Murdock MacDonald, Site Acquisition
c/o New Cingular Wireless, PCS LLC (AT&T)
Centerline Communications, LLC
750 W. Center St., Suite 301
West Bridgewater, MA 02379
Mobile: (508) 246-0548
mmacdonald@clinellc.com

June 27, 2019

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

RE: Notice of Exempt Modification // Site Number: CT5638
88 Parsonage Hill Road, North Branford, CT 06472 (Site Name: Northford - Totoket)
N 41.36916944 // W -72.81048611

Dear Ms. Bachman:

New Cingular Wireless, PCS, LLC ("AT&T") currently maintains six (6) antennas at the 173-foot level of the existing 195-foot self-support tower at Parsonage Hill Road, North Branford, CT 06472. The tower is owned by Ochenkowski Towers LLC. The property is also owned by Ochenkowski Towers LLC. AT&T now intends to add three (3) new LTE antennas for its LTE upgrade. These antennas would be installed at the same 173-foot level of the tower. AT&T also intends to swap three (3) antennas, install six (6) new RRUS (radios), swap three (3) RRUS, add one (1) Surge Arrestor and associated two (2) DC and one (1) fiber cables along existing runs.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Michael Paulhus, Town Manager for the Town of North Branford, as well as the tower and ground owner, Ochenkowski Towers LLC and Town of North Branford Zoning/Building departments.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

Attached to accommodate this filing are construction drawings dated 4/02/2019 by Hudson Design Group LLC, a structural analysis dated 6/25/2019 by Hudson Design Group LLC, a mount analysis dated 4/15/2019 by Hudson Design Group LLC, and an Emissions Analysis Report dated 6/20/2019 by Centerline Communications, LLC.

1. The proposed modifications will not result in an increase in the height of the existing structure.

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The existing structure and its foundation can support the proposed loading as shown in the attached structural analysis by Hudson Design Group LLC, dated 6/25/2019, and the mount analysis by Hudson Design Group LLC, dated 4/15/2019.

For the foregoing reasons, AT&T respectfully submits that the proposed modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

_____

Murdock MacDonald, Site Acquisition
c/o New Cingular Wireless, PCS LLC (AT&T)
Centerline Communications, LLC
750 West Center Street, Suite 301
West Bridgewater, MA 02379
Mobile: (508) 246-0548
mmacdonald@centerlincommunications.com

Attachments: Structural Analysis, Mount Analysis, Property Card, Emissions Analysis, Construction Drawings

cc: Michael Paulhus, Town Manager, Town of North Branford- as elected official
Ochenkowski Towers LLC - as tower and property owner
Thomas Cowell, Building & Zoning, Town of North Branford – as chief building official

88 PARSONAGE HILL RD

Location	88 PARSONAGE HILL RD	**Mblu**	51/A 7/ / /
Acct#	002953	**Owner**	SZWABOWSKI JEAN 1/3
Assessment	$864,000	**Appraisal**	$1,248,800
PID	3060	**Building Count**	3

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$691,400	$557,400	$1,248,800

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$473,900	$390,100	$864,000

Owner of Record

Owner	SZWABOWSKI JEAN 1/3	**Sale Price**	$90,000
Co-Owner	OCHENKOWSKI J J JR 1/3 & K W 1/3 EACH	**Certificate**	
Address	84 PARSONAGE HL RD NORTHFORD, CT 06472-1445	**Book & Page**	429/1132
		Sale Date	12/23/2009

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
SZWABOWSKI JEAN 1/3	$90,000		429/1132	12/23/2009
SZWABOWSKI JEAN &	$90,000		429/1128	12/23/2009
SZWABOWSKI JEAN &	$0		276/ 749	12/15/1998
OCHENKOWSKI VERONICA TIC +	$400,000		269/ 844	05/11/1998
OCHENKOWSKI VERONICA	$0		040/ 206	11/14/1960

Building Information

Building 1 : Section 1

Year Built:	1949
Living Area:	1,996
Replacement Cost:	$197,304
Building Percent Good:	55
Replacement Cost Less Depreciation:	$108,500

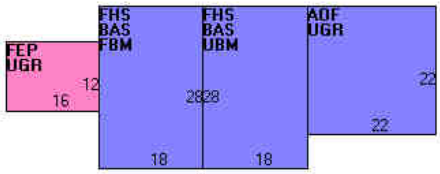
Building Photo

Building Attributes

Field	Description
Style	RES TYPE COMM
Model	Res Type Com
Grade:	Above Avg
Stories:	1 1/2 Stories
Occupancy	2
Exterior Wall 1	Aluminum Sidng
Exterior Wall 2	
Roof Structure:	Gable/Hip
Roof Cover	Asphalt Shingl
Interior Wall 1	Plastered
Interior Wall 2	Plywood Panel
Interior Flr 1	Carpet
Interior Flr 2	Hardwood
Heat Fuel	Oil
Heat Type:	Forced Air-Duc
AC Type:	Central
Total Bedrooms:	2 Bedrooms
Total Bthrms:	2
Total Half Baths:	1
Total Xtra Fixtrs:	
Total Rooms:	
Bath Style:	Average
Kitchen Style:	Average

(http://images.vgsi.com/photos/NorthBranfordCTPhotos//\00\00\14/56.jpg)

Building Layout



(http://images.vgsi.com/photos/NorthBranfordCTPhotos//Sket

Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	1,008	1,008
FHS	Half Story, Finished	1,008	504
AOF	Office, (Average)	484	484
FBM	Basement, Finished	504	0
FEP	Porch, Enclosed, Finished	192	0
UBM	Basement, Unfinished	504	0
UGR	Garage, Unfinished	676	0
		4,376	1,996

Building 1 : Section 1

Year Built: 1949
Living Area: 0
Replacement Cost: $197,304
Building Percent Good: 55
Replacement Cost Less Depreciation: $108,500

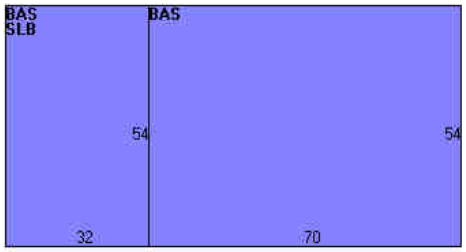
Building Photo

Building Attributes	
Field	**Description**

Style	Outbuildings
Model	
Grade:	
Stories:	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure:	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bthrms:	
Total Half Baths:	
Total Xtra Fixtrs:	
Total Rooms:	
Bath Style:	
Kitchen Style:	

(http://images.vgsi.com/photos/NorthBranfordCTPhotos//defa

Building Layout



(http://images.vgsi.com/photos/NorthBranfordCTPhotos//Sket

Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Building 2 : Section 1

Year Built: 1958
Living Area: 2,286
Replacement Cost: $183,022
Building Percent Good: 64
Replacement Cost Less Depreciation: $117,100

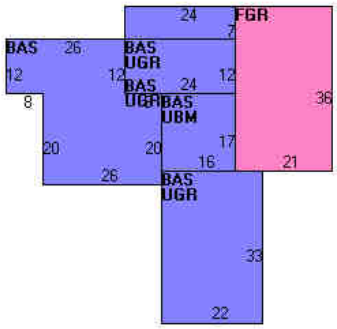
Building Attributes : Bldg 2 of 3	
Field	**Description**
Style	Ranch
Model	Residential
Grade:	Average
Stories:	1 Story
Occupancy	1
Exterior Wall 1	Vinyl Siding
Exterior Wall 2	
Roof Structure:	Gable/Hip

Building Photo

(http://images.vgsi.com/photos/NorthBranfordCTPhotos//defa

Building Layout

Roof Cover	Asphalt Shingl
Interior Wall 1	Drywall/Sheet
Interior Wall 2	
Interior Flr 1	Carpet
Interior Flr 2	
Heat Fuel	Oil
Heat Type:	Hot Water
AC Type:	None
Total Bedrooms:	3 Bedrooms
Total Bthrms:	2
Total Half Baths:	0
Total Xtra Fixtrs:	
Total Rooms:	5 Rooms
Bath Style:	Average
Kitchen Style:	Average



(http://images.vgsi.com/photos/NorthBranfordCTPhotos//Sket

Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	2,286	2,286
FGR	Garage, Framed	756	0
UBM	Basement, Unfinished	272	0
UGR	Garage, Unfinished	1,182	0
		4,496	2,286

Building 3 : Section 1

Year Built: 1973
Living Area: 600
Replacement Cost: $38,964
Building Percent Good: 49
Replacement Cost Less Depreciation: $19,100

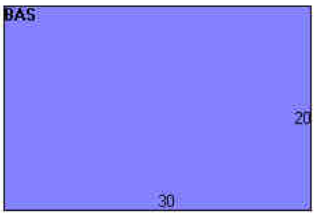
Building Attributes : Bldg 3 of 3	
Field	**Description**
STYLE	Industrial
MODEL	Ind or Comm
Grade	Average
Stories:	1
Occupancy	1
Exterior Wall 1	Concr/Cinder
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Rolled Compos
Interior Wall 1	Drywall/Sheet
Interior Wall 2	Minim/Masonry
Interior Floor 1	Vinyl/Asphalt
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Forced Air-Duc

Building Photo

(http://images.vgsi.com/photos/NorthBranfordCTPhotos//defa

Building Layout

AC Type	Heat Pump
Bldg Use	COMM WHSE MDL-96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	031I
Heat/AC	HEAT/AC PKGS
Frame Type	MASONRY
Baths/Plumbing	LIGHT
Ceiling/Wall	CEIL & WALLS
Rooms/Prtns	AVERAGE
Wall Height	0
% Comn Wall	12



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Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	600	600
		600	600

Extra Features

Extra Features				Legend
Code	Description	Size	Value	Bldg #
FPL2	FIREPLACE 1.5 STY	1 UNITS	$2,800	1

Land

Land Use

Use Code	010M
Description	SINGLE FAM MDL-03
Zone	R40
Neighborhood	
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	9.31
Frontage	0
Depth	0
Assessed Value	$390,100
Appraised Value	$557,400

Outbuildings

Outbuildings						Legend
Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
ELCB	ELECTRONIC COMM BLDG			576 S.F.	$64,800	1
PAV1	PAVING-ASPHALT			4000 S.F.	$3,400	3
SHD1	SHED FRAME			220 S.F.	$800	2
ELCB	ELECTRONIC COMM BLDG			576 S.F.	$64,800	1
FN5	FENCE-10'CHAIN			300 L.F.	$3,200	3
BRN1	BARN - 1 STORY			5058 S.F.	$13,000	1
SHD8	SHED UNDER 144 SF			128 S.F.	$15,000	3
FGR2	GARAGE-GOOD			1200 S.F.	$27,000	3
SHD1	SHED FRAME			288 S.F.	$1,700	1

	RADIO TOWER			175	$17,500	3
	RADIO TOWER			175 HEIGHT	$87,500	3
TW1	CELL TOWER			125 HEIGHT	$50,600	3
ELCB	ELECTRONIC COMM BLDG			360 S.F.	$60,800	3
ELCB	ELECTRONIC COMM BLDG			200 S.F.	$33,800	3

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$691,400	$557,400	$1,248,800
2016	$691,400	$557,400	$1,248,800
2015	$691,400	$557,400	$1,248,800

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$473,900	$390,100	$864,000
2016	$473,900	$390,100	$864,000
2015	$473,900	$390,100	$864,000

April 15, 2019

CENTERLINE COMMUNICATIONS at&t

Centerline Communications
750 West Center Street, Suite #301
West Bridgewater, MA 02379

RE:		
	Site Number:	CT5638 (LTE 3C/4C/5C)
	FA Number:	10071180
	PACE Number:	MRCTB033810
	PT Number:	2101A0JD7W
	Site Name:	NORTHFORD- TOTOKET
	Site Address:	88 Parsonage Hill Road Northford, CT 06472

To Whom It May Concern:

Hudson Design Group LLC (HDG) has been authorized by Centerline Communications to perform a mount analysis on the existing AT&T antenna/RRH mounts to determine their capability of supporting the following additional loading:

- (3) 800-10121 Antennas (54.5"x10.3"x5.9"– Wt. = 45 lbs. /each)
- (3) RRUS-12 RRH's (20.4"x18.5"x7.5" – Wt. = 58 lbs. /each)
- (6) LGP21401 TMA's (14.4"x9.0"x2.7" – Wt. = 19 lbs. /each)
- (1) Squid Surge Arrestor (24.0"x9.7" Φ – Wt. = 33 lbs. /each) (Tower Mount)
- **(6) 800-10965 Antennas (78.7"x20.0"x6.9"– Wt. = 109 lbs. /each)**
- **(3) B14 4478 RRH's (18.1"x13.4"x8.3"– Wt. = 60 lbs. /each)**
- **(3) RRUS-32 RRH's (27.2"x12.1"x7.0" – Wt. = 60 lbs. /each)**
- **(3) B5/B12 4449 RRH's (14.9"x13.2"x10.4" – Wt. = 73 lbs. /each)**
- **(1) Squid Surge Arrestor (24.0"x9.7" Φ – Wt. = 33 lbs. /each)**

**Proposed equipment shown in bold*

No original structural design documents or fabrication drawings were available for the existing mounts. HDG's subconsultant, ProVertic LLC, conducted a survey climb and mapping of the existing AT&T antenna mounts on April 9, 2019.

Mount Analysis Methods:

- This analysis was conducted in accordance with EIA/TIA-222-H, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, the International Building Code 2015 with 2018 Connecticut State Building Code, and AT&T Mount Technical Directive – R12.
- HDG considers this mount to be asymmetrical and has applied wind loads in 30 degree increments all around the mount. Per TIA-222-H and Appendix N of the Connecticut State Building Code, the max basic wind speed for this site is equal to 125 mph with a max basic wind speed with ice of 50 mph and a max ice thickness of 1.0 in. An escalated ice thickness of 1.18 in was used for this analysis.
- HDG considers this site to be exposure category C; tower is located near large, flat, open, terrain/grasslands.
- HDG considers this site to be topographic category 1; tower is located on flat terrain or the bottom of a hill or ridge.
- The mount has been analyzed with load combinations consisting of 250 lbs live load using a service wind speed of 30 mph wind on the worst case antenna. Analysis performed on each antenna pipe to determine worst case location; worst case location was antenna position 1.
- The mount has been analyzed with load combinations consisting of a 250 lbs live load in a worst case location on the mount.
- The existing mount is secured to the existing tower with threaded rods. The connection is considered OK by visual inspection.

Based on our evaluation, we have determined that the existing mounts **ARE CAPABLE** of supporting the proposed installation.

	Component	Controlling Load Case	Stress Ratio	Pass/Fail
Existing (LTE 3C/4C/5C) Mount Rating	3	LC6	97%	**PASS**

Reference Documents:

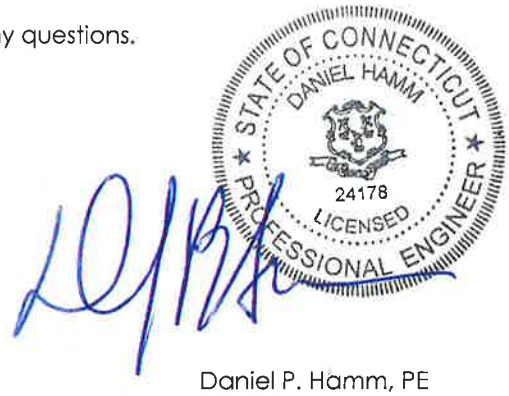
- Mount mapping report prepared by ProVertic LLC.

This determination was based on the following limitations and assumptions:

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

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

Respectfully Submitted,
Hudson Design Group LLC



Michael Cabral
Structural Dept. Head

Daniel P. Hamm, PE
Principal

FIELD PHOTOS:

p: 978.557.5553 f: 978.336.5586 a: 45 Beechwood Drive, N. Andover, MA 01845
p: 203.208.3919 f: 203.234.6398 a: 110 Washington Avenue, 4th Floor, North Haven CT 06473

p: 978.557.5553 f: 978.336.5586 a: 45 Beechwood Drive, N. Andover, MA 01845
p: 203.208.3919 f: 203.234.6398 a: 110 Washington Avenue, 4th Floor, North Haven CT 06473

HUDSON
Design Group LLC

Wind & Ice
Calculations

Date: 4/16/2019
Project Name: NORTHFORD- TOTOKET
Project No.: CT5638
Designed By: LBW **Checked By:** MSC

HUDSON Design Group LLC

2.6.5.2 Velocity Pressure Coeff:

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

K_z=	**1.419**

z=	172	(ft)
z_g=	900	(ft)
α=	9.5	

$K_{zmin} \le K_z \le 2.01$

Table 2-4

Exposure	Z_g	α	K_{zmin}	K_c
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

2.6.6.2 Topographic Factor:

Table 2-5

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

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

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

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

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

Category=	**1**

K_h=	#DIV/0!	
K_c=	1	(from Table 2-4)
K_t=	0	(from Table 2-5)
f=	0	(from Table 2-5)
z=	172	
z_s=	280	(Mean elevation of base of structure above se
H=	0	(Ht. of the crest above surrounding terrain)
K_{zt}=	1.00	(from 2.6.6.2.1)
K_e=	0.99	(from 2.6.8)

2.6.10 Design Ice Thickness

Max Ice Thickness = t_i = **1.00** in
Importance Factor = I= **1.0** (from Table 2-3)
K_{Iz} = **1.18** (from Sec. 2.6.10)

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

t_{Iz} = **1.18** in

Date: 4/16/2019
Project Name: NORTHFORD- TOTOKET
Project No.: CT5638
Designed By: LBW Checked By: MSC

HUDSON Design Group LLC

2.6.9 Gust Effect Factor

2.6.9.1 Self Supporting Lattice Structures

G_h = 1.0 Latticed Structures > 600 ft

G_h = 0.85 Latticed Structures 450 ft or less

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

h=	195	G_h=	0.85

2.6.9.2 Guyed Masts G_h= 0.85

2.6.9.3 Pole Structures G_h= 1.1

2.6.9 Appurtenances G_h= 1.0

2.6.9.4 Structures Supported on Other Structures

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

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

2.6.11.2 Design Wind Force on Appurtenances

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

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

		K_z=	1.419	(from 2.6.5.2)
		K_{zt}=	1.0	(from 2.6.6.2.1)
		K_s=	1.0	(from 2.6.7)
q_z=	**47.75**	K_e=	0.99	(from 2.6.8)
$q_{z\ (ice)}$=	**7.64**	K_d=	0.85	(from Table 2-2)
$q_{z\ (30)}$=	**2.75**	V_{max}=	125	mph (Ultimate Wind Speed)
		$V_{max\ (ice)}$=	50	mph
		V_{30}=	30	mph

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
Tubular pole structures supporting antennas enclosed within a cylindrical shroud	1.00

Date: 4/16/2019
Project Name: NORTHFORD- TOTOKET
Project No.: CT5638
Designed By: LBW Checked By: MSC

HUDSON Design Group LLC

Determine Ca:

Table 2-9

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
Square/Rectangular HSS		1.2 - 2.8(r_s) ≥ 0.85	1.4 - 4.0(r_s) ≥ 0.90	2.0 - 6.0(r_s) ≥ 1.25
Round	C < 39 (Subcritical)	0.7	0.8	1.2
	39 ≤ C ≤ 78 (Transitional)	$4.14/(C^{0.485})$	$3.66/(C^{0.415})$	$46.8/(C^{1.0})$
	C > 78 (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 = **1.18** in | **Angle =** **0 (deg)** | **Equivalent Angle =** **180 (deg)**

Appurtenances	Height	Width	Depth	Flat Area	Aspect Ratio	Ca	Force (lbs)	Force (lbs) (w/ Ice)	Force (lbs) (30 mph)
800-10121 Antenna	54.5	10.3	5.9	3.90	5.29	1.32	**246**	**51**	**14**
800-10965 Antenna	78.7	20.0	6.9	10.93	3.94	1.26	**660**	**122**	**38**
RRUS-12 RRH	20.4	18.5	7.5	2.62	1.10	1.20	**150**	**30**	**9**
RRUS-12 RRH (Shielded)	20.4	0.0	7.5	0.00	0.00	1.20	**0**	**3**	**0**
B14 4478 RRH	18.1	13.4	8.3	1.68	1.35	1.20	**97**	**21**	**6**
B14 4478 RRH (Shielded)	18.1	0.0	8.3	0.00	0.00	1.20	**0**	**3**	**0**
RRUS-32 RRH	27.2	12.1	7.0	2.29	2.25	1.20	**131**	**27**	**8**
RRUS-32 RRH (Shielded)	27.2	0.0	7.0	0.00	0.00	1.20	**0**	**4**	**0**
B5/B12 4449 RRH	14.9	13.2	10.4	1.37	1.13	1.20	**78**	**17**	**5**
B5/B12 4449 RRH (Shielded)	14.9	0.0	10.4	0.00	0.00	1.20	**0**	**3**	**0**
LGP21401 TMA	14.4	2.7	9.0	0.27	5.33	1.33	**17**	**6**	**1**
Surge Arrestor	24.0	9.7	9.7	1.62	2.47	0.70	**54**	**12**	**3**
1-1/2" Pipe	1.9	12.0		0.16	0.16	1.20	**9**	**4**	**1**
2" Pipe	2.4	12.0		0.20	0.20	1.20	**11**	**4**	**1**
2-1/2" Pipe	2.9	12.0		0.24	0.24	1.20	**14**	**5**	**1**

Date: 4/16/2019
Project Name: NORTHFORD- TOTOKET
Project No.: CT5638
Designed By: LBW Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	30	(deg)	Ice Thickness =	1.18	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)
800-10121 Antenna	54.5	10.3	5.9	3.90	2.23	5.29	9.24	1.32	1.47	246	157	224
800-10965 Antenna	78.7	20.0	6.9	10.93	3.77	3.94	11.41	1.26	1.55	660	279	564
RRUS-12 RRH	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	150	61	128
RRUS-12 RRH (Shielded)	20.4	9.3	7.5	1.31	1.06	2.21	2.72	1.20	1.21	75	61	72
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	97	60	87
B14 4478 RRH (Shielded)	18.1	6.7	8.3	0.84	1.04	2.70	2.18	1.21	1.20	49	60	51
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	131	80	118
RRUS-32 RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	70	80	73
B5/B12 4449 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	78	62	74
B5/B12 4449 RRH (Shielc	14.9	6.6	10.4	0.68	1.08	2.26	1.43	1.20	1.20	39	62	45
LGP21401 TMA	14.4	2.7	9.0	0.27	0.90	5.33	1.60	1.33	1.20	17	52	26

WIND LOADS WITH ICE:

800-10121 Antenna	56.9	12.7	8.3	5.00	3.26	4.49	6.88	1.29	1.39	49	35	46
800-10965 Antenna	81.1	22.4	9.3	12.59	5.21	3.63	8.75	1.25	1.46	120	58	105
RRUS-12 RRH	22.8	20.9	9.9	3.30	1.56	1.09	2.31	1.20	1.20	30	14	26
RRUS-12 RRH (Shielded)	22.8	10.4	9.9	1.65	1.56	2.18	2.31	1.20	1.20	15	14	15
B14 4478 RRH	20.5	15.8	10.7	2.24	1.51	1.30	1.92	1.20	1.20	21	14	19
B14 4478 RRH (Shielded)	20.5	7.9	10.7	1.12	1.51	2.60	1.92	1.20	1.20	10	14	11
RRUS-32 RRH	29.6	14.5	9.4	2.97	1.92	2.04	3.16	1.20	1.23	27	18	25
RRUS-32 RRH (Shielded)	29.6	7.2	9.4	1.48	1.92	4.09	3.16	1.27	1.23	14	18	15
B5/B12 4449 RRH	17.3	15.6	12.8	1.86	1.53	1.11	1.35	1.20	1.20	17	14	16
B5/B12 4449 RRH (Shielc	17.3	7.8	12.8	0.93	1.53	2.22	1.35	1.20	1.20	9	14	10
LGP21401 TMA	16.8	5.1	11.4	0.59	1.32	3.31	1.48	1.24	1.20	6	12	7

WIND LOADS AT 30 MPH:

800-10121 Antenna	54.5	10.3	5.9	3.90	2.23	5.29	9.24	1.32	1.47	14	9	13
800-10965 Antenna	78.7	20.0	6.9	10.93	3.77	3.94	11.41	1.26	1.55	38	16	33
RRUS-12 RRH	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	9	4	7
RRUS-12 RRH (Shielded)	20.4	9.3	7.5	1.31	1.06	2.21	2.72	1.20	1.21	4	4	4
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	6	3	5
B14 4478 RRH (Shielded)	18.1	6.7	8.3	0.84	1.04	2.70	2.18	1.21	1.20	3	3	3
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	8	5	7
RRUS-32 RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	4	5	4
B5/B12 4449 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	5	4	4
B5/B12 4449 RRH (Shielc	14.9	6.6	10.4	0.68	1.08	2.26	1.43	1.20	1.20	2	4	3
LGP21401 TMA	14.4	2.7	9.0	0.27	0.90	5.33	1.60	1.33	1.20	1	3	1

Date: 4/16/2019
Project Name: NORTHFORD- TOTOKET
Project No.: CT5638
Designed By: LBW Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	60	(deg)	Ice Thickness =	1.18	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)
800-10121 Antenna	54.5	10.3	5.9	3.90	2.23	5.29	9.24	1.32	1.47	246	157	180
800-10965 Antenna	78.7	20.0	6.9	10.93	3.77	3.94	11.41	1.26	1.55	660	279	374
RRUS-12 RRH	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	150	61	84
RRUS-12 RRH (Shielded)	20.4	13.9	7.5	1.97	1.06	1.47	2.72	1.20	1.21	113	61	74
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	97	60	69
B14 4478 RRH (Shielded)	18.1	10.1	8.3	1.26	1.04	1.80	2.18	1.20	1.20	72	60	63
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	131	80	92
RRUS-32 RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	100	80	85
B5/B12 4449 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	78	62	66
B5/B12 4449 RRH (Shielc	14.9	9.9	10.4	1.02	1.08	1.51	1.43	1.20	1.20	59	62	61
LGP21401 TMA	14.4	2.7	9.0	0.27	0.90	5.33	1.60	1.33	1.20	17	52	43

