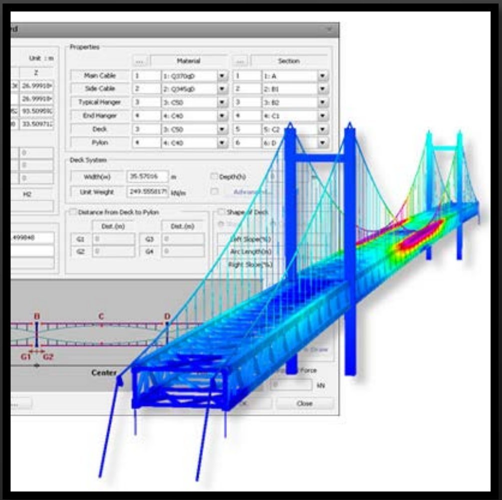
INTEGRATED SOLUTION SYSTEM FOR BRIDGE AND CIVIL ENGINEERING

midas Civil FOR CANADA

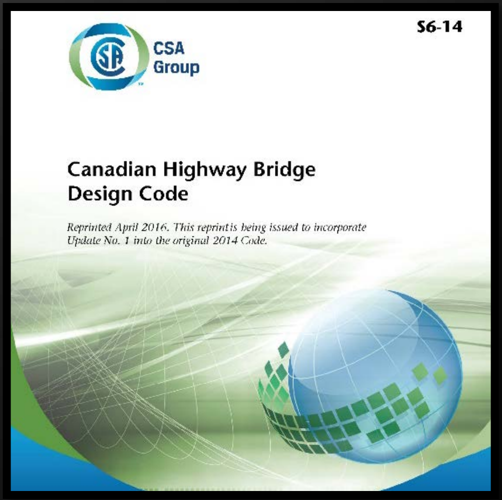
Computational Analysis and Design
In accordance with
CHBDC CSA-S6-14

MIDAS

All-In-One Solution



Ease of Use

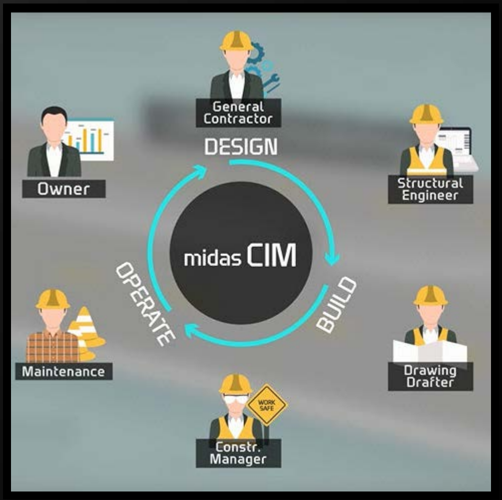

S6-14

CSA Group

Canadian Highway Bridge Design Code

Reprinted April 2016. This reprint is being issued to incorporate Update No. 1 into the original 2014 Code.

Canadian Features



Future

About MIDAS

Company Size

540

Engineers

Established

1989

World wide existence

6

Branch Offices

100,000

Number of Licenses

USERS Across North America (partial list)

Oregon Department of Transportation	State of Florida Department of Transportation	Caltrans	VTrans Working to Get You There	British Columbia	Department of Transportation State of Hawaii
Ontario	Yukon	PENNDOT	City of Milwaukee Emerging Business Enterprise	AECOM	NRC·CNRC Canada
ARUP	Burgess & Niple	Hanson	Lochner Advance Your Vision	WHPacific	SNC·LAVALIN
Delcan	HNTB	McIntosh Perry	Associated Engineering	RK&K	Burns & McDonnell Since 1898
Mead & Hunt	MMM Group	Tutor Perini Corporation	Allnorth Consultants Limited	CHA	HDR
Garver	Klohn Crippen Berger	EAC	Tetra Tech	OBEC Consulting Engineers	Wilson & Company Engineers & Architects
COEG	Dewberry	URS	CH2MHILL	PB Parsons Brinckerhoff	Baker

USERS Across North America (partial list)

Caltrans

Connecticut Department of Transportation

Florida Department of Transportation

Department of Transportation State of Hawaii

Illinois Department of Transportation

DOTD Louisiana Department of Transportation & Development

MoDOT

Montana MDT Department of Transportation

Department of Transportation The State of New Jersey

Minnesota Department of Transportation

Oregon Department of Transportation

Iowa Department of Transportation

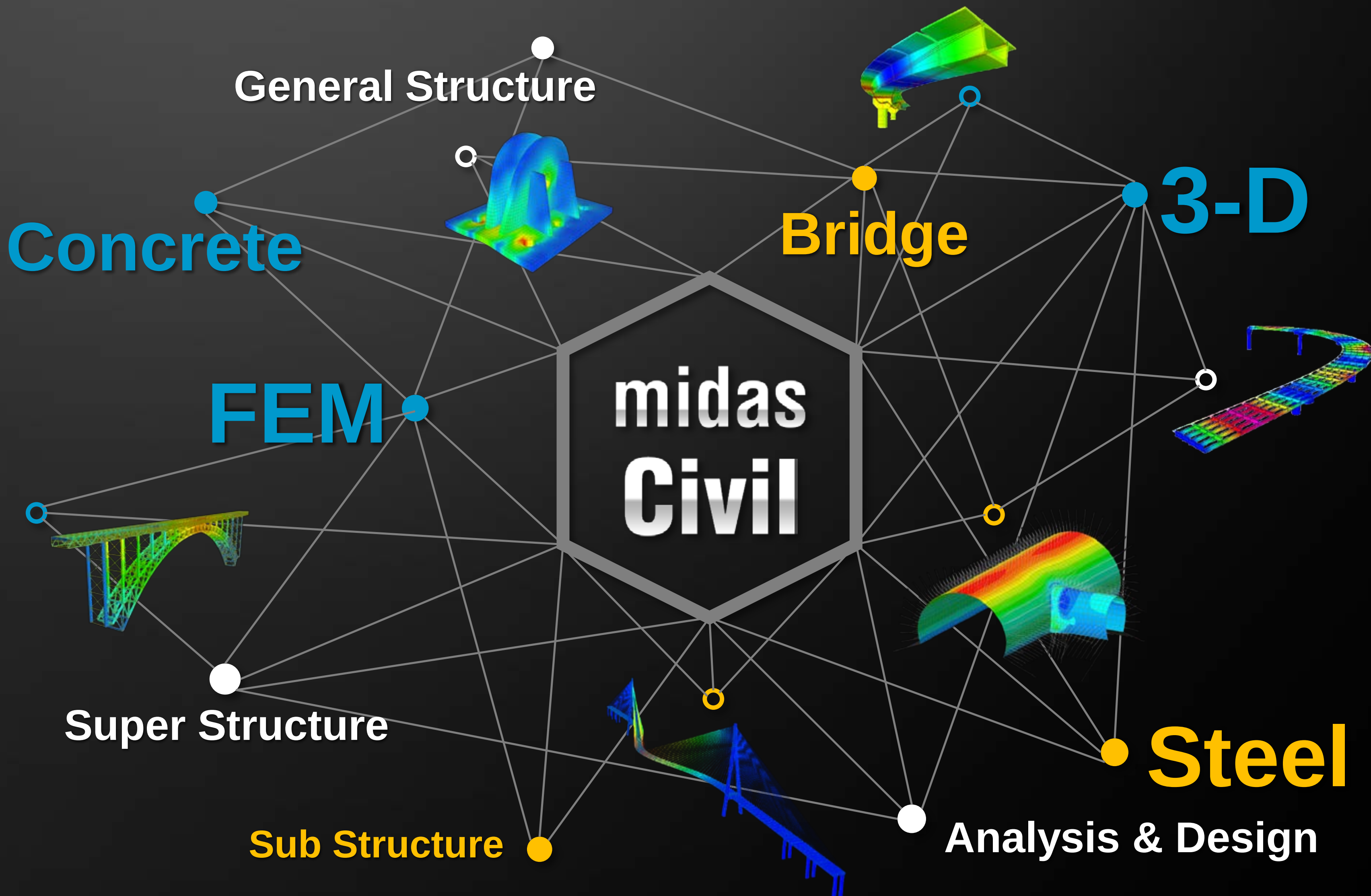
Nevada DOT

State of Ohio Department of Transportation

Oklahoma Department of Transportation

VTrans Working to Get You There Vermont Agency of Transportation

midas Civil Bridge Engineering Software



What kind of bridge type can midas Civil handle?

