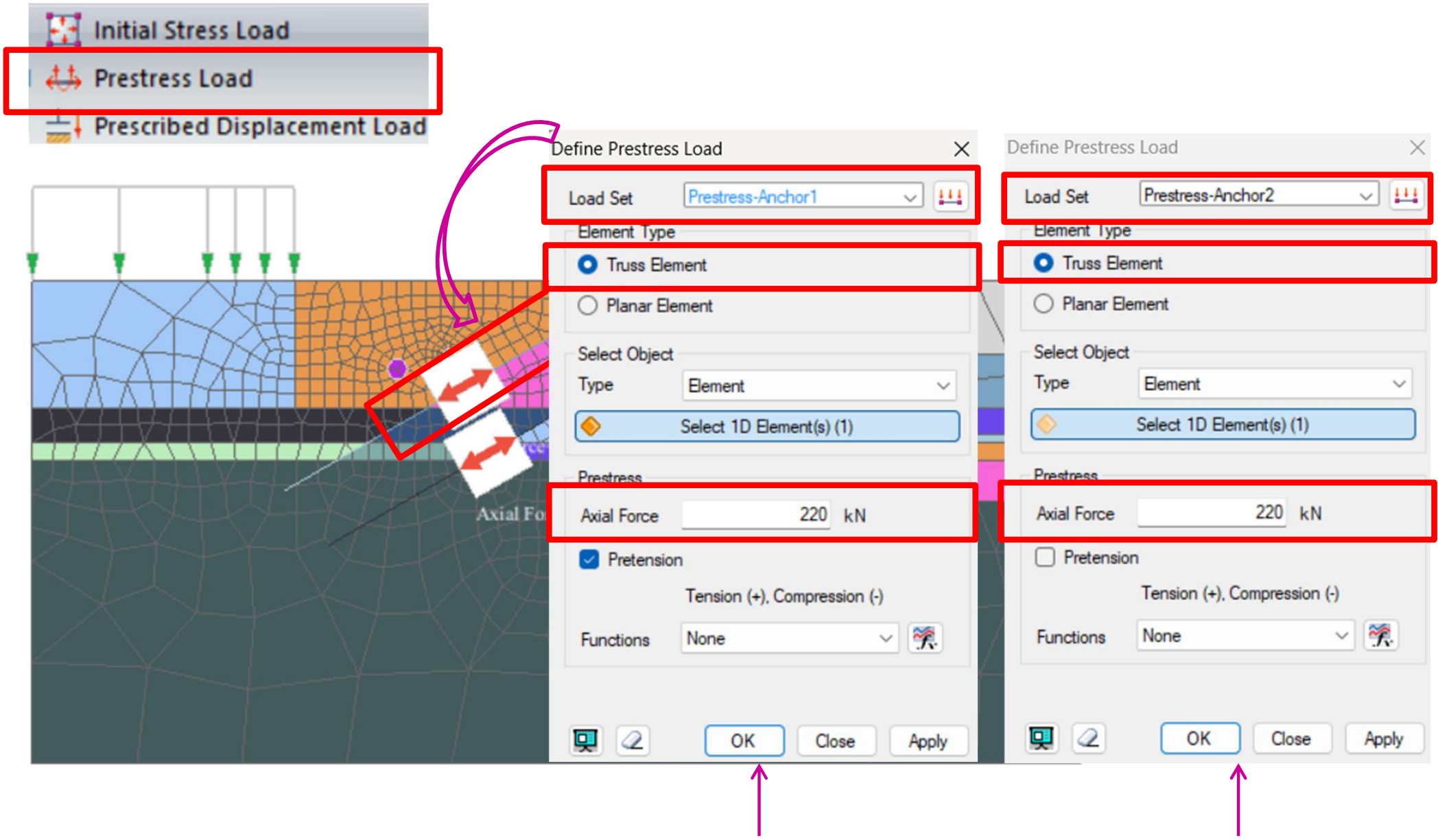
P2: 0.000 kN/m²

Functions: None

OK Close Apply

MIDAS

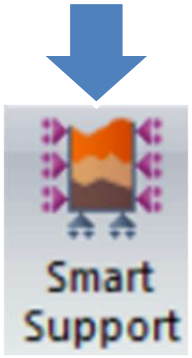
Prestress Load - Anchors

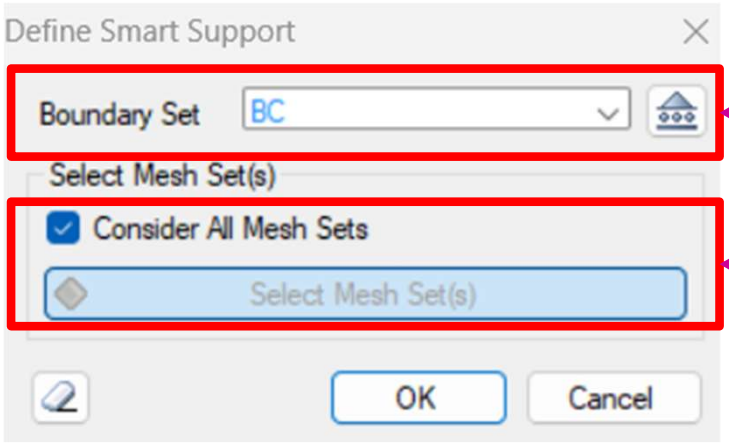


Prestress – Anchor 1

Prestress – Anchor 2

Smart Support

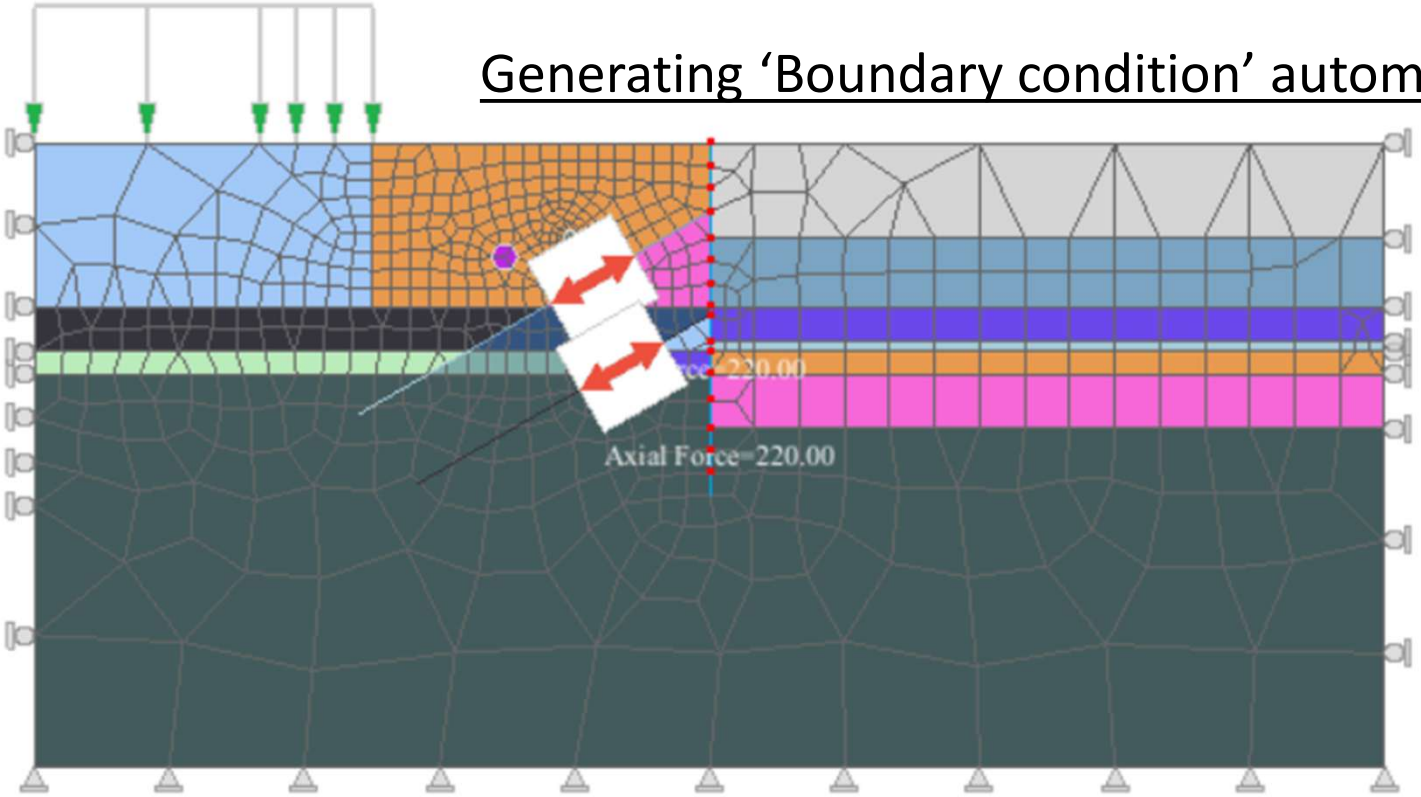




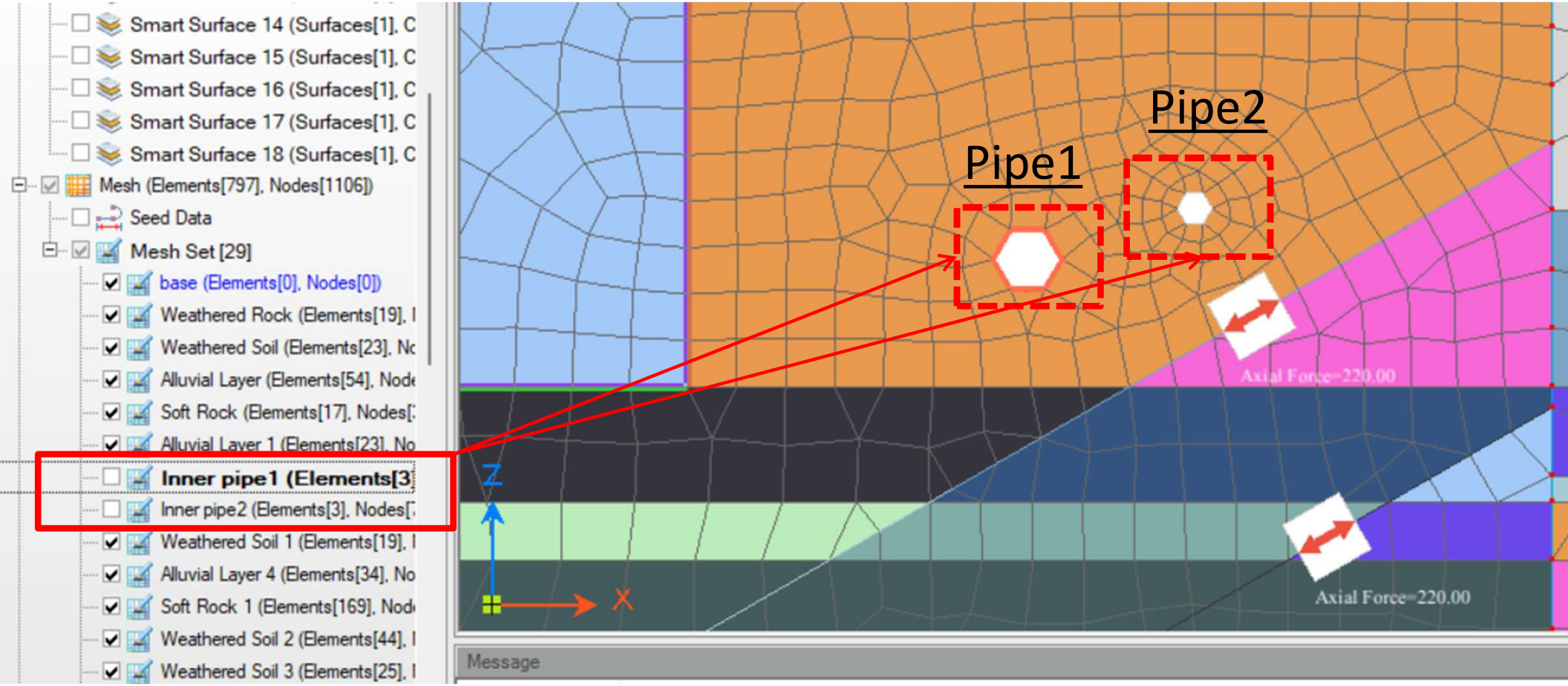
Naming for boundary set

Considered all mesh sets

Generating ‘Boundary condition’ automatically

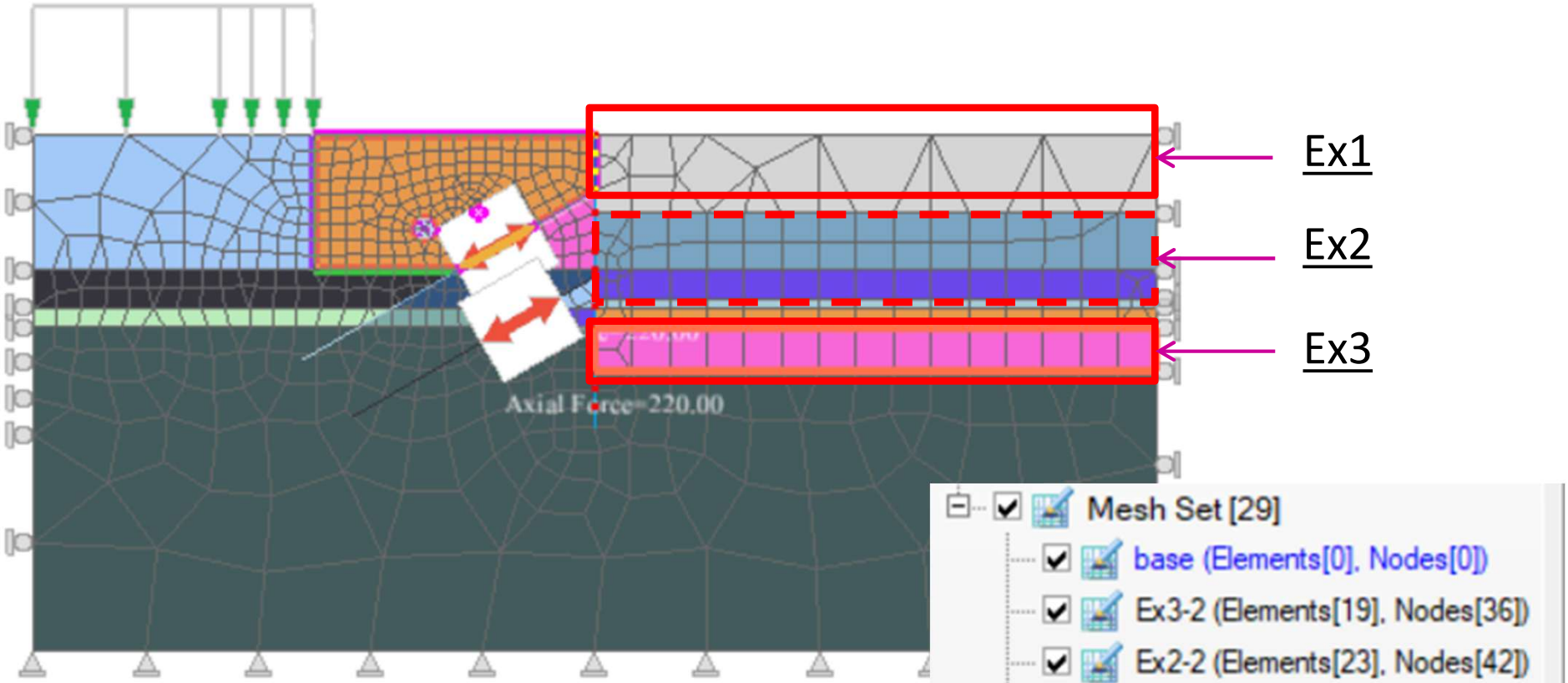


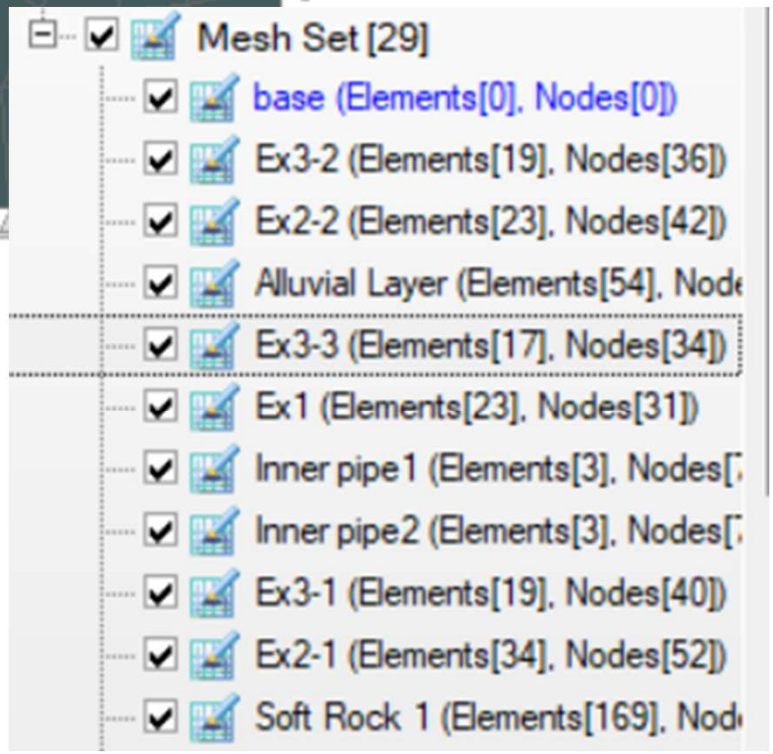
Re-name soil mesh



