STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

VIA ELECTRONIC MAIL

October 9, 2018

Jefferey Barbadora
Real Estate Specialist
Crown Castle
12 Gill Street, Suite 5800
Woburn, MA 01801

RE: **EM-SPRINT-032-180928** – Sprint notice of intent to modify an existing telecommunications facility located at 400 Riley Mountain Road, Coventry, Connecticut.

Dear Mr. Barbadora:

The Connecticut Siting Council (Council) is in receipt of your correspondence of October 5, 2018 submitted in response to the Council's October 3, 2018 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/FOC/IN

Robidoux, Evan

From: Barbadora, Jeff <Jeff.Barbadora@crowncastle.com>
Sent: Friday, October 05, 2018 1:38 PM
To: Robidoux, Evan
Cc: CSC-DL Siting Council
Subject: RE: Council Incomplete Letter for EM-SPRINT-032-180928-RileyMountainRoad-Coventry
Attachments: 876385_Mount_Structural_Analysis_Rev1_06222018.pdf

Good afternoon,

Please find the attached mount analysis dated June 22nd as stated in the CD's. The incomplete letter references a June 21st date. The mount analysis does state a new mount is required and the same mount information is stated in the structural analysis as well.

Please let me know if you have additional questions and if I should send the Council hard copies of the attached mount analysis.

Thanks,

Jeffrey Barbadora
781-970-0053
12 Gill Street, Suite 5800, Woburn, MA 01801
CrownCastle.com

From: Robidoux, Evan
Sent: Wednesday, October 3, 2018 2:47 PM
To: Barbadora, Jeff
Cc: CSC-DL Siting Council
Subject: Council Incomplete Letter for EM-SPRINT-032-180928-RileyMountainRoad-Coventry

Please see the attached correspondence.

Evan Robidoux
Clerk Typist
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

HUDSON Design Group LLC

Date: May 17, 2018
June 22, 2018 (Rev.1)

Marianne Dunst
Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
(724) 416-2000

Hudson Design Group LLC
45 Beechwood Drive
N. Andover, MA 01845
(978) 557-5553

Subject:	**Mount Structural Analysis**	
Carrier Designation:	**Sprint Equipment Change-Out**	
	Carrier Site Number:	CT33XC551
	Carrier Site Name:	N. Coventry/Wallbeoff
Crown Castle Designation:	**Crown Castle BU Number:**	876385
	Crown Castle Site Name:	N. Coventry/Wallbeoff
	Crown Castle JDE Number:	505985
	Crown Castle PO Number:	1182283
	Crown Castle Application Number:	441491 Rev.0
Engineering Firm Designation:	**Crown Castle Report Designation:**	3769586
Site Data:	**Reilly Mtn. Road, Coventry, CT, 06238** **Latitude: 41° 47' 56.21" Longitude: -72° 19' 55.88"**	
Structure Information:	**Tower Height & Type:**	**152 ft Monopole**
	Mount Elevation:	**152 ft**
	Mount Width & Type:	**12 ft Platform Mount**

Dear Marianne Dunst,

Hudson Design Group LLC (HDG) is pleased to submit this "Mount Structural Analysis Report" to determine the structural integrity of Sprint's antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

Based upon our analysis, we have determined the adequacy of the antenna mounting system that will support the existing and proposed loading to be:

Platform Mount (Single) Conditional

This analysis has been performed in accordance with the 2012 International Building Code and the TIA-222-G based on a basic wind speed of 105 mph as required for use in the TIA-222-G Standard Annex B. Exposure Category B with a maximum topographic factor, K_{zt}, of 1.0 and Risk Category II were used in this analysis.

We at HDG appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects, please give us a call.

Mount structural analysis prepared by: HDG
Respectfully Submitted by:

Michael Cabral
Structural Dept. Head

Daniel P. Hamm, P.E.
Principal

TABLE OF CONTENTS

1) INTRODUCTION

This mount is a 12' low-profile platform mount. No original structural design documents or fabrication drawings were available for the existing mounts. A mount mapping was not performed at this site. HDG performed a visual assessment using field photographs and mount mapping data from similar mounts to perform this analysis. The mount is installed at an elevation of 152 ft on the 152 ft Monopole.

2) ANALYSIS CRITERIA

The mount structural analysis was conducted in accordance with the requirements of TIA-222-G, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a basic wind speed of 105 mph with no ice, 50 mph with a 2.33 inch escalated ice thickness, Exposure Category B and Topographic category 1 with a crest height of 0 ft. In addition, the mounts have been analyzed for various live loading conditions consisting of a 250 pound man live load applied individually at the midpoint and cantilevered ends of horizontal members as well as a 500 pound man live load applied individually at mount pipe locations using a 3-second gust wind speed of 30 mph.

Table 1 - Proposed Equipment Loading Information

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Proposed Mount Type	Note
152	152	3	Commscope	NNVV-65B-R4	-	1,2
		3	RFS/Celwave	APXVTM14-ALU-I20	-	1,2
		3	Alcatel Lucent	PCS 1900MHZ 4X45W-65MHZ	-	1,2
		6	Alcatel Lucent	RRH2X50-800	-	1,2
		3	Alcatel Lucent	TD-RRH8x20-25	-	1,2

Notes:
1) Proposed Equipment
2) Existing Mount to Remain

Table 2 - Existing and Reserved Equipment Loading Information

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Existing Mount Type	Note
152	-	-	-	-	12' Platform	1

Notes:
1) Existing Equipment

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
HDG Construction Drawings – 1/23/18	HDG	-	HDG
RFDS	Sprint	-	ON FILE

3.1) Analysis Method

RAM Elements (Version 14.0.1), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

3.2) Assumptions

1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and 2 and the referenced drawings.
3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
4) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Square, Rectangular)	ASTM A500 (GR B)
Pipe	ASTM A53 (GR 53)
Connection Bolts	ASTM A325

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle should be notified to determine the effect on the structural integrity of the antenna mounting system.

4) ANALYSIS RESULTS

Table 4(a) - Mount Component Stresses vs. Capacity (Platform, Alpha Sector)

Notes	Component	Member No.	Centerline (ft)	% Capacity	Pass / Fail
1	Face Horizontal	2	152	98	Pass
1	Standoff Members	4	152	85	Pass
2	Mount-to-Tower Connection	-	152	42	Pass

Table 4(b) - Mount Component Stresses vs. Capacity (Platform, Beta Sector)

Notes	Component	Beam No.	Centerline (ft)	% Capacity	Pass / Fail
1	Face Horizontal	2	152	98	Pass
1	Standoff Members	4	152	85	Pass
2	Mount-to-Tower Connection	-	152	42	Pass

Table 4(c) - Mount Component Stresses vs. Capacity (Platform, Gamma Sector)

Notes	Component	Beam No.	Centerline (ft)	% Capacity	Pass / Fail
1	Face Horizontal	2	152	98	Pass
1	Standoff Members	4	152	85	Pass
2	Mount-to-Tower Connection	-	152	42	Pass

Structure Rating (max from all components) =	98%

Notes:
1) See additional documentation in "Appendix C – Analysis Output" for calculations supporting the % Capacity consumed.
2) See additional documentation in "Appendix D – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The mount has sufficient capacity to support the proposed loading with the following modifications:

- **Install new platform reinforcement kit, SitePro1 P/N PRK-1245 (or approved equal).**

APPENDIX A

WIRE FRAMES AND RENDERED MODELS

Bentley

Current Date: 6/22/2018 11:41 AM
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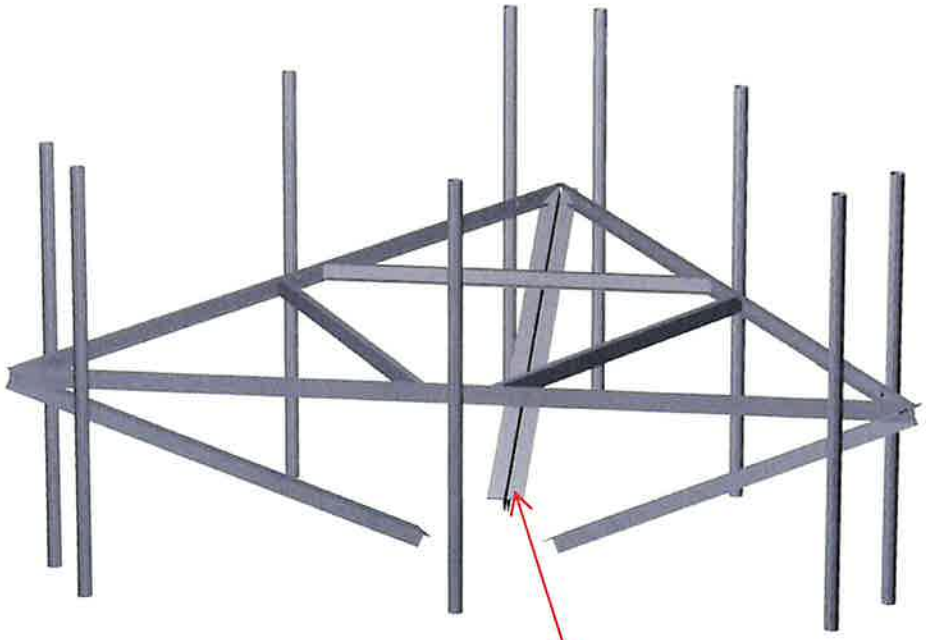

Install new platform reinforcement kit, SitePro1 P/N PRK-1245 (or approved equal).

Bentley

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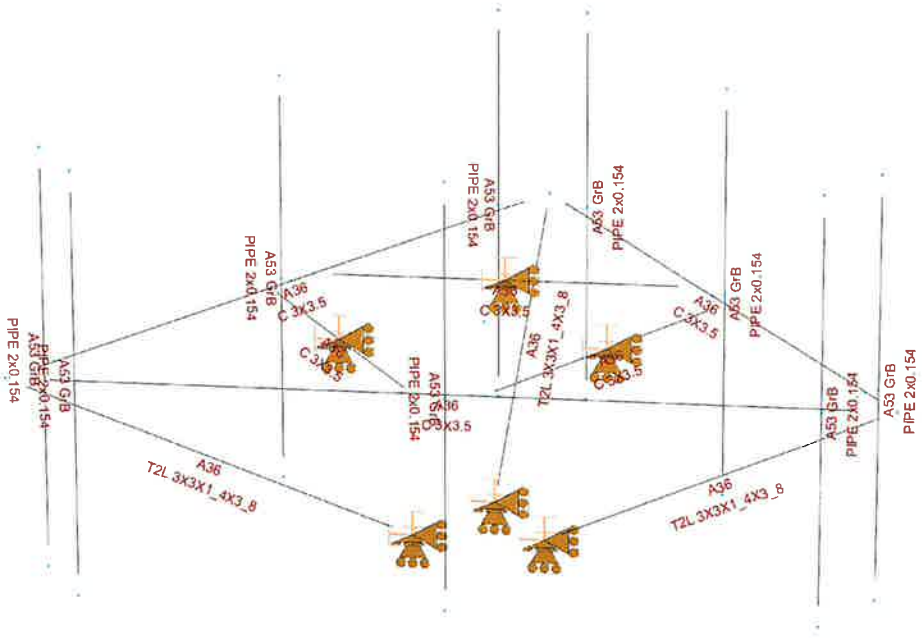

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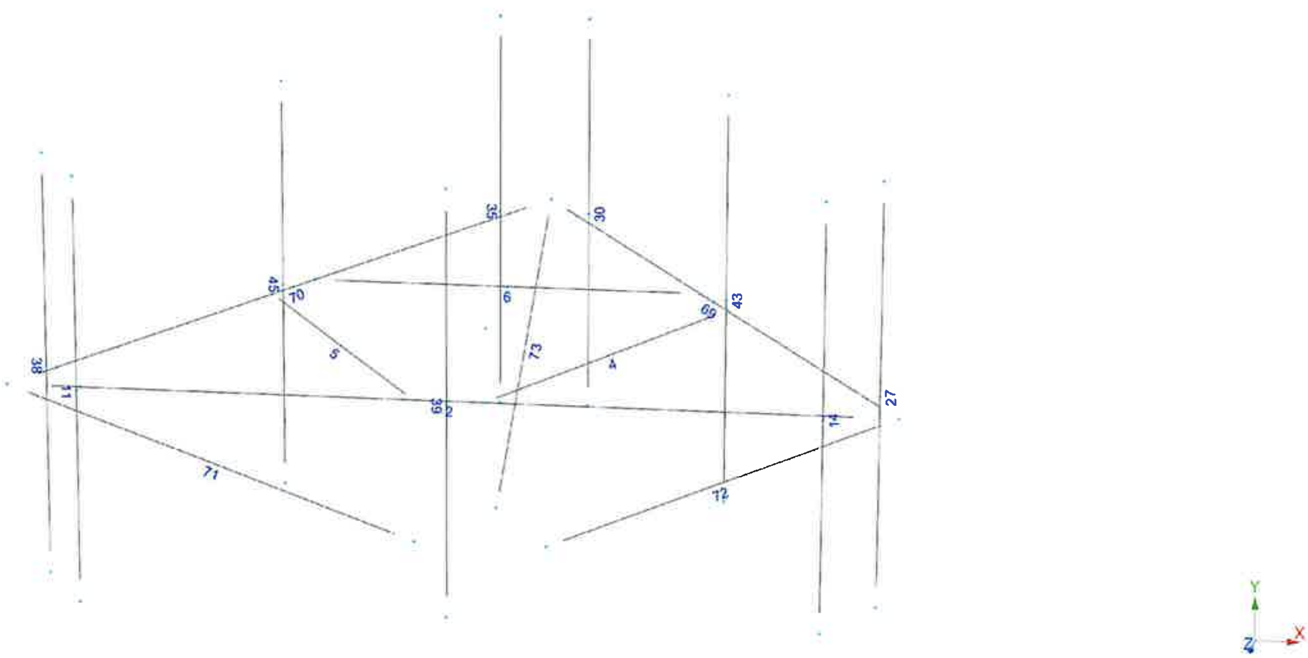


APPENDIX B

RAM ELEMENTS INPUT CALCULATIONS

Date: 6/22/2018
Project Name: N.Coventry/Wallbeoff
Project Number: 876385
Designed By: BD **Checked By:** MSC

HUDSON Design Group LLC

2.6.5.2 Velocity Pressure Coeff:

$K_z = 2.01\ (z/z_g)^{2/\alpha}$

z=	152	(ft)	
z_g=	1200	(ft)	
α=	7.0		
K_z=	**1.114**		

Kzmin ≤ Kz ≤ 2.01

Table 2-4

Exposure	Z_g	α	K_{zmin}	K_e
B	1200 ft	7.0	0.70	0.9
C	900 ft	9.5	0.85	1.0
D	700 ft	11.5	1.03	1.1

2.6.6.4 Topographic Factor:

Table 2-5

Topo. Category	K_t	f
2	0.43	1.25
3	0.53	2.0
4	0.72	1.5

$K_{zt} = [1+(K_e K_t/K_h)]^2$

$K_h = e^{(f*z/H)}$

K_{zt}= **#DIV/0!**

K_h=	#DIV/0!	
K_e=	0	(from Table 2-4)
K_t=	0	(from Table 2-5)
f=	0	(from Table 2-5)
z=	152	
H=	0	(Ht. of the crest above surrounding terrain)
K_{zt}=	1.00	
K_{iz} =	1.17	(from Sec. 2.6.8)

