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PO Box 587
Monroe, NC 28111
704-225-0079 Office

Design Criteria Worksheet

North Carolina COA C2424

PE- L. Dean Arp, Jr., North Carolina PE 18427

Project No.: 67018

Date: 5/7/2026

Project Name: Circle K Fuel Canopy

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

Canopy Size: 24'-0"x163'-8"

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

5/7/2026

Digitally signed by Larry D Arp Jr.
DN: c=US, o=Unaffiliated, dnQualifier=A01410C00000199C4494E53000620B1, cn=Larry D Arp Jr.
Date: 2026.05.08 10:31:32 -04'00'

Project Address:

Street:	East Jackson Blvd & NC 55
City:	Erwin
County:	Harnett
State:	NC
Zip Code:	28339

Building Code: 2018 NCSBC (2015 IBC) (ASCE 7-16)

Roof Live Loads: 20 PSF

Roof Dead Loads: 5 PSF

Snow Loads:

Importance Factor (I_S):	1.0
Ground Snow Load (Pg):	10 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}:	119 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):	0.132g
Mapped Spectral Accel. @ 1.0 sec. (S_1):	0.065g
Site Coefficient, Fa:	1.6
Site Coefficient, Fv:	2.4
Design Spectral Accel. @ 0.2 sec (S_{DS}):	0.141g
Design Spectral Accel. @ 1.0 sec (S_{D1}):	0.104g
Seismic Response Coefficient (C_S):	0.1124
Seismic Base Shear:	4.42 kips

Soils Criteria: Allowable soil bearing of 2,500 psf per the geotechnical report by Universal Engineering Sciences dated July 30, 2025, UES Project No. A25117.01244.000.

Design Comments / Assumptions:

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

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

3. 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.

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

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

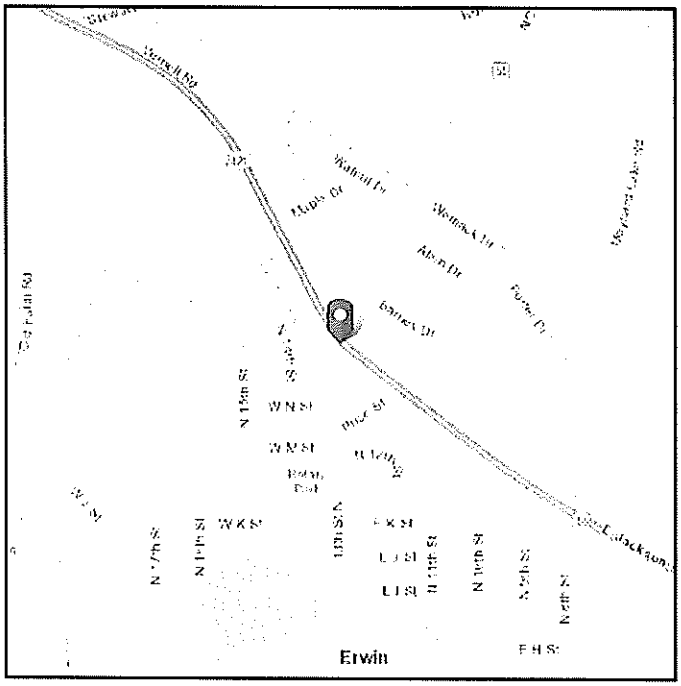
6. Foundations are designed per ACI 318.

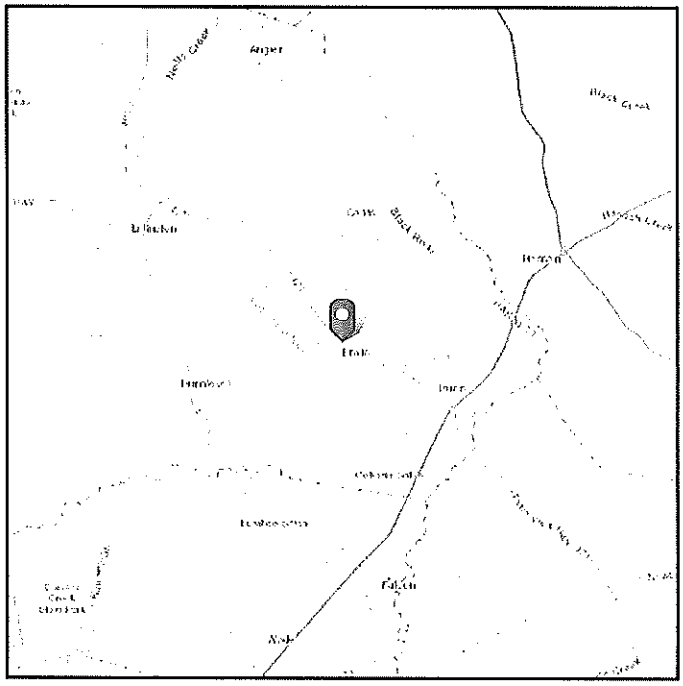
ASCE Hazards Report

Address:
E Jackson Blvd & NC-55
Erwin, North Carolina
28339

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Latitude: 35.336784
Longitude: -78.676006
Elevation: 191.98056582513644 ft (NAVD 88)





Wind

Results:

Wind Speed	119 Vmph
10-year MRI	76 Vmph
25-year MRI	85 Vmph
50-year MRI	92 Vmph
100-year MRI	99 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Tue Apr 21 2026

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

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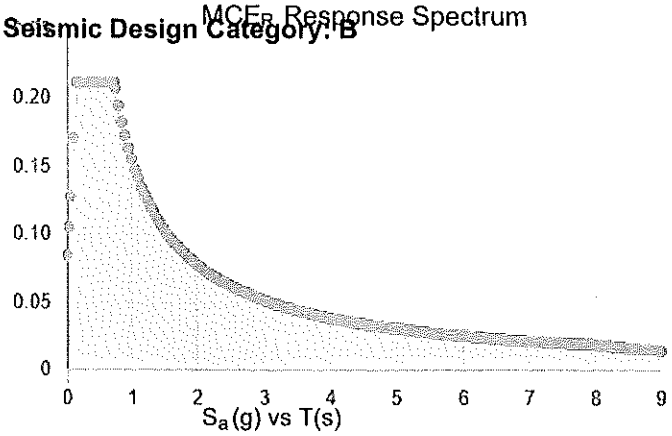
Seismic

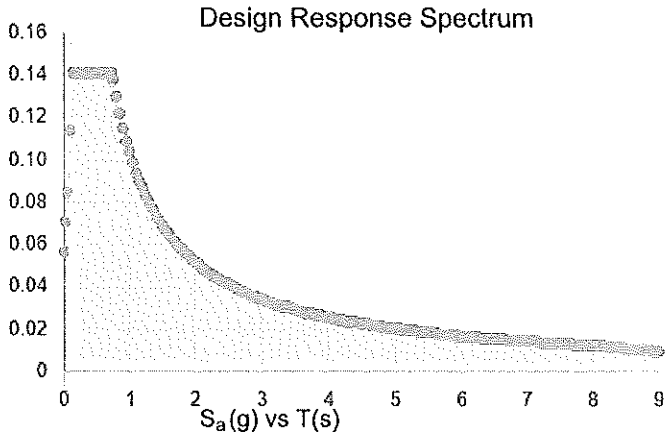
Site Soil Class: D - Stiff Soil

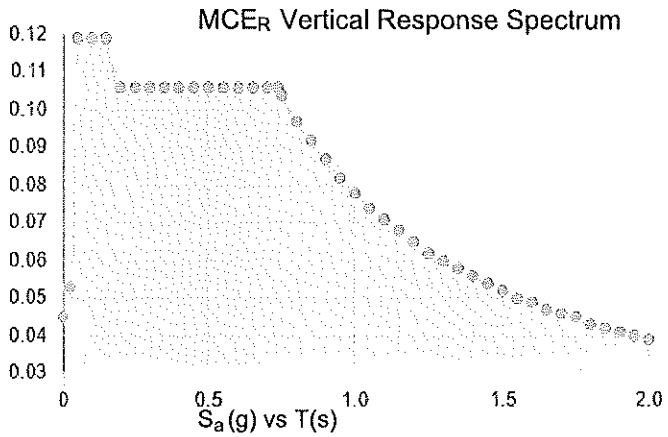
Results:

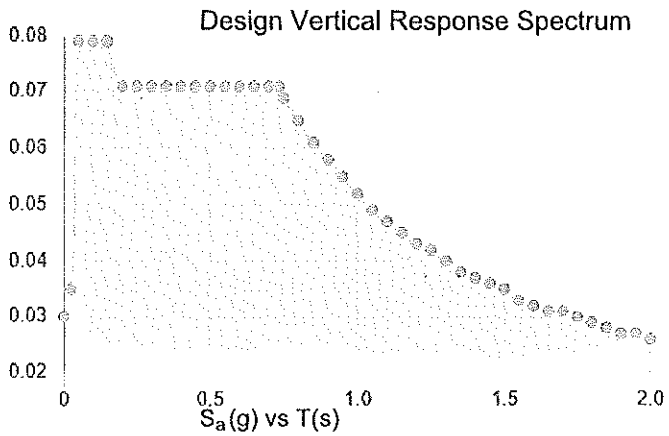
S_S :	0.132	S_{D1} :	0.104
S_1 :	0.065	T_L :	8
F_a :	1.6	PGA :	0.064
F_v :	2.4	PGA_M :	0.103
S_{MS} :	0.212	F_{PGA} :	1.6
S_{M1} :	0.156	I_e :	1
S_{DS} :	0.141	C_v :	0.7

Seismic Design Category: B









Data Accessed: Tue Apr 21 2026

Date Source:
USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

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Snow

Results:

Ground Snow Load, p_g:	10 lb/ft^2
Mapped Elevation:	192.0 ft
Data Source:	ASCE/SEI 7-16, Table 7.2-8
Date Accessed:	Tue Apr 21 2026

Values provided are ground snow loads. In areas designated "case study required," extreme local variations in ground snow loads preclude mapping at this scale. Site-specific case studies are required to establish ground snow loads at elevations not covered.

Snow load values are mapped to a 0.5 mile resolution. This resolution can create a mismatch between the mapped elevation and the site-specific elevation in topographically complex areas. Engineers should consult the local authority having jurisdiction in locations where the reported 'elevation' and 'mapped elevation' differ significantly from each other.

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a complete lateral force-resisting system with adequate strength to resist the forces indicated in Section 1.4.2. All members of the structural system shall be connected to their supporting members in accordance with Section 1.4.3. Structural walls shall be anchored to diaphragms and supports in accordance with Section 1.4.4. The effects on the structure and its components caused by the forces stipulated in this section shall be taken as the notional load, N, and combined with the effects of other loads in accordance with the load combinations of Section 2.6. Where material resistance depends on load duration, notional loads are permitted to be taken as having a duration of 10 minutes. Structures designed in conformance with the requirements of this standard for Seismic Design Categories B, C, D, E, or F shall be deemed to comply with the requirements of Sections 1.4.2, 1.4.3, and 1.4.4.

1.4.1 Load Path Connections. All parts of the structure between separation joints shall be interconnected to form a continuous path to the lateral force-resisting system, and the connections shall be capable of transmitting the lateral forces induced by the parts being connected. Any smaller portion of the structure shall be tied to the remainder of the structure with elements having the strength to resist a force of not less than 5% of the portion's weight.

1.4.2 Lateral Forces. Each structure shall be analyzed for the effects of static lateral forces applied independently in each of two orthogonal directions. In each direction, the static lateral forces at all levels shall be applied simultaneously. For purposes of analysis, the force at each level shall be determined using Eq. (1.4-1):

$$F_x = 0.01 W_x \tag{1.4-1}$$

where

F_x = the design lateral force applied at story x, and
W_x = the portion of the total dead load of the structure, D, located or assigned to level x.

Structures explicitly designed for stability, including second-order effects, shall be deemed to comply with the requirements of this section.

1.4.3 Connection to Supports. A positive connection for resisting a horizontal force acting parallel to the member shall be provided for each beam, girder, or truss either directly to its supporting elements or to slabs designed to act as diaphragms. Where the connection is through a diaphragm, the member's supporting element shall also be connected to the diaphragm. The connection shall have the strength to resist a force of 5% of the unfactored dead load plus live load reaction imposed by the supported member on the supporting member.

1.4.4 Anchorage of Structural Walls. Walls that provide vertical load bearing or lateral shear resistance for a portion of the structure shall be anchored to the roof and all floors and members that provide lateral support for the wall or that are supported by the wall. The anchorage shall provide a direct connection between the walls and the roof or floor construction. The connections shall be capable of resisting a strength level horizontal force perpendicular to the plane of the wall equal to 0.2 times the weight of the wall tributary to the connection, but not less than 5 psf (0.24 kN/m^2).

1.4.5 Extraordinary Loads and Events. When considered, design for resistance to extraordinary loads and events shall be in accordance with the procedures of Section 2.5.

1.5 CLASSIFICATION OF BUILDINGS AND OTHER STRUCTURES

1.5.1 Risk Categorization. Buildings and other structures shall be classified, based on the risk to human life, health, and welfare associated with their damage or failure by nature of their occupancy or use, according to Table 1.5-1 for the purposes of applying flood, wind, snow, earthquake, and ice provisions. Each building or other structure shall be assigned to the highest applicable Risk Category or Categories. Minimum design loads for structures shall incorporate the applicable importance factors given in Table 1.5-2, as required by other sections of this standard. Assignment of a building or other structure to multiple Risk Categories based on the type of load condition being evaluated (e.g., snow or seismic) shall be permitted.

When the building code or other referenced standard specifies an Occupancy Category, the Risk Category shall not be taken as lower than the Occupancy Category specified therein.

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 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	III
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]	
Buildings and other structures designated as essential facilities	IV
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	

[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.

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Table 1.5-2 Importance Factors by Risk Category of Buildings and Other Structures for Snow, Ice, and Earthquake Loads

Risk Category from Table 1.5-1	Snow Importance Factor, I_s	Ice Importance Factor—Thickness, I_i	Ice Importance Factor—Wind, I_w	Seismic Importance Factor, I_e
I	0.80	0.80	1.00	1.00
II	1.00	1.00	1.00	1.00
III	1.10	1.15	1.00	1.25
IV	1.20	1.25	1.00	1.50

Note: The component importance factor, I_p, applicable to earthquake loads, is not included in this table because it depends on the importance of the individual component rather than that of the building as a whole, or its occupancy. Refer to Section 13.1.3.

1.5.2 Multiple Risk Categories. Where buildings or other structures are divided into portions with independent structural systems, the classification for each portion shall be permitted to be determined independently. Where building systems, such as required egress, HVAC, or electrical power, for a portion with a higher Risk Category pass through or depend on other portions of the building or other structure having a lower Risk Category, those portions shall be assigned to the higher Risk Category.

1.5.3 Toxic, Highly Toxic, and Explosive Substances. Buildings and other structures containing toxic, highly toxic, or explosive substances are permitted to be classified as Risk Category II structures if it can be demonstrated to the satisfaction of the Authority Having Jurisdiction by a hazard assessment as part of an overall risk management plan (RMP) that a release of the toxic, highly toxic, or explosive substances is not sufficient to pose a threat to the public.

To qualify for this reduced classification, the owner or operator of the buildings or other structures containing the toxic, highly toxic, or explosive substances shall have an RMP that incorporates three elements as a minimum: a hazard assessment, a prevention program, and an emergency response plan.

As a minimum, the hazard assessment shall include the preparation and reporting of worst-case release scenarios for each structure under consideration, showing the potential effect on the public for each. As a minimum, the worst-case event shall include the complete failure e.g., instantaneous release of entire contents of a vessel, piping system, or other storage structure. A worst-case event includes, but is not limited to, a release during the design wind or design seismic event. In this assessment, the evaluation of the effectiveness of subsequent measures for accident mitigation shall be based on the assumption that the complete failure of the primary storage structure has occurred. The off-site impact shall be defined in terms of population within the potentially affected area. To qualify for the reduced classification, the hazard assessment shall demonstrate that a release of the toxic, highly toxic, or explosive substances from a worst-case event does not pose a threat to the public outside the property boundary of the facility.

As a minimum, the prevention program shall consist of the comprehensive elements of process safety management, which is based upon accident prevention through the application of management controls in the key areas of design, construction, operation, and maintenance. Secondary containment of the toxic, highly toxic, or explosive substances; including, but not limited to, double-wall tank, dike of sufficient size to contain a spill, or other means to contain a release of the toxic, highly toxic, or explosive substances within the property boundary of the facility and prevent release of harmful quantities of contaminants to the air, soil, groundwater, or surface water; are permitted to be used to mitigate the risk of release. Where secondary containment is provided, it shall be designed for all environmental loads and is not eligible for this reduced classification. In hurricane-prone regions, mandatory practices and procedures that effectively diminish the effects of wind on critical structural elements or that alternatively protect against harmful releases during and after hurricanes are permitted to be used to mitigate the risk of release.

