

## NOTE DE CALCUL

### CONSTRUIRE CENTRU MULTIFUNCȚIONAL CU DOTĂRI SPORTIVE ȘI CULTURALE PENTRU COPII

Dat fiind faptul că imobilul investigat este nefuncțional în momentul elaborării prezentei lucrări, evaluarea indicatorului R3 s-a realizat pe situația existentă, luând în considerare situația propusă. Importanța acestui aspect provine din necesitatea evaluării unei situații cât mai reale (din punct de vedere al încărcărilor ce acționează asupra imobilului) în cazul în care structura este considerată în exploatare, în vederea furnizării unor soluții de intervenții optime luând în considerare tema lucrării.

#### 1. Evaluarea încărcărilor

##### 1.1. Evaluarea încărcărilor permanente

- încărcare permanentă din finisaje -  
planșeu nivel curent:  $g_{\text{finisaje.nc}} := 1.50 \frac{\text{kN}}{\text{m}^2}$

- încărcare permanentă din finisaje -  
planșeu terasă:  $g_{\text{finisaje.terasa}} := 2.25 \frac{\text{kN}}{\text{m}^2}$

- încărcare permanentă din pereți de  
închidere / compartimentare:  $g_{\text{per}} := 12 \frac{\text{kN}}{\text{m}^3}$

Notă: Încărcarea din pereții de închidere / compartimentare s-a determinat pentru fiecare tip de perete în parte luând în considerare grosimea și înălțimea acestuia.

##### 1.2. Evaluarea încărcărilor utile conform SREN 1991-1-1

- încărcare utilă pentru planșee - zonele  
de birouri:  $q_{\text{utila.1}} := 2.50 \frac{\text{kN}}{\text{m}^2}$

- încărcare utilă pentru planșee - zonele  
de holuri, balcoane:  $q_{\text{utila.2}} := 3.00 \frac{\text{kN}}{\text{m}^2}$

- încărcare utilă pentru planșee - zonele  
de săli de gimnastică:  $q_{\text{utila.3}} := 5.00 \frac{\text{kN}}{\text{m}^2}$

##### 1.3. Evaluarea încărcărilor din zăpadă - conform CR-1-1-3-2012

- valoarea caracteristică a încărcării din zăpadă pe sol pentru loc. Codlea, jud. Brașov:

$$s_k := 1.5 \frac{\text{kN}}{\text{m}^2}$$

- clasa de importanță-expunere: clasa: III

- factorul de importanță expunere pentru acțiunea zăpezii:  $\gamma_{Is} := 1$

- coeficientul de importanță-expunere al construcției în amplasament: expunere normală  
 $C_e := 1$

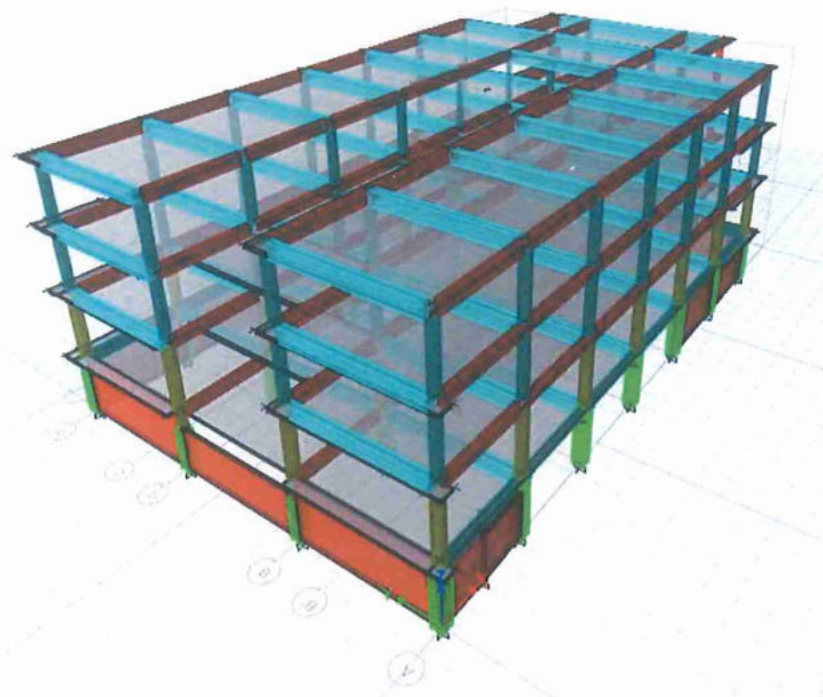
- coeficientul termic:  $C_t := 1$



- unghiul acoperișului:  $\alpha := 2 \text{ deg}$
- coeficienți de formă pentru încărcarea din zăpadă pe acoperiș :  $\mu_1 := 0.8$
- valoarea caracteristică a încărcării din zăpadă pe acoperiș:

$$S' := \gamma_{ls} \cdot \mu_1 \cdot C_e \cdot C_t \cdot s_k = 1.2 \frac{\text{kN}}{\text{m}^2}$$

## 2. Calculul indicatorului R3



Model structural 3D

În conformitate cu prevederile normativului P100-3/2019 factorul maxim de comportare, luând în considerare tipul de structură a imobilului investigat (structură de tip cadre) și anul de realizare a proiectului imobilului investigat (1990), este  $q = 3.50$ . Totodată, din cauza faptului că în zona axelor 1-2/B-C de la nivelul planșeului de peste parter și de peste etajul 1 este executată o placă fără grinzi din beton armat, iar planșeul de peste etajul 2 are o formă de tip U în plan, s-a considerat necesară reducerea cu 20% a factorul de comportare. Astfel, factorul final de comportare ales pentru imobilul investigat este  $q = 2.80$ .

### 2.1. Calculul indicatorului R3. Moment încovoietor

#### 2.1.1. Caracteristici de material

Beton: clasă de beton: C12/15

Oțel: calitate oțel: PC52

$$f_{ck} := 12 \frac{\text{N}}{\text{mm}^2} \quad \gamma_c := 1.5$$

$$f_{yk.PC52} := 345 \frac{\text{N}}{\text{mm}^2} \quad \gamma_s := 1.15$$

$$f_{cd} := \frac{f_{ck}}{\gamma_c} = 8 \frac{\text{N}}{\text{mm}^2}$$

$$f_{yd.PC52} := \frac{f_{yk.PC52}}{\gamma_s} = 300 \frac{\text{N}}{\text{mm}^2}$$

calitate oțel: OB37

$$f_{yk.OB37} := 255 \frac{N}{mm^2} \quad \gamma_s := 1.15$$

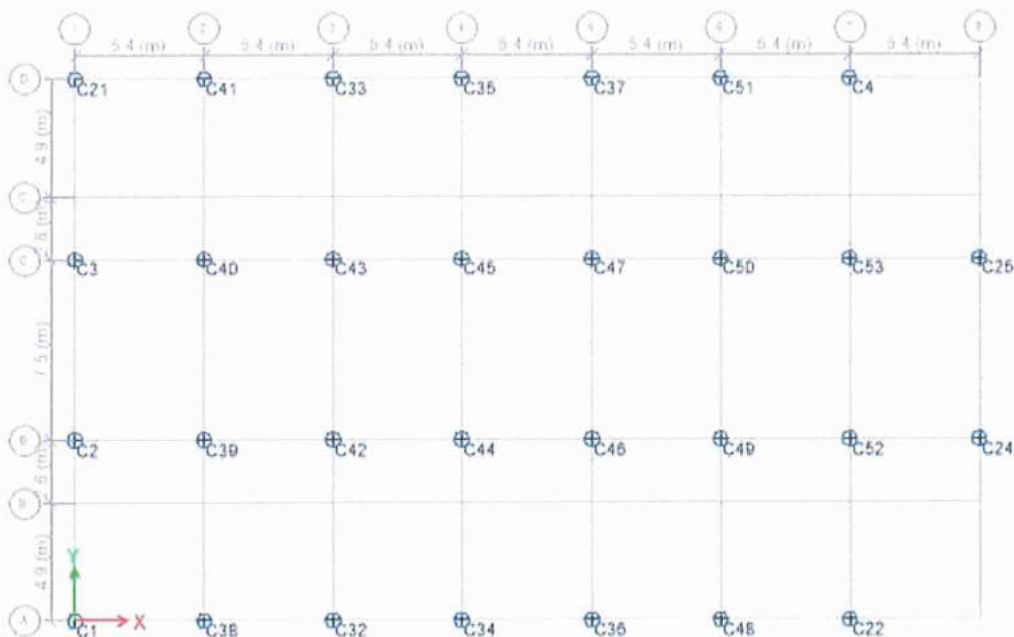
$$f_{yd.OB37} := \frac{f_{yk.OB37}}{\gamma_s} = 221.739 \frac{N}{mm^2}$$

### 2.1.2. Calculul raportului de solicitare al stâlpilor din beton armat la moment încovoietor

Pentru determinarea raportului de solicitare, încărcările ce acționează asupra structurii au fost preluate din Gruparea Seismică, din următoarele ipoteze:

- 1:  $1.00 \cdot P + 1.00 \cdot S_x + 0.30 \cdot S_y + 0.40 \cdot Z + 0.30 \cdot U$
- 2:  $1.00 \cdot P + 1.00 \cdot S_y + 0.30 \cdot S_x + 0.40 \cdot Z + 0.30 \cdot U$

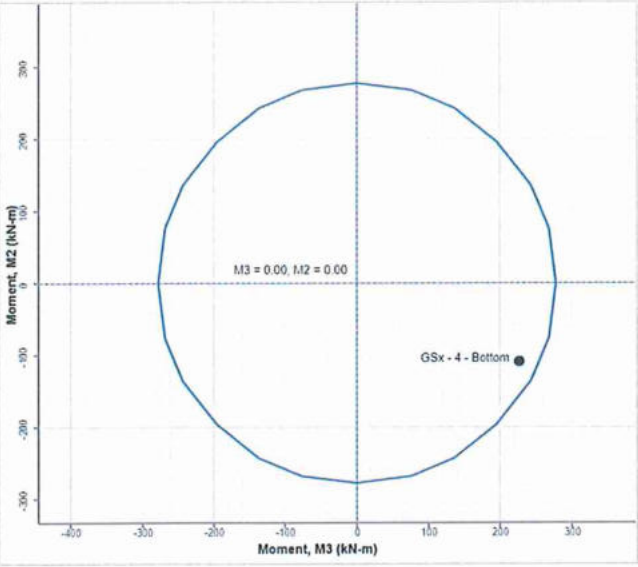
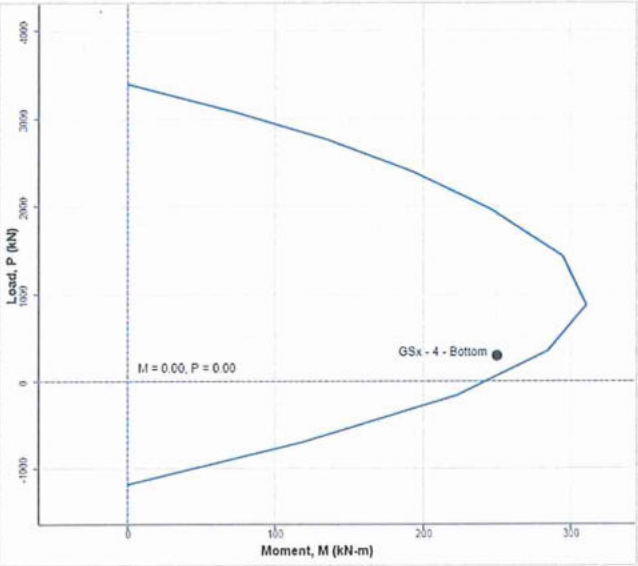
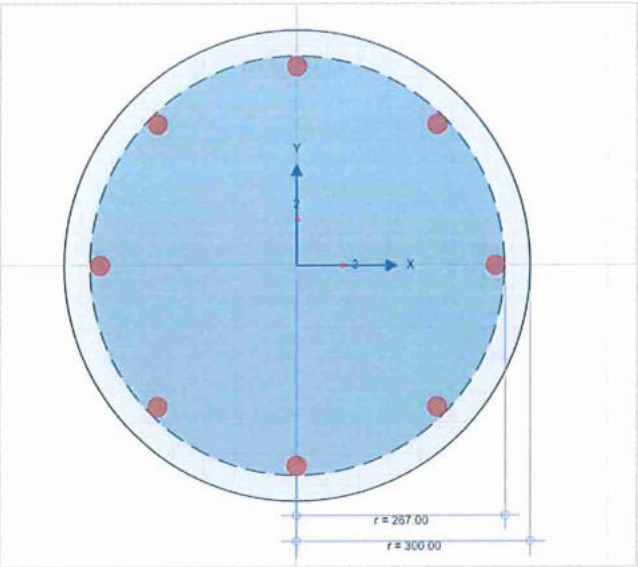
Pentru determinarea indicatorului R3, s-a realizat calculul raportului de solicitare al stâlpilor din beton armat de la nivelul parterului clădirii.



Plan pentru identificarea stâlpilor

Verificarea stâlpilor din beton armat la moment încovoietor s-a realizat în programul de calcul CSiCol.





COLUMN INFORMATION

Name	2 - C1
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, $A$	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

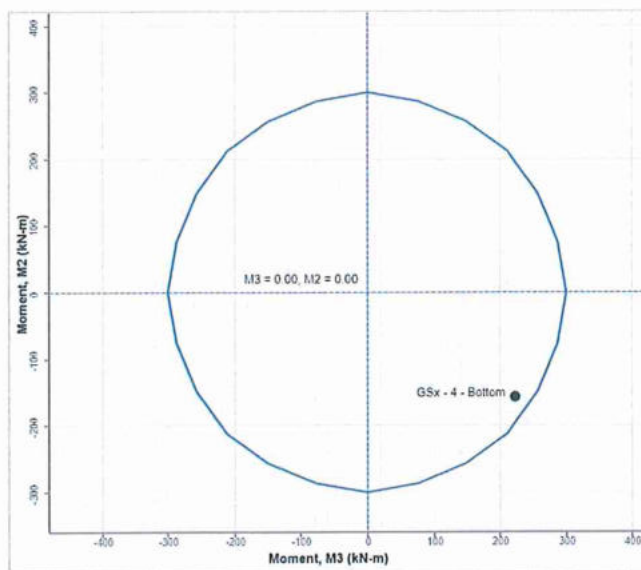
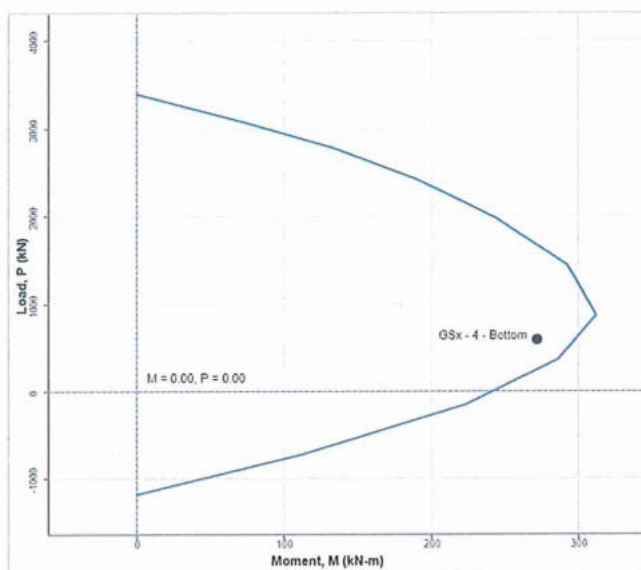
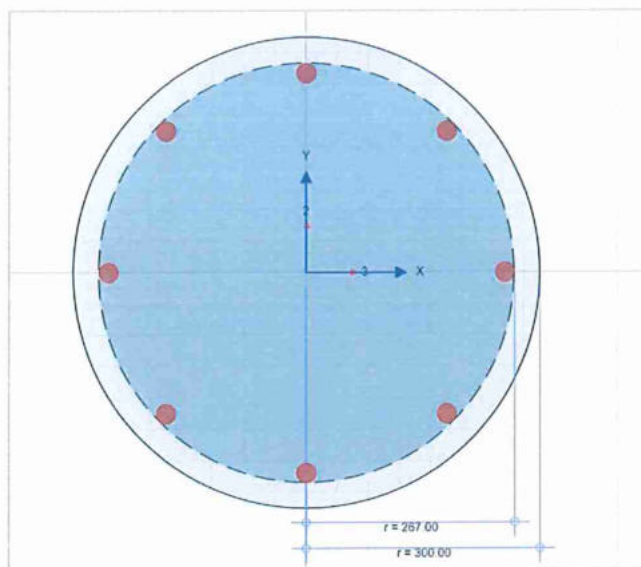
Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 4
Axial Load, $N_{Ed}$	298.48 (kN)
Moment Top, $M_x$	-38.06 (kN-m)
Moment Bottom, $M_x$	225.75 (kN-m)
Moment Top, $M_y$	55.71 (kN-m)
Moment Bottom, $M_y$	-108.27 (kN-m)
Design Moment, $M_{cDesign}$	225.75 (kN-m)
Max Capacity Ratio	0.90



**COLUMN INFORMATION**

Name	38 - C38
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

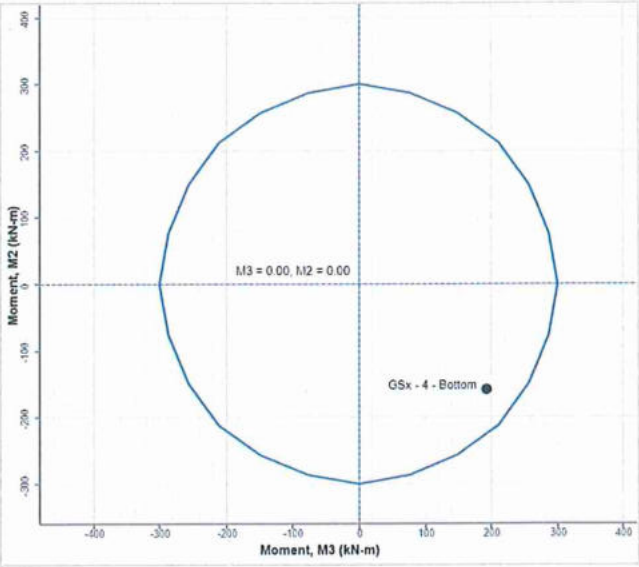
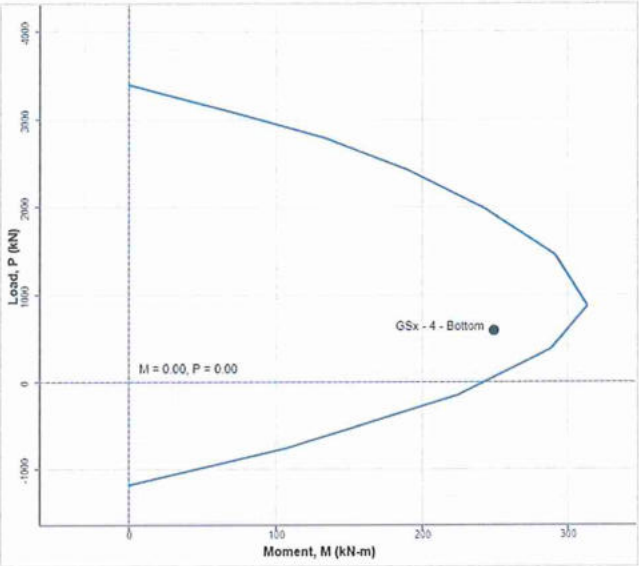
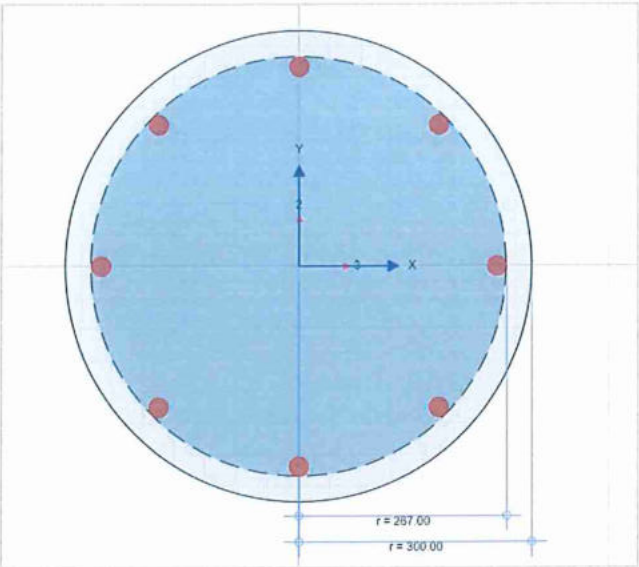
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSx - 4
Axial Load, $N_{Ed}$	591.32 (kN)
Moment Top, $M_x$	-59.62 (kN-m)
Moment Bottom, $M_x$	222.70 (kN-m)
Moment Top, $M_y$	82.67 (kN-m)
Moment Bottom, $M_y$	-156.07 (kN-m)
Design Moment, $M_{cDesign}$	222.70 (kN-m)
Max Capacity Ratio	0.91



COLUMN INFORMATION

Name	42 - C32
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, $A$	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

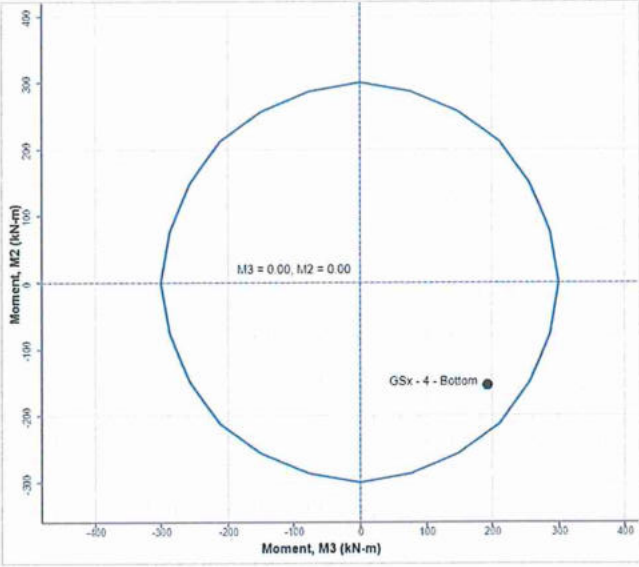
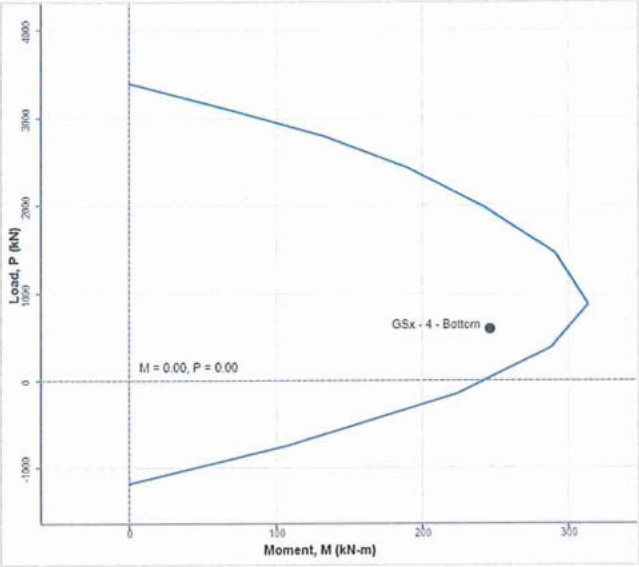
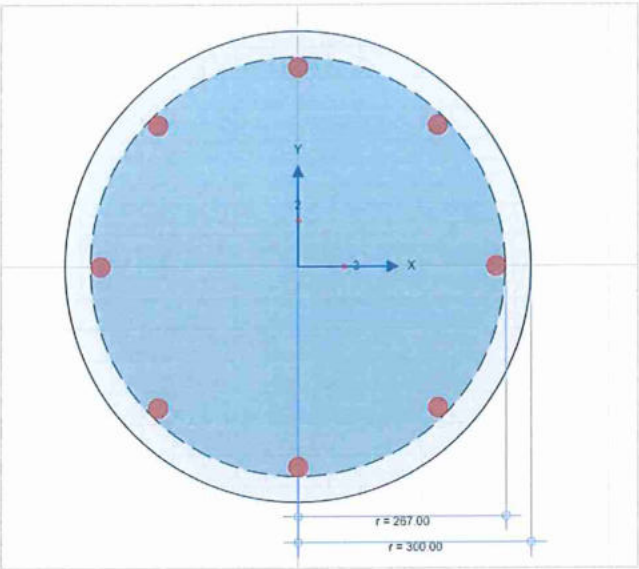
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 4
Axial Load, $N_{Ed}$	589.24 (kN)
Moment Top, $M_x$	-58.61 (kN-m)
Moment Bottom, $M_x$	192.79 (kN-m)
Moment Top, $M_y$	87.41 (kN-m)
Moment Bottom, $M_y$	-157.28 (kN-m)
Design Moment, $M_{cDesign}$	192.79 (kN-m)
Max Capacity Ratio	0.83



COLUMN INFORMATION

Name	46 - C34
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, $A$	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

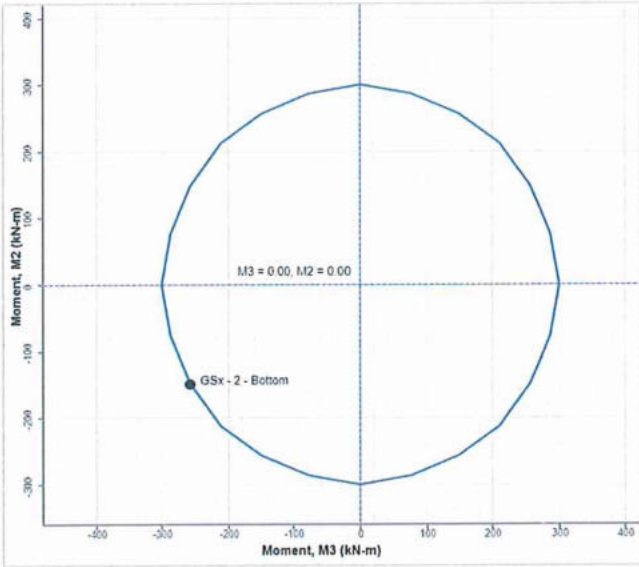
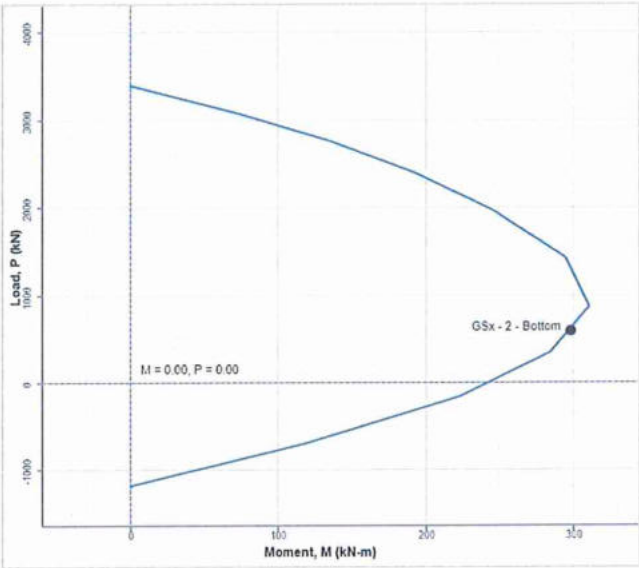
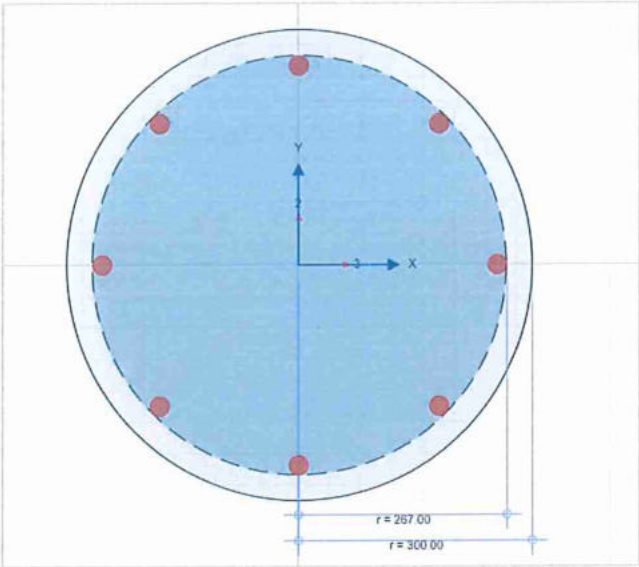
Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 4
Axial Load, $N_{Ed}$	594.44 (kN)
Moment Top, $M_x$	-57.40 (kN-m)
Moment Bottom, $M_x$	191.82 (kN-m)
Moment Top, $M_y$	91.59 (kN-m)
Moment Bottom, $M_y$	-153.86 (kN-m)
Design Moment, $M_{cDesign}$	191.82 (kN-m)
Max Capacity Ratio	0.82





COLUMN INFORMATION

Name	50 - C36
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, $A$	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

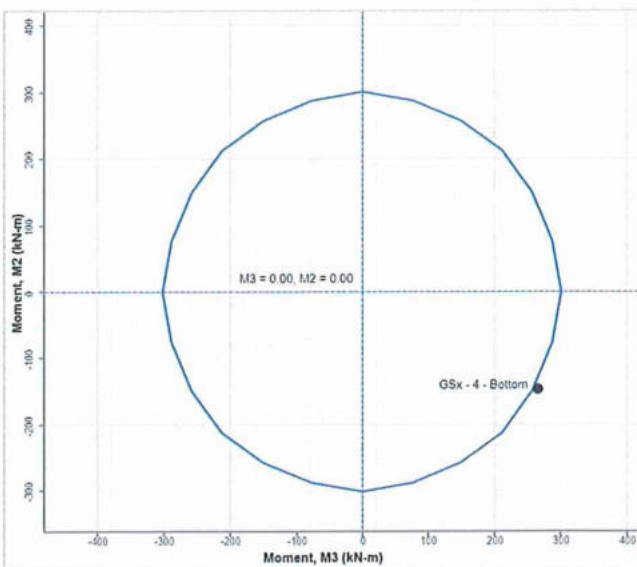
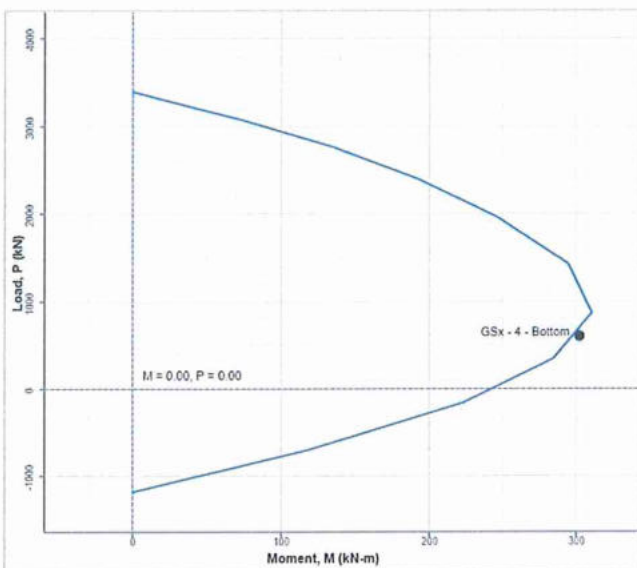
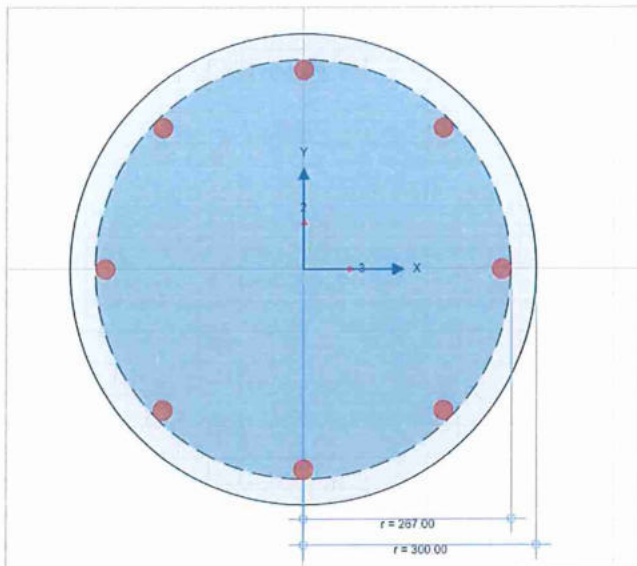
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 2
Axial Load, $N_{Ed}$	595.70 (kN)
Moment Top, $M_x$	60.65 (kN-m)
Moment Bottom, $M_x$	-258.18 (kN-m)
Moment Top, $M_y$	90.15 (kN-m)
Moment Bottom, $M_y$	-148.74 (kN-m)
Design Moment, $M_{cDesign}$	258.18 (kN-m)
Max Capacity Ratio	1.00

**COLUMN INFORMATION**

Name	54 - C48
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

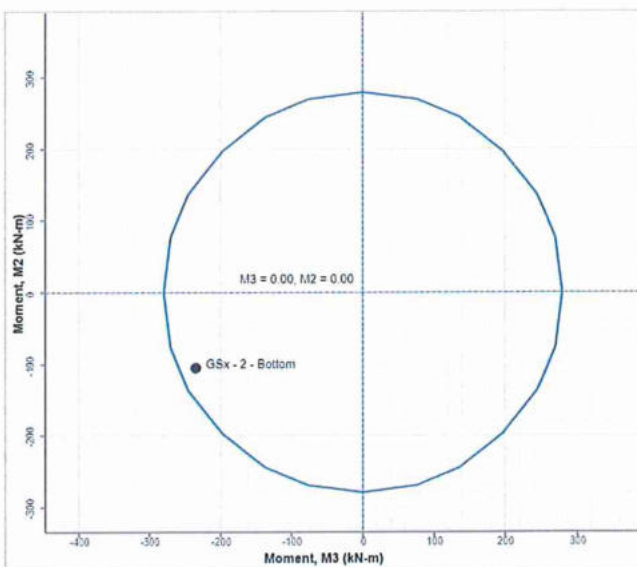
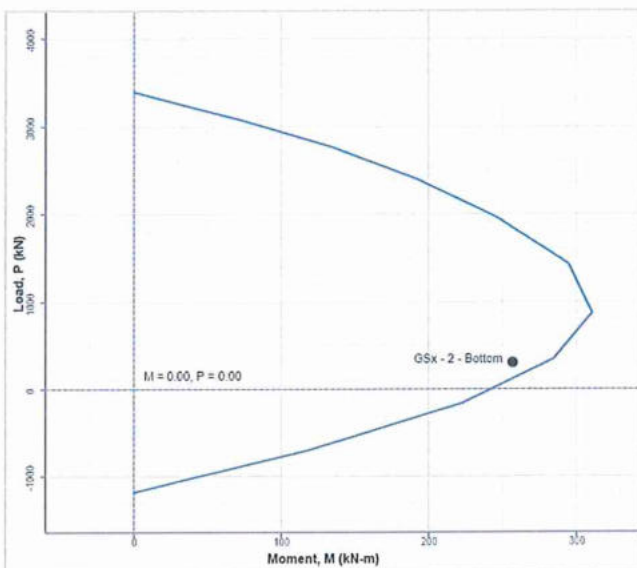
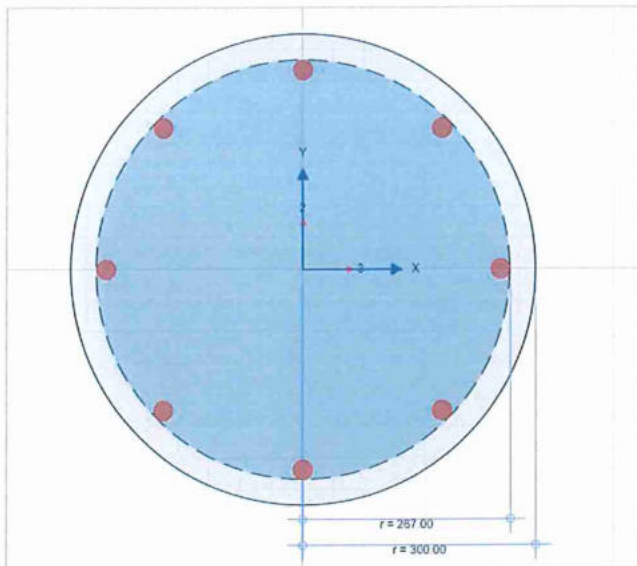
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSx - 4
Axial Load, $N_{Ed}$	607.12 (kN)
Moment Top, $M_x$	-69.42 (kN-m)
Moment Bottom, $M_x$	264.43 (kN-m)
Moment Top, $M_y$	84.55 (kN-m)
Moment Bottom, $M_y$	-145.54 (kN-m)
Design Moment, $M_{cDesign}$	264.43 (kN-m)
Max Capacity Ratio	1.01