(If Category 1 then K_{zt} =1.0)

Category=	1

2.6.8 Design Ice Thickness

Max Ice Thickness = t_i = 1.00 in

$t_{iz} = 2.0*t_i*I*K_{iz}*(Kzt)^{0.35}$ t_{iz} = 2.33 in

Date: 6/22/2018
Project Name: N.Coventry/Wallbeoff
Project Number: 876385
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

2.6.7 Gust Effect Factor

2.6.7.1 Self Supporting Lattice Structures

Gh = 1.0 Latticed Structures > 600 ft

Gh = 0.85 Latticed Structures 450 ft or less

Gh = 0.85 + 0.15 [h/150 - 3.0] h= ht. of structure

h=	152	Gh=	0.85

2.6.7.2 Guyed Masts Gh= 0.85

2.6.7.3 Pole Structures Gh= 1.1

2.6.9 Appurtenances Gh= 1.0

2.6.7.4 Structures Supported on Other Structures
(Cantilivered tubular or latticed spines, pole, structures on buildings (ht. : width ratio > 5)

Gh=	1.35	**Gh=**	**1.00**

2.6.9.2 Design Wind Force on Appurtenances

$F = q_z * Gh * (EPA)_A$

$q_z = 0.00256 * K_z * K_{zt} * K_d * V_{max}^2 * I$

		K_z=	1.114	
		K_{zt}=	1.0	
q_z=	**29.86**	K_d=	0.95	
$q_{z\,(ice)}$=	**6.77**	V_{max}=	105	mph
$q_{z\,(30)}$=	**2.44**	$V_{max\,(ice)}$=	50	mph
		V_{30}=	30	mph
		I=	1.0	

Table 2-2

Structure Type	Wind Direction Probability Factor, Kd
Latticed structures with triangular, square or rectangular cross sections	0.85
Tubular pole structures, latticed structures with other cross sections, appurtenances	0.95

Date: 6/22/2018
Project Name: N.Coventry/Wallbeoff
Project Number: 876385
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

Determine Ca:

Table 2-8

Force Coefficients (Ca) for Appurtenances				
Member Type		Aspect Ratio ≤ 2.5	Aspect Ratio = 7	Aspect Ratio ≥ 25
		Ca	Ca	Ca
Flat		1.2	1.4	2.0
Round	C < 32 (Subcritical)	0.7	0.8	1.2
	32 ≤ C ≤ 64 (Transitional)	$3.76/(C^{0.485})$	$3.37/(C^{0.415})$	$38.4/(C^{1.0})$
	C > 64 (Supercritical)	0.5	0.6	0.6

Aspect Ratio is the overall length/width ratio in the plane normal to the wind direction.
(Aspect ratio is independent of the spacing between support points of a linear appurtenance.

Note: Linear interpolation may be used for aspect ratios other than those shown.

Ice Thickness = **2.33** in | **Angle =** **0 (deg)** | **Equivalent Angle =** **180 (deg)**

Appurtenances	Height	Width	Depth	Flat Area	Aspect Ratio	Ca	Force (lbs)	Force (lbs) (w/ Ice)	Force (lbs) (30 mph)
NNVV-65B-R4 Antenna	72.0	19.6	7.8	9.80	3.67	1.25	366	110	30
APXVTM14-ALU-I20 Antenna	56.3	12.6	6.3	4.93	4.47	1.29	189	64	15
PCS 1900MHZ 4X45W-65MHZ RRH	25.0	11.1	11.4	1.93	2.25	1.20	69	26	6
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	25.0	0.0	11.4	0.00	0.00	1.20	0	0	0
RRH2X50-800 RRH	15.8	13.0	14.0	1.43	1.22	1.20	51	20	4
RRH2X50-800 RRH (Shielded)	15.8	0.0	14.0	0.00	0.00	1.20	0	5	0
TD-RRH8x20-25 RRH	26.1	18.6	6.7	3.37	1.40	1.20	121	40	10
TD-RRH8x20-25 RRH (Shielded)	26.1	0.0	6.7	0.00	0.00	1.20	0	0	0
2" Pipe	2.4	12.0	2.4	0.20	0.20	1.20	7	7	1
C3x3.5	3.0	12.0	3.5	0.25	0.25	2.00	15	12	1

Date: 6/22/2018
Project Name: N.Coventry/Wallbeoff
Project Number: 876385
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	30	(deg)	Ice Thickness =	2.33	in.	Equivalent Angle =	210	(deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Aspect Ratio (normal)	Aspect Ratio	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
NNVV-65B-R4 Antenna	72.0	19.6	7.8	9.80	3.90	3.67	9.23	1.25	1.47	366	172	318
APXVTM14-ALU-I20 Antenna	56.3	12.6	6.3	4.93	2.46	4.47	8.94	1.29	1.46	189	108	169
PCS 1900MHZ 4X45W-65MHZ RRH	25.0	11.1	11.4	1.93	1.98	2.25	2.19	1.20	1.20	69	71	70
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	25.0	5.6	11.4	0.96	1.98	4.50	2.19	1.29	1.20	37	71	46
RRH2X50-800 RRH	15.8	13.0	14.0	1.43	1.54	1.22	1.13	1.20	1.20	51	55	52
RRH2X50-800 RRH (Shielded)	15.8	6.5	14.0	0.71	1.54	2.43	1.13	1.20	1.20	26	55	33
TD-RRH8x20-25 RRH	26.1	18.6	6.7	3.37	1.21	1.40	3.90	1.20	1.26	121	46	102
TD-RRH8x20-25 RRH (Shielded)	26.1	9.3	6.7	1.69	1.21	2.81	3.90	1.21	1.26	61	46	57

WIND LOADS WITH ICE:

NNVV-65B-R4 Antenna	76.7	24.3	12.5	12.92	6.63	3.16	6.15	1.23	1.36	108	61	96
APXVTM14-ALU-I20 Antenna	61.0	17.3	11.0	7.31	4.64	3.53	5.56	1.25	1.34	62	42	57
PCS 1900MHZ 4X45W-65MHZ RRH	29.7	15.8	16.1	3.25	3.31	1.88	1.85	1.20	1.20	26	27	27
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	29.7	7.9	16.1	1.62	3.31	3.76	1.85	1.26	1.20	14	27	17
RRH2X50-800 RRH	20.5	17.7	18.7	2.51	2.65	1.16	1.10	1.20	1.20	20	22	21
RRH2X50-800 RRH (Shielded)	20.5	8.8	18.7	1.25	2.65	2.32	1.10	1.20	1.20	10	22	13
TD-RRH8x20-25 RRH	30.8	23.3	11.4	4.97	2.43	1.32	2.71	1.20	1.21	40	20	35
TD-RRH8x20-25 RRH (Shielded)	30.8	11.6	11.4	2.48	2.43	2.64	2.71	1.21	1.21	20	20	20

WIND LOADS AT 30 MPH:

NNVV-65B-R4 Antenna	72.0	19.6	7.8	9.80	3.90	3.67	9.23	1.25	1.47	30	14	26
APXVTM14-ALU-I20 Antenna	56.3	12.6	6.3	4.93	2.46	4.47	8.94	1.29	1.46	15	9	14
PCS 1900MHZ 4X45W-65MHZ RRH	25.0	11.1	11.4	1.93	1.98	2.25	2.19	1.20	1.20	6	6	6
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	25.0	5.6	11.4	0.96	1.98	4.50	2.19	1.29	1.20	3	6	4
RRH2X50-800 RRH	15.8	13.0	14.0	1.43	1.54	1.22	1.13	1.20	1.20	4	4	4
RRH2X50-800 RRH (Shielded)	15.8	6.5	14.0	0.71	1.54	2.43	1.13	1.20	1.20	2	4	3
TD-RRH8x20-25 RRH	26.1	18.6	6.7	3.37	1.21	1.40	3.90	1.20	1.26	10	4	8
TD-RRH8x20-25 RRH (Shielded)	26.1	9.3	6.7	1.69	1.21	2.81	3.90	1.21	1.26	5	4	5

Date: 6/22/2018
Project Name: N.Coventry/Wallbeoff
Project Number: 876385
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle = 60 (deg)

Ice Thickness = 2.33 in.

Equivalent Angle = 240 (deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs) (normal)	Force (lbs) (side)	Force (lbs) (angle)
NNVV-65B-R4 Antenna	72.0	19.6	7.8	9.80	3.90	3.67	9.23	1.25	1.47	366	172	220
APXVTM14-ALU-I20 Antenna	56.3	12.6	6.3	4.93	2.46	4.47	8.94	1.29	1.46	189	108	128
PCS 1900MHZ 4X45W-65MHZ RRH	25.0	11.1	11.4	1.93	1.98	2.25	2.19	1.20	1.20	69	71	70
PCS 1900MHZ 4X45W-65MHZ RRH (	25.0	8.3	11.4	1.45	1.98	3.00	2.19	1.22	1.20	53	71	66
RRH2X50-800 RRH	15.8	13.0	14.0	1.43	1.54	1.22	1.13	1.20	1.20	51	55	54
RRH2X50-800 RRH (Shielded)	15.8	9.8	14.0	1.07	1.54	1.62	1.13	1.20	1.20	38	55	51
TD-RRH8x20-25 RRH	26.1	18.6	6.7	3.37	1.21	1.40	3.90	1.20	1.26	121	46	65
TD-RRH8x20-25 RRH (Shielded)	26.1	14.0	6.7	2.53	1.21	1.87	3.90	1.20	1.26	91	46	57

WIND LOADS WITH ICE:

NNVV-65B-R4 Antenna	76.7	24.3	12.5	12.92	6.63	3.16	6.15	1.23	1.36	108	61	73
APXVTM14-ALU-I20 Antenna	61.0	17.3	11.0	7.31	4.64	3.53	5.56	1.25	1.34	62	42	47
PCS 1900MHZ 4X45W-65MHZ RRH	29.7	15.8	16.1	3.25	3.31	1.88	1.85	1.20	1.20	26	27	27
PCS 1900MHZ 4X45W-65MHZ RRH (	29.7	11.8	16.1	2.43	3.31	2.51	1.85	1.20	1.20	20	27	25
RRH2X50-800 RRH	20.5	17.7	18.7	2.51	2.65	1.16	1.10	1.20	1.20	20	22	21
RRH2X50-800 RRH (Shielded)	20.5	13.2	18.7	1.88	2.65	1.54	1.10	1.20	1.20	15	22	20
TD-RRH8x20-25 RRH	30.8	23.3	11.4	4.97	2.43	1.32	2.71	1.20	1.21	40	20	25
TD-RRH8x20-25 RRH (Shielded)	30.8	17.4	11.4	3.73	2.43	1.76	2.71	1.20	1.21	30	20	22

WIND LOADS AT 30 MPH:

NNVV-65B-R4 Antenna	72.0	19.6	7.8	9.80	3.90	3.67	9.23	1.25	1.47	30	14	18
APXVTM14-ALU-I20 Antenna	56.3	12.6	6.3	4.93	2.46	4.47	8.94	1.29	1.46	15	9	10
PCS 1900MHZ 4X45W-65MHZ RRH	25.0	11.1	11.4	1.93	1.98	2.25	2.19	1.20	1.20	6	6	6
PCS 1900MHZ 4X45W-65MHZ RRH (	25.0	8.3	11.4	1.45	1.98	3.00	2.19	1.22	1.20	4	6	5
RRH2X50-800 RRH	15.8	13.0	14.0	1.43	1.54	1.22	1.13	1.20	1.20	4	4	4
RRH2X50-800 RRH (Shielded)	15.8	9.8	14.0	1.07	1.54	1.62	1.13	1.20	1.20	3	4	4
TD-RRH8x20-25 RRH	26.1	18.6	6.7	3.37	1.21	1.40	3.90	1.20	1.26	10	4	5
TD-RRH8x20-25 RRH (Shielded)	26.1	14.0	6.7	2.53	1.21	1.87	3.90	1.20	1.26	7	4	5

Date: 6/22/2018
Project Name: N.Coventry/Wallbeoff
Project Number: 876385
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle = 90 (deg) | Ice Thickness = 2.33 in. | Equivalent Angle = 270 (deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
NNVV-65B-R4 Antenna	72.0	19.6	7.8	9.80	3.90	3.67	9.23	1.25	1.47	366	172	172
APXVTM14-ALU-I20 Antenna	56.3	12.6	6.3	4.93	2.46	4.47	8.94	1.29	1.46	189	108	108
PCS 1900MHZ 4X45W-65MHZ RRH	25.0	11.1	11.4	1.93	1.98	2.25	2.19	1.20	1.20	69	71	71
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	25.0	0.0	11.4	0.00	1.98	0.00	2.19	1.20	1.20	0	71	71
RRH2X50-800 RRH	15.8	13.0	14.0	1.43	1.54	1.22	1.13	1.20	1.20	51	55	55
RRH2X50-800 RRH (Shielded)	15.8	0.0	14.0	0.00	1.54	0.00	1.13	1.20	1.20	0	55	55
TD-RRH8x20-25 RRH	26.1	18.6	6.7	3.37	1.21	1.40	3.90	1.20	1.26	121	46	46
TD-RRH8x20-25 RRH (Shielded)	26.1	0.0	6.7	0.00	1.21	0.00	3.90	1.20	1.26	0	46	46

WIND LOADS WITH ICE:

NNVV-65B-R4 Antenna	76.7	24.3	12.5	12.92	6.63	3.16	6.15	1.23	1.36	108	61	61
APXVTM14-ALU-I20 Antenna	61.0	17.3	11.0	7.31	4.64	3.53	5.56	1.25	1.34	62	42	42
PCS 1900MHZ 4X45W-65MHZ RRH	29.7	15.8	16.1	3.25	3.31	1.88	1.85	1.20	1.20	26	27	27
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	29.7	4.7	16.1	0.96	3.31	6.36	1.85	1.37	1.20	9	27	27
RRH2X50-800 RRH	20.5	17.7	18.7	2.51	2.65	1.16	1.10	1.20	1.20	20	22	22
RRH2X50-800 RRH (Shielded)	20.5	4.7	18.7	0.66	2.65	4.39	1.10	1.28	1.20	6	22	22
TD-RRH8x20-25 RRH	30.8	23.3	11.4	4.97	2.43	1.32	2.71	1.20	1.21	40	20	20
TD-RRH8x20-25 RRH (Shielded)	30.8	4.7	11.4	1.00	2.43	6.60	2.71	1.38	1.21	9	20	20

WIND LOADS AT 30 MPH:

NNVV-65B-R4 Antenna	72.0	19.6	7.8	9.80	3.90	3.67	9.23	1.25	1.47	30	14	14
APXVTM14-ALU-I20 Antenna	56.3	12.6	6.3	4.93	2.46	4.47	8.94	1.29	1.46	15	9	9
PCS 1900MHZ 4X45W-65MHZ RRH	25.0	11.1	11.4	1.93	1.98	2.25	2.19	1.20	1.20	6	6	6
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	25.0	0.0	11.4	0.00	1.98	0.00	2.19	1.20	1.20	0	6	6
RRH2X50-800 RRH	15.8	13.0	14.0	1.43	1.54	1.22	1.13	1.20	1.20	4	4	4
RRH2X50-800 RRH (Shielded)	15.8	0.0	14.0	0.00	1.54	0.00	1.13	1.20	1.20	0	4	4
TD-RRH8x20-25 RRH	26.1	18.6	6.7	3.37	1.21	1.40	3.90	1.20	1.26	10	4	4
TD-RRH8x20-25 RRH (Shielded)	26.1	0.0	6.7	0.00	1.21	0.00	3.90	1.20	1.26	0	4	4