WIND LOADS WITH ICE:

800-10121 Antenna	56.9	12.7	8.3	5.00	3.26	4.49	6.88	1.29	1.39	49	35	38
800-10965 Antenna	81.1	22.4	9.3	12.59	5.21	3.63	8.75	1.25	1.46	120	58	74
RRUS-12 RRH	22.8	20.9	9.9	3.30	1.56	1.09	2.31	1.20	1.20	30	14	18
RRUS-12 RRH (Shielded)	22.8	15.6	9.9	2.47	1.56	1.45	2.31	1.20	1.20	23	14	16
B14 4478 RRH	20.5	15.8	10.7	2.24	1.51	1.30	1.92	1.20	1.20	21	14	16
B14 4478 RRH (Shielded)	20.5	11.8	10.7	1.68	1.51	1.73	1.92	1.20	1.20	15	14	14
RRUS-32 RRH	29.6	14.5	9.4	2.97	1.92	2.04	3.16	1.20	1.23	27	18	20
RRUS-32 RRH (Shielded)	29.6	10.8	9.4	2.23	1.92	2.73	3.16	1.21	1.23	21	18	19
B5/B12 4449 RRH	17.3	15.6	12.8	1.86	1.53	1.11	1.35	1.20	1.20	17	14	15
B5/B12 4449 RRH (Shielc	17.3	11.7	12.8	1.40	1.53	1.48	1.35	1.20	1.20	13	14	14
LGP21401 TMA	16.8	5.1	11.4	0.59	1.32	3.31	1.48	1.24	1.20	6	12	10

WIND LOADS AT 30 MPH:

800-10121 Antenna	54.5	10.3	5.9	3.90	2.23	5.29	9.24	1.32	1.47	14	9	10
800-10965 Antenna	78.7	20.0	6.9	10.93	3.77	3.94	11.41	1.26	1.55	38	16	22
RRUS-12 RRH	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	9	4	5
RRUS-12 RRH (Shielded)	20.4	13.9	7.5	1.97	1.06	1.47	2.72	1.20	1.21	6	4	4
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	6	3	4
B14 4478 RRH (Shielded)	18.1	10.1	8.3	1.26	1.04	1.80	2.18	1.20	1.20	4	3	4
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	8	5	5
RRUS-32 RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	6	5	5
B5/B12 4449 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	5	4	4
B5/B12 4449 RRH (Shielc	14.9	9.9	10.4	1.02	1.08	1.51	1.43	1.20	1.20	3	4	4
LGP21401 TMA	14.4	2.7	9.0	0.27	0.90	5.33	1.60	1.33	1.20	1	3	2

Date: 4/16/2019
Project Name: NORTHFORD- TOTOKET
Project No.: CT5638
Designed By: LBW Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	90	(deg)	Ice Thickness =	1.18	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)
800-10121 Antenna	54.5	10.3	5.9	3.90	2.23	5.29	9.24	1.32	1.47	246	157	157
800-10965 Antenna	78.7	20.0	6.9	10.93	3.77	3.94	11.41	1.26	1.55	660	279	279
RRUS-12 RRH	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	150	61	61
RRUS-12 RRH (Shielded)	20.4	0.0	7.5	0.00	1.06	0.00	2.72	1.20	1.21	0	61	61
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	97	60	60
B14 4478 RRH (Shielded)	18.1	0.0	8.3	0.00	1.04	0.00	2.18	1.20	1.20	0	60	60
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	131	80	80
RRUS-32 RRH (Shielded)	27.2	0.0	7.0	0.00	1.32	0.00	3.89	1.20	1.26	0	80	80
B5/B12 4449 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	78	62	62
B5/B12 4449 RRH (Shielc	14.9	0.0	10.4	0.00	1.08	0.00	1.43	1.20	1.20	0	62	62
LGP21401 TMA	14.4	2.7	9.0	0.27	0.90	5.33	1.60	1.33	1.20	17	52	52

WIND LOADS WITH ICE:

800-10121 Antenna	56.9	12.7	8.3	5.00	3.26	4.49	6.88	1.29	1.39	49	35	35
800-10965 Antenna	81.1	22.4	9.3	12.59	5.21	3.63	8.75	1.25	1.46	120	58	58
RRUS-12 RRH	22.8	20.9	9.9	3.30	1.56	1.09	2.31	1.20	1.20	30	14	14
RRUS-12 RRH (Shielded)	22.8	2.4	9.9	0.37	1.56	9.65	2.31	1.49	1.20	4	14	14
B14 4478 RRH	20.5	15.8	10.7	2.24	1.51	1.30	1.92	1.20	1.20	21	14	14
B14 4478 RRH (Shielded)	20.5	2.4	10.7	0.34	1.51	8.67	1.92	1.46	1.20	4	14	14
RRUS-32 RRH	29.6	14.5	9.4	2.97	1.92	2.04	3.16	1.20	1.23	27	18	18
RRUS-32 RRH (Shielded)	29.6	2.4	9.4	0.48	1.92	12.53	3.16	1.58	1.23	6	18	18
B5/B12 4449 RRH	17.3	15.6	12.8	1.86	1.53	1.11	1.35	1.20	1.20	17	14	14
B5/B12 4449 RRH (Shielc	17.3	2.4	12.8	0.28	1.53	7.32	1.35	1.41	1.20	3	14	14
LGP21401 TMA	16.8	5.1	11.4	0.59	1.32	3.31	1.48	1.24	1.20	6	12	12

WIND LOADS AT 30 MPH:

800-10121 Antenna	54.5	10.3	5.9	3.90	2.23	5.29	9.24	1.32	1.47	14	9	9
800-10965 Antenna	78.7	20.0	6.9	10.93	3.77	3.94	11.41	1.26	1.55	38	16	16
RRUS-12 RRH	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	9	4	4
RRUS-12 RRH (Shielded)	20.4	0.0	7.5	0.00	1.06	0.00	2.72	1.20	1.21	0	4	4
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	6	3	3
B14 4478 RRH (Shielded)	18.1	0.0	8.3	0.00	1.04	0.00	2.18	1.20	1.20	0	3	3
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	8	5	5
RRUS-32 RRH (Shielded)	27.2	0.0	7.0	0.00	1.32	0.00	3.89	1.20	1.26	0	5	5
B5/B12 4449 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	5	4	4
B5/B12 4449 RRH (Shielc	14.9	0.0	10.4	0.00	1.08	0.00	1.43	1.20	1.20	0	4	4
LGP21401 TMA	14.4	2.7	9.0	0.27	0.90	5.33	1.60	1.33	1.20	1	3	3

Date: 4/16/2019
Project Name: NORTHFORD- TOTOKET
Project No.: CT5638
Designed By: LBW Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	120	(deg)	Ice Thickness =	1.18	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)
800-10121 Antenna	54.5	10.3	5.9	3.90	2.23	5.29	9.24	1.32	1.47	246	157	180
800-10965 Antenna	78.7	20.0	6.9	10.93	3.77	3.94	11.41	1.26	1.55	660	279	374
RRUS-12 RRH	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	150	61	84
RRUS-12 RRH (Shielded)	20.4	13.9	7.5	1.97	1.06	1.47	2.72	1.20	1.21	113	61	74
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	97	60	69
B14 4478 RRH (Shielded)	18.1	10.1	8.3	1.26	1.04	1.80	2.18	1.20	1.20	72	60	63
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	131	80	92
RRUS-32 RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	100	80	85
B5/B12 4449 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	78	62	66
B5/B12 4449 RRH (Shield	14.9	9.9	10.4	1.02	1.08	1.51	1.43	1.20	1.20	59	62	61
LGP21401 TMA	14.4	2.7	9.0	0.27	0.90	5.33	1.60	1.33	1.20	17	52	43

WIND LOADS WITH ICE:

800-10121 Antenna	56.9	12.7	8.3	5.00	3.26	4.49	6.88	1.29	1.39	49	35	38
800-10965 Antenna	81.1	22.4	9.3	12.59	5.21	3.63	8.75	1.25	1.46	120	58	74
RRUS-12 RRH	22.8	20.9	9.9	3.30	1.56	1.09	2.31	1.20	1.20	30	14	18
RRUS-12 RRH (Shielded)	22.8	15.6	9.9	2.47	1.56	1.45	2.31	1.20	1.20	23	14	16
B14 4478 RRH	20.5	15.8	10.7	2.24	1.51	1.30	1.92	1.20	1.20	21	14	16
B14 4478 RRH (Shielded)	20.5	11.8	10.7	1.68	1.51	1.73	1.92	1.20	1.20	15	14	14
RRUS-32 RRH	29.6	14.5	9.4	2.97	1.92	2.04	3.16	1.20	1.23	27	18	20
RRUS-32 RRH (Shielded)	29.6	10.8	9.4	2.23	1.92	2.73	3.16	1.21	1.23	21	18	19
B5/B12 4449 RRH	17.3	15.6	12.8	1.86	1.53	1.11	1.35	1.20	1.20	17	14	15
B5/B12 4449 RRH (Shield	17.3	11.7	12.8	1.40	1.53	1.48	1.35	1.20	1.20	13	14	14
LGP21401 TMA	16.8	5.1	11.4	0.59	1.32	3.31	1.48	1.24	1.20	6	12	10

WIND LOADS AT 30 MPH:

800-10121 Antenna	54.5	10.3	5.9	3.90	2.23	5.29	9.24	1.32	1.47	14	9	10
800-10965 Antenna	78.7	20.0	6.9	10.93	3.77	3.94	11.41	1.26	1.55	38	16	22
RRUS-12 RRH	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	9	4	5
RRUS-12 RRH (Shielded)	20.4	13.9	7.5	1.97	1.06	1.47	2.72	1.20	1.21	6	4	4
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	6	3	4
B14 4478 RRH (Shielded)	18.1	10.1	8.3	1.26	1.04	1.80	2.18	1.20	1.20	4	3	4
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	8	5	5
RRUS-32 RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	6	5	5
B5/B12 4449 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	5	4	4
B5/B12 4449 RRH (Shield	14.9	9.9	10.4	1.02	1.08	1.51	1.43	1.20	1.20	3	4	4
LGP21401 TMA	14.4	2.7	9.0	0.27	0.90	5.33	1.60	1.33	1.20	1	3	2

Date: 4/16/2019
Project Name: NORTHFORD- TOTOKET
Project No.: CT5638
Designed By: LBW Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	150	(deg)	Ice Thickness =	1.18	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)
800-10121 Antenna	54.5	10.3	5.9	3.90	2.23	5.29	9.24	1.32	1.47	246	157	224
800-10965 Antenna	78.7	20.0	6.9	10.93	3.77	3.94	11.41	1.26	1.55	660	279	564
RRUS-12 RRH	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	150	61	128
RRUS-12 RRH (Shielded)	20.4	9.3	7.5	1.31	1.06	2.21	2.72	1.20	1.21	75	61	72
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	97	60	87
B14 4478 RRH (Shielded)	18.1	6.7	8.3	0.84	1.04	2.70	2.18	1.21	1.20	49	60	51
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	131	80	118
RRUS-32 RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	70	80	73
B5/B12 4449 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	78	62	74
B5/B12 4449 RRH (Shield	14.9	6.6	10.4	0.68	1.08	2.26	1.43	1.20	1.20	39	62	45
LGP21401 TMA	14.4	2.7	9.0	0.27	0.90	5.33	1.60	1.33	1.20	17	52	26

WIND LOADS WITH ICE:

800-10121 Antenna	56.9	12.7	8.3	5.00	3.26	4.49	6.88	1.29	1.39	49	35	46
800-10965 Antenna	81.1	22.4	9.3	12.59	5.21	3.63	8.75	1.25	1.46	120	58	105
RRUS-12 RRH	22.8	20.9	9.9	3.30	1.56	1.09	2.31	1.20	1.20	30	14	26
RRUS-12 RRH (Shielded)	22.8	10.4	9.9	1.65	1.56	2.18	2.31	1.20	1.20	15	14	15
B14 4478 RRH	20.5	15.8	10.7	2.24	1.51	1.30	1.92	1.20	1.20	21	14	19
B14 4478 RRH (Shielded)	20.5	7.9	10.7	1.12	1.51	2.60	1.92	1.20	1.20	10	14	11
RRUS-32 RRH	29.6	14.5	9.4	2.97	1.92	2.04	3.16	1.20	1.23	27	18	25
RRUS-32 RRH (Shielded)	29.6	7.2	9.4	1.48	1.92	4.09	3.16	1.27	1.23	14	18	15
B5/B12 4449 RRH	17.3	15.6	12.8	1.86	1.53	1.11	1.35	1.20	1.20	17	14	16
B5/B12 4449 RRH (Shield	17.3	7.8	12.8	0.93	1.53	2.22	1.35	1.20	1.20	9	14	10
LGP21401 TMA	16.8	5.1	11.4	0.59	1.32	3.31	1.48	1.24	1.20	6	12	7

WIND LOADS AT 30 MPH:

800-10121 Antenna	54.5	10.3	5.9	3.90	2.23	5.29	9.24	1.32	1.47	14	9	13
800-10965 Antenna	78.7	20.0	6.9	10.93	3.77	3.94	11.41	1.26	1.55	38	16	33
RRUS-12 RRH	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	9	4	7
RRUS-12 RRH (Shielded)	20.4	9.3	7.5	1.31	1.06	2.21	2.72	1.20	1.21	4	4	4
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	6	3	5
B14 4478 RRH (Shielded)	18.1	6.7	8.3	0.84	1.04	2.70	2.18	1.21	1.20	3	3	3
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	8	5	7
RRUS-32 RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	4	5	4
B5/B12 4449 RRH	14.9	13.2	10.4	1.37	1.08	1.13	1.43	1.20	1.20	5	4	4
B5/B12 4449 RRH (Shield	14.9	6.6	10.4	0.68	1.08	2.26	1.43	1.20	1.20	2	4	3
LGP21401 TMA	14.4	2.7	9.0	0.27	0.90	5.33	1.60	1.33	1.20	1	3	1

Date: 4/16/2019
Project Name: NORTHFORD-TOTOKET
Project No.: CT5638
Designed By: LBW **Checked By:** MSC

HUDSON Design Group LLC

ICE WEIGHT CALCULATIONS

Thickness of ice: 1.18 in.
Density of ice: 56 pcf

800-10121 Antenna

Weight of ice based on total radial SF area:

Height (in):	54.5	
Width (in):	10.3	
Depth (in):	5.9	
Total weight of ice on object:		85 lbs
Weight of object:	47.0 lbs	
Combined weight of ice and object:		132 lbs

800-10965 Antenna

Weight of ice based on total radial SF area:

Height (in):	78.7	
Width (in):	20.0	
Depth (in):	6.9	
Total weight of ice on object:		211 lbs
Weight of object:	109.0 lbs	
Combined weight of ice and object:		320 lbs

RRUS-12 RRH

Weight of ice based on total radial SF area:

Height (in):	20.4	
Width (in):	18.5	
Depth (in):	7.5	
Total weight of ice on object:		52 lbs
Weight of object:	58.0 lbs	
Combined weight of ice and object:		110 lbs

B14 4478 RRH

Weight of ice based on total radial SF area:

Height (in):	18.1	
Width (in):	13.4	
Depth (in):	8.3	
Total weight of ice on object:		37 lbs
Weight of object:	60.0 lbs	
Combined weight of ice and object:		97 lbs

RRUS-32 RRH

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:		50 lbs
Weight of object:	60.0 lbs	
Combined weight of ice and object:		110 lbs

B5/B12 4449 RRH

Weight of ice based on total radial SF area:

Height (in):	14.9	
Width (in):	13.2	
Depth (in):	10.4	
Total weight of ice on object:		32 lbs
Weight of object:	73.0 lbs	
Combined weight of ice and object:		105 lbs

LGP21401 TMA

Weight of ice based on total radial SF area:

Height (in):	14.4	
Width (in):	2.7	
Depth (in):	9.0	
Total weight of ice on object:		18 lbs
Weight of object:	19.0 lbs	
Combined weight of ice and object:		37 lbs

Squid Surge Arrestor

Weight of ice based on total radial SF area:

Depth (in):	24.0	
Diameter(in):	9.7	
Total weight of ice on object:		31 lbs
Weight of object:	33 lbs	
Combined weight of ice and object:		64 lbs

1-1/2" Pipe

Per foot weight of ice:

diameter (in):	1.9	
Per foot weight of ice on object:		4 plf

2" pipe

Per foot weight of ice:

diameter (in):	2.38	
Per foot weight of ice on object:		5 plf

2-1/2" pipe

Per foot weight of ice:

diameter (in):	2.88	
Per foot weight of ice on object:		6 plf

HUDSON
Design Group LLC

Mount Calculations
(Existing Conditions)

Bentley

Current Date: 4/16/2019 7:45 AM
Units system: English
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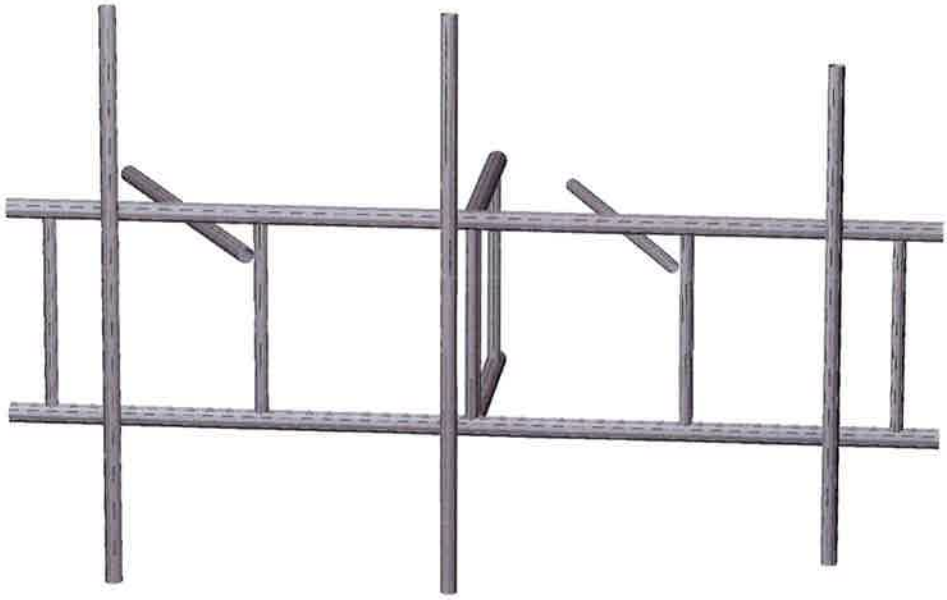

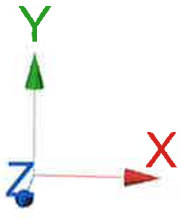

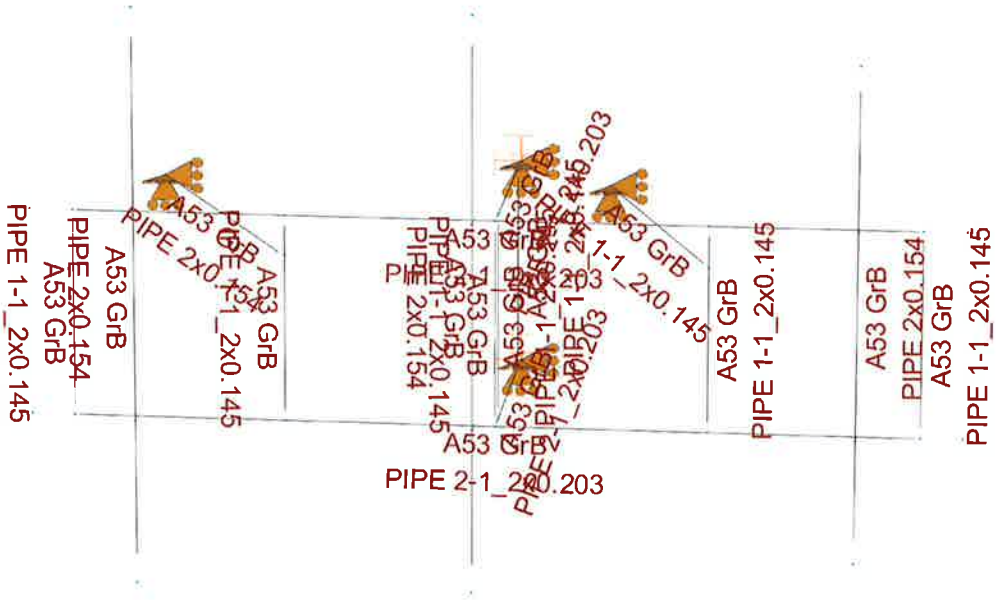
A53 GrB
PIPE 2x0.154
PIPE 1-1_2x0.145
PIPE 2-1_2x0.203
Y
X
Z

Bentley

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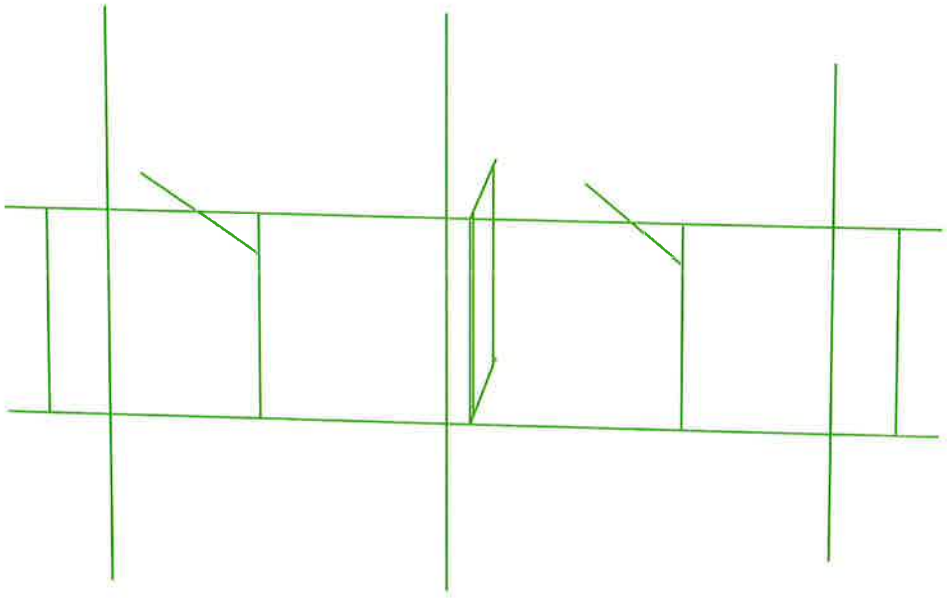
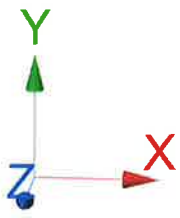
Design status

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





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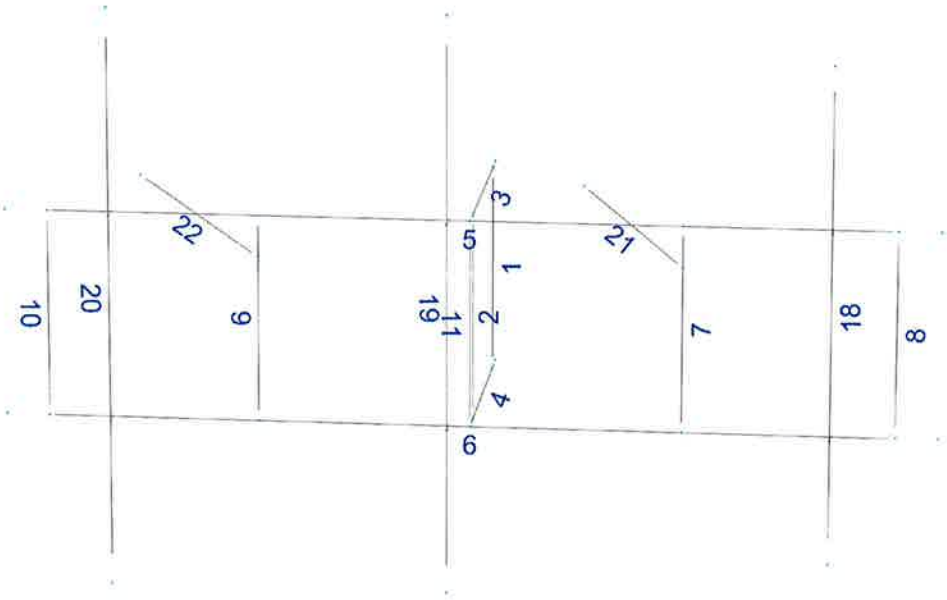

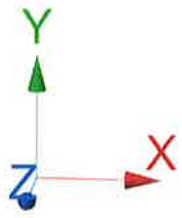

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Load data

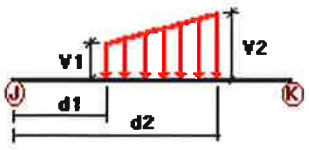
GLOSSARY

Comb : Indicates if load condition is a load combination

Load Conditions

Condition	Description	Comb.	Category
D	Dead Load	No	DL
Wo	Wind Load (NO ICE)	No	WIND
W30	WL 30deg	No	WIND
W60	WL 60deg	No	WIND
W90	WL 90deg	No	WIND
W120	WL 120deg	No	WIND
W150	WL 150deg	No	WIND
Di	Ice Load	No	LL
WI0	WL ICE 0deg	No	WIND
WI30	WL ICE 30deg	No	WIND
WI60	WL ICE 60deg	No	WIND
WI90	WL ICE 90deg	No	WIND
WI120	WL ICE 120deg	No	WIND
WI150	WL ICE 150deg	No	WIND
WL0	WL 30 mph 0deg	No	WIND
WL30	WL 30 mph 30deg	No	WIND
WL60	WL 30 mph 60deg	No	WIND
WL90	WL 30 mph 90deg	No	WIND
WL120	WL 30 mph 120deg	No	WIND
WL150	WL 30 mph 150deg	No	WIND
LL1	250 lb Live Load Center of Mount	No	LL
LL2	250 lb Live Load Right End of Mount	No	LL
LL3	250 lb Live Load Left End of Mount	No	LL
LLa1	250 lb Live Load Antenna 1	No	LL
LLa2	250 lb Live Load Antenna 2	No	LL
LLa3	250 lb Live Load Antenna 3	No	LL

