



# 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](mailto:siting.council@ct.gov)

[www.ct.gov/csc](http://www.ct.gov/csc)

### VIA ELECTRONIC MAIL

May 3, 2018

Mark Roberts  
QC Development  
P.O. Box 916  
Storrs, CT 06268

RE: **EM-CING-083-180403** - New Cingular Wireless PCS, LLC (AT&T) notice of intent to modify an existing telecommunications facility located at 67 Fairchild Road, Middletown, Connecticut.

Dear Mr. Roberts:

The Connecticut Siting Council (Council) is in receipt of your email correspondence of May 3, 2018 submitted in response to the Council's April 16, 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

MB/CMW/mr



**From:** Mark Roberts [mailto:mark.roberts@qcdevelopment.net]

**Sent:** Thursday, May 03, 2018 10:14 AM

**To:** CSC-DL Siting Council <Siting.Council@ct.gov>

**Subject:** RE: Council decision on extension request - EM-CING-083-180403 - Fairchild Rd.

**Importance:** High

Hello – Please see the attached Mount Analysis and Revised CDs, which address the concerns raised in the April 16<sup>th</sup> Incompleteness Letter.

In this case, the Mount Analysis does not call for any reinforcement of the AT&T Antenna Mount and so no revision to the Tower Structural Analysis is necessary.

Thanks

Mark Roberts  
QC Development  
860-670-9068



April 10, 2018



SAI Communications  
12 Industrial Way  
Salem NH, 03079

RE:     Site Number:             CT2547 (LTE 4C)  
          FA Number:             10141343  
          PACE Number:         MRCTB026785  
          PT Number:            2051AOEDP2  
          Site Name:             Middletown Fairchild Road  
          Site Address:         67 Fairchild Road  
                                      Middletown, CT 06457

To Whom It May Concern:

Hudson Design Group LLC (HDG) has been authorized by SAI Communications to perform a mount analysis on the existing AT&T antenna mount to determine its capability of supporting the following equipment loading:

- (3) P65-16-XLH-RR Antennas (72.0"x12.0"x6.0" – Wt. = 64 lbs. /each)
- (3) QS66512-2 Antennas (72.0"x12.0"x9.6" – Wt. = 111 lbs. /each)
- (3) OPA-65R-LCUU-H6 Antennas (72.0"x14.8"x7.4" – Wt. = 73 lbs. /each)
- (3) RRUS-11 RRH's (19.7"x17.0"x7.2" – Wt. = 51 lbs. /each)
- (3) RRUS-32 RRH's (27.2"x12.1"x7.0" – Wt. = 60 lbs. /each)
- (3) RRUS-32 B2 RRH's (27.2"x12.1"x7.0" – Wt. = 60 lbs. /each)
- (3) DTMABP7819VG12A TMA's (14.3"x11.5"x4.2" – Wt. = 20 lbs. /each)
- (2) Squid Surge Arrestors (24.0"x9.7"Ø – Wt. = 33 lbs. /each) (tower mounted)
- **(3) RRUS-32 B66 RRH's (27.2"x12.1"x7.0" – Wt. = 60 lbs. /each)**

*\*Proposed Loading Shown in Bold.*

Fabrication drawings prepared by Commscope, P/N MTC3607, dated September 24, 2013 were available for the existing mount. HDG conducted a ground audit of the existing AT&T antenna mount on December 1, 2017.

Mount Analysis Methods:

- This analysis was conducted in accordance with EIA/TIA-222-G, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and the International Building Code 2012 with 2005 Connecticut Supplement with 2016 Amendments, and AT&T Mount Technical Directive – R5.
- HDG considers this mount to be asymmetrical and has applied wind loads in 30 degree increments all around the mount. A max basic wind speed of 120 mph and a max basic wind speed with ice of 50 mph were used to perform this analysis per TIA-222-G, Annex B.
- HDG considers this site to be exposure category B; tower is located in an urban/suburban and wooded area with numerous closely spaced obstructions.

- HDG considers this site to be topographic category 1; tower is located in flat terrain.
- This 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 4.
- The platform has been analyzed with load combinations consisting of a 250 lbs. live load in a worst case location on the mount.

Based on our analysis, we have determined that the existing antenna mount **IS CAPABLE** of supporting the proposed antenna installation.

	Member	Controlling Load Case	Stress Ratio	Pass/Fail
<b>Existing Mount Rating</b>	27	LC2	99%	<b>PASS</b>

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

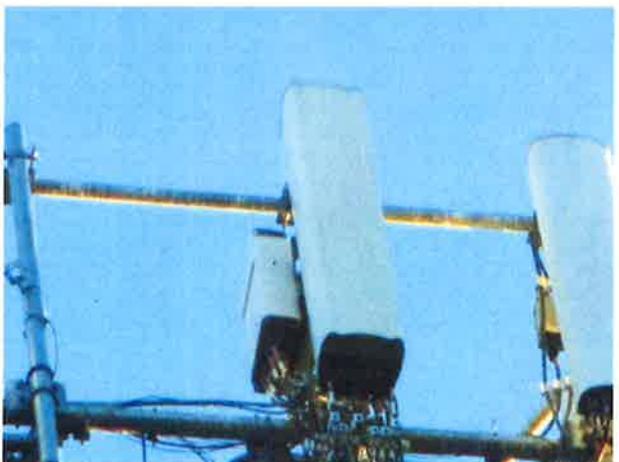


Michael Cabral  
Structural Dept. Head



Daniel P. Hamm, PE  
Principal

**FIELD PHOTOS:**





**HUDSON**  
Design Group LLC

## **Wind & Ice Calculations**

Date: 4/10/2018  
 Project Name: Middletown Fairchild Road  
 Project Number: CT2547  
 Designed By: LN Checked By: MSC



**2.6.5.2 Velocity Pressure Coeff:**

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

z = 130 (ft)  
 z<sub>g</sub> = 1200 (ft)  
 α = 7.0

**K<sub>z</sub> = 1.065**

K<sub>zmin</sub> ≤ K<sub>z</sub> ≤ 2.01

**Table 2-4**

Exposure	Z <sub>g</sub>	α	K <sub>zmin</sub>	K <sub>e</sub>
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 <sub>t</sub>	f
2	0.43	1.25
3	0.53	2.0
4	0.72	1.5

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

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

**K<sub>zt</sub> = 1**

K<sub>h</sub> = #DIV/0!

K<sub>e</sub> = 0 (from Table 2-4)

K<sub>t</sub> = 0 (from Table 2-5)

f = 0 (from Table 2-5)

z = 130

H = 0 (Ht. of the crest above surrounding terrain)

K<sub>zt</sub> = 1.00

K<sub>iz</sub> = 1.15 (from Sec. 2.6.8)

*(If Category 1 then K<sub>zt</sub> = 1.0)*

**Category = 1**

**2.6.8 Design Ice Thickness**

Max Ice Thickness =

t<sub>i</sub> = 1.00 in

$$t_{iz} = 2.0 \cdot t_i \cdot |K_{iz}| \cdot (K_{zt})^{0.35}$$

**t<sub>iz</sub> = 2.29 in**

Date: 4/10/2018  
 Project Name: Middletown Fairchild Road  
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 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= 130      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

(Cantilevered 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 <sub>z</sub> =	1.065
	K <sub>zt</sub> =	1.0
	K <sub>d</sub> =	0.95
	V <sub>max</sub> =	120
	V <sub>max(ice)</sub> =	50
	I=	1.0

**q<sub>z</sub> = 37.30**  
**q<sub>z(ice)</sub> = 6.48**

**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

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**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 = **2.29 in**      Angle = **0 (deg)**      Equivalent Angle = **180 (deg)**

Appurtenances	Height	Width	Depth	Flat Area	Aspect Ratio	Ca	Force (lbs)	Force (lbs) (w/ Ice)
P65-16-XLH-RR	72.0	12.0	6.0	6.00	6.00	1.36	303	77
QS66512-2	72.0	12.0	9.6	6.00	6.00	1.36	303	77
OPA-65R-LCUU-H6	72.0	14.8	7.4	7.40	4.86	1.31	360	87
RRUS-32 B2	27.2	7.0	12.1	1.32	3.89	1.26	62	21
RRUS-32	27.2	7.0	12.1	1.32	3.89	1.26	62	21
RRUS-32 B66	27.2	12.1	7.0	2.29	2.25	1.20	102	29
RRUS-32 B66 (Shielded)	27.2	0.1	7.0	0.02	272.00	10.23	7	69
RRUS-11	19.7	17.0	7.2	2.33	1.16	1.20	104	28
RRUS-11 (Shielded)	19.7	2.2	7.2	0.30	8.95	1.47	16	11
DTMABP7819VG12A	14.3	11.5	4.2	1.14	1.24	1.20	51	16

Date: 4/10/2018  
 Project Name: Middletown Fairchild Road  
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**WIND LOADS**

Angle = 30 (deg)

Ice Thickness = 2.29 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) (normal)	Force (lbs) (side)	Force (lbs) (angle)
P65-16-XLH-RR	72.0	12.0	6.0	6.00	3.00	6.00	12.00	1.36	1.57	303	175	271
QS66512-2	72.0	12.0	9.6	6.00	4.80	6.00	7.50	1.36	1.42	303	254	291
OPA-65R-LCUU-H6	72.0	14.8	7.4	7.40	3.70	4.86	9.73	1.31	1.49	360	206	322
RRUS-32 B2	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	62	102	72
RRUS-32	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	62	102	72
RRUS-32 B66	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	102	62	92
RRUS-32 B66 (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	55	62	57
RRUS-11	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	104	44	89
RRUS-11 (Shielded)	19.7	8.5	7.2	1.16	0.99	2.32	2.74	1.20	1.21	52	44	50
DTMABP7819VG12A	14.3	11.5	4.2	1.14	0.42	1.24	3.40	1.20	1.24	51	19	43

**WIND LOADS WITH ICE:**

P65-16-XLH-RR	76.6	16.6	10.6	8.82	5.63	4.62	7.23	1.29	1.41	74	51	68
QS66512-2	76.6	16.6	14.2	8.82	7.55	4.62	5.40	1.29	1.33	74	65	72
OPA-65R-LCUU-H6	76.6	19.4	12.0	10.31	6.38	3.95	6.39	1.26	1.37	84	57	78
RRUS-32 B2	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	22
RRUS-32	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	22
RRUS-32 B66	31.8	16.7	11.6	3.68	2.56	1.90	2.74	1.20	1.21	29	20	26
RRUS-32 B66 (Shielded)	31.8	8.3	11.6	1.84	2.56	3.81	2.74	1.26	1.21	15	20	16
RRUS-11	24.3	21.6	11.8	3.64	1.99	1.13	2.06	1.20	1.20	28	15	25
RRUS-11 (Shielded)	24.3	10.8	11.8	1.82	1.99	2.25	2.06	1.20	1.20	14	15	14
DTMABP7819VG12A	18.9	16.1	8.8	2.11	1.15	1.17	2.15	1.20	1.20	16	9	15

Date: 4/10/2018  
 Project Name: Middletown Fairchild Road  
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 Designed By: LN Checked By: MSC



**WIND LOADS**

Angle = 60 (deg)

Ice Thickness = 2.29 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)
P65-16-XLH-RR	72.0	12.0	6.0	6.00	3.00	6.00	12.00	1.36	1.57	303	175	207
QS66512-2	72.0	12.0	9.6	6.00	4.80	6.00	7.50	1.36	1.42	303	254	266
OPA-65R-LCUU-H6	72.0	14.8	7.4	7.40	3.70	4.86	9.73	1.31	1.49	960	206	244
RRUS-32 B2	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	62	102	92
RRUS-32	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	62	102	92
RRUS-32 B66	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	102	62	72
RRUS-32 B66 (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	78	62	66
RRUS-11	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	104	44	59
RRUS-11 (Shielded)	19.7	12.8	7.2	1.74	0.99	1.55	2.74	1.20	1.21	78	44	59
DTMABP7819VG12A	14.3	11.5	4.2	1.14	0.42	1.24	3.40	1.20	1.24	51	19	27

**WIND LOADS WITH ICE:**

P65-16-XLH-RR	76.6	16.6	10.6	8.82	5.63	4.62	7.23	1.29	1.41	74	51	57
QS66512-2	76.6	16.6	14.2	8.82	7.55	4.62	5.40	1.29	1.33	74	65	67
OPA-65R-LCUU-H6	76.6	19.4	12.0	10.31	6.38	3.95	6.39	1.26	1.37	84	57	64
RRUS-32 B2	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	26
RRUS-32	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	26
RRUS-32 B66	31.8	16.7	11.6	3.68	2.56	1.90	2.74	1.20	1.21	29	20	22
RRUS-32 B66 (Shielded)	31.8	12.5	11.6	2.76	2.56	2.54	2.74	1.20	1.21	22	20	20
RRUS-11	24.3	21.6	11.8	3.64	1.99	1.13	2.06	1.20	1.20	28	15	19
RRUS-11 (Shielded)	24.3	16.2	11.8	2.73	1.99	1.50	2.06	1.20	1.20	21	15	17
DTMABP7819VG12A	18.9	16.1	8.8	2.11	1.15	1.17	2.15	1.20	1.20	16	9	11

Date: 4/10/2018

Project Name: Middletown Fairchild Road

Project Number: CT2547

Designed By: LN Checked By: MSC



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Design Group LLC

**WIND LOADS**

Angle = 90 (deg)

Ice Thickness = 2.29 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)
P65-16-XLH-RR	72.0	12.0	6.0	6.00	3.00	6.00	12.00	1.36	1.57	309	175	175
QS66512-2	72.0	12.0	9.6	6.00	4.80	6.00	7.50	1.36	1.42	309	254	254
OPA-65R-LCUU-H6	72.0	14.8	7.4	7.40	3.70	4.86	9.73	1.31	1.49	360	206	206
RRUS-32 B2	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	62	102	102
RRUS-32	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	62	102	102
RRUS-32 B66	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	102	62	62
RRUS-32 B66 (Shielded)	27.2	0.1	7.0	0.02	1.32	272.00	3.89	10.23	1.26	7	62	62
RRUS-11	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	104	44	44
RRUS-11 (Shielded)	19.7	2.2	7.2	0.30	0.99	8.95	2.74	1.47	1.21	16	44	44
DTMABP7819VG12A	14.3	11.5	4.2	1.14	0.42	1.24	3.40	1.20	1.24	51	19	19

**WIND LOADS WITH ICE:**

P65-16-XLH-RR	76.6	16.6	10.6	8.82	5.63	4.62	7.23	1.29	1.41	74	51	51
QS66512-2	76.6	16.6	14.2	8.82	7.55	4.62	5.40	1.29	1.33	74	65	65
OPA-65R-LCUU-H6	76.6	19.4	12.0	10.31	6.38	3.95	6.39	1.26	1.37	84	57	57
RRUS-32 B2	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	29
RRUS-32	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	29
RRUS-32 B66	31.8	16.7	11.6	3.68	2.56	1.90	2.74	1.20	1.21	29	20	20
RRUS-32 B66 (Shielded)	31.8	4.7	11.6	1.03	2.56	6.78	2.74	1.39	1.21	9	20	20
RRUS-11	24.3	21.6	11.8	3.64	1.99	1.13	2.06	1.20	1.20	28	15	15
RRUS-11 (Shielded)	24.3	6.8	11.8	1.14	1.99	3.58	2.06	1.25	1.20	9	15	15
DTMABP7819VG12A	18.9	16.1	8.8	2.11	1.15	1.17	2.15	1.20	1.20	16	9	9

Date: 4/10/2018  
 Project Name: Middletown Fairchild Road  
 Project Number: CT2547  
 Designed By: LN Checked By: MSC



**WIND LOADS**

Angle = 120 (deg)

Ice Thickness = 2.29 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)
P65-16-XLH-RR	72.0	12.0	6.0	6.00	3.00	6.00	12.00	1.36	1.57	303	175	207
QS66512-2	72.0	12.0	9.6	6.00	4.80	6.00	7.50	1.36	1.42	303	254	266
OPA-65R-LCUU-H6	72.0	14.8	7.4	7.40	3.70	4.86	9.73	1.31	1.49	360	206	244
RRUS-32 B2	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	62	102	92
RRUS-32	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	62	102	92
RRUS-32 B66	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	102	62	72
RRUS-32 B66 (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	78	62	66
RRUS-11	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	104	44	59
RRUS-11 (Shielded)	19.7	12.8	7.2	1.74	0.99	1.55	2.74	1.20	1.21	78	44	53
DTMABP7819VG12A	14.3	11.5	4.2	1.14	0.42	1.24	3.40	1.20	1.24	51	19	27

**WIND LOADS WITH ICE:**

P65-16-XLH-RR	76.6	16.6	10.6	8.82	5.63	4.62	7.23	1.29	1.41	74	51	57
QS66512-2	76.6	16.6	14.2	8.82	7.55	4.62	5.40	1.29	1.33	74	65	67
OPA-65R-LCUU-H6	76.6	19.4	12.0	10.31	6.38	3.95	6.39	1.26	1.37	84	57	64
RRUS-32 B2	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	26
RRUS-32	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	26
RRUS-32 B66	31.8	16.7	11.6	3.68	2.56	1.90	2.74	1.20	1.21	29	20	22
RRUS-32 B66 (Shielded)	31.8	12.5	11.6	2.76	2.56	2.54	2.74	1.20	1.21	22	20	20
RRUS-11	24.3	21.6	11.8	3.64	1.99	1.13	2.06	1.20	1.20	28	15	19
RRUS-11 (Shielded)	24.3	16.2	11.8	2.73	1.99	1.50	2.06	1.20	1.20	21	15	17
DTMABP7819VG12A	18.9	16.1	8.8	2.11	1.15	1.17	2.15	1.20	1.20	16	9	11

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**WIND LOADS**

Angle = 150 (deg)

Ice Thickness = 2.29 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)
P65-16-XLH-RR	72.0	12.0	6.0	6.00	3.00	6.00	12.00	1.36	1.57	303	175	271
QS66512-2	72.0	12.0	9.6	6.00	4.80	6.00	7.50	1.36	1.42	303	254	291
OPA-65R-LCUU-H6	72.0	14.8	7.4	7.40	3.70	4.86	9.73	1.31	1.49	360	206	322
RRUS-32 B2	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	62	102	72
RRUS-32	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	62	102	72
RRUS-32 B66	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	102	62	92
RRUS-32 B66 (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	55	62	57
RRUS-11	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	104	44	89
RRUS-11 (Shielded)	19.7	8.5	7.2	1.16	0.99	2.32	2.74	1.20	1.21	52	44	50
DTMABP7819VG12A	14.3	11.5	4.2	1.14	0.42	1.24	3.40	1.20	1.24	51	19	43

**WIND LOADS WITH ICE:**

P65-16-XLH-RR	76.6	16.6	10.6	8.82	5.63	4.62	7.23	1.29	1.41	74	51	68
QS66512-2	76.6	16.6	14.2	8.82	7.55	4.62	5.40	1.29	1.33	74	65	72
OPA-65R-LCUU-H6	76.6	19.4	12.0	10.31	6.38	3.95	6.39	1.26	1.37	84	57	78
RRUS-32 B2	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	22
RRUS-32	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	22
RRUS-32 B66	31.8	16.7	11.6	3.68	2.56	1.90	2.74	1.20	1.21	29	20	26
RRUS-32 B66 (Shielded)	31.8	8.3	11.6	1.84	2.56	3.81	2.74	1.26	1.21	15	20	16
RRUS-11	24.3	21.6	11.8	3.64	1.99	1.13	2.06	1.20	1.20	28	15	25
RRUS-11 (Shielded)	24.3	10.8	11.8	1.82	1.99	2.25	2.06	1.20	1.20	14	15	14
DTMABP7819VG12A	18.9	16.1	8.8	2.11	1.15	1.17	2.15	1.20	1.20	16	9	15

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**2.6.5.2 Velocity Pressure Coeff:**

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

z = 130 (ft)  
 z<sub>g</sub> = 1200 (ft)  
 α = 7.0

**K<sub>z</sub> = 1.065**

K<sub>zmin</sub> ≤ K<sub>z</sub> ≤ 2.01

**Table 2-4**

Exposure	Z <sub>g</sub>	α	K <sub>zmin</sub>	K <sub>e</sub>
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 <sub>t</sub>	f
2	0.43	1.25
3	0.53	2.0
4	0.72	1.5

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

$$K_h = e^{(fz/H)}$$

**K<sub>zt</sub> = 1**

K<sub>h</sub> = #DIV/0!

