	<b>REI Software Co., Ltd.</b> 100/1 VORASOMBAT BUILDING, 14TH FLOOR; RAMA 9 ROAD, HUAYKWANG; BANGKOK 10310 THAILAND	Job No.	Rev
	<b>Job Title : REI Software</b>	Part	Ref
	Client :	By	Chd
	File : Compare FEA RIGID.stph	Date 09/30/2025	Time 01:17 PM

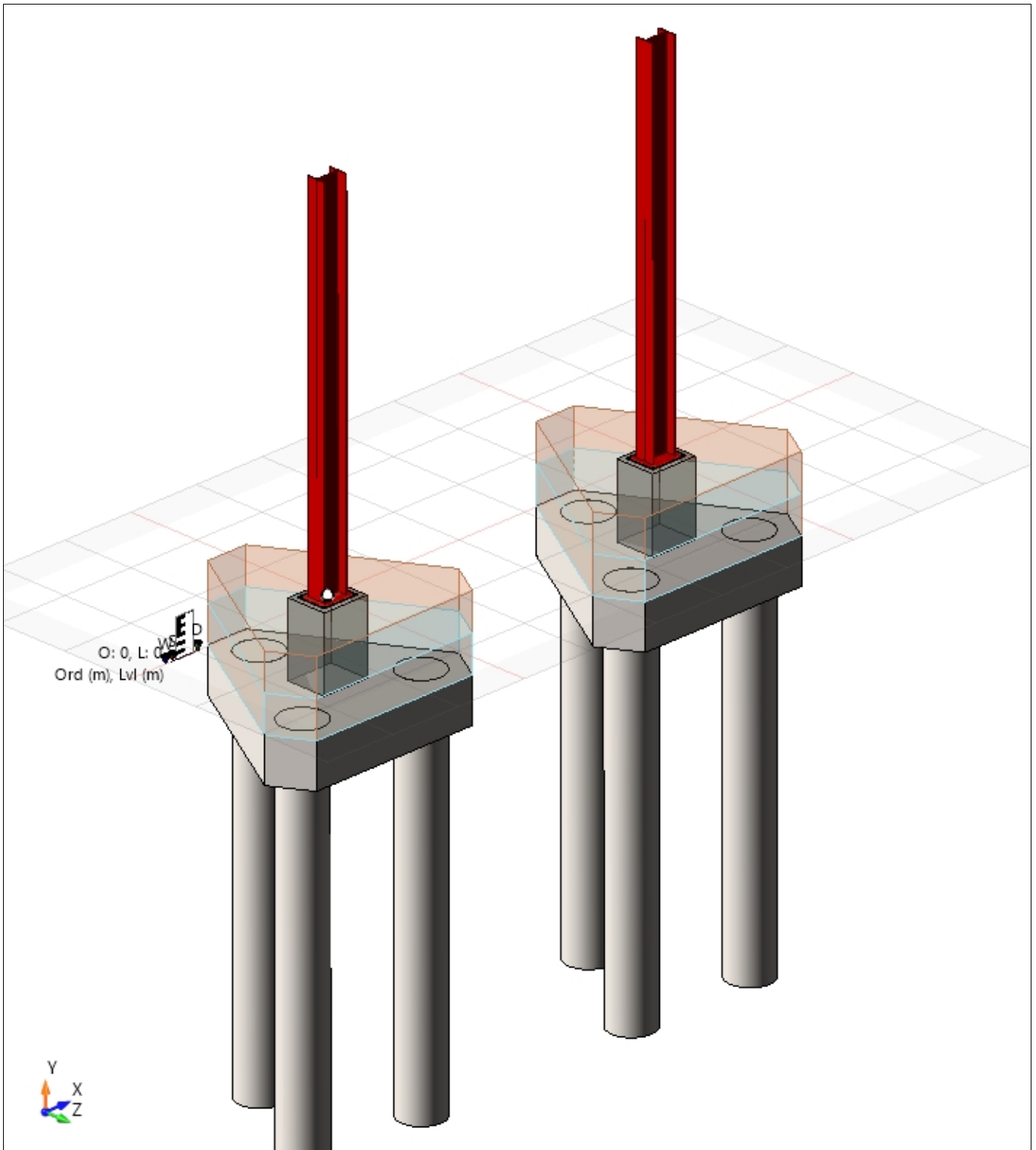
### Load Combinations

L/C Ref.	Load Definition	Associated Analysis Criteria
C1	SLS-(1)S1 : 1: DEAD	
C2	SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE	
C3	SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL	
C4	SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL	
C5	SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL	
C6	SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL	
C7	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL	
C8	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL	
C9	ULSSDEAD1675	
C10	ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE	
C11	ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL	
C12	ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL	
C13	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL	
C14	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL	
C15	SLS-(1)S1 : 1: DEAD + Sat. + Dry	AC2
C16	SLS-(1)S1 : 1: DEAD + Saturated	AC2
C17	SLS-(1)S1 : 1: DEAD + Dry	AC2
C18	SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE + Sat. + Dry	AC2
C19	SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE + Saturated	AC2
C20	SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE + Dry	AC2
C21	SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Sat. + Dry	AC2
C22	SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Saturated	AC2
C23	SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Dry	AC2
C24	SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Sat. + Dry	AC2
C25	SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Saturated	AC2
C26	SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Dry	AC2
C27	SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Sat. + Dry	AC2
C28	SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Saturated	AC2
C29	SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Dry	AC2
C30	SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Sat. + Dry	AC2

L/C Ref.	Load Definition	Associated Analysis Criteria
C31	SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Saturated	AC2
C32	SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Dry	AC2
C33	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL + Sat. + Dry	AC2
C34	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL + Saturated	AC2
C35	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL + Dry	AC2
C36	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL + Sat. + Dry	AC2
C37	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL + Saturated	AC2
C38	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL + Dry	AC2
C39	ULS-(1.4)S1 ; 1; DEAD + Sat. + Dry	AC2
C40	ULS-(1.4)S1 ; 1; DEAD + Saturated	AC2
C41	ULS-(1.4)S1 ; 1; DEAD + Dry	AC2
C42	ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Sat. + Dry	AC2
C43	ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Saturated	AC2
C44	ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Dry	AC2
C45	ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Sat. + Dry	AC2
C46	ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Saturated	AC2
C47	ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Dry	AC2
C48	ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Sat. + Dry	AC2
C49	ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Saturated	AC2
C50	ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Dry	AC2
C51	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL + Sat. + Dry	AC2
C52	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL + Saturated	AC2
C53	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL + Dry	AC2
C54	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL + Sat. + Dry	AC2
C55	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL + Saturated	AC2
C56	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL + Dry	AC2
C57	SLS-(1)S1 : 1: DEAD + Sat. + Dry	AC1
C58	SLS-(1)S1 : 1: DEAD + Saturated	AC1
C59	SLS-(1)S1 : 1: DEAD + Dry	AC1
C60	SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE + Sat. + Dry	AC1
C61	SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE + Saturated	AC1
C62	SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE + Dry	AC1
C63	SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Sat. + Dry	AC1
C64	SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Saturated	AC1
C65	SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Dry	AC1
C66	SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Sat. + Dry	AC1
C67	SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Saturated	AC1

L/C Ref.	Load Definition	Associated Analysis Criteria
C68	SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Dry	AC1
C69	SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Sat. + Dry	AC1
C70	SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Saturated	AC1
C71	SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Dry	AC1
C72	SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Sat. + Dry	AC1
C73	SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Saturated	AC1
C74	SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Dry	AC1
C75	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL + Sat. + Dry	AC1
C76	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL + Saturated	AC1
C77	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL + Dry	AC1
C78	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL + Sat. + Dry	AC1
C79	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL + Saturated	AC1
C80	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL + Dry	AC1
C81	ULS-(1.4)S1 : 1: DEAD + Sat. + Dry	AC1
C82	ULS-(1.4)S1 : 1: DEAD + Saturated	AC1
C83	ULS-(1.4)S1 : 1: DEAD + Dry	AC1
C84	ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Sat. + Dry	AC1
C85	ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Saturated	AC1
C86	ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Dry	AC1
C87	ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Sat. + Dry	AC1
C88	ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Saturated	AC1
C89	ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Dry	AC1
C90	ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Sat. + Dry	AC1
C91	ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Saturated	AC1
C92	ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Dry	AC1
C93	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL + Sat. + Dry	AC1
C94	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL + Saturated	AC1
C95	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL + Dry	AC1
C96	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL + Sat. + Dry	AC1
C97	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL + Saturated	AC1
C98	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL + Dry	AC1

**Pile Cap**



**Glossary : Flexure ACI 318-14-M**

All units in N and mm U.N.O

**Glossary**

Ast. req. = Area of tension reinforcement required

Ast. prov.	=	Area of tension reinforcement provided
B	=	Strip width
D	=	Overall depth of section being designed
d <sub>eff</sub>	=	Effective depth of Mat/Region used for calculation of tension reinforcement
f' <sub>c</sub>	=	Maximum Compressive Stress in the concrete
f <sub>y</sub>	=	Yield Stress of Reinforcement
M <sub>Cap</sub>	=	Moment Capacity of the section
M <sub>u</sub>	=	Factored design moment at section (+ve sign indicates tension at top)
σ <sub>c</sub>	=	Stress in concrete based on clause number 22.2.2.4.1
Φ	=	Strength Reduction factor
ε <sub>s</sub>	=	Strain in extreme tension reinforcement

**PC3**

**Geometry**

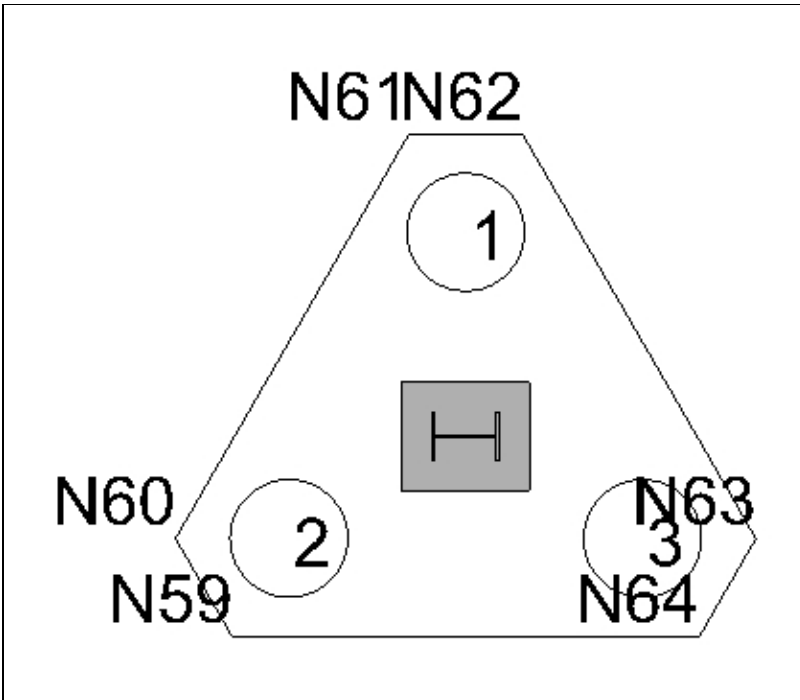
T.O.C. Foundation = -1 m

Soil Level = 0 m

Soil Height = 1 m

Water Level = -0.5 m

Depth of Foundation Submerged = 0.6 m



Pile Configuration - ThreeA

3 Piles, of Diameter - 0.6 m

Thickness - 0.6 m

**Bounding Nodes**

Name	Global X [m]	Global Y [m]	Global Z [m]
N59	-1.19	-1	1.02
N60	-1.48	-1	0.52
N61	-0.29	-1	-1.54
N62	0.29	-1	-1.54
N63	1.48	-1	0.52
N64	1.19	-1	1.02

**Edges**

Name	Start Node	End Node	Edge Length [m]
Edge 1	N64	N59	2.38

Name	Start Node	End Node	Edge Length [m]
Edge 2	N59	N60	0.58
Edge 3	N60	N61	2.38
Edge 4	N61	N62	0.58
Edge 5	N62	N63	2.38
Edge 6	N63	N64	0.58

**Pile Location**

Pile Number	Global X [m]	Global Y [m]	Global Z [m]	Angle in Plane [deg]	Vertical Plane [deg]
1	0	-1	-1.04	0	0
2	-0.9	-1	0.52	0	0
3	0.9	-1	0.52	0	0