Conventional Bridge

Culvert

Frame Bridge

Slab Bridge

Precast (Spliced) Girder Bridge

Integral Bridge

Steel Plate (Flare) Girder Bridge

Steel Box Girder Bridge

Staged Segmental Bridge

Balanced Cantilever Method Bridge

Incremental Launching Method Bridge

Movable Scaffolding Method Bridge

Precast Segmental Method Bridge

Fill Staging Method Bridge

Cable-stayed Bridge & Suspension Bridge

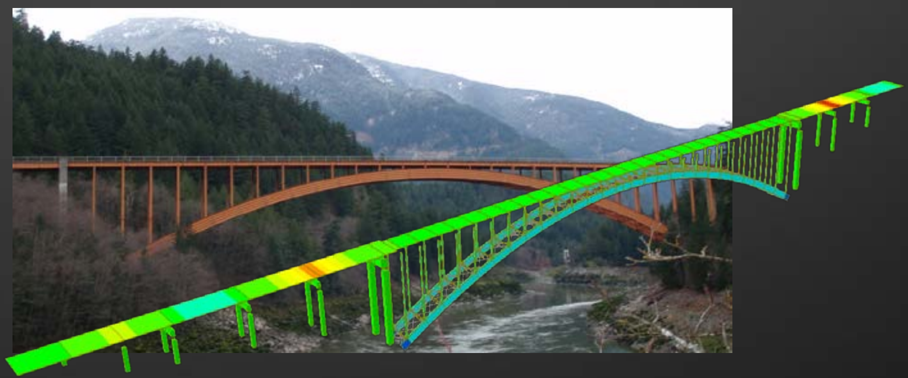
Cable Stayed Bridge

Extra-doesd Bridge

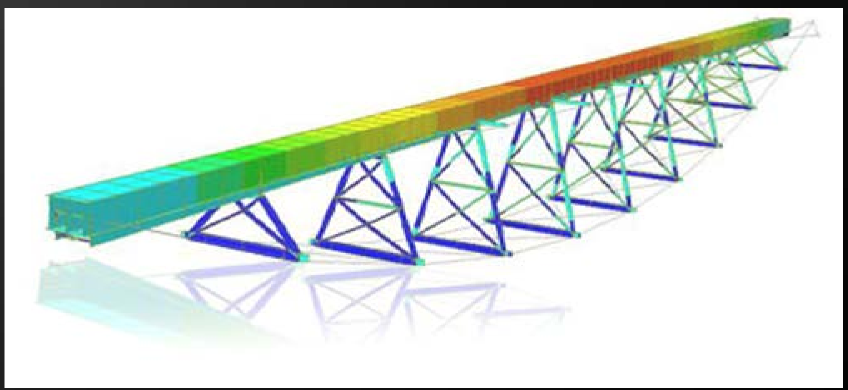
Suspension Bridge

Few project examples - Canada

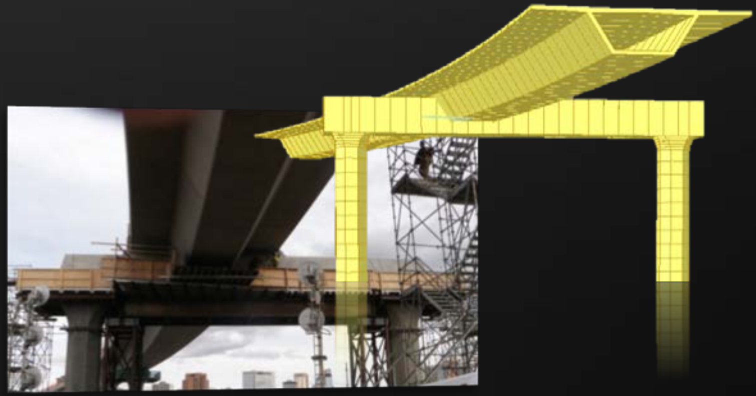
Alexandria Bridge, Hope, BC



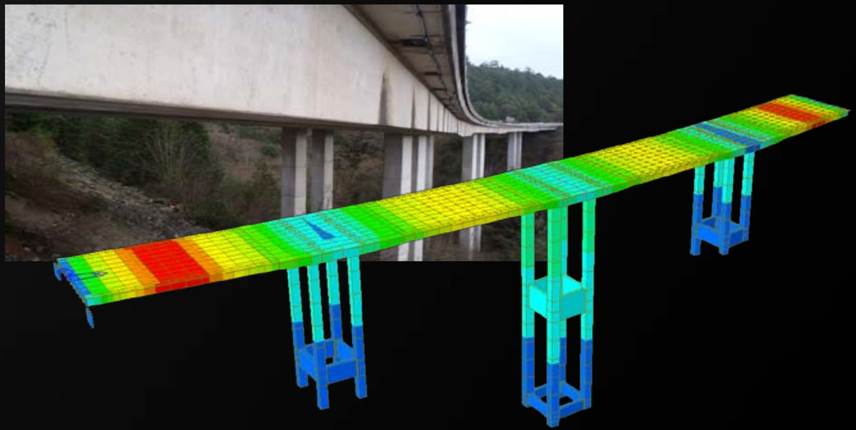
The More Canyon Bridge, BC



Calgary West LRT, Calgary

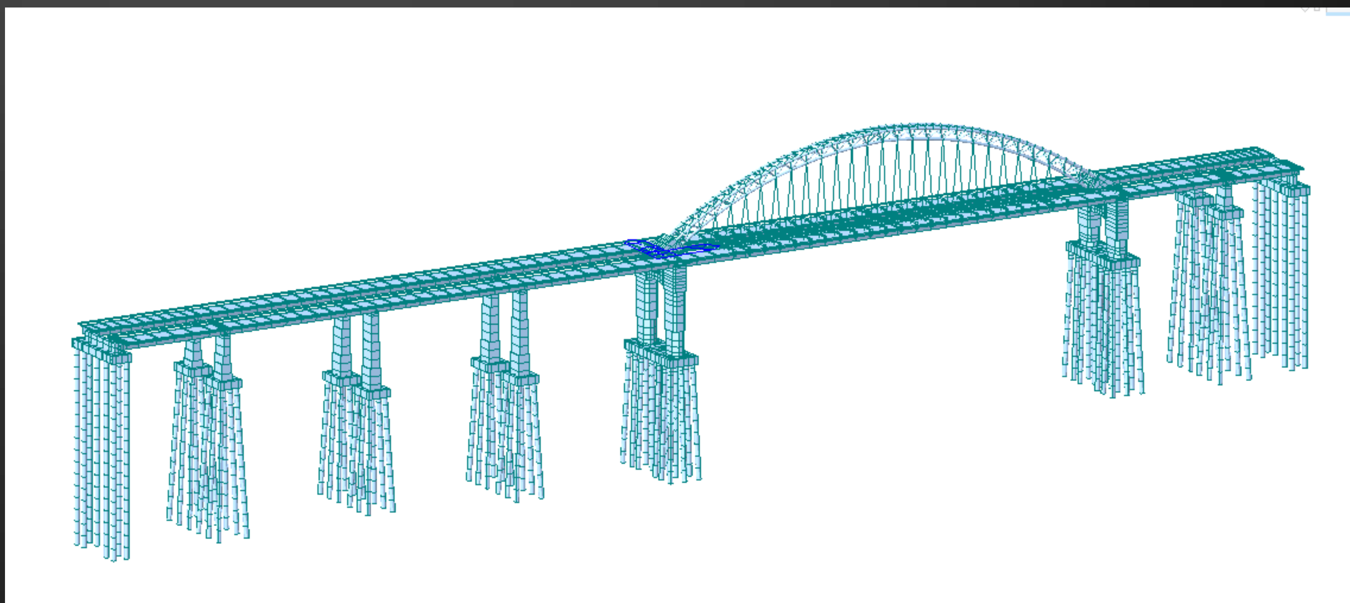


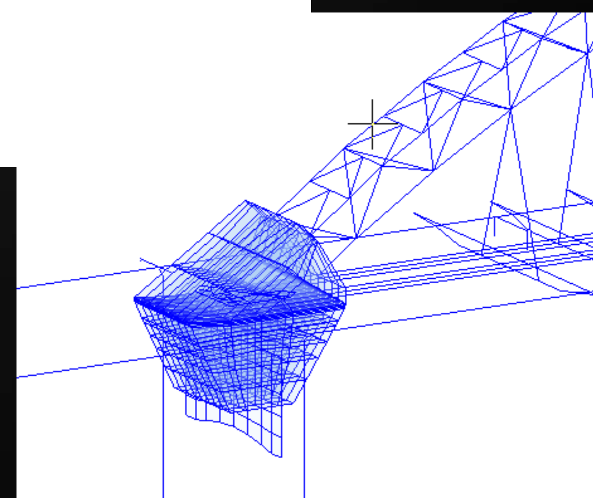
Nelson Creek Bridge, West Vancouver



Few project examples - Canada

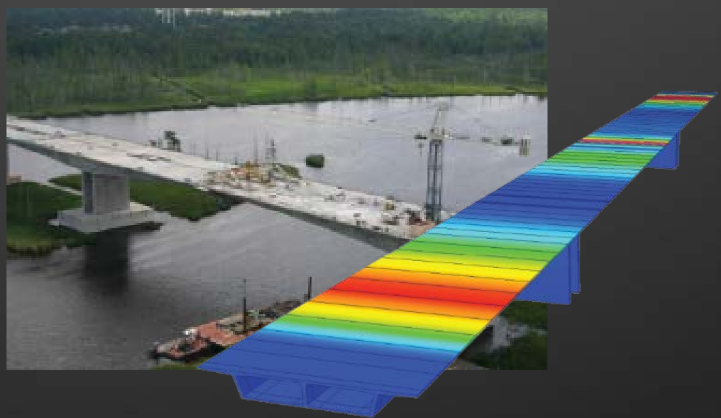
Long Span Steel Arch Bridge



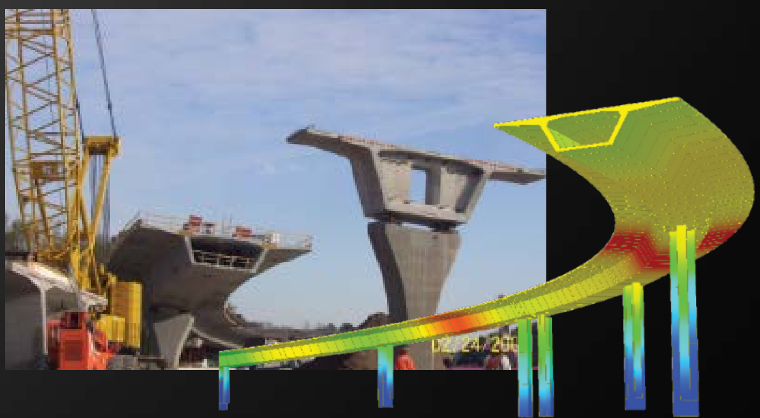


Few project examples - USA

US 17 Wilmington By Pass in USA



Lee Roy Selmon Flyovers in FL USA

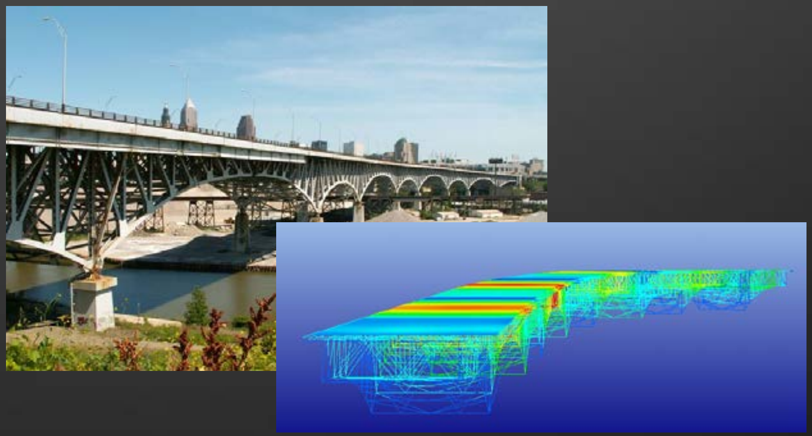


Port Access Bridge, Alaska

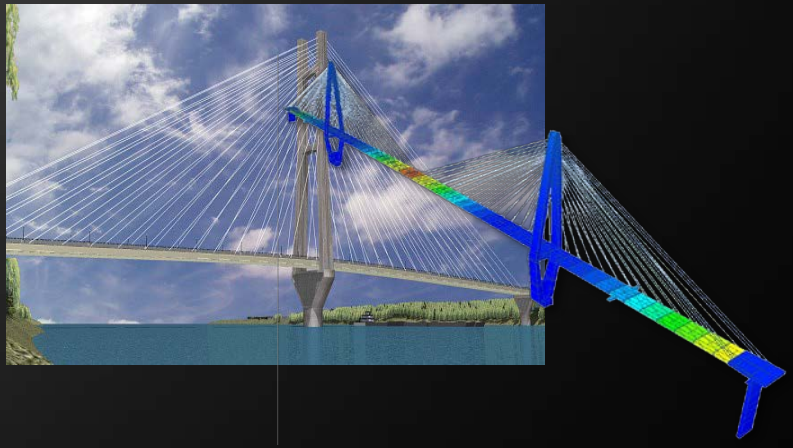
Galena Creek bridge in NV USA

Few project examples - USA

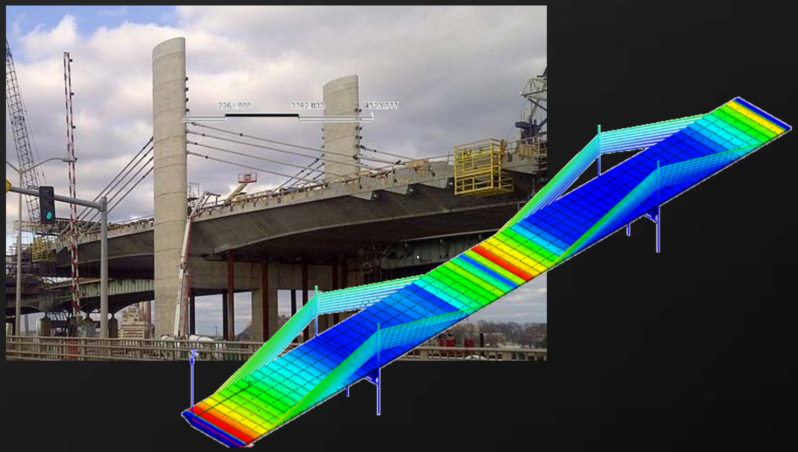
Innerbelt Bridge in Cleveland OH



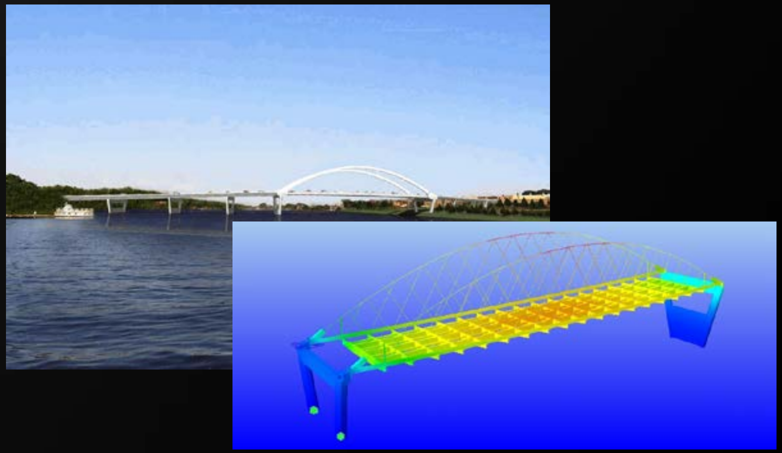
Ironton-Russell Bridge



Pearl Harbor Memorial Bridge



Hastings Bridge

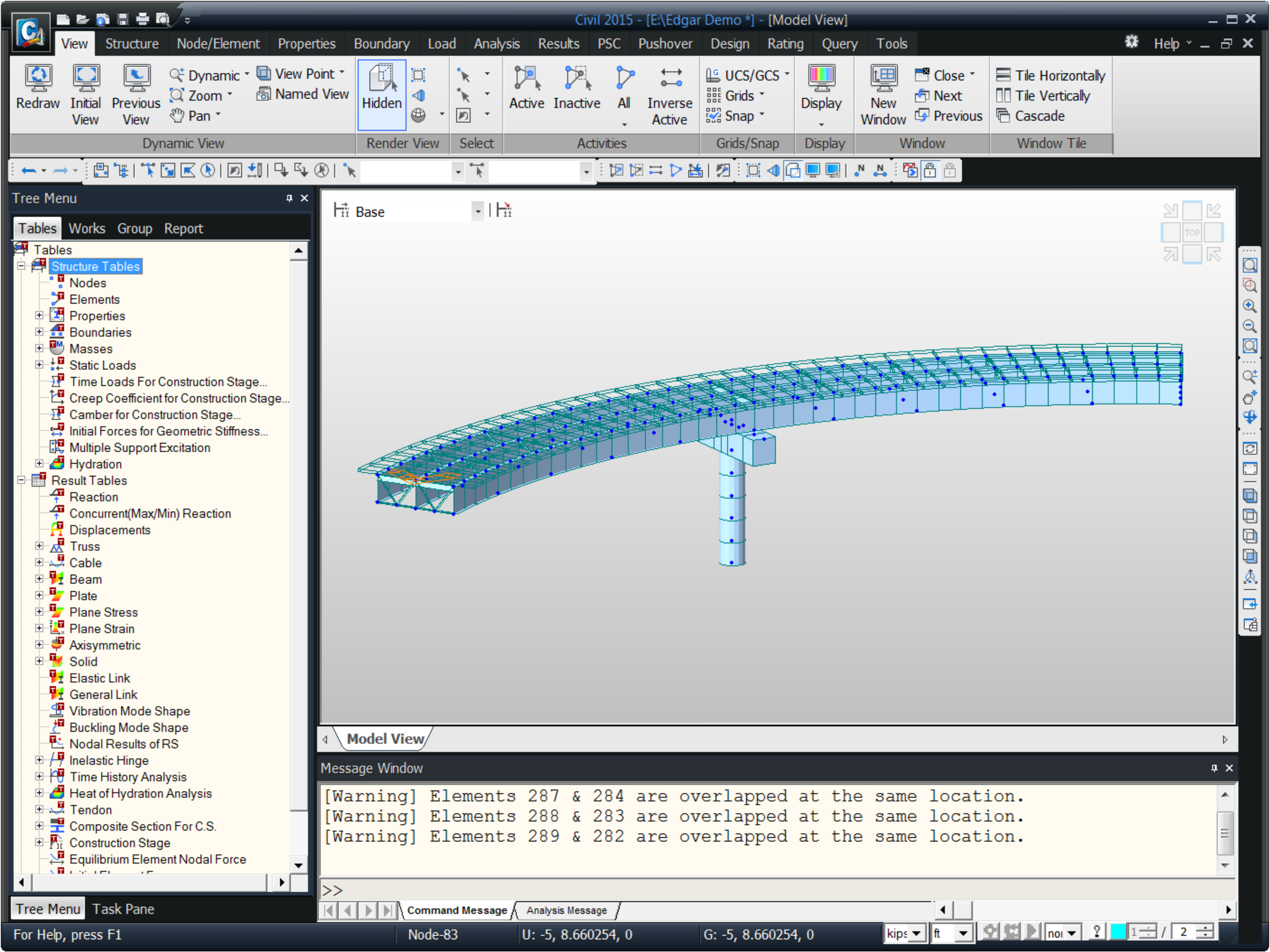


INTEGRATED SOLUTION SYSTEM FOR BRIDGE AND CIVIL ENGINEERING

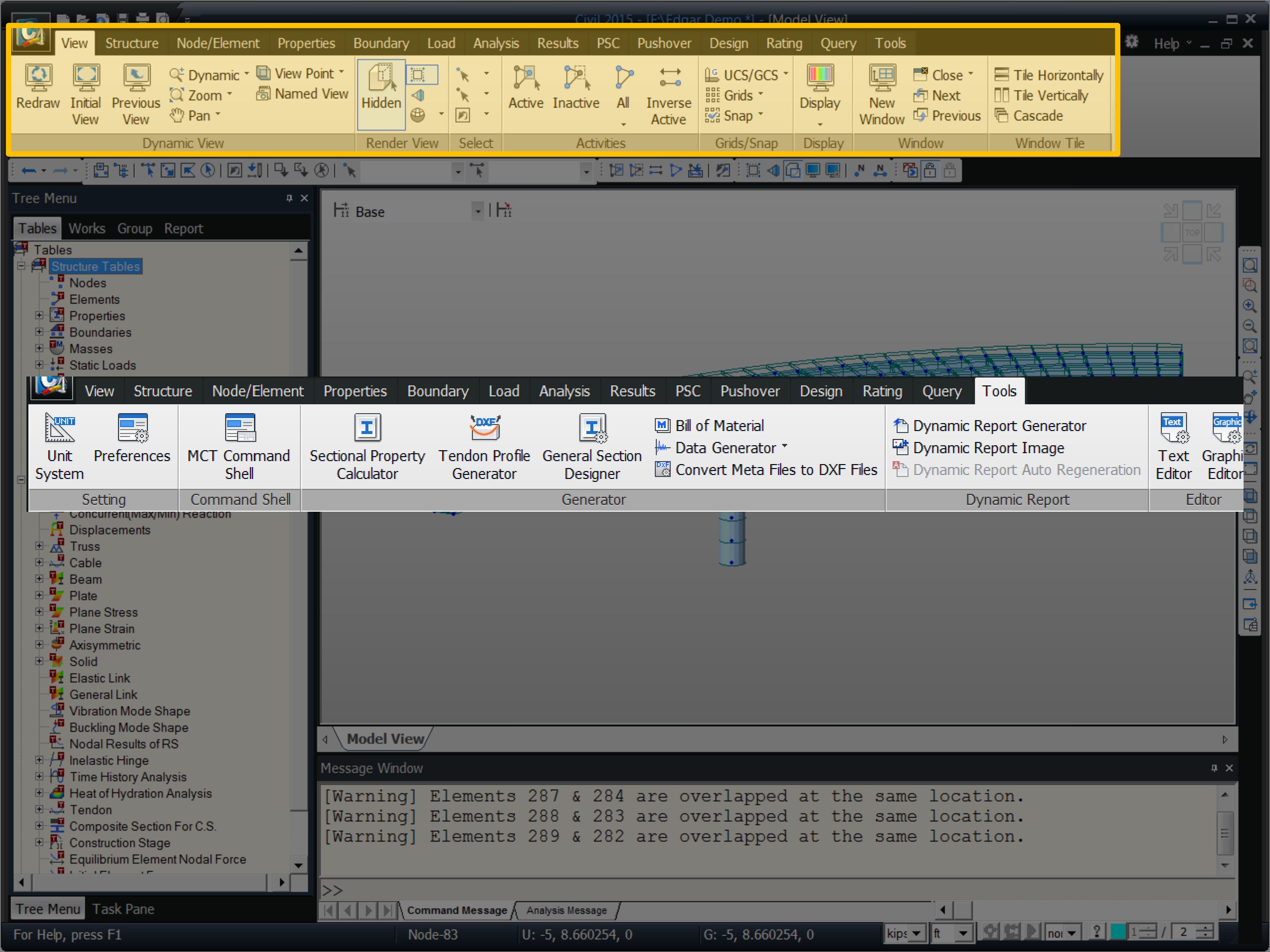
midas Civil for Canada

midas Civil GUI

MIDAS



Civil 2015 - [E:\Edgar Demo *] - [Model View]
View
Structure
Node/Element
Properties
Boundary
Load
Analysis
Results
PSC
Pushover
Design
Rating
Query
Tools
Help
Redraw
Initial View
Previous View
Dynamic
Zoom
Pan
View Point
Named View
Dynamic View
Hidden
Render View
Select
Active
Inactive
All
Inverse Active
Activities
UCS/GCS
Grids
Snap
Grids/Snap
Display
New Window
Close
Next
Previous
Window
Tile Horizontally
Tile Vertically
Cascade
Window Tile
Tree Menu
Tables
Works
Group
Report
Tables
Structure Tables
Nodes
Elements
Properties
Boundaries
Masses
Static Loads
Time Loads For Construction Stage...
Creep Coefficient for Construction Stage...
Camber for Construction Stage...
Initial Forces for Geometric Stiffness...
Multiple Support Excitation
Hydration
Result Tables
Reaction
Concurrent(Max/Min) Reaction
Displacements
Truss
Cable
Beam
Plate
Plane Stress
Plane Strain
Axisymmetric
Solid
Elastic Link
General Link
Vibration Mode Shape
Buckling Mode Shape
Nodal Results of RS
Inelastic Hinge
Time History Analysis
Heat of Hydration Analysis
Tendon
Composite Section For C.S.
Construction Stage
Equilibrium Element Nodal Force
Tree Menu
Task Pane
Base
TOP
Model View
Message Window
[Warning] Elements 287 & 284 are overlapped at the same location.
[Warning] Elements 288 & 283 are overlapped at the same location.
[Warning] Elements 289 & 282 are overlapped at the same location.
>>
Command Message
Analysis Message
For Help, press F1
Node-83
U: -5, 8.660254, 0
G: -5, 8.660254, 0
kips
ft
2


Civil 2015 - [E:\Edgar Demo *] - [Model View]
View Structure Node/Element Properties Boundary Load Analysis Results PSC Pushover Design Rating Query Tools
Redraw Initial View Previous View Dynamic Zoom Pan View Point Named View
Dynamic View
Hidden
Render View
Select
Active Inactive All Inverse Active
Activities
UCS/GCS Grids Snap
Grids/Snap
Display
New Window Close Next Previous
Window
Tile Horizontally Tile Vertically Cascade
Window Tile
Help
Tree Menu
Tables Works Group Report
Tables
Structure Tables
Nodes
Elements
Properties
Boundaries
Masses
Static Loads
Base
Unit System Preferences
Setting
MCT Command Shell
Command Shell
Sectional Property Calculator
Tendon Profile Generator
General Section Designer
Bill of Material
Data Generator
Convert Meta Files to DXF Files
Generator
Dynamic Report Generator
Dynamic Report Image
Dynamic Report Auto Regeneration
Dynamic Report
Text Editor
Graphic Editor
Editor
Concurrent(Max/Min) Reaction
Displacements
Truss
Cable
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Buckling Mode Shape
Nodal Results of RS
Inelastic Hinge
Time History Analysis
Heat of Hydration Analysis
Tendon
Composite Section For C.S.
Construction Stage
Equilibrium Element Nodal Force
Model View
Message Window
[Warning] Elements 287 & 284 are overlapped at the same location.
[Warning] Elements 288 & 283 are overlapped at the same location.
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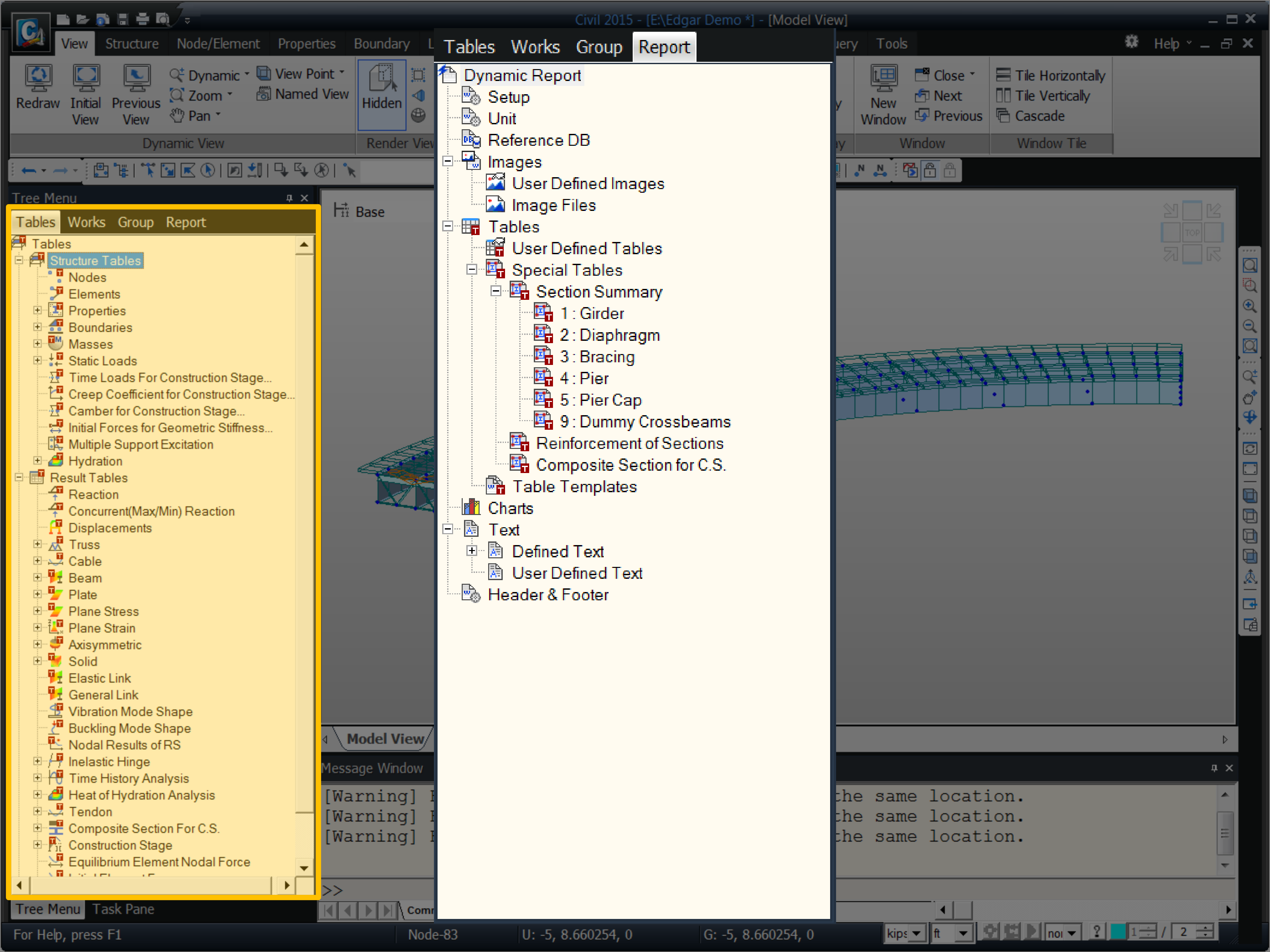
>>
Command Message
Analysis Message
Tree Menu Task Pane
For Help, press F1
Node-83
U: -5, 8.660254, 0
G: -5, 8.660254, 0
kips
ft



