

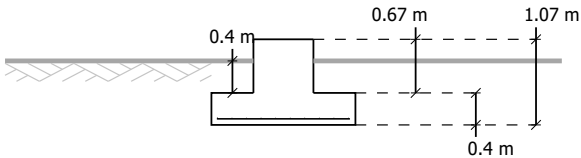
Isolated Footing Design (EURO Code)

EN-1992-1-1: 2004 : BRITISH ANNEX

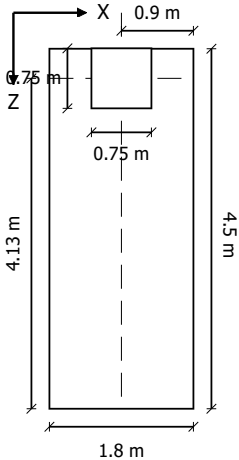
Footing No.	Group ID		Foundation Geometry		
-	-		Length	Width	Thickness
134	1		1.80m	4.50m	0.40m

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M _z)	Bottom Reinforcement(M _y)	Top Reinforcement(M _z)	Top Reinforcement(M _y)	Main Steel	Trans Steel
134	Ø12 @ 200 mm c/c	Ø12 @ 200 mm c/c	N/A	N/A	20 - Ø10	Ø8 mm @ 200 mm

Isolated Footing 134



Elevation



Plan

Input Values

Footing Geometry

Design Type :	Set Dimension
Minimum Footing Length - X (Fl) :	1800.00 mm
Minimum Footing Width - Z (Fw) :	4500.00 mm
Footing Thickness (Ft) :	400.00 mm
Eccentricity along X (Oxd) :	0.00 mm
Eccentricity along Z (Ozd) :	-1875.00 mm

Column Dimensions

Column Shape :	Rectangular
Column Length - X (Pl) :	0.28 m
Column Width - Z (Pw) :	0.27 m

Pedestal

Include Pedestal :	Yes
Pedestal Shape :	Rectangular
Pedestal Height (Ph) :	0.67 m
Pedestal Length - X (Pl) :	0.75 m
Pedestal Width - Z (Pw) :	0.75 m

Design Parameters

Concrete and Rebar Properties

Unit Weight of Concrete :	25.00 kN/m3
Strength of Concrete :	28.00 N/mm2
Yield Strength of Steel :	500.00 N/mm2
Minimum Bar Size :	Ø12
Maximum Bar Size :	Ø20
Minimum Bar Spacing :	1.00 mm
Maximum Bar Spacing :	200.00 mm
Pedestal Clear Cover (P, CL) :	50.00 mm

Footing Clear Cover (F, CL) : 75.00 mm

Soil Properties

Unit Weight : 18.00 kN/m3
Base Value of Soil Bearing Capacity : 150.00 kPa
Multiplying factor for soil bearing capacity for ultimate loads : 1.00
Soil Bearing Capacity Type : Net Bearing Capacity
Soil Surcharge : 0.00 kN/m2
Height of Soil above Footing : 400.00 mm
Type of Depth : Fixed Top
Minimum Percentage of Slab area in Contact for Service Loads : 80.00
Minimum Percentage of Slab area in Contact for Ultimate Loads : 0.00

Sliding and Overturning

Coefficient of Friction : 0.40
Factor of Safety Against Sliding : 1.40
Factor of Safety Against Overturning : 1.50

Global Settings

Top Reinforcement Option : Calculate only when foundation is subjected to uplift forces
Concrete Design Option : Net Pressure(Gross Pressure - Self Weight Pressure)

Load Combinations

Load Combination/s- Service Stress Level					
Load Combination Number	Load Combination Title	Load Case Multiplier (a)	Soil Bearing Factor (b)	Self Weight Factor (c)	Code
a - Value specified in the Load Multiplier table b - Value specified in the Pile/Soil Bearing Capacity Factors table c - Value specified in the Apply Self Weight and Dead Weight Factor table					
101	DL + PE +/- 0.6TL	1.00	1.00	1.00	-
102	DL+PEL+WL(+X)	1.00	1.00	1.00	-
103	DL + LL + PE +/- 0.6TL	1.00	1.00	1.00	-
104	DL+POL+PTF+PAL+WL(+X)	1.00	1.00	1.00	-
105	DL + PE +/- WL +/- 0.6TL	1.00	1.00	1.00	-
106		1.00	1.00	1.00	-
107		1.00	1.00	1.00	-
108		1.00	1.00	1.00	-
109		1.00	1.00	1.00	-
110		1.00	1.00	1.00	-
111		1.00	1.00	1.00	-
112		1.00	1.00	1.00	-
113	DL + LL + PE +/- 0.6 WL +/- 0.6TL	1.00	1.00	1.00	-
114		1.00	1.00	1.00	-
115		1.00	1.00	1.00	-
116		1.00	1.00	1.00	-
117		1.00	1.00	1.00	-
118		1.00	1.00	1.00	-
119		1.00	1.00	1.00	-
120		1.00	1.00	1.00	-
121	DL + PO +/- FL +/- GL +/- AL +/- 0.6TL	1.00	1.00	1.00	-
122		1.00	1.00	1.00	-
123		1.00	1.00	1.00	-
124		1.00	1.00	1.00	-
125	DL + LL + PO +/- FL +/- GL +/- AL +/- 0.6TL	1.00	1.00	1.00	-
126		1.00	1.00	1.00	-
127		1.00	1.00	1.00	-
128		1.00	1.00	1.00	-
129	DL + PO +/- GL +/- AL +/- WL +/- 0.6TL	1.00	1.00	1.00	-
130		1.00	1.00	1.00	-
131		1.00	1.00	1.00	-
132		1.00	1.00	1.00	-
133		1.00	1.00	1.00	-
134		1.00	1.00	1.00	-
135		1.00	1.00	1.00	-
136		1.00	1.00	1.00	-
137		1.00	1.00	1.00	-
138		1.00	1.00	1.00	-
139		1.00	1.00	1.00	-
140		1.00	1.00	1.00	-
141		1.00	1.00	1.00	-
142		1.00	1.00	1.00	-
143		1.00	1.00	1.00	-
144		1.00	1.00	1.00	-
145	DL + LL + PO +/- GL +/- AL +/- 0.6WL +/- 0.6TL	1.00	1.00	1.00	-
146		1.00	1.00	1.00	-
147		1.00	1.00	1.00	-
148		1.00	1.00	1.00	-
149		1.00	1.00	1.00	-
150		1.00	1.00	1.00	-
151		1.00	1.00	1.00	-
152		1.00	1.00	1.00	-
153		1.00	1.00	1.00	-
154		1.00	1.00	1.00	-