**Supports**

**Pile Support Details**

Name	Diameter [mm]	Embedment Length [mm]	Compression Capacity (SLS) [kN]	Tension Capacity (SLS) [kN]	Shear Capacity (SLS) [kN]	Compression Capacity (ULS) [kN]	Tension Capacity (ULS) [kN]	Shear Capacity (ULS) [kN]
P1	600	75	500	150	150	750	225	225

**Loads**

**Load Cases**

Name	Type
Water pressure	Hydrostatic Vertical
Water pressure (Buoyancy)	Hydrostatic Vertical
S1 : 1: DEAD	Dead
S1 : 2: LIVE	Live
S1 : 3: LATERAL	Seismic Horizontal
Soil (Dry)	Soil
Soil (Saturated)	Soil
Soil (Sat. + Dry)	Soil
Soil (Sub. + Dry)	Soil
Soil (Sub. + Sat.)	Soil

**Load Combinations**

L/C Ref.	Name	Type
SLS-(1)S1 : 1: DEAD	SLS-(1)S1 : 1: DEAD	Service
C1	SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE	Service
C2	SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL	Service
C3	SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL	Service
C4	SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL	Service
C5	SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL	Service
C6	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL	Service
C7	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL	Service
C8	ULS-(1.4)S1 : 1: DEAD	Ultimate
C9	ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE	Ultimate
C10	ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL	Ultimate
C11	ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL	Ultimate
C12	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL	Ultimate
C13	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL	Ultimate

**Analysis**

**PC3\_SLS\_RB : Load Calculations**

**SLS-(1)S1 : 1: DEAD**

**SLS-(1)S1 : 1: DEAD + Sat. + Dry [L/C Ref. : C15]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	1	-87.7	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-3.82	0	0	0	0
Total	1	-174.88	0	0	0	0

**SLS-(1)S1 : 1: DEAD + Saturated [L/C Ref. : C16]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	1	-92.32	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-3.82	0	0	0	0
Total	1	-179.5	0	0	0	0

**SLS-(1)S1 : 1: DEAD + Dry [L/C Ref. : C17]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	1	-83.08	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-3.82	0	0	0	0
Total	1	-170.27	0	0	0	0

**SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE**

**SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE + Sat. + Dry [L/C Ref. : C18]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	1	-87.7	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-53.82	0	0	0	0
Total	1	-224.88	0	0	0	0

**SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE + Saturated [L/C Ref. : C19]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	1	-92.32	0	0	0	0

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-53.82	0	0	0	0
Total	1	-229.5	0	0	0	0

**SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE + Dry [L/C Ref. : C20]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	1	-83.08	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-53.82	0	0	0	0
Total	1	-220.27	0	0	0	0

**SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL**

**SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Sat. + Dry [L/C Ref. : C21]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	1	-87.7	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-3.82	-12	0	0	-79.2
Total	1	-174.88	-12	0	0	-79.2

**SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Saturated [L/C Ref. : C22]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	1	-92.32	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-3.82	-12	0	0	-79.2
Total	1	-179.5	-12	0	0	-79.2

**SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Dry [L/C Ref. : C23]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	1	-83.08	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-3.82	-12	0	0	-79.2
Total	1	-170.27	-12	0	0	-79.2

**SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL**

**SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Sat. + Dry [L/C Ref. : C24]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
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Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	1	-87.7	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-3.82	12	0	0	79.2
Total	1	-174.88	12	0	0	79.2

**SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Saturated [L/C Ref. : C25]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	1	-92.32	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-3.82	12	0	0	79.2
Total	1	-179.5	12	0	0	79.2

**SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Dry [L/C Ref. : C26]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	1	-83.08	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-3.82	12	0	0	79.2
Total	1	-170.27	12	0	0	79.2

**SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL**

**SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Sat. + Dry [L/C Ref. : C27]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	0.6	-52.62	0	0	0	0
Self weight	0.6	-50.02	0	0	0	0
SS Reaction	1	-2.29	-12	0	0	-79.2
Total	1	-104.93	-12	0	0	-79.2

**SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Saturated [L/C Ref. : C28]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	0.6	-55.39	0	0	0	0
Self weight	0.6	-50.02	0	0	0	0
SS Reaction	1	-2.29	-12	0	0	-79.2
Total	1	-107.7	-12	0	0	-79.2

**SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Dry [L/C Ref. : C29]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
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Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	0.6	-49.85	0	0	0	0
Self weight	0.6	-50.02	0	0	0	0
SS Reaction	1	-2.29	-12	0	0	-79.2
Total	1	-102.16	-12	0	0	-79.2

**SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL**

**SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Sat. + Dry [L/C Ref. : C30]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	0.6	-52.62	0	0	0	0
Self weight	0.6	-50.02	0	0	0	0
SS Reaction	1	-2.29	12	0	0	79.2
Total	1	-104.93	12	0	0	79.2

**SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Saturated [L/C Ref. : C31]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	0.6	-55.39	0	0	0	0
Self weight	0.6	-50.02	0	0	0	0
SS Reaction	1	-2.29	12	0	0	79.2
Total	1	-107.7	12	0	0	79.2

**SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Dry [L/C Ref. : C32]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	0.6	-49.85	0	0	0	0
Self weight	0.6	-50.02	0	0	0	0
SS Reaction	1	-2.29	12	0	0	79.2
Total	1	-102.16	12	0	0	79.2

**SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL**

**SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL + Sat. + Dry [L/C Ref. : C33]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	1	-87.7	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-41.32	-9	0	0	-59.4
Total	1	-212.38	-9	0	0	-59.4

**SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL + Saturated [L/C Ref. : C34]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	1	-92.32	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-41.32	-9	0	0	-59.4
Total	1	-217	-9	0	0	-59.4

**SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL + Dry [L/C Ref. : C35]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	1	-83.08	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-41.32	-9	0	0	-59.4
Total	1	-207.77	-9	0	0	-59.4

**SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL**

**SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL + Sat. + Dry [L/C Ref. : C36]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	1	-87.7	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-41.32	9	0	0	59.4
Total	1	-212.38	9	0	0	59.4

**SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL + Saturated [L/C Ref. : C37]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	1	-92.32	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-41.32	9	0	0	59.4
Total	1	-217	9	0	0	59.4

**SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL + Dry [L/C Ref. : C38]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	1	-83.08	0	0	0	0
Self weight	1	-83.37	0	0	0	0
SS Reaction	1	-41.32	9	0	0	59.4
Total	1	-207.77	9	0	0	59.4

**ULS-(1.4)S1 : 1: DEAD**

**ULS-(1.4)S1 ; 1; DEAD + Sat. + Dry [L/C Ref. : C39]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	1.4	-122.77	0	0	0	0
Self weight	1.4	-116.71	0	0	0	0
SS Reaction	1	-5.35	0	0	0	0
Total	1	-244.84	0	0	0	0

**ULS-(1.4)S1 ; 1; DEAD + Saturated [L/C Ref. : C40]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	1.4	-129.24	0	0	0	0
Self weight	1.4	-116.71	0	0	0	0
SS Reaction	1	-5.35	0	0	0	0
Total	1	-251.31	0	0	0	0

**ULS-(1.4)S1 ; 1; DEAD + Dry [L/C Ref. : C41]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	1.4	-116.32	0	0	0	0
Self weight	1.4	-116.71	0	0	0	0
SS Reaction	1	-5.35	0	0	0	0
Total	1	-238.38	0	0	0	0

**ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE**

**ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Sat. + Dry [L/C Ref. : C42]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	1.2	-105.23	0	0	0	0
Self weight	1.2	-100.04	0	0	0	0
SS Reaction	1	-84.59	0	0	0	0
Total	1	-289.86	0	0	0	0

**ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Saturated [L/C Ref. : C43]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	1.2	-110.78	0	0	0	0
Self weight	1.2	-100.04	0	0	0	0
SS Reaction	1	-84.59	0	0	0	0
Total	1	-295.41	0	0	0	0

**ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Dry [L/C Ref. : C44]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
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Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	1.2	-99.7	0	0	0	0
Self weight	1.2	-100.04	0	0	0	0
SS Reaction	1	-84.59	0	0	0	0
Total	1	-284.33	0	0	0	0

**ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL**

**ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Sat. + Dry [L/C Ref. : C45]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	0.9	-78.93	0	0	0	0
Self weight	0.9	-75.03	0	0	0	0
SS Reaction	1	-3.44	-12	0	0	-79.2
Total	1	-157.4	-12	0	0	-79.2

**ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Saturated [L/C Ref. : C46]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	0.9	-83.08	0	0	0	0
Self weight	0.9	-75.03	0	0	0	0
SS Reaction	1	-3.44	-12	0	0	-79.2
Total	1	-161.55	-12	0	0	-79.2

**ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Dry [L/C Ref. : C47]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	0.9	-74.78	0	0	0	0
Self weight	0.9	-75.03	0	0	0	0
SS Reaction	1	-3.44	-12	0	0	-79.2
Total	1	-153.25	-12	0	0	-79.2

**ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL**

**ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Sat. + Dry [L/C Ref. : C48]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	0.9	-78.93	0	0	0	0
Self weight	0.9	-75.03	0	0	0	0
SS Reaction	1	-3.44	12	0	0	79.2
Total	1	-157.4	12	0	0	79.2

**ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Saturated [L/C Ref. : C49]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	0.9	-83.08	0	0	0	0
Self weight	0.9	-75.03	0	0	0	0
SS Reaction	1	-3.44	12	0	0	79.2
Total	1	-161.55	12	0	0	79.2

**ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Dry [L/C Ref. : C50]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	0.9	-74.78	0	0	0	0
Self weight	0.9	-75.03	0	0	0	0
SS Reaction	1	-3.44	12	0	0	79.2
Total	1	-153.25	12	0	0	79.2

**ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL**

**ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL + Sat. + Dry [L/C Ref. : C51]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	1.2	-105.23	0	0	0	0
Self weight	1.2	-100.04	0	0	0	0
SS Reaction	1	-54.59	-12	0	0	-79.2
Total	1	-259.86	-12	0	0	-79.2

**ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL + Saturated [L/C Ref. : C52]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	1.2	-110.78	0	0	0	0
Self weight	1.2	-100.04	0	0	0	0
SS Reaction	1	-54.59	-12	0	0	-79.2
Total	1	-265.41	-12	0	0	-79.2

**ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL + Dry [L/C Ref. : C53]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	1.2	-99.7	0	0	0	0
Self weight	1.2	-100.04	0	0	0	0
SS Reaction	1	-54.59	-12	0	0	-79.2
Total	1	-254.33	-12	0	0	-79.2

**ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL**

**ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL + Sat. + Dry [L/C Ref. : C54]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Sat. + Dry)	1.2	-105.23	0	0	0	0
Self weight	1.2	-100.04	0	0	0	0
SS Reaction	1	-54.59	12	0	0	79.2
Total	1	-259.86	12	0	0	79.2

**ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL + Saturated [L/C Ref. : C55]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Saturated)	1.2	-110.78	0	0	0	0
Self weight	1.2	-100.04	0	0	0	0
SS Reaction	1	-54.59	12	0	0	79.2
Total	1	-265.41	12	0	0	79.2

**ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL + Dry [L/C Ref. : C56]**

Component	Load Factor	Factored Fx (local) [kN]	Factored Fy (local) [kN]	Factored Fz (local) [kN]	Factored My (local) [kN*m]	Factored Mz (local) [kN*m]
Soil (Dry)	1.2	-99.7	0	0	0	0
Self weight	1.2	-100.04	0	0	0	0
SS Reaction	1	-54.59	12	0	0	79.2
Total	1	-254.33	12	0	0	79.2

**PC3\_SLS\_RB : Pile Reactions**

**Summary**

**Pile Reactions**

Type	L/C Ref.	Pile No.	Envelope	Axial Fx [kN]	Shear Fy [kN]	Shear Fz [kN]
Max Fx	C37	2	Service	105.33	-3	0
Min Fx	C29	2	Service	-9.95	4	0
Max Fy	C15	1	Service	58.29	0	0
Min Fy	C15	1	Service	58.29	0	0
Max Fz	C23	1	Service	56.76	4	0
Min Fz	C25	1	Service	59.83	-4	0
Max Fx	C52	3	Ultimate	132.47	4	0
Min Fx	C50	3	Ultimate	7.08	-4	0
Max Fy	C40	1	Ultimate	83.77	0	0
Min Fy	C40	1	Ultimate	83.77	0	0
Max Fz	C46	1	Ultimate	53.85	4	0
Min Fz	C50	1	Ultimate	51.08	-4	0