**COLUMN INFORMATION**

Name	58 - C22
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

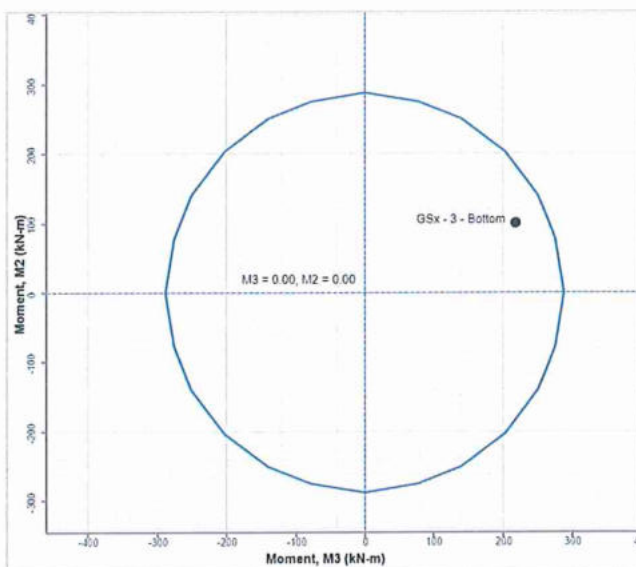
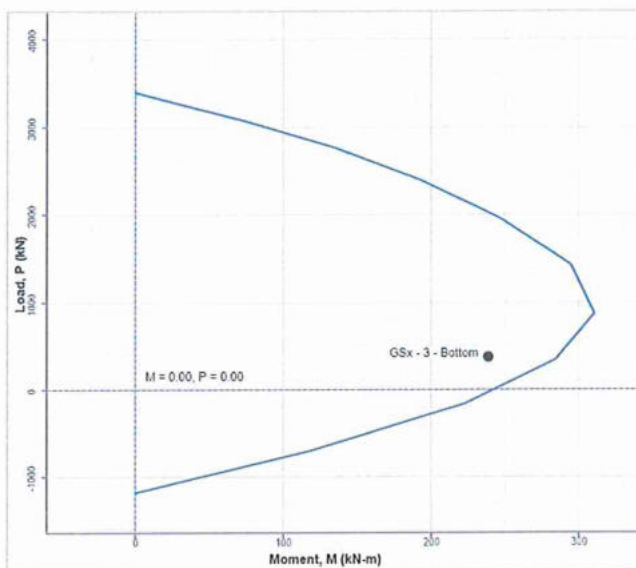
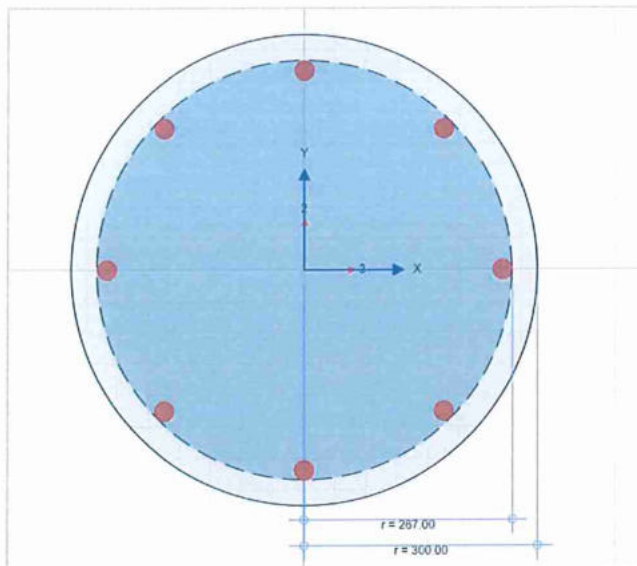
**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSx - 2
Axial Load, $N_{Ed}$	311.84 (kN)
Moment Top, $M_x$	45.51 (kN-m)
Moment Bottom, $M_x$	-234.23 (kN-m)
Moment Top, $M_y$	59.36 (kN-m)
Moment Bottom, $M_y$	-105.21 (kN-m)
Design Moment, $M_{cDesign}$	234.23 (kN-m)
Max Capacity Ratio	0.92



**COLUMN INFORMATION**

Name	3 - C2
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

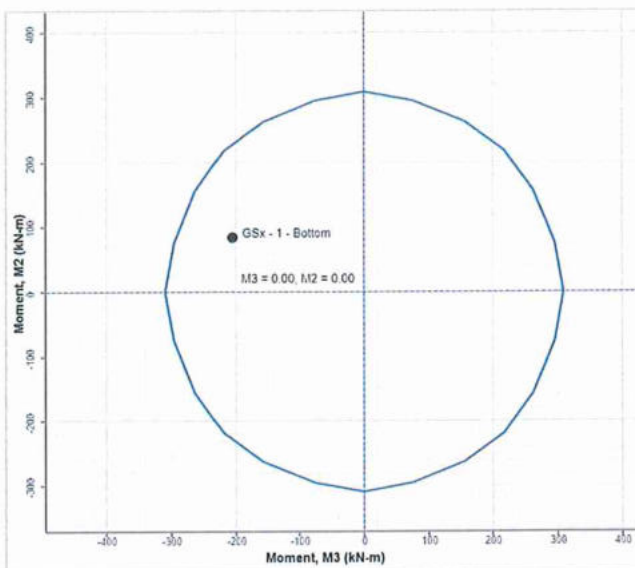
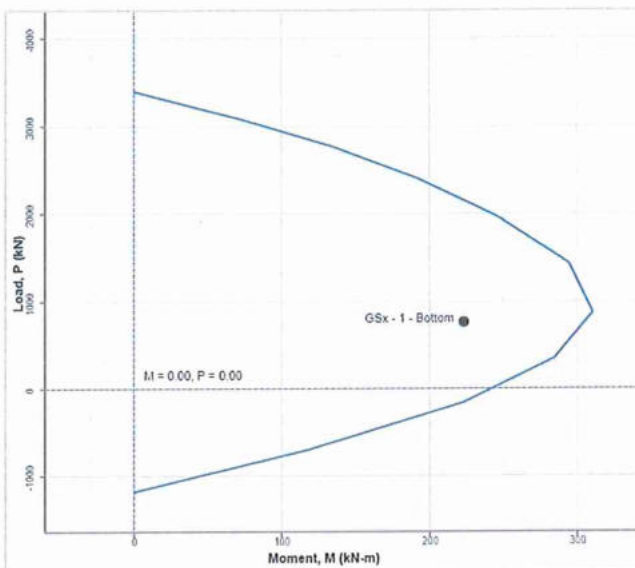
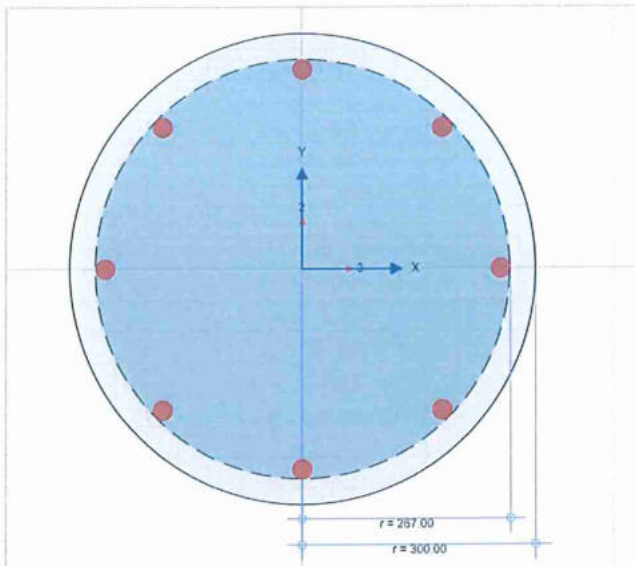
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSx - 3
Axial Load, $N_{Ed}$	380.83 (kN)
Moment Top, $M_x$	-59.13 (kN-m)
Moment Bottom, $M_x$	216.70 (kN-m)
Moment Top, $M_y$	-49.81 (kN-m)
Moment Bottom, $M_y$	100.47 (kN-m)
Design Moment, $M_{cDesign}$	216.70 (kN-m)
Max Capacity Ratio	0.84

**COLUMN INFORMATION**

Name	39 - C39
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

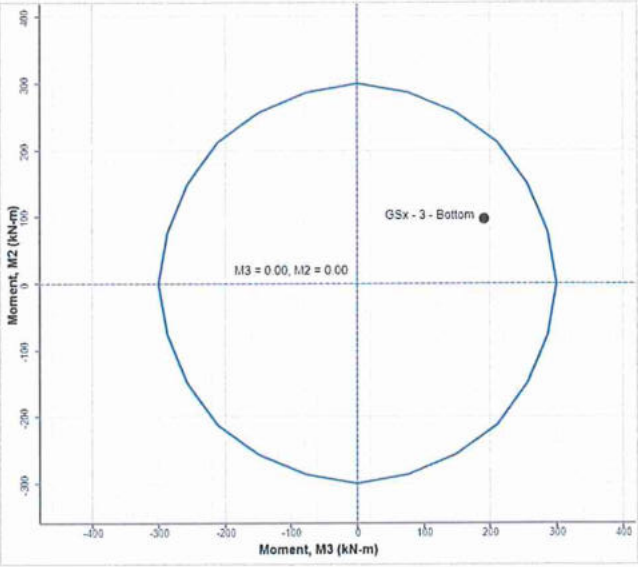
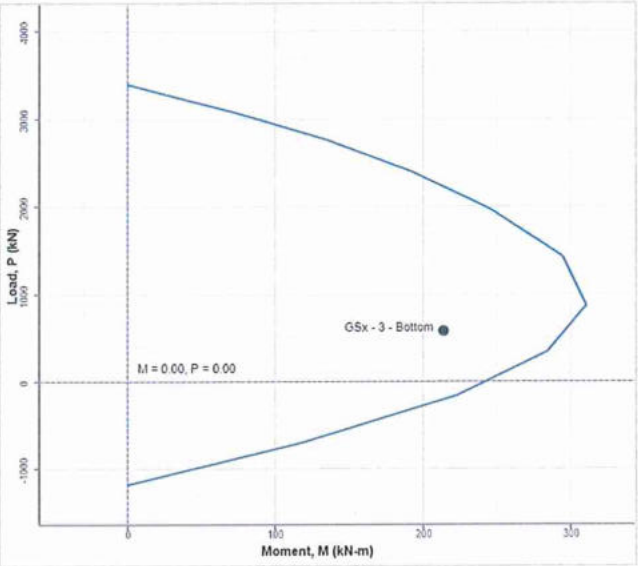
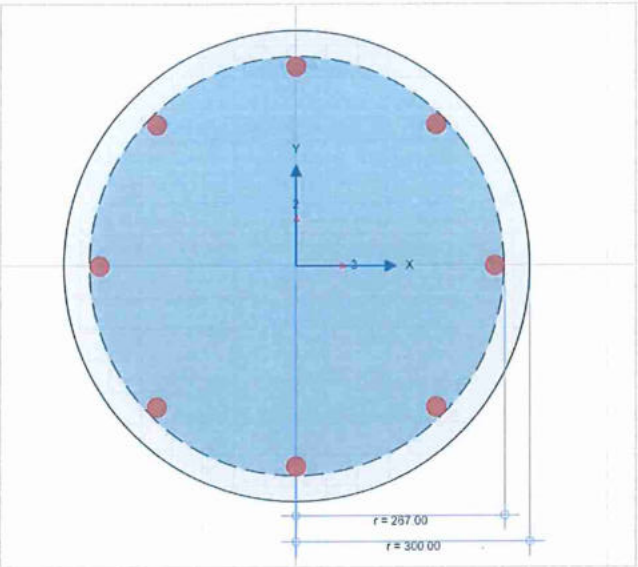
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSx - 1
Axial Load, $N_{Ed}$	764.48 (kN)
Moment Top, $M_x$	86.40 (kN-m)
Moment Bottom, $M_x$	-206.31 (kN-m)
Moment Top, $M_y$	-62.05 (kN-m)
Moment Bottom, $M_y$	85.63 (kN-m)
Design Moment, $M_{cDesign}$	206.31 (kN-m)
Max Capacity Ratio	0.73



COLUMN INFORMATION

Name	43 - C42
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

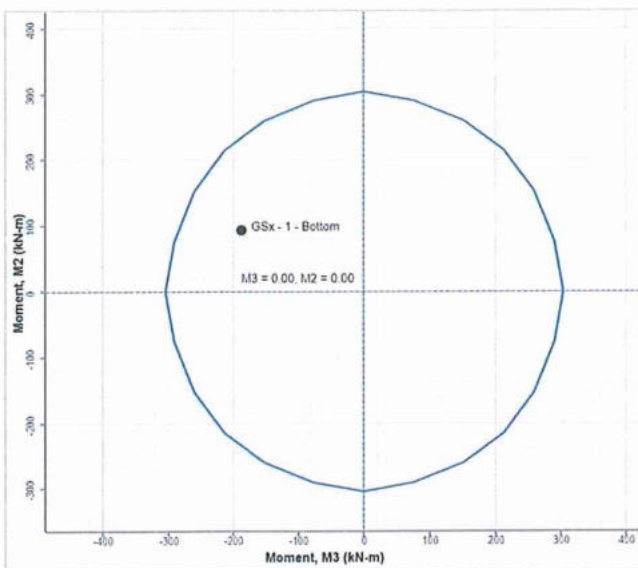
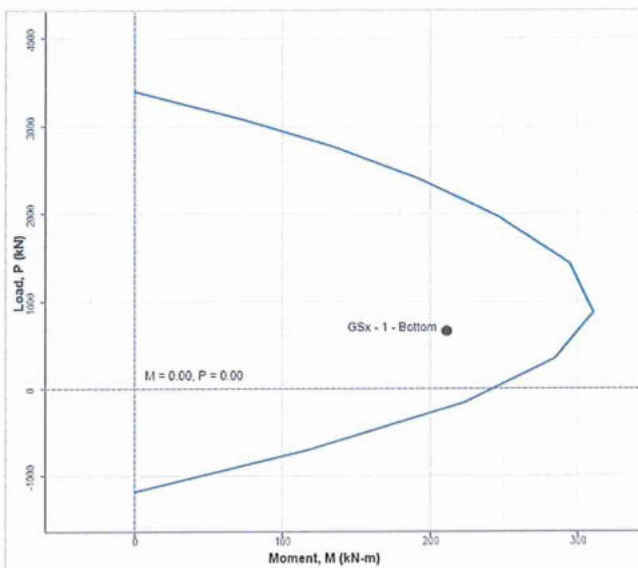
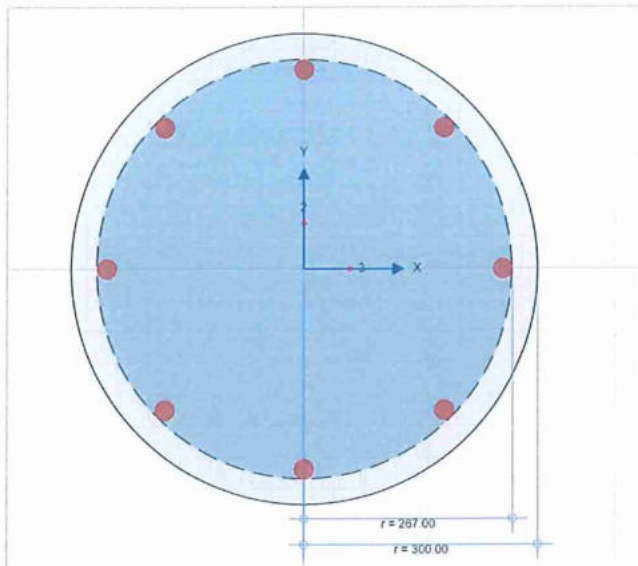
Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 3
Axial Load, $N_{Ed}$	583.05 (kN)
Moment Top, $M_x$	-57.04 (kN-m)
Moment Bottom, $M_x$	190.32 (kN-m)
Moment Top, $M_y$	-83.84 (kN-m)
Moment Bottom, $M_y$	98.03 (kN-m)
Design Moment, $M_{cDesign}$	190.32 (kN-m)
Max Capacity Ratio	0.72



**COLUMN INFORMATION**

Name	47 - C44
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

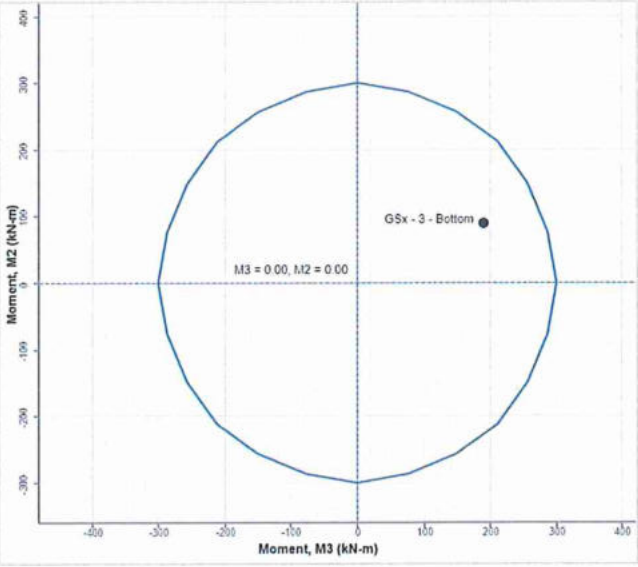
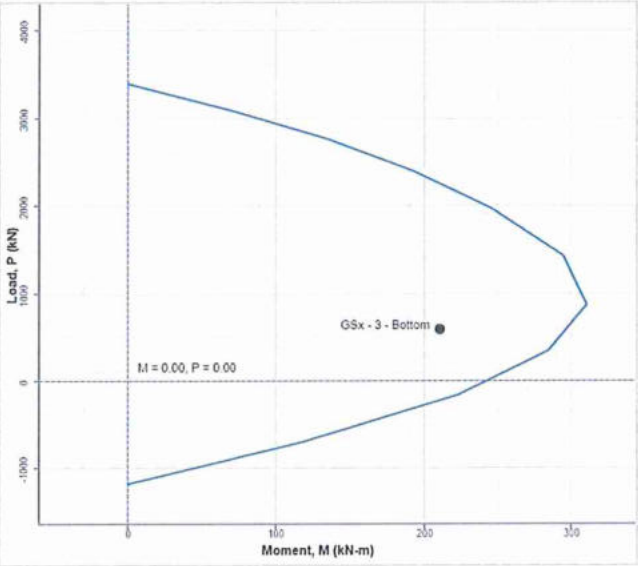
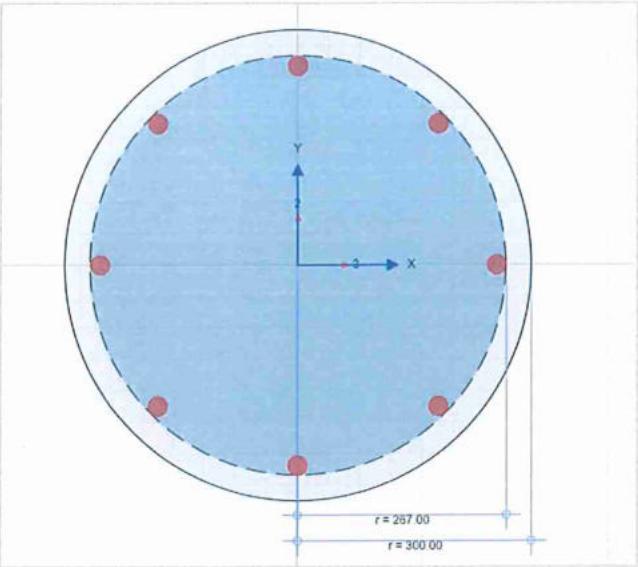
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSx - 1
Axial Load, $N_{Ed}$	659.36 (kN)
Moment Top, $M_x$	56.39 (kN-m)
Moment Bottom, $M_x$	-189.13 (kN-m)
Moment Top, $M_y$	-89.64 (kN-m)
Moment Bottom, $M_y$	93.87 (kN-m)
Design Moment, $M_{cDesign}$	189.13 (kN-m)
Max Capacity Ratio	0.70



COLUMN INFORMATION

Name	51 - C46
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

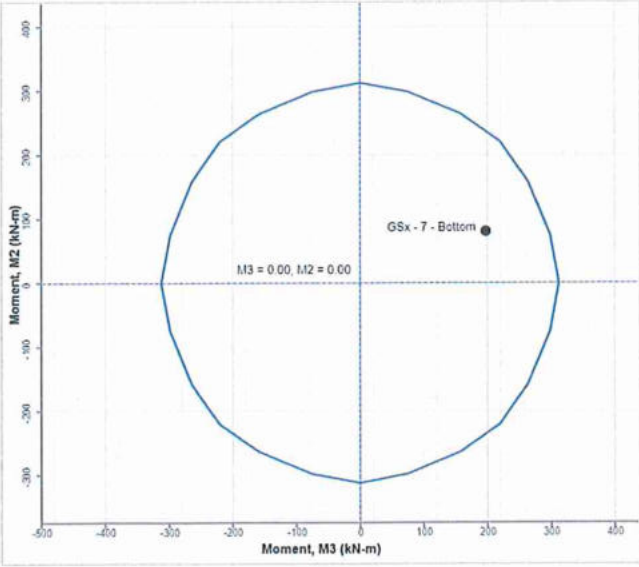
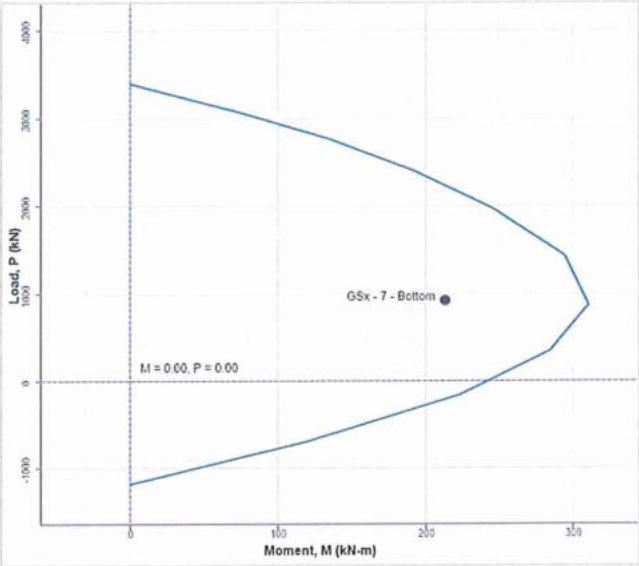
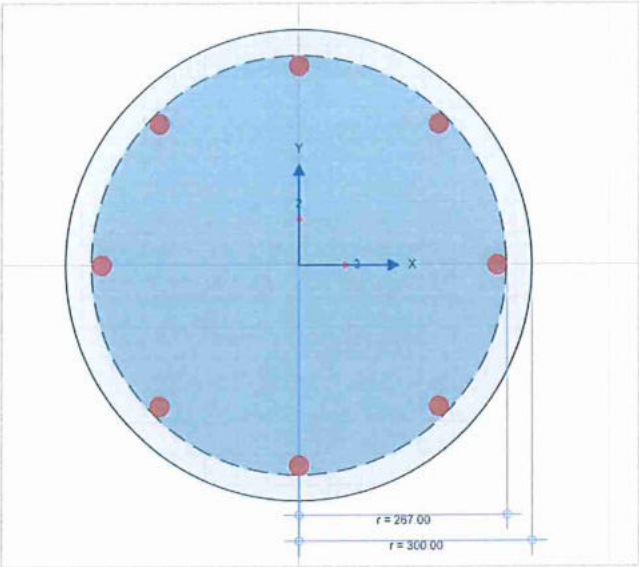
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 3
Axial Load, $N_{Ed}$	597.01 (kN)
Moment Top, $M_x$	-55.25 (kN-m)
Moment Bottom, $M_x$	189.78 (kN-m)
Moment Top, $M_y$	-86.51 (kN-m)
Moment Bottom, $M_y$	90.81 (kN-m)
Design Moment, $M_{cDesign}$	189.78 (kN-m)
Max Capacity Ratio	0.71



COLUMN INFORMATION

Name	55 - C49
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

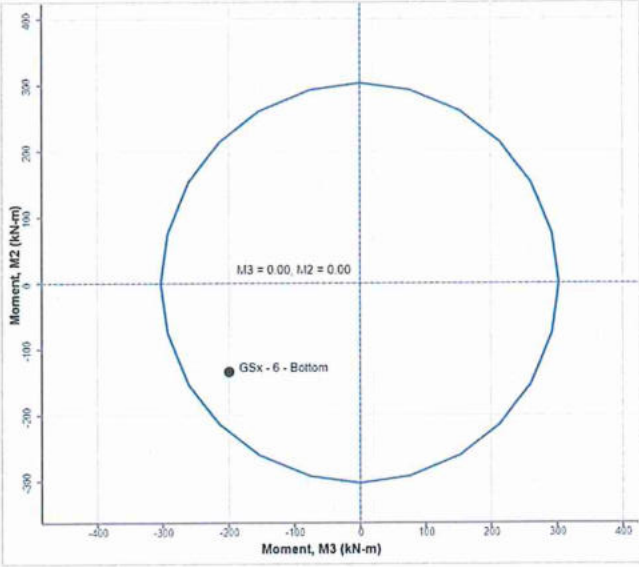
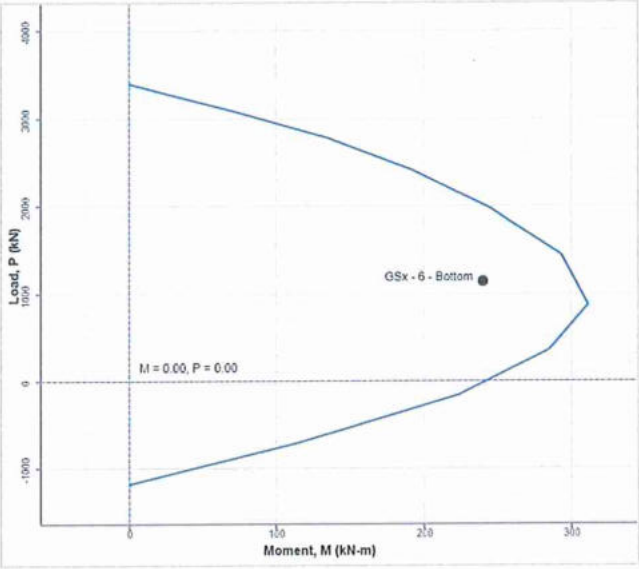
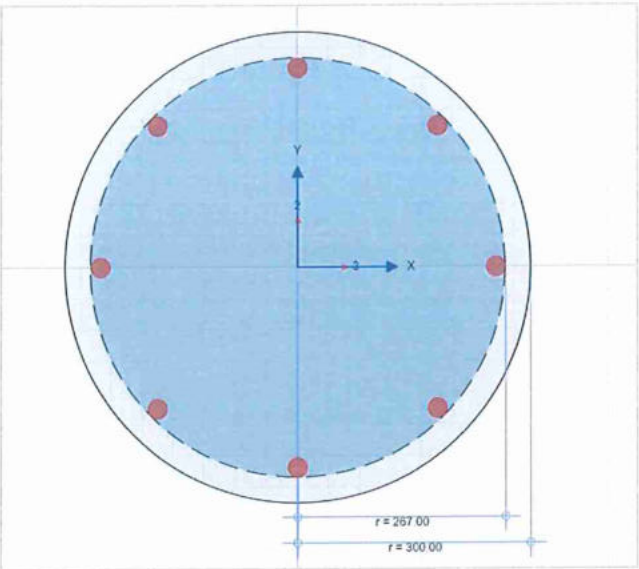
Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 7
Axial Load, $N_{Ed}$	925.61 (kN)
Moment Top, $M_x$	-76.17 (kN-m)
Moment Bottom, $M_x$	197.18 (kN-m)
Moment Top, $M_y$	-59.37 (kN-m)
Moment Bottom, $M_y$	81.14 (kN-m)
Design Moment, $M_{cDesign}$	197.18 (kN-m)
Max Capacity Ratio	0.69





COLUMN INFORMATION

Name	59 - C52
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

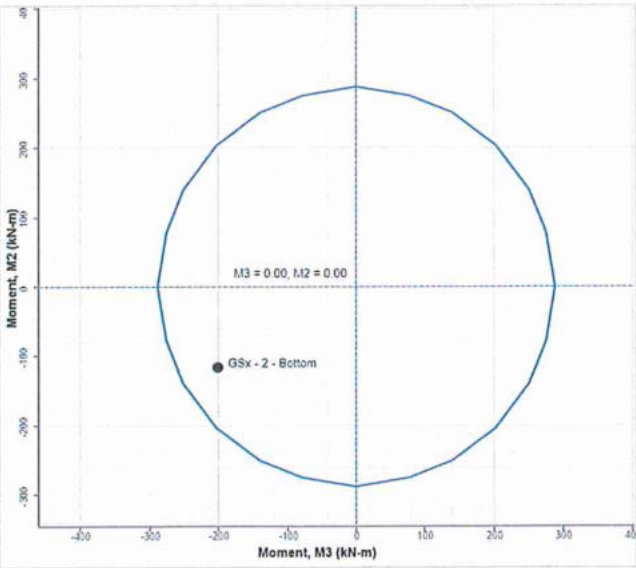
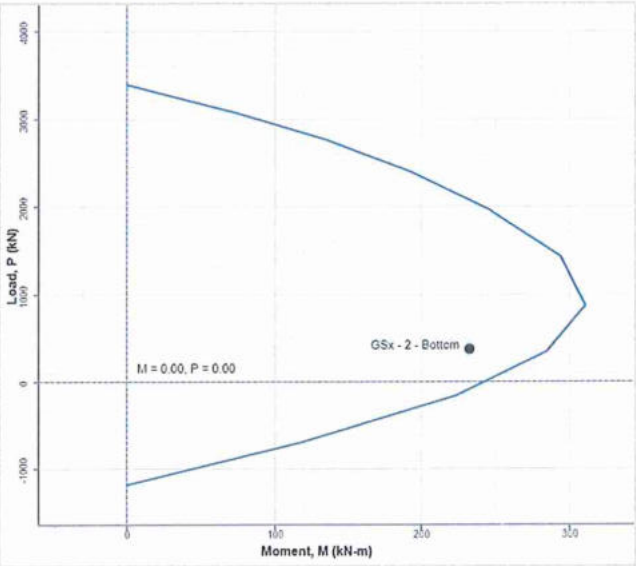
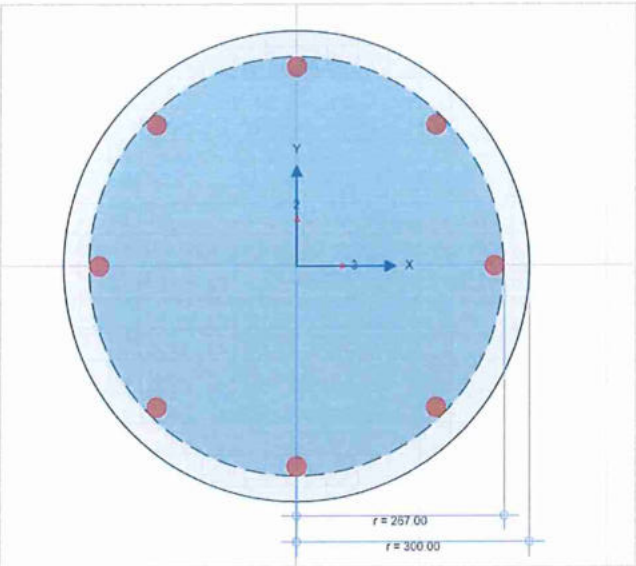
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 6
Axial Load, $N_{Ed}$	1,146.32 (kN)
Moment Top, $M_x$	69.13 (kN-m)
Moment Bottom, $M_x$	-199.89 (kN-m)
Moment Top, $M_y$	38.16 (kN-m)
Moment Bottom, $M_y$	-132.93 (kN-m)
Design Moment, $M_{cDesign}$	199.89 (kN-m)
Max Capacity Ratio	0.79



COLUMN INFORMATION

Name	62 - C24
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, $A$	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

