

midas CIM

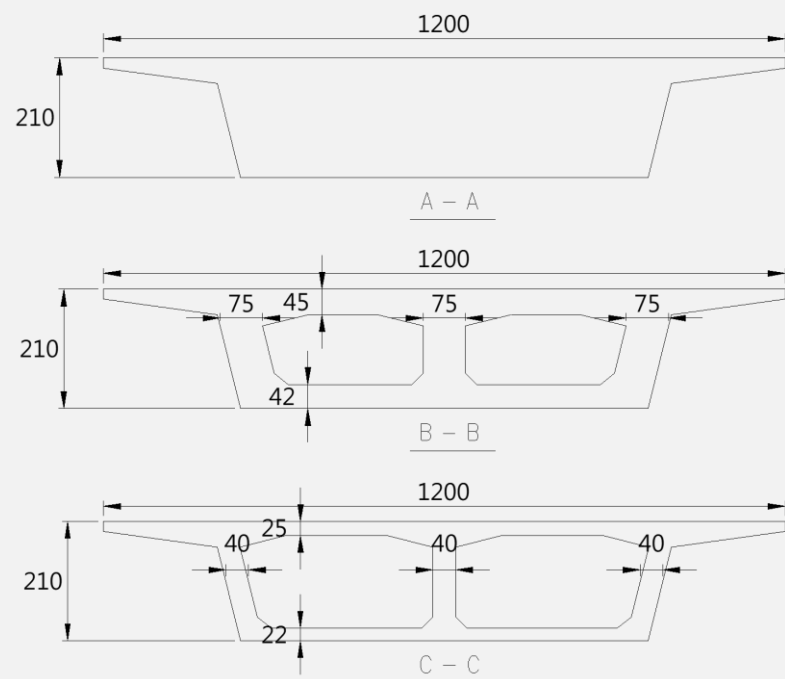
三跨連續箱型梁橋操作例題 (單箱雙室PSC)

主梁 - PSC 箱梁

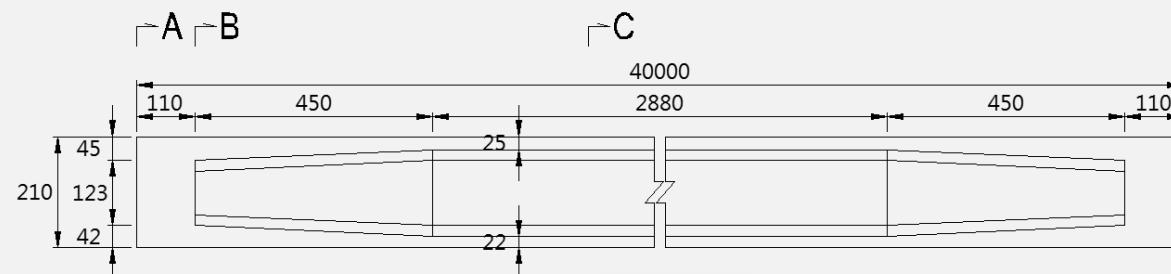
跨徑：40m x 3

箱室數量：單箱雙室

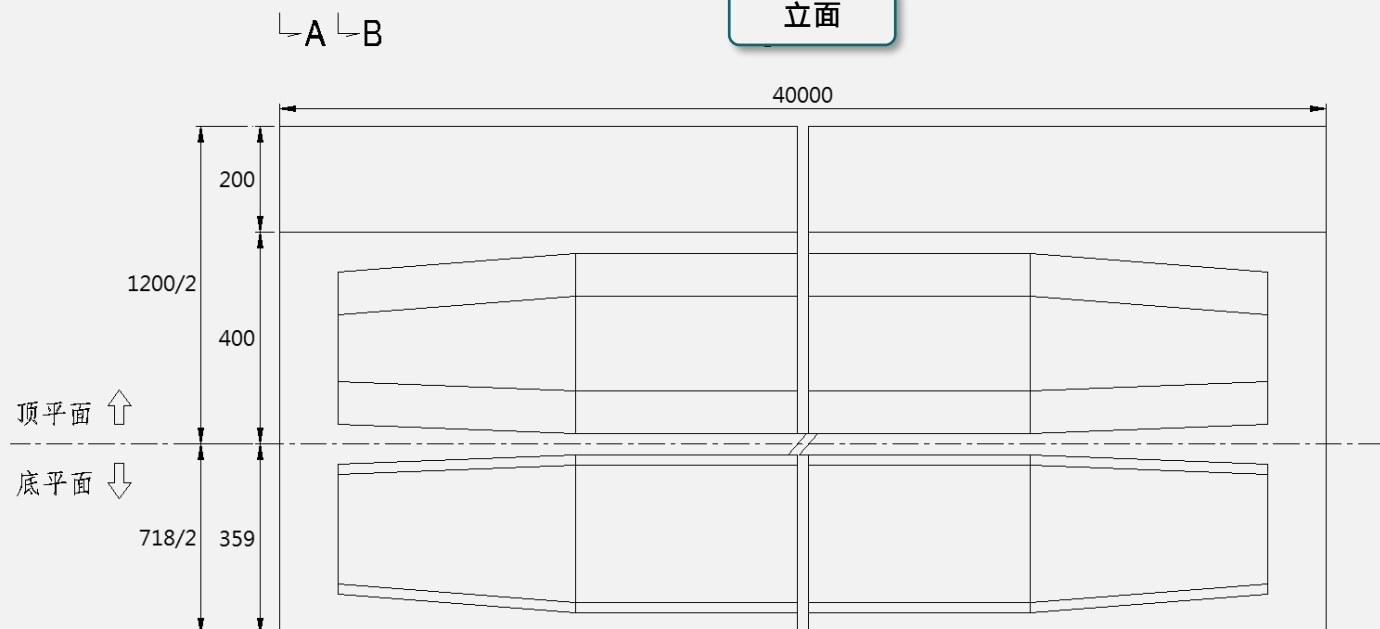
梁頂寬：12m 梁高：2.1m



斷面 (cm)



立面



平面

中間墩 – 雙柱柱式墩

直徑：1.4m

基礎：樁柱式

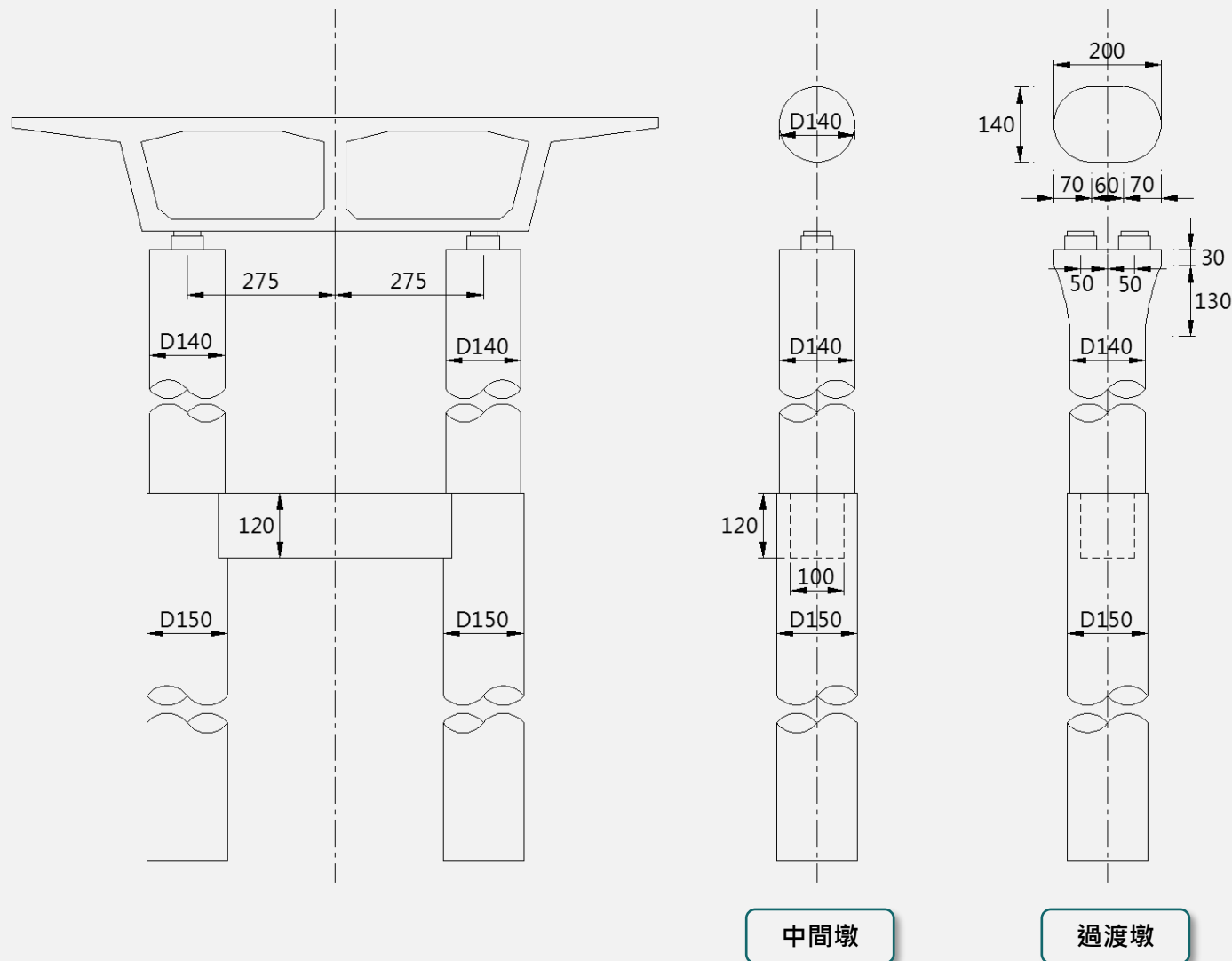
樁基直徑：1.5m

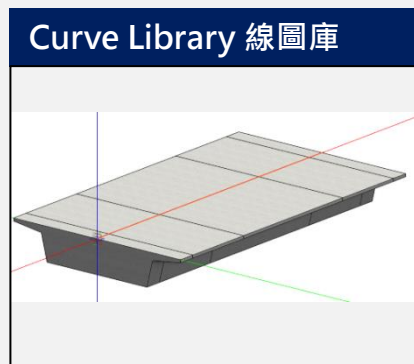
過渡墩 – 擴頭雙柱柱式墩

直徑：1.4m 擴頭寬度2m

基礎：樁柱式

樁基直徑：1.5m

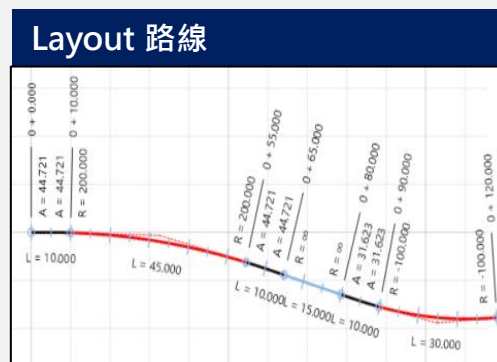
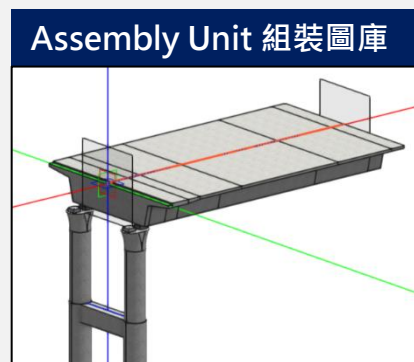
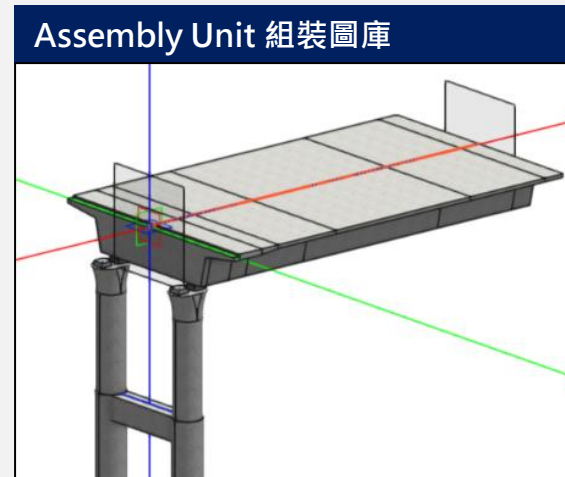




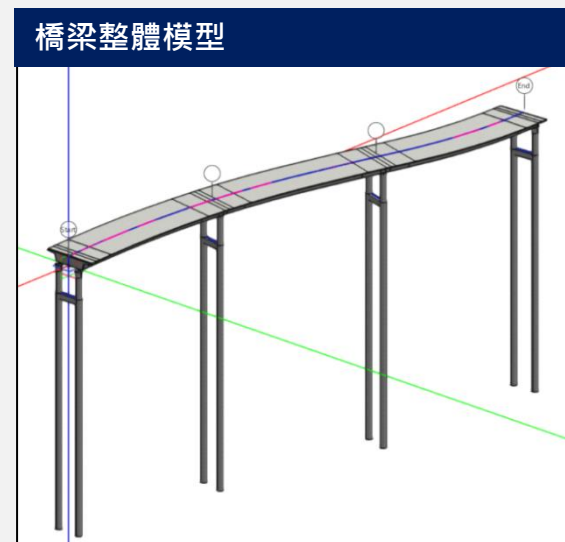
線形隨路線變化的構件
(Ex:上部結構、護欄)



根據參考點排列在路線上的構件
(Ex: 橋墩、橋臺)

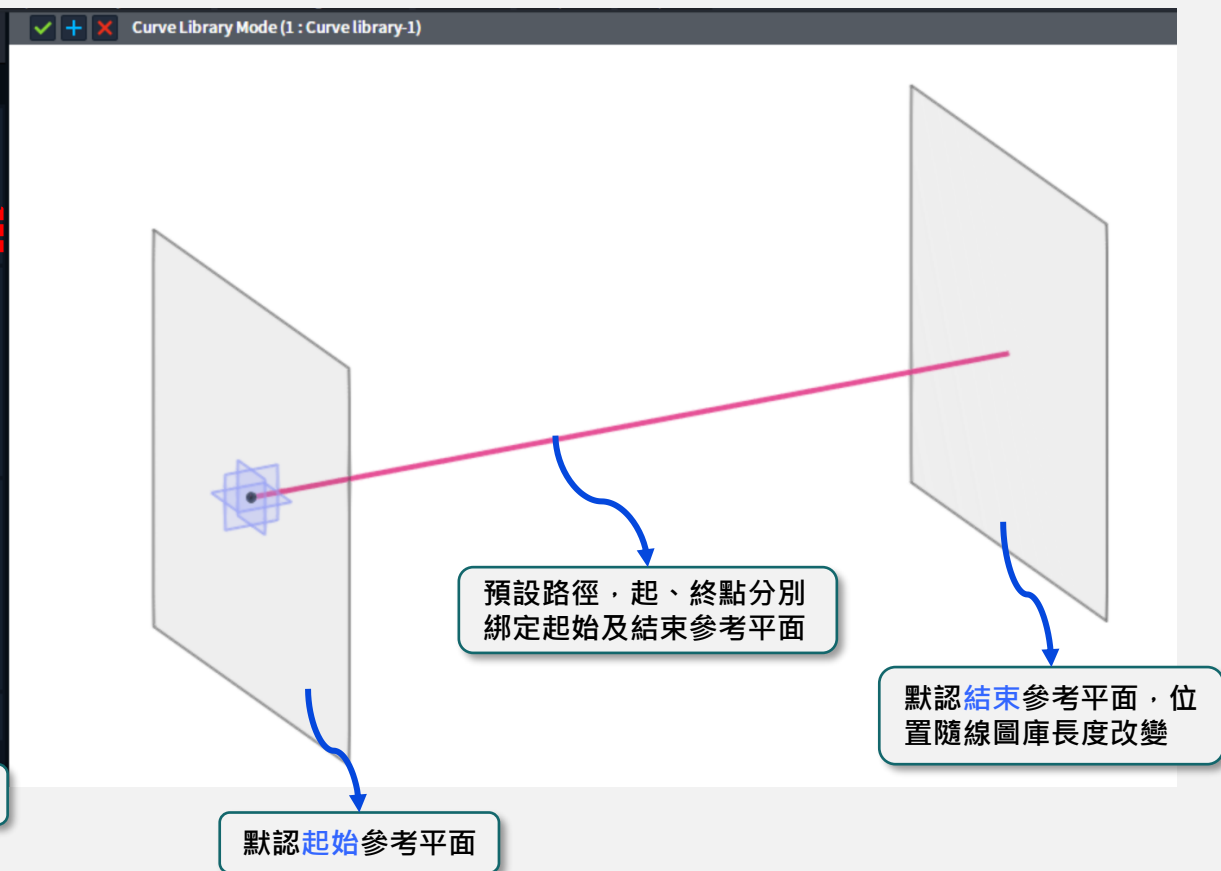
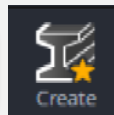


包括平面曲線、縱面曲線、橋梁段與超高等資訊



1. 創建線圖庫 (Curve Library)

1 Base > Curve > Create
進入線圖庫模式(Curve Library Mode)



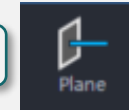
2. 建立參考平面

1 選取默認路徑 > 右擊 > Hide Selected



由於接下來要分段建模，不需要使用這條預設路徑，因此可以選取後將其隱藏。(若不隱藏亦可繼續往下操作)

