ETABS Shear Wall Design

ACI 318-14 Pier Design

Pier Details

Story ID	Pier ID	Centroid X (m)	Centroid Y (m)	Length (m)	Thickness (m)	LLRF
Cielo P1	PFel-A20-2	27,77885	29,44554	1,05	0,21	1

Material Properties

E_c (tonf/m²)	f'_c (tonf/m²)	Lt.Wt Factor (Unitless)	f_y (tonf/m²)	f_{ys} (tonf/m²)
2194996,45	2109,21	1	42184,18	42184,18

Design Code Parameters

ϕ_T	ϕ_C	ϕ_v	ϕ_v (Seismic)	IP_{MAX}	IP_{MIN}	P_{MAX}
0,9	0,65	0,75	0,6	0,04	0,0025	0,8

Pier Leg Location, Length and Thickness

Station Location	ID	Left X_1 m	Left Y_1 m	Right X_2 m	Right Y_2 m	Length m	Thickness m
Top	Leg 1	27,67868	28,93019	27,87902	29,9609	1,05	0,21
Bottom	Leg 1	27,67868	28,93019	27,87902	29,9609	1,05	0,21

Flexural Design for P, M_3 and M_2

Station	D/C	Flexural	P_u tonf	M_{u2} tonf-m	M_{u3} tonf-m
Top	1,716	1.4Y+1.2D+1.0L	-27,0124	0,3156	-13,9629
Bottom	1,164	-1.4Y+1.2D+1.0L	-0,2594	-0,3684	-18,2446

Design Inadequacy Message: Pier fails in flexure or P-M-M interaction !!

Shear Design

Station Location	ID	Rebar m²/m	Shear Combo	P_u tonf	M_u tonf-m	V_u tonf	ϕV_c tonf	ϕV_n tonf
Top	Leg 1	0,00053	-1.4Y+1.2D+1.0L	47,1943	20,4106	21,8501	10,1894	24,1418
Bottom	Leg 1	0,00053	-1.4Y+1.2D+1.0L	-0,2594	-18,2446	21,8808	10,1894	24,1418

Boundary Element Check (ACI 18.10.6.3, 18.10.6.4)

Station Location	ID	Edge Length (m)	Governing Combo	P_u tonf	M_u tonf-m	Stress Comp tonf/m²	Stress Limit tonf/m²	C Depth m	C Limit m
Top–Left	Leg 1	Not Required	-1.4Y+1.2D+1.0L	47,1943	20,4106	-314,91	421,84		
Top–Right	Leg 1	Not Calculated	-1.4Y+1.2D+1.0L	47,1943	20,4106	742,98	421,84	0,20785	0,23333
Bottom–Left	Leg 1	Not Required	1.4Y+1.2D+1.0L	14,7257	15,3568	-331,19	421,84	0,11039	0,23333
Botttom–Right	Leg 1	Not Calculated	1.4Y+1.2D+1.0L	14,7257	15,3568	464,76	421,84	0,11039	0,23333