As a minimum, the emergency response plan shall address public notification, emergency medical treatment for accidental exposure to humans, and procedures for emergency response to releases that have consequences beyond the property boundary of the facility. The emergency response plan shall address the potential that resources for response could be compromised by the event that has caused the emergency.

1.6 ADDITIONS AND ALTERATIONS TO EXISTING STRUCTURES

When an existing building or other structure is enlarged or otherwise altered, structural members affected shall be strengthened if necessary so that the factored loads defined in this document will be supported without exceeding the specified design strength for the materials of construction. When using allowable stress design, strengthening is required when the stresses caused by nominal loads exceed the specified allowable stresses for the materials of construction.

1.7 LOAD TESTS

A load test of any construction shall be conducted when required by the Authority Having Jurisdiction whenever there is reason to question its safety for the intended use.

1.8 CONSENSUS STANDARDS AND OTHER REFERENCED DOCUMENTS

This section lists the consensus standards and other documents that shall be considered part of this standard to the extent referenced in this chapter.

OSHA Standards for General Industry, 29 CFR (Code of Federal Regulations) Part 1910.1200. Appendix A, with Amendments as of February 1, 2000, U.S. Department of Labor, Occupational Safety and Health Administration, 2005.

Cited in: Section 1.2

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CHAPTER 7
SNOW LOADS

7.1 DEFINITIONS AND SYMBOLS

7.1.1 Definitions

DRIFT: The accumulation of wind-driven snow that results in a local surcharge load on the roof structure at locations such as a parapet or roof step.

FLAT ROOF SNOW LOAD: Uniform load for flat roofs.

FREEZER BUILDINGS: Buildings in which the inside temperature is kept at or below freezing. Buildings with an air space between the roof insulation layer above and a ceiling of the freezer area below are not considered freezer buildings.

GROUND SNOW LOAD: The site-specific weight of the accumulated snow at the ground level used to develop roof snow loads on the structure. It generally has a 50-year mean recurrence interval.

MINIMUM SNOW LOAD: Snow load on low sloped roofs, including the roof snow load immediately after a single snow storm without wind.

PONDING: Refer to definitions in Chapter 8, Rain Loads

PONDING INSTABILITY: Refer to definitions in Chapter 8, Rain Loads.

R-VALUE: A measure of the resistance to heat flow through a roof component or assembly per unit area.

SLIPPERY SURFACE: Membranes with a smooth surface, e.g., glass, metal, or rubber. Membranes with an embedded aggregate or mineral granule surface are not considered a slippery surface.

SLOPED ROOF SNOW LOAD: Uniform load on horizontal projection of a sloped roof, also known as the balanced load.

VENTILATED ROOF: Roof that allows exterior air to naturally circulate between the roof surface above and the insulation layer below. The exterior air commonly flows from the eave to the ridge.

7.1.2 Symbols

C_e = exposure factor as determined from Table 7.3-1.
C_s = slope factor as determined from Fig. 7.4-1.
C_t = thermal factor as determined from Table 7.3-2.
h = vertical separation distance in feet (m) between the edge of a higher roof including any parapet and the edge of a lower adjacent roof excluding any parapet.
h_b = height of balanced snow load determined by dividing p_s by γ, in ft (m).
h_c = clear height from top of balanced snow load to (1) closest point on adjacent upper roof, (2) top of parapet, or (3) top of a projection on the roof, in ft (m).
h_d = height of snow drift, in ft (m).
h_{d1} or h_{d2} = heights of snow drifts, in ft (m), where two intersecting snow drifts can form.
h_o = height of obstruction above the surface of the roof, in ft (m).
I_s = importance factor as prescribed in Section 7.3.3.
l_u = length of the roof upwind of the drift, in ft (m).
p_d = maximum intensity of drift surcharge load, in lb/ft^2 (kN/m^2).
p_f = snow load on flat roofs ("flat"= roof *slope* $\leq 5°$), in lb/ft^2 (kN/m^2).
p_g = ground snow load as determined from Fig. 7.2-1 and Table 7.2-1; or a site-specific analysis, in lb/ft^2 (kN/m^2).
p_m = minimum snow load for low-slope roofs, in lb/ft^2 (kN/m^2).
p_s = sloped roof (balanced) snow load, in lb/ft^2 (kN/m^2).
s = horizontal separation distance in ft (m) between the edges of two adjacent buildings.
S = roof slope run for a rise of one.
w = width of snow drift, in ft (m).
w_1 or w_2 = widths of snow drifts, in ft (m), where two intersecting snow drifts can form.
W = horizontal distance from eave to ridge, in ft (m).
γ = snow density, in lb/ft^3 (kN/m^3), as determined from Eq. (7.7-1).
θ = roof slope on the leeward side, in degrees.

7.2 GROUND SNOW LOADS, p_g

Ground snow loads, p_g, to be used in the determination of design snow loads for roofs shall be as set forth in Fig. 7.2-1 for the contiguous United States and Table 7.2-1 for Alaska. Site-specific case studies shall be made to determine ground snow loads in areas designated CS in Fig. 7.2-1 (see also Tables 7.2-2 through 7.2-8). Ground snow loads for sites at elevations above the limits indicated in Fig. 7.2-1 and for all sites within the CS areas shall be approved by the Authority Having Jurisdiction. Ground snow load determination for such sites shall be based on an extreme value statistical analysis of data available in the vicinity of the site using a value with a 2% annual probability of being exceeded (50-year mean recurrence interval).

Snow loads are zero for Hawaii, except in mountainous regions as determined by the Authority Having Jurisdiction.

The importance factor times the ground snow load, $I_s p_g$, shall be used as the balanced snow load for snow accumulation surfaces, such as decks, balconies, and other near-ground level surfaces or roofs of subterranean spaces, whose height above the ground surface is less than the depth of the ground snow, h_g ($h_g = p_g/\gamma$).

7.3 FLAT ROOF SNOW LOADS, p_f

The flat roof snow load, p_f, shall be calculated in lb/ft^2 (kN/m^2) using the following formula:

$$p_f = 0.7 C_e C_t I_s p_g \qquad (7.3\text{-}1)$$

Project #	67018 Circle K
Project Name	Fuel - Erwin, NC
Engineer	LDA
Date	5/7/2026

Snow Loads

ASCE 7-16 (Chapter 7)

Risk Category	II		(Table 1.5-1)
Exposure Factor, Ce	1.00		(Table 7-3-1)
Thermal Factor, Ct	1.20		(Table 7-3-2)
Importance Factor, Is	1.00		(Table 1.5-2)
Ground Snow Load, Pg	10	psf	
Minimum Flat Roof Snow Load			
Does Pfmin apply?	**Yes**		(ASCE 7.3.4)
Pfmin =	10.00	psf	
Flat Roof Snow Load, Pf =	8.40	psf	(ASCE 7.3 EQ 7.3-1)
USE Pf =	**10.00**	psf	

Does Rain-on-Snow apply?	No		
Rain-on-Snow Surcharge			
Prain =	NA	psf	(ASCE 7.10)
Use Pf+r=	**10.00**	psf	

SLOPED ROOF

Roof Type	Flat	Flat (<=5deg),Mono,Hip,Gable
L	163.67	ft
W	24.00	ft
Horiz Distance Eave to Ridge, W	24.00	ft
W/50	0.48	

Sloped Roof Snow Load Ps =CsPf **10.00** psf (ASCE 7.4)

USE Max of Ps OR Pf+r = **10.00** psf

Roof Surface NS ('NS' for Non-Slippery, 'S' for Slippery Roof Surface)

Roof Slope	0.125	on 12	
Roof Slope	0.60	degrees	
Slope Factor, Cs	1.000	(calculated Fig. 7-2)	
	NA	psf	**consider balanced load only**
Is pg	NA	psf	
0.3ps	3.00	psf	
ps	10.00	psf	

10.00	psf	**10.00**	psf		
NA	psf	NA	psf		
NA	psf	NA	psf	NA	psf

DRIFT

Snow Density, γ	15.30	pcf	(Eq. 7.7-1)
Balanced Snow Height, hb =	0.65	ft	
Structure Height Above Low Roof, Hur	2.333 ft	2.333 ft	0 ft
Clear Height from Balanced Snow to Upper Roof, hc=(Hur-hb)=	1.68 ft	1.68 ft	0.00 ft
hc/hb =	2.57	2.57	0.00
	Consider drift loads	**Consider drift loads**	**Do not need to consider drift**

Leeward Wind (ASCE 7.7)

Length of Upper Roof of Drft, Lu=	0.00 ft	0.00 ft	0.00 ft
(Min 20') Use Lu=	0 ft	0 ft	0 ft
Leeward Height of Drift, hd_L	0.00 ft	0.00 ft	0.00 ft
60% Length of Lower Roof=	14.40 ft	98.20 ft	14.40 ft
Use Leeward Height of Drift, hd<=hc	0.00 ft	0.00 ft	0.00 ft
Maximum Drift Surcharge, Pd_L=	**0.00** psf	**0.00** psf	**0.00** psf
Sloped Rf Snow Load, Ps =CsPf	**10.00** psf	**10.00** psf	**10.00** psf
	10.00 psf	**10.00** psf	**10.00** psf
Drift Width, w_L=	0.00 ft	0.00 ft	0.00 ft

Windward Wind (ASCE 7.7)and Roof Projections and Parapets (ASCE 7.8)

Length of Lower Roof	Dir. 1	Dir. 2	Dir. 1
of Drft, Lu=	24.00 ft	163.67 ft	24.00 ft
(Min 20') Use Lu=	24 ft	163.67 ft	24 ft
Windward Height of Drift, hd_W	1.12 ft	3.47 ft	1.12 ft
hd=.75 x hd_W=	0.84 ft	2.61 ft	0.84 ft
Use Windward Height of Drift, hd<=hc	0.84 ft	1.68 ft	0.00 ft
Maximum Drift Surcharge, Pd_W=	**12.89** psf	**25.69** psf	**0.00** psf
Sloped Rf Snow Load, Ps =CsPf	**10.00** psf	**10.00** psf	**10.00** psf
	22.89 psf	**35.69** psf	**10.00** psf
Drift Width, w_W=	3.37 ft	6.72 ft	0.00 ft

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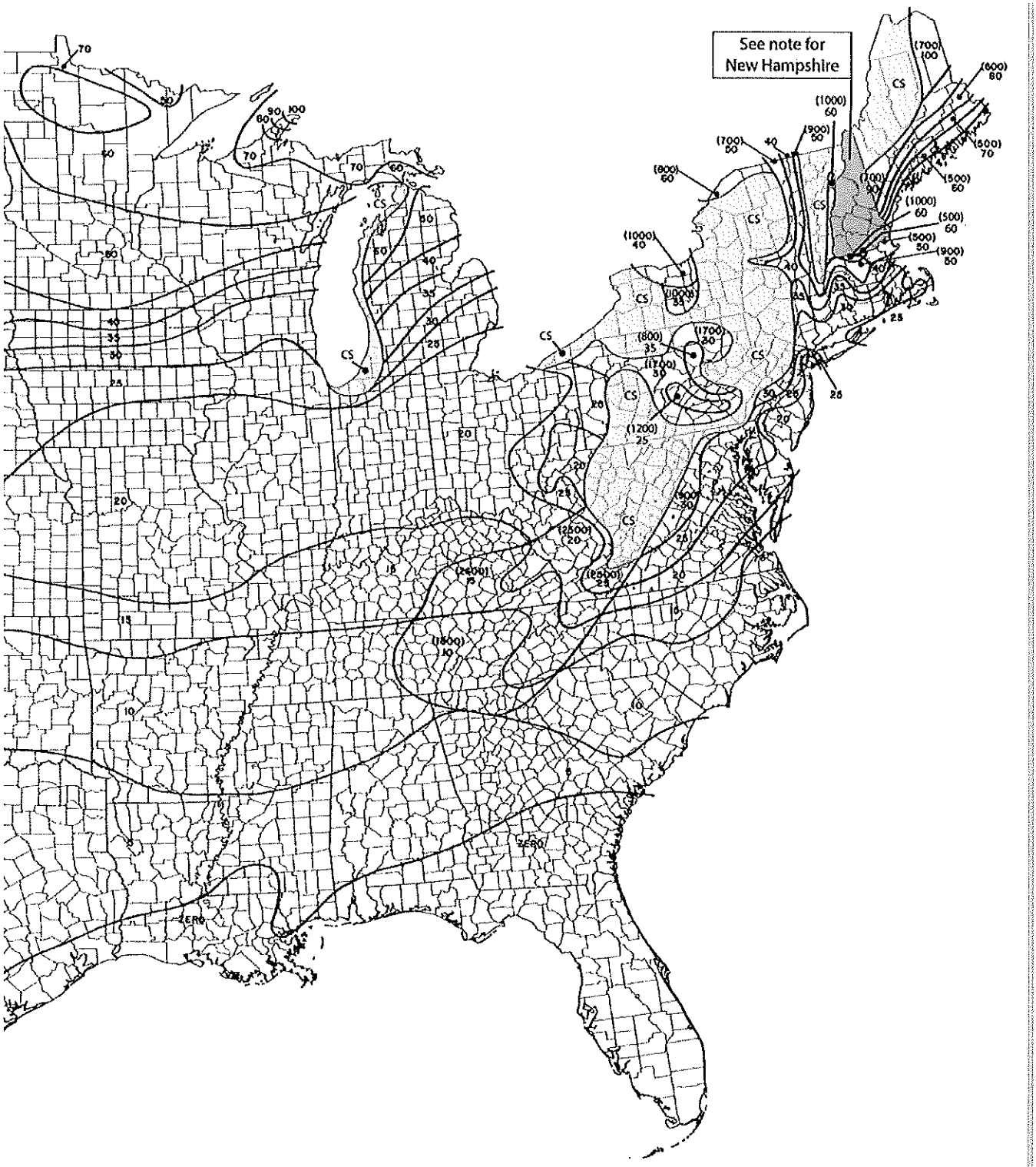


FIGURE 7.2-1 (*Continued*)

hip, and gable roofs with slopes less than 15° and to curved roofs where the vertical angle from the eaves to the crown is less than 10°. The minimum roof snow load for low-slope roofs shall be obtained using the following formula:

Where p_g is 20 lb/ft^2 (0.96 kN/m^2) or less:

$$p_m = I_s p_g \quad \text{(Importance Factor times } p_g\text{)}$$

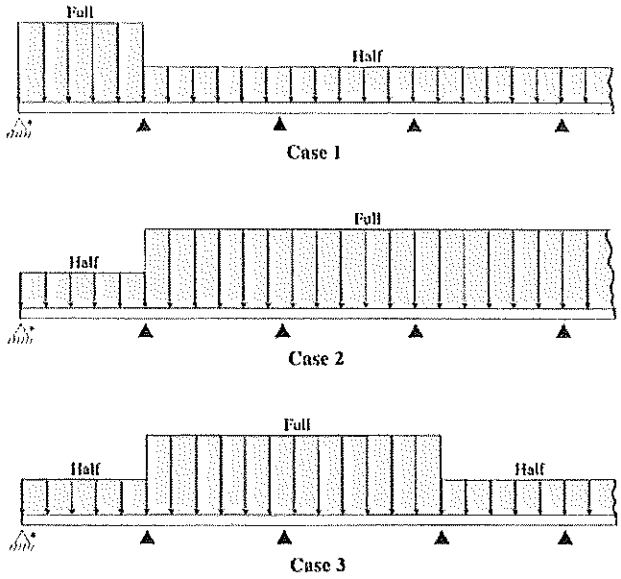
Where p_g exceeds 20 lb/ft^2 (0.96 kN/m^2):

$$p_m = 20(I_s) \quad \text{(20 lb/ft}^2 \text{ times Importance Factor)}$$

$$p_m = 0.96(I_s) \quad \text{(0.96 kN/m}^2 \text{ times Importance Factor)}$$

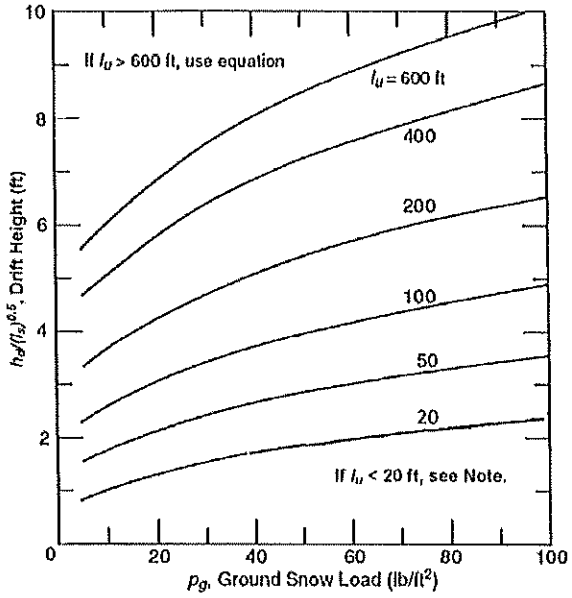
This minimum roof snow load is a separate uniform load case. It need not be used in determining or in combination with drift, sliding, unbalanced, or partial loads.

