NIST GCR 21-917-48v1B

Seismic Design of Archetype Steel Buildings in Central and Eastern United States

Volume 1B –12-story Office Building in Savannah, Georgia Supplementary Documentation

Applied Technology Council

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NIST GCR 21-917-48v1B

**Seismic Design of Archetype Steel
Buildings in Central and Eastern
United States
Volume 1B – 12-story Office
Building in Savannah, Georgia
Supplementary Documentation**

Prepared for
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NIST GCR 21-917-48v1B

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Preface

Seismic design codes in the United States have evolved since first introduced in 1925; however, they are primarily based on the knowledge of performance requirements for buildings located in high seismicity regions of the United States, such as the West Coast. These model codes are extrapolated for use in areas with moderate seismicity, such as the Central and Eastern United States (CEUS), where member sizes of the lateral-force-resisting systems may be governed by wind requirements. There is a need to understand the seismic performance of buildings when the controlling design load is from wind effects.

In September 2018, the Applied Technology Council (ATC) commenced a task order project under National Institute of Standards and Technology (NIST) Contract SB1341-13-CQ-0009 to develop designs for archetype steel buildings to facilitate future research in understanding the seismic performance of buildings when the controlling design load is from wind. For this purpose, three archetype steel buildings were designed in accordance with older building codes and current building codes for specific locations within the CEUS. This document is one of three volumes presenting representative structural calculations supplementing design drawings for archetype steel buildings provided NIST GCR 21-917-48v1A.

The designs presented were developed by design firms PCS Structural Solutions of Seattle, Washington and Uzun + Case of Atlanta, Georgia. The Project Technical Committee, consisting of Don Scott, John Hutton, and Adrian Persaud monitored and guided the technical efforts of the Project Working Groups, which included Steve Antilla, Jared Dragovich, Hai Lin, Chris Putman, Cameron Prince, and Gavin Rinaldo. Project Working Group member McKell Bowen led the development of two of the three designs presented. The Project Review Panel, consisting of Melissa Burton (ATC Board Contact), C.B. Crouse, Ramon Gilsanz, Larry Griffis, Emily Guglielmo, Eric Hines, and Erik Madsen provided technical advice and consultation over the duration of the work. The names and affiliations of all who contributed to this report are provided in the list of Project Participants in the main Volume.

ATC also gratefully acknowledges Jay Harris (Contracting Officer's Representative) for his input and guidance throughout the project development process. ATC staff member Justin Moresco and Ginevra Rojahn provided project management support and report production services, respectively.

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Table of Contents

Preface	iii
Design Case A: 2018 IBC Risk Category II Seismic Design Category D	A-1
Design Case B: 2018 IBC Risk Category III Seismic Design Category D.....	B-1
Design Case C: 1988 SBC “Risk Category II” “Seismic Design Category C”	C-1
Design Case D: 1988 SBC “Risk Category III” “Seismic Design Category C”	D-1
Design Case E: 2018 IBC Risk Category II Seismic Design Category C	E-1

2018 IBC Risk Category II Seismic Design Category D

This section presents representative structural calculations for Building 1 (12-story office building in Savannah, Georgia) Design Case A. Project objectives, building selection criteria, seismic design criteria, structural design drawings, references, and project participants are documented in NIST GCR 21-917-48v1A.

TABLE OF CONTENTS

Design Criteria	3
Gravity Design	6
Beam Design	8
Column Design	15
Lateral Design	19
Braced Frame Design	84
Moment Frame Design.....	119

DESIGN CRITERIA

BUILDING 1 GENERAL DESIGN CRITERIA:

Location:

- Savannah, Georgia
- Coordinates: 32.0808989 Latitude, -81.091203 Longitude

DESIGN A: 2018 IBC RISK CATEGORY II

Applicable Codes

- 2018 International Building Code
- ASCE 7-16: Minimum Design Loads for Buildings and Other Structures
- ACI 318-14: Building Code Requirements for Structural Concrete
- AISC-360-16: Specification for Structural Steel Buildings

Risk Category: II

Wind Loading Criteria:

- Basic Wind Speed (3 Sec. Gust): V = 135 mph
- Exposure: C
- Allowable drift at 10-year mean return interval H/400
- Internal Pressure Coefficient: +/- 0.18

Snow Loads:

- Ground Snow Load: 0 PSF

Seismic Loading Criteria:

- Risk adjusted maximum considered earthquake, 5 percent damped, spectral response acceleration at short periods, S_s : 0.313g
- Risk adjusted maximum considered earthquake, 5 percent damped, spectral response acceleration at a period of 1 second, S_1 : 0.114g
- Site Class: E
- Site Coefficient (F_a): 2.223
- Site Coefficient (F_v): 4.2
- Seismic Importance Factor: 1.00
- Design, 5 percent damped, spectral response acceleration at short periods, S_{DS} : 0.464g
- Design, 5 percent damped, spectral response acceleration at a period of 1 second, S_{D1} : 0.319g
- Seismic Design Category: D
- Analysis Procedure: Equivalent lateral force procedure
- North – South seismic resisting system: Steel special concentrically braced frames
 - Response Magnification Factor (R): 6
 - Over strength Factor: 2
 - Deflection Amplification Factor (C_d): 5
- East-West seismic resisting system: Steel special moment frames
 - Response Magnification Factor (R): 8
 - Over strength Factor: 3
 - Deflection Amplification Factor (C_d): 5.5

- Seismic response coefficient, C_s
 - North-South 0.041
 - East-West 0.020

GRAVITY LOADING

Superimposed Dead Loads:

- Roofing: 10 PSF
- Miscellaneous: 10 PSF

Superimposed Live Loads

- Roof: 20 PSF
- Office: 50 PSF
- Partitions 15 PSF
- Corridors: 80 PSF
- Lobbies and Stairs: 100 PSF (reducible)
- Mechanical and Storage Rooms: 125 PSF

MATERIAL DEFINITIONS:

Concrete:

- Slab on ground: $F'_c = 4,000$ PSI
- Slabs on steel deck (lightweight 110 pcf) $F'_c = 3,000$ PSI
- Foundations: $F'_c = 4,000$ PSI
- Exterior Concrete: $F'_c = 4,500$ PSI

Concrete Reinforcement:

- Rebar: $F_y = 60$ KSI

Structural Steel:

- WF columns and beams: $F_y = 50$ KSI
- Tubes $F_y = 50$ KSI
- Other steel, unless noted otherwise: $F_y = 36$ KSI
- Tubes:
 - Round $F_y = 42$ KSI
 - Rectangular $F_y = 46$ KSI
- Other steel, unless noted otherwise: $F_y = 36$ KSI

FOUNDATION CRITERIA

- 14" square prestressed precast piles
 - Compression capacity 80 tons
 - Tension capacity 60 tons
 - Lateral Capacity 10 tons

GRAVITY DESIGN

GRAVITY LOADING

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SUPERIMPOSED DEAD LOAD DESIGNATIONS			
MARK	USE	LOAD (PSF)	NOTES
A	OFFICE	10	MISC.
B	ROOF	20	10 ROOFING + 10 MISC.

LIVE LOAD DESIGNATIONS		
MARK	USE	LOAD (PSF)
1	OFFICE	50 (R) + 15 (NR)
2	CORRIDORS	50 (R)
3	LOBBIES & STAIRS	100 (R)
4	MECHANICAL & STORAGE	125 (R)
5	ROOF	20 (R)

"NR" INDICATES NON-REDUCIBLE LIVE LOAD.
"R" INDICATES LIVE LOADS REDUCIBLE PER IBC SECTION 1607.11

BEAM DESIGN

TYPICAL FRAMING PLAN
RAM STRUCTURAL SYSTEM DEMAND-CAPACITY RATIO SUMMARY

RAM Structural System

RAM Steel 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version 01/11/21 14:40:05

Building Code: IBC

Steel Code: AISC 360-16 LRFD

Gravity Beam Design

Floor Type: TYPICAL FLOOR**Beam Number = 82****SPAN INFORMATION (ft): I-End (10.00,0.00) J-End (10.00,45.00)**

Beam Size (User Selected) = W21X44

Fy = 50.0 ksi

Total Beam Length (ft) = 45.00

COMPOSITE PROPERTIES (Not Shored):

		Left	Right
Deck Label		3+3.25 LW	3+3.25 LW
Concrete thickness (in)		3.25	3.25
Unit weight concrete (pcf)		110.00	110.00
f _c (ksi)		3.00	3.00
Decking Orientation		perpendicular	perpendicular
Decking type		VULCRAFT 3.0VL	VULCRAFT 3.0VL
beff (in)	=	120.00	Y bar(in) = 20.58
M _{nf} (kip-ft)	=	841.64	M _n (kip-ft) = 716.97
C (kips)	=	342.06	PNA (in) = 20.12
I _{eff} (in ⁴)	=	2305.87	I _{tr} (in ⁴) = 2859.57
Stud length (in)	=	5.00	Stud diam (in) = 0.75
Stud Capacity (kips)	Q _n = 17.1	R _g = 1.00	R _p = 0.60
# of studs:	Max = 90	Partial = 41	Actual = 41
Number of Stud Rows	= 1	Percent of Full Composite Action = 52.38	

POINT LOADS (kips):

Dist	DL	CDL	RedLL	Red%	NonRL	StorLL	Red%	RoofLL	Red%	PartL	CLL
					L						
5.000	0.64	0.60	0.31	24.2	0.00	0.00	0.0	0.00	0.0	0.09	0.12
5.000	0.79	0.75	0.41	24.2	0.00	0.00	0.0	0.00	0.0	0.12	0.16

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	0.198	0.198	0.000	---	NonR	0.000	0.000
	5.000	0.198	0.198	0.000			0.000	0.000
2	0.000	0.043	0.021	0.212	24.2%	Red	0.064	0.085
	5.000	0.043	0.021	0.212			0.064	0.085
3	5.000	0.465	0.465	0.000	---	NonR	0.000	0.000
	45.000	0.465	0.465	0.000			0.000	0.000
4	5.000	0.100	0.050	0.500	24.2%	Red	0.150	0.200
	45.000	0.100	0.050	0.500			0.150	0.200
5	0.000	0.044	0.044	0.000	---	NonR	0.000	0.000
	45.000	0.044	0.044	0.000			0.000	0.000

SHEAR (Ultimate): Max V_u (1.2DL+1.6LL) = 35.59 kips 1.00V_n = 217.35 kips**MOMENTS (Ultimate):**

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Center	PreCmp+	1.2DL+1.6LL	252.8	22.4	0.0	1.00	0.90	357.75
	Init DL	1.4DL	200.5	22.4	---	---		
	Max +	1.2DL+1.6LL	401.9	22.4	---	---	0.90	645.27

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Gravity Beam Design

RAM Steel 17.01.01.05

Page 2/2

RAM Structural System

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version 01/11/21 14:40:05

Building Code: IBC

Steel Code: AISC 360-16 LRFD

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
Controlling		1.2DL+1.6LL	252.8	22.4	0.0	1.00	0.90	357.75

REACTIONS (kips):

	Left	Right
Initial reaction	16.61	17.16
DL reaction	13.45	13.79
Max +LL reaction	11.14	11.90
Max +total reaction (factored)	33.97	35.59

DEFLECTIONS: (Camber = 1-1/2)

				Ratio
Initial load (in)	at 22.50 ft =	-2.139	L/D = 252 > 220	0.87
Live load (in)	at 22.50 ft =	-0.730	L/D = 740 > 360	0.49
Post Comp load (in)	at 22.50 ft =	-0.799	L/D = 676 > 240	0.36
Net Total load (in)	at 22.50 ft =	-1.438	L/D = 376 > 240	0.64

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Project ID:
Project # :
Bay ID : 3-TYPICAL FLOOR: 1-2 , A-C
Model : 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

VIBRATION ANALYSIS:

Activity: Walking
Occupancy Category: Electronic Office
Evaluation Criterion: Walking
References: Murray, T.M., Allen, D.E., Ungar, E.E, Davis, D.B.
"Vibrations of Steel-Framed Structural Systems
Due To Human Activity", AISC Design Guide #11 2nd Ed, 2016
Murray, T.M., and Davis, B.,
"Vibration of Steel Joist-Concrete Floor Systems",
SJI Technical Digest No. 5, 2014
Constant Force, $P_o = 65.1b$
Modal Damping Ratio, $\beta = 0.025$
Acceleration Limit, $a_o/g \times 100\% = 0.50 \%$
Beams are continuous
Girders are not continuous at columns

EVALUATION: Combined Mode $a_p/g = 0.497 \%$ $\leq 0.50 \%$
The system SATISFIES THE CRITERION.

PARAMETER SUMMARY:

Parameter	Beam Panel	Left Girder Panel	Right Girder Panel	System
Member	W21X44	Wall	W24X62	
Uniform Load, plf	619.4	0.0	2849.4	
Effective I, in ⁴	3021.1	0.0	5156.9	
Frequency, Hz	4.38	0.00	6.00	3.54
Panel Width, ft	38.36	0.00	68.81	
Panel Weight, k	160.4	0.0	130.7	151.7

FRAMING: (User Modified Bay)

Girder Span = 30.00 ft
Beam Spans:
Left = 0.00 ft
Center = 45.00 ft
Right = 45.00 ft

Girders/Walls:
Left -Wall
Right-W24X62

Beam -W21X44
3 spaces at 120.00 in

Floor Width =350.00 ft
Floor Length=135.00 ft

Concrete: dc = 6.25 in
f'c = 3.00 ksi
wt. = 110.0 pcf
Deck Height = 3.00 in

Loading: Dead = 4.00 psf
Live = 8.00 psf
Collateral = 0.00 psf

Warning: The bay configuration and/or properties analyzed here have been modified by the user and differ from the actual configuration

and/or properties of the bay in the RAM Structural System.

Note: Floors with a frequency below 3 Hz are not recommended

COLUMN DESIGN

TYPICAL COLUMN PLAN
RAM STRUCTURAL SYSTEM DEMAND-CAPACITY RATIO SUMMARY

RAM Structural System

RAM Steel 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version 02/24/21 15:28:35

Building Code: IBC

Steel Code: AISC360-16 LRFD

Story level Level 3, Column Line 3-C, Column # 33

Fy (ksi) = 50.00

Column Size

= W14X193

Orientation (deg.) = 90.0

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu (ft) _____	13.50	13.50
K _____	1	1
Braced Against Joint Translation _____	Yes	Yes
Column Eccentricity (in) Top _____	10.25	10.35
Bottom _____	10.25	10.35

CONTROLLING AXIAL COLUMN LOADS - Skip-Load Case 1:

	Dead	Live	Roof
Axial (kip) _____	810.24	555.14	13.50

DEMAND CAPACITY RATIO: (1.2DL + 1.6LL + 0.5RF)

Pu (kip) = 1867.26	0.90Pnx (kip) = 2442.52	Pu/0.90Pnx = 0.764
	0.90Pny (kip) = 2273.62	Pu/0.90Pny = 0.821
	0.90Pn (kip) = 2273.62	Pu/0.90Pn = 0.821

DEMAND/CAPACITY LIMIT FOR STRENGTH : 1.000**CONTROLLING COMBINED COLUMN LOADS - Skip-Load Case 4:**

	Dead	Live	Roof
Axial (kip) _____	810.24	555.14	13.50
Moments Top Mx (kip-ft) _____	-2.28	2.86	0.00
My (kip-ft) _____	-0.86	-0.80	0.00
Bot Mx (kip-ft) _____	-2.46	-3.50	0.00
My (kip-ft) _____	-0.93	-8.32	0.00

Single curvature about X-Axis

Reverse curvature about Y-Axis

CALCULATED PARAMETERS: (1.2DL + 1.6LL + 0.5RF)

Pu (kip) = 1867.26	0.90*Pn (kip) = 2273.62
Mux (kip-ft) = -8.56	0.90*Mnx (kip-ft) = 1331.25
Muy (kip-ft) = -14.42	0.90*Mny (kip-ft) = 675.00
Rm = 1.00	
Cbx = 1.46	
Cmx = 0.69	Cmy = 0.54
Pex (kip) = 26174.53	Pey (kip) = 10153.54
B1x = 1.00	B1y = 1.00

INTERACTION EQUATION

Pu/0.90*Pn = 0.821

Gravity Column Design

RAM Steel 17.01.01.05

Page 2/2

RAM Structural System

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version 02/24/21 15:28:35

Building Code: IBC

Steel Code: AISC360-16 LRFD

$$\text{Eq H1-1a: } 0.821 + 8/9(0.006 + 0.021) = 0.846$$

LATERAL DESIGN

LOAD CASE: WIND**WIND**

ASCE 7-16

Exposure: C

Basic Wind Speed (mph): 135.0

Apply Directionality Factor, $K_d = 0.85$ Use Topography Factor, $K_{zt} = 1.00$ Ground Elevation Factor, $K_e = 1.00$

Use Calculated Frequency for X-Dir.

Use Calculated Frequency for Y-Dir.

Gust Factor for Flexible Structures, G: Use Calculated G for X-Dir.

Gust Factor for Flexible Structures, G: Use Calculated G for Y-Dir.

Damping Ratio for Flexible Structures = 0.01

Mean Roof Height (ft): Top Story Height + Parapet = 164.50

Ground Level: GRADE

WIND PRESSURES:

X-Direction: Natural Frequency = 0.226 Structure is Flexible

Y-Direction: Natural Frequency = 0.479 Structure is Flexible

 C_p Windward = 0.80 q Leeward (qh) = 55.74 psf $G C_{pn}$ (Parapet): Windward = 1.50 Leeward = -1.00

Height ft	Kz	Kzt	qz psf	Gust Factor G		C_p Leeward		Pressure (psf)	
				X	Y	X	Y	X	Y
164.50	1.405	1.000	55.736	1.405	1.003	-0.352	-0.500	90.276	72.690
151.00	1.380	1.000	54.740	1.405	1.003	-0.352	-0.500	89.157	71.891
137.50	1.353	1.000	53.672	1.405	1.003	-0.352	-0.500	87.955	71.033
124.00	1.324	1.000	52.517	1.405	1.003	-0.352	-0.500	86.656	70.106
110.50	1.293	1.000	51.258	1.405	1.003	-0.352	-0.500	85.241	69.096
97.00	1.258	1.000	49.871	1.405	1.003	-0.352	-0.500	83.681	67.982
83.50	1.218	1.000	48.322	1.405	1.003	-0.352	-0.500	81.940	66.739
70.00	1.174	1.000	46.561	1.405	1.003	-0.352	-0.500	79.960	65.326
56.50	1.122	1.000	44.507	1.405	1.003	-0.352	-0.500	77.651	63.678
43.00	1.060	1.000	42.021	1.405	1.003	-0.352	-0.500	74.855	61.682
29.50	0.979	1.000	38.816	1.405	1.003	-0.352	-0.500	71.252	59.110
16.00	0.860	1.000	34.125	1.405	1.003	-0.352	-0.500	65.978	55.346
0.00	0.849	1.000	33.665	1.405	1.003	-0.352	-0.500	65.460	54.976

APPLIED STORY FORCES

Type: Wind_ASCE716_1_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	74.04	0.00
Level 12	151.00	146.82	0.00
Level 11	137.50	144.84	0.00
Level 10	124.00	142.69	0.00
Level 9	110.50	140.35	0.00
Level 8	97.00	137.77	0.00
Level 7	83.50	134.89	0.00
Level 6	70.00	131.60	0.00
Level 5	56.50	127.76	0.00
Level 4	43.00	123.07	0.00
Level 3	29.50	116.89	0.00
Level 2	16.00	120.01	0.00

APPLIED STORY FORCES

Type: Wind_ASCE716_1_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	103.64
Level 12	151.00	0.00	205.72
Level 11	137.50	0.00	203.26
Level 10	124.00	0.00	200.60
Level 9	110.50	0.00	197.70
Level 8	97.00	0.00	194.50
Level 7	83.50	0.00	190.93
Level 6	70.00	0.00	186.85
Level 5	56.50	0.00	182.08
Level 4	43.00	0.00	176.26
Level 3	29.50	0.00	168.60
Level 2	16.00	0.00	174.65

 $V_x = 1540.72$ 0.00%0.00% $V_y = 2184.81$

SEISMIC

LOAD CASE: EQ-Y ELF

Seismic ASCE 7-16 Equivalent Lateral Force
 Importance Factor: 1.00 TL: 8.00 s
 Site Class D: Stiff Soil, Default
 Ss: 0.313 g S1: 0.114 g
 Use Specified: SDs: 0.464 g SD1: 0.319 g
 Risk Category: II Seismic Design Category: D
 Provisions for: Force
 Ground Level: GRADE

Dir	Eccent	R	Ta Equation		Building Period-T				
Y	+ And -	6.0	Std,Ct=0.020,x=0.75		Calculated				
Dir	Ta	Cu	T	T-used	Cs	Cs(max)	Cs(min)	Cs-used	k
					Eq12.8-2	Eq12.8-3	Eq12.8-5		
Y	0.919	1.400	2.089	1.286	0.077	0.041	0.020	0.041	1.393

Total Building Weight (kips) = 24194.34

$$V_x = C_s * W = 494 \text{ K}$$

LOAD CASE: EQ-Y ELF

Seismic ASCE 7-16 Equivalent Lateral Force
 Importance Factor: 1.00 TL: 8.00 s
 Site Class D: Stiff Soil, Default
 Ss: 0.313 g S1: 0.114 g
 Use Specified: SDs: 0.464 g SD1: 0.319 g
 Risk Category: II Seismic Design Category: D
 Provisions for: Force
 Ground Level: GRADE

Dir	Eccent	R	Ta Equation		Building Period-T				
Y	+ And -	6.0	Std,Ct=0.020,x=0.75		Calculated				
Dir	Ta	Cu	T	T-used	Cs	Cs(max)	Cs(min)	Cs-used	k
					Eq12.8-2	Eq12.8-3	Eq12.8-5		
Y	0.919	1.400	2.089	1.286	0.077	0.041	0.020	0.041	1.393

Total Building Weight (kips) = 24194.34

$$V_y = C_s * W = 1001 \text{ K}$$

Wind Base shear > Seismic base shear. Wind Controls

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

LOAD CASE: WIND

ASCE 7-16

Exposure: C

Basic Wind Speed (mph): 135.0

Apply Directionality Factor, $K_d = 0.85$ Use Topography Factor, $K_{zt} = 1.00$ Ground Elevation Factor, $K_e = 1.00$

Use Calculated Frequency for X-Dir.

Use Calculated Frequency for Y-Dir.

Gust Factor for Flexible Structures, G: Use Calculated G for X-Dir.

Gust Factor for Flexible Structures, G: Use Calculated G for Y-Dir.

Damping Ratio for Flexible Structures = 0.01

Mean Roof Height (ft): Top Story Height + Parapet = 164.50

Ground Level: GRADE

WIND PRESSURES:

X-Direction: Natural Frequency = 0.226 Structure is Flexible

Y-Direction: Natural Frequency = 0.479 Structure is Flexible

 C_p Windward = 0.80 q Leeward (qh) = 55.74 psf $G C_{pn}$ (Parapet): Windward = 1.50 Leeward = -1.00

Height ft	K_z	K_{zt}	q_z psf	Gust Factor G X	Gust Factor G Y	C_p Leeward X	C_p Leeward Y	Pressure (psf) X	Pressure (psf) Y
164.50	1.405	1.000	55.736	1.405	1.003	-0.352	-0.500	90.276	72.690
151.00	1.380	1.000	54.740	1.405	1.003	-0.352	-0.500	89.157	71.891
137.50	1.353	1.000	53.672	1.405	1.003	-0.352	-0.500	87.955	71.033
124.00	1.324	1.000	52.517	1.405	1.003	-0.352	-0.500	86.656	70.106
110.50	1.293	1.000	51.258	1.405	1.003	-0.352	-0.500	85.241	69.096
97.00	1.258	1.000	49.871	1.405	1.003	-0.352	-0.500	83.681	67.982
83.50	1.218	1.000	48.322	1.405	1.003	-0.352	-0.500	81.940	66.739
70.00	1.174	1.000	46.561	1.405	1.003	-0.352	-0.500	79.960	65.326
56.50	1.122	1.000	44.507	1.405	1.003	-0.352	-0.500	77.651	63.678
43.00	1.060	1.000	42.021	1.405	1.003	-0.352	-0.500	74.855	61.682
29.50	0.979	1.000	38.816	1.405	1.003	-0.352	-0.500	71.252	59.110
16.00	0.860	1.000	34.125	1.405	1.003	-0.352	-0.500	65.978	55.346
0.00	0.849	1.000	33.665	1.405	1.003	-0.352	-0.500	65.460	54.976

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_X

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	74.04	0.00	105.00	60.00
Level 12	1	151.00	146.82	0.00	105.00	60.00
Level 11	1	137.50	144.84	0.00	105.00	60.00
Level 10	1	124.00	142.69	0.00	105.00	60.00
Level 9	1	110.50	140.35	0.00	105.00	60.00
Level 8	1	97.00	137.77	0.00	105.00	60.00

Loads and Applied Forces

RAM Structural System

RAM Frame 17.01.01.05

Page 2/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 7	1	83.50	134.89	0.00	105.00	60.00
Level 6	1	70.00	131.60	0.00	105.00	60.00
Level 5	1	56.50	127.76	0.00	105.00	60.00
Level 4	1	43.00	123.07	0.00	105.00	60.00
Level 3	1	29.50	116.89	0.00	105.00	60.00
Level 2	1	16.00	120.01	0.00	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_1_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	74.04	0.00
Level 12	151.00	146.82	0.00
Level 11	137.50	144.84	0.00
Level 10	124.00	142.69	0.00
Level 9	110.50	140.35	0.00
Level 8	97.00	137.77	0.00
Level 7	83.50	134.89	0.00
Level 6	70.00	131.60	0.00
Level 5	56.50	127.76	0.00
Level 4	43.00	123.07	0.00
Level 3	29.50	116.89	0.00
Level 2	16.00	120.01	0.00
		1540.72	0.00

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	103.64	105.00	60.00
Level 12	1	151.00	0.00	205.72	105.00	60.00
Level 11	1	137.50	0.00	203.26	105.00	60.00
Level 10	1	124.00	0.00	200.60	105.00	60.00
Level 9	1	110.50	0.00	197.70	105.00	60.00
Level 8	1	97.00	0.00	194.50	105.00	60.00
Level 7	1	83.50	0.00	190.93	105.00	60.00
Level 6	1	70.00	0.00	186.85	105.00	60.00
Level 5	1	56.50	0.00	182.08	105.00	60.00
Level 4	1	43.00	0.00	176.26	105.00	60.00
Level 3	1	29.50	0.00	168.60	105.00	60.00
Level 2	1	16.00	0.00	174.65	105.00	60.00

RAM Structural System

RAM Frame 17.01.01.05
DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 3/40

10/09/20 11:39:41

APPLIED STORY FORCES

Type: Wind_ASCE716_1_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	103.64
Level 12	151.00	0.00	205.72
Level 11	137.50	0.00	203.26
Level 10	124.00	0.00	200.60
Level 9	110.50	0.00	197.70
Level 8	97.00	0.00	194.50
Level 7	83.50	0.00	190.93
Level 6	70.00	0.00	186.85
Level 5	56.50	0.00	182.08
Level 4	43.00	0.00	176.26
Level 3	29.50	0.00	168.60
Level 2	16.00	0.00	174.65
		0.00	2184.81

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_X+E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	55.53	0.00	105.00	71.21
Level 12	1	151.00	110.11	0.00	105.00	71.21
Level 11	1	137.50	108.63	0.00	105.00	71.21
Level 10	1	124.00	107.02	0.00	105.00	71.21
Level 9	1	110.50	105.26	0.00	105.00	71.22
Level 8	1	97.00	103.33	0.00	105.00	71.22
Level 7	1	83.50	101.17	0.00	105.00	71.22
Level 6	1	70.00	98.70	0.00	105.00	71.23
Level 5	1	56.50	95.82	0.00	105.00	71.22
Level 4	1	43.00	92.30	0.00	105.00	71.21
Level 3	1	29.50	87.67	0.00	105.00	71.19
Level 2	1	16.00	90.01	0.00	105.00	71.17

APPLIED STORY FORCES

Type: Wind_ASCE716_2_X+E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	55.53	0.00
Level 12	151.00	110.11	0.00
Level 11	137.50	108.63	0.00
Level 10	124.00	107.02	0.00

Loads and Applied Forces

RAM Structural System

RAM Frame 17.01.01.05

Page 4/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 9	110.50	105.26	0.00
Level 8	97.00	103.33	0.00
Level 7	83.50	101.17	0.00
Level 6	70.00	98.70	0.00
Level 5	56.50	95.82	0.00
Level 4	43.00	92.30	0.00
Level 3	29.50	87.67	0.00
Level 2	16.00	90.01	0.00
		<hr/>	<hr/>
		1155.54	0.00

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_X-E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	55.53	0.00	105.00	48.79
Level 12	1	151.00	110.11	0.00	105.00	48.79
Level 11	1	137.50	108.63	0.00	105.00	48.79
Level 10	1	124.00	107.02	0.00	105.00	48.79
Level 9	1	110.50	105.26	0.00	105.00	48.78
Level 8	1	97.00	103.33	0.00	105.00	48.78
Level 7	1	83.50	101.17	0.00	105.00	48.78
Level 6	1	70.00	98.70	0.00	105.00	48.77
Level 5	1	56.50	95.82	0.00	105.00	48.78
Level 4	1	43.00	92.30	0.00	105.00	48.79
Level 3	1	29.50	87.67	0.00	105.00	48.81
Level 2	1	16.00	90.01	0.00	105.00	48.83

APPLIED STORY FORCES

Type: Wind_ASCE716_2_X-E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	55.53	0.00
Level 12	151.00	110.11	0.00
Level 11	137.50	108.63	0.00
Level 10	124.00	107.02	0.00
Level 9	110.50	105.26	0.00
Level 8	97.00	103.33	0.00
Level 7	83.50	101.17	0.00
Level 6	70.00	98.70	0.00
Level 5	56.50	95.82	0.00
Level 4	43.00	92.30	0.00
Level 3	29.50	87.67	0.00
Level 2	16.00	90.01	0.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 5/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

1155.54	0.00
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APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_Y+E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	77.73	131.88	60.00
Level 12	1	151.00	0.00	154.29	131.87	60.00
Level 11	1	137.50	0.00	152.45	131.86	60.00
Level 10	1	124.00	0.00	150.45	131.86	60.00
Level 9	1	110.50	0.00	148.28	131.86	60.00
Level 8	1	97.00	0.00	145.88	131.86	60.00
Level 7	1	83.50	0.00	143.19	131.86	60.00
Level 6	1	70.00	0.00	140.14	131.86	60.00
Level 5	1	56.50	0.00	136.56	131.86	60.00
Level 4	1	43.00	0.00	132.19	131.86	60.00
Level 3	1	29.50	0.00	126.45	131.86	60.00
Level 2	1	16.00	0.00	130.99	131.93	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_2_Y+E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	77.73
Level 12	151.00	0.00	154.29
Level 11	137.50	0.00	152.45
Level 10	124.00	0.00	150.45
Level 9	110.50	0.00	148.28
Level 8	97.00	0.00	145.88
Level 7	83.50	0.00	143.19
Level 6	70.00	0.00	140.14
Level 5	56.50	0.00	136.56
Level 4	43.00	0.00	132.19
Level 3	29.50	0.00	126.45
Level 2	16.00	0.00	130.99

0.00	1638.61
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APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_Y-E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
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Loads and Applied Forces

RAM Structural System

RAM Frame 17.01.01.05

Page 6/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

ROOF	1	164.50	0.00	77.73	78.12	60.00
Level 12	1	151.00	0.00	154.29	78.13	60.00
Level 11	1	137.50	0.00	152.45	78.14	60.00
Level 10	1	124.00	0.00	150.45	78.14	60.00
Level 9	1	110.50	0.00	148.28	78.14	60.00
Level 8	1	97.00	0.00	145.88	78.14	60.00
Level 7	1	83.50	0.00	143.19	78.14	60.00
Level 6	1	70.00	0.00	140.14	78.14	60.00
Level 5	1	56.50	0.00	136.56	78.14	60.00
Level 4	1	43.00	0.00	132.19	78.14	60.00
Level 3	1	29.50	0.00	126.45	78.14	60.00
Level 2	1	16.00	0.00	130.99	78.07	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_2_Y-E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	77.73
Level 12	151.00	0.00	154.29
Level 11	137.50	0.00	152.45
Level 10	124.00	0.00	150.45
Level 9	110.50	0.00	148.28
Level 8	97.00	0.00	145.88
Level 7	83.50	0.00	143.19
Level 6	70.00	0.00	140.14
Level 5	56.50	0.00	136.56
Level 4	43.00	0.00	132.19
Level 3	29.50	0.00	126.45
Level 2	16.00	0.00	130.99
		0.00	1638.61

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_3_X+Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	55.53	77.73	105.00	60.00
Level 12	1	151.00	110.11	154.29	105.00	60.00
Level 11	1	137.50	108.63	152.45	105.00	60.00
Level 10	1	124.00	107.02	150.45	105.00	60.00
Level 9	1	110.50	105.26	148.28	105.00	60.00
Level 8	1	97.00	103.33	145.88	105.00	60.00
Level 7	1	83.50	101.17	143.19	105.00	60.00
Level 6	1	70.00	98.70	140.14	105.00	60.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 7/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 5	1	56.50	95.82	136.56	105.00	60.00
Level 4	1	43.00	92.30	132.19	105.00	60.00
Level 3	1	29.50	87.67	126.45	105.00	60.00
Level 2	1	16.00	90.01	130.99	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_3_X+Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	55.53	77.73
Level 12	151.00	110.11	154.29
Level 11	137.50	108.63	152.45
Level 10	124.00	107.02	150.45
Level 9	110.50	105.26	148.28
Level 8	97.00	103.33	145.88
Level 7	83.50	101.17	143.19
Level 6	70.00	98.70	140.14
Level 5	56.50	95.82	136.56
Level 4	43.00	92.30	132.19
Level 3	29.50	87.67	126.45
Level 2	16.00	90.01	130.99
		1155.54	1638.61

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_3_X-Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	55.53	-77.73	105.00	60.00
Level 12	1	151.00	110.11	-154.29	105.00	60.00
Level 11	1	137.50	108.63	-152.45	105.00	60.00
Level 10	1	124.00	107.02	-150.45	105.00	60.00
Level 9	1	110.50	105.26	-148.28	105.00	60.00
Level 8	1	97.00	103.33	-145.88	105.00	60.00
Level 7	1	83.50	101.17	-143.19	105.00	60.00
Level 6	1	70.00	98.70	-140.14	105.00	60.00
Level 5	1	56.50	95.82	-136.56	105.00	60.00
Level 4	1	43.00	92.30	-132.19	105.00	60.00
Level 3	1	29.50	87.67	-126.45	105.00	60.00
Level 2	1	16.00	90.01	-130.99	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_3_X-Y

Level	Ht	Fx	Fy
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RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 8/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

	ft	kips	kips
ROOF	164.50	55.53	-77.73
Level 12	151.00	110.11	-154.29
Level 11	137.50	108.63	-152.45
Level 10	124.00	107.02	-150.45
Level 9	110.50	105.26	-148.28
Level 8	97.00	103.33	-145.88
Level 7	83.50	101.17	-143.19
Level 6	70.00	98.70	-140.14
Level 5	56.50	95.82	-136.56
Level 4	43.00	92.30	-132.19
Level 3	29.50	87.67	-126.45
Level 2	16.00	90.01	-130.99
		<hr/> 1155.54	<hr/> -1638.61

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X+Y_CW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	41.64	58.30	78.12	71.21
Level 12	1	151.00	82.59	115.72	78.13	71.21
Level 11	1	137.50	81.47	114.34	78.14	71.21
Level 10	1	124.00	80.26	112.84	78.14	71.21
Level 9	1	110.50	78.95	111.21	78.14	71.22
Level 8	1	97.00	77.50	109.41	78.14	71.22
Level 7	1	83.50	75.88	107.40	78.14	71.22
Level 6	1	70.00	74.03	105.10	78.14	71.23
Level 5	1	56.50	71.86	102.42	78.14	71.22
Level 4	1	43.00	69.22	99.15	78.14	71.21
Level 3	1	29.50	65.75	94.84	78.14	71.19
Level 2	1	16.00	67.50	98.24	78.07	71.17

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X+Y_CW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	41.64	58.30
Level 12	151.00	82.59	115.72
Level 11	137.50	81.47	114.34
Level 10	124.00	80.26	112.84
Level 9	110.50	78.95	111.21
Level 8	97.00	77.50	109.41
Level 7	83.50	75.88	107.40

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 9/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 6	70.00	74.03	105.10
Level 5	56.50	71.86	102.42
Level 4	43.00	69.22	99.15
Level 3	29.50	65.75	94.84
Level 2	16.00	67.50	98.24
		<hr/>	<hr/>
		866.66	1228.96

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X+Y_CCW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	41.64	58.30	131.88	48.79
Level 12	1	151.00	82.59	115.72	131.87	48.79
Level 11	1	137.50	81.47	114.34	131.86	48.79
Level 10	1	124.00	80.26	112.84	131.86	48.79
Level 9	1	110.50	78.95	111.21	131.86	48.78
Level 8	1	97.00	77.50	109.41	131.86	48.78
Level 7	1	83.50	75.88	107.40	131.86	48.78
Level 6	1	70.00	74.03	105.10	131.86	48.77
Level 5	1	56.50	71.86	102.42	131.86	48.78
Level 4	1	43.00	69.22	99.15	131.86	48.79
Level 3	1	29.50	65.75	94.84	131.86	48.81
Level 2	1	16.00	67.50	98.24	131.93	48.83

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X+Y_CCW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	41.64	58.30
Level 12	151.00	82.59	115.72
Level 11	137.50	81.47	114.34
Level 10	124.00	80.26	112.84
Level 9	110.50	78.95	111.21
Level 8	97.00	77.50	109.41
Level 7	83.50	75.88	107.40
Level 6	70.00	74.03	105.10
Level 5	56.50	71.86	102.42
Level 4	43.00	69.22	99.15
Level 3	29.50	65.75	94.84
Level 2	16.00	67.50	98.24
		<hr/>	<hr/>
		866.66	1228.96

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 10/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X-Y_CW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	41.64	-58.30	131.88	71.21
Level 12	1	151.00	82.59	-115.72	131.87	71.21
Level 11	1	137.50	81.47	-114.34	131.86	71.21
Level 10	1	124.00	80.26	-112.84	131.86	71.21
Level 9	1	110.50	78.95	-111.21	131.86	71.22
Level 8	1	97.00	77.50	-109.41	131.86	71.22
Level 7	1	83.50	75.88	-107.40	131.86	71.22
Level 6	1	70.00	74.03	-105.10	131.86	71.23
Level 5	1	56.50	71.86	-102.42	131.86	71.22
Level 4	1	43.00	69.22	-99.15	131.86	71.21
Level 3	1	29.50	65.75	-94.84	131.86	71.19
Level 2	1	16.00	67.50	-98.24	131.93	71.17

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X-Y_CW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	41.64	-58.30
Level 12	151.00	82.59	-115.72
Level 11	137.50	81.47	-114.34
Level 10	124.00	80.26	-112.84
Level 9	110.50	78.95	-111.21
Level 8	97.00	77.50	-109.41
Level 7	83.50	75.88	-107.40
Level 6	70.00	74.03	-105.10
Level 5	56.50	71.86	-102.42
Level 4	43.00	69.22	-99.15
Level 3	29.50	65.75	-94.84
Level 2	16.00	67.50	-98.24
		866.66	-1228.96

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X-Y_CCW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	41.64	-58.30	78.12	48.79
Level 12	1	151.00	82.59	-115.72	78.13	48.79
Level 11	1	137.50	81.47	-114.34	78.14	48.79
Level 10	1	124.00	80.26	-112.84	78.14	48.79

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 11/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 9	1	110.50	78.95	-111.21	78.14	48.78
Level 8	1	97.00	77.50	-109.41	78.14	48.78
Level 7	1	83.50	75.88	-107.40	78.14	48.78
Level 6	1	70.00	74.03	-105.10	78.14	48.77
Level 5	1	56.50	71.86	-102.42	78.14	48.78
Level 4	1	43.00	69.22	-99.15	78.14	48.79
Level 3	1	29.50	65.75	-94.84	78.14	48.81
Level 2	1	16.00	67.50	-98.24	78.07	48.83

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X-Y_CCW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	41.64	-58.30
Level 12	151.00	82.59	-115.72
Level 11	137.50	81.47	-114.34
Level 10	124.00	80.26	-112.84
Level 9	110.50	78.95	-111.21
Level 8	97.00	77.50	-109.41
Level 7	83.50	75.88	-107.40
Level 6	70.00	74.03	-105.10
Level 5	56.50	71.86	-102.42
Level 4	43.00	69.22	-99.15
Level 3	29.50	65.75	-94.84
Level 2	16.00	67.50	-98.24
		<hr/> 866.66	<hr/> -1228.96

RAM Structural System

Bentley DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 12/40

10/09/20 11:39:41

Loads and Applied Forces

LOAD CASE: EQ-X ELF

Seismic ASCE 7-16 Equivalent Lateral Force

Importance Factor: 1.00 TL: 8.00 s

Site Class D: Stiff Soil, Default

Ss: 0.313 g S1: 0.114 g

Use Specified: SDs: 0.464 g SD1: 0.319 g

Risk Category: II Seismic Design Category: D

Provisions for: Force

Ground Level: GRADE

Dir	Eccent	R	Ta Equation			Building Period-T			
X	+ And -	8.0	Std,Ct=0.028,x=0.80			Calculated			
Dir	Ta	Cu	T	T-used	Cs	Cs(max)	Cs(min)	Cs-used	k
					Eq12.8-2	Eq12.8-3	Eq12.8-5		
X	1.660	1.400	4.426	2.324	0.058	0.017	0.020	0.020	1.912

Total Building Weight (kips) = 24194.34

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
ROOF	1	164.50	108.44	0.00	99.22	67.60
Level 12	1	151.00	87.45	0.00	98.81	67.57
Level 11	1	137.50	73.38	0.00	98.79	67.57
Level 10	1	124.00	60.52	0.00	98.75	67.56
Level 9	1	110.50	48.81	0.00	98.75	67.56
Level 8	1	97.00	38.27	0.00	98.80	67.54
Level 7	1	83.50	28.88	0.00	98.72	67.54
Level 6	1	70.00	20.76	0.00	98.69	67.53
Level 5	1	56.50	13.85	0.00	98.68	67.52
Level 4	1	43.00	8.28	0.00	98.67	67.51
Level 3	1	29.50	4.04	0.00	98.69	67.51
Level 2	1	16.00	1.27	0.00	98.55	67.52

APPLIED STORY FORCES

Type: EQ_ASCE716_X+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
ROOF	164.50	108.44	0.00
Level 12	151.00	87.45	0.00
Level 11	137.50	73.38	0.00
Level 10	124.00	60.52	0.00
Level 9	110.50	48.81	0.00

RAM Structural System

Loads and Applied Forces

Page 13/40

RAM Frame 17.01.01.05
DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 8	97.00	38.27	0.00
Level 7	83.50	28.88	0.00
Level 6	70.00	20.76	0.00
Level 5	56.50	13.85	0.00
Level 4	43.00	8.28	0.00
Level 3	29.50	4.04	0.00
Level 2	16.00	1.27	0.00
		<hr/>	<hr/>
		493.95	0.00

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	108.44	0.00	99.22	55.40
Level 12	1	151.00	87.45	0.00	98.81	55.37
Level 11	1	137.50	73.38	0.00	98.79	55.37
Level 10	1	124.00	60.52	0.00	98.75	55.36
Level 9	1	110.50	48.81	0.00	98.75	55.36
Level 8	1	97.00	38.27	0.00	98.80	55.34
Level 7	1	83.50	28.88	0.00	98.72	55.34
Level 6	1	70.00	20.76	0.00	98.69	55.33
Level 5	1	56.50	13.85	0.00	98.68	55.32
Level 4	1	43.00	8.28	0.00	98.67	55.31
Level 3	1	29.50	4.04	0.00	98.69	55.31
Level 2	1	16.00	1.27	0.00	98.55	55.32

APPLIED STORY FORCES

Type: EQ_ASCE716_X_-E_F

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	108.44	0.00
Level 12	151.00	87.45	0.00
Level 11	137.50	73.38	0.00
Level 10	124.00	60.52	0.00
Level 9	110.50	48.81	0.00
Level 8	97.00	38.27	0.00
Level 7	83.50	28.88	0.00
Level 6	70.00	20.76	0.00
Level 5	56.50	13.85	0.00
Level 4	43.00	8.28	0.00
Level 3	29.50	4.04	0.00
Level 2	16.00	1.27	0.00

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RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 14/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

493.95

0.00

RAM Structural System

Bentley DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 15/40

10/09/20 11:39:41

Loads and Applied Forces

LOAD CASE: EQ-Y ELF

Seismic ASCE 7-16 Equivalent Lateral Force

Importance Factor: 1.00 TL: 8.00 s

Site Class D: Stiff Soil, Default

Ss: 0.313 g S1: 0.114 g

Use Specified: SDs: 0.464 g SD1: 0.319 g

Risk Category: II Seismic Design Category: D

Provisions for: Force

Ground Level: GRADE

Dir	Eccent	R	Ta Equation			Building Period-T			
Y	+ And -	6.0	Std,Ct=0.020,x=0.75			Calculated			
Dir	Ta	Cu	T	T-used	Cs	Cs(max)	Cs(min)	Cs-used	k
					Eq12.8-2	Eq12.8-3	Eq12.8-5		
Y	0.919	1.400	2.089	1.286	0.077	0.041	0.020	0.041	1.393

Total Building Weight (kips) = 24194.34

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_Y+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
ROOF	1	164.50	0.00	184.13	109.82	61.50
Level 12	1	151.00	0.00	155.24	109.41	61.47
Level 11	1	137.50	0.00	136.74	109.39	61.47
Level 10	1	124.00	0.00	118.99	109.35	61.46
Level 9	1	110.50	0.00	101.89	109.35	61.46
Level 8	1	97.00	0.00	85.46	109.40	61.44
Level 7	1	83.50	0.00	69.72	109.32	61.44
Level 6	1	70.00	0.00	54.91	109.29	61.43
Level 5	1	56.50	0.00	40.95	109.28	61.42
Level 4	1	43.00	0.00	28.19	109.27	61.41
Level 3	1	29.50	0.00	16.75	109.29	61.41
Level 2	1	16.00	0.00	7.20	109.15	61.42

APPLIED STORY FORCES

Type: EQ_ASCE716_Y+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
ROOF	164.50	0.00	184.13
Level 12	151.00	0.00	155.24
Level 11	137.50	0.00	136.74
Level 10	124.00	0.00	118.99
Level 9	110.50	0.00	101.89

RAM Structural System

Loads and Applied Forces

Page 16/40

RAM Frame 17.01.01.05
DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 8	97.00	0.00	85.46
Level 7	83.50	0.00	69.72
Level 6	70.00	0.00	54.91
Level 5	56.50	0.00	40.95
Level 4	43.00	0.00	28.19
Level 3	29.50	0.00	16.75
Level 2	16.00	0.00	7.20
		<hr/>	<hr/>
		0.00	1000.16

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	184.13	88.62	61.50
Level 12	1	151.00	0.00	155.24	88.21	61.47
Level 11	1	137.50	0.00	136.74	88.19	61.47
Level 10	1	124.00	0.00	118.99	88.15	61.46
Level 9	1	110.50	0.00	101.89	88.15	61.46
Level 8	1	97.00	0.00	85.46	88.20	61.44
Level 7	1	83.50	0.00	69.72	88.12	61.44
Level 6	1	70.00	0.00	54.91	88.09	61.43
Level 5	1	56.50	0.00	40.95	88.08	61.42
Level 4	1	43.00	0.00	28.19	88.07	61.41
Level 3	1	29.50	0.00	16.75	88.09	61.41
Level 2	1	16.00	0.00	7.20	87.95	61.42

APPLIED STORY FORCES

Type: EQ_ASCE716_Y_-E_F

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	184.13
Level 12	151.00	0.00	155.24
Level 11	137.50	0.00	136.74
Level 10	124.00	0.00	118.99
Level 9	110.50	0.00	101.89
Level 8	97.00	0.00	85.46
Level 7	83.50	0.00	69.72
Level 6	70.00	0.00	54.91
Level 5	56.50	0.00	40.95
Level 4	43.00	0.00	28.19
Level 3	29.50	0.00	16.75
Level 2	16.00	0.00	7.20

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RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 17/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

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Loads and Applied Forces

RAM Structural System

RAM Frame 17.01.01.05

Page 20/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

LOAD CASE: NOTIONAL

Notional AISC 360-05/10

Fraction of Gravity Load : 0.00200

Ground Level: GRADE

Total Dead Load (kips) = 19824.95

Total Live Load (kips) = 11233.99

Total Roof Load (kips) = 292.37

APPLIED DIAPHRAGM FORCES

Type: NL_AISC360_DL_X

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	3.65	0.00	98.95	61.44
Level 12	1	151.00	3.16	0.00	98.73	61.41
Level 11	1	137.50	3.19	0.00	98.69	61.40
Level 10	1	124.00	3.19	0.00	98.66	61.40
Level 9	1	110.50	3.23	0.00	98.64	61.40
Level 8	1	97.00	3.24	0.00	98.73	61.37
Level 7	1	83.50	3.28	0.00	98.62	61.36
Level 6	1	70.00	3.28	0.00	98.58	61.37
Level 5	1	56.50	3.32	0.00	98.57	61.34
Level 4	1	43.00	3.33	0.00	98.57	61.34
Level 3	1	29.50	3.37	0.00	98.62	61.34
Level 2	1	16.00	3.41	0.00	98.41	61.35

APPLIED STORY FORCES

Type: NL_AISC360_DL_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	3.65	0.00
Level 12	151.00	3.16	0.00
Level 11	137.50	3.19	0.00
Level 10	124.00	3.19	0.00
Level 9	110.50	3.23	0.00
Level 8	97.00	3.24	0.00
Level 7	83.50	3.28	0.00
Level 6	70.00	3.28	0.00
Level 5	56.50	3.32	0.00
Level 4	43.00	3.33	0.00
Level 3	29.50	3.37	0.00
Level 2	16.00	3.41	0.00

39.65

0.00

RAM Structural System

Bentley DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 21/40

10/09/20 11:39:41

Loads and Applied Forces

APPLIED DIAPHRAGM FORCES

Type: NL_AISC360_DL_Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	3.65	98.95	61.44
Level 12	1	151.00	0.00	3.16	98.73	61.41
Level 11	1	137.50	0.00	3.19	98.69	61.40
Level 10	1	124.00	0.00	3.19	98.66	61.40
Level 9	1	110.50	0.00	3.23	98.64	61.40
Level 8	1	97.00	0.00	3.24	98.73	61.37
Level 7	1	83.50	0.00	3.28	98.62	61.36
Level 6	1	70.00	0.00	3.28	98.58	61.37
Level 5	1	56.50	0.00	3.32	98.57	61.34
Level 4	1	43.00	0.00	3.33	98.57	61.34
Level 3	1	29.50	0.00	3.37	98.62	61.34
Level 2	1	16.00	0.00	3.41	98.41	61.35

APPLIED STORY FORCES

Type: NL_AISC360_DL_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	3.65
Level 12	151.00	0.00	3.16
Level 11	137.50	0.00	3.19
Level 10	124.00	0.00	3.19
Level 9	110.50	0.00	3.23
Level 8	97.00	0.00	3.24
Level 7	83.50	0.00	3.28
Level 6	70.00	0.00	3.28
Level 5	56.50	0.00	3.32
Level 4	43.00	0.00	3.33
Level 3	29.50	0.00	3.37
Level 2	16.00	0.00	3.41
		0.00	39.65

APPLIED DIAPHRAGM FORCES

Type: NL_AISC360_LL_X

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.26	0.00	102.73	62.27
Level 12	1	151.00	2.02	0.00	102.02	62.03
Level 11	1	137.50	2.02	0.00	102.02	62.03
Level 10	1	124.00	2.02	0.00	102.02	62.03

Loads and Applied Forces

RAM Structural System

RAM Frame 17.01.01.05

Page 22/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 9	1	110.50	2.02	0.00	102.02	62.03
Level 8	1	97.00	2.02	0.00	102.02	62.03
Level 7	1	83.50	2.02	0.00	102.02	62.03
Level 6	1	70.00	2.02	0.00	102.02	62.03
Level 5	1	56.50	2.02	0.00	102.02	62.03
Level 4	1	43.00	2.02	0.00	102.02	62.03
Level 3	1	29.50	2.02	0.00	102.02	62.03
Level 2	1	16.00	2.02	0.00	102.02	62.03

APPLIED STORY FORCES

Type: NL_AISC360_LL_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.26	0.00
Level 12	151.00	2.02	0.00
Level 11	137.50	2.02	0.00
Level 10	124.00	2.02	0.00
Level 9	110.50	2.02	0.00
Level 8	97.00	2.02	0.00
Level 7	83.50	2.02	0.00
Level 6	70.00	2.02	0.00
Level 5	56.50	2.02	0.00
Level 4	43.00	2.02	0.00
Level 3	29.50	2.02	0.00
Level 2	16.00	2.02	0.00
		22.47	0.00

APPLIED DIAPHRAGM FORCES

Type: NL_AISC360_LL_Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	0.26	102.73	62.27
Level 12	1	151.00	0.00	2.02	102.02	62.03
Level 11	1	137.50	0.00	2.02	102.02	62.03
Level 10	1	124.00	0.00	2.02	102.02	62.03
Level 9	1	110.50	0.00	2.02	102.02	62.03
Level 8	1	97.00	0.00	2.02	102.02	62.03
Level 7	1	83.50	0.00	2.02	102.02	62.03
Level 6	1	70.00	0.00	2.02	102.02	62.03
Level 5	1	56.50	0.00	2.02	102.02	62.03
Level 4	1	43.00	0.00	2.02	102.02	62.03
Level 3	1	29.50	0.00	2.02	102.02	62.03
Level 2	1	16.00	0.00	2.02	102.02	62.03

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 23/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

APPLIED STORY FORCES

Type: NL_AISC360_LL_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	0.26
Level 12	151.00	0.00	2.02
Level 11	137.50	0.00	2.02
Level 10	124.00	0.00	2.02
Level 9	110.50	0.00	2.02
Level 8	97.00	0.00	2.02
Level 7	83.50	0.00	2.02
Level 6	70.00	0.00	2.02
Level 5	56.50	0.00	2.02
Level 4	43.00	0.00	2.02
Level 3	29.50	0.00	2.02
Level 2	16.00	0.00	2.02
		0.00	22.47

APPLIED DIAPHRAGM FORCES

Type: NL_AISC360_Rf_X

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.58	0.00	99.09	61.45
Level 12	1	151.00	0.00	0.00	0.00	0.00
Level 11	1	137.50	0.00	0.00	0.00	0.00
Level 10	1	124.00	0.00	0.00	0.00	0.00
Level 9	1	110.50	0.00	0.00	0.00	0.00
Level 8	1	97.00	0.00	0.00	0.00	0.00
Level 7	1	83.50	0.00	0.00	0.00	0.00
Level 6	1	70.00	0.00	0.00	0.00	0.00
Level 5	1	56.50	0.00	0.00	0.00	0.00
Level 4	1	43.00	0.00	0.00	0.00	0.00
Level 3	1	29.50	0.00	0.00	0.00	0.00
Level 2	1	16.00	0.00	0.00	0.00	0.00

APPLIED STORY FORCES

Type: NL_AISC360_Rf_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.58	0.00
Level 12	151.00	0.00	0.00
Level 11	137.50	0.00	0.00
Level 10	124.00	0.00	0.00

Loads and Applied Forces

RAM Structural System

RAM Frame 17.01.01.05

Page 24/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 9	110.50	0.00	0.00
Level 8	97.00	0.00	0.00
Level 7	83.50	0.00	0.00
Level 6	70.00	0.00	0.00
Level 5	56.50	0.00	0.00
Level 4	43.00	0.00	0.00
Level 3	29.50	0.00	0.00
Level 2	16.00	0.00	0.00
		0.58	0.00

APPLIED DIAPHRAGM FORCES

Type: NL_AISC360_Rf_Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	0.58	99.09	61.45
Level 12	1	151.00	0.00	0.00	0.00	0.00
Level 11	1	137.50	0.00	0.00	0.00	0.00
Level 10	1	124.00	0.00	0.00	0.00	0.00
Level 9	1	110.50	0.00	0.00	0.00	0.00
Level 8	1	97.00	0.00	0.00	0.00	0.00
Level 7	1	83.50	0.00	0.00	0.00	0.00
Level 6	1	70.00	0.00	0.00	0.00	0.00
Level 5	1	56.50	0.00	0.00	0.00	0.00
Level 4	1	43.00	0.00	0.00	0.00	0.00
Level 3	1	29.50	0.00	0.00	0.00	0.00
Level 2	1	16.00	0.00	0.00	0.00	0.00

APPLIED STORY FORCES

Type: NL_AISC360_Rf_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	0.58
Level 12	151.00	0.00	0.00
Level 11	137.50	0.00	0.00
Level 10	124.00	0.00	0.00
Level 9	110.50	0.00	0.00
Level 8	97.00	0.00	0.00
Level 7	83.50	0.00	0.00
Level 6	70.00	0.00	0.00
Level 5	56.50	0.00	0.00
Level 4	43.00	0.00	0.00
Level 3	29.50	0.00	0.00
Level 2	16.00	0.00	0.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 25/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

0.00

0.58

RAM Structural System

Bentley DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 26/40

10/09/20 11:39:41

Loads and Applied Forces

LOAD CASE: WIND 10-YR DRFT

ASCE 7-16

Exposure: C

Basic Wind Speed (mph): 75.0

Apply Directionality Factor, $K_d = 0.85$ Use Topography Factor, $K_{zt} = 1.00$ Ground Elevation Factor, $K_e = 1.00$

Use Calculated Frequency for X-Dir.

Use Calculated Frequency for Y-Dir.

Gust Factor for Flexible Structures, G: Use Calculated G for X-Dir.

Gust Factor for Flexible Structures, G: Use Calculated G for Y-Dir.

Damping Ratio for Flexible Structures = 0.01

Mean Roof Height (ft): Top Story Height + Parapet = 164.50

Ground Level: GRADE

WIND PRESSURES:

X-Direction: Natural Frequency = 0.226 Structure is Flexible

Y-Direction: Natural Frequency = 0.479 Structure is Flexible

 C_p Windward = 0.80 q Leeward (qh) = 17.20 psf $G C_{pn}$ (Parapet): Windward = 1.50 Leeward = -1.00

Height ft	K_z	K_{zt}	q_z psf	Gust Factor G X	Y	C_p Leeward X	Y	Pressure (psf) X	Y
164.50	1.405	1.000	17.203	1.107	0.891	-0.352	-0.500	21.950	19.931
151.00	1.380	1.000	16.895	1.107	0.891	-0.352	-0.500	21.678	19.712
137.50	1.353	1.000	16.565	1.107	0.891	-0.352	-0.500	21.385	19.476
124.00	1.324	1.000	16.209	1.107	0.891	-0.352	-0.500	21.070	19.222
110.50	1.293	1.000	15.820	1.107	0.891	-0.352	-0.500	20.725	18.945
97.00	1.258	1.000	15.392	1.107	0.891	-0.352	-0.500	20.346	18.640
83.50	1.218	1.000	14.914	1.107	0.891	-0.352	-0.500	19.923	18.299
70.00	1.174	1.000	14.371	1.107	0.891	-0.352	-0.500	19.441	17.912
56.50	1.122	1.000	13.737	1.107	0.891	-0.352	-0.500	18.880	17.460
43.00	1.060	1.000	12.969	1.107	0.891	-0.352	-0.500	18.200	16.913
29.50	0.979	1.000	11.980	1.107	0.891	-0.352	-0.500	17.324	16.207
16.00	0.860	1.000	10.532	1.107	0.891	-0.352	-0.500	16.042	15.175
0.00	0.849	1.000	10.390	1.107	0.891	-0.352	-0.500	15.916	15.074

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_X

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	18.00	0.00	105.00	60.00
Level 12	1	151.00	35.70	0.00	105.00	60.00
Level 11	1	137.50	35.22	0.00	105.00	60.00
Level 10	1	124.00	34.69	0.00	105.00	60.00
Level 9	1	110.50	34.13	0.00	105.00	60.00
Level 8	1	97.00	33.50	0.00	105.00	60.00

Loads and Applied Forces

RAM Structural System

RAM Frame 17.01.01.05

Page 27/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 7	1	83.50	32.80	0.00	105.00	60.00
Level 6	1	70.00	32.00	0.00	105.00	60.00
Level 5	1	56.50	31.06	0.00	105.00	60.00
Level 4	1	43.00	29.92	0.00	105.00	60.00
Level 3	1	29.50	28.42	0.00	105.00	60.00
Level 2	1	16.00	29.18	0.00	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_1_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	18.00	0.00
Level 12	151.00	35.70	0.00
Level 11	137.50	35.22	0.00
Level 10	124.00	34.69	0.00
Level 9	110.50	34.13	0.00
Level 8	97.00	33.50	0.00
Level 7	83.50	32.80	0.00
Level 6	70.00	32.00	0.00
Level 5	56.50	31.06	0.00
Level 4	43.00	29.92	0.00
Level 3	29.50	28.42	0.00
Level 2	16.00	29.18	0.00
		374.61	0.00

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	28.42	105.00	60.00
Level 12	1	151.00	0.00	56.41	105.00	60.00
Level 11	1	137.50	0.00	55.73	105.00	60.00
Level 10	1	124.00	0.00	55.00	105.00	60.00
Level 9	1	110.50	0.00	54.21	105.00	60.00
Level 8	1	97.00	0.00	53.33	105.00	60.00
Level 7	1	83.50	0.00	52.35	105.00	60.00
Level 6	1	70.00	0.00	51.23	105.00	60.00
Level 5	1	56.50	0.00	49.92	105.00	60.00
Level 4	1	43.00	0.00	48.33	105.00	60.00
Level 3	1	29.50	0.00	46.23	105.00	60.00
Level 2	1	16.00	0.00	47.89	105.00	60.00

RAM Structural System

RAM Frame 17.01.01.05
DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 28/40

10/09/20 11:39:41

APPLIED STORY FORCES

Type: Wind_ASCE716_1_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	28.42
Level 12	151.00	0.00	56.41
Level 11	137.50	0.00	55.73
Level 10	124.00	0.00	55.00
Level 9	110.50	0.00	54.21
Level 8	97.00	0.00	53.33
Level 7	83.50	0.00	52.35
Level 6	70.00	0.00	51.23
Level 5	56.50	0.00	49.92
Level 4	43.00	0.00	48.33
Level 3	29.50	0.00	46.23
Level 2	16.00	0.00	47.89
		0.00	599.05

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_X+E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	13.50	0.00	105.00	74.19
Level 12	1	151.00	26.77	0.00	105.00	74.18
Level 11	1	137.50	26.41	0.00	105.00	74.18
Level 10	1	124.00	26.02	0.00	105.00	74.18
Level 9	1	110.50	25.59	0.00	105.00	74.19
Level 8	1	97.00	25.12	0.00	105.00	74.19
Level 7	1	83.50	24.60	0.00	105.00	74.19
Level 6	1	70.00	24.00	0.00	105.00	74.19
Level 5	1	56.50	23.30	0.00	105.00	74.19
Level 4	1	43.00	22.44	0.00	105.00	74.19
Level 3	1	29.50	21.32	0.00	105.00	74.18
Level 2	1	16.00	21.88	0.00	105.00	74.17

APPLIED STORY FORCES

Type: Wind_ASCE716_2_X+E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	13.50	0.00
Level 12	151.00	26.77	0.00
Level 11	137.50	26.41	0.00
Level 10	124.00	26.02	0.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 29/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 9	110.50	25.59	0.00
Level 8	97.00	25.12	0.00
Level 7	83.50	24.60	0.00
Level 6	70.00	24.00	0.00
Level 5	56.50	23.30	0.00
Level 4	43.00	22.44	0.00
Level 3	29.50	21.32	0.00
Level 2	16.00	21.88	0.00
		<hr/>	<hr/>
		280.96	0.00

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_X-E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	13.50	0.00	105.00	45.81
Level 12	1	151.00	26.77	0.00	105.00	45.82
Level 11	1	137.50	26.41	0.00	105.00	45.82
Level 10	1	124.00	26.02	0.00	105.00	45.82
Level 9	1	110.50	25.59	0.00	105.00	45.81
Level 8	1	97.00	25.12	0.00	105.00	45.81
Level 7	1	83.50	24.60	0.00	105.00	45.81
Level 6	1	70.00	24.00	0.00	105.00	45.81
Level 5	1	56.50	23.30	0.00	105.00	45.81
Level 4	1	43.00	22.44	0.00	105.00	45.81
Level 3	1	29.50	21.32	0.00	105.00	45.82
Level 2	1	16.00	21.88	0.00	105.00	45.83

APPLIED STORY FORCES

Type: Wind_ASCE716_2_X-E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	13.50	0.00
Level 12	151.00	26.77	0.00
Level 11	137.50	26.41	0.00
Level 10	124.00	26.02	0.00
Level 9	110.50	25.59	0.00
Level 8	97.00	25.12	0.00
Level 7	83.50	24.60	0.00
Level 6	70.00	24.00	0.00
Level 5	56.50	23.30	0.00
Level 4	43.00	22.44	0.00
Level 3	29.50	21.32	0.00
Level 2	16.00	21.88	0.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 30/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

280.96

0.00

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_Y+E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	21.31	135.23	60.00
Level 12	1	151.00	0.00	42.31	135.22	60.00
Level 11	1	137.50	0.00	41.80	135.22	60.00
Level 10	1	124.00	0.00	41.25	135.22	60.00
Level 9	1	110.50	0.00	40.66	135.22	60.00
Level 8	1	97.00	0.00	40.00	135.22	60.00
Level 7	1	83.50	0.00	39.26	135.22	60.00
Level 6	1	70.00	0.00	38.42	135.22	60.00
Level 5	1	56.50	0.00	37.44	135.22	60.00
Level 4	1	43.00	0.00	36.25	135.22	60.00
Level 3	1	29.50	0.00	34.67	135.22	60.00
Level 2	1	16.00	0.00	35.92	135.24	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_2_Y+E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	21.31
Level 12	151.00	0.00	42.31
Level 11	137.50	0.00	41.80
Level 10	124.00	0.00	41.25
Level 9	110.50	0.00	40.66
Level 8	97.00	0.00	40.00
Level 7	83.50	0.00	39.26
Level 6	70.00	0.00	38.42
Level 5	56.50	0.00	37.44
Level 4	43.00	0.00	36.25
Level 3	29.50	0.00	34.67
Level 2	16.00	0.00	35.92

0.00

449.29

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_Y-E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
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49

Loads and Applied Forces

RAM Structural System

RAM Frame 17.01.01.05

Page 31/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

ROOF	1	164.50	0.00	21.31	74.77	60.00
Level 12	1	151.00	0.00	42.31	74.78	60.00
Level 11	1	137.50	0.00	41.80	74.78	60.00
Level 10	1	124.00	0.00	41.25	74.78	60.00
Level 9	1	110.50	0.00	40.66	74.78	60.00
Level 8	1	97.00	0.00	40.00	74.78	60.00
Level 7	1	83.50	0.00	39.26	74.78	60.00
Level 6	1	70.00	0.00	38.42	74.78	60.00
Level 5	1	56.50	0.00	37.44	74.78	60.00
Level 4	1	43.00	0.00	36.25	74.78	60.00
Level 3	1	29.50	0.00	34.67	74.78	60.00
Level 2	1	16.00	0.00	35.92	74.76	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_2_Y-E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	21.31
Level 12	151.00	0.00	42.31
Level 11	137.50	0.00	41.80
Level 10	124.00	0.00	41.25
Level 9	110.50	0.00	40.66
Level 8	97.00	0.00	40.00
Level 7	83.50	0.00	39.26
Level 6	70.00	0.00	38.42
Level 5	56.50	0.00	37.44
Level 4	43.00	0.00	36.25
Level 3	29.50	0.00	34.67
Level 2	16.00	0.00	35.92
		0.00	449.29

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_3_X+Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	13.50	21.31	105.00	60.00
Level 12	1	151.00	26.77	42.31	105.00	60.00
Level 11	1	137.50	26.41	41.80	105.00	60.00
Level 10	1	124.00	26.02	41.25	105.00	60.00
Level 9	1	110.50	25.59	40.66	105.00	60.00
Level 8	1	97.00	25.12	40.00	105.00	60.00
Level 7	1	83.50	24.60	39.26	105.00	60.00
Level 6	1	70.00	24.00	38.42	105.00	60.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 32/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 5	1	56.50	23.30	37.44	105.00	60.00
Level 4	1	43.00	22.44	36.25	105.00	60.00
Level 3	1	29.50	21.32	34.67	105.00	60.00
Level 2	1	16.00	21.88	35.92	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_3_X+Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	13.50	21.31
Level 12	151.00	26.77	42.31
Level 11	137.50	26.41	41.80
Level 10	124.00	26.02	41.25
Level 9	110.50	25.59	40.66
Level 8	97.00	25.12	40.00
Level 7	83.50	24.60	39.26
Level 6	70.00	24.00	38.42
Level 5	56.50	23.30	37.44
Level 4	43.00	22.44	36.25
Level 3	29.50	21.32	34.67
Level 2	16.00	21.88	35.92
		280.96	449.29

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_3_X-Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	13.50	-21.31	105.00	60.00
Level 12	1	151.00	26.77	-42.31	105.00	60.00
Level 11	1	137.50	26.41	-41.80	105.00	60.00
Level 10	1	124.00	26.02	-41.25	105.00	60.00
Level 9	1	110.50	25.59	-40.66	105.00	60.00
Level 8	1	97.00	25.12	-40.00	105.00	60.00
Level 7	1	83.50	24.60	-39.26	105.00	60.00
Level 6	1	70.00	24.00	-38.42	105.00	60.00
Level 5	1	56.50	23.30	-37.44	105.00	60.00
Level 4	1	43.00	22.44	-36.25	105.00	60.00
Level 3	1	29.50	21.32	-34.67	105.00	60.00
Level 2	1	16.00	21.88	-35.92	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_3_X-Y

Level	Ht	Fx	Fy
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RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 33/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

	ft	kips	kips
ROOF	164.50	13.50	-21.31
Level 12	151.00	26.77	-42.31
Level 11	137.50	26.41	-41.80
Level 10	124.00	26.02	-41.25
Level 9	110.50	25.59	-40.66
Level 8	97.00	25.12	-40.00
Level 7	83.50	24.60	-39.26
Level 6	70.00	24.00	-38.42
Level 5	56.50	23.30	-37.44
Level 4	43.00	22.44	-36.25
Level 3	29.50	21.32	-34.67
Level 2	16.00	21.88	-35.92
		<hr/> 280.96	<hr/> -449.29

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X+Y_CW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	10.13	15.98	74.77	74.19
Level 12	1	151.00	20.08	31.73	74.78	74.18
Level 11	1	137.50	19.81	31.35	74.78	74.18
Level 10	1	124.00	19.52	30.94	74.78	74.18
Level 9	1	110.50	19.20	30.49	74.78	74.19
Level 8	1	97.00	18.84	30.00	74.78	74.19
Level 7	1	83.50	18.45	29.45	74.78	74.19
Level 6	1	70.00	18.00	28.82	74.78	74.19
Level 5	1	56.50	17.47	28.08	74.78	74.19
Level 4	1	43.00	16.83	27.18	74.78	74.19
Level 3	1	29.50	15.99	26.00	74.78	74.18
Level 2	1	16.00	16.41	26.94	74.76	74.17

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X+Y_CW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	10.13	15.98
Level 12	151.00	20.08	31.73
Level 11	137.50	19.81	31.35
Level 10	124.00	19.52	30.94
Level 9	110.50	19.20	30.49
Level 8	97.00	18.84	30.00
Level 7	83.50	18.45	29.45

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 34/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 6	70.00	18.00	28.82
Level 5	56.50	17.47	28.08
Level 4	43.00	16.83	27.18
Level 3	29.50	15.99	26.00
Level 2	16.00	16.41	26.94
		<hr/>	<hr/>
		210.72	336.96

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X+Y_CCW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	10.13	15.98	135.23	45.81
Level 12	1	151.00	20.08	31.73	135.22	45.82
Level 11	1	137.50	19.81	31.35	135.22	45.82
Level 10	1	124.00	19.52	30.94	135.22	45.82
Level 9	1	110.50	19.20	30.49	135.22	45.81
Level 8	1	97.00	18.84	30.00	135.22	45.81
Level 7	1	83.50	18.45	29.45	135.22	45.81
Level 6	1	70.00	18.00	28.82	135.22	45.81
Level 5	1	56.50	17.47	28.08	135.22	45.81
Level 4	1	43.00	16.83	27.18	135.22	45.81
Level 3	1	29.50	15.99	26.00	135.22	45.82
Level 2	1	16.00	16.41	26.94	135.24	45.83

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X+Y_CCW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	10.13	15.98
Level 12	151.00	20.08	31.73
Level 11	137.50	19.81	31.35
Level 10	124.00	19.52	30.94
Level 9	110.50	19.20	30.49
Level 8	97.00	18.84	30.00
Level 7	83.50	18.45	29.45
Level 6	70.00	18.00	28.82
Level 5	56.50	17.47	28.08
Level 4	43.00	16.83	27.18
Level 3	29.50	15.99	26.00
Level 2	16.00	16.41	26.94
		<hr/>	<hr/>
		210.72	336.96

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RAM Structural System

Bentley RAM Frame 17.01.01.05 DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 35/40

10/09/20 11:39:41

Loads and Applied Forces

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X-Y_CW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	10.13	-15.98	135.23	74.19
Level 12	1	151.00	20.08	-31.73	135.22	74.18
Level 11	1	137.50	19.81	-31.35	135.22	74.18
Level 10	1	124.00	19.52	-30.94	135.22	74.18
Level 9	1	110.50	19.20	-30.49	135.22	74.19
Level 8	1	97.00	18.84	-30.00	135.22	74.19
Level 7	1	83.50	18.45	-29.45	135.22	74.19
Level 6	1	70.00	18.00	-28.82	135.22	74.19
Level 5	1	56.50	17.47	-28.08	135.22	74.19
Level 4	1	43.00	16.83	-27.18	135.22	74.19
Level 3	1	29.50	15.99	-26.00	135.22	74.18
Level 2	1	16.00	16.41	-26.94	135.24	74.17

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X-Y_CW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	10.13	-15.98
Level 12	151.00	20.08	-31.73
Level 11	137.50	19.81	-31.35
Level 10	124.00	19.52	-30.94
Level 9	110.50	19.20	-30.49
Level 8	97.00	18.84	-30.00
Level 7	83.50	18.45	-29.45
Level 6	70.00	18.00	-28.82
Level 5	56.50	17.47	-28.08
Level 4	43.00	16.83	-27.18
Level 3	29.50	15.99	-26.00
Level 2	16.00	16.41	-26.94
		210.72	-336.96

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X-Y_CCW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	10.13	-15.98	74.77	45.81
Level 12	1	151.00	20.08	-31.73	74.78	45.82
Level 11	1	137.50	19.81	-31.35	74.78	45.82
Level 10	1	124.00	19.52	-30.94	74.78	45.82

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 36/40

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

10/09/20 11:39:41

Level 9	1	110.50	19.20	-30.49	74.78	45.81
Level 8	1	97.00	18.84	-30.00	74.78	45.81
Level 7	1	83.50	18.45	-29.45	74.78	45.81
Level 6	1	70.00	18.00	-28.82	74.78	45.81
Level 5	1	56.50	17.47	-28.08	74.78	45.81
Level 4	1	43.00	16.83	-27.18	74.78	45.81
Level 3	1	29.50	15.99	-26.00	74.78	45.82
Level 2	1	16.00	16.41	-26.94	74.76	45.83

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X-Y_CCW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	10.13	-15.98
Level 12	151.00	20.08	-31.73
Level 11	137.50	19.81	-31.35
Level 10	124.00	19.52	-30.94
Level 9	110.50	19.20	-30.49
Level 8	97.00	18.84	-30.00
Level 7	83.50	18.45	-29.45
Level 6	70.00	18.00	-28.82
Level 5	56.50	17.47	-28.08
Level 4	43.00	16.83	-27.18
Level 3	29.50	15.99	-26.00
Level 2	16.00	16.41	-26.94
		<hr/> 210.72	<hr/> -336.96

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Drift

02/25/21 14:41:25

Steel Code: IBC

CRITERIA:

Rigid End Zones: Ignore Effects

Member Force Output: At Face of Joint

P-Delta: Yes Scale Factor (DL): 1.38 Scale Factor (LL): 0.50

Scale Factor (Roof): 1.00 Scale Factor (Snow): 1.00

Ground Level: GRADE

Use Reduced Stiffness for Steel Members (AISC 360): $\tau_b = 1.00$

LOAD CASE DEFINITIONS:

W13	WIND 10-YR DRFT	Wind_ASCE716_1_X
W14	WIND 10-YR DRFT	Wind_ASCE716_1_Y
W15	WIND 10-YR DRFT	Wind_ASCE716_2_X+E
W16	WIND 10-YR DRFT	Wind_ASCE716_2_X-E
W17	WIND 10-YR DRFT	Wind_ASCE716_2_Y+E
W18	WIND 10-YR DRFT	Wind_ASCE716_2_Y-E
W19	WIND 10-YR DRFT	Wind_ASCE716_3_X+Y
W20	WIND 10-YR DRFT	Wind_ASCE716_3_X-Y
W21	WIND 10-YR DRFT	Wind_ASCE716_4_X+Y_CW
W22	WIND 10-YR DRFT	Wind_ASCE716_4_X+Y_CCW
W23	WIND 10-YR DRFT	Wind_ASCE716_4_X-Y_CW
W24	WIND 10-YR DRFT	Wind_ASCE716_4_X-Y_CCW

Displacements for pseudo-flexible and flexible/none diaphragms are reported based on maximum nodal displacement within diaphragm boundary.

RESULTS:

Location (ft): (105.000, 60.000)

TARGET DRIFT RATIO = 1/400 = 0.0025

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	3.8704	0.0004	0.0906	0.0000	0.0006	0.0000
	W14	0.0007	1.5083	0.0000	0.1149	0.0000	0.0007
	W15	2.9022	-0.0258	0.0679	-0.0016	0.0004	0.0000
	W16	2.9035	0.0264	0.0680	0.0016	0.0004	0.0000
	W17	0.0027	1.2195	0.0001	0.0916	0.0000	0.0006
	W18	-0.0016	1.0429	-0.0000	0.0808	0.0000	0.0005
	W19	2.9034	1.1316	0.0680	0.0862	0.0004	0.0005
	W20	2.9023	-1.1309	0.0679	-0.0862	0.0004	0.0005
	W21	2.1754	0.7629	0.0509	0.0594	0.0003	0.0004
	W22	2.1796	0.9345	0.0510	0.0699	0.0003	0.0004
	W23	2.1746	-0.9340	0.0509	-0.0699	0.0003	0.0004
	W24	2.1788	-0.7624 ⁶	0.0510	-0.0594	0.0003	0.0004

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 2/28

02/25/21 14:41:25

Building Code: IBC

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 12	W13	3.7798	0.0004	0.1692	0.0000	0.0010	0.0000
	W14	0.0007	1.3934	0.0001	0.1286	0.0000	0.0008
	W15	2.8343	-0.0242	0.1268	-0.0020	0.0008	0.0000
	W16	2.8355	0.0248	0.1270	0.0021	0.0008	0.0000
	W17	0.0027	1.1279	0.0003	0.1033	0.0000	0.0006
	W18	-0.0016	0.9621	-0.0002	0.0895	0.0000	0.0006
	W19	2.8354	1.0454	0.1270	0.0965	0.0008	0.0006
	W20	2.8343	-1.0447	0.1268	-0.0964	0.0008	0.0006
	W21	2.1245	0.7035	0.0950	0.0656	0.0006	0.0004
	W22	2.1286	0.8646	0.0954	0.0791	0.0006	0.0005
	W23	2.1237	-0.8641	0.0949	-0.0790	0.0006	0.0005
	W24	2.1278	-0.7030	0.0953	-0.0656	0.0006	0.0004
Level 11	W13	3.6106	0.0004	0.2418	0.0001	0.0015	0.0000
	W14	0.0007	1.2648	0.0001	0.1344	0.0000	0.0008
	W15	2.7074	-0.0222	0.1812	-0.0021	0.0011	0.0000
	W16	2.7085	0.0227	0.1815	0.0022	0.0011	0.0000
	W17	0.0024	1.0246	0.0005	0.1081	0.0000	0.0007
	W18	-0.0014	0.8726	-0.0003	0.0935	0.0000	0.0006
	W19	2.7085	0.9489	0.1815	0.1008	0.0011	0.0006
	W20	2.7075	-0.9484	0.1813	-0.1007	0.0011	0.0006
	W21	2.0295	0.6378	0.1357	0.0685	0.0008	0.0004
	W22	2.0332	0.7855	0.1365	0.0827	0.0008	0.0005
	W23	2.0288	-0.7851	0.1356	-0.0827	0.0008	0.0005
	W24	2.0325	-0.6374	0.1363	-0.0684	0.0008	0.0004
Level 10	W13	3.3688	0.0003	0.3024	0.0001	0.0019	0.0000
	W14	0.0005	1.1305	0.0002	0.1383	0.0000	0.0009
	W15	2.5262	-0.0201	0.2266	-0.0023	0.0014	0.0000
	W16	2.5271	0.0205	0.2269	0.0025	0.0014	0.0000
	W17	0.0019	0.9165	0.0007	0.1119	0.0000	0.0007
	W18	-0.0011	0.7792	-0.0004	0.0956	0.0000	0.0006
	W19	2.5270	0.8481	0.2269	0.1038	0.0014	0.0006
	W20	2.5262	-0.8476	0.2266	-0.1037	0.0014	0.0006
	W21	1.8938	0.5693	0.1697	0.0699	0.0010	0.0004
	W22	1.8967	0.7028	0.1707	0.0858	0.0011	0.0005
	W23	1.8932	-0.7024	0.1694	-0.0857	0.0010	0.0005
	W24	1.8961	-0.5690	0.1705	-0.0698	0.0011	0.0004
Level 9	W13	3.0665	0.0002	0.3412	0.0001	0.0021	0.0000
	W14	0.0003	0.9921	0.0002	0.1439	0.0000	0.0009
	W15	2.2996	-0.0177	0.2558	-0.0025	0.0016	0.0000
	W16	2.3001	0.0180	0.2560	0.0026	0.0016	0.0000
	W17	0.0012	0.8046	0.0005	0.1165	0.0000	0.0007
	W18	-0.0007	0.6836	-0.0003	0.0994	0.0000	0.0006

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Drift

Page 3/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	2.3001	0.7443	0.2560	0.1080	0.0016	0.0007
	W20	2.2996	-0.7439	0.2558	-0.1079	0.0016	0.0007
	W21	1.7241	0.4994	0.1916	0.0727	0.0012	0.0004
	W22	1.7260	0.6169	0.1924	0.0893	0.0012	0.0006
	W23	1.7238	-0.6167	0.1915	-0.0892	0.0012	0.0006
	W24	1.7257	-0.4992	0.1923	-0.0726	0.0012	0.0004
Level 8	W13	2.7252	0.0001	0.3816	0.0000	0.0024	0.0000
	W14	0.0002	0.8482	0.0001	0.1387	0.0000	0.0009
	W15	2.0438	-0.0152	0.2861	-0.0025	0.0018	0.0000
	W16	2.0441	0.0154	0.2862	0.0025	0.0018	0.0000
	W17	0.0007	0.6881	0.0003	0.1124	0.0000	0.0007
	W18	-0.0004	0.5842	-0.0002	0.0956	0.0000	0.0006
	W19	2.0441	0.6363	0.2862	0.1040	0.0018	0.0006
	W20	2.0438	-0.6361	0.2861	-0.1040	0.0018	0.0006
	W21	1.5325	0.4267	0.2145	0.0699	0.0013	0.0004
	W22	1.5336	0.5276	0.2149	0.0862	0.0013	0.0005
	W23	1.5323	-0.5275	0.2144	-0.0861	0.0013	0.0005
	W24	1.5334	-0.4266	0.2148	-0.0699	0.0013	0.0004
Level 7	W13	2.3437	0.0001	0.3910	0.0000	0.0024	0.0000
	W14	0.0001	0.7095	0.0001	0.1391	0.0000	0.0009
	W15	1.7576	-0.0128	0.2932	-0.0024	0.0018	0.0000
	W16	1.7579	0.0129	0.2933	0.0024	0.0018	0.0000
	W17	0.0004	0.5757	0.0002	0.1125	0.0000	0.0007
	W18	-0.0003	0.4886	-0.0001	0.0962	0.0000	0.0006
	W19	1.7578	0.5322	0.2933	0.1044	0.0018	0.0006
	W20	1.7577	-0.5321	0.2932	-0.1043	0.0018	0.0006
	W21	1.3180	0.3568	0.2198	0.0703	0.0014	0.0004
	W22	1.3187	0.4415	0.2201	0.0862	0.0014	0.0005
	W23	1.3179	-0.4414	0.2198	-0.0862	0.0014	0.0005
	W24	1.3186	-0.3567	0.2201	-0.0703	0.0014	0.0004
Level 6	W13	1.9526	0.0000	0.3943	0.0000	0.0024	0.0000
	W14	0.0000	0.5704	0.0000	0.1291	0.0000	0.0008
	W15	1.4644	-0.0104	0.2957	-0.0023	0.0018	0.0000
	W16	1.4645	0.0105	0.2957	0.0023	0.0018	0.0000
	W17	0.0002	0.4632	0.0001	0.1045	0.0000	0.0006
	W18	-0.0002	0.3924	-0.0001	0.0891	0.0000	0.0006
	W19	1.4645	0.4279	0.2957	0.0968	0.0018	0.0006
	W20	1.4644	-0.4278	0.2957	-0.0968	0.0018	0.0006
	W21	1.0982	0.2865	0.2217	0.0652	0.0014	0.0004
	W22	1.0986	0.3553	0.2219	0.0801	0.0014	0.0005
	W23	1.0981	-0.3552	0.2217	-0.0801	0.0014	0.0005
	W24	1.0985	-0.2865	0.2218	-0.0651	0.0014	0.0004

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Drift

Page 4/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 5	W13	1.5584	0.0000	0.3855	-0.0000	0.0024	0.0000
	W14	0.0000	0.4413	-0.0000	0.1265	0.0000	0.0008
	W15	1.1687	-0.0081	0.2892	-0.0022	0.0018	0.0000
	W16	1.1688	0.0082	0.2891	0.0022	0.0018	0.0000
	W17	0.0001	0.3587	-0.0001	0.1024	0.0000	0.0006
	W18	-0.0001	0.3033	0.0001	0.0873	0.0000	0.0005
	W19	1.1688	0.3310	0.2891	0.0949	0.0018	0.0006
	W20	1.1688	-0.3310	0.2892	-0.0949	0.0018	0.0006
	W21	0.8765	0.2214	0.2169	0.0638	0.0013	0.0004
	W22	0.8767	0.2751	0.2168	0.0785	0.0013	0.0005
	W23	0.8765	-0.2751	0.2170	-0.0785	0.0013	0.0005
	W24	0.8767	-0.2214	0.2168	-0.0638	0.0013	0.0004
Level 4	W13	1.1728	0.0000	0.3978	-0.0000	0.0025	0.0000
	W14	0.0000	0.3148	-0.0000	0.1095	0.0000	0.0007
	W15	0.8796	-0.0059	0.2984	-0.0020	0.0018	0.0000
	W16	0.8797	0.0059	0.2983	0.0020	0.0018	0.0000
	W17	0.0002	0.2562	-0.0001	0.0889	0.0000	0.0005
	W18	-0.0002	0.2160	0.0001	0.0753	0.0000	0.0005
	W19	0.8797	0.2362	0.2983	0.0821	0.0018	0.0005
	W20	0.8796	-0.2361	0.2984	-0.0822	0.0018	0.0005
	W21	0.6595	0.1576	0.2238	0.0550	0.0014	0.0003
	W22	0.6599	0.1966	0.2236	0.0682	0.0014	0.0004
	W23	0.6595	-0.1966	0.2239	-0.0682	0.0014	0.0004
	W24	0.6599	-0.1575	0.2237	-0.0550	0.0014	0.0003
Level 3	W13	0.7750	0.0001	0.3898	-0.0000	0.0024	0.0000
	W14	0.0001	0.2053	-0.0000	0.1069	0.0000	0.0007
	W15	0.5812	-0.0039	0.2923	-0.0019	0.0018	0.0000
	W16	0.5814	0.0040	0.2923	0.0019	0.0018	0.0000
	W17	0.0004	0.1673	0.0000	0.0865	0.0000	0.0005
	W18	-0.0003	0.1407	-0.0000	0.0738	0.0000	0.0005
	W19	0.5813	0.1540	0.2923	0.0802	0.0018	0.0005
	W20	0.5812	-0.1539	0.2923	-0.0802	0.0018	0.0005
	W21	0.4357	0.1026	0.2192	0.0540	0.0014	0.0003
	W22	0.4363	0.1285	0.2193	0.0663	0.0014	0.0004
	W23	0.4356	-0.1284	0.2192	-0.0663	0.0014	0.0004
	W24	0.4362	-0.1025	0.2193	-0.0540	0.0014	0.0003
Level 2	W13	0.3853	0.0001	0.3853	0.0001	0.0020	0.0000
	W14	0.0001	0.0984	0.0001	0.0984	0.0000	0.0005
	W15	0.2889	-0.0020	0.2889	-0.0020	0.0015	0.0000
	W16	0.2890	0.0021	0.2890	0.0021	0.0015	0.0000
	W17	0.0003	0.0808	0.0003	0.0808	0.0000	0.0004
	W18	-0.0002	0.0668	-0.0002	0.0668	0.0000	0.0003

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Page 5/28

02/25/21 14:41:25

Steel Code: IBC

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Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	0.2890	0.0739	0.2890	0.0739	0.0015	0.0004
	W20	0.2889	-0.0738	0.2889	-0.0738	0.0015	0.0004
	W21	0.2165	0.0486	0.2165	0.0486	0.0011	0.0003
	W22	0.2170	0.0622	0.2170	0.0622	0.0011	0.0003
	W23	0.2164	-0.0621	0.2164	-0.0621	0.0011	0.0003
	W24	0.2169	-0.0486	0.2169	-0.0486	0.0011	0.0003
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (0.000, 0.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	3.8738	-0.0055	0.0908	-0.0004	0.0006	0.0000
	W14	0.2350	1.0984	0.0146	0.0894	0.0001	0.0006
	W15	2.7088	0.3127	0.0562	0.0189	0.0003	0.0001
	W16	3.1019	-0.3209	0.0801	-0.0195	0.0005	0.0001
	W17	0.8413	-0.2479	0.0512	0.0021	0.0003	0.0000
	W18	-0.4888	1.8955	-0.0293	0.1320	0.0002	0.0008
	W19	3.0816	0.8197	0.0791	0.0668	0.0005	0.0004
	W20	2.7291	-0.8279	0.0572	-0.0673	0.0004	0.0004
	W21	1.6650	1.6561	0.0202	0.1132	0.0001	0.0007
	W22	2.9574	-0.4266	0.0984	-0.0131	0.0006	0.0001
	W23	1.4007	0.4204	0.0038	0.0126	0.0000	0.0001
	W24	2.6930	-1.6623	0.0820	-0.1136	0.0005	0.0007
Level 12	W13	3.7830	-0.0051	0.1696	-0.0006	0.0010	0.0000
	W14	0.2204	1.0090	0.0183	0.0966	0.0001	0.0006
	W15	2.6526	0.2937	0.1120	0.0239	0.0007	0.0001
	W16	3.0219	-0.3013	0.1423	-0.0248	0.0009	0.0002
	W17	0.7901	-0.2500	0.0649	-0.0098	0.0004	0.0001
	W18	-0.4595	1.7635	-0.0374	0.1547	0.0002	0.0010
	W19	3.0025	0.7529	0.1409	0.0720	0.0009	0.0004

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Drift

Page 6/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	2.6719	-0.7605	0.1134	-0.0729	0.0007	0.0004
	W21	1.6448	1.5429	0.0559	0.1340	0.0003	0.0008
	W22	2.8590	-0.4135	0.1554	-0.0260	0.0010	0.0002
	W23	1.3969	0.4078	0.0353	0.0253	0.0002	0.0002
	W24	2.6110	-1.5486	0.1348	-0.1347	0.0008	0.0008
Level 11	W13	3.6134	-0.0045	0.2423	-0.0007	0.0015	0.0000
	W14	0.2021	0.9124	0.0196	0.1003	0.0001	0.0006
	W15	2.5406	0.2698	0.1652	0.0260	0.0010	0.0002
	W16	2.8795	-0.2765	0.1982	-0.0271	0.0012	0.0002
	W17	0.7252	-0.2402	0.0705	-0.0144	0.0004	0.0001
	W18	-0.4221	1.6088	-0.0411	0.1649	0.0003	0.0010
	W19	2.8616	0.6809	0.1964	0.0747	0.0012	0.0005
	W20	2.5585	-0.6877	0.1670	-0.0758	0.0010	0.0005
	W21	1.5889	1.4089	0.0931	0.1432	0.0006	0.0009
	W22	2.7035	-0.3876	0.2015	-0.0311	0.0012	0.0002
	W23	1.3616	0.3825	0.0710	0.0303	0.0004	0.0002
	W24	2.4762	-1.4140	0.1795	-0.1440	0.0011	0.0009
Level 10	W13	3.3712	-0.0038	0.3031	-0.0011	0.0019	0.0000
	W14	0.1825	0.8121	0.0219	0.1003	0.0001	0.0006
	W15	2.3754	0.2438	0.2096	0.0274	0.0013	0.0002
	W16	2.6813	-0.2494	0.2450	-0.0291	0.0015	0.0002
	W17	0.6547	-0.2258	0.0761	-0.0201	0.0005	0.0001
	W18	-0.3810	1.4439	-0.0432	0.1705	0.0003	0.0011
	W19	2.6652	0.6062	0.2437	0.0744	0.0015	0.0005
	W20	2.3915	-0.6119	0.2108	-0.0761	0.0013	0.0005
	W21	1.4958	1.2658	0.1248	0.1484	0.0008	0.0009
	W22	2.5020	-0.3564	0.2408	-0.0368	0.0015	0.0002
	W23	1.2906	0.3522	0.1001	0.0356	0.0006	0.0002
	W24	2.2967	-1.2700	0.2161	-0.1497	0.0013	0.0009
Level 9	W13	3.0681	-0.0027	0.3418	-0.0009	0.0021	0.0000
	W14	0.1605	0.7118	0.0229	0.1041	0.0001	0.0006
	W15	2.1658	0.2164	0.2382	0.0284	0.0015	0.0002
	W16	2.4364	-0.2204	0.2745	-0.0297	0.0017	0.0002
	W17	0.5785	-0.2057	0.0785	-0.0200	0.0005	0.0001
	W18	-0.3378	1.2734	-0.0442	0.1762	0.0003	0.0011
	W19	2.4215	0.5318	0.2735	0.0774	0.0017	0.0005
	W20	2.1807	-0.5358	0.2392	-0.0788	0.0015	0.0005
	W21	1.3710	1.1173	0.1455	0.1534	0.0009	0.0009
	W22	2.2612	-0.3196	0.2648	-0.0373	0.0016	0.0002
	W23	1.1904	0.3166	0.1197	0.0363	0.0007	0.0002
	W24	2.0806	-1.1203	0.2390	-0.1544	0.0015	0.0010

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RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Drift

Page 7/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 8	W13	2.7263	-0.0017	0.3818	-0.0004	0.0024	0.0000
	W14	0.1376	0.6077	0.0224	0.0996	0.0001	0.0006
	W15	1.9276	0.1880	0.2682	0.0289	0.0017	0.0002
	W16	2.1618	-0.1906	0.3045	-0.0295	0.0019	0.0002
	W17	0.5000	-0.1857	0.0782	-0.0240	0.0005	0.0001
	W18	-0.2936	1.0972	-0.0446	0.1734	0.0003	0.0011
	W19	2.1479	0.4544	0.3032	0.0744	0.0019	0.0005
	W20	1.9415	-0.4571	0.2696	-0.0750	0.0017	0.0005
	W21	1.2255	0.9639	0.1677	0.1518	0.0010	0.0009
	W22	1.9964	-0.2823	0.2871	-0.0401	0.0018	0.0002
	W23	1.0707	0.2803	0.1425	0.0397	0.0009	0.0002
	W24	1.8416	-0.9659	0.2619	-0.1522	0.0016	0.0009
Level 7	W13	2.3445	-0.0013	0.3914	-0.0005	0.0024	0.0000
	W14	0.1152	0.5081	0.0217	0.1013	0.0001	0.0006
	W15	1.6594	0.1591	0.2754	0.0289	0.0017	0.0002
	W16	1.8573	-0.1611	0.3117	-0.0296	0.0019	0.0002
	W17	0.4218	-0.1617	0.0776	-0.0230	0.0005	0.0001
	W18	-0.2490	0.9238	-0.0451	0.1749	0.0003	0.0011
	W19	1.8448	0.3800	0.3098	0.0756	0.0019	0.0005
	W20	1.6720	-0.3821	0.2773	-0.0763	0.0017	0.0005
	W21	1.0578	0.8122	0.1727	0.1529	0.0011	0.0009
	W22	1.7093	-0.2421	0.2920	-0.0395	0.0018	0.0002
	W23	0.9282	0.2406	0.1483	0.0389	0.0009	0.0002
	W24	1.5797	-0.8137	0.2676	-0.1534	0.0017	0.0009
Level 6	W13	1.9531	-0.0009	0.3945	-0.0003	0.0024	0.0000
	W14	0.0936	0.4068	0.0205	0.0933	0.0001	0.0006
	W15	1.3841	0.1302	0.2780	0.0287	0.0017	0.0002
	W16	1.5456	-0.1315	0.3137	-0.0292	0.0019	0.0002
	W17	0.3442	-0.1387	0.0758	-0.0280	0.0005	0.0002
	W18	-0.2038	0.7489	-0.0451	0.1680	0.0003	0.0010
	W19	1.5350	0.3044	0.3112	0.0697	0.0019	0.0004
	W20	1.3947	-0.3057	0.2805	-0.0702	0.0017	0.0004
	W21	0.8852	0.6593	0.1747	0.1475	0.0011	0.0009
	W22	1.4173	-0.2026	0.2922	-0.0429	0.0018	0.0003
	W23	0.7799	0.2017	0.1516	0.0425	0.0009	0.0003
	W24	1.3121	-0.6602	0.2691	-0.1479	0.0017	0.0009
Level 5	W13	1.5587	-0.0005	0.3854	0.0002	0.0024	0.0000
	W14	0.0731	0.3135	0.0199	0.0917	0.0001	0.0006
	W15	1.1061	0.1015	0.2718	0.0282	0.0017	0.0002
	W16	1.2319	-0.1023	0.3063	-0.0279	0.0019	0.0002
	W17	0.2683	-0.1107	0.0734	-0.0262	0.0005	0.0002
	W18	-0.1587	0.5809	-0.0436	0.1637	0.0003	0.0010

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 8/28

02/25/21 14:41:25

Building Code: IBC

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	1.2238	0.2347	0.3039	0.0689	0.0019	0.0004
	W20	1.1142	-0.2355	0.2741	-0.0686	0.0017	0.0004
	W21	0.7105	0.5118	0.1711	0.1439	0.0011	0.0009
	W22	1.1252	-0.1597	0.2848	-0.0406	0.0018	0.0003
	W23	0.6283	0.1591	0.1488	0.0408	0.0009	0.0003
	W24	1.0430	-0.5124	0.2624	-0.1437	0.0016	0.0009
Level 4	W13	1.1733	-0.0008	0.3976	0.0004	0.0025	0.0000
	W14	0.0532	0.2218	0.0180	0.0780	0.0001	0.0005
	W15	0.8343	0.0733	0.2820	0.0266	0.0017	0.0002
	W16	0.9256	-0.0744	0.3143	-0.0260	0.0019	0.0002
	W17	0.1949	-0.0845	0.0682	-0.0307	0.0004	0.0002
	W18	-0.1151	0.4172	-0.0413	0.1477	0.0003	0.0009
	W19	0.9199	0.1658	0.3116	0.0588	0.0019	0.0004
	W20	0.8401	-0.1669	0.2847	-0.0582	0.0018	0.0004
	W21	0.5394	0.3678	0.1806	0.1307	0.0011	0.0008
	W22	0.8404	-0.1192	0.2869	-0.0426	0.0018	0.0003
	W23	0.4795	0.1183	0.1603	0.0430	0.0010	0.0003
	W24	0.7806	-0.3687	0.2667	-0.1303	0.0016	0.0008
Level 3	W13	0.7757	-0.0011	0.3897	0.0001	0.0024	0.0000
	W14	0.0352	0.1438	0.0172	0.0769	0.0001	0.0005
	W15	0.5523	0.0467	0.2768	0.0252	0.0017	0.0002
	W16	0.6113	-0.0484	0.3078	-0.0251	0.0019	0.0002
	W17	0.1267	-0.0538	0.0654	-0.0278	0.0004	0.0002
	W18	-0.0738	0.2695	-0.0396	0.1431	0.0002	0.0009
	W19	0.6082	0.1070	0.3052	0.0577	0.0019	0.0004
	W20	0.5554	-0.1087	0.2794	-0.0576	0.0017	0.0004
	W21	0.3588	0.2371	0.1779	0.1262	0.0011	0.0008
	W22	0.5535	-0.0766	0.2798	-0.0397	0.0017	0.0002
	W23	0.3192	0.0753	0.1586	0.0397	0.0010	0.0002
	W24	0.5138	-0.2384	0.2605	-0.1262	0.0016	0.0008
Level 2	W13	0.3860	-0.0012	0.3860	-0.0012	0.0020	0.0000
	W14	0.0181	0.0669	0.0181	0.0669	0.0001	0.0003
	W15	0.2755	0.0215	0.2755	0.0215	0.0014	0.0001
	W16	0.3035	-0.0233	0.3035	-0.0233	0.0016	0.0001
	W17	0.0613	-0.0260	0.0613	-0.0260	0.0003	0.0001
	W18	-0.0342	0.1263	-0.0342	0.1263	0.0002	0.0007
	W19	0.3031	0.0493	0.3031	0.0493	0.0016	0.0003
	W20	0.2759	-0.0511	0.2759	-0.0511	0.0014	0.0003
	W21	0.1809	0.1108	0.1809	0.1108	0.0009	0.0006
	W22	0.2736	-0.0369	0.2736	-0.0369	0.0014	0.0002
	W23	0.1606	0.0356	0.1606	0.0356	0.0008	0.0002
	W24	0.2533	-0.1122	0.2533	-0.1122	0.0013	0.0006

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 9/28

02/25/21 14:41:25

Building Code: IBC

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (0.000, 120.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	3.8671	-0.0055	0.0904	-0.0004	0.0006	0.0000
	W14	-0.2335	1.0984	-0.0146	0.0894	0.0001	0.0006
	W15	3.0956	0.3127	0.0797	0.0189	0.0005	0.0001
	W16	2.7050	-0.3209	0.0559	-0.0195	0.0003	0.0001
	W17	-0.8358	-0.2479	-0.0511	0.0021	0.0003	0.0000
	W18	0.4856	1.8955	0.0292	0.1320	0.0002	0.0008
	W19	2.7252	0.8197	0.0569	0.0668	0.0004	0.0004
	W20	3.0754	-0.8279	0.0787	-0.0673	0.0005	0.0004
	W21	2.6859	1.6561	0.0817	0.1132	0.0005	0.0007
	W22	1.4019	-0.4266	0.0036	-0.0131	0.0000	0.0001
	W23	2.9486	0.4204	0.0980	0.0126	0.0006	0.0001
	W24	1.6646	-1.6623	0.0200	-0.1136	0.0001	0.0007
Level 12	W13	3.7767	-0.0051	0.1688	-0.0006	0.0010	0.0000
	W14	-0.2189	1.0090	-0.0182	0.0966	0.0001	0.0006
	W15	3.0159	0.2937	0.1417	0.0239	0.0009	0.0001
	W16	2.6491	-0.3013	0.1116	-0.0248	0.0007	0.0002
	W17	-0.7848	-0.2500	-0.0644	-0.0098	0.0004	0.0001
	W18	0.4564	1.7635	0.0371	0.1547	0.0002	0.0010
	W19	2.6683	0.7529	0.1130	0.0720	0.0007	0.0004
	W20	2.9967	-0.7605	0.1403	-0.0729	0.0009	0.0004
	W21	2.6042	1.5429	0.1341	0.1340	0.0008	0.0008
	W22	1.3983	-0.4135	0.0354	-0.0260	0.0002	0.0002
	W23	2.8505	0.4078	0.1546	0.0253	0.0010	0.0002
	W24	1.6446	-1.5486	0.0559	-0.1347	0.0003	0.0008
Level 11	W13	3.6079	-0.0045 ₆₄	0.2414	-0.0007	0.0015	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Drift

Page 10/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W14	-0.2007	0.9124	-0.0193	0.1003	0.0001	0.0006
	W15	2.8743	0.2698	0.1973	0.0260	0.0012	0.0002
	W16	2.5375	-0.2765	0.1647	-0.0271	0.0010	0.0002
	W17	-0.7204	-0.2402	-0.0695	-0.0144	0.0004	0.0001
	W18	0.4192	1.6088	0.0405	0.1649	0.0003	0.0010
	W19	2.5553	0.6809	0.1665	0.0747	0.0010	0.0005
	W20	2.8565	-0.6877	0.1955	-0.0758	0.0012	0.0005
	W21	2.4701	1.4089	0.1784	0.1432	0.0011	0.0009
	W22	1.3629	-0.3876	0.0714	-0.0311	0.0004	0.0002
	W23	2.6960	0.3825	0.2001	0.0303	0.0012	0.0002
	W24	1.5887	-1.4140	0.0932	-0.1440	0.0006	0.0009
Level 10	W13	3.3665	-0.0038	0.3017	-0.0011	0.0019	0.0000
	W14	-0.1814	0.8121	-0.0215	0.1003	0.0001	0.0006
	W15	2.6769	0.2438	0.2436	0.0274	0.0015	0.0002
	W16	2.3728	-0.2494	0.2089	-0.0291	0.0013	0.0002
	W17	-0.6509	-0.2258	-0.0747	-0.0201	0.0005	0.0001
	W18	0.3787	1.4439	0.0424	0.1705	0.0003	0.0011
	W19	2.3888	0.6062	0.2101	0.0744	0.0013	0.0005
	W20	2.6609	-0.6119	0.2424	-0.0761	0.0015	0.0005
	W21	2.2917	1.2658	0.2145	0.1484	0.0013	0.0009
	W22	1.2915	-0.3564	0.1006	-0.0368	0.0006	0.0002
	W23	2.4958	0.3522	0.2388	0.0356	0.0015	0.0002
	W24	1.4956	-1.2700	0.1248	-0.1497	0.0008	0.0009
Level 9	W13	3.0648	-0.0027	0.3407	-0.0009	0.0021	0.0000
	W14	-0.1599	0.7118	-0.0226	0.1041	0.0001	0.0006
	W15	2.4333	0.2164	0.2734	0.0284	0.0017	0.0002
	W16	2.1639	-0.2204	0.2376	-0.0297	0.0015	0.0002
	W17	-0.5761	-0.2057	-0.0775	-0.0200	0.0005	0.0001
	W18	0.3363	1.2734	0.0436	0.1762	0.0003	0.0011
	W19	2.1787	0.5318	0.2385	0.0774	0.0015	0.0005
	W20	2.4185	-0.5358	0.2724	-0.0788	0.0017	0.0005
	W21	2.0772	1.1173	0.2377	0.1534	0.0015	0.0009
	W22	1.1909	-0.3196	0.1201	-0.0373	0.0007	0.0002
	W23	2.2571	0.3166	0.2632	0.0363	0.0016	0.0002
	W24	1.3707	-1.1203	0.1455	-0.1544	0.0009	0.0010
Level 8	W13	2.7242	-0.0017	0.3813	-0.0004	0.0024	0.0000
	W14	-0.1373	0.6077	-0.0223	0.0996	0.0001	0.0006
	W15	2.1599	0.1880	0.3040	0.0289	0.0019	0.0002
	W16	1.9263	-0.1906	0.2679	-0.0295	0.0017	0.0002
	W17	-0.4986	-0.1857	-0.0777	-0.0240	0.0005	0.0001
	W18	0.2927	1.0972	0.0443	0.1734	0.0003	0.0011
	W19	1.9402	0.4544	0.2693	0.0744	0.0017	0.0005

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Page 11/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	2.1461	-0.4571	0.3027	-0.0750	0.0019	0.0005
	W21	1.8395	0.9639	0.2613	0.1518	0.0016	0.0009
	W22	1.0708	-0.2823	0.1427	-0.0401	0.0009	0.0002
	W23	1.9939	0.2803	0.2863	0.0397	0.0018	0.0002
	W24	1.2252	-0.9659	0.1677	-0.1522	0.0010	0.0009
Level 7	W13	2.3428	-0.0013	0.3907	-0.0005	0.0024	0.0000
	W14	-0.1150	0.5081	-0.0216	0.1013	0.0001	0.0006
	W15	1.8559	0.1591	0.3111	0.0289	0.0019	0.0002
	W16	1.6584	-0.1611	0.2750	-0.0296	0.0017	0.0002
	W17	-0.4210	-0.1617	-0.0772	-0.0230	0.0005	0.0001
	W18	0.2484	0.9238	0.0449	0.1749	0.0003	0.0011
	W19	1.6709	0.3800	0.2769	0.0756	0.0017	0.0005
	W20	1.8434	-0.3821	0.3092	-0.0763	0.0019	0.0005
	W21	1.5782	0.8122	0.2670	0.1529	0.0016	0.0009
	W22	0.9281	-0.2421	0.1483	-0.0395	0.0009	0.0002
	W23	1.7076	0.2406	0.2913	0.0389	0.0018	0.0002
	W24	1.0575	-0.8137	0.1726	-0.1534	0.0011	0.0009
Level 6	W13	1.9521	-0.0009	0.3941	-0.0003	0.0024	0.0000
	W14	-0.0935	0.4068	-0.0204	0.0933	0.0001	0.0006
	W15	1.5447	0.1302	0.3134	0.0287	0.0019	0.0002
	W16	1.3834	-0.1315	0.2777	-0.0292	0.0017	0.0002
	W17	-0.3437	-0.1387	-0.0756	-0.0280	0.0005	0.0002
	W18	0.2035	0.7489	0.0450	0.1680	0.0003	0.0010
	W19	1.3940	0.3044	0.2802	0.0697	0.0017	0.0004
	W20	1.5342	-0.3057	0.3109	-0.0702	0.0019	0.0004
	W21	1.3112	0.6593	0.2688	0.1475	0.0017	0.0009
	W22	0.7798	-0.2026	0.1516	-0.0429	0.0009	0.0003
	W23	1.4164	0.2017	0.2918	0.0425	0.0018	0.0003
	W24	0.8849	-0.6602	0.1745	-0.1479	0.0011	0.0009
Level 5	W13	1.5580	-0.0005	0.3857	0.0002	0.0024	0.0000
	W14	-0.0731	0.3135	-0.0199	0.0917	0.0001	0.0006
	W15	1.2314	0.1015	0.3066	0.0282	0.0019	0.0002
	W16	1.1057	-0.1023	0.2719	-0.0279	0.0017	0.0002
	W17	-0.2681	-0.1107	-0.0736	-0.0262	0.0005	0.0002
	W18	0.1585	0.5809	0.0437	0.1637	0.0003	0.0010
	W19	1.1137	0.2347	0.2743	0.0689	0.0017	0.0004
	W20	1.2233	-0.2355	0.3042	-0.0686	0.0019	0.0004
	W21	1.0424	0.5118	0.2627	0.1439	0.0016	0.0009
	W22	0.6282	-0.1597	0.1487	-0.0406	0.0009	0.0003
	W23	1.1246	0.1591	0.2851	0.0408	0.0018	0.0003
	W24	0.7104	-0.5124	0.1711	-0.1437	0.0011	0.0009

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RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Drift

Page 12/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 4	W13	1.1724	-0.0008	0.3980	0.0004	0.0025	0.0000
	W14	-0.0531	0.2218	-0.0180	0.0780	0.0001	0.0005
	W15	0.9248	0.0733	0.3147	0.0266	0.0019	0.0002
	W16	0.8338	-0.0744	0.2823	-0.0260	0.0017	0.0002
	W17	-0.1945	-0.0845	-0.0685	-0.0307	0.0004	0.0002
	W18	0.1148	0.4172	0.0414	0.1477	0.0003	0.0009
	W19	0.8394	0.1658	0.2850	0.0588	0.0018	0.0004
	W20	0.9191	-0.1669	0.3121	-0.0582	0.0019	0.0004
	W21	0.7797	0.3678	0.2671	0.1307	0.0016	0.0008
	W22	0.4795	-0.1192	0.1604	-0.0426	0.0010	0.0003
	W23	0.8395	0.1183	0.2874	0.0430	0.0018	0.0003
	W24	0.5392	-0.3687	0.1807	-0.1303	0.0011	0.0008
Level 3	W13	0.7743	-0.0011	0.3898	0.0001	0.0024	0.0000
	W14	-0.0351	0.1438	-0.0172	0.0769	0.0001	0.0005
	W15	0.6101	0.0467	0.3078	0.0252	0.0019	0.0002
	W16	0.5515	-0.0484	0.2769	-0.0251	0.0017	0.0002
	W17	-0.1260	-0.0538	-0.0653	-0.0278	0.0004	0.0002
	W18	0.0733	0.2695	0.0396	0.1431	0.0002	0.0009
	W19	0.5544	0.1070	0.2795	0.0577	0.0017	0.0004
	W20	0.6071	-0.1087	0.3052	-0.0576	0.0019	0.0004
	W21	0.5125	0.2371	0.2605	0.1262	0.0016	0.0008
	W22	0.3191	-0.0766	0.1587	-0.0397	0.0010	0.0002
	W23	0.5520	0.0753	0.2798	0.0397	0.0017	0.0002
	W24	0.3586	-0.2384	0.1780	-0.1262	0.0011	0.0008
Level 2	W13	0.3845	-0.0012	0.3845	-0.0012	0.0020	0.0000
	W14	-0.0179	0.0669	-0.0179	0.0669	0.0001	0.0003
	W15	0.3023	0.0215	0.3023	0.0215	0.0016	0.0001
	W16	0.2745	-0.0233	0.2745	-0.0233	0.0014	0.0001
	W17	-0.0607	-0.0260	-0.0607	-0.0260	0.0003	0.0001
	W18	0.0338	0.1263	0.0338	0.1263	0.0002	0.0007
	W19	0.2750	0.0493	0.2750	0.0493	0.0014	0.0003
	W20	0.3019	-0.0511	0.3019	-0.0511	0.0016	0.0003
	W21	0.2520	0.1108	0.2520	0.1108	0.0013	0.0006
	W22	0.1604	-0.0369	0.1604	-0.0369	0.0008	0.0002
	W23	0.2722	0.0356	0.2722	0.0356	0.0014	0.0002
	W24	0.1806	-0.1122	0.1806	-0.1122	0.0009	0.0006
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Page 13/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (210.000, 120.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	3.8671	0.0064	0.0904	0.0005	0.0006	0.0000
	W14	-0.2335	1.9182	-0.0146	0.1404	0.0001	0.0009
	W15	3.0956	-0.3642	0.0797	-0.0221	0.0005	0.0001
	W16	2.7050	0.3737	0.0559	0.0228	0.0003	0.0001
	W17	-0.8358	2.6870	-0.0511	0.1810	0.0003	0.0011
	W18	0.4856	0.1903	0.0292	0.0296	0.0002	0.0002
	W19	2.7252	1.4434	0.0569	0.1056	0.0004	0.0007
	W20	3.0754	-1.4339	0.0787	-0.1050	0.0005	0.0006
	W21	2.6859	-0.1304	0.0817	0.0056	0.0005	0.0000
	W22	1.4019	2.2955	0.0036	0.1529	0.0000	0.0009
	W23	2.9486	-2.2884	0.0980	-0.1523	0.0006	0.0009
	W24	1.6646	0.1375	0.0200	-0.0051	0.0001	0.0000
Level 12	W13	3.7767	0.0059	0.1688	0.0007	0.0010	0.0000
	W14	-0.2189	1.7778	-0.0182	0.1605	0.0001	0.0010
	W15	3.0159	-0.3421	0.1417	-0.0280	0.0009	0.0002
	W16	2.6491	0.3510	0.1116	0.0290	0.0007	0.0002
	W17	-0.7848	2.5059	-0.0644	0.2165	0.0004	0.0013
	W18	0.4564	0.1608	0.0371	0.0243	0.0002	0.0001
	W19	2.6683	1.3378	0.1130	0.1209	0.0007	0.0007
	W20	2.9967	-1.3289	0.1403	-0.1199	0.0009	0.0007
	W21	2.6042	-0.1360	0.1341	-0.0028	0.0008	0.0000
	W22	1.3983	2.1427	0.0354	0.1841	0.0002	0.0011
	W23	2.8505	-2.1360	0.1546	-0.1833	0.0010	0.0011
	W24	1.6446	0.1426	0.0559	0.0035	0.0003	0.0000
Level 11	W13	3.6079	0.0052	0.2414	0.0008	0.0015	0.0000
	W14	-0.2007	1.6173	-0.0193	0.1684	0.0001	0.0010
	W15	2.8743	-0.3141	0.1973	-0.0303	0.0012	0.0002
	W16	2.5375	0.3220	0.1647	0.0315	0.0010	0.0002
	W17	-0.7204	2.2895	-0.0695	0.2306	0.0004	0.0014
	W18	0.4192	0.1365	0.0405	0.0220	0.0003	0.0001
	W19	2.5553	1.2169	0.1665	0.1269	0.0010	0.0008

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Page 14/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	2.8565	-1.2091	0.1955	-0.1257	0.0012	0.0008
	W21	2.4701	-0.1332	0.1784	-0.0062	0.0011	0.0000
	W22	1.3629	1.9586	0.0714	0.1966	0.0004	0.0012
	W23	2.6960	-1.9527	0.2001	-0.1957	0.0012	0.0012
	W24	1.5887	0.1391	0.0932	0.0071	0.0006	0.0000
Level 10	W13	3.3665	0.0044	0.3017	0.0013	0.0019	0.0000
	W14	-0.1814	1.4489	-0.0215	0.1764	0.0001	0.0011
	W15	2.6769	-0.2839	0.2436	-0.0321	0.0015	0.0002
	W16	2.3728	0.2905	0.2089	0.0341	0.0013	0.0002
	W17	-0.6509	2.0589	-0.0747	0.2439	0.0005	0.0015
	W18	0.3787	0.1145	0.0424	0.0206	0.0003	0.0001
	W19	2.3888	1.0899	0.2101	0.1333	0.0013	0.0008
	W20	2.6609	-1.0834	0.2424	-0.1313	0.0015	0.0008
	W21	2.2917	-0.1271	0.2145	-0.0086	0.0013	0.0001
	W22	1.2915	1.7620	0.1006	0.2085	0.0006	0.0013
	W23	2.4958	-1.7570	0.2388	-0.2070	0.0015	0.0013
	W24	1.4956	0.1320	0.1248	0.0101	0.0008	0.0001
Level 9	W13	3.0648	0.0031	0.3407	0.0011	0.0021	0.0000
	W14	-0.1599	1.2725	-0.0226	0.1837	0.0001	0.0011
	W15	2.4333	-0.2518	0.2734	-0.0333	0.0017	0.0002
	W16	2.1639	0.2564	0.2376	0.0349	0.0015	0.0002
	W17	-0.5761	1.8149	-0.0775	0.2530	0.0005	0.0016
	W18	0.3363	0.0938	0.0436	0.0226	0.0003	0.0001
	W19	2.1787	0.9567	0.2385	0.1386	0.0015	0.0009
	W20	2.4185	-0.9521	0.2724	-0.1370	0.0017	0.0008
	W21	2.0772	-0.1185	0.2377	-0.0080	0.0015	0.0000
	W22	1.1909	1.5535	0.1201	0.2159	0.0007	0.0013
	W23	2.2571	-1.5500	0.2632	-0.2147	0.0016	0.0013
	W24	1.3707	0.1219	0.1455	0.0092	0.0009	0.0001
Level 8	W13	2.7242	0.0020	0.3813	0.0005	0.0024	0.0000
	W14	-0.1373	1.0888	-0.0223	0.1778	0.0001	0.0011
	W15	2.1599	-0.2185	0.3040	-0.0338	0.0019	0.0002
	W16	1.9263	0.2215	0.2679	0.0345	0.0017	0.0002
	W17	-0.4986	1.5619	-0.0777	0.2488	0.0005	0.0015
	W18	0.2927	0.0712	0.0443	0.0179	0.0003	0.0001
	W19	1.9402	0.8181	0.2693	0.1337	0.0017	0.0008
	W20	2.1461	-0.8151	0.3027	-0.1330	0.0019	0.0008
	W21	1.8395	-0.1104	0.2613	-0.0120	0.0016	0.0001
	W22	1.0708	1.3376	0.1427	0.2125	0.0009	0.0013
	W23	1.9939	-1.3353	0.2863	-0.2120	0.0018	0.0013
	W24	1.2252	0.1127	0.1677	0.0125	0.0010	0.0001

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RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Page 15/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 7	W13	2.3428	0.0015	0.3907	0.0006	0.0024	0.0000
	W14	-0.1150	0.9110	-0.0216	0.1769	0.0001	0.0011
	W15	1.8559	-0.1847	0.3111	-0.0337	0.0019	0.0002
	W16	1.6584	0.1870	0.2750	0.0345	0.0017	0.0002
	W17	-0.4210	1.3131	-0.0772	0.2480	0.0005	0.0015
	W18	0.2484	0.0534	0.0449	0.0174	0.0003	0.0001
	W19	1.6709	0.6844	0.2769	0.1331	0.0017	0.0008
	W20	1.8434	-0.6821	0.3092	-0.1323	0.0019	0.0008
	W21	1.5782	-0.0985	0.2670	-0.0122	0.0016	0.0001
	W22	0.9281	1.1251	0.1483	0.2119	0.0009	0.0013
	W23	1.7076	-1.1234	0.2913	-0.2113	0.0018	0.0013
	W24	1.0575	0.1002	0.1726	0.0129	0.0011	0.0001
Level 6	W13	1.9521	0.0010	0.3941	0.0004	0.0024	0.0000
	W14	-0.0935	0.7341	-0.0204	0.1649	0.0001	0.0010
	W15	1.5447	-0.1510	0.3134	-0.0332	0.0019	0.0002
	W16	1.3834	0.1524	0.2777	0.0338	0.0017	0.0002
	W17	-0.3437	1.0651	-0.0756	0.2371	0.0005	0.0015
	W18	0.2035	0.0360	0.0450	0.0103	0.0003	0.0001
	W19	1.3940	0.5513	0.2802	0.1239	0.0017	0.0008
	W20	1.5342	-0.5499	0.3109	-0.1234	0.0019	0.0008
	W21	1.3112	-0.0862	0.2688	-0.0172	0.0017	0.0001
	W22	0.7798	0.9131	0.1516	0.2031	0.0009	0.0013
	W23	1.4164	-0.9121	0.2918	-0.2027	0.0018	0.0013
	W24	0.8849	0.0873	0.1745	0.0176	0.0011	0.0001
Level 5	W13	1.5580	0.0006	0.3857	-0.0003	0.0024	0.0000
	W14	-0.0731	0.5692	-0.0199	0.1613	0.0001	0.0010
	W15	1.2314	-0.1178	0.3066	-0.0327	0.0019	0.0002
	W16	1.1057	0.1186	0.2719	0.0323	0.0017	0.0002
	W17	-0.2681	0.8281	-0.0736	0.2311	0.0005	0.0014
	W18	0.1585	0.0257	0.0437	0.0109	0.0003	0.0001
	W19	1.1137	0.4273	0.2743	0.1208	0.0017	0.0007
	W20	1.2233	-0.4265	0.3042	-0.1212	0.0019	0.0007
	W21	1.0424	-0.0690	0.2627	-0.0164	0.0016	0.0001
	W22	0.6282	0.7100	0.1487	0.1976	0.0009	0.0012
	W23	1.1246	-0.7094	0.2851	-0.1978	0.0018	0.0012
	W24	0.7104	0.0697	0.1711	0.0161	0.0011	0.0001
Level 4	W13	1.1724	0.0008	0.3980	-0.0004	0.0025	0.0000
	W14	-0.0531	0.4079	-0.0180	0.1410	0.0001	0.0009
	W15	0.9248	-0.0851	0.3147	-0.0306	0.0019	0.0002
	W16	0.8338	0.0863	0.2823	0.0300	0.0017	0.0002
	W17	-0.1945	0.5970	-0.0685	0.2086	0.0004	0.0013
	W18	0.1148	0.0148	0.0414	0.0029	0.0003	0.0000

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 16/28

02/25/21 14:41:25

Building Code: IBC

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	0.8394	0.3065	0.2850	0.1054	0.0018	0.0007
	W20	0.9191	-0.3053	0.3121	-0.1061	0.0019	0.0007
	W21	0.7797	-0.0527	0.2671	-0.0208	0.0016	0.0001
	W22	0.4795	0.5125	0.1604	0.1789	0.0010	0.0011
	W23	0.8395	-0.5115	0.2874	-0.1794	0.0018	0.0011
	W24	0.5392	0.0536	0.1807	0.0203	0.0011	0.0001
Level 3	W13	0.7743	0.0013	0.3898	-0.0001	0.0024	0.0000
	W14	-0.0351	0.2669	-0.0172	0.1369	0.0001	0.0008
	W15	0.6101	-0.0544	0.3078	-0.0290	0.0019	0.0002
	W16	0.5515	0.0563	0.2769	0.0288	0.0017	0.0002
	W17	-0.1260	0.3884	-0.0653	0.2009	0.0004	0.0012
	W18	0.0733	0.0119	0.0396	0.0045	0.0002	0.0000
	W19	0.5544	0.2011	0.2795	0.1026	0.0017	0.0006
	W20	0.6071	-0.1992	0.3052	-0.1028	0.0019	0.0006
	W21	0.5125	-0.0319	0.2605	-0.0183	0.0016	0.0001
	W22	0.3191	0.3335	0.1587	0.1723	0.0010	0.0011
	W23	0.5520	-0.3321	0.2798	-0.1724	0.0017	0.0011
	W24	0.3586	0.0333	0.1780	0.0182	0.0011	0.0001
Level 2	W13	0.3845	0.0014	0.3845	0.0014	0.0020	0.0000
	W14	-0.0179	0.1299	-0.0179	0.1299	0.0001	0.0007
	W15	0.3023	-0.0254	0.3023	-0.0254	0.0016	0.0001
	W16	0.2745	0.0275	0.2745	0.0275	0.0014	0.0001
	W17	-0.0607	0.1876	-0.0607	0.1876	0.0003	0.0010
	W18	0.0338	0.0074	0.0338	0.0074	0.0002	0.0000
	W19	0.2750	0.0985	0.2750	0.0985	0.0014	0.0005
	W20	0.3019	-0.0964	0.3019	-0.0964	0.0016	0.0005
	W21	0.2520	-0.0136	0.2520	-0.0136	0.0013	0.0001
	W22	0.1604	0.1613	0.1604	0.1613	0.0008	0.0008
	W23	0.2722	-0.1597	0.2722	-0.1597	0.0014	0.0008
	W24	0.1806	0.0151	0.1806	0.0151	0.0009	0.0001
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Drift

