

Project :

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DESIGN METHOD : ACI 530-99: Working Stress Design  
 MASONRY MATERIAL : Hollow Core Concrete Masonry Units  
 MORTAR TYPE : Type S  
 MORTAR MATERIAL : Portland Cement Lime Mortar  
 BLOCK PLACEMENT : Running Bond

## MASONRY WALL DATA:

Wall Height = 18.00 ft.  
 Nominal Wall Thickness = 8.00 in.  
 Depth to c.g. Steel, Wall = 3.81 in.  
  
 Parapet Height = 0.00 ft.  
 Nominal Parapet Thickness = 0.00 in.  
 Depth to c.g. Steel, Parapet = 0.00 in.  
  
 Design Strip Width = 12.00 in.  
  
 Main Wall Reinf. Layers = One Layer  
 Wall Grout Spacing = Partially Grouted  
  
 Support Type at Base = Pinned Support  
 Span Type = Supported Top and Bottom

## WALL LOADS:

Wall Weight = 50.00 psf.  
  
 Floor or Roof Load: Dead = 400.0 Lb  
 Live = 400.0 Lb  
 Eccentricity = 3.00 in.  
  
 Additional Vertical Load: Dead = 0.0 Lb  
 Live = 0.0 Lb  
 Eccentricity = 0.00 in.  
 Vertical Distance (y) = 18.00 ft.  
  
 Equivalent Fluid Pressure = 0.00 pcf.  
 Vertical Distance (x) = 0.00 ft.

## SEISMIC LOADS:

Site Class (A to F) = Class A  
 Seismic Use Group = I  
 Short Period Spectral Acceleration,  $S_s$  = 0.00 %  
 One Second Spectral Acceleration,  $S_1$  = < 0.75 g  
 (Computed) Design Category, = Category A  
 Parapet Component Importance Factor,  $I_p$  = 1  
 Parapet Height/Roof Height Ratio  $z/h$  = 0  
 Veneer Weight = 0.00 psf.  
 Seismic Load on Main Wall = 5.00 psf.  
 Seismic Load on Parapet Wall = 0.00 psf.

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## WIND LOADS:

	Load W or H	Magnitude (plf, lb)	Distance From Base of Wall (ft)	
			Start	End
1	W	-20.00	0.00	18.00
2				
3				
4				
5				

- Notes: 1. "W" designates a uniform distributed wind load.  
 "H" designates a concentrated horizontal wind load.  
 2. Horizontal loads are positive to the right.

## MASONRY DATA:

Masonry Unit Strength = 1900.00 psi.

Masonry Compressive Strength,  $f'_m$  = 1500.00 psi.Allowable Flexural Stress,  $F_b$  = 500.00 psi.Allowable Shear Stress,  $F_v$  = 38.73 psi.Allowable Tension: No Grout,  $F_t$  = 25.00 psi.Solid Grout,  $F_t$  = 68.00 psi.Modulus of Elasticity,  $E_m$  = 1,350 ksi.Modular Ratio,  $E_s/E_m = n$  = 21.48

Single Grouted Cell + Web Width = 8.30 in.

Nominal Length of Masonry Unit = 16.00 in.

Block Face Shell Thickness = 1.25 in.

Nominal Minus Actual Thickness = 0.38 in.

## MATERIAL DATA:

Steel Yield Strength,  $F_y$  = 60.00 ksi.Allowable Steel Stress,  $F_s$  = 24.00 ksi.Modulus of Elasticity,  $E_s$  = 29,000 ksi.