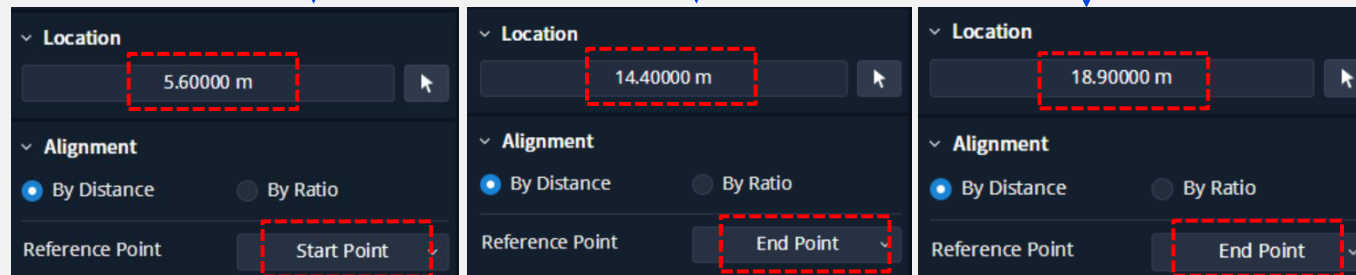
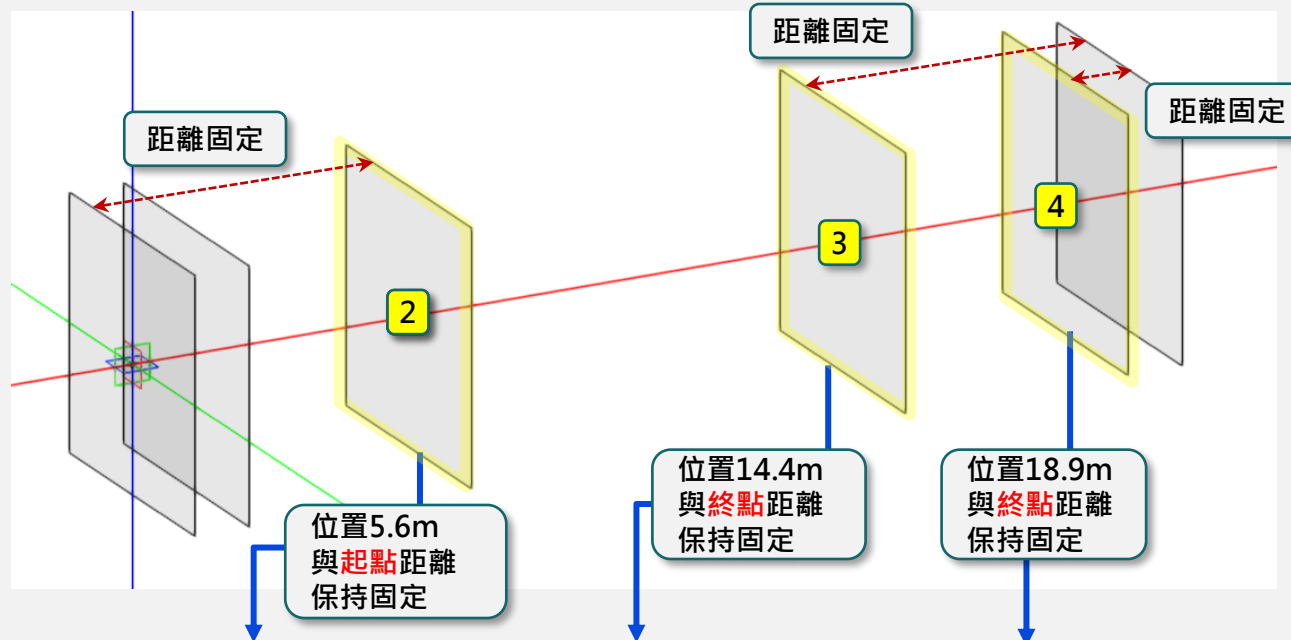
2 Curve Library > Constraint Entity > Plane



2. 建立參考平面

Curve Library Mode (1 : Box-middle)

1 同樣方法建立參考平面 2 ~ 4，按 適用並退出此功能。

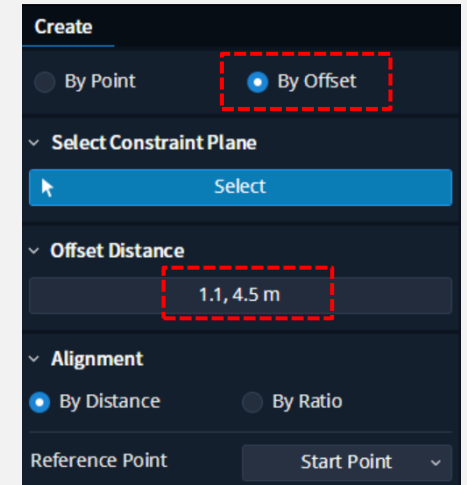


Tips:

批量建立Plane時，可用偏移法
依 By Offset 方法建立參考面

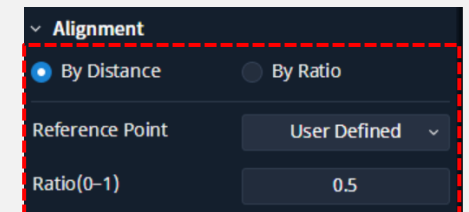
v Select Constraint Plane
選擇一個目標參考面

v Offset Distance
輸入偏移距離

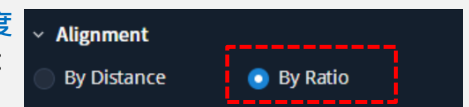


Tips:

若想設置參考平面<與主線中點
距離固定>，可依照右側設置：
(常用於中隔板)



若想令參考平面<位置隨主線長度
等比例變化>，可依照以下設置：
v Alignment > By Ratio



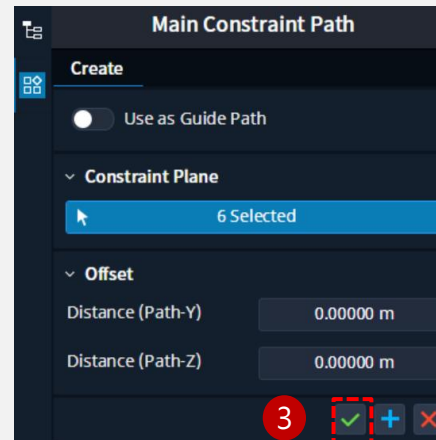
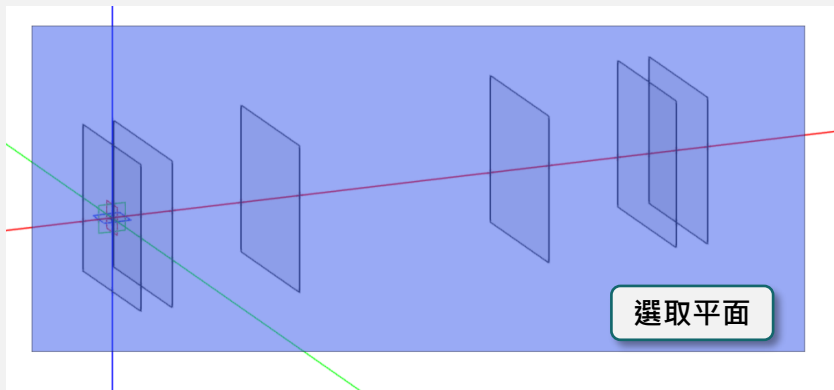
3. 繪製主路徑

Curve Library Mode (1 : Box-middle)

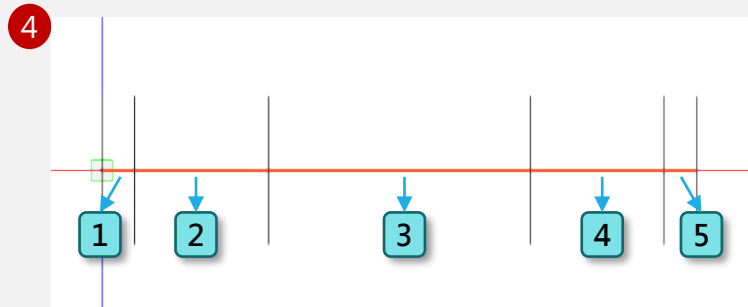
1 Curve Library > Constraint Entity > Path



2 滑鼠窗選圖面上的6個參考平面



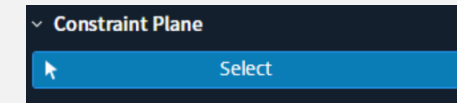
適用並退出功能



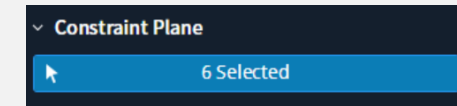
一次選取6個參考平面，在參考平面之間繪製出5條 <主約束路徑> Main Constraint Path

Tips:

1. <Select> 按鈕須在亮顯狀態才可以進行選擇。若 <Select> 按鈕未亮顯，須點擊一下使其亮顯，再進行選擇。

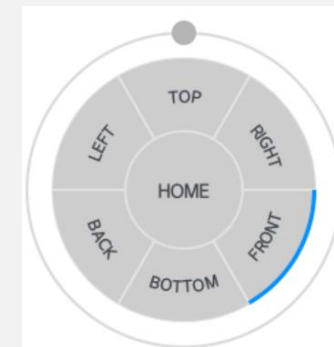


2. 選擇成功時，<Select> 按鈕顯示為 <X Selected>，表示X個目標被選中。



Tips:

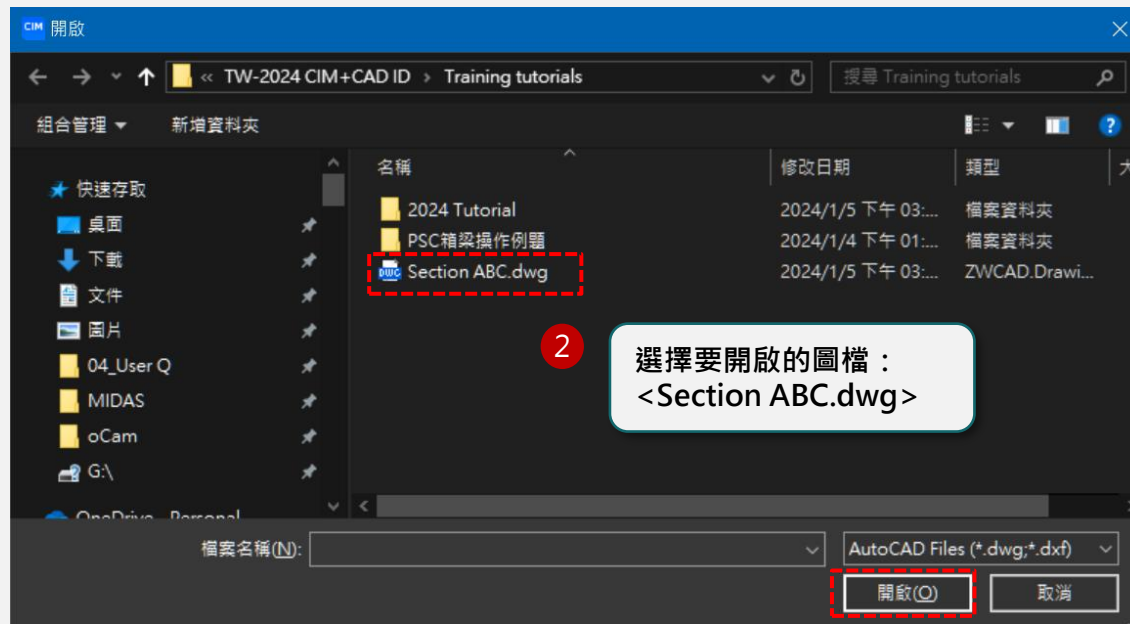
1. 點擊滑鼠中鍵，出現視圖導航圓盤，可點擊改變視角。



4. 創建斷面

Curve Library Mode (1 : Box-middle)

1 Base > Property > User Section > DWG File



補充：利用CAD ID的 CIMUSERSECTION 創建可匯入斷面Profile的DWG檔案。

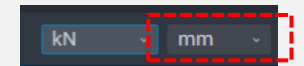
3 DWG檔案匯入後，勾選Layer Name匯入CAD斷面輪廓，並自動建立Section

4 注意單位，調整比例係數

5 勾選要匯入的圖層



Tips:
因DWG檔案建立各斷面輪廓線採用單位mm，匯入時確認Scale Factor = 1，並將CIM輸入長度單位切換為“mm”。



Tips:
預先在DWG檔案建立各斷面輪廓線，並分別指定圖層中，是最便捷的批量創建斷面方法。

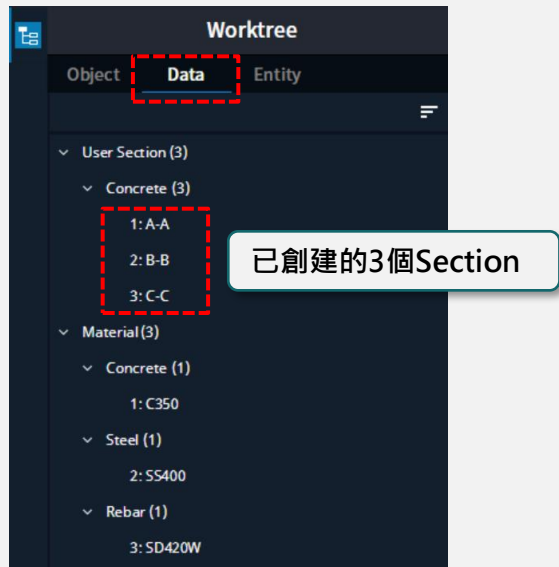
在匯入CIM後，會自動依圖層名稱 (Layer Name) 作為新創建斷面的命名。

也可以不用匯入DWG檔案的方式，以 User Section > Create 功能創建斷面。

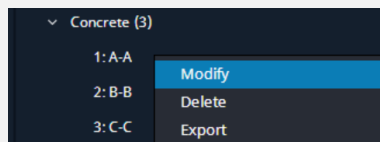
適用

5. 查看已創建斷面

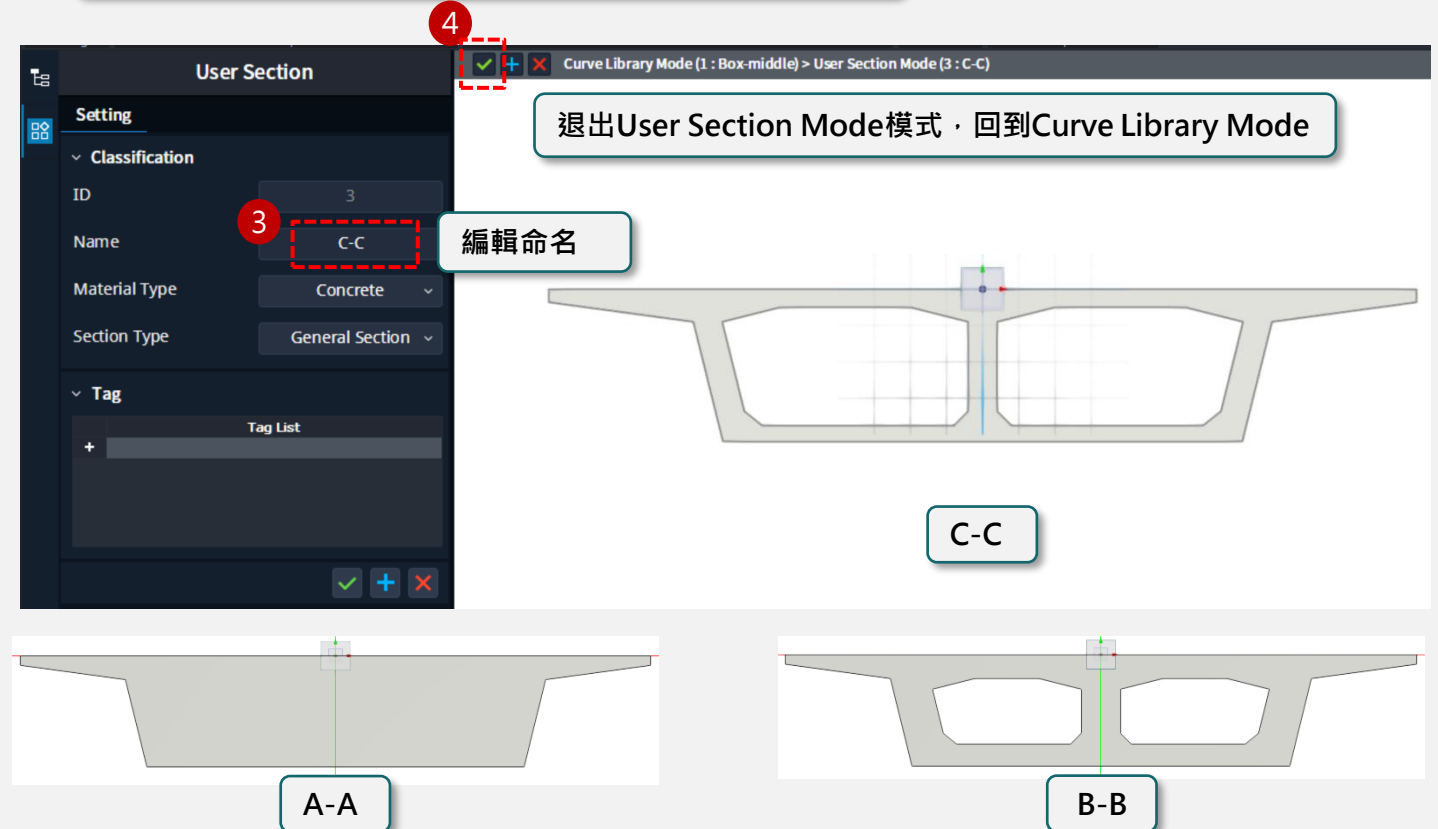
- 1 Base > Worktree > Data
可查看線圖庫 <Box-middle> 中已創建的斷面



Tips:
右擊 > Modify 可查看並編輯該Section斷面
右擊 > Export 可匯出CIM斷面文檔(*.csbz)



- 2 選擇 C-C 後，右擊 > Modify 查看並編輯該Section斷面

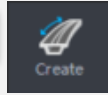


此時有三個斷面，C-C 為標準斷面，B-B 為頂底腹板加厚斷面，A-A為實心斷面。

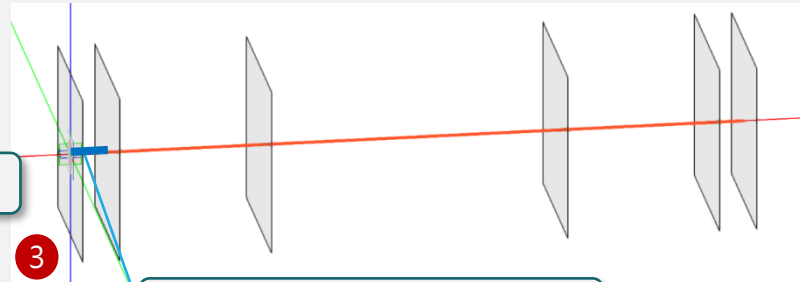
6. 建立與路線關聯的主梁(1)