## Post Analysis Checks

### Basic Data

All post analysis results are about foundation's local axis

Self-Weight of Foundation = 74.54 kN

### Summary

#### Pile Compression Capacity : SLS

L/C Ref.	Capacity [kN]	Demand [kN]	FOS
C34	500	-105.33	4.75

#### Pile Compression Capacity : ULS

L/C Ref.	Capacity [kN]	Demand [kN]	FOS
C52	750	-132.47	5.66

#### Pile Shear Capacity : SLS

L/C Ref.	Capacity [kN]	Demand [kN]	FOS
C21	150	4	37.5

#### Pile Shear Capacity : ULS

L/C Ref.	Capacity [kN]	Demand [kN]	FOS
C45	225	4	56.25

#### Pile Tension Capacity : SLS

L/C Ref.	Capacity [kN]	Demand [kN]	FOS
C29	150	9.95	15.08

#### Pile Tension Capacity : ULS

L/C Ref.	Capacity [kN]	Demand [kN]	FOS
C39	225	0	>1000

#### Pile Group Capacity : SLS

L/C Ref.	Capacity [kN]	Demand [kN]	FOS
C19	1500	-229.5	6.54

#### Pile Group Capacity : ULS

L/C Ref.	Capacity [kN]	Demand [kN]	FOS
C43	2250	-295.41	7.62

**Detailed**

**Pile Compression Capacity**

Critical Load Combination = SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL + Saturated

**Input Data**

Pile = P1  
 Type = Pinned pile  
 Capacity = 500 kN  
 Capacity Multiplier = 1  
 Reduction Multiplier = 1  
 Overloading Multiplier = 1

**Check**

Node Number = 3  
 Pile Reaction = -105.33 kN  
 Factored Capacity = Capacity Multiplier \* Capacity  
 = 500 kN  
 FOS = 4.747  
 ≥ 1 Hence safe.

**Pile Tension Capacity**

Critical Load Combination = SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Dry

**Input Data**

Pile = P1  
 Type = Pinned pile  
 Capacity = 150 kN  
 Capacity Multiplier = 1  
 Reduction Multiplier = 1  
 Overloading Multiplier = 1

**Check**

Node Number = 2  
 Pile Reaction = 9.95 kN  
 Factored Capacity = Capacity Multiplier \* Capacity  
 = 150 kN  
 FOS = 15.082

≥ 1 Hence safe.

**Pile Shear Capacity**

Critical Load Combination = SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Sat. + Dry

**Input Data**

Pile = P1  
 Type = Pinned pile  
 Capacity = 150 kN  
 Capacity Multiplier = 1

**Check**

Node Number = 1  
 FX\_Pile = 4 kN  
 FZ\_Pile = 0 kN  
 FR\_Pile = 4 kN  
 Factored Capacity =  
 = 150 kN  
 FOS = 37.5  
 ≥ 1 Hence safe.

**Pile Group Capacity**

Critical Load Combination = SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE + Saturated

**Input Data**

Pile = P1  
 Capacity = 500 kN  
 Capacity Multiplier = 1  
 Reduction Multiplier = 1  
 Overloading Multiplier = 1

**Check**

Total Reaction = -229.5 kN  
 Factored Capacity = Capacity Multiplier \* Capacity  
 = 1500 kN  
 FOS = 2.179  
 ≥ 1 Hence safe.

**Design**

**PC3\_DGN\_3 : Flexure**

**Summary**

Foundation Name = PC3

Supported Member = M5

**Top X**

Name	L/C Ref.	Mu [kN*m]	Mucap [kN*m]	Ast. Prov. [mm <sup>2</sup> /m]
Top X	C47	16.61	514.75	1356.34

**Bottom X**

Name	L/C Ref.	Mu [kN*m]	Mucap [kN*m]	Ast. Prov. [mm <sup>2</sup> /m]
Bottom X	C52	-46.8	435.48	1356.34

**Top Y**

Name	L/C Ref.	Mu [kN*m]	Mucap [kN*m]	Ast. Prov. [mm <sup>2</sup> /m]
Top Y	C45	0	351.03	887.03

**Bottom Y**

Name	L/C Ref.	Mu [kN*m]	Mucap [kN*m]	Ast. Prov. [mm <sup>2</sup> /m]
Bottom Y	C43	-39.47	351.03	1368.37



**PC3\_DGN\_3 : One Way Shear**

**Summary**

<b>Cutline</b>	<b>Member Number</b>	<b>Direction</b>	<b>L/C Ref.</b>	<b>Vu [kN]</b>	<b><math>\Phi V_c</math> [kN]</b>	<b>Max. Permissible Vu [kN]</b>
CL36	PD7	Along Lx	C55	54.02	558.27	2725.67
CL39	PD7	Along Ly	C43	59.77	493.13	2407.61

**PC3\_DGN\_3 : Punching Shear**

**Detailed**

**PD7**

**Member Details**

Location	=	Interior	
f'c	=	28 N/mm2	
√f'c	=	√28	
	=	5.29 N/mm2 <= 8.3 N/mm2	Cl.22.6.3.1
	=	5.29 N/mm2	
fy	=	280 N/mm2	
Critical Load Combination	=	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL + Saturated	
Φ	=	0.75	
λ	=	1	
β	=	1.182	
d	=	509.1 mm	
Size(DY X DZ)	=	650 mm x 550 mm	
Column Centroid	=	(0,-1000,0)	

**Punching Perimeter Details**

Edge Id	Start Point (mm)	End Point (mm)	Thickness (d) (mm)	Length (l) (mm)
Edge 1	(579.6,-1000,529.5)	(579.6,-1000,-529.6)	509.1	1059.1
Edge 2	(579.6,-1000,-529.6)	(-579.5,-1000,-529.6)	509.1	1159.1
Edge 3	(-579.5,-1000,-529.6)	(-579.5,-1000,529.5)	509.1	1059.1
Edge 4	(-579.5,-1000,529.5)	(579.6,-1000,529.5)	509.1	1159.1

bo	=	4436.4 mm
barea	=	2258571.2 mm2
Jy(10^6)	=	431754.76 mm4
Jz(10^6)	=	494336.86 mm4
Jyz(10^6)	=	0.01 mm4
θ	=	0 deg
Jy'(10^6)	=	431754.76 mm4
Jz'(10^6)	=	494336.86 mm4
Ly'	=	1159.1 mm
Lz'	=	1059.1 mm
vyy'	=	0.389
vyz'	=	0.411

**Design Force and Moments**

Nu = 65.18 kN  
 Muy = 0 kN\*m  
 Muz = -79.2 kN\*m  
 Nu,res = 108.4 kN  
 Muy,res = 0.01 kN\*m  
 Muz,res = -82.28 kN\*m  
 Critical Section Centroid = (0.1,-1254.5,-0.1)

**Shear Stress due to Design Force and Moments**

Edge Id	Stress At Start Point (N/mm2)	Stress At End Point (N/mm2)
Edge 1	-0.088	-0.088
Edge 2	-0.088	-0.008
Edge 3	-0.008	-0.008
Edge 4	-0.008	-0.088

Vug = 0.048 N/mm2  
 Vu = 0.088 N/mm2

**Allowable Shear Stress**

$\Phi V_{c1}$  =  $(0.332 * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (a)  
 =  $(0.332 * 1 * 5.29) * 0.75$   
 = 1.318 N/mm2  
 $\Phi V_{c2}$  =  $(0.166 * (1 + 2 / \beta) * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (b)  
 =  $(0.166 * ((1 + 2/ 1.18) * 1 * 5.29) * 0.75$   
 = 1.774 N/mm2  
 $\Phi V_{c3}$  =  $(0.083 * (2 + (\alpha_s * d/b_o)) * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (c)  
 =  $(0.083 * (2 + (40 * 509.1/4436.4)) * 1 * 5.29) * 0.75$   
 = 2.171 N/mm2  
 $\Phi V_c$  = min. ( $\Phi V_{c1}$ ,  $\Phi V_{c2}$ ,  $\Phi V_{c3}$ ) Cl.22.6.5.2  
 = min. (1.318, 1.774, 2.171)  
 = 1.318 N/mm2  
 Vu/ $\Phi V_c$  Ratio = 0.066  
 < 1 Hence safe.

**Pile 1**

**Member Details**

Location = Corner

$f'_c = 28 \text{ N/mm}^2$   
 $\sqrt{f'_c} = \sqrt{28} = 5.29 \text{ N/mm}^2 \leq 8.3 \text{ N/mm}^2$  Cl.22.6.3.1  
 $= 5.29 \text{ N/mm}^2$   
 $f_y = 280 \text{ N/mm}^2$   
 Critical Load Combination = ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Saturated  
 $\Phi = 0.75$   
 $\lambda = 1$   
 $\beta = 1$   
 $d = 534.1 \text{ mm}$   
 Pile Dia. = 600 mm  
 Pile Centroid = (0,-1600,-1039.2)

**Punching Perimeter Details**

Edge Id	Start Point (mm)	End Point (mm)	Thickness (d) (mm)	Length (l) (mm)
Edge 1	(299.1,-1000,-1521.2)	(267.8,-1000,-1539.2)	534.1	36.1
Edge 2	(-717.7,-1000,-796.1)	(-284.9,-1000,-546.3)	534.1	499.7
Edge 3	(-284.9,-1000,-546.3)	(-147.1,-1000,-489.2)	534.1	149.2
Edge 4	(-147.1,-1000,-489.2)	(0,-1000,-469.8)	534.1	148.4
Edge 5	(0,-1000,-469.8)	(147.1,-1000,-489.2)	534.1	148.4
Edge 6	(147.1,-1000,-489.2)	(284.9,-1000,-546.3)	534.1	149.2
Edge 7	(284.9,-1000,-546.3)	(717.7,-1000,-796.2)	534.1	499.8

$b_o = 1630.7 \text{ mm}$   
 $b_{area} = 870935.2 \text{ mm}^2$   
 $J_y(10^6) = 24951.52 \text{ mm}^4$   
 $J_z(10^6) = 152829.17 \text{ mm}^4$   
 $J_{yz}(10^6) = 4943.14 \text{ mm}^4$   
 $\theta = 2.21 \text{ deg}$   
 $J_y'(10^6) = 24765.81 \text{ mm}^4$   
 $J_z'(10^6) = 153037.66 \text{ mm}^4$   
 $L_y' = 1434.4 \text{ mm}$   
 $L_z' = 1058.2 \text{ mm}$   
 $\gamma_{vy}' = 0.364$   
 $\gamma_{vz}' = 0.437$

**Design Force and Moments**

$N_u = 98.47 \text{ kN}$   
 $M_{uy} = 0 \text{ kN}\cdot\text{m}$   
 $M_{uz} = 0 \text{ kN}\cdot\text{m}$

$N_{u,res} = 55.8 \text{ kN}$   
 $M_{uy,res} = -24.77 \text{ kN}\cdot\text{m}$   
 $M_{uz,res} = -0.23 \text{ kN}\cdot\text{m}$   
 Critical Section Centroid = (6.3,-1267.1,-627.3)

**Shear Stress due to Design Force and Moments**

Edge Id	Stress At Start Point (N/mm <sup>2</sup> )	Stress At End Point (N/mm <sup>2</sup> )
Edge 1	0.386	0.393
Edge 2	0.134	0.038
Edge 3	0.038	0.016
Edge 4	0.016	0.007
Edge 5	0.007	0.012
Edge 6	0.012	0.031
Edge 7	0.031	0.117