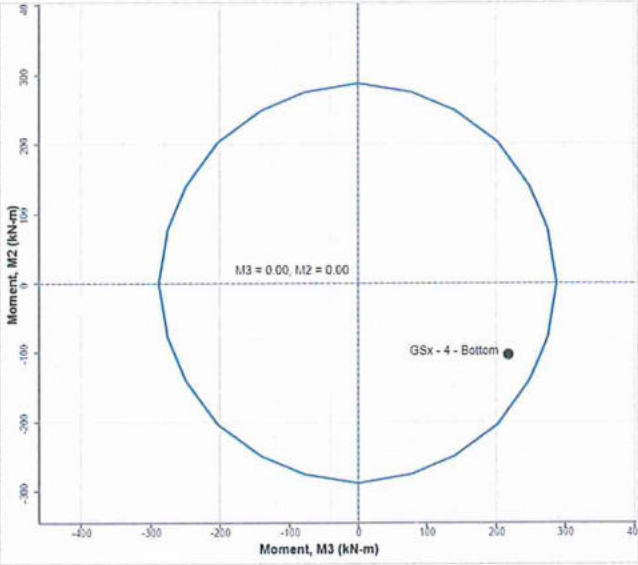
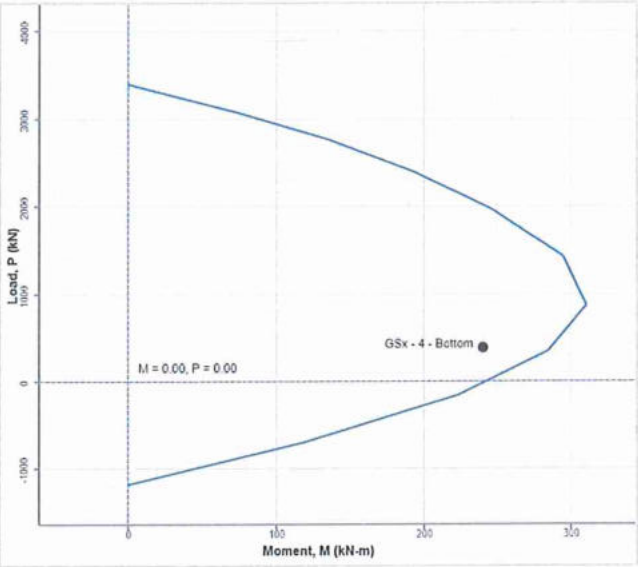
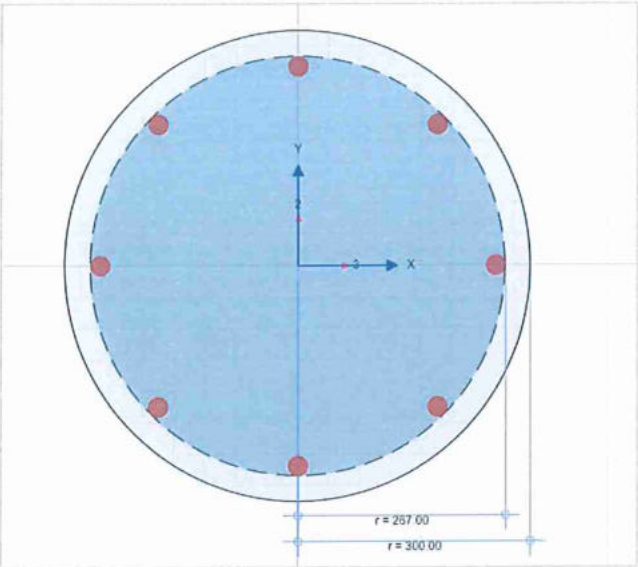
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 2
Axial Load, $N_{Ed}$	380.36 (kN)
Moment Top, $M_x$	54.45 (kN-m)
Moment Bottom, $M_x$	-201.29 (kN-m)
Moment Top, $M_y$	58.54 (kN-m)
Moment Bottom, $M_y$	-115.65 (kN-m)
Design Moment, $M_{cDesign}$	201.29 (kN-m)
Max Capacity Ratio	0.81



### COLUMN INFORMATION

Name	6 - C3
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular
Confinement Zone	Confined
	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

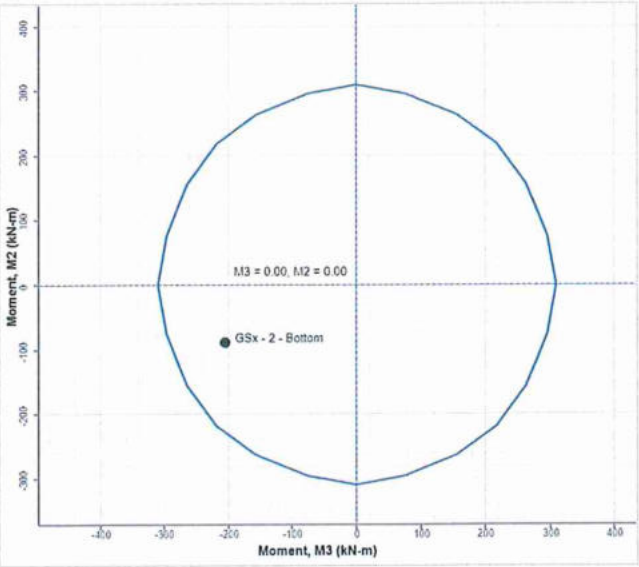
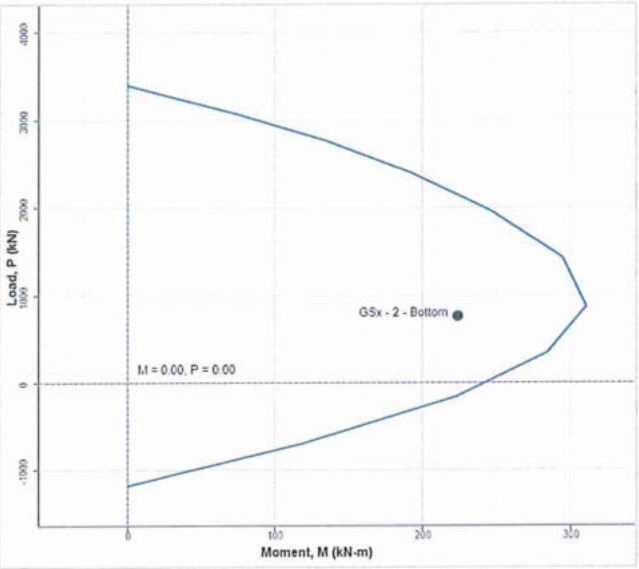
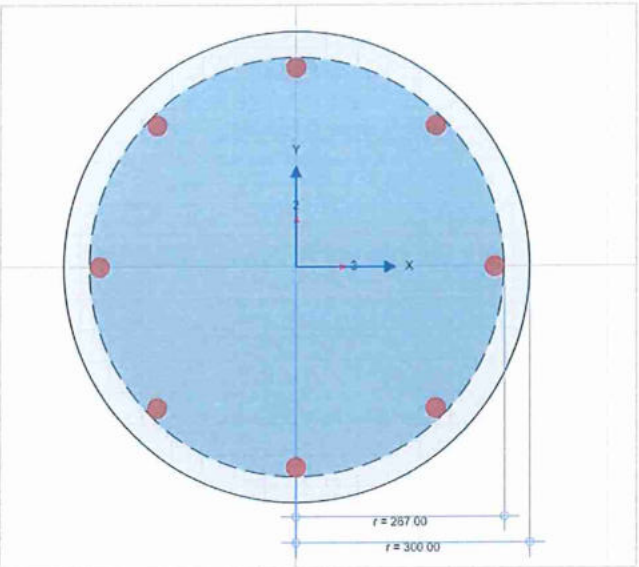
#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSx - 4
Axial Load, $N_{Ed}$	384.43 (kN)
Moment Top, $M_x$	-60.58 (kN-m)
Moment Bottom, $M_x$	216.99 (kN-m)
Moment Top, $M_y$	53.12 (kN-m)
Moment Bottom, $M_y$	-102.44 (kN-m)
Design Moment, $M_{cDesign}$	216.99 (kN-m)
Max Capacity Ratio	0.84





### COLUMN INFORMATION

Name	40 - C40
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

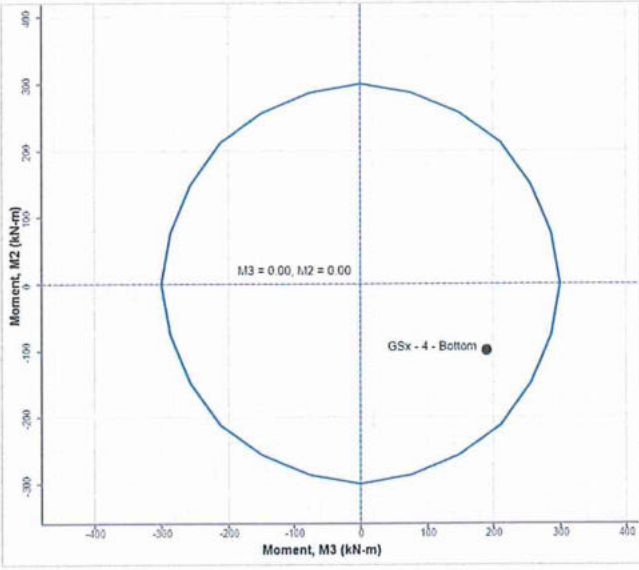
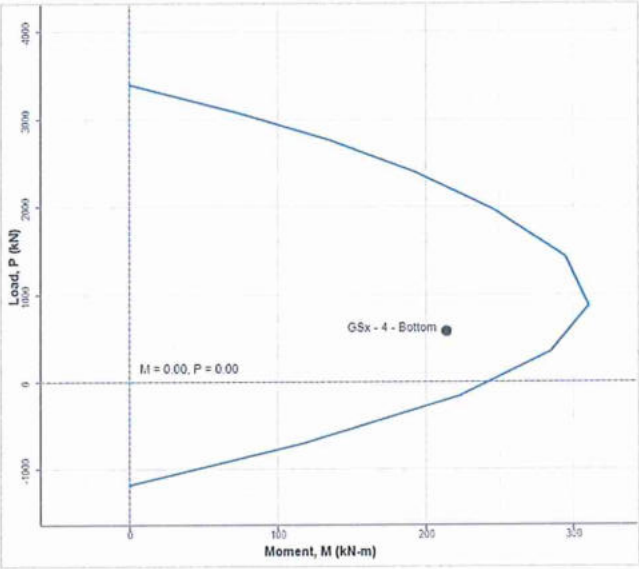
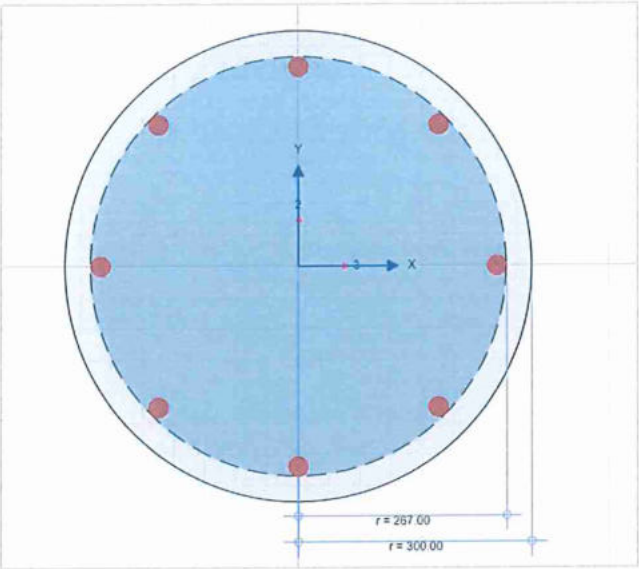
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSx - 2
Axial Load, $N_{Ed}$	769.75 (kN)
Moment Top, $M_x$	86.58 (kN-m)
Moment Bottom, $M_x$	-206.16 (kN-m)
Moment Top, $M_y$	67.97 (kN-m)
Moment Bottom, $M_y$	-87.58 (kN-m)
Design Moment, $M_{cDesign}$	206.16 (kN-m)
Max Capacity Ratio	0.73



COLUMN INFORMATION

Name	44 - C43
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

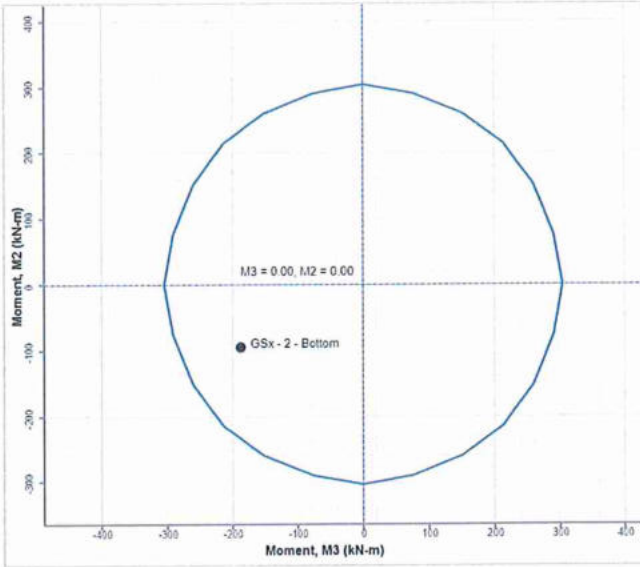
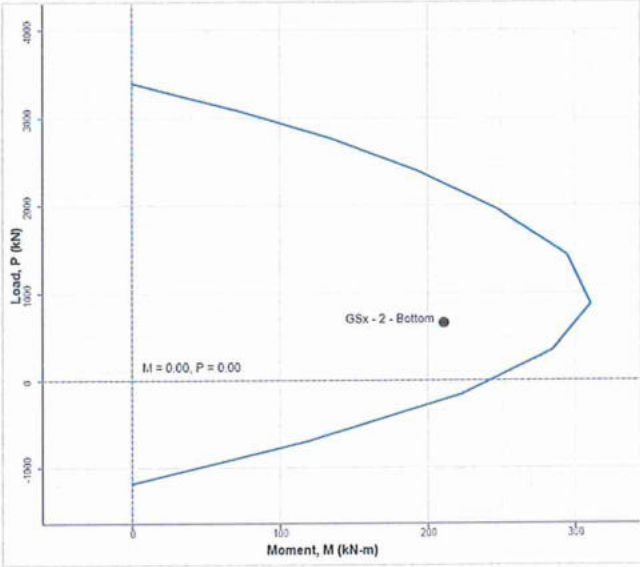
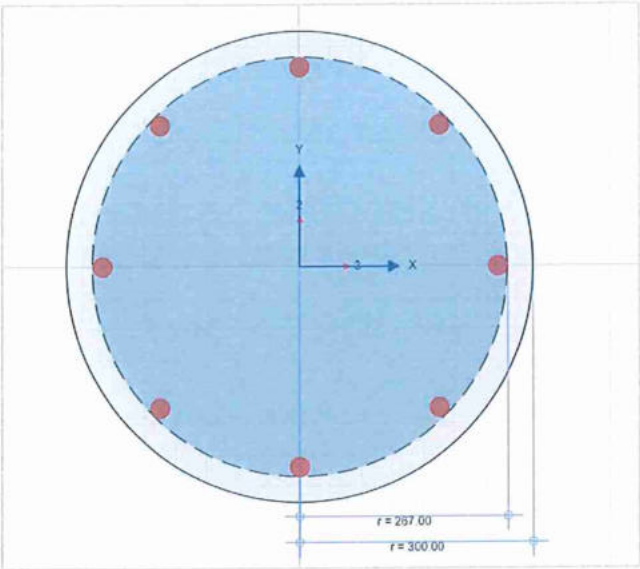
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 4
Axial Load, $N_{Ed}$	586.73 (kN)
Moment Top, $M_x$	-55.81 (kN-m)
Moment Bottom, $M_x$	189.53 (kN-m)
Moment Top, $M_y$	87.07 (kN-m)
Moment Bottom, $M_y$	-99.53 (kN-m)
Design Moment, $M_{cDesign}$	189.53 (kN-m)
Max Capacity Ratio	0.72



COLUMN INFORMATION

Name	48 - C45
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

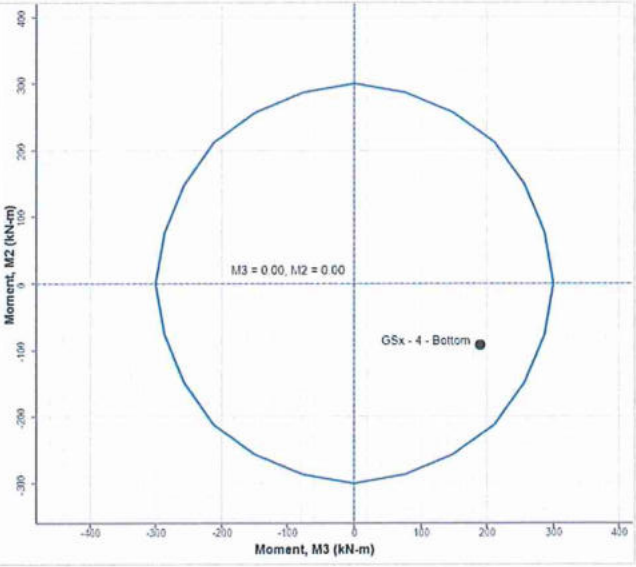
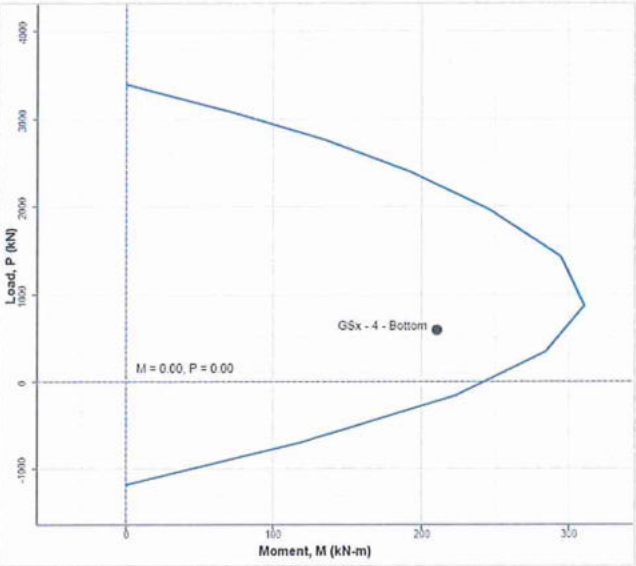
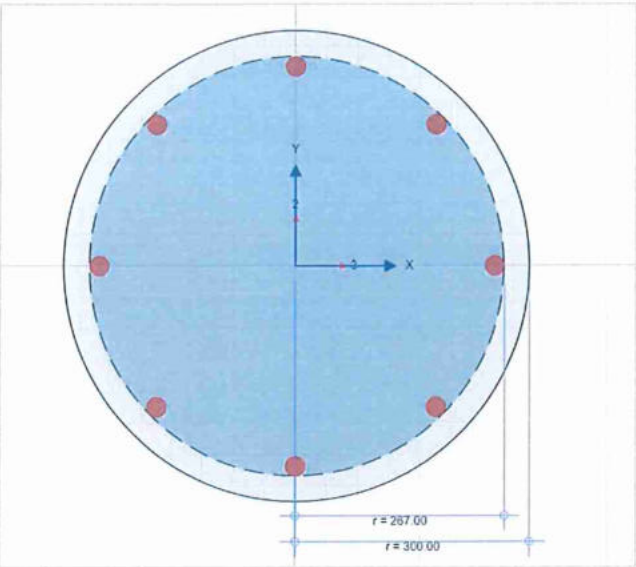
Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 2
Axial Load, $N_{Ed}$	660.04 (kN)
Moment Top, $M_x$	56.07 (kN-m)
Moment Bottom, $M_x$	-189.04 (kN-m)
Moment Top, $M_y$	89.53 (kN-m)
Moment Bottom, $M_y$	-93.73 (kN-m)
Design Moment, $M_{cDesign}$	189.04 (kN-m)
Max Capacity Ratio	0.70





COLUMN INFORMATION

Name	52 - C47
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

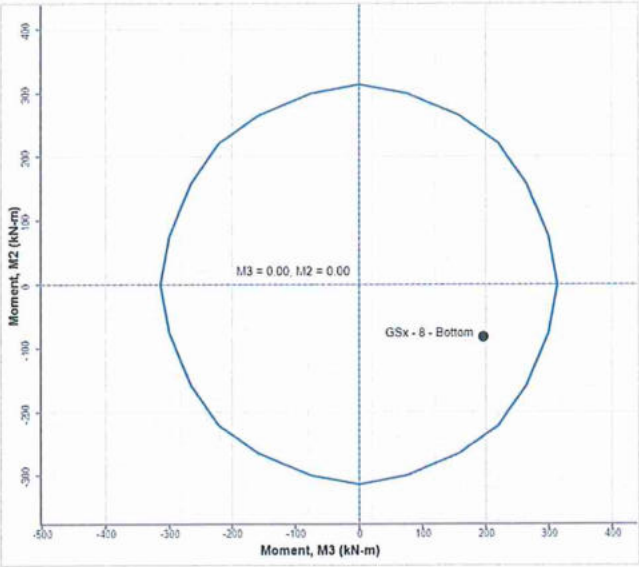
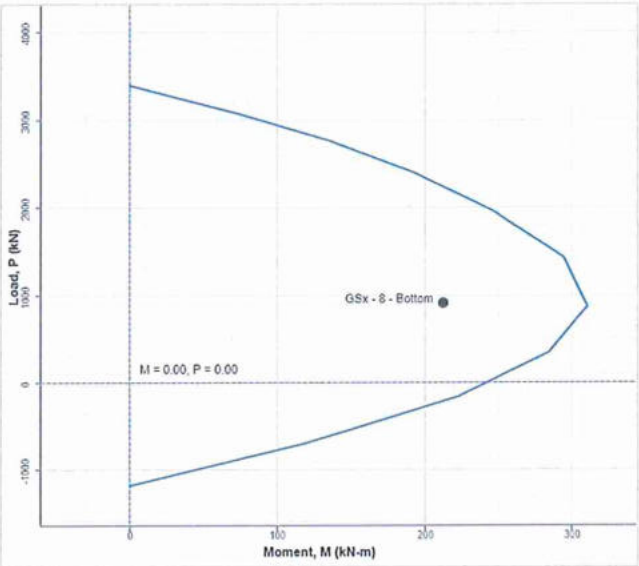
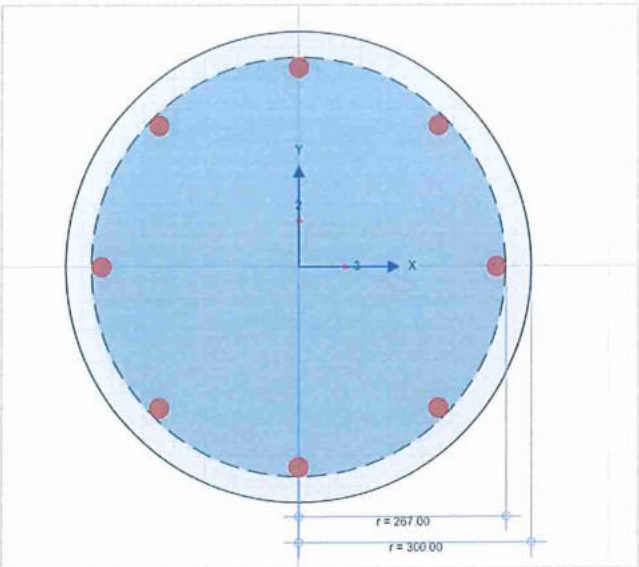
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 4
Axial Load, $N_{Ed}$	591.16 (kN)
Moment Top, $M_x$	-54.01 (kN-m)
Moment Bottom, $M_x$	189.40 (kN-m)
Moment Top, $M_y$	83.53 (kN-m)
Moment Bottom, $M_y$	-91.44 (kN-m)
Design Moment, $M_{cDesign}$	189.40 (kN-m)
Max Capacity Ratio	0.71



### COLUMN INFORMATION

Name	56 - C50
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

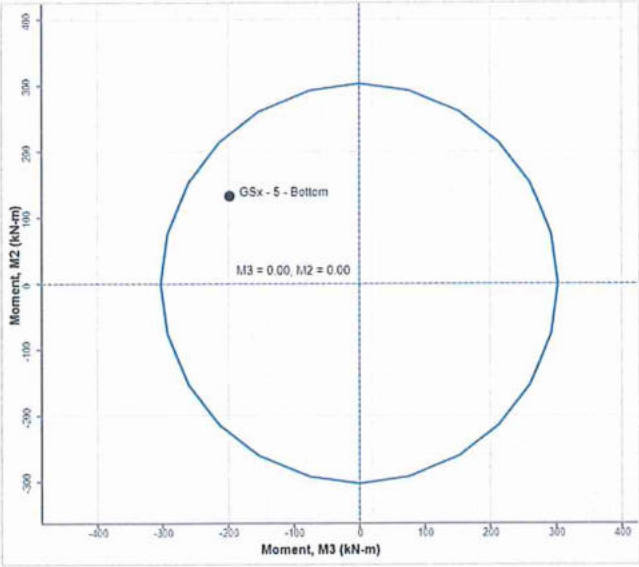
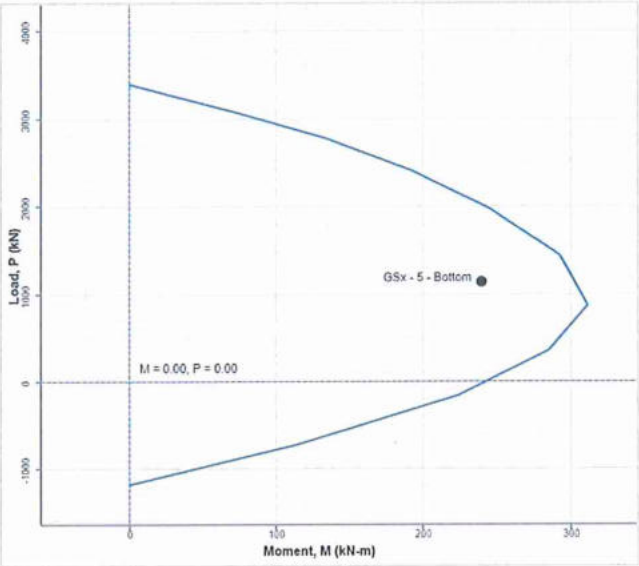
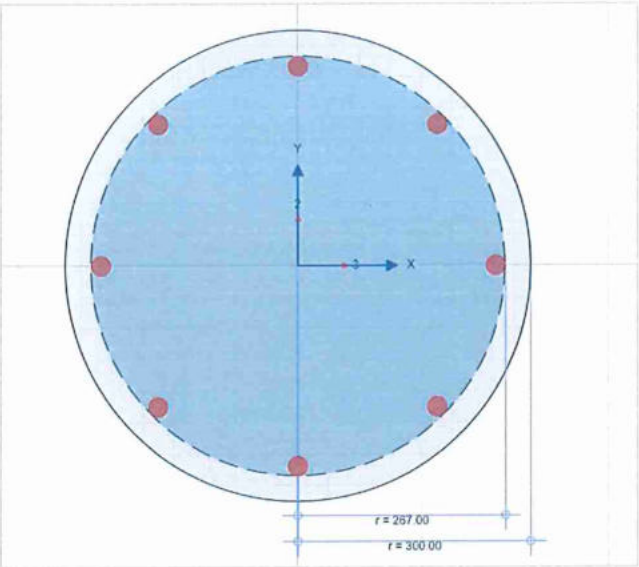
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSx - 8
Axial Load, $N_{Ed}$	911.67 (kN)
Moment Top, $M_x$	-75.94 (kN-m)
Moment Bottom, $M_x$	196.49 (kN-m)
Moment Top, $M_y$	55.11 (kN-m)
Moment Bottom, $M_y$	-81.58 (kN-m)
Design Moment, $M_{cDesign}$	196.49 (kN-m)
Max Capacity Ratio	0.69



COLUMN INFORMATION

Name	60 - C53
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

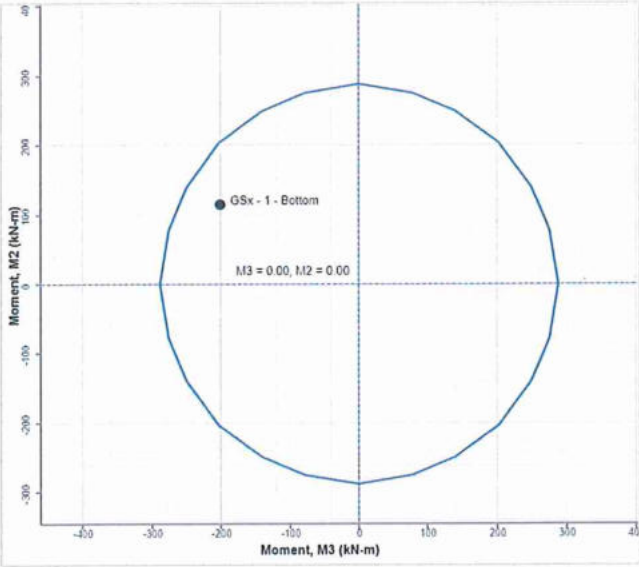
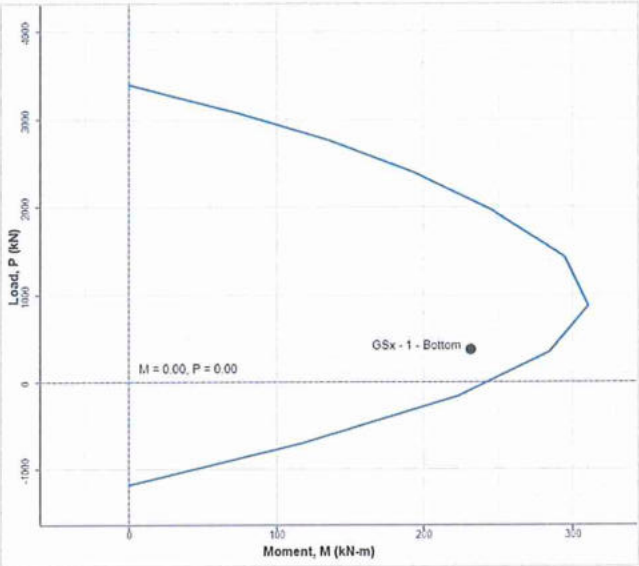
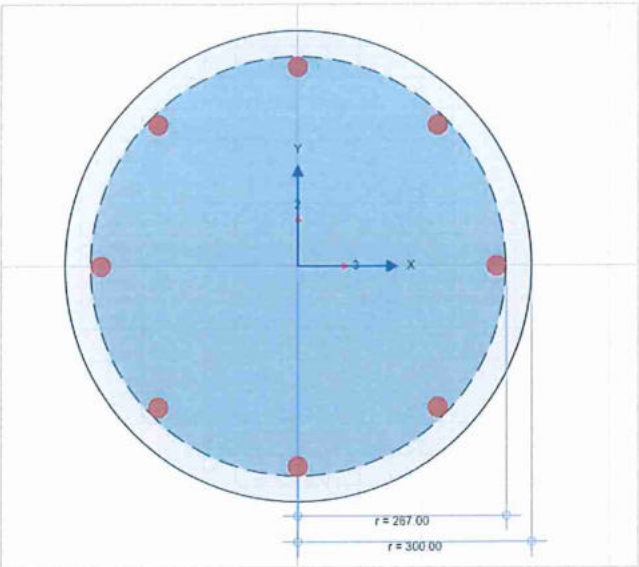
Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 5
Axial Load, $N_{Ed}$	1,141.88 (kN)
Moment Top, $M_x$	68.08 (kN-m)
Moment Bottom, $M_x$	-198.59 (kN-m)
Moment Top, $M_y$	-40.09 (kN-m)
Moment Bottom, $M_y$	133.69 (kN-m)
Design Moment, $M_{cDesign}$	198.59 (kN-m)
Max Capacity Ratio	0.79





### COLUMN INFORMATION

Name	63 - C25
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

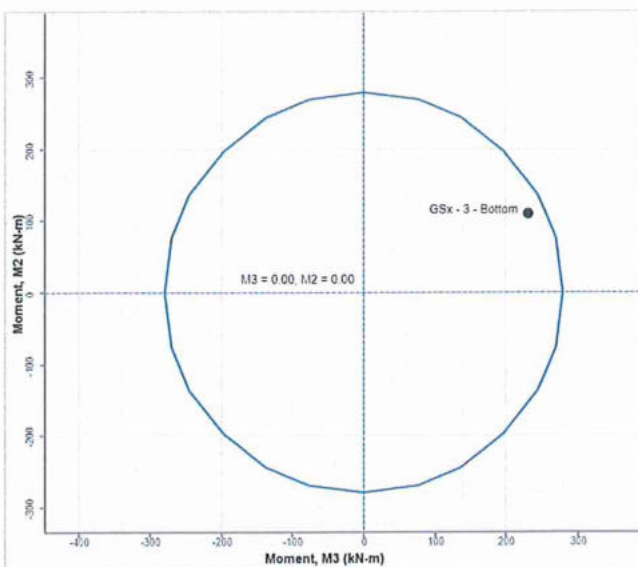
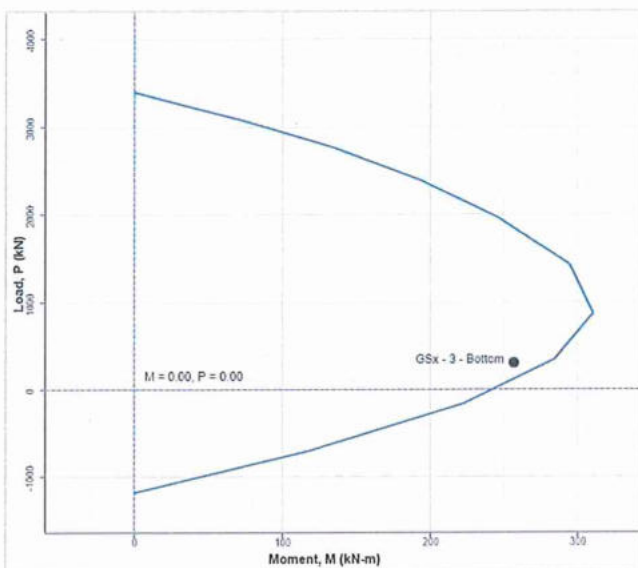
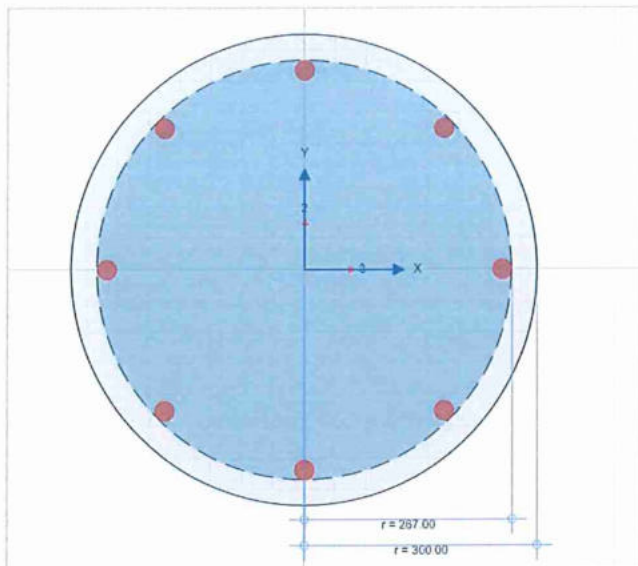
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSx - 1
Axial Load, $N_{Ed}$	382.46 (kN)
Moment Top, $M_x$	54.51 (kN-m)
Moment Bottom, $M_x$	-201.21 (kN-m)
Moment Top, $M_y$	-58.07 (kN-m)
Moment Bottom, $M_y$	114.76 (kN-m)
Design Moment, $M_{cDesign}$	201.21 (kN-m)
Max Capacity Ratio	0.81

