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

November 14, 2018

William Stone
Real Estate Specialist
Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

RE: **EM-T-MOBILE-155-181001** – T-Mobile notice of intent to modify an existing telecommunications facility located at 467 South Quaker Lane, West Hartford, Connecticut.

Dear Mr. Stone:

The Connecticut Siting Council (Council) is in receipt of your correspondence of November 9, 2018, 2018 submitted in response to the Council's October 12, 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/FC/IN

Robidoux, Evan

From: Stone, William <William.Stone@crowncastle.com>
Sent: Friday, November 09, 2018 1:55 PM
To: Robidoux, Evan
Cc: CSC-DL Siting Council
Subject: RE: Council Incomplete Letter for EM-T-MOBILE-155-181001-SouthQuakerLn-WestHartford
Attachments: EM-T-Mobile-155-181001 Response Letter.pdf; 829013 _Mount_Structural_Analysis_Rev2_11062018.pdf

Evan – please see the attached response letter and mount structural analysis. Originals are being overnighted to your office.

Thank you!

WILL STONE
Real Estate Specialist
T: (518) 373-3543 | M: (518) 210-0495 I F: (724) 416-6581

CROWN CASTLE
3 Corporate Park Drive, Suite 101, Clifton Park, NY 12065
Crowncastle.com

From: Robidoux, Evan
Sent: Tuesday, October 16, 2018 8:08 AM
To: Stone, William
Cc: CSC-DL Siting Council
Subject: Council Incomplete Letter for EM-T-MOBILE-155-181001-SouthQuakerLn-WestHartford

Please see the attached correspondence.

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

Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

November 9, 2018

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: **EM-T-Mobile-155-181001 – Incomplete Notice Response**

Dear Ms. Bachman:

Per the letter received dated 10/12/18 – attached are (3) copies of the passing mount analysis for this project along with a copy of the letter for reference. Please let me know if you have any questions.

Sincerely,

William Stone
Real Estate Specialist
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065
518-373-3543
William.stone@crowncastle.com

HUDSON Design Group LLC

Date: May 9, 2018
October 29, 2018 (Rev.1)
November 6, 2018 (Rev.2)

Charles McGuirt
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:	**T-Mobile Equipment Change-Out**	
	Carrier Site Number:	CT11178D
	Carrier Site Name:	WEST HARTFORD/I-84/X43
Crown Castle Designation:	**Crown Castle BU Number:**	829013
	Crown Castle Site Name:	WEST HARTFORD/I-84/X43
	Crown Castle JDE Number:	496734
	Crown Castle PO Number:	1276934
	Crown Castle Application Number:	433326 Rev. 6
Engineering Firm Designation:	**Crown Castle Report Designation:**	4243966
Site Data:	**467 South Quaker Lane, West Hartford, CT, 06110** **Latitude: 41° 44' 55.59" Longitude: -72° 43' 52.86"**	
Structure Information:	**Tower Height & Type:**	**120 ft Monopole**
	Mount Elevation:	**120 ft**
	Mount Width & Type:	**14 ft Platform**

Dear Charles McGuirt,

Hudson Design Group LLC (HDG) is pleased to submit this "Mount Structural Analysis Report" to determine the structural integrity of T-Mobile'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:

STATE OF CONNECTICUT
DANIEL HAMM
24178
LICENSED
PROFESSIONAL ENGINEER

Michael Cabral
Structural Dept. Head

Daniel P. Hamm, P.E.
Principal

TABLE OF CONTENTS

1) INTRODUCTION

This mount is a 14' low profile platform. 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 120 ft on the 120 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 2.28 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
120	120	3	RFS/Celwave	APXVAARR24_43-U-NA20	-	1,2
	120	3	Ericsson	AIR 3246 B66	-	1,2
	120	3	Ericsson	4449 B12/B71 RRH	-	1,2
	120	3	Ericsson	KRY 112 144/2 TMA	-	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
120	120	3	Ericsson	AIR 32 B2a/B66Aa	14' Platform	1
	120	3	Ericsson	KRY 112 144/1 TMA	14' Platform	1

Notes:
1) Existing Equipment

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
RFDS	T-Mobile	-	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 Mount, Alpha Sector)

Notes	Component	Member No.	Centerline (ft)	% Capacity	Pass / Fail
1	Face Horizontal	42	152	35	Pass
1	Standoff Members	84	152	89	Pass
2	Mount-to-Tower Connection	-	152	97	Pass

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

Notes	Component	Member No.	Centerline (ft)	% Capacity	Pass / Fail
1	Face Horizontal	45	152	33	Pass
1	Standoff Members	35	152	88	Pass
2	Mount-to-Tower Connection	-	152	97	Pass

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

Notes	Component	Member No.	Centerline (ft)	% Capacity	Pass / Fail
1	Face Horizontal	48	152	33	Pass
1	Standoff Members	36	152	88	Pass
2	Mount-to-Tower Connection	-	152	97	Pass

Structure Rating (max from all components) =	**97%**

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 existing and proposed loading with the following modifications:

- **Install new handrail kit, SitePro1 P/N HRK-14 (or approved equal).**
- **Install new platform reinforcement kit, SitePro1 P/N PRK-1245L (or approved equal).**
- **Remove existing pipe masts and install new 2-1/2" std. (2.88" O.D.) steel pipe masts, secured to the existing mount (typ. of 1 per sector, total of 3).**

APPENDIX A

WIRE FRAME AND RENDERED MODELS

Bentley

Current Date: 11/6/2018 9:39 AM
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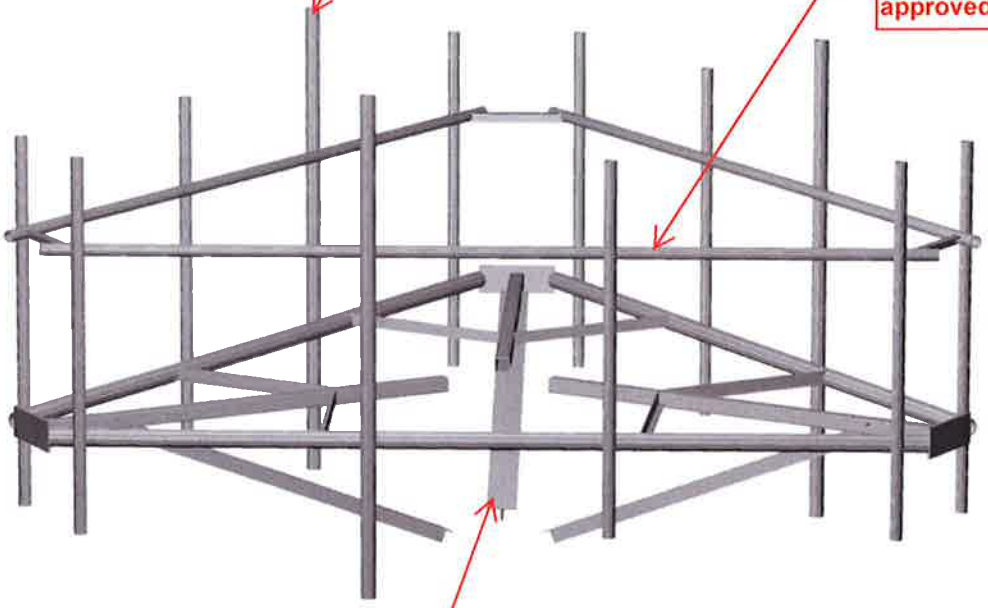

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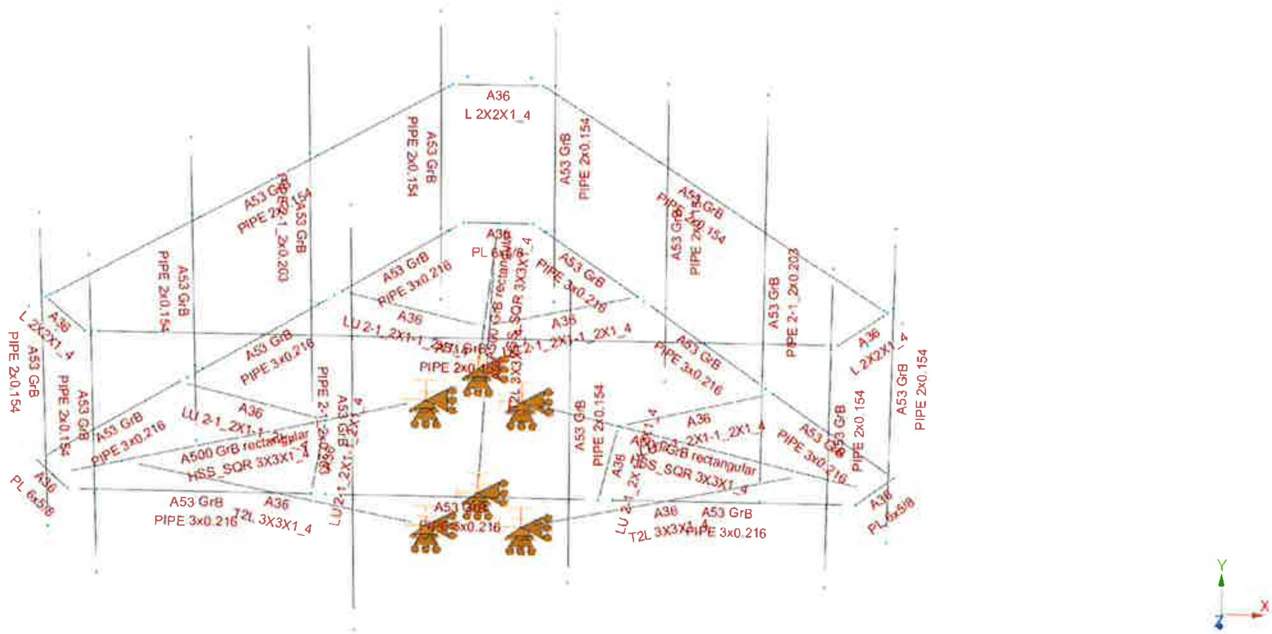