Date: 6/22/2018
Project Name: N.Coventry/Wallbeoff
Project Number: 876385
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle = 120 (deg) | Ice Thickness = 2.33 in. | Equivalent Angle = 300 (deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
NNVV-65B-R4 Antenna	72.0	19.6	7.8	9.80	3.90	3.67	9.23	1.25	1.47	366	172	220
APXVTM14-ALU-I20 Antenna	56.3	12.6	6.3	4.93	2.46	4.47	8.94	1.29	1.46	189	108	128
PCS 1900MHZ 4X45W-65MHZ RRH	25.0	11.1	11.4	1.93	1.98	2.25	2.19	1.20	1.20	69	71	70
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	25.0	8.3	11.4	1.45	1.98	3.00	2.19	1.22	1.20	53	71	66
RRH2X50-800 RRH	15.8	13.0	14.0	1.43	1.54	1.22	1.13	1.20	1.20	51	55	54
RRH2X50-800 RRH (Shielded)	15.8	9.8	14.0	1.07	1.54	1.62	1.13	1.20	1.20	38	55	51
TD-RRH8x20-25 RRH	26.1	18.6	6.7	3.37	1.21	1.40	3.90	1.20	1.26	121	46	65
TD-RRH8x20-25 RRH (Shielded)	26.1	14.0	6.7	2.53	1.21	1.87	3.90	1.20	1.26	91	46	57

WIND LOADS WITH ICE:

NNVV-65B-R4 Antenna	76.7	24.3	12.5	12.92	6.63	3.16	6.15	1.23	1.36	108	61	73
APXVTM14-ALU-I20 Antenna	61.0	17.3	11.0	7.31	4.64	3.53	5.56	1.25	1.34	62	42	47
PCS 1900MHZ 4X45W-65MHZ RRH	29.7	15.8	16.1	3.25	3.31	1.88	1.85	1.20	1.20	26	27	27
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	29.7	11.8	16.1	2.43	3.31	2.51	1.85	1.20	1.20	20	27	25
RRH2X50-800 RRH	20.5	17.7	18.7	2.51	2.65	1.16	1.10	1.20	1.20	20	22	21
RRH2X50-800 RRH (Shielded)	20.5	13.2	18.7	1.88	2.65	1.54	1.10	1.20	1.20	15	22	20
TD-RRH8x20-25 RRH	30.8	23.3	11.4	4.97	2.43	1.32	2.71	1.20	1.21	40	20	25
TD-RRH8x20-25 RRH (Shielded)	30.8	17.4	11.4	3.73	2.43	1.76	2.71	1.20	1.21	30	20	22

WIND LOADS AT 30 MPH:

NNVV-65B-R4 Antenna	72.0	19.6	7.8	9.80	3.90	3.67	9.23	1.25	1.47	30	14	18
APXVTM14-ALU-I20 Antenna	56.3	12.6	6.3	4.93	2.46	4.47	8.94	1.29	1.46	15	9	10
PCS 1900MHZ 4X45W-65MHZ RRH	25.0	11.1	11.4	1.93	1.98	2.25	2.19	1.20	1.20	6	6	6
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	25.0	8.3	11.4	1.45	1.98	3.00	2.19	1.22	1.20	4	6	5
RRH2X50-800 RRH	15.8	13.0	14.0	1.43	1.54	1.22	1.13	1.20	1.20	4	4	4
RRH2X50-800 RRH (Shielded)	15.8	9.8	14.0	1.07	1.54	1.62	1.13	1.20	1.20	3	4	4
TD-RRH8x20-25 RRH	26.1	18.6	6.7	3.37	1.21	1.40	3.90	1.20	1.26	10	4	5
TD-RRH8x20-25 RRH (Shielded)	26.1	14.0	6.7	2.53	1.21	1.87	3.90	1.20	1.26	7	4	5

Date: 6/22/2018
Project Name: N.Coventry/Wallbeoff
Project Number: 876385
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	150	(deg)	Ice Thickness =	2.33	in.	Equivalent Angle =	330	(deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
NNVV-65B-R4 Antenna	72.0	19.6	7.8	9.80	3.90	3.67	9.23	1.25	1.47	366	172	318
APXVTM14-ALU-I20 Antenna	56.3	12.6	6.3	4.93	2.46	4.47	8.94	1.29	1.46	189	108	169
PCS 1900MHZ 4X45W-65MHZ RRH	25.0	11.1	11.4	1.93	1.98	2.25	2.19	1.20	1.20	69	71	70
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	25.0	5.6	11.4	0.96	1.98	4.50	2.19	1.29	1.20	37	71	46
RRH2X50-800 RRH	15.8	13.0	14.0	1.43	1.54	1.22	1.13	1.20	1.20	51	55	52
RRH2X50-800 RRH (Shielded)	15.8	6.5	14.0	0.71	1.54	2.43	1.13	1.20	1.20	26	55	33
TD-RRH8x20-25 RRH	26.1	18.6	6.7	3.37	1.21	1.40	3.90	1.20	1.26	121	46	102
TD-RRH8x20-25 RRH (Shielded)	26.1	9.3	6.7	1.69	1.21	2.81	3.90	1.21	1.26	61	46	57

WIND LOADS WITH ICE:

NNVV-65B-R4 Antenna	76.7	24.3	12.5	12.92	6.63	3.16	6.15	1.23	1.36	108	61	96
APXVTM14-ALU-I20 Antenna	61.0	17.3	11.0	7.31	4.64	3.53	5.56	1.25	1.34	62	42	57
PCS 1900MHZ 4X45W-65MHZ RRH	29.7	15.8	16.1	3.25	3.31	1.88	1.85	1.20	1.20	26	27	27
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	29.7	7.9	16.1	1.62	3.31	3.76	1.85	1.26	1.20	14	27	17
RRH2X50-800 RRH	20.5	17.7	18.7	2.51	2.65	1.16	1.10	1.20	1.20	20	22	21
RRH2X50-800 RRH (Shielded)	20.5	8.8	18.7	1.25	2.65	2.32	1.10	1.20	1.20	10	22	13
TD-RRH8x20-25 RRH	30.8	23.3	11.4	4.97	2.43	1.32	2.71	1.20	1.21	40	20	35
TD-RRH8x20-25 RRH (Shielded)	30.8	11.6	11.4	2.48	2.43	2.64	2.71	1.21	1.21	20	20	20

WIND LOADS AT 30 MPH:

NNVV-65B-R4 Antenna	72.0	19.6	7.8	9.80	3.90	3.67	9.23	1.25	1.47	30	14	26
APXVTM14-ALU-I20 Antenna	56.3	12.6	6.3	4.93	2.46	4.47	8.94	1.29	1.46	15	9	14
PCS 1900MHZ 4X45W-65MHZ RRH	25.0	11.1	11.4	1.93	1.98	2.25	2.19	1.20	1.20	6	6	6
PCS 1900MHZ 4X45W-65MHZ RRH (Shielded)	25.0	5.6	11.4	0.96	1.98	4.50	2.19	1.29	1.20	3	6	4
RRH2X50-800 RRH	15.8	13.0	14.0	1.43	1.54	1.22	1.13	1.20	1.20	4	4	4
RRH2X50-800 RRH (Shielded)	15.8	6.5	14.0	0.71	1.54	2.43	1.13	1.20	1.20	2	4	3
TD-RRH8x20-25 RRH	26.1	18.6	6.7	3.37	1.21	1.40	3.90	1.20	1.26	10	4	8
TD-RRH8x20-25 RRH (Shielded)	26.1	9.3	6.7	1.69	1.21	2.81	3.90	1.21	1.26	5	4	5

Date: 6/22/2018
Project Name: N. Coventry/Wallbeoff
Project Number: 876385
Designed By: BD **Checked By:** MSC

HUDSON Design Group LLC

ICE WEIGHT CALCULATIONS

Thickness of ice:	1	in.
Density of ice:	56	pcf

NNVV-65B-R4 Antenna

Weight of ice based on total radial SF area:

Height (in):	72.0	
Width (in):	19.6	
Depth (in):	7.8	
Total weight of ice on object:	151	lbs
Weight of object:	78	lbs
Combined weight of ice and object:	229	lbs

APXVTM14-ALU-I20 Antenna

Weight of ice based on total radial SF area:

Height (in):	56.3	
Width (in):	12.6	
Depth (in):	6.3	
Total weight of ice on object:	84	lbs
Weight of object:	57	lbs
Combined weight of ice and object:	141	lbs

PCS 1900MHZ 4X45W-65MHZ RRH

Weight of ice based on total radial SF area:

Height (in):	25.0	
Width (in):	11.1	
Depth (in):	11.4	
Total weight of ice on object:	51	lbs
Weight of object:	60	lbs
Combined weight of ice and object:	111	lbs

RRH2X50-800 RRH

Weight of ice based on total radial SF area:

Height (in):	15.8	
Width (in):	13.0	
Depth (in):	14.0	
Total weight of ice on object:	45	lbs
Weight of object:	64	lbs
Combined weight of ice and object:	109	lbs

TD-RRH8x20-25 RRH

Weight of ice based on total radial SF area:

Height (in):	26.1	
Width (in):	18.6	
Depth (in):	6.7	
Total weight of ice on object:	58	lbs
Weight of object:	70	lbs
Combined weight of ice and object:	128	lbs

C 3x3.5

Weight of ice based on total radial SF area:

Height (in):	3	
Width (in):	3.5	
Per foot weight of ice on object:	7	plf

2" pipe

Per foot weight of ice:

diameter (in):	2.38	
Per foot weight of ice on object:	4	plf

Bentley

Current Date: 6/22/2018 11:45 AM
Units system: English
File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\CROWN CASTLE\876385\876385 (MOD.).etz\

Load data

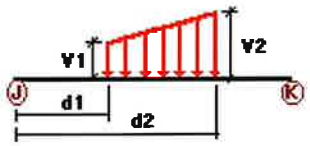
GLOSSARY

Comb : Indicates if load condition is a load combination

Load Conditions

Condition	Description	Comb.	Category
DL	Dead Load	No	DL
W0	Wind Load 0/60/120 deg	No	WIND
W30	Wind Load 30/90/150 deg	No	WIND
Di	Ice Load	No	LL
Wi0	Ice Wind Load 0/60/120 deg	No	WIND
Wi30	Ice Wind Load 30/90/150 deg	No	WIND
WL0	WL 30 mph 0/60/120 deg	No	WIND
WL30	WL 30 mph 30/90/150 deg	No	WIND
LL1	250 lb Live Load Center of Mount	No	LL
LL2	250 lb Live Load End of Mount	No	LL
LLa1	500 lb Live Load Antenna 1	No	LL
LLa2	500 lb Live Load Antenna 2	No	LL
LLa3	500 lb Live Load Antenna 3	No	LL

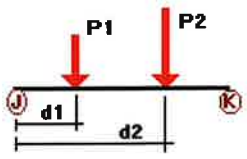
Distributed force on members



Condition	Member	Dir1	Val1 [Kip/ft]	Val2 [Kip/ft]	Dist1 [ft]	%	Dist2 [ft]	%
DL	2	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	4	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	5	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	6	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	69	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	70	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
W0	2	Z	-0.015	-0.015	0.00	Yes	100.00	Yes
	27	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	30	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	35	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	38	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	45	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	43	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	69	Z	-0.003	-0.003	0.00	Yes	100.00	Yes
	70	Z	-0.015	-0.015	0.00	Yes	100.00	Yes
W30	14	X	-0.007	-0.007	0.00	Yes	100.00	Yes

	27	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	11	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	30	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	35	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	38	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	39	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	45	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	43	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	69	x	-0.003	-0.003	0.00	Yes	100.00	Yes
	70	X	-0.015	-0.015	0.00	Yes	100.00	Yes
Di	2	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	4	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	5	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	6	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	14	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	27	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	11	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	30	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	35	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	38	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	39	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	45	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	43	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	69	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	70	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
Wi0	2	Z	-0.012	-0.012	0.00	Yes	100.00	Yes
	27	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	30	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	35	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	38	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	45	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	43	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	69	Z	-0.012	-0.012	0.00	Yes	100.00	Yes
	70	Z	-0.012	-0.012	0.00	Yes	100.00	Yes
Wi30	14	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	27	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	11	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	30	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	35	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	38	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	39	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	45	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	43	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	69	X	-0.012	-0.012	0.00	Yes	100.00	Yes
	70	X	-0.012	-0.012	0.00	Yes	100.00	Yes

Concentrated forces on members



Condition	Member	Dir1	Value1 [Kip]	Dist1 [ft]	%
DL	14	y	-0.029	0.66	No
		y	-0.029	5.34	No
		y	-0.06	2.00	No
	27	y	-0.039	0.00	No
		y	-0.039	6.00	No
		y	-0.07	2.00	No
	11	y	-0.039	0.00	No
		y	-0.039	6.00	No
		y	-0.07	2.00	No
	30	y	-0.029	0.66	No
		y	-0.029	5.34	No
		y	-0.06	2.00	No
	35	y	-0.039	0.00	No
		y	-0.039	6.00	No
		y	-0.07	2.00	No
	38	y	-0.029	0.66	No
		y	-0.029	5.34	No
		y	-0.06	2.00	No
	39	y	-0.064	2.00	No
		y	-0.064	4.00	No
	45	y	-0.064	2.00	No
		y	-0.064	4.00	No
	43	y	-0.064	2.00	No
		y	-0.064	4.00	No
W0	14	z	-0.095	0.66	No
		z	-0.095	5.34	No
	27	z	-0.11	0.00	No
		z	-0.11	6.00	No
	11	z	-0.183	0.00	No
		z	-0.183	6.00	No
	30	z	-0.064	0.66	No
		z	-0.064	5.34	No
	35	z	-0.11	0.00	No
		z	-0.11	6.00	No
	38	z	-0.064	0.66	No
		z	-0.064	5.34	No
	39	z	-0.051	2.00	No
		z	-0.051	4.00	No
	45	z	-0.054	2.00	No
		z	-0.054	4.00	No
	43	z	-0.054	2.00	No
		z	-0.054	4.00	No
W30	14	x	-0.054	0.66	No
		x	-0.054	5.34	No
		x	-0.071	2.00	No
	27	x	-0.159	0.00	No
		x	-0.159	6.00	No
		x	-0.057	2.00	No
	11	x	-0.086	0.00	No
		x	-0.086	6.00	No
		x	-0.046	2.00	No
	30	x	-0.085	0.66	No
		x	-0.085	5.34	No
		x	-0.046	2.00	No
	35	x	-0.159	0.00	No
		x	-0.159	6.00	No
		x	-0.057	2.00	No
	38	x	-0.085	0.66	No
		x	-0.085	5.34	No
		x	-0.046	2.00	No