**COLUMN INFORMATION**

Name	37 - C21
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

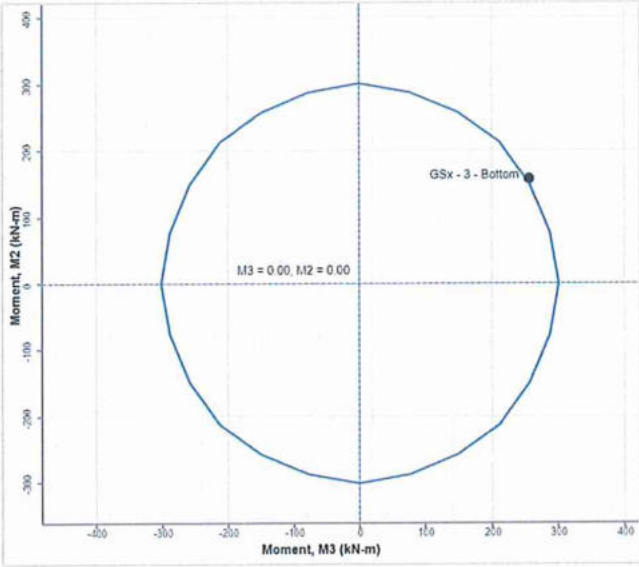
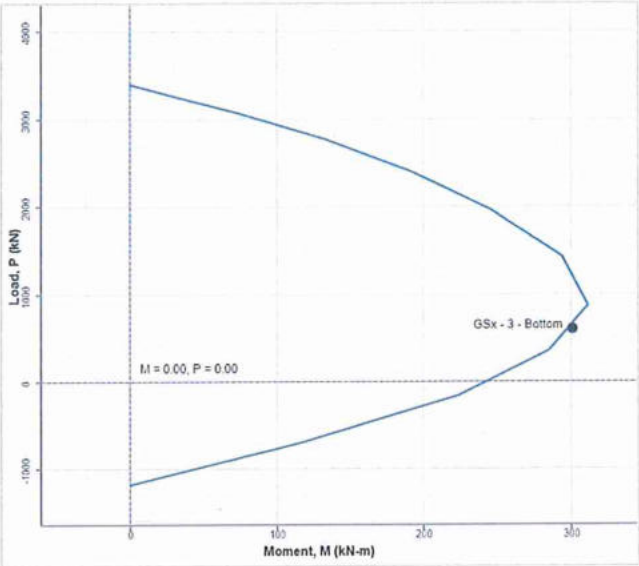
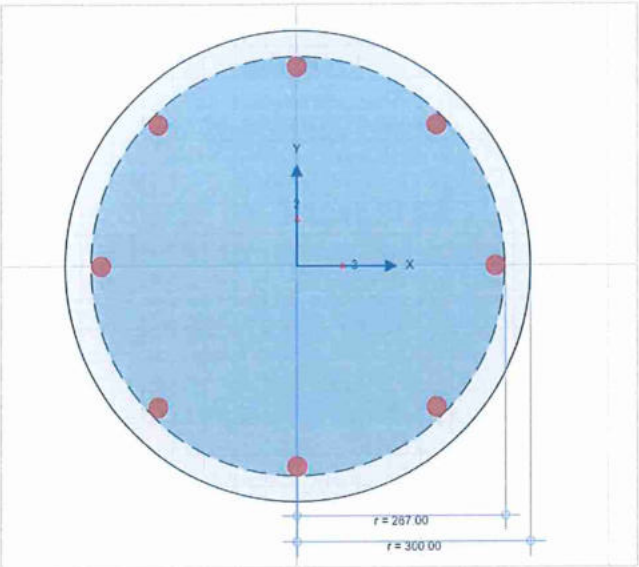
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSx - 3
Axial Load, $N_{Ed}$	313.61 (kN)
Moment Top, $M_x$	-43.82 (kN-m)
Moment Bottom, $M_x$	231.40 (kN-m)
Moment Top, $M_y$	-60.41 (kN-m)
Moment Bottom, $M_y$	110.84 (kN-m)
Design Moment, $M_{cDesign}$	231.40 (kN-m)
Max Capacity Ratio	0.91



COLUMN INFORMATION

Name	41 - C41
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

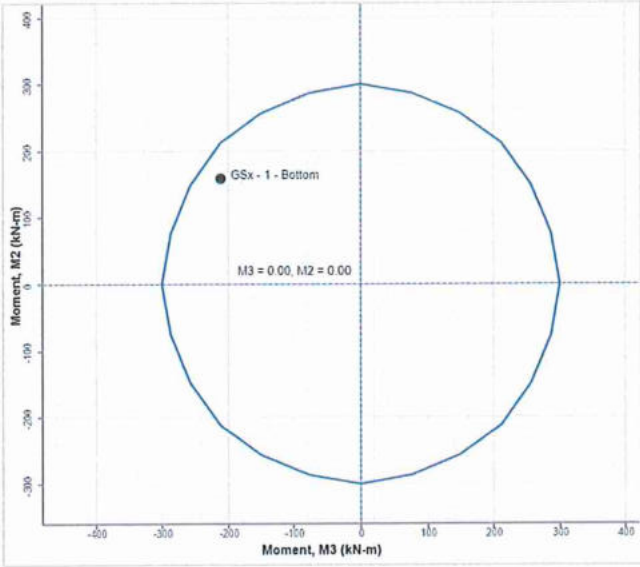
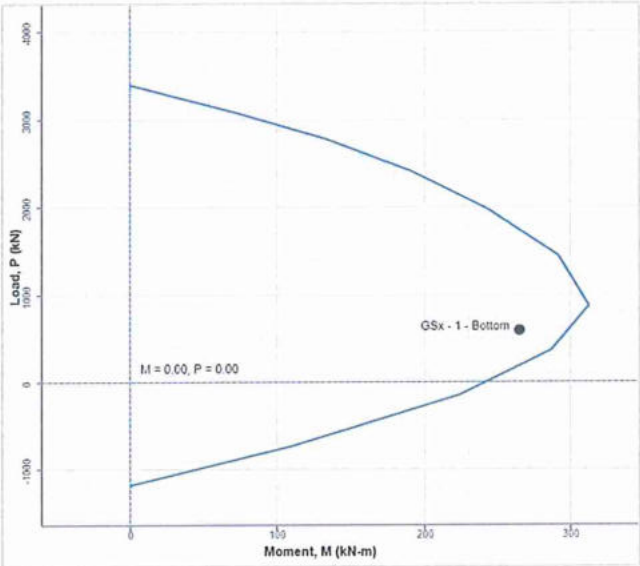
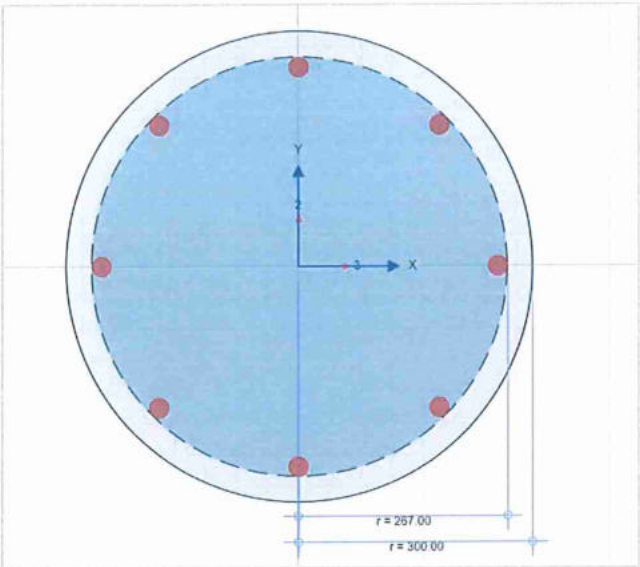
Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 3
Axial Load, $N_{Ed}$	601.82 (kN)
Moment Top, $M_x$	-60.33 (kN-m)
Moment Bottom, $M_x$	255.85 (kN-m)
Moment Top, $M_y$	-89.98 (kN-m)
Moment Bottom, $M_y$	157.64 (kN-m)
Design Moment, $M_{cDesign}$	255.85 (kN-m)
Max Capacity Ratio	1.01





COLUMN INFORMATION

Name	45 - C33
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

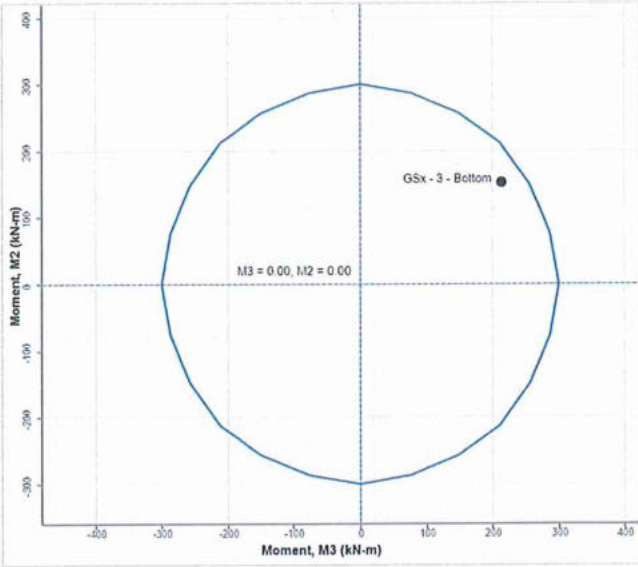
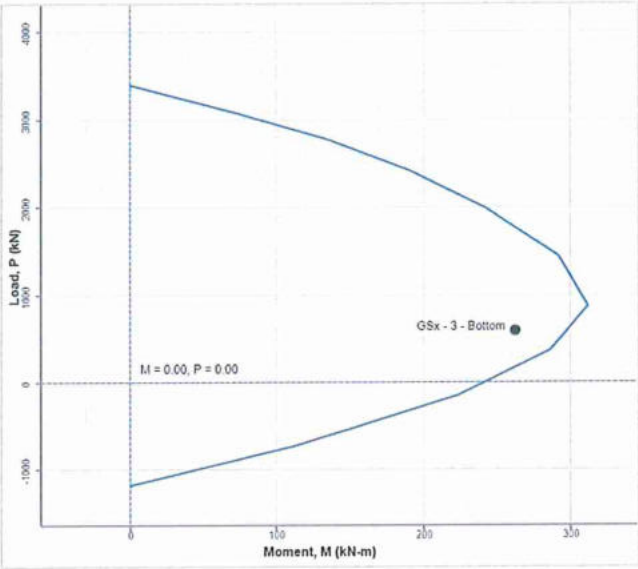
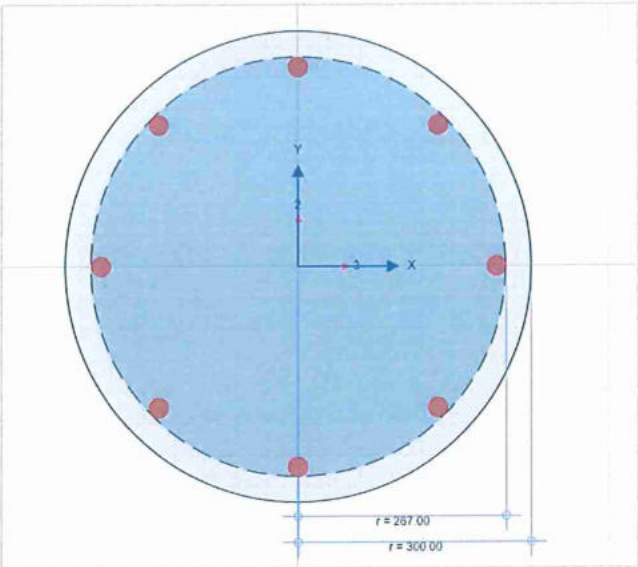
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 1
Axial Load, $N_{Ed}$	592.42 (kN)
Moment Top, $M_x$	58.13 (kN-m)
Moment Bottom, $M_x$	-212.23 (kN-m)
Moment Top, $M_y$	-90.98 (kN-m)
Moment Bottom, $M_y$	158.58 (kN-m)
Design Moment, $M_{cDesign}$	212.23 (kN-m)
Max Capacity Ratio	0.89



COLUMN INFORMATION

Name	49 - C35
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, $A$	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

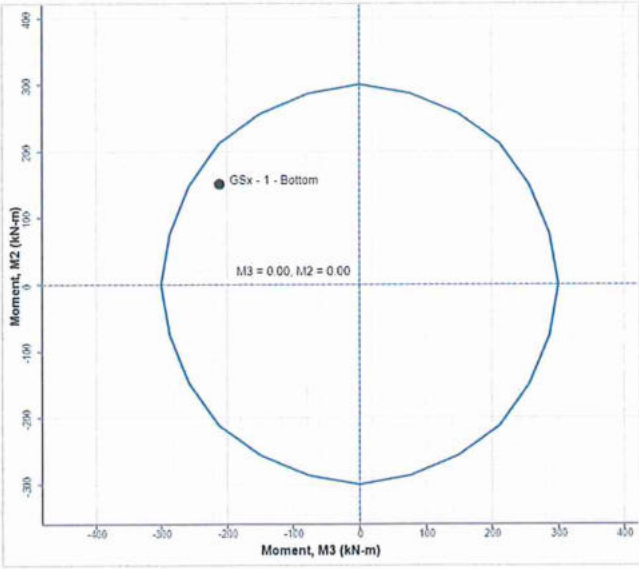
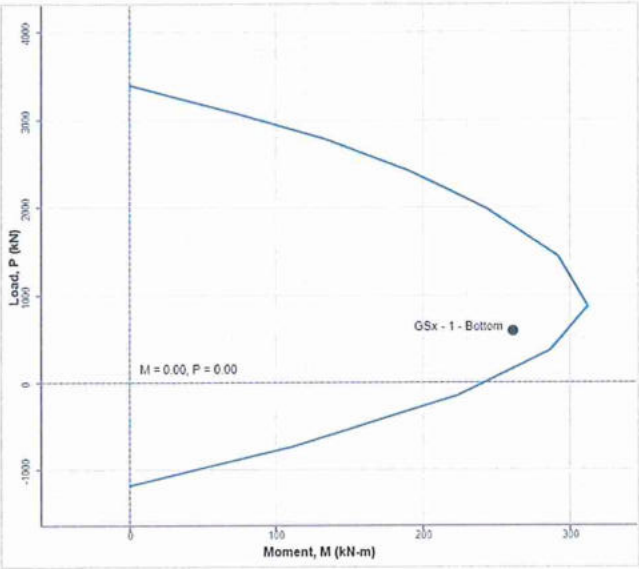
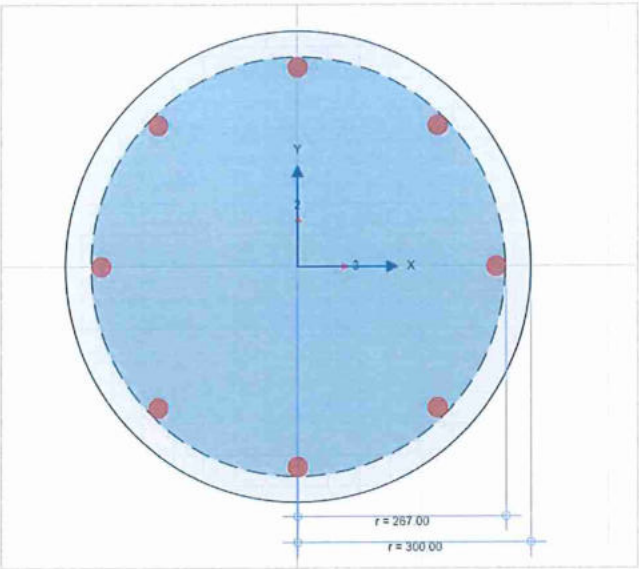
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 3
Axial Load, $N_{Ed}$	595.27 (kN)
Moment Top, $M_x$	-58.39 (kN-m)
Moment Bottom, $M_x$	212.81 (kN-m)
Moment Top, $M_y$	-91.67 (kN-m)
Moment Bottom, $M_y$	153.32 (kN-m)
Design Moment, $M_{cDesign}$	212.81 (kN-m)
Max Capacity Ratio	0.88



COLUMN INFORMATION

Name	53 - C37
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

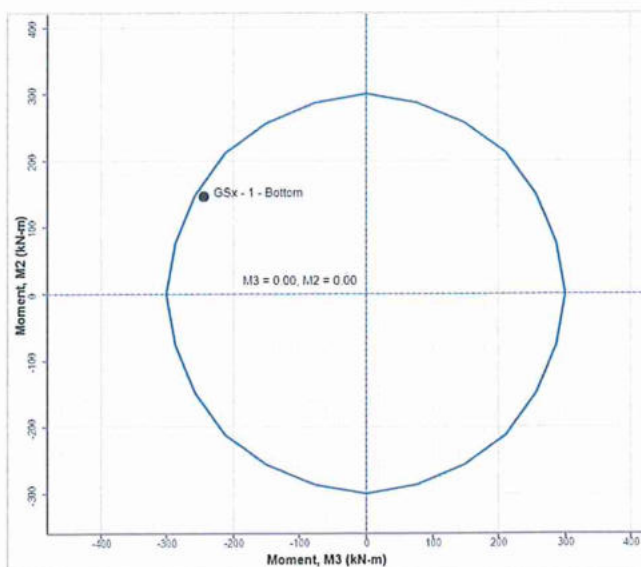
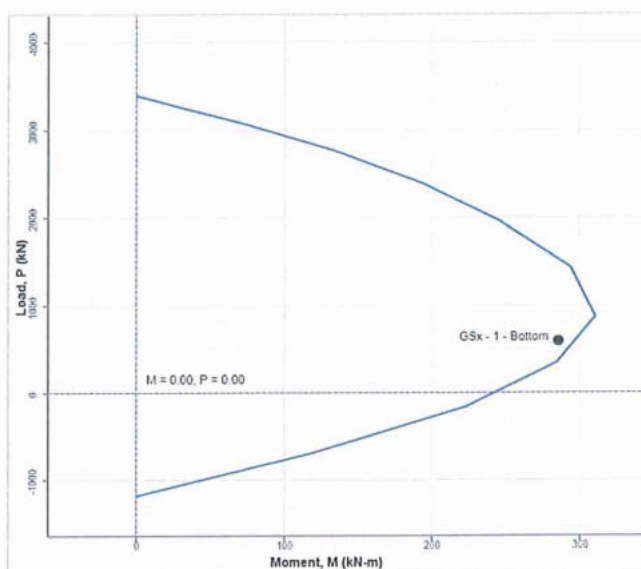
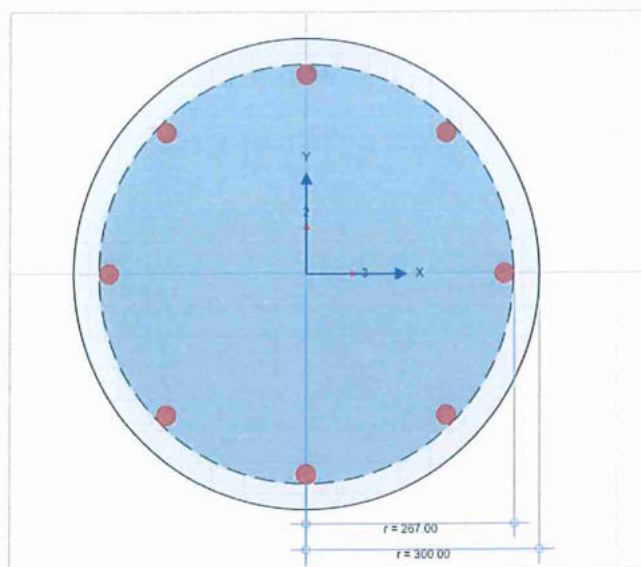
Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSx - 1
Axial Load, $N_{Ed}$	588.79 (kN)
Moment Top, $M_x$	59.90 (kN-m)
Moment Bottom, $M_x$	-212.34 (kN-m)
Moment Top, $M_y$	-87.12 (kN-m)
Moment Bottom, $M_y$	151.92 (kN-m)
Design Moment, $M_{cDesign}$	212.34 (kN-m)
Max Capacity Ratio	0.88



**COLUMN INFORMATION**

Name	57 - C51
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

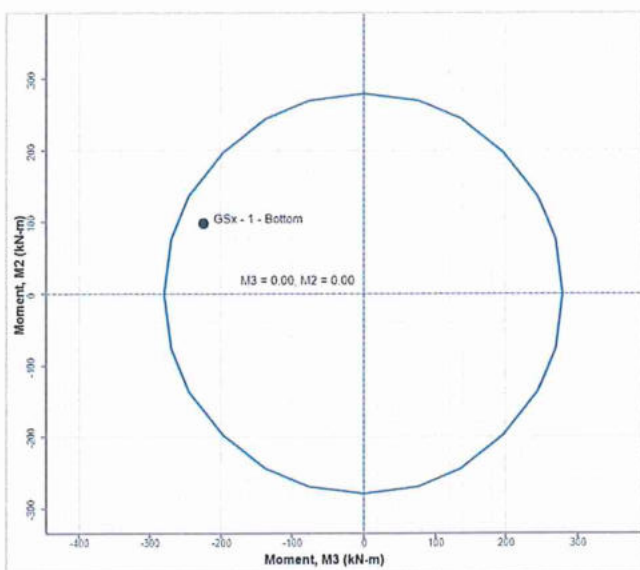
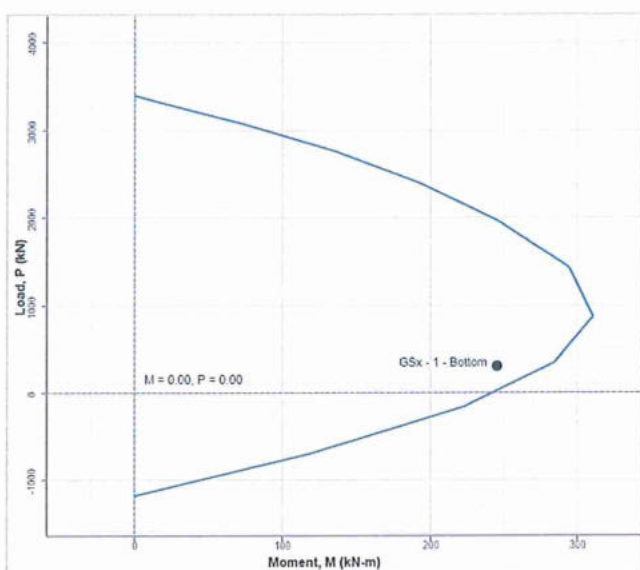
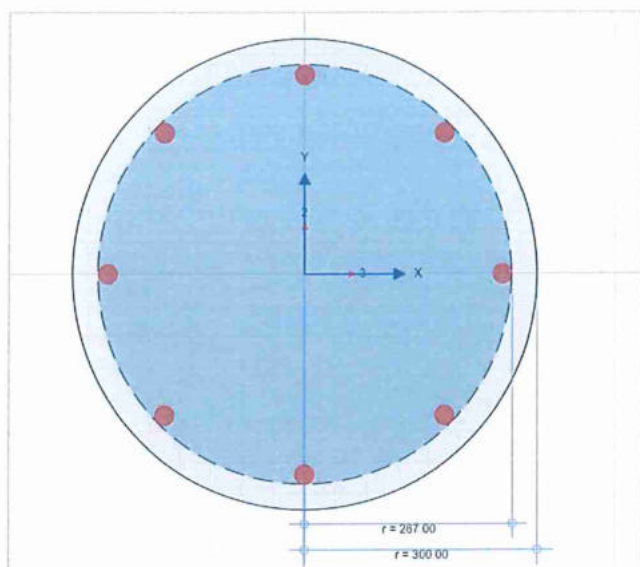
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSx - 1
Axial Load, $N_{Ed}$	592.56 (kN)
Moment Top, $M_x$	59.68 (kN-m)
Moment Bottom, $M_x$	-244.69 (kN-m)
Moment Top, $M_y$	-78.49 (kN-m)
Moment Bottom, $M_y$	146.47 (kN-m)
Design Moment, $M_{cDesign}$	244.69 (kN-m)
Max Capacity Ratio	0.96

**COLUMN INFORMATION**

Name	61 - C4
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

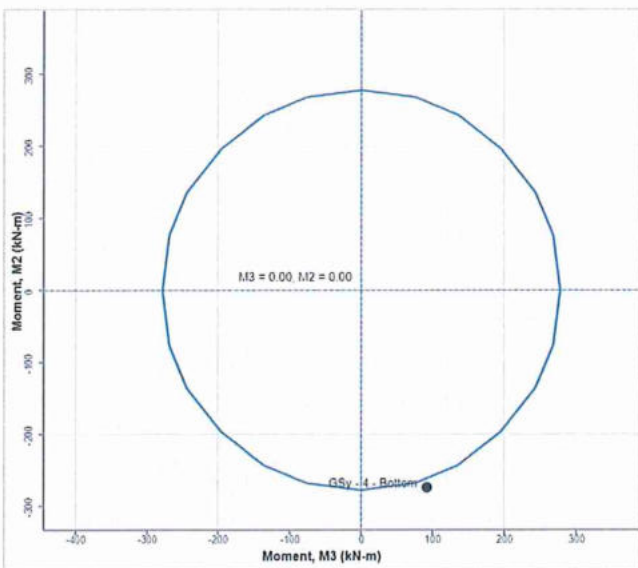
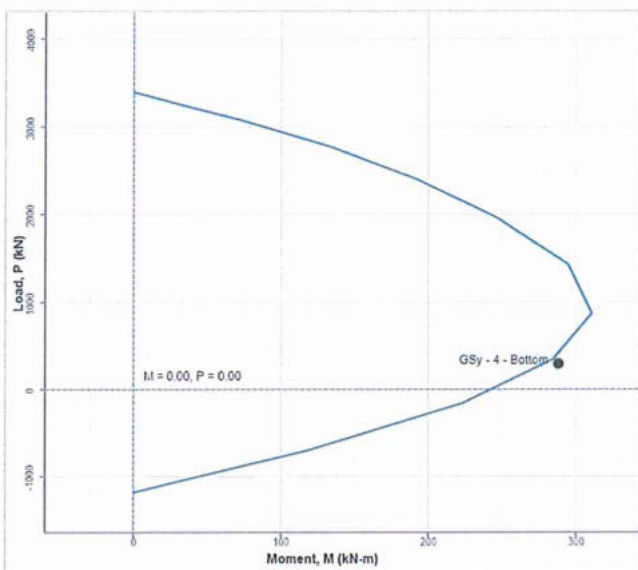
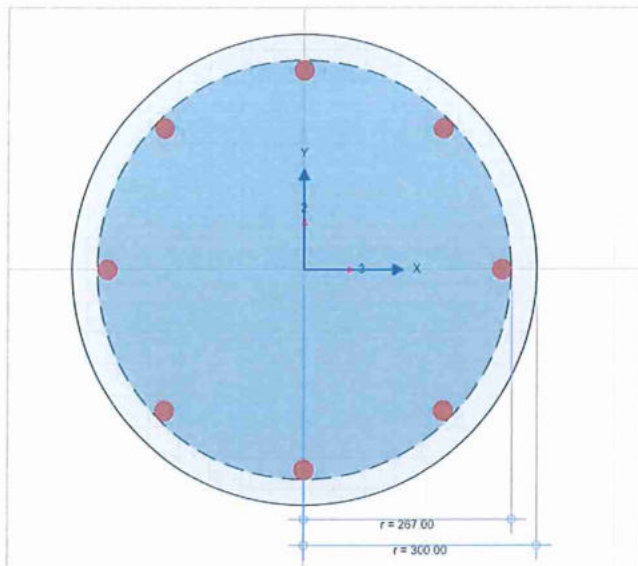
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSx - 1
Axial Load, $N_{Ed}$	306.76 (kN)
Moment Top, $M_x$	43.66 (kN-m)
Moment Bottom, $M_x$	-224.73 (kN-m)
Moment Top, $M_y$	-56.22 (kN-m)
Moment Bottom, $M_y$	99.23 (kN-m)
Design Moment, $M_{cDesign}$	224.73 (kN-m)
Max Capacity Ratio	0.88

**COLUMN INFORMATION**

Name	2 - C1
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

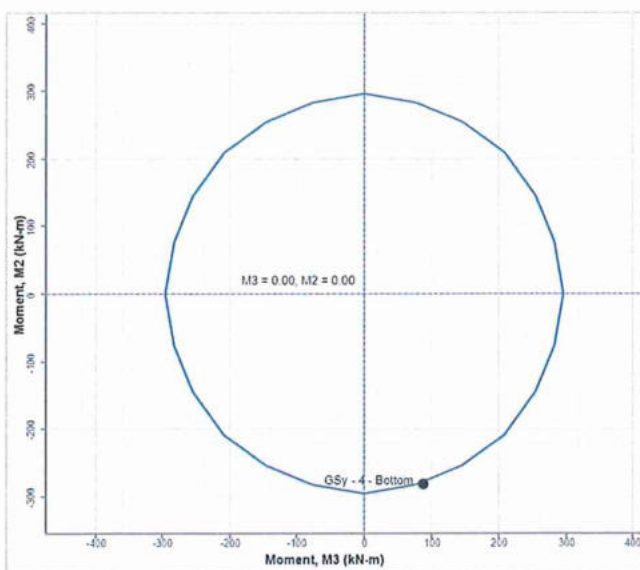
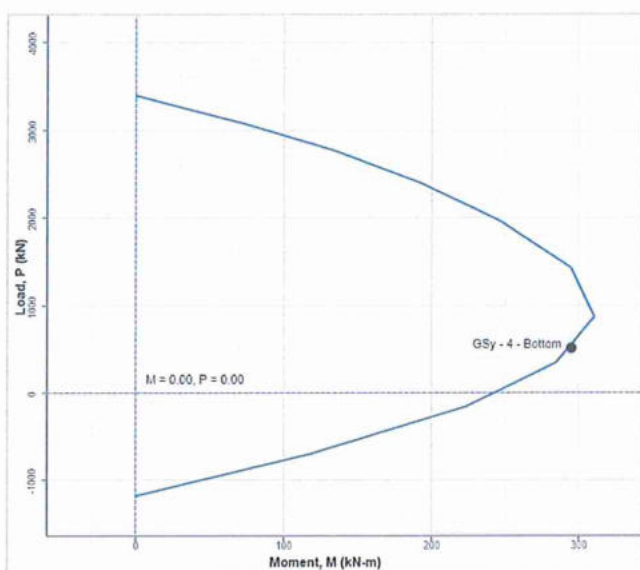
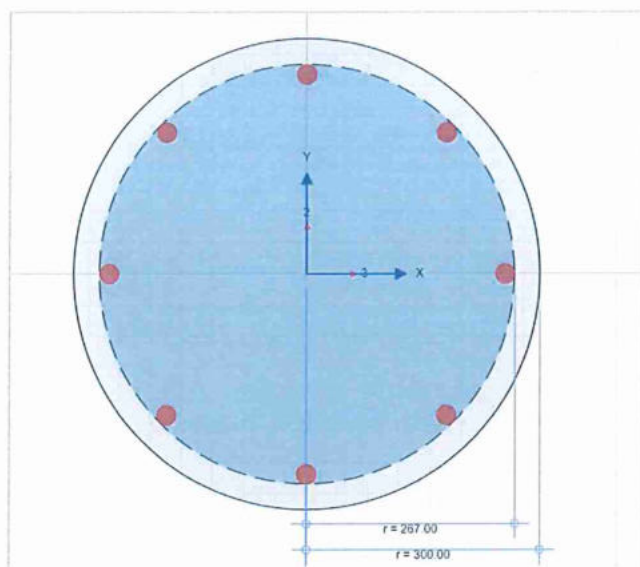
**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSy - 4
Axial Load, $N_{Ed}$	296.57 (kN)
Moment Top, $M_x$	-24.69 (kN-m)
Moment Bottom, $M_x$	91.11 (kN-m)
Moment Top, $M_y$	81.42 (kN-m)
Moment Bottom, $M_y$	-273.24 (kN-m)
Design Moment, $M_{cDesign}$	273.24 (kN-m)
Max Capacity Ratio	1.03





### COLUMN INFORMATION

Name	38 - C38
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

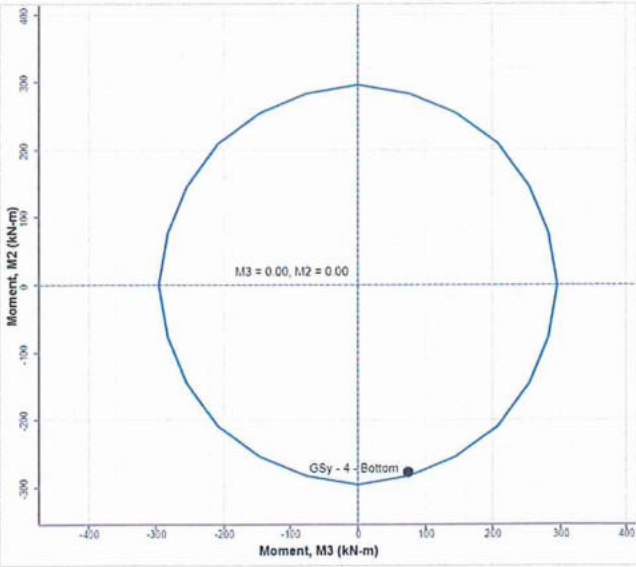
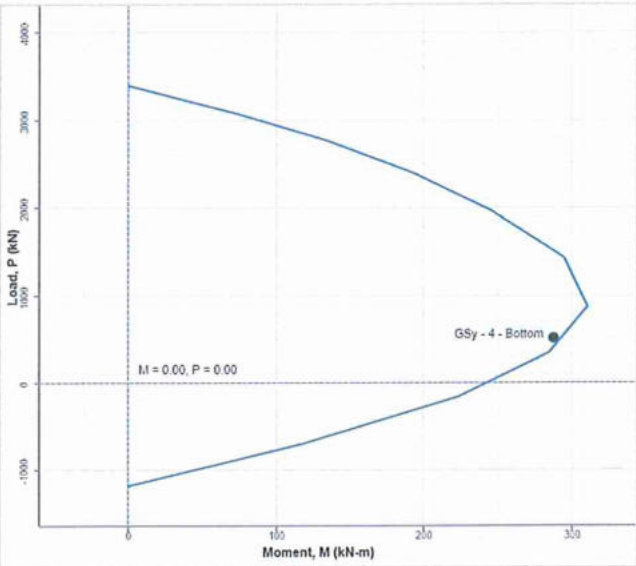
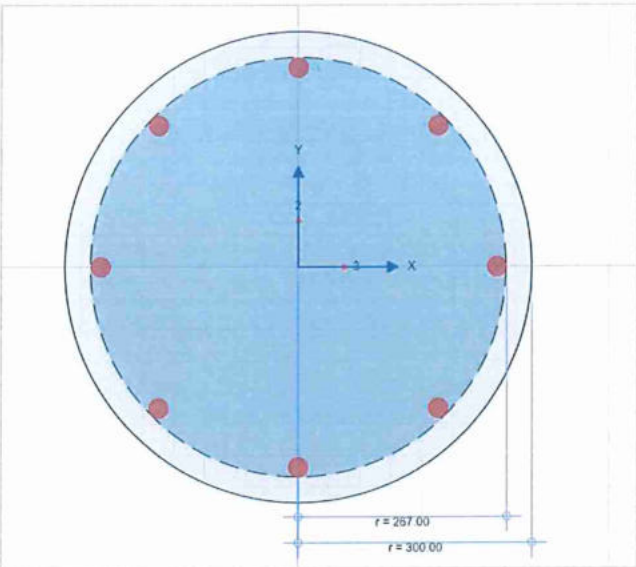
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSy - 4
Axial Load, $N_{Ed}$	512.03 (kN)
Moment Top, $M_x$	-21.49 (kN-m)
Moment Bottom, $M_x$	87.49 (kN-m)
Moment Top, $M_y$	108.91 (kN-m)
Moment Bottom, $M_y$	-281.42 (kN-m)
Design Moment, $M_{cDesign}$	281.42 (kN-m)
Max Capacity Ratio	1.01



### COLUMN INFORMATION

Name	42 - C32
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular
Confinement Zone	Confined
	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