Civil 2015 - [E:\Edgar Demo *] - [Model View]
View
Structure
Node/Element
Properties
Boundary
Tools
Help
Redraw
Initial View
Previous View
Dynamic
Zoom
Pan
View Point
Named View
Hidden
Dynamic View
Render View
New Window
Close
Next
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Window
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Construction Stage
Equilibrium Element Nodal Force
Tree Menu
Task Pane
Base
Model View
Message Window
[Warning]
[Warning]
[Warning]
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the same location.
the same location.
Tables
Works
Group
Report
Dynamic Report
Setup
Unit
Reference DB
Images
User Defined Images
Image Files
Tables
User Defined Tables
Special Tables
Section Summary
1 : Girder
2 : Diaphragm
3 : Bracing
4 : Pier
5 : Pier Cap
9 : Dummy Crossbeams
Reinforcement of Sections
Composite Section for C.S.
Table Templates
Charts
Text
Defined Text
User Defined Text
Header & Footer
For Help, press F1
Node-83
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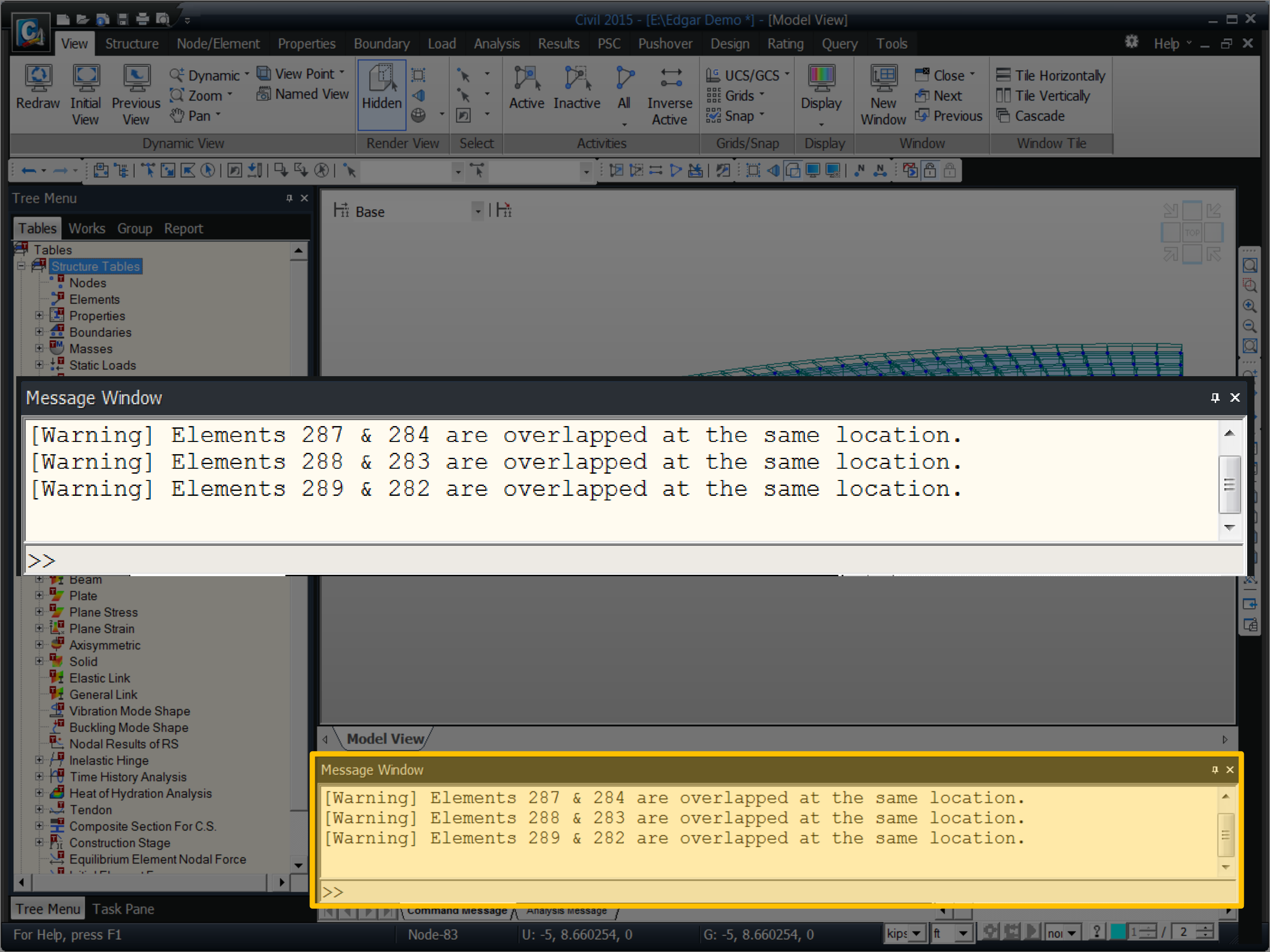
G: -5, 8.660254, 0
kips
ft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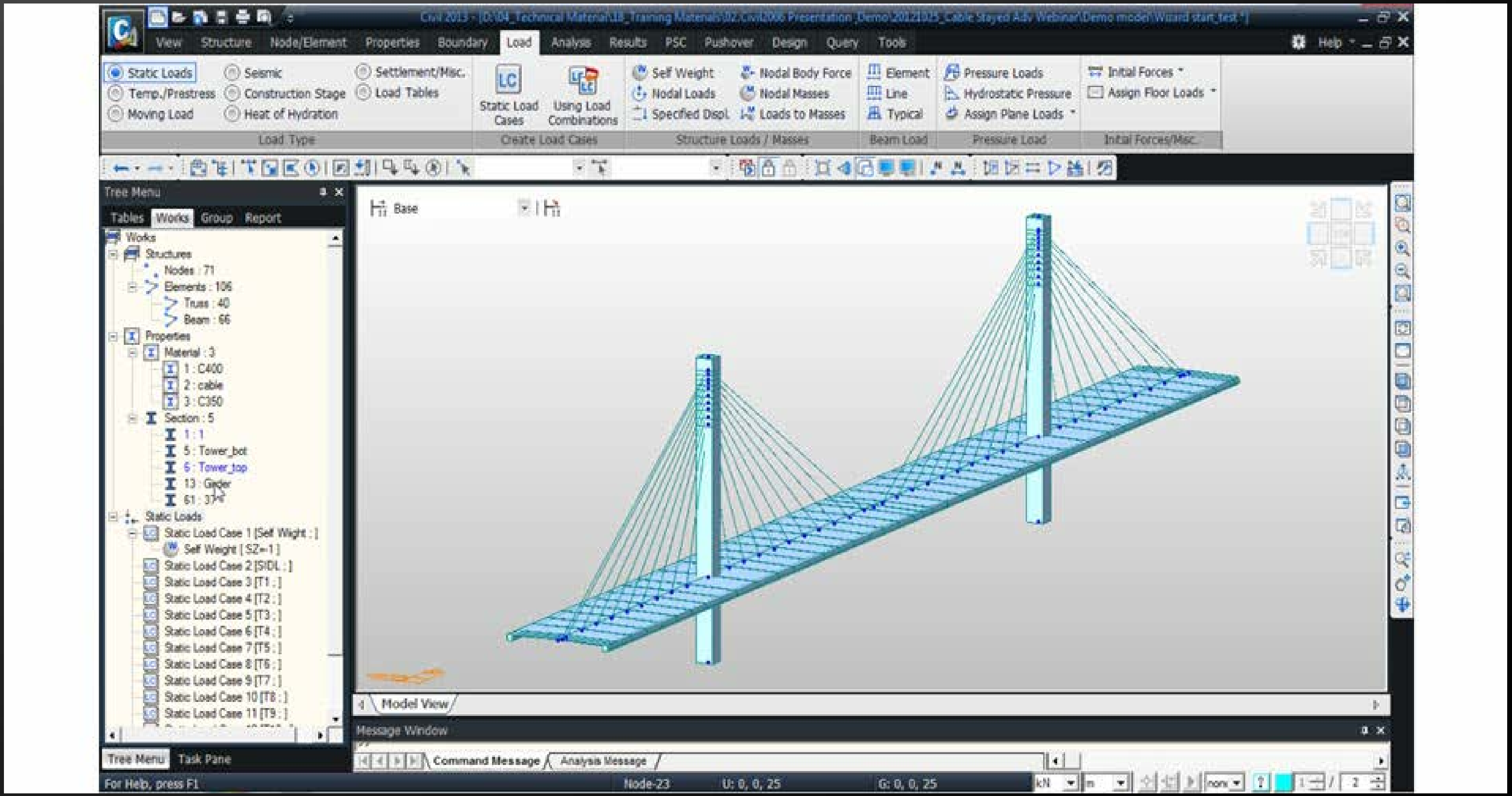
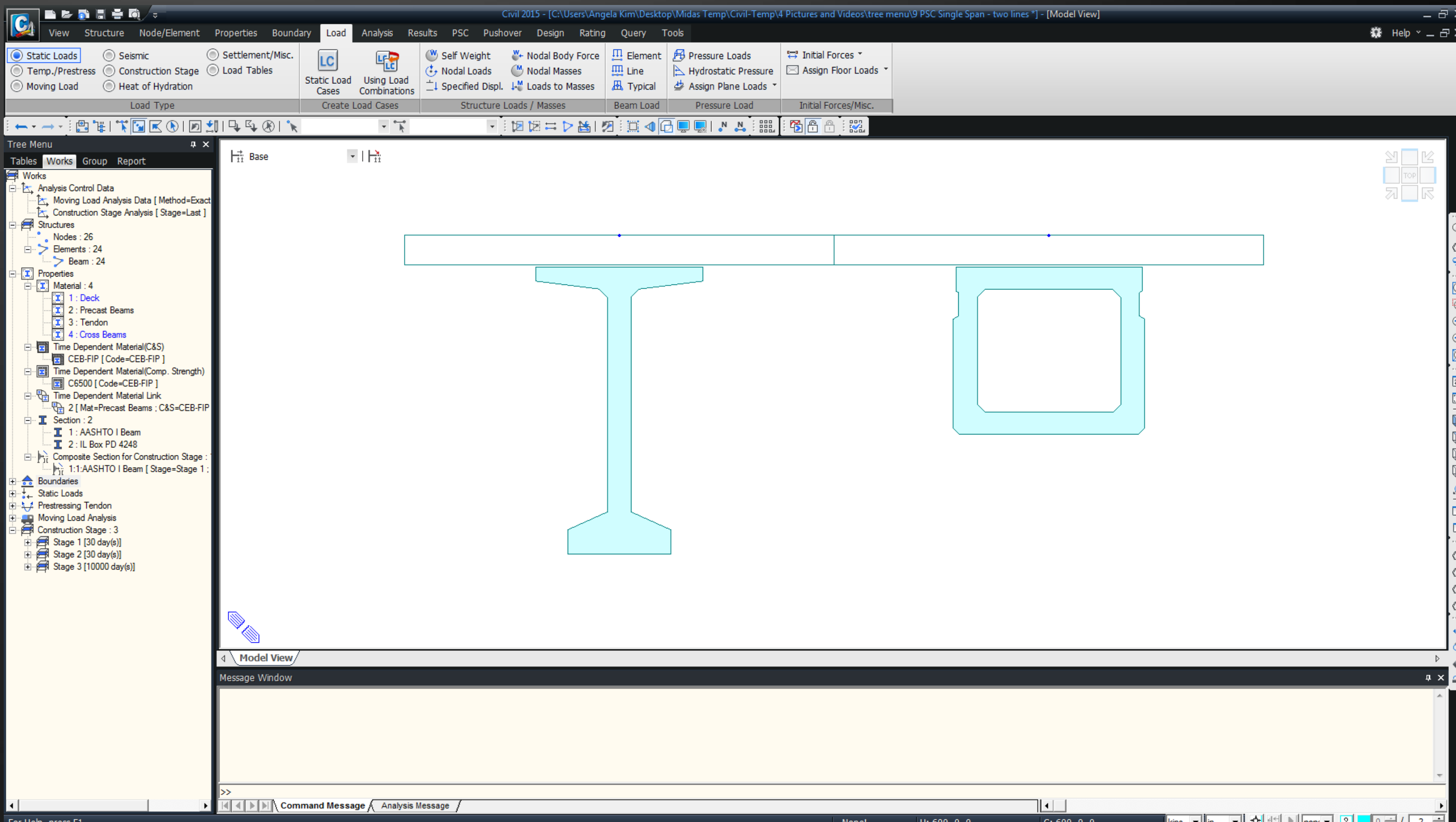
Command Message
Analysis Message
Tree Menu
Task Pane
For Help, press F1
Node-83
U: -5, 8.660254, 0
G: -5, 8.660254, 0
kips
ft

Modeling Features

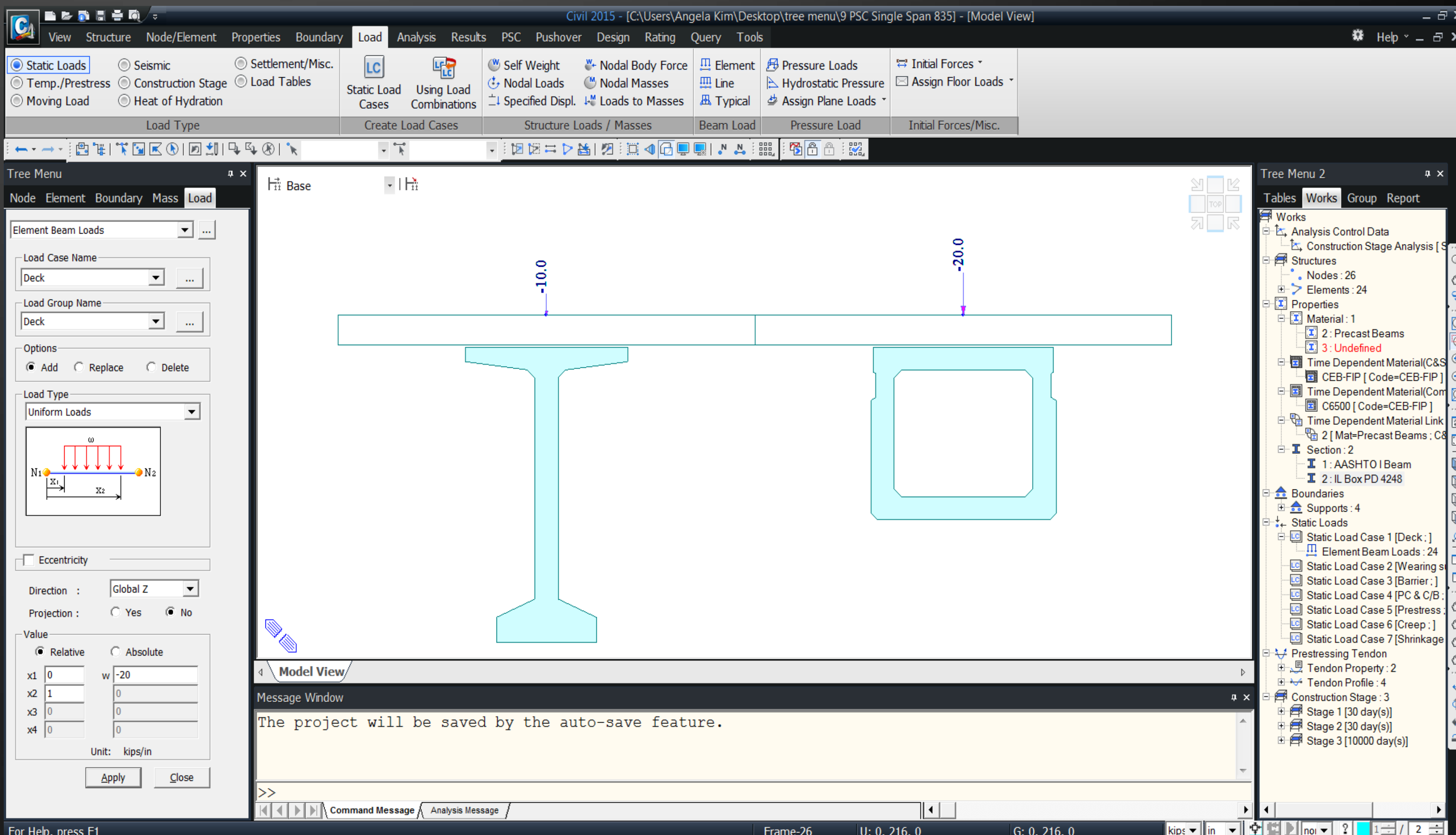
Drag & Drop



Tree Menu


Civil 2015 - [C:\Users\Angela Kim\Desktop\Midas Temp\Civil-Temp\4 Pictures and Videos\tree menu\9 PSC Single Span - two lines *] - [Model View]
View Structure Node/Element Properties Boundary Load Analysis Results PSC Pushover Design Rating Query Tools
Static Loads
Temp./Prestress
Moving Load
Seismic
Construction Stage
Heat of Hydration
Settlement/Misc.
Load Tables
Load Type
Static Load Cases
Using Load Combinations
Create Load Cases
Self Weight
Nodal Loads
Specified Displ.
Nodal Body Force
Nodal Masses
Loads to Masses
Structure Loads / Masses
Element
Line
Typical
Beam Load
Pressure Loads
Hydrostatic Pressure
Assign Plane Loads
Pressure Load
Initial Forces
Assign Floor Loads
Initial Forces/Misc.
Tree Menu
Tables Works Group Report
Works
Analysis Control Data
Moving Load Analysis Data [Method=Exact
Construction Stage Analysis [Stage=Last]
Structures
Nodes : 26
Elements : 24
Beam : 24
Properties
Material : 4
1 : Deck
2 : Precast Beams
3 : Tendon
4 : Cross Beams
Time Dependent Material(C&S)
CEB-FIP [Code=CEB-FIP]
Time Dependent Material(Comp. Strength)
C6500 [Code=CEB-FIP]
Time Dependent Material Link
2 [Mat=Precast Beams ; C&S=CEB-FIP
Section : 2
1 : AASHTO I Beam
2 : IL Box PD 4248
Composite Section for Construction Stage
1:1:AASHTO I Beam [Stage=Stage 1
Boundaries
Static Loads
Prestressing Tendon
Moving Load Analysis
Construction Stage : 3
Stage 1 [30 day(s)]
Stage 2 [30 day(s)]
Stage 3 [10000 day(s)]
Base
Model View
Message Window
Command Message
Analysis Message
For Help, press F1
None!
U: 600, 0, 0
G: 600, 0, 0
kips
in
none

