

Release Note

Release Date : July 2025

Product Ver. : CIVIL NX 2025 (v2.1)



M MIDAS

CVL MIDAS CIVIL NX

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INTEGRATED SOLUTION SYSTEM FOR BRIDGE AND CIVIL ENGINEERING

MIDAS CIVIL NX is a state of the art software, which defines a new paradigm for bridge engineering and civil structures. It provides a distinctively easy user interface through its innovative graphic modules. MIDAS CIVIL NX provides an optimal design solution, which analyzes and designs all types of bridge structures in a 3D environment, accounting for construction stages and time-dependent properties.

Enhancements

Enhancements in CIVIL NX 2025 (v2.1)

1. *Addition of Material Database for Structural Steel Reinforcement as per NR/GN/CIV/025*
2. *Addition of Section Properties for U-girder Bridge as per NR/GN/CIV/025*
3. *Addition of Moving Load for UK Network Rail Bridge Assessment as per NR/GN/CIV/025*
4. *UK Network Rail Bridge Assessment as per NR/GN/CIV/025*
5. *Automated design support for asymmetric (Type 2) composite steel bridges(Eurocode, AASHTO)*
6. *RC design support for US railway bridges(Based on AREMA design code)*
7. *Update PSC section design criteria for Australia to the latest 2024 standard*
8. *Add California-specific provisions from AASHTO LRFD*
9. *Auto-generate Load combination (RC) as per TMH07 : 1981*
10. *PSC Design as per TMH07-3 : 1989*
11. *Significantly Improved Excel Design Report Generation Speed*
12. *Moving patch load analysis as per Eurocode, BS & NZ traffic loads*
13. *Addition of evaluation truck loads for existing bridges in New Zealand(Based on SP/M/022 v3.4)*
14. *Addition of special permit trucks for load rating of existing bridges in Western Australia*
15. *Enhancement of Australian moving load options: Add lateral offset distance option*
16. *Enhancement of Load All Model 1 in the UK rating system to support envelope type loads*
17. *Addition of vehicle database for 46 US states*
18. *Addition of cross-section databases for the US and Canada*
19. *Batch output for tendon loss table by construction stage and tendon group*



1. Addition of Material Database for Structural Steel Reinforcement as per NR/GN/CIV/025

- To support bridge assessment in accordance with NR/GN/CIV/025, MIDAS Civil now includes a comprehensive set of steel and wrought iron materials used in UK railway structures from the pre-1906 era onward.
- **10 new material types** added to the database, including: Wrought Iron, BS 2762:1956(A), BS 2762:1956(B), BS968:1962, BS968:1941, BS548:1934, BS15:1961, BS15:1948, BS15:1906, Pre1906. This includes definition of **Yield strength values** by thickness.
- This addition enables accurate structural assessments for **existing UK railway bridges**, including heritage structures and simplifies compliance with Network Rail's material classification and evaluation requirements.

- **Properties > Material Properties**
- **Rating > Steel Bridge > NR/GN/CIV/025 > Modify Steel Material**


Material Data

General

Material ID1NameWrought Iron

Elasticity Data

Type of DesignSteel



Type of Material

IsotropicOrthotropic

Steel

Modulus of Elasticity1.9000e+08 kN/m²

Poisson's Ratio0.3

Thermal Coefficient1.2000e-05 1/[C]

Weight Density75.51 kN/m³

☐ Use Mass Density7.7 kN/m³/g

Concrete

Modulus of Elasticity0.0000e+00 kN/m²

Poisson's Ratio0

Thermal Coefficient0.0000e+00 1/[C]

Weight Density0 kN/m³

☐ Use Mass Density0 kN/m³/g

Plasticity Data

Steel

StandardNR/GN/CIV/025(S)

DBWrought Iron

Concrete

StandardBS548:1934BS968:1941BS968:1962BS2762:1956(A)BS2762:1956(B)Wrought Iron

Code

DB

Modify Steel Material

Material List

ID	Name	Es	Fu	Fy(Fy1)	Fy2	Fy3	Fy4	Fy5
1	Wrought I...	1.9e+08	285000	190000	190000	190000	190000	190000

Steel Material Selection

CodeNR/GN/CIV/025(S)GradeBS968:1941

Modulus of Elasticity (Es)205000000 kN/m²

Poisson's Ratio (Ps)0.3

Tensile Strength (Fu)570000 kN/m²

Yield Strength (Fy1)355000 kN/m²

Yield Strength (Fy2)325000 kN/m²

Yield Strength (Fy3)295000 kN/m²

Yield Strength (Fy4)295000 kN/m²

Yield Strength (Fy5)295000 kN/m²

Close

Modify

Material Properties

Modify Steel Material

2. Addition of Section Properties for U-girder Bridge as per NR/GN/CIV/025

- Riveted steel plate girders can be defined, including detailed configuration of riveted angles. By accounting for rivet holes, the software automatically computes the net stiffness, which is then applied in the assessment for more accurate structural evaluation.

▪ Properties > Section Properties

Section Data

DB/UserSteel Girder

Section ID2NameCG

Section TypeSteel Girder I

Size

Top

B1

B2

t1

But

B3

B4

t2

Ref.

1

2

3

4

5

6

7

8

y

Distance from Reference Line

Top0m

Bottom0m

B10.3H0.6m

B20.3t10.014m

B30.3t20.014m

B40.3tw0.014m

Stiffener...

Riveted Angle...

OffsetCenter-Bottom

Consider Shear Deformation.

Change Offset ...

Consider Warping Effect(7th DOF)

Show Calculation Results...

OK

Cancel

Apply

Riveted Angle

Angle 3

Angle 1

Angle 5

Angle 7

Angle 4

Angle 2

Angle 6

Angle 8

1

2

3

4

5

6

7

8

y

Defined Angles

Define Angles...

NameType

aAngle

Symmetric

Angle 1a

Angle 2a

Angle 3a

Angle 4a

Angle 5a

Angle 6a

Angle 7a

Angle 8a

ComponentAngleRef.Pos (lateral)Ref.Pos (vertical)dR (m)Diameter (m)

Top Left FlangeAngle 1Left00

Top Right FlangeAngle 5Right00

WebAngle 1Top00

WebAngle 2Top00

Bottom Left FlangeAngle 2Left00

Bottom Right FlangeAngle 6Right00

OK

Cancel

Riveted Steel Plate Girder

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3. Addition of Moving Load for UK Network Rail Bridge Assessment as per NR/GN/CIV/025

- MIDAS Civil now supports Network Rail Standards-based moving load configurations for bridge assessment, in accordance with NR/GN/CIV/025. This enhancement ensures compliance with UK railway bridge evaluation guidelines and expands the platform's global code coverage.

- **Key Features:**

Vehicle Types Included:

- Equivalent Uniformly Distributed Load (EUDL)
- RAI (RA1 ~ RA15)
- Load Wagon (Convoy Mode supported)
- Wagon Type D4 (as per UIC700 standard)

Dynamic Factor Configuration:

Dynamic Amplification Factors (DAF) can be automatically calculated by defined *Determinant Length* and *group-based* selection.

This enables accurate load effect estimation under various speed rail conditions.

Track Factor Input:

Track Factor can be defined per lane in the Moving Load Case for consistent multi-track evaluation.

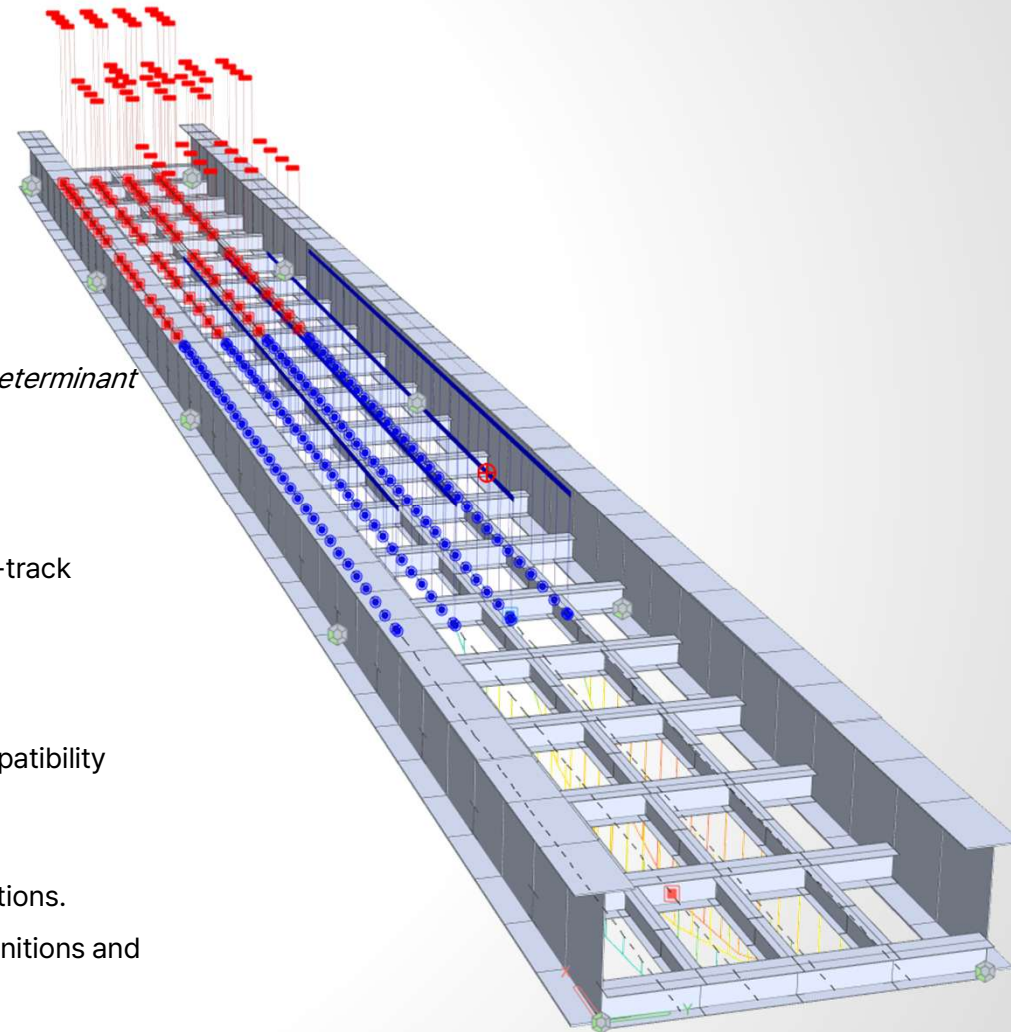
- **Benefits:**

EUDL (Equivalent Uniformly Distributed Load) automatically provided, enhancing compatibility with simplified evaluation methods.

Provides detailed moving load simulation tailored to UK railway infrastructure.

Allows for accurate modeling of various speed rail effects through Dynamic Factor options.

Enables bridge engineers to perform assessments using familiar UK-specific load definitions and parameters.



3. Addition of Moving Load for UK Network Rail Bridge Assessment as per NR/GN/CIV/025

- A new Railway Lane type has been added to support Network Rail moving load assessments, allowing users to define track-specific configurations aligned with UK railway standards.
- The following vehicle types have been newly added: Equivalent Uniformly Distributed Load (EUDL), RA1–RA15 load types, Load Wagon with Convoy Mode, and Wagon Type D4 in accordance with the UIC700 standard.

- **Load > Moving Loads > BS**
- **Load > Moving Loads > Traffic Line/Surface Lanes**
- **Load > Moving Loads > Vehicles**
- **Load > Moving Loads > Moving Load Cases**

Define Standard Vehicular Load

Standard Name

NR/GN/CIV/025

Vehicular Load Properties

Vehicular Load Name

EUDL Loading

Vehicular Load Type

Type RAI Loading

Sub Type

EUDL

W = 85 kN/m

Static

Dynamic

Assessment Speed 90 mph

OK

Cancel

Apply

Define Standard Vehicular Load

Standard Name

NR/GN/CIV/025

Vehicular Load Properties

Vehicular Load Name

RA10 Loading

Vehicular Load Type

Type RAI Loading

Sub Type

RA10

RA Loading Type

Train

Short Length

More Critical

RA Loading

No	P (kN)	D (m)
1	200	1.524
2	200	1.524
3	200	1.524
4	200	2.743
5	150	1.829
6	150	1.829
7	150	1.829
8	150	3.692

Short Length

No	P (kN)	D (m)
1	250	1.829
2	250	end

dW1 = 65 kN/m

dD1 = 1.524 m

dD2 = 100 m

Static

Dynamic

Assessment Speed 90 mph

OK

Cancel

Apply

Define Standard Vehicular Load

Standard Name

NR/GN/CIV/025

Vehicular Load Properties

Vehicular Load Name

Assessment Load Wagon

Vehicular Load Type

Wagon

Sub Type

Assessment Load Wagon

Wagon

No	P (kN)	D (m)
1	250	1.829
2	250	5.01
3	250	1.829
4	250	end

Loading Case

Single

Convoy

Static

Dynamic

Assessment Speed 60 mph

OK

Cancel

Apply

Define Moving Load Case

Load Case Name

RA 10 S

Description

Moving Load Optimization

Select Load Model

Standard Load (BD 37/01, BS 5400)

Special Load (BD 86/11)

CS 454 Assessment (ALL Model 1, Special Load)

CS 454 Assessment (ALL Model 2, Special Load)

NR GN CIV 025 (Network Rail)

Track Factor

Num of Loaded Track

Scale Factor

1

1

2 or more

0.75

Sub-Load Cases

Loading Effect

Combined

Independent

Vehicle	Scale	Lane1	Lane2	Lane3
RA10 S	1	Track 2	Track 1	

Add

Modify

Delete

OK

Cancel

Apply

Traffic Line Lanes

Lane Name

Track 1

Traffic Lane Properties

a : Eccentricity

Lane Type

Roadway

Railway

Lane Width

3 m

Eccentricity

0 m

Wheel Spacing

1.6 m

Transverse Lane Optimization

Allowable Width

3 m

Vehicular Load Distribution

Lane Element

Cross Beam

Cross Beam Group

Cross Girder

Skew

Start 0

End 0

[deg]

Moving Direction

Forward

Backward

Both

Train Database for UK Network Rail Bridge

Moving Load Cases

Traffic Line Lanes

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3. Addition of Moving Load for UK Network Rail Bridge Assessment as per NR/GN/CIV/025

- Dynamic Factor in accordance with NR/GN/CIV/025 can now be applied either by automatic calculation based on determinant length or through user-defined input, providing flexibility and compliance with UK railway standards.
- The calculated Dynamic Factor can be checked in both the table view and the detail report of the Moving Load Tracer.