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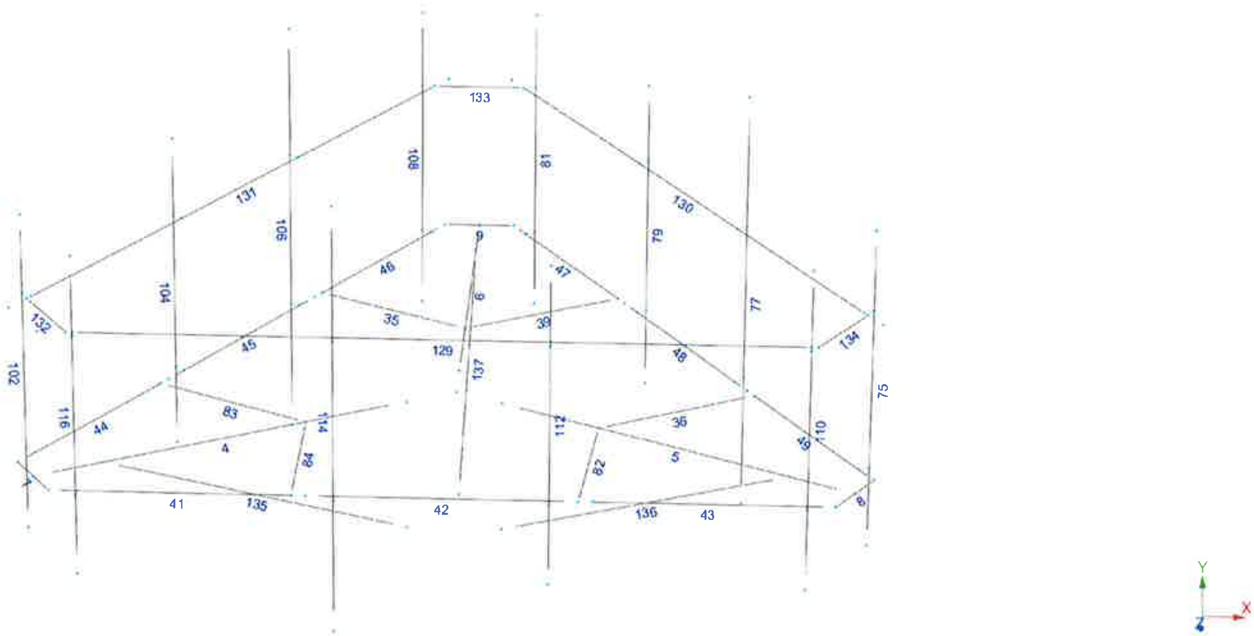


APPENDIX B

RAM ELEMENTS INPUT CALCULATIONS

Date: 11/6/2018
Project Name: WEST HARTFORD/I-84/X43
Project Number: 829013
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=	120 (ft)
		z_g=	1200 (ft)
K_z=	**1.041**	α=	7.0

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)
(If Category 1 then K_{zt} =1.0)		K_t=	0 (from Table 2-5)
		f=	0 (from Table 2-5)
Category=	1	z=	120
		H=	0 (Ht. of the crest above surrounding terrain)
		K_{zt}=	1.00
		K_{iz} =	1.14 (from Sec. 2.6.8)

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} = 2.28 in

Date: 11/6/2018
Project Name: WEST HARTFORD/I-84/X43
Project Number: 829013
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=	120	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=	1.041
		K_{zt}=	1.0
q_z=	**27.91**	K_d=	0.95
$q_{z\,(Ice)}$=	**6.33**	V_{max}=	105 mph
$q_{z\,(30)}$=	**2.28**	$V_{max\,(ice)}$=	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: 11/6/2018
Project Name: WEST HARTFORD/I-84/X43
Project Number: 829013
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 = **2.28 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)
APXVAARR24_43-U-NA20 Antenna	95.9	24.0	8.7	15.98	4.00	1.27	565	160	46
AIR 3246 B66 Antenna	58.1	15.7	9.4	6.33	3.70	1.25	222	70	18
AIR 32 B2a/B66Aa Antenna	56.6	12.9	8.7	5.07	4.39	1.28	182	60	15
4449 B12/B71 RRH	15.0	13.2	9.3	1.38	1.14	1.20	46	18	4
KRY 112 144/1 TMA	6.9	6.1	2.8	0.29	1.13	1.20	10	6	1
KRY 112 144/2 TMA	8.7	6.7	3.2	0.40	1.30	1.20	14	8	1
2" Pipe	2.4	12.0		0.20	0.20	1.20	7	6	1
3" Pipe	3.5	12.0		0.29	0.29	1.20	10	7	1
L2-1/2x1-1/2	2.5	12.0		0.21	0.21	2.00	12	10	1
HSS 3x3	3.0	12.0		0.25	0.25	2.00	14	11	1

Date: 11/6/2018
Project Name: WEST HARTFORD/I-84/X43
Project Number: B29013
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	30	(deg)	Ice Thickness =	2.28	in.	Equivalent Angle =	210	(deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Aspect Ratio	Aspect Ratio	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
APXVAARR24_43-U-NA20 Antenna	95.9	24.0	8.7	15.98	5.79	4.00	11.02	1.27	1.53	565	248	486
AIR 3246 B66 Antenna	58.1	15.7	9.4	6.33	3.79	3.70	6.18	1.25	1.36	222	144	202
AIR 32 B2a/B66Aa Antenna	56.6	12.9	8.7	5.07	3.42	4.39	6.51	1.28	1.38	182	132	169
4449 B12/B71 RRH	15.0	13.2	9.3	1.38	0.97	1.14	1.61	1.20	1.20	46	32	43
KRY 112 144/1 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	10	4	8
KRY 112 144/2 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	10	4	8

WIND LOADS WITH ICE:

APXVAARR24_43-U-NA20 Antenna	100.5	28.6	13.3	19.92	9.24	3.52	7.58	1.25	1.42	157	83	139
AIR 3246 B66 Antenna	62.7	20.3	14.0	8.81	6.07	3.09	4.49	1.23	1.29	68	50	64
AIR 32 B2a/B66Aa Antenna	61.2	17.5	13.3	7.41	5.63	3.50	4.61	1.24	1.29	58	46	55
4449 B12/B71 RRH	19.6	17.8	13.9	2.41	1.88	1.10	1.41	1.20	1.20	18	14	17
KRY 112 144/1 TMA	11.5	10.7	7.4	0.85	0.58	1.08	1.56	1.20	1.20	6	4	6
KRY 112 144/2 TMA	13.3	11.3	7.8	1.04	0.71	1.18	1.71	1.20	1.20	8	5	7

WIND LOADS AT 30 MPH:

APXVAARR24_43-U-NA20 Antenna	95.9	24.0	8.7	15.98	5.79	4.00	11.02	1.27	1.53	46	20	40
AIR 3246 B66 Antenna	58.1	15.7	9.4	6.33	3.79	3.70	6.18	1.25	1.36	18	12	17
AIR 32 B2a/B66Aa Antenna	56.6	12.9	8.7	5.07	3.42	4.39	6.51	1.28	1.38	15	11	14
4449 B12/B71 RRH	15.0	13.2	9.3	1.38	0.97	1.14	1.61	1.20	1.20	4	3	3
KRY 112 144/1 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	1	0	1
KRY 112 144/2 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	1	0	1

Date: 11/6/2018
Project Name: WEST HARTFORD/I-84/X43
Project Number: 829013
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	60	(deg)	Ice Thickness =	2.28	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)
APXVAARR24_43-U-NA20 Antenna	95.9	24.0	8.7	15.98	5.79	4.00	11.02	1.27	1.53	565	248	327
AIR 3246 B66 Antenna	58.1	15.7	9.4	6.33	3.79	3.70	6.18	1.25	1.36	222	144	164
AIR 32 B2a/B66Aa Antenna	56.6	12.9	8.7	5.07	3.42	4.39	6.51	1.28	1.38	182	132	144
4449 B12/B71 RRH	15.0	13.2	9.3	1.38	0.97	1.14	1.61	1.20	1.20	46	32	36
KRY 112 144/1 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	10	4	6
KRY 112 144/2 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	10	4	6

WIND LOADS WITH ICE:

APXVAARR24_43-U-NA20 Antenna	100.5	28.6	13.3	19.92	9.24	3.52	7.58	1.25	1.42	157	83	102
AIR 3246 B66 Antenna	62.7	20.3	14.0	8.81	6.07	3.09	4.49	1.23	1.29	68	50	54
AIR 32 B2a/B66Aa Antenna	61.2	17.5	13.3	7.41	5.63	3.50	4.61	1.24	1.29	58	46	49
4449 B12/B71 RRH	19.6	17.8	13.9	2.41	1.88	1.10	1.41	1.20	1.20	18	14	15
KRY 112 144/1 TMA	11.5	10.7	7.4	0.85	0.58	1.08	1.56	1.20	1.20	6	4	5
KRY 112 144/2 TMA	13.3	11.3	7.8	1.04	0.71	1.18	1.71	1.20	1.20	8	5	6

WIND LOADS AT 30 MPH:

APXVAARR24_43-U-NA20 Antenna	95.9	24.0	8.7	15.98	5.79	4.00	11.02	1.27	1.53	46	20	27
AIR 3246 B66 Antenna	58.1	15.7	9.4	6.33	3.79	3.70	6.18	1.25	1.36	18	12	13
AIR 32 B2a/B66Aa Antenna	56.6	12.9	8.7	5.07	3.42	4.39	6.51	1.28	1.38	15	11	12
4449 B12/B71 RRH	15.0	13.2	9.3	1.38	0.97	1.14	1.61	1.20	1.20	4	3	3
KRY 112 144/1 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	1	0	0
KRY 112 144/2 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	1	0	0

Date: 11/6/2018
Project Name: WEST HARTFORD/I-84/X43
Project Number: 829013
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	90	(deg)	Ice Thickness =	2.28	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) (normal)	Force (lbs) (side)	Force (lbs) (angle)
APXVAARR24_43-U-NA20 Antenna	95.9	24.0	8.7	15.98	5.79	4.00	11.02	1.27	1.53	565	248	248
AIR 3246 B66 Antenna	58.1	15.7	9.4	6.33	3.79	3.70	6.18	1.25	1.36	222	144	144
AIR 32 B2a/B66Aa Antenna	56.6	12.9	8.7	5.07	3.42	4.39	6.51	1.28	1.38	182	132	132
4449 B12/B71 RRH	15.0	13.2	9.3	1.38	0.97	1.14	1.61	1.20	1.20	46	32	32
KRY 112 144/1 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	10	4	4
KRY 112 144/2 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	10	4	4

WIND LOADS WITH ICE:

APXVAARR24_43-U-NA20 Antenna	100.5	28.6	13.3	19.92	9.24	3.52	7.58	1.25	1.42	157	83	83
AIR 3246 B66 Antenna	62.7	20.3	14.0	8.81	6.07	3.09	4.49	1.23	1.29	68	50	50
AIR 32 B2a/B66Aa Antenna	61.2	17.5	13.3	7.41	5.63	3.50	4.61	1.24	1.29	58	46	46
4449 B12/B71 RRH	19.6	17.8	13.9	2.41	1.88	1.10	1.41	1.20	1.20	18	14	14
KRY 112 144/1 TMA	11.5	10.7	7.4	0.85	0.58	1.08	1.56	1.20	1.20	6	4	4
KRY 112 144/2 TMA	13.3	11.3	7.8	1.04	0.71	1.18	1.71	1.20	1.20	8	5	5

WIND LOADS AT 30 MPH:

APXVAARR24_43-U-NA20 Antenna	95.9	24.0	8.7	15.98	5.79	4.00	11.02	1.27	1.53	46	20	20
AIR 3246 B66 Antenna	58.1	15.7	9.4	6.33	3.79	3.70	6.18	1.25	1.36	18	12	12
AIR 32 B2a/B66Aa Antenna	56.6	12.9	8.7	5.07	3.42	4.39	6.51	1.28	1.38	15	11	11
4449 B12/B71 RRH	15.0	13.2	9.3	1.38	0.97	1.14	1.61	1.20	1.20	4	3	3
KRY 112 144/1 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	1	0	0
KRY 112 144/2 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	1	0	0

