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Design Criteria Worksheet

North Carolina COA C2424

PE- L. Dean Arp, Jr., North Carolina PE 15069

Project No.: **62690**

Date: **12/22/2022**

NORTH CAROLINA
PROFESSIONAL
SEAL
18427
ENGINEER
L. DEAN ARP, JR.

12/22/2022

Digitally signed by Larry D Arp Jr.
DN: c=US, o=North Carolina, dnQualifier=A01410C000001853640E4A1000A9A12, cn=Larry D Arp Jr.
Date: 2022.12.22 11:32:14 -05'00'

Project Name: **Circle K Fuel Canopy**

Prepared for: **McGee Corporation**
12100 Stallings Commerce Drive
PO Box 1375
Matthews, NC 28105

Canopy Size: **24'-0"x191'-8"**

Project Address:

Street:	9706 Kennebec Church Rd.
City:	Angier
County:	Harnett
State:	NC
Zip Code:	27501

Building Code: 2018 NCSBC (2015 IBC)

Roof Live Loads: 20 PSF

Roof Dead Loads: 5 PSF

Snow Loads:

Importance Factor (I_S):	1.0
Ground Snow Load (Pg):	15 psf
Thermal Factor (Ct):	1.2
Exposure Factor (Ce):	1.0

Wind Loads:

Importance Factor (I_W):	1.0
Risk Category:	II
Basic Wind Speed	
Ultimate design wind speed, V_{ult}:	116 mph
Exposure Category:	C

Seismic Loads:

Importance Factor (I_E):	1.0
Risk Category:	II
Site Class:	D
Seismic Design Category:	B
Mapped Spectral Accel. @ 0.2 sec. (S_S):	0.171g
Mapped Spectral Accel. @ 1.0 sec. (S_1):	0.082g
Site Coefficient, Fa:	1.6
Site Coefficient, Fv:	2.4
Design Spectral Accel. @ 0.2 sec (S_{DS}):	0.182g
Design Spectral Accel. @ 1.0 sec (S_{D1}):	0.131g
Seismic Base Shear:	6.71 kips

Soils Criteria: Allowable bearing capacity of 2,500 psf per the geotechnical report by Summit dated February 21, 2022, Summit Project No. 8382.G0073.

Design Comments / Assumptions:

1. Decking, purlins, and girders are designed for unbalanced snow loading per ASCE 7.

2. Decking does not transfer lateral forces with diaphragm action. Canopy steel is designed to transfer lateral forces with strong and weak axis bending.

3. Decking does not brace canopy purlins against lateral torsional buckling. Deck clips do not have adequate shear capacity to transfer lateral bracing forces into the deck.

4. Inflection points are not used as braced points in beam design (per AISC).

5. McGee decking (3"x16", 20ga.) can support the following allowable design moments:

   Ma (+) = 0.819ft*k   positive moment
   Ma (-) = 0.682 ft*k   negative moment

   Design calculations will be provided if requested.

6. McGee deck clips can support an allowable vertical design load of 394 lbs/clip. Test data will be provided if requested.

7. Canopy lateral forces are resisted by cantilevered columns (inverted pendulum system).

8. Foundations are designed as 'structural reinforced concrete' per ACI 318.

SECTION 1605
LOAD COMBINATIONS

1605.1 General. Buildings and other structures and portions thereof shall be designed to resist:

1. The load combinations specified in Section 1605.2, 1605.3.1 or 1605.3.2;
2. The load combinations specified in Chapters 18 through 23; and
3. The seismic load effects including overstrength factor in accordance with Section 12.4.3 of ASCE 7 where required by Section 12.2.5.2, 12.3.3.3 or 12.10.2.1 of ASCE 7. With the simplified procedure of ASCE 7 Section 12.14, the seismic load effects including overstrength factor in accordance with Section 12.14.3.2 of ASCE 7 shall be used.

TABLE 1604.5
RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing Group E occupancies with an occupant load greater than 250. • Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500. • Group I-2 occupancies with an occupant load of 50 or more resident care recipients but not having surgery or emergency treatment facilities. • Group I-3 occupancies. • Any other occupancy with an occupant load greater than 5,000.[a] • Power-generating stations, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV. • Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and Are sufficient to pose a threat to the public if released.[b]
IV	Buildings and other structures designated as essential facilities, including but not limited to: • Group I-2 occupancies having surgery or emergency treatment facilities. • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Risk Category IV structures. • Buildings and other structures containing quantities of highly toxic materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and Are sufficient to pose a threat to the public if released.[b] • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.2 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

Table 1.5-1 Risk Category of Buildings and Other Structures for Flood, Wind, Snow, Earthquake, and Ice Loads

Use or Occupancy of Buildings and Structures	Risk Category
Buildings and other structures that represent a low risk to human life in the event of failure	I
All buildings and other structures except those listed in Risk Categories I, III, and IV	II
Buildings and other structures, the failure of which could pose a substantial risk to human life. Buildings and other structures, not included in Risk Category IV, with potential to cause a substantial economic impact and/or mass disruption of day-to-day civilian life in the event of failure. Buildings and other structures not included in Risk Category IV (including, but not limited to, facilities that manufacture, process, handle, store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, hazardous waste, or explosives) containing toxic or explosive substances where the quantity of the material exceeds a threshold quantity established by the authority having jurisdiction and is sufficient to pose a threat to the public if released.[a]	III
Buildings and other structures designated as essential facilities. Buildings and other structures, the failure of which could pose a substantial hazard to the community. Buildings and other structures (including, but not limited to, facilities that manufacture, process, handle, store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, or hazardous waste) containing sufficient quantities of highly toxic substances where the quantity of the material exceeds a threshold quantity established by the authority having jurisdiction and is sufficient to pose a threat to the public if released.[a] Buildings and other structures required to maintain the functionality of other Risk Category IV structures.	IV

[a]Buildings and other structures containing toxic, highly toxic, or explosive substances shall be eligible for classification to a lower Risk Category if it can be demonstrated to the satisfaction of the authority having jurisdiction by a hazard assessment as described in Section 1.5.3 that a release of the substances is commensurate with the risk associated with that Risk Category.

exceed the member design strength (also called "load and resistance factor design").

TEMPORARY FACILITIES: Buildings or other structures that are to be in service for a limited time and have a limited exposure period for environmental loadings.

TOXIC SUBSTANCE: As defined in 29 CFR 1910.1200 Appendix A with Amendments as of February 1, 2000.

1.2.2 Symbols

F_x A minimum design lateral force applied to level x of the structure and used for purposes of evaluating structural integrity in accordance with Section 1.4.2.

W_x The portion of the total dead load of the structure, D, located or assigned to Level x.

D Dead load.

L Live load.

L_r Roof live load.

N Lateral notional load used to evaluate conformance with minimum structural integrity criteria.

R Rain load.

S Snow load.

1.3 BASIC REQUIREMENTS

1.3.1 Strength and Stiffness

Buildings and other structures, and all parts thereof, shall be designed and constructed with adequate strength and stiffness to provide structural stability, protect nonstructural components and systems, and meet the serviceability requirements of Section 1.3.2.

Acceptable strength shall be demonstrated using one or more of the following procedures:

a. the Strength Procedures of Section 1.3.1.1,
b. the Allowable Stress Procedures of Section 1.3.1.2, or
c. subject to the approval of the authority having jurisdiction for individual projects, the Performance-Based Procedures of Section 1.3.1.3.

Project #	62690 Circle K
Project Name	Fuel - Angier, NC
Engineer	LDA
Date	12/22/2022

Snow Loads

ASCE 7-10 (Chapter 7)

Risk Category	II		(Table 1.5-1)
Exposure Factor, Ce	1.00		(Table 7-2)
Thermal Factor, Ct	1.20		(Table 7-3)
Importance Factor, I	1.00		(Table 1.5-2)
Ground Snow Load, Pg	15	psf	

Flat Roof Snow Load
Pf = 12.60 psf   Use Pf+r= **17.60** psf

Does Pfmin apply? **Yes**
Minimum Flat Roof Snow Load
Pfmin = 15.00 psf

Rain-on-Snow Surcharge
Prain = 5.00 psf

SLOPED ROOF

Roof Type	Flat	Flat (<=5deg),Mono,Hip,Gable
L	191.67	ft
W	24.00	ft
he	0.00	ft
L/W	7.99	
beta	1.00	
70/W+0.5	3.42	degrees
275 beta pf/gammaW	9.05	degrees
Roof Surface	NS	('NS' for Non-Slippery, 'S' for Slippery Roof Surface)
Roof Slope	0	on 12
Roof Slope	0.00	degrees
Slope Factor, Cs	1.000	(calculated Fig. 7-2)
1.5Pf/Ce	NA	psf **consider balanced load only**
1.5Ps/Ce	NA	psf
0.3ps	NA	psf
1.2(1+beta/2)ps/Ce	NA	psf
0.3pf	3.78	psf
1.2 pf / Ce	15.12	psf
1.2(1+beta)pf/Ce	30.24	psf
1.2 pf / Ce + gamma he	15.12	psf

Sloped Roof Snow Load   Ps = **17.60** psf

17.60 psf	**17.60** psf	
NA psf	**NA** psf	
NA psf	**NA** psf	**NA** psf
NA psf	**NA** psf	**NA** psf

DRIFT

Snow Density gamma	15.95 pcf	(Eq. 7-4)
Balanced Snow Height, hb =	1.10 ft	
Structure Height Above Low Roof, Hur	2.333 ft	
Clear Height from Balanced Snow to Upper Roof, hc=	1.23 ft (Hur-hb)	

hc/hb = 1.11 **Consider drift loads**

Leeward Wind				
Length of Upper Roof of Drft, Lu=	0.00 ft	0.00 ft		Lu1= 25 ft (if Lu<25' use 25,)
Height of Drift, hd=	1.23 ft	1.23 ft	(Fig. 7-9) (Hd <= hc)	Lu2= 25 ft (if Lu<25' use 25,)
Windward Wind				
Length of Lower Roof	Dir. 1	Dir. 2		
of Drft, Lu=	24.00 ft	191.67 ft		Lu1= 25 ft (if Lu<25' use 25,)
Height of Drift, hd=	1.23 ft	1.23 ft	(Fig. 7-9) (Hd <= hc)	Lu2= 191.667 ft (if Lu<25' use 25,)
.75 x hd=	0.92 ft	0.92 ft		
Use hd=	1.23 ft	1.23 ft		
Maximum Drift Surcharge, Pd=	**19.61** psf	**19.61** psf		
Drift Width, w=	4.92 ft	4.92 ft		

FIGURE 1608.2—continued
GROUND SNOW LOADS, p_g, FOR THE UNITED STATES (psf)

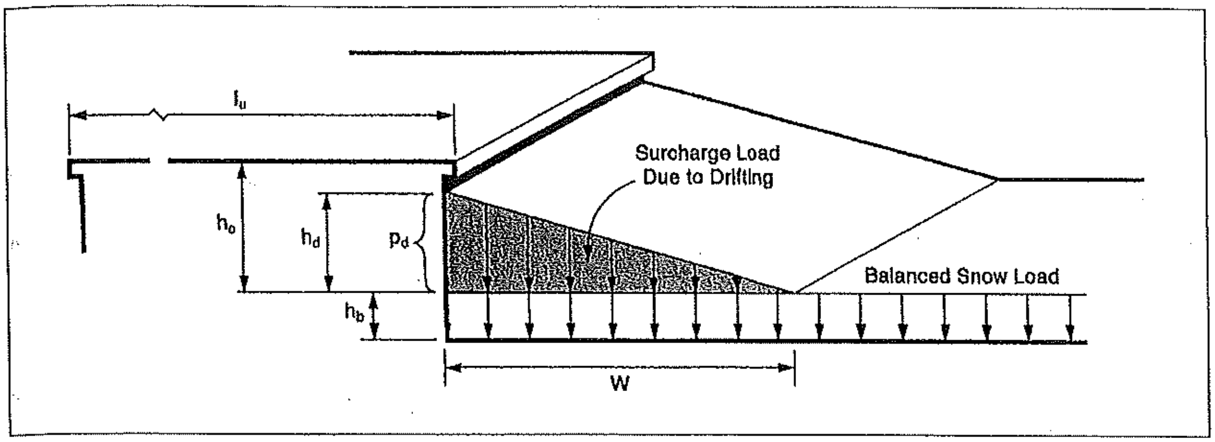
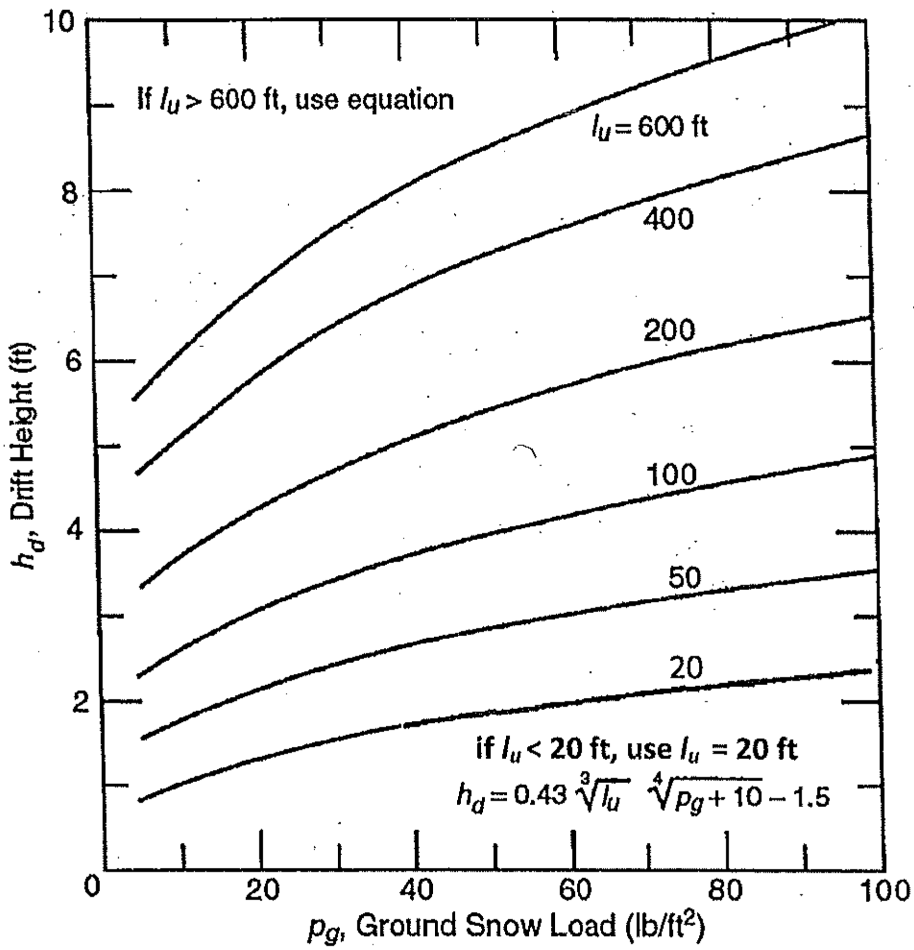


FIGURE 7-8 Configuration of Snow Drifts on Lower Roofs.



To convert lb/ft^2 to kN/m^2, multiply by 0.0479.
To convert ft to m, multiply by 0.3048.

FIGURE 7-9 Graph and Equation for Determining Drift Height, h_d.