▪ **Load > Moving Loads > Railway Dynamic Factor**

Select Structure Group

☐ Cross Girder

☒ Main Girder

☐ Railbearer

☒ Auto Input

Bending and Shear

Natural Frequency, no1.5Hz

Span Length, L20m

Determinant Length, Lp20m

Permissible Speed of Track, v100mph

Depth of Ballast, h.05m

Angle of Skew, α90deg

(Longitudinal Member: 65 to 90, Transverse Member : 0 to 25)

Effects

Bending and Shear for Beam ElementAuto

All Other Effects1.3

(e.g.Axial, Torsion, Stress, Displacements, Reactions, etc)

Group List	no	L	Lp

AddModifyDelete

☐ User Input

OKCancel

Select Structure Group

☒ Cross Girder

☐ Main Girder

☐ Railbearer

☒ User Input

Effects

Bending for Beam Element1.3

Shear for Beam Element1.2

All Other Effects1.3

(e.g.Axial, Torsion, Stress, Displacements, Reactions, etc)

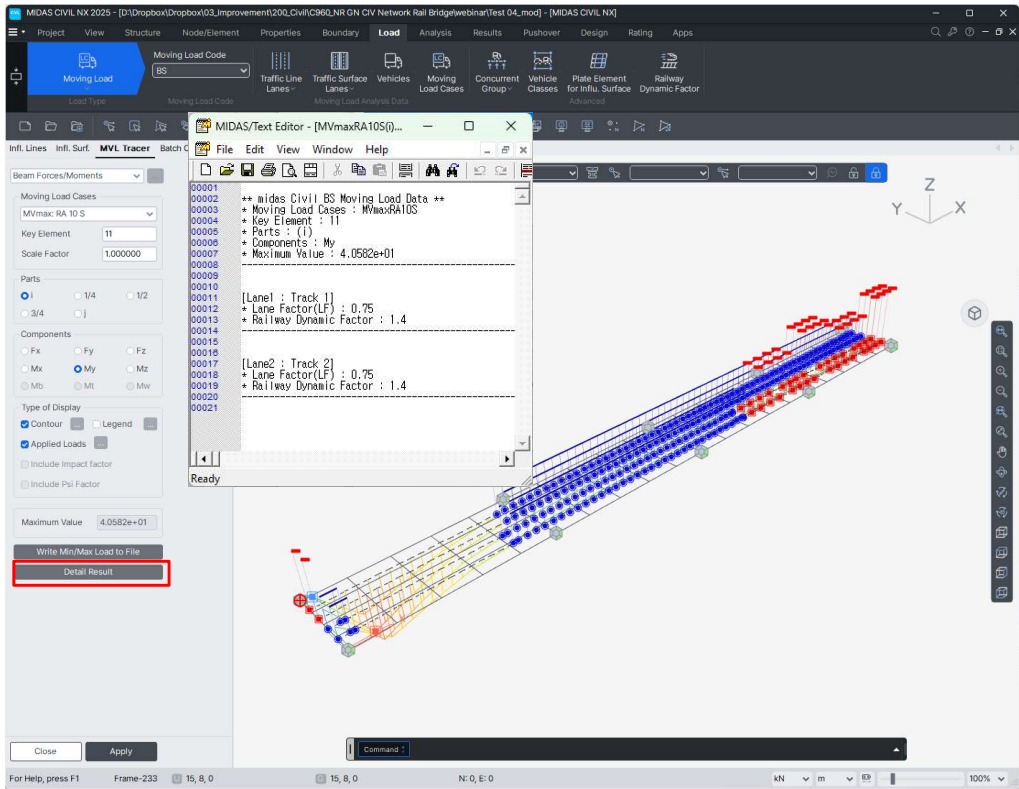
Group List	Bending	Shear	Other
Cross Girder	1.3	1.2	1.3
Main Girder, Railbearer	1.4	1.3	1.4

AddModifyDelete

☐ Auto Input

OKCancel

Dynamic Factor



Moving Load Tracer

4. UK Network Rail Bridge Assessment as per *NR/GN/CIV/025*

- MIDAS Civil now supports a fully automated assessment process for railway bridge structures in accordance with Network Rail standards (NR/GN/CIV/025), including the ability to generate structured Excel reports summarizing all verification results.

- Key Features:**

Automated Assessment Workflow

Perform Ultimate Limit State checks (Flexure, Shear, Longitudinal Shear, Intermediate and Bearing Stiffener) on main girders, cross girders, rail bearers, and stiffeners automatically after analysis.

Code Selection Flexibility

Assessment can be carried out based on either **NR/GN/CIV/025** or **BS 5400 Part 3**, allowing users to choose the appropriate code depending on project requirements.

Utilisation Factor Calculation

Includes auto-calculation of Utilisation Factors based on RA rating criteria, with support for historic steel materials (e.g., Wrought Iron, Early Steel).

Excel Report Output

A detailed **Excel-format report** is generated, capturing all input parameters, applied load cases (e.g., RA1–RA15, EUDL), rating factors, section capacities, and final utilisation results.

Supports Various Design Inputs

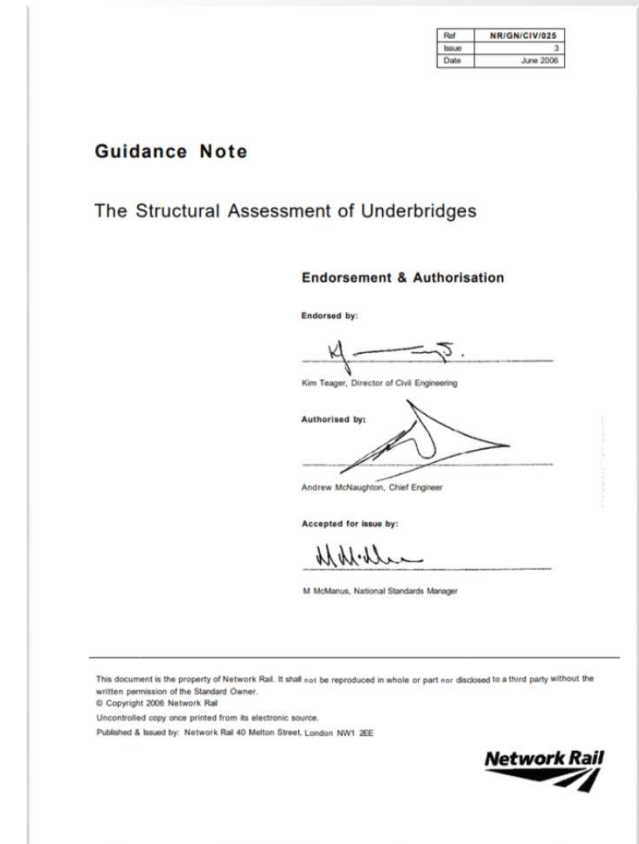
Corrosion depth, riveted angle, effective length, and U-girder specific parameters are fully reflected in both calculation and reporting.

- Benefits:**

Streamlines compliance with UK Network Rail bridge assessment procedures.

Minimizes manual input and post-processing by automating the full assessment-to-report pipeline.

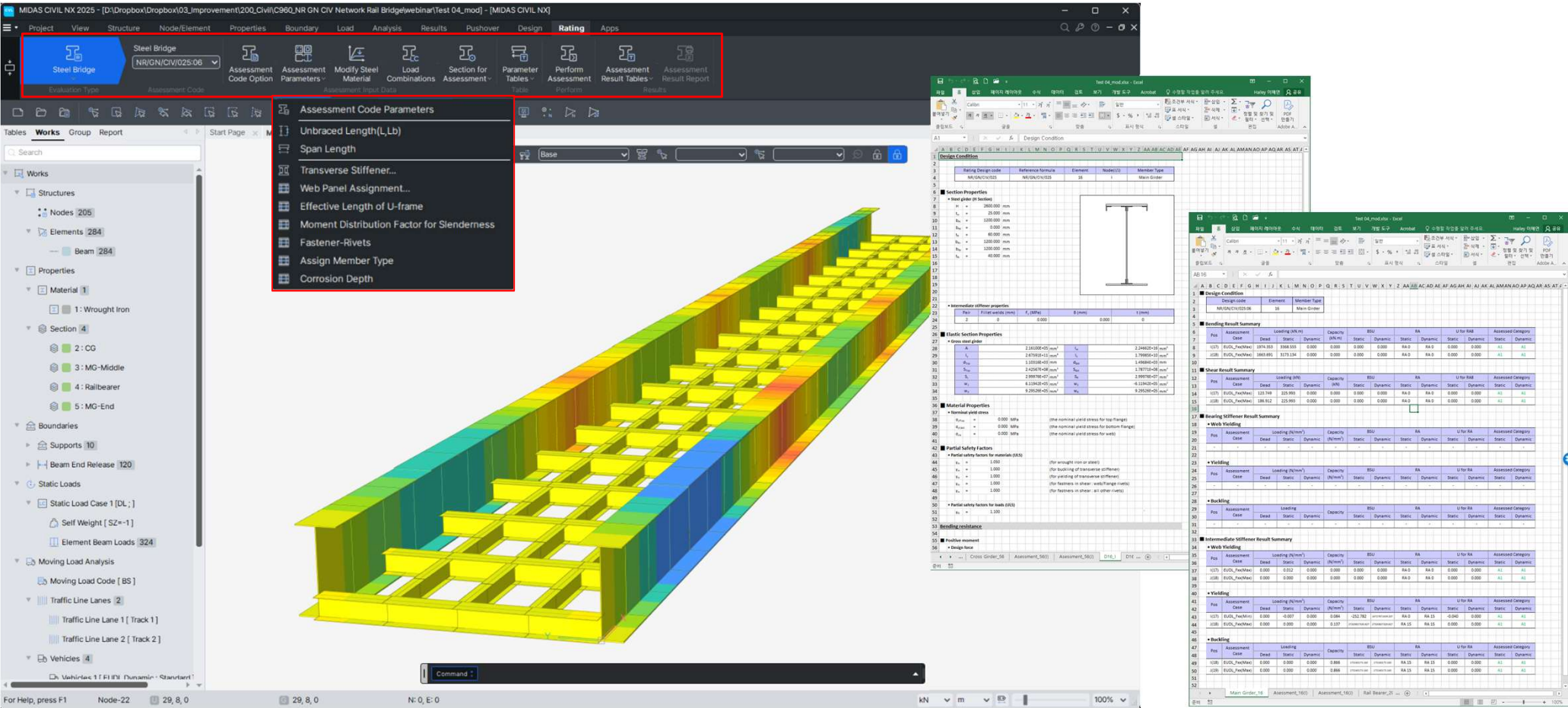
Produces **clear, exportable documentation** for design review, audit, and submission to authorities.



4. UK Network Rail Bridge Assessment as per NR/GN/CIV/025

- When NR/GN/CIV/025 is selected in the Steel Bridge Rating menu, all relevant input and output menus specific to the Network Rail assessment criteria are displayed.

Rating > Steel Bridge > NR/GN/CIV/025



U-girder Bridge Assessment

Excel Report

4. UK Network Rail Bridge Assessment as per NR/GN/CIV/025

- In Assessment Parameter, Users can modify and apply condition factors, material factors, and other parameters as needed to suit specific project conditions.
- In the **assessment case**, when **static live load**, **dynamic live load**, and **dead load** are defined, the software automatically calculates the **utilisation factor** based on these inputs.

Rating > Steel Bridge > NR/GN/CIV/025

Assessment Parameter

Resistance Formula as per

☒ NR/GN/CIV/025

☐ BS5400 Part3

Required Route Availability Number

RA1

Condition Factor(Fc)

1

Material Strength used for Assessment

☒ Characteristic Strength

☐ Worst Credible Strength

Effective Length (BS5400 Part3, 9.6.4.1.1.2)

Span Type

☒ Simply Supported Spans

☐ Continuous Beams

k2

1

k3

1

U-frame Spacing

0

m

☒ Apply Equation A4 of NR/GN/CIV/025, 9.6.4.1.1.2A

☒ User Input

Modify Design Parameters

Ultimate Limit State

☒ Flexure

☒ Shear

☒ Longitudinal Shear

☒ Intermediate and Bearing Stiffener

OK

Cancel

Define Assessment Case

Load Combination

	Name	Limit State	Comb. Type	Description
▶	EUDL	ULS	Comb1	
	RA 10	ULS	Comb1	
*				

Copy into Assessment Load Combination

Copy into General Load Combination

Static Load Cases and Factors(Gamma_{fi})

	Static Load Cases	Factor
▶	DL(ST)	1.2000
*		

Assessment Live Load

☒ Type RAI Loading

☐ Wagon Loading

Moving Load Cases and Factors(Gamma_{fi})

☒ Static (Dynamic Factor = 1)

EUDL S(MV)

1

☒ Dynamic (Dynamic Factor= 1 + phi)

EUDL D(MV)

1

Close

Assessment Parameter

Assessment Case

4. UK Network Rail Bridge Assessment as per *NR/GN/CIV/025*

- **Transverse and bearing stiffeners** can be defined, along with **riveted angles** used for their reinforcement. These inputs are considered in the automatic calculation of **section properties**, which are then used directly in the assessment process.
- Assessment can be performed using **net section properties** that account for **corrosion depth**, ensuring more accurate evaluation of deteriorated structures.

▪ *Rating > Steel Bridge > NR/GN/CIV/025*

Stiffener Type

Type

☒ Located at U-frame

Defined Shape

Define Shape...

Name	Type
S	Flat
A	Angle

Transverse Stiffener

Transverse Stiffener

S

Type

☐ One stiffener

☒ Two stiffener

Fy

190000

kN/m²

Pitch

0.7

m

Num. of U-frames in effective length

5

Cross member rotation difference

0.0036

[rad]

Rivet Angle

Angle 1

Angle 2

Angle 3

Angle 4

☒ Angle 1

A

☒ Angle 2

A

☒ Angle 3

A

☒ Angle 4

A

OK

Cancel

Section Manager

Mode

Corrosion Depth

Grid

0.1

m

☒ Snap

☐ Name

☒ Same Data at i & j-end

Target Section & Element

Section : 4

2 : CG

3 : MG-Middle

4 : Railbearer

5 : MG-End

Corrosion Depth

CG

G : 0.31430, 0.25169

SELECT

Close

Apply

Corrosion Depth

Component

Top Flange

Position

Top

Corrosion Depth

.04

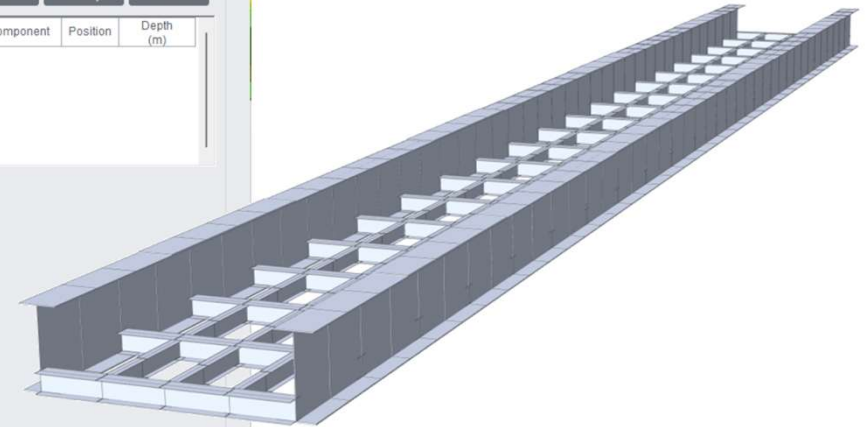
m

Add

Modify

Delete

Component	Position	Depth (m)
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Transverse and
Bearing Stiffener

Corrosion Depth

4. UK Network Rail Bridge Assessment as per NR/GN/CIV/025

- After completing the assessment, results can be reviewed through both the **table view** and a generated **Excel report**.