K<sub>e</sub> = 0 (from Table 2-4)

K<sub>t</sub> = 0 (from Table 2-5)

f = 0 (from Table 2-5)

z = 130

H = 0 (Ht. of the crest above surrounding terrain)

K<sub>zt</sub> = 1.00

K<sub>iz</sub> = 1.15 (from Sec. 2.6.8)

*(If Category 1 then K<sub>zt</sub> = 1.0)*

**Category = 1**

**2.6.8 Design Ice Thickness**

Max Ice Thickness =

t<sub>i</sub> = 1.00 in

$$t_{iz} = 2.0 * t_i * I * K_{iz} * (K_{zt})^{0.35}$$

**t<sub>iz</sub> = 2.29 in**

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**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= 130      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

(Cantilevered 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

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

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

**q<sub>z</sub> = 2.33**

**q<sub>z (ice)</sub> = 6.48**

K<sub>z</sub> = 1.065

K<sub>zt</sub> = 1.0

K<sub>d</sub> = 0.95

V<sub>max</sub> = 30

V<sub>max (ice)</sub> = 50

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

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**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 = **2.29 in**      Angle = **0 (deg)**      Equivalent Angle = **180 (deg)**

Appurtenances	Height	Width	Depth	Flat Area	Aspect Ratio	Ca	Force (lbs)	Force (lbs) (w/ Ice)
P65-16-XLH-RR	72.0	12.0	6.0	6.00	6.00	1.36	19	77
QS66512-2	72.0	12.0	9.6	6.00	6.00	1.36	19	77
OPA-65R-LCUU-H6	72.0	14.8	7.4	7.40	4.86	1.31	23	87
RRUS-32 B2	27.2	7.0	12.1	1.32	3.89	1.26	4	21
RRUS-32	27.2	7.0	12.1	1.32	3.89	1.26	4	21
RRUS-32 B66	27.2	12.1	7.0	2.29	2.25	1.20	6	29
RRUS-32 B66 (Shielded)	27.2	0.1	7.0	0.02	272.00	10.23	0	69
RRUS-11	19.7	17.0	7.2	2.33	1.16	1.20	7	28
RRUS-11 (Shielded)	19.7	2.2	7.2	0.30	8.95	1.47	1	11
DTMABP7819VG12A	14.3	11.5	4.2	1.14	1.24	1.20	3	16

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WIND LOADS

Angle = 30 (deg)      Ice Thickness = 2.29 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) (normal)	Force (lbs) (side)	Force (lbs) (angle)
P65-16-XLH-RR	72.0	12.0	6.0	6.00	3.00	6.00	12.00	1.36	1.57	19	11	17
QS66512-2	72.0	12.0	9.6	6.00	4.80	6.00	7.50	1.36	1.42	19	16	18
OPA-65R-LCUU-H6	72.0	14.8	7.4	7.40	3.70	4.86	9.73	1.31	1.49	23	13	20
RRUS-32 B2	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	5
RRUS-32	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	5
RRUS-32 B66	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	6	4	6
RRUS-32 B66 (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	3	4	4
RRUS-11	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	7	3	6
RRUS-11 (Shielded)	19.7	8.5	7.2	1.16	0.99	2.32	2.74	1.20	1.21	3	3	3
DTMABP7819VG12A	14.3	11.5	4.2	1.14	0.42	1.24	3.40	1.20	1.24	3	1	3

WIND LOADS WITH ICE:

P65-16-XLH-RR	76.6	16.6	10.6	8.82	5.63	4.62	7.23	1.29	1.41	74	51	68
QS66512-2	76.6	16.6	14.2	8.82	7.55	4.62	5.40	1.29	1.33	74	65	72
OPA-65R-LCUU-H6	76.6	19.4	12.0	10.31	6.38	3.95	6.39	1.26	1.37	84	57	78
RRUS-32 B2	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	22
RRUS-32	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	22
RRUS-32 B66	31.8	16.7	11.6	3.68	2.56	1.90	2.74	1.20	1.21	29	20	26
RRUS-32 B66 (Shielded)	31.8	8.3	11.6	1.84	2.56	3.81	2.74	1.26	1.21	15	20	16
RRUS-11	24.3	21.6	11.8	3.64	1.99	1.13	2.06	1.20	1.20	28	15	25
RRUS-11 (Shielded)	24.3	10.8	11.8	1.82	1.99	2.25	2.06	1.20	1.20	14	15	14
DTMABP7819VG12A	18.9	16.1	8.8	2.11	1.15	1.17	2.15	1.20	1.20	16	9	15

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 Designed By: LN Checked By: MSC



**WIND LOADS**

Angle = 60 (deg)      Ice Thickness = 2.29 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)
P65-16-XLH-RR	72.0	12.0	6.0	6.00	3.00	6.00	12.00	1.36	1.57	19	11	13
QS66512-2	72.0	12.0	9.6	6.00	4.80	6.00	7.50	1.36	1.42	19	16	17
OPA-65R-LCUU-H6	72.0	14.8	7.4	7.40	3.70	4.86	9.73	1.31	1.49	23	13	15
RRUS-32 B2	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	6
RRUS-32	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	6
RRUS-32 B66	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	6	4	5
RRUS-32 B66 (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	5	4	4
RRUS-11	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	7	3	4
RRUS-11 (Shielded)	19.7	12.8	7.2	1.74	0.99	1.55	2.74	1.20	1.21	5	3	3
DTMABP7819VG12A	14.3	11.5	4.2	1.14	0.42	1.24	3.40	1.20	1.24	3	1	2

**WIND LOADS WITH ICE:**

P65-16-XLH-RR	76.6	16.6	10.6	8.82	5.63	4.62	7.23	1.29	1.41	74	51	57
QS66512-2	76.6	16.6	14.2	8.82	7.55	4.62	5.40	1.29	1.33	74	65	67
OPA-65R-LCUU-H6	76.6	19.4	12.0	10.31	6.38	3.95	6.39	1.26	1.37	84	57	64
RRUS-32 B2	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	26
RRUS-32	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	26
RRUS-32 B66	31.8	16.7	11.6	3.68	2.56	1.90	2.74	1.20	1.21	29	20	22
RRUS-32 B66 (Shielded)	31.8	12.5	11.6	2.76	2.56	2.54	2.74	1.20	1.21	22	20	20
RRUS-11	24.3	21.6	11.8	3.64	1.99	1.13	2.06	1.20	1.20	28	15	19
RRUS-11 (Shielded)	24.3	16.2	11.8	2.73	1.99	1.50	2.06	1.20	1.20	21	15	17
DTMABP7819VG12A	18.9	16.1	8.8	2.11	1.15	1.17	2.15	1.20	1.20	16	9	11

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**WIND LOADS**

Angle = 90 (deg)      Ice Thickness = 2.29 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)
P65-16-XLH-RR	72.0	12.0	6.0	6.00	3.00	6.00	12.00	1.36	1.57	19	11	11
QS66512-2	72.0	12.0	9.6	6.00	4.80	6.00	7.50	1.36	1.42	19	16	16
OPA-65R-LCUU-H6	72.0	14.8	7.4	7.40	3.70	4.86	9.73	1.31	1.49	23	13	13
RRUS-32 B2	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	6
RRUS-32	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	6
RRUS-32 B66	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	6	4	4
RRUS-32 B66 (Shielded)	27.2	0.1	7.0	0.02	1.32	272.00	3.89	10.23	1.26	0	4	4
RRUS-11	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	7	3	3
RRUS-11 (Shielded)	19.7	2.2	7.2	0.30	0.99	8.95	2.74	1.47	1.21	1	3	3
DTMABP7819VG12A	14.3	11.5	4.2	1.14	0.42	1.24	3.40	1.20	1.24	3	1	1

**WIND LOADS WITH ICE:**

P65-16-XLH-RR	76.6	16.6	10.6	8.82	5.63	4.62	7.23	1.29	1.41	74	51	51
QS66512-2	76.6	16.6	14.2	8.82	7.55	4.62	5.40	1.29	1.33	74	65	65
OPA-65R-LCUU-H6	76.6	19.4	12.0	10.31	6.38	3.95	6.39	1.26	1.37	84	57	57
RRUS-32 B2	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	29
RRUS-32	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	29
RRUS-32 B66	31.8	16.7	11.6	3.68	2.56	1.90	2.74	1.20	1.21	29	20	20
RRUS-32 B66 (Shielded)	31.8	4.7	11.6	1.03	2.56	6.78	2.74	1.39	1.21	9	20	20
RRUS-11	24.3	21.6	11.8	3.64	1.99	1.13	2.06	1.20	1.20	28	15	15
RRUS-11 (Shielded)	24.3	6.8	11.8	1.14	1.99	3.58	2.06	1.25	1.20	9	15	15
DTMABP7819VG12A	18.9	16.1	8.8	2.11	1.15	1.17	2.15	1.20	1.20	16	9	9

Date: 4/10/2018

Project Name: Middletown Fairchild Road

Project Number: CT2547

Designed By: LN Checked By: MSC



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**WIND LOADS**

Angle = 120 (deg)

Ice Thickness = 2.29 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)
P65-16-XLH-RR	72.0	12.0	6.0	6.00	3.00	6.00	12.00	1.36	1.57	19	11	13
QS66512-2	72.0	12.0	9.6	6.00	4.80	6.00	7.50	1.36	1.42	19	16	17
OPA-65R-LCUU-H6	72.0	14.8	7.4	7.40	3.70	4.86	9.73	1.31	1.49	23	13	15
RRUS-32 B2	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	6
RRUS-32	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	6
RRUS-32 B66	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	6	4	5
RRUS-32 B66 (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	5	4	4
RRUS-11	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	7	3	4
RRUS-11 (Shielded)	19.7	12.8	7.2	1.74	0.99	1.55	2.74	1.20	1.21	5	3	3
DTMABP7819VG12A	14.3	11.5	4.2	1.14	0.42	1.24	3.40	1.20	1.24	3	1	2

**WIND LOADS WITH ICE:**

P65-16-XLH-RR	76.6	16.6	10.6	8.82	5.63	4.62	7.23	1.29	1.41	74	51	57
QS66512-2	76.6	16.6	14.2	8.82	7.55	4.62	5.40	1.29	1.33	74	65	67
OPA-65R-LCUU-H6	76.6	19.4	12.0	10.31	6.38	3.95	6.39	1.26	1.37	84	57	64
RRUS-32 B2	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	26
RRUS-32	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	26
RRUS-32 B66	31.8	16.7	11.6	3.68	2.56	1.90	2.74	1.20	1.21	29	20	22
RRUS-32 B66 (Shielded)	31.8	12.5	11.6	2.76	2.56	2.54	2.74	1.20	1.21	22	20	20
RRUS-11	24.3	21.6	11.8	3.64	1.99	1.13	2.06	1.20	1.20	28	15	19
RRUS-11 (Shielded)	24.3	16.2	11.8	2.73	1.99	1.50	2.06	1.20	1.20	21	15	17
DTMABP7819VG12A	18.9	16.1	8.8	2.11	1.15	1.17	2.15	1.20	1.20	16	9	11

Date: 4/10/2018

Project Name: Middletown Falchid Road

Project Number: CT2547

Designed By: LN Checked By: MSC



**HUDSON**  
Design Group LLC

**WIND LOADS**

Angle = 150 (deg)

Ice Thickness = 2.29 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)
P65-16-XLH-RR	72.0	12.0	6.0	6.00	3.00	6.00	12.00	1.36	1.57	19	11	17
QS66512-2	72.0	12.0	9.6	6.00	4.80	6.00	7.50	1.36	1.42	19	16	18
OPA-65R-LCUU-H6	72.0	14.8	7.4	7.40	3.70	4.86	9.73	1.31	1.49	23	13	20
RRUS-32 B2	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	5
RRUS-32	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	5
RRUS-32 B66	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	6	4	6
RRUS-32 B66 (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	3	4	4
RRUS-11	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	7	3	6
RRUS-11 (Shielded)	19.7	8.5	7.2	1.16	0.99	2.32	2.74	1.20	1.21	3	3	3
DTMABP7819VG12A	14.3	11.5	4.2	1.14	0.42	1.24	3.40	1.20	1.24	3	1	3

**WIND LOADS WITH ICE:**

P65-16-XLH-RR	76.6	16.6	10.6	8.82	5.63	4.62	7.23	1.29	1.41	74	51	68
QS66512-2	76.6	16.6	14.2	8.82	7.55	4.62	5.40	1.29	1.33	74	65	72
OPA-65R-LCUU-H6	76.6	19.4	12.0	10.31	6.38	3.95	6.39	1.26	1.37	84	57	78
RRUS-32 B2	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	22
RRUS-32	31.8	11.6	16.7	2.56	3.68	2.74	1.90	1.21	1.20	20	29	22
RRUS-32 B66	31.8	16.7	11.6	3.68	2.56	1.90	2.74	1.20	1.21	29	20	26
RRUS-32 B66 (Shielded)	31.8	8.3	11.6	1.84	2.56	3.81	2.74	1.26	1.21	15	20	16
RRUS-11	24.3	21.6	11.8	3.64	1.99	1.13	2.06	1.20	1.20	28	15	25
RRUS-11 (Shielded)	24.3	10.8	11.8	1.82	1.99	2.25	2.06	1.20	1.20	14	15	14
DTMABP7819VG12A	18.9	16.1	8.8	2.11	1.15	1.17	2.15	1.20	1.20	16	9	15

Date: 4/10/2018

Project Name: Middletown Fairchild Road

Project Number: CT2547

Designed By: LN Checked By: MSC



**HUDSON**  
Design Group LLC

### ICE WEIGHT CALCULATIONS

Thickness of ice (in): 0.75

\* Density of ice used = 56 PCF

#### P65-16-XLH-RR

Weight of ice based on total radial SF area:  
Height (in): 72.0  
Width (in): 12.0  
Depth (in): 6.0  
Total weight of ice on object: 67 lbs  
Weight of object: 64 lbs  
Combined weight of ice and object: 131 lbs

#### OPA-65R-LCUU-H6

Weight of ice based on total radial SF area:  
Height (in): 72.0  
Width (in): 14.8  
Depth (in): 7.4  
Total weight of ice on object: 83 lbs  
Weight of object: 73 lbs  
Combined weight of ice and object: 156 lbs

#### RRUS-11

Weight of ice based on total radial SF area:  
Height (in): 19.7  
Width (in): 17.0  
Depth (in): 7.2  
Total weight of ice on object: 29 lbs  
Weight of object: 51 lbs  
Combined weight of ice and object: 80 lbs

#### L 3x3x1/4

Weight of ice based on total radial SF area:  
Depth (in): 3  
height (in): 12  
Width (in): 3  
Per foot weight of ice on object: 4 lbs/ft

#### 3" pipe

Per foot weight of ice:  
diameter (in): 3.5  
Per foot weight of ice on object: 3 lbs/ft

#### PL 6x1/2

Weight of ice based on total radial SF area:  
Height (in): 6.0  
Width (in): 12.0  
Depth (in): 0.5  
Per foot weight of ice on object: 4 lbs/ft

#### QS66512-2

Weight of ice based on total radial SF area:  
Height (in): 72.0  
Width (in): 12.0  
Depth (in): 9.6  
Total weight of ice on object: 81 lbs  
Weight of object: 111 lbs  
Combined weight of ice and object: 192 lbs

#### DTMABP7819VG12A

Weight of ice based on total radial SF area:  
Height (in): 14.3  
Width (in): 11.5  
Depth (in): 4.2  
Total weight of ice on object: 13 lbs  
Weight of object: 20 lbs  
Combined weight of ice and object: 33 lbs

#### RRUS-32

Weight of ice based on total radial SF area:  
Height (in): 27.2  
Width (in): 12.1  
Depth (in): 7.0  
Total weight of ice on object: 29 lbs  
Weight of object: 60 lbs  
Combined weight of ice and object: 89 lbs

#### 2-1/2"x1-1/2"x1/2" channel

Weight of ice based on total radial SF area:  
Depth (in): 2.5  
height (in): 12  
Width (in): 2.5  
Per foot weight of ice on object: 3 lbs/ft

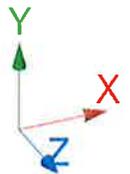
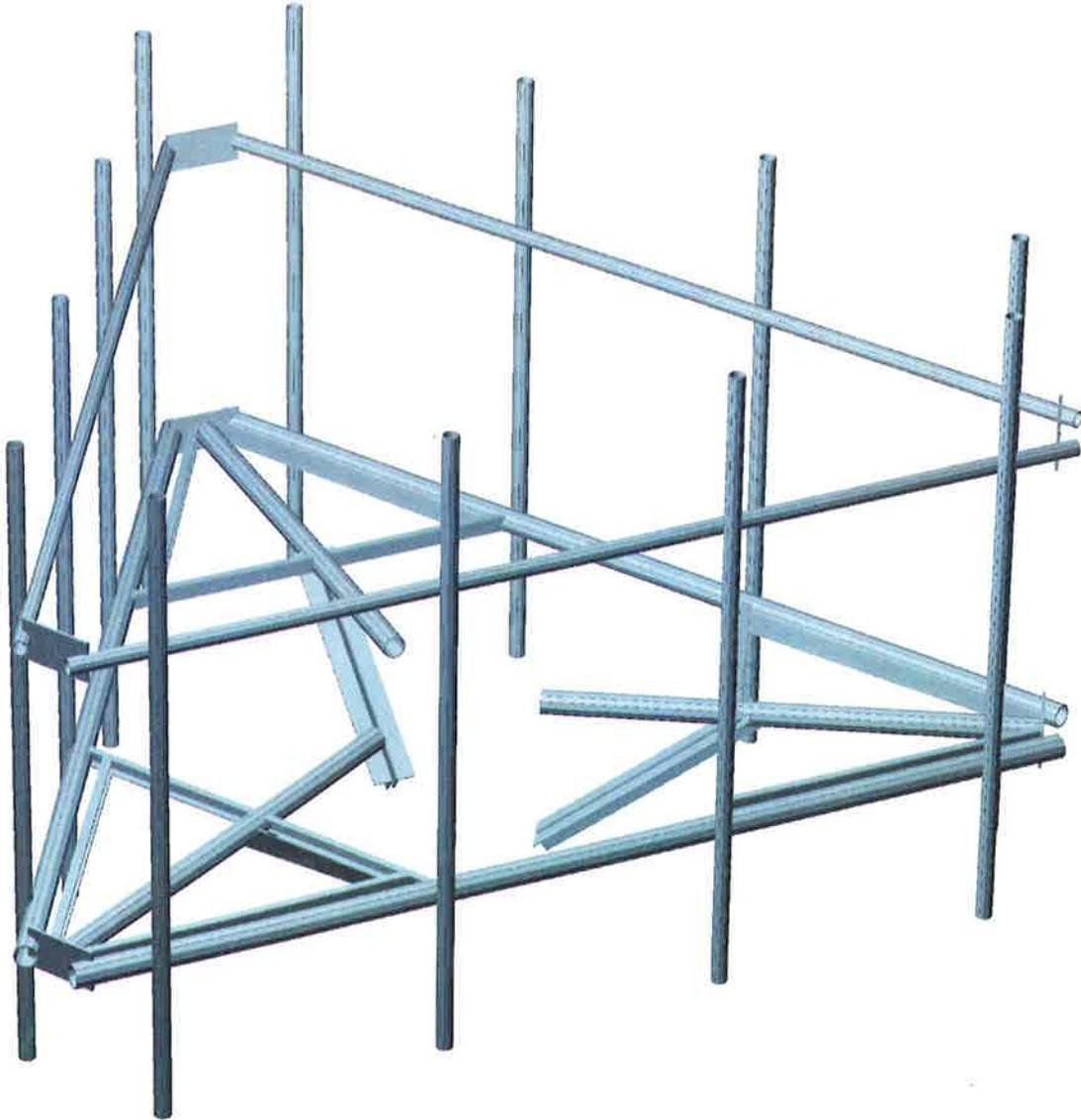
#### 2" pipe

Per foot weight of ice:  
diameter (in): 2.375  
Per foot weight of ice on object: 2 lbs/ft



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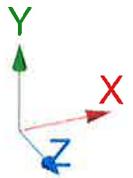
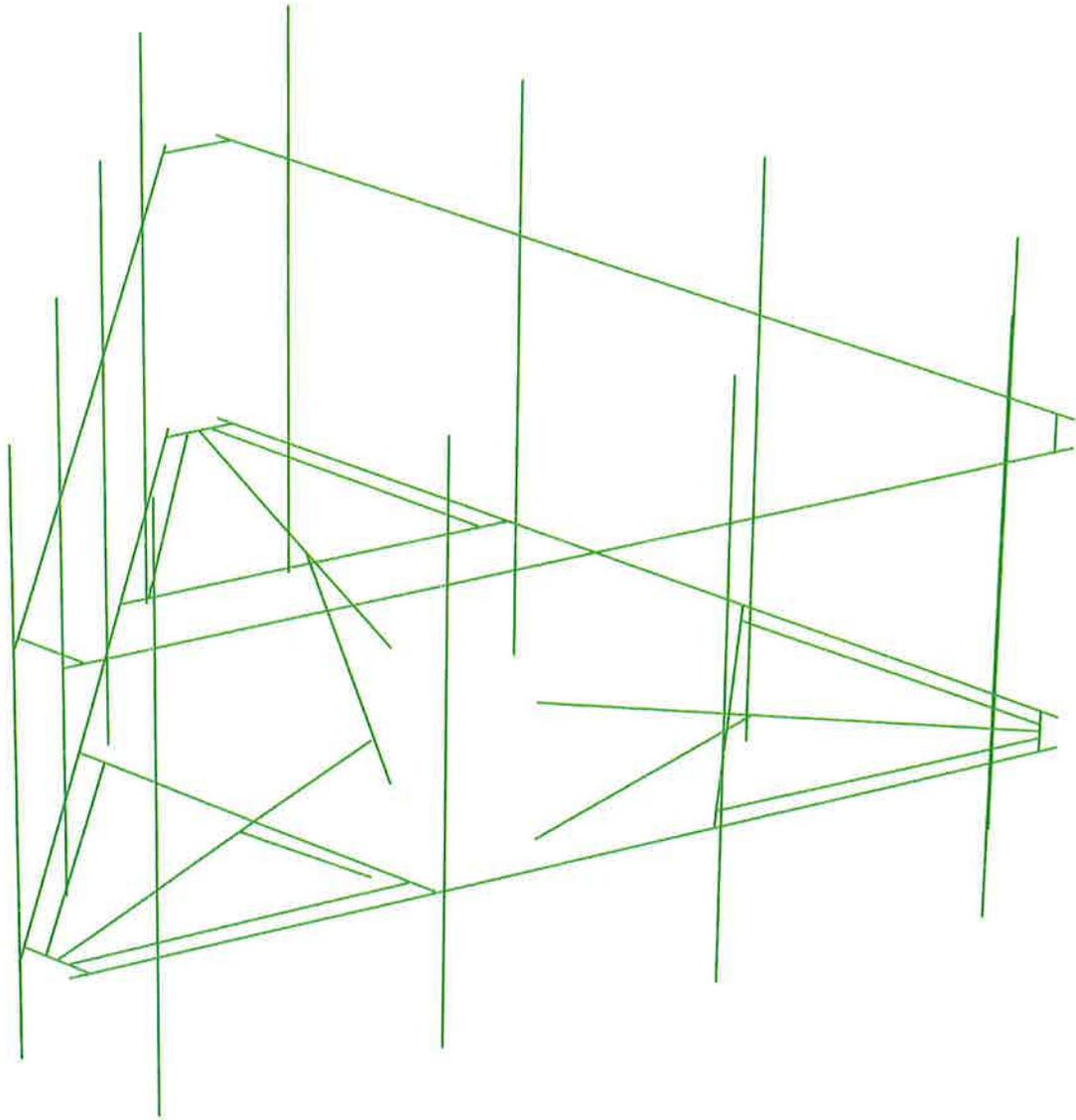
**Mount Calculations  
(Existing Conditions)**