Fig, Adjusting the mesh set name

Re-name soil mesh

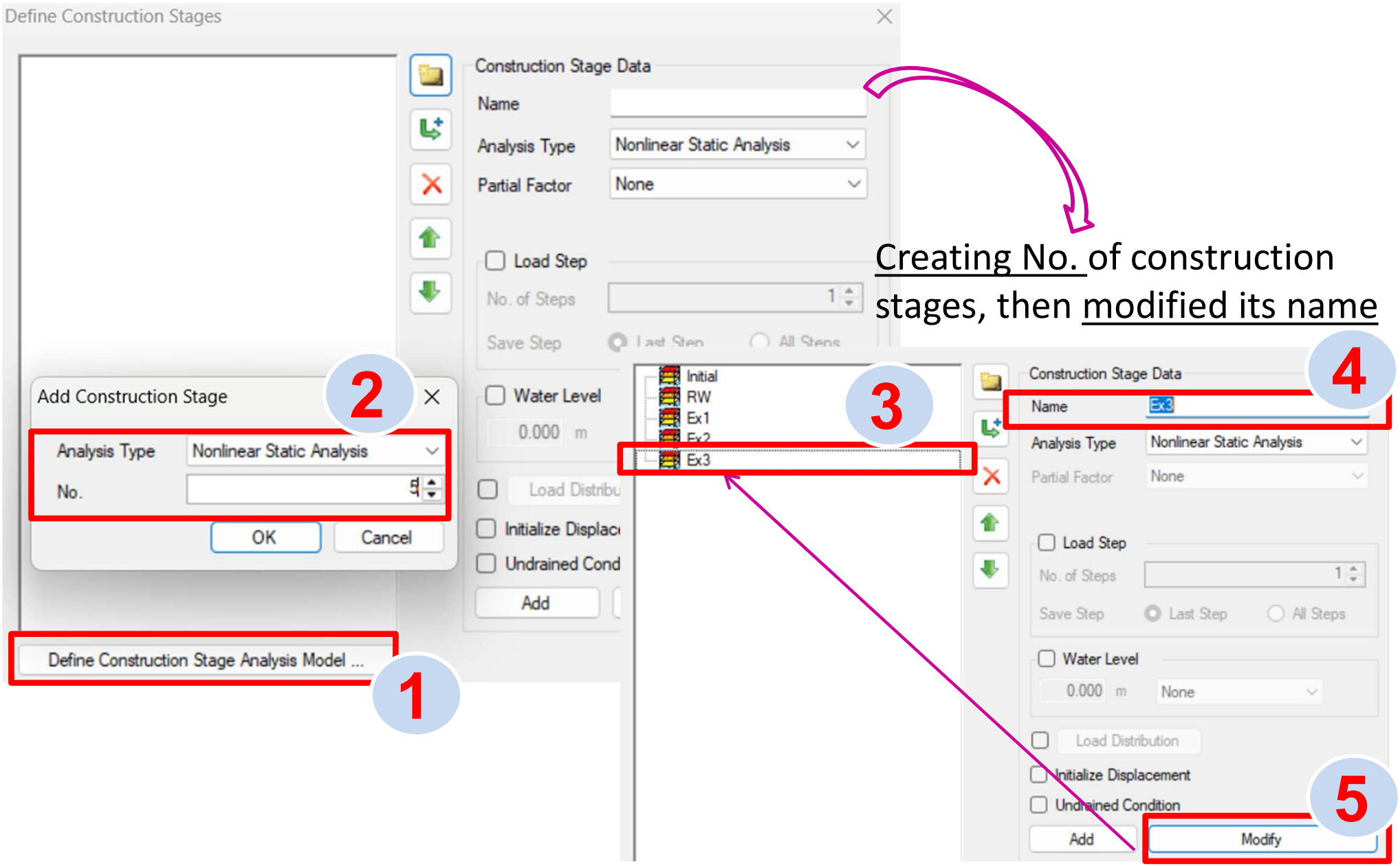




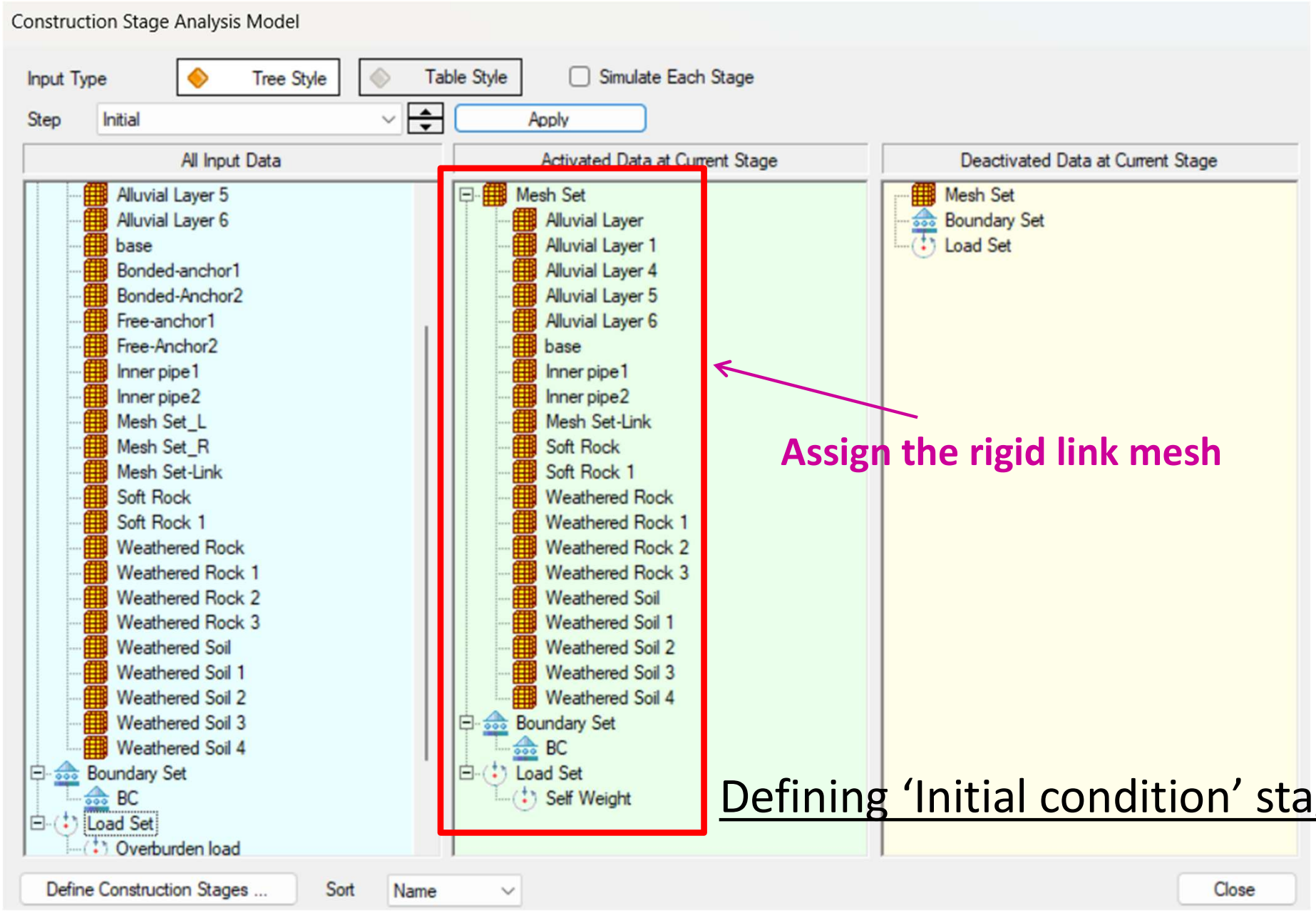
Re-name the soil name into the excavation name

→ To control the mesh set

Define Construction Stages



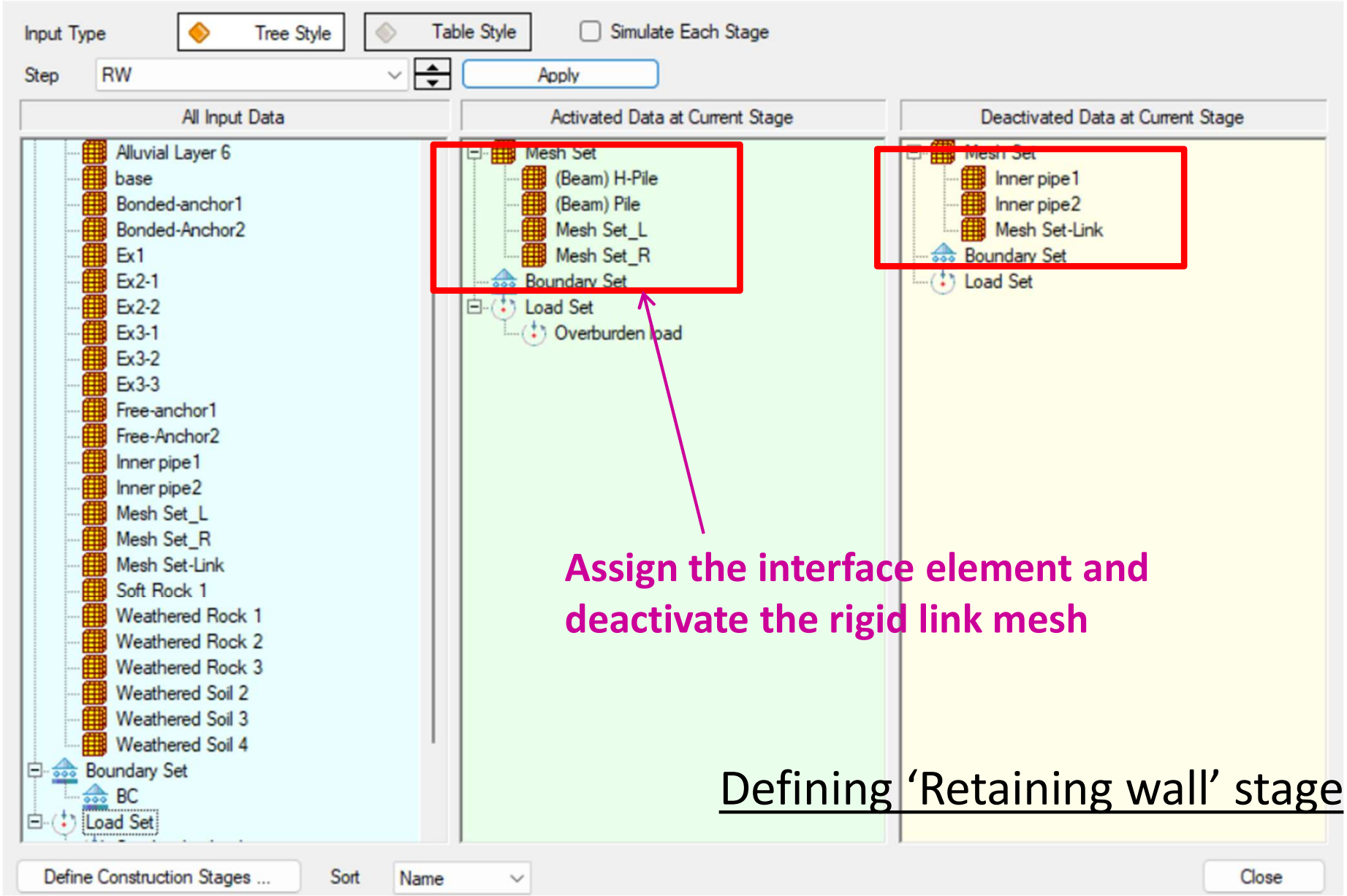
CS – Intial



Assign the rigid link mesh

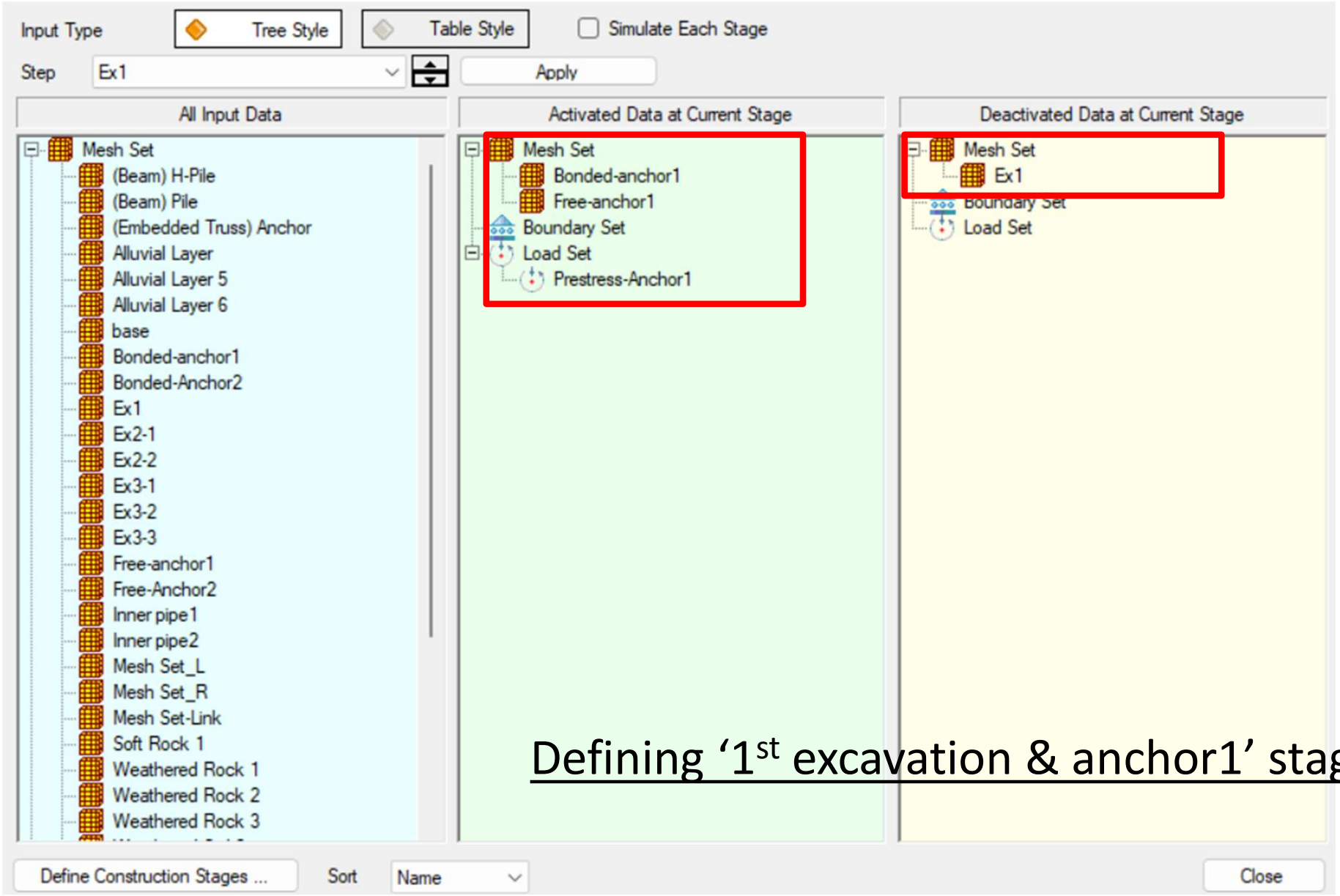
Defining ‘Initial condition’ stage

CS – RW



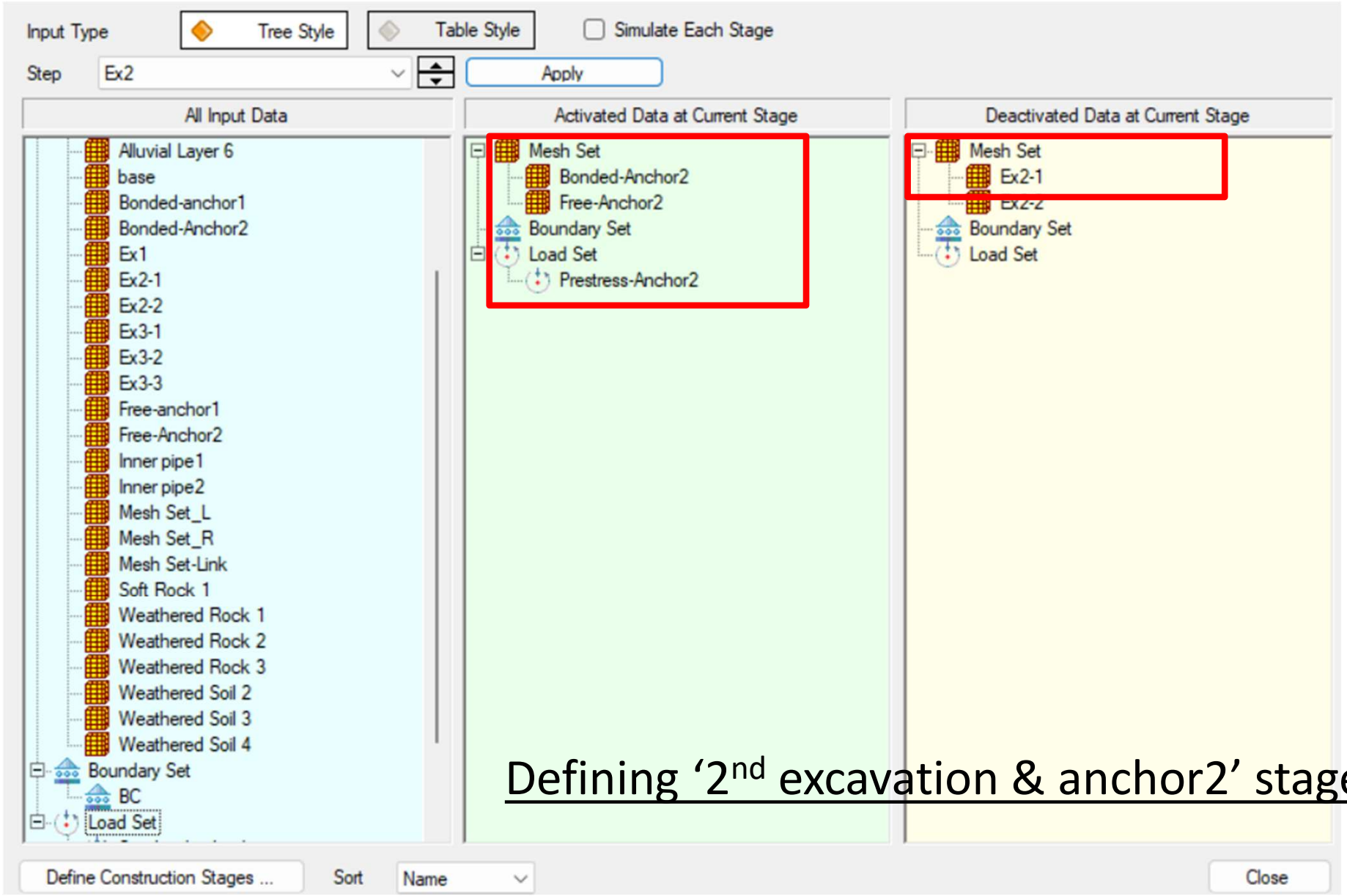
Defining ‘Retaining wall’ stage

CS – Ex1



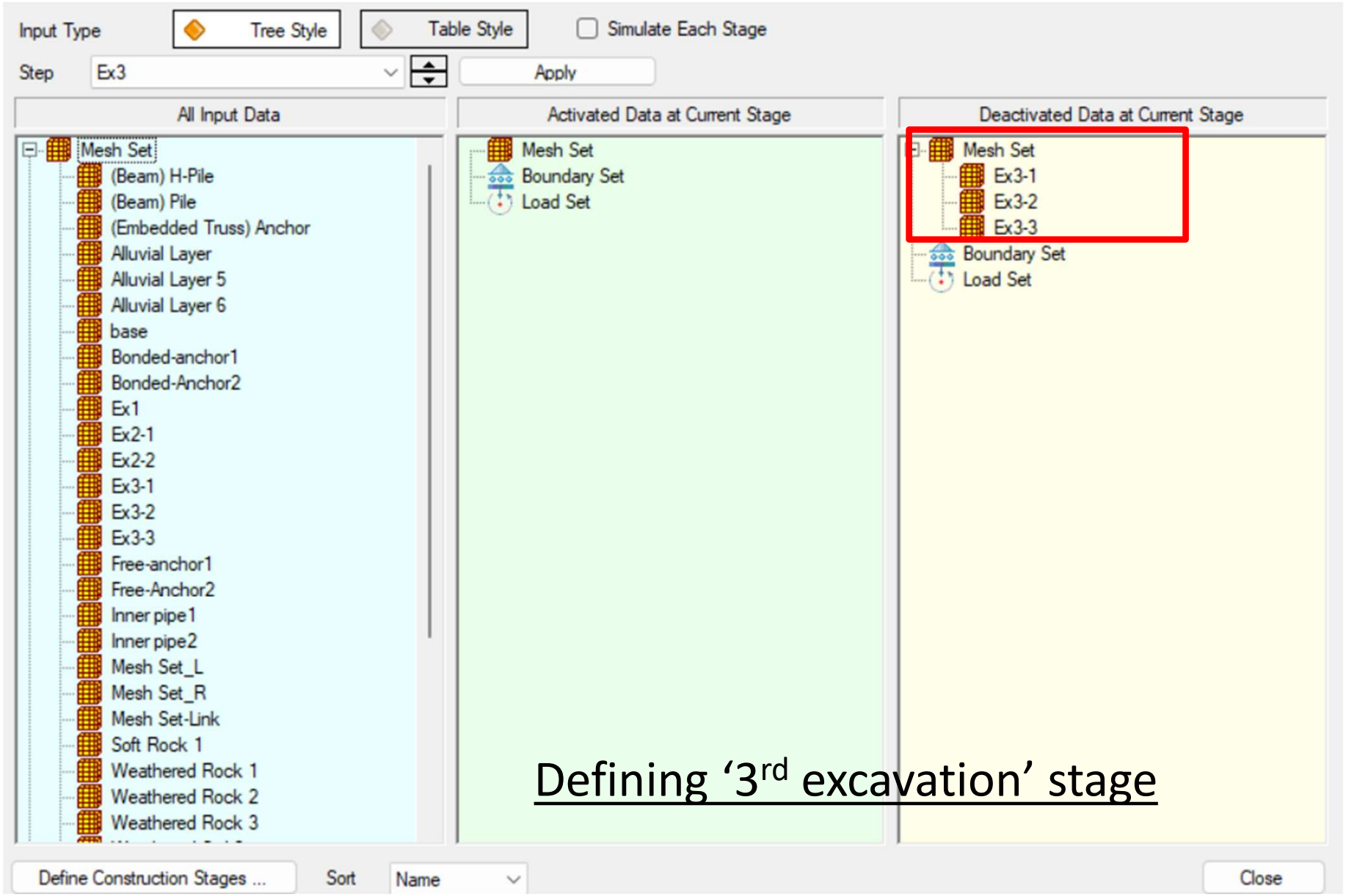
Defining '1st excavation & anchor1' stage