	39	x	-0.055	2.00	No
		x	-0.055	4.00	No
	45	x	-0.052	2.00	No
		x	-0.052	4.00	No
	43	x	-0.052	2.00	No
		x	-0.052	4.00	No
Di	14	y	-0.042	0.66	No
		y	-0.042	5.34	No
		y	-0.051	2.00	No
	27	y	-0.076	0.00	No
		y	-0.076	6.00	No
		y	-0.058	2.00	No
	11	y	-0.076	0.00	No
		y	-0.076	6.00	No
		y	-0.058	2.00	No
	30	y	-0.042	0.66	No
		y	-0.042	5.34	No
		y	-0.051	2.00	No
	35	y	-0.076	0.00	No
		y	-0.076	6.00	No
		y	-0.058	2.00	No
	38	y	-0.042	0.66	No
		y	-0.042	5.34	No
		y	-0.051	2.00	No
	39	y	-0.045	2.00	No
		y	-0.045	4.00	No
	45	y	-0.045	2.00	No
		y	-0.045	4.00	No
	43	y	-0.045	2.00	No
		y	-0.045	4.00	No
Wi0	14	z	-0.032	0.66	No
		z	-0.032	5.34	No
	27	z	-0.037	0.00	No
		z	-0.037	6.00	No
	11	z	-0.055	0.00	No
		z	-0.055	6.00	No
	30	z	-0.024	0.66	No
		z	-0.024	5.34	No
	35	z	-0.037	0.00	No
		z	-0.037	6.00	No
	38	z	-0.024	0.66	No
		z	-0.024	5.34	No
	39	z	-0.02	2.00	No
		z	-0.02	4.00	No
	45	z	-0.021	2.00	No
		z	-0.021	4.00	No
	43	z	-0.021	2.00	No
		z	-0.021	4.00	No
Wi30	14	x	-0.021	0.66	No
		x	-0.021	5.34	No
		x	-0.027	2.00	No
	27	x	-0.048	0.00	No
		x	-0.048	6.00	No
		x	-0.02	2.00	No
	11	x	-0.031	0.00	No
		x	-0.031	6.00	No
		x	-0.02	2.00	No
	30	x	-0.029	0.66	No
		x	-0.029	5.34	No
		x	-0.017	2.00	No

	35	x	-0.048	0.00	No
		x	-0.048	6.00	No
		x	-0.02	2.00	No
	38	x	-0.029	0.66	No
		x	-0.029	5.34	No
		x	-0.017	2.00	No
	39	x	-0.022	2.00	No
		x	-0.022	4.00	No
	45	x	-0.021	2.00	No
		x	-0.021	4.00	No
	43	x	-0.021	2.00	No
		x	-0.021	4.00	No
WL0	14	z	-0.008	0.66	No
		z	-0.008	5.34	No
	27	z	-0.009	0.00	No
		z	-0.009	6.00	No
	11	z	-0.015	0.00	No
		z	-0.015	6.00	No
	30	z	-0.005	0.66	No
		z	-0.005	5.34	No
	35	z	-0.009	0.00	No
		z	-0.009	6.00	No
	38	z	-0.005	0.66	No
		z	-0.005	5.34	No
	39	z	-0.004	2.00	No
		z	-0.004	4.00	No
	45	z	-0.004	2.00	No
		z	-0.004	4.00	No
	43	z	-0.004	2.00	No
		z	-0.004	4.00	No
WL30	14	x	-0.005	0.66	No
		x	-0.005	5.34	No
		x	-0.006	2.00	No
	27	x	-0.013	0.00	No
		x	-0.013	6.00	No
		x	-0.005	2.00	No
	11	x	-0.007	0.00	No
		x	-0.007	6.00	No
		x	-0.004	2.00	No
	30	x	-0.007	0.66	No
		x	-0.007	5.34	No
		x	-0.004	2.00	No
	35	x	-0.013	0.00	No
		x	-0.013	6.00	No
		x	-0.005	2.00	No
	38	x	-0.007	0.66	No
		x	-0.007	5.34	No
		x	-0.004	2.00	No
	39	x	-0.004	2.00	No
		x	-0.004	4.00	No
	45	x	-0.004	2.00	No
		x	-0.004	4.00	No
	43	x	-0.004	2.00	No
		x	-0.004	4.00	No
LL1	2	y	-0.25	6.10	No
LL2	2	y	-0.25	0.00	No
LLa1	14	y	-0.50	3.00	No
LLa2	11	y	-0.50	3.00	No

Self weight multipliers for load conditions

Condition	Description	Self weight multiplier			
		Comb.	MultX	MultY	MultZ
DL	Dead Load	No	0.00	0.00	0.00
W0	Wind Load 0/60/120 deg	No	0.00	0.00	0.00
W30	Wind Load 30/90/150 deg	No	0.00	0.00	0.00
Di	Ice Load	No	0.00	0.00	0.00
Wi0	Ice Wind Load 0/60/120 deg	No	0.00	0.00	0.00
Wi30	Ice Wind Load 30/90/150 deg	No	0.00	0.00	0.00
WL0	WL 30 mph 0/60/120 deg	No	0.00	0.00	0.00
WL30	WL 30 mph 30/90/150 deg	No	0.00	0.00	0.00
LL1	250 lb Live Load Center of Mount	No	0.00	0.00	0.00
LL2	250 lb Live Load End of Mount	No	0.00	0.00	0.00
LLa1	500 lb Live Load Antenna 1	No	0.00	0.00	0.00
LLa2	500 lb Live Load Antenna 2	No	0.00	0.00	0.00
LLa3	500 lb Live Load Antenna 3	No	0.00	0.00	0.00

Earthquake (Dynamic analysis only)

Condition	a/g	Ang. [Deg]	Damp. [%]
DL	0.00	0.00	0.00
W0	0.00	0.00	0.00
W30	0.00	0.00	0.00
Di	0.00	0.00	0.00
Wi0	0.00	0.00	0.00
Wi30	0.00	0.00	0.00
WL0	0.00	0.00	0.00
WL30	0.00	0.00	0.00
LL1	0.00	0.00	0.00
LL2	0.00	0.00	0.00
LLa1	0.00	0.00	0.00
LLa2	0.00	0.00	0.00
LLa3	0.00	0.00	0.00

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Geometry data

GLOSSARY

Cb22, Cb33	: Moment gradient coefficients
Cm22, Cm33	: Coefficients applied to bending term in interaction formula
d0	: Tapered member section depth at J end of member
DJX	: Rigid end offset distance measured from J node in axis X
DJY	: Rigid end offset distance measured from J node in axis Y
DJZ	: Rigid end offset distance measured from J node in axis Z
DKX	: Rigid end offset distance measured from K node in axis X
DKY	: Rigid end offset distance measured from K node in axis Y
DKZ	: Rigid end offset distance measured from K node in axis Z
dL	: Tapered member section depth at K end of member
Ig factor	: Inertia reduction factor (Effective Inertia/Gross Inertia) for reinforced concrete members
K22	: Effective length factor about axis 2
K33	: Effective length factor about axis 3
L22	: Member length for calculation of axial capacity
L33	: Member length for calculation of axial capacity
LB pos	: Lateral unbraced length of the compression flange in the positive side of local axis 2
LB neg	: Lateral unbraced length of the compression flange in the negative side of local axis 2
RX	: Rotation about X
RY	: Rotation about Y
RZ	: Rotation about Z
TO	: 1 = Tension only member 0 = Normal member
TX	: Translation in X
TY	: Translation in Y
TZ	: Translation in Z

Nodes

Node	X [ft]	Y [ft]	Z [ft]	Rigid Floor
1	0.00	0.00	0.00	0
4	-2.80	0.00	-2.1651	0
5	2.80	0.00	-2.1651	0
10	-0.475	0.00	3.5074	0
11	-3.275	0.00	-1.3423	0
14	-6.0708	0.00	3.505	0
17	3.275	0.00	-1.3423	0
18	0.475	0.00	3.5074	0
184	-1.875	0.00	1.0825	0
186	0.00	0.00	-2.1651	0
187	1.875	0.00	1.0825	0
188	-5.0708	0.00	3.505	0
189	5.0708	0.00	3.505	0
192	-5.0708	0.00	3.705	0
195	5.0708	0.00	3.705	0
196	-5.0708	-3.00	3.705	0
199	5.0708	-3.00	3.705	0
200	5.0708	3.00	3.705	0
201	-5.0708	3.00	3.705	0
236	0.6732	3.00	-6.244	0
224	5.5708	0.00	2.639	0
225	0.50	0.00	-6.144	0

228	5.744	0.00	2.539	0
231	0.6732	0.00	-6.244	0
232	5.744	-3.00	2.539	0
235	0.6732	-3.00	-6.244	0
237	5.744	3.00	2.539	0
240	-0.50	0.00	-6.144	0
241	-5.5708	0.00	2.639	0
244	-0.6732	0.00	-6.244	0
247	-5.744	0.00	2.539	0
251	-5.744	-3.00	2.539	0
248	-0.6732	-3.00	-6.244	0
253	-0.6732	3.00	-6.244	0
252	-5.744	3.00	2.539	0
256	0.0008	0.00	3.705	0
257	0.0008	0.00	3.505	0
258	0.0008	-3.00	3.705	0
259	0.0008	3.00	3.705	0
265	3.2082	0.00	-1.8532	0
266	3.035	0.00	-1.7532	0
267	3.2082	-3.00	-1.8532	0
268	3.2082	3.00	-1.8532	0
269	-3.209	0.00	-1.8518	0
270	-3.0358	0.00	-1.7518	0
271	-3.209	-3.00	-1.8518	0
272	-3.209	3.00	-1.8518	0
310	6.0708	0.00	3.505	0
312	0.00	0.00	-7.01	0
316	0.9375	-3.00	0.5413	0
317	0.00	-3.00	-1.0826	0
318	-0.9375	-3.00	0.5413	0

Restraints

Node	TX	TY	TZ	RX	RY	RZ
184	1	1	1	1	1	1
186	1	1	1	1	1	1
187	1	1	1	1	1	1
316	1	1	1	1	1	1
317	1	1	1	1	1	1
318	1	1	1	1	1	1

Members

Member	NJ	NK	Description	Section	Material	d0 [in]	dL [in]	lg factor
2	14	310		C 3X3.5	A36	0.00	0.00	0.00
4	17	18		C 3X3.5	A36	0.00	0.00	0.00
5	10	11		C 3X3.5	A36	0.00	0.00	0.00
6	4	5		C 3X3.5	A36	0.00	0.00	0.00
14	200	199		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
27	237	232		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00

11	201	196	PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
30	236	235	PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
35	253	248	PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
38	252	251	PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
39	259	258	PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
45	272	271	PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
43	268	267	PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
69	312	310	C 3X3.5	A36	0.00	0.00	0.00
70	14	312	C 3X3.5	A36	0.00	0.00	0.00
71	14	318	T2L 3X3X1_4X3_8	A36	0.00	0.00	0.00
72	316	310	T2L 3X3X1_4X3_8	A36	0.00	0.00	0.00
73	317	312	T2L 3X3X1_4X3_8	A36	0.00	0.00	0.00

Orientation of local axes

Member	Rotation [Deg]	Axes23	NX	NY	NZ
2	180.00	0	0.00	0.00	0.00
14	0.00	2	-1.00	0.00	0.00
27	0.00	2	0.50	0.00	0.866
11	0.00	2	-1.00	0.00	0.00
30	0.00	2	0.50	0.00	0.866
35	0.00	2	0.50	0.00	-0.866
38	0.00	2	0.50	0.00	-0.866
39	0.00	2	-1.00	0.00	0.00
45	0.00	2	0.50	0.00	-0.866
43	0.00	2	0.50	0.00	0.866

APPENDIX C

RAM ELEMENTS ANALYSIS OUTPUT

Bentley

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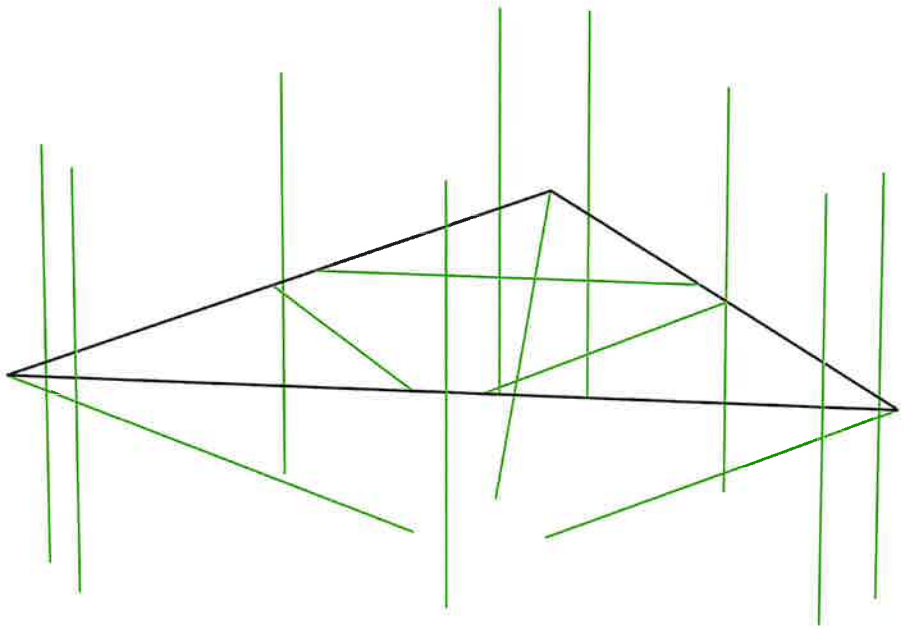
Design status

- Not designed
- Error on design
- Design O.K.
- With warnings



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Steel Code Check

Report: Summary - For all selected load conditions

Load conditions to be included in design :

W180=-W0
W210=-W30
Wi180=-Wi0
Wi210=-Wi30
WL180=-WL0
WL210=-WL30
LC1=1.2DL+1.6W0
LC2=1.2DL+1.6W30
LC3=1.2DL-1.6W0
LC4=1.2DL-1.6W30
LC5=0.9DL+1.6W0
LC6=0.9DL+1.6W30
LC7=0.9DL-1.6W0
LC8=0.9DL-1.6W30
LC9=1.2DL+Di+Wi0
LC10=1.2DL+Di+Wi30
LC11=1.2DL+Di-Wi0
LC12=1.2DL+Di-Wi30
LC13=1.2DL
LC14=0.9DL
LC15=1.2DL+1.5LL1
LC16=1.2DL+1.5LL2
LC17=1.2DL+WL0+1.5LLa1
LC18=1.2DL+WL30+1.5LLa1
LC19=1.2DL-WL0+1.5LLa1
LC20=1.2DL-WL30+1.5LLa1
LC21=1.2DL+WL0+1.5LLa2
LC22=1.2DL+WL30+1.5LLa2
LC23=1.2DL-WL0+1.5LLa2
LC24=1.2DL-WL30+1.5LLa2
LC25=1.2DL+WL0+1.5LLa3
LC26=1.2DL+WL30+1.5LLa3
LC27=1.2DL-WL0+1.5LLa3
LC28=1.2DL-WL30+1.5LLa3

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	C 3X3.5	**2**	LC1 at 0.00%	**0.98**	**With warnings**	Eq. H1-1b
			LC10 at 53.13%	0.25	With warnings	
			LC11 at 0.00%	0.29	With warnings	
			LC12 at 100.00%	0.27	With warnings	
			LC13 at 100.00%	0.08	With warnings	
			LC14 at 100.00%	0.06	With warnings	
			LC15 at 0.00%	0.12	With warnings	
			LC16 at 53.13%	0.18	With warnings	
			LC17 at 46.88%	0.32	With warnings	
			LC18 at 91.67%	0.30	With warnings	
			LC19 at 46.88%	0.34	With warnings	
			LC2 at 53.13%	0.73	With warnings	Eq. H1-1b
			LC20 at 46.88%	0.36	With warnings	
			LC21 at 53.13%	0.32	With warnings	
			LC22 at 53.13%	0.36	With warnings	

