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The Foundation Reactions section also contains two sub-sections. Please click the appropriate sub-section to view the contents.

- 9.1 [Gable Foundation Reactions](#)
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**PURPOSE**

The purpose for this section is to provide the column base reactions for a large variety of standard frame geometries for use in foundation design. The defaults used for the variables for the Column Base Reaction Tables are as listed below. Each of the listed variables can be interpolated for non-standard values. Column base reactions for buildings not fitting these specific parameters may be interpolated so long as they do not exceed the limits for interpolation:

Variable	Standard Value Used	Limits for Interpolation
Bay Spacing	25 ft.	≤ 35 ft.
Span Width <i>(All spans of a multi-span condition must be equal)</i>	Varies	40 ft ≤ span ≤ 60 ft, multi-spans 30 ft ≤ span ≤ 120 ft, clear-span gable 30 ft ≤ span ≤ 100 ft, clear-span single-slope
Eave Height	Varies (12', 18', 24', or 30')	12 ft ≤ height ≤ 30 ft
Slope	1:12 (good up to 2:12)	1/4:12 ≤ slope ≤ 2:12
Live Load	Varies (20, 30, or 40 psf)	≤ 40 psf
Building Code	ASCE 7-95	ANY CURRENT MODEL CODE (ASCE 7-95, BOCA, UBC, SBC)
Wind Speed	80 mph	≤ 110 mph
Exposure Factor	C	B or C

If the structure under consideration exceeds the limits defined in the table above, please contact Nucor Building Systems for the column base reactions and anchor bolt configurations.



Base reactions have been tabulated for a range of possible endwall column heights and spacings. It is recommended that the tallest corner and interior columns be used when extracting information from the table in order to cover the worst-case condition. These values can also be interpolated for geometries or gravity loadings not present in the tables. However, no extrapolation beyond the bounds is allowed.

Reactions have been tabulated for the effects of longitudinal wind loads transferred to the foundation by 'X' bracing. These can be added to the frame column base reactions at affected column locations. The number of braced bays required by the eave height and building width has also been included.

Additional reactions have also been included for a standard closed fascia which has a 4' offset and is 7' tall (with 3' extension above the eave) and for a standard 5' and 10' canopy. As with the bracing loads, these reactions are intended to be added to the column base reactions of columns where fascia or canopy members attach.

Interpolation is also possible for different wind loads due to building codes, basic wind speeds and exposure factors. Load factors have been developed for the frame column base reactions by which each of the X and Y reactions for the Wind Load (WL) case are to be multiplied to adjust for the specific case under consideration. A column is also included under each exposure factor which gives a single factor by which the endwall column base reactions, the additional longitudinal wind bracing reactions and the additional reactions from a fascia or canopy are to be multiplied.