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* The left supports are dashed since they would not exist when a cantilever is present.

FIGURE 7.5-1 Partial Loading Diagrams for Continuous Beams



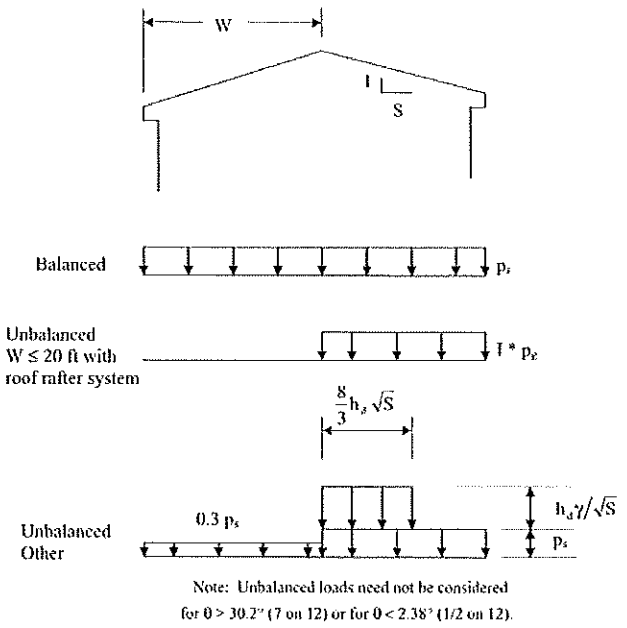
$$\frac{h_d}{\sqrt{l_u}} = \left(0.43\sqrt[3]{l_u}\sqrt{p_g + 10}\right) - 1.5$$

Notes: If l_u < 20 ft, use l_u = 20 ft, except h_d for this small fetch case need not be taken greater than $\sqrt{(l_s p_g l_u/4\gamma)}$ where l_u is the actual fetch distance, not the minimum fetch of 20 ft.
To convert lb/ft² to kN/m², multiply by 0.0479. To convert feet to meters, multiply by 0.3048.

FIGURE 7.6-1 Graph and Equation for Determining Drift Height, h_d

shown in Fig. 7.7-3. Intersecting snowdrift loads shall be considered to occur concurrently, except that the two drift loads need not be superimposed.

For leeward intersecting snowdrifts at reentrant corners, the length of the upper roof applicable for each snowdrift shall be



Note: Unbalanced loads need not be considered for θ > 30.2° (7 on 12) or for θ < 2.38° (1/2 on 12).

FIGURE 7.6-2 Balanced and Unbalanced Snow Loads for Hip and Gable Roofs

used with l_u parallel to w_1 for the first drift and l_u parallel to w_2 for the second drift. For windward snowdrifts, the lengths of the lower roof shall be used for l_u.

7.8 ROOF PROJECTIONS AND PARAPETS

The method in Section 7.7.1 shall be used to calculate drift loads on all sides of roof projections and at parapet walls. The height of such drifts shall be taken as three-quarters the drift height from Fig. 7.6-1 (i.e., $0.75h_d$). For parapet walls, l_u shall be taken equal to the length of the roof upwind of the wall. For roof projections, l_u shall be taken equal to the greater of the length of the roof upwind or downwind of the projection.

EXCEPTION: Drift loads shall not be required where the side of the roof projection is less than 15 ft (4.6 m) or the clear distance between the height of the balanced snow load, h_b, and the bottom of the projection (including horizontal supports) is at least 2 ft (0.61 m).

7.9 SLIDING SNOW

The load caused by snow sliding off a sloped roof onto a lower roof shall be determined for slippery upper roofs with slopes greater than ¼ on 12, and for other (i.e., nonslippery) upper roofs with slopes greater than 2 on 12. The total sliding load per unit length of eave shall be $0.4p_f W$, where W is the horizontal distance from the eave to ridge for the sloped upper roof. The sliding load shall be distributed uniformly on the lower roof over a distance of 15 ft (4.6 m) from the upper roof eave. If the width of the lower roof is less than 15 ft (4.6 m), the sliding load shall be reduced proportionally.

The sliding snow load shall not be further reduced unless a portion of the snow on the upper roof is blocked from sliding onto the lower roof by snow already on the lower roof.

For separated structures, sliding loads shall be considered when $h/s > 1$ and $s < 15$ ft ($s < 4.6$ m). The horizontal extent

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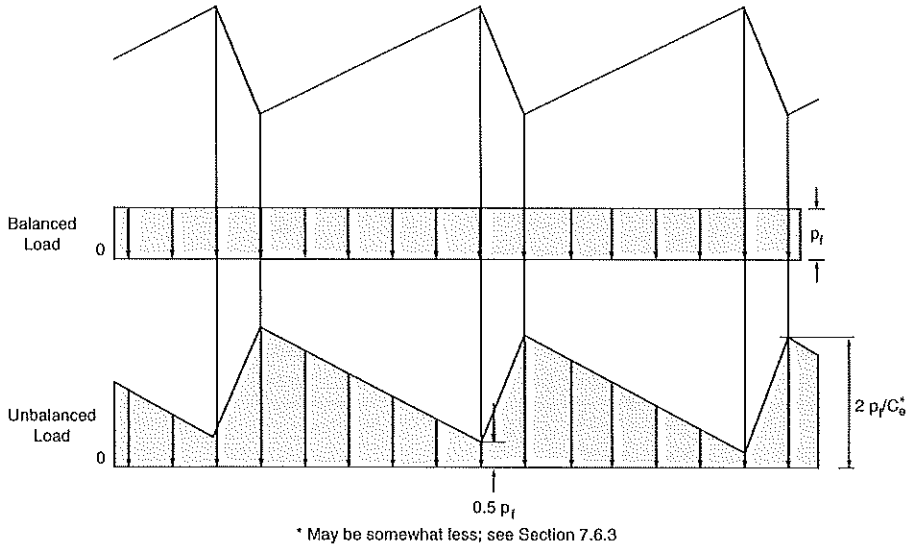


FIGURE 7.6-3 Balanced and Unbalanced Snow Loads for a Sawtooth Roof

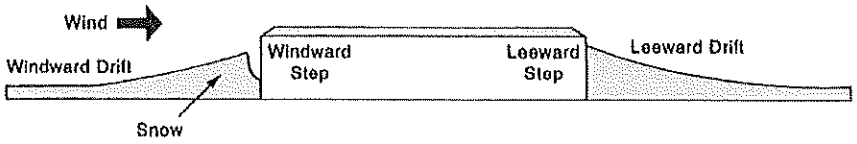


FIGURE 7.7-1 Drifts Formed at Windward and Leeward Steps

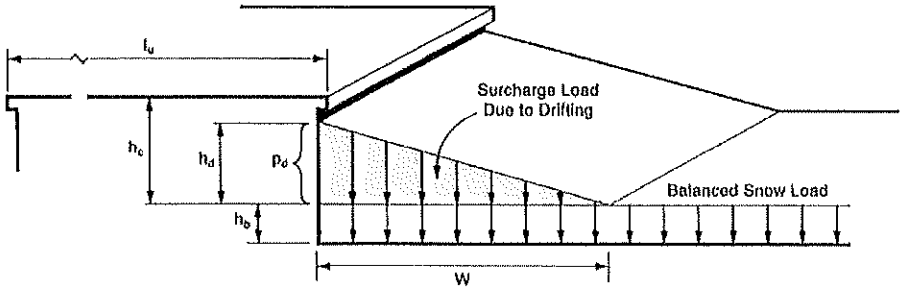


FIGURE 7.7-2 Configuration of Snowdrifts on Lower Roofs

of the sliding load on the lower roof shall be $15 - s$ with s in feet ($4.6 - s$ with s in meters), and the load per unit length shall be $0.4p_f W(15 - s)/15$ with s in feet ($0.4p_f W(4.6 - s)/4.6$ with s in meters).

Sliding loads shall be superimposed on the balanced snow load and need not be used in combination with drift, unbalanced, partial, or rain-on-snow loads.

7.10 RAIN-ON-SNOW SURCHARGE LOAD

For locations where p_g is 20 lb/ft^2 (0.96 kN/m^2) or less, but not zero, all roofs with slopes (in degrees) less than $W/50$ with W in ft (in SI: $W/15.2$ with W in m) shall include a 5 lb/ft^2 (0.24 kN/m^2) rain-on-snow surcharge load. This additional load applies only to the sloped roof (balanced) load case and need not be used in combination with drift, sliding, unbalanced, minimum, or partial loads.

7.11 PONDING INSTABILITY

Susceptible bays shall be designed to preclude ponding instability. Roof deflections caused by full snow loads shall be evaluated when determining the likelihood of ponding instability (see Section 8.4).

7.12 EXISTING ROOFS

Existing roofs shall be evaluated for increased snow loads caused by additions or alterations. Owners or agents for owners

Project #	67018 Circle K
Project Name	Fuel - Erwin, NC
Engineer	LDA
Date	5/7/2026

Wind Loads

ASCE 7-16 (Chapter 26)
Monoslope Roof Over Open Building

			(Table 1.5-1)	Fascia Height	3	ft
Risk Category	II		(Table 1.5-2)	Trib Width Y1	28	ft
Exposure Category	C		(26.7.)	Trib Width Y2	25.83	ft
Design Wind Velocity (Vult)	119	MPH	(Figure 26.5-1A,B,C,D)	# of Cols	6	
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	163.67 ft	L/B =	0.147
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		
Velocity Pressure, qz =	26.86 psf	qz=0.00256 Kz Kzt Kd V^2 I (psf)	
Gust Response Factor, G =	0.85		

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

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	54.79	-75.33	41.09	-38.81	27.39	-25.11
>a^2,<=4a^2	41.09	-38.81	41.09	-38.81	27.39	-25.11
>4a^2	27.39	-25.11	27.39	-25.11	27.39	-25.11

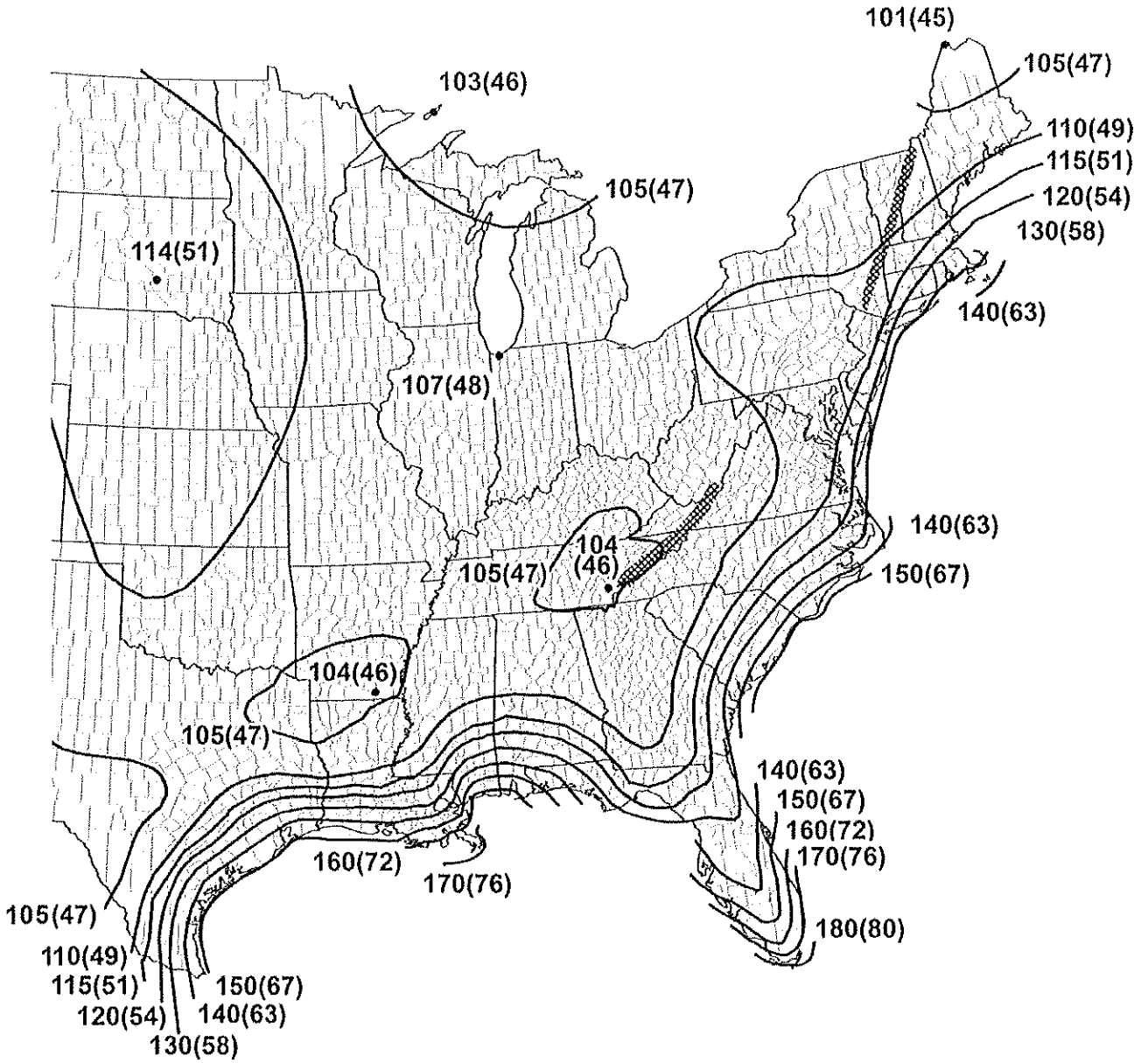
Horizontal Wind Pressures on Parapets
Net Pressure Coefficients

(windward + leeward) GCpn=	2.500		(+1.5 Windward, -1.0 Leeward)
pw (lat) =	67.14	psf	pwl =qz GCpn
Af 1 =	491.01	sf	
Af 2=	72.00	sf	
Pw (lat) 1 =	32.97	kips	Pwl =qz GCpn Af
Pw (lat) 2=	4.83	kips	Pwl =qz GCpn Af
Fy1 =	5.64	kips/frame	
Fy2 =	5.20	kips/frame	
Fx =	0.81	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 (+) =	27.39	6.85	psf
p (-) =	-25.11	-2.28	psf
Pcol =	18.4	kips	

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Location	V (mph)	V (m/s)
Guam	195	(87)
Virgin Islands	165	(74)
American Samoa	160	(72)
Hawaii	See Figure 26.5-2B	



FIGURE 26.5-1B (*Continued*). Basic Wind Speeds for Risk Category II Buildings and Other Structures

27.2.1 Wind Load Parameters Specified in Chapter 26. The following wind load parameters shall be determined in accordance with Chapter 26:

- Basic wind speed, V (Section 26.5).
- Wind directionality factor, K_d (Section 26.6).
- Exposure category (Section 26.7).
- Topographic factor, K_{zt} (Section 26.8).
- Ground elevation factor, K_e; see Section 26.9
- Gust-effect factor (Section 26.11).
- Enclosure classification (Section 26.12).
- Internal pressure coefficient, (GC_{pi}) (Section 26.13).

27.3 WIND LOADS: MAIN WIND FORCE RESISTING SYSTEM

27.3.1 Enclosed and Partially Enclosed Rigid and Flexible Buildings. Design wind pressures for the MWFRS of buildings of all heights in lb/ft^2 (N/m^2), shall be determined by the following equation:

$$p = qGC_p - q_i(GC_{pi}) \tag{27.3-1}$$

where

$q = q_z$ for windward walls evaluated at height z above the ground.
$q = q_h$ for leeward walls, sidewalls, and roofs evaluated at height h.
$q_i = q_h$ for windward walls, sidewalls, leeward walls, and roofs of enclosed buildings, and for negative internal pressure evaluation in partially enclosed buildings.
$q_i = q_z$ for positive internal pressure evaluation in partially enclosed buildings where height z is defined as the level of the highest opening in the building that could affect the positive internal pressure. For buildings sited in wind-borne debris regions, glazing that is not impact-resistant or protected with an impact-resistant covering shall be treated as an opening in accordance with Section 26.12.3. For positive internal pressure evaluation, q_i may conservatively be evaluated at height $h (q_i = q_h)$.
G = gust-effect factor; see Section 26.11. For flexible buildings, G_f determined in accordance with Section 26.11.5 shall be substituted for G.
C_p = external pressure coefficient from Figs. 27.3-1, 27.3-2, and 27.3-3.
(GC_{pi}) = internal pressure coefficient from Table 26.13-1.

