



MIDAS *Technical
Material*

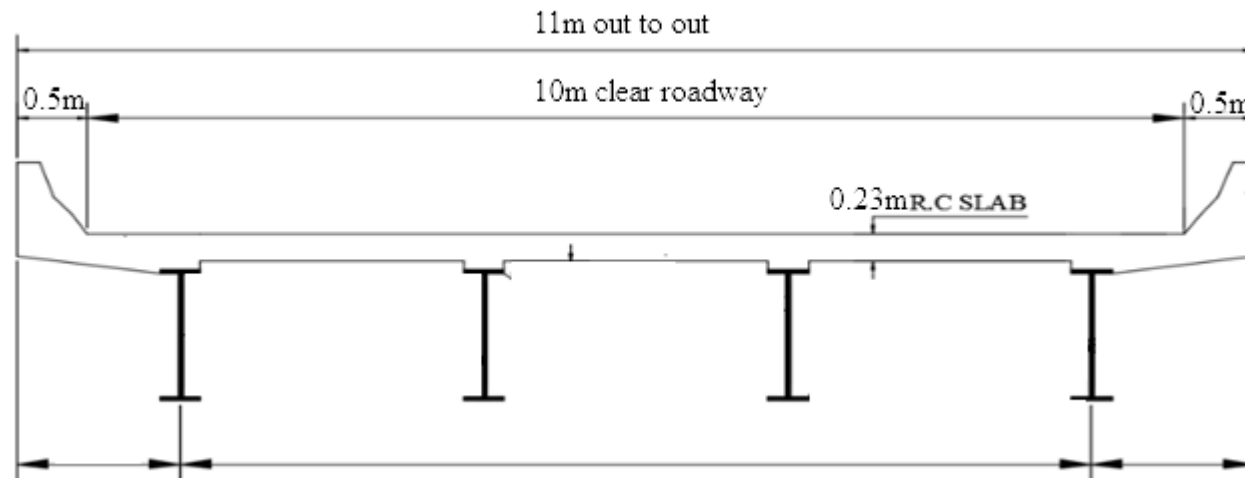
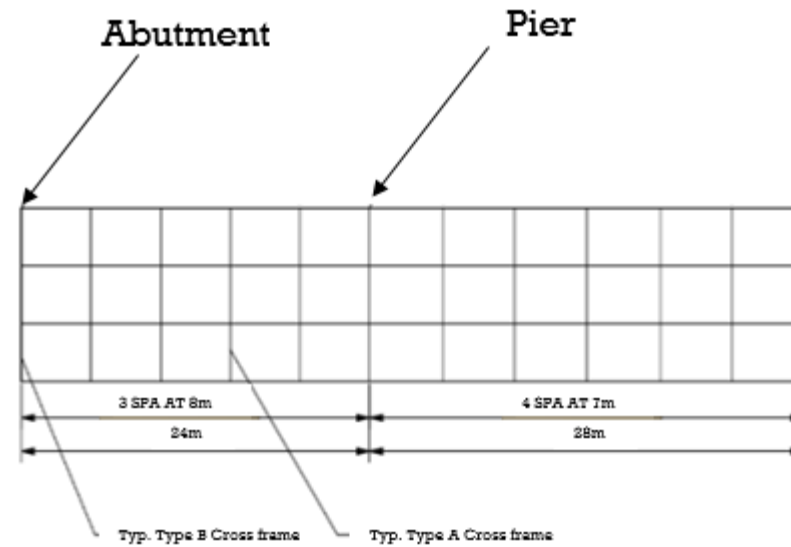
Tutorial

Steel Composite Bridge Wizard



Bridge Overview

- Bridge Type: Straight bridge
- Span Length: 24m and 28m
- Road Way: 10m
- Spacing of cross beams: 8m & 7m



Pre Processing

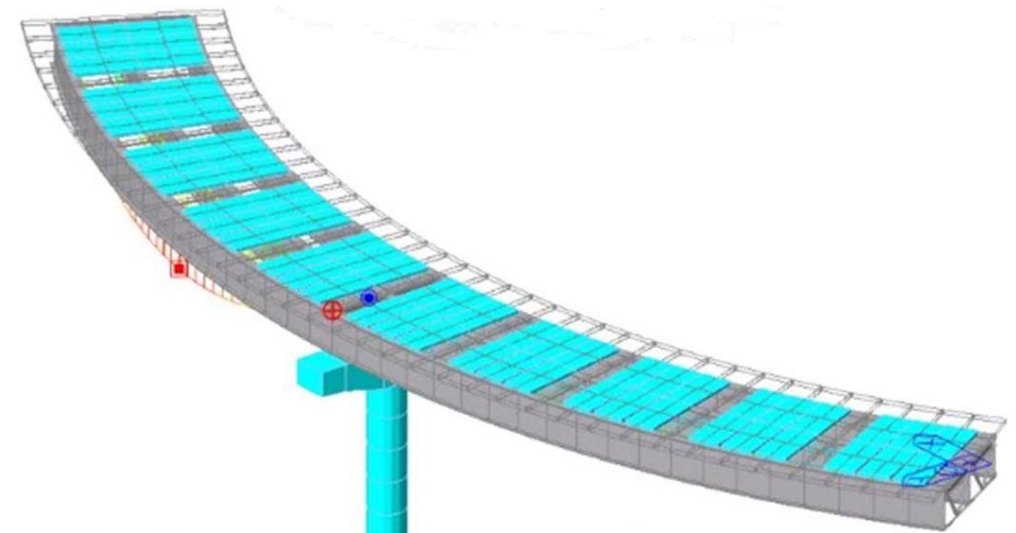
1. Definition of Properties
2. Define Layout- Composite girder wizard
3. Definition of Moving Load
4. Definition of Construction stages
5. Moving Load Analysis Option
6. Perform Analysis

Post processing-Analysis results

7. Reactions
8. Shear
9. Bending
10. Moving Load Influence Lines
11. Moving Load Tracer
12. Convert Moving Load into a Static Load

Composite Design

13. Load Combination Generation
14. Composite design
15. Design Results



Definition of Material Properties

1 Properties-> Material Properties

2 Click Add

3 Define Material Properties:

Name: **Girder**

Type of Design: **Steel**

Standard for steel: **AS/NZS 3678(S)**

DB for steel: **300**

Click: **Apply**

Name: **Bracing**

Type of Design: **Steel**

Standard: **AS/NZS 3678(S)**

DB: **250**

Click **Apply**

Name: **Deck**

Type of Design: **Concrete**

Standard: **AS17(RC)**

DB: **C40**

4 Click: **OK**

5 Click **Close**

The screenshot illustrates the process of defining material properties for a girder bridge. It shows the 'Properties' panel with the 'Material Properties' button highlighted. The 'Material Properties' dialog is open, showing a table of materials and buttons for adding, modifying, deleting, copying, importing, and renumbering. The 'Material Data' dialog is also open, showing the 'General' tab with fields for Material ID, Name, Type of Design, Standard, and DB. The 'Elasticity Data' tab is selected, showing fields for Modulus of Elasticity, Poisson's Ratio, Thermal Coefficient, Weight Density, and Use Mass Density. The 'Plasticity Data' tab is also visible, showing fields for Plastic Material Name, Inelastic Material Properties for Fiber Model, and Thermal Transfer.

Material Properties Dialog:

ID	Name	Type	Standard	DB
1	Girder	Steel	AS/NZS ...	300
2	Bracing	Steel	AS/NZS ...	250
3	Deck	Concrete	AS17(RC)	C40

Material Data Dialog:

General

Material ID: 1 Name: Girder

Elasticity Data

Type of Design: Steel

Steel

Standard: AS/NZS 3678(S)

DB: 300

Concrete

Standard:

Code:

DB:

Type of Material

☒ Isotropic ☐ Orthotropic

Steel

Modulus of Elasticity: 2.0000e+08 kN/m²

Poisson's Ratio: 0.25

Thermal Coefficient: 6.5000e-06 1/[F]

Weight Density: 76.98 kN/m³

☐ Use Mass Density: 7.85 kN/m³/g

Concrete

Plasticity Data

Plastic Material Name: NONE

Inelastic Material Properties for Fiber Model

Concrete: None Steel: None

Confined Concrete for Columns: None

Thermal Transfer

Specific Heat: 0 Btu/kN-[F]

Heat Conduction: 0 Btu/m-hr-[F]

Damping Ratio: 0.02

Buttons: OK, Cancel, Apply

Time Dependent Properties

Definition of Time Dependent Material Properties

1 Properties-> Creep/Shrinkage

2 Click Add

3 Define the following

Name: **C40**

Code: **AS 5100.5-2017**

Compressive strength of concrete at the age of 28 days: **40000** kN/m²

Hypothetical Thickness: **1** m

Click on **Show Result** to see graph

Click on **Close**

Click on **OK**

4 Click on **Comp. Strength**

5 Click on **Add** to define properties

Name: **C40**

Code: **AS 5100.5-2017**

Concrete Compressive Strength at 28 Days (f28): **40000** kN/m²

Click on **Redraw Graph**

Click on **OK** and **Close**

6 Properties-> Material Link

7 Creep/Shrinkage: C40

Comp. Strength: C40

Double click on Deck under Material

Click on **Add/Modify**

Click on **Close**

1 Properties-> Creep/Shrinkage

2 Click Add

3 Define the following

Name: **C40**
 Code: **AS 5100.5-2017**
 Compressive strength of concrete at the age of 28 days: **40000** kN/m²
 Exposure Environment: **Arid**
 Hypothetical Thickness: **1** m
 $h = 2 A_g / u$ (A_g : Section Area, u : Perimeter in contact with atmosphere)
 Drying Basic Shrinkage Strain (10^{-6}): **800.0** (Sydney, Brisbane) **900.0** (Melbourne) **1000.0** (Elsewhere)
 Age of concrete at the beginning of shrinkage: **3** day

4 Click on **Comp. Strength**

5 Click on **Add** to define properties

Name: **C40**
 Code: **AS 5100.5-2017**
 Concrete Compressive Strength at 28 Days (f28): **40000** kN/m²

6 Properties-> Material Link

7 Creep/Shrinkage: C40
 Comp. Strength: C40
 Double click on Deck under Material

Click on **Add/Modify**

Click on **Close**

Definition of Section properties

1 Properties-> Section Properties

2 Click Add

3 Choose Composite tab
Enter Name: **Composite I girder**
Section Type: **Steel – I(Type1)**
Bc: **2.75m**
tc: **0.23m**
Hh: **0.075m**

