

Length along X axis  $L_x := 1.20 \cdot \text{m}$   
 Length along Y axis  $L_y := 1.00 \text{m}$   
 Footing centroid  $CG_x := 0 \cdot \text{m}$   
 $CG_y := 0 \cdot \text{m}$   
 Finish grade level  $\text{Grade} := 100 \cdot \text{m}$   
 Top of pedestal level  $\text{TOP} := 100.15 \cdot \text{m}$   
 Bottom of footing level  $\text{BOF} := \text{Grade} - 0.60 \cdot \text{m}$   
 Thickness of footing  $\text{FootingThickness} := 0.350 \cdot \text{m}$   
 Total No of pedestals on the footing  $\text{NoOfPedestal} := 3$   
 Total No of loads  $\text{NoOfLoad} := 8$   
 Total No of load combinations  $\text{NoOfComb} := 29$   
 Pedestal coordinates

Number of Pedestal is LIMITED to 3, when this is greater than 3, MATRIX will have an error

XY :=

Pedestal No.	Joint No.	Coordinates [m]	
		X	Y
1	1	0.38	0.00
2	2	0.00	0.00
3	3	0.00	0.00
4	4	0.00	0.00
5	5	0.00	0.00

$$XY = \begin{pmatrix} 1.00 & 0.38 & 0.00 \\ 2.00 & 0.00 & 0.00 \\ 3.00 & 0.00 & 0.00 \\ 4.00 & 0.00 & 0.00 \\ 5.00 & 0.00 & 0.00 \end{pmatrix}$$

New pedestal  
coordinates:

$i := 0 \dots \text{NoOfPedestal} - 1$

Case #1

$$XY_{i,1} := XY_{i,1} - \frac{CG_x}{m}$$

$$XY_{i,2} := XY_{i,2} - \frac{CG_y}{m}$$

Case #2

$$L_{x,2} := L_y$$

$$L_{y,2} := L_x$$

$$CG_{x,2} := CG_y$$

$$CG_{y,2} := CG_x$$

Loads on  
pedestal

MatrixLoad :=

Load	Joint No.	Forces [KN]			Moments [KN-m]	
		P	Vx	Vy	Mxx	Myy
DL	1	4.61	0.00	0.00	0.00	0.00
LL	1	0.00	0.00	0.00	0.00	0.00
ELx	1	0.00	0.00	0.00	0.00	0.00
ELy	1	0.00	0.00	0.00	0.00	0.00
WLx	1	0.00	1.84	0.00	0.00	0.00
WLy	1	0.00	0.00	0.00	0.00	0.00
CL	1	0.00	0.00	0.00	0.00	0.00
DL	2	1.78	0.00	0.00	0.00	0.00
LL	2	0.00	0.00	0.00	0.00	0.00
ELx	2	0.00	0.00	0.00	0.00	0.00
ELy	2	0.00	0.00	0.00	0.00	0.00
WLx	2	0.00	0.71	0.00	0.00	0.00
WLy	2	0.00	0.00	0.00	0.00	0.00
CL	2	0.00	0.00	0.00	0.00	0.00
DL	3	7.33	0.00	0.00	0.00	0.00
LL	3	0.00	0.00	0.00	0.00	0.00
ELx	3	0.00	0.00	0.00	0.00	0.00
ELy	3	0.00	0.00	0.00	0.00	0.00
WLx	3	0.00	2.93	0.00	0.00	0.00
WLy	3	0.00	0.00	0.00	0.00	0.00
CL	3	0.00	0.00	0.00	0.00	0.00
DL	4	7.33	0.00	0.00	0.00	0.00
LL	4	0.00	0.00	0.00	0.00	0.00
ELx	4	0.00	0.00	0.00	0.00	0.00
ELy	4	0.00	0.00	0.00	0.00	0.00
WLx	4	0.00	2.93	0.00	0.00	0.00
WLy	4	0.00	0.00	0.00	0.00	0.00
CL	4	0.00	0.00	0.00	0.00	0.00

Combination factors

where,

- DL : dead load
- LL : live load
- CL : crane load
- WL : wind load
- EL : earthquake load

$\begin{pmatrix} \text{Comb} \\ \text{CombFactor} \end{pmatrix} :=$

Comb	Loads						
	DL	LL	ELx	ELy	WLx	WLy	CL
1	1.00						
2	1.00	1.00					
3	1.00						
4	1.00				1.00		
5	1.00					1.00	
6	1.00		1.00				
7	1.00			1.00			
8	1.00		-1.00				
9	1.00			-1.00			
10	1.00	0.75			0.75		
11	1.00	0.75				0.75	
12	1.00	0.75	0.75				
13	1.00	0.75		0.75			
14	1.00	0.75	-0.75				
15	1.00	0.75		-0.75			
16	0.60				1.00		
17	0.60					1.00	
18	0.60		1.00				
19	0.60			1.00			
20	0.60		-1.00				
21	0.60			-1.00			
22	1.00	1.00					1.00
23	1.00						1.00
24	0.75	0.75			0.75		0.75
25	0.75	0.75				0.75	0.75
26	0.75	0.75	0.75				0.75
27	0.75	0.75		0.75			0.75
28	0.75	0.75	-0.75				0.75
29	0.75	0.75		-0.75			0.75