$V_{ug} = 0.064 \text{ N/mm}^2$   
 $V_u = 0.393 \text{ N/mm}^2$

**Allowable Shear Stress**

$\Phi V_{c1} = (0.332 * \lambda * \sqrt{f'_c}) * \Phi$  Cl.22.6.5.2 (a)  
 $= (0.332 * 1 * 5.29) * 0.75$   
 $= 1.318 \text{ N/mm}^2$   
 $\Phi V_{c2} = (0.166 * (1 + 2 / \beta) * \lambda * \sqrt{f'_c}) * \Phi$  Cl.22.6.5.2 (b)  
 $= (0.166 * ((1 + 2 / 1) * 1 * 5.29) * 0.75$   
 $= 1.976 \text{ N/mm}^2$   
 $\Phi V_{c3} = (0.083 * (2 + (\alpha_s * d/b_o)) * \lambda * \sqrt{f'_c}) * \Phi$  Cl.22.6.5.2 (c)  
 $= (0.083 * (2 + (20 * 534.1/1630.66)) * 1 * 5.29) * 0.75$   
 $= 2.817 \text{ N/mm}^2$   
 $\Phi V_c = \text{min.} (\Phi V_{c1}, \Phi V_{c2}, \Phi V_{c3})$  Cl.22.6.5.2  
 $= \text{min.} (1.318, 1.976, 2.817)$   
 $= 1.318 \text{ N/mm}^2$   
 $V_u / \Phi V_c \text{ Ratio} = 0.298$   
 $< 1 \text{ Hence safe.}$

**Pile 2**

**Member Details**

Location = Corner  
 $f'_c = 28 \text{ N/mm}^2$   
 $\sqrt{f'_c} = \sqrt{28}$

= 5.29 N/mm2 <= 8.3 N/mm2 Cl.22.6.3.1

= 5.29 N/mm2

fy = 280 N/mm2

Critical Load Combination = ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL + Saturated

Φ = 0.75

λ = 1

β = 1

d = 534.1 mm

Pile Dia. = 600 mm

Pile Centroid = (-900,-1600,519.6)

**Punching Perimeter Details**

Edge Id	Start Point (mm)	End Point (mm)	Thickness (d) (mm)	Length (l) (mm)
Edge 1	(-330.6,-1000,519.6)	(-350,-1000,372.5)	534.1	148.4
Edge 2	(-350,-1000,372.5)	(-407.1,-1000,234.7)	534.1	149.2
Edge 3	(-407.1,-1000,234.7)	(-497.4,-1000,117)	534.1	148.3
Edge 4	(-497.4,-1000,117)	(-615.1,-1000,26.7)	534.1	148.3
Edge 5	(-615.1,-1000,26.7)	(-1048.3,-1000,-223.4)	534.1	500.2
Edge 6	(-1467.1,-1000,501.9)	(-1467.1,-1000,537.3)	534.1	35.4
Edge 7	(-330.6,-1000,1019.6)	(-330.6,-1000,519.6)	534.1	500

bo = 1629.8 mm

barea = 870500.5 mm2

Jy(10^6) = 116548.66 mm4

Jz(10^6) = 60877.86 mm4

Jyz(10^6) = -57908.8 mm4

θ = 32.16 deg

Jy'(10^6) = 152968.44 mm4

Jz'(10^6) = 24430.14 mm4

Ly' = 1058.4 mm

Lz' = 1434.3 mm

γvy' = 0.437

γvz' = 0.364

**Design Force and Moments**

Nu = 132.47 kN

Muy = 0 kN\*m

Muz = 0 kN\*m

Nu,res = 89.5 kN

Muy,res = 19.91 kN\*m  
 Muz,res = -32.06 kN\*m  
 Critical Section Centroid = (-545.9,-1267,308.1)

**Shear Stress due to Design Force and Moments**

Edge Id	Stress At Start Point (N/mm2)	Stress At End Point (N/mm2)
Edge 1	0.063	0.029
Edge 2	0.029	0.015
Edge 3	0.015	0.023
Edge 4	0.023	0.052
Edge 5	0.052	0.183
Edge 6	0.599	0.61
Edge 7	0.213	0.063

Vug = 0.103 N/mm2  
 Vu = 0.61 N/mm2

**Allowable Shear Stress**

$\Phi V_{c1} = (0.332 * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (a)  
 =  $(0.332 * 1 * 5.29) * 0.75$   
 = 1.318 N/mm2

$\Phi V_{c2} = (0.166 * (1 + 2 / \beta) * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (b)  
 =  $(0.166 * ((1 + 2/ 1) * 1 * 5.29) * 0.75$   
 = 1.976 N/mm2

$\Phi V_{c3} = (0.083 * (2 + (\alpha_s * d/b_o)) * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (c)  
 =  $(0.083 * (2 + (20 * 534.1/1629.85)) * 1 * 5.29) * 0.75$   
 = 2.818 N/mm2

$\Phi V_c = \min. (\Phi V_{c1}, \Phi V_{c2}, \Phi V_{c3})$  Cl.22.6.5.2  
 = min. (1.318, 1.976, 2.818)  
 = 1.318 N/mm2

Vu/ $\Phi V_c$  Ratio = 0.462  
 < 1 Hence safe.

**Pile 3**

**Member Details**

Location = Corner  
 f'c = 28 N/mm2  
 $\sqrt{f'c} = \sqrt{28}$   
 = 5.29 N/mm2 <= 8.3 N/mm2 Cl.22.6.3.1

	=	5.29 N/mm <sup>2</sup>
$f_y$	=	280 N/mm <sup>2</sup>
Critical Load Combination	=	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL + Saturated
$\Phi$	=	0.75
$\lambda$	=	1
$\beta$	=	1
$d$	=	534.1 mm
Pile Dia.	=	600 mm
Pile Centroid	=	(900,-1600,519.6)

**Punching Perimeter Details**

Edge Id	Start Point (mm)	End Point (mm)	Thickness (d) (mm)	Length (l) (mm)
Edge 1	(1048.4,-1000,-223.5)	(615.1,-1000,26.7)	534.1	500.3
Edge 2	(615.1,-1000,26.7)	(497.4,-1000,117)	534.1	148.3
Edge 3	(497.4,-1000,117)	(407.1,-1000,234.7)	534.1	148.3
Edge 4	(407.1,-1000,234.7)	(350,-1000,372.5)	534.1	149.2
Edge 5	(350,-1000,372.5)	(330.6,-1000,519.6)	534.1	148.4
Edge 6	(330.6,-1000,519.6)	(330.6,-1000,1019.6)	534.1	500
Edge 7	(1467,-1000,537.6)	(1467,-1000,501.6)	534.1	36

$b_o$	=	1630.6 mm
$b_{area}$	=	870893.9 mm <sup>2</sup>
$J_y(10^6)$	=	116587.51 mm <sup>4</sup>
$J_z(10^6)$	=	61162.77 mm <sup>4</sup>
$J_{yz}(10^6)$	=	57866.7 mm <sup>4</sup>
$\theta$	=	-32.2 deg
$J_y'(10^6)$	=	153035.33 mm <sup>4</sup>
$J_z'(10^6)$	=	24732.52 mm <sup>4</sup>
$L_y'$	=	1058.3 mm
$L_z'$	=	1434.4 mm
$\gamma_{vy}'$	=	0.437
$\gamma_{vz}'$	=	0.364

**Design Force and Moments**

$N_u$	=	132.47 kN
$M_{uy}$	=	0 kN*m
$M_{uz}$	=	0 kN*m
$N_{u,res}$	=	89.8 kN
$M_{uy,res}$	=	19.78 kN*m

Muz,res = 32.03 kN\*m  
 Critical Section Centroid = (546.4,-1267.1,308.1)

**Shear Stress due to Design Force and Moments**

Edge Id	Stress At Start Point (N/mm2)	Stress At End Point (N/mm2)
Edge 1	0.182	0.052
Edge 2	0.052	0.024
Edge 3	0.024	0.016
Edge 4	0.016	0.03
Edge 5	0.03	0.064
Edge 6	0.064	0.211
Edge 7	0.603	0.593

V<sub>ug</sub> = 0.103 N/mm<sup>2</sup>  
 V<sub>u</sub> = 0.603 N/mm<sup>2</sup>

**Allowable Shear Stress**

$\Phi V_{c1} = (0.332 * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (a)  
 $= (0.332 * 1 * 5.29) * 0.75$   
 $= 1.318 \text{ N/mm}^2$

$\Phi V_{c2} = (0.166 * (1 + 2 / \beta) * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (b)  
 $= (0.166 * ((1 + 2 / 1) * 1 * 5.29) * 0.75$   
 $= 1.976 \text{ N/mm}^2$

$\Phi V_{c3} = (0.083 * (2 + (\alpha_s * d/b_o)) * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (c)  
 $= (0.083 * (2 + (20 * 534.1/1630.58)) * 1 * 5.29) * 0.75$   
 $= 2.817 \text{ N/mm}^2$

$\Phi V_c = \text{min.} (\Phi V_{c1}, \Phi V_{c2}, \Phi V_{c3})$  Cl.22.6.5.2  
 $= \text{min.} (1.318, 1.976, 2.817)$   
 $= 1.318 \text{ N/mm}^2$

V<sub>u</sub>/ΦV<sub>c</sub> Ratio = 0.458  
 < 1 Hence safe.

**PC3\_DGN\_3 : Load Transfer Check**

**Detailed**

**PD7**

Critical Load Combination	=	ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Sat. + Dry	
Depth	=	600 mm	
Nu	=	95.18 kN	
A1	=	0.36 m <sup>2</sup>	
A2	=	4.93 m <sup>2</sup>	
Base Area (LY*LZ)	=	4.97 m <sup>2</sup>	
	=	A2 <= Base Area	
Thus, A2	=	4.93 m <sup>2</sup>	
Sqrt (A2/A1)	=	3.713	
Multiplying Factor	=	Sqrt (A2/A1) <= 2	
Thus, Multiplying Factor	=	2	
φ (bearing)	=	0.65	
φPnb	=	φ * 0.85 * f'c * Multiplying Factor * A1	Cl.22.8.3.2
	=	11061.05 kN	
Status	=	Ok	

**Result Summary**

**PC3\_DGN\_3 : Result Summary**

**Post Analysis Checks**

Check	Critical L/C Ref.	Capacity	Demand	Factor of Safety	Allowable Factor of Safety	Status
Pile Compression Capacity	C34	500 kN	-105.33 kN	4.75	1	Pass
Pile Group Capacity	C19	1500 kN	-229.5 kN	6.54	1	Pass
Pile Shear Capacity	C21	150 kN	4 kN	37.5	1	Pass
Pile Tension Capacity	C29	150 kN	9.95 kN	15.08	1	Pass

**Design**

Check	Critical L/C Ref.	Capacity	Demand	Utilization Ratio	Allowable Ratio	Status
Flexural Check : Top X	C47	514.75 kN*m	16.61 kN*m	0.03	1	Pass
Flexural Check : Bottom X	C52	435.48 kN*m	-46.8 kN*m	0.11	1	Pass
Flexural Check : Top Y	C45	351.03 kN*m	0 kN*m	0	1	Pass
Flexural Check : Bottom Y	C43	351.03 kN*m	-39.47 kN*m	0.11	1	Pass
One Way Shear : PD7 : Along Lx	C55	558.27 kN	54.02 kN	0.1	1	Pass
One Way Shear : PD7 : Along Ly	C43	493.13 kN	59.77 kN	0.12	1	Pass
Punching Shear : Pile 1	C43	1.32 N/mm <sup>2</sup>	0.39 N/mm <sup>2</sup>	0.3	1	Pass
Punching Shear : Pile 2	C55	1.32 N/mm <sup>2</sup>	0.61 N/mm <sup>2</sup>	0.46	1	Pass
Punching Shear : Pile 3	C52	1.32 N/mm <sup>2</sup>	0.6 N/mm <sup>2</sup>	0.46	1	Pass
Punching Shear : PD7	C52	1.32 N/mm <sup>2</sup>	0.09 N/mm <sup>2</sup>	0.07	1	Pass
Bearing Design : PD7	C42	11061.05 kN	95.18 kN	0.01	1	Pass

**Associated Pedestals Result**

**PD7**

Check	Critical L/C Ref.	Capacity	Demand	Utilization Ratio	Allowable Ratio	Status
Flexural Check	C11	263.7 kN*m	72 kN*m	0.27	1	Pass
Axial Capacity Check	C10	4726.13 kN	95.18 kN	0.02	1	Pass
Shear Check Along Y axis	C12	209.12 kN	-12 kN	0.06	1	Pass
Shear Check Along Z axis	C12	368.61 kN	0 kN	0	1	Pass