Rating > Steel Bridge > NR/GN/CIV/025

Main Girder (Bending)									
Element	Part	Rating Case	Loading (kN/m)			Capacity (kN/m)	BSU		Assessed Category
			Dead	Static	Dynamic		Static	Dynamic	
1	J (1)	Positive (max)	-16.949	6.508	3.496	-	-	-	A1
1	J (2)	Positive (max)	1184.805	1216.417	-	-	-	-	A1
2	J (3)	Positive (max)	1184.805	1864.275	647.859	-	-	-	A1
2	J (4)	Positive (max)	2177.200	2470.860	-	-	-	-	A1
3	J (4)	Positive (max)	2164.762	3732.997	1296.597	-	-	-	A1
3	J (5)	Positive (max)	2661.521	2965.194	-	-	-	-	A1
4	J (5)	Positive (max)	2654.792	4542.017	1577.475	-	-	-	A1
4	J (6)	Positive (max)	2935.749	3514.227	-	-	-	-	A1
5	J (6)	Positive (max)	2932.225	6111.904	2646.492	-	-	-	A1
5	J (7)	Positive (max)	2704.454	3293.999	-	-	-	-	A1
6	J (7)	Positive (max)	2704.454	5812.939	2518.940	-	-	-	A1
6	J (8)	Positive (max)	2254.410	5312.588	-	-	-	-	A1
7	J (8)	Positive (max)	2260.340	5396.961	2339.550	-	-	-	A1
7	J (9)	Negative (max)	1301.366	-31.122	-13.486	-	-	-	A1
7	J (9)	Positive (max)	1301.366	2161.713	-	-	-	-	A1
8	J (9)	Positive (max)	1307.686	3675.665	1679.516	-	-	-	A1
8	J (10)	Positive (max)	132.940	1317.961	-	-	-	-	A1
9	J (10)	Positive (max)	140.087	2261.569	980.013	-	-	-	A1
9	J (11)	Positive (max)	-1529.661	82.895	-	-	-	-	A1
10	J (11)	Positive (max)	-1529.661	163.932	71.037	-	-	-	A1
10	J (2)	Positive (max)	-3409.458	-	-	-	-	-	A1
11	J (2)	Positive (max)	-	-	-	-	-	-	A1
11	J (12)	Positive (max)	-	-	-	-	-	-	A1
12	J (12)	Positive (max)	-	-	-	-	-	-	A1
12	J (13)	Positive (max)	-	-	-	-	-	-	A1
12	J (14)	Positive (max)	-	-	-	-	-	-	A1
13	J (14)	Positive (max)	-	-	-	-	-	-	A1
13	J (15)	Positive (max)	-	-	-	-	-	-	A1
14	J (15)	Positive (max)	-	-	-	-	-	-	A1
14	J (16)	Positive (max)	1	J (1)	Bearing Stiffener	max	-	-	max
15	J (16)	Positive (max)	1	J (1)	Intermediate Stiffener	max	-	-	max
15	J (17)	Positive (max)	1	J (3)	Bearing Stiffener	max	0.340	-	max
16	J (17)	Positive (max)	1	J (3)	Intermediate Stiffener	max	-	-	max
16	J (18)	Positive (max)	2	J (3)	Bearing Stiffener	max	0.070	17.243	max
17	J (18)	Positive (max)	2	J (3)	Intermediate Stiffener	max	-	-	max
17	J (19)	Positive (max)	2	J (4)	Bearing Stiffener	max	0.340	-	max
17	J (19)	Positive (max)	2	J (4)	Intermediate Stiffener	max	-	-	max
18	J (19)	Positive (max)	3	J (4)	Bearing Stiffener	max	2960.577	1587.651	max
18	J (20)	Positive (max)	3	J (4)	Intermediate Stiffener	max	-	-	max
19	J (20)	Positive (max)	3	J (5)	Bearing Stiffener	max	14347.80	-	max
19	J (21)	Positive (max)	3	J (5)	Intermediate Stiffener	max	-	-	max
20	J (21)	Positive (max)	4	J (5)	Bearing Stiffener	max	2960.577	1587.651	max
20	J (22)	Positive (max)	4	J (6)	Intermediate Stiffener	max	-	-	max
21	J (22)	Positive (max)	4	J (6)	Bearing Stiffener	max	-	-	max
21	J (23)	Positive (max)	5	J (6)	Intermediate Stiffener	max	11465.94	8791.016	max
22	J (4)	Positive (max)	5	J (6)	Intermediate Stiffener	max	-	-	max
22	J (37)	Positive (max)	5	J (7)	Bearing Stiffener	max	-	-	max
23	J (6)	Positive (max)	5	J (7)	Intermediate Stiffener	max	-	-	max
23	J (38)	Positive (max)	6	J (7)	Bearing Stiffener	max	11465.94	8791.016	max
24	J (8)	Positive (max)	6	J (7)	Intermediate Stiffener	max	-	-	max
7	J (8)	Positive (max)	7	J (8)	Bearing Stiffener	max	24026.86	18965.25	max
7	J (8)	Positive (max)	7	J (8)	Intermediate Stiffener	max	-	-	max
7	J (9)	Positive (max)	7	J (9)	Bearing Stiffener	max	-	-	max
7	J (9)	Positive (max)	7	J (9)	Intermediate Stiffener	max	-	-	max
8	J (9)	Positive (max)	8	J (9)	Bearing Stiffener	max	24026.86	18965.25	max
8	J (10)	Positive (max)	8	J (10)	Intermediate Stiffener	max	-	-	max
9	J (10)	Positive (max)	9	J (10)	Bearing Stiffener	max	41768.24	31955.71	max
9	J (10)	Positive (max)	9	J (10)	Intermediate Stiffener	max	-	-	max
9	J (11)	Positive (max)	9	J (11)	Bearing Stiffener	max	202519.2	-	max
9	J (11)	Positive (max)	9	J (11)	Intermediate Stiffener	max	-	-	max
10	J (11)	Positive (max)	10	J (11)	Bearing Stiffener	max	41768.24	31955.71	max
10	J (11)	Positive (max)	10	J (11)	Intermediate Stiffener	max	-	-	max
10	J (2)	Positive (max)	10	J (2)	Bearing Stiffener	max	202519.2	-	max
10	J (2)	Positive (max)	10	J (2)	Intermediate Stiffener	max	-	-	max
11	J (12)	Positive (max)	11	J (12)	Bearing Stiffener	max	77.439	-	max
11	J (12)	Positive (max)	11	J (12)	Intermediate Stiffener	max	-	-	max
11	J (13)	Positive (max)	11	J (13)	Bearing Stiffener	max	375.296	-	max
11	J (13)	Positive (max)	11	J (13)	Intermediate Stiffener	max	-	-	max
12	J (13)	Positive (max)	12	J (13)	Bearing Stiffener	max	77.439	-	max
12	J (13)	Positive (max)	12	J (13)	Intermediate Stiffener	max	-	-	max

Main Girder (Bearing Stiffener)									
Element	Part	Rating Case	Loading (kN/m)			Capacity (kN/m)	BSU		Assessed Category
			Dead	Static	Dynamic		Static	Dynamic	
1	J (1)	Positive (max)	-16.949	6.508	3.496	-	-	-	A1
1	J (2)	Positive (max)	1184.805	1216.417	-	-	-	-	A1
2	J (3)	Positive (max)	1184.805	1864.275	647.859	-	-	-	A1
2	J (4)	Positive (max)	2177.200	2470.860	-	-	-	-	A1
3	J (4)	Positive (max)	2164.762	3732.997	1296.597	-	-	-	A1
3	J (5)	Positive (max)	2661.521	2965.194	-	-	-	-	A1
4	J (5)	Positive (max)	2654.792	4542.017	1577.475	-	-	-	A1
4	J (6)	Positive (max)	2935.749	3514.227	-	-	-	-	A1
5	J (6)	Positive (max)	2932.225	6111.904	2646.492	-	-	-	A1
5	J (7)	Positive (max)	2704.454	3293.999	-	-	-	-	A1
6	J (7)	Positive (max)	2704.454	5812.939	2518.940	-	-	-	A1
6	J (8)	Positive (max)	2254.410	5312.588	-	-	-	-	A1
7	J (8)	Positive (max)	2260.340	5396.961	2339.550	-	-	-	A1
7	J (9)	Negative (max)	1301.366	-31.122	-13.486	-	-	-	A1
7	J (9)	Positive (max)	1301.366	2161.713	-	-	-	-	A1
8	J (9)	Positive (max)	1307.686	3675.665	1679.516	-	-	-	A1
8	J (10)	Positive (max)	132.940	1317.961	-	-	-	-	A1
9	J (10)	Positive (max)	140.087	2261.569	980.013	-	-	-	A1
9	J (11)	Positive (max)	-1529.661	82.895	-	-	-	-	A1
10	J (11)	Positive (max)	-1529.661	163.932	71.037	-	-	-	A1
10	J (2)	Positive (max)	-3409.458	-	-	-	-	-	A1
11	J (2)	Positive (max)	-	-	-	-	-	-	A1
11	J (12)	Positive (max)	-	-	-	-	-	-	A1
12	J (12)	Positive (max)	-	-	-	-	-	-	A1
12	J (13)	Positive (max)	-	-	-	-	-	-	A1
12	J (14)	Positive (max)	-	-	-	-	-	-	A1
13	J (14)	Positive (max)	-	-	-	-	-	-	A1
13	J (15)	Positive (max)	-	-	-	-	-	-	A1
14	J (15)	Positive (max)	-	-	-	-	-	-	A1
14	J (16)	Positive (max)	1	J (1)	Bearing Stiffener	max	-	-	max
15	J (16)	Positive (max)	1	J (1)	Intermediate Stiffener	max	-	-	max
15	J (17)	Positive (max)	1	J (3)	Bearing Stiffener	max	0.340	-	max
16	J (17)	Positive (max)	1	J (3)	Intermediate Stiffener	max	-	-	max
16	J (18)	Positive (max)	2	J (3)	Bearing Stiffener	max	0.070	17.243	max
17	J (18)	Positive (max)	2	J (3)	Intermediate Stiffener	max	-	-	max
17	J (19)	Positive (max)	2	J (4)	Bearing Stiffener	max	0.340	-	max
17	J (19)	Positive (max)	2	J (4)	Intermediate Stiffener	max	-	-	max
18	J (19)	Positive (max)	3	J (4)	Bearing Stiffener	max	2960.577	1587.651	max
18	J (20)	Positive (max)	3	J (4)	Intermediate Stiffener	max	-	-	max
19	J (20)	Positive (max)	3	J (5)	Bearing Stiffener	max	14347.80	-	max
19	J (21)	Positive (max)	3	J (5)	Intermediate Stiffener	max	-	-	max
20	J (21)	Positive (max)	4	J (5)	Bearing Stiffener	max	2960.577	1587.651	max
20	J (22)	Positive (max)	4	J (6)	Intermediate Stiffener	max	-	-	max
21	J (22)	Positive (max)	4	J (6)	Bearing Stiffener	max	-	-	max
21	J (23)	Positive (max)	5	J (6)	Intermediate Stiffener	max	11465.94	8791.016	max
22	J (4)	Positive (max)	5	J (6)	Intermediate Stiffener	max	-	-	max
22	J (37)	Positive (max)	5	J (7)	Bearing Stiffener	max	-	-	max
23	J (6)	Positive (max)	5	J (7)	Intermediate Stiffener	max	-	-	max
23	J (38)	Positive (max)	6	J (7)	Bearing Stiffener	max	11465.94	8791.016	max
24	J (8)	Positive (max)	6	J (7)	Intermediate Stiffener	max	-	-	max
7	J (8)	Positive (max)	7	J (8)	Bearing Stiffener	max	24026.86	18965.25	max
7	J (8)	Positive (max)	7	J (8)	Intermediate Stiffener	max	-	-	max
7	J (9)	Positive (max)	7	J (9)	Bearing Stiffener	max	-	-	max
7	J (9)	Positive (max)	7	J (9)	Intermediate Stiffener	max	-	-	max
8	J (9)	Positive (max)	8	J (9)	Bearing Stiffener	max	24026.86	18965.25	max
8	J (10)	Positive (max)	8	J (10)	Intermediate Stiffener	max	-	-	max
9	J (10)	Positive (max)	9	J (10)	Bearing Stiffener	max	41768.24	31955.71	max
9	J (10)	Positive (max)	9	J (10)	Intermediate Stiffener	max	-	-	max
9	J (11)	Positive (max)	9	J (11)	Bearing Stiffener	max	202519.2	-	max
9	J (11)	Positive (max)	9	J (11)	Intermediate Stiffener	max	-	-	max
10	J (11)	Positive (max)	10	J (11)	Bearing Stiffener	max	41768.24	31955.71	max
10	J (11)	Positive (max)	10	J (11)	Intermediate Stiffener	max	-	-	max
10	J (2)	Positive (max)	10	J (2)	Bearing Stiffener	max	202519.2	-	max
10	J (2)	Positive (max)	10	J (2)	Intermediate Stiffener	max	-	-	max
11	J (12)	Positive (max)	11	J (12)	Bearing Stiffener	max	77.439	-	max
11	J (12)	Positive (max)	11	J (12)	Intermediate Stiffener	max	-	-	max
11	J (13)	Positive (max)	11	J (13)	Bearing Stiffener	max	375.296	-	max
11	J (13)	Positive (max)	11	J (13)	Intermediate Stiffener	max	-	-	max
12	J (13)	Positive (max)	12	J (13)	Bearing Stiffener	max	77.439	-	max
12	J (13)	Positive (max)	12	J (13)	Intermediate Stiffener	max	-	-	max

Table Results

Excel Report

5. Automated design support for asymmetric (Type 2) composite steel bridges as per Eurocode4 & AASHTO LRFD

- In the case of exterior girders in girder bridges, the deck often needs to be modeled asymmetrically. However, previous versions did not support the design of such asymmetric sections in the automatic section design feature.
- Starting from this version, Steel Composite Design now supports asymmetric (Type 2) sections, in addition to the previously supported symmetric sections.
- The supported design codes are Eurocode 4 and AASHTO LRFD, and Type 2 section checks are available for Steel I-girders, Steel Tub girders, and Steel Box girders.

- Properties > Section Properties**
- Design > Composite Design > EN 1994-2, AASHTO-LRFD20**

Section Data

DB/User: Composite

Section ID: 3 Name: Outer Beam

Section Type: Steel-I (Type2)

☐ Symmetric Section Auto Calculation

Distance from Reference Line

Sg 0 Top 1.8 Bot 1.8 m

Slab

Bc 3.05 tc 0.235 Hh 0 m

Girder

B1 0.15 B6 0 tw2 0 m

B2 0.15 H 0.73 bf1 0 m

B3 0.15 t1 0.025 bf2 0 m

B4 0.15 t2 0.025 ttp 0 m

B5 0 tw 0.02 m

Stiffener...

Material

Select Material from DB ...

Es / Ec 6.61 Ds / Dc 0

Ps 0 Pc 0

Ts / Tc 1

☐ Multiple Modulus of Elasticity

Es/Ec (Creep) 0

Es/Ec (Shrinkage) 0

☒ Use Hambly Eq. for Ixx

Offset: Center-Top ☒ Consider Shear Deformation.