CS – Ex2



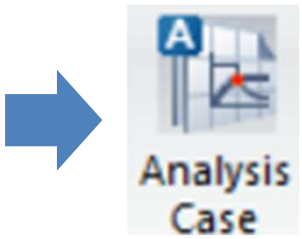
Defining '2nd excavation & anchor2' stage

CS – Ex3



Defining '3rd excavation' stage

Analysis Setting



Add/Modify Analysis Case

Name: 2DExcav

Analysis Method: Static Nonlinear Analysis

Analysis Control Data

Analysis by each Load Set in the Analysis Model

Define Analysis Model

Use All Mesh Sets | Use All Boundary Sets | Use All Load Sets

All Input Data	Data used in Analysis
Mesh Set	Mesh Set
base	Boundary Set
Ex3-2	Load Set
Ex2-2	
Alluvial Layer	
Ex3-3	
Ex1	
Inner pipe1	
Inner pipe2	
Ex3-1	
Ex2-1	
Soft Rock 1	
Weathered Soil 2	
Weathered Soil 3	
Weathered Rock 1	
Weathered Rock 2	
Alluvial Layer 5	
Weathered Rock 3	
Weathered Soil 4	
Alluvial Layer 6	
(Beam) Pile	

OK | Close | Apply

Analysis Control

Static Nonlinear Analysis

Initial Stage for Stress Analysis: Initial

Ko Condition

Load Step and No. of Iterations

No. of Load Steps: 1

Maximum Number of Iterations per Load Step: 30

Convergence Criteria

Energy Norm: 0.001

Displacement Norm: 0.001

Unequilibrium Force Norm: 0.001

Nonlinear Option

Constant Stiffness Method

Newton-Rhapson Method

Auto-define

Initial Load Factor: 1

Minimum Load Factor: 1E-05

Include acceleration of convergence

Save Step Results

Last Step | All Steps

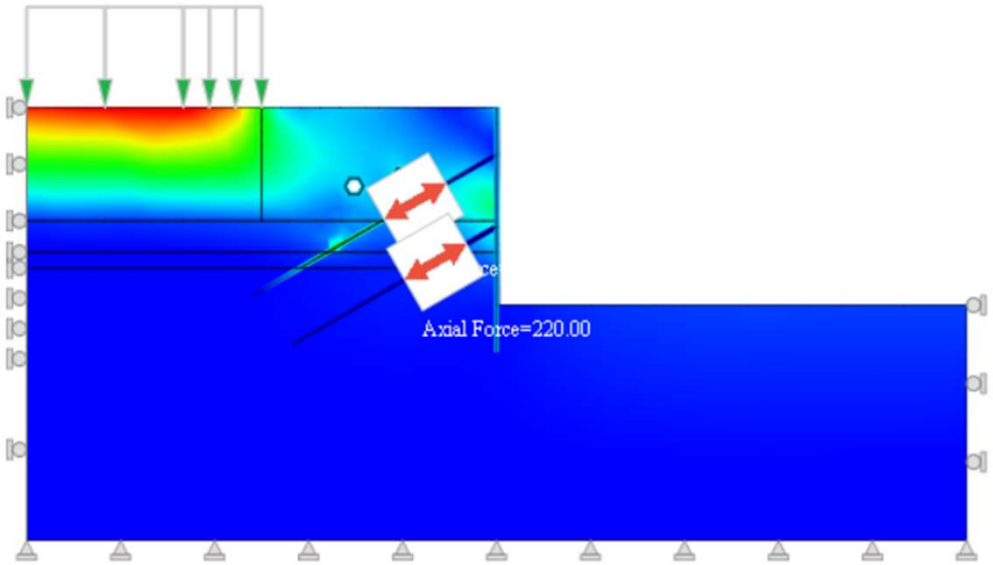
OK | Cancel

RUN analysis →

Analysis Case

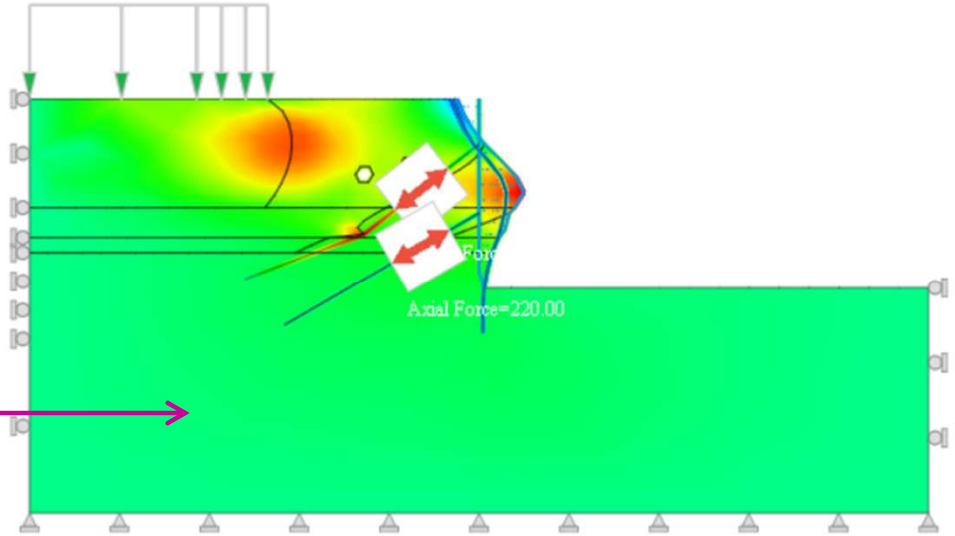
2DExcav [Construction Stage Analysis]

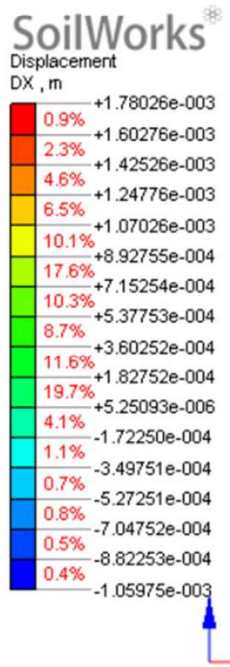
Results - Displacements



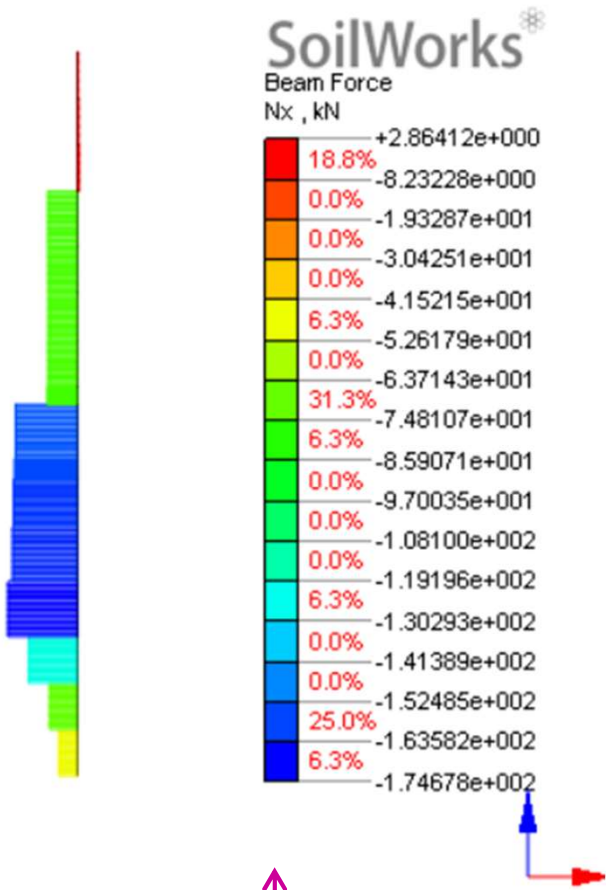
Total displacement

Lateral displacement
(Deformed shape)

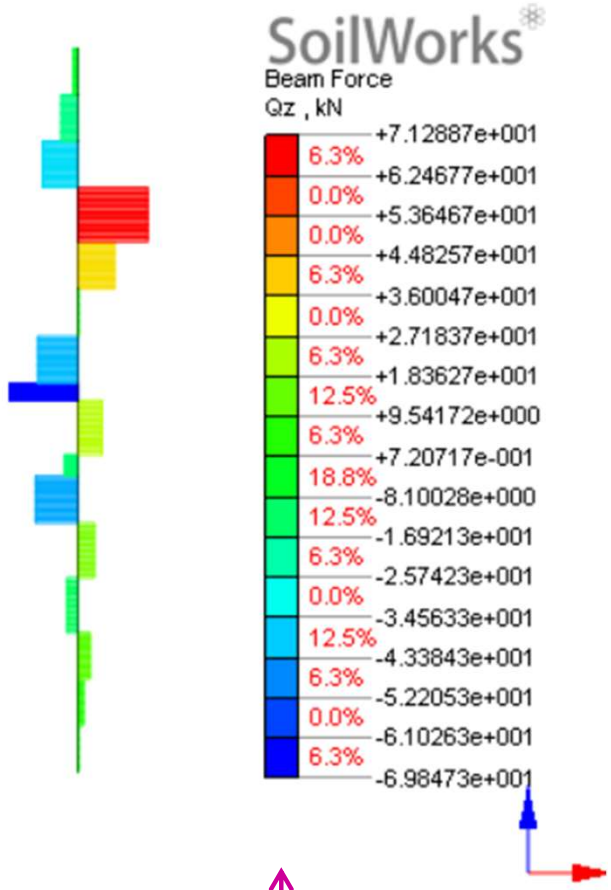




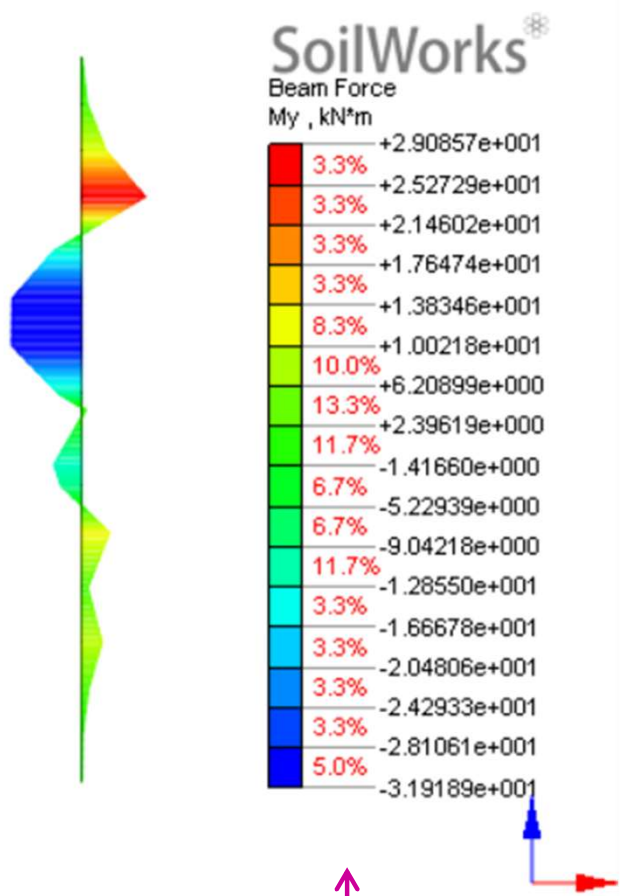
Results – Retaining wall internal forces



Axial force

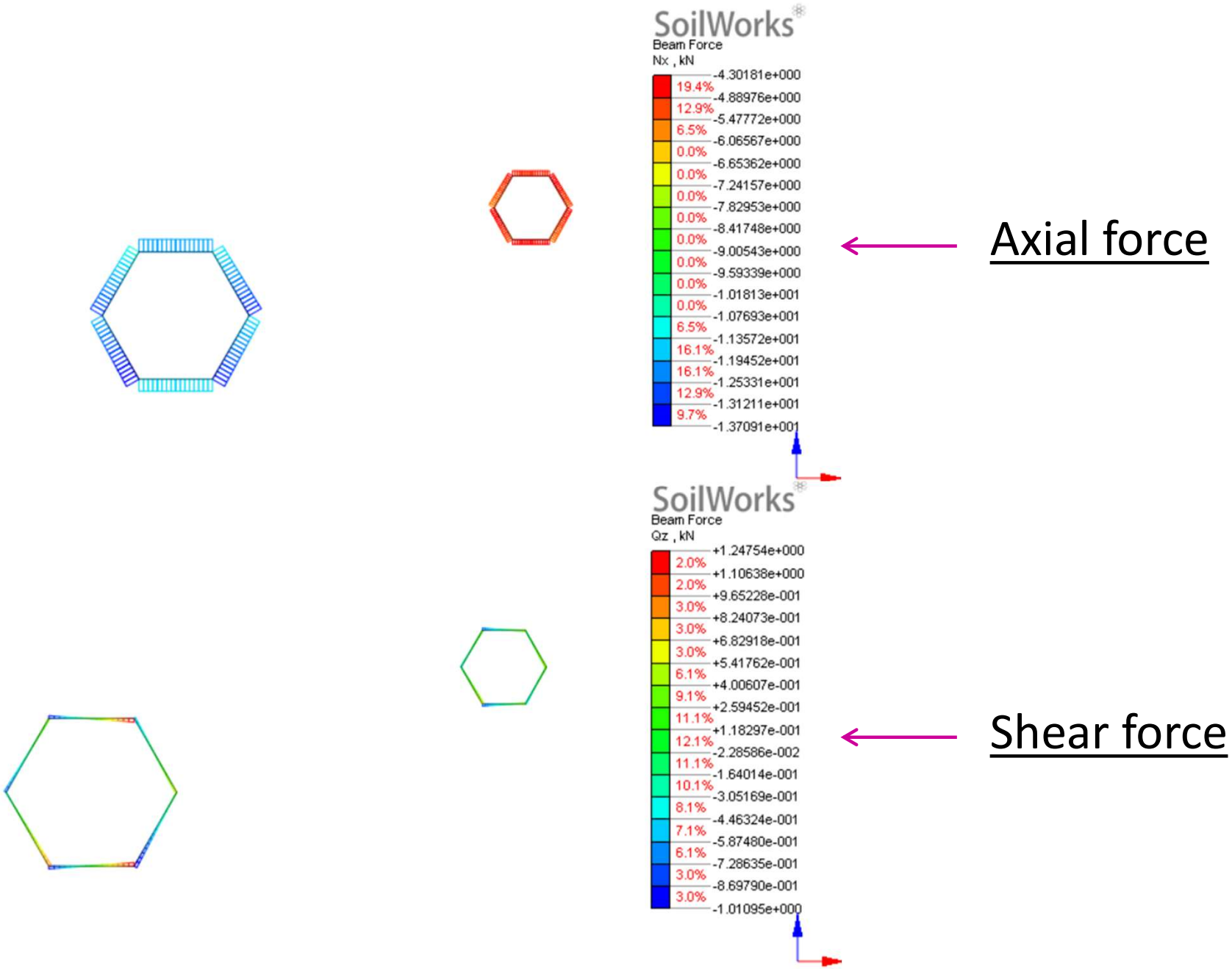


Shear force

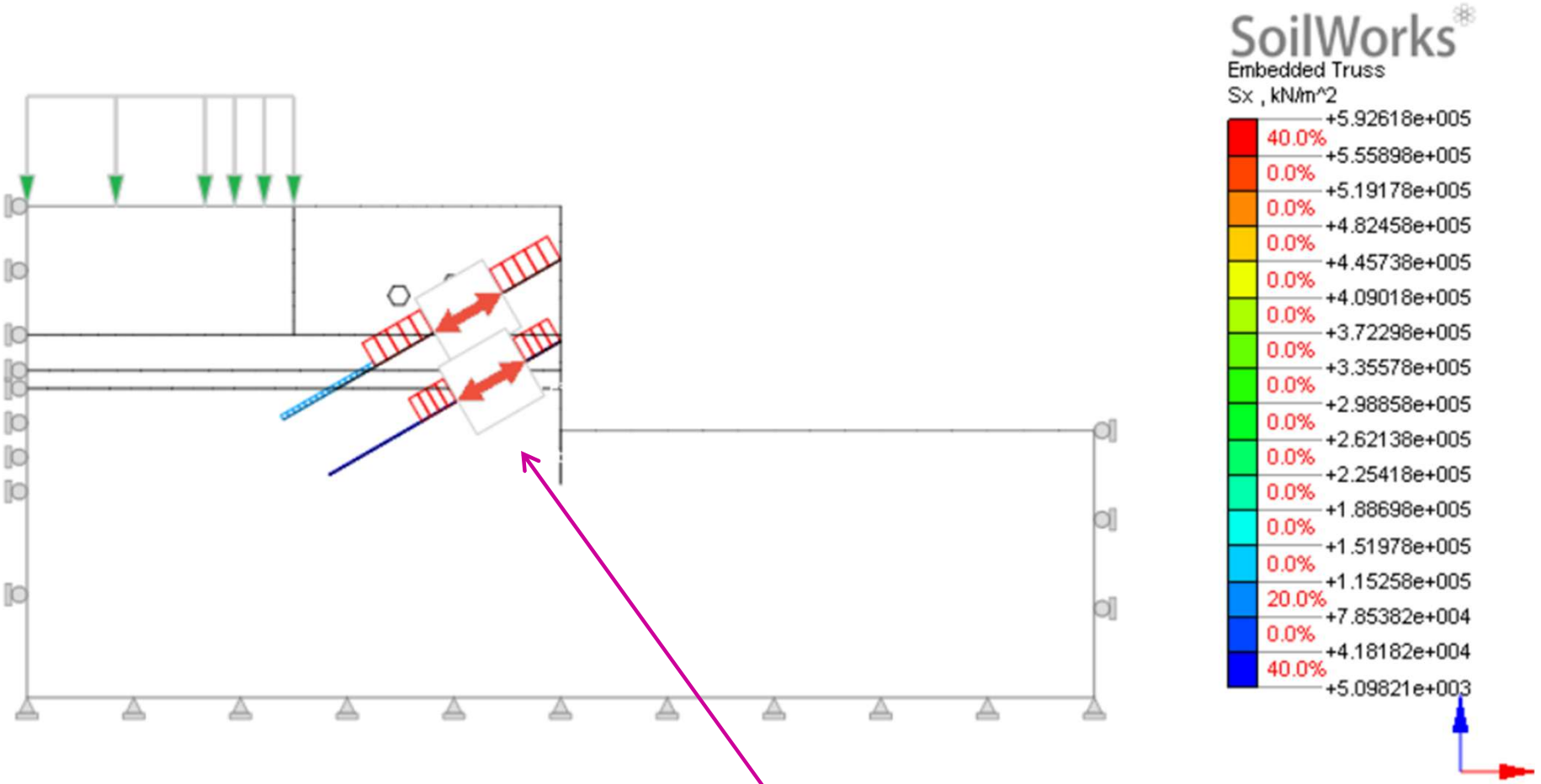


Bending moment

Results – Pipe internal forces



Results – Anchor internal force



Axial force in the ‘Prestress length’ of anchors


Thank you!