Both q and q_i shall be evaluated using exposure defined in Section 26.7.3. Pressure shall be applied simultaneously on windward and leeward walls and on roof surfaces as defined in Figs. 27.3-1, 27.3-2, and 27.3-3.

27.3.2 Open Buildings with Monoslope, Pitched, or Troughed Free Roofs. The net design pressure for the MWFRS of open buildings with monoslope, pitched, or troughed free roofs in lb/ft^2 (N/m^2), shall be determined by the following equation:

$$p = q_h GC_N \tag{27.3-2}$$

where

q_h = velocity pressure evaluated at mean roof height h using the exposure as defined in Section 26.7.3 that results in the highest wind loads for any wind direction at the site.
G = gust-effect factor from Section 26.11.
C_N = net pressure coefficient determined from Figs. 27.3-4 through 27.3-7.

Net pressure coefficients, C_N, include contributions from top and bottom surfaces. All load cases shown for each roof angle shall be investigated. Plus and minus signs signify pressure acting toward and away from the top surface of the roof, respectively.

For free roofs with an angle of plane of roof from horizontal θ less than or equal to 5° and containing fascia panels, the fascia panel shall be considered an inverted parapet. The contribution of loads on the fascia to the MWFRS loads shall be determined using Section 27.3.5, with q_p equal to q_h. For an open or partially enclosed building with transverse frames and a pitched roof ($\theta \leq 45°$), an additional horizontal force in the longitudinal direction (parallel to the ridge) that acts in combination with the roof load calculated in Section 27.3.3 shall be determined in accordance with Section 28.3.5.

27.3.3 Roof Overhangs. The positive external pressure on the bottom surface of windward roof overhangs shall be determined using $C_p = 0.8$ and combined with the top surface pressures determined using Fig. 27.3-1.

27.3.4 Parapets. The design wind pressure for the effect of parapets on MWFRS of rigid or flexible buildings with flat, gable, or hip roofs in lb/ft^2 (N/m^2), shall be determined by the following equation:

$$p_p = q_p(GC_{pn})(\text{lb/ft}^2) \tag{27.3-3}$$

where

p_p = combined net pressure on the parapet caused by the combination of the net pressures from the front and back parapet surfaces. Plus (and minus) signs signify net pressure acting toward (and away from) the front (exterior) side of the parapet.
q_p = velocity pressure evaluated at the top of the parapet.
(GC_{pn}) = combined net pressure coefficient:
= +1.5 for windward parapet or
= −1.0 for leeward parapet.

27.3.5 Design Wind Load Cases. The MWFRS of buildings of all heights, the wind loads of which have been determined under the provisions of this chapter, shall be designed for the wind load cases as defined in Fig. 27.3-8.

EXCEPTION: Buildings meeting the requirements of Section D1.1 of Appendix D need only be designed for Case 1 and Case 3 of Fig. 27.3-8.

The eccentricity e for rigid buildings shall be measured from the geometric center of the building face and shall be considered for each principal axis (e_X, e_Y). The eccentricity e for flexible buildings shall be determined from the following equation and shall be considered for each principal axis (e_X, e_Y):

$$e = \frac{e_Q + 1.7 I_{\bar{z}} \sqrt{(g_Q Q e_Q)^2 + (g_R R e_R)^2}}{1 + 1.7 I_{\bar{z}} \sqrt{(g_Q Q)^2 + (g_R R)^2}} \tag{27.3-4}$$

where

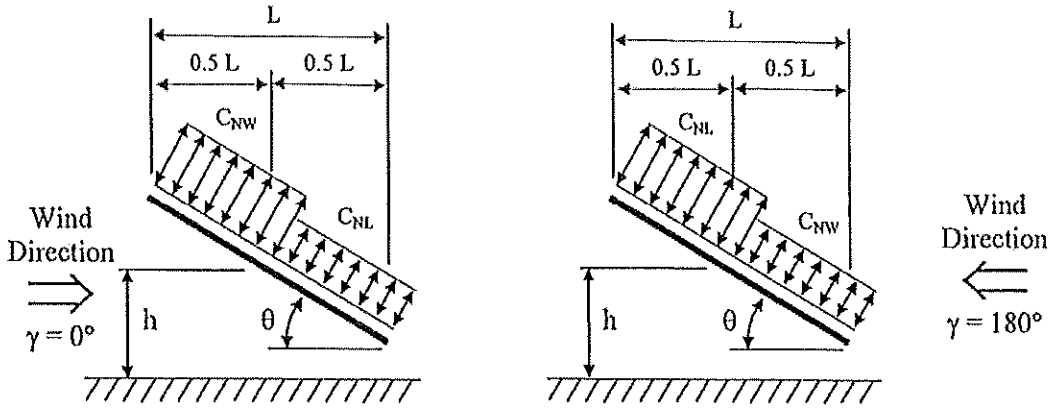
e_Q = eccentricity e as determined for rigid buildings in Fig. 27.3-8.
e_R = distance between the elastic shear center and center of mass of each floor.
I_z, g_Q, Q, g_R, and R shall be as defined in Section 26.11.

The sign of the eccentricity e shall be plus or minus, whichever causes the more severe load effect.

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Diagrams



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.

Net Pressure Coefficient, C_N

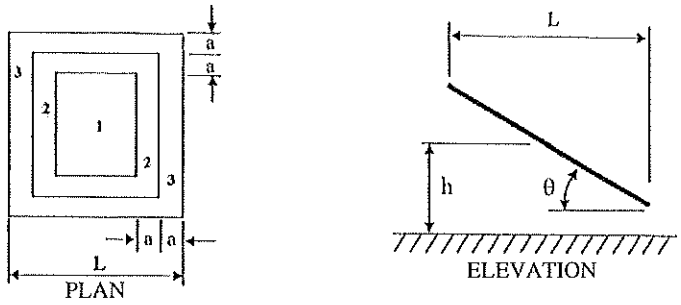
		Wind Direction, $\gamma = 0°$				Wind Direction, $\gamma = 180°$			
		Clear Wind Flow		Obstructed Wind Flow		Clear Wind Flow		Obstructed Wind Flow	
Roof Angle, θ	Load Case	C_{NW}	C_{NL}	C_{NW}	C_{NL}	C_{NW}	C_{NL}	C_{NW}	C_{NL}
0°	A	1.2	0.3	−0.5	−1.2	1.2	0.3	−0.5	−1.2
	B	−1.1	−0.1	−1.1	−0.6	−1.1	−0.1	−1.1	−0.6
7.5°	A	−0.6	−1.0	−1.0	−1.5	0.9	1.5	−0.2	−1.2
	B	−1.4	0.0	−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	0.0	−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	−1.0
	B	−2.4	−0.3	−2.3	−0.9	2.2	0.7	1.3	0.0
30°	A	−1.8	−1.8	−1.5	−1.8	2.1	2.1	0.6	−1.0
	B	−2.5	−0.5	−2.3	−1.1	2.6	1.0	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 toward and away from the top roof surface, respectively.
5. All load cases shown for each roof angle shall be investigated.

FIGURE 27.3-4 Main Wind Force Resisting System, Part 1 ($0.25 \le h/L \le 1.0$): Net Pressure Coefficient, C_N, for Open Buildings with Monoslope Free Roofs, $\theta \le 45°$, $\gamma = 0°$, 180°)

Diagrams



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, in ft (m).

L = Horizontal dimension of building, measured in along-wind direction, in ft (m).

θ = Angle of plane of roof from horizontal, in degrees.

Net Pressure Coefficients, C_N

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

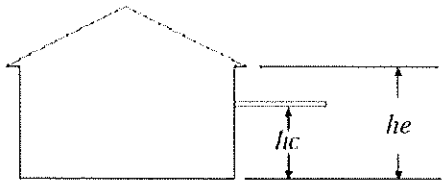
Notes

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 toward and away from the top roof surface, respectively.
5. Components and cladding elements shall be designed for positive and negative pressure coefficients shown.

FIGURE 30.7-1 Components and Cladding ($0.25 \le h/L \le 1.0$): Net Pressure Coefficient, C_N, for Open Buildings—Monoslope Free Roofs, $\theta \le 45°$

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Diagram

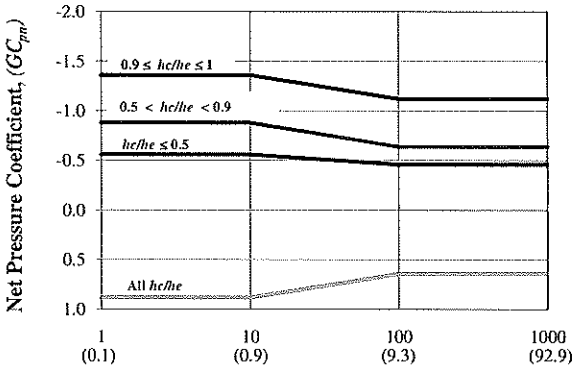


ELEVATION

Notation

hc = Mean canopy height, in ft (m).
he = Mean eave height, in ft (m).
$(GCpn)$ = Net pressure coefficients.
q_h = Velocity pressure evaluated at height $z = h$, in lb/ft^2 (N/m^2).

Net Pressure Coefficients



Notes

1. Vertical scale denotes $(GCpn)$ to be used with q_h.
2. Horizontal scale denotes effective wind area, in ft^2 (m^2).
3. Negative and positive signs signify uplifting and downward pressures, respectively.
4. Each component shall be designed for maximum positive and negative pressures.
5. Use linear interpolation for intermediate values of hc/he.

FIGURE 30.11-1B Net Pressure Coefficients on Attached Canopies Considering Simultaneous Contributions from Upper and Lower Surfaces

be determined from the following equation:

$$p = q_h((GC_p) - (GC_{pi})) \qquad (30.12\text{-}1)$$

where

q_h = velocity pressure for all surfaces evaluated at mean roof height h
(GC_p) = external pressure coefficients given in
- Section 30.12.2 for walls
- Section 30.12.5 for underneath sides
- Section 30.12.4 for roofs

(GC_{pi}) = internal pressure coefficient given in Table 26.13-1 and Section 30.12.3.

30.12.2 External Walls of Isolated Circular Bins, Silos, and Tanks. The external pressures on the walls of circular bins, silos, and tanks shall be determined from the external pressure coefficients (GC_p) as a function of the angle α, given as follows for the shape ranges indicated:

$$(GC_{p(\alpha)}) = k_b C_{(\alpha)} \qquad (30.12\text{-}2)$$

where the cylinder (diameter D) is standing on the ground or supported by columns giving a clearance height (C) less than the height of the cylinder (H), as shown in Fig. 30.12-1.

H/D is in the range 0.25 to 4.0 inclusive. α = angle from the wind direction to a point on the wall of a circular bin, silo, or tank, in degrees.

$$k_b = 1.0 \quad \text{for } C_{(\alpha)} \geq -0.15, \text{ or}$$
$$= 1.0 - 0.55(C(\alpha) + 0.15)\log_{10}(H/D) \quad \text{for } C_{(\alpha)} < -0.15 \qquad (30.12\text{-}3)$$

$$C_{(\alpha)} = -0.5 + 0.4\cos\alpha + 0.8\cos 2\alpha + 0.3\cos 3\alpha \qquad (30.12\text{-}4)$$
$$1 - 0.1\cos 4\alpha - 0.05\cos 5\alpha$$

Fig. 30.12-1 lists the external pressure coefficients for walls, which includes the graphic distribution of the external pressure $(GC_{p(\alpha)})$ around the perimeter of the wall.

30.12.3 Internal Surface of Exterior Walls of Isolated Open-Topped Circular Bins, Silos, and Tanks. The pressures on the

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ASCE7-16 SEISMIC FORCE CALCULATION

Project #	67018 Circle K
Project Name	Fuel - Erwin, NC
Engineer	LDA
Date	05/07/26

SITE CLASS		D	Dead Load	10	PSF
RISK CATEGORY		II	Snow	0	PSF (0.15*pf IF pf>45 PSF)
MAPPED SPECTRAL ACCELERATION AT 0.2 sec, Ss		0.132 g	(If pf>30 PSF)	10	PSF
MAPPED SPECTRAL ACCELERATION AT 1.0 sec, S1		0.065 g	A=	3928.08	sf
SITE COEFFICIENT, Fa		1.60	W=	39.28	k
SITE COEFFICIENT, Fv		2.40			
SOIL MODIFIED SHORT PERIOD SPECTRAL RESPONSE ACCELERATION, SMs		0.211 g			
SOIL MODIFIED LONG PERIOD SPECTRAL RESPONSE ACCELERATION, SM1		0.156 g			
SHORT PERIOD SPECTRAL RESPONSE ACCELERATION, SDs		0.141 g	Ct = building period coefficient		
LONG PERIOD SPECTRAL RESPONSE ACCELERATION, SD1		0.104 g	Ta = Ct H^x		
SEISMIC DESIGN CATEGORY		B	Cs =SDs / (R/Ie)		(ASCE 12.8-2)
OCCUPANCY IMPORTANCE FACTOR, IE		1.00	Cs max =SD1 / [(R/Ie)T]		(ASCE 12.8-3)
BASIC STRUCTURAL SYSTEM			Cs min 1 =0.01		(ASCE 12.8-5)
		Steel Ordinary Cantilever Columns	Cs min 2 0.5S1/(R/Ie)		(ASCE 12.8-6)
RESPONSE MODIFICATION FACTOR, R		1.25			for S1=>0.6g
SYSTEM OVERSTRENGTH FACTOR		1.25			
DEFLECTION AMPLIFICATION FACTOR, Cd		1.25	V =CsW		
ANALYSIS PROCEDURE		EQUIVALENT LATERAL FORCE (ASCE 7-16 SECTION 12.8)	Fx =VCvx		
			Fpx =(Ft+sum(v))/cumul.(W) diaphragm shear		

Trib Width Y1	28	ft								
Trib Width Y2	25.83	ft								
# of Cols	6									
BLDG. H =	17	ft								
# STORIES =	1									
DIRECTION =	Y		use T =	0.2701		k =	1.000			
Ct =	0.028		Cs =	0.1124	(ASCE 12.8-2)					
x =	0.8		Cs max =	0.3080	(ASCE 12.8-3)	V =	4.42	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)				Building Reactions	
Cu =	1.700		Use Cs min=	0.0100		Fy1 =	0.76	kips/frame	Fy1=	0.00
T =CuTa=	0.4592	sec				Fy2 =	0.70	kips/frame	Fx=	0.00
			USE Cs =	**0.1124**		Fx =	0.74	kips/col		
Wtotal =	39	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	39.3	-	668	1.000	4.42	-	-	-	-
			39		668	1.000	4				0

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Table 12.2-1 *(Continued)* Design Coefficients and Factors for Seismic Force-Resisting Systems

Seismic Force-Resisting System	ASCE 7 Section Where Detailing Requirements Are Specified	Response Modification Coefficient, R[a]	Overstrength Factor, Ω_0[b]	Deflection Amplification Factor, C_d[c]	Structural System Limitations Including Structural Height, h_n (ft) Limits[d] — Seismic Design Category B	C	D[e]	E[e]	F[f]
5. Steel and concrete composite special concentrically braced frames	14.3	5½	2½	4½	NL	NL	160	100	NP
6. Steel and concrete composite ordinary braced frames	14.3	3½	2½	3	NL	NL	NP	NP	NP
7. Steel and concrete composite ordinary shear walls	14.3	5	3	4½	NL	NL	NP	NP	NP
8. Ordinary reinforced concrete shear walls[g]	14.2	5½	2½	4½	NL	NL	NP	NP	NP
F. SHEAR WALL-FRAME INTERACTIVE SYSTEM WITH ORDINARY REINFORCED CONCRETE MOMENT FRAMES AND ORDINARY REINFORCED CONCRETE SHEAR WALLS[g]	12.2.5.8 and 14.2	4½	2½	4	NL	NP	NP	NP	NP
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[m]	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 that R reduces forces to a strength level, not an allowable stress level.
[b]Where the tabulated value of the overstrength factor, Ω_0, is greater than or equal to 2½, Ω_0 is permitted to be reduced by subtracting the value of 1/2 for structures with flexible diaphragms.
[c]Deflection amplification factor, C_d, for use in Sections 12.8.6, 12.8.7, and 12.9.1.2.
[d]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.
[e]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.
[f]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.
[g]In Section 2.3 of ACI 318. A shear wall is defined as a structural wall.
[h]In Section 2.3 of ACI 318. The definition of "special structural wall" includes precast and cast-in-place construction.
[i]An increase in structural height, h_n, to 45 ft (13.7 m) is permitted for single-story storage warehouse facilities.
[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 lb/ft^2 (0.96 kN/m^2) and in penthouse structures.
[k]See Section 12.2.5.7 for limitations in structures assigned to Seismic Design Categories D, E, or F.
[l]See Section 12.2.5.6 for limitations in structures assigned to Seismic Design Categories D, E, or F.
[m]In Section 2.3 of ACI 318. The definition of "special moment frame" includes precast and cast-in-place construction.
[n]Cold-formed steel—special bolted moment frames shall be limited to one story in height in accordance with ANSI/AISI S400.
[o]Alternately, the seismic load effect including overstrength, E_{mh}, is permitted to be based on the expected strength determined in accordance with ANSI/AISI S400.
[p]Ordinary moment frame is permitted to be used in lieu of intermediate moment frame for Seismic Design Categories B or C.