Tree Menu

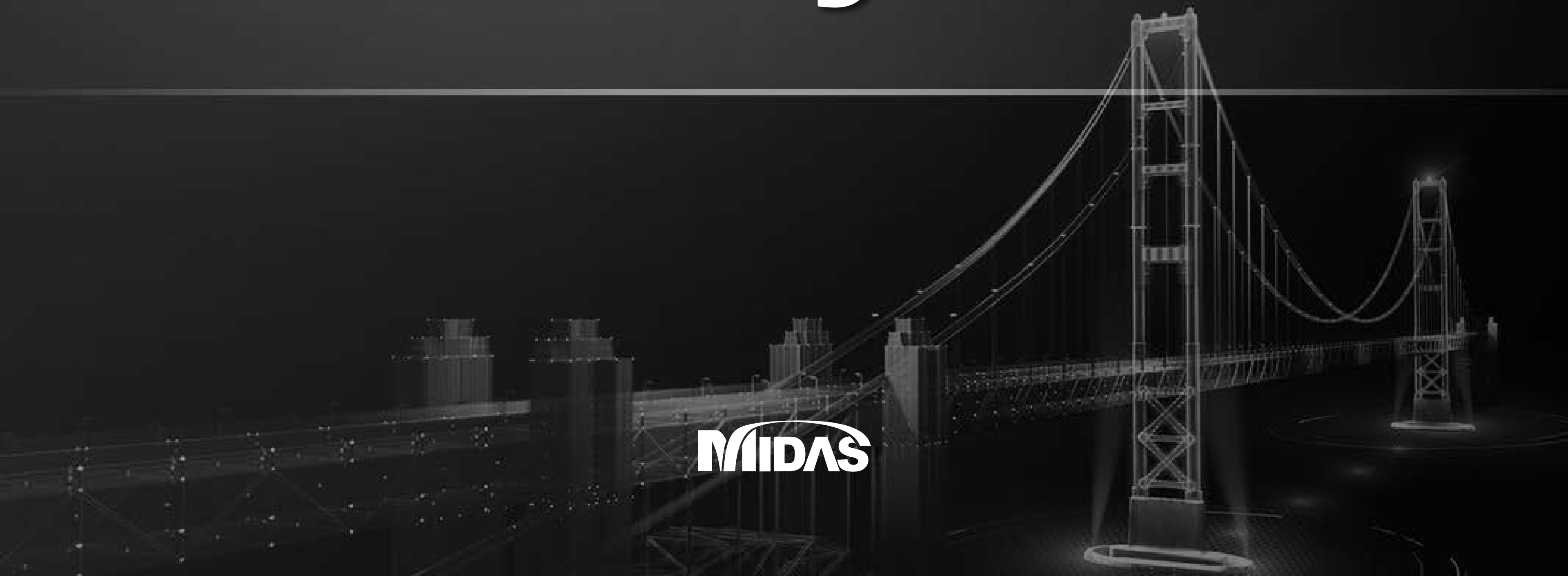


Civil 2015 - [C:\Users\Angela Kim\Desktop\tree menu\9 PSC Single Span 835] - [Model View]
View Structure Node/Element Properties Boundary Load Analysis Results PSC Pushover Design Rating Query Tools
Static Loads Seismic Settlement/Misc. Temp./Prestress Construction Stage Load Tables Moving Load Heat of Hydration
Load Type
Static Load Cases
Using Load Combinations
Create Load Cases
Self Weight Nodal Body Force Nodal Loads Nodal Masses Specified Displ. Loads to Masses
Structure Loads / Masses
Element Line Typical
Beam Load
Pressure Loads Hydrostatic Pressure Assign Plane Loads
Pressure Load
Initial Forces Assign Floor Loads
Initial Forces/Misc.
Tree Menu
Node Element Boundary Mass Load
Element Beam Loads
Load Case Name
Deck
Load Group Name
Deck
Options
Add Replace Delete
Load Type
Uniform Loads
Eccentricity
Direction : Global Z
Projection : Yes No
Value
Relative Absolute
x1 0 w -20
x2 1
Unit: kips/in
Apply Close
Base
-10.0
-20.0
Model View
Message Window
The project will be saved by the auto-save feature.
Command Message Analysis Message
Tree Menu 2
Tables Works Group Report
Works
Analysis Control Data
Construction Stage Analysis
Structures
Nodes : 26
Elements : 24
Properties
Material : 1
2 : Precast Beams
3 : Undefined
Time Dependent Material(C&S
CEB-FIP [Code=CEB-FIP]
Time Dependent Material(Com
C6500 [Code=CEB-FIP]
Time Dependent Material Link
2 [Mat=Precast Beams ; C&
Section : 2
1 : AASHTO I Beam
2 : IL Box PD 4248
Boundaries
Supports : 4
Static Loads
Static Load Case 1 [Deck ;]
Element Beam Loads : 24
Static Load Case 2 [Wearing s
Static Load Case 3 [Barrier ;]
Static Load Case 4 [PC & C/B ;
Static Load Case 5 [Prestress ;
Static Load Case 6 [Creep ;]
Static Load Case 7 [Shrinkage
Prestressing Tendon
Tendon Property : 2
Tendon Profile : 4
Construction Stage : 3
Stage 1 [30 day(s)]
Stage 2 [30 day(s)]
Stage 3 [10000 day(s)]
For Help, press F1
Frame-26
U: 0, 216, 0
G: 0, 216, 0

INTEGRATED SOLUTION SYSTEM FOR BRIDGE AND CIVIL ENGINEERING

Introduction to midas Civil

Analysis



Analysis

Construction Stage analysis

Moving Load Analysis

- Influence Line & Influence Surface

Modal Analysis

- Eigen Value & Ritz Vector

Dynamic Analysis

- Static Seismic Analysis
- Response Spectrum Analysis
- Time History Analysis

Buckling Analysis

Large Displacement Analysis

P - Delta Analysis

Thermal Stress Analysis

Nonlinear Analysis

- Nonlinear Geometric Analysis
- Nonlinear Material Analysis
- Pushover & Fiber Model Analysis
- Inelastic Time History Analysis
- Boundary Nonlinear Analysis

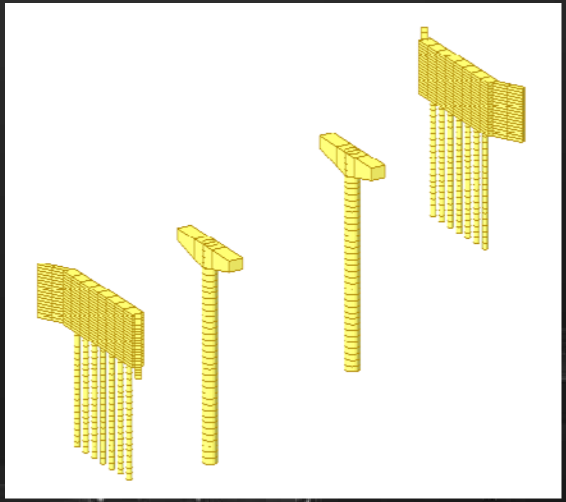
Heat of Hydration Analysis

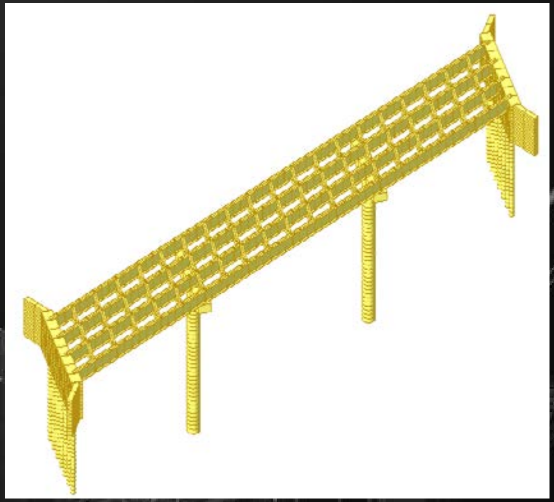
Integral Bridge Analysis

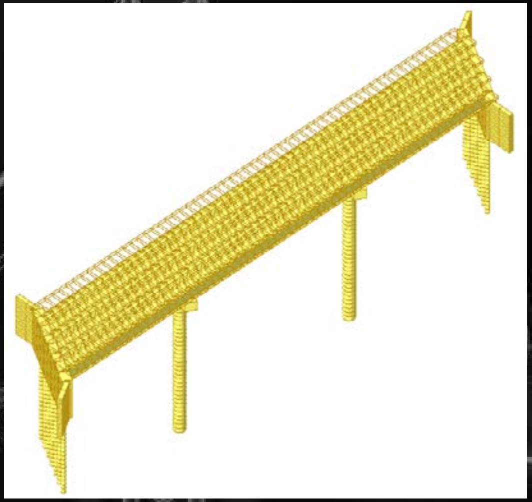
Steel Structure CS Analysis

Substructure	Installation of Steel Girders	Deck Concrete	Composite Action	Wearing Course + Barrier
0	30		60	90

Stage 1 (0–30) | **Stage 2** (30–60) | **Stage 3** (60–90)

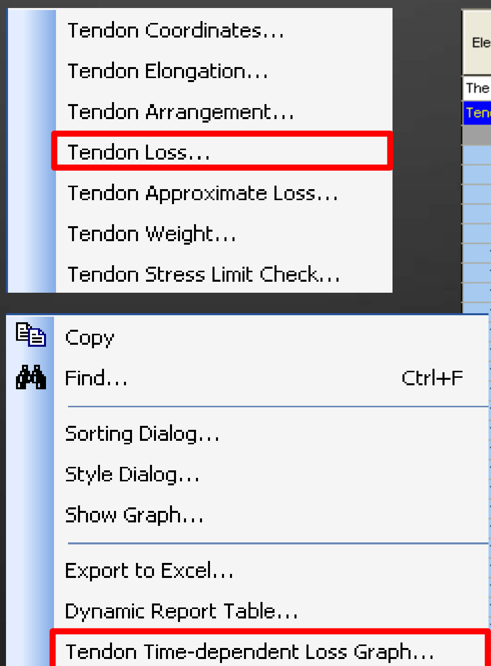


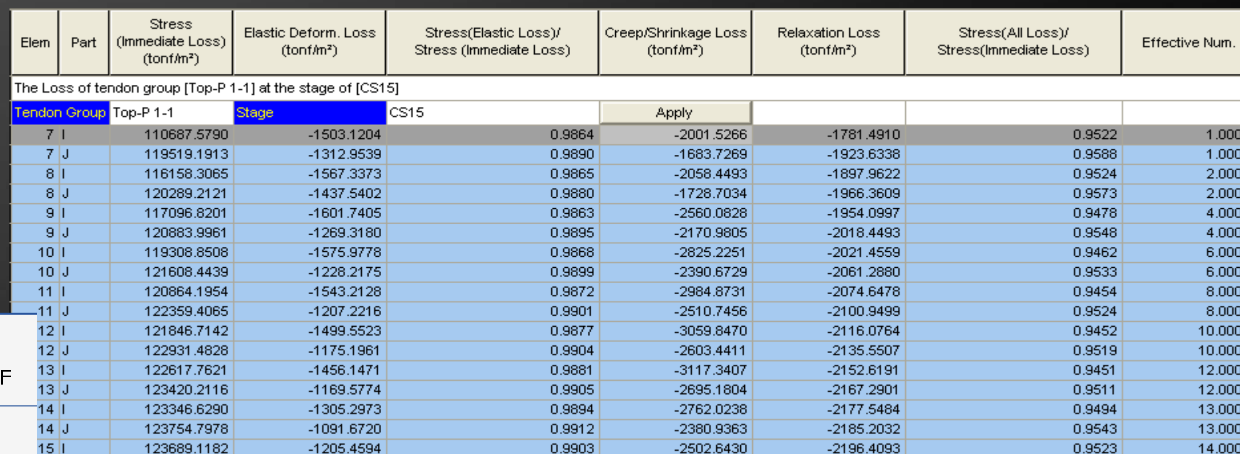




Prestress Analysis

PSC Bridge – Tendon Prestress Loss



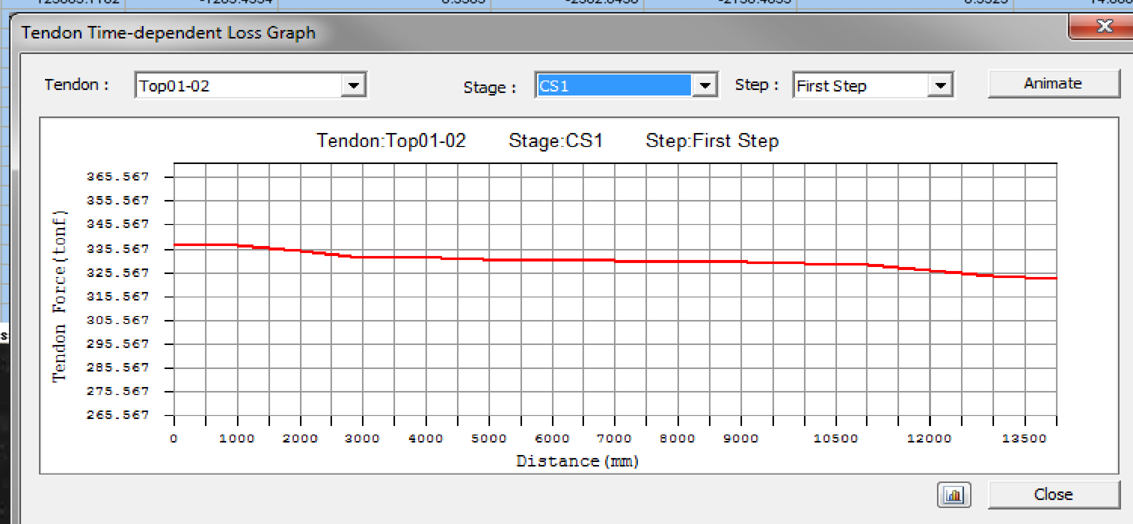


The Loss of tendon group [Top-P 1-1] at the stage of [CS15]

Tendon Group: Top-P 1-1 | Stage: CS15 | Apply

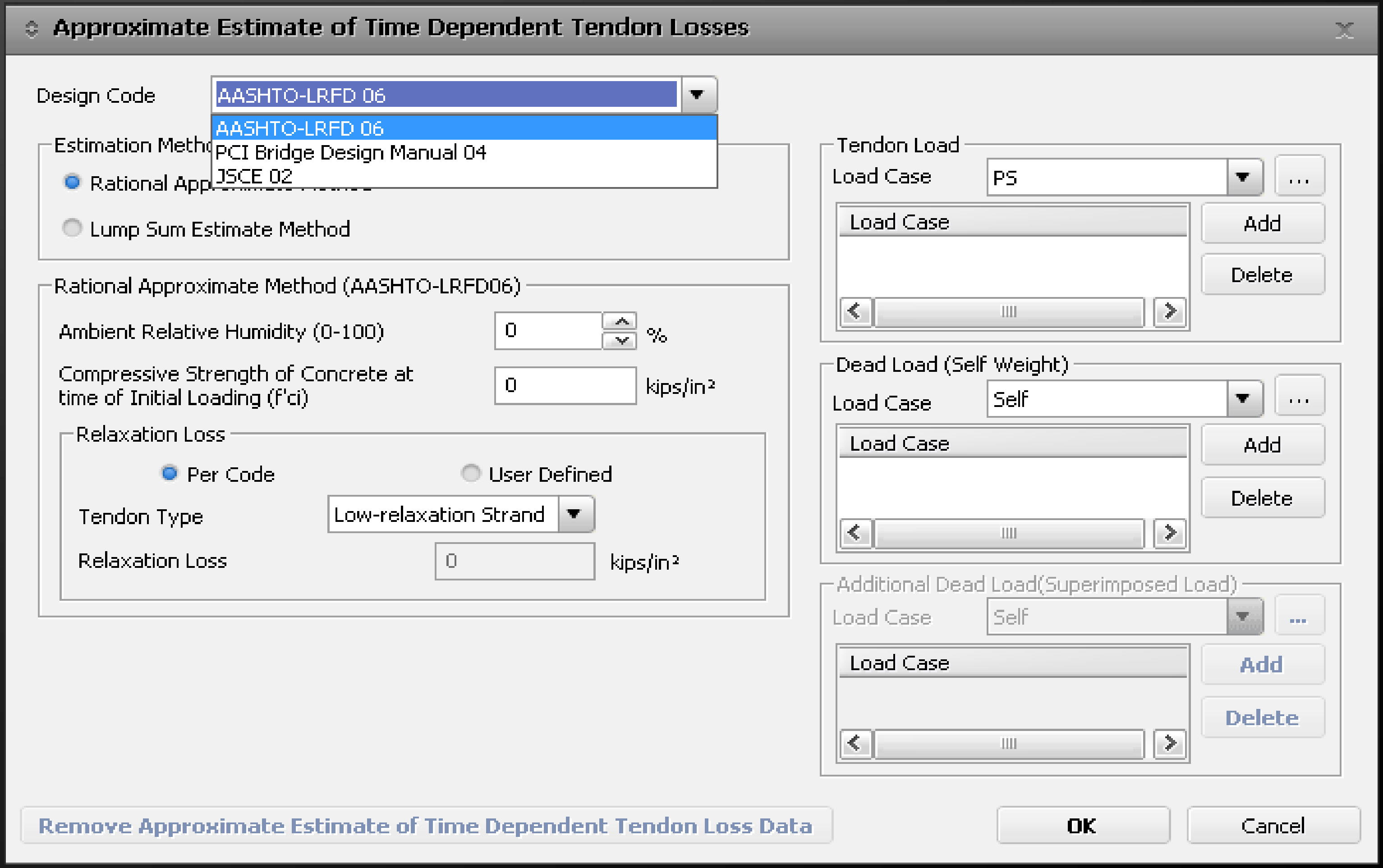
Elem	Part	Stress (Immediate Loss) (tonf/m²)	Elastic Deform. Loss (tonf/m²)	Stress(Elastic Loss)/ Stress (Immediate Loss)	Creep/Shrinkage Loss (tonf/m²)	Relaxation Loss (tonf/m²)	Stress(All Loss)/ Stress(Immediate Loss)	Effective Num.
7	I	110687.5790	-1503.1204	0.9864	-2001.5266	-1781.4910	0.9522	1.0000
7	J	119519.1913	-1312.9539	0.9890	-1683.7269	-1923.6338	0.9588	1.0000
8	I	116158.3065	-1567.3373	0.9865	-2058.4493	-1897.9622	0.9524	2.0000
8	J	120289.2121	-1437.5402	0.9880	-1728.7034	-1966.3609	0.9573	2.0000
9	I	117096.8201	-1601.7405	0.9863	-2560.0828	-1954.0997	0.9478	4.0000
9	J	120883.9961	-1269.3180	0.9895	-2170.9805	-2018.4493	0.9548	4.0000
10	I	119308.8508	-1575.9778	0.9868	-2825.2251	-2021.4559	0.9462	6.0000
10	J	121608.4439	-1228.2175	0.9899	-2390.6729	-2061.2880	0.9533	6.0000
11	I	120864.1954	-1543.2128	0.9872	-2984.8731	-2074.6478	0.9454	8.0000
11	J	122359.4065	-1207.2216	0.9901	-2510.7456	-2100.9499	0.9524	8.0000
12	I	121846.7142	-1499.5523	0.9877	-3059.8470	-2116.0764	0.9452	10.0000
12	J	122931.4828	-1175.1961	0.9904	-2603.4411	-2135.5507	0.9519	10.0000
13	I	122617.7621	-1456.1471	0.9881	-3117.3407	-2152.6191	0.9451	12.0000
13	J	123420.2116	-1169.5774	0.9905	-2695.1804	-2167.2901	0.9511	12.0000
14	I	123346.6290	-1305.2973	0.9894	-2762.0238	-2177.5484	0.9494	13.0000
14	J	123754.7978	-1091.6720	0.9912	-2380.9363	-2185.2032	0.9543	13.0000
15	I	123689.1182	-1205.4594	0.9903	-2502.6430	-2196.4093	0.9523	14.0000
15	J							
16	I							
16	J							
17	I							
17	J							
18	I							
18	J							
19	I							
19	J							
20	I							
20	J							
21	I							
21	J							
22	I							
22	J							
23	I							

Tendon Los



Prestress Analysis

PSC Bridge – Approximate Tendon Prestress Loss



Prestress Analysis

PSC Bridge – Tendon Stress Limit Check

- Tendon Coordinates...
- Tendon Elongation...
- Tendon Arrangement...
- Tendon Loss...
- Tendon Approximate Loss...
- Tendon Weight...
- Tendon Stress Limit Check...