Hw: **1.5m** tw: **0.011m**

B1: **0.36m** B2: **0.45m**

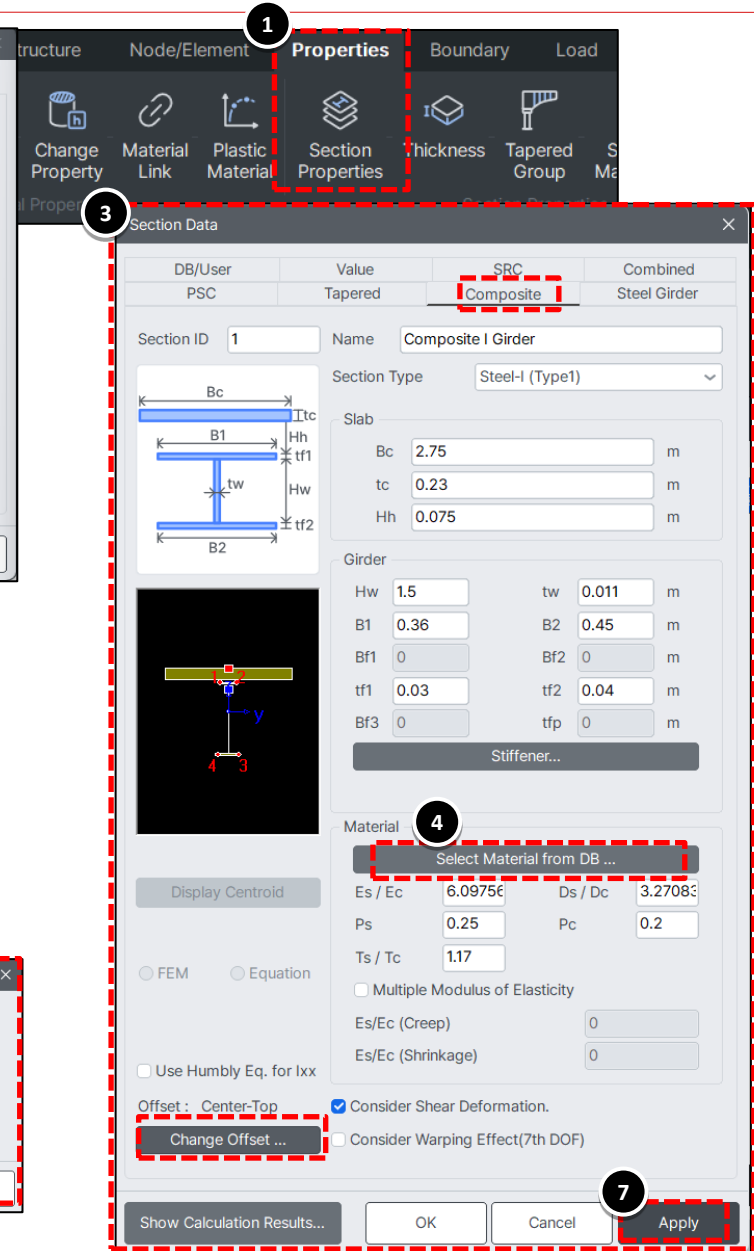
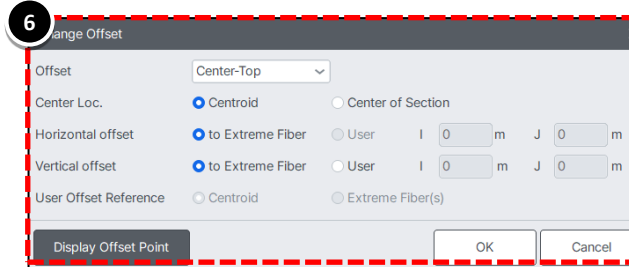
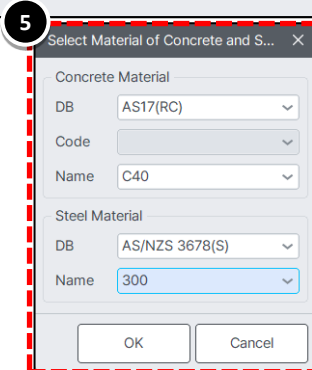
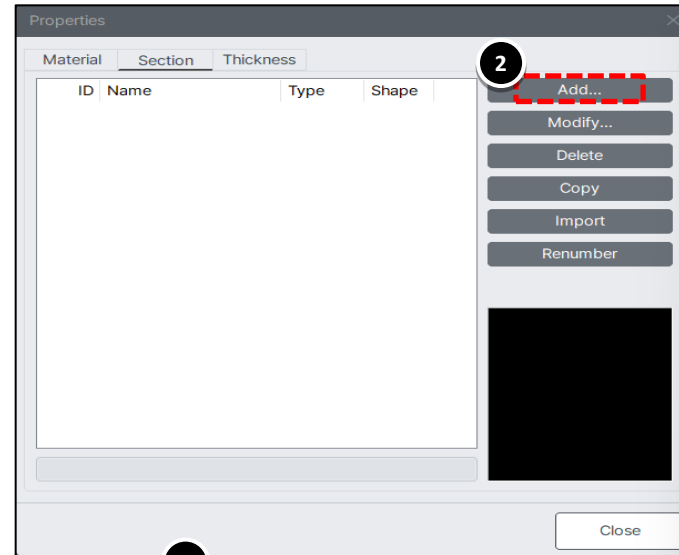
tf1: **0.03m** tf2: **0.04m**

4 Click **Select Material from DB...**

5 DB: **AS17(RC)** Name: **C40**
DB: **AS/NZS 3678(S)** Name: **300**
Click: **OK**

6 Click: **Change Offset ...**
Select: **Centre-Top** → Click: **OK**

7 Click: **Apply**



Definition of Section Properties

8 Change to DB/User Tab

9 Select: Angle Section

Click: User

Name: Bracing

Enter: $H=0.09\text{m}$

$B=0.09\text{m}$

$tw=0.01\text{m}$

$tf=0.01\text{m}$

10 Click: Apply

9 Select: T-Section

Click: User

Name: T-section

Enter: $H=0.267\text{m}$

$B=0.381\text{m}$

$tw=0.074\text{m}$

$tf=0.074\text{m}$

11 Click: OK

12 Click: Close

Section Data

8 DB/User

9 Section ID 2 Angle

Name Bracing User DB UNI

Sect. Name

☒ Built-Up Section

Get Data from Single Angle

DB Name AISC10(US)

Sect. Name

H 0.09 m

B 0.09 m

tw 0.01 m

tf 0.01 m

☐ Consider Principal Axis

theta 0 [deg]

Offset: Center-Center ☒ Consider Shear Deformation.

Change Offset ... ☐ Consider Warping Effect(7th DOF)

Show Calculation Results... OK Cancel Apply

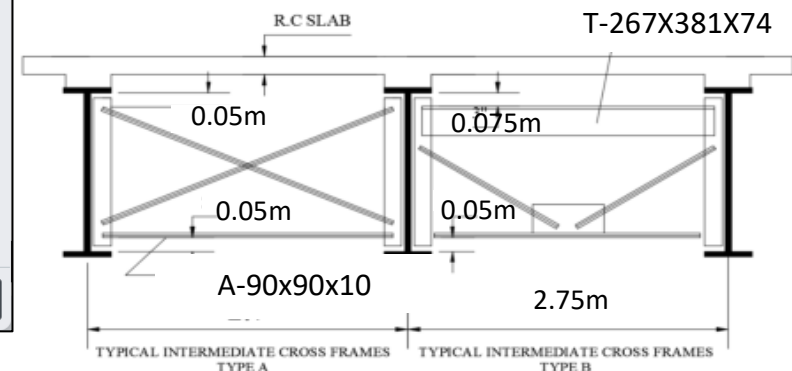
Properties

Material Section Thickness

ID	Name	Type	Shape
1	Composite I Girder	Composite	CP_I
2	Bracing	User	L
3	T-section	User	T