Project # 67018 Circle K
Project Nam Fuel - Erwin, NC
Engineer LDA
Date 05/07/26

Code: AISC 360-10
Chapter: Appendix 2: 2.1
Page: 16.1-188-189
Created: 3/14/2018

Ponding Check

1.5B Deck 18 Ga

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

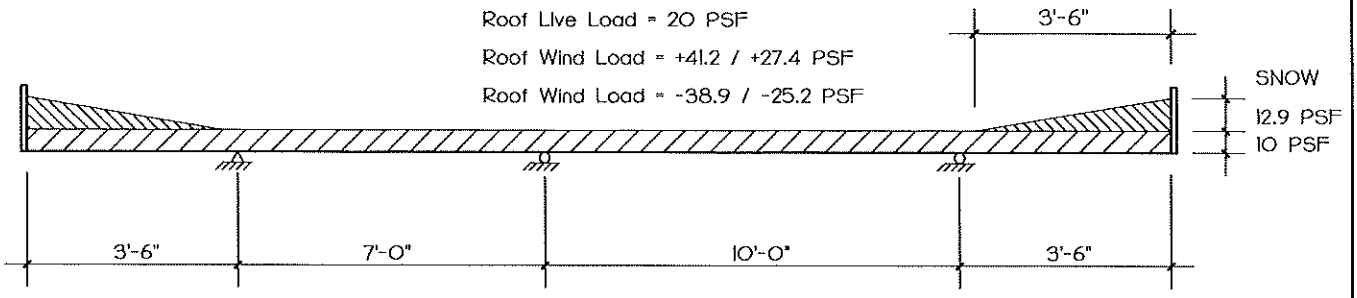
									Condition 1		Condition 2			Stable for
Primary	**Cp**	**Lp(ft)**	**Ip(in^4)**	**Secondary**	**Cs**	**S(ft)**	**Ls(ft)**	**Is(in^4)**	$C_p + 0.9C_s \leq 0.25$		**(in^4)**	$I_d \geq 25(S^4)10^{-6}$		**Ponding**
W14x30	0.02572	17	291	**W12x19**	0.1513	10	28	130	0.16188638	**OK**	0.439	0.25	**OK**	**TRUE**

Dead Load = 5 PSF

Roof Live Load = 20 PSF

Roof Wind Load = +41.2 / +27.4 PSF

Roof Wind Load = -38.9 / -25.2 PSF



+Mmax = .204 k-ft/ft x 16"/panel = .272 k-ft/panel <= 0.819 k-ft :OK

-Mmax = -.236 k-ft/ft x 16"/panel = -.315 k-ft/panel <= -0.682 k-ft :OK

Rmax = 319 #/ft x 16"/panel = 426 #/panel 394 #/clip :Single / Double clip panel

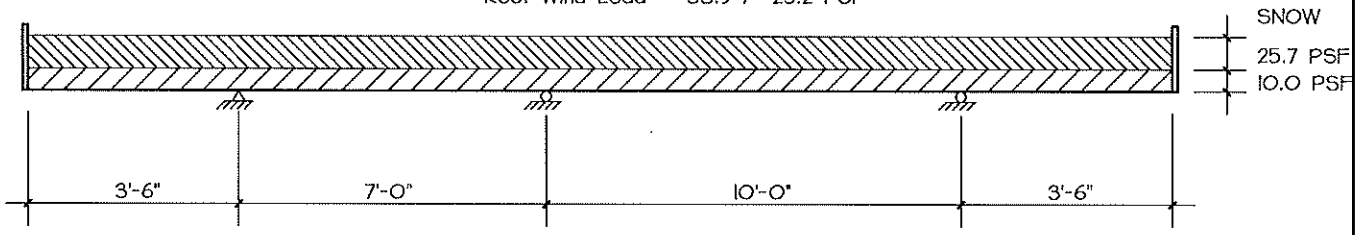
Interior Deck Span

Dead Load = 5 PSF

Roof Live Load = 20 PSF

Roof Wind Load = +41.2 / +27.4 PSF

Roof Wind Load = -38.9 / -25.2 PSF



+Mmax = .275 k-ft/ft x 16"/panel = .367 k-ft/panel <= 0.819 k-ft :OK

-Mmax = -.308 k-ft/ft x 16"/panel = -.411 k-ft/panel <= -0.682 k-ft :OK

Rmax = 419 #/ft x 16"/panel = 559 #/panel 394 #/clip :Single / Double clip panel

Canopy End Deck Span

Envelope Maximum Member Section Forces

	Member		Axial[lb]	Loc[ft]	LC	y Shear[lb]	Loc[ft]	LC	z Shear[lb]	Loc[ft]	LC	Torque[k-ft]	Loc[ft]	LC	y-y Moment[k-ft]	Loc[ft]	LC	z-z Moment[k-ft]	Loc[ft]	LC
1	M1	max	0	3.5	18	71.19	3.5	18	0	3.5	18	0	3.5	18	0	3.5	18	0.236	3.5	11
2		min	0	0	1	-134.89	3.5	11	0	0	1	0	0	1	0	0	1	-0.125	3.5	18
3	M2	max	0	7	18	133.252	0	11	0	7	18	0	7	18	0	7	18	0.236	0	11
4		min	0	0	1	-121.003	7	11	0	0	1	0	0	1	0	0	1	-0.125	0	18
5	M3	max	0	10	18	167.143	0	11	0	10	18	0	10	18	0	10	18	0.236	10	11
6		min	0	0	1	-184.102	10	11	0	0	1	0	0	1	0	0	1	-0.204	5.208	11
7	M4	max	0	3.5	18	134.89	0	11	0	3.5	18	0	3.5	18	0	3.5	18	0.236	0	11
8		min	0	0	1	-71.19	0	18	0	0	1	0	0	1	0	0	1	-0.125	0	18

Envelope Node Reactions

	Node Label		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	268.142	11	0	18	0	18	0	18	0	18
2		min	0	1	-143.222	18	0	1	0	1	0	1	0	1
3	N3	max	0	18	288.146	11	0	18	0	18	0	18	0	18
4		min	0	1	-115.563	18	0	1	0	1	0	1	0	1
5	N4	max	0	18	318.992	11	0	18	0	18	0	18	0	18
6		min	0	1	-163.615	18	0	1	0	1	0	1	0	1
7	Totals:	max	0	18	875.28	11	0	18						
8		min	0	1	-422.4	18	0	1						

Envelope Maximum Member Section Forces

	Member		Axial[lb]	Loc[ft]	LC	y Shear[lb]	Loc[ft]	LC	z Shear[lb]	Loc[ft]	LC	Torque[k-ft]	Loc[ft]	LC	y-y Moment[k-ft]	Loc[ft]	LC	z-z Moment[k-ft]	Loc[ft]	LC
1	M1	max	0	3.5	18	71.19	3.5	18	0	3.5	18	0	3.5	18	0	3.5	18	0.308	3.5	13
2		min	0	0	1	-176.103	3.5	13	0	0	1	0	0	1	0	0	1	-0.125	3.5	18
3	M2	max	0	7	18	173.309	0	13	0	7	18	0	7	18	0	7	18	0.308	7	13
4		min	0	0	1	-163.371	7	13	0	0	1	0	0	1	0	0	1	-0.125	0	18
5	M3	max	0	10	18	226.827	0	13	0	10	18	0	10	18	0	10	18	0.308	0	13
6		min	0	0	1	-242.168	10	13	0	0	1	0	0	1	0	0	1	-0.275	5.104	13
7	M4	max	0	3.5	18	176.102	0	13	0	3.5	18	0	3.5	18	0	3.5	18	0.308	0	13
8		min	0	0	1	-71.19	0	18	0	0	1	0	0	1	0	0	1	-0.125	0	18

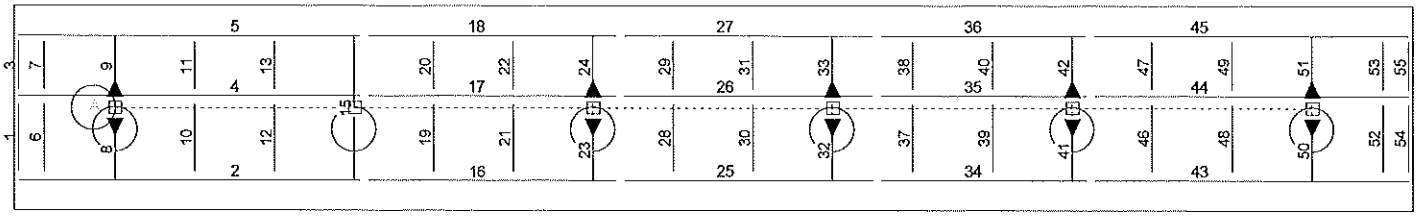
Envelope Node Reactions

	Node Label		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	349.412	13	0	18	0	18	0	18	0	18
2		min	0	1	-143.222	18	0	1	0	1	0	1	0	1
3	N3	max	0	18	390.198	13	0	18	0	18	0	18	0	18
4		min	0	1	-115.563	18	0	1	0	1	0	1	0	1
5	N4	max	0	18	418.27	13	0	18	0	18	0	18	0	18
6		min	0	1	-163.615	18	0	1	0	1	0	1	0	1
7	Totals:	max	0	18	1157.88	13	0	18						
8		min	0	1	-422.4	18	0	1						

Design Warnings

Floor Type: ROOF

Beam Numbers

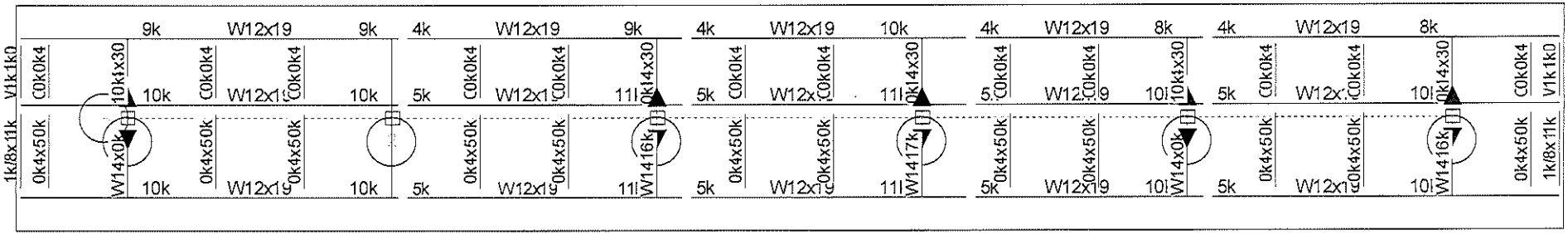


Floor Map

RAM Steel 25.00.02.42
DataBase: 67018 24x163.67.33 A500C Fixed Top - Roof Drains
Building Code: IBC

05/08/26 09:59:22
Steel Code: AISC360-16 LRFD

Floor Type: ROOF **Beam Designs**



Beam Summary

STEEL BEAM DESIGN SUMMARY:

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

Floor Type: ROOF

Beam #	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		
2	11.33	0.0	-24.3					
	28.00	30.1	-24.3	49.9	50.0	W12X19	u	
	0.67	0.0	-3.2					
3	7.00	0.2	0.0	27.3	50.0	W8X10		
4	11.33	0.0	-25.7					
	28.00	29.9	-25.7	49.9	50.0	W12X19	u	
	0.67	0.0	-3.3					
5	11.33	0.0	-20.0					
	28.00	25.9	-20.0	49.9	50.0	W12X19	u	
	0.67	0.0	-2.7					
6	10.00	0.1	0.0	4.5	36.0	C4X5.4		
7	7.00	0.0	0.0	6.2	36.0	C4X5.4		
8	8.50	0.0	-83.8	154.7	50.0	W14X30	u	
9	8.50	0.0	-72.9	177.4	50.0	W14X30	u	
10	10.00	0.1	0.0	4.5	36.0	C4X5.4		
11	7.00	0.0	0.0	6.2	36.0	C4X5.4		
12	10.00	0.1	0.0	4.5	36.0	C4X5.4		
13	7.00	0.0	0.0	6.2	36.0	C4X5.4		
16	27.33	31.6	-12.7	49.8	50.0	W12X19	u	
	2.67	0.0	-12.7					
17	27.33	31.7	-12.7	49.8	50.0	W12X19	u	
	2.67	0.0	-12.7					
18	27.33	27.0	-10.5	49.8	50.0	W12X19	u	
	2.67	0.0	-10.5					
19	10.00	0.1	0.0	4.5	36.0	C4X5.4		
20	7.00	0.0	0.0	6.2	36.0	C4X5.4		
21	10.00	0.1	0.0	4.5	36.0	C4X5.4		
22	7.00	0.0	0.0	6.2	36.0	C4X5.4		
23	8.50	0.0	-86.5	154.7	50.0	W14X30	u	
24	8.50	0.0	-73.0	177.4	50.0	W14X30	u	
25	25.33	26.0	-22.7	50.2	50.0	W12X19	u	
	4.67	0.0	-22.7					

Beam Summary

26	25.33	26.1	-22.9	50.2	50.0	W12X19	u
	4.67	0.0	-22.9				
27	25.33	21.9	-19.0	50.2	50.0	W12X19	u
	4.67	0.0	-19.0				
28	10.00	0.1	0.0	4.5	36.0	C4X5.4	
29	7.00	0.0	0.0	6.2	36.0	C4X5.4	
30	10.00	0.1	0.0	4.5	36.0	C4X5.4	
31	7.00	0.0	0.0	6.2	36.0	C4X5.4	
32	8.50	0.0	-91.2	154.7	50.0	W14X30	u
33	8.50	0.0	-77.2	177.4	50.0	W14X30	u
34	23.33	23.7	-7.8	51.7	50.0	W12X19	u
	1.67	0.0	-7.8				
35	23.33	23.8	-7.7	51.7	50.0	W12X19	u
	1.67	0.0	-7.7				
36	23.33	19.7	-6.5	51.7	50.0	W12X19	u
	1.67	0.0	-6.5				
37	10.00	0.1	0.0	4.5	36.0	C4X5.4	
38	7.00	0.0	0.0	6.2	36.0	C4X5.4	
39	10.00	0.1	0.0	4.5	36.0	C4X5.4	
40	7.00	0.0	0.0	6.2	36.0	C4X5.4	
41	8.50	0.0	-79.1	154.7	50.0	W14X30	u
42	8.50	0.0	-68.1	177.4	50.0	W14X30	u
43	26.33	26.8	-24.3	49.9	50.0	W12X19	u
	11.33	0.0	-24.3				
44	26.33	26.6	-25.7	49.9	50.0	W12X19	u
	11.33	0.0	-25.7				
45	26.33	22.8	-20.0	49.9	50.0	W12X19	u
	11.33	0.0	-20.0				
46	10.00	0.1	0.0	4.5	36.0	C4X5.4	
47	7.00	0.0	0.0	6.2	36.0	C4X5.4	
48	10.00	0.1	0.0	4.5	36.0	C4X5.4	
49	7.00	0.0	0.0	6.2	36.0	C4X5.4	
50	8.50	0.0	-82.4	154.7	50.0	W14X30	u
51	8.50	0.0	-72.2	177.4	50.0	W14X30	u
52	10.00	0.1	0.0	4.5	36.0	C4X5.4	
53	7.00	0.0	0.0	6.2	36.0	C4X5.4	
54	10.00	0.4	0.0	18.1	50.0	W8X10	
55	7.00	0.2	0.0	27.3	50.0	W8X10	

* after Size denotes beam failed stress/capacity criteria.

after Size denotes beam failed deflection criteria.
u after Size denotes this size has been assigned by the User.