Tendon Stress

Tendon Stress Limit

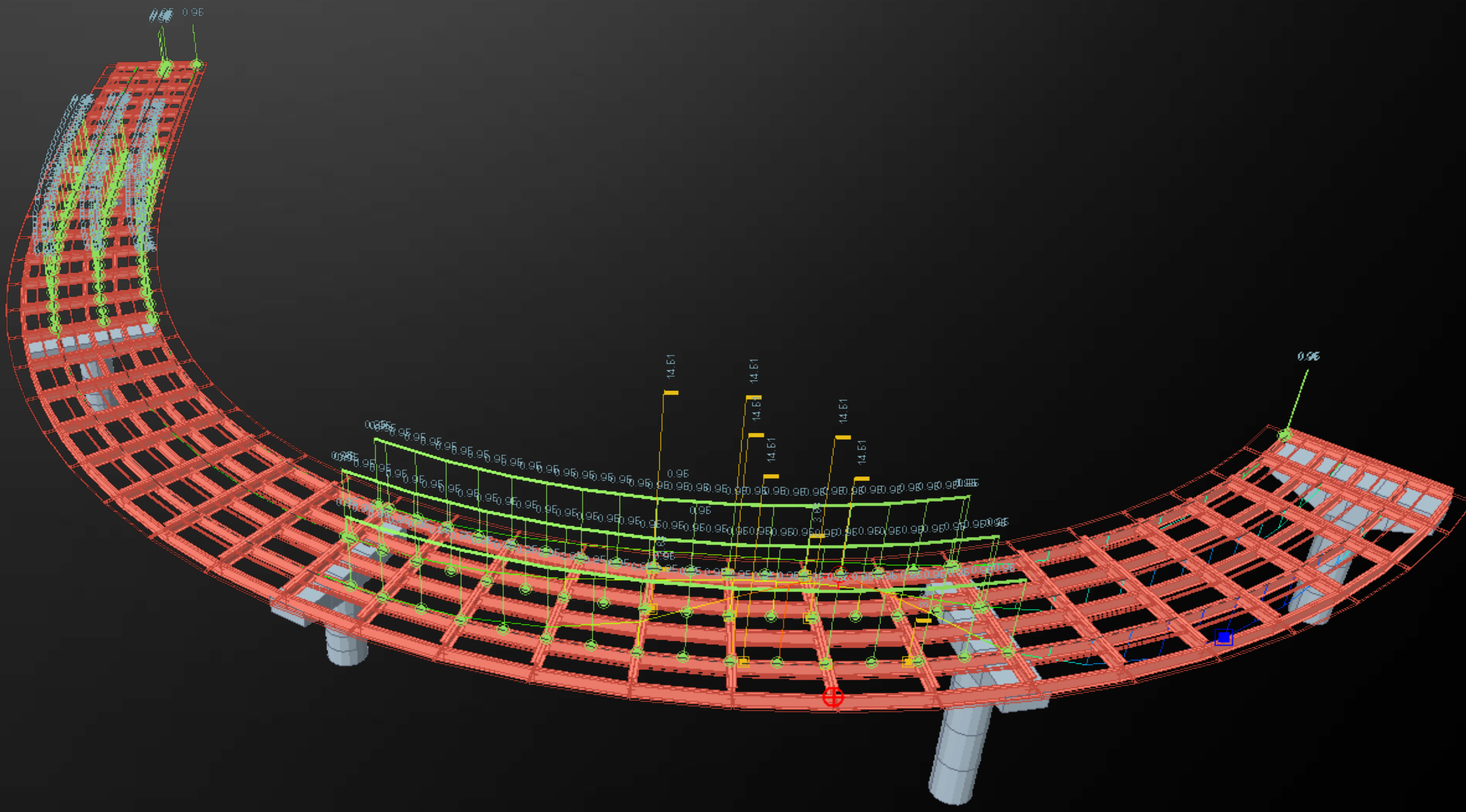
At anch.	0.7	fpu
Away from anch.	0.74	fpu
At service	0.8	fpy

OK Cancel

Tendon	Tendon Stress			Tendon Stress Limit		
	FDL1 (N/mm²)	FDL2 (N/mm²)	FLL (N/mm²)	Immediately after andhor set		At service
				At anch.	Away from anch.	
Bot1	867.1222	1008.6050	1008.6050	1330.0000	1406.0000	1280.0000
Bot2	866.9082	1008.4515	1008.4515	1330.0000	1406.0000	1280.0000
CS01a01_l	951.7275	1086.9387	1079.3223	1330.0000	1406.0000	1280.0000
CS01a01_r	951.9741	1087.2330	1079.6144	1330.0000	1406.0000	1280.0000
CS01a02_l	970.9649	1098.5414	1087.4911	1330.0000	1406.0000	1280.0000
CS01a02_r	971.2241	1098.8414	1087.7895	1330.0000	1406.0000	1280.0000
CS01a03_l	982.9584	1103.6489	1095.1710	1330.0000	1406.0000	1280.0000
CS01a03_r	983.2302	1103.9547	1095.4758	1330.0000	1406.0000	1280.0000
CS01b01_l	928.6975	1069.5204	1069.5204	1330.0000	1406.0000	1280.0000
1b01_r	928.8691	1069.7805	1069.7805	1330.0000	1406.0000	1280.0000
1b02_l	946.5612	1076.5253	1069.6800	1330.0000	1406.0000	1280.0000
1b02_r	946.7449	1076.8016	1069.9516	1330.0000	1406.0000	1280.0000
1b03_l	959.7907	1079.9189	1070.4710	1330.0000	1406.0000	1280.0000
1b03_r	959.9866	1080.2054	1070.7541	1330.0000	1406.0000	1280.0000
2a01_l	932.7898	1071.1960	1071.1960	1330.0000	1406.0000	1280.0000
2a01_r	932.9301	1071.3970	1071.3970	1330.0000	1406.0000	1280.0000
2a02_l	953.0878	1079.1348	1070.7337	1330.0000	1406.0000	1280.0000
2a02_r	953.2380	1079.3484	1070.9434	1330.0000	1406.0000	1280.0000
2a03_l	970.7999	1081.7421	1071.2847	1330.0000	1406.0000	1280.0000
2a03_r	970.9601	1081.9655	1071.5031	1330.0000	1406.0000	1280.0000
2b01_l	781.8189	990.2175	990.2175	1330.0000	1406.0000	1280.0000
CS02b01_r	782.0235	990.4289	990.4289	1330.0000	1406.0000	1280.0000
CS02b02_l	826.3534	1017.4450	1017.4450	1330.0000	1406.0000	1280.0000
CS02b02_r	826.5675	1017.6609	1017.6609	1330.0000	1406.0000	1280.0000
CS02b03_l	865.6381	1042.1207	1042.1207	1330.0000	1406.0000	1280.0000
CS02b03_r	865.8604	1042.3412	1042.3412	1330.0000	1406.0000	1280.0000
CS03a01_l	932.3756	1070.9447	1070.9447	1330.0000	1406.0000	1280.0000
CS03a01_r	932.5233	1071.1613	1071.1613	1330.0000	1406.0000	1280.0000
CS03a02_l	952.9029	1079.3094	1070.7975	1330.0000	1406.0000	1280.0000
CS03a02_r	953.0611	1079.5400	1071.0235	1330.0000	1406.0000	1280.0000

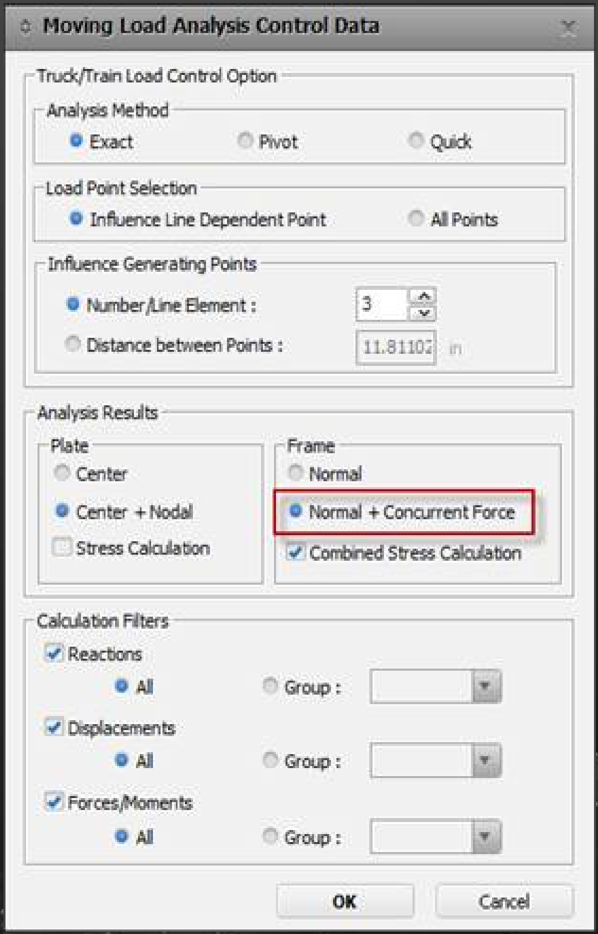
Moving Load Analysis

Moving Load Tracer + Vehicle Load Conversion to Static Load



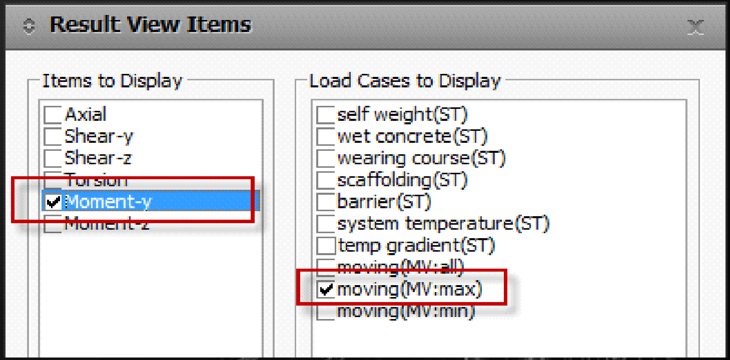
Moving Load Analysis

Live Analysis Control: Normal+ Concurrent Force



	Elem	Load	Part	Axial (kips)	Shear-y (kips)	Shear-z (kips)	Torsion (in·kips)	Moment-y (in·kips)	Moment-z (in·kips)
▶	1	moving(	I[1]	12.84	3.98	9.39	221.00	2154.30	215.69
	1	moving(	J[2]	12.04	3.90	9.39	221.00	1894.00	110.08
	2	moving(	I[2]	11.70	5.59	10.09	169.48	1925.54	151.01
	2	moving(	J[3]	11.70	5.59	10.09	169.48	1644.27	77.53
	3	moving(	I[3]	10.64	8.20	10.39	200.50	1669.82	109.95
	3	moving(	J[4]	8.99	8.20	10.39	200.50	1519.84	93.98
	4	moving(	I[4]	8.66	2.11	10.74	56.20	1569.47	109.85

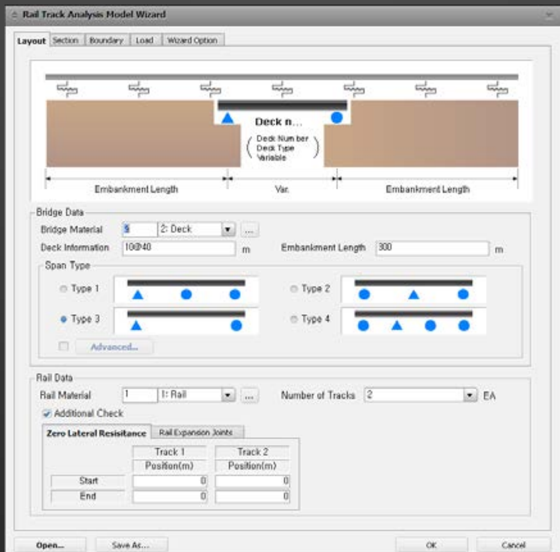
Normal Envelope results



	Elem	Load	Part	Component	Axial (kips)	Shear-y (kips)	Shear-z (kips)	Torsion (in·kips)	Moment-y (in·kips)	Moment-z (in·kips)
▶	1	moving(	I[1]	Moment-y	8.71	-0.27	7.27	-126.65	2154.30	-60.02
	1	moving(	J[2]	Moment-y	8.99	-0.19	7.19	-126.89	1894.66	-50.38
	2	moving(	I[2]	Moment-y	8.31	-0.40	7.84	-97.62	1925.54	-25.04
	2	moving(	J[3]	Moment-y	8.26	-0.38	7.78	-98.04	1644.27	-11.24
	3	moving(	I[3]	Moment-y	7.55	-0.69	8.04	-92.19	1669.82	13.23
	3	moving(	J[4]	Moment-y	6.98	3.24	-4.16	-78.44	1519.84	-171.27

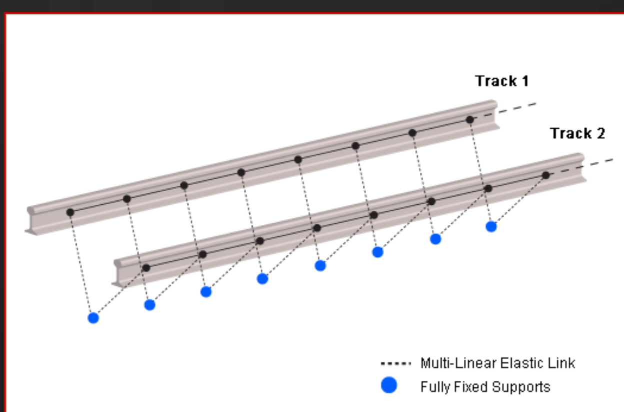
Concurrent force results for Moment-y

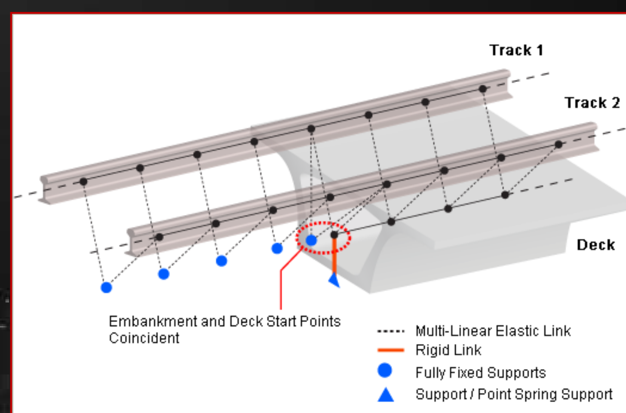
Rail Track Analysis Wizard

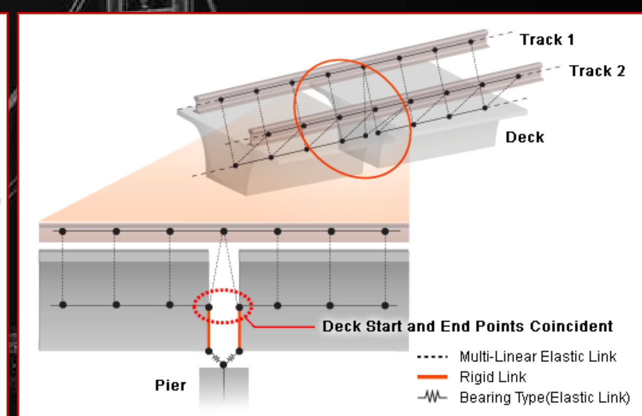


Automated modeling for Structure and Rail Interaction

1) Simplified Separate Analysis Auto generation
2) Stage Analysis or Complete Analysis model
3) Moving Train load Auto Geneartion