Page 17/28

02/25/21 14:41:25

Steel Code: IBC

Location (ft): (210.000, 75.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	3.8696	0.0064	0.0905	0.0005	0.0006	0.0000
	W14	-0.0578	1.9182	-0.0036	0.1404	0.0000	0.0009
	W15	2.9505	-0.3642	0.0709	-0.0221	0.0004	0.0001
	W16	2.8539	0.3737	0.0649	0.0228	0.0004	0.0001
	W17	-0.2069	2.6870	-0.0127	0.1810	0.0001	0.0011
	W18	0.1202	0.1903	0.0073	0.0296	0.0000	0.0002
	W19	2.8588	1.4434	0.0652	0.1056	0.0004	0.0007
	W20	2.9456	-1.4339	0.0706	-0.1050	0.0004	0.0006
	W21	2.3031	-0.1304	0.0586	0.0056	0.0004	0.0000
	W22	1.9852	2.2955	0.0392	0.1529	0.0002	0.0009
	W23	2.3681	-2.2884	0.0627	-0.1523	0.0004	0.0009
	W24	2.0502	0.1375	0.0433	-0.0051	0.0003	0.0000
Level 12	W13	3.7791	0.0059	0.1691	0.0007	0.0010	0.0000
	W14	-0.0542	1.7778	-0.0045	0.1605	0.0000	0.0010
	W15	2.8797	-0.3421	0.1305	-0.0280	0.0008	0.0002
	W16	2.7889	0.3510	0.1231	0.0290	0.0008	0.0002
	W17	-0.1942	2.5059	-0.0159	0.2165	0.0001	0.0013
	W18	0.1129	0.1608	0.0092	0.0243	0.0001	0.0001
	W19	2.7937	1.3378	0.1235	0.1209	0.0008	0.0007
	W20	2.8749	-1.3289	0.1302	-0.1199	0.0008	0.0007
	W21	2.2444	-0.1360	0.1048	-0.0028	0.0006	0.0000
	W22	1.9460	2.1427	0.0804	0.1841	0.0005	0.0011
	W23	2.3054	-2.1360	0.1098	-0.1833	0.0007	0.0011
	W24	2.0070	0.1426	0.0855	0.0035	0.0005	0.0000
Level 11	W13	3.6099	0.0052	0.2417	0.0008	0.0015	0.0000
	W14	-0.0497	1.6173	-0.0047	0.1684	0.0000	0.0010
	W15	2.7491	-0.3141	0.1853	-0.0303	0.0011	0.0002
	W16	2.6658	0.3220	0.1773	0.0315	0.0011	0.0002
	W17	-0.1783	2.2895	-0.0170	0.2306	0.0001	0.0014
	W18	0.1038	0.1365	0.0099	0.0220	0.0001	0.0001
	W19	2.6702	1.2169	0.1777	0.1269	0.0011	0.0008
	W20	2.7447	-1.2091	0.1848	-0.1257	0.0011	0.0008
	W21	2.1397	-0.1332	0.1464	-0.0062	0.0009	0.0000
	W22	1.8656	1.9586	0.1202	0.1966	0.0007	0.0012
	W23	2.1956	-1.9527	0.1517	-0.1957	0.0009	0.0012
	W24	1.9215	0.1391	0.1255	0.0071	0.0008	0.0000
Level 10	W13	3.3682	0.0044	0.3022	0.0013	0.0019	0.0000
	W14	-0.0450	1.4489	-0.0052	0.1764	0.0000	0.0011

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RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Page 18/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W15	2.5639	-0.2839	0.2309	-0.0321	0.0014	0.0002
	W16	2.4885	0.2905	0.2224	0.0341	0.0014	0.0002
	W17	-0.1613	2.0589	-0.0182	0.2439	0.0001	0.0015
	W18	0.0938	0.1145	0.0103	0.0206	0.0001	0.0001
	W19	2.4925	1.0899	0.2227	0.1333	0.0014	0.0008
	W20	2.5599	-1.0834	0.2306	-0.1313	0.0014	0.0008
	W21	1.9933	-0.1271	0.1809	-0.0086	0.0011	0.0001
	W22	1.7454	1.7620	0.1532	0.2085	0.0009	0.0013
	W23	2.0439	-1.7570	0.1868	-0.2070	0.0012	0.0013
	W24	1.7960	0.1320	0.1591	0.0101	0.0010	0.0001
Level 9							
	W13	3.0661	0.0031	0.3411	0.0011	0.0021	0.0000
	W14	-0.0397	1.2725	-0.0055	0.1837	0.0000	0.0011
	W15	2.3330	-0.2518	0.2602	-0.0333	0.0016	0.0002
	W16	2.2661	0.2564	0.2514	0.0349	0.0016	0.0002
	W17	-0.1431	1.8149	-0.0190	0.2530	0.0001	0.0016
	W18	0.0835	0.0938	0.0107	0.0226	0.0001	0.0001
	W19	2.2697	0.9567	0.2517	0.1386	0.0016	0.0009
	W20	2.3293	-0.9521	0.2600	-0.1370	0.0016	0.0008
	W21	1.8124	-0.1185	0.2032	-0.0080	0.0013	0.0000
	W22	1.5922	1.5535	0.1743	0.2159	0.0011	0.0013
	W23	1.8571	-1.5500	0.2094	-0.2147	0.0013	0.0013
	W24	1.6369	0.1219	0.1806	0.0092	0.0011	0.0001
Level 8							
	W13	2.7250	0.0020	0.3815	0.0005	0.0024	0.0000
	W14	-0.0342	1.0888	-0.0055	0.1778	0.0000	0.0011
	W15	2.0728	-0.2185	0.2906	-0.0338	0.0018	0.0002
	W16	2.0147	0.2215	0.2817	0.0345	0.0017	0.0002
	W17	-0.1241	1.5619	-0.0192	0.2488	0.0001	0.0015
	W18	0.0728	0.0712	0.0110	0.0179	0.0001	0.0001
	W19	2.0181	0.8181	0.2820	0.1337	0.0017	0.0008
	W20	2.0694	-0.8151	0.2903	-0.1330	0.0018	0.0008
	W21	1.6092	-0.1104	0.2262	-0.0120	0.0014	0.0001
	W22	1.4179	1.3376	0.1968	0.2125	0.0012	0.0013
	W23	1.6477	-1.3353	0.2324	-0.2120	0.0014	0.0013
	W24	1.4564	0.1127	0.2030	0.0125	0.0013	0.0001
Level 7							
	W13	2.3435	0.0015	0.3910	0.0006	0.0024	0.0000
	W14	-0.0287	0.9110	-0.0053	0.1769	0.0000	0.0011
	W15	1.7822	-0.1847	0.2977	-0.0337	0.0018	0.0002
	W16	1.7330	0.1870	0.2887	0.0345	0.0018	0.0002
	W17	-0.1049	1.3131	-0.0192	0.2480	0.0001	0.0015
	W18	0.0619	0.0534	0.0111	0.0174	0.0001	0.0001
	W19	1.7361	0.6844	0.2892	0.1331	0.0018	0.0008
	W20	1.7791	-0.6821 ₇₃	0.2972	-0.1323	0.0018	0.0008

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Page 19/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W21	1.3831	-0.0985	0.2316	-0.0122	0.0014	0.0001
	W22	1.2210	1.1251	0.2022	0.2119	0.0012	0.0013
	W23	1.4153	-1.1234	0.2377	-0.2113	0.0015	0.0013
	W24	1.2533	0.1002	0.2082	0.0129	0.0013	0.0001
Level 6	W13	1.9525	0.0010	0.3942	0.0004	0.0024	0.0000
	W14	-0.0233	0.7341	-0.0051	0.1649	0.0000	0.0010
	W15	1.4845	-0.1510	0.3001	-0.0332	0.0019	0.0002
	W16	1.4442	0.1524	0.2912	0.0338	0.0018	0.0002
	W17	-0.0858	1.0651	-0.0188	0.2371	0.0001	0.0015
	W18	0.0507	0.0360	0.0112	0.0103	0.0001	0.0001
	W19	1.4469	0.5513	0.2918	0.1239	0.0018	0.0008
	W20	1.4819	-0.5499	0.2995	-0.1234	0.0018	0.0008
	W21	1.1514	-0.0862	0.2335	-0.0172	0.0014	0.0001
	W22	1.0189	0.9131	0.2043	0.2031	0.0013	0.0013
	W23	1.1777	-0.9121	0.2392	-0.2027	0.0015	0.0013
	W24	1.0451	0.0873	0.2100	0.0176	0.0013	0.0001
Level 5	W13	1.5583	0.0006	0.3856	-0.0003	0.0024	0.0000
	W14	-0.0183	0.5692	-0.0050	0.1613	0.0000	0.0010
	W15	1.1844	-0.1178	0.2935	-0.0327	0.0018	0.0002
	W16	1.1530	0.1186	0.2848	0.0323	0.0018	0.0002
	W17	-0.0669	0.8281	-0.0185	0.2311	0.0001	0.0014
	W18	0.0395	0.0257	0.0110	0.0109	0.0001	0.0001
	W19	1.1550	0.4273	0.2854	0.1208	0.0018	0.0007
	W20	1.1824	-0.4265	0.2929	-0.1212	0.0018	0.0007
	W21	0.9179	-0.0690	0.2284	-0.0164	0.0014	0.0001
	W22	0.8146	0.7100	0.1997	0.1976	0.0012	0.0012
	W23	0.9385	-0.7094	0.2340	-0.1978	0.0014	0.0012
	W24	0.8351	0.0697	0.2054	0.0161	0.0013	0.0001
Level 4	W13	1.1727	0.0008	0.3979	-0.0004	0.0025	0.0000
	W14	-0.0133	0.4079	-0.0045	0.1410	0.0000	0.0009
	W15	0.8909	-0.0851	0.3025	-0.0306	0.0019	0.0002
	W16	0.8682	0.0863	0.2943	0.0300	0.0018	0.0002
	W17	-0.0484	0.5970	-0.0172	0.2086	0.0001	0.0013
	W18	0.0286	0.0148	0.0104	0.0029	0.0001	0.0000
	W19	0.8696	0.3065	0.2950	0.1054	0.0018	0.0007
	W20	0.8895	-0.3053	0.3018	-0.1061	0.0019	0.0007
	W21	0.6896	-0.0527	0.2347	-0.0208	0.0014	0.0001
	W22	0.6148	0.5125	0.2078	0.1789	0.0013	0.0011
	W23	0.7045	-0.5115	0.2398	-0.1794	0.0015	0.0011
	W24	0.6297	0.0536	0.2129	0.0203	0.0013	0.0001
Level 3	W13	0.7749	0.0013 ₇₄	0.3898	-0.0001	0.0024	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Drift

Page 20/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W14	-0.0087	0.2669	-0.0043	0.1369	0.0000	0.0008
	W15	0.5884	-0.0544	0.2962	-0.0290	0.0018	0.0002
	W16	0.5739	0.0563	0.2885	0.0288	0.0018	0.0002
	W17	-0.0312	0.3884	-0.0163	0.2009	0.0001	0.0012
	W18	0.0181	0.0119	0.0099	0.0045	0.0001	0.0000
	W19	0.5746	0.2011	0.2891	0.1026	0.0018	0.0006
	W20	0.5877	-0.1992	0.2956	-0.1028	0.0018	0.0006
	W21	0.4549	-0.0319	0.2295	-0.0183	0.0014	0.0001
	W22	0.4070	0.3335	0.2042	0.1723	0.0013	0.0011
	W23	0.4647	-0.3321	0.2344	-0.1724	0.0014	0.0011
	W24	0.4168	0.0333	0.2090	0.0182	0.0013	0.0001
Level 2	W13	0.3851	0.0014	0.3851	0.0014	0.0020	0.0000
	W14	-0.0044	0.1299	-0.0044	0.1299	0.0000	0.0007
	W15	0.2922	-0.0254	0.2922	-0.0254	0.0015	0.0001
	W16	0.2854	0.0275	0.2854	0.0275	0.0015	0.0001
	W17	-0.0149	0.1876	-0.0149	0.1876	0.0001	0.0010
	W18	0.0083	0.0074	0.0083	0.0074	0.0000	0.0000
	W19	0.2855	0.0985	0.2855	0.0985	0.0015	0.0005
	W20	0.2921	-0.0964	0.2921	-0.0964	0.0015	0.0005
	W21	0.2254	-0.0136	0.2254	-0.0136	0.0012	0.0001
	W22	0.2029	0.1613	0.2029	0.1613	0.0011	0.0008
	W23	0.2304	-0.1597	0.2304	-0.1597	0.0012	0.0008
	W24	0.2078	0.0151	0.2078	0.0151	0.0011	0.0001
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (190.000, 75.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	3.8696	0.0052	0.0905	0.0004	0.0006	0.0000
	W14	-0.0578	1.8401 ₇₅	-0.0036	0.1355	0.0000	0.0008

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Drift

Page 21/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W15	2.9505	-0.2997	0.0709	-0.0182	0.0004	0.0001
	W16	2.8539	0.3076	0.0649	0.0187	0.0004	0.0001
	W17	-0.2069	2.4075	-0.0127	0.1640	0.0001	0.0010
	W18	0.1202	0.3527	0.0073	0.0393	0.0000	0.0002
	W19	2.8588	1.3840	0.0652	0.1019	0.0004	0.0006
	W20	2.9456	-1.3762	0.0706	-0.1014	0.0004	0.0006
	W21	2.3031	0.0397	0.0586	0.0158	0.0004	0.0001
	W22	1.9852	2.0363	0.0392	0.1371	0.0002	0.0008
	W23	2.3681	-2.0304	0.0627	-0.1366	0.0004	0.0008
	W24	2.0502	-0.0339	0.0433	-0.0154	0.0003	0.0001
Level 12	W13	3.7791	0.0049	0.1691	0.0006	0.0010	0.0000
	W14	-0.0542	1.7046	-0.0045	0.1544	0.0000	0.0010
	W15	2.8797	-0.2816	0.1305	-0.0230	0.0008	0.0001
	W16	2.7889	0.2888	0.1231	0.0239	0.0008	0.0001
	W17	-0.1942	2.2435	-0.0159	0.1949	0.0001	0.0012
	W18	0.1129	0.3134	0.0092	0.0367	0.0001	0.0002
	W19	2.7937	1.2821	0.1235	0.1162	0.0008	0.0007
	W20	2.8749	-1.2748	0.1302	-0.1154	0.0008	0.0007
	W21	2.2444	0.0239	0.1048	0.0103	0.0006	0.0001
	W22	1.9460	1.8992	0.0804	0.1641	0.0005	0.0010
	W23	2.3054	-1.8938	0.1098	-0.1635	0.0007	0.0010
	W24	2.0070	-0.0184	0.0855	-0.0096	0.0005	0.0001
Level 11	W13	3.6099	0.0043	0.2417	0.0007	0.0015	0.0000
	W14	-0.0497	1.5502	-0.0047	0.1619	0.0000	0.0010
	W15	2.7491	-0.2585	0.1853	-0.0249	0.0011	0.0002
	W16	2.6658	0.2650	0.1773	0.0259	0.0011	0.0002
	W17	-0.1783	2.0485	-0.0170	0.2073	0.0001	0.0013
	W18	0.1038	0.2767	0.0099	0.0356	0.0001	0.0002
	W19	2.6702	1.1658	0.1777	0.1220	0.0011	0.0008
	W20	2.7447	-1.1594	0.1848	-0.1209	0.0011	0.0007
	W21	2.1397	0.0136	0.1464	0.0080	0.0009	0.0000
	W22	1.8656	1.7351	0.1202	0.1749	0.0007	0.0011
	W23	2.1956	-1.7303	0.1517	-0.1741	0.0009	0.0011
	W24	1.9215	-0.0088	0.1255	-0.0073	0.0008	0.0000
Level 10	W13	3.3682	0.0036	0.3022	0.0011	0.0019	0.0000
	W14	-0.0450	1.3882	-0.0052	0.1691	0.0000	0.0010
	W15	2.5639	-0.2336	0.2309	-0.0264	0.0014	0.0002
	W16	2.4885	0.2390	0.2224	0.0281	0.0014	0.0002
	W17	-0.1613	1.8413	-0.0182	0.2188	0.0001	0.0014
	W18	0.0938	0.2411	0.0103	0.0349	0.0001	0.0002
	W19	2.4925	1.0439	0.2227	0.1277	0.0014	0.0008
	W20	2.5599	-1.0385	0.2306	-0.1260	0.0014	0.0008

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Page 22/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 9	W21	1.9933	0.0056	0.1809	0.0064	0.0011	0.0000
	W22	1.7454	1.5602	0.1532	0.1851	0.0009	0.0011
	W23	2.0439	-1.5562	0.1868	-0.1839	0.0012	0.0011
	W24	1.7960	-0.0015	0.1591	-0.0051	0.0010	0.0000
	W13	3.0661	0.0025	0.3411	0.0009	0.0021	0.0000
	W14	-0.0397	1.2191	-0.0055	0.1761	0.0000	0.0011
	W15	2.3330	-0.2072	0.2602	-0.0274	0.0016	0.0002
	W16	2.2661	0.2110	0.2514	0.0288	0.0016	0.0002
	W17	-0.1431	1.6225	-0.0190	0.2270	0.0001	0.0014
	W18	0.0835	0.2062	0.0107	0.0372	0.0001	0.0002
	W19	2.2697	0.9162	0.2517	0.1328	0.0016	0.0008
	W20	2.3293	-0.9124	0.2600	-0.1314	0.0016	0.0008
Level 8	W21	1.8124	-0.0008	0.2032	0.0074	0.0013	0.0000
	W22	1.5922	1.3751	0.1743	0.1918	0.0011	0.0012
	W23	1.8571	-1.3723	0.2094	-0.1908	0.0013	0.0012
	W24	1.6369	0.0036	0.1806	-0.0064	0.0011	0.0000
	W13	2.7250	0.0016	0.3815	0.0004	0.0024	0.0000
	W14	-0.0342	1.0429	-0.0055	0.1703	0.0000	0.0011
	W15	2.0728	-0.1798	0.2906	-0.0278	0.0018	0.0002
	W16	2.0147	0.1822	0.2817	0.0284	0.0017	0.0002
	W17	-0.1241	1.3955	-0.0192	0.2228	0.0001	0.0014
	W18	0.0728	0.1689	0.0110	0.0327	0.0001	0.0002
	W19	2.0181	0.7834	0.2820	0.1280	0.0017	0.0008
	W20	2.0694	-0.7810	0.2903	-0.1275	0.0018	0.0008
Level 7	W21	1.6092	-0.0081	0.2262	0.0036	0.0014	0.0000
	W22	1.4179	1.1833	0.1968	0.1884	0.0012	0.0012
	W23	1.6477	-1.1814	0.2324	-0.1880	0.0014	0.0012
	W24	1.4564	0.0100	0.2030	-0.0032	0.0013	0.0000
	W13	2.3435	0.0013	0.3910	0.0005	0.0024	0.0000
	W14	-0.0287	0.8726	-0.0053	0.1697	0.0000	0.0010
	W15	1.7822	-0.1519	0.2977	-0.0277	0.0018	0.0002
	W16	1.7330	0.1538	0.2887	0.0284	0.0018	0.0002
	W17	-0.1049	1.1727	-0.0192	0.2222	0.0001	0.0014
	W18	0.0619	0.1363	0.0111	0.0324	0.0001	0.0002
	W19	1.7361	0.6554	0.2892	0.1276	0.0018	0.0008
	W20	1.7791	-0.6535	0.2972	-0.1269	0.0018	0.0008
Level 6	W21	1.3831	-0.0117	0.2316	0.0035	0.0014	0.0000
	W22	1.2210	0.9949	0.2022	0.1880	0.0012	0.0012
	W23	1.4153	-0.9934	0.2377	-0.1874	0.0015	0.0012
	W24	1.2533	0.0132	0.2082	-0.0030	0.0013	0.0000
Level 6	W13	1.9525	0.0008	0.3942	0.0003	0.0024	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Drift

Page 23/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W14	-0.0233	0.7029	-0.0051	0.1581	0.0000	0.0010
	W15	1.4845	-0.1242	0.3001	-0.0273	0.0019	0.0002
	W16	1.4442	0.1254	0.2912	0.0278	0.0018	0.0002
	W17	-0.0858	0.9505	-0.0188	0.2118	0.0001	0.0013
	W18	0.0507	0.1039	0.0112	0.0253	0.0001	0.0002
	W19	1.4469	0.5278	0.2918	0.1188	0.0018	0.0007
	W20	1.4819	-0.5266	0.2995	-0.1183	0.0018	0.0007
	W21	1.1514	-0.0152	0.2335	-0.0015	0.0014	0.0000
	W22	1.0189	0.8069	0.2043	0.1797	0.0013	0.0011
	W23	1.1777	-0.8060	0.2392	-0.1794	0.0015	0.0011
	W24	1.0451	0.0161	0.2100	0.0019	0.0013	0.0000
Level 5	W13	1.5583	0.0005	0.3856	-0.0002	0.0024	0.0000
	W14	-0.0183	0.5448	-0.0050	0.1547	0.0000	0.0010
	W15	1.1844	-0.0969	0.2935	-0.0269	0.0018	0.0002
	W16	1.1530	0.0976	0.2848	0.0266	0.0018	0.0002
	W17	-0.0669	0.7387	-0.0185	0.2066	0.0001	0.0013
	W18	0.0395	0.0786	0.0110	0.0255	0.0001	0.0002
	W19	1.1550	0.4090	0.2854	0.1159	0.0018	0.0007
	W20	1.1824	-0.4083	0.2929	-0.1162	0.0018	0.0007
	W21	0.9179	-0.0137	0.2284	-0.0011	0.0014	0.0000
	W22	0.8146	0.6272	0.1997	0.1749	0.0012	0.0011
	W23	0.9385	-0.6267	0.2340	-0.1751	0.0014	0.0011
	W24	0.8351	0.0142	0.2054	0.0008	0.0013	0.0000
Level 4	W13	1.1727	0.0007	0.3979	-0.0004	0.0025	0.0000
	W14	-0.0133	0.3902	-0.0045	0.1350	0.0000	0.0008
	W15	0.8909	-0.0700	0.3025	-0.0252	0.0019	0.0002
	W16	0.8682	0.0710	0.2943	0.0247	0.0018	0.0002
	W17	-0.0484	0.5321	-0.0172	0.1858	0.0001	0.0011
	W18	0.0286	0.0532	0.0104	0.0167	0.0001	0.0001
	W19	0.8696	0.2931	0.2950	0.1010	0.0018	0.0006
	W20	0.8895	-0.2921	0.3018	-0.1015	0.0019	0.0006
	W21	0.6896	-0.0126	0.2347	-0.0064	0.0014	0.0000
	W22	0.6148	0.4523	0.2078	0.1578	0.0013	0.0010
	W23	0.7045	-0.4515	0.2398	-0.1582	0.0015	0.0010
	W24	0.6297	0.0134	0.2129	0.0059	0.0013	0.0000
Level 3	W13	0.7749	0.0010	0.3898	-0.0001	0.0024	0.0000
	W14	-0.0087	0.2551	-0.0043	0.1312	0.0000	0.0008
	W15	0.5884	-0.0448	0.2962	-0.0238	0.0018	0.0001
	W16	0.5739	0.0463	0.2885	0.0237	0.0018	0.0001
	W17	-0.0312	0.3463	-0.0163	0.1791	0.0001	0.0011
	W18	0.0181	0.0364	0.0099	0.0177	0.0001	0.0001
	W19	0.5746	0.1921	0.2891	0.0984	0.0018	0.0006

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Page 24/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	0.5877	-0.1906	0.2956	-0.0985	0.0018	0.0006
	W21	0.4549	-0.0063	0.2295	-0.0045	0.0014	0.0000
	W22	0.4070	0.2945	0.2042	0.1521	0.0013	0.0009
	W23	0.4647	-0.2933	0.2344	-0.1522	0.0014	0.0009
	W24	0.4168	0.0074	0.2090	0.0045	0.0013	0.0000
Level 2	W13	0.3851	0.0011	0.3851	0.0011	0.0020	0.0000
	W14	-0.0044	0.1239	-0.0044	0.1239	0.0000	0.0006
	W15	0.2922	-0.0210	0.2922	-0.0210	0.0015	0.0001
	W16	0.2854	0.0226	0.2854	0.0226	0.0015	0.0001
	W17	-0.0149	0.1672	-0.0149	0.1672	0.0001	0.0009
	W18	0.0083	0.0187	0.0083	0.0187	0.0000	0.0001
	W19	0.2855	0.0938	0.2855	0.0938	0.0015	0.0005
	W20	0.2921	-0.0921	0.2921	-0.0921	0.0015	0.0005
	W21	0.2254	-0.0017	0.2254	-0.0017	0.0012	0.0000
	W22	0.2029	0.1424	0.2029	0.1424	0.0011	0.0007
	W23	0.2304	-0.1411	0.2304	-0.1411	0.0012	0.0007
	W24	0.2078	0.0030	0.2078	0.0030	0.0011	0.0000
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (190.000, 0.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	3.8738	0.0052	0.0908	0.0004	0.0006	0.0000
	W14	0.2350	1.8401	0.0146	0.1355	0.0001	0.0008
	W15	2.7088	-0.2997	0.0562	-0.0182	0.0003	0.0001
	W16	3.1019	0.3076	0.0801	0.0187	0.0005	0.0001
	W17	0.8413	2.4075	0.0512	0.1640	0.0003	0.0010
	W18	-0.4888	0.3527	-0.0293	0.0393	0.0002	0.0002
	W19	3.0816	1.3840	0.0791	0.1019	0.0005	0.0006
	W20	2.7291	-1.3762	0.0572	-0.1014	0.0004	0.0006

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Page 25/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W21	1.6650	0.0397	0.0202	0.0158	0.0001	0.0001
	W22	2.9574	2.0363	0.0984	0.1371	0.0006	0.0008
	W23	1.4007	-2.0304	0.0038	-0.1366	0.0000	0.0008
	W24	2.6930	-0.0339	0.0820	-0.0154	0.0005	0.0001
Level 12	W13	3.7830	0.0049	0.1696	0.0006	0.0010	0.0000
	W14	0.2204	1.7046	0.0183	0.1544	0.0001	0.0010
	W15	2.6526	-0.2816	0.1120	-0.0230	0.0007	0.0001
	W16	3.0219	0.2888	0.1423	0.0239	0.0009	0.0001
	W17	0.7901	2.2435	0.0649	0.1949	0.0004	0.0012
	W18	-0.4595	0.3134	-0.0374	0.0367	0.0002	0.0002
	W19	3.0025	1.2821	0.1409	0.1162	0.0009	0.0007
	W20	2.6719	-1.2748	0.1134	-0.1154	0.0007	0.0007
	W21	1.6448	0.0239	0.0559	0.0103	0.0003	0.0001
	W22	2.8590	1.8992	0.1554	0.1641	0.0010	0.0010
	W23	1.3969	-1.8938	0.0353	-0.1635	0.0002	0.0010
	W24	2.6110	-0.0184	0.1348	-0.0096	0.0008	0.0001
Level 11	W13	3.6134	0.0043	0.2423	0.0007	0.0015	0.0000
	W14	0.2021	1.5502	0.0196	0.1619	0.0001	0.0010
	W15	2.5406	-0.2585	0.1652	-0.0249	0.0010	0.0002
	W16	2.8795	0.2650	0.1982	0.0259	0.0012	0.0002
	W17	0.7252	2.0485	0.0705	0.2073	0.0004	0.0013
	W18	-0.4221	0.2767	-0.0411	0.0356	0.0003	0.0002
	W19	2.8616	1.1658	0.1964	0.1220	0.0012	0.0008
	W20	2.5585	-1.1594	0.1670	-0.1209	0.0010	0.0007
	W21	1.5889	0.0136	0.0931	0.0080	0.0006	0.0000
	W22	2.7035	1.7351	0.2015	0.1749	0.0012	0.0011
	W23	1.3616	-1.7303	0.0710	-0.1741	0.0004	0.0011
	W24	2.4762	-0.0088	0.1795	-0.0073	0.0011	0.0000
Level 10	W13	3.3712	0.0036	0.3031	0.0011	0.0019	0.0000
	W14	0.1825	1.3882	0.0219	0.1691	0.0001	0.0010
	W15	2.3754	-0.2336	0.2096	-0.0264	0.0013	0.0002
	W16	2.6813	0.2390	0.2450	0.0281	0.0015	0.0002
	W17	0.6547	1.8413	0.0761	0.2188	0.0005	0.0014
	W18	-0.3810	0.2411	-0.0432	0.0349	0.0003	0.0002
	W19	2.6652	1.0439	0.2437	0.1277	0.0015	0.0008
	W20	2.3915	-1.0385	0.2108	-0.1260	0.0013	0.0008
	W21	1.4958	0.0056	0.1248	0.0064	0.0008	0.0000
	W22	2.5020	1.5602	0.2408	0.1851	0.0015	0.0011
	W23	1.2906	-1.5562	0.1001	-0.1839	0.0006	0.0011
	W24	2.2967	-0.0015	0.2161	-0.0051	0.0013	0.0000
Level 9	W13	3.0681	0.0025 ₈₀	0.3418	0.0009	0.0021	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Building Code: IBC

Drift

Page 26/28

02/25/21 14:41:25

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W14	0.1605	1.2191	0.0229	0.1761	0.0001	0.0011
	W15	2.1658	-0.2072	0.2382	-0.0274	0.0015	0.0002
	W16	2.4364	0.2110	0.2745	0.0288	0.0017	0.0002
	W17	0.5785	1.6225	0.0785	0.2270	0.0005	0.0014
	W18	-0.3378	0.2062	-0.0442	0.0372	0.0003	0.0002
	W19	2.4215	0.9162	0.2735	0.1328	0.0017	0.0008
	W20	2.1807	-0.9124	0.2392	-0.1314	0.0015	0.0008
	W21	1.3710	-0.0008	0.1455	0.0074	0.0009	0.0000
	W22	2.2612	1.3751	0.2648	0.1918	0.0016	0.0012
	W23	1.1904	-1.3723	0.1197	-0.1908	0.0007	0.0012
	W24	2.0806	0.0036	0.2390	-0.0064	0.0015	0.0000
Level 8	W13	2.7263	0.0016	0.3818	0.0004	0.0024	0.0000
	W14	0.1376	1.0429	0.0224	0.1703	0.0001	0.0011
	W15	1.9276	-0.1798	0.2682	-0.0278	0.0017	0.0002
	W16	2.1618	0.1822	0.3045	0.0284	0.0019	0.0002
	W17	0.5000	1.3955	0.0782	0.2228	0.0005	0.0014
	W18	-0.2936	0.1689	-0.0446	0.0327	0.0003	0.0002
	W19	2.1479	0.7834	0.3032	0.1280	0.0019	0.0008
	W20	1.9415	-0.7810	0.2696	-0.1275	0.0017	0.0008
	W21	1.2255	-0.0081	0.1677	0.0036	0.0010	0.0000
	W22	1.9964	1.1833	0.2871	0.1884	0.0018	0.0012
	W23	1.0707	-1.1814	0.1425	-0.1880	0.0009	0.0012
	W24	1.8416	0.0100	0.2619	-0.0032	0.0016	0.0000
Level 7	W13	2.3445	0.0013	0.3914	0.0005	0.0024	0.0000
	W14	0.1152	0.8726	0.0217	0.1697	0.0001	0.0010
	W15	1.6594	-0.1519	0.2754	-0.0277	0.0017	0.0002
	W16	1.8573	0.1538	0.3117	0.0284	0.0019	0.0002
	W17	0.4218	1.1727	0.0776	0.2222	0.0005	0.0014
	W18	-0.2490	0.1363	-0.0451	0.0324	0.0003	0.0002
	W19	1.8448	0.6554	0.3098	0.1276	0.0019	0.0008
	W20	1.6720	-0.6535	0.2773	-0.1269	0.0017	0.0008
	W21	1.0578	-0.0117	0.1727	0.0035	0.0011	0.0000
	W22	1.7093	0.9949	0.2920	0.1880	0.0018	0.0012
	W23	0.9282	-0.9934	0.1483	-0.1874	0.0009	0.0012
	W24	1.5797	0.0132	0.2676	-0.0030	0.0017	0.0000
Level 6	W13	1.9531	0.0008	0.3945	0.0003	0.0024	0.0000
	W14	0.0936	0.7029	0.0205	0.1581	0.0001	0.0010
	W15	1.3841	-0.1242	0.2780	-0.0273	0.0017	0.0002
	W16	1.5456	0.1254	0.3137	0.0278	0.0019	0.0002
	W17	0.3442	0.9505	0.0758	0.2118	0.0005	0.0013
	W18	-0.2038	0.1039	-0.0451	0.0253	0.0003	0.0002
	W19	1.5350	0.5278 ₈₁	0.3112	0.1188	0.0019	0.0007

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 27/28

02/25/21 14:41:25

Building Code: IBC

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	1.3947	-0.5266	0.2805	-0.1183	0.0017	0.0007
	W21	0.8852	-0.0152	0.1747	-0.0015	0.0011	0.0000
	W22	1.4173	0.8069	0.2922	0.1797	0.0018	0.0011
	W23	0.7799	-0.8060	0.1516	-0.1794	0.0009	0.0011
	W24	1.3121	0.0161	0.2691	0.0019	0.0017	0.0000
Level 5	W13	1.5587	0.0005	0.3854	-0.0002	0.0024	0.0000
	W14	0.0731	0.5448	0.0199	0.1547	0.0001	0.0010
	W15	1.1061	-0.0969	0.2718	-0.0269	0.0017	0.0002
	W16	1.2319	0.0976	0.3063	0.0266	0.0019	0.0002
	W17	0.2683	0.7387	0.0734	0.2066	0.0005	0.0013
	W18	-0.1587	0.0786	-0.0436	0.0255	0.0003	0.0002
	W19	1.2238	0.4090	0.3039	0.1159	0.0019	0.0007
	W20	1.1142	-0.4083	0.2741	-0.1162	0.0017	0.0007
	W21	0.7105	-0.0137	0.1711	-0.0011	0.0011	0.0000
	W22	1.1252	0.6272	0.2848	0.1749	0.0018	0.0011
	W23	0.6283	-0.6267	0.1488	-0.1751	0.0009	0.0011
	W24	1.0430	0.0142	0.2624	0.0008	0.0016	0.0000
Level 4	W13	1.1733	0.0007	0.3976	-0.0004	0.0025	0.0000
	W14	0.0532	0.3902	0.0180	0.1350	0.0001	0.0008
	W15	0.8343	-0.0700	0.2820	-0.0252	0.0017	0.0002
	W16	0.9256	0.0710	0.3143	0.0247	0.0019	0.0002
	W17	0.1949	0.5321	0.0682	0.1858	0.0004	0.0011
	W18	-0.1151	0.0532	-0.0413	0.0167	0.0003	0.0001
	W19	0.9199	0.2931	0.3116	0.1010	0.0019	0.0006
	W20	0.8401	-0.2921	0.2847	-0.1015	0.0018	0.0006
	W21	0.5394	-0.0126	0.1806	-0.0064	0.0011	0.0000
	W22	0.8404	0.4523	0.2869	0.1578	0.0018	0.0010
	W23	0.4795	-0.4515	0.1603	-0.1582	0.0010	0.0010
	W24	0.7806	0.0134	0.2667	0.0059	0.0016	0.0000
Level 3	W13	0.7757	0.0010	0.3897	-0.0001	0.0024	0.0000
	W14	0.0352	0.2551	0.0172	0.1312	0.0001	0.0008
	W15	0.5523	-0.0448	0.2768	-0.0238	0.0017	0.0001
	W16	0.6113	0.0463	0.3078	0.0237	0.0019	0.0001
	W17	0.1267	0.3463	0.0654	0.1791	0.0004	0.0011
	W18	-0.0738	0.0364	-0.0396	0.0177	0.0002	0.0001
	W19	0.6082	0.1921	0.3052	0.0984	0.0019	0.0006
	W20	0.5554	-0.1906	0.2794	-0.0985	0.0017	0.0006
	W21	0.3588	-0.0063	0.1779	-0.0045	0.0011	0.0000
	W22	0.5535	0.2945	0.2798	0.1521	0.0017	0.0009
	W23	0.3192	-0.2933	0.1586	-0.1522	0.0010	0.0009
	W24	0.5138	0.0074	0.2605	0.0045	0.0016	0.0000

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RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version

Page 28/28

02/25/21 14:41:25

Building Code: IBC

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 2	W13	0.3860	0.0011	0.3860	0.0011	0.0020	0.0000
	W14	0.0181	0.1239	0.0181	0.1239	0.0001	0.0006
	W15	0.2755	-0.0210	0.2755	-0.0210	0.0014	0.0001
	W16	0.3035	0.0226	0.3035	0.0226	0.0016	0.0001
	W17	0.0613	0.1672	0.0613	0.1672	0.0003	0.0009
	W18	-0.0342	0.0187	-0.0342	0.0187	0.0002	0.0001
	W19	0.3031	0.0938	0.3031	0.0938	0.0016	0.0005
	W20	0.2759	-0.0921	0.2759	-0.0921	0.0014	0.0005
	W21	0.1809	-0.0017	0.1809	-0.0017	0.0009	0.0000
	W22	0.2736	0.1424	0.2736	0.1424	0.0014	0.0007
	W23	0.1606	-0.1411	0.1606	-0.1411	0.0008	0.0007
	W24	0.2533	0.0030	0.2533	0.0030	0.0013	0.0000
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

BRACED FRAME DESIGN

SAMPLE CALCS.

This publication is

RAM Structural System

Member Code Check

RAM Frame 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version 02/24/21 17:40:44

Building Code: IBC

Steel Code: AISC360-16 LRFD

BRACE INFORMATION:

Story Level = Level 8 Frame Number = 0 Brace Number = 11
 Fy (ksi) = 50.00
 Brace Size = HSS7X7X1/2

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft) _____	20.18	20.18
Lu for Bending (ft) _____	20.18	20.18
K _____	1.00	1.00

CONTROLLING BRACE FORCES - SHEAR

Load Combination: 1.400 D + 1.400 ND1

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

SHEAR CHECK:

Vux (kip) = -0.00	0.90Vnx (kip) = 140.74	Vux/0.90Vnx = 0.000
Vuy (kip) = -0.00	0.90Vny (kip) = 140.74	Vuy/0.90Vny = 0.000

CONTROLLING BRACE FORCES - AXIAL

Load Combination: 1.200 D - 1.200 ND2 + 0.500 Lp - 0.500 NL2 + 0.500 Rfp - 0.500 NR2 - 1.000 W2

AXIAL CHECK:

Pu (kip) = 236.27	0.90Pnx (kip) = 281.40	Pu/0.90Pnx = 0.840
	0.90Pny (kip) = 281.40	Pu/0.90Pny = 0.840
	0.90Pn (kip) = 281.40	Pu/0.90Pn = 0.840

CONTROLLING BRACE FORCES - FLEXURE

Load Combination: 1.200 D - 1.200 ND2 + 0.500 Lp - 0.500 NL2 + 0.500 Rfp - 0.500 NR2 - 1.000 W2

Axial	Load (kip) _____	236.27
Moment	Top	Mux (kip-ft) _____
		Muy (kip-ft) _____
Moment	Bot.	Mux (kip-ft) _____
		Muy (kip-ft) _____

CALCULATED PARAMETERS:

Pu (kip) = 236.27	0.90Pn (kip) = 281.40
Mux (kip-ft) = 0.00	0.90Mnx (kip-ft) = 104.63
Muy (kip-ft) = 0.00	0.90Mny (kip-ft) = 104.63
KL/Rx = 91.93	KL/Ry = 91.93
Cbx = 1.00	

INTERACTION EQUATION:

Pu/0.90*Pn=0.840

Pr/Pc = 0.840

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SCBF BRACE CAPACITY

Brace Size HSS7X7X1/2
 Shape Profile Square
 Grade A500 Gr. C

Width-Thickness Ratio 12
 Limiting Width-Thicknes Ratio 33.71646482
 Element Non-Slender Yes

Gross Area (in^2) 11.6
 Fy (ksi) 50
 Ry (unitless) 1.3

rx (in) 2.63
 ry (in) 2.63
 r (in) 2.63

Horizontal Length (ft) 15 Angle 0.837981
 Vertical Length (ft) 13.5
 Brace Length (ft) 20.18043607

K (unitless) 1

KL (in) 242.1652328

KL/r (unitless) 92.0780353 4.71*SQRT(E/Fy) 99.48629

Fcre (ksi) 29.034882

Tension Strength (kip) 754 Vertical Component 504.3994

Compression Strength (kip) 384.0417688 Vertical Component 256.9104

Buckled Compression Strength (kip) 115.2125306 Vertical Component 77.07312

Horizontal Component 560.4438

Horizontal Component 285.456

Horizontal Component 85.6368

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SCBF BRACE TO BEAM CONNECTION

EXAMPLE CALC: SCBF BRACE-TO-BEAM CONNECTION

PROPERTIES: ASTM A500 GRADE C (SQUARE HSS)

$$F_y = 50 \text{ ksi} \quad F_u = 62 \text{ ksi}$$

: ASTM A572 (PLATES & BARS)

$$F_y = 50 \text{ ksi} \quad F_u = 65 \text{ ksi}$$

AISC SEISMIC PROVISIONS SECTION F2.3(i), F2.3(ii), & SECTION F2.6c

EXPECTED TENSILE STRENGTH OF BRACES

HSS 7x7x1/2 PROPERTIES

$$t_{nom} = 0.5 \text{ in} \quad t_{des} = 0.465 \text{ in} \quad A = 11.6 \text{ in}^2 \quad r = 2.63 \text{ in}$$

W16x67 PROPERTIES

$$d = 16.3 \text{ in} \quad t_w = 0.395 \text{ in} \quad t_f = 0.665 \text{ in} \quad k_{des} = 1.07$$

AISC SEISMIC PROVISIONS TABLE A3.1: $R_y = 1.3$, $R_T = 1.2$

$$P_{TENSION} = R_y F_y A_g$$

$$= 1.3(50 \text{ ksi})(11.6 \text{ in}^2)$$

$$= 754 \text{ k}$$

EXPECTED STRENGTH IN COMPRESSION OF BRACES

$$KL/r = \frac{1.0(20.1667' \times 12'')}{2.63 \text{ in}} = 92.0$$

$$4.71 \sqrt{\frac{E}{R_y F_y}} = 4.71 \sqrt{\frac{29,000 \text{ ksi}}{1.3(50 \text{ ksi})}} = 99.5 \quad \therefore \frac{KL}{r} < 4.71 \sqrt{\frac{E}{R_y F_y}}$$

$$F_e = \frac{\pi^2 E}{\left(\frac{KL}{r}\right)^2} = \frac{\pi^2 (29,000 \text{ ksi})}{(92.0)^2} = 33.82 \text{ ksi}$$

$$F_{CR} = \left[0.658^{\frac{R_y F_y}{F_e}} \right] R_y F_y = \left[0.658^{\left(\frac{1.3 \times 50}{33.82}\right)} \right] 1.3(50 \text{ ksi})$$

$$F_{CR} = 29.1 \text{ ksi}$$

EXPECTED COMPRESSIVE STRENGTH OF BRACES

$$\begin{aligned} P_{\text{COMPRESSION}} &= 1.14 F_{CR} A_g \\ &= 1.14(29.1)(11.6 \text{ in}^2) \\ &= 384 \text{ k} \end{aligned}$$

EXPECTED POST BUCKLING STRENGTH

$$\begin{aligned} 0.3 P_{\text{COMPRESSION}} &= 0.3(384 \text{ k}) \\ &= 115.2 \text{ k} \end{aligned}$$

(EXAMPLE OF BRACE GEOMETRY)

REQUIRED STRENGTH OF BRACING CONNECTIONS
ACCORDING TO AISC SEISMIC PROVISIONS SECTION F2.3i

REQUIRED STRENGTH OF BRACING CONNECTIONS
ACCORDING TO AISC SEISMIC PROVISIONS SECTION F2.3ii

MINIMUM LENGTH, l , REQUIRED FOR BRACE-GUSSET LAP

• EXPECTED BRACE RUPTURE LENGTH, $R_t F_u$ IS USED TO DETERMINE
AVAILABLE STRENGTH IN ACCORDANCE W/ AISC SEISMIC PROVISIONS SECTION A3.2

$$R_t = 1.2 \text{ (TABLE A3.1)}$$

$$R_n = 0.60 R_t F_u A_{nv} \text{ (AISC SPEC SECTION J4-4)}$$

$$A_{nv} = 4(l) t_{des}$$

$$\begin{aligned} \therefore l &\geq \frac{P_u}{0.6(R_t)F_u(4 t_{des})} \\ &\geq \frac{754^k}{0.75(0.6)(1.2)(62^{k/ST})(4 \times 0.465_{in})} \end{aligned}$$

$$\geq 12.1_{in} \text{ (MIN REQ FOR SHEAR RUPTURE IN BRACE WALL)}$$

SIZE OF WELD BTWN BRACE & GUSSET

$$\phi R_n = 1.392 D L \text{ (AISC MANUAL Eq 8.2a)}$$

TRY $\frac{5}{16}$ WELD

$$754k = 1.392(5)(L)$$

$$L = 108.4 \text{ inch} / 4 \text{ SIDES}$$

$$L = 28 \text{ inch/SIDE}$$

CHECK BLOCK SHEAR

$$R_n = 0.6 F_u A_{nv} + U_{bs} F_u A_{nt} \leq 0.60 F_y A_{gv} + U_{bs} F_u A_{nt}$$

$$A_{nv} = A_{gv} \text{ \& } F_u > F_y \therefore \text{RIGHT EQ CONTROLS}$$

$$U_{bs} = 1.0$$

$$\begin{aligned} 0.60 F_y A_{gv} &= 0.60(50 \text{ ksi})(2)(1)(t_p) \\ &= 0.60(50 \text{ ksi})(2)(28 \text{ in})(t_p) \\ &= 1680 t_p \end{aligned}$$

$$\begin{aligned} U_{bs} F_u A_{nt} &= 1.0(F_u)(D_{BRACE})(t_p) \\ &= 1.0(65 \text{ ksi})(7 \text{ in})(t_p) \\ &= 455 t_p \end{aligned}$$

$$\phi R_n = 0.75 (0.6 F_y A_{gv} + U_{bs} F_u A_{nt}) \geq P_u$$

$$t_p \geq \frac{754k}{0.75(1680 \text{ k/in} + 455 \text{ k/in})}$$

$$\geq 0.47 \text{ in} \quad (\text{SAY OKAY TO 1" THICK PLATE})$$

CHECK TENSILE YIELDING

$$\phi R_n = F_y A_g \phi$$

$$754 \text{ k} = (50 \text{ ksi}) A_g (0.9)$$

$$A_g = 16.8 \text{ in}^2 \quad \text{YIELDING LINE} \approx 19"$$

$$\therefore t_p = 1" \text{ WORKS}$$

NOTE: ACTUAL ANGLE CHOSEN IS 10° WHICH IS LESS THAN 30°

$\therefore$ PLATE MEETS WHITMORE WIDTH CRITERIA

CHECK BRACE EFFECTIVE NET AREA

• AISC SEISMIC PROVISIONS SECTION F2.5b(3) $A_e > A_g$

$$A_n = A_g - 2(t_p + 2(\text{GAP})) L_{des}$$

• 1" GAP ES OF BRACE FOR EASE DURING ERECTION

$$A_n = 11.6 - 2[1" + 2(1")] 0.465$$

$$= 8.81 \text{ in}^2$$

• AISC SPEC TABLE D3.1 BECAUSE $l > 1.3 D$, $U = 1.0$

$$A_e = 1.0(8.81 \text{ in}^2)$$

• $A_e < A_g \therefore$ BRACE REIN REQ'D

• TRY (2) $1\frac{1}{2}" \times 1\frac{1}{2}"$ FLAT BAR ES (GRADE 50)

$$r_1 = (3.5 - \frac{1}{2} - 1\frac{1}{2})/2 + \frac{1}{2} = 1.75"$$

$$A_1 = (2)(\frac{1}{2})(3\frac{1}{2} - \frac{1}{2} - \frac{1}{2}) = 2.5"$$

$$\bar{x}_1 A_1 = 1.75 \times 2.5 \text{ in}^2 = 4.375 \text{ in}^3$$

$$r_2 = 3\frac{1}{2} - \frac{1}{2} \div 2 = 3.25"$$

$$A_2 = \frac{1}{2} \times 7 = 3.5"$$

$$\bar{x}_2 A_2 = 3.25 \times 3.5 \text{ in}^2 = 11.375 \text{ in}^3$$

$$r_3 = 3.5 + 1\frac{1}{2} / 2 = 4.25"$$

$$A_3 = 1\frac{1}{2} \times 1\frac{1}{2} = 2.25 \text{ in}^2$$

$$\bar{x}_3 A_3 = 4.25 \text{ in} \times 2.25 \text{ in}^2 = 9.5625 \text{ in}^3$$

$$\Sigma \bar{x} A = 25.3125$$

$$\Sigma A = 8.25$$

$$\bar{x} = \frac{\Sigma \bar{x} A}{\Sigma A} = \left(\frac{25.3125 \text{ in}^3}{8.25 \text{ in}^2} \right) = 3.068 \text{ in}$$

° AISC SPEC TABLE D3.1, CASE 2

$$U = 1 - \frac{\bar{x}}{l}$$

$$= 1 - \frac{3.068}{20.1667}$$

$$= 0.848$$

$$A_n = A_2 (\text{BRACE}) + A_m$$

$$= 11.6 \text{ in}^2 + 2(1.5)(1.5)$$

$$= 16.1 \text{ in}^2$$

$$A_e = U A_n = 0.848(16.1 \text{ in}^2)$$

$$A_e = 13.65 \text{ in}^2 > A_g = 11.6 \text{ in}^2 \quad \therefore \text{SAY OKAY}$$

- DEVELOP THE EXPECTED STRENGTH OF FLAT BAR IN ACCORDANCE W/ SEISMIC PROVISIONS SECTION F2.5b (3)(ii)

$$R_y F_y A_{fb} = 1.1 (50^{ksi}) (1.5 \times 1.5) \quad R_y = 1.1 \text{ (TABLE A3.1)}$$

$$= 124 \text{ KIPS}$$

- TRY $\frac{5}{16}$ WELD

$$l_w = 124^k / (2 \times 1.312 \text{ in}) (5)$$

$$= 8.9 \text{ in}$$

- WELD MUST BE DEVELOPED ON EACH END OF BRACE

$$\therefore \text{WELD LENGTH} = 9" + (\text{EXTENT OF SLOT}) + 9" \text{ OR } 18" + x$$

FORCES AT THE GUSSET-TO-BEAM INTERFACE

$$V_u = 754 \cos(42^\circ)$$

$$= 560^k$$

1/4" WELD

9" OFFSET

c = 3"

$$\text{NORMAL } (N_u) = 754 \sin(42^\circ)$$

$$= 505^k$$

- CONTACT LENGTH BTWN GUSSET & BEAM ~20"

THE LINE OF ACTION MISSES THE CENTROID BY ~3" (SEE REVIT)

$$\therefore \text{THE MOMENT } (M_u) = N_u (3")$$

$$= 505^k (3")$$

$$= 1515 \text{ k-in}$$

COMBINE N_u & M_u TO CREATE N_u (EQUIV)

$$N_u (\text{EQUIV}) = N_u + 4M_u / l_b$$

$$= 505^k + 4(1515 \text{ k-in}) / 24 \text{ in}$$

$$= 758 \text{ KIPS}$$

• STRESS IN GUSSET (TENSION)

$$f_{ua} = \frac{N_u (EQUIV)}{t_p l_b}$$

$$= \frac{758^k}{(1")(24")}$$

$$= 32$$

$$\phi F_y = 0.9(50^{ksi})$$

$$= 45^{ksi} > 32^{ksi}$$

• STRESS IN GUSSET (SHEAR)

$$f_{uv} = \frac{V_u}{t_p l_b}$$

$$= 560^k / (1")(24")$$

$$= 23.3^{ksi}$$

$$\phi 0.60 F_y = (1.0)(0.6)(50^{ksi})$$

$$= 30^{ksi} > 23.3^{ksi}$$

SIZE GUSSET-TO-BEAM WELD

$$\theta = \tan^{-1} \left(\frac{N_u (EQUIV)}{V_u} \right)$$

$$= \tan^{-1} \left(\frac{758^k}{560^k} \right)$$

$$= 53.5^\circ$$

• AISC SPEC J2.4 ALLOW INCREASE IN STRENGTH OF WELD

• WELD DUCTILITY FACTOR = 1.25 FROM AISC MAN PART 13

$$D_{req'd} = \frac{1.25 \sqrt{N_u^2 + V_u^2}}{2(1.392 \text{ k/in})(1 + 0.5 \sin^{1.5} \theta) l_b}$$

$$= \frac{1.25 \sqrt{758^2 + 560^2}}{2(1.392 \text{ k/in})(1 + 0.5 \sin^{1.5}(53.5)) (24")}$$

1.361

$$= 13 \text{ SIXTEENTHS}$$

CHECK BEAM WEB LOCAL YIELDING

$$R_{nw} = F_{yw} t_w (5k + l_b)$$

$$= 50 \text{ ksi} (0.375) (5(1.07) + 24")$$

$$= 551 \text{ k}$$

$$\phi R_n = 1.0(662 \text{ k})$$

$$= 550 \text{ k} > N_u = 758 \text{ k}$$

∴ ADD STIFFENER

CHECK BEAM WEB LOCAL CRIPPLING

$$\phi R_n = \phi 0.8 t_w^2 \left[1 + 3 \left(\frac{l_b}{d} \right) \left(\frac{t_w}{t_f} \right)^{1.5} \right] \sqrt{\frac{E F_y t_f'}{t_w}}$$

$$= 0.75 (0.8) (0.395)^2 \left[1 + 3 \left(\frac{24''}{16.3''} \right) \left(\frac{0.395}{0.665} \right)^{1.5} \right] \times 2829$$

$$\sqrt{\frac{29,000 \text{ ksi} (50 \text{ ksi}) (0.930 \text{ in})}{0.570 \text{ in}}}$$

$$= 435^k > 505^k = N_u$$

∴ ADD STIFFENER

NOTE: TOP BRACES ARE THE SAME AS BOTTOM SO WE CAN USE THE SAME CONNECTION

CHECK BEAM WEB SHEAR AT CENTERLINE OF CONNECTION

• COMPRESSION BRACE $V_u, N_u, \& M_u$ VALUES

$$V_u = 384^k \cos(42^\circ)$$

$$= 286^k$$

$$N_u = 384 \sin(42^\circ)$$

$$= 257^k$$

$$M_u = 257^k (3'')$$

$$= 771^k\text{-in}$$

$$V_{u_{max}} = 762^k$$

$$\phi V_n = 193^k < V_u$$

ADD DOUBLER PLATE

DOUBLER PLATE TO RUN 2" BEYOND MAX SHEAR LOAD

$$\therefore \text{PLATE} = 20 \times 13 \text{ (HEIGHT OF T VALUE)} \text{ CENTERED ON WEB}$$

FIND PLATE THICKNESS REQUIRED

$$\begin{aligned} \phi R_n &= 1.0(0.6 F_y A_{gv}) \\ &= 1.0(0.6)(50^{\text{ksi}})(13")(t_d)(2 \text{ PLATES}) \\ &= 780 t_d \end{aligned}$$

$$V_u - \phi V_n = 762^k - 193^k = 569^k$$

$$t_d = \frac{569^k}{780^k/in}$$

$$t_d = .729 \text{ IN}$$

$\therefore$ USE (2) $\frac{3}{4}$ " PLATES

USING INSTANTANEOUS CENTER OF ROTATION METHOD $\theta = 0^\circ$ (AISC MANUAL TABLE 8.8)

$$l = 13''$$

$$kl = 20 \quad k = 1.4$$

$$e_x = ad = 8''$$

$$a = 0.615$$

$$\therefore C = 7.11$$

$$C_1 = 1.0$$

$$\begin{aligned} D_{MIN} &= \frac{V_{POWDER}}{\phi C C_1 l} \\ &= \frac{569/2 \text{ PLATES}}{0.75(7.11)(1.0)(13'')} \\ &= 4.1 \end{aligned}$$

$\therefore$ USE (2) $13'' \times 20'' \times \frac{3}{4}''$ w/ $\frac{5}{16}$ WELD ALL AROUND

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EXAMPLE CALC: SCBF BRACE-TO-BEAM/COLUMN CONNECTION

PROPERTIES: ASTM A500 GRADE C

$$F_y = 50 \text{ ksi} \quad F_u = 62 \text{ ksi}$$

ASTM A572 (PLATES) & A992 (W-SHAPE)

$$F_y = 50 \text{ ksi} \quad F_u = 65 \text{ ksi}$$

HSS 7x7x1/2 PROPERTIES

$$t_{nom} = 0.5, t_{des} = 0.465 \quad A = 11.6 \text{ in}^2 \quad r = 2.63 \text{ in}$$

W16x67 PROPERTIES

$$d = 16.3 \text{ in} \quad t_w = 0.395 \quad t_f = 0.665 \quad k_{des} = 1.07$$

W18x130

$$A = 38.3 \text{ in}^2 \quad d = 19.3 \text{ in} \quad t_w = 0.67 \text{ in} \quad t_f = 1.2 \text{ in} \\ k_{des} = 1.6 \text{ in} \quad T = 15 \frac{1}{8} \text{ in} \quad r_y = 2.70 \text{ in}$$

W14x211

$$d = 15.7 \text{ in} \quad t_w = 0.48 \text{ in} \quad t_f = 1.56 \text{ in} \quad k_{des} = 2.16 \text{ in}$$

5-120 5-206

AISC SEISMIC PROVISIONS
SECTION F2.3i

AISC SEISMIC PROVISIONS
SECTION F2.3ii

$$P_x = (\cos 42^\circ) [\sum \text{BRACES BELOW} - \sum \text{BRACES ABOVE}]$$

$$= (\cos 42^\circ) [(754 + 384) - (754 + 384)]$$

$$= 0$$

∴ NO AXIAL FORCES FROM SEISMIC PROVISIONS

F2.3(i)

$$A_u = \cos(42^\circ)(754^k - 384^k)$$

$$= 275^k$$

$$V_u = 17.5^k \quad (\text{FROM RAM})$$

F2.3(ii)

$$A_u = \cos(42^\circ)(754^k - 115^k)$$

$$= 475^k$$

$$V_u = 17.5^k \quad (\text{FROM RAM}) \quad 135-231$$

SEE EXAMPLE CALC FOR SCBF BRACE-TO-BEAM CONNECTION
 FOR ALL CALCULATIONS BTWN THE BRACE AND THE GUSSET

FORCES @ THE BEAM TO GUSSET INTERFACE

$$V_u = 560^k$$

$$H_u = 505^k$$

- USE AISC MAN TABLE B-10a
- GEOMETRY CALCULATED USING REVIT
- C.G. CALCULATED USING ENERCALC

CONSERVATIVE TO USE 45°
ANGLE TABLES

$$e_x = al = 0.25 = a(12")$$

$$a \sim 0.02$$

$$kl = 18" = k(12")$$

$$k = 1.5$$

$$C = 5.8 \text{ (CONSERVATIVE INTERPOLATION)}$$

$$C_1 = 1.0$$

$$D_{MIN} = \frac{1.25(754^k)}{0.75(5.8)(1.0)(12")}$$

25% INCREASE FOR DUCTILITY AISC MAN PART 13

$$= 18.1 \text{ SIXTEENTHS} / 2 \text{ WELDS}$$

$$\therefore \text{USE } 10/16" \text{ OR } 5/8" \text{ WELD}$$

USING TABLE 7-10
 $s = 3"$ $e_x = 26"$ $n = 4$

$$C = 1.695$$

USING 1" ϕ A 325-X BOLTS IN DOUBLE SHEAR

$$\phi R_n = 80.1^k$$

$$\phi R_n = 1.695(80.1^k) \\ = 135^k > 17.5^k$$

GRAVITY SHEAR NEEDS TO BE DELIVERED TO COLUMN

USING TABLE 7-10
 $s = 3"$ $e_x = 15"$ $n = 4$

$$C = 2.83$$

$$\phi R_n = C \phi R_n \\ = 2.83(80.1^k)$$

$$= 226.4^k > 17.5^k \quad \sim 8\% \text{ OF CAPACITY}$$

AXIAL LOAD CHECK
 $A_u = 475^k$

$$\phi R_n = 12 \text{ BOLTS} \times (80.1^k) \\ = 960^k > A_u = 475^k \quad \sim 50\% \text{ CAPACITY}$$

$\therefore$ SAY OKAY TO BOLT STRENGTH

CHECK BOLT BEARING

W16x67 CONTROLS FOR THIS CHECK

$$\phi_r n = \phi 2.4 d t F_u$$

$$= 0.75(2.4)(1'')(0.395)(65 \text{ ksi})$$

$$= 46.2 \text{ k/BOLT} \times 12 \text{ BOLTS} = 554 \text{ k} > A_u = 475$$

$$\frac{475}{554} = .85$$

SAY OKAY

NOTE: USING ENGINEERING JUDGEMENT GRAVITY LOADING WILL NOT REQUIRE MORE THAN 10% OF THE CAPACITY OF THE SPLICE. $\therefore$ DESIGN SEISMIC LOADING TO 90% OF CAPACITY.

ADDITIONALLY ONLY 1.2D+L REQUIRED IN LOAD COMBO W/ SEISMIC

CHECK YIELDING OF W16x67

$$\text{YIELDING: } \phi P_n = 0.9 F_y A_g$$

$$= 0.9(50)(19.6 \text{ in}^2)$$

$$= 882 \text{ k} > 475 \text{ k}$$

$\therefore$ YIELDING ALSO WORKS FOR W18x130

° BLOCK SHEAR NOT REQ'D BECAUSE CONNECTION IS IN COMPRESSION

SIZE SPLICE PLATES

AXIAL COMPRESSION IN PLATES

$$\frac{KL}{r} = \frac{1.2(8'')}{\frac{5/8}{\sqrt{12}}} = 53.2$$

TABLE 4.22 FOR $F_y = 50 \text{ ksi}$

$$\phi_c F_{cr} = 36.2 \text{ ksi}$$

$$\begin{aligned}\phi_c P_n &= \phi_c F_{cr} A_g \\ &= 36.2 \text{ ksi} \left(\frac{3}{8}\right)(13'')(2) \\ &= 588 \text{ k} > 475 \text{ k}\end{aligned}$$

SHEAR STRENGTH OF PLATES

$$\begin{aligned}\phi R_n &= \phi 0.6 F_y A_{gv} \\ &= 1.0(0.6)(50)\left(\frac{3}{8}\right)(13)(2) \\ &= 487 \text{ k} > 475 \text{ k} \quad \text{SAY OKAY}\end{aligned}$$

CHECK DUCTILITY OF SPLICE PLATES

$$\begin{aligned}\phi_b M_n &= \phi_b F_y Z \\ &= 0.9(50 \text{ ksi}) \frac{\left(\frac{3}{8}\right)(13)^2}{4} (2 \text{ PLATES}) \\ &= 1426 \text{ k}\cdot\text{in}\end{aligned}$$

$$M_{max} = \frac{F_v}{0.9} (A_b C') \quad (\text{Eq 10-3})$$

$$t_{max} = \frac{6 M_{max}}{F_y d^2} \quad (\text{Eq 10.4})$$

$$F_v = 68 \text{ ksi}$$

$$A_b = 0.785 \text{ in}^2$$

FROM AISC MANUAL, TABLE 7-7
 ANGLE = 0° $S = 3$ $n = 4$

$$C' = 44.7 \text{ in}$$

$$M_{\max} = \frac{68 \text{ ksi}}{0.9} (0.785 \text{ in}^2) (44.7 \text{ in})$$

$$= 2652 \text{ k-in}$$

$$t_{\max} = \frac{6 (2652 \text{ k-in})}{(50 \text{ ksi}) (13 \text{ in}^2)}$$

$$= 1.88 \text{ in}$$

$$2(t) = 2\left(\frac{5}{8}\right) = 1.25 < 1.88$$

$\therefore$ SAY OKAY TO $(2) \frac{5}{8}$ " SPLICE PLATES

FORCES INTO BEAM STUB

COMPRESSION LOAD = 342 k

$$V_u = 342 \cos(42^\circ) = 255 \text{ k}$$

$$N_u = 342 (\sin)(42^\circ) = 228 \text{ k}$$

$$\sum M_o = 0$$

$$= M_u + (V_{u1} + V_{u2})(d) + (N_{u1} + N_{u2})(2") + 18 \text{ k} \times (26")$$

$$M_u = (560 \text{ k} + 255 \text{ k})(19.3") + (505 \text{ k} + 289 \text{ k})(2") + 18 \text{ k} \times 26"$$

$$= 17786 \text{ k-in}$$

$$M_{u(max)} = 17786 \text{ k-in} \times \frac{1}{12} = 1483 \text{ k-ft}$$

MOMENT TRANSFERS INTO COLUMN THRU WELDS

$$A_{u(max)} = 475 \text{ k}$$

$$\phi A_n = F_y A_g = 50 \text{ ksi} (38.3 \text{ in}^2) = 1915 \text{ k} > 475 \text{ k}$$

CALCULATE $V_u(max)$

PORTIONS OF N_u COMPONENTS WILL BE TRANSFERRED INTO COLUMN THROUGH GUSSET PLATES VIA WELD FROM GUSSET TO COLUMN

$$\begin{aligned} \text{TOP } N_u &= 505 \text{ k} - \text{CAPACITY OF } \swarrow \text{VERTICAL WELD} \\ &= 505 \text{ k} - 1.392(10)(12)(2 \text{ WELD}) \\ &= 171 \text{ k} \end{aligned}$$

$$\begin{aligned} \text{BTM } N_u &= 289 \text{ k} - \text{CAPACITY OF VERT WELD} \\ &= -45 \text{ k} \therefore \text{LOAD DOES NOT TRANSFER TO BEAM} \end{aligned}$$

$$V_{u(max)} = 171 \text{ k} < \phi V_n = 388 \text{ k}$$

DESIGN BEAM STUB WELD TO COLUMN

LOADS ONTO WELD

$$V_u = 171 \text{ k}$$

$$A_u = 475 \text{ k}$$

$$\begin{aligned} R_u &= \sqrt{V_u^2 + A_u^2} \\ &= 505 \text{ k} \end{aligned}$$

$$\theta = \tan^{-1}\left(\frac{A_u}{V_u}\right) = \tan^{-1}\left(\frac{475}{171}\right) = 70.3^\circ$$

$$1.0 + 0.5 \sin^{1.5} 70.3^\circ = 1.45$$

$$D_{REQD} = \frac{505 \text{ k}}{2(1.392 \text{ ksi})(19.1 \text{ in})(1.45)} = 6.6 \text{ in USE } \frac{9}{16} \text{ in}$$

RESOLVE MOMENT CAUSED BY V_u INTO COLUMN
 FROM GUSSET

$$V_u = 560^k$$

$$D_{REQ'D} = \frac{560^k}{(2)(1.392)(11.2'')(1.5)}$$

$$= 11.9$$

∴ USE $\frac{3}{4}$ " WELD

USE STIFFENER IN COLUMN

- LOCAL WEB YIELDING & CRIPPLING OF COLUMN ARE OKAY BY OBSERVATION & ENGINEERING JUDGEMENT
- SEE OTHER CALCULATIONS FOR DESIGN OF COLUMNS

**SAMPLE
BASE CONN.**

SCBF BRACED FRAME BASE CONNECTION

EXAMPLE CALC: SCBF BRACED FRAME BASE CONNECTION

* SEE SCBF BRACE-TO-BEAM CONNECTION & SCBF BRACE-TO-BEAM/COLUMN CONNECTION FOR EXAMPLE OF HOW TO TRANSFER FORCES FROM BRACES TO GUSSETS AND COLUMNS

IN THIS CALCULATION WE SHOW CALCULATIONS FOR TRANSFERRING SHEAR FORCE INTO GRADE BEAM & GRAVITY DIRECTION FORCES INTO FOOTINGS

SINCE C of GRADE BEAM GOES THROUGH C of BRACE FORCE NO MOMENTS ARE TRANSFERRED INTO GB OR BASEPLATE

TENSION LOADING

$$V_u = 1465^k \cos(47^\circ) = 999^k$$

$$P_u = 1465^k \sin(47^\circ) = 1072^k$$

COMPRESSIVE LOADING

$$V_u = 871^k$$

$$P_u = 934^k$$

FACTORED P_u TENSION LOAD = 4313^k (LRFD) {FROM RAM}

FACTORED P_u COMPRESSION LOAD = 7294^k (LRFD) {FROM RAM}

DESIGN OF LOAD INTO GRADE BEAM

$$V_u = 999^k_{(MAX)}$$

WELD REQ'D FROM GUSSET TO WT

$$\phi R_n = 1.392 (D)(L)$$

$$999^k = 1.392 (D)(18" + 24")(2 \text{ SIDES})$$

$$D = 8.5 \quad \text{USE } \frac{5}{8}" \text{ WELD}$$

USE $\frac{3}{4}" \times 5"$ SHEAR STUDS @ 6" OC

NOMINAL STRENGTH W/ 4^{KSI} CONCRETE

$$Q_n = 26.1^k$$

RUPTURE OF STUD

$$\begin{aligned} \phi P_n &= 0.75(65 \text{ ksi})((0.75/2)^2 \pi) \\ &= 21.6^k \end{aligned}$$

$\therefore 21.6^k$ CONTROLS

$$999^k / 21.6^k = 47 \text{ STUDS REQ'D}$$

4 STUDS / FT $\therefore$ 11.75' OF STUDS REQ'D

USE $\frac{3}{4}" \times 5"$ SHEAR STUDS @ 6" (OKAY)

BOLTS REQ'D FOR UPLIFT

TRY $2\frac{1}{2}" \phi$ ANCHORS F1554 (Gr 105)

$$\{F_y = 105 \text{ ksi}; F_u = 125 \text{ ksi}\}$$

$$N_{sa} = A_{se,N} F_{uTA}$$

$$\phi = 0.75$$

$$\text{LRFD FACTORED UPLIFT} = 4313^*$$

$$\phi N_{sa} = 0.75(3.14 \text{ in.})(125 \text{ ksi}) \times N$$

$$A_{se} = \frac{(2.5 \text{ in})^2 \pi}{4}$$

$$A_{se} = \frac{(2.5 \text{ in})^2 \pi}{4}$$

$$4313 = 234.3 \times N$$

$$= 4,908 \text{ in}^2$$

$$= 3.14 \text{ in}^2$$

$$N \sim 9.4 \therefore 10 \text{ rods}$$

OR

$$15 \text{ rods } 2\frac{1}{2}" \phi$$

$$\text{Program} = 2.5 \text{ in}^2$$

$$N_p = 8 A_{brg} f'_c$$

$$\frac{1}{3} \left(3\frac{5}{8} \text{ in} \right) = 1.21 \text{ in}$$

$$\frac{(3.625)^2 \pi}{4}$$

$$= 8(7.18 \text{ in}^2)(4,000 \text{ psi})$$

$$A = 3\sqrt{3} s^2$$

$$= 10.32 - 3.14$$

$$4313 = 229 \text{ kips} \times N$$

$$A = 3.8^2$$

$$= 7.18$$

$$2\frac{1}{2}" \phi \quad N = 18.8 \therefore N = 19$$

$$a = x \sqrt{3}$$

$$x = \frac{3.625}{2} / \sqrt{3}$$

$$= \frac{(21.5)^2 \pi}{4}$$

$$2\frac{1}{2}" \phi \quad N = 8.5$$

$$s = 2.04$$

$$= 15.9$$

USE (20) $2\frac{1}{2}" \phi$ ANCHORS (GRADE 105)

ANCHOR ROD EMBED = 42" TO AVOID CHANGING PILE DEPTH

DESIGN OF CONCRETE BREAKOUT

$$\#10 @ \sim 6" OC \quad \therefore 127" / 6" \approx 21.16$$

$$108 / 6" = 18 \quad \therefore \text{BREAKOUT CONE GOES THROUGH } 39 \#10\text{'s}$$

$$+ (4) \#9 \times 4 \text{ PILES} = 16 \#9\text{'s}$$

$$\text{TOTAL STEEL AREA TO "BREAKOUT"} = (39) 1.27" + (16) 1.0" = 65" \quad 60 \text{ ksi REBAR}$$

$$\begin{aligned} \phi V_b &= 0.75 A_s F_y \\ &= 65 \text{ in}^2 \times 60 \text{ ksi} (0.75) \\ &= 2925 \text{ kIPS} \end{aligned}$$

OF #6 BARS NEEDED

$$4313 \text{ k} - 2925 \text{ k} = 0.75 (.44 \times 2 \text{ SURF} \times \# \text{ OF } \#6) 60 \text{ ksi}$$

$$\# \text{ OF } \#6 = 35 \text{ BARS}$$

USE 36 BARS @ EACH SIDE

CONC BREAKOUT (SINGLE ANCHOR)

$$\begin{aligned} N_b &= k_c \lambda_a \sqrt{f'_c} l_{cF}^{1.5} \\ &= 24 \sqrt{4000} (42)^{1.5} \\ &= 413.2 \text{ k} \quad \therefore \text{VERY SMALL} \end{aligned}$$

MOMENT FRAME DESIGN

SAMPLE MOMENT FRAME MEMBER - LOCATION

RAM Structural System

Member Code Check

RAM Frame 17.01.01.05

DataBase: 2020_0825_ATC RCII_SDC D_GMR_Savannah_Newest Version 01/07/21 16:12:24

Building Code: IBC

Steel Code: AISC360-16 LRFD

BEAM INFORMATION:

Story Level = Level 2 Frame Number = 1 Beam Number = 12
 Fy (ksi) = 50.00
 Beam Size = W27X102

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft) _____	30.00	3.00
Lu for Bending (ft) _____	30.00	3.00
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 + 0.500 Lp + 0.500 NL1 + 0.500 Rfp + 0.500 NR1 + 1.000 W1

Segment distance (ft) i - end _____ 27.00
 j - end _____ 30.00

SHEAR CHECK:

Vux (kip) = -88.25	1.00Vnx (kip) = 418.70	Vux/1.00Vnx = 0.211
Vuy (kip) = -0.00	0.90Vny (kip) = 448.20	Vuy/0.90Vny = 0.000

CONTROLLING BEAM SEGMENT FORCES - AXIAL

Load Combination: 1.400 D + 1.400 ND1

Segment distance (ft) i - end _____ 3.00
 j - end _____ 10.00

AXIAL CHECK:

Pu (kip) = 0.00	0.90Pnx (kip) = 1350.00	Pu/0.90Pnx = 0.000
	0.90Pny (kip) = 1350.00	Pu/0.90Pny = 0.000
	0.90Pn (kip) = 1350.00	Pu/0.90Pn = 0.000

CONTROLLING BEAM SEGMENT FORCES - FLEXURE

Load Combination: 1.200 D + 1.200 ND1 + 0.500 Lp + 0.500 NL1 + 0.500 Rfp + 0.500 NR1 + 1.000 W1

Segment distance (ft) i - end _____ 27.00
 j - end _____ 30.00

CALCULATED PARAMETERS:

Pu (kip) = 0.00	0.90Pn (kip) = 1350.00
Mux (kip-ft) = -982.42	0.90Mnx (kip-ft) = 1143.75
Muy (kip-ft) = 0.00	0.90Mny (kip-ft) = 162.75
Cbx = 1.07	

INTERACTION EQUATION:

Pu/0.90*Pn=0.000
 Mrx/Mcx = 0.859

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GR 50 PL, 1/2" TO MATCH BEAM WEB
 WF COLUMN, SEE SCHED.
 DOUBLER PL, SEE ELEVATION
 DOUBLER PL, WELD PER AWS D1.8, CLAUSE 4.3
 75% DOUBLER PL THICKNESS
 CIP STIFFENER PL TO COL.
 CIP PL TO COLUMN FLANGE
 BEAM WEB TO COLUMN FLANGE, DCW
 PROTECTED ZONE 0.5 x Dbm
 ERECTION BOLTS
 GR 50 STIFFENER PL EA SIDE OF COLUMN WEB, MATCH BEAM FLANGE THICKNESS, TYP.
 DETAIL A-A
 DETAIL B-B
 T&B FLANGE, DCW
 1/2" MIN.
 1" MAX.
 5/16"
 1/4" MIN.
 1/2" MAX.
 7" MIN.
 30°
 REMOVE BACKING BAR, BACK GOUGE AND REINFORCE PER AISC 358

PROTECTED ZONES ARE AREAS OF THE SEISMIC FORCE RESISTING SYSTEM MEMBERS AND MEMBER CONNECTIONS WHERE LIMITATIONS APPLY TO FABRICATION AND SUPPLEMENTAL ATTACHMENTS WITHIN DESIGNATED PROTECTED ZONES COMPLY WITH THE FOLLOWING AND AS INDICATED IN AISC 341 SECTION D7.3 AND D2.1:

1. HOLES, TACK WELDS, ERECTION AIDS, AIR-ARC GOUGING AND UNSPECIFIED
THERMAL CUTTING FROM FABRICATION OR ERECTION OPERATIONS SHALL BE
REPAIRED AS REQUIRED BY THE ENGINEER OF RECORD.
2. WELDED, BOLTED, SCREWED OR SHOT-IN ATTACHMENTS FOR FACADES,
PARTITIONS, DUCT WORK, PIPING OR OTHER CONSTRUCTION SHALL NOT BE
PERMITTED.

SAMPLE MOMENT FRAME CONNECTION - JOINTS

THE JOINTS OF THE MOMENT FRAME ARE CHECKED USING THE SEISMIC PROVISIONS FEATURE WITHIN RAM STRUCTURAL SYSTEM. DOUBLER PLATES ARE ADDED WHERE REQUIRED.

8028/NIST.GCR.21-917-48v1B

RAM Structural System

Seismic Provisions Joint Code Check

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC RCII_SDC D_GMR_Savannah_V1

01/07/21 21:05:34

Building Code: IBC

Steel Code: AISC341-16 - LRFD

Joint Parameters

Story: Level 2 Frame No: 1 Joint No: 274
 Fy (ksi): 50.00 Column Size: W24X162
 Joint Frame Type: Special Moment Resisting Frame
 Apply AISC 358 Provisions to Moment Frame
 Strain Hardening Factor Cpr = 1.40

E3.4a Moment Ratio --- OK

Col.	Size	M*pc (kip-ft)	Zc (in ³)	Pu (kip)	Combo#
Top	W24X162	1166.94	468.00	959.75	6
Bot	W24X162	1078.65	468.00	1067.97	6
Bm.	Size	M*pb (kip-ft)	Mpr (kip-ft)	Muv (kip-ft)	Sh+dc/2 (in)
11	W27X102	2131.22	1957.08	174.13	12.50

*Sh = Distance face-of-column to location of hinge.**Mpr = Cpr x Ry x Fy x Zhng, where Zhng = Z at hinge.* $\Sigma M^*_{pc} = \Sigma Z_c(F_y - P_u/A_g)$ (kip-ft) = 2245.59 ΣM^*_{pb} (kip-ft) = 2131.22 $\Sigma M^*_{pc} / \Sigma M^*_{pb}$ (Eqn E3-1) = 1.05 > 1.0 OK

E3.4c Stability Bracing at Beam-to-Column Connections --- OK

Joint is restrained in the minor axis at both the top and bottom flange of the moment-frame beams.

E3.6d Connection Required Shear Strength

Bm No.	Col Side	Mpr (kip-ft)	L (ft)	0.8Mp(kip-ft)	V Max (kip)
11	Flange	1957.08	27.862	1016.67	167.17

*V Max = Max shear from applicable load combinations with Ecl**Mpr = Cpr x Ry x Fy x Zhng, where Zhng = Z at hinge.*

E3.6e(1) Panel-Zone of Beam-to-Column Connections: Strength --- OK With Web Plate / Stiffeners

Bm.	Size	Bf Red. (in)	Z (in ³)	Z hng (in ³)	Mpr (kip-ft)
11	W27X102	0.000	305.00	305.00	1957.08
Bm.	Mpr (kip-ft)	Sh (in)	V hng (kip)	Mf (kip-ft)	Vpz (kip)
11	1957.08	0.00	167.169	1957.08	893.99

*Sh = Distance face-of-column to location of hinge.**Vhng = Shear at hinge or col face from applicable load combinations with Ecl**Mpr = Cpr x Ry x Fy x Zhng, where Zhng = Z at hinge.*

Required Panel Zone Shear Strength (kip) = 761.30

Panel Zone Shear Reduced by Vc (kip) = 132.68

Axial Comp. for Panel Zone Calc. (kip) = 1067.97 - Combination 1.293 D - 1.293 ND1 + 0.500 Lp - 0.500 NL1 - 3.000 E2

Panel Zone Strength Without Web Plate (kip) = 593.01 NG

Web Plate Reqd Thickness (in) = 0.312

Web Plate Thickness Used (in) = 0.625

Panel Zone Strength With Web Plate (kip) = 930.51 OK

E3.6e(2) Panel-Zone of Beam-to-Column Connections: Thickness --- OK

No plug welds specified so both column and web plate must meet Equation E3-7

dz (in) = 25.440 wz (in) = 22.560

Column web thickness reqd (in) = 0.533 Thickness provided = 0.705 OK

RAM Structural System

Seismic Provisions Joint Code Check

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC RCII_SDC D_GMR_Savannah_V1

Building Code: IBC

Page 2/2

01/07/21 21:05:34

Steel Code: AISC341-16 - LRFD

Web PL thickness reqd (in) = 0.533 Thickness provided = 0.625 **OK**

358 - 2.4.4 Continuity Plates --- **OK With Web Plate / Stiffeners**

Bm.	Size	Fyb (ksi)	Bbf (in)	Tbf (in)	Tf Req. (in)	Tf Prov (in)	Stiffen
11	W27X102	50.00	10.00	0.830	1.67	1.22	Yes

See Additional AISC 358 Requirements for Assigned Connection Type.

SAMPLE MOMENT FRAME CONNECTION AT BASE

THE PHILOSOPHY FOR THE BASE CONNECTION IS FOR THE FRAME TO BE "FIXED". THE STEEL COLUMN TENSION IS RESISTED IN THE ANCHOR BOLTS, THE MOMENT IS RESISTED BY BARS WELDED TO THE COLUMN AND LAPPED WITH THE GRADE BEAM. SHEAR IS RESISTED BY

VERTICAL LOADS ONTO MOMENT FRAME BASE

RC2-SDCD

$$1.2D + 1.0W + L$$

$$1.2(605) + 1.0(1046) + (342) = 2114^k$$

$$(1.2 + 0.2 S_{DS})D + \Omega_o Q_E$$

$$(1.2 + 0.2(.464))(605) + (3)(453) = 1427^k$$

$$0.9D + 1.0W$$

$$0.9(605) + 1.0(1046) = 1502^k$$

$$(0.9 - 0.2 S_{DS})D + \Omega_o Q_E$$

$$(0.9 - 0.2(.464))(605) + (3)(453) = 871^k$$

*LOADS FROM RAM

RC3-SDCD

$$1.2(D) + 1.0W + L$$

$$1.2(610^k) + 1.0(1213^k) + (342^k) = 2287^k$$

$$(1.2 + 0.2 S_{DS})D + \Omega_o Q_E$$

$$(1.2 + 0.2(.464))(610) + 3(539^k) = 2406^k$$

$$0.9D + 1.0W$$

$$0.9(610) + 1.0(1213^k) = 1664^k$$

$$(0.9 - 0.2 S_{DS})D + \Omega_o Q_E$$

$$(0.9 - 0.2(.464))(610^k) + (3)(539^k) = 1125^k$$

$$W24 \times 250 \quad \text{WELDABLE SURFACE} = 13.2 \times 2 + 20.75 \times 2$$

$$= 67.9"$$

$$\phi R_n = 1.392(D)l$$

$$1125 = 1.392(D)(67.9)$$

$$D = 12$$

OR CJP @ FLANGES & FILLET ON WEB

$$\phi R_n = F_u A_m A_{BM}$$

$$= 50^{ksi} (13.2" \times 1.89") \times 2 \text{ FLANGES}$$

$$= 2494^k$$

SAY OKAY TO CJP FOR FLANGES

$$t_f = 1.89" b_f = 13.2"$$

MOMENT IS RESOLVED INTO GRADE BEAM
THROUGH REBAR ATTACHED TO THE COLUMN

$$M_{u(WIND)} = 1552 \text{ K-FT (FROM RAM)} \quad \Omega = 3$$

$$M_{u(EQ)} = 537 \text{ K} \times \Omega = 1611 \text{ K-FT (FROM RAM)}$$

CAPACITY OF COUPLE CREATED BY #11 BARS

COMPRESSION IS HANDLED
BY GRADE BEAM

$$\phi P_n \Rightarrow (6) 75 \text{ KSI } \#11 \text{ BARS}$$

$$\begin{aligned} \phi P_n &= F_y A_g (6 \text{ BARS}) \\ &= 75 \text{ KSI} (1.56 \text{ in}^2) (6 \text{ BARS}) \\ &= 702 \text{ K} \times 2 \text{ SIDES} \\ &= 1404 \text{ K} \end{aligned}$$

$$\begin{aligned} \phi M_n &= 1404 \text{ K} \times 1.667' \\ &= 2341 \text{ K-FT} \end{aligned}$$

SEE SCBF BRACE-TO-BEAM CONNECTION CALC
FOR EXAMPLE CALS FOR WEB, DOUBLER, & STIFFNER CHECKS

Baseplate and Anchor Bolts

$$V_u := 0 \quad \text{kips} \quad Uplift := -1125 \quad \text{kips} \quad P_u := 2406 \quad \text{kips}$$

Given:**Required Base Plate Area**

$$\begin{aligned} f'_c &:= 4000 \quad \text{psi} & \phi_c &:= 0.65 & d &:= 26 \quad \text{in} \\ F_y &:= 50000 \quad \text{psi} & \phi_b &:= 0.9 & b_f &:= 14 \quad \text{in} \end{aligned} \quad A_1 := \frac{P_u \cdot 1000}{\phi_c \cdot 0.85 \cdot f'_c} \quad A_1 = 1.089 \cdot 10^3 \text{ in}^2$$

Optimize the Base Plate Dimensions:

$$\Delta := \frac{0.95 \cdot d - 0.8 \cdot b_f}{2} \quad \Delta = 6.75$$

$$N := \sqrt{A_1} + \Delta \quad N = 39.745$$

$$\text{Try} \quad N := 41 \quad \text{in} \quad B := 32 \quad \text{in}$$

$$A_2 := N \cdot B \quad A_2 = 1.312 \cdot 10^3 \quad \text{in}^2$$

$$\phi_c P_p := \phi_c \cdot 0.85 \cdot \frac{f'_c}{1000} \cdot A_1 \cdot \sqrt{\frac{A_2}{A_1}} \quad \phi_c P_p = 2.641 \cdot 10^3 \quad \text{kips}$$

Plate Thickness:

$$m := \frac{N - 0.95 \cdot d}{2} \quad m = 8.15$$

$$n := \frac{B - 0.8 \cdot b_f}{2} \quad n = 10.4$$

$$X := \left(\frac{4 \cdot d \cdot b_f}{(d + b_f)^2} \right) \cdot \frac{P_u}{\phi_c P_p} \quad X = 0.829$$

$$\lambda := \frac{2 \cdot \sqrt{X}}{1 + \sqrt{1 - X}} \quad \therefore \lambda := 1$$

$$\lambda n' := \lambda \cdot \frac{\sqrt{d \cdot b_f}}{4} \quad \lambda n' = 4.77$$

$$l := \max(m, n, \lambda n') \quad l = 10.4$$

$$t_{min} := l \cdot \sqrt{\frac{2 \cdot P_u \cdot 1000}{\phi_b \cdot F_y \cdot B \cdot N}} \quad t_{min} = 2.969$$

USE t=3"**Bearing_Plate := " (41"x32"x3") "**

Anchor Rod Design***Given:*****Anchor Bolt Size**

$$F_y := 105 \text{ ksi}$$

$$F_u := 125 \text{ ksi}$$

$$\phi := .75$$

(Choose Size)

$$\text{Try } d_R := 2 \text{ in} \quad A_b := \frac{\pi \cdot (d_R)^2}{4} \text{ in}^2 \quad A_b = 3.142 \text{ in}^2$$

$$\#ofRods := 6$$

$$\phi R_n := \phi \cdot F_u \cdot A_b \cdot \#ofRods \quad \phi R_n = 1.767 \cdot 10^3 \text{ kips}$$

If $\phi R_n = 1.767 \cdot 10^3 \text{ kips} > -Uplift = 1.125 \cdot 10^3 \text{ kips}$, then Say O.K.

$$d_R = 2 \text{ in}$$

Use 6 F1554 Grade 105 Anchor Rods

Design Case B

2018 IBC Risk Category III Seismic Design Category D

This section presents representative structural calculations for Building 1 (12-story office building in Savannah, Georgia) Design Case B. Project objectives, building selection criteria, seismic design criteria, structural design drawings, references, and project participants are documented in NIST GCR 21-917-48v1A.

TABLE OF CONTENTS

Design Criteria	3
Gravity Design	6
Beam Design	8
Column Design	17
Lateral Design	21
Braced Frame Design	86
Moment Frame Design.....	121

DESIGN CRITERIA

BUILDING 1 GENERAL DESIGN CRITERIA:

Location:

- Savannah, Georgia
- Coordinates: 32.0808989 Latitude, -81.091203 Longitude

DESIGN B: 2018 IBC RISK CATEGORY III

Applicable Codes

- 2018 International Building Code
- ASCE 7-16: Minimum Design Loads for Buildings and Other Structures
- ACI 318-14: Building Code Requirements for Structural Concrete
- AISC-360-16: Specification for Structural Steel Buildings

Risk Category: III

Wind Loading Criteria:

- Basic Wind Speed (3 Sec. Gust): V = 148 mph
- Exposure: C
- Allowable drift at 25-year mean return interval H/400
- Internal Pressure Coefficient: +/- 0.18

Snow Loads:

- Ground Snow Load: 0 PSF

Seismic Loading Criteria:

- Risk adjusted maximum considered earthquake, 5 percent damped, spectral response acceleration at short periods, S_s : 0.313g
- Risk adjusted maximum considered earthquake, 5 percent damped, spectral response acceleration at a period of 1 second, S_1 : 0.114g
- Site Class: E
- Site Coefficient (F_a): 2.22
- Site Coefficient (F_v): 4.2
- Seismic Importance Factor: 1.25
- Design, 5 percent damped, spectral response acceleration at short periods, S_{DS} : 0.464g
- Design, 5 percent damped, spectral response acceleration at a period of 1 second, S_{D1} : 0.319g
- Seismic Design Category: D
- Analysis Procedure: Equivalent Lateral Force
- North – South seismic resisting system: Steel special concentrically braced frames
 - Response Magnification Factor (R): 6
 - Over strength Factor: 2
 - Deflection Amplification Factor (C_d): 5
- East-West seismic resisting system: Steel special moment frames
 - Response Magnification Factor (R): 8
 - Over strength Factor: 3
 - Deflection Amplification Factor (C_d): 5.5

- Seismic response coefficient, C_s
 - North-South 0.052
 - East-West 0.026

GRAVITY LOADING

Superimposed Dead Loads:

- Roofing: 10 PSF
- Miscellaneous: 10 PSF

Superimposed Live Loads

- Roof: 20 PSF
- Office: 50 PSF
- Partitions 15 PSF
- Corridors: 80 PSF
- Lobbies and Stairs: 100 PSF (reducible)
- Mechanical and Storage Rooms: 125 PSF

MATERIAL DEFINITIONS:

Concrete:

- Slab on ground: $F'_c = 4,000$ PSI
- Slabs on steel deck (lightweight 110 pcf) $F'_c = 3,000$ PSI
- Foundations: $F'_c = 4,000$ PSI
- Exterior Concrete: $F'_c = 4,500$ PSI

Concrete Reinforcement:

- Rebar: $F_y = 60$ KSI

Structural Steel:

- WF columns and beams: $F_y = 50$ KSI
- Tubes $F_y = 50$ KSI
- Other steel, unless noted otherwise: $F_y = 36$ KSI
- Tubes:
 - Round $F_y = 42$ KSI
 - Rectangular $F_y = 46$ KSI
- Other steel, unless noted otherwise: $F_y = 36$ KSI

FOUNDATION CRITERIA

- 14" square prestressed precast piles
 - Compression capacity 80 tons
 - Tension capacity 60 tons
 - Lateral Capacity 10 tons

GRAVITY DESIGN

GRAVITY LOADING

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SUPERIMPOSED DEAD LOAD DESIGNATIONS			
MARK	USE	LOAD (PSF)	NOTES
A	OFFICE	10	MISC.
B	ROOF	20	10 ROOFING + 10 MISC.

LIVE LOAD DESIGNATIONS		
MARK	USE	LOAD (PSF)
1	OFFICE	50 (R) + 15 (NR)
2	CORRIDORS	50 (R)
3	LOBBIES & STAIRS	100 (R)
4	MECHANICAL & STORAGE	125 (R)
5	ROOF	20 (R)

"NR" INDICATES NON-REDUCIBLE LIVE LOAD.
"R" INDICATES LIVE LOADS REDUCIBLE PER IBC SECTION 1607.11

BEAM DESIGN

TYPICAL FRAMING PLAN RAM STRUCTURAL SYSTEM DEMAND-CAPACITY RATIO SUMMARY

RAM Structural System

RAM Steel 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

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Building Code: IBC

Steel Code: AISC 360-16 LRFD

Gravity Beam Design

Floor Type: TYPICAL FLOOR**Beam Number = 82****SPAN INFORMATION (ft): I-End (10.00,0.00) J-End (10.00,45.00)**

Beam Size (User Selected) = W21X44

Fy = 50.0 ksi

Total Beam Length (ft) = 45.00

COMPOSITE PROPERTIES (Not Shored):

		Left	Right
Deck Label		3+3.25 LW	3+3.25 LW
Concrete thickness (in)		3.25	3.25
Unit weight concrete (pcf)		110.00	110.00
f _c (ksi)		3.00	3.00
Decking Orientation		perpendicular	perpendicular
Decking type		VULCRAFT 3.0VL	VULCRAFT 3.0VL
beff (in)	=	120.00	Y bar(in) = 20.58
Mnf (kip-ft)	=	841.64	Mn (kip-ft) = 716.97
C (kips)	=	342.06	PNA (in) = 20.12
I _{eff} (in ⁴)	=	2305.87	I _{tr} (in ⁴) = 2859.57
Stud length (in)	=	5.00	Stud diam (in) = 0.75
Stud Capacity (kips)	Q _n = 17.1	R _g = 1.00	R _p = 0.60
# of studs:	Max = 90	Partial = 41	Actual = 41
Number of Stud Rows	= 1	Percent of Full Composite Action = 52.38	

POINT LOADS (kips):

Dist	DL	CDL	RedLL	Red%	NonRL	StorLL	Red%	RoofLL	Red%	PartL	CLL
					L						
5.000	0.64	0.60	0.31	24.2	0.00	0.00	0.0	0.00	0.0	0.09	0.12
5.000	0.79	0.75	0.41	24.2	0.00	0.00	0.0	0.00	0.0	0.12	0.16

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	0.198	0.198	0.000	---	NonR	0.000	0.000
	5.000	0.198	0.198	0.000			0.000	0.000
2	0.000	0.043	0.021	0.212	24.2%	Red	0.064	0.085
	5.000	0.043	0.021	0.212			0.064	0.085
3	5.000	0.465	0.465	0.000	---	NonR	0.000	0.000
	45.000	0.465	0.465	0.000			0.000	0.000
4	5.000	0.100	0.050	0.500	24.2%	Red	0.150	0.200
	45.000	0.100	0.050	0.500			0.150	0.200
5	0.000	0.044	0.044	0.000	---	NonR	0.000	0.000
	45.000	0.044	0.044	0.000			0.000	0.000

SHEAR (Ultimate): Max V_u (1.2DL+1.6LL) = 35.59 kips 1.00V_n = 217.35 kips**MOMENTS (Ultimate):**

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Center	PreCmp+	1.2DL+1.6LL	252.8	22.4	0.0	1.00	0.90	357.75
	Init DL	1.4DL	200.5	22.4	---	---		
	Max +	1.2DL+1.6LL	401.9	22.4	---	---	0.90	645.27

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Gravity Beam Design

RAM Steel 17.01.01.05

Page 2/2

RAM Structural System

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

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Building Code: IBC

Steel Code: AISC 360-16 LRFD

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
Controlling		1.2DL+1.6LL	252.8	22.4	0.0	1.00	0.90	357.75

REACTIONS (kips):

	Left	Right
Initial reaction	16.61	17.16
DL reaction	13.45	13.79
Max +LL reaction	11.14	11.90
Max +total reaction (factored)	33.97	35.59

DEFLECTIONS: (Camber = 1-1/2)

				Ratio
Initial load (in)	at 22.50 ft =	-2.139	L/D = 252 > 220	0.87
Live load (in)	at 22.50 ft =	-0.730	L/D = 740 > 360	0.49
Post Comp load (in)	at 22.50 ft =	-0.799	L/D = 676 > 240	0.36
Net Total load (in)	at 22.50 ft =	-1.438	L/D = 376 > 240	0.64

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RAM Structural System

RAM Steel 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Gravity Column Design

02/24/21 16:28:25

Steel Code: AISC360-16 LRFD

Story level Level 3, Column Line 3-C, Column # 33

Fy (ksi) = 50.00 Column Size = W14X193
 Orientation (deg.) = 90.0

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu (ft) _____	13.50	13.50
K _____	1	1
Braced Against Joint Translation _____	Yes	Yes
Column Eccentricity (in) Top _____	10.25	10.35
Bottom _____	10.25	10.35

CONTROLLING AXIAL COLUMN LOADS - Skip-Load Case 1:

	Dead	Live	Roof
Axial (kip) _____	810.24	555.14	13.50

DEMAND CAPACITY RATIO: (1.2DL + 1.6LL + 0.5RF)

Pu (kip) = 1867.26	0.90Pnx (kip) = 2442.52	Pu/0.90Pnx = 0.764
	0.90Pny (kip) = 2273.62	Pu/0.90Pny = 0.821
	0.90Pn (kip) = 2273.62	Pu/0.90Pn = 0.821

DEMAND/CAPACITY LIMIT FOR STRENGTH : 1.000**CONTROLLING COMBINED COLUMN LOADS - Skip-Load Case 4:**

	Dead	Live	Roof
Axial (kip) _____	810.24	555.14	13.50
Moments Top Mx (kip-ft) _____	-2.28	2.86	0.00
My (kip-ft) _____	-0.86	-0.80	0.00
Bot Mx (kip-ft) _____	-2.46	-3.50	0.00
My (kip-ft) _____	-0.93	-8.32	0.00

Single curvature about X-Axis

Reverse curvature about Y-Axis

CALCULATED PARAMETERS: (1.2DL + 1.6LL + 0.5RF)

Pu (kip) = 1867.26	0.90*Pn (kip) = 2273.62
Mux (kip-ft) = -8.56	0.90*Mnx (kip-ft) = 1331.25
Muy (kip-ft) = -14.42	0.90*Mny (kip-ft) = 675.00
Rm = 1.00	
Cbx = 1.46	
Cmx = 0.69	Cmy = 0.54
Pex (kip) = 26174.53	Pey (kip) = 10153.54
B1x = 1.00	B1y = 1.00

INTERACTION EQUATION

Pu/0.90*Pn = 0.821

RAM Structural System

Gravity Column Design

RAM Steel 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Page 2/2

02/24/21 16:28:25

Building Code: IBC

Steel Code: AISC360-16 LRFD

$$\text{Eq H1-1a: } 0.821 + 8/9(0.006 + 0.021) = 0.846$$

Project ID:
Project # :
Bay ID : 3-TYPICAL FLOOR: 1-2 , A-C
Model : 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

VIBRATION ANALYSIS:

Activity: Walking
Occupancy Category: Electronic Office
Evaluation Criterion: Walking
References: Murray, T.M., Allen, D.E., Ungar, E.E, Davis, D.B.
"Vibrations of Steel-Framed Structural Systems
Due To Human Activity", AISC Design Guide #11 2nd Ed, 2016
Murray, T.M., and Davis, B.,
"Vibration of Steel Joist-Concrete Floor Systems",
SJI Technical Digest No. 5, 2014
Constant Force, $P_o = 65.1b$
Modal Damping Ratio, $\beta = 0.025$
Acceleration Limit, $a_o/g \times 100\% = 0.50 \%$
Beams are continuous
Girders are not continuous at columns

EVALUATION: Combined Mode $a_p/g = 0.497 \%$ $\leq 0.50 \%$
The system SATISFIES THE CRITERION.

PARAMETER SUMMARY:

Parameter	Beam Panel	Left Girder Panel	Right Girder Panel	System
Member	W21X44	Wall	W24X62	
Uniform Load, plf	619.4	0.0	2849.4	
Effective I, in ⁴	3021.1	0.0	5156.9	
Frequency, Hz	4.38	0.00	6.00	3.54
Panel Width, ft	38.36	0.00	68.81	
Panel Weight, k	160.4	0.0	130.7	151.7

FRAMING: (User Modified Bay)

Girder Span = 30.00 ft
Beam Spans:
Left = 0.00 ft
Center = 45.00 ft
Right = 45.00 ft

Girders/Walls:
Left -Wall
Right-W24X62

Beam -W21X44
3 spaces at 120.00 in

Floor Width =350.00 ft
Floor Length=120.00 ft

Concrete: $d_c = 6.25$ in
 $f'_c = 3.00$ ksi
wt. = 110.0 pcf
Deck Height = 3.00 in

Loading: Dead = 4.00 psf
Live = 8.00 psf
Collateral = 0.00 psf

Warning: The bay configuration and/or properties analyzed here have been modified by the user and differ from the actual configuration

and/or properties of the bay in the RAM Structural System.

Note: Floors with a frequency below 3 Hz are not recommended

COLUMN DESIGN

RAM STRUCTURAL SYSTEM DEMAND-CAPACITY RATIO SUMMARY

SAMPLE
COL.

RAM Structural System

RAM Steel 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Gravity Column Design

02/24/21 16:28:25

Steel Code: AISC360-16 LRFD

Story level Level 3, Column Line 3-C, Column # 33

Fy (ksi) = 50.00

Column Size

= W14X193

Orientation (deg.) = 90.0

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu (ft) _____	13.50	13.50
K _____	1	1
Braced Against Joint Translation _____	Yes	Yes
Column Eccentricity (in) Top _____	10.25	10.35
Bottom _____	10.25	10.35

CONTROLLING AXIAL COLUMN LOADS - Skip-Load Case 1:

	Dead	Live	Roof
Axial (kip) _____	810.24	555.14	13.50

DEMAND CAPACITY RATIO: (1.2DL + 1.6LL + 0.5RF)

Pu (kip) = 1867.26	0.90Pnx (kip) = 2442.52	Pu/0.90Pnx = 0.764
	0.90Pny (kip) = 2273.62	Pu/0.90Pny = 0.821
	0.90Pn (kip) = 2273.62	Pu/0.90Pn = 0.821

DEMAND/CAPACITY LIMIT FOR STRENGTH : 1.000**CONTROLLING COMBINED COLUMN LOADS - Skip-Load Case 4:**

	Dead	Live	Roof
Axial (kip) _____	810.24	555.14	13.50
Moments Top Mx (kip-ft) _____	-2.28	2.86	0.00
My (kip-ft) _____	-0.86	-0.80	0.00
Bot Mx (kip-ft) _____	-2.46	-3.50	0.00
My (kip-ft) _____	-0.93	-8.32	0.00

Single curvature about X-Axis

Reverse curvature about Y-Axis

CALCULATED PARAMETERS: (1.2DL + 1.6LL + 0.5RF)

Pu (kip) = 1867.26	0.90*Pn (kip) = 2273.62
Mux (kip-ft) = -8.56	0.90*Mnx (kip-ft) = 1331.25
Muy (kip-ft) = -14.42	0.90*Mny (kip-ft) = 675.00
Rm = 1.00	
Cbx = 1.46	
Cmx = 0.69	Cmy = 0.54
Pex (kip) = 26174.53	Pey (kip) = 10153.54
B1x = 1.00	B1y = 1.00

INTERACTION EQUATION

Pu/0.90*Pn = 0.821

RAM Structural System

Gravity Column Design

RAM Steel 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Page 2/2

02/24/21 16:28:25

Building Code: IBC

Steel Code: AISC360-16 LRFD

$$\text{Eq H1-1a: } 0.821 + 8/9(0.006 + 0.021) = 0.846$$

LATERAL DESIGN

LOAD CASE: WIND**WIND**

ASCE 7-16

Exposure: C

Basic Wind Speed (mph): 148.0

Apply Directionality Factor, $K_d = 0.85$ Use Topography Factor, $K_{zt} = 1.00$ Ground Elevation Factor, $K_e = 1.00$

Use Calculated Frequency for X-Dir.

Use Calculated Frequency for Y-Dir.

Gust Factor for Flexible Structures, G : Use Calculated G for X-Dir.Gust Factor for Flexible Structures, G : Use Calculated G for Y-Dir.

Damping Ratio for Flexible Structures = 0.01

Mean Roof Height (ft): Top Story Height + Parapet = 164.50

Ground Level: GRADE

WIND PRESSURES:

X-Direction: Natural Frequency = 0.237 Structure is Flexible

Y-Direction: Natural Frequency = 0.506 Structure is Flexible

 C_p Windward = 0.80 q Leeward (qh) = 66.99 psf $G C_{pn}$ (Parapet): Windward = 1.50 Leeward = -1.00

Height ft	K_z	K_{zt}	q_z psf	Gust Factor G		C_p Leeward		Pressure (psf)	
				X	Y	X	Y	X	Y
164.50	1.405	1.000	66.988	1.434	1.015	-0.352	-0.500	110.712	88.416
151.00	1.380	1.000	65.791	1.434	1.015	-0.352	-0.500	109.339	87.444
137.50	1.353	1.000	64.506	1.434	1.015	-0.352	-0.500	107.865	86.401
124.00	1.324	1.000	63.118	1.434	1.015	-0.352	-0.500	106.272	85.273
110.50	1.293	1.000	61.605	1.434	1.015	-0.352	-0.500	104.536	84.044
97.00	1.258	1.000	59.938	1.434	1.015	-0.352	-0.500	102.624	82.690
83.50	1.218	1.000	58.076	1.434	1.015	-0.352	-0.500	100.488	81.178
70.00	1.174	1.000	55.960	1.434	1.015	-0.352	-0.500	98.060	79.459
56.50	1.122	1.000	53.492	1.434	1.015	-0.352	-0.500	95.228	77.454
43.00	1.060	1.000	50.503	1.434	1.015	-0.352	-0.500	91.800	75.027
29.50	0.979	1.000	46.652	1.434	1.015	-0.352	-0.500	87.381	71.899
16.00	0.860	1.000	41.014	1.434	1.015	-0.352	-0.500	80.913	67.320
0.00	0.849	1.000	40.460	1.434	1.015	-0.352	-0.500	80.278	66.870

APPLIED STORY FORCES

Type: Wind_ASCE716_1_X

Level	Ht ft	F_x kips	F_y kips
ROOF	164.50	90.79	0.00
Level 12	151.00	180.05	0.00
Level 11	137.50	177.62	0.00
Level 10	124.00	174.99	0.00
Level 9	110.50	172.12	0.00
Level 8	97.00	168.96	0.00
Level 7	83.50	165.42	0.00
Level 6	70.00	161.39	0.00
Level 5	56.50	156.68	0.00
Level 4	43.00	150.92	0.00
Level 3	29.50	143.35	0.00
Level 2	16.00	147.17	0.00

APPLIED STORY FORCES

Type: Wind_ASCE716_1_Y

Level	Ht ft	F_x kips	F_y kips
ROOF	164.50	0.00	126.06
Level 12	151.00	0.00	250.23
Level 11	137.50	0.00	247.24
Level 10	124.00	0.00	244.00
Level 9	110.50	0.00	240.48
Level 8	97.00	0.00	236.58
Level 7	83.50	0.00	232.23
Level 6	70.00	0.00	227.28
Level 5	56.50	0.00	221.47
Level 4	43.00	0.00	214.39
Level 3	29.50	0.00	205.08
Level 2	16.00	0.00	212.44

 $V_x = 1889.49$

0.00

0.00 $V_y = 2657.49$

SEISMIC

LOAD CASE: EQ-X ELF

Seismic ASCE 7-16 Equivalent Lateral Force
 Importance Factor: 1.25 TL: 8.00 s
 Site Class D: Stiff Soil, Default
 Ss: 0.313 g S1: 0.114 g
 Use Specified: SDs: 0.464 g SD1: 0.319 g
 Risk Category: III Seismic Design Category: D
 Provisions for: Force
 Ground Level: GRADE

Dir	Eccent	R	Ta Equation			Building Period-T			
X	+ And -	8.0	Std,Ct=0.028,x=0.80			Calculated			
Dir	Ta	Cu	T	T-used	Cs	Cs(max)	Cs(min)	Cs-used	k
					Eq12.8-2	Eq12.8-3	Eq12.8-5		
X	1.660	1.400	4.211	2.324	0.072	0.021	0.026	0.026	1.912

Total Building Weight (kips) = 24284.91

$$V_x = C_s * W = 620K$$

LOAD CASE: EQ-Y ELF

Seismic ASCE 7-16 Equivalent Lateral Force
 Importance Factor: 1.25 TL: 8.00 s
 Site Class D: Stiff Soil, Default
 Ss: 0.313 g S1: 0.114 g
 Use Specified: SDs: 0.464 g SD1: 0.319 g
 Risk Category: III Seismic Design Category: D
 Provisions for: Force
 Ground Level: GRADE

Dir	Eccent	R	Ta Equation			Building Period-T			
Y	+ And -	6.0	Std,Ct=0.020,x=0.75			Calculated			
Dir	Ta	Cu	T	T-used	Cs	Cs(max)	Cs(min)	Cs-used	k
					Eq12.8-2	Eq12.8-3	Eq12.8-5		
Y	0.919	1.400	1.975	1.286	0.097	0.052	0.026	0.052	1.393

Total Building Weight (kips) = 24284.91

$$V_y = C_s * W = 1,255 K$$

Wind Base shear > Seismic base shear. Wind Controls

RAM Structural System

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

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Loads and Applied Forces

LOAD CASE: WIND

ASCE 7-16

Exposure: C

Basic Wind Speed (mph): 148.0

Apply Directionality Factor, $K_d = 0.85$ Use Topography Factor, $K_{zt} = 1.00$ Ground Elevation Factor, $K_e = 1.00$

Use Calculated Frequency for X-Dir.

Use Calculated Frequency for Y-Dir.

Gust Factor for Flexible Structures, G: Use Calculated G for X-Dir.

Gust Factor for Flexible Structures, G: Use Calculated G for Y-Dir.

Damping Ratio for Flexible Structures = 0.01

Mean Roof Height (ft): Top Story Height + Parapet = 164.50

Ground Level: GRADE

WIND PRESSURES:

X-Direction: Natural Frequency = 0.237 Structure is Flexible

Y-Direction: Natural Frequency = 0.506 Structure is Flexible

 C_p Windward = 0.80 q Leeward (qh) = 66.99 psf $G C_{p_n}$ (Parapet): Windward = 1.50 Leeward = -1.00

Height ft	K_z	K_{zt}	q_z psf	Gust Factor G		C_p Leeward		Pressure (psf)	
				X	Y	X	Y	X	Y
164.50	1.405	1.000	66.988	1.434	1.015	-0.352	-0.500	110.712	88.416
151.00	1.380	1.000	65.791	1.434	1.015	-0.352	-0.500	109.339	87.444
137.50	1.353	1.000	64.506	1.434	1.015	-0.352	-0.500	107.865	86.401
124.00	1.324	1.000	63.118	1.434	1.015	-0.352	-0.500	106.272	85.273
110.50	1.293	1.000	61.605	1.434	1.015	-0.352	-0.500	104.536	84.044
97.00	1.258	1.000	59.938	1.434	1.015	-0.352	-0.500	102.624	82.690
83.50	1.218	1.000	58.076	1.434	1.015	-0.352	-0.500	100.488	81.178
70.00	1.174	1.000	55.960	1.434	1.015	-0.352	-0.500	98.060	79.459
56.50	1.122	1.000	53.492	1.434	1.015	-0.352	-0.500	95.228	77.454
43.00	1.060	1.000	50.503	1.434	1.015	-0.352	-0.500	91.800	75.027
29.50	0.979	1.000	46.652	1.434	1.015	-0.352	-0.500	87.381	71.899
16.00	0.860	1.000	41.014	1.434	1.015	-0.352	-0.500	80.913	67.320
0.00	0.849	1.000	40.460	1.434	1.015	-0.352	-0.500	80.278	66.870

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_X

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	90.79	0.00	105.00	60.00
Level 12	1	151.00	180.05	0.00	105.00	60.00
Level 11	1	137.50	177.62	0.00	105.00	60.00
Level 10	1	124.00	174.99	0.00	105.00	60.00
Level 9	1	110.50	172.12	0.00	105.00	60.00
Level 8	1	97.00	168.96	0.00	105.00	60.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 2/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

Level 7	1	83.50	165.42	0.00	105.00	60.00
Level 6	1	70.00	161.39	0.00	105.00	60.00
Level 5	1	56.50	156.68	0.00	105.00	60.00
Level 4	1	43.00	150.92	0.00	105.00	60.00
Level 3	1	29.50	143.35	0.00	105.00	60.00
Level 2	1	16.00	147.17	0.00	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_1_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	90.79	0.00
Level 12	151.00	180.05	0.00
Level 11	137.50	177.62	0.00
Level 10	124.00	174.99	0.00
Level 9	110.50	172.12	0.00
Level 8	97.00	168.96	0.00
Level 7	83.50	165.42	0.00
Level 6	70.00	161.39	0.00
Level 5	56.50	156.68	0.00
Level 4	43.00	150.92	0.00
Level 3	29.50	143.35	0.00
Level 2	16.00	147.17	0.00
		1889.49	0.00

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	126.06	105.00	60.00
Level 12	1	151.00	0.00	250.23	105.00	60.00
Level 11	1	137.50	0.00	247.24	105.00	60.00
Level 10	1	124.00	0.00	244.00	105.00	60.00
Level 9	1	110.50	0.00	240.48	105.00	60.00
Level 8	1	97.00	0.00	236.58	105.00	60.00
Level 7	1	83.50	0.00	232.23	105.00	60.00
Level 6	1	70.00	0.00	227.28	105.00	60.00
Level 5	1	56.50	0.00	221.47	105.00	60.00
Level 4	1	43.00	0.00	214.39	105.00	60.00
Level 3	1	29.50	0.00	205.08	105.00	60.00
Level 2	1	16.00	0.00	212.44	105.00	60.00

RAM Structural System

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Loads and Applied Forces

Page 3/40

01/07/21 17:12:07

APPLIED STORY FORCES

Type: Wind_ASCE716_1_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	126.06
Level 12	151.00	0.00	250.23
Level 11	137.50	0.00	247.24
Level 10	124.00	0.00	244.00
Level 9	110.50	0.00	240.48
Level 8	97.00	0.00	236.58
Level 7	83.50	0.00	232.23
Level 6	70.00	0.00	227.28
Level 5	56.50	0.00	221.47
Level 4	43.00	0.00	214.39
Level 3	29.50	0.00	205.08
Level 2	16.00	0.00	212.44
		0.00	2657.49

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_X+E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	68.10	0.00	105.00	70.99
Level 12	1	151.00	135.04	0.00	105.00	70.99
Level 11	1	137.50	133.22	0.00	105.00	70.99
Level 10	1	124.00	131.24	0.00	105.00	71.02
Level 9	1	110.50	129.09	0.00	105.00	71.04
Level 8	1	97.00	126.72	0.00	105.00	71.05
Level 7	1	83.50	124.07	0.00	105.00	71.03
Level 6	1	70.00	121.05	0.00	105.00	71.04
Level 5	1	56.50	117.51	0.00	105.00	71.00
Level 4	1	43.00	113.19	0.00	105.00	70.99
Level 3	1	29.50	107.52	0.00	105.00	70.98
Level 2	1	16.00	110.38	0.00	105.00	70.97

APPLIED STORY FORCES

Type: Wind_ASCE716_2_X+E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	68.10	0.00
Level 12	151.00	135.04	0.00
Level 11	137.50	133.22	0.00
Level 10	124.00	131.24	0.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 4/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

Level 9	110.50	129.09	0.00
Level 8	97.00	126.72	0.00
Level 7	83.50	124.07	0.00
Level 6	70.00	121.05	0.00
Level 5	56.50	117.51	0.00
Level 4	43.00	113.19	0.00
Level 3	29.50	107.52	0.00
Level 2	16.00	110.38	0.00
		<hr/>	<hr/>
		1417.12	0.00

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_X-E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	68.10	0.00	105.00	49.01
Level 12	1	151.00	135.04	0.00	105.00	49.01
Level 11	1	137.50	133.22	0.00	105.00	49.01
Level 10	1	124.00	131.24	0.00	105.00	48.98
Level 9	1	110.50	129.09	0.00	105.00	48.96
Level 8	1	97.00	126.72	0.00	105.00	48.95
Level 7	1	83.50	124.07	0.00	105.00	48.97
Level 6	1	70.00	121.05	0.00	105.00	48.96
Level 5	1	56.50	117.51	0.00	105.00	49.00
Level 4	1	43.00	113.19	0.00	105.00	49.01
Level 3	1	29.50	107.52	0.00	105.00	49.02
Level 2	1	16.00	110.38	0.00	105.00	49.03

APPLIED STORY FORCES

Type: Wind_ASCE716_2_X-E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	68.10	0.00
Level 12	151.00	135.04	0.00
Level 11	137.50	133.22	0.00
Level 10	124.00	131.24	0.00
Level 9	110.50	129.09	0.00
Level 8	97.00	126.72	0.00
Level 7	83.50	124.07	0.00
Level 6	70.00	121.05	0.00
Level 5	56.50	117.51	0.00
Level 4	43.00	113.19	0.00
Level 3	29.50	107.52	0.00
Level 2	16.00	110.38	0.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 5/40

01/07/21 17:12:07

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

1417.12	0.00
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APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_Y+E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	94.55	131.53	60.00
Level 12	1	151.00	0.00	187.67	131.53	60.00
Level 11	1	137.50	0.00	185.43	131.53	60.00
Level 10	1	124.00	0.00	183.00	131.53	60.00
Level 9	1	110.50	0.00	180.36	131.53	60.00
Level 8	1	97.00	0.00	177.44	131.53	60.00
Level 7	1	83.50	0.00	174.17	131.53	60.00
Level 6	1	70.00	0.00	170.46	131.53	60.00
Level 5	1	56.50	0.00	166.10	131.53	60.00
Level 4	1	43.00	0.00	160.80	131.53	60.00
Level 3	1	29.50	0.00	153.81	131.53	60.00
Level 2	1	16.00	0.00	159.33	131.54	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_2_Y+E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	94.55
Level 12	151.00	0.00	187.67
Level 11	137.50	0.00	185.43
Level 10	124.00	0.00	183.00
Level 9	110.50	0.00	180.36
Level 8	97.00	0.00	177.44
Level 7	83.50	0.00	174.17
Level 6	70.00	0.00	170.46
Level 5	56.50	0.00	166.10
Level 4	43.00	0.00	160.80
Level 3	29.50	0.00	153.81
Level 2	16.00	0.00	159.33

0.00	1993.12
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APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_Y-E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
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RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 6/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

ROOF	1	164.50	0.00	94.55	78.47	60.00
Level 12	1	151.00	0.00	187.67	78.47	60.00
Level 11	1	137.50	0.00	185.43	78.47	60.00
Level 10	1	124.00	0.00	183.00	78.47	60.00
Level 9	1	110.50	0.00	180.36	78.47	60.00
Level 8	1	97.00	0.00	177.44	78.47	60.00
Level 7	1	83.50	0.00	174.17	78.47	60.00
Level 6	1	70.00	0.00	170.46	78.47	60.00
Level 5	1	56.50	0.00	166.10	78.47	60.00
Level 4	1	43.00	0.00	160.80	78.47	60.00
Level 3	1	29.50	0.00	153.81	78.47	60.00
Level 2	1	16.00	0.00	159.33	78.46	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_2_Y-E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	94.55
Level 12	151.00	0.00	187.67
Level 11	137.50	0.00	185.43
Level 10	124.00	0.00	183.00
Level 9	110.50	0.00	180.36
Level 8	97.00	0.00	177.44
Level 7	83.50	0.00	174.17
Level 6	70.00	0.00	170.46
Level 5	56.50	0.00	166.10
Level 4	43.00	0.00	160.80
Level 3	29.50	0.00	153.81
Level 2	16.00	0.00	159.33
		0.00	1993.12

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_3_X+Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	68.10	94.55	105.00	60.00
Level 12	1	151.00	135.04	187.67	105.00	60.00
Level 11	1	137.50	133.22	185.43	105.00	60.00
Level 10	1	124.00	131.24	183.00	105.00	60.00
Level 9	1	110.50	129.09	180.36	105.00	60.00
Level 8	1	97.00	126.72	177.44	105.00	60.00
Level 7	1	83.50	124.07	174.17	105.00	60.00
Level 6	1	70.00	121.05	170.46	105.00	60.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 7/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

Level 5	1	56.50	117.51	166.10	105.00	60.00
Level 4	1	43.00	113.19	160.80	105.00	60.00
Level 3	1	29.50	107.52	153.81	105.00	60.00
Level 2	1	16.00	110.38	159.33	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_3_X+Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	68.10	94.55
Level 12	151.00	135.04	187.67
Level 11	137.50	133.22	185.43
Level 10	124.00	131.24	183.00
Level 9	110.50	129.09	180.36
Level 8	97.00	126.72	177.44
Level 7	83.50	124.07	174.17
Level 6	70.00	121.05	170.46
Level 5	56.50	117.51	166.10
Level 4	43.00	113.19	160.80
Level 3	29.50	107.52	153.81
Level 2	16.00	110.38	159.33
		1417.12	1993.12

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_3_X-Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	68.10	-94.55	105.00	60.00
Level 12	1	151.00	135.04	-187.67	105.00	60.00
Level 11	1	137.50	133.22	-185.43	105.00	60.00
Level 10	1	124.00	131.24	-183.00	105.00	60.00
Level 9	1	110.50	129.09	-180.36	105.00	60.00
Level 8	1	97.00	126.72	-177.44	105.00	60.00
Level 7	1	83.50	124.07	-174.17	105.00	60.00
Level 6	1	70.00	121.05	-170.46	105.00	60.00
Level 5	1	56.50	117.51	-166.10	105.00	60.00
Level 4	1	43.00	113.19	-160.80	105.00	60.00
Level 3	1	29.50	107.52	-153.81	105.00	60.00
Level 2	1	16.00	110.38	-159.33	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_3_X-Y

Level	Ht	Fx	Fy
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RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 8/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

	ft	kips	kips
ROOF	164.50	68.10	-94.55
Level 12	151.00	135.04	-187.67
Level 11	137.50	133.22	-185.43
Level 10	124.00	131.24	-183.00
Level 9	110.50	129.09	-180.36
Level 8	97.00	126.72	-177.44
Level 7	83.50	124.07	-174.17
Level 6	70.00	121.05	-170.46
Level 5	56.50	117.51	-166.10
Level 4	43.00	113.19	-160.80
Level 3	29.50	107.52	-153.81
Level 2	16.00	110.38	-159.33
		<hr/> 1417.12	<hr/> -1993.12

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X+Y_CW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	51.07	70.91	78.47	70.99
Level 12	1	151.00	101.28	140.76	78.47	70.99
Level 11	1	137.50	99.91	139.07	78.47	70.99
Level 10	1	124.00	98.43	137.25	78.47	71.02
Level 9	1	110.50	96.82	135.27	78.47	71.04
Level 8	1	97.00	95.04	133.08	78.47	71.05
Level 7	1	83.50	93.05	130.63	78.47	71.03
Level 6	1	70.00	90.78	127.84	78.47	71.04
Level 5	1	56.50	88.13	124.58	78.47	71.00
Level 4	1	43.00	84.89	120.60	78.47	70.99
Level 3	1	29.50	80.64	115.36	78.47	70.98
Level 2	1	16.00	82.78	119.50	78.46	70.97

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X+Y_CW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	51.07	70.91
Level 12	151.00	101.28	140.76
Level 11	137.50	99.91	139.07
Level 10	124.00	98.43	137.25
Level 9	110.50	96.82	135.27
Level 8	97.00	95.04	133.08
Level 7	83.50	93.05	130.63

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 9/40

01/07/21 17:12:07

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Level 6	70.00	90.78	127.84
Level 5	56.50	88.13	124.58
Level 4	43.00	84.89	120.60
Level 3	29.50	80.64	115.36
Level 2	16.00	82.78	119.50
		<hr/>	<hr/>
		1062.84	1494.84

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X+Y_CCW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	51.07	70.91	131.53	49.01
Level 12	1	151.00	101.28	140.76	131.53	49.01
Level 11	1	137.50	99.91	139.07	131.53	49.01
Level 10	1	124.00	98.43	137.25	131.53	48.98
Level 9	1	110.50	96.82	135.27	131.53	48.96
Level 8	1	97.00	95.04	133.08	131.53	48.95
Level 7	1	83.50	93.05	130.63	131.53	48.97
Level 6	1	70.00	90.78	127.84	131.53	48.96
Level 5	1	56.50	88.13	124.58	131.53	49.00
Level 4	1	43.00	84.89	120.60	131.53	49.01
Level 3	1	29.50	80.64	115.36	131.53	49.02
Level 2	1	16.00	82.78	119.50	131.54	49.03

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X+Y_CCW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	51.07	70.91
Level 12	151.00	101.28	140.76
Level 11	137.50	99.91	139.07
Level 10	124.00	98.43	137.25
Level 9	110.50	96.82	135.27
Level 8	97.00	95.04	133.08
Level 7	83.50	93.05	130.63
Level 6	70.00	90.78	127.84
Level 5	56.50	88.13	124.58
Level 4	43.00	84.89	120.60
Level 3	29.50	80.64	115.36
Level 2	16.00	82.78	119.50
		<hr/>	<hr/>
		1062.84	1494.84

RAM Structural System

RAM Frame 17.01.01.05
DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Page 10/40

01/07/21 17:12:07

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X-Y_CW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	51.07	-70.91	131.53	70.99
Level 12	1	151.00	101.28	-140.76	131.53	70.99
Level 11	1	137.50	99.91	-139.07	131.53	70.99
Level 10	1	124.00	98.43	-137.25	131.53	71.02
Level 9	1	110.50	96.82	-135.27	131.53	71.04
Level 8	1	97.00	95.04	-133.08	131.53	71.05
Level 7	1	83.50	93.05	-130.63	131.53	71.03
Level 6	1	70.00	90.78	-127.84	131.53	71.04
Level 5	1	56.50	88.13	-124.58	131.53	71.00
Level 4	1	43.00	84.89	-120.60	131.53	70.99
Level 3	1	29.50	80.64	-115.36	131.53	70.98
Level 2	1	16.00	82.78	-119.50	131.54	70.97

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X-Y_CW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	51.07	-70.91
Level 12	151.00	101.28	-140.76
Level 11	137.50	99.91	-139.07
Level 10	124.00	98.43	-137.25
Level 9	110.50	96.82	-135.27
Level 8	97.00	95.04	-133.08
Level 7	83.50	93.05	-130.63
Level 6	70.00	90.78	-127.84
Level 5	56.50	88.13	-124.58
Level 4	43.00	84.89	-120.60
Level 3	29.50	80.64	-115.36
Level 2	16.00	82.78	-119.50
		1062.84	-1494.84

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X-Y_CCW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	51.07	-70.91	78.47	49.01
Level 12	1	151.00	101.28	-140.76	78.47	49.01
Level 11	1	137.50	99.91	-139.07	78.47	49.01
Level 10	1	124.00	98.43	-137.25	78.47	48.98

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RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 11/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

Level 9	1	110.50	96.82	-135.27	78.47	48.96
Level 8	1	97.00	95.04	-133.08	78.47	48.95
Level 7	1	83.50	93.05	-130.63	78.47	48.97
Level 6	1	70.00	90.78	-127.84	78.47	48.96
Level 5	1	56.50	88.13	-124.58	78.47	49.00
Level 4	1	43.00	84.89	-120.60	78.47	49.01
Level 3	1	29.50	80.64	-115.36	78.47	49.02
Level 2	1	16.00	82.78	-119.50	78.46	49.03

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X-Y_CCW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	51.07	-70.91
Level 12	151.00	101.28	-140.76
Level 11	137.50	99.91	-139.07
Level 10	124.00	98.43	-137.25
Level 9	110.50	96.82	-135.27
Level 8	97.00	95.04	-133.08
Level 7	83.50	93.05	-130.63
Level 6	70.00	90.78	-127.84
Level 5	56.50	88.13	-124.58
Level 4	43.00	84.89	-120.60
Level 3	29.50	80.64	-115.36
Level 2	16.00	82.78	-119.50
		<hr/> 1062.84	<hr/> -1494.84

This publication is available free of charge from: <https://doi.org/10.6028/NIST.GCR.21-917-48v1B>

RAM Structural System

Bentley DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Loads and Applied Forces

Page 12/40

01/07/21 17:12:07

LOAD CASE: EQ-X ELF

Seismic ASCE 7-16 Equivalent Lateral Force

Importance Factor: 1.25 TL: 8.00 s

Site Class D: Stiff Soil, Default

Ss: 0.313 g S1: 0.114 g

Use Specified: SDs: 0.464 g SD1: 0.319 g

Risk Category: III Seismic Design Category: D

Provisions for: Force

Ground Level: GRADE

Dir	Eccent	R	Ta Equation			Building Period-T			
X	+ And -	8.0	Std,Ct=0.028,x=0.80			Calculated			
Dir	Ta	Cu	T	T-used	Cs	Cs(max)	Cs(min)	Cs-used	k
					Eq12.8-2	Eq12.8-3	Eq12.8-5		
X	1.660	1.400	4.211	2.324	0.072	0.021	0.026	0.026	1.912

Total Building Weight (kips) = 24284.91

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
ROOF	1	164.50	135.88	0.00	99.21	67.60
Level 12	1	151.00	109.74	0.00	98.78	67.58
Level 11	1	137.50	92.07	0.00	98.79	67.56
Level 10	1	124.00	75.95	0.00	98.74	67.58
Level 9	1	110.50	61.24	0.00	98.77	67.53
Level 8	1	97.00	48.05	0.00	98.77	67.52
Level 7	1	83.50	36.29	0.00	98.76	67.52
Level 6	1	70.00	26.03	0.00	98.78	67.53
Level 5	1	56.50	17.39	0.00	98.73	67.49
Level 4	1	43.00	10.42	0.00	98.69	67.52
Level 3	1	29.50	5.10	0.00	98.72	67.49
Level 2	1	16.00	1.59	0.00	98.73	67.50

APPLIED STORY FORCES

Type: EQ_ASCE716_X+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
ROOF	164.50	135.88	0.00
Level 12	151.00	109.74	0.00
Level 11	137.50	92.07	0.00
Level 10	124.00	75.95	0.00
Level 9	110.50	61.24	0.00

RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Page 13/40

01/07/21 17:12:07

Level 8	97.00	48.05	0.00
Level 7	83.50	36.29	0.00
Level 6	70.00	26.03	0.00
Level 5	56.50	17.39	0.00
Level 4	43.00	10.42	0.00
Level 3	29.50	5.10	0.00
Level 2	16.00	1.59	0.00
		<hr/>	<hr/>
		619.75	0.00

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	135.88	0.00	99.21	55.40
Level 12	1	151.00	109.74	0.00	98.78	55.38
Level 11	1	137.50	92.07	0.00	98.79	55.36
Level 10	1	124.00	75.95	0.00	98.74	55.38
Level 9	1	110.50	61.24	0.00	98.77	55.33
Level 8	1	97.00	48.05	0.00	98.77	55.32
Level 7	1	83.50	36.29	0.00	98.76	55.32
Level 6	1	70.00	26.03	0.00	98.78	55.33
Level 5	1	56.50	17.39	0.00	98.73	55.29
Level 4	1	43.00	10.42	0.00	98.69	55.32
Level 3	1	29.50	5.10	0.00	98.72	55.29
Level 2	1	16.00	1.59	0.00	98.73	55.30

APPLIED STORY FORCES

Type: EQ_ASCE716_X_-E_F

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	135.88	0.00
Level 12	151.00	109.74	0.00
Level 11	137.50	92.07	0.00
Level 10	124.00	75.95	0.00
Level 9	110.50	61.24	0.00
Level 8	97.00	48.05	0.00
Level 7	83.50	36.29	0.00
Level 6	70.00	26.03	0.00
Level 5	56.50	17.39	0.00
Level 4	43.00	10.42	0.00
Level 3	29.50	5.10	0.00
Level 2	16.00	1.59	0.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 14/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

619.75

0.00

RAM Structural System

Bentley DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Loads and Applied Forces

Page 15/40

01/07/21 17:12:07

LOAD CASE: EQ-Y ELF

Seismic ASCE 7-16 Equivalent Lateral Force

Importance Factor: 1.25 TL: 8.00 s

Site Class D: Stiff Soil, Default

Ss: 0.313 g S1: 0.114 g

Use Specified: SDs: 0.464 g SD1: 0.319 g

Risk Category: III Seismic Design Category: D

Provisions for: Force

Ground Level: GRADE

Dir	Eccent	R	Ta Equation			Building Period-T			
Y	+ And -	6.0	Std,Ct=0.020,x=0.75			Calculated			
Dir	Ta	Cu	T	T-used	Cs	Cs(max)	Cs(min)	Cs-used	k
					Eq12.8-2	Eq12.8-3	Eq12.8-5		
Y	0.919	1.400	1.975	1.286	0.097	0.052	0.026	0.052	1.393

Total Building Weight (kips) = 24284.91

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_Y+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
ROOF	1	164.50	0.00	230.68	109.81	61.50
Level 12	1	151.00	0.00	194.76	109.38	61.48
Level 11	1	137.50	0.00	171.55	109.39	61.46
Level 10	1	124.00	0.00	149.31	109.34	61.48
Level 9	1	110.50	0.00	127.81	109.37	61.43
Level 8	1	97.00	0.00	107.29	109.37	61.42
Level 7	1	83.50	0.00	87.58	109.36	61.42
Level 6	1	70.00	0.00	68.85	109.38	61.43
Level 5	1	56.50	0.00	51.40	109.33	61.39
Level 4	1	43.00	0.00	35.48	109.29	61.42
Level 3	1	29.50	0.00	21.11	109.32	61.39
Level 2	1	16.00	0.00	9.06	109.33	61.40

APPLIED STORY FORCES

Type: EQ_ASCE716_Y+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
ROOF	164.50	0.00	230.68
Level 12	151.00	0.00	194.76
Level 11	137.50	0.00	171.55
Level 10	124.00	0.00	149.31
Level 9	110.50	0.00	127.81

RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Page 16/40

01/07/21 17:12:07

Level 8	97.00	0.00	107.29
Level 7	83.50	0.00	87.58
Level 6	70.00	0.00	68.85
Level 5	56.50	0.00	51.40
Level 4	43.00	0.00	35.48
Level 3	29.50	0.00	21.11
Level 2	16.00	0.00	9.06
		<hr/>	<hr/>
		0.00	1254.88

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	230.68	88.61	61.50
Level 12	1	151.00	0.00	194.76	88.18	61.48
Level 11	1	137.50	0.00	171.55	88.19	61.46
Level 10	1	124.00	0.00	149.31	88.14	61.48
Level 9	1	110.50	0.00	127.81	88.17	61.43
Level 8	1	97.00	0.00	107.29	88.17	61.42
Level 7	1	83.50	0.00	87.58	88.16	61.42
Level 6	1	70.00	0.00	68.85	88.18	61.43
Level 5	1	56.50	0.00	51.40	88.13	61.39
Level 4	1	43.00	0.00	35.48	88.09	61.42
Level 3	1	29.50	0.00	21.11	88.12	61.39
Level 2	1	16.00	0.00	9.06	88.13	61.40

APPLIED STORY FORCES

Type: EQ_ASCE716_Y_-E_F

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	230.68
Level 12	151.00	0.00	194.76
Level 11	137.50	0.00	171.55
Level 10	124.00	0.00	149.31
Level 9	110.50	0.00	127.81
Level 8	97.00	0.00	107.29
Level 7	83.50	0.00	87.58
Level 6	70.00	0.00	68.85
Level 5	56.50	0.00	51.40
Level 4	43.00	0.00	35.48
Level 3	29.50	0.00	21.11
Level 2	16.00	0.00	9.06

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 17/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

0.00 1254.88

RAM Structural System

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Loads and Applied Forces

Page 20/40

01/07/21 17:12:07

LOAD CASE: NOTIONAL

Notional AISC 360-05/10

Fraction of Gravity Load : 0.00200

Ground Level: GRADE

Total Dead Load (kips) = 19923.07

Total Live Load (kips) = 11233.99

Total Roof Load (kips) = 292.37

APPLIED DIAPHRAGM FORCES

Type: NL_AISC360_DL_X

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	3.66	0.00	98.95	61.45
Level 12	1	151.00	3.17	0.00	98.70	61.42
Level 11	1	137.50	3.20	0.00	98.68	61.38
Level 10	1	124.00	3.20	0.00	98.65	61.43
Level 9	1	110.50	3.24	0.00	98.67	61.35
Level 8	1	97.00	3.25	0.00	98.69	61.35
Level 7	1	83.50	3.29	0.00	98.69	61.36
Level 6	1	70.00	3.29	0.00	98.70	61.37
Level 5	1	56.50	3.34	0.00	98.62	61.31
Level 4	1	43.00	3.36	0.00	98.59	61.35
Level 3	1	29.50	3.41	0.00	98.64	61.30
Level 2	1	16.00	3.43	0.00	98.63	61.32

APPLIED STORY FORCES

Type: NL_AISC360_DL_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	3.66	0.00
Level 12	151.00	3.17	0.00
Level 11	137.50	3.20	0.00
Level 10	124.00	3.20	0.00
Level 9	110.50	3.24	0.00
Level 8	97.00	3.25	0.00
Level 7	83.50	3.29	0.00
Level 6	70.00	3.29	0.00
Level 5	56.50	3.34	0.00
Level 4	43.00	3.36	0.00
Level 3	29.50	3.41	0.00
Level 2	16.00	3.43	0.00

39.85

0.00

RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Page 21/40

01/07/21 17:12:07

APPLIED DIAPHRAGM FORCES

Type: NL_AISC360_DL_Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	3.66	98.95	61.45
Level 12	1	151.00	0.00	3.17	98.70	61.42
Level 11	1	137.50	0.00	3.20	98.68	61.38
Level 10	1	124.00	0.00	3.20	98.65	61.43
Level 9	1	110.50	0.00	3.24	98.67	61.35
Level 8	1	97.00	0.00	3.25	98.69	61.35
Level 7	1	83.50	0.00	3.29	98.69	61.36
Level 6	1	70.00	0.00	3.29	98.70	61.37
Level 5	1	56.50	0.00	3.34	98.62	61.31
Level 4	1	43.00	0.00	3.36	98.59	61.35
Level 3	1	29.50	0.00	3.41	98.64	61.30
Level 2	1	16.00	0.00	3.43	98.63	61.32

APPLIED STORY FORCES

Type: NL_AISC360_DL_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	3.66
Level 12	151.00	0.00	3.17
Level 11	137.50	0.00	3.20
Level 10	124.00	0.00	3.20
Level 9	110.50	0.00	3.24
Level 8	97.00	0.00	3.25
Level 7	83.50	0.00	3.29
Level 6	70.00	0.00	3.29
Level 5	56.50	0.00	3.34
Level 4	43.00	0.00	3.36
Level 3	29.50	0.00	3.41
Level 2	16.00	0.00	3.43
		0.00	39.85

APPLIED DIAPHRAGM FORCES

Type: NL_AISC360_LL_X

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.26	0.00	102.73	62.27
Level 12	1	151.00	2.02	0.00	102.02	62.03
Level 11	1	137.50	2.02	0.00	102.02	62.03
Level 10	1	124.00	2.02	0.00	102.02	62.03

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 22/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

Level 9	1	110.50	2.02	0.00	102.02	62.03
Level 8	1	97.00	2.02	0.00	102.02	62.03
Level 7	1	83.50	2.02	0.00	102.02	62.03
Level 6	1	70.00	2.02	0.00	102.02	62.03
Level 5	1	56.50	2.02	0.00	102.02	62.03
Level 4	1	43.00	2.02	0.00	102.02	62.03
Level 3	1	29.50	2.02	0.00	102.02	62.03
Level 2	1	16.00	2.02	0.00	102.02	62.03

APPLIED STORY FORCES

Type: NL_AISC360_LL_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.26	0.00
Level 12	151.00	2.02	0.00
Level 11	137.50	2.02	0.00
Level 10	124.00	2.02	0.00
Level 9	110.50	2.02	0.00
Level 8	97.00	2.02	0.00
Level 7	83.50	2.02	0.00
Level 6	70.00	2.02	0.00
Level 5	56.50	2.02	0.00
Level 4	43.00	2.02	0.00
Level 3	29.50	2.02	0.00
Level 2	16.00	2.02	0.00
		22.47	0.00

APPLIED DIAPHRAGM FORCES

Type: NL_AISC360_LL_Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	0.26	102.73	62.27
Level 12	1	151.00	0.00	2.02	102.02	62.03
Level 11	1	137.50	0.00	2.02	102.02	62.03
Level 10	1	124.00	0.00	2.02	102.02	62.03
Level 9	1	110.50	0.00	2.02	102.02	62.03
Level 8	1	97.00	0.00	2.02	102.02	62.03
Level 7	1	83.50	0.00	2.02	102.02	62.03
Level 6	1	70.00	0.00	2.02	102.02	62.03
Level 5	1	56.50	0.00	2.02	102.02	62.03
Level 4	1	43.00	0.00	2.02	102.02	62.03
Level 3	1	29.50	0.00	2.02	102.02	62.03
Level 2	1	16.00	0.00	2.02	102.02	62.03

RAM Structural System

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Loads and Applied Forces

Page 23/40

01/07/21 17:12:07

APPLIED STORY FORCES

Type: NL_AISC360_LL_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	0.26
Level 12	151.00	0.00	2.02
Level 11	137.50	0.00	2.02
Level 10	124.00	0.00	2.02
Level 9	110.50	0.00	2.02
Level 8	97.00	0.00	2.02
Level 7	83.50	0.00	2.02
Level 6	70.00	0.00	2.02
Level 5	56.50	0.00	2.02
Level 4	43.00	0.00	2.02
Level 3	29.50	0.00	2.02
Level 2	16.00	0.00	2.02
		0.00	22.47

APPLIED DIAPHRAGM FORCES

Type: NL_AISC360_Rf_X

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.58	0.00	99.09	61.45
Level 12	1	151.00	0.00	0.00	0.00	0.00
Level 11	1	137.50	0.00	0.00	0.00	0.00
Level 10	1	124.00	0.00	0.00	0.00	0.00
Level 9	1	110.50	0.00	0.00	0.00	0.00
Level 8	1	97.00	0.00	0.00	0.00	0.00
Level 7	1	83.50	0.00	0.00	0.00	0.00
Level 6	1	70.00	0.00	0.00	0.00	0.00
Level 5	1	56.50	0.00	0.00	0.00	0.00
Level 4	1	43.00	0.00	0.00	0.00	0.00
Level 3	1	29.50	0.00	0.00	0.00	0.00
Level 2	1	16.00	0.00	0.00	0.00	0.00

APPLIED STORY FORCES

Type: NL_AISC360_Rf_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.58	0.00
Level 12	151.00	0.00	0.00
Level 11	137.50	0.00	0.00
Level 10	124.00	0.00	0.00

RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Page 24/40

01/07/21 17:12:07

Loads and Applied Forces

Level 9	110.50	0.00	0.00
Level 8	97.00	0.00	0.00
Level 7	83.50	0.00	0.00
Level 6	70.00	0.00	0.00
Level 5	56.50	0.00	0.00
Level 4	43.00	0.00	0.00
Level 3	29.50	0.00	0.00
Level 2	16.00	0.00	0.00
		0.58	0.00

APPLIED DIAPHRAGM FORCES

Type: NL_AISC360_Rf_Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	0.58	99.09	61.45
Level 12	1	151.00	0.00	0.00	0.00	0.00
Level 11	1	137.50	0.00	0.00	0.00	0.00
Level 10	1	124.00	0.00	0.00	0.00	0.00
Level 9	1	110.50	0.00	0.00	0.00	0.00
Level 8	1	97.00	0.00	0.00	0.00	0.00
Level 7	1	83.50	0.00	0.00	0.00	0.00
Level 6	1	70.00	0.00	0.00	0.00	0.00
Level 5	1	56.50	0.00	0.00	0.00	0.00
Level 4	1	43.00	0.00	0.00	0.00	0.00
Level 3	1	29.50	0.00	0.00	0.00	0.00
Level 2	1	16.00	0.00	0.00	0.00	0.00

APPLIED STORY FORCES

Type: NL_AISC360_Rf_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	0.58
Level 12	151.00	0.00	0.00
Level 11	137.50	0.00	0.00
Level 10	124.00	0.00	0.00
Level 9	110.50	0.00	0.00
Level 8	97.00	0.00	0.00
Level 7	83.50	0.00	0.00
Level 6	70.00	0.00	0.00
Level 5	56.50	0.00	0.00
Level 4	43.00	0.00	0.00
Level 3	29.50	0.00	0.00
Level 2	16.00	0.00	0.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 25/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

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RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Page 26/40

01/07/21 17:12:07

LOAD CASE: WIND 25-YR DRFT

ASCE 7-16

Exposure: C

Basic Wind Speed (mph): 86.0

Apply Directionality Factor, $K_d = 0.85$ Use Topography Factor, $K_{zt} = 1.00$ Ground Elevation Factor, $K_e = 1.00$

Use Calculated Frequency for X-Dir.