Load Combination/s- Service Stress Level					
Load Combination Number	Load Combination Title	Load Case Multiplier (a)	Soil Bearing Factor (b)	Self Weight Factor (c)	Code
a - Value specified in the Load Multiplier table b - Value specified in the Pile/Soil Bearing Capacity Factors table c - Value specified in the Apply Self Weight and Dead Weight Factor table					
155		1.00	1.00	1.00	-
156		1.00	1.00	1.00	-
157		1.00	1.00	1.00	-
158		1.00	1.00	1.00	-
159		1.00	1.00	1.00	-
160		1.00	1.00	1.00	-
161	DL + LL + PT +/- 0.5WL	1.00	1.00	1.00	-
162		1.00	1.00	1.00	-
163		1.00	1.00	1.00	-
164		1.00	1.00	1.00	-
165	DL + LL + PO +/- GL +/- AL +/- 0.6TL +/- SL	1.00	1.00	1.00	-
166		1.00	1.00	1.00	-
167		1.00	1.00	1.00	-
168		1.00	1.00	1.00	-
169		1.00	1.00	1.00	-
170		1.00	1.00	1.00	-
171		1.00	1.00	1.00	-
172		1.00	1.00	1.00	-
173		1.00	1.00	1.00	-
174		1.00	1.00	1.00	-
175		1.00	1.00	1.00	-
176		1.00	1.00	1.00	-
177		1.00	1.00	1.00	-
178		1.00	1.00	1.00	-
179		1.00	1.00	1.00	-
180		1.00	1.00	1.00	-
Load Combination/s- Strength Level					
Load Combination Number	Load Combination Title	Load Case Multiplier (a)	Soil Bearing Factor (b)	Self Weight Factor (c)	Code
a - Value specified in the Load Multiplier table b - Value specified in the Pile/Soil Bearing Capacity Factors table c - Value specified in the Apply Self Weight and Dead Weight Factor table					
201	1.4DL +1.5LL + 1.4PE +/- 0.9TL	1.00	1.40	1.40	-
202	1.35DL+1.35PEL+1.35WL(+X)	1.00	1.35	1.35	-
203	1.4DL + 1.4PE +/- 1.5WL +/- 0.9TL	1.00	1.40	1.40	-
204	1.35DL+1.35POL+1.35PTF+1.35PAL+1.35WL(+X)	1.00	1.35	1.35	-
205	1.35DL+1.35POL+1.35PTF+1.35PAL+1.35WL(+Z)	1.00	1.35	1.35	-
206		1.00	1.35	1.35	-
207		1.00	1.35	1.35	-
208		1.00	1.35	1.35	-
209		1.00	1.35	1.35	-
210		1.00	1.35	1.35	-
211	1.4DL + 1.5LL + 1.4PE +/- 0.9WL +/- 0.9TL	1.00	1.40	1.40	-
212		1.00	1.40	1.40	-
213		1.00	1.40	1.40	-
214		1.00	1.40	1.40	-
215		1.00	1.40	1.40	-
216		1.00	1.40	1.40	-
217		1.00	1.40	1.40	-
218		1.00	1.40	1.40	-
219	1.4DL + 0.9LL + 1.4PE +/- 1.5WL +/- 0.9TL	1.00	1.40	1.40	-
220		1.00	1.40	1.40	-
221		1.00	1.40	1.40	-
222		1.00	1.40	1.40	-
223		1.00	1.40	1.40	-
224		1.00	1.40	1.40	-
225		1.00	1.40	1.40	-
226		1.00	1.40	1.40	-
227	1.4DL + 0.9LL + 1.4PE +/- 0.9WL +/- 0.9TL	1.00	1.40	1.40	-
228		1.00	1.40	1.40	-
229		1.00	1.40	1.40	-
230		1.00	1.40	1.40	-
231		1.00	1.40	1.40	-
232		1.00	1.40	1.40	-
233		1.00	1.40	1.40	-
234		1.00	1.40	1.40	-
235	1.4DL + 1.5LL + 1.4PO +/- 1.4FL +/- 1.4GL +/- 1.4AL +/- 0.9TL	1.00	1.40	1.40	-
236		1.00	1.40	1.40	-
237		1.00	1.40	1.40	-
238		1.00	1.40	1.40	-
239	1.4DL + 1.4PO +/- 1.4GL +/- 1.4 AL +/- 1.5WL +/- 0.9TL	1.00	1.40	1.40	-
240		1.00	1.40	1.40	-
241		1.00	1.40	1.40	-
242		1.00	1.40	1.40	-
243		1.00	1.40	1.40	-
244		1.00	1.40	1.40	-
245		1.00	1.40	1.40	-
246		1.00	1.40	1.40	-
247		1.00	1.40	1.40	-
248		1.00	1.40	1.40	-
249		1.00	1.40	1.40	-
250		1.00	1.40	1.40	-
251		1.00	1.40	1.40	-
252		1.00	1.40	1.40	-
253		1.00	1.40	1.40	-
254		1.00	1.40	1.40	-

Load Combination/s- Strength Level					
Load Combination Number	Load Combination Title	Load Case Multiplier (a)	Soil Bearing Factor (b)	Self Weight Factor (c)	Code
a - Value specified in the Load Multiplier table b - Value specified in the Pile/Soil Bearing Capacity Factors table c - Value specified in the Apply Self Weight and Dead Weight Factor table					
255	1.4DL + 1.5LL + 1.4PO +/- 1.4GL +/- 1.4AL +/- 0.9WL +/- 0.9TL	1.00	1.40	1.40	-
256		1.00	1.40	1.40	-
257		1.00	1.40	1.40	-
258		1.00	1.40	1.40	-
259		1.00	1.40	1.40	-
260		1.00	1.40	1.40	-
261		1.00	1.40	1.40	-
262		1.00	1.40	1.40	-
263		1.00	1.40	1.40	-
264		1.00	1.40	1.40	-
265		1.00	1.40	1.40	-
266		1.00	1.40	1.40	-
267		1.00	1.40	1.40	-
268		1.00	1.40	1.40	-
269		1.00	1.40	1.40	-
270		1.00	1.40	1.40	-
271	1.4DL + 0.9LL + 1.4PO +/- 1.4GL +/- 1.4AL +/- 1.5WL +/- 0.9TL	1.00	1.40	1.40	-
272		1.00	1.40	1.40	-
273		1.00	1.40	1.40	-
274		1.00	1.40	1.40	-
275		1.00	1.40	1.40	-
276		1.00	1.40	1.40	-
277		1.00	1.40	1.40	-
278		1.00	1.40	1.40	-
279		1.00	1.40	1.40	-
280		1.00	1.40	1.40	-
281		1.00	1.40	1.40	-
282		1.00	1.40	1.40	-
283		1.00	1.40	1.40	-
284		1.00	1.40	1.40	-
285		1.00	1.40	1.40	-
286		1.00	1.40	1.40	-
287	1.4DL + 0.9LL + 1.4PO +/- 1.4GL +/- 1.4AL +/- 0.9WL +/- 0.9TL	1.00	1.40	1.40	-
288		1.00	1.40	1.40	-
289		1.00	1.40	1.40	-
290		1.00	1.40	1.40	-
291		1.00	1.40	1.40	-
292		1.00	1.40	1.40	-
293		1.00	1.40	1.40	-
294		1.00	1.40	1.40	-
295		1.00	1.40	1.40	-
296		1.00	1.40	1.40	-
297		1.00	1.40	1.40	-
298		1.00	1.40	1.40	-
299		1.00	1.40	1.40	-
300		1.00	1.40	1.40	-
301		1.00	1.40	1.40	-
302		1.00	1.40	1.40	-
303	1.4DL + LL + 1.4PT	1.00	1.40	1.40	-
304	1.4DL + LL + 1.4PT +/- 0.8WL	1.00	1.40	1.40	-
305		1.00	1.40	1.40	-
306		1.00	1.40	1.40	-
307		1.00	1.40	1.40	-
308	DL + LL + PO +/- GL +/- AL +/- 0.6TL +/- SL	1.00	1.00	1.00	-
309		1.00	1.00	1.00	-
310		1.00	1.00	1.00	-
311		1.00	1.00	1.00	-
312		1.00	1.00	1.00	-
313		1.00	1.00	1.00	-
314		1.00	1.00	1.00	-
315		1.00	1.00	1.00	-
316		1.00	1.00	1.00	-
317		1.00	1.00	1.00	-
318		1.00	1.00	1.00	-
319		1.00	1.00	1.00	-
320		1.00	1.00	1.00	-
321		1.00	1.00	1.00	-
322		1.00	1.00	1.00	-
323		1.00	1.00	1.00	-

Applied Loads on Top of Pedestal

Before consideration of self weight and load multiplier table

Moments are about the center of Column / Pedestal (does not include moments caused by lateral loads)
For the loads shown in this table, the sign convention is the same as that for JOINT LOADS in STAAD.Pro when global Y is the vertical axis.