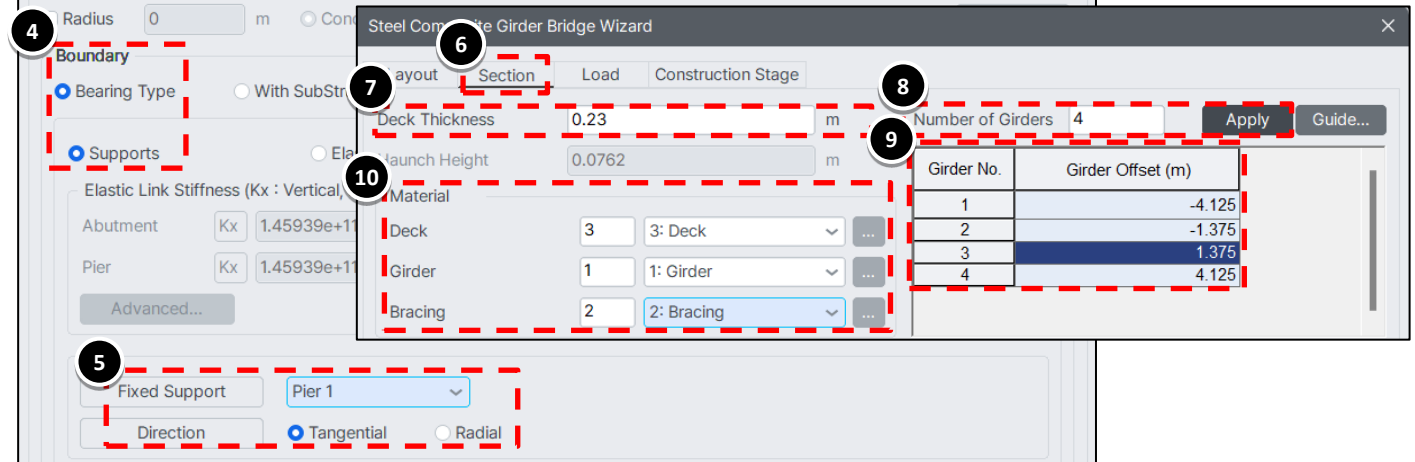
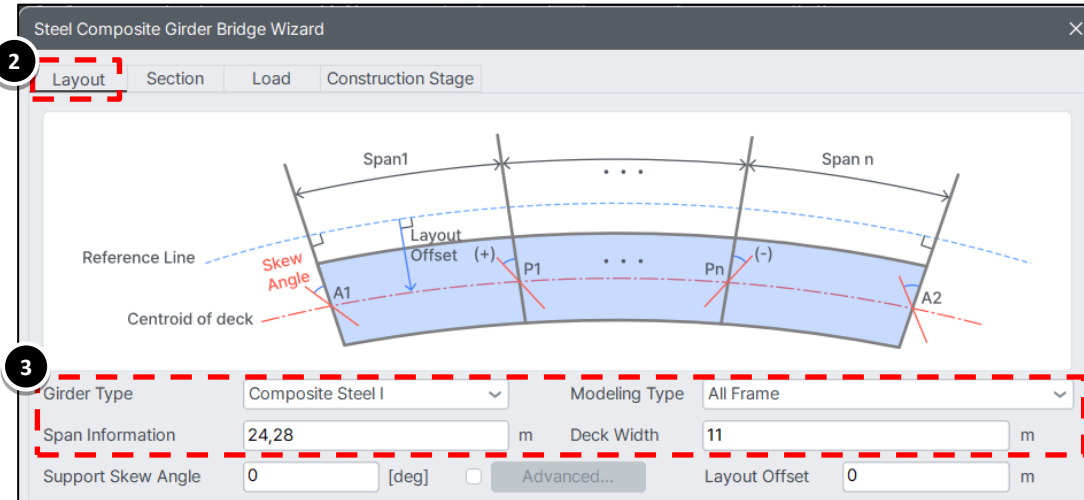
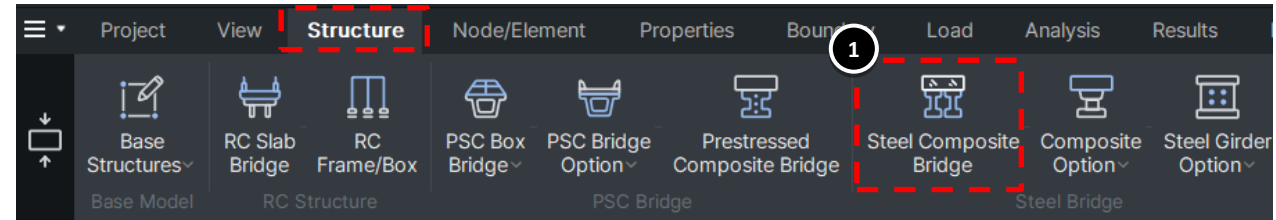
Add... Modify... Delete Copy Import Renumber

12 Close



Steel Composite Girder Bridge Wizard

- 1 Go to **Structure**-> **Steel Composite Bridge**
- 2 Click: **Layout**
- 3 Girder Type: **Composite Steel I**
Modelling Type: **All Frame**
Span Information: **24m, 28m**
Deck Width: **11m**
- 4 Boundary: **Bearing Type**
Click: **Supports**
- 5 Fixed Support: Select **Pier 1**
Direction: Select **Tangential**
- 6 Click: **Section**
- 7 Deck Thickness: **0.23m**
- 8 No. of Girder: **4**
- 9 Girder Offset(m)
No. 1: **-4.125m** No. 2: **-1.375m**
No. 3: **1.375m** No. 4: **4.125m**
- 10 Material:
Deck 3: **Deck**
Girder 1: **Girder**
Bracing 2: **Bracing**



Steel Composite Girder Bridge Wizard

Bracing Information

- 1 Transverse Deck Element:
Select Distances: **2m**
Click: **Bracing Details...**
- 2 Name: **Type-A**
Type: **Bracing**
Bracing Parameter
Element Type: **Truss**
Uncheck **Top**
Brace: **Bracing**
Type: **X Brace**
Bottom: **Bracing**
Gap at Top: **0.05m**
Gap at Bottom: **0.05m**
- 3 Click **Modify**
- 2 ID: **2**
Name: **Type-B**
Type: **Bracing**
Bracing Parameter
Check **Top**
Top **T-Section**
Gap at Top: **0.075m**
Gap at Bottom: **0.05m**
All other parameters remains same
- 3 Click: **Add**
- 4 Click: **Close**

Steel Composite Girder Bridge Wizard

Layout Section Load Construction Stage

Deck Thickness: 0.23 m

Haunch Height: 0.0762 m

Material

Deck: 3 3: Deck

Girder: 1 1: Girder

Bracing: 2 2: Bracing

Number of Girders: 4

Girder No.	Girder Offset (m)
1	-4.125
2	-1.375
3	1.375
4	4.125

Angle type: Perpendicular

Transverse Deck Element

Spacing: Distances 2 m

Bracing Information

Bracing Details... Guide...

Spacing Divisions per Span Different Brace Spacing per Girder

Girder	Name	Divisions per Span	Angle Type	Angle
1~4	Type-A	3,4	Perpendicular	0

Different Support Bracing

Support	Name	Angle Type
1	Type-B	
2	Type-A	Perpendicular
3	Type-B	

Girder Information

Girder 1 Girder 2 Girder 3 Girder 4

No. of Divisions: 2

No.	Name	Start (m)	End (m)
1	1: Composite I Girder	0	26
2	1: Composite I Girder	26	52

Stringer

Section: 7

Material: 1 1: Girder

Define Girder Section...

Splice

Generate 10th points elements

Copy Current Girder Data to Other Girders

Open... Save As... OK Cancel

Bracing Information

Spacing: **Division per span**
Enter Divisions per Span as **3,4**
Girder 1~4:
Select **Type-A**

Check **Different Support Bracing**
Support 1 & 3: **Type-B**
Support 2: **Type-A**

Define Bracing Details

ID: 1 Name: Type-A

Type

Bracing Single Beam Guide...

Bracing Parameter

Element Type: Truss Beam

Top

Brace: 2: Bracing

Type: X Brace

Bottom: 2: Bracing

Brace/Chord Location

Gap between Top Chord/Brace End & Top Girder Flange: 0.05 m

Gap between Bottom Chord/Brace End & Bottom Girder Flange: 0.05 m

Add Modify Delete

ID	Name
1	Type-A
2	Type-B

Close

Steel Composite Girder Bridge Wizard

Girder Information

1 Click Girder 1 tab

No. of Division:1

Click **Apply**

No	Name	Start (m)	End (m)
1	Composite I girder	0	52

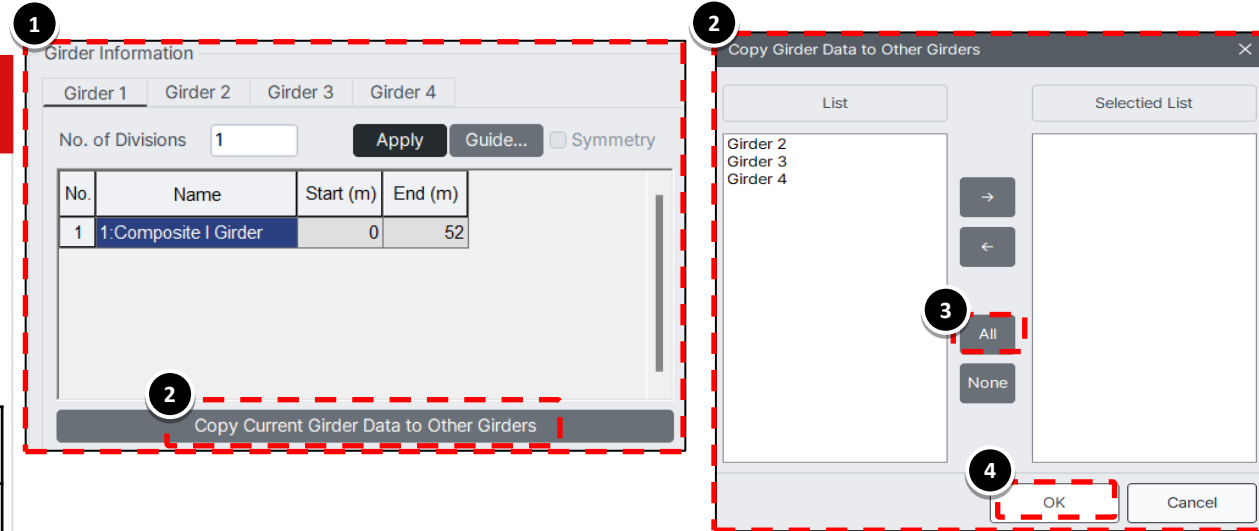
2 Click: **Copy to Current Girder Data**

to Other Girders

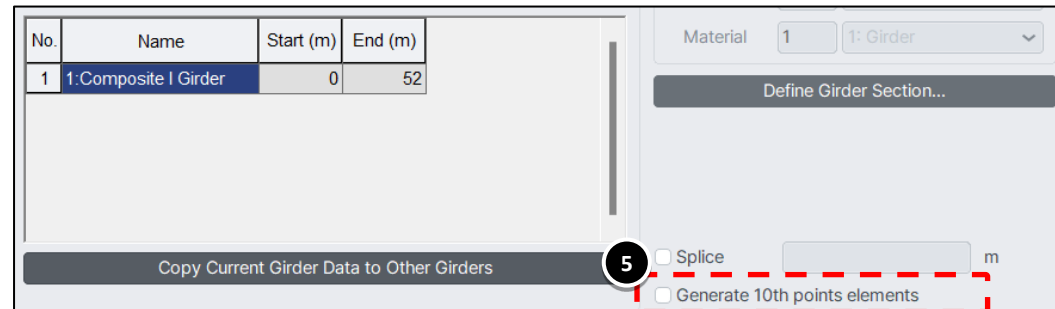
3 Click: **All**

4 Click: **OK**

5 Tick off **Generate 10th points**
elements



Note: If multiple girder lines have different section properties along the bridge length, girder data for one girder can be copied to the other girder(s)



Steel Composite Girder Bridge Wizard

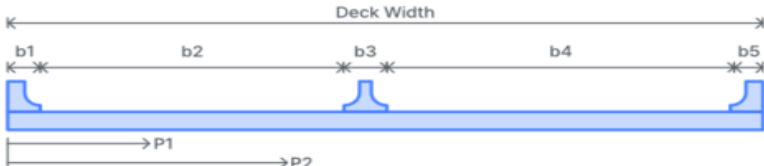
Load Information

- 1 Click on: **Load** tab
- 2 b1: **0.5m** b2: **5m**
b3: **0m** b4: **5m**
b5: **0.5m**
- 3 Check **DC(Before Composite)** and **DW(After Composite)**
Weight Density: **24kN/m³** &
Thickness **0.23m**
Barrier: **2.1kN/m**
Uncheck Median Strip
Check: **Wearing Surface**
Weight Density: **20 kN/m³**
Thickness: **0.1m**

Steel Composite Girder Bridge Wizard

Layout Section **Load** Construction Stage

Pavement and Barrier



b1: 0.5 m b2: 5 m b3: 0 m b4: 5 m b5: 0.5 m

Dead Loads

Equally to All Girder

☒ DC(Before Composite) ☐ DC(After Composite) ☒ DW(After Composite)

	DC	DW
Before Composite	☒ Self Weight ☒ Wet Con'c Weight Density: 24 kN/m ³ Thickness: 0.23 m ☐ Form Work: 0 kN/m ² ☐ S.I.P forms	
After Composite	☒ Barrier: 2.1 kN/m ☐ Median Strip: 2.626903 kN/m ☐ Additional Load: 0 kN/m Positions (P1): m	☒ Wearing Surface Weight Density: 20 kN/m ³ Thickness: 0.1 m ☐ Utilities: 0 kN/m Positions (P2): m

☐ Live Loads Define Moving Load Case... Define Traffic Lanes... Define Vehicles...