Use Calculated Frequency for Y-Dir.

Gust Factor for Flexible Structures, G: Use Calculated G for X-Dir.

Gust Factor for Flexible Structures, G: Use Calculated G for Y-Dir.

Damping Ratio for Flexible Structures = 0.01

Mean Roof Height (ft): Top Story Height + Parapet = 164.50

Ground Level: GRADE

WIND PRESSURES:

X-Direction: Natural Frequency = 0.237 Structure is Flexible

Y-Direction: Natural Frequency = 0.506 Structure is Flexible

 C_p Windward = 0.80 q Leeward (qh) = 22.62 psf $G C_{pn}$ (Parapet): Windward = 1.50 Leeward = -1.00

Height ft	K_z	K_{zt}	q_z psf	Gust Factor G		C_p Leeward		Pressure (psf)	
				X	Y	X	Y	X	Y
164.50	1.405	1.000	22.619	1.145	0.901	-0.352	-0.500	29.840	26.484
151.00	1.380	1.000	22.215	1.145	0.901	-0.352	-0.500	29.470	26.193
137.50	1.353	1.000	21.781	1.145	0.901	-0.352	-0.500	29.073	25.880
124.00	1.324	1.000	21.312	1.145	0.901	-0.352	-0.500	28.644	25.542
110.50	1.293	1.000	20.801	1.145	0.901	-0.352	-0.500	28.176	25.174
97.00	1.258	1.000	20.238	1.145	0.901	-0.352	-0.500	27.660	24.769
83.50	1.218	1.000	19.610	1.145	0.901	-0.352	-0.500	27.085	24.316
70.00	1.174	1.000	18.895	1.145	0.901	-0.352	-0.500	26.430	23.801
56.50	1.122	1.000	18.062	1.145	0.901	-0.352	-0.500	25.667	23.200
43.00	1.060	1.000	17.053	1.145	0.901	-0.352	-0.500	24.743	22.473
29.50	0.979	1.000	15.752	1.145	0.901	-0.352	-0.500	23.552	21.536
16.00	0.860	1.000	13.849	1.145	0.901	-0.352	-0.500	21.808	20.165
0.00	0.849	1.000	13.662	1.145	0.901	-0.352	-0.500	21.637	20.030

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_X

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	24.47	0.00	105.00	60.00
Level 12	1	151.00	48.53	0.00	105.00	60.00
Level 11	1	137.50	47.87	0.00	105.00	60.00
Level 10	1	124.00	47.17	0.00	105.00	60.00
Level 9	1	110.50	46.39	0.00	105.00	60.00
Level 8	1	97.00	45.54	0.00	105.00	60.00

RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Page 27/40

01/07/21 17:12:07

Level 7	1	83.50	44.59	0.00	105.00	60.00
Level 6	1	70.00	43.50	0.00	105.00	60.00
Level 5	1	56.50	42.23	0.00	105.00	60.00
Level 4	1	43.00	40.68	0.00	105.00	60.00
Level 3	1	29.50	38.64	0.00	105.00	60.00
Level 2	1	16.00	39.67	0.00	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_1_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	24.47	0.00
Level 12	151.00	48.53	0.00
Level 11	137.50	47.87	0.00
Level 10	124.00	47.17	0.00
Level 9	110.50	46.39	0.00
Level 8	97.00	45.54	0.00
Level 7	83.50	44.59	0.00
Level 6	70.00	43.50	0.00
Level 5	56.50	42.23	0.00
Level 4	43.00	40.68	0.00
Level 3	29.50	38.64	0.00
Level 2	16.00	39.67	0.00
		509.27	0.00

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	37.76	105.00	60.00
Level 12	1	151.00	0.00	74.95	105.00	60.00
Level 11	1	137.50	0.00	74.06	105.00	60.00
Level 10	1	124.00	0.00	73.09	105.00	60.00
Level 9	1	110.50	0.00	72.03	105.00	60.00
Level 8	1	97.00	0.00	70.87	105.00	60.00
Level 7	1	83.50	0.00	69.56	105.00	60.00
Level 6	1	70.00	0.00	68.08	105.00	60.00
Level 5	1	56.50	0.00	66.34	105.00	60.00
Level 4	1	43.00	0.00	64.22	105.00	60.00
Level 3	1	29.50	0.00	61.43	105.00	60.00
Level 2	1	16.00	0.00	63.63	105.00	60.00

RAM Structural System

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Loads and Applied Forces

Page 28/40

01/07/21 17:12:07

APPLIED STORY FORCES

Type: Wind_ASCE716_1_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	37.76
Level 12	151.00	0.00	74.95
Level 11	137.50	0.00	74.06
Level 10	124.00	0.00	73.09
Level 9	110.50	0.00	72.03
Level 8	97.00	0.00	70.87
Level 7	83.50	0.00	69.56
Level 6	70.00	0.00	68.08
Level 5	56.50	0.00	66.34
Level 4	43.00	0.00	64.22
Level 3	29.50	0.00	61.43
Level 2	16.00	0.00	63.63
		0.00	796.01

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_X+E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	18.35	0.00	105.00	73.73
Level 12	1	151.00	36.40	0.00	105.00	73.72
Level 11	1	137.50	35.91	0.00	105.00	73.72
Level 10	1	124.00	35.37	0.00	105.00	73.74
Level 9	1	110.50	34.79	0.00	105.00	73.75
Level 8	1	97.00	34.15	0.00	105.00	73.75
Level 7	1	83.50	33.44	0.00	105.00	73.75
Level 6	1	70.00	32.63	0.00	105.00	73.75
Level 5	1	56.50	31.67	0.00	105.00	73.73
Level 4	1	43.00	30.51	0.00	105.00	73.72
Level 3	1	29.50	28.98	0.00	105.00	73.72
Level 2	1	16.00	29.75	0.00	105.00	73.71

APPLIED STORY FORCES

Type: Wind_ASCE716_2_X+E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	18.35	0.00
Level 12	151.00	36.40	0.00
Level 11	137.50	35.91	0.00
Level 10	124.00	35.37	0.00

RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Page 29/40

01/07/21 17:12:07

Level 9	110.50	34.79	0.00
Level 8	97.00	34.15	0.00
Level 7	83.50	33.44	0.00
Level 6	70.00	32.63	0.00
Level 5	56.50	31.67	0.00
Level 4	43.00	30.51	0.00
Level 3	29.50	28.98	0.00
Level 2	16.00	29.75	0.00
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		381.95	0.00

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_X-E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	18.35	0.00	105.00	46.27
Level 12	1	151.00	36.40	0.00	105.00	46.28
Level 11	1	137.50	35.91	0.00	105.00	46.28
Level 10	1	124.00	35.37	0.00	105.00	46.26
Level 9	1	110.50	34.79	0.00	105.00	46.25
Level 8	1	97.00	34.15	0.00	105.00	46.25
Level 7	1	83.50	33.44	0.00	105.00	46.25
Level 6	1	70.00	32.63	0.00	105.00	46.25
Level 5	1	56.50	31.67	0.00	105.00	46.27
Level 4	1	43.00	30.51	0.00	105.00	46.28
Level 3	1	29.50	28.98	0.00	105.00	46.28
Level 2	1	16.00	29.75	0.00	105.00	46.29

APPLIED STORY FORCES

Type: Wind_ASCE716_2_X-E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	18.35	0.00
Level 12	151.00	36.40	0.00
Level 11	137.50	35.91	0.00
Level 10	124.00	35.37	0.00
Level 9	110.50	34.79	0.00
Level 8	97.00	34.15	0.00
Level 7	83.50	33.44	0.00
Level 6	70.00	32.63	0.00
Level 5	56.50	31.67	0.00
Level 4	43.00	30.51	0.00
Level 3	29.50	28.98	0.00
Level 2	16.00	29.75	0.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 30/40

01/07/21 17:12:07

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

381.95	0.00
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APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_Y+E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	28.32	134.90	60.00
Level 12	1	151.00	0.00	56.21	134.90	60.00
Level 11	1	137.50	0.00	55.54	134.90	60.00
Level 10	1	124.00	0.00	54.82	134.90	60.00
Level 9	1	110.50	0.00	54.02	134.90	60.00
Level 8	1	97.00	0.00	53.15	134.90	60.00
Level 7	1	83.50	0.00	52.17	134.90	60.00
Level 6	1	70.00	0.00	51.06	134.90	60.00
Level 5	1	56.50	0.00	49.75	134.90	60.00
Level 4	1	43.00	0.00	48.16	134.90	60.00
Level 3	1	29.50	0.00	46.07	134.90	60.00
Level 2	1	16.00	0.00	47.72	134.91	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_2_Y+E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	28.32
Level 12	151.00	0.00	56.21
Level 11	137.50	0.00	55.54
Level 10	124.00	0.00	54.82
Level 9	110.50	0.00	54.02
Level 8	97.00	0.00	53.15
Level 7	83.50	0.00	52.17
Level 6	70.00	0.00	51.06
Level 5	56.50	0.00	49.75
Level 4	43.00	0.00	48.16
Level 3	29.50	0.00	46.07
Level 2	16.00	0.00	47.72

0.00	597.01
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APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_2_Y-E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
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RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 31/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

ROOF	1	164.50	0.00	28.32	75.10	60.00
Level 12	1	151.00	0.00	56.21	75.10	60.00
Level 11	1	137.50	0.00	55.54	75.10	60.00
Level 10	1	124.00	0.00	54.82	75.10	60.00
Level 9	1	110.50	0.00	54.02	75.10	60.00
Level 8	1	97.00	0.00	53.15	75.10	60.00
Level 7	1	83.50	0.00	52.17	75.10	60.00
Level 6	1	70.00	0.00	51.06	75.10	60.00
Level 5	1	56.50	0.00	49.75	75.10	60.00
Level 4	1	43.00	0.00	48.16	75.10	60.00
Level 3	1	29.50	0.00	46.07	75.10	60.00
Level 2	1	16.00	0.00	47.72	75.09	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_2_Y-E

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	28.32
Level 12	151.00	0.00	56.21
Level 11	137.50	0.00	55.54
Level 10	124.00	0.00	54.82
Level 9	110.50	0.00	54.02
Level 8	97.00	0.00	53.15
Level 7	83.50	0.00	52.17
Level 6	70.00	0.00	51.06
Level 5	56.50	0.00	49.75
Level 4	43.00	0.00	48.16
Level 3	29.50	0.00	46.07
Level 2	16.00	0.00	47.72
		0.00	597.01

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_3_X+Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	18.35	28.32	105.00	60.00
Level 12	1	151.00	36.40	56.21	105.00	60.00
Level 11	1	137.50	35.91	55.54	105.00	60.00
Level 10	1	124.00	35.37	54.82	105.00	60.00
Level 9	1	110.50	34.79	54.02	105.00	60.00
Level 8	1	97.00	34.15	53.15	105.00	60.00
Level 7	1	83.50	33.44	52.17	105.00	60.00
Level 6	1	70.00	32.63	51.06	105.00	60.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 32/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

Level 5	1	56.50	31.67	49.75	105.00	60.00
Level 4	1	43.00	30.51	48.16	105.00	60.00
Level 3	1	29.50	28.98	46.07	105.00	60.00
Level 2	1	16.00	29.75	47.72	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_3_X+Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	18.35	28.32
Level 12	151.00	36.40	56.21
Level 11	137.50	35.91	55.54
Level 10	124.00	35.37	54.82
Level 9	110.50	34.79	54.02
Level 8	97.00	34.15	53.15
Level 7	83.50	33.44	52.17
Level 6	70.00	32.63	51.06
Level 5	56.50	31.67	49.75
Level 4	43.00	30.51	48.16
Level 3	29.50	28.98	46.07
Level 2	16.00	29.75	47.72
		381.95	597.01

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_3_X-Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	18.35	-28.32	105.00	60.00
Level 12	1	151.00	36.40	-56.21	105.00	60.00
Level 11	1	137.50	35.91	-55.54	105.00	60.00
Level 10	1	124.00	35.37	-54.82	105.00	60.00
Level 9	1	110.50	34.79	-54.02	105.00	60.00
Level 8	1	97.00	34.15	-53.15	105.00	60.00
Level 7	1	83.50	33.44	-52.17	105.00	60.00
Level 6	1	70.00	32.63	-51.06	105.00	60.00
Level 5	1	56.50	31.67	-49.75	105.00	60.00
Level 4	1	43.00	30.51	-48.16	105.00	60.00
Level 3	1	29.50	28.98	-46.07	105.00	60.00
Level 2	1	16.00	29.75	-47.72	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_3_X-Y

Level	Ht	Fx	Fy
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RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 33/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

	ft	kips	kips
ROOF	164.50	18.35	-28.32
Level 12	151.00	36.40	-56.21
Level 11	137.50	35.91	-55.54
Level 10	124.00	35.37	-54.82
Level 9	110.50	34.79	-54.02
Level 8	97.00	34.15	-53.15
Level 7	83.50	33.44	-52.17
Level 6	70.00	32.63	-51.06
Level 5	56.50	31.67	-49.75
Level 4	43.00	30.51	-48.16
Level 3	29.50	28.98	-46.07
Level 2	16.00	29.75	-47.72
		<hr/> 381.95	<hr/> -597.01

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X+Y_CW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	13.77	21.24	75.10	73.73
Level 12	1	151.00	27.30	42.16	75.10	73.72
Level 11	1	137.50	26.93	41.66	75.10	73.72
Level 10	1	124.00	26.53	41.11	75.10	73.74
Level 9	1	110.50	26.10	40.52	75.10	73.75
Level 8	1	97.00	25.62	39.86	75.10	73.75
Level 7	1	83.50	25.08	39.13	75.10	73.75
Level 6	1	70.00	24.47	38.29	75.10	73.75
Level 5	1	56.50	23.75	37.32	75.10	73.73
Level 4	1	43.00	22.88	36.12	75.10	73.72
Level 3	1	29.50	21.73	34.55	75.10	73.72
Level 2	1	16.00	22.31	35.79	75.09	73.71

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X+Y_CW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	13.77	21.24
Level 12	151.00	27.30	42.16
Level 11	137.50	26.93	41.66
Level 10	124.00	26.53	41.11
Level 9	110.50	26.10	40.52
Level 8	97.00	25.62	39.86
Level 7	83.50	25.08	39.13

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 34/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

Level 6	70.00	24.47	38.29
Level 5	56.50	23.75	37.32
Level 4	43.00	22.88	36.12
Level 3	29.50	21.73	34.55
Level 2	16.00	22.31	35.79
		<hr/>	<hr/>
		286.47	447.76

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X+Y_CCW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	13.77	21.24	134.90	46.27
Level 12	1	151.00	27.30	42.16	134.90	46.28
Level 11	1	137.50	26.93	41.66	134.90	46.28
Level 10	1	124.00	26.53	41.11	134.90	46.26
Level 9	1	110.50	26.10	40.52	134.90	46.25
Level 8	1	97.00	25.62	39.86	134.90	46.25
Level 7	1	83.50	25.08	39.13	134.90	46.25
Level 6	1	70.00	24.47	38.29	134.90	46.25
Level 5	1	56.50	23.75	37.32	134.90	46.27
Level 4	1	43.00	22.88	36.12	134.90	46.28
Level 3	1	29.50	21.73	34.55	134.90	46.28
Level 2	1	16.00	22.31	35.79	134.91	46.29

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X+Y_CCW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	13.77	21.24
Level 12	151.00	27.30	42.16
Level 11	137.50	26.93	41.66
Level 10	124.00	26.53	41.11
Level 9	110.50	26.10	40.52
Level 8	97.00	25.62	39.86
Level 7	83.50	25.08	39.13
Level 6	70.00	24.47	38.29
Level 5	56.50	23.75	37.32
Level 4	43.00	22.88	36.12
Level 3	29.50	21.73	34.55
Level 2	16.00	22.31	35.79
		<hr/>	<hr/>
		286.47	447.76

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RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 35/40

01/07/21 17:12:07

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X-Y_CW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	13.77	-21.24	134.90	73.73
Level 12	1	151.00	27.30	-42.16	134.90	73.72
Level 11	1	137.50	26.93	-41.66	134.90	73.72
Level 10	1	124.00	26.53	-41.11	134.90	73.74
Level 9	1	110.50	26.10	-40.52	134.90	73.75
Level 8	1	97.00	25.62	-39.86	134.90	73.75
Level 7	1	83.50	25.08	-39.13	134.90	73.75
Level 6	1	70.00	24.47	-38.29	134.90	73.75
Level 5	1	56.50	23.75	-37.32	134.90	73.73
Level 4	1	43.00	22.88	-36.12	134.90	73.72
Level 3	1	29.50	21.73	-34.55	134.90	73.72
Level 2	1	16.00	22.31	-35.79	134.91	73.71

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X-Y_CW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	13.77	-21.24
Level 12	151.00	27.30	-42.16
Level 11	137.50	26.93	-41.66
Level 10	124.00	26.53	-41.11
Level 9	110.50	26.10	-40.52
Level 8	97.00	25.62	-39.86
Level 7	83.50	25.08	-39.13
Level 6	70.00	24.47	-38.29
Level 5	56.50	23.75	-37.32
Level 4	43.00	22.88	-36.12
Level 3	29.50	21.73	-34.55
Level 2	16.00	22.31	-35.79
		286.47	-447.76

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_4_X-Y_CCW

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	13.77	-21.24	75.10	46.27
Level 12	1	151.00	27.30	-42.16	75.10	46.28
Level 11	1	137.50	26.93	-41.66	75.10	46.28
Level 10	1	124.00	26.53	-41.11	75.10	46.26

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 36/40

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

01/07/21 17:12:07

Level 9	1	110.50	26.10	-40.52	75.10	46.25
Level 8	1	97.00	25.62	-39.86	75.10	46.25
Level 7	1	83.50	25.08	-39.13	75.10	46.25
Level 6	1	70.00	24.47	-38.29	75.10	46.25
Level 5	1	56.50	23.75	-37.32	75.10	46.27
Level 4	1	43.00	22.88	-36.12	75.10	46.28
Level 3	1	29.50	21.73	-34.55	75.10	46.28
Level 2	1	16.00	22.31	-35.79	75.09	46.29

APPLIED STORY FORCES

Type: Wind_ASCE716_4_X-Y_CCW

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	13.77	-21.24
Level 12	151.00	27.30	-42.16
Level 11	137.50	26.93	-41.66
Level 10	124.00	26.53	-41.11
Level 9	110.50	26.10	-40.52
Level 8	97.00	25.62	-39.86
Level 7	83.50	25.08	-39.13
Level 6	70.00	24.47	-38.29
Level 5	56.50	23.75	-37.32
Level 4	43.00	22.88	-36.12
Level 3	29.50	21.73	-34.55
Level 2	16.00	22.31	-35.79
		<hr/> 286.47	<hr/> -447.76

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

02/25/21 15:36:23

Steel Code: IBC

CRITERIA:

Rigid End Zones: Ignore Effects

Member Force Output: At Face of Joint

P-Delta: Yes Scale Factor (DL): 1.38 Scale Factor (LL): 0.50
 Scale Factor (Roof): 1.00 Scale Factor (Snow): 1.00

Ground Level: GRADE

Use Reduced Stiffness for Steel Members (AISC 360): $\tau_b = 1.00$

LOAD CASE DEFINITIONS:

W13	WIND 25-YR DRFT	Wind_ASCE716_1_X
W14	WIND 25-YR DRFT	Wind_ASCE716_1_Y
W15	WIND 25-YR DRFT	Wind_ASCE716_2_X+E
W16	WIND 25-YR DRFT	Wind_ASCE716_2_X-E
W17	WIND 25-YR DRFT	Wind_ASCE716_2_Y+E
W18	WIND 25-YR DRFT	Wind_ASCE716_2_Y-E
W19	WIND 25-YR DRFT	Wind_ASCE716_3_X+Y
W20	WIND 25-YR DRFT	Wind_ASCE716_3_X-Y
W21	WIND 25-YR DRFT	Wind_ASCE716_4_X+Y_CW
W22	WIND 25-YR DRFT	Wind_ASCE716_4_X+Y_CCW
W23	WIND 25-YR DRFT	Wind_ASCE716_4_X-Y_CW
W24	WIND 25-YR DRFT	Wind_ASCE716_4_X-Y_CCW

Displacements for pseudo-flexible and flexible/none diaphragms are reported based on maximum nodal displacement within diaphragm boundary.

RESULTS:

Location (ft): (105.000, 60.000)

TARGET DRIFT RATIO = 1/400 = 0.0025

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X in	Y in	X in	Y in	X	Y
ROOF	W13	4.7554	0.0003	0.1199	0.0000	0.0007	0.0000
	W14	0.0006	1.7799	0.0000	0.1424	0.0000	0.0009
	W15	3.5662	-0.0244	0.0899	-0.0016	0.0006	0.0000
	W16	3.5670	0.0247	0.0900	0.0016	0.0006	0.0000
	W17	0.0018	1.4179	0.0001	0.1122	0.0000	0.0007
	W18	-0.0009	1.2520	-0.0001	0.1014	0.0000	0.0006
	W19	3.5670	1.3351	0.0900	0.1068	0.0006	0.0007
	W20	3.5661	-1.3348	0.0899	-0.1068	0.0006	0.0007
	W21	2.6740	0.9207	0.0674	0.0748	0.0004	0.0005
	W22	2.6766	1.0820	0.0676	0.0853	0.0004	0.0005
	W23	2.6733	-1.0817	0.0673	-0.0853	0.0004	0.0005
	W24	2.6759	-0.9204 ⁹	0.0675	-0.0748	0.0004	0.0005

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 2/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 12	W13	4.6355	0.0003	0.2102	0.0000	0.0013	0.0000
	W14	0.0006	1.6376	0.0001	0.1601	0.0000	0.0010
	W15	3.4763	-0.0228	0.1575	-0.0022	0.0010	0.0000
	W16	3.4770	0.0231	0.1577	0.0022	0.0010	0.0000
	W17	0.0017	1.3057	0.0005	0.1274	0.0000	0.0008
	W18	-0.0008	1.1506	-0.0003	0.1127	0.0000	0.0007
	W19	3.4771	1.2284	0.1577	0.1201	0.0010	0.0007
	W20	3.4762	-1.2280	0.1575	-0.1200	0.0010	0.0007
	W21	2.6066	0.8459	0.1179	0.0829	0.0007	0.0005
	W22	2.6090	0.9967	0.1187	0.0972	0.0007	0.0006
	W23	2.6059	-0.9964	0.1177	-0.0972	0.0007	0.0006
	W24	2.6083	-0.8456	0.1185	-0.0829	0.0007	0.0005
Level 11	W13	4.4253	0.0002	0.2988	0.0002	0.0018	0.0000
	W14	0.0005	1.4775	0.0004	0.1680	0.0000	0.0010
	W15	3.3188	-0.0206	0.2237	-0.0022	0.0014	0.0000
	W16	3.3193	0.0209	0.2244	0.0025	0.0014	0.0000
	W17	0.0012	1.1783	0.0016	0.1339	0.0000	0.0008
	W18	-0.0005	1.0379	-0.0010	0.1181	0.0000	0.0007
	W19	3.3193	1.1083	0.2244	0.1261	0.0014	0.0008
	W20	3.3187	-1.1079	0.2238	-0.1259	0.0014	0.0008
	W21	2.4887	0.7630	0.1671	0.0869	0.0010	0.0005
	W22	2.4903	0.8994	0.1695	0.1023	0.0010	0.0006
	W23	2.4882	-0.8992	0.1666	-0.1021	0.0010	0.0006
	W24	2.4898	-0.7627	0.1690	-0.0867	0.0010	0.0005
Level 10	W13	4.1266	0.0000	0.3721	0.0002	0.0023	0.0000
	W14	0.0000	1.3095	0.0004	0.1730	0.0000	0.0011
	W15	3.0951	-0.0184	0.2787	-0.0025	0.0017	0.0000
	W16	3.0948	0.0185	0.2794	0.0028	0.0017	0.0000
	W17	-0.0004	1.0444	0.0016	0.1386	0.0000	0.0009
	W18	0.0005	0.9198	-0.0010	0.1208	0.0000	0.0007
	W19	3.0950	0.9821	0.2794	0.1299	0.0017	0.0008
	W20	3.0949	-0.9821	0.2787	-0.1295	0.0017	0.0008
	W21	2.3216	0.6760	0.2083	0.0888	0.0013	0.0005
	W22	2.3208	0.7972	0.2108	0.1061	0.0013	0.0007
	W23	2.3216	-0.7971	0.2078	-0.1058	0.0013	0.0007
	W24	2.3208	-0.6760	0.2103	-0.0885	0.0013	0.0005
Level 9	W13	3.7545	-0.0002	0.4193	-0.0000	0.0026	0.0000
	W14	-0.0004	1.1365	0.0000	0.1746	0.0000	0.0011
	W15	2.8164	-0.0159	0.3145	-0.0024	0.0019	0.0000
	W16	2.8154	0.0157	0.3145	0.0023	0.0019	0.0000
	W17	-0.0020	0.9058	0.0000	0.1389	0.0000	0.0009
	W18	0.0014	0.7990	0.0000	0.1230	0.0000	0.0008

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 3/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	2.8156	0.8522	0.3145	0.1310	0.0019	0.0008
	W20	2.8162	-0.8525	0.3145	-0.1310	0.0019	0.0008
	W21	2.1134	0.5873	0.2359	0.0905	0.0015	0.0006
	W22	2.1101	0.6911	0.2359	0.1059	0.0015	0.0007
	W23	2.1138	-0.6913	0.2359	-0.1059	0.0015	0.0007
	W24	2.1105	-0.5875	0.2359	-0.0905	0.0015	0.0006
Level 8	W13	3.3352	-0.0002	0.4643	-0.0001	0.0029	0.0000
	W14	-0.0004	0.9619	-0.0001	0.1671	0.0000	0.0010
	W15	2.5019	-0.0136	0.3484	-0.0023	0.0022	0.0000
	W16	2.5009	0.0133	0.3482	0.0022	0.0021	0.0000
	W17	-0.0020	0.7669	-0.0004	0.1328	0.0000	0.0008
	W18	0.0014	0.6759	0.0003	0.1179	0.0000	0.0007
	W19	2.5011	0.7213	0.3482	0.1253	0.0021	0.0008
	W20	2.5017	-0.7216	0.3483	-0.1254	0.0022	0.0008
	W21	1.8775	0.4968	0.2615	0.0867	0.0016	0.0005
	W22	1.8742	0.5852	0.2608	0.1012	0.0016	0.0006
	W23	1.8779	-0.5854	0.2616	-0.1013	0.0016	0.0006
	W24	1.8746	-0.4970	0.2609	-0.0868	0.0016	0.0005
Level 7	W13	2.8708	-0.0001	0.4924	0.0000	0.0030	0.0000
	W14	-0.0003	0.7948	-0.0000	0.1581	0.0000	0.0010
	W15	2.1535	-0.0113	0.3693	-0.0018	0.0023	0.0000
	W16	2.1527	0.0111	0.3692	0.0019	0.0023	0.0000
	W17	-0.0016	0.6341	-0.0002	0.1248	0.0000	0.0008
	W18	0.0011	0.5580	0.0001	0.1123	0.0000	0.0007
	W19	2.1529	0.5960	0.3693	0.1186	0.0023	0.0007
	W20	2.1534	-0.5962	0.3693	-0.1185	0.0023	0.0007
	W21	1.6160	0.4100	0.2771	0.0828	0.0017	0.0005
	W22	1.6133	0.4840	0.2768	0.0951	0.0017	0.0006
	W23	1.6163	-0.4841	0.2771	-0.0950	0.0017	0.0006
	W24	1.6137	-0.4102	0.2768	-0.0828	0.0017	0.0005
Level 6	W13	2.3785	-0.0002	0.5078	-0.0001	0.0031	0.0000
	W14	-0.0003	0.6367	-0.0002	0.1447	0.0000	0.0009
	W15	1.7842	-0.0095	0.3811	-0.0018	0.0024	0.0000
	W16	1.7835	0.0092	0.3807	0.0016	0.0023	0.0000
	W17	-0.0014	0.5093	-0.0008	0.1142	0.0000	0.0007
	W18	0.0010	0.4458	0.0006	0.1029	0.0000	0.0006
	W19	1.7836	0.4774	0.3808	0.1085	0.0024	0.0007
	W20	1.7841	-0.4776	0.3810	-0.1086	0.0024	0.0007
	W21	1.3389	0.3272	0.2862	0.0758	0.0018	0.0005
	W22	1.3366	0.3889	0.2849	0.0869	0.0018	0.0005
	W23	1.3392	-0.3891	0.2864	-0.0870	0.0018	0.0005
	W24	1.3369	-0.3274	0.2851	-0.0760	0.0018	0.0005

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 4/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 5	W13	1.8706	-0.0001	0.4822	-0.0001	0.0030	0.0000
	W14	-0.0001	0.4920	-0.0001	0.1419	0.0000	0.0009
	W15	1.4031	-0.0077	0.3618	-0.0017	0.0022	0.0000
	W16	1.4028	0.0076	0.3614	0.0015	0.0022	0.0000
	W17	-0.0006	0.3951	-0.0007	0.1119	0.0000	0.0007
	W18	0.0004	0.3429	0.0005	0.1009	0.0000	0.0006
	W19	1.4029	0.3689	0.3615	0.1063	0.0022	0.0007
	W20	1.4031	-0.3690	0.3617	-0.1065	0.0022	0.0007
	W21	1.0527	0.2514	0.2717	0.0743	0.0017	0.0005
	W22	1.0516	0.3020	0.2705	0.0851	0.0017	0.0005
	W23	1.0528	-0.3021	0.2719	-0.0853	0.0017	0.0005
	W24	1.0518	-0.2514	0.2707	-0.0745	0.0017	0.0005
Level 4	W13	1.3885	0.0001	0.4788	0.0000	0.0030	0.0000
	W14	0.0000	0.3501	-0.0000	0.1189	0.0000	0.0007
	W15	1.0413	-0.0060	0.3591	-0.0019	0.0022	0.0000
	W16	1.0414	0.0061	0.3590	0.0020	0.0022	0.0000
	W17	0.0001	0.2831	-0.0002	0.0958	0.0000	0.0006
	W18	-0.0001	0.2420	0.0001	0.0825	0.0000	0.0005
	W19	1.0414	0.2626	0.3590	0.0892	0.0022	0.0006
	W20	1.0413	-0.2625	0.3591	-0.0891	0.0022	0.0006
	W21	0.7809	0.1770	0.2694	0.0604	0.0017	0.0004
	W22	0.7811	0.2169	0.2691	0.0734	0.0017	0.0005
	W23	0.7809	-0.2168	0.2695	-0.0733	0.0017	0.0005
	W24	0.7811	-0.1769	0.2692	-0.0604	0.0017	0.0004
Level 3	W13	0.9097	0.0000	0.4542	0.0000	0.0028	0.0000
	W14	0.0000	0.2312	-0.0000	0.1163	0.0000	0.0007
	W15	0.6822	-0.0041	0.3406	-0.0019	0.0021	0.0000
	W16	0.6824	0.0041	0.3406	0.0019	0.0021	0.0000
	W17	0.0003	0.1873	-0.0000	0.0938	0.0000	0.0006
	W18	-0.0002	0.1595	0.0000	0.0807	0.0000	0.0005
	W19	0.6823	0.1734	0.3406	0.0872	0.0021	0.0005
	W20	0.6823	-0.1734	0.3406	-0.0872	0.0021	0.0005
	W21	0.5115	0.1166	0.2555	0.0591	0.0016	0.0004
	W22	0.5120	0.1436	0.2555	0.0718	0.0016	0.0004
	W23	0.5115	-0.1435	0.2555	-0.0718	0.0016	0.0004
	W24	0.5119	-0.1166	0.2555	-0.0591	0.0016	0.0004
Level 2	W13	0.4555	0.0000	0.4555	0.0000	0.0024	0.0000
	W14	0.0000	0.1149	0.0000	0.1149	0.0000	0.0006
	W15	0.3416	-0.0022	0.3416	-0.0022	0.0018	0.0000
	W16	0.3417	0.0022	0.3417	0.0022	0.0018	0.0000
	W17	0.0003	0.0936	0.0003	0.0936	0.0000	0.0005
	W18	-0.0002	0.0788	-0.0002	0.0788	0.0000	0.0004

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 5/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	0.3417	0.0862	0.3417	0.0862	0.0018	0.0004
	W20	0.3416	-0.0862	0.3416	-0.0862	0.0018	0.0004
	W21	0.2560	0.0575	0.2560	0.0575	0.0013	0.0003
	W22	0.2565	0.0718	0.2565	0.0718	0.0013	0.0004
	W23	0.2560	-0.0718	0.2560	-0.0718	0.0013	0.0004
	W24	0.2565	-0.0575	0.2565	-0.0575	0.0013	0.0003
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (0.000, 0.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	4.7563	-0.0013	0.1200	-0.0001	0.0007	0.0000
	W14	0.2254	1.3865	0.0159	0.1146	0.0001	0.0007
	W15	3.3346	0.3808	0.0752	0.0242	0.0005	0.0001
	W16	3.7998	-0.3828	0.1048	-0.0243	0.0006	0.0001
	W17	0.9550	-0.2502	0.0618	0.0043	0.0004	0.0000
	W18	-0.6169	2.3300	-0.0379	0.1676	0.0002	0.0010
	W19	3.7363	1.0389	0.1019	0.0859	0.0006	0.0005
	W20	3.3982	-1.0409	0.0780	-0.0860	0.0005	0.0005
	W21	2.0383	2.0331	0.0280	0.1438	0.0002	0.0009
	W22	3.5661	-0.4747	0.1249	-0.0150	0.0008	0.0001
	W23	1.7847	0.4732	0.0100	0.0149	0.0001	0.0001
	W24	3.3125	-2.0345	0.1070	-0.1439	0.0007	0.0009
Level 12	W13	4.6363	-0.0012	0.2104	-0.0004	0.0013	0.0000
	W14	0.2095	1.2720	0.0206	0.1244	0.0001	0.0008
	W15	3.2595	0.3566	0.1390	0.0301	0.0009	0.0002
	W16	3.6951	-0.3585	0.1765	-0.0307	0.0011	0.0002
	W17	0.8932	-0.2545	0.0786	-0.0093	0.0005	0.0001
	W18	-0.5790	2.1624	-0.0478	0.1958	0.0003	0.0012
	W19	3.6344	0.9530	0.1732	0.0930	0.0011	0.0006

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 6/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	3.3201	-0.9549	0.1424	-0.0935	0.0009	0.0006
	W21	2.0104	1.8893	0.0684	0.1695	0.0004	0.0010
	W22	3.4412	-0.4597	0.1914	-0.0300	0.0012	0.0002
	W23	1.7747	0.4583	0.0453	0.0296	0.0003	0.0002
	W24	3.2055	-1.8907	0.1683	-0.1699	0.0010	0.0010
Level 11	W13	4.4260	-0.0009	0.3002	-0.0024	0.0019	0.0000
	W14	0.1889	1.1476	0.0225	0.1293	0.0001	0.0008
	W15	3.1204	0.3265	0.2043	0.0317	0.0013	0.0002
	W16	3.5185	-0.3278	0.2460	-0.0353	0.0015	0.0002
	W17	0.8146	-0.2452	0.0872	-0.0160	0.0005	0.0001
	W18	-0.5312	1.9666	-0.0534	0.2099	0.0003	0.0013
	W19	3.4612	0.8601	0.2421	0.0952	0.0015	0.0006
	W20	3.1778	-0.8614	0.2083	-0.0987	0.0013	0.0006
	W21	1.9419	1.7198	0.1132	0.1812	0.0007	0.0011
	W22	3.2498	-0.4297	0.2499	-0.0384	0.0015	0.0002
	W23	1.7294	0.4287	0.0878	0.0358	0.0005	0.0002
	W24	3.0373	-1.7208	0.2246	-0.1839	0.0014	0.0011
Level 10	W13	4.1257	0.0015	0.3737	-0.0026	0.0023	0.0000
	W14	0.1664	1.0183	0.0245	0.1309	0.0002	0.0008
	W15	2.9161	0.2948	0.2581	0.0336	0.0016	0.0002
	W16	3.2725	-0.2925	0.3024	-0.0374	0.0019	0.0002
	W17	0.7274	-0.2292	0.0932	-0.0217	0.0006	0.0001
	W18	-0.4778	1.7567	-0.0565	0.2180	0.0003	0.0013
	W19	3.2191	0.7649	0.2986	0.0962	0.0018	0.0006
	W20	2.9695	-0.7626	0.2619	-0.1001	0.0016	0.0006
	W21	1.8287	1.5386	0.1512	0.1887	0.0009	0.0012
	W22	2.9999	-0.3913	0.2967	-0.0443	0.0018	0.0003
	W23	1.6415	0.3930	0.1237	0.0415	0.0008	0.0003
	W24	2.8127	-1.5369	0.2692	-0.1916	0.0017	0.0012
Level 9	W13	3.7521	0.0041	0.4191	0.0004	0.0026	0.0000
	W14	0.1420	0.8874	0.0215	0.1370	0.0001	0.0008
	W15	2.6580	0.2612	0.2921	0.0368	0.0018	0.0002
	W16	2.9701	-0.2551	0.3366	-0.0363	0.0021	0.0002
	W17	0.6342	-0.2075	0.0911	-0.0205	0.0006	0.0001
	W18	-0.4213	1.5387	-0.0588	0.2260	0.0004	0.0014
	W19	2.9205	0.6686	0.3305	0.1030	0.0020	0.0006
	W20	2.7076	-0.6625	0.2982	-0.1024	0.0018	0.0006
	W21	1.6776	1.3499	0.1750	0.1971	0.0011	0.0012
	W22	2.7032	-0.3470	0.3208	-0.0426	0.0020	0.0003
	W23	1.5179	0.3515	0.1507	0.0430	0.0009	0.0003
	W24	2.5435	-1.3453	0.2965	-0.1967	0.0018	0.0012

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RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 7/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 8	W13	3.3330	0.0037	0.4637	0.0011	0.0029	0.0000
	W14	0.1204	0.7505	0.0196	0.1327	0.0001	0.0008
	W15	2.3659	0.2243	0.3260	0.0369	0.0020	0.0002
	W16	2.6335	-0.2188	0.3695	-0.0353	0.0023	0.0002
	W17	0.5431	-0.1870	0.0882	-0.0223	0.0005	0.0001
	W18	-0.3625	1.3127	-0.0588	0.2214	0.0004	0.0014
	W19	2.5900	0.5656	0.3624	0.1004	0.0022	0.0006
	W20	2.4094	-0.5601	0.3331	-0.0987	0.0021	0.0006
	W21	1.5026	1.1528	0.2004	0.1937	0.0012	0.0012
	W22	2.3825	-0.3044	0.3433	-0.0432	0.0021	0.0003
	W23	1.3671	0.3085	0.1783	0.0444	0.0011	0.0003
	W24	2.2470	-1.1487	0.3213	-0.1925	0.0020	0.0012
Level 7	W13	2.8693	0.0026	0.4928	-0.0006	0.0030	0.0000
	W14	0.1008	0.6178	0.0165	0.1292	0.0001	0.0008
	W15	2.0400	0.1874	0.3486	0.0344	0.0022	0.0002
	W16	2.2640	-0.1836	0.3905	-0.0353	0.0024	0.0002
	W17	0.4549	-0.1647	0.0830	-0.0208	0.0005	0.0001
	W18	-0.3036	1.0913	-0.0583	0.2145	0.0004	0.0013
	W19	2.2276	0.4653	0.3819	0.0964	0.0024	0.0006
	W20	2.0763	-0.4614	0.3572	-0.0973	0.0022	0.0006
	W21	1.3022	0.9591	0.2178	0.1867	0.0013	0.0012
	W22	2.0391	-0.2612	0.3551	-0.0421	0.0022	0.0003
	W23	1.1888	0.2641	0.1992	0.0414	0.0012	0.0003
	W24	1.9257	-0.9562	0.3366	-0.1874	0.0021	0.0012
Level 6	W13	2.3765	0.0032	0.5066	0.0021	0.0031	0.0000
	W14	0.0844	0.4886	0.0148	0.1186	0.0001	0.0007
	W15	1.6913	0.1530	0.3596	0.0358	0.0022	0.0002
	W16	1.8735	-0.1483	0.4002	-0.0326	0.0025	0.0002
	W17	0.3719	-0.1439	0.0798	-0.0268	0.0005	0.0002
	W18	-0.2453	0.8768	-0.0576	0.2046	0.0004	0.0013
	W19	1.8457	0.3688	0.3910	0.0905	0.0024	0.0006
	W20	1.7191	-0.3640	0.3688	-0.0873	0.0023	0.0005
	W21	1.0845	0.7724	0.2265	0.1804	0.0014	0.0011
	W22	1.6840	-0.2191	0.3600	-0.0446	0.0022	0.0003
	W23	0.9896	0.2227	0.2098	0.0470	0.0013	0.0003
	W24	1.5891	-0.7688	0.3434	-0.1780	0.0021	0.0011
Level 5	W13	1.8700	0.0011	0.4808	0.0022	0.0030	0.0000
	W14	0.0696	0.3700	0.0151	0.1152	0.0001	0.0007
	W15	1.3317	0.1172	0.3413	0.0342	0.0021	0.0002
	W16	1.4732	-0.1156	0.3800	-0.0309	0.0023	0.0002
	W17	0.2921	-0.1171	0.0768	-0.0237	0.0005	0.0001
	W18	-0.1877	0.6721	-0.0541	0.1965	0.0003	0.0012

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 8/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	1.4547	0.2783	0.3719	0.0881	0.0023	0.0005
	W20	1.3503	-0.2767	0.3493	-0.0848	0.0022	0.0005
	W21	0.8580	0.5920	0.2154	0.1730	0.0013	0.0011
	W22	1.3240	-0.1746	0.3425	-0.0409	0.0021	0.0003
	W23	0.7797	0.1758	0.1984	0.0434	0.0012	0.0003
	W24	1.2457	-0.5908	0.3256	-0.1705	0.0020	0.0011
Level 4	W13	1.3891	-0.0011	0.4789	-0.0002	0.0030	0.0000
	W14	0.0545	0.2548	0.0172	0.0887	0.0001	0.0005
	W15	0.9905	0.0830	0.3417	0.0285	0.0021	0.0002
	W16	1.0933	-0.0847	0.3766	-0.0288	0.0023	0.0002
	W17	0.2153	-0.0935	0.0720	-0.0305	0.0004	0.0002
	W18	-0.1336	0.4757	-0.0462	0.1635	0.0003	0.0010
	W19	1.0827	0.1902	0.3721	0.0663	0.0023	0.0004
	W20	1.0010	-0.1919	0.3463	-0.0667	0.0021	0.0004
	W21	0.6426	0.4190	0.2217	0.1440	0.0014	0.0009
	W22	0.9814	-0.1336	0.3365	-0.0445	0.0021	0.0003
	W23	0.5814	0.1324	0.2023	0.0442	0.0012	0.0003
	W24	0.9202	-0.4203	0.3171	-0.1443	0.0020	0.0009
Level 3	W13	0.9102	-0.0009	0.4540	0.0003	0.0028	0.0000
	W14	0.0372	0.1661	0.0177	0.0853	0.0001	0.0005
	W15	0.6487	0.0546	0.3237	0.0276	0.0020	0.0002
	W16	0.7166	-0.0559	0.3573	-0.0272	0.0022	0.0002
	W17	0.1433	-0.0630	0.0702	-0.0291	0.0004	0.0002
	W18	-0.0874	0.3122	-0.0436	0.1571	0.0003	0.0010
	W19	0.7106	0.1239	0.3538	0.0642	0.0022	0.0004
	W20	0.6547	-0.1253	0.3273	-0.0638	0.0020	0.0004
	W21	0.4210	0.2750	0.2101	0.1385	0.0013	0.0009
	W22	0.6449	-0.0892	0.3206	-0.0422	0.0020	0.0003
	W23	0.3791	0.0882	0.1902	0.0425	0.0012	0.0003
	W24	0.6031	-0.2760	0.3007	-0.1382	0.0019	0.0009
Level 2	W13	0.4562	-0.0012	0.4562	-0.0012	0.0024	0.0000
	W14	0.0195	0.0808	0.0195	0.0808	0.0001	0.0004
	W15	0.3250	0.0269	0.3250	0.0269	0.0017	0.0001
	W16	0.3593	-0.0286	0.3593	-0.0286	0.0019	0.0001
	W17	0.0731	-0.0339	0.0731	-0.0339	0.0004	0.0002
	W18	-0.0438	0.1551	-0.0438	0.1551	0.0002	0.0008
	W19	0.3568	0.0597	0.3568	0.0597	0.0019	0.0003
	W20	0.3275	-0.0615	0.3275	-0.0615	0.0017	0.0003
	W21	0.2109	0.1365	0.2109	0.1365	0.0011	0.0007
	W22	0.3243	-0.0469	0.3243	-0.0469	0.0017	0.0002
	W23	0.1889	0.0456	0.1889	0.0456	0.0010	0.0002
	W24	0.3023	-0.1378	0.3023	-0.1378	0.0016	0.0007

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 9/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (0.000, 120.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	4.7545	-0.0013	0.1199	-0.0001	0.0007	0.0000
	W14	-0.2242	1.3865	-0.0159	0.1146	0.0001	0.0007
	W15	3.7977	0.3808	0.1046	0.0242	0.0006	0.0001
	W16	3.3341	-0.3828	0.0752	-0.0243	0.0005	0.0001
	W17	-0.9514	-0.2502	-0.0615	0.0043	0.0004	0.0000
	W18	0.6151	2.3300	0.0377	0.1676	0.0002	0.0010
	W19	3.3978	1.0389	0.0780	0.0859	0.0005	0.0005
	W20	3.7340	-1.0409	0.1018	-0.0860	0.0006	0.0005
	W21	3.3096	2.0331	0.1068	0.1438	0.0007	0.0009
	W22	1.7870	-0.4747	0.0102	-0.0150	0.0001	0.0001
	W23	3.5618	0.4732	0.1246	0.0149	0.0008	0.0001
	W24	2.0392	-2.0345	0.0281	-0.1439	0.0002	0.0009
Level 12	W13	4.6346	-0.0012	0.2099	-0.0004	0.0013	0.0000
	W14	-0.2083	1.2720	-0.0203	0.1244	0.0001	0.0008
	W15	3.6931	0.3566	0.1760	0.0301	0.0011	0.0002
	W16	3.2589	-0.3585	0.1389	-0.0307	0.0009	0.0002
	W17	-0.8899	-0.2545	-0.0776	-0.0093	0.0005	0.0001
	W18	0.5774	2.1624	0.0472	0.1958	0.0003	0.0012
	W19	3.3197	0.9530	0.1422	0.0930	0.0009	0.0006
	W20	3.6322	-0.9549	0.1727	-0.0935	0.0011	0.0006
	W21	3.2028	1.8893	0.1674	0.1695	0.0010	0.0010
	W22	1.7768	-0.4597	0.0460	-0.0300	0.0003	0.0002
	W23	3.4372	0.4583	0.1902	0.0296	0.0012	0.0002
	W24	2.0111	-1.8907	0.0688	-0.1699	0.0004	0.0010
Level 11	W13	4.4247	-0.0009	0.2973	-0.0024	0.0018	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 10/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W14	-0.1880	1.1476	-0.0217	0.1293	0.0001	0.0008
	W15	3.5171	0.3265	0.2431	0.0317	0.0015	0.0002
	W16	3.1200	-0.3278	0.2029	-0.0353	0.0013	0.0002
	W17	-0.8122	-0.2452	-0.0841	-0.0160	0.0005	0.0001
	W18	0.5302	1.9666	0.0515	0.2099	0.0003	0.0013
	W19	3.1775	0.8601	0.2067	0.0952	0.0013	0.0006
	W20	3.4596	-0.8614	0.2393	-0.0987	0.0015	0.0006
	W21	3.0355	1.7198	0.2209	0.1812	0.0014	0.0011
	W22	1.7308	-0.4297	0.0891	-0.0384	0.0005	0.0002
	W23	3.2470	0.4287	0.2454	0.0358	0.0015	0.0002
	W24	1.9423	-1.7208	0.1135	-0.1839	0.0007	0.0011
Level 10	W13	4.1274	0.0015	0.3705	-0.0026	0.0023	0.0000
	W14	-0.1663	1.0183	-0.0236	0.1309	0.0001	0.0008
	W15	3.2740	0.2948	0.2993	0.0336	0.0018	0.0002
	W16	2.9171	-0.2925	0.2564	-0.0374	0.0016	0.0002
	W17	-0.7282	-0.2292	-0.0900	-0.0217	0.0006	0.0001
	W18	0.4787	1.7567	0.0545	0.2180	0.0003	0.0013
	W19	2.9708	0.7649	0.2601	0.0962	0.0016	0.0006
	W20	3.2203	-0.7626	0.2956	-0.1001	0.0018	0.0006
	W21	2.8145	1.5386	0.2654	0.1887	0.0016	0.0012
	W22	1.6417	-0.3913	0.1248	-0.0443	0.0008	0.0003
	W23	3.0016	0.3930	0.2920	0.0415	0.0018	0.0003
	W24	1.8288	-1.5369	0.1514	-0.1916	0.0009	0.0012
Level 9	W13	3.7569	0.0041	0.4196	0.0004	0.0026	0.0000
	W14	-0.1427	0.8874	-0.0215	0.1370	0.0001	0.0008
	W15	2.9747	0.2612	0.3369	0.0368	0.0021	0.0002
	W16	2.6607	-0.2551	0.2924	-0.0363	0.0018	0.0002
	W17	-0.6382	-0.2075	-0.0911	-0.0205	0.0006	0.0001
	W18	0.4241	1.5387	0.0588	0.2260	0.0004	0.0014
	W19	2.7107	0.6686	0.2985	0.1030	0.0018	0.0006
	W20	2.9247	-0.6625	0.3308	-0.1024	0.0020	0.0006
	W21	2.5492	1.3499	0.2968	0.1971	0.0018	0.0012
	W22	1.5169	-0.3470	0.1510	-0.0426	0.0009	0.0003
	W23	2.7097	0.3515	0.3210	0.0430	0.0020	0.0003
	W24	1.6774	-1.3453	0.1752	-0.1967	0.0011	0.0012
Level 8	W13	3.3374	0.0037	0.4650	0.0011	0.0029	0.0000
	W14	-0.1212	0.7505	-0.0197	0.1327	0.0001	0.0008
	W15	2.6378	0.2243	0.3707	0.0369	0.0023	0.0002
	W16	2.3682	-0.2188	0.3268	-0.0353	0.0020	0.0002
	W17	-0.5471	-0.1870	-0.0890	-0.0223	0.0005	0.0001
	W18	0.3653	1.3127	0.0594	0.2214	0.0004	0.0014
	W19	2.4121	0.5656	0.3340	0.1004	0.0021	0.0006

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Page 11/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	2.5939	-0.5601	0.3635	-0.0987	0.0022	0.0006
	W21	2.2523	1.1528	0.3226	0.1937	0.0020	0.0012
	W22	1.3659	-0.3044	0.1783	-0.0432	0.0011	0.0003
	W23	2.3887	0.3085	0.3448	0.0444	0.0021	0.0003
	W24	1.5022	-1.1487	0.2005	-0.1925	0.0012	0.0012
Level 7	W13	2.8724	0.0026	0.4920	-0.0006	0.0030	0.0000
	W14	-0.1015	0.6178	-0.0165	0.1292	0.0001	0.0008
	W15	2.2671	0.1874	0.3900	0.0344	0.0024	0.0002
	W16	2.0415	-0.1836	0.3480	-0.0353	0.0021	0.0002
	W17	-0.4581	-0.1647	-0.0834	-0.0208	0.0005	0.0001
	W18	0.3059	1.0913	0.0586	0.2145	0.0004	0.0013
	W19	2.0782	0.4653	0.3566	0.0964	0.0022	0.0006
	W20	2.2304	-0.4614	0.3814	-0.0973	0.0024	0.0006
	W21	1.9297	0.9591	0.3365	0.1867	0.0021	0.0012
	W22	1.1875	-0.2612	0.1984	-0.0421	0.0012	0.0003
	W23	2.0439	0.2641	0.3551	0.0414	0.0022	0.0003
	W24	1.3017	-0.9562	0.2170	-0.1874	0.0013	0.0012
Level 6	W13	2.3804	0.0032	0.5091	0.0021	0.0031	0.0000
	W14	-0.0849	0.4886	-0.0151	0.1186	0.0001	0.0007
	W15	1.8771	0.1530	0.4026	0.0358	0.0025	0.0002
	W16	1.6935	-0.1483	0.3611	-0.0326	0.0022	0.0002
	W17	-0.3747	-0.1439	-0.0814	-0.0268	0.0005	0.0002
	W18	0.2473	0.8768	0.0587	0.2046	0.0004	0.0013
	W19	1.7216	0.3688	0.3705	0.0905	0.0023	0.0006
	W20	1.8490	-0.3640	0.3932	-0.0873	0.0024	0.0005
	W21	1.5933	0.7724	0.3459	0.1804	0.0021	0.0011
	W22	0.9891	-0.2191	0.2098	-0.0446	0.0013	0.0003
	W23	1.6888	0.2227	0.3629	0.0470	0.0022	0.0003
	W24	1.0847	-0.7688	0.2268	-0.1780	0.0014	0.0011
Level 5	W13	1.8713	0.0011	0.4835	0.0022	0.0030	0.0000
	W14	-0.0698	0.3700	-0.0154	0.1152	0.0001	0.0007
	W15	1.4745	0.1172	0.3823	0.0342	0.0024	0.0002
	W16	1.3324	-0.1156	0.3429	-0.0309	0.0021	0.0002
	W17	-0.2933	-0.1171	-0.0782	-0.0237	0.0005	0.0001
	W18	0.1886	0.6721	0.0552	0.1965	0.0003	0.0012
	W19	1.3511	0.2783	0.3511	0.0881	0.0022	0.0005
	W20	1.4558	-0.2767	0.3741	-0.0848	0.0023	0.0005
	W21	1.2473	0.5920	0.3281	0.1730	0.0020	0.0011
	W22	0.7793	-0.1746	0.1985	-0.0409	0.0012	0.0003
	W23	1.3259	0.1758	0.3454	0.0434	0.0021	0.0003
	W24	0.8578	-0.5908	0.2158	-0.1705	0.0013	0.0011

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RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 12/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 4	W13	1.3878	-0.0011	0.4786	-0.0002	0.0030	0.0000
	W14	-0.0545	0.2548	-0.0173	0.0887	0.0001	0.0005
	W15	1.0922	0.0830	0.3765	0.0285	0.0023	0.0002
	W16	0.9895	-0.0847	0.3414	-0.0288	0.0021	0.0002
	W17	-0.2151	-0.0935	-0.0723	-0.0305	0.0004	0.0002
	W18	0.1334	0.4757	0.0464	0.1635	0.0003	0.0010
	W19	1.0000	0.1902	0.3460	0.0663	0.0021	0.0004
	W20	1.0817	-0.1919	0.3719	-0.0667	0.0023	0.0004
	W21	0.9192	0.4190	0.3172	0.1440	0.0020	0.0009
	W22	0.5808	-0.1336	0.2018	-0.0445	0.0012	0.0003
	W23	0.9805	0.1324	0.3366	0.0442	0.0021	0.0003
	W24	0.6421	-0.4203	0.2212	-0.1443	0.0014	0.0009
Level 3	W13	0.9092	-0.0009	0.4543	0.0003	0.0028	0.0000
	W14	-0.0372	0.1661	-0.0177	0.0853	0.0001	0.0005
	W15	0.7157	0.0546	0.3575	0.0276	0.0022	0.0002
	W16	0.6481	-0.0559	0.3240	-0.0272	0.0020	0.0002
	W17	-0.1428	-0.0630	-0.0702	-0.0291	0.0004	0.0002
	W18	0.0870	0.3122	0.0437	0.1571	0.0003	0.0010
	W19	0.6540	0.1239	0.3275	0.0642	0.0020	0.0004
	W20	0.7098	-0.1253	0.3540	-0.0638	0.0022	0.0004
	W21	0.6020	0.2750	0.3009	0.1385	0.0019	0.0009
	W22	0.3790	-0.0892	0.1903	-0.0422	0.0012	0.0003
	W23	0.6439	0.0882	0.3208	0.0425	0.0020	0.0003
	W24	0.4208	-0.2760	0.2102	-0.1382	0.0013	0.0009
Level 2	W13	0.4549	-0.0012	0.4549	-0.0012	0.0024	0.0000
	W14	-0.0195	0.0808	-0.0195	0.0808	0.0001	0.0004
	W15	0.3582	0.0269	0.3582	0.0269	0.0019	0.0001
	W16	0.3241	-0.0286	0.3241	-0.0286	0.0017	0.0001
	W17	-0.0726	-0.0339	-0.0726	-0.0339	0.0004	0.0002
	W18	0.0433	0.1551	0.0433	0.1551	0.0002	0.0008
	W19	0.3265	0.0597	0.3265	0.0597	0.0017	0.0003
	W20	0.3558	-0.0615	0.3558	-0.0615	0.0019	0.0003
	W21	0.3011	0.1365	0.3011	0.1365	0.0016	0.0007
	W22	0.1887	-0.0469	0.1887	-0.0469	0.0010	0.0002
	W23	0.3231	0.0456	0.3231	0.0456	0.0017	0.0002
	W24	0.2106	-0.1378	0.2106	-0.1378	0.0011	0.0007
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 13/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (210.000, 120.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	4.7545	0.0018	0.1199	0.0001	0.0007	0.0000
	W14	-0.2242	2.1734	-0.0159	0.1702	0.0001	0.0011
	W15	3.7977	-0.4295	0.1046	-0.0274	0.0006	0.0002
	W16	3.3341	0.4322	0.0752	0.0275	0.0005	0.0002
	W17	-0.9514	3.0861	-0.0615	0.2201	0.0004	0.0014
	W18	0.6151	0.1740	0.0377	0.0352	0.0002	0.0002
	W19	3.3978	1.6314	0.0780	0.1277	0.0005	0.0008
	W20	3.7340	-1.6287	0.1018	-0.1276	0.0006	0.0008
	W21	3.3096	-0.1917	0.1068	0.0059	0.0007	0.0000
	W22	1.7870	2.6387	0.0102	0.1857	0.0001	0.0011
	W23	3.5618	-2.6367	0.1246	-0.1856	0.0008	0.0011
	W24	2.0392	0.1937	0.0281	-0.0058	0.0002	0.0000
Level 12	W13	4.6346	0.0017	0.2099	0.0004	0.0013	0.0000
	W14	-0.2083	2.0031	-0.0203	0.1958	0.0001	0.0012
	W15	3.6931	-0.4022	0.1760	-0.0345	0.0011	0.0002
	W16	3.2589	0.4048	0.1389	0.0351	0.0009	0.0002
	W17	-0.8899	2.8659	-0.0776	0.2642	0.0005	0.0016
	W18	0.5774	0.1388	0.0472	0.0296	0.0003	0.0002
	W19	3.3197	1.5037	0.1422	0.1472	0.0009	0.0009
	W20	3.6322	-1.5011	0.1727	-0.1465	0.0011	0.0009
	W21	3.2028	-0.1975	0.1674	-0.0037	0.0010	0.0000
	W22	1.7768	2.4530	0.0460	0.2244	0.0003	0.0014
	W23	3.4372	-2.4511	0.1902	-0.2240	0.0012	0.0014
	W24	2.0111	0.1995	0.0688	0.0041	0.0004	0.0000
Level 11	W13	4.4247	0.0013	0.2973	0.0027	0.0018	0.0000
	W14	-0.1880	1.8073	-0.0217	0.2067	0.0001	0.0013
	W15	3.5171	-0.3677	0.2431	-0.0361	0.0015	0.0002
	W16	3.1200	0.3697	0.2029	0.0402	0.0013	0.0002
	W17	-0.8122	2.6018	-0.0841	0.2838	0.0005	0.0018
	W18	0.5302	0.1092	0.0515	0.0263	0.0003	0.0002
	W19	3.1775	1.3565	0.2067	0.1571	0.0013	0.0010

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Page 14/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	3.4596	-1.3545	0.2393	-0.1530	0.0015	0.0009
	W21	3.0355	-0.1939	0.2209	-0.0074	0.0014	0.0000
	W22	1.7308	2.2286	0.0891	0.2430	0.0005	0.0015
	W23	3.2470	-2.2271	0.2454	-0.2399	0.0015	0.0015
	W24	1.9423	0.1954	0.1135	0.0104	0.0007	0.0001
Level 10	W13	4.1274	-0.0014	0.3705	0.0030	0.0023	0.0000
	W14	-0.1663	1.6006	-0.0236	0.2150	0.0001	0.0013
	W15	3.2740	-0.3316	0.2993	-0.0385	0.0018	0.0002
	W16	2.9171	0.3294	0.2564	0.0431	0.0016	0.0003
	W17	-0.7282	2.3180	-0.0900	0.2989	0.0006	0.0018
	W18	0.4787	0.0829	0.0545	0.0237	0.0003	0.0001
	W19	2.9708	1.1994	0.2601	0.1635	0.0016	0.0010
	W20	3.2203	-1.2015	0.2956	-0.1590	0.0018	0.0010
	W21	2.8145	-0.1865	0.2654	-0.0111	0.0016	0.0001
	W22	1.6417	1.9856	0.1248	0.2565	0.0008	0.0016
	W23	3.0016	-1.9872	0.2920	-0.2531	0.0018	0.0016
	W24	1.8288	0.1849	0.1514	0.0145	0.0009	0.0001
Level 9	W13	3.7569	-0.0044	0.4196	-0.0004	0.0026	0.0000
	W14	-0.1427	1.3856	-0.0215	0.2123	0.0001	0.0013
	W15	2.9747	-0.2930	0.3369	-0.0415	0.0021	0.0003
	W16	2.6607	0.2864	0.2924	0.0409	0.0018	0.0003
	W17	-0.6382	2.0192	-0.0911	0.2984	0.0006	0.0018
	W18	0.4241	0.0592	0.0588	0.0201	0.0004	0.0001
	W19	2.7107	1.0359	0.2985	0.1589	0.0018	0.0010
	W20	2.9247	-1.0425	0.3308	-0.1595	0.0020	0.0010
	W21	2.5492	-0.1754	0.2968	-0.0161	0.0018	0.0001
	W22	1.5169	1.7292	0.1510	0.2545	0.0009	0.0016
	W23	2.7097	-1.7342	0.3210	-0.2549	0.0020	0.0016
	W24	1.6774	0.1704	0.1752	0.0157	0.0011	0.0001
Level 8	W13	3.3374	-0.0040	0.4650	-0.0012	0.0029	0.0000
	W14	-0.1212	1.1733	-0.0197	0.2015	0.0001	0.0012
	W15	2.6378	-0.2515	0.3707	-0.0414	0.0023	0.0003
	W16	2.3682	0.2454	0.3268	0.0396	0.0020	0.0002
	W17	-0.5471	1.7208	-0.0890	0.2878	0.0005	0.0018
	W18	0.3653	0.0391	0.0594	0.0144	0.0004	0.0001
	W19	2.4121	0.8769	0.3340	0.1502	0.0021	0.0009
	W20	2.5939	-0.8830	0.3635	-0.1521	0.0022	0.0009
	W21	2.2523	-0.1593	0.3226	-0.0202	0.0020	0.0001
	W22	1.3659	1.4747	0.1783	0.2456	0.0011	0.0015
	W23	2.3887	-1.4792	0.3448	-0.2469	0.0021	0.0015
	W24	1.5022	0.1547	0.2005	0.0189	0.0012	0.0001

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RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 15/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 7	W13	2.8724	-0.0028	0.4920	0.0007	0.0030	0.0000
	W14	-0.1015	0.9718	-0.0165	0.1870	0.0001	0.0012
	W15	2.2671	-0.2101	0.3900	-0.0381	0.0024	0.0002
	W16	2.0415	0.2058	0.3480	0.0391	0.0021	0.0002
	W17	-0.4581	1.4330	-0.0834	0.2705	0.0005	0.0017
	W18	0.3059	0.0247	0.0586	0.0100	0.0004	0.0001
	W19	2.0782	0.7267	0.3566	0.1407	0.0022	0.0009
	W20	2.2304	-0.7309	0.3814	-0.1397	0.0024	0.0009
	W21	1.9297	-0.1390	0.3365	-0.0211	0.0021	0.0001
	W22	1.1875	1.2291	0.1984	0.2322	0.0012	0.0014
	W23	2.0439	-1.2323	0.3551	-0.2314	0.0022	0.0014
	W24	1.3017	0.1359	0.2170	0.0218	0.0013	0.0001
Level 6	W13	2.3804	-0.0035	0.5091	-0.0023	0.0031	0.0000
	W14	-0.0849	0.7848	-0.0151	0.1709	0.0001	0.0011
	W15	1.8771	-0.1720	0.4026	-0.0393	0.0025	0.0002
	W16	1.6935	0.1668	0.3611	0.0358	0.0022	0.0002
	W17	-0.3747	1.1625	-0.0814	0.2552	0.0005	0.0016
	W18	0.2473	0.0147	0.0587	0.0011	0.0004	0.0000
	W19	1.7216	0.5860	0.3705	0.1264	0.0023	0.0008
	W20	1.8490	-0.5913	0.3932	-0.1299	0.0024	0.0008
	W21	1.5933	-0.1180	0.3459	-0.0287	0.0021	0.0002
	W22	0.9891	0.9969	0.2098	0.2183	0.0013	0.0013
	W23	1.6888	-1.0009	0.3629	-0.2209	0.0022	0.0014
	W24	1.0847	0.1140	0.2268	0.0261	0.0014	0.0002
Level 5	W13	1.8713	-0.0012	0.4835	-0.0024	0.0030	0.0000
	W14	-0.0698	0.6139	-0.0154	0.1685	0.0001	0.0010
	W15	1.4745	-0.1327	0.3823	-0.0377	0.0024	0.0002
	W16	1.3324	0.1309	0.3429	0.0340	0.0021	0.0002
	W17	-0.2933	0.9073	-0.0782	0.2475	0.0005	0.0015
	W18	0.1886	0.0136	0.0552	0.0052	0.0003	0.0000
	W19	1.3511	0.4595	0.3511	0.1245	0.0022	0.0008
	W20	1.4558	-0.4613	0.3741	-0.1282	0.0023	0.0008
	W21	1.2473	-0.0893	0.3281	-0.0243	0.0020	0.0002
	W22	0.7793	0.7786	0.1985	0.2111	0.0012	0.0013
	W23	1.3259	-0.7800	0.3454	-0.2139	0.0021	0.0013
	W24	0.8578	0.0880	0.2158	0.0216	0.0013	0.0001
Level 4	W13	1.3878	0.0013	0.4786	0.0003	0.0030	0.0000
	W14	-0.0545	0.4454	-0.0173	0.1491	0.0001	0.0009
	W15	1.0922	-0.0950	0.3765	-0.0323	0.0023	0.0002
	W16	0.9895	0.0969	0.3414	0.0328	0.0021	0.0002
	W17	-0.2151	0.6597	-0.0723	0.2221	0.0004	0.0014
	W18	0.1334	0.0084	0.0464	0.0015	0.0003	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 16/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	1.0000	0.3350	0.3460	0.1121	0.0021	0.0007
	W20	1.0817	-0.3331	0.3719	-0.1116	0.0023	0.0007
	W21	0.9192	-0.0650	0.3172	-0.0231	0.0020	0.0001
	W22	0.5808	0.5675	0.2018	0.1912	0.0012	0.0012
	W23	0.9805	-0.5661	0.3366	-0.1908	0.0021	0.0012
	W24	0.6421	0.0664	0.2212	0.0235	0.0014	0.0001
Level 3	W13	0.9092	0.0009	0.4543	-0.0003	0.0028	0.0000
	W14	-0.0372	0.2963	-0.0177	0.1473	0.0001	0.0009
	W15	0.7157	-0.0627	0.3575	-0.0315	0.0022	0.0002
	W16	0.6481	0.0641	0.3240	0.0311	0.0020	0.0002
	W17	-0.1428	0.4376	-0.0702	0.2166	0.0004	0.0013
	W18	0.0870	0.0069	0.0437	0.0043	0.0003	0.0000
	W19	0.6540	0.2229	0.3275	0.1102	0.0020	0.0007
	W20	0.7098	-0.2216	0.3540	-0.1106	0.0022	0.0007
	W21	0.6020	-0.0419	0.3009	-0.0204	0.0019	0.0001
	W22	0.3790	0.3763	0.1903	0.1858	0.0012	0.0011
	W23	0.6439	-0.3752	0.3208	-0.1861	0.0020	0.0011
	W24	0.4208	0.0429	0.2102	0.0201	0.0013	0.0001
Level 2	W13	0.4549	0.0012	0.4549	0.0012	0.0024	0.0000
	W14	-0.0195	0.1491	-0.0195	0.1491	0.0001	0.0008
	W15	0.3582	-0.0312	0.3582	-0.0312	0.0019	0.0002
	W16	0.3241	0.0330	0.3241	0.0330	0.0017	0.0002
	W17	-0.0726	0.2210	-0.0726	0.2210	0.0004	0.0012
	W18	0.0433	0.0026	0.0433	0.0026	0.0002	0.0000
	W19	0.3265	0.1127	0.3265	0.1127	0.0017	0.0006
	W20	0.3558	-0.1109	0.3558	-0.1109	0.0019	0.0006
	W21	0.3011	-0.0215	0.3011	-0.0215	0.0016	0.0001
	W22	0.1887	0.1905	0.1887	0.1905	0.0010	0.0010
	W23	0.3231	-0.1892	0.3231	-0.1892	0.0017	0.0010
	W24	0.2106	0.0228	0.2106	0.0228	0.0011	0.0001
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 17/28

02/25/21 15:36:23

Steel Code: IBC

Location (ft): (210.000, 75.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	4.7552	0.0018	0.1199	0.0001	0.0007	0.0000
	W14	-0.0556	2.1734	-0.0039	0.1702	0.0000	0.0011
	W15	3.6240	-0.4295	0.0936	-0.0274	0.0006	0.0002
	W16	3.5088	0.4322	0.0863	0.0275	0.0005	0.0002
	W17	-0.2365	3.0861	-0.0153	0.2201	0.0001	0.0014
	W18	0.1531	0.1740	0.0094	0.0352	0.0001	0.0002
	W19	3.5247	1.6314	0.0870	0.1277	0.0005	0.0008
	W20	3.6081	-1.6287	0.0929	-0.1276	0.0006	0.0008
	W21	2.8329	-0.1917	0.0772	0.0059	0.0005	0.0000
	W22	2.4542	2.6387	0.0532	0.1857	0.0003	0.0011
	W23	2.8954	-2.6367	0.0817	-0.1856	0.0005	0.0011
	W24	2.5167	0.1937	0.0577	-0.0058	0.0004	0.0000
Level 12	W13	4.6353	0.0017	0.2101	0.0004	0.0013	0.0000
	W14	-0.0516	2.0031	-0.0050	0.1958	0.0000	0.0012
	W15	3.5305	-0.4022	0.1621	-0.0345	0.0010	0.0002
	W16	3.4225	0.4048	0.1530	0.0351	0.0009	0.0002
	W17	-0.2212	2.8659	-0.0190	0.2642	0.0001	0.0016
	W18	0.1437	0.1388	0.0116	0.0296	0.0001	0.0002
	W19	3.4377	1.5037	0.1539	0.1472	0.0009	0.0009
	W20	3.5152	-1.5011	0.1613	-0.1465	0.0010	0.0009
	W21	2.7557	-0.1975	0.1303	-0.0037	0.0008	0.0000
	W22	2.4010	2.4530	0.1005	0.2244	0.0006	0.0014
	W23	2.8137	-2.4511	0.1359	-0.2240	0.0008	0.0014
	W24	2.4590	0.1995	0.1061	0.0041	0.0007	0.0000
Level 11	W13	4.4252	0.0013	0.2984	0.0027	0.0018	0.0000
	W14	-0.0467	1.8073	-0.0051	0.2067	0.0000	0.0013
	W15	3.3683	-0.3677	0.2285	-0.0361	0.0014	0.0002
	W16	3.2694	0.3697	0.2190	0.0402	0.0014	0.0002
	W17	-0.2022	2.6018	-0.0198	0.2838	0.0001	0.0018
	W18	0.1322	0.1092	0.0122	0.0263	0.0001	0.0002
	W19	3.2839	1.3565	0.2200	0.1571	0.0014	0.0010
	W20	3.3539	-1.3545	0.2276	-0.1530	0.0014	0.0009
	W21	2.6254	-0.1939	0.1805	-0.0074	0.0011	0.0000
	W22	2.3004	2.2286	0.1494	0.2430	0.0009	0.0015
	W23	2.6779	-2.2271	0.1863	-0.2399	0.0011	0.0015
	W24	2.3529	0.1954	0.1552	0.0104	0.0010	0.0001
Level 10	W13	4.1268	-0.0014	0.3717	0.0030	0.0023	0.0000
	W14	-0.0415	1.6006 ₇₅	-0.0056	0.2150	0.0000	0.0013

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RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 18/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W15	3.1398	-0.3316	0.2838	-0.0385	0.0018	0.0002
	W16	3.0504	0.3294	0.2737	0.0431	0.0017	0.0003
	W17	-0.1823	2.3180	-0.0213	0.2989	0.0001	0.0018
	W18	0.1200	0.0829	0.0129	0.0237	0.0001	0.0001
	W19	3.0639	1.1994	0.2746	0.1635	0.0017	0.0010
	W20	3.1263	-1.2015	0.2829	-0.1590	0.0017	0.0010
	W21	2.4449	-0.1865	0.2226	-0.0111	0.0014	0.0001
	W22	2.1510	1.9856	0.1893	0.2565	0.0012	0.0016
	W23	2.4916	-1.9872	0.2288	-0.2531	0.0014	0.0016
	W24	2.1978	0.1849	0.1956	0.0145	0.0012	0.0001
Level 9	W13	3.7551	-0.0044	0.4194	-0.0004	0.0026	0.0000
	W14	-0.0360	1.3856	-0.0054	0.2123	0.0000	0.0013
	W15	2.8560	-0.2930	0.3201	-0.0415	0.0020	0.0003
	W16	2.7767	0.2864	0.3090	0.0409	0.0019	0.0003
	W17	-0.1610	2.0192	-0.0228	0.2984	0.0001	0.0018
	W18	0.1071	0.0592	0.0147	0.0201	0.0001	0.0001
	W19	2.7894	1.0359	0.3105	0.1589	0.0019	0.0010
	W20	2.8433	-1.0425	0.3186	-0.1595	0.0020	0.0010
	W21	2.2223	-0.1754	0.2511	-0.0161	0.0016	0.0001
	W22	1.9618	1.7292	0.2147	0.2545	0.0013	0.0016
	W23	2.2628	-1.7342	0.2571	-0.2549	0.0016	0.0016
	W24	2.0022	0.1704	0.2207	0.0157	0.0014	0.0001
Level 8	W13	3.3357	-0.0040	0.4645	-0.0012	0.0029	0.0000
	W14	-0.0306	1.1733	-0.0050	0.2015	0.0000	0.0012
	W15	2.5359	-0.2515	0.3540	-0.0414	0.0022	0.0003
	W16	2.4677	0.2454	0.3428	0.0396	0.0021	0.0002
	W17	-0.1383	1.7208	-0.0225	0.2878	0.0001	0.0018
	W18	0.0924	0.0391	0.0151	0.0144	0.0001	0.0001
	W19	2.4789	0.8769	0.3446	0.1502	0.0021	0.0009
	W20	2.5247	-0.8830	0.3521	-0.1521	0.0022	0.0009
	W21	1.9712	-0.1593	0.2768	-0.0202	0.0017	0.0001
	W22	1.7471	1.4747	0.2402	0.2456	0.0015	0.0015
	W23	2.0056	-1.4792	0.2824	-0.2469	0.0017	0.0015
	W24	1.7815	0.1547	0.2458	0.0189	0.0015	0.0001
Level 7	W13	2.8712	-0.0028	0.4923	0.0007	0.0030	0.0000
	W14	-0.0256	0.9718	-0.0042	0.1870	0.0000	0.0012
	W15	2.1819	-0.2101	0.3745	-0.0381	0.0023	0.0002
	W16	2.1249	0.2058	0.3639	0.0391	0.0022	0.0002
	W17	-0.1157	1.4330	-0.0210	0.2705	0.0001	0.0017
	W18	0.0773	0.0247	0.0148	0.0100	0.0001	0.0001
	W19	2.1342	0.7267	0.3661	0.1407	0.0023	0.0009
	W20	2.1726	-0.7309	0.3723	-0.1397	0.0023	0.0009

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 19/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W21	1.6944	-0.1390	0.2920	-0.0211	0.0018	0.0001
	W22	1.5069	1.2291	0.2572	0.2322	0.0016	0.0014
	W23	1.7232	-1.2323	0.2966	-0.2314	0.0018	0.0014
	W24	1.5357	0.1359	0.2619	0.0218	0.0016	0.0001
Level 6	W13	2.3789	-0.0035	0.5082	-0.0023	0.0031	0.0000
	W14	-0.0214	0.7848	-0.0039	0.1709	0.0000	0.0011
	W15	1.8074	-0.1720	0.3864	-0.0393	0.0024	0.0002
	W16	1.7610	0.1668	0.3758	0.0358	0.0023	0.0002
	W17	-0.0947	1.1625	-0.0209	0.2552	0.0001	0.0016
	W18	0.0626	0.0147	0.0151	0.0011	0.0001	0.0000
	W19	1.7681	0.5860	0.3782	0.1264	0.0023	0.0008
	W20	1.8003	-0.5913	0.3840	-0.1299	0.0024	0.0008
	W21	1.4025	-0.1180	0.3011	-0.0287	0.0019	0.0002
	W22	1.2497	0.9969	0.2661	0.2183	0.0016	0.0013
	W23	1.4266	-1.0009	0.3055	-0.2209	0.0019	0.0014
	W24	1.2738	0.1140	0.2705	0.0261	0.0017	0.0002
Level 5	W13	1.8708	-0.0012	0.4825	-0.0024	0.0030	0.0000
	W14	-0.0176	0.6139	-0.0039	0.1685	0.0000	0.0010
	W15	1.4210	-0.1327	0.3669	-0.0377	0.0023	0.0002
	W16	1.3852	0.1309	0.3568	0.0340	0.0022	0.0002
	W17	-0.0738	0.9073	-0.0201	0.2475	0.0001	0.0015
	W18	0.0475	0.0136	0.0142	0.0052	0.0001	0.0000
	W19	1.3899	0.4595	0.3589	0.1245	0.0022	0.0008
	W20	1.4163	-0.4613	0.3648	-0.1282	0.0023	0.0008
	W21	1.1013	-0.0893	0.2858	-0.0243	0.0018	0.0002
	W22	0.9836	0.7786	0.2525	0.2111	0.0016	0.0013
	W23	1.1211	-0.7800	0.2903	-0.2139	0.0018	0.0013
	W24	1.0033	0.0880	0.2570	0.0216	0.0016	0.0001
Level 4	W13	1.3883	0.0013	0.4787	0.0003	0.0030	0.0000
	W14	-0.0136	0.4454	-0.0043	0.1491	0.0000	0.0009
	W15	1.0540	-0.0950	0.3635	-0.0323	0.0022	0.0002
	W16	1.0284	0.0969	0.3546	0.0328	0.0022	0.0002
	W17	-0.0537	0.6597	-0.0182	0.2221	0.0001	0.0014
	W18	0.0333	0.0084	0.0117	0.0015	0.0001	0.0000
	W19	1.0310	0.3350	0.3558	0.1121	0.0022	0.0007
	W20	1.0514	-0.3331	0.3623	-0.1116	0.0022	0.0007
	W21	0.8155	-0.0650	0.2814	-0.0231	0.0017	0.0001
	W22	0.7310	0.5675	0.2523	0.1912	0.0016	0.0012
	W23	0.8308	-0.5661	0.2862	-0.1908	0.0018	0.0012
	W24	0.7463	0.0664	0.2572	0.0235	0.0016	0.0001
Level 3	W13	0.9096	0.0009	0.4542	-0.0003	0.0028	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 20/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W14	-0.0093	0.2963	-0.0044	0.1473	0.0000	0.0009
	W15	0.6906	-0.0627	0.3449	-0.0315	0.0021	0.0002
	W16	0.6738	0.0641	0.3365	0.0311	0.0021	0.0002
	W17	-0.0355	0.4376	-0.0176	0.2166	0.0001	0.0013
	W18	0.0216	0.0069	0.0109	0.0043	0.0001	0.0000
	W19	0.6752	0.2229	0.3373	0.1102	0.0021	0.0007
	W20	0.6891	-0.2216	0.3440	-0.1106	0.0021	0.0007
	W21	0.5341	-0.0419	0.2668	-0.0204	0.0016	0.0001
	W22	0.4787	0.3763	0.2392	0.1858	0.0015	0.0011
	W23	0.5446	-0.3752	0.2718	-0.1861	0.0017	0.0011
	W24	0.4892	0.0429	0.2442	0.0201	0.0015	0.0001
Level 2	W13	0.4554	0.0012	0.4554	0.0012	0.0024	0.0000
	W14	-0.0048	0.1491	-0.0048	0.1491	0.0000	0.0008
	W15	0.3457	-0.0312	0.3457	-0.0312	0.0018	0.0002
	W16	0.3373	0.0330	0.3373	0.0330	0.0018	0.0002
	W17	-0.0179	0.2210	-0.0179	0.2210	0.0001	0.0012
	W18	0.0107	0.0026	0.0107	0.0026	0.0001	0.0000
	W19	0.3379	0.1127	0.3379	0.1127	0.0018	0.0006
	W20	0.3452	-0.1109	0.3452	-0.1109	0.0018	0.0006
	W21	0.2673	-0.0215	0.2673	-0.0215	0.0014	0.0001
	W22	0.2395	0.1905	0.2395	0.1905	0.0012	0.0010
	W23	0.2727	-0.1892	0.2727	-0.1892	0.0014	0.0010
	W24	0.2450	0.0228	0.2450	0.0228	0.0013	0.0001
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (190.000, 75.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	4.7552	0.0015	0.1199	0.0001	0.0007	0.0000
	W14	-0.0556	2.0984 ₇₈	-0.0039	0.1649	0.0000	0.0010

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 21/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W15	3.6240	-0.3524	0.0936	-0.0225	0.0006	0.0001
	W16	3.5088	0.3546	0.0863	0.0225	0.0005	0.0001
	W17	-0.2365	2.7683	-0.0153	0.1996	0.0001	0.0012
	W18	0.1531	0.3793	0.0094	0.0478	0.0001	0.0003
	W19	3.5247	1.5750	0.0870	0.1237	0.0005	0.0008
	W20	3.6081	-1.5727	0.0929	-0.1236	0.0006	0.0008
	W21	2.8329	0.0202	0.0772	0.0190	0.0005	0.0001
	W22	2.4542	2.3422	0.0532	0.1666	0.0003	0.0010
	W23	2.8954	-2.3405	0.0817	-0.1665	0.0005	0.0010
	W24	2.5167	-0.0185	0.0577	-0.0190	0.0004	0.0001
Level 12	W13	4.6353	0.0015	0.2101	0.0004	0.0013	0.0000
	W14	-0.0516	1.9335	-0.0050	0.1890	0.0000	0.0012
	W15	3.5305	-0.3299	0.1621	-0.0283	0.0010	0.0002
	W16	3.4225	0.3321	0.1530	0.0288	0.0009	0.0002
	W17	-0.2212	2.5688	-0.0190	0.2381	0.0001	0.0015
	W18	0.1437	0.3315	0.0116	0.0454	0.0001	0.0003
	W19	3.4377	1.4512	0.1539	0.1420	0.0009	0.0009
	W20	3.5152	-1.4490	0.1613	-0.1415	0.0010	0.0009
	W21	2.7557	0.0012	0.1303	0.0128	0.0008	0.0001
	W22	2.4010	2.1756	0.1005	0.2002	0.0006	0.0012
	W23	2.8137	-2.1740	0.1359	-0.1998	0.0008	0.0012
	W24	2.4590	0.0004	0.1061	-0.0124	0.0007	0.0001
Level 11	W13	4.4252	0.0011	0.2984	0.0022	0.0018	0.0000
	W14	-0.0467	1.7445	-0.0051	0.1993	0.0000	0.0012
	W15	3.3683	-0.3016	0.2285	-0.0297	0.0014	0.0002
	W16	3.2694	0.3032	0.2190	0.0330	0.0014	0.0002
	W17	-0.2022	2.3307	-0.0198	0.2552	0.0001	0.0016
	W18	0.1322	0.2861	0.0122	0.0438	0.0001	0.0003
	W19	3.2839	1.3092	0.2200	0.1512	0.0014	0.0009
	W20	3.3539	-1.3075	0.2276	-0.1478	0.0014	0.0009
	W21	2.6254	-0.0116	0.1805	0.0106	0.0011	0.0001
	W22	2.3004	1.9754	0.1494	0.2162	0.0009	0.0013
	W23	2.6779	-1.9742	0.1863	-0.2137	0.0011	0.0013
	W24	2.3529	0.0129	0.1552	-0.0081	0.0010	0.0000
Level 10	W13	4.1268	-0.0011	0.3717	0.0025	0.0023	0.0000
	W14	-0.0415	1.5452	-0.0056	0.2070	0.0000	0.0013
	W15	3.1398	-0.2719	0.2838	-0.0317	0.0018	0.0002
	W16	3.0504	0.2702	0.2737	0.0354	0.0017	0.0002
	W17	-0.1823	2.0754	-0.0213	0.2683	0.0001	0.0017
	W18	0.1200	0.2423	0.0129	0.0422	0.0001	0.0003
	W19	3.0639	1.1580	0.2746	0.1571	0.0017	0.0010
	W20	3.1263	-1.1597	0.2829	-0.1534	0.0017	0.0009

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 22/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W21	2.4449	-0.0222	0.2226	0.0079	0.0014	0.0000
	W22	2.1510	1.7592	0.1893	0.2278	0.0012	0.0014
	W23	2.4916	-1.7605	0.2288	-0.2250	0.0014	0.0014
	W24	2.1978	0.0209	0.1956	-0.0051	0.0012	0.0000
Level 9	W13	3.7551	-0.0036	0.4194	-0.0003	0.0026	0.0000
	W14	-0.0360	1.3381	-0.0054	0.2051	0.0000	0.0013
	W15	2.8560	-0.2403	0.3201	-0.0341	0.0020	0.0002
	W16	2.7767	0.2348	0.3090	0.0336	0.0019	0.0002
	W17	-0.1610	1.8071	-0.0228	0.2680	0.0001	0.0017
	W18	0.1071	0.2001	0.0147	0.0397	0.0001	0.0002
	W19	2.7894	1.0009	0.3105	0.1536	0.0019	0.0009
	W20	2.8433	-1.0063	0.3186	-0.1541	0.0020	0.0010
	W21	2.2223	-0.0301	0.2511	0.0042	0.0016	0.0000
	W22	1.9618	1.5314	0.2147	0.2262	0.0013	0.0014
	W23	2.2628	-1.5355	0.2571	-0.2266	0.0016	0.0014
	W24	2.0022	0.0260	0.2207	-0.0046	0.0014	0.0000
Level 8	W13	3.3357	-0.0033	0.4645	-0.0010	0.0029	0.0000
	W14	-0.0306	1.1330	-0.0050	0.1950	0.0000	0.0012
	W15	2.5359	-0.2062	0.3540	-0.0340	0.0022	0.0002
	W16	2.4677	0.2012	0.3428	0.0325	0.0021	0.0002
	W17	-0.1383	1.5391	-0.0225	0.2583	0.0001	0.0016
	W18	0.0924	0.1604	0.0151	0.0341	0.0001	0.0002
	W19	2.4789	0.8473	0.3446	0.1455	0.0021	0.0009
	W20	2.5247	-0.8522	0.3521	-0.1470	0.0022	0.0009
	W21	1.9712	-0.0343	0.2768	0.0001	0.0017	0.0000
	W22	1.7471	1.3052	0.2402	0.2181	0.0015	0.0013
	W23	2.0056	-1.3090	0.2824	-0.2192	0.0017	0.0014
	W24	1.7815	0.0306	0.2458	-0.0013	0.0015	0.0000
Level 7	W13	2.8712	-0.0023	0.4923	0.0006	0.0030	0.0000
	W14	-0.0256	0.9381	-0.0042	0.1815	0.0000	0.0011
	W15	2.1819	-0.1722	0.3745	-0.0312	0.0023	0.0002
	W16	2.1249	0.1688	0.3639	0.0320	0.0022	0.0002
	W17	-0.1157	1.2808	-0.0210	0.2427	0.0001	0.0015
	W18	0.0773	0.1263	0.0148	0.0295	0.0001	0.0002
	W19	2.1342	0.7018	0.3661	0.1365	0.0023	0.0008
	W20	2.1726	-0.7053	0.3723	-0.1357	0.0023	0.0008
	W21	1.6944	-0.0345	0.2920	-0.0013	0.0018	0.0000
	W22	1.5069	1.0872	0.2572	0.2060	0.0016	0.0013
	W23	1.7232	-1.0898	0.2966	-0.2054	0.0018	0.0013
	W24	1.5357	0.0319	0.2619	0.0019	0.0016	0.0000
Level 6	W13	2.3789	-0.0029 ₈₀	0.5082	-0.0019	0.0031	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 23/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W14	-0.0214	0.7566	-0.0039	0.1659	0.0000	0.0010
	W15	1.8074	-0.1411	0.3864	-0.0322	0.0024	0.0002
	W16	1.7610	0.1368	0.3758	0.0293	0.0023	0.0002
	W17	-0.0947	1.0381	-0.0209	0.2284	0.0001	0.0014
	W18	0.0626	0.0968	0.0151	0.0205	0.0001	0.0001
	W19	1.7681	0.5653	0.3782	0.1230	0.0023	0.0008
	W20	1.8003	-0.5696	0.3840	-0.1259	0.0024	0.0008
	W21	1.4025	-0.0332	0.3011	-0.0088	0.0019	0.0001
	W22	1.2497	0.8811	0.2661	0.1933	0.0016	0.0012
	W23	1.4266	-0.8844	0.3055	-0.1954	0.0019	0.0012
	W24	1.2738	0.0299	0.2705	0.0066	0.0017	0.0000
Level 5	W13	1.8708	-0.0010	0.4825	-0.0020	0.0030	0.0000
	W14	-0.0176	0.5907	-0.0039	0.1634	0.0000	0.0010
	W15	1.4210	-0.1089	0.3669	-0.0308	0.0023	0.0002
	W16	1.3852	0.1074	0.3568	0.0278	0.0022	0.0002
	W17	-0.0738	0.8097	-0.0201	0.2217	0.0001	0.0014
	W18	0.0475	0.0763	0.0142	0.0234	0.0001	0.0001
	W19	1.3899	0.4423	0.3589	0.1211	0.0022	0.0007
	W20	1.4163	-0.4437	0.3648	-0.1241	0.0023	0.0008
	W21	1.1013	-0.0244	0.2858	-0.0055	0.0018	0.0000
	W22	0.9836	0.6879	0.2525	0.1871	0.0016	0.0012
	W23	1.1211	-0.6889	0.2903	-0.1894	0.0018	0.0012
	W24	1.0033	0.0233	0.2570	0.0033	0.0016	0.0000
Level 4	W13	1.3883	0.0010	0.4787	0.0003	0.0030	0.0000
	W14	-0.0136	0.4273	-0.0043	0.1433	0.0000	0.0009
	W15	1.0540	-0.0781	0.3635	-0.0265	0.0022	0.0002
	W16	1.0284	0.0796	0.3546	0.0269	0.0022	0.0002
	W17	-0.0537	0.5880	-0.0182	0.1981	0.0001	0.0012
	W18	0.0333	0.0529	0.0117	0.0169	0.0001	0.0001
	W19	1.0310	0.3212	0.3558	0.1077	0.0022	0.0007
	W20	1.0514	-0.3197	0.3623	-0.1073	0.0022	0.0007
	W21	0.8155	-0.0189	0.2814	-0.0072	0.0017	0.0000
	W22	0.7310	0.5007	0.2523	0.1688	0.0016	0.0010
	W23	0.8308	-0.4995	0.2862	-0.1685	0.0018	0.0010
	W24	0.7463	0.0200	0.2572	0.0075	0.0016	0.0000
Level 3	W13	0.9096	0.0008	0.4542	-0.0002	0.0028	0.0000
	W14	-0.0093	0.2839	-0.0044	0.1414	0.0000	0.0009
	W15	0.6906	-0.0515	0.3449	-0.0259	0.0021	0.0002
	W16	0.6738	0.0527	0.3365	0.0255	0.0021	0.0002
	W17	-0.0355	0.3899	-0.0176	0.1932	0.0001	0.0012
	W18	0.0216	0.0360	0.0109	0.0188	0.0001	0.0001
	W19	0.6752	0.2135	0.3373	0.1059	0.0021	0.0007

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 24/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	0.6891	-0.2124	0.3440	-0.1062	0.0021	0.0007
	W21	0.5341	-0.0117	0.2668	-0.0053	0.0016	0.0000
	W22	0.4787	0.3319	0.2392	0.1640	0.0015	0.0010
	W23	0.5446	-0.3311	0.2718	-0.1643	0.0017	0.0010
	W24	0.4892	0.0125	0.2442	0.0050	0.0015	0.0000
Level 2	W13	0.4554	0.0010	0.4554	0.0010	0.0024	0.0000
	W14	-0.0048	0.1426	-0.0048	0.1426	0.0000	0.0007
	W15	0.3457	-0.0257	0.3457	-0.0257	0.0018	0.0001
	W16	0.3373	0.0271	0.3373	0.0271	0.0018	0.0001
	W17	-0.0179	0.1967	-0.0179	0.1967	0.0001	0.0010
	W18	0.0107	0.0171	0.0107	0.0171	0.0001	0.0001
	W19	0.3379	0.1077	0.3379	0.1077	0.0018	0.0006
	W20	0.3452	-0.1062	0.3452	-0.1062	0.0018	0.0006
	W21	0.2673	-0.0064	0.2673	-0.0064	0.0014	0.0000
	W22	0.2395	0.1679	0.2395	0.1679	0.0012	0.0009
	W23	0.2727	-0.1668	0.2727	-0.1668	0.0014	0.0009
	W24	0.2450	0.0075	0.2450	0.0075	0.0013	0.0000
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (190.000, 0.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	4.7563	0.0015	0.1200	0.0001	0.0007	0.0000
	W14	0.2254	2.0984	0.0159	0.1649	0.0001	0.0010
	W15	3.3346	-0.3524	0.0752	-0.0225	0.0005	0.0001
	W16	3.7998	0.3546	0.1048	0.0225	0.0006	0.0001
	W17	0.9550	2.7683	0.0618	0.1996	0.0004	0.0012
	W18	-0.6169	0.3793	-0.0379	0.0478	0.0002	0.0003
	W19	3.7363	1.5750	0.1019	0.1237	0.0006	0.0008
	W20	3.3982	-1.5727	0.0780	-0.1236	0.0005	0.0008

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 25/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W21	2.0383	0.0202	0.0280	0.0190	0.0002	0.0001
	W22	3.5661	2.3422	0.1249	0.1666	0.0008	0.0010
	W23	1.7847	-2.3405	0.0100	-0.1665	0.0001	0.0010
	W24	3.3125	-0.0185	0.1070	-0.0190	0.0007	0.0001
Level 12	W13	4.6363	0.0015	0.2104	0.0004	0.0013	0.0000
	W14	0.2095	1.9335	0.0206	0.1890	0.0001	0.0012
	W15	3.2595	-0.3299	0.1390	-0.0283	0.0009	0.0002
	W16	3.6951	0.3321	0.1765	0.0288	0.0011	0.0002
	W17	0.8932	2.5688	0.0786	0.2381	0.0005	0.0015
	W18	-0.5790	0.3315	-0.0478	0.0454	0.0003	0.0003
	W19	3.6344	1.4512	0.1732	0.1420	0.0011	0.0009
	W20	3.3201	-1.4490	0.1424	-0.1415	0.0009	0.0009
	W21	2.0104	0.0012	0.0684	0.0128	0.0004	0.0001
	W22	3.4412	2.1756	0.1914	0.2002	0.0012	0.0012
	W23	1.7747	-2.1740	0.0453	-0.1998	0.0003	0.0012
	W24	3.2055	0.0004	0.1683	-0.0124	0.0010	0.0001
Level 11	W13	4.4260	0.0011	0.3002	0.0022	0.0019	0.0000
	W14	0.1889	1.7445	0.0225	0.1993	0.0001	0.0012
	W15	3.1204	-0.3016	0.2043	-0.0297	0.0013	0.0002
	W16	3.5185	0.3032	0.2460	0.0330	0.0015	0.0002
	W17	0.8146	2.3307	0.0872	0.2552	0.0005	0.0016
	W18	-0.5312	0.2861	-0.0534	0.0438	0.0003	0.0003
	W19	3.4612	1.3092	0.2421	0.1512	0.0015	0.0009
	W20	3.1778	-1.3075	0.2083	-0.1478	0.0013	0.0009
	W21	1.9419	-0.0116	0.1132	0.0106	0.0007	0.0001
	W22	3.2498	1.9754	0.2499	0.2162	0.0015	0.0013
	W23	1.7294	-1.9742	0.0878	-0.2137	0.0005	0.0013
	W24	3.0373	0.0129	0.2246	-0.0081	0.0014	0.0000
Level 10	W13	4.1257	-0.0011	0.3737	0.0025	0.0023	0.0000
	W14	0.1664	1.5452	0.0245	0.2070	0.0002	0.0013
	W15	2.9161	-0.2719	0.2581	-0.0317	0.0016	0.0002
	W16	3.2725	0.2702	0.3024	0.0354	0.0019	0.0002
	W17	0.7274	2.0754	0.0932	0.2683	0.0006	0.0017
	W18	-0.4778	0.2423	-0.0565	0.0422	0.0003	0.0003
	W19	3.2191	1.1580	0.2986	0.1571	0.0018	0.0010
	W20	2.9695	-1.1597	0.2619	-0.1534	0.0016	0.0009
	W21	1.8287	-0.0222	0.1512	0.0079	0.0009	0.0000
	W22	2.9999	1.7592	0.2967	0.2278	0.0018	0.0014
	W23	1.6415	-1.7605	0.1237	-0.2250	0.0008	0.0014
	W24	2.8127	0.0209	0.2692	-0.0051	0.0017	0.0000
Level 9	W13	3.7521	-0.0036 ₈₃	0.4191	-0.0003	0.0026	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Drift

Page 26/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W14	0.1420	1.3381	0.0215	0.2051	0.0001	0.0013
	W15	2.6580	-0.2403	0.2921	-0.0341	0.0018	0.0002
	W16	2.9701	0.2348	0.3366	0.0336	0.0021	0.0002
	W17	0.6342	1.8071	0.0911	0.2680	0.0006	0.0017
	W18	-0.4213	0.2001	-0.0588	0.0397	0.0004	0.0002
	W19	2.9205	1.0009	0.3305	0.1536	0.0020	0.0009
	W20	2.7076	-1.0063	0.2982	-0.1541	0.0018	0.0010
	W21	1.6776	-0.0301	0.1750	0.0042	0.0011	0.0000
	W22	2.7032	1.5314	0.3208	0.2262	0.0020	0.0014
	W23	1.5179	-1.5355	0.1507	-0.2266	0.0009	0.0014
	W24	2.5435	0.0260	0.2965	-0.0046	0.0018	0.0000
Level 8	W13	3.3330	-0.0033	0.4637	-0.0010	0.0029	0.0000
	W14	0.1204	1.1330	0.0196	0.1950	0.0001	0.0012
	W15	2.3659	-0.2062	0.3260	-0.0340	0.0020	0.0002
	W16	2.6335	0.2012	0.3695	0.0325	0.0023	0.0002
	W17	0.5431	1.5391	0.0882	0.2583	0.0005	0.0016
	W18	-0.3625	0.1604	-0.0588	0.0341	0.0004	0.0002
	W19	2.5900	0.8473	0.3624	0.1455	0.0022	0.0009
	W20	2.4094	-0.8522	0.3331	-0.1470	0.0021	0.0009
	W21	1.5026	-0.0343	0.2004	0.0001	0.0012	0.0000
	W22	2.3825	1.3052	0.3433	0.2181	0.0021	0.0013
	W23	1.3671	-1.3090	0.1783	-0.2192	0.0011	0.0014
	W24	2.2470	0.0306	0.3213	-0.0013	0.0020	0.0000
Level 7	W13	2.8693	-0.0023	0.4928	0.0006	0.0030	0.0000
	W14	0.1008	0.9381	0.0165	0.1815	0.0001	0.0011
	W15	2.0400	-0.1722	0.3486	-0.0312	0.0022	0.0002
	W16	2.2640	0.1688	0.3905	0.0320	0.0024	0.0002
	W17	0.4549	1.2808	0.0830	0.2427	0.0005	0.0015
	W18	-0.3036	0.1263	-0.0583	0.0295	0.0004	0.0002
	W19	2.2276	0.7018	0.3819	0.1365	0.0024	0.0008
	W20	2.0763	-0.7053	0.3572	-0.1357	0.0022	0.0008
	W21	1.3022	-0.0345	0.2178	-0.0013	0.0013	0.0000
	W22	2.0391	1.0872	0.3551	0.2060	0.0022	0.0013
	W23	1.1888	-1.0898	0.1992	-0.2054	0.0012	0.0013
	W24	1.9257	0.0319	0.3366	0.0019	0.0021	0.0000
Level 6	W13	2.3765	-0.0029	0.5066	-0.0019	0.0031	0.0000
	W14	0.0844	0.7566	0.0148	0.1659	0.0001	0.0010
	W15	1.6913	-0.1411	0.3596	-0.0322	0.0022	0.0002
	W16	1.8735	0.1368	0.4002	0.0293	0.0025	0.0002
	W17	0.3719	1.0381	0.0798	0.2284	0.0005	0.0014
	W18	-0.2453	0.0968	-0.0576	0.0205	0.0004	0.0001
	W19	1.8457	0.5653 ₈₄	0.3910	0.1230	0.0024	0.0008

RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Page 27/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	1.7191	-0.5696	0.3688	-0.1259	0.0023	0.0008
	W21	1.0845	-0.0332	0.2265	-0.0088	0.0014	0.0001
	W22	1.6840	0.8811	0.3600	0.1933	0.0022	0.0012
	W23	0.9896	-0.8844	0.2098	-0.1954	0.0013	0.0012
	W24	1.5891	0.0299	0.3434	0.0066	0.0021	0.0000
Level 5	W13	1.8700	-0.0010	0.4808	-0.0020	0.0030	0.0000
	W14	0.0696	0.5907	0.0151	0.1634	0.0001	0.0010
	W15	1.3317	-0.1089	0.3413	-0.0308	0.0021	0.0002
	W16	1.4732	0.1074	0.3800	0.0278	0.0023	0.0002
	W17	0.2921	0.8097	0.0768	0.2217	0.0005	0.0014
	W18	-0.1877	0.0763	-0.0541	0.0234	0.0003	0.0001
	W19	1.4547	0.4423	0.3719	0.1211	0.0023	0.0007
	W20	1.3503	-0.4437	0.3493	-0.1241	0.0022	0.0008
	W21	0.8580	-0.0244	0.2154	-0.0055	0.0013	0.0000
	W22	1.3240	0.6879	0.3425	0.1871	0.0021	0.0012
	W23	0.7797	-0.6889	0.1984	-0.1894	0.0012	0.0012
	W24	1.2457	0.0233	0.3256	0.0033	0.0020	0.0000
Level 4	W13	1.3891	0.0010	0.4789	0.0003	0.0030	0.0000
	W14	0.0545	0.4273	0.0172	0.1433	0.0001	0.0009
	W15	0.9905	-0.0781	0.3417	-0.0265	0.0021	0.0002
	W16	1.0933	0.0796	0.3766	0.0269	0.0023	0.0002
	W17	0.2153	0.5880	0.0720	0.1981	0.0004	0.0012
	W18	-0.1336	0.0529	-0.0462	0.0169	0.0003	0.0001
	W19	1.0827	0.3212	0.3721	0.1077	0.0023	0.0007
	W20	1.0010	-0.3197	0.3463	-0.1073	0.0021	0.0007
	W21	0.6426	-0.0189	0.2217	-0.0072	0.0014	0.0000
	W22	0.9814	0.5007	0.3365	0.1688	0.0021	0.0010
	W23	0.5814	-0.4995	0.2023	-0.1685	0.0012	0.0010
	W24	0.9202	0.0200	0.3171	0.0075	0.0020	0.0000
Level 3	W13	0.9102	0.0008	0.4540	-0.0002	0.0028	0.0000
	W14	0.0372	0.2839	0.0177	0.1414	0.0001	0.0009
	W15	0.6487	-0.0515	0.3237	-0.0259	0.0020	0.0002
	W16	0.7166	0.0527	0.3573	0.0255	0.0022	0.0002
	W17	0.1433	0.3899	0.0702	0.1932	0.0004	0.0012
	W18	-0.0874	0.0360	-0.0436	0.0188	0.0003	0.0001
	W19	0.7106	0.2135	0.3538	0.1059	0.0022	0.0007
	W20	0.6547	-0.2124	0.3273	-0.1062	0.0020	0.0007
	W21	0.4210	-0.0117	0.2101	-0.0053	0.0013	0.0000
	W22	0.6449	0.3319	0.3206	0.1640	0.0020	0.0010
	W23	0.3791	-0.3311	0.1902	-0.1643	0.0012	0.0010
	W24	0.6031	0.0125	0.3007	0.0050	0.0019	0.0000

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RAM Structural System

Drift

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

Building Code: IBC

Page 28/28

02/25/21 15:36:23

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 2	W13	0.4562	0.0010	0.4562	0.0010	0.0024	0.0000
	W14	0.0195	0.1426	0.0195	0.1426	0.0001	0.0007
	W15	0.3250	-0.0257	0.3250	-0.0257	0.0017	0.0001
	W16	0.3593	0.0271	0.3593	0.0271	0.0019	0.0001
	W17	0.0731	0.1967	0.0731	0.1967	0.0004	0.0010
	W18	-0.0438	0.0171	-0.0438	0.0171	0.0002	0.0001
	W19	0.3568	0.1077	0.3568	0.1077	0.0019	0.0006
	W20	0.3275	-0.1062	0.3275	-0.1062	0.0017	0.0006
	W21	0.2109	-0.0064	0.2109	-0.0064	0.0011	0.0000
	W22	0.3243	0.1679	0.3243	0.1679	0.0017	0.0009
	W23	0.1889	-0.1668	0.1889	-0.1668	0.0010	0.0009
	W24	0.3023	0.0075	0.3023	0.0075	0.0016	0.0000
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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BRACED FRAME DESIGN

SAMPLE CALCS.