1 Curve Library > Path Linked > Create

Curve Library Mode (1 : Box-middle)

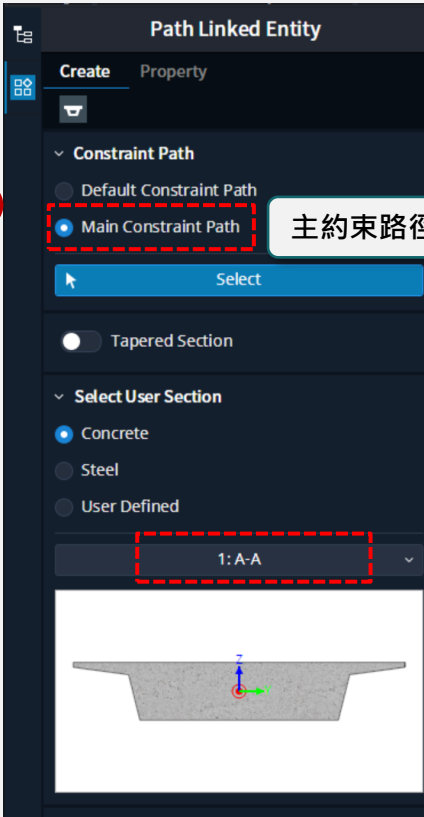


2 主約束路徑

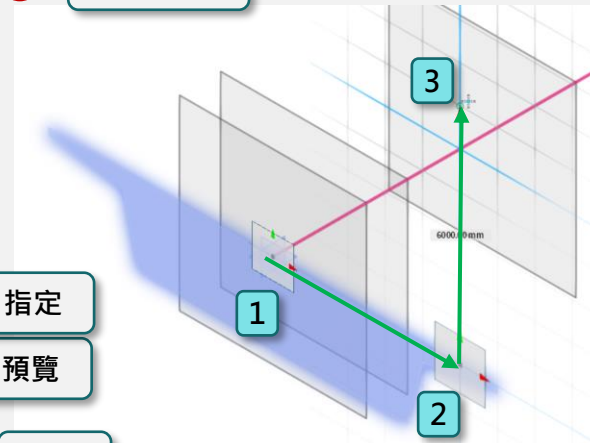


圖面點選前面建立的主約束路徑

4 1: A-A



5 指定位置



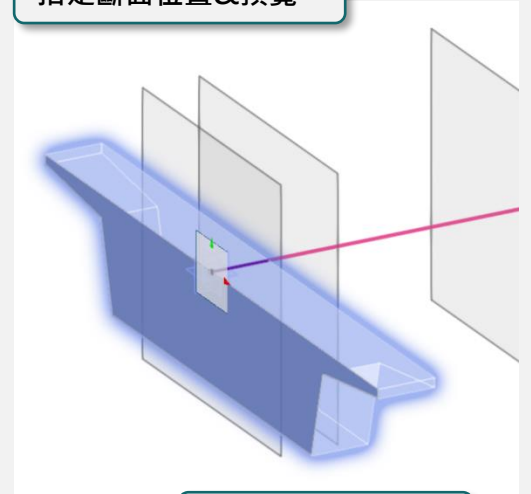
指定

預覽

適用

6 指定斷面位置&預覽

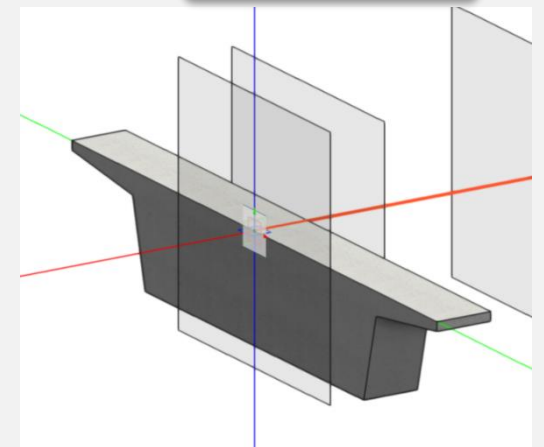
7



8



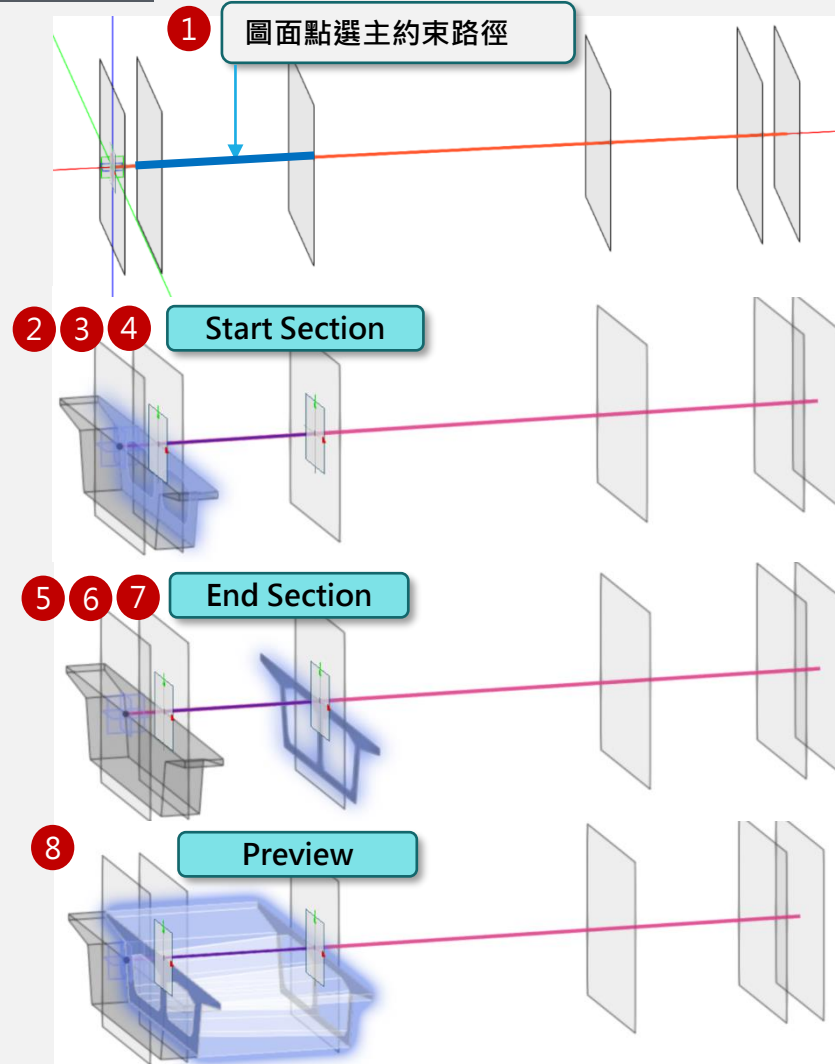
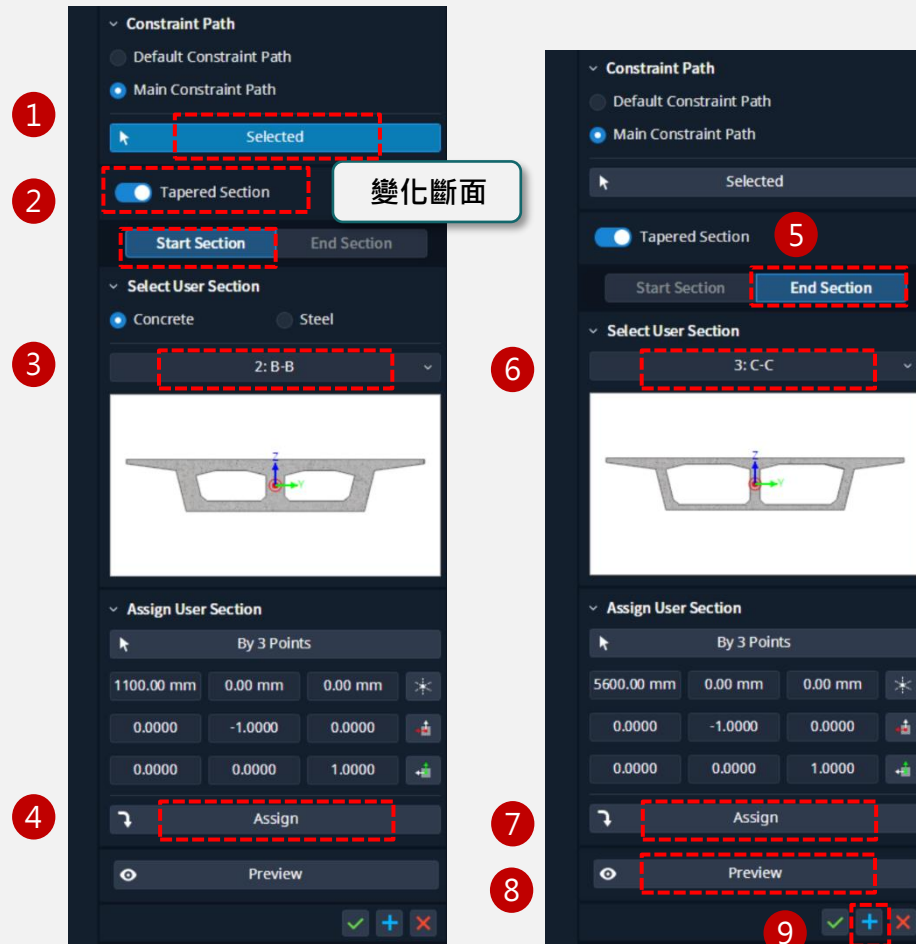
適用但不退出功能



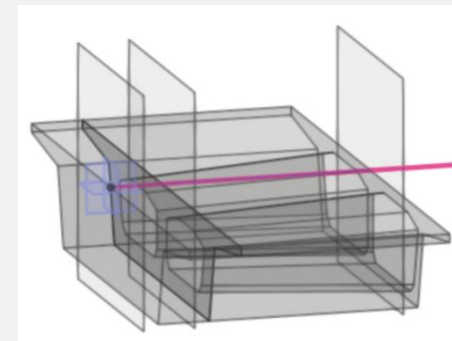
6. 建立與路線關聯的主梁(2)

Curve Library Mode (1 : Box-middle)

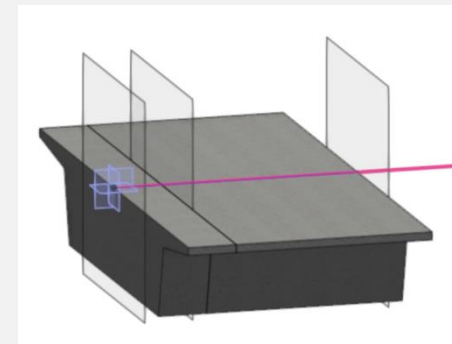
Curve Library > Path Linked > Create 功能下:



9. 適用但不退出功能



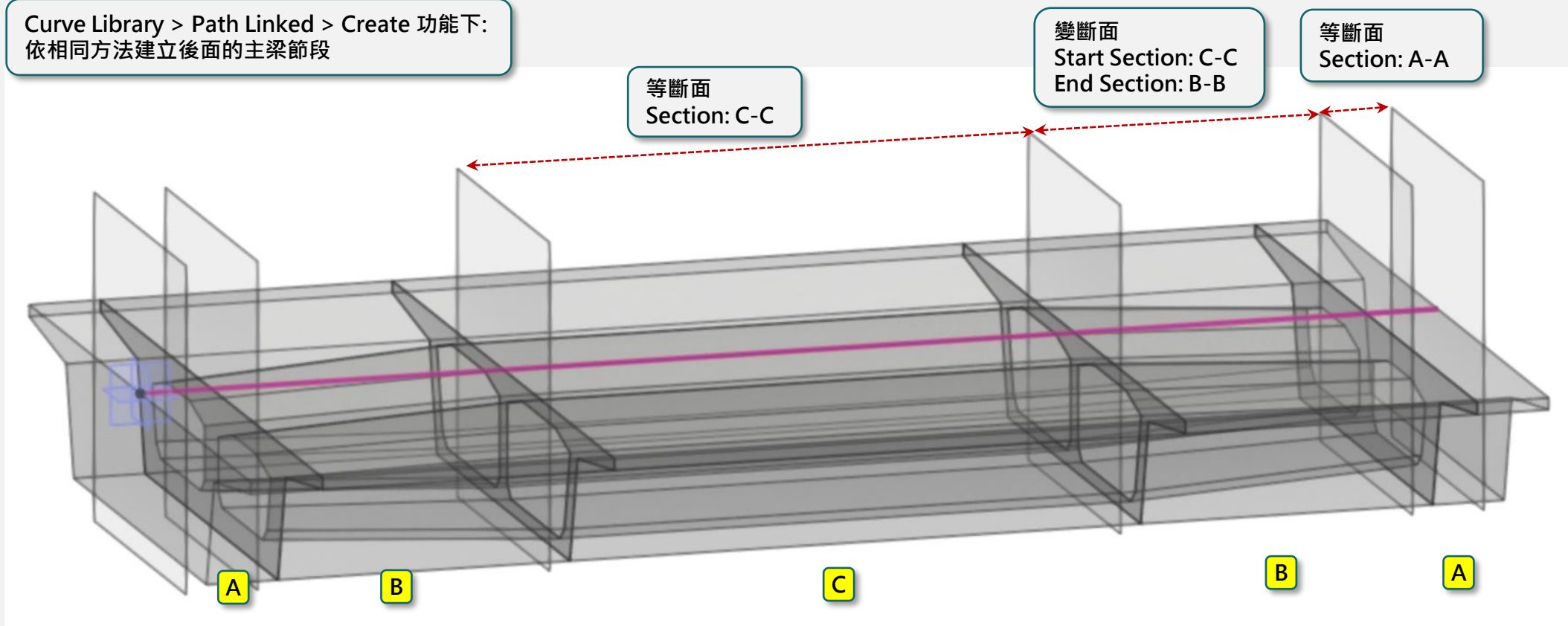
9. 改變View Option



6. 建立與路線關聯的主梁(3)

✓ + ✗ Curve Library Mode (1 : Box-middle)

- 1 Curve Library > Path Linked > Create 功能下:
依相同方法建立後面的主梁節段



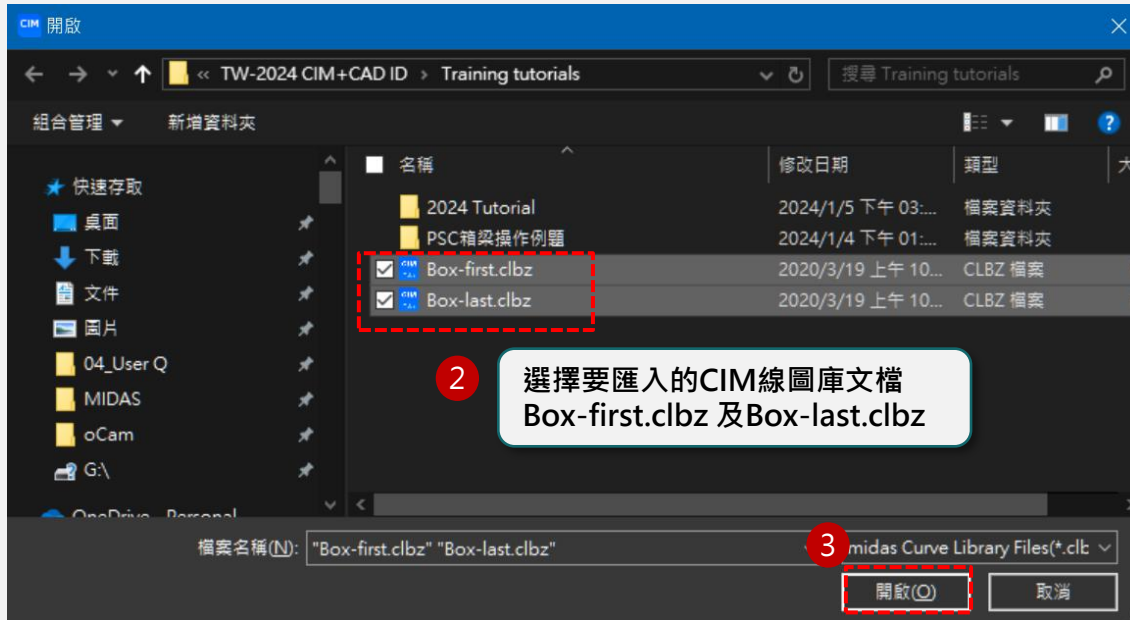
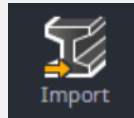
- 2 保存變更並關閉Curve Library Mode，隨後儲存檔案。

✓ + ✗ Curve Library Mode (1 : Box-middle)

至此中跨主梁線圖庫 (Curve名稱 : Box-middle)已完成。
本線圖庫以20m創建，但套用在路線上時，可隨路線彎曲，且長度會隨著跨徑變化。由於參考平面設置了約束，因此當20m線圖庫被套用在跨徑40m的路線上時，A、B節段的長度不會改變，而中間的C節段會變長。

7. 匯入已創建的線圖庫

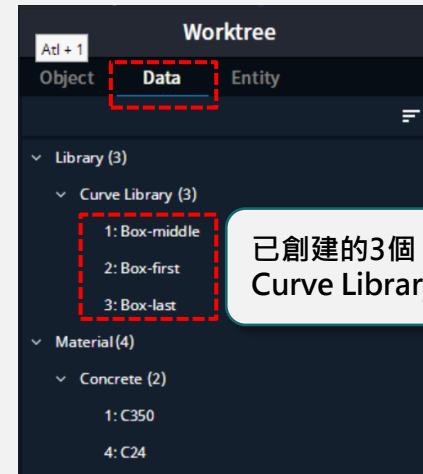
1 Base > Library > Curve > Import



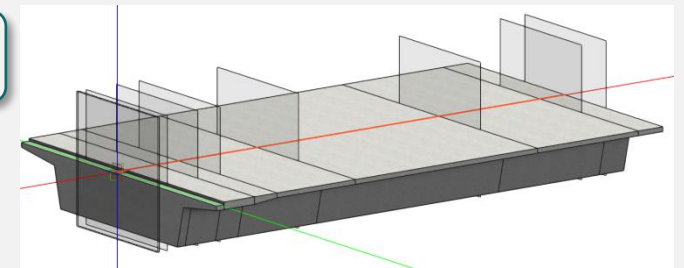
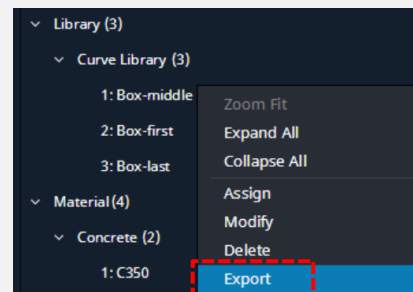
3 midas Curve Library Files(*.clb)
開啟(O) 取消