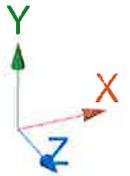
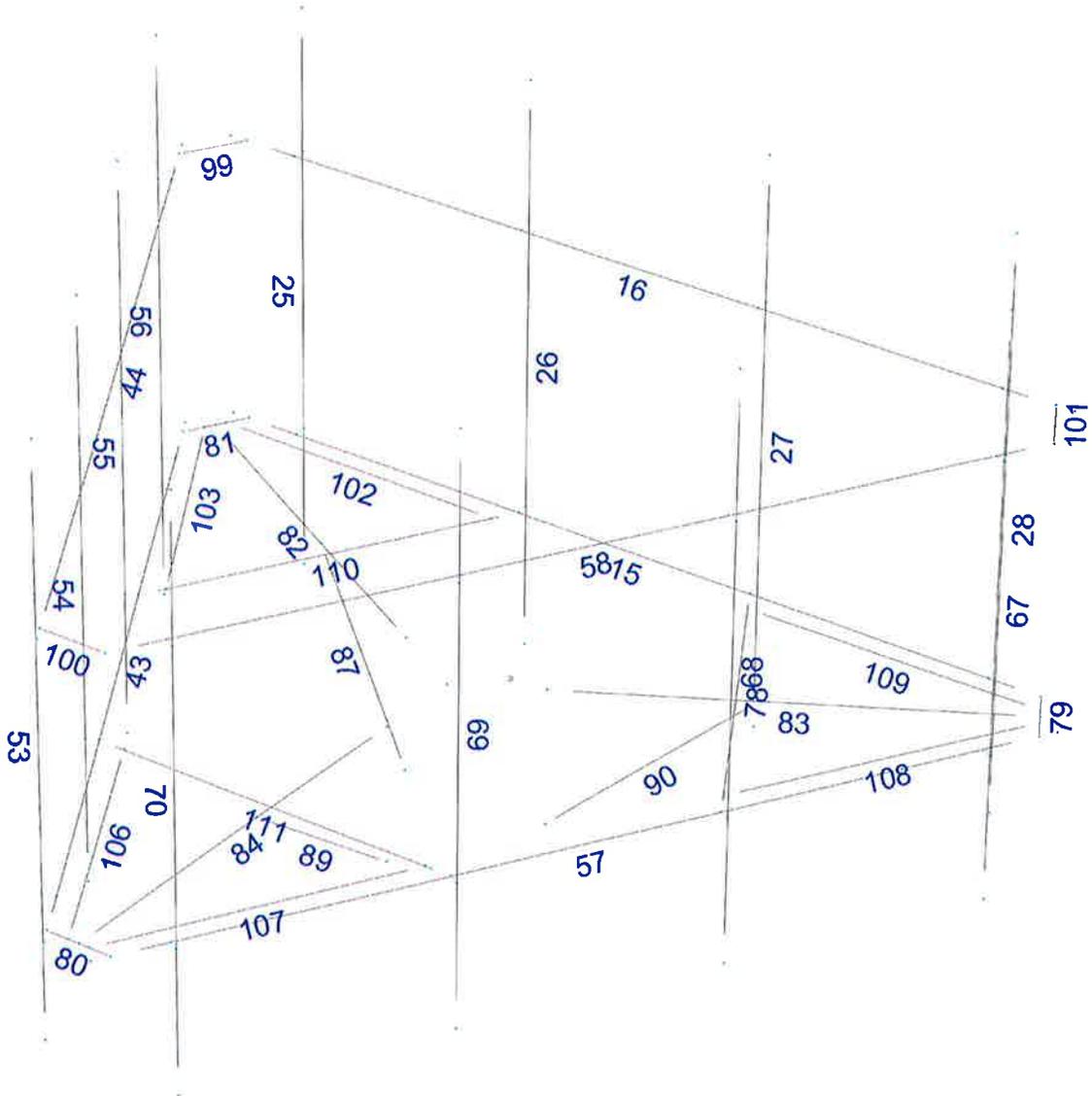




Design status

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





## Load data

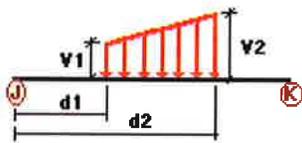
### GLOSSARY

Comb : Indicates if load condition is a load combination

### Load Conditions

Condition	Description	Comb.	Category
DL	Dead Load	No	DL
W0	Wind Load 0/60deg	No	WIND
W30	Wind Load 30/90deg	No	WIND
Di	Ice Load	No	LL
Wi0	Ice Wind Load 0/60deg	No	WIND
Wi30	Ice Wind Load 30/90deg	No	WIND
WL0	WL 30 mph 0/60deg	No	WIND
WL30	WL 30 mph 30/90deg	No	WIND
LL1	250 lb Live Load	No	LL
LL2	500 lb Live Load	No	LL
W180	-W0	Yes	
W210	-W30	Yes	
Wi180	-Wi0	Yes	
Wi210	-Wi30	Yes	
WL180	-WL0	Yes	
WL210	-WL30	Yes	

### Distributed force on members

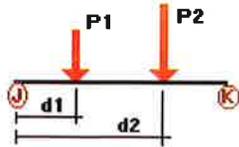


Condition	Member	Dir1	Val1 [Kip/ft]	Val2 [Kip/ft]	Dist1 [ft]	%	Dist2 [ft]	%	
DL	78	Y	-0.001	-0.001	0.00	Yes	100.00	Yes	
	102	Y	-0.001	-0.001	0.00	Yes	100.00	Yes	
	103	Y	-0.001	-0.001	0.00	Yes	100.00	Yes	
	106	Y	-0.001	-0.001	0.00	Yes	100.00	Yes	
	107	Y	-0.001	-0.001	0.00	Yes	100.00	Yes	
	108	Y	-0.001	-0.001	0.00	Yes	100.00	Yes	
	109	Y	-0.001	-0.001	0.00	Yes	100.00	Yes	
	110	Y	-0.001	-0.001	0.00	Yes	100.00	Yes	
	111	Y	-0.001	-0.001	0.00	Yes	100.00	Yes	
	W0	15	z	-0.008	0.00	0.00	No	0.00	No
		16	z	-0.005	0.00	0.00	No	0.00	No
43		z	-0.008	0.00	0.00	No	0.00	No	
44		z	-0.005	0.00	0.00	No	0.00	No	

	57	z	-0.008	0.00	0.00	No	0.00	No
	58	z	-0.005	0.00	0.00	No	0.00	No
	78	z	-0.009	0.00	0.00	No	0.00	No
	79	z	-0.011	0.00	0.00	No	0.00	No
	80	z	-0.011	0.00	0.00	No	0.00	No
	81	z	-0.011	0.00	0.00	No	0.00	No
	83	z	-0.008	0.00	0.00	No	0.00	No
	84	z	-0.008	0.00	0.00	No	0.00	No
	87	z	-0.011	0.00	0.00	No	0.00	No
	89	z	-0.011	0.00	0.00	No	0.00	No
	90	z	-0.011	0.00	0.00	No	0.00	No
	99	z	-0.009	0.00	0.00	No	0.00	No
	100	z	-0.009	0.00	0.00	No	0.00	No
	101	z	-0.009	0.00	0.00	No	0.00	No
	110	z	-0.009	0.00	0.00	No	0.00	No
	111	z	-0.009	0.00	0.00	No	0.00	No
W30	70	x	-0.005	0.00	0.00	No	0.00	No
	15	x	-0.008	0.00	0.00	No	0.00	No
	16	x	-0.005	0.00	0.00	No	0.00	No
	43	x	-0.008	0.00	0.00	No	0.00	No
	44	x	-0.005	0.00	0.00	No	0.00	No
	67	x	-0.005	0.00	0.00	No	0.00	No
	68	x	-0.005	0.00	0.00	No	0.00	No
	69	x	-0.005	0.00	0.00	No	0.00	No
	78	x	-0.009	0.00	0.00	No	0.00	No
	79	x	-0.011	0.00	0.00	No	0.00	No
	80	x	-0.011	0.00	0.00	No	0.00	No
	82	x	-0.008	0.00	0.00	No	0.00	No
	83	x	-0.008	0.00	0.00	No	0.00	No
	84	x	-0.008	0.00	0.00	No	0.00	No
	87	x	-0.011	0.00	0.00	No	0.00	No
	89	x	-0.011	0.00	0.00	No	0.00	No
	90	x	-0.011	0.00	0.00	No	0.00	No
	100	x	-0.009	0.00	0.00	No	0.00	No
	101	x	-0.009	0.00	0.00	No	0.00	No
	111	x	-0.009	0.00	0.00	No	0.00	No
Di	70	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	15	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
	16	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	25	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	26	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	27	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	28	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	43	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
	44	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	53	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	54	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	55	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	56	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	57	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
	58	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	67	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	68	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	69	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	78	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
	79	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	80	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	-0.003	-0.003	0.00	Yes	100.00	Yes
	83	Y	-0.003	-0.003	0.00	Yes	100.00	Yes

	84	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
	87	y	-0.008	-0.008	0.00	Yes	100.00	Yes
	89	Y	-0.008	-0.008	0.00	Yes	100.00	Yes
	90	Y	-0.008	-0.008	0.00	Yes	100.00	Yes
	99	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	100	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	101	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	102	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
	103	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
	106	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
	107	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
	108	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
	109	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
	110	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
	111	Y	-0.003	-0.003	0.00	Yes	100.00	Yes
W10	15	z	-0.003	0.00	0.00	No	0.00	No
	16	z	-0.003	0.00	0.00	No	0.00	No
	43	z	-0.003	0.00	0.00	No	0.00	No
	44	z	-0.003	0.00	0.00	No	0.00	No
	57	z	-0.003	0.00	0.00	No	0.00	No
	58	z	-0.003	0.00	0.00	No	0.00	No
	78	z	-0.005	0.00	0.00	No	0.00	No
	79	z	-0.005	0.00	0.00	No	0.00	No
	80	z	-0.005	0.00	0.00	No	0.00	No
	81	z	-0.005	0.00	0.00	No	0.00	No
	83	z	-0.003	0.00	0.00	No	0.00	No
	84	z	-0.003	0.00	0.00	No	0.00	No
	87	z	-0.01	0.00	0.00	No	0.00	No
	89	z	-0.005	0.00	0.00	No	0.00	No
	90	z	-0.005	0.00	0.00	No	0.00	No
	99	z	-0.005	0.00	0.00	No	0.00	No
	100	z	-0.005	0.00	0.00	No	0.00	No
	101	z	-0.005	0.00	0.00	No	0.00	No
	110	z	-0.005	0.00	0.00	No	0.00	No
	111	z	-0.005	0.00	0.00	No	0.00	No
W130	70	x	-0.003	0.00	0.00	No	0.00	No
	15	x	-0.003	0.00	0.00	No	0.00	No
	16	x	-0.003	0.00	0.00	No	0.00	No
	43	x	-0.003	0.00	0.00	No	0.00	No
	44	x	-0.003	0.00	0.00	No	0.00	No
	58	x	-0.003	0.00	0.00	No	0.00	No
	67	x	-0.003	0.00	0.00	No	0.00	No
	68	x	-0.003	0.00	0.00	No	0.00	No
	69	x	-0.003	0.00	0.00	No	0.00	No
	78	x	-0.005	0.00	0.00	No	0.00	No
	79	x	-0.005	0.00	0.00	No	0.00	No
	80	x	-0.005	0.00	0.00	No	0.00	No
	82	x	-0.003	0.00	0.00	No	0.00	No
	83	x	-0.003	0.00	0.00	No	0.00	No
	84	x	-0.003	0.00	0.00	No	0.00	No
	87	x	-0.005	0.00	0.00	No	0.00	No
	89	x	-0.005	0.00	0.00	No	0.00	No
	90	x	-0.005	0.00	0.00	No	0.00	No
	100	x	-0.005	0.00	0.00	No	0.00	No
	101	x	-0.005	0.00	0.00	No	0.00	No
	110		-0.005	0.00	0.00	No	0.00	No
	111	x	-0.005	0.00	0.00	No	0.00	No

## Concentrated forces on members



Condition	Member	Dir1	Value1 [Kip]	Dist1 [ft]	%
DL	70	y	-0.037	6.25	No
		y	-0.037	1.75	No
		y	-0.051	3.00	No
	25	y	-0.06	5.00	No
		y	-0.032	6.25	No
		y	-0.032	1.75	No
	26	y	-0.02	4.00	No
		y	-0.056	6.25	No
		y	-0.056	1.75	No
	27	y	-0.12	4.00	No
		y	0.00	0.00	No
		y	0.00	0.00	No
	28	y	0.00	0.00	No
		y	-0.037	6.25	No
		y	-0.037	1.75	No
	53	y	-0.051	3.00	No
		y	-0.06	5.00	No
		y	-0.032	6.25	No
	54	y	-0.032	1.75	No
		y	-0.02	4.00	No
		y	-0.056	6.25	No
	55	y	-0.056	1.75	No
		y	-0.12	4.00	No
		y	0.00	0.00	No
	56	y	0.00	0.00	No
		y	0.00	0.00	No
		y	-0.037	6.25	No
	67	y	-0.037	1.75	No
		y	-0.051	3.00	No
		y	-0.06	5.00	No
68	y	-0.032	6.25	No	
	y	-0.032	1.75	No	
	y	-0.02	4.00	No	
69	y	-0.056	6.25	No	
	y	-0.056	1.75	No	
	y	-0.12	4.00	No	
70	y	0.00	0.00	No	
	y	0.00	0.00	No	
	z	-0.181	6.25	No	
W0	z	-0.181	1.75	No	
	z	-0.016	3.00	No	
	z	-0.007	5.00	No	
25	z	-0.104	6.25	No	
	z	-0.104	1.75	No	
	z	-0.134	6.25	No	
26	z	-0.134	1.75	No	
	z	-0.092	4.00	No	
	z	-0.123	6.25	No	
28	z	-0.123	1.75	No	
	z	-0.053	3.00	No	
	z	-0.066	5.00	No	
53	z	-0.104	6.25	No	
	z	-0.104	1.75	No	

W30	54	z	-0.134	6.25	No
		z	-0.134	1.75	No
		z	-0.092	4.00	No
	56	z	-0.123	6.25	No
		z	-0.123	1.75	No
		z	-0.053	3.00	No
		z	-0.066	5.00	No
	67	z	-0.152	6.25	No
		z	-0.152	1.75	No
	68	z	-0.152	6.25	No
	z	-0.152	1.75	No	
	z	-0.124	4.00	No	
70	x	-0.103	6.25	No	
	x	-0.103	1.75	No	
	x	-0.044	3.00	No	
	x	-0.062	4.00	No	
25	x	-0.136	6.25	No	
	x	-0.136	1.75	No	
	x	0.00	0.00	No	
	x	0.00	0.00	No	
26	x	-0.146	6.25	No	
	x	-0.146	1.75	No	
	x	-0.072	4.00	No	
	x	0.00	0.00	No	
27	x	0.00	0.00	No	
	x	0.00	0.00	No	
	x	0.00	0.00	No	
	x	0.00	0.00	No	
28	x	-0.161	6.25	No	
	x	-0.161	1.75	No	
	x	-0.05	3.00	No	
	x	-0.057	5.00	No	
53	x	-0.136	6.25	No	
	x	-0.136	1.75	No	
	x	0.00	0.00	No	
	x	0.00	0.00	No	
54	x	-0.146	6.25	No	
	x	-0.146	1.75	No	
	x	-0.072	4.00	No	
	x	0.00	0.00	No	
55	x	0.00	0.00	No	
	x	0.00	0.00	No	
	x	0.00	0.00	No	
	x	0.00	0.00	No	
56	x	-0.161	6.25	No	
	x	-0.161	1.75	No	
	x	-0.05	3.00	No	
	x	-0.057	5.00	No	
67	x	-0.088	6.25	No	
	x	-0.088	1.75	No	
	x	-0.019	4.00	No	
	x	0.00	0.00	No	
68	x	-0.127	6.25	No	
	x	-0.127	1.75	No	
	x	-0.102	4.00	No	
	x	0.00	0.00	No	
69	x	0.00	0.00	No	
	x	0.00	0.00	No	
	x	0.00	0.00	No	
	x	0.00	0.00	No	

Di	70	y	-0.042	6.25	No
		y	-0.042	1.75	No
		y	-0.029	3.00	No
		y	-0.029	5.00	No
	25	y	-0.034	6.25	No
		y	-0.034	1.75	No
		y	-0.013	4.00	No
	26	y	-0.041	6.25	No
		y	-0.041	1.75	No
	27	y	-0.058	4.00	No
		y	0.00	0.00	No
		y	0.00	0.00	No
	28	y	0.00	0.00	No
		y	-0.042	6.25	No
		y	-0.042	1.75	No
	53	y	-0.029	3.00	No
		y	-0.029	5.00	No
		y	-0.034	6.25	No
		y	-0.034	1.75	No
	54	y	-0.013	4.00	No
		y	-0.041	6.25	No
		y	-0.041	1.75	No
		y	-0.058	4.00	No
	55	y	0.00	0.00	No
		y	0.00	0.00	No
		y	0.00	0.00	No
	56	y	-0.042	6.25	No
		y	-0.042	1.75	No
		y	-0.029	3.00	No
		y	-0.029	5.00	No
	67	y	-0.034	6.25	No
		y	-0.034	1.75	Yes
		y	-0.013	4.00	No
		y	-0.041	6.25	No
	68	y	-0.041	1.75	No
		y	-0.058	4.00	No
		y	0.00	0.00	No
	69	y	0.00	0.00	No
		y	0.00	0.00	No
		y	0.00	0.00	No
WiO	70	z	-0.044	6.25	No
		z	-0.044	1.75	No
		z	-0.011	3.00	No
		z	-0.069	5.00	No
	25	z	-0.029	6.25	No
		z	-0.029	1.75	No
	26	z	0.00	0.00	No
		z	-0.034	6.25	No
		z	-0.034	1.75	No
		z	-0.026	4.00	No
	27	z	0.00	0.00	No
		z	0.00	0.00	No
		z	0.00	0.00	No
	28	z	-0.032	6.25	No
		z	-0.032	1.75	No
		z	-0.017	3.00	No
z		-0.02	5.00	No	
53	z	-0.029	6.25	No	
	z	-0.029	1.75	No	
54	z	0.00	0.00	No	
	z	-0.034	6.25	No	

		z	-0.034	1.75	No
		z	-0.026	4.00	No
55		z	0.00	0.00	No
		z	0.00	0.00	No
		z	0.00	0.00	No
56		z	-0.032	6.25	No
		z	-0.032	1.75	No
		z	-0.017	3.00	No
		z	-0.02	5.00	No
67		z	-0.039	6.25	No
		z	-0.039	1.75	No
			-0.036	4.00	No
68		z	-0.039	6.25	No
		z	-0.039	1.75	No
		z	-0.042	4.00	No
69		z	0.00	0.00	No
		z	0.00	0.00	No
		z	0.00	0.00	No
Wi30	70	x	-0.029	6.25	No
		x	-0.029	1.75	No
		x	-0.015	3.00	No
		x	-0.02	5.00	No
25		x	-0.034	6.25	No
		x	-0.034	1.75	No
		x	0.00	0.00	No
		x	0.00	0.00	No
26		x	-0.036	6.25	No
		x	-0.036	1.75	No
		x	-0.022	4.00	No
		x	0.00	0.00	No
27		x	0.00	0.00	No
		x	0.00	0.00	No
		x	0.00	0.00	No
		x	0.00	0.00	No
28		x	-0.039	6.25	No
		x	-0.039	1.75	No
		x	-0.014	3.00	No
		x	-0.016	5.00	No
53		x	-0.034	6.25	No
		x	-0.034	1.75	No
		x	0.00	0.00	No
		x	0.00	0.00	No
54		x	-0.036	6.25	No
		x	-0.036	1.75	No
		x	-0.022	4.00	No
		x	0.00	0.00	No
55		x	0.00	0.00	No
		x	0.00	0.00	No
		x	0.00	0.00	No
		x	0.00	0.00	No
56		x	-0.039	6.25	No
		x	-0.039	1.75	No
		x	-0.014	3.00	No
		x	-0.016	5.00	No
67		x	-0.026	6.25	No
		x	-0.026	1.75	No
		x	-0.009	4.00	No
		x	0.00	0.00	No
68		x	-0.033	6.25	No
		x	-0.033	1.75	No

		x	-0.029	4.00	No
		x	0.00	0.00	No
	69	x	0.00	0.00	No
		x	0.00	0.00	No
		x	0.00	0.00	No
		x	0.00	0.00	No
WLO	70	z	-0.012	6.25	No
		z	-0.012	1.75	No
		z	-0.001	3.00	No
	25	z	-0.007	6.25	No
		z	-0.007	1.75	No
		z	0.00	0.00	No
	26	z	-0.009	6.25	No
		z	-0.009	1.75	No
		z	-0.006	4.00	No
	27	z	0.00	0.00	No
		z	0.00	0.00	No
		z	0.00	0.00	No
	28	z	-0.008	6.25	No
		z	-0.008	1.75	No
		z	-0.003	3.00	No
		z	-0.004	5.00	No
	53	z	-0.007	6.25	No
		z	-0.007	1.75	No
		z	0.00	0.00	No
	54	z	-0.009	6.25	No
		z	-0.009	1.75	No
		z	-0.006	4.00	No
	55	z	0.00	0.00	No
		z	0.00	0.00	No
		z	0.00	0.00	No
	56	z	-0.008	6.25	No
		z	-0.008	1.75	No
		z	-0.003	3.00	No
		z	-0.004	5.00	No
	67	z	-0.01	6.25	No
		z	-0.01	1.75	No
		z	0.00	0.00	No
	68	z	-0.01	6.25	No
		z	-0.01	1.75	No
		z	-0.008	4.00	No
	69	z	0.00	0.00	No
		z	0.00	0.00	No
		z	0.00	0.00	No
WL30	70	x	-0.007	6.25	No
		x	-0.007	1.75	No
		x	-0.003	3.00	No
		x	-0.004	5.00	No
	25	x	-0.009	6.25	No
		x	-0.009	1.75	No
		x	0.00	0.00	No
		x	0.00	0.00	No
	26	x	-0.01	6.25	No
		x	-0.01	1.75	No
		x	-0.005	4.00	No
		x	0.00	0.00	No
	27	x	0.00	0.00	No
		x	0.00	0.00	No
		x	0.00	0.00	No
		x	0.00	0.00	No

