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Seismic Design for Reinforced Concrete Building

Overview

This example problem is meant to demonstrate the design of a Reinforced Concrete building structure subjected to floor loads, wind loads and seismic loads.

Seismic Design Data

- Dual system (special reinforced concrete structural walls with special moment frame) in the transverse direction
- Special moment frame in the longitudinal direction
- Assigned to a seismic zone III

Methodology

- Static and Response spectrum analysis

Program Version

Gen 2024 (v2.1)

Revision Date

Feb. 14, 2025

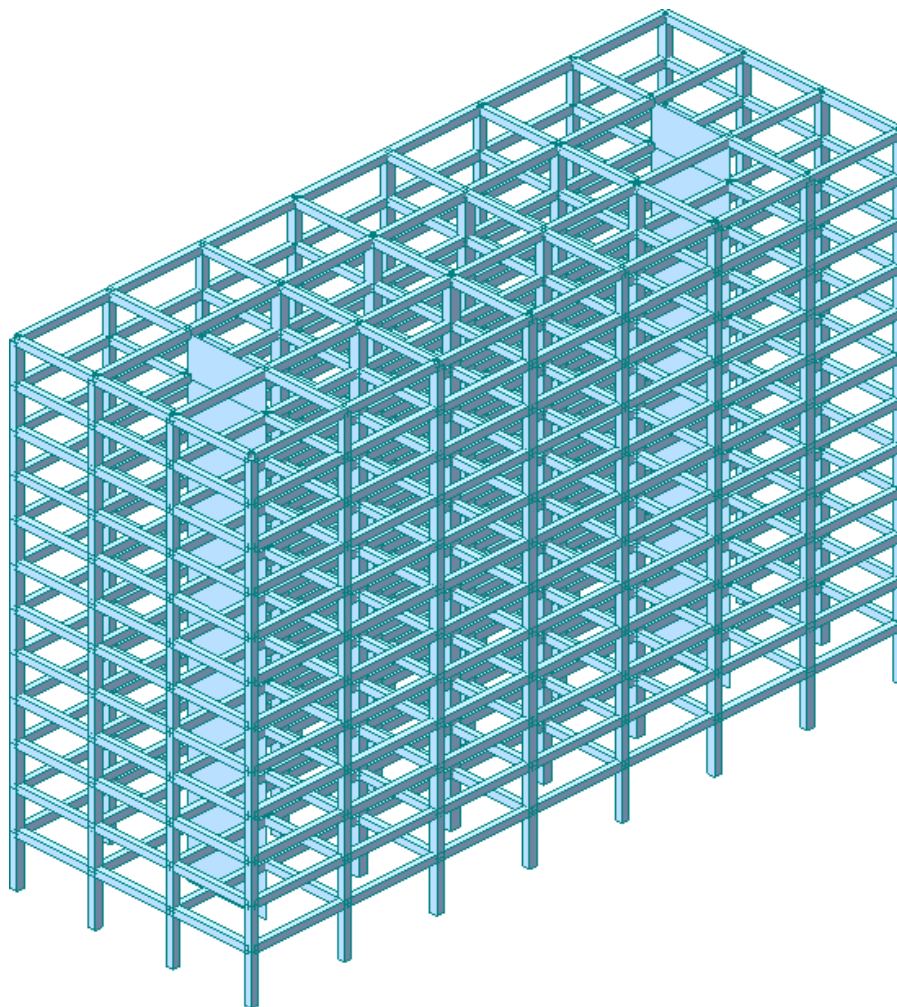


Figure 1: RC Building Model

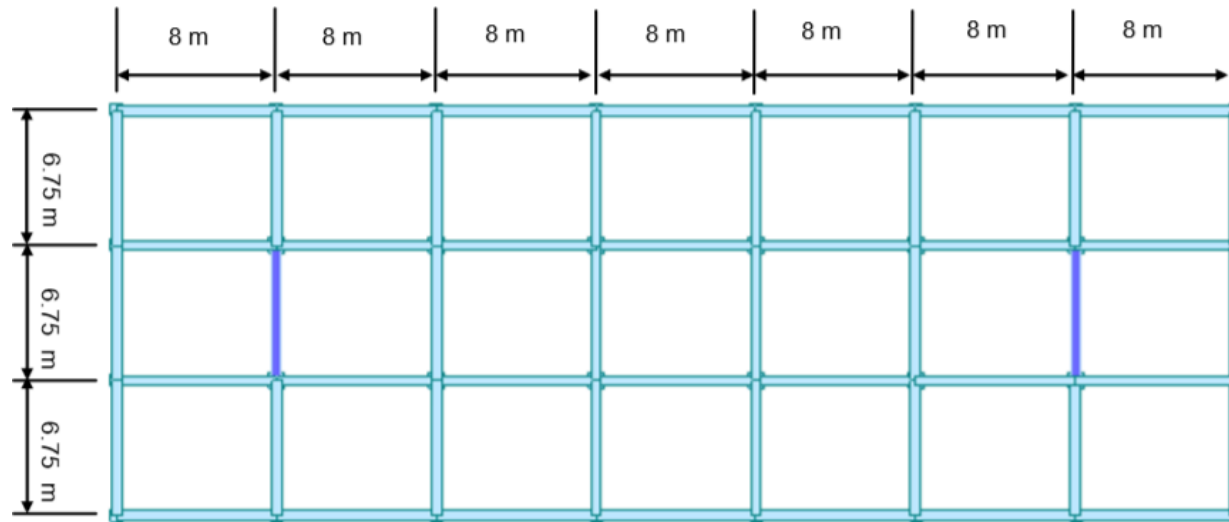


Figure 2: Typical Floor Plan

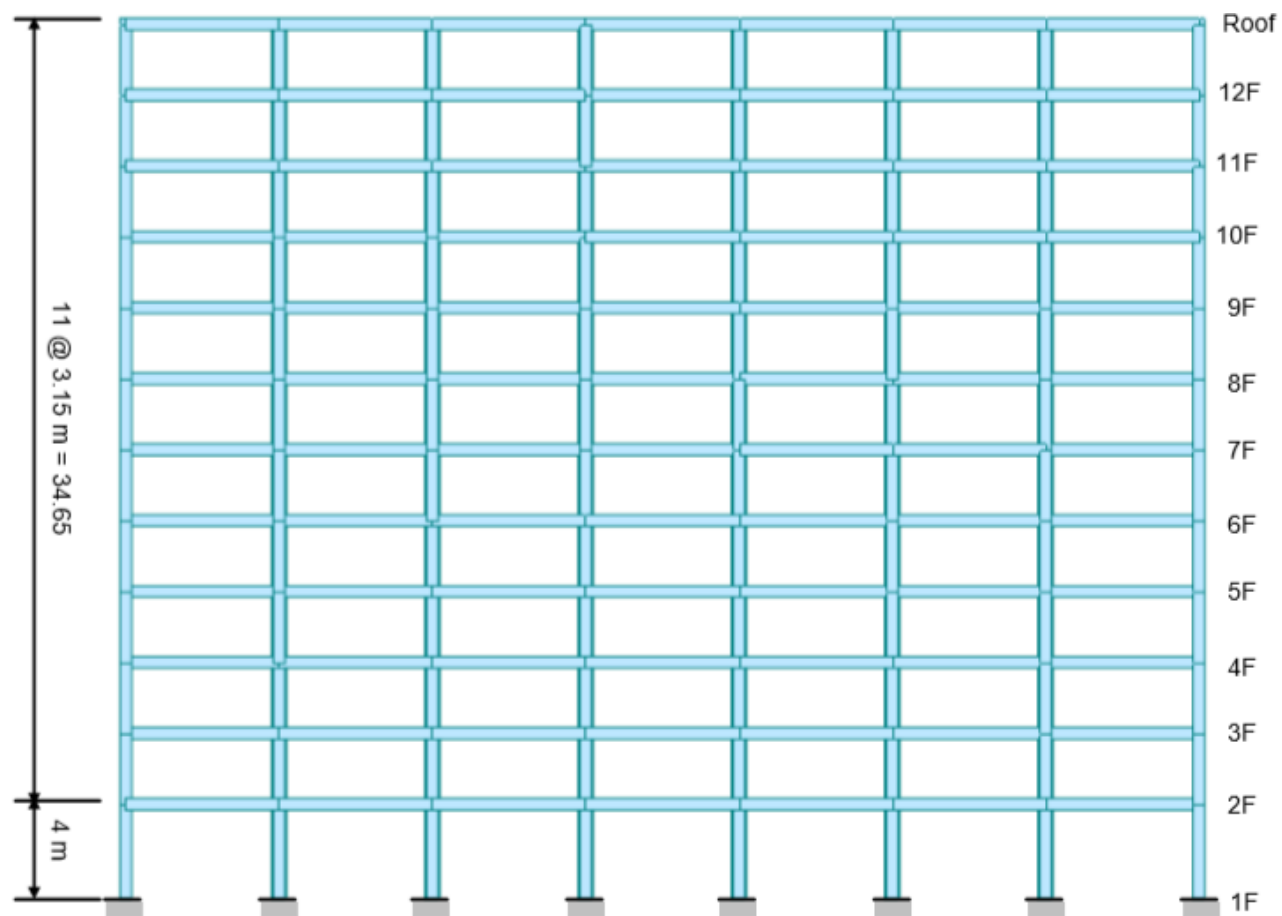


Figure 3: Longitudinal Section

Details of the Reinforced Concrete Building (1)

Applied Code

EN(RC)

Materials

Concrete C30/37

Building Structure Elements

Section ID	Dimension	Description
1	600x600mm	Edge columns
2	750x750mm	Interior Columns
3	500x600mm	Beam
4	450mm thick	Walls

Applied Load

Load	Description	Intensity
Dead Load	Self Weight	
Typical Floor Load	Dead Load Live load	8 kN/m ² 2 kN/m ²
Roof Load	Dead Load Live load	7 kN/m ² 1.5 kN/m ²
Wind Load	X, Y direction	EN-1(2005)
Earthquake Loads	X, Y direction	EN-8(2004)

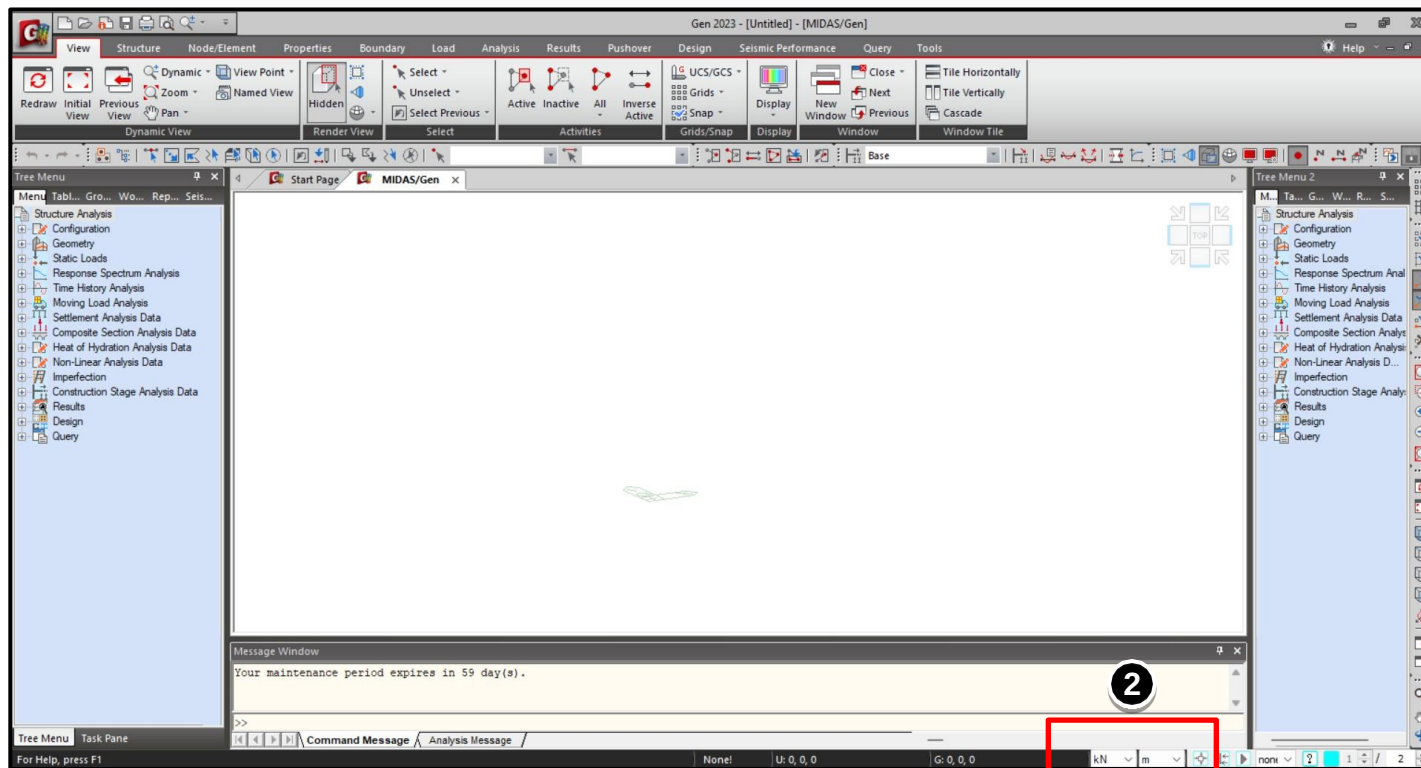
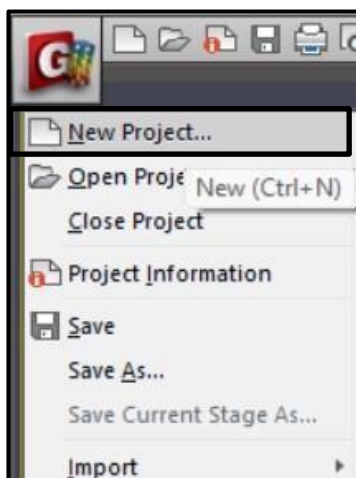
1-1.Initialization of workspace

Procedure

Starting Midas Gen

- ① Main Menu>File>> New Project
- ② Check the units on the lower right corner of the screen.