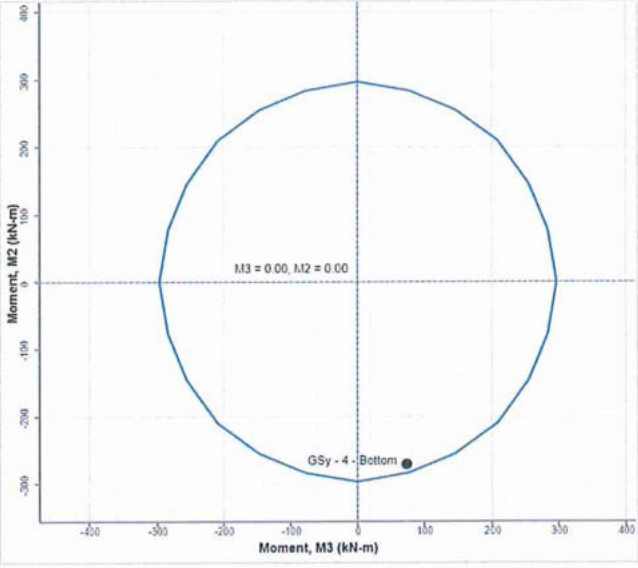
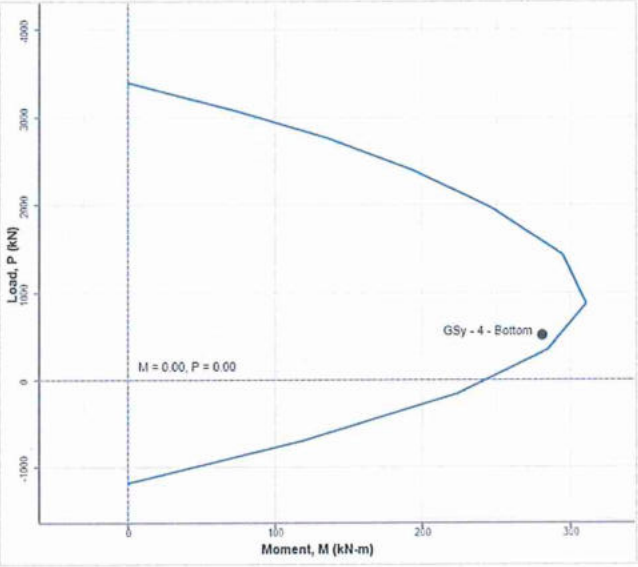
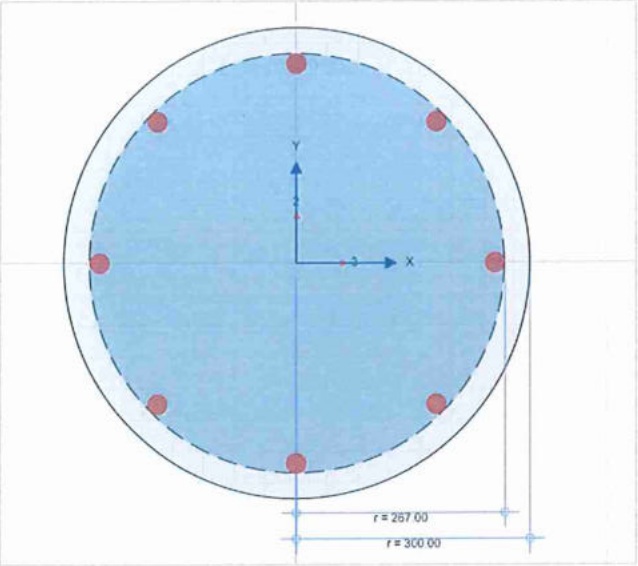
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSy - 4
Axial Load, $N_{Ed}$	510.92 (kN)
Moment Top, $M_x$	-22.99 (kN-m)
Moment Bottom, $M_x$	73.44 (kN-m)
Moment Top, $M_y$	113.61 (kN-m)
Moment Bottom, $M_y$	-277.62 (kN-m)
Design Moment, $M_{cDesign}$	277.62 (kN-m)
Max Capacity Ratio	0.98



COLUMN INFORMATION

Name	46 - C34
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

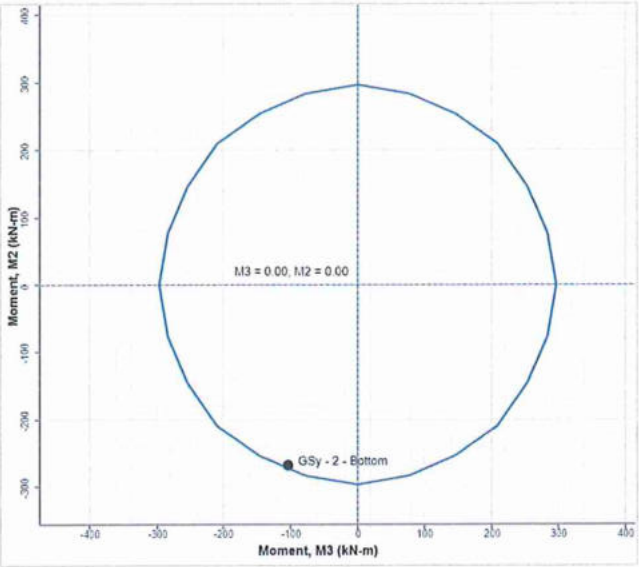
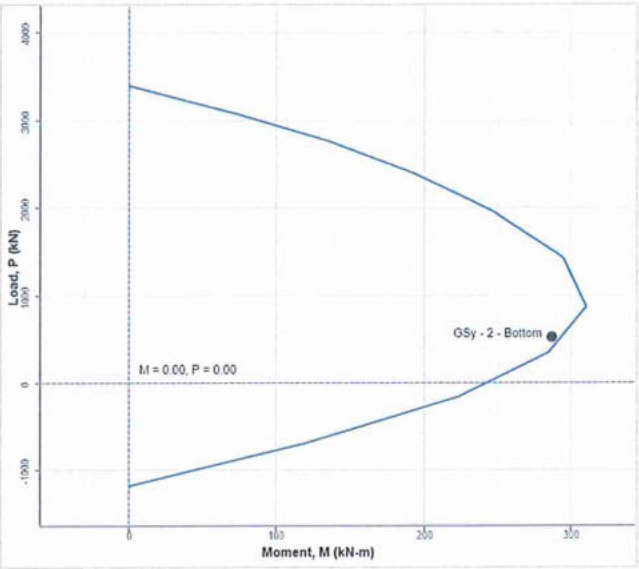
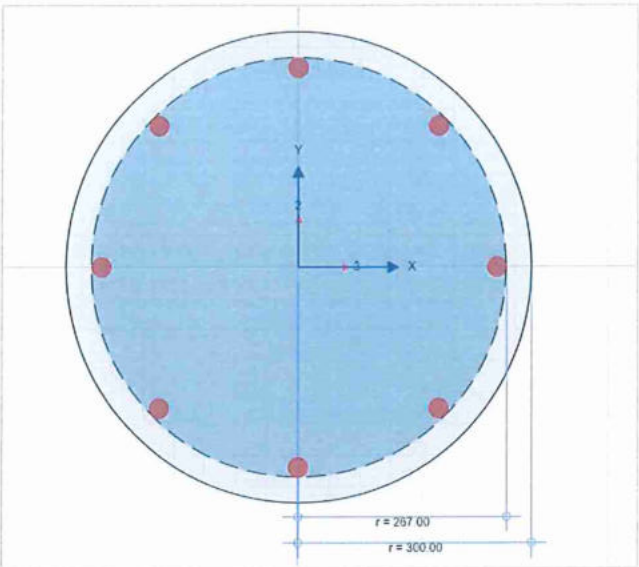
Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSy - 4
Axial Load, $N_{Ed}$	519.36 (kN)
Moment Top, $M_x$	-21.33 (kN-m)
Moment Bottom, $M_x$	73.40 (kN-m)
Moment Top, $M_y$	117.59 (kN-m)
Moment Bottom, $M_y$	-270.39 (kN-m)
Design Moment, $M_{cDesign}$	270.39 (kN-m)
Max Capacity Ratio	0.96





COLUMN INFORMATION

Name	50 - C36
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

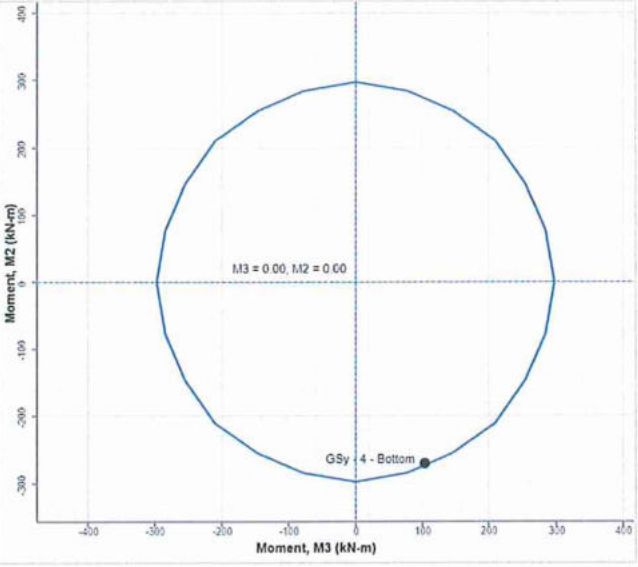
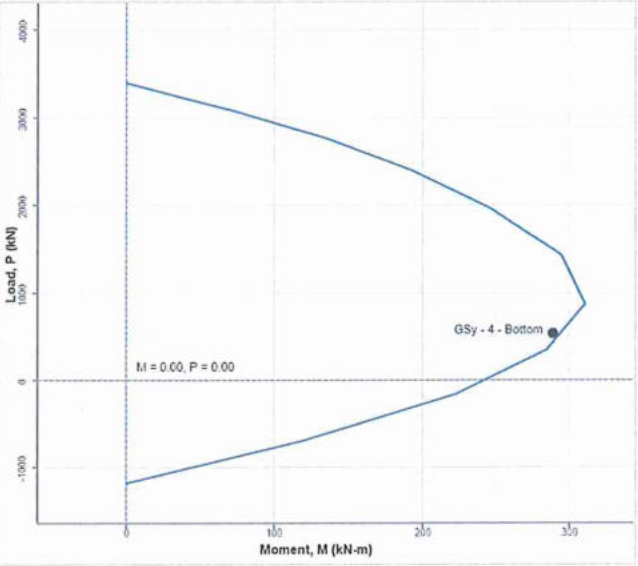
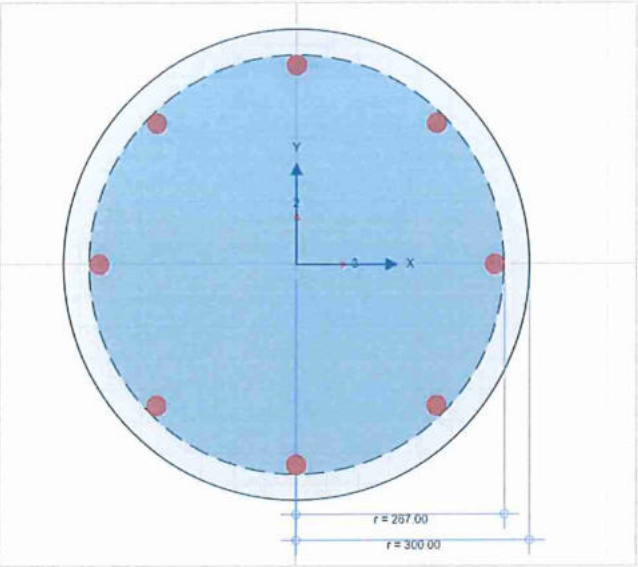
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSy - 2
Axial Load, $N_{Ed}$	521.97 (kN)
Moment Top, $M_x$	23.14 (kN-m)
Moment Bottom, $M_x$	-103.78 (kN-m)
Moment Top, $M_y$	115.89 (kN-m)
Moment Bottom, $M_y$	-267.15 (kN-m)
Design Moment, $M_{cDesign}$	267.15 (kN-m)
Max Capacity Ratio	0.98



COLUMN INFORMATION

Name	54 - C48
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

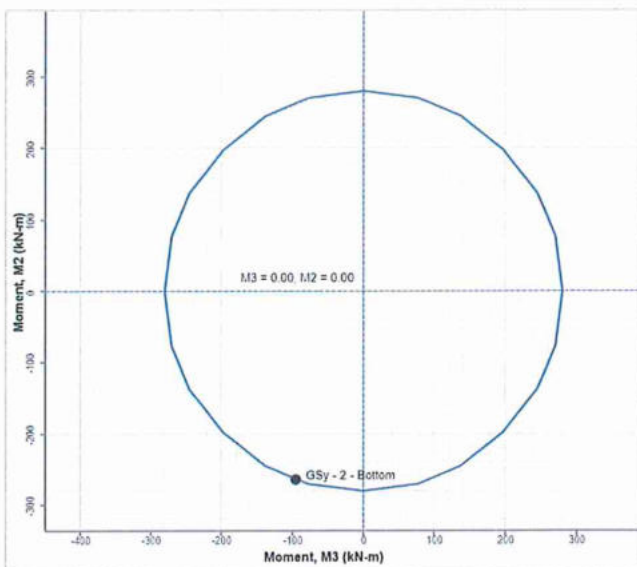
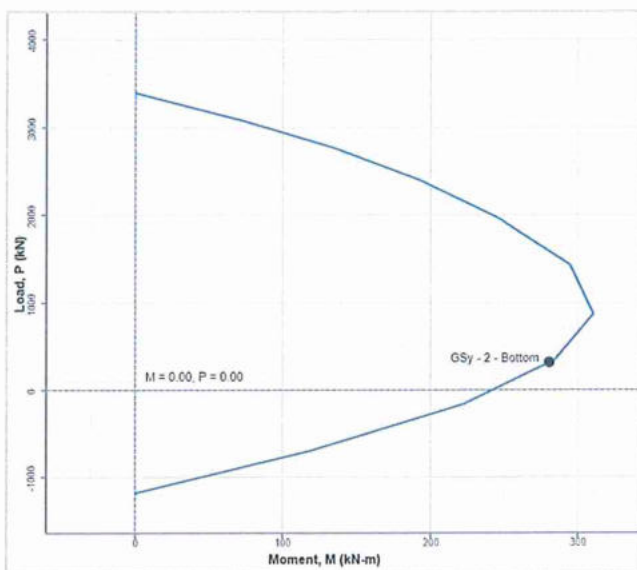
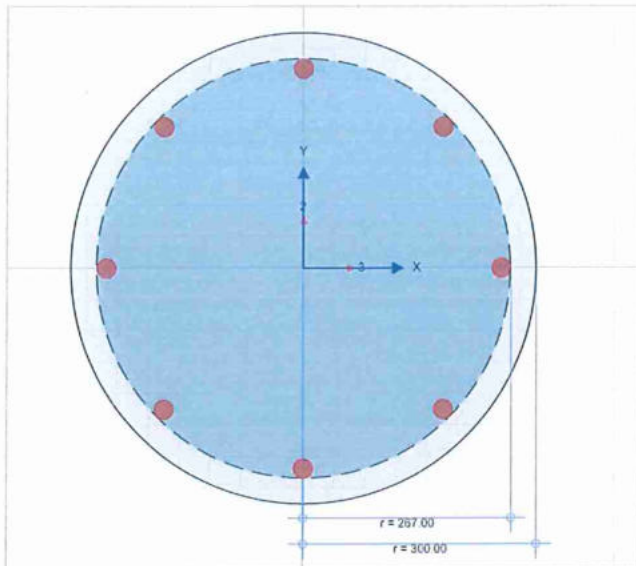
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSy - 4
Axial Load, $N_{Ed}$	540.96 (kN)
Moment Top, $M_x$	-28.81 (kN-m)
Moment Bottom, $M_x$	102.08 (kN-m)
Moment Top, $M_y$	108.83 (kN-m)
Moment Bottom, $M_y$	-269.63 (kN-m)
Design Moment, $M_{cDesign}$	269.63 (kN-m)
Max Capacity Ratio	0.98

**COLUMN INFORMATION**

Name	58 - C22
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

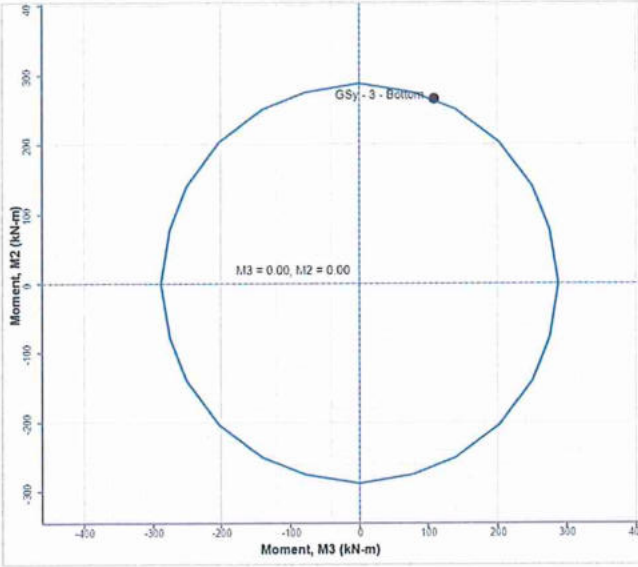
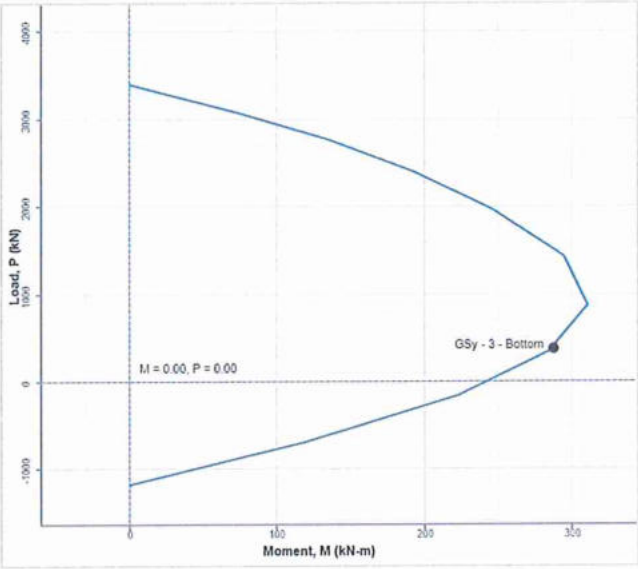
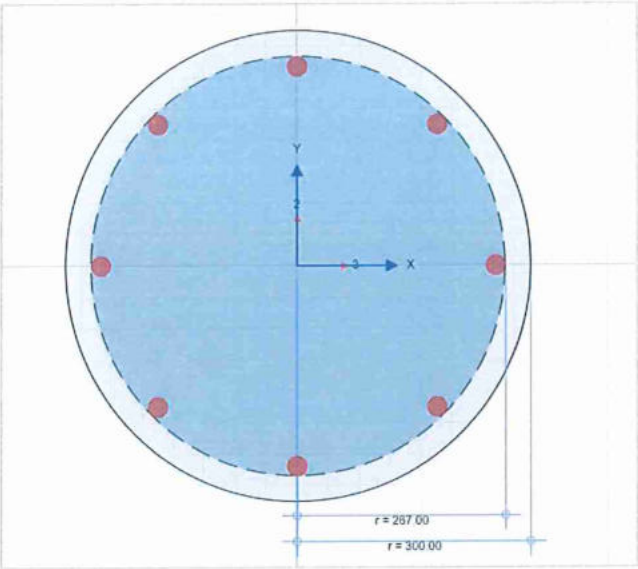
**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSy - 2
Axial Load, $N_{Ed}$	321.59 (kN)
Moment Top, $M_x$	30.51 (kN-m)
Moment Bottom, $M_x$	-95.84 (kN-m)
Moment Top, $M_y$	81.96 (kN-m)
Moment Bottom, $M_y$	-263.33 (kN-m)
Design Moment, $M_{cDesign}$	263.33 (kN-m)
Max Capacity Ratio	1.00





COLUMN INFORMATION

Name	3 - C2
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

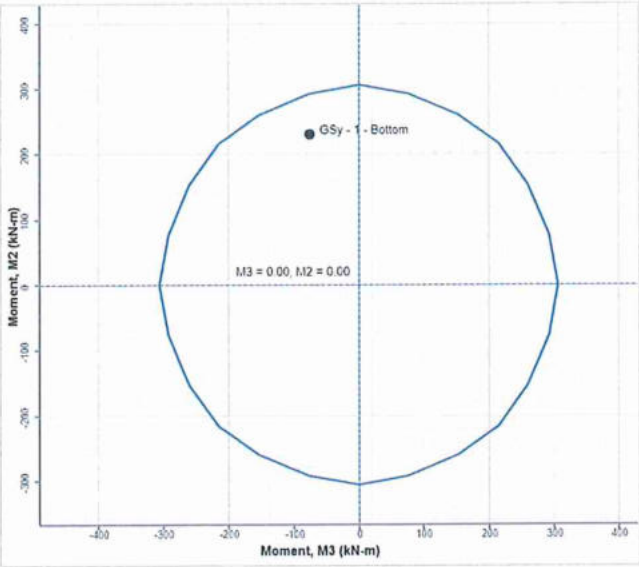
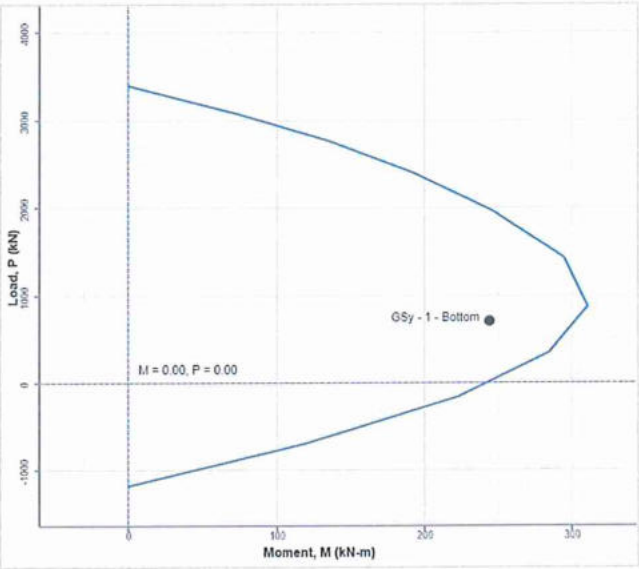
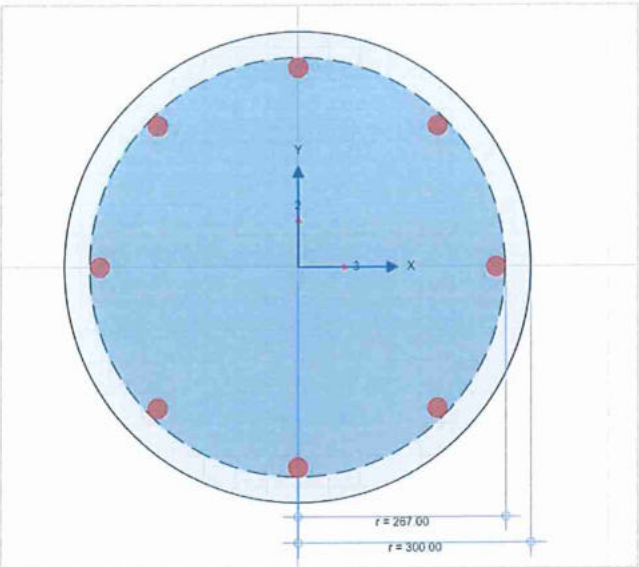
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSy - 3
Axial Load, $N_{Ed}$	380.98 (kN)
Moment Top, $M_x$	-44.67 (kN-m)
Moment Bottom, $M_x$	107.25 (kN-m)
Moment Top, $M_y$	-78.38 (kN-m)
Moment Bottom, $M_y$	266.18 (kN-m)
Design Moment, $M_{cDesign}$	266.18 (kN-m)
Max Capacity Ratio	1.00



### COLUMN INFORMATION

Name	39 - C39
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

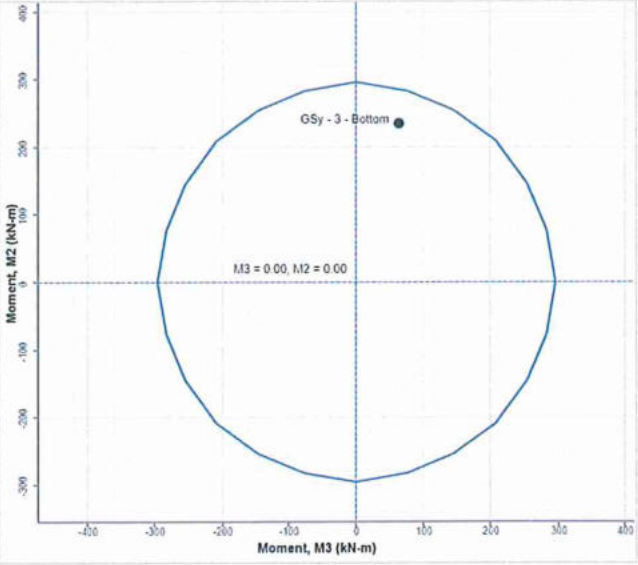
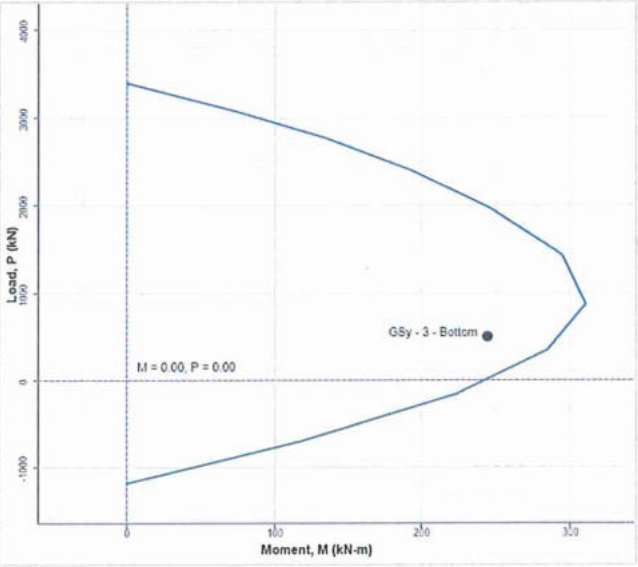
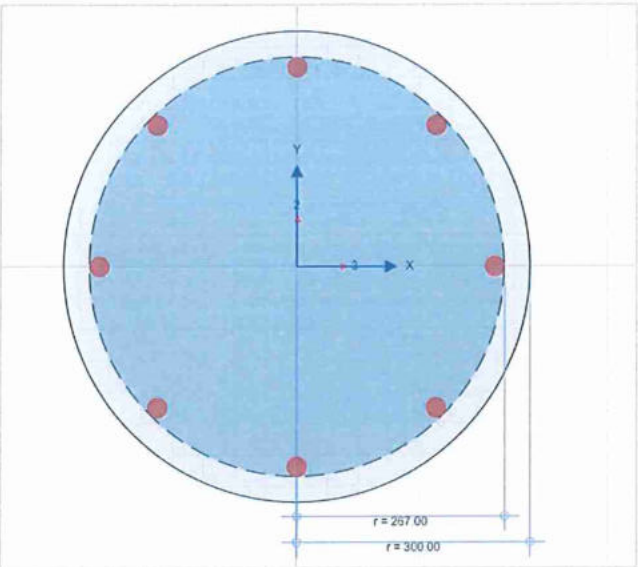
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSy - 1
Axial Load, $N_{Ed}$	704.00 (kN)
Moment Top, $M_x$	43.33 (kN-m)
Moment Bottom, $M_x$	-76.43 (kN-m)
Moment Top, $M_y$	-96.08 (kN-m)
Moment Bottom, $M_y$	231.56 (kN-m)
Design Moment, $M_{cDesign}$	231.56 (kN-m)
Max Capacity Ratio	0.81



COLUMN INFORMATION

Name	43 - C42
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

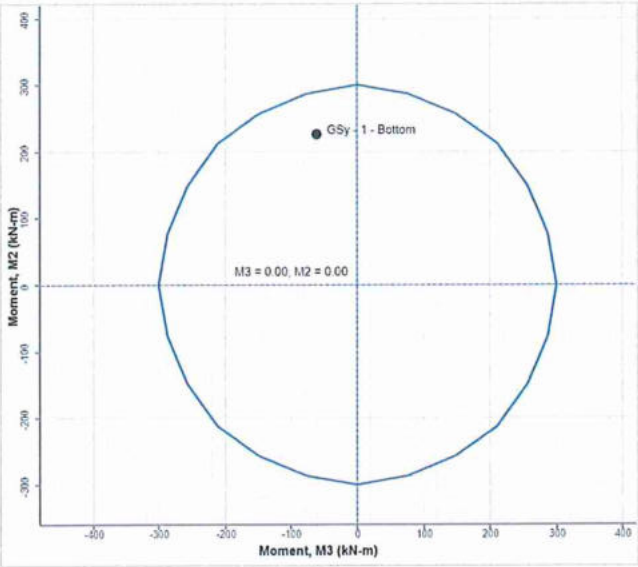
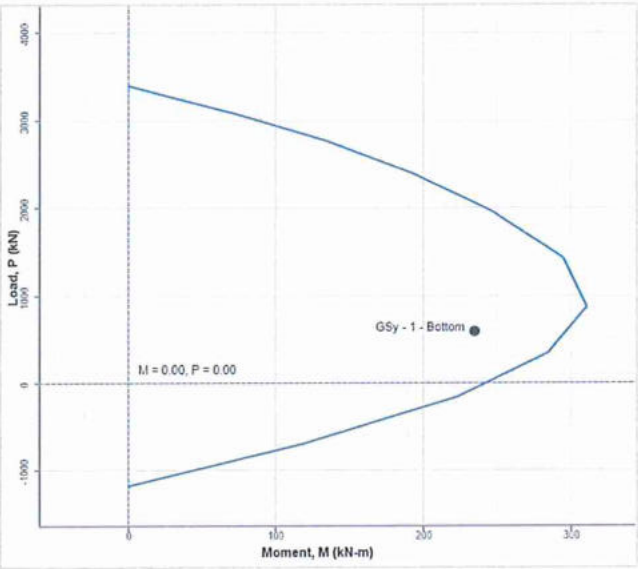
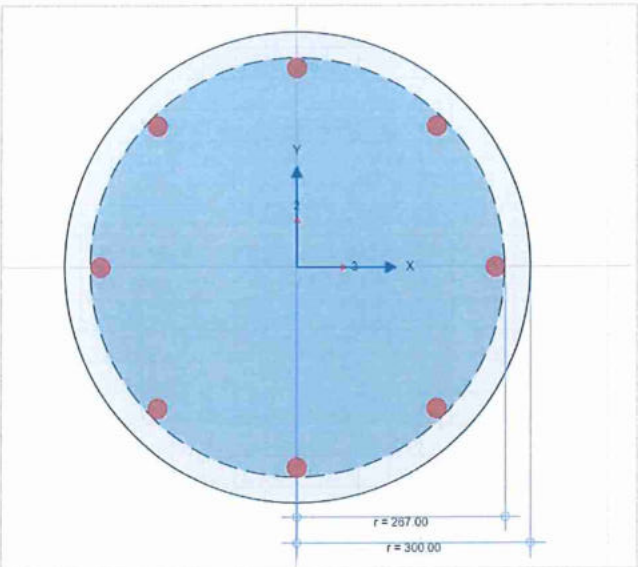
Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSy - 3
Axial Load, $N_{Ed}$	504.31 (kN)
Moment Top, $M_x$	-20.14 (kN-m)
Moment Bottom, $M_x$	63.19 (kN-m)
Moment Top, $M_y$	-110.18 (kN-m)
Moment Bottom, $M_y$	235.85 (kN-m)
Design Moment, $M_{cDesign}$	235.85 (kN-m)
Max Capacity Ratio	0.84





### COLUMN INFORMATION

Name	47 - C44
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

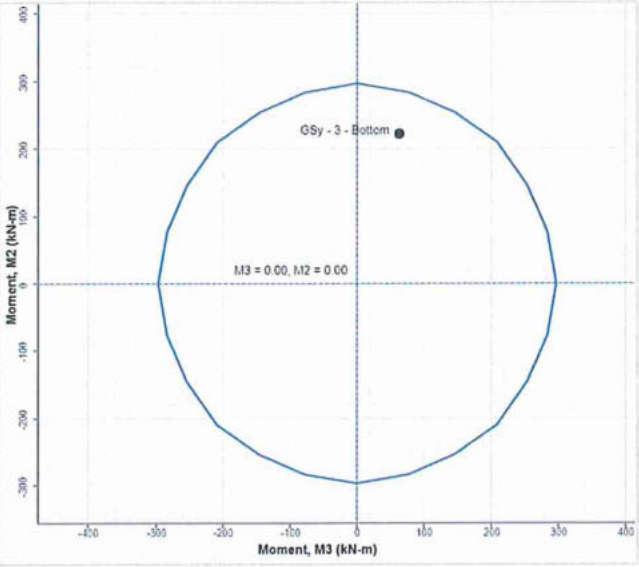
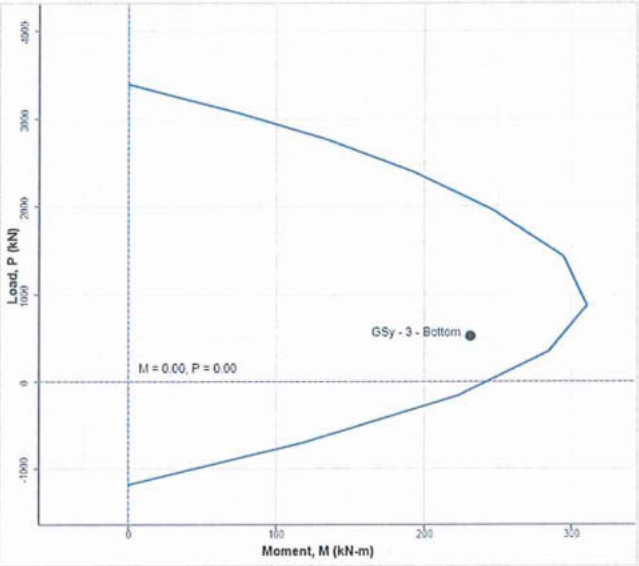
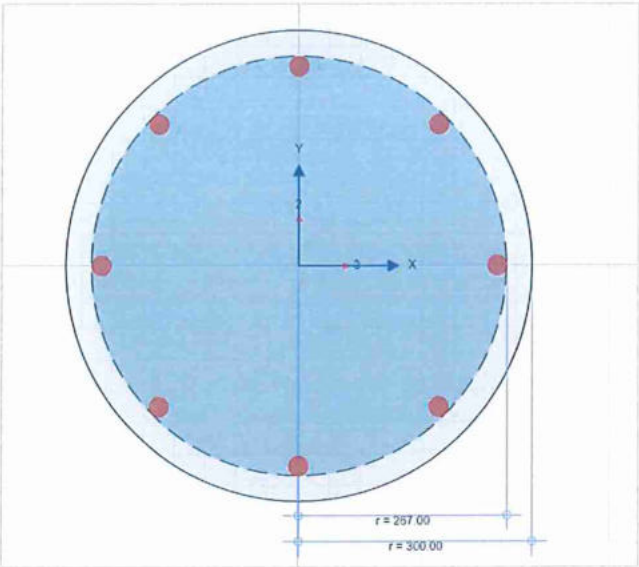
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSy - 1
Axial Load, $N_{Ed}$	590.72 (kN)
Moment Top, $M_x$	19.78 (kN-m)
Moment Bottom, $M_x$	-62.27 (kN-m)
Moment Top, $M_y$	-113.80 (kN-m)
Moment Bottom, $M_y$	226.25 (kN-m)
Design Moment, $M_{cDesign}$	226.25 (kN-m)
Max Capacity Ratio	0.79