### INTRODUCTION FRAME COLUMN BASE REACTIONS

Wind Interpolation Factors for Frames, Endwall Columns, Bracing, Fascias, and Canopies													
C o d e	Wind Speed (mph)	Exposure B						Exposure C					
		Main Frames					Other *	Main Frames					Other *
		Low Eave Ext. Col.		High Eave Ext. Col.		Int. Col.		Low Eave Ext. Col.		High Eave Ext. Col.		Int. Col.	
		X	Y	X	Y		Y	X or Y	X	Y	X		Y
9 6 A	70	0.43	0.47	0.47	0.53	0.49	0.50	0.74	0.74	0.78	0.80	0.75	0.77
	80	0.56	0.62	0.60	0.66	0.64	0.61	1.00	1.00	1.00	1.00	1.00	1.00
	90	0.74	0.74	0.78	0.80	0.75	0.78	1.25	1.24	1.28	1.29	1.22	1.27
	100	1.00	1.00	1.00	1.00	1.00	0.96	1.61	1.58	1.53	1.54	1.50	1.56
	110	1.25	1.24	1.28	1.29	1.22	1.16	2.00	1.96	1.79	1.78	1.75	1.89
9 7 B C	70	0.47	0.58	0.49	0.65	0.62	0.62	0.79	0.97	0.85	1.12	1.01	1.01
	80	0.62	0.75	0.62	0.83	0.80	0.81	1.04	1.23	1.01	1.31	1.26	1.31
	90	0.79	0.97	0.85	1.12	1.01	1.03	1.35	1.58	1.20	1.56	1.57	1.66
	100	1.04	1.23	1.01	1.31	1.26	1.27	1.71	1.97	1.56	2.01	1.92	2.04
	110	1.18	1.44	1.14	1.49	1.51	1.53	2.01	2.36	1.76	2.27	2.32	2.48
9 7 S B C	70	0.33	0.82	0.36	0.67	0.92	0.50	0.33	0.82	0.36	0.67	0.92	0.50
	80	0.48	1.12	0.47	0.87	1.20	0.66	0.48	1.12	0.47	0.87	1.20	0.66
	90	0.62	1.43	0.62	1.15	1.51	0.82	0.62	1.43	0.62	1.15	1.51	0.82
	100	0.83	1.80	0.75	1.39	1.78	1.02	0.83	1.80	0.75	1.39	1.78	1.02
	110	1.07	2.22	1.04	1.84	2.18	1.23	1.07	2.22	1.04	1.84	2.18	1.23

\* These factors are for use with the reactions tabulated for Endwall Columns, Bracing, Fascias, and Canopies

Reactions are provided by load cases in order to aid the foundation designer in determining the appropriate load factors and combinations to be used with either Working Stress or Ultimate Strength design methods. Wind load cases are given for each primary wind direction, and the case which produces the largest reaction at a particular column should be used for design.

Anchor bolt embedment lengths and types are not provided by Nucor Building Systems. This information is closely related to the complete foundation design which should be done by a Registered Professional Engineer familiar with the local site conditions and construction practices.