Date: 11/6/2018
Project Name: WEST HARTFORD/I-84/X43
Project Number: 829013
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	120	(deg)	Ice Thickness =	2.28	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) (normal)	Force (lbs) (side)	Force (lbs) (angle)
APXVAARR24_43-U-NA20 Antenna	95.9	24.0	8.7	15.98	5.79	4.00	11.02	1.27	1.53	565	248	327
AIR 3246 B66 Antenna	58.1	15.7	9.4	6.33	3.79	3.70	6.18	1.25	1.36	222	144	164
AIR 32 B2a/B66Aa Antenna	56.6	12.9	8.7	5.07	3.42	4.39	6.51	1.28	1.38	182	132	144
4449 B12/B71 RRH	15.0	13.2	9.3	1.38	0.97	1.14	1.61	1.20	1.20	46	32	36
KRY 112 144/1 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	10	4	6
KRY 112 144/2 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	10	4	6

WIND LOADS WITH ICE:

APXVAARR24_43-U-NA20 Antenna	100.5	28.6	13.3	19.92	9.24	3.52	7.58	1.25	1.42	157	83	102
AIR 3246 B66 Antenna	62.7	20.3	14.0	8.81	6.07	3.09	4.49	1.23	1.29	68	50	54
AIR 32 B2a/B66Aa Antenna	61.2	17.5	13.3	7.41	5.63	3.50	4.61	1.24	1.29	58	46	49
4449 B12/B71 RRH	19.6	17.8	13.9	2.41	1.88	1.10	1.41	1.20	1.20	18	14	15
KRY 112 144/1 TMA	11.5	10.7	7.4	0.85	0.58	1.08	1.56	1.20	1.20	6	4	5
KRY 112 144/2 TMA	13.3	11.3	7.8	1.04	0.71	1.18	1.71	1.20	1.20	8	5	6

WIND LOADS AT 30 MPH:

APXVAARR24_43-U-NA20 Antenna	95.9	24.0	8.7	15.98	5.79	4.00	11.02	1.27	1.53	46	20	27
AIR 3246 B66 Antenna	58.1	15.7	9.4	6.33	3.79	3.70	6.18	1.25	1.36	18	12	13
AIR 32 B2a/B66Aa Antenna	56.6	12.9	8.7	5.07	3.42	4.39	6.51	1.28	1.38	15	11	12
4449 B12/B71 RRH	15.0	13.2	9.3	1.38	0.97	1.14	1.61	1.20	1.20	4	3	3
KRY 112 144/1 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	1	0	0
KRY 112 144/2 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	1	0	0

Date: 11/6/2018
Project Name: WEST HARTFORD/I-84/X43
Project Number: 829013
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	150	(deg)	Ice Thickness =	2.28	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) (normal)	Force (lbs) (side)	Force (lbs) (angle)
APXVAARR24_43-U-NA20 Antenna	95.9	24.0	8.7	15.98	5.79	4.00	11.02	1.27	1.53	565	248	486
AIR 3246 B66 Antenna	58.1	15.7	9.4	6.33	3.79	3.70	6.18	1.25	1.36	222	144	202
AIR 32 B2a/B66Aa Antenna	56.6	12.9	8.7	5.07	3.42	4.39	6.51	1.28	1.38	182	132	169
4449 B12/B71 RRH	15.0	13.2	9.3	1.38	0.97	1.14	1.61	1.20	1.20	46	32	43
KRY 112 144/1 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	10	4	8
KRY 112 144/2 TMA	8.7	6.7	3.2	0.40	0.19	1.30	2.72	1.20	1.21	14	7	12

WIND LOADS WITH ICE:

APXVAARR24_43-U-NA20 Antenna	100.5	28.6	13.3	19.92	9.24	3.52	7.58	1.25	1.42	157	83	139
AIR 3246 B66 Antenna	62.7	20.3	14.0	8.81	6.07	3.09	4.49	1.23	1.29	68	50	64
AIR 32 B2a/B66Aa Antenna	61.2	17.5	13.3	7.41	5.63	3.50	4.61	1.24	1.29	58	46	55
4449 B12/B71 RRH	19.6	18.2	13.9	2.47	1.88	1.07	1.41	1.20	1.20	19	14	18
KRY 112 144/1 TMA	11.5	16.3	7.4	1.30	0.58	0.70	1.56	1.20	1.20	10	4	8
KRY 112 144/2 TMA	13.3	11.3	7.8	1.04	0.71	1.18	1.71	1.20	1.20	8	5	7

WIND LOADS AT 30 MPH:

APXVAARR24_43-U-NA20 Antenna	95.9	24.0	8.7	15.98	5.79	4.00	11.02	1.27	1.53	46	20	40
AIR 3246 B66 Antenna	58.1	15.7	9.4	6.33	3.79	3.70	6.18	1.25	1.36	18	12	17
AIR 32 B2a/B66Aa Antenna	56.6	12.9	8.7	5.07	3.42	4.39	6.51	1.28	1.38	15	11	14
4449 B12/B71 RRH	15.0	13.2	9.3	1.38	0.97	1.14	1.61	1.20	1.20	4	3	3
KRY 112 144/1 TMA	6.9	6.1	2.8	0.29	0.13	1.13	2.46	1.20	1.20	1	0	1
KRY 112 144/2 TMA	8.7	6.7	3.2	0.40	0.19	1.30	2.72	1.20	1.21	1	1	1

Date: 11/6/2018
Project Name: WEST HARTFORD/I-84/X43
Project Number: 829013
Designed By: BD **Checked By:** MSC

HUDSON Design Group LLC

ICE WEIGHT CALCULATIONS

Thickness of ice: 2.28 in.
Density of ice: 56 pcf

APXVAARR24_43-U-NA20 Antenna

Weight of ice based on total radial SF area:

Height (in):	95.9	
Width (in):	24.0	
Depth (in):	8.7	
Total weight of ice on object:		584 lbs
Weight of object:	128 lbs	
Combined weight of ice and object:		712 lbs

AIR 3246 B66 Antenna

Weight of ice based on total radial SF area:

Height (in):	58.1	
Width (in):	15.7	
Depth (in):	9.4	
Total weight of ice on object:		296 lbs
Weight of object:	179 lbs	
Combined weight of ice and object:		475 lbs

AIR 32 B2a/B66Aa Antenna

Weight of ice based on total radial SF area:

Height (in):	56.6	
Width (in):	12.9	
Depth (in):	8.7	
Total weight of ice on object:		253 lbs
Weight of object:	133 lbs	
Combined weight of ice and object:		386 lbs

4449 B12/B71 RRH

Weight of ice based on total radial SF area:

Height (in):	15.0	
Width (in):	13.2	
Depth (in):	9.3	
Total weight of ice on object:		96 lbs
Weight of object:	74 lbs	
Combined weight of ice and object:		170 lbs

KRY 112 144/1 TMA

Weight of ice based on total radial SF area:

Height (in):	6.9	
Width (in):	6.1	
Depth (in):	2.8	
Total weight of ice on object:		25 lbs
Weight of object:	11 lbs	
Combined weight of ice and object:		36 lbs

KRY 112 144/2 TMA

Weight of ice based on total radial SF area:

Height (in):	8.7	
Width (in):	6.7	
Depth (in):	3.2	
Total weight of ice on object:		32 lbs
Weight of object:	10 lbs	
Combined weight of ice and object:		42 lbs

2" pipe

Per foot weight of ice:

diameter (in):	2.38	
Per foot weight of ice on object:		13 plf

3" Pipe

Per foot weight of ice:

diameter (in):	3.5	
Per foot weight of ice on object:		16 plf

HSS 3x3

Weight of ice based on total radial SF area:

Height (in):	3	
Width (in):	3	
Per foot weight of ice on object:		19 plf

L2-1/2x1-1/2x1/4 Angles

Weight of ice based on total radial SF area:

Thickness (in):	0.25	
Height (in):	2.5	
Width (in):	1.5	
Per foot weight of ice on object:		16 plf

PL 6x5/8

Weight of ice based on total radial SF area:

Height (in):	6	
Width (in):	0.625	
Per foot weight of ice on object:		20 plf

Bentley

Current Date: 11/6/2018 9:44 AM
Units system: English
File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\CROWN CASTLE\829013\Rev2\829013 (Rev.2).e

Load data

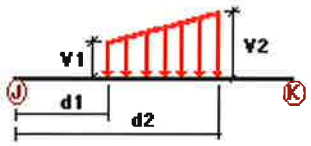
GLOSSARY

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

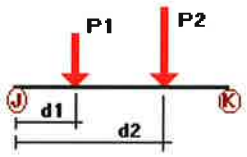


Condition	Member	Dir1	Val1 [Kip/ft]	Val2 [Kip/ft]	Dist1 [ft]	%	Dist2 [ft]	%
DL	41	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	42	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	43	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	44	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	45	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	46	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	47	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	48	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
	49	Y	-0.01	-0.01	0.00	Yes	100.00	Yes
W0	4	Z	-0.014	-0.014	0.00	Yes	100.00	Yes
	5	Z	-0.014	-0.014	0.00	Yes	100.00	Yes
	35	Z	-0.012	-0.012	0.00	Yes	100.00	Yes
	36	Z	-0.012	-0.012	0.00	Yes	100.00	Yes
	39	Z	-0.012	-0.012	0.00	Yes	100.00	Yes
	41	Z	-0.01	-0.01	0.00	Yes	100.00	Yes
	42	Z	-0.01	-0.01	0.00	Yes	100.00	Yes

	43	Z	-0.01	-0.01	0.00	Yes	100.00	Yes
	44	Z	-0.01	-0.01	0.00	Yes	100.00	Yes
	45	Z	-0.01	-0.01	0.00	Yes	100.00	Yes
	46	Z	-0.01	-0.01	0.00	Yes	100.00	Yes
	47	Z	-0.01	-0.01	0.00	Yes	100.00	Yes
	48	Z	-0.01	-0.01	0.00	Yes	100.00	Yes
	49	Z	-0.01	-0.01	0.00	Yes	100.00	Yes
	75	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	77	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	79	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	81	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	83	Z	-0.012	-0.012	0.00	Yes	100.00	Yes
	102	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	104	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	106	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
	108	Z	-0.007	-0.007	0.00	Yes	100.00	Yes
W30	4	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	5	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	6	X	-0.014	-0.014	0.00	Yes	100.00	Yes
	35	X	-0.012	-0.012	0.00	Yes	100.00	Yes
	36	X	-0.012	-0.012	0.00	Yes	100.00	Yes
	39	X	-0.012	-0.012	0.00	Yes	100.00	Yes
	44	X	-0.01	-0.01	0.00	Yes	100.00	Yes
	45	X	-0.01	-0.01	0.00	Yes	100.00	Yes
	46	X	-0.01	-0.01	0.00	Yes	100.00	Yes
	47	X	-0.01	-0.01	0.00	Yes	100.00	Yes
	48	X	-0.01	-0.01	0.00	Yes	100.00	Yes
	49	X	-0.01	-0.01	0.00	Yes	100.00	Yes
	75	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	77	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	79	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	81	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	82	X	-0.012	-0.012	0.00	Yes	100.00	Yes
	83	X	-0.012	-0.012	0.00	Yes	100.00	Yes
	84	X	-0.012	-0.012	0.00	Yes	100.00	Yes
	102	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	104	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	106	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	108	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	110	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	112	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	114	X	-0.007	-0.007	0.00	Yes	100.00	Yes
	116	X	-0.007	-0.007	0.00	Yes	100.00	Yes
Di	4	Y	-0.019	-0.019	0.00	Yes	100.00	Yes
	5	Y	-0.019	-0.019	0.00	Yes	100.00	Yes
	6	Y	-0.019	-0.019	0.00	Yes	100.00	Yes
	7	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	8	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	9	Y	-0.007	-0.007	0.00	Yes	100.00	Yes
	35	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
	36	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
	39	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
	41	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
	42	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
	43	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
	44	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
	45	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
	46	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
	47	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
	48	Y	-0.016	-0.016	0.00	Yes	100.00	Yes