Reference: *Soil Nail Reinforced Slope Stability– SoilWorks Tutorials*

MIDAS

SoilWorks
Geotechnical Solutions for Practical Design

SoilWorks – Slope Module

Soil Nail Reinforced Slope Stability

Midas e-mail: support@midasuser.com
My e-mail: tam@midasuser.com.tw

MIDAS

DATE: 2025.07.25

Part 1: General introduction

Part 2: Strength Reduction Method

Part 3: Limit Equilibrium Method

Part 4: Results and discussion

Part 5: Results and discussion

Part 1: General introduction

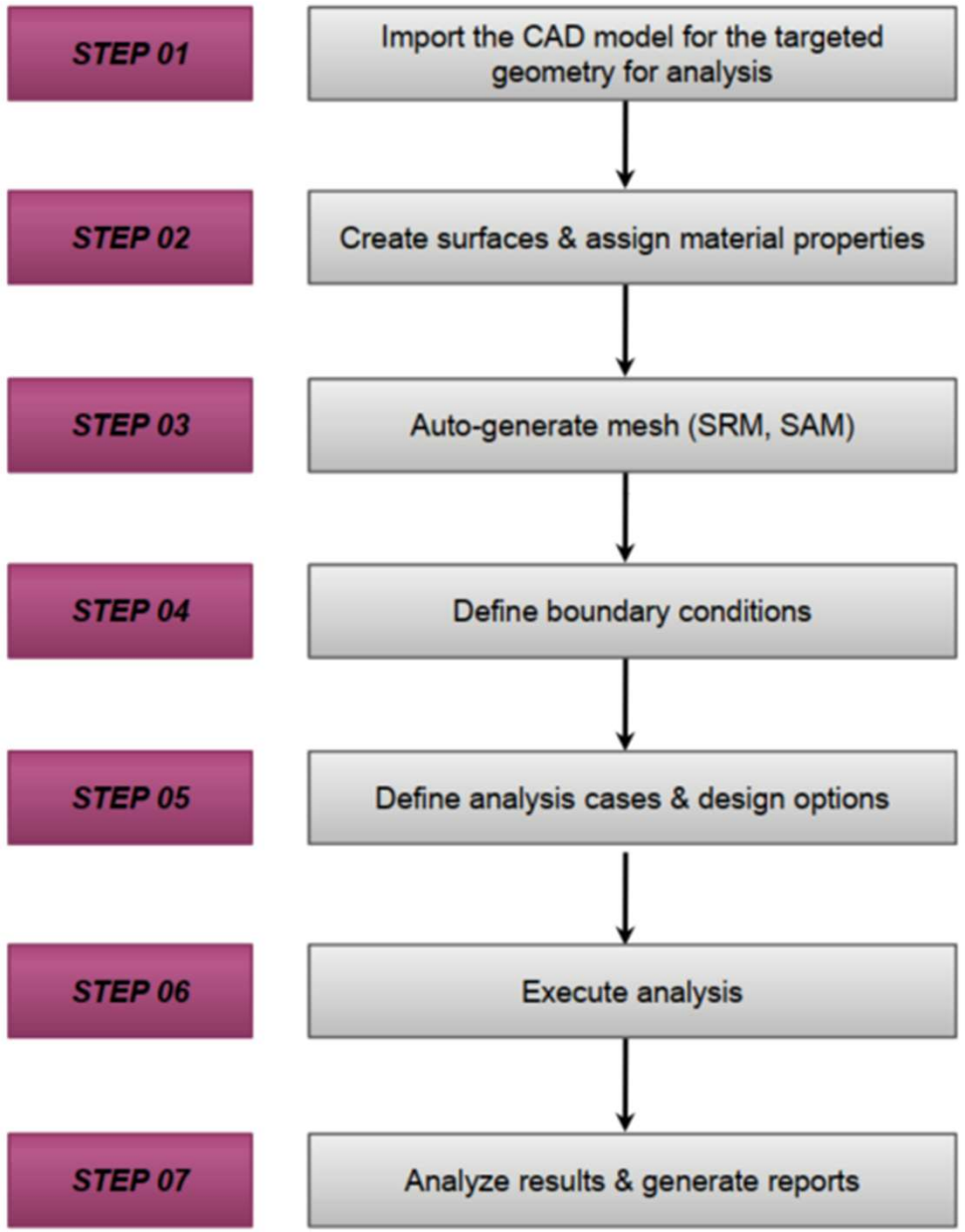
Learning Objective

- Expose to slope stability analysis using:

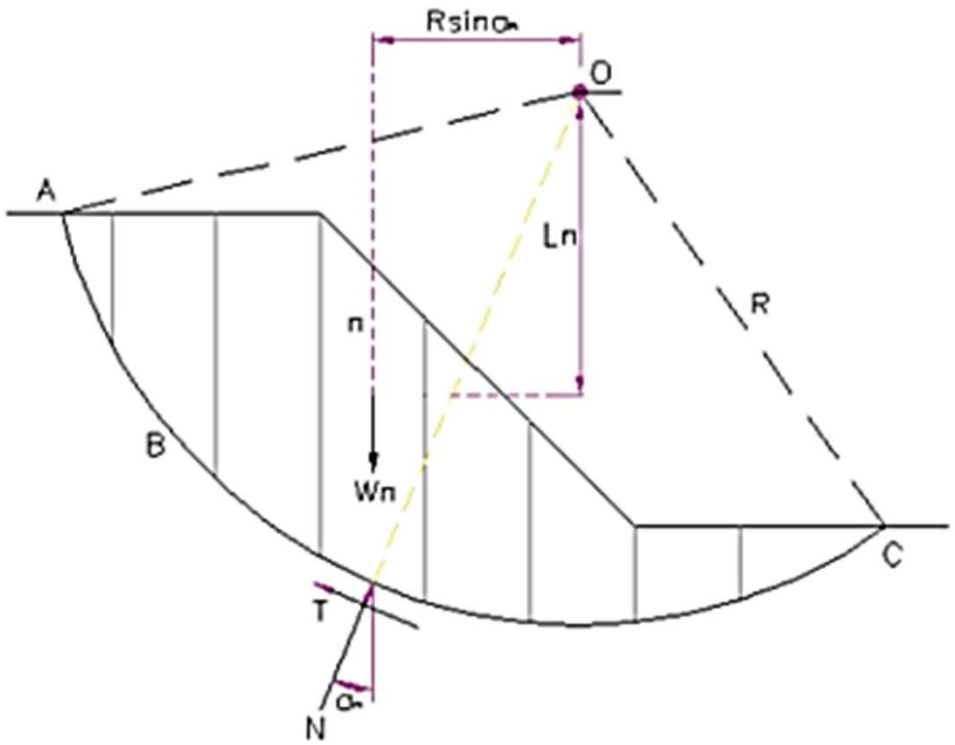
  ✓ LEM
  (Limit Equilibrium Method)

  ✓ SRM
  (Strength Reduction Method)

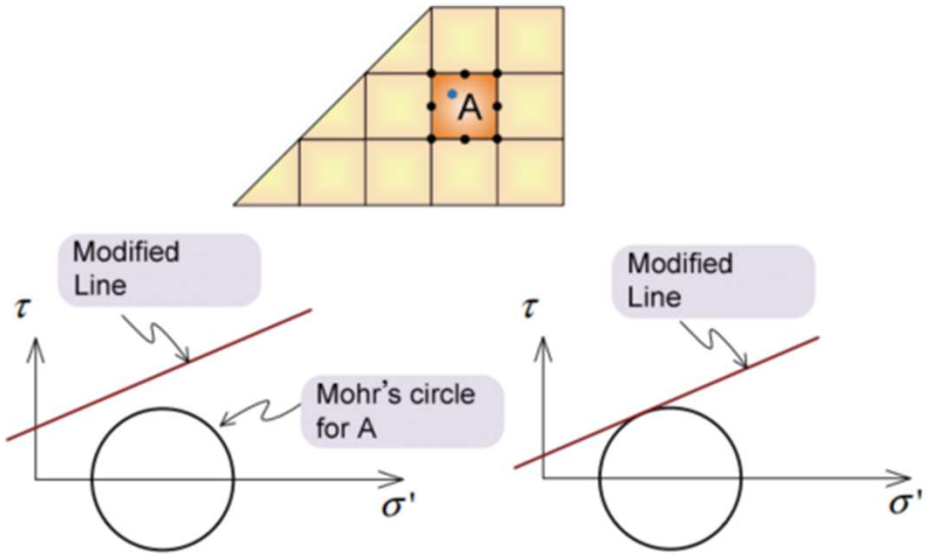
  ✓ SAM
  (Stress Analysis Method)



Overview



Fig, Limit Equilibrium Method



Fig, Strength Reduction Method

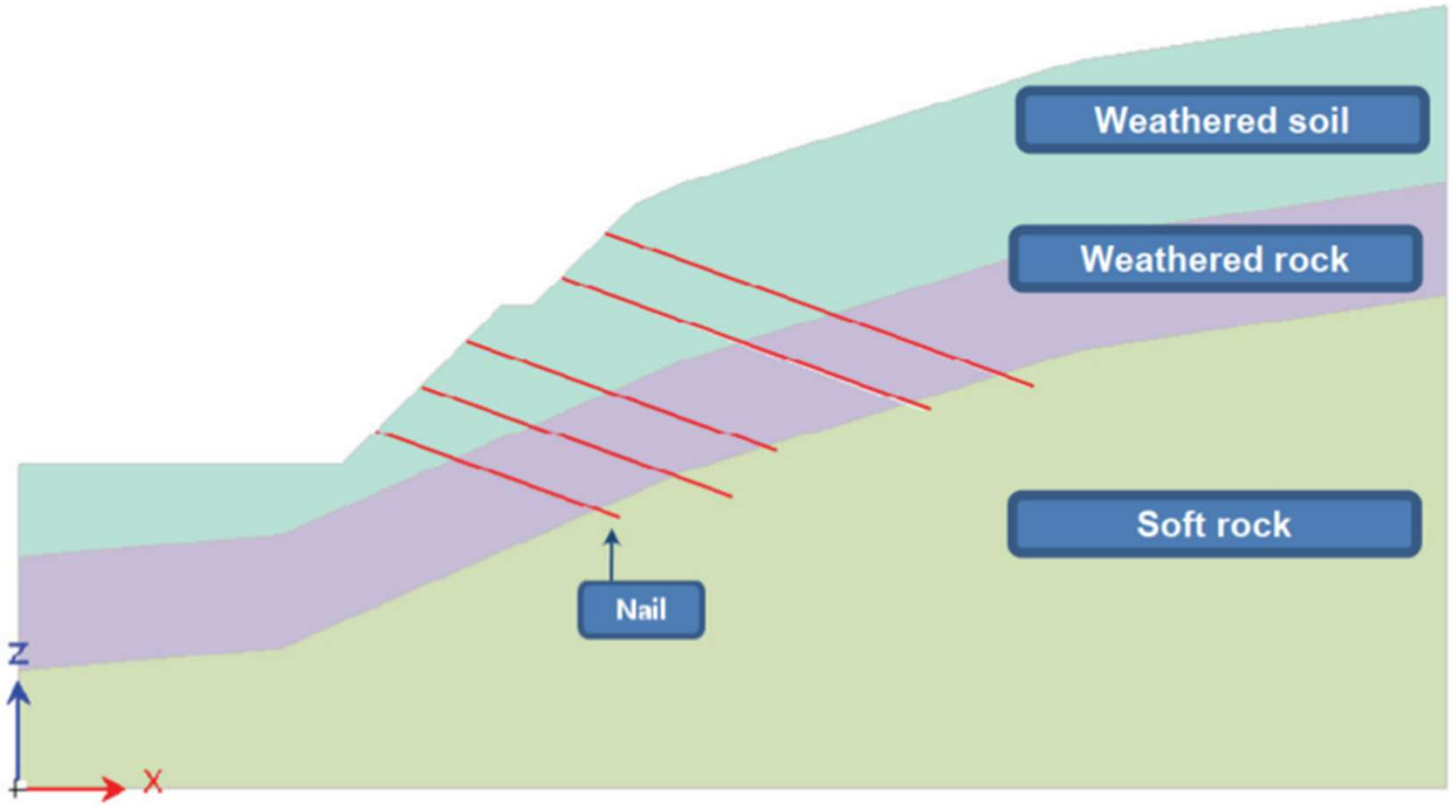
$$Fs = \frac{\sum_{n=1}^{n=p}(cb_n + W_n \tan\phi + \Delta T \tan\phi)\frac{1}{m}\alpha(n)}{\sum_{n=1}^{n=p}(\sin\alpha_n)}$$

where $m\alpha(n) = \cos\alpha_n + \frac{\tan\phi \cdot \sin\alpha_n}{F_s}$

W : Total weight of soil slices (tf/m³)
α : Angle of slope (degree)
C : Cohesion of soil (tf/m²)
b : Slice width (m)
ø : Internal angle of friction (degree)
ΔT : Tn - Tn+1

In SAM, based on the stress analysis results, safety factors for various sliding surfaces used in LEM are calculated.

Overview



Fig, Soil distribution

- Nailing can be assigned as '**Embedded truss**'
- Then, No need the same node **between soil & truss**

Property

▶ Ground properties

No	Ground Type	Model Type	Modulus of Elasticity (kN/m^2)	Unit Weight (kN/m^3)	Saturated Unit Weight (kN/m^3)	Poisson's Ratio	Cohesion (kN/m^2)	Internal Friction Angle (degree)
1	Weathered soil	Mohr Coulomb	36,500	18.5	19.5	0.33	17.5	31
2	Weathered rock	Mohr Coulomb	150,000	21	22	0.30	50	33
3	Soft rock	Mohr Coulomb	1,850,000	24	25	0.28	180	35.5
4	Weathered soil	Mohr Coulomb (LEM)	-	18.5	-	-	17.5	31
5	Weathered rock	Mohr Coulomb (LEM)	-	21	-	-	50	33
6	Soft rock	Mohr Coulomb (LEM)	-	24	-	-	180	35.5

▶ Structural properties

No	Structure Type	Model Type	Reinforcement Spacing (m)	Initial Diffusion Width (m)	Initial Diffusion Angle (deg)	Tensile Strength (kN)	Equivalent Radius (m)
1	Nail (LEM)	Nail (LEM)	2.0	1.0	10	115	0.05

No	Structure Type	Model Type	Horizontal Spacing (m)	Rebar Section Area (m^2)	Modulus of Elasticity (kN/m^2)	Poisson's Ratio	Unit Weight (kN/m^3)	Yield Strength (kN/m_2)
1	Nail	Embedded Truss	2.0	10	115	0.05	25	350,000

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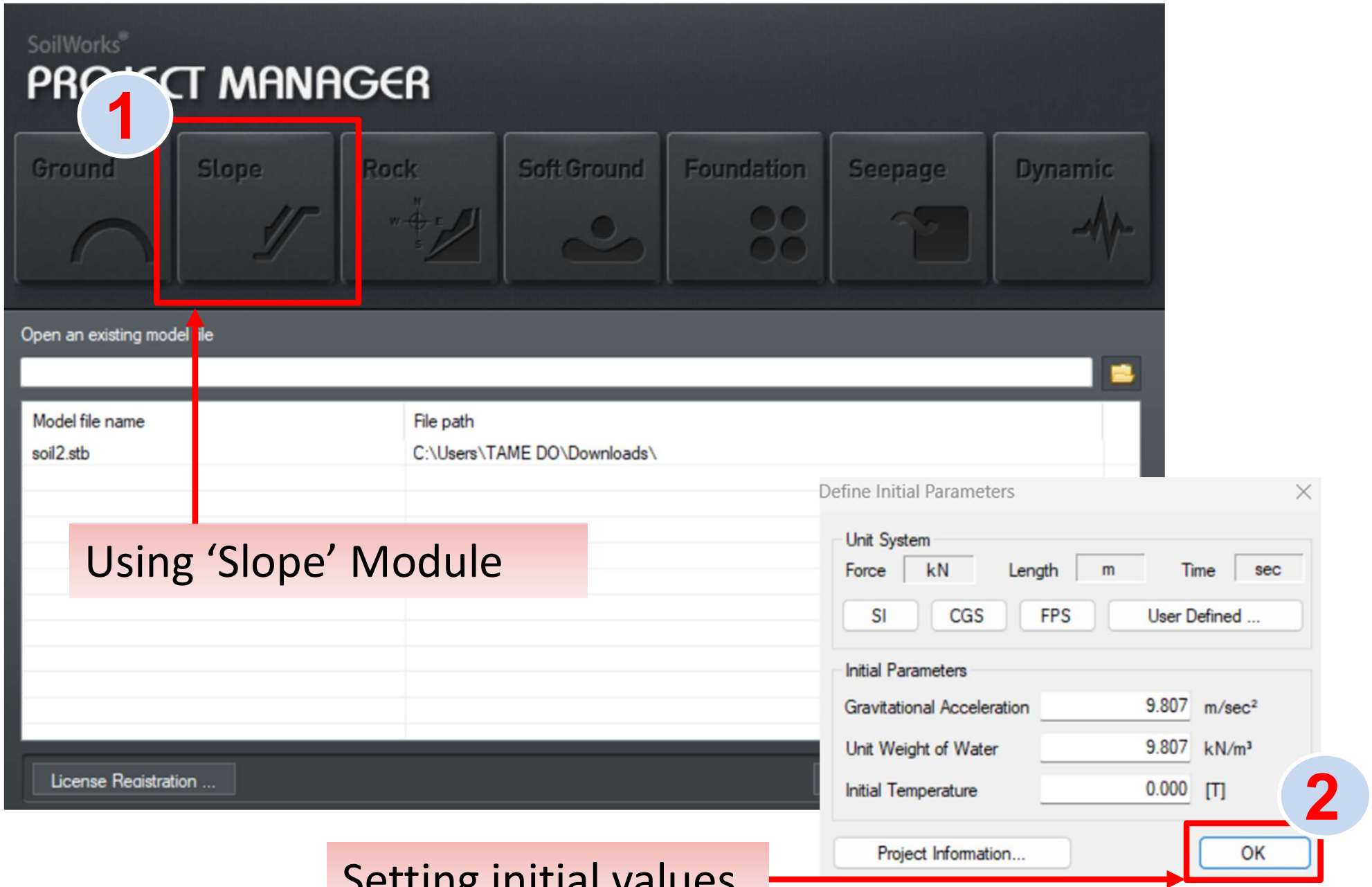
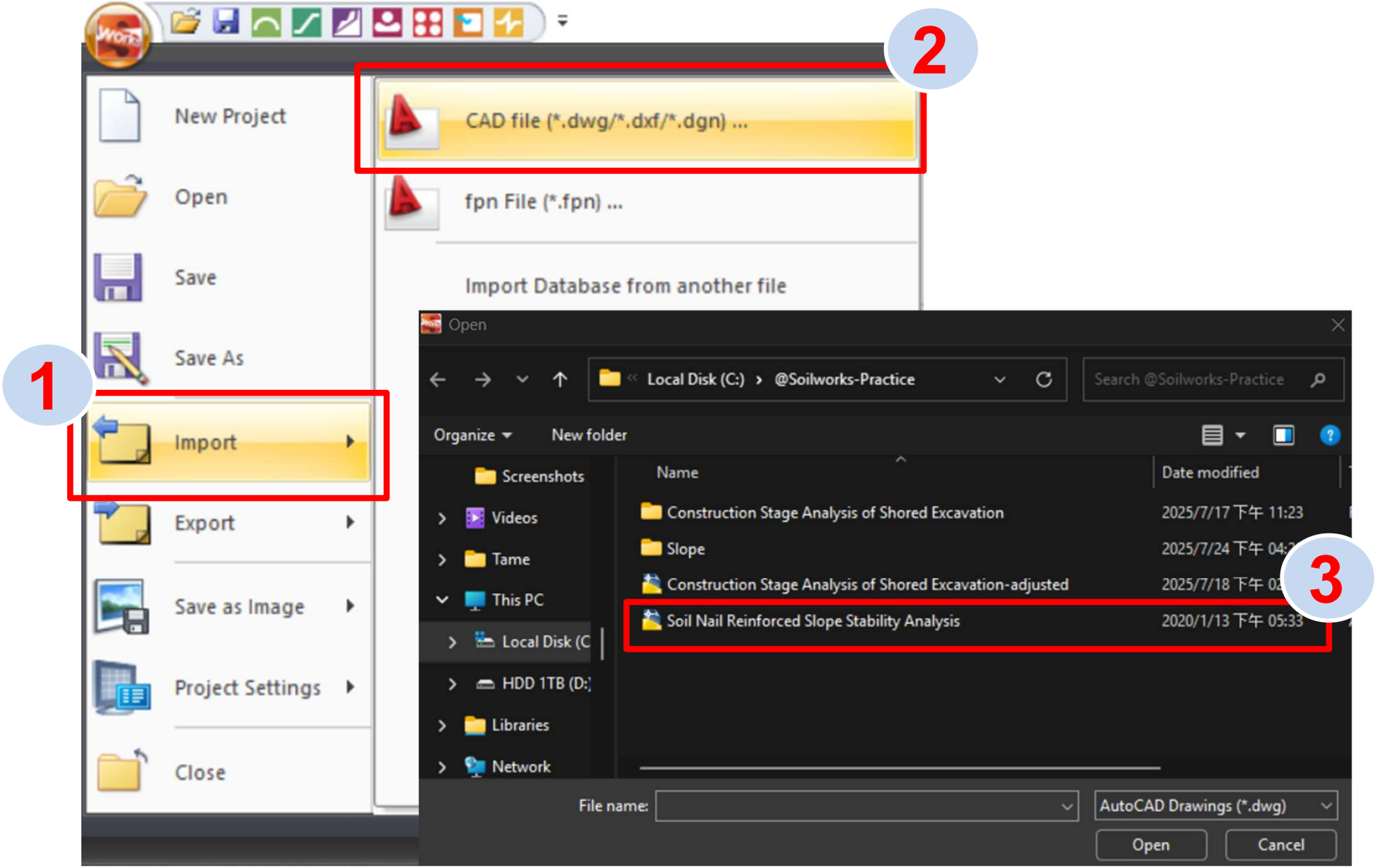
Start SoilWorks