Open... Save As... OK Cancel

Steel Composite Girder Bridge Wizard

Load Information

1 Click **Define Moving Load Case**

2 Moving Load Code: **Australia**

Click **OK**

3 Check: **Live loads**

4 Click **Define Traffic Lane...**

No. of Lanes: **3**

Type distance

5 D1: **2.1m** D2: **5.3m** D3: **8.5m**

6 Click: **OK**

3 ☐ Live Loads 1 Define Moving Load Case... 4 Define Traffic Lanes... Define Vehicles...

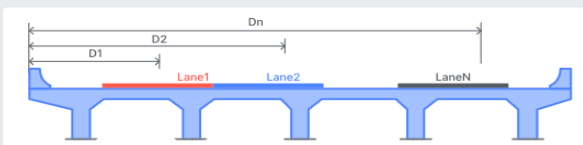
Select Moving Load Code

Moving Load Code Australia

- None
- AASHTO Standard
- AASHTO LRFD
- PENNDOT
- Canada
- BS
- EUROCODE
- Australia**
- Poland
- Russia
- South Africa
- France
- Korea
- KSCE-LSD15
- China
- India
- Taiwan
- Transverse

4 Define Traffic Lanes

Traffic Lanes



No. of Lanes 3

No.	Distance(m)
D1	2.1
D2	5.3
D3	8.5

6 OK Cancel

Steel Composite Girder Bridge Wizard

Load Information

- 1 Click **Define Vehicles**
- 2 Click **Add Standard**
- 3 Vehicular Load Type: Select
Vehicular load type: M1600
- 4 Click **OK**
- 5 Click **Close** for vehicles window

☒ Live Loads

Define Moving Load Case...

Define Traffic Lanes...

1 Define Vehicles...

Vehicles
✕

Vehicle Name	Type

2 Add Standard

Add User Defined

Modify

Delete

5 Close

Define Standard Vehicular Load
✕

Standard Name

AS 5100.2 - Road Traffic

Vehicular Load Properties

Vehicular Load Name

M1600

Vehicular Load Type

3 M1600

Dynamic Load Allowance

0.3

No	Load(kN)	Spacing(m)
1	120	1.25
2	120	1.25
3	120	3.75
4	120	1.25
5	120	1.25
6	120	6.25
7	120	Infinite
8	120	1.25
9	120	1.25

W

6

kN/m

4 OK

Cancel

Apply

Steel Composite Girder Bridge Wizard

Construction Stage and reinforcement

Information

- ① Click **Construction Stage** tab
- ② Make sure the option for **Construction stage** and **Deck Pouring Sequence** is checked
- ③ For **Negative-moment zone length** input **7.8m**
- ④ Check the box for **Reinforcement**
- ⑤ Click on **Define Reinforcement**
- ⑥ Click on **Composite I girder** this will display the section.

Steel Composite Girder Bridge Wizard

Layout Section Load **Construction Stage**

☒ Construction Stage

☒ Deck Pouring Sequence

Deck Split Construction... Negative-moment zone length m ☐ Advanced...

Stage	Stage Description	Load Condition	Duration (Day)
1	Girder(Part1), Bracing is Activated	Form Work Load Activated	10
2-1	Deck(D1, D3) is Activated as a load	Wet concrete Load(D1, D3) is Activate	10
2-2	Deck(D1, D3) is in composite stage	Bridge deck concrete formwork load (D	0
2-3	Deck(D2) is Activated as a load	Wet concrete Load(D2) is Activated	10
2-4	Deck(D2) is in composite stage	Bridge deck concrete formwork load (D	0
3	After-Composite Load is Activated	DC2, DW Load Activated	10
4	Long Term Effect is considered	-	10000

☐ Long Term Boundary Group...

☒ Reinforcement

Define Reinforcement...

Section Manager

Mode

Reinforcements

Target Section & Element

Section: 1

1 : Composite I Girder

Steel Composite Girder Bridge Wizard

Reinforcement definition

7 Check **Guide Line: 0.05m**

8 Select **Input Method B**

9 Check **Edge Bar**

Select **Dia: D12 Part: Part 2**

Select **Num.** and enter **28**

10 Click in box for **Starting Point (y,z)**

Click on the top left and top right corners of the **guide line**

11 Click **Add**

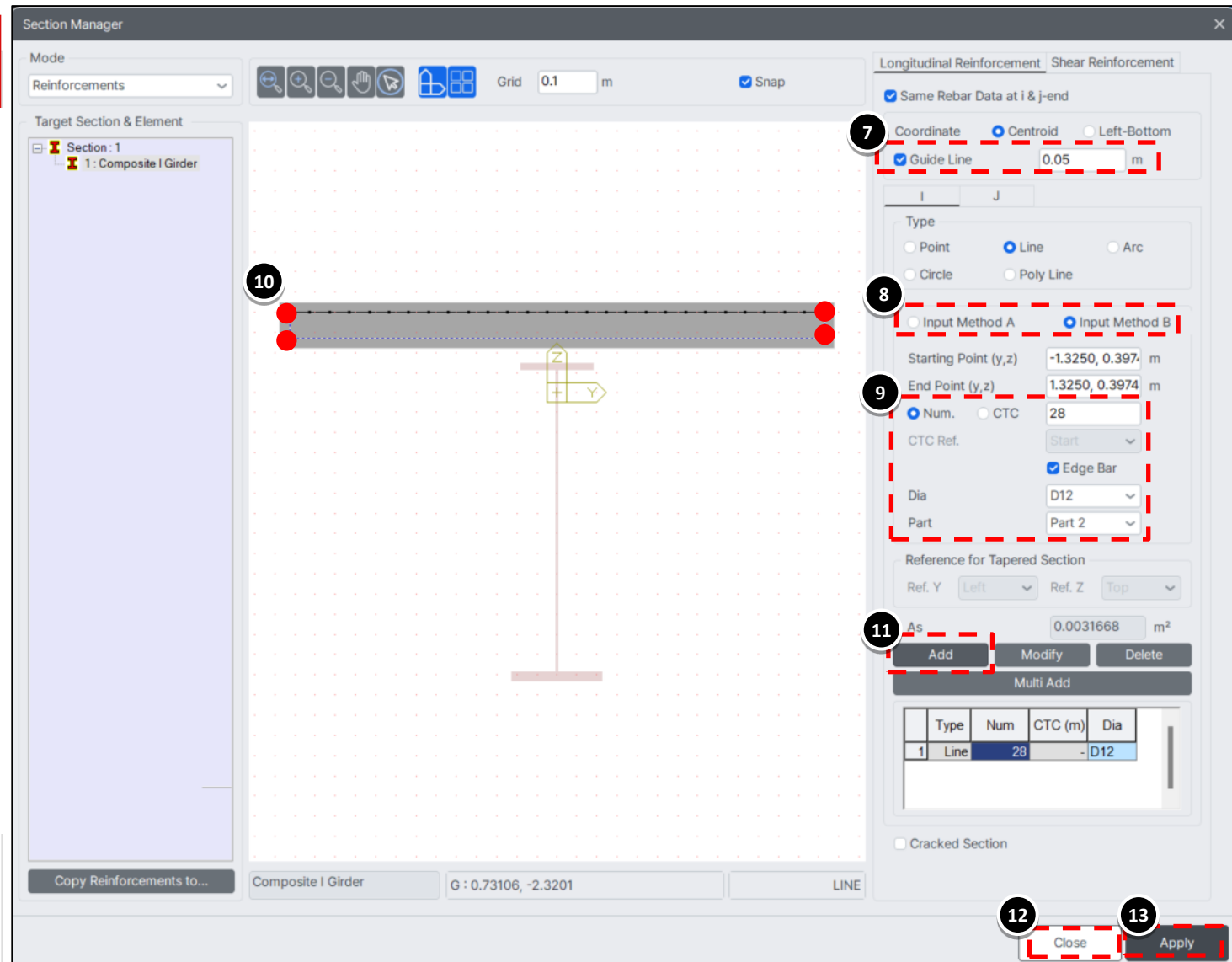
Click in box for **Starting Point (y,z)**

10 Click on the bottom left and bottom right corners of the **guide line**

11 Click **Add**

12 Click **Apply**

13 Click **Close**



Steel Composite Girder Bridge Wizard

Running the wizard

Run the wizard by clicking on **OK**

Steel Composite Girder Bridge Wizard

Layout Section Load Construction Stage

☒ Construction Stage

☒ Deck Pouring Sequence

Deck Split Construction... Negative-moment zone length m ☐ Advanced...