Applied Loads from Column - Service Stress Level					
Load Case	F _x (kN)	F _y (kN) Downwards is negative Upwards is positive	F _z (kN)	M _x (kNm)	M _z (kNm)
101	0.00	-22.16	0.00	-17.55	0.00
102	0.00	-22.16	0.00	-17.55	0.00
103	0.00	-22.16	0.00	-17.55	0.00
104	0.00	-22.16	0.00	-17.55	0.00
105	2.89	-22.16	0.00	-17.55	-5.09
106	2.89	-22.16	0.00	-17.55	-5.09
107	-2.89	-22.16	0.00	-17.55	5.09

Applied Loads from Column - Service Stress Level					
Load Case	F _x (kN)	F _y (kN) Downwards is negative Upwards is positive	F _z (kN)	M _x (kNm)	M _z (kNm)
108	-2.89	-22.16	0.00	-17.55	5.09
109	0.00	-22.16	5.86	-5.86	0.00
110	0.00	-22.16	5.86	-5.86	0.00
111	0.00	-22.16	-5.86	-29.25	0.00
112	0.00	-22.16	-5.86	-29.25	0.00
113	1.74	-22.16	0.00	-17.55	-3.05
114	1.74	-22.16	0.00	-17.55	-3.05
115	-1.74	-22.16	0.00	-17.55	3.05
116	-1.74	-22.16	0.00	-17.55	3.05
117	0.00	-22.16	3.52	-10.54	0.00
118	0.00	-22.16	3.52	-10.54	0.00
119	0.00	-22.16	-3.52	-24.57	0.00
120	0.00	-22.16	-3.52	-24.57	0.00
121	11.51	-22.29	-12.70	-45.71	-25.42
122	11.51	-22.29	-12.70	-45.71	-25.42
123	-11.51	-22.29	12.70	10.38	25.42
124	-11.51	-22.29	12.70	10.38	25.42
125	11.51	-22.29	-12.70	-45.71	-25.42
126	11.51	-22.29	-12.70	-45.71	-25.42
127	-11.51	-22.29	12.70	10.38	25.42
128	-11.51	-22.29	12.70	10.38	25.42
129	14.41	-22.29	-12.70	-45.71	-30.51
130	14.41	-22.29	-12.70	-45.71	-30.51
131	8.62	-22.29	-12.70	-45.71	-20.33
132	8.62	-22.29	-12.70	-45.71	-20.33
133	11.51	-22.29	-6.84	-34.02	-25.42
134	11.51	-22.29	-6.84	-34.02	-25.42
135	11.51	-22.29	-18.56	-57.40	-25.42
136	11.51	-22.29	-18.56	-57.40	-25.42
137	-8.62	-22.29	12.70	10.38	20.33
138	-8.62	-22.29	12.70	10.38	20.33
139	-14.41	-22.29	12.70	10.38	30.51
140	-14.41	-22.29	12.70	10.38	30.51
141	-11.51	-22.29	18.56	22.07	25.42
142	-11.51	-22.29	18.56	22.07	25.42
143	-11.51	-22.29	6.84	-1.31	25.42
144	-11.51	-22.29	6.84	-1.31	25.42
145	13.25	-22.29	-12.70	-45.71	-28.48
146	13.25	-22.29	-12.70	-45.71	-28.48
147	9.78	-22.29	-12.70	-45.71	-22.37
148	9.78	-22.29	-12.70	-45.71	-22.37
149	11.51	-22.29	-9.18	-38.69	-25.42
150	11.51	-22.29	-9.18	-38.69	-25.42
151	11.51	-22.29	-16.22	-52.72	-25.42
152	11.51	-22.29	-16.22	-52.72	-25.42
153	-9.78	-22.29	12.70	10.38	22.37
154	-9.78	-22.29	12.70	10.38	22.37
155	-13.25	-22.29	12.70	10.38	28.48
156	-13.25	-22.29	12.70	10.38	28.48
157	-11.51	-22.29	16.22	17.39	25.42
158	-11.51	-22.29	16.22	17.39	25.42
159	-11.51	-22.29	9.18	3.36	25.42
160	-11.51	-22.29	9.18	3.36	25.42
161	-4.14	-21.63	-2.59	-22.81	9.80
162	-7.04	-21.63	-2.59	-22.81	14.89
163	-5.59	-21.63	0.34	-16.96	12.34
164	-5.59	-21.63	-5.52	-28.65	12.34
165	12.57	-22.29	-12.70	-45.71	-27.73
166	12.57	-22.29	-12.70	-45.71	-27.73
167	10.46	-22.29	-12.70	-45.71	-23.11
168	10.46	-22.29	-12.70	-45.71	-23.11
169	11.51	-22.29	-11.64	-43.40	-25.42
170	11.51	-22.29	-11.64	-43.40	-25.42
171	11.51	-22.29	-13.76	-48.02	-25.42
172	11.51	-22.29	-13.76	-48.02	-25.42
173	-10.46	-22.29	12.70	10.38	23.11
174	-10.46	-22.29	12.70	10.38	23.11
175	-12.57	-22.29	12.70	10.38	27.73
176	-12.57	-22.29	12.70	10.38	27.73
177	-11.51	-22.29	13.76	12.69	25.42
178	-11.51	-22.29	13.76	12.69	25.42
179	-11.51	-22.29	11.64	8.07	25.42
180	-11.51	-22.29	11.64	8.07	25.42

Applied Loads from Column - Strength Level					
Load Case	F _x (kN)	F _y (kN) Downwards is negative Upwards is positive	F _z (kN)	M _x (kNm)	M _z (kNm)
201	0.00	-31.03	0.00	-24.58	0.00
202	0.00	-31.03	0.00	-24.58	0.00
203	4.34	-31.03	0.00	-24.58	-7.63
204	4.34	-31.03	0.00	-24.58	-7.63
205	-4.34	-31.03	0.00	-24.58	7.63
206	-4.34	-31.03	0.00	-24.58	7.63
207	0.00	-31.03	8.79	-7.04	0.00
208	0.00	-31.03	8.79	-7.04	0.00
209	0.00	-31.03	-8.79	-42.11	0.00
210	0.00	-31.03	-8.79	-42.11	0.00
211	2.60	-31.03	0.00	-24.58	-4.58
212	2.60	-31.03	0.00	-24.58	-4.58
213	-2.60	-31.03	0.00	-24.58	4.58
214	-2.60	-31.03	0.00	-24.58	4.58
215	0.00	-31.03	5.28	-14.05	0.00
216	0.00	-31.03	5.28	-14.05	0.00
217	0.00	-31.03	-5.28	-35.10	0.00
218	0.00	-31.03	-5.28	-35.10	0.00
219	4.34	-31.03	0.00	-24.58	-7.63
220	4.34	-31.03	0.00	-24.58	-7.63
221	-4.34	-31.03	0.00	-24.58	7.63
222	-4.34	-31.03	0.00	-24.58	7.63
223	0.00	-31.03	8.79	-7.04	0.00
224	0.00	-31.03	8.79	-7.04	0.00
225	0.00	-31.03	-8.79	-42.11	0.00
226	0.00	-31.03	-8.79	-42.11	0.00