	28	x	-0.011	6.25	No
		x	-0.011	1.75	No
		x	-0.003	3.00	No
		x	-0.004	5.00	No
	53	x	-0.009	6.25	No
		x	-0.009	1.75	No
		x	0.00	0.00	No
		x	0.00	0.00	No
	54	x	-0.01	6.25	No
		x	-0.01	1.75	No
		x	-0.005	4.00	No
		x	0.00	0.00	No
	55	x	0.00	0.00	No
		x	0.00	0.00	No
		x	0.00	0.00	No
		x	0.00	0.00	No
	56	x	-0.011	6.25	No
		x	-0.011	1.75	No
		x	-0.003	3.00	No
		x	-0.004	5.00	No
	67	x	-0.006	6.25	No
		x	-0.006	1.75	No
		x	-0.001	4.00	No
		x	0.00	0.00	No
	68	x	-0.008	6.25	No
		x	-0.008	1.75	No
		x	-0.006	4.00	No
		x	0.00	0.00	No
	69	x	0.00	0.00	No
		x	0.00	0.00	No
		x	0.00	0.00	No
		x	0.00	0.00	No
LL1	101	y	-0.25	0.50	No
LL2	70	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 0/60deg	No	0.00	0.00	0.00
W30	Wind Load 30/90deg	No	0.00	0.00	0.00
Di	Ice Load	No	0.00	0.00	0.00
Wi0	Ice Wind Load 0/60deg	No	0.00	0.00	0.00
Wi30	Ice Wind Load 30/90deg	No	0.00	0.00	0.00
WL0	WL 30 mph 0/60deg	No	0.00	0.00	0.00
WL30	WL 30 mph 30/90deg	No	0.00	0.00	0.00
LL1	250 lb Live Load	No	0.00	0.00	0.00
LL2	500 lb Live Load	No	0.00	0.00	0.00
W180	-W0	Yes	0.00	0.00	0.00
W210	-W30	Yes	0.00	0.00	0.00
Wi180	-Wi0	Yes	0.00	0.00	0.00
Wi210	-Wi30	Yes	0.00	0.00	0.00
WL180	-WL0	Yes	0.00	0.00	0.00
WL210	-WL30	Yes	0.00	0.00	0.00

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### Earthquake (Dynamic analysis only)

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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
W180	0.00	0.00	0.00
W210	0.00	0.00	0.00
Wi180	0.00	0.00	0.00
Wi210	0.00	0.00	0.00
WL180	0.00	0.00	0.00
WL210	0.00	0.00	0.00

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Current Date: 4/10/2018 8:59 AM

Units system: English

File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\AT&T\CT\CT2547\CT2547 (LTE4C).etz\

## 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+1.6LL1
- LC16=1.2DL+1.6WL0+LL2
- LC17=1.2DL+1.6WL30+LL2
- LC18=1.2DL-1.6WL0+LL2
- LC19=1.2DL-1.6WL30+LL2

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	<b>C 2-1/2x1-2x1/2</b>	<b>78</b>	LC1 at 0.00%	<b>0.86</b>	<b>OK</b>	
			LC10 at 48.44%	0.42	OK	
			LC11 at 48.44%	0.52	OK	
			LC12 at 50.00%	0.52	OK	
			LC13 at 48.44%	0.30	OK	
			LC14 at 48.44%	0.23	OK	
			LC15 at 50.00%	0.41	OK	
			LC16 at 48.44%	0.32	OK	
			LC17 at 48.44%	0.31	OK	
			LC18 at 48.44%	0.34	OK	
			LC19 at 48.44%	0.34	OK	
			LC2 at 100.00%	0.73	OK	Eq. H1-1b
			LC3 at 48.44%	0.61	OK	
			LC4 at 50.00%	0.67	OK	Eq. H1-1b
			LC5 at 0.00%	0.82	OK	
			LC6 at 100.00%	0.69	OK	
			LC7 at 100.00%	0.57	OK	
			LC8 at 50.00%	0.59	OK	
			LC9 at 48.44%	0.45	OK	
			W180 at 0.00%	0.43	OK	
			W210 at 100.00%	0.30	OK	
			Wi180 at 0.00%	0.14	OK	
			Wi210 at 100.00%	0.08	OK	
			WL180 at 0.00%	0.02	OK	

	WL210 at 100.00%	0.02	OK	
<b>102</b>	LC1 at 100.00%	<b>0.25</b>	<b>OK</b>	Eq. H1-1b
	LC10 at 100.00%	0.12	OK	
	LC11 at 100.00%	0.10	OK	
	LC12 at 100.00%	0.07	OK	
	LC13 at 100.00%	0.06	OK	
	LC14 at 100.00%	0.05	OK	
	LC15 at 100.00%	0.06	OK	
	LC16 at 100.00%	0.06	OK	
	LC17 at 100.00%	0.07	OK	
	LC18 at 100.00%	0.07	OK	
	LC19 at 100.00%	0.06	OK	
	LC2 at 100.00%	0.21	OK	
	LC3 at 100.00%	0.16	OK	
	LC4 at 100.00%	0.08	OK	
	LC5 at 100.00%	0.24	OK	
	LC6 at 100.00%	0.19	OK	
	LC7 at 100.00%	0.17	OK	
	LC8 at 100.00%	0.10	OK	
	LC9 at 100.00%	0.10	OK	
	W180 at 100.00%	0.12	OK	
	W210 at 100.00%	0.09	OK	
	Wi180 at 100.00%	0.04	OK	
	Wi210 at 100.00%	0.03	OK	
	WL180 at 100.00%	0.01	OK	
	WL210 at 100.00%	0.01	OK	
<b>103</b>	LC1 at 100.00%	<b>0.25</b>	<b>OK</b>	Eq. H1-1b
	LC10 at 100.00%	0.07	OK	
	LC11 at 100.00%	0.10	OK	
	LC12 at 100.00%	0.11	OK	
	LC13 at 100.00%	0.06	OK	
	LC14 at 100.00%	0.04	OK	
	LC15 at 100.00%	0.06	OK	
	LC16 at 100.00%	0.05	OK	
	LC17 at 100.00%	0.04	OK	
	LC18 at 100.00%	0.05	OK	
	LC19 at 100.00%	0.06	OK	
	LC2 at 100.00%	0.08	OK	
	LC3 at 100.00%	0.16	OK	
	LC4 at 100.00%	0.19	OK	
	LC5 at 100.00%	0.24	OK	
	LC6 at 100.00%	0.10	OK	
	LC7 at 100.00%	0.17	OK	
	LC8 at 100.00%	0.18	OK	
	LC9 at 100.00%	0.10	OK	
	W180 at 100.00%	0.12	OK	
	W210 at 100.00%	0.08	OK	
	Wi180 at 100.00%	0.04	OK	
	Wi210 at 100.00%	0.02	OK	
	WL180 at 100.00%	0.01	OK	
	WL210 at 100.00%	0.00	OK	
<b>106</b>	LC1 at 100.00%	0.07	OK	
	LC10 at 100.00%	0.09	OK	
	LC11 at 100.00%	0.12	OK	
	LC12 at 100.00%	0.11	OK	
	LC13 at 100.00%	0.06	OK	
	LC14 at 100.00%	0.05	OK	
	LC15 at 100.00%	0.06	OK	
	LC16 at 100.00%	0.09	OK	
	LC17 at 100.00%	0.09	OK	
	LC18 at 100.00%	0.11	OK	

LC19 at 100.00%	0.10	OK
LC2 at 100.00%	<b>0.24</b>	<b>OK</b>
LC3 at 100.00%	0.16	OK
LC4 at 100.00%	0.16	OK
LC5 at 100.00%	0.08	OK
LC6 at 100.00%	0.23	OK
LC7 at 100.00%	0.14	OK
LC8 at 100.00%	0.15	OK
LC9 at 100.00%	0.07	OK
W180 at 100.00%	0.07	OK
W210 at 100.00%	0.11	OK
Wi180 at 100.00%	0.02	OK
Wi210 at 100.00%	0.03	OK
WL180 at 100.00%	0.00	OK
WL210 at 100.00%	0.01	OK

Eq. H1-1b

107

LC1 at 100.00%	0.18	OK
LC10 at 100.00%	0.10	OK
LC11 at 100.00%	0.08	OK
LC12 at 100.00%	0.08	OK
LC13 at 100.00%	0.06	OK
LC14 at 100.00%	0.04	OK
LC15 at 100.00%	0.05	OK
LC16 at 100.00%	0.09	OK
LC17 at 100.00%	0.08	OK
LC18 at 100.00%	0.07	OK
LC19 at 100.00%	0.08	OK
LC2 at 100.00%	<b>0.24</b>	<b>OK</b>
LC3 at 100.00%	0.14	OK
LC4 at 100.00%	0.15	OK
LC5 at 100.00%	0.16	OK
LC6 at 100.00%	0.23	OK
LC7 at 100.00%	0.13	OK
LC8 at 100.00%	0.16	OK
LC9 at 100.00%	0.12	OK
W180 at 100.00%	0.08	OK
W210 at 100.00%	0.12	OK
Wi180 at 100.00%	0.03	OK
Wi210 at 100.00%	0.04	OK
WL180 at 100.00%	0.00	OK
WL210 at 100.00%	0.01	OK

Eq. H1-1b

108

LC1 at 100.00%	0.20	OK
LC10 at 100.00%	0.09	OK
LC11 at 100.00%	0.08	OK
LC12 at 100.00%	0.10	OK
LC13 at 100.00%	0.06	OK
LC14 at 100.00%	0.05	OK
LC15 at 100.00%	0.09	OK
LC16 at 100.00%	0.07	OK
LC17 at 100.00%	0.06	OK
LC18 at 100.00%	0.05	OK
LC19 at 100.00%	0.06	OK
LC2 at 100.00%	0.15	OK
LC3 at 100.00%	0.15	OK
LC4 at 100.00%	<b>0.23</b>	<b>OK</b>
LC5 at 100.00%	0.18	OK
LC6 at 100.00%	0.16	OK
LC7 at 100.00%	0.14	OK
LC8 at 100.00%	0.22	OK
LC9 at 100.00%	0.12	OK
W180 at 100.00%	0.10	OK
W210 at 100.00%	0.12	OK
Wi180 at 100.00%	0.03	OK

Eq. H1-1b

	Wi210 at 100.00%	0.04	OK	
	WL180 at 100.00%	0.01	OK	
	WL210 at 100.00%	0.01	OK	
<b>109</b>	LC1 at 100.00%	0.08	OK	
	LC10 at 100.00%	0.11	OK	
	LC11 at 100.00%	0.11	OK	
	LC12 at 100.00%	0.09	OK	
	LC13 at 100.00%	0.06	OK	
	LC14 at 100.00%	0.04	OK	
	LC15 at 100.00%	0.08	OK	
	LC16 at 100.00%	0.06	OK	
	LC17 at 100.00%	0.07	OK	
	LC18 at 100.00%	0.07	OK	
	LC19 at 100.00%	0.06	OK	
	LC2 at 100.00%	0.16	OK	
	LC3 at 100.00%	0.17	OK	
	LC4 at 100.00%	<b>0.23</b>	<b>OK</b>	Eq. H1-1b
	LC5 at 100.00%	0.09	OK	
	LC6 at 100.00%	0.15	OK	
	LC7 at 100.00%	0.15	OK	
	LC8 at 100.00%	0.23	OK	
	LC9 at 100.00%	0.07	OK	
	W180 at 100.00%	0.07	OK	
	W210 at 100.00%	0.13	OK	
	Wi180 at 100.00%	0.02	OK	
	Wi210 at 100.00%	0.04	OK	
	WL180 at 100.00%	0.00	OK	
	WL210 at 100.00%	0.01	OK	
<b>110</b>	LC1 at 48.44%	0.66	OK	Eq. H1-1b
	LC10 at 50.00%	0.48	OK	
	LC11 at 48.44%	0.41	OK	
	LC12 at 48.44%	0.48	OK	
	LC13 at 48.44%	0.31	OK	
	LC14 at 48.44%	0.23	OK	
	LC15 at 48.44%	0.30	OK	
	LC16 at 48.44%	0.30	OK	
	LC17 at 48.44%	0.29	OK	
	LC18 at 48.44%	0.26	OK	
	LC19 at 48.44%	0.29	OK	
	LC2 at 0.00%	0.58	OK	Eq. H1-1b
	LC3 at 100.00%	0.31	OK	
	LC4 at 100.00%	<b>0.71</b>	<b>OK</b>	Eq. H1-1b
	LC5 at 48.44%	0.58	OK	
	LC6 at 0.00%	0.54	OK	
	LC7 at 0.00%	0.31	OK	
	LC8 at 100.00%	0.67	OK	
	LC9 at 48.44%	0.53	OK	
	W180 at 0.00%	0.25	OK	
	W210 at 0.00%	0.39	OK	
	Wi180 at 50.00%	0.07	OK	
	Wi210 at 0.00%	0.12	OK	
	WL180 at 0.00%	0.01	OK	
	WL210 at 0.00%	0.02	OK	
<b>111</b>	LC1 at 0.00%	<b>0.72</b>	<b>OK</b>	Eq. H1-1b
	LC10 at 50.00%	0.56	OK	
	LC11 at 50.00%	0.54	OK	
	LC12 at 50.00%	0.45	OK	
	LC13 at 50.00%	0.32	OK	
	LC14 at 50.00%	0.24	OK	
	LC15 at 50.00%	0.31	OK	
	LC16 at 50.00%	0.44	OK	

		LC17 at 50.00%	0.47	OK	
		LC18 at 50.00%	0.46	OK	
		LC19 at 50.00%	0.43	OK	
		LC2 at 50.00%	0.71	OK	Eq. H1-1b
		LC3 at 100.00%	0.61	OK	
		LC4 at 100.00%	0.69	OK	Eq. H1-1b
		LC5 at 0.00%	0.68	OK	
		LC6 at 50.00%	0.63	OK	
		LC7 at 100.00%	0.57	OK	
		LC8 at 100.00%	0.65	OK	
		LC9 at 50.00%	0.47	OK	
		W180 at 0.00%	0.35	OK	
		W210 at 100.00%	0.32	OK	
		Wi180 at 0.00%	0.12	OK	
		Wi210 at 100.00%	0.09	OK	
		WL180 at 0.00%	0.02	OK	
		WL210 at 100.00%	0.02	OK	
		<hr/>			
<b>PIPE 2x0.154</b>	<b>16</b>	LC1 at 91.96%	0.44	OK	Eq. H1-1b
		LC10 at 64.29%	0.19	OK	
		LC11 at 63.39%	0.19	OK	
		LC12 at 35.71%	0.18	OK	
		LC13 at 64.29%	0.11	OK	
		LC14 at 64.29%	0.08	OK	
		LC15 at 64.29%	0.15	OK	
		LC16 at 64.29%	0.12	OK	
		LC17 at 64.29%	0.12	OK	
		LC18 at 63.39%	0.11	OK	
		LC19 at 35.71%	0.10	OK	
		LC2 at 36.61%	0.78	OK	
		LC3 at 36.61%	0.57	OK	
		LC4 at 36.61%	0.42	OK	
		LC5 at 91.96%	0.43	OK	
		LC6 at 36.61%	<b>0.78</b>	<b>OK</b>	Eq. H1-1b
		LC7 at 36.61%	0.58	OK	
		LC8 at 36.61%	0.42	OK	
		LC9 at 64.29%	0.20	OK	
		W180 at 36.61%	0.37	OK	
		W210 at 36.61%	0.25	OK	
		Wi180 at 36.61%	0.10	OK	
		Wi210 at 36.61%	0.07	OK	
		WL180 at 36.61%	0.02	OK	
		WL210 at 36.61%	0.01	OK	
		<hr/>			
	<b>25</b>	LC1 at 72.92%	0.32	OK	
		LC10 at 72.92%	0.19	OK	
		LC11 at 72.92%	0.26	OK	
		LC12 at 72.92%	0.15	OK	
		LC13 at 72.92%	0.11	OK	
		LC14 at 72.92%	0.08	OK	
		LC15 at 72.92%	0.12	OK	
		LC16 at 72.92%	0.09	OK	
		LC17 at 72.92%	0.13	OK	
		LC18 at 72.92%	0.15	OK	
		LC19 at 72.92%	0.10	OK	
		LC2 at 72.92%	0.58	OK	
		LC3 at 72.92%	<b>0.60</b>	<b>OK</b>	Eq. H1-1b
		LC4 at 72.92%	0.41	OK	
		LC5 at 72.92%	0.34	OK	
		LC6 at 72.92%	0.58	OK	
		LC7 at 72.92%	0.57	OK	
		LC8 at 72.92%	0.40	OK	
		LC9 at 72.92%	0.08	OK	
		W180 at 72.92%	0.31	OK	

	W210 at 72.92%	0.25	OK	
	Wi180 at 72.92%	0.09	OK	
	Wi210 at 72.92%	0.07	OK	
	WL180 at 72.92%	0.02	OK	
	WL210 at 72.92%	0.01	OK	
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<b>26</b>	LC1 at 72.92%	0.63	OK	
	LC10 at 25.00%	0.14	OK	
	LC11 at 25.00%	0.25	OK	
	LC12 at 72.92%	0.16	OK	
	LC13 at 72.92%	0.09	OK	
	LC14 at 72.92%	0.06	OK	
	LC15 at 72.92%	0.11	OK	
	LC16 at 72.92%	0.07	OK	
	LC17 at 25.00%	0.10	OK	
	LC18 at 25.00%	0.13	OK	
	LC19 at 72.92%	0.13	OK	
	LC2 at 25.00%	0.69	OK	
	LC3 at 25.00%	0.75	OK	Eq. H1-1b
	LC4 at 72.92%	0.76	OK	
	LC5 at 72.92%	0.66	OK	
	LC6 at 25.00%	0.68	OK	
	LC7 at 72.92%	0.75	OK	
	LC8 at 72.92%	<b>0.77</b>	<b>OK</b>	Eq. H1-1b
	LC9 at 72.92%	0.16	OK	
	W180 at 72.92%	0.47	OK	
	W210 at 72.92%	0.50	OK	
	Wi180 at 72.92%	0.13	OK	
	Wi210 at 72.92%	0.14	OK	
	WL180 at 72.92%	0.03	OK	
	WL210 at 72.92%	0.03	OK	
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<b>27</b>	LC1 at 72.92%	0.69	OK	
	LC10 at 72.92%	0.32	OK	
	LC11 at 72.92%	0.27	OK	
	LC12 at 72.92%	0.08	OK	
	LC13 at 72.92%	0.10	OK	
	LC14 at 72.92%	0.08	OK	
	LC15 at 72.92%	0.13	OK	
	LC16 at 72.92%	0.11	OK	
	LC17 at 72.92%	0.15	OK	
	LC18 at 72.92%	0.14	OK	
	LC19 at 72.92%	0.07	OK	
	LC2 at 72.92%	<b>0.99</b>	<b>OK</b>	Eq. H1-1b
	LC3 at 72.92%	0.97	OK	
	LC4 at 72.92%	0.52	OK	
	LC5 at 72.92%	0.70	OK	
	LC6 at 72.92%	0.96	OK	
	LC7 at 72.92%	0.95	OK	
	LC8 at 72.92%	0.54	OK	
	LC9 at 72.92%	0.19	OK	
	W180 at 72.92%	0.56	OK	
	W210 at 72.92%	0.37	OK	
	Wi180 at 72.92%	0.17	OK	
	Wi210 at 72.92%	0.11	OK	
	WL180 at 72.92%	0.03	OK	
	WL210 at 72.92%	0.02	OK	
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<b>28</b>	LC1 at 72.92%	0.51	OK	
	LC10 at 72.92%	0.28	OK	
	LC11 at 72.92%	0.16	OK	
	LC12 at 72.92%	0.10	OK	
	LC13 at 72.92%	0.13	OK	
	LC14 at 72.92%	0.09	OK	

	LC15 at 72.92%	0.21	OK	
	LC16 at 72.92%	0.13	OK	
	LC17 at 72.92%	0.16	OK	
	LC18 at 72.92%	0.12	OK	
	LC19 at 72.92%	0.09	OK	
	LC2 at 72.92%	<b>0.59</b>	<b>OK</b>	Eq. H1-1b
	LC3 at 72.92%	0.47	OK	
	LC4 at 72.92%	0.36	OK	
	LC5 at 72.92%	0.51	OK	
	LC6 at 72.92%	0.56	OK	
	LC7 at 72.92%	0.48	OK	
	LC8 at 72.92%	0.38	OK	
	LC9 at 72.92%	0.24	OK	
	W180 at 72.92%	0.31	OK	
	W210 at 72.92%	0.29	OK	
	Wi180 at 72.92%	0.09	OK	
	Wi210 at 72.92%	0.08	OK	
	WL180 at 72.92%	0.02	OK	
	WL210 at 72.92%	0.02	OK	
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<b>44</b>	LC1 at 36.61%	0.45	OK	Eq. H1-1b
	LC10 at 64.29%	0.19	OK	
	LC11 at 64.29%	0.20	OK	
	LC12 at 63.39%	0.15	OK	
	LC13 at 64.29%	0.11	OK	
	LC14 at 64.29%	0.08	OK	
	LC15 at 64.29%	0.11	OK	
	LC16 at 35.71%	0.15	OK	
	LC17 at 35.71%	0.14	OK	
	LC18 at 64.29%	0.14	OK	
	LC19 at 35.71%	0.13	OK	
	LC2 at 92.86%	0.45	OK	
	LC3 at 91.96%	0.39	OK	Eq. H1-1b
	LC4 at 92.86%	0.35	OK	
	LC5 at 36.61%	0.44	OK	
	LC6 at 92.86%	<b>0.45</b>	<b>OK</b>	Eq. H1-1b
	LC7 at 36.61%	0.39	OK	
	LC8 at 92.86%	0.35	OK	
	LC9 at 35.71%	0.17	OK	
	W180 at 36.61%	0.26	OK	
	W210 at 36.61%	0.22	OK	
	Wi180 at 36.61%	0.08	OK	
	Wi210 at 36.61%	0.06	OK	
	WL180 at 36.61%	0.02	OK	
	WL210 at 36.61%	0.01	OK	
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<b>53</b>	LC1 at 72.92%	0.43	OK	
	LC10 at 72.92%	0.08	OK	
	LC11 at 72.92%	0.12	OK	
	LC12 at 72.92%	0.24	OK	
	LC13 at 72.92%	0.10	OK	
	LC14 at 72.92%	0.07	OK	
	LC15 at 72.92%	0.11	OK	
	LC16 at 72.92%	0.18	OK	
	LC17 at 72.92%	0.14	OK	
	LC18 at 72.92%	0.16	OK	
	LC19 at 72.92%	0.19	OK	
	LC2 at 72.92%	0.33	OK	
	LC3 at 72.92%	0.41	OK	
	LC4 at 72.92%	<b>0.52</b>	<b>OK</b>	Eq. H1-1b
	LC5 at 72.92%	0.43	OK	
	LC6 at 72.92%	0.36	OK	
	LC7 at 72.92%	0.41	OK	
	LC8 at 72.92%	0.49	OK	