Stage	Stage Description	Load Condition	Duration (Day)
1	Girder(Part1), Bracing is Activated	Form Work Load Activated	10
2-1	Deck(D1, D3) is Activated as a load	Wet concrete Load(D1, D3) is Activate	10
2-2	Deck(D1, D3) is in composite stage	Bridge deck concrete formwork load (D	0
2-3	Deck(D2) is Activated as a load	Wet concrete Load(D2) is Activated	10
2-4	Deck(D2) is in composite stage	Bridge deck concrete formwork load (D	0
3	After-Composite Load is Activated	DC2, DW Load Activated	10
4	Long Term Effect is considered	-	10000

☐ Long Term Boundary Group...

☒ Reinforcement

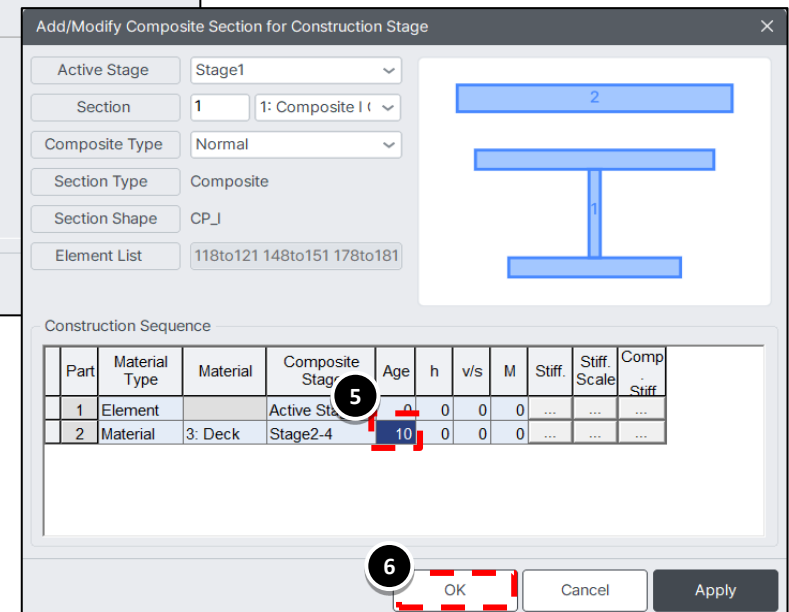
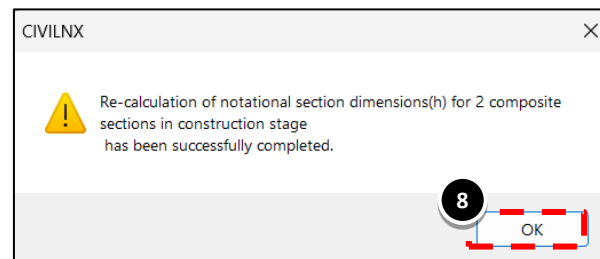
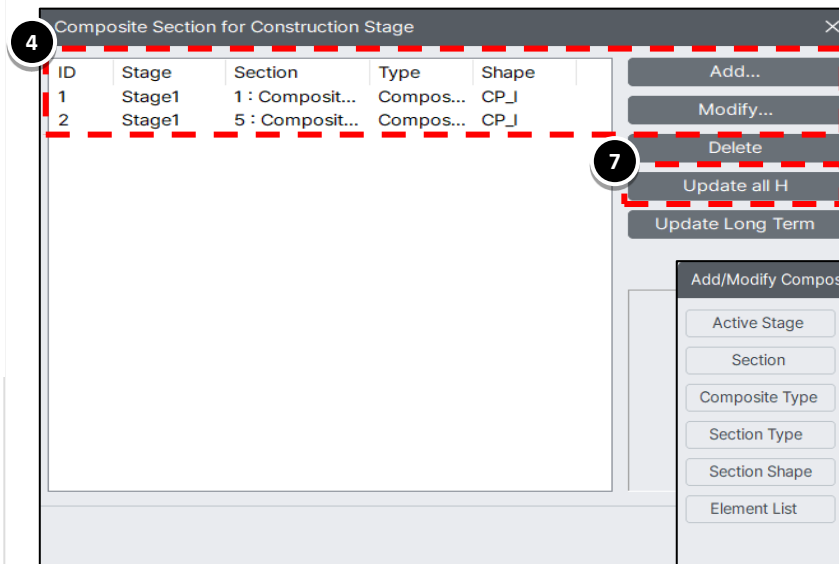
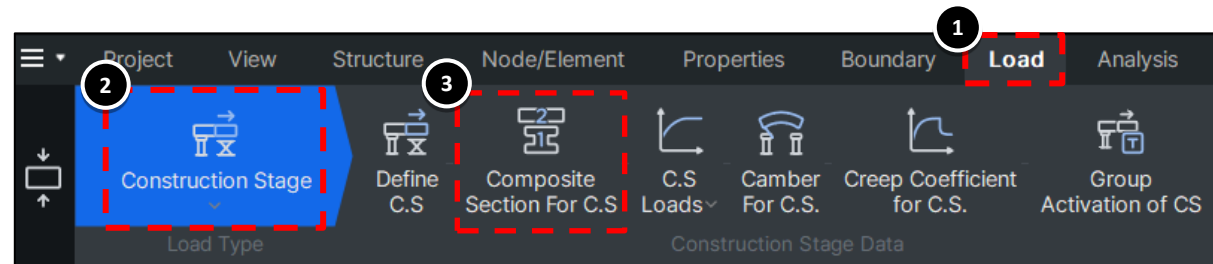
Define Reinforcement...

Open... Save As... **OK** Cancel

Modifying Composite Section For C.S

Modify Construction Stages for Composite Section

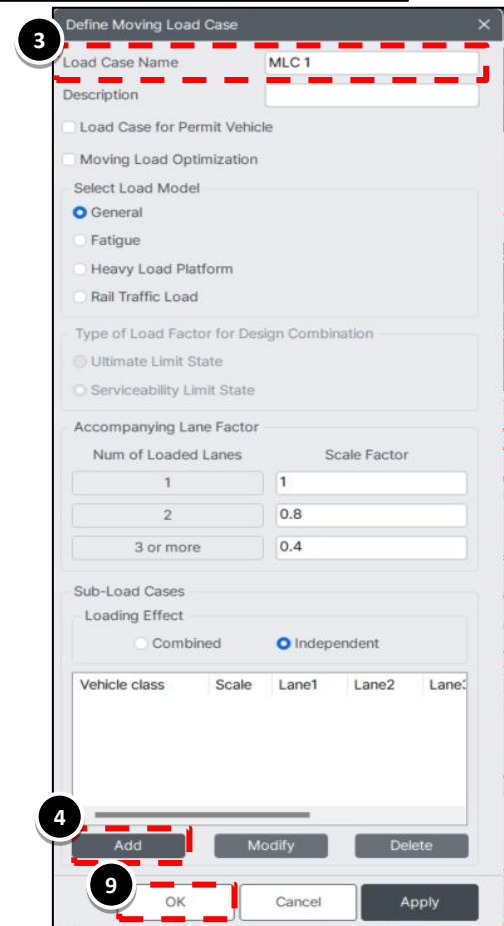
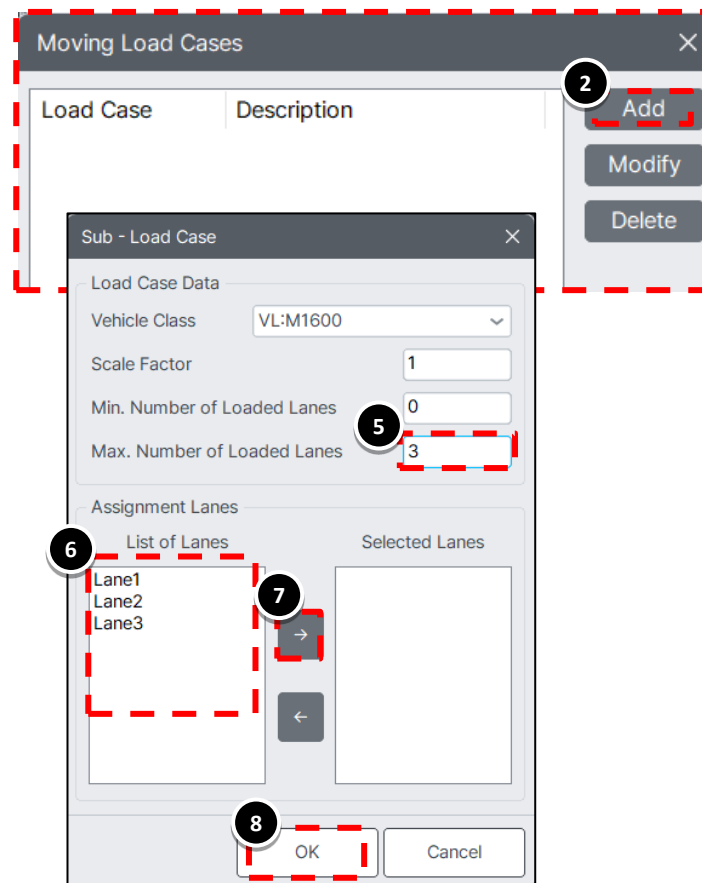
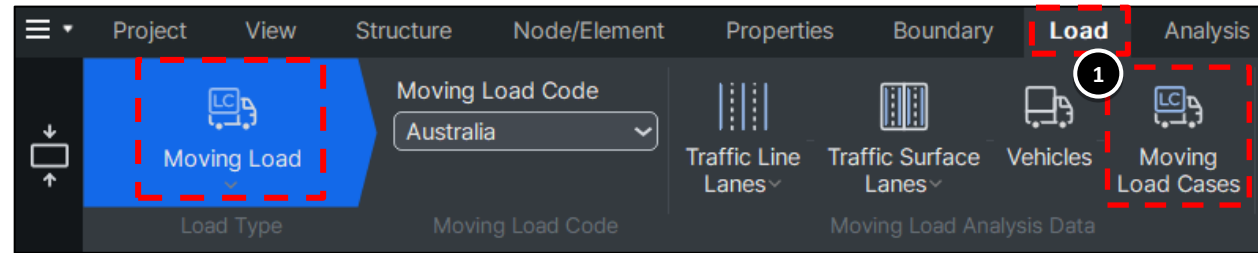
- ① Once the model is generated, go to
- ② **Load -> Construction Stage ->**
- ③ **Composite Section For C.S**
- ④ Select ID '1' section and Click **Modify**
- ⑤ Update **Part 2 Age** to **10**
- ⑥ Click **OK**
- Repeat same steps for ID '2'
- ⑦ Click on **Update all H**
- ⑧ Click **OK** and **Close**