**PC4**

**Geometry**

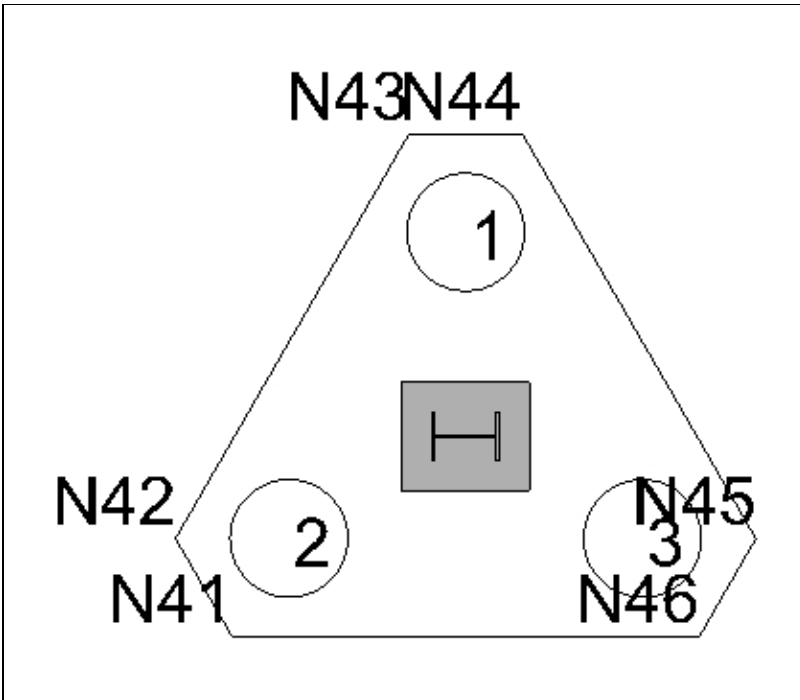
T.O.C. Foundation = -1 m

Soil Level = 0 m

Soil Height = 1 m

Water Level = -0.5 m

Depth of Foundation Submerged = 0.6 m



Pile Configuration - ThreeA

3 Piles, of Diameter - 0.6 m

Thickness - 0.6 m

**Bounding Nodes**

Name	Global X [m]	Global Y [m]	Global Z [m]
N41	3.81	-1	1.02
N42	3.52	-1	0.52
N43	4.71	-1	-1.54
N44	5.29	-1	-1.54
N45	6.48	-1	0.52
N46	6.19	-1	1.02

**Edges**

Name	Start Node	End Node	Edge Length [m]
Edge 1	N46	N41	2.38

Name	Start Node	End Node	Edge Length [m]
Edge 2	N41	N42	0.58
Edge 3	N42	N43	2.38
Edge 4	N43	N44	0.58
Edge 5	N44	N45	2.38
Edge 6	N45	N46	0.58

**Pile Location**

Pile Number	Global X [m]	Global Y [m]	Global Z [m]	Angle in Plane [deg]	Vertical Plane [deg]
1	5	-1	-1.04	0	0
2	4.1	-1	0.52	0	0
3	5.9	-1	0.52	0	0

**Supports**

**Pile Support Details**

Name	Diameter [mm]	Embedment Length [mm]	Compression Capacity (SLS) [kN]	Tension Capacity (SLS) [kN]	Shear Capacity (SLS) [kN]	Compression Capacity (ULS) [kN]	Tension Capacity (ULS) [kN]	Shear Capacity (ULS) [kN]
P1	600	75	500	150	150	750	225	225

**Loads**

**Load Cases**

Name	Type
Water pressure	Hydrostatic Vertical
Water pressure (Buoyancy)	Hydrostatic Vertical
S1 : 1: DEAD	Dead
S1 : 2: LIVE	Live
S1 : 3: LATERAL	Seismic Horizontal
Soil (Dry)	Soil
Soil (Saturated)	Soil
Soil (Sat. + Dry)	Soil
Soil (Sub. + Dry)	Soil
Soil (Sub. + Sat.)	Soil

**Load Combinations**

L/C Ref.	Name	Type
SLS-(1)S1 : 1: DEAD	SLS-(1)S1 : 1: DEAD	Service
C1	SLS-(1)S1 : 1: DEAD + (1)S1 : 2: LIVE	Service
C2	SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL	Service
C3	SLS-(1)S1 : 1: DEAD + (-1)S1 : 3: LATERAL	Service
C4	SLS-(0.6)S1 : 1: DEAD + (1)S1 : 3: LATERAL	Service
C5	SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL	Service
C6	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (0.75)S1 : 3: LATERAL	Service
C7	SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL	Service
C8	ULS-(1.4)S1 : 1: DEAD	Ultimate
C9	ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE	Ultimate
C10	ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL	Ultimate
C11	ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL	Ultimate
C12	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL	Ultimate
C13	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL	Ultimate

**Analysis**

**PC4\_SLS\_FE : Support Reactions**

**Summary**

Type	Analytical Node ID	L/C Ref.	FX [kN]	FY [kN]	FZ [kN]	MX [kN*m]	MY [kN*m]	MZ [kN*m]
Max Fx	330	C90	4	8.52	0.0003	0	0	0
Min Fx	330	C95	-4	128.66	-0.0003	0	0	0
Max Fy	329	C97	4	132.35	-0.0004	0	0	0
Min Fy	330	C74	4	-9.88	0.0003	0	0	0
Max Fz	329	C95	-4	40.82	0.0004	0	0	0
Min Fz	329	C90	4	96.36	-0.0004	0	0	0
Max Mx	329	C82	0	83.73	0	0	0	0
Min Mx	329	C82	0	83.73	0	0	0	0
Max My	329	C82	0	83.73	0	0	0	0
Min My	329	C82	0	83.73	0	0	0	0
Max Mz	329	C82	0	83.73	0	0	0	0
Min Mz	329	C82	0	83.73	0	0	0	0

**PC4\_SLS\_FE : Node Displacements**

**Summary**

Type	Analytical Node ID	L/C Ref.	X-Coord [m]	Y-Coord [m]	Z-Coord [m]	DX [mm]	DY [mm]	DZ [mm]	Resultant [mm]	RX [deg]	RY [deg]	RZ [deg]
Max X	24	C63	5.32	-1	-0.28	1	-18.56	0	18.58	-0.0001	0.33	-0.7
Min X	24	C66	5.32	-1	-0.28	-1	-10.6	0	10.65	0.0001	-0.33	0.7
Max Y	322	C71	3.52	-1	0.52	1	9.52	-0.0002	9.57	0.0006	0.33	-0.7
Min Y	322	C97	3.52	-1	0.52	-1	-40.13	0.0002	40.14	0	-0.33	0.7
Max Z	322	C63	3.52	-1	0.52	1	3.46	-0.0002	3.6	0.0005	0.33	-0.7
Min Z	322	C66	3.52	-1	0.52	-1	-32.59	0.0002	32.61	0	-0.33	0.7
Max rX	581	C85	5	-1	-0.84	0	-24.62	0	24.62	0	0	0
Min rX	413	C94	6.13	-1	0.21	1	-35.86	0.0001	35.87	0	0.33	-0.7
Max rY	346	C63	4.49	-1	-1.15	1	-8.32	0.0002	8.38	0.0005	0.33	-0.7
Min rY	346	C66	4.49	-1	-1.15	-1	-20.83	-0.0002	20.85	0.0005	-0.33	0.7
Max rZ	346	C97	4.49	-1	-1.15	-1	-28.37	-0.0002	28.39	0.001	-0.33	0.7
Min rZ	354	C94	5.51	-1	-1.15	1	-28.37	-0.0001	28.39	0.001	0.33	-0.7
Max Rst	322	C97	3.52	-1	0.52	-1	-40.13	0.0002	40.14	0	-0.33	0.7

**PC4\_SLS\_FE : Shell Stresses**

**Summary**

Type	Shell	Analytical Node ID	L/C Ref.	SQX [N/mm <sup>2</sup> ]	SQY [N/mm <sup>2</sup> ]	SX [N/mm <sup>2</sup> ]	SY [N/mm <sup>2</sup> ]	SXY [N/mm <sup>2</sup> ]	MX [kN*m/m]	MY [kN*m/m]	MYX [kN*m/m]
Max Qx	427	329	C97	0.6	0.25	-0.01	0.0009	0	-38.67	-24.11	-11.12
Min Qx	482	557	C94	-0.53	0.1	0	-0.01	0.01	5.95	-3.74	-6.06
Max Qy	493	568	C97	-0.02	0.54	-0.01	0	0.01	-4.68	7.29	-4.34
Min Qy	370	329	C97	-0.43	-0.48	0.01	0	0.01	-35.78	-28.74	-10.96
Max Sx	509	389	C92	0.07	-0.14	0.08	0.01	0	-233.13	93.3	0.54
Min Sx	509	389	C89	-0.09	0.13	-0.08	-0.01	0	221.5	-84.31	-0.53
Max Sy	512	396	C92	-0.04	0.07	-0.02	0.03	0	-170.93	107.97	0.23
Min Sy	512	396	C89	0.04	-0.11	0.02	-0.03	0	113.98	-39.62	-0.01
Max Sxy	347	328	C89	0.18	0.18	0.01	0.01	0.02	-14.65	-11.47	-3.71
Min Sxy	347	328	C92	0.17	0.16	-0.01	-0.01	-0.02	-14.39	-11.35	-4.1
Max Mx	287	395	C74	0.08	0.27	-0.01	0	0	736.99	-82.96	-0.49
Min Mx	287	395	C94	-0.01	-0.2	0.01	0	0	-762.82	208.84	1.07
Max My	333	400	C94	-0.03	-0.06	0.0001	0	0	220.78	571.86	-1.1
Min My	333	589	C94	-0.01	-0.09	0.0001	0	0.0009	357.84	-634.03	-0.69
Max Mxy	277	22	C97	0.4	0.39	0	-0.01	-0.01	43.01	64.73	37.36
Min Mxy	391	476	C97	-0.07	0.04	-0.01	0.0005	0	37.36	18.39	-20.17

**Post Analysis Checks**

**Basic Data**

All post analysis results are about foundation's local axis

Self-Weight of Foundation = 74.54 kN

**Summary**

**Pile Compression Capacity : SLS**

L/C Ref.	Capacity [kN]	Demand [kN]	FOS
C79	500	-105.25	4.75

**Pile Shear Capacity : SLS**

L/C Ref.	Capacity [kN]	Demand [kN]	FOS
C63	150	4	37.5

**Pile Tension Capacity : SLS**

L/C Ref.	Capacity [kN]	Demand [kN]	FOS
C74	150	9.88	15.18

**Detailed**

**Pile Settlement**

Critical Load Combination = SLS-(1)S1 : 1: DEAD + (0.75)S1 : 2: LIVE + (-0.75)S1 : 3: LATERAL + Saturated

**Input Data**

Pile = P1  
 Type = Spring pile  
 $\Delta_p$  Allowable = 12 mm  
 $\Delta_p$  Multiplier = 1

**Check**

Node Number = 2  
 $\Delta_p$  Actual = -26.31 mm  
 $\Delta_p$  Factored Allowable =  $\Delta_p$  Multiplier \*  $\Delta_p$  Allowable  
 = 12 mm  
 FOS = 0.4561  
 < 1 Hence unsafe.

**Pile Compression Capacity**

Critical Load Combination = ULS-(1.4)S1 : 1: DEAD + Dry

**Input Data**

Pile = P1  
 Type = Spring pile  
 Capacity = 750 kN  
 Capacity Multiplier = 1  
 Reduction Multiplier = 1  
 Overloading Multiplier = 1

**Check**

Node Number = 1  
 Pile Reaction = -79.42 kN  
 Factored Capacity = Capacity Multiplier \* Capacity  
 = 750 kN  
 FOS = 9.443  
 $\geq$  1 Hence safe.

**Pile Tension Capacity**

Critical Load Combination = SLS-(0.6)S1 : 1: DEAD + (-1)S1 : 3: LATERAL + Dry

**Input Data**

Pile = P1  
 Type = Spring pile  
 Capacity = 150 kN  
 Capacity Multiplier = 1  
 Reduction Multiplier = 1  
 Overloading Multiplier = 1

**Check**

Node Number = 3  
 Pile Reaction = 9.88 kN  
 Factored Capacity = Capacity Multiplier \* Capacity  
 = 150 kN  
 FOS = 15.181  
 ≥ 1 Hence safe.