Applied Loads from Column - Strength Level					
Load Case	F _x (kN)	F _y (kN) Downwards is negative Upwards is positive	F _z (kN)	M _x (kNm)	M _z (kNm)
227	2.60	-31.03	0.00	-24.58	-4.58
228	2.60	-31.03	0.00	-24.58	-4.58
229	-2.60	-31.03	0.00	-24.58	4.58
230	-2.60	-31.03	0.00	-24.58	4.58
231	0.00	-31.03	5.28	-14.05	0.00
232	0.00	-31.03	5.28	-14.05	0.00
233	0.00	-31.03	-5.28	-35.10	0.00
234	0.00	-31.03	-5.28	-35.10	0.00
235	16.12	-31.20	-17.78	-63.99	-35.59
236	16.12	-31.20	-17.78	-63.99	-35.59
237	-16.12	-31.20	17.78	14.53	35.59
238	-16.12	-31.20	17.78	14.53	35.59
239	20.46	-31.20	-17.78	-63.99	-43.23
240	20.46	-31.20	-17.78	-63.99	-43.23
241	11.78	-31.20	-17.78	-63.99	-27.96
242	11.78	-31.20	-17.78	-63.99	-27.96
243	16.12	-31.20	-8.99	-46.45	-35.59
244	16.12	-31.20	-8.99	-46.45	-35.59
245	16.12	-31.20	-26.57	-81.53	-35.59
246	16.12	-31.20	-26.57	-81.53	-35.59
247	-11.78	-31.20	17.78	14.53	27.96
248	-11.78	-31.20	17.78	14.53	27.96
249	-20.46	-31.20	17.78	14.53	43.23
250	-20.46	-31.20	17.78	14.53	43.23
251	-16.12	-31.20	26.57	32.07	35.59
252	-16.12	-31.20	26.57	32.07	35.59
253	-16.12	-31.20	8.99	-3.01	35.59
254	-16.12	-31.20	8.99	-3.01	35.59
255	18.72	-31.20	-17.78	-63.99	-40.17
256	18.72	-31.20	-17.78	-63.99	-40.17
257	13.52	-31.20	-17.78	-63.99	-31.01
258	13.52	-31.20	-17.78	-63.99	-31.01
259	16.12	-31.20	-12.51	-53.47	-35.59
260	16.12	-31.20	-12.51	-53.47	-35.59
261	16.12	-31.20	-23.06	-74.51	-35.59
262	16.12	-31.20	-23.06	-74.51	-35.59
263	-13.52	-31.20	17.78	14.53	31.01
264	-13.52	-31.20	17.78	14.53	31.01
265	-18.72	-31.20	17.78	14.53	40.17
266	-18.72	-31.20	17.78	14.53	40.17
267	-16.12	-31.20	23.06	25.05	35.59
268	-16.12	-31.20	23.06	25.05	35.59
269	-16.12	-31.20	12.51	4.01	35.59
270	-16.12	-31.20	12.51	4.01	35.59
271	20.46	-31.20	-17.78	-63.99	-43.23
272	20.46	-31.20	-17.78	-63.99	-43.23
273	11.78	-31.20	-17.78	-63.99	-27.96
274	11.78	-31.20	-17.78	-63.99	-27.96
275	16.12	-31.20	-8.99	-46.45	-35.59
276	16.12	-31.20	-8.99	-46.45	-35.59
277	16.12	-31.20	-26.57	-81.53	-35.59
278	16.12	-31.20	-26.57	-81.53	-35.59
279	-11.78	-31.20	17.78	14.53	27.96
280	-11.78	-31.20	17.78	14.53	27.96
281	-20.46	-31.20	17.78	14.53	43.23
282	-20.46	-31.20	17.78	14.53	43.23
283	-16.12	-31.20	26.57	32.07	35.59
284	-16.12	-31.20	26.57	32.07	35.59
285	-16.12	-31.20	8.99	-3.01	35.59
286	-16.12	-31.20	8.99	-3.01	35.59
287	18.72	-31.20	-17.78	-63.99	-40.17
288	18.72	-31.20	-17.78	-63.99	-40.17
289	13.52	-31.20	-17.78	-63.99	-31.01
290	13.52	-31.20	-17.78	-63.99	-31.01
291	16.12	-31.20	-12.51	-53.47	-35.59
292	16.12	-31.20	-12.51	-53.47	-35.59
293	16.12	-31.20	-23.06	-74.51	-35.59
294	16.12	-31.20	-23.06	-74.51	-35.59
295	-13.52	-31.20	17.78	14.53	31.01
296	-13.52	-31.20	17.78	14.53	31.01
297	-18.72	-31.20	17.78	14.53	40.17
298	-18.72	-31.20	17.78	14.53	40.17
299	-16.12	-31.20	23.06	25.05	35.59
300	-16.12	-31.20	23.06	25.05	35.59
301	-16.12	-31.20	12.51	4.01	35.59
302	-16.12	-31.20	12.51	4.01	35.59
303	-7.82	-30.28	-3.63	-31.93	17.28
304	-5.51	-30.28	-3.63	-31.93	13.20
305	-10.14	-30.28	-3.63	-31.93	21.35
306	-7.82	-30.28	1.06	-22.58	17.28
307	-7.82	-30.28	-8.32	-41.28	17.28
308	12.57	-22.29	-12.70	-45.71	-27.73
309	12.57	-22.29	-12.70	-45.71	-27.73
310	10.46	-22.29	-12.70	-45.71	-23.11
311	10.46	-22.29	-12.70	-45.71	-23.11
312	11.51	-22.29	-11.64	-43.40	-25.42
313	11.51	-22.29	-11.64	-43.40	-25.42
314	11.51	-22.29	-13.76	-48.02	-25.42
315	11.51	-22.29	-13.76	-48.02	-25.42
316	-10.46	-22.29	12.70	10.38	23.11
317	-10.46	-22.29	12.70	10.38	23.11
318	-12.57	-22.29	12.70	10.38	27.73
319	-12.57	-22.29	12.70	10.38	27.73
320	-11.51	-22.29	13.76	12.69	25.42
321	-11.51	-22.29	13.76	12.69	25.42
322	-11.51	-22.29	11.64	8.07	25.42
323	-11.51	-22.29	11.64	8.07	25.42

[Design Calculations](#)

[Footing Size](#)

Initial Length (L_o) =

1.80 m

Initial Width (W_o) =

4.50 m

Weight of the footing + pedestal (if any) =

90.49 kN

Weight of the soil above the footing (dry) =

54.27 kN

Uplift force due to buoyancy =

0.00 kN

Effect due to adhesion =

0.00 kN

Area from initial length and width, A_o

=

$L_o \times W_o$

=

8.10 m²

Min. area required from bearing pressure, A_{min}

=

$\frac{P}{q_{max}}$

=

1.02 m²

Note: A_{min} is an initial estimation.
P = Vertical load from column + selfweight of footing + weight of soil.
q_{max} = Respective Factored Bearing Capacity.

Final Footing Size

Length (L₂) =

1.80 m

Governing Load Case :

272

Width (W₂) =

4.50 m

Governing Load Case :

272

Depth (D₂) =

0.40 m

Depth is governed by Ultimate Load Case

(Service check is performed with footing thickness requirements from concrete check)

Area (A₂) =

8.10 m²

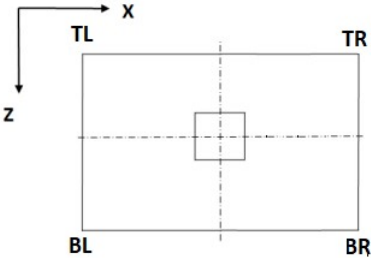
Final Pedestal Height =

0.67 m

Final Soil Height =

0.40 m

Net Pressures at 4 Corners



Load Case	Pressure at top left corner (kN/m2)	Pressure at top right corner (kN/m2)	Pressure at bottom right corner (kN/m2)	Pressure at bottom left corner (kN/m2)	Area of footing in uplift (A _u) (m ²)	Net Bearing Capacity (kN/m2)
139	31.0072	-6.8537	-18.5600	19.3010	0.17	150.0000
129	6.8738	44.7348	5.5734	-32.2875	1.28	150.0000
133	7.2868	38.3983	5.1605	-25.9510	0.66	150.0000
139	31.0072	-6.8537	-18.5600	19.3010	0.17	150.0000

If A_u is zero, there is no uplift and no pressure adjustment is necessary. Otherwise, to account for uplift, areas of negative pressure will be set to zero and the pressure will be redistributed to remaining corners.

Summary of adjusted Net Pressures at Four Corners

Load Case	Pressure at top left corner (kN/m2)	Pressure at top right corner (kN/m2)	Pressure at bottom right corner (kN/m2)	Pressure at bottom left corner (kN/m2)	Net Bearing Capacity (kN/m2)
139	31.1375	-6.8957	-14.4000	19.2821	150.0000
129	5.5954	49.0814	4.2264	-14.4000	150.0000
133	6.9285	39.8097	4.7735	-14.4000	150.0000
139	31.1375	-6.8957	-14.4000	19.2821	150.0000

Note - If the pressure is negative at some of the corners, it is because the footing is under partial uplift for that load case. The gross pressure however, obtained after the weight of soil above that level is accounted for, will be zero or positive.

Details of Out-of-Contact Area
(If Any)