49	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
75	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
77	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
79	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
81	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
82	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
83	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
84	Y	-0.016	-0.016	0.00	Yes	100.00	Yes
102	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
104	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
106	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
108	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
110	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
112	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
114	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
116	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
129	Y	-0.013	-0.013	0.00	Yes	100.00	Yes
130	Y	-0.013	-0.013	0.00	Yes	100.00	Yes
131	Y	-0.013	-0.013	0.00	Yes	100.00	Yes
132	Y	-0.015	-0.015	0.00	Yes	100.00	Yes
133	Y	-0.015	-0.015	0.00	Yes	100.00	Yes
134	Y	-0.015	-0.015	0.00	Yes	100.00	Yes

Concentrated forces on members



Condition	Member	Dir1	Value1 [Kip]	Dist1 [ft]	%
DL	75	y	-0.067	0.64	No
		y	-0.067	5.36	No
		y	-0.011	2.00	No
	77	y	-0.064	0.00	No
		y	-0.064	8.00	No
	79	y	-0.074	2.00	No
	81	y	-0.09	0.58	No
		y	-0.09	5.42	No
		y	-0.01	2.00	No
	102	y	-0.09	0.58	No
		y	-0.09	5.42	No
		y	-0.01	2.00	No
	104	y	-0.074	2.00	No
	106	y	-0.064	0.00	No
		y	-0.064	8.00	No
	108	y	-0.067	0.64	No
		y	-0.067	5.36	No
		y	-0.011	2.00	No
	110	y	-0.09	0.58	No
		y	-0.09	5.42	No
		y	-0.01	2.00	No
	112	y	-0.074	2.00	No
	114	y	-0.064	0.00	No

		y	-0.064	8.00	No
	116	y	-0.067	0.64	No
		y	-0.067	5.36	No
		y	-0.011	2.00	No
W0	75	z	-0.072	0.64	No
		z	-0.072	5.36	No
	77	z	-0.164	0.00	No
		z	-0.164	8.00	No
	79	z	-0.036	2.00	No
	81	z	-0.082	0.58	No
		z	-0.082	5.42	No
	102	z	-0.082	0.58	No
		z	-0.082	5.42	No
	104	z	-0.036	2.00	No
	106	z	-0.164	0.00	No
		z	-0.164	8.00	No
	108	z	-0.072	0.64	No
		z	-0.072	5.36	No
	110	z	-0.111	0.58	No
		z	-0.111	5.42	No
	112	z	-0.046	2.00	No
	114	z	-0.283	0.00	No
		z	-0.283	8.00	No
	116	z	-0.091	0.64	No
		z	-0.091	5.36	No
W30	75	x	-0.085	0.64	No
		x	-0.085	5.36	No
		x	-0.008	2.00	No
	77	x	-0.243	0.00	No
		x	-0.243	8.00	No
	79	x	-0.043	2.00	No
	81	x	-0.101	0.58	No
		x	-0.101	5.42	No
		x	-0.008	2.00	No
	102	x	-0.101	0.58	No
		x	-0.101	5.42	No
		x	-0.008	2.00	No
	104	x	-0.043	2.00	No
	106	x	-0.243	0.00	No
		x	-0.243	8.00	No
	108	x	-0.085	0.64	No
		x	-0.085	5.36	No
		x	-0.008	2.00	No
	110	x	-0.072	0.58	No
		x	-0.072	5.42	No
		x	-0.004	2.00	No
	112	x	-0.032	2.00	No
	114	x	-0.124	0.00	No
		x	-0.124	8.00	No
	116	x	-0.066	0.64	No
		x	-0.066	5.36	No
		x	-0.004	2.00	No
Di	75	y	-0.127	0.64	No
		y	-0.127	5.36	No
		y	-0.025	2.00	No
	77	y	-0.292	0.00	No
		y	-0.292	8.00	No
	79	y	-0.096	2.00	No
	81	y	-0.148	0.58	No
		y	-0.148	5.42	No

		y	-0.032	2.00	No
	102	y	-0.148	0.58	No
		y	-0.148	5.42	No
		y	-0.032	2.00	No
	104	y	-0.096	2.00	No
	106	y	-0.292	0.00	No
		y	-0.292	8.00	No
	108	y	-0.127	0.64	No
		y	-0.127	5.36	No
		y	-0.025	2.00	No
	110	y	-0.148	0.58	No
		y	-0.148	5.42	No
		y	-0.032	2.00	No
	112	y	-0.096	2.00	No
	114	y	-0.292	0.00	No
		y	-0.292	8.00	No
	116	y	-0.127	0.64	No
		y	-0.127	5.36	No
		y	-0.025	2.00	No
Wi0	75	z	-0.025	0.64	No
		z	-0.025	5.36	No
	77	z	-0.051	0.00	No
		z	-0.051	8.00	No
	79	z	-0.015	2.00	No
	81	z	-0.027	0.58	No
		z	-0.027	5.42	No
	102	z	-0.027	0.58	No
		z	-0.027	5.42	No
	104	z	-0.015	2.00	No
	106	z	-0.051	0.00	No
		z	-0.051	8.00	No
	108	z	-0.025	0.64	No
		z	-0.025	5.36	No
	110	z	-0.035	0.58	No
		z	-0.035	5.42	No
	112	z	-0.018	2.00	No
	114	z	-0.08	0.00	No
		z	-0.08	8.00	No
	116	z	-0.03	0.64	No
		z	-0.03	5.36	No
Wi30	75	x	-0.028	0.64	No
		x	-0.028	5.36	No
		x	-0.006	2.00	No
	77	x	-0.07	0.00	No
		x	-0.07	8.00	No
	79	x	-0.017	2.00	No
	81	x	-0.032	0.58	No
		x	-0.032	5.42	No
		x	-0.007	2.00	No
	102	x	-0.032	0.58	No
		x	-0.032	5.42	No
		x	-0.007	2.00	No
	104	x	-0.017	2.00	No
	106	x	-0.07	0.00	No
		x	-0.07	8.00	No
	108	x	-0.028	0.64	No
		x	-0.028	5.36	No
		x	-0.006	2.00	No
	110	x	-0.025	0.58	No
		x	-0.025	5.42	No

		x	-0.005	2.00	No
	112	x	-0.014	2.00	No
	114	x	-0.042	0.00	No
		x	-0.042	8.00	No
	116	x	-0.023	0.64	No
		x	-0.023	5.36	No
		x	-0.004	2.00	No
WL0	75	z	-0.006	0.64	No
		z	-0.006	5.36	No
	77	z	-0.014	0.00	No
		z	-0.014	8.00	No
	79	z	-0.003	2.00	No
	81	z	-0.007	0.58	No
		z	-0.007	5.42	No
	102	z	-0.007	0.58	No
		z	-0.007	5.42	No
	104	z	-0.003	2.00	No
	106	z	-0.014	0.00	No
		z	-0.014	8.00	No
	108	z	-0.006	0.64	No
		z	-0.006	5.36	No
	110	z	-0.009	0.58	No
		z	-0.009	5.42	No
	112	z	-0.004	2.00	No
	114	z	-0.023	0.00	No
		z	-0.023	8.00	No
	116	z	-0.008	0.64	No
		z	-0.008	5.36	No
WL30	75	x	-0.007	0.64	No
		x	-0.007	5.36	No
		x	-0.001	2.00	No
	77	x	-0.02	0.00	No
		x	-0.02	8.00	No
	79	x	-0.003	2.00	No
	81	x	-0.009	0.58	No
		x	-0.009	5.42	No
		x	-0.001	2.00	No
	102	x	-0.009	0.58	No
		x	-0.009	5.42	No
		x	-0.001	2.00	No
	104	x	-0.003	2.00	No
	106	x	-0.02	0.00	No
		x	-0.02	8.00	No
	108	x	-0.007	0.64	No
		x	-0.007	5.36	No
		x	-0.001	2.00	No
	110	x	-0.006	0.58	No
		x	-0.006	5.42	No
		x	-0.001	2.00	No
	112	x	-0.003	2.00	No
	114	x	-0.01	0.00	No
		x	-0.01	8.00	No
	116	x	-0.006	0.64	No
		x	-0.006	5.36	No
		x	-0.001	2.00	No
LL1	42	y	-0.25	2.40	No
LL2	43	y	-0.25	4.50	No
LLa1	81	y	-0.50	3.00	No
	102	y	-0.50	3.00	No
	110	y	-0.50	3.00	No

LLa3	77	y	-0.50	4.00	No
	106	y	-0.50	4.00	No
	114	y	-0.50	4.00	No

Self weight multipliers for load conditions

Condition	Description	Self weight multiplier			
		Comb.	MultX	MultY	MultZ
DL	Dead Load	No	0.00	-1.00	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

Bentley

Current Date: 11/6/2018 9:44 AM
Units system: English
File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\CROWN CASTLE\829013\Rev2\829013 (Rev.2).e

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
3	4.1136	0.00	-2.375	0
4	0.6761	0.00	-8.3289	0
5	7.5511	0.00	3.5789	0
24	-4.1136	0.00	-2.375	0
25	-7.5511	0.00	3.5789	0
26	-0.6761	0.00	-8.3289	0
31	0.00	0.00	4.75	0
32	6.875	0.00	4.75	0
33	-6.875	0.00	4.75	0
42	-1.85E-06	0.00	-8.3289	0
45	-7.2131	0.00	4.1645	0
46	7.2131	0.00	4.1645	0
47	-0.866	0.00	0.50	0
48	0.866	0.00	0.50	0
49	0.00	0.00	-1.00	0
152	5.3011	0.00	-0.3182	0
153	2.9261	0.00	-4.4318	0
158	-2.9261	0.00	-4.4318	0
159	-5.3011	0.00	-0.3182	0
160	2.375	0.00	4.75	0
161	-2.375	0.00	4.75	0