BRACE FRAME DESIGN IN RAM

RAM Structural System

Member Code Check

RAM Frame 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

02/25/21 16:05:29

Building Code: IBC

Steel Code: AISC360-16 LRFD

BRACE INFORMATION:

Story Level = Level 8 Frame Number = 4 Brace Number = 9
 Fy (ksi) = 50.00
 Brace Size = HSS7X7X1/2

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft) _____	20.18	20.18
Lu for Bending (ft) _____	20.18	20.18
K _____	1.00	1.00

CONTROLLING BRACE FORCES - SHEAR

Load Combination: 1.400 D + 1.400 ND1

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

SHEAR CHECK:

Vux (kip) = -0.00	0.90Vnx (kip) = 140.74	Vux/0.90Vnx = 0.000
Vuy (kip) = -0.00	0.90Vny (kip) = 140.74	Vuy/0.90Vny = 0.000

CONTROLLING BRACE FORCES - AXIAL

Load Combination: 1.200 D - 1.200 ND2 + 0.500 Lp - 0.500 NL2 + 0.500 Rfp - 0.500 NR2 - 1.000 W2

AXIAL CHECK:

Pu (kip) = 242.92	0.90Pnx (kip) = 281.40	Pu/0.90Pnx = 0.863
	0.90Pny (kip) = 281.40	Pu/0.90Pny = 0.863
	0.90Pn (kip) = 281.40	Pu/0.90Pn = 0.863

CONTROLLING BRACE FORCES - FLEXURE

Load Combination: 1.200 D - 1.200 ND2 + 0.500 Lp - 0.500 NL2 + 0.500 Rfp - 0.500 NR2 - 1.000 W2

Axial	Load (kip) _____	242.92
Moment	Top	Mux (kip-ft) _____
		Muy (kip-ft) _____
Moment	Bot.	Mux (kip-ft) _____
		Muy (kip-ft) _____

CALCULATED PARAMETERS:

Pu (kip) = 242.92	0.90Pn (kip) = 281.40
Mux (kip-ft) = 0.00	0.90Mnx (kip-ft) = 104.63
Muy (kip-ft) = 0.00	0.90Mny (kip-ft) = 104.63
KL/Rx = 91.93	KL/Ry = 91.93
Cbx = 1.00	

INTERACTION EQUATION:

Pu/0.90*Pn=0.863

Pr/Pc = 0.863

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SCBF BRACE CAPACITY

Brace Size HSS7X7X1/2
 Shape Profile Square
 Grade A500 Gr. C

Width-Thickness Ratio 12
 Limiting Width-Thicknes Ratio 33.71646482
 Element Non-Slender Yes

Gross Area (in^2) 11.6
 Fy (ksi) 50
 Ry (unitless) 1.3

rx (in) 2.63
 ry (in) 2.63
 r (in) 2.63

Horizontal Length (ft) 15 Angle 0.837981
 Vertical Length (ft) 13.5
 Brace Length (ft) 20.18043607

K (unitless) 1

KL (in) 242.1652328

KL/r (unitless) 92.0780353 4.71*SQRT(E/Fy) 99.48629

Fcre (ksi) 29.034882

Tension Strength (kip) 754 Vertical Component 504.3994

Compression Strength (kip) 384.0417688 Vertical Component 256.9104

Buckled Compression Strength (kip) 115.2125306 Vertical Component 77.07312

Horizontal Component 560.4438

Horizontal Component 285.456

Horizontal Component 85.6368

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SCBF BRACE TO BEAM CONNECTION

EXAMPLE CALC: SCBF BRACE-TO-BEAM CONNECTION

PROPERTIES: ASTM A500 GRADE C (SQUARE HSS)

$$F_y = 50 \text{ ksi} \quad F_u = 62 \text{ ksi}$$

: ASTM A572 (PLATES & BARS)

$$F_y = 50 \text{ ksi} \quad F_u = 65 \text{ ksi}$$

AISC SEISMIC PROVISIONS SECTION F2.3(i), F2.3(ii), & SECTION F2.6c

EXPECTED TENSILE STRENGTH OF BRACES

HSS 7x7x1/2 PROPERTIES

$$t_{nom} = 0.5 \text{ in} \quad t_{des} = 0.465 \text{ in} \quad A = 11.6 \text{ in}^2 \quad r = 2.63 \text{ in}$$

W16x67 PROPERTIES

$$d = 16.3 \text{ in} \quad t_w = 0.395 \text{ in} \quad t_f = 0.665 \text{ in} \quad k_{des} = 1.07$$

AISC SEISMIC PROVISIONS TABLE A3.1: $R_y = 1.3$, $R_T = 1.2$

$$P_{TENSION} = R_y F_y A_g$$

$$= 1.3(50 \text{ ksi})(11.6 \text{ in}^2)$$

$$= 754 \text{ k}$$

EXPECTED STRENGTH IN COMPRESSION OF BRACES

$$KL/r = \frac{1.0(20.1667' \times 12'')}{2.63 \text{ in}} = 92.0$$

$$4.71 \sqrt{\frac{E}{R_y F_y}} = 4.71 \sqrt{\frac{29,000 \text{ ksi}}{1.3(50 \text{ ksi})}} = 99.5 \quad \therefore \frac{KL}{r} < 4.71 \sqrt{\frac{E}{R_y F_y}}$$

$$F_e = \frac{\pi^2 E}{\left(\frac{KL}{r}\right)^2} = \frac{\pi^2 (29,000 \text{ ksi})}{(92.0)^2} = 33.82 \text{ ksi}$$

$$F_{CR} = \left[0.658^{\frac{R_y F_y}{F_e}} \right] R_y F_y = \left[0.658^{\left(\frac{1.3 \times 50}{33.82}\right)} \right] 1.3(50 \text{ ksi})$$

$$F_{CR} = 29.1 \text{ ksi}$$

EXPECTED COMPRESSIVE STRENGTH OF BRACES

$$\begin{aligned} P_{\text{COMPRESSION}} &= 1.14 F_{CR} A_g \\ &= 1.14(29.1)(11.6 \text{ in}^2) \\ &= 384 \text{ k} \end{aligned}$$

EXPECTED POST BUCKLING STRENGTH

$$\begin{aligned} 0.3 P_{\text{COMPRESSION}} &= 0.3(384 \text{ k}) \\ &= 115.2 \text{ k} \end{aligned}$$

(EXAMPLE OF BRACE GEOMETRY)

REQUIRED STRENGTH OF BRACING CONNECTIONS
ACCORDING TO AISC SEISMIC PROVISIONS SECTION F2.3i

REQUIRED STRENGTH OF BRACING CONNECTIONS
ACCORDING TO AISC SEISMIC PROVISIONS SECTION F2.3ii

MINIMUM LENGTH, l , REQUIRED FOR BRACE-GUSSET LAP

• EXPECTED BRACE RUPTURE LENGTH, $R_t F_u$ IS USED TO DETERMINE AVAILABLE STRENGTH IN ACCORDANCE W/ AISC SEISMIC PROVISIONS SECTION A3.2

$$R_t = 1.2 \text{ (TABLE A3.1)}$$

$$R_n = 0.60 R_t F_u A_{nv} \text{ (AISC SPEC SECTION J4-4)}$$

$$A_{nv} = 4(l) t_{des}$$

$$\therefore l \geq \frac{P_u}{0.6(R_t)F_u(4 t_{des})}$$

$$\geq \frac{754^k}{0.75(0.6)(1.2)(62^{k/ST})(4 \times 0.465_{in})}$$

$$\geq 12.1_{in} \text{ (MIN REQ FOR SHEAR RUPTURE IN BRACE WALL)}$$

SIZE OF WELD BTWN BRACE & GUSSET

$$\phi R_n = 1.392 D L \text{ (AISC MANUAL Eq 8.2a)}$$

TRY $\frac{5}{16}$ WELD

$$754k = 1.392(5)(L)$$

$$L = 108.4 \text{ inch} / 4 \text{ SIDES}$$

$$L = 28 \text{ inch/SIDE}$$

CHECK BLOCK SHEAR

$$R_n = 0.6 F_u A_{nv} + U_{bs} F_u A_{nt} \leq 0.60 F_y A_{gv} + U_{bs} F_u A_{nt}$$

$$A_{nv} = A_{gv} \text{ \& } F_u > F_y \therefore \text{RIGHT EQ CONTROLS}$$

$$U_{bs} = 1.0$$

$$\begin{aligned} 0.60 F_y A_{gv} &= 0.60(50 \text{ ksi})(2)(1)(t_p) \\ &= 0.60(50 \text{ ksi})(2)(28 \text{ in})(t_p) \\ &= 1680 t_p \end{aligned}$$

$$\begin{aligned} U_{bs} F_u A_{nt} &= 1.0(F_u)(D_{BRACE})(t_p) \\ &= 1.0(65 \text{ ksi})(7 \text{ in})(t_p) \\ &= 455 t_p \end{aligned}$$

$$\phi R_n = 0.75 (0.6 F_y A_{gv} + U_{bs} F_u A_{nt}) \geq P_u$$

$$t_p \geq \frac{754k}{0.75(1680 \text{ k/in} + 455 \text{ k/in})}$$

$$\geq 0.47 \text{ in} \quad (\text{SAY OKAY TO } 1" \text{ THICK PLATE})$$

CHECK TENSILE YIELDING

$$\phi R_n = F_y A_g \phi$$

$$754 \text{ k} = (50 \text{ ksi}) A_g (0.9)$$

$$A_g = 16.8 \text{ in}^2 \quad \text{YIELDING LINE} \approx 19"$$

$$\therefore t_p = 1" \text{ WORKS}$$

NOTE: ACTUAL ANGLE CHOSEN IS 10° WHICH IS LESS THAN 30°

$\therefore$ PLATE MEETS WHITMORE WIDTH CRITERIA

CHECK BRACE EFFECTIVE NET AREA

• AISC SEISMIC PROVISIONS SECTION F2.5b(3) $A_e > A_g$

$$A_n = A_g - 2(t_p + 2(\text{GAP})) L_{des}$$

• 1" GAP ES OF BRACE FOR EASE DURING ERECTION

$$A_n = 11.6 - 2[1" + 2(1")] 0.465$$

$$= 8.81 \text{ in}^2$$

• AISC SPEC TABLE D3.1 BECAUSE $l > 1.3 D$, $U = 1.0$

$$A_e = 1.0(8.81 \text{ in}^2)$$

• $A_e < A_g \therefore$ BRACE REIN REQ'D

• TRY (2) $1\frac{1}{2}" \times 1\frac{1}{2}"$ FLAT BAR ES (GRADE 50)

$$r_1 = (3.5 - \frac{1}{2} - 1\frac{1}{2})/2 + \frac{1}{2} = 1.75"$$

$$A_1 = (2)(\frac{1}{2})(3\frac{1}{2} - \frac{1}{2} - \frac{1}{2}) = 2.5"$$

$$\bar{x}_1 A_1 = 1.75 \times 2.5 \text{ in}^2 = 4.375 \text{ in}^3$$

$$r_2 = 3\frac{1}{2} - \frac{1}{2} \div 2 = 3.25"$$

$$A_2 = \frac{1}{2} \times 7 = 3.5"$$

$$\bar{x}_2 A_2 = 3.25 \times 3.5 \text{ in}^2 = 11.375 \text{ in}^3$$

$$r_3 = 3.5 - 1\frac{1}{2} / 2 = 4.25"$$

$$A_3 = 1\frac{1}{2} \times 1\frac{1}{2} = 2.25 \text{ in}^2$$

$$\bar{x}_3 A_3 = 4.25 \text{ in} \times 2.25 \text{ in}^2 = 9.5625 \text{ in}^3$$

$$\Sigma \bar{x} A = 25.3125$$

$$\Sigma A = 8.25$$

$$\bar{x} = \frac{\Sigma \bar{x} A}{\Sigma A} = \left(\frac{25.3125 \text{ in}^3}{8.25 \text{ in}^2} \right) = 3.068 \text{ in}$$

° AISC SPEC TABLE D3.1, CASE 2

$$U = 1 - \frac{\bar{x}}{l}$$

$$= 1 - \frac{3.068}{20.1667}$$

$$= 0.848$$

$$A_n = A_{22} (\text{BRACE}) + A_m$$

$$= 11.6 \text{ in}^2 + 2(1.5)(1.5)$$

$$= 16.1 \text{ in}^2$$

$$A_e = U A_n = 0.848(16.1 \text{ in}^2)$$

$$A_e = 13.65 \text{ in}^2 > A_g = 11.6 \text{ in}^2 \quad \therefore \text{SAY OKAY}$$

- DEVELOP THE EXPECTED STRENGTH OF FLAT BAR IN ACCORDANCE W/ SEISMIC PROVISIONS SECTION F2.5b (3)(ii)

$$R_y F_y A_{fb} = 1.1 (50^{ksi}) (1.5 \times 1.5) \quad R_y = 1.1 \text{ (TABLE A3.1)}$$

$$= 124 \text{ KIPS}$$

- TRY $\frac{5}{16}$ WELD

$$l_w = 124^k / (2 \times 1.312 \text{ in}) (5)$$

$$= 8.9 \text{ in}$$

- WELD MUST BE DEVELOPED ON EACH END OF BRACE

$$\therefore \text{WELD LENGTH} = 9" + (\text{EXTENT OF SLOT}) + 9" \text{ OR } 18" + x$$

FORCES AT THE GUSSET-TO-BEAM INTERFACE

$$V_u = 754 \cos(42^\circ)$$

$$= 560^k$$

1/4" WELLS

9" OFFSET

c = 3"

$$\text{NORMAL } (N_u) = 754 \sin(42^\circ)$$

$$= 505^k$$

- CONTACT LENGTH BTWN GUSSET & BEAM ~20"

THE LINE OF ACTION MISSES THE CENTROID BY ~3" (SEE REVIT)

$$\therefore \text{THE MOMENT } (M_u) = N_u (3")$$

$$= 505^k (3")$$

$$= 1515 \text{ k-in}$$

COMBINE N_u & M_u TO CREATE N_u (EQUIV)

$$N_u (\text{EQUIV}) = N_u + 4M_u / l_b$$

$$= 505^k + 4(1515 \text{ k-in}) / 24 \text{ in}$$

$$= 758 \text{ KIPS}$$

• STRESS IN GUSSET (TENSION)

$$f_{ua} = \frac{N_u (EQUIV)}{t_p l_b}$$

$$= \frac{758^k}{(1")(24")}$$

$$= 32$$

$$\phi F_y = 0.9(50^{ksi})$$

$$= 45^{ksi} > 32^{ksi}$$

• STRESS IN GUSSET (SHEAR)

$$f_{uv} = \frac{V_u}{t_p l_b}$$

$$= 560^k / (1")(24")$$

$$= 23.3^{ksi}$$

$$\phi 0.60 F_y = (1.0)(0.6)(50^{ksi})$$

$$= 30^{ksi} > 23.3^{ksi}$$

SIZE GUSSET-TO-BEAM WELD

$$\theta = \tan^{-1} \left(\frac{N_u (EQUIV)}{V_u} \right)$$

$$= \tan^{-1} \left(\frac{758^k}{560^k} \right)$$

$$= 53.5^\circ$$

• AISC SPEC J2.4 ALLOW INCREASE IN STRENGTH OF WELD

• WELD DUCTILITY FACTOR = 1.25 FROM AISC MAN PART 13

$$D_{req'd} = \frac{1.25 \sqrt{N_u^2 + V_u^2}}{2(1.392 \text{ k/in})(1 + 0.5 \sin^{1.5} \theta) l_b}$$

$$= \frac{1.25 \sqrt{758^2 + 560^2}}{2(1.392 \text{ k/in})(1 + 0.5 \sin^{1.5}(53.5)) (24")}$$

1.361

$$= 13 \text{ SIXTEENTHS}$$

CHECK BEAM WEB LOCAL YIELDING

$$R_n = F_{yw} t_w (5k + l_b)$$

$$= 50 \text{ ksi} (0.375) (5(1.07) + 24")$$

$$= 551 \text{ k}$$

$$\phi R_n = 1.0(662 \text{ k})$$

$$= 550 \text{ k} > N_u = 758 \text{ k}$$

∴ ADD STIFFENER

CHECK BEAM WEB LOCAL CRIPPLING

$$\phi R_n = \phi 0.8 t_w^2 \left[1 + 3 \left(\frac{l_b}{d} \right) \left(\frac{t_w}{t_f} \right)^{1.5} \right] \sqrt{\frac{E F_y t_f'}{t_w}}$$

$$= 0.75 (0.8) (0.395)^2 \left[1 + 3 \left(\frac{24''}{16.3''} \right) \left(\frac{0.395}{0.665} \right)^{1.5} \right] \times 2829$$

$$\sqrt{\frac{29,000 \text{ ksi} (50 \text{ ksi}) (0.930 \text{ in})}{0.570 \text{ in}}}$$

$$= 435^k > 505^k = N_u$$

∴ ADD STIFFENER

NOTE: TOP BRACES ARE THE SAME AS BOTTOM SO WE CAN USE THE SAME CONNECTION

CHECK BEAM WEB SHEAR AT CENTERLINE OF CONNECTION

• COMPRESSION BRACE $V_u, N_u, \& M_u$ VALUES

$$V_u = 384^k \cos(42^\circ)$$

$$= 286^k$$

$$N_u = 384 \sin(42^\circ)$$

$$= 257^k$$

$$M_u = 257^k (3'')$$

$$= 771^k\text{-in}$$

$$V_{u_{max}} = 762^k$$

$$\phi V_n = 193^k < V_u$$

ADD DOUBLER PLATE

DOUBLER PLATE TO RUN 2" BEYOND MAX SHEAR LOAD

$$\therefore \text{PLATE} = 20 \times 13 \text{ (HEIGHT OF T VALUE)} \text{ CENTERED ON WEB}$$

FIND PLATE THICKNESS REQUIRED

$$\begin{aligned} \phi R_n &= 1.0(0.6 F_y A_{gv}) \\ &= 1.0(0.6)(50^{\text{ksi}})(13")(t_d)(2 \text{ PLATES}) \\ &= 780 t_d \end{aligned}$$

$$V_u - \phi V_n = 762^k - 193^k = 569^k$$

$$t_d = \frac{569^k}{780^k/in}$$

$$t_d = .729 \text{ IN}$$

$\therefore$ USE (2) $\frac{3}{4}$ " PLATES

USING INSTANTANEOUS CENTER OF ROTATION METHOD $\theta = 0^\circ$ (AISC MANUAL TABLE 8.8)

$$l = 13''$$

$$kl = 20 \quad K = 1.4$$

$$e_x = ad = 8''$$

$$a = 0.615$$

$$\therefore C = 7.11$$

$$C_1 = 1.0$$

$$\begin{aligned} D_{MIN} &= \frac{V_{POWDER}}{\phi C C_1 l} \\ &= \frac{569 / 2 \text{ PLATES}}{0.75 (7.11) (1.0) (13'')} \\ &= 4.1 \end{aligned}$$

$\therefore$ USE (2) $13'' \times 20'' \times \frac{3}{4}''$ w/ $\frac{5}{16}$ WELD ALL AROUND

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EXAMPLE CALC: SCBF BRACE-TO-BEAM/COLUMN CONNECTION

PROPERTIES: ASTM A500 GRADE C

$$F_y = 50 \text{ ksi} \quad F_u = 62 \text{ ksi}$$

ASTM A572 (PLATES) & A992 (W-SHAPE)

$$F_y = 50 \text{ ksi} \quad F_u = 65 \text{ ksi}$$

HSS 7x7x1/2 PROPERTIES

$$t_{nom} = 0.5, t_{des} = 0.465 \quad A = 11.6 \text{ in}^2 \quad r = 2.63 \text{ in}$$

W16x67 PROPERTIES

$$d = 16.3 \text{ in} \quad t_w = 0.395 \quad t_f = 0.665 \quad k_{des} = 1.07$$

W18x130

$$A = 38.3 \text{ in}^2 \quad d = 19.3 \text{ in} \quad t_w = 0.67 \text{ in} \quad t_f = 1.2 \text{ in} \\ k_{des} = 1.6 \text{ in} \quad T = 15 \frac{1}{8} \text{ in} \quad r_y = 2.70 \text{ in}$$

W14x211

$$d = 15.7 \text{ in} \quad t_w = 0.48 \text{ in} \quad t_f = 1.56 \text{ in} \quad k_{des} = 2.16 \text{ in}$$

5-120 5-206

AISC SEISMIC PROVISIONS
SECTION F2.3i

AISC SEISMIC PROVISIONS
SECTION F2.3ii

$$P_x = (\cos 42^\circ) [\sum \text{BRACES BELOW} - \sum \text{BRACES ABOVE}]$$

$$= (\cos 42^\circ) [(754 + 384) - (754 + 384)]$$

$$= 0$$

∴ NO AXIAL FORCES FROM SEISMIC PROVISIONS

F2.3(i)

$$A_u = \cos(42^\circ)(754^k - 384^k)$$

$$= 275^k$$

$$V_u = 17.5^k \quad (\text{FROM RAM})$$

F2.3(ii)

$$A_u = \cos(42^\circ)(754^k - 115^k)$$

$$= 475^k$$

$$V_u = 17.5^k \quad (\text{FROM RAM}) \quad 135-231$$

SEE EXAMPLE CALC FOR SCBF BRACE-TO-BEAM CONNECTION
 FOR ALL CALCULATIONS BTWN THE BRACE AND THE GUSSET

FORCES @ THE BEAM TO GUSSET INTERFACE

$$V_u = 560^k$$

$$H_u = 505^k$$

- USE AISC MAN TABLE B-10a
- GEOMETRY CALCULATED USING REVIT
- C.G. CALCULATED USING ENERCALC

CONSERVATIVE TO USE 45°
ANGLE TABLES

$$e_x = al = 0.25 = a(12")$$

$$a \sim 0.02$$

$$kl = 18" = k(12")$$

$$k = 1.5$$

$$C = 5.8 \text{ (CONSERVATIVE INTERPOLATION)}$$

$$C_1 = 1.0$$

$$D_{MIN} = \frac{1.25(754^k)}{0.75(5.8)(1.0)(12")}$$

25% INCREASE FOR DUCTILITY AISC MAN PART 13

$$= 18.1 \text{ SIXTEENTHS} / 2 \text{ WELDS}$$

$$\therefore \text{USE } 10/16" \text{ OR } 5/8" \text{ WELD}$$

USING TABLE 7-10
 $s = 3"$ $e_x = 26"$ $n = 4$

$$C = 1.695$$

USING 1" ϕ A 325-X BOLTS IN DOUBLE SHEAR

$$\phi R_n = 80.1^k$$

$$\phi R_n = 1.695(80.1^k) \\ = 135^k > 17.5^k$$

GRAVITY SHEAR NEEDS TO BE DELIVERED TO COLUMN

USING TABLE 7-10

$$s = 3" \quad e_x = 15" \quad n = 4$$

$$C = 2.83$$

$$\phi R_n = C \phi R_n \\ = 2.83(80.1^k)$$

$$= 226.4^k > 17.5^k \quad \sim 8\% \text{ OF CAPACITY}$$

AXIAL LOAD CHECK
 $A_u = 475^k$

$$\phi R_n = 12 \text{ BOLTS} \times (80.1^k) \\ = 960^k > A_u = 475^k \quad \sim 50\% \text{ CAPACITY}$$

$\therefore$ SAY OKAY TO BOLT STRENGTH

CHECK BOLT BEARING

W16x67 CONTROLS FOR THIS CHECK

$$\phi_r n = \phi 2.4 d t F_u$$

$$= 0.75(2.4)(1'')(0.395)(65 \text{ ksi})$$

$$= 46.2 \text{ k/BOLT} \times 12 \text{ BOLTS} = 554 \text{ k} > A_n = 475$$

$$\frac{475}{554} = .85$$

SAY OKAY

NOTE: USING ENGINEERING JUDGEMENT GRAVITY LOADING WILL NOT REQUIRE MORE THAN 10% OF THE CAPACITY OF THE SPLICE. $\therefore$ DESIGN SEISMIC LOADING TO 90% OF CAPACITY.

ADDITIONALLY ONLY 1.2D+L REQUIRED IN LOAD COMBO W/ SEISMIC

CHECK YIELDING OF W16x67

$$\text{YIELDING: } \phi P_n = 0.9 F_y A_g$$

$$= 0.9(50)(19.6 \text{ in}^2)$$

$$= 882 \text{ k} > 475 \text{ k}$$

$\therefore$ YIELDING ALSO WORKS FOR W18x130

° BLOCK SHEAR NOT REQ'D BECAUSE CONNECTION IS IN COMPRESSION

SIZE SPLICE PLATES

AXIAL COMPRESSION IN PLATES

$$\frac{KL}{r} = \frac{1.2(8'')}{\frac{5/8}{\sqrt{12}}} = 53.2$$

TABLE 4.22 FOR $F_y = 50 \text{ ksi}$

$$\phi_c F_{cr} = 36.2 \text{ ksi}$$

$$\begin{aligned}\phi_c P_n &= \phi_c F_{cr} A_g \\ &= 36.2 \text{ ksi} \left(\frac{3}{8}\right)(13'')(2) \\ &= 588 \text{ k} > 475 \text{ k}\end{aligned}$$

SHEAR STRENGTH OF PLATES

$$\begin{aligned}\phi R_n &= \phi 0.6 F_y A_{gv} \\ &= 1.0(0.6)(50)\left(\frac{3}{8}\right)(13)(2) \\ &= 487 \text{ k} > 475 \text{ k} \quad \text{SAY OKAY}\end{aligned}$$

CHECK DUCTILITY OF SPLICE PLATES

$$\begin{aligned}\phi_b M_n &= \phi_b F_y Z \\ &= 0.9(50 \text{ ksi}) \frac{\left(\frac{3}{8}\right)(13)^2}{4} (2 \text{ PLATES}) \\ &= 1426 \text{ k-in}\end{aligned}$$

$$M_{max} = \frac{F_v}{0.9} (A_b C') \quad (\text{Eq 10-3})$$

$$t_{max} = \frac{6 M_{max}}{F_y d^2} \quad (\text{Eq 10.4})$$

$$F_v = 68 \text{ ksi}$$

$$A_b = 0.785 \text{ in}^2$$

FROM AISC MANUAL, TABLE 7-7
 ANGLE = 0° $S = 3$ $n = 4$

$$C' = 44.7 \text{ in}$$

$$M_{\max} = \frac{68 \text{ ksi}}{0.9} (0.785 \text{ in}^2) (44.7 \text{ in})$$

$$= 2652 \text{ k-in}$$

$$t_{\max} = \frac{6 (2652 \text{ k-in})}{(50 \text{ ksi}) (13 \text{ in}^2)}$$

$$= 1.88 \text{ in}$$

$$2(t) = 2\left(\frac{5}{8}\right) = 1.25 < 1.88$$

$\therefore$ SAY OKAY TO $(2) \frac{5}{8}$ " SPLICE PLATES

FORCES INTO BEAM STUB

COMPRESSION LOAD = 342 k

$$V_u = 342 \cos(42^\circ) = 255 \text{ k}$$

$$N_u = 342 (\sin)(42^\circ) = 228 \text{ k}$$

$$\sum M_o = 0$$

$$= M_u + (V_{u1} + V_{u2})(d) + (N_{u1} + N_{u2})(2") + 18 \text{ k} \times (26")$$

$$M_u = (560 \text{ k} + 255 \text{ k})(19.3") + (505 \text{ k} + 289 \text{ k})(2") + 18 \text{ k} \times 26"$$

$$= 17786 \text{ k-in}$$

$$M_{u(max)} = 17786 \text{ k-in} \times \frac{1}{12} = 1483 \text{ k-ft}$$

MOMENT TRANSFERS INTO COLUMN THRU WELDS

$$A_{u(max)} = 475 \text{ k}$$

$$\phi A_n = F_y A_g = 50 \text{ ksi} (38.3 \text{ in}^2) = 1915 \text{ k} > 475 \text{ k}$$

CALCULATE $V_u(max)$

PORTIONS OF N_u COMPONENTS WILL BE TRANSFERRED INTO COLUMN THROUGH GUSSET PLATES VIA WELD FROM GUSSET TO COLUMN

$$\begin{aligned} \text{TOP } N_u &= 505 \text{ k} - \text{CAPACITY OF } \overset{\text{VERTICAL}}{\text{WELD}} \\ &= 505 \text{ k} - 1.392(10)(12)(2 \text{ WELD}) \\ &= 171 \text{ k} \end{aligned}$$

$$\begin{aligned} \text{BTM } N_u &= 289 \text{ k} - \text{CAPACITY OF VERT WELD} \\ &= -45 \text{ k} \therefore \text{LOAD DOES NOT TRANSFER TO BEAM} \end{aligned}$$

$$V_{u(max)} = 171 \text{ k} < \phi V_n = 388 \text{ k}$$

DESIGN BEAM STUB WELD TO COLUMN

LOADS ONTO WELD

$$V_u = 171 \text{ k}$$

$$A_u = 475 \text{ k}$$

$$\begin{aligned} R_u &= \sqrt{V_u^2 + A_u^2} \\ &= 505 \text{ k} \end{aligned}$$

$$\theta = \tan^{-1}\left(\frac{A_u}{V_u}\right) = \tan^{-1}\left(\frac{475}{171}\right) = 70.3^\circ$$

$$1.0 + 0.5 \sin^{1.5} 70.3^\circ = 1.45$$

$$D_{REQD} = \frac{505 \text{ k}}{2(1.392 \text{ ksi})(19.1 \text{ in})(1.45)} = 6.6 \text{ in USE } \frac{9}{16} \text{ in}$$

RESOLVE MOMENT CAUSED BY V_u INTO COLUMN
 FROM GUSSET

$$V_u = 560^k$$

$$D_{REQ'D} = \frac{560^k}{(2)(1.392)(11.2'')(1.5)}$$

$$= 11.9$$

∴ USE $\frac{3}{4}$ " WELD

USE STIFFENER IN COLUMN

- LOCAL WEB YIELDING & CRIPPLING OF COLUMN ARE OKAY BY OBSERVATION & ENGINEERING JUDGEMENT
- SEE OTHER CALCULATIONS FOR DESIGN OF COLUMNS

SAMPLE
BASE CONN.

SCALE: 1/8" = 1'-0"

SCBF BRACED FRAME BASE CONNECTION

EXAMPLE CALC: SCBF BRACED FRAME BASE CONNECTION

* SEE SCBF BRACE-TO-BEAM CONNECTION & SCBF BRACE-TO-BEAM/COLUMN CONNECTION FOR EXAMPLE OF HOW TO TRANSFER FORCES FROM BRACES TO GUSSETS AND COLUMNS

IN THIS CALCULATION WE SHOW CALCULATIONS FOR TRANSFERRING SHEAR FORCE INTO GRADE BEAM & GRAVITY DIRECTION FORCES INTO FOOTINGS

SINCE C of GRADE BEAM GOES THROUGH C of BRACE FORCE NO MOMENTS ARE TRANSFERRED INTO GB OR BASEPLATE

TENSION LOADING

$$V_u = 1465^k \cos(47^\circ) = 999^k$$

$$P_u = 1465^k \sin(47^\circ) = 1072^k$$

COMPRESSIVE LOADING

$$V_u = 871^k$$

$$P_u = 934^k$$

FACTORED P_u TENSION LOAD = 4313^k (LRFD) {FROM RAM}

FACTORED P_u COMPRESSION LOAD = 7294^k (LRFD) {FROM RAM}

DESIGN OF LOAD INTO GRADE BEAM

$$V_u = 999^k_{(MAX)}$$

WELD REQ'D FROM GUSSET TO WT

$$\phi R_n = 1.392 (D)(L)$$

$$999^k = 1.392 (D)(18" + 24")(2 \text{ SIDES})$$

$$D = 8.5 \quad \text{USE } 5/8" \text{ WELD}$$

USE 3/4" x 5" SHEAR STUDS @ 6" OC

NOMINAL STRENGTH W/ 4^{KSI} CONCRETE

$$Q_n = 26.1^k$$

RUPTURE OF STUD

$$\begin{aligned} \phi P_n &= 0.75(65 \text{ ksi})((0.75/2)^2 \pi) \\ &= 21.6^k \end{aligned}$$

$\therefore 21.6^k$ CONTROLS

$$999^k / 21.6^k = 47 \text{ STUDS REQ'D}$$

4 STUDS / FT $\therefore$ 11.75' OF STUDS REQ'D

USE 3/4" x 5" SHEAR STUDS @ 6" (OKAY)

BOLTS REQ'D FOR UPLIFT

TRY $2\frac{1}{2}" \phi$ ANCHORS F1554 (Gr 105)

$$\{F_y = 105 \text{ ksi}; F_u = 125 \text{ ksi}\}$$

$$N_{sa} = A_{se,N} F_{uTA}$$

$$\phi = 0.75$$

$$\text{LRFD FACTORED UPLIFT} = 4313^*$$

$$\phi N_{sa} = 0.75(3.14 \text{ in.})(125 \text{ ksi}) \times N$$

$$A_{se} = \frac{(2.5 \text{ in})^2 \pi}{4}$$

$$A_{se} = \frac{(2.5 \text{ in})^2 \pi}{4}$$

$$4313 = 234.3 \times N$$

$$= 4,908 \text{ in}^2$$

$$= 3.14 \text{ in}^2$$

$$N \sim 9.4 \therefore 10 \text{ rods}$$

$$\text{OR } 15 \text{ rods } 2\frac{1}{2}" \phi$$

$$\text{Program} = 2.5 \text{ in}^2$$

$$N_p = 8 A_{brg} f'_c$$

$$\frac{1}{3} \left(3\frac{5}{8} \text{ in} \right) = 1.21 \text{ in}$$

$$\frac{(3.625)^2 \pi}{4}$$

$$= 8(7.18 \text{ in}^2)(4,000 \text{ psi})$$

$$A = 3\sqrt{3} s^2$$

$$= 10.32 - 3.14$$

$$4313 = 229 \text{ kips} \times N$$

$$A = 3.8^2$$

$$= 7.18$$

$$2\frac{1}{2}" \phi \quad N = 18.8 \therefore N = 19$$

$$a = x \sqrt{3}$$

$$x = \frac{3.625}{2} / \sqrt{3}$$

$$= \frac{(21.5)^2 \pi}{4}$$

$$2\frac{1}{2}" \phi \quad N = 8.5$$

$$s = 2.04$$

$$= 15.9$$

USE (20) $2\frac{1}{2}" \phi$ ANCHORS (GRADE 105)

ANCHOR ROD EMBED = 42" TO AVOID CHANGING PILE DEPTH

DESIGN OF CONCRETE BREAKOUT

$$\#10 @ \sim 6" OC \quad \therefore 127" / 6" \approx 21.16$$

$$108 / 6" = 18 \quad \therefore \text{BREAKOUT CONE GOES THROUGH } 39 \#10\text{'s}$$

$$+ (4) \#9 \times 4 \text{ PILES} = 16 \#9\text{'s}$$

$$\text{TOTAL STEEL AREA TO "BREAKOUT"} = (39) 1.27" + (16) 1.0" = 65" \quad 60 \text{ ksi REBAR}$$

$$\begin{aligned} \phi V_b &= 0.75 A_s F_y \\ &= 65 \text{ in}^2 \times 60 \text{ ksi} (0.75) \\ &= 2925 \text{ kIPS} \end{aligned}$$

OF #6 BARS NEEDED

$$4313 \text{ k} - 2925 \text{ k} = 0.75 (.44 \times 2 \text{ SURF} \times \# \text{ OF } \#6) 60 \text{ ksi}$$

$$\# \text{ OF } \#6 = 35 \text{ BARS}$$

USE 36 BARS @ EACH SIDE

CONC BREAKOUT (SINGLE ANCHOR)

$$\begin{aligned} N_b &= k_c \lambda_a \sqrt{f'_c} l_{eF}^{1.5} \\ &= 24 \sqrt{4000} (42)^{1.5} \\ &= 413.2 \text{ k} \quad \therefore \text{VERY SMALL} \end{aligned}$$

MOMENT FRAME DESIGN

SAMPLE MOMENT FRAME MEMBER - LOCATION

RAM Structural System

Member Code Check

RAM Frame 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

02/25/21 16:05:29

Building Code: IBC

Steel Code: AISC360-16 LRFD

BEAM INFORMATION:

Story Level = Level 2 Frame Number = 1 Beam Number = 12
 Fy (ksi) = 50.00
 Beam Size = W30X108

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft) _____	30.00	3.00
Lu for Bending (ft) _____	30.00	3.00
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 + 0.500 Lp + 0.500 NL1 + 0.500 Rfp + 0.500 NR1 + 1.000 W1

Segment distance (ft) i - end _____ 27.00
 j - end _____ 30.00

SHEAR CHECK:

Vux (kip) = -103.48	1.00Vnx (kip) = 487.23	Vux/1.00Vnx = 0.212
Vuy (kip) = 0.00	0.90Vny (kip) = 430.92	Vuy/0.90Vny = 0.000

CONTROLLING BEAM SEGMENT FORCES - AXIAL

Load Combination: 1.400 D + 1.400 ND1

Segment distance (ft) i - end _____ 3.00
 j - end _____ 10.00

AXIAL CHECK:

Pu (kip) = 0.00	0.90Pnx (kip) = 1426.50	Pu/0.90Pnx = 0.000
	0.90Pny (kip) = 1426.50	Pu/0.90Pny = 0.000
	0.90Pn (kip) = 1426.50	Pu/0.90Pn = 0.000

CONTROLLING BEAM SEGMENT FORCES - FLEXURE

Load Combination: 1.200 D + 1.200 ND1 + 0.500 Lp + 0.500 NL1 + 0.500 Rfp + 0.500 NR1 + 1.000 W1

Segment distance (ft) i - end _____ 27.00
 j - end _____ 30.00

CALCULATED PARAMETERS:

Pu (kip) = 0.00	0.90Pn (kip) = 1426.50
Mux (kip-ft) = -1191.73	0.90Mnx (kip-ft) = 1297.50
Muy (kip-ft) = 0.00	0.90Mny (kip-ft) = 164.63
Cbx = 1.07	

INTERACTION EQUATION:

Pu/0.90*Pn=0.000
 Mrx/Mcx = 0.918

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SAMPLE MOMENT FRAME CONNECTION

SPECIAL STEEL MOMENT FRAMES ARE UTILIZED IN THE EAST-WEST DIRECTION. THE CONNECTION SELECTED IS THE WELDED UNREINFORCED FLANGES - WELDED WEB (WUF-W) PREQUALIFIED MOMENT CONNECTION. THE BEAMS SELECTED ARE WITHIN THE BEAM DEPTH, WEIGHT, AND FLANGE THICKNESS REQUIREMENTS OF 36", 150 PLF, AND 1" RESPECTIVELY.

3 MOMENT CONNECTION WUF - W

S7.10

SAMPLE MOMENT FRAME CONNECTION - JOINTS

THE JOINTS OF THE MOMENT FRAME ARE CHECKED USING THE SEISMIC PROVISIONS FEATURE WITHIN RAM STRUCTURAL SYSTEM. DOUBLER PLATES ARE ADDED WHERE REQUIRED.

SAMPLE JOINT

RAM Structural System

Seismic Provisions Member Code Check

RAM Structural System 17.01.01.05

DataBase: 2020_0902_ATC_GMR_Savannah_CHRIS REFERENCE

02/25/21 16:33:57

Building Code: IBC

Steel Code: AISC341-16 - LRFD

Beam Parameters

Story: Level 2 Frame No: 1 Member No: 11

Fy (ksi): 50.00 Size: W30X108

Frame Type: Special Moment Resisting Frame

Apply AISC 358 Provisions to Moment Frame

E3.4b Stability Bracing of Beams (D1.2b Highly Ductile) --- OK

Max Lu (in) = 84.00 Lu Limit = 107.50 OK

Lateral Bracing Requirements along Beam

Required strength of lateral brace along beam (A-6-7) = 13.11 kip

Required stiffness of bracing (A-6-8) = 8737.37 kip / Lb

Lateral Bracing Requirements at Plastic Hinge

Required strength of lateral brace at hinge = 39.32 kip

Required stiffness of bracing (A-6-8) = 8737.37 kip / Lb

 $C_d = 1.0$ assumed for eqns (A-6-7/8) L_b = distance between braces (in)The brace closest to the point of inflection should be designed for two times these values ($C_d=2$)

E3.5a Basic Requirements (D1.1 Highly Ductile) --- OK

Flange b/tf = 6.91 Limit = 7.35 OK

Web h/tw = 49.50 Limit = 59.01 OK

E3.6b Beam-to-Column Connection Requirements

Beam-to-column connection must be capable of sustaining a 0.04 radian interstory drift ratio.

Required flexural strength of connection (kip-ft) = 0.8Mp = 1153.33 at story drift angle in (1)

All beam-to-column joints to demonstrate conformance with E3.6b(1) as indicated in E3.6b(2)

See Additional AISC 358 Requirements for Assigned Connection Type.

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SAMPLE MOMENT FRAME CONNECTION AT BASE

THE PHILOSOPHY FOR THE BASE CONNECTION IS FOR THE FRAME TO BE "FIXED". THE STEEL COLUMN TENSION IS RESISTED IN THE ANCHOR BOLTS, THE MOMENT IS RESISTED BY BARS WELDED TO THE COLUMN AND LAPPED WITH THE GRADE BEAM. SHEAR IS RESISTED BY

VERTICAL LOADS ONTO MOMENT FRAME BASE

RC2-SDCD

$$1.2D + 1.0W + L$$

$$1.2(605) + 1.0(1046) + (342) = 2114^k$$

$$(1.2 + 0.2 S_{DS})D + \Omega_o Q_E$$

$$(1.2 + 0.2(.464))(605) + (3)(453) = 1427^k$$

$$0.9D + 1.0W$$

$$0.9(605) + 1.0(1046) = 1502^k$$

$$(0.9 - 0.2 S_{DS})D + \Omega_o Q_E$$

$$(0.9 - 0.2(.464))(605) + (3)(453) = 871^k$$

* LOADS FROM RAM

RC3-SDCD

$$1.2(D) + 1.0W + L$$

$$1.2(610^k) + 1.0(1213^k) + (342^k) = 2287^k$$

$$(1.2 + 0.2 S_{DS})D + \Omega_o Q_E$$

$$(1.2 + 0.2(.464))(610) + 3(539^k) = 2406^k$$

$$0.9D + 1.0W$$

$$0.9(610) + 1.0(1213^k) = 1664^k$$

$$(0.9 - 0.2 S_{DS})D + \Omega_o Q_E$$

$$(0.9 - 0.2(.464))(610^k) + (3)(539^k) = 1125^k$$

$$W24 \times 250 \quad \text{WELDABLE SURFACE} = 13.2 \times 2 + 20.75 \times 2$$

$$= 67.9"$$

$$\phi R_n = 1.392(D)l$$

$$1125 = 1.392(D)(67.9)$$

$$D = 12$$

OR CJP @ FLANGES & FILLET ON WEB

$$\phi R_n = F_u A_m A_{BM}$$

$$= 50^{ksi} (13.2" \times 1.89") \times 2 \text{ FLANGES}$$

$$= 2494^k$$

SAY OKAY TO CJP FOR FLANGES

$$t_f = 1.89" b_f = 13.2"$$

MOMENT IS RESOLVED INTO GRADE BEAM
THROUGH REBAR ATTACHED TO THE COLUMN

$$M_{u(WIND)} = 1552 \text{ K-FT (FROM RAM)} \quad \Omega = 3$$

$$M_{u(EQ)} = 537 \text{ K} \times \Omega = 1611 \text{ K-FT (FROM RAM)}$$

CAPACITY OF COUPLE CREATED BY #11 BARS

COMPRESSION IS HANDLED
BY GRADE BEAM

$$\phi P_n \Rightarrow (6) 75 \text{ KSI } \#11 \text{ BARS}$$

$$\begin{aligned} \phi P_n &= F_y A_g (6 \text{ BARS}) \\ &= 75 \text{ KSI} (1.56 \text{ in}^2) (6 \text{ BARS}) \\ &= 702 \text{ K} \times 2 \text{ SIDES} \\ &= 1404 \text{ K} \end{aligned}$$

$$\begin{aligned} \phi M_n &= 1404 \text{ K} \times 1.667' \\ &= 2341 \text{ K-FT} \end{aligned}$$

SEE SCBF BRACE-TO-BEAM CONNECTION CALC
FOR EXAMPLE CALS FOR WEB, DOUBLER, & STIFFNER CHECKS

Baseplate and Anchor Bolts

$$V_u := 0 \quad \text{kips} \quad Uplift := -1125 \quad \text{kips} \quad P_u := 2406 \quad \text{kips}$$

Given:**Required Base Plate Area**

$$\begin{aligned} f'_c &:= 4000 \quad \text{psi} & \phi_c &:= 0.65 & d &:= 26 \quad \text{in} \\ F_y &:= 50000 \quad \text{psi} & \phi_b &:= 0.9 & b_f &:= 14 \quad \text{in} \end{aligned} \quad A_1 := \frac{P_u \cdot 1000}{\phi_c \cdot 0.85 \cdot f'_c} \quad A_1 = 1.089 \cdot 10^3 \text{ in}^2$$

Optimize the Base Plate Dimensions:

$$\Delta := \frac{0.95 \cdot d - 0.8 \cdot b_f}{2} \quad \Delta = 6.75$$

$$N := \sqrt{A_1} + \Delta \quad N = 39.745$$

$$\text{Try} \quad N := 41 \quad \text{in} \quad B := 32 \quad \text{in}$$

$$A_2 := N \cdot B \quad A_2 = 1.312 \cdot 10^3 \quad \text{in}^2$$

$$\phi_c P_p := \phi_c \cdot 0.85 \cdot \frac{f'_c}{1000} \cdot A_1 \cdot \sqrt{\frac{A_2}{A_1}} \quad \phi_c P_p = 2.641 \cdot 10^3 \quad \text{kips}$$

Plate Thickness:

$$m := \frac{N - 0.95 \cdot d}{2} \quad m = 8.15$$

$$n := \frac{B - 0.8 \cdot b_f}{2} \quad n = 10.4$$

$$X := \left(\frac{4 \cdot d \cdot b_f}{(d + b_f)^2} \right) \cdot \frac{P_u}{\phi_c P_p} \quad X = 0.829$$

$$\lambda := \frac{2 \cdot \sqrt{X}}{1 + \sqrt{1 - X}} \quad \therefore \lambda := 1$$

$$\lambda n' := \lambda \cdot \frac{\sqrt{d \cdot b_f}}{4} \quad \lambda n' = 4.77$$

$$l := \max(m, n, \lambda n') \quad l = 10.4$$

$$t_{min} := l \cdot \sqrt{\frac{2 \cdot P_u \cdot 1000}{\phi_b \cdot F_y \cdot B \cdot N}} \quad t_{min} = 2.969$$

USE t=3"**Bearing_Plate := " (41"x32"x3") "**

Anchor Rod Design***Given:*****Anchor Bolt Size**

$$F_y := 105 \text{ ksi} \quad F_u := 125 \text{ ksi} \quad \phi := .75$$

(Choose Size)

$$\text{Try } d_R := 2 \text{ in} \quad A_b := \frac{\pi \cdot (d_R)^2}{4} \text{ in}^2 \quad A_b = 3.142 \text{ in}^2$$

$$\#ofRods := 6$$

$$\phi R_n := \phi \cdot F_u \cdot A_b \cdot \#ofRods \quad \phi R_n = 1.767 \cdot 10^3 \text{ kips}$$

If $\phi R_n = 1.767 \cdot 10^3 \text{ kips} > -Uplift = 1.125 \cdot 10^3 \text{ kips}$, then Say O.K.

$$d_R = 2 \text{ in} \quad \text{*Use 6 F1554 Grade 105 Anchor Rods*}$$

1988 SBC “Risk Category II” “Seismic Design Category C”

This section presents representative structural calculations for Building 1 (12-story office building in Savannah, Georgia) Design Case C. Project objectives, building selection criteria, seismic design criteria, structural design drawings, references, and project participants are documented in NIST GCR 21-917-48v1A.

TABLE OF CONTENTS

Design Criteria	3
Gravity Design	8
Beam Design	12
Column Design	17
Lateral Design	21
Braced Frame Design	43
Moment Frame Design.....	62

DESIGN CRITERIA

DESIGN C: 1988 SBC "RISK CATEGORY II" EQUIVALENT**Applicable Codes**

- 1988 Standard Building Code
- ACI 318-83: Building Code Requirements for Structural Concrete
- AISC Design, Fabrication and Erection of Structural Steel for Buildings, 1978

Nature of Occupancy: All buildings except those listed

Wind Loading Criteria:

- Basic Wind Speed: $V = 90$ mph
- Use Factor: 1.0
- Allowable drift at design wind speed: $H/360$

Snow Loads:

- Ground Snow Load: 0 PSF

Seismic Loading Criteria:

- Zone: 2
- A_v : 0.10
- Z Factor: 0.24
- I, Occupancy Importance Factor: 1.0
- K, Braced Frames: 1.0
- K, Ordinary moment-resisting steel frames: 1.0
- S (Soil Profile Type S3): 1.5

DESIGN C (1988 SBC) DEFINITIONS:**Concrete:**

- Slab on ground: $F'_c = 4000$ PSI
- Slabs on steel deck (lightweight 110 pcf) $F'_c = 3,000$ PSI
- Foundations: $F'_c = 4,000$ PSI
- Exterior Concrete: $F'_c = 4,500$ PSI

Concrete Reinforcement:

- Rebar: $F_y = 60$ KSI

Structural Steel:

- WF columns and beams: $F_y = 36$ KSI
- Tubes:
 - Round $F_y = 42$ KSI
 - Rectangular $F_y = 46$ KSI
- Other steel, unless noted otherwise: $F_y = 36$ KSI

FOUNDATION CRITERIA

- 14" square prestressed precast piles
 - Compression capacity 80 tons
 - Tension capacity 60 tons
 - Lateral Capacity 10 tons

1208 LOAD COMBINATIONS

1208.1 Working Stress Design

Every building element shall be provided with sufficient strength to resist the most critical effects resulting from the following combinations of loads:

1. Dead + Floor Live¹ + Roof Live (or Snow)².
2. Dead + Floor Live¹ + Wind (or Seismic).
3. Dead + Floor Live¹ + Wind + 1/2 Snow.²
4. Dead + Floor Live¹ + 1/2 Wind + Snow.²
5. Dead + Floor Live¹ + Snow³ + Seismic.

NOTES:

1. Floor live load shall not be included where its inclusion results in lower stresses in the building element under investigation.
2. Crane loads need not be combined with roof live load nor with more than 3/4 of snow load or 1/2 wind load.
3. Snow loads over 30 psf may be reduced 75% upon approval of the Building Official. Snow loads 30 psf or less need not be combined with seismic.

LOAD COMBINATIONS USED IN RAM MODEL

(ALLOWABLE STRESS DESIGN COMBINATIONS)

1	D	DL
2	D+Lp	DL+LL
3	D+Lp+Rfp	DL+LL+RL
4	0.75*D+0.75*Lp+0.75*O1	0.75*DL+0.75*LL+0.75*WL _x
5	0.75*D+0.75*Lp+0.75*O2	0.75*DL+0.75*LL+0.75*WL _y
6	0.75*D+0.75*Lp-0.75*O1	0.75*DL+0.75*LL-0.75*WL _x
7	0.75*D+0.75*Lp-0.75*O2	0.75*DL+0.75*LL-0.75*WL _y
8	0.75*D+0.75*O1	0.75*DL+0.75*WL _x
9	0.75*D+0.75*O2	0.75*DL+0.75*WL _y
10	0.75*D-0.75*O1	0.75*DL-0.75*WL _x
11	0.75*D-0.75*O2	0.75*DL-0.75*WL _y

Steel/Footing Design Combos

Notes: Wind load is reduced by 1/1.33333 (0.75x) to account for the code allowed stress increased

(STRENGTH DESIGN COMBINATIONS)

12	1.4*D + 1.7*Lp+1.7*Rfp	
13	1.05*D+1.275*Lp+1.275*Rfp+1.275*O1	Pile Cap Design Combos
14	1.05*D+1.275*Lp+1.275*Rfp-1.275*O1	
15	0.9*D+1.3*O1	
16	0.9*D-1.3*O1	
17	1.05*D+1.275*Lp+1.275*Rfp+1.275*O2	
18	1.05*D+1.275*Lp+1.275*Rfp-1.275*O2	
19	0.9*D+1.3*O2	
20	0.9*D-1.3*O2	

STRENGTH DESIGN—GENERAL PRINCIPLES

General. Strength design is based on the concept that after the yield point of the reinforcing is reached, the reinforcement continues to elongate until the maximum compressive fiber strain of the concrete section is reached. The design limitations of the code ensure that structural sections will be under-reinforced for flexure, so that yield of the steel occurs before concrete crushes. The ultimate flexural capacity of a reinforced concrete section is computed as the resistance when the reinforcement reaches the yield strength.

Load Factors. Load factors provide for overloads. ACI 318-83 requires that the actual or specified dead, live, wind, earthquake and other load effects each be increased by an appropriate load factor to form the design loads. The design strength at each section must be equal to, or greater than, the effect of these design load combinations:

$$U = 1.4D + 1.7L \dots \dots \dots (9-1)$$

$$U = 0.75(1.4D + 1.7L + 1.7W) \dots \dots \dots (9-2)$$

$$U = 0.9D + 1.3W \dots \dots \dots (9-3)$$

where D , L , and W are specified dead, live, and wind loads. The combinations for earthquake load, $1.1E$, are the same as for wind, W . Other load effects are to be multiplied by factors appropriate.

1.5.4 Cast Steel and Steel Forgings

Allowable stresses shall be the same as those provided in Sect. 1.5.1, where applicable.

1.5.5 Masonry Bearing

In the absence of Code regulations the following stresses apply:

On sandstone and limestone $F_p = 0.40$ ksi

On brick in cement mortar $F_p = 0.25$ ksi

On the full area of a concrete support $F_p = 0.35f'_c$

On less than the full area of a
concrete support $F_p = 0.35f'_c \sqrt{A_2/A_1} \leq 0.7f'_c$

where f'_c = specified compressive strength of concrete, kips per square inch

A_1 = bearing area, square inches

A_2 = full cross-sectional area of concrete support, square inches

1.5.6 Wind and Seismic Stresses

Allowable stresses may be increased $1/3$ above the values otherwise provided when produced by wind or seismic loading, acting alone or in combination with the design dead and live loads, provided the required section computed on this basis is not less than that required for the design dead and live load and impact (if any), computed without the $1/3$ stress increase, and further provided that stresses are not otherwise* required to be calculated on the basis of reduction factors applied to design loads in combinations. The above stress increase does not apply to allowable stress ranges provided in Appendix B.

SECTION 1.6 COMBINED STRESSES

1.6.1 Axial Compression and Bending

Members subjected to both axial compression and bending stresses shall be proportioned to satisfy the following requirements:

$$\frac{f_a}{F_a} + \frac{C_{mx}f_{bx}}{\left(1 - \frac{f_a}{F'_{ex}}\right)F_{bx}} + \frac{C_{my}f_{by}}{\left(1 - \frac{f_a}{F'_{ey}}\right)F_{by}} \leq 1.0 \quad (1.6-1a)$$

Handwritten notes:
 $f_a = P/A$
 $F_a = F_{KR}/r$
 $f_b = M/S$
 $F_b = \text{CHECK COMPACT COMPARE TO } M_p$

$$\frac{f_a}{0.60F_y} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} \leq 1.0 \quad (0.95 - 1.02) \quad (1.6-1b)$$

When $f_a/F_a \leq 0.15$, Formula (1.6-2) may be used in lieu of Formulas (1.6-1a) and (1.6-1b):

$$\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} \leq 1.0 \quad (1.6-2)$$

In Formulas (1.6-1a), (1.6-1b), and (1.6-2), the subscripts x and y , combined with subscripts b , m , and e , indicate the axis of bending about which a particular stress or design property applies, and

* For example, see ANSI A58.1-72, Sect. 4.2.

GRAVITY DESIGN

This publication is available free of charge from: <https://doi.org/10.6028/NIST.GCR.21-917-48v1B>

SUPERIMPOSED DEAD LOAD DESIGNATIONS			
MARK	USE	LOAD (PSF)	NOTES
A	OFFICE	10 + 20	MISC. + PARTITIONS
B	ROOF	20	10 ROOFING + 10 MISC.

LIVE LOAD DESIGNATIONS				
MARK	USE	LOAD (PSF)	NOTES	
1	OFFICE	50 (R)		
2	CORRIDORS	80 (R)		
3	LOBBIES & STAIRS	100 (R)		
4	MECHANICAL & STORAGE	125 (NR)		
5	ROOF	20 (R)

ventilating, and air conditioning systems, shall be included whenever such equipment is supported by structural elements.

1203 LIVE LOADS

1203.1 Uniform Floor Live Loads

The live loads assumed for purposes of design shall be the greatest loads that probably will be produced by the intended uses and occupancies, provided that the minimum live loads to be considered as uniformly distributed shall be as given in Table 1203.1.

1203.2 Reduction of Uniform Floor Live Load

Floor live loads in 1203.1 may be reduced in accordance with the following provisions. Such reductions shall apply to slab systems designed for flexure in more than one direction, beams, girders, columns, piers, walls and foundations.

1. A reduction shall not be permitted in Group A occupancies, or for roof live loads or lateral loads.
2. A reduction shall not be permitted when the live load exceeds 100 psf except that the design live load for columns may be reduced 20%.
3. For live loads not exceeding 100 psf, the design live load for any structural member supporting 150 sq ft or more may be reduced at the rate of 0.08% per sq ft of the area supported. Such reduction shall not exceed 40% for horizontal members, 60% for vertical members, nor R as determined by the following formula:

$$R = 23.1 (1 + D/L)$$

where: R = Reduction in percent

D = Dead load per square foot of area supported

L = Live load per square foot of area supported.

1203.3 Concentrated Floor Live Loads

In the design of floors, probable concentrated loads shall be considered. Where such loads may occur, the supporting beams, girders and slabs shall be designed to carry either the concentrated loads or the live load described in 1203.1, whichever produces the greater stresses. Concentrated loads shall be equal to the machinery, vehicle, equipment, or apparatus anticipated but shall not be less than the loads specified in Table 1203.3.

1203.4 Distribution of Live Loads

Where structural members are arranged so as to create continuity, the distribution of the live loads, such as on adjacent spans or alternate spans, which would cause maximum design conditions shall be used, except that roof live loads shall be distributed uniformly as provided in 1203.6.

EXCEPTION: The distribution of live loads on reinforced concrete structures shall be in accordance with ACI 318.

1203.5 Interior Wall Loads

Interior walls, permanent partitions, and temporary partitions shall be designed to resist all loads to which they are subjected but not less than 5 psf applied perpendicular to the walls, except for decorative screen walls.

Live Load Reduction Calculator SBC-1988 (Typ. Floor Beam)

L_o = Unreduced Design Live load per square foot of area supported by the member.

Element	Beams/Girders
L_o =	50 psf
A_T =	450 sq.ft
Reduction %	36.0%
Max Reduction %	40.0%
Used Reduction %	36.0%
Reduced LL =	$(0.64) \times L_o$
Reduced LL =	32.0 psf

Live Load Reduction Calculator SBC-1988 (Typ. Floor Girder)

L_o = Unreduced Design Live load per square foot of area supported by the member.

Element	Beams/Girders
L_o =	50 psf
A_T =	1125 sq.ft
Reduction %	90.0%
Max Reduction %	40.0%
Used Reduction %	40.0%
Reduced LL =	$(0.60) \times L_o$
Reduced LL =	30.0 psf

Live Load Reduction Calculator SBC-1988 (Typ. Int. Col.)

L_o = Unreduced Design Live load per square foot of area supported by the member.

Element	Column
L_o =	50 psf
A_T =	13500 sq.ft
Reduction %	1080.0%
Max Reduction %	60.0%
Used Reduction %	60.0%
Reduced LL =	$(0.40) \times L_o$
Reduced LL =	20.0 psf

BEAM DESIGN

RAM STRUCTURAL SYSTEM DEMAND-CAPACITY RATIO SUMMARY

-SAMPLE BEAM

ASD V8 Steel Manual

W shape only

Project ID:	20.027
Project Name:	ATC BLDG
Engineer:	FS
Date:	9/4/2020

Beam # = **FB1**

Shape **W 24x55**

Properties	Geometry	
	A	16.2 <i>in.^2</i>
	d	23.57 <i>in.</i>
	b_f	7.005 <i>in.</i>
	t_f	0.505 <i>in.</i>
	t_w	0.395 <i>in.</i>
	W(weight)	55 <i>#/ft.</i>
	r_T	1.68
	d/A_f	6.66

Compact Section Criteria	
b_f/2t_f	6.9
F_y	—
d/t_w	59.7
F_y	— <i>ksi</i>
F_y	18.5 <i>ksi</i>

Elastic Properties					
X-X			Y-Y		
I_x	1350	<i>in.^4</i>	I_y	29.1	<i>in.^4</i>
S_x	114	<i>in.^3</i>	S_y	8.3	<i>in.^3</i>
r_x	9.11	<i>in.</i>	r_y	1.34	<i>in.</i>
Plastic Modulus					
Z_x	134	<i>in.^3</i>	Z_y	13.3	<i>in.^3</i>

Torsional Constant	
J	1.18 <i>in.^4</i>

Warping Constant	
C_w	— <i>in.^6</i>

Material Property	
E	29000 <i>ksi</i>
F_y	36 <i>ksi</i>

Note: Input/ verify data in yellow box:

PROVIDE W24x55 AS TYPICAL GRAVITY BEAM

Composite Beam AISC 8th Edition

Note: The following calculation is basic on the "Steel Tips by Steel Committee of California" dated Jan 1987 and Example 2 of Composite Design for building construction in AISC 8ed

Assumption:

Item	Ribs Perpendicular	Ribs Parallel
1. Concrete Area below Top of deck	Neglect	Include
2. Stud Reduction Factor	$\frac{0.85}{(Nr)^{1/2}} \left(\frac{wr}{hr} \right) * \left(\frac{Hs}{hr} - 1 \right)$	$0.6 \left(\frac{wr}{hr} \right) * \left(\frac{Hs}{hr} - 1 \right)$
3. Maximum Stud Spacing	32 in.	Not Specified
4. Deck Welding	16 in.	Not Specified
5 Minimum Width of Rib	2 in.	Depends on Nr

Building info:

Steel			Concrete			Deck		
Beam Length	45	ft.	Weight	110	pcf	Depth hr	3	in.
Beam Spacing	10	ft.	Thickness t	6.25	inches	Conc. thickness tc	3.25	in.
Fy	36	ksi	f'c	3000	psi	Stud Dia.	3/4	in.
			E'c	3122	ksi	Stud Height	5	in.
			β_1	0.85		Deck Orientation	Perpendicular	
			Light Weight concrete Reduction	0.83		Deck Width, wr	6	in.

Uniform Load		Deflection Criteria	
Dead Load	60 psf	Dead Load	L/240 or 1.5 in.
Live Load	62 psf	Live Load	L/360
Roof Live Load	0 psf		
Snow Load	0 psf		

Uniform Load W/ Combo	
w(D+L+Lr or S)	122 psf

Max Moment:		Kips-ft
M(max D)	1822.5	151.9
M(D overwrite)	0.0	0.0
M(Dead use)	1822.5	151.9
M(max D+L)	3705.8	308.8
M(D+L overwrite)	0.0	0.0
M(max use)	3705.8	308.8
Max Shear		kips
V(max D)	13.5	
V(max D+L)	27.45	
V(D+L overwrite)	0	
V(max use)	27.45	

M_{LL} 156.9 Kip-ft

Solution Summary:

W 24x55 <---- Change W shapes

Partial Composite: **50%**

ASD Result:

Concrete Stress	0.225	
Steel Stress	0.917	
Dead Load Δ	0.949	1.4238 in.
Live Load Δ	0.373	0.5599 in.
Shoring?	No Shoreing needed	
# of studs	16	at each side of max moment
Studs per rib check	OK	
Camber=	1.000	in.
Overall	GOOD	

Result illustration:

Beam	Stud	Camber
W 24x55	32	1.000
o----- Δ		
27.45 Reaction		27.45 Reaction

$n=E/E_c$	9
-----------	---

1. Effective Width :

$L/4$	135	in.
s	120	in.
$16t+bf$	107.0	in.

Govern b_{eff} : 107.0 in.**2. Required Section Moduli**

$M(D+L+S), S_{tr}$	154.4	in.^3
$M(D \text{ only}), S_s$	75.9	in.^3

3. Composite design section properties**a. Moment of Inertia**

Ac_L	347.7663	
Ac/I	514.2888	
$Ac=b(tc)$	347.7663	in.^2
$A'c=Ac/n$	38.64	in.^2
$Y_s=d/2$	11.79	in.
$Y_c=d+tr+tc/2$	28.195	in.

Section:	A	Y	AY	ds	Ad^2	I_o
W 24x55	16.2	11.79	190.9	11.56	2165.8	1350.0
Concrete	38.64	28.195	1089	4.85	908.0	34.0
Sum	54.84069		1280.4		3073.8	1384.0
					$I_{tr}=4457.80$	in.^4

 $Y_b=23.35$ in.**b. Section Moduli**

			Partial Composite	
Str=	190.93	in.^3	Seff=	168.4 in.^3
St=	688.73	in.^3	Ieff=	3547.5 in.^4

4. Check Stress**a. Concrete** $f_c=M/n \cdot St$ 0.3038 ksi < 1.35 OK**b. Steel**

Total Load, Str= 168.4 in.^3 > 154.40625 in.^3 OK

Dead Load, Ss= 114 in.^3 > 75.94 in.^3 OK

Web shear, Fv= 2.948 ksi < 14.4 OK

5. Check Deflection

$$\Delta = \frac{5wL^4}{384 \cdot EI} = \frac{ML^2}{1920 I}$$

 $\Delta D=1.423828$ in. < 1.5 OK $\Delta L=0.559891$ in. < 1.5 OK**6a. Check if shore is required**

Str max=	195.13	in.^3 >	190.93	No Shoreing needed
----------	--------	---------	--------	--------------------

6b. Check if shore is required - Alt. procedure

$f_b =$	25.85	Ksi	32.04
---------	-------	-----	-------

7. Shear Connection, Stud**a. Max Stud dia** 1.2625 in. > 0.75 OK**b. Horizontal shear** $V_h=0.85 \cdot f'_c \cdot A_c/2$ 443.402 kips Concrete $V_h=As \cdot F_y/2$ 291.6 kips Steel <----- Govern**Reduction Factor**

$$\frac{0.85}{(Nr)^{1/2}} \left(\frac{wr}{hr} \right) \cdot \left(\frac{Hs}{hr} - 1 \right) \quad \text{or} \quad 0.6 \left(\frac{wr}{hr} \right) \cdot \left(\frac{Hs}{hr} - 1 \right)$$

Rf $\perp$ = 1.00Rf $\parallel$ = 1.000

Rf(use)= 1.000

q per stud= 9.5450 <-Lightweight Concrete reduction included

q * Rf= 9.545

Stud Shear	F'c(From AISC V8 Table 1.11.4) (ksi)		
Connector	3000	3500	4000
0.5	5.1	5.5	5.9
0.625	8	8.6	9.2
0.75	11.5	12.5	13.3
0.875	15.6	16.8	18

Stud Per Rib, Nr	1	
Rib Spacing	12	in.

Number of Studs= 16 At each side of where max moment is

Check Stud Per Rib 32 ft < 45 OK

COLUMN DESIGN

TYPICAL COLUMN PLAN
RAM STRUCTURAL SYSTEM DEMAND-CAPACITY RATIO SUMMARY

SAMPLE COL.

TYPICAL COLUMN AT LEVEL 2, GRID LINE 3-C

Story level Level 2, Column Line 3-C,

Fy (ksi) = 36.00
Orientation (degrees) = 90.0

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu (ft) _____	16.00	16.00
K _____	1	1
Braced Against Joint Translation _____	Yes	Yes

CONTROLLING COMBINED COLUMN LOADS

	Dead	Live	Roof
Axial (kips) _____	1201.48	522.25	22.50
Moments			
Top Mx (kip-ft) _____	-3.19	3.65	0.00
My (kip-ft) _____	-0.48	-6.51	0.00
Bot Mx (kip-ft) _____	-0.00	0.00	0.00
My (kip-ft) _____	0.00	0.00	0.00

TOTAL AXIAL LOAD = 1746.23 K (DL+LL+RL)

TRY W14x342 COL.

ALLOWABLE AXIAL LOAD CAPACITY = 1894K

S.R. = 0.922 < 1, **OK**

PROVIDE W14x342 COL ON GRID 3-C

$F_y = 36 \text{ ksi}$ $F_y = 50 \text{ ksi}$ COLUMNS
W shapes

Allowable axial loads in kips

Designation		W14									
Wt./ft.		455		426		398		370		342	
F_y		36	50	36	50	36	50	36	50	36	50
Effective length in ft. KL with respect to least radius of gyration r_y	0	2894	4020	2700	3750	2527	3510	2354	3270	2182	3030
	11	2671	3636	2499	3388	2328	3168	2167	2947	2006	2728
	12	2644	3590	2464	3344	2304	3126	2144	2908	1985	2692
	13	2617	3542	2438	3298	2280	3083	2121	2868	1963	2654
	14	2589	3492	2411	3251	2255	3039	2097	2826	1941	2614
	15	2560	3441	2384	3203	2229	2993	2073	2782	1918	2574
	16	2530	3388	2356	3153	2202	2946	2047	2738	1894	2532
	17	2499	3333	2326	3101	2174	2897	2021	2692	1870	2489
	18	2467	3277	2296	3048	2146	2847	1995	2644	1845	2444
	19	2435	3220	2266	2994	2117	2795	1967	2596	1819	2399
	20	2401	3161	2234	2938	2087	2743	1939	2546	1793	2352
	22	2332	3038	2169	2822	2025	2633	1881	2442	1738	2255
	24	2260	2909	2100	2700	1961	2518	1820	2333	1681	2153
	26	2184	2775	2029	2573	1893	2397	1756	2220	1621	2047
	28	2106	2635	1955	2440	1823	2272	1690	2101	1559	1935
	30	2025	2488	1878	2302	1750	2141	1621	1977	1495	1819
	32	1940	2336	1798	2158	1674	2004	1549	1848	1428	1698
	34	1853	2178	1715	2008	1596	1862	1475	1713	1358	1572
	36	1762	2013	1630	1852	1515	1714	1398	1573	1286	1441
	38	1668	1841	1541	1689	1431	1560	1319	1427	1212	1304
	40	1571	1666	1449	1526	1344	1409	1237	1288	1135	1177
	42	1471	1511	1354	1384	1254	1278	1151	1168	1053	1067
	44	1367	1377	1255	1261	1161	1164	1063	1065	972	973
	46	1260	1260	1154	1154	1065	1065	974	974	890	890
	48	1157	1157	1060	1060	978	978	895	895	817	817
	50	1066	1066	977	977	902	902	824	824	753	753
Properties											
U		2.19	2.19	2.20	2.20	2.20	2.20	2.22	2.22	2.23	2.23
P_{wo} (kips)		1405	1952	1245	1729	1115	1549	987	1371	866	1203
P_{wi} (kips/in.)		73	101	68	94	64	89	60	83	55	77
P_{wb} (kips)		17,890	21,080	14,410	6990	12,130	14,290	9912	11,680	7986	9412
P_{fb} (kips)		2318	3220	2073	2879	1821	2529	1592	2211	1373	1907
L_c (ft.)		17.8	15.1	17.6	15.0	17.5	14.9	17.4	14.8	17.3	14.7
L_u (ft.)		132.3	95.2	125.1	90.1	118.7	85.5	112.9	81.3	107.7	77.5
A (in. ²)		134	125	117	109	101	94	87	80	74	68
I_x (in. ⁴)		7190	6600	6000	5440	4900	4390	3920	3490	3100	2740
I_y (in. ⁴)		2560	2360	2170	1990	1810	1640	1480	1330	1190	1060
r_y (in.)		4.38	4.34	4.31	4.27	4.24	4.21	4.17	4.14	4.10	4.07
Ratio r_x/r_y		1.67	1.67	1.66	1.66	1.66	1.66	1.66	1.66	1.65	1.65
B_x } Bending		0.177	0.177	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
B_y } factors		0.441	0.442	0.447	0.447	0.447	0.447	0.447	0.447	0.447	0.447
a_x }		1073	982	894	812	733	657	584	514	447	383
a_y }		383	351	324	296	271	246	222	199	177	155

* Tabulated values of a_x and a_y must be multiplied by 10^6 .

LATERAL DESIGN

Project: ATC - 146 - Design C - MWFRS Wind Load $I=1.0$
 Project # 20.027

Date: 8/26/2020
 Engineer: FBS

DESIGN - C - WIND PRESSURES FOR MWFRF ANY HT. BY SBC-88

Input:

Wind Velocity (3-second Gust) [V]:
 Building Classification [I, II, III, or IV]:
 Coastal or Standard Exposure
 Enclosure Classification:
 Mean Roof Height [h]:
 Roof Pitch [(" RISE) / (12" RUN)]:
 Length of the building (Dim. in 'X' Direction)
 Width of the building (Dim. in 'Y' Direction)
 Auto generate Height 'z' values

90	mph
II	
Coastal Exposure	
Enclosed	
164.50	
0.25	
215	
125	
No

Case 1a: Wind blowing North-South

Calculations:

Roof Angle [degrees off of Horizontal]: θ
 Building Importance Factor for wind, 'Iw'
 Gust velocity pressure at mean roof ht, Gq_h

1.193	deg
1	
34.580	psf

Note:

Since windward pressure coefficient has incremental values per table 1205.3A, Case I from Figure 1205.3B will produce higher overall wind pressures as leeward pressures are constant for height of building.

Case 1b: Wind blowing East-West

Case 1a: Wind blowing North-South

Horizontal Dim. of bldg ⊥ to wind, 'B'				215.00	ft
Horizontal Dim. of bldg to wind, 'L'				125.00	
Windward Wall Cp				0.60	
Leeward Wall Cp				-0.70	
Wind Base shear in N-S Direction				1,476.55	Kips
Height 'z' (ft.)	Gqz*Iw	P _{WW} (psf)	P _{LW} (psf)	P _{WW+LW} (psf)	Wind force applied @ z (Kips)
0.00	23.00	13.80	-24.21	38.01	65.37
16.00	23.00	13.80	-24.21	38.01	120.53
29.50	23.00	13.80	-24.21	38.01	110.31
43.00	25.60	15.36	-24.21	39.57	114.84
56.50	27.65	16.59	-24.21	40.80	118.41
70.00	29.00	17.40	-24.21	41.61	120.76
83.50	30.35	18.21	-24.21	42.42	123.11
97.00	31.70	19.02	-24.21	43.23	125.46
110.50	32.42	19.45	-24.21	43.66	126.72
124.00	32.96	19.78	-24.21	43.98	127.66
137.50	33.50	20.10	-24.21	44.31	128.60
151.00	34.04	20.42	-24.21	44.63	129.54
164.50	34.58	20.75	-24.21	44.95	65.24

Case 1b: Wind blowing East-West

Horizontal Dim. of bldg $\perp$ to wind, 'B'				125.00	ft
Horizontal Dim. of bldg $\parallel$ to wind, 'L'				215.00	
Windward Wall Cp				0.60	
Leeward Wall Cp				-0.70	
Wind Base shear in E-W Direction				858.46	Kips
Height 'z' (ft.)	Gqz*Iw	P _{WW} (psf)	P _{LW} (psf)	P _{WW+LW} (psf)	Wind force applied @ z (Kips)
0.00	23.00	13.80	-24.21	38.01	38.01
16.00	23.00	13.80	-24.21	38.01	70.07
29.50	23.00	13.80	-24.21	38.01	64.14
43.00	25.60	15.36	-24.21	39.57	66.77
56.50	27.65	16.59	-24.21	40.80	68.84
70.00	29.00	17.40	-24.21	41.61	70.21
83.50	30.35	18.21	-24.21	42.42	71.58
97.00	31.70	19.02	-24.21	43.23	72.94
110.50	32.42	19.45	-24.21	43.66	73.67
124.00	32.96	19.78	-24.21	43.98	74.22
137.50	33.50	20.10	-24.21	44.31	74.77
151.00	34.04	20.42	-24.21	44.63	75.31
164.50	34.58	20.75	-24.21	44.95	37.93

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Case IIa: Wind blowing North-South						Case IIb: Wind blowing East-West					
Horizontal Dim. of bldg $\perp$ to wind, 'B'		215.00	ft			Horizontal Dim. of bldg $\perp$ to wind, 'B'		125.00	ft		
Horizontal Dim. of bldg $\parallel$ to wind, 'L'		125.00	ft			Horizontal Dim. of bldg $\parallel$ to wind, 'L'		215.00	ft		
Windward Wall Cp		1.00				Windward Wall Cp		1.00			
Leeward Wall Cp		-0.30				Leeward Wall Cp		-0.30			
Wind Base shear in N-S Direction		1,400.97	Kips			Wind Base shear in E-W Direction		814.52	Kips		
Height 'z' (ft.)	Gqz*Iw	P _{WW} (psf)	P _{LW} (psf)	P _{WW+LW} (psf)	Wind force applied @ z (Kips)	Height 'z' (ft.)	Gqz*Iw	P _{WW} (psf)	P _{LW} (psf)	P _{WW+LW} (psf)	Wind force applied @ z (Kips)
0.00	23.00	23.00	-10.37	33.37	57.40	0.00	23.00	23.00	-10.37	33.37	33.37
16.00	23.00	23.00	-10.37	33.37	105.84	16.00	23.00	23.00	-10.37	33.37	61.53
29.50	23.00	23.00	-10.37	33.37	96.87	29.50	23.00	23.00	-10.37	33.37	56.32
43.00	25.60	25.60	-10.37	35.97	104.41	43.00	25.60	25.60	-10.37	35.97	60.71
56.50	27.65	27.65	-10.37	38.02	110.36	56.50	27.65	27.65	-10.37	38.02	64.17
70.00	29.00	29.00	-10.37	39.37	114.28	70.00	29.00	29.00	-10.37	39.37	66.44
83.50	30.35	30.35	-10.37	40.72	118.20	83.50	30.35	30.35	-10.37	40.72	68.72
97.00	31.70	31.70	-10.37	42.07	122.12	97.00	31.70	31.70	-10.37	42.07	71.00
110.50	32.42	32.42	-10.37	42.79	124.21	110.50	32.42	32.42	-10.37	42.79	72.21
124.00	32.96	32.96	-10.37	43.33	125.78	124.00	32.96	32.96	-10.37	43.33	73.13
137.50	33.50	33.50	-10.37	43.87	127.34	137.50	33.50	33.50	-10.37	43.87	74.04
151.00	34.04	34.04	-10.37	44.41	128.91	151.00	34.04	34.04	-10.37	44.41	74.95
164.50	34.58	34.58	-10.37	44.95	65.24	164.50	34.58	34.58	-10.37	44.95	37.93

Wind Base Shear in N-S Direction = 1476.6 Kips
 Wind Shear in E-W Direction = 858.5 Kips
 Seismic Shear in Both Direction = 521.2 Kips
 Wind Controls in Both Directions. Therefore, EQ loads are ignored in design.

FIGURE 1205.3B
APPLICATION OF MWFRS COEFFICIENTS
 (Positive sign indicates inwardly acting pressure)

TABLE 1205.3B
MWFRS COEFFICIENTS, C_p
Building Height Greater Than 60 ft

	Enclosed Bldg		Partially Enclosed Bldg	
	Case I	Case II	Case I	Case II
Windward Walls.....	+ .6	+1.0	+ .2	+1.1
Leeward Walls.....	- .7	- .3	-1.1	- .2
Side Walls	- .9	- .5	-1.3	- .4
Roof $\leq 10^\circ$	- .9	- .5	-1.3	- .4

Case I = positive internal pressure
 Case II = negative internal pressure
 Refer to Figure 1205.3B

Project: ATC-146 - Design C
 Project No: 20.027
 Description: Seismic Forces for Design C - I = 1.0

Date: 8/26/2020
 Engineer: FBS
 Sheet No. _____

1988 SBC Seismic Design - Design - D

Av Factor	0.10	SBC 88 - Figure 1206.1	h _n	165.83 ft.
Z factor	0.24	SBC 88 - Figure 1206.4.1	C _{used}	0.05
Imp. Factor, I _E	1.00	SBC 88 - Table 1206.1	C _{Smax}	0.14
K Factor	1.00	SBC 88 - Table 1206.4.3	C _{Sused}	0.079
Alt. T Calc., sec. (Steel frames)	1.62	SBC 88 - Section 1206.4.5.2		
C Factor, from Alternate T Eqn	0.05	SBC 88 - Section 1206.4.4		
C Factor, from T formula	0.04	SBC 88 - Section 1206.4.4	Z*I*K*C*S =	0.019
S Factor	1.50	SBC 88 - Ta		
C _{Scalc}	0.079			
T Factor (Based on allwbl drifts)	7.43	SBC 88 - Section 1206.4.5.1		

Base Shear Calculations

Allowable Story Drift

Dead Loads

Roof DL 78 psf
 Typ. Floor DL 90 psf
 Spandrel DL 15 psf
 Bldg. Width 215 ft
 Bldg. Depth 125 ft
 Total Area: 24,364 sq. ft.
 Total Perimeter 668 ft.
 Parapet Ht 2.0 ft.

$\Delta a = 0.005 h$ SBC 88 - Section 1206.7
 $\delta x = \frac{1 * \delta x_e}{K} = \Delta a = 0.005 h$ SBC 88 - Section 1206.7
 $\delta x_e = (1/K) \times 0.005 h = 0.005 h$

Dead Load Calculations

Story	Story Ht. (ft.)	Area (sq.ft.)	Spandrel Length (ft.)	Spandrel Trib Ht (ft.)	Additional DL (kips)	Spandrel Wt (kips)	Area Wt. (kips)	Story Dead Loads (kips)
Roof	13.50	24,364	668	8.9		89	1,900	1,990
11	13.50	24,364	668	13.5		135	2,193	2,328
10	13.50	24,364	668	13.5		135	2,193	2,328
9	13.50	24,364	668	13.5		135	2,193	2,328
8	13.50	24,364	668	13.5		135	2,193	2,328
7	13.50	24,364	668	13.5		135	2,193	2,328
6	13.50	24,364	668	13.5		135	2,193	2,328
5	13.50	24,364	668	13.5		135	2,193	2,328
4	13.50	24,364	668	13.5		135	2,193	2,328
3	13.50	24,364	668	13.5		135	2,193	2,328
2	13.50	24,364	668	13.5		135	2,193	2,328
1	17.33	24,364	668	15.415		154	2,193	2,347
Totals:	165.8 ft.	292368 sq. ft.	8016.0 ft.	159.3 ft.		1596 k	26,021	27,617

Seismic Base Shear: $V = Z * I * K * C * S * W:$ **521.2 kips**

Vertical Distribution of Seismic Forces

Story	height, h (ft.)	Story DL, w (kips)	wh	C _{vx}	F _{vx} (kips)	M _{OT} (k-ft)	$\delta x_e(\max)$ (in.)	w _i σ _i ²	f _i σ _i
Roof	165.8 ft.			0.113	59.0	9785	0.81	1,246.85	47.79
11	152.33	2,328	354,629	0.145	75.4	11491	0.81	1,527.42	61.10
10	138.83	2,328	323,200	0.132	68.8	9545	0.81	1,527.42	55.69
9	125.33	2,328	291,772	0.119	62.1	7779	0.81	1,527.42	50.27
8	111.83	2,328	260,344	0.106	55.4	6193	0.81	1,527.42	44.86
7	98.33	2,328	228,915	0.093	48.7	4788	0.81	1,527.42	39.44
6	84.83	2,328	197,487	0.081	42.0	3564	0.81	1,527.42	34.03
5	71.33	2,328	166,058	0.068	35.3	2520	0.81	1,527.42	28.61
4	57.83	2,328	134,630	0.055	28.6	1656	0.81	1,527.42	23.20
3	44.33	2,328	103,202	0.042	22.0	973	0.81	1,527.42	17.78
2	30.83	2,328	71,773	0.029	15.3	471	0.81	1,527.42	12.37
1	17.33	2,347	40,677	0.017	8.7	150	1.04	2,537.77	9.00
Totals:		25,628	2,172,687	1.000	521.2 k	58913 k-ft	9.95 in.	19,059	424

In locations where the soil properties are not known in sufficient detail to determine the soil profile type or the profile does not fit any of the three 3 types, soil profile S_2 or soil profile S_3 shall be used, whichever gives the larger value of CS.

**TABLE 1206.4.6
SOIL PROFILE COEFFICIENT, S**

Soil profile type	S
S_1	1.0
S_2	1.2
S_3	1.5

**TABLE 1206.1
OCCUPANCY IMPORTANCE FACTOR, I**

Nature of occupancy	I Factor
All buildings and structures except those listed below	1.0
Buildings and structures of Use Group A with a total occupant load of more than 300.	1.25
Buildings and structures designated as essential facilities, including, but not limited to: <ol style="list-style-type: none"> 1. Group I Unrestrained Uses having surgery or emergency treatment areas 2. Fire or rescue and police stations 3. Structures and equipment in government communication centers and other facilities required for emergency response. 4. Power stations and other utilities required in an emergency. 5. Structures having critical national defense capabilities. 	1.5

1206.4.5.1 T Formula. T is the fundamental period which shall be established using the structural properties and deformational characteristics of the resisting elements using the following formula or the appropriate formula in 1206.4.5.2.

$$T = 2 \pi \sqrt{\frac{\sum_{i=1}^n w_i \sigma_i^2}{g \sum_{i=1}^n f_i \sigma_i}}$$

where the values of f_i represent any lateral force distributed approximately in accordance with the principles of the equation in 1206.5.1 or any other rational distribution. The elastic deflections σ_i shall be calculated using the applied lateral forces f_i . The value of C when calculated using the period T as determined by the equation in this section shall not be less than 80% of the value of C based on the period T estimated using the appropriate equation in 1206.4.5.2.

Wind Base Shear in N-S Direction = 1476.6 Kips
 Wind Shear in E-W Direction = 858.5 Kips
 Seismic Shear in Both Direction = 521.2 Kips

Wind Controls in Both Directions. Therefore, EQ loads are ignored in design.

RAM Structural System

Bentley DataBase: ATC_1988_RISK CAT II_SBC 88

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Loads and Applied Forces

LOAD CASE: WIND_X

Other User Defined Story Forces
Ground Level: GRADE

APPLIED DIAPHRAGM FORCES

Type: User_User

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	37.93	0.00	105.00	60.00
Level 12	1	151.00	75.31	0.00	105.00	60.00
Level 11	1	137.50	74.77	0.00	105.00	60.00
Level 10	1	124.00	74.22	0.00	105.00	60.00
Level 9	1	110.50	73.67	0.00	105.00	60.00
Level 8	1	97.00	72.94	0.00	105.00	60.00
Level 7	1	83.50	71.58	0.00	105.00	60.00
Level 6	1	70.00	70.21	0.00	105.00	60.00
Level 5	1	56.50	68.84	0.00	105.00	60.00
Level 4	1	43.00	66.77	0.00	105.00	60.00
Level 3	1	29.50	64.14	0.00	105.00	60.00
Level 2	1	16.00	70.07	0.00	105.00	60.00

APPLIED STORY FORCES

Type: User_User

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	37.93	0.00
Level 12	151.00	75.31	0.00
Level 11	137.50	74.77	0.00
Level 10	124.00	74.22	0.00
Level 9	110.50	73.67	0.00
Level 8	97.00	72.94	0.00
Level 7	83.50	71.58	0.00
Level 6	70.00	70.21	0.00
Level 5	56.50	68.84	0.00
Level 4	43.00	66.77	0.00
Level 3	29.50	64.14	0.00
Level 2	16.00	70.07	0.00

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RAM Structural System

Bentley

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 2/2

DataBase: ATC_1988_RISK CAT II_SBC 88

01/04/21 15:47:01

LOAD CASE: WIND_Y

Other User Defined Story Forces
Ground Level: GRADE

APPLIED DIAPHRAGM FORCES

Type: User_User

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	65.24	105.00	60.00
Level 12	1	151.00	0.00	129.54	105.00	60.00
Level 11	1	137.50	0.00	128.60	105.00	60.00
Level 10	1	124.00	0.00	127.66	105.00	60.00
Level 9	1	110.50	0.00	126.72	105.00	60.00
Level 8	1	97.00	0.00	125.46	105.00	60.00
Level 7	1	83.50	0.00	123.11	105.00	60.00
Level 6	1	70.00	0.00	120.76	105.00	60.00
Level 5	1	56.50	0.00	118.41	105.00	60.00
Level 4	1	43.00	0.00	114.84	105.00	60.00
Level 3	1	29.50	0.00	110.31	105.00	60.00
Level 2	1	16.00	0.00	120.53	105.00	60.00

APPLIED STORY FORCES

Type: User_User

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	65.24
Level 12	151.00	0.00	129.54
Level 11	137.50	0.00	128.60
Level 10	124.00	0.00	127.66
Level 9	110.50	0.00	126.72
Level 8	97.00	0.00	125.46
Level 7	83.50	0.00	123.11
Level 6	70.00	0.00	120.76
Level 5	56.50	0.00	118.41
Level 4	43.00	0.00	114.84
Level 3	29.50	0.00	110.31
Level 2	16.00	0.00	120.53

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RAM Structural System

Frame Reaction Envelope

RAM Frame 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

01/05/21 14:03:32

CRITERIA:

Rigid End Zones: Ignore Effects
 Member Force Output: At Face of Joint
 P-Delta: No
 Ground Level: GRADE
 Mesh Criteria :
 Max. Distance Between Nodes on Mesh Line (ft) : 4.00
 Merge Node Tolerance (in) : 0.0100
 Geometry Tolerance (in) : 0.0050
 Walls Out-of-plane Stiffness Not Included in Analysis.
 Sign considered for Dynamic Load Case Results.
 Rigid Links Included at Fixed Beam-to-Wall Locations
 Eigenvalue Analysis : Eigen Vectors (Subspace Iteration)

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Lp	PosLiveLoad	RAMUSER
Rfp	PosRoofLiveLoad	RAMUSER
O1	WIND_X	User_User
O2	WIND_Y	User_User

USER DEFINED LOAD COMBINATIONS:

1	*	D
2	*	D+Lp
3	*	D+Lp+Rfp
4	*	0.75*D+0.75*Lp+0.75*O1
5	*	0.75*D+0.75*Lp+0.75*O2
6	*	0.75*D+0.75*Lp-0.75*O1
7	*	0.75*D+0.75*Lp-0.75*O2
8	*	0.75*D+0.75*O1
9	*	0.75*D+0.75*O2
10	*	0.75*D-0.75*O1
11	*	0.75*D-0.75*O2

* = Load combination currently selected to use

REACTION MAXIMA AND MINIMA:

Frame #0:

Node		Rx kips	Ry kips	Rz kips	Mxx kip-ft	Myy kip-ft	Tzz kip-ft
331	Max:	35.73	0.09	573.31	-0.10	107.18	0.78
	LC:	6	3	3	11	6	7
	Min:	-31.62	0.03	154.96	-0.28	-94.87	-0.55
	LC:	8	11	8	3	8	9
332	Max:	0.02	0.10	873.61	0.11	5.34	0.41

GRIDS	RAM Node #
A-1	331
C-1	332
D-1	333
E-1	334
A-2	335
C-2	336
D-2	337
E-2	338
A-3	339
E-3	340
A-4	341
C-4	342
D-4	343
E-4	344
A-5	345
C-5	346
D-5	347
E-5	348
A-6	349
C-6	350
D-6	351
E-6	352
A-7	353
E-7	354
B-7.3	355
C-7.3	356
D-7.3	357
D-8	358
E-8	359

RAM Structural System

Frame Reaction Envelope

RAM Frame 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

Page 2/5

01/05/21 14:03:32

Node		Rx	Ry	Rz	Mxx	Myy	Tzz
	LC:	6	4	3	4	6	6
	Min:	-0.02	0.02	481.50	-0.04	-5.08	-0.37
	LC:	8	10	9	10	8	8
333	Max:	0.02	0.01	873.61	-0.06	5.33	0.36
	LC:	6	10	3	10	6	8
	Min:	-0.02	-0.05	481.50	-0.23	-5.05	-0.40
	LC:	8	4	11	4	8	6
334	Max:	35.49	0.10	575.14	-0.11	106.47	0.55
	LC:	6	3	3	11	6	11
	Min:	-31.37	0.04	155.58	-0.30	-94.11	-0.78
	LC:	8	11	8	3	8	5
335	Max:	45.42	28.60	993.93	64.40	136.27	0.40
	LC:	6	7	3	9	6	10
	Min:	-44.17	-21.47	556.20	-85.81	-132.51	-0.40
	LC:	8	9	8	7	8	4
336	Max:	0.03	91.28	1815.45	207.35	0.08	0.56
	LC:	6	7	7	9	6	6
	Min:	-0.03	-69.12	254.55	-273.83	-0.08	-0.55
	LC:	8	9	9	7	8	8
337	Max:	0.47	68.73	1807.33	273.99	1.41	0.52
	LC:	4	11	5	5	4	8
	Min:	-0.43	-91.33	251.67	-206.19	-1.29	-0.54
	LC:	10	5	11	11	10	6
338	Max:	45.10	21.52	994.04	85.18	135.29	0.41
	LC:	6	11	3	5	6	4
	Min:	-43.82	-28.39	556.23	-64.57	-131.45	-0.40
	LC:	8	5	8	11	8	10
339	Max:	48.40	0.25	996.57	-0.31	145.19	0.06
	LC:	10	3	3	11	10	11
	Min:	-48.24	0.10	565.96	-0.75	-144.73	-0.08
	LC:	4	11	10	3	4	5
340	Max:	47.97	0.20	996.56	-0.23	143.92	0.08
	LC:	10	3	3	11	10	6
	Min:	-47.78	0.08	565.96	-0.61	-143.35	-0.05
	LC:	4	11	10	3	4	8
341	Max:	49.10	33.37	996.28	80.12	147.29	0.88

RAM Structural System

Frame Reaction Envelope

RAM Frame 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

Page 3/5

01/05/21 14:03:32

Node		Rx	Ry	Rz	Mxx	Myy	Tzz
	LC:	10	7	3	9	10	7
	Min:	-49.33	-26.71	565.74	-100.11	-147.99	-0.73
	LC:	4	9	9	7	4	9
342	Max:	0.03	106.31	1753.85	257.20	0.09	0.60
	LC:	10	7	7	9	10	10
	Min:	-0.03	-85.73	121.17	-318.92	-0.09	-0.61
	LC:	4	9	9	7	4	4
343	Max:	0.47	84.91	1751.12	315.79	1.40	0.59
	LC:	4	11	5	5	4	4
	Min:	-0.43	-105.26	119.61	-254.73	-1.29	-0.58
	LC:	10	5	11	11	10	10
344	Max:	48.45	26.63	996.24	98.40	145.34	0.72
	LC:	10	11	3	5	10	11
	Min:	-48.63	-32.80	565.72	-79.90	-145.90	-0.88
	LC:	4	5	11	11	4	5
345	Max:	48.43	39.78	996.11	97.40	145.30	0.40
	LC:	10	7	3	9	10	10
	Min:	-48.96	-32.47	565.64	-119.34	-146.89	-0.39
	LC:	4	9	8	7	4	4
346	Max:	0.03	127.24	1989.56	311.87	0.09	0.60
	LC:	10	7	7	9	10	10
	Min:	-0.03	-103.96	-29.02	-381.72	-0.09	-0.61
	LC:	4	9	9	7	4	4
347	Max:	0.52	102.88	1992.74	378.89	1.56	0.57
	LC:	4	11	5	5	4	4
	Min:	-0.48	-126.30	-27.20	-308.64	-1.43	-0.56
	LC:	10	5	11	11	10	10
348	Max:	47.11	32.31	996.51	117.78	141.32	0.38
	LC:	10	11	3	5	10	8
	Min:	-47.55	-39.26	565.78	-96.94	-142.66	-0.41
	LC:	4	5	8	11	4	6
349	Max:	45.51	40.93	987.89	99.98	136.52	0.68
	LC:	10	7	3	9	10	9
	Min:	-46.66	-33.33	560.81	-122.80	-139.99	-0.83
	LC:	4	9	8	7	4	7
350	Max:	0.03	130.42	2249.34	320.66	0.08	0.56

RAM Structural System

Frame Reaction Envelope

RAM Frame 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

Page 4/5

01/05/21 14:03:32

Node		Rx	Ry	Rz	Mxx	Myy	Tzz
	LC:	6	7	7	9	6	6
	Min:	-0.03	-106.89	112.04	-391.27	-0.08	-0.57
	LC:	8	9	9	7	8	8
351	Max:	0.68	105.60	2257.00	393.48	2.03	0.50
	LC:	4	11	5	5	4	4
	Min:	-0.62	-131.16	114.66	-316.80	-1.87	-0.50
	LC:	10	5	11	11	10	10
352	Max:	41.92	33.12	1008.80	122.76	125.77	0.83
	LC:	10	11	3	5	10	5
	Min:	-42.94	-40.92	573.78	-99.35	-128.83	-0.66
	LC:	4	5	10	11	4	11
353	Max:	35.36	0.56	805.88	0.86	106.07	1.44
	LC:	10	4	3	10	10	8
	Min:	-38.03	-0.29	290.79	-1.67	-114.09	-1.71
	LC:	4	10	10	4	4	6
354	Max:	25.37	0.23	976.85	-0.08	76.10	0.95
	LC:	10	5	3	11	10	5
	Min:	-28.44	0.03	414.55	-0.69	-85.31	-0.77
	LC:	4	11	10	5	4	11
355	Max:	0.18	7.00	231.63	43.36	9.81	1.49
	LC:	6	10	3	6	10	6
	Min:	-0.19	-7.51	104.76	-39.77	-10.06	-1.54
	LC:	8	4	10	8	4	8
356	Max:	0.02	5.83	999.99	13.66	0.09	-0.00
	LC:	4	4	3	6	6	8
	Min:	-0.01	-4.83	576.90	-7.47	0.00	-0.07
	LC:	10	10	8	8	8	6
357	Max:	0.02	1.32	1359.80	5.88	8.31	0.05
	LC:	8	8	3	6	3	10
	Min:	-0.02	-1.80	801.11	-2.77	5.18	-0.08
	LC:	6	6	8	8	10	4
358	Max:	0.01	0.01	415.18	0.35	8.35	0.14
	LC:	10	5	3	3	3	6
	Min:	-0.02	-0.01	207.20	0.17	5.12	-0.05
	LC:	4	11	8	9	10	8
359	Max:	18.92	0.00	580.18	0.33	15.92	0.08

RAM Structural System

Frame Reaction Envelope

RAM Frame 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

Page 5/5

01/05/21 14:03:32

Node	Rx	Ry	Rz	Mxx	Myy	Tzz
LC:	10	8	3	7	8	7
Min:	-20.89	-0.01	293.33	0.07	-15.75	-0.06
LC:	4	6	10	9	6	9

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

Drift

02/25/21 14:31:52

Steel Code: SBC

CRITERIA:

Rigid End Zones: Ignore Effects
 Member Force Output: At Face of Joint
 P-Delta: No
 Ground Level: GRADE

LOAD CASE DEFINITIONS:

O1	WIND_X	User_User
O2	WIND_Y	User_User

Displacements for pseudo-flexible and flexible/none diaphragms are reported based on maximum nodal displacement within diaphragm boundary.

RESULTS:

TARGET DRIFT RATIO = 1/360 = 0.028**Location (ft): (105.000, 60.000)**

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	O1	4.6958	-0.0002	0.1419	-0.0000	0.0009	0.0000
	O2	-0.0003	4.2202	-0.0000	0.3093	0.0000	0.0019
Level 12	O1	4.5539	-0.0001	0.2891	-0.0001	0.0018	0.0000
	O2	-0.0003	3.9110	-0.0001	0.3734	0.0000	0.0023
Level 11	O1	4.2648	-0.0001	0.3753	-0.0001	0.0023	0.0000
	O2	-0.0002	3.5376	-0.0002	0.3830	0.0000	0.0024
Level 10	O1	3.8895	0.0000	0.4144	-0.0000	0.0026	0.0000
	O2	0.0000	3.1546	-0.0001	0.4048	0.0000	0.0025
Level 9	O1	3.4751	0.0000	0.4069	-0.0000	0.0025	0.0000
	O2	0.0001	2.7498	-0.0000	0.4040	0.0000	0.0025
Level 8	O1	3.0682	0.0001	0.4478	0.0000	0.0028	0.0000
	O2	0.0001	2.3458	-0.0000	0.3953	0.0000	0.0024
Level 7	O1	2.6204	0.0000	0.4285	-0.0000	0.0026	0.0000
	O2	0.0001	1.9505	-0.0000	0.3845	0.0000	0.0024
Level 6	O1	2.1919	0.0001	0.4484	0.0000	0.0028	0.0000
	O2	0.0001	1.5660	0.0000	0.3622	0.0000	0.0022

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

Drift

Page 2/8

02/25/21 14:31:52

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 5	O1	1.7434	0.0000	0.4114	-0.0001	0.0025	0.0000
	O2	0.0001	1.2038	-0.0000	0.3416	0.0000	0.0021
Level 4	O1	1.3320	0.0001	0.4377	0.0000	0.0027	0.0000
	O2	0.0002	0.8622	0.0000	0.3016	0.0000	0.0019
Level 3	O1	0.8943	0.0001	0.4338	0.0000	0.0027	0.0000
	O2	0.0001	0.5607	0.0001	0.2739	0.0000	0.0017
Level 2	O1	0.4605	0.0001	0.4605	0.0001	0.0024	0.0000
	O2	0.0001	0.2868	0.0001	0.2868	0.0000	0.0015
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (0.000, 0.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	O1	4.6946	0.0020	0.1418	0.0003	0.0009	0.0000
	O2	0.2119	3.8489	0.0163	0.2807	0.0001	0.0017
Level 12	O1	4.5528	0.0017	0.2885	0.0009	0.0018	0.0000
	O2	0.1956	3.5682	0.0263	0.3271	0.0002	0.0020
Level 11	O1	4.2643	0.0008	0.3741	0.0020	0.0023	0.0000
	O2	0.1692	3.2411	0.0250	0.3388	0.0002	0.0021
Level 10	O1	3.8902	-0.0012	0.4139	0.0009	0.0026	0.0000
	O2	0.1442	2.9023	0.0225	0.3652	0.0001	0.0023
Level 9	O1	3.4763	-0.0021	0.4066	0.0004	0.0025	0.0000
	O2	0.1216	2.5371	0.0171	0.3741	0.0001	0.0023
Level 8	O1	3.0697	-0.0025	0.4479	-0.0001	0.0028	0.0000
	O2	0.1046	2.1631	0.0149	0.3692	0.0001	0.0023
Level 7	O1	2.6217	-0.0024	0.4283	0.0003	0.0026	0.0000
	O2	0.0896	1.7939	0.0131	0.3616	0.0001	0.0022
Level 6	O1	2.1934	-0.0026	0.4487	-0.0004	0.0028	0.0000
	O2	0.0766	1.4323	0.0170	0.3324	0.0001	0.0021
Level 5	O1	1.7447	-0.0023 ₃₆	0.4106	0.0015	0.0025	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

Drift

Page 3/8

02/25/21 14:31:52

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	O2	0.0595	1.0999	0.0158	0.3139	0.0001	0.0019
Level 4	O1	1.3342	-0.0037	0.4379	-0.0004	0.0027	0.0000
	O2	0.0437	0.7860	0.0166	0.2726	0.0001	0.0017
Level 3	O1	0.8962	-0.0033	0.4345	-0.0012	0.0027	0.0000
	O2	0.0271	0.5134	0.0143	0.2491	0.0001	0.0015
Level 2	O1	0.4617	-0.0021	0.4617	-0.0021	0.0024	0.0000
	O2	0.0129	0.2644	0.0129	0.2644	0.0001	0.0014
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (0.000, 120.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	O1	4.6971	0.0020	0.1421	0.0003	0.0009	0.0000
	O2	-0.2125	3.8489	-0.0164	0.2807	0.0001	0.0017
Level 12	O1	4.5549	0.0017	0.2896	0.0009	0.0018	0.0000
	O2	-0.1961	3.5682	-0.0265	0.3271	0.0002	0.0020
Level 11	O1	4.2653	0.0008	0.3766	0.0020	0.0023	0.0000
	O2	-0.1696	3.2411	-0.0254	0.3388	0.0002	0.0021
Level 10	O1	3.8887	-0.0012	0.4149	0.0009	0.0026	0.0000
	O2	-0.1442	2.9023	-0.0227	0.3652	0.0001	0.0023
Level 9	O1	3.4738	-0.0021	0.4071	0.0004	0.0025	0.0000
	O2	-0.1215	2.5371	-0.0171	0.3741	0.0001	0.0023
Level 8	O1	3.0667	-0.0025	0.4478	-0.0001	0.0028	0.0000
	O2	-0.1043	2.1631	-0.0149	0.3692	0.0001	0.0023
Level 7	O1	2.6190	-0.0024	0.4287	0.0003	0.0026	0.0000
	O2	-0.0894	1.7939	-0.0131	0.3616	0.0001	0.0022
Level 6	O1	2.1903	-0.0026	0.4482	-0.0004	0.0028	0.0000
	O2	-0.0763	1.4323	-0.0170	0.3324	0.0001	0.0021
Level 5	O1	1.7421	-0.0023	0.4123	0.0015	0.0025	0.0000
	O2	-0.0593	1.0999	-0.0159	0.3139	0.0001	0.0019

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

Drift

Page 4/8

02/25/21 14:31:52

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 4	O1	1.3298	-0.0037	0.4374	-0.0004	0.0027	0.0000
	O2	-0.0434	0.7860	-0.0165	0.2726	0.0001	0.0017
Level 3	O1	0.8924	-0.0033	0.4331	-0.0012	0.0027	0.0000
	O2	-0.0269	0.5134	-0.0141	0.2491	0.0001	0.0015
Level 2	O1	0.4593	-0.0021	0.4593	-0.0021	0.0024	0.0000
	O2	-0.0127	0.2644	-0.0127	0.2644	0.0001	0.0014
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (210.000, 120.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	O1	4.6971	-0.0023	0.1421	-0.0003	0.0009	0.0000
	O2	-0.2125	4.5916	-0.0164	0.3379	0.0001	0.0021
Level 12	O1	4.5549	-0.0020	0.2896	-0.0010	0.0018	0.0000
	O2	-0.1961	4.2537	-0.0265	0.4196	0.0002	0.0026
Level 11	O1	4.2653	-0.0010	0.3766	-0.0022	0.0023	0.0000
	O2	-0.1696	3.8341	-0.0254	0.4271	0.0002	0.0026
Level 10	O1	3.8887	0.0013	0.4149	-0.0009	0.0026	0.0000
	O2	-0.1442	3.4069	-0.0227	0.4444	0.0001	0.0027
Level 9	O1	3.4738	0.0022	0.4071	-0.0004	0.0025	0.0000
	O2	-0.1215	2.9625	-0.0171	0.4339	0.0001	0.0027
Level 8	O1	3.0667	0.0026	0.4478	0.0002	0.0028	0.0000
	O2	-0.1043	2.5286	-0.0149	0.4214	0.0001	0.0026
Level 7	O1	2.6190	0.0024	0.4287	-0.0003	0.0026	0.0000
	O2	-0.0894	2.1071	-0.0131	0.4074	0.0001	0.0025
Level 6	O1	2.1903	0.0028	0.4482	0.0004	0.0028	0.0000
	O2	-0.0763	1.6997	-0.0170	0.3919	0.0001	0.0024
Level 5	O1	1.7421	0.0023	0.4123	-0.0016	0.0025	0.0000
	O2	-0.0593	1.3078	-0.0159	0.3693	0.0001	0.0023
Level 4	O1	1.3298	0.0039 ₃₈	0.4374	0.0005	0.0027	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

Drift

Page 5/8

02/25/21 14:31:52

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	O2	-0.0434	0.9385	-0.0165	0.3305	0.0001	0.0020
Level 3	O1	0.8924	0.0035	0.4331	0.0012	0.0027	0.0000
	O2	-0.0269	0.6079	-0.0141	0.2988	0.0001	0.0018
Level 2	O1	0.4593	0.0022	0.4593	0.0022	0.0024	0.0000
	O2	-0.0127	0.3092	-0.0127	0.3092	0.0001	0.0016
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (210.000, 75.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X in	Y in	X in	Y in	X	Y
ROOF	O1	4.6961	-0.0023	0.1420	-0.0003	0.0009	0.0000
	O2	-0.0534	4.5916	-0.0041	0.3379	0.0000	0.0021
Level 12	O1	4.5541	-0.0020	0.2892	-0.0010	0.0018	0.0000
	O2	-0.0492	4.2537	-0.0067	0.4196	0.0000	0.0026
Level 11	O1	4.2649	-0.0010	0.3756	-0.0022	0.0023	0.0000
	O2	-0.0425	3.8341	-0.0065	0.4271	0.0000	0.0026
Level 10	O1	3.8893	0.0013	0.4145	-0.0009	0.0026	0.0000
	O2	-0.0360	3.4069	-0.0058	0.4444	0.0000	0.0027
Level 9	O1	3.4748	0.0022	0.4069	-0.0004	0.0025	0.0000
	O2	-0.0303	2.9625	-0.0043	0.4339	0.0000	0.0027
Level 8	O1	3.0678	0.0026	0.4478	0.0002	0.0028	0.0000
	O2	-0.0260	2.5286	-0.0037	0.4214	0.0000	0.0026
Level 7	O1	2.6200	0.0024	0.4285	-0.0003	0.0026	0.0000
	O2	-0.0223	2.1071	-0.0033	0.4074	0.0000	0.0025
Level 6	O1	2.1915	0.0028	0.4484	0.0004	0.0028	0.0000
	O2	-0.0190	1.6997	-0.0042	0.3919	0.0000	0.0024
Level 5	O1	1.7431	0.0023	0.4116	-0.0016	0.0025	0.0000
	O2	-0.0147	1.3078	-0.0040	0.3693	0.0000	0.0023
Level 4	O1	1.3315	0.0039	0.4376	0.0005	0.0027	0.0000
	O2	-0.0107	0.9385 ₃₉	-0.0041	0.3305	0.0000	0.0020

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

Drift

Page 6/8

02/25/21 14:31:52

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 3	O1	0.8938	0.0035	0.4337	0.0012	0.0027	0.0000
	O2	-0.0066	0.6079	-0.0035	0.2988	0.0000	0.0018
Level 2	O1	0.4602	0.0022	0.4602	0.0022	0.0024	0.0000
	O2	-0.0031	0.3092	-0.0031	0.3092	0.0000	0.0016
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (190.000, 75.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	O1	4.6961	-0.0019	0.1420	-0.0002	0.0009	0.0000
	O2	-0.0534	4.5209	-0.0041	0.3325	0.0000	0.0021
Level 12	O1	4.5541	-0.0017	0.2892	-0.0008	0.0018	0.0000
	O2	-0.0492	4.1884	-0.0067	0.4108	0.0000	0.0025
Level 11	O1	4.2649	-0.0008	0.3756	-0.0018	0.0023	0.0000
	O2	-0.0425	3.7776	-0.0065	0.4187	0.0000	0.0026
Level 10	O1	3.8893	0.0010	0.4145	-0.0008	0.0026	0.0000
	O2	-0.0360	3.3589	-0.0058	0.4369	0.0000	0.0027
Level 9	O1	3.4748	0.0018	0.4069	-0.0003	0.0025	0.0000
	O2	-0.0303	2.9220	-0.0043	0.4282	0.0000	0.0026
Level 8	O1	3.0678	0.0021	0.4478	0.0001	0.0028	0.0000
	O2	-0.0260	2.4938	-0.0037	0.4165	0.0000	0.0026
Level 7	O1	2.6200	0.0020	0.4285	-0.0003	0.0026	0.0000
	O2	-0.0223	2.0773	-0.0033	0.4031	0.0000	0.0025
Level 6	O1	2.1915	0.0022	0.4484	0.0003	0.0028	0.0000
	O2	-0.0190	1.6742	-0.0042	0.3863	0.0000	0.0024
Level 5	O1	1.7431	0.0019	0.4116	-0.0013	0.0025	0.0000
	O2	-0.0147	1.2880	-0.0040	0.3640	0.0000	0.0022
Level 4	O1	1.3315	0.0032	0.4376	0.0004	0.0027	0.0000
	O2	-0.0107	0.9239	-0.0041	0.3250	0.0000	0.0020
Level 3	O1	0.8938	0.0028	0.4337	0.0010	0.0027	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

Drift

Page 7/8

02/25/21 14:31:52

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	O2	-0.0066	0.5989	-0.0035	0.2940	0.0000	0.0018
Level 2	O1	0.4602	0.0018	0.4602	0.0018	0.0024	0.0000
	O2	-0.0031	0.3049	-0.0031	0.3049	0.0000	0.0016
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (190.000, 0.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	O1	4.6946	-0.0019	0.1418	-0.0002	0.0009	0.0000
	O2	0.2119	4.5209	0.0163	0.3325	0.0001	0.0021
Level 12	O1	4.5528	-0.0017	0.2885	-0.0008	0.0018	0.0000
	O2	0.1956	4.1884	0.0263	0.4108	0.0002	0.0025
Level 11	O1	4.2643	-0.0008	0.3741	-0.0018	0.0023	0.0000
	O2	0.1692	3.7776	0.0250	0.4187	0.0002	0.0026
Level 10	O1	3.8902	0.0010	0.4139	-0.0008	0.0026	0.0000
	O2	0.1442	3.3589	0.0225	0.4369	0.0001	0.0027
Level 9	O1	3.4763	0.0018	0.4066	-0.0003	0.0025	0.0000
	O2	0.1216	2.9220	0.0171	0.4282	0.0001	0.0026
Level 8	O1	3.0697	0.0021	0.4479	0.0001	0.0028	0.0000
	O2	0.1046	2.4938	0.0149	0.4165	0.0001	0.0026
Level 7	O1	2.6217	0.0020	0.4283	-0.0003	0.0026	0.0000
	O2	0.0896	2.0773	0.0131	0.4031	0.0001	0.0025
Level 6	O1	2.1934	0.0022	0.4487	0.0003	0.0028	0.0000
	O2	0.0766	1.6742	0.0170	0.3863	0.0001	0.0024
Level 5	O1	1.7447	0.0019	0.4106	-0.0013	0.0025	0.0000
	O2	0.0595	1.2880	0.0158	0.3640	0.0001	0.0022
Level 4	O1	1.3342	0.0032	0.4379	0.0004	0.0027	0.0000
	O2	0.0437	0.9239	0.0166	0.3250	0.0001	0.0020
Level 3	O1	0.8962	0.0028	0.4345	0.0010	0.0027	0.0000
	O2	0.0271	0.5989	0.0143	0.2940	0.0001	0.0018

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT II_SBC 88

Building Code: SBC

Drift

Page 8/8

02/25/21 14:31:52

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 2	O1	0.4617	0.0018	0.4617	0.0018	0.0024	0.0000
	O2	0.0129	0.3049	0.0129	0.3049	0.0001	0.0016
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

BRACED FRAME DESIGN

BRACE FRAME DESIGN IN RAM

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SAMPLE MEMBER DESIGN CALCS

DESIGN FORCES FOR BRACE FRAME COL. ON LEVEL 2 AT GRID 2-C

CONTROLLING COLUMN FORCES - FLEXURE

Load Combination: $0.75*D+0.75*L_p-0.75*O_2$

Axial		Load (kips)	1666.57
Moment	Top	Mmajor (kip-ft)	-37.66
		Mminor (kip-ft)	-0.00
Moment	Bot.	Mmajor (kip-ft)	0.00
		Mminor (kip-ft)	0.00

	X-Axis	Y-Axis
Lu for Axial (ft)	16.00	16.00
Lu for Bending (ft)	16.00	16.00
K	1.00	1.00
Braced Against Joint Translation	No	No

PROVIDE W14x342 COL ON GRID 2-C

BRACE FRAME COL. ON LEVEL 2 AT GRID 2-C

AISC Eighth Edition Column Design Wide Flange Member Only

Project ID:	19051
Project Name:	ATC
Engineer:	FBS
Date:	3/1/2021

Member # =

Shape W 14x342

Properties	Geometry	
	A	101 <i>in.²</i>
	d	17.54 <i>in.</i>
	b_f	16.36 <i>in.</i>
	t_f	2.47 <i>in.</i>
	t_w	1.54 <i>in.</i>
	W(weight)	342 <i>#/ft.</i>
	r_T	4.54
	d/A_f	0.43

Compact Section Criteria	
b_f/2t_f	3.3
F_y	— <i>ksi</i>
d/t_w	11.4
F_y	— <i>ksi</i>
F_y	— <i>ksi</i>

Elastic Properties				
X-X			Y-Y	
I_x	4900	<i>in.⁴</i>	I_y	1810 <i>in.⁴</i>
S_x	559	<i>in.³</i>	S_y	221 <i>in.³</i>
r_x	6.98	<i>in.</i>	r_y	4.24 <i>in.</i>
Plastic Modulus				
Z_x	672	<i>in.³</i>	Z_y	338 <i>in.³</i>

Torsional Constant	
J	178 <i>in.⁴</i>

Warping Constant	
C_w	— <i>in.⁶</i>

Material Property	
E	29000 <i>ksi</i>
F_y	36 <i>ksi</i>

Non-Composite Beam/Column Design AISC Eighth Edition

Building info:

Steel Properties

Total Member Length =	16	ft.
Beam Spacing (w) =	0	ft.
Tributary Area to Col=	0	ft.^2
K=	1	
Unbraced Length =	16	ft.

Loading

Dead Load (D)=		psf
Live Load(L)=		psf
Roof Live Load(Lr)=		psf
Snow Load(S)=		psf

Excentricity on Column

ex =		in.
ey =	0	in.

Kl_{bx}/r_x = 27.507163

Kl_{by}/r_y = 45.283019

Deflection Criteria

Total Load	L/360=	0.53	in.
------------	--------	------	-----

Max Moment About Major Axis:

MD(Max Dead)=	0	kips-in
MD(Dead Overwrite)=	451.92	kips-in
MD(Max Use)=	451.92	kips-in
ML(Max Live)=	0	kips-in
ML(Live Overwrite)=	0	kips-in
ML(Max Use)=	0	kips-in
M(Lr or S)(Max Live)=	0	kips-in
M(Lr or S)(Live Overwrite)=	0	kips-in
M(Lr or S)(Max Use)=	0	kips-in
Mu=	451.92	kips-in

Max Moment About Minor Axis:

MD(Max Dead)=	0	kips-in
MD(Dead Overwrite)=	0	kips-in
MD(Max Use)=	0	kips-in
ML(Max Live)=	0	kips-in
ML(Live Overwrite)=	0	kips-in
ML(Max Use)=	0	kips-in
M(Lr or S)(Max Live)=	0	kips-in
M(Lr or S)(Live Overwrite)=	0	kips-in
M(Lr or S)(Max Use)=	0	kips-in
Mu=	0	kips-in

Max Shear

VD(Max Dead)=	0	kips
VD(Dead Overwrite)=		kips
VMD(Max Use)=	0	kips
VL(Max Live)=	0	kips
VL(Live Overwrite)=	0	kips
VL(Max Use)=	0	kips
V(Lr or S)(Max Live)=	0	kips
V(Lr or S)(Live Overwrite)=	0	kips
V(Lr or S)(Max Use)=	0	kips
Vu=	0	kips

Max Axial Load

PD(Max Dead)=	0	kips
PD(Dead Overwrite)=	1667.57	kips
PD(Max Use)=	1667.57	kips
PL(Max Live)=	0	kips
PL(Live Overwrite)=	0	kips
PL(Max Use)=	0	kips
P(Lr or S)(Max Live)=	0	kips
P(Lr or S)(Live Overwrite)=	0	kips
P(Lr or S)(Max Use)=	0	kips
P(E or W)=		kips
P=	1667.57	kips

Solution Summary:

Try **W 14x342** <---- Change W shapes

Member	Major Axis Beam Bending	3%
	Beam Shear	0%
	Minor Axis Beam Bending	0%
	Axial	88%
	Deflection	0%
	Combined Bending and Axial	91%
Overall Check		91%

Column Design AISC Eighth Edition

Note: All Equations in this section can be found in the AISC Eighth Edition Appendix A

Column Height= 16 ft
K= 1
KL= 16 ft
KL/r= 45.3

Column in Compression	
$C_c = \sqrt{2\pi^2 E / F_y} =$	126
if $\frac{KL}{r} \leq C_c$ then $F_a = \frac{[1 - \frac{(\frac{KL}{r})^2}{2C_c^2}] F_y}{\frac{5}{8} + \frac{3(\frac{KL}{r})}{8C_c} - (\frac{KL}{r})^3 / 8C_c^3}$	Section 15.1.3.1
if $\frac{KL}{r} \geq C_c$ then $F_a = \frac{12\pi^2 E}{23(\frac{KL}{r})^2}$	Section 15.1.3.2
Column in Tension	
$F_a = 0.6F_y$	Section 15.1.1

Fa = 18.80 ksi

Calculate Stresses in Column

Axial Stress: fa= Pu/A= 16.5 ksi Okay

Non-Composite Major Axis Beam Design AISC Eighth Edition

Unbraced length (Lb)= 16 ft

Checks for Typical Major Bending Stress Equation			
Equation From Appendix A	Variable Value	Limit Value	
$b_f / 2t_f \leq 65 / \sqrt{F_y}$	3.3	10.8	Good
$d / t_w \leq 412(1 - 2.33 \frac{f_a}{F_y}) / \sqrt{F_y}$	11.4	-4.7	No Good, Use Alternate EQN
$l_b \leq 76b_f / \sqrt{F_y}$	192	207.2	Good
$l_b \leq \frac{20,000}{(d/A_f) F_y}$	192	1279.9	Good
			Use Alternate Equation

Checks for Alternate Major Bending Stress Equation			
Equation From Appendix A	Variable Value	Limit Value	
$55.2 / \sqrt{F_y} < b_f / 2t_f$	3.3	8.7	Good
$b_f / 2t_f \leq 95.0 / \sqrt{F_y}$	3.3	15.8	Good
			Use Alternate Bending Stress Equation

Typical Bending Stress Equation: $F_{bx} = 0.66F_y$

Fbx= N/A ksi

Alternate Bending Stress Equation: $F_{bx} = F_y [0.733 - 0.0014 (\frac{b_f}{t_f}) \sqrt{F_y}]$

Fbx= 24 ksi

Shear Stress Equation: $F_v = 0.40F_y$

Fv= 14.4 ksi

Non-Composite Minor Axis Beam Design AISC Eighth Edition

Minor Axis Bending Equation: $F_{by} = 0.75F_y$

Fby= 27 ksi

Calculate Stresses in Beam

Major Bending Stress:	$f_{bx} = M_{ux}/S_x =$	0.81	ksi	Okay
Shear Stress:	$f_v = V_u/(t_w*d) =$	0	ksi	Okay
Minor Bending Stress:	$f_{by} = M_{uy}/S_y =$	0	ksi	Okay

Calculate Deflections

Camber:	$C = .8 \frac{5w_d L^4}{384EI} =$	0	in.	
Total Deflection:	$\Delta_T = \frac{5w L^4}{384EI} - C =$	0	in.	Okay

$$F'_{ex} = \frac{12 \cdot \pi \cdot ()^2 \cdot E}{23(Kl_{bx}/r_{bx})^2} = 197.36 \text{ Ksi}$$

$$F'_{ey} = \frac{12 \cdot \pi \cdot ()^2 \cdot E}{23(Kl_{by}/r_{by})^2} = 72.82 \text{ Ksi}$$

Check Combined Stressed

$$\frac{f_a}{F_a} = 0.878 \quad \frac{f_a}{F'_{ex}} = 0.084 \quad \frac{f_a}{F'_{ey}} = 0.227$$

$$\frac{f_{bx}}{F_{bx}} = 0.034 \quad \frac{f_{by}}{F_{by}} = 0.000$$

C _{mx} =	0.85
C _{my} =	0.85

Formula 1.6-1a:	$\frac{f_a}{F_a} + \frac{C_{mx} f_{bx}}{(1 - \frac{f_a}{F'_{ex}}) F_{bx}} + \frac{C_{my} f_{by}}{(1 - \frac{f_a}{F'_{ey}}) F_{by}} =$	0.909	Less than 1.0, Okay
Formula 1.6-1b:	$\frac{f_a}{0.6 F_y} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} =$	0.798	Less than 1.0, Okay

DESIGN FORCES FOR BRACE FRAME BRACE AT LEVEL 2 ALONG GRID 2

CONTROLLING BRACE FORCES - FLEXURE

Load Combination: $0.75 \cdot D + 0.75 \cdot L_p - 0.75 \cdot O_2$

Axial		Load (kips)	219.49
Moment	Top	Mmajor (kip-ft)	0.00
		Mminor (kip-ft)	0.00
Moment	Bot.	Mmajor (kip-ft)	0.00
		Mminor (kip-ft)	0.00

	X-Axis	Y-Axis
Lu for Axial (ft)	21.93	21.93
Lu for Bending (ft)	21.93	21.93
K	1.00	1.00
Braced Against Joint Translation	No	No

TRY HSS 10x10x5/16 BRACE

ALLOWABLE AXIAL CAPACITY = 240 K

S.R. = $0.915 < 1$ **OK**

**PROVIDE HSS10x10x5/16 BRACE AT LEVEL 2 FOR FRAME
ALONG GRID 2**

$F_y = 46$ ksi

COLUMNS

Square structural tubing

Allowable concentric loads in kips

Nominal Size		16 x 16	14 x 14		12 x 12		10 x 10			
Thickness		1/2	1/2	3/8	1/2	3/8	5/8	1/2	3/8	5/16
Wt./ft.		103.30	89.68	68.31	76.07	58.10	76.33	62.46	47.90	40.35
F_y		46 ksi								
Effective length in feet KL with respect to radius of gyration	0	839	729	555	618	472	618	508	389	328
	6	815	704	536	593	453	588	481	370	311
	7	810	699	533	588	449	581	476	366	308
	8	805	694	529	583	445	574	471	361	305
	9	800	689	525	577	441	567	465	357	301
	10	795	684	521	571	437	559	459	352	297
	11	790	678	517	566	433	551	452	348	293
	12	785	672	513	559	428	543	446	343	289
	13	779	666	508	553	423	534	439	338	285
	14	773	660	504	546	418	525	432	332	280
	15	767	654	499	540	413	516	424	327	276
	16	761	647	494	533	408	507	417	321	271
	17	755	641	489	526	403	497	409	315	266
	18	748	634	484	518	397	487	401	309	261
	19	741	627	478	511	391	476	392	303	256
	20	735	619	473	503	386	466	384	296	251
	21	728	612	467	495	380	455	375	290	245
	22	721	604	462	487	373	444	366	283	240
	23	713	597	456	478	367	432	357	276	234
	24	706	589	450	470	361	420	348	269	228
	25	698	581	444	461	354	408	338	262	222
	26	691	573	438	452	348	396	328	255	216
	27	683	564	432	443	341	383	318	247	210
	28	675	556	425	434	334	370	308	239	203
	29	667	547	419	424	327	357	297	232	197
	30	658	538	412	415	320	344	287	224	190
	32	641	520	398	395	305	316	264	207	176
	34	624	501	384	374	289	287	241	190	162
	36	606	482	370	353	274	257	217	172	147
	38	587	462	355	331	257	230	195	154	132
	40	568	441	339	308	240	208	176	139	119

Properties

A (in. ²)	30.40	26.40	20.10	22.40	17.10	22.40	18.40	14.10	11.90
I (in. ⁴)	1200	791	615	485	380	321	271	214	183
r (in.)	6.29	5.48	5.54	4.66	4.72	3.78	3.84	3.90	3.93
B Bending factor	0.202	0.233	0.228	0.276	0.269	0.350	0.339	0.328	0.323
* a	179	118	91.7	72.3	56.7	47.8	40.4	32.0	27.3

* Tabulated values of a must be multiplied by 10^6 .Note: Heavy line indicates KL/r of 200.

TYP. BRACE CONNECTION DESIGN PER AISC 8 - DESIGN C

Beam Size =	W 16x31
tf =	0.44 inch
tw =	0.275 inch
Beam Gravity Shear Reaction =	30 Kips
Beam Axial Reaction =	28 Kips
Length of 2L4x4x5/16 conn. Beam with Col. Flange =	19 inch
Column Size =	W 14x342
tf =	2.47 inch
(2)L4x4 Angle Thickness for Conn. Gusset to Col. Flange =	5/16
Brace Size=	ST S 8x8x0.375
B =	8 inch
tw =	0.375 inch
(2)L4x4 Angle Thickness for Conn. Beam with Col. Flange =	5/16
Brace ASD Axial force =	182 Kips
Angle of Brace to Horz. =	41.89 Degree
Vertical Reaction Component from Brace =	121.52 Kips
Horz. Reaction Component from Brace =	135.49 Kips

Brace to Gusset Connection

Brace Gusset Plate Thickness =	0.625 in
HSS Brace to Gusset overlap =	10 in
Brace Gusset Plate Length =	18.5 in
Brace Gusset Plate Height =	17 in
HSS Brace Gusset to HSS Weld Size =	5/16
HSS Brace to Gusset Min. Weld Size Check =	1/4 OK
HSS Brace to Gusset Max. Weld Size Check =	5/16 OK
Available Weld Strength for Brace to Gusset Conn. =	185.60 OK

Gusset to Beam Flange Connection

Demand Horz. Force =	135.49 Kips
Gusset plate to Beam flange weld =	1/4
Gusset to Beam Flange Min. Weld Size Check =	1/4 OK
Gusset to Beam Flange Max. Weld Size Check =	3/8 OK
Available Weld Strength for Gusset to Beam Flange Conn. =	137.34 OK

2L4x4 to Beam Web Welded Connection

Demand Vert. Load =	30 Kips
Demand Horz. Load =	28 Kips
Length of 2L4x4x5/16 conn. Gusset with Col. Flange =	12 inch
Gusset plate to 2L4x4 Weld Size =	3/16
Beam Web to 2L4x4 Min. Weld Size Check =	3/16 OK
Beam Web to 2L4x4 Max. Weld Size Check =	3/16 OK
Beam Web to 2L4x4 Weld Length, l =	12 inch
k/ =	3.5 inch
k =	0.29
xl =	0.64 inch
al =	3.36
lp =	416.69 inch^4
Stress Due to Vertical Shear Load, V, fy =	1.18 ksi
Stress Due to Horz. Load, T, fx =	1.11 ksi
Couple M Due to Eccentricity = Vxl =	100.66 k-in
Vertical stress on weld due to moment, f'y =	0.52 ksi
Horizontal Stress on weld due to moment, f'x =	1.09 ksi
Resultant of stresses on weld =	2.78 ksi
Weld Capacity for Double Angle Conn. =	5.57 ksi

OK

2L4x4-Beam web to Col. Flange Bolted Connection

Demand Vert. Load =	30 Kips	
Demand Horz. Load =	28 Kips	
Length of 2L4x4x5/16 conn. Gusset with Col. Flange =	19 inch	
Dia. of Bolts from 2L4x4 into WF Col. =	3/4 inch	
No. of Bolts =	4	
Hole Diameter for a Std. Hole, d' =	13/16 inch	
Bolt Spacing from Edge of L4x4 =	2.5 inch	
Edge Distance =	1.5 inch	
Minimum Edge Distance =	1 inch	OK
(2)L4x4 Angle Thickness for Conn. Beam web to Col. Flange =	5/16	
b =	2.188 inch	
b' =	1.813	
a =	1.500 inch	
1.25 b =	2.734 inch	OK
a' =	1.875 inch	
p =	3.5	
ϕ =	0.768	
T =	2.625 Kips	
M =	1.538 k-in	
α =	2.726	
Bc =	4.342 Kips	OK
Vb =	3.75 Kips	OK
Tension Capacity of Single Bolt, B =	19.400 Kips/bolt	(From Table 1-A from AISC M
Shear Capacity of Single Bolt (Single Shear), V =	9.300 Kips/bolt	(From Table 1-D from AISC IV
tf req =	0.313 inch	OK

Gusset Plate Shear Check

Actual Shear Stress, fv =	8.788 ksi	
Allowable Shear Stress, Fv =	14.4 ksi	OK

Gusset Plate Yielding Check

Tension Demand =	182 Kips	
Net Tension Gusset Area =	6.25 in ²	
Net Shear Gusset Area =	12.5 in ²	
P allowed =	398.75 Kips	OK

Gusset Plate Buckling Check

Demand from Brace force =	182 Kips	
Thickness of the Gusset plate =	0.625 inch	
Base width of the Whitmore Section, W =	19.55 inch	
Actual stress at Whitmore Section, fa =	11.173 ksi	OK
Allowable Tension Stress, Ft =	21.6 ksi	OK
Distance to the Work point, L1 =	22.625 inch	
radius of gyration for 1" strip, r =	0.180	
KL1/r =	81.510	
Allowable Compression Stress, Fa =	15.2 ksi	(From Table 3-36 Page 5-74 f

2L4x4 from Gusset to Column Flange Connection

Demand shear force, V =	121.52 Kips	OK
Weld size =	5/16	
Length of the connection Angle =	15 inch	
No. of 3/4" Dia. Bolts, N =	5	(From Table III Page 4-31 froi
Connection Capacity =	139 Kips	

TABLE 3-36
ALLOWABLE STRESS
FOR COMPRESSION MEMBERS OF 36 KSI SPECIFIED YIELD STRESS STEEL

 $F_y = 36 \text{ ksi}$

Main and Secondary Members Kl/r not over 120					Main Members Kl/r 121 to 200				Secondary Members ^a l/r 121 to 200				
$\frac{Kl}{r}$	F_a (ksi)	$\frac{Kl}{r}$	F_a (ksi)	$\frac{Kl}{r}$	F_a (ksi)	$\frac{Kl}{r}$	F_a (ksi)	$\frac{Kl}{r}$	F_a (ksi)	$\frac{l}{r}$	F_{as} (ksi)	$\frac{l}{r}$	F_{as} (ksi)
1	21.56	41	19.11	81	15.24	121	10.14	161	5.76	121	10.19	161	7.25
2	21.52	42	19.03	82	15.13	122	9.99	162	5.69	122	10.09	162	7.20
3	21.48	43	18.95	83	15.02	123	9.85	163	5.62	123	10.00	163	7.16
4	21.44	44	18.86	84	14.90	124	9.70	164	5.55	124	9.90	164	7.12
5	21.39	45	18.78	85	14.79	125	9.55	165	5.49	125	9.80	165	7.08
6	21.35	46	18.70	86	14.67	126	9.41	166	5.42	126	9.70	166	7.04
7	21.30	47	18.61	87	14.56	127	9.26	167	5.35	127	9.59	167	7.00
8	21.25	48	18.53	88	14.44	128	9.11	168	5.29	128	9.49	168	6.96
9	21.21	49	18.44	89	14.32	129	8.97	169	5.23	129	9.40	169	6.93
10	21.16	50	18.35	90	14.20	130	8.84	170	5.17	130	9.30	170	6.89
11	21.10	51	18.26	91	14.09	131	8.70	171	5.11	131	9.21	171	6.85
12	21.05	52	18.17	92	13.97	132	8.57	172	5.05	132	9.12	172	6.82
13	21.00	53	18.08	93	13.84	133	8.44	173	4.99	133	9.03	173	6.79
14	20.95	54	17.99	94	13.72	134	8.32	174	4.93	134	8.94	174	6.76
15	20.89	55	17.90	95	13.60	135	8.19	175	4.88	135	8.86	175	6.73
16	20.83	56	17.81	96	13.48	136	8.07	176	4.82	136	8.78	176	6.70
17	20.78	57	17.71	97	13.35	137	7.96	177	4.77	137	8.70	177	6.67
18	20.72	58	17.62	98	13.23	138	7.84	178	4.71	138	8.62	178	6.64
19	20.66	59	17.53	99	13.10	139	7.73	179	4.66	139	8.54	179	6.61
20	20.60	60	17.43	100	12.98	140	7.62	180	4.61	140	8.47	180	6.58
21	20.54	61	17.33	101	12.85	141	7.51	181	4.56	141	8.39	181	6.56
22	20.48	62	17.24	102	12.72	142	7.41	182	4.51	142	8.32	182	6.53
23	20.41	63	17.14	103	12.59	143	7.30	183	4.46	143	8.25	183	6.51
24	20.35	64	17.04	104	12.47	144	7.20	184	4.41	144	8.18	184	6.49
25	20.28	65	16.94	105	12.33	145	7.10	185	4.36	145	8.12	185	6.46
26	20.22	66	16.84	106	12.20	146	7.01	186	4.32	146	8.05	186	6.44
27	20.15	67	16.74	107	12.07	147	6.91	187	4.27	147	7.99	187	6.42
28	20.08	68	16.64	108	11.94	148	6.82	188	4.23	148	7.93	188	6.40
29	20.01	69	16.53	109	11.81	149	6.73	189	4.18	149	7.87	189	6.38
30	19.94	70	16.43	110	11.67	150	6.64	190	4.14	150	7.81	190	6.36
31	19.87	71	16.33	111	11.54	151	6.55	191	4.09	151	7.75	191	6.35
32	19.80	72	16.22	112	11.40	152	6.46	192	4.05	152	7.69	192	6.33
33	19.73	73	16.12	113	11.26	153	6.38	193	4.01	153	7.64	193	6.31
34	19.65	74	16.01	114	11.13	154	6.30	194	3.97	154	7.59	194	6.30
35	19.58	75	15.90	115	10.99	155	6.22	195	3.93	155	7.53	195	6.28
36	19.50	76	15.79	116	10.85	156	6.14	196	3.89	156	7.48	196	6.27
37	19.42	77	15.69	117	10.71	157	6.06	197	3.85	157	7.43	197	6.26
38	19.35	78	15.58	118	10.57	158	5.98	198	3.81	158	7.39	198	6.24
39	19.27	79	15.47	119	10.43	159	5.91	199	3.77	159	7.34	199	6.23
40	19.19	80	15.36	120	10.28	160	5.83	200	3.73	160	7.29	200	6.22

^a K taken as 1.0 for secondary members.