Project #	62690 Circle K
Project Name	Fuel - Angier, NC
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Wind Loads

ASCE 7-10 (Chapter 26)
Monoslope Roof Over Open Building

Risk Category	II		(Table 1.5-1)	Fascia Height	3	ft
Importance Factor, I	1.00		(Table 1.5-2)	Trib Width Y	28	ft
Exposure Category	C		(26.7.)	# of Cols	7	
Design Wind Velocity (Vult)	116	MPH	(Figure 26.5-1A,B,C)			
Height, z	17	ft				
Use Height, z	17	ft	(Note: Zmin=30' for Case 1 Exp. B)			
Roof Slope	0.00	degrees				

Directionality Factor, Kd	0.85	(Table 26.6-1)
Topographic factor, Kzt =	1.00	

Horiz. Dim. Measured Norm. to Wind Dir., B	191.667 ft	L/B =	0.125
Horiz. Dim. Measured Parallel. to Wind Dir., L	24 ft		

Velocity Pressure Exposure Coefficient, Kz =	0.872
α=	9.5
zg=	900
a =	3.00 ft

Exposure	α	zg		
A	5.0	1500		
B	7.0	1200		
C	9.5	900	9.5	900
D	11.5	700		

Velocity Pressure, qz = 25.52 psf qz=0.00256 Kz Kzt Kd V^2 I (psf)

Gust Response Factor, G =	0.85	Panel Trib Length	8 ft		
		Panel Trib Width	1.33 ft	a =	3.00 ft
		Panel Trib Area	10.64 sf	a^2 =	9.00 sf
		Min. Panel Trib Area	21.33 sf	4a^2 =	36.00 sf

Net External Surface Pressure - Components and Cladding (PSF)

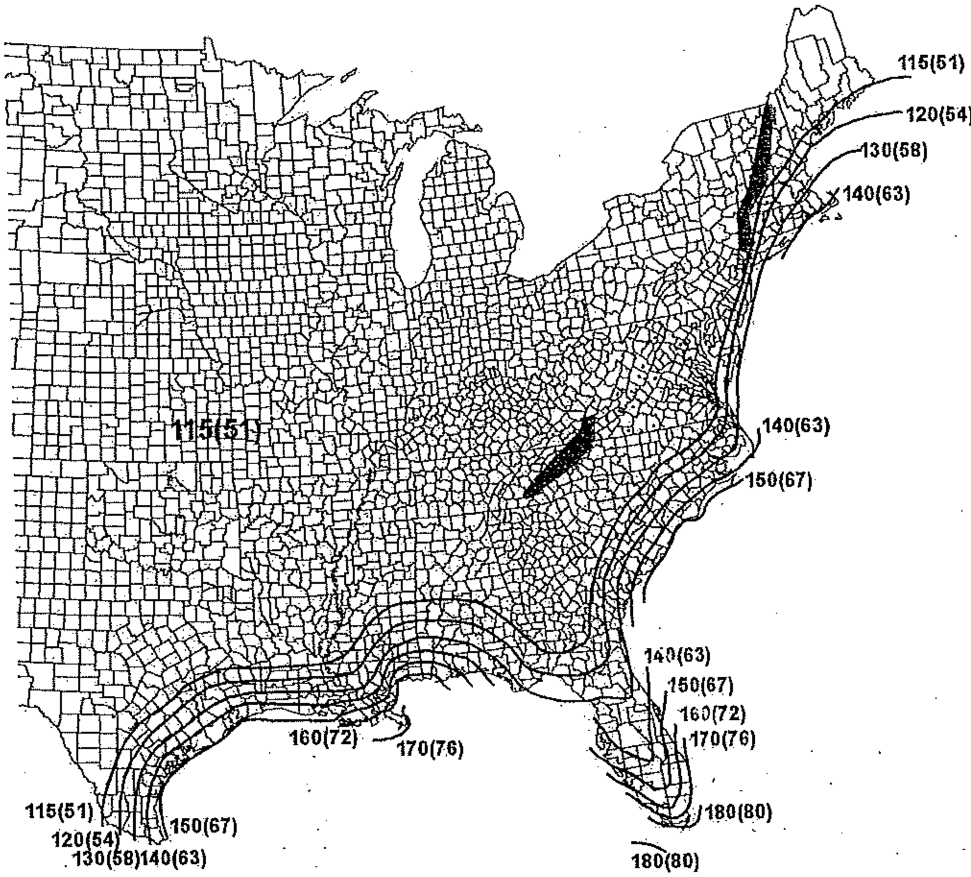
	Zone 3		Zone 2		Zone 1	
<= a^2	52.06	-71.58	39.04	-36.88	26.03	-23.86
>a^2,<=4a^2	39.04	-36.88	39.04	-36.88	26.03	-23.86
>4a^2	26.03	-23.86	26.03	-23.86	26.03	-23.86

Horizontal Wind Pressures on Parapets
Net Pressure Coefficients

(windward + leeward) GCpn=	2.500	(+1.5 Windward, -1.0 Leeward)
pw (lat) =	63.80 psf	pwl =qz GCpn
Af 1 =	575.00 sf	
Af 2=	72.00 sf	
Pw (lat) 1 =	36.68 kips	Pwl =qz GCpn Af
Pw (lat) 2=	4.59 kips	Pwl =qz GCpn Af
Fy =	5.36 kips/frame	
Fx =	0.66 kips/col	

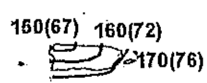
Vertical Wind MWFRS Pressures on Roof
Net Pressure Coefficients Cn
p =qh GCn

Cn=	1.2	0.3
Cn=	-1.1	-0.1
p (+) =	26.03	6.51 psf
p (-) =	-23.86	-2.17 psf
Pcol=	17.5 kips	



Special Wind Region

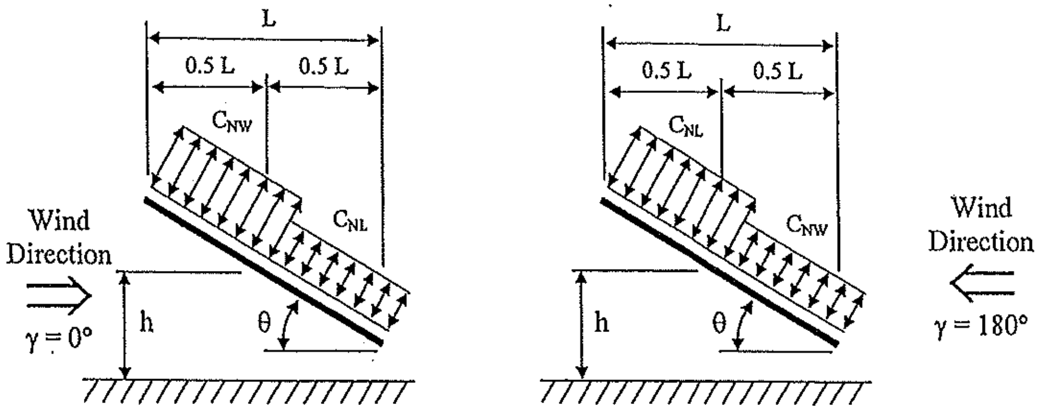
Location	Vmph	(m/s)
Guam	195	(87)
Virgin Islands	165	(74)
American Samoa	160	(72)
Hawaii – [redacted]	130	(58)



Puerto Rico

Figure 26.5-1A (*Continued*)

Main Wind Force Resisting System – Part 1		0.25 ≤ h/L ≤ 1.0
Figure 27.4-4	Net Pressure Coefficient, C_N	**Monoslope Free Roofs**
Open Buildings		**$\theta \le 45°, \gamma = 0°, 180°$**

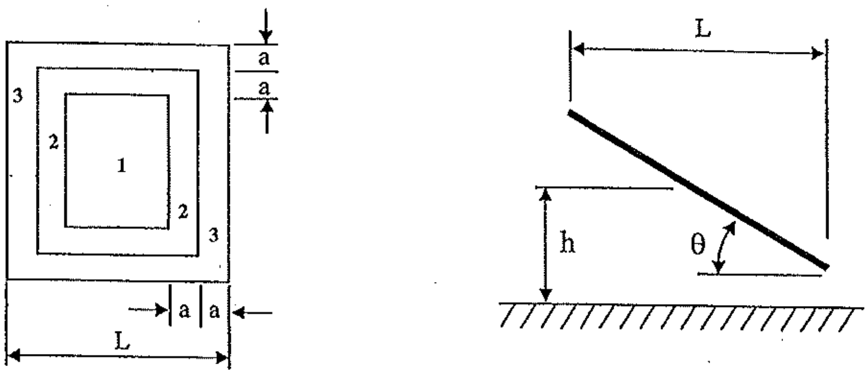


Roof Angle θ	Load Case	Wind Direction, γ = 0°				Wind Direction, γ = 180°			
		Clear Wind Flow		Obstructed Wind Flow		Clear Wind Flow		Obstructed Wind Flow	
		C_{NW}	C_{NL}	C_{NW}	C_{NL}	C_{NW}	C_{NL}	C_{NW}	C_{NL}
0°	A	1.2	0.3	-0.5	-1.2	1.2	0.3	-0.5	-1.2
	B	-1.1	-0.1	-1.1	-0.6	-1.1	-0.1	-1.1	-0.6
7.5°	A	-0.6	-1	-1	-1.5	0.9	1.5	-0.2	-1.2
	B	-1.4	0	-1.7	-0.8	1.6	0.3	0.8	-0.3
15°	A	-0.9	-1.3	-1.1	-1.5	1.3	1.6	0.4	-1.1
	B	-1.9	0	-2.1	-0.6	1.8	0.6	1.2	-0.3
22.5°	A	-1.5	-1.6	-1.5	-1.7	1.7	1.8	0.5	-1
	B	-2.4	-0.3	-2.3	-0.9	2.2	0.7	1.3	0
30°	A	-1.8	-1.8	-1.5	-1.8	2.1	2.1	0.6	-1
	B	-2.5	-0.5	-2.3	-1.1	2.6	1	1.6	0.1
37.5°	A	-1.8	-1.8	-1.5	-1.8	2.1	2.2	0.7	-0.9
	B	-2.4	-0.6	-2.2	-1.1	2.7	1.1	1.9	0.3
45°	A	-1.6	-1.8	-1.3	-1.8	2.2	2.5	0.8	-0.9
	B	-2.3	-0.7	-1.9	-1.2	2.6	1.4	2.1	0.4

Notes:

1. C_{NW} and C_{NL} denote net pressures (contributions from top and bottom surfaces) for windward and leeward half of roof surfaces, respectively.
2. Clear wind flow denotes relatively unobstructed wind flow with blockage less than or equal to 50%. Obstructed wind flow denotes objects below roof inhibiting wind flow (>50% blockage).
3. For values of θ between 7.5° and 45°, linear interpolation is permitted. For values of θ less than 7.5°, use load coefficients for 0°.
4. Plus and minus signs signify pressures acting towards and away from the top roof surface, respectively.
5. All load cases shown for each roof angle shall be investigated.
6. Notation:
   - L : horizontal dimension of roof, measured in the along wind direction, ft. (m)
   - h : mean roof height, ft. (m)
   - γ : direction of wind, degrees
   - θ : angle of plane of roof from horizontal, degrees

Components and Cladding		$0.25 \le h/L \le 1.0$
Figure 30.8-1	**Net Pressure Coefficient, C_N**	**Monoslope Free Roofs** $\theta \le 45°$
Open Buildings		



Roof Angle θ	Effective Wind Area	C_N											
		Clear Wind Flow						Obstructed Wind Flow					
		Zone 3		Zone 2		Zone 1		Zone 3		Zone 2		Zone 1	
0°	$\le a^2$	2.4	-3.3	1.8	-1.7	1.2	-1.1	1	-3.6	0.8	-1.8	0.5	-1.2
	$> a^2, \le 4.0a^2$	1.8	-1.7	1.8	-1.7	1.2	-1.1	0.8	-1.8	0.8	-1.8	0.5	-1.2
	$> 4.0a^2$	1.2	-1.1	1.2	-1.1	1.2	-1.1	0.5	-1.2	0.5	-1.2	0.5	-1.2
7.5°	$\le a^2$	3.2	-4.2	2.4	-2.1	1.6	-1.4	1.6	-5.1	1.2	-2.6	0.8	-1.7
	$> a^2, \le 4.0a^2$	2.4	-2.1	2.4	-2.1	1.6	-1.4	1.2	-2.6	1.2	-2.6	0.8	-1.7
	$> 4.0a^2$	1.6	-1.4	1.6	-1.4	1.6	-1.4	0.8	-1.7	0.8	-1.7	0.8	-1.7
15°	$\le a^2$	3.6	-3.8	2.7	-2.9	1.8	-1.9	2.4	-4.2	1.8	-3.2	1.2	-2.1
	$> a^2, \le 4.0a^2$	2.7	-2.9	2.7	-2.9	1.8	-1.9	1.8	-3.2	1.8	-3.2	1.2	-2.1
	$> 4.0a^2$	1.8	-1.9	1.8	-1.9	1.8	-1.9	1.2	-2.1	1.2	-2.1	1.2	-2.1
30°	$\le a^2$	5.2	-5	3.9	-3.8	2.6	-2.5	3.2	-4.6	2.4	-3.5	1.6	-2.3
	$> a^2, \le 4.0a^2$	3.9	-3.8	3.9	-3.8	2.6	-2.5	2.4	-3.5	2.4	-3.5	1.6	-2.3
	$> 4.0a^2$	2.6	-2.5	2.6	-2.5	2.6	-2.5	1.6	-2.3	1.6	-2.3	1.6	-2.3
45°	$\le a^2$	5.2	-4.6	3.9	-3.5	2.6	-2.3	4.2	-3.8	3.2	-2.9	2.1	-1.9
	$> a^2, \le 4.0a^2$	3.9	-3.5	3.9	-3.5	2.6	-2.3	3.2	-2.9	3.2	-2.9	2.1	-1.9
	$> 4.0a^2$	2.6	-2.3	2.6	-2.3	2.6	-2.3	2.1	-1.9	2.1	-1.9	2.1	-1.9

Notes:

1. C_N denotes net pressures (contributions from top and bottom surfaces).
2. Clear wind flow denotes relatively unobstructed wind flow with blockage less than or equal to 50%. Obstructed wind flow denotes objects below roof inhibiting wind flow (>50% blockage).
3. For values of θ other than those shown, linear interpolation is permitted.
4. Plus and minus signs signify pressures acting towards and away from the top roof surface, respectively.
5. Components and cladding elements shall be designed for positive and negative pressure coefficients shown.
6. Notation:
   - a : 10% of least horizontal dimension or 0.4h, whichever is smaller but not less than 4% of least horizontal dimension or 3 ft. (0.9 m)
   - h : mean roof height, ft. (m)
   - L : horizontal dimension of building, measured in along wind direction, ft. (m)
   - θ : angle of plane of roof from horizontal, degrees

ASCE7-05 SEISMIC FORCE CALCULATION

Project #	62690 Circle K
Project Name	Fuel - Angier, NC
Engineer	LDA
Date	12/22/22

SITE CLASS	D	
RISK CATEGORY	II	
MAPPED SPECTRAL ACCELERATION AT 0.2 sec, Ss	0.171	g
MAPPED SPECTRAL ACCELERATION AT 1.0 sec, S1	0.082	g
SITE COEFFICIENT, Fa	1.60	
SITE COEFFICIENT, Fv	2.40	
SOIL MODIFIED SHORT PERIOD SPECTRAL RESPONSE ACCELERATION, SMs	0.274	g
SOIL MODIFIED LONG PERIOD SPECTRAL RESPONSE ACCELERATION, SM1	0.197	g
SHORT PERIOD SPECTRAL RESPONSE ACCELERATION, SDs	0.182	g
LONG PERIOD SPECTRAL RESPONSE ACCELERATION, SD1	0.131	g
SEISMIC DESIGN CATEGORY	B	
OCCUPANCY IMPORTANCE FACTOR, IE	1.00	
BASIC STRUCTURAL SYSTEM	Steel Ordinary Cantilever Column	
RESPONSE MODIFICATION FACTOR, R	1.25	
SYSTEM OVERSTRENGTH FACTOR	1.25	
DEFLECTION AMPLIFICATION FACTOR, Cd	1.25	
ANALYSIS PROCEDURE	EQUIVALENT LATERAL FORCE (ASCE 7-10 SECTION 12.8)	

Ct = building period coefficient
Ta = Ct H^x
Cs =SDs / (R/Ie) (ASCE 12.8-2)
Cs max =SD1 / [(R/Ie)T] (ASCE 12.8-3)
Cs min 1 =0.01 (ASCE 12.8-5)
Cs min 2 0.5S1/(R/Ie) (ASCE 12.8-6) for S1=>0.6g

V =CsW

Fx =VCvx
Fpx =(Ft+sum(v))/cumul.(W) diaphragm shear

Trib Width Y 28 ft
\# of Cols 7

BLDG. H =	17 ft						
# STORIES =	1						
DIRECTION =	Y	use T =	0.2701		k =	1.000	
Ct =	0.028	Cs =	0.1459	(ASCE 12.8-2)			
x =	0.8	Cs max =	0.3886	(ASCE 12.8-3)	V =	6.71	kips
T analysis =	0.2701 sec	Cs min 1=	0.0100	(ASCE 12.8-5)			
Ta =	0.2701 sec	Cs min 2=	NA	(ASCE 12.8-6)			
Cu =	1.638	Use Cs min=	0.0100		Fy =	0.98	kips/frame
T =CuTa=	0.4423 sec				Fx =	0.96	kips/col
		USE Cs =	**0.1459**				
Wtotal =	46 kips						
Mf =	0 k-ft	(w/ red. factor = 0.75)					

LEVEL	STORY h (ft)	H (ft)	Wx (kips)	cumul. W (kips)	WH^k (k-ft)	Cvx	Fx (kips)	Vx (kips)	OTM red.factor	delta(OTM) (k-ft)	sum(OTM) (k-ft)
Roof	-	17.00	46.0	-	782	1.000	6.71	-	-	-	-
			46		782	1.000	7			0	

Table 12.2-1 *(Continued)*

Seismic Force-Resisting System	ASCE 7 Section Where Detailing Requirements Are Specified	Response Modification Coefficient, R^a	Overstrength Factor, Ω_0^g	Deflection Amplification Factor, C_d^b	Structural System Limitations Including Structural Height, h_n (ft) Limits[c] — Seismic Design Category B	C	D[d]	E[d]	F[e]
G. CANTILEVERED COLUMN SYSTEMS DETAILED TO CONFORM TO THE REQUIREMENTS FOR:	12.2.5.2								
1. Steel special cantilever column systems	14.1	2½	1¼	2½	35	35	35	35	35
2. Steel ordinary cantilever column systems	14.1	1¼	1¼	1¼	35	35	NP[i]	NP[i]	NP[i]
3. Special reinforced concrete moment frames[n]	12.2.5.5 and 14.2	2½	1¼	2½	35	35	35	35	35
4. Intermediate reinforced concrete moment frames	14.2	1½	1¼	1½	35	35	NP	NP	NP
5. Ordinary reinforced concrete moment frames	14.2	1	1¼	1	35	NP	NP	NP	NP
6. Timber frames	14.5	1½	1½	1½	35	35	35	NP	NP
H. STEEL SYSTEMS NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE, EXCLUDING CANTILEVER COLUMN SYSTEMS	14.1	3	3	3	NL	NL	NP	NP	NP

[a]Response modification coefficient, R, for use throughout the standard. Note R reduces forces to a strength level, not an allowable stress level.
[b]Deflection amplification factor, C_d, for use in Sections 12.8.6, 12.8.7, and 12.9.2.
[c]NL = Not Limited and NP = Not Permitted. For metric units use 30.5 m for 100 ft and use 48.8 m for 160 ft.
[d]See Section 12.2.5.4 for a description of seismic force-resisting systems limited to buildings with a structural height, h_n, of 240 ft (73.2 m) or less.
[e]See Section 12.2.5.4 for seismic force-resisting systems limited to buildings with a structural height, h_n, of 160 ft (48.8 m) or less.
[f]Ordinary moment frame is permitted to be used in lieu of intermediate moment frame for Seismic Design Categories B or C.
[g]Where the tabulated value of the overstrength factor, Ω_0, is greater than or equal to 2½, Ω_o is permitted to be reduced by subtracting the value of 1/2 for structures with flexible diaphragms.
[h]See Section 12.2.5.7 for limitations in structures assigned to Seismic Design Categories D, E, or F.
[i]See Section 12.2.5.6 for limitations in structures assigned to Seismic Design Categories D, E, or F.
[j]Steel ordinary concentrically braced frames are permitted in single-story buildings up to a structural height, h_n, of 60 ft (18.3 m) where the dead load of the roof does not exceed 20 psf
(0.96 kN/m²) and in penthouse structures.
[k]An increase in structural height, h_n, to 45 ft (13.7 m) is permitted for single story storage warehouse facilities.
[l]In Section 2.2 of ACI 318. A shear wall is defined as a structural wall.
[m]In Section 2.2 of ACI 318. The definition of "special structural wall" includes precast and cast-in-place construction.
[n]In Section 2.2 of ACI 318. The definition of "special moment frame" includes precast and cast-in-place construction.
[o]Alternately, the seismic load effect with overstrength, E_{mh}, is permitted to be based on the expected strength determined in accordance with AISI S110.
[p]Cold-formed steel – special bolted moment frames shall be limited to one-story in height in accordance with AISI S110.