### COLUMN INFORMATION

Name	51 - C46
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

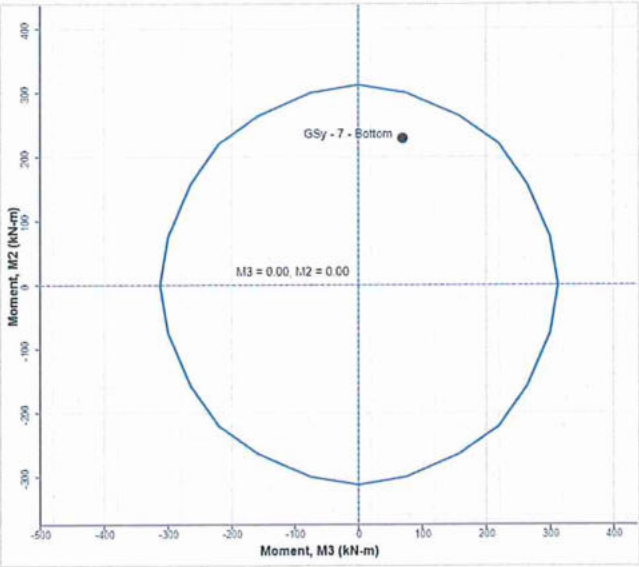
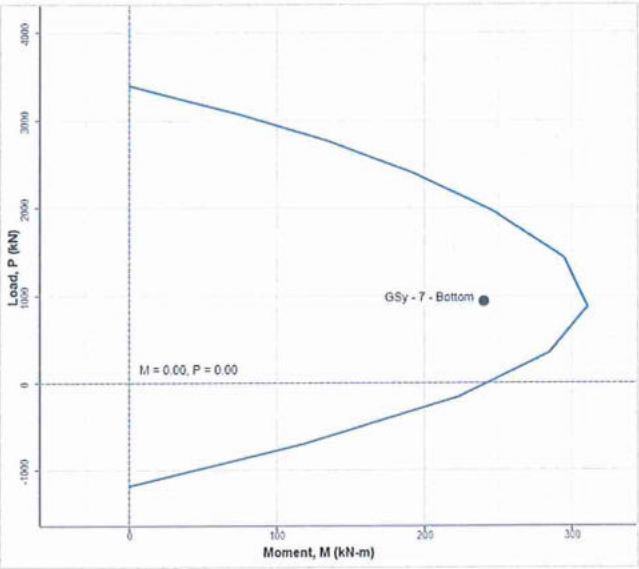
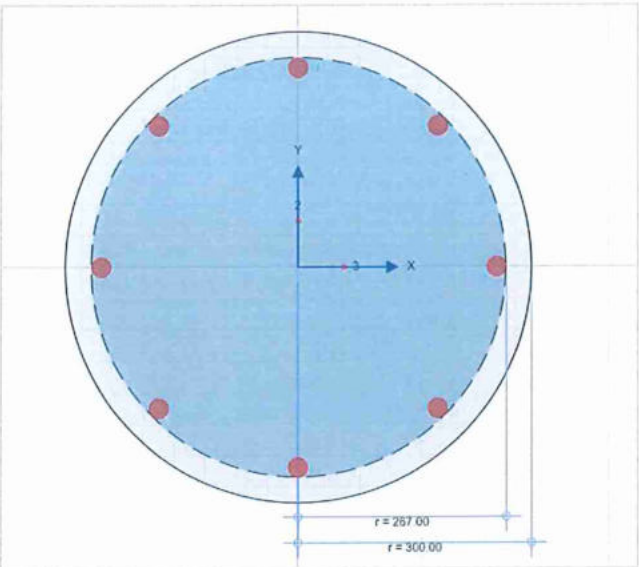
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSy - 3
Axial Load, $N_{Ed}$	522.63 (kN)
Moment Top, $M_x$	-18.32 (kN-m)
Moment Bottom, $M_x$	62.68 (kN-m)
Moment Top, $M_y$	-112.62 (kN-m)
Moment Bottom, $M_y$	222.93 (kN-m)
Design Moment, $M_{cDesign}$	222.93 (kN-m)
Max Capacity Ratio	0.79



### COLUMN INFORMATION

Name	55 - C49
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

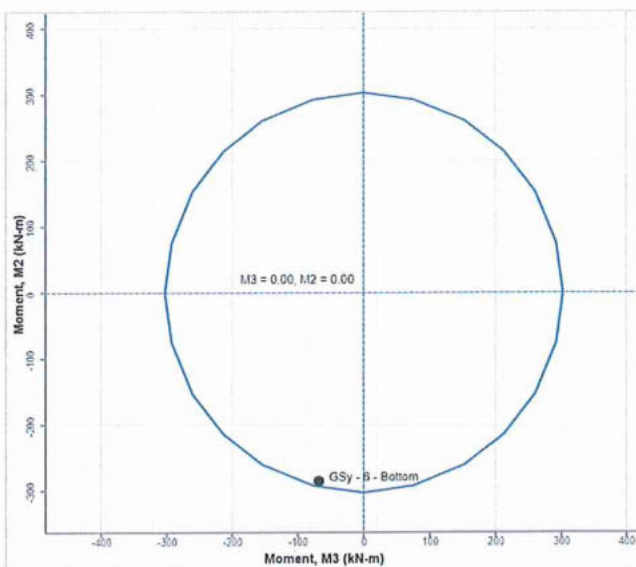
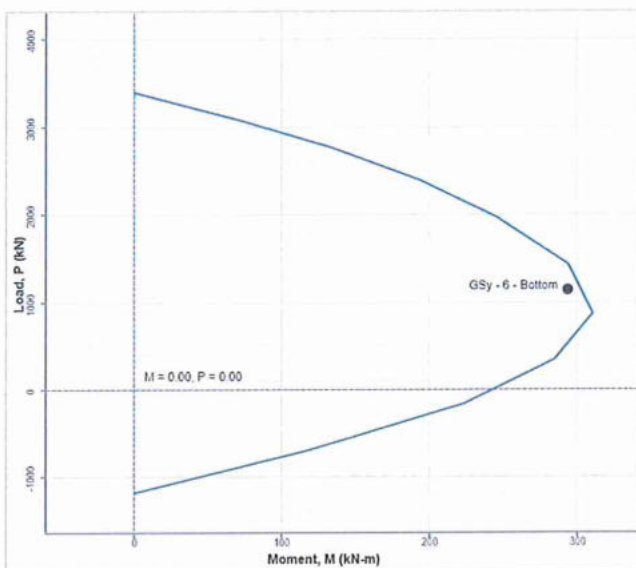
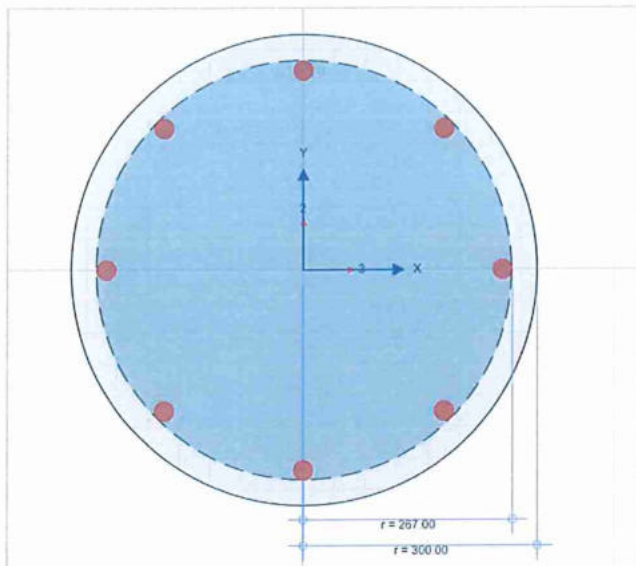
#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSy - 7
Axial Load, $N_{Ed}$	935.14 (kN)
Moment Top, $M_x$	-35.97 (kN-m)
Moment Bottom, $M_x$	68.53 (kN-m)
Moment Top, $M_y$	-115.65 (kN-m)
Moment Bottom, $M_y$	229.83 (kN-m)
Design Moment, $M_{cDesign}$	229.83 (kN-m)
Max Capacity Ratio	0.78



**COLUMN INFORMATION**

Name	59 - C52
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

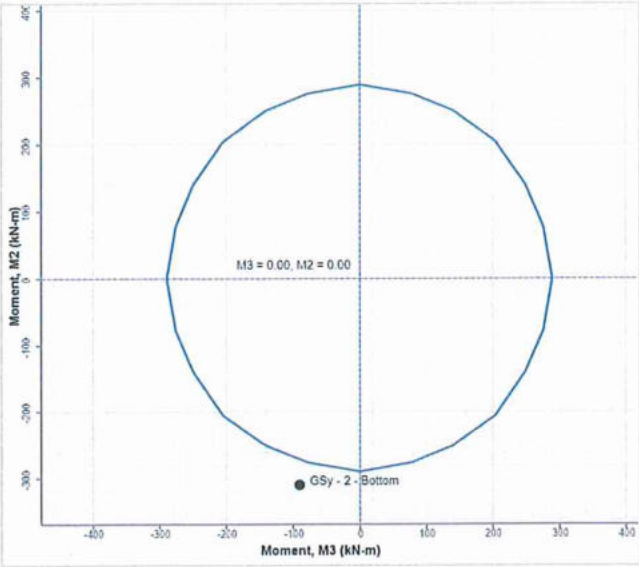
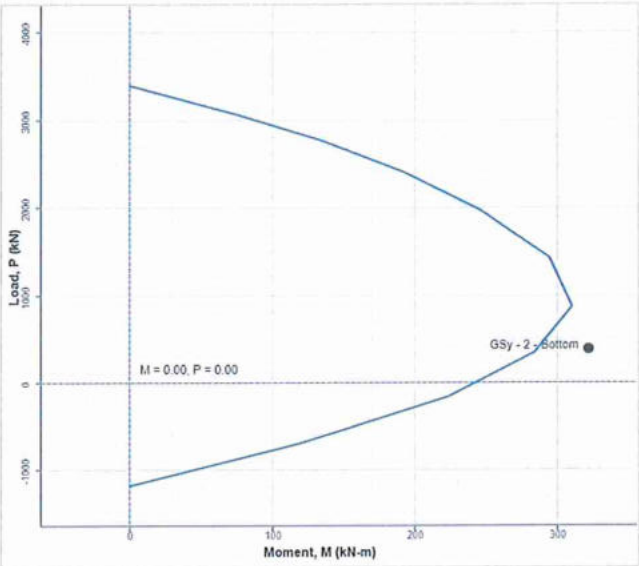
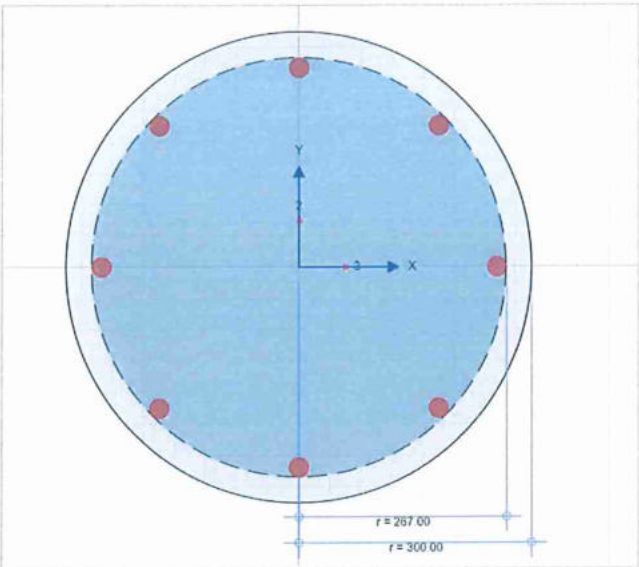
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSy - 6
Axial Load, $N_{Ed}$	1,140.10 (kN)
Moment Top, $M_x$	24.21 (kN-m)
Moment Bottom, $M_x$	-68.46 (kN-m)
Moment Top, $M_y$	97.82 (kN-m)
Moment Bottom, $M_y$	-285.59 (kN-m)
Design Moment, $M_{cDesign}$	285.59 (kN-m)
Max Capacity Ratio	0.97



### COLUMN INFORMATION

Name	62 - C24
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

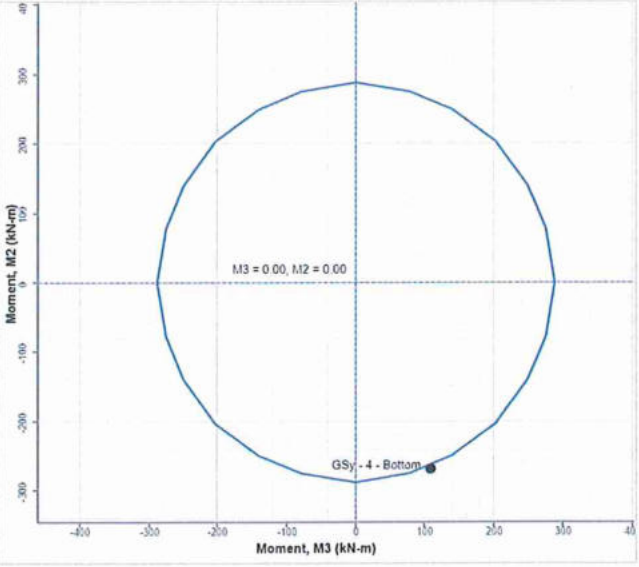
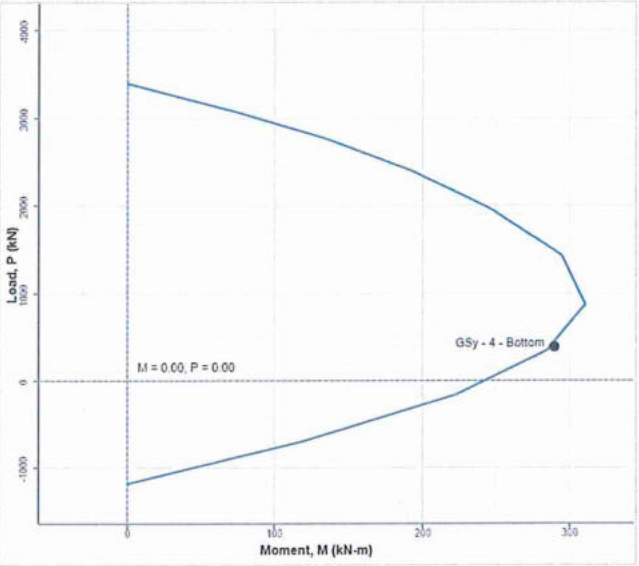
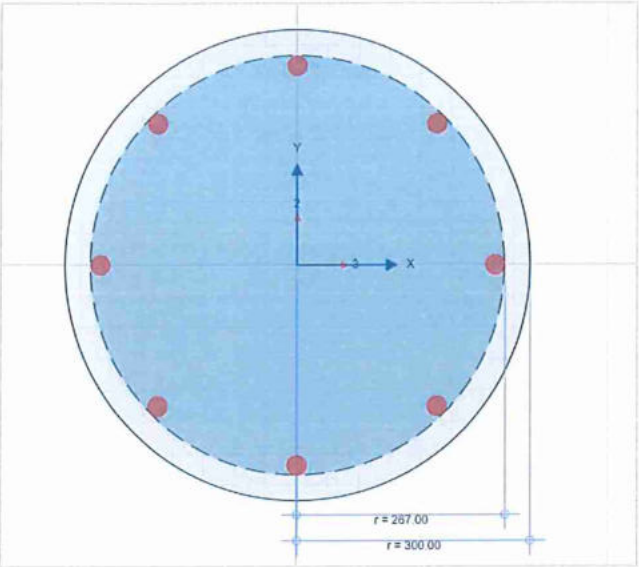
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSy - 2
Axial Load, $N_{Ed}$	393.50 (kN)
Moment Top, $M_x$	38.61 (kN-m)
Moment Bottom, $M_x$	-90.48 (kN-m)
Moment Top, $M_y$	125.23 (kN-m)
Moment Bottom, $M_y$	-308.41 (kN-m)
Design Moment, $M_{cDesign}$	308.41 (kN-m)
Max Capacity Ratio	1.12



COLUMN INFORMATION

Name	6 - C3
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

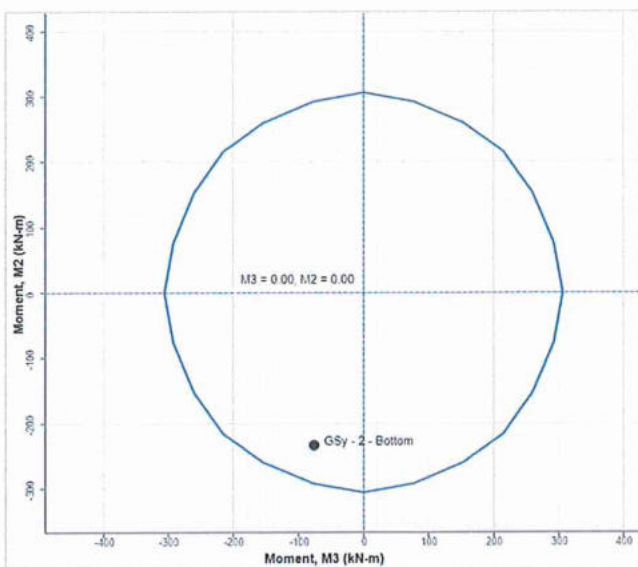
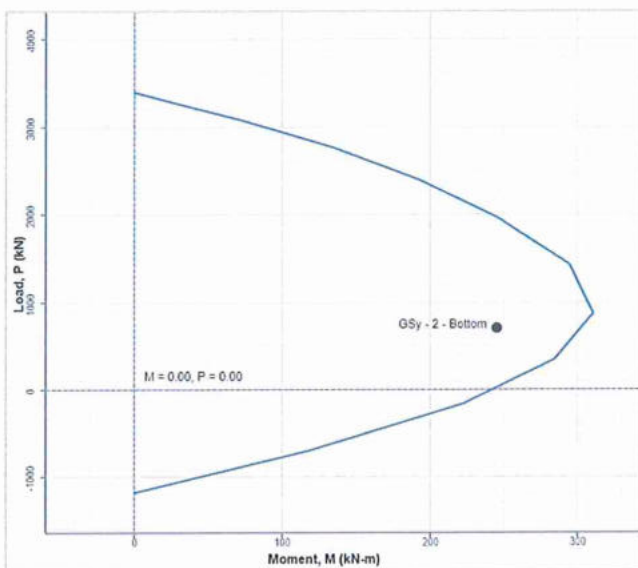
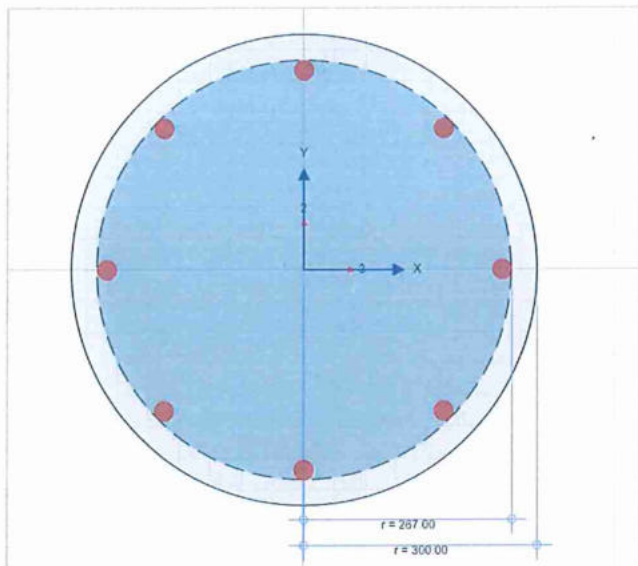
Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSy - 4
Axial Load, $N_{Ed}$	383.61 (kN)
Moment Top, $M_x$	-46.10 (kN-m)
Moment Bottom, $M_x$	107.62 (kN-m)
Moment Top, $M_y$	81.84 (kN-m)
Moment Bottom, $M_y$	-268.21 (kN-m)
Design Moment, $M_{cDesign}$	268.21 (kN-m)
Max Capacity Ratio	1.01



**COLUMN INFORMATION**

Name	40 - C40
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

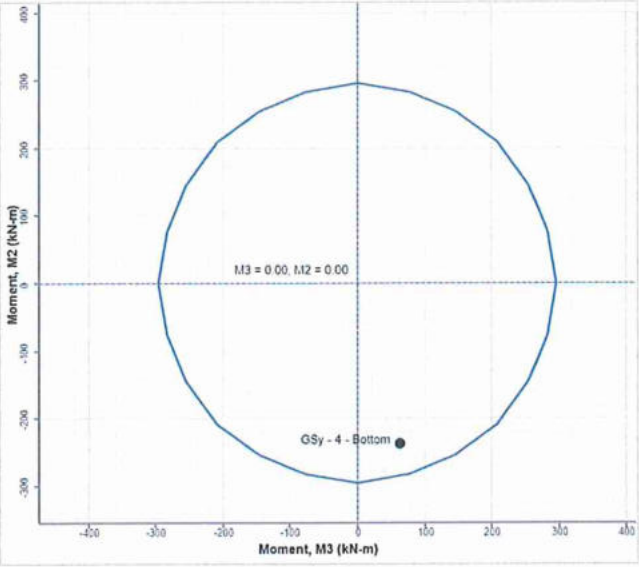
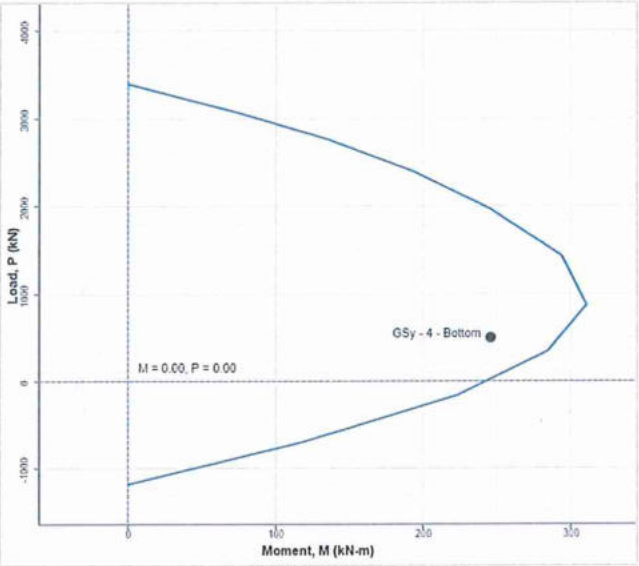
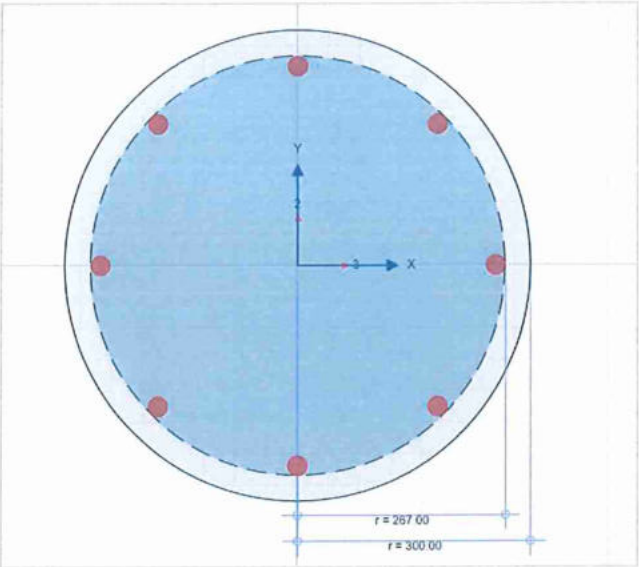
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSy - 2
Axial Load, $N_{Ed}$	708.68 (kN)
Moment Top, $M_x$	43.52 (kN-m)
Moment Bottom, $M_x$	-76.35 (kN-m)
Moment Top, $M_y$	102.29 (kN-m)
Moment Bottom, $M_y$	-233.43 (kN-m)
Design Moment, $M_{cDesign}$	233.43 (kN-m)
Max Capacity Ratio	0.81



COLUMN INFORMATION

Name	44 - C43
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

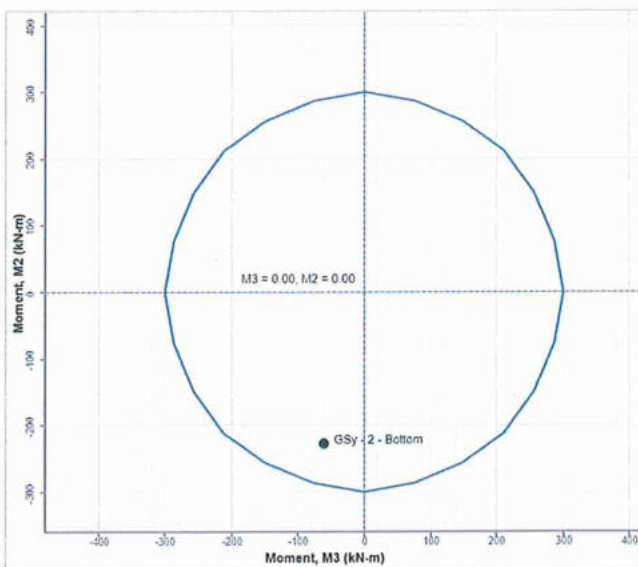
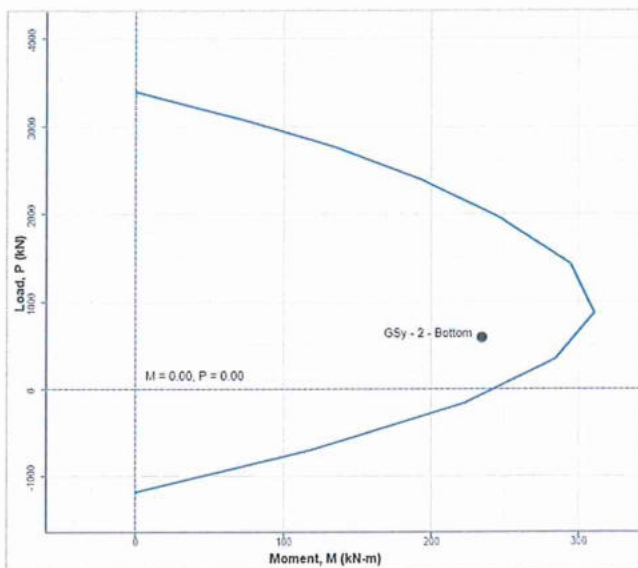
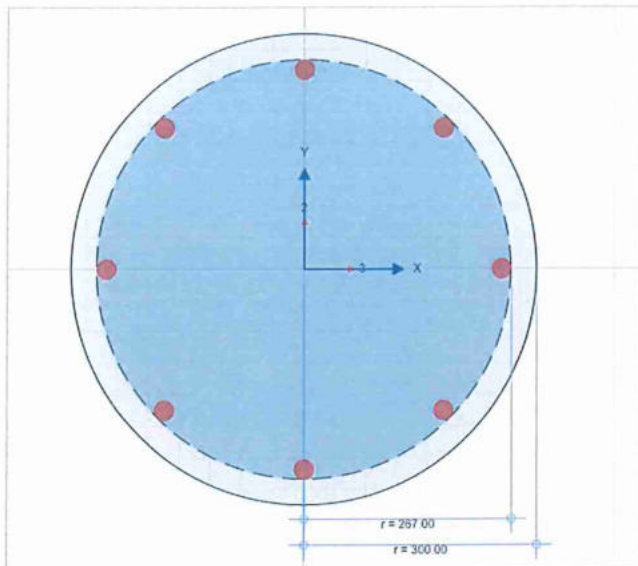
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSy - 4
Axial Load, $N_{Ed}$	508.04 (kN)
Moment Top, $M_x$	-18.91 (kN-m)
Moment Bottom, $M_x$	62.48 (kN-m)
Moment Top, $M_y$	113.42 (kN-m)
Moment Bottom, $M_y$	-237.30 (kN-m)
Design Moment, $M_{cDesign}$	237.30 (kN-m)
Max Capacity Ratio	0.84

**COLUMN INFORMATION**

Name	48 - C45
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

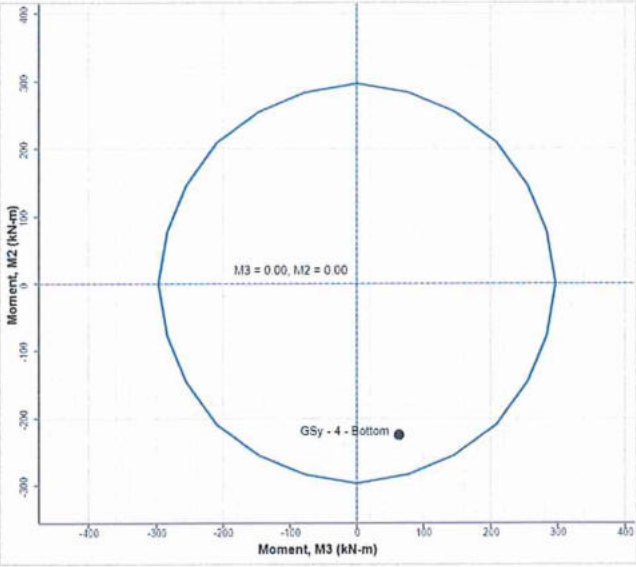
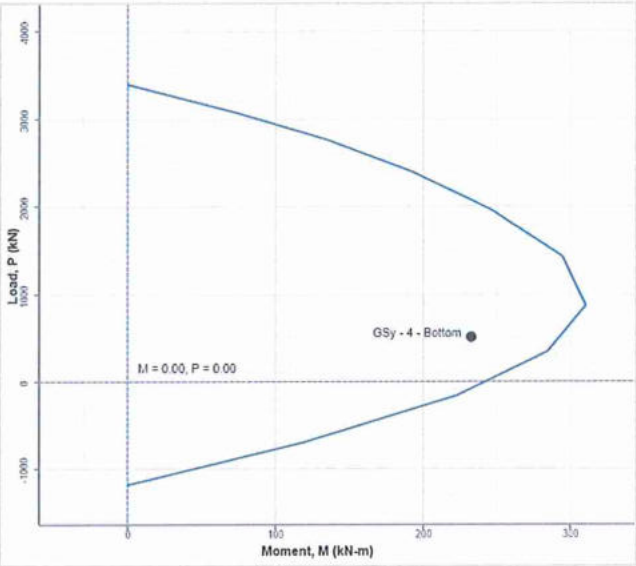
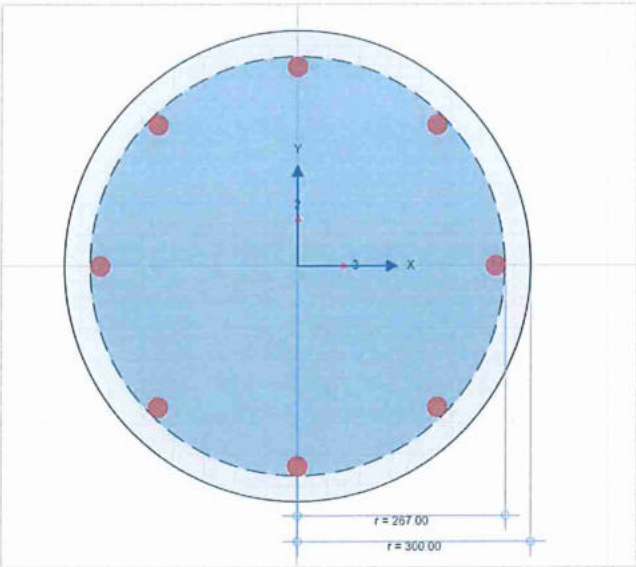
**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSy - 2
Axial Load, $N_{Ed}$	591.34 (kN)
Moment Top, $M_x$	19.47 (kN-m)
Moment Bottom, $M_x$	-62.23 (kN-m)
Moment Top, $M_y$	113.71 (kN-m)
Moment Bottom, $M_y$	-226.09 (kN-m)
Design Moment, $M_{cDesign}$	226.09 (kN-m)
Max Capacity Ratio	0.79





### COLUMN INFORMATION

Name	52 - C47
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

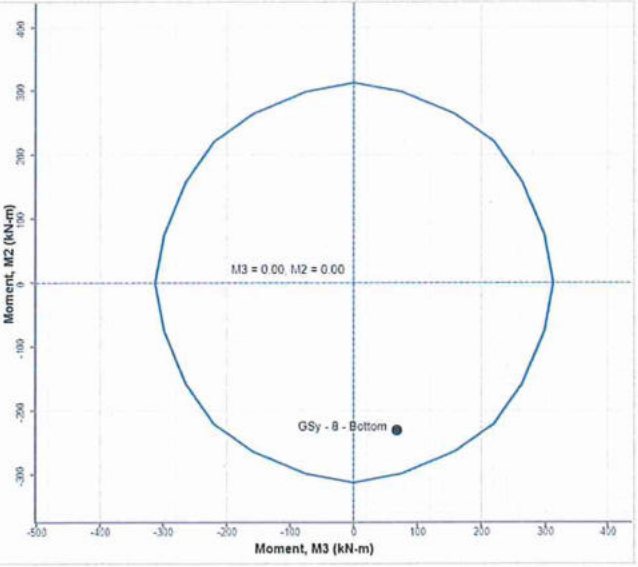
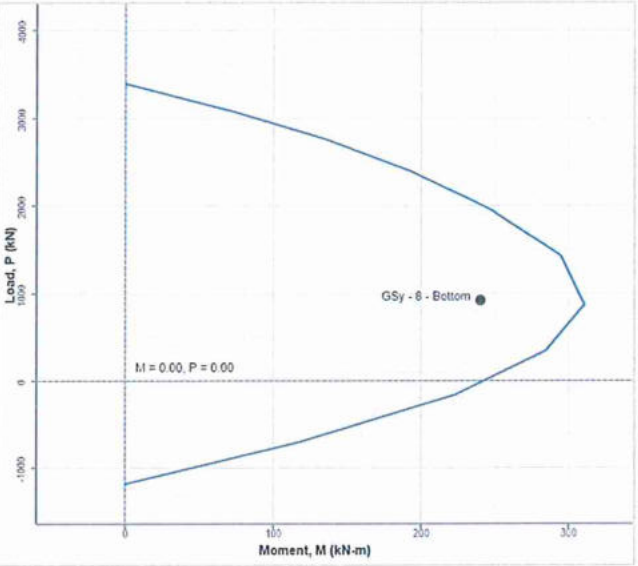
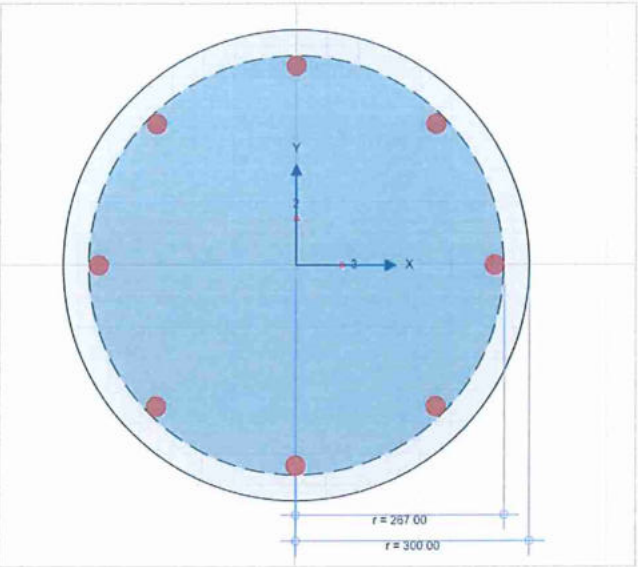
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSy - 4
Axial Load, $N_{Ed}$	516.83 (kN)
Moment Top, $M_x$	-17.09 (kN-m)
Moment Bottom, $M_x$	62.40 (kN-m)
Moment Top, $M_y$	109.59 (kN-m)
Moment Bottom, $M_y$	-223.80 (kN-m)
Design Moment, $M_{cDesign}$	223.80 (kN-m)
Max Capacity Ratio	0.79