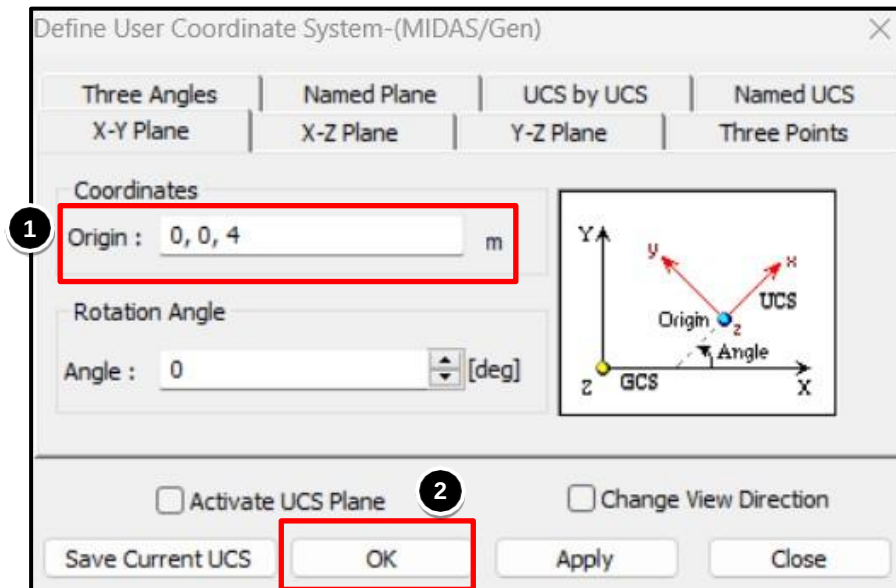
①



Procedure

Menu>Structure>Select UCS/GCS

- ① Set UCS to X-Y Plane>> Origin
0,0,4
- ② Click on Apply And OK



Procedure

Generate the required gridline system

Menu>Structure>Grids>Define Line Grid

① Add

② Name it 2F,

③ Add X grid lines

④ Relative

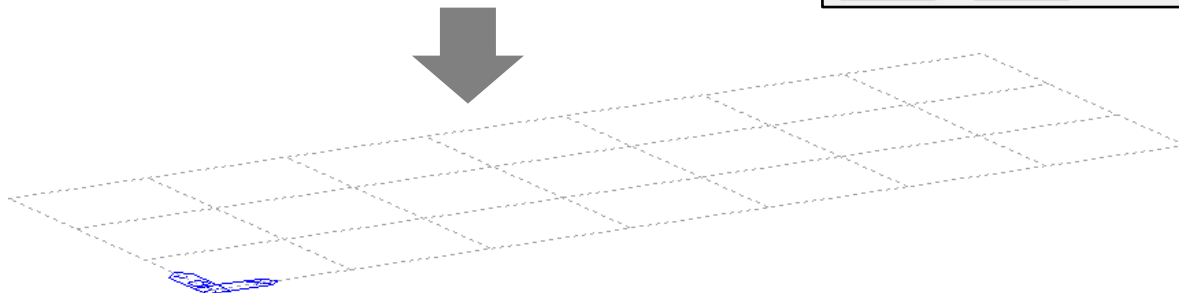
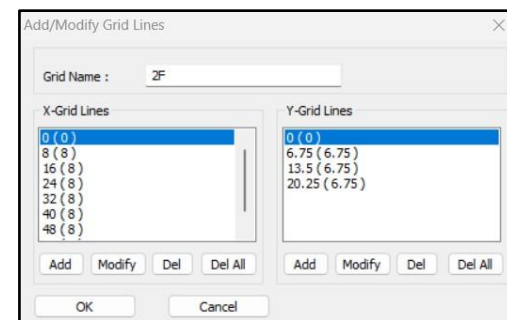
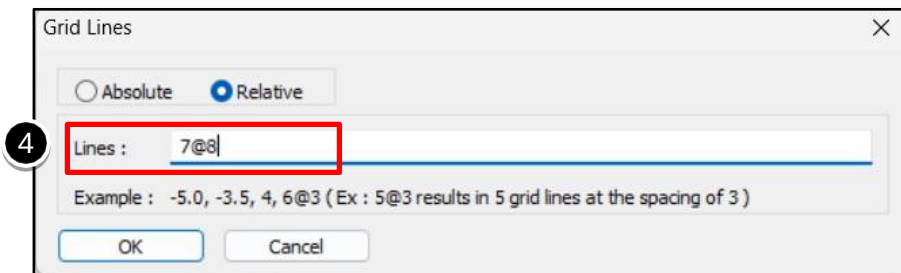
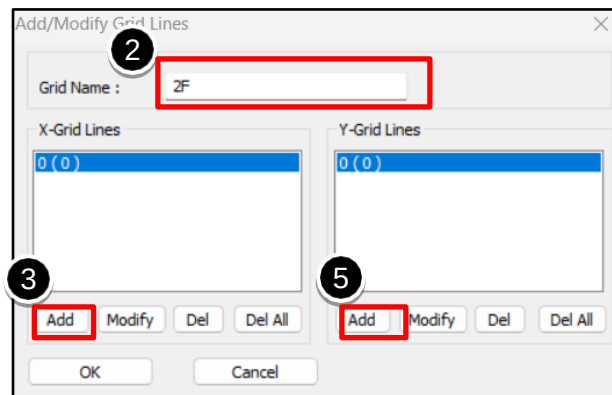
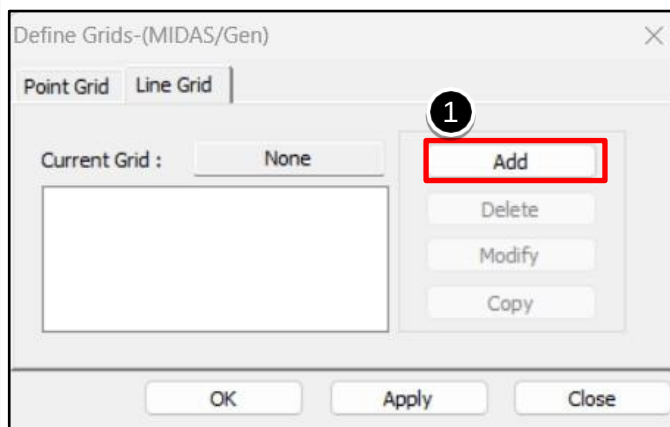
Lines: 7@8

⑤ Add Y grid lines and

Relative Lines: [3@6.75](#)

A dialog box depicting the Gridlines appears. Click OK

Click [Apply]



2-1. Defining the Material & Frame Section Properties. (1)

Procedure

Defining Material Properties

Menu>>Properties>Material



- ① Add
- ② Material Data:
Material id: 1
Name: ConcM30
- ③ Type of Design: Concrete
Standard: EN(RC)
DB: C30/37
- ④ Click OK

Properties

Material | Section | Thickness

ID	Name	Type	Standard	DB
1	C30...	Concr...	EN(RC)	C30...

Buttons: Add..., Modify..., Delete, Copy, Import, Renumber, Close

Material Data

General

Material ID: 1 Name: C30/37

Elasticity Data

Type of Design: Concrete

Steel

Standard: DB Product:

Concrete

Standard: EN(RC) Code: DB: C30/37

Type of Material

☒ Isotropic ☐ Orthotropic

Steel

Modulus of Elasticity: 0.0000e+00 kN/m²

Poisson's Ratio: 0

Thermal Coefficient: 0.0000e+00 1/[F]

Weight Density: 0 kN/m³

☐ Use Mass Density: 0 kN/m³/q

Concrete

Modulus of Elasticity: 3.1938e+07 kN/m²

Poisson's Ratio: 0.2

Thermal Coefficient: 5.5556e-06 1/[F]

Weight Density: 23.54 kN/m³

☐ Use Mass Density: 2.4 kN/m³/q

Plasticity Data

Plastic Material Name: NONE

Inelastic Material Properties for Fiber Model & Non-dissipative element

Concrete: None Rebar: None

Confined Concrete for Columns: None

Thermal Transfer

Specific Heat: 0 Btu/kN·[F]

Heat Conduction: 0 Btu/m·hr·[F]

Damping Ratio: 0.05

Buttons: OK, Cancel, Apply

2-1. Defining the Material & Frame Section Properties. (2)

Procedure

Defining Frame Section Properties

1 Menu>Properties>Section properties >Add
Section ID:1

Solid rectangle

Name: Edge Columns

2 User

H=0.6m B=0.6m

Similarly define the other Frame Section Properties.

Name: Interior Columns

H=0.75m and B=0.75m

Name: Beams H=0.6m and

B=0.5m

3

Click [Apply] > [Close]

4

For the Shear Walls: Add
'Thickness' Section Value>> In plane
and out of plane=0.45m

5

On creating the wall, it is Displayed in
the dialog box

Section Data

DB/User Value SRC Combined Tapered Composite

Section ID 1

Name edge columns

Solid Rectangle

User DB IS

Sect. Name

Built-Up Section

Get Data from Single Angle

DB Name AISC10(US)

Sect. Name

H 0.6 m

B 0.6 m

Consider Shear Deformation.

Offset: Center-Center

Change Offset ...

Show Calculation Results... OK Cancel Apply

Thickness Data

Value Stiffened

Thickness ID 1 Name Wall

In-plane & Out-of-plane 0.45 m

In-plane 0 m

Out-of-plane 0 m

Plate Offset

Thickness Ratio

Local z 0 m

Value

Local z 0 m

Offset Distance

5

ID	Name	Type	Thickness(m)
1	Wall	Value	0.450000

3-1. Generation of Floor layout (1)