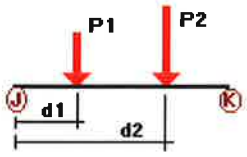
Distributed force on members



Condition	Member	Dir1	Val1 [Kip/ft]	Val2 [Kip/ft]	Dist1 [ft]	%	Dist2 [ft]	%
Wo	1	z	-0.009	0.00	0.00	No	0.00	No
	2	z	-0.009	0.00	0.00	No	0.00	No
	3	z	-0.014	0.00	0.00	No	0.00	No
	4	z	-0.014	0.00	0.00	No	0.00	No
	5	z	-0.014	0.00	0.00	No	0.00	No
	6	z	-0.014	0.00	0.00	No	0.00	No
	7	z	-0.009	0.00	0.00	No	0.00	No
	9	z	-0.009	0.00	0.00	No	0.00	No
	10	z	-0.009	0.00	0.00	No	0.00	No
	11	z	-0.009	0.00	0.00	No	0.00	No
	21	z	-0.009	0.00	0.00	No	0.00	No
	22	z	-0.011	0.00	0.00	No	0.00	No
W30	1	z	-0.009	0.00	0.00	No	0.00	No
	2	z	-0.009	0.00	0.00	No	0.00	No
	3	z	-0.014	0.00	0.00	No	0.00	No
	4	z	-0.014	0.00	0.00	No	0.00	No
	5	z	-0.014	0.00	0.00	No	0.00	No
	6	z	-0.014	0.00	0.00	No	0.00	No
	7	z	-0.009	0.00	0.00	No	0.00	No
	9	z	-0.009	0.00	0.00	No	0.00	No
	10	z	-0.009	0.00	0.00	No	0.00	No
	11	z	-0.009	0.00	0.00	No	0.00	No
	21	z	-0.009	0.00	0.00	No	0.00	No
	22	z	-0.011	0.00	0.00	No	0.00	No
W60	1	x	-0.009	0.00	0.00	No	0.00	No
	2	x	-0.009	0.00	0.00	No	0.00	No
	3	x	-0.014	0.00	0.00	No	0.00	No
	4	x	-0.014	0.00	0.00	No	0.00	No
	5	x	-0.014	0.00	0.00	No	0.00	No
	6	x	-0.014	0.00	0.00	No	0.00	No
	7	x	-0.009	0.00	0.00	No	0.00	No
	8	x	-0.009	0.00	0.00	No	0.00	No
	9	x	-0.009	0.00	0.00	No	0.00	No
	10	x	-0.009	0.00	0.00	No	0.00	No
	11	x	-0.009	0.00	0.00	No	0.00	No
	18	x	-0.011	0.00	0.00	No	0.00	No
	19	x	-0.011	0.00	0.00	No	0.00	No
	20	x	-0.011	0.00	0.00	No	0.00	No
	21	x	-0.009	0.00	0.00	No	0.00	No
	22	x	-0.011	0.00	0.00	No	0.00	No
W90	1	x	-0.009	0.00	0.00	No	0.00	No
	2	x	-0.009	0.00	0.00	No	0.00	No
	3	x	-0.014	0.00	0.00	No	0.00	No
	4	x	-0.014	0.00	0.00	No	0.00	No
	5	x	-0.014	0.00	0.00	No	0.00	No
	6	x	-0.014	0.00	0.00	No	0.00	No
	7	x	-0.009	0.00	0.00	No	0.00	No
	8	x	-0.009	0.00	0.00	No	0.00	No
	9	x	-0.009	0.00	0.00	No	0.00	No
	10	x	-0.009	0.00	0.00	No	0.00	No
	11	x	-0.009	0.00	0.00	No	0.00	No
	18	x	-0.011	0.00	0.00	No	0.00	No
	19	x	-0.011	0.00	0.00	No	0.00	No
	20	x	-0.011	0.00	0.00	No	0.00	No
	21	x	-0.009	0.00	0.00	No	0.00	No
	22	x	-0.011	0.00	0.00	No	0.00	No
W120	1	x	-0.009	0.00	0.00	No	0.00	No
	2	x	-0.009	0.00	0.00	No	0.00	No
	3	x	-0.014	0.00	0.00	No	0.00	No
	4	x	-0.014	0.00	0.00	No	0.00	No

	5	x	-0.014	0.00	0.00	No	0.00	No
	6	x	-0.014	0.00	0.00	No	0.00	No
	7	x	-0.009	0.00	0.00	No	0.00	No
	8	x	-0.009	0.00	0.00	No	0.00	No
	9	x	-0.009	0.00	0.00	No	0.00	No
	10	x	-0.009	0.00	0.00	No	0.00	No
	11	x	-0.009	0.00	0.00	No	0.00	No
	18	x	-0.011	0.00	0.00	No	0.00	No
	19	x	-0.011	0.00	0.00	No	0.00	No
	20	x	-0.011	0.00	0.00	No	0.00	No
	21	x	-0.009	0.00	0.00	No	0.00	No
	22	x	-0.011	0.00	0.00	No	0.00	No
W150	1	z	0.009	0.00	0.00	No	0.00	No
	2	z	0.009	0.00	0.00	No	0.00	No
	3	z	0.014	0.00	0.00	No	0.00	No
	4	z	0.014	0.00	0.00	No	0.00	No
	5	z	0.014	0.00	0.00	No	0.00	No
	6	z	0.014	0.00	0.00	No	0.00	No
	7	z	0.009	0.00	0.00	No	0.00	No
	9	z	0.009	0.00	0.00	No	0.00	No
	10	z	0.009	0.00	0.00	No	0.00	No
	11	z	0.009	0.00	0.00	No	0.00	No
	21	z	0.009	0.00	0.00	No	0.00	No
	22	z	0.011	0.00	0.00	No	0.00	No
Di	1	y	-0.004	0.00	0.00	No	0.00	No
	2	y	-0.004	0.00	0.00	No	0.00	No
	3	y	-0.006	0.00	0.00	No	0.00	No
	4	y	-0.006	0.00	0.00	No	0.00	No
	5	y	-0.006	0.00	0.00	No	0.00	No
	6	y	-0.006	0.00	0.00	No	0.00	No
	7	y	-0.004	0.00	0.00	No	0.00	No
	8	y	-0.004	0.00	0.00	No	0.00	No
	9	y	-0.004	0.00	0.00	No	0.00	No
	10	y	-0.004	0.00	0.00	No	0.00	No
	11	y	-0.004	0.00	0.00	No	0.00	No
	18	y	-0.005	0.00	0.00	No	0.00	No
	19	y	-0.005	0.00	0.00	No	0.00	No
	20	y	-0.005	0.00	0.00	No	0.00	No
	21	y	-0.004	0.00	0.00	No	0.00	No
	22	y	-0.005	0.00	0.00	No	0.00	No

Concentrated forces on members



Condition	Member	Dir1	Value1 [Kip]	Dist1 [ft]	%
D	8	y	-0.038	1.25	No
	18	y	-0.024	1.00	No
		y	-0.024	5.00	No
	19	y	-0.055	0.50	No
		y	-0.055	6.50	No

		y	-0.058	1.50	No
		y	-0.06	3.50	No
	20	y	-0.055	0.50	No
		y	-0.055	6.50	No
		y	-0.133	1.50	No
Wo	8	z	-0.034	1.25	No
	18	z	-0.124	1.00	No
		z	-0.124	5.00	No
	19	z	-0.33	0.50	No
		z	-0.33	6.50	No
	20	z	-0.33	0.50	No
		z	-0.33	6.50	No
W30	8	3	-0.052	1.25	No
	18	3	-0.113	1.00	No
		3	-0.113	5.00	No
	19	3	-0.283	0.50	No
		3	-0.283	6.50	No
		3	-0.072	1.50	No
		3	-0.051	3.50	No
	20	3	-0.283	0.50	No
		3	-0.283	6.50	No
		3	-0.073	1.50	No
W60	8	3	-0.086	1.25	No
	18	3	-0.09	1.00	No
		3	-0.09	5.00	No
	19	3	-0.187	0.50	No
		3	-0.187	6.50	No
		3	-0.074	1.50	No
		3	-0.063	3.50	No
	20	3	-0.187	0.50	No
		3	-0.187	6.50	No
		3	-0.085	1.50	No
W90	8	x	-0.104	1.25	No
	18	x	-0.079	1.00	No
		x	-0.079	5.00	No
	19	x	-0.14	0.50	No
		x	-0.14	6.50	No
		x	-0.061	1.50	No
		x	-0.06	3.50	No
	20	x	-0.14	0.50	No
		x	-0.14	6.50	No
		x	-0.08	1.50	No
W120	8	2	-0.086	1.25	No
	18	2	-0.09	1.00	No
		2	-0.09	5.00	No
	19	2	-0.187	0.50	No
		2	-0.187	6.50	No
		2	-0.074	1.50	No
		2	-0.063	3.50	No
	20	2	-0.187	0.50	No
		2	-0.187	6.50	No
		2	-0.085	1.50	No
W150	8	2	-0.052	1.25	No
	18	2	-0.113	1.00	No
		2	-0.113	5.00	No
	19	2	-0.283	0.50	No
		2	-0.283	6.50	No
		2	-0.072	1.50	No
		2	-0.051	3.50	No
	20	2	-0.283	0.50	No

		2	-0.283	6.50	No
		2	-0.073	1.50	No
Di	8	y	-0.036	1.25	No
	18	y	-0.043	1.00	No
		y	-0.043	5.00	No
	19	y	-0.106	0.50	No
		y	-0.106	6.50	No
		y	-0.052	1.50	No
		y	-0.037	3.50	No
	20	y	-0.106	0.50	No
		y	-0.106	6.50	No
		y	-0.082	1.50	No
WI0	8	z	-0.012	1.25	No
	18	z	-0.026	1.00	No
		z	-0.026	5.00	No
	19	z	-0.061	0.50	No
		z	-0.061	6.50	No
		z	-0.003	1.50	No
		z	-0.003	3.50	No
	20	z	-0.061	0.50	No
		z	-0.061	6.50	No
		z	-0.007	1.50	No
WI30	8	3	-0.014	1.25	No
	18	3	-0.023	1.00	No
		3	-0.023	5.00	No
	19	3	-0.053	0.50	No
		3	-0.053	6.50	No
		3	-0.015	1.50	No
		3	-0.011	3.50	No
	20	3	-0.053	0.50	No
		3	-0.053	6.50	No
		3	-0.015	1.50	No
WI60	8	3	-0.02	1.25	No
	18	3	-0.02	1.00	No
		3	-0.02	5.00	No
	19	3	-0.037	0.50	No
		3	-0.037	6.50	No
		3	-0.016	1.50	No
		3	-0.014	3.50	No
	20	3	-0.037	0.50	No
		3	-0.037	6.50	No
		3	-0.019	1.50	No
WI90	8	x	-0.024	1.25	No
	18	x	-0.018	1.00	No
		x	-0.018	5.00	No
	19	x	-0.03	0.50	No
		x	-0.03	6.50	No
		x	-0.014	1.50	No
		x	-0.014	3.50	No
	20	x	-0.03	0.50	No
		x	-0.03	6.50	No
		x	-0.018	1.50	No
WI120	8	2	-0.02	1.25	No
	18	2	-0.02	1.00	No
		2	-0.02	5.00	No
	19	2	-0.037	0.50	No
		2	-0.037	6.50	No
		2	-0.016	1.50	No
		2	-0.014	3.50	No
	20	2	-0.037	0.50	No

		2	-0.037	6.50	No
		2	-0.019	1.50	No
WI150	8	2	-0.014	1.25	No
	18	2	-0.023	1.00	No
		2	-0.023	5.00	No
	19	2	-0.053	0.50	No
		2	-0.053	6.50	No
		2	-0.015	1.50	No
		2	-0.011	3.50	No
	20	2	-0.053	0.50	No
		2	-0.053	6.50	No
		2	-0.015	1.50	No
WL0	8	z	-0.002	1.25	No
	18	z	-0.008	1.00	No
		z	-0.008	5.00	No
	19	z	-0.019	0.50	No
		z	-0.019	6.50	No
	20	z	-0.019	0.50	No
		z	-0.019	6.50	No
WL30	8	3	-0.002	1.25	No
	18	3	-0.007	1.00	No
		3	-0.007	5.00	No
	19	3	-0.017	0.50	No
		3	-0.017	6.50	No
		3	-0.004	1.50	No
		3	-0.003	3.50	No
	20	3	-0.017	0.50	No
		3	-0.017	6.50	No
		3	-0.004	1.50	No
WL60	8	3	-0.004	1.25	No
	18	3	-0.006	1.00	No
		3	-0.006	5.00	No
	19	3	-0.011	0.50	No
		3	-0.011	6.50	No
		3	-0.004	1.50	No
		3	-0.004	3.50	No
	20	3	-0.011	0.50	No
		3	-0.011	6.50	No
		3	-0.005	1.50	No
WL90	8	x	-0.006	1.25	No
	18	x	-0.005	1.00	No
		x	-0.005	5.00	No
	19	x	-0.009	0.50	No
		x	-0.009	6.50	No
		x	-0.004	1.50	No
		x	-0.003	3.50	No
	20	x	-0.009	0.50	No
		x	-0.009	6.50	No
		x	-0.005	1.50	No
WL120	8	2	-0.004	1.25	No
	18	2	-0.006	1.00	No
		2	-0.006	5.00	No
	19	2	-0.011	0.50	No
		2	-0.011	6.50	No
		2	-0.004	1.50	No
		2	-0.004	3.50	No
	20	2	-0.011	0.50	No
		2	-0.011	6.50	No
		2	-0.005	1.50	No
WL150	8	2	-0.002	1.25	No

	18	2	-0.007	1.00	No
		2	-0.007	5.00	No
	19	2	-0.017	0.50	No
		2	-0.017	6.50	No
		2	-0.004	1.50	No
		2	-0.003	3.50	No
	20	2	-0.017	0.50	No
		2	-0.017	6.50	No
		2	-0.004	1.50	No
LL1	6	y	-0.25	5.50	No
LL2	6	y	-0.25	11.00	No
LL3	6	y	-0.25	0.00	No
LLa1	18	y	-0.25	3.00	No
LLa2	19	y	-0.25	3.50	No
LLa3	20	y	-0.25	3.50	No

Self weight multipliers for load conditions

Condition	Description	Self weight multiplier			
		Comb.	MultX	MultY	MultZ
D	Dead Load	No	0.00	-1.00	0.00
Wo	Wind Load (NO ICE)	No	0.00	0.00	0.00
W30	WL 30deg	No	0.00	0.00	0.00
W60	WL 60deg	No	0.00	0.00	0.00
W90	WL 90deg	No	0.00	0.00	0.00
W120	WL 120deg	No	0.00	0.00	0.00
W150	WL 150deg	No	0.00	0.00	0.00
Di	Ice Load	No	0.00	0.00	0.00
WI0	WL ICE 0deg	No	0.00	0.00	0.00
WI30	WL ICE 30deg	No	0.00	0.00	0.00
WI60	WL ICE 60deg	No	0.00	0.00	0.00
WI90	WL ICE 90deg	No	0.00	0.00	0.00
WI120	WL ICE 120deg	No	0.00	0.00	0.00
WI150	WL ICE 150deg	No	0.00	0.00	0.00
WL0	WL 30 mph 0deg	No	0.00	0.00	0.00
WL30	WL 30 mph 30deg	No	0.00	0.00	0.00
WL60	WL 30 mph 60deg	No	0.00	0.00	0.00
WL90	WL 30 mph 90deg	No	0.00	0.00	0.00
WL120	WL 30 mph 120deg	No	0.00	0.00	0.00
WL150	WL 30 mph 150deg	No	0.00	0.00	0.00
LL1	250 lb Live Load Center of Mount	No	0.00	0.00	0.00
LL2	250 lb Live Load Right End of Mount	No	0.00	0.00	0.00
LL3	250 lb Live Load Left End of Mount	No	0.00	0.00	0.00
LLa1	250 lb Live Load Antenna 1	No	0.00	0.00	0.00
LLa2	250 lb Live Load Antenna 2	No	0.00	0.00	0.00
LLa3	250 lb Live Load Antenna 3	No	0.00	0.00	0.00

Earthquake (Dynamic analysis only)

Condition	a/g	Ang. [Deg]	Damp. [%]
D	0.00	0.00	0.00
Wo	0.00	0.00	0.00
W30	0.00	0.00	0.00
W60	0.00	0.00	0.00
W90	0.00	0.00	0.00
W120	0.00	0.00	0.00
W150	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
WI60	0.00	0.00	0.00
WI90	0.00	0.00	0.00
WI120	0.00	0.00	0.00
WI150	0.00	0.00	0.00
WL0	0.00	0.00	0.00
WL30	0.00	0.00	0.00
WL60	0.00	0.00	0.00
WL90	0.00	0.00	0.00
WL120	0.00	0.00	0.00
WL150	0.00	0.00	0.00
LL1	0.00	0.00	0.00
LL2	0.00	0.00	0.00
LL3	0.00	0.00	0.00
LLa1	0.00	0.00	0.00
LLa2	0.00	0.00	0.00
LLa3	0.00	0.00	0.00

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Steel Code Check

Report: Summary - Group by member

Load conditions to be included in design :

LC1=1.2D+Wo
LC2=1.2D+W30
LC3=1.2D+W60
LC4=1.2D+W90
LC5=1.2D+W120
LC6=1.2D+W150
LC7=1.2D-Wo
LC8=1.2D-W30
LC9=1.2D-W60
LC10=1.2D-W90
LC11=1.2D-W120
LC12=1.2D-W150
LC13=0.9D+Wo
LC14=0.9D+W30
LC15=0.9D+W60
LC16=0.9D+W90
LC17=0.9D+W120
LC18=0.9D+W150
LC19=0.9D-Wo
LC20=0.9D-W30
LC21=0.9D-W60
LC22=0.9D-W90
LC23=0.9D-W120
LC24=0.9D-W150
LC25=1.2D+Di+WI0
LC26=1.2D+Di+WI30
LC27=1.2D+Di+WI60
LC28=1.2D+Di+WI90
LC29=1.2D+Di+WI120
LC30=1.2D+Di+WI150
LC31=1.2D+Di-WI0
LC32=1.2D+Di-WI30
LC33=1.2D+Di-WI60
LC34=1.2D+Di-WI90
LC35=1.2D+Di-WI120
LC36=1.2D+Di-WI150
LC38=1.2D+1.5LL1
LC39=1.2D+1.5LL2
LC40=1.2D+1.5LL3
LC41=1.2D+WL0+1.5LLa1
LC42=1.2D+WL30+1.5LLa1
LC43=1.2D+WL60+1.5LLa1
LC44=1.2D+WL90+1.5LLa1
LC45=1.2D+WL120+1.5LLa1
LC46=1.2D+WL150+1.5LLa1
LC47=1.2D-WL0+1.5LLa1
LC48=1.2D-WL30+1.5LLa1
LC49=1.2D-WL60+1.5LLa1
LC50=1.2D-WL90+1.5LLa1
LC51=1.2D-WL120+1.5LLa1
LC52=1.2D-WL150+1.5LLa1
LC53=1.2D+WL0+1.5LLa2

LC54=1.2D+WL30+1.5LLa2
LC55=1.2D+WL60+1.5LLa2
LC56=1.2D+WL90+1.5LLa2
LC57=1.2D+WL120+1.5LLa2
LC58=1.2D+WL150+1.5LLa2
LC59=1.2D-WL0+1.5LLa2
LC60=1.2D-WL30+1.5LLa2
LC61=1.2D-WL60+1.5LLa2
LC62=1.2D-WL90+1.5LLa2
LC63=1.2D-WL120+1.5LLa2
LC64=1.2D-WL150+1.5LLa2
LC65=1.2D+WL0+1.5LLa3
LC66=1.2D+WL30+1.5LLa3
LC67=1.2D+WL60+1.5LLa3
LC68=1.2D+WL90+1.5LLa3
LC69=1.2D+WL120+1.5LLa3
LC70=1.2D+WL150+1.5LLa3
LC71=1.2D-WL0+1.5LLa3
LC72=1.2D-WL30+1.5LLa3
LC73=1.2D-WL60+1.5LLa3
LC74=1.2D-WL90+1.5LLa3
LC75=1.2D-WL120+1.5LLa3
LC76=1.2D-WL150+1.5LLa3

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	PIPE 1-1_2x0.145	**1**	LC31 at 0.00%	0.28	OK	Eq. H1-1b
		2	LC25 at 100.00%	0.57	OK	Eq. H1-1b
		7	LC39 at 0.00%	0.58	OK	Eq. H1-1b
		8	LC39 at 100.00%	0.52	OK	Eq. H1-1b
		9	LC2 at 81.25%	**0.76**	**OK**	Eq. H1-1b
		10	LC40 at 0.00%	0.44	OK	Eq. H1-1b
		11	LC25 at 0.00%	0.49	OK	Eq. H1-1b
		21	LC1 at 100.00%	0.16	OK	Eq. H1-1b
	PIPE 2-1_2x0.203	**3**	LC6 at 0.00%	**0.97**	**OK**	Eq. H1-1b
		4	LC36 at 0.00%	0.86	OK	Eq. H1-1b
		5	LC6 at 49.31%	0.66	OK	Eq. H1-1b
		6	LC12 at 47.92%	0.59	OK	Eq. H1-1b
	PIPE 2x0.154	**18**	LC39 at 33.33%	0.29	OK	Eq. H1-1b
		19	LC7 at 35.42%	0.75	OK	Eq. H1-1b
		20	LC7 at 35.42%	**0.75**	**OK**	Eq. H1-1b
		22	LC40 at 0.00%	0.43	OK	Eq. H1-1b

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Geometry data

GLOSSARY

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

Nodes

Node	X [ft]	Y [ft]	Z [ft]	Rigid Floor
1	0.00	0.00	0.10	0
2	0.00	0.00	0.43	0
3	0.00	0.00	2.66	0
4	0.00	0.00	2.99	0
5	0.00	2.50	0.10	0
6	0.00	2.50	0.43	0
7	0.00	2.50	2.66	0
8	0.00	2.50	2.99	0
9	5.50	0.00	2.99	0
10	5.50	2.50	2.99	0
11	-5.50	0.00	2.99	0
12	-5.50	2.50	2.99	0
13	-5.00	0.00	2.99	0
14	-5.00	2.50	2.99	0
15	-2.50	0.00	2.99	0
16	-2.50	2.50	2.99	0
17	2.50	0.00	2.99	0
18	2.50	2.50	2.99	0
19	5.00	0.00	2.99	0
20	5.00	2.50	2.99	0
31	4.25	-1.50	3.19	0

32	-0.25	-2.00	3.19	0
33	-4.25	-2.00	3.19	0
34	4.25	4.50	3.19	0
35	-0.25	5.00	3.19	0
36	-4.25	5.00	3.19	0
37	2.50	2.00	2.99	0
38	-2.50	2.00	2.99	0
39	-4.50	2.00	-0.75	0
40	1.00	2.00	-0.75	0

Restraints

Node	TX	TY	TZ	RX	RY	RZ
1	1	1	1	1	1	1
5	1	1	1	1	1	1
39	1	1	1	0	0	0
40	1	1	1	0	0	0

Members

Member	NJ	NK	Description	Section	Material	d0 [in]	dL [in]	lg factor
1	2	6		PIPE 1-1_2x0.145	A53 GrB	0.00	0.00	0.00
2	3	7		PIPE 1-1_2x0.145	A53 GrB	0.00	0.00	0.00
3	5	8		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
4	1	4		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
5	12	10		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
6	11	9		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00
7	17	18		PIPE 1-1_2x0.145	A53 GrB	0.00	0.00	0.00
8	20	19		PIPE 1-1_2x0.145	A53 GrB	0.00	0.00	0.00
9	15	16		PIPE 1-1_2x0.145	A53 GrB	0.00	0.00	0.00
10	13	14		PIPE 1-1_2x0.145	A53 GrB	0.00	0.00	0.00
11	8	4		PIPE 1-1_2x0.145	A53 GrB	0.00	0.00	0.00
18	34	31		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
19	35	32		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
20	36	33		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
21	37	40		PIPE 1-1_2x0.145	A53 GrB	0.00	0.00	0.00
22	38	39		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00

Orientation of local axes

Member	Rotation [Deg]	Axes23	NX	NY	NZ
8	315.00	0	0.00	0.00	0.00
18	315.00	0	0.00	0.00	0.00
19	315.00	0	0.00	0.00	0.00
20	315.00	0	0.00	0.00	0.00

Rigid end offsets

Member	DJX [in]	DJY [in]	DJZ [in]	DKX [in]	DKY [in]	DKZ [in]
21	-2.00	0.00	0.00	-2.00	0.00	0.00
22	-2.00	0.00	0.00	-2.00	0.00	0.00

STRUCTURAL ANALYSIS REPORT
SELF SUPPORT TOWER

Prepared For:

Com-Ex Consultants, LLC
115 Route 46 – Suite E39
Mountain Lakes, NJ 07046

Structure Rating:

Tower:	**69.8% (Pass)**
Anchor bolts:	**56.6% (Pass)**
Foundation:	**48.6% (Pass)**

Sincerely,
Destek Engineering, LLC
Firm PEC No: 0001429

06-25-2019

STATE OF CONNECTICUT
AHMET COLAKOGLU
PEN. 27057
LICENSED
PROFESSIONAL ENGINEER

Ahmet Colakoglu, PE
Connecticut Professional Engineer
License No: 27057

Site ID: CT5638
Site Name: Northford-Totoket
FA Code: 10071180
88 Parsonage Hill Road
Northford, CT 06472

DESTEK ENGINEERING, LLC
1281 Kennestone Circle, Ste 100, Marietta, GA 30066 -Tel: (770) 693-0835

CONTENTS

DESTEK ENGINEERING, LLC
1281 Kennestone Circle, Ste 100, Marietta, GA 30066 -Tel: (770) 693-0835

1.0 SUBJECT AND REFERENCES

The purpose of this analysis is to evaluate the structural capacity of the existing 195 feet tall self-support tower located at 88 Parsonage Hill Road, Northford, CT 06472 for the additions and alterations proposed by AT&T.