Import File


1
2
3
New Project
Open
Save
Save As
Import
Export
Save as Image
Project Settings
Close
CAD file (*.dwg/*.dxf/*.dgn) ...
fpn File (*.fpn) ...
Import Database from another file
Open
Local Disk (C:) › @Soilworks-Practice
Search @Soilworks-Practice
Organize
New folder
Screenshots
Videos
Tame
This PC
Local Disk (C
HDD 1TB (D:)
Libraries
Network
Name
Date modified
Construction Stage Analysis of Shored Excavation
2025/7/17 下午 11:23
Slope
Construction Stage Analysis of Shored Excavation-adjusted
Soil Nail Reinforced Slope Stability Analysis
2020/1/13 下午 05:33
File name:
AutoCAD Drawings (*.dwg)
Open
Cancel

Define Ground Properties (SRM & LEM)

Define Ground Material Property

Data

ID	Name
1	Weathered Soil
2	Weathered R...
3	Soft Rock

6

General

ID 1 Name

Model Type: Mohr-Coulomb

General Parameters

Modulus of Elasticity (E)	20000000	kN/m²
Poisson's Ratio (υ)	0.3	
Temperature Coeff. (α)	1E-06	
Unit Weight (Yt)	20	kN/m³
Saturated Unit Weight	21	kN/m³
Cohesion (c)	30	kN/m²
Internal Friction Angle (Φ)	36	[deg]
Earth Pressure Coeff. (Ko)	1	
Draining Condition	Drained	

Additional Parameters

Variation in Modulus of Elasticity	0	kN/
Variation in Cohesion	0	kN/
Reference Height	0	m
Dilatancy Angle (Ψ)	36	[deg
Tensile Strength	2000	kN/m²

1

Ground Material Property

Ground Material Database

Database: 1.1 Schist#1

3

Select All | Unselect All

No.	Soil Type	Modulus of Elasticity (kN/m²)	Unit Weight (kN/m³)	Saturated Unit Weight (kN/m³)	Poisson's Ratio	Cohesion (kN/m²)	Internal Friction Angle ([deg])	Select
1	Landfill Layer	13000	18	19	0.33	0	27	
2	Alluvial Layer	8000	17	18	0.35	15	20	
3	Weathered Soil	36500	18.5	19.5	0.33	17.5	31	☑
4	Weathered Rock	150000	21	22	0.3	50	33	☑
5	Soft Rock	1850000	24	25	0.28	180	35.5	☑
6	Hard Rock	17500000	26	27	0.23	1750	40.5	☐

4

2

Database ...

Reset | Save | Model Type: Mohr-Coulomb | Assign | Close

5

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Mohr-Coulomb (LEM) for LEM analysis

Part 2: Strength Reduction Method (SRM)

Define Strutural Properties

1

General
ID 1
Name Nail
Element Type Embedded Truss
Standard NONE
Horizontal Spacing 2

2

Section
Shape Rebar
Tapered Section
Sub-Shapes U Type

3

Section User Defined
Section-2 User Defined

Material
Material Type Rebar
Concrete User Defined
RebarGrade User Defined

4

Section Data | Material Data
Section | Section-2 | Stiffn

5

Stiffness
Area 0.000642 m²

6

Section Data | Material Data
User Defined | Rebar

7

Properties		
Modulus of Elasticity	200000000	kN/m²
Poisson's Ratio	0.3	
Unit Weight	77	kN/m³
Thermal Coefficient	0.0000055	
Design Strength		
Yield Strength	350000	kN/m²

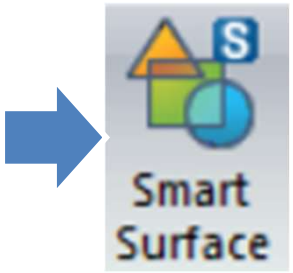
Define: ‘Pile Property’

8

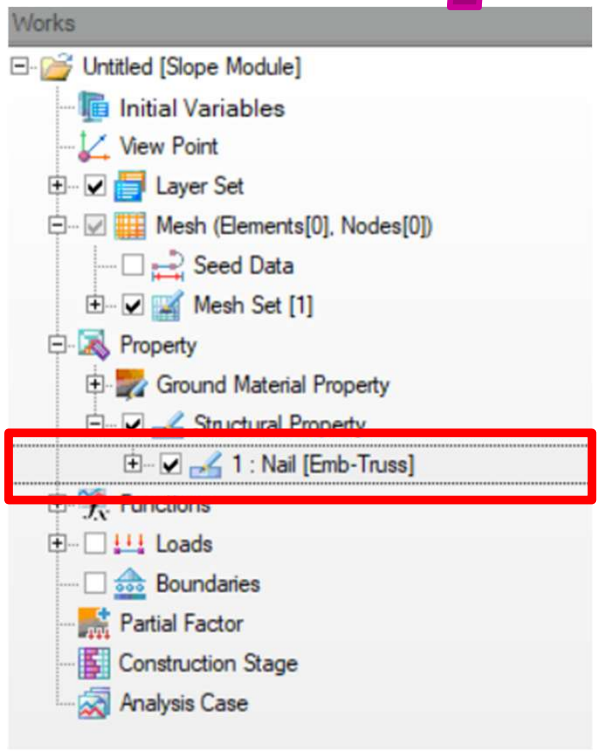
Add | Modify | Delete | Close

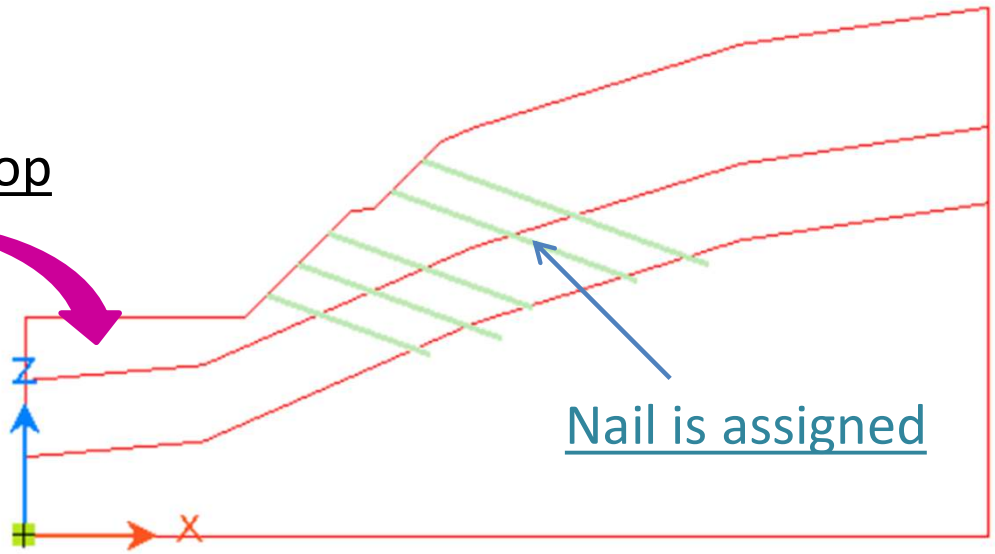
MIDAS

Embedded truss

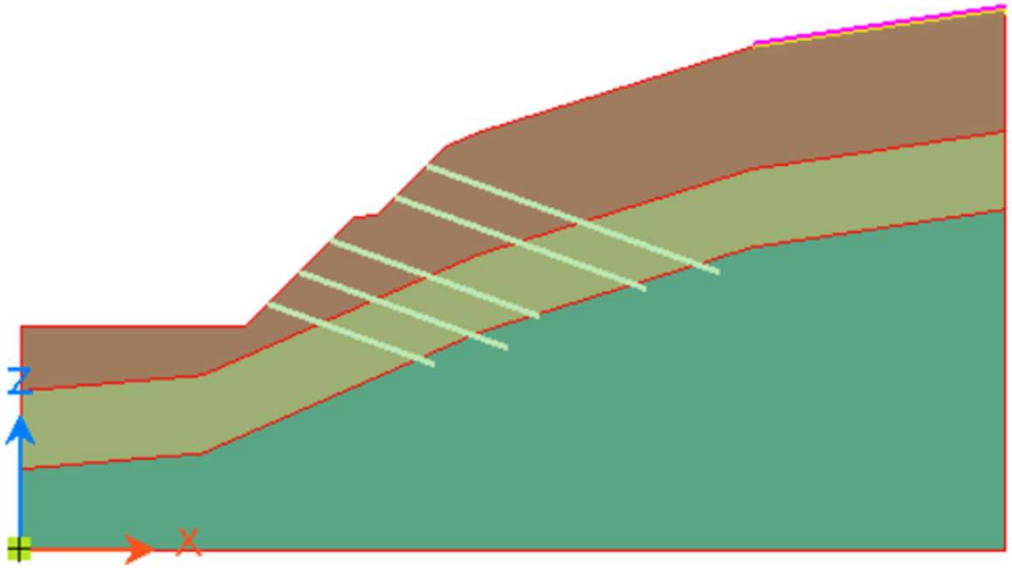


Drag & Drop



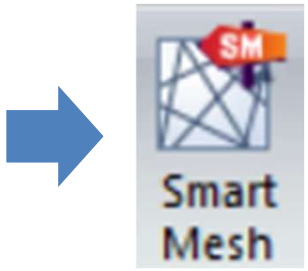


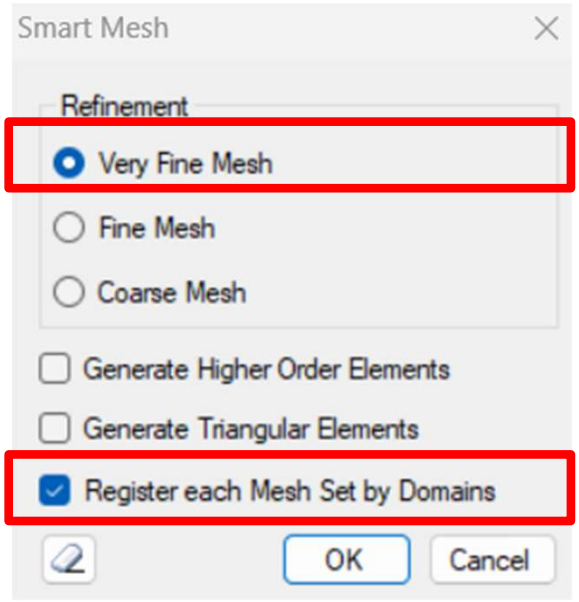
Fig, Assigning 'Embedded truss'

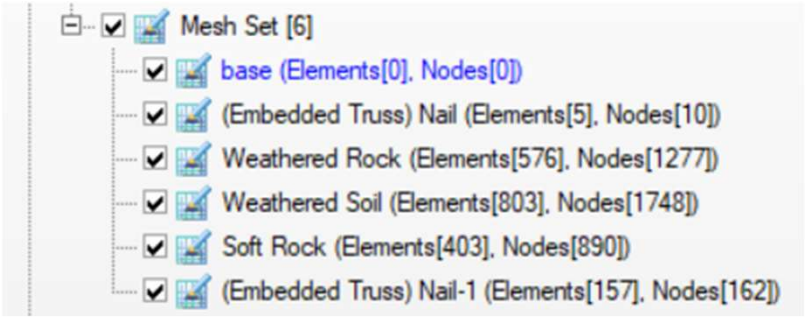


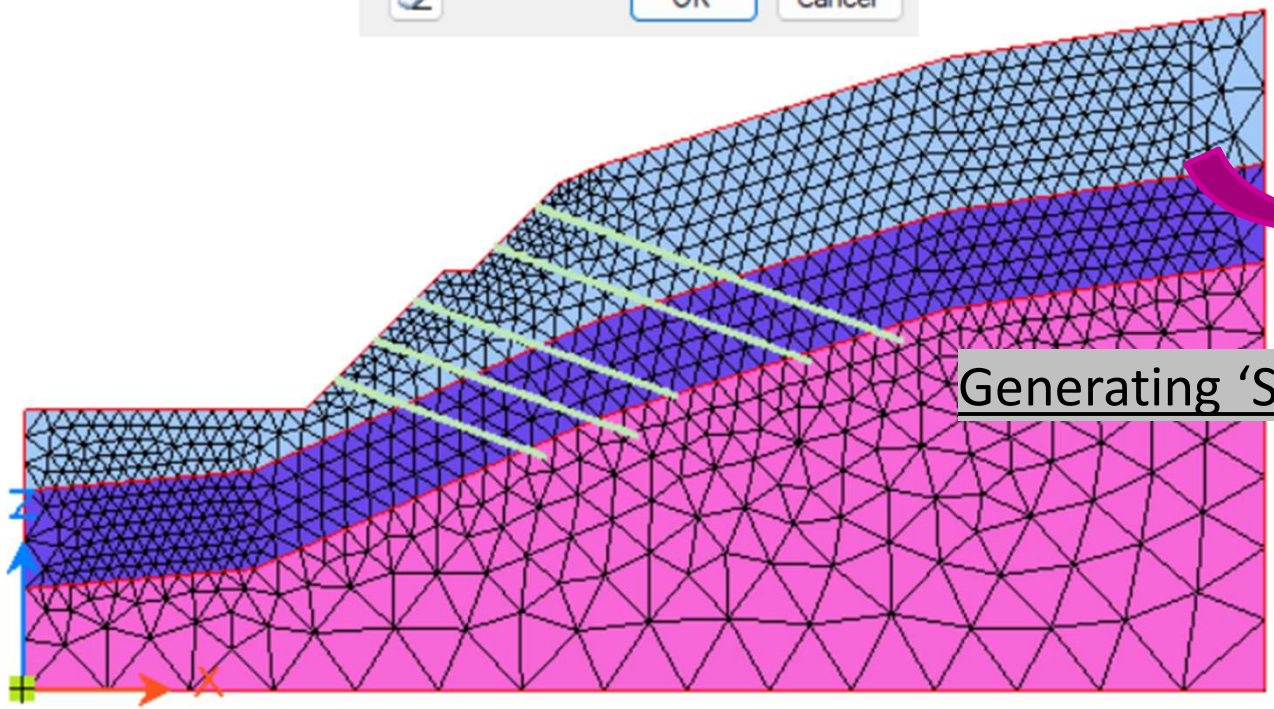
Fig, Assigning 'Smart surface'