	LC9 at 72.92%	0.21	OK	
	W180 at 72.92%	0.26	OK	
	W210 at 72.92%	0.26	OK	
	Wi180 at 72.92%	0.08	OK	
	Wi210 at 72.92%	0.08	OK	
	WL180 at 72.92%	0.02	OK	
	WL210 at 72.92%	0.02	OK	
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<b>54</b>	LC1 at 72.92%	0.77	OK	
	LC10 at 72.92%	0.08	OK	
	LC11 at 72.92%	0.25	OK	
	LC12 at 72.92%	0.32	OK	
	LC13 at 72.92%	0.12	OK	
	LC14 at 72.92%	0.09	OK	
	LC15 at 72.92%	0.12	OK	
	LC16 at 72.92%	0.17	OK	
	LC17 at 72.92%	0.10	OK	
	LC18 at 72.92%	0.15	OK	
	LC19 at 72.92%	0.19	OK	
	LC2 at 72.92%	0.62	OK	
	LC3 at 72.92%	<b>0.88</b>	<b>OK</b>	Eq. H1-1b
	LC4 at 72.92%	0.82	OK	
	LC5 at 72.92%	0.78	OK	
	LC6 at 72.92%	0.64	OK	
	LC7 at 72.92%	0.86	OK	
	LC8 at 72.92%	0.79	OK	
	LC9 at 72.92%	0.24	OK	
	W180 at 72.92%	0.51	OK	
	W210 at 72.92%	0.44	OK	
	Wi180 at 72.92%	0.16	OK	
	Wi210 at 72.92%	0.13	OK	
	WL180 at 72.92%	0.03	OK	
	WL210 at 72.92%	0.03	OK	
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<b>55</b>	LC1 at 72.92%	0.53	OK	
	LC10 at 25.00%	0.14	OK	
	LC11 at 72.92%	0.25	OK	
	LC12 at 72.92%	0.20	OK	
	LC13 at 72.92%	0.09	OK	
	LC14 at 72.92%	0.06	OK	
	LC15 at 72.92%	0.09	OK	
	LC16 at 72.92%	0.10	OK	
	LC17 at 72.92%	0.13	OK	
	LC18 at 72.92%	0.17	OK	
	LC19 at 72.92%	0.14	OK	
	LC2 at 72.92%	0.68	OK	
	LC3 at 72.92%	0.69	OK	
	LC4 at 72.92%	<b>0.74</b>	<b>OK</b>	Eq. H1-1b
	LC5 at 72.92%	0.55	OK	
	LC6 at 72.92%	0.69	OK	
	LC7 at 72.92%	0.67	OK	
	LC8 at 72.92%	0.72	OK	
	LC9 at 72.92%	0.15	OK	
	W180 at 72.92%	0.38	OK	
	W210 at 72.92%	0.43	OK	
	Wi180 at 72.92%	0.12	OK	
	Wi210 at 72.92%	0.12	OK	
	WL180 at 72.92%	0.02	OK	
	WL210 at 72.92%	0.03	OK	
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<b>56</b>	LC1 at 72.92%	0.38	OK	
	LC10 at 72.92%	0.18	OK	
	LC11 at 72.92%	0.29	OK	
	LC12 at 72.92%	0.20	OK	

	LC13 at 72.92%	0.12	OK	
	LC14 at 72.92%	0.09	OK	
	LC15 at 72.92%	0.13	OK	
	LC16 at 72.92%	0.13	OK	
	LC17 at 72.92%	0.15	OK	
	LC18 at 72.92%	0.18	OK	
	LC19 at 72.92%	0.16	OK	
	LC2 at 72.92%	<b>0.61</b>	<b>OK</b>	Eq. H1-1b
	LC3 at 72.92%	0.59	OK	
	LC4 at 72.92%	0.45	OK	
	LC5 at 72.92%	0.41	OK	
	LC6 at 72.92%	0.60	OK	
	LC7 at 72.92%	0.56	OK	
	LC8 at 72.92%	0.46	OK	
	LC9 at 72.92%	0.11	OK	
	W180 at 72.92%	0.29	OK	
	W210 at 72.92%	0.30	OK	
	Wi180 at 72.92%	0.09	OK	
	Wi210 at 72.92%	0.08	OK	
	WL180 at 72.92%	0.02	OK	
	WL210 at 72.92%	0.02	OK	
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<b>58</b>	LC1 at 92.86%	0.33	OK	Eq. H1-1b
	LC10 at 63.39%	0.18	OK	
	LC11 at 64.29%	0.18	OK	
	LC12 at 64.29%	0.20	OK	
	LC13 at 64.29%	0.11	OK	
	LC14 at 64.29%	0.08	OK	
	LC15 at 64.29%	0.13	OK	
	LC16 at 64.29%	0.18	OK	
	LC17 at 64.29%	0.17	OK	
	LC18 at 64.29%	0.18	OK	
	LC19 at 64.29%	0.19	OK	
	LC2 at 8.04%	0.46	OK	Eq. H1-1b
	LC3 at 35.71%	0.35	OK	Eq. H1-1b
	LC4 at 91.96%	<b>0.47</b>	<b>OK</b>	Eq. H1-1b
	LC5 at 92.86%	0.33	OK	
	LC6 at 8.04%	0.46	OK	
	LC7 at 7.14%	0.34	OK	Eq. H3-6
	LC8 at 91.96%	0.46	OK	
	LC9 at 64.29%	0.16	OK	
	W180 at 92.86%	0.21	OK	
	W210 at 91.96%	0.27	OK	
	Wi180 at 92.86%	0.07	OK	
	Wi210 at 91.96%	0.08	OK	
	WL180 at 92.86%	0.01	OK	
	WL210 at 8.04%	0.02	OK	
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<b>67</b>	LC1 at 72.92%	0.34	OK	
	LC10 at 72.92%	0.24	OK	
	LC11 at 72.92%	0.11	OK	
	LC12 at 72.92%	0.09	OK	
	LC13 at 72.92%	0.10	OK	
	LC14 at 72.92%	0.07	OK	
	LC15 at 72.92%	0.19	OK	
	LC16 at 72.92%	0.13	OK	
	LC17 at 72.92%	0.14	OK	
	LC18 at 72.92%	0.10	OK	
	LC19 at 72.92%	0.09	OK	
	LC2 at 72.92%	<b>0.50</b>	<b>OK</b>	Eq. H1-1b
	LC3 at 72.92%	0.27	OK	
	LC4 at 72.92%	0.38	OK	
	LC5 at 72.92%	0.32	OK	
	LC6 at 72.92%	0.48	OK	

	LC7 at 72.92%	0.27	OK	
	LC8 at 72.92%	0.38	OK	
	LC9 at 72.92%	0.21	OK	
	W180 at 72.92%	0.16	OK	
	W210 at 72.92%	0.26	OK	
	Wi180 at 72.92%	0.05	OK	
	Wi210 at 72.92%	0.08	OK	
	WL180 at 72.92%	0.01	OK	
	WL210 at 72.92%	0.01	OK	
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68	LC1 at 72.92%	0.63	OK	
	LC10 at 72.92%	0.31	OK	
	LC11 at 25.00%	0.10	OK	
	LC12 at 72.92%	0.23	OK	
	LC13 at 72.92%	0.12	OK	
	LC14 at 72.92%	0.09	OK	
	LC15 at 72.92%	0.15	OK	
	LC16 at 72.92%	0.16	OK	
	LC17 at 72.92%	0.16	OK	
	LC18 at 72.92%	0.09	OK	
	LC19 at 72.92%	0.10	OK	
	LC2 at 72.92%	0.72	OK	
	LC3 at 72.92%	0.53	OK	
	LC4 at 72.92%	<b>0.79</b>	<b>OK</b>	Eq. H1-1b
	LC5 at 72.92%	0.61	OK	
	LC6 at 72.92%	0.70	OK	
	LC7 at 72.92%	0.54	OK	
	LC8 at 72.92%	0.77	OK	
	LC9 at 72.92%	0.29	OK	
	W180 at 72.92%	0.35	OK	
	W210 at 72.92%	0.45	OK	
	Wi180 at 72.92%	0.11	OK	
	Wi210 at 72.92%	0.14	OK	
	WL180 at 72.92%	0.02	OK	
	WL210 at 72.92%	0.03	OK	
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69	LC1 at 72.92%	0.47	OK	
	LC10 at 72.92%	0.21	OK	
	LC11 at 25.00%	0.09	OK	
	LC12 at 72.92%	0.24	OK	
	LC13 at 72.92%	0.09	OK	
	LC14 at 72.92%	0.06	OK	
	LC15 at 72.92%	0.11	OK	
	LC16 at 72.92%	0.17	OK	
	LC17 at 72.92%	0.12	OK	
	LC18 at 72.92%	0.13	OK	
	LC19 at 72.92%	0.18	OK	
	LC2 at 72.92%	<b>0.73</b>	<b>OK</b>	Eq. H1-1b
	LC3 at 72.92%	0.34	OK	
	LC4 at 72.92%	0.64	OK	
	LC5 at 72.92%	0.44	OK	
	LC6 at 72.92%	0.71	OK	
	LC7 at 72.92%	0.35	OK	
	LC8 at 72.92%	0.63	OK	
	LC9 at 72.92%	0.21	OK	
	W180 at 72.92%	0.24	OK	
	W210 at 72.92%	0.42	OK	
	Wi180 at 72.92%	0.08	OK	
	Wi210 at 72.92%	0.13	OK	
	WL180 at 72.92%	0.01	OK	
	WL210 at 72.92%	0.02	OK	
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70	LC1 at 72.92%	0.35	OK	
	LC10 at 72.92%	0.11	OK	

**PIPE 3x0.216**

**15**

LC11 at 72.92%	0.13	OK
LC12 at 72.92%	0.28	OK
LC13 at 72.92%	0.12	OK
LC14 at 72.92%	0.09	OK
LC15 at 72.92%	0.14	OK
LC16 at 72.92%	0.24	OK
LC17 at 72.92%	0.21	OK
LC18 at 72.92%	0.22	OK
LC19 at 72.92%	0.25	OK
LC2 at 72.92%	0.39	OK
LC3 at 72.92%	0.27	OK
LC4 at 72.92%	<b>0.57</b>	<b>OK</b>
LC5 at 72.92%	0.32	OK
LC6 at 72.92%	0.40	OK
LC7 at 72.92%	0.27	OK
LC8 at 72.92%	0.54	OK
LC9 at 72.92%	0.25	OK
W180 at 72.92%	0.15	OK
W210 at 72.92%	0.28	OK
Wi180 at 72.92%	0.06	OK
Wi210 at 72.92%	0.09	OK
WL180 at 72.92%	0.01	OK
WL210 at 72.92%	0.02	OK

Eq. H1-1b

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LC1 at 36.61%	0.19	OK
LC10 at 64.29%	0.16	OK
LC11 at 64.29%	0.16	OK
LC12 at 64.29%	0.15	OK
LC13 at 64.29%	0.09	OK
LC14 at 64.29%	0.07	OK
LC15 at 64.29%	0.15	OK
LC16 at 64.29%	0.09	OK
LC17 at 64.29%	0.10	OK
LC18 at 64.29%	0.09	OK
LC19 at 64.29%	0.09	OK
LC2 at 91.96%	0.21	OK
LC3 at 63.39%	<b>0.27</b>	<b>OK</b>
LC4 at 63.39%	0.21	OK
LC5 at 36.61%	0.19	OK
LC6 at 91.96%	0.20	OK
LC7 at 63.39%	0.26	OK
LC8 at 63.39%	0.20	OK
LC9 at 64.29%	0.13	OK
W180 at 36.61%	0.14	OK
W210 at 91.96%	0.11	OK
Wi180 at 36.61%	0.05	OK
Wi210 at 91.96%	0.03	OK
WL180 at 36.61%	0.01	OK
WL210 at 91.96%	0.01	OK

Eq. H1-1b  
Eq. H1-1b

**43**

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LC1 at 63.39%	<b>0.28</b>	<b>OK</b>
LC10 at 64.29%	0.13	OK
LC11 at 64.29%	0.15	OK
LC12 at 64.29%	0.15	OK
LC13 at 64.29%	0.09	OK
LC14 at 64.29%	0.07	OK
LC15 at 64.29%	0.09	OK
LC16 at 35.71%	0.11	OK
LC17 at 35.71%	0.11	OK
LC18 at 35.71%	0.11	OK
LC19 at 35.71%	0.11	OK
LC2 at 36.61%	0.20	OK
LC3 at 91.96%	0.22	OK
LC4 at 64.29%	0.18	OK

Eq. H1-1b

Eq. H1-1b

	LC5 at 63.39%	0.27	OK	
	LC6 at 36.61%	0.20	OK	
	LC7 at 91.96%	0.21	OK	
	LC8 at 36.61%	0.17	OK	
	LC9 at 64.29%	0.15	OK	
	W180 at 63.39%	0.13	OK	
	W210 at 36.61%	0.10	OK	
	Wi180 at 91.96%	0.04	OK	
	Wi210 at 8.04%	0.03	OK	
	WL180 at 63.39%	0.01	OK	
	WL210 at 36.61%	0.01	OK	
<hr/>				
<b>57</b>	LC1 at 64.29%	0.19	OK	
	LC10 at 64.29%	0.15	OK	
	LC11 at 64.29%	0.14	OK	
	LC12 at 64.29%	0.14	OK	
	LC13 at 64.29%	0.09	OK	
	LC14 at 64.29%	0.07	OK	
	LC15 at 35.71%	0.11	OK	
	LC16 at 64.29%	0.16	OK	
	LC17 at 64.29%	0.15	OK	
	LC18 at 64.29%	0.14	OK	
	LC19 at 64.29%	0.15	OK	
	LC2 at 63.39%	<b>0.31</b>	<b>OK</b>	Eq. H1-1b
	LC3 at 2.68%	0.16	OK	Eq. H3-1
	LC4 at 36.61%	0.23	OK	
	LC5 at 64.29%	0.17	OK	
	LC6 at 63.39%	0.30	OK	
	LC7 at 2.68%	0.15	OK	
	LC8 at 36.61%	0.24	OK	
	LC9 at 64.29%	0.16	OK	
	W180 at 2.68%	0.07	OK	
	W210 at 63.39%	0.15	OK	
	Wi180 at 64.29%	0.03	OK	
	Wi210 at 63.39%	0.04	OK	
	WL180 at 8.04%	0.00	OK	
	WL210 at 63.39%	0.01	OK	
<hr/>				
<b>82</b>	LC1 at 56.25%	<b>0.72</b>	<b>OK</b>	Eq. H1-1b
	LC10 at 56.25%	0.38	OK	
	LC11 at 56.25%	0.30	OK	
	LC12 at 56.25%	0.37	OK	
	LC13 at 56.25%	0.24	OK	
	LC14 at 56.25%	0.18	OK	
	LC15 at 56.25%	0.22	OK	
	LC16 at 56.25%	0.24	OK	
	LC17 at 56.25%	0.22	OK	
	LC18 at 56.25%	0.19	OK	
	LC19 at 56.25%	0.21	OK	
	LC2 at 100.00%	0.36	OK	
	LC3 at 56.25%	0.24	OK	
	LC4 at 100.00%	0.38	OK	Eq. H1-1b
	LC5 at 56.25%	0.66	OK	
	LC6 at 100.00%	0.35	OK	
	LC7 at 56.25%	0.29	OK	
	LC8 at 100.00%	0.36	OK	
	LC9 at 56.25%	0.45	OK	
	W180 at 56.25%	0.29	OK	
	W210 at 100.00%	0.20	OK	
	Wi180 at 56.25%	0.09	OK	
	Wi210 at 100.00%	0.05	OK	
	WL180 at 56.25%	0.02	OK	
	WL210 at 100.00%	0.01	OK	

<b>83</b>	LC1 at 100.00%	0.32	OK	
	LC10 at 56.25%	0.29	OK	
	LC11 at 56.25%	0.42	OK	
	LC12 at 56.25%	0.45	OK	
	LC13 at 56.25%	0.24	OK	
	LC14 at 56.25%	0.18	OK	
	LC15 at 56.25%	0.41	OK	Eq. H1-1b
	LC16 at 56.25%	0.22	OK	
	LC17 at 56.25%	0.21	OK	
	LC18 at 56.25%	0.24	OK	
	LC19 at 56.25%	0.26	OK	
	LC2 at 56.25%	0.26	OK	
	LC3 at 56.25%	0.55	OK	
	LC4 at 56.25%	<b>0.69</b>	<b>OK</b>	Eq. H1-1b
	LC5 at 100.00%	0.34	OK	
	LC6 at 56.25%	0.32	OK	
	LC7 at 56.25%	0.49	OK	
	LC8 at 56.25%	0.63	OK	
	LC9 at 56.25%	0.33	OK	
	W180 at 100.00%	0.23	OK	
	W210 at 56.25%	0.28	OK	
	Wi180 at 100.00%	0.06	OK	
	Wi210 at 56.25%	0.09	OK	
WL180 at 100.00%	0.01	OK		
WL210 at 56.25%	0.02	OK		

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<b>84</b>	LC1 at 100.00%	0.25	OK	
	LC10 at 56.25%	0.44	OK	
	LC11 at 56.25%	0.42	OK	
	LC12 at 56.25%	0.29	OK	
	LC13 at 56.25%	0.24	OK	
	LC14 at 56.25%	0.18	OK	
	LC15 at 56.25%	0.22	OK	
	LC16 at 56.25%	0.42	OK	
	LC17 at 56.25%	0.45	OK	
	LC18 at 56.25%	0.44	OK	
	LC19 at 56.25%	0.41	OK	
	LC2 at 56.25%	<b>0.71</b>	<b>OK</b>	Eq. H1-1b
	LC3 at 56.25%	0.52	OK	
	LC4 at 56.25%	0.27	OK	
	LC5 at 100.00%	0.26	OK	
	LC6 at 56.25%	0.66	OK	
	LC7 at 56.25%	0.46	OK	
	LC8 at 56.25%	0.32	OK	
	LC9 at 56.25%	0.33	OK	
	W180 at 58.33%	0.19	OK	
	W210 at 56.25%	0.31	OK	
	Wi180 at 100.00%	0.07	OK	
	Wi210 at 56.25%	0.09	OK	
WL180 at 58.33%	0.01	OK		
WL210 at 56.25%	0.02	OK		

**PL 6x1/2**

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<b>79</b>	LC1 at 50.00%	0.43	OK	
	LC10 at 34.38%	0.32	OK	
	LC11 at 34.38%	0.42	OK	
	LC12 at 50.00%	0.44	OK	
	LC13 at 50.00%	0.23	OK	
	LC14 at 50.00%	0.18	OK	
	LC15 at 50.00%	0.35	OK	
	LC16 at 50.00%	0.23	OK	
	LC17 at 34.38%	0.23	OK	
	LC18 at 34.38%	0.26	OK	
	LC19 at 50.00%	0.25	OK	
	LC2 at 48.44%	0.39	OK	

	LC3 at 34.38%	0.65	OK	Eq. H3-1
	LC4 at 50.00%	<b>0.79</b>	<b>OK</b>	Eq. H3-6
	LC5 at 50.00%	0.39	OK	
	LC6 at 50.00%	0.40	OK	
	LC7 at 34.38%	0.60	OK	
	LC8 at 50.00%	0.71	OK	
	LC9 at 50.00%	0.38	OK	
	W180 at 34.38%	0.27	OK	
	W210 at 50.00%	0.27	OK	
	Wi180 at 34.38%	0.08	OK	
	Wi210 at 50.00%	0.08	OK	
	WL180 at 34.38%	0.02	OK	
	WL210 at 50.00%	0.02	OK	
<b>80</b>	LC1 at 48.44%	0.35	OK	
	LC10 at 34.38%	0.42	OK	
	LC11 at 50.00%	0.45	OK	
	LC12 at 50.00%	0.33	OK	
	LC13 at 50.00%	0.24	OK	
	LC14 at 50.00%	0.18	OK	
	LC15 at 50.00%	0.24	OK	
	LC16 at 50.00%	0.38	OK	
	LC17 at 50.00%	0.41	OK	
	LC18 at 50.00%	0.43	OK	
	LC19 at 50.00%	0.39	OK	
	LC2 at 48.44%	<b>0.79</b>	<b>OK</b>	Eq. H3-6
	LC3 at 50.00%	0.64	OK	Eq. H3-1
	LC4 at 50.00%	0.41	OK	
	LC5 at 48.44%	0.32	OK	
	LC6 at 48.44%	0.72	OK	
	LC7 at 50.00%	0.58	OK	
	LC8 at 50.00%	0.41	OK	
	LC9 at 34.38%	0.35	OK	
	W180 at 50.00%	0.25	OK	
	W210 at 34.38%	0.27	OK	
	Wi180 at 50.00%	0.08	OK	
	Wi210 at 34.38%	0.08	OK	
	WL180 at 50.00%	0.01	OK	
	WL210 at 34.38%	0.02	OK	
<b>81</b>	LC1 at 50.00%	<b>0.77</b>	<b>OK</b>	Eq. H3-6
	LC10 at 50.00%	0.43	OK	
	LC11 at 50.00%	0.31	OK	
	LC12 at 34.38%	0.39	OK	
	LC13 at 50.00%	0.24	OK	
	LC14 at 50.00%	0.18	OK	
	LC15 at 34.38%	0.22	OK	
	LC16 at 50.00%	0.25	OK	
	LC17 at 50.00%	0.25	OK	
	LC18 at 50.00%	0.21	OK	
	LC19 at 50.00%	0.21	OK	
	LC2 at 50.00%	0.60	OK	Eq. H3-1
	LC3 at 50.00%	0.38	OK	
	LC4 at 34.38%	0.51	OK	
	LC5 at 50.00%	0.71	OK	
	LC6 at 50.00%	0.54	OK	
	LC7 at 50.00%	0.38	OK	
	LC8 at 34.38%	0.46	OK	
	LC9 at 50.00%	0.42	OK	
	W180 at 50.00%	0.24	OK	
	W210 at 34.38%	0.18	OK	
	Wi180 at 50.00%	0.07	OK	
	Wi210 at 34.38%	0.05	OK	
	WL180 at 50.00%	0.01	OK	