The structural analysis is based on the following information provided to Destek Engineering, LLC (Destek):

- Structural Analysis Report-Rev1 prepared by Destek Engineering, dated 01/21/2016.
- RFDS provided by Hudson Design Group, LLC dated 02/15/2019.
- Construction Drawings prepared by Hudson Design Group, LLC dated 05/09/2019.
- Site Photos dated 04/08/2019.

1.1 STRUCTURE

The subject structure is a 3-sided, 195'-0" tall self-support tower formed by nine 20'-0" sections and one 15'-0" section. Solid rod legs are X-braced at all sections with single angle diagonals. The tower is 5' wide at the top and 23.5' wide at the base, with a slope change at 175'-0" level. The tower is supported on a mat foundation. Please refer to the software output in Appendix A for tower geometry, member sizes, and other details.

2.0 EXISTING AND PROPOSED APPURTENANCES

The analysis is based on the following existing and proposed appurtenances:

Existing AT&T Appurtenance Configuration:

RAD CENTER (FT)	ANTENNA & TMA	FEED LINES	MOUNT
173	(3) Kathrein 800-10121 (3) KMW AM-X-CD-16-65-00T-RET (3) Ericsson RRUS-11 (3) Ericsson RRUS-12 (6) Powerwave LGP21401 (1) Raycap DC6-48-60-18-8C	(6) 1-5/8" (1) Fiber Cable (2) DC Cables	(3) Sector Mounts

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Proposed and Final AT&T Appurtenances:

RAD CENTER (FT)	ANTENNA & TMA	FEED LINES	MOUNT
173	(3) Kathrein 800-10121 (6) Kathrein 800-10965 (6) Powerwave LGP21401 (3) Ericsson Radio B14 4478* (3) Ericsson RRUS B5/B12 4449* (3) Ericsson RRUS-32* (3) Ericsson RRUS-12 (3) Raycap DC6-48-60-18-8C	(6) 1-5/8” (2) Fiber Cable (6) DC Cables	(3) Sector Mounts

***Proposed RRUs to be mounted behind the antennas**

Existing Appurtenances by Others:

RAD CENTER (FT) CARRIER	ANTENNA & TMA	FEED LINES	MOUNT
190 Sprint	(3) APXVSPP18-C-A20 (3) RRH 2x50 800Mhz (3) RRH 4x45 1900Mhz	(3) 1-1/4”	(3) 15’ Triangular Mount
180 T-Mobile	(6) AIR 21 B2A/B4P (3) 8’ Panel Antennas (6) Ericsson AIR 21 (3) TMAs	(12) 1-5/8” (1) Fiber	(3) Sector Mounts
160 Nextel	-	-	(3) Sector Mounts
145 Verizon	(6) LPA-80080-4CF (3) BXA-70063/6CF (3) BXA-171085-8CF (6) FD9R6004/2C-3L Diplexers	(12) 1-5/8”	(3) Sector Mounts
80	(2) GPS	(2) 1/2"	(2) 2’ Stand Off

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3.0 CODES AND LOADING

This analysis has been performed in accordance with the 2018 Connecticut Building Code (2015 IBC) based upon an ultimate 3-second gust wind speed of 125 mph (Risk Category II) converted to a nominal 3-second gust wind speed of 97 mph per section 1609.3.1 as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. The following loading criteria were used in the analysis:

- Basic wind speed of 97 mph without ice (V)
- Basic wind speed of 50 mph concurrent with the design ice thickness of 0.75" (V_i and t_i)
- Exposure Category C, Topographic Category 1, Risk Category II

The following load combinations were used with wind blowing at 0°, 30°, 60°, and 90°, measured from a line normal to the face of the tower:

- $1.2\ D + 1.6\ W_0$
- $0.9\ D + 1.6\ W_0$
- $1.2\ D + 1.0\ D_i + 1.0\ W_i + 1.0\ T_i$

D: Dead load of structures and appurtenances
D_i: Weight of ice due to factored ice thickness (based upon t_i)
T_i: Load effects due to temperature
W_0: Wind load without ice (based upon V)
W_i: Wind load with ice (based upon V_i)

4.0 STANDARD CONDITIONS FOR ENGINEERING SERVICES ON EXISTING STRUCTURES

The analysis is based on the information provided to Destek and is assumed to be current and correct. Unless otherwise noted, the structure is assumed to be in good condition, free of defects and can achieve theoretical strength.

It is assumed that the structure has been maintained and shall be maintained during its service. The superstructure and the foundation system are assumed to be designed with proper engineering practice and fabricated, constructed and erected in accordance with the design documents. Destek will accept no liability which may arise due to any existing deficiency in design, material, fabrication, erection, construction, etc. or lack of maintenance.

The analysis does not include a qualification of the mounts attached on the structure or their connections. The analysis is performed to verify the capacity of the main structural members, which is the current practice in the tower industry.

The analysis results presented in this report are only applicable for the previously mentioned existing and proposed appurtenances. Any deviation of the appurtenances and appurtenance placement will require Destek to generate an additional structural analysis. Additionally, the proposed linear appurtenances should be placed per recommendations of this report.

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5.0 ANALYSIS AND ASSUMPTIONS

The tower was analyzed by utilizing tnxTower, a non-linear 3-Dimensional finite element software, a product of Tower Numerics, Inc. Software output for this analysis is provided in Appendix-A of this report.

6.0 RESULTS AND CONCLUSION

Based on an analysis per ANSI/TIA-222-G, the existing tower is found to have **adequate** structural capacity for the proposed changes by AT&T. For the code specified load combinations and as a maximum, tower diagonal bolts between 40 feet and 55 feet are stressed to **69.8%** of their structural capacity. The tower legs, diagonals and anchor bolts are stressed to 55.2%, 69.4% and 56.6% of their structural capacity, respectively.

The existing tower foundation has **adequate** capacity for the proposed loading by AT&T. For the code specified load combinations and as a maximum, the tower foundation is stressed to **48.6%** of its structural capacity.

Therefore, the additions and alterations proposed by AT&T **can** be implemented as intended with the conditions and recommendations outlined in this report.

Should you have any questions about this report, please contact Ahmet Colakoglu at (770) 693-0835 or acolakoglu@destekengineering.com.

DESTEK ENGINEERING, LLC
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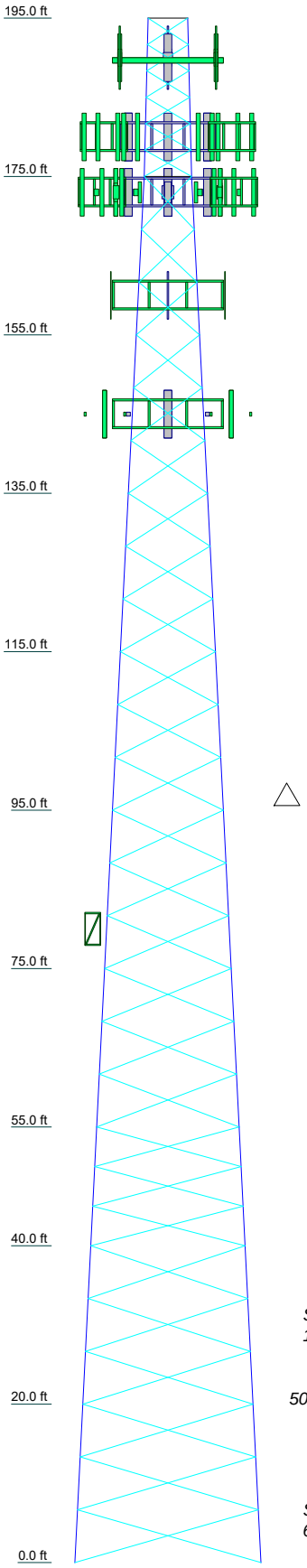
APPENDIX A
SOFTWARE OUTPUT

Section	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	SR 5		SR 4 3/4		SR 4 1/2	SR 4 1/4		SR 4	SR 3 3/4	SR 3
Leg Grade	A529-50									
Diagonals	L4x4x3/8	L4x4x5/16		L4x4x1/4		L3 1/2x3 1/2x5/16	L3x3x1/4	L2 1/2x2 1/2x5/16	L2 1/2x2 1/2x3/16	SR 1 1/4
Diagonal Grade	A36					L3x3x3/8				
Top Girts	N.A.									SR 1 1/4
Bottom Girts	N.A.									SR 1 1/4
Face Width (ft)	23.5	21.5	19.5	18	16	14	12	10	8	6
# Panels @ (ft)	51.3	6 @ 6.66667		3 @ 5		18 @ 6.66667				6 @ 3.33333
Weight (K)	8.5	7.1	5.3	6.1	5.6	5.0	4.2	3.8	2.9	2.7



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXVSPP18-C-A20 w/ Mount Pipe	190	RRUS 4449 B5/B12	173
APXVSPP18-C-A20 w/ Mount Pipe	190	RRUS 4449 B5/B12	173
APXVSPP18-C-A20 w/ Mount Pipe	190	RRUS 32	173
RRH2X50-800	190	RRUS 32	173
RRH2X50-800	190	RRUS 32	173
RRH2X50-800	190	RRUS 12	173
PCS 1900MHz 4x45W-65MHz	190	RRUS 12	173
PCS 1900MHz 4x45W-65MHz	190	RRUS 12	173
PCS 1900MHz 4x45W-65MHz	190	DC6-48-60-18-8C	173
(3) 8'-P2x0.203	190	DC6-48-60-18-8C	173
(3) 8'-P2x0.203	190	DC6-48-60-18-8C	173
(3) 8'-P2x0.203	190	Sector Mount [SM 409-3]	173
Platform Mount [LP 1101-1]	190	Sector Mount [SM 410-3]	160
(2) AIR 21 B2A/B4P w/ Mount Pipe	180	(4) 6'-P2x0.154	160
(2) AIR 21 B2A/B4P w/ Mount Pipe	180	(4) 6'-P2x0.154	160
(2) AIR 21 B2A/B4P w/ Mount Pipe	180	(4) 6'-P2x0.154	160
8' Panel Antenna	180	(2) LPA-80080/4CF w/ Mount Pipe	145
8' Panel Antenna	180	(2) LPA-80080/4CF w/ Mount Pipe	145
8' Panel Antenna	180	(2) LPA-80080/4CF w/ Mount Pipe	145
TMA	180	BXA-70063/6CF w/ Mount Pipe	145
TMA	180	BXA-70063/6CF w/ Mount Pipe	145
TMA	180	BXA-70063/6CF w/ Mount Pipe	145
Sector Mount [SM 410-3]	180	BXA-171085-8CF-EDIN-X w/ Mount Pipe	145
800 10121 w/ Mount Pipe	173		
800 10121 w/ Mount Pipe	173	BXA-171085-8CF-EDIN-X w/ Mount Pipe	145
800 10121 w/ Mount Pipe	173		
(2) 80010965 w/ Mount Pipe	173	BXA-171085-8CF-EDIN-X w/ Mount Pipe	145
(2) 80010965 w/ Mount Pipe	173		
(2) 80010965 w/ Mount Pipe	173	(2) FD9R6004/2C-3L	145
(2) LGP21401	173	(2) FD9R6004/2C-3L	145
(2) LGP21401	173	(2) FD9R6004/2C-3L	145
(2) LGP21401	173	Sector Mount [SM 410-3]	145
RRUS 4478 B14	173	GPS	80
RRUS 4478 B14	173	GPS	80
RRUS 4478 B14	173	2ft Stand Off	80
RRUS 4449 B5/B12	173	2ft Stand Off	80

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A529-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 69.8%

ALL RE
ARE FA
MAX. CO
DOV
SHE
UPLIFT: -295 K
SHEAR: 33 K
BASE

AXIAL
189 K
SHEAR
18 K
MOMENT
2051 kip-ft

TORQUE 25 kip-ft
50 mph WIND - 0.7500 in ICE

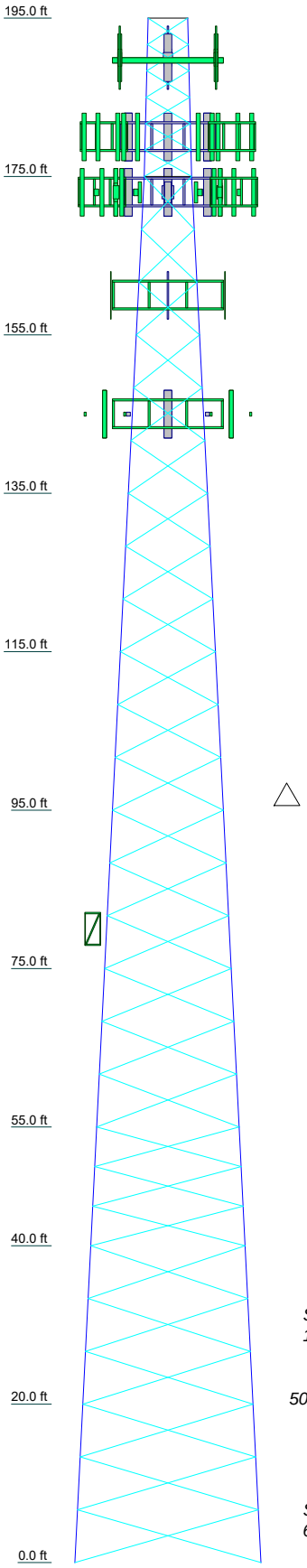
AXIAL
85 K
SHEAR
65 K
MOMENT
6773 kip-ft

TORQUE 67 kip-ft
REACTIONS - 97 mph WIND

Destek Engineering, LLC
1281 Kennestone Circle, Ste 100
Marietta, GA
Phone: (770) 693-0835
FAX:

Job: **CT5638**			
Project: **1999002**			
Client: Hudson Design Group	Drawn by: Ahmet Colakoglu	App'd:	
Code: TIA-222-G	Date: 06/25/19	Scale: NTS	
Path: S:\Projects\2019\99 - Misc\Hudson Design Group\002 - CT5638\TNX\CT5638.eri		Dwg No. E-1	

Section	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	SR 5	SR 4 3/4			SR 4 1/2	SR 4 1/4		SR 4	SR 3 3/4	SR 3
Leg Grade	A529-50									
Diagonals	L4x4x3/8	L4x4x5/16		L4x4x1/4		L3 1/2x3 1/2x5/16	L3x3x1/4	L2 1/2x2 1/2x5/16	L2 1/2x2 1/2x3/16	SR 1 1/4
Diagonal Grade	A36					L3x3x3/8				
Top Girts	N.A.									SR 1 1/4
Bottom Girts	N.A.									SR 1 1/4
Face Width (ft)	23.5	21.5	19.5	18	16	14	12	10	8	6
# Panels @ (ft)	51.3	6 @ 6.66667		3 @ 5		18 @ 6.66667				6 @ 3.33333
Weight (K)	8.5	7.1	5.3	6.1	5.6	5.0	4.2	3.8	2.9	2.7



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A529-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

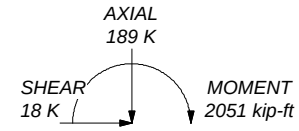
TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 69.8%

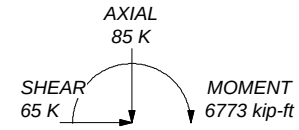
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 361 K
SHEAR: 40 K

UPLIFT: -295 K
SHEAR: 33 K



TORQUE 25 kip-ft
50 mph WIND - 0.7500 in ICE



TORQUE 67 kip-ft
REACTIONS - 97 mph WIND

Destek Engineering, LLC
1281 Kennestone Circle, Ste 100
Marietta, GA
Phone: (770) 693-0835
FAX:

Job: **CT5638**			
Project: **1999002**			
Client: Hudson Design Group	Drawn by: Ahmet Colakoglu	App'd:	
Code: TIA-222-G	Date: 06/25/19	Scale: NTS	
Path: S:\Projects\2019\99 - Misc\Hudson Design Group\002 - CT5638\TNX\CT5638.eri		Dwg No. E-1	

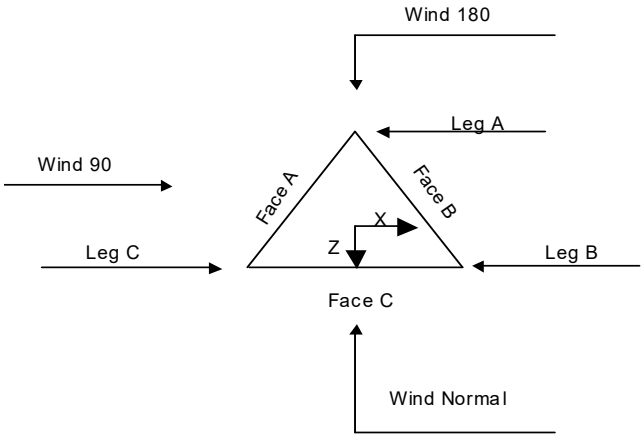
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 195.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 5.00 ft at the top and 23.50 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in New Haven County, Connecticut.
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area	√	SR Leg Bolts Resist Compression
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients	√	Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
√	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	195.00-175.00			5.00	1	20.00
T2	175.00-155.00			6.00	1	20.00
T3	155.00-135.00			8.00	1	20.00
T4	135.00-115.00			10.00	1	20.00
T5	115.00-95.00			12.00	1	20.00
T6	95.00-75.00			14.00	1	20.00
T7	75.00-55.00			16.00	1	20.00
T8	55.00-40.00			18.00	1	15.00
T9	40.00-20.00			19.50	1	20.00
T10	20.00-0.00			21.50	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	195.00-175.00	3.33	X Brace	No	Yes	0.0000	0.0000
T2	175.00-155.00	6.67	X Brace	No	No	0.0000	0.0000
T3	155.00-135.00	6.67	X Brace	No	No	0.0000	0.0000
T4	135.00-115.00	6.67	X Brace	No	No	0.0000	0.0000
T5	115.00-95.00	6.67	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T6	95.00-75.00	6.67	X Brace	No	No	0.0000	0.0000
T7	75.00-55.00	6.67	X Brace	No	No	0.0000	0.0000
T8	55.00-40.00	5.00	X Brace	No	No	0.0000	0.0000
T9	40.00-20.00	6.67	X Brace	No	No	0.0000	0.0000
T10	20.00-0.00	6.67	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 195.00-175.00	Solid Round	3	A529-50 (50 ksi)	Solid Round	1 1/4	A36 (36 ksi)
T2 175.00-155.00	Solid Round	3 3/4	A529-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 155.00-135.00	Solid Round	4	A529-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x5/16	A36 (36 ksi)
T4 135.00-115.00	Solid Round	4 1/4	A529-50 (50 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T5 115.00-95.00	Solid Round	4 1/4	A529-50 (50 ksi)	Single Angle	L3x3x3/8	A36 (36 ksi)
T6 95.00-75.00	Solid Round	4 1/2	A529-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T7 75.00-55.00	Solid Round	4 3/4	A529-50 (50 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T8 55.00-40.00	Solid Round	4 3/4	A529-50 (50 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T9 40.00-20.00	Solid Round	4 3/4	A529-50 (50 ksi)	Single Angle	L4x4x5/16	A36 (36 ksi)
T10 20.00-0.00	Solid Round	5	A529-50 (50 ksi)	Single Angle	L4x4x3/8	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 195.00-175.00	Solid Round	1 1/4	A36 (36 ksi)	Solid Round	1 1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 195.00-175.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T2 175.00-155.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T3 155.00-135.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T4 135.00-115.00	0.00	0.5000	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T5 115.00-95.00	0.00	0.5000	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T6 95.00-75.00	0.00	0.5000	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T7 75.00-55.00	0.00	0.5000	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T8 55.00-40.00	0.00	0.5000	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T9 40.00-20.00	0.00	0.5000	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T10 20.00-0.00	0.00	0.5000	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
195.00-175.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
175.00-155.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
155.00-135.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
135.00-115.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
115.00-95.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
95.00-75.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
75.00-55.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
55.00-40.00				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
20.00-0.00				1	1	1	1	1	1	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 195.00-175.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 175.00-155.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 155.00-135.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 135.00-115.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 115.00-95.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 95.00-75.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 75.00-55.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 55.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 195.00-175.00	Flange	1.1250 A325N	4	0.7500 A325N	0	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	0	0.6250 A325N	0
T2 175.00-155.00	Flange	1.1250 A325N	6	0.8750 A325N	1	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	0	0.6250 A325N	0
T3 155.00-135.00	Flange	1.1250 A325N	6	0.8750 A325N	1	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	0	0.7500 A325N	0
T4 135.00-115.00	Flange	1.1250 A325N	6	0.8750 A325N	1	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	0	0.7500 A325N	0
T5 115.00-95.00	Flange	1.1250 A325N	8	1.0000 A325N	1	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	0	0.7500 A325N	0
T6 95.00-75.00	Flange	1.1250 A325N	8	1.0000 A325N	1	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	0	0.7500 A325N	0
T7 75.00-55.00	Flange	1.2500 A325N	8	1.0000 A325N	1	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	0	0.7500 A325N	2
T8 55.00-40.00	Flange	1.2500 A325N	8	1.0000 A325N	1	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	0	0.7500 A325N	2
T9 40.00-20.00	Flange	1.2500 A325N	8	1.0000 A325N	1	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	0	0.7500 A325N	2
T10 20.00-0.00	Flange	1.3750 A449	0	1.0000 A325N	1	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	0	0.7500 A325N	2

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
ATT													
LDF7-50A(1-5/8")	A	No	No	Ar (CaAa)	173.00 - 0.00	0.0000	0.45	6	3	1.9800	1.9800		1.04
Fiber Cable	A	No	No	Ar (CaAa)	173.00 - 0.00	0.0000	0.45	2	2	0.5000	0.5000		1.00
DC Cable	A	No	No	Ar (CaAa)	173.00 - 0.00	0.0000	0.45	6	3	0.2500	0.1285		0.05
********** **** ********** ****													
LDF6-50A(1-1/4")	A	No	No	Ar (CaAa)	190.00 - 0.00	0.0000	-0.4	3	3	1.5400	1.5400		1.30
LDF7-50A(1-5/8")	C	No	No	Ar (CaAa)	180.00 - 0.00	0.0000	0.45	1	1	1.9800	1.9800		1.90
LDF7-50A(1-5/8")	C	No	No	Ar (CaAa)	180.00 - 0.00	0.0000	0.4	12	6	1.9800	1.9800		1.04
Feedline Ladder (Af)	C	No	No	Af (CaAa)	180.00 - 0.00	0.0000	0.4	1	1	3.0000	3.0000		8.40
LDF7-50A(1-5/8")	B	No	No	Ar (CaAa)	145.00 - 0.00	0.0000	-0.38	12	12	1.9800	1.9800		1.04
LDF4-50A(1/2")	A	No	No	Ar (CaAa)	80.00 - 0.00	0.0000	-0.39	2	2	0.5800	0.5800		0.25

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight plf
**********								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	195.00-175.00	A	0.000	0.000	6.930	0.000	0.06
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	15.370	0.000	0.11
T2	175.00-155.00	A	0.000	0.000	33.812	0.000	0.23
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	61.480	0.000	0.46
T3	155.00-135.00	A	0.000	0.000	36.542	0.000	0.25
		B	0.000	0.000	23.760	0.000	0.12
		C	0.000	0.000	61.480	0.000	0.46
T4	135.00-115.00	A	0.000	0.000	36.542	0.000	0.25
		B	0.000	0.000	47.520	0.000	0.25
		C	0.000	0.000	61.480	0.000	0.46
T5	115.00-95.00	A	0.000	0.000	36.542	0.000	0.25

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B	0.000	0.000	47.520	0.000	0.25
		C	0.000	0.000	61.480	0.000	0.46
T6	95.00-75.00	A	0.000	0.000	37.122	0.000	0.25
		B	0.000	0.000	47.520	0.000	0.25
		C	0.000	0.000	61.480	0.000	0.46
T7	75.00-55.00	A	0.000	0.000	38.862	0.000	0.26
		B	0.000	0.000	47.520	0.000	0.25
		C	0.000	0.000	61.480	0.000	0.46
T8	55.00-40.00	A	0.000	0.000	29.147	0.000	0.19
		B	0.000	0.000	35.640	0.000	0.19
		C	0.000	0.000	46.110	0.000	0.34
T9	40.00-20.00	A	0.000	0.000	38.862	0.000	0.26
		B	0.000	0.000	47.520	0.000	0.25
		C	0.000	0.000	61.480	0.000	0.46
T10	20.00-0.00	A	0.000	0.000	38.862	0.000	0.26
		B	0.000	0.000	47.520	0.000	0.25
		C	0.000	0.000	61.480	0.000	0.46