## REINFORCED WALL DATA:

Minimum Steel Ratio,  $A_s/bt$  = 0.0007

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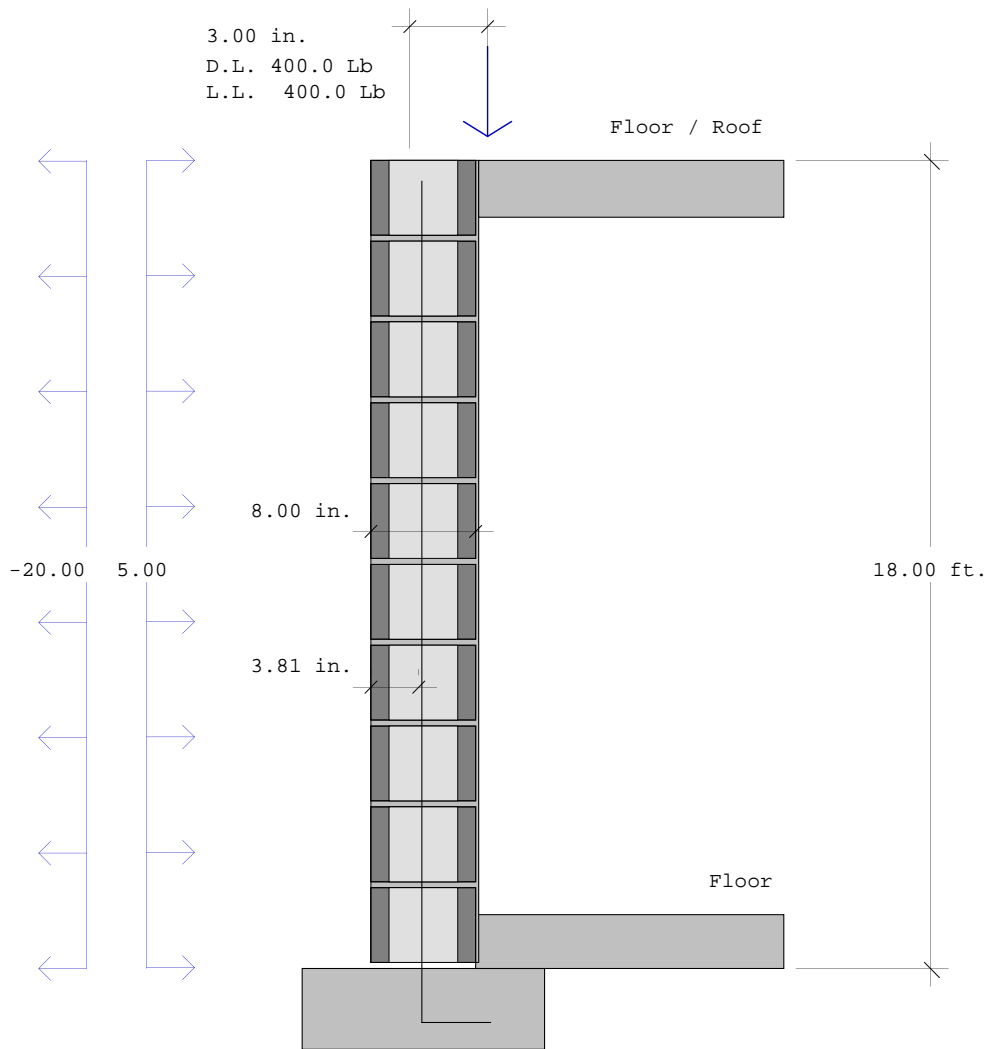
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GRAPHIC SUMMARY OF MASONRY WALL DATA



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 S U M M A R Y   O F   R E S U L T S  
 F O R   M A I N   W A L L  
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## DESIGN LOADS:

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 Moment,  $M_s = -860.0 \text{ ft-lb} / 12.00 \text{ in.}$   
 Axial Load,  $P_s = 850.0 \text{ Lb} / 12.00 \text{ in.}$   
 Load Combination =  $1*DL+1*WL$   
 Eccentricity at Moment,  $e = M/P = 12.14 \text{ in.}$

NOTE: Max. moment is located in Zone C, ( $e > 2d/3$ )  
 Wall is cracked, steel is stressed in tension.