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

Show Calculation Results... OK Cancel Apply

Composite Steel-I (Type2) Section

MEMBER NAME : Steel Composite : 6 - i

1) Member Information

1) Design Code
EN 1994-2 (NA : Recommended)

2) Section Property
Outer Beam

3) Material
Steel
 $f_y = 355.000\text{MPa}$, $E_s = 205.000.000\text{MPa}$
Concrete
 $f_{ck} = 40.000\text{MPa}$, $E_{cm} = 35.220.462\text{MPa}$
Reinforcement
 $f_{yk} = 400.000\text{MPa}$, $E_s = 205.000.000\text{MPa}$

4) Length
L = 1.721m

5) Partial factors

	Factor
γ_c for concrete	1.500
γ_s for reinforcing steel	1.150
γ_{st} for structural steel	1.000
γ_{st} for structural steel	1.100
γ_s for headed stud	1.250
γ_{st} for equivalent constant Amplitude stress range	1.000
γ_{st} for fatigue strength	1.000
γ_{st} for fatigue strength of studs in shear	1.000

6) Section Properties

	Steel Section	Short-Term Composite Section	Long-Term Composite Section
Area	37.600.000mm ²	146.034.191mm ²	146.034.191mm ²
I_y	3.308610e+9mm ⁴	1.165795e+10mm ⁴	1.165795e+10mm ⁴
I_z	137.253.333mm ⁴	8.923921e+10mm ⁴	8.923921e+10mm ⁴
C_y	150.000mm	165.574mm	165.574mm
C_z	367.334mm	760.070mm	760.070mm

Steel Composite Design Report as per Eurocode4

23 Curved Steel Composite Design,Type2.xlsx

1) Design Properties

1) Design Code
AASHTO LRFD 2020

2) Section Property
Outer Beam

3) Material
Steel
 $f_y = 355.000\text{MPa}$, $E_s = 205.000.000\text{MPa}$
Concrete
 $f_{ck} = 40.000\text{MPa}$, $E_{cm} = 35.220.462\text{MPa}$
Reinforcement
 $f_{yk} = 400.000\text{MPa}$, $E_s = 205.000.000\text{MPa}$

4) Length
L = 1.721m

5) Partial factors

	Factor
γ_c for concrete	1.500
γ_s for reinforcing steel	1.150
γ_{st} for structural steel	1.000
γ_{st} for structural steel	1.100
γ_s for headed stud	1.250
γ_{st} for equivalent constant Amplitude stress range	1.000
γ_{st} for fatigue strength	1.000
γ_{st} for fatigue strength of studs in shear	1.000

6) Section Properties

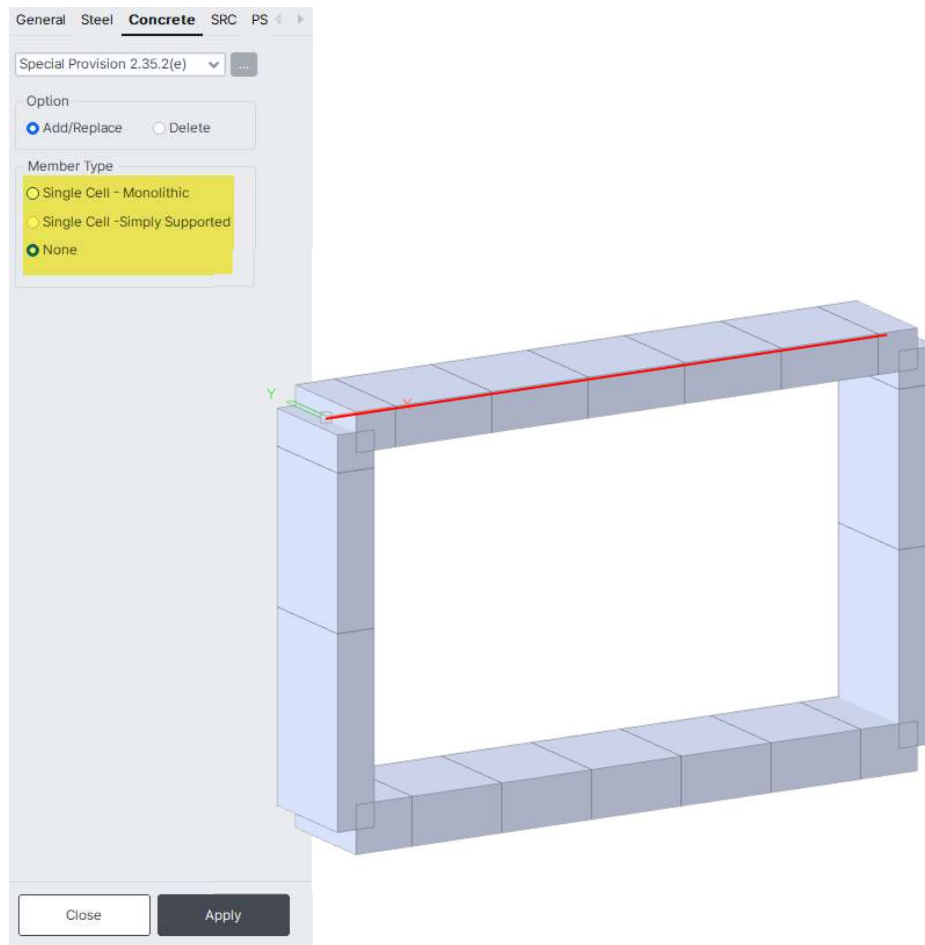
	Steel Section	Short-Term Composite Section	Long-Term Composite Section
Area	37.600.000mm ²	146.034.191mm ²	146.034.191mm ²
I_y	3.308610e+9mm ⁴	1.165795e+10mm ⁴	1.165795e+10mm ⁴
I_z	137.253.333mm ⁴	8.923921e+10mm ⁴	8.923921e+10mm ⁴
C_y	150.000mm	165.574mm	165.574mm
C_z	367.334mm	760.070mm	760.070mm

Steel Composite Design Report as per AASHTO LRFD

6. RC Design for 1D Beam & Column as per AREMA 2023

- A new option, "Special Provision 2.35.2(e)" has been added under Design Parameters to specify the type of box culvert.

Design > RC Design > Design Parameters > Special Provision 2.35.2(e)



Special Provision 2.35.2(e)

Concrete Structures and Foundations

$$v_c = 2 \left(1 + 0.0005 \frac{N_u}{A_g} \right) \sqrt{f'_c} \quad \text{EQ 2-47}$$

$$v_c = 0.17 \left(1 + 0.072 \frac{N_u}{A_g} \right) \sqrt{f'_c} \quad \text{EQ 2-47M}$$

The quantity $\frac{N_u}{A_g}$ shall be expressed in psi (MPa).

- d. For members subject to significant axial tension, shear reinforcement shall be designed to carry the total shear, unless a more detailed analysis is made using

$$v_c = 2 \left(1 + 0.002 \frac{N_u}{A_g} \right) \sqrt{f'_c} \quad \text{EQ 2-48}$$

$$v_c = 0.17 \left(1 + 0.29 \frac{N_u}{A_g} \right) \sqrt{f'_c} \quad \text{EQ 2-48M}$$

where:

N_u is negative for tension

the quantity $\frac{N_u}{A_g}$ shall be expressed in psi (MPa).

- e. Special provisions for slabs of box culverts. For slabs of box culverts under rail with 18 inches (450 mm) or more of fill (base of rail to top of culvert), shear stress v_c may be computed by:

$$v_c = 2.14 \sqrt{f'_c} + 4600 \rho \frac{V_u d}{M_u} \quad \text{EQ 2-49}$$

$$v_c = 0.18 \sqrt{f'_c} + 32 \rho \frac{V_u d}{M_u} \quad \text{EQ 2-49M}$$

but v_c shall not exceed $4 \sqrt{f'_c}$ (or $\frac{1}{3} \sqrt{f'_c}$ in metric). For single cell box culverts only, v_c need not be taken

less than $3 \sqrt{f'_c}$ (or $\frac{\sqrt{f'_c}}{4}$ in metric) for slabs monolithic with walls or $2.5 \sqrt{f'_c}$ (or $\frac{5}{24} \sqrt{f'_c}$ in metric)

for slabs simply supported. The quantity $\frac{V_u d}{M_u}$ shall not be taken greater than 1.0, where M_u is factored moment occurring simultaneously with V_u at section considered.

6. RC Design for 1D Beam & Column as per AREMA 2023

- Design and checking of RC frame elements to AREMA 2023 are newly introduced in midas.
- This feature can be applied to RC beam & RC column (T-girder, diaphragm, pier, pier cap & other related substructure components).
- The detailed design report provides calculations in both SI and US units, available in Word format.

■ Design > RC Design > RC Code Design > Beam/Column Design

AREMA-2023 RC-Beam Design Result Dialog

Code : AREMA-2023 Unit : kN , mm Primary Sorting Option
Sorted by ☒ Member ☐ SECT ☒ MEMB
☐ Section

Negative Moment

Positive Moment

Shear & Torsion

MEMB	SECT	SEL	Section	Bc	Hc	fy	POS	CHK	N(-) Mu	LCB	AsTop	P(+) Mu	LCB	AsBot	vu	LCB	AsV	Tu	LCB	St	Stirrups
Span			bf	hf	fys																
7			Pier Cap Mid	0.04826	I	OK			2.0E+07	1-F	29121	0.00000	3	0.0000	0.00572	1-F	17.676	4376.23	2-F	101.83	9.0-#5 @100
8			1500, 2000, 0.000	0.000	0.41369	M	OK		2.8E+07	1-F	37933	0.00000	3	0.0000	0.00573	1-F	17.528	4376.23	2-F	102.69	9.0-#5 @100
750.00			0.000	0.000	0.41369	J	OK		2.8E+07	1-F	42465	0.00000	3	0.0000	0.00574	1-F	17.451	4376.23	2-F		
8			Pier Cap Mid	0.04826	I	OK			2.0E+07	1-F	29021	0.00000	3	0.0000	0.00570	1-F	17.605	1040.10	1		
8			1500, 2000, 0.000	0.000	0.41369	M	OK		2.8E+07	1-F	37800	0.00000	3	0.0000	0.00571	1-F	17.458	1040.10	1		
750.00			0.000	0.000	0.41369	J	OK		2.8E+07	1-F	42315	0.00000	3	0.0000	0.00572	1-F	17.381	1040.10	1		
9			Pier Cap Mid	0.04826	I	OK			2.9E+07	1-M	42586	0.00000	3	0.0000	0.00576	1-F	17.520	5359.33	2		
8			1500, 2000, 0.000	0.000	0.41369	M	OK		2.6E+07	1-M	38037	0.00000	3	0.0000	0.00575	1-F	17.520	5359.33	2		
750.00			0.000	0.000	0.41369	J	OK		2.0E+07	1-M	29195	0.00000	3	0.0000	0.00574	1-F	17.598	5359.33	2		
10			Pier Cap Mid	0.04826	I	OK			2.8E+07	1-M	42510	0.00000	3	0.0000	0.00575	1-F	17.492	1040.95	1		
8			1500, 2000, 0.000	0.000	0.41369	M	OK		2.6E+07	1-M	37969	0.00000	3	0.0000	0.00574	1-F	17.492	1040.95	1		
750.00			0.000	0.000	0.41369	J	OK		2.0E+07	1-M	29140	0.00000	3	0.0000	0.00573	1-F	17.569	1040.95	1		

☐ Connect Model View
Select All Unselect All Re-calculation
Graphic... Summary... Summary By LCB <<
Detail... C:\Users\midas\OneDrive - MIDAS\A...
Option for Detail Print Position
☒ End I. ☐ Mid. ☐ End J. Close
Result View Option
☒ All ☐ OK ☐ NG
Copy Table

AREMA-2023 RC-Beam Checking Result Dialog

Code : AREMA-2023 Unit : kN , mm Primary Sorting Option
Sorted by ☒ Member ☐ SECT ☒ MEMB
☐ Section Results ☐ Strength ☒ Serviceability ☒ Stress Check

MEMB	SECT	SEL	Section	Bc	Hc	fy	POS	CHK	Stress Control			
Span			bf	hf	fys				Top-s	Top-sa	Bot-s	Bot-sa
7			Pier Cap Mid	0.04826	I	OK			205.00	206.00	0.0000	206.00
8			1500, 2000, 0.000	0.000	0.41369	M	OK		184.00	206.00	0.0000	206.00
750.00			0.000	0.000	0.41369	J	OK		205.00	206.00	0.0000	206.00
8			Pier Cap Mid	0.04826	I	OK			204.00	206.00	0.0000	206.00
8			1500, 2000, 0.000	0.000	0.41369	M	OK		184.00	206.00	0.0000	206.00
750.00			0.000	0.000	0.41369	J	OK		204.00	206.00	0.0000	206.00
9			Pier Cap Mid	0.04826	I	T*			292.00	206.00	0.0000	206.00
8			1500, 2000, 0.000	0.000	0.41369	M	OK		185.00	206.00	0.0000	206.00
750.00			0.000	0.000	0.41369	J	OK		144.00	206.00	0.0000	206.00
10			Pier Cap Mid	0.04826	I	T*			292.00	206.00	0.0000	206.00
8			1500, 2000, 0.000	0.000	0.41369	M	OK		184.00	206.00	0.0000	206.00
750.00			0.000	0.000	0.41369	J	OK		144.00	206.00	0.0000	206.00

☐ Connect Model View
Select All Unselect All Re-calculation
Graphic... Summary... Summary By LCB <<
Detail... C:\Users\midas\OneDrive - MIDAS\A...
Option for Detail Print Position
☒ End I. ☐ Mid. ☐ End J. Close
Result View Option
☒ All ☐ OK ☐ NG
Copy Table

Design Result Table

MIDAS Information Technology Co.,Ltd.
MIDAS CIVIL NX 2025 (v1.1) / Design

■ MEMBER NAME : Pier (Section ID : 9, Element No.1)

1. Member Information

1) Design Code
AREMA-2023

2) Section Property
Pier (ID : 9)

3) Material
Concrete
 $f_c = 48.263\text{MPa}$, $E_c = 0.043w_c^{1.5}f_c^{0.5} = 35,219.834\text{MPa}$
Reinforcement
 $f_y = 413.686\text{MPa}$, $f_{yk} = 413.686\text{MPa}$, $E_s = 199,948.024\text{MPa}$

4) Length
 $L = 10.00\text{m}$

5) Reinforcement Data

1500

1500

End Part

Main
22,500.000mm²

Tie Stirrups
2-#3@273

2. Axial and moment capacity (End, 1.00L)

	LCB	Strength Group I-FX	
Axial and moment	$P_u / \phi P_n$	30,926.254kN / 60,413.089kN = 0.512	OK
	$M_{uy} / \phi M_{ny}$	7,118kN-m / 17,308kN-m = 0.411	OK
	$M_{ux} / \phi M_{nx}$	97,692kN-m / 237,556kN-m = 0.411	OK
	$M_u / \phi M_n$	97,950kN-m / 238,186kN-m = 0.411	OK
	$\rho_{min} \geq \rho \geq \rho_{max}$	$\rho_{min} = 0.01000 \leq \rho = 0.01000 \leq \rho_{max} = 0.08000$	OK

* Strength Group I-FX : (1.400) Dead Load, FX minimum concurrent force

Detailed Design Report

7. Update PSC section design criteria for Australia to the latest 2024 standard

- The PSC Design feature has been updated to support the latest amendment of the Australian bridge design standard: AS 5100.5:2017 Amendment 2024.
- **Key Updates :** Support for the 2024 Amendment is now available in the PSC Design Parameters.
Updated reinforcing steel material properties in accordance with the new amendment.
All relevant design equations and checks have been revised to comply with the updated provisions.
- This update ensures that engineers can perform PSC design fully aligned with the most current Australian bridge design standards.

Design > PSC Design > AS 5100.5:17 > Amd 2:2024

PSC Design Code

Design Code

AS 5100.5:17

Amendments :

Amd 2:2024

Input Paramaters

Maximum nominal aggregate size (8.2.4.2)

d_g

0.016

m

Crack Control

Maximum Increment of Steel Stress

160000

kN/m²

Output Paramaters

Ultimate limit states

☐ Transfer Check

☐ Flexural resistance

☐ Shear resistance

☐ Torsional resistance

Serviceability limit state

☐ Control of Cracking

PSC Design Parameter as per AS5100:5 Amd 2:2024

AS 5100.5:2017 Amd 2:2024
Bridge design, Part 5: Concrete

This Australian Amendment was prepared by BD-090, Br Standards Australia's Standards Development and Accreditation Committee.