Procedure

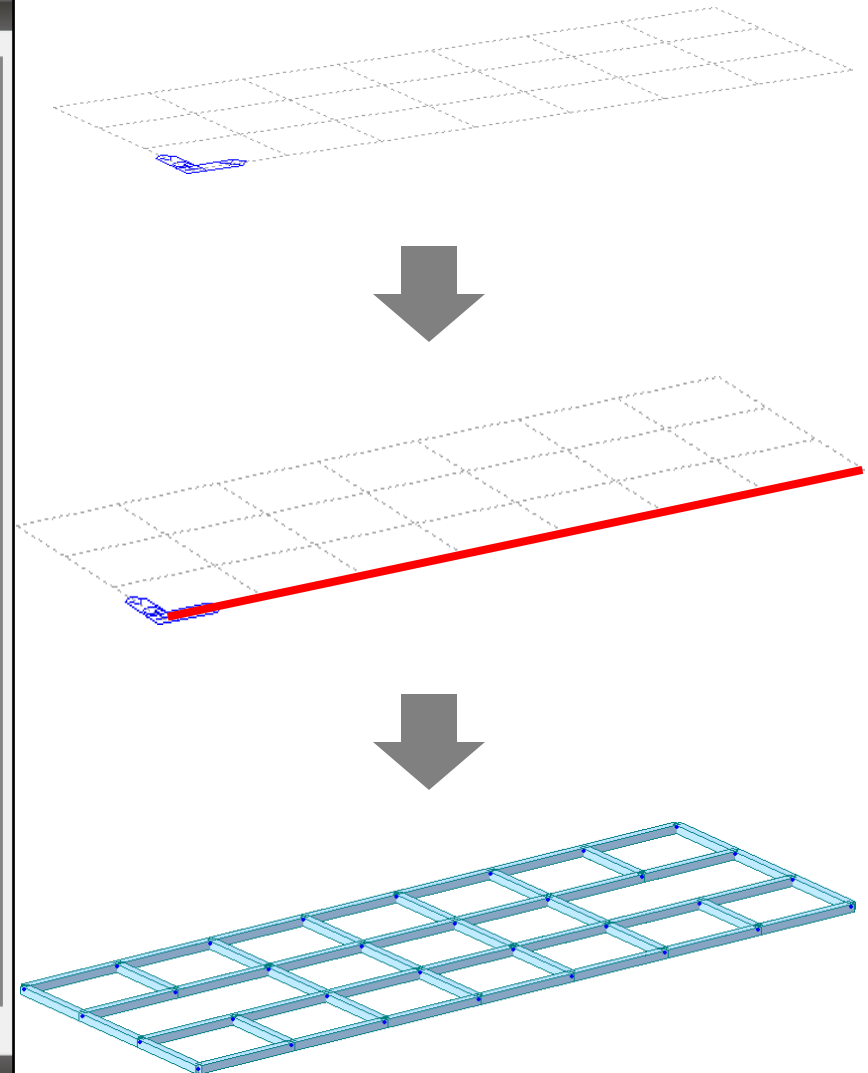
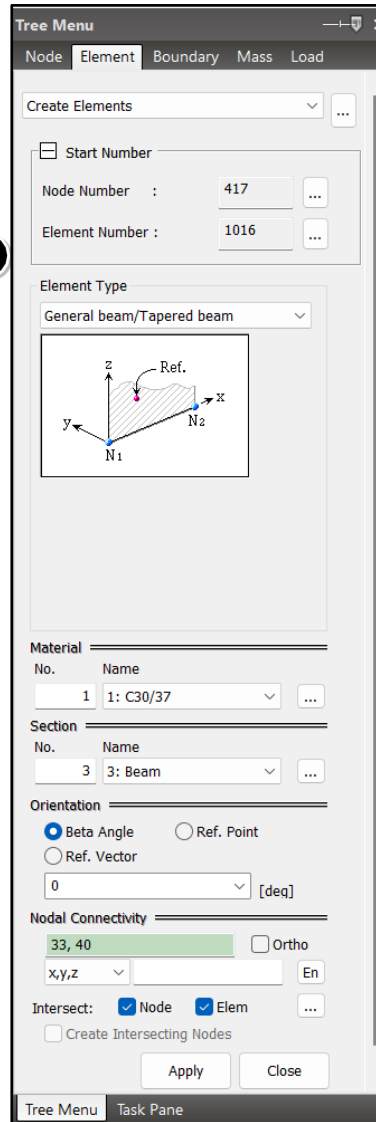
Generate the Beams

Menu>Model>Elements>Create
Element 

- ① Select material as C30/C37 and section as Beam
- ② Make sure that Intersect at nodes and Elements is on. To create a beam, click on Nodal connectivity tab and select the origin as the first point and the Node 8 as the last point.

The beams between these two points are formed breaking at each node
Similarly mark the other beams. Click [Close]

1

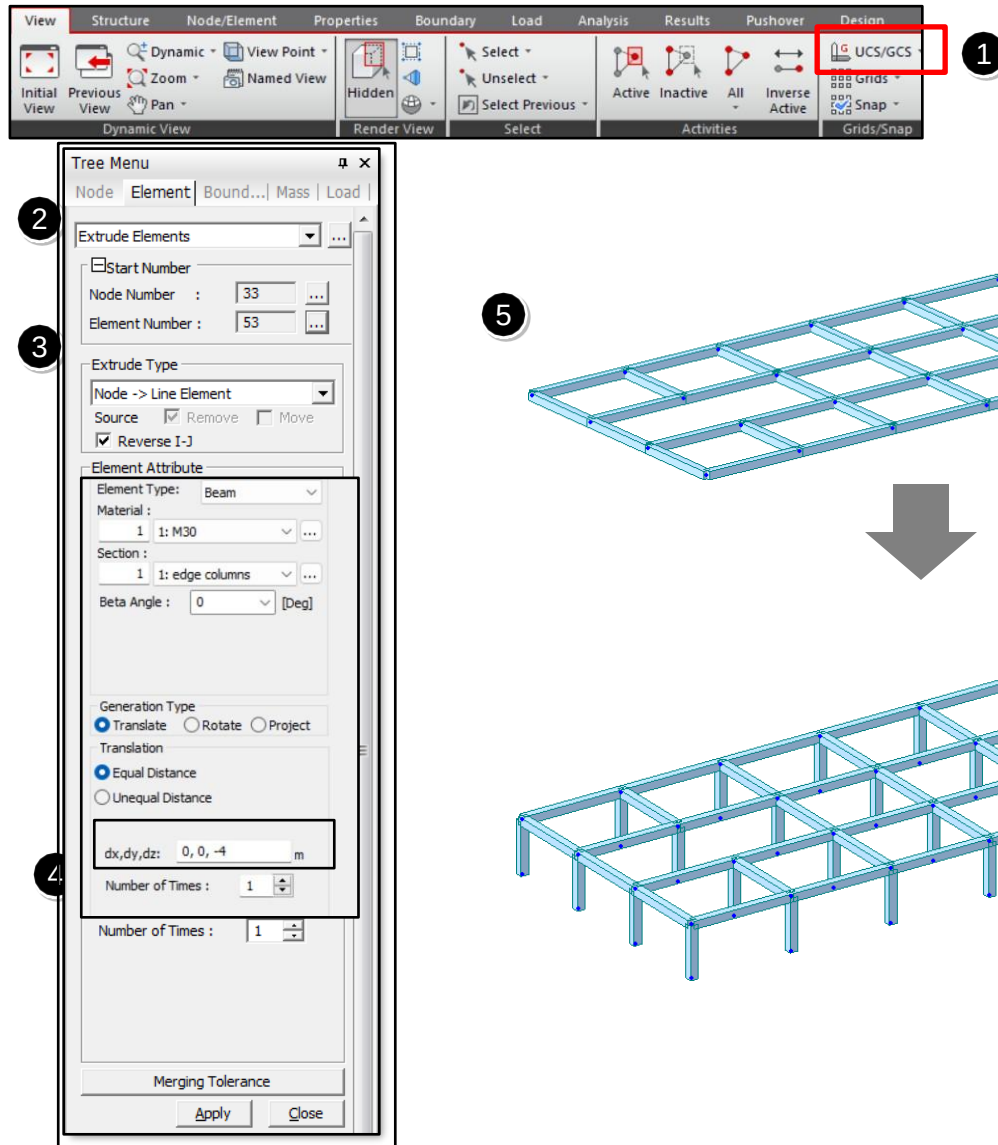


3-1. Generation of Floor layout (2)

Procedure

Generate Columns

- ① Click GCS 
- ② Main Menu>Elements> Extrude Elements
- ③ Node to Line elements, Reverse I-J, Select material as M30 and section as edge columns
- ④ Translation Distance as -4 Along Z axis.
- ⑤ Select all the nodes
- ⑥ Click on Apply



3-1. Generation of Floor layout (3)

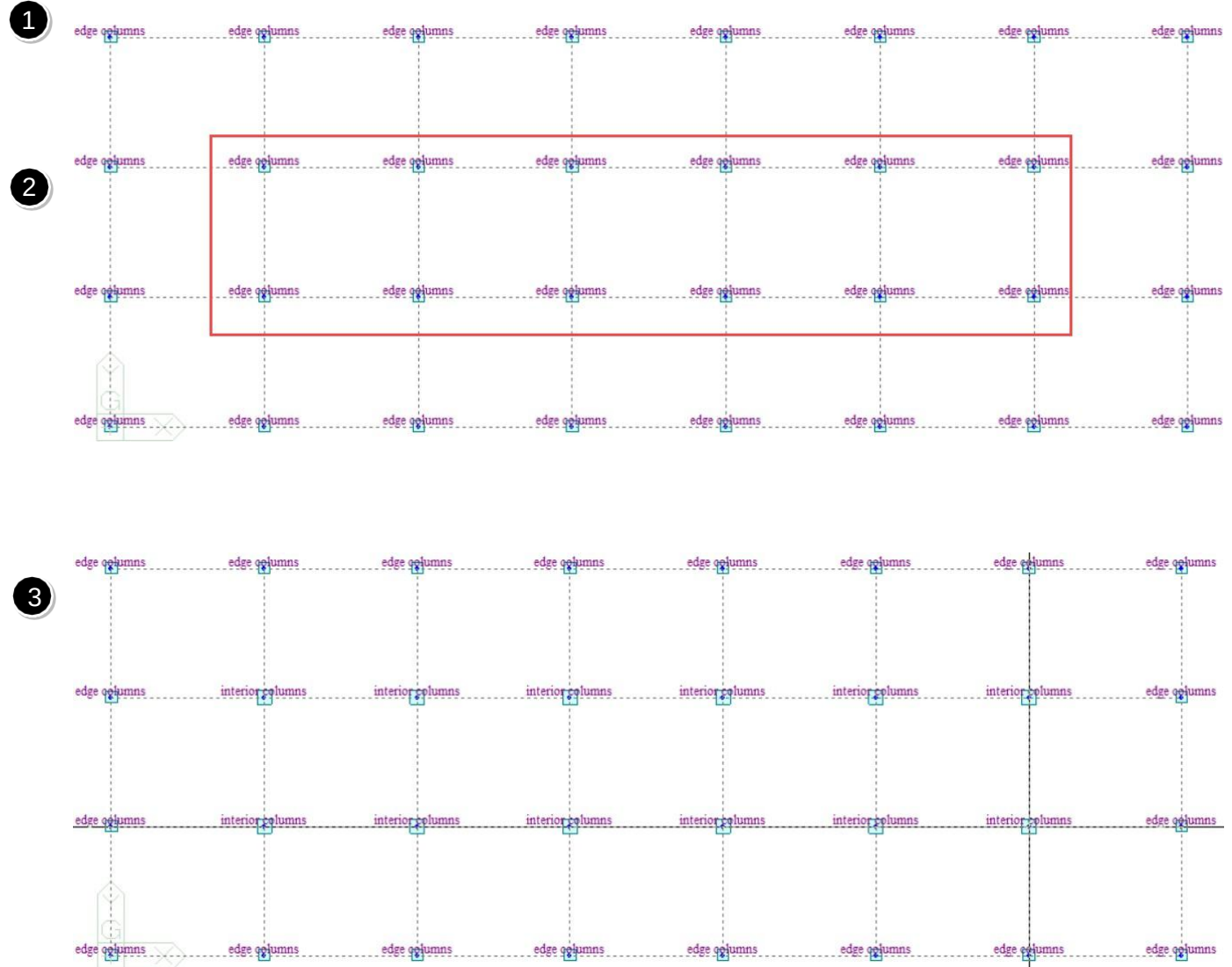
Procedure

Modify the Property of Columns:
(To Change the property of certain exterior columns to Interior)

- ① Works> Edge columns> Active.
Select the columns whose property has to be changed.

- ② Views>Display options>
Property Name 

- ③ Now from the Works Menu,
Drag and Drop Interior Column



3-1. Generation of Floor layout (4)

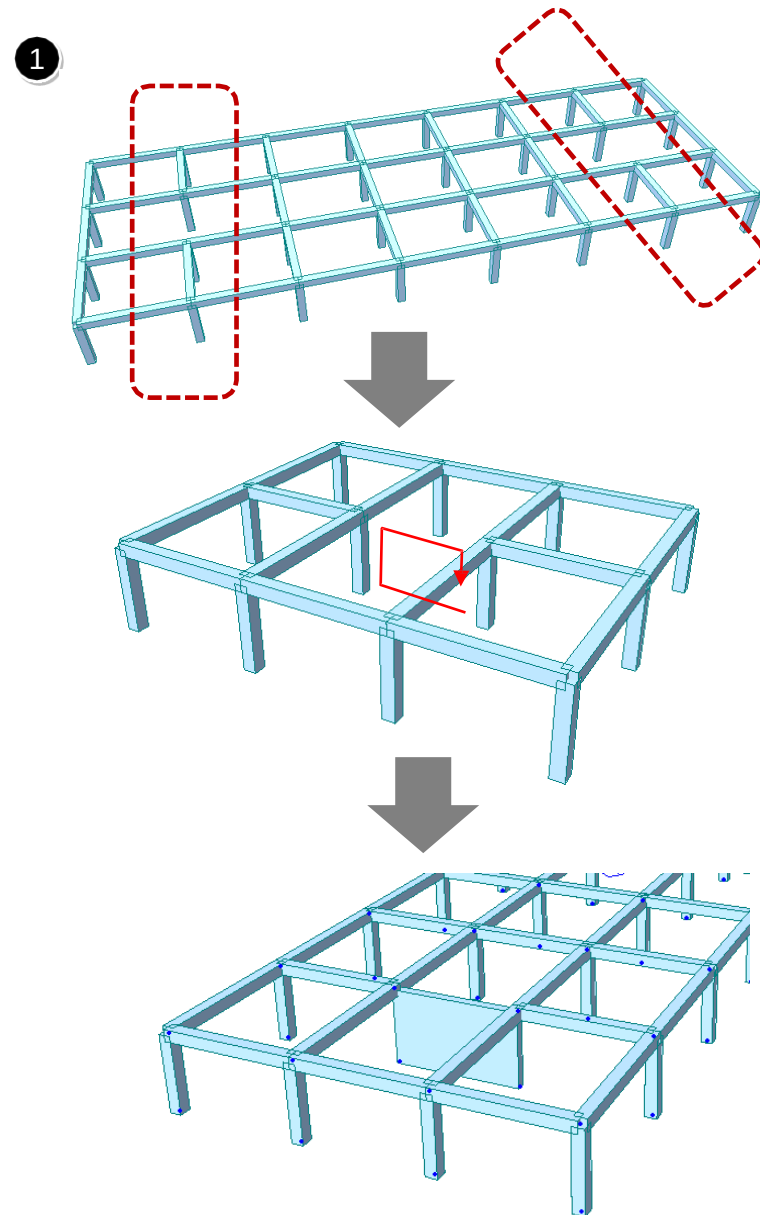
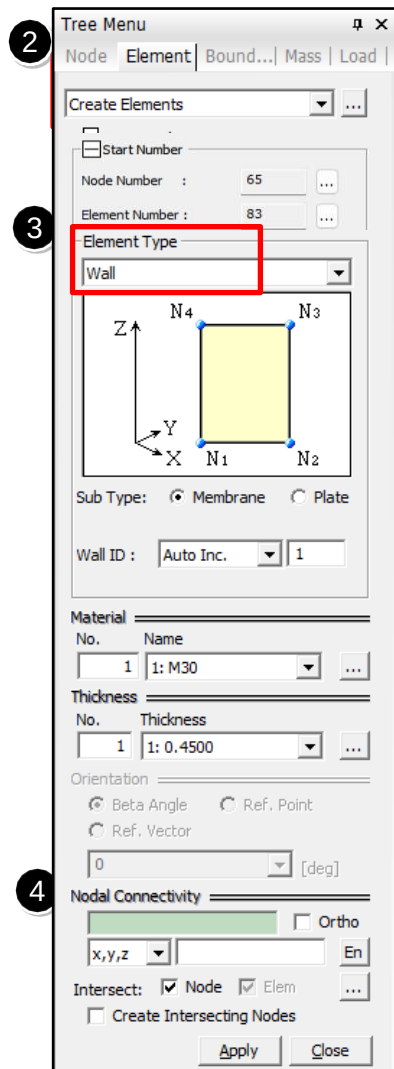
Procedure