Defining Moving Load Combination

Moving Load Case Definition

- ① Once the model is generated, go to **Load -> Moving Load -> Moving Load Cases**
- ② Click on **Add**
- ③ Load case Name: **MLC1**
- ④ Click on **Add**
- ⑤ Enter max. number of loaded lanes **3**
- ⑥ Select all lanes
- ⑦ Click on **->**
- ⑧ Click **OK**
- ⑨ Click **OK**

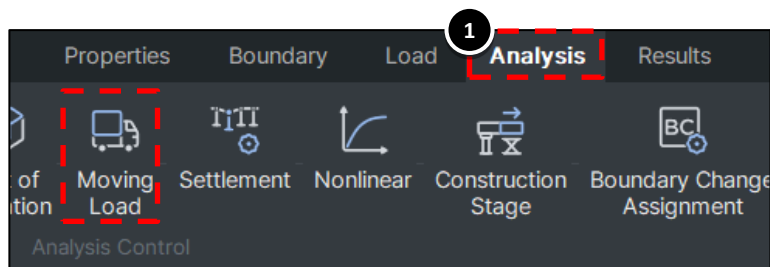
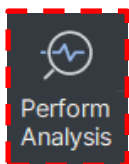


Moving Load Analysis Control

Moving Load Analysis option

- ① Go to Analysis -> Moving Load
Click on Add
- ② Select Normal + Concurrent
Force/Stress
- ③ Click OK

Click on the “Perform Analysis”
button



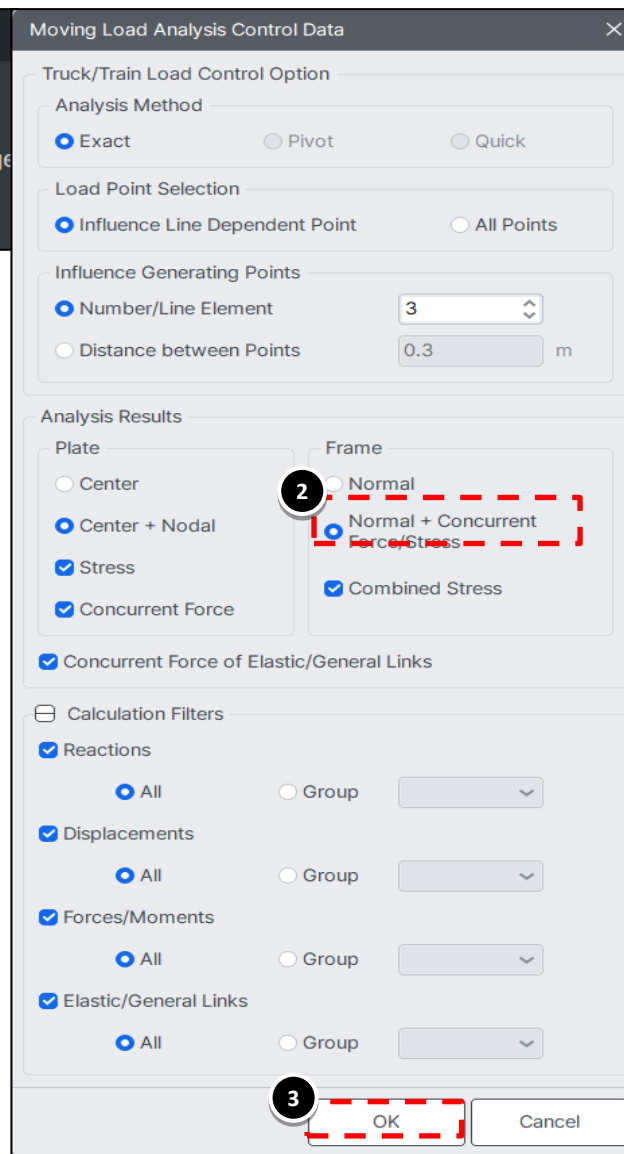
Normal + Concurrent Force: If the output of the concurrent forces for max and min values is required for moving load analysis select : “Normal + Concurrent Force”

Note

Concurrent forces for LM1 and 3 (Multi) model are calculated only if Eurocode is chosen as the moving load code.

Calculation Filters :One can apply filters thus obtain certain results for specific groups only.

Number/Line Element: Assign the number of reference points on a line element for moving loads and drawing influence line analysis. The accuracy of results increases with the increase in the number but the analysis time may become excessive



Steel Composite Bridge Results

Results:

- 1 Go to **Results** Tab
- 2 Click on **Reactions -> Reaction Forces/Moments...**
- 3 Select **Stage 3** from drop down menu
- 4 Select **CS: Dead Load**
Component: **FZ**
Type of Display: **Value and Legend**
- 5 Click **Apply**

To view moving load result:

- 3 Change to **Post CS**
 - 6 Right Click in model window
 - 7 Go to Forces -> **Beam Diagram**
 - 8 Select Required Load Case
- Select the component
- Select Contour and Legend

To view Result Tables:

Results-> Results Tables

1 Results

2 Forces

3 Beam Diagrams

4 Reaction Forces/Moments

5 Apply

6 Forces

7 Beam Diagrams

8 Beam Forces/Moments

9 Beam Diagrams

10 Plate Forces/Moments

11 Plate Cutting Line Diagram

12 Resultant Force Diagram

13 Truss Forces

14 Beam Forces/Moments

15 Beam Diagrams

16 Plate Forces/Moments

17 Plate Cutting Line Diagram

18 Resultant Force Diagram

19 Truss Forces

20 Beam Forces/Moments

21 Beam Diagrams

22 Plate Forces/Moments

23 Plate Cutting Line Diagram

24 Resultant Force Diagram

25 Truss Forces

26 Beam Forces/Moments

27 Beam Diagrams

28 Plate Forces/Moments

29 Plate Cutting Line Diagram

30 Resultant Force Diagram

31 Truss Forces

32 Beam Forces/Moments

33 Beam Diagrams

34 Plate Forces/Moments

35 Plate Cutting Line Diagram

36 Resultant Force Diagram

37 Truss Forces

38 Beam Forces/Moments

39 Beam Diagrams

40 Plate Forces/Moments

41 Plate Cutting Line Diagram

42 Resultant Force Diagram

43 Truss Forces

44 Beam Forces/Moments

45 Beam Diagrams

46 Plate Forces/Moments

47 Plate Cutting Line Diagram

48 Resultant Force Diagram

49 Truss Forces

50 Beam Forces/Moments

51 Beam Diagrams

52 Plate Forces/Moments

53 Plate Cutting Line Diagram

54 Resultant Force Diagram

55 Truss Forces

56 Beam Forces/Moments

57 Beam Diagrams

58 Plate Forces/Moments

59 Plate Cutting Line Diagram

60 Resultant Force Diagram

61 Truss Forces

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66 Resultant Force Diagram

67 Truss Forces

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71 Plate Cutting Line Diagram

72 Resultant Force Diagram

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205 Truss Forces

206 Beam Forces/Moments

207 Beam Diagrams

208 Plate Forces/Moments

209 Plate Cutting Line Diagram

210 Resultant Force Diagram

211 Truss Forces

212 Beam Forces/Moments

213 Beam Diagrams

214 Plate Forces/Moments

215 Plate Cutting Line Diagram

216 Resultant Force Diagram

217 Truss Forces

218 Beam Forces/Moments

219 Beam Diagrams

220 Plate Forces/Moments

221 Plate Cutting Line Diagram

222 Resultant Force Diagram

223 Truss Forces

224 Beam Forces/Moments

225 Beam Diagrams

226 Plate Forces/Moments

227 Plate Cutting Line Diagram

228 Result

Influence lines

To view Influence Line:

❶ Go to Results-> Influence Lines ->

Beam Forces/Moments...

❷ Key Element:147

❸ Part: j

Components: My

Check on Legend

❹ Click Apply

To use Moving Load Tracer:

❶ Go to Results-> Moving Load

Tracer-> Beam

Follow steps ❷ & ❸

Select Applied Loads

❹ Click Apply

The screenshot displays the MIDAS CIVIL NX POST-PROCESSOR interface. The top menu bar includes Results, Pushover, Design, Rating, and Apps. The Results menu is open, showing options like Local Direction Force Sum, Set Reduction Moment, Beam/Element, Stage/Step Graph, Strain, Moving Load, and Mode Shapes. The Moving Load menu is further expanded, showing options like Influ. Lines, Influ. Surfaces, Moving Tracer, and Batch Conversion. The Influ. Lines menu is also expanded, showing options like Reactions, Displacements, Truss Forces, Beam Forces/Moments, Plate Forces/Moments, Beam Stresses, and Solid Stresses. The Beam Forces/Moments option is highlighted with a red dashed box and a circled 1.

The Tree Menu on the left shows the following structure:

- Tree Menu
 - Infl. Lines
 - Beam Forces/Moments
 - Line/Surface Lanes: LANE all (circled 2)
 - Key Element: 147 (circled 3)
 - Scale Factor: 1.000000
 - Parts: i, 1/4, 1/2, 3/4, j (selected)
 - Components: Fx, Fy, Fz, Mx, My (selected), Mz, Mb, Mt, Mw
 - Type of Display: Contour, Legend (selected), 3D Cont, Values, Animate, Include Impact factor

The main window shows a 3D model of a bridge structure with a moving load tracer applied. The load is represented by a red circle with a crosshair. The bridge is shown in a perspective view with a coordinate system (X, Y, Z) visible. A color scale bar on the right indicates the magnitude of the influence line, ranging from -0.77 to 1.40. The text "KEY ELEM., 147" and "PART, j-node" is displayed next to the scale bar. The bottom status bar shows "PostCS", "LANE ALL", "MAX: None", "MIN: None", "FILE: STEEL CO-", and "UNIT: kN.m".