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## 9.0 FOUNDATION REACTIONS

### ENDWALL CORNER COLUMN BASE REACTIONS

Column Height (ft.)	DL	LL			WL		Anchor Bolts	Baseplate Dim.
	Y (kips)	20 psf	30 psf	40 psf	X (kips)	Y (kips)		
		Y (kips)	Y (kips)	Y (kips)				
Distance from left steel line to 1st interior column = 15 ft.								
12	0.4	1.9	2.8	3.8	1.9	-2.4	2 @ 3/4"	8"x10"
15	0.4	1.9	2.8	3.8	2.4	-2.8	2 @ 3/4"	8"x10"
18	0.4	1.9	2.8	3.8	2.8	-3.3	2 @ 3/4"	8"x10"
21	0.4	1.9	2.8	3.8	3.3	-3.9	2 @ 3/4"	8"x10"
24	0.4	1.9	2.8	3.8	3.8	-4.6	2 @ 3/4"	8"x10"
27	0.4	1.9	2.8	3.8	4.3	-5.4	2 @ 3/4"	8"x12"
30	0.4	1.9	2.8	3.8	4.7	-6.2	2 @ 3/4"	8"x12"
33	0.4	1.9	2.8	3.8	5.2	-7.2	4 @ 3/4"	8"x16"
36	0.4	1.9	2.8	3.8	5.7	-8.2	4 @ 3/4"	8"x16"
39	0.4	1.9	2.8	3.8	6.1	-9.3	4 @ 3/4"	8"x16"
42	0.4	1.9	2.8	3.8	6.6	-10.6	4 @ 3/4"	8"x16"
Distance from left steel line to 1st interior column = 20 ft.								
12	0.5	2.5	3.8	5.0	2.0	-2.8	2 @ 3/4"	8"x10"
15	0.5	2.5	3.8	5.0	2.4	-3.1	2 @ 3/4"	8"x10"
18	0.5	2.5	3.8	5.0	2.9	-3.5	2 @ 3/4"	8"x10"
21	0.5	2.5	3.8	5.0	3.4	-3.9	2 @ 3/4"	8"x10"
24	0.5	2.5	3.8	5.0	3.9	-4.4	2 @ 3/4"	8"x10"
27	0.5	2.5	3.8	5.0	4.4	-5.0	2 @ 3/4"	8"x12"
30	0.5	2.5	3.8	5.0	4.9	-5.7	2 @ 3/4"	8"x12"
33	0.5	2.5	3.8	5.0	5.4	-6.4	4 @ 3/4"	8"x16"
36	0.5	2.5	3.8	5.0	5.9	-7.2	4 @ 3/4"	8"x16"
39	0.5	2.5	3.8	5.0	6.3	-8.0	4 @ 3/4"	8"x16"
42	0.5	2.5	3.8	5.0	6.8	-8.9	4 @ 3/4"	8"x16"
Distance from left steel line to 1st interior column = 30 ft.								
12	0.8	3.8	5.6	7.5	2.1	-3.8	2 @ 3/4"	8"x10"
15	0.8	3.8	5.6	7.5	2.6	-4.0	2 @ 3/4"	8"x10"
18	0.8	3.8	5.6	7.5	3.2	-4.2	2 @ 3/4"	8"x10"
21	0.8	3.8	5.6	7.5	3.7	-4.5	2 @ 3/4"	8"x10"
24	0.8	3.8	5.6	7.5	4.2	-4.8	2 @ 3/4"	8"x10"
27	0.8	3.8	5.6	7.5	4.8	-5.2	2 @ 3/4"	8"x12"
30	0.8	3.8	5.6	7.5	5.3	-5.7	2 @ 3/4"	8"x12"
33	0.8	3.8	5.6	7.5	5.8	-6.1	4 @ 3/4"	8"x16"
36	0.8	3.8	5.6	7.5	6.3	-6.6	4 @ 3/4"	8"x16"
39	0.8	3.8	5.6	7.5	6.9	-7.2	4 @ 3/4"	8"x16"
42	0.8	3.8	5.6	7.5	7.4	-7.8	4 @ 3/4"	8"x16"