COLUMN INFORMATION

Name	56 - C50
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

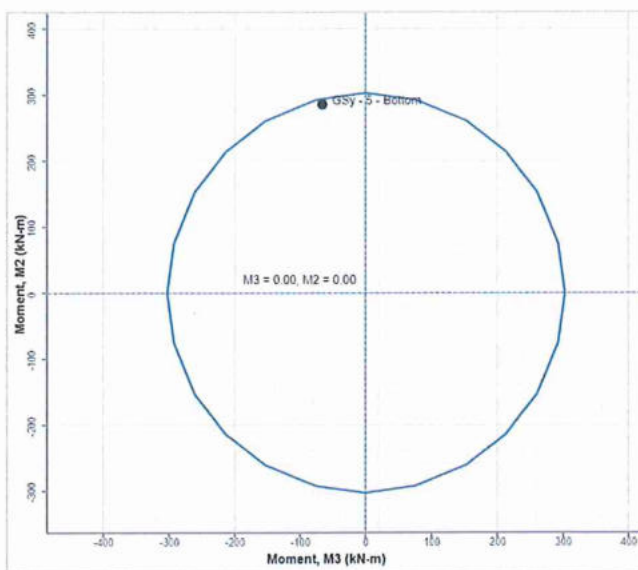
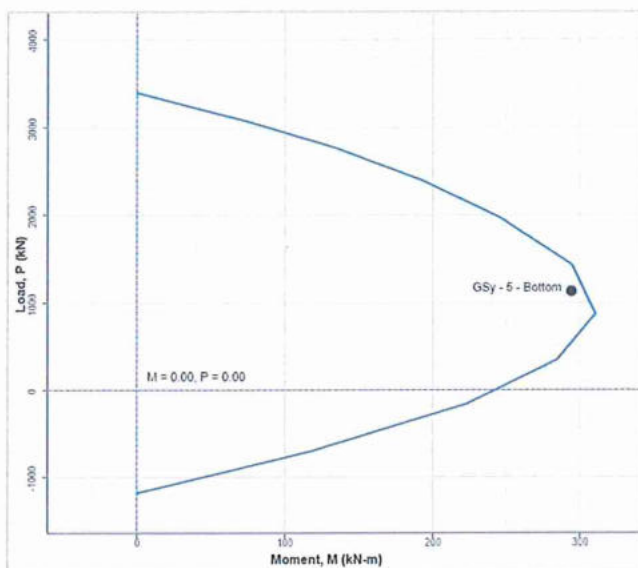
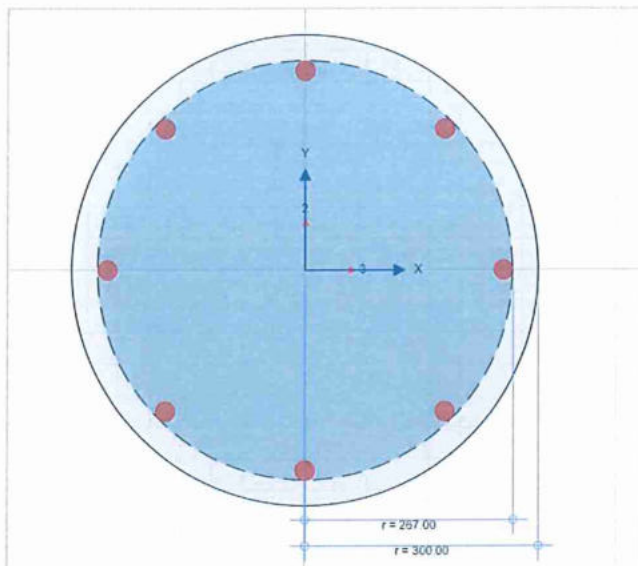
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSy - 8
Axial Load, $N_{Ed}$	920.85 (kN)
Moment Top, $M_x$	-35.75 (kN-m)
Moment Bottom, $M_x$	67.89 (kN-m)
Moment Top, $M_y$	111.33 (kN-m)
Moment Bottom, $M_y$	-230.54 (kN-m)
Design Moment, $M_{cDesign}$	230.54 (kN-m)
Max Capacity Ratio	0.78

**COLUMN INFORMATION**

Name	60 - C53
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

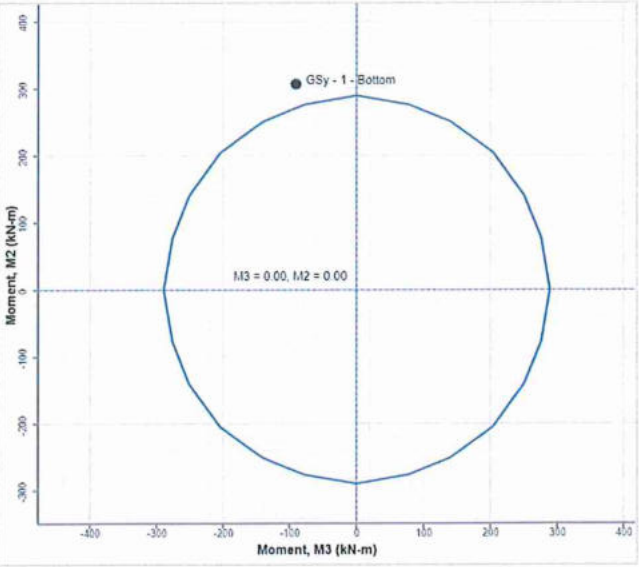
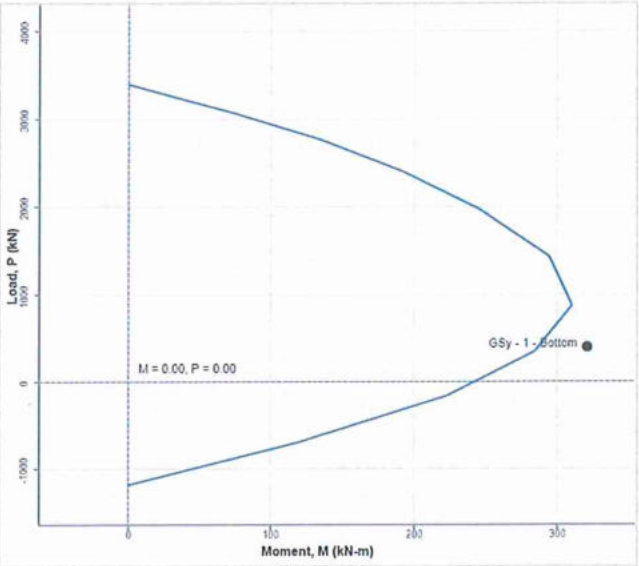
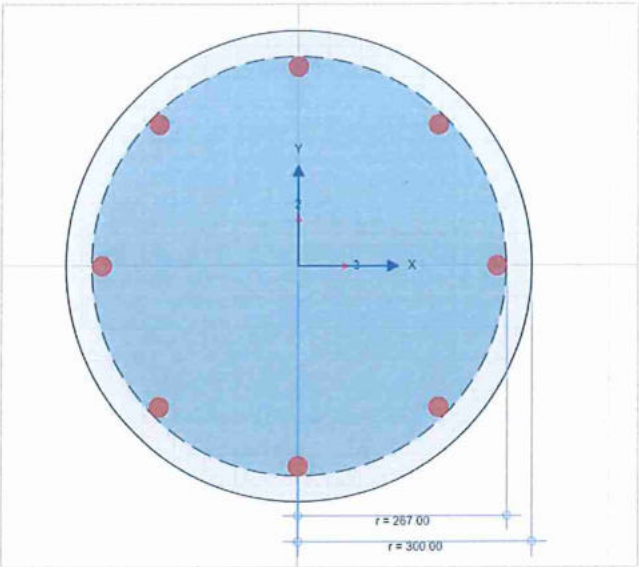
**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSy - 5
Axial Load, $N_{Ed}$	1,135.44 (kN)
Moment Top, $M_x$	23.18 (kN-m)
Moment Bottom, $M_x$	-67.40 (kN-m)
Moment Top, $M_y$	-99.60 (kN-m)
Moment Bottom, $M_y$	286.08 (kN-m)
Design Moment, $M_{cDesign}$	286.08 (kN-m)
Max Capacity Ratio	0.97





COLUMN INFORMATION

Name	63 - C25
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

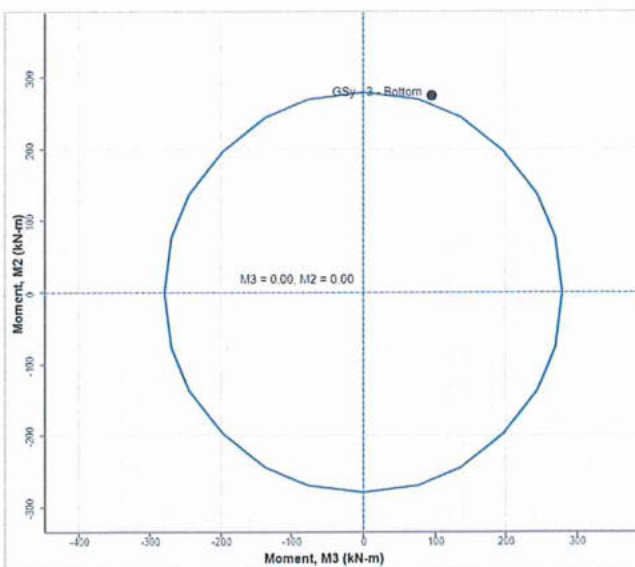
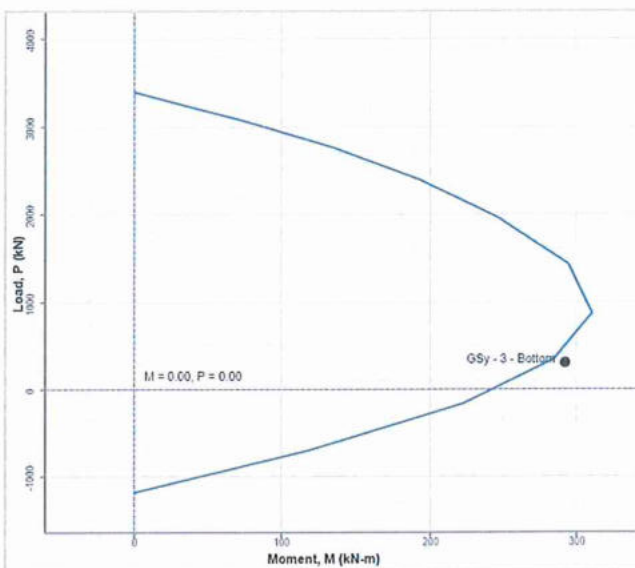
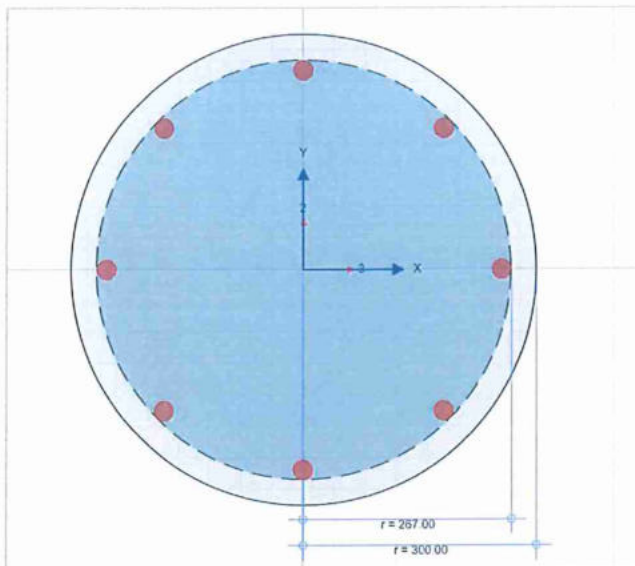
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSy - 1
Axial Load, $N_{Ed}$	395.26 (kN)
Moment Top, $M_x$	38.66 (kN-m)
Moment Bottom, $M_x$	-90.44 (kN-m)
Moment Top, $M_y$	-124.76 (kN-m)
Moment Bottom, $M_y$	307.51 (kN-m)
Design Moment, $M_{cDesign}$	307.51 (kN-m)
Max Capacity Ratio	1.12

**COLUMN INFORMATION**

Name	37 - C21
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, $A$	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

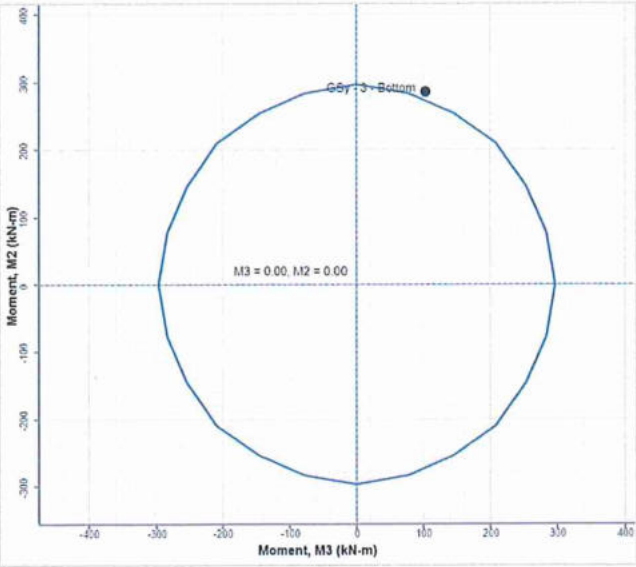
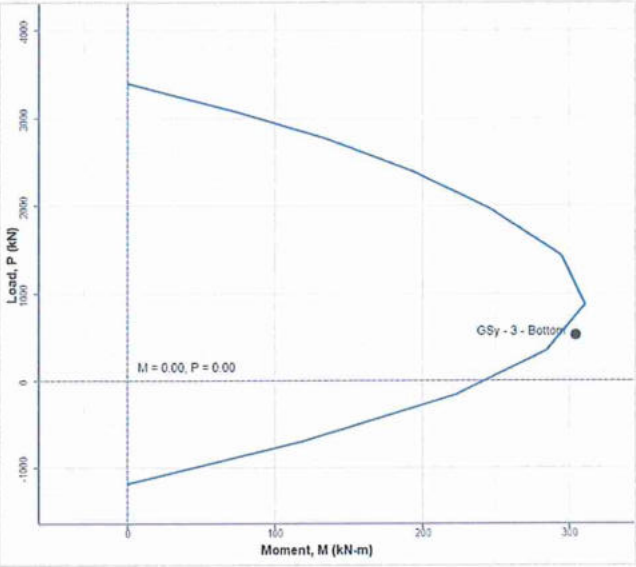
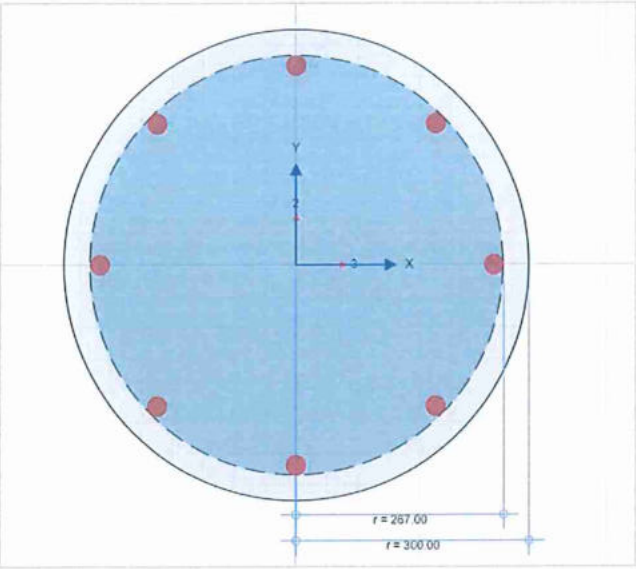
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSy - 3
Axial Load, $N_{Ed}$	313.36 (kN)
Moment Top, $M_x$	-29.31 (kN-m)
Moment Bottom, $M_x$	94.67 (kN-m)
Moment Top, $M_y$	-86.78 (kN-m)
Moment Bottom, $M_y$	276.06 (kN-m)
Design Moment, $M_{cDesign}$	276.06 (kN-m)
Max Capacity Ratio	1.04



### COLUMN INFORMATION

Name	41 - C41
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

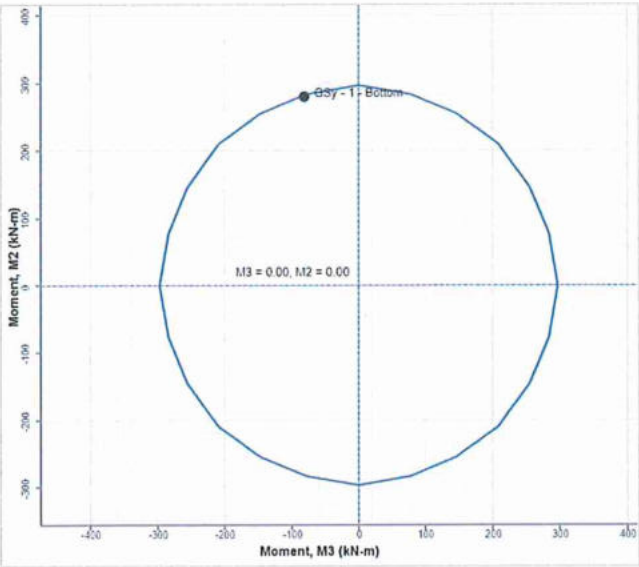
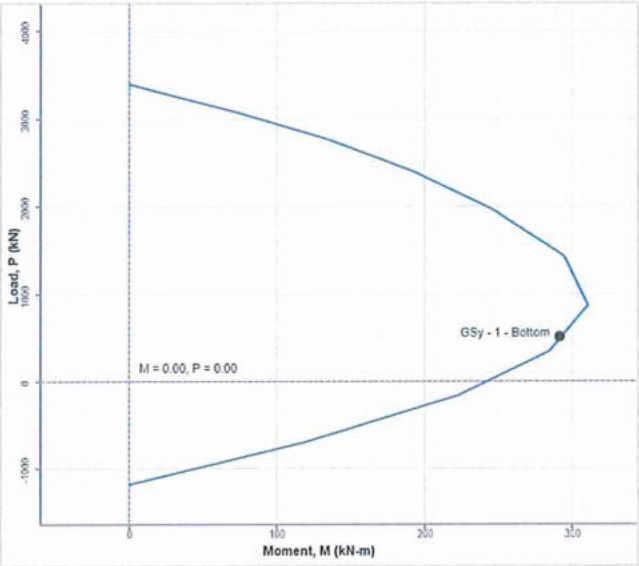
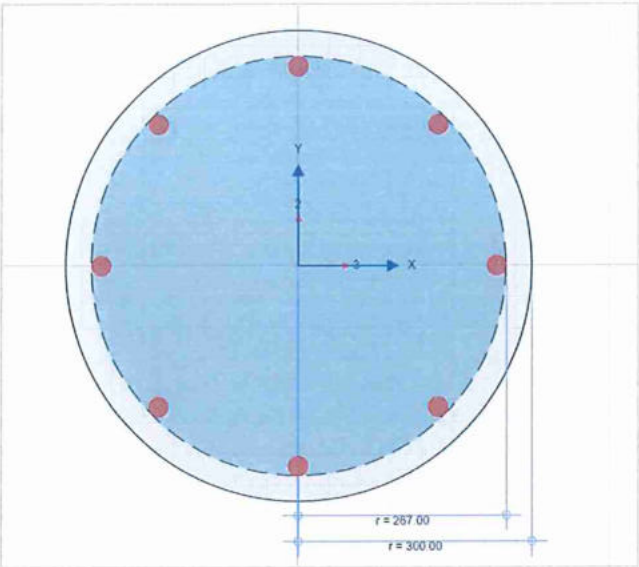
#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSy - 3
Axial Load, $N_{Ed}$	522.42 (kN)
Moment Top, $M_x$	-20.82 (kN-m)
Moment Bottom, $M_x$	101.99 (kN-m)
Moment Top, $M_y$	-116.56 (kN-m)
Moment Bottom, $M_y$	286.47 (kN-m)
Design Moment, $M_{cDesign}$	286.47 (kN-m)
Max Capacity Ratio	1.04





### COLUMN INFORMATION

Name	45 - C33
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

### SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

### SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

### REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

### COLUMN MATERIALS

#### Concrete

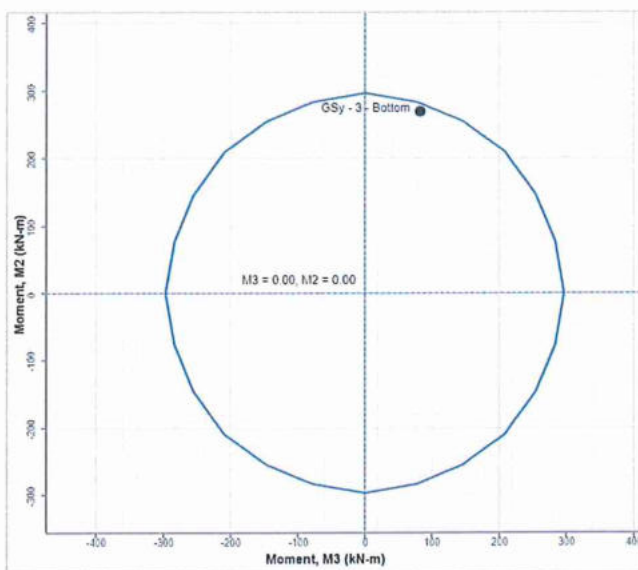
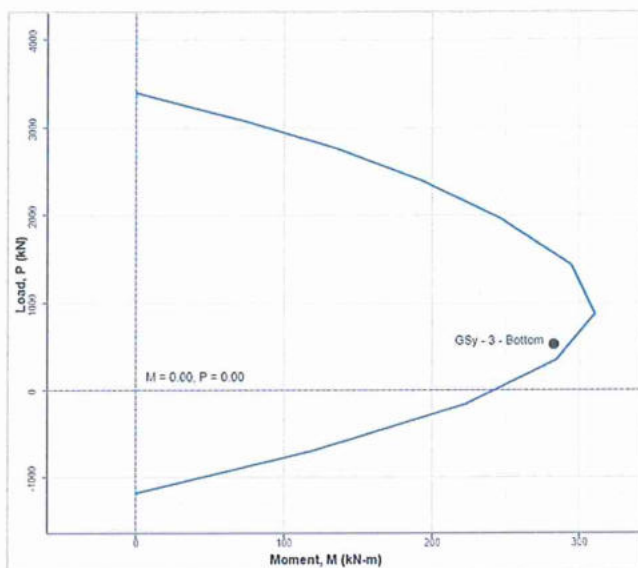
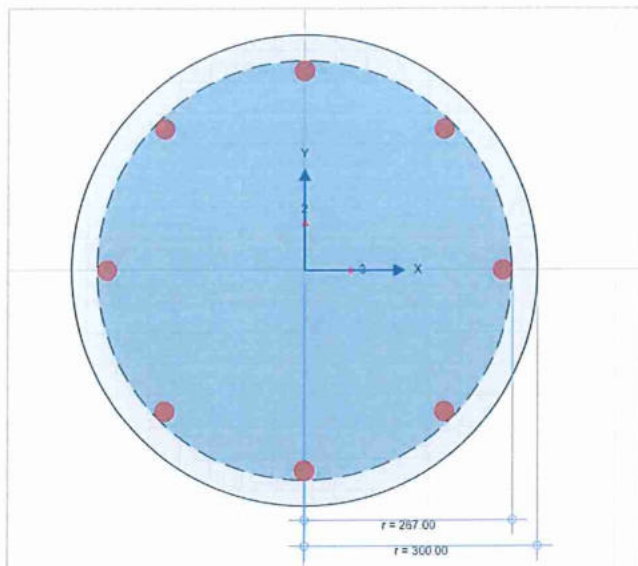
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

#### Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

### GOVERNING LOAD

Name	GSy - 1
Axial Load, $N_{Ed}$	513.93 (kN)
Moment Top, $M_x$	21.49 (kN-m)
Moment Bottom, $M_x$	-80.87 (kN-m)
Moment Top, $M_y$	-117.23 (kN-m)
Moment Bottom, $M_y$	279.61 (kN-m)
Design Moment, $M_{cDesign}$	279.61 (kN-m)
Max Capacity Ratio	0.99

**COLUMN INFORMATION**

Name	49 - C35
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

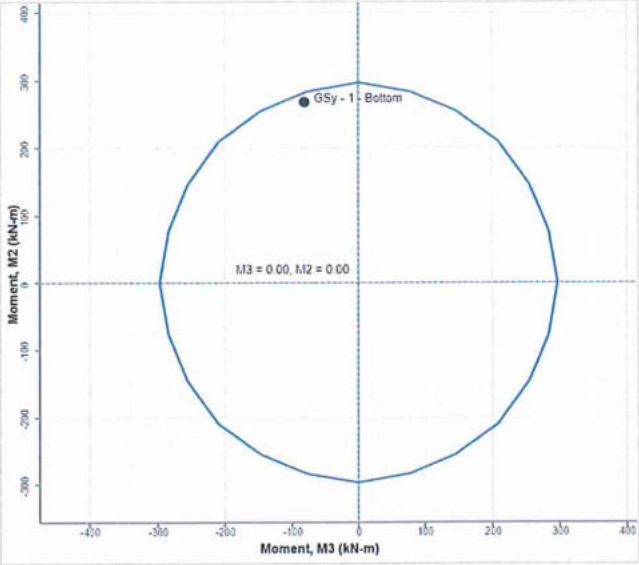
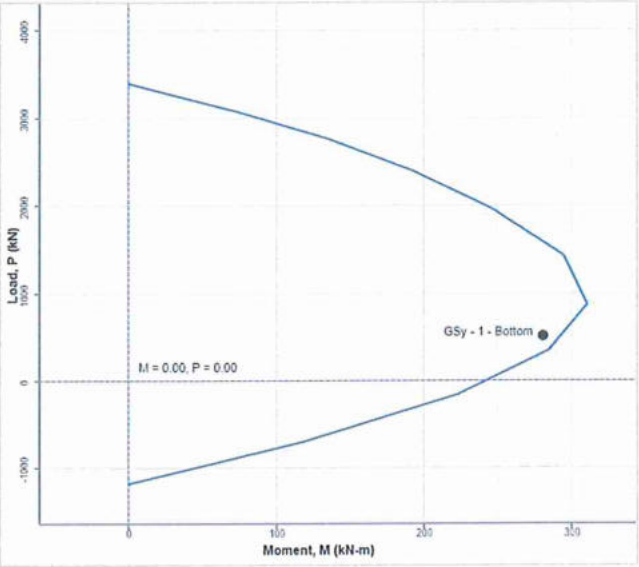
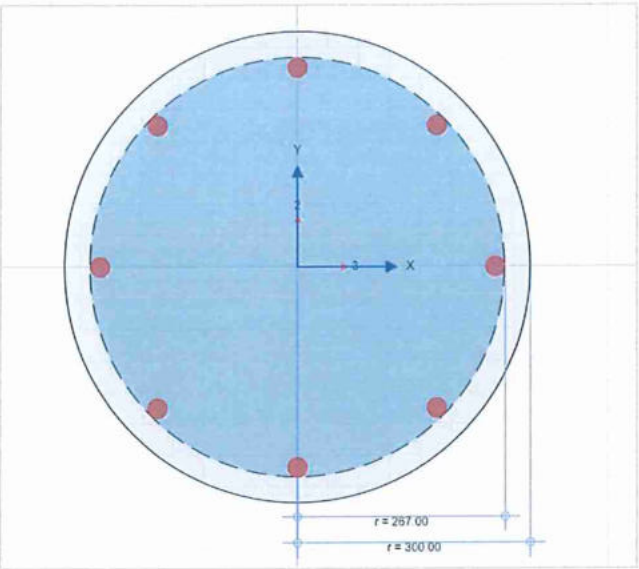
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSy - 3
Axial Load, $N_{Ed}$	519.98 (kN)
Moment Top, $M_x$	-21.97 (kN-m)
Moment Bottom, $M_x$	81.12 (kN-m)
Moment Top, $M_y$	-117.71 (kN-m)
Moment Bottom, $M_y$	270.52 (kN-m)
Design Moment, $M_{cDesign}$	270.52 (kN-m)
Max Capacity Ratio	0.96



COLUMN INFORMATION

Name	53 - C37
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

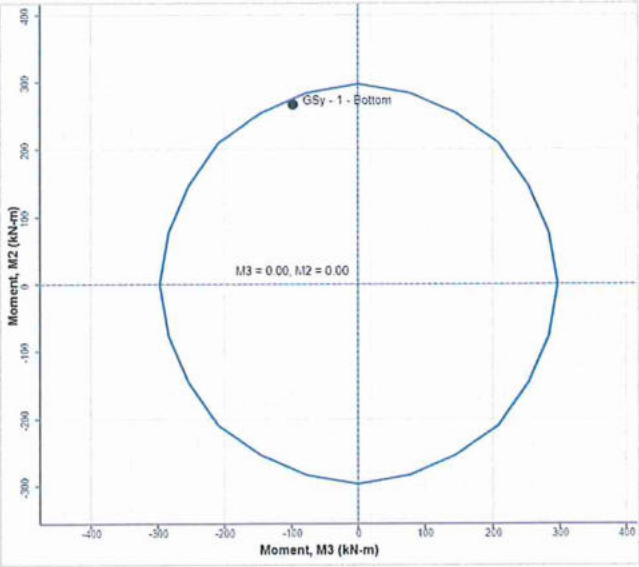
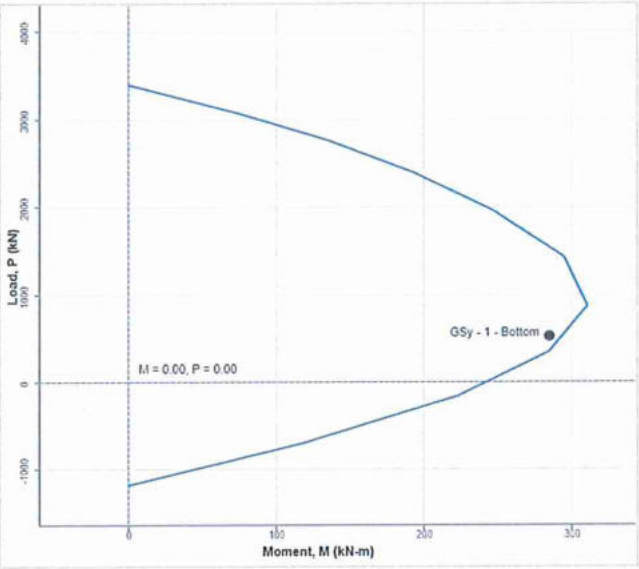
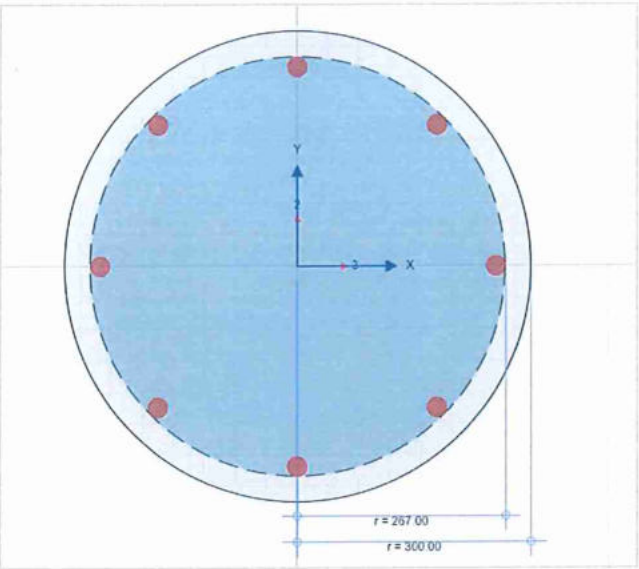
Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSy - 1
Axial Load, $N_{Ed}$	515.17 (kN)
Moment Top, $M_x$	23.36 (kN-m)
Moment Bottom, $M_x$	-80.80 (kN-m)
Moment Top, $M_y$	-112.80 (kN-m)
Moment Bottom, $M_y$	268.17 (kN-m)
Design Moment, $M_{cDesign}$	268.17 (kN-m)
Max Capacity Ratio	0.96





COLUMN INFORMATION

Name	57 - C51
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

SHAPE

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

SECTION PROPERTIES

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, $A$	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

REBARS

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

COLUMN MATERIALS

Concrete

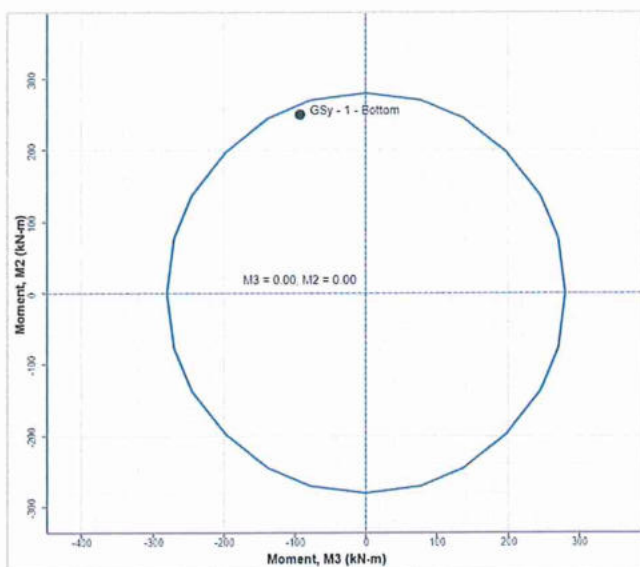
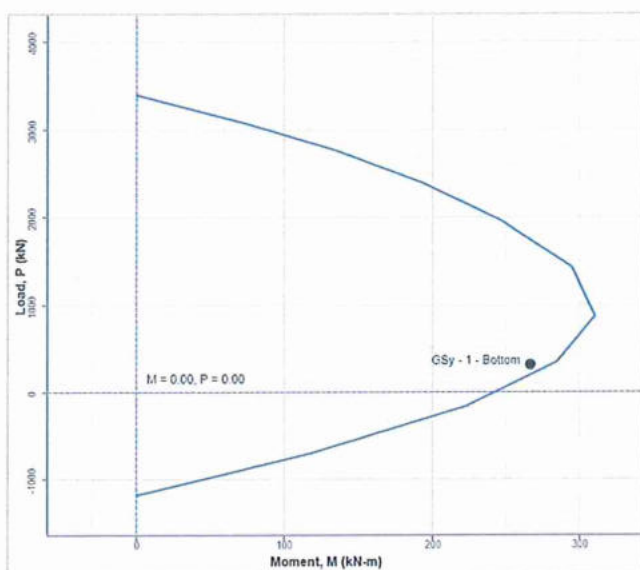
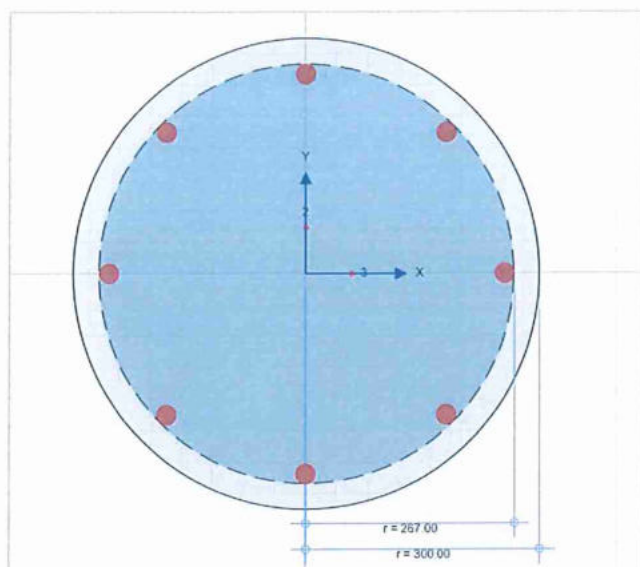
Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

Rebar

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

GOVERNING LOAD

Name	GSy - 1
Axial Load, $N_{Ed}$	525.86 (kN)
Moment Top, $M_x$	20.07 (kN-m)
Moment Bottom, $M_x$	-97.31 (kN-m)
Moment Top, $M_y$	-102.69 (kN-m)
Moment Bottom, $M_y$	267.43 (kN-m)
Design Moment, $M_{cDesign}$	267.43 (kN-m)
Max Capacity Ratio	0.97

**COLUMN INFORMATION**

Name	61 - C4
Code	Eurocode 2: 2004
Shape	Circle
Consider Slenderness	No

**SHAPE**

Name	Stalp_fi_60
Material	C12/15
Stress-Strain Curve	Mander, Rectangular Confined
Confinement Zone	Mander, Circular Confined

**SECTION PROPERTIES**

Total Width, $W_{total}$	600.00 (mm)
Total Height, $H_{total}$	600.00 (mm)
Area, A	282,289.40 (mm <sup>2</sup> )
Inertia, $I_{22}$	6,341,326,000.00 (mm <sup>4</sup> )
Inertia, $I_{33}$	6,341,323,000.00 (mm <sup>4</sup> )
Centroid, $\bar{x}$	300.00 (mm)
Centroid, $\bar{y}$	300.00 (mm)

**REBARS**

Rebars	8-d 25
Rebar Area	3,926.99 (mm <sup>2</sup> )
Rebar Ratio	1.39%

**COLUMN MATERIALS****Concrete**

Name	C12/15
Elastic Modulus	27,000.00 (MPa)
Compressive Strength	12.00 (MPa)

**Rebar**

Name	PC52
Stress-Strain Curve	Elasto-Plastic
Elastic Modulus	200,000.00 (MPa)
Minimum Yield Stress	345.00 (MPa)
Minimum Tensile Stress	510.00 (MPa)

**GOVERNING LOAD**

Name	GSy - 1
Axial Load, $N_{Ed}$	315.78 (kN)
Moment Top, $M_x$	28.95 (kN-m)
Moment Bottom, $M_x$	-91.75 (kN-m)
Moment Top, $M_y$	-78.64 (kN-m)
Moment Bottom, $M_y$	250.14 (kN-m)
Design Moment, $M_{cDesign}$	250.14 (kN-m)
Max Capacity Ratio	0.95

Nivel de cunoaștere: limitată =>

$$CF := 1.20$$

Rezultatele obținute în urma verificărilor se prezintă în continuare sub formă tabelară.

