■ MEMBER NAME : F01

1. General Information

(1) Design Code : ACI318-11

(2) Unit System : lbf, in

2. Material

(1) F'_c : 3,481psi

(2) F_y : 58,015psi

3. Design Load

(1) Service Load

- P_s : 450kip
- M_{sx} : 443kip·in
- M_{sy} : 443kip·in

(2) Factored Load

- P_u : 225kip
- M_{ux} : 443kip·in
- M_{uy} : 885kip·in

(3) Surcharge Load

- Surface Load : 0.0313kip/ft²
- Weight Density : 0.115kip/ft³
- Soil Height : 1.312ft

(4) Self weight is considered.

4. Section

(1) Section Size

- Depth : 27.56in
- Cover : 3.150in

(2) Column Section

- Shape of Column : Circle
- Section : ø21.65in
- Eccentricity (X) : 4.724in
- Eccentricity (Y) : 0.000in

5. Rebar

(1) Direction Y

- Layer 1 : #7@11.81 (A_s = 0.610in²)

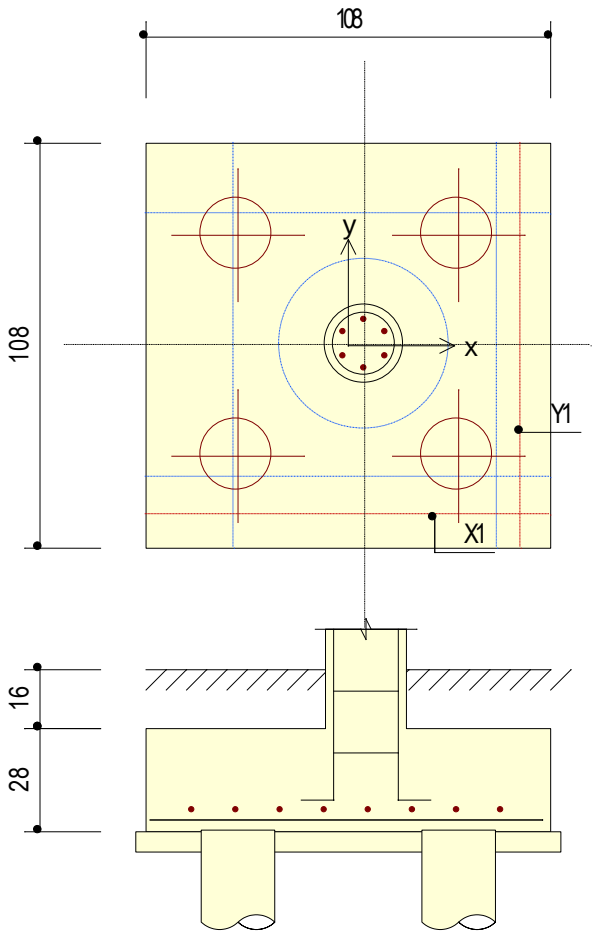
(2) Direction X

- Layer 1 : #7@11.81 (A_s = 0.610in²)

6. Foundation

(1) Foundation Size

- L_x : 9.022ft
- L_y : 9.022ft
- No. of pile : 4-ø19.69
- Space of pile : 59.06in
- $q_{a,comp.}$: 202kip/EA
- $q_{a,tens.}$: 0.000kip/EA



7. Check Pile Capacity

Index	X(in)	Y(in)	q_s(kip)	q_u(kip)	V_u(kip)	øV_c(kip)	V_u/øV_c
1	-29.53	29.53	105	55.71	55.71	354	0.157
2	29.53	29.53	148	92.28	92.28	354	0.260
3	-29.53	-29.53	97.40	48.22	48.22	354	0.136
4	29.53	-29.53	141	84.79	84.79	354	0.239

- V_u , V_c : Pile Punching

(1) Calculate actual pile stress (kip/EA)

- $q_{s,max}$ =148kip/EA
- $q_{s,max}$ / q_a =0.733 → O.K
- $q_{s,min}$ =0.000kip/EA
- $q_{s,min}$ / q_a =0.000 → O.K

(2) Calculate factored pile stress (kip/EA)

- $q_{u,max}$ =92.28kip/EA
- $q_{u,min}$ =48.22kip/EA

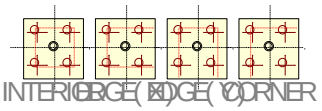
8. Check Shear

(1) Calculate one-way shear

- ø = 0.750
- V_{ux} =25.95kip øV$_{cx}$ =230kip
- V_{ux} / øV$_{cx}$ =0.113 → O.K
- V_{uy} =33.36kip øV$_{cy}$ =221kip
- V_{uy} / øV$_{cy}$ =0.151 → O.K

(2) Calculate two-way shear

-	b_0(in)	V_{c1}(kip)	V_{c2}(kip)	V_{c3}(kip)	V_c(kip)	V_u(kip)	øV_c(kip)	Ratio
Interior	143	1,216	1,762	811	811	234	608	0.385
Edge(X)	170	1,447	1,499	964	964	217	723	0.299
Edge(Y)	180	1,527	1,526	1,018	1,018	218	763	0.286
Corner	139	1,183	1,072	789	789	128	591	0.216



- ø = 0.750
- d = 0.000in
- $V_{c1} = \left(2 + \frac{4}{\beta}\right)\sqrt{f'_c}\, b_0\, d$
- $V_{c2} = \left(\frac{a_s\, d}{b_0 + 2}\right)\sqrt{f'_c}\, b_0\, d$
- $V_{c3} = 4.0\sqrt{f'_c}\, b_0\, d$
- V_c = min(V_{c1}, V_{c2}, V_{c3})
- V_u =234kip
- V_u / øV_c =0.385 → O.K

9. Check Moment Capacity

(1) Calculate moment capacity (Direction X)

- ø = 0.900
- M_{uy} =367kip·in øM$_{ny}$ =747kip·in
- M_{uy} / øM_{ny} =0.491 → O.K

(2) Calculate moment capacity (Direction Y)

- ø = 0.900
- M_{ux} =307kip·in øM$_{nx}$ =719kip·in
- M_{ux} / øM_{nx} =0.426 → O.K

10. Check Rebar

(1) Calculate minimum rebar area required

- $A_{s,min}$ = 0.00180D =0.595in²

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

- A_s =0.600in² (#7@11.81)
- $s_{req.}$ =12.10in
- s_y = 11.81in < $s_{req.}$ = 12.10in → O.K

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

- A_s =0.600in² (#7@11.81)
- $s_{req.}$ =12.10in
- s_x = 11.81in < $s_{req.}$ = 12.10in → O.K