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	195.00-175.00	A	1.782	0.000	0.000	23.188	0.000	0.33
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	23.972	0.000	0.60
T2	175.00-155.00	A	1.762	0.000	0.000	95.663	0.000	1.52
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	95.595	0.000	2.40
T3	155.00-135.00	A	1.739	0.000	0.000	102.246	0.000	1.62
		B		0.000	0.000	61.652	0.000	1.00
		C		0.000	0.000	95.268	0.000	2.38
T4	135.00-115.00	A	1.714	0.000	0.000	101.537	0.000	1.60
		B		0.000	0.000	123.163	0.000	1.97
		C		0.000	0.000	94.899	0.000	2.36
T5	115.00-95.00	A	1.684	0.000	0.000	100.718	0.000	1.58
		B		0.000	0.000	122.999	0.000	1.95
		C		0.000	0.000	94.471	0.000	2.33
T6	95.00-75.00	A	1.649	0.000	0.000	103.717	0.000	1.59
		B		0.000	0.000	122.805	0.000	1.92
		C		0.000	0.000	93.963	0.000	2.30
T7	75.00-55.00	A	1.605	0.000	0.000	114.125	0.000	1.65
		B		0.000	0.000	122.565	0.000	1.89
		C		0.000	0.000	93.334	0.000	2.27
T8	55.00-40.00	A	1.556	0.000	0.000	84.307	0.000	1.21
		B		0.000	0.000	91.719	0.000	1.38
		C		0.000	0.000	69.465	0.000	1.67
T9	40.00-20.00	A	1.486	0.000	0.000	109.991	0.000	1.55
		B		0.000	0.000	121.909	0.000	1.79
		C		0.000	0.000	91.613	0.000	2.17
T10	20.00-0.00	A	1.331	0.000	0.000	104.650	0.000	1.43
		B		0.000	0.000	121.064	0.000	1.67
		C		0.000	0.000	89.389	0.000	2.05

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	195.00-175.00	-8.6740	3.8800	-6.1269	3.2035
T2	175.00-155.00	-13.9417	-1.7448	-13.6804	-2.0070
T3	155.00-135.00	-14.5219	-10.0253	-14.6808	-10.9747
T4	135.00-115.00	-14.0870	-16.1205	-15.0139	-18.0603
T5	115.00-95.00	-15.6754	-18.0070	-16.7630	-20.3874
T6	95.00-75.00	-16.1822	-18.4317	-18.0818	-21.4787
T7	75.00-55.00	-16.6646	-18.3279	-19.8624	-21.5324
T8	55.00-40.00	-15.4468	-17.1234	-18.9095	-20.9909
T9	40.00-20.00	-18.1408	-20.0404	-21.7417	-24.2480
T10	20.00-0.00	-18.8036	-20.8047	-22.4667	-25.7981

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	7	LDF6-50A(1-1/4")	175.00 - 190.00	0.6000	0.5397
T1	8	LDF7-50A(1-5/8")	175.00 - 180.00	0.6000	0.5397
T1	9	LDF7-50A(1-5/8")	175.00 - 180.00	0.6000	0.5397
T1	10	Feedline Ladder (Af)	175.00 - 180.00	0.6000	0.5397
T2	2	LDF7-50A(1-5/8")	155.00 - 173.00	0.6000	0.6000
T2	3	Fiber Cable	155.00 - 173.00	0.6000	0.6000
T2	4	DC Cable	155.00 - 173.00	0.6000	0.6000
T2	7	LDF6-50A(1-1/4")	155.00 - 175.00	0.6000	0.6000
T2	8	LDF7-50A(1-5/8")	155.00 - 175.00	0.6000	0.6000
T2	9	LDF7-50A(1-5/8")	155.00 - 175.00	0.6000	0.6000
T2	10	Feedline Ladder (Af)	155.00 - 175.00	0.6000	0.6000
T3	2	LDF7-50A(1-5/8")	135.00 - 155.00	0.6000	0.6000
T3	3	Fiber Cable	135.00 - 155.00	0.6000	0.6000
T3	4	DC Cable	135.00 - 155.00	0.6000	0.6000
T3	7	LDF6-50A(1-1/4")	135.00 - 155.00	0.6000	0.6000
T3	8	LDF7-50A(1-5/8")	135.00 - 155.00	0.6000	0.6000
T3	9	LDF7-50A(1-5/8")	135.00 - 155.00	0.6000	0.6000
T3	10	Feedline Ladder (Af)	135.00 - 155.00	0.6000	0.6000
T3	12	LDF7-50A(1-5/8")	135.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			145.00		
T4	2	LDF7-50A(1-5/8")	115.00 - 135.00	0.6000	0.6000
T4	3	Fiber Cable	115.00 - 135.00	0.6000	0.6000
T4	4	DC Cable	115.00 - 135.00	0.6000	0.6000
T4	7	LDF6-50A(1-1/4")	115.00 - 135.00	0.6000	0.6000
T4	8	LDF7-50A(1-5/8")	115.00 - 135.00	0.6000	0.6000
T4	9	LDF7-50A(1-5/8")	115.00 - 135.00	0.6000	0.6000
T4	10	Feedline Ladder (Af)	115.00 - 135.00	0.6000	0.6000
T4	12	LDF7-50A(1-5/8")	115.00 - 135.00	0.6000	0.6000
T5	2	LDF7-50A(1-5/8")	95.00 - 115.00	0.6000	0.6000
T5	3	Fiber Cable	95.00 - 115.00	0.6000	0.6000
T5	4	DC Cable	95.00 - 115.00	0.6000	0.6000
T5	7	LDF6-50A(1-1/4")	95.00 - 115.00	0.6000	0.6000
T5	8	LDF7-50A(1-5/8")	95.00 - 115.00	0.6000	0.6000
T5	9	LDF7-50A(1-5/8")	95.00 - 115.00	0.6000	0.6000
T5	10	Feedline Ladder (Af)	95.00 - 115.00	0.6000	0.6000
T5	12	LDF7-50A(1-5/8")	95.00 - 115.00	0.6000	0.6000
T6	2	LDF7-50A(1-5/8")	75.00 - 95.00	0.6000	0.6000
T6	3	Fiber Cable	75.00 - 95.00	0.6000	0.6000
T6	4	DC Cable	75.00 - 95.00	0.6000	0.6000
T6	7	LDF6-50A(1-1/4")	75.00 - 95.00	0.6000	0.6000
T6	8	LDF7-50A(1-5/8")	75.00 - 95.00	0.6000	0.6000
T6	9	LDF7-50A(1-5/8")	75.00 - 95.00	0.6000	0.6000
T6	10	Feedline Ladder (Af)	75.00 - 95.00	0.6000	0.6000
T6	12	LDF7-50A(1-5/8")	75.00 - 95.00	0.6000	0.6000
T6	13	LDF4-50A(1/2")	75.00 - 80.00	0.6000	0.6000
T7	2	LDF7-50A(1-5/8")	55.00 - 75.00	0.6000	0.6000
T7	3	Fiber Cable	55.00 - 75.00	0.6000	0.6000
T7	4	DC Cable	55.00 - 75.00	0.6000	0.6000
T7	7	LDF6-50A(1-1/4")	55.00 - 75.00	0.6000	0.6000
T7	8	LDF7-50A(1-5/8")	55.00 - 75.00	0.6000	0.6000
T7	9	LDF7-50A(1-5/8")	55.00 - 75.00	0.6000	0.6000
T7	10	Feedline Ladder (Af)	55.00 - 75.00	0.6000	0.6000
T7	12	LDF7-50A(1-5/8")	55.00 - 75.00	0.6000	0.6000
T7	13	LDF4-50A(1/2")	55.00 - 75.00	0.6000	0.6000
T8	2	LDF7-50A(1-5/8")	40.00 - 55.00	0.6000	0.6000
T8	3	Fiber Cable	40.00 - 55.00	0.6000	0.6000
T8	4	DC Cable	40.00 - 55.00	0.6000	0.6000
T8	7	LDF6-50A(1-1/4")	40.00 - 55.00	0.6000	0.6000
T8	8	LDF7-50A(1-5/8")	40.00 - 55.00	0.6000	0.6000
T8	9	LDF7-50A(1-5/8")	40.00 - 55.00	0.6000	0.6000
T8	10	Feedline Ladder (Af)	40.00 - 55.00	0.6000	0.6000
T8	12	LDF7-50A(1-5/8")	40.00 - 55.00	0.6000	0.6000
T8	13	LDF4-50A(1/2")	40.00 - 55.00	0.6000	0.6000
T9	2	LDF7-50A(1-5/8")	20.00 - 40.00	0.6000	0.6000
T9	3	Fiber Cable	20.00 - 40.00	0.6000	0.6000
T9	4	DC Cable	20.00 - 40.00	0.6000	0.6000
T9	7	LDF6-50A(1-1/4")	20.00 - 40.00	0.6000	0.6000
T9	8	LDF7-50A(1-5/8")	20.00 - 40.00	0.6000	0.6000
T9	9	LDF7-50A(1-5/8")	20.00 - 40.00	0.6000	0.6000
T9	10	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T9	12	LDF7-50A(1-5/8")	20.00 - 40.00	0.6000	0.6000
T9	13	LDF4-50A(1/2")	20.00 - 40.00	0.6000	0.6000
T10	2	LDF7-50A(1-5/8")	0.00 - 20.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T10	3	Fiber Cable	0.00 - 20.00	0.6000	0.6000
T10	4	DC Cable	0.00 - 20.00	0.6000	0.6000
T10	7	LDF6-50A(1-1/4")	0.00 - 20.00	0.6000	0.6000
T10	8	LDF7-50A(1-5/8")	0.00 - 20.00	0.6000	0.6000
T10	9	LDF7-50A(1-5/8")	0.00 - 20.00	0.6000	0.6000
T10	10	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T10	12	LDF7-50A(1-5/8")	0.00 - 20.00	0.6000	0.6000
T10	13	LDF4-50A(1/2")	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
190ft Sprint									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	4.60 5.05 5.50	4.01 4.45 4.89	0.10 0.16 0.23
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	4.60 5.05 5.50	4.01 4.45 4.89	0.10 0.16 0.23
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	4.60 5.05 5.50	4.01 4.45 4.89	0.10 0.16 0.23
RRH2X50-800	A	From Leg	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	1.70 1.86 2.03	1.28 1.43 1.58	0.05 0.07 0.09
RRH2X50-800	B	From Leg	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	1.70 1.86 2.03	1.28 1.43 1.58	0.05 0.07 0.09
RRH2X50-800	C	From Leg	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	1.70 1.86 2.03	1.28 1.43 1.58	0.05 0.07 0.09
PCS 1900MHz 4x45W-65MHz	A	From Leg	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	2.32 2.53 2.74	2.24 2.44 2.65	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	B	From Leg	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	2.32 2.53 2.74	2.24 2.44 2.65	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	C	From Leg	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	2.32 2.53 2.74	2.24 2.44 2.65	0.06 0.08 0.11
(3) 8'-P2x0.203	A	From Leg	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	1.90 2.73 3.40	1.90 2.73 3.40	0.03 0.04 0.06
(3) 8'-P2x0.203	B	From Leg	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	1.90 2.73 3.40	1.90 2.73 3.40	0.03 0.04 0.06
(3) 8'-P2x0.203	C	From Leg	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	1.90 2.73 3.40	1.90 2.73 3.40	0.03 0.04 0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Platform Mount [LP 1101-1]	C	None		0.0000	190.00	No Ice	41.16	41.16	2.35
						1/2" Ice	53.20	53.20	2.96
						1" Ice	65.30	65.30	3.56
180ft T-Mobile									
(2) AIR 21 B2A/B4P w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	6.16 6.60 7.03	5.55 6.30 7.00	0.10 0.16 0.22
(2) AIR 21 B2A/B4P w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	6.16 6.60 7.03	5.55 6.30 7.00	0.10 0.16 0.22
(2) AIR 21 B2A/B4P w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	6.16 6.60 7.03	5.55 6.30 7.00	0.10 0.16 0.22
8' Panel Antenna	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	5.56 6.07 6.59	4.47 4.97 5.48	0.08 0.16 0.26
8' Panel Antenna	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	5.56 6.07 6.59	4.47 4.97 5.48	0.08 0.16 0.26
8' Panel Antenna	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	5.56 6.07 6.59	4.47 4.97 5.48	0.08 0.16 0.26
TMA	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.17 1.31 7.43	0.39 0.48 5.20	0.01 0.02 0.16
TMA	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.17 1.31 7.43	0.39 0.48 5.20	0.01 0.02 0.16
TMA	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	1.17 1.31 7.43	0.39 0.48 5.20	0.01 0.02 0.16
Sector Mount [SM 410-3]	A	None		0.0000	180.00	No Ice 1/2" Ice 1" Ice	23.96 34.06 44.16	23.96 34.06 44.16	1.10 1.60 2.10
173ft AT&T									
800 10121 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	173.00	No Ice 1/2" Ice 1" Ice	3.60 4.00 4.42	2.95 3.34 3.74	0.07 0.11 0.17
800 10121 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	173.00	No Ice 1/2" Ice 1" Ice	3.60 4.00 4.42	2.95 3.34 3.74	0.07 0.11 0.17
800 10121 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	173.00	No Ice 1/2" Ice 1" Ice	3.60 4.00 4.42	2.95 3.34 3.74	0.07 0.11 0.17
(2) 80010965 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	173.00	No Ice 1/2" Ice 1" Ice	14.05 14.69 15.30	7.63 8.90 9.96	0.13 0.22 0.33
(2) 80010965 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	173.00	No Ice 1/2" Ice 1" Ice	14.05 14.69 15.30	7.63 8.90 9.96	0.13 0.22 0.33
(2) 80010965 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	173.00	No Ice 1/2" Ice 1" Ice	14.05 14.69 15.30	7.63 8.90 9.96	0.13 0.22 0.33
(2) LGP21401	A	From Leg	4.00 0.00 0.00	0.0000	173.00	No Ice 1/2" Ice 1" Ice	1.10 1.24 1.38	0.21 0.27 0.35	0.01 0.02 0.03
(2) LGP21401	B	From Leg	4.00	0.0000	173.00	No Ice	1.10	0.21	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	1.24	0.27	0.02
			0.00			1" Ice	1.38	0.35	0.03
(2) LGP21401	C	From Leg	4.00	0.0000	173.00	No Ice	1.10	0.21	0.01
			0.00			1/2" Ice	1.24	0.27	0.02
			0.00			1" Ice	1.38	0.35	0.03
RRUS 4478 B14	A	From Leg	4.00	0.0000	173.00	No Ice	1.84	1.06	0.06
			0.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
RRUS 4478 B14	B	From Leg	4.00	0.0000	173.00	No Ice	1.84	1.06	0.06
			0.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
RRUS 4478 B14	C	From Leg	4.00	0.0000	173.00	No Ice	1.84	1.06	0.06
			0.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
RRUS 4449 B5/B12	A	From Leg	4.00	0.0000	173.00	No Ice	1.97	1.41	0.07
			0.00			1/2" Ice	2.14	1.56	0.09
			0.00			1" Ice	2.33	1.73	0.11
RRUS 4449 B5/B12	B	From Leg	4.00	0.0000	173.00	No Ice	1.97	1.41	0.07
			0.00			1/2" Ice	2.14	1.56	0.09
			0.00			1" Ice	2.33	1.73	0.11
RRUS 4449 B5/B12	C	From Leg	4.00	0.0000	173.00	No Ice	1.97	1.41	0.07
			0.00			1/2" Ice	2.14	1.56	0.09
			0.00			1" Ice	2.33	1.73	0.11
RRUS 32	A	From Leg	4.00	0.0000	173.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			0.00			1" Ice	3.32	2.17	0.10
RRUS 32	B	From Leg	4.00	0.0000	173.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			0.00			1" Ice	3.32	2.17	0.10
RRUS 32	C	From Leg	4.00	0.0000	173.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			0.00			1" Ice	3.32	2.17	0.10
RRUS 12	A	From Leg	4.00	0.0000	173.00	No Ice	3.15	1.29	0.06
			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
RRUS 12	B	From Leg	4.00	0.0000	173.00	No Ice	3.15	1.29	0.06
			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
RRUS 12	C	From Leg	4.00	0.0000	173.00	No Ice	3.15	1.29	0.06
			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
DC6-48-60-18-8C	A	From Leg	0.50	0.0000	173.00	No Ice	1.14	1.14	0.03
			0.00			1/2" Ice	1.79	1.79	0.05
			0.00			1" Ice	2.00	2.00	0.07
DC6-48-60-18-8C	B	From Leg	0.50	0.0000	173.00	No Ice	1.14	1.14	0.03
			0.00			1/2" Ice	1.79	1.79	0.05
			0.00			1" Ice	2.00	2.00	0.07
DC6-48-60-18-8C	C	From Leg	0.50	0.0000	173.00	No Ice	1.14	1.14	0.03
			0.00			1/2" Ice	1.79	1.79	0.05
			0.00			1" Ice	2.00	2.00	0.07
Sector Mount [SM 409-3]	A	None		0.0000	173.00	No Ice	22.47	22.47	1.03
						1/2" Ice	31.99	31.99	1.50
						1" Ice	41.51	41.51	1.97
160ft Nextel Sector Mount [SM 410-3]	A	None		0.0000	160.00	No Ice	23.96	23.96	1.10
						1/2" Ice	34.06	34.06	1.60
						1" Ice	44.16	44.16	2.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(4) 6'-P2x0.154	A	From Leg	4.00	0.0000	160.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.92	1.92	0.03
			0.00			1" Ice	2.29	2.29	0.05
(4) 6'-P2x0.154	B	From Leg	4.00	0.0000	160.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.92	1.92	0.03
			0.00			1" Ice	2.29	2.29	0.05
(4) 6'-P2x0.154	C	From Leg	4.00	0.0000	160.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.92	1.92	0.03
			0.00			1" Ice	2.29	2.29	0.05
145ft Verizon									
(2) LPA-80080/4CF w/ Mount Pipe	A	From Leg	4.00	0.0000	145.00	No Ice	2.86	6.57	0.03
			0.00			1/2" Ice	3.22	7.19	0.08
			0.00			1" Ice	3.59	7.84	0.13
(2) LPA-80080/4CF w/ Mount Pipe	B	From Leg	4.00	0.0000	145.00	No Ice	2.86	6.57	0.03
			0.00			1/2" Ice	3.22	7.19	0.08
			0.00			1" Ice	3.59	7.84	0.13
(2) LPA-80080/4CF w/ Mount Pipe	C	From Leg	4.00	0.0000	145.00	No Ice	2.86	6.57	0.03
			0.00			1/2" Ice	3.22	7.19	0.08
			0.00			1" Ice	3.59	7.84	0.13
BXA-70063/6CF w/ Mount Pipe	A	From Leg	4.00	0.0000	145.00	No Ice	7.82	5.41	0.04
			0.00			1/2" Ice	8.37	6.56	0.10
			0.00			1" Ice	8.89	7.42	0.17
BXA-70063/6CF w/ Mount Pipe	B	From Leg	4.00	0.0000	145.00	No Ice	7.82	5.41	0.04
			0.00			1/2" Ice	8.37	6.56	0.10
			0.00			1" Ice	8.89	7.42	0.17
BXA-70063/6CF w/ Mount Pipe	C	From Leg	4.00	0.0000	145.00	No Ice	7.82	5.41	0.04
			0.00			1/2" Ice	8.37	6.56	0.10
			0.00			1" Ice	8.89	7.42	0.17
BXA-171085-8CF-EDIN-X w/ Mount Pipe	A	From Leg	4.00	0.0000	145.00	No Ice	3.16	3.33	0.03
			0.00			1/2" Ice	3.53	3.94	0.06
			0.00			1" Ice	3.90	4.56	0.10
BXA-171085-8CF-EDIN-X w/ Mount Pipe	B	From Leg	4.00	0.0000	145.00	No Ice	3.16	3.33	0.03
			0.00			1/2" Ice	3.53	3.94	0.06
			0.00			1" Ice	3.90	4.56	0.10
BXA-171085-8CF-EDIN-X w/ Mount Pipe	C	From Leg	4.00	0.0000	145.00	No Ice	3.16	3.33	0.03
			0.00			1/2" Ice	3.53	3.94	0.06
			0.00			1" Ice	3.90	4.56	0.10
(2) FD9R6004/2C-3L	A	From Leg	4.00	0.0000	145.00	No Ice	0.31	0.08	0.00
			0.00			1/2" Ice	0.39	0.12	0.01
			0.00			1" Ice	0.47	0.17	0.01
(2) FD9R6004/2C-3L	B	From Leg	4.00	0.0000	145.00	No Ice	0.31	0.08	0.00
			0.00			1/2" Ice	0.39	0.12	0.01
			0.00			1" Ice	0.47	0.17	0.01
(2) FD9R6004/2C-3L	C	From Leg	4.00	0.0000	145.00	No Ice	0.31	0.08	0.00
			0.00			1/2" Ice	0.39	0.12	0.01
			0.00			1" Ice	0.47	0.17	0.01
Sector Mount [SM 410-3]	A	None		0.0000	145.00	No Ice	23.96	23.96	1.10
						1/2" Ice	34.06	34.06	1.60
						1" Ice	44.16	44.16	2.10
80ft									
GPS	A	From Leg	2.00	0.0000	80.00	No Ice	1.00	1.00	0.01
			0.00			1/2" Ice	1.50	1.50	0.01
			0.00			1" Ice	2.00	2.00	0.04
GPS	C	From Leg	2.00	0.0000	80.00	No Ice	1.00	1.00	0.01
			0.00			1/2" Ice	1.50	1.50	0.01
			0.00			1" Ice	2.00	2.00	0.04
2ft Stand Off	A	From Leg	2.00	0.0000	80.00	No Ice	1.07	1.07	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	1.62	1.62	0.03
			0.00			1" Ice	2.17	2.17	0.04
2ft Stand Off	C	From Leg	2.00	0.0000	80.00	No Ice	1.07	1.07	0.02
			0.00			1/2" Ice	1.62	1.62	0.03
			0.00			1" Ice	2.17	2.17	0.04
***									