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Draft published as: DR AS 5100.5:2017 Amd 2:2024
Committee: BD-090
Committee members: ARRB (Australian Road Research Board), Australian Industry Group, Australian Steel Institute, Austroads Ltd., Bureau of Steel Manufacturers, Cement Concrete & Aggregates Institute of Australia, Concrete NZ Inc, Concrete Pipe Association of Australia, Consult Australia, Engineers Australia, Independent Chairperson (Australia), Institute of Public Works Engineers, National Precast Concrete Association, New Zealand Heavy Engineering, Queensland University of Technology, Rail Industry Safety and Standards New Zealand (SNZ), Steel Construction New Zealand, Steel Reinforcement Institute of New Zealand, The University of Sydney, WSP New Zealand Ltd, Waka Kotahi-NZ Transport Agency

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1. Design Condition																					
Design code		Element		Node(s)																	
AS5100.5:17 Amd2:24		508		I																	
Section Properties																					
Section Type																					
Composite																					
Gross section						Transformed section															
Before						After															
H (mm)	1500.0	1680.0	H (mm)	1500.0	1680.0	H (mm)	1500.0	1680.0	H (mm)	1500.0	1680.0										
B (mm)	2100.0	2960.0	B (mm)	2100.0	2960.0	B (mm)	2100.0	2960.0	B (mm)	2100.0	2960.0										
C _{top} (mm)	823.3	389.7	C _{top} (mm)	850.3	414.8	C _{top} (mm)	850.3	414.8	C _{top} (mm)	850.3	414.8										
C _{bot} (mm)	676.7	1110.3	C _{bot} (mm)	649.7	1065.2	C _{bot} (mm)	649.7	1065.2	C _{bot} (mm)	649.7	1065.2										
A _g (mm ²)	5.557 E+05	1.058 E+06	A _g (mm ²)	5.855 E+05	1.090 E+06	A _g (mm ²)	5.855 E+05	1.090 E+06	A _g (mm ²)	5.855 E+05	1.090 E+06										
I _g (mm ⁴)	1.588 E+11	3.802 E+11	I _g (mm ⁴)	1.669 E+11	4.081 E+11	I _g (mm ⁴)	1.669 E+11	4.081 E+11	I _g (mm ⁴)	1.669 E+11	4.081 E+11										
S _g (mm ³)	1.928 E+08	4.075 E+08	S _g (mm ³)	1.963 E+08	4.023 E+08	S _g (mm ³)	1.963 E+08	4.023 E+08	S _g (mm ³)	1.963 E+08	4.023 E+08										
S _{xt} (mm ³)	2.347 E+08	1.431 E+08	S _{xt} (mm ³)	2.569 E+08	1.538 E+08	S _{xt} (mm ³)	2.569 E+08	1.538 E+08	S _{xt} (mm ³)	2.569 E+08	1.538 E+08										
S _{yt} (mm ³)	6.674 E+08	9.756 E+08	S _{yt} (mm ³)	6.392 E+08	9.166 E+08	S _{yt} (mm ³)	6.392 E+08	9.166 E+08	S _{yt} (mm ³)	6.392 E+08	9.166 E+08										
Materials																					
Concrete																					
		f _c (MPa)		E _c (MPa)		f _{yk} ± 0.5 f _{yk} (MPa)		α _s		γ											
Girder		50.000		34800.000		4.243		0.85		0.70											
Slab		65.000		37400.000		4.837		0.81		0.67											
* α _s = 1.0 - 0.003f _c (within the limits of 0.67 ≤ α _s ≤ 0.85)																					
* γ = 1.05 - 0.007f _c (within the limits of 0.67 ≤ γ ≤ 0.85)																					
Pre-stressing steel information																					
No.	Tendon name	Bond type	d _s (mm)	A _{ps} (mm ²)	Strength (MPa)	f _{yk}	f _{pu}	E _s (MPa)													
1	S_Span1-175	Bond	1465.0	138.7	1569.1	1863.3	205000.0														
2	S_Span1-165	Bond	1465.0	138.7	1569.1	1863.3	205000.0														
3	S_Span1-155	Bond	1515.0	138.7	1569.1	1863.3	205000.0														
4	S_Span1-145	Bond	1565.0	138.7	1569.1	1863.3	205000.0														
5	S_Span1-135	Bond	1615.0	138.7	1569.1	1863.3	205000.0														
6	S_Span1-168	Bond	1465.0	138.7	1569.1	1863.3	205000.0														
7	S_Span1-158	Bond	1515.0	138.7	1569.1	1863.3	205000.0														
8	S_Span1-148	Bond	1565.0	138.7	1569.1	1863.3	205000.0														
9	S_Span1-138	Bond	1615.0	138.7	1569.1	1863.3	205000.0														
10	S_Span1-169	Bond	1465.0	138.7	1569.1	1863.3	205000.0														
11	S_Span1-159	Bond	1515.0	138.7	1569.1	1863.3	205000.0														
12	S_Span1-149	Bond	1565.0	138.7	1569.1	1863.3	205000.0														
13	S_Span1-139	Bond	1615.0	138.7	1569.1	1863.3	205000.0														
14	S_Span1-172	Bond	1465.0	138.7	1569.1	1863.3	205000.0														
15	S_Span1-162	Bond	1515.0	138.7	1569.1	1863.3	205000.0														
16	S_Span1-152	Bond	1565.0	138.7	1569.1	1863.3	205000.0														
17	S_Span1-142	Bond	1565.0	138.7	1569.1	1863.3	205000.0														
18	S_Span1-173	Bond	1465.0	138.7	1569.1	1863.3	205000.0														
19	S_Span1-163	Bond	1515.0	138.7	1569.1	1863.3	205000.0														
20	S_Span1-153	Bond	1515.0	138.7	1569.1	1863.3	205000.0														
21	S_Span1-143	Bond	1565.0	138.7	1569.1	1863.3	205000.0														
22	S_Span1-133	Bond	1615.0	138.7	1569.1	1863.3	205000.0														
23	S_Span1-170	Bond	1465.0	138.7	1569.1	1863.3	205000.0														
24	S_Span1-160	Bond	1515.0	138.7	1569.1	1863.3	205000.0														
25	S_Span1-150	Bond	1565.0	138.7	1569.1	1863.3	205000.0														
26	S_Span1-140	Bond	1615.0	138.7	1569.1	1863.3	205000.0														
27	S_Span1-171	Bond	1465.0	138.7	1569.1	1863.3	205000.0														
28	S_Span1-161	Bond	1515.0	138.7	1569.1	1863.3	205000.0														
29	S_Span1-151	Bond	1565.0	138.7	1569.1	1863.3	205000.0														

PSC Design Report

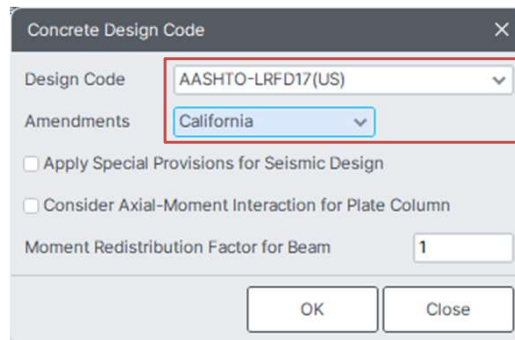
MIDAS

16

8. Add California-specific provisions from AASHTO LRFD

- To meet the specific requirements of California bridge projects, MIDAS CIVIL NX now supports the California Amendment to AASHTO LRFD design specifications.
- Applicable Design Modules : Steel Design, RC Design, PSC Design, Steel Composite Design
- Users can now perform code checks and design in full compliance with California Department of Transportation (Caltrans) standards, ensuring regional accuracy and approval readiness.

- Design > Steel Design > AASHTO-LRFD17 > California Amendments**
- Design > RC Design > AASHTO-LRFD17 > California Amendments**
- Design > PSC Design > AASHTO-LRFD17 > California Amendments**
- Design > Composite Design > AASHTO-LRFD17 > California Amendments**



Concrete Design Code

Design Code: AASHTO-LRFD17(US)

Amendments: California

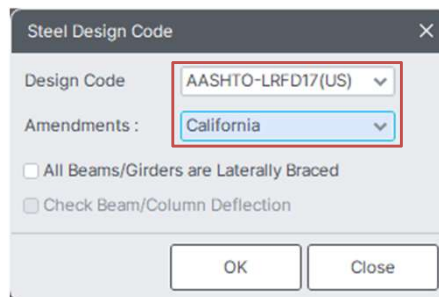
☐ Apply Special Provisions for Seismic Design

☐ Consider Axial-Moment Interaction for Plate Column

Moment Redistribution Factor for Beam: 1

OK Close

RC Design – CA Amendment



Steel Design Code

Design Code: AASHTO-LRFD17(US)

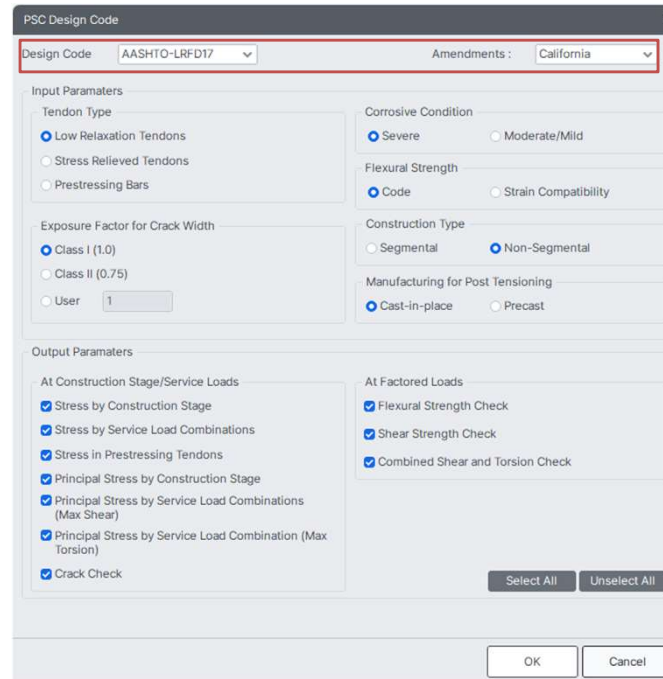
Amendments: California

☐ All Beams/Girders are Laterally Braced

☐ Check Beam/Column Deflection

OK Close

Steel Design – CA Amendment



PSC Design Code

Design Code: AASHTO-LRFD17

Amendments: California

Input Parameters

Tendon Type

☒ Low Relaxation Tendons

☐ Stress Relieved Tendons

☐ Prestressing Bars

Corrosive Condition

☒ Severe ☐ Moderate/Mild

Flexural Strength

☒ Code ☐ Strain Compatibility

Exposure Factor for Crack Width

☒ Class I (1.0)

☐ Class II (0.75)

☐ User: 1

Construction Type

☐ Segmental ☒ Non-Segmental

Manufacturing for Post Tensioning

☒ Cast-in-place ☐ Precast

Output Parameters

At Construction Stage/Service Loads

☒ Stress by Construction Stage

☒ Stress by Service Load Combinations

☒ Stress in Prestressing Tendons

☒ Principal Stress by Construction Stage

☒ Principal Stress by Service Load Combinations (Max Shear)

☒ Principal Stress by Service Load Combination (Max Torsion)

☒ Crack Check

At Factored Loads

☒ Flexural Strength Check

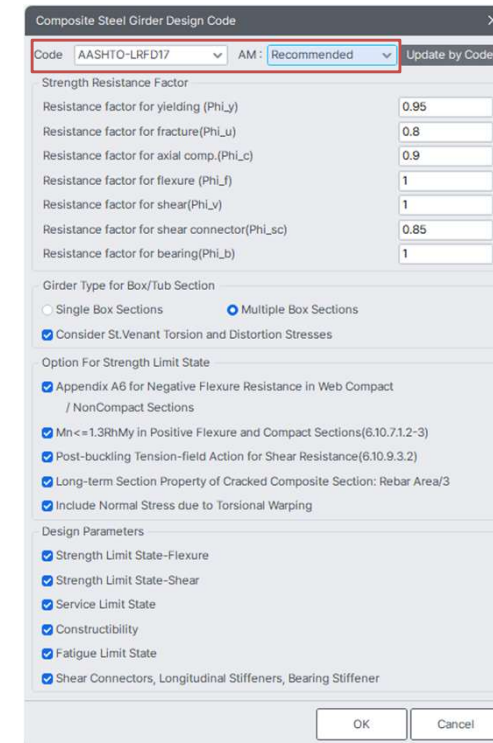
☒ Shear Strength Check

☒ Combined Shear and Torsion Check

Select All Unselect All

OK Cancel

PSC Design – CA Amendment



Composite Steel Girder Design Code

Code: AASHTO-LRFD17

AM: Recommended

Update by Code

Strength Resistance Factor

Resistance factor for yielding (Phi_y): 0.95

Resistance factor for fracture (Phi_u): 0.8

Resistance factor for axial comp. (Phi_{lc}): 0.9

Resistance factor for flexure (Phi_f): 1

Resistance factor for shear (Phi_{lv}): 1

Resistance factor for shear connector (Phi_{sc}): 0.85

Resistance factor for bearing (Phi_b): 1

Girder Type for Box/Tub Section

☐ Single Box Sections ☒ Multiple Box Sections

☒ Consider St.Venant Torsion and Distortion Stresses

Option For Strength Limit State

☒ Appendix A6 for Negative Flexure Resistance in Web Compact / NonCompact Sections

☒ Mn <= 1.3RhMy in Positive Flexure and Compact Sections (6.10.7.1.2-3)

☒ Post-buckling Tension-field Action for Shear Resistance (6.10.9.3.2)

☒ Long-term Section Property of Cracked Composite Section: Rebar Area/3

☒ Include Normal Stress due to Torsional Warping

Design Parameters

☒ Strength Limit State-Flexure

☒ Strength Limit State-Shear

☒ Service Limit State

☒ Constructibility

☒ Fatigue Limit State

☒ Shear Connectors, Longitudinal Stiffeners, Bearing Stiffener

OK Cancel

Steel Composite Design – CA Amendment

9. Auto-generate Load combination (RC) as per TMH07 : 1981

- Load combination are generated as per Table 17 of TMH07 : 1981
- For automatically generated load combinations, the SLS combinations are classified according to TMH07-1981 for serviceability checks under PSC Design.