Note: $C_c = 126.1$

FRAMED BEAM CONNECTIONS

Welded—E70XX electrodes for
combination with Table II connections

TABLE III Allowable loads in kips

Weld A		Weld B		Angle Length L In.	^a Minimum Web Thickness for Welds A		Maximum Number of Fasteners in One Vertical Row (Table II)
Capacity, Kips	^b Size, In.	^c Capacity, Kips	Size, In.		$F_y = 36$ ksi $F_v = 14.5$ ksi	$F_y = 50$ ksi $F_v = 20$ ksi	
266	5/16	296	3/8	29 1/2	.64	.46	10
213	1/4	247	5/16	29 1/2	.51	.37	
160	3/16	197	1/4	29 1/2	.38	.28	
245	5/16	261	3/8	26 1/2	.64	.46	9
196	1/4	217	5/16	26 1/2	.51	.37	
147	3/16	173	1/4	26 1/2	.38	.28	
222	5/16	223	3/8	23 1/2	.64	.46	8
178	1/4	186	5/16	23 1/2	.51	.37	
133	3/16	149	1/4	23 1/2	.38	.28	
198	5/16	187	3/8	20 1/2	.64	.46	7
158	1/4	156	5/16	20 1/2	.51	.37	
119	3/16	125	1/4	20 1/2	.38	.28	
174	5/16	152	3/8	17 1/2	.64	.46	6
139	1/4	126	5/16	17 1/2	.51	.37	
104	3/16	101	1/4	17 1/2	.38	.28	
148	5/16	115	3/8	14 1/2	.64	.46	5
118	1/4	95.7	5/16	14 1/2	.51	.37	
88.7	3/16	76.6	1/4	14 1/2	.38	.28	
121	5/16	80.1	3/8	11 1/2	.64	.46	4
97.0	1/4	66.9	5/16	11 1/2	.51	.37	
72.7	3/16	53.4	1/4	11 1/2	.38	.28	
92.1	5/16	48.2	3/8	8 1/2	.64	.46	3
73.7	1/4	40.3	5/16	8 1/2	.51	.37	
55.3	3/16	32.2	1/4	8 1/2	.38	.28	
61.8	5/16	21.9	3/8	5 1/2	.64	.46	2
49.5	1/4	18.3	5/16	5 1/2	.51	.37	
37.1	3/16	14.6	1/4	5 1/2	.38	.28	

^a When the beam web thickness is less than the minimum, multiply the connection capacity furnished by Weld A by the ratio of the actual web thickness to the tabulated minimum thickness. Thus, if 5/16" Weld A, with a connection capacity of 156 kips and a 14 1/2" long angle, is considered for a beam of web thickness of 0.375" with $F_y = 36$ ksi, the connection capacity must be multiplied by $0.375/0.64$, giving 91.4 kips.

^b Should the thickness of material to which connection angles are welded exceed the limits set by AISC Specification Sect. 1.17.2 for weld sizes specified, increase the weld size as required, but not to exceed the angle thickness.

^c When welds are used on outstanding legs, connection capacity may be limited by the shear capacity of the supporting member as stipulated by AISC Specification Sect. 1.5.3. See Examples (d) and (e) for Table IV.

Note 1: Connection Angles: Two L 4 x 3 1/2 x thickness x L ; $F_y = 36$ ksi. See discussion preceding examples for Table III for limiting values of thickness and optional width of legs.

Note 2: Capacities shown in this table apply only when the material welded is $F_y = 36$ ksi or $F_y = 50$ ksi steel.

BRACE FRAME BASE CONN.

20.027

Detailed Design Results

Baseplates for Cols. at C-4 Lateral Combo

9/30/20 10:50

CRITERIA:

Analysis

Strain Compatibility Not Maintained

Use min. effective plate area for axial only compression load on plate.

Design

Use ASD 9th to check plate bending

Max concrete bearing per AISC J9.

Anchor Shear Check Per AISC Specifications.

Anchor Tension Check Per AISC Specifications.

INPUT DATA:

Column

Column Size.....	W14X370
Dim: BfTop TfTop BfBot TfBot TW Depth	
(in) 16.50 2.660 16.50 2.660 1.660 17.90	

Base Plate

Plate Fy (ksi)	36.000
N (Parallel to Web) (in).....	50.000
B (Perpendicular to Web) (in).....	30.000
Plate Thickness (in).....	3.500

Anchor

Anchor Size.....	2 1/2"
Anchor Area (in^2).....	4.910
Anchor Material.....	Other
Anchor Strength Fu (ksi)	58.00
Thread Included in Shear Plane	

Footing

Footing Strength f'c (ksi)	4.00
Concrete Modulus (ksi)	3605.00
Dimension (Parallel to web) (ft).....	16.00
Dimension (Perpendicular to web) (ft)...	12.00

Design Load

Building Code: - None -

Load combination: Single Load Case

Axial (kip).....	1995.00
Vx (kip).....	128.00
Mx (kip-ft).....	0.00
Allowable Stress Increase Factor	1.00

RESULTS:

Analysis

Uniform Load on Base Plate.

Plate Bending

Max bending moment from concrete compression	
Allowable Stress Increase Factor	1.00
N Eff (in).....	28.855
B Eff (in).....	25.177
m [N-0.95d]/2.0 (in).....	5.925
n [B-0.80b]/2.0 (in).....	5.988
Lamda.....	1.000
n'.....	4.296
Controlling effective width to resist moment (in) ...	28.855
Controlling plate bending moment (kip-ft)	118.38
fb (ksi)	24.11
Fb (ksi)	27.00

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fb/Fb 0.89
 Thickness Required (in)..... 3.308
 Thickness controlled by cantilever action.

Anchors

Anchor	X(in)	Y(in)	V(kip)	T(kip)	Interaction
1	-21.00	10.00	21.33	0.00	0.44
2	21.00	10.00	21.33	0.00	0.44
3	-21.00	-10.00	21.33	0.00	0.44
4	21.00	-10.00	21.33	0.00	0.44
5	0.00	10.00	21.33	0.00	0.44
6	0.00	-10.00	21.33	0.00	0.44

Bearing

Eff Area of Support A2 (in^2)..... 2905.92
 Plate Area A1 (in^2)..... 726.48
 Sqrt (A2/A1)..... 2.00
 Allowable Bearing Pressure (ksi) 2.80
 Actual Bearing Stress (ksi) 2.75

DIAGRAM:

#	X(in)	Y(in)
1	-21.000	10.000
2	21.000	10.000
3	-21.000	-10.000
4	21.000	-10.000
5	0.000	10.000
6	0.000	-10.000

PL 50.00 X 30.00 X 3.50 (in)
 6 - 2 1/2" Other Anchor Bolts

DESIGN - C - ANCHOR BOLT DESIGN - BF COL. AT GRID C-5

Bolt Grade =	A36	
Anchor Confined for Tension =	No	
Steel Yield Stress, F_y =	36	Ksi
Steel Ult. Stress, F_u =	58	Ksi
Total service moment, M =	0	Kip-ft
lever arm between anchor bolts =	42	inch
No. of bolts =	3	
Approx. area of concrete cone at top, A_e =	3,500	sq.in
Plate Type =	Grouted Plate	
f'_c =	4000	psi
Bolt Dia., d =	2 1/4	inch
Tension Force in bolt group =	0.00	Kips
Tension Force in each Anchor, T_f =	5.00	Kips
Shear Force in each Anchor, V_i =	21.33	Kips
ϕ =	0.55	
Stress increase Factor, SIF =	1.00	
Probability factor, α =	1.00	
Concrete tensile stress red. Factor, β =	0.85	
Shear coefficient, C =	1.85	
Total effective Anchor bolt tension, T =	80.84	Kips
Yield Capacity of one Anchor, $A_t F_y$ =	117.10	Kips OK
Ult. Capacity of one Anchor, $A_t F_u$ =	188.50	Kips
Ult. Capacity of anchor group, $n \cdot A_t F_u$ =	565.50	Kips
Minimum Bolt spacing, r_m =	36.00	in
Development length, L_d =	27.00	in
Minimum edge distance for tension, m_t =	11.25	in
A_e req. =	876.60	sq.in
Min. square footing size =	29.61	in
Area of tension steel, A_{st} =	9.43	sq.in
Area of shear steel, A_{sv} =	2.40	sq.in
Shear Capacity of each anchor =	39.36	Kips
Pullout strength of concrete cone, U_p =	752.6	Kips OK
Combined shear and Tension Interaction =	0.69	≤ 1.0 OK

Expressed as an interaction equation:

$$\frac{CV}{\phi F_y A_t} + \frac{F}{\phi F_y A_t} \leq \frac{1}{\alpha}$$

1
S7.00
BRACED FRAME BASE PLATE DETAIL
SCALE: 3/4" = 1'-0"

2
S7.00
TYPICAL COLUMN ISOLATION PLAN DETAIL AT BRACED FRAME
SCALE: 3/4" = 1'-0"

MOMENT FRAME DESIGN

SAMPLE MOMENT FRAME MEMBER - LOCATION

SAMPLE DESIGN

DESIGN FORCES FOR MOMENT FRAME COL. ON LEVEL 2 AT GRID 2-E

CONTROLLING COLUMN FORCES - FLEXURE

Load Combination: $0.75 \cdot D + 0.75 \cdot L_p - 0.75 \cdot O_1$

Axial		Load (kips)	746.84
Moment	Top	Mmajor (kip-ft)	220.66
		Mminor (kip-ft)	2.62
Moment	Bot.	Mmajor (kip-ft)	-438.20
		Mminor (kip-ft)	0.00

	X-Axis	Y-Axis
Lu for Axial (ft)	16.00	16.00
Lu for Bending (ft)	16.00	16.00
K	2.05	1.00
Braced Against Joint Translation	No	No

PROVIDE W36x245 COL ON GRID 2-E

MOMENT FRAME COL. ON LEVEL 2 AT GRID 2-E

AISC Eighth Edition Column Design Wide Flange Member Only	Project ID:	19051
	Project Name:	ATC
	Engineer:	FBS
	Date:	3/1/2021

Member # =

Shape W 36x245

Properties	Geometry	
	A	72.1 <i>in.²</i>
	d	36.08 <i>in.</i>
	b _f	16.51 <i>in.</i>
	t _f	1.35 <i>in.</i>
	t _w	0.8 <i>in.</i>
	W(weight)	245 <i>#/ft.</i>
	r _T	4.32
	d/A _T	1.62

Compact Section Criteria	
b _f /2t _f	6.1
F _y	— <i>ksi</i>
d/t _w	45.1
F _y	— <i>ksi</i>
F _y	32.5 <i>ksi</i>

Elastic Properties					
X-X			Y-Y		
I _x	16100	<i>in.⁴</i>	I _y	1010	<i>in.⁴</i>
S _x	895	<i>in.³</i>	S _y	123	<i>in.³</i>
r _x	15	<i>in.</i>	r _y	3.75	<i>in.</i>
Plastic Modulus					
Z _x	1010	<i>in.³</i>	Z _y	190	<i>in.³</i>

Torsional Constant	
J	34.6 <i>in.⁴</i>

Warping Constant	
C _w	— <i>in.⁶</i>

Material Property	
E	29000 <i>ksi</i>
F _y	36 <i>ksi</i>

Non-Composite Beam/Column Design AISC Eighth Edition

Building info:

Steel Properties

Total Member Length =	16	ft.
Beam Spacing (w) =	0	ft.
Tributary Area to Col=	0	ft.^2
K=	1	
Unbraced Length =	16	ft.

Loading

Dead Load (D)=		psf
Live Load(L)=		psf
Roof Live Load(Lr)=		psf
Snow Load(S)=		psf

Excentricity on Column

ex =		in.
ey =	0	in.

Deflection Criteria

Total Load	L/360=	0.53	in.
------------	--------	------	-----

Kx =	2.05	Kl _{bx} /r _x =	26.24	(Kl/r) _{max} =	51.20
Ky =	1	Kl _{by} /r _y =	51.20		

Max Moment About Major Axis:

MD(Max Dead)=	0	kips-in
MD(Dead Overwrite)=	5258.4	kips-in
MD(Max Use)=	5258.4	kips-in
ML(Max Live)=	0	kips-in
ML(Live Overwrite)=	0	kips-in
ML(Max Use)=	0	kips-in
M(Lr or S)(Max Live)=	0	kips-in
M(Lr or S)(Live Overwrite)=	0	kips-in
M(Lr or S)(Max Use)=	0	kips-in
Mu=	5258.4	kips-in

Max Moment About Minor Axis:

MD(Max Dead)=	0	kips-in
MD(Dead Overwrite)=	0	kips-in
MD(Max Use)=	0	kips-in
ML(Max Live)=	0	kips-in
ML(Live Overwrite)=	0	kips-in
ML(Max Use)=	0	kips-in
M(Lr or S)(Max Live)=	0	kips-in
M(Lr or S)(Live Overwrite)=	0	kips-in
M(Lr or S)(Max Use)=	0	kips-in
Mu=	0	kips-in

Max Shear

VD(Max Dead)=	0	kips
VD(Dead Overwrite)=		kips
VMD(Max Use)=	0	kips
VL(Max Live)=	0	kips
VL(Live Overwrite)=	0	kips
VL(Max Use)=	0	kips
V(Lr or S)(Max Live)=	0	kips
V(Lr or S)(Live Overwrite)=	0	kips
V(Lr or S)(Max Use)=	0	kips
Vu=	0	kips

Max Axial Load

PD(Max Dead)=	0	kips
PD(Dead Overwrite)=	746.84	kips
PD(Max Use)=	746.84	kips
PL(Max Live)=	0	kips
PL(Live Overwrite)=	0	kips
PL(Max Use)=	0	kips
P(Lr or S)(Max Live)=	0	kips
P(Lr or S)(Live Overwrite)=	0	kips
P(Lr or S)(Max Use)=	0	kips
P(E or W)=		kips
P=	746.84	kips

Solution Summary:

Try **W 36x245** <---- Change W shapes

Member	Major Axis Beam Bending	27%
	Beam Shear	0%
	Minor Axis Beam Bending	0%
	Axial	57%
	Deflection	0%
	Combined Bending and Axial	81%
Overall Check		81%

Column Design AISC Eighth Edition

Note: All Equations in this section can be found in the AISC Eighth Edition Appendix A
Column Height= 16 ft

$(Kl/r)_{\max} = 51.20$

Column in Compression	
$C_c = \sqrt{2\pi^2 E / F_y} =$	126
if $\frac{KL}{r} \leq C_c$ then $F_a = \frac{[1 - \frac{(\frac{KL}{r})^2}{2C_c^2}] F_y}{\frac{5}{8} + \frac{3(\frac{KL}{r})}{8C_c} - (\frac{KL}{r})^3 / 8C_c^3}$	Section 15.1.3.1
if $\frac{KL}{r} \geq C_c$ then $F_a = \frac{12\pi^2 E}{23 (\frac{KL}{r})^2}$	Section 15.1.3.2
Column in Tension	
$F_a = 0.6F_y$	Section 15.1.1

$F_a = 18.20$ ksi

Calculate Stresses in Column

Axial Stress:	$f_a =$	$P_u/A =$	10.4	ksi	Okay
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Non-Composite Major Axis Beam Design AISC Eighth Edition

Unbraced length (L_b)= 16 ft

Checks for Typical Major Bending Stress Equation			
Equation From Appendix A	Variable Value	Limit Value	
$b_f/2t_f \leq 65/\sqrt{F_y}$	6.1	10.8	Good
$d/t_w \leq 412(1 - 2.33 \frac{f_a}{F_y})/\sqrt{F_y}$	45.1	22.4	No Good, Use Alternate EQN
$l_b \leq 76b_f/\sqrt{F_y}$	192	209.1	Good
$l_b \leq \frac{20,000}{(d/A_f) F_y}$	192	343.2	Good
			Use Alternate Equation

Checks for Alternate Major Bending Stress Equation			
Equation From Appendix A	Variable Value	Limit Value	
$55.2/\sqrt{F_y} < b_f/2t_f$	6.1	8.7	Good
$b_f/2t_f \leq 95.0/\sqrt{F_y}$	6.1	15.8	Good
			Use Alternate Bending Stress Equation

Typical Bending Stress Equation: $F_{bx} = 0.66F_y$

$F_{bx} = N/A$ ksi

Alternate Bending Stress Equation: $F_{bx} = F_y [0.733 - 0.0014 (\frac{b_f}{t_f}) \sqrt{F_y}]$

$F_{bx} = 21.6$ ksi

Shear Stress Equation: $F_v = 0.40F_y$

$F_v = 14.4$ ksi

Non-Composite Minor Axis Beam Design AISC Eighth Edition

Minor Axis Bending Equation: $F_{by} = 0.75F_y$

$F_{by} = 27$ ksi

Calculate Stresses in Beam

Major Bending Stress:	$f_{bx} = M_{ux}/S_x =$	5.88	ksi	Okay
Shear Stress:	$f_v = V_u/(t_w \cdot d) =$	0	ksi	Okay
Minor Bending Stress:	$f_{by} = M_{uy}/S_y =$	0	ksi	Okay

Calculate Deflections

Camber:	$C = .8 \frac{5w_d L^4}{384EI} =$	0	in.	
Total Deflection:	$\Delta_T = \frac{5w L^4}{384EI} - C =$	0	in.	Okay

$$F'_{ex} = \frac{12 \cdot \pi \cdot ()^2 \cdot E}{23(Kl_{bx}/r_{bx})^2} = 216.88 \text{ Ksi}$$

$$F'_{ey} = \frac{12 \cdot \pi \cdot ()^2 \cdot E}{23(Kl_{by}/r_{by})^2} = 56.97 \text{ Ksi}$$

Check Combined Stressed

$$\frac{f_a}{F_a} = 0.571 \quad \frac{f_a}{F'_{ex}} = 0.048 \quad \frac{f_a}{F'_{ey}} = 0.183$$

$$\frac{f_{bx}}{F_{bx}} = 0.272 \quad \frac{f_{by}}{F_{by}} = 0.000$$

$C_{mx} =$	0.85
$C_{my} =$	0.85

Formula 1.6-1a:	$\frac{f_a}{F_a} + \frac{C_{mx} f_{bx}}{(1 - \frac{f_a}{F'_{ex}}) F_{bx}} + \frac{C_{my} f_{by}}{(1 - \frac{f_a}{F'_{ey}}) F_{by}} =$	0.814	Less than 1.0, Okay
Formula 1.6-1b:	$\frac{f_a}{0.6 F_y} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} =$	0.753	Less than 1.0, Okay

DESIGN FORCES FOR MOMENT FRAME BEAM AT LEVEL 2 AT GRID 2-E

Load Combination: $0.75 \cdot D + 0.75 \cdot L_p + 0.75 \cdot O_1$

Axial	Load (kips)	0.00
Moment	Mmajor (kip-ft)	-405.37
Moment	Mminor (kip-ft)	-0.00

	X-Axis	Y-Axis
Lu for Axial (ft)	30.00	10.00
Lu for Bending (ft)	30.00	10.00
K	1.00	1.00
Braced Against Joint Translation	No	No
Top Flange Continuously Braced	Yes	
Bottom Flange Continuously Braced	No	

TRY W30x124 BEAM

Moment Cap. = 710 K-ft

S.R. = $0.571 < 1 = \text{OK}$

PROVIDE W30x124 BEAM AT LEVEL 2 ALONG GRID E BTWN GRIDS 2 AND 3

S_x ALLOWABLE STRESS DESIGN SELECTION TABLE

For shapes used as beams

$F_y = 50$ ksi			S_x	Shape	Depth d	F_y'	$F_y = 36$ ksi		
L_c	L_u	M_R					L_c	L_u	M_R
Ft.	Ft.	Kip-ft.			In.	Ksi	Ft.	Ft.	Kip-ft.
14.9	25.4	3050	1110	W 36x300	36 $\frac{3}{4}$	—	17.6	35.3	2220
14.9	23.8	2830	1030	W 36x280	36 $\frac{1}{2}$	—	17.5	33.1	2060
14.8	21.9	2620	953	W 36x260	36 $\frac{1}{4}$	—	17.5	30.5	1910
14.8	20.6	2460	895	W 36x245	36 $\frac{1}{8}$	—	17.4	28.6	1790
14.8	19.3	2300	837	W 36x230	35 $\frac{7}{8}$	—	17.4	26.8	1670
14.2	21.6	2280	829	W 33x241	34 $\frac{1}{8}$	—	16.7	30.1	1660
14.2	19.8	2080	757	W 33x221	33 $\frac{7}{8}$	—	16.7	27.6	1510
10.9	15.1	1980	719	W 36x210	36 $\frac{3}{4}$	—	12.9	20.9	1440
14.1	17.9	1880	684	W 33x201	33 $\frac{5}{8}$	—	16.6	24.9	1370
10.9	13.9	1830	664	W 36x194	36 $\frac{1}{2}$	—	12.8	19.4	1330
13.5	21.4	1820	663	W 30x211	31	—	15.9	29.7	1330
10.8	13.1	1710	623	W 36x182	36 $\frac{3}{8}$	—	12.7	18.2	1250
13.5	19.4	1640	598	W 30x191	30 $\frac{5}{8}$	—	15.9	26.9	1200
10.8	12.2	1600	580	W 36x170	36 $\frac{1}{8}$	—	12.7	17.0	1160
10.7	11.4	1490	542	W 36x160	36	—	12.7	15.7	1080
13.4	17.5	1480	539	W 30x173	30 $\frac{1}{2}$	—	15.8	24.2	1080
10.5	11.3	1390	504	W 36x150	35 $\frac{7}{8}$	—	12.6	14.6	1010
12.6	20.1	1380	502	W 27x178	27 $\frac{3}{4}$	—	14.9	27.9	1000
10.4	12.2	1340	487	W 33x152	33 $\frac{1}{2}$	—	12.2	16.9	974
12.6	18.3	1250	455	W 27x161	27 $\frac{5}{8}$	—	14.8	25.4	910
10.3	11.1	1230	448	W 33x141	33 $\frac{3}{4}$	—	12.2	15.4	896
8.8	11.0	1210	439	W 36x135	35 $\frac{1}{2}$	—	12.3	13.0	878
11.6	21.1	1140	414	W 24x162	25	—	13.7	29.3	828
12.5	16.6	1130	411	W 27x146	27 $\frac{3}{8}$	—	14.7	23.0	822
9.9	10.8	1120	406	W 33x130	33 $\frac{1}{8}$	—	12.1	13.8	812
9.4	11.6	1050	380	W 30x132	30 $\frac{1}{4}$	—	11.1	16.1	760
11.6	18.9	1020	371	W 24x146	24 $\frac{3}{4}$	—	13.6	26.3	742
8.6	10.7	987	359	W 33x118	32 $\frac{7}{8}$	—	12.0	12.6	718
9.4	10.8	976	355	W 30x124	30 $\frac{1}{8}$	—	11.1	15.0	710
9.4	9.9	905	329	W 30x116	30	—	11.1	13.8	658
11.5	16.8	905	329	W 24x131	24 $\frac{1}{2}$	—	13.6	23.4	658
11.2	21.8	905	329	W 21x147	22	—	13.2	30.3	658
8.9	9.8	822	299	W 30x108	29 $\frac{7}{8}$	—	11.1	12.3	598
9.0	11.5	822	299	W 27x114	27 $\frac{1}{4}$	—	10.6	15.9	598
11.1	19.6	811	295	W 21x132	21 $\frac{7}{8}$	—	13.1	27.2	590
11.5	14.9	800	291	W 24x117	24 $\frac{1}{4}$	—	13.5	20.8	582
11.1	18.3	751	273	W 21x122	21 $\frac{5}{8}$	—	13.1	25.4	546

CRITERIA:

Analysis

Strain Compatibility Not Maintained

Use min. effective plate area for axial only compression load on plate.

Design

Use ASD 9th to check plate bending

Max concrete bearing per AISC J9.

Anchor Shear Check Per AISC Specifications.

Anchor Tension Check Per AISC Specifications.

INPUT DATA:

Column

Column Size.....	W36X245
Dim: BfTop TfTop BfBot TfBot TW Depth	
(in) 16.50 1.350 16.50 1.350 0.800 36.10	

Base Plate

Plate Fy (ksi)	36.000
N (Parallel to Web) (in).....	52.000
B (Perpendicular to Web) (in).....	34.000
Plate Thickness (in).....	1.500

Anchor

Anchor Size.....	2 1/4"
Anchor Area (in^2).....	3.976
Anchor Material.....	Other
Anchor Strength Fu (ksi)	58.00
Thread Included in Shear Plane	

Footing

Footing Strength f'c (ksi)	4.00
Concrete Modulus (ksi)	3605.00
Dimension (Parallel to web) (ft).....	12.00
Dimension (Perpendicular to web) (ft)...	11.00

Design Load

Building Code: - None -

Load combination: Single Load Case

Axial (kip).....	1002.00
Vx (kip).....	0.00
Mx (kip-ft).....	0.00
Allowable Stress Increase Factor	1.00

RESULTS:

Analysis

Uniform Load on Base Plate.

Plate Bending

Max bending moment from concrete compression	
Allowable Stress Increase Factor	1.00
N Eff (in).....	41.110
B Eff (in).....	21.510
m [N-0.95d]/2.0 (in).....	3.407
n [B-0.80b]/2.0 (in).....	4.155
Lamda.....	0.653
n'.....	6.101
Controlling effective width to resist moment (in) ...	41.110
Controlling plate bending moment (kip-ft)	33.50
fb (ksi)	26.08
Fb (ksi)	27.00

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CRITERIA:

Analysis

Strain Compatibility Not Maintained

Use min. effective plate area for axial only compression load on plate.

Design

Use ASD 9th to check plate bending

Max concrete bearing per AISC J9.

Anchor Shear Check Per AISC Specifications.

Anchor Tension Check Per AISC Specifications.

INPUT DATA:

Column

Column Size.....	W36X245
Dim: BfTop TfTop BfBot TfBot TW Depth	
(in) 16.50 1.350 16.50 1.350 0.800 36.10	

Base Plate

Plate Fy (ksi)	36.000
N (Parallel to Web) (in).....	52.000
B (Perpendicular to Web) (in).....	34.000
Plate Thickness (in).....	1.500

Anchor

Anchor Size.....	2 1/4"
Anchor Area (in^2).....	3.976
Anchor Material.....	Other
Anchor Strength Fu (ksi)	58.00
Thread Included in Shear Plane	

Footing

Footing Strength f'c (ksi)	4.00
Concrete Modulus (ksi)	3605.00
Dimension (Parallel to web) (ft).....	12.00
Dimension (Perpendicular to web) (ft)...	11.00

Design Load

Building Code: - None -

Load combination: Single Load Case

Axial (kip).....	1002.00
Vx (kip).....	0.00
Mx (kip-ft).....	0.00
Allowable Stress Increase Factor	1.00

RESULTS:

Analysis

Uniform Load on Base Plate.

Plate Bending

Max bending moment from concrete compression	
Allowable Stress Increase Factor	1.00
N Eff (in).....	41.110
B Eff (in).....	21.510
m [N-0.95d]/2.0 (in).....	3.407
n [B-0.80b]/2.0 (in).....	4.155
Lamda.....	0.653
n'.....	6.101
Controlling effective width to resist moment (in) ...	41.110
Controlling plate bending moment (kip-ft)	33.50
fb (ksi)	26.08
Fb (ksi)	27.00

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fb/Fb 0.97
 Thickness Required (in)..... 1.474
 Thickness controlled by cantilever action.

Anchors

Anchor	X(in)	Y(in)	V(kip)	T(kip)	Interaction
1	-24.50	0.00	0.00	0.00	0.00
2	24.50	0.00	0.00	0.00	0.00
3	-24.50	15.50	0.00	0.00	0.00
4	24.50	15.50	0.00	0.00	0.00
5	-24.50	-15.50	0.00	0.00	0.00
6	24.50	-15.50	0.00	0.00	0.00

Bearing

Eff Area of Support A2 (in^2)..... 3537.10
 Plate Area A1 (in^2)..... 884.28
 Sqrt (A2/A1)..... 2.00
 Allowable Bearing Pressure (ksi) 2.80
 Actual Bearing Stress (ksi) 1.13

DIAGRAM:

#	X(in)	Y(in)
1	-24.500	0.000
2	24.500	0.000
3	-24.500	15.500
4	24.500	15.500
5	-24.500	-15.500
6	24.500	-15.500

PL 52.00 X 34.00 X 1.50 (in)
 6 - 2 1/4" Other Anchor Bolts

CRITERIA:

Analysis

Strain Compatibility Not Maintained

Use min. effective plate area for axial only compression load on plate.

Design

Use ASD 9th to check plate bending

Max concrete bearing per AISC J9.

Anchor Shear Check Per AISC Specifications.

Anchor Tension Check Per AISC Specifications.

INPUT DATA:

Column

Column Size.....	W36X245
Dim: BfTop TfTop BfBot TfBot TW Depth	
(in) 16.50 1.350 16.50 1.350 0.800 36.10	

Base Plate

Plate Fy (ksi)	36.000
N (Parallel to Web) (in).....	52.000
B (Perpendicular to Web) (in).....	34.000
Plate Thickness (in).....	2.750

Anchor

Anchor Size.....	2 1/4"
Anchor Area (in^2).....	3.976
Anchor Material.....	Other
Anchor Strength Fu (ksi)	58.00
Thread Included in Shear Plane	

Footing

Footing Strength f'c (ksi)	4.00
Concrete Modulus (ksi)	3605.00
Dimension (Parallel to web) (ft).....	12.00
Dimension (Perpendicular to web) (ft)...	11.00

Design Load

Building Code: - None -

Load combination: Single Load Case

Axial (kip).....	742.00
Vx (kip).....	50.50
Mx (kip-ft).....	451.00
Allowable Stress Increase Factor	1.00

RESULTS:

Analysis

YBar (in)	56.89
Resultant Angle (°).....	0.00

Plate Bending

Max bending moment from concrete compression	
Allowable Stress Increase Factor	1.00
m [N-0.95d]/2.0 (in).....	8.853
n [B-0.80b]/2.0 (in).....	10.400
Controlling effective width to resist moment (in) ...	34.000
Controlling plate bending moment (kip-ft)	81.36
fb (ksi)	22.78
Fb (ksi)	27.00
fb/Fb	0.84
Thickness Required (in).....	2.526
Thickness controlled by cantilever action.	

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Anchors

Anchor	X(in)	Y(in)	V(kip)	T(kip)	Interaction
1	-24.50	0.00	8.42	0.00	0.21
2	24.50	0.00	8.42	0.00	0.21
3	-24.50	15.50	8.42	0.00	0.21
4	24.50	15.50	8.42	0.00	0.21
5	-24.50	-15.50	8.42	0.00	0.21
6	24.50	-15.50	8.42	0.00	0.21

Bearing

Eff Area of Support A2 (in^2).....	7072.00
Plate Area A1 (in^2).....	1768.00
Sqrt (A2/A1).....	2.00
Allowable Bearing Pressure (ksi)	2.80
Actual Bearing Stress (ksi)	0.77

DIAGRAM:

#	X(in)	Y(in)
1	-24.500	0.000
2	24.500	0.000
3	-24.500	15.500
4	24.500	15.500
5	-24.500	-15.500
6	24.500	-15.500

DESIGN C - ANCHOR BOLT DESIGN - MF COL. AT GRID A-2

Bolt Grade =	A36
Anchor Confined for Tension =	No
Steel Yield Stress, F_y =	36 Ksi
Steel Ult. Stress, F_u =	58 Ksi
Total service moment, M =	451 Kip-ft
lever arm between anchor bolts =	43 inch
No. of bolts =	3
Approx. area of concrete cone at top, A_e =	3,960 sq.in
Plate Type =	Grouted Plate
f'_c =	4000 psi
Bolt Dia., d =	2 1/4 inch
Tension Force in bolt group =	125.86 Kips
Tension Force in each Anchor, T_f =	41.95 Kips
Shear Force in each Anchor, V_i =	8.5 Kips
ϕ =	0.55
Stress increase Factor, SIF =	1.00
Probability factor, α =	1.00
Concrete tensile stress red. Factor, β =	0.85
Shear coefficient, C =	1.85
Total effective Anchor bolt tension, T =	104.87 Kips
Yield Capacity of one Anchor, AtF_y =	117.10 Kips
Ult. Capacity of one Anchor, AtF_u =	188.50 Kips
Ult. Capacity of anchor group, $n*AtF_u$ =	565.50 Kips
Minimum Bolt spacing, r_m =	36.00 in
Development length, L_d =	27.00 in
Minimum edge distance for tension, mt =	11.25 in
A_e req. =	876.60 sq.in
Min. square footing size =	29.61 in
Area of tension steel, A_{st} =	9.43 sq.in
Area of shear steel, A_{sv} =	2.40 sq.in
Pullout strength of concrete cone, U_p =	851.5 Kips
Combined shear and Tension Interaction =	0.90 <=1.0

OK

OK

OK

Expressed as an interaction equation:

$$\frac{CV}{\phi F_y A_t} + \frac{F}{\phi F_y A_t} \leq \frac{1}{\alpha}$$

1
S7.10 TYPICAL BEAM TO WF COLUMN FLANGE MOMENT CONNECTION
SCALE: 3/4" = 1'-0"

3
S7.10 TYP. MOMENT FRAME COL. BASE PLATE
SCALE: 1" = 1'-0"

Design Case D

1988 SBC “Risk Category III” “Seismic Design Category C”

This section presents representative structural calculations for Building 1 (12-story office building in Savannah, Georgia) Design Case D. Project objectives, building selection criteria, seismic design criteria, structural design drawings, references, and project participants are documented in NIST GCR 21-917-48v1A.

TABLE OF CONTENTS

Design Criteria	3
Gravity Design	8
Beam Design	12
Column Design	17
Lateral Design	21
Braced Frame Design	43
Moment Frame Design.....	61

DESIGN CRITERIA

DESIGN D: 1988 SBC "RISK CATEGORY III" EQUIVALENT**Applicable Codes**

- 1988 Standard Building Code
- ACI 318-83: Building Code Requirements for Structural Concrete
- AISC Design, Fabrication and Erection of Structural Steel for Buildings, 1978

Nature of Occupancy:

Occupant load > 300 in any one room (wind)
Total occupant load > 300 in Use Group A
(seismic)

Wind Loading Criteria:

- Basic Wind Speed: $V = 90$ mph
- Use Factor: 1.15
- Allowable drift at design wind speed: $H/360$

Snow Loads:

- Ground Snow Load: 0 PSF

Seismic Loading Criteria:

- Zone: 2
- A_v : 0.10
- Z Factor: 0.24
- I, Occupancy Importance Factor: 1.25
- K, Braced Frames: 1.0
- K, Ordinary moment-resisting steel frames: 1.0
- S (Soil Profile Type S₃): 1.5

DESIGN D (1988 SBC) DEFINITIONS:**Concrete:**

- Slab on ground: $F'_c = 4000$ PSI
- Slabs on steel deck (lightweight 110 pcf) $F'_c = 3,000$ PSI
- Foundations: $F'_c = 4,000$ PSI
- Exterior Concrete: $F'_c = 4,500$ PSI

Concrete Reinforcement:

- Rebar: $F_y = 60$ KSI

Structural Steel:

- WF columns and beams: $F_y = 36$ KSI
- Tubes:
 - Round $F_y = 42$ KSI
 - Rectangular $F_y = 46$ KSI
- Other steel, unless noted otherwise: $F_y = 36$ KSI

FOUNDATION CRITERIA

- 14" square prestressed precast piles
 - Compression capacity 80 tons
 - Tension capacity 60 tons
 - Lateral Capacity 10 tons

1208 LOAD COMBINATIONS

1208.1 Working Stress Design

Every building element shall be provided with sufficient strength to resist the most critical effects resulting from the following combinations of loads:

1. Dead + Floor Live¹ + Roof Live (or Snow)².
2. Dead + Floor Live¹ + Wind (or Seismic).
3. Dead + Floor Live¹ + Wind + 1/2 Snow.²
4. Dead + Floor Live¹ + 1/2 Wind + Snow.²
5. Dead + Floor Live¹ + Snow³ + Seismic.

NOTES:

1. Floor live load shall not be included where its inclusion results in lower stresses in the building element under investigation.
2. Crane loads need not be combined with roof live load nor with more than 3/4 of snow load or 1/2 wind load.
3. Snow loads over 30 psf may be reduced 75% upon approval of the Building Official. Snow loads 30 psf or less need not be combined with seismic.

LOAD COMBINATIONS USED IN RAM MODEL

(ALLOWABLE STRESS DESIGN COMBINATIONS)

1	D	DL
2	D+Lp	DL+LL
3	D+Lp+Rfp	DL+LL+RL
4	0.75*D+0.75*Lp+0.75*O1	0.75*DL+0.75*LL+0.75*WL _x
5	0.75*D+0.75*Lp+0.75*O2	0.75*DL+0.75*LL+0.75*WL _y
6	0.75*D+0.75*Lp-0.75*O1	0.75*DL+0.75*LL-0.75*WL _x
7	0.75*D+0.75*Lp-0.75*O2	0.75*DL+0.75*LL-0.75*WL _y
8	0.75*D+0.75*O1	0.75*DL+0.75*WL _x
9	0.75*D+0.75*O2	0.75*DL+0.75*WL _y
10	0.75*D-0.75*O1	0.75*DL-0.75*WL _x
11	0.75*D-0.75*O2	0.75*DL-0.75*WL _y

Steel/Footing Design Combos

Notes: Wind load is reduced by 1/1.33333 (0.75x) to account for the code allowed stress increased

(STRENGTH DESIGN COMBINATIONS)

12	1.4*D + 1.7*Lp+1.7*Rfp	
13	1.05*D+1.275*Lp+1.275*Rfp+1.275*O1	Pile Cap Design Combos
14	1.05*D+1.275*Lp+1.275*Rfp-1.275*O1	
15	0.9*D+1.3*O1	
16	0.9*D-1.3*O1	
17	1.05*D+1.275*Lp+1.275*Rfp+1.275*O2	
18	1.05*D+1.275*Lp+1.275*Rfp-1.275*O2	
19	0.9*D+1.3*O2	
20	0.9*D-1.3*O2	

STRENGTH DESIGN—GENERAL PRINCIPLES

General. Strength design is based on the concept that after the yield point of the reinforcing is reached, the reinforcement continues to elongate until the maximum compressive fiber strain of the concrete section is reached. The design limitations of the code ensure that structural sections will be under-reinforced for flexure, so that yield of the steel occurs before concrete crushes. The ultimate flexural capacity of a reinforced concrete section is computed as the resistance when the reinforcement reaches the yield strength.

Load Factors. Load factors provide for overloads. ACI 318-83 requires that the actual or specified dead, live, wind, earthquake and other load effects each be increased by an appropriate load factor to form the design loads. The design strength at each section must be equal to, or greater than, the effect of these design load combinations:

$$U = 1.4D + 1.7L \dots \dots \dots (9-1)$$

$$U = 0.75(1.4D + 1.7L + 1.7W) \dots \dots \dots (9-2)$$

$$U = 0.9D + 1.3W \dots \dots \dots (9-3)$$

where D , L , and W are specified dead, live, and wind loads. The combinations for earthquake load, $1.1E$, are the same as for wind, W . Other load effects are to be multiplied by factors appropriate.

1.5.4 Cast Steel and Steel Forgings

Allowable stresses shall be the same as those provided in Sect. 1.5.1, where applicable.

1.5.5 Masonry Bearing

In the absence of Code regulations the following stresses apply:

On sandstone and limestone $F_p = 0.40 \text{ ksi}$

On brick in cement mortar $F_p = 0.25 \text{ ksi}$

On the full area of a concrete support $F_p = 0.35f'_c$

On less than the full area of a
concrete support $F_p = 0.35f'_c \sqrt{A_2/A_1} \leq 0.7f'_c$

where f'_c = specified compressive strength of concrete, kips per square inch

A_1 = bearing area, square inches

A_2 = full cross-sectional area of concrete support, square inches

1.5.6 Wind and Seismic Stresses

Allowable stresses may be increased $1/3$ above the values otherwise provided when produced by wind or seismic loading, acting alone or in combination with the design dead and live loads, provided the required section computed on this basis is not less than that required for the design dead and live load and impact (if any), computed without the $1/3$ stress increase, and further provided that stresses are not otherwise* required to be calculated on the basis of reduction factors applied to design loads in combinations. The above stress increase does not apply to allowable stress ranges provided in Appendix B.

SECTION 1.6 COMBINED STRESSES

1.6.1 Axial Compression and Bending

Members subjected to both axial compression and bending stresses shall be proportioned to satisfy the following requirements:

$$\frac{f_a}{F_a} + \frac{C_{mx}f_{bx}}{\left(1 - \frac{f_a}{F'_{ex}}\right)F_{bx}} + \frac{C_{my}f_{by}}{\left(1 - \frac{f_a}{F'_{ey}}\right)F_{by}} \leq 1.0 \quad (1.6-1a)$$

Handwritten notes:
 $f_a = P/A$
 $F_a = F_{KR}/r$
 $f_b = M/S$
 $F_b = \text{CHECK COMPACT COMPARE TO } M_p$

$$\frac{f_a}{0.60F_y} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} \leq 1.0 \quad (0.95 - 1.02) \quad (1.6-1b)$$

When $f_a/F_a \leq 0.15$, Formula (1.6-2) may be used in lieu of Formulas (1.6-1a) and (1.6-1b):

$$\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} \leq 1.0 \quad (1.6-2)$$

In Formulas (1.6-1a), (1.6-1b), and (1.6-2), the subscripts x and y , combined with subscripts b , m , and e , indicate the axis of bending about which a particular stress or design property applies, and

* For example, see ANSI A58.1-72, Sect. 4.2.

GRAVITY DESIGN

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SUPERIMPOSED DEAD LOAD DESIGNATIONS			
MARK	USE	LOAD (PSF)	NOTES
A	OFFICE	10 + 20	MISC. + PARTITIONS
B	ROOF	20	10 ROOFING + 10 MISC.

LIVE LOAD DESIGNATIONS				
MARK	USE	LOAD (PSF)	NOTES	
1	OFFICE	50 (R)		
2	CORRIDORS	80 (R)		
3	LOBBIES & STAIRS	100 (R)		
4	MECHANICAL & STORAGE	125 (NR)		
5	ROOF	20 (R)

ventilating, and air conditioning systems, shall be included whenever such equipment is supported by structural elements.

1203 LIVE LOADS

1203.1 Uniform Floor Live Loads

The live loads assumed for purposes of design shall be the greatest loads that probably will be produced by the intended uses and occupancies, provided that the minimum live loads to be considered as uniformly distributed shall be as given in Table 1203.1.

1203.2 Reduction of Uniform Floor Live Load

Floor live loads in 1203.1 may be reduced in accordance with the following provisions. Such reductions shall apply to slab systems designed for flexure in more than one direction, beams, girders, columns, piers, walls and foundations.

1. A reduction shall not be permitted in Group A occupancies, or for roof live loads or lateral loads.
2. A reduction shall not be permitted when the live load exceeds 100 psf except that the design live load for columns may be reduced 20%.
3. For live loads not exceeding 100 psf, the design live load for any structural member supporting 150 sq ft or more may be reduced at the rate of 0.08% per sq ft of the area supported. Such reduction shall not exceed 40% for horizontal members, 60% for vertical members, nor R as determined by the following formula:

$$R = 23.1 (1 + D/L)$$

where: R = Reduction in percent

D = Dead load per square foot of area supported

L = Live load per square foot of area supported.

1203.3 Concentrated Floor Live Loads

In the design of floors, probable concentrated loads shall be considered. Where such loads may occur, the supporting beams, girders and slabs shall be designed to carry either the concentrated loads or the live load described in 1203.1, whichever produces the greater stresses. Concentrated loads shall be equal to the machinery, vehicle, equipment, or apparatus anticipated but shall not be less than the loads specified in Table 1203.3.

1203.4 Distribution of Live Loads

Where structural members are arranged so as to create continuity, the distribution of the live loads, such as on adjacent spans or alternate spans, which would cause maximum design conditions shall be used, except that roof live loads shall be distributed uniformly as provided in 1203.6.

EXCEPTION: The distribution of live loads on reinforced concrete structures shall be in accordance with ACI 318.

1203.5 Interior Wall Loads

Interior walls, permanent partitions, and temporary partitions shall be designed to resist all loads to which they are subjected but not less than 5 psf applied perpendicular to the walls, except for decorative screen walls.

Live Load Reduction Calculator SBC-1988 (Typ. Floor Beam)

L_o = Unreduced Design Live load per square foot of area supported by the member.

Element	Beams/Girders
L_o =	50 psf
A_T =	450 sq.ft
Reduction %	36.0%
Max Reduction %	40.0%
Used Reduction %	36.0%
Reduced LL =	$(0.64) \times L_o$
Reduced LL =	32.0 psf

Live Load Reduction Calculator SBC-1988 (Typ. Floor Girder)

L_o = Unreduced Design Live load per square foot of area supported by the member.

Element	Beams/Girders
L_o =	50 psf
A_T =	1125 sq.ft
Reduction %	90.0%
Max Reduction %	40.0%
Used Reduction %	40.0%
Reduced LL =	$(0.60) \times L_o$
Reduced LL =	30.0 psf

Live Load Reduction Calculator SBC-1988 (Typ. Int. Col.)

L_o = Unreduced Design Live load per square foot of area supported by the member.

Element	Column
L_o =	50 psf
A_T =	13500 sq.ft
Reduction %	1080.0%
Max Reduction %	60.0%
Used Reduction %	60.0%
Reduced LL =	$(0.40) \times L_o$
Reduced LL =	20.0 psf

BEAM DESIGN

TYPICAL FRAMING PLAN
RAM STRUCTURAL SYSTEM DEMAND-CAPACITY RATIO SUMMARY

ASD V8 Steel Manual W shape only

Project ID:	20.027
Project Name:	ATC BLDG
Engineer:	FS
Date:	9/4/2020

Beam # = **FB1**

Shape **W 24x55**

Properties	Geometry	
	A	16.2 <i>in.^2</i>
	d	23.57 <i>in.</i>
	b_f	7.005 <i>in.</i>
	t_f	0.505 <i>in.</i>
	t_w	0.395 <i>in.</i>
	W(weight)	55 <i>#/ft.</i>
	r_T	1.68
	d/A_f	6.66

Compact Section Criteria	
b_f/2t_f	6.9
F_y	—
d/t_w	59.7
F_y	— <i>ksi</i>
F_y	18.5 <i>ksi</i>

Elastic Properties					
X-X			Y-Y		
I_x	1350	<i>in.^4</i>	I_y	29.1	<i>in.^4</i>
S_x	114	<i>in.^3</i>	S_y	8.3	<i>in.^3</i>
r_x	9.11	<i>in.</i>	r_y	1.34	<i>in.</i>
Plastic Modulus					
Z_x	134	<i>in.^3</i>	Z_y	13.3	<i>in.^3</i>

Torsional Constant	
J	1.18 <i>in.^4</i>

Warping Constant	
C_w	— <i>in.^6</i>

Material Property	
E	29000 <i>ksi</i>
F_y	36 <i>ksi</i>

Note: Input/ verify data in yellow box:

PROVIDE W24x55 AS TYPICAL GRAVITY BEAM

Composite Beam AISC 8th Edition

Note: The following calculation is basic on the "Steel Tips by Steel Committee of California" dated Jan 1987 and Example 2 of Composite Design for building construction in AISC 8ed

Assumption:

Item	Ribs Perpendicular	Ribs Parallel
1. Concrete Area below Top of deck	Neglect	Include
2. Stud Reduction Factor	$\frac{0.85}{(Nr)^{1/2}} \left(\frac{wr}{hr} \right) * \left(\frac{Hs}{hr} - 1 \right)$	$0.6 \left(\frac{wr}{hr} \right) * \left(\frac{Hs}{hr} - 1 \right)$
3. Maximum Stud Spacing	32 in.	Not Specified
4. Deck Welding	16 in.	Not Specified
5 Minimum Width of Rib	2 in.	Depends on Nr

Building info:

Steel			Concrete			Deck		
Beam Length	45	ft.	Weight	110	pcf	Depth hr	3	in.
Beam Spacing	10	ft.	Thickness t	6.25	inches	Conc. thickness tc	3.25	in.
Fy	36	ksi	f'c	3000	psi	Stud Dia.	3/4	in.
			E'c	3122	ksi	Stud Height	5	in.
			β_1	0.85		Deck Orientation	Perpendicular	
			Light Weight concrete Reduction	0.83		Deck Width, wr	6	in.

Uniform Load		Deflection Criteria	
Dead Load	60 psf	Dead Load	L/240 or 1.5 in.
Live Load	62 psf	Live Load	L/360
Roof Live Load	0 psf		
Snow Load	0 psf		

Uniform Load W/ Combo	
w(D+L+Lr or S)	122 psf

Max Moment:		Kips-in	Kips-ft
M(max D)		1822.5	151.9
M(D overwrite)	0.0	0.0	
M(Dead use)		1822.5	151.9
M(max D+L)		3705.8	308.8
M(D+L overwrite)	0.0	0.0	
M(max use)		3705.8	308.8
Max Shear		kips	
V(max D)		13.5	
V(max D+L)		27.45	
V(D+L overwrite)	0		
V(max use)		27.45	

M_{LL} 156.9 Kip-ft

Solution Summary:

W 24x55 <---- Change W shapes

Partial Composite: **50%**

ASD Result:

Concrete Stress	0.225	
Steel Stress	0.917	
Dead Load Δ	0.949	1.4238 in.
Live Load Δ	0.373	0.5599 in.
Shoring?	No Shoreing needed	
# of studs	16	at each side of max moment
Studs per rib check	OK	
Camber=	1.000	in.
Overall	GOOD	

Result illustration:

Beam	Stud	Camber
W 24x55	32	1.000
o----- Δ		
27.45 Reaction		27.45 Reaction

$n=E/E_c$	9
-----------	---

1. Effective Width :

$L/4$	135	in.
s	120	in.
$16t+bf$	107.0	in.

Govern b_{eff} : 107.0 in.**2. Required Section Moduli**

$M(D+L+S), S_{tr}$	154.4	in.^3
$M(D \text{ only}), S_s$	75.9	in.^3

3. Composite design section properties**a. Moment of Inertia**

Ac_L	347.7663	
Ac/I	514.2888	
$Ac=b(tc)$	347.7663	in.^2
$A'c=Ac/n$	38.64	in.^2
$Y_s=d/2$	11.79	in.
$Y_c=d+hr+tc/2$	28.195	in.

Section:	A	Y	AY	ds	Ad^2	I_o
W 24x55	16.2	11.79	190.9	11.56	2165.8	1350.0
Concrete	38.64	28.195	1089	4.85	908.0	34.0
Sum	54.84069		1280.4		3073.8	1384.0
					$I_{tr}=4457.80$	in.^4

 $Y_b=23.35$ in.**b. Section Moduli**

			Partial Composite	
Str=	190.93	in.^3	Seff=	168.4 in.^3
St=	688.73	in.^3	Ieff=	3547.5 in.^4

4. Check Stress**a. Concrete** $f_c=M/n \cdot St$ 0.3038 ksi < 1.35 OK**b. Steel**

Total Load, Str= 168.4 in.^3 > 154.40625 in.^3 OK

Dead Load, Ss= 114 in.^3 > 75.94 in.^3 OK

Web shear, Fv= 2.948 ksi < 14.4 OK

5. Check Deflection

$$\Delta = \frac{5wL^4}{384EI} = \frac{ML^2}{1920I}$$

 $\Delta D=1.423828$ in. < 1.5 OK $\Delta L=0.559891$ in. < 1.5 OK**6a. Check if shore is required**

Str max=	195.13	in.^3 >	190.93	No Shoreing needed
----------	--------	---------	--------	--------------------

6b. Check if shore is required - Alt. procedure

$f_b =$	25.85	Ksi	32.04
---------	-------	-----	-------

7. Shear Connection, Stud**a. Max Stud dia** 1.2625 in. > 0.75 OK**b. Horizontal shear** $V_h=0.85 \cdot f'_c \cdot A_c/2$ 443.402 kips Concrete $V_h=As \cdot F_y/2$ 291.6 kips Steel <----- Govern**Reduction Factor**

$$\frac{0.85}{(Nr)^{1/2}} \left(\frac{wr}{hr} \right) \cdot \left(\frac{Hs}{hr} - 1 \right) \quad \text{or} \quad 0.6 \left(\frac{wr}{hr} \right) \cdot \left(\frac{Hs}{hr} - 1 \right)$$

Rf $\perp$ = 1.00Rf $\parallel$ = 1.000

Rf(use)= 1.000

q per stud= 9.5450 <-Lightweight Concrete reduction included

q * Rf= 9.545

Stud Shear	F'c(From AISC V8 Table 1.11.4) (ksi)		
Connector	3000	3500	4000
0.5	5.1	5.5	5.9
0.625	8	8.6	9.2
0.75	11.5	12.5	13.3
0.875	15.6	16.8	18

Stud Per Rib, Nr	1	
Rib Spacing	12	in.

Number of Studs= 16 At each side of where max moment is

Check Stud Per Rib 32 ft < 45 OK

COLUMN DESIGN

TYPICAL COLUMN PLAN
RAM STRUCTURAL SYSTEM DEMAND-CAPACITY RATIO SUMMARY

TYPICAL COLUMN AT LEVEL 2, GRID LINE 3-C

Story level Level 2, Column Line 3-C,

Fy (ksi) = 36.00
Orientation (degrees) = 90.0

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu (ft) _____	16.00	16.00
K _____	1	1
Braced Against Joint Translation _____	Yes	Yes

CONTROLLING COMBINED COLUMN LOADS

	Dead	Live	Roof
Axial (kips) _____	1201.48	522.25	22.50
Moments			
Top Mx (kip-ft) _____	-3.19	3.65	0.00
My (kip-ft) _____	-0.48	-6.51	0.00
Bot Mx (kip-ft) _____	-0.00	0.00	0.00
My (kip-ft) _____	0.00	0.00	0.00

TOTAL AXIAL LOAD = 1746.23 K (DL+LL+RL)

TRY W14x342 COL.

ALLOWABLE AXIAL LOAD CAPACITY = 1894K

S.R. = 0.922 < 1, **OK**

PROVIDE W14x342 COL ON GRID 3-C

$F_y = 36 \text{ ksi}$ $F_y = 50 \text{ ksi}$ COLUMNS
W shapes

Allowable axial loads in kips

Designation		W14									
Wt./ft.		455		426		398		370		342	
F_y		36	50	36	50	36	50	36	50	36	50
Effective length in ft. KL with respect to least radius of gyration r_y	0	2894	4020	2700	3750	2527	3510	2354	3270	2182	3030
	11	2671	3636	2499	3388	2328	3168	2167	2947	2006	2728
	12	2644	3590	2464	3344	2304	3126	2144	2908	1985	2692
	13	2617	3542	2438	3298	2280	3083	2121	2868	1963	2654
	14	2589	3492	2411	3251	2255	3039	2097	2826	1941	2614
	15	2560	3441	2384	3203	2229	2993	2073	2782	1918	2574
	16	2530	3388	2356	3153	2202	2946	2047	2738	1894	2532
	17	2499	3333	2326	3101	2174	2897	2021	2692	1870	2489
	18	2467	3277	2296	3048	2146	2847	1995	2644	1845	2444
	19	2435	3220	2266	2994	2117	2795	1967	2596	1819	2399
	20	2401	3161	2234	2938	2087	2743	1939	2546	1793	2352
	22	2332	3038	2169	2822	2025	2633	1881	2442	1738	2255
	24	2260	2909	2100	2700	1961	2518	1820	2333	1681	2153
	26	2184	2775	2029	2573	1893	2397	1756	2220	1621	2047
	28	2106	2635	1955	2440	1823	2272	1690	2101	1559	1935
	30	2025	2488	1878	2302	1750	2141	1621	1977	1495	1819
	32	1940	2336	1798	2158	1674	2004	1549	1848	1428	1698
	34	1853	2178	1715	2008	1596	1862	1475	1713	1358	1572
	36	1762	2013	1630	1852	1515	1714	1398	1573	1286	1441
	38	1668	1841	1541	1689	1431	1560	1319	1427	1212	1304
	40	1571	1666	1449	1526	1344	1409	1237	1288	1135	1177
	42	1471	1511	1354	1384	1254	1278	1151	1168	1053	1067
	44	1367	1377	1255	1261	1161	1164	1063	1065	972	973
	46	1260	1260	1154	1154	1065	1065	974	974	890	890
	48	1157	1157	1060	1060	978	978	895	895	817	817
	50	1066	1066	977	977	902	902	824	824	753	753
Properties											
U		2.19	2.19	2.20	2.20	2.20	2.20	2.22	2.22	2.23	2.23
P_{wo} (kips)		1405	1952	1245	1729	1115	1549	987	1371	866	1203
P_{wi} (kips/in.)		73	101	68	94	64	89	60	83	55	77
P_{wb} (kips)		17,890	21,080	14,410	6990	12,130	14,290	9912	11,680	7986	9412
P_{fb} (kips)		2318	3220	2073	2879	1821	2529	1592	2211	1373	1907
L_c (ft.)		17.8	15.1	17.6	15.0	17.5	14.9	17.4	14.8	17.3	14.7
L_u (ft.)		132.3	95.2	125.1	90.1	118.7	85.5	112.9	81.3	107.7	77.5
A (in. ²)		134	125	117	109	101					
I_x (in. ⁴)		7190	6600	6000	5440	4900					
I_y (in. ⁴)		2560	2360	2170	1990	1810					
r_y (in.)		4.38	4.34	4.31	4.27	4.24					
Ratio r_x/r_y		1.67	1.67	1.66	1.66	1.65					
B_x } Bending		0.177	0.177	0.178	0.180	0.181					
B_y } factors		0.441	0.442	0.447	0.452	0.457					
a_x }		1073	982	894	812	733					
a_y } *		383	351	324	296	271					

* Tabulated values of a_x and a_y must be multiplied by 10^6 .

LATERAL DESIGN

Project: ATC - 146 - Design D - MWFRS Wind Load_I=1.15
Project # 20.027

Date: 8/26/2020
Engineer: FBS

DESIGN - D - WIND PRESSURES FOR MWFRF ANY HT. BY SBC-88

Input:

Wind Velocity (3-second Gust) [V]:
 Building Classification [I, II, III, or IV]:
 Coastal or Standard Exposure
 Enclosure Classification:
 Mean Roof Height [h]:
 Roof Pitch [(_ " RISE) / (12" RUN)]:
 Length of the building (Dim. in 'X' Direction)
 Width of the building (Dim. in 'Y' Direction)
 Auto generate Height 'z' values

90
III
Coastal Exposure
Enclosed
164.50
0.25
215
125
No

Case 1a: Wind blowing North-South

Calculations:

Roof Angle [degrees off of Horizontal]: θ
 Building Importance Factor for wind, 'Iw'
 Gust velocity pressure at mean roof ht, Gqh

1.193	deg
1.15	
34.580	psf

Note:

Since windward pressure coefficient has incremental values per table 1205.3A, Case I from Figure 1205.3B will produce higher overall wind pressures as leeward pressures are constant for height of building.

Case 1b: Wind blowing East-West

Case 1a: Wind blowing North-South

Horizontal Dim. of bldg $\perp$ to wind, 'B'	215.00	ft
Horizontal Dim. of bldg $\parallel$ to wind, 'L'	125.00	ft
Windward Wall Cp	0.60	
Leeward Wall Cp	-0.70	
Wind Base shear in N-S Direction	1,698.03	Kips

Height 'z' (ft.)	Gqz*Iw	P _{WW} (psf)	P _{LW} (psf)	P _{WW+LW} (psf)	Wind force applied @ z (Kips)
0.00	26.45	15.87	-27.84	43.71	75.18
16.00	26.45	15.87	-27.84	43.71	138.61
29.50	26.45	15.87	-27.84	43.71	126.86
43.00	29.44	17.66	-27.84	45.50	132.07
56.50	31.80	19.08	-27.84	46.92	136.17
70.00	33.35	20.01	-27.84	47.85	138.88
83.50	34.90	20.94	-27.84	48.78	141.58
97.00	36.46	21.87	-27.84	49.71	144.28
110.50	37.28	22.37	-27.84	50.21	145.72
124.00	37.90	22.74	-27.84	50.58	146.81
137.50	38.53	23.12	-27.84	50.95	147.89
151.00	39.15	23.49	-27.84	51.32	148.97
164.50	39.77	23.86	-27.84	51.70	75.03

Case 1b: Wind blowing East-West

Horizontal Dim. of bldg $\perp$ to wind, 'B'	125.00	ft
Horizontal Dim. of bldg $\parallel$ to wind, 'L'	215.00	ft
Windward Wall Cp	0.60	
Leeward Wall Cp	-0.70	
Wind Base shear in E-W Direction	987.23	Kips

Height 'z' (ft.)	Gqz*Iw	P _{WW} (psf)	P _{LW} (psf)	P _{WW+LW} (psf)	Wind force applied @ z (Kips)
0.00	26.45	15.87	-27.84	43.71	43.71
16.00	26.45	15.87	-27.84	43.71	80.58
29.50	26.45	15.87	-27.84	43.71	73.76
43.00	29.44	17.66	-27.84	45.50	76.78
56.50	31.80	19.08	-27.84	46.92	79.17
70.00	33.35	20.01	-27.84	47.85	80.74
83.50	34.90	20.94	-27.84	48.78	82.31
97.00	36.46	21.87	-27.84	49.71	83.89
110.50	37.28	22.37	-27.84	50.21	84.72
124.00	37.90	22.74	-27.84	50.58	85.35
137.50	38.53	23.12	-27.84	50.95	85.98
151.00	39.15	23.49	-27.84	51.32	86.61
164.50	39.77	23.86	-27.84	51.70	43.62

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Case IIa: Wind blowing North-South						Case IIb: Wind blowing East-West					
Horizontal Dim. of bldg $\perp$ to wind, 'B'			215.00	ft		Horizontal Dim. of bldg $\perp$ to wind, 'B'			125.00	ft	
Horizontal Dim. of bldg $\parallel$ to wind, 'L'			125.00	ft		Horizontal Dim. of bldg $\parallel$ to wind, 'L'			215.00	ft	
Windward Wall Cp			1.00			Windward Wall Cp			1.00		
Leeward Wall Cp			-0.30			Leeward Wall Cp			-0.30		
Wind Base shear in N-S Direction			1,611.12	Kips		Wind Base shear in E-W Direction			936.70	Kips	
Height 'z' (ft.)	Gqz*Iw	P _{WW} (psf)	P _{LW} (psf)	P _{WW+LW} (psf)	Wind force applied @ z (Kips)	Height 'z' (ft.)	Gqz*Iw	P _{WW} (psf)	P _{LW} (psf)	P _{WW+LW} (psf)	Wind force applied @ z (Kips)
0.00	26.45	26.45	-11.93	38.38	66.01	0.00	26.45	26.45	-11.93	38.38	38.38
16.00	26.45	26.45	-11.93	38.38	121.71	16.00	26.45	26.45	-11.93	38.38	70.76
29.50	26.45	26.45	-11.93	38.38	111.40	29.50	26.45	26.45	-11.93	38.38	64.77
43.00	29.44	29.44	-11.93	41.37	120.08	43.00	29.44	29.44	-11.93	41.37	69.81
56.50	31.80	31.80	-11.93	43.73	126.92	56.50	31.80	31.80	-11.93	43.73	73.79
70.00	33.35	33.35	-11.93	45.28	131.43	70.00	33.35	33.35	-11.93	45.28	76.41
83.50	34.90	34.90	-11.93	46.83	135.93	83.50	34.90	34.90	-11.93	46.83	79.03
97.00	36.46	36.46	-11.93	48.39	140.44	97.00	36.46	36.46	-11.93	48.39	81.65
110.50	37.28	37.28	-11.93	49.21	142.84	110.50	37.28	37.28	-11.93	49.21	83.05
124.00	37.90	37.90	-11.93	49.83	144.64	124.00	37.90	37.90	-11.93	49.83	84.10
137.50	38.53	38.53	-11.93	50.46	146.45	137.50	38.53	38.53	-11.93	50.46	85.14
151.00	39.15	39.15	-11.93	51.08	148.25	151.00	39.15	39.15	-11.93	51.08	86.19
164.50	39.77	39.77	-11.93	51.70	75.03	164.50	39.77	39.77	-11.93	51.70	43.62

Wind Base Shear in N-S Direction = 1698.1 Kips

Wind Shear in E-W Direction = 987.2 Kips

Seismic Shear in Both Direction = 651.5 Kips

Wind Controls in Both Directions. Therefore, EQ loads are ignored in design.

FIGURE 1205.3B
APPLICATION OF MWFRS COEFFICIENTS
 (Positive sign indicates inwardly acting pressure)

TABLE 1205.3B
MWFRS COEFFICIENTS, C_p
Building Height Greater Than 60 ft

	Enclosed Bldg		Partially Enclosed Bldg	
	Case I	Case II	Case I	Case II
Windward Walls.....	+.6	+1.0	+ .2	+1.1
Leeward Walls.....	-.7	- .3	-1.1	- .2
Side Walls	-.9	- .5	-1.3	- .4
Roof $\leq 10^\circ$	-.9	- .5	-1.3	- .4

Case I = positive internal pressure
 Case II = negative internal pressure
 Refer to Figure 1205.3B

Project: ATC-146 - Design D
 Project No: 20.027
 Description: Seismic Forces for Design D- I = 1.25

Date: 8/26/2020
 Engineer: FBS
 Sheet No. _____

1988 SBC Seismic Design - Design - D

Av Factor	0.10	SBC 88 - Figure 1206.1	h_n	165.83 ft.
Z factor	0.24	SBC 88 - Figure 1206.4.1	Cused	0.05
Imp. Factor, I_E	1.25	SBC 88 - Table 1206.1	CSmax	0.14
K Factor	1.00	SBC 88 - Table 1206.4.3	CSused	0.079
Alt. T Calc., sec. (Steel frames)	1.62	SBC 88 - Section 1206.4.5.2		
C Factor, from Alternate T Eqn	0.05	SBC 88 - Section 1206.4.4		
C Factor, from T formula	0.04	SBC 88 - Section 1206.4.4	$Z*I*K*C*S =$	0.024
S Factor	1.50	SBC 88 - Ta		
CScalc	0.079			
T Factor (Based on allwbl drifts)	6.64	SBC 88 - Section 1206.4.5.1		

Base Shear Calculations

Allowable Story Drift

Dead Loads

Roof DL 78 psf
 Typ. Floor DL 90 psf
 Spandrel DL 15 psf
 Bldg. Width 215 ft
 Bldg. Depth 125 ft
 Total Area: 24,364 sq. ft.
 Total Perimeter: 668 ft.
 Parapet Ht 2.0 ft.

$\Delta a = 0.005 h$ SBC 88 - Section 1206.7
 $\delta x = \frac{1 * \delta x_e}{K} = \Delta a = 0.005 h$ SBC 88 - Section 1206.7
 $\delta x_e = (1/K) \times 0.005 h = 0.005 h$

Dead Load Calculations

Story	Story Ht. (ft.)	Area (sq.ft.)	Spandrel Length (ft.)	Spandrel Trib Ht (ft.)	Additional DL (kips)	Spandrel Wt (kips)	Area Wt. (kips)	Story Dead Loads (kips)
Roof	13.50	24,364	668	8.9		89	1,900	1,990
11	13.50	24,364	668	13.5		135	2,193	2,328
10	13.50	24,364	668	13.5		135	2,193	2,328
9	13.50	24,364	668	13.5		135	2,193	2,328
8	13.50	24,364	668	13.5		135	2,193	2,328
7	13.50	24,364	668	13.5		135	2,193	2,328
6	13.50	24,364	668	13.5		135	2,193	2,328
5	13.50	24,364	668	13.5		135	2,193	2,328
4	13.50	24,364	668	13.5		135	2,193	2,328
3	13.50	24,364	668	13.5		135	2,193	2,328
2	13.50	24,364	668	13.5		135	2,193	2,328
1	17.33	24,364	668	15.415		154	2,193	2,347
Totals:	165.8 ft.	292368 sq. ft.	8016.0 ft.	159.3 ft.		1596 k	26,021	27,617

Seismic Base Shear: $V = Z*I*K*C*S*W:$ **651.5 kips**

Vertical Distribution of Seismic Forces

Story	height, h (ft.)	Story DL, w (kips)	wh	C_{vx}	F_{vx} (kips)	M_{OT} (k-ft)	$\delta x_e(\max)$ (in.)	$w_i \sigma_i^2$	$f_i \sigma_i$
Roof	165.8 ft.			0.113	73.8	12231	0.81	1,246.85	59.74
11	152.33	2,328	354,629	0.145	94.3	14364	0.81	1,527.42	76.38
10	138.83	2,328	323,200	0.132	85.9	11931	0.81	1,527.42	69.61
9	125.33	2,328	291,772	0.119	77.6	9723	0.81	1,527.42	62.84
8	111.83	2,328	260,344	0.106	69.2	7741	0.81	1,527.42	56.07
7	98.33	2,328	228,915	0.093	60.9	5985	0.81	1,527.42	49.30
6	84.83	2,328	197,487	0.081	52.5	4454	0.81	1,527.42	42.53
5	71.33	2,328	166,058	0.068	44.2	3150	0.81	1,527.42	35.76
4	57.83	2,328	134,630	0.055	35.8	2070	0.81	1,527.42	29.00
3	44.33	2,328	103,202	0.042	27.4	1216	0.81	1,527.42	22.23
2	30.83	2,328	71,773	0.029	19.1	588	0.81	1,527.42	15.46
1	17.33	2,347	40,677	0.017	10.8	187	1.04	2,537.77	11.25
Totals:		25,628	2,172,687	1.000	651.5 k	73642 k-ft	9.95 in.	19,059	530

In locations where the soil properties are not known in sufficient detail to determine the soil profile type or the profile does not fit any of the three 3 types, soil profile S₂ or soil profile S₃ shall be used, whichever gives the larger value of CS.

**TABLE 1206.4.6
SOIL PROFILE COEFFICIENT, S**

Soil profile type	S
S ₁	1.0
S ₂	1.2
S ₃	1.5

**TABLE 1206.1
OCCUPANCY IMPORTANCE FACTOR, I**

Nature of occupancy	I Factor
All buildings and structures except those listed below	1.0
Buildings and structures of Use Group A with a total occupant load of more than 300.	1.25
Buildings and structures designated as essential facilities, including, but not limited to: <ol style="list-style-type: none"> 1. Group I Unrestrained Uses having surgery or emergency treatment areas 2. Fire or rescue and police stations 3. Structures and equipment in government communication centers and other facilities required for emergency response. 4. Power stations and other utilities required in an emergency. 5. Structures having critical national defense capabilities. 	1.5

1206.4.5.1 T Formula. T is the fundamental period which shall be established using the structural properties and deformational characteristics of the resisting elements using the following formula or the appropriate formula in 1206.4.5.2.

$$T = 2 \pi \sqrt{\frac{\sum_{i=1}^n w_i \sigma_i^2}{g \sum_{i=1}^n f_i \sigma_i}}$$

where the values of f_i represent any lateral force distributed approximately in accordance with the principles of the equation in 1206.5.1 or any other rational distribution. The elastic deflections σ_i shall be calculated using the applied lateral forces f_i . The value of C when calculated using the period T as determined by the equation in this section shall not be less than 80% of the value of C based on the period T estimated using the appropriate equation in 1206.4.5.2.

Wind Base Shear in N-S Direction = 1698.1 Kips
 Wind Shear in E-W Direction = 987.2 Kips
 Seismic Shear in Both Direction = 651.5 Kips

Wind Controls in Both Directions. Therefore, EQ loads are ignored in design.

RAM Structural System

Bentley DataBase: ATC_1988_RISK CAT III_SBC 88

01/04/21 15:50:23

Loads and Applied Forces

LOAD CASE: WIND_X

Other User Defined Story Forces
Ground Level: GRADE

APPLIED DIAPHRAGM FORCES

Type: User_User

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	43.62	0.00	105.00	60.00
Level 12	1	151.00	86.61	0.00	105.00	60.00
Level 11	1	137.50	85.98	0.00	105.00	60.00
Level 10	1	124.00	85.35	0.00	105.00	60.00
Level 9	1	110.50	84.72	0.00	105.00	60.00
Level 8	1	97.00	83.89	0.00	105.00	60.00
Level 7	1	83.50	82.31	0.00	105.00	60.00
Level 6	1	70.00	80.74	0.00	105.00	60.00
Level 5	1	56.50	79.17	0.00	105.00	60.00
Level 4	1	43.00	76.78	0.00	105.00	60.00
Level 3	1	29.50	73.76	0.00	105.00	60.00
Level 2	1	16.00	80.58	0.00	105.00	60.00

APPLIED STORY FORCES

Type: User_User

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	43.62	0.00
Level 12	151.00	86.61	0.00
Level 11	137.50	85.98	0.00
Level 10	124.00	85.35	0.00
Level 9	110.50	84.72	0.00
Level 8	97.00	83.89	0.00
Level 7	83.50	82.31	0.00
Level 6	70.00	80.74	0.00
Level 5	56.50	79.17	0.00
Level 4	43.00	76.78	0.00
Level 3	29.50	73.76	0.00
Level 2	16.00	80.58	0.00

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RAM Structural System

Bentley

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 2/2

01/04/21 15:50:23

LOAD CASE: WIND_Y

Other User Defined Story Forces

Ground Level: GRADE

APPLIED DIAPHRAGM FORCES

Type: User_User

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	75.03	105.00	60.00
Level 12	1	151.00	0.00	148.97	105.00	60.00
Level 11	1	137.50	0.00	147.89	105.00	60.00
Level 10	1	124.00	0.00	146.81	105.00	60.00
Level 9	1	110.50	0.00	145.72	105.00	60.00
Level 8	1	97.00	0.00	144.28	105.00	60.00
Level 7	1	83.50	0.00	141.58	105.00	60.00
Level 6	1	70.00	0.00	138.88	105.00	60.00
Level 5	1	56.50	0.00	136.17	105.00	60.00
Level 4	1	43.00	0.00	132.07	105.00	60.00
Level 3	1	29.50	0.00	126.86	105.00	60.00
Level 2	1	16.00	0.00	138.61	105.00	60.00

APPLIED STORY FORCES

Type: User_User

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	75.03
Level 12	151.00	0.00	148.97
Level 11	137.50	0.00	147.89
Level 10	124.00	0.00	146.81
Level 9	110.50	0.00	145.72
Level 8	97.00	0.00	144.28
Level 7	83.50	0.00	141.58
Level 6	70.00	0.00	138.88
Level 5	56.50	0.00	136.17
Level 4	43.00	0.00	132.07
Level 3	29.50	0.00	126.86
Level 2	16.00	0.00	138.61

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RAM Structural System

Frame Reaction Envelope

RAM Frame 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

01/05/21 15:55:39

CRITERIA:

Rigid End Zones: Ignore Effects
 Member Force Output: At Face of Joint
 P-Delta: No
 Ground Level: GRADE
 Mesh Criteria :
 Max. Distance Between Nodes on Mesh Line (ft) : 4.00
 Merge Node Tolerance (in) : 0.0100
 Geometry Tolerance (in) : 0.0050
 Walls Out-of-plane Stiffness Not Included in Analysis.
 Sign considered for Dynamic Load Case Results.
 Rigid Links Included at Fixed Beam-to-Wall Locations
 Eigenvalue Analysis : Eigen Vectors (Subspace Iteration)

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Lp	PosLiveLoad	RAMUSER
Rfp	PosRoofLiveLoad	RAMUSER
O1	WIND_X	User_User
O2	WIND_Y	User_User

USER DEFINED LOAD COMBINATIONS:

1	*	D
2	*	D+Lp
3	*	D+Lp+Rfp
4	*	0.75*D+0.75*Lp+0.75*O1
5	*	0.75*D+0.75*Lp+0.75*O2
6	*	0.75*D+0.75*Lp-0.75*O1
7	*	0.75*D+0.75*Lp-0.75*O2
8	*	0.75*D+0.75*O1
9	*	0.75*D+0.75*O2
10	*	0.75*D-0.75*O1
11	*	0.75*D-0.75*O2

* = Load combination currently selected to use

REACTION MAXIMA AND MINIMA:

Frame #0:

Node		Rx kips	Ry kips	Rz kips	Mxx kip-ft	Myy kip-ft	Tzz kip-ft
331	Max:	41.80	0.13	604.67	-0.10	125.40	0.88
	LC:	6	5	6	11	6	7
	Min:	-37.62	0.03	136.98	-0.38	-112.87	-0.64
	LC:	8	11	8	5	8	9
332	Max:	0.02	0.11	873.61	0.09	6.38	0.47

GRIDS	RAM Node #
A-1	331
C-1	332
D-1	333
E-1	334
A-2	335
C-2	336
D-2	337
E-2	338
A-3	339
E-3	340
A-4	341
C-4	342
D-4	343
E-4	344
A-5	345
C-5	346
D-5	347
E-5	348
A-6	349
C-6	350
D-6	351
E-6	352
A-7	353
E-7	354
B-7.3	355
C-7.3	356
D-7.3	357
D-8	358
E-8	359

RAM Structural System

Frame Reaction Envelope

RAM Frame 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

Page 2/5

01/05/21 15:55:39

Node		Rx	Ry	Rz	Mxx	Myy	Tzz
	LC:	6	4	3	4	6	6
	Min:	-0.02	0.02	481.50	-0.06	-6.14	-0.44
	LC:	8	10	9	10	8	8
333	Max:	0.02	0.02	873.61	-0.05	6.36	0.43
	LC:	6	10	3	10	6	8
	Min:	-0.02	-0.04	481.50	-0.26	-6.07	-0.47
	LC:	8	4	11	4	8	6
334	Max:	41.42	0.13	607.28	-0.11	124.27	0.64
	LC:	6	5	6	11	6	11
	Min:	-37.02	0.04	137.99	-0.39	-111.07	-0.88
	LC:	8	11	8	5	8	5
335	Max:	52.17	33.09	981.40	75.90	156.50	0.46
	LC:	6	7	3	9	6	10
	Min:	-50.92	-25.30	551.83	-99.28	-152.76	-0.46
	LC:	8	9	8	7	8	4
336	Max:	0.03	105.59	1911.28	243.89	0.09	0.63
	LC:	6	7	7	9	6	6
	Min:	-0.03	-81.30	157.88	-316.76	-0.09	-0.62
	LC:	8	9	9	7	8	8
337	Max:	0.14	81.30	1904.17	317.42	0.43	0.60
	LC:	4	11	5	5	4	8
	Min:	-0.11	-105.81	155.68	-243.90	-0.34	-0.62
	LC:	10	5	11	11	10	6
338	Max:	51.71	25.47	980.33	98.85	155.13	0.46
	LC:	6	11	3	5	6	4
	Min:	-50.14	-32.95	551.71	-76.41	-150.43	-0.46
	LC:	8	5	8	11	8	10
339	Max:	54.89	0.24	996.28	-0.40	164.68	0.09
	LC:	10	3	3	9	10	7
	Min:	-54.88	0.13	565.72	-0.73	-164.63	-0.09
	LC:	4	9	8	3	4	9
340	Max:	54.34	0.19	996.23	-0.31	163.02	0.08
	LC:	6	3	3	10	6	6
	Min:	-53.97	0.10	565.71	-0.57	-161.91	-0.07
	LC:	8	10	8	3	8	8
341	Max:	55.55	38.84	996.31	91.45	166.65	0.74

RAM Structural System

Frame Reaction Envelope

RAM Frame 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

Page 3/5

01/05/21 15:55:39

Node		Rx	Ry	Rz	Mxx	Myy	Tzz
	LC:	10	7	3	9	10	7
	Min:	-55.98	-30.48	565.75	-116.53	-167.94	-0.60
	LC:	4	9	9	7	4	9
342	Max:	0.03	123.73	1848.46	293.10	0.10	0.67
	LC:	10	7	7	9	10	10
	Min:	-0.03	-97.70	26.48	-371.18	-0.10	-0.69
	LC:	4	9	9	7	4	4
343	Max:	0.14	95.23	1845.69	361.30	0.42	0.67
	LC:	4	11	5	5	4	4
	Min:	-0.11	-120.43	25.11	-285.70	-0.33	-0.66
	LC:	10	5	11	11	10	10
344	Max:	54.74	29.88	996.28	112.74	164.23	0.59
	LC:	10	11	3	5	10	11
	Min:	-54.81	-37.58	565.73	-89.65	-164.42	-0.76
	LC:	4	5	11	11	4	5
345	Max:	54.88	35.45	995.91	85.91	164.64	0.48
	LC:	10	7	3	9	10	6
	Min:	-55.63	-28.64	565.62	-106.34	-166.90	-0.42
	LC:	4	9	10	7	4	8
346	Max:	0.03	113.17	1978.26	274.53	0.10	0.67
	LC:	10	7	7	9	10	10
	Min:	-0.03	-91.51	-19.41	-339.50	-0.10	-0.68
	LC:	4	9	9	7	4	4
347	Max:	0.16	89.65	1983.15	347.97	0.47	0.65
	LC:	4	11	5	5	4	4
	Min:	-0.12	-115.99	-15.93	-268.94	-0.37	-0.64
	LC:	10	5	11	11	10	10
348	Max:	53.33	28.23	996.48	108.26	160.00	0.41
	LC:	10	11	3	5	10	8
	Min:	-53.72	-36.09	565.93	-84.68	-161.15	-0.47
	LC:	4	5	8	11	4	6
349	Max:	52.08	57.57	978.64	139.07	156.25	0.62
	LC:	10	7	3	9	10	9
	Min:	-53.50	-46.36	555.18	-172.70	-160.50	-0.75
	LC:	4	9	8	7	4	7
350	Max:	0.03	183.38	2540.72	444.93	0.09	0.63

RAM Structural System

Frame Reaction Envelope

RAM Frame 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

Page 4/5

01/05/21 15:55:39

Node		Rx	Ry	Rz	Mxx	Myy	Tzz
	LC:	6	7	7	9	6	10
	Min:	-0.03	-148.31	-176.79	-550.15	-0.09	-0.64
	LC:	8	9	9	7	8	4
351	Max:	0.25	147.87	2545.79	544.24	0.75	0.58
	LC:	4	11	5	5	4	4
	Min:	-0.20	-181.41	-176.68	-443.60	-0.60	-0.58
	LC:	10	5	11	11	10	10
352	Max:	48.09	46.40	999.13	170.16	144.26	0.76
	LC:	10	11	3	5	10	5
	Min:	-49.17	-56.72	568.99	-139.20	-147.52	-0.58
	LC:	4	5	8	11	4	11
353	Max:	41.27	0.65	816.10	0.93	123.80	1.67
	LC:	10	4	3	10	10	8
	Min:	-43.92	-0.31	274.80	-1.96	-131.77	-2.02
	LC:	4	10	10	4	4	6
354	Max:	30.33	0.23	987.16	-0.35	91.00	1.35
	LC:	10	3	3	11	10	5
	Min:	-33.48	0.12	398.75	-0.70	-100.43	-1.11
	LC:	4	11	10	3	4	11
355	Max:	0.21	8.20	231.63	50.23	11.46	1.74
	LC:	6	10	3	6	10	6
	Min:	-0.22	-8.70	104.08	-46.61	-11.70	-1.79
	LC:	8	4	10	8	4	8
356	Max:	0.02	6.71	999.99	15.36	0.10	0.00
	LC:	4	4	3	6	6	8
	Min:	-0.01	-5.71	576.79	-9.17	-0.00	-0.08
	LC:	10	10	8	8	8	6
357	Max:	0.02	1.58	1359.80	6.57	8.31	0.06
	LC:	8	8	3	6	3	10
	Min:	-0.02	-2.06	801.10	-3.46	5.17	-0.10
	LC:	6	6	8	8	10	4
358	Max:	0.02	0.01	415.18	0.35	8.35	0.15
	LC:	10	5	3	3	3	6
	Min:	-0.02	-0.01	207.20	0.17	5.10	-0.06
	LC:	4	11	8	9	10	8
359	Max:	22.60	0.00	580.16	0.36	18.64	0.10

RAM Structural System

Frame Reaction Envelope

RAM Frame 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

Page 5/5

01/05/21 15:55:39

Node	Rx	Ry	Rz	Mxx	Myy	Tzz
LC:	10	8	3	7	8	11
Min:	-24.57	-0.01	291.86	0.04	-18.71	-0.10
LC:	4	6	10	9	6	5

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

Drift

02/25/21 14:28:05

Steel Code: SBC

CRITERIA:

Rigid End Zones: Ignore Effects
 Member Force Output: At Face of Joint
 P-Delta: No
 Ground Level: GRADE

LOAD CASE DEFINITIONS:

O1	WIND_X	User_User
O2	WIND_Y	User_User

Displacements for pseudo-flexible and flexible/none diaphragms are reported based on maximum nodal displacement within diaphragm boundary.

RESULTS:

TARGET DRIFT RATIO = 1/360 = 0.028

Location (ft): (105.000, 60.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	O1	4.8542	-0.0001	0.1698	-0.0000	0.0010	0.0000
	O2	-0.0002	4.2405	-0.0001	0.3464	0.0000	0.0021
Level 12	O1	4.6845	-0.0001	0.2968	0.0000	0.0018	0.0000
	O2	-0.0001	3.8940	0.0000	0.4149	0.0000	0.0026
Level 11	O1	4.3877	-0.0001	0.3858	-0.0000	0.0024	0.0000
	O2	-0.0001	3.4792	-0.0000	0.4020	0.0000	0.0025
Level 10	O1	4.0019	-0.0001	0.4424	0.0000	0.0027	0.0000
	O2	-0.0001	3.0772	0.0000	0.4211	0.0000	0.0026
Level 9	O1	3.5594	-0.0001	0.4223	-0.0000	0.0026	0.0000
	O2	-0.0001	2.6561	0.0000	0.3889	0.0000	0.0024
Level 8	O1	3.1371	-0.0001	0.4405	0.0000	0.0027	0.0000
	O2	-0.0001	2.2672	0.0001	0.3972	0.0000	0.0025
Level 7	O1	2.6966	-0.0001	0.4309	-0.0000	0.0027	0.0000
	O2	-0.0001	1.8700	-0.0000	0.3698	0.0000	0.0023
Level 6	O1	2.2657	-0.0001	0.4372	0.0000	0.0027	0.0000
	O2	-0.0001	1.5002	0.0000	0.3542	0.0000	0.0022

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

Drift

Page 2/8

02/25/21 14:28:05

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 5	O1	1.8285	-0.0001	0.4200	-0.0000	0.0026	0.0000
	O2	-0.0001	1.1460	-0.0000	0.3318	0.0000	0.0020
Level 4	O1	1.4085	-0.0001	0.4507	-0.0000	0.0028	0.0000
	O2	-0.0001	0.8142	-0.0000	0.2966	0.0000	0.0018
Level 3	O1	0.9578	-0.0001	0.4471	-0.0001	0.0028	0.0000
	O2	-0.0001	0.5176	-0.0000	0.2544	0.0000	0.0016
Level 2	O1	0.5107	0.0000	0.5107	0.0000	0.0027	0.0000
	O2	-0.0001	0.2632	-0.0001	0.2632	0.0000	0.0014
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (0.000, 0.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	O1	4.8565	-0.0040	0.1696	0.0003	0.0010	0.0000
	O2	0.0696	4.1184	0.0216	0.3085	0.0001	0.0019
Level 12	O1	4.6869	-0.0044	0.2968	-0.0001	0.0018	0.0000
	O2	0.0480	3.8099	0.0246	0.3718	0.0002	0.0023
Level 11	O1	4.3901	-0.0042	0.3858	-0.0000	0.0024	0.0000
	O2	0.0234	3.4381	0.0096	0.3851	0.0001	0.0024
Level 10	O1	4.0042	-0.0042	0.4426	-0.0003	0.0027	0.0000
	O2	0.0138	3.0530	0.0146	0.3956	0.0001	0.0024
Level 9	O1	3.5616	-0.0039	0.4223	0.0000	0.0026	0.0000
	O2	-0.0008	2.6574	0.0179	0.3576	0.0001	0.0022
Level 8	O1	3.1393	-0.0039	0.4405	-0.0001	0.0027	0.0000
	O2	-0.0187	2.2998	0.0173	0.3670	0.0001	0.0023
Level 7	O1	2.6988	-0.0038	0.4311	-0.0003	0.0027	0.0000
	O2	-0.0360	1.9328	0.0048	0.3613	0.0000	0.0022
Level 6	O1	2.2676	-0.0034	0.4375	-0.0006	0.0027	0.0000
	O2	-0.0408	1.5714	-0.0007	0.3555	0.0000	0.0022
Level 5	O1	1.8301	-0.0028 ₃₆	0.4198	0.0003	0.0026	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

Drift

Page 3/8

02/25/21 14:28:05

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	O2	-0.0401	1.2160	-0.0070	0.3439	0.0000	0.0021
Level 4	O1	1.4102	-0.0031	0.4507	-0.0001	0.0028	0.0000
	O2	-0.0331	0.8720	-0.0097	0.3137	0.0001	0.0019
Level 3	O1	0.9595	-0.0031	0.4470	0.0001	0.0028	0.0000
	O2	-0.0234	0.5583	-0.0114	0.2744	0.0001	0.0017
Level 2	O1	0.5125	-0.0032	0.5125	-0.0032	0.0027	0.0000
	O2	-0.0119	0.2839	-0.0119	0.2839	0.0001	0.0015
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (0.000, 120.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	O1	4.8520	-0.0040	0.1700	0.0003	0.0010	0.0000
	O2	-0.0699	4.1184	-0.0217	0.3085	0.0001	0.0019
Level 12	O1	4.6820	-0.0044	0.2967	-0.0001	0.0018	0.0000
	O2	-0.0482	3.8099	-0.0246	0.3718	0.0002	0.0023
Level 11	O1	4.3853	-0.0042	0.3858	-0.0000	0.0024	0.0000
	O2	-0.0236	3.4381	-0.0096	0.3851	0.0001	0.0024
Level 10	O1	3.9995	-0.0042	0.4422	-0.0003	0.0027	0.0000
	O2	-0.0139	3.0530	-0.0146	0.3956	0.0001	0.0024
Level 9	O1	3.5573	-0.0039	0.4223	0.0000	0.0026	0.0000
	O2	0.0007	2.6574	-0.0179	0.3576	0.0001	0.0022
Level 8	O1	3.1349	-0.0039	0.4404	-0.0001	0.0027	0.0000
	O2	0.0185	2.2998	-0.0172	0.3670	0.0001	0.0023
Level 7	O1	2.6945	-0.0038	0.4308	-0.0003	0.0027	0.0000
	O2	0.0357	1.9328	-0.0048	0.3613	0.0000	0.0022
Level 6	O1	2.2638	-0.0034	0.4368	-0.0006	0.0027	0.0000
	O2	0.0406	1.5714	0.0007	0.3555	0.0000	0.0022
Level 5	O1	1.8269	-0.0028	0.4202	0.0003	0.0026	0.0000
	O2	0.0398	1.2160	0.0069	0.3439	0.0000	0.0021

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

Drift

Page 4/8

02/25/21 14:28:05

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 4	O1	1.4067	-0.0031	0.4506	-0.0001	0.0028	0.0000
	O2	0.0329	0.8720	0.0097	0.3137	0.0001	0.0019
Level 3	O1	0.9561	-0.0031	0.4473	0.0001	0.0028	0.0000
	O2	0.0232	0.5583	0.0114	0.2744	0.0001	0.0017
Level 2	O1	0.5088	-0.0032	0.5088	-0.0032	0.0027	0.0000
	O2	0.0118	0.2839	0.0118	0.2839	0.0001	0.0015
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (210.000, 120.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	O1	4.8520	0.0039	0.1700	-0.0004	0.0010	0.0000
	O2	-0.0699	4.3626	-0.0217	0.3843	0.0001	0.0024
Level 12	O1	4.6820	0.0042	0.2967	0.0001	0.0018	0.0000
	O2	-0.0482	3.9782	-0.0246	0.4580	0.0002	0.0028
Level 11	O1	4.3853	0.0041	0.3858	0.0000	0.0024	0.0000
	O2	-0.0236	3.5202	-0.0096	0.4188	0.0001	0.0026
Level 10	O1	3.9995	0.0041	0.4422	0.0004	0.0027	0.0000
	O2	-0.0139	3.1014	-0.0146	0.4466	0.0001	0.0028
Level 9	O1	3.5573	0.0038	0.4223	-0.0000	0.0026	0.0000
	O2	0.0007	2.6548	-0.0179	0.4202	0.0001	0.0026
Level 8	O1	3.1349	0.0038	0.4404	0.0001	0.0027	0.0000
	O2	0.0185	2.2346	-0.0172	0.4273	0.0001	0.0026
Level 7	O1	2.6945	0.0036	0.4308	0.0003	0.0027	0.0000
	O2	0.0357	1.8073	-0.0048	0.3783	0.0000	0.0023
Level 6	O1	2.2638	0.0033	0.4368	0.0006	0.0027	0.0000
	O2	0.0406	1.4290	0.0007	0.3530	0.0000	0.0022
Level 5	O1	1.8269	0.0027	0.4202	-0.0003	0.0026	0.0000
	O2	0.0398	1.0761	0.0069	0.3196	0.0000	0.0020
Level 4	O1	1.4067	0.0030	0.4506	0.0001	0.0028	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

Drift

Page 5/8

02/25/21 14:28:05

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	O2	0.0329	0.7564	0.0097	0.2796	0.0001	0.0017
Level 3	O1	0.9561	0.0029	0.4473	-0.0003	0.0028	0.0000
	O2	0.0232	0.4768	0.0114	0.2344	0.0001	0.0014
Level 2	O1	0.5088	0.0033	0.5088	0.0033	0.0027	0.0000
	O2	0.0118	0.2424	0.0118	0.2424	0.0001	0.0013
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (210.000, 75.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X in	Y in	X in	Y in	X	Y
ROOF	O1	4.8537	0.0039	0.1698	-0.0004	0.0010	0.0000
	O2	-0.0176	4.3626	-0.0055	0.3843	0.0000	0.0024
Level 12	O1	4.6838	0.0042	0.2967	0.0001	0.0018	0.0000
	O2	-0.0121	3.9782	-0.0062	0.4580	0.0000	0.0028
Level 11	O1	4.3871	0.0041	0.3858	0.0000	0.0024	0.0000
	O2	-0.0060	3.5202	-0.0024	0.4188	0.0000	0.0026
Level 10	O1	4.0013	0.0041	0.4424	0.0004	0.0027	0.0000
	O2	-0.0035	3.1014	-0.0036	0.4466	0.0000	0.0028
Level 9	O1	3.5589	0.0038	0.4223	-0.0000	0.0026	0.0000
	O2	0.0001	2.6548	-0.0045	0.4202	0.0000	0.0026
Level 8	O1	3.1366	0.0038	0.4405	0.0001	0.0027	0.0000
	O2	0.0046	2.2346	-0.0043	0.4273	0.0000	0.0026
Level 7	O1	2.6961	0.0036	0.4309	0.0003	0.0027	0.0000
	O2	0.0088	1.8073	-0.0012	0.3783	0.0000	0.0023
Level 6	O1	2.2652	0.0033	0.4371	0.0006	0.0027	0.0000
	O2	0.0100	1.4290	0.0002	0.3530	0.0000	0.0022
Level 5	O1	1.8281	0.0027	0.4201	-0.0003	0.0026	0.0000
	O2	0.0099	1.0761	0.0017	0.3196	0.0000	0.0020
Level 4	O1	1.4080	0.0030	0.4507	0.0001	0.0028	0.0000
	O2	0.0081	0.7564	0.0024	0.2796	0.0000	0.0017

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

Drift

Page 6/8

02/25/21 14:28:05

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 3	O1	0.9574	0.0029	0.4472	-0.0003	0.0028	0.0000
	O2	0.0057	0.4768	0.0028	0.2344	0.0000	0.0014
Level 2	O1	0.5102	0.0033	0.5102	0.0033	0.0027	0.0000
	O2	0.0029	0.2424	0.0029	0.2424	0.0000	0.0013
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (190.000, 75.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	O1	4.8537	0.0031	0.1698	-0.0003	0.0010	0.0000
	O2	-0.0176	4.3393	-0.0055	0.3771	0.0000	0.0023
Level 12	O1	4.6838	0.0034	0.2967	0.0001	0.0018	0.0000
	O2	-0.0121	3.9622	-0.0062	0.4498	0.0000	0.0028
Level 11	O1	4.3871	0.0033	0.3858	0.0000	0.0024	0.0000
	O2	-0.0060	3.5124	-0.0024	0.4156	0.0000	0.0026
Level 10	O1	4.0013	0.0033	0.4424	0.0003	0.0027	0.0000
	O2	-0.0035	3.0968	-0.0036	0.4418	0.0000	0.0027
Level 9	O1	3.5589	0.0030	0.4223	-0.0000	0.0026	0.0000
	O2	0.0001	2.6551	-0.0045	0.4143	0.0000	0.0026
Level 8	O1	3.1366	0.0030	0.4405	0.0001	0.0027	0.0000
	O2	0.0046	2.2408	-0.0043	0.4216	0.0000	0.0026
Level 7	O1	2.6961	0.0029	0.4309	0.0003	0.0027	0.0000
	O2	0.0088	1.8193	-0.0012	0.3767	0.0000	0.0023
Level 6	O1	2.2652	0.0027	0.4371	0.0005	0.0027	0.0000
	O2	0.0100	1.4426	0.0002	0.3532	0.0000	0.0022
Level 5	O1	1.8281	0.0022	0.4201	-0.0003	0.0026	0.0000
	O2	0.0099	1.0894	0.0017	0.3220	0.0000	0.0020
Level 4	O1	1.4080	0.0024	0.4507	0.0000	0.0028	0.0000
	O2	0.0081	0.7674	0.0024	0.2828	0.0000	0.0017
Level 3	O1	0.9574	0.0024	0.4472	-0.0003	0.0028	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

Drift

Page 7/8

02/25/21 14:28:05

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	O2	0.0057	0.4846	0.0028	0.2383	0.0000	0.0015
Level 2	O1	0.5102	0.0027	0.5102	0.0027	0.0027	0.0000
	O2	0.0029	0.2463	0.0029	0.2463	0.0000	0.0013
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (190.000, 0.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	O1	4.8565	0.0031	0.1696	-0.0003	0.0010	0.0000
	O2	0.0696	4.3393	0.0216	0.3771	0.0001	0.0023
Level 12	O1	4.6869	0.0034	0.2968	0.0001	0.0018	0.0000
	O2	0.0480	3.9622	0.0246	0.4498	0.0002	0.0028
Level 11	O1	4.3901	0.0033	0.3858	0.0000	0.0024	0.0000
	O2	0.0234	3.5124	0.0096	0.4156	0.0001	0.0026
Level 10	O1	4.0042	0.0033	0.4426	0.0003	0.0027	0.0000
	O2	0.0138	3.0968	0.0146	0.4418	0.0001	0.0027
Level 9	O1	3.5616	0.0030	0.4223	-0.0000	0.0026	0.0000
	O2	-0.0008	2.6551	0.0179	0.4143	0.0001	0.0026
Level 8	O1	3.1393	0.0030	0.4405	0.0001	0.0027	0.0000
	O2	-0.0187	2.2408	0.0173	0.4216	0.0001	0.0026
Level 7	O1	2.6988	0.0029	0.4311	0.0003	0.0027	0.0000
	O2	-0.0360	1.8193	0.0048	0.3767	0.0000	0.0023
Level 6	O1	2.2676	0.0027	0.4375	0.0005	0.0027	0.0000
	O2	-0.0408	1.4426	-0.0007	0.3532	0.0000	0.0022
Level 5	O1	1.8301	0.0022	0.4198	-0.0003	0.0026	0.0000
	O2	-0.0401	1.0894	-0.0070	0.3220	0.0000	0.0020
Level 4	O1	1.4102	0.0024	0.4507	0.0000	0.0028	0.0000
	O2	-0.0331	0.7674	-0.0097	0.2828	0.0001	0.0017
Level 3	O1	0.9595	0.0024	0.4470	-0.0003	0.0028	0.0000
	O2	-0.0234	0.4846 ₄₁	-0.0114	0.2383	0.0001	0.0015

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: ATC_1988_RISK CAT III_SBC 88

Building Code: SBC

Drift

Page 8/8

02/25/21 14:28:05

Steel Code: SBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 2	O1	0.5125	0.0027	0.5125	0.0027	0.0027	0.0000
	O2	-0.0119	0.2463	-0.0119	0.2463	0.0001	0.0013
GRADE	O1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	O2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

BRACED FRAME DESIGN

BRACE FRAME DESIGN IN RAM

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SAMPLE MEMBER DESIGN CALCS

DESIGN FORCES FOR BRACE FRAME COL. ON LEVEL 2 AT GRID 4-C

CONTROLLING COLUMN FORCES - FLEXURE

Load Combination: $0.75 \cdot D + 0.75 \cdot L_p - 0.75 \cdot O_2$

Axial		Load (kips)	1649.45
Moment	Top	Mmajor (kip-ft)	-38.11
		Mminor (kip-ft)	0.00
Moment	Bot.	Mmajor (kip-ft)	0.00
		Mminor (kip-ft)	0.00

	X-Axis	Y-Axis
Lu for Axial (ft)	16.00	16.00
Lu for Bending (ft)	16.00	16.00
K	1.00	1.00
Braced Against Joint Translation	No	No

PROVIDE W14x342 COL ON GRID 4-C

BRACE FRAME COL. ON LEVEL 2 AT GRID 4-C

AISC Eighth Edition Column Design Wide Flange Member Only

Project ID:	19051
Project Name:	ATC
Engineer:	FBS
Date:	3/1/2021

Member # =

Shape W 14x342

Properties	Geometry	
	A	101 <i>in.²</i>
	d	17.54 <i>in.</i>
	b_f	16.36 <i>in.</i>
	t_f	2.47 <i>in.</i>
	t_w	1.54 <i>in.</i>
	W(weight)	342 <i>#/ft.</i>
	r_T	4.54
	d/A_f	0.43

Compact Section Criteria	
b_f/2t_f	3.3
F_y	— <i>ksi</i>
d/t_w	11.4
F_y	— <i>ksi</i>
F_y	— <i>ksi</i>

Elastic Properties				
X-X			Y-Y	
I_x	4900	<i>in.⁴</i>	I_y	1810 <i>in.⁴</i>
S_x	559	<i>in.³</i>	S_y	221 <i>in.³</i>
r_x	6.98	<i>in.</i>	r_y	4.24 <i>in.</i>
Plastic Modulus				
Z_x	672	<i>in.³</i>	Z_y	338 <i>in.³</i>

Torsional Constant	
J	178 <i>in.⁴</i>

Warping Constant	
C_w	— <i>in.⁶</i>

Material Property	
E	29000 <i>ksi</i>
F_y	36 <i>ksi</i>

Non-Composite Beam/Column Design AISC Eighth Edition

Building info:

Steel Properties

Total Member Length =	16	ft.
Beam Spacing (w) =	0	ft.
Tributary Area to Col=	0	ft.^2
K=	1	
Unbraced Length =	16	ft.

Loading

Dead Load (D)=		psf
Live Load(L)=		psf
Roof Live Load(Lr)=		psf
Snow Load(S)=		psf

Excentricity on Column

ex =		in.
ey =	0	in.

Deflection Criteria

Total Load	L/360=	0.53	in.
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Kx =	1	Kl _{bx} /r _x =	27.507163	(Kl/r) _{max} =	45.28301887
Ky =	1	Kl _{by} /r _y =	45.283019		

Max Moment About Major Axis:

MD(Max Dead)=	0	kips-in
MD(Dead Overwrite)=	457.32	kips-in
MD(Max Use)=	457.32	kips-in
ML(Max Live)=	0	kips-in
ML(Live Overwrite)=	0	kips-in
ML(Max Use)=	0	kips-in
M(Lr or S)(Max Live)=	0	kips-in
M(Lr or S)(Live Overwrite)=	0	kips-in
M(Lr or S)(Max Use)=	0	kips-in
Mu=	457.32	kips-in

Max Moment About Minor Axis:

MD(Max Dead)=	0	kips-in
MD(Dead Overwrite)=	0	kips-in
MD(Max Use)=	0	kips-in
ML(Max Live)=	0	kips-in
ML(Live Overwrite)=	0	kips-in
ML(Max Use)=	0	kips-in
M(Lr or S)(Max Live)=	0	kips-in
M(Lr or S)(Live Overwrite)=	0	kips-in
M(Lr or S)(Max Use)=	0	kips-in
Mu=	0	kips-in

Max Shear

VD(Max Dead)=	0	kips
VD(Dead Overwrite)=		kips
VMD(Max Use)=	0	kips
VL(Max Live)=	0	kips
VL(Live Overwrite)=	0	kips
VL(Max Use)=	0	kips
V(Lr or S)(Max Live)=	0	kips
V(Lr or S)(Live Overwrite)=	0	kips
V(Lr or S)(Max Use)=	0	kips
Vu=	0	kips

Max Axial Load

PD(Max Dead)=	0	kips
PD(Dead Overwrite)=	1649.45	kips
PD(Max Use)=	1649.45	kips
PL(Max Live)=	0	kips
PL(Live Overwrite)=	0	kips
PL(Max Use)=	0	kips
P(Lr or S)(Max Live)=	0	kips
P(Lr or S)(Live Overwrite)=	0	kips
P(Lr or S)(Max Use)=	0	kips
P(E or W)=		kips
P=	1649.45	kips

Solution Summary:

Try **W 14x342** <---- Change W shapes

Member	Major Axis Beam Bending	3%
	Beam Shear	0%
	Minor Axis Beam Bending	0%
	Axial	87%
	Deflection	0%
	Combined Bending and Axial	90%
Overall Check		90%

Column Design AISC Eighth Edition

Note: All Equations in this section can be found in the AISC Eighth Edition Appendix A
Column Height= 16 ft

$(Kl/r)_{\max} = 45.28301887$

Column in Compression	
$C_c = \sqrt{2\pi^2 E / F_y} =$	126
if $\frac{KL}{r} \leq C_c$ then $F_a = \frac{[1 - \frac{(\frac{KL}{r})^2}{2C_c^2}]F_y}{\frac{5}{8} + \frac{3(\frac{KL}{r})}{8C_c} - (\frac{KL}{r})^3 / 8C_c^3}$	Section 15.1.3.1
if $\frac{KL}{r} \geq C_c$ then $F_a = \frac{12\pi^2 E}{23(\frac{KL}{r})^2}$	Section 15.1.3.2
Column in Tension	
$F_a = 0.6F_y$	Section 15.1.1

$F_a = 18.80$ ksi

Calculate Stresses in Column

Axial Stress:	$f_a =$	$P_u/A =$	16.3	ksi	Okay
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Non-Composite Major Axis Beam Design AISC Eighth Edition

Unbraced length (L_b)= 16 ft

Checks for Typical Major Bending Stress Equation			
Equation From Appendix A	Variable Value	Limit Value	
$b_f/2t_f \leq 65/\sqrt{F_y}$	3.3	10.8	Good
$d/t_w \leq 412(1 - 2.33\frac{f_a}{F_y})/\sqrt{F_y}$	11.4	-3.8	No Good, Use Alternate EQN
$l_b \leq 76b_f/\sqrt{F_y}$	192	207.2	Good
$l_b \leq \frac{20,000}{(d/A_f)F_y}$	192	1279.9	Good
			Use Alternate Equation

Checks for Alternate Major Bending Stress Equation			
Equation From Appendix A	Variable Value	Limit Value	
$55.2/\sqrt{F_y} < b_f/2t_f$	3.3	8.7	Good
$b_f/2t_f \leq 95.0/\sqrt{F_y}$	3.3	15.8	Good
			Use Alternate Bending Stress Equation

Typical Bending Stress Equation: $F_{bx} = 0.66F_y$

$F_{bx} = N/A$ ksi

Alternate Bending Stress Equation: $F_{bx} = F_y[0.733 - 0.0014(\frac{b_f}{t_f})\sqrt{F_y}]$

$F_{bx} = 24$ ksi

Shear Stress Equation: $F_v = 0.40F_y$

$F_v = 14.4$ ksi

Non-Composite Minor Axis Beam Design AISC Eighth Edition

Minor Axis Bending Equation: $F_{by} = 0.75F_y$

$F_{by} = 27$ ksi

Calculate Stresses in Beam

Major Bending Stress:	$f_{bx} = M_{ux}/S_x =$	0.82	ksi	Okay
Shear Stress:	$f_v = V_u/(t_w*d) =$	0	ksi	Okay
Minor Bending Stress:	$f_{by} = M_{uy}/S_y =$	0	ksi	Okay

Calculate Deflections

Camber:	$C = .8 \frac{5w_d L^4}{384EI} =$	0	in.	
Total Deflection:	$\Delta_T = \frac{5w L^4}{384EI} - C =$	0	in.	Okay

$$F'_{ex} = \frac{12 \cdot \pi \cdot ()^2 \cdot E}{23(KI_{bx}/r_{bx})^2} = 197.36 \text{ Ksi}$$

$$F'_{ey} = \frac{12 \cdot \pi \cdot ()^2 \cdot E}{23(KI_{by}/r_{by})^2} = 72.82 \text{ Ksi}$$

Check Combined Stressed

$$\frac{f_a}{F_a} = 0.867 \quad \frac{f_a}{F'_{ex}} = 0.083 \quad \frac{f_a}{F'_{ey}} = 0.224$$

$$\frac{f_{bx}}{F_{bx}} = 0.034 \quad \frac{f_{by}}{F_{by}} = 0.000$$

$C_{mx} =$	0.85
$C_{my} =$	0.85

Formula 1.6-1a:	$\frac{f_a}{F_a} + \frac{C_{mx} f_{bx}}{(1 - \frac{f_a}{F'_{ex}}) F_{bx}} + \frac{C_{my} f_{by}}{(1 - \frac{f_a}{F'_{ey}}) F_{by}} =$	0.899	Less than 1.0, Okay
Formula 1.6-1b:	$\frac{f_a}{0.6 F_y} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} =$	0.789	Less than 1.0, Okay

DESIGN FORCES FOR BRACE FRAME BRACE AT LEVEL 2 ALONG GRID 4

CONTROLLING BRACE FORCES - FLEXURE

Load Combination: $0.75 \cdot D + 0.75 \cdot L_p - 0.75 \cdot O_2$

Axial		Load (kips)	290.68
Moment	Top	Mmajor (kip-ft)	0.00
		Mminor (kip-ft)	0.00
Moment	Bot.	Mmajor (kip-ft)	0.00
		Mminor (kip-ft)	0.00

	X-Axis	Y-Axis
Lu for Axial (ft)	21.93	21.93
Lu for Bending (ft)	21.93	21.93
K	1.00	1.00
Braced Against Joint Translation	No	No

TRY HSS 12x12x3/8 BRACE

ALLOWABLE AXIAL CAPACITY = 373 K

S.R. = $0.78 < 1$ **OK**

PROVIDE HSS12x12x3/8 BRACE AT LEVEL 2 FOR FRAME ALONG GRID 4

$F_y = 46$ ksi

COLUMNS

Square structural tubing

Allowable concentric loads in kips

Nominal Size		16 x 16	14 x 14		12 x 12		10 x 10			
Thickness		1/2	1/2	3/8	1/2	3/8	5/8	1/2	3/8	5/16
Wt./ft.		103.30	89.68	68.31	76.07	58.10	76.33	62.46	47.90	40.35
F_y		46 ksi								
Effective length in feet KL with respect to radius of gyration	0	839	729	555	618	472	618	508	389	328
	6	815	704	536	593	453	588	481	370	311
	7	810	699	533	588	449	581	476	366	308
	8	805	694	529	583	445	574	471	361	305
	9	800	689	525	577	441	567	465	357	301
	10	795	684	521	571	437	559	459	352	297
	11	790	678	517	566	433	551	452	348	293
	12	785	672	513	559	428	543	446	343	289
	13	779	666	508	553	423	534	439	338	285
	14	773	660	504	546	418	525	432	332	280
	15	767	654	499	540	413	516	424	327	276
	16	761	647	494	533	408	507	417	321	271
	17	755	641	489	526	403	497	409	315	266
	18	748	634	484	518	397	487	401	309	261
	19	741	627	478	511	391	476	392	303	256
	20	735	619	473	503	386	466	384	296	251
	21	728	612	467	495	380	455	375	290	245
	22	721	604	462	487	373	444	366	283	240
	23	713	597	456	478	367	432	357	276	234
	24	706	589	450	470	361	420	348	269	228
	25	698	581	444	461	354	408	338	262	222
	26	691	573	438	452	348	396	328	255	216
	27	683	564	432	443	341	383	318	247	210
	28	675	556	425	434	334	370	308	239	203
	29	667	547	419	424	327	357	297	232	197
	30	658	538	412	415	320	344	287	224	190
	32	641	520	398	395	305	316	264	207	176
	34	624	501	384	374	289	287	241	190	162
	36	606	482	370	353	274	257	217	172	147
	38	587	462	355	331	257	230	195	154	132
	40	568	441	339	308	240	208	176	139	119

Properties

A (in. ²)	30.40	26.40	20.10	22.40	17.10	22.40	18.40	14.10	11.90
I (in. ⁴)	1200	791	615	485	380	321	271	214	183
r (in.)	6.29	5.48	5.54	4.66	4.72	3.78	3.84	3.90	3.93
B } Bending factor	0.202	0.233	0.228	0.276	0.269	0.350	0.339	0.328	0.323
* a	179	118	91.7	72.3	56.7	47.8	40.4	32.0	27.3

* Tabulated values of a must be multiplied by 10^6 .Note: Heavy line indicates Kl/r of 200.

TYP. BRACE CONNECTION DESIGN PER AISC 8 - DESIGN D

Beam Size =	W 16x31
tf =	0.44 inch
tw =	0.275 inch
Beam Gravity Shear Reaction =	30 Kips
Beam Axial Reaction =	32 Kips
Length of 2L4x4x5/16 conn. Beam with Col. Flange =	19 inch
Column Size =	W 14x342
tf =	2.47 inch
(2)L4x4 Angle Thickness for Conn. Gusset to Col. Flange =	3/8
Brace Size=	ST S 10x10x0.3125
B =	10 inch
tw =	0.3125 inch
(2)L4x4 Angle Thickness for Conn. Beam with Col. Flange =	3/8
Brace ASD Axial force =	205 Kips
Angle of Brace to Horz. =	41.89 Degree
Vertical Reaction Component from Brace =	136.88 Kips
Horz. Reaction Component from Brace =	152.61 Kips

Brace to Gusset Connection

Brace Gusset Plate Thickness =	0.5 in
HSS Brace to Gusset overlap =	14 in
Brace Gusset Plate Length =	22.5 in
Brace Gusset Plate Height =	20 in
HSS Brace Gusset to HSS Weld Size =	1/4
HSS Brace to Gusset Min. Weld Size Check =	3/16 OK
HSS Brace to Gusset Max. Weld Size Check =	1/4 OK
Available Weld Strength for Brace to Gusset Conn. =	207.87 OK

Gusset to Beam Flange Connection

Demand Horz. Force =	152.61 Kips
Gusset plate to Beam flange weld =	1/4
Gusset to Beam Flange Min. Weld Size Check =	3/16 OK
Gusset to Beam Flange Max. Weld Size Check =	37/98 OK
Available Weld Strength for Gusset to Beam Flange Conn. =	167.04 OK

2L4x4 to Beam Web Welded Connection

Demand Vert. Load =	30 Kips
Demand Horz. Load =	32 Kips
Length of 2L4x4x5/16 conn. Gusset with Col. Flange =	12 inch
Gusset plate to 2L4x4 Weld Size =	3/16
Beam Web to 2L4x4 Min. Weld Size Check =	3/16 OK
Beam Web to 2L4x4 Max. Weld Size Check =	3/16 OK
Beam Web to 2L4x4 Weld Length, l =	12 inch
k/l =	3.5 inch
k =	0.29
xl =	0.64 inch
al =	3.36
lp =	416.69 inch^4
Stress Due to Vertical Shear Load, V, fy =	1.18 ksi
Stress Due to Horz. Load, T, fx =	1.26 ksi
Couple M Due to Eccentricity = Vxal =	100.66 k-in
Vertical stress on weld due to moment, f'y =	0.52 ksi
Horizontal Stress on weld due to moment, f'x =	1.09 ksi
Resultant of stresses on weld =	2.90 ksi
Weld Capacity for Double Angle Conn. =	5.57 ksi OK

2L4x4-Beam web to Col. Flange Bolted Connection

Demand Vert. Load =	30 Kips	
Demand Horz. Load =	32 Kips	
Length of 2L4x4x5/16 conn. Gusset with Col. Flange =	19 inch	
Dia. of Bolts from 2L4x4 into WF Col. =	3/4 inch	
No. of Bolts =	4	
Hole Diameter for a Std. Hole, d' =	13/16 inch	
Bolt Spacing from Edge of L4x4 =	2.5 inch	
Edge Distance =	1.5 inch	
Minimum Edge Distance =	1 inch	OK
(2)L4x4 Angle Thickness for Conn. Beam web to Col. Flange =	3/8	
b =	2.125 inch	
b' =	1.750	
a =	1.500 inch	
1.25 b =	2.656 inch	OK
a' =	1.875 inch	
p =	3.5	
δ =	0.768	
T =	3.000 Kips	
M =	2.215 k-in	
α =	1.785	
Bc =	4.619 Kips	OK
Vb =	3.75 Kips	OK
Tension Capacity of Single Bolt, B =	19.400 Kips/bolt	(From Table 1-A from AISC)
Shear Capacity of Single Bolt (Single Shear), V =	9.300 Kips/bolt	(From Table 1-D from AISC)
tf req =	0.375 inch	OK

Gusset Plate Shear Check

Actual Shear Stress, fv =	10.174 ksi	
Allowable Shear Stress, Fv =	14.4 ksi	OK

Gusset Plate Yielding Check

Tension Demand =	205 Kips	
Net Tension Gusset Area =	7 in ²	
Net Shear Gusset Area =	14 in ²	
P allowed =	446.6 Kips	OK

Gusset Plate Buckling Check

Demand from Brace force =	205	
Thickness of the Gusset plate =	0.5	
Base width of the Whitmore Section, W =	26.17 inch	
Actual stress at Whitmore Section, fa =	11.752 ksi	OK
Allowable Tension Stress, Ft =	21.6 ksi	OK
Distance to the Work point, L1 =	22.625 inch	
radius of gyration for 1" strip, r =	0.144	
KL1/r =	101.888	
Allowable Compression Stress, Fa =	12.72 ksi	(From Table 3-36 Page 4-1)

2L4x4 from Gusset to Column Flange Connection

Demand shear force, V =	136.88 Kips	OK
Weld size =	1/4	
Length of the connection Angle =	18 inch	
No. of 3/4" Dia. Bolts, N =	6	(From Table III Page 4-1)
Connection Capacity =	139 Kips

4

TYPICAL BRACED FRAME CONNECTION DETAIL

\$7.00

SCALE: 3/4" = 1'-0"

TABLE 3-36
ALLOWABLE STRESS
FOR COMPRESSION MEMBERS OF 36 KSI SPECIFIED YIELD STRESS STEEL

Main and Secondary Members <i>Kl/r</i> not over 120						Main Members <i>Kl/r</i> 121 to 200				Secondary Members ^a <i>l/r</i> 121 to 200			
$\frac{Kl}{r}$	F_a (ksi)	$\frac{Kl}{r}$	F_a (ksi)	$\frac{Kl}{r}$	F_a (ksi)	$\frac{Kl}{r}$	F_a (ksi)	$\frac{Kl}{r}$	F_a (ksi)	$\frac{l}{r}$	F_{as} (ksi)	$\frac{l}{r}$	F_{as} (ksi)
1	21.56	41	19.11	81	15.24	121	10.14	161	5.76	121	10.19	161	7.25
2	21.52	42	19.03	82	15.13	122	9.99	162	5.69	122	10.09	162	7.20
3	21.48	43	18.95	83	15.02	123	9.85	163	5.62	123	10.00	163	7.16
4	21.44	44	18.86	84	14.90	124	9.70	164	5.55	124	9.90	164	7.12
5	21.39	45	18.78	85	14.79	125	9.55	165	5.49	125	9.80	165	7.08
6	21.35	46	18.70	86	14.67	126	9.41	166	5.42	126	9.70	166	7.04
7	21.30	47	18.61	87	14.56	127	9.26	167	5.35	127	9.59	167	7.00
8	21.25	48	18.53	88	14.44	128	9.11	168	5.29	128	9.49	168	6.96
9	21.21	49	18.44	89	14.32	129	8.97	169	5.23	129	9.40	169	6.93
10	21.16	50	18.35	90	14.20	130	8.84	170	5.17	130	9.30	170	6.89
11	21.10	51	18.26	91	14.09	131	8.70	171	5.11	131	9.21	171	6.85
12	21.05	52	18.17	92	13.97	132	8.57	172	5.05	132	9.12	172	6.82
13	21.00	53	18.08	93	13.84	133	8.44	173	4.99	133	9.03	173	6.79
14	20.95	54	17.99	94	13.72	134	8.32	174	4.93	134	8.94	174	6.76
15	20.89	55	17.90	95	13.60	135	8.19	175	4.88	135	8.86	175	6.73
16	20.83	56	17.81	96	13.48	136	8.07	176	4.82	136	8.78	176	6.70
17	20.78	57	17.71	97	13.35	137	7.96	177	4.77	137	8.70	177	6.67
18	20.72	58	17.62	98	13.23	138	7.84	178	4.71	138	8.62	178	6.64
19	20.66	59	17.53	99	13.10	139	7.73	179	4.66	139	8.54	179	6.61
20	20.60	60	17.43	100	12.98	140	7.62	180	4.61	140	8.47	180	6.58
21	20.54	61	17.33	101	12.85	141	7.51	181	4.56	141	8.39	181	6.56
22	20.48	62	17.24	102	12.72	142	7.41	182	4.51	142	8.32	182	6.53
23	20.41	63	17.14	103	12.59	143	7.30	183	4.46	143	8.25	183	6.51
24	20.35	64	17.04	104	12.47	144	7.20	184	4.41	144	8.18	184	6.49
25	20.28	65	16.94	105	12.33	145	7.10	185	4.36	145	8.12	185	6.46
26	20.22	66	16.84	106	12.20	146	7.01	186	4.32	146	8.05	186	6.44
27	20.15	67	16.74	107	12.07	147	6.91	187	4.27	147	7.99	187	6.42
28	20.08	68	16.64	108	11.94	148	6.82	188	4.23	148	7.93	188	6.40
29	20.01	69	16.53	109	11.81	149	6.73	189	4.18	149	7.87	189	6.38
30	19.94	70	16.43	110	11.67	150	6.64	190	4.14	150	7.81	190	6.36
31	19.87	71	16.33	111	11.54	151	6.55	191	4.09	151	7.75	191	6.35
32	19.80	72	16.22	112	11.40	152	6.46	192	4.05	152	7.69	192	6.33
33	19.73	73	16.12	113	11.26	153	6.38	193	4.01	153	7.64	193	6.31
34	19.65	74	16.01	114	11.13	154	6.30	194	3.97	154	7.59	194	6.30
35	19.58	75	15.90	115	10.99	155	6.22	195	3.93	155	7.53	195	6.28
36	19.50	76	15.79	116	10.85	156	6.14	196	3.89	156	7.48	196	6.27
37	19.42	77	15.69	117	10.71	157	6.06	197	3.85	157	7.43	197	6.26
38	19.35	78	15.58	118	10.57	158	5.98	198	3.81	158	7.39	198	6.24
39	19.27	79	15.47	119	10.43	159	5.91	199	3.77	159	7.34	199	6.23
40	19.19	80	15.36	120	10.28	160	5.83	200	3.73	160	7.29	200	6.22

^a *K* taken as 1.0 for secondary members.Note: $C_c = 126.1$

FRAMED BEAM CONNECTIONS Welded—E70XX electrodes for combination with Table II connections

TABLE III Allowable loads in kips

Weld A		Weld B		Angle Length L In.	^a Minimum Web Thickness for Welds A		Maximum Number of Fasteners in One Vertical Row (Table II)
Capacity, Kips	^b Size, In.	^c Capacity, Kips	Size, In.		$F_y = 36$ ksi $F_v = 14.5$ ksi	$F_y = 50$ ksi $F_v = 20$ ksi	
266	5/16	296	3/8	29 1/2	.64	.46	10
213	1/4	247	5/16	29 1/2	.51	.37	
160	3/16	197	1/4	29 1/2	.38	.28	
245	5/16	261	3/8	26 1/2	.64	.46	9
196	1/4	217	5/16	26 1/2	.51	.37	
147	3/16	173	1/4	26 1/2	.38	.28	
222	5/16	223	3/8	23 1/2	.64	.46	8
178	1/4	186	5/16	23 1/2	.51	.37	
133	3/16	149	1/4	23 1/2	.38	.28	
198	5/16	187	3/8	20 1/2	.64	.46	7
158	1/4	156	5/16	20 1/2	.51	.37	
119	3/16	125	1/4	20 1/2	.38	.28	
174	5/16	152	3/8	17 1/2	.64	.46	6
139	1/4	126	5/16	17 1/2	.51	.37	
104	3/16	101	1/4	17 1/2	.38	.28	
148	5/16	115	3/8	14 1/2	.64	.46	5
118	1/4	95.7	5/16	14 1/2	.51	.37	
88.7	3/16	76.6	1/4	14 1/2	.38	.28	
121	5/16	80.1	3/8	11 1/2	.64	.46	4
97.0	1/4	66.9	5/16	11 1/2	.51	.37	
72.7	3/16	53.4	1/4	11 1/2	.38	.28	
92.1	5/16	48.2	3/8	8 1/2	.64	.46	3
73.7	1/4	40.3	5/16	8 1/2	.51	.37	
55.3	3/16	32.2	1/4	8 1/2	.38	.28	
61.8	5/16	21.9	3/8	5 1/2	.64	.46	2
49.5	1/4	18.3	5/16	5 1/2	.51	.37	
37.1	3/16	14.6	1/4	5 1/2	.38	.28	

^a When the beam web thickness is less than the minimum, multiply the connection capacity furnished by Weld A by the ratio of the actual web thickness to the tabulated minimum thickness. Thus, if 5/16" Weld A, with a connection capacity of 156 kips and a 14 1/2" long angle, is considered for a beam of web thickness of 0.375" with $F_y = 36$ ksi, the connection capacity must be multiplied by $0.375/0.64$, giving 91.4 kips.