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service

Comb. No.	Description
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	195 - 175	Leg	Max Tension	15	10.28	-0.04	0.01
			Max. Compression	2	-15.59	0.61	0.05
			Max. Mx	6	9.06	-0.66	0.03
			Max. My	24	-0.24	-0.01	-0.66
			Max. Vy	6	0.59	-0.33	-0.00
			Max. Vx	24	0.58	-0.01	0.29
		Diagonal	Max Tension	4	2.47	0.00	0.00
			Max. Compression	4	-2.50	0.00	0.00
			Max. Mx	34	0.37	-0.02	0.00
			Max. My	36	0.36	-0.02	-0.00
			Max. Vy	35	-0.02	-0.02	-0.00
			Max. Vx	36	0.00	0.00	0.00
		Top Girt	Max Tension	7	0.06	0.00	0.00
			Max. Compression	18	-0.09	0.00	0.00
			Max. Mx	26	-0.04	0.04	0.00
			Max. My	24	-0.02	0.00	-0.00
			Max. Vy	26	-0.03	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
		Bottom Girt	Max Tension	3	0.47	0.00	0.00
			Max. Compression	14	-0.52	0.00	0.00
			Max. Mx	26	-0.09	0.05	0.00
			Max. My	24	-0.02	0.00	-0.00
			Max. Vy	26	0.04	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
T2	175 - 155	Leg	Max Tension	15	40.14	-0.21	-0.06
			Max. Compression	2	-50.53	0.28	0.08
			Max. Mx	6	16.31	1.52	0.03
			Max. My	24	-4.95	-0.05	-1.54
			Max. Vy	6	-1.11	-0.66	0.03
			Max. Vx	24	1.10	-0.02	0.59
		Diagonal	Max Tension	4	5.54	0.00	0.00
			Max. Compression	4	-5.63	0.00	0.00
			Max. Mx	37	1.27	0.04	0.01
			Max. My	38	-0.89	0.03	0.01
			Max. Vy	37	0.04	0.04	0.01
			Max. Vx	38	-0.00	0.00	0.00
T3	155 - 135	Leg	Max Tension	15	74.92	-0.67	-0.06
			Max. Compression	2	-90.76	-0.02	0.06
			Max. Mx	6	57.51	1.07	0.04
			Max. My	12	-8.64	-0.03	1.09
			Max. Vy	6	0.56	-0.67	0.04
			Max. Vx	24	-0.58	-0.03	0.65
		Diagonal	Max Tension	4	7.19	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	4	-7.24	0.00	0.00
			Max. Mx	37	1.65	0.07	-0.01
			Max. My	33	-1.85	0.06	-0.01
			Max. Vy	37	0.05	0.07	-0.01
			Max. Vx	38	-0.00	0.00	0.00
T4	135 - 115	Leg	Max Tension	15	110.57	-0.14	-0.05
			Max. Compression	2	-131.33	0.32	0.08
			Max. Mx	3	-128.44	0.32	0.08
			Max. My	24	-11.55	-0.00	0.34
			Max. Vy	6	0.11	-0.25	0.06
			Max. Vx	8	-0.13	-0.00	0.32
		Diagonal	Max Tension	4	7.68	0.00	0.00
			Max. Compression	4	-7.76	0.00	0.00
			Max. Mx	37	1.54	0.10	-0.01
			Max. My	27	-0.04	0.09	0.01
			Max. Vy	37	0.07	0.10	-0.01
			Max. Vx	27	-0.00	0.00	0.00
T5	115 - 95	Leg	Max Tension	15	143.45	-0.21	-0.06
			Max. Compression	2	-169.99	0.19	0.05
			Max. Mx	3	-140.85	0.32	0.08
			Max. My	24	-11.84	-0.00	0.34
			Max. Vy	6	-0.09	-0.30	0.07
			Max. Vx	8	0.13	-0.00	0.32
		Diagonal	Max Tension	4	8.54	0.00	0.00
			Max. Compression	4	-8.66	0.00	0.00
			Max. Mx	37	1.51	0.15	-0.02
			Max. My	35	-0.05	0.13	-0.02
			Max. Vy	37	0.09	0.15	-0.02
			Max. Vx	35	0.01	0.00	0.00
T6	95 - 75	Leg	Max Tension	15	175.00	-0.25	-0.06
			Max. Compression	2	-208.18	0.19	0.04
			Max. Mx	14	171.44	-0.26	-0.06
			Max. My	24	-15.82	-0.01	0.32
			Max. Vy	6	-0.11	-0.25	0.06
			Max. Vx	2	0.17	-0.14	0.30
		Diagonal	Max Tension	4	9.62	0.00	0.00
			Max. Compression	4	-9.69	0.00	0.00
			Max. Mx	37	1.58	0.19	-0.02
			Max. My	35	-0.02	0.18	-0.03
			Max. Vy	37	0.11	0.19	-0.02
			Max. Vx	35	0.01	0.00	0.00
T7	75 - 55	Leg	Max Tension	15	206.18	-0.30	-0.06
			Max. Compression	2	-246.58	0.05	-0.02
			Max. Mx	14	201.93	-0.31	-0.06
			Max. My	24	-18.73	-0.04	0.38
			Max. Vy	6	-0.11	-0.30	0.06
			Max. Vx	12	-0.16	-0.04	-0.38
		Diagonal	Max Tension	4	10.75	0.00	0.00
			Max. Compression	4	-10.86	0.00	0.00
			Max. Mx	37	1.56	0.25	-0.03
			Max. My	35	-0.08	0.23	-0.03
			Max. Vy	37	0.13	0.25	-0.03
			Max. Vx	35	0.01	0.00	0.00
T8	55 - 40	Leg	Max Tension	15	230.73	-0.09	0.00
			Max. Compression	2	-277.60	0.65	0.14
			Max. Mx	29	21.66	-0.73	0.05
			Max. My	24	-22.16	-0.02	0.61
			Max. Vy	29	0.24	-0.73	0.05
			Max. Vx	12	0.17	-0.02	-0.61
		Diagonal	Max Tension	4	11.36	0.00	0.00
			Max. Compression	4	-11.45	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	37	1.36	0.26	-0.03
			Max. My	29	-2.13	0.23	0.04
			Max. Vy	37	0.13	0.25	0.03
			Max. Vx	29	0.01	0.00	0.00
T9	40 - 20	Leg	Max Tension	15	260.43	-0.28	-0.04
			Max. Compression	2	-315.54	0.34	0.07
			Max. Mx	31	-128.81	2.03	-0.00
			Max. My	24	-22.59	-0.02	0.61
			Max. Vy	33	-0.50	-1.29	-0.02
			Max. Vx	20	0.15	-0.03	-0.55
		Diagonal	Max Tension	4	12.62	0.00	0.00
			Max. Compression	4	-12.79	0.00	0.00
			Max. Mx	37	0.49	0.40	0.05
			Max. My	29	-3.96	0.37	0.05
			Max. Vy	37	0.16	0.40	-0.04
			Max. Vx	29	0.01	0.00	0.00
T10	20 - 0	Leg	Max Tension	15	290.37	-0.29	-0.04
			Max. Compression	2	-355.07	-0.00	-0.00
			Max. Mx	31	-138.13	3.32	0.00
			Max. My	24	-27.91	-0.06	0.62
			Max. Vy	33	-0.96	-3.04	-0.01
			Max. Vx	24	0.18	-0.06	0.62
		Diagonal	Max Tension	4	13.54	0.00	0.00
			Max. Compression	4	-13.79	0.00	0.00
			Max. Mx	37	-1.23	0.54	0.06
			Max. My	29	-6.86	0.52	0.06
			Max. Vy	37	0.18	0.54	0.06
			Max. Vx	29	-0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	350.46	32.59	-20.51
	Max. H_x	18	350.46	32.59	-20.51
	Max. H_z	5	-254.41	-23.26	18.36
	Min. Vert	7	-282.53	-27.15	17.41
	Min. H_x	7	-282.53	-27.15	17.41
	Min. H_z	18	350.46	32.59	-20.51
Leg B	Max. Vert	10	346.05	-32.86	-19.20
	Max. H_x	23	-283.18	27.49	16.13
	Max. H_z	23	-283.18	27.49	16.13
	Min. Vert	23	-283.18	27.49	16.13
	Min. H_x	10	346.05	-32.86	-19.20
	Min. H_z	10	346.05	-32.86	-19.20
Leg A	Max. Vert	2	361.01	-1.64	39.61
	Max. H_x	21	21.41	6.45	1.67
	Max. H_z	2	361.01	-1.64	39.61
	Min. Vert	15	-294.69	1.66	-33.40
	Min. H_x	8	28.55	-6.49	2.24
	Min. H_z	15	-294.69	1.66	-33.40

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	70.49	-0.00	-0.00	-5.85	28.28	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	84.59	0.00	-64.64	-6773.20	34.16	-67.11
0.9 Dead+1.6 Wind 0 deg - No Ice	63.44	0.00	-64.64	-6764.97	25.61	-67.10
1.2 Dead+1.6 Wind 30 deg - No Ice	84.59	30.74	-53.25	-5640.03	-3218.05	-63.18
0.9 Dead+1.6 Wind 30 deg - No Ice	63.44	30.74	-53.25	-5632.86	-3223.46	-63.16
1.2 Dead+1.6 Wind 60 deg - No Ice	84.59	50.36	-29.08	-3109.99	-5340.23	-60.30
0.9 Dead+1.6 Wind 60 deg - No Ice	63.44	50.36	-29.08	-3105.23	-5343.58	-60.28
1.2 Dead+1.6 Wind 90 deg - No Ice	84.59	58.69	0.00	-7.13	-6192.27	-58.55
0.9 Dead+1.6 Wind 90 deg - No Ice	63.44	58.68	0.00	-5.36	-6194.82	-58.52
1.2 Dead+1.6 Wind 120 deg - No Ice	84.59	53.67	30.99	3243.87	-5596.69	-8.59
0.9 Dead+1.6 Wind 120 deg - No Ice	63.44	53.67	30.99	3242.52	-5599.83	-8.59
1.2 Dead+1.6 Wind 150 deg - No Ice	84.59	29.06	50.33	5434.60	-3107.54	64.96
0.9 Dead+1.6 Wind 150 deg - No Ice	63.44	29.06	50.33	5431.07	-3113.03	64.92
1.2 Dead+1.6 Wind 180 deg - No Ice	84.59	0.00	60.12	6432.22	34.15	67.10
0.9 Dead+1.6 Wind 180 deg - No Ice	63.44	0.00	60.12	6427.76	25.62	67.08
1.2 Dead+1.6 Wind 210 deg - No Ice	84.59	-30.74	53.25	5625.88	3286.30	63.18
0.9 Dead+1.6 Wind 210 deg - No Ice	63.44	-30.74	53.25	5622.23	3274.65	63.16
1.2 Dead+1.6 Wind 240 deg - No Ice	84.59	-54.28	31.34	3259.24	5691.53	60.31
0.9 Dead+1.6 Wind 240 deg - No Ice	63.44	-54.28	31.34	3257.89	5677.60	60.30
1.2 Dead+1.6 Wind 270 deg - No Ice	84.59	-58.69	0.00	-7.08	6260.37	58.55
0.9 Dead+1.6 Wind 270 deg - No Ice	63.44	-58.68	0.00	-5.32	6245.85	58.52
1.2 Dead+1.6 Wind 300 deg - No Ice	84.59	-49.76	-28.73	-3094.48	5381.66	8.58
0.9 Dead+1.6 Wind 300 deg - No Ice	63.44	-49.76	-28.73	-3089.73	5367.95	8.59
1.2 Dead+1.6 Wind 330 deg - No Ice	84.59	-29.06	-50.33	-5448.57	3175.81	-64.96
0.9 Dead+1.6 Wind 330 deg - No Ice	63.44	-29.06	-50.33	-5441.52	3164.22	-64.92
1.2 Dead+1.0 Ice+1.0 Temp	188.81	0.00	0.00	-81.39	144.98	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	188.81	0.00	-17.00	-1979.75	145.32	-18.72
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	188.81	8.63	-14.94	-1737.68	-810.81	-20.12
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	188.81	15.03	-8.68	-1038.88	-1512.68	-24.90
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	188.81	17.04	0.00	-81.62	-1745.75	-19.16

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	188.81	14.54	8.40	856.90	-1480.15	0.48
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	188.81	8.02	13.90	1502.04	-768.92	16.14
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	188.81	0.00	16.36	1770.44	145.36	18.72
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	188.81	-8.63	14.94	1574.52	1101.48	20.12
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	188.81	-15.59	9.00	898.79	1843.33	24.90
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	188.81	-17.04	0.00	-81.54	2036.41	19.16
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	188.81	-13.98	-8.07	-996.97	1730.84	-0.48
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	188.81	-8.02	-13.90	-1665.17	1059.60	-16.14
Dead+Wind 0 deg - Service	70.49	-0.00	-15.46	-1622.83	28.37	-16.05
Dead+Wind 30 deg - Service	70.49	7.35	-12.73	-1352.01	-748.84	-15.10
Dead+Wind 60 deg - Service	70.49	12.04	-6.95	-747.38	-1255.98	-14.42
Dead+Wind 90 deg - Service	70.49	14.03	0.00	-5.87	-1459.59	-14.00
Dead+Wind 120 deg - Service	70.49	12.84	7.41	771.04	-1317.26	-2.05
Dead+Wind 150 deg - Service	70.49	6.95	12.03	1294.56	-722.42	15.53
Dead+Wind 180 deg - Service	70.49	0.00	14.38	1532.98	28.36	16.04
Dead+Wind 210 deg - Service	70.49	-7.35	12.73	1340.29	805.56	15.10
Dead+Wind 240 deg - Service	70.49	-12.98	7.49	774.72	1380.37	14.42
Dead+Wind 270 deg - Service	70.49	-14.03	0.00	-5.86	1516.31	14.00
Dead+Wind 300 deg - Service	70.49	-11.90	-6.87	-743.69	1306.32	2.05
Dead+Wind 330 deg - Service	70.49	-6.95	-12.03	-1306.26	779.15	-15.53

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-70.49	0.00	0.00	70.49	0.00	0.000%
2	0.00	-84.59	-64.64	-0.00	84.59	64.64	0.001%
3	0.00	-63.44	-64.64	-0.00	63.44	64.64	0.001%
4	30.74	-84.59	-53.25	-30.74	84.59	53.25	0.000%
5	30.74	-63.44	-53.25	-30.74	63.44	53.25	0.001%
6	50.36	-84.59	-29.08	-50.36	84.59	29.08	0.000%
7	50.36	-63.44	-29.08	-50.36	63.44	29.08	0.001%
8	58.69	-84.59	0.00	-58.69	84.59	-0.00	0.000%
9	58.69	-63.44	0.00	-58.68	63.44	-0.00	0.001%
10	53.68	-84.59	30.99	-53.67	84.59	-30.99	0.000%
11	53.68	-63.44	30.99	-53.67	63.44	-30.99	0.001%
12	29.06	-84.59	50.33	-29.06	84.59	-50.33	0.000%
13	29.06	-63.44	50.33	-29.06	63.44	-50.33	0.001%
14	0.00	-84.59	60.12	-0.00	84.59	-60.12	0.000%
15	0.00	-63.44	60.12	-0.00	63.44	-60.12	0.002%
16	-30.74	-84.59	53.25	30.74	84.59	-53.25	0.000%
17	-30.74	-63.44	53.25	30.74	63.44	-53.25	0.001%
18	-54.28	-84.59	31.34	54.28	84.59	-31.34	0.001%
19	-54.28	-63.44	31.34	54.28	63.44	-31.34	0.001%
20	-58.69	-84.59	0.00	58.69	84.59	-0.00	0.000%
21	-58.69	-63.44	0.00	58.68	63.44	-0.00	0.001%
22	-49.76	-84.59	-28.73	49.76	84.59	28.73	0.000%
23	-49.76	-63.44	-28.73	49.76	63.44	28.73	0.002%
24	-29.06	-84.59	-50.33	29.06	84.59	50.33	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
25	-29.06	-63.44	-50.33	29.06	63.44	50.33	0.002%
26	0.00	-188.81	0.00	-0.00	188.81	-0.00	0.000%
27	0.00	-188.81	-17.00	-0.00	188.81	17.00	0.000%
28	8.63	-188.81	-14.94	-8.63	188.81	14.94	0.000%
29	15.03	-188.81	-8.68	-15.03	188.81	8.68	0.000%
30	17.05	-188.81	0.00	-17.04	188.81	-0.00	0.000%
31	14.54	-188.81	8.40	-14.54	188.81	-8.40	0.000%
32	8.02	-188.81	13.90	-8.02	188.81	-13.90	0.000%
33	0.00	-188.81	16.36	-0.00	188.81	-16.36	0.000%
34	-8.63	-188.81	14.94	8.63	188.81	-14.94	0.000%
35	-15.59	-188.81	9.00	15.59	188.81	-9.00	0.000%
36	-17.05	-188.81	0.00	17.04	188.81	-0.00	0.000%
37	-13.98	-188.81	-8.07	13.98	188.81	8.07	0.000%
38	-8.02	-188.81	-13.90	8.02	188.81	13.90	0.000%
39	-0.00	-70.49	-15.46	0.00	70.49	15.46	0.001%
40	7.35	-70.49	-12.73	-7.35	70.49	12.73	0.000%
41	12.04	-70.49	-6.95	-12.04	70.49	6.95	0.000%
42	14.03	-70.49	0.00	-14.03	70.49	-0.00	0.000%
43	12.84	-70.49	7.41	-12.84	70.49	-7.41	0.000%
44	6.95	-70.49	12.04	-6.95	70.49	-12.03	0.000%
45	0.00	-70.49	14.38	-0.00	70.49	-14.38	0.000%
46	-7.35	-70.49	12.73	7.35	70.49	-12.73	0.000%
47	-12.98	-70.49	7.49	12.98	70.49	-7.49	0.000%
48	-14.03	-70.49	0.00	14.03	70.49	-0.00	0.000%
49	-11.90	-70.49	-6.87	11.90	70.49	6.87	0.000%
50	-6.95	-70.49	-12.04	6.95	70.49	12.03	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	9	0.00000001	0.00003936
3	Yes	8	0.00000001	0.00011474
4	Yes	9	0.00000001	0.00004028
5	Yes	8	0.00000001	0.00011834
6	Yes	9	0.00000001	0.00004121
7	Yes	8	0.00000001	0.00012182
8	Yes	9	0.00000001	0.00004031
9	Yes	8	0.00000001	0.00011849
10	Yes	9	0.00000001	0.00003933
11	Yes	8	0.00000001	0.00011481
12	Yes	9	0.00000001	0.00004054
13	Yes	8	0.00000001	0.00011913
14	Yes	9	0.00000001	0.00004131
15	Yes	8	0.00000001	0.00012212
16	Yes	9	0.00000001	0.00004029
17	Yes	8	0.00000001	0.00011837
18	Yes	9	0.00000001	0.00003934
19	Yes	8	0.00000001	0.00011474
20	Yes	9	0.00000001	0.00004031
21	Yes	8	0.00000001	0.00011848
22	Yes	9	0.00000001	0.00004124
23	Yes	8	0.00000001	0.00012191
24	Yes	9	0.00000001	0.00004052
25	Yes	8	0.00000001	0.00011909

26	Yes	7	0.00000001	0.00008918
27	Yes	9	0.00000001	0.00007551
28	Yes	9	0.00000001	0.00007412
29	Yes	9	0.00000001	0.00007268
30	Yes	9	0.00000001	0.00007108
31	Yes	9	0.00000001	0.00007069
32	Yes	9	0.00000001	0.00007146
33	Yes	9	0.00000001	0.00007338
34	Yes	9	0.00000001	0.00007507
35	Yes	9	0.00000001	0.00007639
36	Yes	9	0.00000001	0.00007673
37	Yes	9	0.00000001	0.00007672
38	Yes	9	0.00000001	0.00007623
39	Yes	8	0.00000001	0.00012161
40	Yes	8	0.00000001	0.00012173
41	Yes	8	0.00000001	0.00012178
42	Yes	8	0.00000001	0.00012086
43	Yes	8	0.00000001	0.00012069
44	Yes	8	0.00000001	0.00012213
45	Yes	8	0.00000001	0.00012303
46	Yes	8	0.00000001	0.00012212
47	Yes	8	0.00000001	0.00012119
48	Yes	8	0.00000001	0.00012161
49	Yes	8	0.00000001	0.00012252
50	Yes	8	0.00000001	0.00012242

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	195 - 175	2.417	39	0.0927	0.0336
T2	175 - 155	2.026	39	0.0910	0.0329
T3	155 - 135	1.631	39	0.0858	0.0291
T4	135 - 115	1.272	39	0.0768	0.0255
T5	115 - 95	0.950	39	0.0664	0.0214
T6	95 - 75	0.679	39	0.0542	0.0182
T7	75 - 55	0.455	39	0.0424	0.0148
T8	55 - 40	0.273	39	0.0314	0.0107
T9	40 - 20	0.157	39	0.0230	0.0068
T10	20 - 0	0.053	39	0.0111	0.0031

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
190.00	APXVSPP18-C-A20 w/ Mount Pipe	39	2.320	0.0924	0.0336	Inf
180.00	(2) AIR 21 B2A/B4P w/ Mount Pipe	39	2.124	0.0916	0.0334	377096
173.00	800 10121 w/ Mount Pipe	39	1.986	0.0906	0.0326	504296
160.00	Sector Mount [SM 410-3]	39	1.728	0.0875	0.0301	141301
145.00	(2) LPA-80080/4CF w/ Mount Pipe	39	1.446	0.0816	0.0273	119458
80.00	GPS	39	0.507	0.0453	0.0157	106036

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	195 - 175	10.103	2	0.3880	0.1407
T2	175 - 155	8.464	2	0.3806	0.1377
T3	155 - 135	6.814	2	0.3588	0.1216
T4	135 - 115	5.312	2	0.3209	0.1068
T5	115 - 95	3.966	2	0.2774	0.0895
T6	95 - 75	2.837	2	0.2262	0.0764
T7	75 - 55	1.903	2	0.1770	0.0619
T8	55 - 40	1.140	2	0.1311	0.0449
T9	40 - 20	0.654	2	0.0960	0.0284
T10	20 - 0	0.223	2	0.0463	0.0132

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
190.00	APXVSPP18-C-A20 w/ Mount Pipe	2	9.696	0.3868	0.1408	275254
180.00	(2) AIR 21 B2A/B4P w/ Mount Pipe	2	8.877	0.3834	0.1397	91752
173.00	800 10121 w/ Mount Pipe	2	8.297	0.3792	0.1366	124325
160.00	Sector Mount [SM 410-3]	2	7.217	0.3660	0.1260	33992
145.00	(2) LPA-80080/4CF w/ Mount Pipe	2	6.042	0.3411	0.1141	28693
80.00	GPS	2	2.119	0.1889	0.0657	25398

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	195	Leg	A325N	1.1250	4	2.57	67.10	0.038	1	Bolt Tension
T2	175	Leg	A325N	1.1250	6	6.69	67.10	0.100	1	Bolt Tension
		Diagonal	A325N	0.8750	1	5.54	9.07	0.610	1	Member Block Shear
T3	155	Leg	A325N	1.1250	6	12.49	67.10	0.186	1	Bolt Tension
		Diagonal	A325N	0.8750	1	7.19	15.12	0.475	1	Member Block Shear
T4	135	Leg	A325N	1.1250	6	18.43	67.10	0.275	1	Bolt Tension
		Diagonal	A325N	0.8750	1	7.68	13.46	0.570	1	Member Block Shear
T5	115	Leg	A325N	1.1250	8	17.93	67.10	0.267	1	Bolt Tension
		Diagonal	A325N	1.0000	1	8.54	20.33	0.420	1	Member Block Shear
T6	95	Leg	A325N	1.1250	8	21.88	67.10	0.326	1	Bolt Tension
		Diagonal	A325N	1.0000	1	9.62	20.34	0.473	1	Member Block Shear
T7	75	Leg	A325N	1.2500	8	25.77	82.83	0.311	1	Bolt Tension
		Diagonal	A325N	1.0000	1	10.75	16.27	0.661	1	Member Block Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T8	55	Leg	A325N	1.2500	8	28.84	82.83	0.348	1	Bolt Tension
		Diagonal	A325N	1.0000	1	11.36	16.27	0.698	1	Member Block Shear
T9	40	Leg	A325N	1.2500	8	32.55	82.83	0.393	1	Bolt Tension
		Diagonal	A325N	1.0000	1	12.62	20.34	0.620	1	Member Block Shear
T10	20	Diagonal	A325N	1.0000	1	13.54	24.41	0.555	1	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 175	3	20.01	3.33	53.4 K=1.00	7.0686	-15.59	258.31	0.060 [1]
T2	175 - 155	3 3/4	20.03	6.68	85.5 K=1.00	11.0447	-50.53	291.32	0.173 [1]
T3	155 - 135	4	20.03	6.68	80.1 K=1.00	12.5664	-90.76	353.60	0.257 [1]
T4	135 - 115	4 1/4	20.03	6.68	75.4 K=1.00	14.1863	-131.33	421.17	0.312 [1]
T5	115 - 95	4 1/4	20.03	6.68	75.4 K=1.00	14.1863	-169.99	421.17	0.404 [1]
T6	95 - 75	4 1/2	20.03	6.68	71.2 K=1.00	15.9043	-208.18	493.88	0.422 [1]
T7	75 - 55	4 3/4	20.03	6.68	67.5 K=1.00	17.7205	-246.57	571.60	0.431 [1]
T8	55 - 40	4 3/4	15.03	5.01	50.6 K=1.00	17.7205	-277.60	661.23	0.420 [1]
T9	40 - 20	4 3/4	20.03	6.68	67.5 K=1.00	17.7205	-315.54	571.60	0.552 [1]
T10	20 - 0	5	20.03	6.68	64.1 K=1.00	19.6350	-355.07	654.25	0.543 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 175	1 1/4	6.79	3.30	114.0 K=0.90	1.2272	-2.50	20.05	0.125 [1]
T2	175 - 155	L2 1/2x2 1/2x3/16	10.16	4.94	119.9	0.9020	-5.63	13.71	0.411 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	155 - 135	L2 1/2x2 1/2x5/16	11.74	5.72	K=1.00 140.4	1.4600	-7.24	16.73	0.433 [1]
T4	135 - 115	L3x3x1/4	13.44	6.56	K=1.00 132.9	1.4400	-7.76	18.41	0.421 [1]
T5	115 - 95	L3x3x3/8	15.21	7.43	K=1.00 151.8	2.1100	-8.66	20.69	0.418 [1]
T6	95 - 75	L3 1/2x3 1/2x5/16	17.03	8.32	K=1.00 144.8	2.0900	-9.69	22.53	0.430 [1]
T7	75 - 55	L4x4x1/4	18.88	9.24	K=1.00 139.5	1.9400	-10.86	22.52	0.482 [1]
T8	55 - 40	L4x4x1/4	19.89	9.70	K=1.00 146.5	1.9400	-11.45	20.43	0.560 [1]
T9	40 - 20	L4x4x5/16	22.19	10.90	K=1.00 165.3	2.4000	-12.79	19.84	0.645 [1]
T10	20 - 0	L4x4x3/8	24.11	11.84	K=1.00 180.4	2.8600	-13.79	19.86	0.694 [1]
					K=1.00				

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 175	1 1/4	5.00	4.75	127.7 K=0.70	1.2272	-0.09	16.86	0.005 [1]

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 175	1 1/4	6.00	5.75	154.6 K=0.70	1.2272	-0.52	11.61	0.044 [1]

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	195 - 175	3	20.01	3.33	53.4	7.0686	10.28	318.09	0.032 [1]
T2	175 - 155	3 3/4	20.03	6.68	85.5	11.0447	40.14	497.01	0.081 [1]
T3	155 - 135	4	20.03	6.68	80.1	12.5664	74.92	565.49	0.132 [1]
T4	135 - 115	4 1/4	20.03	6.68	75.4	14.1863	110.57	638.38	0.173 [1]
T5	115 - 95	4 1/4	20.03	6.68	75.4	14.1863	143.44	638.38	0.225 [1]
T6	95 - 75	4 1/2	20.03	6.68	71.2	15.9043	175.00	715.69	0.245 [1]
T7	75 - 55	4 3/4	20.03	6.68	67.5	17.7205	206.18	797.42	0.259 [1]
T8	55 - 40	4 3/4	15.03	5.01	50.6	17.7205	230.73	797.42	0.289 [1]
T9	40 - 20	4 3/4	20.03	6.68	67.5	17.7205	260.43	797.42	0.327 [1]
T10	20 - 0	5	20.03	6.68	64.1	19.6350	290.37	883.57	0.329 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	195 - 175	1 1/4	6.79	3.30	126.7	1.2272	2.47	39.76	0.062 [1]
T2	175 - 155	L2 1/2x2 1/2x3/16	10.16	4.94	78.6	0.5359	5.54	23.31	0.237 [1]
T3	155 - 135	L2 1/2x2 1/2x5/16	11.74	5.72	92.6	0.8606	7.19	37.44	0.192 [1]
T4	135 - 115	L3x3x1/4	13.44	6.56	86.5	0.8925	7.68	38.82	0.198 [1]
T5	115 - 95	L3x3x3/8	15.21	7.43	99.8	1.2661	8.54	55.08	0.155 [1]
T6	95 - 75	L3 1/2x3 1/2x5/16	17.03	8.32	94.3	1.3038	9.62	56.72	0.170 [1]
T7	75 - 55	L4x4x1/4	18.88	9.24	90.3	1.2441	10.75	54.12	0.199 [1]
T8	55 - 40	L4x4x1/4	19.89	9.70	94.7	1.2441	11.36	54.12	0.210 [1]
T9	40 - 20	L4x4x5/16	22.19	10.90	107.1	1.5363	12.62	66.83	0.189 [1]
T10	20 - 0	L4x4x3/8	24.11	11.84	117.2	1.8286	13.54	79.54	0.170 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	195 - 175	1 1/4	5.00	4.75	182.4	1.2272	0.06	39.76	0.001 [1]