**Pile Shear Capacity**

Critical Load Combination = SLS-(1)S1 : 1: DEAD + (1)S1 : 3: LATERAL + Dry

**Input Data**

Pile = P1  
 Type = Spring pile  
 Capacity = 150 kN  
 Capacity Multiplier = 1

**Check**

Node Number = 3  
 FX\_Pile = 4 kN  
 FZ\_Pile = 0.0003 kN  
 FR\_Pile = 4 kN  
 Factored Capacity =  
 = 150 kN  
 FOS = 37.498  
 ≥ 1 Hence safe.

**Design**

**PC4\_DGN\_2 : Flexure**

**Summary**

Foundation Name = PC4

Supported Member = M6

**Top X**

Name	L/C Ref.	Mu [kN*m]	Mucap [kN*m]	Ast. Prov. [mm <sup>2</sup> /m]
Top X	C92	21.67	514.75	1356.34

**Bottom X**

Name	L/C Ref.	Mu [kN*m]	Mucap [kN*m]	Ast. Prov. [mm <sup>2</sup> /m]
Bottom X	C94	-62.39	435.48	1356.34

**Top Y**

Name	L/C Ref.	Mu [kN*m]	Mucap [kN*m]	Ast. Prov. [mm <sup>2</sup> /m]
Top Y	C92	4.39	423.7	1368.37

**Bottom Y**

Name	L/C Ref.	Mu [kN*m]	Mucap [kN*m]	Ast. Prov. [mm <sup>2</sup> /m]
Bottom Y	C85	-46.63	388.6	1368.37



**PC4\_DGN\_2 : One Way Shear**

**Summary**

<b>Cutline</b>	<b>Member Number</b>	<b>Direction</b>	<b>L/C Ref.</b>	<b>Vu [kN]</b>	<b><math>\Phi V_c</math> [kN]</b>	<b>Max. Permissible Vu [kN]</b>
CL44	PD8	Along Lx	C97	120.41	558.27	2725.67
CL47	PD8	Along Ly	C85	74.09	493.13	2407.61

**PC4\_DGN\_2 : Punching Shear**

**Detailed**

**PD8**

**Member Details**

Location	=	Interior	
f'c	=	28 N/mm2	
√f'c	=	√28	
	=	5.29 N/mm2 <= 8.3 N/mm2	Cl.22.6.3.1
	=	5.29 N/mm2	
fy	=	280 N/mm2	
Critical Load Combination	=	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL + Saturated	
Φ	=	0.75	
λ	=	1	
β	=	1.182	
d	=	509.1 mm	
Size(DY X DZ)	=	650 mm x 550 mm	
Column Centroid	=	(5000,-1000,0)	

**Punching Perimeter Details**

Edge Id	Start Point (mm)	End Point (mm)	Thickness (d) (mm)	Length (l) (mm)
Edge 1	(5579.6,-1000,529.5)	(5579.6,-1000,-529.6)	509.1	1059.1
Edge 2	(5579.6,-1000,-529.6)	(4420.5,-1000,-529.6)	509.1	1159.1
Edge 3	(4420.5,-1000,-529.6)	(4420.5,-1000,529.5)	509.1	1059.1
Edge 4	(4420.5,-1000,529.5)	(5579.6,-1000,529.5)	509.1	1159.1

bo	=	4436.4 mm
barea	=	2258571.2 mm2
Jy(10^6)	=	431754.76 mm4
Jz(10^6)	=	494336.86 mm4
Jyz(10^6)	=	0.01 mm4
θ	=	0 deg
Jy'(10^6)	=	431754.76 mm4
Jz'(10^6)	=	494336.86 mm4
Ly'	=	1159.1 mm
Lz'	=	1059.1 mm
vyy'	=	0.389
vyz'	=	0.411

**Design Force and Moments**

Nu = 65.18 kN  
 Muy = 0 kN\*m  
 Muz = 79.2 kN\*m  
 Nu,res = 109.62 kN  
 Muy,res = -0.11 kN\*m  
 Muz,res = 82.38 kN\*m  
 Critical Section Centroid = (5000.1,-1254.5,-0.1)

**Shear Stress due to Design Force and Moments**

Edge Id	Stress At Start Point (N/mm2)	Stress At End Point (N/mm2)
Edge 1	-0.009	-0.009
Edge 2	-0.009	-0.088
Edge 3	-0.088	-0.088
Edge 4	-0.088	-0.009

Vug = 0.049 N/mm2  
 Vu = 0.088 N/mm2

**Allowable Shear Stress**

$\Phi V_{c1} = (0.332 * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (a)  
 $= (0.332 * 1 * 5.29) * 0.75$   
 $= 1.318 \text{ N/mm}^2$

$\Phi V_{c2} = (0.166 * (1 + 2 / \beta) * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (b)  
 $= (0.166 * ((1 + 2 / 1.18) * 1 * 5.29) * 0.75$   
 $= 1.774 \text{ N/mm}^2$

$\Phi V_{c3} = (0.083 * (2 + (\alpha_s * d/b_o)) * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (c)  
 $= (0.083 * (2 + (40 * 509.1/4436.4)) * 1 * 5.29) * 0.75$   
 $= 2.171 \text{ N/mm}^2$

$\Phi V_c = \text{min.} (\Phi V_{c1}, \Phi V_{c2}, \Phi V_{c3})$  Cl.22.6.5.2  
 $= \text{min.} (1.318, 1.774, 2.171)$   
 $= 1.318 \text{ N/mm}^2$

Vu/ $\Phi V_c$  Ratio = 0.067  
 < 1 Hence safe.

**Pile 1**

**Member Details**

Location = Corner

$f'_c$  = 28 N/mm<sup>2</sup>  
 $\sqrt{f'_c}$  =  $\sqrt{28}$   
 = 5.29 N/mm<sup>2</sup> <= 8.3 N/mm<sup>2</sup> Cl.22.6.3.1  
 = 5.29 N/mm<sup>2</sup>  
 $f_y$  = 280 N/mm<sup>2</sup>  
 Critical Load Combination = ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Saturated  
 $\Phi$  = 0.75  
 $\lambda$  = 1  
 $\beta$  = 1  
 $d$  = 534.1 mm  
 Pile Dia. = 600 mm  
 Pile Centroid = (5000,-1600,-1039.2)

**Punching Perimeter Details**

Edge Id	Start Point (mm)	End Point (mm)	Thickness (d) (mm)	Length (l) (mm)
Edge 1	(4732.2,-1000,-1539.2)	(4700.9,-1000,-1521.2)	534.1	36.1
Edge 2	(4282.3,-1000,-796.2)	(4715.1,-1000,-546.3)	534.1	499.8
Edge 3	(4715.1,-1000,-546.3)	(4852.9,-1000,-489.2)	534.1	149.2
Edge 4	(4852.9,-1000,-489.2)	(5000,-1000,-469.8)	534.1	148.4
Edge 5	(5000,-1000,-469.8)	(5147.1,-1000,-489.2)	534.1	148.4
Edge 6	(5147.1,-1000,-489.2)	(5284.9,-1000,-546.3)	534.1	149.2
Edge 7	(5284.9,-1000,-546.3)	(5717.7,-1000,-796.2)	534.1	499.8

$b_o$  = 1630.7 mm  
 $b_{area}$  = 870961.9 mm<sup>2</sup>  
 $J_y(10^6)$  = 24953.99 mm<sup>4</sup>  
 $J_z(10^6)$  = 152836.47 mm<sup>4</sup>  
 $J_{yz}(10^6)$  = -4934.57 mm<sup>4</sup>  
 $\theta$  = -2.21 deg  
 $J_y'(10^6)$  = 24771.08 mm<sup>4</sup>  
 $J_z'(10^6)$  = 153042.99 mm<sup>4</sup>  
 $L_y'$  = 1434.4 mm  
 $L_z'$  = 1058.3 mm  
 $\gamma_{vy}'$  = 0.364  
 $\gamma_{vz}'$  = 0.437

**Design Force and Moments**

$N_u$  = 98.43 kN  
 $M_{uy}$  = 0 kN\*m  
 $M_{uz}$  = 0 kN\*m

$N_{u,res} = 55.16 \text{ kN}$   
 $M_{uy,res} = -24.62 \text{ kN}\cdot\text{m}$   
 $M_{uz,res} = 0.33 \text{ kN}\cdot\text{m}$   
 Critical Section Centroid = (4993.7,-1267.1,-627.3)

**Shear Stress due to Design Force and Moments**

Edge Id	Stress At Start Point (N/mm2)	Stress At End Point (N/mm2)
Edge 1	0.39	0.383
Edge 2	0.116	0.031
Edge 3	0.031	0.012
Edge 4	0.012	0.006
Edge 5	0.006	0.015
Edge 6	0.015	0.038
Edge 7	0.038	0.133

$V_{ug} = 0.063 \text{ N/mm}^2$   
 $V_u = 0.39 \text{ N/mm}^2$

**Allowable Shear Stress**

$\Phi V_{c1} = (0.332 * \lambda * \sqrt{f'_c}) * \Phi$  Cl.22.6.5.2 (a)  
 $= (0.332 * 1 * 5.29) * 0.75$   
 $= 1.318 \text{ N/mm}^2$   
 $\Phi V_{c2} = (0.166 * (1 + 2 / \beta) * \lambda * \sqrt{f'_c}) * \Phi$  Cl.22.6.5.2 (b)  
 $= (0.166 * ((1 + 2/ 1) * 1 * 5.29) * 0.75$   
 $= 1.976 \text{ N/mm}^2$   
 $\Phi V_{c3} = (0.083 * (2 + (\alpha_s * d/b_o)) * \lambda * \sqrt{f'_c}) * \Phi$  Cl.22.6.5.2 (c)  
 $= (0.083 * (2 + (20 * 534.1/1630.71)) * 1 * 5.29) * 0.75$   
 $= 2.817 \text{ N/mm}^2$   
 $\Phi V_c = \text{min.} (\Phi V_{c1}, \Phi V_{c2}, \Phi V_{c3})$  Cl.22.6.5.2  
 $= \text{min.} (1.318, 1.976, 2.817)$   
 $= 1.318 \text{ N/mm}^2$   
 $V_u / \Phi V_c \text{ Ratio} = 0.296$   
 $< 1 \text{ Hence safe.}$

**Pile 2**

**Member Details**

Location = Corner  
 $f'_c = 28 \text{ N/mm}^2$   
 $\sqrt{f'_c} = \sqrt{28}$

	=	5.29 N/mm <sup>2</sup> <= 8.3 N/mm <sup>2</sup>	Cl.22.6.3.1
	=	5.29 N/mm <sup>2</sup>	
fy	=	280 N/mm <sup>2</sup>	
Critical Load Combination	=	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (-1)S1 : 3: LATERAL + Saturated	
Φ	=	0.75	
λ	=	1	
β	=	1	
d	=	534.1 mm	
Pile Dia.	=	600 mm	
Pile Centroid	=	(4100,-1600,519.6)	

**Punching Perimeter Details**

Edge Id	Start Point (mm)	End Point (mm)	Thickness (d) (mm)	Length (l) (mm)
Edge 1	(4669.4,-1000,519.6)	(4650,-1000,372.5)	534.1	148.4
Edge 2	(4650,-1000,372.5)	(4592.9,-1000,234.7)	534.1	149.2
Edge 3	(4592.9,-1000,234.7)	(4502.6,-1000,117)	534.1	148.3
Edge 4	(4502.6,-1000,117)	(4384.9,-1000,26.7)	534.1	148.3
Edge 5	(4384.9,-1000,26.7)	(3951.6,-1000,-223.5)	534.1	500.3
Edge 6	(3533,-1000,501.6)	(3533,-1000,537.6)	534.1	36
Edge 7	(4669.4,-1000,1019.6)	(4669.4,-1000,519.6)	534.1	500

bo	=	1630.6 mm
barea	=	870893.9 mm <sup>2</sup>
Jy(10 <sup>6</sup> )	=	116587.51 mm <sup>4</sup>
Jz(10 <sup>6</sup> )	=	61162.77 mm <sup>4</sup>
Jyz(10 <sup>6</sup> )	=	-57866.7 mm <sup>4</sup>
θ	=	32.2 deg
Jy'(10 <sup>6</sup> )	=	153040.79 mm <sup>4</sup>
Jz'(10 <sup>6</sup> )	=	24733.44 mm <sup>4</sup>
Ly'	=	1058.3 mm
Lz'	=	1434.4 mm
γvy'	=	0.437
γvz'	=	0.364