Table 11.4-1 Site Coefficient, F_a

Site Class	Mapped Risk-Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameter at Short Period				
	$S_S \leq 0.25$	$S_S = 0.5$	$S_S = 0.75$	$S_S = 1.0$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7				

Note: Use straight-line interpolation for intermediate values of S_S.

Table 11.4-2 Site Coefficient, F_v

Site Class	Mapped Risk-Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameter at 1-s Period				
	$S_1 \leq 0.1$	$S_1 = 0.2$	$S_1 = 0.3$	$S_1 = 0.4$	$S_1 \geq 0.5$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7				

Note: Use straight-line interpolation for intermediate values of S_1.

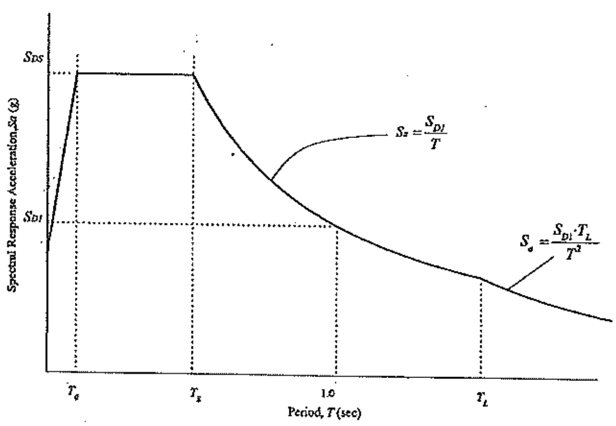


FIGURE 11.4-1 Design Response Spectrum.

11.4.5 Design Response Spectrum

Where a design response spectrum is required by this standard and site-specific ground motion procedures are not used, the design response spectrum curve shall be developed as indicated in Fig. 11.4-1 and as follows:

1. For periods less than T_0, the design spectral response acceleration, S_a, shall be taken as given by Eq. 11.4-5:

$$S_a = S_{DS}\left(0.4 + 0.6\frac{T}{T_0}\right) \quad (11.4\text{-}5)$$

2. For periods greater than or equal to T_0 and less than or equal to T_S, the design spectral response acceleration, S_a, shall be taken equal to S_{DS}.
3. For periods greater than T_S, and less than or equal to T_L, the design spectral response acceleration, S_a, shall be taken as given by Eq. 11.4-6:

$$S_a = \frac{S_{D1}}{T} \quad (11.4\text{-}6)$$

4. For periods greater than T_L, S_a shall be taken as given by Eq. 11.4-7:

$$S_a = \frac{S_{D1}T_L}{T^2} \quad (11.4\text{-}7)$$

where

S_{DS} = the design spectral response acceleration parameter at short periods

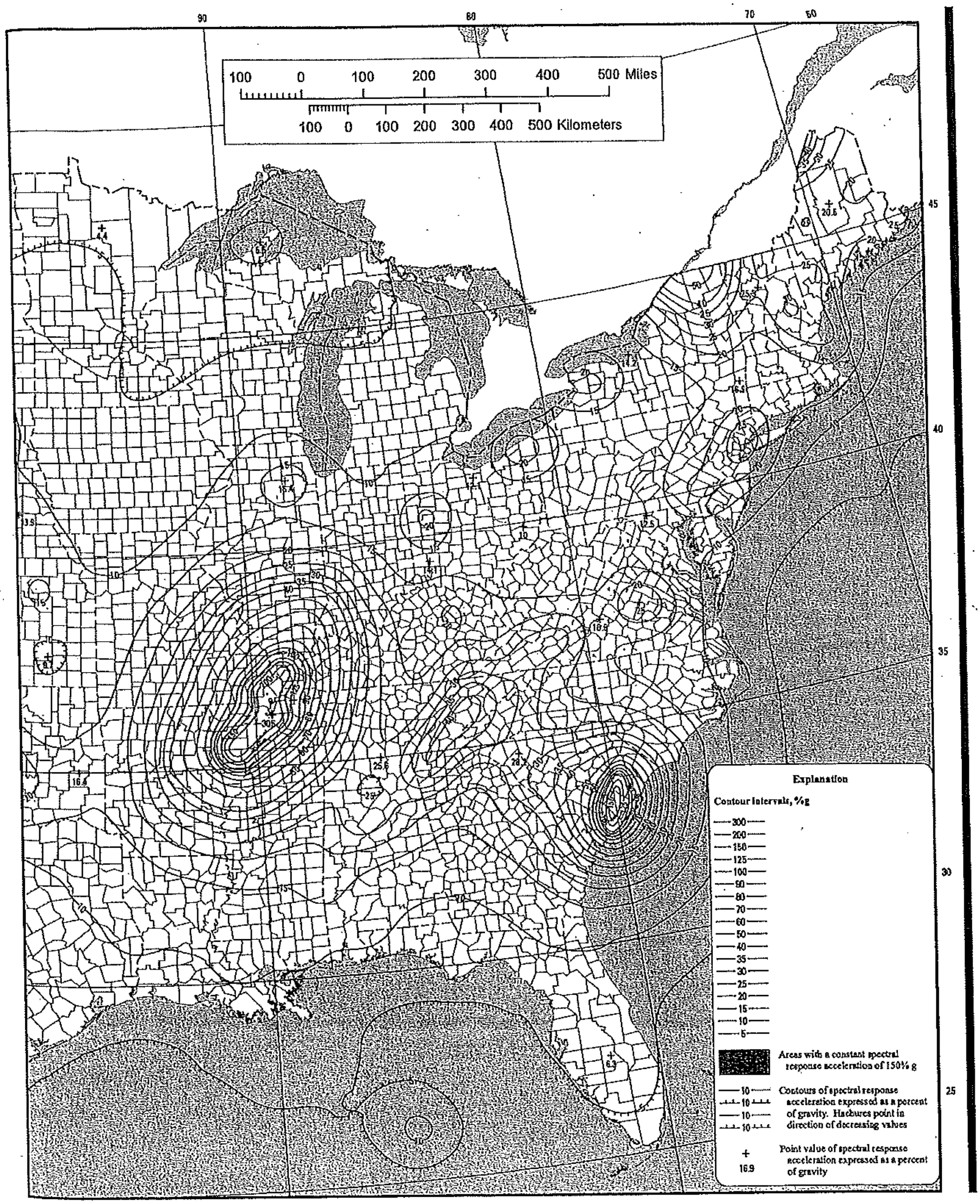


FIGURE 22-1 *(Continued)*

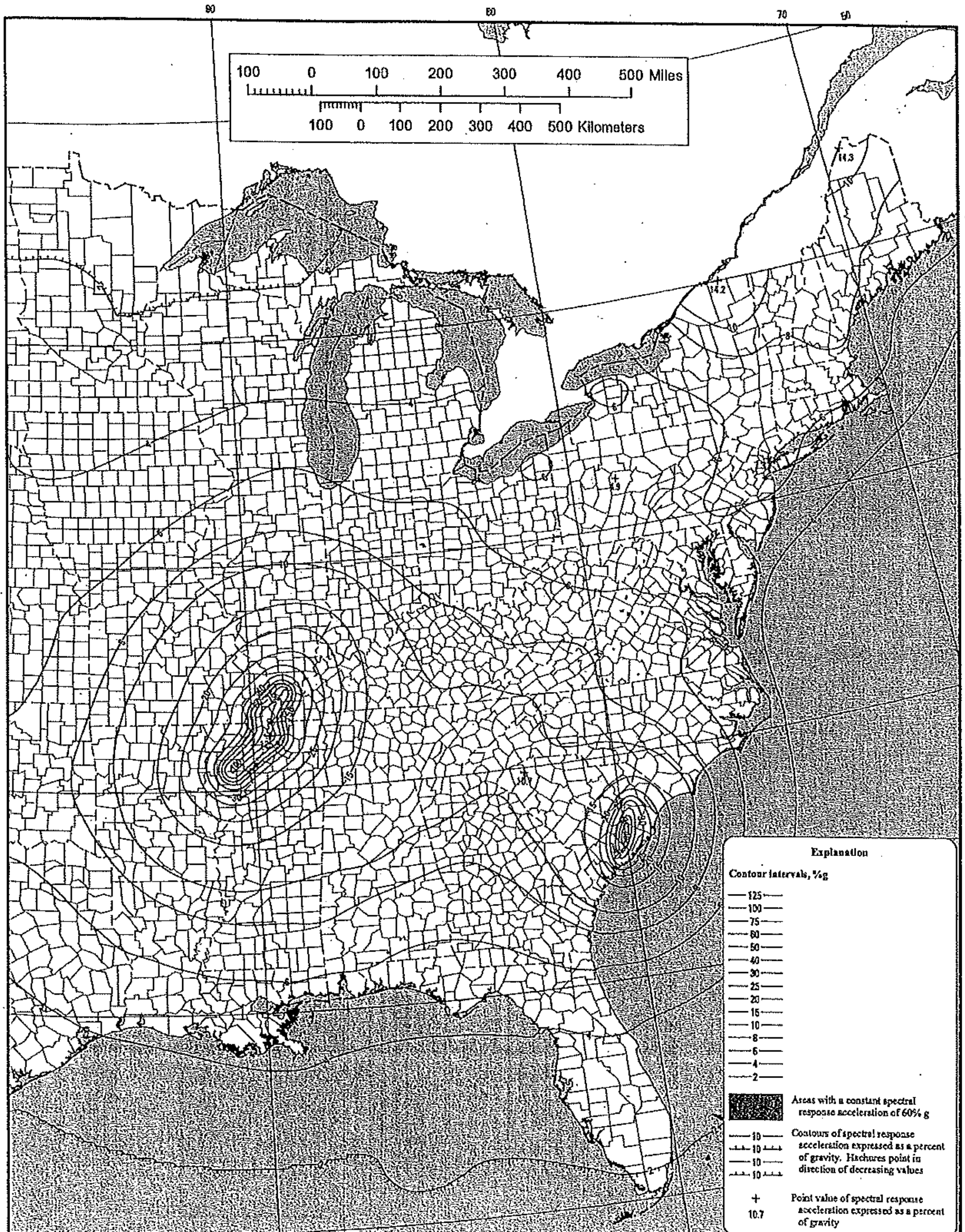


FIGURE 22-2 *(Continued)*

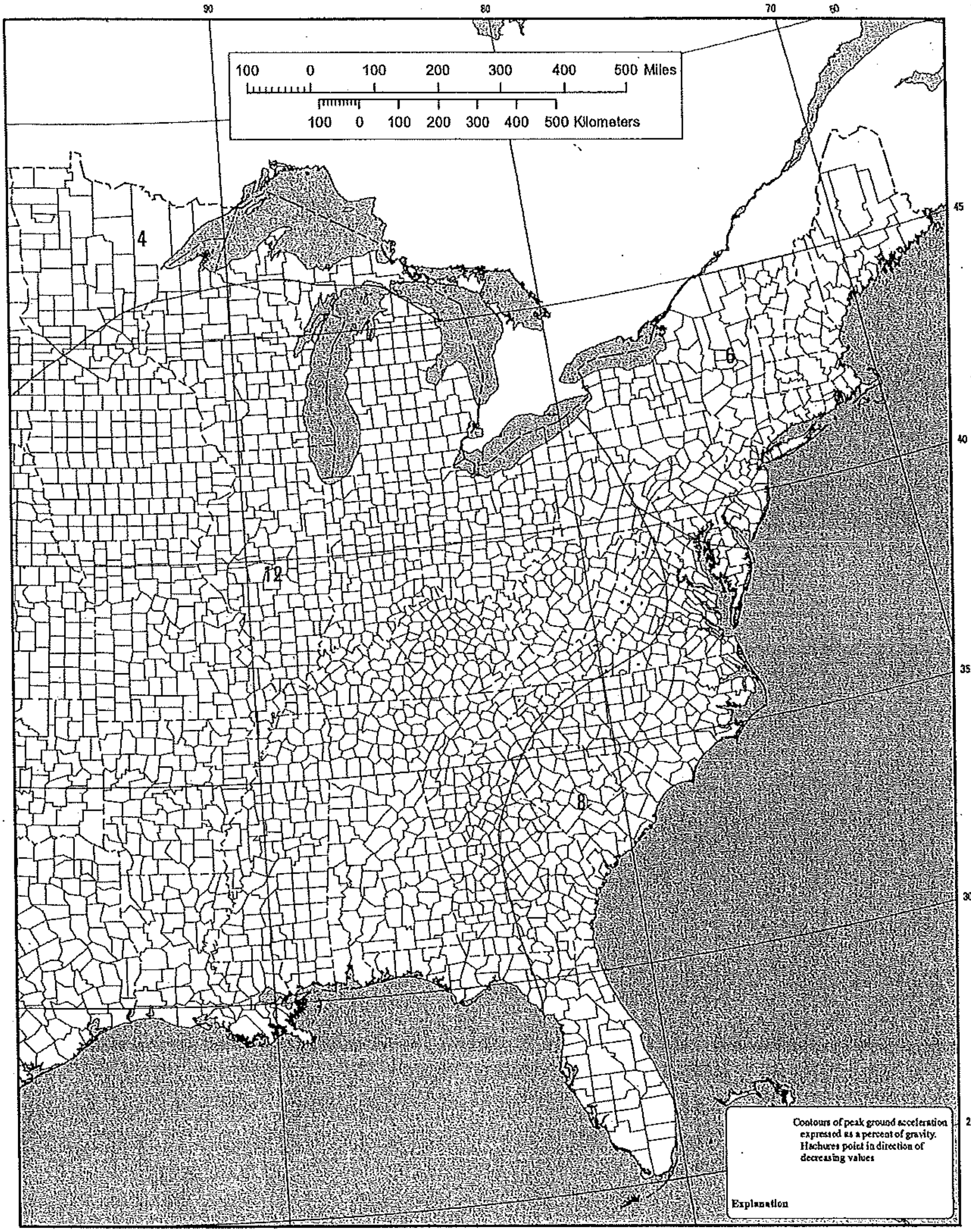
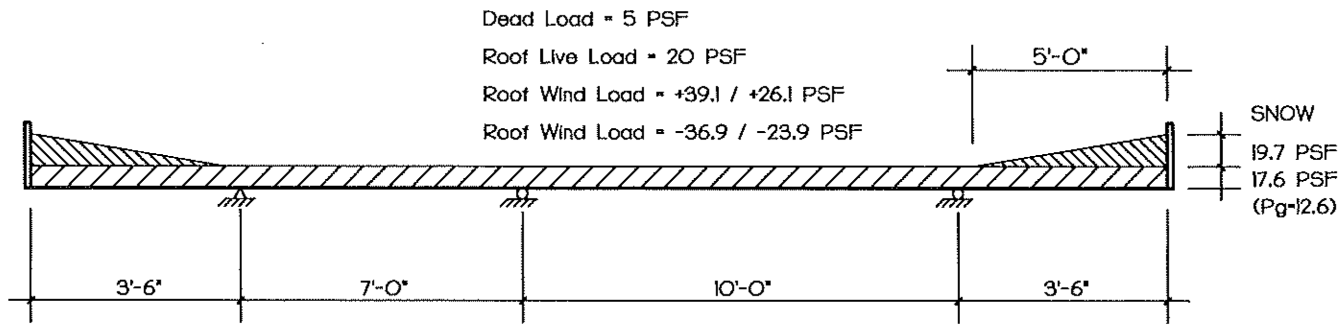