	WL210 at 34.38%	0.01	OK	
<b>99</b>	LC1 at 100.00%	0.15	OK	
	LC10 at 100.00%	0.08	OK	
	LC11 at 93.75%	0.03	OK	
	LC12 at 0.00%	0.11	OK	
	LC13 at 100.00%	0.04	OK	
	LC14 at 100.00%	0.03	OK	
	LC15 at 100.00%	0.05	OK	
	LC16 at 0.00%	0.06	OK	
	LC17 at 100.00%	0.04	OK	
	LC18 at 0.00%	0.04	OK	
	LC19 at 0.00%	0.07	OK	
	LC2 at 0.00%	0.44	OK	
	LC3 at 0.00%	0.14	OK	
	LC4 at 0.00%	0.37	OK	
	LC5 at 0.00%	0.14	OK	
	LC6 at 0.00%	<b>0.45</b>	<b>OK</b>	Eq. H3-6
	LC7 at 0.00%	0.15	OK	
	LC8 at 0.00%	0.36	OK	
	LC9 at 100.00%	0.08	OK	
	W180 at 0.00%	0.11	OK	
	W210 at 0.00%	0.17	OK	
	Wi180 at 100.00%	0.03	OK	
	Wi210 at 0.00%	0.05	OK	
	WL180 at 0.00%	0.01	OK	
	WL210 at 0.00%	0.01	OK	
<b>100</b>	LC1 at 0.00%	0.25	OK	Eq. H3-6
	LC10 at 0.00%	0.10	OK	
	LC11 at 100.00%	0.12	OK	
	LC12 at 100.00%	0.07	OK	
	LC13 at 0.00%	0.04	OK	
	LC14 at 0.00%	0.03	OK	
	LC15 at 0.00%	0.05	OK	
	LC16 at 100.00%	0.06	OK	
	LC17 at 100.00%	0.07	OK	
	LC18 at 100.00%	0.09	OK	
	LC19 at 100.00%	0.07	OK	
	LC2 at 0.00%	0.26	OK	Eq. H1-1b
	LC3 at 100.00%	<b>0.33</b>	<b>OK</b>	Eq. H3-6
	LC4 at 0.00%	0.17	OK	
	LC5 at 100.00%	0.26	OK	
	LC6 at 0.00%	0.25	OK	
	LC7 at 100.00%	0.32	OK	
	LC8 at 0.00%	0.18	OK	
	LC9 at 0.00%	0.10	OK	
	W180 at 100.00%	0.15	OK	
	W210 at 0.00%	0.13	OK	
	Wi180 at 100.00%	0.05	OK	
	Wi210 at 0.00%	0.04	OK	
	WL180 at 100.00%	0.01	OK	
	WL210 at 0.00%	0.01	OK	
<b>101</b>	LC1 at 0.00%	0.31	OK	
	LC10 at 0.00%	0.06	OK	
	LC11 at 0.00%	0.11	OK	
	LC12 at 100.00%	0.10	OK	
	LC13 at 100.00%	0.04	OK	
	LC14 at 100.00%	0.03	OK	
	LC15 at 56.25%	0.07	OK	
	LC16 at 100.00%	0.06	OK	
	LC17 at 0.00%	0.05	OK	
	LC18 at 0.00%	0.06	OK	

LC19 at 100.00%	0.06	OK
LC2 at 100.00%	0.20	OK
LC3 at 0.00%	<b>0.38</b>	<b>OK</b>
LC4 at 100.00%	0.24	OK
LC5 at 0.00%	0.32	OK
LC6 at 100.00%	0.21	OK
LC7 at 0.00%	0.37	OK
LC8 at 100.00%	0.23	OK
LC9 at 100.00%	0.09	OK
W180 at 0.00%	0.17	OK
W210 at 100.00%	0.13	OK
Wi180 at 0.00%	0.05	OK
Wi210 at 100.00%	0.04	OK
WL180 at 0.00%	0.01	OK
WL210 at 100.00%	0.01	OK

Eq. H3-6  
Eq. H1-1b

T2L 3X3X1\_4X3\_4

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LC1 at 0.00%	<b>0.61</b>	<b>OK</b>
LC10 at 0.00%	0.34	OK
LC11 at 0.00%	0.26	OK
LC12 at 0.00%	0.35	OK
LC13 at 0.00%	0.22	OK
LC14 at 0.00%	0.16	OK
LC15 at 0.00%	0.21	OK
LC16 at 0.00%	0.21	OK
LC17 at 0.00%	0.19	OK
LC18 at 0.00%	0.16	OK
LC19 at 0.00%	0.19	OK
LC2 at 0.00%	0.34	OK
LC3 at 0.00%	0.11	OK
LC4 at 0.00%	0.31	OK
LC5 at 0.00%	0.56	OK
LC6 at 0.00%	0.29	OK
LC7 at 0.00%	0.14	OK
LC8 at 0.00%	0.26	OK
LC9 at 0.00%	0.41	OK
W180 at 0.00%	0.15	OK
W210 at 100.00%	0.09	OK
Wi180 at 0.00%	0.05	OK
Wi210 at 100.00%	0.02	OK
WL180 at 0.00%	0.01	OK
WL210 at 100.00%	0.01	OK

Eq. H2-1

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LC1 at 0.00%	0.11	OK
LC10 at 0.00%	0.41	OK
LC11 at 0.00%	0.37	OK
LC12 at 0.00%	0.25	OK
LC13 at 0.00%	0.21	OK
LC14 at 0.00%	0.16	OK
LC15 at 0.00%	0.19	OK
LC16 at 0.00%	0.38	OK
LC17 at 0.00%	0.41	OK
LC18 at 0.00%	0.41	OK
LC19 at 0.00%	0.38	OK
LC2 at 0.00%	<b>0.65</b>	<b>OK</b>
LC3 at 0.00%	0.49	OK
LC4 at 0.00%	0.14	OK
LC5 at 0.00%	0.12	OK
LC6 at 0.00%	0.59	OK
LC7 at 0.00%	0.44	OK
LC8 at 0.00%	0.17	OK
LC9 at 0.00%	0.31	OK
W180 at 0.00%	0.18	OK
W210 at 0.00%	0.17	OK
Wi180 at 0.00%	0.06	OK

Eq. H2-1

Wi210 at 0.00%	0.05	OK
WL180 at 0.00%	0.01	OK
WL210 at 0.00%	0.01	OK

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LC1 at 100.00%	0.17	OK
LC10 at 0.00%	0.27	OK
LC11 at 0.00%	0.39	OK
LC12 at 0.00%	0.39	OK
LC13 at 0.00%	0.21	OK
LC14 at 0.00%	0.16	OK
LC15 at 0.00%	0.36	OK
LC16 at 0.00%	0.20	OK
LC17 at 0.00%	0.20	OK
LC18 at 0.00%	0.24	OK
LC19 at 0.00%	0.24	OK
LC2 at 0.00%	0.15	OK
LC3 at 0.00%	0.50	OK
LC4 at 0.00%	<b>0.62</b>	<b>OK</b>
LC5 at 100.00%	0.17	OK
LC6 at 0.00%	0.18	OK
LC7 at 0.00%	0.44	OK
LC8 at 0.00%	0.57	OK
LC9 at 0.00%	0.29	OK
W180 at 0.00%	0.18	OK
W210 at 0.00%	0.26	OK
Wi180 at 0.00%	0.06	OK
Wi210 at 0.00%	0.08	OK
WL180 at 0.00%	0.01	OK
WL210 at 0.00%	0.02	OK

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Eq. H2-1

## 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
55	6.5891	0.00	3.4127	0
56	0.3391	0.00	-7.4127	0
57	6.5891	4.00	3.4127	0
58	0.3391	4.00	-7.4127	0
59	6.2363	6.00	2.4616	0
60	6.2363	4.00	2.4616	0
61	6.2363	0.00	2.4616	0
62	6.2363	-2.00	2.4616	0
63	6.0891	0.00	2.5466	0
64	6.0891	4.00	2.5466	0
65	4.4863	6.00	-0.5695	0
66	4.4863	4.00	-0.5695	0
67	4.3391	4.00	-0.4845	0
68	4.4863	0.00	-0.5695	0
69	4.3391	0.00	-0.4845	0
70	4.4863	-2.00	-0.5695	0
71	2.7363	6.00	-3.6005	0
72	2.7363	4.00	-3.6005	0
73	2.5891	4.00	-3.5155	0
74	2.7363	0.00	-3.6005	0
75	2.5891	0.00	-3.5155	0
76	2.7363	-2.00	-3.6005	0

77	0.9863	6.00	-6.6316	0
79	0.8391	4.00	-6.5466	0
80	0.9863	0.00	-6.6316	0
81	0.8391	0.00	-6.5466	0
82	0.9863	-2.00	-6.6316	0
111	-0.3391	0.00	-7.4127	0
112	-6.5891	0.00	3.4127	0
113	-0.3391	4.00	-7.4127	0
114	-6.5891	4.00	3.4127	0
115	-0.9863	6.00	-6.6316	0
116	-0.9863	4.00	-6.6316	0
117	-0.9863	0.00	-6.6316	0
118	-0.9863	-2.00	-6.6316	0
119	-0.8391	0.00	-6.5466	0
120	-0.8391	4.00	-6.5466	0
121	-2.7363	6.00	-3.6005	0
122	-2.7363	4.00	-3.6005	0
123	-2.5891	4.00	-3.5155	0
124	-2.7363	0.00	-3.6005	0
125	-2.5891	0.00	-3.5155	0
126	-2.7363	-2.00	-3.6005	0
127	-4.4863	6.00	-0.5695	0
128	-4.4863	4.00	-0.5695	0
129	-4.3391	4.00	-0.4845	0
130	-4.4863	0.00	-0.5695	0
131	-4.3391	0.00	-0.4845	0
132	-4.4863	-2.00	-0.5695	0
133	-6.2363	6.00	2.4616	0
134	-6.2363	4.00	2.4616	0
135	-6.0891	4.00	2.5466	0
136	-6.2363	0.00	2.4616	0
137	-6.0891	0.00	2.5466	0
138	-6.2363	-2.00	2.4616	0
139	-6.25	0.00	4.00	0
140	6.25	0.00	4.00	0
141	-6.25	4.00	4.00	0
142	6.25	4.00	4.00	0
143	-5.25	6.00	4.17	0
144	-5.25	4.00	4.17	0
145	-5.25	0.00	4.17	0
146	-5.25	-2.00	4.17	0
147	-5.25	0.00	4.00	0
148	-5.25	4.00	4.00	0
149	-1.75	6.00	4.17	0
150	-1.75	4.00	4.17	0
151	-1.75	4.00	4.00	0
152	-1.75	0.00	4.17	0
153	-1.75	0.00	4.00	0
154	-1.75	-2.00	4.17	0
155	1.75	6.00	4.17	0
156	1.75	4.00	4.17	0
157	1.75	4.00	4.00	0
158	1.75	0.00	4.17	0
159	1.75	0.00	4.00	0
160	1.75	-2.00	4.17	0
161	5.25	6.00	4.17	0
162	5.25	4.00	4.17	0
163	5.25	4.00	4.00	0
164	5.25	0.00	4.17	0
165	5.25	0.00	4.00	0

166	5.25	-2.00	4.17	0
167	0.00	0.00	0.00	0
169	0.00	0.00	-1.2354	0
171	0.4641	0.00	-7.1962	0
173	6.4641	0.00	3.1962	0
177	-6.4641	0.00	3.1962	0
178	-0.4641	0.00	-7.1962	0
179	-1.0699	0.00	0.6177	0
180	6.00	0.00	4.00	0
181	-6.00	0.00	4.00	0
182	1.0699	0.00	0.6177	0
183	-6.2321	0.00	3.5981	0
184	6.2321	0.00	3.5981	0
185	0.00	0.00	-7.1962	0
188	0.00	0.00	-3.79	0
189	0.00	-1.90	-1.2354	0
192	-3.2823	0.00	1.895	0
193	-1.0699	-1.90	0.6177	0
194	3.2823	0.00	1.895	0
195	1.0699	-1.90	0.6177	0
217	-0.1547	0.00	-7.1962	0
218	0.1547	0.00	-7.1962	0
221	-0.4641	4.00	-7.1962	0
222	0.4641	4.00	-7.1962	0
223	-6.4641	4.00	3.1962	0
224	-6.00	4.00	4.00	0
225	6.4641	4.00	3.1962	0
226	6.00	4.00	4.00	0
230	2.2125	0.00	-3.5155	0
231	-2.2125	0.00	-3.5155	0
236	-4.1508	0.00	-0.1583	0
237	-1.9383	0.00	3.6739	0
238	-6.1547	0.00	3.7321	0
239	-6.3094	0.00	3.4641	0
240	1.9383	0.00	3.6739	0
241	4.1508	0.00	-0.1583	0
242	6.3094	0.00	3.4641	0
243	6.1547	0.00	3.7321	0

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## Restraints

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Node	TX	TY	TZ	RX	RY	RZ
169	1	1	1	1	1	1
179	1	1	1	1	1	1
182	1	1	1	1	1	1
189	1	1	1	1	1	1
193	1	1	1	1	1	1
195	1	1	1	1	1	1

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## Members

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Member	NJ	NK	Description	Section	Material	d0 [in]	dL [in]	Ig factor
70	143	146		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
15	56	55		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
16	58	57		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
25	77	82		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
26	71	76		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
27	65	70		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
28	59	62		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
43	112	111		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
44	114	113		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
53	133	138		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
54	127	132		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
55	121	126		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
56	115	118		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
57	140	139		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
58	142	141		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
67	161	166		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
68	155	160		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
69	149	154		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
78	159	69		C 2-1/2x1-1/2x1/2	A36	0.00	0.00	0.00
79	173	180		PL 6x1/2	A36	0.00	0.00	0.00
80	181	177		PL 6x1/2	A36	0.00	0.00	0.00
81	178	171		PL 6x1/2	A36	0.00	0.00	0.00
82	185	169		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
83	184	182		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
84	183	179		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
87	188	189		T2L 3X3X1_4X3_4	A36	0.00	0.00	0.00
89	192	193		T2L 3X3X1_4X3_4	A36	0.00	0.00	0.00
90	194	195		T2L 3X3X1_4X3_4	A36	0.00	0.00	0.00
99	221	222		PL 6x1/2	A36	0.00	0.00	0.00
100	224	223		PL 6x1/2	A36	0.00	0.00	0.00
101	225	226		PL 6x1/2	A36	0.00	0.00	0.00
102	230	218		C 2-1/2x1-1/2x1/2	A36	0.00	0.00	0.00
103	231	217		C 2-1/2x1-1/2x1/2	A36	0.00	0.00	0.00
106	236	239		C 2-1/2x1-1/2x1/2	A36	0.00	0.00	0.00
107	237	238		C 2-1/2x1-1/2x1/2	A36	0.00	0.00	0.00
108	240	243		C 2-1/2x1-1/2x1/2	A36	0.00	0.00	0.00
109	241	242		C 2-1/2x1-1/2x1/2	A36	0.00	0.00	0.00
110	75	125		C 2-1/2x1-1/2x1/2	A36	0.00	0.00	0.00
111	153	131		C 2-1/2x1-1/2x1/2	A36	0.00	0.00	0.00

### Orientation of local axes

Member	Rotation [Deg]	Axes23	NX	NY	NZ
25	0.00	2	-0.50	0.00	-0.866
26	0.00	2	-0.50	0.00	-0.866
27	0.00	2	-0.50	0.00	-0.866
28	0.00	2	-0.50	0.00	-0.866
53	0.00	2	-0.50	0.00	0.866
54	0.00	2	-0.50	0.00	0.866
55	0.00	2	-0.50	0.00	0.866
56	0.00	2	-0.50	0.00	0.866
102	180.00	0	0.00	0.00	0.00
106	180.00	0	0.00	0.00	0.00
108	180.00	0	0.00	0.00	0.00
111	180.00	0	0.00	0.00	0.00

**PROJECT INFORMATION**

SCOPE OF WORK: ITEMS TO BE MOUNTED ON MONOPOLE TOWER:  
 • NEW AT&T RRUS: (3) RRUS-32 B66.  
 • NEW JUMPER CABLES: COAX JUMPER (1) PER SECTOR FROM EACH RRU (TOTAL OF 3)  
 • NEW FIBER JUMPERS: FIBER JUMPERS (2) FROM THE SQUID TO EACH RRU (TOTAL OF 6)

ITEMS TO REMAIN:  
 • (9) ANTENNAS, (9) RRUS, (1) SURGE ARRESTOR, (2) DC POWER CABLES, (1) FIBER RUN & (6) 1-5/8" COAX CABLES

SITE ADDRESS: 67 FAIRCHILD ROAD  
 MIDDLETOWN, CT 06457

LATITUDE: 41.545011° N 41° 32' 42.03" N  
 LONGITUDE: 72.620766° W 72° 37' 14.76" W  
 TYPE OF SITE: MONOPOLE / INDOOR EQUIPMENT  
 TOWER HEIGHT: 130'-0"±  
 RAD CENTER: 130'-0"±  
 JURISDICTION: NATIONAL, STATE & LOCAL CODES OR ORDINANCES  
 CURRENT USE: TELECOMMUNICATIONS FACILITY  
 PROPOSED USE: TELECOMMUNICATIONS FACILITY



**SITE NUMBER: CT2547**

**SITE NAME: MIDDLETOWN FAIRCHILD ROAD**

**PROJECT: LTE 4C 2018 UPGRADE**

**DRAWING INDEX**

SHEET NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	1
GN-1	GENERAL NOTES	1
A-1	COMPOUND & EQUIPMENT PLAN	1
A-2	ELEVATION & ANTENNA LAYOUTS	1
A-3	DETAILS	1
RF-1	RF-PLUMBING DIAGRAM	1
G-1	GROUNDING DETAILS	1

**VICINITY MAP**

**DIRECTIONS TO SITE:**  
 FROM HARTFORD, TAKE I-91 SOUTH. TAKE ROUTE 9 SOUTH. TAKE EXIT 12. TURN LEFT ON SILVER STREET. TURN RIGHT ON EASTERN DRIVE. TURN LEFT ON BOW LANE. TURN RIGHT ON FAIRCHILD STREET. SITE AT END OF FAIRCHILD STREET. CONTINUE DOWN PRIVATE HOME DRIVEWAY AT THE END OF STREET TO ACCESS ROAD. FOLLOW ACCESS ROAD TO SITE. GATE COMBO 4722.



**GENERAL NOTES**

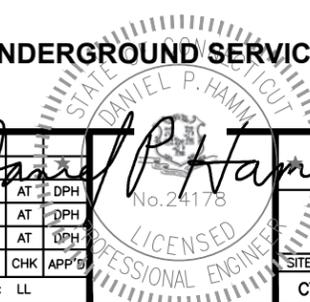
1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY AND COPYRIGHTED WORK OF AT&T. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.
2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE AT&T MOBILITY REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.
4. CONSTRUCTION DRAWINGS ARE VALID FOR SIX MONTHS AFTER ENGINEER OF RECORD'S STAMPED AND SIGNED SUBMITTAL DATE LISTED HEREIN.

**72 HOURS**



**CALL BEFORE YOU DIG**  
 CALL TOLL FREE 1-800-922-4455  
 OR CALL 811

**UNDERGROUND SERVICE ALERT**



**SBA SITE #: CT13064**



45 BEECHWOOD DRIVE  
 NORTH ANDOVER, MA 01845  
 TEL: (978) 557-5553  
 FAX: (978) 336-5586



12 INDUSTRIAL WAY  
 SALEM, NH 03079

**SITE NUMBER: CT2547**  
**SITE NAME: MIDDLETOWN FAIRCHILD ROAD**  
**SBA SITE NUMBER: CT13064**  
 67 FAIRCHILD ROAD  
 MIDDLETOWN, CT 06457  
 MIDDLESEX COUNTY



500 ENTERPRISE DRIVE, SUITE 3A  
 ROCKY HILL, CT 06067

NO.	DATE	REVISIONS	BY	CHK	APP'D	SITE NUMBER	DRAWING NUMBER	REV
1	04/12/18	ISSUED FOR CONSTRUCTION	SG	AT	DPH	CT2157	T-1	1
B	03/07/18	ISSUED FOR PERMITTING	SG	AT	DPH			
A	02/15/18	ISSUED FOR REVIEW	TB	AT	DPH			
SCALE: AS SHOWN    DESIGNED BY: AT    DRAWN BY: LL						AT&T TITLE SHEET LTE 4C 2018 UPGRADE		

**GROUNDING NOTES**

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTNING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.
4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS 2 AWG STRANDED COPPER FOR OUTDOOR BTS.
6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO GROUND BAR.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
11. METAL CONDUIT SHALL BE MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWS COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
12. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE OF 1/2 IN. OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID BARE TINNED COPPER GROUND WIRE, PER NEC 250.50

**GENERAL NOTES**

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:  
 CONTRACTOR – SAI  
 SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)  
 OWNER – AT&T MOBILITY
2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.
5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
6. "KITTING LIST" SUPPLIED WITH THE BID PACKAGE IDENTIFIES ITEMS THAT WILL BE SUPPLIED BY CONTRACTOR. ITEMS NOT INCLUDED IN THE BILL OF MATERIALS AND KITTING LIST SHALL BE SUPPLIED BY THE SUBCONTRACTOR.
7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.
9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR.
10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
13. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.

14. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL BE AIR-ENTRAINED AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS. ALL CONCRETE WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.
15. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy = 36 ksi) UNLESS OTHERWISE NOTED. PIPES SHALL BE ASTM A53 TYPE E (Fy = 36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCHUP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.
16. CONSTRUCTION SHALL COMPLY WITH LTE SPECIFICATIONS AND "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T SITES."
17. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
18. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
19. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.
20. APPLICABLE BUILDING CODES:  
 SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.  
 BUILDING CODE: IBC 2012 WITH 2016 CT BUILDING CODE AMENDMENTS  
 ELECTRICAL CODE: REFER TO ELECTRICAL DRAWINGS  
 LIGHTENING CODE: REFER TO ELECTRICAL DRAWINGS  
  
 SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:  
  
 AMERICAN CONCRETE INSTITUTE (ACI) 318; BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE;  
  
 AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)  
 MANUAL OF STEEL CONSTRUCTION, ASD, FOURTEENTH EDITION;  
  
 TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-G,  
 STRUCTURAL STANDARDS FOR STEEL  
  
 EQUIPMENT AND ANTENNA SUPPORTING STRUCTURES; REFER TO ELECTRICAL DRAWINGS FOR SPECIFIC ELECTRICAL STANDARDS.  
  
 FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

**ABBREVIATIONS**

AGL	ABOVE GRADE LEVEL	EQ	EQUAL	REQ	REQUIRED
AWG	AMERICAN WIRE GAUGE	GC	GENERAL CONTRACTOR	RF	RADIO FREQUENCY
BBU	BATTERY BACKUP UNIT	GRC	GALVANIZED RIGID CONDUIT	TBD	TO BE DETERMINED
BTCW	BARE TINNED SOLID COPPER WIRE	MGB	MASTER GROUND BAR	TBR	TO BE REMOVED
BGR	BURIED GROUND RING	MIN	MINIMUM	TBRR	TO BE REMOVED AND REPLACED
BTS	BASE TRANSCEIVER STATION	P	PROPOSED	TYP	TYPICAL
E	EXISTING	NTS	NOT TO SCALE	UG	UNDER GROUND
EGB	EQUIPMENT GROUND BAR	RAD	RADIATION CENTER LINE (ANTENNA)	VIF	VERIFY IN FIELD
EGR	EQUIPMENT GROUND RING	REF	REFERENCE		

**HGD HUDSON Design Group LLC**  
 45 BEECHWOOD DRIVE NORTH ANDOVER, MA 01845  
 TEL: (978) 557-5553 FAX: (978) 336-5586

**SAI**  
 12 INDUSTRIAL WAY SALEM, NH 03079

**SITE NUMBER: CT2547**  
**SITE NAME: MIDDLETOWN FAIRCHILD ROAD**  
  
**SBA SITE NUMBER: CT13064**  
 67 FAIRCHILD ROAD MIDDLETOWN, CT 06457 MIDDLESEX COUNTY

**at&t**  
 500 ENTERPRISE DRIVE, SUITE 3A ROCKY HILL, CT 06067

1	04/12/18	ISSUED FOR CONSTRUCTION	SG	AT	DPH
B	03/07/18	ISSUED FOR PERMITTING	SG	AT	DPH
A	02/15/18	ISSUED FOR REVIEW	TB	AT	DPH
NO.	DATE	REVISIONS	BY	CHK	APP'D
SCALE: AS SHOWN		DESIGNED BY: AT	DRAWN BY: LL		



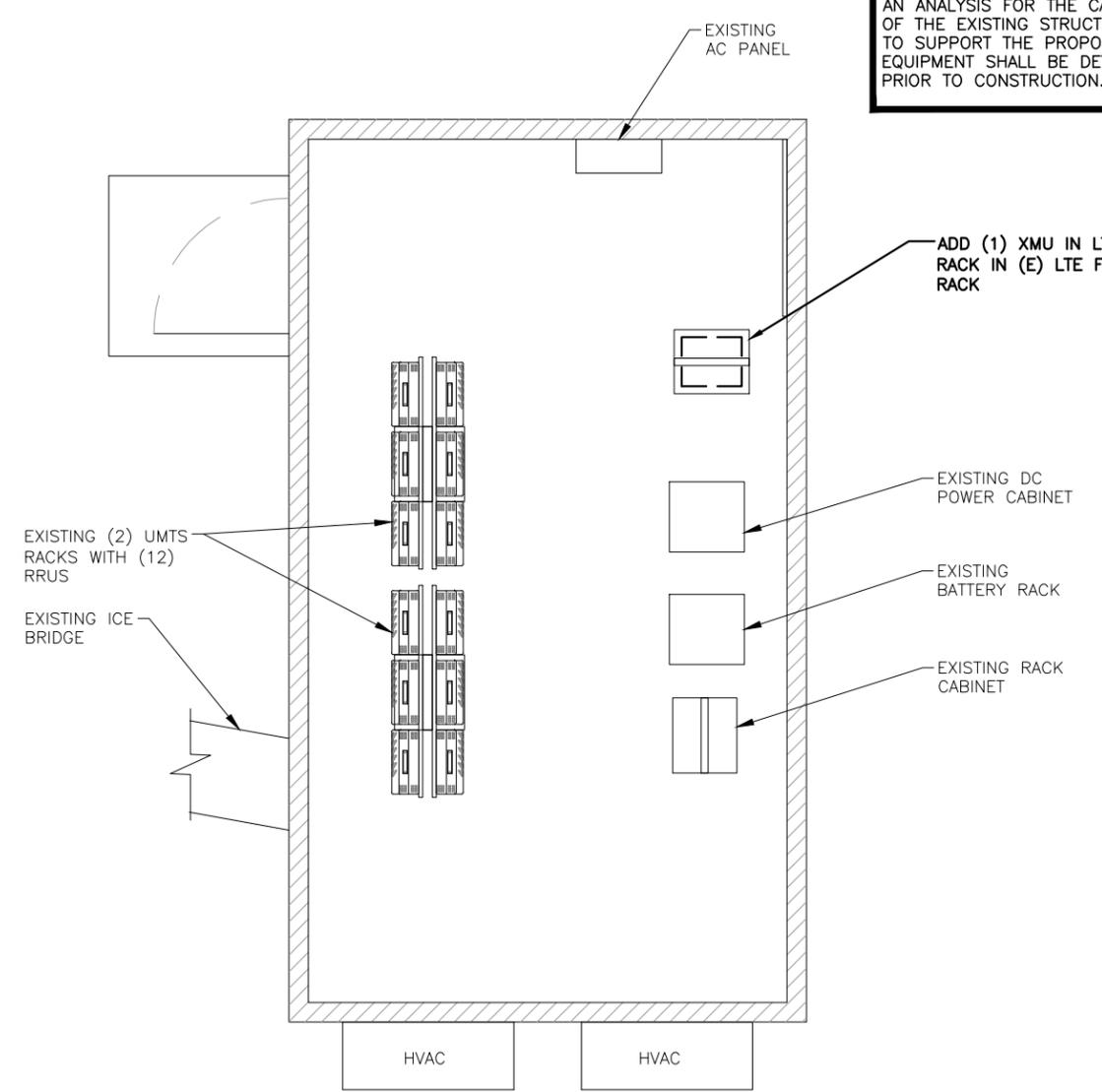
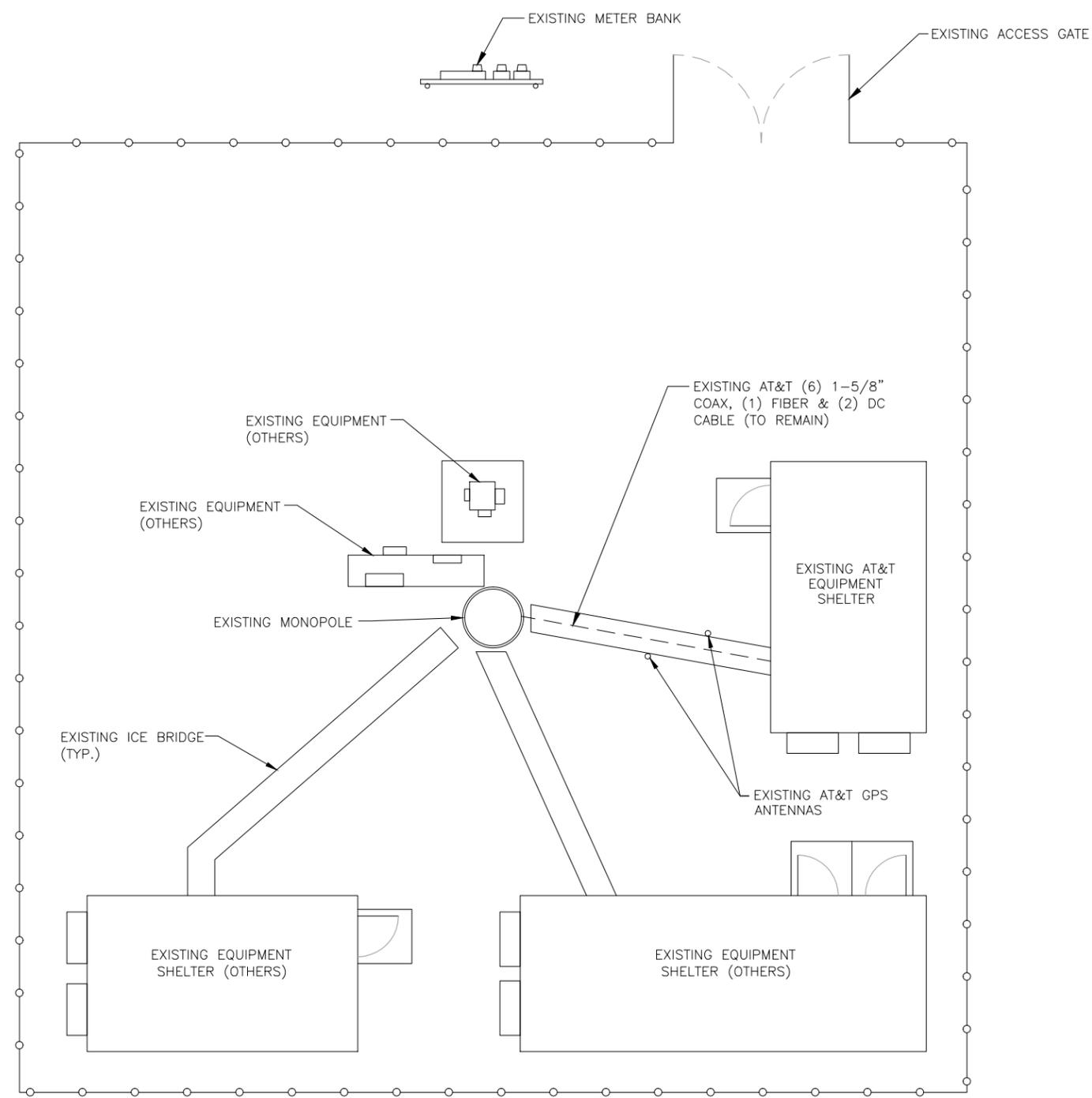
**AT&T**  
**GENERAL NOTES**  
**LTE 4C 2018 UPGRADE**

SITE NUMBER	DRAWING NUMBER	REV
CT2157	GN-1	1

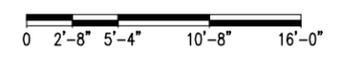
**NOTE:**  
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

**NOTE:**  
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING ANTENNA MOUNT TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY:  
HUDSON DESIGN GROUP, LLC.  
DATED: APRIL 10, 2018

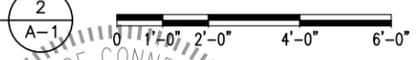
**NOTE:**  
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT SHALL BE DETERMINED PRIOR TO CONSTRUCTION.



**COMPOUND PLAN**  
22x34 SCALE: 3/16"=1'-0"  
11x17 SCALE: 3/32"=1'-0"  
MAGNETIC NORTH  
TRUE NORTH  
13'50"



**EQUIPMENT PLAN**  
22x34 SCALE: 1/2"=1'-0"  
11x17 SCALE: 1/4"=1'-0"  
MAGNETIC NORTH  
TRUE NORTH  
13'50"



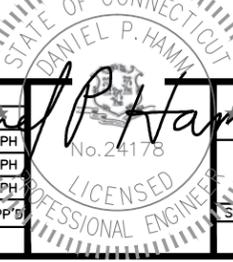
**HG HUDSON Design Group LLC**  
45 BEECHWOOD DRIVE  
NORTH ANDOVER, MA 01845  
TEL: (978) 557-5553  
FAX: (978) 336-5586

**SAI**  
12 INDUSTRIAL WAY  
SALEM, NH 03079

**SITE NUMBER: CT2547**  
**SITE NAME: MIDDLETOWN FAIRCHILD ROAD**  
**SBA SITE NUMBER: CT13064**  
67 FAIRCHILD ROAD  
MIDDLETOWN, CT 06457  
MIDDLESEX COUNTY

**at&t**  
500 ENTERPRISE DRIVE, SUITE 3A  
ROCKY HILL, CT 06067

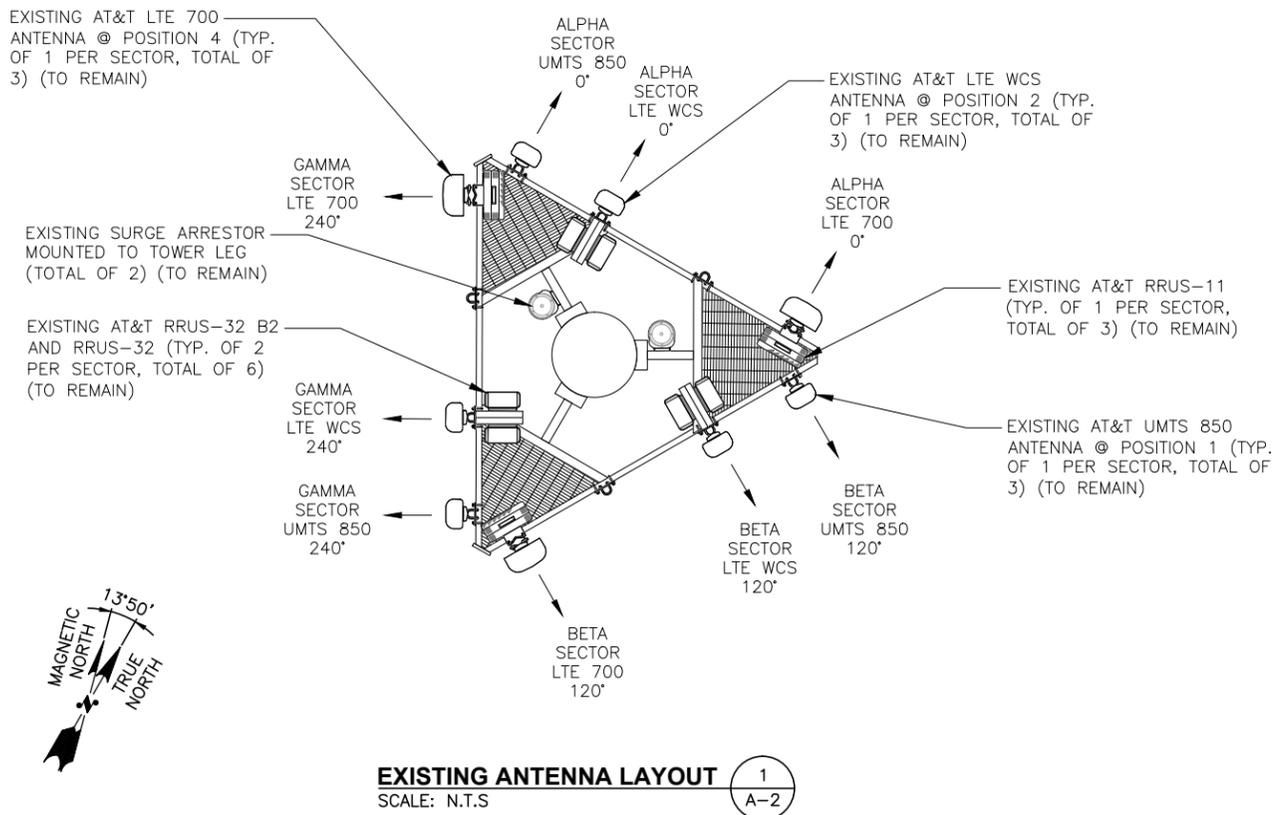
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B	03/07/18	ISSUED FOR PERMITTING	SG	AT	DPH
A	02/15/18	ISSUED FOR REVIEW	TB	AT	DPH
NO.	DATE	REVISIONS	BY	CHK	APP'D
SCALE: AS SHOWN		DESIGNED BY: AT	DRAWN BY: LL		



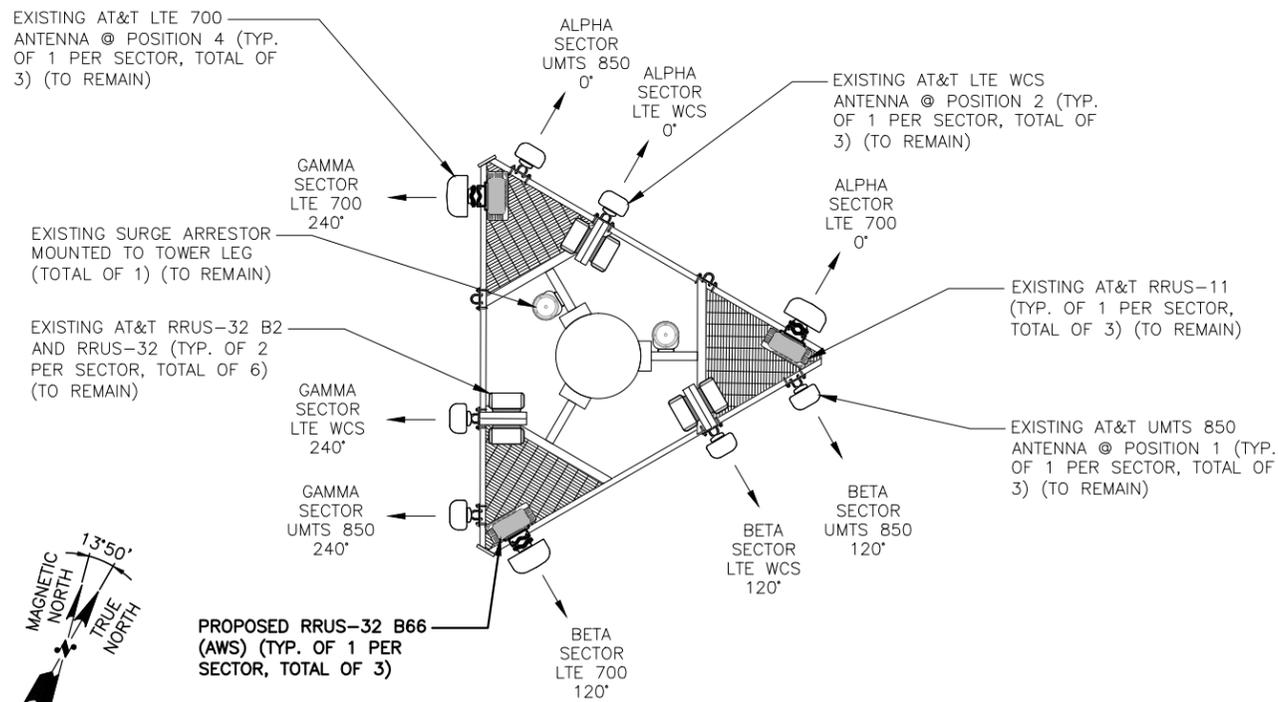
**AT&T**

**COMPOUND & EQUIPMENT PLAN**  
**LTE 4C 2018 UPGRADE**

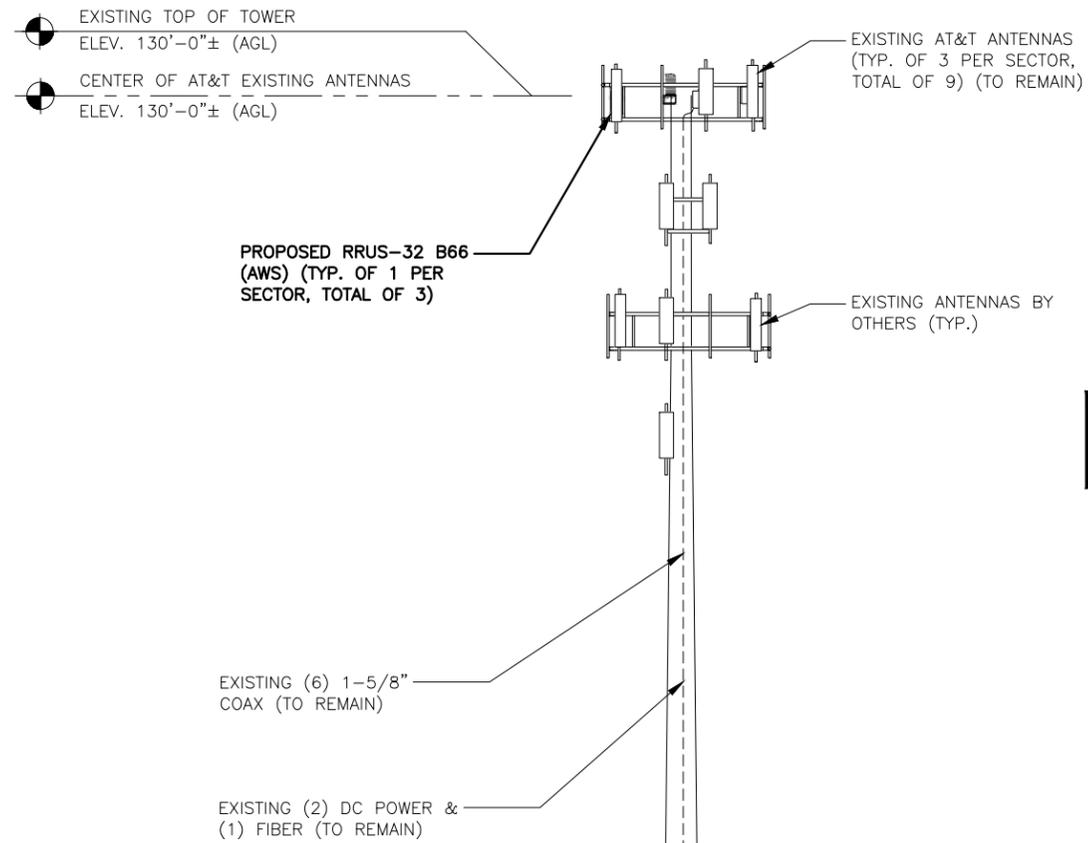
SITE NUMBER	DRAWING NUMBER	REV
CT2157	A-1	1