	LC23 at 8.33%	0.34	With warnings	
	LC24 at 8.33%	0.32	With warnings	
	LC25 at 0.00%	0.12	With warnings	
	LC26 at 0.00%	0.09	With warnings	
	LC27 at 0.00%	0.10	With warnings	
	LC28 at 100.00%	0.10	With warnings	
	LC3 at 0.00%	0.81	With warnings	
	LC4 at 46.88%	0.73	With warnings	Eq. H1-1b
	LC5 at 0.00%	0.96	With warnings	
	LC6 at 53.13%	0.72	With warnings	
	LC7 at 0.00%	0.87	With warnings	
	LC8 at 46.88%	0.72	With warnings	
	LC9 at 0.00%	0.37	With warnings	
	W180 at 0.00%	0.69	With warnings	
	W210 at 45.83%	0.48	With warnings	
	Wi180 at 0.00%	0.25	With warnings	
	Wi210 at 53.13%	0.23	With warnings	
	WL180 at 0.00%	0.05	With warnings	
	WL210 at 46.88%	0.03	With warnings	
4	LC1 at 0.00%	0.50	OK	
	LC10 at 50.00%	0.45	OK	
	LC11 at 46.88%	0.43	OK	
	LC12 at 50.00%	0.48	OK	
	LC13 at 50.00%	0.17	OK	
	LC14 at 50.00%	0.13	OK	
	LC15 at 50.00%	0.37	OK	
	LC16 at 50.00%	0.28	OK	
	LC17 at 50.00%	0.54	OK	
	LC18 at 50.00%	0.52	OK	
	LC19 at 50.00%	0.55	OK	
	LC2 at 100.00%	0.72	OK	Eq. H1-1b
	LC20 at 50.00%	0.57	OK	
	LC21 at 50.00%	0.43	OK	
	LC22 at 50.00%	0.45	OK	
	LC23 at 50.00%	0.43	OK	
	LC24 at 50.00%	0.41	OK	
	LC25 at 46.88%	0.17	OK	
	LC26 at 50.00%	0.19	OK	
	LC27 at 46.88%	0.18	OK	
	LC28 at 50.00%	0.19	OK	
	LC3 at 0.00%	0.58	OK	
	LC4 at 100.00%	**0.85**	**OK**	Eq. H1-1a
	LC5 at 0.00%	0.50	OK	
	LC6 at 100.00%	0.71	OK	
	LC7 at 0.00%	0.57	OK	
	LC8 at 100.00%	0.84	OK	
	LC9 at 46.88%	0.40	OK	
	W180 at 0.00%	0.35	OK	
	W210 at 100.00%	0.50	OK	
	Wi180 at 0.00%	0.21	OK	
	Wi210 at 100.00%	0.24	OK	
	WL180 at 0.00%	0.02	OK	
	WL210 at 100.00%	0.03	OK	
5	LC1 at 50.00%	0.64	OK	Eq. H1-1b
	LC10 at 46.88%	0.46	OK	
	LC11 at 50.00%	0.46	OK	
	LC12 at 46.88%	0.41	OK	
	LC13 at 50.00%	0.17	OK	
	LC14 at 50.00%	0.13	OK	
	LC15 at 46.88%	0.35	OK	
	LC16 at 50.00%	0.32	OK	
	LC17 at 46.88%	0.39	OK	

	LC18 at 46.88%	0.37	OK	
	LC19 at 46.88%	0.39	OK	
	LC2 at 0.00%	**0.85**	**OK**	Eq. H1-1a
	LC20 at 46.88%	0.41	OK	
	LC21 at 46.88%	0.49	OK	
	LC22 at 46.88%	0.52	OK	
	LC23 at 46.88%	0.50	OK	
	LC24 at 46.88%	0.47	OK	
	LC25 at 50.00%	0.19	OK	
	LC26 at 50.00%	0.19	OK	
	LC27 at 50.00%	0.19	OK	
	LC28 at 50.00%	0.18	OK	
	LC3 at 100.00%	0.74	OK	Eq. H1-1a
	LC4 at 0.00%	0.72	OK	Eq. H1-1b
	LC5 at 100.00%	0.60	OK	
	LC6 at 0.00%	0.85	OK	
	LC7 at 100.00%	0.74	OK	
	LC8 at 0.00%	0.72	OK	
	LC9 at 50.00%	0.44	OK	
	W180 at 100.00%	0.43	OK	
	W210 at 0.00%	0.45	OK	
	Wi180 at 100.00%	0.22	OK	
	Wi210 at 0.00%	0.22	OK	
	WL180 at 100.00%	0.02	OK	
	WL210 at 0.00%	0.03	OK	
6	LC1 at 0.00%	**0.76**	**OK**	Eq. H1-1b
	LC10 at 50.00%	0.39	OK	
	LC11 at 50.00%	0.43	OK	
	LC12 at 50.00%	0.42	OK	
	LC13 at 50.00%	0.17	OK	
	LC14 at 50.00%	0.13	OK	
	LC15 at 50.00%	0.17	OK	
	LC16 at 46.88%	0.25	OK	
	LC17 at 50.00%	0.31	OK	
	LC18 at 50.00%	0.30	OK	
	LC19 at 50.00%	0.33	OK	
	LC2 at 46.88%	0.48	OK	
	LC20 at 50.00%	0.34	OK	
	LC21 at 46.88%	0.27	OK	
	LC22 at 46.88%	0.30	OK	
	LC23 at 46.88%	0.30	OK	
	LC24 at 46.88%	0.27	OK	
	LC25 at 50.00%	0.19	OK	
	LC26 at 50.00%	0.18	OK	
	LC27 at 50.00%	0.18	OK	
	LC28 at 50.00%	0.19	OK	
	LC3 at 0.00%	0.69	OK	Eq. H1-1b
	LC4 at 50.00%	0.57	OK	
	LC5 at 0.00%	0.75	OK	
	LC6 at 100.00%	0.47	OK	
	LC7 at 0.00%	0.68	OK	
	LC8 at 50.00%	0.53	OK	
	LC9 at 50.00%	0.48	OK	
	W180 at 0.00%	0.42	OK	
	W210 at 0.00%	0.26	OK	
	Wi180 at 0.00%	0.22	OK	
	Wi210 at 0.00%	0.13	OK	
	WL180 at 0.00%	0.02	OK	
	WL210 at 100.00%	0.02	OK	
69	LC1 at 53.13%	0.57	With warnings	
	LC10 at 100.00%	0.43	With warnings	
	LC11 at 0.00%	0.27	With warnings	

	LC12 at 100.00%	0.35	With warnings	
	LC13 at 0.00%	0.08	With warnings	
	LC14 at 0.00%	0.06	With warnings	
	LC15 at 100.00%	0.11	With warnings	
	LC16 at 100.00%	0.08	With warnings	
	LC17 at 100.00%	0.32	With warnings	
	LC18 at 100.00%	0.29	With warnings	
	LC19 at 100.00%	0.32	With warnings	
	LC2 at 100.00%	**0.97**	**With warnings**	Eq. H1-1b
	LC20 at 100.00%	0.35	With warnings	
	LC21 at 0.00%	0.09	With warnings	
	LC22 at 100.00%	0.12	With warnings	
	LC23 at 100.00%	0.09	With warnings	
	LC24 at 100.00%	0.09	With warnings	
	LC25 at 0.00%	0.10	With warnings	
	LC26 at 100.00%	0.12	With warnings	
	LC27 at 100.00%	0.09	With warnings	
	LC28 at 100.00%	0.10	With warnings	
	LC3 at 53.13%	0.60	With warnings	Eq. H1-1b
	LC4 at 100.00%	0.81	With warnings	
	LC5 at 53.13%	0.57	With warnings	
	LC6 at 100.00%	0.95	With warnings	
	LC7 at 53.13%	0.59	With warnings	
	LC8 at 100.00%	0.83	With warnings	
	LC9 at 0.00%	0.31	With warnings	
	W180 at 53.13%	0.36	With warnings	
	W210 at 45.83%	0.65	With warnings	
	Wi180 at 53.13%	0.23	With warnings	
	Wi210 at 45.83%	0.36	With warnings	
	WL180 at 53.13%	0.02	With warnings	
	WL210 at 100.00%	0.04	With warnings	
70	LC1 at 46.88%	0.72	With warnings	
	LC10 at 0.00%	0.35	With warnings	
	LC11 at 100.00%	0.31	With warnings	
	LC12 at 100.00%	0.37	With warnings	
	LC13 at 0.00%	0.08	With warnings	
	LC14 at 0.00%	0.06	With warnings	
	LC15 at 0.00%	0.12	With warnings	
	LC16 at 53.13%	0.18	With warnings	
	LC17 at 100.00%	0.08	With warnings	
	LC18 at 0.00%	0.09	With warnings	
	LC19 at 100.00%	0.10	With warnings	
	LC2 at 54.17%	0.84	With warnings	
	LC20 at 100.00%	0.11	With warnings	
	LC21 at 0.00%	0.32	With warnings	
	LC22 at 0.00%	0.35	With warnings	
	LC23 at 0.00%	0.33	With warnings	
	LC24 at 0.00%	0.31	With warnings	
	LC25 at 100.00%	0.09	With warnings	
	LC26 at 0.00%	0.10	With warnings	
	LC27 at 100.00%	0.10	With warnings	
	LC28 at 100.00%	0.11	With warnings	
	LC3 at 46.88%	0.75	With warnings	Eq. H1-1b
	LC4 at 100.00%	0.86	With warnings	Eq. H1-1b
	LC5 at 45.83%	0.78	With warnings	Eq. H1-1a
	LC6 at 54.17%	**0.92**	**With warnings**	Eq. H1-1a
	LC7 at 46.88%	0.74	With warnings	
	LC8 at 100.00%	0.84	With warnings	
	LC9 at 100.00%	0.29	With warnings	
	W180 at 46.88%	0.45	With warnings	
	W210 at 100.00%	0.48	With warnings	
	Wi180 at 46.88%	0.24	With warnings	
	Wi210 at 53.13%	0.22	With warnings	

		WL180 at 46.88%	0.02	With warnings	
		WL210 at 100.00%	0.03	With warnings	
PIPE 2x0.154	**14**	LC1 at 50.00%	0.29	OK	
		LC10 at 46.88%	0.08	OK	
		LC11 at 46.88%	0.06	OK	
		LC12 at 46.88%	0.08	OK	
		LC13 at 34.38%	0.01	OK	
		LC14 at 34.38%	0.01	OK	
		LC15 at 34.38%	0.01	OK	
		LC16 at 34.38%	0.01	OK	
		LC17 at 46.88%	0.02	OK	
		LC18 at 46.88%	0.02	OK	
		LC19 at 46.88%	0.02	OK	
		LC2 at 46.88%	0.26	OK	
		LC20 at 46.88%	0.02	OK	
		LC21 at 46.88%	0.02	OK	
		LC22 at 46.88%	0.02	OK	
		LC23 at 46.88%	0.02	OK	
		LC24 at 46.88%	0.02	OK	
		LC25 at 46.88%	0.02	OK	
		LC26 at 46.88%	0.02	OK	
		LC27 at 46.88%	0.02	OK	
		LC28 at 46.88%	0.02	OK	
		LC3 at 50.00%	**0.29**	**OK**	Eq. H1-1b
		LC4 at 46.88%	0.26	OK	
		LC5 at 50.00%	0.29	OK	
		LC6 at 46.88%	0.26	OK	
		LC7 at 50.00%	0.29	OK	
		LC8 at 46.88%	0.26	OK	
		LC9 at 46.88%	0.06	OK	
		W180 at 50.00%	0.18	OK	
		W210 at 46.88%	0.16	OK	
		Wi180 at 50.00%	0.06	OK	
		Wi210 at 46.88%	0.08	OK	
		WL180 at 50.00%	0.02	OK	
		WL210 at 46.88%	0.01	OK	
	27	LC1 at 50.00%	0.64	OK	
		LC10 at 46.88%	0.21	OK	
		LC11 at 50.00%	0.16	OK	
		LC12 at 46.88%	0.21	OK	
		LC13 at 34.38%	0.01	OK	
		LC14 at 34.38%	0.01	OK	
		LC15 at 34.38%	0.01	OK	
		LC16 at 34.38%	0.01	OK	
		LC17 at 50.00%	0.03	OK	
		LC18 at 46.88%	0.05	OK	
		LC19 at 50.00%	0.03	OK	
		LC2 at 46.88%	0.92	OK	
		LC20 at 46.88%	0.05	OK	
		LC21 at 50.00%	0.03	OK	
		LC22 at 46.88%	0.05	OK	
		LC23 at 50.00%	0.03	OK	
		LC24 at 46.88%	0.05	OK	
		LC25 at 50.00%	0.03	OK	
		LC26 at 46.88%	0.05	OK	
		LC27 at 50.00%	0.03	OK	
		LC28 at 46.88%	0.05	OK	
		LC3 at 50.00%	0.64	OK	
		LC4 at 46.88%	**0.92**	**OK**	Eq. H1-1b
		LC5 at 50.00%	0.64	OK	
		LC6 at 46.88%	0.92	OK	
		LC7 at 50.00%	0.64	OK	

	LC8 at 46.88%	0.92	OK	
	LC9 at 50.00%	0.16	OK	
	W180 at 50.00%	0.40	OK	
	W210 at 46.88%	0.57	OK	
	Wi180 at 50.00%	0.16	OK	
	Wi210 at 46.88%	0.20	OK	
	WL180 at 50.00%	0.03	OK	
	WL210 at 46.88%	0.04	OK	
11	LC1 at 50.00%	**0.71**	**OK**	Eq. H1-1b
	LC10 at 46.88%	0.12	OK	
	LC11 at 50.00%	0.14	OK	
	LC12 at 46.88%	0.12	OK	
	LC13 at 34.38%	0.01	OK	
	LC14 at 34.38%	0.01	OK	
	LC15 at 34.38%	0.01	OK	
	LC16 at 34.38%	0.01	OK	
	LC17 at 46.88%	0.04	OK	
	LC18 at 46.88%	0.02	OK	
	LC19 at 46.88%	0.04	OK	
	LC2 at 46.88%	0.40	OK	
	LC20 at 46.88%	0.02	OK	
	LC21 at 46.88%	0.04	OK	
	LC22 at 46.88%	0.02	OK	
	LC23 at 46.88%	0.04	OK	
	LC24 at 46.88%	0.02	OK	
	LC25 at 46.88%	0.04	OK	
	LC26 at 46.88%	0.02	OK	
	LC27 at 46.88%	0.04	OK	
	LC28 at 46.88%	0.02	OK	
	LC3 at 50.00%	0.71	OK	
	LC4 at 46.88%	0.40	OK	
	LC5 at 50.00%	0.71	OK	
	LC6 at 46.88%	0.40	OK	
	LC7 at 50.00%	0.71	OK	
	LC8 at 46.88%	0.40	OK	
	LC9 at 50.00%	0.14	OK	
	W180 at 50.00%	0.44	OK	
	W210 at 46.88%	0.25	OK	
	Wi180 at 50.00%	0.13	OK	
	Wi210 at 46.88%	0.11	OK	
	WL180 at 50.00%	0.04	OK	
	WL210 at 46.88%	0.02	OK	
30	LC1 at 50.00%	0.32	OK	
	LC10 at 46.88%	0.12	OK	
	LC11 at 50.00%	0.10	OK	
	LC12 at 46.88%	0.12	OK	
	LC13 at 34.38%	0.01	OK	
	LC14 at 34.38%	0.01	OK	
	LC15 at 34.38%	0.01	OK	
	LC16 at 34.38%	0.01	OK	
	LC17 at 50.00%	0.01	OK	
	LC18 at 46.88%	0.02	OK	
	LC19 at 50.00%	0.01	OK	
	LC2 at 46.88%	0.44	OK	
	LC20 at 46.88%	0.02	OK	
	LC21 at 50.00%	0.01	OK	
	LC22 at 46.88%	0.02	OK	
	LC23 at 50.00%	0.01	OK	
	LC24 at 46.88%	0.02	OK	
	LC25 at 50.00%	0.01	OK	
	LC26 at 46.88%	0.02	OK	
	LC27 at 50.00%	0.01	OK	