Smart Mesh



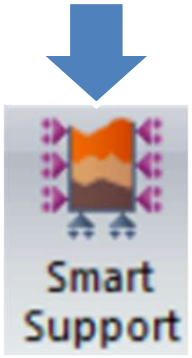


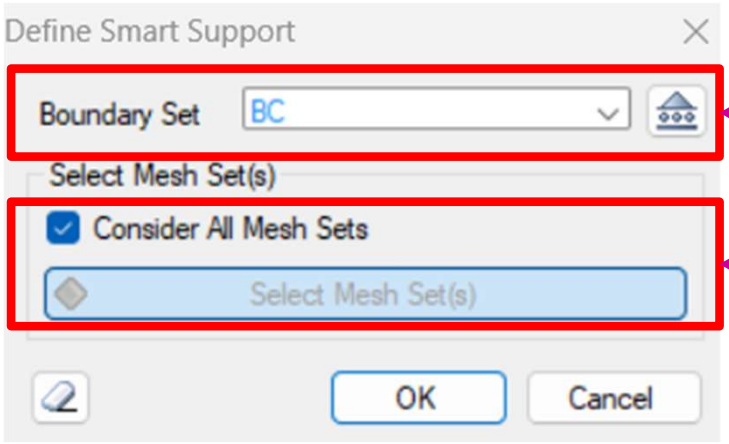




Generating ‘Smart Mesh’ automatically

Smart Support

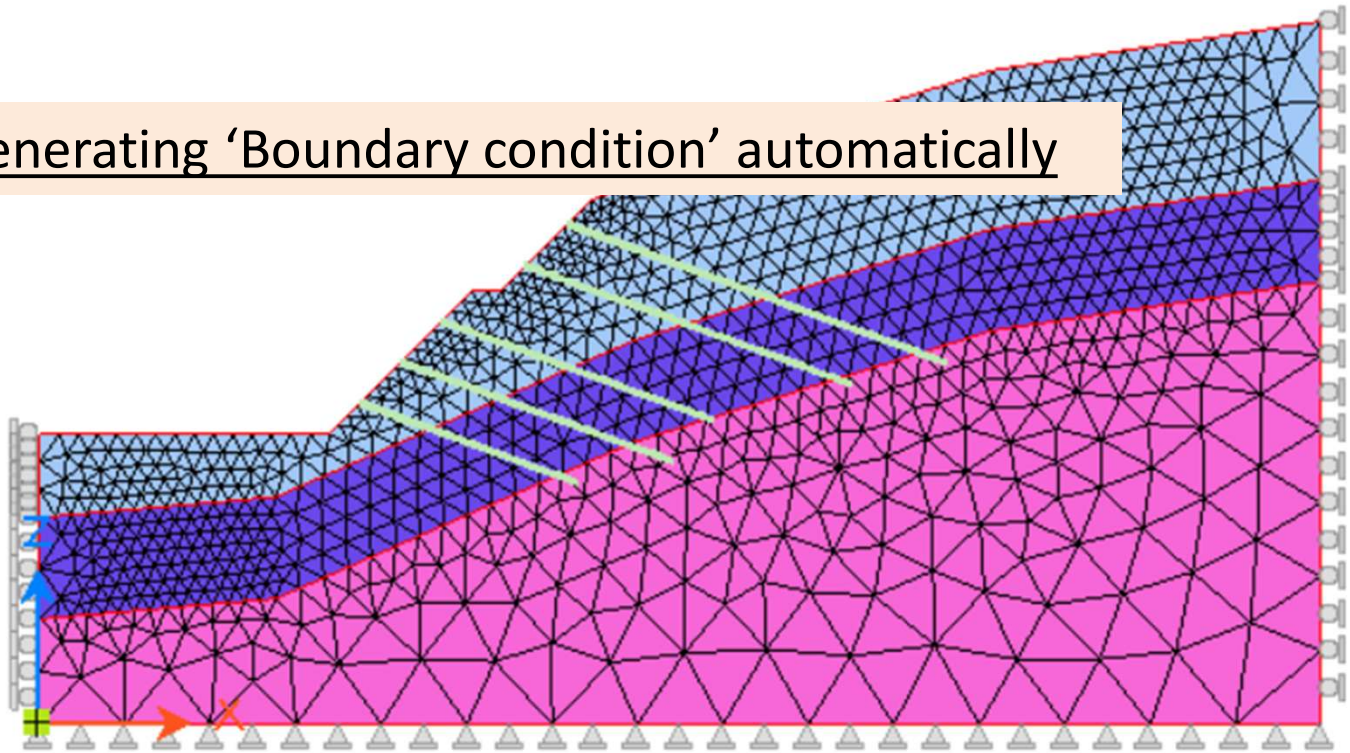




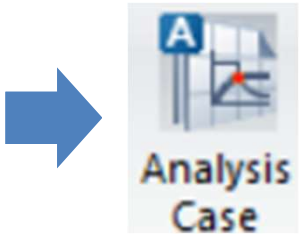
Naming for boundary set

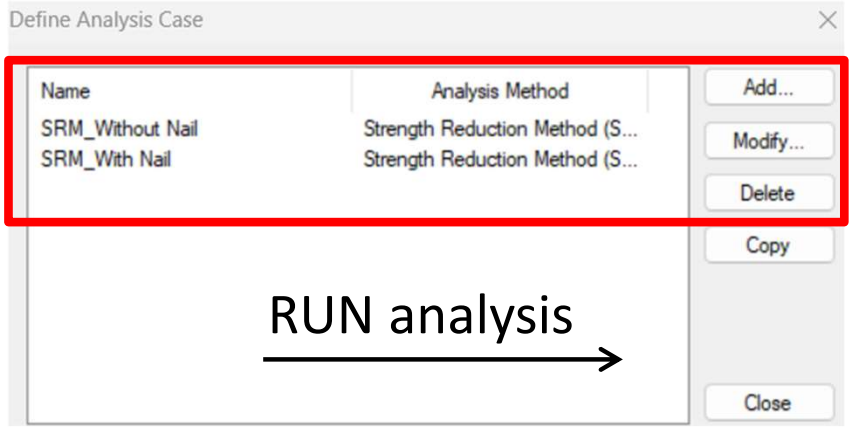
Considered all mesh sets

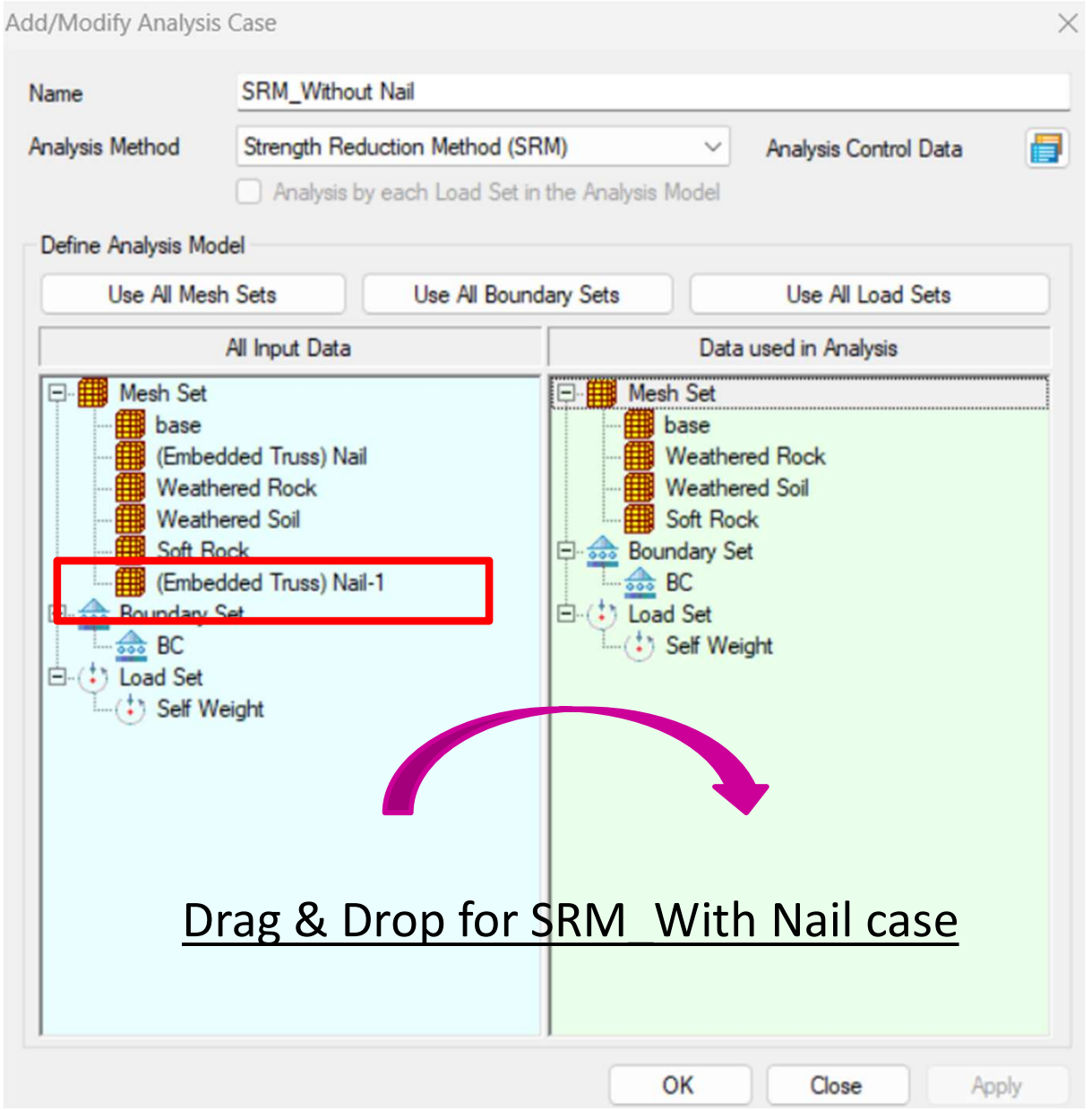
Generating 'Boundary condition' automatically



Analysis Setting

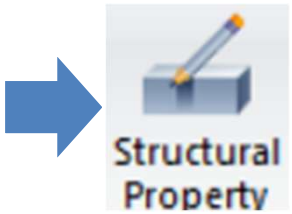






Part 3: Limit Equilibrium Method (LEM)

Define Strutural Properties



Define: ‘Pile Property’

Define Structural Property

Data

ID	Name
1	Nail (LEM)

General

ID 2

Name Nail (LEM)

Element Type Nail (LEM)

Stiffness

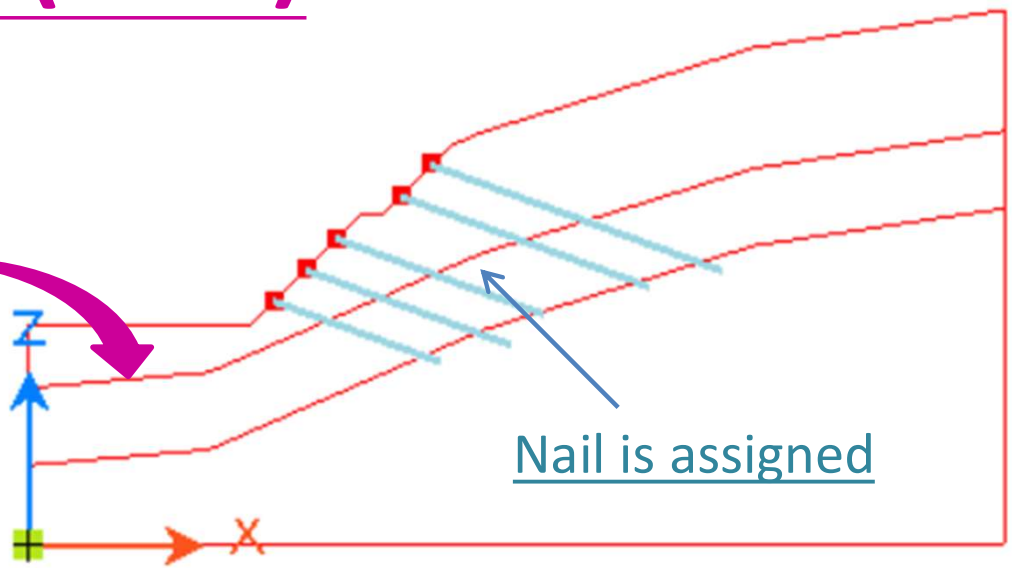
General		
Spacing	2	m
Initial Diffusion Width	1	m
Initial Diffusion Angle	10	[deg]
Adjust Reinf. Effect by FS	Independent	
Reinforcement Load		
Tensile Force	115	kN
Tension/Shear Application Method	Nail	
RCS calculation from qs		
Equivalent Radius	0.05	m
Pullout Force		kN/m
Shear Force	50	kN
Shear Force Function	None	...

Reset Add Modify Delete Close

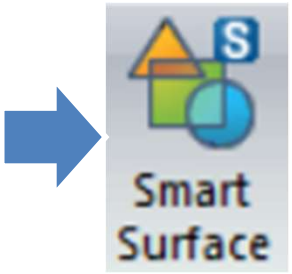
1 2 3

Nail (LEM)

Drag & Drop

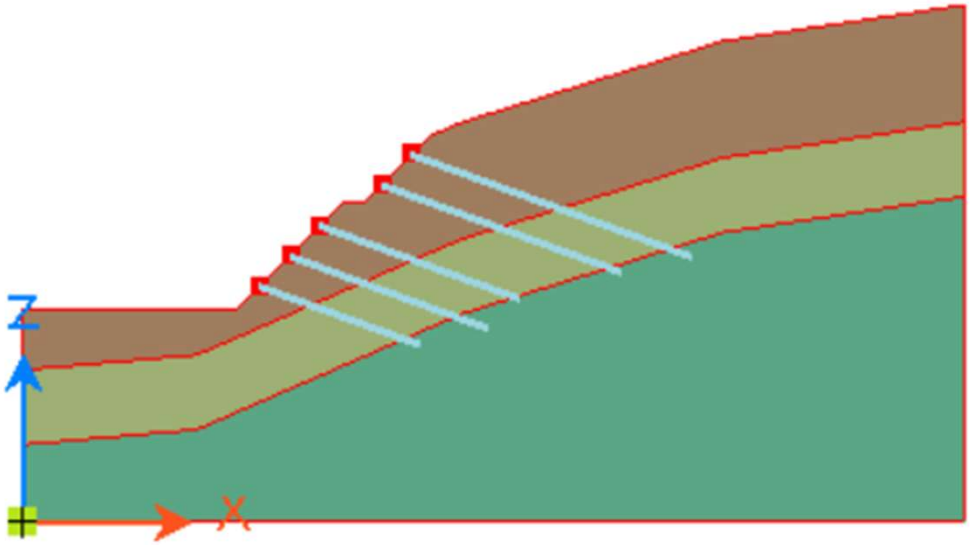


Fig, Assigning 'Embedded truss'



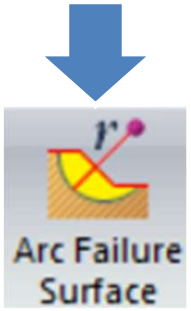
Nail (LEM) is available in SoilWorks

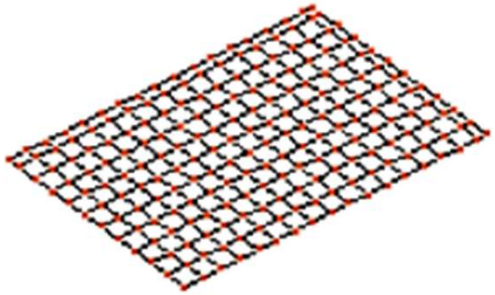
No mesh is required



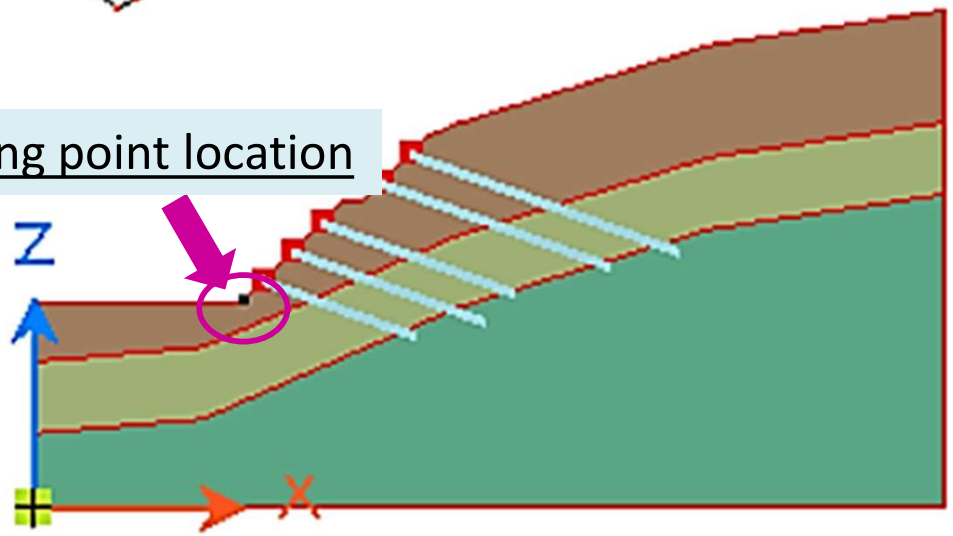
Fig, Assigning 'Smart surface'