FIGURE 22-12 (*Continued*)



+Mmax =	.199	k-ft/ft x 16"/panel = .266	k-ft/panel	<=	0.819 k-ft	:OK	
-Mmax =	.264	k-ft/ft x 16"/panel = -.351	k-ft/panel	<=	-0.682 k-ft	:OK	
Rmax =	323	#/ft x 16"/panel = 431	#/panel		394 #/clip	:Single / Double clip panel	

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-...	LC	y-y Mome...	LC	z-z Mome...	LC
1	M1	1	max	0	18	0	18	0	18	0	18	0	18	0	18
2			min	0	1	0	1	0	1	0	1	0	1	0	1
3		2	max	0	18	16.748	18	0	18	0	18	0	18	.018	13
4			min	0	1	-39.762	13	0	1	0	1	0	1	-.007	18
5		3	max	0	18	33.495	18	0	18	0	18	0	18	.069	13
6			min	0	1	-77.112	13	0	1	0	1	0	1	-.029	18
7		4	max	0	18	50.242	18	0	18	0	18	0	18	.152	13
8			min	0	1	-112.05	13	0	1	0	1	0	1	-.066	18
9		5	max	0	18	66.99	18	0	18	0	18	0	18	.264	13
10			min	0	1	-144.576	13	0	1	0	1	0	1	-.117	18
11	M2	1	max	0	18	133.426	13	0	18	0	18	0	18	.264	13
12			min	0	1	-67.804	18	0	1	0	1	0	1	-.117	18
13		2	max	0	18	70.785	13	0	18	0	18	0	18	.086	13
14			min	0	1	-34.309	18	0	1	0	1	0	1	-.028	18
15		3	max	0	18	10.631	4	0	18	0	18	0	18	.023	4
16			min	0	1	-2.453	3	0	1	0	1	0	1	0	17
17		4	max	0	18	26.831	18	0	18	0	18	0	18	.065	11
18			min	0	1	-63.073	11	0	1	0	1	0	1	-.023	18
19		5	max	0	18	46.676	18	0	18	0	18	0	18	.224	11
20			min	0	1	-118.627	11	0	1	0	1	0	1	-.087	18
21	M3	1	max	0	18	163.989	11	0	18	0	18	0	18	.224	11
22			min	0	1	-61.59	18	0	1	0	1	0	1	-.087	18
23		2	max	0	18	84.626	11	0	18	0	18	0	18	.031	18
24			min	0	1	-33.24	18	0	1	0	1	0	1	-.088	13
25		3	max	0	18	5.53	9	0	18	0	18	0	18	.079	18
26			min	0	1	-9.318	14	0	1	0	1	0	1	-.199	11
27		4	max	0	18	39.06	18	0	18	0	18	0	18	.04	18
28			min	0	1	-88.168	13	0	1	0	1	0	1	-.102	11
29		5	max	0	18	86.91	18	0	18	0	18	0	18	.264	13
30			min	0	1	-179.786	11	0	1	0	1	0	1	-.117	18
31	M4	1	max	0	18	144.576	13	0	18	0	18	0	18	.264	13
32			min	0	1	-66.99	18	0	1	0	1	0	1	-.117	18
33		2	max	0	18	112.05	13	0	18	0	18	0	18	.152	13
34			min	0	1	-50.242	18	0	1	0	1	0	1	-.066	18
35		3	max	0	18	77.112	13	0	18	0	18	0	18	.069	13
36			min	0	1	-33.495	18	0	1	0	1	0	1	-.029	18
37		4	max	0	18	39.762	13	0	18	0	18	0	18	.018	13
38			min	0	1	-16.748	18	0	1	0	1	0	1	-.007	18
39		5	max	0	18	0	18	0	18	0	18	0	18	0	18
40			min	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N2	max	0	18	278.003	13	0	18	0	18	0	18	0	18
2		min	0	1	-134.794	18	0	1	0	1	0	1	0	1
3	N3	max	0	18	282.615	11	0	18	0	18	0	18	0	18
4		min	0	1	-108.266	18	0	1	0	1	0	1	0	1
5	N4	max	0	18	322.232	13	0	18	0	18	0	18	0	18
6		min	0	1	-153.9	18	0	1	0	1	0	1	0	1
7	Totals:	max	0	18	855.48	11	0	18						
8		min	0	1	-396.96	18	0	1						

Project #	62690 Circle K		Code: AISC 360-10
Project Nam	Fuel - Angier, NC		Chapter: Appendix 2: 2.1
Engineer	LDA		Page: 16.1-188-189
Date	12/22/22		Created: 3/14/2018

Ponding Check

"The roof system shall be considered stable for *ponding* and no further investigation is needed if both of the following two conditions are met:

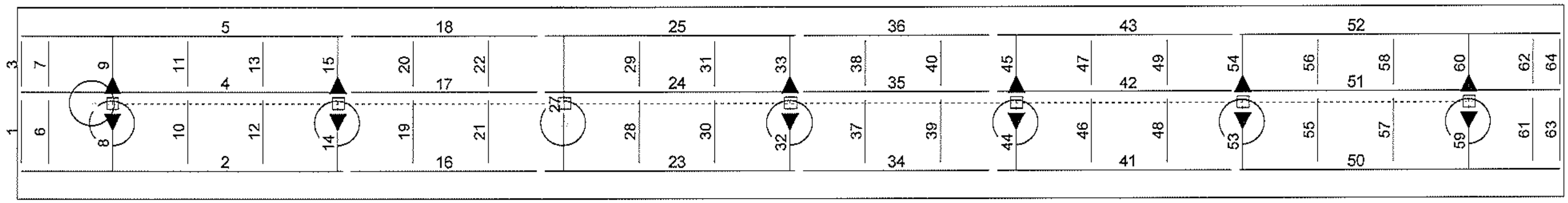
									Condition 1			Condition 2		Stable for
Primary	Cp	Lp(ft)	Ip(in^4)	Secondary	Cs	S(ft)	Ls(ft)	Is(in^4)	$C_p + 0.9C_s \leq 0.25$		(in^4)	$I_d \geq 25(S^4)10^{-6}$		Ponding
W14x30	0.02572	17	291	W12x16	0.16232	8.5	28	103	0.17180166	OK	0.439	0.131	OK	TRUE
W14x30	0.02572	17	291	W12x16	0.16232	8.5	28	103	0.17180166	OK	0.439	0.131	OK	TRUE

Floor Map

RAM Steel 17.04.02.12
DataBase: 62690 24x191.67 12-12 HSS12x12 A500C - Drain Holes
Building Code: IBC

12/22/22 10:57:56
Steel Code: AISC 360-10 LRFD

Floor Type: ROOF **Beam Numbers**



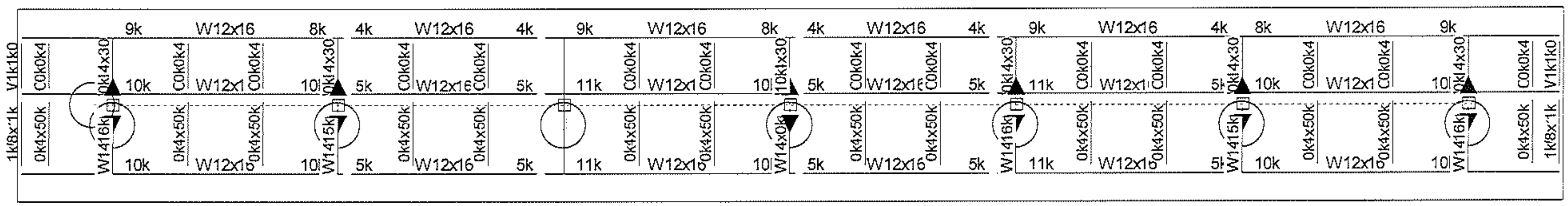
Floor Map

RAM Steel 17.04.02.12
DataBase: 62690 24x191.67 12-12 HSS12x12 A500C - Drain Holes
Building Code: IBC

12/22/22 10:57:56
Steel Code: AISC 360-10 LRFD

Floor Type: ROOF

Beam Designs



STEEL BEAM DESIGN SUMMARY:

Demand/Capacity Limits for: Strength: 1.000 Deflection: 1.000

Floor Type: ROOF

Bm #	Length ft	+Mu kip-ft	-Mu kip-ft	ΦMn kip-ft	Fy ksi	Beam Size	Studs
1	10.00	0.4	0.0	18.1	50.0	W8X10 u	
2	11.33	0.0	-24.0				
	28.00	29.8	-24.0	35.4	50.0	W12X16 u	
	0.67	0.0	-3.0				
3	7.00	0.2	0.0	27.3	50.0	W8X10 u	
4	11.33	0.0	-25.4				
	28.00	29.6	-25.4	35.5	50.0	W12X16 u	
	0.67	0.0	-3.0				
5	11.33	0.0	-19.8				
	28.00	25.6	-19.8	35.4	50.0	W12X16 u	
	0.67	0.0	-2.5				
6	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
7	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
8	8.50	0.0	-82.9	154.7	50.0	W14X30 u	
9	8.50	0.0	-71.9	177.4	50.0	W14X30 u	
10	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
11	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
12	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
13	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
14	8.50	0.0	-78.1	154.7	50.0	W14X30 u	
15	8.50	0.0	-66.8	177.4	50.0	W14X30 u	
16	25.00	26.7	0.0	35.6	50.0	W12X16 u	
17	25.00	26.9	0.0	35.6	50.0	W12X16 u	
18	25.00	22.5	0.0	35.6	50.0	W12X16 u	
19	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
20	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
21	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
22	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
23	2.33	0.0	-11.0				
	28.00	31.4	-11.0	35.4	50.0	W12X16 u	
	0.67	0.0	-3.0				
24	2.33	0.0	-11.0				
	28.00	31.5	-11.0	35.4	50.0	W12X16 u	
	0.67	0.0	-3.0				
25	2.33	0.0	-9.2				
	28.00	26.9	-9.2	35.4	50.0	W12X16 u	
	0.67	0.0	-2.5				
28	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
29	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	

Bm #	Length	+Mu	-Mu	ΦMn	Fy	Beam Size	Studs
30	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
31	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
32	8.50	0.0	-79.1	154.7	50.0	W14X30 u	
33	8.50	0.0	-67.8	177.4	50.0	W14X30 u	
34	25.00	26.7	0.0	35.6	50.0	W12X16 u	
35	25.00	26.9	0.0	35.6	50.0	W12X16 u	
36	25.00	22.5	0.0	35.6	50.0	W12X16 u	
37	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
38	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
39	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
40	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
41	2.33	0.0	-11.0				
	27.67	31.0	-11.0	35.4	50.0	W12X16 u	
42	2.33	0.0	-11.0				
	27.67	31.2	-11.0	35.4	50.0	W12X16 u	
43	2.33	0.0	-9.2				
	27.67	26.5	-9.2	35.4	50.0	W12X16 u	
44	8.50	0.0	-85.7	154.7	50.0	W14X30 u	
45	8.50	0.0	-72.7	177.4	50.0	W14X30 u	
46	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
47	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
48	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
49	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
50	0.33	0.0	-1.6				
	28.00	30.0	-24.0	35.4	50.0	W12X16 u	
	11.33	0.0	-24.0				
51	0.33	0.0	-1.6				
	28.00	29.8	-25.4	35.5	50.0	W12X16 u	
	11.33	0.0	-25.4				
52	0.33	0.0	-1.3				
	28.00	25.8	-19.8	35.4	50.0	W12X16 u	
	11.33	0.0	-19.8				
53	8.50	0.0	-79.3	154.7	50.0	W14X30 u	
54	8.50	0.0	-67.1	177.4	50.0	W14X30 u	
55	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
56	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
57	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
58	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
59	8.50	0.0	-83.0	154.7	50.0	W14X30 u	
60	8.50	0.0	-72.0	177.4	50.0	W14X30 u	
61	10.00	0.1	0.0	4.5	36.0	C4X5.4 u	
62	7.00	0.0	0.0	6.2	36.0	C4X5.4 u	
63	10.00	0.4	0.0	18.1	50.0	W8X10 u	
64	7.00	0.2	0.0	27.3	50.0	W8X10 u	

Member Code Check

RAM Frame 17.04.02.12
DataBase: 62690 24x191.67 12-12 HSS12x12 A500C - Drain Holes 12/22/22 11:02:31
Building Code: IBC Steel Code: AISC360-10 LRFD

BEAM INFORMATION:

Story Level = ROOF Frame Number = 0 Beam Number = 27
Fy (ksi) = 50.00
Beam Size = W14X30

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft)	8.50	1.50
Lu for Bending (ft)	8.50	1.50
K	1.00	1.00
Top Flange Continuously Braced	No	
Bottom Flange Continuously Braced	No	

CONTROLLING BEAM SEGMENT FORCES - SHEAR

Load Combination: 1.200 D + 1.200 ND1 + 1.600 Rfp + 1.600 NR1

Segment distance (ft) i - end 0.00
j - end 1.50

SHEAR CHECK:

Vux (kip)	=	15.55	1.00Vnx (kip)	=	111.78	Vux/1.00Vnx	=	0.139
Vuy (kip)	=	0.00	0.90Vny (kip)	=	139.92	Vuy/0.90Vny	=	0.000

CONTROLLING BEAM SEGMENT FORCES - AXIAL

Load Combination: 1.400 D + 1.400 ND1

Segment distance (ft) i - end 0.00
j - end 1.50

AXIAL CHECK:

Pu (kip)	=	0.00	0.90Pnx (kip)	=	398.25	Pu/0.90Pnx	=	0.000
			0.90Pny (kip)	=	398.25	Pu/0.90Pny	=	0.000
			0.90Pn (kip)	=	398.25	Pu/0.90Pn	=	0.000

CONTROLLING BEAM SEGMENT FORCES - FLEXURE

Load Combination: 1.200 D + 1.200 ND1 + 1.600 Rfp + 1.600 NR1

Segment distance (ft) i - end 0.00
j - end 1.50

CALCULATED PARAMETERS:

Pu (kip)	=	0.00	0.90Pn (kip)	=	398.25
Mux (kip-ft)	=	-64.88	0.90Mnx (kip-ft)	=	177.38
Muy(kip-ft)	=	-0.00	0.90Mny (kip-ft)	=	33.71
B1x	=	1.00	B1y	=	1.00
Cbx	=	1.00			

INTERACTION EQUATION:

$Pu/\phi Pn = 0.000$
Eq H1-1b: 0.000 + 0.366 + 0.000 = 0.366

Member Code Check

RAM Frame 17.04.02.12
DataBase: 62690 24x191.67 12-12 HSS12x12 A500C - Drain Holes 12/22/22 11:02:31
Building Code: IBC Steel Code: AISC360-10 LRFD

BEAM INFORMATION:

Story Level = ROOF Frame Number = 0 Beam Number = 26
Fy (ksi) = 50.00
Beam Size = W14X30

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft)	8.50	8.50
Lu for Bending (ft)	8.50	8.50
K	1.00	1.00
Top Flange Continuously Braced	No	
Bottom Flange Continuously Braced	No	

CONTROLLING BEAM SEGMENT FORCES - SHEAR

Load Combination: 1.200 D + 1.200 ND1 + 1.600 Rfp + 1.600 NR1

Segment distance (ft) i - end 0.00
j - end 8.50

SHEAR CHECK:

Vux (kip)	= -10.23	1.00Vnx (kip)	=	111.78	Vux/1.00Vnx	=	0.092
Vuy (kip)	= -0.00	0.90Vny (kip)	=	139.92	Vuy/0.90Vny	=	0.000

CONTROLLING BEAM SEGMENT FORCES - AXIAL

Load Combination: 1.400 D + 1.400 ND1

Segment distance (ft) i - end 0.00
j - end 8.50

AXIAL CHECK:

Pu (kip)	= 0.00	0.90Pnx (kip)	=	398.25	Pu/0.90Pnx	=	0.000
		0.90Pny (kip)	=	398.25	Pu/0.90Pny	=	0.000
		0.90Pn (kip)	=	398.25	Pu/0.90Pn	=	0.000

CONTROLLING BEAM SEGMENT FORCES - FLEXURE

Load Combination: 1.200 D + 1.200 ND1 + 1.600 Rfp + 1.600 NR1

Segment distance (ft) i - end 0.00
j - end 8.50

CALCULATED PARAMETERS:

Pu (kip)	=	0.00	0.90Pn (kip)	=	398.25
Mux (kip-ft)	=	-80.69	0.90Mnx (kip-ft)	=	154.72
Muy(kip-ft)	=	-0.00	0.90Mny (kip-ft)	=	33.71
B1x	=	1.00	B1y	=	1.00
Cbx	=	1.00			

INTERACTION EQUATION:

$Pu/\phi Pn = 0.000$
Eq H1-1b: 0.000 + 0.522 + 0.000 = 0.522

Member Code Check

RAM Frame 17.04.02.12
DataBase: 62690 24x191.67 12-12 HSS12x12 A500C - Drain Holes 12/22/22 11:02:31
Building Code: IBC Steel Code: AISC360-10 LRFD

COLUMN INFORMATION:

Story Level = ROOF Frame Number = 0 Column Number = 3
Fy (ksi) = 50.00
Column Size = HSS12X12X516H

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft)	20.50	20.50
Lu for Bending (ft)	20.50	20.50
K	1.00	1.00