4

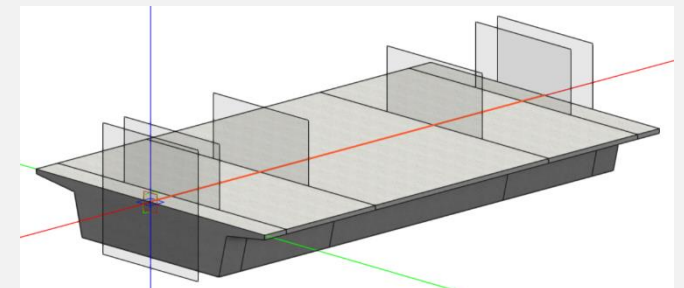
Base > Worktree > Data
查看Curve Library 已創建的線圖庫



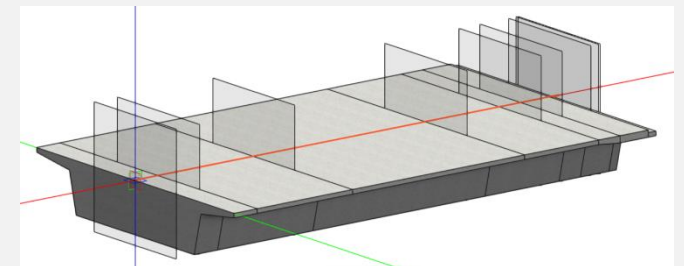
Tips:
右擊 > Modify 可查看並編輯該Curve Lib.
右擊 > Export 可匯出CIM線圖庫文檔(*.clbz)



前跨



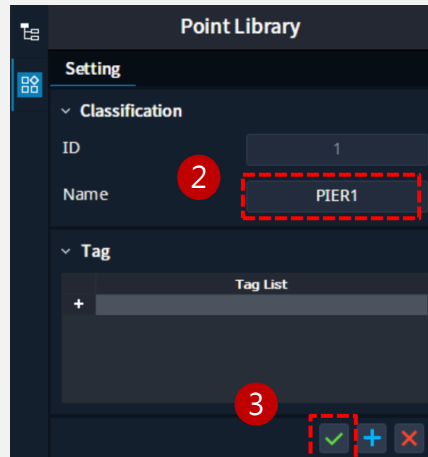
中跨



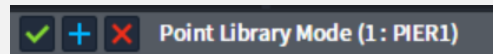
後跨

1. 創建點圖庫

- 1 Base > Point > Create
進入點圖庫模式(Point Library Mode)

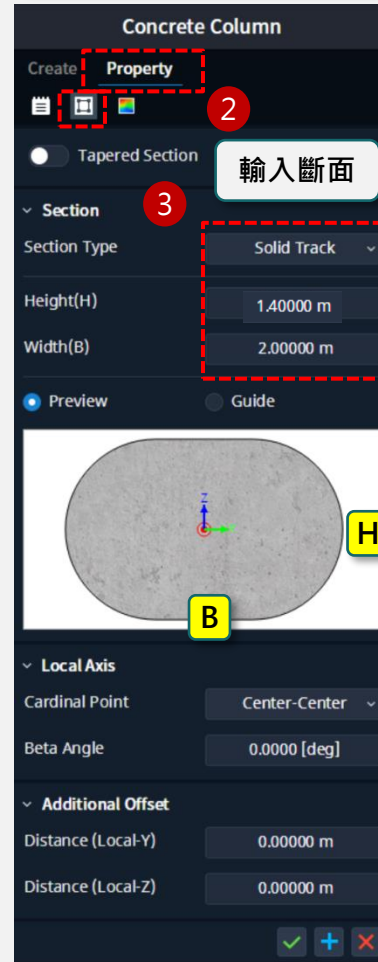
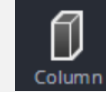


適用並退出功能



2. 建立墩柱桿件(1)

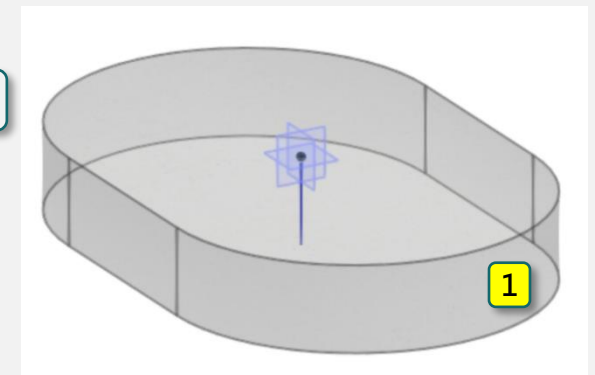
- 1 Model > Member > Concrete > Column



高度0.3m

指定原點(0,0,0)

適用但不退出功能



2. 建立墩柱桿件(2) ✓ + ✗ Point Library Mode (1: PIER1)

1 同樣方法採用 Tapered Section 建立桿件 2

Concrete Column

Create **Property**

2 ☒ Tapered Section **變化斷面**

3 **Section**

Section Type: Solid Track

Start Point	End Point
Height(H): 1.40000 m	Height(H): 1.40010 m
Width(B): 2.00000 m	Width(B): 2.00000 m

Preview Guide

4

5 **Shape Variation**

Local-Y Local-Z

Arc

Radius: 3.49000 m

Convexity

Option

☒ Keep Bulge Factor(Curve)

Concrete Column

Create **Property**

6 ☒ Vertical Column ☐ General Column

7 **Column Height**

-1.30000 m **高度1.3m**

8 **Define Location**

Point

Point(Single Point)

0.00000 m 0.00000 m -0.30000 m **指定點(0,0,-0.3)**

9 **Preview Level**

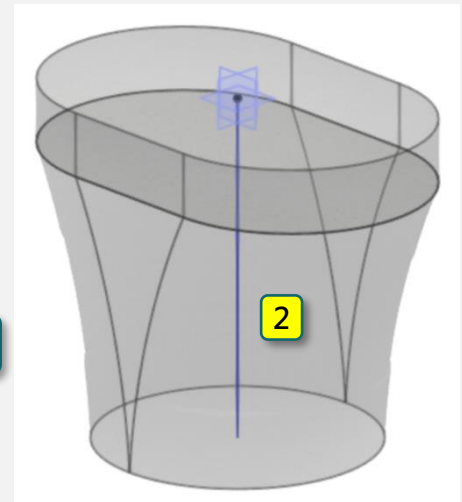
Member Geometry with Solid

適用但不退出功能

y向採用圓曲線變化
半徑為3.49m

完成墩柱擴頭變化段桿件 2

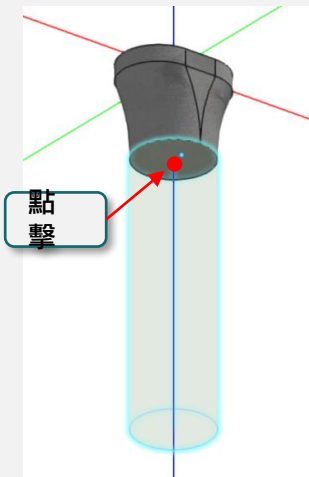
Tips:
搭配ctrl+滑鼠中鍵旋轉·定位在既有桿件的底部頂點



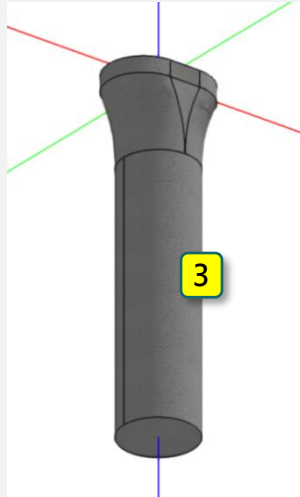
2. 建立墩柱桿件(3)

✓ + ✗ Point Library Mode (1: PIER1)

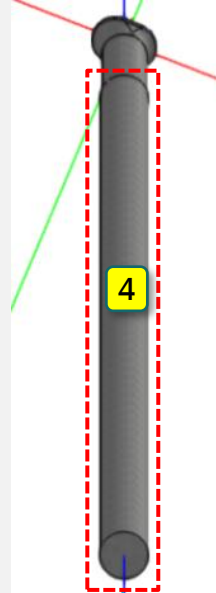
同樣方法採用等斷面建立柱 **3** 與基樁桿件 **4**



墩柱
直徑1.4m
長度4.84m

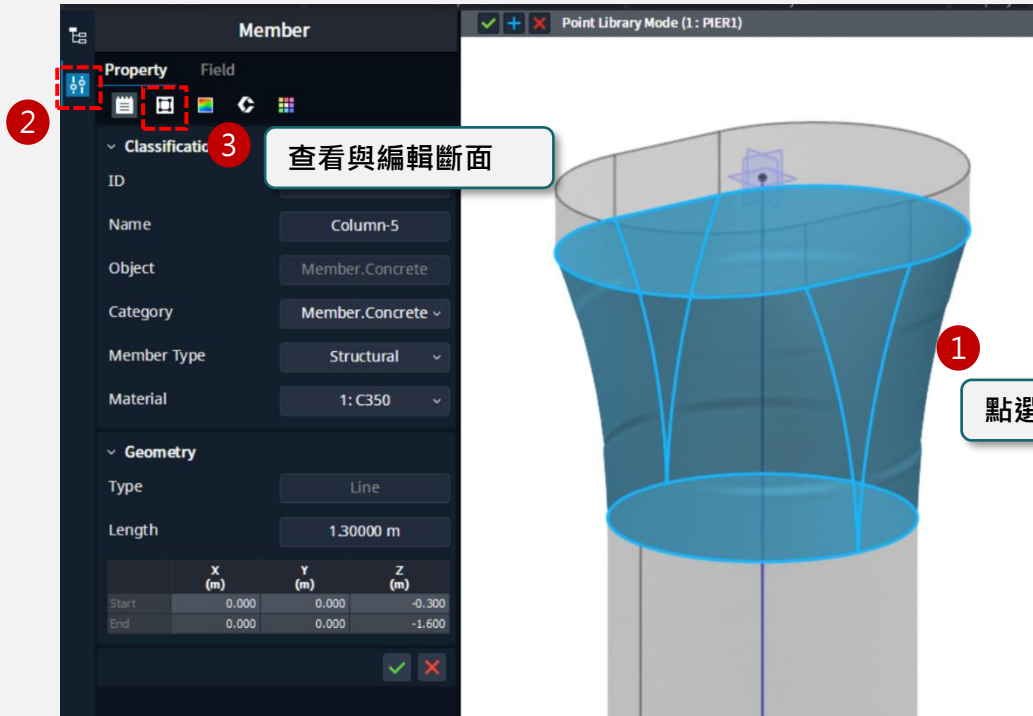


完成墩柱等斷面段

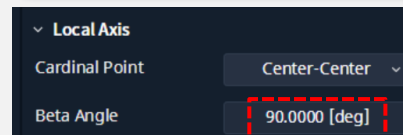


樁基
直徑1.5m
長度52m

1 選擇桿件後，按左側  可查看與編輯Member資訊

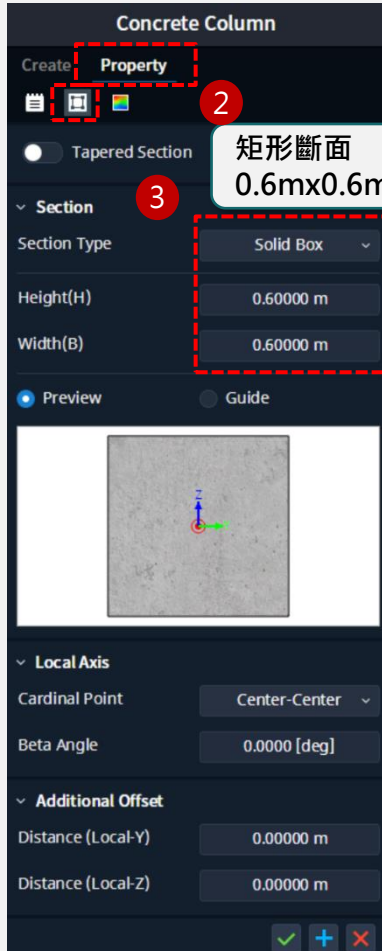


4 指定Beta Angle = 90 度

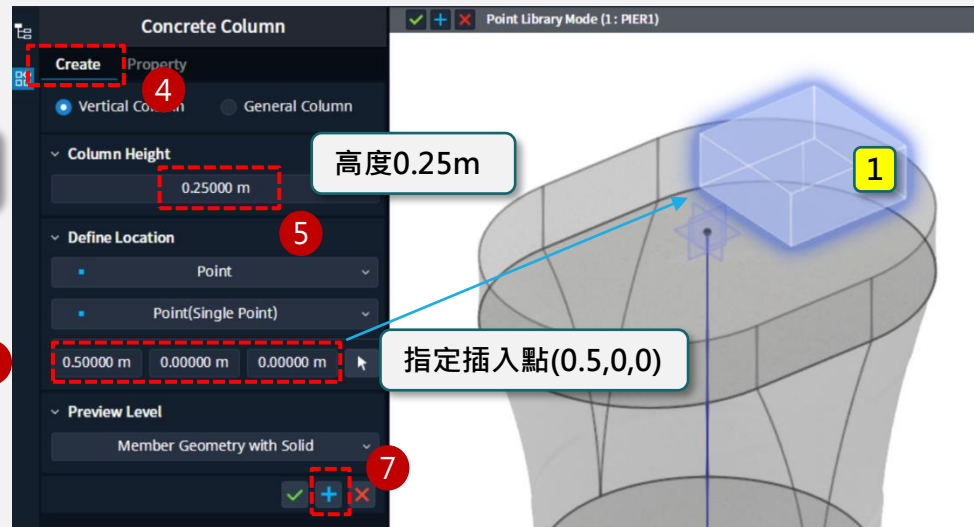


✓ + ✗ Point Library Mode (1: PIER1)

1 Model > Member > Concrete> Column 同樣方法建立支承墊與墊石



矩形断面
0.6m x 0.6m



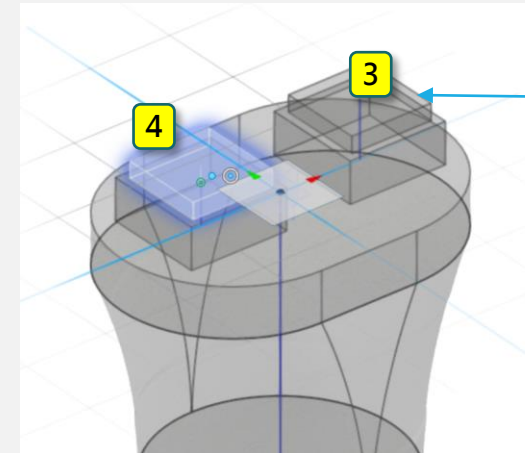
高度0.25m

指定插入點(0.5,0,0)

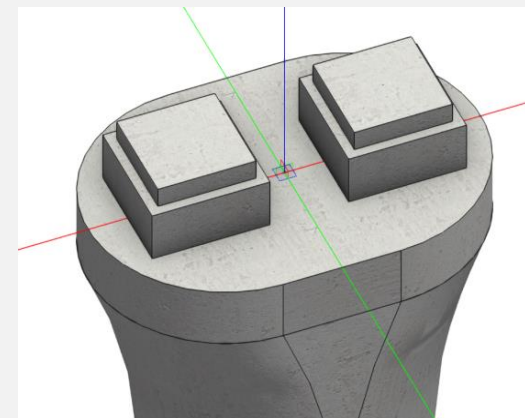


指定插入點(-0.5,0,0)

Tips:
直接定位桿件中心點放置支承墊 **3** **4**



支承墊
 尺寸0.5m×0.5m
 高度0.1m



完成支承墊與墊石的創建

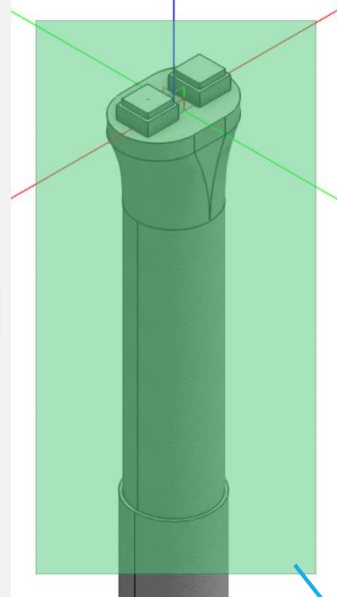
3. 墩柱移動與鏡像複製(1)

✓ + ✗ Point Library Mode (1: PIER1)

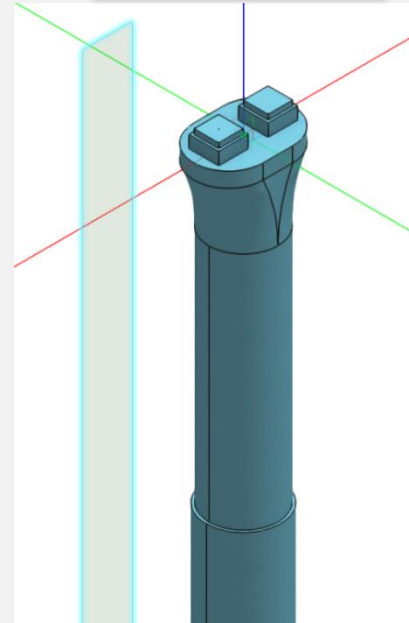
1 Edit > Move 移動



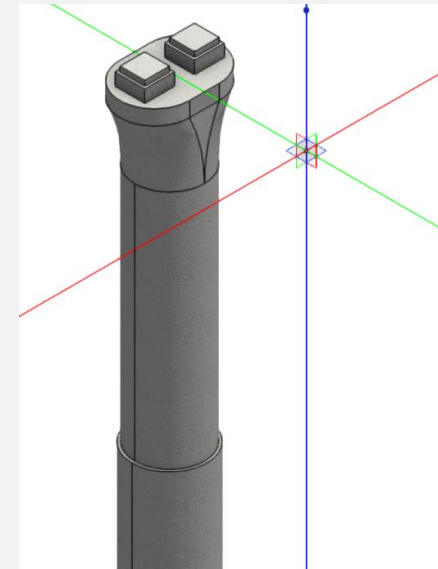
3 窗選要移動的目標



5 向Y方向移動2.75m



6 完成墩柱移動



Tips:

1.CIM窗選功能與CAD相同

由左上至右下：選擇完全在選取框中的物件

由右下至左上：選擇所有選取框內的物件及選取框接觸到的物件

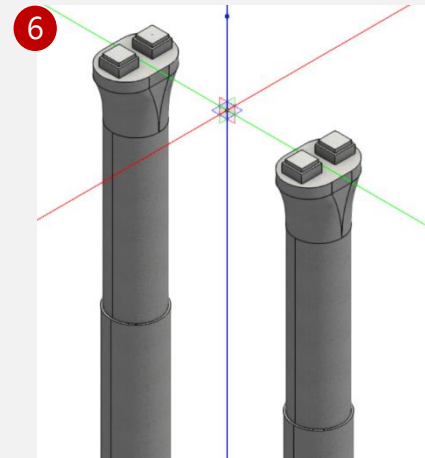
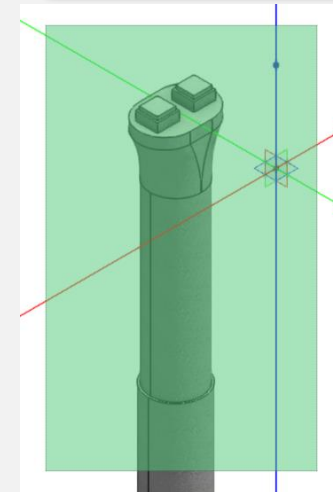
3. 墩柱定位與鏡像複製(2)

1 Edit > Mirror 鏡像複製

Point Library Mode (1: PIER1)

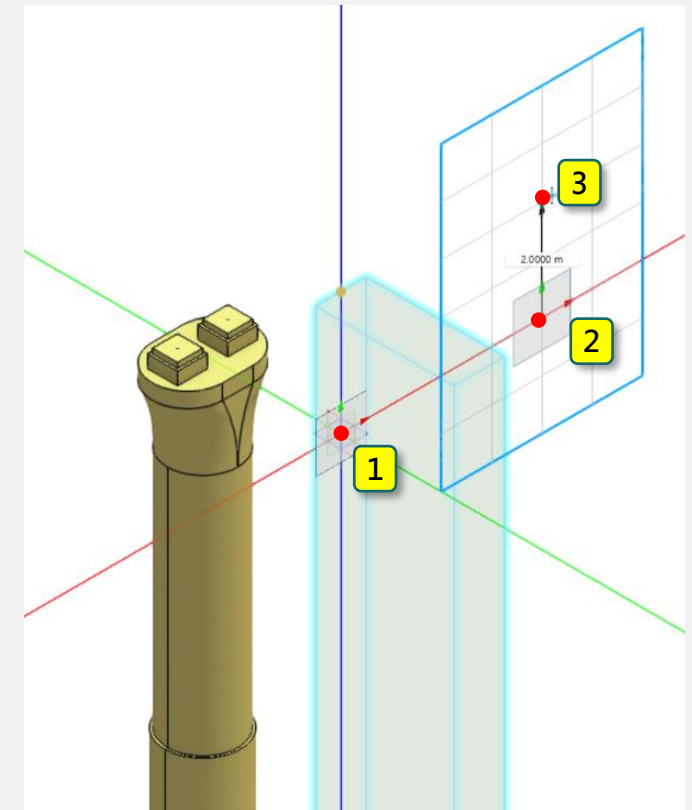


4 窗選要鏡像的目標



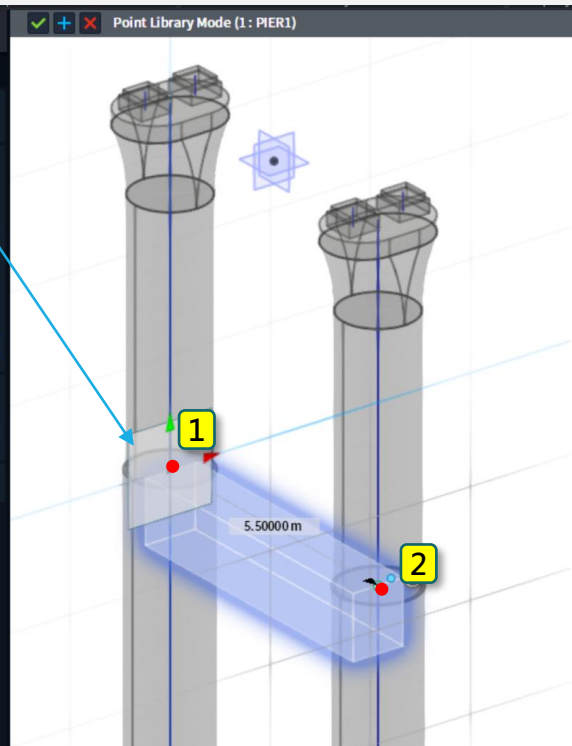
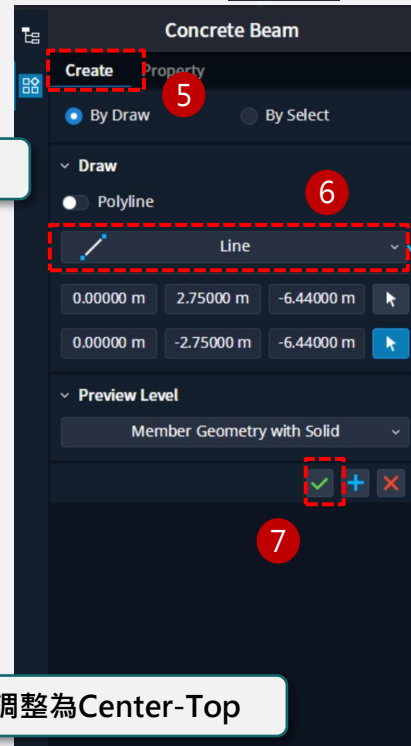
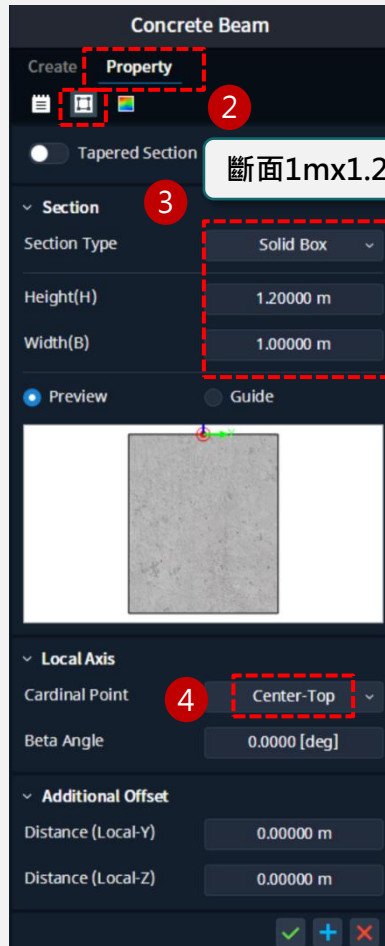
Tips:

- 在圖面上點擊三點(3 Points) 定義鏡像平面
- 1.快捷鍵F，使用FRONT方向格網，幫助定位
- 2.第一點決定原點，第二點決定X方向，第三點決定Y方向

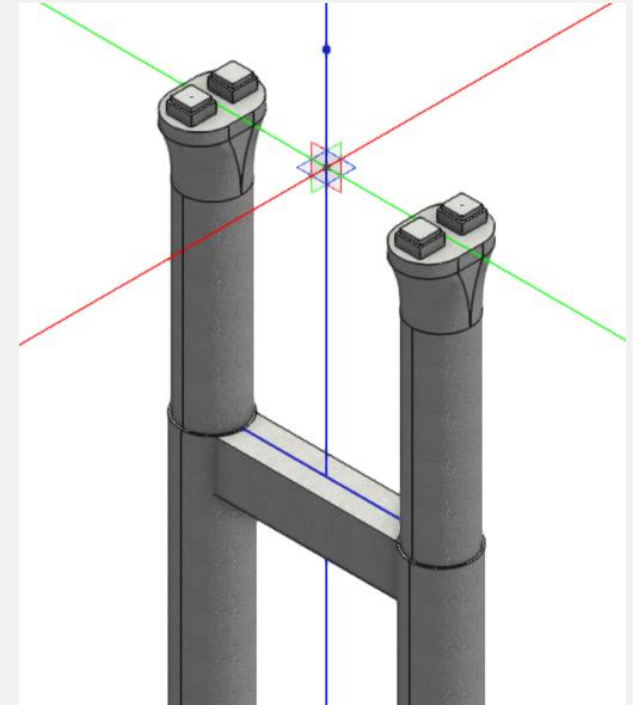


4. 創建橫繫梁

1 Model > Member > Concrete > Beam



6 在圖面上點擊兩點 1 → 2 繪製梁

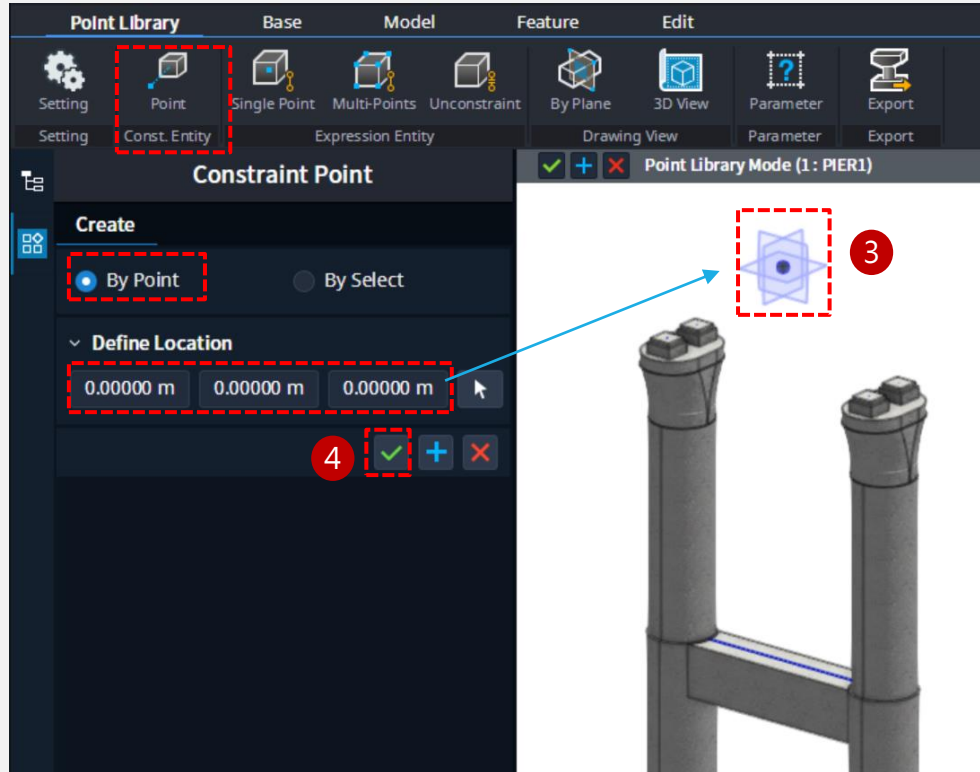


7 完成橫向繫梁建模

5. 設定並關聯約束點

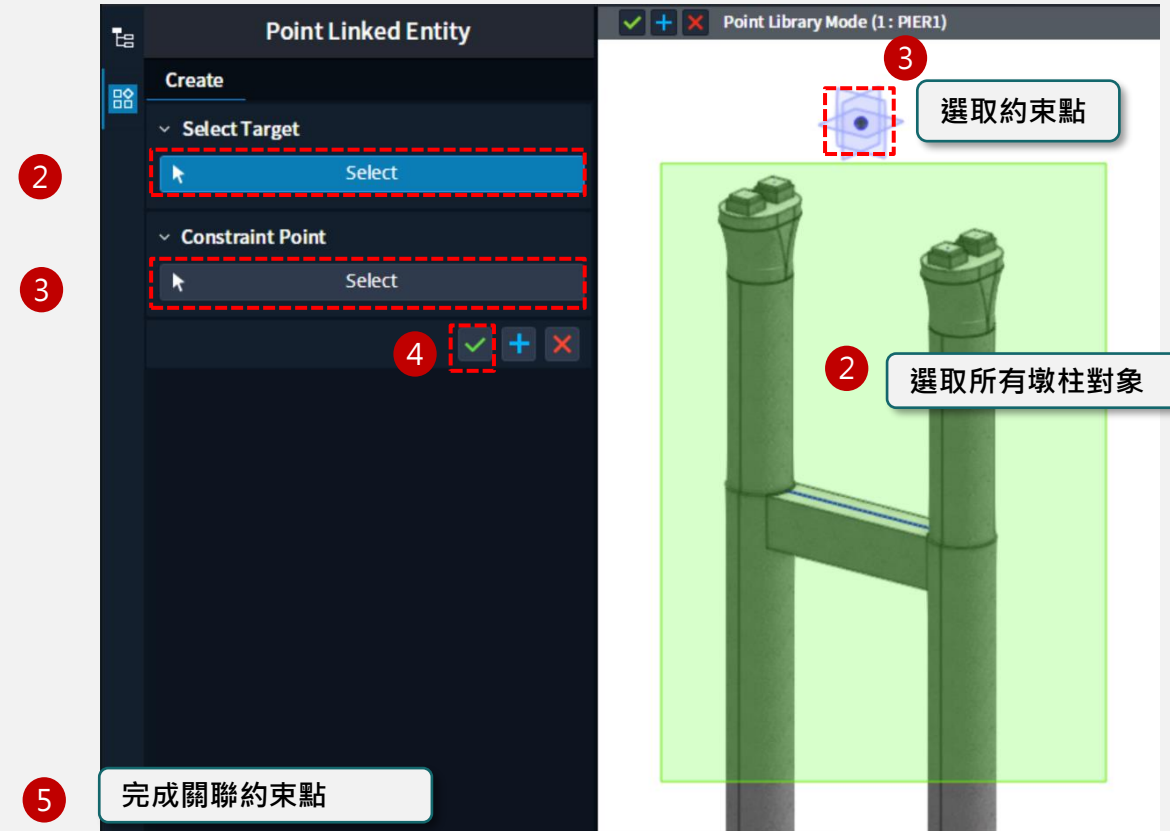
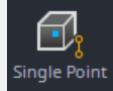
✓ + ✗ Point Library Mode (1: PIER1)

1 Point Library > Const. Entity > Point



輸入點圖庫的原點: (0,0,0m)
將來插入Point Library時，以此點為插入點。

1 Point Library > Expression Entity > Single Point



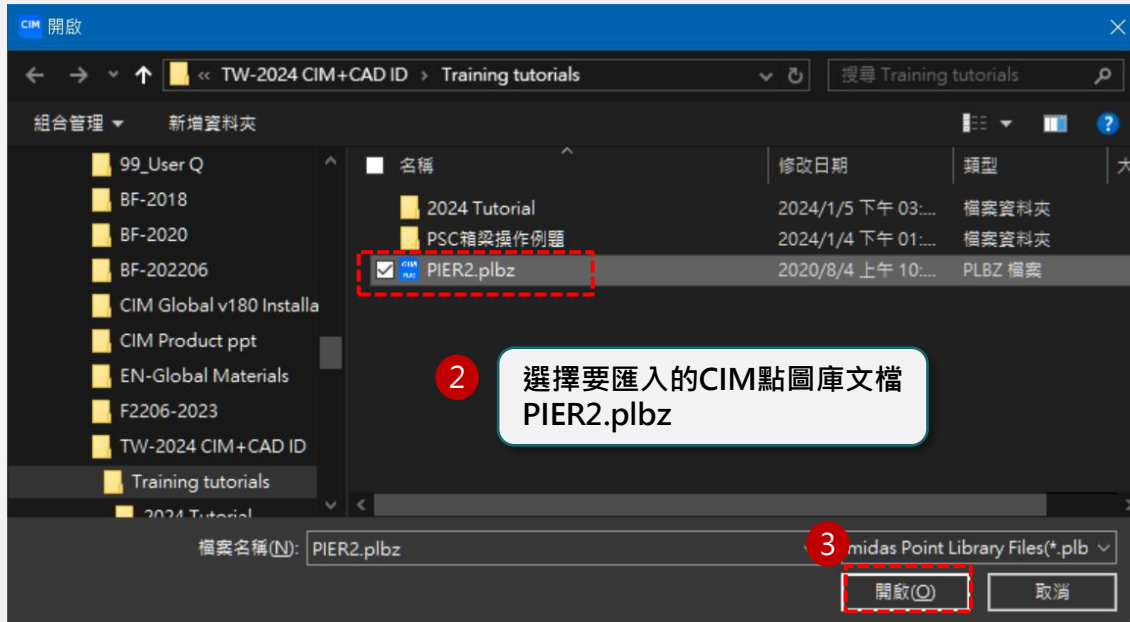
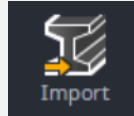
5 完成關聯約束點

保存變更並關閉Point Library Mode，隨後儲存檔案。

✓ + ✗ Point Library Mode (1: PIER1)