Stâlp	Raport de solicitare GsX $r_1/r_f$	Raport de solicitare GsY $r_1/r_f$	V <sub>x</sub> [kN]	V <sub>y</sub> [kN]
C1	0.90	1.03	85.42	115.84
C38	0.91	1.01	92.38	127.58
C32	0.83	0.98	80.74	127.87
C34	0.82	0.96	81.51	126.81
C36	1.00	0.98	104.33	125.16
C48	1.01	0.98	109.28	123.58
C22	0.92	1.00	90.81	112.59
C2	0.84	1.00	89.46	112.59
C39	0.73	0.81	95.81	107.15
C42	0.72	0.84	80.90	113.04
C44	0.70	0.79	80.28	110.98
C46	0.71	0.79	80.13	109.58
C49	0.69	0.78	89.44	113.17
C52	0.79	0.97	88.06	125.61
C24	0.81	1.12	83.00	142.08
C3	0.84	1.01	90.03	114.39
C40	0.73	0.81	95.82	109.80
C43	0.72	0.84	80.24	114.58
C45	0.70	0.79	80.15	110.90
C47	0.71	0.79	79.60	108.88
C50	0.69	0.78	89.15	111.98
C53	0.79	0.97	87.29	126.35
C25	0.81	1.12	82.99	141.63
C21	0.91	1.04	89.27	118.54
C41	1.01	1.04	103.48	131.75
C33	0.89	0.99	88.54	129.70
C35	0.88	0.96	88.71	126.89
C37	0.88	0.96	89.05	124.48
C51	0.96	0.97	99.61	120.85
C4	0.88	0.95	87.05	107.17
Raport de solicitare mediu	0.83	0.94		
CF =	1.20			
R <sub>3,global,M</sub> =	1.01	0.89		

$$R_{3,M,x} := 1.01$$

$$R_{3,M,y} := 0.89$$

$$R_{3M} := \min(R_{3,M,x}, R_{3,M,y}) = 0.89$$

- indicatorul R3, din moment încovoietor

## 2.2. Calculul Indicatorului R3. Forță tăietoare

### 2.2.1. Stâlp circular $\phi = 60\text{cm}$

$$h_{st} := 530 \text{ mm}$$

$$b_{st} := 530 \text{ mm}$$

$$c_{nom} := 25 \text{ mm}$$

$$\eta := 1$$

$$C_{Rdc} := \frac{0.18}{\gamma_c} = 0.12$$

$$\phi_{sl} := 25 \text{ mm}$$

$$\phi_{sw} := 8 \text{ mm}$$

$$d_y := h_{st} - c_{nom} - \phi_{sw} - \frac{\phi_{sl}}{2} = 484.5 \text{ mm}$$

$$z_y := 0.85 \cdot d_y = 411.825 \text{ mm}$$



$$k := 1 + \sqrt{\frac{200}{d_y}} = 1.642$$

$$\rho_l := \frac{3 \cdot \frac{\pi \cdot (\phi_{slt})^2}{4}}{b_{st} \cdot d_y} = 0.006$$

$$V_{Rdc} := \frac{\left( C_{Rdc} \cdot \eta \cdot k \cdot \left( 100 \cdot \rho_l \cdot \frac{f_{ck}}{\text{MPa}} \right)^{\frac{1}{3}} \right) \cdot \frac{b_{st}}{\text{mm}} \cdot \frac{d_y}{\text{mm}}}{1000} \cdot \text{kN} = 96.269 \text{ kN}$$

$$A_{s,w} := 2 \cdot \frac{\pi \cdot \phi_{sw}^2}{4} = 100.531 \text{ mm}^2$$

$$s := 100 \text{ mm}$$

$$\theta := 45 \text{ deg}$$

$$\cot(0) = 1$$

$$V_{Rds} := \frac{A_{s,w}}{s} \cdot Z_y \cdot f_{yd,OB37} \cdot \cot(\theta) = 91.803 \text{ kN} \quad V_{Rd} := \max(V_{Rds}, V_{Rdc}) = 96.269 \text{ kN}$$

Stâlپ	V <sub>x</sub> [kN]	V <sub>y</sub> [kN]	V <sub>Rdx</sub> [kN]	V <sub>Rdy</sub> [kN]	Raportul de solicitare r <sub>x</sub>	Raportul de solicitare r <sub>y</sub>
C1	85.42	115.84	97.27	97.27	0.88	1.19
C38	92.38	127.58	97.27	97.27	0.95	1.31
C32	80.74	127.87	97.27	97.27	0.83	1.31
C34	81.51	126.81	97.27	97.27	0.84	1.30
C36	104.33	125.16	97.27	97.27	1.07	1.29
C48	109.28	123.58	97.27	97.27	1.12	1.27
C22	90.81	112.59	97.27	97.27	0.93	1.16
C2	89.46	112.59	97.27	97.27	0.92	1.16
C39	95.81	107.15	97.27	97.27	0.98	1.10
C42	80.90	113.04	97.27	97.27	0.83	1.16
C44	80.28	110.98	97.27	97.27	0.83	1.14
C46	80.13	109.58	97.27	97.27	0.82	1.13
C49	89.44	113.17	97.27	97.27	0.92	1.16
C52	88.06	125.61	97.27	97.27	0.91	1.29
C24	83.00	142.08	97.27	97.27	0.85	1.46
C3	90.03	114.39	97.27	97.27	0.93	1.18
C40	95.82	109.80	97.27	97.27	0.99	1.13
C43	80.24	114.58	97.27	97.27	0.82	1.18
C45	80.15	110.90	97.27	97.27	0.82	1.14
C47	79.60	108.88	97.27	97.27	0.82	1.12
C50	89.15	111.98	97.27	97.27	0.92	1.15
C53	87.29	126.35	97.27	97.27	0.90	1.30
C25	82.99	141.63	97.27	97.27	0.85	1.46
C21	89.27	118.54	97.27	97.27	0.92	1.22
C41	103.48	131.75	97.27	97.27	1.06	1.35
C33	88.54	129.70	97.27	97.27	0.91	1.33
C35	88.71	126.89	97.27	97.27	0.91	1.30
C37	89.05	124.48	97.27	97.27	0.92	1.28
C51	99.61	120.85	97.27	97.27	1.02	1.24
C4	87.05	107.17	97.27	97.27	0.89	1.10
Raportul de solicitare mediu				r <sub>3V,med</sub> =	0.91	1.23
C.F.					1.20	
R <sub>3,V</sub> =					0.91	0.68

$$R_{3,Vx} := 0.91 \quad R_{3,Vy} := 0.68$$

$$R_{3V} := \min(R_{3,Vx}, R_{3,Vy}) = 0.68$$

- indicatorul R3, din forță tăietoare

### 2.3. Stabilirea indicatorului R3 global

$$R_3 := \min(R_{3M}, R_{3V}) = 0.68$$

- indicatorul R3 global

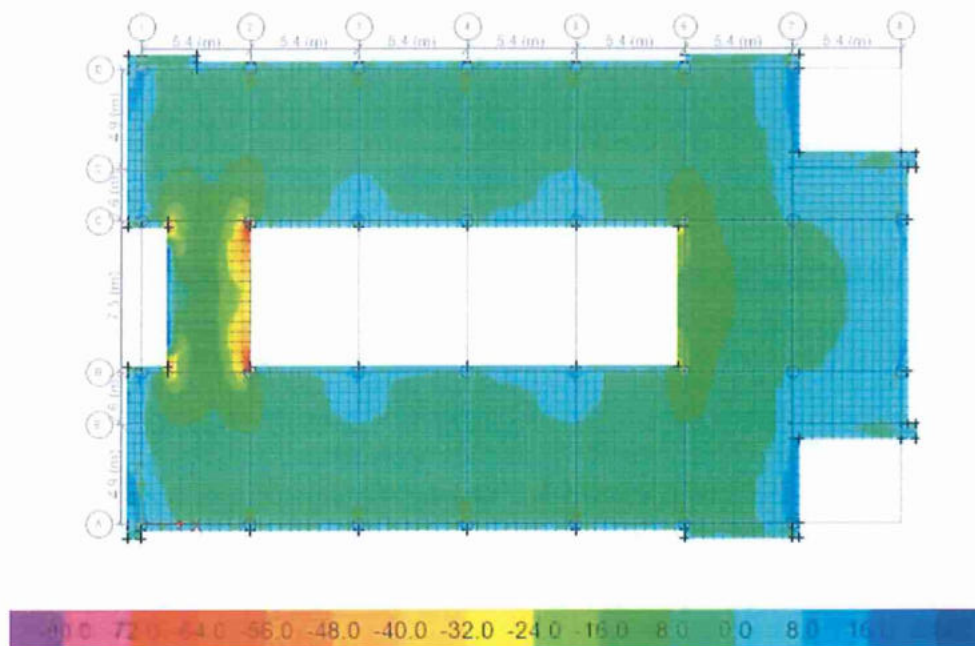
În conformitate cu prevederile codului P100-3/2019 Gradul de asigurare seismică pentru structură, R3, este minimul dintre valorile determinate distinct pentru fiecare direcție orizontală principală ortogonală considerată în evaluarea clădirii.

Pentru cazul de față, clasa de risc seismic asociată indicatorului R3 ( $65\% \leq 68\% < 90\%$ ) este Clasa de risc seismic RsIII.

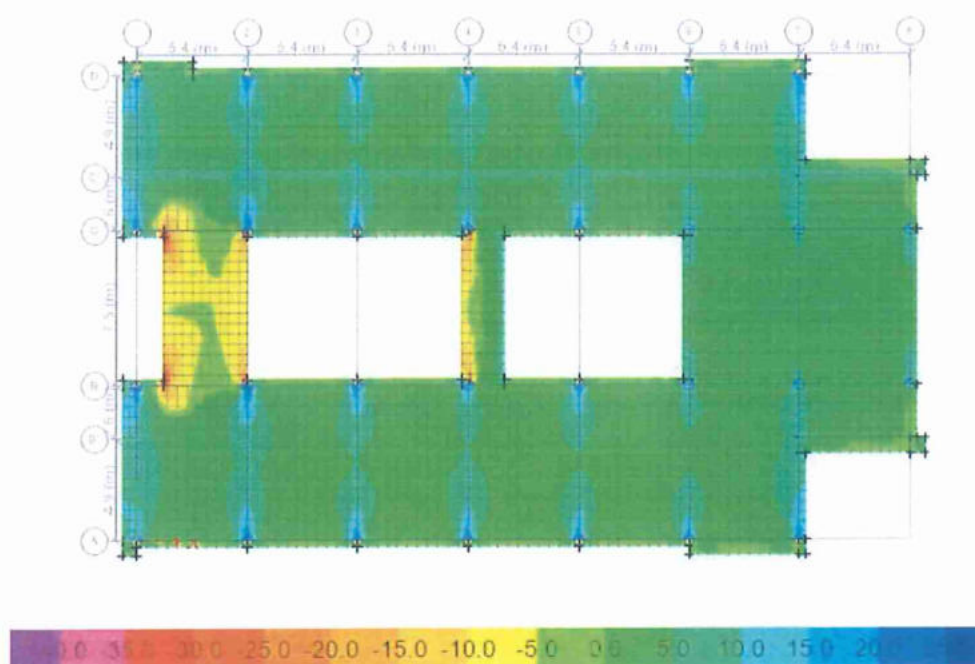
### 3. Analize prin calcul

#### 3.1. Analiza plăcilor din zonele de pasarele

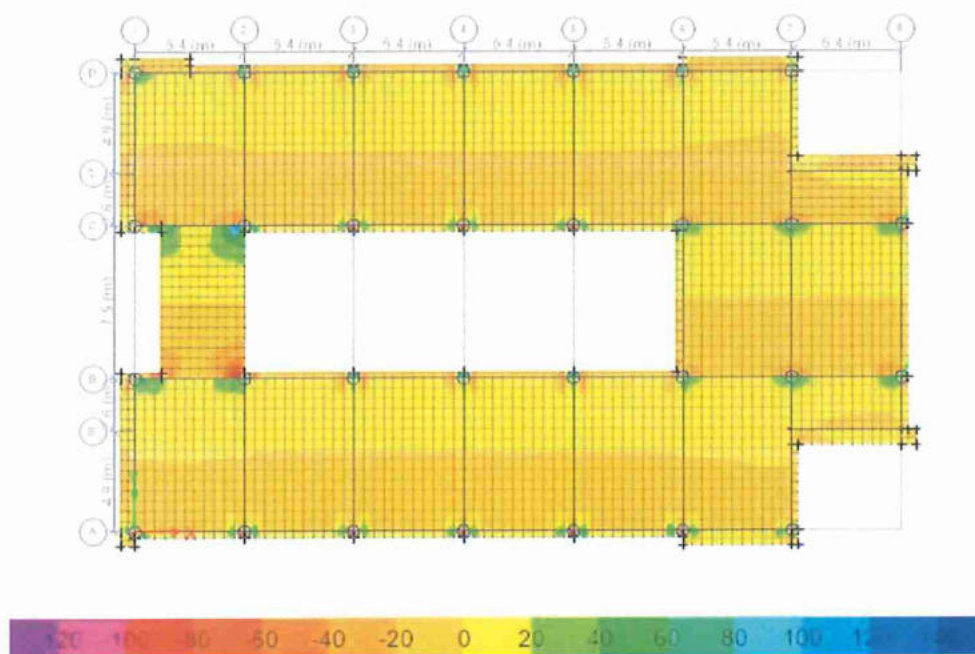
În zona axelor 1-2/B-C la nivelul planșeului de peste parter și etajul 1, precum și în zona axelor 4-5/B-C la nivelul planșeului de peste etajul 1 au fost realizate plăci din beton armat care leagă cele două aripi ale construcției. Plăcile s-au executat fără grinzi din beton armat, aspect care conduce la concentrări mari de eforturi în zonele respective. În cele ce urmează se prezintă diagramele de eforturi.



Diagramă F22 (GSy) - Planșeu peste parter

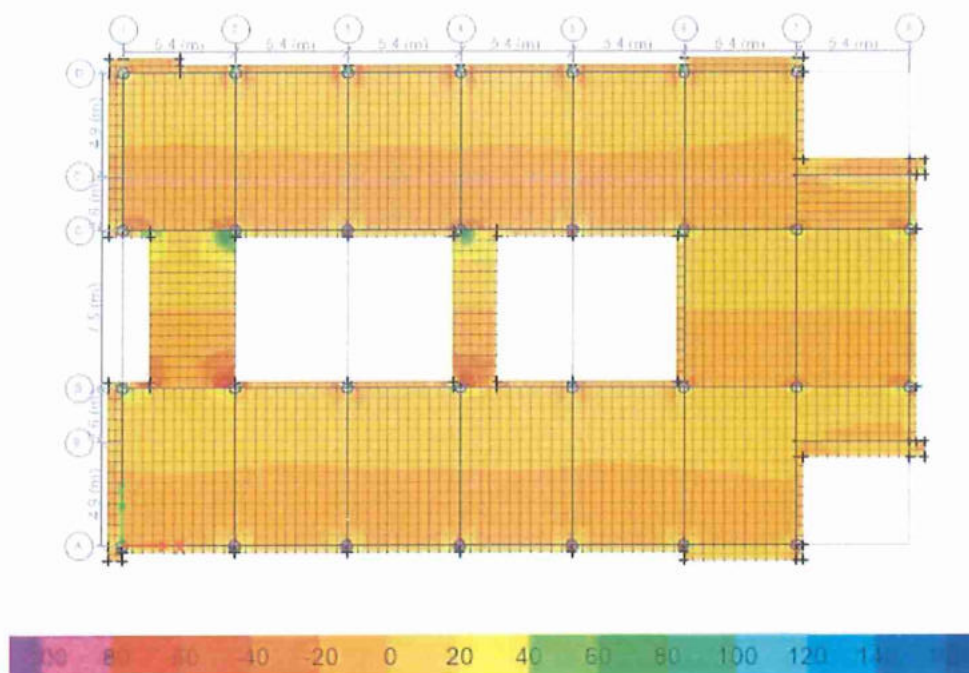


Diagramă F22 (GSy) - Planșeu peste etajul 1



Diagramă V23 (GSx) - Planșeu peste parter





Diagramă V23 (GSx) - Planșeu peste etajul 1

În urma analizei rezultatelor obținute se poate concluziona faptul că din cauza lipsei de grinzi din zona pasarelelor plăcile din beton armat suferă concentrații mari de eforturi, atât normale (întindere/compresiune), cât și tangențiale (forfecare). Totodată, lipsa grinzilor din beton armat conduce la un comportament deficitar de ansamblu al imobilului investigat.

### 3.2. Verificarea planșeelor din beton armat

Din cauza faptului că se dorește schimbarea de destinație din pavilion de expoziție în centru multifuncțional (încărcările utile variind între 2.00 - 5.00 kN/m<sup>2</sup>), s-a considerat necesară realizarea unor verificări la nivelul plăcilor și grinzilor din beton armat ale planșeelor.

#### 3.2.1. Verificarea plăcii din beton armat (ax 2-3/C-D)

În câmp

$$h_{pl} := 15 \text{ cm} \quad \eta = 1 \quad \lambda := 0.8 \quad c_{nom} := 25 \text{ mm} \quad b_{calc} := 1.00 \text{ m}$$

$$\phi_1 := 8 \text{ mm} \quad / \quad 100 \text{ mm} - 140 \text{ mm}$$

$$d_1 := c_{nom} + \frac{\phi_1}{2} = 29 \text{ mm}$$

$$d := h_{pl} - \frac{d_1}{2} = 135.5 \text{ mm}$$

$$A_{s,eff} := 9 \cdot \frac{\pi \cdot (\phi_1)^2}{4} = 452.389 \text{ mm}^2$$

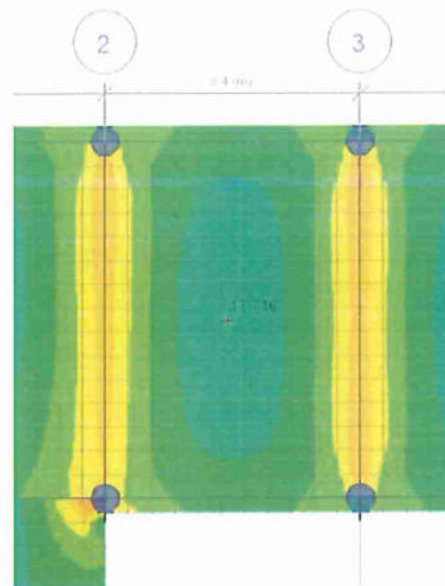
$$x := \frac{(A_{s,eff} \cdot f_{yd,PC52})}{\lambda \cdot \eta \cdot f_{cd} \cdot b_{calc}} = 21.206 \text{ mm}$$

$$z := d - \left( \lambda \cdot \frac{x}{2} \right) = 127.018 \text{ mm}$$

$$M_{Rd} := A_{s,eff} \cdot f_{yd,PC52} \cdot z = 17.238 \text{ kN} \cdot \text{m}$$

$$M_{Ed} := 17.72 \text{ kN} \cdot \text{m}$$

$$\frac{M_{Ed}}{M_{Rd}} = 1.028 \quad \rightarrow \text{NU VERIFICĂ!}$$



### 3.2.2 Grindă 4/A-B

#### Moment încovoietor în câmp

$$h_{gr} := 700 \text{ mm} \quad b_{gr} := 300 \text{ mm} \quad c_{nom} := 25 \text{ mm}$$

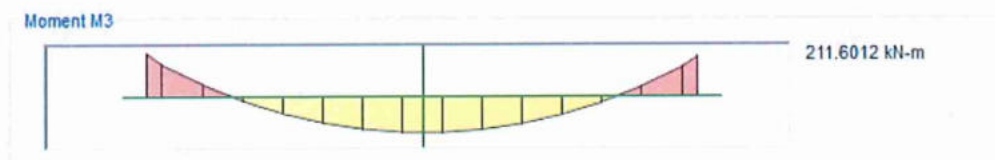
$$\phi_{sl} := 20 \text{ mm} \quad \phi_{sw} := 8 \text{ mm}$$

$$d_1 := c_{nom} + \phi_{sw} + \frac{\phi_{sl}}{2} = 43 \text{ mm} \quad d := h_{gr} - d_1 = 657 \text{ mm}$$

$$A_{sl} := 3 \cdot \frac{\pi \cdot (\phi_{sl})^2}{4} = 9.425 \text{ cm}^2$$

$$x := \frac{A_{sl} \cdot f_{yd,PC52}}{\lambda \cdot \eta \cdot f_{cd} \cdot b_{gr}} = 147.262 \text{ mm} \quad \xi := \frac{x}{d} = 0.224$$

$$M_{Rd} := \lambda \cdot \eta \cdot f_{cd} \cdot \xi \cdot (1 - 0.5 \cdot \lambda \cdot \xi) \cdot b_{gr} \cdot d^2 = 169.107 \text{ kN} \cdot \text{m}$$



$$M_{Ed} := 211.6 \text{ kN} \cdot \text{m}$$

$$\frac{M_{Ed}}{M_{Rd}} = 1.251 \quad \rightarrow \text{NU VERIFICĂ!}$$

### Forță tăietoare

$$C_{Rdc} := \frac{0.18}{\gamma_c} = 0.12 \quad \theta := 35 \text{ deg}$$

$$k := 1 + \sqrt{\frac{200}{\frac{d}{\text{mm}}}} = 1.552 \quad \rho_l := \frac{A_{sl}}{b_{gr} \cdot d} = 0.005$$

$$V_{Rd,c} := \frac{\left( C_{Rdc} \cdot \eta \cdot k \cdot \left( 100 \cdot \rho_l \cdot \frac{f_{ck}}{\text{MPa}} \right)^{\frac{1}{3}} \right) \cdot \frac{b_{gr}}{\text{mm}} \cdot \frac{d}{\text{mm}}}{1000} \cdot \text{kN} = 65.706 \text{ kN}$$

$$A_{s,w} := 2 \cdot \frac{\pi \cdot \phi_{sw}^2}{4} = 100.531 \text{ mm}^2$$

$$s := 100 \text{ mm} \quad z := d - \lambda \cdot \frac{x}{2} = 0.598 \text{ m}$$

$$V_{Rd,s,etr} := \frac{A_{s,w}}{s} \cdot z \cdot f_{yd,OB37} \cdot \cot(\theta) = 190.408 \text{ kN}$$

$$\phi_{incl} := 20 \text{ mm} \quad n_{b,incl} := 1 \quad A_{s,b,incl} := n_{b,incl} \cdot \frac{\pi \cdot \phi_{incl}^2}{4} = 314.159 \text{ mm}^2$$

$$\alpha := 45 \text{ deg} \quad \sin(\alpha) = 0.707$$

$$V_{Rd,s,bara.inclinata} := A_{s,b,incl} \cdot f_{yd,PC52} \cdot \sin(\alpha) = 66.643 \text{ kN}$$

$$V_{Rd,s} := V_{Rd,s,etr} + V_{Rd,s,bara.inclinata} = 257.051 \text{ kN}$$

$$V_{Rd} := \max(V_{Rd,s}, V_{Rd,c}) = 257.051 \text{ kN}$$

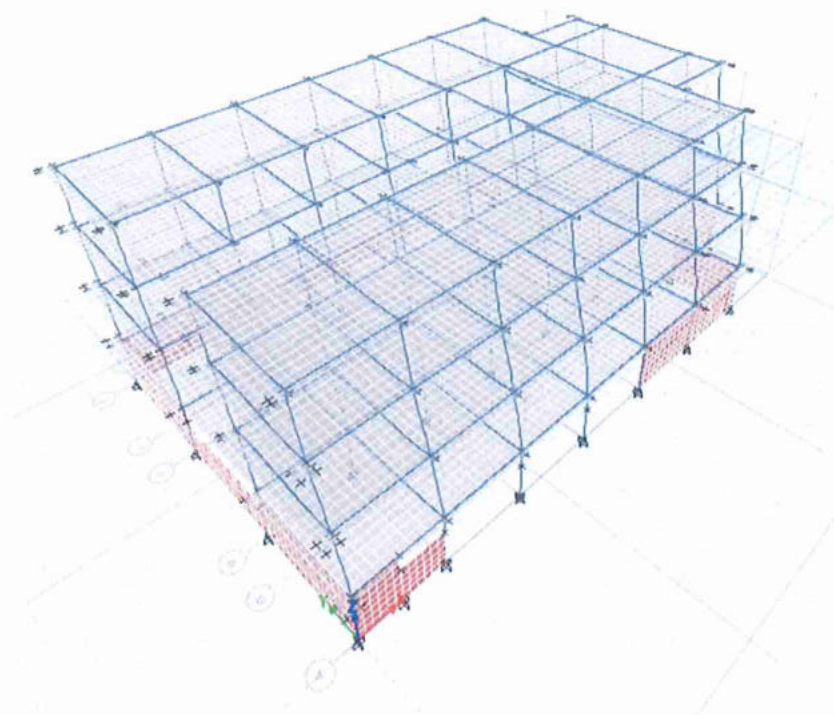


$$V_{Ed} := 311.48 \text{ kN}$$

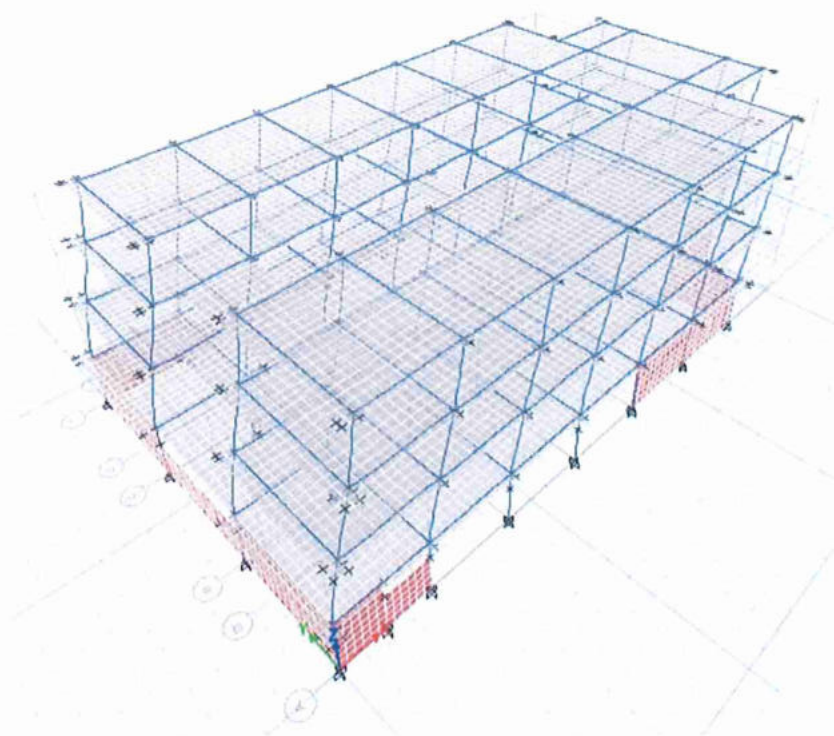
$$\frac{V_{Ed}}{V_{Rd}} = 1.212 \quad \rightarrow \text{NU VERIFICĂ!}$$



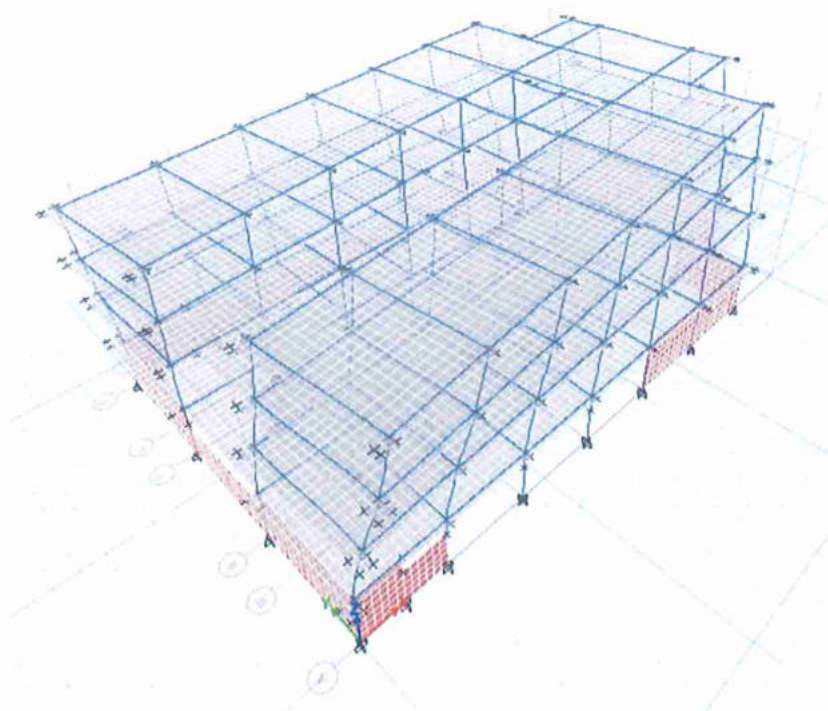
### 3.3. Moduri proprii de vibrație



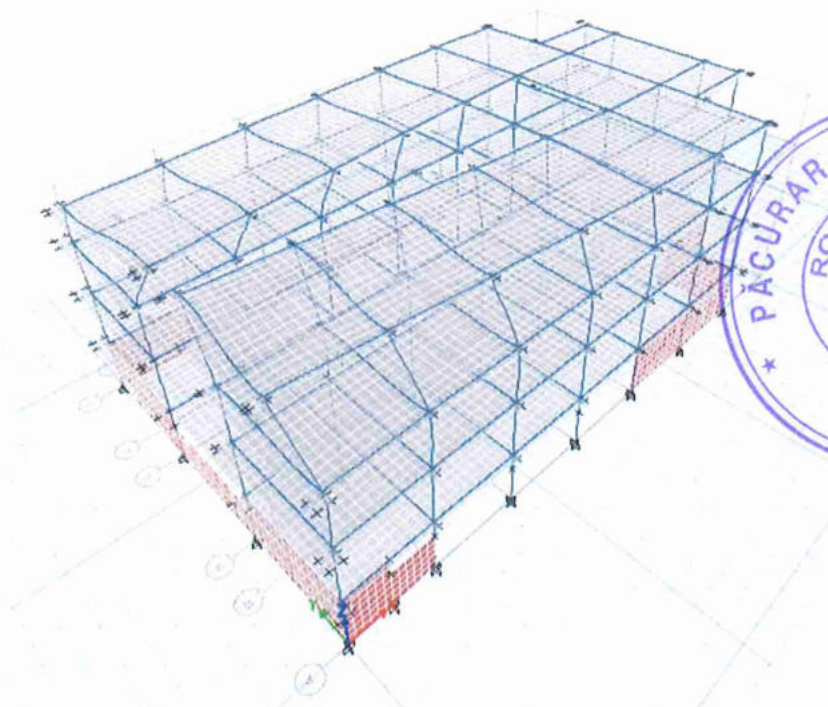
Modul 1 de vibrație -  $T = 0.94$  s



Modul 2 de vibrație -  $T = 0.93$  s



Modul 3 de vibrație -  $T = 0.86$  s



Modul 7 de vibrație -  $T = 0.27$  s



intocmit,  
ing. Ghindea Marcel