CONTROLLING COLUMN FORCES - SHEAR

Load Combination: 1.200 D + 1.200 ND2 + 0.500 Rfp + 0.500 NR2 + 1.000 W2

Shear	Top	Vux (kip)	5.64
		Vuy (kip)	-0.00
Shear	Bot.	Vux (kip)	5.64
		Vuy (kip)	-0.00

SHEAR CHECK:

Vux (kip) =	5.64	0.90Vnx (kip) =	174.85	Vux/0.90Vnx =	0.032
Vuy (kip) =	-0.00	0.90Vny (kip) =	174.85	Vuy/0.90Vny =	0.000

CONTROLLING COLUMN FORCES - AXIAL

Load Combination: 1.200 D + 1.200 ND1 + 1.600 Rfp + 1.600 NR1

AXIAL CHECK:

Pu (kip) =	21.67	0.90Pnx (kip) =	402.92	Pu/0.90Pnx =	0.054
		0.90Pny (kip) =	415.48	Pu/0.90Pny =	0.052
		0.90Pn (kip) =	402.92	Pu/0.90Pn =	0.054

CONTROLLING COLUMN FORCES - FLEXURE

Load Combination: 1.200 D + 1.200 ND2 + 0.500 Rfp + 0.500 NR2 + 1.000 W2

Axial		Load (kip)	12.17
Moment	Top	Mux (kip-ft)	4.10
		Muy (kip-ft)	0.00
Moment	Bot.	Mux (kip-ft)	116.45
		Muy (kip-ft)	-0.00

CALCULATED PARAMETERS:

Pu (kip) =	12.17	0.90Pn (kip) =	402.92
Mux (kip-ft) =	116.45	0.90Mnx (kip-ft) =	147.17
Muy(kip-ft) =	-0.00	0.90Mny (kip-ft) =	177.00
KL/Rx =	53.80	KL/Ry =	49.24
Cmx =	0.61	Cmy =	1.00
B1x =	1.00	B1y =	1.01
Cbx =	1.63		

INTERACTION EQUATION:

$Pu/\phi Pn = 0.030$

Eq H1-1b: 0.015 + 0.791 + 0.000 = 0.806

Code Check Summary

RAM Frame 17.04.02.12
DataBase: 62690 24x191.67 12-12 HSS12x12 A500C - Drain Holes 12/22/22 11:02:31
Building Code: IBC Steel Code: AISC360-10 LRFD

CRITERIA:

Rigid End Zones:		Ignore Effects			
Member Force Output:		At Face of Joint			
P-Delta:	Yes	Scale Factor (DL):	1.20	Scale Factor (LL):	1.60
		Scale Factor (Roof):	1.00	Scale Factor (Snow):	1.00
Ground Level:	Base				

Mesh Criteria :
  Max. Distance Between Nodes on Mesh Line (ft) : 8.00
  Merge Node Tolerance (in) : 0.0100
  Geometry Tolerance (in) : 0.0050

Walls Out-of-plane Stiffness Not Included in Analysis.
Use Reduced Stiffness for Steel Members (AISC 360): $\tau b = 1.00$
Sign considered for Dynamic Load Case Results.
Rigid Links Not Included at Fixed Beam-to-Wall Locations
Eigenvalue Analysis : Eigen Vectors (Subspace Iteration)

LOAD COMBINATION CRITERIA:

Notional Loads	Consider with all Combinations in direction of lateral load
Live Load factor f1 (0.5 or 1.0)	0.500
Sds (for Ev)	0.182
RhoX	1.000
RhoY	1.000

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Rfp	PosRoofLiveLoad	RAMUSER
Rfn	NegRoofLiveLoad	RAMUSER
W1	WX	RAMUSERNODAL_W
W2	WY	RAMUSERNODAL_W
E1	EX	RAMUSERNODAL_S
E2	EY	RAMUSERNODAL_S
ND1	Notionall	NL_AISC360_DL_X
ND2	Notionall	NL_AISC360_DL_Y
NR1	Notionall	NL_AISC360_Rf_X
NR2	Notionall	NL_AISC360_Rf_Y

LOAD COMBINATIONS: IBC 2015 / ASCE 7-10 LRFD

1	*	1.400 D + 1.400 ND1
2	*	1.400 D + 1.400 ND2
3	*	1.400 D - 1.400 ND1
4	*	1.400 D - 1.400 ND2
5	*	1.200 D + 1.200 ND1 + 1.600 Rfp + 1.600 NR1
6	*	1.200 D + 1.200 ND2 + 1.600 Rfp + 1.600 NR2
7	*	1.200 D - 1.200 ND1 + 1.600 Rfp - 1.600 NR1
8	*	1.200 D - 1.200 ND2 + 1.600 Rfp - 1.600 NR2
9	*	1.200 D + 1.200 ND1 + 1.600 Rfn + 1.600 NR1
10	*	1.200 D + 1.200 ND2 + 1.600 Rfn + 1.600 NR2

11	*	1.200 D + 1.200 ND1 + 1.600 Rfp + 1.600 NR1 + 0.500 W1
12	*	1.200 D + 1.200 ND2 + 1.600 Rfp + 1.600 NR2 + 0.500 W2
13	*	1.200 D - 1.200 ND1 + 1.600 Rfp - 1.600 NR1 - 0.500 W1
14	*	1.200 D - 1.200 ND2 + 1.600 Rfp - 1.600 NR2 - 0.500 W2
15	*	1.200 D + 1.200 ND1 + 1.600 Rfn + 1.600 NR1 + 0.500 W1
16	*	1.200 D + 1.200 ND2 + 1.600 Rfn + 1.600 NR2 + 0.500 W2
17	*	1.200 D - 1.200 ND1 + 1.600 Rfn - 1.600 NR1 - 0.500 W1
18	*	1.200 D - 1.200 ND2 + 1.600 Rfn - 1.600 NR2 - 0.500 W2
19	*	1.200 D + 1.200 ND1 + 0.500 Rfp + 0.500 NR1 + 1.000 W1
20	*	1.200 D + 1.200 ND2 + 0.500 Rfp + 0.500 NR2 + 1.000 W2
21	*	1.200 D - 1.200 ND1 + 0.500 Rfp - 0.500 NR1 - 1.000 W1
22	*	1.200 D - 1.200 ND2 + 0.500 Rfp - 0.500 NR2 - 1.000 W2
23	*	1.200 D + 1.200 ND1 + 0.500 Rfn + 0.500 NR1 + 1.000 W1
24	*	1.200 D + 1.200 ND2 + 0.500 Rfn + 0.500 NR2 + 1.000 W2
25	*	1.200 D - 1.200 ND1 + 0.500 Rfn - 0.500 NR1 - 1.000 W1
26	*	1.200 D - 1.200 ND2 + 0.500 Rfn - 0.500 NR2 - 1.000 W2
27	*	1.200 D + 1.200 ND1 + 1.000 W1
28	*	1.200 D + 1.200 ND2 + 1.000 W2
29	*	1.200 D - 1.200 ND1 - 1.000 W1
30	*	1.200 D - 1.200 ND2 - 1.000 W2
31	*	0.900 D + 0.900 ND1 + 1.000 W1
32	*	0.900 D + 0.900 ND2 + 1.000 W2
33	*	0.900 D - 0.900 ND1 - 1.000 W1
34	*	0.900 D - 0.900 ND2 - 1.000 W2
35	*	1.236 D + 1.236 ND1 + 1.000 E1
36	*	1.236 D + 1.236 ND2 + 1.000 E2
37	*	1.236 D - 1.236 ND1 - 1.000 E1
38	*	1.236 D - 1.236 ND2 - 1.000 E2
39	*	0.864 D + 0.864 ND1 + 1.000 E1
40	*	0.864 D + 0.864 ND2 + 1.000 E2
41	*	0.864 D - 0.864 ND1 - 1.000 E1
42	*	0.864 D - 0.864 ND2 - 1.000 E2

* = Load combination currently selected to use

Frame #0:

Level: ROOF

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
3	12.17	116.45	-0.00	5.64	-0.00	20	0.81 (H1-1b)	50	HSS12X12X516H

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
26	0.00	-80.69	-0.00	-10.23	-0.00	5	0.52 (H1-1b)	50	W14X30
27	0.00	-64.88	-0.00	15.55	0.00	5	0.37 (H1-1b)	50	W14X30

Nodal Displacements

RAM Frame 17.04.02.12
DataBase: 62690 24x191.67 12-12 HSS12x12 A500C - Drain Holes 12/22/22 11:02:31

CRITERIA:

Rigid End Zones:		Ignore Effects			
Member Force Output:		At Face of Joint			
P-Delta:	Yes	Scale Factor (DL):	1.20	Scale Factor (LL):	1.60
		Scale Factor (Roof):	1.00	Scale Factor (Snow):	1.00
Ground Level:	Base				

Mesh Criteria :

Max. Distance Between Nodes on Mesh Line (ft) : 8.00
Merge Node Tolerance (in) : 0.0100
Geometry Tolerance (in) : 0.0050

Walls Out-of-plane Stiffness Not Included in Analysis.
Use Reduced Stiffness for Steel Members (AISC 360): $\tau b = 1.00$
Sign considered for Dynamic Load Case Results.
Rigid Links Not Included at Fixed Beam-to-Wall Locations
Eigenvalue Analysis : Eigen Vectors (Subspace Iteration)

LOAD CASES:

D	DeadLoad	RAMUSER
Rfp	PosRoofLiveLoad	RAMUSER
Rfn	NegRoofLiveLoad	RAMUSER
W1	WX	RAMUSERNODAL_W
W2	WY	RAMUSERNODAL_W
E1	EX	RAMUSERNODAL_S
E2	EY	RAMUSERNODAL_S
ND1	Notionall	NL_AISC360_DL_X
ND2	Notionall	NL_AISC360_DL_Y
NL1	Notionall	NL_AISC360_LL_X
NL2	Notionall	NL_AISC360_LL_Y
NR1	Notionall	NL_AISC360_Rf_X
NR2	Notionall	NL_AISC360_Rf_Y

Note: Nodal Displacements for Live Load Cases are based on Unreduced Live Loads.

Frame #0

Level: ROOF

Node	LdC	Disp X in	Disp Y in	Disp Z in	Theta X (rad)	Theta Y (rad)	Theta Z (rad)
1	D	0.00000	0.04412	-0.07293	0.00109	0.00000	0.00000
	Rfp	0.00000	-0.00000	-0.29235	0.00393	0.00000	0.00000
	Rfn	0.00000	0.00000	0.00298	-0.00004	0.00000	0.00000
	W1	0.49799	0.00000	0.00000	0.00000	0.00302	0.00000
	W2	0.00000	4.58235	2.83939	-0.02784	0.00000	0.00000
	E1	0.78255	0.00000	0.00000	0.00000	0.00475	0.00000
	E2	0.00000	0.84858	0.52581	-0.00516	0.00000	0.00000
	ND1	0.09237	0.00000	0.00000	0.00000	0.00056	-0.00000
	ND2	0.00000	0.11018	0.06827	-0.00067	0.00000	0.00000

Nodal Displacements

Node	LdC	Disp X	Disp Y	Disp Z	Theta X	Theta Y	Theta Z
	NL1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	NL2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	NR1	0.11781	0.00000	0.00000	0.00000	0.00072	0.00000
	NR2	0.00000	0.14053	0.08707	-0.00085	0.00000	0.00000
2	D	0.00000	0.04412	-0.00573	-0.00036	0.00000	0.00000
	Rfp	0.00000	-0.00000	-0.01262	0.00000	0.00000	0.00000
	Rfn	0.00000	0.00000	0.00013	-0.00000	0.00000	0.00000
	W1	0.49799	0.00000	0.00000	0.00000	0.00302	-0.00000
	W2	0.00000	4.58235	0.00000	-0.02784	0.00000	0.00000
	E1	0.78255	0.00000	0.00000	0.00000	0.00475	0.00000
	E2	0.00000	0.84858	0.00000	-0.00516	0.00000	0.00000
	ND1	0.09237	0.00000	0.00000	0.00000	0.00056	-0.00000
	ND2	0.00000	0.11018	-0.00000	-0.00067	0.00000	0.00000
	NL1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	NL2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	NR1	0.11781	0.00000	0.00000	0.00000	0.00072	0.00000
	NR2	0.00000	0.14053	0.00000	-0.00085	0.00000	-0.00000
3	D	0.00000	0.04412	-0.13755	-0.00167	0.00000	0.00000
	Rfp	0.00000	-0.00000	-0.25580	-0.00336	0.00000	0.00000
	Rfn	0.00000	0.00000	0.00261	0.00003	0.00000	0.00000
	W1	0.49799	0.00000	0.00000	0.00000	0.00302	-0.00000
	W2	0.00000	4.58235	-2.83939	-0.02784	0.00000	0.00000
	E1	0.78255	0.00000	0.00000	0.00000	0.00475	0.00000
	E2	0.00000	0.84858	-0.52581	-0.00516	0.00000	0.00000
	ND1	0.09237	0.00000	0.00000	0.00000	0.00056	0.00000
	ND2	0.00000	0.11018	-0.06827	-0.00067	0.00000	-0.00000
	NL1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	NL2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	NR1	0.11781	0.00000	0.00000	0.00000	0.00072	-0.00000
	NR2	0.00000	0.14053	-0.08707	-0.00085	0.00000	-0.00000

Frame Reactions

ptLr

RAM Frame 17.04.02.12
DataBase: 62690 24x191.67 12-12 HSS12x12 A500C - Drain Holes 12/22/22 11:02:31
Building Code: IBC

Bentley

CRITERIA:

Rigid End Zones:		Ignore Effects			
Member Force Output:		At Face of Joint			
P-Delta:	Yes	Scale Factor (DL):	1.20	Scale Factor (LL):	1.60
		Scale Factor (Roof):	1.00	Scale Factor (Snow):	1.00
Ground Level:	Base				

Mesh Criteria :

Max. Distance Between Nodes on Mesh Line (ft) : 8.00
Merge Node Tolerance (in) : 0.0100
Geometry Tolerance (in) : 0.0050

Walls Out-of-plane Stiffness Not Included in Analysis.
Use Reduced Stiffness for Steel Members (AISC 360): $\tau b = 1.00$
Sign considered for Dynamic Load Case Results.
Rigid Links Not Included at Fixed Beam-to-Wall Locations
Eigenvalue Analysis : Eigen Vectors (Subspace Iteration)

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Rfp	PosRoofLiveLoad	RAMUSER
Rfn	NegRoofLiveLoad	RAMUSER
W1	WX	RAMUSERNODAL_W
W2	WY	RAMUSERNODAL_W
E1	EX	RAMUSERNODAL_S
E2	EY	RAMUSERNODAL_S
ND1	Notionall	NL_AISC360_DL_X
ND2	Notionall	NL_AISC360_DL_Y
NL1	Notionall	NL_AISC360_LL_X
NL2	Notionall	NL_AISC360_LL_Y
NR1	Notionall	NL_AISC360_Rf_X
NR2	Notionall	NL_AISC360_Rf_Y

Frame #0:

Node	LdC	Rx kips	Ry kips	Rz kips	Mxx kip-ft	Myy kip-ft	Tzz kip-ft
4	D	-0.00	-0.00	6.54	0.71	-0.00	0.00
	Rfp	-0.00	-0.00	8.64	-0.00	0.00	0.00
	Rfn	-0.00	-0.00	-0.09	0.00	-0.00	0.00
	W1	-0.70	0.00	0.00	-0.00	-14.35	0.00
	W2	-0.00	-5.40	-0.00	110.70	-0.00	0.00
	E1	-1.10	0.00	0.00	-0.00	-22.55	-0.00
	E2	-0.00	-1.00	-0.00	20.50	-0.00	0.00
	ND1	-0.13	0.00	0.00	-0.00	-2.66	0.00
	ND2	-0.00	-0.13	0.00	2.66	-0.00	-0.00
	NL1	0.00	0.00	0.00	0.00	0.00	0.00
	NL2	0.00	0.00	0.00	0.00	0.00	0.00
	NR1	-0.17	0.00	0.00	-0.00	-3.39	-0.00

Frame Reactions

Node	LdC	Rx	Ry	Rz	Mxx	Myy	Tzz
	NR2	-0.00	-0.17	-0.00	3.39	-0.00	0.00

Frame Reactions

RAM Frame 17.04.02.12 Snow Drift

DataBase: 62690 24x191.67 12-12 HSS12x12 A500C - Drain Holes 12/22/22 11:03:54

Building Code: IBC

CRITERIA:

Rigid End Zones:		Ignore Effects			
Member Force Output:		At Face of Joint			
P-Delta:	Yes	Scale Factor (DL):	1.20	Scale Factor (LL):	1.60
		Scale Factor (Roof):	1.00	Scale Factor (Snow):	1.00
Ground Level:	Base				

Mesh Criteria :

Max. Distance Between Nodes on Mesh Line (ft) : 8.00

Merge Node Tolerance (in) : 0.0100

Geometry Tolerance (in) : 0.0050

Walls Out-of-plane Stiffness Not Included in Analysis.

Use Reduced Stiffness for Steel Members (AISC 360): τb = 1.00

Sign considered for Dynamic Load Case Results.