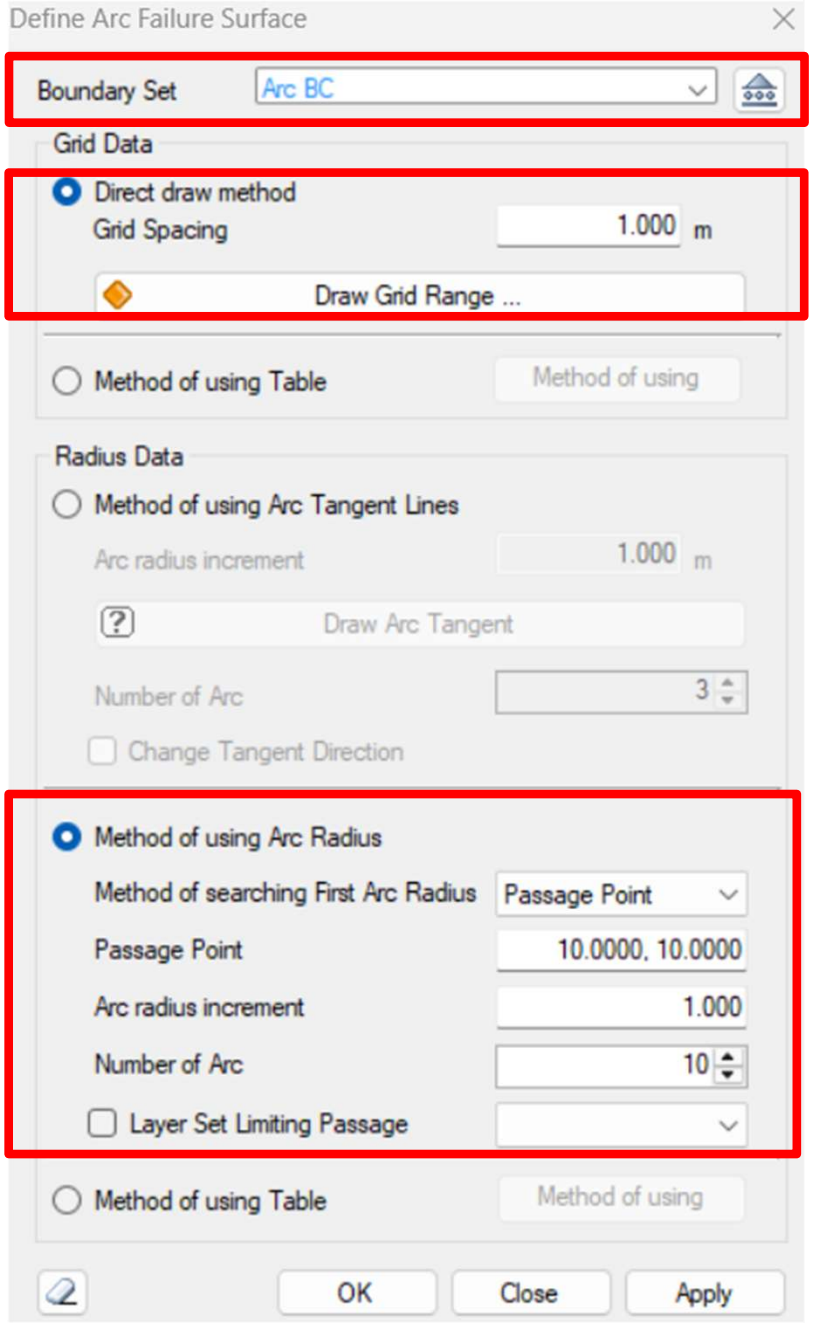
Arc Support



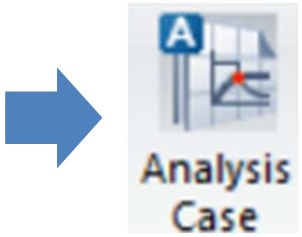


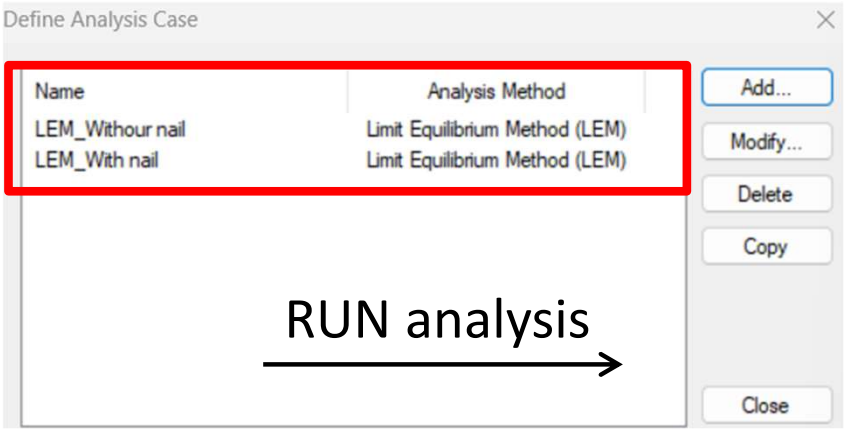
Passing point location

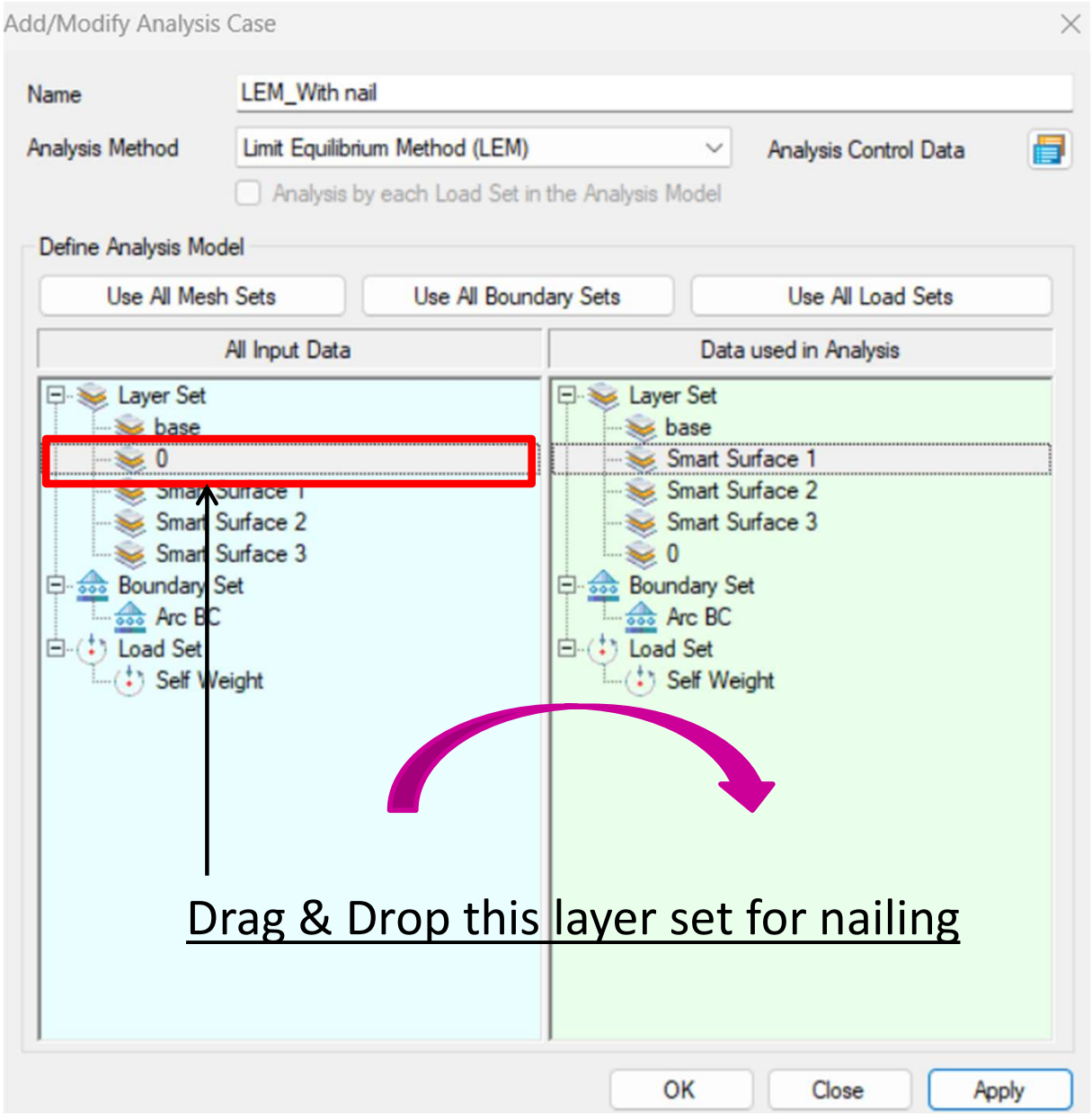




Analysis Setting

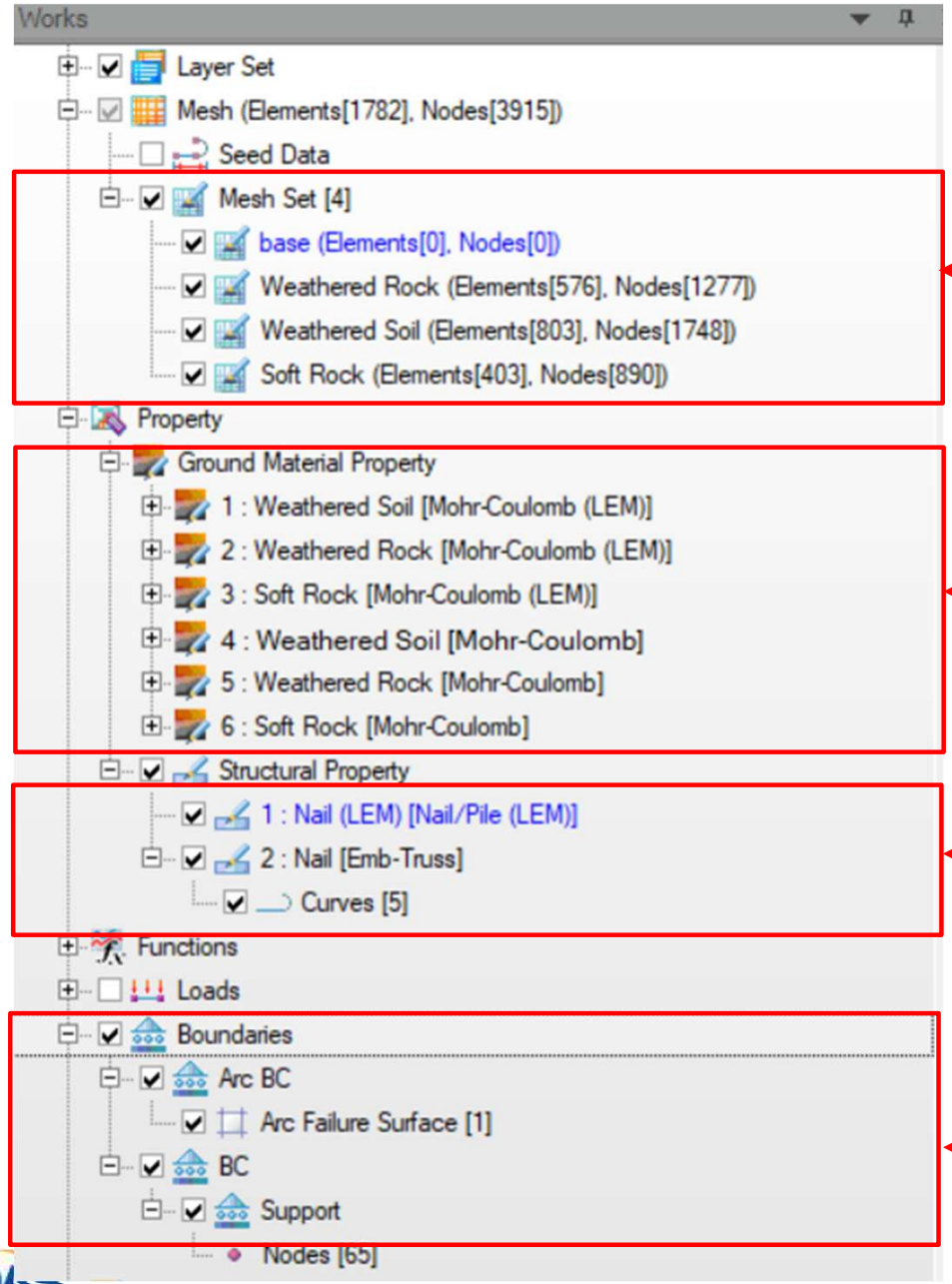






Part 4: Stress Analysis Method (SAM)

Required Assignment in SAM



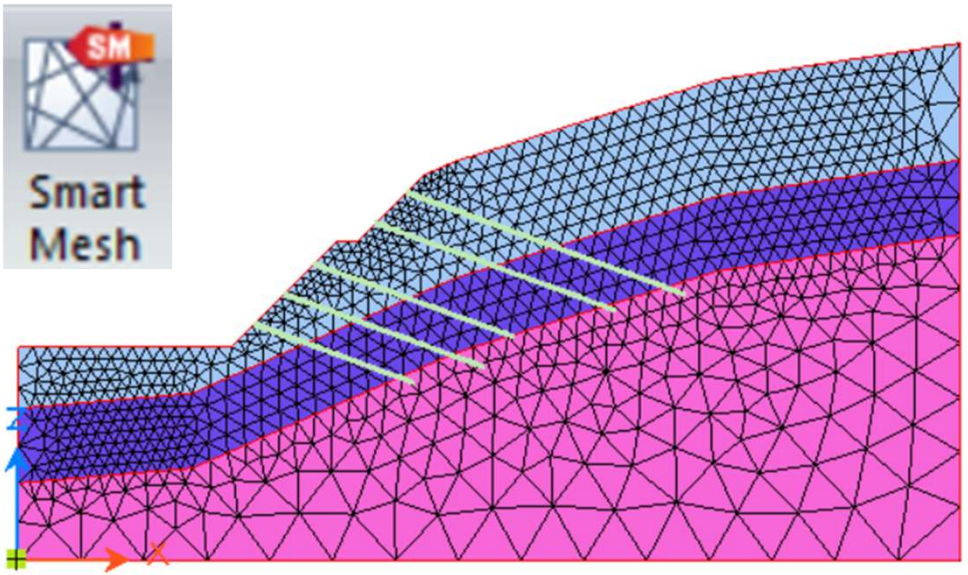
Mesh generation is required

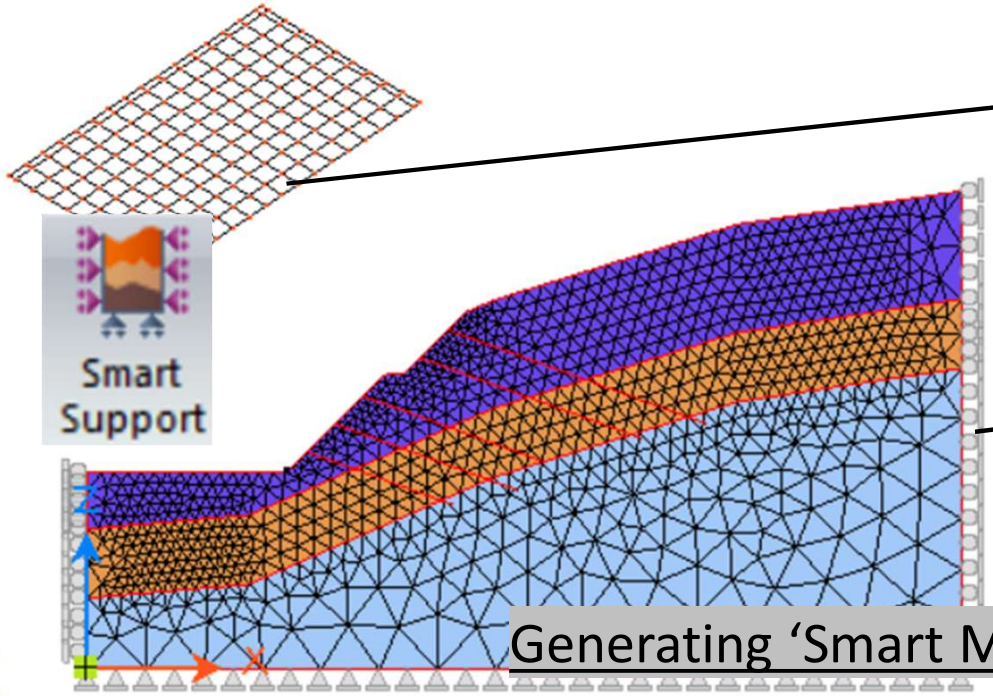
Material Property as Mohr-Coulomb SRM model is only required

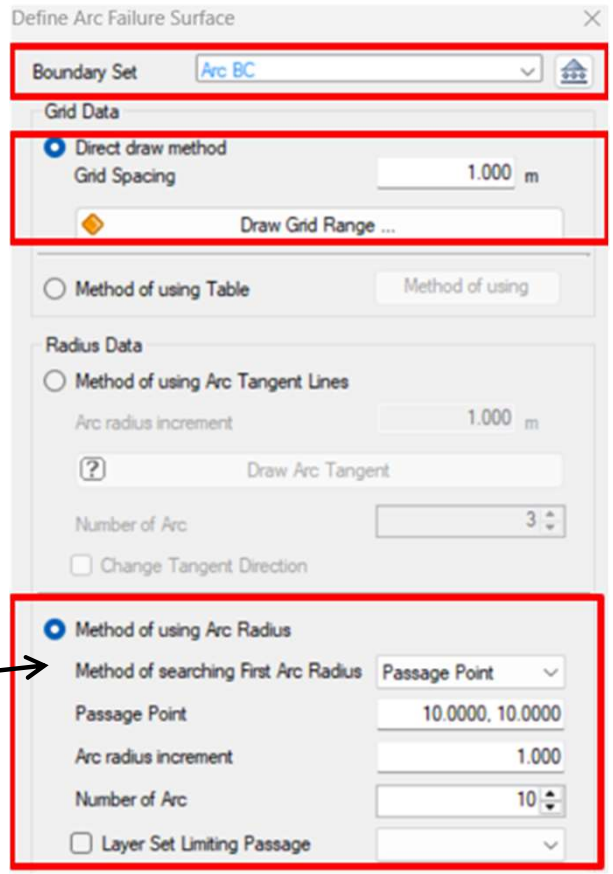
Nail for SRM is only required

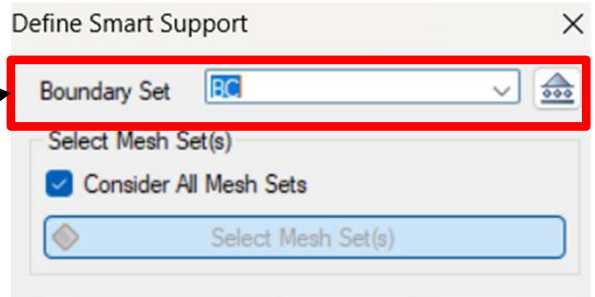
Arc & Normal BC are required

Smart Mesh + Smart Support



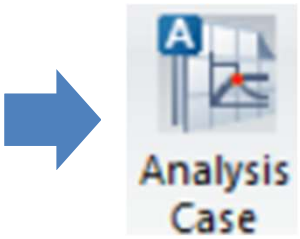


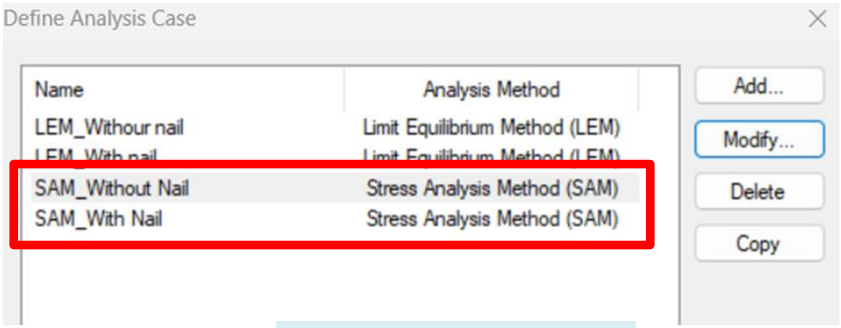




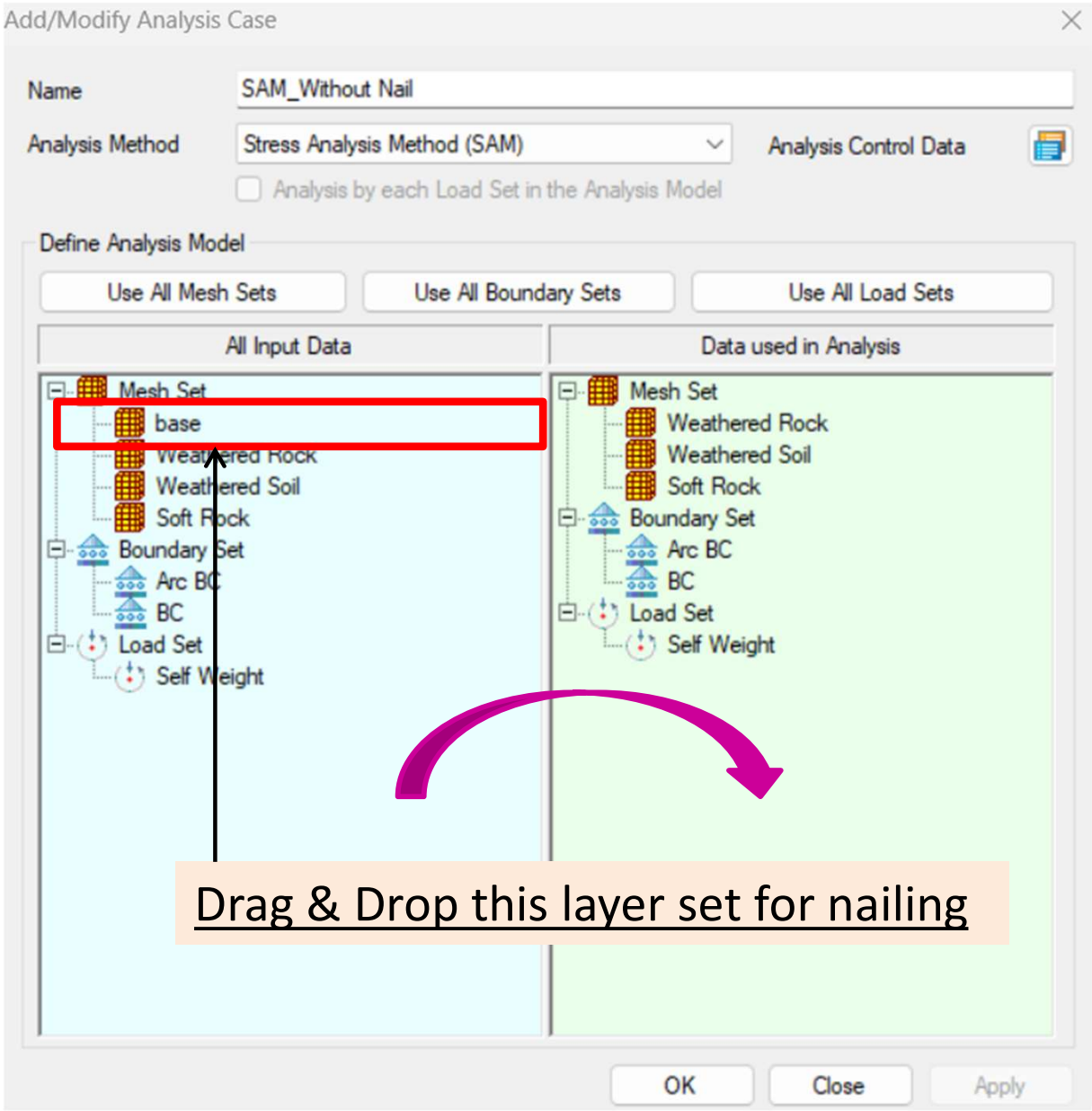
Generating ‘Smart Mesh and Smart Support’ automatically