Max. Shear,  $V_s = 191.1 \text{ Lb} / 12.00 \text{ in.}$   
 Load Combination =  $1*DL+1*LL+1*WL$

## ANALYSIS RESULTS:

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 Design Strip Width = 12.00 in.  
 Actual Wall Thickness,  $t = 7.63 \text{ in.}$   
 Effective Height,  $h' = 18.00 \text{ ft.}$   
 Seismic Force, (IBC 2000 1620.1.7)  $F_p = 5.00 \text{ plf.} / 12.00 \text{ in.}$

Minimum Area of Steel, Vertical Reinf. =  $0.064 \text{ in.}^2 / 12.00 \text{ in.}$   
 Minimum Area of Steel, Horiz. Reinf. = Not Required

Ref. ACI 99 1.11/IBC 2000 2109.6.5

## DESIGN RESULTS:

-----  

Bar Size	Fa, psi ( $4/3 * .25 * f'_m * R$ )	fv, psi ( $V/b'd$ )	All. Moment @ Axial Load ( $P=850.0 \text{ lb}$ )	Bar Spa. (in. o.c.)
#3	305.36	8.05	1,008.0	16.00
#4	340.84	16.10	941.5	32.00
#5	354.32	24.15	963.7	48.00
#6	354.32	36.23	899.0	72.00
#7	354.32	36.23	992.3	72.00
#8	354.32	36.23	1,071.2	72.00
#9	354.32	36.23	1,136.0	72.00

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Max. vertical bar spacing is 72 inch per ACI 99 2.3.3.3 (commentary)

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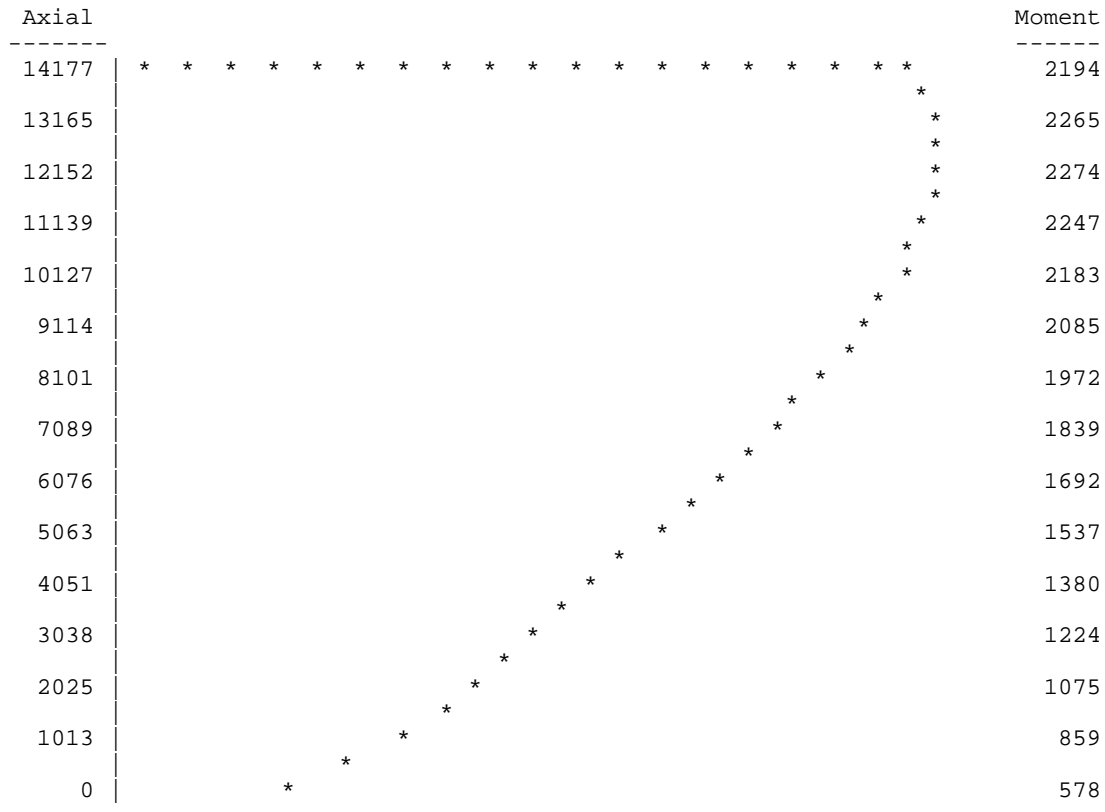
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MASONRY WALL INTERACTION DIAGRAM: (DEAD + LIVE LOAD ONLY)

Effective Wall Height = 18.00 ft. All. Axial Stress, Fa = 229.02 psi.  
 Actual Wall Thickness = 7.63 in. All. Bending Stress, Fb = 500.00 psi.  
 Depth to c.g. Steel = 3.81 in. All. Steel Stress, Fs = 24.00 ksi.  
 Design Width = 12.00 in.  
 Reinforcing Design = #3 @ 16 in. o.c.