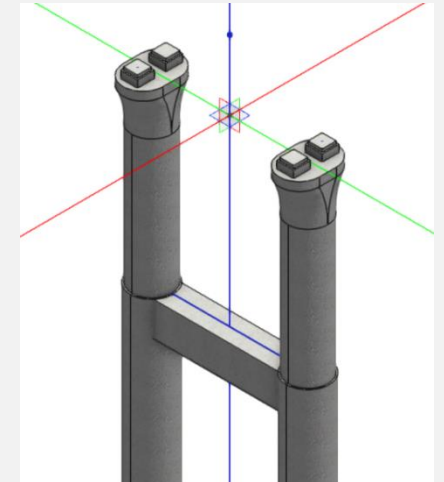
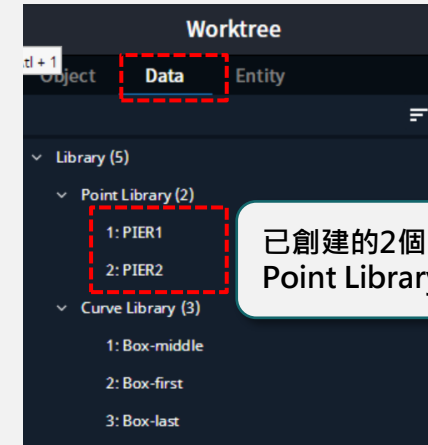
7. 匯入已創建的點圖庫

1 Base > Library > Point > Import

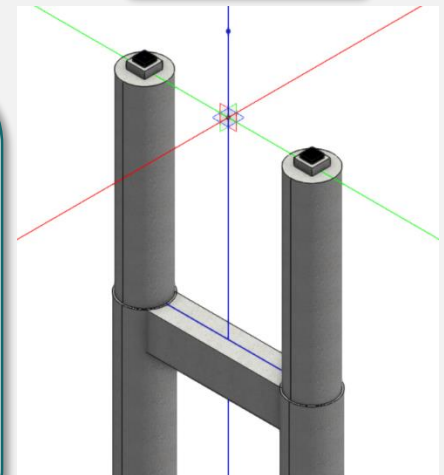


4

Base > Worktree > Data
查看Point Library 已創建的點圖庫

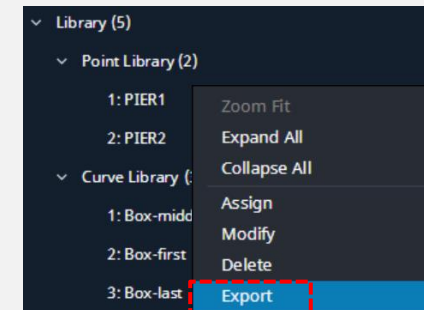


PIER1: 過渡墩



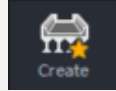
PIER2: 中間墩

Tips:
右擊 > Modify 可查看並編輯該Point Library
右擊 > Export 可匯出CIM線圖庫文檔 (*.plbz)



1. 創建組裝圖庫 (Assembly Unit Library)

1 Base > Assembly > Create

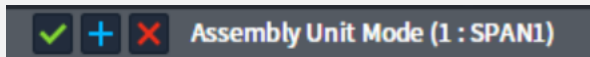


The 'Assembly Unit' dialog box is shown. It has a 'Setting' tab. Under 'Classification', the 'ID' is set to '1' and the 'Name' is 'SPAN1'. Under 'Tag', there is a 'Tag List' section with a '+' button. At the bottom right, there are three buttons: a green checkmark, a blue plus sign, and a red X.

輸入組裝圖庫名稱

適用並退出功能

進入組裝圖庫模式(Assembly Library Mode)



1 Assembly Unit > Constraint Entity > Space

The 'Constraint Space' dialog box is shown. It has a 'Create / Edit' tab. Under 'Connected', the 'Default Space' radio button is selected. Under 'Classification', the 'Space Order' is '1' and the 'Space Name' is 'Default Space'. Under 'Space Setting', the 'Unit Length' is '20.00000 m'. Under 'Total Length', the value is '10.00000 m'. At the bottom right, there are three buttons: a green checkmark, a blue plus sign, and a red X. A 3D model of a bridge span is shown in the background with a pink line indicating the unit length.

默認約束空間

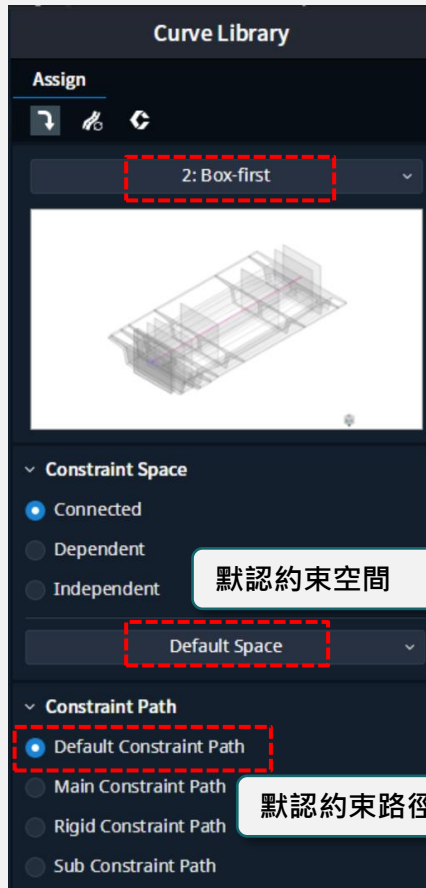
輸入長度：20m

適用並退出功能

2. 裝配主梁段(線圖庫)

1 Assembly Unit > Assign Library > Curve

2



選擇要裝配的線圖庫<前跨>
Curve Library > 2:Box-first

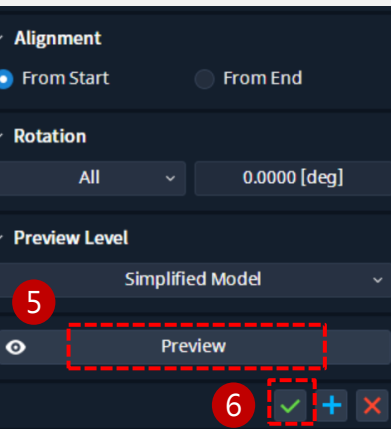
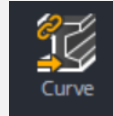
3

默認約束空間

4

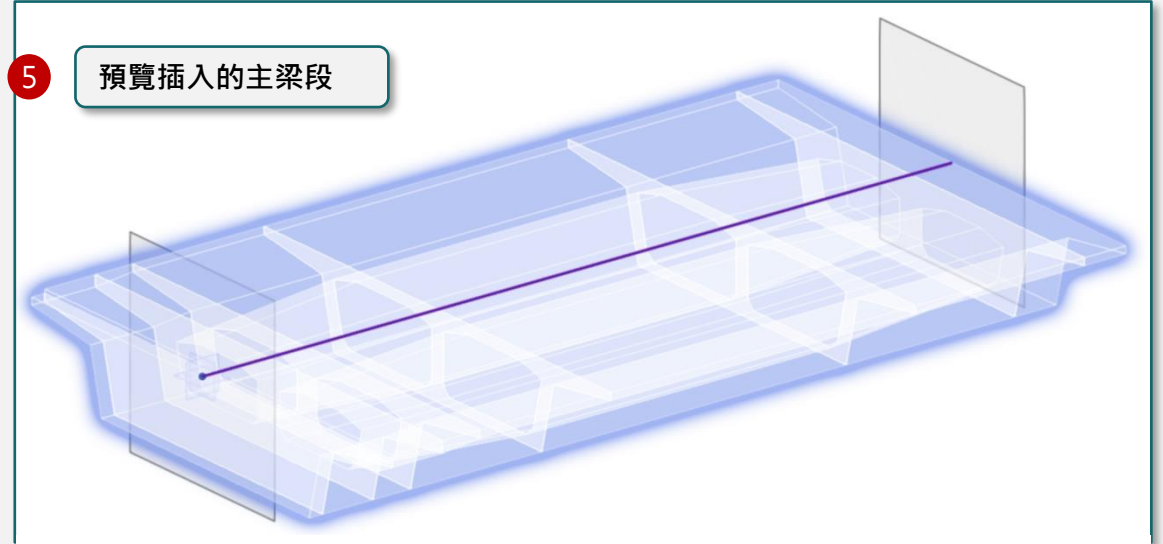
默認約束路徑

Assembly Unit Mode (1 : SPAN1)



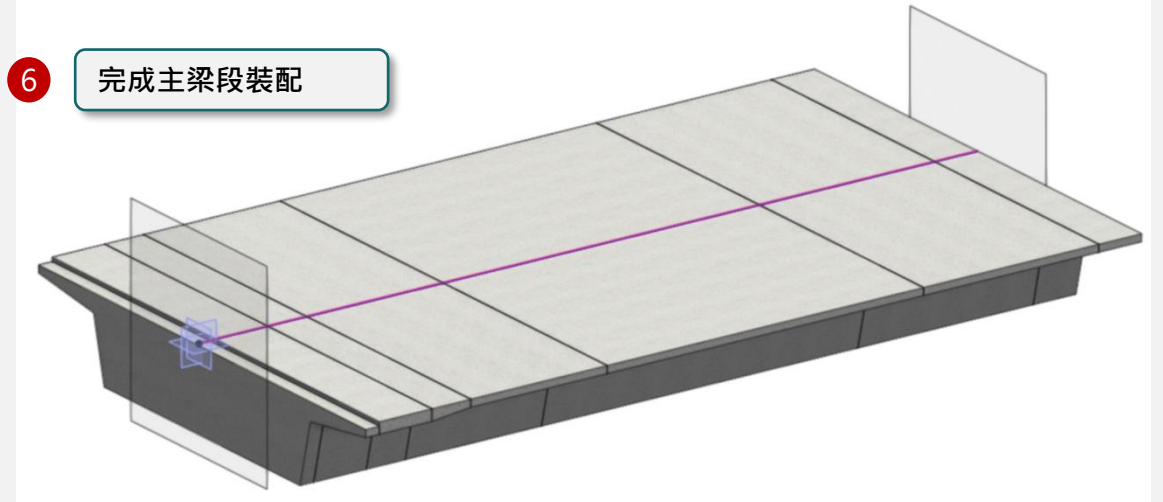
5

預覽插入的主梁段



6

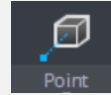
完成主梁段裝配



3. 建立約束參考點

1 Assembly Unit > Constraint Entity > Point

Assembly Unit Mode (1 : SPAN1)



Constraint Point

Create

Constraint Space

- ☒ Connected
- ☐ Dependent
- ☐ Independent

2 Default Space 默認約束空間

☒ Point ☐ Offset

3 Constraint Path

- ☒ Default Constraint Path 默認約束路徑
- ☐ Main Constraint Path
- ☐ Rigid Constraint Path
- ☐ Sub Constraint Path

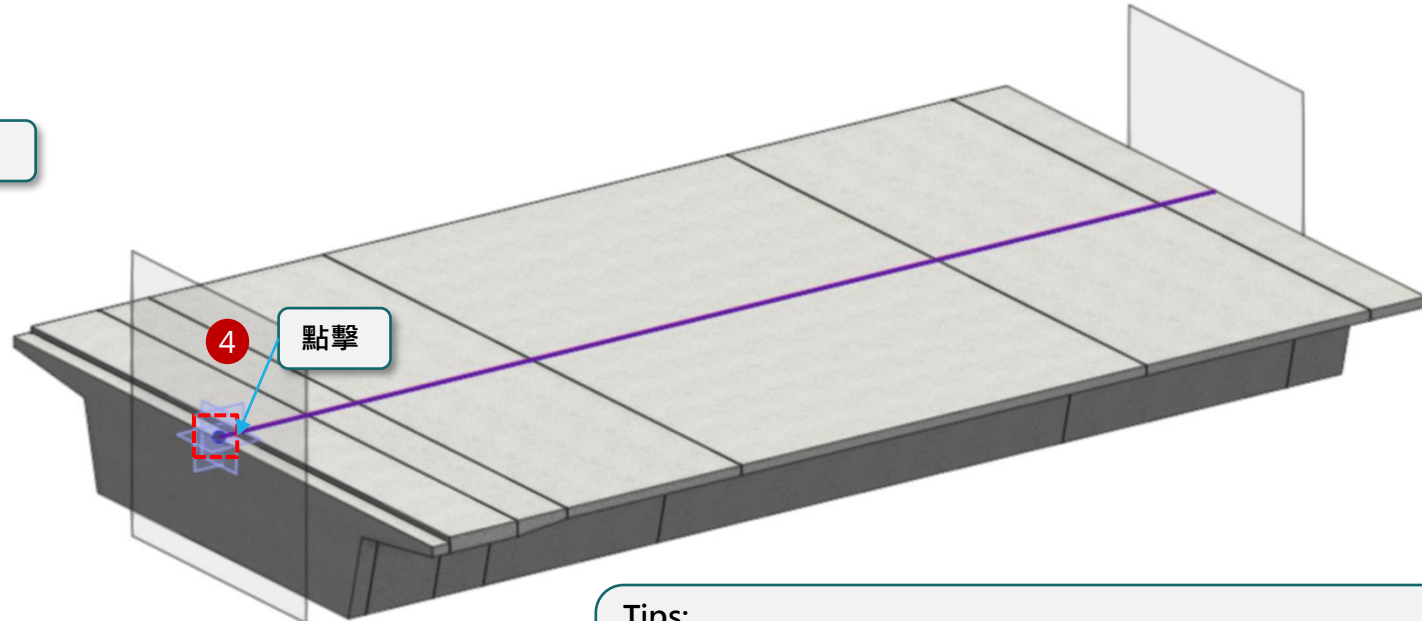
Location

4 0.00000 m 參考點位置: 0 m

5 Alignment

- ☐ By Distance
- ☒ By Ratio

6 ☒ ☐ ☐

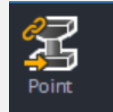


Tips:

1. 本例題橋墩點圖庫位置都在組裝圖庫的端部，因此 <Alignment> 欄位無論選擇 <By Ratio> 或 <By Distance> 都沒有區別。如果建模時對參考點有其他約束需求，可以自行修改約束設置，方法同前述 <參考平面> 的建立。

4. 裝配墩柱(點圖庫)

1 Assembly Unit > Assign Library > Point



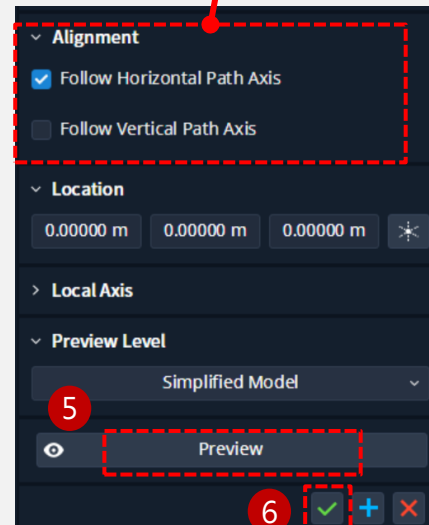
選擇要裝配的点圖庫<過渡墩>
Point Library > 1:PIER1

默認約束空間

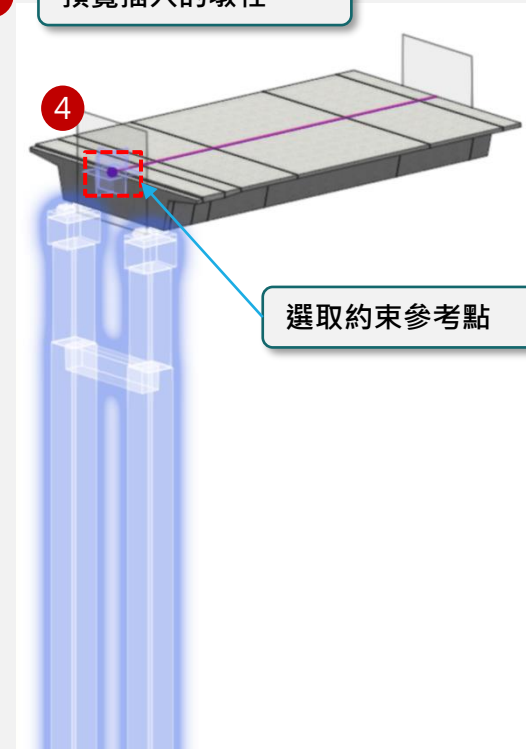
選取約束參考點

Tips:

1.此選項控制路線彎曲時，點圖庫的水平角度及垂直角度是否隨路線方向角變化，亦即下部結構是否與路線保持正交。默認水平角隨路線，垂直角不隨路線。



5 預覽插入的墩柱

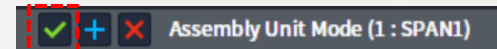


選取約束參考點

6 完成墩柱裝配

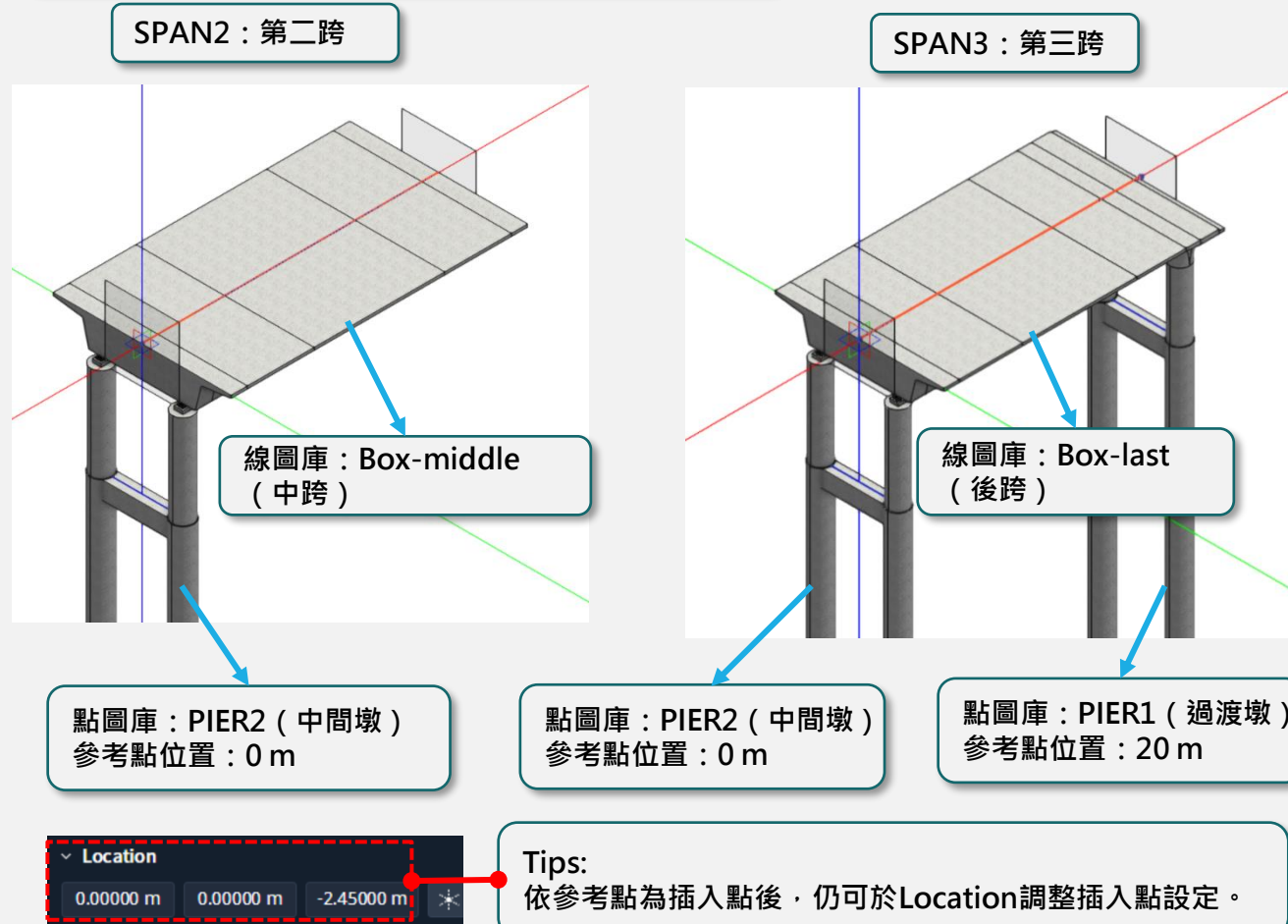


保存變更並關閉Assembly Unit Mode，隨後儲存檔案。



5. 創建與完成其他梁段組裝圖庫

1 依前述步驟1.~4.同樣方法建立第二跨及第三跨組裝圖庫



Tips:
依參考點為插入點後，仍可於Location調整插入點設定。

2 Base > Worktree > Data
查看Assembly Library 已創建的組裝圖庫



已創建的3個
Assembly Library

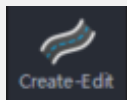
Tips:
右擊 > Modify 可查看並編輯該Assembly Library
右擊 > Export 可匯出CIM 組裝圖庫文檔(*.aubz)



1. 創建與規劃路線-平面曲線

1

Base > Layout > Create-Edit



2

Layout

Create / Edit

New

Classification

ID 1

Name Layout Info-1

Start Location

Geographic Coordinate

Origin Point (X) 0.0000 m

Origin Point (Y) 0.0000 m

Initial Angle 0.000 [deg]

Start Station

0.0000 m

Import Layout

Grid Setting

Main Scale 10.0000 m

Sub Division 2

命名路線

平面曲線

3

Horizontal Alignment

Vertical Alignment

Segment

Superelevation

4

Input Method By Length Transition Curve Accuracy

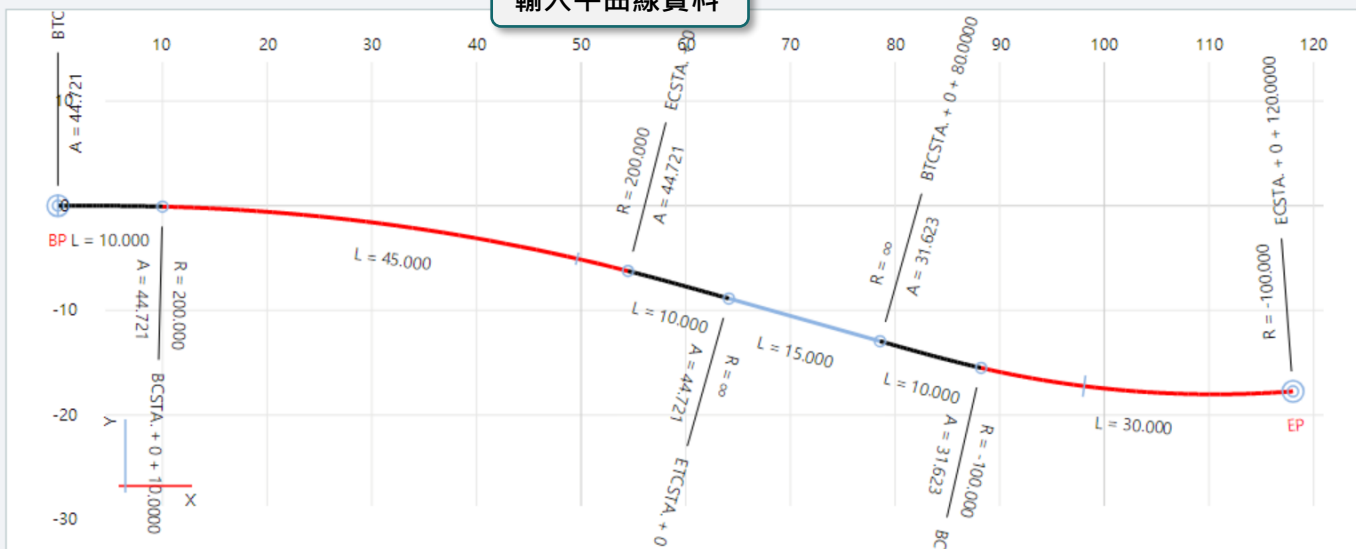
Number of Row 1 Add Del

增加路線平曲線 Number of Row : 5 <Add>

5

	Type	Coordinate-1(X) (m)	Coordinate-2(Y) (m)	Station (m)	Length (m)	R (m)	Rs (m)	Re (m)
1	B.P.	0.000000	0.000000	0.000000	0.000000			
2	Clothoid	6.666885	0.000000	10.000000	10.000000		0.000000	200.000000
3	Arc	32.587719	-0.648156	55.000000	45.000000	200.000000		
4	Clothoid	57.710588	-7.063077	65.000000	10.000000		200.000000	0.000000
5	Straight	78.563344	-12.946654	80.000000	15.000000			
6	Clothoid	84.980352	-14.757204	90.000000	10.000000		0.000000	-100.000000
7	Arc	102.963012	-18.872992	120.000000	30.000000	-100.000000		
8	E.P.	118.034047	-17.740540	120.000000	0.000000			

輸入平曲線資料



2. 規劃路線-縱面曲線

在 Layout Info-1 路線內：

Layout

Create / Edit

New

Classification

ID 1

Name Layout Info-1

Start Location

Geographic Coordinate

Origin Point (X) 0.0000 m

Origin Point (Y) 0.0000 m

Initial Angle 0.000 [deg]

Start Station

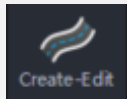
0.0000 m

Import Layout

Grid Setting

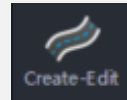
Main Scale 10.00000 m

Sub Division 2



3. 規劃路線-橋梁段

在 Layout Info-1 路線內：



Layout

Create / Edit

New

Classification

ID: 1

Name: **Layout Info-1**

Start Location

Geographic Coordinate

Origin Point (X): 0.00000 m

Origin Point (Y): 0.00000 m

Initial Angle: 0.0000 [deg]

Start Station: 0.00000 m

Import Layout

Grid Setting

Main Scale: 10.00000 m

Sub Division: 2

✓ + ✗

橋梁段 Sub Panel

Horizontal Alignment Vertical Alignment **Segment** Superelevation

增加分段點 Number of Row : 2 <Add>

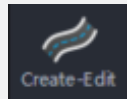
Number of Row: 1 Add Del

	Name	Station (m)	Skew ([deg])	Label
1	P1	0.000000	0.00	On
2	P2	40.000000	0.00	On
3	P3	80.000000	0.00	On
4	P4	120.000000	0.00	On

輸入橋梁段資料

4. 查看Layout 路線

在 Layout Info-1 路線內：



1

完成路線設定

Layout

Create / Edit

New

Classification

ID 1

Name Layout Info-1

Start Location

Geographic Coordinate

Origin Point (X) 0.00000 m

Origin Point (Y) 0.00000 m

Initial Angle 0.0000 [deg]

Start Station

0.00000 m

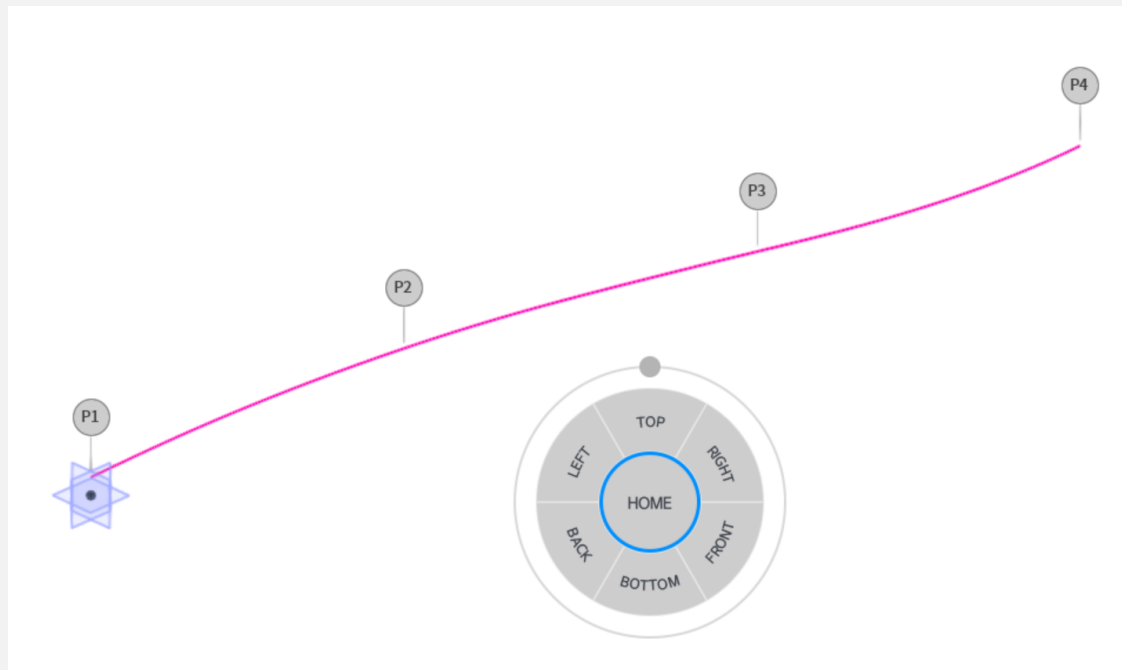
Import Layout

Grid Setting

Main Scale 10.00000 m

Sub Division 2

1 [check] + x

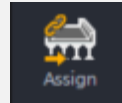


Tips:

1. 點擊滑鼠中鍵，出現視圖導航圓盤，可點擊改變視角。

5. 在路線上裝配 Assembly Unit

1 Base > Library > Assembly > Assign

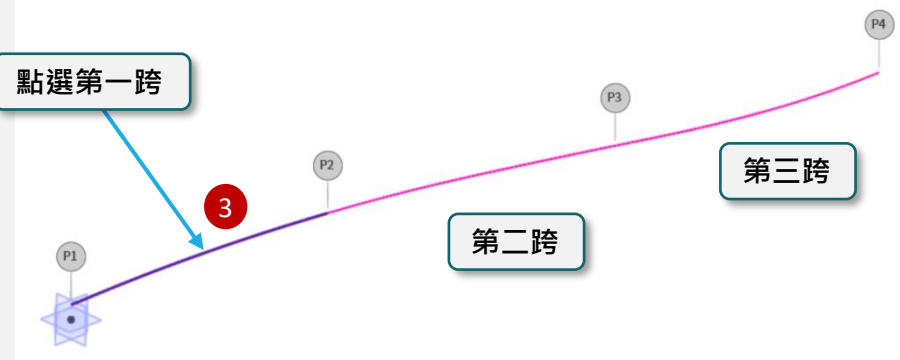


5 重複 2 ~ 4 · 將三跨組裝圖庫都添加到相應的路線分段上

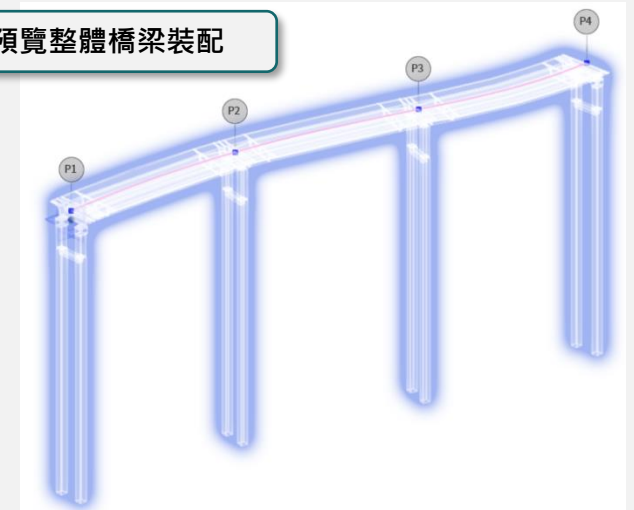
	Assembly Unit	Path Type	Offset	Dir.
1	SPAN1	Single Segment	Parallel	Fro...
2	SPAN2	Single Segment	Parallel	Fro...
3	SPAN3	Single Segment	Parallel	Fro...