Analysis Setting



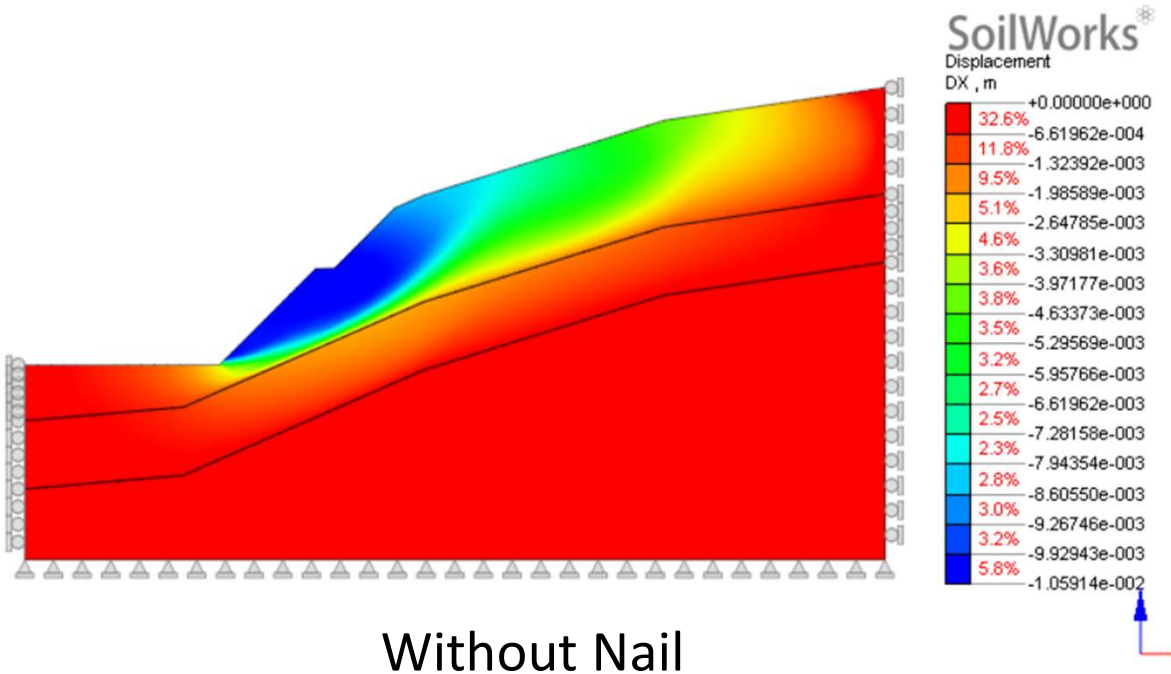


RUN analysis



Part 5: Results and discussion

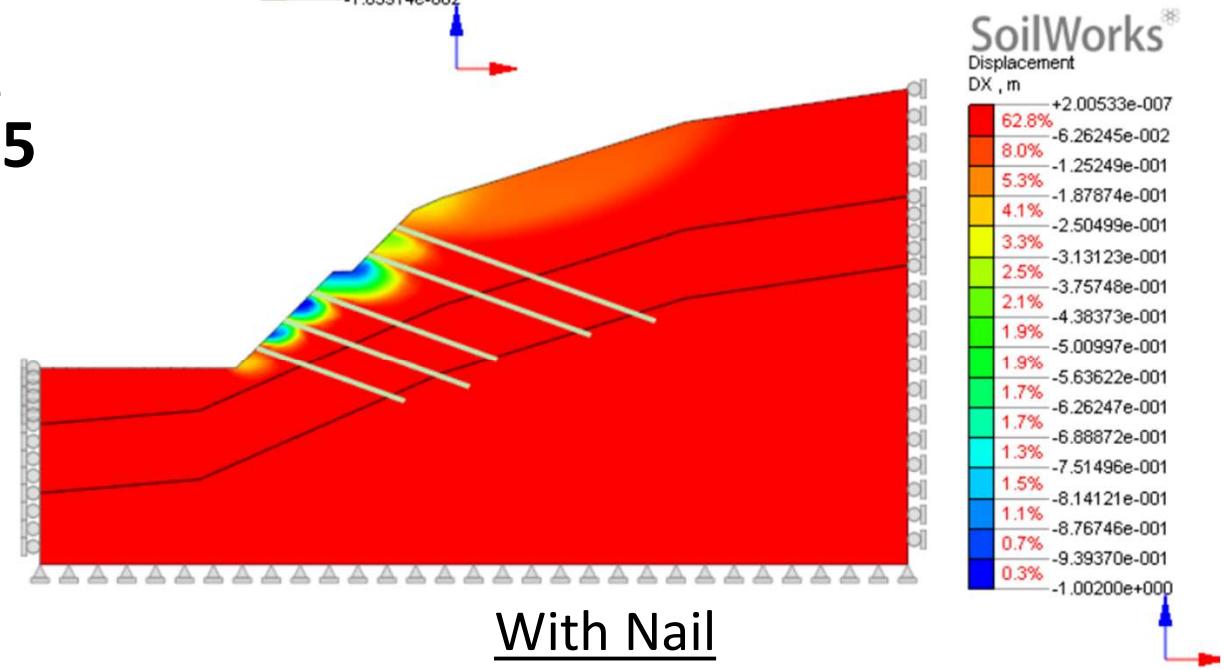
Results – Horizontal Displacements (SRM)



Horizontal displacement

Without Nail

FOS = 1.8375

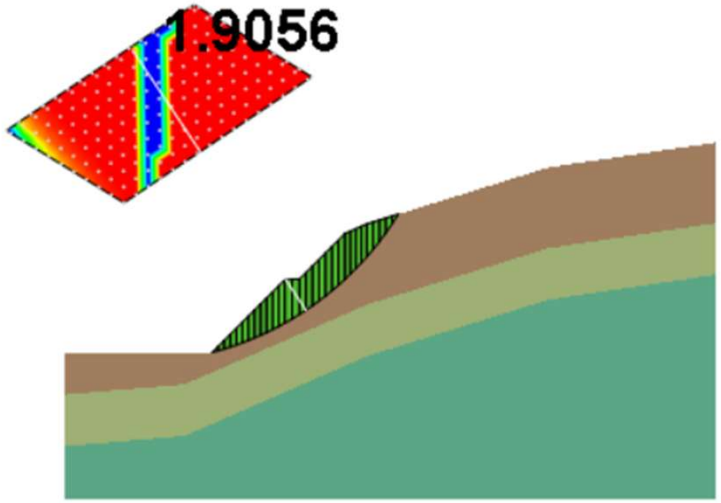


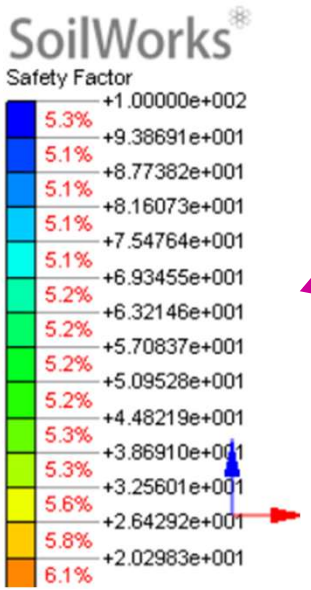
Horizontal displacement

With Nail

FOS = 3.5875

Results – Horizontal Displacements (LEM)



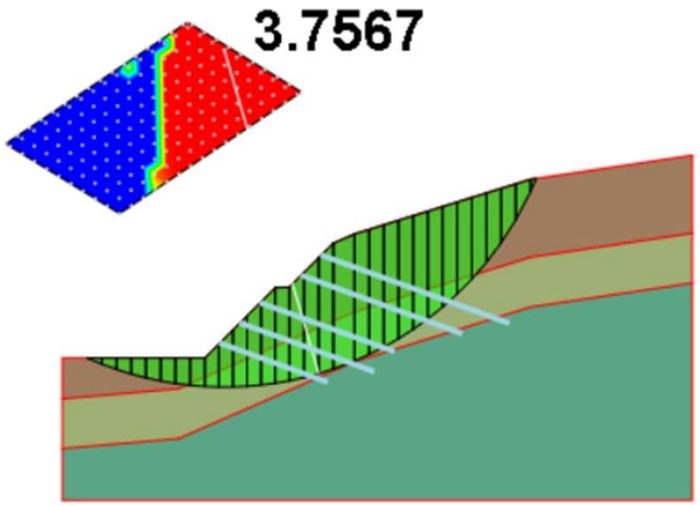


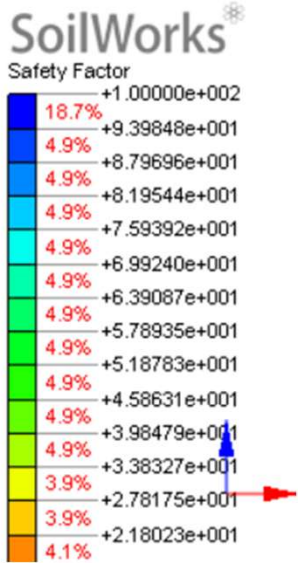
LEM-Without Nail

Without Nail

FOS = 1.9056

LEM-With Nail



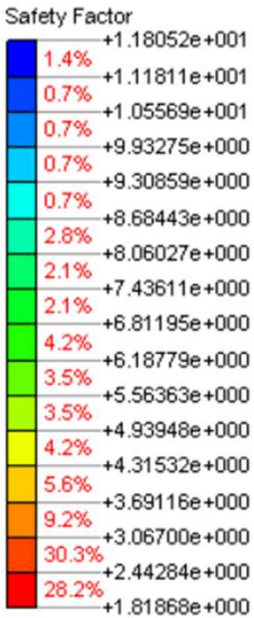


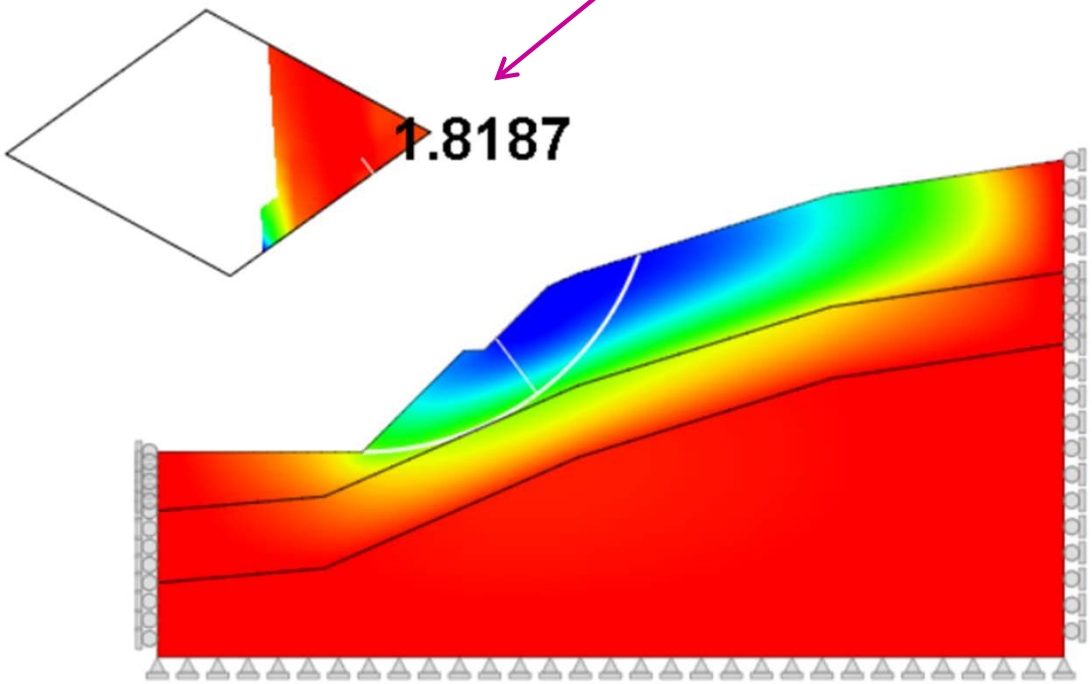
With Nail

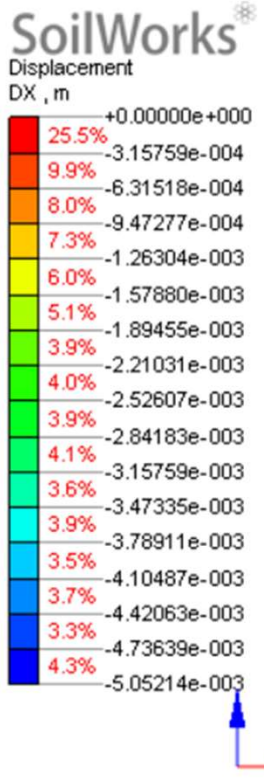
FOS = 3.7567

Results – Horizontal Displacements (SAM)

SAM-Without Nail



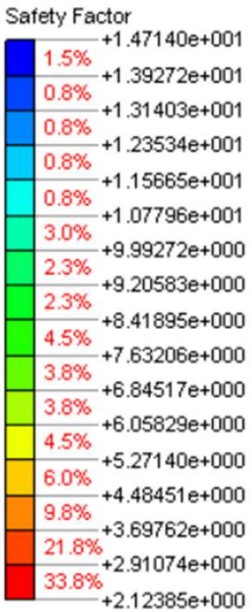


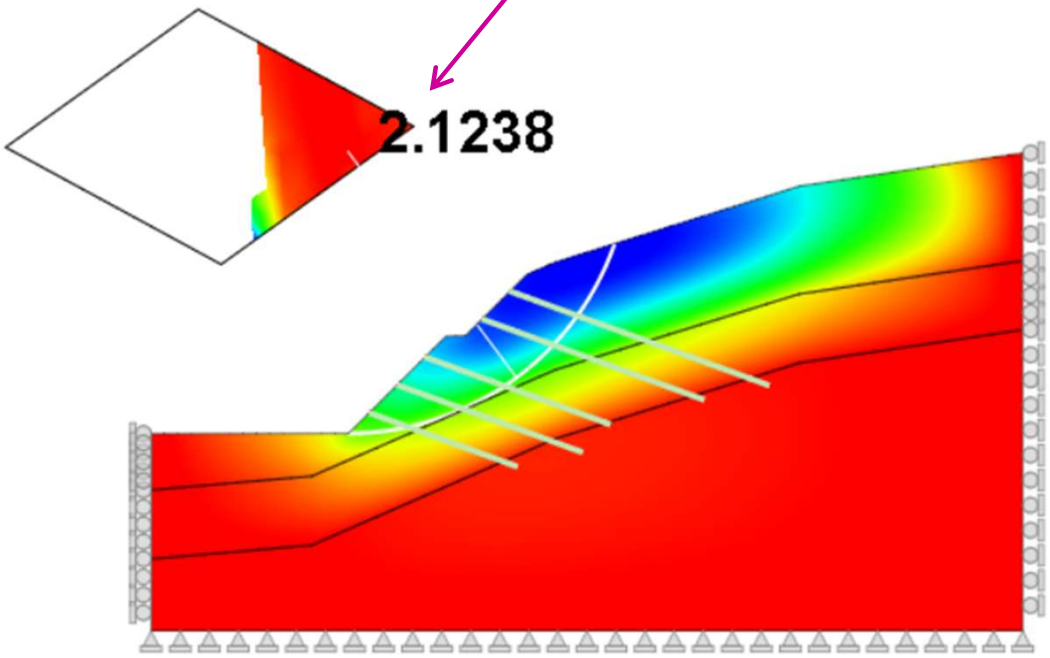


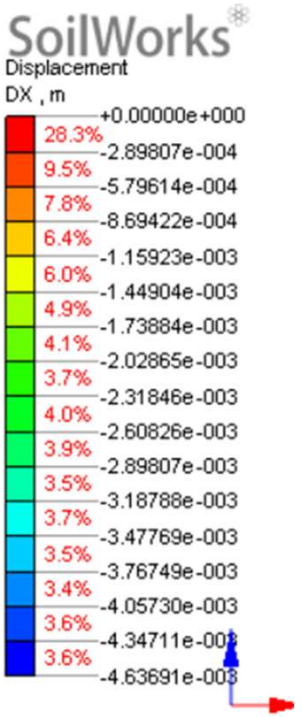
Without Nail (SAM)		Without Nail (SRM)		Without Nail (LEM)
FOS = 1.8187	**<**	**FOS = 1.8375**	**<**	**FOS = 1.9056**

Results – Horizontal Displacements (SAM)

SAM-With Nail

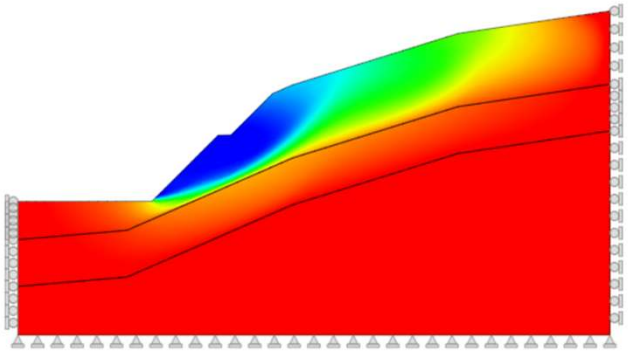


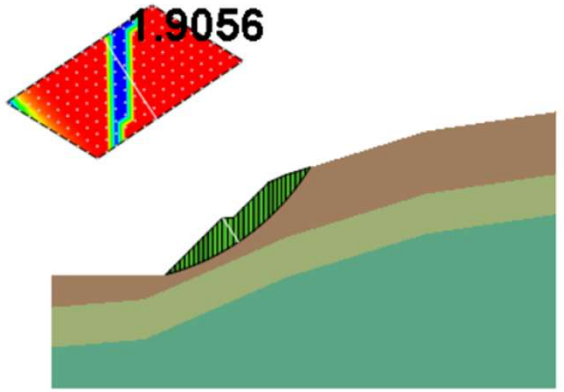


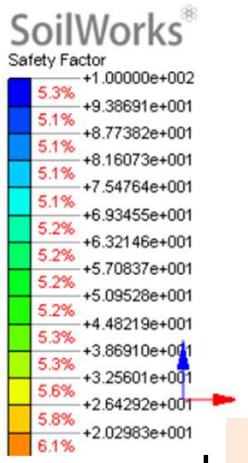


With Nail (SAM)		With Nail (SRM)		With Nail (LEM)
FOS = 2.1238	**<**	**FOS = 3.5875**	**<**	**FOS = 3.7567**

SRM & LEM Comparison







Increased by 48.78%

Without Nail

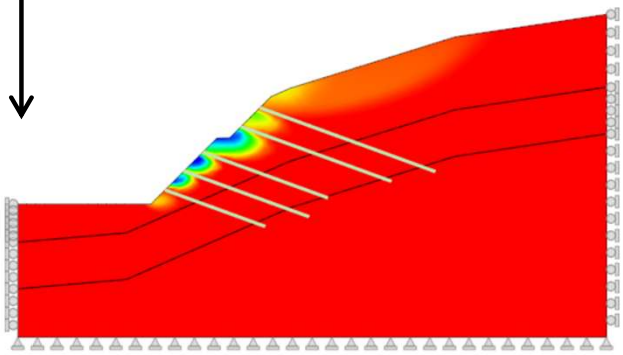
FOS = 1.8375

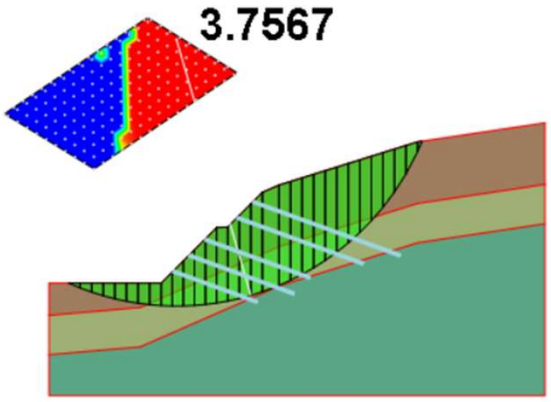
Increased by 3.57%

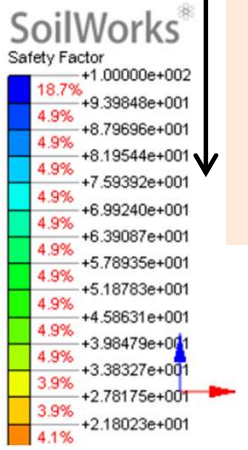
Without Nail

FOS = 1.9056

Increased by 49.27%







With Nail

FOS = 3.5875

Increased by 4.50%

With Nail

FOS = 3.7567

MIDAS


Thank you!