NoOfForce := cols(MatrixLoad)      NoOfCoord := cols(XY)

```
MatrixXY := | for i ∈ 0 .. NoOfComb - 1
              for j ∈ 0 .. NoOfCoord - 1
              for k ∈ 0 .. NoOfPedestal - 1
                MatrixXYi+NoOfComb·k,j ← XYk,j
              |
MatrixXY
```

```
CombAUX := | for k ∈ 0 .. NoOfPedestal - 1
              CombAUXk,0 ← Comb
            |
CombAUX
```

```
MatrixComb := for i ∈ 0 .. NoOfComb - 1
              for k ∈ 0 .. NoOfPedestal - 1
                MatrixCombi+NoOfComb·k ← (CombAUXk,0)i
```

```
CombFactorAUX := for k ∈ 0 .. NoOfPedestal - 1
                  CombFactorAUXk,0 ← CombFactor
```

```
MatrixCombFactor := for i ∈ 0 .. NoOfComb - 1
                    for j ∈ 0 .. NoOfLoad - 1
                    for k ∈ 0 .. NoOfPedestal - 1
                      MatrixCombFactori+NoOfComb·k,j ← (CombFactorAUXk,0)i,j
```

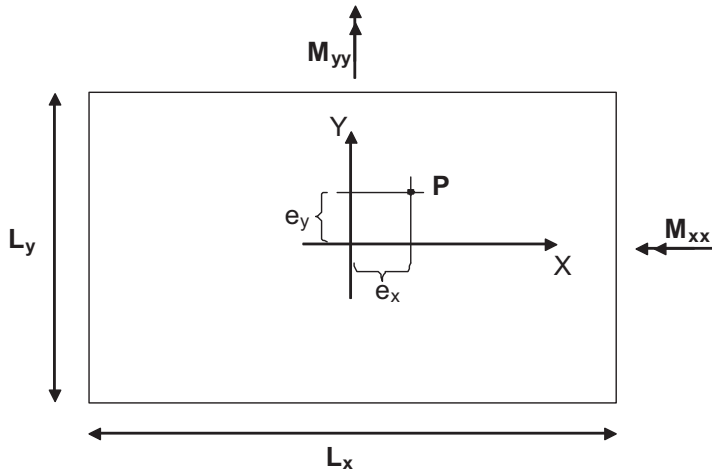
```
CombLoadAUX := for k ∈ 0 .. NoOfPedestal - 1
                CombLoadAUXk,0 ← CombFactor·submatrix[MatrixLoad, NoOfLoad·k, NoOfLoad·(k + 1) - 1, 0, NoOfFc
```

```
MatrixCombLoad := for i ∈ 0 .. NoOfComb - 1
                  for j ∈ 0 .. NoOfForce - 1
                  for k ∈ 0 .. NoOfPedestal - 1
                    MatrixCombLoadi+NoOfComb·k,j ← (CombLoadAUXk,0)i,j
```

```
MatrixLoad := | MatrixLoad ← stack(MatrixCombT, MatrixXYT, MatrixCombLoadT)
                |
                | MatrixLoad ← MatrixLoadT
                |
                | csort(MatrixLoad, 0)
```

MatrixLoad =

	0	1	2	3	4	5	6	7	8
0	1.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	1.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1.00	1.00	0.38	0.00	4.61	0.00	0.00	0.00	0.00
3	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	2.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	2.00	1.00	0.38	0.00	4.61	0.00	0.00	0.00	0.00
6	3.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	3.00	1.00	0.38	0.00	4.61	0.00	0.00	0.00	0.00
8	3.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	4.00	1.00	0.38	0.00	4.61	1.84	0.00	0.00	0.00
10	4.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	4.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	5.00	1.00	0.38	0.00	4.61	0.00	0.00	0.00	0.00
13	5.00	3.00	0.00	0.00	7.33	0.00	0.00	0.00	0.00
14	5.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	6.00	3.00	0.00	0.00	0.00	2.93	0.00	0.00	...



Length along X axis  
Length along Y axis

$$L_x := 1.20 \cdot \text{m}$$

$$L_y := 1.00 \cdot \text{m}$$

Footing centroid

$$CG_x := 0 \cdot \text{m}$$

$$CG_y := 0 \cdot \text{m}$$

Finish grade level

$$\text{Grade} := 100 \cdot \text{m}$$

Top of pedestal level

$$\text{TOP} := 100.15 \cdot \text{m}$$

Bottom of footing level

$$\text{BOF} := \text{Grade} - 0.60 \cdot \text{m}$$

Thickness of footing

$$\text{FootingThickness} := 0.350 \cdot \text{m}$$

Total No of pedestals on the footing

$$\text{NoOfPedestal} := 4$$

Number of Pedestal is LIMITED to 3, when this is greater than 3, MATRIX will have an error

