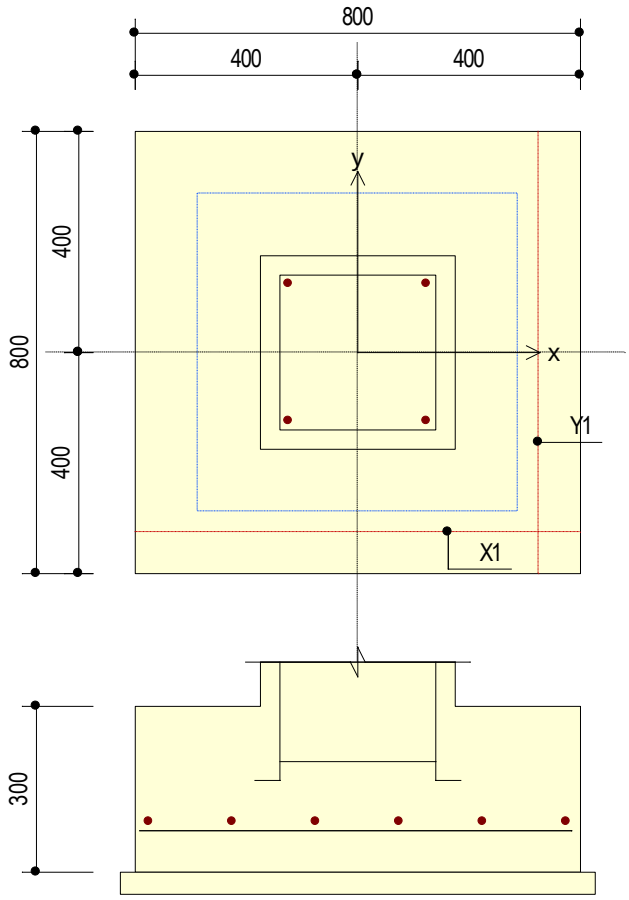
■ ZAPATA Z-6

1. General Information

(1) Design Code : ACI318M-14
(2) Unit System : N, mm

2. Material

(1) F'_c : 28.00MPa
(2) F_y : 400MPa



3. Section

(1) Section Size
- Depth : 300mm
- Cover : 75.00mm

(2) Column Section
- Shape of Column : Rectangle
- Section : 350x350mm

4. Rebar

(1) Direction Y

- Layer 1 : #4@150 (A_s = 860mm²)

(2) Direction X

- Layer 1 : #4@150 (A_s = 860mm²)

5. Foundation

(1) Foundation Size

- L_x : 0.800m
- L_y : 0.800m
- f_e : 120KPa

6. Design Load

(1) Service Load

- P_s : 17.74kN
- M_{sx} : 3.600kN·m
- M_{sy} : 1.500kN·m

(2) Factored Load

- P_u : 26.60kN
- M_{ux} : 5.500kN·m
- M_{uy} : 2.300kN·m

(3) Surcharge Load is not considered.

(4) Self weight is considered.

7. Check Soil Capacity

(1) Calculate actual soil stress (KPa)

- $q_{s.top\text{-}left}$ = 58.65 $q_{s.top\text{-}right}$ = 100
- $q_{s.bot\text{-}left}$ = 0.000 $q_{s.bot\text{-}right}$ = 6.895
- $q_{s.max}$ = 100
- $q_{s.max}$ / f_e = 0.834 → O.K

(2) Calculate factored soil stress (KPa)

- $q_{u.top\text{-}left}$ = 86.40 $q_{u.top\text{-}right}$ = 153
- $q_{u.bot\text{-}left}$ = 0.000 $q_{u.bot\text{-}right}$ = 5.391
- $q_{u.max}$ = 153 $q_{u.min}$ = 0.000

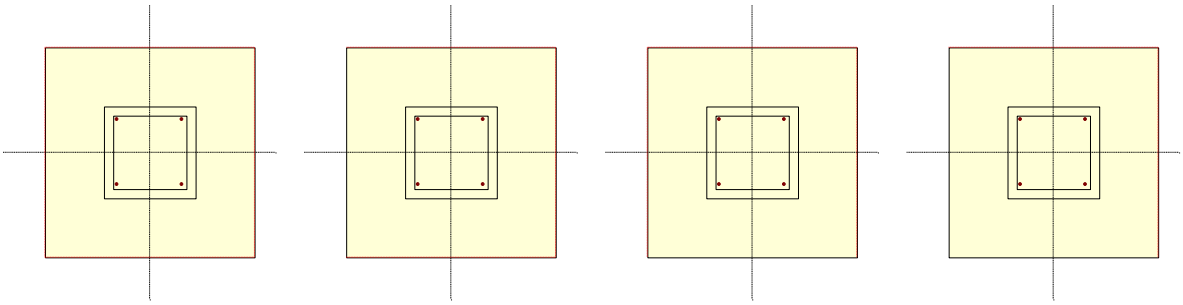
8. Check Shear

(1) Calculate one-way shear

- ø = 0.750
- V_{ux} = 0.000kN øV$_{cx}$ = 118kN
- V_{ux} / øV$_{cx}$ = 0.000 → O.K
- V_{uy} = 0.322kN øV$_{cy}$ = 111kN
- V_{uy} / øV$_{cy}$ = 0.00290 → O.K

(2) Calculate two-way shear

-	b_0 (mm)	V_{c1} (kN)	V_{c2} (kN)	V_{c3} (kN)	V_c (kN)	V_u (kN)	øV_c (kN)	Ratio
Interior	2,275	1,342	1,277	868	868	13.16	651	0.0202
Edge(X)	1,937	1,143	1,002	740	740	9.887	555	0.0178
Edge(Y)	1,937	1,143	1,002	740	740	9.887	555	0.0178
Corner	1,369	808	683	523	523	5.948	392	0.0152



- ø = 0.750
- d = 219mm
- $V_{c1} = 0.17\left(1 + \frac{2}{\beta}\right)\sqrt{f'_c}\ b_0\ d$
- $V_{c2} = 0.083\left(\frac{a_s\ d}{b_0} + 2\right)\sqrt{f'_c}\ b_0\ d$
- $V_{c3} = 0.33\sqrt{f'_c}\ b_0\ d$
- $V_c = \min(V_{c1}, V_{c2}, V_{c3})$
- $V_u = 13.16kN$
- $V_u / øV_c = 0.0202 \rightarrow$ O.K

9. Check Moment Capacity

(1) Calculate moment capacity (Direction X)

- ø = 0.900
- $M_{uy} = 1.696kN·m$ $øM_{ny} = 65.47kN·m$
- $M_{uy} / øM_{ny} = 0.0259 \rightarrow$ O.K

(2) Calculate moment capacity (Direction Y)

- ø = 0.900
- $M_{ux} = 2.473kN·m$ $øM_{nx} = 61.54kN·m$
- $M_{ux} / øM_{nx} = 0.0402 \rightarrow$ O.K

10. Check Rebar

(1) Calculate minimum rebar area required

- $A_{s.min} = 0.00180D = 540mm^2$

(2) Calculate minimum rebar space required (Direction Y)

- $A_s = 129mm^2$ (#4@150)
- $s_{req.} = 239mm$
- $s_x = 150mm < s_{req.} = 239mm \rightarrow$ O.K

(3) Calculate minimum rebar space required (Direction X)

- $A_s = 129mm^2$ (#4@150)
- $s_{req.} = 239mm$
- $s_y = 150mm < s_{req.} = 239mm \rightarrow$ O.K