Performance Based Seismic Design

Pushover Analysis – Performance Based Seismic Design

Static Analysis and Member Design

Select Load or Displacement Control

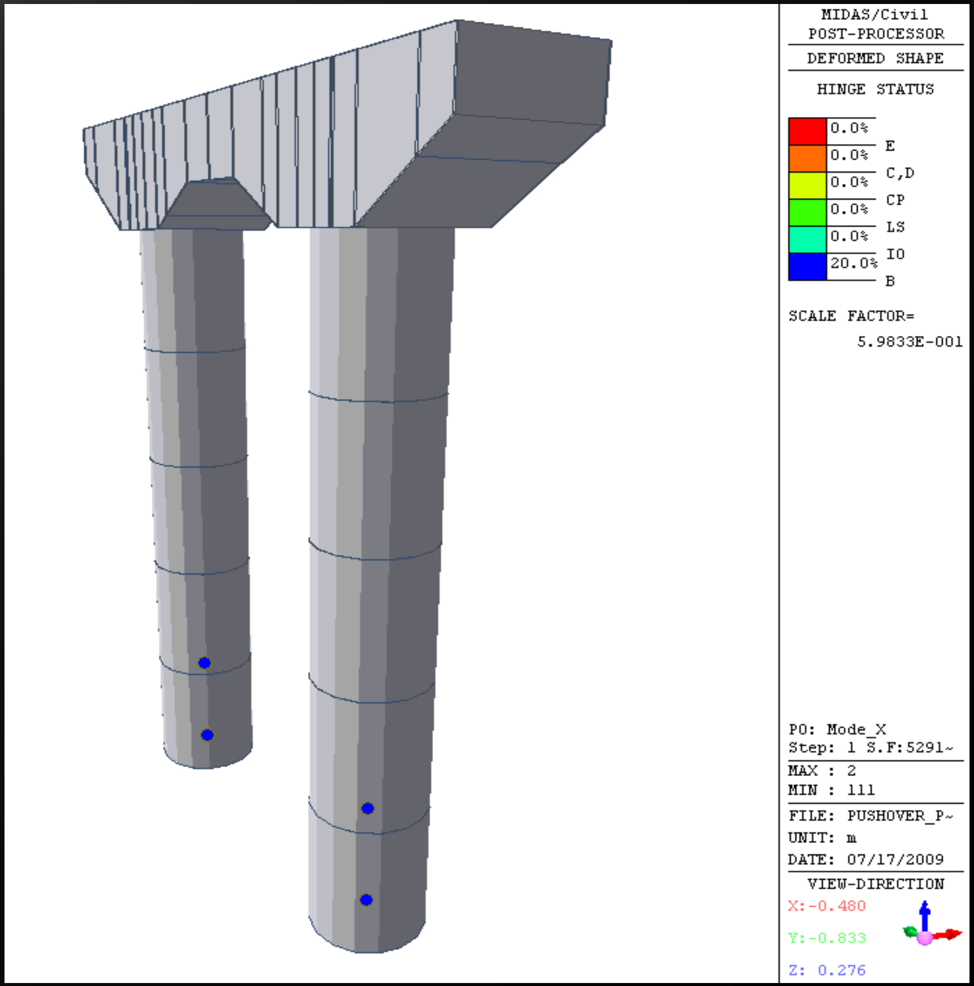
Define Inelastic Hinge Properties

Pushover Analysis

Review Capacity of Structure

Performance Point by CSM

Evaluation of Structure to Resist Earthquake



Dynamic Analysis

Seismic Analysis Capabilities

Response Spectrum Analysis

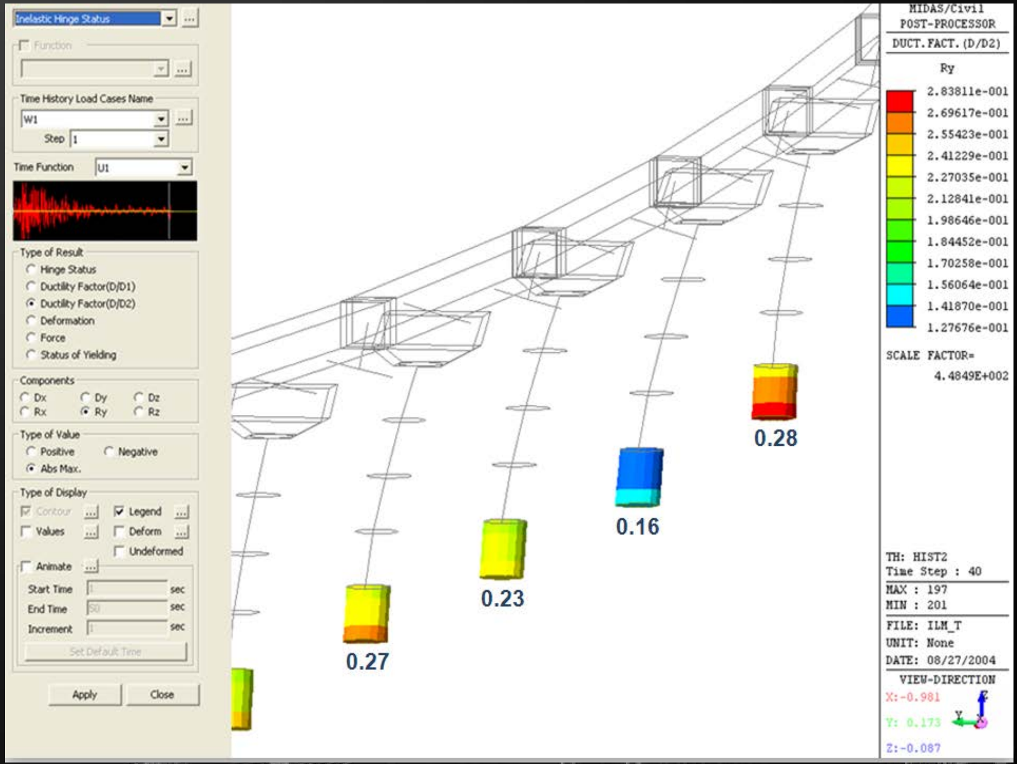
Pushover Analysis

- 4 Basic (P, V, M & PMM) Hinges
- FEMA, Eurocode, Multi-linear type hinge
- RC, Steel, SRC, Masonry material types
- Load or Displacement Option
- Demand Spectrums and Performance Points

Boundary NL Time History Analysis

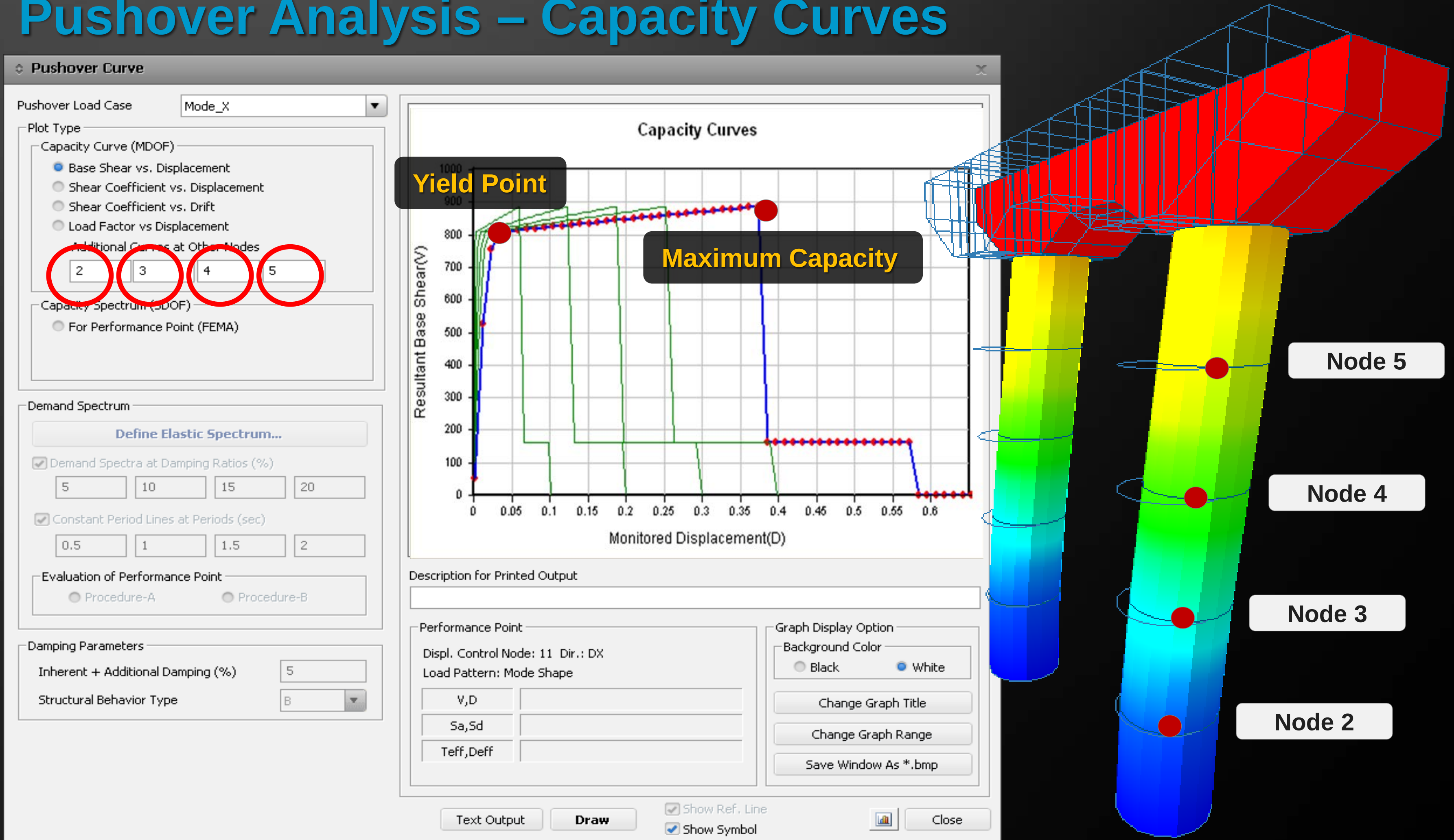
- Damper, Isolator, Gap, Hook

Inelastic Time History Analysis



Non-linear Analysis

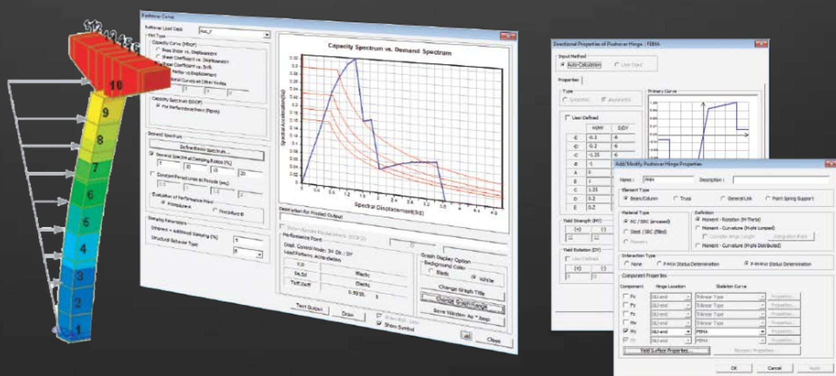
Pushover Analysis – Capacity Curves



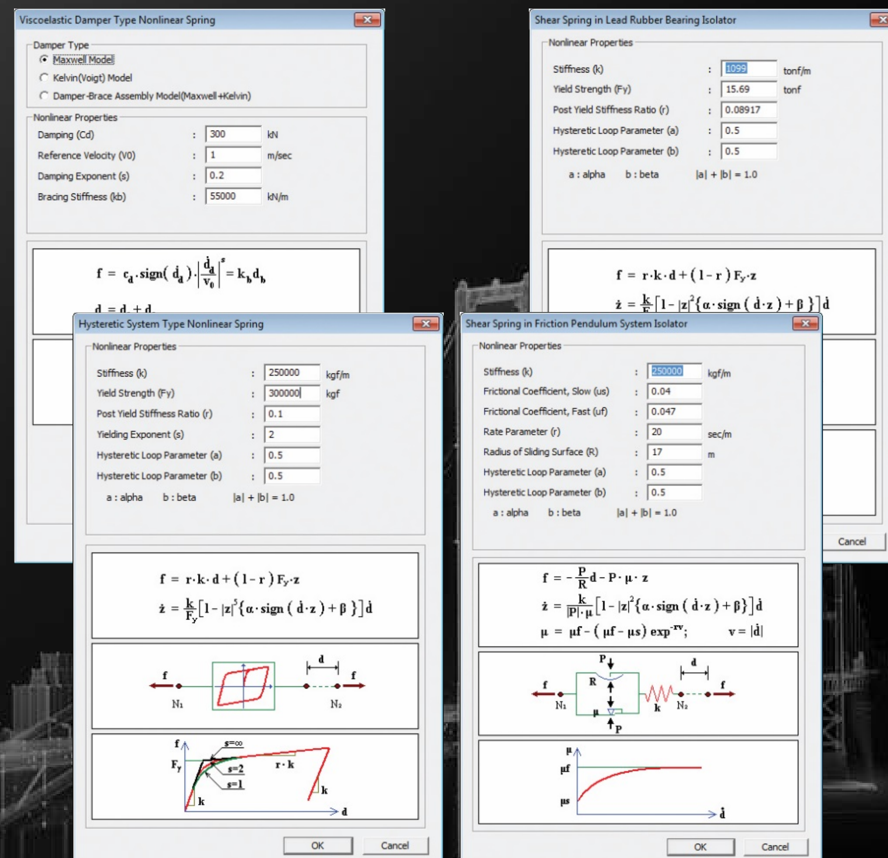
Dynamic Analysis

Nonlinear Matrix

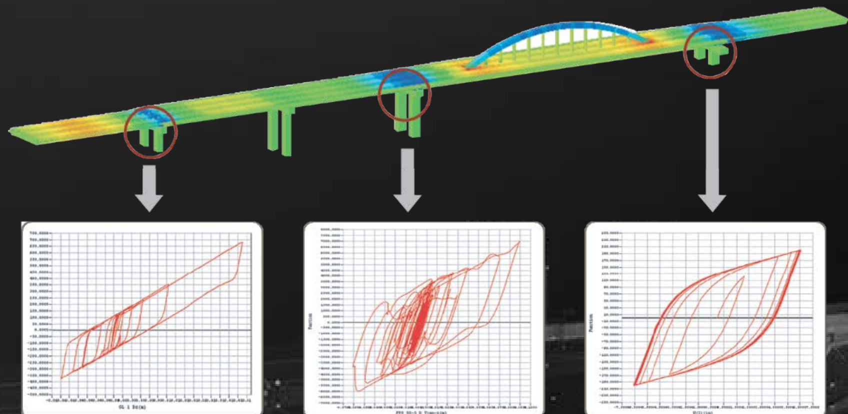
Pushover Analysis



Boundary nonlinear analysis



Dampers & isolators

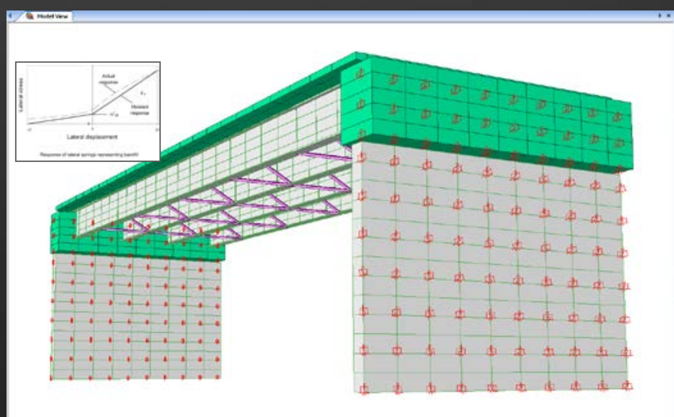


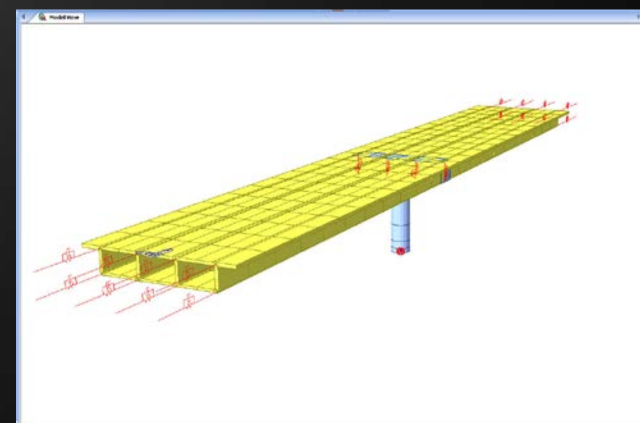
Soil Structure Interaction

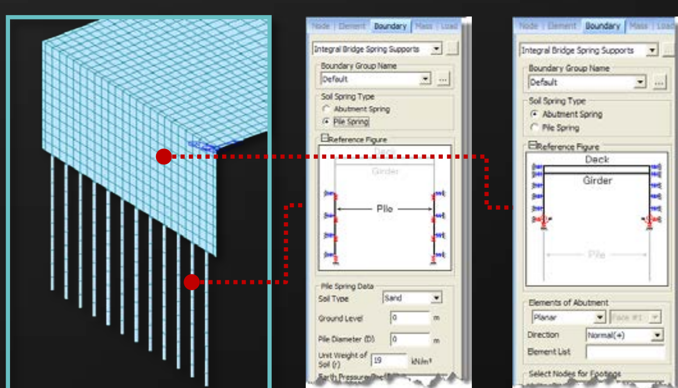
Non Linear spring supports for Abutment and Foundation

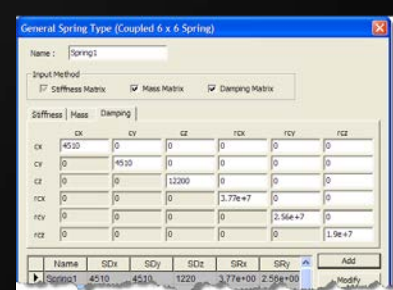
Nonlinear point spring support to represent the stiffness of the backfill and soil

General Link for Soil-Structure interaction (6x6 stiffness, mass, and damping matrix)





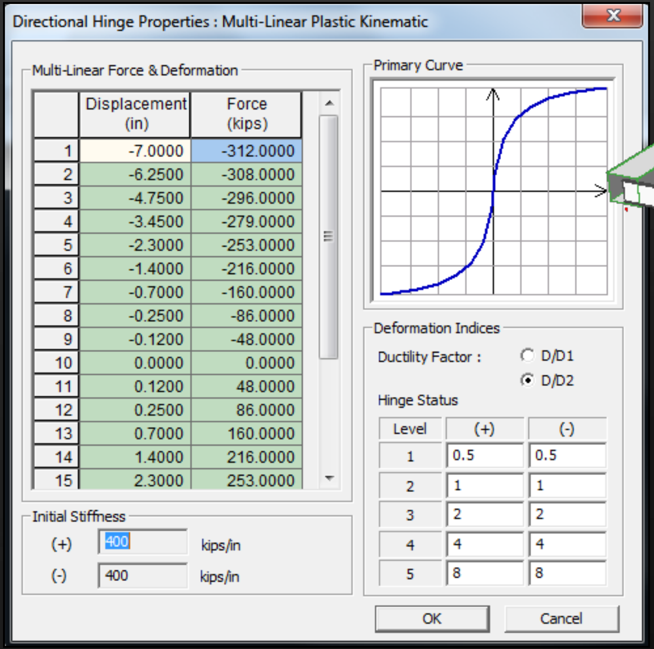




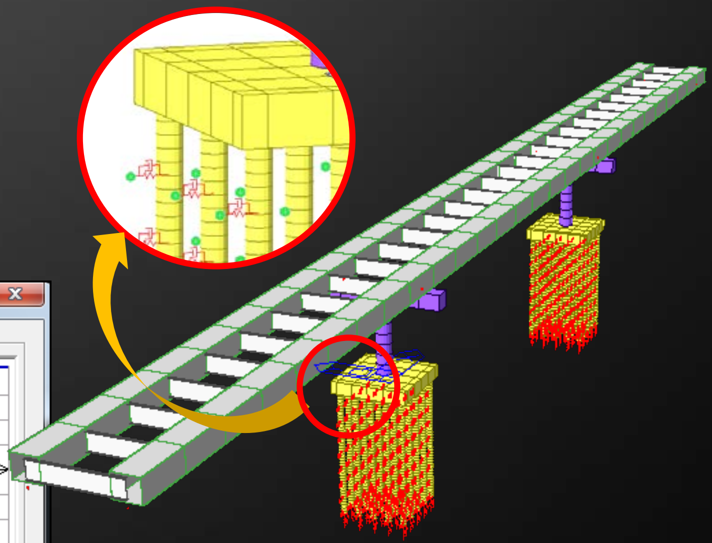
Soil Structure Interaction

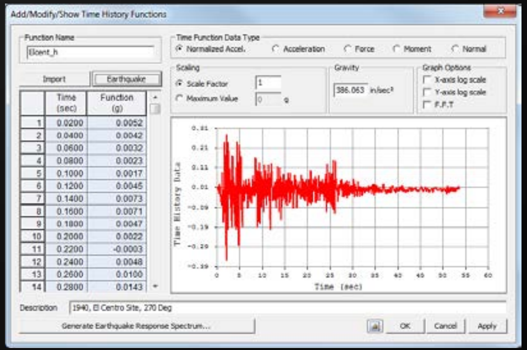
Non-linear Soil Springs for Pile

- Multi-Linear Elastic
- Multi-Linear Plastic Kinematic
- Multi-Linear Plastic Takeda
- Multi-Linear Plastic Pivot