Member Code Check

BEAM INFORMATION:

Story Level = ROOF Frame Number = 0 Beam Number= 15
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)	=	14.70	1.00Vnx (kip)	=	111.78	Vux/1.00Vnx	= 0.132
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 1.50
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 1.50

CALCULATED PARAMETERS:

Pu (kip)	=	0.00	0.90Pn (kip)	=	398.25
Mux (kip-ft)	=	-61.45	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/0.90*Pn=0.000

Mrx/Mcx = 0.346

Member Code Check

BEAM INFORMATION:

Story Level = ROOF Frame Number = 0 Beam Number= 14
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)	=	-9.71	1.00Vnx (kip)	=	111.78	Vux/1.00Vnx	= 0.087
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)	=	-76.49	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/0.90*Pn=0.000

Mrx/Mcx = 0.494

Member Code Check

COLUMN INFORMATION:

Story Level = ROOF Frame Number = 0 Column Number= 2
Fy (ksi) = 50.00
Column Size = HSS12X12X516H

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft)	21.00	21.00
Lu for Bending (ft)	21.00	21.00
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)	5.91
		Vuy (kip)	-0.00
Shear	Bot.	Vux (kip)	5.91
		Vuy (kip)	-0.00

SHEAR CHECK:

Vux (kip)	=	5.91	0.90Vnx (kip)	=	174.85	Vux/0.90Vnx	= 0.034
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)	=	20.22	0.90Pnx (kip)	=	431.80	Pu/0.90Pnx	= 0.047
			0.90Pny (kip)	=	442.22	Pu/0.90Pny	= 0.046
			0.90Pn (kip)	=	431.80	Pu/0.90Pn	= 0.047

CONTROLLING COLUMN FORCES - FLEXURE

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

Axial		Load (kip)	11.05
Moment	Top	Mux (kip-ft)	4.26
		Muy (kip-ft)	0.00
Moment	Bot.	Mux (kip-ft)	124.88
		Muy (kip-ft)	0.00

CALCULATED PARAMETERS:

Pu (kip)	=	11.05	0.90Pn (kip)	=	431.80
Mux (kip-ft)	=	124.88	0.90Mnx (kip-ft)	=	149.25
Muy(kip-ft)	=	0.00	0.90Mny (kip-ft)	=	179.24
KL/Rx	=	55.11	KL/Ry	=	50.44
Cmx	=	0.61	Cmy	=	1.00
B1x	=	1.00	B1y	=	1.01

Cbx = 1.63

INTERACTION EQUATION:

Pu/0.90*Pn=0.026

Eq H1-1b: 0.013 + 0.837 + 0.000 = 0.850

Code Check Summary

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)	0.141
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 2021 / ASCE 7-16 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 Rfn - 1.600 NR1
12	*	1.200 D - 1.200 ND2 + 1.600 Rfn - 1.600 NR2
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 Rfp - 1.600 NR1 - 0.500 W1
16	*	1.200 D - 1.200 ND2 + 1.600 Rfp - 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 + 1.600 Rfn - 1.600 NR1 - 0.500 W1
20	*	1.200 D - 1.200 ND2 + 1.600 Rfn - 1.600 NR2 - 0.500 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 Rfp - 0.500 NR1 - 1.000 W1
24	*	1.200 D - 1.200 ND2 + 0.500 Rfp - 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 + 0.500 Rfn - 0.500 NR1 - 1.000 W1
28	*	1.200 D - 1.200 ND2 + 0.500 Rfn - 0.500 NR2 - 1.000 W2
29	*	1.200 D + 1.200 ND1 + 1.000 W1
30	*	1.200 D + 1.200 ND2 + 1.000 W2
31	*	1.200 D - 1.200 ND1 - 1.000 W1
32	*	1.200 D - 1.200 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	*	0.900 D - 0.900 ND1 - 1.000 W1
36	*	0.900 D - 0.900 ND2 - 1.000 W2
37	*	1.228 D + 1.228 ND1 + 1.000 E1
38	*	1.228 D + 1.228 ND2 + 1.000 E2
39	*	1.228 D - 1.228 ND1 - 1.000 E1
40	*	1.228 D - 1.228 ND2 - 1.000 E2
41	*	0.872 D + 0.872 ND1 + 1.000 E1
42	*	0.872 D + 0.872 ND2 + 1.000 E2
43	*	0.872 D - 0.872 ND1 - 1.000 E1

44 * 0.872 D - 0.872 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
2	11.05	124.88	0.00	5.91	-0.00	22	0.85 H1-1b	50	HSS12X12X516H

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
14	0.00	-76.49	0.00	-9.71	0.00	5	0.49 H1-1b	50	W14X30
15	0.00	-61.45	0.00	14.70	-0.00	5	0.35 H1-1b	50	W14X30

Nodal Displacements

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	0.05688	-0.05182	0.00082	0.00000	0.00000
	Rfp	0.00000	0.00000	-0.28554	0.00379	0.00000	0.00000
	Rfn	0.00000	0.00000	0.03783	-0.00050	0.00000	0.00000
	W1	0.84484	0.00000	0.00000	0.00000	0.00501	0.00000

Nodal Displacements

	W2	0.00000	6.35439	3.84404	-0.03769	0.00000	0.00000
	E1	0.75097	0.00000	0.00000	0.00000	0.00445	0.00000
	E2	0.00000	0.89184	0.53951	-0.00529	0.00000	0.00000
	ND1	0.10577	0.00000	0.00000	0.00000	0.00063	-0.00000
	ND2	0.00000	0.12561	0.07599	-0.00074	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	0.13274	0.00000	0.00000	0.00000	0.00079	0.00000
	NR2	0.00000	0.15764	0.09536	-0.00093	0.00000	0.00000
2	D	0.00000	0.05688	-0.00642	-0.00045	0.00000	0.00000
	Rfp	0.00000	0.00000	-0.01556	-0.00000	0.00000	0.00000
	Rfn	0.00000	0.00000	0.00207	-0.00000	0.00000	0.00000
	W1	0.84484	0.00000	0.00000	0.00000	0.00501	0.00000
	W2	0.00000	6.35439	-0.00000	-0.03769	0.00000	0.00000
	E1	0.75097	0.00000	0.00000	0.00000	0.00445	0.00000
	E2	0.00000	0.89184	-0.00000	-0.00529	0.00000	0.00000
	ND1	0.10577	0.00000	0.00000	0.00000	0.00063	-0.00000
	ND2	0.00000	0.12561	0.00000	-0.00074	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	0.13274	0.00000	0.00000	0.00000	0.00079	0.00000
	NR2	0.00000	0.15764	-0.00000	-0.00093	0.00000	0.00000
3	D	0.00000	0.05688	-0.13719	-0.00161	0.00000	0.00000
	Rfp	0.00000	0.00000	-0.25027	-0.00324	0.00000	0.00000
	Rfn	0.00000	0.00000	0.03306	0.00043	0.00000	0.00000
	W1	0.84484	0.00000	0.00000	0.00000	0.00501	0.00000
	W2	0.00000	6.35439	-3.84404	-0.03769	0.00000	0.00000
	E1	0.75097	0.00000	0.00000	0.00000	0.00445	0.00000
	E2	0.00000	0.89184	-0.53951	-0.00529	0.00000	0.00000
	ND1	0.10577	0.00000	0.00000	0.00000	0.00063	-0.00000
	ND2	0.00000	0.12561	-0.07599	-0.00074	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	0.13274	0.00000	0.00000	0.00000	0.00079	0.00000
	NR2	0.00000	0.15764	-0.09536	-0.00093	0.00000	0.00000

Frame Reactions

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	5.73	0.72	-0.00	0.00
	Rfp	0.00	0.00	8.34	0.00	-0.00	0.00
	Rfn	0.00	0.00	-1.11	0.00	-0.00	0.00
	W1	-0.90	0.00	0.00	-0.00	-18.90	-0.00
	W2	-0.00	-5.70	0.00	119.70	-0.00	0.00
	E1	-0.80	0.00	0.00	-0.00	-16.80	-0.00
	E2	-0.00	-0.80	0.00	16.80	-0.00	0.00

Frame Reactions

ND1	-0.11	0.00	0.00	-0.00	-2.37	0.00
ND2	-0.00	-0.11	-0.00	2.37	-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	-0.14	0.00	0.00	-0.00	-2.97	-0.00
NR2	-0.00	-0.14	0.00	2.97	-0.00	-0.00

Frame Reactions

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
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	5.90	0.72	-0.00	0.00
	Sp	0.00	0.00	8.13	0.00	-0.00	0.00
	Sn	0.00	0.00	-1.67	0.00	-0.00	0.00
	W1	-0.90	0.00	0.00	-0.00	-18.90	-0.00
	W2	-0.00	-5.70	0.00	119.70	-0.00	0.00
	E1	-0.80	0.00	0.00	-0.00	-16.80	-0.00
	E2	-0.00	-0.80	-0.00	16.80	-0.00	0.00

Frame Reactions

ND1	-0.11	0.00	0.00	-0.00	-2.38	-0.00
ND2	-0.00	-0.11	-0.00	2.38	-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	-0.15	0.00	0.00	-0.00	-3.15	-0.00
NR2	-0.00	-0.15	0.00	3.15	-0.00	0.00

Frame Reactions

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
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

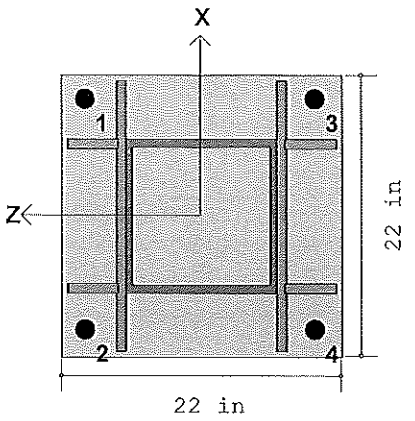
Frame #0:

Node	LdC	Rx kips	Ry kips	Rz kips	Mxx kip-ft	Myy kip-ft	Tzz kip-ft
4	D	0.00	0.00	5.90	0.72	-0.00	0.00
	Sp	-0.00	-0.00	7.54	5.00	-0.00	0.00
	Sn	-0.00	-0.00	-1.60	-0.54	0.00	0.00
	W1	-0.90	0.00	0.00	-0.00	-18.90	-0.00
	W2	-0.00	-5.70	0.00	119.70	-0.00	0.00
	E1	-0.80	0.00	0.00	-0.00	-16.80	-0.00
	E2	-0.00	-0.80	-0.00	16.80	-0.00	0.00

Frame Reactions

ND1	-0.11	0.00	0.00	-0.00	-2.38	-0.00
ND2	-0.00	-0.11	-0.00	2.38	-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	-0.14	0.00	0.00	-0.00	-2.93	0.00
NR2	-0.00	-0.14	0.00	2.93	-0.00	-0.00

Circle K Erwin, NC Base Plate



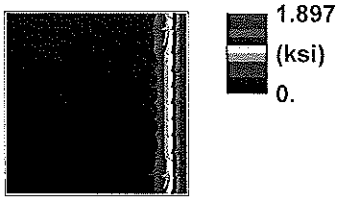
Stiffened Base Plate Connection

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	: HSS12x12x5
Steel Code	: AISC 14th:LRFD
Concrete Code	: ACI 318-11

Coarse Solution Selected

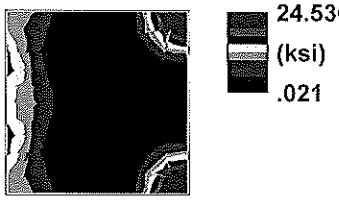
Bearing Pressure

Maximum Bearing 1.897 ksi
Max/Allowable Ratio .572 IBC 16-4 (a)
(ABIF = 1.000)



Base Plate Stress

Maximum Stress 24.536 ksi
Max/Allowable Ratio .505 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.	31.999	0.	-1.45	43.5	18.109	26.1	.821	.555 (T)	IBC 16-6 (a) (13)
2	-9.	9.	31.999	0.	-1.45	43.5	18.109	26.1	.821	.555 (T)	IBC 16-6 (a) (13)
3	9.	-9.	40.591	0.	1.45	43.5	22.972	26.1	.821	.704 (T)	IBC 16-6 (b) (14)
4	-9.	-9.	40.591	0.	1.45	43.5	22.972	26.1	.821	.704 (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	5.8			.8	
LL	8.2			5.	
WL	18.4		5.8	120.	
EL			.9	17.	

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	40.591	61.335	74.191	52.416	0.	.774	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.	.225	25.515	44.756	71.158	32.021	71.158	138.49	0.	.009

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.	.225	0.	.009	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.	1.45	25.515	44.756	71.158	32.021	71.158	138.49	0.	.057

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.	1.45	0.	.057	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	.108	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	81.182	0.	109.084	0.	.744	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.	5.8	0.	0.	0.	36.596	81.323	203.623	N.A.	.158
			Nr Edge	0.	2.9	0.	0.	0.	36.596	64.042	142.536	N.A.	.079

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.	5.8	N.A.	.158	N.A.	0.	0.	N.A.	0.	0.
			Nr Edge	0.	2.9	N.A.	.079	N.A.	0.	0.	N.A.	0.	0.

Footing	5'x5'x6'	Service Values			Ultimate Values			
F1	Reported	2500psf						
	Pd =	5.8	kips					
	Plr =	8.4	kips					
	Ps =	8.2	kips	S	Ps =	8.2	kips	S
	pw=	11.04	kips	0.6W	pw=	18.4	kips	W
	Md =	0.8	kip-ft					
	Mlr =	0	kip-ft					
	Ms =	2.625	kip-ft	0.525S	Ms =	5	kip-ft	S
	Mw =	72	kip-ft	0.6W	Mw =	120	kip-ft	W
	Me =	11.9	kip-ft	0.7E	Me =	17	kip-ft	E
	Vw =	3.48	kips	0.6W	Vw =	5.8	kips	W
	Ve =	0.63	kips	0.7E	Ve =	0.9	kips	E
	z =	21	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	12	in	
D wt	2	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	

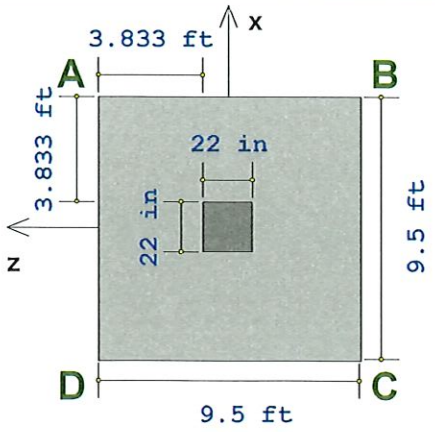
Dead Loads

Pd =	5.80	kips	
Pd ftng =	21.75	kips	
Pd slab =	1.21	kips	
Pd soil =	1.83	kips	
Pd total =	30.59	kips	Dead Load for Uplift
Pmax(lr,sl) =	8.4	kips	
fp =	568	psf	D+(Lr or S) OK
fp =	1010	psf	D+(Lr or S)+W OK
P up =	-18.84	kips	0.6D-0.6W
P resisting =	18.36	kips	
SF Uplift	0.97	< 1 : NG	

Constrained Post Footing

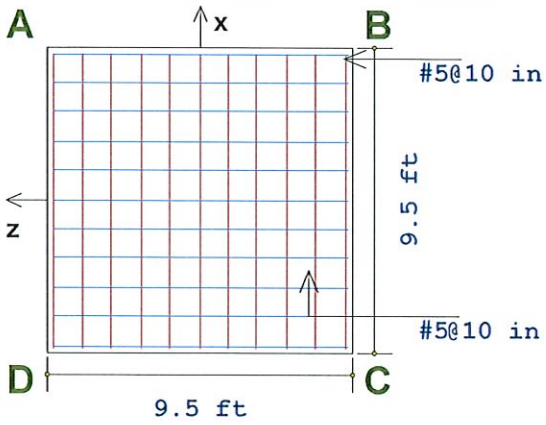
P (lbs)	h (ft)	S0 psf/ft	d (ft)	S3 psf/ft	b (ft)	d (ft)	d calc (ft)	d / d calc
3,480	21	300.00	5.60	1980.17	5.00	5.60	5.60	1.000

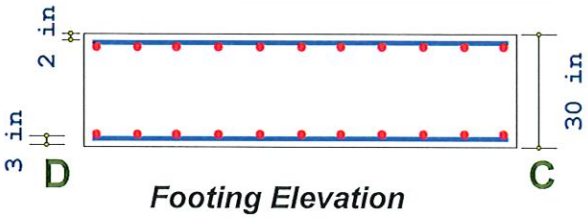
Sketch





Details



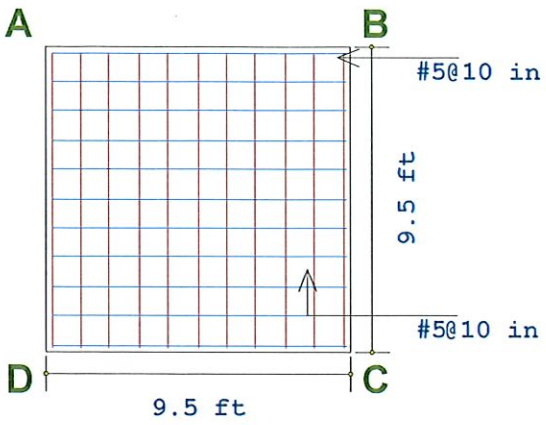


Footing Elevation

x Dir. Steel: 3.37 in^2 (11 #5)

z Dir. Steel: 3.37 in^2 (11 #5)