Generation Shear Walls

- ① Location where we need to create the shear wall.
- ② Main Menu >Node/Elements > >Create Elements
- ③ Select Element Type > Wall
- ④ Select Nodal Connectivity

All the four nodes of the Shear

Columns if present, should be Deleted.



4-1. Generation of Building Model.

Procedure

Building Generation

Menu>View>Select>Select All

① Menu> Structure>Building>

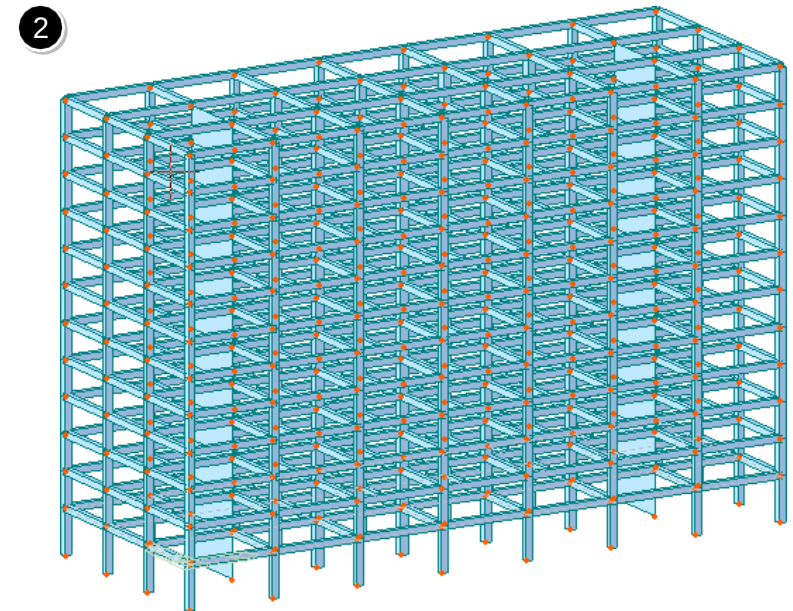
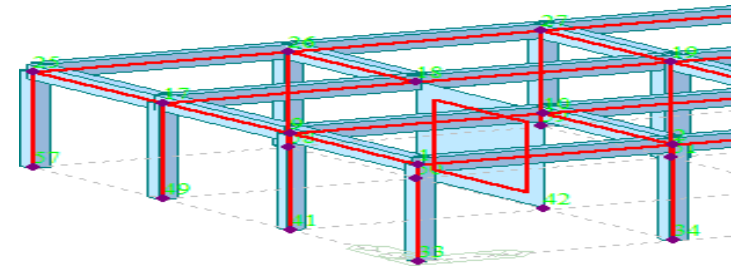
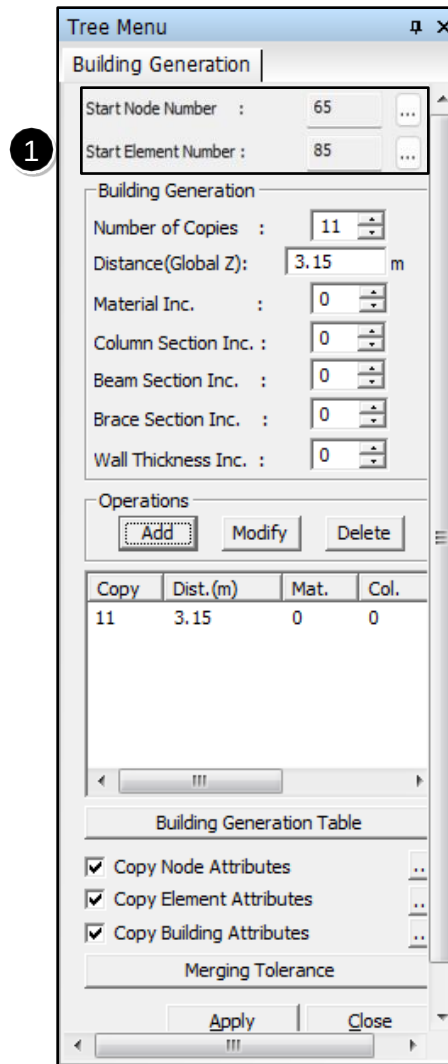
Building Generation

No of Copies: 11

Distance (Global Z): 3.15m

Click Add and Apply

② The building is generated as shown



4-2. Automatic generation of the story data

Procedure

Menu> Structure > Building > Story

- ① Click [Auto Generate Story Data] button. This will create the data needed to generate diaphragms for each floor
- ② Click [OK]
- ③ Click [Close]

	Module Name	Story Name	Level(m)	Height(m)	Floor Diaphragm
▶	Base	Roof	38.65	0.00	Consider
	Base	12F	35.50	3.15	Consider
	Base	11F	32.35	3.15	Consider
	Base	10F	29.20	3.15	Consider
	Base	9F	26.05	3.15	Consider
	Base	8F	22.90	3.15	Consider
	Base	7F	19.75	3.15	Consider
	Base	6F	16.60	3.15	Consider
	Base	5F	13.45	3.15	Consider
	Base	4F	10.30	3.15	Consider
	Base	3F	7.15	3.15	Consider
	Base	2F	4.00	3.15	Consider
	Base	1F	0.00	4.00	Do not consider

No	Name	Level	Height
1	1F	0	4
2	2F	4	3.15
3	3F	7.15	3.15
4	4F	10.3	3.15
5	5F	13.45	3.15
6	6F	16.6	3.15
7	7F	19.75	3.15
8	8F	22.9	3.15
9	9F	26.05	3.15
10	10F	29.2	3.15
11	11F	32.35	3.15
12	12F	35.5	3.15

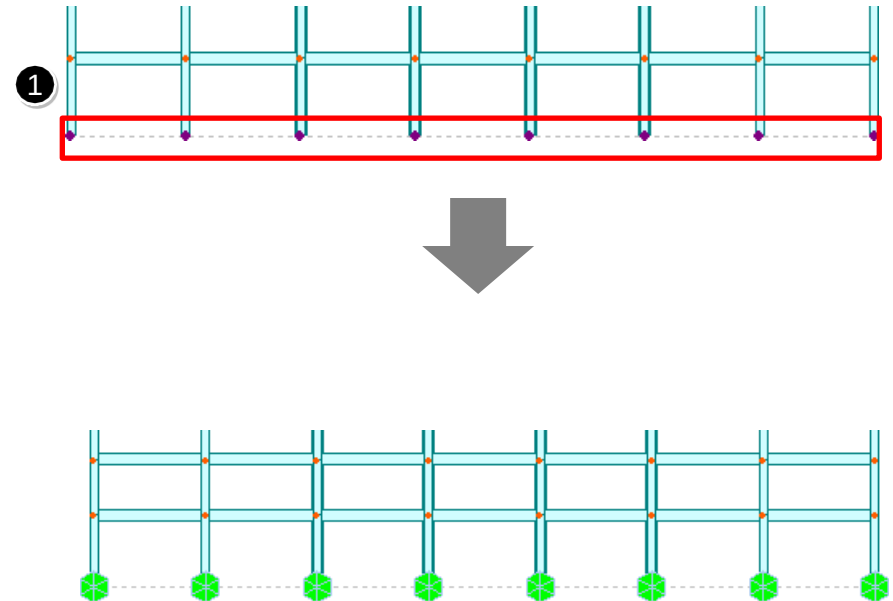
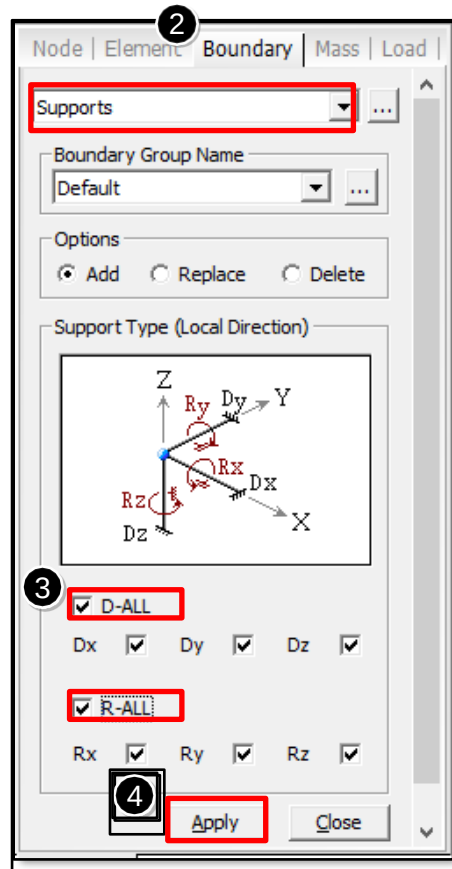
☒ Include Seismic Accidental Eccentricity : 5 % of Plan Dimension
☒ Include Wind Eccentricity : 15 % of Plan Dimension

6-1. Boundary Conditions

Procedure

The lower ends of the Columns are assumed fixed

- ① Select the ends of all the columns from the elevation view.
- ② Menu>Model>Boundaries> Supports
- ③ Select the property of Fixed Support i.e. D- all, R- all.
- ④ Click on Apply



Procedure

Menu>Load>>Static Load Cases

① Add the loads and their details

② Click : [Close]

Static Load Cases

Name : DL

Type : Dead Load (D)

Description : DEAD LOAD

Add

Modify

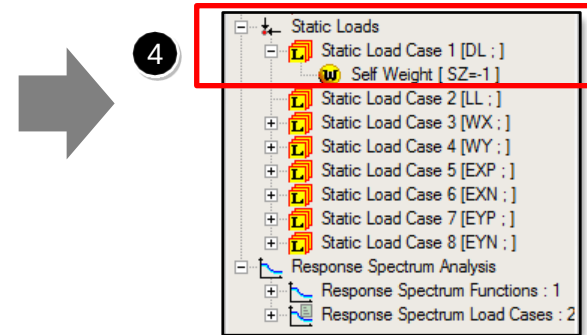
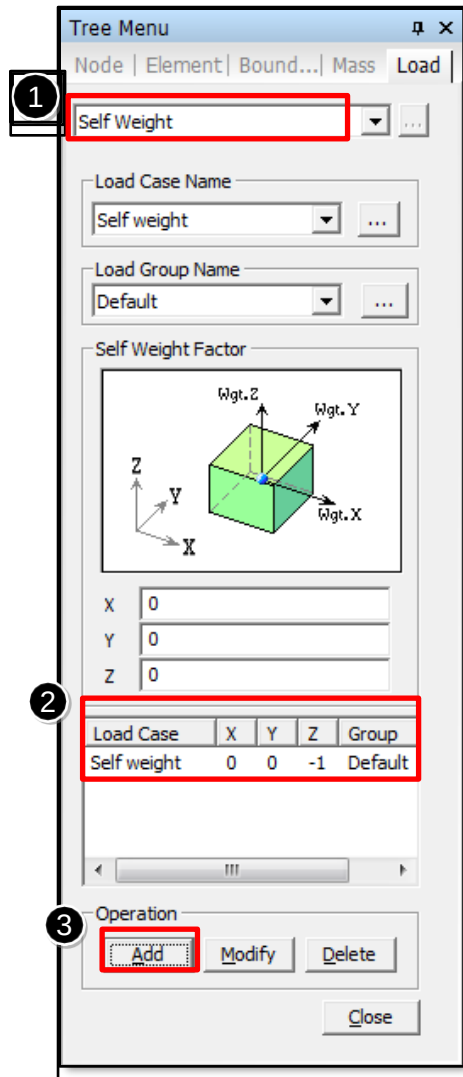
Delete