Governing load case =

129

Plan area of footing =

8.10 sq.m

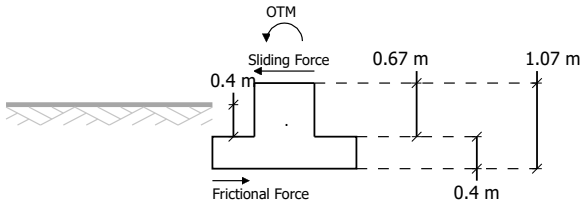
Area not in contact with soil =

1.28 sq.m

% of total area not in contact =

15.84 %

Stability Check



-	Factor of safety against sliding				Factor of safety against overturning		
Load Case No.	Along X-Direction	Along Z-Direction	Resultant	Required FOS	About X-Direction	About Z-Direction	Required FOS
101	N/A	N/A	N/A	1.40	4.98	N/A	1.50
102	N/A	N/A	N/A	1.40	4.98	N/A	1.50
103	N/A	N/A	N/A	1.40	4.98	N/A	1.50
104	N/A	N/A	N/A	1.40	4.98	N/A	1.50
105	23.07	N/A	23.07	1.40	4.98	18.32	1.50
106	23.07	N/A	23.07	1.40	4.98	18.32	1.50
107	23.07	N/A	23.07	1.40	4.98	18.32	1.50
108	23.07	N/A	23.07	1.40	4.98	18.32	1.50
109	N/A	11.39	11.39	1.40	6.50	N/A	1.50
110	N/A	11.39	11.39	1.40	6.50	N/A	1.50
111	N/A	11.39	11.39	1.40	4.04	N/A	1.50
112	N/A	11.39	11.39	1.40	4.04	N/A	1.50
113	38.46	N/A	38.46	1.40	4.98	30.53	1.50
114	38.46	N/A	38.46	1.40	4.98	30.53	1.50
115	38.46	N/A	38.46	1.40	4.98	30.53	1.50
116	38.46	N/A	38.46	1.40	4.98	30.53	1.50
117	N/A	18.98	18.98	1.40	5.80	N/A	1.50
118	N/A	18.98	18.98	1.40	5.80	N/A	1.50
119	N/A	18.98	18.98	1.40	4.37	N/A	1.50
120	N/A	18.98	18.98	1.40	4.37	N/A	1.50
121	5.80	5.26	3.90	1.40	3.22	3.98	1.50
122	5.80	5.26	3.90	1.40	3.22	3.98	1.50
123	5.80	5.26	3.90	1.40	10.78	3.98	1.50
124	5.80	5.26	3.90	1.40	10.78	3.98	1.50
125	5.80	5.26	3.90	1.40	3.22	3.98	1.50
126	5.80	5.26	3.90	1.40	3.22	3.98	1.50
127	5.80	5.26	3.90	1.40	10.78	3.98	1.50
128	5.80	5.26	3.90	1.40	10.78	3.98	1.50
129	4.64	5.26	3.48	1.40	3.22	3.27	1.50
130	4.64	5.26	3.48	1.40	3.22	3.27	1.50
131	7.75	5.26	4.35	1.40	3.22	5.08	1.50
132	7.75	5.26	4.35	1.40	3.22	5.08	1.50
133	5.80	9.77	4.99	1.40	3.80	3.98	1.50
134	5.80	9.77	4.99	1.40	3.80	3.98	1.50
135	5.80	3.60	3.06	1.40	2.80	3.98	1.50
136	5.80	3.60	3.06	1.40	2.80	3.98	1.50
137	7.75	5.26	4.35	1.40	10.78	5.08	1.50
138	7.75	5.26	4.35	1.40	10.78	5.08	1.50
139	4.64	5.26	3.48	1.40	10.78	3.27	1.50
140	4.64	5.26	3.48	1.40	10.78	3.27	1.50
141	5.80	3.60	3.06	1.40	21.83	3.98	1.50
142	5.80	3.60	3.06	1.40	21.83	3.98	1.50
143	5.80	9.77	4.99	1.40	7.16	3.98	1.50
144	5.80	9.77	4.99	1.40	7.16	3.98	1.50
145	5.04	5.26	3.64	1.40	3.22	3.52	1.50
146	5.04	5.26	3.64	1.40	3.22	3.52	1.50
147	6.83	5.26	4.17	1.40	3.22	4.57	1.50
148	6.83	5.26	4.17	1.40	3.22	4.57	1.50
149	5.80	7.28	4.54	1.40	3.55	3.98	1.50
150	5.80	7.28	4.54	1.40	3.55	3.98	1.50
151	5.80	4.12	3.36	1.40	2.96	3.98	1.50
152	5.80	4.12	3.36	1.40	2.96	3.98	1.50
153	6.83	5.26	4.17	1.40	10.78	4.57	1.50
154	6.83	5.26	4.17	1.40	10.78	4.57	1.50
155	5.04	5.26	3.64	1.40	10.78	3.52	1.50
156	5.04	5.26	3.64	1.40	10.78	3.52	1.50

-	Factor of safety against sliding				Factor of safety against overturning		
Load Case No.	Along X-Direction	Along Z-Direction	Resultant	Required FOS	About X-Direction	About Z-Direction	Required FOS
157	5.80	4.12	3.36	1.40	15.49	3.98	1.50
158	5.80	4.12	3.36	1.40	15.49	3.98	1.50
159	5.80	7.28	4.54	1.40	8.27	3.98	1.50
160	5.80	7.28	4.54	1.40	8.27	3.98	1.50
161	16.07	25.69	13.62	1.40	4.55	10.51	1.50
162	9.46	25.69	8.88	1.40	4.55	6.67	1.50
163	11.91	195.83	11.89	1.40	5.10	8.16	1.50
164	11.91	12.05	8.47	1.40	4.11	8.16	1.50
165	5.32	5.26	3.74	1.40	3.22	3.65	1.50
166	5.32	5.26	3.74	1.40	3.22	3.65	1.50
167	6.39	5.26	4.06	1.40	3.22	4.38	1.50
168	6.39	5.26	4.06	1.40	3.22	4.38	1.50
169	5.80	5.74	4.08	1.40	3.32	3.98	1.50
170	5.80	5.74	4.08	1.40	3.32	3.98	1.50
171	5.80	4.86	3.72	1.40	3.13	3.98	1.50
172	5.80	4.86	3.72	1.40	3.13	3.98	1.50
173	6.39	5.26	4.06	1.40	10.78	4.38	1.50
174	6.39	5.26	4.06	1.40	10.78	4.38	1.50
175	5.32	5.26	3.74	1.40	10.78	3.65	1.50
176	5.32	5.26	3.74	1.40	10.78	3.65	1.50
177	5.80	4.86	3.72	1.40	11.94	3.98	1.50
178	5.80	4.86	3.72	1.40	11.94	3.98	1.50
179	5.80	5.74	4.08	1.40	9.83	3.98	1.50
180	5.80	5.74	4.08	1.40	9.83	3.98	1.50

Critical Load Case And The Governing Factor Of Safety For Overturning and Sliding X Direction

Critical Load Case for Sliding along X-Direction : 129

Governing Disturbing Force : 14.41 kN
Governing Restoring Force : 66.82 kN

Minimum Sliding Ratio for the Critical Load Case : 4.64

Critical Load Case for Overturning About X-Direction : 135

Governing Overturning Moment : -136.94 kNm
Governing Resisting Moment : 383.45 kNm

Minimum Overturning Ratio for the Critical Load Case : 2.80

Critical Load Case And The Governing Factor Of Safety For Overturning and Sliding Z Direction

Critical Load Case for Sliding along Z-Direction : 135

Governing Disturbing Force : -18.56 kN
Governing Restoring Force : 66.82 kN

Minimum Sliding Ratio for the Critical Load Case : 3.60

Critical Load Case for Overturning About Z-Direction : 129

Governing Overturning Moment : -46.00 kNm
Governing Resisting Moment : 150.34 kNm

Minimum Overturning Ratio for the Critical Load Case : 3.27

Critical Load Case And The Governing Factor Of Safety For Sliding Along Resultant Direction

Critical Load Case for Sliding along Resultant Direction : 135

Governing Disturbing Force : 21.84 kN
Governing Restoring Force : 66.82 kN

Minimum Sliding Ratio for the Critical Load Case : 3.06

Ultimate Gross Pressures

The base pressures reported in this table and the area of footing in contact include the effect of buoyancy (if any).

Load Case / Load Combination ID	Pressure at top left corner (kN/m2)	Pressure at top right corner (kN/m2)	Pressure at bottom right corner (kN/ m2)	Pressure at bottom left corner (kN/ m2)	Gross Factored Bearing Capacity For Ultimate Load Case (kN/m2)	Area of footing in Contact with soil (A _u) (m ²)
201	46.5751	46.5751	11.1275	11.1275	230.1600	8.10
202	45.5350	45.5350	10.3804	10.3804	221.9400	8.10
203	41.5130	51.6372	16.1896	6.0654	230.1600	8.10
204	40.4729	50.5971	15.4425	5.3183	221.9400	8.10
205	50.5971	40.4729	5.3183	15.4425	221.9400	8.10
206	50.5971	40.4729	5.3183	15.4425	221.9400	8.10
207	41.0924	41.0924	14.8230	14.8230	221.9400	8.10
208	41.0924	41.0924	14.8230	14.8230	221.9400	8.10
209	49.9777	49.9777	5.9377	5.9377	221.9400	8.10
210	49.9777	49.9777	5.9377	5.9377	221.9400	8.10
211	43.5378	49.6124	14.1647	8.0902	230.1600	8.10
212	43.5378	49.6124	14.1647	8.0902	230.1600	8.10