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	195 - 175	1 1/4	6.00	5.75	220.8	1.2272	0.47	39.76	0.012 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	195 - 175	Leg	3	3	-15.59	258.31	6.0	Pass
T2	175 - 155	Leg	3 3/4	48	-50.53	291.32	17.3	Pass
T3	155 - 135	Leg	4	69	-90.76	353.60	25.7	Pass
T4	135 - 115	Leg	4 1/4	90	-131.33	421.17	31.2	Pass
T5	115 - 95	Leg	4 1/4	111	-169.99	421.17	40.4	Pass
T6	95 - 75	Leg	4 1/2	132	-208.18	493.88	42.2	Pass
T7	75 - 55	Leg	4 3/4	153	-246.57	571.60	43.1	Pass
T8	55 - 40	Leg	4 3/4	174	-277.60	661.23	42.0	Pass
T9	40 - 20	Leg	4 3/4	195	-315.54	571.60	55.2	Pass
T10	20 - 0	Leg	5	216	-355.07	654.25	54.3	Pass
T1	195 - 175	Diagonal	1 1/4	14	-2.50	20.05	12.5	Pass
T2	175 - 155	Diagonal	L2 1/2x2 1/2x3/16	53	-5.63	13.71	41.1 61.0 (b)	Pass
T3	155 - 135	Diagonal	L2 1/2x2 1/2x5/16	74	-7.24	16.73	43.3 47.5 (b)	Pass
T4	135 - 115	Diagonal	L3x3x1/4	95	-7.76	18.41	42.1 57.0 (b)	Pass
T5	115 - 95	Diagonal	L3x3x3/8	116	-8.66	20.69	41.8 42.0 (b)	Pass
T6	95 - 75	Diagonal	L3 1/2x3 1/2x5/16	137	-9.69	22.53	43.0 47.3 (b)	Pass
T7	75 - 55	Diagonal	L4x4x1/4	158	-10.86	22.52	48.2 66.1 (b)	Pass
T8	55 - 40	Diagonal	L4x4x1/4	179	-11.45	20.43	56.0 69.8 (b)	Pass
T9	40 - 20	Diagonal	L4x4x5/16	200	-12.79	19.84	64.5	Pass
T10	20 - 0	Diagonal	L4x4x3/8	221	-13.79	19.86	69.4	Pass
T1	195 - 175	Top Girt	1 1/4	5	-0.09	16.86	0.5	Pass
T1	195 - 175	Bottom Girt	1 1/4	7	-0.52	11.61	4.4	Pass
							Summary	
						Leg (T9)	55.2	Pass
						Diagonal (T8)	69.8	Pass
						Top Girt (T1)	0.5	Pass
						Bottom Girt (T1)	4.4	Pass
						Bolt Checks	69.8	Pass
						RATING =	**69.8**	**Pass**

Project Information

Site #	CT5638

Tower Information

Tower Type	Self Support
TIA-222 Rev	G

☐ Load Z Normalization

Applied Loads

	Comp.	Uplift
Axial (k)	361.00	295.00
Shear (k)	40.00	33.00

Anchor Rod Data

Quantity:	8
Diameter (in):	1.375
Material Grade:	A449
Grout Considered:	No
l_{ar} (in):	1
Eta Factor, η:	0.5
Thread Type:	N-Included
Configuration:	Symmetrical

Fy=81 ksi Fu=105 ksi

Anchor Rod Results

Axial, Pu_c (kips)	45.13
Shear, Vu (kips)	5.00
Moment, Mu (kip-in)	-
Axial Cap., φPn_t (kips)	97.44
Shear Cap., ϕVn (kips)	-
Moment Cap., ϕMn (kip-in)	-
Stress Rating	56.6%

Pass

SST Unit Base Foundation

Site #:	CT5638
TIA-222 Revision:	G

Top & Bot. Pad Rein. Different?:	☐
Tower Centroid Offset?:	☐
Block Foundation?:	☐

Superstructure Analysis Reactions		
Global Moment, **M**:	6773	ft-kips
Global Axial, **P**:	85	kips
Global Shear, **V**:	65	kips
Leg Compression, $\mathbf{P_{comp}}$:	361	kips
Leg Comp. Shear, $\mathbf{V_{u\_comp}}$:	40	kips
Leg Uplift, $\mathbf{P_{uplift}}$:	295	kips
Leg Uplift. Shear, $\mathbf{V_{u\_uplift}}$:	33	kips
Tower Height, **H**:	195	ft
Base Face Width, **BW**:	23.5	ft
BP Dist. Above Fdn, $\mathbf{bp_{dist}}$:	3	in

Foundation Analysis Checks	Capacity	Demand	Rating	Check
Lateral (Sliding) (kips)	446.03	65.00	**14.6%**	**Pass**
Bearing Pressure (ksf)	9.54	1.80	**18.9%**	**Pass**
*Overturning (kip*ft)*	14846.26	7211.75	**48.6%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	1046.03	160.00	**15.3%**	**Pass**
*Pier Flexure (Tension) (kip*ft)*	650.06	132.00	**20.3%**	**Pass**
Pier Compression (kip)	3374.26	366.09	**10.8%**	**Pass**
*Pad Flexure (kip*ft)*	2988.57	1335.64	**44.7%**	**Pass**
Pad Shear - 1-way (kips)	854.78	225.36	**26.4%**	**Pass**
Pad Shear - Comp 2-way (ksi)	0.164	0.078	**47.4%**	**Pass**

Pier Properties		
Pier Shape:	Circular	
Pier Diameter, **dpier**:	3.0	ft
Ext. Above Grade, **E**:	0.50	ft
Pier Rebar Size, **Sc**:	8	
Pier Rebar Quantity, **mc**:	20	
Pier Tie/Spiral Size, **St**:	3	
Pier Tie/Spiral Quantity, **mt**:	6	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, $\mathbf{cc_{pier}}$:	3	in

Soil Rating:	**48.6%**
Structural Rating:	**47.4%**

Pad Properties		
Depth, **D**:	6.00	ft
Pad Width, **W**:	34.00	ft
Pad Thickness, **T**:	2.50	ft
Pad Rebar Size (Bottom), **Sp**:	8	
Pad Rebar Quantity (Bottom), **mp**:	34	
Pad Clear Cover, $\mathbf{cc_{pad}}$:	3	in

Material Properties		
Rebar Grade, **Fy**:	60	ksi
Concrete Compressive Strength, **F'c**:	3	ksi
Dry Concrete Density, δ**c**:	150	pcf

Soil Properties		
Total Soil Unit Weight, γ:	120	pcf
Ultimate Net Bearing, Qnet:	12.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, φ:	30	degrees
SPT Blow Count, $\mathbf{N_{blows}}$:		
Base Friction, μ:	0.5	
Neglected Depth, **N**:	3.3	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	N/A	ft

<-- Toggle between Gross and Net

Version 3.2.0

PROJECT INFORMATION

SCOPE OF WORK:	ITEMS TO BE MOUNTED ON EXISTING SELF SUPPORT TOWER: • NEW AT&T ANTENNAS (800-10965) @ POS. 3 & POS. 4 (TYP. OF 2 PER SECTOR, TOTAL OF 6). • NEW AT&T RRUS B5/B12 4449 (700/850) (TYP. OF 1 PER SECTOR, TOTAL OF 3). • NEW AT&T RRUS B14 4478 (700) (TYP. OF 1 PER SECTOR, TOTAL OF 3). • NEW AT&T RRUS 32 (WCS) (TYP. OF 1 PER SECTOR, TOTAL OF 3). • NEW AT&T SURGE ARRESTOR (DC6-48-60-18-8C) (TOTAL OF 1). • INSTALL (2) DC POWER CABLES & (1) FIBER RUN (TO FOLLOW EXISTING ROUTE). ITEMS TO BE MOUNTED AT EQUIPMENT LOCATION: • SWAP BASEBAND WITH 5216. • ADD XMU. • ADD RBS 6630. • BASEBAND CONFIGURATION AS PER PD / SECTION-7. ITEMS TO REMAIN: • (3) ANTENNAS, (6) TMA'S, (1) SURGE ARRESTOR, (6) 1-5/8" COAX, (2) DC POWER & (1) FIBER.
SITE ADDRESS:	88 PARSONAGE HILL ROAD NORTHFORD, CT 06472
LATITUDE:	41.369091 N, 41° 22' 08.73" N
LONGITUDE:	72.810498 W, 72° 48' 37.79" W
TYPE OF SITE:	SELF SUPPORT TOWER / OUTDOOR EQUIPMENT
STRUCTURE HEIGHT:	195'-0"±
RAD CENTER:	173'-0"±
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY

SITE NUMBER: CT5638

SITE NAME: NORTHFORD - TOTOKET

FA CODE: 10071180

PACE ID: MRCTB033810, MRCTB033657, MRCTB033597, MRCTB033747

PROJECT: LTE 3C_4C_5C_4TX4RX 2019 UPGRADE

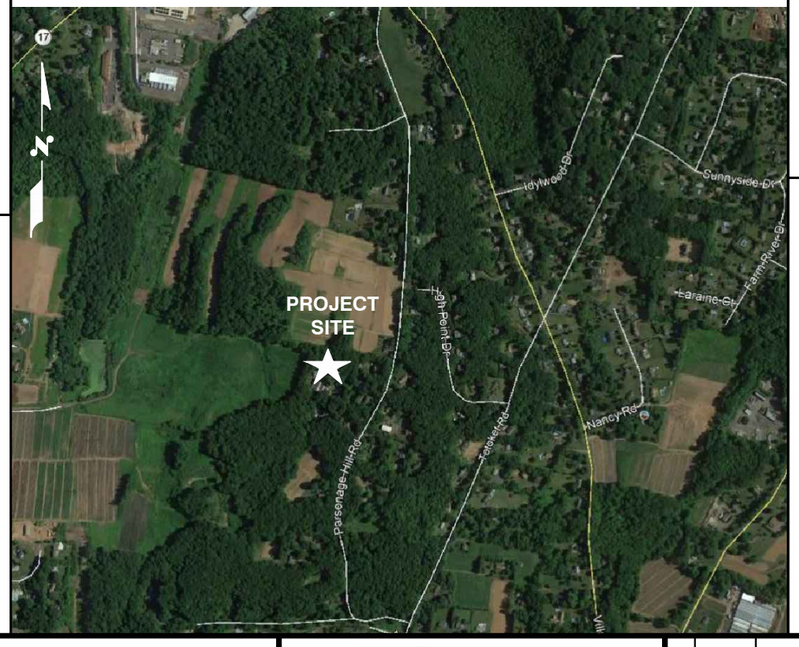
DRAWING INDEX

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

VICINITY MAP

DIRECTIONS TO SITE:

FROM ROCKY HILL, HEAD SOUTHWEST ON CONCRIB LN. TURN LEFT ONTO SOLO DR. TURN RIGHT ONTO GILBERT AVE. TURN RIGHT ONTO STATE HWY 411. TURN LEFT TO MERGE ONTO I-91 S. TAKE EXIT 14 FOR E CENTER ST TOWARD CT-150. TURN LEFT ONTO E CENTER ST. TURN RIGHT ONTO NORTHFORD RD. CONTINUE ONTO WOODS HILL RD. TURN RIGHT ONTO CT-17 S. TURN LEFT ONTO VILLAGE ST. SLIGHT RIGHT ONTO PARSONAGE HILL RD. SITE WILL BE ON RIGHT.



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

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

CENTERLINE COMMUNICATIONS
750 WEST CENTER STREET., SUITE #301
WEST BRIDGEWATER, MA 02379

SITE NUMBER: CT5638
SITE NAME: NORTHFORD - TOTOKET

88 PARSONAGE HILL ROAD
NORTHFORD, CT 06472
NEW HAVEN COUNTY

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

NO.	DATE	REVISIONS	BY	CHK	APP'D
A	04/02/19	ISSUED FOR REVIEW	AM	AT	DJC

SCALE: AS SHOWN | DESIGNED BY: AT | DRAWN BY: AM

AT&T

TITLE SHEET
(LTE 3C_4C_5C_4TX4RX)

SITE NUMBER	DRAWING NUMBER	REV
CT5638	T-1	A

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) LIGHTING 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 – CENTERLINE
   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 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 2015 WITH 2018 CT STATE BUILDING CODE AMENDMENTS
    ELECTRICAL CODE: 2017 NATIONAL ELECTRICAL CODE (NFPA 70-2017)

    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

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		

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WEST BRIDGEWATER, MA 02379

SITE NUMBER: CT5638
SITE NAME: NORTHFORD - TOTOKET

88 PARSONAGE HILL ROAD
NORTHFORD, CT 06472
NEW HAVEN COUNTY

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

NO.	DATE	REVISIONS	BY	CHK	APP'D
A	04/02/19	ISSUED FOR REVIEW	AM	AT	DJC

SCALE: AS SHOWN | DESIGNED BY: AT | DRAWN BY: AM

AT&T

GENERAL NOTES
(LTE 3C_4C_5C_4TX4RX)

SITE NUMBER	DRAWING NUMBER	REV
CT5638	GN-1	A

NOTE:

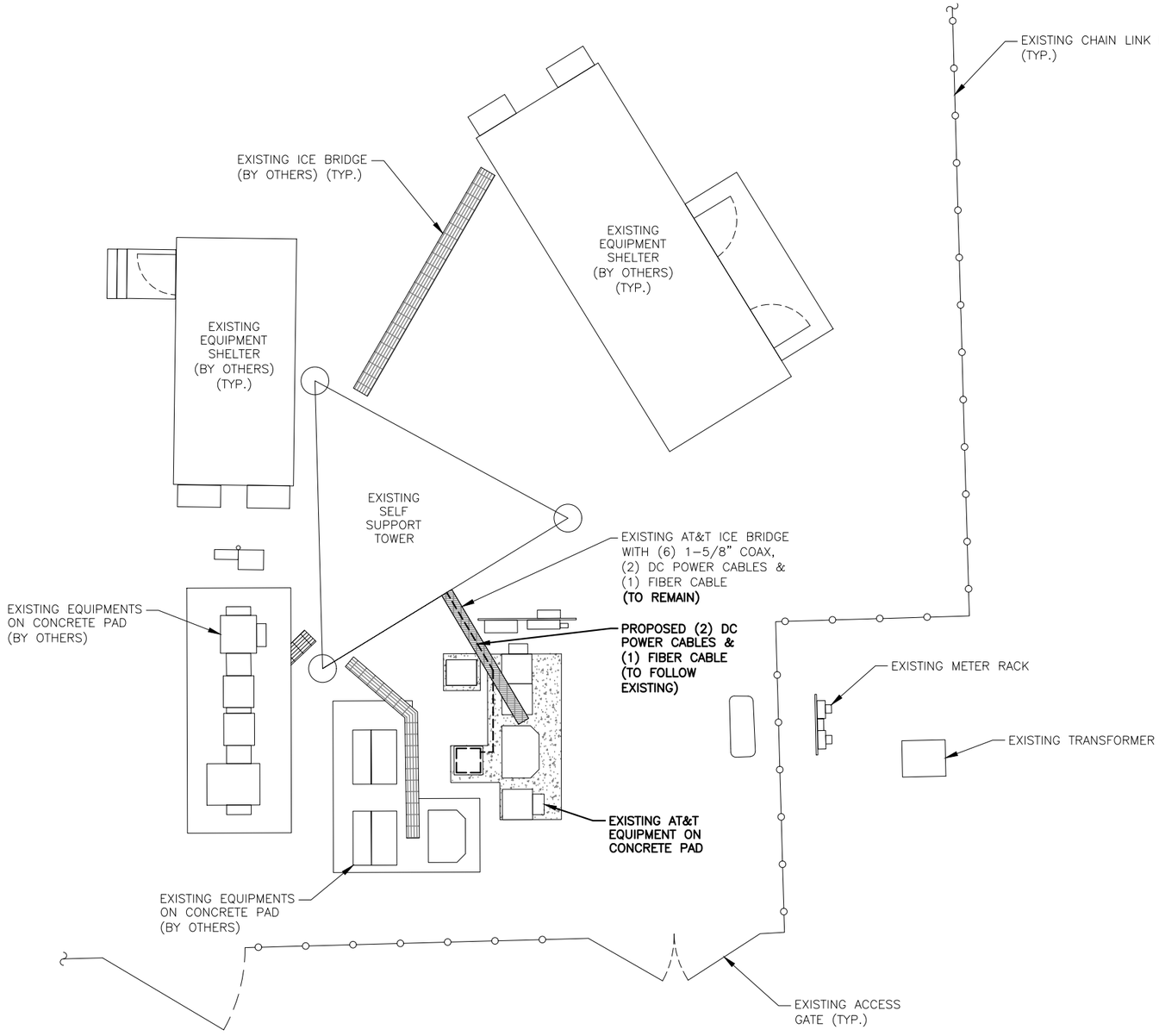
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT SHALL BE DETERMINED PRIOR TO CONSTRUCTION.

NOTE:

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

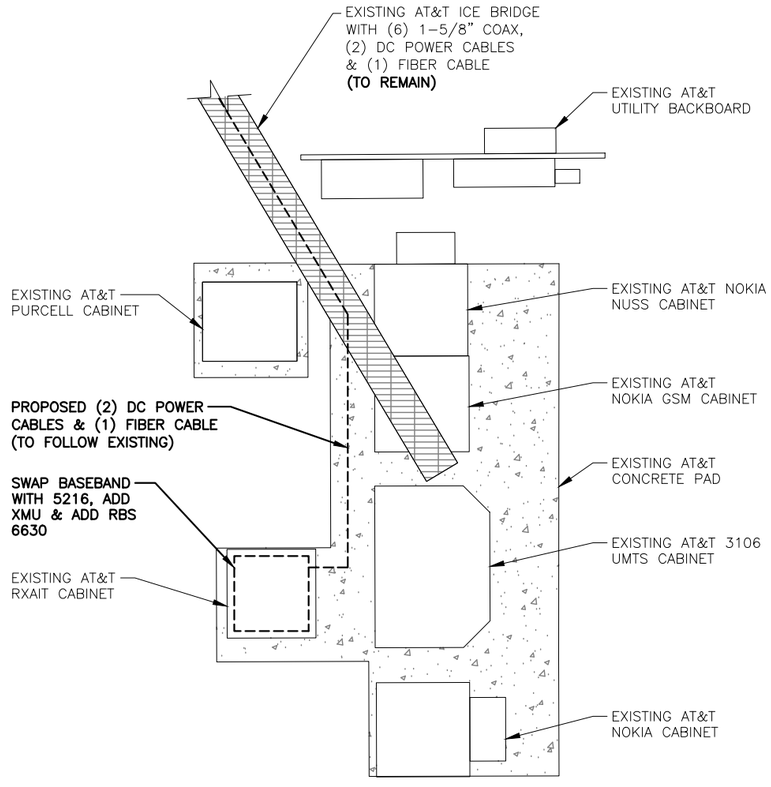
NOTE:

HDG RECOMMENDS THE EXISTING ANTENNA MOUNT BE MAPPED IN ITS ENTIRETY & A STRUCTURAL ANALYSIS BE PERFORMED PRIOR TO THE ANTENNA INSTALLATION.



COMPOUND PLAN (1 / A-1)
22x34 SCALE: 3/16"=1'-0"
11x17 SCALE: 3/32"=1'-0"

0 2'-8" 5'-4" 10'-8" 16'-0"



EQUIPMENT PLAN (2 / A-1)
22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"

0 1'-0" 2'-0" 4'-0" 6'-0"

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NO.	DATE	REVISIONS	BY	CHK	APP'D
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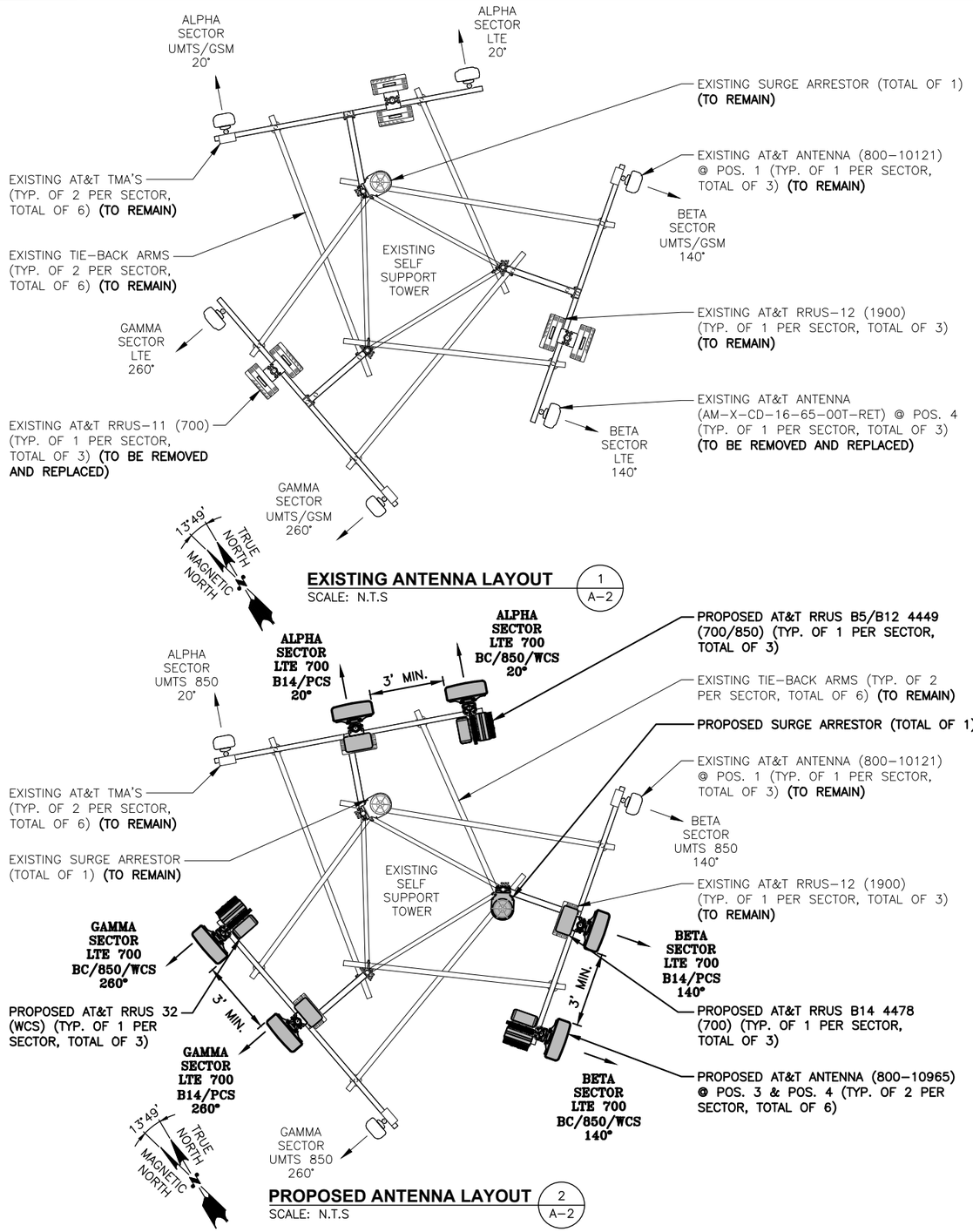
SCALE: AS SHOWN | DESIGNED BY: AT | DRAWN BY: AM

AT&T

COMPOUND & EQUIPMENT PLANS
(LTE 3C_4C_5C_4TX4RX)

SITE NUMBER	DRAWING NUMBER	REV
CT5638	A-1	A



NOTE:

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NOTE:

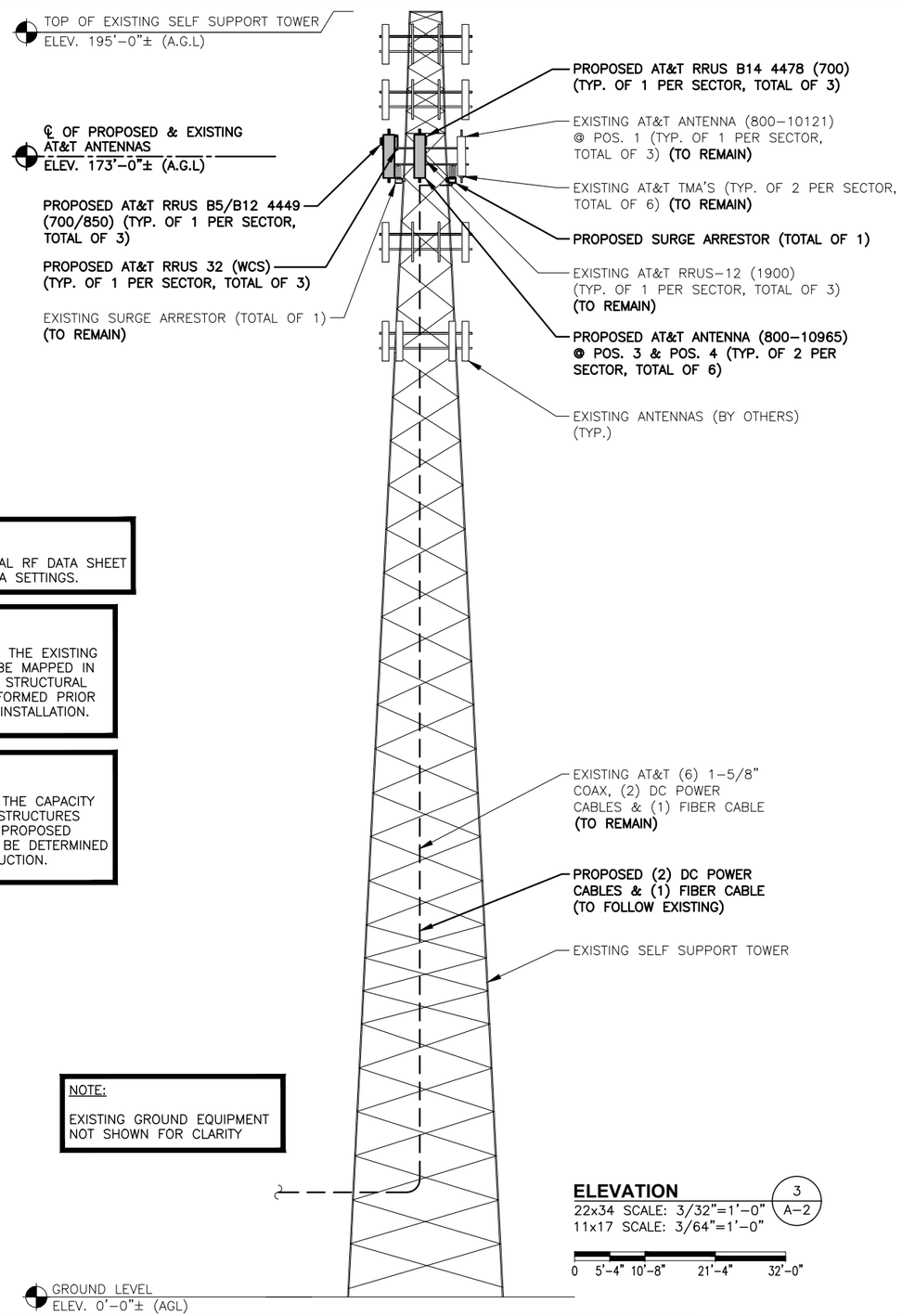
HDG RECOMMENDS THE EXISTING ANTENNA MOUNT BE MAPPED IN ITS ENTIRETY & A STRUCTURAL ANALYSIS BE PERFORMED PRIOR TO THE ANTENNA INSTALLATION.