No	Name	Type	Description
1	DL	Dead Load (D)	DEAD LOAD
2	LL	Live Load (L)	LIVE LOAD
3	WX	Wind Load on Structure (W)	Wind load in X-direction
4	WY	Wind Load on Structure (W)	Wind load in Y-direction
5	EXP	Earthquake (E)	Earthquake load in X-direction
6	EXN	Earthquake (E)	Earthquake load in X-direction(-ve)
7	EYP	Earthquake (E)	Earthquake load in Y-direction(+v
8	EYN	Earthquake (E)	Earthquake load in Y-direction(-ve
*			

Close

Procedure

- ① Menu> Load>>Self Weight
- ② Load Case Name: DL
Z=-1
- ③ Add
- ④ In the Work Tree menu, Self Weight will be displayed



Procedure

Menu>Load>>Define Floor Load Type

① Name: Typical Floor

DL: -8kN/m²

LL: -2kN/m²

Similarly define the Roof Load

DL: -7kN/m²

② LL: -1.5kN/m²

When you click on Add, The
Load appears in the dialog Box

①

Floor Load Type

Floor Load Type Name & Description

Name : **Typical floor**

Description :

Floor Load & Load Case

	Load Case	Floor Load		
1.	DL	-8	kN/m ²	☒ Sub Beam Weight
2.	LL	-2	kN/m ²	☒ Sub Beam Weight
3.	NONE	0	kN/m ²	☐ Sub Beam Weight
4.	NONE	0	kN/m ²	☐ Sub Beam Weight
5.	NONE	0	kN/m ²	☐ Sub Beam Weight
6.	NONE	0	kN/m ²	☐ Sub Beam Weight
7.	NONE	0	kN/m ²	☐ Sub Beam Weight
8.	NONE	0	kN/m ²	☐ Sub Beam Weight

Define Load Case...

②

	Name	Description
▶	Typical floor	
	Roof level	
*		

Add

Modify

Delete

Close

Procedure

Menu>Load>Assign Floor Load

- ① Name: Typical Floor
- ② Copy Floor load: 10@3.15
(Total 10 floors and each floor distance is 3.15m)

To select the floor area, first
Select Nodes Defining Loading
Area wherein You need to
Select the nodes . On the last
Click, the load is applied.

Similarly assign the Roof Load
But be careful to unselect the
Copy Floor load option.

Tree Menu

Node | Element | Bound... | Mass | Load

Assign Floor Loads

Load Group Name: Default

Floor Load Type

Load Type: Typical Floor

Distribution: Two way

Load Angle(A1): 0 [deg]

☐ Exclude Inner Elem. of Area

☐ Allow Polygon Type Unit Area

Diagram showing a rectangular area defined by nodes 1st, 2nd, 3rd, and Nth, with sub-beams and angles A1 and A2.

Unmodeled Sub-Beam

No. of Sub Beams: 0

Sub-Beam Angle(A2): 90

Unit Self Weight: 0 kN/m

Load Direction & Projection

Load Direction: Global Z

Projection: ☐ Yes ☒ No

Description:

Nodes Defining Loading Area:

☒ Copy Floor Load

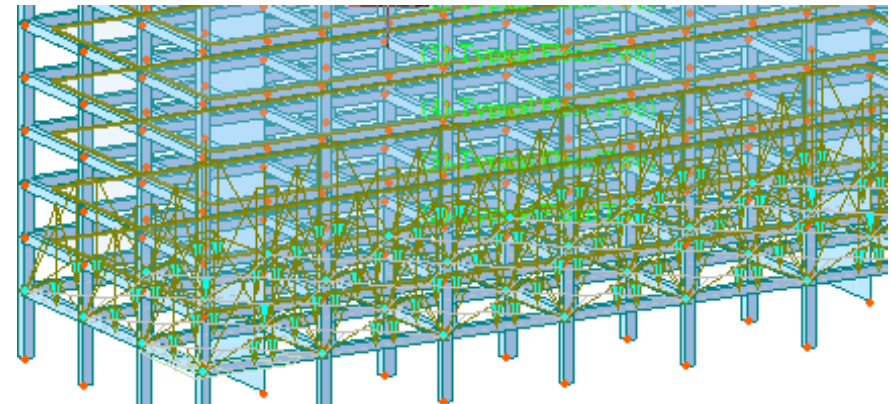
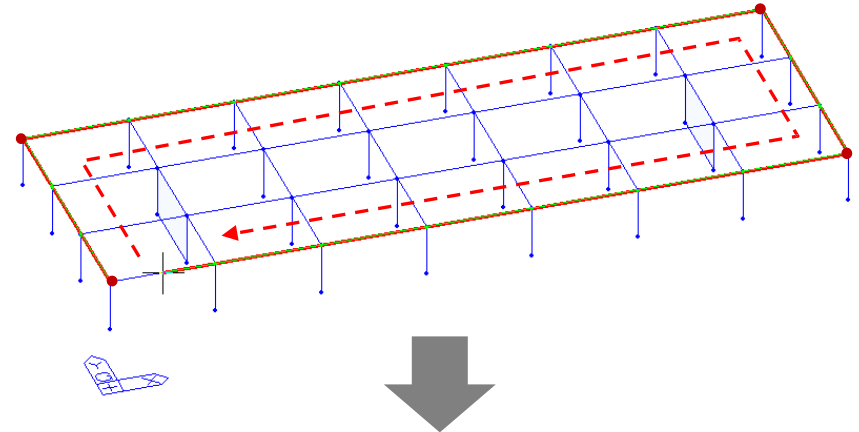
Axis: ☐ x ☐ y ☐ z

Distances: 10@3.15 m

(Example : 5, 3, 4.5, 3@5.0)

☐ Convert to Beam Load Type

Apply Close

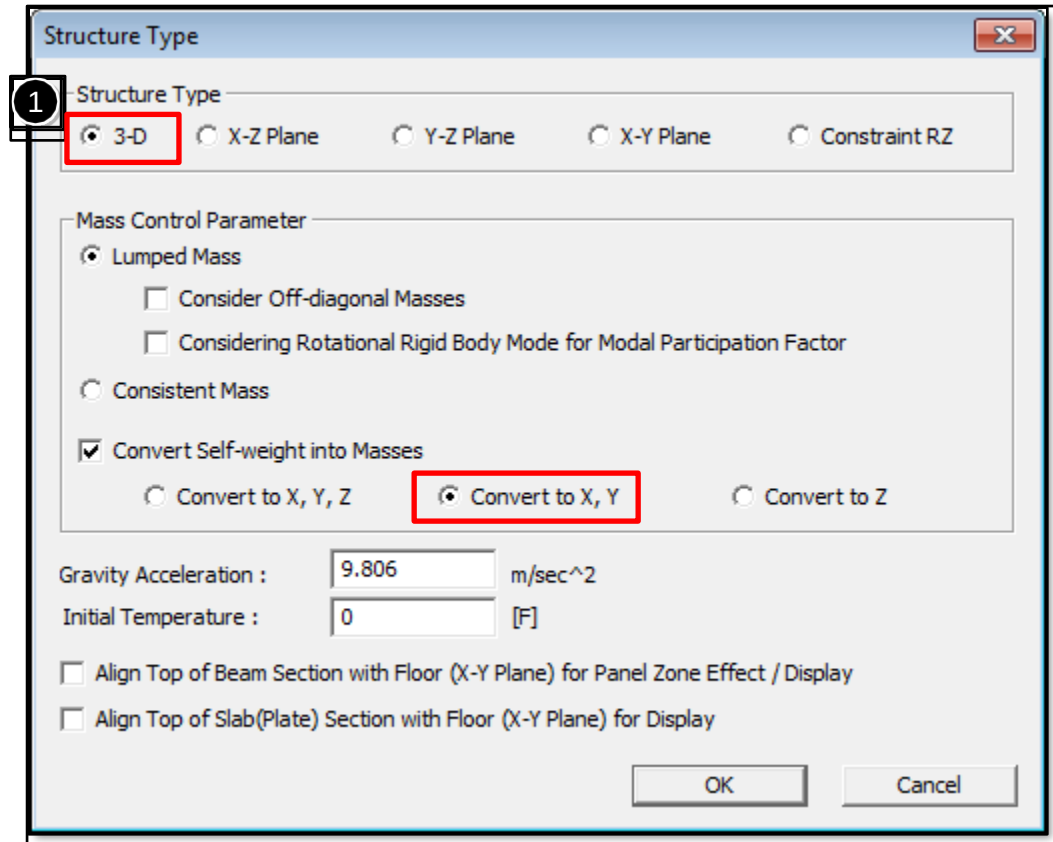


7-2. Convert Model Weight & Loads to Masses (1)

Procedure

Menu>Structure > Structure type

- 1 Structure type: 3-D
Mass Control Parameter:
Lumped Mass
Convert Self-Weight into
masses
Convert to X,Y
Gravity Acceleration:
9.806 m/sec²



7-2. Convert Model Weight & Loads to Masses (2)

Procedure

Menu>Load > Masses> Loads to Masses

① Mass Direction: X,Y

Load Case / Factor:

DL: 1

Click Add

LL: 0.25

Click Add

On clicking Ok, Such a model is generated

① Loads to Masses

Mass Direction

☐ X ☐ Y ☐ Z

☒ X, Y ☐ Y, Z ☐ X, Z

☐ X, Y, Z

Load Type for Converting

☒ Nodal Load

☒ Beam Load

☒ Floor Load

☒ Pressure (Hydrostatic)

Gravity : 9.806 m/sec²

Load Case / Factor

Load Case : live load

Scale Factor : 0.25

LoadCase	Scale
Self weight	1
live load	0.25

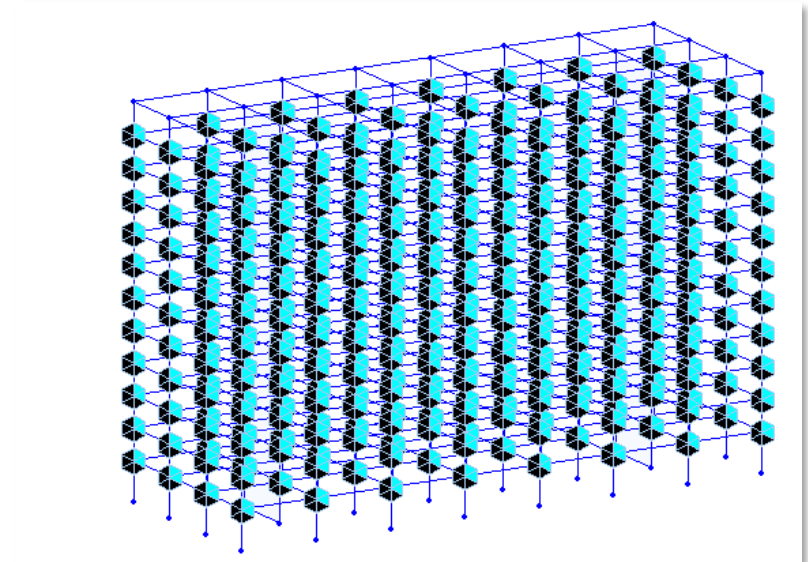
Add

Modify

Delete

Remove Load to Mass Data

OK Cancel



Procedure

Menu>Load > Lateral Loads >
Wind Loads > Click [Add]

- ① Load Case Name : WX
Wind Load Code : EN-1(2005)
Basic Wind Speed: 26m/s
Terrain Category: II
Building Height: 38.65m
Wind Load Direction Factor
for X: 1 rest all will
Be 0. Click Apply

Similarly assign the Load
parameters for WY

- ② The loads are summarized in
The dialog box

Add/Modify Wind Load Specification

Load Case Name : WX
Wind Load Code : Eurocode-1(2005)
National Annex : Recommended
Description :

☐ Wind Load Parameters

Terrain Category : II
Friction Coefficient (Cfr) : 0
Fund. Basic Wind Velocity (Vb,o) : 26 [m/s]
Directional Factor (Cdir) : 1
Seasonal Factor (Cseason) : 1
Turbulence Factor (KI) : 1
Building Height (h) : 38.65 m

External Pressure Coefficients
☒ Automatic ☐ User Defined

Windward(A=10)	Windward(A=1)	Leeward Coef.
0.8	1	-0.7

Lack of Correlation Factor
☒ Automatic ☐ User Defined 1

Parameters for Mean Wind Velocity (Vm)...