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# PRODUCT AND ENGINEERING MANUAL

## 9.0 FOUNDATION REACTIONS

### ENDWALL INTERIOR COLUMN BASE REACTIONS

Column Height (ft.)	DL	LL			WL		Anchor Bolts	Baseplate Dim.
	Y (kips)	20 psf	30 psf	40 psf	X (kips)	Y (kips)		
		Y (kips)	Y (kips)	Y (kips)				
Interior Column Spacing = 20 ft.								
12	1.0	5.0	7.5	10.0	1.7	-5.1	2 @ 3/4"	8"x10"
15	1.0	5.0	7.5	10.0	2.1	-5.4	2 @ 3/4"	8"x10"
18	1.0	5.0	7.5	10.0	2.6	-5.7	2 @ 3/4"	8"x10"
21	1.0	5.0	7.5	10.0	3.0	-6.2	2 @ 3/4"	8"x10"
24	1.0	5.0	7.5	10.0	3.4	-6.7	2 @ 3/4"	8"x10"
27	1.0	5.0	7.5	10.0	3.8	-7.3	2 @ 3/4"	8"x12"
30	1.0	5.0	7.5	10.0	4.3	-7.9	2 @ 3/4"	8"x12"
33	1.0	5.0	7.5	10.0	4.7	-8.6	4 @ 3/4"	8"x16"
36	1.0	5.0	7.5	10.0	5.1	-9.4	4 @ 3/4"	8"x16"
39	1.0	5.0	7.5	10.0	5.6	-10.3	4 @ 3/4"	8"x16"
42	1.0	5.0	7.5	10.0	6.0	-11.2	4 @ 3/4"	8"x16"
Interior Column Spacing = 25 ft.								
12	1.3	6.3	9.4	12.5	2.0	-6.1	2 @ 3/4"	8"x10"
15	1.3	6.3	9.4	12.5	2.5	-6.3	2 @ 3/4"	8"x10"
18	1.3	6.3	9.4	12.5	3.0	-6.6	2 @ 3/4"	8"x10"
21	1.3	6.3	9.4	12.5	3.5	-7.0	2 @ 3/4"	8"x10"
24	1.3	6.3	9.4	12.5	4.1	-7.4	2 @ 3/4"	8"x10"
27	1.3	6.3	9.4	12.5	4.6	-7.8	2 @ 3/4"	8"x12"
30	1.3	6.3	9.4	12.5	5.1	-8.4	2 @ 3/4"	8"x12"
33	1.3	6.3	9.4	12.5	5.6	-8.9	4 @ 3/4"	8"x16"
36	1.3	6.3	9.4	12.5	6.1	-9.6	4 @ 3/4"	8"x16"
39	1.3	6.3	9.4	12.5	6.6	-10.2	4 @ 3/4"	8"x16"
42	1.3	6.3	9.4	12.5	7.1	-11.0	4 @ 3/4"	8"x16"
Interior Column Spacing = 30 ft.								
12	1.5	7.5	11.3	15.0	2.4	-7.1	2 @ 3/4"	8"x10"
15	1.5	7.5	11.3	15.0	2.9	-7.3	2 @ 3/4"	8"x10"
18	1.5	7.5	11.3	15.0	3.5	-7.6	2 @ 3/4"	8"x10"
21	1.5	7.5	11.3	15.0	4.1	-7.9	2 @ 3/4"	8"x10"
24	1.5	7.5	11.3	15.0	4.7	-8.2	2 @ 3/4"	8"x10"
27	1.5	7.5	11.3	15.0	5.3	-8.6	2 @ 3/4"	8"x12"
30	1.5	7.5	11.3	15.0	5.9	-9.0	2 @ 3/4"	8"x12"
33	1.5	7.5	11.3	15.0	6.5	-9.5	4 @ 3/4"	8"x16"
36	1.5	7.5	11.3	15.0	7.1	-10.0	4 @ 3/4"	8"x16"
39	1.5	7.5	11.3	15.0	7.7	-10.6	4 @ 3/4"	8"x16"
42	1.5	7.5	11.3	15.0	8.2	-11.2	4 @ 3/4"	8"x16"

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# PRODUCT AND ENGINEERING MANUAL

## 9.0 FOUNDATION REACTIONS

### ADDITIONAL REACTIONS DUE TO LONGITUDINAL BRACING

Gable & Single Slope Low-Side Total Bracing Reactions												
Total Bldg. Width (ft)	Eave Height											
	12'			18'			24'			30'		
	Bays	X	Y	Bays	X	Y	Bays	X	Y	Bays	X	Y
30	1	2.0	-0.9	1	2.9	-2.1	2	1.9	-1.9	2	2.4	-2.9
40	1	2.7	-1.3	1	3.9	-2.8	2	2.6	-2.5	2	3.2	-3.9
50	1	3.4	-1.6	1	4.9	-3.5	2	3.3	-3.1	2	4.0	-4.8
60	1	4.1	-2.0	1	6.0	-4.3	2	3.9	-3.8	2	4.9	-5.8
70	1	4.9	-2.3	1	7.0	-5.1	2	4.6	-4.5	2	5.7	-6.9
80	1	5.7	-2.7	1	8.1	-5.9	2	5.3	-5.1	2	6.6	-7.9
100	2	3.7	-1.8	2	5.2	-3.8	3	4.5	-4.3	3	5.5	-6.6
120	2	4.5	-2.2	2	6.4	-4.6	3	5.5	-5.3	3	6.7	-8.1
150	2	5.9	-2.8	2	8.2	-5.9	3	7.0	-6.7	3	8.6	-10.3
160	2	6.4	-3.1	2	8.9	-6.4	3	7.5	-7.2	3	9.2	-11.0
180	2	7.4	-3.5	3	6.8	-4.9	3	8.6	-8.3	4	7.9	-9.4
200	3	5.6	-2.7	3	7.6	-5.5	3	9.7	-9.3	4	8.9	-10.6
240	3	7.0	-3.4	4	7.2	-5.2	4	9.0	-8.7	5	8.7	-10.4