Rigid Links Not Included at Fixed Beam-to-Wall Locations

Eigenvalue Analysis : Eigen Vectors (Subspace Iteration)

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Sp	PosSnowLoad	RAMUSER
Sn	NegSnowLoad	RAMUSER
W1	WX	RAMUSERNODAL_W
W2	WY	RAMUSERNODAL_W
E1	EX	RAMUSERNODAL_S
E2	EY	RAMUSERNODAL_S
ND1	Notionall	NL_AISC360_DL_X
ND2	Notionall	NL_AISC360_DL_Y
NL1	Notionall	NL_AISC360_LL_X
NL2	Notionall	NL_AISC360_LL_Y
NR1	Notionall	NL_AISC360_Rf_X
NR2	Notionall	NL_AISC360_Rf_Y

Frame #0:

Node	LdC	Rx kips	Ry kips	Rz kips	Mxx kip-ft	Myy kip-ft	Tzz kip-ft
4	D	-0.00	-0.00	6.54	0.71	-0.00	0.00
	Sp	-0.00	-0.00	14.69	-0.21	0.00	0.00
	Sn	-0.00	-0.00	-0.15	0.00	-0.00	0.00
	W1	-0.70	0.00	0.00	-0.00	-14.35	0.00
	W2	-0.00	-5.40	-0.00	110.70	-0.00	0.00
	E1	-1.10	0.00	0.00	-0.00	-22.55	-0.00
	E2	-0.00	-1.00	-0.00	20.50	-0.00	0.00
	ND1	-0.13	0.00	0.00	-0.00	-2.66	0.00
	ND2	-0.00	-0.13	0.00	2.66	-0.00	-0.00
	NL1	0.00	0.00	0.00	0.00	0.00	0.00
	NL2	0.00	0.00	0.00	0.00	0.00	0.00
	NR1	-0.29	0.00	0.00	-0.00	-5.91	-0.00

Frame Reactions

Node	LdC	Rx	Ry	Rz	Mxx	Myy	Tzz
	NR2	-0.00	-0.29	-0.00	5.91	-0.00	-0.00

Frame Reactions

RAM Frame 17.04.02.12　　SNOW DRIFT PART
DataBase: 62690 24x191.67 12-12 HSS12x12 A500C - Drain Holes　　12/22/22 11:05:09
Building Code: IBC

CRITERIA:

Rigid End Zones:		Ignore Effects			
Member Force Output:		At Face of Joint			
P-Delta:	Yes	Scale Factor (DL):	1.20	Scale Factor (LL):	1.60
		Scale Factor (Roof):	1.00	Scale Factor (Snow):	1.00
Ground Level:	Base				

Mesh Criteria :

Max. Distance Between Nodes on Mesh Line (ft) : 8.00
Merge Node Tolerance (in) : 0.0100
Geometry Tolerance (in) : 0.0050

Walls Out-of-plane Stiffness Not Included in Analysis.
Use Reduced Stiffness for Steel Members (AISC 360):　　τb = 1.00
Sign considered for Dynamic Load Case Results.
Rigid Links Not Included at Fixed Beam-to-Wall Locations
Eigenvalue Analysis : Eigen Vectors (Subspace Iteration)

LOAD CASE DEFINITIONS:

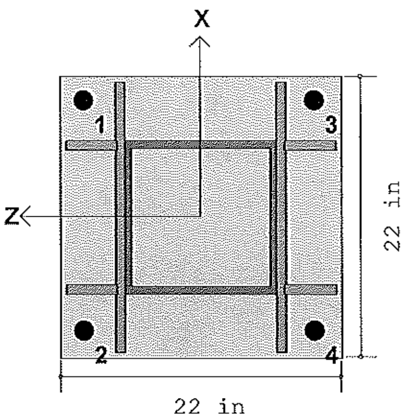
D	DeadLoad	RAMUSER
Sp	PosSnowLoad	RAMUSER
Sn	NegSnowLoad	RAMUSER
W1	WX	RAMUSERNODAL_W
W2	WY	RAMUSERNODAL_W
E1	EX	RAMUSERNODAL_S
E2	EY	RAMUSERNODAL_S
ND1	Notionall	NL_AISC360_DL_X
ND2	Notionall	NL_AISC360_DL_Y
NL1	Notionall	NL_AISC360_LL_X
NL2	Notionall	NL_AISC360_LL_Y
NR1	Notionall	NL_AISC360_Rf_X
NR2	Notionall	NL_AISC360_Rf_Y

Frame #0:

Node	LdC	Rx kips	Ry kips	Rz kips	Mxx kip-ft	Myy kip-ft	Tzz kip-ft
4	D	-0.00	-0.00	6.54	0.71	-0.00	0.00
	Sp	-0.00	-0.00	13.67	9.01	-0.00	0.00
	Sn	-0.00	-0.00	-0.14	-0.09	0.00	0.00
	W1	-0.70	0.00	0.00	-0.00	-14.35	0.00
	W2	-0.00	-5.40	-0.00	110.70	-0.00	0.00
	E1	-1.10	0.00	0.00	-0.00	-22.55	-0.00
	E2	-0.00	-1.00	-0.00	20.50	-0.00	0.00
	ND1	-0.13	0.00	0.00	-0.00	-2.66	0.00
	ND2	-0.00	-0.13	0.00	2.66	-0.00	-0.00
	NL1	0.00	0.00	0.00	0.00	0.00	0.00
	NL2	0.00	0.00	0.00	0.00	0.00	0.00
	NR1	-0.27	0.00	0.00	-0.00	-5.49	0.00

Node	LdC	Rx	Ry	Rz	Mxx	Myy	Tzz
	NR2	-0.00	-0.27	0.00	5.49	-0.00	0.00

Circle K Angier, NC Base Plate



Stiffened Base Plate Connection

Base Plate Thickness	: 1.25 in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 3.315 ksi
Anchor Bolt Diameter	: 1.5 in
Anchor Bolt Material	: F1554-36
Anchor Bolt Fu	: 58. ksi
Column Shape	: HSS12x12x6
Steel Code	: AISC 14th:LRFD
Concrete Code	: ACI 318-11

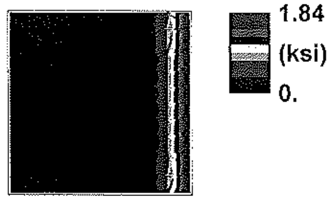
Coarse Solution Selected

Bearing Pressure

Maximum Bearing 1.84 ksi

Max/Allowable Ratio .555 IBC 16-4 (a)

(ABIF = 1.000)

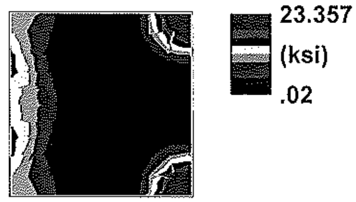


Base Plate Stress

Maximum Stress 23.357 ksi

Max/Allowable Ratio .481 IBC 16-6 (b)

(ASIF = 1.000)



Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	9.	9.	30.162	0.	-1.4	43.5	17.069	26.1	.792	.523 (T)	IBC 16-6 (a) (13)
2	-9.	9.	30.162	0.	-1.4	43.5	17.069	26.1	.792	.523 (T)	IBC 16-6 (a) (13)
3	9.	-9.	38.303	0.	1.4	43.5	21.677	26.1	.792	.664 (T)	IBC 16-6 (b) (14)
4	-9.	-9.	38.303	0.	1.4	43.5	21.677	26.1	.792	.664 (T)	IBC 16-6 (b) (14)

Note: Fnt and Fnv shown above include phi factors.

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)
DL	6.6			.8	
LL	14.7			9.1	
WL	17.5		5.6	114.	
EL			1.2	24.	

Anchor Bolt Embed Capacity Results

Note: All capacities shown include phi factors

Single Bolt Tension Envelope Results

LC	Bolt	Tens.(k)	Nsa(k)	Ncb(k)	Npn(k)	Nsb(k)	Unity	Ductility	Load(k)	Steel(in2)
14	3	38.303	61.335	74.191	52.416	0.	.731	N.A.	0.	0.

Single Bolt Vx Envelope Results

LC	Bolt	Vx (k)	Vz (k)	Vsa(k)	VcbXx(k)	VcbXz(k)	VcbZz(k)	VcbZx(k)	Vcp (k)	VxUnity	VzUnity
1	1	0.	.3	25.515	44.756	71.158	32.021	71.158	138.49	0.	.012

Seismic Ductility & Anchor Reinforcement Results

LC	Bolt	Vx (k)	Vz (k)	VxUnity	VzUnity	Vx-Duct	Vx-L(k)	Vx-St(in2)	Vz-Duct	Vz-L(k)	Vz-St(in2)
1	1	0.	.3	0.	.012	N.A.	0.	0.	N.A.	0.	0.

Single Bolt Vz Envelope Results

LC	Bolt	Vx (k)	Vz (k)	Vsa(k)	VcbXx(k)	VcbXz(k)	VcbZz(k)	VcbZx(k)	Vcp (k)	VxUnity	VzUnity
9	1	0.	1.4	25.515	44.756	71.158	32.021	71.158	138.49	0.	.055

Seismic Ductility & Anchor Reinforcement Results

LC	Bolt	Vx (k)	Vz (k)	VxUnity	VzUnity	Vx-Duct	Vx-L(k)	Vx-St(in2)	Vz-Duct	Vz-L(k)	Vz-St(in2)
9	1	0.	1.4	0.	.055	N.A.	0.	0.	N.A.	0.	0.

Single Bolt: Combined Tension and Shear Capacity Envelope Results

LC	Bolt	Nn(k)	Vnx(k)	Vnz(k)	SRSS	Interaction
1	1	39.312	25.515	25.515	.16	N.A.

Group Bolt: Tension Capacity Envelope Results

LC	Group	Tens.(k)	Nsa.(k)	Ncb.(k)	Nsb.(k)	Unity	Ductility	Load(k)	Steel(in^2)
14	T-1	76.606	0.	109.084	0.	.702	N.A.	0.	0.

Vz Shear Groups Capacity Envelope Results

LC	Gr	Type	Failure	Vx (k)	Vz (k)	Vsa(k)	VcbXx(k)	VcbXz(k)	VcbZz(k)	VcbZx(k)	Vcp (k)	VxUnity	VzUnity
9	S-1	+Vz	Full	0.	5.6	0.	0.	0.	36.596	81.323	203.623	N.A.	.153
			Nr Edge	0.	2.8	0.	0.	0.	36.596	64.042	142.536	N.A.	.077

Seismic Ductility & Anchor Reinforcement Results

LC	Gr	Type	Failure	Vx (k)	Vz (k)	VxUnity	VzUnity	Vx-Duct	Vx-L(k)	Vx-St(in2)	Vz-Duct	Vz-L(k)	Vz-St(in2)
9	S-1	+Vz	Full	0.	5.6	N.A.	.153	N.A.	0.	0.	N.A.	0.	0.
			Nr Edge	0.	2.8	N.A.	.077	N.A.	0.	0.	N.A.	0.	0.

Footing	5'x5'x6'		
Reported	2500psf		
Pd =	6.6	kips	
Plr =	8.7	kips	
Ps =	14.7	kips	
pw=	17.5	kips	
Md =	0.8	kip-ft	
Mlr =	0	kip-ft	
Ms =	9.1	kip-ft	
Mw =	114	kip-ft	
Me =	24	kip-ft	
Vw =	5.6	kips	
Ve =	1.2	kips	
z =	20.5	ft	Top of canopy above ftng

Foundation Design

Fp =	2500	psf	Allowable soil bearing pressure	
(gamma)s =	110	pcf	Unit weight Soil	
(gamma)c =	145	pcf	Unit weight Concrete	
B =	5	ft	Footing Width	
L =	5	ft	Footing Length	
D =	6	ft	Footing Depth	
t slab =	4	in	Slab Thickness	
TOF	24	in		
D wt	3	ft	Depth of water table below grade	
	5	ft	Depth of footing into water table	
P buoyancy =	7.8	kips		
			x2	
So =	150	psf/ft	300	
μ =	0.35			
Af =	25	sf		

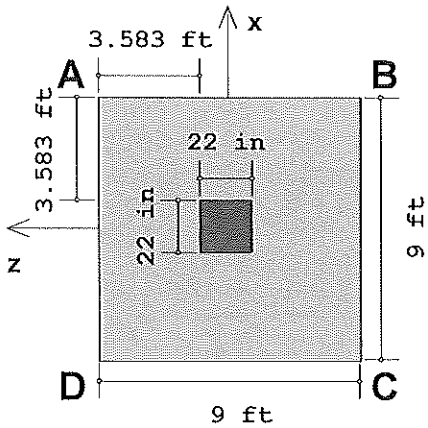
Dead Loads

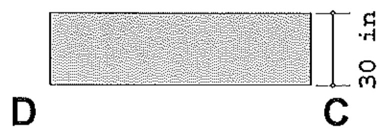
Pd =	6.60	kips		
Pd ftng =	21.75	kips		
Pd slab =	1.21	kips		
Pd soil =	4.58	kips		
Pd total =	34.14	kips	Dead Load for Uplift	
Pmax(lr,sl) =	14.7	kips		
fp =	852	psf	D+(Lr or S)	**OK**
fp =	1552	psf	D+(Lr or S)+W	**OK**
P up =	-18.3	kips	0.6D-0.6W	
P resisting =	20.49	kips		
SF Uplift	1.12	**>= 1 : OK**		

Constrained Post Footing

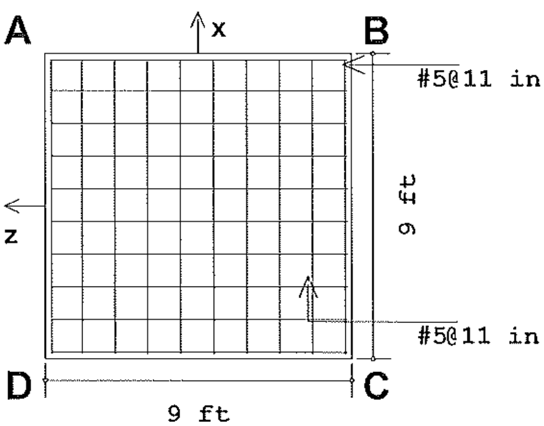
P (lbs)	h (ft)	S0 psf/ft	d (ft)	S3 psf/ft	b (ft)	d (ft)	d calc (ft)	d / d calc
3,500	20.5	300.00	5.28	2185.00	5.00	**5.28**	5.28	1.000

Sketch





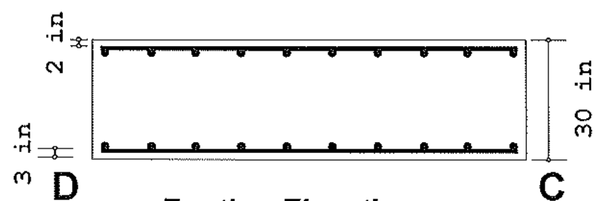
Details



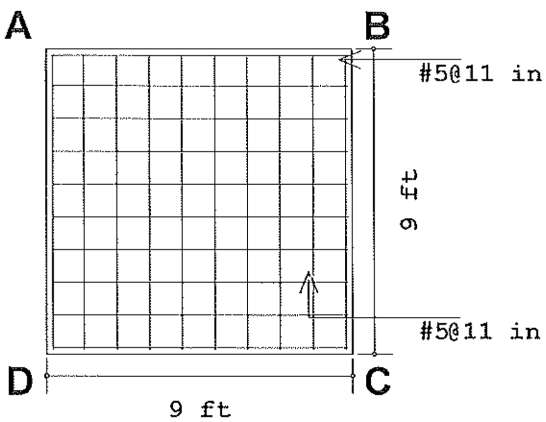
x Dir. Steel: 3.07 in^2 (10 #5)

z Dir. Steel: 3.07 in^2 (10 #5)

Bottom Rebar Plan



Footing Elevation



x Dir. Steel: 3.07 in^2 (10 #5)

z Dir. Steel: 3.07 in^2 (10 #5)

Top Rebar Plan

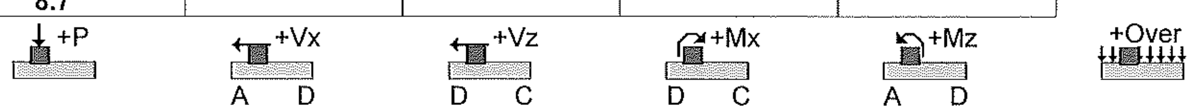
Geometry, Materials and Criteria

Length	: **9 ft**	eX	: **0 in**	Gross Allow. Bearing	: **2500 psf (gross)**	Steel fy	: **60 ksi**
Width	: **9 ft**	eZ	: **0 in**	Concrete Weight	: **150 pcf**	Minimum Steel	: **.0018**
Thickness	: **30 in**	pX	: **22 in**	Concrete f'c	: **3 ksi**	Maximum Steel	: **.0075**
Height	: **0 in**	pZ	: **22 in**	Design Code	: **ACI 318-11**		

Footing Top Bar Cover	: **2 in**	Overturning / Sliding SF	: **1**	Phi for Flexure	: **0.9**
Footing Bottom Bar Cover	: **3 in**	Coefficient of Friction	: **0.35**	Phi for Shear	: **0.75**
Pedestal Longitudinal Bar Cover	: **1.5 in**	Passive Resistance of Soil	: **0 k**	Phi for Bearing	: **0.65**

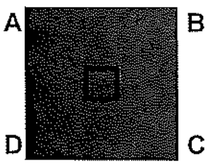
Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL	**6.6**			**.8**		**100**
EL	**1**		**1.2**	**24**		
WL	**17.5**		**5.6**	**114**		
SL	**14.7**			**9.1**		
RLL	**8.7**					