**EXISTING ANTENNA LAYOUT** 1  
SCALE: N.T.S. A-2



**PROPOSED ANTENNA PLAN** 2  
SCALE: N.T.S. A-2



**ELEVATION** 3  
22x34 SCALE: 3/32"=1'-0"  
11x17 SCALE: 3/64"=1'-0"  
A-2

**NOTE:**  
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING **ANTENNA MOUNT** TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY:  
HUDSON DESIGN GROUP, LLC.  
DATED: APRIL 10, 2018

**NOTE:**  
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT SHALL BE DETERMINED PRIOR TO CONSTRUCTION.

**NOTE:**  
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

**HGD HUDSON Design Group LLC**  
45 BEECHWOOD DRIVE  
NORTH ANDOVER, MA 01845  
TEL: (978) 557-5553  
FAX: (978) 336-5586

**S&I**  
12 INDUSTRIAL WAY  
SALEM, NH 03079

**SITE NUMBER: CT2547**  
**SITE NAME: MIDDLETOWN FAIRCHILD ROAD**  
**SBA SITE NUMBER: CT13064**  
67 FAIRCHILD ROAD  
MIDDLETOWN, CT 06457  
MIDDLESEX COUNTY

**at&t**  
500 ENTERPRISE DRIVE, SUITE 3A  
ROCKY HILL, CT 06067

NO.	DATE	REVISIONS	BY	CHK	APP'D
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A	02/15/18	ISSUED FOR REVIEW	TB	AT	DPH

SCALE: AS SHOWN    DESIGNED BY: AT    DRAWN BY: LL

**DANIEL P. HAMM**  
No. 24178  
LICENSED PROFESSIONAL ENGINEER

**AT&T**  
**ANTENNA LAYOUTS & ELEVATION**  
**LTE 4C 2018 UPGRADE**

SITE NUMBER	DRAWING NUMBER	REV
CT2157	A-2	1

**NOTE:**  
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING ANTENNA MOUNT TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY:  
HUDSON DESIGN GROUP, LLC.  
DATED: APRIL 10, 2018

**\*COAX JUMPER NOTE:**  
COAX JUMPERS (1) PER SECTOR, FROM EACH RRU (TOTAL OF 3).

**\*\*FIBER JUMPER NOTE:**  
FIBER JUMPERS (2) PER SECTOR, FROM THE SQUID TO EACH RRU (TOTAL OF 6).

**NOTE:**  
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT SHALL BE DETERMINED PRIOR TO CONSTRUCTION.

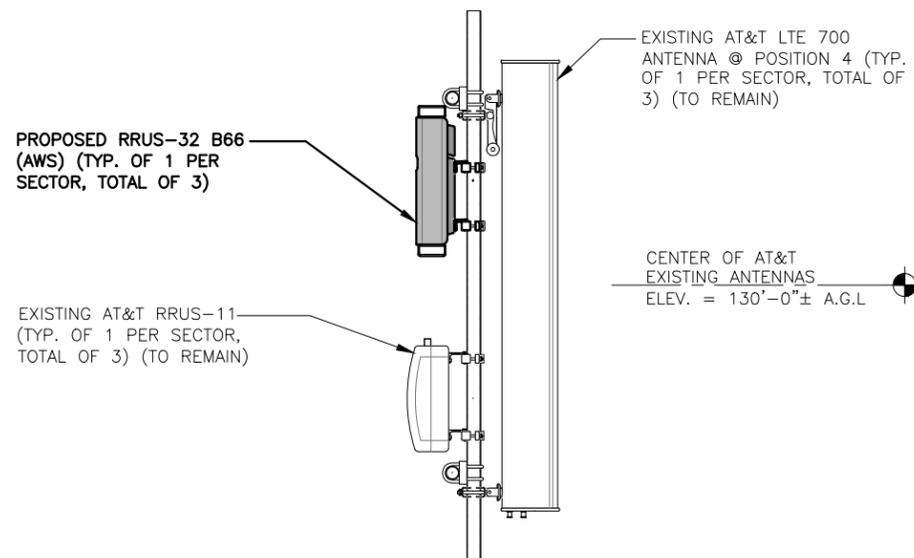
**NOTE:**  
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

FINAL ANTENNA SCHEDULE												
SECTOR	BAND	ANTENNA	SIZE (INCHES) (L X W X D)	RAD CENTER	AZIMUTH	TMA	RRU	SIZE (INCHES) (L X W X D)	COAX JUMPERS	FIBER JUMPERS	COAX	
ALPHA	UMTS DB	EXISTING	P65-16-XLH-RR	72X12X6	130'-0"±	0°	EXISTING (1) CCI DTMABP7819VG12A	-	-	-	(2) 1-5/8"	
	LTE WCS/LTE PCS	EXISTING	QS66512-2	72X12X9.6	130'-0"±	0°	-	EXISTING RRUS-32 B2 (PCS) RRUS-32 (WCS)	-	-	-	
	LTE 700 BC/AWS	EXISTING	OPA-65R-LCUU-H6	72X14.8X7.4	130'-0"±	0°	-	EXISTING RRUS-11 (700) RRUS-32 B66 (AWS)	27.2X12.1X7.0	1*	2*	-
BETA	UMTS DB	EXISTING	P65-16-XLH-RR	72X12X6	130'-0"±	120°	EXISTING (1) CCI DTMABP7819VG12A	-	-	-	(2) 1-5/8"	
	LTE WCS/LTE PCS	EXISTING	QS66512-2	72X12X9.6	130'-0"±	120°	-	EXISTING RRUS-32 B2 (PCS) RRUS-32 (WCS)	-	-	-	
	LTE 700 BC/AWS	EXISTING	OPA-65R-LCUU-H6	72X14.8X7.4	130'-0"±	120°	-	EXISTING RRUS-11 (700) RRUS-32 B66 (AWS)	27.2X12.1X7.0	1*	2*	-
GAMMA	UMTS DB	EXISTING	P65-16-XLH-RR	72X12X6	130'-0"±	240°	EXISTING (1) CCI DTMABP7819VG12A	-	-	-	(2) 1-5/8"	
	LTE WCS/LTE PCS	EXISTING	QS66512-2	72X12X9.6	130'-0"±	240°	-	EXISTING RRUS-32 B2 (PCS) RRUS-32 (WCS)	-	-	-	
	LTE 700 BC/AWS	EXISTING	OPA-65R-LCUU-H6	72X14.8X7.4	130'-0"±	240°	-	EXISTING RRUS-11 (700) RRUS-32 B66 (AWS)	27.2X12.1X7.0	1*	2*	-

**FINAL ANTENNA CONFIGURATION**

SCALE: N.T.S

3  
A-3



**PROPOSED ANTENNA & RRU MOUNTING DETAIL**

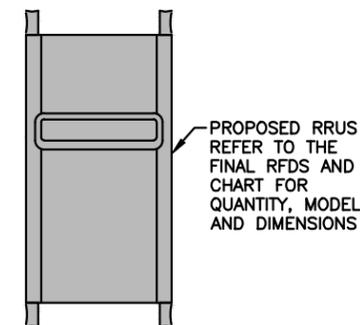
22x34 SCALE: 1"=1'-0"  
11x17 SCALE: 1/2"=1'-0"

1  
A-3



RRU CHART				
QUANTITY	MODEL	L	W	D
3(E)	RRUS-11	19.7"	17.0"	7.2"
3(P)	RRUS-32	27.2"	12.1"	7.0"
6(E)	RRUS-32	27.2"	12.1"	7.0"
-	RRUS-E2	20.4"	18.5"	7.5"
-	LTE-A2	16.4"	15.2"	3.4"

**NOTE:**  
MOUNT PER MANUFACTURER'S SPECIFICATIONS



**NOTE:**  
MOUNT PER MANUFACTURER'S SPECIFICATIONS.

**RRUS DETAIL**

SCALE: N.T.S

2  
A-3



45 BEECHWOOD DRIVE  
NORTH ANDOVER, MA 01845  
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FAX: (978) 336-5586



12 INDUSTRIAL WAY  
SALEM, NH 03079

SITE NUMBER: CT2547  
SITE NAME: MIDDLETOWN FAIRCHILD ROAD

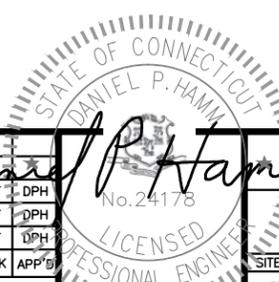
SBA SITE NUMBER: CT13064  
67 FAIRCHILD ROAD  
MIDDLETOWN, CT 06457  
MIDDLESEX COUNTY



500 ENTERPRISE DRIVE, SUITE 3A  
ROCKY HILL, CT 06067

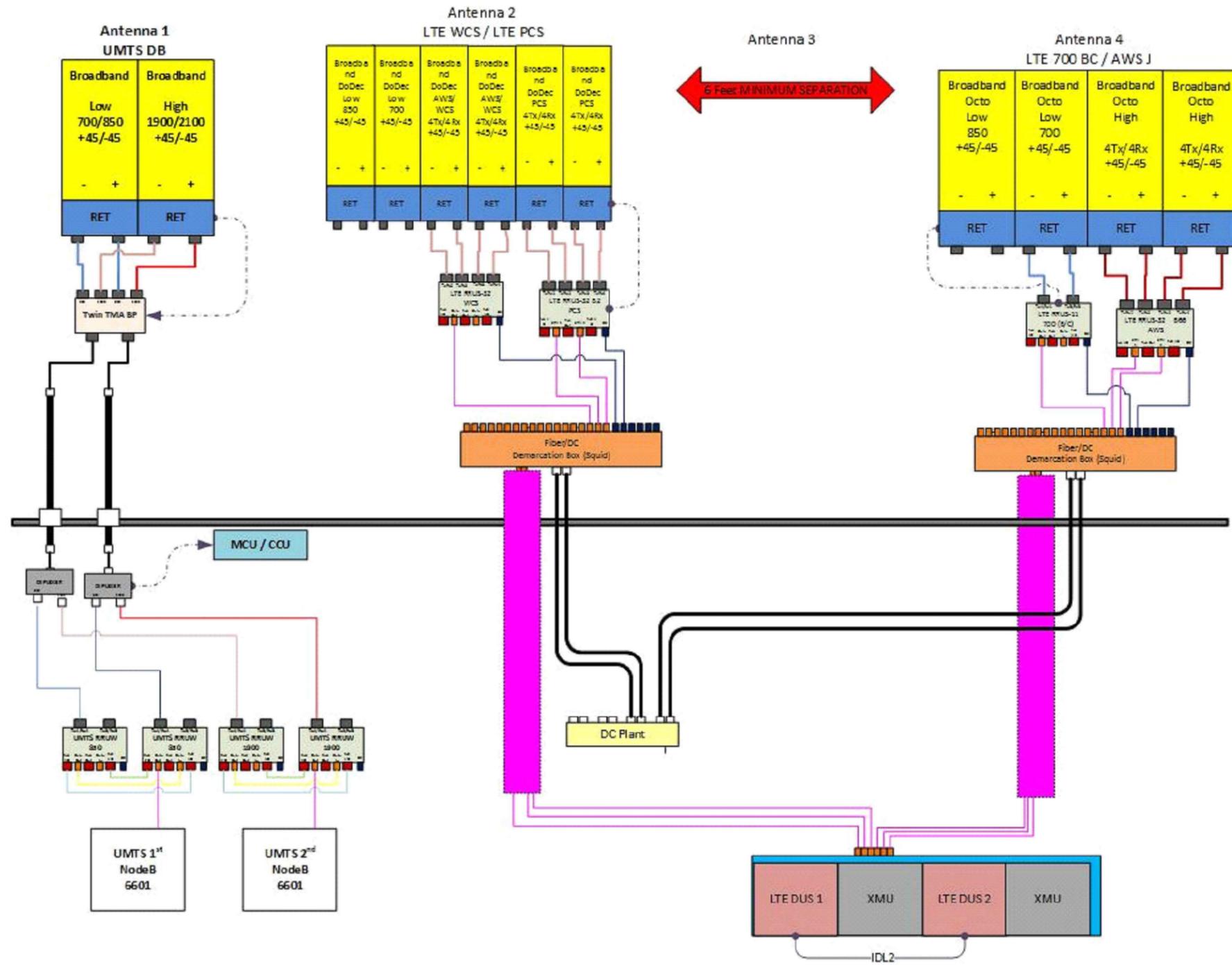
NO.	DATE	REVISIONS	BY	CHK	APP'D
1	04/12/18	ISSUED FOR CONSTRUCTION	SG	AT	DPH
B	03/07/18	ISSUED FOR PERMITTING	SG	AT	DPH
A	02/15/18	ISSUED FOR REVIEW	TB	AT	DPH

SCALE: AS SHOWN    DESIGNED BY: AT    DRAWN BY: LL



SITE NUMBER	DRAWING NUMBER	REV
CT2157	A-3	1

AT&T  
DETAILS  
LTE 4C 2018 UPGRADE

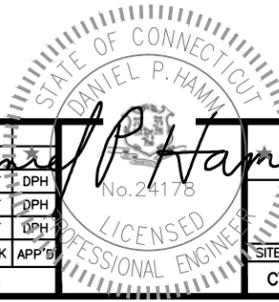


**RF PLUMBING DIAGRAM**  
SCALE: N.T.S

**NOTE:**  
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

**NOTE:**  
1. CONTRACTOR TO CONFIRM ALL PARTS.  
2. INSTALL ALL EQUIPMENT TO MANUFACTURER'S RECOMMENDATIONS

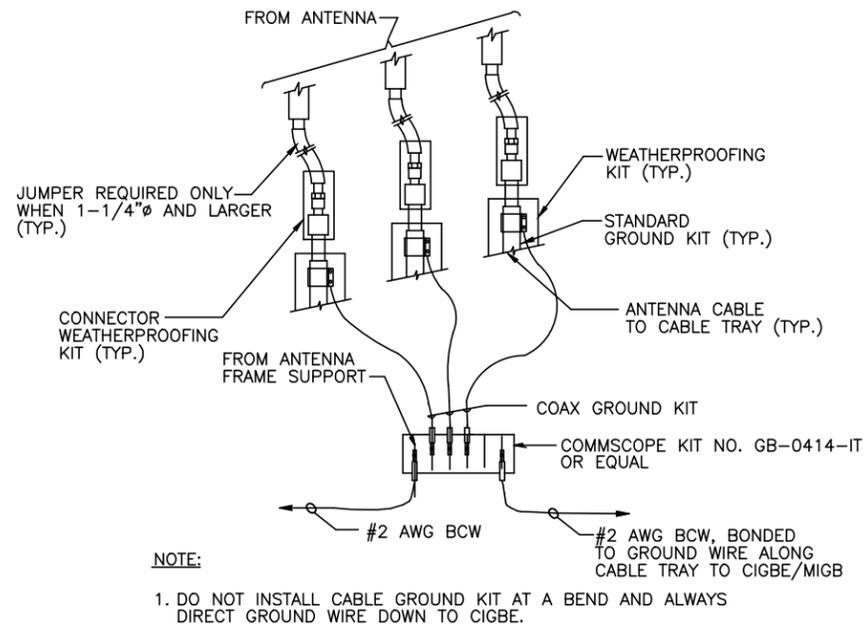
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B	03/07/18	ISSUED FOR PERMITTING	SG	AT	DPH
A	02/15/18	ISSUED FOR REVIEW	TB	AT	DPH
NO.	DATE	REVISIONS	BY	CHK	APP'D
SCALE: AS SHOWN		DESIGNED BY: AT	DRAWN BY: LL		



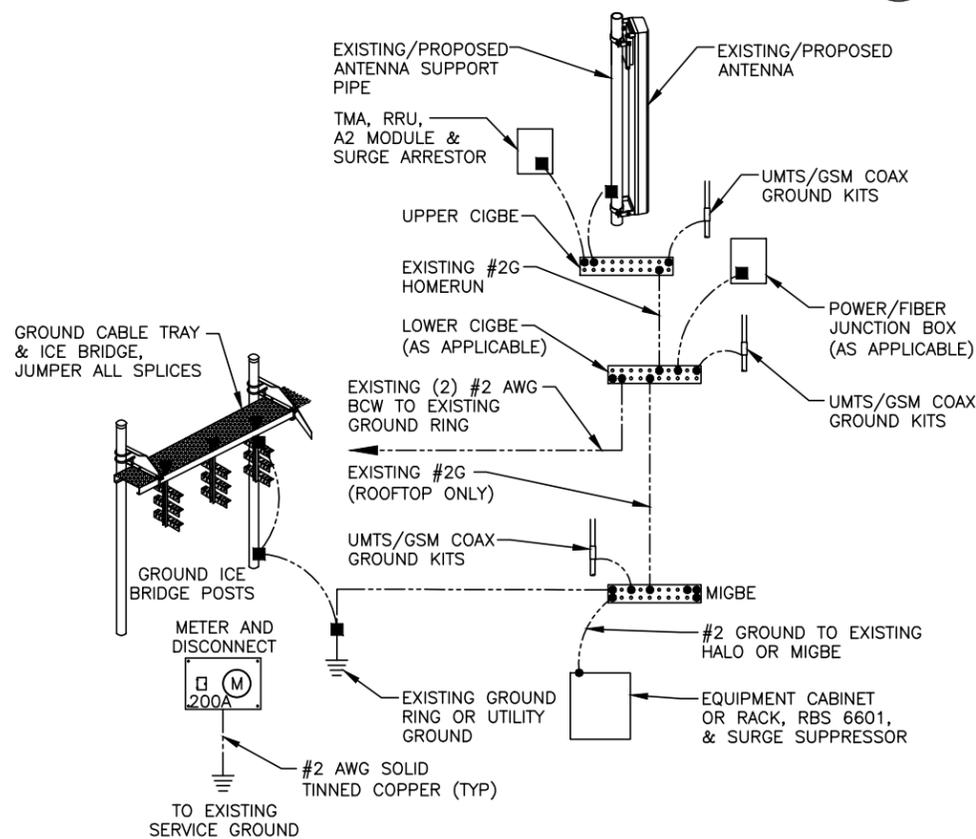
AT&T

RF PLUMBING DIAGRAM  
LTE 4C 2018 UPGRADE

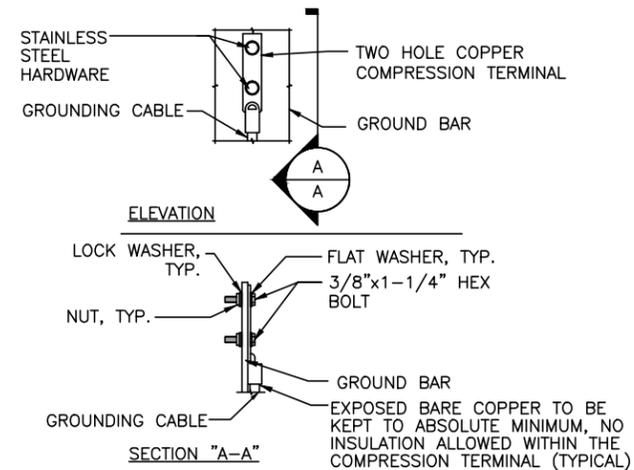
SITE NUMBER	DRAWING NUMBER	REV
CT2157	RF-1	1



**GROUND WIRE TO GROUND BAR CONNECTION DETAIL** 1  
SCALE: N.T.S. G-1



**GROUNDING RISER DIAGRAM** 2  
SCALE: N.T.S. G-1



**TYPICAL GROUND BAR CONNECTION DETAIL** 3  
SCALE: N.T.S. G-1

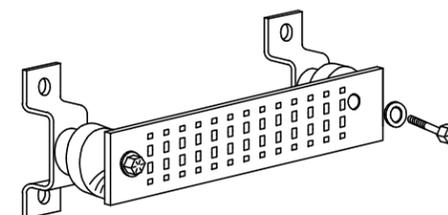
EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR SHALL HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION.

**SECTION "P" - SURGE PRODUCERS**

- CABLE ENTRY PORTS (HATCH PLATES) (#2)
- GENERATOR FRAMEWORK (IF AVAILABLE) (#2)
- TELCO GROUND BAR
- COMMERCIAL POWER COMMON NEUTRAL/GROUND BOND (#2)
- +24V POWER SUPPLY RETURN BAR (#2)
- 48V POWER SUPPLY RETURN BAR (#2)
- RECTIFIER FRAMES.

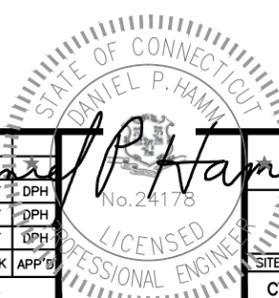
**SECTION "A" - SURGE ABSORBERS**

- INTERIOR GROUND RING (#2)
- EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2)
- METALLIC COLD WATER PIPE (IF AVAILABLE) (#2)
- BUILDING STEEL (IF AVAILABLE) (#2)



**GROUND BAR - DETAIL** 4  
SCALE: N.T.S. G-1

NO.	DATE	REVISIONS	BY	CHK	APP'D
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A	02/15/18	ISSUED FOR REVIEW	TB	AT	DPH
SCALE: AS SHOWN		DESIGNED BY: AT	DRAWN BY: LL		



AT&T		
GROUNDING DETAILS LTE 4C 2018 UPGRADE		
SITE NUMBER	DRAWING NUMBER	REV
CT2157	G-1	1