Bottom Rebar Plan



x Dir. Steel: 3.37 in^2 (11 #5)

z Dir. Steel: 3.37 in^2 (11 #5)

Top Rebar Plan

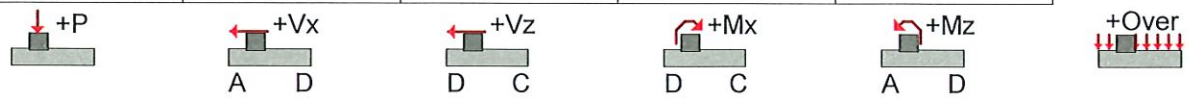
Geometry, Materials and Criteria

Length	: 9.5 ft	eX	: 0 in	Gross Allow. Bearing	: 2500 psf (gross)	Steel fy	: 60 ksi
Width	: 9.5 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

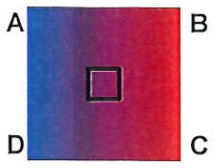
Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL	5.8			.8		100
EL	1		.9	17		
WL	18.4		5.8	120		
SL	8.2			5		
RLL	8.4					

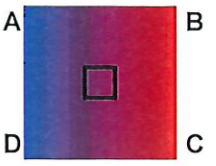


Soil Bearing

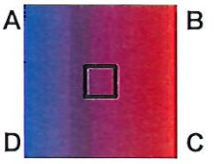
Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
ASCE 1	1DL	2500	544.864 (B)	.218
ASCE 2	1DL+1HL+1LL+1LLS	2500	544.864 (B)	.218
ASCE 3 (a)	1DL+1HL+1RLL	2500	637.939 (B)	.255
ASCE 3 (b)	1DL+1HL+1SL	2500	670.714 (B)	.268
ASCE 3 (c)	1DL+1HL+1RL	2500	544.864 (B)	.218
ASCE 4 (a)	1DL+1HL+.75LL+.75LLS+..	2500	614.671 (B)	.246
ASCE 4 (b)	1DL+1HL+.75LL+.75LLS+..	2500	639.251 (B)	.256
ASCE 4 (c)	1DL+1HL+.75LL+.75LLS+..	2500	544.864 (B)	.218
ASCE 5 (a) (a)	1DL+1HL+.6WL	2500	1110.17 (B)	.444
ASCE 5 (a) (b)	1DL+1HL-.6WL	2500	854.834 (A)	.342
ASCE 5 (b) (a)	1DL+1HL+.7EL	2500	624.876 (B)	.25
ASCE 5 (b) (b)	1DL+1HL-.7EL	2500	598.167 (A)	.239
ASCE 6 (a) (a)	1DL+1HL+.45WL+.75LL+..	2500	1038.65 (B)	.415
ASCE 6 (a) (b)	1DL+1HL-.45WL+.75LL+..	2500	843.963 (A)	.338
ASCE 6 (b) (a)	1DL+1HL+.525EL+.75LL+..	2500	674.679 (B)	.27
ASCE 6 (b) (b)	1DL+1HL-.525EL+.75LL+..	2500	651.848 (A)	.261
ASCE 6 (c) (a)	1DL+1HL+.45WL+.75LL+..	2500	1063.23 (B)	.425
ASCE 6 (c) (b)	1DL+1HL-.45WL+.75LL+..	2500	816.058 (A)	.326
ASCE 6 (d) (a)	1DL+1HL+.525EL+.75LL+..	2500	699.26 (B)	.28
ASCE 6 (d) (b)	1DL+1HL-.525EL+.75LL+..	2500	623.943 (A)	.25
ASCE 6 (e) (a)	1DL+1HL+.45WL+.75LL+..	2500	968.845 (B)	.388
ASCE 6 (e) (b)	1DL+1HL-.45WL+.75LL+..	2500	774.157 (A)	.31
ASCE 6 (f) (a)	1DL+1HL+.525EL+.75LL+..	2500	604.873 (B)	.242
ASCE 6 (f) (b)	1DL+1HL-.525EL+.75LL+..	2500	582.042 (A)	.233
ASCE 7 (a) (a)	.6DL+1HL+.6WL	2500	892.226 (B)	.357
ASCE 7 (a) (b)	.6DL+1HL-.6WL	2500	987.209 (A)	.395
ASCE 7 (b) (a)	.6DL+.6HL+.6WL	2500	892.226 (B)	.357
ASCE 7 (b) (b)	.6DL+.6HL-.6WL	2500	987.209 (A)	.395
ASCE 8 (a) (a)	.6DL+1HL+.7EL	2500	406.93 (B)	.163
ASCE 8 (a) (b)	.6DL+1HL-.7EL	2500	384.7 (A)	.154
ASCE 8 (b) (a)	.6DL+.6HL+.7EL	2500	406.93 (B)	.163
ASCE 8 (b) (b)	.6DL+.6HL-.7EL	2500	384.7 (A)	.154



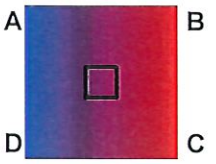
1DL
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QB: 544.864 psf
QC: 544.864 psf
QD: 533.667 psf
NAZ: 5547.44 in
NAX: -1 in



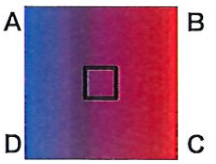
1DL+1HL+1LL+1LLS
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QB: 544.864 psf
QC: 544.864 psf
QD: 533.667 psf
NAZ: 5547.44 in
NAX: -1 in



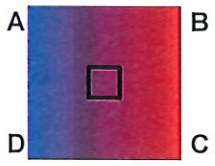
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NAX: -1 in



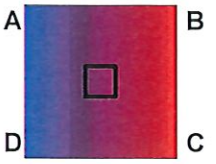
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QD: 589.536 psf
NAZ: 941.897 in
NAX: -1 in



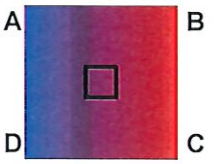
1DL+1HL+1RL
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QD: 533.667 psf
NAZ: 5547.44 in
NAX: -1 in



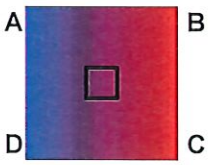
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QC: 614.671 psf
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NAX: -1 in



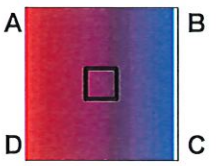
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NAZ: 1144.34 in
NAX: -1 in



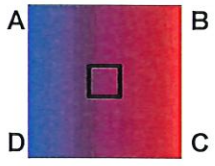
1DL+1HL+.75LL+.75LLS
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QB: 544.864 psf
QC: 544.864 psf
QD: 533.667 psf
NAZ: 5547.44 in
NAX: -1 in



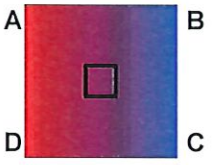
1DL+1HL+.6WL
QA: 213.014 psf
QB: 1110.17 psf
QC: 1110.17 psf
QD: 213.014 psf
NAZ: 141.067 in
NAX: -1 in



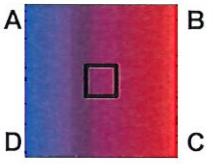
1DL+1HL-.6WL
QA: 854.834 psf
QB: 0 psf
QC: 0 psf
QD: 854.834 psf
NAZ: 111.205 in
NAX: -1 in



1DL+1HL+.7EL
QA: 469.168 psf
QB: 624.876 psf
QC: 624.876 psf
QD: 469.168 psf
NAZ: 457.497 in
NAX: -1 in



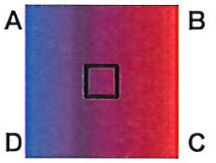
1DL+1HL-.7EL
QA: 598.167 psf
QB: 464.853 psf
QC: 464.853 psf
QD: 598.167 psf
NAZ: 511.507 in
NAX: -1 in



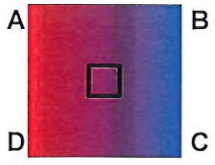
1DL+1HL+.45WL+.75LL+..
QA: 362.984 psf
QB: 1038.65 psf
QC: 1038.65 psf
QD: 362.984 psf
NAZ: 175.243 in
NAX: -1 in



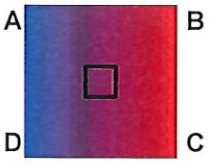
1DL+1HL-.45WL+.75LL+..
QA: 843.963 psf
QB: 190.69 psf
QC: 190.69 psf
QD: 843.963 psf
NAZ: 147.277 in
NAX: -1 in



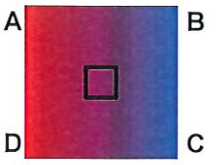
1DL+1HL+.525EL+.75LL+..
QA: 555.099 psf
QB: 674.679 psf
QC: 674.679 psf
QD: 555.099 psf
NAZ: 643.196 in
NAX: -1 in



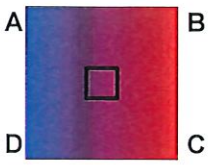
1DL+1HL-.525EL+.75LL+..
QA: 651.848 psf
QB: 554.662 psf
QC: 554.662 psf
QD: 651.848 psf
NAZ: 764.622 in
NAX: -1 in



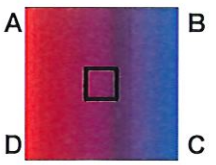
1DL+1HL+.45WL+.75LL+..
QA: 335.079 psf
QB: 1063.23 psf
QC: 1063.23 psf
QD: 335.079 psf
NAZ: 166.46 in
NAX: -1 in



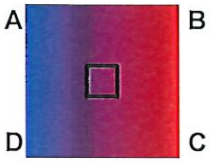
1DL+1HL-.45WL+.75LL+..
QA: 816.058 psf
QB: 215.271 psf
QC: 215.271 psf
QD: 816.058 psf
NAZ: 154.848 in
NAX: -1 in



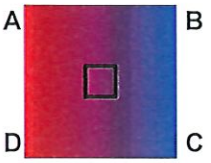
1DL+1HL+.525EL+.75LL+..
QA: 527.194 psf
QB: 699.26 psf
QC: 699.26 psf
QD: 527.194 psf
NAZ: 463.286 in
NAX: -1 in



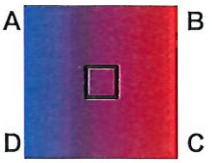
1DL+1HL-.525EL+.75LL+..
QA: 623.943 psf
QB: 579.243 psf
QC: 579.243 psf
QD: 623.943 psf
NAZ: 1591.25 in
NAX: -1 in



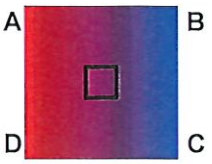
1DL+1HL+.45WL+.75LL
QA: 293.178 psf
QB: 968.845 psf
QC: 968.845 psf
QD: 293.178 psf
NAZ: 163.466 in
NAX: -1 in



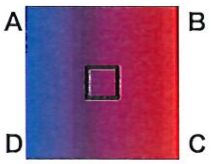
1DL+1HL-.45WL+.75LL
QA: 774.157 psf
QB: 120.884 psf
QC: 120.884 psf
QD: 774.157 psf
NAZ: 135.095 in
NAX: -1 in



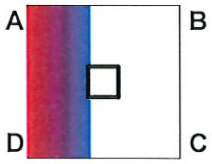
1DL+1HL+.525EL+.75LL
QA: 485.293 psf
QB: 604.873 psf
QC: 604.873 psf
QD: 485.293 psf
NAZ: 576.647 in
NAX: -1 in



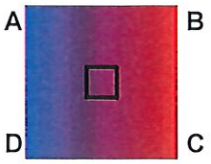
1DL+1HL-.525EL+.75LL
QA: 582.042 psf
QB: 484.856 psf
QC: 484.856 psf
QD: 582.042 psf
NAZ: 682.739 in
NAX: -1 in



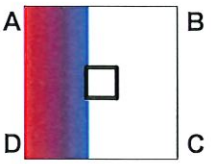
.6DL+1HL+.6WL
QA: 0 psf
QB: 892.226 psf
QC: 892.226 psf
QD: 0 psf
NAZ: 113.942 in
NAX: -1 in



.6DL+1HL-.6WL
QA: 987.209 psf
QB: 0 psf
QC: 0 psf
QD: 987.209 psf
NAZ: 46.476 in
NAX: -1 in



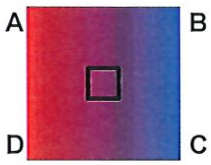
.6DL+.6HL+.6WL
QA: 0 psf
QB: 892.226 psf
QC: 892.226 psf
QD: 0 psf
NAZ: 113.942 in
NAX: -1 in



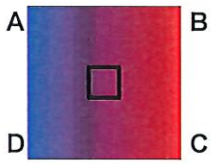
.6DL+.6HL-.6WL
QA: 987.209 psf
QB: 0 psf
QC: 0 psf
QD: 987.209 psf
NAZ: 46.476 in
NAX: -1 in



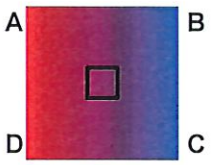
.6DL+1HL+.7EL
QA: 255.701 psf
QB: 406.93 psf
QC: 406.93 psf
QD: 255.701 psf
NAZ: 306.754 in
NAX: -1 in



.6DL+1HL-.7EL
QA: 384.7 psf
QB: 246.907 psf
QC: 246.907 psf
QD: 384.7 psf
NAZ: 318.274 in
NAX: -1 in



.6DL+.6HL+.7EL
QA: 255.701 psf
QB: 406.93 psf
QC: 406.93 psf
QD: 255.701 psf
NAZ: 306.754 in
NAX: -1 in



.6DL+.6HL-.7EL
QA: 384.7 psf
QB: 246.907 psf
QC: 246.907 psf
QD: 384.7 psf
NAZ: 318.274 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

As-min x-dir (Top Flexure): **10.403 in^2**
As-min z-dir (Top Flexure): **10.403 in^2**
As-min x-dir (Bot Flexure): **10.403 in^2**
As-min z-dir (Bot Flexure): **10.403 in^2**

As-min x-dir (T & S): **6.156 in^2**
As-min z-dir (T & S): **6.156 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	.0169	6.68	.056	3.375	.01589	6.28	.053	3.375
IBC 16-2 (a)	1.2DL+1.6LL+1.6LL..	.0227	8.97	.076	3.375	.02184	8.63	.073	3.375
IBC 16-2 (b)	1.2DL+1.6LL+1.6LL..	.02477	9.79	.083	3.375	.02164	8.55	.072	3.375
IBC 16-2 (c)	1.2DL+1.6LL+1.6LL..	.01449	5.73	.048	3.375	.01362	5.38	.045	3.375
IBC 16-3 (a)	1.2DL+1.6RLL+1.6H..	.04078	16.12	.136	3.375	.03992	15.78	.133	3.375
IBC 16-3 (b) (a.	1.2DL+1.6RLL+1.6H..	.10644	42.07	.355	3.375	.05792	22.89	.193	3.375
IBC 16-3 (b) (b	1.2DL+1.6RLL+1.6H..	.0687	27.15	.229	3.375	.02192	8.66	.073	3.375
IBC 16-3 (c)	1.2DL+1.6SL+1.6SL..	.04738	18.73	.158	3.375	.03929	15.53	.131	3.375
IBC 16-3 (d) (a.	1.2DL+1.6SL+1.6SL..	.11304	44.68	.377	3.375	.05729	22.64	.191	3.375
IBC 16-3 (d) (b.	1.2DL+1.6SL+1.6SL..	.06085	24.05	.203	3.375	.02129	8.41	.071	3.375
IBC 16-3 (e)	1.2DL+1.6RL+1.6HL..	.01449	5.73	.048	3.375	.01362	5.38	.045	3.375
IBC 16-3 (f) (a.	1.2DL+1.6RL+1.6HL..	.08014	31.68	.267	3.375	.03162	12.5	.105	3.375
IBC 16-3 (f) (b.	1.2DL+1.6RL+1.6HL..	.0424	16.76	.141	3.375	0	0	0	3.375
IBC 16-4 (a) (a.	1.2DL+1WL+.5LL+1..	.15401	60.87	.514	3.375	.05784	22.86	.193	3.375
IBC 16-4 (a) (b.	1.2DL-1WL+.5LL+1..	.088	34.78	.293	3.375	0	0	0	3.375
IBC 16-4 (b) (a.	1.2DL+1WL+.5LL+1..	.15608	61.69	.521	3.375	.05764	22.78	.192	3.375
IBC 16-4 (b) (b.	1.2DL-1WL+.5LL+1..	.08445	33.38	.282	3.375	0	0	0	3.375
IBC 16-4 (c) (a.	1.2DL+1WL+.5LL+1..	.14579	57.63	.486	3.375	.04962	19.61	.165	3.375
IBC 16-4 (c) (b.	1.2DL-1WL+.5LL+1..	.0851	33.64	.284	3.375	0	0	0	3.375
IBC 16-5 (a)	1.2DL+1EL+.5LL+1..	.03388	13.39	.113	3.375	.01878	7.42	.063	3.375
IBC 16-5 (b)	1.2DL-1EL+.5LL+1..	.02643	10.44	.088	3.375	.01487	5.88	.05	3.375
IBC 16-6 (a) (a..	.9DL+1WL+1.6HL	.1424	56.29	.475	3.375	.04622	18.27	.154	3.375
IBC 16-6 (a) (b..	.9DL-1WL+1.6HL	.13069	51.66	.436	3.375	0	0	0	3.375
IBC 16-6 (b) (a..	.9DL+1WL+.9HL	.1424	56.29	.475	3.375	.04622	18.27	.154	3.375
IBC 16-6 (b) (b..	.9DL-1WL+.9HL	.13069	51.66	.436	3.375	0	0	0	3.375
IBC 16-7 (a) (a..	.9DL+1WL+1.6HL	.1424	56.29	.475	3.375	.04622	18.27	.154	3.375
IBC 16-7 (a) (b..	.9DL-1WL+1.6HL	.13069	51.66	.436	3.375	0	0	0	3.375
IBC 16-7 (b) (a..	.9DL+1EL+.9HL	.02615	10.33	.087	3.375	.01217	4.81	.041	3.375
IBC 16-7 (b) (b..	.9DL-1EL+.9HL	.02093	8.27	.07	3.375	.00826	3.26	.028	3.375

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 16-6 (a..,IBC 16-6 (a..)	33.154	0	13.509	0

Moment Capacity of Plain Concrete Section Along xx and zz= **186.974k-ft,186.974k-ft** Per Chapter 22 of ACI 318.