**Design Force and Moments**

Nu	=	132.35 kN
Muy	=	0 kN*m
Muz	=	0 kN*m
Nu,res	=	88.24 kN

Muy,res = 19.6 kN\*m  
 Muz,res = -31.98 kN\*m  
 Critical Section Centroid = (4453.7,-1267.1,308.1)

**Shear Stress due to Design Force and Moments**

Edge Id	Stress At Start Point (N/mm2)	Stress At End Point (N/mm2)
Edge 1	0.062	0.028
Edge 2	0.028	0.015
Edge 3	0.015	0.022
Edge 4	0.022	0.051
Edge 5	0.051	0.18
Edge 6	0.589	0.6
Edge 7	0.209	0.062

Vug = 0.101 N/mm2  
 Vu = 0.6 N/mm2

**Allowable Shear Stress**

$\Phi Vc1 = (0.332 * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (a)  
 $= (0.332 * 1 * 5.29) * 0.75$   
 $= 1.318 \text{ N/mm}^2$   
 $\Phi Vc2 = (0.166 * (1 + 2 / \beta) * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (b)  
 $= (0.166 * ((1 + 2 / 1) * 1 * 5.29) * 0.75$   
 $= 1.976 \text{ N/mm}^2$   
 $\Phi Vc3 = (0.083 * (2 + (\alpha_s * d / bo)) * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (c)  
 $= (0.083 * (2 + (20 * 534.1 / 1630.58)) * 1 * 5.29) * 0.75$   
 $= 2.817 \text{ N/mm}^2$   
 $\Phi Vc = \text{min.} (\Phi Vc1, \Phi Vc2, \Phi Vc3)$  Cl.22.6.5.2  
 $= \text{min.} (1.318, 1.976, 2.817)$   
 $= 1.318 \text{ N/mm}^2$   
 Vu/ΦVc Ratio = 0.455  
 < 1 Hence safe.

**Pile 3**

**Member Details**

Location = Corner  
 f'c = 28 N/mm2  
 $\sqrt{f'c} = \sqrt{28}$   
 $= 5.29 \text{ N/mm}^2 \leq 8.3 \text{ N/mm}^2$  Cl.22.6.3.1

	=	5.29 N/mm <sup>2</sup>
$f_y$	=	280 N/mm <sup>2</sup>
Critical Load Combination	=	ULS-(1.2)S1 : 1: DEAD + (1)S1 : 2: LIVE + (1)S1 : 3: LATERAL + Saturated
$\Phi$	=	0.75
$\lambda$	=	1
$\beta$	=	1
$d$	=	534.1 mm
Pile Dia.	=	600 mm
Pile Centroid	=	(5900,-1600,519.6)

**Punching Perimeter Details**

Edge Id	Start Point (mm)	End Point (mm)	Thickness (d) (mm)	Length (l) (mm)
Edge 1	(6048.3,-1000,-223.4)	(5615.1,-1000,26.7)	534.1	500.2
Edge 2	(5615.1,-1000,26.7)	(5497.4,-1000,117)	534.1	148.3
Edge 3	(5497.4,-1000,117)	(5407.1,-1000,234.7)	534.1	148.3
Edge 4	(5407.1,-1000,234.7)	(5350,-1000,372.5)	534.1	149.2
Edge 5	(5350,-1000,372.5)	(5330.6,-1000,519.6)	534.1	148.4
Edge 6	(5330.6,-1000,519.6)	(5330.6,-1000,1019.6)	534.1	500
Edge 7	(6467.1,-1000,537.3)	(6467.1,-1000,501.9)	534.1	35.4

$b_o$	=	1629.8 mm
$b_{area}$	=	870500.5 mm <sup>2</sup>
$J_y(10^6)$	=	116548.66 mm <sup>4</sup>
$J_z(10^6)$	=	60877.86 mm <sup>4</sup>
$J_{yz}(10^6)$	=	57908.8 mm <sup>4</sup>
$\theta$	=	-32.16 deg
$J_y'(10^6)$	=	152971.16 mm <sup>4</sup>
$J_z'(10^6)$	=	24488.28 mm <sup>4</sup>
$L_y'$	=	1058.5 mm
$L_z'$	=	1434.3 mm
$\gamma_{vy}'$	=	0.437
$\gamma_{vz}'$	=	0.364

**Design Force and Moments**

$N_u$	=	132.35 kN
$M_{uy}$	=	0 kN*m
$M_{uz}$	=	0 kN*m
$N_{u,res}$	=	88.74 kN
$M_{uy,res}$	=	19.8 kN*m

Muz,res = 31.89 kN\*m  
 Critical Section Centroid = (5546,-1267,308.1)

**Shear Stress due to Design Force and Moments**

Edge Id	Stress At Start Point (N/mm2)	Stress At End Point (N/mm2)
Edge 1	0.182	0.051
Edge 2	0.051	0.022
Edge 3	0.022	0.014
Edge 4	0.014	0.028
Edge 5	0.028	0.063
Edge 6	0.063	0.211
Edge 7	0.606	0.596

V<sub>ug</sub> = 0.102 N/mm<sup>2</sup>  
 V<sub>u</sub> = 0.606 N/mm<sup>2</sup>

**Allowable Shear Stress**

$\Phi V_{c1} = (0.332 * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (a)  
 $= (0.332 * 1 * 5.29) * 0.75$   
 $= 1.318 \text{ N/mm}^2$

$\Phi V_{c2} = (0.166 * (1 + 2 / \beta) * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (b)  
 $= (0.166 * ((1 + 2 / 1) * 1 * 5.29) * 0.75$   
 $= 1.976 \text{ N/mm}^2$

$\Phi V_{c3} = (0.083 * (2 + (\alpha_s * d/b_o)) * \lambda * \sqrt{f'c}) * \Phi$  Cl.22.6.5.2 (c)  
 $= (0.083 * (2 + (20 * 534.1/1629.85)) * 1 * 5.29) * 0.75$   
 $= 2.818 \text{ N/mm}^2$

$\Phi V_c = \text{min.} (\Phi V_{c1}, \Phi V_{c2}, \Phi V_{c3})$  Cl.22.6.5.2  
 $= \text{min.} (1.318, 1.976, 2.818)$   
 $= 1.318 \text{ N/mm}^2$

V<sub>u</sub>/ΦV<sub>c</sub> Ratio = 0.46  
 < 1 Hence safe.

**PC4\_DGN\_2 : Load Transfer Check**

**Detailed**

**PD8**

Critical Load Combination	=	ULS-(1.2)S1 : 1: DEAD + (1.6)S1 : 2: LIVE + Saturated	
Depth	=	600 mm	
Nu	=	95.18 kN	
A1	=	0.36 m <sup>2</sup>	
A2	=	4.93 m <sup>2</sup>	
Base Area (LY*LZ)	=	4.97 m <sup>2</sup>	
	=	A2 <= Base Area	
Thus, A2	=	4.93 m <sup>2</sup>	
Sqrt (A2/A1)	=	3.713	
Multiplying Factor	=	Sqrt (A2/A1) <= 2	
Thus, Multiplying Factor	=	2	
φ (bearing)	=	0.65	
φPnb	=	φ * 0.85 * f'c * Multiplying Factor * A1	Cl.22.8.3.2
	=	11061.05 kN	
Status	=	Ok	

**Result Summary**

**PC4\_DGN\_2 : Result Summary**

**Post Analysis Checks**

Check	Critical L/C Ref.	Capacity	Demand	Factor of Safety	Allowable Factor of Safety	Status
Pile Compression Capacity	C83	750 kN	-79.42 kN	9.44	1	Pass
Pile Settlement	C79	12 mm	-26.31 mm	0.46	1	Fail
Pile Shear Capacity	C65	150 kN	4 kN	37.5	1	Pass
Pile Tension Capacity	C74	150 kN	9.88 kN	15.18	1	Pass

**Design**

Check	Critical L/C Ref.	Capacity	Demand	Utilization Ratio	Allowable Ratio	Status
Flexural Check : Top X	C92	514.75 kN*m	21.67 kN*m	0.04	1	Pass
Flexural Check : Bottom X	C94	435.48 kN*m	-62.39 kN*m	0.14	1	Pass
Flexural Check : Top Y	C92	423.7 kN*m	4.39 kN*m	0.01	1	Pass
Flexural Check : Bottom Y	C85	388.6 kN*m	-46.63 kN*m	0.12	1	Pass
One Way Shear : PD8 : Along Lx	C97	558.27 kN	120.41 kN	0.22	1	Pass
One Way Shear : PD8 : Along Ly	C85	493.13 kN	74.09 kN	0.15	1	Pass
Punching Shear : Pile 1	C85	1.32 N/mm <sup>2</sup>	0.39 N/mm <sup>2</sup>	0.3	1	Pass
Punching Shear : Pile 2	C97	1.32 N/mm <sup>2</sup>	0.6 N/mm <sup>2</sup>	0.46	1	Pass
Punching Shear : Pile 3	C94	1.32 N/mm <sup>2</sup>	0.61 N/mm <sup>2</sup>	0.46	1	Pass
Punching Shear : PD8	C97	1.32 N/mm <sup>2</sup>	0.09 N/mm <sup>2</sup>	0.07	1	Pass
Bearing Design : PD8	C85	11061.05 kN	95.18 kN	0.01	1	Pass

**Associated Pedestals Result**

**PD8**

Check	Critical L/C Ref.	Capacity	Demand	Utilization Ratio	Allowable Ratio	Status
Flexural Check	C12	263.7 kN*m	72 kN*m	0.27	1	Pass
Axial Capacity Check	C10	4726.13 kN	95.18 kN	0.02	1	Pass
Shear Check Along Y axis	C11	209.12 kN	12 kN	0.06	1	Pass
Shear Check Along Z axis	C11	368.61 kN	0 kN	0	1	Pass

**PD7**

**Geometry**

Start Node (X)[m]	Start Node (Y)[m]	Start Node (Z)[m]	End Node (X)[m]	End Node (Y)[m]	End Node (Z)[m]	Section	Section Profile	Beta Angle [deg]
0	-1	0	0	-0.01	0	Rectangle	0.55 m x 0.65 m	0

**Design**

**PD7\_DGN\_4**

**Detailed**

Axial Capacity Ratio	Critical Load Combination	Location	Interaction Ratio	Steel Percentage (%)	Area of Steel Prov.(mm2)	Main Rebar	Rebar Links
0.02	ULS-(0.9)S1 : 1: DEAD + (1) S1 : 3: LATERAL	Bottom	0.273	1.002	3582	18-#16	#10 - 250

**PedestalDesign**

Design Length = 988 mm

**Longitudinal Reinforcement Details**

Area of longitudinal bars = 3582 mm<sup>2</sup>

Number of bars and bar dia = 18-#16

Longitudinal steel percentage (%) = 1.002

Bar arrangement sequence on each side along the side parallel to YD = 6-#16

Bar arrangement sequence on each side along the side parallel to ZD = 5-#16

**Flexure Governing Load Case Details**

Governing load combination number = ULS-(0.9)S1 : 1: DEAD + (1)S1 : 3: LATERAL

Critical location = Bottom

Axial load = 12.27 kN

Analysis moment about local Z axis = 72 kN\*m

Analysis moment about local Y axis = 0 kN\*m  
 Design moment about local Z axis = 72 kN\*m  
 Design moment about local Y axis = 0 kN\*m  
 Resultant moment = 72 kN\*m  
 Moment capacity = 263.7 kN\*m  
 Angle of inclination of neutral axis with respect to local Z axis = 0 deg