213	49.6124	43.5378	8.0902	14.1647	230.1600	8.10
214	49.6124	43.5378	8.0902	14.1647	230.1600	8.10
215	43.9095	43.9095	13.7931	13.7931	230.1600	8.10
216	43.9095	43.9095	13.7931	13.7931	230.1600	8.10
217	49.2407	49.2407	8.4619	8.4619	230.1600	8.10
218	49.2407	49.2407	8.4619	8.4619	230.1600	8.10
219	41.5130	51.6372	16.1896	6.0654	230.1600	8.10
220	41.5130	51.6372	16.1896	6.0654	230.1600	8.10
221	51.6372	41.5130	6.0654	16.1896	230.1600	8.10
222	51.6372	41.5130	6.0654	16.1896	230.1600	8.10
223	42.1324	42.1324	15.5701	15.5701	230.1600	8.10
224	42.1324	42.1324	15.5701	15.5701	230.1600	8.10
225	51.0178	51.0178	6.6848	6.6848	230.1600	8.10
226	51.0178	51.0178	6.6848	6.6848	230.1600	8.10
227	43.5378	49.6124	14.1647	8.0902	230.1600	8.10
228	43.5378	49.6124	14.1647	8.0902	230.1600	8.10
229	49.6124	43.5378	8.0902	14.1647	230.1600	8.10
230	49.6124	43.5378	8.0902	14.1647	230.1600	8.10
231	43.9095	43.9095	13.7931	13.7931	230.1600	8.10
232	43.9095	43.9095	13.7931	13.7931	230.1600	8.10
233	49.2407	49.2407	8.4619	8.4619	230.1600	8.10
234	49.2407	49.2407	8.4619	8.4619	230.1600	8.10
235	33.6503	81.6646	22.0594	0.0000	230.1600	7.15
236	33.6503	81.6646	22.0594	0.0000	230.1600	7.15
237	58.8470	15.2891	0.0000	42.4564	230.1600	8.09
238	58.8470	15.2891	0.0000	42.4564	230.1600	8.09
239	27.5659	89.4240	26.3573	0.0000	230.1600	6.79
240	27.5659	89.4240	26.3573	0.0000	230.1600	6.79
241	39.2291	74.8054	17.5599	0.0000	230.1600	7.45
242	39.2291	74.8054	17.5599	0.0000	230.1600	7.45
243	29.5856	75.5047	27.1708	0.0000	230.1600	7.46
244	29.5856	75.5047	27.1708	0.0000	230.1600	7.46
245	37.6331	88.6461	16.3483	0.0000	230.1600	6.78
246	37.6331	88.6461	16.3483	0.0000	230.1600	6.78
247	53.7834	20.3515	3.9627	37.3946	230.1600	8.10
248	53.7834	20.3515	3.9627	37.3946	230.1600	8.10
249	64.1212	10.1565	0.0000	47.4888	230.1600	7.91
250	64.1212	10.1565	0.0000	47.4888	230.1600	7.91
251	54.4028	10.8467	3.3433	46.8994	230.1600	8.10
252	54.4028	10.8467	3.3433	46.8994	230.1600	8.10
253	63.4138	19.7000	0.0000	37.9899	230.1600	7.98
254	63.4138	19.7000	0.0000	37.9899	230.1600	7.98
255	30.0797	86.1973	24.6621	0.0000	230.1600	6.94
256	30.0797	86.1973	24.6621	0.0000	230.1600	6.94
257	37.0415	77.4549	19.3837	0.0000	230.1600	7.34
258	37.0415	77.4549	19.3837	0.0000	230.1600	7.34
259	31.2239	77.8824	25.1789	0.0000	230.1600	7.34
260	31.2239	77.8824	25.1789	0.0000	230.1600	7.34
261	36.0463	85.7416	18.7272	0.0000	230.1600	6.93
262	36.0463	85.7416	18.7272	0.0000	230.1600	6.93
263	55.8082	18.3266	1.9379	39.4195	230.1600	8.10
264	55.8082	18.3266	1.9379	39.4195	230.1600	8.10
265	61.9522	12.2327	0.0000	45.4825	230.1600	8.01
266	61.9522	12.2327	0.0000	45.4825	230.1600	8.01
267	56.1799	12.6238	1.5662	45.1223	230.1600	8.10
268	56.1799	12.6238	1.5662	45.1223	230.1600	8.10
269	61.5565	17.9438	0.0000	39.7826	230.1600	8.04
270	61.5565	17.9438	0.0000	39.7826	230.1600	8.04
271	27.5659	89.4240	26.3573	0.0000	230.1600	6.79
272	27.5659	89.4240	26.3573	0.0000	230.1600	6.79
273	39.2291	74.8054	17.5599	0.0000	230.1600	7.45
274	39.2291	74.8054	17.5599	0.0000	230.1600	7.45
275	29.5856	75.5047	27.1708	0.0000	230.1600	7.46
276	29.5856	75.5047	27.1708	0.0000	230.1600	7.46
277	37.6331	88.6461	16.3483	0.0000	230.1600	6.78
278	37.6331	88.6461	16.3483	0.0000	230.1600	6.78
279	53.7834	20.3515	3.9627	37.3946	230.1600	8.10
280	53.7834	20.3515	3.9627	37.3946	230.1600	8.10
281	64.1212	10.1565	0.0000	47.4888	230.1600	7.91

282	64.1212	10.1565	0.0000	47.4888	230.1600	7.91
283	54.4028	10.8467	3.3433	46.8994	230.1600	8.10
284	54.4028	10.8467	3.3433	46.8994	230.1600	8.10
285	63.4138	19.7000	0.0000	37.9899	230.1600	7.98
286	63.4138	19.7000	0.0000	37.9899	230.1600	7.98
287	30.0797	86.1973	24.6621	0.0000	230.1600	6.94
288	30.0797	86.1973	24.6621	0.0000	230.1600	6.94
289	37.0415	77.4549	19.3837	0.0000	230.1600	7.34
290	37.0415	77.4549	19.3837	0.0000	230.1600	7.34
291	31.2239	77.8824	25.1789	0.0000	230.1600	7.34
292	31.2239	77.8824	25.1789	0.0000	230.1600	7.34
293	36.0463	85.7416	18.7272	0.0000	230.1600	6.93
294	36.0463	85.7416	18.7272	0.0000	230.1600	6.93
295	55.8082	18.3266	1.9379	39.4195	230.1600	8.10
296	55.8082	18.3266	1.9379	39.4195	230.1600	8.10
297	61.9522	12.2327	0.0000	45.4825	230.1600	8.01
298	61.9522	12.2327	0.0000	45.4825	230.1600	8.01
299	56.1799	12.6238	1.5662	45.1223	230.1600	8.10
300	56.1799	12.6238	1.5662	45.1223	230.1600	8.10
301	61.5565	17.9438	0.0000	39.7826	230.1600	8.04
302	61.5565	17.9438	0.0000	39.7826	230.1600	8.04
303	58.6775	37.5331	0.0000	19.9842	230.1600	8.09
304	55.9762	40.2332	1.5418	17.2848	230.1600	8.10
305	61.4209	34.8245	0.0000	22.6739	230.1600	8.04
306	56.3065	35.1640	1.2115	22.3540	230.1600	8.10
307	61.0838	39.8956	0.0000	17.6058	230.1600	8.04
308	22.3871	60.4187	16.9771	0.0000	164.4000	7.01
309	22.3871	60.4187	16.9771	0.0000	164.4000	7.01
310	25.6303	56.3434	14.5140	0.0000	164.4000	7.27
311	25.6303	56.3434	14.5140	0.0000	164.4000	7.27
312	23.5224	57.5068	16.4339	0.0000	164.4000	7.21
313	23.5224	57.5068	16.4339	0.0000	164.4000	7.21
314	24.5474	59.1755	15.0662	0.0000	164.4000	7.09
315	24.5474	59.1755	15.0662	0.0000	164.4000	7.09
316	40.6152	12.3383	0.6321	28.9089	164.4000	8.10
317	40.6152	12.3383	0.6321	28.9089	164.4000	8.10
318	43.4713	9.4981	0.0000	31.7398	164.4000	8.05
319	43.4713	9.4981	0.0000	31.7398	164.4000	8.05
320	41.4612	10.3519	0.0000	30.8954	164.4000	8.10
321	41.4612	10.3519	0.0000	30.8954	164.4000	8.10
322	42.6044	11.4868	0.0000	29.7584	164.4000	8.08
323	42.6044	11.4868	0.0000	29.7584	164.4000	8.08