^b Should the thickness of material to which connection angles are welded exceed the limits set by AISC Specification Sect. 1.17.2 for weld sizes specified, increase the weld size as required, but not to exceed the angle thickness.

^c When welds are used on outstanding legs, connection capacity may be limited by the shear capacity of the supporting member as stipulated by AISC Specification Sect. 1.5.3. See Examples (d) and (e) for Table IV.

Note 1: Connection Angles: Two L 4 x 3 1/2 x thickness x L ; $F_y = 36$ ksi. See discussion preceding examples for Table III for limiting values of thickness and optional width of legs.

Note 2: Capacities shown in this table apply only when the material welded is $F_y = 36$ ksi or $F_y = 50$ ksi steel.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION

BRACE FRAME BASE CONN.

Baseplates for Cols. at C-2 Lateral Combo

Detailed Design Results

10/ 7/20 15:56

CRITERIA:

Analysis

Strain Compatibility Not Maintained

Use min. effective plate area for axial only compression load on plate.

Design

Use ASD 9th to check plate bending

Max concrete bearing per AISC J9.

Anchor Shear Check Per AISC Specifications.

Anchor Tension Check Per AISC Specifications.

INPUT DATA:

Column

Column Size.....	W14X370
Dim: BfTop TfTop BfBot TfBot TW Depth	
(in) 16.50 2.660 16.50 2.660 1.660 17.90	

Base Plate

Plate Fy (ksi)	36.000
N (Parallel to Web) (in).....	50.000
B (Perpendicular to Web) (in).....	30.000
Plate Thickness (in).....	3.500

Anchor

Anchor Size.....	2 1/2"
Anchor Area (in^2).....	4.910
Anchor Material.....	Other
Anchor Strength Fu (ksi)	58.00
Thread Included in Shear Plane	

Footing

Footing Strength f'c (ksi)	4.00
Concrete Modulus (ksi)	3605.00
Dimension (Parallel to web) (ft).....	16.00
Dimension (Perpendicular to web) (ft)...	12.00

Design Load

Building Code: - None -

Load combination: Single Load Case

Axial (kip).....	1984.00
Vx (kip).....	116.00
Mx (kip-ft).....	0.00
Allowable Stress Increase Factor	1.00

RESULTS:

Analysis

Uniform Load on Base Plate.

Plate Bending

Max bending moment from concrete compression	
Allowable Stress Increase Factor	1.00
N Eff (in).....	28.782
B Eff (in).....	25.103
m [N-0.95d]/2.0 (in).....	5.888
n [B-0.80b]/2.0 (in).....	5.952
Lamda.....	1.000
n'.....	4.296
Controlling effective width to resist moment (in) ...	28.782
Controlling plate bending moment (kip-ft)	116.63
fb (ksi)	23.82
Fb (ksi)	27.00

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fb/Fb 0.88
 Thickness Required (in)..... 3.287
 Thickness controlled by cantilever action.

Anchors

Anchor	X(in)	Y(in)	V(kip)	T(kip)	Interaction
1	-21.00	10.00	19.33	0.00	0.40
2	21.00	10.00	19.33	0.00	0.40
3	-21.00	-10.00	19.33	0.00	0.40
4	21.00	-10.00	19.33	0.00	0.40
5	0.00	10.00	19.33	0.00	0.40
6	0.00	-10.00	19.33	0.00	0.40

Bearing

Eff Area of Support A2 (in^2)..... 2890.06
 Plate Area A1 (in^2)..... 722.51
 Sqrt (A2/A1)..... 2.00
 Allowable Bearing Pressure (ksi) 2.80
 Actual Bearing Stress (ksi) 2.75

DIAGRAM:

#	X(in)	Y(in)
1	-21.000	10.000
2	21.000	10.000
3	-21.000	-10.000
4	21.000	-10.000
5	0.000	10.000
6	0.000	-10.000

PL 50.00 X 30.00 X 3.50 (in)
 6 - 2 1/2" Other Anchor Bolts

DESIGN D - ANCHOR BOLT DESIGN - BF COL. AT GRID C-2

Bolt Grade =	A36	
Anchor Confined for Tension =	No	
Steel Yield Stress, F_y =	36	Ksi
Steel Ult. Stress, F_u =	58	Ksi
Total service moment, M =	0	Kip-ft
lever arm between anchor bolts =	42	inch
No. of bolts =	3	
Approx. area of concrete cone at top, A_e =	3,500	sq.in
Plate Type =	Grouted Plate	
f'_c =	4000	psi
Bolt Dia., d =	2 1/4	inch
Tension Force in bolt group =	0.00	Kips
Tension Force in each Anchor, T_f =	2.67	Kips
Shear Force in each Anchor, V_i =	19.33333	Kips
ϕ =	0.55	
Stress increase Factor, SIF =	1.00	
Probability factor, α =	1.00	
Concrete tensile stress red. Factor, β =	0.85	
Shear coefficient, C =	1.85	
Total effective Anchor bolt tension, T =	69.88	Kips
Yield Capacity of one Anchor, $A_t F_y$ =	117.10	Kips OK
Ult. Capacity of one Anchor, $A_t F_u$ =	188.50	Kips
Ult. Capacity of anchor group, $n \cdot A_t F_u$ =	565.50	Kips
Minimum Bolt spacing, r_m =	36.00	in
Development length, L_d =	27.00	in
Minimum edge distance for tension, m_t =	11.25	in
A_e req. =	876.60	sq.in
Min. square footing size =	29.61	in
Area of tension steel, A_{st} =	9.43	sq.in
Area of shear steel, A_{sv} =	2.40	sq.in
Shear Capacity of each anchor =	39.36	Kips
Pullout strength of concrete cone, U_p =	752.6	Kips OK
Combined shear and Tension Interaction =	0.60	≤ 1.0 OK

Expressed as an interaction equation:

$$\frac{CV}{\phi F_y A_t} + \frac{F}{\phi F_y A_t} \leq \frac{1}{\alpha}$$

MOMENT FRAME DESIGN

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SAMPLE
MEMBER
DESIGN

DESIGN FORCES FOR MOMENT FRAME COL. ON LEVEL 2 AT GRID 2-E

CONTROLLING COLUMN FORCES - FLEXURE

Load Combination: $0.75 \cdot D + 0.75 \cdot L_p - 0.75 \cdot O_1$

Axial		Load (kips)	734.93
Moment	Top	Mmajor (kip-ft)	307.81
		Mminor (kip-ft)	2.36
Moment	Bot.	Mmajor (kip-ft)	-453.30
		Mminor (kip-ft)	0.00

	X-Axis	Y-Axis
Lu for Axial (ft)	16.00	16.00
Lu for Bending (ft)	16.00	16.00
K	1.82	1.00
Braced Against Joint Translation	No	No

PROVIDE W33x221 COL ON GRID 2-E

MOMENT FRAME COL. ON LEVEL 2 AT GRID 2-E

AISC Eighth Edition Column Design Wide Flange Member Only	Project ID:	19051
	Project Name:	ATC
	Engineer:	FBS
	Date:	3/1/2021

Member # =		Shape	W 33x221
------------	--	-------	----------

Properties	Geometry	
	A	65 in. ²
	d	33.93 in.
	b _f	15.805 in.
	t _f	1.275 in.
	t _w	0.775 in.
	W(weight)	221 #/ft.
	r _T	4.15
	d/A _f	1.68

Compact Section Criteria	
b _f /2t _f	6.2
F _y	— ksi
d/t _w	43.8
F _y	— ksi
F _y	34.5 ksi

Elastic Properties					
X-X			Y-Y		
I _x	12800	in. ⁴	I _y	840	in. ⁴
S _x	757	in. ³	S _y	106	in. ³
r _x	14.1	in.	r _y	3.59	in.
Plastic Modulus					
Z _x	855	in. ³	Z _y	164	in. ³

Torsional Constant	
J	27.5 in. ⁴

Warping Constant	
C _w	— in. ⁶

Material Property	
E	29000 ksi
F _y	36 ksi

Non-Composite Beam/Column Design AISC Eighth Edition

Building info:

Steel Properties

Total Member Length =	16	ft.
Beam Spacing (w) =	0	ft.
Tributary Area to Col=	0	ft.^2
K=	1	
Unbraced Length =	16	ft.

Loading

Dead Load (D)=		psf
Live Load(L)=		psf
Roof Live Load(Lr)=		psf
Snow Load(S)=		psf

Excentricity on Column

ex =		in.
ey =	0	in.

Deflection Criteria

Total Load	L/360=	0.53	in.
------------	--------	------	-----

Kx =	1.82	Kl _{bx} /r _x =	24.78	(Kl/r) _{max} =	53.48
Ky =	1	Kl _{by} /r _y =	53.48		

Max Moment About Major Axis:

MD(Max Dead)=	0	kips-in
MD(Dead Overwrite)=	5439.6	kips-in
MD(Max Use)=	5439.6	kips-in
ML(Max Live)=	0	kips-in
ML(Live Overwrite)=	0	kips-in
ML(Max Use)=	0	kips-in
M(Lr or S)(Max Live)=	0	kips-in
M(Lr or S)(Live Overwrite)=	0	kips-in
M(Lr or S)(Max Use)=	0	kips-in
Mu=	5439.6	kips-in

Max Moment About Minor Axis:

MD(Max Dead)=	0	kips-in
MD(Dead Overwrite)=	0	kips-in
MD(Max Use)=	0	kips-in
ML(Max Live)=	0	kips-in
ML(Live Overwrite)=	0	kips-in
ML(Max Use)=	0	kips-in
M(Lr or S)(Max Live)=	0	kips-in
M(Lr or S)(Live Overwrite)=	0	kips-in
M(Lr or S)(Max Use)=	0	kips-in
Mu=	0	kips-in

Max Shear

VD(Max Dead)=	0	kips
VD(Dead Overwrite)=		kips
VMD(Max Use)=	0	kips
VL(Max Live)=	0	kips
VL(Live Overwrite)=	0	kips
VL(Max Use)=	0	kips
V(Lr or S)(Max Live)=	0	kips
V(Lr or S)(Live Overwrite)=	0	kips
V(Lr or S)(Max Use)=	0	kips
Vu=	0	kips

Max Axial Load

PD(Max Dead)=	0	kips
PD(Dead Overwrite)=	734.93	kips
PD(Max Use)=	734.93	kips
PL(Max Live)=	0	kips
PL(Live Overwrite)=	0	kips
PL(Max Use)=	0	kips
P(Lr or S)(Max Live)=	0	kips
P(Lr or S)(Live Overwrite)=	0	kips
P(Lr or S)(Max Use)=	0	kips
P(E or W)=		kips
P=	734.93	kips

Solution Summary:

Try **W 33x221** <---- Change W shapes

Member	Major Axis Beam Bending	33%
	Beam Shear	0%
	Minor Axis Beam Bending	0%
	Axial	63%
	Deflection	0%
	Combined Bending and Axial	92%
Overall Check		92%

Column Design AISC Eighth Edition

Note: All Equations in this section can be found in the AISC Eighth Edition Appendix A
Column Height= 16 ft

$(Kl/r)_{\max} = 53.48$

Column in Compression	
$C_c = \sqrt{2\pi^2 E / F_y} =$	126
if $\frac{KL}{r} \leq C_c$ then $F_a = \frac{[1 - \frac{(\frac{KL}{r})^2}{2C_c^2}] F_y}{\frac{5}{8} + \frac{3(\frac{KL}{r})}{8C_c} - (\frac{KL}{r})^3 / 8C_c^3}$	Section 15.1.3.1
if $\frac{KL}{r} \geq C_c$ then $F_a = \frac{12\pi^2 E}{23 (\frac{KL}{r})^2}$	Section 15.1.3.2
Column in Tension	
$F_a = 0.6F_y$	Section 15.1.1

$F_a = 18.00$ ksi

Calculate Stresses in Column

Axial Stress:	$f_a =$	$P_u/A =$	11.3	ksi	Okay
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Non-Composite Major Axis Beam Design AISC Eighth Edition

Unbraced length (L_b)= 16 ft

Checks for Typical Major Bending Stress Equation			
Equation From Appendix A	Variable Value	Limit Value	
$b_f/2t_f \leq 65/\sqrt{F_y}$	6.2	10.8	Good
$d/t_w \leq 412(1 - 2.33 \frac{f_a}{F_y})/\sqrt{F_y}$	43.8	18.4	No Good, Use Alternate EQN
$l_b \leq 76b_f/\sqrt{F_y}$	192	200.2	Good
$l_b \leq \frac{20,000}{(d/A_f) F_y}$	192	330	Good
			Use Alternate Equation

Checks for Alternate Major Bending Stress Equation			
Equation From Appendix A	Variable Value	Limit Value	
$55.2/\sqrt{F_y} < b_f/2t_f$	6.2	8.7	Good
$b_f/2t_f \leq 95.0/\sqrt{F_y}$	6.2	15.8	Good
			Use Alternate Bending Stress Equation

Typical Bending Stress Equation: $F_{bx} = 0.66F_y$

$F_{bx} = N/A$ ksi

Alternate Bending Stress Equation: $F_{bx} = F_y [0.733 - 0.0014 (\frac{b_f}{t_f}) \sqrt{F_y}]$

$F_{bx} = 21.6$ ksi

Shear Stress Equation: $F_v = 0.40F_y$

$F_v = 14.4$ ksi

Non-Composite Minor Axis Beam Design AISC Eighth Edition

Minor Axis Bending Equation: $F_{by} = 0.75F_y$

$F_{by} = 27$ ksi

Calculate Stresses in Beam

Major Bending Stress:	$f_{bx} = M_{ux}/S_x =$	7.19	ksi	Okay
Shear Stress:	$f_v = V_u/(t_w*d) =$	0	ksi	Okay
Minor Bending Stress:	$f_{by} = M_{uy}/S_y =$	0	ksi	Okay

Calculate Deflections

Camber:	$C = .8 \frac{5w_d L^4}{384EI} =$	0	in.	
Total Deflection:	$\Delta_T = \frac{5w L^4}{384EI} - C =$	0	in.	Okay

$$F'_{ex} = \frac{12 \cdot \pi \cdot ()^2 \cdot E}{23(Kl_{bx}/r_{bx})^2} = 243.13 \text{ Ksi}$$

$$F'_{ey} = \frac{12 \cdot \pi \cdot ()^2 \cdot E}{23(Kl_{by}/r_{by})^2} = 52.21 \text{ Ksi}$$

Check Combined Stressed

$$\frac{f_a}{F_a} = 0.628 \quad \frac{f_a}{F'_{ex}} = 0.046 \quad \frac{f_a}{F'_{ey}} = 0.216$$

$$\frac{f_{bx}}{F_{bx}} = 0.333 \quad \frac{f_{by}}{F_{by}} = 0.000$$

$C_{mx} =$	0.85
$C_{my} =$	0.85

Formula 1.6-1a:	$\frac{f_a}{F_a} + \frac{C_{mx} f_{bx}}{(1 - \frac{f_a}{F'_{ex}}) F_{bx}} + \frac{C_{my} f_{by}}{(1 - \frac{f_a}{F'_{ey}}) F_{by}} =$	0.924	Less than 1.0, Okay
Formula 1.6-1b:	$\frac{f_a}{0.6 F_y} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} =$	0.856	Less than 1.0, Okay

DESIGN FORCES FOR MOMENT FRAME BEAM AT LEVEL 2 AT GRID 2-E

Load Combination: $0.75 \cdot D + 0.75 \cdot L_p + 0.75 \cdot O_1$

Axial	Load (kips)	-0.00
Moment	Mmajor (kip-ft)	-454.03
Moment	Mminor (kip-ft)	0.00

	X-Axis	Y-Axis
Lu for Axial (ft)	30.00	10.00
Lu for Bending (ft)	30.00	10.00
K	1.00	1.00
Braced Against Joint Translation	No	No
Top Flange Continuously Braced	Yes	
Bottom Flange Continuously Braced	No	

TRY W27x161 BEAM.

Moment Cap. = 910 K-ft

S.R. = $0.50 < 1$ = OK

PROVIDE W27x161 BEAM AT LEVEL 2 ALONG GRID E BTWN GRIDS 2 AND 3

S_x ALLOWABLE STRESS DESIGN SELECTION TABLE

For shapes used as beams

$F_y = 50$ ksi			S_x	Shape	Depth d	F_y'	$F_y = 36$ ksi		
L_c	L_u	M_R					L_c	L_u	M_R
Ft.	Ft.	Kip-ft.	In. ³		In.	Ksi	Ft.	Ft.	Kip-ft.
14.9	25.4	3050	1110	W 36x300	36 ³ / ₄	—	17.6	35.3	2220
14.9	23.8	2830	1030	W 36x280	36 ¹ / ₂	—	17.5	33.1	2060
14.8	21.9	2620	953	W 36x260	36 ¹ / ₄	—	17.5	30.5	1910
14.8	20.6	2460	895	W 36x245	36 ¹ / ₈	—	17.4	28.6	1790
14.8	19.3	2300	837	W 36x230	35 ⁷ / ₈	—	17.4	26.8	1670
14.2	21.6	2280	829	W 33x241	34 ¹ / ₈	—	16.7	30.1	1660
14.2	19.8	2080	757	W 33x221	33 ⁷ / ₈	—	16.7	27.6	1510
10.9	15.1	1980	719	W 36x210	36 ³ / ₄	—	12.9	20.9	1440
14.1	17.9	1880	684	W 33x201	33 ⁵ / ₈	—	16.6	24.9	1370
10.9	13.9	1830	664	W 36x194	36 ¹ / ₂	—	12.8	19.4	1330
13.5	21.4	1820	663	W 30x211	31	—	15.9	29.7	1330
10.8	13.1	1710	623	W 36x182	36 ³ / ₈	—	12.7	18.2	1250
13.5	19.4	1640	598	W 30x191	30 ⁵ / ₈	—	15.9	26.9	1200
10.8	12.2	1600	580	W 36x170	36 ¹ / ₈	—	12.7	17.0	1160
10.7	11.4	1490	542	W 36x160	36	—	12.7	15.7	1080
13.4	17.5	1480	539	W 30x173	30 ¹ / ₂	—	15.8	24.2	1080
10.5	11.3	1390	504	W 36x150	35 ⁷ / ₈	—	12.6	14.6	1010
12.6	20.1	1380	502	W 27x178	27 ³ / ₄	—	14.9	27.9	1000
10.4	12.2	1340	487	W 33x152	33 ¹ / ₂	—	12.2	16.9	974
12.6	18.3	1250	455	W 27x161	27 ⁵ / ₈	—	14.8	25.4	910
10.3	11.1	1230	448	W 33x141	33 ³ / ₄	—	12.2	15.4	896
8.8	11.0	1210	439	W 36x135	35 ¹ / ₂	—	12.3	13.0	878
11.6	21.1	1140	414	W 24x162	25	—	13.7	29.3	828
12.5	16.6	1130	411	W 27x146	27 ³ / ₈	—	14.7	23.0	822
9.9	10.8	1120	406	W 33x130	33 ¹ / ₈	—	12.1	13.8	812
9.4	11.6	1050	380	W 30x132	30 ¹ / ₄	—	11.1	16.1	760
11.6	18.9	1020	371	W 24x146	24 ³ / ₄	—	13.6	26.3	742
8.6	10.7	987	359	W 33x118	32 ⁷ / ₈	—	12.0	12.6	718
9.4	10.8	976	355	W 30x124	30 ¹ / ₈	—	11.1	15.0	710
9.4	9.9	905	329	W 30x116	30	—	11.1	13.8	658
11.5	16.8	905	329	W 24x131	24 ¹ / ₂	—	13.6	23.4	658
11.2	21.8	905	329	W 21x147	22	—	13.2	30.3	658
8.9	9.8	822	299	W 30x108	29 ⁷ / ₈	—	11.1	12.3	598
9.0	11.5	822	299	W 27x114	27 ¹ / ₄	—	10.6	15.9	598
11.1	19.6	811	295	W 21x132	21 ⁷ / ₈	—	13.1	27.2	590
11.5	14.9	800	291	W 24x117	24 ¹ / ₄	—	13.5	20.8	582
11.1	18.3	751	273	W 21x122	21 ⁵ / ₈	—	13.1	25.4	546

CRITERIA:

Analysis

Strain Compatibility Not Maintained

Use min. effective plate area for axial only compression load on plate.

Design

Use ASD 9th to check plate bending

Max concrete bearing per AISC J9.

Anchor Shear Check Per AISC Specifications.

Anchor Tension Check Per AISC Specifications.

INPUT DATA:

Column

Column Size.....	W33X221
Dim: BfTop TfTop BfBot TfBot TW Depth	
(in) 15.80 1.270 15.80 1.270 0.775 33.90	

Base Plate

Plate Fy (ksi)	36.000
N (Parallel to Web) (in).....	52.000
B (Perpendicular to Web) (in).....	34.000
Plate Thickness (in).....	3.000

Anchor

Anchor Size.....	2 1/4"
Anchor Area (in^2).....	3.976
Anchor Material.....	Other
Anchor Strength Fu (ksi)	58.00
Thread Included in Shear Plane	

Footing

Footing Strength f'c (ksi)	4.00
Concrete Modulus (ksi)	3605.00
Dimension (Parallel to web) (ft).....	12.00
Dimension (Perpendicular to web) (ft)...	11.00

Design Load

Building Code: - None -

Load combination: Single Load Case

Axial (kip).....	744.00
Vx (kip).....	60.00
Mx (kip-ft).....	466.00
Allowable Stress Increase Factor	1.00

RESULTS:

Analysis

YBar (in)	55.98
Resultant Angle (°).....	0.00

Plate Bending

Max bending moment from concrete compression	
Allowable Stress Increase Factor	1.00
m [N-0.95d]/2.0 (in).....	9.897
n [B-0.80b]/2.0 (in).....	10.680
Controlling effective width to resist moment (in) ...	34.000
Controlling plate bending moment (kip-ft)	102.62
fb (ksi)	24.15
Fb (ksi)	27.00
fb/Fb	0.89
Thickness Required (in).....	2.837
Thickness controlled by cantilever action.	

Anchors

Anchor	X(in)	Y(in)	V(kip)	T(kip)	Interaction
1	-24.50	0.00	10.00	0.00	0.26
2	24.50	0.00	10.00	0.00	0.26
3	-24.50	15.50	10.00	0.00	0.26
4	24.50	15.50	10.00	0.00	0.26
5	-24.50	-15.50	10.00	0.00	0.26
6	24.50	-15.50	10.00	0.00	0.26

Bearing

Eff Area of Support A2 (in^2).....	7072.00
Plate Area A1 (in^2).....	1768.00
Sqrt (A2/A1).....	2.00
Allowable Bearing Pressure (ksi)	2.80
Actual Bearing Stress (ksi)	0.79

DIAGRAM:

#	X(in)	Y(in)
1	-24.500	0.000
2	24.500	0.000
3	-24.500	15.500
4	24.500	15.500
5	-24.500	-15.500
6	24.500	-15.500

DESIGN D - ANCHOR BOLT DESIGN - MF COL. AT GRID A-2

Bolt Grade =	A36
Anchor Confined for Tension =	No
Steel Yield Stress, F_y =	36 Ksi
Steel Ult. Stress, F_u =	58 Ksi
Total service moment, M =	466 Kip-ft
lever arm between anchor bolts =	43 inch
No. of bolts =	3
Approx. area of concrete cone at top, A_e =	3,960 sq.in
Plate Type =	Grouted Plate
f'_c =	4000 psi
Bolt Dia., d =	2 1/4 inch
Tension Force in bolt group =	130.05 Kips
Tension Force in each Anchor, T_f =	43.35 Kips
Shear Force in each Anchor, V_i =	8.5 Kips
ϕ =	0.55
Stress increase Factor, SIF =	1.00
Probability factor, α =	1.00
Concrete tensile stress red. Factor, β =	0.85
Shear coefficient, C =	1.85
Total effective Anchor bolt tension, T =	107.41 Kips
Yield Capacity of one Anchor, AtF_y =	117.10 Kips
Ult. Capacity of one Anchor, AtF_u =	188.50 Kips
Ult. Capacity of anchor group, $n*AtF_u$ =	565.50 Kips
Minimum Bolt spacing, r_m =	36.00 in
Development length, L_d =	27.00 in
Minimum edge distance for tension, mt =	11.25 in
A_e req. =	876.60 sq.in
Min. square footing size =	29.61 in
Area of tension steel, A_{st} =	9.43 sq.in
Area of shear steel, A_{sv} =	2.40 sq.in
Pullout strength of concrete cone, U_p =	851.5 Kips
Combined shear and Tension Interaction =	0.92 <=1.0

OK

OK

OK

Expressed as an interaction equation:

$$\frac{CV}{\phi F_y A_t} + \frac{F}{\phi F_y A_t} \leq \frac{1}{\alpha}$$

1
S7.10 TYPICAL BEAM TO WF COLUMN FLANGE MOMENT CONNECTION
SCALE: 3/4" = 1'-0"

3
S7.10 TYP. MOMENT FRAME COL. BASE PLATE
SCALE: 1" = 1'-0"

2018 IBC Risk Category II Seismic Design Category C

This section presents representative structural calculations for Building 1 (12-story office building in Savannah, Georgia) Design Case E. Project objectives, building selection criteria, seismic design criteria, structural design drawings, references, and project participants are documented in NIST GCR 21-917-48v1A.

TABLE OF CONTENTS

Design Criteria	3
Gravity Design	6
Beam Design	8
Column Design	15
Lateral Design	19
Braced Frame Design	52
Moment Frame Design.....	135

DESIGN CRITERIA

BUILDING 1 GENERAL DESIGN CRITERIA:

Location:

- Savannah, Georgia
- Coordinates: 32.0808989 Latitude, -81.091203 Longitude

DESIGN E: 2018 IBC RISK CATEGORY II SDC C

Applicable Codes

- 2018 International Building Code
- ASCE 7-16: Minimum Design Loads for Buildings and Other Structures
- ACI 318-14: Building Code Requirements for Structural Concrete
- AISC-360-16: Specification for Structural Steel Buildings

Risk Category: II

Wind Loading Criteria:

- Basic Wind Speed (3 Sec. Gust): V = 135 mph
- Exposure: C
- Allowable drift at 10-year mean return interval H/400
- Internal Pressure Coefficient: +/- 0.18

Snow Loads:

- Ground Snow Load: 0 PSF
- Importance Factor: 1.00

Seismic Loading Criteria:

- Risk adjusted maximum considered earthquake, 5 percent damped, spectral response acceleration at short periods, S_S : 0.313g
- Risk adjusted maximum considered earthquake, 5 percent damped, spectral response acceleration at a period of 1 second, S_1 : 0.114g
- Site Class: D
- Site Coefficient (F_a): 1.549
- Site Coefficient (F_v): 2.372
- Seismic Importance Factor: 1.00
- Design, 5 percent damped, spectral response acceleration at short periods, S_{DS} : 0.324g
- Design, 5 percent damped, spectral response acceleration at a period of 1 second, S_{D1} : 0.180 g
- Seismic Design Category: C
- Analysis Procedure: Equivalent Lateral Force
- Seismic Force-Resisting Systems: Steel System not Specifically Detailed for Seismic Resistance
 - North – South seismic resisting system: Steel braced frames
 - East-West seismic resisting system: Steel moment frames
 - Response Magnification Factor (R): 3
 - Over strength Factor: 3
 - Deflection Amplification Factor (C_d): 3

- Seismic response coefficient, C_s
 - North-South 0.042
 - East-West 0.023

GRAVITY LOADING

Superimposed Dead Loads:

- Roofing: 10 PSF
- Miscellaneous: 10 PSF

Superimposed Live Loads

- Roof: 20 PSF
- Office: 50 PSF
- Partitions 15 PSF
- Corridors: 80 PSF
- Lobbies and Stairs: 100 PSF (reducible)
- Mechanical and Storage Rooms: 125 PSF

MATERIAL DEFINITIONS:

Concrete:

- Slab on ground: $F'_c = 4,000$ PSI
- Slabs on steel deck (lightweight 110 pcf) $F'_c = 3,000$ PSI
- Foundations: $F'_c = 4,000$ PSI
- Exterior Concrete: $F'_c = 4,500$ PSI

Concrete Reinforcement:

- Rebar: $F_y = 60$ KSI

Structural Steel:

- WF columns and beams: $F_y = 50$ KSI
- Tubes $F_y = 50$ KSI
- Other steel, unless noted otherwise: $F_y = 36$ KSI
- Tubes:
 - Round $F_y = 42$ KSI
 - Rectangular $F_y = 46$ KSI
- Other steel, unless noted otherwise: $F_y = 36$ KSI

FOUNDATION CRITERIA

- 14" square prestressed precast piles
 - Compression capacity 80 tons
 - Tension capacity 60 tons
 - Lateral Capacity 10 tons

GRAVITY DESIGN

GRAVITY LOADING

This publication is available free of charge from: <https://doi.org/10.6028/NIST.GCR.21-917-48v1B>

SUPERIMPOSED DEAD LOAD DESIGNATIONS			
MARK	USE	LOAD (PSF)	NOTES
A	OFFICE	10	MISC.
B	ROOF	20	10 ROOFING + 10 MISC.

LIVE LOAD DESIGNATIONS		
MARK	USE	LOAD (PSF)
1	OFFICE	50 (R) + 15 (NR)
2	CORRIDORS	80 (R)
3	LOBBIES & STAIRS	100 (R)
4	MECHANICAL & STORAGE	125 (R)
5	ROOF	20 (R)

"NR" INDICATES NON-REDUCIBLE LIVE LOAD.
"R" INDICATES LIVE LOADS REDUCIBLE PER IRC SECTION 1607.11

BEAM DESIGN

RAM STRUCTURAL SYSTEM DEMAND-CAPACITY RATIO SUMMARY

SAMPLE BEAM

RAM Structural System

RAM Steel 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_FS

Building Code: IBC

01/14/21 16:31:48

Steel Code: AISC 360-16 LRFD

Floor Type: TYPICAL FLOOR**Beam Number = 82****SPAN INFORMATION (ft): I-End (10.00,0.00) J-End (10.00,45.00)**

Beam Size (User Selected) = W21X44

Fy = 50.0 ksi

Total Beam Length (ft) = 45.00

COMPOSITE PROPERTIES (Not Shored):

		Left	Right
Deck Label		3+3.25 LW	3+3.25 LW
Concrete thickness (in)		3.25	3.25
Unit weight concrete (pcf)		110.00	110.00
f _c (ksi)		3.00	3.00
Decking Orientation		perpendicular	perpendicular
Decking type		VULCRAFT 3.0VL	VULCRAFT 3.0VL
beff (in)	=	120.00	Y bar(in) = 20.58
M _{nf} (kip-ft)	=	841.64	M _n (kip-ft) = 716.97
C (kips)	=	342.06	PNA (in) = 20.12
I _{eff} (in ⁴)	=	2305.87	I _{tr} (in ⁴) = 2859.57
Stud length (in)	=	5.00	Stud diam (in) = 0.75
Stud Capacity (kips)	Q _n = 17.1	R _g = 1.00	R _p = 0.60
# of studs:	Max = 90	Partial = 40	Actual = 40
Number of Stud Rows	= 1	Percent of Full Composite Action = 52.62	

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	0.465	0.465	0.000	---	NonR	0.000	0.000
	45.000	0.465	0.465	0.000			0.000	0.000
2	0.000	0.100	0.050	0.500	25.0%	Red	0.150	0.200
	45.000	0.100	0.050	0.500			0.150	0.200
3	0.000	0.044	0.044	0.000	---	NonR	0.000	0.000
	45.000	0.044	0.044	0.000			0.000	0.000

SHEAR (Ultimate): Max V_u (1.2DL+1.6LL) = 35.36 kips 1.00V_n = 217.35 kips**MOMENTS (Ultimate):**

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.2DL+1.6LL	251.0	22.5	0.0	1.00	0.90	357.75
	Init DL	1.4DL	198.3	22.5	---	---		
	Max +	1.2DL+1.6LL	397.8	22.5	---	---	0.90	645.27
Controlling		1.2DL+1.6LL	251.0	22.5	---	---	0.90	357.75

REACTIONS (kips):

	Left	Right
Initial reaction	17.09	17.09
DL reaction	13.72	13.72
Max +LL reaction	11.81	11.81
Max +total reaction (factored)	35.36	35.36

DEFLECTIONS: (Camber = 1-1/2)

10

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Gravity Beam Design

RAM Steel 17.01.01.05

Page 2/2

RAM Structural System

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_FS

01/14/21 16:31:48

Building Code: IBC

Steel Code: AISC 360-16 LRFD

Initial load (in)	at 22.50 ft =	-2.112	L/D =	256	>	220	0.86
Live load (in)	at 22.50 ft =	-0.724	L/D =	745	>	360	0.48
Post Comp load (in)	at 22.50 ft =	-0.793	L/D =	681	>	240	0.35
Net Total load (in)	at 22.50 ft =	-1.406	L/D =	384	>	240	0.62

Project ID:
Project # :
Bay ID : 3-TYPICAL FLOOR: 1-2 , A-C
Model : 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_FS

VIBRATION ANALYSIS:

Activity: Walking
Occupancy Category: Electronic Office
Evaluation Criterion: Walking
References: Murray, T.M., Allen, D.E., Ungar, E.E, Davis, D.B.
"Vibrations of Steel-Framed Structural Systems
Due To Human Activity", AISC Design Guide #11 2nd Ed, 2016
Murray, T.M., and Davis, B.,
"Vibration of Steel Joist-Concrete Floor Systems",
SJI Technical Digest No. 5, 2014
Constant Force, $P_o = 65.1b$
Modal Damping Ratio, $\beta = 0.025$
Acceleration Limit, $a_o/g \times 100\% = 0.50 \%$
Beams are continuous
Girders are not continuous at columns

EVALUATION: Combined Mode $a_p/g = 0.497 \%$ $\leq 0.50 \%$
The system SATISFIES THE CRITERION.

PARAMETER SUMMARY:

Parameter	Beam Panel	Left Girder Panel	Right Girder Panel	System
Member	W21X44	Wall	W24X62	
Uniform Load, plf	619.4	0.0	2849.4	
Effective I, in ⁴	3021.1	0.0	5156.9	
Frequency, Hz	4.38	0.00	6.00	3.54
Panel Width, ft	38.36	0.00	68.81	
Panel Weight, k	160.4	0.0	130.7	151.7

FRAMING: (User Modified Bay)

Girder Span = 30.00 ft
Beam Spans:
Left = 0.00 ft
Center = 45.00 ft
Right = 45.00 ft

Girders/Walls:
Left -Wall
Right-W24X62

Beam -W21X44
3 spaces at 120.00 in

Floor Width =350.00 ft
Floor Length=120.00 ft

Concrete: $d_c = 6.25$ in Loading: Dead = 4.00 psf
 $f'_c = 3.00$ ksi Live = 8.00 psf
 wt. = 110.0 pcf Collateral = 0.00 psf
Deck Height = 3.00 in

Warning: The bay configuration and/or properties analyzed here have been modified by the user and differ from the actual configuration

and/or properties of the bay in the RAM Structural System.

Note: Floors with a frequency below 3 Hz are not recommended

COLUMN DESIGN

TYPICAL COLUMN PLAN
RAM STRUCTURAL SYSTEM DEMAND-CAPACITY RATIO SUMMARY

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RAM Structural System

RAM Steel 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_FS

Building Code: IBC

Gravity Column Design

02/24/21 17:14:46

Steel Code: AISC360-16 LRFD

Story level Level 3, Column Line 3-C, Column # 33

Fy (ksi) = 50.00

Column Size

= W14X193

Orientation (deg.) = 90.0

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu (ft) _____	13.50	13.50
K _____	1	1
Braced Against Joint Translation _____	Yes	Yes
Column Eccentricity (in) Top _____	10.25	10.35
Bottom _____	10.25	10.35

CONTROLLING AXIAL COLUMN LOADS - Skip-Load Case 1:

	Dead	Live	Roof
Axial (kip) _____	807.98	555.14	13.50

DEMAND CAPACITY RATIO: (1.2DL + 1.6LL + 0.5RF)

Pu (kip) = 1864.55	0.90Pnx (kip) = 2442.52	Pu/0.90Pnx = 0.763
	0.90Pny (kip) = 2273.62	Pu/0.90Pny = 0.820
	0.90Pn (kip) = 2273.62	Pu/0.90Pn = 0.820

DEMAND/CAPACITY LIMIT FOR STRENGTH : 1.000**CONTROLLING COMBINED COLUMN LOADS - Skip-Load Case 4:**

	Dead	Live	Roof
Axial (kip) _____	807.98	555.14	13.50
Moments Top Mx (kip-ft) _____	-2.25	2.86	0.00
My (kip-ft) _____	-0.86	-0.80	0.00
Bot Mx (kip-ft) _____	-2.44	-3.50	0.00
My (kip-ft) _____	-0.93	-8.32	0.00

Single curvature about X-Axis

Reverse curvature about Y-Axis

CALCULATED PARAMETERS: (1.2DL + 1.6LL + 0.5RF)

Pu (kip) = 1864.55	0.90*Pn (kip) = 2273.62
Mux (kip-ft) = -8.53	0.90*Mnx (kip-ft) = 1331.25
Muy (kip-ft) = -14.42	0.90*Mny (kip-ft) = 675.00
Rm = 1.00	
Cbx = 1.45	
Cmx = 0.69	Cmy = 0.54
Pex (kip) = 26174.53	Pey (kip) = 10153.54
B1x = 1.00	B1y = 1.00

INTERACTION EQUATION

Pu/0.90*Pn = 0.820

RAM Structural System

Gravity Column Design

RAM Steel 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_FS

Building Code: IBC

Page 2/2

02/24/21 17:14:46

Steel Code: AISC360-16 LRFD

$$\text{Eq H1-1a: } 0.820 + 8/9(0.006 + 0.021) = 0.845$$

LATERAL DESIGN

LOAD CASE: WIND**WIND**

ASCE 7-16

Exposure: C

Basic Wind Speed (mph): 135.0

Apply Directionality Factor, $K_d = 0.85$ Use Topography Factor, $K_{zt} = 1.00$ Ground Elevation Factor, $K_e = 1.00$

Use Calculated Frequency for X-Dir.

Use Calculated Frequency for Y-Dir.

Gust Factor for Flexible Structures, G : Use Calculated G for X-Dir.Gust Factor for Flexible Structures, G : Use Calculated G for Y-Dir.

Damping Ratio for Flexible Structures = 0.01

Mean Roof Height (ft): Top Story Height + Parapet = 164.50

Ground Level: GRADE

WIND PRESSURES:

X-Direction: Natural Frequency = 0.233 Structure is Flexible

Y-Direction: Natural Frequency = 0.370 Structure is Flexible

CpWindward = 0.80 qLeeward (qh) = 55.74 psf

GCpn (Parapet): Windward = 1.50 Leeward = -1.00

Height ft	Kz	Kzt	qz psf	Gust Factor G		CpLeeward		Pressure (psf)	
				X	Y	X	Y	X	Y
164.50	1.405	1.000	55.736	1.389	1.090	-0.352	-0.500	89.234	78.956
151.00	1.380	1.000	54.740	1.389	1.090	-0.352	-0.500	88.127	78.088
137.50	1.353	1.000	53.672	1.389	1.090	-0.352	-0.500	86.940	77.156
124.00	1.324	1.000	52.517	1.389	1.090	-0.352	-0.500	85.656	76.149
110.50	1.293	1.000	51.258	1.389	1.090	-0.352	-0.500	84.257	75.051
97.00	1.258	1.000	49.871	1.389	1.090	-0.352	-0.500	82.715	73.842
83.50	1.218	1.000	48.322	1.389	1.090	-0.352	-0.500	80.994	72.492
70.00	1.174	1.000	46.561	1.389	1.090	-0.352	-0.500	79.037	70.957
56.50	1.122	1.000	44.507	1.389	1.090	-0.352	-0.500	76.754	69.167
43.00	1.060	1.000	42.021	1.389	1.090	-0.352	-0.500	73.991	66.999
29.50	0.979	1.000	38.816	1.389	1.090	-0.352	-0.500	70.430	64.206
16.00	0.860	1.000	34.125	1.389	1.090	-0.352	-0.500	65.216	60.116
0.00	0.849	1.000	33.665	1.389	1.090	-0.352	-0.500	64.705	59.715

APPLIED STORY FORCES

Type: Wind_ASCE716_1_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	73.18	0.00
Level 12	151.00	145.12	0.00
Level 11	137.50	143.16	0.00
Level 10	124.00	141.04	0.00
Level 9	110.50	138.73	0.00
Level 8	97.00	136.18	0.00
Level 7	83.50	133.33	0.00
Level 6	70.00	130.08	0.00
Level 5	56.50	126.28	0.00
Level 4	43.00	121.64	0.00
Level 3	29.50	115.54	0.00
Level 2	16.00	118.62	0.00

APPLIED STORY FORCES

Type: Wind_ASCE716_1_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	112.57
Level 12	151.00	0.00	223.46
Level 11	137.50	0.00	220.78
Level 10	124.00	0.00	217.90
Level 9	110.50	0.00	214.74
Level 8	97.00	0.00	211.27
Level 7	83.50	0.00	207.38
Level 6	70.00	0.00	202.96
Level 5	56.50	0.00	197.78
Level 4	43.00	0.00	191.45
Level 3	29.50	0.00	183.14
Level 2	16.00	0.00	189.71

Vx = 1522.93 0.00

20

0.00 2373.14
Vy =

SEISMIC

LOAD CASE: EQ-X ELF

Seismic ASCE 7-16 Equivalent Lateral Force
 Importance Factor: 1.00 TL: 8.00 s
 Site Class D: Stiff Soil, Default
 Ss: 0.313 g S1: 0.114 g
 Use Specified: SDs: 0.324 g SD1: 0.180 g
 Risk Category: II Seismic Design Category: C
 Provisions for: Force
 Ground Level: GRADE

Dir	Eccent	R	Ta Equation			Building Period-T			
X	+ Only	3.0	Std,Ct=0.028,x=0.80			Calculated			
Dir	Ta	Cu	T	T-used	Cs	Cs(max)	Cs(min)	Cs-used	k
					Eq12.8-2	Eq12.8-3	Eq12.8-5		
X	1.660	1.540	4.298	2.556	0.108	0.023	0.014	0.023	2.000

Total Building Weight (kips) = 23549.06

$$V_x = C_s * W = 553 \text{ K}$$

LOAD CASE: EQ-Y ELF

Seismic ASCE 7-16 Equivalent Lateral Force
 Importance Factor: 1.00 TL: 8.00 s
 Site Class D: Stiff Soil, Default
 Ss: 0.313 g S1: 0.114 g
 Use Specified: SDs: 0.324 g SD1: 0.180 g
 Risk Category: II Seismic Design Category: C
 Provisions for: Force
 Ground Level: GRADE

Dir	Eccent	R	Ta Equation			Building Period-T			
Y	+ Only	3.0	Std,Ct=0.020,x=0.75			Calculated			
Dir	Ta	Cu	T	T-used	Cs	Cs(max)	Cs(min)	Cs-used	k
					Eq12.8-2	Eq12.8-3	Eq12.8-5		
Y	0.919	1.540	2.704	1.415	0.108	0.042	0.014	0.042	1.457

Total Building Weight (kips) = 23549.06

$$V_y = C_s * W = 999 \text{ K}$$

Wind Base shear > Seismic base shear. Wind Controls

RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

01/07/21 11:22:23

LOAD CASE: WIND

ASCE 7-16

Exposure: C

Basic Wind Speed (mph): 135.0

Apply Directionality Factor, $K_d = 0.85$ Use Topography Factor, $K_{zt} = 1.00$ Ground Elevation Factor, $K_e = 1.00$

Use Calculated Frequency for X-Dir.

Use Calculated Frequency for Y-Dir.

Gust Factor for Flexible Structures, G : Use Calculated G for X-Dir.Gust Factor for Flexible Structures, G : Use Calculated G for Y-Dir.

Damping Ratio for Flexible Structures = 0.01

Mean Roof Height (ft): Top Story Height + Parapet = 164.50

Ground Level: GRADE

NOTE:

ONLY BASE WIND AND
SEISMIC REPORTS ARE
SHOWN FOR BREVITY.
ECCENTRIC CASES CAN BE
INCLUDED UPON REQUEST.

WIND PRESSURES:

X-Direction: Natural Frequency = 0.233

Structure is Flexible

Y-Direction: Natural Frequency = 0.370

Structure is Flexible

 C_p Windward = 0.80 q Leeward (q_h) = 55.74 psf $G C_{pn}$ (Parapet): Windward = 1.50

Leeward = -1.00

Height ft	K_z	K_{zt}	q_z psf	Gust Factor G		C_p Leeward		Pressure (psf)	
				X	Y	X	Y	X	Y
164.50	1.405	1.000	55.736	1.389	1.090	-0.352	-0.500	89.234	78.956
151.00	1.380	1.000	54.740	1.389	1.090	-0.352	-0.500	88.127	78.088
137.50	1.353	1.000	53.672	1.389	1.090	-0.352	-0.500	86.940	77.156
124.00	1.324	1.000	52.517	1.389	1.090	-0.352	-0.500	85.656	76.149
110.50	1.293	1.000	51.258	1.389	1.090	-0.352	-0.500	84.257	75.051
97.00	1.258	1.000	49.871	1.389	1.090	-0.352	-0.500	82.715	73.842
83.50	1.218	1.000	48.322	1.389	1.090	-0.352	-0.500	80.994	72.492
70.00	1.174	1.000	46.561	1.389	1.090	-0.352	-0.500	79.037	70.957
56.50	1.122	1.000	44.507	1.389	1.090	-0.352	-0.500	76.754	69.167
43.00	1.060	1.000	42.021	1.389	1.090	-0.352	-0.500	73.991	66.999
29.50	0.979	1.000	38.816	1.389	1.090	-0.352	-0.500	70.430	64.206
16.00	0.860	1.000	34.125	1.389	1.090	-0.352	-0.500	65.216	60.116
0.00	0.849	1.000	33.665	1.389	1.090	-0.352	-0.500	64.705	59.715

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_X

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	73.18	0.00	105.00	60.00
Level 12	1	151.00	145.12	0.00	105.00	60.00
Level 11	1	137.50	143.16	0.00	105.00	60.00
Level 10	1	124.00	141.04	0.00	105.00	60.00
Level 9	1	110.50	138.73	0.00	105.00	60.00
Level 8	1	97.00	136.18	0.00	105.00	60.00

RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

Page 2/10

01/07/21 11:22:23

Level 7	1	83.50	133.33	0.00	105.00	60.00
Level 6	1	70.00	130.08	0.00	105.00	60.00
Level 5	1	56.50	126.28	0.00	105.00	60.00
Level 4	1	43.00	121.64	0.00	105.00	60.00
Level 3	1	29.50	115.54	0.00	105.00	60.00
Level 2	1	16.00	118.62	0.00	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_1_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	73.18	0.00
Level 12	151.00	145.12	0.00
Level 11	137.50	143.16	0.00
Level 10	124.00	141.04	0.00
Level 9	110.50	138.73	0.00
Level 8	97.00	136.18	0.00
Level 7	83.50	133.33	0.00
Level 6	70.00	130.08	0.00
Level 5	56.50	126.28	0.00
Level 4	43.00	121.64	0.00
Level 3	29.50	115.54	0.00
Level 2	16.00	118.62	0.00
		1522.93	0.00

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	112.57	105.00	60.00
Level 12	1	151.00	0.00	223.46	105.00	60.00
Level 11	1	137.50	0.00	220.78	105.00	60.00
Level 10	1	124.00	0.00	217.90	105.00	60.00
Level 9	1	110.50	0.00	214.74	105.00	60.00
Level 8	1	97.00	0.00	211.27	105.00	60.00
Level 7	1	83.50	0.00	207.38	105.00	60.00
Level 6	1	70.00	0.00	202.96	105.00	60.00
Level 5	1	56.50	0.00	197.78	105.00	60.00
Level 4	1	43.00	0.00	191.45	105.00	60.00
Level 3	1	29.50	0.00	183.14	105.00	60.00
Level 2	1	16.00	0.00	189.71	105.00	60.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 3/10

01/07/21 11:22:23

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

APPLIED STORY FORCES

Type: Wind_ASCE716_1_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	112.57
Level 12	151.00	0.00	223.46
Level 11	137.50	0.00	220.78
Level 10	124.00	0.00	217.90
Level 9	110.50	0.00	214.74
Level 8	97.00	0.00	211.27
Level 7	83.50	0.00	207.38
Level 6	70.00	0.00	202.96
Level 5	56.50	0.00	197.78
Level 4	43.00	0.00	191.45
Level 3	29.50	0.00	183.14
Level 2	16.00	0.00	189.71
		0.00	2373.14

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RAM Structural System

Bentley DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

Loads and Applied Forces

Page 4/10

01/07/21 11:22:23

LOAD CASE: EQ-X ELF

Seismic ASCE 7-16 Equivalent Lateral Force

Importance Factor: 1.00 TL: 8.00 s

Site Class D: Stiff Soil, Default

Ss: 0.313 g S1: 0.114 g

Use Specified: SDs: 0.324 g SD1: 0.180 g

Risk Category: II Seismic Design Category: C

Provisions for: Force

Ground Level: GRADE

Dir	Eccent	R	Ta Equation			Building Period-T			
X	+ Only	3.0	Std,Ct=0.028,x=0.80			Calculated			
Dir	Ta	Cu	T	T-used	Cs	Cs(max)	Cs(min)	Cs-used	k
					Eq12.8-2	Eq12.8-3	Eq12.8-5		
X	1.660	1.540	4.298	2.556	0.108	0.023	0.014	0.023	2.000

Total Building Weight (kips) = 23549.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	125.71	0.00	99.40	67.65
Level 12	1	151.00	99.53	0.00	98.99	67.65
Level 11	1	137.50	82.93	0.00	98.96	67.64
Level 10	1	124.00	67.60	0.00	98.95	67.63
Level 9	1	110.50	54.01	0.00	98.96	67.62
Level 8	1	97.00	41.85	0.00	98.96	67.61
Level 7	1	83.50	31.11	0.00	98.92	67.61
Level 6	1	70.00	22.05	0.00	98.86	67.59
Level 5	1	56.50	14.39	0.00	98.89	67.50
Level 4	1	43.00	8.40	0.00	98.83	67.58
Level 3	1	29.50	3.97	0.00	98.89	67.57
Level 2	1	16.00	1.17	0.00	98.94	67.58

APPLIED STORY FORCES

Type: EQ_ASCE716_X+E_F

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	125.71	0.00
Level 12	151.00	99.53	0.00
Level 11	137.50	82.93	0.00
Level 10	124.00	67.60	0.00
Level 9	110.50	54.01	0.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 5/10

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

01/07/21 11:22:23

Level 8	97.00	41.85	0.00
Level 7	83.50	31.11	0.00
Level 6	70.00	22.05	0.00
Level 5	56.50	14.39	0.00
Level 4	43.00	8.40	0.00
Level 3	29.50	3.97	0.00
Level 2	16.00	1.17	0.00
		<hr/>	<hr/>
		552.73	0.00

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RAM Structural System

Bentley DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

Loads and Applied Forces

Page 6/10

01/07/21 11:22:23

LOAD CASE: EQ-Y ELF

Seismic ASCE 7-16 Equivalent Lateral Force

Importance Factor: 1.00 TL: 8.00 s

Site Class D: Stiff Soil, Default

Ss: 0.313 g S1: 0.114 g

Use Specified: SDs: 0.324 g SD1: 0.180 g

Risk Category: II Seismic Design Category: C

Provisions for: Force

Ground Level: GRADE

Dir	Eccent	R	Ta Equation			Building Period-T			
Y	+ Only	3.0	Std,Ct=0.020,x=0.75			Calculated			
Dir	Ta	Cu	T	T-used	Cs	Cs(max)	Cs(min)	Cs-used	k
					Eq12.8-2	Eq12.8-3	Eq12.8-5		
Y	0.919	1.540	2.704	1.415	0.108	0.042	0.014	0.042	1.457

Total Building Weight (kips) = 23549.06

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_Y+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
ROOF	1	164.50	0.00	190.14	110.00	61.55
Level 12	1	151.00	0.00	157.70	109.59	61.55
Level 11	1	137.50	0.00	138.25	109.56	61.54
Level 10	1	124.00	0.00	119.20	109.55	61.53
Level 9	1	110.50	0.00	101.38	109.56	61.52
Level 8	1	97.00	0.00	84.30	109.56	61.51
Level 7	1	83.50	0.00	67.99	109.52	61.51
Level 6	1	70.00	0.00	53.03	109.46	61.49
Level 5	1	56.50	0.00	38.88	109.49	61.40
Level 4	1	43.00	0.00	26.31	109.43	61.48
Level 3	1	29.50	0.00	15.28	109.49	61.47
Level 2	1	16.00	0.00	6.28	109.54	61.48

APPLIED STORY FORCES

Type: EQ_ASCE716_Y+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
ROOF	164.50	0.00	190.14
Level 12	151.00	0.00	157.70
Level 11	137.50	0.00	138.25
Level 10	124.00	0.00	119.20
Level 9	110.50	0.00	101.38

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 7/10

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

01/07/21 11:22:23

Level 8	97.00	0.00	84.30
Level 7	83.50	0.00	67.99
Level 6	70.00	0.00	53.03
Level 5	56.50	0.00	38.88
Level 4	43.00	0.00	26.31
Level 3	29.50	0.00	15.28
Level 2	16.00	0.00	6.28
		<hr/>	<hr/>
		0.00	998.73

RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

Page 8/10

01/07/21 11:22:23

LOAD CASE: WIND 10-YR DRFT

ASCE 7-16

Exposure: C

Basic Wind Speed (mph): 75.0

Apply Directionality Factor, $K_d = 0.85$ Use Topography Factor, $K_{zt} = 1.00$ Ground Elevation Factor, $K_e = 1.00$

Use Calculated Frequency for X-Dir.

Use Calculated Frequency for Y-Dir.

Gust Factor for Flexible Structures, G : Use Calculated G for X-Dir.Gust Factor for Flexible Structures, G : Use Calculated G for Y-Dir.

Damping Ratio for Flexible Structures = 0.01

Mean Roof Height (ft): Top Story Height + Parapet = 164.50

Ground Level: GRADE

WIND PRESSURES:

X-Direction: Natural Frequency = 0.233

Structure is Flexible

Y-Direction: Natural Frequency = 0.370

Structure is Flexible

 C_p Windward = 0.80 q Leeward (q_h) = 17.20 psf $G C_{pn}$ (Parapet): Windward = 1.50

Leeward = -1.00

Height ft	K_z	K_{zt}	q_z psf	Gust Factor G		C_p Leeward		Pressure (psf)	
				X	Y	X	Y	X	Y
164.50	1.405	1.000	17.203	1.096	0.924	-0.352	-0.500	21.738	20.662
151.00	1.380	1.000	16.895	1.096	0.924	-0.352	-0.500	21.468	20.435
137.50	1.353	1.000	16.565	1.096	0.924	-0.352	-0.500	21.179	20.191
124.00	1.324	1.000	16.209	1.096	0.924	-0.352	-0.500	20.866	19.927
110.50	1.293	1.000	15.820	1.096	0.924	-0.352	-0.500	20.525	19.640
97.00	1.258	1.000	15.392	1.096	0.924	-0.352	-0.500	20.150	19.324
83.50	1.218	1.000	14.914	1.096	0.924	-0.352	-0.500	19.730	18.970
70.00	1.174	1.000	14.371	1.096	0.924	-0.352	-0.500	19.254	18.569
56.50	1.122	1.000	13.737	1.096	0.924	-0.352	-0.500	18.698	18.100
43.00	1.060	1.000	12.969	1.096	0.924	-0.352	-0.500	18.024	17.533
29.50	0.979	1.000	11.980	1.096	0.924	-0.352	-0.500	17.157	16.802
16.00	0.860	1.000	10.532	1.096	0.924	-0.352	-0.500	15.887	15.732
0.00	0.849	1.000	10.390	1.096	0.924	-0.352	-0.500	15.762	15.627

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_X

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	17.83	0.00	105.00	60.00
Level 12	1	151.00	35.35	0.00	105.00	60.00
Level 11	1	137.50	34.88	0.00	105.00	60.00
Level 10	1	124.00	34.36	0.00	105.00	60.00
Level 9	1	110.50	33.80	0.00	105.00	60.00
Level 8	1	97.00	33.17	0.00	105.00	60.00

RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 9/10

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

01/07/21 11:22:23

Level 7	1	83.50	32.48	0.00	105.00	60.00
Level 6	1	70.00	31.69	0.00	105.00	60.00
Level 5	1	56.50	30.76	0.00	105.00	60.00
Level 4	1	43.00	29.63	0.00	105.00	60.00
Level 3	1	29.50	28.15	0.00	105.00	60.00
Level 2	1	16.00	28.90	0.00	105.00	60.00

APPLIED STORY FORCES

Type: Wind_ASCE716_1_X

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	17.83	0.00
Level 12	151.00	35.35	0.00
Level 11	137.50	34.88	0.00
Level 10	124.00	34.36	0.00
Level 9	110.50	33.80	0.00
Level 8	97.00	33.17	0.00
Level 7	83.50	32.48	0.00
Level 6	70.00	31.69	0.00
Level 5	56.50	30.76	0.00
Level 4	43.00	29.63	0.00
Level 3	29.50	28.15	0.00
Level 2	16.00	28.90	0.00
		370.99	0.00

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_Y

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
ROOF	1	164.50	0.00	29.46	105.00	60.00
Level 12	1	151.00	0.00	58.48	105.00	60.00
Level 11	1	137.50	0.00	57.78	105.00	60.00
Level 10	1	124.00	0.00	57.02	105.00	60.00
Level 9	1	110.50	0.00	56.20	105.00	60.00
Level 8	1	97.00	0.00	55.29	105.00	60.00
Level 7	1	83.50	0.00	54.27	105.00	60.00
Level 6	1	70.00	0.00	53.11	105.00	60.00
Level 5	1	56.50	0.00	51.76	105.00	60.00
Level 4	1	43.00	0.00	50.10	105.00	60.00
Level 3	1	29.50	0.00	47.93	105.00	60.00
Level 2	1	16.00	0.00	49.64	105.00	60.00

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RAM Structural System

Loads and Applied Forces

RAM Frame 17.01.01.05

Page 10/10

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

01/07/21 11:22:23

APPLIED STORY FORCES

Type: Wind_ASCE716_1_Y

Level	Ht ft	Fx kips	Fy kips
ROOF	164.50	0.00	29.46
Level 12	151.00	0.00	58.48
Level 11	137.50	0.00	57.78
Level 10	124.00	0.00	57.02
Level 9	110.50	0.00	56.20
Level 8	97.00	0.00	55.29
Level 7	83.50	0.00	54.27
Level 6	70.00	0.00	53.11
Level 5	56.50	0.00	51.76
Level 4	43.00	0.00	50.10
Level 3	29.50	0.00	47.93
Level 2	16.00	0.00	49.64
		<hr/> 0.00	<hr/> 621.03

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

02/25/21 17:37:55

Steel Code: IBC

CRITERIA:

Rigid End Zones: Ignore Effects

Member Force Output: At Face of Joint

P-Delta: Yes Scale Factor (DL): 1.38 Scale Factor (LL): 0.50
 Scale Factor (Roof): 1.00 Scale Factor (Snow): 1.00

Ground Level: GRADE

Use Reduced Stiffness for Steel Members (AISC 360): $\tau_b = 1.00$

LOAD CASE DEFINITIONS:

W13	WIND 10-YR DRFT	Wind_ASCE716_1_X
W14	WIND 10-YR DRFT	Wind_ASCE716_1_Y
W15	WIND 10-YR DRFT	Wind_ASCE716_2_X+E
W16	WIND 10-YR DRFT	Wind_ASCE716_2_X-E
W17	WIND 10-YR DRFT	Wind_ASCE716_2_Y+E
W18	WIND 10-YR DRFT	Wind_ASCE716_2_Y-E
W19	WIND 10-YR DRFT	Wind_ASCE716_3_X+Y
W20	WIND 10-YR DRFT	Wind_ASCE716_3_X-Y
W21	WIND 10-YR DRFT	Wind_ASCE716_4_X+Y_CW
W22	WIND 10-YR DRFT	Wind_ASCE716_4_X+Y_CCW
W23	WIND 10-YR DRFT	Wind_ASCE716_4_X-Y_CW
W24	WIND 10-YR DRFT	Wind_ASCE716_4_X-Y_CCW

Displacements for pseudo-flexible and flexible/none diaphragms are reported based on maximum nodal displacement within diaphragm boundary.

RESULTS:

Location (ft): (105.000, 60.000)

TARGET DRIFT RATIO = 1/400 = 0.0025

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X in	Y in	X in	Y in	X	Y
ROOF	W13	3.8191	-0.0019	0.1627	-0.0001	0.0010	0.0000
	W14	-0.0028	2.6822	-0.0001	0.2464	0.0000	0.0015
	W15	2.8675	-0.0282	0.1221	-0.0022	0.0008	0.0000
	W16	2.8612	0.0253	0.1219	0.0020	0.0008	0.0000
	W17	-0.0127	2.1016	-0.0003	0.1918	0.0000	0.0012
	W18	0.0084	1.9217	0.0002	0.1778	0.0000	0.0011
	W19	2.8622	2.0102	0.1220	0.1847	0.0008	0.0011
	W20	2.8665	-2.0131	0.1221	-0.1849	0.0008	0.0011
	W21	2.1569	1.4202	0.0918	0.1317	0.0006	0.0008
	W22	2.1364	1.5952	0.0912	0.1454	0.0006	0.0009
	W23	2.1601	-1.5973	0.0918	-0.1455	0.0006	0.0009
	W24	2.1396	-1.4223 ²	0.0913	-0.1319	0.0006	0.0008

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 2/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 12	W13	3.6564	-0.0018	0.2711	-0.0001	0.0017	0.0000
	W14	-0.0028	2.4358	-0.0001	0.2728	0.0000	0.0017
	W15	2.7454	-0.0260	0.2035	-0.0028	0.0013	0.0000
	W16	2.7393	0.0233	0.2032	0.0026	0.0013	0.0000
	W17	-0.0124	1.9098	-0.0005	0.2137	0.0000	0.0013
	W18	0.0082	1.7439	0.0003	0.1955	0.0000	0.0012
	W19	2.7402	1.8255	0.2033	0.2045	0.0013	0.0013
	W20	2.7444	-1.8282	0.2034	-0.2047	0.0013	0.0013
	W21	2.0652	1.2884	0.1528	0.1445	0.0009	0.0009
	W22	2.0452	1.4498	0.1521	0.1622	0.0009	0.0010
	W23	2.0683	-1.4519	0.1529	-0.1624	0.0009	0.0010
	W24	2.0483	-1.2905	0.1522	-0.1447	0.0009	0.0009
Level 11	W13	3.3853	-0.0017	0.3223	-0.0001	0.0020	0.0000
	W14	-0.0027	2.1630	-0.0001	0.2569	0.0000	0.0016
	W15	2.5419	-0.0232	0.2419	-0.0025	0.0015	0.0000
	W16	2.5360	0.0207	0.2416	0.0023	0.0015	0.0000
	W17	-0.0119	1.6962	-0.0005	0.2007	0.0000	0.0012
	W18	0.0079	1.5484	0.0004	0.1846	0.0000	0.0011
	W19	2.5370	1.6210	0.2416	0.1926	0.0015	0.0012
	W20	2.5410	-1.6235	0.2418	-0.1928	0.0015	0.0012
	W21	1.9124	1.1439	0.1817	0.1366	0.0011	0.0008
	W22	1.8931	1.2876	0.1808	0.1523	0.0011	0.0009
	W23	1.9154	-1.2895	0.1818	-0.1524	0.0011	0.0009
	W24	1.8961	-1.1458	0.1809	-0.1367	0.0011	0.0008
Level 10	W13	3.0630	-0.0015	0.3533	-0.0001	0.0022	0.0000
	W14	-0.0025	1.9061	-0.0001	0.2648	0.0000	0.0016
	W15	2.3000	-0.0207	0.2651	-0.0028	0.0016	0.0000
	W16	2.2944	0.0184	0.2648	0.0026	0.0016	0.0000
	W17	-0.0114	1.4954	-0.0006	0.2076	0.0000	0.0013
	W18	0.0075	1.3638	0.0004	0.1896	0.0000	0.0012
	W19	2.2953	1.4284	0.2649	0.1985	0.0016	0.0012
	W20	2.2991	-1.4307	0.2651	-0.1987	0.0016	0.0012
	W21	1.7307	1.0073	0.1991	0.1401	0.0012	0.0009
	W22	1.7123	1.1353	0.1982	0.1576	0.0012	0.0010
	W23	1.7336	-1.1371	0.1993	-0.1578	0.0012	0.0010
	W24	1.7152	-1.0090	0.1983	-0.1403	0.0012	0.0009
Level 9	W13	2.7097	-0.0014	0.3310	-0.0002	0.0020	0.0000
	W14	-0.0024	1.6413	-0.0002	0.2546	0.0000	0.0016
	W15	2.0349	-0.0179	0.2485	-0.0026	0.0015	0.0000
	W16	2.0296	0.0158	0.2481	0.0024	0.0015	0.0000
	W17	-0.0108	1.2878	-0.0008	0.1993	0.0000	0.0012
	W18	0.0072	1.1741	0.0006	0.1826	0.0000	0.0011

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 3/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	2.0305	1.2299	0.2481	0.1908	0.0015	0.0012
	W20	2.0341	-1.2320	0.2484	-0.1911	0.0015	0.0012
	W21	1.5316	0.8672	0.1868	0.1350	0.0012	0.0008
	W22	1.5141	0.9777	0.1854	0.1513	0.0011	0.0009
	W23	1.5343	-0.9793	0.1870	-0.1514	0.0012	0.0009
	W24	1.5168	-0.8687	0.1856	-0.1352	0.0011	0.0008
Level 8	W13	2.3787	-0.0012	0.3440	-0.0001	0.0021	0.0000
	W14	-0.0022	1.3867	-0.0002	0.2613	0.0000	0.0016
	W15	1.7864	-0.0153	0.2583	-0.0029	0.0016	0.0000
	W16	1.7815	0.0134	0.2578	0.0027	0.0016	0.0000
	W17	-0.0100	1.0885	-0.0010	0.2054	0.0000	0.0013
	W18	0.0066	0.9915	0.0006	0.1865	0.0000	0.0012
	W19	1.7823	1.0391	0.2579	0.1959	0.0016	0.0012
	W20	1.7857	-1.0410	0.2582	-0.1961	0.0016	0.0012
	W21	1.3448	0.7322	0.1942	0.1377	0.0012	0.0008
	W22	1.3287	0.8265	0.1926	0.1561	0.0012	0.0010
	W23	1.3473	-0.8279	0.1944	-0.1563	0.0012	0.0010
	W24	1.3312	-0.7336	0.1929	-0.1378	0.0012	0.0009
Level 7	W13	2.0346	-0.0011	0.3190	-0.0000	0.0020	0.0000
	W14	-0.0020	1.1254	-0.0002	0.2478	0.0000	0.0015
	W15	1.5282	-0.0124	0.2395	-0.0024	0.0015	0.0000
	W16	1.5237	0.0107	0.2390	0.0023	0.0015	0.0000
	W17	-0.0090	0.8831	-0.0011	0.1938	0.0000	0.0012
	W18	0.0060	0.8050	0.0007	0.1779	0.0000	0.0011
	W19	1.5245	0.8432	0.2390	0.1858	0.0015	0.0011
	W20	1.5275	-0.8449	0.2394	-0.1859	0.0015	0.0011
	W21	1.1506	0.5945	0.1802	0.1316	0.0011	0.0008
	W22	1.1361	0.6703	0.1784	0.1471	0.0011	0.0009
	W23	1.1529	-0.6716	0.1804	-0.1471	0.0011	0.0009
	W24	1.1383	-0.5957	0.1787	-0.1317	0.0011	0.0008
Level 6	W13	1.7157	-0.0011	0.3314	-0.0005	0.0020	0.0000
	W14	-0.0018	0.8776	-0.0007	0.2252	0.0000	0.0014
	W15	1.2887	-0.0100	0.2493	-0.0026	0.0015	0.0000
	W16	1.2848	0.0084	0.2477	0.0019	0.0015	0.0000
	W17	-0.0079	0.6893	-0.0033	0.1766	0.0000	0.0011
	W18	0.0052	0.6271	0.0022	0.1613	0.0000	0.0010
	W19	1.2854	0.6574	0.2480	0.1686	0.0015	0.0010
	W20	1.2881	-0.6590	0.2491	-0.1693	0.0015	0.0010
	W21	0.9704	0.4628	0.1887	0.1190	0.0012	0.0007
	W22	0.9577	0.5233	0.1833	0.1339	0.0011	0.0008
	W23	0.9724	-0.5245	0.1895	-0.1344	0.0012	0.0008
	W24	0.9597	-0.4640	0.1841	-0.1195	0.0011	0.0007

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 4/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 5	W13	1.3843	-0.0006	0.3299	-0.0005	0.0020	0.0000
	W14	-0.0011	0.6524	-0.0007	0.2090	0.0000	0.0013
	W15	1.0394	-0.0074	0.2482	-0.0027	0.0015	0.0000
	W16	1.0371	0.0065	0.2466	0.0019	0.0015	0.0000
	W17	-0.0046	0.5127	-0.0032	0.1646	0.0000	0.0010
	W18	0.0030	0.4659	0.0022	0.1490	0.0000	0.0009
	W19	1.0374	0.4888	0.2469	0.1564	0.0015	0.0010
	W20	1.0390	-0.4897	0.2479	-0.1572	0.0015	0.0010
	W21	0.7818	0.3439	0.1878	0.1097	0.0012	0.0007
	W22	0.7743	0.3894	0.1825	0.1249	0.0011	0.0008
	W23	0.7830	-0.3901	0.1886	-0.1255	0.0012	0.0008
	W24	0.7755	-0.3445	0.1833	-0.1103	0.0011	0.0007
Level 4	W13	1.0544	-0.0001	0.3381	-0.0000	0.0021	0.0000
	W14	-0.0004	0.4434	-0.0002	0.1713	0.0000	0.0011
	W15	0.7911	-0.0047	0.2538	-0.0016	0.0016	0.0000
	W16	0.7905	0.0046	0.2533	0.0016	0.0016	0.0000
	W17	-0.0014	0.3481	-0.0010	0.1339	0.0000	0.0008
	W18	0.0008	0.3169	0.0006	0.1231	0.0000	0.0008
	W19	0.7905	0.3325	0.2534	0.1285	0.0016	0.0008
	W20	0.7911	-0.3326	0.2537	-0.1285	0.0016	0.0008
	W21	0.5940	0.2342	0.1908	0.0911	0.0012	0.0006
	W22	0.5918	0.2645	0.1893	0.1016	0.0012	0.0006
	W23	0.5944	-0.2646	0.1910	-0.1016	0.0012	0.0006
	W24	0.5922	-0.2343	0.1895	-0.0911	0.0012	0.0006
Level 3	W13	0.7163	-0.0001	0.3470	0.0001	0.0021	0.0000
	W14	-0.0002	0.2721	-0.0001	0.1494	0.0000	0.0009
	W15	0.5373	-0.0031	0.2603	-0.0013	0.0016	0.0000
	W16	0.5372	0.0030	0.2601	0.0014	0.0016	0.0000
	W17	-0.0004	0.2143	-0.0004	0.1167	0.0000	0.0007
	W18	0.0002	0.1938	0.0002	0.1073	0.0000	0.0007
	W19	0.5371	0.2040	0.2601	0.1121	0.0016	0.0007
	W20	0.5374	-0.2041	0.2603	-0.1120	0.0016	0.0007
	W21	0.4032	0.1431	0.1954	0.0795	0.0012	0.0005
	W22	0.4025	0.1629	0.1948	0.0886	0.0012	0.0005
	W23	0.4033	-0.1630	0.1955	-0.0885	0.0012	0.0005
	W24	0.4027	-0.1432	0.1949	-0.0794	0.0012	0.0005
Level 2	W13	0.3694	-0.0001	0.3694	-0.0001	0.0019	0.0000
	W14	-0.0001	0.1227	-0.0001	0.1227	0.0000	0.0006
	W15	0.2770	-0.0017	0.2770	-0.0017	0.0014	0.0000
	W16	0.2770	0.0015	0.2770	0.0015	0.0014	0.0000
	W17	-0.0001	0.0975	-0.0001	0.0975	0.0000	0.0005
	W18	-0.0000	0.0865	-0.0000	0.0865	0.0000	0.0005

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 5/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	0.2770	0.0919	0.2770	0.0919	0.0014	0.0005
	W20	0.2771	-0.0921	0.2771	-0.0921	0.0014	0.0005
	W21	0.2077	0.0636	0.2077	0.0636	0.0011	0.0003
	W22	0.2077	0.0743	0.2077	0.0743	0.0011	0.0004
	W23	0.2078	-0.0745	0.2078	-0.0745	0.0011	0.0004
	W24	0.2078	-0.0637	0.2078	-0.0637	0.0011	0.0003
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (0.000, 0.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	3.7990	0.0332	0.1614	0.0021	0.0010	0.0000
	W14	0.2458	2.2471	0.0201	0.2112	0.0001	0.0013
	W15	2.5659	0.4996	0.0991	0.0381	0.0006	0.0002
	W16	3.1326	-0.4497	0.1431	-0.0350	0.0009	0.0002
	W17	1.1390	0.0862	0.0890	0.0354	0.0005	0.0002
	W18	-0.7703	3.2845	-0.0589	0.2813	0.0004	0.0017
	W19	3.0336	1.7103	0.1361	0.1600	0.0008	0.0010
	W20	2.6649	-1.6604	0.1060	-0.1568	0.0007	0.0010
	W21	1.3467	2.8380	0.0301	0.2396	0.0002	0.0015
	W22	3.2037	-0.2726	0.1741	0.0003	0.0011	0.0000
	W23	1.0702	0.3100	0.0075	0.0020	0.0000	0.0000
	W24	2.9272	-2.8006	0.1515	-0.2372	0.0009	0.0015
Level 12	W13	3.6376	0.0311	0.2697	0.0024	0.0017	0.0000
	W14	0.2257	2.0359	0.0251	0.2288	0.0002	0.0014
	W15	2.4669	0.4614	0.1749	0.0473	0.0011	0.0003
	W16	2.9896	-0.4147	0.2296	-0.0436	0.0014	0.0003
	W17	1.0500	0.0508	0.1109	0.0188	0.0007	0.0001
	W18	-0.7114	3.0031	-0.0733	0.3244	0.0005	0.0020
	W19	2.8975	1.5503 ₃₆	0.2210	0.1734	0.0014	0.0011

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 6/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	2.5589	-1.5036	0.1835	-0.1697	0.0011	0.0010
	W21	1.3166	2.5984	0.0762	0.2787	0.0005	0.0017
	W22	3.0296	-0.2730	0.2554	-0.0186	0.0016	0.0001
	W23	1.0627	0.3080	0.0480	0.0214	0.0003	0.0001
	W24	2.7757	-2.5634	0.2272	-0.2760	0.0014	0.0017
Level 11	W13	3.3679	0.0287	0.3208	0.0025	0.0020	0.0000
	W14	0.2007	1.8072	0.0223	0.2177	0.0001	0.0013
	W15	2.2920	0.4142	0.2141	0.0460	0.0013	0.0003
	W16	2.7599	-0.3711	0.2671	-0.0423	0.0016	0.0003
	W17	0.9391	0.0320	0.1058	0.0147	0.0007	0.0001
	W18	-0.6380	2.6788	-0.0723	0.3118	0.0004	0.0019
	W19	2.6765	1.3769	0.2573	0.1651	0.0016	0.0010
	W20	2.3754	-1.3339	0.2239	-0.1614	0.0014	0.0010
	W21	1.2405	2.3197	0.1063	0.2684	0.0007	0.0017
	W22	2.7742	-0.2543	0.2796	-0.0207	0.0017	0.0001
	W23	1.0147	0.2866	0.0813	0.0235	0.0005	0.0001
	W24	2.5485	-2.2874	0.2545	-0.2656	0.0016	0.0016
Level 10	W13	3.0471	0.0262	0.3519	0.0024	0.0022	0.0000
	W14	0.1784	1.5895	0.0244	0.2218	0.0002	0.0014
	W15	2.0779	0.3681	0.2362	0.0478	0.0015	0.0003
	W16	2.4928	-0.3288	0.2916	-0.0443	0.0018	0.0003
	W17	0.8333	0.0173	0.1114	0.0116	0.0007	0.0001
	W18	-0.5657	2.3670	-0.0748	0.3212	0.0005	0.0020
	W19	2.4191	1.2118	0.2822	0.1681	0.0017	0.0010
	W20	2.1516	-1.1725	0.2456	-0.1646	0.0015	0.0010
	W21	1.1341	2.0513	0.1211	0.2767	0.0007	0.0017
	W22	2.4946	-0.2336	0.3023	-0.0245	0.0019	0.0002
	W23	0.9334	0.2631	0.0936	0.0271	0.0006	0.0002
	W24	2.2939	-2.0219	0.2748	-0.2741	0.0017	0.0017
Level 9	W13	2.6953	0.0239	0.3294	0.0028	0.0020	0.0000
	W14	0.1539	1.3677	0.0236	0.2130	0.0001	0.0013
	W15	1.8417	0.3203	0.2207	0.0461	0.0014	0.0003
	W16	2.2012	-0.2846	0.2734	-0.0419	0.0017	0.0003
	W17	0.7218	0.0057	0.1063	0.0118	0.0007	0.0001
	W18	-0.4909	2.0458	-0.0709	0.3077	0.0004	0.0019
	W19	2.1369	1.0437	0.2647	0.1619	0.0016	0.0010
	W20	1.9060	-1.0079	0.2293	-0.1577	0.0014	0.0010
	W21	1.0130	1.7746	0.1123	0.2653	0.0007	0.0016
	W22	2.1923	-0.2091	0.2847	-0.0225	0.0018	0.0001
	W23	0.8399	0.2360	0.0858	0.0257	0.0005	0.0002
	W24	2.0191	-1.7478	0.2582	-0.2622	0.0016	0.0016

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RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 7/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 8	W13	2.3659	0.0211	0.3426	0.0024	0.0021	0.0000
	W14	0.1304	1.1547	0.0256	0.2161	0.0002	0.0013
	W15	1.6210	0.2743	0.2295	0.0475	0.0014	0.0003
	W16	1.9279	-0.2427	0.2844	-0.0439	0.0018	0.0003
	W17	0.6155	-0.0061	0.1116	0.0084	0.0007	0.0001
	W18	-0.4200	1.7381	-0.0732	0.3158	0.0005	0.0019
	W19	1.8722	0.8818	0.2762	0.1639	0.0017	0.0010
	W20	1.6767	-0.8502	0.2377	-0.1603	0.0015	0.0010
	W21	0.9007	1.5093	0.1172	0.2724	0.0007	0.0017
	W22	1.9076	-0.1866	0.2970	-0.0266	0.0018	0.0002
	W23	0.7541	0.2103	0.0884	0.0293	0.0005	0.0002
	W24	1.7609	-1.4856	0.2682	-0.2697	0.0017	0.0017
Level 7	W13	2.0233	0.0187	0.3185	0.0008	0.0020	0.0000
	W14	0.1047	0.9386	0.0219	0.2091	0.0001	0.0013
	W15	1.3915	0.2268	0.2136	0.0429	0.0013	0.0003
	W16	1.6435	-0.1988	0.2641	-0.0416	0.0016	0.0003
	W17	0.5039	-0.0145	0.1013	0.0146	0.0006	0.0001
	W18	-0.3468	1.4224	-0.0685	0.2991	0.0004	0.0018
	W19	1.5960	0.7179	0.2552	0.1575	0.0016	0.0010
	W20	1.4389	-0.6899	0.2225	-0.1562	0.0014	0.0010
	W21	0.7835	1.2369	0.1089	0.2565	0.0007	0.0016
	W22	1.6105	-0.1600	0.2740	-0.0203	0.0017	0.0001
	W23	0.6657	0.1810	0.0843	0.0212	0.0005	0.0001
	W24	1.4927	-1.2159	0.2494	-0.2555	0.0015	0.0016
Level 6	W13	1.7049	0.0178	0.3263	0.0084	0.0020	0.0001
	W14	0.0829	0.7295	0.0205	0.1882	0.0001	0.0012
	W15	1.1779	0.1839	0.2206	0.0476	0.0014	0.0003
	W16	1.3794	-0.1572	0.2688	-0.0350	0.0017	0.0002
	W17	0.4026	-0.0291	0.0965	0.0020	0.0006	0.0000
	W18	-0.2783	1.1233	-0.0658	0.2803	0.0004	0.0017
	W19	1.3408	0.5605	0.2601	0.1474	0.0016	0.0009
	W20	1.2165	-0.5337	0.2294	-0.1349	0.0014	0.0008
	W21	0.6747	0.9804	0.1161	0.2459	0.0007	0.0015
	W22	1.3365	-0.1397	0.2740	-0.0247	0.0017	0.0002
	W23	0.5814	0.1598	0.0931	0.0342	0.0006	0.0002
	W24	1.2433	-0.9604	0.2510	-0.2365	0.0015	0.0015
Level 5	W13	1.3786	0.0094	0.3247	0.0086	0.0020	0.0001
	W14	0.0624	0.5413	0.0192	0.1741	0.0001	0.0011
	W15	0.9572	0.1363	0.2216	0.0439	0.0014	0.0003
	W16	1.1106	-0.1222	0.2655	-0.0311	0.0016	0.0002
	W17	0.3061	-0.0311	0.0884	0.0042	0.0005	0.0000
	W18	-0.2125	0.8430	-0.0595	0.2570	0.0004	0.0016

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 8/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	1.0807	0.4130	0.2580	0.1370	0.0016	0.0008
	W20	0.9871	-0.3989	0.2291	-0.1242	0.0014	0.0008
	W21	0.5586	0.7345	0.1215	0.2257	0.0008	0.0014
	W22	1.0625	-0.1150	0.2654	-0.0201	0.0016	0.0001
	W23	0.4883	0.1256	0.0999	0.0298	0.0006	0.0002
	W24	0.9923	-0.7239	0.2437	-0.2160	0.0015	0.0013
Level 4	W13	1.0539	0.0009	0.3377	0.0006	0.0021	0.0000
	W14	0.0432	0.3671	0.0156	0.1436	0.0001	0.0009
	W15	0.7356	0.0924	0.2328	0.0351	0.0014	0.0002
	W16	0.8452	-0.0911	0.2738	-0.0342	0.0017	0.0002
	W17	0.2177	-0.0353	0.0809	-0.0093	0.0005	0.0001
	W18	-0.1530	0.5860	-0.0574	0.2247	0.0004	0.0014
	W19	0.8228	0.2760	0.2650	0.1081	0.0016	0.0007
	W20	0.7580	-0.2747	0.2416	-0.1073	0.0015	0.0007
	W21	0.4370	0.5088	0.1316	0.1948	0.0008	0.0012
	W22	0.7972	-0.0948	0.2660	-0.0326	0.0016	0.0002
	W23	0.3884	0.0958	0.1140	0.0333	0.0007	0.0002
	W24	0.7486	-0.5079	0.2484	-0.1942	0.0015	0.0012
Level 3	W13	0.7161	0.0003	0.3465	0.0010	0.0021	0.0000
	W14	0.0276	0.2236	0.0136	0.1255	0.0001	0.0008
	W15	0.5028	0.0574	0.2420	0.0307	0.0015	0.0002
	W16	0.5714	-0.0569	0.2776	-0.0292	0.0017	0.0002
	W17	0.1369	-0.0260	0.0704	-0.0072	0.0004	0.0000
	W18	-0.0955	0.3613	-0.0501	0.1954	0.0003	0.0012
	W19	0.5578	0.1679	0.2700	0.0948	0.0017	0.0006
	W20	0.5164	-0.1675	0.2497	-0.0934	0.0015	0.0006
	W21	0.3055	0.3140	0.1440	0.1695	0.0009	0.0010
	W22	0.5312	-0.0622	0.2610	-0.0273	0.0016	0.0002
	W23	0.2745	0.0625	0.1287	0.0284	0.0008	0.0002
	W24	0.5002	-0.3137	0.2458	-0.1684	0.0015	0.0010
Level 2	W13	0.3697	-0.0007	0.3697	-0.0007	0.0019	0.0000
	W14	0.0140	0.0981	0.0140	0.0981	0.0001	0.0005
	W15	0.2608	0.0267	0.2608	0.0267	0.0014	0.0001
	W16	0.2937	-0.0277	0.2937	-0.0277	0.0015	0.0001
	W17	0.0664	-0.0188	0.0664	-0.0188	0.0003	0.0001
	W18	-0.0455	0.1660	-0.0455	0.1660	0.0002	0.0009
	W19	0.2878	0.0731	0.2878	0.0731	0.0015	0.0004
	W20	0.2668	-0.0741	0.2668	-0.0741	0.0014	0.0004
	W21	0.1615	0.1445	0.1615	0.1445	0.0008	0.0008
	W22	0.2701	-0.0349	0.2701	-0.0349	0.0014	0.0002
	W23	0.1458	0.0342	0.1458	0.0342	0.0008	0.0002
	W24	0.2544	-0.1453	0.2544	-0.1453	0.0013	0.0008

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 9/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (0.000, 120.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	3.8392	0.0332	0.1640	0.0021	0.0010	0.0000
	W14	-0.2515	2.2471	-0.0202	0.2112	0.0001	0.0013
	W15	3.1690	0.4996	0.1452	0.0381	0.0009	0.0002
	W16	2.5898	-0.4497	0.1008	-0.0350	0.0006	0.0002
	W17	-1.1644	0.0862	-0.0897	0.0354	0.0006	0.0002
	W18	0.7872	3.2845	0.0594	0.2813	0.0004	0.0017
	W19	2.6908	1.7103	0.1078	0.1600	0.0007	0.0010
	W20	3.0680	-1.6604	0.1382	-0.1568	0.0009	0.0010
	W21	2.9672	2.8380	0.1534	0.2396	0.0009	0.0015
	W22	1.0691	-0.2726	0.0083	0.0003	0.0001	0.0000
	W23	3.2501	0.3100	0.1761	0.0020	0.0011	0.0000
	W24	1.3520	-2.8006	0.0311	-0.2372	0.0002	0.0015
Level 12	W13	3.6752	0.0311	0.2726	0.0024	0.0017	0.0000
	W14	-0.2312	2.0359	-0.0253	0.2288	0.0002	0.0014
	W15	3.0239	0.4614	0.2321	0.0473	0.0014	0.0003
	W16	2.4890	-0.4147	0.1768	-0.0436	0.0011	0.0003
	W17	-1.0747	0.0508	-0.1118	0.0188	0.0007	0.0001
	W18	0.7278	3.0031	0.0739	0.3244	0.0005	0.0020
	W19	2.5830	1.5503	0.1855	0.1734	0.0011	0.0011
	W20	2.9299	-1.5036	0.2234	-0.1697	0.0014	0.0010
	W21	2.8138	2.5984	0.2295	0.2787	0.0014	0.0017
	W22	1.0607	-0.2730	0.0488	-0.0186	0.0003	0.0001
	W23	3.0739	0.3080	0.2579	0.0214	0.0016	0.0001
	W24	1.3209	-2.5634	0.0772	-0.2760	0.0005	0.0017
Level 11	W13	3.4026	0.0287 ₄₀	0.3238	0.0025	0.0020	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 10/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W14	-0.2060	1.8072	-0.0225	0.2177	0.0001	0.0013
	W15	2.7918	0.4142	0.2696	0.0460	0.0017	0.0003
	W16	2.3121	-0.3711	0.2161	-0.0423	0.0013	0.0003
	W17	-0.9628	0.0320	-0.1069	0.0147	0.0007	0.0001
	W18	0.6539	2.6788	0.0730	0.3118	0.0005	0.0019
	W19	2.3975	1.3769	0.2259	0.1651	0.0014	0.0010
	W20	2.7065	-1.3339	0.2597	-0.1614	0.0016	0.0010
	W21	2.5843	2.3197	0.2570	0.2684	0.0016	0.0017
	W22	1.0120	-0.2543	0.0819	-0.0207	0.0005	0.0001
	W23	2.8160	0.2866	0.2823	0.0235	0.0017	0.0001
	W24	1.2437	-2.2874	0.1073	-0.2656	0.0007	0.0016
Level 10	W13	3.0788	0.0262	0.3547	0.0024	0.0022	0.0000
	W14	-0.1834	1.5895	-0.0247	0.2218	0.0002	0.0014
	W15	2.5222	0.3681	0.2940	0.0478	0.0018	0.0003
	W16	2.0960	-0.3288	0.2381	-0.0443	0.0015	0.0003
	W17	-0.8560	0.0173	-0.1126	0.0116	0.0007	0.0001
	W18	0.5808	2.3670	0.0755	0.3212	0.0005	0.0020
	W19	2.1715	1.2118	0.2475	0.1681	0.0015	0.0010
	W20	2.4467	-1.1725	0.2845	-0.1646	0.0018	0.0010
	W21	2.3273	2.0513	0.2772	0.2767	0.0017	0.0017
	W22	0.9300	-0.2336	0.0941	-0.0245	0.0006	0.0002
	W23	2.5337	0.2631	0.3049	0.0271	0.0019	0.0002
	W24	1.1364	-2.0219	0.1219	-0.2741	0.0008	0.0017
Level 9	W13	2.7241	0.0239	0.3327	0.0028	0.0021	0.0000
	W14	-0.1588	1.3677	-0.0240	0.2130	0.0001	0.0013
	W15	2.2282	0.3203	0.2763	0.0461	0.0017	0.0003
	W16	1.8580	-0.2846	0.2228	-0.0419	0.0014	0.0003
	W17	-0.7434	0.0057	-0.1080	0.0118	0.0007	0.0001
	W18	0.5053	2.0458	0.0721	0.3077	0.0004	0.0019
	W19	1.9240	1.0437	0.2316	0.1619	0.0014	0.0010
	W20	2.1622	-1.0079	0.2675	-0.1577	0.0017	0.0010
	W21	2.0501	1.7746	0.2613	0.2653	0.0016	0.0016
	W22	0.8359	-0.2091	0.0861	-0.0225	0.0005	0.0001
	W23	2.2287	0.2360	0.2882	0.0257	0.0018	0.0002
	W24	1.0145	-1.7478	0.1131	-0.2622	0.0007	0.0016
Level 8	W13	2.3914	0.0211	0.3455	0.0024	0.0021	0.0000
	W14	-0.1348	1.1547	-0.0260	0.2161	0.0002	0.0013
	W15	1.9519	0.2743	0.2870	0.0475	0.0018	0.0003
	W16	1.6352	-0.2427	0.2312	-0.0439	0.0014	0.0003
	W17	-0.6354	-0.0061	-0.1136	0.0084	0.0007	0.0001
	W18	0.4332	1.7381	0.0745	0.3158	0.0005	0.0019
	W19	1.6924	0.8818 ₄₁	0.2396	0.1639	0.0015	0.0010

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 11/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	1.8947	-0.8502	0.2786	-0.1603	0.0017	0.0010
	W21	1.7889	1.5093	0.2712	0.2724	0.0017	0.0017
	W22	0.7498	-0.1866	0.0882	-0.0266	0.0005	0.0002
	W23	1.9405	0.2103	0.3005	0.0293	0.0019	0.0002
	W24	0.9015	-1.4856	0.1175	-0.2697	0.0007	0.0017
Level 7	W13	2.0459	0.0187	0.3195	0.0008	0.0020	0.0000
	W14	-0.1088	0.9386	-0.0223	0.2091	0.0001	0.0013
	W15	1.6649	0.2268	0.2654	0.0429	0.0016	0.0003
	W16	1.4040	-0.1988	0.2138	-0.0416	0.0013	0.0003
	W17	-0.5219	-0.0145	-0.1035	0.0146	0.0006	0.0001
	W18	0.3587	1.4224	0.0700	0.2991	0.0004	0.0018
	W19	1.4529	0.7179	0.2229	0.1575	0.0014	0.0010
	W20	1.6160	-0.6899	0.2564	-0.1562	0.0016	0.0010
	W21	1.5177	1.2369	0.2515	0.2565	0.0016	0.0016
	W22	0.6616	-0.1600	0.0828	-0.0203	0.0005	0.0001
	W23	1.6401	0.1810	0.2766	0.0212	0.0017	0.0001
	W24	0.7840	-1.2159	0.1079	-0.2555	0.0007	0.0016
Level 6	W13	1.7264	0.0178	0.3364	0.0084	0.0021	0.0001
	W14	-0.0864	0.7295	-0.0219	0.1882	0.0001	0.0012
	W15	1.3995	0.1839	0.2780	0.0476	0.0017	0.0003
	W16	1.1902	-0.1572	0.2266	-0.0350	0.0014	0.0002
	W17	-0.4184	-0.0291	-0.1030	0.0020	0.0006	0.0000
	W18	0.2888	1.1233	0.0702	0.2803	0.0004	0.0017
	W19	1.2300	0.5605	0.2359	0.1474	0.0015	0.0009
	W20	1.3597	-0.5337	0.2687	-0.1349	0.0017	0.0008
	W21	1.2662	0.9804	0.2612	0.2459	0.0016	0.0015
	W22	0.5788	-0.1397	0.0927	-0.0247	0.0006	0.0002
	W23	1.3634	0.1598	0.2858	0.0342	0.0018	0.0002
	W24	0.6761	-0.9604	0.1173	-0.2365	0.0007	0.0015
Level 5	W13	1.3900	0.0094	0.3351	0.0086	0.0021	0.0001
	W14	-0.0646	0.5413	-0.0206	0.1741	0.0001	0.0011
	W15	1.1215	0.1363	0.2749	0.0439	0.0017	0.0003
	W16	0.9636	-0.1222	0.2278	-0.0311	0.0014	0.0002
	W17	-0.3154	-0.0311	-0.0949	0.0042	0.0006	0.0000
	W18	0.2185	0.8430	0.0639	0.2570	0.0004	0.0016
	W19	0.9941	0.4130	0.2359	0.1370	0.0015	0.0008
	W20	1.0909	-0.3989	0.2668	-0.1242	0.0016	0.0008
	W21	1.0050	0.7345	0.2541	0.2257	0.0016	0.0014
	W22	0.4861	-0.1150	0.0997	-0.0201	0.0006	0.0001
	W23	1.0776	0.1256	0.2773	0.0298	0.0017	0.0002
	W24	0.5588	-0.7239	0.1229	-0.2160	0.0008	0.0013

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RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 12/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 4	W13	1.0549	0.0009	0.3384	0.0006	0.0021	0.0000
	W14	-0.0439	0.3671	-0.0160	0.1436	0.0001	0.0009
	W15	0.8466	0.0924	0.2747	0.0351	0.0017	0.0002
	W16	0.7358	-0.0911	0.2329	-0.0342	0.0014	0.0002
	W17	-0.2205	-0.0353	-0.0828	-0.0093	0.0005	0.0001
	W18	0.1546	0.5860	0.0587	0.2247	0.0004	0.0014
	W19	0.7582	0.2760	0.2418	0.1081	0.0015	0.0007
	W20	0.8241	-0.2747	0.2658	-0.1073	0.0016	0.0007
	W21	0.7509	0.5088	0.2501	0.1948	0.0015	0.0012
	W22	0.3865	-0.0948	0.1126	-0.0326	0.0007	0.0002
	W23	0.8003	0.0958	0.2681	0.0333	0.0017	0.0002
	W24	0.4359	-0.5079	0.1306	-0.1942	0.0008	0.0012
Level 3	W13	0.7165	0.0003	0.3475	0.0010	0.0021	0.0000
	W14	-0.0279	0.2236	-0.0138	0.1255	0.0001	0.0008
	W15	0.5719	0.0574	0.2786	0.0307	0.0017	0.0002
	W16	0.5029	-0.0569	0.2426	-0.0292	0.0015	0.0002
	W17	-0.1377	-0.0260	-0.0712	-0.0072	0.0004	0.0000
	W18	0.0959	0.3613	0.0505	0.1954	0.0003	0.0012
	W19	0.5165	0.1679	0.2503	0.0948	0.0015	0.0006
	W20	0.5583	-0.1675	0.2709	-0.0934	0.0017	0.0006
	W21	0.5008	0.3140	0.2468	0.1695	0.0015	0.0010
	W22	0.2739	-0.0622	0.1286	-0.0273	0.0008	0.0002
	W23	0.5322	0.0625	0.2623	0.0284	0.0016	0.0002
	W24	0.3053	-0.3137	0.1441	-0.1684	0.0009	0.0010
Level 2	W13	0.3691	-0.0007	0.3691	-0.0007	0.0019	0.0000
	W14	-0.0141	0.0981	-0.0141	0.0981	0.0001	0.0005
	W15	0.2933	0.0267	0.2933	0.0267	0.0015	0.0001
	W16	0.2603	-0.0277	0.2603	-0.0277	0.0014	0.0001
	W17	-0.0666	-0.0188	-0.0666	-0.0188	0.0003	0.0001
	W18	0.0454	0.1660	0.0454	0.1660	0.0002	0.0009
	W19	0.2662	0.0731	0.2662	0.0731	0.0014	0.0004
	W20	0.2874	-0.0741	0.2874	-0.0741	0.0015	0.0004
	W21	0.2540	0.1445	0.2540	0.1445	0.0013	0.0008
	W22	0.1453	-0.0349	0.1453	-0.0349	0.0008	0.0002
	W23	0.2699	0.0342	0.2699	0.0342	0.0014	0.0002
	W24	0.1612	-0.1453	0.1612	-0.1453	0.0008	0.0008
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 13/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Location (ft): (210.000, 120.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	3.8392	-0.0371	0.1640	-0.0024	0.0010	0.0000
	W14	-0.2515	3.1173	-0.0202	0.2817	0.0001	0.0017
	W15	3.1690	-0.5559	0.1452	-0.0425	0.0009	0.0003
	W16	2.5898	0.5002	0.1008	0.0390	0.0006	0.0002
	W17	-1.1644	4.1171	-0.0897	0.3482	0.0006	0.0021
	W18	0.7872	0.5589	0.0594	0.0743	0.0004	0.0005
	W19	2.6908	2.3102	0.1078	0.2095	0.0007	0.0013
	W20	3.0680	-2.3658	0.1382	-0.2130	0.0009	0.0013
	W21	2.9672	0.0023	0.1534	0.0239	0.0009	0.0001
	W22	1.0691	3.4630	0.0083	0.2904	0.0001	0.0018
	W23	3.2501	-3.5047	0.1761	-0.2930	0.0011	0.0018
	W24	1.3520	-0.0440	0.0311	-0.0265	0.0002	0.0002
Level 12	W13	3.6752	-0.0347	0.2726	-0.0027	0.0017	0.0000
	W14	-0.2312	2.8357	-0.0253	0.3168	0.0002	0.0020
	W15	3.0239	-0.5134	0.2321	-0.0529	0.0014	0.0003
	W16	2.4890	0.4613	0.1768	0.0488	0.0011	0.0003
	W17	-1.0747	3.7689	-0.1118	0.4085	0.0007	0.0025
	W18	0.7278	0.4846	0.0739	0.0667	0.0005	0.0004
	W19	2.5830	2.1007	0.1855	0.2356	0.0011	0.0015
	W20	2.9299	-2.1528	0.2234	-0.2396	0.0014	0.0015
	W21	2.8138	-0.0216	0.2295	0.0103	0.0014	0.0001
	W22	1.0607	3.1726	0.0488	0.3430	0.0003	0.0021
	W23	3.0739	-3.2117	0.2579	-0.3461	0.0016	0.0021
	W24	1.3209	-0.0175	0.0772	-0.0134	0.0005	0.0001
Level 11	W13	3.4026	-0.0320	0.3238	-0.0028	0.0020	0.0000
	W14	-0.2060	2.5188	-0.0225	0.2961	0.0001	0.0018
	W15	2.7918	-0.4605	0.2696	-0.0510	0.0017	0.0003
	W16	2.3121	0.4125	0.2161	0.0469	0.0013	0.0003
	W17	-0.9628	3.3603	-0.1069	0.3868	0.0007	0.0024
	W18	0.6539	0.4179	0.0730	0.0574	0.0005	0.0004
	W19	2.3975	1.8651 ₄₄	0.2259	0.2200	0.0014	0.0014

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 14/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W20	2.7065	-1.9132	0.2597	-0.2242	0.0016	0.0014
	W21	2.5843	-0.0319	0.2570	0.0048	0.0016	0.0000
	W22	1.0120	2.8296	0.0819	0.3253	0.0005	0.0020
	W23	2.8160	-2.8656	0.2823	-0.3284	0.0017	0.0020
	W24	1.2437	-0.0041	0.1073	-0.0079	0.0007	0.0000
Level 10	W13	3.0788	-0.0293	0.3547	-0.0026	0.0022	0.0000
	W14	-0.1834	2.2227	-0.0247	0.3078	0.0002	0.0019
	W15	2.5222	-0.4095	0.2940	-0.0533	0.0018	0.0003
	W16	2.0960	0.3656	0.2381	0.0494	0.0015	0.0003
	W17	-0.8560	2.9735	-0.1126	0.4036	0.0007	0.0025
	W18	0.5808	0.3605	0.0755	0.0581	0.0005	0.0004
	W19	2.1715	1.6451	0.2475	0.2289	0.0015	0.0014
	W20	2.4467	-1.6890	0.2845	-0.2328	0.0018	0.0014
	W21	2.3273	-0.0367	0.2772	0.0036	0.0017	0.0000
	W22	0.9300	2.5043	0.0941	0.3397	0.0006	0.0021
	W23	2.5337	-2.5373	0.3049	-0.3427	0.0019	0.0021
	W24	1.1364	0.0038	0.1219	-0.0065	0.0008	0.0000
Level 9	W13	2.7241	-0.0267	0.3327	-0.0031	0.0021	0.0000
	W14	-0.1588	1.9149	-0.0240	0.2962	0.0001	0.0018
	W15	2.2282	-0.3562	0.2763	-0.0513	0.0017	0.0003
	W16	1.8580	0.3162	0.2228	0.0466	0.0014	0.0003
	W17	-0.7434	2.5699	-0.1080	0.3868	0.0007	0.0024
	W18	0.5053	0.3024	0.0721	0.0575	0.0004	0.0004
	W19	1.9240	1.4162	0.2316	0.2198	0.0014	0.0014
	W20	2.1622	-1.4562	0.2675	-0.2245	0.0017	0.0014
	W21	2.0501	-0.0403	0.2613	0.0047	0.0016	0.0000
	W22	0.8359	2.1646	0.0861	0.3251	0.0005	0.0020
	W23	2.2287	-2.1946	0.2882	-0.3286	0.0018	0.0020
	W24	1.0145	0.0103	0.1131	-0.0082	0.0007	0.0001
Level 8	W13	2.3914	-0.0235	0.3455	-0.0027	0.0021	0.0000
	W14	-0.1348	1.6187	-0.0260	0.3065	0.0002	0.0019
	W15	1.9519	-0.3049	0.2870	-0.0533	0.0018	0.0003
	W16	1.6352	0.2696	0.2312	0.0493	0.0014	0.0003
	W17	-0.6354	2.1831	-0.1136	0.4025	0.0007	0.0025
	W18	0.4332	0.2449	0.0745	0.0573	0.0005	0.0004
	W19	1.6924	1.1964	0.2396	0.2279	0.0015	0.0014
	W20	1.8947	-1.2317	0.2786	-0.2319	0.0017	0.0014
	W21	1.7889	-0.0450	0.2712	0.0030	0.0017	0.0000
	W22	0.7498	1.8395	0.0882	0.3388	0.0005	0.0021
	W23	1.9405	-1.8660	0.3005	-0.3418	0.0019	0.0021
	W24	0.9015	0.0185	0.1175	-0.0060	0.0007	0.0000

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RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 15/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
Level 7	W13	2.0459	-0.0209	0.3195	-0.0009	0.0020	0.0000
	W14	-0.1088	1.3122	-0.0223	0.2865	0.0001	0.0018
	W15	1.6649	-0.2516	0.2654	-0.0476	0.0016	0.0003
	W16	1.4040	0.2203	0.2138	0.0463	0.0013	0.0003
	W17	-0.5219	1.7806	-0.1035	0.3729	0.0006	0.0023
	W18	0.3587	0.1877	0.0700	0.0567	0.0004	0.0004
	W19	1.4529	0.9685	0.2229	0.2142	0.0014	0.0013
	W20	1.6160	-0.9998	0.2564	-0.2155	0.0016	0.0013
	W21	1.5177	-0.0479	0.2515	0.0068	0.0016	0.0000
	W22	0.6616	1.5007	0.0828	0.3144	0.0005	0.0019
	W23	1.6401	-1.5242	0.2766	-0.3154	0.0017	0.0019
	W24	0.7840	0.0244	0.1079	-0.0079	0.0007	0.0000
Level 6	W13	1.7264	-0.0200	0.3364	-0.0093	0.0021	0.0001
	W14	-0.0864	1.0258	-0.0219	0.2623	0.0001	0.0016
	W15	1.3995	-0.2039	0.2780	-0.0529	0.0017	0.0003
	W16	1.1902	0.1740	0.2266	0.0388	0.0014	0.0002
	W17	-0.4184	1.4077	-0.1030	0.3512	0.0006	0.0022
	W18	0.2888	0.1309	0.0702	0.0422	0.0004	0.0003
	W19	1.2300	0.7543	0.2359	0.1897	0.0015	0.0012
	W20	1.3597	-0.7843	0.2687	-0.2037	0.0017	0.0013
	W21	1.2662	-0.0548	0.2612	-0.0080	0.0016	0.0000
	W22	0.5788	1.1863	0.0927	0.2925	0.0006	0.0018
	W23	1.3634	-1.2087	0.2858	-0.3030	0.0018	0.0019
	W24	0.6761	0.0323	0.1173	-0.0025	0.0007	0.0000
Level 5	W13	1.3900	-0.0106	0.3351	-0.0096	0.0021	0.0001
	W14	-0.0646	0.7635	-0.0206	0.2439	0.0001	0.0015
	W15	1.1215	-0.1511	0.2749	-0.0493	0.0017	0.0003
	W16	0.9636	0.1352	0.2278	0.0349	0.0014	0.0002
	W17	-0.3154	1.0565	-0.0949	0.3249	0.0006	0.0020
	W18	0.2185	0.0887	0.0639	0.0409	0.0004	0.0003
	W19	0.9941	0.5646	0.2359	0.1757	0.0015	0.0011
	W20	1.0909	-0.5806	0.2668	-0.1901	0.0016	0.0012
	W21	1.0050	-0.0468	0.2541	-0.0063	0.0016	0.0000
	W22	0.4861	0.8937	0.0997	0.2699	0.0006	0.0017
	W23	1.0776	-0.9057	0.2773	-0.2807	0.0017	0.0017
	W24	0.5588	0.0348	0.1229	-0.0045	0.0008	0.0000
Level 4	W13	1.0549	-0.0010	0.3384	-0.0006	0.0021	0.0000
	W14	-0.0439	0.5196	-0.0160	0.1990	0.0001	0.0012
	W15	0.8466	-0.1018	0.2747	-0.0383	0.0017	0.0002
	W16	0.7358	0.1003	0.2329	0.0374	0.0014	0.0002
	W17	-0.2205	0.7316	-0.0828	0.2770	0.0005	0.0017
	W18	0.1546	0.0478	0.0587	0.0215	0.0004	0.0001

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 16/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W19	0.7582	0.3889	0.2418	0.1488	0.0015	0.0009
	W20	0.8241	-0.3904	0.2658	-0.1497	0.0016	0.0009
	W21	0.7509	-0.0405	0.2501	-0.0126	0.0015	0.0001
	W22	0.3865	0.6239	0.1126	0.2358	0.0007	0.0015
	W23	0.8003	-0.6250	0.2681	-0.2365	0.0017	0.0015
	W24	0.4359	0.0394	0.1306	0.0120	0.0008	0.0001
Level 3	W13	0.7165	-0.0004	0.3475	-0.0008	0.0021	0.0000
	W14	-0.0279	0.3206	-0.0138	0.1733	0.0001	0.0011
	W15	0.5719	-0.0635	0.2786	-0.0333	0.0017	0.0002
	W16	0.5029	0.0629	0.2426	0.0321	0.0015	0.0002
	W17	-0.1377	0.4546	-0.0712	0.2406	0.0004	0.0015
	W18	0.0959	0.0263	0.0505	0.0193	0.0003	0.0001
	W19	0.5165	0.2401	0.2503	0.1293	0.0015	0.0008
	W20	0.5583	-0.2408	0.2709	-0.1306	0.0017	0.0008
	W21	0.5008	-0.0279	0.2468	-0.0105	0.0015	0.0001
	W22	0.2739	0.3881	0.1286	0.2045	0.0008	0.0013
	W23	0.5322	-0.3885	0.2623	-0.2054	0.0016	0.0013
	W24	0.3053	0.0274	0.1441	0.0096	0.0009	0.0001
Level 2	W13	0.3691	0.0004	0.3691	0.0004	0.0019	0.0000
	W14	-0.0141	0.1473	-0.0141	0.1473	0.0001	0.0008
	W15	0.2933	-0.0302	0.2933	-0.0302	0.0015	0.0002
	W16	0.2603	0.0308	0.2603	0.0308	0.0014	0.0002
	W17	-0.0666	0.2139	-0.0666	0.2139	0.0003	0.0011
	W18	0.0454	0.0070	0.0454	0.0070	0.0002	0.0000
	W19	0.2662	0.1108	0.2662	0.1108	0.0014	0.0006
	W20	0.2874	-0.1102	0.2874	-0.1102	0.0015	0.0006
	W21	0.2540	-0.0173	0.2540	-0.0173	0.0013	0.0001
	W22	0.1453	0.1835	0.1453	0.1835	0.0008	0.0010
	W23	0.2699	-0.1831	0.2699	-0.1831	0.0014	0.0010
	W24	0.1612	0.0178	0.1612	0.0178	0.0008	0.0001
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 17/20

02/25/21 17:37:55

Steel Code: IBC

Location (ft): (190.000, 0.000)

Story	LdC	Displacement		Story Drift		Drift Ratio	
		X	Y	X	Y	X	Y
		in	in	in	in		
ROOF	W13	3.7990	-0.0304	0.1614	-0.0019	0.0010	0.0000
	W14	0.2458	3.0344	0.0201	0.2749	0.0001	0.0017
	W15	2.5659	-0.4554	0.0991	-0.0348	0.0006	0.0002
	W16	3.1326	0.4098	0.1431	0.0319	0.0009	0.0002
	W17	1.1390	3.7332	0.0890	0.3184	0.0005	0.0020
	W18	-0.7703	0.8185	-0.0589	0.0940	0.0004	0.0006
	W19	3.0336	2.2530	0.1361	0.2048	0.0008	0.0013
	W20	2.6649	-2.2986	0.1060	-0.2077	0.0007	0.0013
	W21	1.3467	0.2723	0.0301	0.0444	0.0002	0.0003
	W22	3.2037	3.1072	0.1741	0.2627	0.0011	0.0016
	W23	1.0702	-3.1414	0.0075	-0.2649	0.0000	0.0016
	W24	2.9272	-0.3065	0.1515	-0.0466	0.0009	0.0003
Level 12	W13	3.6376	-0.0285	0.2697	-0.0022	0.0017	0.0000
	W14	0.2257	2.7595	0.0251	0.3084	0.0002	0.0019
	W15	2.4669	-0.4206	0.1749	-0.0433	0.0011	0.0003
	W16	2.9896	0.3778	0.2296	0.0400	0.0014	0.0002
	W17	1.0500	3.4148	0.1109	0.3714	0.0007	0.0023
	W18	-0.7114	0.7245	-0.0733	0.0912	0.0005	0.0006
	W19	2.8975	2.0483	0.2210	0.2297	0.0014	0.0014
	W20	2.5589	-2.0910	0.1835	-0.2330	0.0011	0.0014
	W21	1.3166	0.2279	0.0762	0.0359	0.0005	0.0002
	W22	3.0296	2.8445	0.2554	0.3086	0.0016	0.0019
	W23	1.0627	-2.8765	0.0480	-0.3111	0.0003	0.0019
	W24	2.7757	-0.2600	0.2272	-0.0384	0.0014	0.0002
Level 11	W13	3.3679	-0.0263	0.3208	-0.0023	0.0020	0.0000
	W14	0.2007	2.4511	0.0223	0.2887	0.0001	0.0018
	W15	2.2920	-0.3772	0.2141	-0.0418	0.0013	0.0003
	W16	2.7599	0.3378	0.2671	0.0384	0.0016	0.0002
	W17	0.9391	3.0433	0.1058	0.3513	0.0007	0.0022
	W18	-0.6380	0.6333	-0.0723	0.0816	0.0004	0.0005
	W19	2.6765	1.8186	0.2573	0.2148	0.0016	0.0013
	W20	2.3754	-1.8580	0.2239	-0.2182	0.0014	0.0013
	W21	1.2405	0.1920	0.1063	0.0299	0.0007	0.0002
	W22	2.7742	2.5359	0.2796	0.2923	0.0017	0.0018
	W23	1.0147	-2.5654	0.0813	-0.2949	0.0005	0.0018
	W24	2.5485	-0.2216	0.2545	-0.0324	0.0016	0.0002
Level 10	W13	3.0471	-0.0240	0.3519	-0.0021	0.0022	0.0000
	W14	0.1784	2.1624 ₄₈	0.0244	0.2996	0.0002	0.0018

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RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 18/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W15	2.0779	-0.3354	0.2362	-0.0437	0.0015	0.0003
	W16	2.4928	0.2994	0.2916	0.0405	0.0018	0.0002
	W17	0.8333	2.6920	0.1114	0.3663	0.0007	0.0023
	W18	-0.5657	0.5516	-0.0748	0.0832	0.0005	0.0005
	W19	2.4191	1.6038	0.2822	0.2231	0.0017	0.0014
	W20	2.1516	-1.6398	0.2456	-0.2263	0.0015	0.0014
	W21	1.1341	0.1621	0.1211	0.0296	0.0007	0.0002
	W22	2.4946	2.2436	0.3023	0.3051	0.0019	0.0019
	W23	0.9334	-2.2706	0.0936	-0.3075	0.0006	0.0019
	W24	2.2939	-0.1891	0.2748	-0.0320	0.0017	0.0002
Level 9	W13	2.6953	-0.0219	0.3294	-0.0026	0.0020	0.0000
	W14	0.1539	1.8628	0.0236	0.2883	0.0001	0.0018
	W15	1.8417	-0.2917	0.2207	-0.0420	0.0014	0.0003
	W16	2.2012	0.2590	0.2734	0.0382	0.0017	0.0002
	W17	0.7218	2.3257	0.1063	0.3511	0.0007	0.0022
	W18	-0.4909	0.4685	-0.0709	0.0813	0.0004	0.0005
	W19	2.1369	1.3807	0.2647	0.2143	0.0016	0.0013
	W20	1.9060	-1.4135	0.2293	-0.2181	0.0014	0.0013
	W21	1.0130	0.1326	0.1123	0.0295	0.0007	0.0002
	W22	2.1923	1.9385	0.2847	0.2920	0.0018	0.0018
	W23	0.8399	-1.9631	0.0858	-0.2948	0.0005	0.0018
	W24	2.0191	-0.1571	0.2582	-0.0324	0.0016	0.0002
Level 8	W13	2.3659	-0.0193	0.3426	-0.0022	0.0021	0.0000
	W14	0.1304	1.5745	0.0256	0.2979	0.0002	0.0018
	W15	1.6210	-0.2497	0.2295	-0.0437	0.0014	0.0003
	W16	1.9279	0.2208	0.2844	0.0404	0.0018	0.0002
	W17	0.6155	1.9746	0.1116	0.3650	0.0007	0.0023
	W18	-0.4200	0.3871	-0.0732	0.0819	0.0005	0.0005
	W19	1.8722	1.1664	0.2762	0.2218	0.0017	0.0014
	W20	1.6767	-1.1954	0.2377	-0.2251	0.0015	0.0014
	W21	0.9007	0.1031	0.1172	0.0286	0.0007	0.0002
	W22	1.9076	1.6465	0.2970	0.3040	0.0018	0.0019
	W23	0.7541	-1.6683	0.0884	-0.3065	0.0005	0.0019
	W24	1.7609	-0.1248	0.2682	-0.0311	0.0017	0.0002
Level 7	W13	2.0233	-0.0171	0.3185	-0.0008	0.0020	0.0000
	W14	0.1047	1.2766	0.0219	0.2791	0.0001	0.0017
	W15	1.3915	-0.2060	0.2136	-0.0390	0.0013	0.0002
	W16	1.6435	0.1804	0.2641	0.0379	0.0016	0.0002
	W17	0.5039	1.6097	0.1013	0.3388	0.0006	0.0021
	W18	-0.3468	0.3053	-0.0685	0.0798	0.0004	0.0005
	W19	1.5960	0.9446	0.2552	0.2088	0.0016	0.0013
	W20	1.4389	-0.9703 ₄₉	0.2225	-0.2099	0.0014	0.0013

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 19/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W21	0.7835	0.0744	0.1089	0.0306	0.0007	0.0002
	W22	1.6105	1.3425	0.2740	0.2825	0.0017	0.0017
	W23	0.6657	-1.3618	0.0843	-0.2834	0.0005	0.0017
	W24	1.4927	-0.0937	0.2494	-0.0314	0.0015	0.0002
Level 6	W13	1.7049	-0.0164	0.3263	-0.0076	0.0020	0.0000
	W14	0.0829	0.9975	0.0205	0.2552	0.0001	0.0016
	W15	1.1779	-0.1670	0.2206	-0.0433	0.0014	0.0003
	W16	1.3794	0.1425	0.2688	0.0318	0.0017	0.0002
	W17	0.4026	1.2709	0.0965	0.3179	0.0006	0.0020
	W18	-0.2783	0.2254	-0.0658	0.0649	0.0004	0.0004
	W19	1.3408	0.7359	0.2601	0.1857	0.0016	0.0011
	W20	1.2165	-0.7604	0.2294	-0.1972	0.0014	0.0012
	W21	0.6747	0.0438	0.1161	0.0162	0.0007	0.0001
	W22	1.3365	1.0600	0.2740	0.2623	0.0017	0.0016
	W23	0.5814	-1.0784	0.0931	-0.2709	0.0006	0.0017
	W24	1.2433	-0.0622	0.2510	-0.0248	0.0015	0.0002
Level 5	W13	1.3786	-0.0087	0.3247	-0.0079	0.0020	0.0000
	W14	0.0624	0.7423	0.0192	0.2373	0.0001	0.0015
	W15	0.9572	-0.1237	0.2216	-0.0405	0.0014	0.0002
	W16	1.1106	0.1106	0.2655	0.0286	0.0016	0.0002
	W17	0.3061	0.9529	0.0884	0.2944	0.0005	0.0018
	W18	-0.2125	0.1606	-0.0595	0.0615	0.0004	0.0004
	W19	1.0807	0.5502	0.2580	0.1720	0.0016	0.0011
	W20	0.9871	-0.5633	0.2291	-0.1839	0.0014	0.0011
	W21	0.5586	0.0276	0.1215	0.0158	0.0008	0.0001
	W22	1.0625	0.7977	0.2654	0.2422	0.0016	0.0015
	W23	0.4883	-0.8075	0.0999	-0.2511	0.0006	0.0016
	W24	0.9923	-0.0374	0.2437	-0.0247	0.0015	0.0002
Level 4	W13	1.0539	-0.0008	0.3377	-0.0005	0.0021	0.0000
	W14	0.0432	0.5051	0.0156	0.1937	0.0001	0.0012
	W15	0.7356	-0.0833	0.2328	-0.0313	0.0014	0.0002
	W16	0.8452	0.0820	0.2738	0.0306	0.0017	0.0002
	W17	0.2177	0.6585	0.0809	0.2498	0.0005	0.0015
	W18	-0.1530	0.0991	-0.0574	0.0408	0.0004	0.0003
	W19	0.8228	0.3782	0.2650	0.1449	0.0016	0.0009
	W20	0.7580	-0.3794	0.2416	-0.1456	0.0015	0.0009
	W21	0.4370	0.0118	0.1316	0.0071	0.0008	0.0000
	W22	0.7972	0.5554	0.2660	0.2102	0.0016	0.0013
	W23	0.3884	-0.5563	0.1140	-0.2108	0.0007	0.0013
	W24	0.7486	-0.0128	0.2484	-0.0077	0.0015	0.0000
Level 3	W13	0.7161	-0.0003 ₅₀	0.3465	-0.0006	0.0021	0.0000

RAM Structural System

RAM Structural System 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1

Building Code: IBC

Drift

Page 20/20

02/25/21 17:37:55

Steel Code: IBC

Story	LdC	Displacement		Story Drift		Drift Ratio	
	W14	0.0276	0.3114	0.0136	0.1687	0.0001	0.0010
	W15	0.5028	-0.0520	0.2420	-0.0272	0.0015	0.0002
	W16	0.5714	0.0515	0.2776	0.0263	0.0017	0.0002
	W17	0.1369	0.4088	0.0704	0.2170	0.0004	0.0013
	W18	-0.0955	0.0582	-0.0501	0.0361	0.0003	0.0002
	W19	0.5578	0.2333	0.2700	0.1261	0.0017	0.0008
	W20	0.5164	-0.2338	0.2497	-0.1270	0.0015	0.0008
	W21	0.3055	0.0047	0.1440	0.0066	0.0009	0.0000
	W22	0.5312	0.3452	0.2610	0.1825	0.0016	0.0011
	W23	0.2745	-0.3456	0.1287	-0.1832	0.0008	0.0011
	W24	0.5002	-0.0051	0.2458	-0.0074	0.0015	0.0000
Level 2	W13	0.3697	0.0003	0.3697	0.0003	0.0019	0.0000
	W14	0.0140	0.1426	0.0140	0.1426	0.0001	0.0007
	W15	0.2608	-0.0248	0.2608	-0.0248	0.0014	0.0001
	W16	0.2937	0.0252	0.2937	0.0252	0.0015	0.0001
	W17	0.0664	0.1918	0.0664	0.1918	0.0003	0.0010
	W18	-0.0455	0.0222	-0.0455	0.0222	0.0002	0.0001
	W19	0.2878	0.1072	0.2878	0.1072	0.0015	0.0006
	W20	0.2668	-0.1068	0.2668	-0.1068	0.0014	0.0006
	W21	0.1615	-0.0019	0.1615	-0.0019	0.0008	0.0000
	W22	0.2701	0.1627	0.2701	0.1627	0.0014	0.0008
	W23	0.1458	-0.1624	0.1458	-0.1624	0.0008	0.0008
	W24	0.2544	0.0023	0.2544	0.0023	0.0013	0.0000
GRADE	W13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	W24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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BRACED FRAME DESIGN

BRACED FRAME DEMAND-CAPACITY RATIOS

RAM Structural System

Member Code Check

SAMPLE BRACED FRAME BEAM

RAM Frame 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

01/08/21 06:41:53

Building Code: IBC

Steel Code: AISC360-16 LRFD

BEAM INFORMATION:

Story Level = Level 2 Frame Number = 4 Beam Number = 3
 Fy (ksi) = 50.00
 Beam Size = W16X26

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft) _____	15.00	15.00
Lu for Bending (ft) _____	15.00	15.00
K _____	1.00	1.00
Top Flange Continuously Braced _____	Yes	
Bottom Flange Continuously Braced _____	No	

CONTROLLING BEAM SEGMENT FORCES - SHEAR

Load Combination: 1.200 D - 1.200 ND1 + 1.600 Lp - 1.600 NL1 + 0.500 Rfp - 0.500 NR1

Segment distance (ft) i - end _____ 0.00
 j - end _____ 15.00

SHEAR CHECK:

Vux (kip) = -10.76	0.90Vnx (kip) = 105.97	Vux/0.90Vnx = 0.102
Vuy (kip) = -0.00	0.90Vny (kip) = 102.46	Vuy/0.90Vny = 0.000

CONTROLLING BEAM SEGMENT FORCES - AXIAL

Load Combination: 0.900 D - 0.900 ND2 - 1.000 W2

Segment distance (ft) i - end _____ 15.00
 j - end _____ 30.00

AXIAL CHECK:

Pu (kip) = 10.22	0.90Pnx (kip) = 283.33	Pu/0.90Pnx = 0.036
	0.90Pny (kip) = 66.87	Pu/0.90Pny = 0.153
	0.90Pn (kip) = 66.87	Pu/0.90Pn = 0.153

CONTROLLING BEAM SEGMENT FORCES - FLEXURE

Load Combination: 1.200 D + 1.200 ND2 + 1.600 Lp + 1.600 NL2

Segment distance (ft) i - end _____ 0.00
 j - end _____ 15.00

CALCULATED PARAMETERS:

Pu (kip) = -11.60	0.90Pn (kip) = 345.60
Mux (kip-ft) = -35.50	0.90Mnx (kip-ft) = 155.62
Muy (kip-ft) = 0.00	0.90Mny (kip-ft) = 20.55
L/r = 161.08	
Cbx = 2.38	

INTERACTION EQUATION:

Pu/0.90*Pn=0.034

Eq H1-1b: 0.017 + 0.228 + 0.000 = 0.245

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RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

Building Code: IBC

Member Code CheckSAMPLE BRACED FRAME
COLUMN

01/08/21 06:41:53

Steel Code: AISC360-16 LRFD

COLUMN INFORMATION:

Story Level = Level 2 Frame Number = 4 Column Number = 35
 Fy (ksi) = 50.00
 Column Size = W14X257

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft) _____	16.00	16.00
Lu for Bending (ft) _____	16.00	16.00
K _____	1.00	1.00

CONTROLLING COLUMN FORCES - SHEAR**Load Combination: 1.200 D - 1.200 ND2 + 0.500 Lp - 0.500 NL2 + 0.500 Rfp - 0.500 NR2 - 1.000 W2**

Shear	Top	Vux (kip) _____	5.70
		Vuy (kip) _____	0.00
Shear	Bot.	Vux (kip) _____	5.70
		Vuy (kip) _____	0.00

SHEAR CHECK:

Vux (kip) = 5.70	1.00Vnx (kip) = 580.56	Vux/1.00Vnx = 0.010
Vuy (kip) = 0.00	0.90Vny (kip) = 1632.96	Vuy/0.90Vny = 0.000

CONTROLLING COLUMN FORCES - AXIAL**Load Combination: 1.200 D - 1.200 ND2 + 0.500 Lp - 0.500 NL2 + 0.500 Rfp - 0.500 NR2 - 1.000 W2****AXIAL CHECK:**

Pu (kip) = 2520.67	0.90Pnx (kip) = 3204.10	Pu/0.90Pnx = 0.787
	0.90Pny (kip) = 2904.91	Pu/0.90Pny = 0.868
	0.90Pn (kip) = 2904.91	Pu/0.90Pn = 0.868

CONTROLLING COLUMN FORCES - FLEXURE**Load Combination: 1.200 D - 1.200 ND2 + 0.500 Lp - 0.500 NL2 + 0.500 Rfp - 0.500 NR2 - 1.000 W2**