168	5.4261	0.00	-0.1017	0
169	2.8011	0.00	-4.6483	0
174	-2.8011	0.00	-4.6483	0
175	-5.4261	0.00	-0.1017	0
176	-2.625	0.00	4.75	0
177	2.625	0.00	4.75	0
178	2.625	0.00	1.5155	0
181	3.86E-06	0.00	-3.0311	0
182	-2.625	0.00	1.5155	0
231	7.3011	0.00	3.1459	0
232	7.4743	0.00	3.0459	0
233	7.4743	-1.50	3.0459	0
234	7.4743	4.50	3.0459	0
235	5.0511	0.00	-0.7512	0
236	5.2243	-2.50	-0.8512	0
237	5.2243	0.00	-0.8512	0
238	5.2243	5.50	-0.8512	0
239	3.1761	0.00	-3.9988	0
240	3.3493	0.00	-4.0988	0
241	3.3493	-1.50	-4.0988	0
242	3.3493	4.50	-4.0988	0
243	0.9261	0.00	-7.8959	0
244	1.0993	4.50	-7.9959	0
245	1.0993	0.00	-7.9959	0
246	1.0993	-1.50	-7.9959	0
279	-7.3011	0.00	3.1459	0
280	-7.4743	4.50	3.0459	0
281	-7.4743	0.00	3.0459	0
282	-7.4743	-1.50	3.0459	0
283	-5.0511	0.00	-0.7512	0
284	-5.2243	0.00	-0.8512	0
285	-5.2243	-1.50	-0.8512	0
286	-5.2243	4.50	-0.8512	0
287	-3.1761	0.00	-3.9988	0
288	-3.3493	-2.50	-4.0988	0
289	-3.3493	0.00	-4.0988	0
290	-3.3493	5.50	-4.0988	0
291	-0.9261	0.00	-7.8959	0
292	-1.0993	0.00	-7.9959	0
293	-1.0993	-1.50	-7.9959	0
294	-1.0993	4.50	-7.9959	0
295	6.375	0.00	4.75	0
296	6.375	4.50	4.95	0
297	6.375	0.00	4.95	0
298	6.375	-1.50	4.95	0
299	1.875	0.00	4.75	0
300	1.875	0.00	4.95	0
301	1.875	-1.50	4.95	0
302	1.875	4.50	4.95	0
303	-1.875	0.00	4.75	0
304	-1.875	-2.50	4.95	0
305	-1.875	0.00	4.95	0
306	-1.875	5.50	4.95	0
307	-6.375	0.00	4.75	0
308	-6.375	0.00	4.95	0
309	-6.375	-1.50	4.95	0
310	-6.375	4.50	4.95	0
311	-6.375	3.00	4.75	0
312	-6.375	3.00	4.95	0
313	-1.875	3.00	4.75	0

314	-1.875	3.00	4.95	0
315	1.875	3.00	4.75	0
316	1.875	3.00	4.95	0
317	6.375	3.00	4.75	0
318	6.375	3.00	4.95	0
319	7.3011	3.00	3.1459	0
320	7.4743	3.00	3.0459	0
321	5.0511	3.00	-0.7512	0
322	5.2243	3.00	-0.8512	0
323	3.1761	3.00	-3.9988	0
324	3.3493	3.00	-4.0988	0
325	0.9261	3.00	-7.8959	0
326	1.0993	3.00	-7.9959	0
327	-0.9261	3.00	-7.8959	0
328	-1.0993	3.00	-7.9959	0
329	-3.1761	3.00	-3.9988	0
330	-3.3493	3.00	-4.0988	0
331	-5.0511	3.00	-0.7512	0
332	-5.2243	3.00	-0.8512	0
333	-7.3011	3.00	3.1459	0
334	-7.4743	3.00	3.0459	0
335	7.6136	3.00	3.6872	0
336	0.6136	3.00	-8.4372	0
337	7.3636	3.00	3.2542	0
338	0.8636	3.00	-8.0042	0
347	-0.8636	3.00	-8.0042	0
348	-0.6136	3.00	-8.4372	0
349	-7.6136	3.00	3.6872	0
350	-7.3636	3.00	3.2542	0
351	7.00	3.00	4.75	0
352	6.50	3.00	4.75	0
353	-6.50	3.00	4.75	0
354	-7.00	3.00	4.75	0
365	-1.51E-06	0.00	-6.9964	0
374	6.0591	0.00	3.4982	0
376	-6.0591	0.00	3.4982	0
377	-0.866	-2.50	0.50	0
378	0.866	-2.50	0.50	0
379	0.00	-2.50	-1.00	0

Restraints

Node	TX	TY	TZ	RX	RY	RZ
47	1	1	1	1	1	1
48	1	1	1	1	1	1
49	1	1	1	1	1	1
377	1	1	1	1	1	1
378	1	1	1	1	1	1
379	1	1	1	1	1	1

Members

Member	NJ	NK	Description	Section	Material	d0 [in]	dL [in]	lg factor
4	45	47		HSS_SQR 3X3X1_4	A500 GrB rectangular	0.00	0.00	0.00
5	48	46		HSS_SQR 3X3X1_4	A500 GrB rectangular	0.00	0.00	0.00
6	49	42		HSS_SQR 3X3X1_4	A500 GrB rectangular	0.00	0.00	0.00
7	33	25		PL 6x5/8	A36	0.00	0.00	0.00
8	32	5		PL 6x5/8	A36	0.00	0.00	0.00
9	4	26		PL 6x5/8	A36	0.00	0.00	0.00
35	181	174		LU 2-1_2X1-1_2X1_4	A36	0.00	0.00	0.00
36	178	168		LU 2-1_2X1-1_2X1_4	A36	0.00	0.00	0.00
39	169	181		LU 2-1_2X1-1_2X1_4	A36	0.00	0.00	0.00
41	33	161		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
42	161	160		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
43	160	32		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
44	25	159		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
45	159	158		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
46	158	26		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
47	4	153		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
48	153	152		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
49	152	5		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
75	234	233		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
77	238	236		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
79	242	241		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
81	244	246		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
82	160	178		LU 2-1_2X1-1_2X1_4	A36	0.00	0.00	0.00
83	175	182		LU 2-1_2X1-1_2X1_4	A36	0.00	0.00	0.00
84	182	176		LU 2-1_2X1-1_2X1_4	A36	0.00	0.00	0.00
102	280	282		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
104	286	285		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
106	290	288		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
108	294	293		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
110	296	298		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
112	302	301		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
114	306	304		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
116	310	309		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
129	354	351		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
130	335	336		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
131	348	349		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
132	353	350		L 2X2X1_4	A36	0.00	0.00	0.00
133	347	338		L 2X2X1_4	A36	0.00	0.00	0.00
134	337	352		L 2X2X1_4	A36	0.00	0.00	0.00
135	377	376		T2L 3X3X1_4	A36	0.00	0.00	0.00
136	378	374		T2L 3X3X1_4	A36	0.00	0.00	0.00
137	379	365		T2L 3X3X1_4	A36	0.00	0.00	0.00

Orientation of local axes

Member	Rotation [Deg]	Axes23	NX	NY	NZ
75	0.00	2	-0.50	0.00	-0.866
77	0.00	2	-0.50	0.00	-0.866
79	0.00	2	-0.50	0.00	-0.866
81	0.00	2	-0.50	0.00	-0.866
102	0.00	2	-0.50	0.00	0.866
104	0.00	2	-0.50	0.00	0.866
106	0.00	2	-0.50	0.00	0.866
108	0.00	2	-0.50	0.00	0.866
132	180.00	0	0.00	0.00	0.00

133	180.00	0	0.00	0.00	0.00
134	180.00	0	0.00	0.00	0.00

APPENDIX C

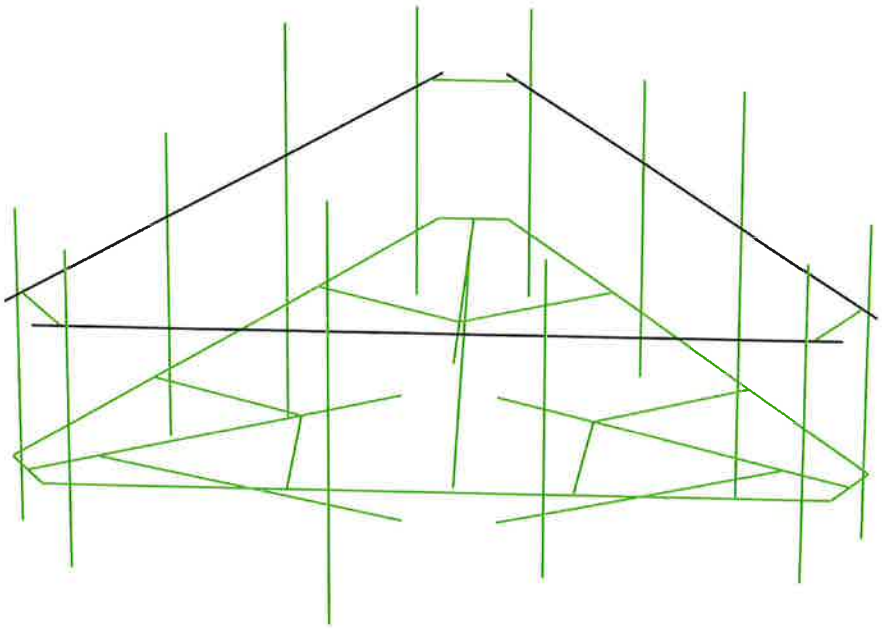
RAM ELEMENTS ANALYSIS OUTPUT

Bentley

Current Date: 11/6/2018 9:44 AM
Units system: English
File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\CROWN CASTLE\829013\Rev2\829013 (Rev.2).etz\

Design status

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



Bentley

Current Date: 11/6/2018 9:44 AM
Units system: English
File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\CROWN CASTLE\829013\Rev2\829013 (Rev.2).e

Steel Code Check

Report: Summary - Group by member

Load conditions to be included in design :

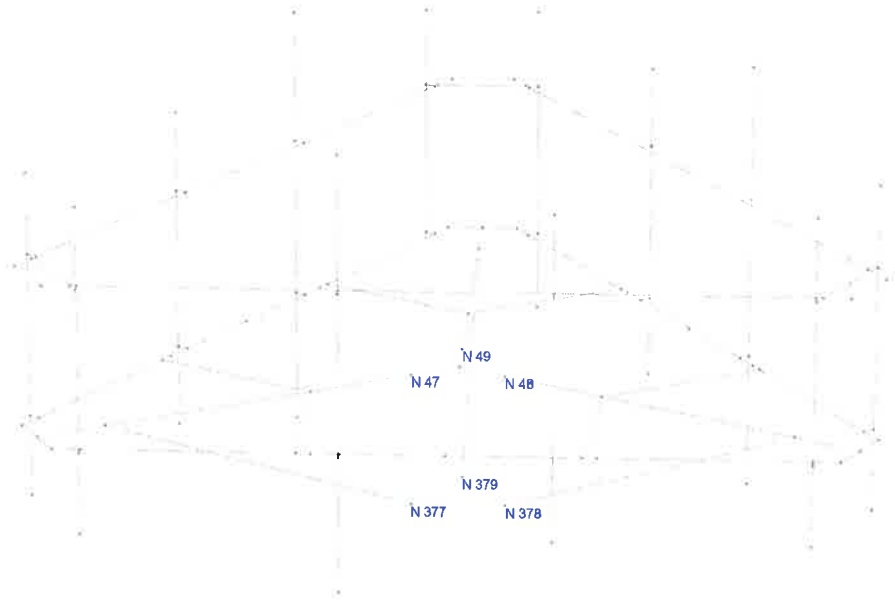
W180=-W0
W210=-W30
Wi180=-Wi0
Wi210=-Wi30
WL180=-WL0
WL210=-WL30
LC1=1.2DL+1.6W0
LC2=1.2DL+1.6W30
LC3=1.2DL-1.6W0
LC4=1.2DL-1.6W30
LC5=0.9DL+1.6W0
LC6=0.9DL+1.6W30
LC7=0.9DL-1.6W0
LC8=0.9DL-1.6W30
LC9=1.2DL+Di+Wi0
LC10=1.2DL+Di+Wi30
LC11=1.2DL+Di-Wi0
LC12=1.2DL+Di-Wi30
LC13=1.2DL
LC14=0.9DL
LC15=1.2DL+1.5LL1
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
	HSS_SQR 3X3X1_4	**4**	LC10 at 16.67%	0.39	OK	Eq. H1-1b
		5	LC12 at 83.33%	0.39	OK	Eq. H1-1b
		6	LC2 at 0.00%	**0.43**	**OK**	Eq. H1-1b
	L 2X2X1_4	**132**	LC3 at 100.00%	0.57	OK	Sec. F1
		133	LC2 at 100.00%	**0.58**	**OK**	Sec. F1
		134	LC4 at 100.00%	0.50	OK	Sec. F1
	LU 2-1_2X1-1_2X1_4	**35**	LC12 at 0.00%	0.88	OK	Eq. H2-1
		36	LC10 at 0.00%	0.88	OK	Eq. H2-1
		39	LC10 at 100.00%	0.82	OK	Eq. H2-1
		82	LC9 at 100.00%	0.83	OK	Eq. H2-1
		83	LC11 at 100.00%	0.82	OK	Eq. H2-1
		84	LC9 at 0.00%	**0.89**	**OK**	Eq. H2-1