Results > Load Combination > Concrete Design > Auto Generation > TMH07: 1981

Type of action	Nominal actions F _k	Note	Clause number	Limit state	γ _k = γ ₁ = γ ₂ to be considered in combinations:		
					1	2	3
PRINCIPAL ACTIONS	Dead loads: concrete	g _k	2.2.2	ULS	1.2	1.05	1.2
	Dead loads: steel	g _k	2.2.2	SLS	1.0	1.0	1.0
	Superimposed dead loads	q _k	2.3.2	ULS	1.2	1.05	1.2
	Reduced load for dead and superimposed dead load where this has a more severe effect	q _k	2.3.2.2	SLS	1.0	1.0	1.0
	Vertical earth loading on curbs	Method (i)	2.3.3.3	ULS	1.8	1.3	1.8
		Methods (ii) & (iii)	2.3.3.3	SLS	1.4	1.0	1.4
	Earth pressure due to retained fill	Approximate theory	2.4.3	ULS	1.5	1.3	1.5
		More accurate theory	2.4.3	SLS	1.0	1.0	1.0
	As above but causing relieving effect	f _{ek}	2.4.3	ULS	See Clause 2.4.3		
	Water pressure of retained or excluded water	f _w	2.5.2	ULS	1.2	1.05	1.2
	As above but causing relieving effect	f _w	2.5.2	SLS	1.0	1.0	1.0
	Vehicle traffic loading and surcharge	NA	2.6.3.3	ULS	1.5	1.3	—
		NB	2.6.4.3	SLS	1.2	1.1	—
	Sidewalk and cycle track loading	Q _k	2.7.1.2	ULS	1.5	1.3	—
DIRECT ACTIONS	Erection loads	Q _k	2.8.2.2	ULS	—	1.15	—
	Centrifugal forces	F _k	3.2.4	ULS	—	1.50	—
	Longitudinal braking and traction forces	NA load	3.3.6	ULS	—	1.25	—
		NB load	3.3.6	SLS	—	1.1	—
	Accidental skidding	F _{sk}	3.4.4	ULS	—	1.25	—
	Impact due to vehicle collision with bridge abutment or pier	F _{ik}	3.5.4	ULS	—	1.25	—
	Impact due to vehicle collision with bridge supports	F _{im}	3.7.5	ULS	—	1.25	—
	Wind action	(A)	3.8.7	ULS	—	1.1	—
		(B)	3.8.7	SLS	—	1.0	—
		(C)	3.8.7	ULS	—	1.1	—
		(D)	3.8.7	SLS	—	1.0	—
	Flood action	F _f	3.9.8	ULS	—	1.05	1.3
	Earthquake action	F _{ek}	3.10.5	ULS	—	1.3	—
	Creep and shrinkage	F _{cs} , F _{ss}	4.2.2	ULS	1.0	1.0	1.0
	Parasitic prestress and prestress	F _{ps} , F _{ps}	4.3.2	ULS	1.0	1.0	1.0
INDIRECT ACTIONS	Differential settlement	F _s	4.4.2	ULS	1.0	1.0	1.0
	Temperature range	F _t	4.5.8	ULS	—	1.0	1.3
	Temperature gradient	F _{tg}	4.5.8	SLS	—	0.6	1.0
	Frictional bearing restraint	F _{br}	4.6.2	ULS	—	1.3	1.0

Auto Load Combination

Automatic Generation of Load Combinations

Option

Add

Replace

Code Selection

Steel Concrete SRC Steel Composite

Design Code TMH07-1981

Manipulation of Construction Stage Load Case

ST Only CS Only ST+CS

ST : Static Load Case CS : Construction Stage

Code Based

User Defined

Load Factors for Permanent Loads

Dead Load : 1.20 1.05 Both

Super Imposed DL : 1.20 1.05 Both

Vertical Earth Pressure : Method-1

Non-Vertical Earth Pressure : Approximate

Earth Pressure Relieving : 0.5

Partial Safety Factor for Moving Load, Surcharge Load

Load Case : NA

Vehicle Type : NA

TMH7 vehicle Load Factor Table

Load Ca... Vehicle Type

Add Delete

Longitudinal Braking & Traction

Load Case :

Load Factor : 1.25

Load Case Factor

Add Delete

Partial Load Factor for Inaccurate Load Effect

For Ultimate Limit State 1.10

For Service Limit State 1.00

Consider Orthogonal Effect (100 : 30 Rule)

Set Load Cases for Orthogonal Effect...

OK Cancel

Serviceability Load Combination Type

Serviceability

Combination 1

cLCB533

cLCB534

Combination 2 and 3

cLCB535

cLCB536

cLCB537

cLCB538

cLCB539

cLCB540

cLCB541

cLCB542

cLCB543

cLCB544

cLCB545

cLCB546

cLCB547

cLCB548

OK Cancel

SLS Load combination Type

11. Significantly Improved Excel Design Report Generation Speed

- The generation speed of Excel-based design reports has been dramatically improved by adopting the LibXL library. This enhancement reduces the time required to export large and complex design calculation sheets.
- **Key Improvements** : Significantly faster export performance for design reports.
Improved stability when generating large files.
- This update enhances user productivity, especially for projects requiring frequent report generation and documentation submission.

Design > Steel Design ,RC Design , PSC Design , Composite Design

- Applicable to the following design codes:

PSC/PSC Composite

AASHTO-LRFD20
AS 5100.5:17
BS 5400-4:1990
CSA-S6-14
CSA-S6-19
CSA-S6S1-10
KSCE-LSD15
KDS 24 14 21 : 2021
TMH07
Eurocode2-2:05
IRC112, IRS
BD44/15 for CS455, CS457
SNiP 2.05.03-84*
SP 35.13330.2011

Steel Composite

AASHTO-LRFD20
CSA-S6-14
CSA-S6-19
SNiP 2.05.03-84*
SP 35.13330.2011
EN 1994-2
KSCE-LSD15
KDS 24 14 31 : 2018

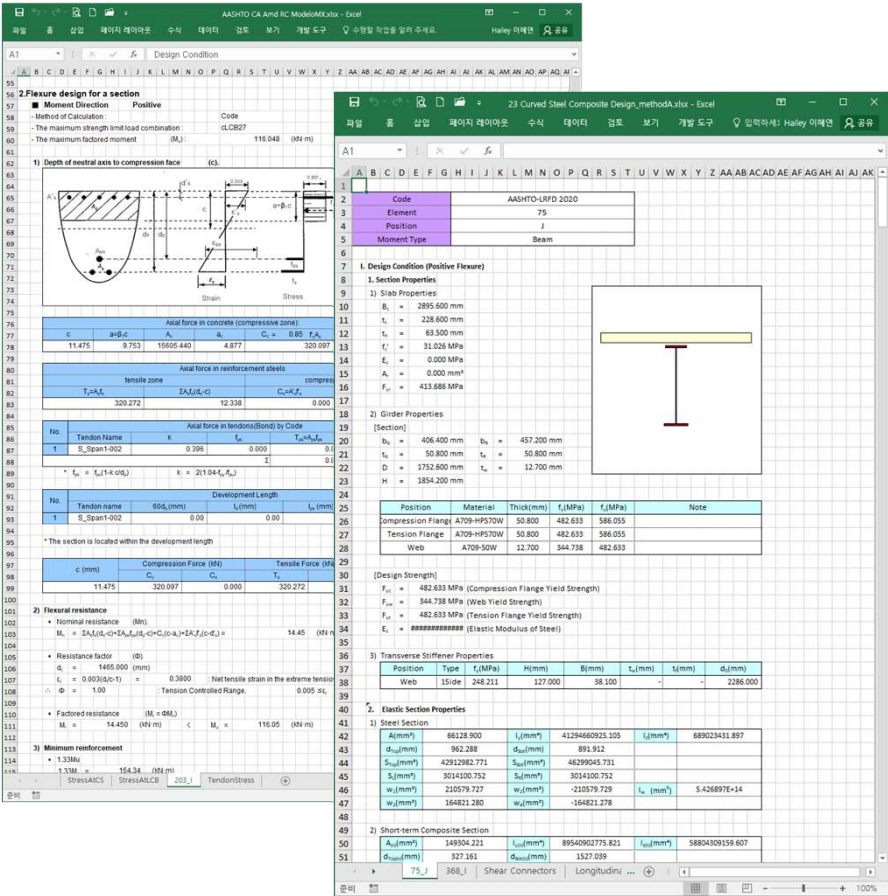
Steel SOD
SNiP 2.05.03-84*
SP 35.13330.2011

Steel Rating

AASHTO-LRFR11
AASHTO-LRFR19
CS454/20
NR GN CIV 025

PSC Rating

AASHTO-LRFR11
AASHTO-LRFR19
CS454/20
KSCE-LSD15



Excel Report

12. Moving patch load analysis as per Eurocode, BS & NZ traffic loads

- The tire contact area of a wheel can now be applied during moving load analysis not only for AASHTO LRFD vehicles (as in previous versions), but also for all road bridge vehicles defined in Eurocode, BS and New Zealand standards.
- By applying patch (area) loads instead of concentrated wheel loads, the resulting design forces on plate elements can be significantly reduced, leading to more realistic and optimized analysis results. This enhancement improves modeling accuracy, especially for deck and slab structures where local stress distribution is critical.

▪ **Load > Moving Load (AASHTO LRFD) > Vehicles**

Define Standard Vehicular Load

Standard Name

CS 458 (BD86/11) Special Load

Vehicular Load Properties

Vehicular Load Name

SV 80

Vehicular Load Type

SV 80

P1

P2

P3

P4

P5

P6

K

D1

D2

A

D4

D5

* SV 80

No	P (kN)	D (m)
1	130	1.2
2	130	1.2
3	130	A
4	130	1.2
5	130	1.2
6	130	end

No	P (kN)	D (m)
----	--------	-------

A is Critical of 1.2m or 5.0m or 9.0m

☒ Dynamic Amplification Factor

☒ Auto

☐ User Input

ψ :

1

☒ Overload Factor

☒ Auto

☐ User Input

Critical Axle

1.2

All Other Axles

1.1

Distance to Front and Rear Vehicles

☒ 25m

☐ 5m

☒ Consider Contact Area

Width

0.35

m

Length

0.35

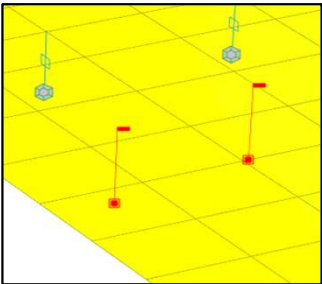
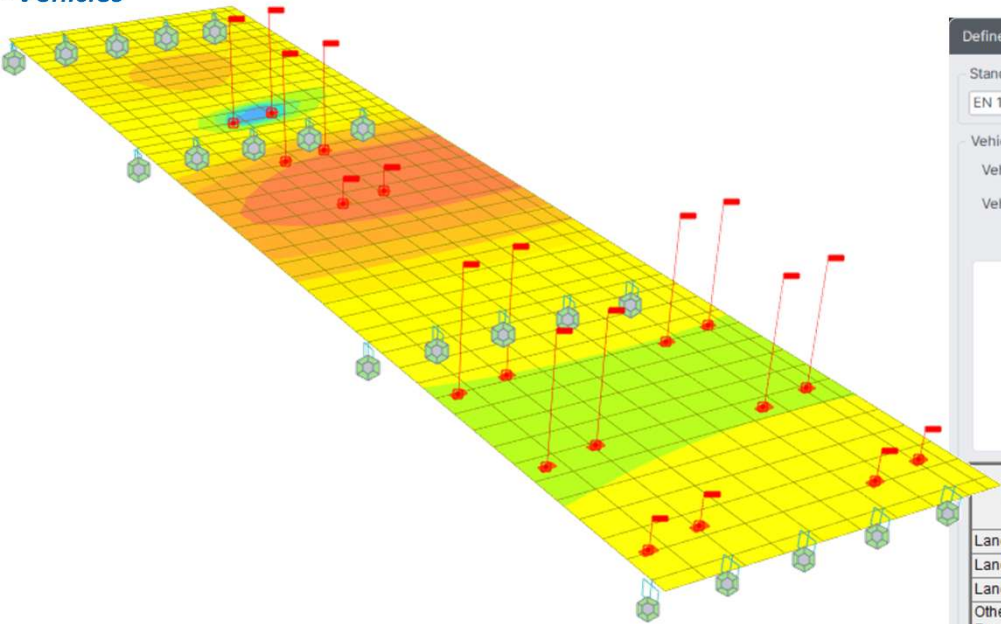
m

OK

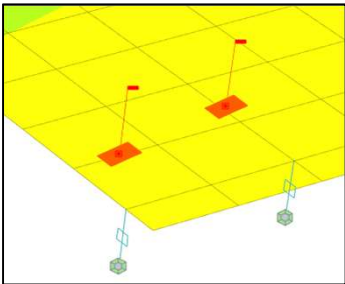
Cancel

Apply

BS Special Vehicle



Concentrated wheel loads



Patch/area wheel loads

Define Standard Vehicular Load

Standard Name

EN 1991-2:2003 - RoadBridge

Vehicular Load Properties

Vehicular Load Name

Load Model 1

Vehicular Load Type

Load Model 1

$\alpha_{Q1} Q_{1k}$

$\alpha_{Q2} Q_{2k}$

$\alpha_{q1} q_{1k}$

$\alpha_{Q1} Q_{1k}$

$\alpha_{Q2} Q_{2k}$

$\alpha_{q1} q_{1k}$

1.2m

$\alpha_{Q1} Q_{1k}$: Tandem System, Qik

$\alpha_{q1} q_{1k}$: UDL System, qik

Dynamic amplification factor included

Location	Tandem System		UDL System	
	Adjustment Factor	Axle Loads (kN)	Adjustment Factor	Uniformly Dist. Loads (kN/m²)
Lane Number1	1	300	1	9
Lane Number2	1	200	1	2.5
Lane Number3	1	100	1	2.5
Other Lanes & Remaining Area	0	0	1	2.5

ψ factor for Tandem System

0.75

ψ factor for UDL System

0.4

☒ Consider Contact Area

Width

0.4

m

Length

0.4

m

OK

Cancel

Apply

Eurocode Load Model1 Vehicle

13. Addition of evaluation truck loads for existing bridges in New Zealand(Based on SP/M/022 v3.4)

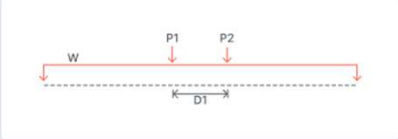
- A full set of New Zealand vehicle load models, as specified in SP/M/022 v3.4, has been added, including: HN (normal) loading, HO (overload) loading, TT530 (Fatigue), HPMV evaluation loading, General access and 50MAX reference vehicles
- This enhancement is integrated with the lane optimization feature and the patch load (tire contact area) function for improved load distribution on deck elements.
- Users can define the target element and span length, and the Dynamic Factor is automatically calculated and applied in the analysis, ensuring more accurate simulation of vehicle effects on bridge structures.

▪ Load > Moving Load > New Zealand

Define Standard Vehicular Load

Standard Name
Traffic Load

General Access Vehicle
50MAX Conforming Vehicle
High Productivity Motor Vehicle
Deck Evaluation Vehicle
Fatigue Loading Model



No	Load(kN)	Spacing(m)
1	120	5
2	120	end

W 10.5 kN/m

☐ Consider Contact Area

Width 0.5 m

Length 0.2 m

OK Cancel Apply

New Zealand Vehicles

Dynamic Load Factor

Select Structure Group
SG-P2Seg12
SG-KeySeg1
SG-KeySeg2
SG-KeySeg3
SG-FSM1
SG-FSM2
BG-S-Pier
BG-S-FsmLeft
BG-S-FsmRight
BG-EL-Pier
BG-EL-FsmLeft
BG-EL-FsmRight

Dynamic Factor Input Type
☒ Auto Input ☐ User Input

Auto Calculation

Span Length 80 m

Bending and Shear for Beam Element Auto

Reaction Auto

All Other Effects 1

(e.g.Axial, Torsion, Stress, Displacements, etc)