Axial	Load (kip) _____	2520.67
Moment	Top	Mux (kip-ft) _____
		-91.23
		Muy (kip-ft) _____
		0.00
Moment	Bot.	Mux (kip-ft) _____
		0.00
		Muy (kip-ft) _____
		0.00

CALCULATED PARAMETERS:

Pu (kip) = 2520.67	0.90Pn (kip) = 2904.91
Mux (kip-ft) = -91.23	0.90Mnx (kip-ft) = 1826.25
Muy (kip-ft) = 0.00	0.90Mny (kip-ft) = 922.50
KL/Rx = 28.63	KL/Ry = 46.48
Cbx = 1.67	

INTERACTION EQUATION:

Pu/0.90*Pn=0.868

Eq H1-1a: 0.868 + 8/9(0.050 + 0.000) = 0.912

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RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

Building Code: IBC

Member Code CheckSAMPLE BRACED FRAME
BRACE

01/08/21 06:41:53

Steel Code: AISC360-16 LRFD

BRACE INFORMATION:

Story Level = Level 2 Frame Number = 0 Brace Number = 12
 Fy (ksi) = 50.00
 Brace Size = HSS12X12X5/16

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft) _____	21.93	21.93
Lu for Bending (ft) _____	21.93	21.93
K _____	1.00	1.00

CONTROLLING BRACE FORCES - SHEAR**Load Combination: 1.400 D + 1.400 ND1**

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

SHEAR CHECK:

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

CONTROLLING BRACE FORCES - AXIAL**Load Combination: 1.200 D - 1.200 ND2 + 0.500 Lp - 0.500 NL2 + 0.500 Rfp - 0.500 NR2 - 1.000 W2****AXIAL CHECK:**

Pu (kip) = 424.44	0.90Pnx (kip) = 478.26	Pu/0.90Pnx = 0.887
	0.90Pny (kip) = 478.26	Pu/0.90Pny = 0.887
	0.90Pn (kip) = 478.26	Pu/0.90Pn = 0.887

CONTROLLING BRACE FORCES - FLEXURE**Load Combination: 1.200 D - 1.200 ND2 + 0.500 Lp - 0.500 NL2 + 0.500 Rfp - 0.500 NR2 - 1.000 W2**

Axial	Load (kip) _____	424.44
Moment	Top	Mux (kip-ft) _____
		Muy (kip-ft) _____
Moment	Bot.	Mux (kip-ft) _____
		Muy (kip-ft) _____

CALCULATED PARAMETERS:

Pu (kip) = 424.44	0.90Pn (kip) = 478.26
Mux (kip-ft) = 0.00	0.90Mnx (kip-ft) = 180.85
Muy (kip-ft) = 0.00	0.90Mny (kip-ft) = 180.85
KL/Rx = 55.25	KL/Ry = 55.25
Cbx = 1.00	

INTERACTION EQUATION:

Pu/0.90*Pn=0.887

Pr/Pc = 0.887

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SAMPLE BRACED FRAME CONNECTION REPORT:

Current Date: 1/7/2021 2:33 PM

Units system: English

File name: C:\ProgramData\Bentley\Engineering\RAM Structural System\Working\2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD.ram

Steel connections

Results

Connection name : CVR
Connection ID : 24

Family: Chevron - Braces (CVR)
Type: Gusset
Description: CVR 1
Design code: AISC 360-16 LRFD

DEMANDS

Description	Beam			Pu				Load type
	Pu [Kip]	Vu [Kip]	Mu33 [Kip*ft]	Brace1 [Kip]	Brace2 [Kip]	Brace3 [Kip]	Brace4 [Kip]	
C1	7.18	8.03	-26.51	-84.03	-81.06	-86.87	-86.53	Design
C2	6.91	8.03	-26.52	-75.13	-89.42	-75.94	-96.97	Design
C3	7.21	8.03	-26.51	-84.58	-80.43	-87.51	-85.82	Design
C4	7.48	8.03	-26.50	-93.49	-72.07	-98.44	-75.39	Design
C5	13.82	16.62	-54.45	-172.19	-165.75	-179.60	-179.61	Design
C6	13.43	16.63	-54.47	-159.09	-178.05	-163.51	-194.97	Design
C7	13.87	16.62	-54.45	-173.21	-164.63	-180.78	-178.33	Design
C8	14.26	16.62	-54.43	-186.31	-152.33	-196.87	-162.98	Design
C9	13.75	16.62	-54.41	-171.39	-164.94	-178.88	-178.85	Design
C10	13.37	16.62	-54.43	-158.34	-177.19	-162.85	-194.15	Design
C11	13.80	16.62	-54.42	-172.40	-163.82	-180.05	-177.58	Design
C12	14.19	16.62	-54.40	-185.46	-151.57	-196.08	-162.28	Design
C13	8.75	9.93	-32.73	-105.64	-101.91	-109.40	-109.32	Design
C14	8.46	9.93	-32.75	-96.15	-110.82	-97.76	-120.44	Design
C15	8.79	9.93	-32.73	-106.29	-101.17	-110.15	-108.49	Design
C16	9.08	9.93	-32.72	-115.77	-92.26	-121.80	-97.36	Design
C17	6.38	6.89	-22.83	-74.59	-72.07	-76.77	-76.60	Design
C18	6.14	6.89	-22.84	-66.79	-79.40	-67.21	-85.74	Design
C19	6.41	6.89	-22.83	-75.07	-71.52	-77.33	-75.98	Design
C20	6.65	6.89	-22.82	-82.86	-64.20	-86.89	-66.84	Design
C21	6.26	6.89	-22.81	-75.07	-72.49	-77.72	-76.47	Design
C22	0.51	6.91	-23.05	108.00	-245.72	145.59	-290.80	Design
C23	5.62	6.89	-22.85	-48.81	-96.80	-45.11	-107.30	Design
C24	6.95	6.89	-22.77	-101.09	-47.97	-109.86	-45.71	Design
C25	4.13	6.89	-22.85	-23.59	-122.15	-16.51	-136.03	Design
C26	-0.30	6.91	-23.15	152.19	-286.12	201.28	-343.04	Design
C33	6.35	6.89	-22.82	-74.70	-72.18	-77.00	-76.57	Design
C34	4.66	6.89	-22.90	-21.05	-122.92	-11.52	-139.40	Design
C35	6.15	6.89	-22.84	-66.68	-79.61	-67.04	-86.00	Design
C36	6.56	6.89	-22.81	-82.67	-64.69	-86.84	-67.16	Design
C37	5.72	6.89	-22.84	-59.61	-86.74	-59.05	-94.04	Design
C38	4.35	6.90	-22.93	-5.36	-137.34	8.17	-157.93	Design
C45	6.53	6.89	-22.85	-74.58	-71.11	-76.37	-76.11	Design
C46	12.28	6.88	-22.61	-257.65	102.12	-299.68	138.21	Design
C47	7.17	6.89	-22.80	-100.84	-46.80	-108.98	-45.28	Design
C48	5.84	6.89	-22.89	-48.56	-95.63	-44.24	-106.87	Design
C49	8.66	6.89	-22.81	-126.06	-21.45	-137.59	-16.56	Design
C50	13.08	6.87	-22.51	-301.85	142.53	-355.38	190.46	Design

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C57	6.44	6.89	-22.84	-74.95	-71.42	-77.09	-76.01	Design
C58	8.12	6.89	-22.76	-128.60	-20.67	-142.57	-13.18	Design
C59	6.63	6.89	-22.82	-82.97	-63.98	-87.05	-66.59	Design
C60	6.23	6.89	-22.85	-66.98	-78.91	-67.25	-85.42	Design
C61	7.07	6.89	-22.82	-90.04	-56.86	-95.05	-58.54	Design
C62	8.44	6.88	-22.73	-144.29	-6.25	-162.26	5.35	Design
C69	8.35	9.93	-32.61	-104.86	-100.95	-109.72	-107.39	Design
C70	-2.94	9.96	-33.10	255.08	-441.56	329.28	-528.75	Design
C71	7.08	9.93	-32.71	-52.33	-149.57	-44.50	-169.04	Design
C72	9.74	9.92	-32.54	-156.90	-51.92	-173.99	-45.86	Design
C73	4.30	9.93	-32.70	-8.09	-194.43	5.10	-219.21	Design
C74	-4.55	9.97	-33.28	343.47	-522.38	440.68	-633.24	Design
C81	8.54	9.93	-32.65	-104.12	-100.33	-108.28	-107.58	Design
C82	5.37	9.94	-32.78	-3.02	-195.98	15.07	-225.96	Design
C83	8.15	9.93	-32.68	-88.07	-115.20	-88.36	-126.43	Design
C84	8.96	9.93	-32.62	-120.05	-85.35	-127.96	-88.76	Design
C85	7.47	9.93	-32.66	-80.14	-123.61	-79.99	-135.24	Design
C86	4.74	9.94	-32.85	28.36	-224.82	54.44	-263.01	Design
C93	8.88	9.93	-32.71	-103.54	-98.57	-106.65	-107.08	Design
C94	20.17	9.90	-32.22	-463.49	242.04	-545.65	314.28	Design
C95	10.15	9.93	-32.61	-156.07	-49.95	-171.87	-45.42	Design
C96	7.49	9.94	-32.78	-51.51	-147.61	-42.38	-168.61	Design
C97	12.93	9.93	-32.62	-200.31	-5.09	-221.47	4.74	Design
C98	21.78	9.89	-32.03	-551.87	322.85	-657.05	418.77	Design
C105	8.69	9.93	-32.67	-104.28	-99.20	-108.09	-106.89	Design
C106	11.86	9.92	-32.54	-205.38	-3.55	-231.44	11.49	Design
C107	9.08	9.93	-32.64	-120.33	-84.32	-128.01	-88.04	Design
C108	8.27	9.93	-32.70	-88.36	-114.18	-88.41	-125.71	Design
C109	9.76	9.93	-32.65	-128.26	-75.91	-136.38	-79.23	Design
C110	12.49	9.92	-32.47	-236.76	25.29	-270.81	48.55	Design
C117	8.28	9.92	-32.58	-104.06	-100.14	-109.00	-106.63	Design
C118	-3.01	9.96	-33.06	255.83	-440.70	329.94	-527.93	Design
C119	7.01	9.93	-32.68	-51.53	-148.76	-43.78	-168.28	Design
C120	9.67	9.92	-32.51	-156.10	-51.11	-173.26	-45.10	Design
C121	4.23	9.93	-32.66	-7.35	-193.57	5.76	-218.39	Design
C122	-4.62	9.97	-33.25	344.22	-521.52	441.34	-632.42	Design
C129	8.47	9.93	-32.61	-103.32	-99.52	-107.55	-106.82	Design
C130	5.30	9.93	-32.75	-2.27	-195.12	15.73	-225.14	Design
C131	8.07	9.93	-32.64	-87.27	-114.39	-87.64	-125.67	Design
C132	8.89	9.92	-32.59	-119.25	-84.54	-127.24	-88.00	Design
C133	7.40	9.93	-32.63	-79.39	-122.75	-79.33	-134.42	Design
C134	4.67	9.94	-32.81	29.11	-223.96	55.10	-262.20	Design
C141	8.81	9.93	-32.67	-102.74	-97.77	-105.93	-106.33	Design
C142	20.10	9.90	-32.19	-462.63	242.80	-544.87	314.98	Design
C143	10.07	9.92	-32.57	-155.27	-49.14	-171.15	-44.67	Design
C144	7.42	9.93	-32.75	-50.70	-146.80	-41.66	-167.86	Design
C145	12.86	9.92	-32.59	-199.45	-4.33	-220.68	5.43	Design
C146	21.71	9.89	-32.00	-551.02	323.61	-656.26	419.46	Design
C153	8.62	9.93	-32.64	-103.48	-98.39	-107.37	-106.13	Design
C154	11.79	9.92	-32.50	-204.53	-2.79	-230.65	12.18	Design
C155	9.01	9.93	-32.61	-119.53	-83.51	-127.29	-87.28	Design
C156	8.20	9.93	-32.66	-87.55	-113.37	-87.68	-124.95	Design
C157	9.68	9.93	-32.62	-127.41	-75.16	-135.60	-78.53	Design
C158	12.42	9.91	-32.44	-235.91	26.05	-270.02	49.24	Design
C165	5.98	6.88	-22.71	-73.81	-71.12	-77.09	-74.67	Design
C166	-5.27	6.91	-23.19	284.44	-410.14	359.83	-494.05	Design
C167	4.71	6.89	-22.81	-21.28	-119.74	-11.87	-136.33	Design
C168	7.37	6.88	-22.63	-125.84	-22.08	-141.36	-13.14	Design
C169	1.97	6.89	-22.79	21.26	-163.01	35.65	-184.51	Design
C170	-6.88	6.93	-23.38	372.83	-490.96	471.23	-598.54	Design
C177	6.16	6.88	-22.74	-73.07	-70.49	-75.65	-74.87	Design
C178	3.04	6.89	-22.88	26.34	-164.56	45.62	-191.26	Design
C179	5.77	6.89	-22.77	-57.02	-85.37	-55.73	-93.72	Design
C180	6.58	6.88	-22.72	-88.99	-55.52	-95.33	-56.05	Design
C181	5.14	6.89	-22.76	-50.78	-92.19	-49.44	-100.54	Design
C182	2.41	6.90	-22.94	57.72	-193.40	84.99	-228.32	Design

C189	6.50	6.89	-22.80	-72.32	-68.92	-73.82	-74.58	Design
C190	17.74	6.86	-22.32	-430.57	270.10	-510.75	344.80	Design
C191	7.76	6.88	-22.70	-124.85	-20.30	-139.05	-12.92	Design
C192	5.11	6.89	-22.88	-20.29	-117.96	-9.56	-136.11	Design
C193	10.50	6.88	-22.72	-167.39	22.97	-186.56	35.26	Design
C194	19.35	6.84	-22.13	-518.96	350.92	-622.14	449.29	Design
C201	6.31	6.89	-22.77	-73.06	-69.55	-75.27	-74.38	Design
C202	9.43	6.88	-22.63	-172.47	24.52	-196.53	42.01	Design
C203	6.70	6.88	-22.74	-89.11	-54.67	-95.18	-55.53	Design
C204	5.89	6.89	-22.79	-57.14	-84.52	-55.58	-93.20	Design
C205	7.33	6.89	-22.75	-95.35	-47.85	-101.48	-48.71	Design
C206	10.06	6.87	-22.57	-203.85	53.36	-235.90	79.07	Design
C213	5.90	6.88	-22.68	-73.01	-70.31	-76.37	-73.91	Design
C214	-5.34	6.91	-23.16	285.19	-409.28	360.49	-493.23	Design
C215	4.64	6.89	-22.77	-20.48	-118.93	-11.14	-135.57	Design
C216	7.29	6.88	-22.60	-125.05	-21.27	-140.63	-12.39	Design
C217	1.90	6.89	-22.76	22.01	-162.15	36.31	-183.69	Design
C218	-6.95	6.92	-23.34	373.58	-490.10	471.89	-597.72	Design
C225	6.09	6.88	-22.71	-72.27	-69.68	-74.92	-74.11	Design
C226	2.97	6.89	-22.84	27.09	-163.70	46.28	-190.44	Design
C227	5.70	6.88	-22.74	-56.22	-84.56	-55.01	-92.96	Design
C228	6.51	6.88	-22.69	-88.20	-54.71	-94.61	-55.29	Design
C229	5.08	6.88	-22.73	-50.03	-91.33	-48.77	-99.72	Design
C230	2.34	6.90	-22.91	58.46	-192.54	85.65	-227.50	Design
C237	6.42	6.89	-22.77	-71.52	-68.11	-73.10	-73.82	Design
C238	17.67	6.85	-22.29	-429.72	270.86	-509.96	345.50	Design
C239	7.69	6.88	-22.67	-124.05	-19.49	-138.32	-12.16	Design
C240	5.03	6.89	-22.84	-19.48	-117.15	-8.83	-135.35	Design
C241	10.43	6.88	-22.69	-166.54	23.73	-185.77	35.95	Design
C242	19.28	6.84	-22.10	-518.11	351.67	-621.35	449.98	Design
C249	6.24	6.88	-22.73	-72.26	-68.74	-74.54	-73.63	Design
C250	9.36	6.88	-22.60	-171.62	25.27	-195.75	42.71	Design
C251	6.63	6.88	-22.71	-88.31	-53.86	-94.46	-54.78	Design
C252	5.82	6.89	-22.76	-56.33	-83.72	-54.85	-92.45	Design
C253	7.25	6.88	-22.72	-94.50	-47.09	-100.69	-48.01	Design
C254	9.99	6.87	-22.54	-202.99	54.11	-235.12	79.76	Design
C261	4.37	5.16	-17.00	-55.00	-52.94	-57.75	-55.37	Design
C262	-6.82	5.19	-17.47	301.29	-390.12	376.77	-472.45	Design
C263	3.10	5.17	-17.09	-2.47	-101.56	7.47	-117.03	Design
C264	5.76	5.15	-16.92	-107.04	-3.90	-122.02	6.16	Design
C265	0.42	5.16	-17.07	38.11	-142.99	52.58	-162.91	Design
C266	-8.43	5.20	-17.66	389.68	-470.93	488.16	-576.94	Design
C273	4.55	5.16	-17.03	-54.26	-52.31	-56.31	-55.57	Design
C274	1.49	5.17	-17.16	43.19	-144.53	62.55	-169.66	Design
C275	4.16	5.16	-17.06	-38.21	-67.19	-36.39	-74.42	Design
C276	4.97	5.16	-17.01	-70.19	-37.34	-75.99	-36.75	Design
C277	3.60	5.16	-17.04	-33.93	-72.17	-32.50	-78.94	Design
C278	0.86	5.17	-17.22	74.56	-173.38	101.92	-206.72	Design
C285	4.88	5.17	-17.09	-53.40	-50.88	-54.35	-55.43	Design
C286	16.06	5.13	-16.61	-409.69	286.30	-488.87	361.65	Design
C287	6.15	5.16	-16.99	-105.92	-2.26	-119.57	6.23	Design
C288	3.49	5.17	-17.16	-1.36	-99.91	9.92	-116.96	Design
C289	8.82	5.16	-17.01	-146.51	39.17	-164.68	52.11	Design
C290	17.67	5.12	-16.42	-498.07	367.12	-600.26	466.14	Design
C297	4.69	5.16	-17.05	-54.14	-51.50	-55.79	-55.24	Design
C298	7.75	5.15	-16.92	-151.58	40.72	-174.65	58.86	Design
C299	5.08	5.16	-17.02	-70.18	-36.63	-75.71	-36.39	Design
C300	4.27	5.16	-17.08	-38.21	-66.48	-36.10	-74.05	Design
C301	5.65	5.16	-17.04	-74.46	-31.65	-79.60	-31.86	Design
C302	8.38	5.15	-16.86	-182.96	69.56	-214.02	95.92	Design
C309	8.08	10.30	-33.85	-90.57	-119.70	-90.59	-131.63	Design
C310	9.14	10.30	-33.82	-117.58	-93.66	-124.57	-98.53	Design
C311	1.88	10.30	-33.92	39.04	-246.27	57.54	-276.98	Design
C312	-1.25	10.31	-34.00	124.39	-328.34	164.15	-380.60	Design
C313	9.67	10.30	-33.86	-124.04	-85.68	-132.40	-89.30	Design
C314	8.61	10.30	-33.88	-97.02	-111.72	-98.42	-122.40	Design

C315	15.87	10.29	-33.78	-253.65	40.89	-280.54	56.05	Design
C316	19.00	10.29	-33.70	-339.00	122.96	-387.14	159.67	Design
C317	5.71	7.25	-23.94	-59.52	-89.87	-57.96	-98.91	Design
C318	6.76	7.25	-23.92	-86.53	-63.83	-91.94	-65.82	Design
C319	-0.45	7.26	-24.02	68.40	-214.85	88.09	-242.28	Design
C320	-3.58	7.26	-24.10	153.75	-296.92	194.70	-345.90	Design
C321	7.29	7.26	-23.96	-92.82	-56.03	-99.58	-56.80	Design
C322	6.23	7.26	-23.98	-65.80	-82.07	-65.60	-89.90	Design
C323	13.44	7.25	-23.88	-220.74	68.95	-245.63	86.57	Design
C324	16.57	7.24	-23.80	-306.08	151.02	-352.23	190.19	Design
C325	3.51	4.79	-15.81	-33.73	-65.00	-31.30	-72.36	Design
C326	4.56	4.79	-15.78	-60.74	-38.95	-65.28	-39.26	Design
C327	-2.57	4.79	-15.88	91.46	-187.41	111.39	-212.52	Design
C328	-5.70	4.80	-15.96	176.80	-269.48	218.00	-316.14	Design
C329	5.08	4.79	-15.82	-66.86	-31.35	-72.73	-30.46	Design
C330	4.02	4.79	-15.85	-39.85	-57.39	-38.74	-63.56	Design
C331	11.15	4.79	-15.75	-192.05	91.06	-215.42	109.70	Design
C332	14.28	4.78	-15.67	-277.40	173.14	-322.03	213.32	Design

Interface between Gusset - Top right brace Connection: Directly welded

DEMANDS

Pu [Kip]	Description	Load type
-84.03	C1	Design
-75.13	C2	Design
-84.58	C3	Design
-93.49	C4	Design
-172.19	C5	Design
-159.09	C6	Design
-173.21	C7	Design
-186.31	C8	Design
-171.39	C9	Design
-158.34	C10	Design
-172.40	C11	Design
-185.46	C12	Design
-105.64	C13	Design
-96.15	C14	Design
-106.29	C15	Design
-115.77	C16	Design
-74.59	C17	Design
-66.79	C18	Design
-75.07	C19	Design
-82.86	C20	Design
-75.07	C21	Design
108.00	C22	Design
-48.81	C23	Design
-101.09	C24	Design
-23.59	C25	Design
152.19	C26	Design
-74.70	C33	Design
-21.05	C34	Design
-66.68	C35	Design
-82.67	C36	Design
-59.61	C37	Design
-5.36	C38	Design
-74.58	C45	Design
-257.65	C46	Design
-100.84	C47	Design
-48.56	C48	Design
-126.06	C49	Design
-301.85	C50	Design
-74.95	C57	Design
-128.60	C58	Design

-82.97	C59	Design
-66.98	C60	Design
-90.04	C61	Design
-144.29	C62	Design
-104.86	C69	Design
255.08	C70	Design
-52.33	C71	Design
-156.90	C72	Design
-8.09	C73	Design
343.47	C74	Design
-104.12	C81	Design
-3.02	C82	Design
-88.07	C83	Design
-120.05	C84	Design
-80.14	C85	Design
28.36	C86	Design
-103.54	C93	Design
-463.49	C94	Design
-156.07	C95	Design
-51.51	C96	Design
-200.31	C97	Design
-551.87	C98	Design
-104.28	C105	Design
-205.38	C106	Design
-120.33	C107	Design
-88.36	C108	Design
-128.26	C109	Design
-236.76	C110	Design
-104.06	C117	Design
255.83	C118	Design
-51.53	C119	Design
-156.10	C120	Design
-7.35	C121	Design
344.22	C122	Design
-103.32	C129	Design
-2.27	C130	Design
-87.27	C131	Design
-119.25	C132	Design
-79.39	C133	Design
29.11	C134	Design
-102.74	C141	Design
-462.63	C142	Design
-155.27	C143	Design
-50.70	C144	Design
-199.45	C145	Design
-551.02	C146	Design
-103.48	C153	Design
-204.53	C154	Design
-119.53	C155	Design
-87.55	C156	Design
-127.41	C157	Design
-235.91	C158	Design
-73.81	C165	Design
284.44	C166	Design
-21.28	C167	Design
-125.84	C168	Design
21.26	C169	Design
372.83	C170	Design
-73.07	C177	Design
26.34	C178	Design
-57.02	C179	Design
-88.99	C180	Design
-50.78	C181	Design
57.72	C182	Design
-72.32	C189	Design
-430.57	C190	Design

-124.85	C191	Design
-20.29	C192	Design
-167.39	C193	Design
-518.96	C194	Design
-73.06	C201	Design
-172.47	C202	Design
-89.11	C203	Design
-57.14	C204	Design
-95.35	C205	Design
-203.85	C206	Design
-73.01	C213	Design
285.19	C214	Design
-20.48	C215	Design
-125.05	C216	Design
22.01	C217	Design
373.58	C218	Design
-72.27	C225	Design
27.09	C226	Design
-56.22	C227	Design
-88.20	C228	Design
-50.03	C229	Design
58.46	C230	Design
-71.52	C237	Design
-429.72	C238	Design
-124.05	C239	Design
-19.48	C240	Design
-166.54	C241	Design
-518.11	C242	Design
-72.26	C249	Design
-171.62	C250	Design
-88.31	C251	Design
-56.33	C252	Design
-94.50	C253	Design
-202.99	C254	Design
-55.00	C261	Design
301.29	C262	Design
-2.47	C263	Design
-107.04	C264	Design
38.11	C265	Design
389.68	C266	Design
-54.26	C273	Design
43.19	C274	Design
-38.21	C275	Design
-70.19	C276	Design
-33.93	C277	Design
74.56	C278	Design
-53.40	C285	Design
-409.69	C286	Design
-105.92	C287	Design
-1.36	C288	Design
-146.51	C289	Design
-498.07	C290	Design
-54.14	C297	Design
-151.58	C298	Design
-70.18	C299	Design
-38.21	C300	Design
-74.46	C301	Design
-182.96	C302	Design
-90.57	C309	Design
-117.58	C310	Design
39.04	C311	Design
124.39	C312	Design
-124.04	C313	Design
-97.02	C314	Design
-253.65	C315	Design
-339.00	C316	Design

-59.52	C317	Design
-86.53	C318	Design
68.40	C319	Design
153.75	C320	Design
-92.82	C321	Design
-65.80	C322	Design
-220.74	C323	Design
-306.08	C324	Design
-33.73	C325	Design
-60.74	C326	Design
91.46	C327	Design
176.80	C328	Design
-66.86	C329	Design
-39.85	C330	Design
-192.05	C331	Design
-277.40	C332	Design

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Brace - Directly welded Connection						
Total weld design strength	[Kip]	623.67	551.87	C98	0.88	Eq. J2-4, Eq. J2-6
Maximum weld force that brace can develop	[Kip]	1143.32	551.87	C98	0.48	Eq. J4-4
Gusset						
Maximum weld force that gusset can develop	[Kip]	730.80	551.87	C98	0.76	Eq. J4-4
Block shear on gusset	[Kip]	730.80	389.68	C266	0.53	Eq. J4-5
<hr/>						
Ratio	0.88					

Checks for gusset and brace**DESIGN CHECK**

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Brace						
Yielding strength due to axial load	[Kip]	720.00	389.68	C266	0.54	Eq. J4-1
Tension rupture	[Kip]	636.79	389.68	C266	0.61	Eq. J4-2
Gusset						
Tension yielding on the Whitmore section	[Kip]	665.47	389.68	C266	0.59	Eq. J4-1
Buckling on the Whitmore section	[Kip]	626.46	551.87	C98	0.88	Eq. E3-1
<hr/>						
Ratio	0.88					

Interface between Gusset - Top left brace
Connection: Directly welded
DEMANDS

Pu [Kip]	Description	Load type
<hr/>		
-81.06	C1	Design
-89.42	C2	Design
-80.43	C3	Design
-72.07	C4	Design
-165.75	C5	Design
-178.05	C6	Design
-164.63	C7	Design
-152.33	C8	Design
-164.94	C9	Design
-177.19	C10	Design
-163.82	C11	Design
-151.57	C12	Design
-101.91	C13	Design
-110.82	C14	Design
-101.17	C15	Design
-92.26	C16	Design

-72.07	C17	Design
-79.40	C18	Design
-71.52	C19	Design
-64.20	C20	Design
-72.49	C21	Design
-245.72	C22	Design
-96.80	C23	Design
-47.97	C24	Design
-122.15	C25	Design
-286.12	C26	Design
-72.18	C33	Design
-122.92	C34	Design
-79.61	C35	Design
-64.69	C36	Design
-86.74	C37	Design
-137.34	C38	Design
-71.11	C45	Design
102.12	C46	Design
-46.80	C47	Design
-95.63	C48	Design
-21.45	C49	Design
142.53	C50	Design
-71.42	C57	Design
-20.67	C58	Design
-63.98	C59	Design
-78.91	C60	Design
-56.86	C61	Design
-6.25	C62	Design
-100.95	C69	Design
-441.56	C70	Design
-149.57	C71	Design
-51.92	C72	Design
-194.43	C73	Design
-522.38	C74	Design
-100.33	C81	Design
-195.98	C82	Design
-115.20	C83	Design
-85.35	C84	Design
-123.61	C85	Design
-224.82	C86	Design
-98.57	C93	Design
242.04	C94	Design
-49.95	C95	Design
-147.61	C96	Design
-5.09	C97	Design
322.85	C98	Design
-99.20	C105	Design
-3.55	C106	Design
-84.32	C107	Design
-114.18	C108	Design
-75.91	C109	Design
25.29	C110	Design
-100.14	C117	Design
-440.70	C118	Design
-148.76	C119	Design
-51.11	C120	Design
-193.57	C121	Design
-521.52	C122	Design
-99.52	C129	Design
-195.12	C130	Design
-114.39	C131	Design
-84.54	C132	Design
-122.75	C133	Design
-223.96	C134	Design
-97.77	C141	Design
242.80	C142	Design

-49.14	C143	Design
-146.80	C144	Design
-4.33	C145	Design
323.61	C146	Design
-98.39	C153	Design
-2.79	C154	Design
-83.51	C155	Design
-113.37	C156	Design
-75.16	C157	Design
26.05	C158	Design
-71.12	C165	Design
-410.14	C166	Design
-119.74	C167	Design
-22.08	C168	Design
-163.01	C169	Design
-490.96	C170	Design
-70.49	C177	Design
-164.56	C178	Design
-85.37	C179	Design
-55.52	C180	Design
-92.19	C181	Design
-193.40	C182	Design
-68.92	C189	Design
270.10	C190	Design
-20.30	C191	Design
-117.96	C192	Design
22.97	C193	Design
350.92	C194	Design
-69.55	C201	Design
24.52	C202	Design
-54.67	C203	Design
-84.52	C204	Design
-47.85	C205	Design
53.36	C206	Design
-70.31	C213	Design
-409.28	C214	Design
-118.93	C215	Design
-21.27	C216	Design
-162.15	C217	Design
-490.10	C218	Design
-69.68	C225	Design
-163.70	C226	Design
-84.56	C227	Design
-54.71	C228	Design
-91.33	C229	Design
-192.54	C230	Design
-68.11	C237	Design
270.86	C238	Design
-19.49	C239	Design
-117.15	C240	Design
23.73	C241	Design
351.67	C242	Design
-68.74	C249	Design
25.27	C250	Design
-53.86	C251	Design
-83.72	C252	Design
-47.09	C253	Design
54.11	C254	Design
-52.94	C261	Design
-390.12	C262	Design
-101.56	C263	Design
-3.90	C264	Design
-142.99	C265	Design
-470.93	C266	Design
-52.31	C273	Design
-144.53	C274	Design

-67.19	C275	Design
-37.34	C276	Design
-72.17	C277	Design
-173.38	C278	Design
-50.88	C285	Design
286.30	C286	Design
-2.26	C287	Design
-99.91	C288	Design
39.17	C289	Design
367.12	C290	Design
-51.50	C297	Design
40.72	C298	Design
-36.63	C299	Design
-66.48	C300	Design
-31.65	C301	Design
69.56	C302	Design
-119.70	C309	Design
-93.66	C310	Design
-246.27	C311	Design
-328.34	C312	Design
-85.68	C313	Design
-111.72	C314	Design
40.89	C315	Design
122.96	C316	Design
-89.87	C317	Design
-63.83	C318	Design
-214.85	C319	Design
-296.92	C320	Design
-56.03	C321	Design
-82.07	C322	Design
68.95	C323	Design
151.02	C324	Design
-65.00	C325	Design
-38.95	C326	Design
-187.41	C327	Design
-269.48	C328	Design
-31.35	C329	Design
-57.39	C330	Design
91.06	C331	Design
173.14	C332	Design

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Brace - Directly welded Connection</u>						
Total weld design strength	[Kip]	623.67	522.38	C74	0.84	Eq. J2-4, Eq. J2-6
Maximum weld force that brace can develop	[Kip]	1143.32	522.38	C74	0.46	Eq. J4-4
<u>Gusset</u>						
Maximum weld force that gusset can develop	[Kip]	730.80	522.38	C74	0.71	Eq. J4-4
Block shear on gusset	[Kip]	730.80	367.12	C290	0.50	Eq. J4-5
Ratio	0.84					

Checks for gusset and brace

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Brace</u>						
Yielding strength due to axial load	[Kip]	720.00	367.12	C290	0.51	Eq. J4-1
Tension rupture	[Kip]	636.79	367.12	C290	0.58	Eq. J4-2
<u>Gusset</u>						
Tension yielding on the Whitmore section	[Kip]	665.47	367.12	C290	0.55	Eq. J4-1
Buckling on the Whitmore section	[Kip]	626.46	522.38	C74	0.83	Eq. E3-1
Ratio	0.83					

Interface between Gusset - Bottom left brace
Connection: Directly welded

DEMANDS

Pu [Kip]	Description	Load type
-86.87	C1	Design
-75.94	C2	Design
-87.51	C3	Design
-98.44	C4	Design
-179.60	C5	Design
-163.51	C6	Design
-180.78	C7	Design
-196.87	C8	Design
-178.88	C9	Design
-162.85	C10	Design
-180.05	C11	Design
-196.08	C12	Design
-109.40	C13	Design
-97.76	C14	Design
-110.15	C15	Design
-121.80	C16	Design
-76.77	C17	Design
-67.21	C18	Design
-77.33	C19	Design
-86.89	C20	Design
-77.72	C21	Design
145.59	C22	Design
-45.11	C23	Design
-109.86	C24	Design
-16.51	C25	Design
201.28	C26	Design
-77.00	C33	Design
-11.52	C34	Design
-67.04	C35	Design
-86.84	C36	Design
-59.05	C37	Design
8.17	C38	Design
-76.37	C45	Design
-299.68	C46	Design
-108.98	C47	Design
-44.24	C48	Design
-137.59	C49	Design
-355.38	C50	Design
-77.09	C57	Design
-142.57	C58	Design
-87.05	C59	Design
-67.25	C60	Design
-95.05	C61	Design
-162.26	C62	Design
-109.72	C69	Design
329.28	C70	Design
-44.50	C71	Design
-173.99	C72	Design
5.10	C73	Design
440.68	C74	Design
-108.28	C81	Design
15.07	C82	Design
-88.36	C83	Design
-127.96	C84	Design
-79.99	C85	Design
54.44	C86	Design

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-106.65	C93	Design
-545.65	C94	Design
-171.87	C95	Design
-42.38	C96	Design
-221.47	C97	Design
-657.05	C98	Design
-108.09	C105	Design
-231.44	C106	Design
-128.01	C107	Design
-88.41	C108	Design
-136.38	C109	Design
-270.81	C110	Design
-109.00	C117	Design
329.94	C118	Design
-43.78	C119	Design
-173.26	C120	Design
5.76	C121	Design
441.34	C122	Design
-107.55	C129	Design
15.73	C130	Design
-87.64	C131	Design
-127.24	C132	Design
-79.33	C133	Design
55.10	C134	Design
-105.93	C141	Design
-544.87	C142	Design
-171.15	C143	Design
-41.66	C144	Design
-220.68	C145	Design
-656.26	C146	Design
-107.37	C153	Design
-230.65	C154	Design
-127.29	C155	Design
-87.68	C156	Design
-135.60	C157	Design
-270.02	C158	Design
-77.09	C165	Design
359.83	C166	Design
-11.87	C167	Design
-141.36	C168	Design
35.65	C169	Design
471.23	C170	Design
-75.65	C177	Design
45.62	C178	Design
-55.73	C179	Design
-95.33	C180	Design
-49.44	C181	Design
84.99	C182	Design
-73.82	C189	Design
-510.75	C190	Design
-139.05	C191	Design
-9.56	C192	Design
-186.56	C193	Design
-622.14	C194	Design
-75.27	C201	Design
-196.53	C202	Design
-95.18	C203	Design
-55.58	C204	Design
-101.48	C205	Design
-235.90	C206	Design
-76.37	C213	Design
360.49	C214	Design
-11.14	C215	Design
-140.63	C216	Design
36.31	C217	Design
471.89	C218	Design

-74.92	C225	Design
46.28	C226	Design
-55.01	C227	Design
-94.61	C228	Design
-48.77	C229	Design
85.65	C230	Design
-73.10	C237	Design
-509.96	C238	Design
-138.32	C239	Design
-8.83	C240	Design
-185.77	C241	Design
-621.35	C242	Design
-74.54	C249	Design
-195.75	C250	Design
-94.46	C251	Design
-54.85	C252	Design
-100.69	C253	Design
-235.12	C254	Design
-57.75	C261	Design
376.77	C262	Design
7.47	C263	Design
-122.02	C264	Design
52.58	C265	Design
488.16	C266	Design
-56.31	C273	Design
62.55	C274	Design
-36.39	C275	Design
-75.99	C276	Design
-32.50	C277	Design
101.92	C278	Design
-54.35	C285	Design
-488.87	C286	Design
-119.57	C287	Design
9.92	C288	Design
-164.68	C289	Design
-600.26	C290	Design
-55.79	C297	Design
-174.65	C298	Design
-75.71	C299	Design
-36.10	C300	Design
-79.60	C301	Design
-214.02	C302	Design
-90.59	C309	Design
-124.57	C310	Design
57.54	C311	Design
164.15	C312	Design
-132.40	C313	Design
-98.42	C314	Design
-280.54	C315	Design
-387.14	C316	Design
-57.96	C317	Design
-91.94	C318	Design
88.09	C319	Design
194.70	C320	Design
-99.58	C321	Design
-65.60	C322	Design
-245.63	C323	Design
-352.23	C324	Design
-31.30	C325	Design
-65.28	C326	Design
111.39	C327	Design
218.00	C328	Design
-72.73	C329	Design
-38.74	C330	Design
-215.42	C331	Design
-322.03	C332	Design

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Brace - Directly welded Connection</u>						
Total weld design strength	[Kip]	801.86	657.05	C98	0.82	Eq. J2-4, Eq. J2-6
Maximum weld force that brace can develop	[Kip]	2018.84	657.05	C98	0.33	Eq. J4-4
<u>Gusset</u>						
Maximum weld force that gusset can develop	[Kip]	939.60	657.05	C98	0.70	Eq. J4-4
Block shear on gusset	[Kip]	860.40	488.16	C266	0.57	Eq. J4-5
Ratio	0.82					

Checks for gusset and brace**DESIGN CHECK**

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Brace</u>						
Yielding strength due to axial load	[Kip]	865.26	488.16	C266	0.56	Eq. J4-1
Tension rupture	[Kip]	893.39	488.16	C266	0.55	Eq. J4-2
<u>Gusset</u>						
Tension yielding on the Whitmore section	[Kip]	798.83	488.16	C266	0.61	Eq. J4-1
Buckling on the Whitmore section	[Kip]	776.90	657.05	C98	0.85	Eq. E3-1
Ratio	0.85					

Interface between Gusset - Bottom right brace
Connection: Directly welded
DEMANDS

Pu [Kip]	Description	Load type
-86.53	C1	Design
-96.97	C2	Design
-85.82	C3	Design
-75.39	C4	Design
-179.61	C5	Design
-194.97	C6	Design
-178.33	C7	Design
-162.98	C8	Design
-178.85	C9	Design
-194.15	C10	Design
-177.58	C11	Design
-162.28	C12	Design
-109.32	C13	Design
-120.44	C14	Design
-108.49	C15	Design
-97.36	C16	Design
-76.60	C17	Design
-85.74	C18	Design
-75.98	C19	Design
-66.84	C20	Design
-76.47	C21	Design
-290.80	C22	Design
-107.30	C23	Design
-45.71	C24	Design
-136.03	C25	Design
-343.04	C26	Design
-76.57	C33	Design
-139.40	C34	Design
-86.00	C35	Design
-67.16	C36	Design
-94.04	C37	Design
-157.93	C38	Design

-76.11	C45	Design
138.21	C46	Design
-45.28	C47	Design
-106.87	C48	Design
-16.56	C49	Design
190.46	C50	Design
-76.01	C57	Design
-13.18	C58	Design
-66.59	C59	Design
-85.42	C60	Design
-58.54	C61	Design
5.35	C62	Design
-107.39	C69	Design
-528.75	C70	Design
-169.04	C71	Design
-45.86	C72	Design
-219.21	C73	Design
-633.24	C74	Design
-107.58	C81	Design
-225.96	C82	Design
-126.43	C83	Design
-88.76	C84	Design
-135.24	C85	Design
-263.01	C86	Design
-107.08	C93	Design
314.28	C94	Design
-45.42	C95	Design
-168.61	C96	Design
4.74	C97	Design
418.77	C98	Design
-106.89	C105	Design
11.49	C106	Design
-88.04	C107	Design
-125.71	C108	Design
-79.23	C109	Design
48.55	C110	Design
-106.63	C117	Design
-527.93	C118	Design
-168.28	C119	Design
-45.10	C120	Design
-218.39	C121	Design
-632.42	C122	Design
-106.82	C129	Design
-225.14	C130	Design
-125.67	C131	Design
-88.00	C132	Design
-134.42	C133	Design
-262.20	C134	Design
-106.33	C141	Design
314.98	C142	Design
-44.67	C143	Design
-167.86	C144	Design
5.43	C145	Design
419.46	C146	Design
-106.13	C153	Design
12.18	C154	Design
-87.28	C155	Design
-124.95	C156	Design
-78.53	C157	Design
49.24	C158	Design
-74.67	C165	Design
-494.05	C166	Design
-136.33	C167	Design
-13.14	C168	Design
-184.51	C169	Design
-598.54	C170	Design

-74.87	C177	Design
-191.26	C178	Design
-93.72	C179	Design
-56.05	C180	Design
-100.54	C181	Design
-228.32	C182	Design
-74.58	C189	Design
344.80	C190	Design
-12.92	C191	Design
-136.11	C192	Design
35.26	C193	Design
449.29	C194	Design
-74.38	C201	Design
42.01	C202	Design
-55.53	C203	Design
-93.20	C204	Design
-48.71	C205	Design
79.07	C206	Design
-73.91	C213	Design
-493.23	C214	Design
-135.57	C215	Design
-12.39	C216	Design
-183.69	C217	Design
-597.72	C218	Design
-74.11	C225	Design
-190.44	C226	Design
-92.96	C227	Design
-55.29	C228	Design
-99.72	C229	Design
-227.50	C230	Design
-73.82	C237	Design
345.50	C238	Design
-12.16	C239	Design
-135.35	C240	Design
35.95	C241	Design
449.98	C242	Design
-73.63	C249	Design
42.71	C250	Design
-54.78	C251	Design
-92.45	C252	Design
-48.01	C253	Design
79.76	C254	Design
-55.37	C261	Design
-472.45	C262	Design
-117.03	C263	Design
6.16	C264	Design
-162.91	C265	Design
-576.94	C266	Design
-55.57	C273	Design
-169.66	C274	Design
-74.42	C275	Design
-36.75	C276	Design
-78.94	C277	Design
-206.72	C278	Design
-55.43	C285	Design
361.65	C286	Design
6.23	C287	Design
-116.96	C288	Design
52.11	C289	Design
466.14	C290	Design
-55.24	C297	Design
58.86	C298	Design
-36.39	C299	Design
-74.05	C300	Design
-31.86	C301	Design
95.92	C302	Design

-131.63	C309	Design
-98.53	C310	Design
-276.98	C311	Design
-380.60	C312	Design
-89.30	C313	Design
-122.40	C314	Design
56.05	C315	Design
159.67	C316	Design
-98.91	C317	Design
-65.82	C318	Design
-242.28	C319	Design
-345.90	C320	Design
-56.80	C321	Design
-89.90	C322	Design
86.57	C323	Design
190.19	C324	Design
-72.36	C325	Design
-39.26	C326	Design
-212.52	C327	Design
-316.14	C328	Design
-30.46	C329	Design
-63.56	C330	Design
109.70	C331	Design
213.32	C332	Design

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Brace - Directly welded Connection						
Total weld design strength	[Kip]	801.86	633.24	C74	0.79	Eq. J2-4, Eq. J2-6
Maximum weld force that brace can develop	[Kip]	2018.84	633.24	C74	0.31	Eq. J4-4
Gusset						
Maximum weld force that gusset can develop	[Kip]	939.60	633.24	C74	0.67	Eq. J4-4
Block shear on gusset	[Kip]	860.40	466.14	C290	0.54	Eq. J4-5
Ratio	0.79					

Checks for gusset and brace

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Brace						
Yielding strength due to axial load	[Kip]	865.26	466.14	C290	0.54	Eq. J4-1
Tension rupture	[Kip]	893.39	466.14	C290	0.52	Eq. J4-2
Gusset						
Tension yielding on the Whitmore section	[Kip]	798.83	466.14	C290	0.58	Eq. J4-1
Buckling on the Whitmore section	[Kip]	776.90	633.24	C74	0.82	Eq. E3-1
Ratio	0.82					

Upper gusset interface - beam Directly welded

DEMANDS

Description	Beam			Column			Load type
	Ru [Kip]	Pu [Kip]	Mu [Kip*ft]	Pu [Kip]	Mu22 [Kip*ft]	Mu33 [Kip*ft]	
C1	-2.21	-110.44	-1.46	0.00	0.00	0.00	Design
C2	10.62	-110.08	7.04	0.00	0.00	0.00	Design
C3	-3.09	-110.39	-2.04	0.00	0.00	0.00	Design
C4	-15.92	-110.75	-10.55	0.00	0.00	0.00	Design
C5	-4.78	-226.07	-3.17	0.00	0.00	0.00	Design
C6	14.10	-225.54	9.34	0.00	0.00	0.00	Design
C7	-6.37	-226.00	-4.22	0.00	0.00	0.00	Design

C8	-25.25	-226.54	-16.73	0.00	0.00	0.00	Design
C9	-4.79	-225.00	-3.18	0.00	0.00	0.00	Design
C10	14.01	-224.46	9.28	0.00	0.00	0.00	Design
C11	-6.38	-224.93	-4.22	0.00	0.00	0.00	Design
C12	-25.18	-225.46	-16.68	0.00	0.00	0.00	Design
C13	-2.77	-138.84	-1.84	0.00	0.00	0.00	Design
C14	10.90	-138.46	7.22	0.00	0.00	0.00	Design
C15	-3.80	-138.78	-2.52	0.00	0.00	0.00	Design
C16	-17.48	-139.17	-11.58	0.00	0.00	0.00	Design
C17	-1.87	-98.11	-1.24	0.00	0.00	0.00	Design
C18	9.37	-97.80	6.21	0.00	0.00	0.00	Design
C19	-2.63	-98.06	-1.75	0.00	0.00	0.00	Design
C20	-13.87	-98.37	-9.19	0.00	0.00	0.00	Design
C21	-1.92	-98.71	-1.27	0.00	0.00	0.00	Design
C22	262.92	-92.13	174.18	0.00	0.00	0.00	Design
C23	35.67	-97.41	23.63	0.00	0.00	0.00	Design
C24	-39.49	-99.72	-26.16	0.00	0.00	0.00	Design
C25	73.26	-97.49	48.54	0.00	0.00	0.00	Design
C26	325.80	-89.59	215.84	0.00	0.00	0.00	Design
C33	-1.88	-98.26	-1.25	0.00	0.00	0.00	Design
C34	75.72	-96.31	50.17	0.00	0.00	0.00	Design
C35	9.61	-97.87	6.37	0.00	0.00	0.00	Design
C36	-13.37	-98.58	-8.86	0.00	0.00	0.00	Design
C37	20.17	-97.90	13.36	0.00	0.00	0.00	Design
C38	98.10	-95.47	64.99	0.00	0.00	0.00	Design
C45	-2.58	-97.46	-1.71	0.00	0.00	0.00	Design
C46	-267.42	-104.05	-177.16	0.00	0.00	0.00	Design
C47	-40.17	-98.76	-26.61	0.00	0.00	0.00	Design
C48	34.99	-96.45	23.18	0.00	0.00	0.00	Design
C49	-77.76	-98.68	-51.52	0.00	0.00	0.00	Design
C50	-330.30	-106.58	-218.82	0.00	0.00	0.00	Design
C57	-2.62	-97.92	-1.74	0.00	0.00	0.00	Design
C58	-80.22	-99.86	-53.15	0.00	0.00	0.00	Design
C59	-14.11	-98.31	-9.35	0.00	0.00	0.00	Design
C60	8.87	-97.60	5.87	0.00	0.00	0.00	Design
C61	-24.67	-98.27	-16.34	0.00	0.00	0.00	Design
C62	-102.60	-100.71	-67.97	0.00	0.00	0.00	Design
C69	-2.90	-137.68	-1.92	0.00	0.00	0.00	Design
C70	517.81	-124.75	343.05	0.00	0.00	0.00	Design
C71	72.28	-135.07	47.89	0.00	0.00	0.00	Design
C72	-78.03	-139.69	-51.70	0.00	0.00	0.00	Design
C73	138.50	-135.48	91.76	0.00	0.00	0.00	Design
C74	643.58	-119.68	426.37	0.00	0.00	0.00	Design
C81	-2.82	-136.77	-1.87	0.00	0.00	0.00	Design
C82	143.42	-133.12	95.02	0.00	0.00	0.00	Design
C83	20.17	-135.98	13.36	0.00	0.00	0.00	Design
C84	-25.79	-137.40	-17.09	0.00	0.00	0.00	Design
C85	32.31	-136.30	21.41	0.00	0.00	0.00	Design
C86	188.18	-131.43	124.67	0.00	0.00	0.00	Design
C93	-3.70	-135.21	-2.45	0.00	0.00	0.00	Design
C94	-524.41	-148.14	-347.42	0.00	0.00	0.00	Design
C95	-78.88	-137.82	-52.26	0.00	0.00	0.00	Design
C96	71.43	-133.20	47.32	0.00	0.00	0.00	Design
C97	-145.10	-137.40	-96.13	0.00	0.00	0.00	Design
C98	-650.18	-153.21	-430.74	0.00	0.00	0.00	Design
C105	-3.78	-136.12	-2.50	0.00	0.00	0.00	Design
C106	-150.02	-139.77	-99.39	0.00	0.00	0.00	Design
C107	-26.77	-136.90	-17.73	0.00	0.00	0.00	Design
C108	19.19	-135.49	12.71	0.00	0.00	0.00	Design
C109	-38.91	-136.59	-25.78	0.00	0.00	0.00	Design
C110	-194.78	-141.46	-129.04	0.00	0.00	0.00	Design
C117	-2.91	-136.60	-1.93	0.00	0.00	0.00	Design
C118	517.73	-123.67	343.00	0.00	0.00	0.00	Design
C119	72.27	-133.99	47.88	0.00	0.00	0.00	Design
C120	-78.04	-138.61	-51.70	0.00	0.00	0.00	Design
C121	138.42	-134.41	91.70	0.00	0.00	0.00	Design

C122	643.50	-118.61	426.32	0.00	0.00	0.00	Design
C129	-2.83	-135.69	-1.87	0.00	0.00	0.00	Design
C130	143.34	-132.05	94.96	0.00	0.00	0.00	Design
C131	20.16	-134.91	13.36	0.00	0.00	0.00	Design
C132	-25.80	-136.32	-17.09	0.00	0.00	0.00	Design
C133	32.23	-135.23	21.35	0.00	0.00	0.00	Design
C134	188.10	-130.35	124.62	0.00	0.00	0.00	Design
C141	-3.70	-134.13	-2.45	0.00	0.00	0.00	Design
C142	-524.34	-147.06	-347.38	0.00	0.00	0.00	Design
C143	-78.88	-136.75	-52.26	0.00	0.00	0.00	Design
C144	71.43	-132.12	47.32	0.00	0.00	0.00	Design
C145	-145.03	-136.33	-96.08	0.00	0.00	0.00	Design
C146	-650.11	-152.13	-430.70	0.00	0.00	0.00	Design
C153	-3.78	-135.05	-2.51	0.00	0.00	0.00	Design
C154	-149.95	-138.69	-99.34	0.00	0.00	0.00	Design
C155	-26.77	-135.83	-17.74	0.00	0.00	0.00	Design
C156	19.19	-134.41	12.71	0.00	0.00	0.00	Design
C157	-38.84	-135.51	-25.73	0.00	0.00	0.00	Design
C158	-194.71	-140.39	-129.00	0.00	0.00	0.00	Design
C165	-2.00	-96.95	-1.32	0.00	0.00	0.00	Design
C166	516.28	-84.09	342.04	0.00	0.00	0.00	Design
C167	73.19	-94.34	48.49	0.00	0.00	0.00	Design
C168	-77.12	-98.96	-51.09	0.00	0.00	0.00	Design
C169	136.97	-94.83	90.74	0.00	0.00	0.00	Design
C170	642.05	-79.02	425.35	0.00	0.00	0.00	Design
C177	-1.91	-96.04	-1.27	0.00	0.00	0.00	Design
C178	141.89	-92.46	94.00	0.00	0.00	0.00	Design
C179	21.07	-95.25	13.96	0.00	0.00	0.00	Design
C180	-24.88	-96.67	-16.49	0.00	0.00	0.00	Design
C181	30.78	-95.64	20.39	0.00	0.00	0.00	Design
C182	186.65	-90.77	123.66	0.00	0.00	0.00	Design
C189	-2.53	-94.49	-1.68	0.00	0.00	0.00	Design
C190	-520.81	-107.35	-345.03	0.00	0.00	0.00	Design
C191	-77.71	-97.10	-51.49	0.00	0.00	0.00	Design
C192	72.60	-92.48	48.10	0.00	0.00	0.00	Design
C193	-141.50	-96.61	-93.74	0.00	0.00	0.00	Design
C194	-646.57	-112.41	-428.35	0.00	0.00	0.00	Design
C201	-2.61	-95.40	-1.73	0.00	0.00	0.00	Design
C202	-146.42	-98.97	-97.00	0.00	0.00	0.00	Design
C203	-25.60	-96.18	-16.96	0.00	0.00	0.00	Design
C204	20.36	-94.77	13.49	0.00	0.00	0.00	Design
C205	-35.30	-95.79	-23.39	0.00	0.00	0.00	Design
C206	-191.18	-100.67	-126.65	0.00	0.00	0.00	Design
C213	-2.00	-95.87	-1.33	0.00	0.00	0.00	Design
C214	516.20	-83.01	341.98	0.00	0.00	0.00	Design
C215	73.18	-93.26	48.48	0.00	0.00	0.00	Design
C216	-77.13	-97.88	-51.10	0.00	0.00	0.00	Design
C217	136.89	-93.75	90.69	0.00	0.00	0.00	Design
C218	641.96	-77.95	425.30	0.00	0.00	0.00	Design
C225	-1.92	-94.96	-1.27	0.00	0.00	0.00	Design
C226	141.81	-91.39	93.95	0.00	0.00	0.00	Design
C227	21.07	-94.18	13.96	0.00	0.00	0.00	Design
C228	-24.89	-95.60	-16.49	0.00	0.00	0.00	Design
C229	30.70	-94.57	20.34	0.00	0.00	0.00	Design
C230	186.57	-89.69	123.60	0.00	0.00	0.00	Design
C237	-2.53	-93.41	-1.68	0.00	0.00	0.00	Design
C238	-520.74	-106.27	-344.99	0.00	0.00	0.00	Design
C239	-77.72	-96.02	-51.49	0.00	0.00	0.00	Design
C240	72.59	-91.40	48.09	0.00	0.00	0.00	Design
C241	-141.43	-95.54	-93.69	0.00	0.00	0.00	Design
C242	-646.50	-111.34	-428.31	0.00	0.00	0.00	Design
C249	-2.62	-94.33	-1.73	0.00	0.00	0.00	Design
C250	-146.35	-97.90	-96.95	0.00	0.00	0.00	Design
C251	-25.60	-95.11	-16.96	0.00	0.00	0.00	Design
C252	20.35	-93.69	13.48	0.00	0.00	0.00	Design
C253	-35.23	-94.72	-23.34	0.00	0.00	0.00	Design

C254	-191.11	-99.59	-126.61	0.00	0.00	0.00	Design
C261	-1.53	-72.21	-1.01	0.00	0.00	0.00	Design
C262	513.92	-59.42	340.47	0.00	0.00	0.00	Design
C263	73.65	-69.59	48.79	0.00	0.00	0.00	Design
C264	-76.66	-74.22	-50.79	0.00	0.00	0.00	Design
C265	134.61	-70.16	89.18	0.00	0.00	0.00	Design
C266	639.69	-54.36	423.79	0.00	0.00	0.00	Design
C273	-1.45	-71.29	-0.96	0.00	0.00	0.00	Design
C274	139.53	-67.80	92.44	0.00	0.00	0.00	Design
C275	21.54	-70.51	14.27	0.00	0.00	0.00	Design
C276	-24.42	-71.93	-16.18	0.00	0.00	0.00	Design
C277	28.42	-70.98	18.83	0.00	0.00	0.00	Design
C278	184.29	-66.10	122.09	0.00	0.00	0.00	Design
C285	-1.87	-69.76	-1.24	0.00	0.00	0.00	Design
C286	-517.32	-82.54	-342.73	0.00	0.00	0.00	Design
C287	-77.06	-72.37	-51.05	0.00	0.00	0.00	Design
C288	73.26	-67.75	48.53	0.00	0.00	0.00	Design
C289	-138.01	-71.80	-91.43	0.00	0.00	0.00	Design
C290	-643.09	-87.61	-426.05	0.00	0.00	0.00	Design
C297	-1.96	-70.67	-1.30	0.00	0.00	0.00	Design
C298	-142.93	-74.17	-94.69	0.00	0.00	0.00	Design
C299	-24.94	-71.45	-16.52	0.00	0.00	0.00	Design
C300	21.02	-70.03	13.92	0.00	0.00	0.00	Design
C301	-31.82	-70.99	-21.08	0.00	0.00	0.00	Design
C302	-187.70	-75.86	-124.35	0.00	0.00	0.00	Design
C309	21.66	-140.66	14.35	0.00	0.00	0.00	Design
C310	-17.78	-141.31	-11.78	0.00	0.00	0.00	Design
C311	212.07	-138.63	140.50	0.00	0.00	0.00	Design
C312	336.52	-136.44	222.94	0.00	0.00	0.00	Design
C313	-28.51	-140.29	-18.89	0.00	0.00	0.00	Design
C314	10.93	-139.64	7.24	0.00	0.00	0.00	Design
C315	-218.93	-142.33	-145.04	0.00	0.00	0.00	Design
C316	-343.37	-144.52	-227.48	0.00	0.00	0.00	Design
C317	22.56	-99.94	14.95	0.00	0.00	0.00	Design
C318	-16.88	-100.58	-11.18	0.00	0.00	0.00	Design
C319	210.54	-97.97	139.48	0.00	0.00	0.00	Design
C320	334.98	-95.78	221.93	0.00	0.00	0.00	Design
C321	-27.35	-99.57	-18.12	0.00	0.00	0.00	Design
C322	12.09	-98.92	8.01	0.00	0.00	0.00	Design
C323	-215.32	-101.54	-142.65	0.00	0.00	0.00	Design
C324	-339.77	-103.73	-225.09	0.00	0.00	0.00	Design
C325	23.24	-66.05	15.40	0.00	0.00	0.00	Design
C326	-16.20	-66.69	-10.73	0.00	0.00	0.00	Design
C327	207.28	-64.19	137.32	0.00	0.00	0.00	Design
C328	331.72	-62.00	219.77	0.00	0.00	0.00	Design
C329	-26.40	-65.70	-17.49	0.00	0.00	0.00	Design
C330	13.04	-65.05	8.64	0.00	0.00	0.00	Design
C331	-210.44	-67.56	-139.41	0.00	0.00	0.00	Design
C332	-334.88	-69.74	-221.86	0.00	0.00	0.00	Design

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Gusset						
Beam yielding (normal stress)	[Kip]	1387.82	394.55	C98	0.28	Eq. B-1, Appendix B, DG29, Eq. J4-1
Shear yielding	[Kip]	925.21	650.18	C98	0.70	Eq. J4-3
Gusset edge tension stress	[Kip/in2]	32.40	5.29	C8	0.16	J4-1
Gusset edge shear stress	[Kip/in2]	21.60	15.18	C98	0.70	J4-1
Weld capacity	[Kip]	975.17	834.98	C98	0.86	Tables 8-4 .. 8-11
Beam						
Web crippling	[Kip]	621.09	394.55	C98	0.64	Eq. J10-4, Eq. B-1, Appendix B, DG29

Local web yielding

[Kip]

1235.82

394.55 C98

0.32 Eq. J10-2,
Eq. B-1,
Appendix B,
DG29

Ratio

0.86

Lower gusset interface - beam
Directly welded

DEMANDS

Description	Beam			Column			Load type
	Ru [Kip]	Pu [Kip]	Mu [Kip*ft]	Pu [Kip]	Mu22 [Kip*ft]	Mu33 [Kip*ft]	
C1	0.23	-126.50	0.15	0.00	0.00	0.00	Design
C2	-14.39	-126.14	-9.53	0.00	0.00	0.00	Design
C3	1.15	-126.45	0.76	0.00	0.00	0.00	Design
C4	15.77	-126.81	10.44	0.00	0.00	0.00	Design
C5	-0.01	-262.06	-0.01	0.00	0.00	0.00	Design
C6	-21.51	-261.53	-14.25	0.00	0.00	0.00	Design
C7	1.67	-261.99	1.11	0.00	0.00	0.00	Design
C8	23.18	-262.52	15.35	0.00	0.00	0.00	Design
C9	0.02	-260.98	0.01	0.00	0.00	0.00	Design
C10	-21.41	-260.45	-14.18	0.00	0.00	0.00	Design
C11	1.69	-260.91	1.12	0.00	0.00	0.00	Design
C12	23.12	-261.44	15.31	0.00	0.00	0.00	Design
C13	0.06	-159.56	0.04	0.00	0.00	0.00	Design
C14	-15.51	-159.18	-10.28	0.00	0.00	0.00	Design
C15	1.14	-159.51	0.76	0.00	0.00	0.00	Design
C16	16.71	-159.89	11.07	0.00	0.00	0.00	Design
C17	0.11	-111.89	0.08	0.00	0.00	0.00	Design
C18	-12.68	-111.58	-8.40	0.00	0.00	0.00	Design
C19	0.92	-111.84	0.61	0.00	0.00	0.00	Design
C20	13.71	-112.15	9.08	0.00	0.00	0.00	Design
C21	0.85	-112.49	0.57	0.00	0.00	0.00	Design
C22	-298.46	-105.94	-197.73	0.00	0.00	0.00	Design
C23	-42.53	-111.19	-28.18	0.00	0.00	0.00	Design
C24	43.87	-113.49	29.07	0.00	0.00	0.00	Design
C25	-81.74	-111.28	-54.15	0.00	0.00	0.00	Design
C26	-372.29	-103.42	-246.64	0.00	0.00	0.00	Design
C33	0.29	-112.04	0.19	0.00	0.00	0.00	Design
C34	-87.46	-110.10	-57.94	0.00	0.00	0.00	Design
C35	-12.96	-111.65	-8.59	0.00	0.00	0.00	Design
C36	13.46	-112.35	8.92	0.00	0.00	0.00	Design
C37	-23.93	-111.69	-15.86	0.00	0.00	0.00	Design
C38	-113.60	-109.26	-75.26	0.00	0.00	0.00	Design
C45	0.18	-111.24	0.12	0.00	0.00	0.00	Design
C46	299.49	-117.80	198.41	0.00	0.00	0.00	Design
C47	43.57	-112.54	28.86	0.00	0.00	0.00	Design
C48	-42.84	-110.24	-28.38	0.00	0.00	0.00	Design
C49	82.78	-112.46	54.84	0.00	0.00	0.00	Design
C50	373.32	-120.32	247.32	0.00	0.00	0.00	Design
C57	0.74	-111.70	0.49	0.00	0.00	0.00	Design
C58	88.50	-113.63	58.63	0.00	0.00	0.00	Design
C59	14.00	-112.09	9.27	0.00	0.00	0.00	Design
C60	-12.43	-111.38	-8.23	0.00	0.00	0.00	Design
C61	24.97	-112.05	16.54	0.00	0.00	0.00	Design
C62	114.63	-114.47	75.94	0.00	0.00	0.00	Design
C69	1.59	-158.39	1.06	0.00	0.00	0.00	Design
C70	-586.84	-145.52	-388.78	0.00	0.00	0.00	Design
C71	-85.18	-155.79	-56.43	0.00	0.00	0.00	Design
C72	87.63	-160.38	58.06	0.00	0.00	0.00	Design
C73	-153.41	-156.20	-101.63	0.00	0.00	0.00	Design

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C74	-734.49	-140.48	-486.60	0.00	0.00	0.00	Design
C81	0.48	-157.48	0.31	0.00	0.00	0.00	Design
C82	-164.85	-153.85	-109.21	0.00	0.00	0.00	Design
C83	-26.04	-156.70	-17.25	0.00	0.00	0.00	Design
C84	26.81	-158.11	17.76	0.00	0.00	0.00	Design
C85	-37.79	-157.02	-25.04	0.00	0.00	0.00	Design
C86	-217.12	-152.16	-143.84	0.00	0.00	0.00	Design
C93	-0.29	-155.93	-0.19	0.00	0.00	0.00	Design
C94	588.14	-168.80	389.65	0.00	0.00	0.00	Design
C95	86.48	-158.53	57.30	0.00	0.00	0.00	Design
C96	-86.33	-153.93	-57.19	0.00	0.00	0.00	Design
C97	154.71	-158.11	102.49	0.00	0.00	0.00	Design
C98	735.79	-173.84	487.46	0.00	0.00	0.00	Design
C105	0.83	-156.84	0.55	0.00	0.00	0.00	Design
C106	166.15	-160.46	110.07	0.00	0.00	0.00	Design
C107	27.34	-157.62	18.11	0.00	0.00	0.00	Design
C108	-25.51	-156.20	-16.90	0.00	0.00	0.00	Design
C109	39.09	-157.30	25.90	0.00	0.00	0.00	Design
C110	218.42	-162.15	144.70	0.00	0.00	0.00	Design
C117	1.62	-157.31	1.07	0.00	0.00	0.00	Design
C118	-586.74	-144.44	-388.71	0.00	0.00	0.00	Design
C119	-85.16	-154.71	-56.42	0.00	0.00	0.00	Design
C120	87.66	-159.30	58.07	0.00	0.00	0.00	Design
C121	-153.30	-155.12	-101.56	0.00	0.00	0.00	Design
C122	-734.39	-139.40	-486.53	0.00	0.00	0.00	Design
C129	0.50	-156.40	0.33	0.00	0.00	0.00	Design
C130	-164.74	-152.77	-109.14	0.00	0.00	0.00	Design
C131	-26.01	-155.62	-17.23	0.00	0.00	0.00	Design
C132	26.84	-157.03	17.78	0.00	0.00	0.00	Design
C133	-37.68	-155.94	-24.96	0.00	0.00	0.00	Design
C134	-217.01	-151.08	-143.77	0.00	0.00	0.00	Design
C141	-0.27	-154.85	-0.18	0.00	0.00	0.00	Design
C142	588.08	-167.71	389.60	0.00	0.00	0.00	Design
C143	86.50	-157.45	57.31	0.00	0.00	0.00	Design
C144	-86.31	-152.85	-57.18	0.00	0.00	0.00	Design
C145	154.65	-157.03	102.45	0.00	0.00	0.00	Design
C146	735.73	-172.75	487.42	0.00	0.00	0.00	Design
C153	0.85	-155.76	0.56	0.00	0.00	0.00	Design
C154	166.09	-159.38	110.03	0.00	0.00	0.00	Design
C155	27.36	-156.54	18.13	0.00	0.00	0.00	Design
C156	-25.49	-155.12	-16.89	0.00	0.00	0.00	Design
C157	39.03	-156.22	25.86	0.00	0.00	0.00	Design
C158	218.36	-161.07	144.66	0.00	0.00	0.00	Design
C165	1.65	-110.72	1.09	0.00	0.00	0.00	Design
C166	-584.01	-97.92	-386.90	0.00	0.00	0.00	Design
C167	-85.13	-108.12	-56.40	0.00	0.00	0.00	Design
C168	87.69	-112.71	58.09	0.00	0.00	0.00	Design
C169	-150.57	-108.60	-99.75	0.00	0.00	0.00	Design
C170	-731.66	-92.88	-484.72	0.00	0.00	0.00	Design
C177	0.53	-109.81	0.35	0.00	0.00	0.00	Design
C178	-162.01	-106.25	-107.33	0.00	0.00	0.00	Design
C179	-25.98	-109.03	-17.21	0.00	0.00	0.00	Design
C180	26.87	-110.44	17.80	0.00	0.00	0.00	Design
C181	-34.95	-109.41	-23.16	0.00	0.00	0.00	Design
C182	-214.28	-104.56	-141.96	0.00	0.00	0.00	Design
C189	-0.52	-108.26	-0.34	0.00	0.00	0.00	Design
C190	585.14	-121.06	387.66	0.00	0.00	0.00	Design
C191	86.26	-110.86	57.15	0.00	0.00	0.00	Design
C192	-86.55	-106.27	-57.34	0.00	0.00	0.00	Design
C193	151.71	-110.38	100.51	0.00	0.00	0.00	Design
C194	732.79	-126.10	485.48	0.00	0.00	0.00	Design
C201	0.60	-109.17	0.40	0.00	0.00	0.00	Design
C202	163.15	-112.73	108.09	0.00	0.00	0.00	Design
C203	27.12	-109.95	17.97	0.00	0.00	0.00	Design
C204	-25.73	-108.54	-17.05	0.00	0.00	0.00	Design
C205	36.09	-109.56	23.91	0.00	0.00	0.00	Design

C206	215.42	-114.42	142.72	0.00	0.00	0.00	Design
C213	1.68	-109.63	1.11	0.00	0.00	0.00	Design
C214	-583.90	-96.84	-386.83	0.00	0.00	0.00	Design
C215	-85.10	-107.03	-56.38	0.00	0.00	0.00	Design
C216	87.71	-111.63	58.11	0.00	0.00	0.00	Design
C217	-150.46	-107.52	-99.68	0.00	0.00	0.00	Design
C218	-731.55	-91.80	-484.65	0.00	0.00	0.00	Design
C225	0.56	-108.73	0.37	0.00	0.00	0.00	Design
C226	-161.90	-105.17	-107.26	0.00	0.00	0.00	Design
C227	-25.96	-107.95	-17.20	0.00	0.00	0.00	Design
C228	26.89	-109.36	17.82	0.00	0.00	0.00	Design
C229	-34.85	-108.33	-23.09	0.00	0.00	0.00	Design
C230	-214.18	-103.48	-141.89	0.00	0.00	0.00	Design
C237	-0.49	-107.18	-0.33	0.00	0.00	0.00	Design
C238	585.08	-119.98	387.62	0.00	0.00	0.00	Design
C239	86.28	-109.78	57.16	0.00	0.00	0.00	Design
C240	-86.53	-105.19	-57.33	0.00	0.00	0.00	Design
C241	151.65	-109.30	100.47	0.00	0.00	0.00	Design
C242	732.73	-125.02	485.43	0.00	0.00	0.00	Design
C249	0.62	-108.09	0.41	0.00	0.00	0.00	Design
C250	163.09	-111.65	108.05	0.00	0.00	0.00	Design
C251	27.14	-108.87	17.98	0.00	0.00	0.00	Design
C252	-25.71	-107.46	-17.03	0.00	0.00	0.00	Design
C253	36.03	-108.48	23.87	0.00	0.00	0.00	Design
C254	215.36	-113.34	142.68	0.00	0.00	0.00	Design
C261	1.63	-82.53	1.08	0.00	0.00	0.00	Design
C262	-580.82	-69.81	-384.79	0.00	0.00	0.00	Design
C263	-85.15	-79.93	-56.41	0.00	0.00	0.00	Design
C264	87.67	-84.52	58.08	0.00	0.00	0.00	Design
C265	-147.38	-80.49	-97.64	0.00	0.00	0.00	Design
C266	-728.47	-64.77	-482.61	0.00	0.00	0.00	Design
C273	0.51	-81.62	0.34	0.00	0.00	0.00	Design
C274	-158.82	-78.14	-105.22	0.00	0.00	0.00	Design
C275	-26.01	-80.84	-17.23	0.00	0.00	0.00	Design
C276	26.84	-82.25	17.78	0.00	0.00	0.00	Design
C277	-31.76	-81.30	-21.04	0.00	0.00	0.00	Design
C278	-211.09	-76.45	-139.85	0.00	0.00	0.00	Design
C285	-0.74	-80.09	-0.49	0.00	0.00	0.00	Design
C286	581.70	-92.81	385.38	0.00	0.00	0.00	Design
C287	86.04	-82.69	57.00	0.00	0.00	0.00	Design
C288	-86.78	-78.09	-57.49	0.00	0.00	0.00	Design
C289	148.27	-82.12	98.23	0.00	0.00	0.00	Design
C290	729.35	-97.85	483.20	0.00	0.00	0.00	Design
C297	0.38	-81.00	0.25	0.00	0.00	0.00	Design
C298	159.71	-84.47	105.81	0.00	0.00	0.00	Design
C299	26.89	-81.78	17.82	0.00	0.00	0.00	Design
C300	-25.96	-80.36	-17.20	0.00	0.00	0.00	Design
C301	32.65	-81.31	21.63	0.00	0.00	0.00	Design
C302	211.98	-86.16	140.44	0.00	0.00	0.00	Design
C309	-28.07	-162.12	-18.59	0.00	0.00	0.00	Design
C310	17.81	-162.76	11.80	0.00	0.00	0.00	Design
C311	-228.79	-160.09	-151.57	0.00	0.00	0.00	Design
C312	-372.57	-157.91	-246.83	0.00	0.00	0.00	Design
C313	29.48	-161.74	19.53	0.00	0.00	0.00	Design
C314	-16.40	-161.10	-10.86	0.00	0.00	0.00	Design
C315	230.20	-163.77	152.51	0.00	0.00	0.00	Design
C316	373.98	-165.95	247.76	0.00	0.00	0.00	Design
C317	-28.01	-114.45	-18.56	0.00	0.00	0.00	Design
C318	17.87	-115.09	11.84	0.00	0.00	0.00	Design
C319	-225.96	-112.49	-149.70	0.00	0.00	0.00	Design
C320	-369.74	-110.31	-244.95	0.00	0.00	0.00	Design
C321	29.26	-114.08	19.38	0.00	0.00	0.00	Design
C322	-16.62	-113.44	-11.01	0.00	0.00	0.00	Design
C323	227.20	-116.04	150.52	0.00	0.00	0.00	Design
C324	370.98	-118.22	245.78	0.00	0.00	0.00	Design
C325	-28.08	-75.63	-18.60	0.00	0.00	0.00	Design

C326	17.79	-76.27	11.79	0.00	0.00	0.00	Design
C327	-221.54	-73.78	-146.77	0.00	0.00	0.00	Design
C328	-365.32	-71.60	-242.03	0.00	0.00	0.00	Design
C329	28.90	-75.28	19.15	0.00	0.00	0.00	Design
C330	-16.97	-74.63	-11.24	0.00	0.00	0.00	Design
C331	222.36	-77.13	147.32	0.00	0.00	0.00	Design
C332	366.15	-79.31	242.57	0.00	0.00	0.00	Design

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Gusset						
Beam yielding (normal stress)	[Kip]	1438.15	437.40	C98	0.30	Eq. B-1, Appendix B, DG29, Eq. J4-1
Shear yielding	[Kip]	958.77	735.79	C98	0.77	Eq. J4-3
Gusset edge tension stress	[Kip/in2]	32.40	5.91	C8	0.18	J4-1
Gusset edge shear stress	[Kip/in2]	21.60	16.58	C98	0.77	J4-1
Weld capacity	[Kip]	1011.18	945.06	C98	0.93	Tables 8-4 .. 8-11
Beam						
Web crippling	[Kip]	641.11	437.40	C98	0.68	Eq. J10-4, Eq. B-1, Appendix B, DG29
Local web yielding	[Kip]	1278.54	437.40	C98	0.34	Eq. J10-2, Eq. B-1, Appendix B, DG29
Ratio	0.93					
Global critical strength ratio	0.93					

REFERENCES

[9] AISC 2005, Design Examples Version 13.0, pp. IIC-26 - IIC-27

SCALE: 3/4" = 1'-0"

Current Date: 1/7/2021 3:24 PM

Units system: English

File name: C:\ProgramData\Bentley\Engineering\RAM Structural System\Working\2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD.ram

Steel connections

Results

Connection name : CBB_DW
Connection ID : 25

Family: Column - Beams - Braces (CBB)
Type: Gusset
Description: CBB_DW 1
Design code: AISC 360-16 LRFD

DEMANDS

Description Brace4	Pu Load type [Kip]	Right beam			Left beam			Column		Pu		
		Vu [Kip]	Mu33 [Kip*ft]		Pu [Kip]	Vu [Kip]	Mu33 [Kip*ft]	Pu [Kip]	Vu [Kip]	Brace1 [Kip]	Brace2 [Kip]	Brace3 [Kip]
C1	0.00	19.20	0.00		84.40	12.69	0.00	-1082.96	5.49	0.00	-48.47	-81.06
C2	0.00	19.20	0.00		85.06	12.69	0.00	-1049.31	5.34	0.00	-40.70	-89.42
C3	0.00	19.20	0.00		84.50	12.69	0.00	-1086.30	5.50	0.00	-49.28	-80.43
C4	0.00	19.20	0.00		83.84	12.69	0.00	-1119.95	5.65	0.00	-57.05	-72.07
C5	0.00	35.98	0.00		162.12	26.10	0.00	-1571.51	7.97	0.00	-100.90	-165.75
C6	0.00	35.98	0.00		163.10	26.10	0.00	-1523.14	7.75	0.00	-89.50	-178.05
C7	0.00	35.98	0.00		162.26	26.10	0.00	-1576.99	8.00	0.00	-102.27	-164.63
C8	0.00	35.98	0.00		161.27	26.10	0.00	-1625.35	8.21	0.00	-113.67	-152.33
C9	0.00	35.98	0.00		161.28	26.10	0.00	-1565.10	7.93	0.00	-100.40	-164.94
C10	0.00	35.98	0.00		162.26	26.10	0.00	-1517.11	7.72	0.00	-89.06	-177.19
C11	0.00	35.98	0.00		161.41	26.10	0.00	-1570.55	7.96	0.00	-101.78	-163.82
C12	0.00	35.98	0.00		160.43	26.10	0.00	-1618.54	8.17	0.00	-113.12	-151.57
C13	0.00	22.56	0.00		102.84	15.64	0.00	-1147.77	5.82	0.00	-61.51	-101.91
C14	0.00	22.56	0.00		103.54	15.64	0.00	-1111.76	5.66	0.00	-53.22	-110.82
C15	0.00	22.56	0.00		102.94	15.64	0.00	-1151.54	5.84	0.00	-62.44	-101.17
C16	0.00	22.56	0.00		102.24	15.64	0.00	-1187.55	6.00	0.00	-70.73	-92.26
C17	0.00	16.46	0.00		75.05	10.88	0.00	-948.76	4.81	0.00	-43.12	-72.07

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C18	0.00	16.46	0.00	75.62	10.88	0.00	-918.73	4.67	0.00	-36.29	-79.40
0.00	Design										
C19	0.00	16.46	0.00	75.14	10.88	0.00	-951.72	4.82	0.00	-43.83	-71.52
0.00	Design										
C20	0.00	16.46	0.00	74.57	10.88	0.00	-981.74	4.96	0.00	-50.66	-64.20
0.00	Design										
C21	0.00	16.46	0.00	73.94	10.88	0.00	-939.53	4.74	0.00	-41.00	-72.49
0.00	Design										
C22	0.00	16.46	0.00	85.99	10.88	0.00	-235.39	1.58	0.00	122.38	-245.72
0.00	Design										
C23	0.00	16.46	0.00	76.33	10.88	0.00	-856.17	4.39	0.00	-19.29	-96.80
0.00	Design										
C24	0.00	16.46	0.00	72.11	10.88	0.00	-1027.51	5.12	0.00	-63.78	-47.97
0.00	Design										
C25	0.00	16.46	0.00	76.17	10.88	0.00	-692.26	3.56	0.00	8.21	-122.15
0.00	Design										
C26	0.00	16.46	0.00	90.62	10.88	0.00	-120.18	1.14	0.00	157.21	-286.12
0.00	Design										
C33	0.00	16.46	0.00	74.78	10.88	0.00	-946.51	4.79	0.00	-42.60	-72.18
0.00	Design										
C34	0.00	16.46	0.00	78.33	10.88	0.00	-739.90	3.86	0.00	5.23	-122.92
0.00	Design										
C35	0.00	16.46	0.00	75.50	10.88	0.00	-920.90	4.68	0.00	-35.94	-79.61
0.00	Design										
C36	0.00	16.46	0.00	74.20	10.88	0.00	-973.24	4.91	0.00	-49.53	-64.69
0.00	Design										
C37	0.00	16.46	0.00	75.43	10.88	0.00	-872.89	4.44	0.00	-28.14	-86.74
0.00	Design										
C38	0.00	16.46	0.00	79.88	10.88	0.00	-696.33	3.69	0.00	17.84	-137.34
0.00	Design										
C45	0.00	16.46	0.00	76.24	10.88	0.00	-960.94	4.89	0.00	-45.95	-71.11
0.00	Design										
C46	0.00	16.46	0.00	64.20	10.88	0.00	-1665.09	8.05	0.00	-209.33	102.12
0.00	Design										
C47	0.00	16.46	0.00	73.85	10.88	0.00	-1044.31	5.24	0.00	-67.66	-46.80
0.00	Design										
C48	0.00	16.46	0.00	78.08	10.88	0.00	-872.96	4.51	0.00	-23.17	-95.63
0.00	Design										
C49	0.00	16.46	0.00	74.01	10.88	0.00	-1208.21	6.07	0.00	-95.16	-21.45
0.00	Design										
C50	0.00	16.46	0.00	59.57	10.88	0.00	-1780.29	8.49	0.00	-244.16	142.53
0.00	Design										
C57	0.00	16.46	0.00	75.41	10.88	0.00	-953.96	4.84	0.00	-44.35	-71.42
0.00	Design										
C58	0.00	16.46	0.00	71.85	10.88	0.00	-1160.57	5.77	0.00	-92.18	-20.67
0.00	Design										
C59	0.00	16.46	0.00	74.69	10.88	0.00	-979.58	4.95	0.00	-51.01	-63.98
0.00	Design										
C60	0.00	16.46	0.00	75.99	10.88	0.00	-927.23	4.73	0.00	-37.42	-78.91
0.00	Design										
C61	0.00	16.46	0.00	74.76	10.88	0.00	-1027.58	5.19	0.00	-58.81	-56.86
0.00	Design										
C62	0.00	16.46	0.00	70.30	10.88	0.00	-1204.14	5.94	0.00	-104.79	-6.25
0.00	Design										
C69	0.00	22.56	0.00	98.77	15.64	0.00	-1115.23	5.61	0.00	-56.20	-100.95
0.00	Design										
C70	0.00	22.56	0.00	122.41	15.64	0.00	268.21	-0.60	0.00	265.09	-441.56
0.00	Design										
C71	0.00	22.56	0.00	103.55	15.64	0.00	-948.50	4.92	0.00	-12.77	-149.57
0.00	Design										
C72	0.00	22.56	0.00	95.10	15.64	0.00	-1291.18	6.37	0.00	-101.75	-51.92
0.00	Design										
C73	0.00	22.56	0.00	102.79	15.64	0.00	-645.55	3.36	0.00	36.75	-194.43
0.00	Design										
C74	0.00	22.56	0.00	131.67	15.64	0.00	498.62	-1.47	0.00	334.76	-522.38
0.00	Design										

C81	0.00	22.56	0.00	100.44	15.64	0.00	-1129.18	5.71	0.00	-59.40	-100.33
0.00	Design										
C82	0.00	22.56	0.00	107.10	15.64	0.00	-740.83	3.97	0.00	30.79	-195.98
0.00	Design										
C83	0.00	22.56	0.00	101.87	15.64	0.00	-1077.96	5.50	0.00	-46.06	-115.20
0.00	Design										
C84	0.00	22.56	0.00	99.28	15.64	0.00	-1182.65	5.94	0.00	-73.25	-85.35
0.00	Design										
C85	0.00	22.56	0.00	101.29	15.64	0.00	-1006.80	5.12	0.00	-35.95	-123.61
0.00	Design										
C86	0.00	22.56	0.00	110.20	15.64	0.00	-653.69	3.63	0.00	56.02	-224.82
0.00	Design										
C93	0.00	22.56	0.00	103.29	15.64	0.00	-1155.82	5.90	0.00	-65.57	-98.57
0.00	Design										
C94	0.00	22.56	0.00	79.65	15.64	0.00	-2539.26	12.11	0.00	-386.87	242.04
0.00	Design										
C95	0.00	22.56	0.00	98.51	15.64	0.00	-1322.55	6.59	0.00	-109.00	-49.95
0.00	Design										
C96	0.00	22.56	0.00	106.96	15.64	0.00	-979.87	5.14	0.00	-20.02	-147.61
0.00	Design										
C97	0.00	22.56	0.00	99.28	15.64	0.00	-1625.50	8.15	0.00	-158.53	-5.09
0.00	Design										
C98	0.00	22.56	0.00	70.39	15.64	0.00	-2769.67	12.98	0.00	-456.53	322.85
0.00	Design										
C105	0.00	22.56	0.00	101.62	15.64	0.00	-1141.87	5.80	0.00	-62.37	-99.20
0.00	Design										
C106	0.00	22.56	0.00	94.96	15.64	0.00	-1530.22	7.54	0.00	-152.56	-3.55
0.00	Design										
C107	0.00	22.56	0.00	100.19	15.64	0.00	-1193.09	6.01	0.00	-75.71	-84.32
0.00	Design										
C108	0.00	22.56	0.00	102.78	15.64	0.00	-1088.40	5.57	0.00	-48.52	-114.18
0.00	Design										
C109	0.00	22.56	0.00	100.77	15.64	0.00	-1264.25	6.39	0.00	-85.82	-75.91
0.00	Design										
C110	0.00	22.56	0.00	91.86	15.64	0.00	-1617.36	7.88	0.00	-177.79	25.29
0.00	Design										
C117	0.00	22.56	0.00	97.93	15.64	0.00	-1108.82	5.58	0.00	-55.71	-100.14
0.00	Design										
C118	0.00	22.56	0.00	121.56	15.64	0.00	274.24	-0.63	0.00	265.53	-440.70
0.00	Design										
C119	0.00	22.56	0.00	102.70	15.64	0.00	-942.09	4.89	0.00	-12.28	-148.76
0.00	Design										
C120	0.00	22.56	0.00	94.26	15.64	0.00	-1284.77	6.34	0.00	-101.26	-51.11
0.00	Design										
C121	0.00	22.56	0.00	101.94	15.64	0.00	-639.51	3.33	0.00	37.19	-193.57
0.00	Design										
C122	0.00	22.56	0.00	130.82	15.64	0.00	504.65	-1.50	0.00	335.20	-521.52
0.00	Design										
C129	0.00	22.56	0.00	99.60	15.64	0.00	-1122.77	5.68	0.00	-58.91	-99.52
0.00	Design										
C130	0.00	22.56	0.00	106.26	15.64	0.00	-734.79	3.94	0.00	31.23	-195.12
0.00	Design										
C131	0.00	22.56	0.00	101.03	15.64	0.00	-1071.55	5.47	0.00	-45.57	-114.39
0.00	Design										
C132	0.00	22.56	0.00	98.44	15.64	0.00	-1176.25	5.91	0.00	-72.76	-84.54
0.00	Design										
C133	0.00	22.56	0.00	100.44	15.64	0.00	-1000.76	5.09	0.00	-35.51	-122.75
0.00	Design										
C134	0.00	22.56	0.00	109.36	15.64	0.00	-647.65	3.60	0.00	56.46	-223.96
0.00	Design										
C141	0.00	22.56	0.00	102.44	15.64	0.00	-1149.38	5.87	0.00	-65.07	-97.77
0.00	Design										
C142	0.00	22.56	0.00	78.81	15.64	0.00	-2532.45	12.08	0.00	-386.32	242.80
0.00	Design										
C143	0.00	22.56	0.00	97.67	15.64	0.00	-1316.11	6.56	0.00	-108.51	-49.14
0.00	Design										

C144	0.00	22.56	0.00	106.12	15.64	0.00	-973.43	5.11	0.00	-19.53	-146.80
0.00	Design										
C145	0.00	22.56	0.00	98.43	15.64	0.00	-1618.69	8.11	0.00	-157.98	-4.33
0.00	Design										
C146	0.00	22.56	0.00	69.55	15.64	0.00	-2762.86	12.95	0.00	-455.98	323.61
0.00	Design										
C153	0.00	22.56	0.00	100.77	15.64	0.00	-1135.43	5.77	0.00	-61.87	-98.39
0.00	Design										
C154	0.00	22.56	0.00	94.11	15.64	0.00	-1523.41	7.51	0.00	-152.02	-2.79
0.00	Design										
C155	0.00	22.56	0.00	99.34	15.64	0.00	-1186.65	5.98	0.00	-75.21	-83.51
0.00	Design										
C156	0.00	22.56	0.00	101.94	15.64	0.00	-1081.96	5.54	0.00	-48.02	-113.37
0.00	Design										
C157	0.00	22.56	0.00	99.93	15.64	0.00	-1257.44	6.36	0.00	-85.27	-75.16
0.00	Design										
C158	0.00	22.56	0.00	91.01	15.64	0.00	-1610.55	7.85	0.00	-177.24	26.05
0.00	Design										
C165	0.00	16.46	0.00	70.98	10.88	0.00	-916.21	4.60	0.00	-37.81	-71.12
0.00	Design										
C166	0.00	16.46	0.00	94.49	10.88	0.00	461.24	-1.59	0.00	282.02	-410.14
0.00	Design										
C167	0.00	16.46	0.00	75.76	10.88	0.00	-749.48	3.91	0.00	5.62	-119.74
0.00	Design										
C168	0.00	16.46	0.00	67.31	10.88	0.00	-1092.17	5.36	0.00	-83.35	-22.08
0.00	Design										
C169	0.00	16.46	0.00	74.87	10.88	0.00	-452.52	2.38	0.00	53.68	-163.01
0.00	Design										
C170	0.00	16.46	0.00	103.75	10.88	0.00	691.65	-2.46	0.00	351.69	-490.96
0.00	Design										
C177	0.00	16.46	0.00	72.65	10.88	0.00	-930.17	4.70	0.00	-41.01	-70.49
0.00	Design										
C178	0.00	16.46	0.00	79.18	10.88	0.00	-547.80	2.99	0.00	47.72	-164.56
0.00	Design										
C179	0.00	16.46	0.00	74.08	10.88	0.00	-878.94	4.49	0.00	-27.67	-85.37
0.00	Design										
C180	0.00	16.46	0.00	71.49	10.88	0.00	-983.64	4.93	0.00	-54.86	-55.52
0.00	Design										
C181	0.00	16.46	0.00	73.37	10.88	0.00	-813.77	4.14	0.00	-19.03	-92.19
0.00	Design										
C182	0.00	16.46	0.00	82.28	10.88	0.00	-460.66	2.64	0.00	72.94	-193.40
0.00	Design										
C189	0.00	16.46	0.00	75.48	10.88	0.00	-956.00	4.89	0.00	-46.97	-68.92
0.00	Design										
C190	0.00	16.46	0.00	51.97	10.88	0.00	-2333.45	11.07	0.00	-366.80	270.10
0.00	Design										
C191	0.00	16.46	0.00	70.71	10.88	0.00	-1122.73	5.58	0.00	-90.40	-20.30
0.00	Design										
C192	0.00	16.46	0.00	79.16	10.88	0.00	-780.05	4.13	0.00	-1.42	-117.96
0.00	Design										
C193	0.00	16.46	0.00	71.60	10.88	0.00	-1419.70	7.11	0.00	-138.46	22.97
0.00	Design										
C194	0.00	16.46	0.00	42.72	10.88	0.00	-2563.86	11.94	0.00	-436.46	350.92
0.00	Design										
C201	0.00	16.46	0.00	73.81	10.88	0.00	-942.05	4.78	0.00	-43.77	-69.55
0.00	Design										
C202	0.00	16.46	0.00	67.28	10.88	0.00	-1324.41	6.50	0.00	-132.49	24.52
0.00	Design										
C203	0.00	16.46	0.00	72.38	10.88	0.00	-993.27	5.00	0.00	-57.10	-54.67
0.00	Design										
C204	0.00	16.46	0.00	74.98	10.88	0.00	-888.57	4.55	0.00	-29.92	-84.52
0.00	Design										
C205	0.00	16.46	0.00	73.09	10.88	0.00	-1058.44	5.35	0.00	-65.75	-47.85
0.00	Design										
C206	0.00	16.46	0.00	64.18	10.88	0.00	-1411.56	6.84	0.00	-157.72	53.36
0.00	Design										

C213	0.00	16.46	0.00	70.14	10.88	0.00	-909.80	4.57	0.00	-37.32	-70.31
0.00	Design										
C214	0.00	16.46	0.00	93.64	10.88	0.00	467.27	-1.62	0.00	282.46	-409.28
0.00	Design										
C215	0.00	16.46	0.00	74.91	10.88	0.00	-743.08	3.87	0.00	6.12	-118.93
0.00	Design										
C216	0.00	16.46	0.00	66.46	10.88	0.00	-1085.76	5.33	0.00	-82.86	-21.27
0.00	Design										
C217	0.00	16.46	0.00	74.02	10.88	0.00	-446.48	2.35	0.00	54.12	-162.15
0.00	Design										
C218	0.00	16.46	0.00	102.90	10.88	0.00	697.68	-2.49	0.00	352.13	-490.10
0.00	Design										
C225	0.00	16.46	0.00	71.81	10.88	0.00	-923.76	4.67	0.00	-40.51	-69.68
0.00	Design										
C226	0.00	16.46	0.00	78.34	10.88	0.00	-541.76	2.95	0.00	48.16	-163.70
0.00	Design										
C227	0.00	16.46	0.00	73.24	10.88	0.00	-872.54	4.46	0.00	-27.18	-84.56
0.00	Design										
C228	0.00	16.46	0.00	70.64	10.88	0.00	-977.23	4.90	0.00	-54.37	-54.71
0.00	Design										
C229	0.00	16.46	0.00	72.52	10.88	0.00	-807.73	4.10	0.00	-18.59	-91.33
0.00	Design										
C230	0.00	16.46	0.00	81.44	10.88	0.00	-454.62	2.61	0.00	73.38	-192.54
0.00	Design										
C237	0.00	16.46	0.00	74.64	10.88	0.00	-949.56	4.85	0.00	-46.47	-68.11
0.00	Design										
C238	0.00	16.46	0.00	51.13	10.88	0.00	-2326.64	11.04	0.00	-366.25	270.86
0.00	Design										
C239	0.00	16.46	0.00	69.86	10.88	0.00	-1116.29	5.55	0.00	-89.90	-19.49
0.00	Design										
C240	0.00	16.46	0.00	78.31	10.88	0.00	-773.61	4.09	0.00	-0.92	-117.15
0.00	Design										
C241	0.00	16.46	0.00	70.75	10.88	0.00	-1412.89	7.07	0.00	-137.91	23.73
0.00	Design										
C242	0.00	16.46	0.00	41.87	10.88	0.00	-2557.05	11.91	0.00	-435.91	351.67
0.00	Design										
C249	0.00	16.46	0.00	72.97	10.88	0.00	-935.61	4.75	0.00	-43.27	-68.74
0.00	Design										
C250	0.00	16.46	0.00	66.44	10.88	0.00	-1317.60	6.47	0.00	-131.95	25.27
0.00	Design										
C251	0.00	16.46	0.00	71.54	10.88	0.00	-986.83	4.96	0.00	-56.61	-53.86
0.00	Design										
C252	0.00	16.46	0.00	74.13	10.88	0.00	-882.13	4.52	0.00	-29.42	-83.72
0.00	Design										
C253	0.00	16.46	0.00	72.25	10.88	0.00	-1051.63	5.32	0.00	-65.20	-47.09
0.00	Design										
C254	0.00	16.46	0.00	63.34	10.88	0.00	-1404.75	6.81	0.00	-157.17	54.11
0.00	Design										
C261	0.00	12.35	0.00	52.05	8.16	0.00	-677.74	3.39	0.00	-26.93	-52.94
0.00	Design										
C262	0.00	12.35	0.00	75.42	8.16	0.00	692.13	-2.76	0.00	291.18	-390.12
0.00	Design										
C263	0.00	12.35	0.00	56.83	8.16	0.00	-511.01	2.70	0.00	16.50	-101.56
0.00	Design										
C264	0.00	12.35	0.00	48.38	8.16	0.00	-853.70	4.15	0.00	-72.48	-3.90
0.00	Design										
C265	0.00	12.35	0.00	55.79	8.16	0.00	-221.63	1.20	0.00	62.84	-142.99
0.00	Design										
C266	0.00	12.35	0.00	84.67	8.16	0.00	922.54	-3.63	0.00	360.85	-470.93
0.00	Design										
C273	0.00	12.35	0.00	53.72	8.16	0.00	-691.70	3.49	0.00	-30.13	-52.31
0.00	Design										
C274	0.00	12.35	0.00	60.11	8.16	0.00	-316.91	1.81	0.00	56.88	-144.53
0.00	Design										
C275	0.00	12.35	0.00	55.15	8.16	0.00	-640.47	3.28	0.00	-16.79	-67.19
0.00	Design										

C276	0.00	12.35	0.00	52.56	8.16	0.00	-745.17	3.72	0.00	-43.98	-37.34
0.00	Design										
C277	0.00	12.35	0.00	54.30	8.16	0.00	-582.88	2.96	0.00	-9.86	-72.17
0.00	Design										
C278	0.00	12.35	0.00	63.21	8.16	0.00	-229.77	1.47	0.00	82.11	-173.38
0.00	Design										
C285	0.00	12.35	0.00	56.53	8.16	0.00	-716.78	3.67	0.00	-35.91	-50.88
0.00	Design										
C286	0.00	12.35	0.00	33.16	8.16	0.00	-2086.65	9.83	0.00	-354.02	286.30
0.00	Design										
C287	0.00	12.35	0.00	51.76	8.16	0.00	-883.51	4.37	0.00	-79.34	-2.26
0.00	Design										
C288	0.00	12.35	0.00	60.20	8.16	0.00	-540.83	2.91	0.00	9.64	-99.91
0.00	Design										
C289	0.00	12.35	0.00	52.79	8.16	0.00	-1172.90	5.86	0.00	-125.68	39.17
0.00	Design										
C290	0.00	12.35	0.00	23.91	8.16	0.00	-2317.06	10.70	0.00	-423.69	367.12
0.00	Design										
C297	0.00	12.35	0.00	54.86	8.16	0.00	-702.83	3.57	0.00	-32.71	-51.50
0.00	Design										
C298	0.00	12.35	0.00	48.47	8.16	0.00	-1077.61	5.25	0.00	-119.72	40.72
0.00	Design										
C299	0.00	12.35	0.00	53.43	8.16	0.00	-754.05	3.78	0.00	-46.05	-36.63
0.00	Design										
C300	0.00	12.35	0.00	56.02	8.16	0.00	-649.36	3.34	0.00	-18.86	-66.48
0.00	Design										
C301	0.00	12.35	0.00	54.28	8.16	0.00	-811.64	4.10	0.00	-52.97	-31.65
0.00	Design										
C302	0.00	12.35	0.00	45.37	8.16	0.00	-1164.76	5.60	0.00	-144.94	69.56
0.00	Design										
C309	0.00	23.45	0.00	103.75	16.22	0.00	-1086.47	5.54	0.00	-44.16	-119.70
0.00	Design										
C310	0.00	23.45	0.00	102.57	16.22	0.00	-1216.89	6.12	0.00	-69.86	-93.66
0.00	Design										
C311	0.00	23.45	0.00	107.49	16.22	0.00	-397.97	2.08	0.00	84.99	-246.27
0.00	Design										
C312	0.00	23.45	0.00	111.48	16.22	0.00	-11.55	0.36	0.00	165.30	-328.34
0.00	Design										
C313	0.00	23.45	0.00	104.44	16.22	0.00	-1272.14	6.42	0.00	-81.14	-85.68
0.00	Design										
C314	0.00	23.45	0.00	105.62	16.22	0.00	-1141.72	5.83	0.00	-55.44	-111.72
0.00	Design										
C315	0.00	23.45	0.00	100.70	16.22	0.00	-1960.64	9.87	0.00	-210.30	40.89
0.00	Design										
C316	0.00	23.45	0.00	96.70	16.22	0.00	-2347.06	11.60	0.00	-290.61	122.96
0.00	Design										
C317	0.00	17.35	0.00	75.96	11.47	0.00	-887.45	4.53	0.00	-25.77	-89.87
0.00	Design										
C318	0.00	17.35	0.00	74.78	11.47	0.00	-1017.88	5.11	0.00	-51.47	-63.83
0.00	Design										
C319	0.00	17.35	0.00	79.57	11.47	0.00	-204.94	1.10	0.00	101.92	-214.85
0.00	Design										
C320	0.00	17.35	0.00	83.56	11.47	0.00	181.48	-0.63	0.00	182.23	-296.92
0.00	Design										
C321	0.00	17.35	0.00	76.63	11.47	0.00	-1072.32	5.40	0.00	-62.54	-56.03
0.00	Design										
C322	0.00	17.35	0.00	77.81	11.47	0.00	-941.89	4.82	0.00	-36.84	-82.07
0.00	Design										
C323	0.00	17.35	0.00	73.03	11.47	0.00	-1754.83	8.83	0.00	-190.23	68.95
0.00	Design										
C324	0.00	17.35	0.00	69.03	11.47	0.00	-2141.25	10.56	0.00	-270.54	151.02
0.00	Design										
C325	0.00	11.46	0.00	50.06	7.57	0.00	-555.14	2.84	0.00	-10.90	-65.00
0.00	Design										
C326	0.00	11.46	0.00	48.88	7.57	0.00	-685.56	3.43	0.00	-36.60	-38.95
0.00	Design										

C327	0.00	11.46	0.00	53.46	7.57	0.00	117.05	-0.54	0.00	114.41	-187.41
0.00	Design										
C328	0.00	11.46	0.00	57.46	7.57	0.00	503.47	-2.27	0.00	194.72	-269.48
0.00	Design										
C329	0.00	11.46	0.00	50.70	7.57	0.00	-738.98	3.71	0.00	-47.42	-31.35
0.00	Design										
C330	0.00	11.46	0.00	51.88	7.57	0.00	-608.56	3.13	0.00	-21.72	-57.39
0.00	Design										
C331	0.00	11.46	0.00	47.30	7.57	0.00	-1411.16	7.10	0.00	-172.73	91.06
0.00	Design										
C332	0.00	11.46	0.00	43.30	7.57	0.00	-1797.58	8.82	0.00	-253.03	173.14
0.00	Design										

Interface between Gusset - Top left brace
Connection: Directly welded

DEMANDS

Pu [Kip]	Description	Load type
-48.47	C1	Design
-40.70	C2	Design
-49.28	C3	Design
-57.05	C4	Design
-100.90	C5	Design
-89.50	C6	Design
-102.27	C7	Design
-113.67	C8	Design
-100.40	C9	Design
-89.06	C10	Design
-101.78	C11	Design
-113.12	C12	Design
-61.51	C13	Design
-53.22	C14	Design
-62.44	C15	Design
-70.73	C16	Design
-43.12	C17	Design
-36.29	C18	Design
-43.83	C19	Design
-50.66	C20	Design
-41.00	C21	Design
122.38	C22	Design
-19.29	C23	Design
-63.78	C24	Design
8.21	C25	Design
157.21	C26	Design
-42.60	C33	Design
5.23	C34	Design
-35.94	C35	Design
-49.53	C36	Design
-28.14	C37	Design
17.84	C38	Design
-45.95	C45	Design
-209.33	C46	Design
-67.66	C47	Design
-23.17	C48	Design
-95.16	C49	Design
-244.16	C50	Design
-44.35	C57	Design
-92.18	C58	Design
-51.01	C59	Design
-37.42	C60	Design
-58.81	C61	Design
-104.79	C62	Design
-56.20	C69	Design

265.09	C70	Design
-12.77	C71	Design
-101.75	C72	Design
36.75	C73	Design
334.76	C74	Design
-59.40	C81	Design
30.79	C82	Design
-46.06	C83	Design
-73.25	C84	Design
-35.95	C85	Design
56.02	C86	Design
-65.57	C93	Design
-386.87	C94	Design
-109.00	C95	Design
-20.02	C96	Design
-158.53	C97	Design
-456.53	C98	Design
-62.37	C105	Design
-152.56	C106	Design
-75.71	C107	Design
-48.52	C108	Design
-85.82	C109	Design
-177.79	C110	Design
-55.71	C117	Design
265.53	C118	Design
-12.28	C119	Design
-101.26	C120	Design
37.19	C121	Design
335.20	C122	Design
-58.91	C129	Design
31.23	C130	Design
-45.57	C131	Design
-72.76	C132	Design
-35.51	C133	Design
56.46	C134	Design
-65.07	C141	Design
-386.32	C142	Design
-108.51	C143	Design
-19.53	C144	Design
-157.98	C145	Design
-455.98	C146	Design
-61.87	C153	Design
-152.02	C154	Design
-75.21	C155	Design
-48.02	C156	Design
-85.27	C157	Design
-177.24	C158	Design
-37.81	C165	Design
282.02	C166	Design
5.62	C167	Design
-83.35	C168	Design
53.68	C169	Design
351.69	C170	Design
-41.01	C177	Design
47.72	C178	Design
-27.67	C179	Design
-54.86	C180	Design
-19.03	C181	Design
72.94	C182	Design
-46.97	C189	Design
-366.80	C190	Design
-90.40	C191	Design
-1.42	C192	Design
-138.46	C193	Design
-436.46	C194	Design
-43.77	C201	Design

-132.49	C202	Design
-57.10	C203	Design
-29.92	C204	Design
-65.75	C205	Design
-157.72	C206	Design
-37.32	C213	Design
282.46	C214	Design
6.12	C215	Design
-82.86	C216	Design
54.12	C217	Design
352.13	C218	Design
-40.51	C225	Design
48.16	C226	Design
-27.18	C227	Design
-54.37	C228	Design
-18.59	C229	Design
73.38	C230	Design
-46.47	C237	Design
-366.25	C238	Design
-89.90	C239	Design
-0.92	C240	Design
-137.91	C241	Design
-435.91	C242	Design
-43.27	C249	Design
-131.95	C250	Design
-56.61	C251	Design
-29.42	C252	Design
-65.20	C253	Design
-157.17	C254	Design
-26.93	C261	Design
291.18	C262	Design
16.50	C263	Design
-72.48	C264	Design
62.84	C265	Design
360.85	C266	Design
-30.13	C273	Design
56.88	C274	Design
-16.79	C275	Design
-43.98	C276	Design
-9.86	C277	Design
82.11	C278	Design
-35.91	C285	Design
-354.02	C286	Design
-79.34	C287	Design
9.64	C288	Design
-125.68	C289	Design
-423.69	C290	Design
-32.71	C297	Design
-119.72	C298	Design
-46.05	C299	Design
-18.86	C300	Design
-52.97	C301	Design
-144.94	C302	Design
-44.16	C309	Design
-69.86	C310	Design
84.99	C311	Design
165.30	C312	Design
-81.14	C313	Design
-55.44	C314	Design
-210.30	C315	Design
-290.61	C316	Design
-25.77	C317	Design
-51.47	C318	Design
101.92	C319	Design
182.23	C320	Design
-62.54	C321	Design

-36.84	C322	Design
-190.23	C323	Design
-270.54	C324	Design
-10.90	C325	Design
-36.60	C326	Design
114.41	C327	Design
194.72	C328	Design
-47.42	C329	Design
-21.72	C330	Design
-172.73	C331	Design
-253.03	C332	Design

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Brace - Directly welded Connection</u>						
Total weld design strength	[Kip]	501.16	456.53	C98	0.91	Eq. J2-4, Eq. J2-6
Maximum weld force that brace can develop	[Kip]	510.70	456.53	C98	0.89	Eq. J4-4
<u>Gusset</u>						
Maximum weld force that gusset can develop	[Kip]	489.38	456.53	C98	0.93	Eq. J4-4
Block shear on gusset	[Kip]	650.25	360.85	C266	0.55	Eq. J4-5
Ratio		0.93				

Checks for gusset and brace

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Brace</u>						
Yielding strength due to axial load	[Kip]	603.00	360.85	C266	0.60	Eq. J4-1
Tension rupture	[Kip]	442.38	360.85	C266	0.82	Eq. J4-2
<u>Gusset</u>						
Tension yielding on the Whitmore section	[Kip]	598.57	360.85	C266	0.60	Eq. J4-1
Buckling on the Whitmore section	[Kip]	583.61	456.53	C98	0.78	Eq. E3-1
Ratio		0.82				

Upper left gusset interface - beam Directly welded

DEMANDS

Description	Beam			Column			Load type
	Ru [Kip]	Pu [Kip]	Mu [Kip*ft]	Pu [Kip]	Mu22 [Kip*ft]	Mu33 [Kip*ft]	
C1	-23.16	-14.25	0.00	0.00	0.00	0.00	Design
C2	-19.45	-11.97	0.00	0.00	0.00	0.00	Design
C3	-23.55	-14.49	0.00	0.00	0.00	0.00	Design
C4	-27.26	-16.78	0.00	0.00	0.00	0.00	Design
C5	-48.21	-29.67	0.00	0.00	0.00	0.00	Design
C6	-42.76	-26.32	0.00	0.00	0.00	0.00	Design
C7	-48.87	-30.08	0.00	0.00	0.00	0.00	Design
C8	-54.32	-33.43	0.00	0.00	0.00	0.00	Design
C9	-47.98	-29.53	0.00	0.00	0.00	0.00	Design
C10	-42.55	-26.19	0.00	0.00	0.00	0.00	Design
C11	-48.63	-29.93	0.00	0.00	0.00	0.00	Design
C12	-54.05	-33.27	0.00	0.00	0.00	0.00	Design
C13	-29.39	-18.09	0.00	0.00	0.00	0.00	Design
C14	-25.43	-15.65	0.00	0.00	0.00	0.00	Design
C15	-29.83	-18.36	0.00	0.00	0.00	0.00	Design
C16	-33.79	-20.80	0.00	0.00	0.00	0.00	Design
C17	-20.60	-12.68	0.00	0.00	0.00	0.00	Design
C18	-17.34	-10.67	0.00	0.00	0.00	0.00	Design
C19	-20.94	-12.89	0.00	0.00	0.00	0.00	Design
C20	-24.20	-14.90	0.00	0.00	0.00	0.00	Design

C21	-19.59	-12.06	0.00	0.00	0.00	0.00	Design
C22	58.48	35.99	0.00	0.00	0.00	0.00	Design
C23	-9.22	-5.67	0.00	0.00	0.00	0.00	Design
C24	-30.47	-18.76	0.00	0.00	0.00	0.00	Design
C25	3.92	2.41	0.00	0.00	0.00	0.00	Design
C26	75.12	46.23	0.00	0.00	0.00	0.00	Design
C33	-20.36	-12.53	0.00	0.00	0.00	0.00	Design
C34	2.50	1.54	0.00	0.00	0.00	0.00	Design
C35	-17.17	-10.57	0.00	0.00	0.00	0.00	Design
C36	-23.67	-14.57	0.00	0.00	0.00	0.00	Design
C37	-13.45	-8.28	0.00	0.00	0.00	0.00	Design
C38	8.52	5.25	0.00	0.00	0.00	0.00	Design
C45	-21.95	-13.51	0.00	0.00	0.00	0.00	Design
C46	-100.02	-61.56	0.00	0.00	0.00	0.00	Design
C47	-32.33	-19.90	0.00	0.00	0.00	0.00	Design
C48	-11.07	-6.81	0.00	0.00	0.00	0.00	Design
C49	-45.47	-27.98	0.00	0.00	0.00	0.00	Design
C50	-116.67	-71.80	0.00	0.00	0.00	0.00	Design
C57	-21.19	-13.04	0.00	0.00	0.00	0.00	Design
C58	-44.05	-27.11	0.00	0.00	0.00	0.00	Design
C59	-24.38	-15.00	0.00	0.00	0.00	0.00	Design
C60	-17.88	-11.00	0.00	0.00	0.00	0.00	Design
C61	-28.10	-17.29	0.00	0.00	0.00	0.00	Design
C62	-50.07	-30.82	0.00	0.00	0.00	0.00	Design
C69	-26.85	-16.53	0.00	0.00	0.00	0.00	Design
C70	126.67	77.96	0.00	0.00	0.00	0.00	Design
C71	-6.10	-3.76	0.00	0.00	0.00	0.00	Design
C72	-48.62	-29.92	0.00	0.00	0.00	0.00	Design
C73	17.56	10.81	0.00	0.00	0.00	0.00	Design
C74	159.96	98.45	0.00	0.00	0.00	0.00	Design
C81	-28.38	-17.47	0.00	0.00	0.00	0.00	Design
C82	14.71	9.06	0.00	0.00	0.00	0.00	Design
C83	-22.01	-13.55	0.00	0.00	0.00	0.00	Design
C84	-35.00	-21.54	0.00	0.00	0.00	0.00	Design
C85	-17.18	-10.57	0.00	0.00	0.00	0.00	Design
C86	26.77	16.47	0.00	0.00	0.00	0.00	Design
C93	-31.33	-19.28	0.00	0.00	0.00	0.00	Design
C94	-184.86	-113.77	0.00	0.00	0.00	0.00	Design
C95	-52.08	-32.06	0.00	0.00	0.00	0.00	Design
C96	-9.57	-5.89	0.00	0.00	0.00	0.00	Design
C97	-75.75	-46.62	0.00	0.00	0.00	0.00	Design
C98	-218.14	-134.26	0.00	0.00	0.00	0.00	Design
C105	-29.80	-18.34	0.00	0.00	0.00	0.00	Design
C106	-72.90	-44.87	0.00	0.00	0.00	0.00	Design
C107	-36.18	-22.26	0.00	0.00	0.00	0.00	Design
C108	-23.18	-14.27	0.00	0.00	0.00	0.00	Design
C109	-41.01	-25.24	0.00	0.00	0.00	0.00	Design
C110	-84.95	-52.28	0.00	0.00	0.00	0.00	Design
C117	-26.62	-16.38	0.00	0.00	0.00	0.00	Design
C118	126.88	78.09	0.00	0.00	0.00	0.00	Design
C119	-5.87	-3.61	0.00	0.00	0.00	0.00	Design
C120	-48.38	-29.78	0.00	0.00	0.00	0.00	Design
C121	17.77	10.94	0.00	0.00	0.00	0.00	Design
C122	160.17	98.58	0.00	0.00	0.00	0.00	Design
C129	-28.15	-17.32	0.00	0.00	0.00	0.00	Design
C130	14.92	9.18	0.00	0.00	0.00	0.00	Design
C131	-21.78	-13.40	0.00	0.00	0.00	0.00	Design
C132	-34.77	-21.40	0.00	0.00	0.00	0.00	Design
C133	-16.97	-10.44	0.00	0.00	0.00	0.00	Design
C134	26.98	16.60	0.00	0.00	0.00	0.00	Design
C141	-31.09	-19.14	0.00	0.00	0.00	0.00	Design
C142	-184.59	-113.61	0.00	0.00	0.00	0.00	Design
C143	-51.85	-31.91	0.00	0.00	0.00	0.00	Design
C144	-9.33	-5.74	0.00	0.00	0.00	0.00	Design
C145	-75.49	-46.46	0.00	0.00	0.00	0.00	Design
C146	-217.88	-134.10	0.00	0.00	0.00	0.00	Design

C153	-29.57	-18.20	0.00	0.00	0.00	0.00	Design
C154	-72.64	-44.70	0.00	0.00	0.00	0.00	Design
C155	-35.94	-22.12	0.00	0.00	0.00	0.00	Design
C156	-22.95	-14.12	0.00	0.00	0.00	0.00	Design
C157	-40.74	-25.08	0.00	0.00	0.00	0.00	Design
C158	-84.69	-52.12	0.00	0.00	0.00	0.00	Design
C165	-18.07	-11.12	0.00	0.00	0.00	0.00	Design
C166	134.76	82.94	0.00	0.00	0.00	0.00	Design
C167	2.69	1.65	0.00	0.00	0.00	0.00	Design
C168	-39.83	-24.51	0.00	0.00	0.00	0.00	Design
C169	25.65	15.79	0.00	0.00	0.00	0.00	Design
C170	168.05	103.43	0.00	0.00	0.00	0.00	Design
C177	-19.59	-12.06	0.00	0.00	0.00	0.00	Design
C178	22.80	14.03	0.00	0.00	0.00	0.00	Design
C179	-13.22	-8.14	0.00	0.00	0.00	0.00	Design
C180	-26.21	-16.13	0.00	0.00	0.00	0.00	Design
C181	-9.09	-5.60	0.00	0.00	0.00	0.00	Design
C182	34.85	21.45	0.00	0.00	0.00	0.00	Design
C189	-22.44	-13.81	0.00	0.00	0.00	0.00	Design
C190	-175.27	-107.87	0.00	0.00	0.00	0.00	Design
C191	-43.20	-26.58	0.00	0.00	0.00	0.00	Design
C192	-0.68	-0.42	0.00	0.00	0.00	0.00	Design
C193	-66.16	-40.72	0.00	0.00	0.00	0.00	Design
C194	-208.55	-128.36	0.00	0.00	0.00	0.00	Design
C201	-20.91	-12.87	0.00	0.00	0.00	0.00	Design
C202	-63.31	-38.96	0.00	0.00	0.00	0.00	Design
C203	-27.29	-16.79	0.00	0.00	0.00	0.00	Design
C204	-14.29	-8.80	0.00	0.00	0.00	0.00	Design
C205	-31.42	-19.34	0.00	0.00	0.00	0.00	Design
C206	-75.36	-46.38	0.00	0.00	0.00	0.00	Design
C213	-17.83	-10.97	0.00	0.00	0.00	0.00	Design
C214	134.97	83.07	0.00	0.00	0.00	0.00	Design
C215	2.92	1.80	0.00	0.00	0.00	0.00	Design
C216	-39.59	-24.37	0.00	0.00	0.00	0.00	Design
C217	25.86	15.92	0.00	0.00	0.00	0.00	Design
C218	168.26	103.55	0.00	0.00	0.00	0.00	Design
C225	-19.36	-11.91	0.00	0.00	0.00	0.00	Design
C226	23.01	14.16	0.00	0.00	0.00	0.00	Design
C227	-12.99	-7.99	0.00	0.00	0.00	0.00	Design
C228	-25.98	-15.99	0.00	0.00	0.00	0.00	Design
C229	-8.88	-5.47	0.00	0.00	0.00	0.00	Design
C230	35.06	21.58	0.00	0.00	0.00	0.00	Design
C237	-22.20	-13.67	0.00	0.00	0.00	0.00	Design
C238	-175.00	-107.71	0.00	0.00	0.00	0.00	Design
C239	-42.96	-26.44	0.00	0.00	0.00	0.00	Design
C240	-0.44	-0.27	0.00	0.00	0.00	0.00	Design
C241	-65.90	-40.56	0.00	0.00	0.00	0.00	Design
C242	-208.29	-128.19	0.00	0.00	0.00	0.00	Design
C249	-20.68	-12.72	0.00	0.00	0.00	0.00	Design
C250	-63.05	-38.80	0.00	0.00	0.00	0.00	Design
C251	-27.05	-16.65	0.00	0.00	0.00	0.00	Design
C252	-14.06	-8.65	0.00	0.00	0.00	0.00	Design
C253	-31.15	-19.17	0.00	0.00	0.00	0.00	Design
C254	-75.10	-46.22	0.00	0.00	0.00	0.00	Design
C261	-12.87	-7.92	0.00	0.00	0.00	0.00	Design
C262	139.14	85.63	0.00	0.00	0.00	0.00	Design
C263	7.89	4.85	0.00	0.00	0.00	0.00	Design
C264	-34.63	-21.31	0.00	0.00	0.00	0.00	Design
C265	30.03	18.48	0.00	0.00	0.00	0.00	Design
C266	172.42	106.12	0.00	0.00	0.00	0.00	Design
C273	-14.40	-8.86	0.00	0.00	0.00	0.00	Design
C274	27.18	16.73	0.00	0.00	0.00	0.00	Design
C275	-8.02	-4.94	0.00	0.00	0.00	0.00	Design
C276	-21.01	-12.93	0.00	0.00	0.00	0.00	Design
C277	-4.71	-2.90	0.00	0.00	0.00	0.00	Design
C278	39.23	24.15	0.00	0.00	0.00	0.00	Design

C285	-17.16	-10.56	0.00	0.00	0.00	0.00	Design
C286	-169.16	-104.11	0.00	0.00	0.00	0.00	Design
C287	-37.91	-23.33	0.00	0.00	0.00	0.00	Design
C288	4.61	2.83	0.00	0.00	0.00	0.00	Design
C289	-60.05	-36.96	0.00	0.00	0.00	0.00	Design
C290	-202.45	-124.60	0.00	0.00	0.00	0.00	Design
C297	-15.63	-9.62	0.00	0.00	0.00	0.00	Design
C298	-57.21	-35.21	0.00	0.00	0.00	0.00	Design
C299	-22.00	-13.54	0.00	0.00	0.00	0.00	Design
C300	-9.01	-5.55	0.00	0.00	0.00	0.00	Design
C301	-25.31	-15.58	0.00	0.00	0.00	0.00	Design
C302	-69.26	-42.63	0.00	0.00	0.00	0.00	Design
C309	-21.10	-12.99	0.00	0.00	0.00	0.00	Design
C310	-33.38	-20.55	0.00	0.00	0.00	0.00	Design
C311	40.61	25.00	0.00	0.00	0.00	0.00	Design
C312	78.98	48.61	0.00	0.00	0.00	0.00	Design
C313	-38.77	-23.86	0.00	0.00	0.00	0.00	Design
C314	-26.49	-16.30	0.00	0.00	0.00	0.00	Design
C315	-100.49	-61.85	0.00	0.00	0.00	0.00	Design
C316	-138.86	-85.46	0.00	0.00	0.00	0.00	Design
C317	-12.31	-7.58	0.00	0.00	0.00	0.00	Design
C318	-24.59	-15.14	0.00	0.00	0.00	0.00	Design
C319	48.70	29.97	0.00	0.00	0.00	0.00	Design
C320	87.07	53.59	0.00	0.00	0.00	0.00	Design
C321	-29.88	-18.39	0.00	0.00	0.00	0.00	Design
C322	-17.60	-10.83	0.00	0.00	0.00	0.00	Design
C323	-90.90	-55.94	0.00	0.00	0.00	0.00	Design
C324	-129.27	-79.56	0.00	0.00	0.00	0.00	Design
C325	-5.21	-3.20	0.00	0.00	0.00	0.00	Design
C326	-17.49	-10.76	0.00	0.00	0.00	0.00	Design
C327	54.67	33.65	0.00	0.00	0.00	0.00	Design
C328	93.04	57.26	0.00	0.00	0.00	0.00	Design
C329	-22.66	-13.94	0.00	0.00	0.00	0.00	Design
C330	-10.38	-6.39	0.00	0.00	0.00	0.00	Design
C331	-82.53	-50.80	0.00	0.00	0.00	0.00	Design
C332	-120.91	-74.41	0.00	0.00	0.00	0.00	Design

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Gusset						
Beam yielding (normal stress)	[Kip]	588.45	134.26	C98	0.23	Eq. B-1, Appendix B, DG29, Eq. J4-1
Shear yielding	[Kip]	392.30	218.14	C98	0.56	Eq. J4-3
Gusset edge tension stress	[Kip/in2]	32.40	7.39	C98	0.23	J4-1
Gusset edge shear stress	[Kip/in2]	21.60	12.01	C98	0.56	J4-1
Weld capacity	[Kip]	385.03	320.18	C98	0.83	Tables 8-4 .. 8-11
Beam						
Weld block shear	[Kip]	636.63	218.14	C98	0.34	Eq. J4-5
Web crippling	[Kip]	736.25	134.26	C98	0.18	Eq. J10-4, Eq. B-1, Appendix B, DG29
Local web yielding	[Kip]	794.08	134.26	C98	0.17	Eq. J10-3, Eq. B-1, Appendix B, DG29
Ratio	0.83					

Upper left gusset interface - column
Angles

DEMANDS	Description	Ru [Kip]	Pu [Kip]	Load type
	C1	-18.17	-12.87	Design
	C2	-15.26	-10.80	Design
	C3	-18.47	-13.08	Design
	C4	-21.39	-15.14	Design
	C5	-37.82	-26.78	Design
	C6	-33.55	-23.76	Design
	C7	-38.34	-27.15	Design
	C8	-42.61	-30.18	Design
	C9	-37.64	-26.65	Design
	C10	-33.39	-23.64	Design
	C11	-38.15	-27.02	Design
	C12	-42.41	-30.03	Design
	C13	-23.06	-16.33	Design
	C14	-19.95	-14.13	Design
	C15	-23.41	-16.57	Design
	C16	-26.51	-18.78	Design
	C17	-16.16	-11.45	Design
	C18	-13.61	-9.64	Design
	C19	-16.43	-11.64	Design
	C20	-18.99	-13.45	Design
	C21	-15.37	-10.89	Design
	C22	45.88	32.49	Design
	C23	-7.23	-5.12	Design
	C24	-23.91	-16.93	Design
	C25	3.08	2.18	Design
	C26	58.94	41.74	Design
	C33	-15.97	-11.31	Design
	C34	1.96	1.39	Design
	C35	-13.47	-9.54	Design
	C36	-18.57	-13.15	Design
	C37	-10.55	-7.47	Design
	C38	6.69	4.74	Design
	C45	-17.22	-12.20	Design
	C46	-78.47	-55.57	Design
	C47	-25.37	-17.96	Design
	C48	-8.69	-6.15	Design
	C49	-35.67	-25.26	Design
	C50	-91.53	-64.82	Design
	C57	-16.62	-11.77	Design
	C58	-34.56	-24.47	Design
	C59	-19.12	-13.54	Design
	C60	-14.03	-9.93	Design
	C61	-22.05	-15.61	Design
	C62	-39.28	-27.82	Design
	C69	-21.07	-14.92	Design
	C70	99.38	70.37	Design
	C71	-4.79	-3.39	Design
	C72	-38.14	-27.01	Design
	C73	13.78	9.76	Design
	C74	125.50	88.87	Design
	C81	-22.27	-15.77	Design
	C82	11.54	8.17	Design
	C83	-17.27	-12.23	Design
	C84	-27.46	-19.45	Design
	C85	-13.48	-9.54	Design
	C86	21.00	14.87	Design
	C93	-24.58	-17.41	Design
	C94	-145.03	-102.70	Design
	C95	-40.86	-28.94	Design
	C96	-7.51	-5.32	Design

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C97	-59.43	-42.08	Design
C98	-171.15	-121.19	Design
C105	-23.38	-16.56	Design
C106	-57.19	-40.50	Design
C107	-28.38	-20.10	Design
C108	-18.19	-12.88	Design
C109	-32.17	-22.78	Design
C110	-66.65	-47.20	Design
C117	-20.88	-14.79	Design
C118	99.54	70.49	Design
C119	-4.60	-3.26	Design
C120	-37.96	-26.88	Design
C121	13.94	9.87	Design
C122	125.66	88.98	Design
C129	-22.08	-15.64	Design
C130	11.71	8.29	Design
C131	-17.08	-12.10	Design
C132	-27.28	-19.32	Design
C133	-13.31	-9.43	Design
C134	21.16	14.99	Design
C141	-24.40	-17.28	Design
C142	-144.82	-102.55	Design
C143	-40.68	-28.80	Design
C144	-7.32	-5.18	Design
C145	-59.22	-41.94	Design
C146	-170.94	-121.05	Design
C153	-23.20	-16.43	Design
C154	-56.99	-40.36	Design
C155	-28.20	-19.97	Design
C156	-18.00	-12.75	Design
C157	-31.97	-22.64	Design
C158	-66.44	-47.05	Design
C165	-14.17	-10.04	Design
C166	105.73	74.87	Design
C167	2.11	1.49	Design
C168	-31.25	-22.13	Design
C169	20.12	14.25	Design
C170	131.84	93.36	Design
C177	-15.37	-10.89	Design
C178	17.89	12.67	Design
C179	-10.37	-7.35	Design
C180	-20.57	-14.56	Design
C181	-7.13	-5.05	Design
C182	27.35	19.36	Design
C189	-17.61	-12.47	Design
C190	-137.51	-97.37	Design
C191	-33.89	-24.00	Design
C192	-0.53	-0.38	Design
C193	-51.90	-36.76	Design
C194	-163.62	-115.87	Design
C201	-16.41	-11.62	Design
C202	-49.67	-35.17	Design
C203	-21.41	-15.16	Design
C204	-11.22	-7.94	Design
C205	-24.65	-17.45	Design
C206	-59.13	-41.87	Design
C213	-13.99	-9.91	Design
C214	105.89	74.98	Design
C215	2.29	1.62	Design
C216	-31.06	-22.00	Design
C217	20.29	14.37	Design
C218	132.01	93.48	Design
C225	-15.19	-10.76	Design
C226	18.05	12.79	Design
C227	-10.19	-7.22	Design
C228	-20.38	-14.43	Design