Footing Shear Check

Two Way (Punching) Vc: **1118.13 k** One Way (x Dir. Cut) Vc **329.373 k** One Way (z Dir. Cut) Vc: **329.373 k**

		Punching		x Dir. Cut		z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/⌀Vc	Vu(k)	Vu/⌀Vc	Vu(k)	Vu/⌀Vc
IBC 16-1	1.4DL	6.658	.008	1.499	.006	1.398	.006
IBC 16-2 (a)	1.2DL+1.6LL+1.6LLS+1.6H..	9.15	.011	2.008	.008	1.921	.008
IBC 16-2 (b)	1.2DL+1.6LL+1.6LLS+1.6H..	9.068	.011	2.215	.009	1.904	.008
IBC 16-2 (c)	1.2DL+1.6LL+1.6LLS+1.6H..	5.707	.007	1.285	.005	1.198	.005
IBC 16-3 (a)	1.2DL+1.6RLL+1.6HL+.5L..	16.727	.02	3.598	.015	3.512	.014
IBC 16-3 (b) (a..	1.2DL+1.6RLL+1.6HL+.5W..	24.27	.029	9.93	.04	5.096	.021
IBC 16-3 (b) (b..	1.2DL+1.6RLL+1.6HL-.5W..	9.183	.011	6.59	.027	1.928	.008
IBC 16-3 (c)	1.2DL+1.6SL+1.6SLN+1.6H..	16.464	.02	4.263	.017	3.457	.014
IBC 16-3 (d) (a..	1.2DL+1.6SL+1.6SLN+1.6H..	24.008	.029	10.595	.043	5.041	.02
IBC 16-3 (d) (b..	1.2DL+1.6SL+1.6SLN+1.6H..	8.921	.011	5.814	.024	1.873	.008
IBC 16-3 (e)	1.2DL+1.6RL+1.6HL+.5LL..	5.707	.007	1.285	.005	1.198	.005
IBC 16-3 (f) (a..	1.2DL+1.6RL+1.6HL+.5WL	13.25	.016	7.616	.031	2.782	.011
IBC 16-3 (f) (b..	1.2DL+1.6RL+1.6HL-.5WL	NA	NA	5.047	.02	.386	.002
IBC 16-4 (a) (a..	1.2DL+1WL+.5LL+1LLS+1...	24.237	.029	14.671	.059	5.089	.021
IBC 16-4 (a) (b..	1.2DL-1WL+.5LL+1LLS+1...	NA	NA	9.042	.037	1.246	.005
IBC 16-4 (b) (a..	1.2DL+1WL+.5LL+1LLS+1...	24.155	.029	14.879	.06	5.072	.021
IBC 16-4 (b) (b..	1.2DL-1WL+.5LL+1LLS+1...	NA	NA	8.856	.036	1.264	.005
IBC 16-4 (c) (a..	1.2DL+1WL+.5LL+1LLS+1...	20.794	.025	13.948	.056	4.366	.018
IBC 16-4 (c) (b..	1.2DL-1WL+.5LL+1LLS+1...	NA	NA	8.952	.036	1.969	.008
IBC 16-5 (a)	1.2DL+1EL+.5LL+1LLS+1...	7.871	.009	3.157	.013	1.653	.007
IBC 16-5 (b)	1.2DL-1EL+.5LL+1LLS+1...	6.231	.007	2.46	.01	1.308	.005
IBC 16-6 (a) (a..	.9DL+1WL+1.6HL	19.386	.023	13.652	.055	4.066	.016
IBC 16-6 (a) (b..	.9DL-1WL+1.6HL	NA	NA	18.344	.074	2.269	.009
IBC 16-6 (b) (a..	.9DL+1WL+.9HL	19.386	.023	13.652	.055	4.066	.016
IBC 16-6 (b) (b..	.9DL-1WL+.9HL	NA	NA	18.344	.074	2.269	.009
IBC 16-7 (a) (a..	.9DL+1WL+1.6HL	19.386	.023	13.652	.055	4.066	.016
IBC 16-7 (a) (b..	.9DL-1WL+1.6HL	NA	NA	18.344	.074	2.269	.009
IBC 16-7 (b) (a..	.9DL+1EL+.9HL	5.1	.006	2.463	.01	1.071	.004
IBC 16-7 (b) (b..	.9DL-1EL+.9HL	3.46	.004	1.989	.008	.726	.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	8.12	.005
IBC 16-2 (a)	1.2DL+1.6LL+1.6LLS+1.6H..	11.16	.007
IBC 16-2 (b)	1.2DL+1.6LL+1.6LLS+1.6H..	11.06	.007
IBC 16-2 (c)	1.2DL+1.6LL+1.6LLS+1.6H..	6.96	.004
IBC 16-3 (a)	1.2DL+1.6RLL+1.6HL+.5L..	20.4	.013
IBC 16-3 (b) (a..	1.2DL+1.6RLL+1.6HL+.5W..	29.6	.018
IBC 16-3 (b) (b..	1.2DL+1.6RLL+1.6HL-.5W..	11.2	.007
IBC 16-3 (c)	1.2DL+1.6SL+1.6SLN+1.6H..	20.08	.013
IBC 16-3 (d) (a..	1.2DL+1.6SL+1.6SLN+1.6H..	29.28	.018
IBC 16-3 (d) (b..	1.2DL+1.6SL+1.6SLN+1.6H..	10.88	.007
IBC 16-3 (e)	1.2DL+1.6RL+1.6HL+.5LL..	6.96	.004
IBC 16-3 (f) (a..	1.2DL+1.6RL+1.6HL+.5WL	16.16	.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...	29.56	.018
IBC 16-4 (a) (b..	1.2DL-1WL+.5LL+1LLS+1...	0	0
IBC 16-4 (b) (a..	1.2DL+1WL+.5LL+1LLS+1...	29.46	.018
IBC 16-4 (b) (b..	1.2DL-1WL+.5LL+1LLS+1...	0	0
IBC 16-4 (c) (a..	1.2DL+1WL+.5LL+1LLS+1...	25.36	.016
IBC 16-4 (c) (b..	1.2DL-1WL+.5LL+1LLS+1...	0	0
IBC 16-5 (a)	1.2DL+1EL+.5LL+1LLS+1...	9.6	.006
IBC 16-5 (b)	1.2DL-1EL+.5LL+1LLS+1...	7.6	.005
IBC 16-6 (a) (a..	.9DL+1WL+1.6HL	23.62	.015
IBC 16-6 (a) (b..	.9DL-1WL+1.6HL	0	0
IBC 16-6 (b) (a..	.9DL+1WL+.9HL	23.62	.015
IBC 16-6 (b) (b..	.9DL-1WL+.9HL	0	0
IBC 16-7 (a) (a..	.9DL+1WL+1.6HL	23.62	.015
IBC 16-7 (a) (b..	.9DL-1WL+1.6HL	0	0
IBC 16-7 (b) (a..	.9DL+1EL+.9HL	6.22	.004
IBC 16-7 (b) (b..	.9DL-1EL+.9HL	4.22	.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	231.177	0	231.177	288.971	NA
ASCE 2	1DL+1HL+1LL+1LLS	.8	231.177	0	231.177	288.971	NA
ASCE 3 (a)	1DL+1HL+1RLL	.8	271.077	0	271.077	338.846	NA
ASCE 3 (b)	1DL+1HL+1SL	5.8	270.127	0	270.127	46.574	NA
ASCE 3 (c)	1DL+1HL+1RL	.8	231.177	0	231.177	288.971	NA
ASCE 4 (a)	1DL+1HL+.75LL+...	.8	261.102	0	261.102	326.377	NA
ASCE 4 (b)	1DL+1HL+.75LL+...	4.55	260.389	0	260.389	57.228	NA
ASCE 4 (c)	1DL+1HL+.75LL+...	.8	231.177	0	231.177	288.971	NA
ASCE 5 (a) (a)	1DL+1HL+.6WL	72.8	292.317	0	283.617	4.015	NA
ASCE 5 (a) (b)	1DL+1HL-.6WL	124.44	240.677	52.44	231.177	1.934	4.408
ASCE 5 (b) (a)	1DL+1HL+.7EL	12.7	236.077	0	234.502	18.589	NA
ASCE 5 (b) (b)	1DL+1HL-.7EL	15.225	233.552	3.325	231.177	15.34	69.527
ASCE 6 (a) (a)	1DL+1HL+.45WL+...	54.8	306.957	0	300.432	5.601	NA
ASCE 6 (a) (b)	1DL+1HL-.45WL+...	93.33	268.427	39.33	261.102	2.876	6.639
ASCE 6 (b) (a)	1DL+1HL+.525EL+..	9.725	264.777	0	263.595	27.226	NA
ASCE 6 (b) (b)	1DL+1HL-.525EL+..	11.419	263.083	2.494	261.102	23.04	104.702
ASCE 6 (c) (a)	1DL+1HL+.45WL+...	58.55	306.244	0	299.719	5.23	NA
ASCE 6 (c) (b)	1DL+1HL-.45WL+...	93.33	271.464	39.33	260.389	2.909	6.621
ASCE 6 (d) (a)	1DL+1HL+.525EL+..	13.475	264.064	0	262.883	19.597	NA
ASCE 6 (d) (b)	1DL+1HL-.525EL+..	11.419	266.12	2.494	260.389	23.306	104.417
ASCE 6 (e) (a)	1DL+1HL+.45WL+...	54.8	277.032	0	270.507	5.055	NA
ASCE 6 (e) (b)	1DL+1HL-.45WL+...	93.33	238.502	39.33	231.177	2.555	5.878
ASCE 6 (f) (a)	1DL+1HL+.525EL+..	9.725	234.852	0	233.67	24.149	NA
ASCE 6 (f) (b)	1DL+1HL-.525EL+..	11.419	233.158	2.494	231.177	20.419	92.702
ASCE 7 (a) (a)	.6DL+1HL+.6WL	72.48	199.846	0	191.146	2.757	NA
ASCE 7 (a) (b)	.6DL+1HL-.6WL	124.44	147.886	52.44	138.706	1.188	2.645
ASCE 7 (b) (a)	.6DL+.6HL+.6WL	72.48	199.846	0	191.146	2.757	NA
ASCE 7 (b) (b)	.6DL+.6HL-.6WL	124.44	147.886	52.44	138.706	1.188	2.645
ASCE 8 (a) (a)	.6DL+1HL+.7EL	12.38	143.606	0	142.031	11.6	NA
ASCE 8 (a) (b)	.6DL+1HL-.7EL	15.225	140.761	3.325	138.706	9.245	41.716
ASCE 8 (b) (a)	.6DL+.6HL+.7EL	12.38	143.606	0	142.031	11.6	NA
ASCE 8 (b) (b)	.6DL+.6HL-.7EL	15.225	140.761	3.325	138.706	9.245	41.716

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	16.916	0	16.916	NA	NA
ASCE 2	1DL+1HL+1LL+1LLS	0	16.916	0	16.916	NA	NA
ASCE 3 (a)	1DL+1HL+1RLL	0	19.856	0	19.856	NA	NA
ASCE 3 (b)	1DL+1HL+1SL	0	19.786	0	19.786	NA	NA
ASCE 3 (c)	1DL+1HL+1RL	0	16.916	0	16.916	NA	NA
ASCE 4 (a)	1DL+1HL+.75LL+...	0	19.121	0	19.121	NA	NA
ASCE 4 (b)	1DL+1HL+.75LL+...	0	19.069	0	19.069	NA	NA
ASCE 4 (c)	1DL+1HL+.75LL+...	0	16.916	0	16.916	NA	NA
ASCE 5 (a) (a)	1DL+1HL+.6WL	0	20.78	3.48	20.78	NA	5.971
ASCE 5 (a) (b)	1DL+1HL-.6WL	0	13.052	3.48	13.052	NA	3.751
ASCE 5 (b) (a)	1DL+1HL+.7EL	0	17.161	.63	17.161	NA	27.24
ASCE 5 (b) (b)	1DL+1HL-.7EL	0	16.671	.63	16.671	NA	26.463
ASCE 6 (a) (a)	1DL+1HL+.45WL+...	0	22.019	2.61	22.019	NA	8.437
ASCE 6 (a) (b)	1DL+1HL-.45WL+...	0	16.223	2.61	16.223	NA	6.216
ASCE 6 (b) (a)	1DL+1HL+.525EL+..	0	19.305	.473	19.305	NA	40.858
ASCE 6 (b) (b)	1DL+1HL-.525EL+..	0	18.938	.473	18.938	NA	40.08
ASCE 6 (c) (a)	1DL+1HL+.45WL+...	0	21.967	2.61	21.967	NA	8.416
ASCE 6 (c) (b)	1DL+1HL-.45WL+...	0	16.171	2.61	16.171	NA	6.196
ASCE 6 (d) (a)	1DL+1HL+.525EL+..	0	19.253	.473	19.253	NA	40.746
ASCE 6 (d) (b)	1DL+1HL-.525EL+..	0	18.885	.473	18.885	NA	39.969
ASCE 6 (e) (a)	1DL+1HL+.45WL+...	0	19.814	2.61	19.814	NA	7.592
ASCE 6 (e) (b)	1DL+1HL-.45WL+...	0	14.018	2.61	14.018	NA	5.371
ASCE 6 (f) (a)	1DL+1HL+.525EL+..	0	17.1	.473	17.1	NA	36.191
ASCE 6 (f) (b)	1DL+1HL-.525EL+..	0	16.733	.473	16.733	NA	35.413
ASCE 7 (a) (a)	.6DL+1HL+.6WL	0	14.014	3.48	14.014	NA	4.027
ASCE 7 (a) (b)	.6DL+1HL-.6WL	0	6.286	3.48	6.286	NA	1.806
ASCE 7 (b) (a)	.6DL+.6HL+.6WL	0	14.014	3.48	14.014	NA	4.027
ASCE 7 (b) (b)	.6DL+.6HL-.6WL	0	6.286	3.48	6.286	NA	1.806
ASCE 8 (a) (a)	.6DL+1HL+.7EL	0	10.395	.63	10.395	NA	16.5
ASCE 8 (a) (b)	.6DL+1HL-.7EL	0	9.905	.63	9.905	NA	15.722
ASCE 8 (b) (a)	.6DL+.6HL+.7EL	0	10.395	.63	10.395	NA	16.5
ASCE 8 (b) (b)	.6DL+.6HL-.7EL	0	9.905	.63	9.905	NA	15.722

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