Total No of loads

$$\text{NoOfLoad} := 8$$

Total No of load combinations

$$\text{NoOfComb} := 29$$

Pedestal coordinates

XY :=

Pedestal No.	Joint No.	Coordinates [m]	
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New pedestal coordinates:

$$i := 0 \dots \text{NoOfPedestal} - 1$$

Case #1

$$XY_{i,1} := XY_{i,1} - \frac{CG_x}{m}$$

$$XY_{i,2} := XY_{i,2} - \frac{CG_y}{m}$$

Case #2

$L_{x,2} := L_y$

$L_{y,2} := L_x$

$CG_{x,2} := CG_y$

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Loads on  
pedestal

MatrixLoad :=

Load	Joint No.	Forces [KN]			Moments [KN-m]	
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ELy	1	0.00	0.00	0.00	0.00	0.00
WLx	1	0.00	1.84	0.00	0.00	0.00
WLy	1	0.00	0.00	0.00	0.00	0.00
CL	1	0.00	0.00	0.00	0.00	0.00
DL	2	1.78	0.00	0.00	0.00	0.00
LL	2	0.00	0.00	0.00	0.00	0.00
ELx	2	0.00	0.00	0.00	0.00	0.00
ELy	2	0.00	0.00	0.00	0.00	0.00
WLx	2	0.00	0.71	0.00	0.00	0.00
WLy	2	0.00	0.00	0.00	0.00	0.00
CL	2	0.00	0.00	0.00	0.00	0.00
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ELy	4	0.00	0.00	0.00	0.00	0.00
WLx	4	0.00	2.93	0.00	0.00	0.00
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CL	4	0.00	0.00	0.00	0.00	0.00

Combination factors

$\begin{pmatrix} \text{Comb} \\ \text{CombFactor} \end{pmatrix} :=$

where,

- DL : dead load
- LL : live load
- CL : crane load
- WL : wind load
- EL : earthquake load

Comb	Loads						
	DL	LL	ELx	ELy	WLx	WLy	CL
1	1.00						
2	1.00	1.00					
3	1.00						
4	1.00				1.00		
5	1.00					1.00	
6	1.00		1.00				
7	1.00			1.00			
8	1.00		-1.00				
9	1.00			-1.00			
10	1.00	0.75			0.75		
11	1.00	0.75				0.75	
12	1.00	0.75	0.75				
13	1.00	0.75		0.75			
14	1.00	0.75	-0.75				
15	1.00	0.75		-0.75			
16	0.60				1.00		
17	0.60					1.00	
18	0.60		1.00				
19	0.60			1.00			
20	0.60		-1.00				
21	0.60			-1.00			
22	1.00	1.00					1.00
23	1.00						1.00
24	0.75	0.75			0.75		0.75
25	0.75	0.75				0.75	0.75
26	0.75	0.75	0.75				0.75
27	0.75	0.75		0.75			0.75
28	0.75	0.75	-0.75				0.75
29	0.75	0.75		-0.75			0.75



NoOfForce := cols(MatrixLoad)      NoOfCoord := cols(XY)

```
MatrixXY := | for i ∈ 0 .. NoOfComb - 1
              | for j ∈ 0 .. NoOfCoord - 1
              |   for k ∈ 0 .. NoOfPedestal - 1
              |     MatrixXYi+NoOfComb·k,j ← XYk,j
              | MatrixXY
```

```
CombAUX := | for k ∈ 0 .. NoOfPedestal - 1
             |   CombAUXk,0 ← Comb
             | CombAUX
```

```
MatrixComb := for i ∈ 0 .. NoOfComb - 1
               | for k ∈ 0 .. NoOfPedestal - 1
               |   MatrixCombi+NoOfComb·k ← (CombAUXk,0)i
```

```
CombFactorAUX := for k ∈ 0 .. NoOfPedestal - 1
                  | CombFactorAUXk,0 ← CombFactor
```

```
MatrixCombFactor := for i ∈ 0 .. NoOfComb - 1
                    | for j ∈ 0 .. NoOfLoad - 1
                    |   for k ∈ 0 .. NoOfPedestal - 1
                    |     MatrixCombFactori+NoOfComb·k,j ← (CombFactorAUXk,0)i,j
```

```
CombLoadAUX := for k ∈ 0 .. NoOfPedestal - 1
                | CombLoadAUXk,0 ← CombFactor·submatrix[MatrixLoad, NoOfLoad·k, NoOfLoad·(k + 1) - 1, 0, NoOfFc
```

```
MatrixCombLoad := for i ∈ 0 .. NoOfComb - 1
                  | for j ∈ 0 .. NoOfForce - 1
                  |   for k ∈ 0 .. NoOfPedestal - 1
                  |     MatrixCombLoadi+NoOfComb·k,j ← (CombLoadAUXk,0)i,j
```

```
MatrixLoad := | MatrixLoad ← stack(MatrixCombT, MatrixXYT, MatrixCombLoadT)
               | MatrixLoad ← MatrixLoadT
               | csort(MatrixLoad, 0)
```

MatrixLoad =