

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 | 0,26 | 1 |

Material Properties

| E_c (tonf/m ²) | f'_c (tonf/m ²) | Lt.Wt Factor (Unitless) | f_y (tonf/m ²) | f_{ys} (tonf/m ²) |
|------------------------------|-------------------------------|-------------------------|------------------------------|---------------------------------|
| 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 | 0,26 |
| Bottom | Leg 1 | 27,67868 | 28,93019 | 27,87902 | 29,9609 | 1,05 | 0,26 |

Flexural Design for P, M₃ and M₂

| Station | D/C | Flexural | P_u tonf | M_{u2} tonf-m | M_{u3} tonf-m |
|---------|-------|-----------------|---------------|--------------------|--------------------|
| Top | 1,245 | 1.4Y+1.2D+1.0L | -23,5369 | 0,3902 | -15,0505 |
| Bottom | 0,848 | -1.4Y+1.2D+1.0L | 1,9755 | -0,537 | -18,9669 |

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

Shear Design

| Station Location | ID | Rebar m ² /m | Shear Combo | P_u tonf | M_u tonf-m | V_u tonf | ϕV_c tonf | ϕV_n tonf |
|------------------|-------|----------------------------|-----------------|---------------|-----------------|---------------|--------------------|--------------------|
| Top | Leg 1 | 0,00065 | -1.4Y+1.2D+1.0L | 43,1873 | 23,0996 | 22,1076 | 12,6155 | 29,8899 |
| Bottom | Leg 1 | 0,00065 | -1.4Y+1.2D+1.0L | 1,9755 | -18,9669 | 21,9836 | 12,6155 | 29,8899 |

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/m ² | Stress Limit tonf/m ² | C Depth m | C Limit m |
|------------------|-------|-----------------|-----------------|---------------|-----------------|------------------------------------|-------------------------------------|--------------|--------------|
| Top-Left | Leg 1 | Not Required | -1.4Y+1.2D+1.0L | 43,1873 | 23,0996 | -325,31 | 421,84 | 0,17501 | 0,23333 |
| Top-Right | Leg 1 | Not Calculated | -1.4Y+1.2D+1.0L | 43,1873 | 23,0996 | 641,7 | 421,84 | 0,17501 | 0,23333 |
| Bottom-Left | Leg 1 | 0,04258 | -1.4Y+1.2D+1.0L | 1,9755 | -18,9669 | 404,24 | 421,84 | 0,08517 | 0,23333 |
| Bottom-Right | Leg 1 | 0,05495 | 1.4Y+1.2D+1.0L | 15,2985 | 15,9988 | 390,92 | 421,84 | 0,1099 | 0,23333 |