PIPE 2-1_2x0.203	**77**	LC4 at 66.67%	**0.76**	**OK**	Eq. H1-1b
	106	LC4 at 66.67%	0.74	OK	Eq. H1-1b
	114	LC1 at 66.67%	0.66	OK	Eq. H1-1b
PIPE 2x0.154	**75**	LC4 at 72.92%	0.49	OK	Eq. H1-1b
	79	LC2 at 72.92%	**0.72**	**OK**	Eq. H1-1b
	81	LC1 at 72.92%	0.50	OK	Eq. H1-1b
	102	LC2 at 72.92%	0.46	OK	Eq. H1-1b
	104	LC2 at 72.92%	0.67	OK	Eq. H1-1b
	108	LC1 at 72.92%	0.52	OK	Eq. H1-1b
	110	LC4 at 72.92%	0.47	OK	Eq. H1-1b
	112	LC4 at 72.92%	0.46	OK	Eq. H1-1b
	116	LC2 at 72.92%	0.48	OK	Eq. H1-1b
	129	LC2 at 4.46%	0.52	With warnings	Eq. H1-1b
	130	LC4 at 35.71%	0.67	With warnings	Eq. H1-1b
	131	LC2 at 36.61%	0.57	With warnings	Eq. H1-1b
PIPE 3x0.216	**41**	LC12 at 100.00%	0.28	OK	Eq. H1-1b
	42	LC10 at 9.38%	**0.35**	**OK**	Eq. H1-1b
	43	LC9 at 100.00%	0.27	OK	Eq. H1-1b
	44	LC12 at 0.00%	0.27	OK	Eq. H1-1b
	45	LC9 at 90.63%	0.33	OK	Eq. H1-1b
	46	LC12 at 100.00%	0.27	OK	Eq. H1-1b
	47	LC10 at 0.00%	0.27	OK	Eq. H1-1b
	48	LC11 at 90.63%	0.34	OK	Eq. H1-1b
	49	LC10 at 100.00%	0.28	OK	Eq. H1-1b
PL 6x5/8	**7**	LC9 at 46.88%	0.72	OK	Eq. H3-6
	8	LC10 at 53.13%	**0.72**	**OK**	Eq. H3-6
	9	LC12 at 53.13%	0.71	OK	Eq. H3-6
T2L 3X3X1_4	**135**	LC10 at 100.00%	0.64	OK	Eq. H2-1
	136	LC12 at 100.00%	**0.65**	**OK**	Eq. H2-1
	137	LC9 at 100.00%	0.65	OK	Eq. H2-1

APPENDIX D

ADDITIONAL CALCUATIONS

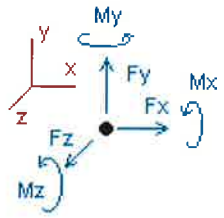

N 49
N 47
N 48
N 379
N 377
N 378
Y
X
Z

Bentley

Current Date: 11/6/2018 9:45 AM
Units system: English
File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\CROWN CASTLE\829013\Rev2\829013 (Rev.2).e

Analysis result

Reactions



Direction of positive forces and moments

Node	Forces [Kip] FX	FY	FZ	Moments [Kip*ft] MX	MY	MZ
Condition **W180=-W0**						
48	-0.89186	-0.03813	-1.05264	-0.08513	0.70173	-0.11082
49	-0.05793	0.05973	-2.64352	0.08252	0.06994	0.00459
47	0.94830	-0.02759	-1.24935	-0.10807	-0.90849	0.10525
379	-0.00128	-0.37018	0.97683	0.05678	-0.00196	-0.00069
377	-0.43595	0.18726	0.22971	-0.04032	-0.14410	0.05461
378	0.43873	0.18892	0.24200	-0.02273	0.10132	-0.04896
SUM	0.00000	0.00000	-3.49696	-0.11695	-0.18157	0.00397
Condition **W210=-W30**						
48	-2.31890	-0.05770	-1.02118	0.12185	-0.26607	-0.02267
49	-0.85386	-0.00945	-0.08358	-0.01528	1.40667	0.17906
47	-2.16734	0.06434	1.11185	-0.11770	-0.05894	-0.03706
379	-0.05780	0.00291	-0.01184	-0.00411	0.39705	0.16793
377	0.82209	-0.35074	-0.43313	0.03606	0.18189	-0.08633
378	0.81599	0.35064	0.43788	-0.02872	0.15897	-0.07936
SUM	-3.75981	0.00000	0.00000	-0.00789	1.81958	0.12158
Condition **Wi180=-Wi0**						
48	-0.21679	-0.01134	-0.23890	-0.02204	0.15230	-0.03153
49	-0.01735	0.01635	-0.62988	0.02313	0.02164	0.00139
47	0.23351	-0.00813	-0.29235	-0.02849	-0.20662	0.02952
379	-0.00057	-0.10202	0.26924	0.01607	0.00048	0.00023
377	-0.11900	0.05230	0.06925	-0.00486	-0.02306	0.01198
378	0.12019	0.05285	0.07264	-0.00048	0.01274	-0.01084
SUM	0.00000	0.00000	-0.75000	-0.01667	-0.04252	0.00074
Condition **Wi210=-Wi30**						
48	-0.55141	-0.01534	-0.24700	0.03148	-0.06823	-0.00704
49	-0.16375	-0.00269	-0.02247	-0.00435	0.27439	0.04543
47	-0.51032	0.01739	0.27171	-0.03080	-0.01201	-0.01115
379	-0.00460	0.00083	-0.00339	-0.00117	0.06404	0.02733
377	0.22466	-0.09583	-0.11845	0.00529	0.03747	-0.02139
378	0.22242	0.09563	0.11960	-0.00325	0.03092	-0.01932
SUM	-0.78300	0.00000	0.00000	-0.00281	0.32659	0.01385

Condition **WL180=-WL0**						
48	-0.05658	-0.00306	-0.06210	-0.00579	0.03869	-0.00842
49	-0.00420	0.00428	-0.16392	0.00605	0.00446	0.00042
47	0.06066	-0.00217	-0.07949	-0.00773	-0.05861	0.00795
379	0.00005	-0.02663	0.07029	0.00420	-0.00104	-0.00042
377	-0.03136	0.01372	0.01796	-0.00178	-0.00745	0.00344
378	0.03142	0.01386	0.01927	0.00035	0.00205	-0.00260
SUM	0.00000	0.00000	-0.19800	-0.00469	-0.02190	0.00037
Condition **WL210=-WL30**						
48	-0.14100	-0.00393	-0.06343	0.00825	-0.01528	-0.00171
49	-0.04541	-0.00072	-0.00654	-0.00116	0.07675	0.01187
47	-0.12875	0.00439	0.07045	-0.00783	0.00104	-0.00276
379	-0.00174	0.00023	-0.00092	-0.00031	0.01953	0.00831
377	0.05713	-0.02428	-0.02959	0.00240	0.01239	-0.00599
378	0.05677	0.02431	0.03003	-0.00181	0.01063	-0.00549
SUM	-0.20300	0.00000	0.00000	-0.00047	0.10506	0.00422
Condition **LC1=1.2DL+1.6W0**						
48	-0.99767	0.12541	0.28405	0.09256	-1.12321	0.25457
49	0.09238	-0.03382	7.03106	-0.04333	-0.11136	-0.01104
47	0.90612	0.10757	0.60015	0.12408	1.45371	-0.24586
379	0.00230	1.85088	-4.66044	-0.16514	0.00239	0.00081
377	-1.98263	0.95830	1.17982	0.10100	0.23008	-0.02376
378	1.97950	0.95540	1.16050	0.07384	-0.16207	0.01345
SUM	0.00000	3.96374	5.59514	0.18301	0.28954	-0.01184
Condition **LC2=1.2DL+1.6W30**						
48	1.28560	0.15672	0.23371	-0.23862	0.42525	0.11353
49	1.36588	0.07687	2.93517	0.11314	-2.25013	-0.29019
47	5.89113	-0.03953	-3.17777	0.13948	0.09442	-0.01817
379	0.09272	1.25393	-3.07857	-0.06771	-0.63602	-0.26899
377	-3.99550	1.81910	2.24036	-0.02119	-0.29150	0.20173
378	1.37587	0.69664	0.84710	0.08342	-0.25433	0.06208
SUM	6.01570	3.96374	0.00000	0.00851	-2.91230	-0.20000
Condition **LC3=1.2DL-1.6W0**						
48	-3.85161	0.00340	-3.08441	-0.17987	1.12231	-0.10005
49	-0.09299	0.15730	-1.42819	0.22073	0.11244	0.00364
47	3.94068	0.01927	-3.39777	-0.22175	-1.45346	0.09094
379	-0.00181	0.66629	-1.53459	0.01657	-0.00389	-0.00141
377	-3.37769	1.55754	1.91490	-0.02801	-0.23103	0.15098
378	3.38342	1.55993	1.93491	0.00110	0.16214	-0.14323
SUM	0.00000	3.96374	-5.59514	-0.19124	-0.29150	0.00088
Condition **LC4=1.2DL-1.6W30**						
48	-6.13487	-0.02791	-3.03407	0.15131	-0.42616	0.04099
49	-1.36649	0.04662	2.66771	0.06426	2.25121	0.28279
47	-1.04434	0.16637	0.38015	-0.23715	-0.09417	-0.13675
379	-0.09223	1.26324	-3.11645	-0.08086	0.63453	0.26838
377	-1.36482	0.69674	0.85435	0.09418	0.29055	-0.07451
378	3.98705	1.81868	2.24832	-0.00848	0.25439	-0.19186
SUM	-6.01570	3.96374	0.00000	-0.01675	2.91035	0.18904