	LC28 at 46.88%	0.02	OK	
	LC3 at 50.00%	0.32	OK	
	LC4 at 46.88%	**0.44**	**OK**	Eq. H1-1b
	LC5 at 50.00%	0.32	OK	
	LC6 at 46.88%	0.44	OK	
	LC7 at 50.00%	0.32	OK	
	LC8 at 46.88%	0.44	OK	
	LC9 at 50.00%	0.10	OK	
	W180 at 50.00%	0.20	OK	
	W210 at 46.88%	0.27	OK	
	Wi180 at 50.00%	0.10	OK	
	Wi210 at 46.88%	0.11	OK	
	WL180 at 50.00%	0.01	OK	
	WL210 at 46.88%	0.02	OK	
35	LC1 at 50.00%	0.64	OK	
	LC10 at 46.88%	0.21	OK	
	LC11 at 50.00%	0.16	OK	
	LC12 at 46.88%	0.21	OK	
	LC13 at 34.38%	0.01	OK	
	LC14 at 34.38%	0.01	OK	
	LC15 at 34.38%	0.01	OK	
	LC16 at 34.38%	0.01	OK	
	LC17 at 50.00%	0.03	OK	
	LC18 at 46.88%	0.05	OK	
	LC19 at 50.00%	0.03	OK	
	LC2 at 46.88%	**0.92**	**OK**	Eq. H1-1b
	LC20 at 46.88%	0.05	OK	
	LC21 at 50.00%	0.03	OK	
	LC22 at 46.88%	0.05	OK	
	LC23 at 50.00%	0.03	OK	
	LC24 at 46.88%	0.05	OK	
	LC25 at 50.00%	0.03	OK	
	LC26 at 46.88%	0.05	OK	
	LC27 at 50.00%	0.03	OK	
	LC28 at 46.88%	0.05	OK	
	LC3 at 50.00%	0.64	OK	
	LC4 at 46.88%	0.92	OK	
	LC5 at 50.00%	0.64	OK	
	LC6 at 46.88%	0.92	OK	
	LC7 at 50.00%	0.64	OK	
	LC8 at 46.88%	0.92	OK	
	LC9 at 50.00%	0.16	OK	
	W180 at 50.00%	0.40	OK	
	W210 at 46.88%	0.57	OK	
	Wi180 at 50.00%	0.16	OK	
	Wi210 at 46.88%	0.20	OK	
	WL180 at 50.00%	0.03	OK	
	WL210 at 46.88%	0.04	OK	
38	LC1 at 50.00%	0.32	OK	
	LC10 at 46.88%	0.12	OK	
	LC11 at 50.00%	0.10	OK	
	LC12 at 46.88%	0.12	OK	
	LC13 at 34.38%	0.01	OK	
	LC14 at 34.38%	0.01	OK	
	LC15 at 34.38%	0.01	OK	
	LC16 at 34.38%	0.01	OK	
	LC17 at 50.00%	0.01	OK	
	LC18 at 46.88%	0.02	OK	
	LC19 at 50.00%	0.01	OK	
	LC2 at 46.88%	0.44	OK	
	LC20 at 46.88%	0.02	OK	
	LC21 at 50.00%	0.01	OK	

	LC22 at 46.88%	0.02	OK	
	LC23 at 50.00%	0.01	OK	
	LC24 at 46.88%	0.02	OK	
	LC25 at 50.00%	0.01	OK	
	LC26 at 46.88%	0.02	OK	
	LC27 at 50.00%	0.01	OK	
	LC28 at 46.88%	0.02	OK	
	LC3 at 50.00%	0.32	OK	
	LC4 at 46.88%	**0.44**	**OK**	Eq. H1-1b
	LC5 at 50.00%	0.32	OK	
	LC6 at 46.88%	0.44	OK	
	LC7 at 50.00%	0.32	OK	
	LC8 at 46.88%	0.44	OK	
	LC9 at 50.00%	0.10	OK	
	W180 at 50.00%	0.20	OK	
	W210 at 46.88%	0.27	OK	
	Wi180 at 50.00%	0.10	OK	
	Wi210 at 46.88%	0.11	OK	
	WL180 at 50.00%	0.01	OK	
	WL210 at 46.88%	0.02	OK	
39	LC1 at 50.00%	0.07	OK	
	LC10 at 50.00%	0.05	OK	
	LC11 at 50.00%	0.02	OK	
	LC12 at 50.00%	0.05	OK	
	LC13 at 34.38%	0.01	OK	
	LC14 at 34.38%	0.00	OK	
	LC15 at 34.38%	0.01	OK	
	LC16 at 34.38%	0.01	OK	
	LC17 at 34.38%	0.01	OK	
	LC18 at 34.38%	0.01	OK	
	LC19 at 34.38%	0.01	OK	
	LC2 at 50.00%	**0.11**	**OK**	Eq. H1-1b
	LC20 at 34.38%	0.01	OK	
	LC21 at 34.38%	0.01	OK	
	LC22 at 34.38%	0.01	OK	
	LC23 at 34.38%	0.01	OK	
	LC24 at 34.38%	0.01	OK	
	LC25 at 34.38%	0.01	OK	
	LC26 at 34.38%	0.01	OK	
	LC27 at 34.38%	0.01	OK	
	LC28 at 34.38%	0.01	OK	
	LC3 at 50.00%	0.07	OK	
	LC4 at 50.00%	0.11	OK	
	LC5 at 50.00%	0.07	OK	
	LC6 at 50.00%	0.11	OK	
	LC7 at 50.00%	0.07	OK	
	LC8 at 50.00%	0.11	OK	
	LC9 at 50.00%	0.02	OK	
	W180 at 50.00%	0.04	OK	
	W210 at 50.00%	0.07	OK	
	Wi180 at 50.00%	0.02	OK	
	Wi210 at 50.00%	0.04	OK	
	WL180 at 50.00%	0.00	OK	
	WL210 at 50.00%	0.00	OK	
45	LC1 at 50.00%	**0.15**	**OK**	Eq. H1-1b
	LC10 at 50.00%	0.06	OK	
	LC11 at 50.00%	0.06	OK	
	LC12 at 50.00%	0.06	OK	
	LC13 at 34.38%	0.01	OK	
	LC14 at 34.38%	0.00	OK	
	LC15 at 34.38%	0.01	OK	
	LC16 at 34.38%	0.01	OK	

		LC17 at 50.00%	0.01	OK	
		LC18 at 46.88%	0.01	OK	
		LC19 at 50.00%	0.01	OK	
		LC2 at 50.00%	0.15	OK	
		LC20 at 46.88%	0.01	OK	
		LC21 at 50.00%	0.01	OK	
		LC22 at 46.88%	0.01	OK	
		LC23 at 50.00%	0.01	OK	
		LC24 at 46.88%	0.01	OK	
		LC25 at 50.00%	0.01	OK	
		LC26 at 46.88%	0.01	OK	
		LC27 at 50.00%	0.01	OK	
		LC28 at 46.88%	0.01	OK	
		LC3 at 50.00%	0.15	OK	
		LC4 at 50.00%	0.15	OK	
		LC5 at 50.00%	0.15	OK	
		LC6 at 50.00%	0.15	OK	
		LC7 at 50.00%	0.15	OK	
		LC8 at 50.00%	0.15	OK	
		LC9 at 50.00%	0.06	OK	
		W180 at 50.00%	0.09	OK	
		W210 at 50.00%	0.09	OK	
		Wi180 at 50.00%	0.06	OK	
		Wi210 at 50.00%	0.06	OK	
		WL180 at 50.00%	0.00	OK	
		WL210 at 50.00%	0.00	OK	
	43	LC1 at 50.00%	**0.15**	**OK**	Eq. H1-1b
		LC10 at 50.00%	0.06	OK	
		LC11 at 50.00%	0.06	OK	
		LC12 at 50.00%	0.06	OK	
		LC13 at 34.38%	0.01	OK	
		LC14 at 34.38%	0.00	OK	
		LC15 at 34.38%	0.01	OK	
		LC16 at 34.38%	0.01	OK	
		LC17 at 50.00%	0.01	OK	
		LC18 at 46.88%	0.01	OK	
		LC19 at 50.00%	0.01	OK	
		LC2 at 50.00%	0.15	OK	
		LC20 at 46.88%	0.01	OK	
		LC21 at 50.00%	0.01	OK	
		LC22 at 46.88%	0.01	OK	
		LC23 at 50.00%	0.01	OK	
		LC24 at 46.88%	0.01	OK	
		LC25 at 50.00%	0.01	OK	
		LC26 at 46.88%	0.01	OK	
		LC27 at 50.00%	0.01	OK	
		LC28 at 46.88%	0.01	OK	
		LC3 at 50.00%	0.15	OK	
		LC4 at 50.00%	0.15	OK	
		LC5 at 50.00%	0.15	OK	
		LC6 at 50.00%	0.15	OK	
		LC7 at 50.00%	0.15	OK	
		LC8 at 50.00%	0.15	OK	
		LC9 at 50.00%	0.06	OK	
		W180 at 50.00%	0.09	OK	
		W210 at 50.00%	0.09	OK	
		Wi180 at 50.00%	0.06	OK	
		Wi210 at 50.00%	0.06	OK	
		WL180 at 50.00%	0.00	OK	
		WL210 at 50.00%	0.00	OK	
T2L 3X3X1_4X3_8	**71**	LC1 at 0.00%	0.18	OK	
		LC10 at 100.00%	0.24	OK	

	LC11 at 100.00%	0.23	OK	
	LC12 at 0.00%	0.19	OK	
	LC13 at 0.00%	0.09	OK	
	LC14 at 0.00%	0.07	OK	
	LC15 at 0.00%	0.12	OK	
	LC16 at 100.00%	0.16	OK	
	LC17 at 0.00%	0.10	OK	
	LC18 at 0.00%	0.09	OK	
	LC19 at 0.00%	0.09	OK	
	LC2 at 100.00%	**0.32**	**OK**	Eq. H2-1
	LC20 at 0.00%	0.09	OK	
	LC21 at 100.00%	0.28	OK	
	LC22 at 100.00%	0.29	OK	
	LC23 at 100.00%	0.28	OK	
	LC24 at 100.00%	0.27	OK	
	LC25 at 0.00%	0.10	OK	
	LC26 at 0.00%	0.10	OK	
	LC27 at 0.00%	0.10	OK	
	LC28 at 0.00%	0.09	OK	
	LC3 at 100.00%	0.31	OK	
	LC4 at 100.00%	0.15	OK	
	LC5 at 100.00%	0.18	OK	
	LC6 at 100.00%	0.30	OK	
	LC7 at 100.00%	0.29	OK	
	LC8 at 100.00%	0.16	OK	
	LC9 at 0.00%	0.21	OK	
	W180 at 100.00%	0.15	OK	
	W210 at 100.00%	0.11	OK	
	Wi180 at 100.00%	0.07	OK	
	Wi210 at 100.00%	0.05	OK	
	WL180 at 100.00%	0.01	OK	
	WL210 at 100.00%	0.01	OK	
72	LC1 at 100.00%	0.15	OK	
	LC10 at 100.00%	0.20	OK	
	LC11 at 0.00%	0.23	OK	
	LC12 at 0.00%	0.24	OK	
	LC13 at 100.00%	0.09	OK	
	LC14 at 100.00%	0.07	OK	
	LC15 at 100.00%	0.12	OK	
	LC16 at 100.00%	0.09	OK	
	LC17 at 0.00%	0.28	OK	
	LC18 at 0.00%	0.27	OK	
	LC19 at 0.00%	0.28	OK	
	LC2 at 100.00%	0.17	OK	
	LC20 at 0.00%	0.29	OK	
	LC21 at 100.00%	0.09	OK	
	LC22 at 100.00%	0.09	OK	
	LC23 at 100.00%	0.09	OK	
	LC24 at 100.00%	0.09	OK	
	LC25 at 100.00%	0.09	OK	
	LC26 at 100.00%	0.10	OK	
	LC27 at 100.00%	0.10	OK	
	LC28 at 100.00%	0.09	OK	
	LC3 at 0.00%	0.26	OK	
	LC4 at 0.00%	**0.33**	**OK**	Eq. H2-1
	LC5 at 0.00%	0.13	OK	
	LC6 at 0.00%	0.17	OK	
	LC7 at 0.00%	0.24	OK	
	LC8 at 0.00%	0.31	OK	
	LC9 at 100.00%	0.20	OK	
	W180 at 0.00%	0.11	OK	
	W210 at 0.00%	0.16	OK	
	Wi180 at 0.00%	0.07	OK	