**P-M Data for Bending**

P (kN)	M (kN-m)	Strength Reduction Factor (Φ)
-843.759	18.997	0.9
-843.759	18.997	0.9
-784.854	37.699	0.9
-725.949	56.107	0.9
-667.044	74.22	0.9
-577.214	101.276	0.9
-512.124	120.452	0.9
-343.431	166.935	0.9
-192.787	208.239	0.9
-61.154	244.106	0.9
54.225	275.264	0.9
135.372	296.961	0.9
230.573	322.116	0.9
320.19	345.485	0.9
405.419	367.389	0.9
521.009	396.309	0.9
606.062	417.22	0.9
684.034	435.881	0.9
761.659	452.75	0.9
842.679	469.804	0.9
916.216	484.978	0.9
988.093	499.573	0.9
1058.791	513.686	0.9
1128.463	527.339	0.9
1227.869	546.487	0.9
1302.04	560.286	0.9
1375.511	573.613	0.9

<b>P (kN)</b>	<b>M (kN-m)</b>	<b>Strength Reduction Factor (<math>\Phi</math>)</b>
1448.363	586.48	0.9
1520.659	598.9	0.9
1595.366	610.74	0.9
1662.33	620.5	0.9
1736.75	631.232	0.9
1810.199	641.579	0.9
1882.768	651.548	0.9
1988.108	665.8	0.9
2028.437	663.617	0.884
2060.603	659.151	0.866
2091.519	654.666	0.849
2121.316	650.158	0.833
2145.028	645.066	0.817
2169.648	639.849	0.803
2198.132	634.437	0.789
2225.515	629.092	0.775
2277.621	626.084	0.763
2307.872	621.107	0.751
2337.173	616.109	0.739
2365.608	611.087	0.728
2393.252	606.038	0.718
2417.442	600.705	0.708
2437.147	595.052	0.698
2449.965	589.089	0.689
2469.539	583.432	0.68
2492.836	577.154	0.671
2540.092	571.763	0.663
2566.526	565.593	0.655
2603.016	561.716	0.65
2658.827	561.932	0.65
2714.329	561.911	0.65
2765.71	561.634	0.65
2816.175	561.158	0.65
2866.375	560.488	0.65
2916.324	559.625	0.65
2987.732	558.213	0.65
3049.793	554.582	0.65
3112.292	550.532	0.65

<b>P (kN)</b>	<b>M (kN-m)</b>	<b>Strength Reduction Factor (<math>\Phi</math>)</b>
3174.315	546.31	0.65
3235.882	541.911	0.65
3295.526	537.399	0.65
3351.776	532.87	0.65
3401.473	528.529	0.65
3456.946	523.716	0.65
3512.054	518.757	0.65
3590.638	511.948	0.65
3649.53	506.221	0.65
3708.1	500.293	0.65
3766.363	494.162	0.65
3824.329	487.825	0.65
3878.395	481.643	0.65
3931.336	475.379	0.65
3983.326	468.914	0.65
4034.724	462.264	0.65
4107.388	452.843	0.65
4162.824	445.18	0.65
4218.056	437.3	0.65
4273.094	429.201	0.65
4327.942	420.883	0.65
4381.331	412.535	0.65
4431.354	404.473	0.65
4475.05	397.221	0.65
4524.739	388.804	0.65
4574.268	380.207	0.65
4647.256	367.266	0.65
4700.95	357.372	0.65
4754.501	347.249	0.65
4807.913	336.895	0.65
4861.19	326.31	0.65
4901.628	316.192	0.65
4901.628	306.099	0.65
4901.628	295.82	0.65
4901.628	285.353	0.65
4901.628	269.885	0.65
4901.628	257.894	0.65
4901.628	245.667	0.65

<b>P (kN)</b>	<b>M (kN-m)</b>	<b>Strength Reduction Factor (Φ)</b>
4901.628	233.202	0.65
4901.628	220.499	0.65
4901.628	207.828	0.65
4901.628	195.815	0.65
4901.628	183.609	0.65
4901.628	175.321	0.65
4901.628	162.727	0.65
4901.628	143.39	0.65
4901.628	129.043	0.65
4901.628	114.453	0.65
4901.628	99.619	0.65
4901.628	84.541	0.65
4901.628	70.209	0.65
4901.628	56.067	0.65
4901.628	41.728	0.65
4901.628	27.19	0.65
4901.628	26.385	0.65
4901.628	25.595	0.65
4901.628	24.817	0.65
4901.628	24.051	0.65
4901.628	23.299	0.65
4901.628	22.558	0.65
4901.628	21.83	0.65
4901.628	21.112	0.65
4901.628	20.407	0.65
4901.628	19.712	0.65
4901.628	19.028	0.65
4901.628	18.354	0.65
4901.628	17.691	0.65
4901.628	17.038	0.65
4901.628	16.394	0.65
4901.628	15.761	0.65
4901.628	15.136	0.65
4901.628	14.521	0.65
4901.628	13.915	0.65
4901.628	13.317	0.65
4901.628	12.728	0.65
4901.628	12.151	0.65











**Result Summary****PD7**

Check	Critical L/C Ref.	Capacity	Demand	Utilization Ratio	Allowable Ratio	Status
Flexural Check	C11	263.7 kN*m	72 kN*m	0.27	1	Pass
Axial Capacity Check	C10	4726.13 kN	95.18 kN	0.02	1	Pass
Shear Check Along Y axis	C12	209.12 kN	-12 kN	0.06	1	Pass
Shear Check Along Z axis	C12	368.61 kN	0 kN	0	1	Pass

**PD8**

**Geometry**

Start Node (X)[m]	Start Node (Y)[m]	Start Node (Z)[m]	End Node (X)[m]	End Node (Y)[m]	End Node (Z)[m]	Section	Section Profile	Beta Angle [deg]
5	-1	0	5	-0.01	0	Rectangle	0.55 m x 0.65 m	0

**Design**

**PD8\_DGN\_5**

**Detailed**

Axial Capacity Ratio	Critical Load Combination	Location	Interaction Ratio	Steel Percentage (%)	Area of Steel Prov.(mm2)	Main Rebar	Rebar Links
0.02	ULS-(0.9)S1 : 1: DEAD + (-1) S1 : 3: LATERAL	Bottom	0.273	1.002	3582	18-#16	#10 - 250

**PedestalDesign**

Design Length = 988 mm

**Longitudinal Reinforcement Details**

Area of longitudinal bars = 3582 mm<sup>2</sup>

Number of bars and bar dia = 18-#16

Longitudinal steel percentage (%) = 1.002

Bar arrangement sequence on each side along the side parallel to YD = 6-#16

Bar arrangement sequence on each side along the side parallel to ZD = 5-#16

**Flexure Governing Load Case Details**

Governing load combination number = ULS-(0.9)S1 : 1: DEAD + (-1)S1 : 3: LATERAL

Critical location = Bottom

Axial load = 12.27 kN

Analysis moment about local Z axis = -72 kN\*m

Analysis moment about local Y axis = 0 kN\*m  
 Design moment about local Z axis = -72 kN\*m  
 Design moment about local Y axis = 0 kN\*m  
 Resultant moment = 72 kN\*m  
 Moment capacity = 263.7 kN\*m  
 Angle of inclination of neutral axis with respect to local Z axis = 0 deg

**P-M Data for Bending**

P (kN)	M (kN-m)	Strength Reduction Factor (Φ)
-843.759	18.997	0.9
-843.759	18.997	0.9
-784.854	37.699	0.9
-725.949	56.107	0.9
-667.044	74.22	0.9
-577.214	101.276	0.9
-512.124	120.452	0.9
-343.431	166.935	0.9
-192.787	208.239	0.9
-61.154	244.106	0.9
54.225	275.264	0.9
135.372	296.961	0.9
230.573	322.116	0.9
320.19	345.485	0.9
405.419	367.389	0.9
521.009	396.309	0.9
606.062	417.22	0.9
684.034	435.881	0.9
761.659	452.75	0.9
842.679	469.804	0.9
916.216	484.978	0.9
988.093	499.573	0.9
1058.791	513.686	0.9
1128.463	527.339	0.9
1227.869	546.487	0.9
1302.04	560.286	0.9
1375.511	573.613	0.9

<b>P (kN)</b>	<b>M (kN-m)</b>	<b>Strength Reduction Factor (Φ)</b>
1448.363	586.48	0.9
1520.659	598.9	0.9
1595.366	610.74	0.9
1662.33	620.5	0.9
1736.75	631.232	0.9
1810.199	641.579	0.9
1882.768	651.548	0.9
1988.108	665.8	0.9
2028.437	663.617	0.884
2060.603	659.151	0.866
2091.519	654.666	0.849
2121.316	650.158	0.833
2145.028	645.066	0.817
2169.648	639.849	0.803
2198.132	634.437	0.789
2225.515	629.092	0.775
2277.621	626.084	0.763
2307.872	621.107	0.751
2337.173	616.109	0.739
2365.608	611.087	0.728
2393.252	606.038	0.718
2417.442	600.705	0.708
2437.147	595.052	0.698
2449.965	589.089	0.689
2469.539	583.432	0.68
2492.836	577.154	0.671
2540.092	571.763	0.663
2566.526	565.593	0.655
2603.016	561.716	0.65
2658.827	561.932	0.65
2714.329	561.911	0.65
2765.71	561.634	0.65
2816.175	561.158	0.65
2866.375	560.488	0.65
2916.324	559.625	0.65
2987.732	558.213	0.65
3049.793	554.582	0.65
3112.292	550.532	0.65

<b>P (kN)</b>	<b>M (kN-m)</b>	<b>Strength Reduction Factor (Φ)</b>
3174.315	546.31	0.65
3235.882	541.911	0.65
3295.526	537.399	0.65
3351.776	532.87	0.65
3401.473	528.529	0.65
3456.946	523.716	0.65
3512.054	518.757	0.65
3590.638	511.948	0.65
3649.53	506.221	0.65
3708.1	500.293	0.65
3766.363	494.162	0.65
3824.329	487.825	0.65
3878.395	481.643	0.65
3931.336	475.379	0.65
3983.326	468.914	0.65
4034.724	462.264	0.65
4107.388	452.843	0.65
4162.824	445.18	0.65
4218.056	437.3	0.65
4273.094	429.201	0.65
4327.942	420.883	0.65
4381.331	412.535	0.65
4431.354	404.473	0.65
4475.05	397.221	0.65
4524.739	388.804	0.65
4574.268	380.207	0.65
4647.256	367.266	0.65
4700.95	357.372	0.65
4754.501	347.249	0.65
4807.913	336.895	0.65
4861.19	326.31	0.65
4901.628	316.192	0.65
4901.628	306.099	0.65
4901.628	295.82	0.65
4901.628	285.353	0.65
4901.628	269.885	0.65
4901.628	257.894	0.65
4901.628	245.667	0.65

<b>P (kN)</b>	<b>M (kN-m)</b>	<b>Strength Reduction Factor (Φ)</b>
4901.628	233.202	0.65
4901.628	220.499	0.65
4901.628	207.828	0.65
4901.628	195.815	0.65
4901.628	183.609	0.65
4901.628	175.321	0.65
4901.628	162.727	0.65
4901.628	143.39	0.65
4901.628	129.043	0.65
4901.628	114.453	0.65
4901.628	99.619	0.65
4901.628	84.541	0.65
4901.628	70.209	0.65
4901.628	56.067	0.65
4901.628	41.728	0.65
4901.628	27.19	0.65
4901.628	26.385	0.65
4901.628	25.595	0.65
4901.628	24.817	0.65
4901.628	24.051	0.65
4901.628	23.299	0.65
4901.628	22.558	0.65
4901.628	21.83	0.65
4901.628	21.112	0.65
4901.628	20.407	0.65
4901.628	19.712	0.65
4901.628	19.028	0.65
4901.628	18.354	0.65
4901.628	17.691	0.65
4901.628	17.038	0.65
4901.628	16.394	0.65
4901.628	15.761	0.65
4901.628	15.136	0.65
4901.628	14.521	0.65
4901.628	13.915	0.65
4901.628	13.317	0.65
4901.628	12.728	0.65
4901.628	12.151	0.65











**Result Summary**

**PD8**

Check	Critical L/C Ref.	Capacity	Demand	Utilization Ratio	Allowable Ratio	Status
Flexural Check	C12	263.7 kN*m	72 kN*m	0.27	1	Pass
Axial Capacity Check	C10	4726.13 kN	95.18 kN	0.02	1	Pass
Shear Check Along Y axis	C11	209.12 kN	12 kN	0.06	1	Pass
Shear Check Along Z axis	C11	368.61 kN	0 kN	0	1	Pass