Single Slope High-Side Total Bracing Reactions												
Total Bldg. Width (ft)	Eave Height											
	12'			18'			24'			30'		
	Bays	X	Y	Bays	X	Y	Bays	X	Y	Bays	X	Y
30	1	2.2	-1.2	1	3.1	-2.5	2	2.0	-2.2	2	2.5	-3.2
40	1	3.0	-1.8	1	4.2	-3.6	2	2.8	-3.0	2	3.4	-4.5
50	1	3.9	-2.5	1	5.5	-4.8	2	3.5	-4.0	2	4.3	-5.9
60	1	4.9	-3.3	1	6.8	-6.2	2	4.3	-5.0	2	5.3	-7.4
70	1	5.9	-4.2	1	8.1	-7.7	2	5.2	-6.2	2	6.3	-9.0
80	1	7.0	-5.3	1	9.5	-9.4	2	6.0	-7.4	2	7.3	-10.7
100	2	4.7	-3.9	2	6.3	-6.6	3	5.2	-6.7	3	6.3	-9.6
120	2	6.1	-5.4	2	7.9	-8.9	3	6.5	-8.9	3	7.8	-12.4
150	2	8.3	-8.2	2	10.7	-13.0	3	8.6	-12.6	3	10.2	-17.3
160	2	9.1	-9.3	2	11.6	-14.6	3	9.4	-14.0	3	11.0	-19.1
180	2	10.9	-11.7	3	9.1	-12.0	3	10.9	-17.1	4	9.6	-17.3
200	3	8.5	-9.7	3	10.5	-14.6	3	12.6	-20.5	4	11.0	-20.5

\* This column represents the standard number of braced bays required due to eave height and building width according to requirements as outlined in Section 4 of this manual.



### ADDITIONAL REACTIONS DUE TO FASCIA OR CANOPY

Additional Reactions due to Fascia (kips)										
Eave Ht.	DL		LL=20 psf		LL=30 psf		LL=40 psf		WL	
	X	Y	X	Y	X	Y	X	Y	X	Y
12'	0.5	2.0	1.0	2.0	1.0	2.5	1.0	3.5	-3.0	-5.0
18'	0.5	2.0	1.0	2.0	1.0	2.5	1.0	3.5	-3.0	-6.0
24'	1.0	2.0	1.0	2.0	1.0	2.5	1.0	3.5	-3.0	-6.5
30'	1.0	2.0	1.0	2.0	1.0	2.5	1.0	3.5	-4.0	-8.5

Additional Reactions due to 5' Canopy Extension (kips)										
Eave Ht.	DL		LL=20 psf		LL=30 psf		LL=40 psf		WL	
	X	Y	X	Y	X	Y	X	Y	X	Y
12'	0.1	0.4	0.5	2.5	0.8	3.8	1.0	5.0	-1.1	-5.3
18'	0.1	0.4	0.3	2.5	0.5	3.8	0.7	5.0	-0.7	-5.3
24'	0.0	0.4	0.3	2.5	0.4	3.8	0.5	5.0	-0.6	-5.3
30'	0.0	0.4	0.2	2.5	0.3	3.8	0.4	5.0	-0.4	-5.3

Additional Reactions due to 10' Canopy Extension (kips)										
Eave Ht.	DL		LL=20 psf		LL=30 psf		LL=40 psf		WL	
	X	Y	X	Y	X	Y	X	Y	X	Y
12'	0.3	0.8	2.1	5.0	3.1	7.5	4.2	10.0	-4.4	-10.6
18'	0.2	0.8	1.4	5.0	2.1	7.5	2.8	10.0	-2.9	-10.6
24'	0.2	0.8	1.0	5.0	1.6	7.5	2.1	10.0	-2.2	-10.6
30'	0.1	0.8	0.8	5.0	1.3	7.5	1.7	10.0	-1.8	-10.6