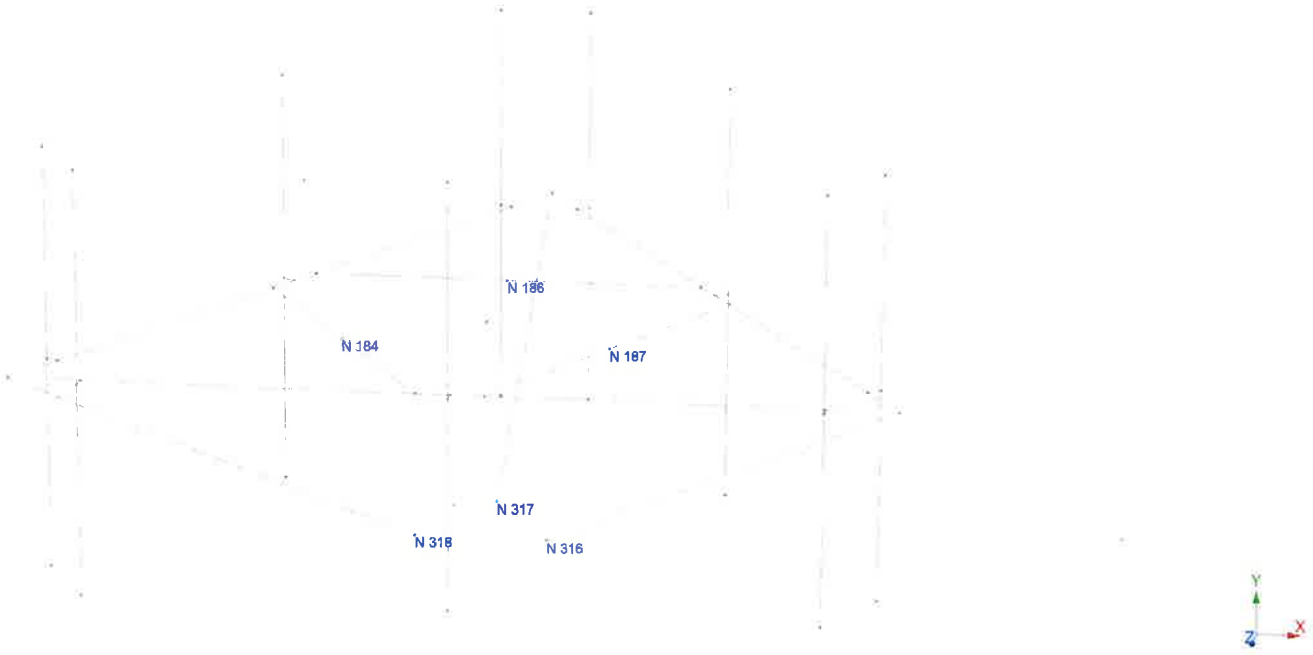
	Wi210 at 0.00%	0.08	OK	
	WL180 at 0.00%	0.01	OK	
	WL210 at 0.00%	0.01	OK	
73	LC1 at 0.00%	**0.28**	**OK**	Eq. H2-1
	LC10 at 0.00%	0.21	OK	
	LC11 at 100.00%	0.18	OK	
	LC12 at 100.00%	0.22	OK	Eq. H2-1
	LC13 at 100.00%	0.09	OK	
	LC14 at 100.00%	0.07	OK	
	LC15 at 100.00%	0.09	OK	
	LC16 at 100.00%	0.09	OK	
	LC17 at 100.00%	0.09	OK	
	LC18 at 100.00%	0.10	OK	
	LC19 at 100.00%	0.09	OK	
	LC2 at 0.00%	0.24	OK	
	LC20 at 100.00%	0.09	OK	
	LC21 at 100.00%	0.10	OK	
	LC22 at 100.00%	0.09	OK	
	LC23 at 100.00%	0.10	OK	
	LC24 at 100.00%	0.10	OK	
	LC25 at 100.00%	0.09	OK	
	LC26 at 100.00%	0.10	OK	
	LC27 at 100.00%	0.09	OK	
	LC28 at 100.00%	0.10	OK	
	LC3 at 0.00%	0.11	OK	
	LC4 at 0.00%	0.24	OK	
	LC5 at 0.00%	0.26	OK	
	LC6 at 0.00%	0.22	OK	
	LC7 at 0.00%	0.11	OK	
	LC8 at 0.00%	0.21	OK	
	LC9 at 0.00%	0.23	OK	
	W180 at 0.00%	0.08	OK	
	W210 at 0.00%	0.10	OK	
	Wi180 at 0.00%	0.04	OK	
	Wi210 at 0.00%	0.05	OK	
	WL180 at 0.00%	0.00	OK	
	WL210 at 0.00%	0.01	OK	

APPENDIX D

ADDITIONAL CALCUATIONS

Bentley

Current Date: 6/22/2018 11:46 AM
Units system: English
File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\CROWN CASTLE\876385\876385 (MOD.).etz\

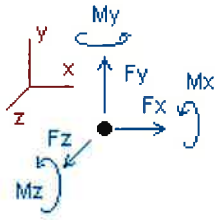


Bentley

Current Date: 6/22/2018 11:46 AM
Units system: English
File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\CROWN CASTLE\876385\876385 (MOD.).etz\

Analysis result

Reactions



Direction of positive forces and moments

	Forces [Kip]			Moments [Kip*ft]		
Node	**FX**	**FY**	**FZ**	**MX**	**MY**	**MZ**
Condition **W180=-W0**						
187	0.29182	0.03101	-0.72386	-0.08890	0.09962	-0.05078
186	0.10210	-0.05908	-0.23222	-0.00114	-0.03215	0.02956
184	-0.38086	0.02822	-0.92725	-0.11998	-0.11893	0.06850
318	0.00572	-0.00677	-0.12192	-0.22011	-0.34005	-0.03468
317	-0.00589	0.01511	-0.12351	-0.25037	-0.01446	-0.00694
316	-0.01289	-0.00849	-0.09391	-0.17010	0.26016	0.02993
SUM	0.00000	0.00000	-2.22268	-0.85059	-0.14580	0.03558
Condition **W210=-W30**						
187	-0.42833	0.05856	0.26676	0.13018	-0.04402	0.07630
186	-1.29910	0.00248	-0.01095	-0.00006	0.17635	0.24678
184	-0.42988	-0.06641	-0.27400	-0.08855	-0.04933	0.05223
318	-0.10795	0.00854	0.00731	0.05000	-0.15435	0.24467
317	-0.12144	-0.00077	-0.00046	-0.00543	0.43380	0.22151
316	-0.10197	-0.00240	0.01135	-0.04126	-0.17510	0.25154
SUM	-2.48867	0.00000	0.00000	0.04489	0.18734	1.09303
Condition **Wi180=-Wi0**						
187	0.18690	0.01572	-0.45069	-0.04357	0.05873	-0.02481
186	0.01178	-0.03072	-0.13072	-0.00064	-0.00386	0.00592
184	-0.19543	0.01496	-0.47495	-0.05022	-0.05958	0.02860
318	0.00668	-0.00363	-0.05643	-0.10597	-0.15928	-0.02148
317	-0.00154	0.00768	-0.06703	-0.13850	-0.00014	0.00000
316	-0.00839	-0.00402	-0.05128	-0.09807	0.14700	0.02046
SUM	0.00000	0.00000	-1.23110	-0.43696	-0.01713	0.00870
Condition **Wi210=-Wi30**						
187	-0.22222	0.02965	0.14300	0.05703	-0.01670	0.03351
186	-0.71570	0.00066	-0.00305	-0.00002	0.08590	0.11255
184	-0.21958	-0.03179	-0.14506	-0.04297	-0.02114	0.02538
318	-0.05573	0.00470	0.00407	0.02564	-0.07584	0.12206
317	-0.06209	-0.00025	-0.00067	-0.00310	0.22089	0.11267
316	-0.05508	-0.00298	0.00171	-0.02377	-0.08210	0.12554
SUM	-1.33040	0.00000	0.00000	0.01280	0.11101	0.53171

Condition **WL180=-WL0**						
187	0.01729	0.00191	-0.04236	-0.00574	0.00657	-0.00328
186	0.00353	-0.00357	-0.01339	-0.00007	-0.00117	0.00181
184	-0.01982	0.00168	-0.04965	-0.00777	-0.00682	0.00444
318	0.00014	-0.00041	-0.00743	-0.01295	-0.02016	-0.00186
317	-0.00048	0.00092	-0.00728	-0.01461	-0.00002	0.00001
316	-0.00066	-0.00053	-0.00587	-0.01055	0.01645	0.00153
SUM	0.00000	0.00000	-0.12600	-0.05168	-0.00515	0.00265
Condition **WL210=-WL30**						
187	-0.02856	0.00387	0.01715	0.01007	-0.00294	0.00589
186	-0.07917	0.00021	-0.00095	-0.00001	0.01167	0.01790
184	-0.02769	-0.00452	-0.01776	-0.00577	-0.00430	0.00340
318	-0.00646	0.00042	0.00042	0.00305	-0.01032	0.01584
317	-0.00781	-0.00008	-0.00021	-0.00096	0.02802	0.01432
316	-0.00631	0.00010	0.00135	-0.00248	-0.01228	0.01695
SUM	-0.15600	0.00000	0.00000	0.00391	0.00985	0.07429
Condition **LC1=1.2DL+1.6W0**						
187	-0.46821	0.23862	1.16019	0.14736	-0.15863	0.08560
186	-0.16097	0.38277	0.37168	0.00303	0.05220	-0.05391
184	0.60828	0.24309	1.48147	0.18563	0.19104	-0.10735
318	-0.57950	0.40829	0.52582	0.28706	0.54714	-0.06002
317	0.00817	0.37328	-0.46170	0.53320	0.02619	0.01247
316	0.59224	0.41105	0.47882	0.20468	-0.41320	0.06627
SUM	0.00000	2.05710	3.55628	1.36095	0.24474	-0.05693
Condition **LC2=1.2DL+1.6W30**						
187	0.68403	0.19455	-0.42480	-0.20317	0.07119	-0.11772
186	2.08096	0.28428	0.01765	0.00130	-0.28140	-0.40146
184	0.68671	0.39449	0.43627	0.13534	0.07969	-0.08131
318	-0.39763	0.38380	0.31906	-0.14512	0.25002	-0.50699
317	0.19304	0.39869	-0.65859	0.14129	-0.69102	-0.35305
316	0.73477	0.40130	0.31041	-0.00147	0.28322	-0.28831
SUM	3.98187	2.05710	0.00000	-0.07183	-0.28830	-1.74884
Condition **LC3=1.2DL-1.6W0**						
187	0.46561	0.33786	-1.15616	-0.13711	0.16016	-0.07689
186	0.16576	0.19371	-0.37144	-0.00060	-0.05068	0.04068
184	-0.61046	0.33339	-1.48574	-0.19830	-0.18952	0.11186
318	-0.56121	0.38663	0.13568	-0.41730	-0.54103	-0.17101
317	-0.01069	0.42164	-0.85693	-0.26800	-0.02008	-0.00974
316	0.55099	0.38388	0.17831	-0.33964	0.41931	0.16204
SUM	0.00000	2.05710	-3.55628	-1.36095	-0.22183	0.05693
Condition **LC4=1.2DL-1.6W30**						
187	-0.68663	0.38193	0.42883	0.21341	-0.06967	0.12643
186	-2.07617	0.29220	-0.01741	0.00112	0.28293	0.38823
184	-0.68889	0.18199	-0.44053	-0.14801	-0.07817	0.08583
318	-0.74308	0.41112	0.34244	0.01488	-0.24391	0.27595
317	-0.19556	0.39623	-0.66005	0.12391	0.69713	0.35577
316	0.40847	0.39362	0.34672	-0.13349	-0.27711	0.51662
SUM	-3.98187	2.05710	0.00000	0.07183	0.31121	1.74884

Condition	**LC5=0.9DL+1.6W0**					
187	-0.46789	0.16656	1.15969	0.14608	-0.15882	0.08452
186	-0.16157	0.31071	0.37165	0.00273	0.05201	-0.05225
184	0.60855	0.17103	1.48200	0.18721	0.19085	-0.10791
318	-0.43692	0.30893	0.44313	0.30334	0.54638	-0.03114
317	0.00849	0.27392	-0.29687	0.50005	0.02543	0.01213
316	0.44934	0.31168	0.39668	0.22155	-0.41397	0.03773
SUM	0.00000	1.54283	3.55628	1.36095	0.24188	-0.05693
Condition	**LC6=0.9DL+1.6W30**					
187	0.68436	0.12249	-0.42530	-0.20445	0.07100	-0.11881
186	2.08036	0.21222	0.01762	0.00100	-0.28159	-0.39981
184	0.68698	0.32243	0.43680	0.13692	0.07950	-0.08188
318	-0.25504	0.28443	0.23637	-0.12884	0.24926	-0.47811
317	0.19335	0.29933	-0.49376	0.10814	-0.69179	-0.35339
316	0.59186	0.30193	0.22827	0.01540	0.28246	-0.31685
SUM	3.98187	1.54283	0.00000	-0.07183	-0.29116	-1.74884
Condition	**LC7=0.9DL-1.6W0**					
187	0.46594	0.26580	-1.15667	-0.13839	0.15997	-0.07798
186	0.16516	0.12165	-0.37147	-0.00091	-0.05087	0.04233
184	-0.61019	0.26133	-1.48520	-0.19672	-0.18971	0.11130
318	-0.41862	0.28726	0.05300	-0.40102	-0.54180	-0.14213
317	-0.01038	0.32227	-0.69210	-0.30115	-0.02084	-0.01009
316	0.40809	0.28451	0.09617	-0.32277	0.41855	0.13350
SUM	0.00000	1.54283	-3.55628	-1.36095	-0.22470	0.05693
Condition	**LC8=0.9DL-1.6W30**					
187	-0.68631	0.30987	0.42832	0.21213	-0.06986	0.12535
186	-2.07677	0.22014	-0.01744	0.00082	0.28274	0.38989
184	-0.68862	0.10993	-0.44000	-0.14643	-0.07836	0.08526
318	-0.60049	0.31176	0.25975	0.03116	-0.24467	0.30483
317	-0.19525	0.29687	-0.49522	0.09076	0.69637	0.35543
316	0.26556	0.29426	0.26458	-0.11662	-0.27787	0.48808
SUM	-3.98187	1.54283	0.00000	0.07183	0.30834	1.74884
Condition	**LC9=1.2DL+Di+Wi0**					
187	-0.19081	0.48513	0.45696	0.06016	-0.05638	0.03691
186	-0.00439	0.53157	0.13097	0.00283	0.00621	-0.02634
184	0.19195	0.48589	0.46843	0.03144	0.06193	-0.02029
318	-1.19371	0.81967	0.74626	-0.01701	0.16871	-0.19993
317	-0.00235	0.80836	-1.30588	0.39173	0.00957	0.00421
316	1.19931	0.82006	0.73436	-0.03219	-0.13757	0.19675
SUM	0.00000	3.95068	1.23110	0.43696	0.05248	-0.00870
Condition	**LC10=1.2DL+Di+Wi30**					
187	0.21831	0.47120	-0.13672	-0.04044	0.01905	-0.02141
186	0.72308	0.50019	0.00330	0.00221	-0.08355	-0.13297
184	0.21610	0.53264	0.13854	0.02419	0.02349	-0.01706
318	-1.13130	0.81134	0.68575	-0.14861	0.08527	-0.34347
317	0.05820	0.81629	-1.37224	0.25633	-0.21146	-0.10847
316	1.24600	0.81902	0.68137	-0.10648	0.09153	0.09167
SUM	1.33040	3.95068	0.00000	-0.01280	-0.07566	-0.53171