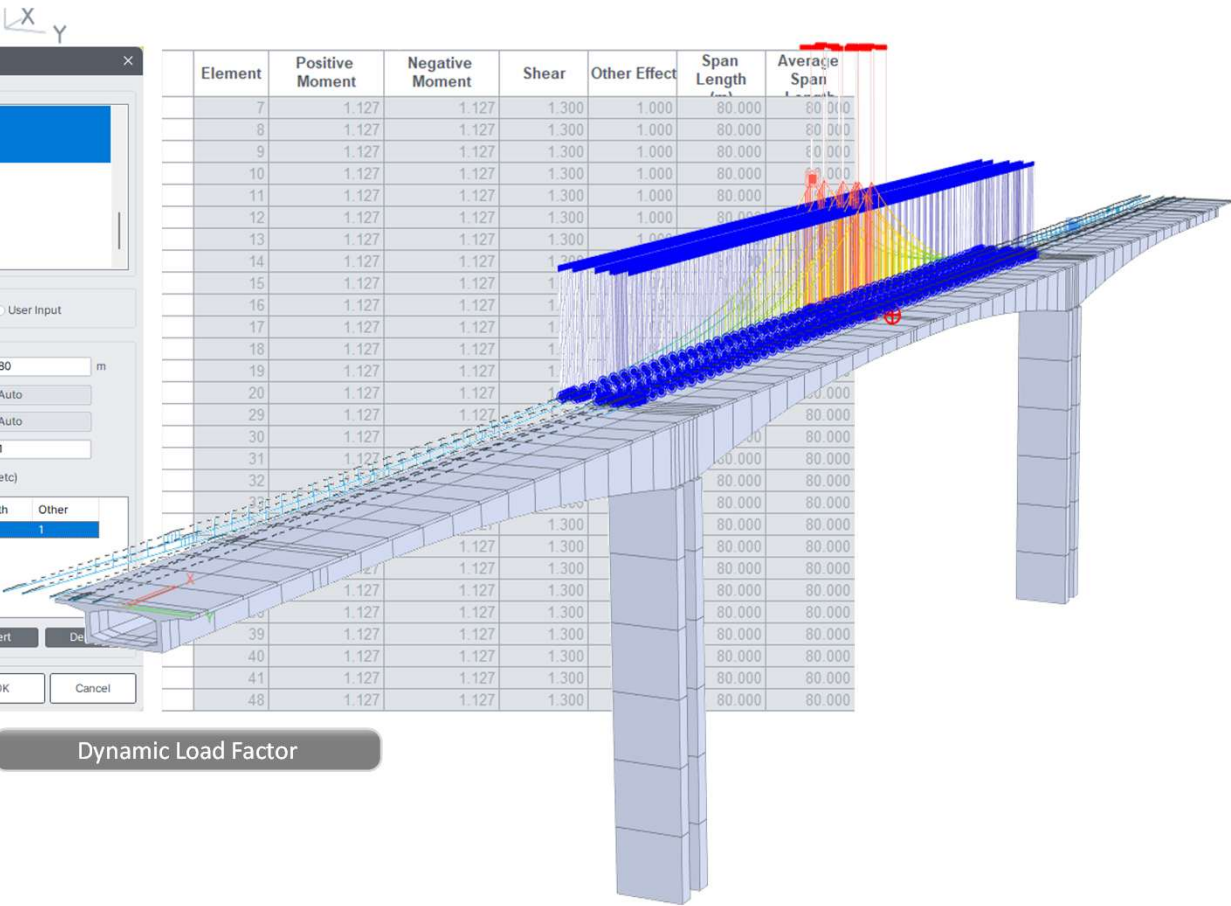
Span ID	Group List	Length	Other
1	SG-P1Seg1, SG-P1S...	80	1

Add Modify Insert Delete

OK Cancel

Dynamic Load Factor

Element	Positive Moment	Negative Moment	Shear	Other Effect	Span Length (m)	Average Span Length (m)
7	1.127	1.127	1.300	1.000	80.000	80.000
8	1.127	1.127	1.300	1.000	80.000	80.000
9	1.127	1.127	1.300	1.000	80.000	80.000
10	1.127	1.127	1.300	1.000	80.000	80.000
11	1.127	1.127	1.300	1.000	80.000	80.000
12	1.127	1.127	1.300	1.000	80.000	80.000
13	1.127	1.127	1.300	1.000	80.000	80.000
14	1.127	1.127	1.300	1.000	80.000	80.000
15	1.127	1.127	1.300	1.000	80.000	80.000
16	1.127	1.127	1.300	1.000	80.000	80.000
17	1.127	1.127	1.300	1.000	80.000	80.000
18	1.127	1.127	1.300	1.000	80.000	80.000
19	1.127	1.127	1.300	1.000	80.000	80.000
20	1.127	1.127	1.300	1.000	80.000	80.000
29	1.127	1.127	1.300	1.000	80.000	80.000
30	1.127	1.127	1.300	1.000	80.000	80.000
31	1.127	1.127	1.300	1.000	80.000	80.000
32	1.127	1.127	1.300	1.000	80.000	80.000
33	1.127	1.127	1.300	1.000	80.000	80.000
34	1.127	1.127	1.300	1.000	80.000	80.000
35	1.127	1.127	1.300	1.000	80.000	80.000
36	1.127	1.127	1.300	1.000	80.000	80.000
37	1.127	1.127	1.300	1.000	80.000	80.000
38	1.127	1.127	1.300	1.000	80.000	80.000
39	1.127	1.127	1.300	1.000	80.000	80.000
40	1.127	1.127	1.300	1.000	80.000	80.000
41	1.127	1.127	1.300	1.000	80.000	80.000
48	1.127	1.127	1.300	1.000	80.000	80.000



14. Addition of special permit trucks for load rating of existing bridges in Western Australia

- The latest version of MIDAS Civil includes a newly added vehicle database for Western Australia (WA) to support region-specific bridge assessments.
- Group 1 and Group 2 vehicles can be selected while optionally enabling Multiple Lane Factors and Accompanying Lane Factors. Group2 vehicles are fully compatible with SM1600 vehicle configurations.
- This enhancement provides improved flexibility and regulatory compliance for bridge evaluations in Western Australia.

▪ Load > Moving Load > Australia

Define Standard Vehicular Load

Standard Name

AS 5100.7 - Rating Vehicles

Vehicular Load Properties

Vehicular Load Name

WA-Group1-Vehicle1

Vehicular Load Type

WA-Group1-Vehicle1

Dynamic Load Allowance

0.4

P1P2P3P4P5

D1D2D3D4

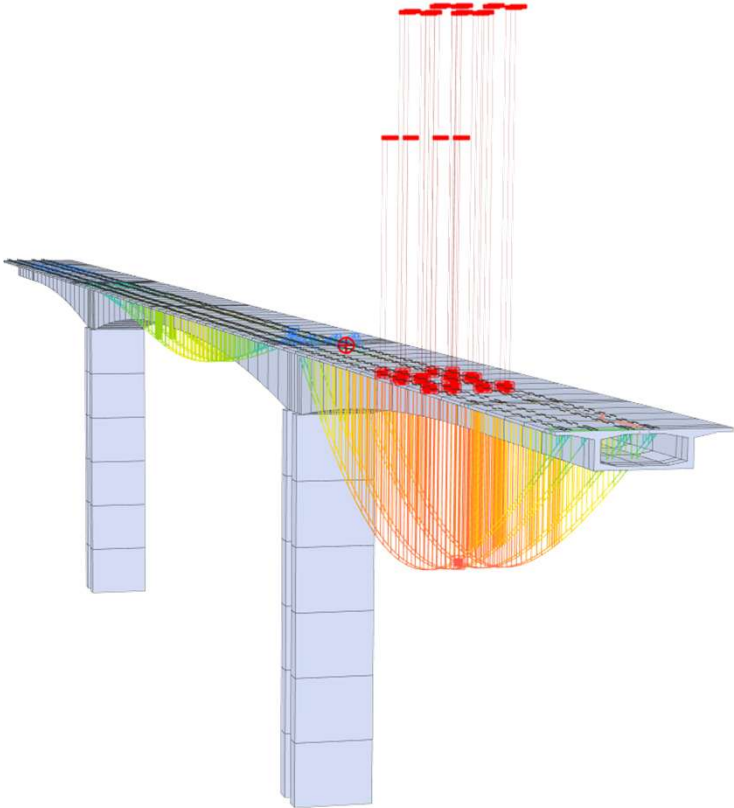
No	Load(tonf)	Spacing(m)
1	6	4.9
2	9	1.2
3	9	7.25
4	9	1.2
5	9	end

OK

Cancel

Apply

- T44 Truck Load
L44 Lane Load
VIC-45.5T HML B DOUBLE
VIC-68T HML B DOUBLE
QLD-50.5T 8G1 GML 19m B DOUBLE
QLD-50.5T 8G2 GML 19m B DOUBLE
QLD-62.5T 7G GML B DOUBLE
QLD-68T 7H HML B DOUBLE
WA-Group1-Vehicle1
WA-Group1-Vehicle2
WA-Group1-Vehicle3
WA-Group1-Vehicle4
WA-Group2-Vehicle1 (3.01m O/A)
WA-Group2-Vehicle1 (3.70m O/A)
WA-Group2-Vehicle2 (3.01m O/A)
WA-Group2-Vehicle2 (3.70m O/A)
WA-Group2-Vehicle4
WA-Group2-Vehicle5
WA-Group2-Vehicle7
WA-Group2-Vehicle8



Define Moving Load Case

Load Case Name

Lane

Description

☐ Load Case for Permit Vehicle

☒ Moving Load Optimization

Select Load Model

General

Fatigue

Heavy Load Platform

Rail Traffic Load

B-Double Load

WA Rating Vehicle Group1

WA Rating Vehicle Group2

Multiple Lane Factor

Accompanying Lane Factor

Num of Loaded Lanes

Scale Factor

1

1

2

0.8

3 or more

0.4

Optimization

Min. Vehicle Distance

1

m

Load Case Data

Loaded Lane

Lane

Min. Number of Vehicle

0

Max. Number of Vehicle

2

Loading Effect

Combined

Independent

Assignment Vehicle

Selected Vehicle

VL-WA-Group1-Vehi

Scale Factor

1.0

Vehicle

VL-WA-Group1-Vehicle1

Scale

1

Add

Modify

Delete

OK

Cancel

Apply

Moving Load Cases

MIDAS

23

15. Enhancement of Australian moving load options: Add lateral offset distance option

- When performing moving load analysis for Heavy Load Platform (HLP) vehicles under AS 5100.2 or WA Group 2 vehicles under AS 5100.7, it is important to evaluate the critical vehicle position considering lateral eccentricity. In previous versions, lateral eccentricity was fixed at 1.0 m during vehicle placement. With this update, users can now manually define lateral eccentricity up to 1.0 m, allowing for more accurate and flexible simulation of critical load positions.
- Benefits :** Improves accuracy in rating calculations by reflecting realistic vehicle positioning.
Enables detailed control of vehicle eccentricity in accordance with project-specific requirements.
Enhances compliance with AS 5100.2 and AS 5100.7 practices.
- This feature provides more robust control for heavy vehicle evaluation, especially in rating scenarios involving wide bridges or straddling lanes.

Load > Moving Load > Australia

Define Standard Vehicular Load

Standard Name

AS 5100.2 - Heavy Load Platform

Vehicular Load Properties

Vehicular Load Name

HLP320

Vehicular Load Type

HLP320

Dynamic Load Allowance

0.1

Lateral Eccentricity

1

m

P

P

...

P

P

D

D

...

D

D

P = 200

kN

D = 1.8

m

Number of Axles = 16

OK

Cancel

Apply

Heavy Load Platform

Define Standard Vehicular Load

Standard Name

AS 5100.7 - Rating Vehicles

Vehicular Load Properties

Vehicular Load Name

WA-Group2-Vehicle1 (3.01m O/A)

Vehicular Load Type

WA-Group2-Vehicle1 (3.01m O/A)

Dynamic Load Allowance

0.1

Lateral Eccentricity

1

m

P1

P2

P3

P4

P5

P6

P7

P8

D1

D2

D3

D4

D5

D6

D7

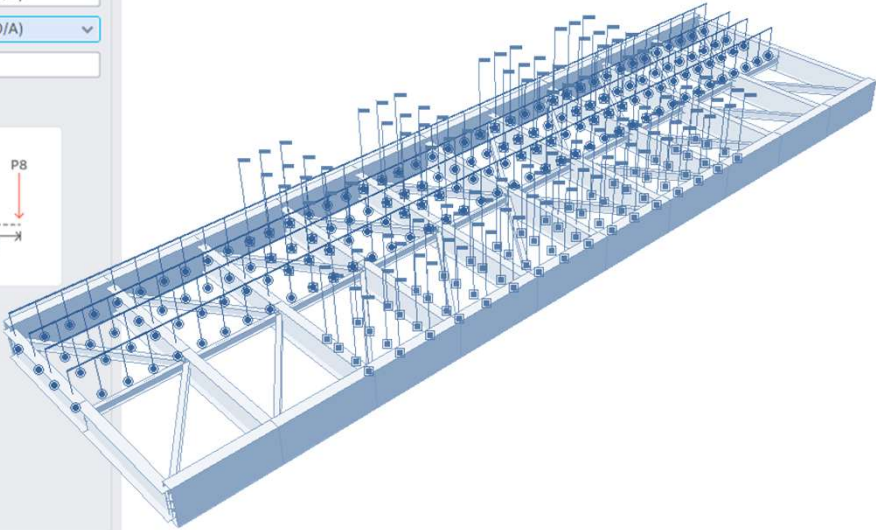
No	Load(kN)	Spacing(m)
1	58.8399	4.9
2	88.2598	1.2
3	88.2598	3
4	176.52	1.2
5	176.52	6.5
6	176.52	1.8
7	176.52	1.8
8	176.52	end

OK

Cancel

Apply

WA Rating Vehicles



16. Enhancement of Load All Model 1 in the UK rating system to support envelope type loads

- The UK rating system has been enhanced to support Vehicle Class functionality for BS moving loads, including All Model 1 as per CS454.
- Previously, reviewing All Model 1 required checking results for over 20 different vehicles individually, which was time-consuming. With the new Vehicle Class feature, users can now define a single moving load case that automatically evaluates all vehicles in the class and returns results for the most critical vehicle.
- This significantly improves efficiency by: Reducing setup and post-processing time, Automatically identifying governing cases, Enabling envelope-type load evaluations in a single step. This update streamlines the BS-based assessment process and enhances productivity, especially for complex rating projects.

▪ Load > Moving Load > Australia

Define Standard Vehicular Load

Standard Name

CS 454 Assessment

Vehicular Load Properties

Vehicular Load Name

A-4AXLE

Vehicular Load Type

ALL MODEL 1

Sub Type

A-4AXLE

O1

D1

D

P1

P2

A-4AXLE

B-4AXLE

C-5AXLE

D-5AXLE_1

D-5AXLE_2

E-5AXLE_1

E-5AXLE_2

F-6AXLE_1

F-6AXLE_2

G-6AXLE_1

G-6AXLE_2

H-5AXLE_1

H-5AXLE_2

I-3AXLE

J-3AXLE

K-3AXLE_1

K-3AXLE_2

L-3AXLE_1

L-3AXLE_2

M-2AXLE

N-2AXLE

O-2AXLE

* A-4AXLE

No	P (kN)	D (m)
1	64	1.2
2	64	3.9
3	113	1.3
4	74	end

Loading Case

Single

Convoy

Road Surface

Good

Poor

Traffic Flow Category

High

Medium

Low

Consider Contact Area

Width 0.3 m

Length 0.3 m

OK

Cancel

Apply

All Model1 Vehicles

Define Moving Load Case

Load Case Name

All Model1 Env

Description

Moving Load Optimization

Select Load Model

Standard Load (BD 37/01, BS 5400)

Special Load (BD 86/11)

CS 454 Assessment (ALL Model 1, Special Load)

CS 454 Assessment (ALL Model 2, Special Load)

NR GN CIV 025 (Network Rail)

Auto Live Load Combination

Type of Design Combination Factor

Ultimate Limit State

Serviceability Limit State

Combination of Loads

Combination 1

Combination 2 or 3

Load Case Data

Standard Load

VC:Class1

Special Load

SV 80

Assignment Lanes

Line of Lanes

Selected Lanes

Straddling Lanes

Lane 4

Lane 3

Lane 2

Lane 1

Lane 2 : Lane

Lane 3 : Lane

Lane 4 : Lane

Remaining Area

OK

Cancel

Apply

Moving Load Case

Vehicle Class Data

Vehicle Class Name

Class1

Vehicle Load

Selected Load

A-4AXLE

B-4AXLE

C-5AXLE

D-5AXLE_1

D-5AXLE_2

E-5AXLE_1

E-5AXLE_2

F-6AXLE_1

G-6AXLE_1

H-5AXLE_1

H-5AXLE_2

OK

Cancel

Apply

Vehicle Class

17. Addition of vehicle database for 46 US states

- In previous versions, MIDAS Civil provided AASHTO LRFD vehicle databases for only 10 states, including California. With this update, the database has been expanded to cover all 46 U.S. states that follow the AASHTO LRFD specification.
- Key Additions: State-specific Design Trucks, Legal Trucks, and Permit Trucks are now included for each state.
- This enhancement allows users to perform more accurate and regionally compliant bridge load rating and design across a wide range of jurisdictions in the United States.