Structural Factor (CsCd) : 1

☐ Load Evaluation Using Force Coefficient
Force Coefficient (Cf) : 1

Wind Load Direction Factor (Scale Factor)
X-Dir. 1 Y-Dir. 0 Z-Rot. 0

Additional Wind Loads (Unit:kN,m)

Story	Add.-X	Add.-Y	Add.-R

Wind Load Profile... OK Cancel Apply

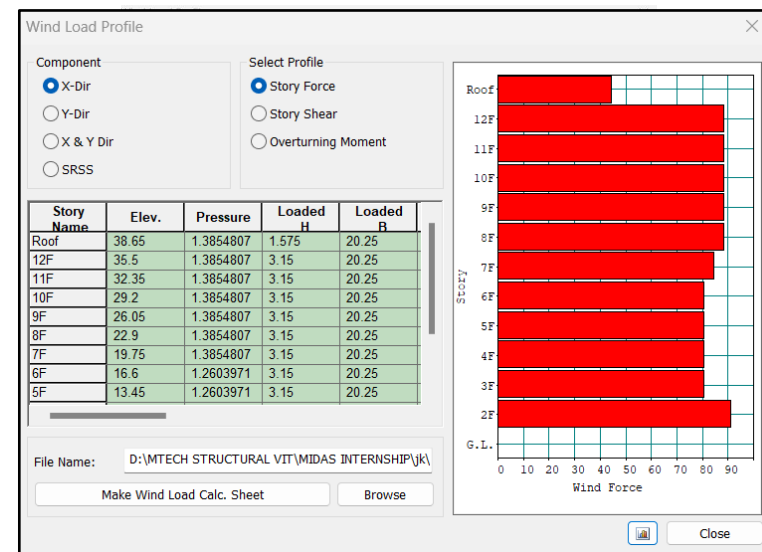
1

Wind Loads

Load Case	Code Name	Description
WX	EURO2005	
WY	EURO2005	

Add
Modify
Delete
Close

2



Procedure

Menu>Load >Lateral Load>Static
Seismic Loads

① Fill in the details as shown.

② Calculating time period , use period

Calculator for Auto-calculation of periods
from the code equations

③ On defining all the load cases

Such a dialog box appears.

Add/Modify Seismic Load Specification

Load Case Name : EXP ...

Seismic Load Code : Eurocode-8(2004) Import

National Annex : Recommended

Description :

Seismic Load Parameters

Ground Type : B

Spectrum Parameters

☒ Type1 ☐ Type2 ☐ User Defined

Soil Factor(S)	Tb	Tc	Td
1.2	0.2	0.5	2

Ref. Peak Ground Acc. (AgR) : 0.08 q

Behavior Factor (q) : 1.5

Lower Bound Factor (b) : 0.2

Importance Factor (I) : 1

Structural Parameters

X-Dir. Y-Dir.

Fundamental Period : 1.318 1.318 ...

Seismic Load Direction Factor (Scale Factor)

X-Direction : 1 Y-Direction : 0

Accidental Eccentricity

X-Direction (Ex) : ☒ Positive ☐ Negative ☐ None

Y-Direction (Ey) : ☒ Positive ☐ Negative ☐ None

Torsional Amplification

☐ Accidental Eccentricity ☐ Inherent Eccentricity

Additional Seismic Loads (Unit:kN,m)

Story	Add.-X	Add.-Y	Add.-R

Seismic Load Profile... OK Cancel Apply

Eurocode Period Calculator

X- Direction Period Y- Direction Period

☒ 1. $T = 0.085H^{(3/4)}$ ☒ 1. $T = 0.085H^{(3/4)}$

☐ 2. $T = 0.075H^{(3/4)}$ ☐ 2. $T = 0.075H^{(3/4)}$

☐ 3. $T = 0.050H^{(3/4)}$ ☐ 3. $T = 0.050H^{(3/4)}$

☐ 4. $T = 0.075H^{(3/4)} / \sqrt{Ac}$ ☐ 4. $T = 0.075H^{(3/4)} / \sqrt{Ac}$

☐ 5. $T = 2 \sqrt{d}$ ☐ 5. $T = 2 \sqrt{d}$

H : 38.65 (m)

Ac : 0 (m²)

d : 0 (m)

OK Cancel

Static Seismic Loads

Load Case	Code Name	Description
EXP	EURO2004	
EXN	EURO2004	
EYP	EURO2004	
EYN	EURO2004	

Add

Modify

Delete

Close

Procedure

Menu>Loads> Lateral Loads>
Static Seismic Loads

Select Load Case Name EXP>
Modify

① Seismic Load Profile

② X-Dir (on)

Story Force (on)

Conform Story Shear of Base
floor

Add/Modify Seismic Load Specification

Load Case Name : EXP

Seismic Load Code : Eurocode-8(2004)

National Annex : Recommended

Description :

Seismic Load Parameters

Ground Type : B

Spectrum Parameters

☒ Type1 ☐ Type2 ☐ User Defined

Soil Factor(S)	Tb	Tc	Td
1.2	0.2	0.5	2

Ref. Peak Ground Acc. (AgR) : 0.08

Behavior Factor (q) : 1.5

Lower Bound Factor (b) : 0.2

Importance Factor (I) : 1

Structural Parameters

Fundamental Period : X-Dir. 1.318 Y-Dir. 1.318

Seismic Load Direction Factor (Scale Factor)

X-Direction : 1 Y-Direction : 0

Accidental Eccentricity

X-Direction (Ex) : ☐ Positive ☐ Negative ☒ None

Y-Direction (Ey) : ☐ Positive ☐ Negative ☒ None

Torsional Amplification

☐ Accidental Eccentricity ☐ Inherent Eccentricity

Additional Seismic Loads (Unit:kN,m)

Story	Add.-X	Add.-Y	Add.-R

Seismic Load Profile...

2

Seismic Load Profile

Component ☒ X-Dir ☐ Y-Dir ☐ X & Y Dir ☐ SRSS

Select Profile ☒ Story Force ☐ Story Shear ☐ Overturning Moment

Story Name	Weight	Elev.	Seismic Force	Added Force
Roof	11809.488	38.65	1313.5961	0.0
12F	13827.548	35.5	1412.7157	0.0
11F	13827.548	32.35	1287.3621	0.0
10F	13827.548	29.2	1162.0084	0.0
9F	13827.548	26.05	1036.6548	0.0
8F	13827.548	22.9	911.30114	0.0
7F	13827.548	19.75	785.94749	0.0
6F	13827.548	16.6	660.59384	0.0
5F	13827.548	13.45	535.24019	0.0

File Name: D:\MTECH STRUCTURAL VIT\MIDAS INTERNSHIP\jk\

Make Seismic Load Calc. Sheet Browse

Close

Seismic Load Profile

Component ☒ X-Dir ☐ Y-Dir ☐ X & Y Dir ☐ SRSS

Select Profile ☐ Story Force ☒ Story Shear ☐ Overturning Moment

Story Name	Weight	Elev.	Seismic Force	Added Force
9F	13827.548	26.05	1036.6548	0.0
8F	13827.548	22.9	911.30114	0.0
7F	13827.548	19.75	785.94749	0.0
6F	13827.548	16.6	660.59384	0.0
5F	13827.548	13.45	535.24019	0.0
4F	13827.548	10.3	409.88654	0.0
3F	13827.548	7.15	284.53289	0.0
2F	13827.548	4.0	159.18544	0.0
G.L.	--	0.0	--	--

File Name: D:\MTECH STRUCTURAL VIT\MIDAS INTERNSHIP\jk\

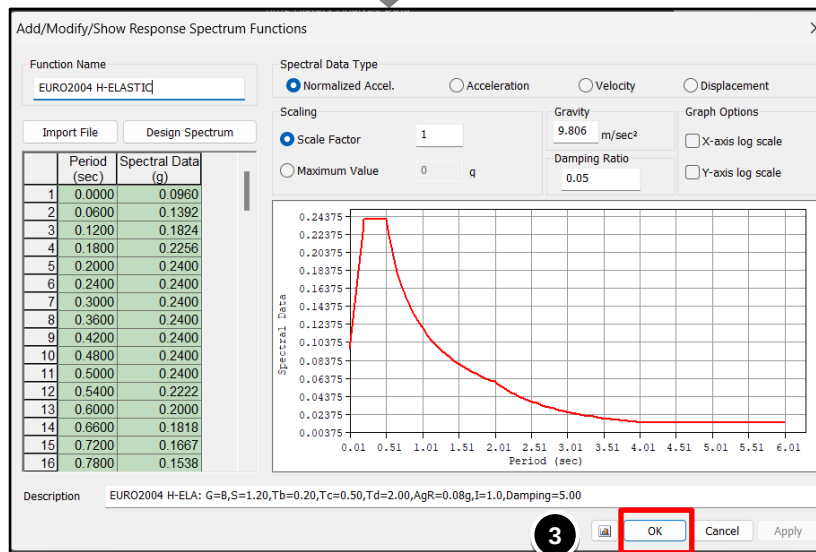
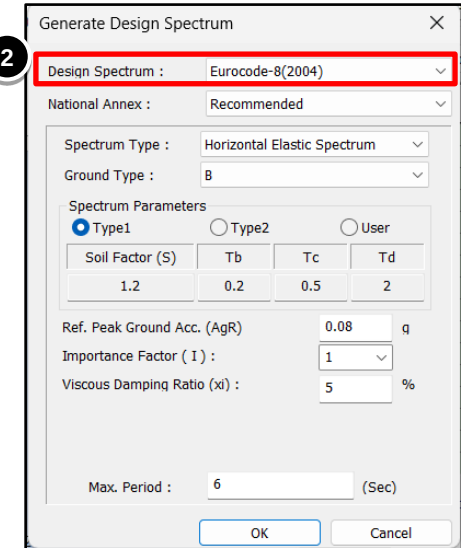
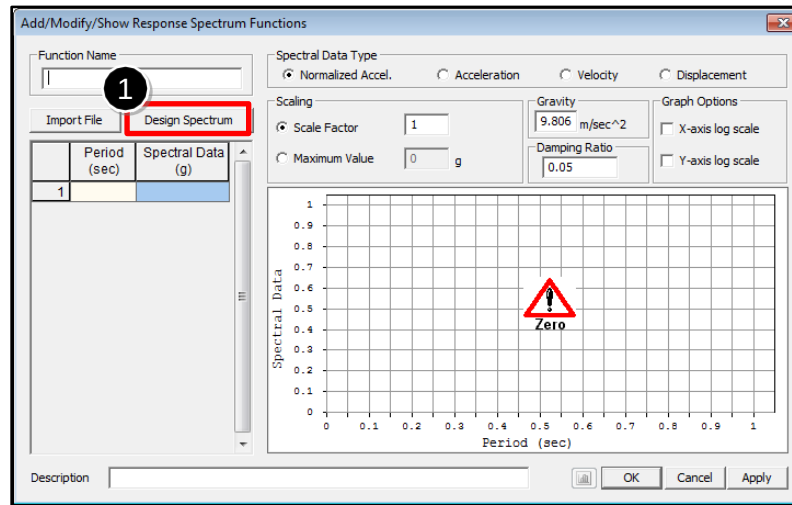
Make Seismic Load Calc. Sheet Browse

Close

Procedure

Menu>Load>Dynamic loads>
Response Spectrum functions

- ① Add > Function Name:
Design Spectrum
 - ② Generate Design Spectrum:
Design Spectrum: EN-8(2004)
Spectrum type : Horizontal
Elastic spectrum
Spectrum Parameters: type 1
Importance Factor: 1
Viscous Damping Ratio: 5
Click OK
 - ③ Such a Dialog Box appears.
Click OK
- The Response Spectrum .
Function is generated



7-6. Response Spectrum Load cases

Procedure

Menu>Load>Response Spectrum
Analysis Data > Response
Spectrum Load Cases

- ① Load Cases Name : RX
Excitation Angle : 0
 - ② Check : EURO 2004
 - ③ Click [Add]
 - ④ Load Cases Name : RY
Excitation Angle : 90
> Click [Add]
 - ⑤ The two Spectrum Load Cases
Are created
- Click [Close]

1

2

3

Tree Menu

Response Spectrum Load Cases

Spectrum Load Case

Load Case Name: RX

Direction: X-Y

☐ Auto-Search Angle

☒ Major ☐ Ortho

Excitation Angle: 0 [deg]

Scale Factor: 1

Period Modification Factor: 1

Modal Combination Control: ...

Spectrum Functions

Function Name (Damping Ratio)

☒ EURO2004 H-ELASTIC (0.05)

☐ Apply Damping Method

Damping Method...

☐ Correction by Damping Ratio

Interpolation of Spectral Data

☐ Linear ☒ Logarithm

☐ Accidental Eccentricity

☐ Non-Dissipative q_{ND}: 1.2

Description:

LoadCase	Direction	Scale
RX	X-Y	1
RY	X-Y	1

Operations

Add Modify Copy Delete

Eigenvalue Analysis Control...