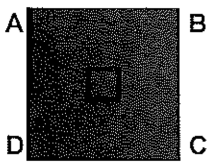


Soil Bearing

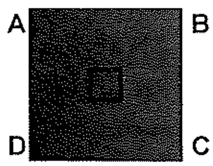
Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
ASCE 1	1DL	2500	563.066 (B)	.225
ASCE 2	1DL+1HL+1LL+1LLS	2500	563.066 (B)	.225
ASCE 3 (a)	1DL+1HL+1RLL	2500	670.473 (B)	.268
ASCE 3 (b)	1DL+1HL+1SL	2500	819.444 (B)	.328
ASCE 3 (c)	1DL+1HL+1RL	2500	563.066 (B)	.225
ASCE 4 (a)	1DL+1HL+.75LL+.75LLS+..	2500	643.621 (B)	.257
ASCE 4 (b)	1DL+1HL+.75LL+.75LLS+..	2500	755.35 (B)	.302
ASCE 4 (c)	1DL+1HL+.75LL+.75LLS+..	2500	563.066 (B)	.225
ASCE 5 (a) (a)	1DL+1HL+.6WL	2500	1186.52 (B)	.475
ASCE 5 (a) (b)	1DL+1HL-.6WL	2500	918.692 (A)	.367
ASCE 5 (b) (a)	1DL+1HL+.7EL	2500	692.695 (B)	.277
ASCE 5 (b) (b)	1DL+1HL-.7EL	2500	662.243 (A)	.265
ASCE 6 (a) (a)	1DL+1HL+.45WL+.75LL+..	2500	1111.21 (B)	.444
ASCE 6 (a) (b)	1DL+1HL-.45WL+.75LL+..	2500	903.601 (A)	.361
ASCE 6 (b) (a)	1DL+1HL+.525EL+.75LL+..	2500	740.844 (B)	.296
ASCE 6 (b) (b)	1DL+1HL-.525EL+.75LL+..	2500	714.712 (A)	.286
ASCE 6 (c) (a)	1DL+1HL+.45WL+.75LL+..	2500	1222.94 (B)	.489
ASCE 6 (c) (b)	1DL+1HL-.45WL+.75LL+..	2500	902.984 (A)	.361
ASCE 6 (d) (a)	1DL+1HL+.525EL+.75LL+..	2500	852.572 (B)	.341
ASCE 6 (d) (b)	1DL+1HL-.525EL+.75LL+..	2500	714.095 (A)	.286
ASCE 6 (e) (a)	1DL+1HL+.45WL+.75LL+..	2500	1030.66 (B)	.412
ASCE 6 (e) (b)	1DL+1HL-.45WL+.75LL+..	2500	823.045 (A)	.329
ASCE 6 (f) (a)	1DL+1HL+.525EL+.75LL+..	2500	660.288 (B)	.264
ASCE 6 (f) (b)	1DL+1HL-.525EL+.75LL+..	2500	634.156 (A)	.254
ASCE 7 (a) (a)	.6DL+1HL+.6WL	2500	962.611 (B)	.385
ASCE 7 (a) (b)	.6DL+1HL-.6WL	2500	1357.9 (A)	.543
ASCE 7 (b) (a)	.6DL+.6HL+.6WL	2500	962.611 (B)	.385
ASCE 7 (b) (b)	.6DL+.6HL-.6WL	2500	1357.9 (A)	.543
ASCE 8 (a) (a)	.6DL+1HL+.7EL	2500	467.469 (B)	.187
ASCE 8 (a) (b)	.6DL+1HL-.7EL	2500	442.284 (A)	.177
ASCE 8 (b) (a)	.6DL+.6HL+.7EL	2500	467.469 (B)	.187
ASCE 8 (b) (b)	.6DL+.6HL-.7EL	2500	442.284 (A)	.177



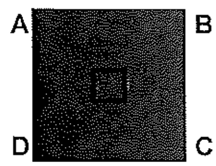
1DL
QA: 549.897 psf
QB: 563.066 psf
QC: 563.066 psf
QD: 549.897 psf
NAZ: 4617.84 in
NAX: -1 in



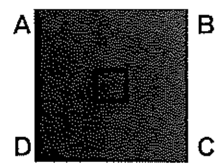
1DL+1HL+1LL+1LLS
QA: 549.897 psf
QB: 563.066 psf
QC: 563.066 psf
QD: 549.897 psf
NAZ: 4617.84 in
NAX: -1 in



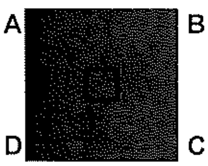
1DL+1HL+1RLL
QA: 657.305 psf
QB: 670.473 psf
QC: 670.473 psf
QD: 657.305 psf
NAZ: 5498.72 in
NAX: -1 in



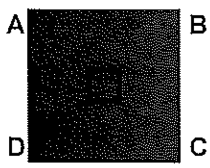
1DL+1HL+1SL
QA: 656.481 psf
QB: 819.444 psf
QC: 819.444 psf
QD: 656.481 psf
NAZ: 543.068 in
NAX: -1 in



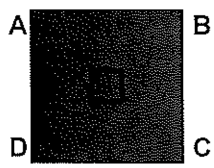
1DL+1HL+1RL
QA: 549.897 psf
QB: 563.066 psf
QC: 563.066 psf
QD: 549.897 psf
NAZ: 4617.84 in
NAX: -1 in



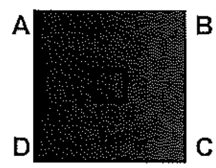
1DL+1HL+.75LL+.75LLS
QA: 630.453 psf
QB: 643.621 psf
QC: 643.621 psf
QD: 630.453 psf
NAZ: 5278.5 in
NAX: -1 in



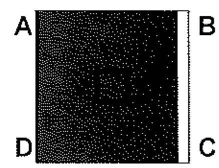
1DL+1HL+.75LL+.75LLS
QA: 629.835 psf
QB: 755.35 psf
QC: 755.35 psf
QD: 629.835 psf
NAZ: 649.948 in
NAX: -1 in



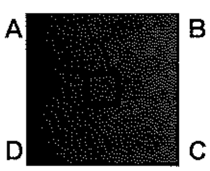
1DL+1HL+.75LL+.75LLS
QA: 549.897 psf
QB: 563.066 psf
QC: 563.066 psf
QD: 549.897 psf
NAZ: 4617.84 in
NAX: -1 in



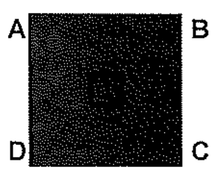
1DL+1HL+.6WL
QA: 185.7 psf
QB: 1186.52 psf
QC: 1186.52 psf
QD: 185.7 psf
NAZ: 128.039 in
NAX: -1 in



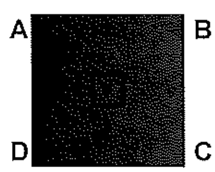
1DL+1HL-.6WL
QA: 918.692 psf
QB: 0 psf
QC: 0 psf
QD: 918.692 psf
NAZ: 100.36 in
NAX: -1 in



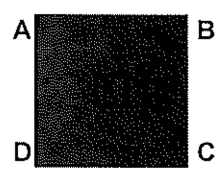
1DL+1HL+.7EL
QA: 437.551 psf
QB: 692.695 psf
QC: 692.695 psf
QD: 437.551 psf
NAZ: 293.211 in
NAX: -1 in



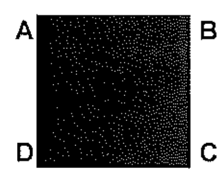
1DL+1HL-.7EL
QA: 662.243 psf
QB: 433.436 psf
QC: 433.436 psf
QD: 662.243 psf
NAZ: 312.588 in
NAX: -1 in



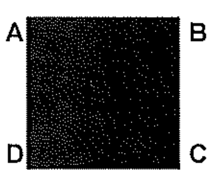
1DL+1HL+.45WL+.75LL
QA: 357.305 psf
QB: 1111.21 psf
QC: 1111.21 psf
QD: 357.305 psf
NAZ: 159.185 in
NAX: -1 in



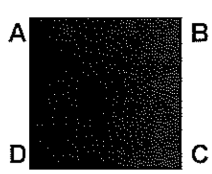
1DL+1HL-.45WL+.75LL
QA: 903.601 psf
QB: 176.029 psf
QC: 176.029 psf
QD: 903.601 psf
NAZ: 134.13 in
NAX: -1 in



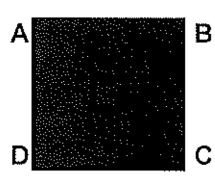
1DL+1HL+.525EL+.75LL+..
QA: 546.193 psf
QB: 740.844 psf
QC: 740.844 psf
QD: 546.193 psf
NAZ: 411.051 in
NAX: -1 in



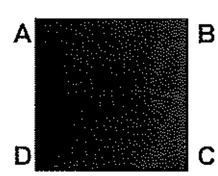
1DL+1HL-.525EL+.75LL
QA: 714.712 psf
QB: 546.399 psf
QC: 546.399 psf
QD: 714.712 psf
NAZ: 458.604 in
NAX: -1 in



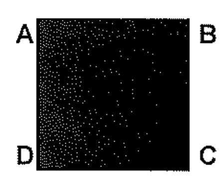
1DL+1HL+.45WL+.75LL
QA: 356.687 psf
QB: 1222.94 psf
QC: 1222.94 psf
QD: 356.687 psf
NAZ: 152.47 in
NAX: -1 in



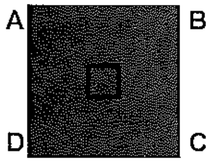
1DL+1HL-.45WL+.75LL
QA: 902.984 psf
QB: 287.757 psf
QC: 287.757 psf
QD: 902.984 psf
NAZ: 158.514 in
NAX: -1 in



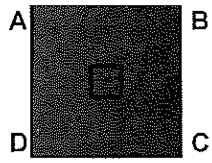
1DL+1HL+.525EL+.75LL
QA: 545.576 psf
QB: 852.572 psf
QC: 852.572 psf
QD: 545.576 psf
NAZ: 299.932 in
NAX: -1 in



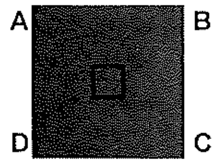
1DL+1HL-.525EL+.75LL+..
QA: 714.095 psf
QB: 658.128 psf
QC: 658.128 psf
QD: 714.095 psf
NAZ: 1377.99 in
NAX: -1 in



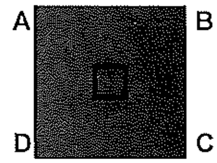
1DL+1HL+.45WL+.75LL
QA: 276.749 psf
QB: 1030.66 psf
QC: 1030.66 psf
QD: 276.749 psf
NAZ: 147.645 in
NAX: -1 in



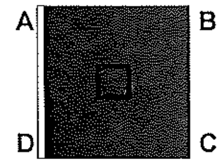
1DL+1HL-.45WL+.75LL
QA: 823.045 psf
QB: 95.473 psf
QC: 95.473 psf
QD: 823.045 psf
NAZ: 122.172 in
NAX: -1 in



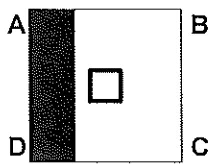
1DL+1HL+.525EL+.75LL
QA: 465.638 psf
QB: 660.288 psf
QC: 660.288 psf
QD: 465.638 psf
NAZ: 366.355 in
NAX: -1 in



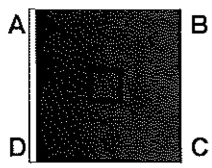
1DL+1HL-.525EL+.75LL
QA: 634.156 psf
QB: 465.844 psf
QC: 465.844 psf
QD: 634.156 psf
NAZ: 406.914 in
NAX: -1 in



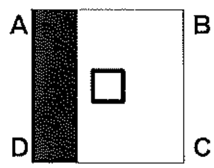
.6DL+1HL+.6WL
QA: 0 psf
QB: 962.611 psf
QC: 962.611 psf
QD: 0 psf
NAZ: 104.009 in
NAX: -1 in



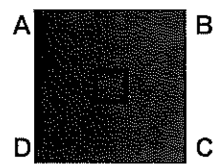
.6DL+1HL-.6WL
QA: 1357.9 psf
QB: 0 psf
QC: 0 psf
QD: 1357.9 psf
NAZ: 32.491 in
NAX: -1 in



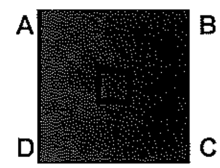
.6DL+.6HL+.6WL
QA: 0 psf
QB: 962.611 psf
QC: 962.611 psf
QD: 0 psf
NAZ: 104.009 in
NAX: -1 in



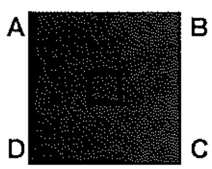
.6DL+.6HL-.6WL
QA: 1357.9 psf
QB: 0 psf
QC: 0 psf
QD: 1357.9 psf
NAZ: 32.491 in
NAX: -1 in



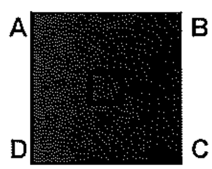
.6DL+1HL+.7EL
QA: 217.593 psf
QB: 467.469 psf
QC: 467.469 psf
QD: 217.593 psf
NAZ: 202.046 in
NAX: -1 in



.6DL+1HL-.7EL
QA: 442.284 psf
QB: 208.21 psf
QC: 208.21 psf
QD: 442.284 psf
NAZ: 204.066 in
NAX: -1 in



.6DL+.6HL+.7EL
QA: 217.593 psf
QB: 467.469 psf
QC: 467.469 psf
QD: 217.593 psf
NAZ: 202.046 in
NAX: -1 in



.6DL+.6HL-.7EL
QA: 442.284 psf
QB: 208.21 psf
QC: 208.21 psf
QD: 442.284 psf
NAZ: 204.066 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

As-min x-dir (Top Flexure): **9.855 in^2**
As-min z-dir (Top Flexure): **9.855 in^2**
As-min x-dir (Bot Flexure): **9.855 in^2**
As-min z-dir (Bot Flexure): **9.855 in^2**
As-min x-dir (T & S): **5.832 in^2**
As-min z-dir (T & S): **5.832 in^2**

Description	Categories and Factors	Mu-xx UC Max	Mu-xx (k-ft)	z-Dir As Required (in^2)	z-Dir As Provided (in^2)	Mu-zz UC Max	Mu-zz (k-ft)	x-Dir As Required (in^2)	x-Dir As Provided (in^2)
IBC 16-1	1.4DL	.01942	6.98	.059	3.068	.01833	6.59	.056	3.068
IBC 16-2 (a)	1.2DL+1.6LL+1.6LL..	.02528	9.09	.077	3.068	.02435	8.75	.074	3.068
IBC 16-2 (b)	1.2DL+1.6LL+1.6LL..	.03565	12.82	.108	3.068	.0303	10.89	.092	3.068
IBC 16-2 (c)	1.2DL+1.6LL+1.6LL..	.01665	5.99	.05	3.068	.01571	5.65	.048	3.068
IBC 16-3 (a)	1.2DL+1.6RLL+1.6H..	.04427	15.91	.134	3.068	.04333	15.58	.131	3.068
IBC 16-3 (b) (a	1.2DL+1.6RLL+1.6H..	.11021	39.62	.334	3.068	.0607	21.82	.184	3.068
IBC 16-3 (b) (b	1.2DL+1.6RLL+1.6H..	.07362	26.47	.223	3.068	.02597	9.34	.079	3.068
IBC 16-3 (c)	1.2DL+1.6SL+1.6SL..	.07746	27.85	.235	3.068	.06238	22.43	.189	3.068
IBC 16-3 (d) (a	1.2DL+1.6SL+1.6SL..	.14341	51.56	.435	3.068	.07974	28.67	.242	3.068
IBC 16-3 (d) (b	1.2DL+1.6SL+1.6SL..	.07853	28.23	.238	3.068	.04502	16.19	.136	3.068
IBC 16-3 (e)	1.2DL+1.6RL+1.6HL..	.01665	5.99	.05	3.068	.01571	5.65	.048	3.068
IBC 16-3 (f) (a.	1.2DL+1.6RL+1.6HL..	.08259	29.69	.25	3.068	.03308	11.89	.1	3.068
IBC 16-3 (f) (b.	1.2DL+1.6RL+1.6HL..	.046	16.54	.139	3.068	0	0	0	3.068
IBC 16-4 (a) (a	1.2DL+1WL+.5LL+1..	.15717	56.51	.477	3.068	.05907	21.24	.179	3.068
IBC 16-4 (a) (b.	1.2DL-1WL+.5LL+1..	.0978	35.16	.297	3.068	0	0	0	3.068
IBC 16-4 (b) (a	1.2DL+1WL+.5LL+1..	.16754	60.23	.509	3.068	.06502	23.38	.197	3.068
IBC 16-4 (b) (b.	1.2DL-1WL+.5LL+1..	.0933	33.54	.283	3.068	0	0	0	3.068
IBC 16-4 (c) (a	1.2DL+1WL+.5LL+1..	.14854	53.4	.451	3.068	.05044	18.13	.153	3.068
IBC 16-4 (c) (b.	1.2DL-1WL+.5LL+1..	.09737	35.01	.295	3.068	0	0	0	3.068
IBC 16-5 (a)	1.2DL+1EL+.5LL+1..	.04664	16.77	.141	3.068	.02353	8.46	.071	3.068
IBC 16-5 (b)	1.2DL-1EL+.5LL+1..	.03727	13.4	.113	3.068	.01956	7.03	.059	3.068
IBC 16-6 (a) (a	. .9DL+1WL+1.6HL	.14528	52.23	.441	3.068	.04651	16.72	.141	3.068
IBC 16-6 (a) (b	. .9DL-1WL+1.6HL	.14863	53.43	.451	3.068	0	0	0	3.068
IBC 16-6 (b) (a	. .9DL+1WL+.9HL	.14528	52.23	.441	3.068	.04651	16.72	.141	3.068
IBC 16-6 (b) (b	. .9DL-1WL+.9HL	.14863	53.43	.451	3.068	0	0	0	3.068
IBC 16-7 (a) (a	. .9DL+1WL+1.6HL	.14528	52.23	.441	3.068	.04651	16.72	.141	3.068
IBC 16-7 (a) (b	. .9DL-1WL+1.6HL	.14863	53.43	.451	3.068	0	0	0	3.068
IBC 16-7 (b) (a	. .9DL+1EL+.9HL	.03488	12.54	.106	3.068	.01377	4.95	.042	3.068
IBC 16-7 (b) (b	. .9DL-1EL+.9HL	.02951	10.61	.089	3.068	.0098	3.52	.03	3.068

Footing Flexure Design (Top Bars)

Description	Categories and Factors	Mu-xx (k-ft)	z Dir As (in^2)	Mu-zz (k-ft)	x Dir As (in^2)
SW+OB	1SW+1OB-(IBC 16-4 (c..,IBC 16-6 (a..)	27.446	0	10.991	0

Moment Capacity of Plain Concrete Section Along xx and zz= **177.133k-ft,177.133k-ft** Per Chapter 22 of ACI 318.