Load > Moving Load > Australia

Define Standard Vehicular Load

Standard Name

AASHTO LRFD Load

AASHTO LRFD Load

AASHTO Standard Load

AASHTO Legal/Permit Load

IADOT Load

ILDOT Load

LADOT Load

MODOT Load

OHDOT Load

RIDOT Load

VADOT Load

WIDOT Load

INDOT Load

Fast Act EV Loads

Caltrans Standard Load (2017_draft)

Caltrans Standard Load

Turkey

Colombia

Others

Lane Support-Neg. Moment / Reaction

Application

Not assigned

a

Assigned

a,b

No

Load(kN)

Spacing(m)

W

9.3401007

kN/m

r

90

%

Dist.

15.24

m

Consider Contact Area

Width

0.508

m

Length

0.254

m

Add Centrifugal Force

OK

Cancel

Apply

CIVIL NX 2025 (v1.1)



Define Standard Vehicular Load

Standard Name

AASHTO LRFD Load

AASHTO LRFD Load

AASHTO Standard Load

AASHTO Legal/Permit Load

Alaska

Alabama

Arizona

Arkansas

California

Colorado

Connecticut

District of Columbia

Delaware

Florida

Georgia

Hawaii

Iowa

Idaho

Illinois

Indiana

Kansas

Kentucky

Louisiana

Massachusetts

Maryland

Maine

Michigan Normal Loading

Michigan Designed loading

Michigan Special Designed loading

Minnesota

Missouri

Mississippi

North Dakota

Nebraska

Nevada

New Jersey

New Mexico

New York

Ohio

Oklahoma

Oregon

Rhode Island

South Carolina

South Dakota

Tennessee

Texas

Utah

Virginia

Vermont

Washington

Wisconsin

West Virginia

Fast Act EV Loads

Caltrans Standard Load (2017_draft)

Caltrans Standard Load

Turkey

Colombia

Others

Define User Defined Vehicular Load

Load Type

Truck/Lane

Legal Load

Train Load

Permit Truck

Vehicular Load Properties

Vehicular Load Name

Impact Factor

0

Center of Vehicle

Axle1

Axle2

Axle3

Eccentricity

Center of Ref. Lane

Type of Axle

Name

a1

Add

Modify

Delete

Evenly Distributed Wheel Load

Symmetric Vehicle

P1

D1

P2

D2

P3

D3

P4

D4

P5

D

55.60

0.952

Type of Axle

VS

Spacing (m)

P1 (kN)

D1 (m)

P2 (kN)

D2 (m)

P3 (kN)

D3 (m)

1

a1

3.35

55.60

0.95

2

a2

1.22

62.28

1.07

3

a2

1.22

62.28

1.07

4

a2

end

62.28

1.07

5

Iowa

IADOT-SPV-Type 4

User Defined

Caltrans Standard Load (2017_draft)

Caltrans Standard Load

IRC:6 Standard Load

Iowa

Alaska

Kansas

Missouri

OK

Cancel

Apply

18. Addition of cross-section databases for the US and Canada

- The section database has been significantly expanded to support regional standards in the U.S. and Canada, enhancing modeling accuracy and design efficiency. These additions provide engineers with ready-to-use section profiles that comply with local specifications, streamlining design workflows for North American bridge projects.
- Canada : Added steel section database according to CISC-ICCA 2022, including : Angle, Channel, I-section, T-section, Box, Pipe, and Double Angle profiles.
Added 12 PSC sections used in Ontario, including : PSC I-girders and PSC Box-girders.
- United States – Florida : Added 41 prestressed concrete (PSC) sections based on Florida Department of Transportation (FDOT) standards, covering : PSC I-Girders, PSC U-Girders, Interior & Exterior Slab Beams, PSC Pile (Square Sections)

Properties > Section Properties

Section Data

PSC DB/User Tapered Value Composite SRC Steel Girder Combined

Section ID 1 I-Section

Name HP410x211 User DB CISC(SS12)

Sect. Name HP410x211

Get Data from Single Angle

DB Name AISC(US)

Sect. Name

H 0.406 m

B1 0.406 m

tw 0.0222 m

tf1 0.0222 m

B2 0 m

tf2 0 m

r1 0 m

r2 0 m

Offset : Center-Center Consider Shear Deformation.

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

Show Calculation Results... OK Cancel Apply

Canada CISC Steel DB sections

Select PSC DB

Code Canada Type Ontario

Select DB

1:B700

2:B800

3:B900

4:B1000

5:NU900

6:NU1200

7:NU1400

8:NU1600

9:NU1800

10:NU1900

11:NU2000

12:NU2400

OK Cancel

Canada Ontario PSC DB Sections

Select PSC DB

Code USA Type FDOT

Select DB

1:1 36 Beam

2:1 45 Beam

3:1 54 Beam

4:1 63 Beam

5:1 72 Beam

6:1 78 Beam

7:1 84 Beam

8:1 96 Beam

9:ExtL Slab Beam 4.5ft x 12in

10:ExtL Slab Beam 4.5ft x 15in

11:ExtL Slab Beam 4.5ft x 18in

12:ExtL Slab Beam 4ft x 12in

13:ExtL Slab Beam 4ft x 15in

14:ExtL Slab Beam 4ft x 18in

OK Cancel

USA Florida PSC DB Sections

Florida-I 36 Beam - Standard Details
 Florida-I 45 Beam - Standard Details
 Florida-I 54 Beam - Standard Details
 Florida-I 63 Beam - Standard Details
 Florida-I 72 Beam - Standard Details
 Florida-I 78 Beam - Standard Details
 Florida-I 84 Beam - Standard Details
 Florida-I 96 Beam - Standard Details
 AASHTO Type II Beam
 Florida-U 48 Beam - Standard Details
 Florida-U 54 Beam - Standard Details
 Florida-U 63 Beam - Standard Details
 Florida-U 72 Beam - Standard Details
 12" Florida Slab Beam
 15" Florida Slab Beam
 18" Florida Slab Beam

19. Batch output for tendon loss table by construction stage and tendon group

- In previous versions, users could view tendon loss results for only one tendon group and one construction stage at a time.
- With this update, the result table now supports multi-selection of both tendon groups and construction stages, allowing users to review multiple results simultaneously.
- **Benefits :** Streamlines the process of reviewing and comparing tendon losses across various groups and stages.
Significantly improves efficiency when generating reports or summarizing results, eliminating the need to check tendon data one by one.
Results for all selected items are displayed together in a single integrated table.

Results > Result Tables > Tendon > Tendon Loss

Start Page MIDAS CIVIL NX Result-[Tendon Loss (Tendon Group)]							
Elem	Part	Stress (After Immediate Loss) - A (kN/m²)	Elastic Deform. Loss - B (kN/m²)	Stress(Elastic Loss/ Stress(Immediate Loss))	Creep/Shrinkage Loss (kN/m²)	Relaxation Loss (kN/m²)	Stress(After All Loss/ Stress(After Immediate Loss))
The Loss of tendon group [Tendon-Span1] at the stage of [Stage2]							
Tendon Group	Tendon-Span1	Stage	Stage2	Apply			
90 J	601261.7614	3461.4555	Stage3-1	0.0000	0.0000	1.0058	44.0000
90 J	601261.7614	5870.3434	Stage3-1	0.0000	0.0000	1.0090	44.0000
91 J	601261.7614	1441.4976	Stage3-2	0.0000	0.0000	1.0024	44.0000
91 J	601261.7614	13877.0406	Stage4	0.0000	0.0000	1.0231	44.0000
92 J	601261.7614	13877.0406	Stage5	0.0000	0.0000	1.0231	44.0000
92 J	601261.7614	27214.1713		1.0453	0.0000	1.0453	44.0000
93 J	601261.7614	27214.1713		1.0453	0.0000	1.0453	44.0000
93 J	601261.7614	29714.8786		1.0494	0.0000	1.0494	44.0000
94 J	601261.7614	29714.8786		1.0494	0.0000	1.0494	44.0000
94 J	601261.7614	39148.4665		1.0651	0.0000	1.0651	44.0000
95 J	601261.7614	39148.4665		1.0651	0.0000	1.0651	44.0000
95 J	601261.7614	49679.9281		1.0826	0.0000	1.0826	44.0000
96 J	601261.7614	49679.9281		1.0826	0.0000	1.0826	44.0000
96 J	601261.7614	53502.1487		1.0890	0.0000	1.0890	44.0000
97 J	601261.7614	53502.1487		1.0890	0.0000	1.0890	44.0000
97 J	601261.7614	58008.5502		1.0978	0.0000	1.0978	44.0000
98 J	601261.7614	58008.5502		1.0978	0.0000	1.0978	44.0000
98 J	601261.7614	66534.3387		1.1107	0.0000	1.1107	44.0000
99 J	601261.7614	66534.3387		1.1107	0.0000	1.1107	44.0000
99 J	601261.7614	70494.8280		1.1172	0.0000	1.1172	44.0000
100 J	601261.7614	70494.8280		1.1172	0.0000	1.1172	44.0000
100 J	601261.7614	72857.2917		1.1212	0.0000	1.1212	44.0000
101 J	601261.7614	72857.2917		1.1212	0.0000	1.1212	44.0000
101 J	601261.7614	77777.4092		1.1294	0.0000	1.1294	44.0000
102 J	601261.7614	77777.4092		1.1294	0.0000	1.1294	44.0000
102 J	601261.7614	80703.0552		1.1342	0.0000	1.1342	44.0000
103 J	601261.7614	80703.0552		1.1342	0.0000	1.1342	44.0000
103 J	601261.7614	81294.6911		1.1352	0.0000	1.1352	44.0000
104 J	601261.7614	81294.6911		1.1352	0.0000	1.1352	44.0000
104 J	601261.7614	83409.1375		1.1387	0.0000	1.1387	44.0000
105 J	601261.7614	83409.1375		1.1387	0.0000	1.1387	44.0000
105 J	601261.7614	84120.0581		1.1399	0.0000	1.1399	44.0000
106 J	601261.7614	86981.0733		1.1447	0.0000	1.1447	44.0000
106 J	601261.7614	86956.4939		1.1446	0.0000	1.1446	44.0000
107 J	601261.7614	86956.4939		1.1446	0.0000	1.1446	44.0000
107 J	601261.7614	86251.8282		1.1418	0.0000	1.1418	44.0000
108 J	601261.7614	86251.8282		1.1418	0.0000	1.1418	44.0000
108 J	601261.7614	82144.3229		1.1366	0.0000	1.1366	44.0000
109 J	601261.7614	82144.3229		1.1366	0.0000	1.1366	44.0000
109 J	601261.7614	81353.9453		1.1353	0.0000	1.1353	44.0000
110 J	601261.7614	81353.9453		1.1353	0.0000	1.1353	44.0000
110 J	601261.7614	77633.9841		1.1291	0.0000	1.1291	44.0000
111 J	601261.7614	77633.9841		1.1291	0.0000	1.1291	44.0000
111 J	601261.7614	71720.8097		1.1193	0.0000	1.1193	44.0000
112 J	601261.7614	71720.8097		1.1193	0.0000	1.1193	44.0000
112 J	601261.7614	68960.8626		1.1147	0.0000	1.1147	44.0000
113 J	601261.7614	68960.8626		1.1147	0.0000	1.1147	44.0000
113 J	601261.7614	64404.7998		1.1071	0.0000	1.1071	44.0000
114 J	601261.7614	64404.7998		1.1071	0.0000	1.1071	44.0000

CIVIL NX 2025 (v1.1)

Start Page MIDAS CIVIL NX Result-[Tendon Loss (Tendon Group)]							
Tendon Group	Stage	Elem	Part	Stress (After Immediate Loss) - A (kN/m²)	Elastic Deform. Loss - B (kN/m²)	Stress(Elastic Loss/ Stress(Immediate Loss))	Creep/Shrinkage Loss (kN/m²)
Tendon-Span1	Stage2	601.0000	J	1.0087	-43813.6287	-18682.8073	0.9582
Tendon-Span1	Stage2	601.0000	J	1.0077	-43323.2191	-18755.9957	0.9595
Tendon-Span1	Stage2	601.0000	J	1.0049	-44758.0615	-18537.9068	0.9557
Tendon-Span1	Stage2	482.0000	J	1.0037	-45350.8002	-18451.2183	0.9542
Tendon-Span1	Stage2	607.0000	J	1.0091	-42669.1826	-18955.2434	0.9615
Tendon-Span1	Stage2	607.0000	J	1.0087	-42781.8576	-18836.4456	0.9609
Tendon-Span1	Stage2	137.0000	J	1.0066	-43765.9623	-18676.2854	0.9582
Tendon-Span1	Stage2	137.0000	J	1.0075	-43304.7568	-18742.2595	0.9593
Tendon-Span1	Stage2	143.0000	J	1.0092	-42376.3314	-18867.8251	0.9616
Tendon-Span1	Stage2	143.0000	J	1.0089	-42519.1993	-18947.2049	0.9613
Tendon-Span1	Stage2	149.0000	J	1.0049	-44607.3267	-18542.3662	0.9559
Tendon-Span1	Stage2	149.0000	J	1.0037	-45249.5809	-18448.7618	0.9543
Tendon-Span1	Stage2	274.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	274.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	280.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	280.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	286.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	286.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	411.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	411.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	536.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	417.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	417.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	542.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	542.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	667.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	667.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	673.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	673.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	203.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	203.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	209.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	209.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	215.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	215.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	340.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	340.0000	J	1.0050	-44405.0000	-18645.8214	0.9575
Tendon-Span1	Stage2	346.0000	J	1.0096	-42252.4534	-18888.6619	0.9619
Tendon-Span1	Stage2	346.0000	J	1.0096	-42270.4965	-18901.5094	0.9621
Tendon-Span1	Stage2	471.0000	J	1.0072	-43551.0737	-18716.0384	0.9589
Tendon-Span1	Stage2	471.0000	J	1.0081	-43082.0674	-18786.8666	0.9601
Tendon-Span1	Stage2	471.0000	J	1.0070	-43619.3025	-18698.5487	0.9586
Tendon-Span1	Stage2	352.0000	J	1.0059	-44198.5611	-18613.2375	0.9571
Tendon-Span1	Stage2	477.0000	J	1.0093	-42434.7663	-18879.2253	0.9617
Tendon-Span1	Stage2	477.0000	J	1.0088	-42690.3720	-18841.5412	0.9611
Tendon-Span1	Stage2	477.0000	J	1.0077	-43323.2191	-18755.9957	0.9595
Tendon-Span1	Stage2	602.0000	J	1.0094	-42943.4984	-18913.0884	0.9605
Tendon-Span1	Stage2	608.0000	J	1.0087	-42781.8576	-18836.4456	0.9609
Tendon-Span1	Stage2	608.0000	J	1.0081	-43104.4930	-18768.4941	0.9601
Tendon-Span1	Stage2	138.0000	J	1.0075	-43304.7568	-18742.2595	0.9593
Tendon-Span1	Stage2	138.0000	J	1.0082	-42936.2139	-18784.7994	0.9603
Tendon-Span1	Stage2	144.0000	J	1.0089	-42519.1993	-18947.2049	0.9613
Tendon-Span1	Stage2	144.0000	J	1.0085	-42754.3309	-18813.0271	0.9607
Tendon-Span1	Stage2	275.0000	J	1.0070	-43626.5099	-18700.9574	0.9586
Tendon-Span1	Stage2	275.0000	J	1.0079	-43157.0726	-18769.1812	0.9588
Tendon-Span1	Stage2	281.0000	J	1.0094	-42343.2211	-18883.4917	0.9619

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