Response Spectrum Functions...

Close

4

5

Tree Menu

Response Spectrum Load Cases

Spectrum Load Case

Load Case Name: RY

Direction: X-Y

☐ Auto-Search Angle

☒ Major ☐ Ortho

Excitation Angle: 90 [deg]

Scale Factor: 1

Period Modification Factor: 1

Modal Combination Control: ...

Spectrum Functions

Function Name (Damping Ratio)

☒ EURO2004 H-ELASTIC (0.05)

☐ Apply Damping Method

Damping Method...

☐ Correction by Damping Ratio

Interpolation of Spectral Data

☐ Linear ☒ Logarithm

☐ Accidental Eccentricity

☐ Non-Dissipative q_{ND}: 1.2

Description:

LoadCase	Direction	Scale
RX	X-Y	1
RY	X-Y	1

Operations

Add Modify Copy Delete

Eigenvalue Analysis Control...

Response Spectrum Functions...

Close

Procedure

Menu>Analysis> Eigen value Analysis Control

- 1 Fill in the details as shown.

1

Eigenvalue Analysis Control

Type of Analysis

☒ Eigen Vectors ☐ Ritz Vectors

☒ Subspace Iteration ☐ Lanczos

Eigen Vectors

Number of Frequencies : 10

☐ Frequency range of interest

Search From : 0 [cps]

To : 1600 [cps]

Eigenvalue Control Parameters

Number of Iterations : 20

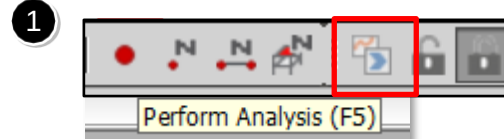
Subspace Dimension : 0

Convergence Tolerance : 1e-10

Remove Eigenvalue Analysis Data OK Cancel

Procedure

- ① Menu>Analysis>Perform Analysis
- ② Menu>Results > Result Tables >
Story >Reaction>
Select EXP, EYP and RX and RY
- ③ Calculate the ratio of
EXP/RX(RS) and EYP/RY(RS)



2

Node	Load	FX (kN)	FY (kN)	FZ (kN)	MX (kN·m)	MY (kN·m)	MZ (kN·m)
38	RY(RS)	0.371274	28.833733	693.109049	105.222369	1.169539	0.083282
39	RY(RS)	0.524953	31.971417	925.137022	109.051939	1.423524	0.083282
40	RY(RS)	0.666254	28.114865	646.660941	103.712627	1.574554	0.083282
41	RY(RS)	3.021708	38.546040	181.592762	119.274375	3.673013	0.083282
42	RY(RS)	0.413654	3317.757068	16124.256312	281.663925	1.368826	0.203324
43	RY(RS)	3.512143	65.473310	263.793424	251.034233	5.114434	0.203324
44	RY(RS)	0.284681	72.219837	420.527225	258.932339	1.190538	0.203324
45	RY(RS)	0.358108	72.024435	428.744161	257.973046	1.301269	0.203324
46	RY(RS)	2.916076	71.733081	577.717770	256.879645	3.244729	0.203324
47	RY(RS)	0.390363	3275.879575	15732.484201	276.661473	1.340449	0.203324
48	RY(RS)	3.152059	37.585936	179.236722	115.996056	4.319796	0.083282
49	RY(RS)	3.145967	38.546039	181.524765	119.274374	4.042065	0.083282
50	RY(RS)	0.043193	3317.755780	16124.239394	281.663926	0.178467	0.203324
51	RY(RS)	3.212293	65.473302	263.800153	251.034223	4.111307	0.203324
52	RY(RS)	0.182756	72.218631	420.671994	258.930765	0.250345	0.203324
53	RY(RS)	0.056090	72.024880	428.654807	257.973632	0.166975	0.203324
54	RY(RS)	3.186602	71.740214	576.770082	256.889036	3.999017	0.203324
55	RY(RS)	0.040305	3276.041824	15734.726281	276.660224	0.170795	0.203324
56	RY(RS)	3.024775	37.594891	178.080282	116.007906	3.918599	0.083282
57	RY(RS)	0.242077	28.740572	655.087553	106.559933	0.507191	0.083282
58	RY(RS)	0.196524	32.581505	970.832556	111.295683	0.705443	0.083282
59	RY(RS)	0.375881	29.096085	688.539594	106.427895	0.920062	0.083282
60	RY(RS)	0.209004	28.879255	665.107621	105.856339	0.723250	0.083282
61	RY(RS)	0.203005	28.789219	662.347312	105.449137	0.714912	0.083282
62	RY(RS)	0.195936	28.813889	685.214511	105.196428	0.600881	0.083282
63	RY(RS)	0.223002	32.017436	942.781853	109.111766	0.741744	0.083282
64	RY(RS)	0.371626	28.092614	635.484444	103.683654	0.897339	0.083282
SUMMATION OF REACTION FORCES PRINTOUT							
	Load	FX (kN)	FY (kN)	FZ (kN)			
	EXP	-9961.324351	0.000000	0.000000			
	EYP	0.000000	-9961.324351	0.000000			
	RX(RS)	8390.035829	4.598289	0.000000			
	RY(RS)	4.598289	14369.086811	0.000000			

3

$$\text{EXP/RX(RS)} = 2.13$$

$$\text{EYP/RY(RS)} = 1.38$$

9-1. Automatic generation of load combinations

Procedure

Menu>Results > Combinations >
Concrete Design

① Select Concrete Design tab

② Auto Generation

Scale Up Factor: RX 1.500

Scale Up Factor: RY 1.00

③ Select Design Code as

“Eurocode 2:04”

> Click [OK]

> Click [Close]

Automatic Generation of Load Combinations

Option
☒ Add ☐ Replace

Code Selection
☐ Steel ☒ Concrete ☐ SRC
☐ Cold Formed Steel ☐ Footing
☐ Aluminum

Design Code : Eurocode2:04
 National Annex : Recommended

☒ Scale Up of Response Spectrum Load Cases
 Scale Up Factor : 1 RX

Factor	Load Case
1.500	RX
1.000	RY

 Add
 Modify
 Delete

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

☐ Consider Orthogonal Effect
 Set Load Cases for Orthogonal Effect...

☒ 100 : 30 : 30 Rule
☐ SRSS(Square-Root-of-Sum-of-Squares)

Define Factors for Variable Actions
 Factors for Variable Actions...

Partial factors for actions
 Gamma_G : 1.35 Gamma_Q : 1.5

☐ Will Execute Construction Stage Analysis
☐ Consider Losses for Prestress Load Cases
 Transfer Stage : 1 Define Factors
 Service Load Stage : 1

☐ Consider Imperfection Load
 Set Load Cases and Direction...

OK Cancel

Load Combinations

General | Steel Design | **Concrete Design** | RC Design | Cold Formed Steel Design | Footing Design | Aluminum Design

Load Combination List

No	Name	Active	Type	Description
1	cLCB1	Streng	Add	1.35D + 1.5(1.0LL)
2	cLCB2	Streng	Add	1.35D + 1.5(1.0LL)
3	cLCB3	Streng	Add	1.35D + 1.5(1.0LL)
4	cLCB4	Streng	Add	1.35D + 1.5(0.7LL)
5	cLCB5	Streng	Add	1.35D + 1.5(0.7LL)
6	cLCB6	Streng	Add	1.35D + 1.5(1.0LL)
7	cLCB7	Streng	Add	1.35D + 1.5(1.0LL)
8	cLCB8	Streng	Add	1.35D + 1.5(0.7LL)
9	cLCB9	Streng	Add	1.35D + 1.5(0.7LL)
10	cLCB1	Streng	Add	1.0D + 1.0(0.3L) +
11	cLCB1	Streng	Add	1.0D + 1.0(0.3L) +
12	cLCB1	Streng	Add	1.0D + 1.0(0.3L) +
13	cLCB1	Streng	Add	1.0D + 1.0(0.3L) +
14	cLCB1	Streng	Add	1.0D + 1.0(0.3L) -
15	cLCB1	Streng	Add	1.0D + 1.0(0.3L) -
16	cLCB1	Streng	Add	1.0D + 1.0(0.3L) -
17	cLCB1	Streng	Add	1.0D + 1.0(0.3L) -
18	cLCB1	Streng	Add	1.0D + 1.0(0.3L) +
19	cLCB1	Streng	Add	1.0D + 1.0(0.3L) +
20	cLCB2	Streng	Add	1.0D + 1.0(0.3L) -
21	cLCB2	Streng	Add	1.0D + 1.0(0.3L) -
22	cLCB2	Service	Artd	SFRV : 1.0D + 1.0

Load Cases and Factors

LoadCase	Factor
DL(ST)	1.3500
LL(ST)	1.5000

Copy Import... **Auto Generation...** Spread Sheet Form

File Name: D:\MTECH STRUCTURAL VIT\MIDAS INTERNSHIP\jk\Appl_RC Browse Make Load Combination Sheet Close

Procedure

Menu>Design > General Design
Parameter >Definition of Frame

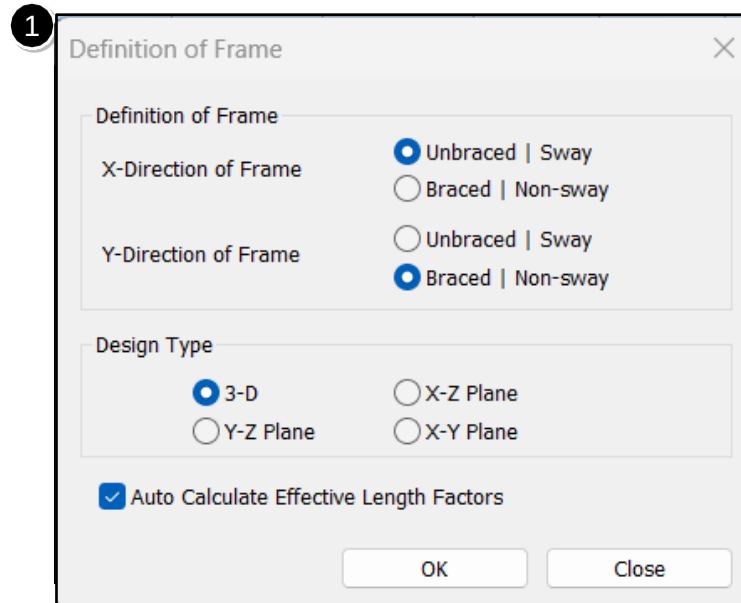
① X-direction > Unbraced
Sway (on)

Y-direction > Braced
Non-Sway (on)

Design Type > 3-D

Click OK [Close]

Design > Concrete Design
Parameter > Design Code
Design Code > EN 2 :2004



Procedure

Menu>Design > RC Design >Design
Criteria for Rebar

- 1 Fill in the details as per Requirements for every Structural element
- 2 Click on Input Additional Wall Data
- 3 Select any End Rebar Design Method

1

Design Criteria for Rebars

For Beam Design

Main Rebar : P20 Rebar...

Stirrups : P10 Arrangement : 2

Side Bar : P12

dT : 0 m dB : 0 m

☒ Consider Spacing Limit for Main Rebar

Spliced Bars : ☒ None ☐ 50% ☐ 100%

For Column Design

Main Rebar : P20 Rebar...

Ties/Spirals : P10 Arrangement : Y: 2 Z: 2

do : 0 m

☒ Consider Spacing Limit for Main Rebar

Spliced Bars : ☒ None ☐ 50% ☐ 100%

For Brace Design

Main Rebar : P20 Rebar...

Ties/Spirals : P10 Arrangement : Y: 2 Z: 2

do : 0 m

☒ Consider Spacing Limit for Main Rebar

Spliced Bars : ☒ None ☐ 50% ☐ 100%

For Shear Wall Design

Vertical Rebar : P12 Rebar...

Horizontal Rebar : P10 End Rebar From : P10

Boundary Element Rebar : P10

Boundary Element Rebar Space : 0.2 m

de : 0 m dw : 0 m

2

Input Additional Wall Data...

OK Close

3

Input Additional Wall Data

☐ Design of Out-of-plane Bending

Spacing of Wall Rebars

Spacing of Vertical Rebars : @100,@150,@200,@300,@400 Space...

Spacing of Horizontal Rebars : From 0.05 m

End Rebar Design Method

Not Used : ☒ Method-1

Auto Calculation : ☐ Method-2 ☐ Method-3 ☐ Method-4

Spacing of End Rebar

End Rebar Q'ty = 4

End Rebar Q'ty = 6

End Rebar Q'ty >= 8

Dist1 : 0.3 m Dist2 : 0.15 m Dist3 : 0.1 m

OK Cancel

Procedure

Menu>Design > RC Design>Modify
Concrete Materials

- ① Select material ID #1
- Rebar Selection
- Code > EN(RC)
- Grade of Main Rebar > S400
- Grade of Sub-Rebar > S400
- Click Modify

Modify Concrete Materials

Material List

ID	Name	fc fck R	Chk	Lamb...	Main-bar	Sub-bar
1	C30/37	30000	X	1	S400	S400

Concrete Material Selection

Code : EN(RC) Grade : C30/37 ...