NOTES: Axial Load = Lb, Moment = ft-lb

Positive moment is defined as moment which causes compression on the outside face of wall.

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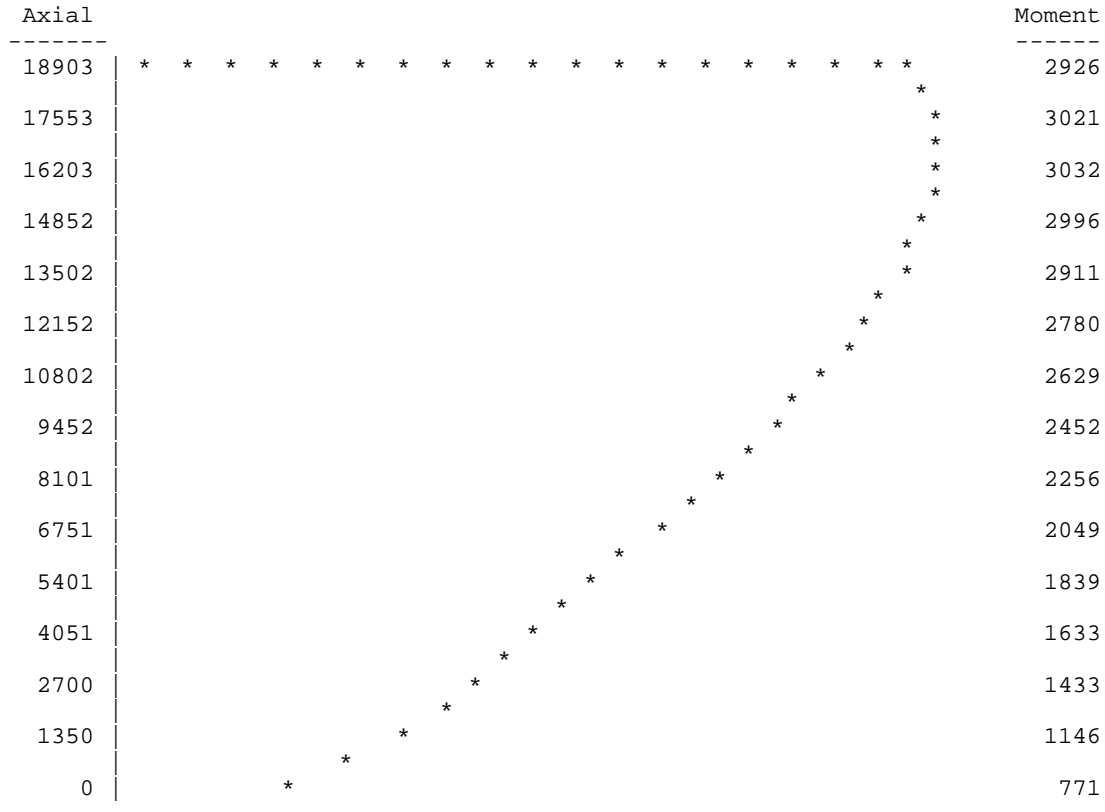
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MASONRY WALL INTERACTION DIAGRAM: (WIND / SEISMIC LOADS)

Effective Wall Height = 18.00 ft. All. Axial Stress, Fa = 305.36 psi.  
 Actual Wall Thickness = 7.63 in. All. Bending Stress, Fb = 666.67 psi.  
 Depth to c.g. Steel = 3.81 in. All. Steel Stress, Fs = 32.00 ksi.  
 Design Width = 12.00 in.  
 Reinforcing Design = #3 @ 16 in. o.c.



NOTES: Axial Load = Lb, Moment = ft-lb

Positive moment is defined as moment which causes compression on the outside face of wall.