Condition **LC11=1.2DL+Di-Wi0**						
187	0.18299	0.51657	-0.44441	-0.02698	0.06108	-0.01270
186	0.01917	0.47014	-0.13047	0.00155	-0.00151	-0.01450
184	-0.19891	0.51581	-0.48147	-0.06900	-0.05723	0.03692
318	-1.18035	0.81241	0.63339	-0.22895	-0.14985	-0.24289
317	-0.00543	0.82372	-1.43994	0.11474	0.00930	0.00420
316	1.18253	0.81202	0.63180	-0.22833	0.15643	0.23767
SUM	0.00000	3.95068	-1.23110	-0.43696	0.01823	0.00870
Condition **LC12=1.2DL+Di-Wi30**						
187	-0.22613	0.53050	0.14927	0.07362	-0.01435	0.04562
186	-0.70831	0.50151	-0.00280	0.00216	0.08825	0.09213
184	-0.22306	0.46906	-0.15158	-0.06175	-0.01878	0.03369
318	-1.24276	0.82074	0.69389	-0.09734	-0.06641	-0.09935
317	-0.06598	0.81579	-1.37358	0.25014	0.23033	0.11688
316	1.13584	0.81306	0.68480	-0.15403	-0.07267	0.34274
SUM	-1.33040	3.95068	0.00000	0.01280	0.14636	0.53171
Condition **LC13=1.2DL**						
187	-0.00130	0.28824	0.00201	0.00512	0.00076	0.00436
186	0.00239	0.28824	0.00012	0.00121	0.00076	-0.00661
184	-0.00109	0.28824	-0.00213	-0.00633	0.00076	0.00226
318	-0.57036	0.39746	0.33075	-0.06512	0.00306	-0.11552
317	-0.00126	0.39746	-0.65932	0.13260	0.00306	0.00136
316	0.57162	0.39746	0.32857	-0.06748	0.00306	0.11415
SUM	0.00000	2.05710	0.00000	0.00000	0.01145	0.00000
Condition **LC14=0.9DL**						
187	-0.00098	0.21618	0.00151	0.00384	0.00057	0.00327
186	0.00180	0.21618	0.00009	0.00091	0.00057	-0.00496
184	-0.00082	0.21618	-0.00160	-0.00475	0.00057	0.00169
318	-0.42777	0.29810	0.24806	-0.04884	0.00229	-0.08664
317	-0.00095	0.29810	-0.49449	0.09945	0.00229	0.00102
316	0.42871	0.29810	0.24643	-0.05061	0.00229	0.08562
SUM	0.00000	1.54283	0.00000	0.00000	0.00859	0.00000
Condition **LC15=1.2DL+1.5LL1**						
187	0.00501	0.44409	-0.01246	-0.39493	0.00061	-0.22600
186	0.00115	0.28225	-0.00279	0.00123	0.00099	-0.00689
184	-0.00841	0.44297	-0.01709	-0.40328	0.00058	0.23087
318	-0.59243	0.43057	0.34853	-0.08170	0.01041	-0.15019
317	-0.00130	0.39947	-0.66410	0.13006	0.00335	0.00151
316	0.59599	0.43275	0.34792	-0.08477	-0.00501	0.15072
SUM	0.00000	2.43210	0.00000	-0.83338	0.01093	0.00003
Condition **LC16=1.2DL+1.5LL2**						
187	0.18443	0.27989	-0.22114	0.00791	0.05720	0.00563
186	0.28852	0.27989	-0.04915	0.00092	-0.05567	-0.00356
184	0.08436	0.30788	-0.05147	-0.00664	0.00076	0.00173
318	-1.16449	0.76756	0.67377	-0.12579	0.00306	-0.22060
317	0.01002	0.39844	-0.68230	0.07725	-0.07246	-0.03659
316	0.59717	0.39844	0.33029	-0.07267	0.07857	0.04725
SUM	0.00000	2.43210	0.00000	-0.11901	0.01145	-0.20614

Condition **LC17=1.2DL+WL0+1.5LLa1**

187	-0.15061	0.36858	-0.05240	-0.29660	-0.02133	-0.16775
186	-0.48902	0.26054	-0.06148	0.00096	0.09483	-0.06741
184	-0.28491	0.32818	-0.30337	-0.13392	-0.08571	0.07695
318	-0.58628	0.38145	0.32528	-0.05637	-0.10316	0.00604
317	-0.01904	0.40467	-0.69881	0.06506	0.12598	0.06313
316	1.52987	1.06368	0.91677	-0.19382	-0.07375	0.40318
SUM	0.00000	2.80710	0.12600	-0.61468	-0.06312	0.31414

Condition **LC18=1.2DL+WL30+1.5LLa1**

187	-0.10476	0.36662	-0.11191	-0.31241	-0.01182	-0.17693
186	-0.40632	0.25677	-0.07392	0.00091	0.08198	-0.08350
184	-0.27704	0.33437	-0.33526	-0.13592	-0.08822	0.07799
318	-0.57969	0.38062	0.31743	-0.07237	-0.11300	-0.01165
317	-0.01171	0.40567	-0.70589	0.05142	0.09794	0.04881
316	1.53552	1.06305	0.90955	-0.20189	-0.04501	0.38777
SUM	0.15600	2.80710	0.00000	-0.67027	-0.07812	0.24249

Condition **LC19=1.2DL-WL0+1.5LLa1**

187	-0.11603	0.37240	-0.13713	-0.30808	-0.00818	-0.17432
186	-0.48197	0.25341	-0.08826	0.00083	0.09249	-0.06379
184	-0.32456	0.33153	-0.40268	-0.14945	-0.09934	0.08583
318	-0.58600	0.38063	0.31042	-0.08226	-0.14347	0.00232
317	-0.01999	0.40652	-0.71338	0.03584	0.12594	0.06314
316	1.52855	1.06262	0.90503	-0.21492	-0.04084	0.40625
SUM	0.00000	2.80710	-0.12600	-0.71804	-0.07342	0.31944

Condition **LC20=1.2DL-WL30+1.5LLa1**

187	-0.16188	0.37436	-0.07761	-0.29227	-0.01769	-0.16515
186	-0.56467	0.25718	-0.07582	0.00089	0.10533	-0.04769
184	-0.33243	0.32534	-0.37078	-0.14745	-0.09683	0.08479
318	-0.59260	0.38146	0.31827	-0.06627	-0.13363	0.02002
317	-0.02732	0.40552	-0.70630	0.04949	0.15398	0.07746
316	1.52290	1.06325	0.91225	-0.20684	-0.06958	0.42166
SUM	-0.15600	2.80710	0.00000	-0.66245	-0.05842	0.39108

Condition **LC21=1.2DL+WL0+1.5LLa2**

187	0.28505	0.32795	-0.30651	-0.12448	0.08747	-0.07149
186	0.48676	0.26054	-0.06148	0.00096	-0.09096	0.05056
184	0.15075	0.36882	-0.04925	-0.30604	0.02310	0.17321
318	-1.52809	1.06356	0.92052	-0.18906	0.08356	-0.40422
317	0.01747	0.40467	-0.69881	0.06506	-0.11982	-0.06042
316	0.58806	0.38157	0.32154	-0.06112	0.11298	-0.00708
SUM	0.00000	2.80710	0.12600	-0.61468	0.09632	-0.31944

Condition **LC22=1.2DL+WL30+1.5LLa2**

187	0.33091	0.32599	-0.36603	-0.14030	0.09699	-0.08066
186	0.56945	0.25677	-0.07392	0.00091	-0.10381	0.03447
184	0.15862	0.37501	-0.08115	-0.30803	0.02058	0.17425
318	-1.52149	1.06273	0.91266	-0.20506	0.07372	-0.42191
317	0.02480	0.40567	-0.70589	0.05142	-0.14786	-0.07473
316	0.59371	0.38094	0.31432	-0.06920	0.14171	-0.02249
SUM	0.15600	2.80710	0.00000	-0.67027	0.08133	-0.39108

Condition **LC23=1.2DL-WL0+1.5LLa2**

187	0.31963	0.33176	-0.39124	-0.13597	0.10062	-0.07806
186	0.49381	0.25341	-0.08826	0.00083	-0.09331	0.05418
184	0.11110	0.37217	-0.14856	-0.32157	0.00946	0.18209
318	-1.52781	1.06274	0.90565	-0.21496	0.04325	-0.40794
317	0.01652	0.40652	-0.71338	0.03584	-0.11987	-0.06040
316	0.58675	0.38051	0.30979	-0.08223	0.14588	-0.00401
SUM	0.00000	2.80710	-0.12600	-0.71804	0.08603	-0.31414

Condition **LC24=1.2DL-WL30+1.5LLa2**

187	0.27378	0.33372	-0.33173	-0.12015	0.09111	-0.06889
186	0.41111	0.25718	-0.07582	0.00089	-0.08046	0.07027
184	0.10323	0.36598	-0.11667	-0.31957	0.01198	0.18105
318	-1.53441	1.06357	0.91351	-0.19896	0.05309	-0.39024
317	0.00919	0.40552	-0.70630	0.04949	-0.09183	-0.04609
316	0.58110	0.38113	0.31702	-0.07415	0.11714	0.01140
SUM	-0.15600	2.80710	0.00000	-0.66245	0.10103	-0.24249

Condition **LC25=1.2DL+WL0+1.5LLa3**

187	-0.01859	0.28633	0.04438	0.01086	-0.00581	0.00764
186	-0.00113	0.29181	0.01351	0.00128	0.00193	-0.00843
184	0.01873	0.28656	0.04752	0.00143	0.00758	-0.00218
318	-0.57050	0.39787	0.33819	-0.05217	0.02321	-0.11366
317	-0.00079	0.39654	-0.65203	0.14721	0.00308	0.00135
316	0.57227	0.39799	0.33444	-0.05693	-0.01340	0.11262
SUM	0.00000	2.05710	0.12600	0.05168	0.01660	-0.00265

Condition **LC26=1.2DL+WL30+1.5LLa3**

187	0.02726	0.28437	-0.01514	-0.00495	0.00370	-0.00153
186	0.08157	0.28803	0.00107	0.00122	-0.01091	-0.02452
184	0.02660	0.29275	0.01563	-0.00057	0.00506	-0.00114
318	-0.56390	0.39704	0.33033	-0.06817	0.01337	-0.13135
317	0.00654	0.39754	-0.65911	0.13356	-0.02496	-0.01296
316	0.57793	0.39736	0.32722	-0.06500	0.01534	0.09721
SUM	0.15600	2.05710	0.00000	-0.00391	0.00160	-0.07429

Condition **LC27=1.2DL-WL0+1.5LLa3**

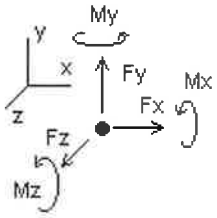
187	0.01599	0.29015	-0.04035	-0.00062	0.00733	0.00107
186	0.00592	0.28467	-0.01327	0.00115	-0.00041	-0.00480
184	-0.02092	0.28991	-0.05179	-0.01410	-0.00605	0.00670
318	-0.57022	0.39705	0.32332	-0.07807	-0.01710	-0.11738
317	-0.00174	0.39838	-0.66660	0.11799	0.00303	0.00137
316	0.57096	0.39693	0.32269	-0.07803	0.01951	0.11569
SUM	0.00000	2.05710	-0.12600	-0.05168	0.00631	0.00265

Condition **LC28=1.2DL-WL30+1.5LLa3**

187	-0.02986	0.29211	0.01916	0.01519	-0.00218	0.01025
186	-0.07678	0.28845	-0.00083	0.00120	0.01244	0.01129
184	-0.02879	0.28372	-0.01989	-0.01210	-0.00354	0.00566
318	-0.57681	0.39788	0.33117	-0.06207	-0.00726	-0.09968
317	-0.00907	0.39739	-0.65953	0.13164	0.03107	0.01569
316	0.56531	0.39756	0.32992	-0.06996	-0.00923	0.13110
SUM	-0.15600	2.05710	0.00000	0.00391	0.02130	0.07429

Envelope for nodal reactions

Note.- **Ic** is the controlling load condition



Direction of positive forces and moments

Envelope of nodal reactions for :

W180=-W0
W210=-W30
Wi180=-Wi0
Wi210=-Wi30
WL180=-WL0
WL210=-WL30
LC1=1.2DL+1.6W0
LC2=1.2DL+1.6W30
LC3=1.2DL-1.6W0
LC4=1.2DL-1.6W30
LC5=0.9DL+1.6W0
LC6=0.9DL+1.6W30
LC7=0.9DL-1.6W0
LC8=0.9DL-1.6W30
LC9=1.2DL+Di+Wi0
LC10=1.2DL+Di+Wi30
LC11=1.2DL+Di-Wi0
LC12=1.2DL+Di-Wi30
LC13=1.2DL
LC14=0.9DL
LC15=1.2DL+1.5LL1
LC16=1.2DL+1.5LL2
LC17=1.2DL+WL0+1.5LLa1
LC18=1.2DL+WL30+1.5LLa1
LC19=1.2DL-WL0+1.5LLa1
LC20=1.2DL-WL30+1.5LLa1
LC21=1.2DL+WL0+1.5LLa2
LC22=1.2DL+WL30+1.5LLa2
LC23=1.2DL-WL0+1.5LLa2
LC24=1.2DL-WL30+1.5LLa2
LC25=1.2DL+WL0+1.5LLa3
LC26=1.2DL+WL30+1.5LLa3
LC27=1.2DL-WL0+1.5LLa3
LC28=1.2DL-WL30+1.5LLa3

Node		Forces						Moments					
		Fx [Kip]	lc	Fy [Kip]	lc	Fz [Kip]	lc	Mx [Kip*ft]	lc	My [Kip*ft]	lc	Mz [Kip*ft]	lc
187	Max	0.684	LC6	0.531	LC12	1.160	LC1	0.21341	LC4	0.16016	LC3	0.12643	LC4
	Min	-0.687	LC4	0.002	WL180	-1.157	LC7	-0.39493	LC15	-0.15882	LC5	-0.22600	LC15
186	Max	2.081	LC2	0.532	LC9	0.372	LC1	0.00303	LC1	0.28293	LC4	0.38989	LC8
	Min	-2.077	LC8	-0.059	W180	-0.371	LC7	-0.00114	W180	-0.28159	LC6	-0.40146	LC2
184	Max	0.687	LC6	0.533	LC10	1.482	LC5	0.18721	LC5	0.19104	LC1	0.23087	LC15
	Min	-0.689	LC4	-0.066	W210	-1.486	LC3	-0.40328	LC15	-0.18971	LC7	-0.10791	LC5
318	Max	0.007	Wi180	1.064	LC24	0.921	LC21	0.30334	LC5	0.54714	LC1	0.30483	LC8
	Min	-1.534	LC24	-0.007	W180	-0.122	W180	-0.41730	LC3	-0.54180	LC7	-0.50699	LC2
317	Max	0.193	LC6	0.824	LC11	0.000	WL210	0.53320	LC1	0.69713	LC4	0.35577	LC4
	Min	-0.196	LC4	-0.001	W210	-1.440	LC11	-0.30115	LC7	-0.69179	LC6	-0.35339	LC6
316	Max	1.536	LC18	1.064	LC17	0.917	LC17	0.22155	LC5	0.41931	LC3	0.51662	LC4
	Min	-0.102	W210	-0.008	W180	-0.094	W180	-0.33964	LC3	-0.41397	LC5	-0.31685	LC6

Date: 6/22/2018
Project Name: N. Coventry/Wallbeoff
Project Number: 876385
Designed By: BD **Checked By:** MSC

HUDSON Design Group LLC

CHECK CONNECTION CAPACITY (Worse Case)

Reference: AISC Steel Construction Manual 9th Edition (ASD)

Bolt Type = Threaded Rod
Bolt Diameter = 1/2 in.
Steel Grade = A36

Allowable Tensile Load =

F_{Tall} = 3750 lbs.

Allowable Shear Load =

F_{Vall}= 1940 lbs.

WIND FORCES

Reaction F = 2081 lbs.

GRAVITY LOADS

Ice and Equipment 532 lbs.

No. of Supports = 1
No. of Bolts / Support = 2

Tension Design Load /Bolts =

f_t= 1040.50 lbs. < 3750 lbs. **Therefore, OK !**

Shear Design Load / Bolts=

f_v= 266.00 lbs. < 1940 lbs. **Therefore, OK !**

CHECK COMBINED TENSION AND SHEAR

f_t / F_T	+	f_v / F_V	≤	1.0			
0.277	+	0.137	=	0.415	<	1.0	**Therefore, OK !**