Minimum Required Contact Area for Ultimate Loads : 0.00 m²

Actual Area in Contact for all ultimate load cases exceeds the minimum required. Hence Safe

Maximum Corner Pressure from all ultimate load cases is less than the allowable. Hence Safe

Moment Calculation

Check Trial Depth against moment (About X Axis)

Critical Load Case = #251

Effective Depth =

$D - (cc + 1.5 \times d_b)$

=

0.31 m

Governing moment (Mu) =

48.42 kNm

As Per EN-1992-1-1:2004 Clause No.3.1.7(3)

λ

=

0.80

η

=

1.00

Depth of Neutral Axis(X) =

0.11 m

Limiting Moment Of Resistance

$(M_{umax}) = (\lambda \cdot X \cdot \eta \cdot f_{cd} \cdot b) \times (d - \lambda \cdot \frac{X}{2})$

=

787.86 kNm

$M_u \leq M_{umax}$ hence, safe

Check Trial Depth against moment (About Z Axis)

Critical Load Case = #239

Effective Depth =

$D - (cc + 1.5 \times d_b)$

=

0.31 m

Governing moment (Mu) =

17.67 kNm

As Per EN-1992-1-1:2004 Clause No.3.1.7(3)

λ

=

0.80

η

=

1.00

Depth of Neutral Axis(X) =

0.11 m

Limiting Moment Of Resistance

$(M_{umax}) = (\lambda \cdot X \cdot \eta \cdot f_{cd} \cdot b) \times (d - \lambda \cdot \frac{X}{2})$

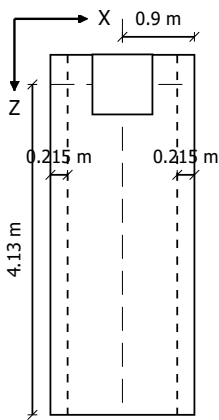
=

1969.66 kNm

$M_u \leq M_{umax}$ hence, safe

One-Way Shear in YZ Plane

(Shear Plane Parallel to Global Z Axis)

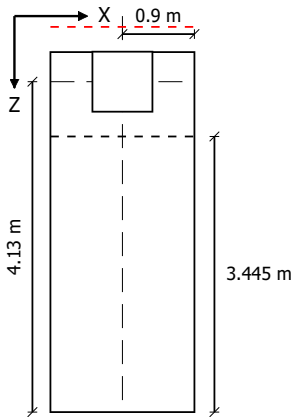


Plan

Critical Load Case	=	# 272
Distance of Critical section from top left corner along X axis, D_x	=	0.22 m
Effective Depth(d)	=	0.31 m
Shear Force(S)	=	30.18 kN
Percentage Of Steel(P_t)	=	0.20
As Per EN-1992-1-1:2004 Clause No.6.2.2(1)		
CRdc(National Annex- Input)	=	0.120
Vmin(As per 6.3 N, BS EN 1992-1-1:2004)	=	0.45
K(As per Eq. 6.2.b)	=	1.81
VRd,c(As per Eq. 6.2.a)	=	532.91 kN
VRd,c(As per Eq. 6.2.b)	=	621.56 kN
Resisting Shear($V_{rd,c}$)	=	621.56 kN
$S \leq V_{rdc}$ hence, safe		

One-Way Shear in XY Plane

(Shear Plane Parallel to Global X Axis)



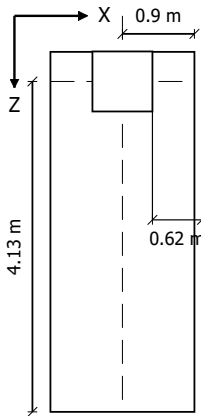
Plan

Critical Load Case	=	# 284
Distance of Critical section from top left corner along Z axis, D_z	=	0.00 m
Effective Depth(d)	=	0.31 m
Shear Force(S)	=	28.58 kN
Percentage Of Steel(P_t)	=	0.19
As Per EN-1992-1-1:2004 Clause No.6.2.2(1)		
CRdc(National Annex- Input)	=	0.120
Vmin(As per 6.3 N, BS EN 1992-1-1:2004)	=	0.45
K(As per Eq. 6.2.b)	=	1.81
VRd,c(As per Eq. 6.2.a)	=	207.38 kN
VRd,c(As per Eq. 6.2.b)	=	248.62 kN
Resisting Shear($V_{rd,c}$)	=	248.6243 kN
$S \leq V_{rdc}$ hence, safe		

Punching Shear Check

Note: The punching shear boundary extends beyond the footing boundary.

For all load cases, punching shear check is done twice, once at Column/Pedestal face and then at 2xdeff distance from Column/Pedestal face.Capacity calculation at the two locations will be different as per code instructions.



Plan

Critical Load Case = #278
 Eccentricity Factor (β) = 3.47

Punching Shear Check at 2 x deff from Column Face

Punching Shear Perimeter(b_0) = 1.80 m
 Punching Shear Force(S) = -26.22 kN
 As Per EN-1992-1-1:2004 Clause No.6.4.4
 Punching Shear Capacity(V_{rdc}) = 251.85 kN
 $\beta. S \leq V_{rdc}$ Hence, safe

Punching Shear Check at Column Face

Punching Shear Perimeter(b_0) = 3.00 m
 Punching Shear Force = 32.31 kN
 Punching Shear Stress(T_v) = 34.41 kN/m2
 Punching Shear Capacity(T_c) = 4970.00 kN/m2
 As Per EN-1992-1-1:2004 Clause No 6.4.3 and Chapter 6, table 7 from “How to Design Concrete Structures using Eurocode 2” published by The Concrete Centre
 $\beta T_v < T_c$ Hence, safe.

Reinforcement Calculation

Calculation of Maximum Bar Size

Along X Axis

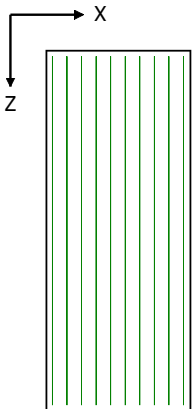
Bar diameter corresponding to max bar size (d_b) = 16mm
 As Per EN-1992-1-1:2004 Clause No.8.4.3,8.4.4 and Table 8.2
 Development Length(l_d) = 0.42m
 Available Development Length(l_{db}) = $\left[\frac{(B-b)}{2} - cc \right] = 0.45m$
 $l_{db} \geq l_d$ hence, safe

Along Z Axis

Bar diameter corresponding to max bar size (d_b) = 16mm
 As Per EN-1992-1-1:2004 Clause No.8.4.3,8.4.4 and Table 8.2
 Development Length(l_d) = 0.53m
 Available Development Length(l_{db}) = $\left[\frac{(H-h)}{2} - cc \right] = 1.80m$
 $l_{db} \geq l_d$ hence, safe

Flexure About X-Axis

Design For Bottom Reinforcement Parallel to Z Axis



10 - 12 mm

For moment About X Axis (M_x)
 As Per EN-1992-1-1: 2004 Clause No. 3.1.7(3),3.2.7,9.2.1.1 and Fig.3.5,3.8

Critical Load Case = #251

Minimum Area of Steel (A_{stmin}) = 799 mm2

Calculated Area of Steel (A_{st}) = 799 mm2

Note - "Area of Steel required" reported here is the larger value between the calculated area of steel and minimum steel required as per code stipulations

Provided Area of Steel ($A_{st,Provided}$) = 799 mm2

$A_{stProvided} \geq A_{stmin}$, . Hence, OK.

Selected bar Size (d_b) = Ø12

Minimum spacing allowed (S_{min}) = 1.00 mm

Selected spacing (S) = 200.00 mm

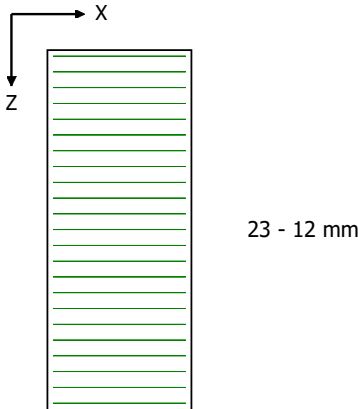
$S_{min} \leq S \leq S_{max}$ and selected bar size < selected maximum bar size. Hence, OK.