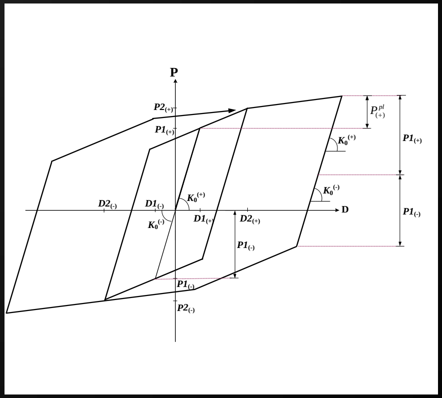


Multi-Linear Plastic Kinematic Hinge Model

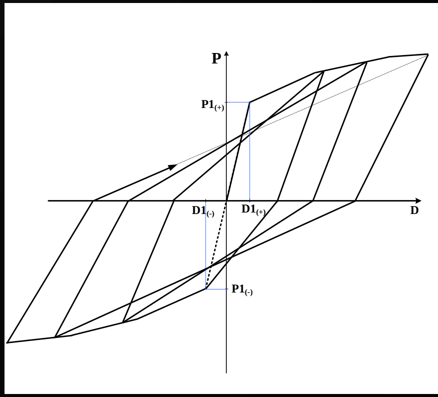




Time Forcing Function



Kinematic Hinge Model

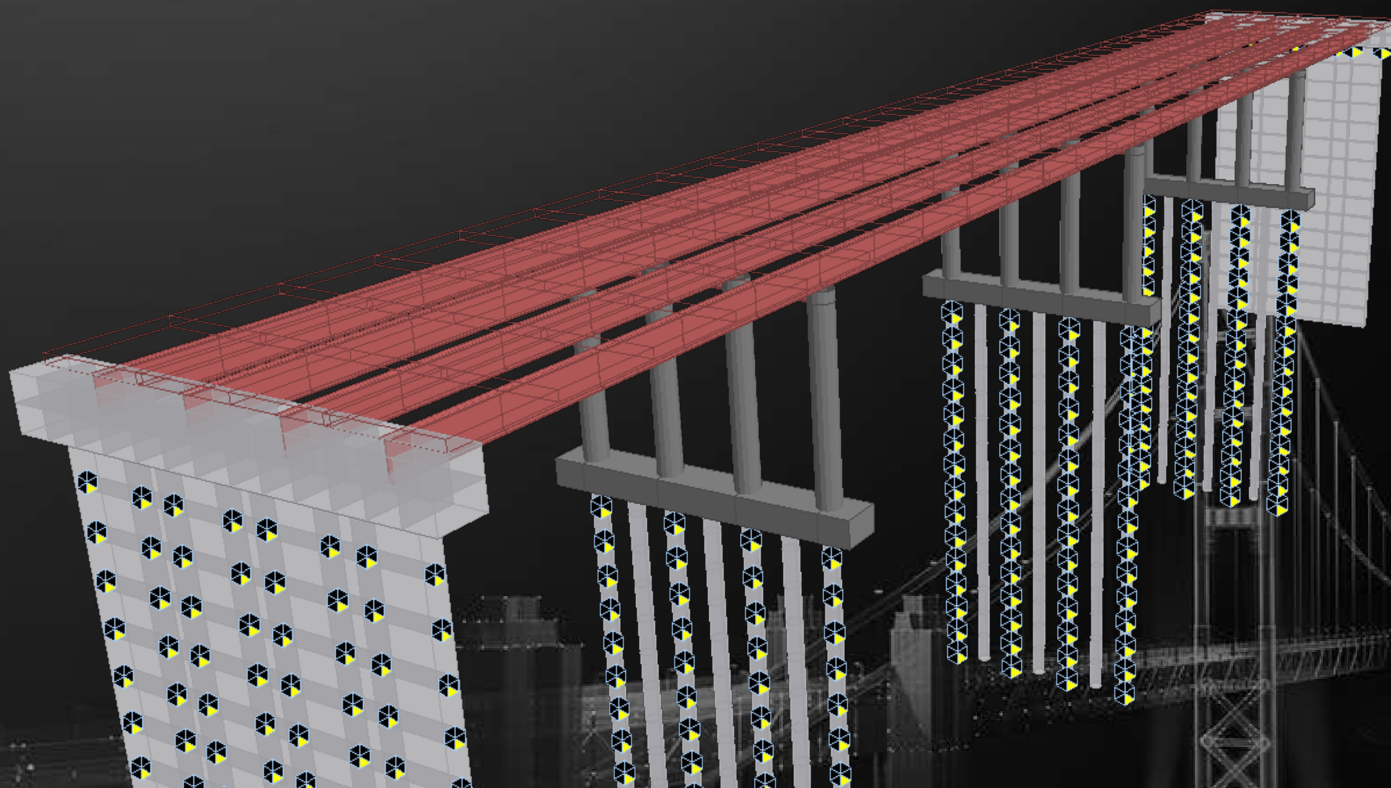


Takeda Hinge Model

Soil Structure Interaction

Integral Bridge

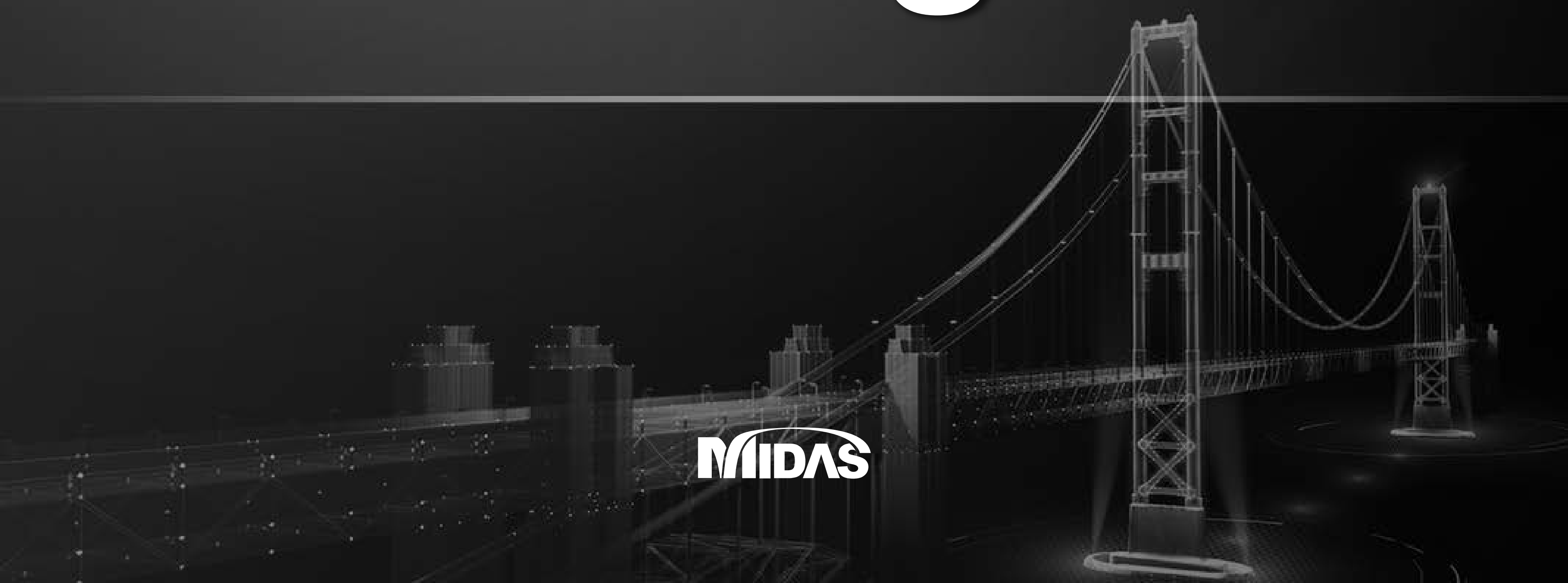
Automatic Soil Spring generated for Soil-Structure Interaction



INTEGRATED SOLUTION SYSTEM FOR BRIDGE AND CIVIL ENGINEERING

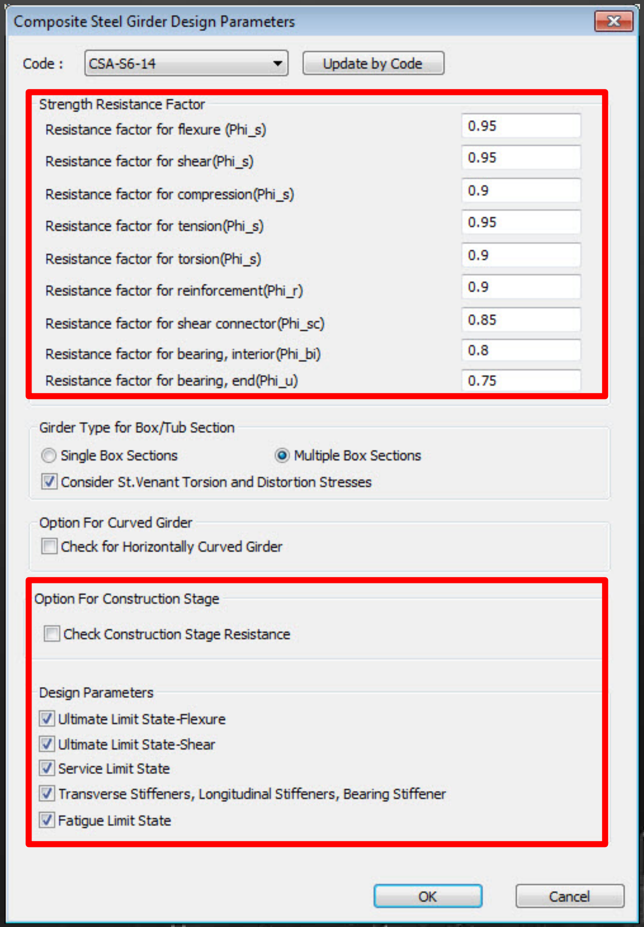
midas Civil for Canada

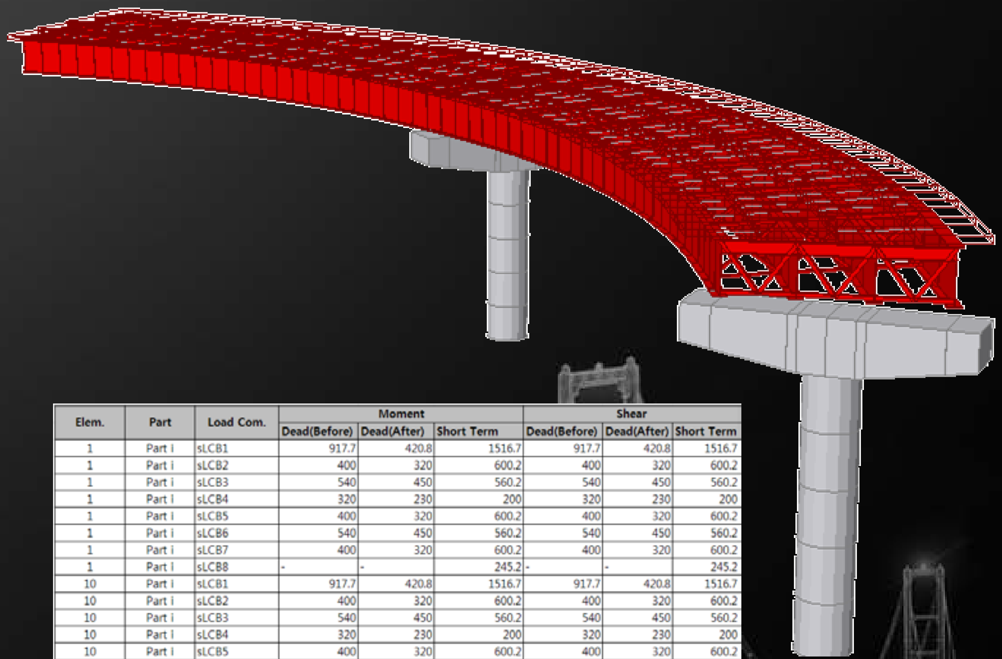
Design



Steel Composite Section Design Check

Steel Composite Section Design Check as per CSA-S6-14





Elem.	Part	Load Com.	Moment			Shear		
			Dead(Before)	Dead(After)	Short Term	Dead(Before)	Dead(After)	Short Term
1	Part i	sLCB1	917.7	420.8	1516.7	917.7	420.8	1516.7
1	Part i	sLCB2	400	320	600.2	400	320	600.2
1	Part i	sLCB3	540	450	560.2	540	450	560.2
1	Part I	sLCB4	320	230	200	320	230	200
1	Part i	sLCB5	400	320	600.2	400	320	600.2
1	Part i	sLCB6	540	450	560.2	540	450	560.2
1	Part i	sLCB7	400	320	600.2	400	320	600.2
1	Part I	sLCB8	-	-	245.2	-	-	245.2
10	Part i	sLCB1	917.7	420.8	1516.7	917.7	420.8	1516.7
10	Part i	sLCB2	400	320	600.2	400	320	600.2
10	Part i	sLCB3	540	450	560.2	540	450	560.2
10	Part I	sLCB4	320	230	200	320	230	200
10	Part i	sLCB5	400	320	600.2	400	320	600.2
10	Part i	sLCB6	540	450	560.2	540	450	560.2
10	Part i	sLCB7	400	320	600.2	400	320	600.2
10	Part I	sLCB8	-	-	245.2	-	-	245.2

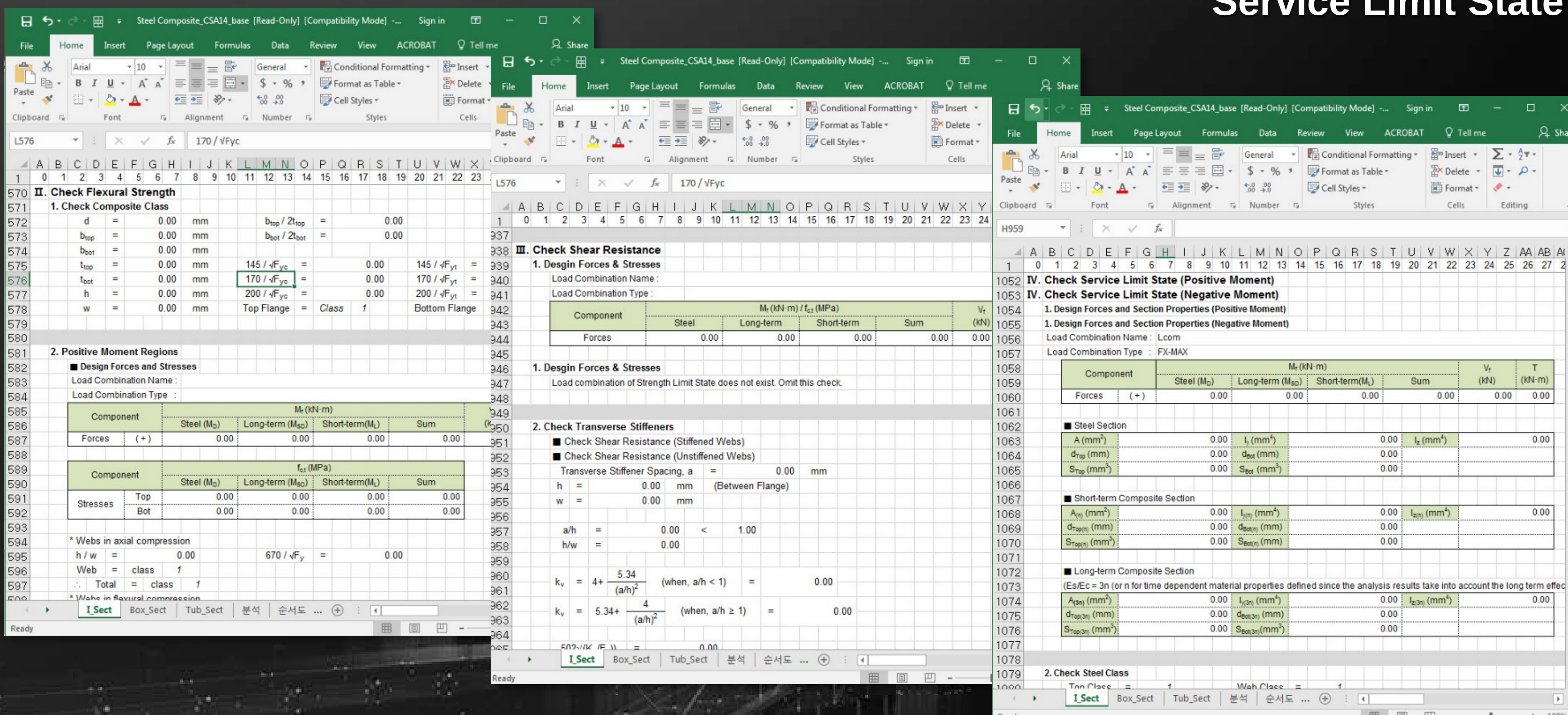
- Before Composite/ After Composite
- With Time dependent material behavior/modular ratio

Steel Composite Section Design Check

Steel Composite Section Design Check as per CSA-S6-14

Design Report (EXCEL compatible)