Bridge Design – Load Combination

To generate Load Combinations:

- 1 Results -> Load Combinations ->
Composite Steel Girder Design Tab
-> Auto generation
- 2 Select AS 5100.2:17 as Design
Code
- 3 Click on OK
- 4 Click Close

Load Combinations

General Steel Design Concrete Design SRC Design Composite Steel Girder

Load Combination List

No	Name	Active	Type	Description
*				

Automatic Generation of Load Combinations

Option
☒ Add ☐ Replace

Code Selection
☐ Steel ☐ Concrete ☐ SRC ☒ Steel Composite

Design Code AS 5100.2:17

Manipulation of Construction Stage Load Case
☐ ST Only ☐ CS Only ☒ ST+CS
 ST : Static Load Case CS : Construction Stage

Bridge Type Roadway

Load Factors for Permanent Loads

Type of Load	R.S	I.S	Both
Dead Load	☐ 1.20	☐ 0.85	☒
Superimposed Dead Load	☐ 2.00	☐ 0.80	☒
Soil Load	☐ 1.50	☐ 0.70	☒
Groundwater Load	☐ 1.00	☐ 1.00	☒

R.S : Reduce Safety
I.S : Increase Safety

Fatigue Load Combination
 Road Traffic Case MLC 1

Load Case MLC 1

Add Delete

OK Cancel

Close

Design Preferences

In order to set the rebar sizes to the

Australian standard go to:

① Project-> Preferences-> Design/Load

Code

Go to the “Composite” tab

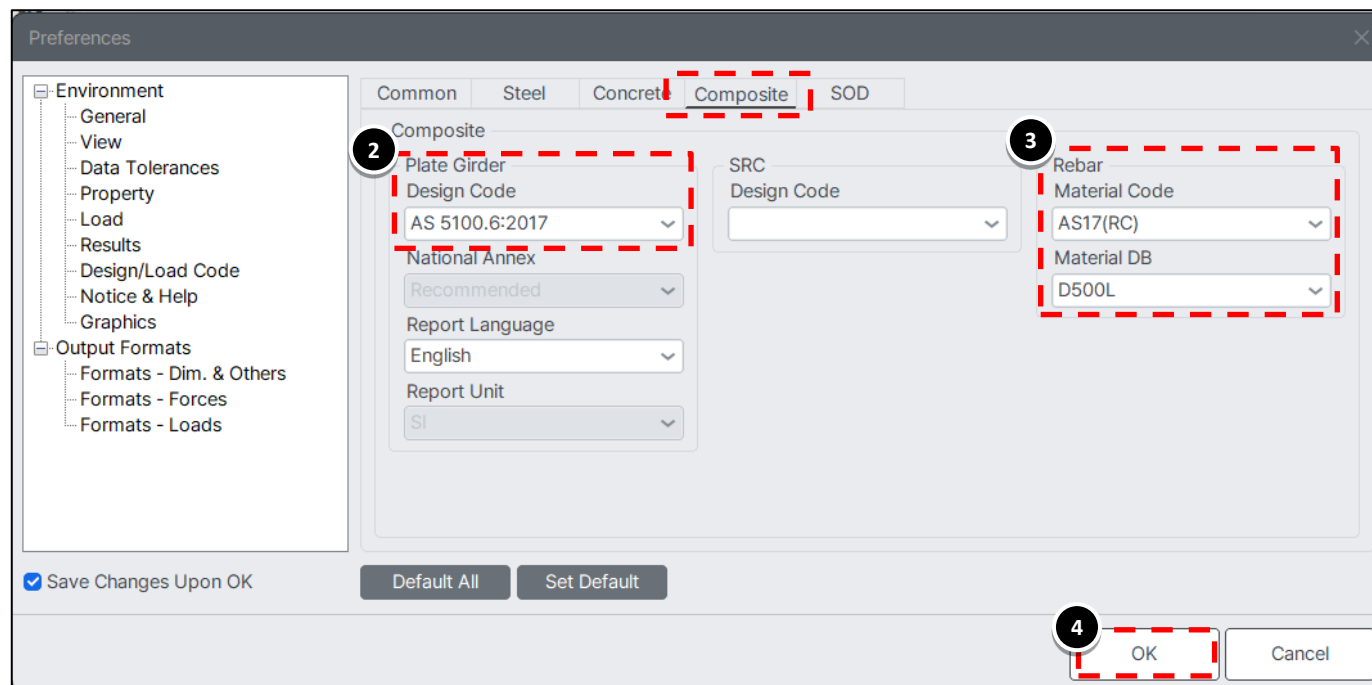
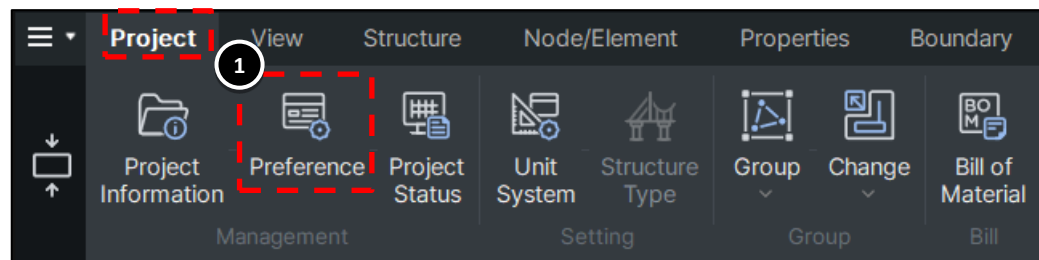
② For **Design Code**, select code as

AS 5100.6:2017

③ For the **Rebar**, select the **Material**

Code to be: AS 17 (RC)

④ Click: **OK**



Composite Design

① Select Design code **AS5100.6:2017**

② Design Input data-> **Modify**

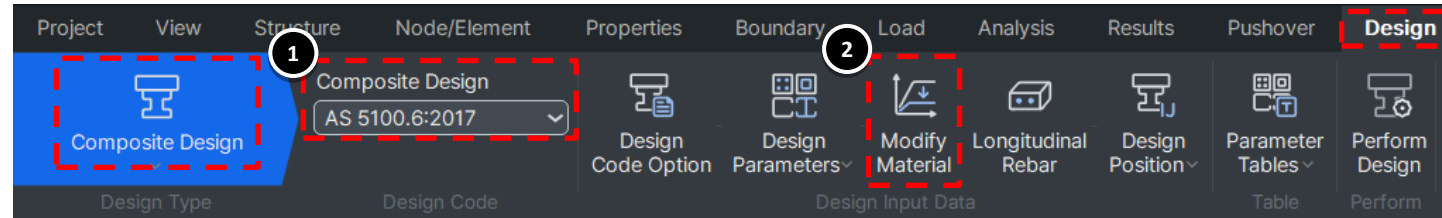
Material

③ Select **Girder**

④ Enter the Data as in image

⑤ Click **Modify**

⑥ Click **Close**



ID	Name	Steel	Concrete	Main-bar	Sub-bar
1	Girder	300	C40	D500L	-
2	Bracing	250			

Composite Material Selection

Steel Material Selection

Code: AS/NZS 3678(S)

Grade: 300

Es: 200000000 kN/m² Fu: 430000 kN/m²

Fy1: 320000 kN/m² Fy2: 310000 kN/m²

Fy3: 300000 kN/m² Fy4: 280000 kN/m²

Fy5: 270000 kN/m² Fy6: 260000 kN/m²

Concrete Material Selection

Code: AS17(RC) Grade: C40

Specified Compressive Strength (f'c/fck): 40000 kN/m²

Reinforcement Selection

Code: AS17(RC)

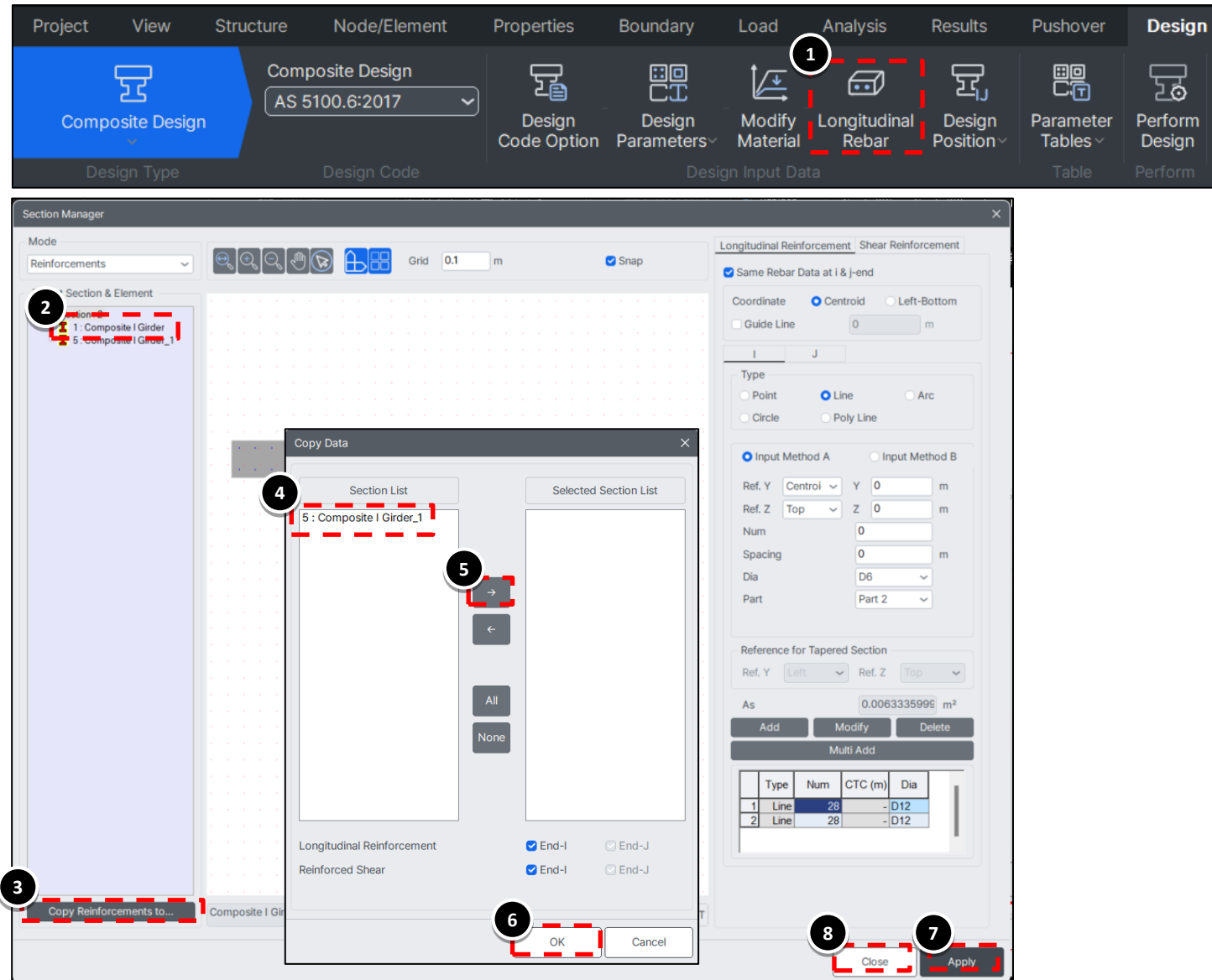
Grade of Main Rebar: D500L Fyr: 500000 kN/m²