Based on spacing reinforcement increment; provided reinforcement is

Ø12 @ 200mm o.c.

Flexure About Z-Axis

Design For Bottom Reinforcement Parallel to X Axis



For moment About Z Axis (M_z)

As Per EN-1992-1-1: 2004 Clause No. 3.1.7(3),3.2.7,9.2.1.1 and Fig.3.5,3.8

Critical Load Case = #239

Minimum Area of Steel (A_{stmin}) = 1997 mm2

Calculated Area of Steel (A_{st}) = 1997 mm2

Note - "Area of Steel required" reported here is the larger value between the calculated area of steel and minimum steel required as per code stipulations

Provided Area of Steel ($A_{st,Provided}$) = 2600 mm2

$A_{stProvided} \geq A_{stmin}$, . Hence, OK.

Selected bar Size (d_b) = Ø12

Minimum spacing allowed (S_{min}) = 1.00 mm

Selected spacing (S) = 200.00 mm

$S_{min} \leq S \leq S_{max}$ and selected bar size < selected maximum bar size. Hence, OK.

Based on spacing reinforcement increment; provided reinforcement is

Ø12 @ 200mm o.c.

Pedestal Design

Pedestal at Support No.	Axial Capacity Ratio, Critical Load Case, Location	Flexural Capacity Ratio	% of Main Steel	Main Reinforcement	Links
134	0.01, 235, Bottom	0.40	0.28	20-T10	8 @ 200mm

Pedestal Size

Pedestal Shape = Rectangular

Dimension Along Global X = 750.00 mm

Dimension Along Global Z = 750.00 mm

Longitudinal Reinforcement Details

Area of Longitudinal Bars = 1570.80 sq.mm

Number of Bars and Bar Dia = 20-T10

Longitudinal Steel Percentage = 0.28

Bar arrangement sequence on each side along Global X = 6 # 10

Bar arrangement sequence on each side along Global Z = 6 # 10

Flexure - Governing Load Case Details

Governing Load Case Number = 245

Critical Location = Bottom

Axial load = 44.49 kN

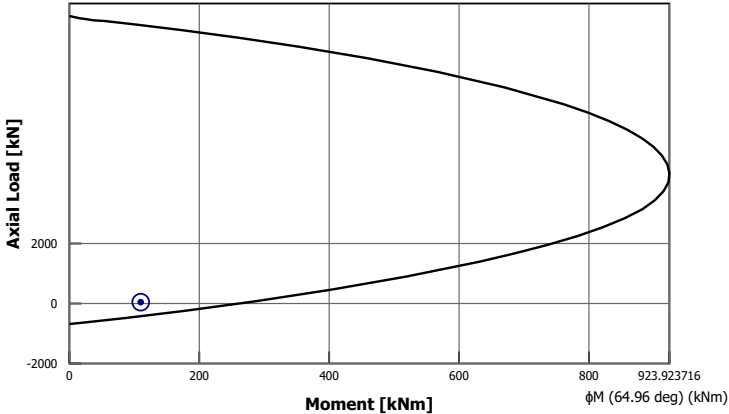
Moment about X axis = -99.47 kNm

Moment about Z axis = -46.47 kNm

Resultant moment = 109.79
Moment Capacity = 276.13
Angle of inclination of Neutral Axis
with respect to local Z = 64.96 degrees

kNm
kNm

Serial No.	P (kN)	M (kNm)
1	-682.96	0.00
2	-681.52	0.71
3	-641.55	19.15
4	-484.85	85.87
5	-239.00	179.48
6	77.74	287.62
7	457.84	402.14
8	896.27	518.32
9	1394.75	631.74
10	1667.57	685.04
11	1953.81	736.15
12	2248.81	782.58
13	2546.48	821.89
14	2845.18	855.34
15	3143.17	882.36
16	3444.21	901.55
17	3743.11	914.85
18	4042.47	922.48
19	4340.68	923.92
20	4637.10	920.69
21	4930.09	912.48
22	5219.53	899.52
23	5508.17	881.65
24	5793.71	858.99
25	6078.84	831.31
26	6362.27	798.64
27	6643.89	760.89
28	7201.38	670.40
29	7723.07	566.39
30	8177.51	458.44
31	8562.01	352.69
32	8861.03	259.91
33	9114.36	172.48
34	9300.38	101.77
35	9417.28	54.05
36	9438.32	37.41
37	9449.81	34.19
38	9458.94	31.54
39	9466.50	29.34
40	9472.88	27.48
41	9478.33	25.90
42	9482.92	24.51
43	9486.86	23.28
44	9493.12	21.19
45	9498.09	19.51
46	9502.14	18.14
47	9505.33	16.96
48	9507.98	15.95
49	9583.03	0.00



Shear - Governing Load Case Details

Critical Load Case for Shear Along X = 282
Critical Load Case for Shear Along Z = 284
Shear force along X = -20.46 kN
Shear force along Z = 26.57 kN

Transverse Stirrups Details

Rebar Links = 8 @ 200 mm
No. of Legs in X direction = 6
No. of Legs in Z direction = 6

Design for Shear

Along the Direction Parallel to the Longer Side

VRD,c = 190.04 kN
As Tension = 1570.80 sq.mm
CRdc = 0.12
deff = 0.70 m
k = 1.54
ρ1 = 0.00150
k1 = 0.15

σ_{cp}

=

0.08

Along the Direction Parallel to the Shorter Side

VRD,c

=

190.04

kN

As Tension

=

1570.80

sq.mm

CRdc

=

0.12

deff

=

0.70

m

k

=

1.54

ρ_1

=

0.00150

k1

=

0.15

σ_{cp}

=

0.08

Design for Axial Load + Biaxial Bending

λ_D

=

3.11

λ_B

=

3.11

eD(top)

=

-0.80

m

eD(bot)

=

-1.04

m

eB(top)

=

-1.83

m

eB(bot)

=

-2.24

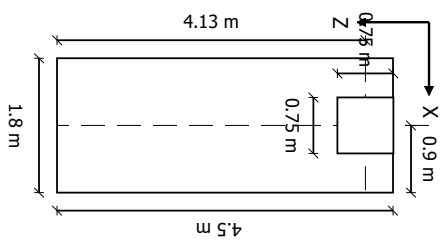
m

Biaxial Bending Ratio

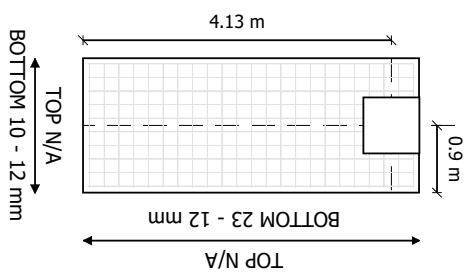
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0.40

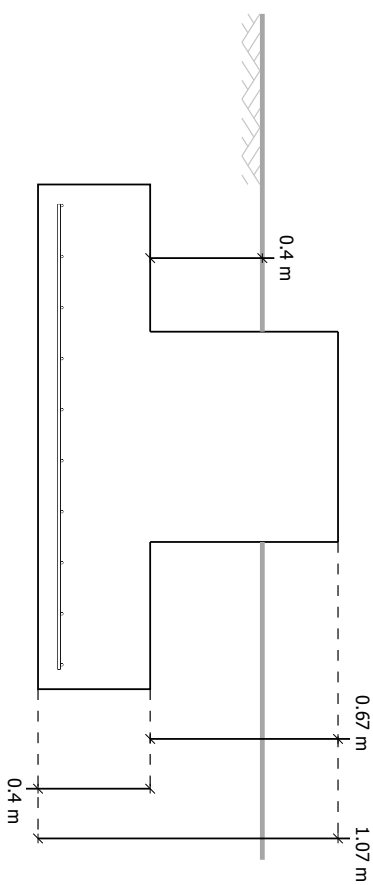




Plan



Plan

Elevation

Dimensions (m)				Reinforcement			
Foundation	L	B	D	AsX(T)	AsZ(T)	AsX(B)	AsZ(B)
	1.8 m	4.5 m	0.4 m	N/A	N/A	10 - 12 mm	23 - 12 mm
Pedestal	l	b	h	Main Reinforcement		Trans Reinforcement	
	0.75 m	0.75 m	0.67 m	10 mm - 20		8 mm @ 200 mm	