選擇第一跨組裝圖庫

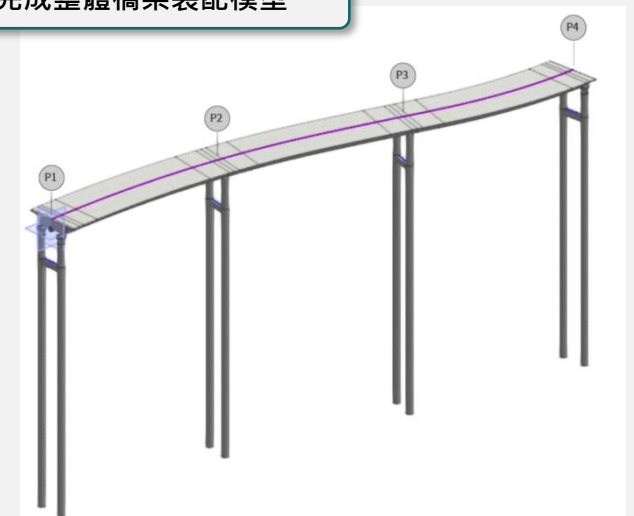
點選第一跨



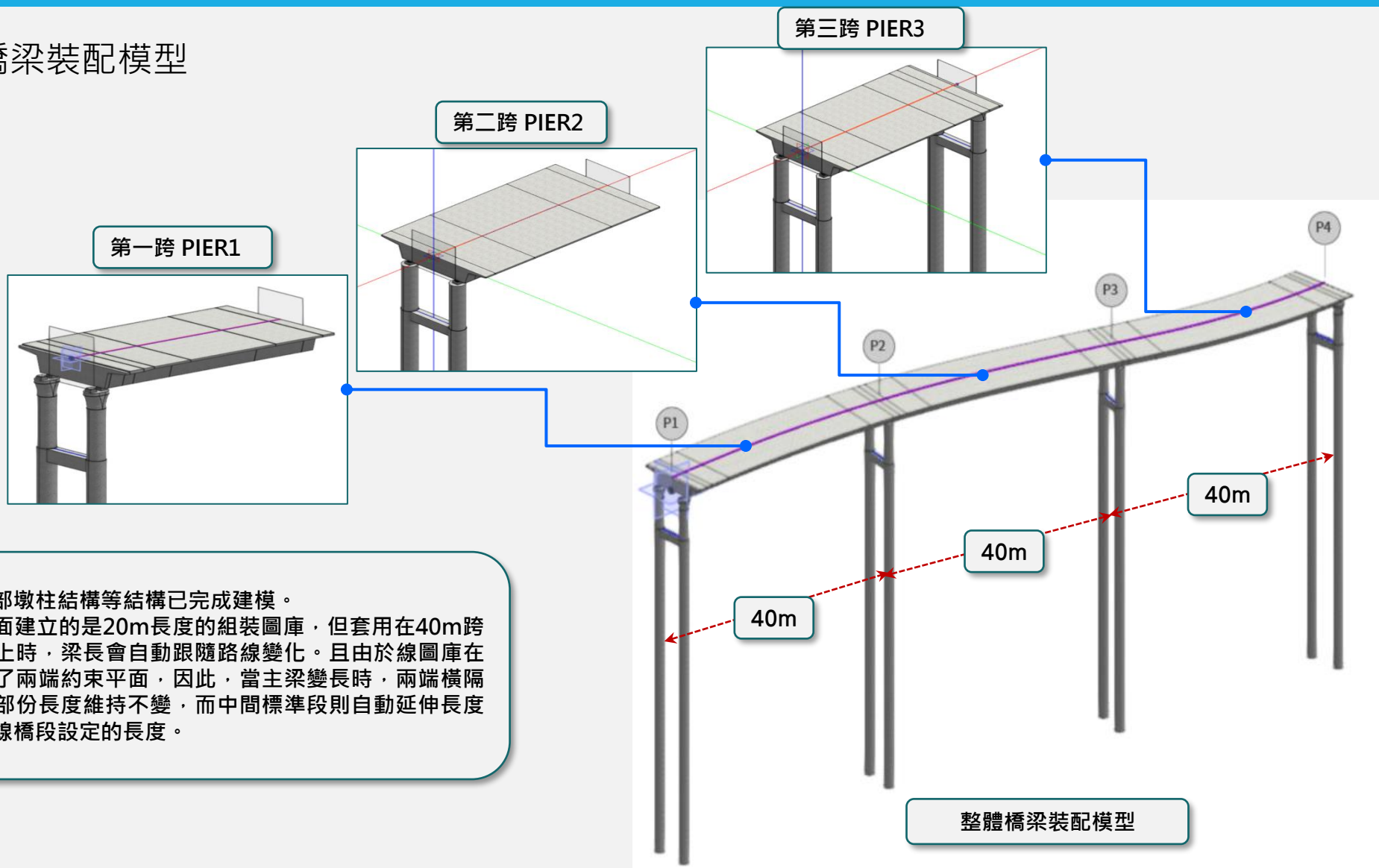
6 預覽整體橋梁裝配



7 完成整體橋梁裝配模型



6. 查看整體橋梁裝配模型



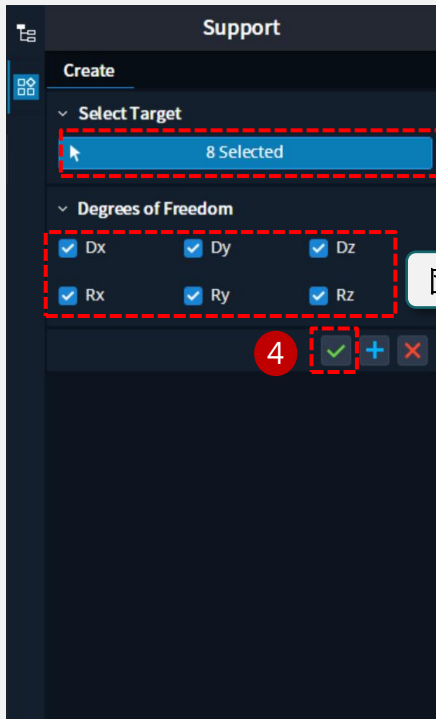
1. 墩柱底固定支承

1 Model > Analysis > Boundary > Support

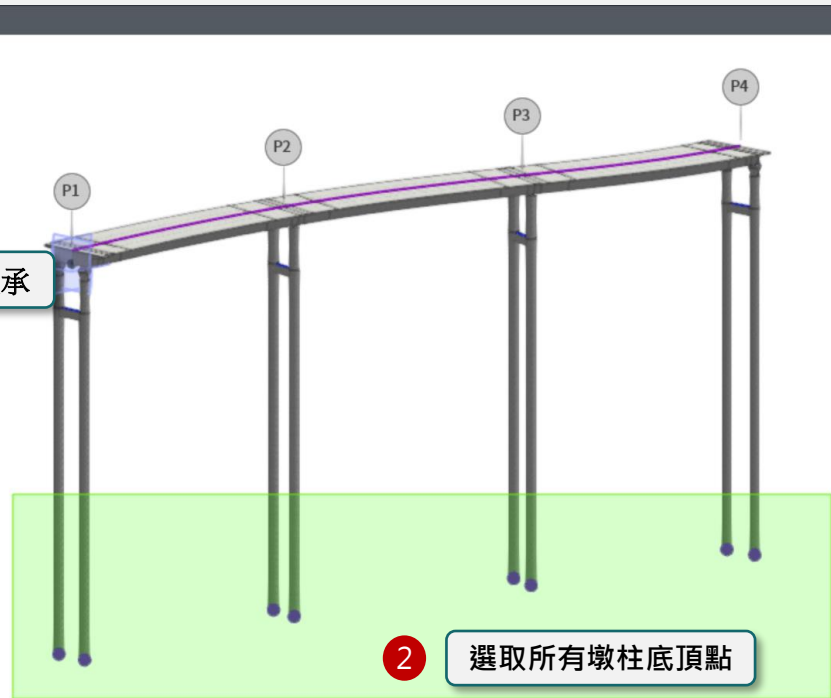


2

3



固定支承

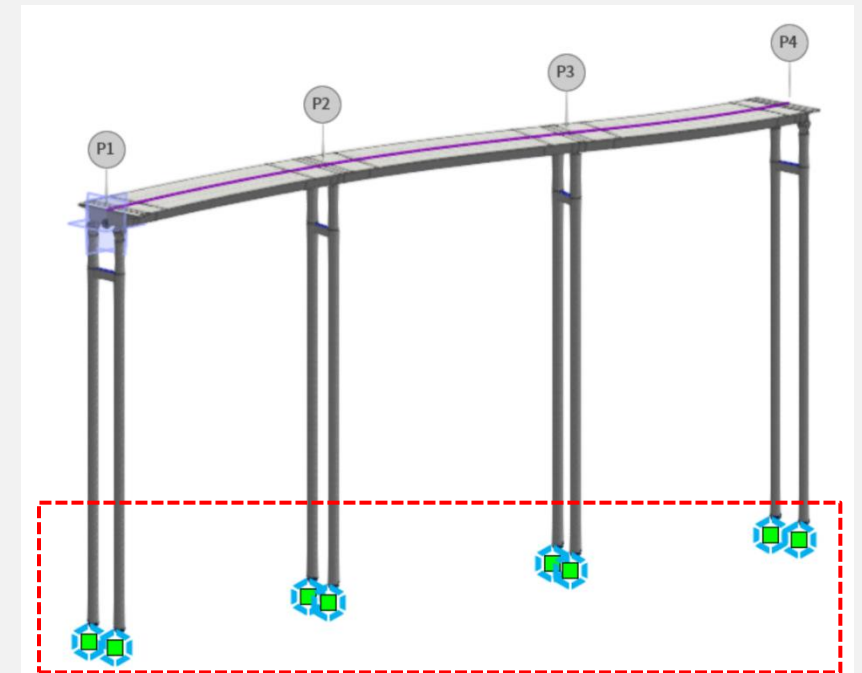


2

選取所有墩柱底頂點

4

墩柱底固定支承設定完成



2. 主梁與墩柱連接(剛性連桿)

1 Model > Analysis > Boundary > Rigid Link

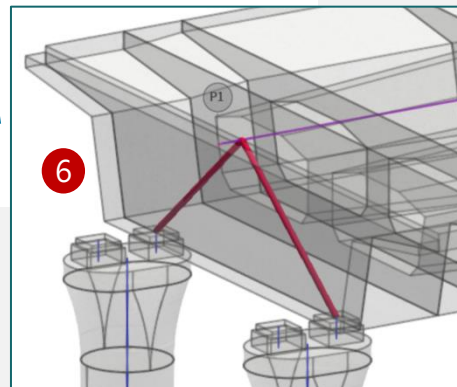
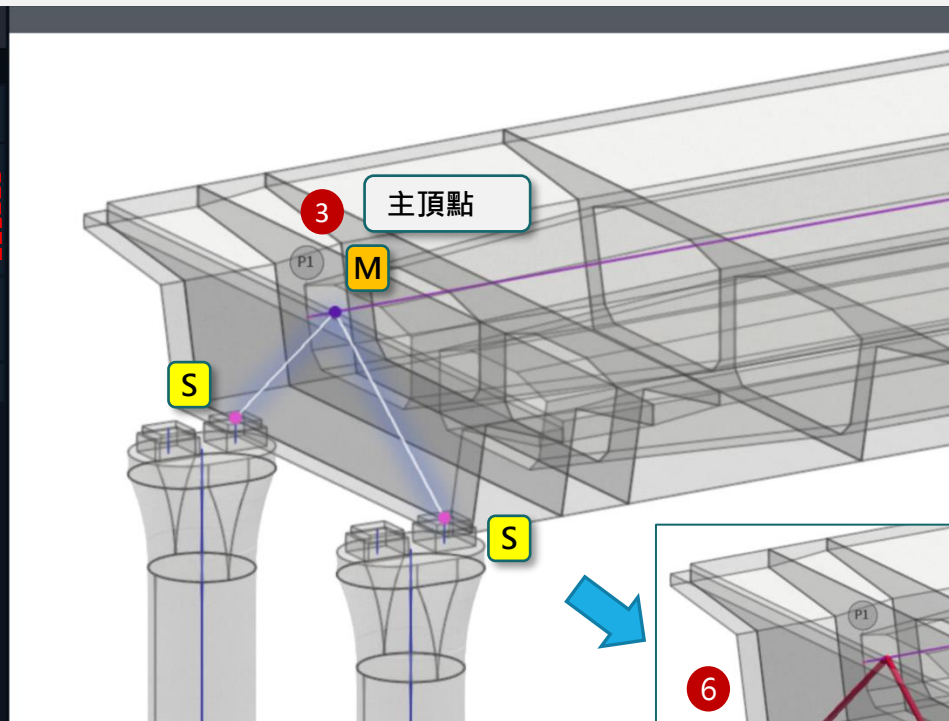
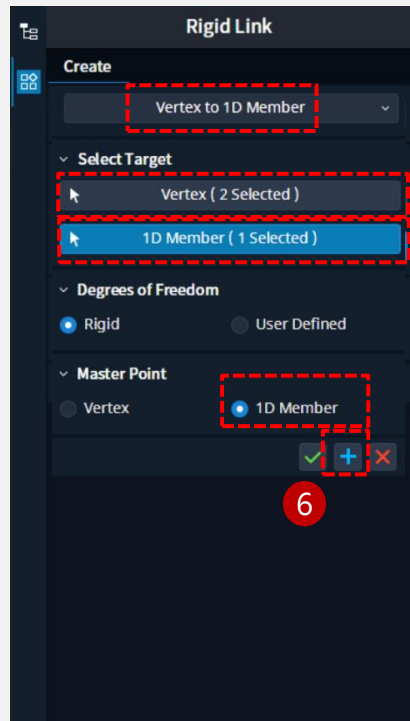


2

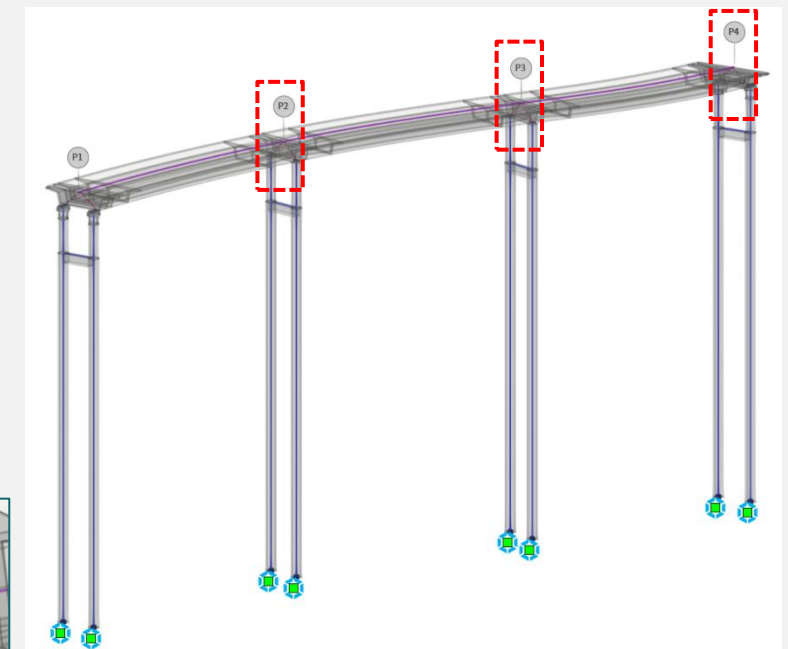
3

4

5



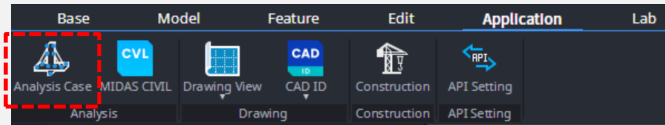
6 依相同方法完成P2~P4位置的連接



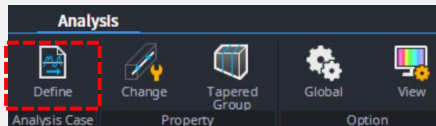
完成剛性連桿設定

1. 分析案例設定

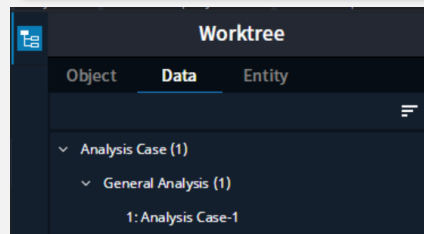
1 Application > Analysis > Analysis Case



2 Analysis > Analysis Case > Define



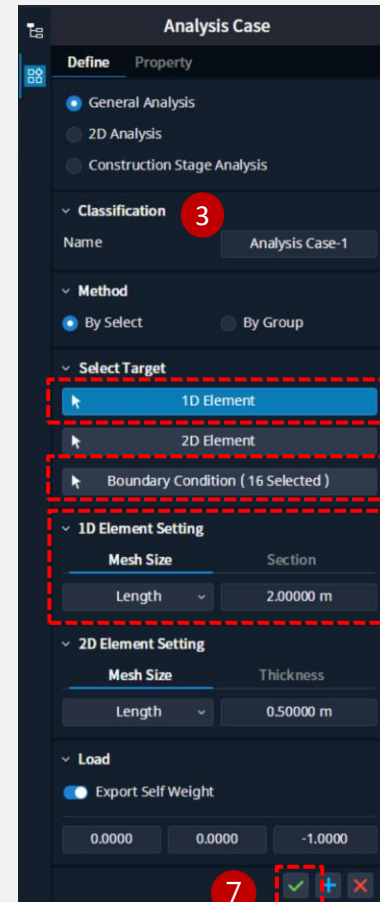
7 Analysis Case建立完成後，
可於Worktree > Data 查看已
經設定的Analysis Case



4

5

6



8

Analysis Mode

檔案命名

設定依長度分段
Length : 2 m

4

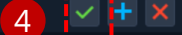
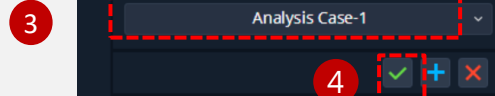
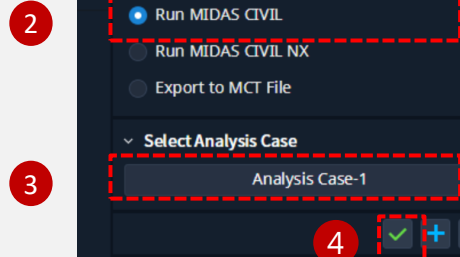
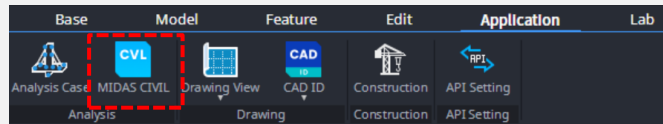
5

選取全部的模型對象
會自動選出 1D Element 及
Boundary Condition

保存變更並關閉Analysis Mode，隨後儲存檔案。

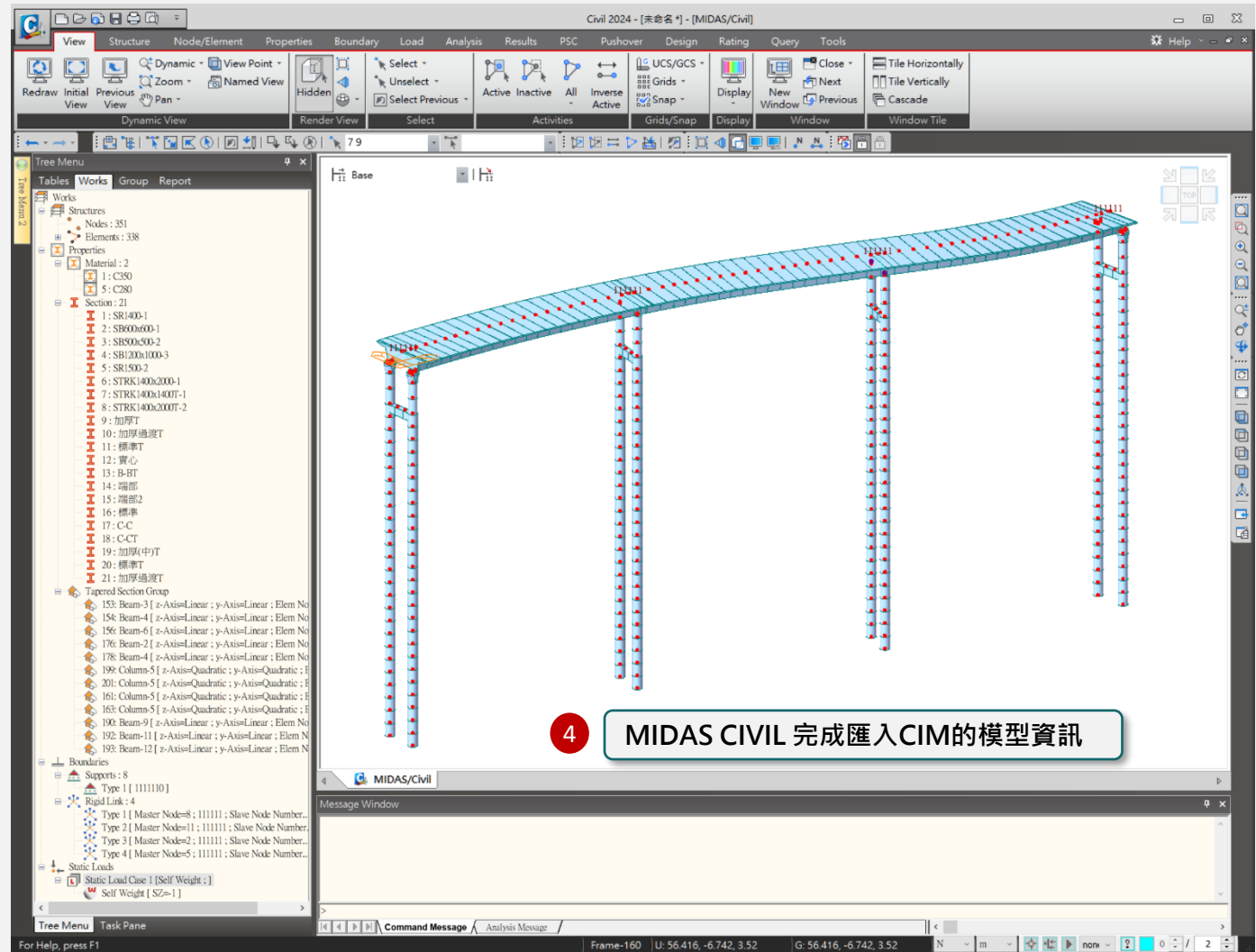
1.匯出MIDAS CIVIL分析模型檔案

1 Application > Analysis > MIDAS CIVIL



Export to
MIDAS CIVIL

同樣方式可匯出到 MIDAS CIVIL NX 或 MCT File



4 MIDAS CIVIL 完成匯入CIM的模型資訊