Condition **LC5=0.9DL+1.6W0**						
48	-0.39151	0.10931	0.63409	0.10347	-1.12310	0.23525
49	0.09246	-0.04925	6.33071	-0.06550	-0.11149	-0.01012
47	0.30027	0.09171	0.94985	0.13629	1.45368	-0.22650
379	0.00224	1.53623	-3.88606	-0.14657	0.00258	0.00088
377	-1.31259	0.64382	0.79298	0.09188	0.23020	-0.03966
378	1.30913	0.64098	0.77357	0.06447	-0.16208	0.02967
SUM	0.00000	2.97281	5.59514	0.18404	0.28979	-0.01047
Condition **LC6=0.9DL+1.6W30**						
48	1.89175	0.14062	0.58376	-0.22771	0.42537	0.09421
49	1.36595	0.06143	2.23481	0.09097	-2.25027	-0.28927
47	5.28529	-0.05538	-2.82806	0.15169	0.09439	0.00120
379	0.09266	0.93928	-2.30419	-0.04914	-0.63584	-0.26891
377	-3.32546	1.50462	1.85352	-0.03032	-0.29138	0.18583
378	0.70550	0.38223	0.46017	0.07405	-0.25433	0.07831
SUM	6.01570	2.97281	0.00000	0.00954	-2.91206	-0.19863
Condition **LC7=0.9DL-1.6W0**						
48	-3.24545	-0.01270	-2.73436	-0.16896	1.12242	-0.11937
49	-0.09292	0.14187	-2.12855	0.19856	0.11230	0.00457
47	3.33483	0.00342	-3.04806	-0.20954	-1.45349	0.11031
379	-0.00187	0.35164	-0.76021	0.03514	-0.00370	-0.00134
377	-2.70765	1.24306	1.52806	-0.03714	-0.23091	0.13508
378	2.71305	1.24551	1.54799	-0.00826	0.16213	-0.12701
SUM	0.00000	2.97281	-5.59514	-0.19021	-0.29125	0.00225
Condition **LC8=0.9DL-1.6W30**						
48	-5.52871	-0.04401	-2.68403	0.16222	-0.42605	0.02167
49	-1.36641	0.03118	1.96735	0.04208	2.25108	0.28372
47	-1.65019	0.15052	0.72985	-0.22494	-0.09420	-0.11739
379	-0.09229	0.94859	-2.34208	-0.06229	0.63472	0.26846
377	-0.69478	0.38226	0.46751	0.08506	0.29067	-0.09041
378	3.31668	1.50426	1.86139	-0.01785	0.25438	-0.17564
SUM	-6.01570	2.97281	0.00000	-0.01572	2.91059	0.19041
Condition **LC9=1.2DL+Di+Wi0**						
48	-6.02287	0.23268	-3.36053	-0.10296	-0.16598	0.31139
49	0.01986	0.19734	7.83894	0.28104	-0.03254	-0.04225
47	6.00103	0.22655	-3.31028	-0.16338	0.19420	-0.27911
379	-0.00587	3.27819	-8.23228	-0.26586	0.00627	0.00238
377	-6.76745	3.12226	3.91495	0.13103	0.03078	0.20057
378	6.77531	3.12026	3.89920	0.12328	-0.00405	-0.20858
SUM	0.00000	10.17727	0.75000	0.00316	0.02869	-0.01560
Condition **LC10=1.2DL+Di+Wi30**						
48	-5.68825	0.23667	-3.35244	-0.15648	0.05455	0.28690
49	0.16625	0.21638	7.23153	0.30852	-0.28530	-0.08629
47	6.74487	0.20103	-3.87433	-0.16106	-0.00041	-0.23845
379	-0.00184	3.17534	-7.95965	-0.24861	-0.05729	-0.02471
377	-7.11110	3.27039	4.10265	0.12088	-0.02974	0.23394
378	6.67308	3.07747	3.85224	0.12605	-0.02223	-0.20010
SUM	0.78300	10.17727	0.00000	-0.01070	-0.34042	-0.02871

Condition	**LC11=1.2DL+Di-Wi0**					
48	-6.45646	0.20999	-3.83834	-0.14704	0.13862	0.24833
49	-0.01484	0.23004	6.57918	0.32730	0.01074	-0.03948
47	6.46806	0.21029	-3.89498	-0.22035	-0.21904	-0.22008
379	-0.00701	3.07415	-7.69381	-0.23371	0.00723	0.00285
377	-7.00544	3.22686	4.05345	0.12131	-0.01533	0.22453
378	7.01569	3.22595	4.04449	0.12233	0.02143	-0.23027
SUM	0.00000	10.17727	-0.75000	-0.03017	-0.05635	-0.01412
Condition	**LC12=1.2DL+Di-Wi30**					
48	-6.79107	0.20599	-3.84643	-0.09352	-0.08190	0.27282
49	-0.16124	0.21100	7.18659	0.29982	0.26349	0.00456
47	5.72423	0.23582	-3.33092	-0.22267	-0.02443	-0.26075
379	-0.01104	3.17700	-7.96643	-0.25096	0.07079	0.02994
377	-6.66179	3.07873	3.86574	0.13146	0.04520	0.19116
378	7.11791	3.26874	4.09145	0.11956	0.03961	-0.23875
SUM	-0.78300	10.17727	0.00000	-0.01631	0.31276	-0.00101
Condition	**LC13=1.2DL**					
48	-2.42464	0.06441	-1.40018	-0.04366	-0.00045	0.07726
49	-0.00030	0.06174	2.80144	0.08870	0.00054	-0.00370
47	2.42340	0.06342	-1.39881	-0.04884	0.00013	-0.07746
379	0.00024	1.25858	-3.09751	-0.07428	-0.00075	-0.00030
377	-2.68016	1.25792	1.54736	0.03650	-0.00048	0.06361
378	2.68146	1.25766	1.54771	0.03747	0.00003	-0.06489
SUM	0.00000	3.96374	0.00000	-0.00412	-0.00098	-0.00548
Condition	**LC14=0.9DL**					
48	-1.81848	0.04831	-1.05013	-0.03274	-0.00034	0.05794
49	-0.00023	0.04631	2.10108	0.06653	0.00041	-0.00278
47	1.81755	0.04757	-1.04911	-0.03663	0.00009	-0.05809
379	0.00018	0.94394	-2.32313	-0.05571	-0.00056	-0.00023
377	-2.01012	0.94344	1.16052	0.02737	-0.00036	0.04771
378	2.01109	0.94325	1.16078	0.02810	0.00002	-0.04867
SUM	0.00000	2.97281	0.00000	-0.00309	-0.00073	-0.00411
Condition	**LC15=1.2DL+1.5LL1**					
48	-2.78600	0.09080	-1.62263	-0.14656	0.02214	0.06811
49	-0.00048	0.06510	2.69042	0.09325	0.00103	-0.00348
47	2.78076	0.08939	-1.61966	-0.15259	-0.02441	-0.06964
379	0.00037	1.22633	-3.01348	-0.06970	-0.00083	-0.00034
377	-3.04839	1.43313	1.78183	0.05288	0.03377	0.06455
378	3.05374	1.43400	1.78352	0.05403	-0.03297	-0.06709
SUM	0.00000	4.33874	0.00000	-0.16870	-0.00127	-0.00789
Condition	**LC16=1.2DL+1.5LL2**					
48	-3.36160	0.02129	-1.95113	-0.03477	0.02076	-0.00200
49	-0.00162	0.06522	2.70150	0.09387	0.00529	-0.00351
47	2.40939	0.06338	-1.39585	-0.05779	-0.00823	-0.07259
379	-0.00063	1.23607	-3.03805	-0.07051	0.00394	0.00165
377	-2.69668	1.26621	1.56044	0.03861	0.00455	0.06329
378	3.65114	1.68656	2.12308	0.08111	-0.02329	-0.12184
SUM	0.00000	4.33874	0.00000	0.05050	0.00302	-0.13502

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

48	-4.00729	0.00533	-2.30240	-0.04048	0.00817	-0.03810
49	-0.01137	-0.00518	4.86593	-0.02265	0.04328	0.06048
47	4.01647	0.00331	-2.25607	0.06890	0.10667	-0.02801
379	0.02591	2.09735	-5.28866	-0.20238	-0.03673	-0.01452
377	-4.49888	2.05658	2.56746	0.08730	-0.03051	0.17472
378	4.47515	2.05635	2.61173	0.11188	-0.03898	-0.16257
SUM	0.00000	6.21374	0.19800	0.00258	0.05190	-0.00801

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

48	-3.92286	0.00620	-2.30107	-0.05451	0.06214	-0.04482
49	0.02984	-0.00018	4.70855	-0.01544	-0.02901	0.04902
47	4.20588	-0.00325	-2.40600	0.06899	0.04702	-0.01730
379	0.02770	2.07049	-5.21745	-0.19786	-0.05731	-0.02324
377	-4.58736	2.09459	2.61500	0.08312	-0.05035	0.18415
378	4.44980	2.04589	2.60097	0.11405	-0.04755	-0.15967
SUM	0.20300	6.21374	0.00000	-0.00164	-0.07507	-0.01186

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

48	-4.12044	-0.00079	-2.42660	-0.05205	0.08555	-0.05495
49	-0.01977	0.00338	4.53809	-0.01054	0.05220	0.06132
47	4.13779	-0.00102	-2.41505	0.05343	-0.01055	-0.01212
379	0.02601	2.04409	-5.14808	-0.19397	-0.03882	-0.01536
377	-4.56159	2.08403	2.60338	0.08374	-0.04541	0.18160
378	4.53800	2.08406	2.65027	0.11259	-0.03488	-0.16776
SUM	0.00000	6.21374	-0.19800	-0.00681	0.00809	-0.00727

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

48	-4.20486	-0.00167	-2.42793	-0.03802	0.03158	-0.04823
49	-0.06098	-0.00162	4.69547	-0.01776	0.12449	0.07277
47	3.94838	0.00554	-2.26511	0.05334	0.04910	-0.02283
379	0.02422	2.07095	-5.21929	-0.19849	-0.01824	-0.00663
377	-4.47310	2.04602	2.55583	0.08792	-0.02557	0.17216
378	4.56334	2.09452	2.66103	0.11042	-0.02630	-0.17066
SUM	-0.20300	6.21374	0.00000	-0.00258	0.13506	-0.00342

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

48	-2.36806	0.06747	-1.33808	-0.03787	-0.03914	0.08568
49	0.00390	0.05746	2.96536	0.08265	-0.00392	-0.00412
47	2.36274	0.06559	-1.31932	-0.04111	0.05874	-0.08541
379	0.00019	1.28522	-3.16780	-0.07848	0.00029	0.00012
377	-2.64880	1.24420	1.52940	0.03828	0.00697	0.06017
378	2.65004	1.24380	1.52844	0.03712	-0.00202	-0.06229
SUM	0.00000	3.96374	0.19800	0.00058	0.02093	-0.00585

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

48	-2.28364	0.06834	-1.33675	-0.05190	0.01483	0.07896
49	0.04511	0.06246	2.80797	0.08986	-0.07621	-0.01557
47	2.55215	0.05903	-1.46925	-0.04101	-0.00091	-0.07470
379	0.00198	1.25835	-3.09659	-0.07397	-0.02028	-0.00861
377	-2.73729	1.28221	1.57694	0.03410	-0.01287	0.06961
378	2.62469	1.23335	1.51768	0.03928	-0.01059	-0.05940
SUM	0.20300	3.96374	0.00000	-0.00365	-0.10604	-0.00971