Grade of Sub-Rebar: Fys: 0 kN/m²

Close Modify

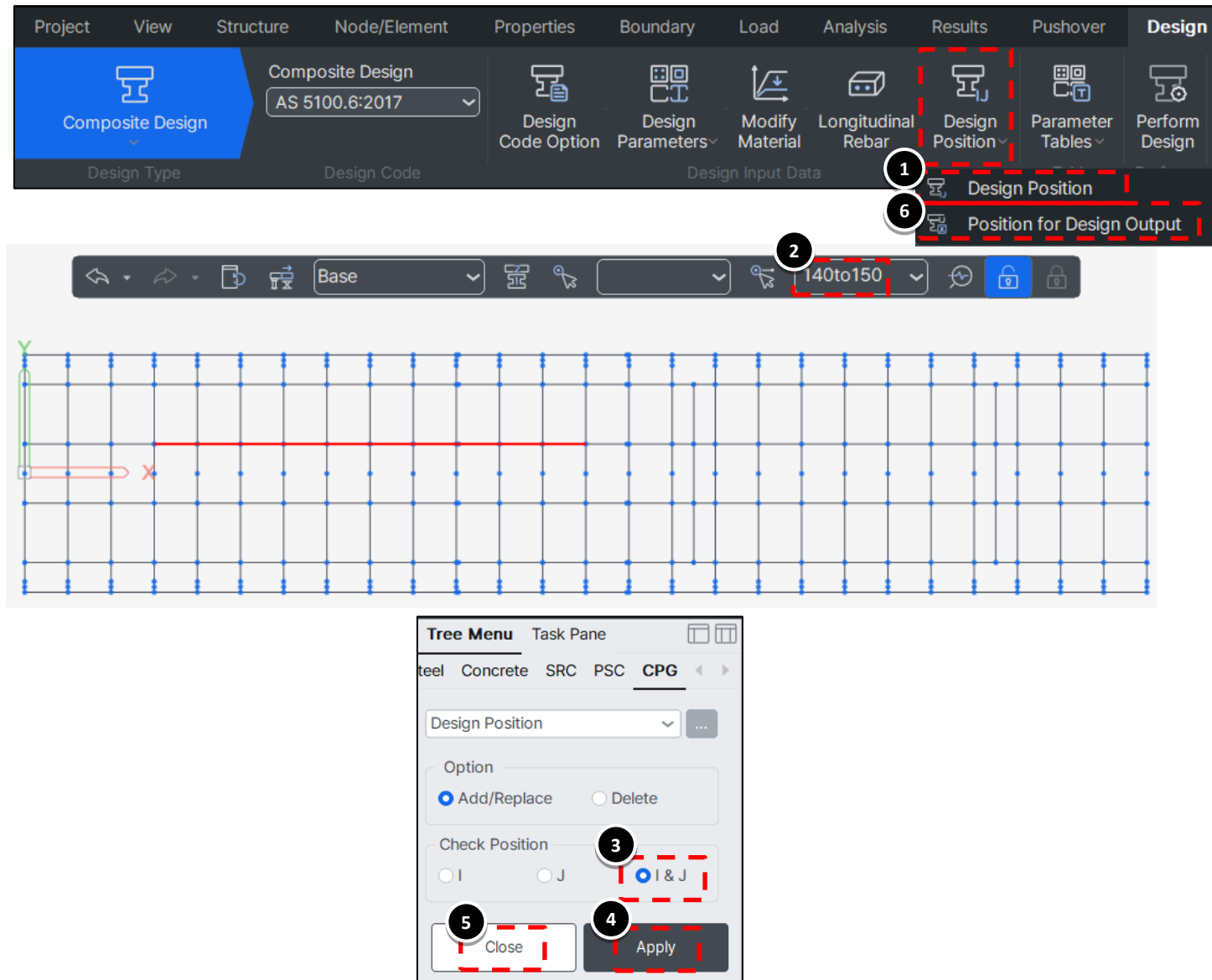
Composite Design

- 1 Click **Longitudinal Rebar**
- 2 Click on **1: Composite I girder**
- 3 Click on **Copy Reinforcements to...**
- 4 Select **5: Composite I girder_1**
- 5 Click on “→”
- 6 Click **OK**
- 7 Click **Apply**
- 8 Click **Close**



Composite Design

- 1 Click on **Design Position**
- 2 Input **140to150** in the element selection window and press Enter
- 3 Select **I&J**
- 4 Click **Apply**
- 5 Click **Close**
- 6 Repeat the same steps for
Position for Design Output...
Select Only Element nos. **145** for
Design Output...



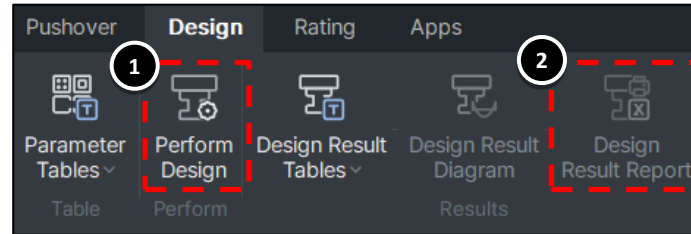
Composite Design

- 1 Click **Design Parameters** -> **Shear Connector**
- 2 Input **140to150** in the element selection window and press Enter
- 3 Enter Data as shown in image
- 4 Click **Apply & Close**

The screenshot illustrates the software interface for Composite Design. The top menu bar includes Project, View, Structure, Node/Element, Properties, Boundary, Load, Analysis, Results, Pushover, and Design. The Design menu is open, showing options like Design Parameters, Modify Material, Longitudinal Rebar, Design Position, Parameter Tables, and Perform Design. The Design Parameters dialog is open, showing the Shear Connector section with fields for Pitch, Height, Dia, Fu, Transverse Spacing, and Num. of Shear Connectors. The element selection window shows a grid of elements with a red dashed box highlighting the selected range 140to150. The dialog is also showing the Tree Menu and Task Pane.

Design Composite Results

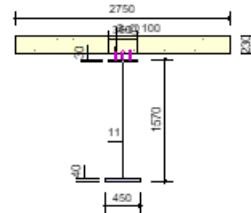
- 1 Click **Perform Design**, and after completing the design
- 2 Click **Design Result Report**



■ MEMBER NAME : Steel Composite : 145 - i

1. Member Information

- 1) Design Code
- 2) Section Property
Composite I Girder_1
- 3) Material
Steel
 $f_y = 320.000\text{MPa}$, $E = 200,000.000\text{MPa}$
Concrete
 $f_c = 40.000\text{MPa}$, $E_c = 32,800.000\text{MPa}$
Reinforcement
 $f_{ty} = 500.000\text{MPa}$, $E_r = 200,000.000\text{MPa}$
- 4) Length
 $L = 2.000\text{m}$
- 5) Section Properties



	Steel Section	Short-Term Composite Section	Long-Term Composite Section
Area	45,300.000mm ²	149,030.000mm ²	149,030.000mm ²
I _y	1.939781e+10mm ⁴	5.756252e+10mm ⁴	5.756252e+10mm ⁴
I _x	420,556,375.000mm ⁴	6.579207e+10mm ⁴	6.579207e+10mm ⁴
C _y	225.000mm	225.000mm	225.000mm
C _x	666.424mm	1,427.590mm	1,427.590mm

	Short-Term Composite Section(Cracked)	Long-Term Composite Section(Cracked)
Area	51,633.600mm ²	51,633.600mm ²
I _y	2.606993e+10mm ⁴	2.606993e+10mm ⁴
I _x	4.401643e+9mm ⁴	4.401643e+9mm ⁴
C _y	225.000mm	225.000mm
C _x	800.567mm	800.567mm

2. Moment Capacity (y-Dir., Negative)

Neg. Moment	LCB	sclCB5	
M ⁺ / ϕ M _b	7,911.708kN-m / 14,916.246kN-m = 0.530		OK

1) Design Force

	Steel	Long-Term Composite	Short-Term Composite	Summation
Force				
F _x (kN)	-0.173	2.860	429.130	431.817
M _y (kN-m)	1,400.707	-664.896	7,175.897	7,911.708
M _x (kN-m)	-0.0218	-5.051	48.868	43.796

2) Stress

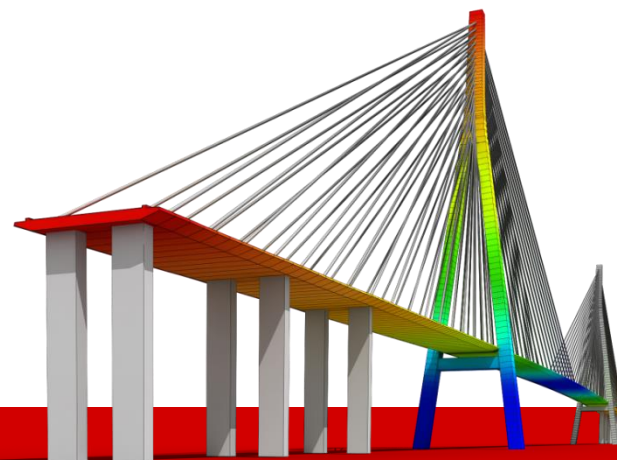
	Steel	Long-Term Composite	Short-Term Composite	Summation
Stresses (MPa)				
Reinforcement	0.000	0.000	0.000	0.000
Top flange	65.247	-1.645	17.753	81.355
Bottom flange	-48.122	16.490	-177.967	-209.600

3) Section classification

Part	λ _{pl}	f _t (MPa)	f _y (MPa)	λ _{sl}	λ _{sl2}	Class
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AS 6100.8:2017, 6.2

For Technical questions:
<https://support.midasuser.com>



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