Specified Compressive Strength (fc|fck) : 30000 kN/m²

☐ Light Weight Concrete Factor (Lambda) : 1

Rebar Selection

Code : EN(RC)

Grade of Main Rebar : S400 Fy : 400000 kN/m²

Grade of Sub-Rebar : S400 Fys : 400000 kN/m²

Modify Close

10-3. Design Output (Beam)

Procedure

Menu>Design > RC

Design > Concrete code design>

Beam Design

① Sorted by > Member (on)

Similarly Design The column
And Shear wall.

Eurocode2:04 RC-Beam Design...

Code : EC2:04,NTC2018 Unit : kN , m

Sorted by ☒ Member ☐ Property

MEMB	SEL	Section		fck	POS	CH
SECT		Bc	Hc	fyk		K
Span		bf	hf	fyw		
1	☐	Beam	30000.0	I	OK	
3	☐	0.6000	0.5000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK
2	☐	Beam	30000.0	I	OK	
3	☒	0.6000	0.5000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK
3	☐	Beam	30000.0	I	OK	
3	☐	0.6000	0.5000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK
4	☐	edge columns	30000.0	I	OK	
1	☐	0.6000	0.6000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK
5	☐	edge columns	30000.0	I	OK	
1	☐	0.6000	0.6000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK
6	☐	edge columns	30000.0	I	OK	
1	☐	0.6000	0.6000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK
7	☐	edge columns	30000.0	I	OK	
1	☐	0.6000	0.6000	400000	M	OK

☐ Connect Model View

Select All Unselect All Re-calculation

Graphic... Detail... Summary... >>

Option for Detail Print Position

☒ End I. ☐ Mid. ☐ End J.

Update Rebar Close

Preview Window

No : 2 Print Print All Close Save

1. Design Information

Member Number 2

Design Code Eurocode2:04 Unit System kN, m

Material Data fck = 30000, fyk = 400000, fyw = 400000 KPa

Section Property Beam (No : 3) Beam Span 8m

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	20	20	20
Moment (MEd)	627.38	222.72	625.06
Factored Strength (MRd)	710.51	225.77	710.51
Check Ratio (MEd/MRd)	0.8830	0.9865	0.8797
Neutral Axis (x/d)	0.2891	0.1406	0.2891
(+) Load Combination No.	18	18	18
Moment (MEd)	325.66	256.31	330.69
Factored Strength (MRd)	346.98	267.77	346.98
Check Ratio (MEd/MRd)	0.9386	0.9572	0.9531
Neutral Axis (x/d)	0.1892	0.1494	0.1892
Required Rebar Top (As.top)	0.0055	0.0016	0.0055
Required Rebar Bot (As.bot)	0.0024	0.0018	0.0024

3. Shear Capacity

Procedure

Menu>Design>RC design>

Concrete code design>

Beam Design

① Click Detail...

② Conform Detail Calculation report as per EN 2 :2004

Eurocode2:04 RC-Beam Design...

Code : EC2:04 Unit : kN , m

Sorted by ☒ Member ☐ Property

MEMB	SECT	Section		fck	POS	CH
Span	SEL	Bc	Hc	fyk		K
		bf	hf	fyw		
1		Beam		30000.0	I	OK
3	☐	0.6000	0.5000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK
2		Beam		30000.0	I	OK
3	☒	0.6000	0.5000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK
3	☐	Beam		30000.0	I	OK
3	☐	0.6000	0.5000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK
4	☐	edge columns		30000.0	I	OK
1	☐	0.6000	0.6000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK
5	☐	edge columns		30000.0	I	OK
1	☐	0.6000	0.6000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK
6	☐	edge columns		30000.0	I	OK
1	☐	0.6000	0.6000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK
7	☐	edge columns		30000.0	I	OK
1	☐	0.6000	0.6000	400000	M	OK
8.0000		0.0000	0.0000	400000	J	OK

☐ Connect Model View

Select All **1** Unselect All Re-calculation

Graphic... **Detail...** Summary... >>

Option for Detail Print Position
☒ End I ☐ Mid. ☐ End J Update Rebar

Close

MIDAS/Text Editor - [App1_RC_Building eurocode.rcs]

File Edit View Window Help

```

00001
00002 midas Gen - RC-Beam Design [ Eurocode2:04 & NTC2018 ] Gen 2025
00003
00004
00005
00006
00007 +=====+
00008 | MIDAS (Modeling, Integrated Design & Analysis Software) |
00009 | midas Gen - Design & checking system for windows |
00010 +=====+
00011 | RC-Member (Beam/Column/Brace/Wall) Analysis and Design |
00012 | Based On Eurocode2:04, Eurocode2, ACI318-19, |
00013 | ACI318M-19, ACI318-14, ACI318M-14, ACI318-11, |
00014 | ACI318-08, ACI318-05, ACI318-02, ACI318-99, |
00015 | ACI318-95, ACI318-89, NSR-10, CSA-A23.3-94, |
00016 | BS8110-97, AIJ-WSD99, GB/T50010-10, |
00017 | GB50010-02, IS456:2000, KDS 41 20 : 2022, |
00018 | KDS 41 30 : 2018, KCI-USD12, KCI-USD07, |
00019 | KCI-USD03, KCI-USD99, KSCE-USD96, AIK-USD94, |
00020 | AIK-WSD2K, TWM-USD112, TWM-USD100, TWM-USD92, |
00021 | NSCP 2015, NTC-DCEC (2023), NTC-DCEC (2017), |
00022 | (c)SINCE 1989 |
00023 +=====+
00024 | MIDAS Information Technology Co., Ltd. (MIDAS IT) |
00025 | MIDAS IT Design Development Team |
00026 +=====+
00027 | HomePage : www.MidasUser.com |
00028 +=====+
00029 | Gen 2025 |
00030 +=====+
00031
00032 *. DEFINITION OF LOAD COMBINATIONS WITH SCALING UP FACTORS.
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10-3. Design Output (Column)

Procedure

Menu>Design > RC

Design > Concrete code design>

Column Design

① Sorted by > Member (on)

Eurocode2:04 RC-Column Design...

Code : EC2-04 Unit : kN , m

Sorted by **Member**

MEMB	SECT	Section	Bc	Hc	Height	fck	fyk	CHK
51	1	edge columns	0.6000	0.6000	4.0000	30000.0	400000	OK
52	1	edge columns	0.6000	0.6000	4.0000	30000.0	400000	NM
53	1	edge columns	0.6000	0.6000	4.0000	30000.0	400000	NM
54	1	edge columns	0.6000	0.6000	4.0000	30000.0	400000	NM
55	1	edge columns	0.6000	0.6000	4.0000	30000.0	400000	NM
56	1	edge columns	0.6000	0.6000	4.0000	30000.0	400000	NM
57	1	edge columns	0.6000	0.6000	4.0000	30000.0	400000	NM
58	1	edge columns	0.6000	0.6000	4.0000	30000.0	400000	OK
59	1	edge columns	0.6000	0.6000	4.0000	30000.0	400000	NM
60	2	Interior column	0.7500	0.7500	4.0000	30000.0	400000	NM
61	2	Interior column	0.7500	0.7500	4.0000	30000.0	400000	NM
62	2	Interior column	0.7500	0.7500	4.0000	30000.0	400000	NM
63	2	Interior column	0.7500	0.7500	4.0000	30000.0	400000	NM

☐ Connect Model View

Select All Unselect All Re-calculation

Graphic... Detail... Summary... >>

Draw PM Curve... Update Rebar Close

①

Preview Window

No : 54

Print Print All Close Save

1. Design Condition

Design Code : Eurocode2:04 UNIT SYSTEM : kN, m

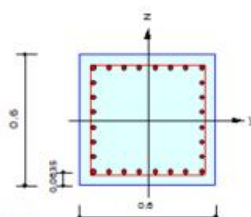
Member Number : 54

Material Data : fck = 30000, fyk = 400000, fyw = 400000 KPa

Column Height : 4 m

Section Property : edge columns (No : 1)

Rebar Pattern : 28 - 8 - P20 Ast = 0.00879648 m² (pst = 0.024)



2. Axial and Moments Capacity

Load Combination : 20 (Pos : J)

Concentric Max. Axial Load N.Rdmax = 10083.7 kN

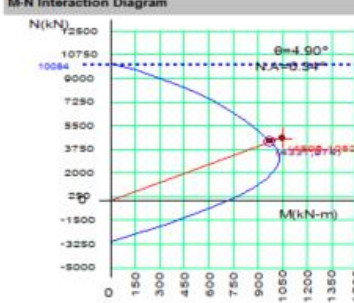
Axial Load Ratio N.Ed / N.Rd = 4596.35 / 4337.02 = 1.060 > 1.000 N.G

Moment Ratio M.Ed / M.Rd = 1052.22 / 974.443 = 1.080 > 1.000 N.G

M.Edy / M.Rdy = 1048.20 / 970.877 = 1.080 > 1.000 N.G

M.Edz / M.Rdz = 91.9270 / 83.2860 = 1.104 > 1.000 N.G

M-N Interaction Diagram



N(kN)	M.Rd(kN-m)
10083.72	0.00
9039.99	301.86
7821.36	552.48
6634.37	735.31
5506.12	866.36
4523.25	958.44
3929.47	1007.73
3412.67	1033.89
2607.00	1020.76
1584.27	951.34
284.97	773.27
-1688.84	354.95
-3059.65	0.00

3. Shear Capacity

	y (LCB : 19, POS : J)	z (LCB : 20, POS : J)
Applied Shear Force (V.Ed)	49.7209 kN	331.312 kN
V.Ed / V.Rdc	49.7209 / 321.502 = 0.155	331.312 / 321.502 = 1.031
V.Ed / V.Rds	49.7209 / 114.701 = 0.433	331.312 / 376.875 = 0.879
V.Ed / V.Rdmax	49.7209 / 1529.67 = 0.033	331.312 / 1529.67 = 0.217
Shear Ratio	0.155 < 1.000 O.K	0.879 < 1.000 O.K
Asw-H.req	0.00066 m ² /m, 2-P10 @230	0.00197 m ² /m, 2-P10 @70

	y (LCB : 19, POS : 1/2)	z (LCB : 20, POS : 1/2)
Applied Shear Force (V.Ed)	49.7209 kN	331.312 kN
V.Ed / V.Rdc	49.7209 / 321.502 = 0.155	331.312 / 321.502 = 1.031
V.Ed / V.Rds	49.7209 / 114.701 = 0.433	331.312 / 376.875 = 0.879
V.Ed / V.Rdmax	49.7209 / 1529.67 = 0.033	331.312 / 1529.67 = 0.217
Shear Ratio	0.155 < 1.000 O.K	0.879 < 1.000 O.K
Asw-H.req	0.00066 m ² /m, 2-P10 @230	0.00197 m ² /m, 2-P10 @70

Procedure

Menu>Design > RC

Design > Concrete code design>

Shear wall design

- Sorted by>Wall ID+story and select a wall>Graphic

Such a window explaining the design would be displayed

Eurocode2:04 RC-Wall Design Result...

Code : EC2:04 (Method 1) Unit : kN , m

Sorted by ☒ Wall ID + Story ☐ Wall ID (WID) Sort Result...

WID	SE	Wall Mark	fck	fyk	CH	
Story	L	Lw	HTw	hw	fyw	K
1		wM0001	30000.0	400000		
1F		6.7500	4.0000	0.4500	400000	NMV
2		wM0002	30000.0	400000		
1F		6.7500	4.0000	0.4500	400000	NMV
1		wM0001	30000.0	400000		
2F		6.7500	3.1500	0.4500	400000	NMV
2		wM0002	30000.0	400000		
2F		6.7500	3.1500	0.4500	400000	OK
1		wM0001	30000.0	400000		
3F		6.7500	3.1500	0.4500	400000	OK
2		wM0002	30000.0	400000		
3F		6.7500	3.1500	0.4500	400000	OK
1		wM0001	30000.0	400000		
4F		6.7500	3.1500	0.4500	400000	OK
2		wM0002	30000.0	400000		
4F		6.7500	3.1500	0.4500	400000	OK
1		wM0001	30000.0	400000		
5F		6.7500	3.1500	0.4500	400000	OK
2		wM0002	30000.0	400000		
5F		6.7500	3.1500	0.4500	400000	OK
1		wM0001	30000.0	400000		
6F		6.7500	3.1500	0.4500	400000	OK
2		wM0002	30000.0	400000		
6F		6.7500	3.1500	0.4500	400000	OK
1		wM0001	30000.0	400000		
7F		6.7500	3.1500	0.4500	400000	OK

☐ Connect Model View

Select All Unselect All Re-calculation

Graphic... Detail... Summary... >>

Draw PM Curve... Update Rebar Close