Service Limit State

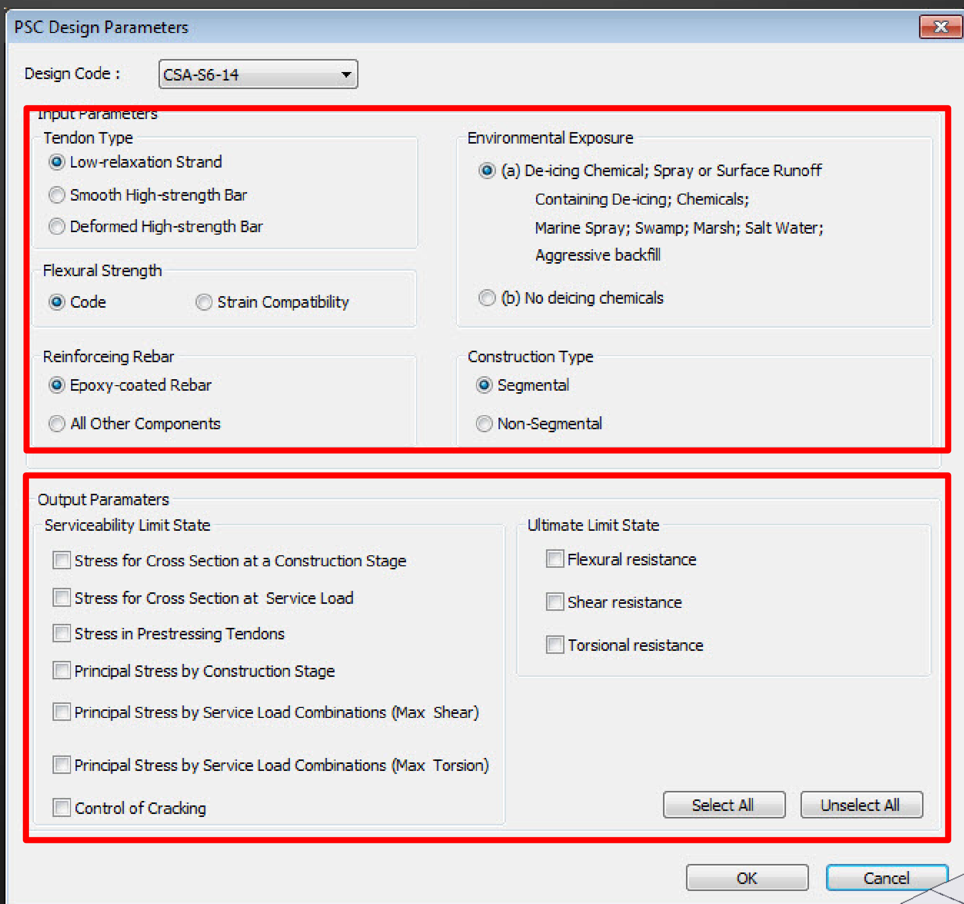


Flexure Design

Shear Resistance

PSC Design

PSC Design as per CSA-S6-14



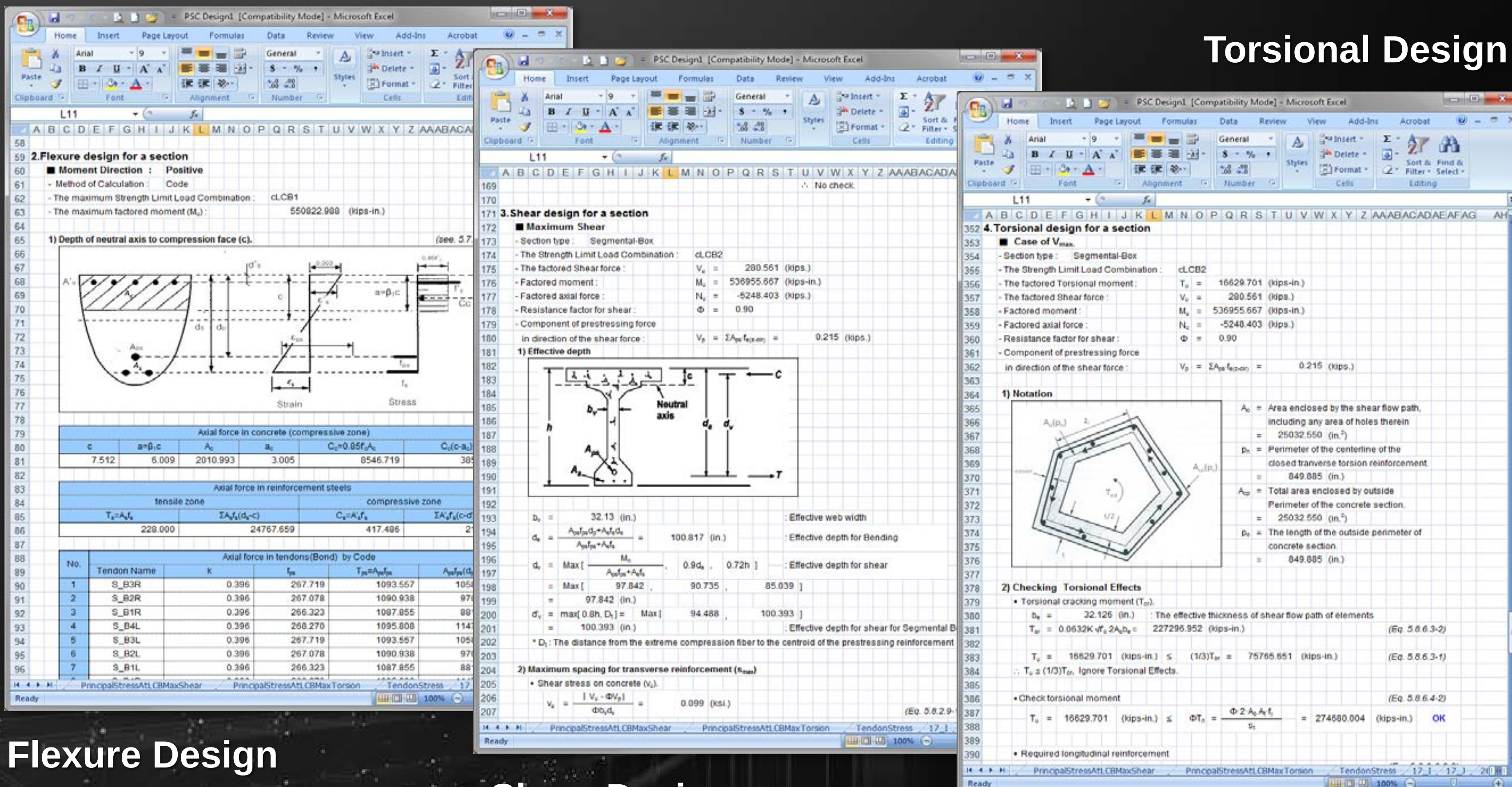
Select Tendon / Bridge / Construction types

Select PSC Design Results

PSC Design

PSC Design as per CSA-S6-14

Design Report (EXCEL compatible)



Torsional Design

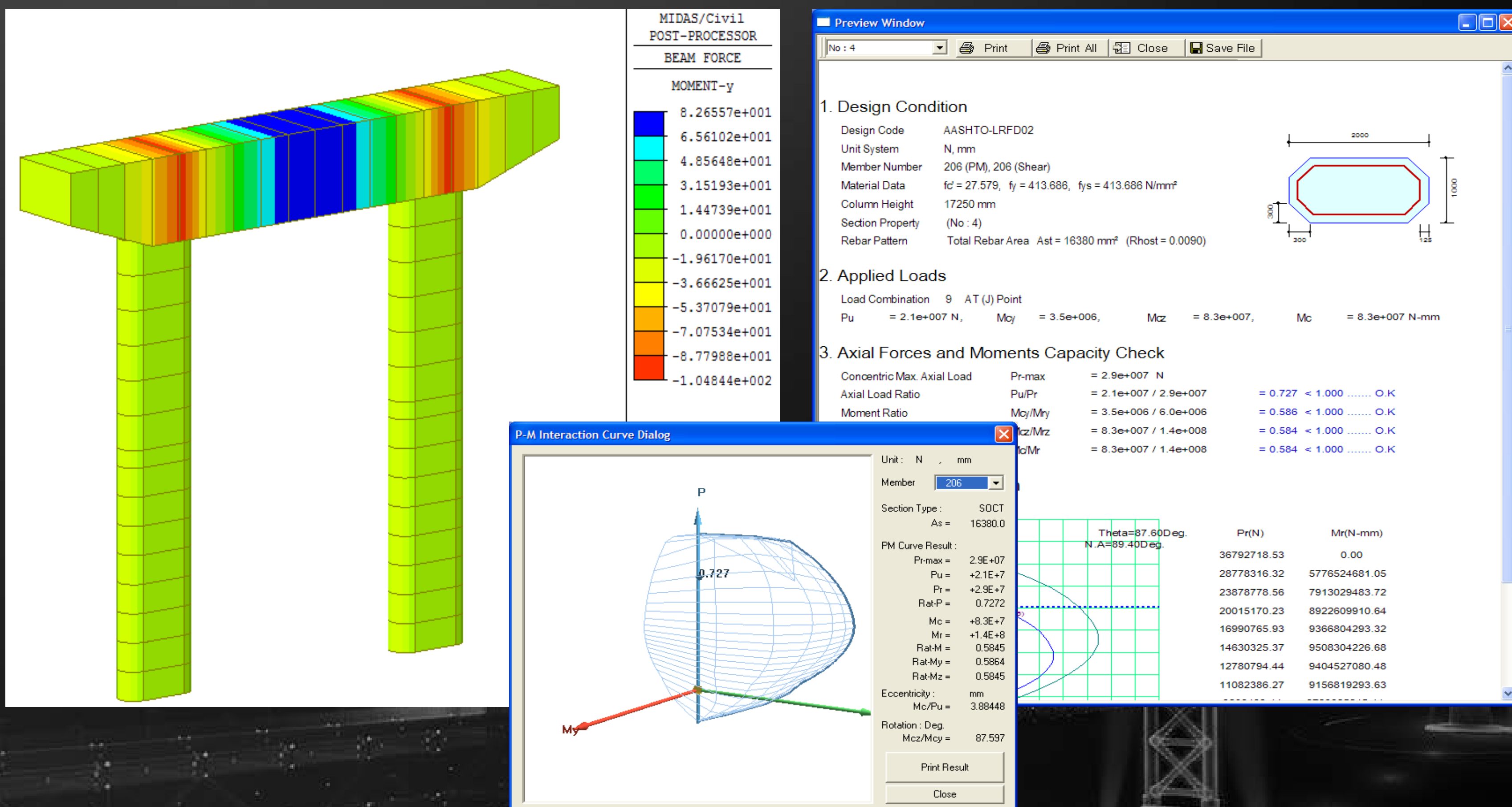
Flexure Design

Shear Design

Reinforced Concrete Design

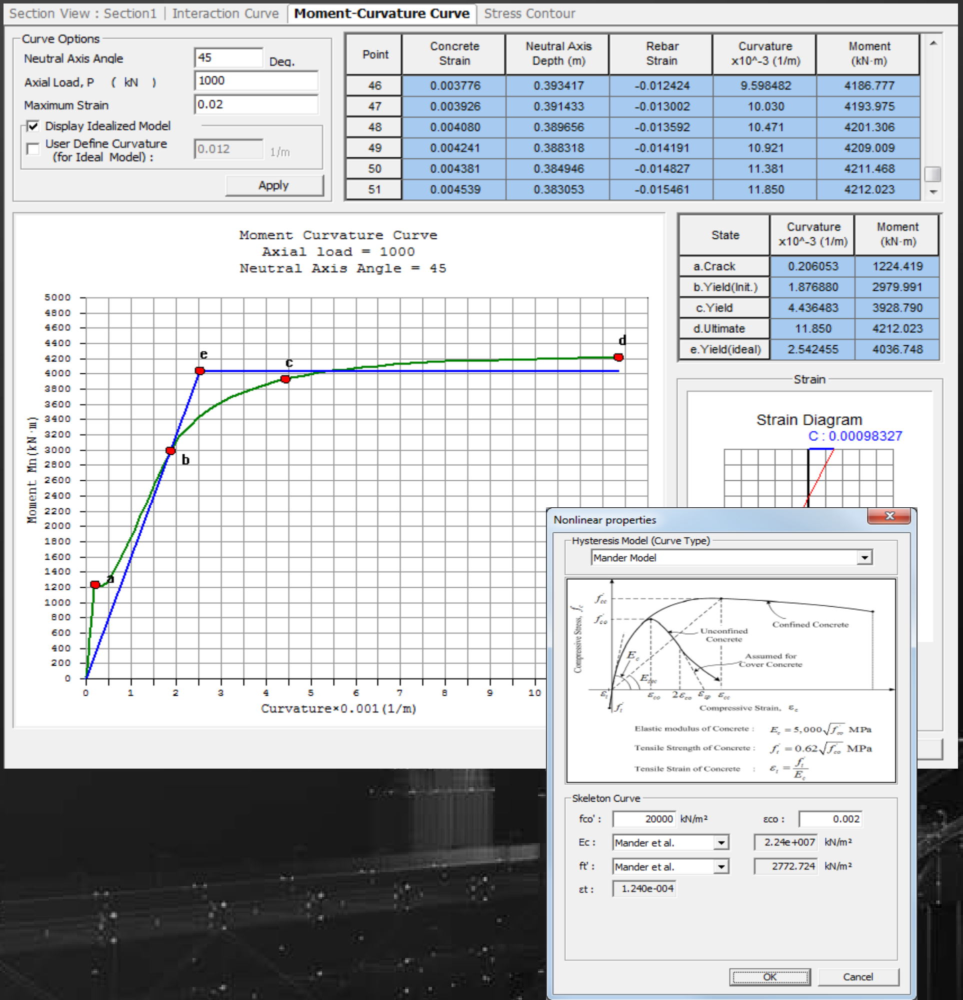
Reinforced Concrete Design as per CSA-S6

Design Report



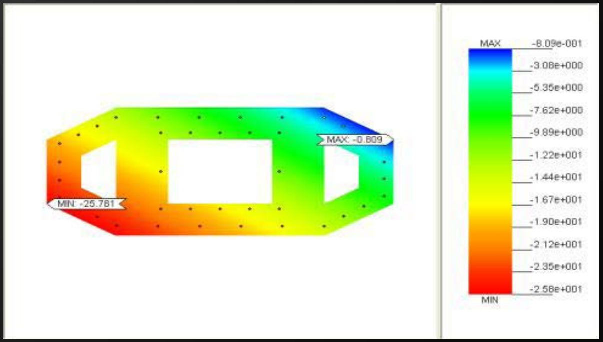
midas GSD

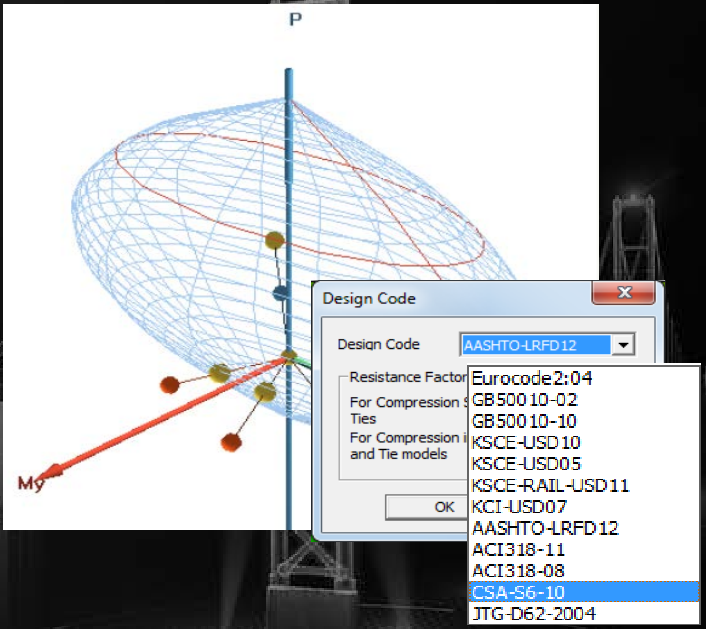
General Section Design as per CSA-S6



Point	Concrete Strain	Neutral Axis Depth (m)	Rebar Strain	Curvature x10^-3 (1/m)	Moment (kN·m)
46	0.003776	0.393417	-0.012424	9.598482	4186.777
47	0.003926	0.391433	-0.013002	10.030	4193.975
48	0.004080	0.389656	-0.013592	10.471	4201.306
49	0.004241	0.388318	-0.014191	10.921	4209.009
50	0.004381	0.384946	-0.014827	11.381	4211.468
51	0.004539	0.383053	-0.015461	11.850	4212.023

State	Curvature x10^-3 (1/m)	Moment (kN·m)
a.Crack	0.206053	1224.419
b.Yield(Init.)	1.876880	2979.991
c.Yield	4.436483	3928.790
d.Ultimate	11.850	4212.023
e.Yield(ideal)	2.542455	4036.748





Dynamic Report Generator

Register Data → **Generate a report** → **Modify model data** → **Re-generation**

Register Data

- Register images, tables, and graphs to insert into the report.
- Registered data can be verified in the Report Tree.

Generate a report

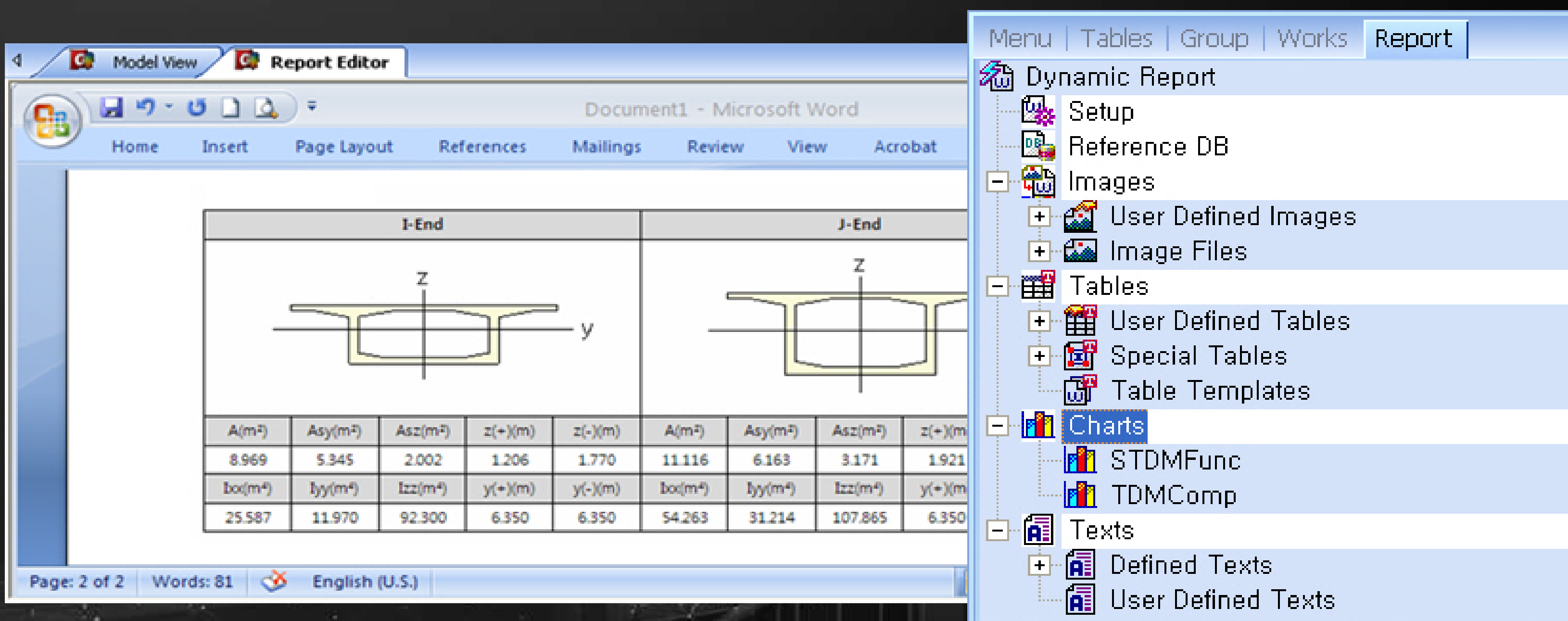
- Generate a report in MS Word format.
- Insert data by Drag & Drop from the Report Tree

Modify model data

- Re-perform analysis and design

Re-generation

- Automatic re-generation of the report with updated analysis results




MIDAS

INTEGRATED SOLUTION SYSTEM FOR BRIDGE AND CIVIL ENGINEERING

midas Civil for Canada

Thank you

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Midasoft@midasit.com