C229	-6.97	-4.93	Design
C230	27.51	19.48	Design
C237	-17.42	-12.34	Design
C238	-137.30	-97.23	Design
C239	-33.70	-23.87	Design
C240	-0.35	-0.24	Design
C241	-51.70	-36.61	Design
C242	-163.42	-115.72	Design
C249	-16.22	-11.49	Design
C250	-49.46	-35.03	Design
C251	-21.22	-15.03	Design
C252	-11.03	-7.81	Design
C253	-24.44	-17.31	Design
C254	-58.92	-41.72	Design
C261	-10.10	-7.15	Design
C262	109.16	77.30	Design
C263	6.19	4.38	Design
C264	-27.17	-19.24	Design
C265	23.56	16.68	Design
C266	135.28	95.79	Design
C273	-11.29	-8.00	Design
C274	21.32	15.10	Design
C275	-6.30	-4.46	Design
C276	-16.49	-11.68	Design
C277	-3.70	-2.62	Design
C278	30.78	21.80	Design
C285	-13.46	-9.53	Design
C286	-132.72	-93.98	Design
C287	-29.74	-21.06	Design
C288	3.61	2.56	Design
C289	-47.12	-33.36	Design
C290	-158.83	-112.48	Design
C297	-12.26	-8.68	Design
C298	-44.88	-31.78	Design
C299	-17.26	-12.22	Design
C300	-7.07	-5.01	Design
C301	-19.86	-14.06	Design
C302	-54.34	-38.48	Design
C309	-16.56	-11.72	Design
C310	-26.19	-18.55	Design
C311	31.86	22.56	Design
C312	61.97	43.88	Design
C313	-30.42	-21.54	Design
C314	-20.78	-14.72	Design
C315	-78.84	-55.83	Design
C316	-108.94	-77.15	Design
C317	-9.66	-6.84	Design
C318	-19.30	-13.66	Design
C319	38.21	27.06	Design
C320	68.31	48.38	Design
C321	-23.45	-16.60	Design
C322	-13.81	-9.78	Design
C323	-71.31	-50.50	Design
C324	-101.42	-71.82	Design
C325	-4.08	-2.89	Design
C326	-13.72	-9.72	Design
C327	42.89	30.37	Design
C328	73.00	51.69	Design
C329	-17.78	-12.59	Design
C330	-8.14	-5.77	Design
C331	-64.75	-45.85	Design
C332	-94.86	-67.17	Design

GEOMETRIC CONSIDERATIONS

Dimensions	Unit	Value	Min. value	Max. value	Sta.	References
<u>Angle (Gusset side)</u>						
Weld size	[1/16in]	5	4	8	✓	table J2.4, Sec. J2.2b
<u>Angle (Column side)</u>						
Vertical edge distance	[in]	1.50	1.13	--	✓	Tables J3.4, J3.5
Horizontal edge distance	[in]	3.31	1.13	--	✓	Tables J3.4, J3.5
Vertical center-to-center spacing (pitch)	[in]	3.00	2.33	12.00	✓	Sec. J3.3, Sec. J3.5
<u>Column</u>						
Horizontal edge distance	[in]	5.05	1.13	--	✓	Tables J3.4, J3.5

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Angle (Gusset side)</u>						
Weld capacity	[Kip]	356.37	209.71	C98	0.59	Tables 8-4 .. 8-11
Shear yielding	[Kip]	364.50	171.15	C98	0.47	Eq. J4-3
Leg tensile yielding	[Kip]	546.75	95.79	C266	0.18	Eq. J4-1
<u>Angle (Column side)</u>						
Bolts shear	[Kip]	243.40	171.15	C98	0.70	Tables (7-1..14)
Bolt bearing under shear load	[Kip]	471.64	171.15	C98	0.36	p. 7-18, Sec. J3.10
Shear yielding	[Kip]	364.50	171.15	C98	0.47	Eq. J4-3
Shear rupture	[Kip]	293.63	171.15	C98	0.58	Eq. J4-4
Block shear	[Kip]	383.67	171.15	C98	0.45	Eq. J4-5
Resulting tension capacity due prying action	[Kip]	106.18	95.79	C266	0.90	p. 9-11, p. 9-10
<u>Gusset</u>						
Welds rupture	[Kip/ft]	261.00	131.07	C98	0.50	p. 9-5
Shear yielding	[Kip]	318.37	171.15	C98	0.54	Eq. J4-3
Tear out under axial load	[Kip]	519.19	95.79	C266	0.18	Eq. J4-5
<u>Column</u>						
Bolt bearing under shear load	[Kip]	2119.16	171.15	C98	0.08	Eq. J3-6
Web crippling	[Kip]	4753.37	121.19	C98	0.03	Eq. J10-4
Ratio	0.90					

Interface between Gusset - Bottom left brace
Connection: Directly welded

DEMANDS

Pu [Kip]	Description	Load type
-81.06	C1	Design
-89.42	C2	Design
-80.43	C3	Design
-72.07	C4	Design
-165.75	C5	Design
-178.05	C6	Design
-164.63	C7	Design
-152.33	C8	Design
-164.94	C9	Design
-177.19	C10	Design
-163.82	C11	Design
-151.57	C12	Design
-101.91	C13	Design
-110.82	C14	Design
-101.17	C15	Design
-92.26	C16	Design
-72.07	C17	Design

-79.40	C18	Design
-71.52	C19	Design
-64.20	C20	Design
-72.49	C21	Design
-245.72	C22	Design
-96.80	C23	Design
-47.97	C24	Design
-122.15	C25	Design
-286.12	C26	Design
-72.18	C33	Design
-122.92	C34	Design
-79.61	C35	Design
-64.69	C36	Design
-86.74	C37	Design
-137.34	C38	Design
-71.11	C45	Design
102.12	C46	Design
-46.80	C47	Design
-95.63	C48	Design
-21.45	C49	Design
142.53	C50	Design
-71.42	C57	Design
-20.67	C58	Design
-63.98	C59	Design
-78.91	C60	Design
-56.86	C61	Design
-6.25	C62	Design
-100.95	C69	Design
-441.56	C70	Design
-149.57	C71	Design
-51.92	C72	Design
-194.43	C73	Design
-522.38	C74	Design
-100.33	C81	Design
-195.98	C82	Design
-115.20	C83	Design
-85.35	C84	Design
-123.61	C85	Design
-224.82	C86	Design
-98.57	C93	Design
242.04	C94	Design
-49.95	C95	Design
-147.61	C96	Design
-5.09	C97	Design
322.85	C98	Design
-99.20	C105	Design
-3.55	C106	Design
-84.32	C107	Design
-114.18	C108	Design
-75.91	C109	Design
25.29	C110	Design
-100.14	C117	Design
-440.70	C118	Design
-148.76	C119	Design
-51.11	C120	Design
-193.57	C121	Design
-521.52	C122	Design
-99.52	C129	Design
-195.12	C130	Design
-114.39	C131	Design
-84.54	C132	Design
-122.75	C133	Design
-223.96	C134	Design
-97.77	C141	Design
242.80	C142	Design
-49.14	C143	Design

-146.80	C144	Design
-4.33	C145	Design
323.61	C146	Design
-98.39	C153	Design
-2.79	C154	Design
-83.51	C155	Design
-113.37	C156	Design
-75.16	C157	Design
26.05	C158	Design
-71.12	C165	Design
-410.14	C166	Design
-119.74	C167	Design
-22.08	C168	Design
-163.01	C169	Design
-490.96	C170	Design
-70.49	C177	Design
-164.56	C178	Design
-85.37	C179	Design
-55.52	C180	Design
-92.19	C181	Design
-193.40	C182	Design
-68.92	C189	Design
270.10	C190	Design
-20.30	C191	Design
-117.96	C192	Design
22.97	C193	Design
350.92	C194	Design
-69.55	C201	Design
24.52	C202	Design
-54.67	C203	Design
-84.52	C204	Design
-47.85	C205	Design
53.36	C206	Design
-70.31	C213	Design
-409.28	C214	Design
-118.93	C215	Design
-21.27	C216	Design
-162.15	C217	Design
-490.10	C218	Design
-69.68	C225	Design
-163.70	C226	Design
-84.56	C227	Design
-54.71	C228	Design
-91.33	C229	Design
-192.54	C230	Design
-68.11	C237	Design
270.86	C238	Design
-19.49	C239	Design
-117.15	C240	Design
23.73	C241	Design
351.67	C242	Design
-68.74	C249	Design
25.27	C250	Design
-53.86	C251	Design
-83.72	C252	Design
-47.09	C253	Design
54.11	C254	Design
-52.94	C261	Design
-390.12	C262	Design
-101.56	C263	Design
-3.90	C264	Design
-142.99	C265	Design
-470.93	C266	Design
-52.31	C273	Design
-144.53	C274	Design
-67.19	C275	Design

-37.34	C276	Design
-72.17	C277	Design
-173.38	C278	Design
-50.88	C285	Design
286.30	C286	Design
-2.26	C287	Design
-99.91	C288	Design
39.17	C289	Design
367.12	C290	Design
-51.50	C297	Design
40.72	C298	Design
-36.63	C299	Design
-66.48	C300	Design
-31.65	C301	Design
69.56	C302	Design
-119.70	C309	Design
-93.66	C310	Design
-246.27	C311	Design
-328.34	C312	Design
-85.68	C313	Design
-111.72	C314	Design
40.89	C315	Design
122.96	C316	Design
-89.87	C317	Design
-63.83	C318	Design
-214.85	C319	Design
-296.92	C320	Design
-56.03	C321	Design
-82.07	C322	Design
68.95	C323	Design
151.02	C324	Design
-65.00	C325	Design
-38.95	C326	Design
-187.41	C327	Design
-269.48	C328	Design
-31.35	C329	Design
-57.39	C330	Design
91.06	C331	Design
173.14	C332	Design

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Brace - Directly welded Connection</u>						
Total weld design strength	[Kip]	584.69	522.38	C74	0.89	Eq. J2-4, Eq. J2-6
Maximum weld force that brace can develop	[Kip]	612.49	522.38	C74	0.85	Eq. J4-4
<u>Gusset</u>						
Maximum weld force that gusset can develop	[Kip]	587.25	522.38	C74	0.89	Eq. J4-4
Block shear on gusset	[Kip]	780.30	367.12	C290	0.47	Eq. J4-5
Ratio	0.89					

Checks for gusset and brace

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Brace</u>						
Yielding strength due to axial load	[Kip]	720.00	367.12	C290	0.51	Eq. J4-1
Tension rupture	[Kip]	525.16	367.12	C290	0.70	Eq. J4-2
<u>Gusset</u>						
Tension yielding on the Whitmore section	[Kip]	707.76	367.12	C290	0.52	Eq. J4-1
Buckling on the Whitmore section	[Kip]	703.86	522.38	C74	0.74	Eq. E3-1
Ratio	0.74					

Lower left gusset interface - beam
Directly welded

DEMANDS

Description	Beam			Column			Load type
	Ru [Kip]	Pu [Kip]	Mu [Kip*ft]	Pu [Kip]	Mu22 [Kip*ft]	Mu33 [Kip*ft]	
C1	-39.22	-23.30	0.00	0.00	0.00	0.00	Design
C2	-43.27	-25.70	0.00	0.00	0.00	0.00	Design
C3	-38.92	-23.12	0.00	0.00	0.00	0.00	Design
C4	-34.87	-20.71	0.00	0.00	0.00	0.00	Design
C5	-80.20	-47.64	0.00	0.00	0.00	0.00	Design
C6	-86.15	-51.18	0.00	0.00	0.00	0.00	Design
C7	-79.65	-47.32	0.00	0.00	0.00	0.00	Design
C8	-73.70	-43.78	0.00	0.00	0.00	0.00	Design
C9	-79.81	-47.41	0.00	0.00	0.00	0.00	Design
C10	-85.73	-50.93	0.00	0.00	0.00	0.00	Design
C11	-79.26	-47.09	0.00	0.00	0.00	0.00	Design
C12	-73.34	-43.57	0.00	0.00	0.00	0.00	Design
C13	-49.31	-29.29	0.00	0.00	0.00	0.00	Design
C14	-53.62	-31.85	0.00	0.00	0.00	0.00	Design
C15	-48.95	-29.08	0.00	0.00	0.00	0.00	Design
C16	-44.64	-26.52	0.00	0.00	0.00	0.00	Design
C17	-34.87	-20.72	0.00	0.00	0.00	0.00	Design
C18	-38.42	-22.82	0.00	0.00	0.00	0.00	Design
C19	-34.61	-20.56	0.00	0.00	0.00	0.00	Design
C20	-31.06	-18.45	0.00	0.00	0.00	0.00	Design
C21	-35.07	-20.83	0.00	0.00	0.00	0.00	Design
C22	-118.89	-70.62	0.00	0.00	0.00	0.00	Design
C23	-46.84	-27.82	0.00	0.00	0.00	0.00	Design
C24	-23.21	-13.79	0.00	0.00	0.00	0.00	Design
C25	-59.10	-35.11	0.00	0.00	0.00	0.00	Design
C26	-138.44	-82.24	0.00	0.00	0.00	0.00	Design
C33	-34.92	-20.74	0.00	0.00	0.00	0.00	Design
C34	-59.48	-35.33	0.00	0.00	0.00	0.00	Design
C35	-38.52	-22.88	0.00	0.00	0.00	0.00	Design
C36	-31.30	-18.59	0.00	0.00	0.00	0.00	Design
C37	-41.97	-24.93	0.00	0.00	0.00	0.00	Design
C38	-66.45	-39.48	0.00	0.00	0.00	0.00	Design
C45	-34.40	-20.44	0.00	0.00	0.00	0.00	Design
C46	49.41	29.35	0.00	0.00	0.00	0.00	Design
C47	-22.64	-13.45	0.00	0.00	0.00	0.00	Design
C48	-46.27	-27.48	0.00	0.00	0.00	0.00	Design
C49	-10.38	-6.16	0.00	0.00	0.00	0.00	Design
C50	68.96	40.97	0.00	0.00	0.00	0.00	Design
C57	-34.56	-20.53	0.00	0.00	0.00	0.00	Design
C58	-10.00	-5.94	0.00	0.00	0.00	0.00	Design
C59	-30.96	-18.39	0.00	0.00	0.00	0.00	Design
C60	-38.18	-22.68	0.00	0.00	0.00	0.00	Design
C61	-27.51	-16.34	0.00	0.00	0.00	0.00	Design
C62	-3.03	-1.80	0.00	0.00	0.00	0.00	Design
C69	-48.84	-29.02	0.00	0.00	0.00	0.00	Design
C70	-213.65	-126.91	0.00	0.00	0.00	0.00	Design
C71	-72.37	-42.99	0.00	0.00	0.00	0.00	Design
C72	-25.12	-14.92	0.00	0.00	0.00	0.00	Design
C73	-94.07	-55.88	0.00	0.00	0.00	0.00	Design
C74	-252.75	-150.14	0.00	0.00	0.00	0.00	Design
C81	-48.54	-28.84	0.00	0.00	0.00	0.00	Design
C82	-94.82	-56.33	0.00	0.00	0.00	0.00	Design
C83	-55.74	-33.11	0.00	0.00	0.00	0.00	Design
C84	-41.29	-24.53	0.00	0.00	0.00	0.00	Design
C85	-59.81	-35.53	0.00	0.00	0.00	0.00	Design

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C86	-108.78	-64.62	0.00	0.00	0.00	0.00	Design
C93	-47.69	-28.33	0.00	0.00	0.00	0.00	Design
C94	117.11	69.57	0.00	0.00	0.00	0.00	Design
C95	-24.17	-14.36	0.00	0.00	0.00	0.00	Design
C96	-71.42	-42.43	0.00	0.00	0.00	0.00	Design
C97	-2.46	-1.46	0.00	0.00	0.00	0.00	Design
C98	156.21	92.79	0.00	0.00	0.00	0.00	Design
C105	-48.00	-28.51	0.00	0.00	0.00	0.00	Design
C106	-1.72	-1.02	0.00	0.00	0.00	0.00	Design
C107	-40.80	-24.24	0.00	0.00	0.00	0.00	Design
C108	-55.24	-32.82	0.00	0.00	0.00	0.00	Design
C109	-36.73	-21.82	0.00	0.00	0.00	0.00	Design
C110	12.24	7.27	0.00	0.00	0.00	0.00	Design
C117	-48.45	-28.78	0.00	0.00	0.00	0.00	Design
C118	-213.23	-126.67	0.00	0.00	0.00	0.00	Design
C119	-71.98	-42.76	0.00	0.00	0.00	0.00	Design
C120	-24.73	-14.69	0.00	0.00	0.00	0.00	Design
C121	-93.66	-55.64	0.00	0.00	0.00	0.00	Design
C122	-252.33	-149.89	0.00	0.00	0.00	0.00	Design
C129	-48.15	-28.60	0.00	0.00	0.00	0.00	Design
C130	-94.41	-56.08	0.00	0.00	0.00	0.00	Design
C131	-55.35	-32.88	0.00	0.00	0.00	0.00	Design
C132	-40.90	-24.30	0.00	0.00	0.00	0.00	Design
C133	-59.39	-35.28	0.00	0.00	0.00	0.00	Design
C134	-108.36	-64.37	0.00	0.00	0.00	0.00	Design
C141	-47.30	-28.10	0.00	0.00	0.00	0.00	Design
C142	117.47	69.78	0.00	0.00	0.00	0.00	Design
C143	-23.78	-14.12	0.00	0.00	0.00	0.00	Design
C144	-71.03	-42.19	0.00	0.00	0.00	0.00	Design
C145	-2.10	-1.25	0.00	0.00	0.00	0.00	Design
C146	156.57	93.01	0.00	0.00	0.00	0.00	Design
C153	-47.61	-28.28	0.00	0.00	0.00	0.00	Design
C154	-1.35	-0.80	0.00	0.00	0.00	0.00	Design
C155	-40.41	-24.00	0.00	0.00	0.00	0.00	Design
C156	-54.85	-32.58	0.00	0.00	0.00	0.00	Design
C157	-36.36	-21.60	0.00	0.00	0.00	0.00	Design
C158	12.60	7.49	0.00	0.00	0.00	0.00	Design
C165	-34.41	-20.44	0.00	0.00	0.00	0.00	Design
C166	-198.44	-117.88	0.00	0.00	0.00	0.00	Design
C167	-57.94	-34.42	0.00	0.00	0.00	0.00	Design
C168	-10.69	-6.35	0.00	0.00	0.00	0.00	Design
C169	-78.87	-46.85	0.00	0.00	0.00	0.00	Design
C170	-237.54	-141.11	0.00	0.00	0.00	0.00	Design
C177	-34.11	-20.26	0.00	0.00	0.00	0.00	Design
C178	-79.62	-47.30	0.00	0.00	0.00	0.00	Design
C179	-41.31	-24.54	0.00	0.00	0.00	0.00	Design
C180	-26.86	-15.96	0.00	0.00	0.00	0.00	Design
C181	-44.61	-26.50	0.00	0.00	0.00	0.00	Design
C182	-93.57	-55.59	0.00	0.00	0.00	0.00	Design
C189	-33.35	-19.81	0.00	0.00	0.00	0.00	Design
C190	130.69	77.63	0.00	0.00	0.00	0.00	Design
C191	-9.82	-5.83	0.00	0.00	0.00	0.00	Design
C192	-57.07	-33.90	0.00	0.00	0.00	0.00	Design
C193	11.11	6.60	0.00	0.00	0.00	0.00	Design
C194	169.79	100.86	0.00	0.00	0.00	0.00	Design
C201	-33.65	-19.99	0.00	0.00	0.00	0.00	Design
C202	11.86	7.05	0.00	0.00	0.00	0.00	Design
C203	-26.45	-15.71	0.00	0.00	0.00	0.00	Design
C204	-40.90	-24.29	0.00	0.00	0.00	0.00	Design
C205	-23.15	-13.75	0.00	0.00	0.00	0.00	Design
C206	25.82	15.34	0.00	0.00	0.00	0.00	Design
C213	-34.02	-20.21	0.00	0.00	0.00	0.00	Design
C214	-198.03	-117.64	0.00	0.00	0.00	0.00	Design
C215	-57.54	-34.18	0.00	0.00	0.00	0.00	Design
C216	-10.29	-6.11	0.00	0.00	0.00	0.00	Design
C217	-78.46	-46.61	0.00	0.00	0.00	0.00	Design

C218	-237.13	-140.86	0.00	0.00	0.00	0.00	Design
C225	-33.72	-20.03	0.00	0.00	0.00	0.00	Design
C226	-79.20	-47.05	0.00	0.00	0.00	0.00	Design
C227	-40.91	-24.30	0.00	0.00	0.00	0.00	Design
C228	-26.47	-15.72	0.00	0.00	0.00	0.00	Design
C229	-44.19	-26.25	0.00	0.00	0.00	0.00	Design
C230	-93.16	-55.34	0.00	0.00	0.00	0.00	Design
C237	-32.96	-19.58	0.00	0.00	0.00	0.00	Design
C238	131.05	77.85	0.00	0.00	0.00	0.00	Design
C239	-9.43	-5.60	0.00	0.00	0.00	0.00	Design
C240	-56.68	-33.67	0.00	0.00	0.00	0.00	Design
C241	11.48	6.82	0.00	0.00	0.00	0.00	Design
C242	170.15	101.08	0.00	0.00	0.00	0.00	Design
C249	-33.26	-19.76	0.00	0.00	0.00	0.00	Design
C250	12.23	7.26	0.00	0.00	0.00	0.00	Design
C251	-26.06	-15.48	0.00	0.00	0.00	0.00	Design
C252	-40.51	-24.06	0.00	0.00	0.00	0.00	Design
C253	-22.79	-13.54	0.00	0.00	0.00	0.00	Design
C254	26.18	15.55	0.00	0.00	0.00	0.00	Design
C261	-25.61	-15.22	0.00	0.00	0.00	0.00	Design
C262	-188.76	-112.13	0.00	0.00	0.00	0.00	Design
C263	-49.14	-29.19	0.00	0.00	0.00	0.00	Design
C264	-1.89	-1.12	0.00	0.00	0.00	0.00	Design
C265	-69.18	-41.10	0.00	0.00	0.00	0.00	Design
C266	-227.86	-135.36	0.00	0.00	0.00	0.00	Design
C273	-25.31	-15.04	0.00	0.00	0.00	0.00	Design
C274	-69.93	-41.54	0.00	0.00	0.00	0.00	Design
C275	-32.51	-19.31	0.00	0.00	0.00	0.00	Design
C276	-18.06	-10.73	0.00	0.00	0.00	0.00	Design
C277	-34.92	-20.74	0.00	0.00	0.00	0.00	Design
C278	-83.89	-49.83	0.00	0.00	0.00	0.00	Design
C285	-24.62	-14.62	0.00	0.00	0.00	0.00	Design
C286	138.52	82.29	0.00	0.00	0.00	0.00	Design
C287	-1.09	-0.65	0.00	0.00	0.00	0.00	Design
C288	-48.34	-28.72	0.00	0.00	0.00	0.00	Design
C289	18.95	11.26	0.00	0.00	0.00	0.00	Design
C290	177.62	105.52	0.00	0.00	0.00	0.00	Design
C297	-24.92	-14.80	0.00	0.00	0.00	0.00	Design
C298	19.70	11.70	0.00	0.00	0.00	0.00	Design
C299	-17.72	-10.53	0.00	0.00	0.00	0.00	Design
C300	-32.17	-19.11	0.00	0.00	0.00	0.00	Design
C301	-15.31	-9.10	0.00	0.00	0.00	0.00	Design
C302	33.65	19.99	0.00	0.00	0.00	0.00	Design
C309	-57.92	-34.41	0.00	0.00	0.00	0.00	Design
C310	-45.32	-26.92	0.00	0.00	0.00	0.00	Design
C311	-119.15	-70.78	0.00	0.00	0.00	0.00	Design
C312	-158.87	-94.37	0.00	0.00	0.00	0.00	Design
C313	-41.45	-24.63	0.00	0.00	0.00	0.00	Design
C314	-54.06	-32.11	0.00	0.00	0.00	0.00	Design
C315	19.78	11.75	0.00	0.00	0.00	0.00	Design
C316	59.49	35.34	0.00	0.00	0.00	0.00	Design
C317	-43.48	-25.83	0.00	0.00	0.00	0.00	Design
C318	-30.88	-18.35	0.00	0.00	0.00	0.00	Design
C319	-103.95	-61.75	0.00	0.00	0.00	0.00	Design
C320	-143.66	-85.34	0.00	0.00	0.00	0.00	Design
C321	-27.11	-16.10	0.00	0.00	0.00	0.00	Design
C322	-39.71	-23.59	0.00	0.00	0.00	0.00	Design
C323	33.36	19.82	0.00	0.00	0.00	0.00	Design
C324	73.07	43.41	0.00	0.00	0.00	0.00	Design
C325	-31.45	-18.68	0.00	0.00	0.00	0.00	Design
C326	-18.85	-11.20	0.00	0.00	0.00	0.00	Design
C327	-90.68	-53.86	0.00	0.00	0.00	0.00	Design
C328	-130.39	-77.45	0.00	0.00	0.00	0.00	Design
C329	-15.17	-9.01	0.00	0.00	0.00	0.00	Design
C330	-27.77	-16.50	0.00	0.00	0.00	0.00	Design
C331	44.06	26.17	0.00	0.00	0.00	0.00	Design

C332	83.77	49.76	0.00	0.00	0.00	0.00	Design
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DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Gusset</u>						
Beam yielding (normal stress)	[Kip]	683.87	150.14	C74	0.22	Eq. B-1, Appendix B, DG29, Eq. J4-1
Shear yielding	[Kip]	455.91	252.75	C74	0.55	Eq. J4-3
Gusset edge tension stress	[Kip/in2]	32.40	7.11	C74	0.22	J4-1
Gusset edge shear stress	[Kip/in2]	21.60	11.97	C74	0.55	J4-1
Weld capacity	[Kip]	463.28	367.47	C74	0.79	Tables 8-4 .. 8-11
<u>Beam</u>						
Weld block shear	[Kip]	626.42	252.75	C74	0.40	Eq. J4-5
Web crippling	[Kip]	720.18	150.14	C74	0.21	Eq. J10-4, Eq. B-1, Appendix B, DG29
Local web yielding	[Kip]	771.40	150.14	C74	0.19	Eq. J10-3, Eq. B-1, Appendix B, DG29
<hr/>						
Ratio	0.79					

Lower left gusset interface - column Angles

DEMANDS

Description	Ru [Kip]	Pu [Kip]	Load type
C1	-30.93	-21.03	Design
C2	-34.12	-23.20	Design
C3	-30.69	-20.87	Design
C4	-27.50	-18.70	Design
C5	-63.24	-43.01	Design
C6	-67.94	-46.20	Design
C7	-62.81	-42.71	Design
C8	-58.12	-39.52	Design
C9	-62.93	-42.80	Design
C10	-67.61	-45.97	Design
C11	-62.51	-42.51	Design
C12	-57.83	-39.33	Design
C13	-38.88	-26.44	Design
C14	-42.28	-28.75	Design
C15	-38.60	-26.25	Design
C16	-35.20	-23.94	Design
C17	-27.50	-18.70	Design
C18	-30.29	-20.60	Design
C19	-27.29	-18.56	Design
C20	-24.49	-16.66	Design
C21	-27.66	-18.81	Design
C22	-93.75	-63.75	Design
C23	-36.93	-25.11	Design
C24	-18.30	-12.45	Design
C25	-46.61	-31.69	Design
C26	-109.17	-74.24	Design
C33	-27.54	-18.73	Design
C34	-46.90	-31.89	Design
C35	-30.38	-20.66	Design
C36	-24.68	-16.78	Design
C37	-33.10	-22.51	Design
C38	-52.40	-35.63	Design
C45	-27.13	-18.45	Design

C46	38.96	26.50	Design
C47	-17.86	-12.14	Design
C48	-36.49	-24.81	Design
C49	-8.18	-5.56	Design
C50	54.38	36.98	Design
C57	-27.25	-18.53	Design
C58	-7.89	-5.36	Design
C59	-24.41	-16.60	Design
C60	-30.11	-20.47	Design
C61	-21.69	-14.75	Design
C62	-2.39	-1.62	Design
C69	-38.52	-26.19	Design
C70	-168.48	-114.57	Design
C71	-57.07	-38.81	Design
C72	-19.81	-13.47	Design
C73	-74.18	-50.45	Design
C74	-199.31	-135.53	Design
C81	-38.28	-26.03	Design
C82	-74.77	-50.85	Design
C83	-43.96	-29.89	Design
C84	-32.56	-22.14	Design
C85	-47.16	-32.07	Design
C86	-85.78	-58.33	Design
C93	-37.61	-25.57	Design
C94	92.35	62.80	Design
C95	-19.06	-12.96	Design
C96	-56.32	-38.30	Design
C97	-1.94	-1.32	Design
C98	123.18	83.77	Design
C105	-37.85	-25.74	Design
C106	-1.35	-0.92	Design
C107	-32.17	-21.88	Design
C108	-43.56	-29.62	Design
C109	-28.96	-19.70	Design
C110	9.65	6.56	Design
C117	-38.21	-25.98	Design
C118	-168.15	-114.34	Design
C119	-56.76	-38.60	Design
C120	-19.50	-13.26	Design
C121	-73.86	-50.22	Design
C122	-198.98	-135.31	Design
C129	-37.97	-25.82	Design
C130	-74.45	-50.62	Design
C131	-43.65	-29.68	Design
C132	-32.26	-21.93	Design
C133	-46.84	-31.85	Design
C134	-85.45	-58.11	Design
C141	-37.30	-25.37	Design
C142	92.64	62.99	Design
C143	-18.75	-12.75	Design
C144	-56.01	-38.09	Design
C145	-1.65	-1.12	Design
C146	123.47	83.96	Design
C153	-37.54	-25.53	Design
C154	-1.06	-0.72	Design
C155	-31.86	-21.67	Design
C156	-43.26	-29.41	Design
C157	-28.68	-19.50	Design
C158	9.94	6.76	Design
C165	-27.14	-18.45	Design
C166	-156.49	-106.41	Design
C167	-45.69	-31.07	Design
C168	-8.43	-5.73	Design
C169	-62.20	-42.29	Design
C170	-187.32	-127.38	Design
C177	-26.90	-18.29	Design

C178	-62.79	-42.69	Design
C179	-32.57	-22.15	Design
C180	-21.18	-14.40	Design
C181	-35.17	-23.92	Design
C182	-73.79	-50.18	Design
C189	-26.30	-17.88	Design
C190	103.06	70.08	Design
C191	-7.74	-5.27	Design
C192	-45.01	-30.60	Design
C193	8.76	5.96	Design
C194	133.89	91.05	Design
C201	-26.54	-18.04	Design
C202	9.35	6.36	Design
C203	-20.86	-14.18	Design
C204	-32.25	-21.93	Design
C205	-18.26	-12.41	Design
C206	20.36	13.84	Design
C213	-26.83	-18.24	Design
C214	-156.16	-106.19	Design
C215	-45.38	-30.86	Design
C216	-8.12	-5.52	Design
C217	-61.87	-42.07	Design
C218	-186.99	-127.16	Design
C225	-26.59	-18.08	Design
C226	-62.46	-42.47	Design
C227	-32.26	-21.94	Design
C228	-20.87	-14.19	Design
C229	-34.85	-23.70	Design
C230	-73.46	-49.96	Design
C237	-25.99	-17.67	Design
C238	103.34	70.28	Design
C239	-7.44	-5.06	Design
C240	-44.70	-30.40	Design
C241	9.05	6.16	Design
C242	134.18	91.24	Design
C249	-26.23	-17.83	Design
C250	9.64	6.56	Design
C251	-20.55	-13.97	Design
C252	-31.94	-21.72	Design
C253	-17.97	-12.22	Design
C254	20.65	14.04	Design
C261	-20.20	-13.74	Design
C262	-148.85	-101.22	Design
C263	-38.75	-26.35	Design
C264	-1.49	-1.01	Design
C265	-54.56	-37.10	Design
C266	-179.68	-122.19	Design
C273	-19.96	-13.57	Design
C274	-55.15	-37.50	Design
C275	-25.64	-17.43	Design
C276	-14.25	-9.69	Design
C277	-27.54	-18.72	Design
C278	-66.15	-44.98	Design
C285	-19.41	-13.20	Design
C286	109.24	74.28	Design
C287	-0.86	-0.59	Design
C288	-38.12	-25.92	Design
C289	14.95	10.16	Design
C290	140.07	95.25	Design
C297	-19.65	-13.36	Design
C298	15.53	10.56	Design
C299	-13.97	-9.50	Design
C300	-25.37	-17.25	Design
C301	-12.08	-8.21	Design
C302	26.54	18.05	Design
C309	-45.67	-31.06	Design

C310	-35.74	-24.30	Design
C311	-93.96	-63.90	Design
C312	-125.28	-85.19	Design
C313	-32.69	-22.23	Design
C314	-42.63	-28.99	Design
C315	15.60	10.61	Design
C316	46.92	31.90	Design
C317	-34.29	-23.32	Design
C318	-24.35	-16.56	Design
C319	-81.97	-55.74	Design
C320	-113.29	-77.04	Design
C321	-21.38	-14.54	Design
C322	-31.31	-21.29	Design
C323	26.31	17.89	Design
C324	57.62	39.18	Design
C325	-24.80	-16.86	Design
C326	-14.86	-10.11	Design
C327	-71.50	-48.62	Design
C328	-102.82	-69.92	Design
C329	-11.96	-8.13	Design
C330	-21.90	-14.89	Design
C331	34.74	23.63	Design
C332	66.06	44.92	Design

GEOMETRIC CONSIDERATIONS

Dimensions	Unit	Value	Min. value	Max. value	Sta.	References
<u>Angle (Gusset side)</u>						
Weld size	[1/16in]	5	4	8	✓	table J2.4, Sec. J2.2b
<u>Angle (Column side)</u>						
Vertical edge distance	[in]	1.50	1.13	--	✓	Tables J3.4, J3.5
Horizontal edge distance	[in]	3.38	1.13	--	✓	Tables J3.4, J3.5
Vertical center-to-center spacing (pitch)	[in]	3.00	2.33	12.00	✓	Sec. J3.3, Sec. J3.5
<u>Column</u>						
Horizontal edge distance	[in]	5.05	1.13	--	✓	Tables J3.4, J3.5

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Angle (Gusset side)</u>						
Weld capacity	[Kip]	312.99	241.03	C74	0.77	Tables 8-4 .. 8-11
Shear yielding	[Kip]	364.50	199.31	C74	0.55	Eq. J4-3
Leg tensile yielding	[Kip]	546.75	95.25	C290	0.17	Eq. J4-1
<u>Angle (Column side)</u>						
Bolts shear	[Kip]	243.40	199.31	C74	0.82	Tables (7-1..14)
Bolt bearing under shear load	[Kip]	471.64	199.31	C74	0.42	p. 7-18, Sec. J3.10
Shear yielding	[Kip]	364.50	199.31	C74	0.55	Eq. J4-3
Shear rupture	[Kip]	293.63	199.31	C74	0.68	Eq. J4-4
Block shear	[Kip]	386.73	199.31	C74	0.52	Eq. J4-5
Resulting tension capacity due prying action	[Kip]	109.66	95.25	C290	0.87	p. 9-11, p. 9-10
<u>Gusset</u>						
Welds rupture	[Kip/ft]	313.20	171.53	C74	0.55	p. 9-5
Shear yielding	[Kip]	397.85	199.31	C74	0.50	Eq. J4-3
Tear out under axial load	[Kip]	598.73	95.25	C290	0.16	Eq. J4-5
<u>Column</u>						
Bolt bearing under shear load	[Kip]	2119.16	199.31	C74	0.09	Eq. J3-6
Web crippling	[Kip]	4753.37	135.53	C74	0.03	Eq. J10-4

Left beam interface - column
Angles

DEMANDS	Description	Ru [Kip]	Pu [Kip]	Load type
C1		3.65	22.02	Design
C2		-1.04	22.35	Design
C3		4.07	22.04	Design
C4		8.75	21.71	Design
C5		8.13	33.71	Design
C6		1.24	34.19	Design
C7		8.86	33.73	Design
C8		15.75	33.25	Design
C9		8.22	33.49	Design
C10		1.36	33.97	Design
C11		8.94	33.51	Design
C12		15.80	33.04	Design
C13		4.44	24.14	Design
C14		-0.56	24.49	Design
C15		4.92	24.16	Design
C16		9.92	23.81	Design
C17		2.84	19.57	Design
C18		-1.27	19.86	Design
C19		3.21	19.59	Design
C20		7.32	19.30	Design
C21		2.10	19.28	Design
C22		-95.73	25.58	Design
C23		-11.27	20.28	Design
C24		15.85	18.42	Design
C25		-26.64	21.00	Design
C26		-117.59	27.30	Design
C33		2.66	19.50	Design
C34		-25.99	21.36	Design
C35		-1.44	19.80	Design
C36		6.85	19.23	Design
C37		-5.78	20.01	Design
C38		-33.84	21.96	Design
C45		3.95	19.88	Design
C46		101.79	13.58	Design
C47		17.33	18.88	Design
C48		-9.79	20.74	Design
C49		32.70	18.16	Design
C50		123.65	11.86	Design
C57		3.39	19.66	Design
C58		32.04	17.80	Design
C59		7.49	19.36	Design
C60		-0.80	19.93	Design
C61		11.83	19.15	Design
C62		39.90	17.21	Design
C69		3.15	23.07	Design
C70		-189.24	35.44	Design
C71		-23.60	25.08	Design
C72		30.64	21.36	Design
C73		-51.06	26.28	Design
C74		-232.95	38.88	Design
C81		4.27	23.52	Design
C82		-49.75	27.00	Design
C83		-3.93	24.12	Design
C84		12.65	22.98	Design
C85		-9.32	24.30	Design

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C86	-65.45	28.19	Design
C93	6.59	24.27	Design
C94	198.97	11.90	Design
C95	33.33	22.26	Design
C96	-20.90	25.98	Design
C97	60.79	21.06	Design
C98	242.69	8.46	Design
C105	5.47	23.82	Design
C106	59.48	20.34	Design
C107	13.66	23.22	Design
C108	-2.91	24.35	Design
C109	19.05	23.04	Design
C110	75.19	19.15	Design
C117	3.24	22.86	Design
C118	-189.12	35.21	Design
C119	-23.51	24.86	Design
C120	30.72	21.15	Design
C121	-50.94	26.05	Design
C122	-232.84	38.66	Design
C129	4.36	23.30	Design
C130	-49.63	26.78	Design
C131	-3.84	23.91	Design
C132	12.73	22.77	Design
C133	-9.20	24.08	Design
C134	-65.34	27.97	Design
C141	6.67	24.05	Design
C142	199.03	11.69	Design
C143	33.42	22.04	Design
C144	-20.82	25.76	Design
C145	60.85	20.85	Design
C146	242.74	8.24	Design
C153	5.55	23.60	Design
C154	59.54	20.13	Design
C155	13.75	23.00	Design
C156	-2.83	24.14	Design
C157	19.11	22.82	Design
C158	75.25	18.93	Design
C165	1.56	18.50	Design
C166	-189.94	30.81	Design
C167	-25.19	20.51	Design
C168	29.04	16.80	Design
C169	-51.76	21.65	Design
C170	-233.66	34.25	Design
C177	2.68	18.95	Design
C178	-50.45	22.37	Design
C179	-5.52	19.55	Design
C180	11.05	18.42	Design
C181	-10.02	19.67	Design
C182	-66.16	23.56	Design
C189	4.88	19.70	Design
C190	196.38	7.39	Design
C191	31.63	17.69	Design
C192	-22.61	21.41	Design
C193	58.20	16.55	Design
C194	240.09	3.95	Design
C201	3.76	19.25	Design
C202	56.89	15.83	Design
C203	11.96	18.65	Design
C204	-4.62	19.78	Design
C205	16.46	18.53	Design
C206	72.60	14.64	Design
C213	1.64	18.29	Design
C214	-189.82	30.59	Design
C215	-25.10	20.29	Design
C216	29.13	16.58	Design
C217	-51.64	21.43	Design

C218	-233.54	34.03	Design
C225	2.76	18.73	Design
C226	-50.33	22.15	Design
C227	-5.43	19.34	Design
C228	11.14	18.20	Design
C229	-9.91	19.45	Design
C230	-66.04	23.34	Design
C237	4.97	19.48	Design
C238	196.44	7.18	Design
C239	31.71	17.47	Design
C240	-22.52	21.19	Design
C241	58.25	16.34	Design
C242	240.15	3.73	Design
C249	3.85	19.03	Design
C250	56.94	15.62	Design
C251	12.04	18.43	Design
C252	-4.53	19.57	Design
C253	16.52	18.31	Design
C254	72.65	14.42	Design
C261	0.86	13.57	Design
C262	-189.60	25.80	Design
C263	-25.89	15.57	Design
C264	28.35	11.86	Design
C265	-51.42	16.64	Design
C266	-233.32	29.24	Design
C273	1.98	14.01	Design
C274	-50.11	17.36	Design
C275	-6.21	14.62	Design
C276	10.36	13.48	Design
C277	-9.68	14.67	Design
C278	-65.82	18.56	Design
C285	4.10	14.76	Design
C286	194.56	2.53	Design
C287	30.84	12.75	Design
C288	-23.39	16.46	Design
C289	56.38	11.69	Design
C290	238.27	-0.92	Design
C297	2.97	14.31	Design
C298	55.07	10.97	Design
C299	11.17	13.71	Design
C300	-5.40	14.84	Design
C301	14.64	13.66	Design
C302	70.78	9.77	Design
C309	-5.20	24.73	Design
C310	9.85	23.87	Design
C311	-79.55	28.94	Design
C312	-126.76	31.60	Design
C313	15.46	24.21	Design
C314	0.42	25.07	Design
C315	89.82	20.00	Design
C316	137.03	17.34	Design
C317	-6.79	20.16	Design
C318	8.26	19.30	Design
C319	-80.26	24.32	Design
C320	-127.47	26.98	Design
C321	13.75	19.64	Design
C322	-1.29	20.50	Design
C323	87.23	15.49	Design
C324	134.43	12.83	Design
C325	-7.91	13.41	Design
C326	7.14	12.54	Design
C327	-79.94	17.46	Design
C328	-127.15	20.12	Design
C329	12.51	12.88	Design
C330	-2.54	13.74	Design
C331	84.54	8.83	Design

GEOMETRIC CONSIDERATIONS

Dimensions	Unit	Value	Min. value	Max. value	Sta.	References
<u>Angle</u>						
Length	[in]	15.00	8.04	16.08	✓	p. 10-8
<u>Angle (Beam side)</u>						
Weld size	[1/16in]	4	3	8	✓	table J2.4, Sec. J2.2b
<u>Angle (Column side)</u>						
Vertical edge distance	[in]	1.50	1.25	--	✓	Tables J3.4, J3.5
Horizontal edge distance	[in]	3.25	1.25	--	✓	Tables J3.4, J3.5
Vertical center-to-center spacing (pitch)	[in]	3.00	2.67	12.00	✓	Sec. J3.3, Sec. J3.5
<u>Column</u>						
Horizontal edge distance	[in]	5.05	1.25	--	✓	Tables J3.4, J3.5

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Angle (Beam side)</u>						
Weld capacity	[Kip]	286.97	242.88	C146	0.85	Tables 8-4 .. 8-11
Shear yielding	[Kip]	364.50	242.74	C146	0.67	Eq. J4-3
Leg tensile yielding	[Kip]	546.75	38.88	C74	0.07	Eq. J4-1
<u>Angle (Column side)</u>						
Bolts shear	[Kip]	317.93	242.74	C146	0.76	Tables (7-1..14)
Bolt bearing under shear load	[Kip]	495.49	242.74	C146	0.49	p. 7-18, Sec. J3.10
Shear yielding	[Kip]	364.50	242.74	C146	0.67	Eq. J4-3
Shear rupture	[Kip]	266.10	242.74	C146	0.91	Eq. J4-4
Block shear	[Kip]	369.36	242.74	C146	0.66	Eq. J4-5
Resulting tension capacity due prying action	[Kip]	102.11	38.88	C74	0.38	p. 9-11, p. 9-10
<u>Beam</u>						
Welds rupture	[Kip/ft]	231.66	150.82	C146	0.65	p. 9-5
Shear yielding	[Kip]	274.73	242.74	C146	0.88	Eq. J4-3
Tear out under axial load	[Kip]	495.62	38.88	C74	0.08	Eq. J4-5
<u>Column</u>						
Bolt bearing under shear load	[Kip]	2300.80	242.74	C146	0.11	Eq. J3-6
Web crippling	[Kip]	4753.37	0.92	C290	0.00	Eq. J10-4
Ratio	0.91					

Global critical strength ratio**0.93****REFERENCES**

[9] AISC 2005, Design Examples Version 13.0, pp. IIC-26 - IIC-27

[8] Dowswell, B., 2003, Connection Design For Steel Structures, Structural Design Solutions, LLC. Chapter 13, p. 14

4

S7.00

TYPICAL BRACED FRAME CONNECTION DETAIL

SCALE: 3/4" = 1'-0"

Current Date: 1/7/2021 3:03 PM

Units system: English

File name: C:\ProgramData\Bentley\Engineering\RAM Structural System\Working\2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD.ram

Steel connections

Results

Connection name : Gusset BP
Connection ID : 26

Family: Column - Base (CB)
Type: Gusset
Description: Smart Gusset Base Plate 1
Design code: AISC 360-16 LRFD, ACI 318-08

Interface between Gusset - Top right brace
Connection: Directly welded

DEMANDS

Pu [Kip]	Description	Load type
-------------	-------------	-----------

-86.53	C1	Design
-96.97	C2	Design
-85.82	C3	Design
-75.39	C4	Design
-179.61	C5	Design
-194.97	C6	Design
-178.33	C7	Design
-162.98	C8	Design
-178.85	C9	Design
-194.15	C10	Design
-177.58	C11	Design
-162.28	C12	Design
-109.32	C13	Design
-120.44	C14	Design
-108.49	C15	Design
-97.36	C16	Design
-76.60	C17	Design
-85.74	C18	Design
-75.98	C19	Design
-66.84	C20	Design
-76.47	C21	Design
-290.80	C22	Design
-107.30	C23	Design
-45.71	C24	Design
-136.03	C25	Design
-343.04	C26	Design
-76.57	C33	Design
-139.40	C34	Design
-86.00	C35	Design
-67.16	C36	Design
-94.04	C37	Design
-157.93	C38	Design
-76.11	C45	Design
138.21	C46	Design
-45.28	C47	Design
-106.87	C48	Design

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-16.56	C49	Design
190.46	C50	Design
-76.01	C57	Design
-13.18	C58	Design
-66.59	C59	Design
-85.42	C60	Design
-58.54	C61	Design
5.35	C62	Design
-107.39	C69	Design
-528.75	C70	Design
-169.04	C71	Design
-45.86	C72	Design
-219.21	C73	Design
-633.24	C74	Design
-107.58	C81	Design
-225.96	C82	Design
-126.43	C83	Design
-88.76	C84	Design
-135.24	C85	Design
-263.01	C86	Design
-107.08	C93	Design
314.28	C94	Design
-45.42	C95	Design
-168.61	C96	Design
4.74	C97	Design
418.77	C98	Design
-106.89	C105	Design
11.49	C106	Design
-88.04	C107	Design
-125.71	C108	Design
-79.23	C109	Design
48.55	C110	Design
-106.63	C117	Design
-527.93	C118	Design
-168.28	C119	Design
-45.10	C120	Design
-218.39	C121	Design
-632.42	C122	Design
-106.82	C129	Design
-225.14	C130	Design
-125.67	C131	Design
-88.00	C132	Design
-134.42	C133	Design
-262.20	C134	Design
-106.33	C141	Design
314.98	C142	Design
-44.67	C143	Design
-167.86	C144	Design
5.43	C145	Design
419.46	C146	Design
-106.13	C153	Design
12.18	C154	Design
-87.28	C155	Design
-124.95	C156	Design
-78.53	C157	Design
49.24	C158	Design
-74.67	C165	Design
-494.05	C166	Design
-136.33	C167	Design
-13.14	C168	Design
-184.51	C169	Design
-598.54	C170	Design
-74.87	C177	Design
-191.26	C178	Design
-93.72	C179	Design
-56.05	C180	Design

-100.54	C181	Design
-228.32	C182	Design
-74.58	C189	Design
344.80	C190	Design
-12.92	C191	Design
-136.11	C192	Design
35.26	C193	Design
449.29	C194	Design
-74.38	C201	Design
42.01	C202	Design
-55.53	C203	Design
-93.20	C204	Design
-48.71	C205	Design
79.07	C206	Design
-73.91	C213	Design
-493.23	C214	Design
-135.57	C215	Design
-12.39	C216	Design
-183.69	C217	Design
-597.72	C218	Design
-74.11	C225	Design
-190.44	C226	Design
-92.96	C227	Design
-55.29	C228	Design
-99.72	C229	Design
-227.50	C230	Design
-73.82	C237	Design
345.50	C238	Design
-12.16	C239	Design
-135.35	C240	Design
35.95	C241	Design
449.98	C242	Design
-73.63	C249	Design
42.71	C250	Design
-54.78	C251	Design
-92.45	C252	Design
-48.01	C253	Design
79.76	C254	Design
-55.37	C261	Design
-472.45	C262	Design
-117.03	C263	Design
6.16	C264	Design
-162.91	C265	Design
-576.94	C266	Design
-55.57	C273	Design
-169.66	C274	Design
-74.42	C275	Design
-36.75	C276	Design
-78.94	C277	Design
-206.72	C278	Design
-55.43	C285	Design
361.65	C286	Design
6.23	C287	Design
-116.96	C288	Design
52.11	C289	Design
466.14	C290	Design
-55.24	C297	Design
58.86	C298	Design
-36.39	C299	Design
-74.05	C300	Design
-31.86	C301	Design
95.92	C302	Design
-131.63	C309	Design
-98.53	C310	Design
-276.98	C311	Design
-380.60	C312	Design

-89.30	C313	Design
-122.40	C314	Design
56.05	C315	Design
159.67	C316	Design
-98.91	C317	Design
-65.82	C318	Design
-242.28	C319	Design
-345.90	C320	Design
-56.80	C321	Design
-89.90	C322	Design
86.57	C323	Design
190.19	C324	Design
-72.36	C325	Design
-39.26	C326	Design
-212.52	C327	Design
-316.14	C328	Design
-30.46	C329	Design
-63.56	C330	Design
109.70	C331	Design
213.32	C332	Design

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Brace - Directly welded Connection</u>						
Total weld design strength	[Kip]	668.22	633.24	C74	0.95	Eq. J2-4, Eq. J2-6
Maximum weld force that brace can develop	[Kip]	841.19	633.24	C74	0.75	Eq. J4-4
<u>Gusset</u>						
Maximum weld force that gusset can develop	[Kip]	783.00	633.24	C74	0.81	Eq. J4-4
Block shear on gusset	[Kip]	1040.40	466.14	C290	0.45	Eq. J4-5
Ratio	0.95					

Checks for gusset and brace

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Brace</u>						
Yielding strength due to axial load	[Kip]	865.26	466.14	C290	0.54	Eq. J4-1
Tension rupture	[Kip]	698.36	466.14	C290	0.67	Eq. J4-2
<u>Gusset</u>						
Tension yielding on the Whitmore section	[Kip]	1122.06	466.14	C290	0.42	Eq. J4-1
Buckling on the Whitmore section	[Kip]	949.33	633.24	C74	0.67	Eq. E3-1
Ratio	0.67					

Right gusset interface - base plate Directly welded

DEMANDS

Description	Beam			Column			Load type
	Ru [Kip]	Pu [Kip]	Mu [Kip*ft]	Pu [Kip]	Mu22 [Kip*ft]	Mu33 [Kip*ft]	
C1	-30.75	-15.32	0.00	0.00	0.00	0.00	Design
C2	-34.46	-17.17	0.00	0.00	0.00	0.00	Design
C3	-30.50	-15.20	0.00	0.00	0.00	0.00	Design
C4	-26.79	-13.35	0.00	0.00	0.00	0.00	Design
C5	-63.83	-31.80	0.00	0.00	0.00	0.00	Design
C6	-69.29	-34.52	0.00	0.00	0.00	0.00	Design
C7	-63.38	-31.58	0.00	0.00	0.00	0.00	Design
C8	-57.92	-28.86	0.00	0.00	0.00	0.00	Design
C9	-63.56	-31.67	0.00	0.00	0.00	0.00	Design
C10	-69.00	-34.38	0.00	0.00	0.00	0.00	Design
C11	-63.11	-31.44	0.00	0.00	0.00	0.00	Design

C12	-57.67	-28.74	0.00	0.00	0.00	0.00	Design
C13	-38.85	-19.36	0.00	0.00	0.00	0.00	Design
C14	-42.80	-21.33	0.00	0.00	0.00	0.00	Design
C15	-38.55	-19.21	0.00	0.00	0.00	0.00	Design
C16	-34.60	-17.24	0.00	0.00	0.00	0.00	Design
C17	-27.22	-13.56	0.00	0.00	0.00	0.00	Design
C18	-30.47	-15.18	0.00	0.00	0.00	0.00	Design
C19	-27.00	-13.45	0.00	0.00	0.00	0.00	Design
C20	-23.75	-11.84	0.00	0.00	0.00	0.00	Design
C21	-27.18	-13.54	0.00	0.00	0.00	0.00	Design
C22	-103.34	-51.49	0.00	0.00	0.00	0.00	Design
C23	-38.13	-19.00	0.00	0.00	0.00	0.00	Design
C24	-16.24	-8.09	0.00	0.00	0.00	0.00	Design
C25	-48.34	-24.09	0.00	0.00	0.00	0.00	Design
C26	-121.91	-60.74	0.00	0.00	0.00	0.00	Design
C33	-27.21	-13.56	0.00	0.00	0.00	0.00	Design
C34	-49.54	-24.68	0.00	0.00	0.00	0.00	Design
C35	-30.56	-15.23	0.00	0.00	0.00	0.00	Design
C36	-23.87	-11.89	0.00	0.00	0.00	0.00	Design
C37	-33.42	-16.65	0.00	0.00	0.00	0.00	Design
C38	-56.12	-27.96	0.00	0.00	0.00	0.00	Design
C45	-27.05	-13.48	0.00	0.00	0.00	0.00	Design
C46	49.12	24.47	0.00	0.00	0.00	0.00	Design
C47	-16.09	-8.02	0.00	0.00	0.00	0.00	Design
C48	-37.98	-18.92	0.00	0.00	0.00	0.00	Design
C49	-5.88	-2.93	0.00	0.00	0.00	0.00	Design
C50	67.68	33.72	0.00	0.00	0.00	0.00	Design
C57	-27.01	-13.46	0.00	0.00	0.00	0.00	Design
C58	-4.68	-2.33	0.00	0.00	0.00	0.00	Design
C59	-23.66	-11.79	0.00	0.00	0.00	0.00	Design
C60	-30.36	-15.13	0.00	0.00	0.00	0.00	Design
C61	-20.80	-10.37	0.00	0.00	0.00	0.00	Design
C62	1.90	0.95	0.00	0.00	0.00	0.00	Design
C69	-38.16	-19.01	0.00	0.00	0.00	0.00	Design
C70	-187.91	-93.63	0.00	0.00	0.00	0.00	Design
C71	-60.07	-29.93	0.00	0.00	0.00	0.00	Design
C72	-16.30	-8.12	0.00	0.00	0.00	0.00	Design
C73	-77.90	-38.81	0.00	0.00	0.00	0.00	Design
C74	-225.04	-112.13	0.00	0.00	0.00	0.00	Design
C81	-38.23	-19.05	0.00	0.00	0.00	0.00	Design
C82	-80.30	-40.01	0.00	0.00	0.00	0.00	Design
C83	-44.93	-22.39	0.00	0.00	0.00	0.00	Design
C84	-31.54	-15.72	0.00	0.00	0.00	0.00	Design
C85	-48.06	-23.95	0.00	0.00	0.00	0.00	Design
C86	-93.47	-46.57	0.00	0.00	0.00	0.00	Design
C93	-38.05	-18.96	0.00	0.00	0.00	0.00	Design
C94	111.69	55.65	0.00	0.00	0.00	0.00	Design
C95	-16.14	-8.04	0.00	0.00	0.00	0.00	Design
C96	-59.92	-29.86	0.00	0.00	0.00	0.00	Design
C97	1.68	0.84	0.00	0.00	0.00	0.00	Design
C98	148.82	74.15	0.00	0.00	0.00	0.00	Design
C105	-37.99	-18.93	0.00	0.00	0.00	0.00	Design
C106	4.08	2.03	0.00	0.00	0.00	0.00	Design
C107	-31.29	-15.59	0.00	0.00	0.00	0.00	Design
C108	-44.67	-22.26	0.00	0.00	0.00	0.00	Design
C109	-28.16	-14.03	0.00	0.00	0.00	0.00	Design
C110	17.25	8.60	0.00	0.00	0.00	0.00	Design
C117	-37.89	-18.88	0.00	0.00	0.00	0.00	Design
C118	-187.61	-93.48	0.00	0.00	0.00	0.00	Design
C119	-59.80	-29.80	0.00	0.00	0.00	0.00	Design
C120	-16.03	-7.99	0.00	0.00	0.00	0.00	Design
C121	-77.61	-38.67	0.00	0.00	0.00	0.00	Design
C122	-224.75	-111.98	0.00	0.00	0.00	0.00	Design
C129	-37.96	-18.92	0.00	0.00	0.00	0.00	Design
C130	-80.01	-39.87	0.00	0.00	0.00	0.00	Design
C131	-44.66	-22.25	0.00	0.00	0.00	0.00	Design

C132	-31.27	-15.58	0.00	0.00	0.00	0.00	Design
C133	-47.77	-23.80	0.00	0.00	0.00	0.00	Design
C134	-93.18	-46.43	0.00	0.00	0.00	0.00	Design
C141	-37.79	-18.83	0.00	0.00	0.00	0.00	Design
C142	111.94	55.77	0.00	0.00	0.00	0.00	Design
C143	-15.87	-7.91	0.00	0.00	0.00	0.00	Design
C144	-59.65	-29.72	0.00	0.00	0.00	0.00	Design
C145	1.93	0.96	0.00	0.00	0.00	0.00	Design
C146	149.07	74.27	0.00	0.00	0.00	0.00	Design
C153	-37.72	-18.79	0.00	0.00	0.00	0.00	Design
C154	4.33	2.16	0.00	0.00	0.00	0.00	Design
C155	-31.02	-15.45	0.00	0.00	0.00	0.00	Design
C156	-44.40	-22.12	0.00	0.00	0.00	0.00	Design
C157	-27.91	-13.91	0.00	0.00	0.00	0.00	Design
C158	17.50	8.72	0.00	0.00	0.00	0.00	Design
C165	-26.54	-13.22	0.00	0.00	0.00	0.00	Design
C166	-175.57	-87.48	0.00	0.00	0.00	0.00	Design
C167	-48.45	-24.14	0.00	0.00	0.00	0.00	Design
C168	-4.67	-2.33	0.00	0.00	0.00	0.00	Design
C169	-65.57	-32.67	0.00	0.00	0.00	0.00	Design
C170	-212.71	-105.98	0.00	0.00	0.00	0.00	Design
C177	-26.61	-13.26	0.00	0.00	0.00	0.00	Design
C178	-67.97	-33.87	0.00	0.00	0.00	0.00	Design
C179	-33.31	-16.59	0.00	0.00	0.00	0.00	Design
C180	-19.92	-9.92	0.00	0.00	0.00	0.00	Design
C181	-35.73	-17.80	0.00	0.00	0.00	0.00	Design
C182	-81.14	-40.43	0.00	0.00	0.00	0.00	Design
C189	-26.50	-13.21	0.00	0.00	0.00	0.00	Design
C190	122.53	61.05	0.00	0.00	0.00	0.00	Design
C191	-4.59	-2.29	0.00	0.00	0.00	0.00	Design
C192	-48.37	-24.10	0.00	0.00	0.00	0.00	Design
C193	12.53	6.24	0.00	0.00	0.00	0.00	Design
C194	159.67	79.56	0.00	0.00	0.00	0.00	Design
C201	-26.43	-13.17	0.00	0.00	0.00	0.00	Design
C202	14.93	7.44	0.00	0.00	0.00	0.00	Design
C203	-19.73	-9.83	0.00	0.00	0.00	0.00	Design
C204	-33.12	-16.50	0.00	0.00	0.00	0.00	Design
C205	-17.31	-8.62	0.00	0.00	0.00	0.00	Design
C206	28.10	14.00	0.00	0.00	0.00	0.00	Design
C213	-26.27	-13.09	0.00	0.00	0.00	0.00	Design
C214	-175.28	-87.34	0.00	0.00	0.00	0.00	Design
C215	-48.18	-24.01	0.00	0.00	0.00	0.00	Design
C216	-4.40	-2.19	0.00	0.00	0.00	0.00	Design
C217	-65.28	-32.53	0.00	0.00	0.00	0.00	Design
C218	-212.42	-105.84	0.00	0.00	0.00	0.00	Design
C225	-26.34	-13.12	0.00	0.00	0.00	0.00	Design
C226	-67.68	-33.72	0.00	0.00	0.00	0.00	Design
C227	-33.04	-16.46	0.00	0.00	0.00	0.00	Design
C228	-19.65	-9.79	0.00	0.00	0.00	0.00	Design
C229	-35.44	-17.66	0.00	0.00	0.00	0.00	Design
C230	-80.85	-40.28	0.00	0.00	0.00	0.00	Design
C237	-26.23	-13.07	0.00	0.00	0.00	0.00	Design
C238	122.78	61.18	0.00	0.00	0.00	0.00	Design
C239	-4.32	-2.15	0.00	0.00	0.00	0.00	Design
C240	-48.10	-23.97	0.00	0.00	0.00	0.00	Design
C241	12.78	6.37	0.00	0.00	0.00	0.00	Design
C242	159.91	79.68	0.00	0.00	0.00	0.00	Design
C249	-26.17	-13.04	0.00	0.00	0.00	0.00	Design
C250	15.18	7.56	0.00	0.00	0.00	0.00	Design
C251	-19.47	-9.70	0.00	0.00	0.00	0.00	Design
C252	-32.85	-16.37	0.00	0.00	0.00	0.00	Design
C253	-17.06	-8.50	0.00	0.00	0.00	0.00	Design
C254	28.35	14.12	0.00	0.00	0.00	0.00	Design
C261	-19.68	-9.80	0.00	0.00	0.00	0.00	Design
C262	-167.90	-83.66	0.00	0.00	0.00	0.00	Design
C263	-41.59	-20.72	0.00	0.00	0.00	0.00	Design

C264	2.19	1.09	0.00	0.00	0.00	0.00	Design
C265	-57.89	-28.85	0.00	0.00	0.00	0.00	Design
C266	-205.03	-102.16	0.00	0.00	0.00	0.00	Design
C273	-19.75	-9.84	0.00	0.00	0.00	0.00	Design
C274	-60.29	-30.04	0.00	0.00	0.00	0.00	Design
C275	-26.45	-13.18	0.00	0.00	0.00	0.00	Design
C276	-13.06	-6.51	0.00	0.00	0.00	0.00	Design
C277	-28.05	-13.98	0.00	0.00	0.00	0.00	Design
C278	-73.46	-36.60	0.00	0.00	0.00	0.00	Design
C285	-19.70	-9.82	0.00	0.00	0.00	0.00	Design
C286	128.52	64.04	0.00	0.00	0.00	0.00	Design
C287	2.21	1.10	0.00	0.00	0.00	0.00	Design
C288	-41.56	-20.71	0.00	0.00	0.00	0.00	Design
C289	18.52	9.23	0.00	0.00	0.00	0.00	Design
C290	165.65	82.54	0.00	0.00	0.00	0.00	Design
C297	-19.63	-9.78	0.00	0.00	0.00	0.00	Design
C298	20.92	10.42	0.00	0.00	0.00	0.00	Design
C299	-12.93	-6.44	0.00	0.00	0.00	0.00	Design
C300	-26.32	-13.11	0.00	0.00	0.00	0.00	Design
C301	-11.32	-5.64	0.00	0.00	0.00	0.00	Design
C302	34.09	16.98	0.00	0.00	0.00	0.00	Design
C309	-46.78	-23.31	0.00	0.00	0.00	0.00	Design
C310	-35.02	-17.45	0.00	0.00	0.00	0.00	Design
C311	-98.43	-49.04	0.00	0.00	0.00	0.00	Design
C312	-135.26	-67.39	0.00	0.00	0.00	0.00	Design
C313	-31.74	-15.81	0.00	0.00	0.00	0.00	Design
C314	-43.50	-21.67	0.00	0.00	0.00	0.00	Design
C315	19.92	9.92	0.00	0.00	0.00	0.00	Design
C316	56.74	28.27	0.00	0.00	0.00	0.00	Design
C317	-35.15	-17.51	0.00	0.00	0.00	0.00	Design
C318	-23.39	-11.65	0.00	0.00	0.00	0.00	Design
C319	-86.10	-42.90	0.00	0.00	0.00	0.00	Design
C320	-122.93	-61.25	0.00	0.00	0.00	0.00	Design
C321	-20.19	-10.06	0.00	0.00	0.00	0.00	Design
C322	-31.95	-15.92	0.00	0.00	0.00	0.00	Design
C323	30.76	15.33	0.00	0.00	0.00	0.00	Design
C324	67.59	33.68	0.00	0.00	0.00	0.00	Design
C325	-25.72	-12.81	0.00	0.00	0.00	0.00	Design
C326	-13.95	-6.95	0.00	0.00	0.00	0.00	Design
C327	-75.53	-37.63	0.00	0.00	0.00	0.00	Design
C328	-112.35	-55.98	0.00	0.00	0.00	0.00	Design
C329	-10.83	-5.39	0.00	0.00	0.00	0.00	Design
C330	-22.59	-11.25	0.00	0.00	0.00	0.00	Design
C331	38.98	19.42	0.00	0.00	0.00	0.00	Design
C332	75.81	37.77	0.00	0.00	0.00	0.00	Design

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Gusset</u>						
Beam yielding (normal stress)	[Kip]	585.24	112.13	C74	0.19	Eq. B-1, Appendix B, DG29, Eq. J4-1
Shear yielding	[Kip]	390.16	225.04	C74	0.58	Eq. J4-3
Gusset edge tension stress	[Kip/in2]	32.40	6.21	C74	0.19	J4-1
Gusset edge shear stress	[Kip/in2]	21.60	12.46	C74	0.58	J4-1
Weld capacity	[Kip]	346.68	314.28	C74	0.91	Tables 8-4 .. 8-11
Ratio	0.91					

Upper right gusset interface - column
Directly welded

DEMANDS

Description	Beam			Column			Load type
	Ru [Kip]	Pu [Kip]	Mu [Kip*ft]	Pu [Kip]	Mu22 [Kip*ft]	Mu33 [Kip*ft]	
C1	-47.81	-28.43	0.00	-1177.08	0.00	0.00	Design
C2	-53.57	-31.86	0.00	-1211.10	0.00	0.00	Design
C3	-47.42	-28.20	0.00	-1173.80	0.00	0.00	Design
C4	-41.65	-24.77	0.00	-1139.79	0.00	0.00	Design
C5	-99.23	-59.01	0.00	-1701.44	0.00	0.00	Design
C6	-107.71	-64.06	0.00	-1750.34	0.00	0.00	Design
C7	-98.52	-58.59	0.00	-1696.04	0.00	0.00	Design
C8	-90.04	-53.55	0.00	-1647.14	0.00	0.00	Design
C9	-98.81	-58.76	0.00	-1695.00	0.00	0.00	Design
C10	-107.26	-63.79	0.00	-1743.52	0.00	0.00	Design
C11	-98.11	-58.35	0.00	-1689.62	0.00	0.00	Design
C12	-89.66	-53.32	0.00	-1641.09	0.00	0.00	Design
C13	-60.39	-35.92	0.00	-1243.95	0.00	0.00	Design
C14	-66.54	-39.57	0.00	-1280.35	0.00	0.00	Design
C15	-59.93	-35.64	0.00	-1240.24	0.00	0.00	Design
C16	-53.79	-31.99	0.00	-1203.84	0.00	0.00	Design
C17	-42.32	-25.17	0.00	-1029.55	0.00	0.00	Design
C18	-47.37	-28.17	0.00	-1059.89	0.00	0.00	Design
C19	-41.98	-24.96	0.00	-1026.64	0.00	0.00	Design
C20	-36.93	-21.96	0.00	-996.30	0.00	0.00	Design
C21	-42.25	-25.13	0.00	-1038.18	0.00	0.00	Design
C22	-160.66	-95.55	0.00	-1748.89	0.00	0.00	Design
C23	-59.28	-35.26	0.00	-1122.84	0.00	0.00	Design
C24	-25.25	-15.02	0.00	-949.20	0.00	0.00	Design
C25	-75.15	-44.69	0.00	-1286.66	0.00	0.00	Design
C26	-189.52	-112.71	0.00	-1866.63	0.00	0.00	Design
C33	-42.30	-25.16	0.00	-1031.66	0.00	0.00	Design
C34	-77.01	-45.80	0.00	-1240.20	0.00	0.00	Design
C35	-47.51	-28.26	0.00	-1057.66	0.00	0.00	Design
C36	-37.10	-22.07	0.00	-1004.60	0.00	0.00	Design
C37	-51.96	-30.90	0.00	-1105.63	0.00	0.00	Design
C38	-87.25	-51.89	0.00	-1284.62	0.00	0.00	Design
C45	-42.05	-25.01	0.00	-1018.02	0.00	0.00	Design
C46	76.36	45.41	0.00	-307.30	0.00	0.00	Design
C47	-25.02	-14.88	0.00	-933.35	0.00	0.00	Design
C48	-59.04	-35.12	0.00	-1107.00	0.00	0.00	Design
C49	-9.15	-5.44	0.00	-769.53	0.00	0.00	Design
C50	105.22	62.58	0.00	-189.57	0.00	0.00	Design
C57	-41.99	-24.98	0.00	-1024.54	0.00	0.00	Design
C58	-7.28	-4.33	0.00	-816.00	0.00	0.00	Design
C59	-36.79	-21.88	0.00	-998.54	0.00	0.00	Design
C60	-47.19	-28.07	0.00	-1051.59	0.00	0.00	Design
C61	-32.34	-19.23	0.00	-950.57	0.00	0.00	Design
C62	2.95	1.76	0.00	-771.58	0.00	0.00	Design
C69	-59.33	-35.28	0.00	-1247.01	0.00	0.00	Design
C70	-292.12	-173.73	0.00	-2643.35	0.00	0.00	Design
C71	-93.39	-55.54	0.00	-1416.35	0.00	0.00	Design
C72	-25.34	-15.07	0.00	-1069.06	0.00	0.00	Design
C73	-121.10	-72.02	0.00	-1718.88	0.00	0.00	Design
C74	-349.84	-208.06	0.00	-2878.81	0.00	0.00	Design
C81	-59.44	-35.35	0.00	-1233.97	0.00	0.00	Design
C82	-124.83	-74.24	0.00	-1625.96	0.00	0.00	Design
C83	-69.85	-41.54	0.00	-1285.98	0.00	0.00	Design
C84	-49.04	-29.16	0.00	-1179.87	0.00	0.00	Design
C85	-74.72	-44.43	0.00	-1356.82	0.00	0.00	Design
C86	-145.31	-86.42	0.00	-1714.79	0.00	0.00	Design
C93	-59.16	-35.18	0.00	-1208.88	0.00	0.00	Design
C94	173.63	103.26	0.00	187.45	0.00	0.00	Design
C95	-25.10	-14.92	0.00	-1039.55	0.00	0.00	Design

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C96	-93.15	-55.40	0.00	-1386.84	0.00	0.00	Design
C97	2.62	1.56	0.00	-737.01	0.00	0.00	Design
C98	231.35	137.59	0.00	422.91	0.00	0.00	Design
C105	-59.05	-35.12	0.00	-1221.93	0.00	0.00	Design
C106	6.35	3.77	0.00	-829.94	0.00	0.00	Design
C107	-48.64	-28.93	0.00	-1169.92	0.00	0.00	Design
C108	-69.45	-41.30	0.00	-1276.03	0.00	0.00	Design
C109	-43.77	-26.03	0.00	-1099.08	0.00	0.00	Design
C110	26.82	15.95	0.00	-741.10	0.00	0.00	Design
C117	-58.91	-35.03	0.00	-1240.57	0.00	0.00	Design
C118	-291.66	-173.46	0.00	-2636.53	0.00	0.00	Design
C119	-92.97	-55.29	0.00	-1409.90	0.00	0.00	Design
C120	-24.92	-14.82	0.00	-1062.61	0.00	0.00	Design
C121	-120.65	-71.75	0.00	-1712.07	0.00	0.00	Design
C122	-349.39	-207.79	0.00	-2871.99	0.00	0.00	Design
C129	-59.02	-35.10	0.00	-1227.53	0.00	0.00	Design
C130	-124.38	-73.97	0.00	-1619.14	0.00	0.00	Design
C131	-69.43	-41.29	0.00	-1279.53	0.00	0.00	Design
C132	-48.62	-28.91	0.00	-1173.42	0.00	0.00	Design
C133	-74.26	-44.17	0.00	-1350.00	0.00	0.00	Design
C134	-144.85	-86.15	0.00	-1707.98	0.00	0.00	Design
C141	-58.74	-34.94	0.00	-1202.47	0.00	0.00	Design
C142	174.01	103.49	0.00	193.49	0.00	0.00	Design
C143	-24.68	-14.68	0.00	-1033.13	0.00	0.00	Design
C144	-92.73	-55.15	0.00	-1380.43	0.00	0.00	Design
C145	3.00	1.78	0.00	-730.97	0.00	0.00	Design
C146	231.74	137.82	0.00	428.96	0.00	0.00	Design
C153	-58.63	-34.87	0.00	-1215.51	0.00	0.00	Design
C154	6.73	4.00	0.00	-823.90	0.00	0.00	Design
C155	-48.22	-28.68	0.00	-1163.51	0.00	0.00	Design
C156	-69.03	-41.05	0.00	-1269.62	0.00	0.00	Design
C157	-43.39	-25.80	0.00	-1093.04	0.00	0.00	Design
C158	27.20	16.18	0.00	-735.06	0.00	0.00	Design
C165	-41.25	-24.53	0.00	-1032.62	0.00	0.00	Design
C166	-272.95	-162.33	0.00	-2422.90	0.00	0.00	Design
C167	-75.32	-44.79	0.00	-1201.95	0.00	0.00	Design
C168	-7.26	-4.32	0.00	-854.66	0.00	0.00	Design
C169	-101.93	-60.62	0.00	-1498.43	0.00	0.00	Design
C170	-330.67	-196.66	0.00	-2658.36	0.00	0.00	Design
C177	-41.36	-24.60	0.00	-1019.58	0.00	0.00	Design
C178	-105.67	-62.84	0.00	-1405.51	0.00	0.00	Design
C179	-51.78	-30.79	0.00	-1071.58	0.00	0.00	Design
C180	-30.97	-18.42	0.00	-965.47	0.00	0.00	Design
C181	-55.55	-33.03	0.00	-1136.37	0.00	0.00	Design
C182	-126.14	-75.02	0.00	-1494.34	0.00	0.00	Design
C189	-41.20	-24.50	0.00	-995.29	0.00	0.00	Design
C190	190.49	113.29	0.00	394.99	0.00	0.00	Design
C191	-7.14	-4.25	0.00	-825.95	0.00	0.00	Design
C192	-75.19	-44.72	0.00	-1173.25	0.00	0.00	Design
C193	19.48	11.58	0.00	-529.47	0.00	0.00	Design
C194	248.22	147.62	0.00	630.45	0.00	0.00	Design
C201	-41.09	-24.44	0.00	-1008.33	0.00	0.00	Design
C202	23.21	13.80	0.00	-622.40	0.00	0.00	Design
C203	-30.68	-18.25	0.00	-956.33	0.00	0.00	Design
C204	-51.49	-30.62	0.00	-1062.44	0.00	0.00	Design
C205	-26.91	-16.00	0.00	-891.54	0.00	0.00	Design
C206	43.68	25.98	0.00	-533.56	0.00	0.00	Design
C213	-40.83	-24.29	0.00	-1026.17	0.00	0.00	Design
C214	-272.49	-162.06	0.00	-2416.08	0.00	0.00	Design
C215	-74.90	-44.54	0.00	-1195.51	0.00	0.00	Design
C216	-6.84	-4.07	0.00	-848.22	0.00	0.00	Design
C217	-101.48	-60.35	0.00	-1491.62	0.00	0.00	Design
C218	-330.22	-196.39	0.00	-2651.54	0.00	0.00	Design
C225	-40.94	-24.35	0.00	-1013.13	0.00	0.00	Design
C226	-105.21	-62.57	0.00	-1398.69	0.00	0.00	Design
C227	-51.36	-30.54	0.00	-1065.14	0.00	0.00	Design

C228	-30.55	-18.17	0.00	-959.02	0.00	0.00	Design
C229	-55.09	-32.77	0.00	-1129.55	0.00	0.00	Design
C230	-125.69	-74.75	0.00	-1487.53	0.00	0.00	Design
C237	-40.78	-24.26	0.00	-988.87	0.00	0.00	Design
C238	190.88	113.52	0.00	401.03	0.00	0.00	Design
C239	-6.72	-4.00	0.00	-819.54	0.00	0.00	Design
C240	-74.78	-44.47	0.00	-1166.83	0.00	0.00	Design
C241	19.86	11.81	0.00	-523.43	0.00	0.00	Design
C242	248.60	147.85	0.00	636.50	0.00	0.00	Design
C249	-40.68	-24.19	0.00	-1001.92	0.00	0.00	Design
C250	23.59	14.03	0.00	-616.36	0.00	0.00	Design
C251	-30.26	-18.00	0.00	-949.91	0.00	0.00	Design
C252	-51.07	-30.37	0.00	-1056.02	0.00	0.00	Design
C253	-26.53	-15.78	0.00	-885.50	0.00	0.00	Design
C254	44.07	26.21	0.00	-527.52	0.00	0.00	Design
C261	-30.59	-18.19	0.00	-773.94	0.00	0.00	Design
C262	-261.01	-155.23	0.00	-2156.56	0.00	0.00	Design
C263	-64.65	-38.45	0.00	-943.28	0.00	0.00	Design
C264	3.40	2.02	0.00	-595.98	0.00	0.00	Design
C265	-90.00	-53.53	0.00	-1232.10	0.00	0.00	Design
C266	-318.74	-189.56	0.00	-2392.02	0.00	0.00	Design
C273	-30.70	-18.26	0.00	-760.90	0.00	0.00	Design
C274	-93.73	-55.74	0.00	-1139.17	0.00	0.00	Design
C275	-41.11	-24.45	0.00	-812.90	0.00	0.00	Design
C276	-20.30	-12.07	0.00	-706.79	0.00	0.00	Design
C277	-43.61	-25.94	0.00	-870.03	0.00	0.00	Design
C278	-114.21	-67.92	0.00	-1228.01	0.00	0.00	Design
C285	-30.62	-18.21	0.00	-737.34	0.00	0.00	Design
C286	199.80	118.83	0.00	645.27	0.00	0.00	Design
C287	3.44	2.05	0.00	-568.01	0.00	0.00	Design
C288	-64.62	-38.43	0.00	-915.30	0.00	0.00	Design
C289	28.79	17.12	0.00	-279.19	0.00	0.00	Design
C290	257.53	153.16	0.00	880.74	0.00	0.00	Design
C297	-30.52	-18.15	0.00	-750.39	0.00	0.00	Design
C298	32.52	19.34	0.00	-372.12	0.00	0.00	Design
C299	-20.10	-11.96	0.00	-698.38	0.00	0.00	Design
C300	-40.91	-24.33	0.00	-804.49	0.00	0.00	Design
C301	-17.60	-10.47	0.00	-641.26	0.00	0.00	Design
C302	52.99	31.51	0.00	-283.28	0.00	0.00	Design
C309	-72.72	-43.25	0.00	-1368.58	0.00	0.00	Design
C310	-54.44	-32.37	0.00	-1237.50	0.00	0.00	Design
C311	-153.02	-91.00	0.00	-2059.10	0.00	0.00	Design
C312	-210.27	-125.05	0.00	-2447.71	0.00	0.00	Design
C313	-49.34	-29.34	0.00	-1183.27	0.00	0.00	Design
C314	-67.62	-40.22	0.00	-1314.35	0.00	0.00	Design
C315	30.96	18.41	0.00	-492.75	0.00	0.00	Design
C316	88.21	52.46	0.00	-104.14	0.00	0.00	Design
C317	-54.65	-32.50	0.00	-1154.18	0.00	0.00	Design
C318	-36.36	-21.63	0.00	-1023.11	0.00	0.00	Design
C319	-133.85	-79.60	0.00	-1838.65	0.00	0.00	Design
C320	-191.10	-113.65	0.00	-2227.26	0.00	0.00	Design
C321	-31.38	-18.66	0.00	-969.68	0.00	0.00	Design
C322	-49.66	-29.54	0.00	-1100.75	0.00	0.00	Design
C323	47.83	28.44	0.00	-285.21	0.00	0.00	Design
C324	105.07	62.49	0.00	103.40	0.00	0.00	Design
C325	-39.98	-23.78	0.00	-792.99	0.00	0.00	Design
C326	-21.69	-12.90	0.00	-661.91	0.00	0.00	Design
C327	-117.41	-69.83	0.00	-1467.02	0.00	0.00	Design
C328	-174.66	-103.87	0.00	-1855.63	0.00	0.00	Design
C329	-16.83	-10.01	0.00	-609.49	0.00	0.00	Design
C330	-35.11	-20.88	0.00	-740.56	0.00	0.00	Design
C331	60.61	36.04	0.00	64.55	0.00	0.00	Design
C332	117.85	70.09	0.00	453.15	0.00	0.00	Design

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Gusset						
Beam yielding (normal stress)	[Kip]	909.81	208.06	C74	0.23	Eq. B-1, Appendix B, DG29, Eq. J4-1
Shear yielding	[Kip]	606.54	349.84	C74	0.58	Eq. J4-3
Gusset edge tension stress	[Kip/in2]	32.40	7.41	C74	0.23	J4-1
Gusset edge shear stress	[Kip/in2]	21.60	12.46	C74	0.58	J4-1
Weld capacity	[Kip]	554.81	508.79	C74	0.92	Tables 8-4 .. 8-11
Column						
Web crippling	[Kip]	5302.59	208.06	C74	0.04	Eq. J10-4, Eq. B-1, Appendix B, DG29
Local web yielding	[Kip]	2672.26	208.06	C74	0.08	Eq. J10-2, Eq. B-1, Appendix B, DG29
Ratio	0.92					

interface between Column - base plate**DEMANDS**

Description	Pu [Kip]	Mu22 [Kip*ft]	Mu33 [Kip*ft]	Vu2 [Kip]	Vu3 [Kip]	Load type
C1	-1240.21	0.00	184.51	60.67	0.00	Design
C2	-1281.84	0.00	188.77	67.90	-0.04	Design
C3	-1236.42	0.00	184.06	60.17	-0.09	Design
C4	-1194.79	0.00	179.80	52.94	-0.04	Design
C5	-1832.48	0.00	259.35	124.93	0.04	Design
C6	-1892.58	0.00	265.42	135.56	-0.03	Design
C7	-1826.14	0.00	258.62	124.03	-0.11	Design
C8	-1766.04	0.00	252.54	113.40	-0.04	Design
C9	-1825.48	0.00	258.37	124.40	0.04	Design
C10	-1885.16	0.00	264.40	134.99	-0.03	Design
C11	-1819.17	0.00	257.65	123.51	-0.11	Design
C12	-1759.49	0.00	251.63	112.91	-0.04	Design
C13	-1323.70	0.00	192.58	76.32	0.02	Design
C14	-1368.21	0.00	197.15	84.02	-0.04	Design
C15	-1319.38	0.00	192.07	75.74	-0.09	Design
C16	-1274.87	0.00	187.51	68.03	-0.04	Design
C17	-1085.44	0.00	161.26	53.69	0.01	Design
C18	-1122.45	0.00	165.08	60.03	-0.04	Design
C19	-1082.07	0.00	160.86	53.26	-0.08	Design
C20	-1045.07	0.00	157.03	46.92	-0.04	Design
C21	-1093.97	0.00	162.71	53.68	0.73	Design
C22	-1961.04	0.00	252.26	202.31	-0.05	Design
C23	-1201.13	0.00	172.67	74.94	0.56	Design
C24	-982.55	0.00	152.03	32.43	0.53	Design
C25	-1385.90	0.00	196.10	95.31	-0.09	Design
C26	-2116.89	0.00	264.83	238.17	0.01	Design
C33	-1087.52	0.00	161.61	53.69	0.18	Design
C34	-1341.90	0.00	187.90	97.26	-0.04	Design
C35	-1120.40	0.00	164.68	60.19	0.14	Design
C36	-1053.60	0.00	158.37	47.19	0.13	Design
C37	-1174.24	0.00	171.59	65.91	-0.05	Design
C38	-1399.83	0.00	192.80	110.00	-0.02	Design
C45	-1073.55	0.00	159.40	53.27	-0.80	Design
C46	-206.47	0.00	69.86	-95.36	-0.03	Design
C47	-966.39	0.00	149.45	32.01	-0.64	Design
C48	-1184.97	0.00	170.08	74.53	-0.61	Design
C49	-781.61	0.00	126.02	11.64	0.02	Design
C50	-50.63	0.00	57.29	-131.22	-0.08	Design

C57	-1080.00	0.00	160.50	53.26	-0.26	Design
C58	-825.62	0.00	134.22	9.69	-0.04	Design
C59	-1047.12	0.00	157.44	46.76	-0.22	Design
C60	-1113.91	0.00	163.74	59.76	-0.21	Design
C61	-993.28	0.00	150.53	41.04	-0.02	Design
C62	-767.68	0.00	129.32	-3.05	-0.05	Design
C69	-1325.36	0.00	193.35	75.12	1.46	Design
C70	-3029.09	0.00	369.24	367.34	-0.05	Design
C71	-1539.67	0.00	213.26	117.64	1.13	Design
C72	-1102.51	0.00	171.99	32.62	1.07	Design
C73	-1878.80	0.00	256.91	153.33	-0.15	Design
C74	-3340.78	0.00	394.39	439.06	0.05	Design
C81	-1312.46	0.00	191.15	75.15	0.37	Design
C82	-1790.80	0.00	240.51	157.24	-0.04	Design
C83	-1378.21	0.00	197.28	88.15	0.29	Design
C84	-1244.62	0.00	184.67	62.15	0.27	Design
C85	-1455.48	0.00	207.89	94.53	-0.07	Design
C86	-1906.67	0.00	250.32	182.71	-0.01	Design
C93	-1287.00	0.00	187.04	74.61	-1.54	Design
C94	416.73	0.00	11.15	-217.60	-0.02	Design
C95	-1072.69	0.00	167.13	32.09	-1.20	Design
C96	-1509.85	0.00	208.40	117.12	-1.14	Design
C97	-733.56	0.00	123.47	-3.60	0.07	Design
C98	728.42	0.00	-14.00	-289.33	-0.12	Design
C105	-1299.90	0.00	189.24	74.59	-0.44	Design
C106	-821.56	0.00	139.87	-7.50	-0.03	Design
C107	-1234.15	0.00	183.11	61.59	-0.36	Design
C108	-1367.74	0.00	195.72	87.58	-0.34	Design
C109	-1156.88	0.00	172.49	55.20	0.00	Design
C110	-705.69	0.00	130.07	-32.98	-0.06	Design
C117	-1318.36	0.00	192.38	74.59	1.46	Design
C118	-3021.67	0.00	368.21	366.77	-0.05	Design
C119	-1532.67	0.00	212.28	117.11	1.13	Design
C120	-1095.51	0.00	171.02	32.09	1.07	Design
C121	-1871.39	0.00	255.89	152.76	-0.15	Design
C122	-3333.36	0.00	393.36	438.49	0.05	Design
C129	-1305.46	0.00	190.18	74.62	0.37	Design
C130	-1783.39	0.00	239.49	156.67	-0.04	Design
C131	-1371.21	0.00	196.30	87.62	0.29	Design
C132	-1237.62	0.00	183.70	61.62	0.27	Design
C133	-1448.06	0.00	206.87	93.96	-0.07	Design
C134	-1899.26	0.00	249.30	182.14	-0.01	Design
C141	-1280.04	0.00	186.07	74.09	-1.53	Design
C142	423.28	0.00	10.24	-218.09	-0.02	Design
C143	-1065.72	0.00	166.16	31.56	-1.20	Design
C144	-1502.88	0.00	207.43	116.59	-1.14	Design
C145	-727.01	0.00	122.56	-4.08	0.07	Design
C146	734.97	0.00	-14.91	-289.81	-0.12	Design
C153	-1292.94	0.00	188.27	74.06	-0.44	Design
C154	-815.01	0.00	138.96	-7.99	-0.03	Design
C155	-1227.18	0.00	182.14	61.06	-0.36	Design
C156	-1360.77	0.00	194.75	87.06	-0.34	Design
C157	-1150.33	0.00	171.58	54.72	0.00	Design
C158	-699.14	0.00	129.15	-33.46	-0.06	Design
C165	-1087.10	0.00	162.03	52.50	1.45	Design
C166	-2783.33	0.00	337.17	343.34	-0.05	Design
C167	-1301.41	0.00	181.94	95.02	1.12	Design
C168	-864.25	0.00	140.67	9.99	1.06	Design
C169	-1633.04	0.00	224.85	129.33	-0.15	Design
C170	-3095.02	0.00	362.32	415.06	0.05	Design
C177	-1074.20	0.00	159.83	52.52	0.36	Design
C178	-1545.04	0.00	208.45	133.24	-0.04	Design
C179	-1139.95	0.00	165.96	65.52	0.28	Design
C180	-1006.36	0.00	153.35	39.53	0.26	Design
C181	-1209.71	0.00	175.83	70.53	-0.07	Design
C182	-1660.91	0.00	218.26	158.71	-0.01	Design

C189	-1049.69	0.00	155.82	52.13	-1.53	Design
C190	646.54	0.00	-19.32	-238.71	-0.02	Design
C191	-835.38	0.00	135.92	9.61	-1.19	Design
C192	-1272.54	0.00	177.18	94.64	-1.14	Design
C193	-503.75	0.00	93.00	-24.70	0.07	Design
C194	958.23	0.00	-44.47	-310.43	-0.13	Design
C201	-1062.60	0.00	158.02	52.11	-0.43	Design
C202	-591.75	0.00	109.40	-28.61	-0.03	Design
C203	-996.84	0.00	151.90	39.11	-0.35	Design
C204	-1130.43	0.00	164.50	65.11	-0.34	Design
C205	-927.08	0.00	142.02	34.10	-0.01	Design
C206	-475.88	0.00	99.59	-54.08	-0.07	Design
C213	-1080.10	0.00	161.06	51.97	1.45	Design
C214	-2775.91	0.00	336.15	342.77	-0.05	Design
C215	-1294.41	0.00	180.96	94.49	1.12	Design
C216	-857.25	0.00	139.70	9.47	1.06	Design
C217	-1625.63	0.00	223.83	128.76	-0.15	Design
C218	-3087.60	0.00	361.30	414.49	0.05	Design
C225	-1067.20	0.00	158.86	51.99	0.36	Design
C226	-1537.62	0.00	207.43	132.67	-0.04	Design
C227	-1132.95	0.00	164.98	65.00	0.28	Design
C228	-999.36	0.00	152.38	39.00	0.26	Design
C229	-1202.30	0.00	174.81	69.96	-0.07	Design
C230	-1653.50	0.00	217.23	158.14	-0.01	Design
C237	-1042.73	0.00	154.85	51.61	-1.53	Design
C238	653.09	0.00	-20.24	-239.19	-0.02	Design
C239	-828.41	0.00	134.95	9.09	-1.19	Design
C240	-1265.57	0.00	176.21	94.11	-1.13	Design
C241	-497.20	0.00	92.09	-25.19	0.07	Design
C242	964.78	0.00	-45.39	-310.92	-0.13	Design
C249	-1055.63	0.00	157.05	51.58	-0.43	Design
C250	-585.20	0.00	108.49	-29.09	-0.03	Design
C251	-989.87	0.00	150.93	38.58	-0.35	Design
C252	-1123.46	0.00	163.53	64.58	-0.34	Design
C253	-920.53	0.00	141.11	33.61	-0.01	Design
C254	-469.33	0.00	98.68	-54.57	-0.07	Design
C261	-814.34	0.00	121.52	38.97	1.45	Design
C262	-2501.23	0.00	295.70	328.22	-0.04	Design
C263	-1028.65	0.00	141.43	81.49	1.12	Design
C264	-591.49	0.00	100.16	-3.54	1.06	Design
C265	-1350.95	0.00	183.37	114.21	-0.14	Design
C266	-2812.92	0.00	320.85	399.94	0.06	Design
C273	-801.44	0.00	119.32	38.99	0.36	Design
C274	-1262.94	0.00	166.98	118.12	-0.03	Design
C275	-867.19	0.00	125.45	51.99	0.28	Design
C276	-733.60	0.00	112.84	26.00	0.26	Design
C277	-927.62	0.00	134.36	55.41	-0.06	Design
C278	-1378.82	0.00	176.78	143.59	0.00	Design
C285	-777.78	0.00	115.41	38.71	-1.51	Design
C286	909.11	0.00	-58.76	-250.54	-0.01	Design
C287	-563.47	0.00	95.51	-3.81	-1.17	Design
C288	-1000.63	0.00	136.77	81.22	-1.11	Design
C289	-241.17	0.00	53.56	-36.53	0.08	Design
C290	1220.80	0.00	-83.91	-322.26	-0.12	Design
C297	-790.68	0.00	117.61	38.69	-0.41	Design
C298	-329.18	0.00	69.96	-40.44	-0.02	Design
C299	-724.93	0.00	111.49	25.69	-0.33	Design
C300	-858.52	0.00	124.09	51.69	-0.32	Design
C301	-664.50	0.00	102.58	22.27	0.00	Design
C302	-213.30	0.00	60.15	-65.91	-0.06	Design
C309	-1464.61	0.00	210.34	91.88	0.79	Design
C310	-1309.39	0.00	192.96	68.92	0.76	Design
C311	-2261.17	0.00	305.82	194.29	-0.07	Design
C312	-2725.37	0.00	356.61	266.13	0.01	Design
C313	-1248.42	0.00	185.17	62.40	-0.87	Design
C314	-1403.64	0.00	202.55	85.35	-0.84	Design

C315	-451.86	0.00	89.68	-40.02	-0.01	Design
C316	12.34	0.00	38.89	-111.86	-0.09	Design
C317	-1226.34	0.00	179.02	69.25	0.78	Design
C318	-1071.13	0.00	161.64	46.29	0.75	Design
C319	-2015.41	0.00	273.76	170.30	-0.07	Design
C320	-2479.61	0.00	324.55	242.13	0.01	Design
C321	-1011.11	0.00	153.95	39.92	-0.86	Design
C322	-1166.33	0.00	171.33	62.88	-0.83	Design
C323	-222.05	0.00	59.21	-61.13	-0.01	Design
C324	242.15	0.00	8.42	-132.96	-0.09	Design
C325	-845.78	0.00	122.40	50.63	0.78	Design
C326	-690.56	0.00	105.02	27.68	0.75	Design
C327	-1622.06	0.00	215.84	149.46	-0.06	Design
C328	-2086.26	0.00	266.63	221.29	0.02	Design
C329	-631.71	0.00	97.47	21.46	-0.83	Design
C330	-786.93	0.00	114.85	44.41	-0.80	Design
C331	144.58	0.00	4.04	-77.37	0.00	Design
C332	608.78	0.00	-46.75	-149.21	-0.07	Design

Design for major axis Base plate (AISC 360-16 LRFD)

GEOMETRIC CONSIDERATIONS

Dimensions	Unit	Value	Min. value	Max. value	Sta.	References
<u>Base plate</u>						
Distance from anchor to edge	[in]	4.00	0.25	--	✓	
Weld size	[1/16in]	5	5	--	✓	table J2.4
<u>Right gusset</u>						
Weld size	[1/16in]	6	5	--	✓	table J2.4

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Concrete base</u>						
Axial bearing	[Kip/in ²]	4.42	1.36	C74	0.31	DG1 3.1.1;
<u>Base plate</u>						
Flexural yielding (bearing interface)	[Kip*ft/ft]	227.81	209.72	C74	0.92	DG1 Eq. 3.3.13, DG1 Sec 3.1.2
Flexural yielding (tension interface)	[Kip*ft/ft]	227.81	133.37	C290	0.59	DG1 Eq. 3.3.13
<u>Column</u>						
Weld capacity	[Kip/ft]	125.29	68.66	C290	0.55	p. 8-9, Sec. J2.5, Sec. J2.4, DG1 p. 35
Ratio		0.92				

Major axis Anchors

GEOMETRIC CONSIDERATIONS

Dimensions	Unit	Value	Min. value	Max. value	Sta.	References
<u>Anchors</u>						
Anchor spacing	[in]	11.00	8.00	--	✓	Sec. D.8.1
Concrete cover	[in]	47.50	3.00	--	✓	Sec. 7.7.1
Effective length	[in]	25.30	--	70.70	✓	

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Anchor tension	[Kip]	140.52	107.18	C290	0.76	Eq. D-3
Pullout of anchor in tension	[Kip]	166.69	107.18	C290	0.64	Sec. D.4.1.1
Anchors reinforcement in tension	[Kip]	1350.00	1220.80	C290	0.90	Sec. D.5.2.9, D.6.2.9
Anchor shear	[Kip]	73.07	36.59	C74	0.50	Eq. D-20
Pryout of anchor in shear	[Kip]	353.62	36.59	C74	0.10	Eq. D-4, Sec. D.4.1.1
Pryout of group of anchors in shear	[Kip]	819.98	322.26	C290	0.39	Eq. D-5, Sec. D.4.1.1
Anchors reinforcement in shear	[Kip]	711.00	439.06	C74	0.62	Sec. D.5.2.9, D.6.2.9
Interaction of tensile and shear forces	[Kip]	1.20	1.16	C290	0.96	Eq. D-3, Sec. D.4.1.1, Eq. D-20, Eq. D-4, Eq. D-5, Eq. D-32
Ratio		0.96				
Ratio		0.96				

Major axis

Maximum compression (C74)

Maximum bearing pressure	1360.25	[psi]
Minimum bearing pressure	1360.25	[psi]
Maximum anchor tension	0.00	[Kip]
Minimum anchor tension	0.00	[Kip]
Neutral axis angle	0.00	
Bearing length	51.17	[in]

Anchors tensions

Anchor	Transverse [in]	Longitudinal [in]	Shear [Kip]	Tension [Kip]
1	17.00	-7.00	36.59	0.00
2	17.00	7.00	36.59	0.00
3	17.00	22.00	36.59	0.00
4	17.00	-22.00	36.59	0.00
5	-17.00	-7.00	36.59	0.00
6	-17.00	7.00	36.59	0.00

7	-17.00	22.00	36.59	0.00
8	-17.00	-22.00	36.59	0.00
9	5.50	22.00	36.59	0.00
10	5.50	-22.00	36.59	0.00
11	-5.50	22.00	36.59	0.00
12	-5.50	-22.00	36.59	0.00

Maximum tension (C290)

Maximum bearing pressure	0.00	[psi]
Minimum bearing pressure	0.00	[psi]
Maximum anchor tension	107.18	[Kip]
Minimum anchor tension	96.29	[Kip]
Neutral axis angle	0.00	
Bearing length	-383.99	[in]

Anchors tensions

Anchor	Transverse [in]	Longitudinal [in]	Shear [Kip]	Tension [Kip]
1	17.00	-7.00	-26.85	103.47
2	17.00	7.00	-26.85	100.00
3	17.00	22.00	-26.85	96.29
4	17.00	-22.00	-26.85	107.18
5	-17.00	-7.00	-26.85	103.47
6	-17.00	7.00	-26.85	100.00
7	-17.00	22.00	-26.85	96.29
8	-17.00	-22.00	-26.85	107.18
9	5.50	22.00	-26.85	96.29
10	5.50	-22.00	-26.85	107.18
11	-5.50	22.00	-26.85	96.29
12	-5.50	-22.00	-26.85	107.18

Global critical strength ratio

0.96

REFERENCES

[9] AISC 2005, Design Examples Version 13.0, pp. IIC-26 - IIC-27

Technical drawing of a braced frame column joint, showing reinforcement details and dimensions. The drawing includes the following elements:

- Reinforcement:** 16#9 U-BARS are shown around the perimeter of the joint.
- Dimensions:**
 - Horizontal dimensions: 1'-7", 1'-11", 5", 4'-4", 4'-0", 1'-5", 1'-5", 11' 3/8".
 - Vertical dimensions: 7", 5", 7".
- Annotations:**
 - COLUMN ISOLATION EXTENSION AS REQUIRED TO CLEAR BRACE
 - DIAGONAL BRACE
 - SEE TYPICAL REINFORCING AT RE-ENTRANT CORNERS FOR ADDITIONAL INFORMATION (DO NOT CROSS CONTROL JOINTS)
 - BASE PLATE (GR. 50) AND ANCHOR RODS
 - BRACED FRAME COLUMN
- Other Features:** The drawing shows a central column section with a base plate and anchor rods, and a diagonal brace intersecting the column. The joint is detailed with reinforcement bars and dimensions.

134

MOMENT FRAME DESIGN

MOMENT FRAME ELEVATIONS

ROOF	W18x35	W18x35	W18x35	W18x35	W18x35	W18x35	
Level 12	W24x55	W24x55	W24x55	W24x55	W24x55	W24x55	W24x55
Level 11	W21x44	W21x50	W21x50	W21x50	W21x50	W21x44	W24x55
Level 10	W24x55	W24x62	W24x62	W24x62	W24x62	W24x55	W24x68
Level 9	W24x62	W24x76	W24x76	W24x76	W24x76	W24x68	W24x94
Level 8	W24x68	W24x94	W24x94	W24x94	W24x84	W24x84	W24x94
Level 7	W27x84	W27x84	W27x84	W27x84	W27x84	W27x84	W24x104
Level 6	W27x114	W27x114	W27x114	W27x114	W27x114	W27x114	W24x104
Level 5	W27x94	W27x114	W27x114	W27x114	W27x114	W27x114	W24x131
Level 4	W27x129	W27x129	W27x129	W27x129	W27x129	W27x129	W24x131
Level 3	W27x129	W27x129	W27x129	W27x129	W27x129	W27x129	W24x229
Level 2	W30x99	W30x99	W30x99	W30x99	W30x99	W30x99	W24x229
GRADE	GRBM(36"x36")	GRBM(36"x36")	GRBM(36"x36")	GRBM(36"x36")	GRBM(36"x36")	GRBM(36"x36")	
1	2	3	4	5	6	7	
A	A	A	A	A	A	A	A

MOMENT FRAME DEMAND-CAPACITY RATIOS

SAMPLE MOMENT FRAME BEAM

SAMPLE MOMENT FRAME COLUMN

RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

Building Code: IBC

Member Code CheckSAMPLE MOMENT
FRAME BEAM CHECK

01/08/21 06:41:53

Steel Code: AISC360-16 LRFD

BEAM INFORMATION:

Story Level = Level 3 Frame Number = 1 Beam Number = 11
 Fy (ksi) = 50.00
 Beam Size = W27X129

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft) _____	30.00	10.00
Lu for Bending (ft) _____	30.00	10.00
K _____	1.00	1.00
Top Flange Continuously Braced _____	Yes	
Bottom Flange Continuously Braced _____	No	

CONTROLLING BEAM SEGMENT FORCES - SHEAR

Load Combination: 1.200 D + 1.200 ND1 + 0.500 Lp + 0.500 NL1 + 0.500 Rfp + 0.500 NR1 + 1.000 W1

Segment distance (ft) i - end _____ 20.00
 j - end _____ 30.00

SHEAR CHECK:

Vux (kip) = -88.60	1.00Vnx (kip) = 505.08	Vux/1.00Vnx = 0.175
Vuy (kip) = -0.00	0.90Vny (kip) = 594.00	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 _____ 10.00

AXIAL CHECK:

Pu (kip) = 0.00	0.90Pnx (kip) = 1701.00	Pu/0.90Pnx = 0.000
	0.90Pny (kip) = 1701.00	Pu/0.90Pny = 0.000
	0.90Pn (kip) = 1701.00	Pu/0.90Pn = 0.000

CONTROLLING BEAM SEGMENT FORCES - FLEXURE

Load Combination: 1.200 D + 1.200 ND1 + 0.500 Lp + 0.500 NL1 + 0.500 Rfp + 0.500 NR1 + 1.000 W1

Segment distance (ft) i - end _____ 20.00
 j - end _____ 30.00

CALCULATED PARAMETERS:

Pu (kip) = 0.00	0.90Pn (kip) = 1701.00
Mux (kip-ft) = -984.19	0.90Mnx (kip-ft) = 1481.25
Muy (kip-ft) = 0.00	0.90Mny (kip-ft) = 216.00
Cbx = 1.47	

INTERACTION EQUATION:

Pu/0.90*Pn=0.000
 Mrx/Mcx = 0.664

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RAM Structural System

RAM Frame 17.01.01.05

DataBase: 2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD

Building Code: IBC

Member Code CheckSAMPLE MOMENT
FRAME COLUMN
CHECK

01/08/21 06:41:53

Steel Code: AISC360-16 LRFD

COLUMN INFORMATION:

Story Level = Level 3 Frame Number = 1 Column Number = 13
 Fy (ksi) = 50.00
 Column Size = W24X131

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu for Axial (ft) _____	13.50	13.50
Lu for Bending (ft) _____	13.50	13.50
K _____	1.00	1.00

CONTROLLING COLUMN FORCES - SHEAR**Load Combination: 1.200 D - 1.200 ND1 + 0.500 Lp - 0.500 NL1 + 0.500 Rfp - 0.500 NR1 - 1.000 W1**

Shear	Top	Vux (kip) _____	-80.78
		Vuy (kip) _____	0.97
Shear	Bot.	Vux (kip) _____	-80.78
		Vuy (kip) _____	0.97

SHEAR CHECK:

Vux (kip) = -80.78	1.00Vnx (kip) = 444.68	Vux/1.00Vnx = 0.182
Vuy (kip) = 0.97	0.90Vny (kip) = 668.74	Vuy/0.90Vny = 0.001

CONTROLLING COLUMN FORCES - AXIAL**Load Combination: 1.200 D - 1.200 ND1 + 0.500 Lp - 0.500 NL1 + 0.500 Rfp - 0.500 NR1 - 1.000 W1****AXIAL CHECK:**

Pu (kip) = 758.31	0.90Pnx (kip) = 1705.29	Pu/0.90Pnx = 0.445
	0.90Pny (kip) = 1396.97	Pu/0.90Pny = 0.543
	0.90Pn (kip) = 1396.97	Pu/0.90Pn = 0.543

CONTROLLING COLUMN FORCES - FLEXURE**Load Combination: 1.200 D - 1.200 ND1 + 0.500 Lp - 0.500 NL1 + 0.500 Rfp - 0.500 NR1 - 1.000 W1**

Axial	Load (kip) _____	758.31
Moment	Top	Mux (kip-ft) _____
		Muy (kip-ft) _____
		-3.61
Moment	Bot.	Mux (kip-ft) _____
		Muy (kip-ft) _____
		-412.50
		9.48

CALCULATED PARAMETERS:

Pu (kip) = 758.31	0.90Pnx (kip) = 1705.29
	0.90Pny (kip) = 1396.97
Mux (kip-ft) = 485.15	0.90Mnx (kip-ft) = 1387.50
Muy (kip-ft) = -3.61	0.90Mny (kip-ft) = 305.63
	Mcx (kip-ft) = 1313.48
KL/Rx = 15.87	KL/Ry = 54.58
Cbx = 2.24	

INTERACTION EQUATION:

Pu/0.90*Pn=0.445

Eq H1-3: 0.667 + 0.027 = 0.694

Eq H1-1a Per H1.3: 0.445 + 8/9(0.350 + 0.000) = 0.755

SAMPLE MOMENT FRAME BASE PLATE CONNECTION REPORT:

Current Date: 1/7/2021 3:08 PM

Units system: English

File name: C:\ProgramData\Bentley\Engineering\RAM Structural System\Working\2021_0104_ATC RCII_SDC C_ELF_Savannah_V1.0_SD.ram

Steel connections

Results

Connection name : Pinned BP
Connection ID : 5

Family: Column - Base (CB)
Type: Base plate
Description: Smart Pinned Base Plate 4
Design code: AISC 360-16 LRFD, ACI 318-08

DEMANDS

Description	Pu [Kip]	Mu22 [Kip*ft]	Mu33 [Kip*ft]	Vu2 [Kip]	Vu3 [Kip]	Load type
C1	-804.69	-55.69	61.22	-7.15	-5.38	Design
C2	-806.60	-54.97	20.36	-2.37	-5.33	Design
C3	-808.51	-55.73	-20.32	2.40	-5.38	Design
C4	-806.60	-56.45	20.54	-2.38	-5.43	Design
C5	-1251.31	-48.13	80.03	-9.58	-4.81	Design
C6	-1254.09	-47.06	17.86	-2.30	-4.74	Design
C7	-1256.91	-48.19	-44.73	5.04	-4.81	Design
C8	-1254.13	-49.26	17.44	-2.24	-4.89	Design
C9	-1247.13	-48.13	79.81	-9.55	-4.81	Design
C10	-1249.88	-47.06	17.87	-2.30	-4.73	Design
C11	-1252.68	-48.19	-44.50	5.01	-4.81	Design
C12	-1249.92	-49.25	17.44	-2.24	-4.89	Design
C13	-877.30	-47.87	61.74	-7.28	-4.68	Design
C14	-879.37	-47.10	17.57	-2.11	-4.63	Design
C15	-881.44	-47.91	-26.63	3.06	-4.68	Design
C16	-879.37	-48.68	17.54	-2.10	-4.73	Design
C17	-703.11	-47.75	53.19	-6.21	-4.62	Design
C18	-704.83	-47.12	17.44	-2.03	-4.58	Design
C19	-706.54	-47.78	-18.16	2.14	-4.62	Design
C20	-704.82	-48.41	17.59	-2.04	-4.66	Design
C21	-675.87	-47.90	636.82	-74.42	-4.65	Design
C22	-703.13	-33.39	38.01	-4.42	-3.67	Design
C23	-684.34	-45.61	470.49	-55.10	-4.47	Design
C24	-681.02	-50.12	511.34	-59.64	-4.81	Design
C25	-698.03	-44.42	101.65	-11.49	-4.49	Design
C26	-709.09	-29.22	-35.91	3.85	-3.31	Design
C33	-696.48	-47.79	195.37	-22.83	-4.63	Design
C34	-704.39	-43.53	22.82	-2.66	-4.34	Design
C35	-698.64	-47.09	153.58	-17.98	-4.57	Design
C36	-697.63	-48.47	166.07	-19.37	-4.68	Design
C37	-702.79	-46.77	42.70	-4.87	-4.58	Design
C38	-706.21	-42.08	0.25	-0.13	-4.22	Design
C45	-733.78	-47.63	-601.79	70.35	-4.59	Design
C46	-706.52	-62.14	-2.98	0.35	-5.57	Design
C47	-725.31	-49.93	-435.46	51.02	-4.77	Design
C48	-728.63	-45.41	-476.31	55.57	-4.42	Design
C49	-711.63	-51.11	-66.62	7.42	-4.75	Design
C50	-700.57	-66.31	70.94	-7.92	-5.93	Design
C57	-713.18	-47.74	-160.34	18.76	-4.61	Design

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C58	-705.27	-52.01	12.21	-1.42	-4.90	Design
C59	-711.01	-48.44	-118.55	13.91	-4.67	Design
C60	-712.03	-47.06	-131.04	15.30	-4.56	Design
C61	-706.86	-48.76	-7.67	0.79	-4.66	Design
C62	-703.45	-53.45	34.78	-3.94	-5.02	Design
C69	-813.62	-48.16	1228.49	-143.64	-4.73	Design
C70	-866.72	-19.64	58.73	-6.89	-2.81	Design
C71	-830.56	-43.58	895.83	-104.99	-4.37	Design
C72	-823.92	-52.60	977.53	-114.09	-5.07	Design
C73	-856.50	-41.71	186.00	-21.03	-4.45	Design
C74	-878.63	-11.30	-89.12	9.64	-2.08	Design
C81	-854.83	-47.94	345.59	-40.46	-4.69	Design
C82	-869.23	-39.91	28.34	-3.36	-4.15	Design
C83	-859.16	-46.54	262.00	-30.76	-4.58	Design
C84	-857.13	-49.30	287.00	-33.54	-4.79	Design
C85	-866.03	-46.40	68.10	-7.78	-4.63	Design
C86	-872.86	-37.02	-16.80	1.68	-3.90	Design
C93	-926.61	-47.60	-1193.37	139.42	-4.62	Design
C94	-873.52	-76.13	-23.60	2.67	-6.54	Design
C95	-909.67	-52.19	-860.70	100.77	-4.98	Design
C96	-916.31	-43.16	-942.41	109.87	-4.29	Design
C97	-883.73	-54.06	-150.87	16.81	-4.91	Design
C98	-861.60	-84.47	124.24	-13.86	-7.27	Design
C105	-885.41	-47.83	-310.46	36.24	-4.66	Design
C106	-871.01	-55.85	6.78	-0.85	-5.20	Design
C107	-881.07	-49.23	-226.88	26.54	-4.77	Design
C108	-883.10	-46.47	-251.87	29.32	-4.56	Design
C109	-874.20	-49.36	-32.98	3.57	-4.72	Design
C110	-867.37	-58.75	51.93	-5.90	-5.45	Design
C117	-809.44	-48.16	1228.27	-143.62	-4.73	Design
C118	-862.51	-19.63	58.73	-6.89	-2.81	Design
C119	-826.38	-43.57	895.60	-104.97	-4.37	Design
C120	-819.74	-52.60	977.31	-114.06	-5.06	Design
C121	-852.30	-41.70	186.00	-21.03	-4.44	Design
C122	-874.43	-11.30	-89.11	9.64	-2.08	Design
C129	-850.65	-47.93	345.36	-40.43	-4.69	Design
C130	-865.02	-39.91	28.35	-3.37	-4.15	Design
C131	-854.98	-46.53	261.78	-30.73	-4.58	Design
C132	-852.95	-49.29	286.77	-33.51	-4.79	Design
C133	-861.83	-46.40	68.11	-7.79	-4.63	Design
C134	-868.66	-37.02	-16.80	1.68	-3.90	Design
C141	-922.38	-47.60	-1193.13	139.40	-4.62	Design
C142	-869.31	-76.12	-23.60	2.67	-6.54	Design
C143	-905.44	-52.19	-860.47	100.75	-4.98	Design
C144	-912.08	-43.16	-942.17	109.84	-4.28	Design
C145	-879.53	-54.05	-150.87	16.81	-4.90	Design
C146	-857.40	-84.46	124.25	-13.86	-7.27	Design
C153	-881.18	-47.82	-310.23	36.21	-4.66	Design
C154	-866.80	-55.84	6.79	-0.86	-5.20	Design
C155	-876.84	-49.22	-226.64	26.51	-4.77	Design
C156	-878.87	-46.46	-251.64	29.29	-4.56	Design
C157	-870.00	-49.36	-32.97	3.56	-4.72	Design
C158	-863.17	-58.74	51.93	-5.90	-5.45	Design
C165	-639.44	-48.04	1219.95	-142.58	-4.67	Design
C166	-692.18	-19.65	58.60	-6.81	-2.76	Design
C167	-656.38	-43.45	887.28	-103.92	-4.31	Design
C168	-649.74	-52.48	968.99	-113.02	-5.01	Design
C169	-681.97	-41.72	185.87	-20.95	-4.39	Design
C170	-704.10	-11.32	-89.25	9.72	-2.03	Design
C177	-680.64	-47.82	337.05	-39.39	-4.63	Design
C178	-694.69	-39.93	28.21	-3.28	-4.10	Design
C179	-684.98	-46.42	253.46	-29.69	-4.52	Design
C180	-682.95	-49.18	278.46	-32.47	-4.73	Design
C181	-691.50	-46.42	67.97	-7.70	-4.58	Design
C182	-698.33	-37.04	-16.93	1.76	-3.85	Design
C189	-751.71	-47.47	-1184.90	138.50	-4.56	Design

C190	-698.97	-75.86	-23.55	2.73	-6.47	Design
C191	-734.78	-52.06	-852.24	99.85	-4.92	Design
C192	-741.41	-43.03	-933.95	108.94	-4.22	Design
C193	-709.18	-53.79	-150.82	16.87	-4.84	Design
C194	-687.06	-84.20	124.30	-13.80	-7.20	Design
C201	-710.51	-47.70	-302.00	35.31	-4.60	Design
C202	-696.46	-55.58	6.83	-0.79	-5.13	Design
C203	-706.18	-49.10	-218.41	25.61	-4.71	Design
C204	-708.21	-46.33	-243.41	28.40	-4.50	Design
C205	-699.65	-49.09	-32.93	3.63	-4.65	Design
C206	-692.82	-58.48	51.98	-5.84	-5.38	Design
C213	-635.26	-48.04	1219.73	-142.55	-4.67	Design
C214	-687.98	-19.65	58.60	-6.81	-2.76	Design
C215	-652.20	-43.45	887.06	-103.90	-4.30	Design
C216	-645.56	-52.48	968.77	-112.99	-5.00	Design
C217	-677.76	-41.72	185.87	-20.95	-4.39	Design
C218	-699.89	-11.31	-89.24	9.72	-2.03	Design
C225	-676.46	-47.81	336.82	-39.36	-4.63	Design
C226	-690.49	-39.93	28.22	-3.28	-4.09	Design
C227	-680.79	-46.41	253.24	-29.66	-4.52	Design
C228	-678.77	-49.17	278.23	-32.45	-4.73	Design
C229	-687.29	-46.42	67.98	-7.70	-4.58	Design
C230	-694.12	-37.03	-16.93	1.76	-3.85	Design
C237	-747.48	-47.46	-1184.67	138.47	-4.56	Design
C238	-694.76	-75.85	-23.55	2.73	-6.47	Design
C239	-730.55	-52.05	-852.00	99.82	-4.92	Design
C240	-737.18	-43.03	-933.71	108.91	-4.22	Design
C241	-704.98	-53.78	-150.82	16.87	-4.83	Design
C242	-682.85	-84.19	124.30	-13.80	-7.19	Design
C249	-706.28	-47.69	-301.76	35.29	-4.60	Design
C250	-692.26	-55.57	6.84	-0.79	-5.13	Design
C251	-701.95	-49.09	-218.18	25.59	-4.71	Design
C252	-703.98	-46.33	-243.18	28.37	-4.50	Design
C253	-695.45	-49.08	-32.92	3.63	-4.65	Design
C254	-688.62	-58.47	51.98	-5.84	-5.38	Design
C261	-462.83	-36.10	1206.61	-141.02	-3.51	Design
C262	-515.13	-7.87	54.24	-6.30	-1.62	Design
C263	-479.76	-31.52	873.94	-102.37	-3.15	Design
C264	-473.12	-40.54	955.65	-111.46	-3.85	Design
C265	-504.92	-29.94	181.51	-20.44	-3.25	Design
C266	-527.05	0.47	-93.61	10.23	-0.89	Design
C273	-504.03	-35.88	323.70	-37.83	-3.47	Design
C274	-517.64	-28.15	23.86	-2.77	-2.95	Design
C275	-508.36	-34.48	240.12	-28.13	-3.36	Design
C276	-506.33	-37.24	265.11	-30.91	-3.58	Design
C277	-514.45	-34.64	63.62	-7.19	-3.44	Design
C278	-521.28	-25.26	-21.29	2.27	-2.71	Design
C285	-574.23	-35.52	-1180.32	137.96	-3.40	Design
C286	-521.92	-63.76	-27.95	3.24	-5.30	Design
C287	-557.29	-40.11	-847.65	99.31	-3.77	Design
C288	-563.93	-31.08	-929.36	108.40	-3.07	Design
C289	-532.14	-41.69	-155.22	17.38	-3.67	Design
C290	-510.01	-72.09	119.90	-13.29	-6.03	Design
C297	-533.03	-35.75	-297.41	34.77	-3.45	Design
C298	-519.41	-43.48	2.44	-0.28	-3.97	Design
C299	-528.70	-37.15	-213.83	25.07	-3.56	Design
C300	-530.72	-34.39	-238.82	27.86	-3.34	Design
C301	-522.61	-36.99	-37.33	4.14	-3.48	Design
C302	-515.78	-46.37	47.58	-5.33	-4.21	Design
C309	-869.88	-49.07	485.26	-56.06	-4.84	Design
C310	-867.01	-51.42	506.74	-58.31	-5.00	Design
C311	-899.14	-41.47	50.49	-5.68	-4.68	Design
C312	-907.48	-34.12	-16.51	1.38	-4.17	Design
C313	-936.61	-51.85	-448.23	51.62	-5.00	Design
C314	-939.48	-49.49	-469.71	53.87	-4.84	Design
C315	-907.35	-59.45	-13.46	1.24	-5.16	Design

C316	-899.02	-66.79	53.54	-5.82	-5.67	Design
C317	-695.70	-48.95	476.72	-54.99	-4.78	Design
C318	-692.83	-51.30	498.20	-57.24	-4.94	Design
C319	-724.61	-41.49	50.36	-5.60	-4.63	Design
C320	-732.94	-34.14	-16.65	1.46	-4.12	Design
C321	-761.71	-51.71	-439.77	50.70	-4.94	Design
C322	-764.59	-49.36	-461.25	52.94	-4.78	Design
C323	-732.80	-59.17	-13.41	1.30	-5.09	Design
C324	-724.47	-66.52	53.59	-5.76	-5.60	Design
C325	-448.77	-31.86	457.93	-52.80	-3.13	Design
C326	-445.90	-34.21	479.41	-55.05	-3.29	Design
C327	-477.10	-24.62	44.11	-4.87	-3.00	Design
C328	-485.43	-17.27	-22.89	2.19	-2.49	Design
C329	-513.62	-34.61	-433.53	49.96	-3.29	Design
C330	-516.49	-32.26	-455.02	52.21	-3.13	Design
C331	-485.29	-41.85	-19.71	2.03	-3.42	Design
C332	-476.96	-49.20	47.29	-5.03	-3.93	Design

Design for major axis Base plate (AISC 360-16 LRFD)

GEOMETRIC CONSIDERATIONS

Dimensions	Unit	Value	Min. value	Max. value	Sta.	References
<u>Base plate</u>						
Distance from anchor to edge	[in]	3.00	0.25	--	✓	
Weld size	[1/16in]	11	5	--	✓	table J2.4
<u>Ratio</u>						
		0.97				

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Concrete base</u>						
Axial bearing	[Kip/in ²]	3.94	0.48	C93	0.12	DG1 3.1.1;
<u>Base plate</u>						
Flexural yielding (bearing interface)	[Kip*ft/ft]	118.83	115.16	C93	0.97	DG1 Eq. 3.3.13, DG1 Sec 3.1.2
Flexural yielding (tension interface)	[Kip*ft/ft]	118.83	30.92	C261	0.26	DG1 Eq. 3.3.13
<u>Column</u>						
Weld capacity	[Kip/ft]	275.64	6.98	C261	0.03	p. 8-9, Sec. J2.5, Sec. J2.4, DG1 p. 35
Elastic method weld shear capacity	[Kip/ft]	183.76	39.98	C69	0.22	p. 8-9, Sec. J2.5, Sec. J2.4
Elastic method weld axial capacity	[Kip/ft]	275.64	140.38	C261	0.51	p. 8-9, Sec. J2.5, Sec. J2.4

⚠ WARNINGS

- High value moments detected in the axis perpendicular to the design axis

Major axis Anchors

GEOMETRIC CONSIDERATIONS

Dimensions	Unit	Value	Min. value	Max. value	Sta.	References
<u>Anchors</u>						
Anchor spacing	[in]	8.40	8.00	--	✓	Sec. D.8.1
Concrete cover	[in]	28.00	3.00	--	✓	Sec. 7.7.1
Effective length	[in]	17.30	--	46.70	✓	

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Anchor tension	[Kip]	140.52	17.62	C261	0.13	Eq. D-3
Pullout of anchor in tension	[Kip]	166.85	17.62	C261	0.11	Sec. D.4.1.1
Anchors reinforcement in tension	[Kip]	426.60	105.74	C261	0.25	Sec. D.5.2.9, D.6.2.9
Anchor shear	[Kip]	73.07	11.97	C69	0.16	Eq. D-20
Breakout of anchor in shear	[Kip]	114.84	11.97	C69	0.10	Sec. D.4.1.1
Breakout of group of anchors in shear	[Kip]	165.14	143.64	C69	0.87	Sec. D.4.1.1
Pryout of anchor in shear	[Kip]	179.91	11.97	C69	0.07	Eq. D-4, Sec. D.4.1.1
Pryout of group of anchors in shear	[Kip]	337.33	71.82	C69	0.21	Eq. D-5, Sec. D.4.1.1
Interaction of tensile and shear forces	[Kip]	1.20	0.00	C21	0.00	Eq. D-3, Sec. D.4.1.1, Eq. D-20, Eq. D-4, Eq. D-5, Sec. D.7
Ratio		0.87				
Global critical strength ratio		0.97				

Major axis

Maximum compression (C93)

Maximum bearing pressure	484.62	[psi]
Minimum bearing pressure	484.62	[psi]
Maximum anchor tension	7.54	[Kip]
Minimum anchor tension	0.00	[Kip]
Neutral axis angle	0.00	
Bearing length	37.14	[in]

Anchors tensions

Anchor	Transverse [in]	Longitudinal [in]	Shear [Kip]	Tension [Kip]
1	-21.00	-28.00	11.62	7.54
2	-12.60	-28.00	11.62	7.54
3	-4.20	-28.00	11.62	7.54
4	4.20	-28.00	11.62	7.54
5	12.60	-28.00	11.62	7.54
6	21.00	-28.00	11.62	7.54

7	21.00	28.00	11.62	0.00
8	12.60	28.00	11.62	0.00
9	4.20	28.00	11.62	0.00
10	-4.20	28.00	11.62	0.00
11	-12.60	28.00	11.62	0.00
12	-21.00	28.00	11.62	0.00

Maximum tension (C261)

Maximum bearing pressure	448.38	[psi]
Minimum bearing pressure	448.38	[psi]
Maximum anchor tension	17.62	[Kip]
Minimum anchor tension	0.00	[Kip]
Neutral axis angle	0.00	
Bearing length	23.48	[in]

Anchors tensions

Anchor	Transverse [in]	Longitudinal [in]	Shear [Kip]	Tension [Kip]
1	-21.00	-28.00	-11.75	0.00
2	-12.60	-28.00	-11.75	0.00
3	-4.20	-28.00	-11.75	0.00
4	4.20	-28.00	-11.75	0.00
5	12.60	-28.00	-11.75	0.00
6	21.00	-28.00	-11.75	0.00
7	21.00	28.00	-11.75	17.62
8	12.60	28.00	-11.75	17.62
9	4.20	28.00	-11.75	17.62
10	-4.20	28.00	-11.75	17.62
11	-12.60	28.00	-11.75	17.62
12	-21.00	28.00	-11.75	17.62

Results for shear breakout (C69)

Group	Area [in ²]	Shear [Kip]	Anchors
1	4567.50	71.82	1, 2, 3, 4, 5, 6
2	5040.00	143.64	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

TYPICAL BEAM TO WF COLUMN FLANGE MOMENT CONNECTION

3

S7.10

TYP. MOMENT FRAME COL. BASE PLATE

SCALE: 1" = 1'-0"