Footing Shear Check

Two Way (Punching) Vc: **1118.13 k** One Way (x Dir. Cut) Vc **312.038 k** One Way (z Dir. Cut) Vc: **312.038 k**

Description	Categories and Factors	Punching Vu(k)	Punching Vu/⌀Vc	x Dir. Cut Vu(k)	x Dir. Cut Vu/⌀Vc	z Dir. Cut Vu(k)	z Dir. Cut Vu/⌀Vc
IBC 16-1	1.4DL	7.386	.009	1.52	.006	1.422	.006
IBC 16-2 (a)	1.2DL+1.6LL+1.6LLS+1.6H..	9.808	.012	1.972	.008	1.889	.008
IBC 16-2 (b)	1.2DL+1.6LL+1.6LLS+1.6H..	12.206	.015	2.829	.012	2.351	.01
IBC 16-2 (c)	1.2DL+1.6LL+1.6LLS+1.6H..	6.331	.008	1.303	.006	1.219	.005
IBC 16-3 (a)	1.2DL+1.6RLL+1.6HL+.5L..	17.458	.021	3.445	.015	3.362	.014
IBC 16-3 (b) (a..	1.2DL+1.6RLL+1.6HL+.5W..	24.453	.029	9.134	.039	4.709	.02
IBC 16-3 (b) (b..	1.2DL+1.6RLL+1.6HL-.5W..	10.464	.012	6.273	.027	2.015	.009
IBC 16-3 (c)	1.2DL+1.6SL+1.6SLN+1.6H..	25.132	.03	6.187	.026	4.84	.021
IBC 16-3 (d) (a..	1.2DL+1.6SL+1.6SLN+1.6H..	32.127	.038	11.876	.051	6.187	.026
IBC 16-3 (d) (b..	1.2DL+1.6SL+1.6SLN+1.6H..	18.138	.022	6.487	.028	3.493	.015
IBC 16-3 (e)	1.2DL+1.6RL+1.6HL+.5LL..	6.331	.008	1.303	.006	1.219	.005
IBC 16-3 (f) (a..	1.2DL+1.6RL+1.6HL+.5WL	13.326	.016	6.991	.03	2.566	.011
IBC 16-3 (f) (b..	1.2DL+1.6RL+1.6HL-.5WL	NA	NA	4.386	.019	.128	0
IBC 16-4 (a) (a..	1.2DL+1WL+.5LL+1LLS+1...	23.797	.028	13.349	.057	4.583	.02
IBC 16-4 (a) (b..	1.2DL-1WL+.5LL+1LLS+1...	NA	NA	9.048	.039	.805	.003
IBC 16-4 (b) (a..	1.2DL+1WL+.5LL+1LLS+1...	26.195	.031	14.205	.061	5.044	.022
IBC 16-4 (b) (b..	1.2DL-1WL+.5LL+1LLS+1...	NA	NA	8.468	.036	.343	.001
IBC 16-4 (c) (a..	1.2DL+1WL+.5LL+1LLS+1...	20.32	.024	12.679	.054	3.913	.017
IBC 16-4 (c) (b..	1.2DL-1WL+.5LL+1LLS+1...	NA	NA	9.312	.04	1.475	.006
IBC 16-5 (a)	1.2DL+1EL+.5LL+1LLS+1...	9.481	.011	3.89	.017	1.826	.008
IBC 16-5 (b)	1.2DL-1EL+.5LL+1LLS+1...	7.882	.009	3.1	.013	1.518	.006
IBC 16-6 (a) (a..	.9DL+1WL+1.6HL	18.821	.022	12.444	.053	3.608	.015
IBC 16-6 (a) (b..	.9DL-1WL+1.6HL	NA	NA	17.737	.076	1.779	.008
IBC 16-6 (b) (a..	.9DL+1WL+.9HL	18.821	.022	12.444	.053	3.608	.015
IBC 16-6 (b) (b..	.9DL-1WL+.9HL	NA	NA	17.737	.076	1.779	.008
IBC 16-7 (a) (a..	.9DL+1WL+1.6HL	18.821	.022	12.444	.053	3.608	.015
IBC 16-7 (a) (b..	.9DL-1WL+1.6HL	NA	NA	17.737	.076	1.779	.008
IBC 16-7 (b) (a..	.9DL+1EL+.9HL	5.548	.007	2.954	.013	1.068	.005
IBC 16-7 (b) (b..	.9DL-1EL+.9HL	3.949	.005	2.521	.011	.76	.003

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : **2468.4 k**

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/⌀Bc
IBC 16-1	1.4DL	9.24	.006
IBC 16-2 (a)	1.2DL+1.6LL+1.6LLS+1.6H..	12.27	.008
IBC 16-2 (b)	1.2DL+1.6LL+1.6LLS+1.6H..	15.27	.01
IBC 16-2 (c)	1.2DL+1.6LL+1.6LLS+1.6H..	7.92	.005
IBC 16-3 (a)	1.2DL+1.6RLL+1.6HL+.5L...	21.84	.014
IBC 16-3 (b) (a..	1.2DL+1.6RLL+1.6HL+.5W..	30.59	.019
IBC 16-3 (b) (b..	1.2DL+1.6RLL+1.6HL-.5W..	13.09	.008
IBC 16-3 (c)	1.2DL+1.6SL+1.6SLN+1.6H..	31.44	.02
IBC 16-3 (d) (a..	1.2DL+1.6SL+1.6SLN+1.6H..	40.19	.025
IBC 16-3 (d) (b..	1.2DL+1.6SL+1.6SLN+1.6H..	22.69	.014
IBC 16-3 (e)	1.2DL+1.6RL+1.6HL+.5LL..	7.92	.005
IBC 16-3 (f) (a..	1.2DL+1.6RL+1.6HL+.5WL	16.67	.01
IBC 16-3 (f) (b..	1.2DL+1.6RL+1.6HL-.5WL	0	0
IBC 16-4 (a) (a..	1.2DL+1WL+.5LL+1LLS+1...	29.77	.019
IBC 16-4 (a) (b..	1.2DL-1WL+.5LL+1LLS+1...	0	0
IBC 16-4 (b) (a..	1.2DL+1WL+.5LL+1LLS+1...	32.77	.02
IBC 16-4 (b) (b..	1.2DL-1WL+.5LL+1LLS+1...	0	0
IBC 16-4 (c) (a..	1.2DL+1WL+.5LL+1LLS+1...	25.42	.016
IBC 16-4 (c) (b..	1.2DL-1WL+.5LL+1LLS+1...	0	0
IBC 16-5 (a)	1.2DL+1EL+.5LL+1LLS+1...	11.86	.007
IBC 16-5 (b)	1.2DL-1EL+.5LL+1LLS+1...	9.86	.006
IBC 16-6 (a) (a..	.9DL+1WL+1.6HL	23.44	.015
IBC 16-6 (a) (b..	.9DL-1WL+1.6HL	0	0
IBC 16-6 (b) (a..	.9DL+1WL+.9HL	23.44	.015
IBC 16-6 (b) (b..	.9DL-1WL+.9HL	0	0
IBC 16-7 (a) (a..	.9DL+1WL+1.6HL	23.44	.015
IBC 16-7 (a) (b..	.9DL-1WL+1.6HL	0	0
IBC 16-7 (b) (a..	.9DL+1EL+.9HL	6.94	.004
IBC 16-7 (b) (b..	.9DL-1EL+.9HL	4.94	.003

Overturning Check (Service)

Description	Categories and Factors	Mo-xx (k-ft)	Ms-xx (k-ft)	Mo-zz (k-ft)	Ms-zz (k-ft)	OSF-xx	OSF-zz
ASCE 1	1DL	.8	202.837	0	202.837	253.547	NA
ASCE 2	1DL+1HL+1LL+1LLS	.8	202.837	0	202.837	253.547	NA
ASCE 3 (a)	1DL+1HL+1RLL	.8	241.987	0	241.987	302.484	NA
ASCE 3 (b)	1DL+1HL+1SL	9.9	268.987	0	268.987	27.17	NA
ASCE 3 (c)	1DL+1HL+1RL	.8	202.837	0	202.837	253.547	NA
ASCE 4 (a)	1DL+1HL+.75LL+...	.8	232.2	0	232.2	290.25	NA
ASCE 4 (b)	1DL+1HL+.75LL+...	7.625	252.45	0	252.45	33.108	NA
ASCE 4 (c)	1DL+1HL+.75LL+...	.8	202.837	0	202.837	253.547	NA
ASCE 5 (a) (a)	1DL+1HL+.6WL	69.2	258.487	0	250.087	3.735	NA
ASCE 5 (a) (b)	1DL+1HL-.6WL	115.65	212.037	47.25	202.837	1.833	4.293
ASCE 5 (b) (a)	1DL+1HL+.7EL	17.6	208.087	0	205.987	11.823	NA
ASCE 5 (b) (b)	1DL+1HL-.7EL	19.95	205.737	3.15	202.837	10.313	64.393
ASCE 6 (a) (a)	1DL+1HL+.45WL+...	52.1	273.937	0	267.637	5.258	NA
ASCE 6 (a) (b)	1DL+1HL-.45WL+...	86.737	239.3	35.438	232.2	2.759	6.552
ASCE 6 (b) (a)	1DL+1HL+.525EL+..	13.4	236.137	0	234.562	17.622	NA
ASCE 6 (b) (b)	1DL+1HL-.525EL+..	14.963	234.575	2.363	232.2	15.678	98.286
ASCE 6 (c) (a)	1DL+1HL+.45WL+...	58.925	294.187	0	287.887	4.993	NA
ASCE 6 (c) (b)	1DL+1HL-.45WL+...	86.737	266.375	35.438	252.45	3.071	7.124
ASCE 6 (d) (a)	1DL+1HL+.525EL+..	20.225	256.387	0	254.812	12.677	NA
ASCE 6 (d) (b)	1DL+1HL-.525EL+..	14.963	261.65	2.363	252.45	17.487	106.857
ASCE 6 (e) (a)	1DL+1HL+.45WL+...	52.1	244.575	0	238.275	4.694	NA
ASCE 6 (e) (b)	1DL+1HL-.45WL+...	86.737	209.937	35.438	202.837	2.42	5.724
ASCE 6 (f) (a)	1DL+1HL+.525EL+..	13.4	206.775	0	205.2	15.431	NA
ASCE 6 (f) (b)	1DL+1HL-.525EL+..	14.963	205.212	2.363	202.837	13.715	85.857
ASCE 7 (a) (a)	.6DL+1HL+.6WL	68.88	177.352	0	168.952	2.575	NA
ASCE 7 (a) (b)	.6DL+1HL-.6WL	115.65	130.582	47.25	121.702	1.129	2.576
ASCE 7 (b) (a)	.6DL+.6HL+.6WL	68.88	177.352	0	168.952	2.575	NA
ASCE 7 (b) (b)	.6DL+.6HL-.6WL	115.65	130.582	47.25	121.702	1.129	2.576
ASCE 8 (a) (a)	.6DL+1HL+.7EL	17.28	126.952	0	124.852	7.347	NA
ASCE 8 (a) (b)	.6DL+1HL-.7EL	19.95	124.282	3.15	121.702	6.23	38.636
ASCE 8 (b) (a)	.6DL+.6HL+.7EL	17.28	126.952	0	124.852	7.347	NA
ASCE 8 (b) (b)	.6DL+.6HL-.7EL	19.95	124.282	3.15	121.702	6.23	38.636

Mo-xx: Governing Overturning Moment about AD or BC
Ms-xx: Governing Stablizing Moment about AD or BC
OSF-xx: Ratio of Ms-xx to Mo-xx

Sliding Check (Service)

Description	Categories and Factors	Va-xx (k)	Vr-xx (k)	Va-zz (k)	Vr-zz (k)	SR-xx	SR-zz
ASCE 1	1DL	0	15.659	0	15.659	NA	NA
ASCE 2	1DL+1HL+1LL+1LLS	0	15.659	0	15.659	NA	NA
ASCE 3 (a)	1DL+1HL+1RLL	0	18.704	0	18.704	NA	NA
ASCE 3 (b)	1DL+1HL+1SL	0	20.804	0	20.804	NA	NA
ASCE 3 (c)	1DL+1HL+1RL	0	15.659	0	15.659	NA	NA
ASCE 4 (a)	1DL+1HL+.75LL+...	0	17.942	0	17.942	NA	NA
ASCE 4 (b)	1DL+1HL+.75LL+...	0	19.517	0	19.517	NA	NA
ASCE 4 (c)	1DL+1HL+.75LL+...	0	15.659	0	15.659	NA	NA
ASCE 5 (a) (a)	1DL+1HL+.6WL	0	19.334	3.36	19.334	NA	5.754
ASCE 5 (a) (b)	1DL+1HL-.6WL	0	11.984	3.36	11.984	NA	3.567
ASCE 5 (b) (a)	1DL+1HL+.7EL	0	15.904	.84	15.904	NA	18.933
ASCE 5 (b) (b)	1DL+1HL-.7EL	0	15.414	.84	15.414	NA	18.35
ASCE 6 (a) (a)	1DL+1HL+.45WL+...	0	20.699	2.52	20.699	NA	8.214
ASCE 6 (a) (b)	1DL+1HL-.45WL+...	0	15.186	2.52	15.186	NA	6.026
ASCE 6 (b) (a)	1DL+1HL+.525EL+..	0	18.126	.63	18.126	NA	28.772
ASCE 6 (b) (b)	1DL+1HL-.525EL+..	0	17.759	.63	17.759	NA	28.188
ASCE 6 (c) (a)	1DL+1HL+.45WL+...	0	22.274	2.52	22.274	NA	8.839
ASCE 6 (c) (b)	1DL+1HL-.45WL+...	0	16.761	2.52	16.761	NA	6.651
ASCE 6 (d) (a)	1DL+1HL+.525EL+..	0	19.701	.63	19.701	NA	31.272
ASCE 6 (d) (b)	1DL+1HL-.525EL+..	0	19.334	.63	19.334	NA	30.688
ASCE 6 (e) (a)	1DL+1HL+.45WL+...	0	18.415	2.52	18.415	NA	7.307
ASCE 6 (e) (b)	1DL+1HL-.45WL+...	0	12.902	2.52	12.902	NA	5.12
ASCE 6 (f) (a)	1DL+1HL+.525EL+..	0	15.842	.63	15.842	NA	25.147
ASCE 6 (f) (b)	1DL+1HL-.525EL+..	0	15.475	.63	15.475	NA	24.563
ASCE 7 (a) (a)	.6DL+1HL+.6WL	0	13.07	3.36	13.07	NA	3.89
ASCE 7 (a) (b)	.6DL+1HL-.6WL	0	5.72	3.36	5.72	NA	1.702
ASCE 7 (b) (a)	.6DL+.6HL+.6WL	0	13.07	3.36	13.07	NA	3.89
ASCE 7 (b) (b)	.6DL+.6HL-.6WL	0	5.72	3.36	5.72	NA	1.702
ASCE 8 (a) (a)	.6DL+1HL+.7EL	0	9.64	.84	9.64	NA	11.476
ASCE 8 (a) (b)	.6DL+1HL-.7EL	0	9.15	.84	9.15	NA	10.893
ASCE 8 (b) (a)	.6DL+.6HL+.7EL	0	9.64	.84	9.64	NA	11.476
ASCE 8 (b) (b)	.6DL+.6HL-.7EL	0	9.15	.84	9.15	NA	10.893

Va-xx: Applied Lateral Force to Cause Sliding Along xx Axis
Vr-xx: Resisting Lateral Force Against Sliding Along xx Axis
SR-xx: Ratio of Vr-xx to Va-xx