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

48	-2.48122	0.06135	-1.46228	-0.04945	0.03824	0.06884
49	-0.00450	0.06602	2.63751	0.09476	0.00500	-0.00328
47	2.48406	0.06125	-1.47830	-0.05657	-0.05849	-0.06951
379	0.00029	1.23195	-3.02723	-0.07008	-0.00179	-0.00073
377	-2.71151	1.27165	1.56531	0.03471	-0.00792	0.06705
378	2.71288	1.27152	1.56697	0.03782	0.00208	-0.06749
SUM	0.00000	3.96374	-0.19800	-0.00881	-0.02288	-0.00512

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

48	-2.56564	0.06047	-1.46361	-0.03541	-0.01573	0.07555
49	-0.04572	0.06103	2.79490	0.08754	0.07729	0.00817
47	2.29465	0.06781	-1.32836	-0.05667	0.00116	-0.08022
379	-0.00149	1.25881	-3.09844	-0.07460	0.01879	0.00800
377	-2.62303	1.23364	1.51777	0.03889	0.01192	0.05762
378	2.73823	1.28197	1.57774	0.03566	0.01066	-0.07038
SUM	-0.20300	3.96374	0.00000	-0.00459	0.10409	-0.00126

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

48	-3.68369	0.15534	-2.09085	-0.06318	-0.06235	0.24310
49	0.00936	0.14247	4.48372	0.23067	-0.02540	-0.06495
47	3.67111	0.15257	-2.08150	-0.17068	0.03595	-0.18539
379	-0.01231	1.94938	-4.82699	-0.11785	0.01511	0.00591
377	-4.07574	1.90730	2.36831	0.06264	0.02250	0.09023
378	4.09126	1.90668	2.34532	0.05172	0.01363	-0.09980
SUM	0.00000	6.21374	0.19800	-0.00668	-0.00055	-0.01089

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

48	-3.59927	0.15621	-2.08952	-0.07721	-0.00838	0.23638
49	0.05058	0.14746	4.32634	0.23789	-0.09769	-0.07640
47	3.86052	0.14601	-2.23144	-0.17058	-0.02370	-0.17468
379	-0.01053	1.92251	-4.75578	-0.11334	-0.00546	-0.00282
377	-4.16422	1.94531	2.41585	0.05846	0.00266	0.09967
378	4.06591	1.89623	2.33456	0.05388	0.00505	-0.09690
SUM	0.20300	6.21374	0.00000	-0.01090	-0.12752	-0.01475

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

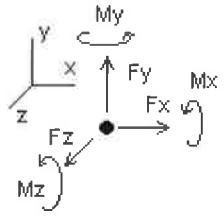
48	-3.79684	0.14922	-2.21505	-0.07475	0.01503	0.22625
49	0.00096	0.15102	4.15588	0.24278	-0.01648	-0.06411
47	3.79243	0.14824	-2.24048	-0.18614	-0.08128	-0.16949
379	-0.01221	1.89611	-4.68642	-0.10945	0.01303	0.00507
377	-4.13845	1.93475	2.40422	0.05908	0.00761	0.09711
378	4.15411	1.93440	2.38386	0.05242	0.01772	-0.10499
SUM	0.00000	6.21374	-0.19800	-0.01606	-0.04436	-0.01016

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

48	-3.88127	0.14835	-2.21638	-0.06072	-0.03894	0.23297
49	-0.04025	0.14603	4.31326	0.23557	0.05582	-0.05266
47	3.60302	0.15480	-2.09055	-0.18624	-0.02162	-0.18020
379	-0.01400	1.92298	-4.75763	-0.11396	0.03361	0.01379
377	-4.04996	1.89674	2.35668	0.06326	0.02745	0.08768
378	4.17945	1.94485	2.39462	0.05025	0.02630	-0.10789
SUM	-0.20300	6.21374	0.00000	-0.01184	0.08261	-0.00630

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
48	Max	1.892	LC6	0.237	LC10	0.634	LC5	0.16222	LC8	1.12242	LC7	0.31139	LC9
	Min	-6.791	LC12	-0.058	W210	-3.846	LC12	-0.23862	LC2	-1.12321	LC1	-0.11937	LC7
49	Max	1.366	LC6	0.230	LC11	7.839	LC9	0.32730	LC11	2.25121	LC4	0.28372	LC8
	Min	-1.366	LC4	-0.049	LC5	-2.644	W180	-0.06550	LC5	-2.25027	LC6	-0.29019	LC2
47	Max	6.745	LC10	0.236	LC12	1.112	W210	0.15169	LC6	1.45371	LC1	0.11031	LC7
	Min	-2.167	W210	-0.055	LC6	-3.895	LC11	-0.23715	LC4	-1.45349	LC7	-0.27911	LC9
379	Max	0.093	LC2	3.278	LC9	0.977	W180	0.05678	W180	0.63472	LC8	0.26846	LC8
	Min	-0.092	LC8	-0.370	W180	-8.232	LC9	-0.26586	LC9	-0.63602	LC2	-0.26899	LC2
377	Max	0.822	W210	3.270	LC10	4.103	LC10	0.13146	LC12	0.29067	LC8	0.23394	LC10
	Min	-7.111	LC10	-0.351	W210	-0.433	W210	-0.04032	W180	-0.29150	LC2	-0.09041	LC8
378	Max	7.118	LC12	3.269	LC12	4.091	LC12	0.12605	LC10	0.25439	LC4	0.07831	LC6
	Min	0.031	WL180	0.014	WL180	0.019	WL180	-0.02872	W210	-0.25433	LC6	-0.23875	LC12

Date: 11/6/2018
Project Name: WEST HARTFORD/I-84/X43
Project Number: 829013
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 = 8232 lbs.

GRAVITY LOADS

Ice and Equipment 3278 lbs.

No. of Supports = 1
No. of Bolts / Support = 4

Tension Design Load /Bolts =

f_t = 2058.00 lbs. < 3750 lbs. **Therefore, OK !**

Shear Design Load / Bolts=

f_v = 819.50 lbs. < 1940 lbs. **Therefore, OK !**

CHECK COMBINED TENSION AND SHEAR

f_t / F_T	+	f_v / F_V	≤	1.0			
0.549	+	0.422	=	0.971	<	1.0	**Therefore, OK !**

- HDG considers this mount to be asymmetrical and has applied wind loads in 30 degree increments all around the mount. Per TIA-222-G Annex B, the max basic wind speed for this site is equal to 100 mph with a max basic wind speed with ice of 40 mph. Per the AT&T Mount Technical Directive and Appendix N of the Connecticut State Building Code, an ultimate wind speed of 120 mph converted to a nominal wind speed of 93 mph was used for this analysis.
- HDG considers this site to be exposure category B; tower is located in an urban/suburban or wooded area with numerous closely spaced obstructions.
- HDG considers this site to be topographic category 1; tower is located on flat terrain or the bottom of a hill or ridge.
- The mount has been analyzed with load combinations consisting of 500 lbs live load using a service wind speed of 30 mph wind on the worst case antenna. Analysis performed on each antenna pipe to determine worst case location; worst case location was antenna position 1.
- The mount has been analyzed with load combinations consisting of a 250 lbs live load in a worst case location on the mount.

Based on our evaluation, we have determined that the existing mounts **ARE NOT CAPABLE** of supporting the proposed installation. HDG recommends the following modifications:

- **Install new 2"std. (2.38" O.D.) diagonal steel brace (typ. of 2 per sector, total of 6).**

	Component	Controlling Load Case	Stress Ratio	Pass/Fail
Existing 3C/4C/5C/6C Mount Rating	10	LC52	118%	**FAIL**
Proposed 3C/4C/5C/6C Mount Rating	27	LC52	97%	**PASS**

Reference Documents:

- Mount mapping report prepared by ProVertic LLC.

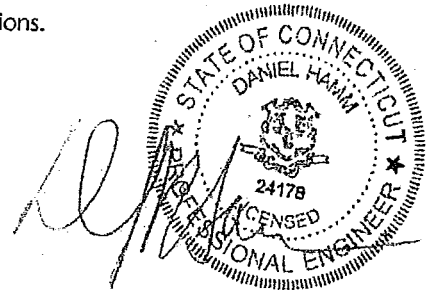
This determination was based on the following limitations and assumptions:

1. HDG is not responsible for any modifications completed prior to and hereafter which HDG was not directly involved.
2. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities.
3. All antennas, coax cables and waveguide cables are assumed to be properly installed and supported as per the manufacturer's requirements.
4. The existing mount has been adequately secured to the tower structure per the mount manufacturer's specifications.
5. All components pertaining to AT&T's mounts must be tightened and re-plumbed prior to the installation of new appurtenances.
6. HDG performed a localized analysis on the mount itself and not on the supporting tower structure.

Please feel free to contact our office should you have any questions.

Respectfully Submitted,
Hudson Design Group LLC

Michael Cabral
Structural Dept. Head



Daniel P. Hamm, PE
Principal

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

October 12, 2018

William Stone
Real Estate Specialist
Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

RE: **EM-T-MOBILE-155-181001 –** T-Mobile notice of intent to modify an existing telecommunications facility located at 467 South Quaker Lane, West Hartford, Connecticut.

Dear Mr. Stone:

The Connecticut Siting Council (Council) received a notice of intent to modify the above-referenced facility on October 1, 2018.

According to Section 16-50j-71 of the Regulations of Connecticut State Agencies, "…any modification, as defined in Section 16-50j-2a of the Regulations of Connecticut State Agencies, to an existing tower site, except as specified in Sections 16-50j-72 and 16-50j-88 of the Regulations of Connecticut State Agencies, may have a substantial adverse environmental effect."

Staff has reviewed this exempt modification request for completeness and has identified a deficiency in the Mount Structural Analysis (MA) prepared by Hudson Design Group, dated May 9, 2018 and stamped and signed by Daniel Hamm. The Analysis Results on page 4 of the MA indicates a Mount Structure Rating of 181%, this is an overstress situation (>100%) and although the Structural Analysis Report submitted with the request does include the recommended mount modifications and indicates an overall Tower Structure Rating of 88.7% the MA does not indicate the Mount Structure Rating which includes the recommended mount modifications. Please see attached the mount structure rating table on page 2 of the Mount Analysis prepared by Hudson Design Group for site no. CT1131, dated June 21, 2018, for your reference.

Therefore, the exempt modification request is incomplete at this time. The Council recommends that Crown Castle provide a mount analysis for the proposed equipment that includes a passing mount structure rating as referenced above and is stamped and signed by a professional engineer duly licensed in the State of Connecticut on or before November 16, 2018. If additional time is needed to gather the requested information, please submit a written request for an extension of time prior to November 16, 2018.

This notice of incompletion shall have the effect of tolling the Federal Communications Commission (FCC) 60-day timeframe in accordance with Paragraph 217 of the FCC Wireless Infrastructure Report and Order issued on October 21, 2014 (FCC 14-153).

Thank you for your attention to this matter. Should you have any questions, please feel free to contact me at 860-827-2951.

Sincerely,

Melanie Bachman
Executive Director

MAB/FOC/in

c: The Honorable Shari Cantor, Mayor, Town of West Hartford
Todd Dumais, Town Planner, Town of West Hartford

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