NOTE:

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

NOTE:

EXISTING GROUND EQUIPMENT NOT SHOWN FOR CLARITY



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

0 5'-4" 10'-8" 21'-4" 32'-0"

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ANTENNA LAYOUTS & ELEVATION
(LTE 3C_4C_5C_4TX4RX)

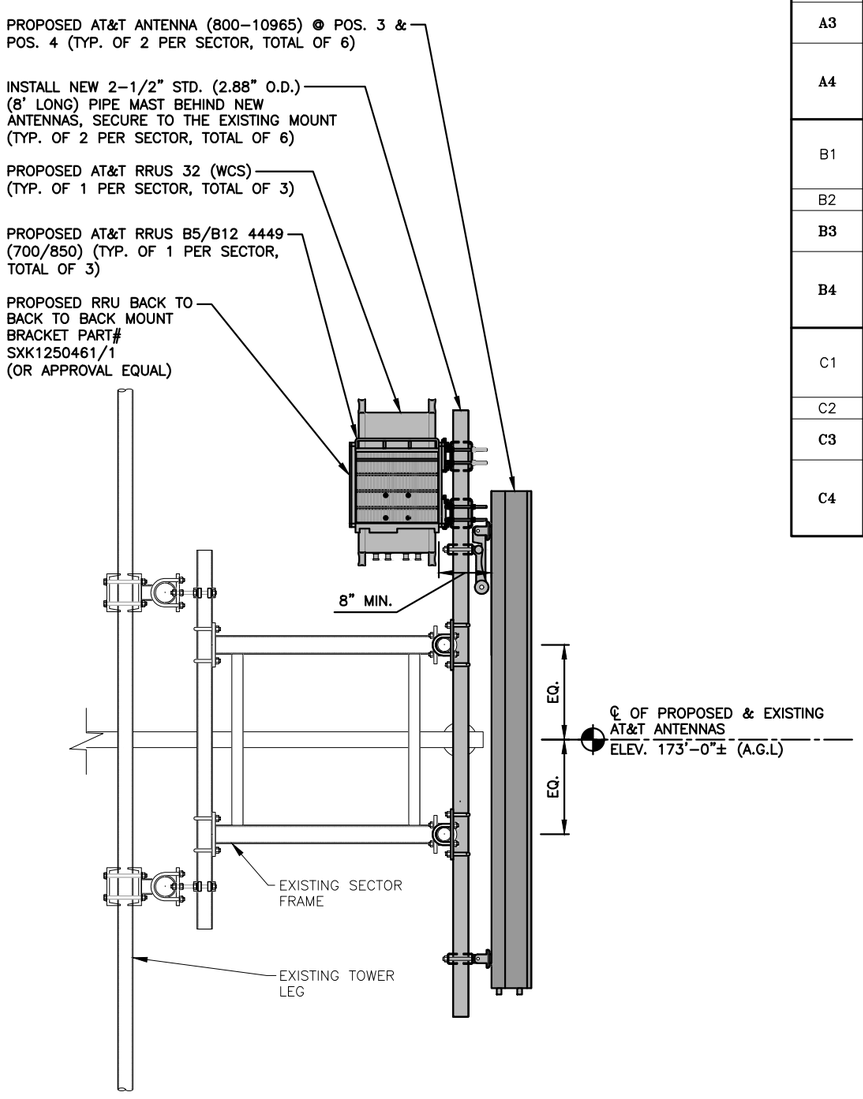
SITE NUMBER	DRAWING NUMBER	REV
CT5638	A-2	A

NOTE:

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

NOTE:

HDG RECOMMENDS THE EXISTING ANTENNA MOUNT BE MAPPED IN ITS ENTIRETY & A STRUCTURAL ANALYSIS BE PERFORMED PRIOR TO THE ANTENNA INSTALLATION.



PROPOSED ANTENNA & RRH MOUNTING DETAIL (2 / A-3)
22x34 SCALE: 1"=1'-0"
11x17 SCALE: 1/2"=1'-0"

0 0'-6" 1'-0" 2'-0" 3'-0"

ANTENNA SCHEDULE

SECTOR	EXISTING/ PROPOSED	BAND	ANTENNA	SIZE (INCHES) (L x W x D)	ANTENNA ℄ HEIGHT	AZIMUTH	TMA/ DIPLEXER	RRU	SIZE (INCHES) (L x W x D)	FEEDER	RAYCAP
A1	EXISTING	UMTS 850	800-10121	54.5X10.3X5.9	173'±	20°	(E)(2) POWERWAVE LGP21401 (E)(2)(G) POWERWAVE LGP21901	–	–	(2) 1-5/8" COAX (LENGTH 215'±)	(E)(1) RAYCAP DC6-48-60-18-8C
A2	–	–	–	–	–	–	–	–	–	–	
A3	**PROPOSED**	**LTE 700 B14/PCS**	**800-10965**	**78.7X20X6.9**	**173'±**	**20°**	–	(E)(1) RRUS 12 (1900) **(P)(1) B14 4478 (700)**	– **18.1X13.4X8.3**	–	
A4	**PROPOSED**	**LTE 700 BC/850/WCS**	**800-10965**	**78.7X20X6.9**	**173'±**	**20°**	–	**(P)(1) B5/B12 4449 (700/850) (P)(1) RRUS-32 (WCS)**	**14.9X13.2X10.4 27.2X12.1X7.0**	–	
B1	EXISTING	UMTS 850	800-10121	54.5X10.3X5.9	173'±	140°	(E)(2) POWERWAVE LGP21401 (E)(2)(G) POWERWAVE LGP21901	–	–	(2) 1-5/8" COAX (LENGTH 215'±)	(P)(1) RAYCAP DC6-48-60-18-8C (DC ONLY)
B2	–	–	–	–	–	–	–	–	–	–	
B3	**PROPOSED**	**LTE 700 B14/PCS**	**800-10965**	**78.7X20X6.9**	**173'±**	**140°**	–	(E)(1) RRUS 12 (1900) **(P)(1) B14 4478 (700)**	– **18.1X13.4X8.3**	–	
B4	**PROPOSED**	**LTE 700 BC/850/WCS**	**800-10965**	**78.7X20X6.9**	**173'±**	**140°**	–	**(P)(1) B5/B12 4449 (700/850) (P)(1) RRUS-32 (WCS)**	**14.9X13.2X10.4 27.2X12.1X7.0**	–	
C1	EXISTING	UMTS 850	800-10121	54.5X10.3X5.9	173'±	260°	(E)(2) POWERWAVE LGP21401 (E)(2)(G) POWERWAVE LGP21901	–	–	(2) 1-5/8" COAX (LENGTH 215'±)	SHARED
C2	–	–	–	–	–	–	–	–	–	–	
C3	**PROPOSED**	**LTE 700 B14/PCS**	**800-10965**	**78.7X20X6.9**	**173'±**	**260°**	–	(E)(1) RRUS 12 (1900) **(P)(1) B14 4478 (700)**	– **18.1X13.4X8.3**	–	
C4	**PROPOSED**	**LTE 700 BC/850/WCS**	**800-10965**	**78.7X20X6.9**	**173'±**	**260°**	–	**(P)(1) B5/B12 4449 (700/850) (P)(1) RRUS-32 (WCS)**	**14.9X13.2X10.4 27.2X12.1X7.0**	–	

FINAL ANTENNA SCHEDULE (1 / A-3)
SCALE: N.T.S

NOTE:

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

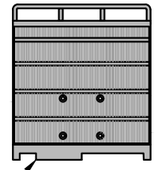
RRU CHART

QUANTITY	MODEL	L	W	D
3(E)	RRUS 12 (1900)	20.4"	18.5"	7.5"
3(P)	RRUS-32 (WCS)	27.2"	12.1"	7.0"
3(P)	B5/B12 4449 (700/850)	14.9"	13.2"	10.4"
3(P)	B14 4478 (700)	18.1"	13.4"	8.3"

NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS

NOTE:

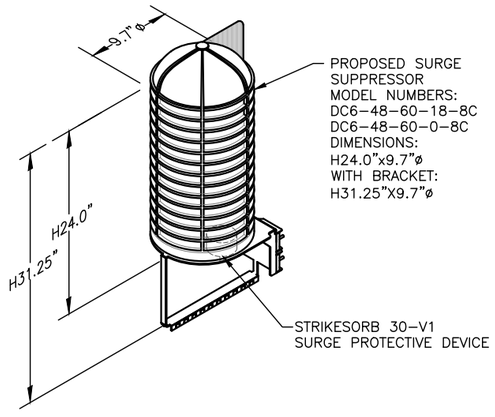
SEE RFDS FOR RRH FREQUENCY AND MODEL NUMBER



PROPOSED RRU REFER TO THE FINAL RFDS AND CHART FOR QUANTITY, MODEL AND DIMENSIONS

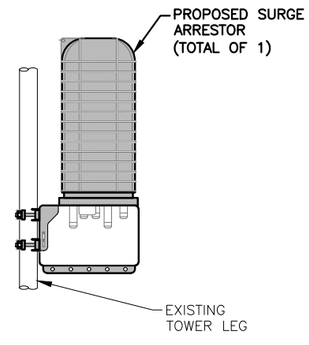
NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS.

PROPOSED RRUS DETAIL (3 / A-3)
SCALE: N.T.S



NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS.

DC SURGE SUPPRESSOR DETAIL (4 / A-3)
SCALE: N.T.S



SURGE SUPPRESSOR MOUNTING DETAIL (5 / A-3)
SCALE: N.T.S

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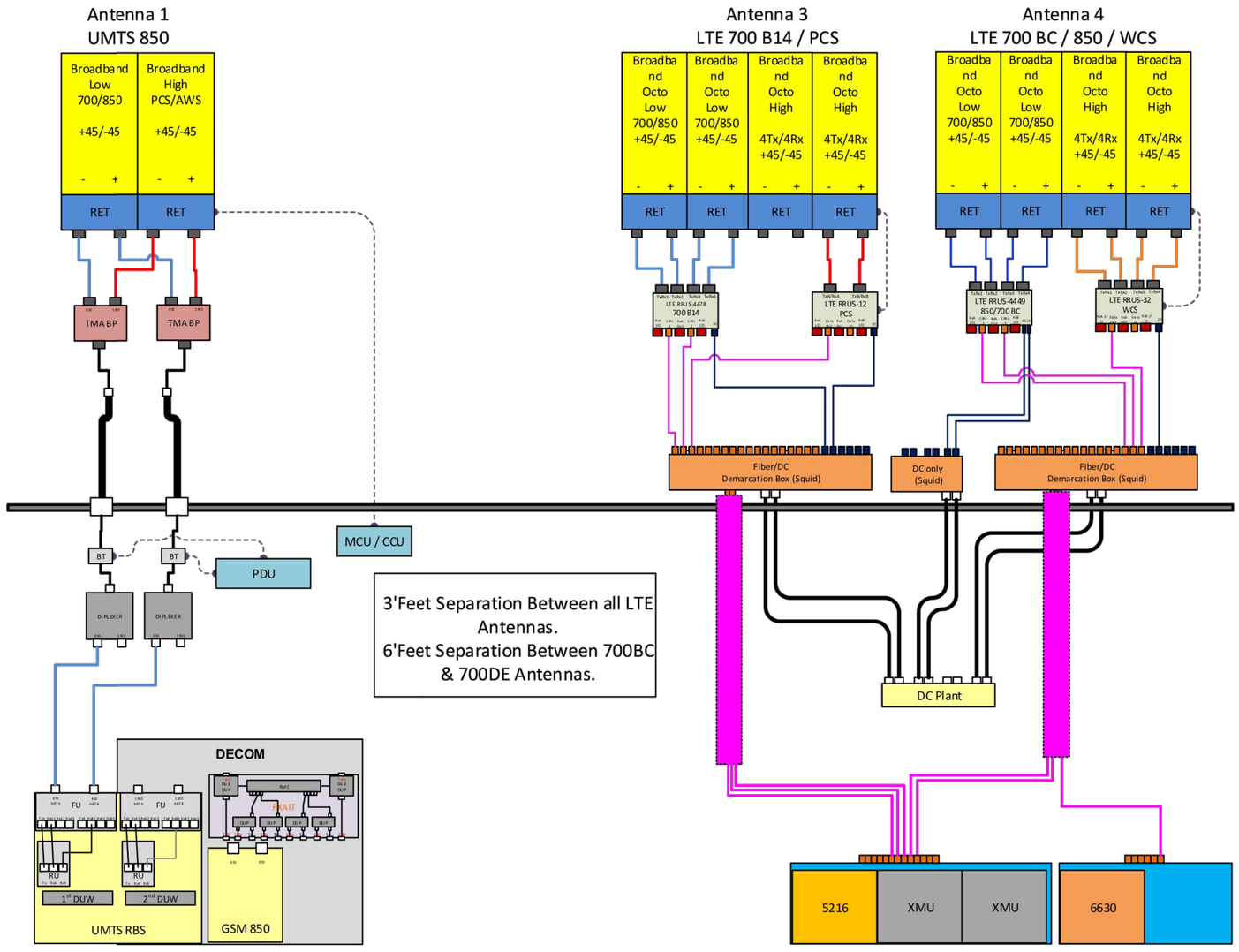
NO.	DATE	REVISIONS	BY	CHK	APP'D
A	04/02/19	ISSUED FOR REVIEW	AM	AT	DJC

SCALE: AS SHOWN | DESIGNED BY: AT | DRAWN BY: AM

AT&T

DETAILS
(LTE 3C_4C_5C_4TX4RX)

SITE NUMBER	DRAWING NUMBER	REV
CT5638	A-5	A



RF PLUMBING DIAGRAM (1 / RF–1)
SCALE: N.T.S

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

NOTE:

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

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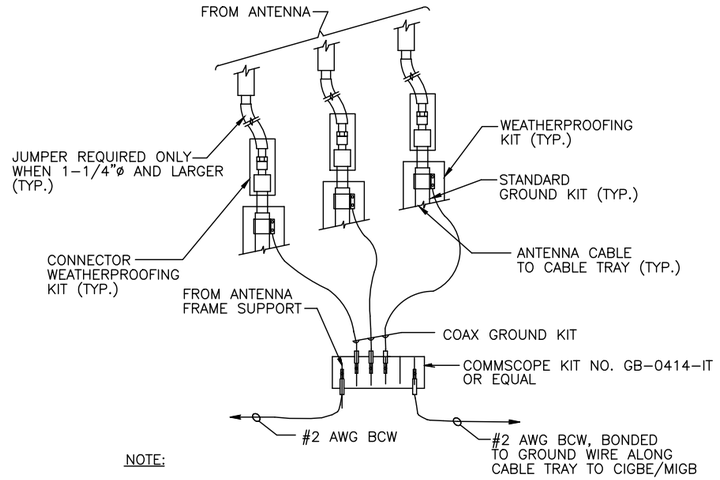
NO.	DATE	REVISIONS	BY	CHK	APP'D
A	04/02/19	ISSUED FOR REVIEW	AM	AT	DJC

SCALE: AS SHOWN | DESIGNED BY: AT | DRAWN BY: AM

AT&T

RF PLUMBING DIAGRAM
(LTE 3C_4C_5C_4TX4RX)

SITE NUMBER	DRAWING NUMBER	REV
CT5638	RF–1	A



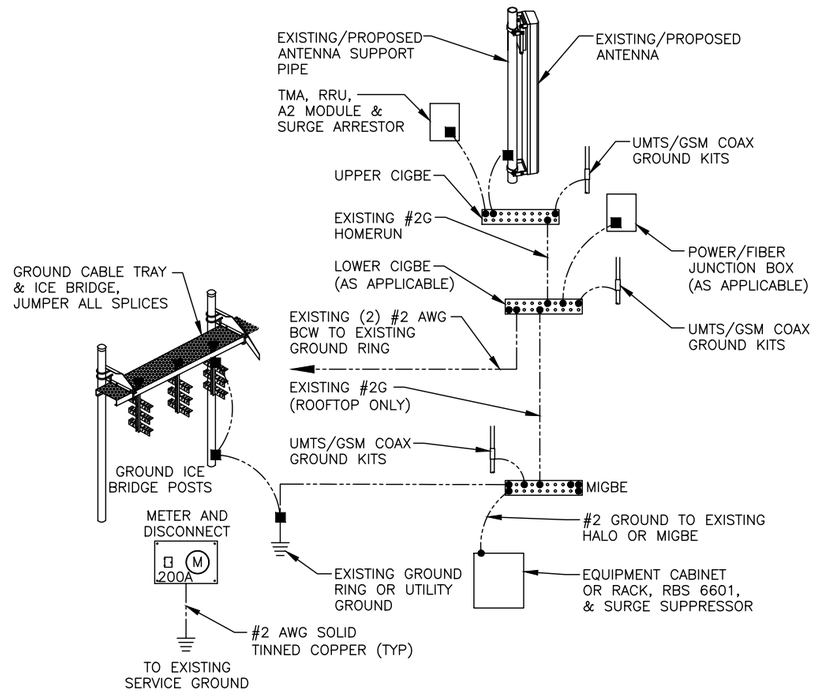
NOTE:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

GROUND WIRE TO GROUND BAR CONNECTION DETAIL

SCALE: N.T.S

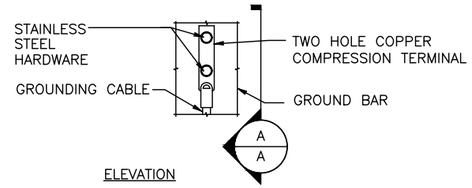
1 / G-1



GROUNDING RISER DIAGRAM

SCALE: N.T.S

2 / G-1



NOTE:

1. "DOUBLING UP" OR "STACKING" OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATION.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB

TYPICAL GROUND BAR CONNECTION DETAIL

SCALE: N.T.S

3 / G-1

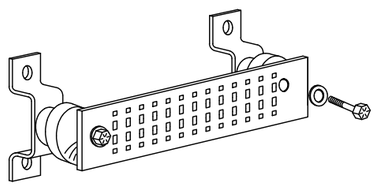
EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR SHALL HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION.

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

SCALE: N.T.S

4 / G-1

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

CENTERLINE COMMUNICATIONS
750 WEST CENTER STREET., SUITE #301
WEST BRIDGEWATER, MA 02379

SITE NUMBER: CT5638
SITE NAME: NORTHFORD - TOTOKET

88 PARSONAGE HILL ROAD
NORTHFORD, CT 06472
NEW HAVEN COUNTY

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

NO.	DATE	REVISIONS	BY	CHK	APP'D
A	04/02/19	ISSUED FOR REVIEW	AM	AT	DJC

SCALE: AS SHOWN | DESIGNED BY: AT | DRAWN BY: AM

AT&T

GROUNDING DETAILS
(LTE 3C_4C_5C_4TX4RX)

SITE NUMBER	DRAWING NUMBER	REV
CT5638	G-1	A

Radio Frequency Emissions Analysis Report

AT&T Existing Facility

Site ID: CTL05638

Northford- Totoket
88 Parsonage Hill Road

Northford, CT 06472

June 20, 2019

Centerline Communications Project Number: 950012-227

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**8.66 %**

June 20, 2019

AT&T Mobility – New England
Attn: John Benedetto, RF Manager
550 Cochituate Road
Suite 550 – 13&14
Framingham, MA 06040

Emissions Analysis for Site: **CTL05638 – Northford- Totoket**

Centerline Communications, LLC ("Centerline") was directed to analyze the proposed AT&T facility located at **88 Parsonage Hill Road** in **Northford, Connecticut** for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu W/cm^2$). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general population may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 700 and 850 MHz Bands are approximately 467 $\mu W/cm^2$ and 567 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were performed for the proposed AT&T Wireless antenna facility located at **88 Parsonage Hill Road in Northford, Connecticut**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. All power values expressed and analyzed are maximum power levels expected to be used on all radios.

All emissions values for additional carriers were taken from the Connecticut Siting Council (CSC) active MPE database. Values in this database are provided by the individual carriers themselves

For each sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
UMTS	850 MHz	2	30
5G	850 MHz	2	25
LTE	850 MHz	2	40
LTE	700 MHz	4	40
LTE	2300 MHz (WCS)	2	30
LTE	1900 MHz (PCS)	3	40

Table 1: Channel Data Table

The following antennas listed in Table 2 were used in the modeling for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS), and 2300 MHz (WCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	Kathrein 800-10121	173
A	2	Kathrein 800-10965	173
A	3	Kathrein 800-10965	173
B	1	Kathrein 800-10121	173
B	2	Kathrein 800-10965	173
B	3	Kathrein 800-10965	173
C	1	Kathrein 800-10121	173
C	2	Kathrein 800-10965	173
C	3	Kathrein 800-10965	173

Table 2: Antenna Data

All calculations were done with respect to uncontrolled / general population threshold limits.

RESULTS

Per the calculations completed for the proposed AT&T configurations *Table 3* shows resulting emissions power levels and percentages of the FCC's allowable general population limit.

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX	ERP (W)	MPE %
Antenna A1	Kathrein 800-10121	850 MHz	11.25 dBd	2	60	800.11	0.17
Antenna A2	Kathrein 800-10965	700 MHz / 1900 MHz / 1900 MHz	12.65 dBd / 15.65 dBd / 15.65 dBd	10	400	11,760.01	1.82
Antenna A3	Kathrein 800-10965	700 MHz / 850 MHz / 2300 MHz	12.65 dBd / 13.45 dBd / 15.85 dBd	10	350	8,129.81	1.64
						Sector A Composite MPE%	**3.63**
Antenna B1	Kathrein 800-10121	850 MHz	11.25 dBd	2	60	800.11	0.17
Antenna B2	Kathrein 800-10965	700 MHz / 1900 MHz / 1900 MHz	12.65 dBd / 15.65 dBd / 15.65 dBd	10	400	11,760.01	1.82
Antenna B3	Kathrein 800-10965	700 MHz / 850 MHz / 2300 MHz	12.65 dBd / 13.45 dBd / 15.85 dBd	10	350	8,129.81	1.64
						Sector B Composite MPE%	**3.63**
Antenna C1	Kathrein 800-10121	850 MHz	11.25 dBd	2	60	800.11	0.17
Antenna C2	Kathrein 800-10965	700 MHz / 1900 MHz / 1900 MHz	12.65 dBd / 15.65 dBd / 15.65 dBd	10	400	11,760.01	1.82
Antenna C3	Kathrein 800-10965	700 MHz / 850 MHz / 2300 MHz / 850 MHz	12.65 dBd / 13.45 dBd / 15.85 dBd /13.45 dBd	10	350	8,129.81	1.64
						Sector C Composite MPE%	**3.63**

Table 3: AT&T Emissions Levels

The Following table (*table 4*) shows all additional carriers on site and their MPE% as recorded in the CSC active MPE database for this facility along with the newly calculated maximum AT&T MPE contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, all three sectors have the same configuration yielding the same results on all three sectors. *Table 5* below shows a summary for each AT&T Sector as well as the composite MPE value for the site.

Site Composite MPE%	
Carrier	**MPE%**
AT&T – Max Per Sector Value	3.63%
Nextel	0.24%
Motient	0.54%
Sprint	1.56%
T-Mobile	0.63%
Verizon	2.06%
Site Total MPE %:	**8.66 %**

Table 4: All Carrier MPE Contributions

AT&T Sector A Total:	3.63 %
AT&T Sector B Total:	3.63 %
AT&T Sector C Total:	3.63 %
Site Total:	8.66 %

Table 5: Site MPE Summary

FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. *Table 6* below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated AT&T sector(s). For this site, all three sectors have the same configuration yielding the same results on all three sectors.

AT&T _ Frequency Band / Technology Max Power Values (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($i.tW/cm^2$)	Frequency (MHz)	Allowable MPE ($i.tW/cm^2$)	Calculated % MPE
AT&T 850 MHz UMTS- Antenna 1	2	400.06	173.0	0.96	850 MHz UMTS	567	0.17%
AT&T 700 MHz LTE- Antenna 2	4	736.31	173.0	3.54	700 MHz LTE	467	0.76%
AT&T 1900 MHz LTE- Antenna 2	3	1469.13	173.0	5.29	1900 MHz LTE	1000	0.53%
AT&T 1900 MHz LTE- Antenna 2	3	1469.13	173.0	5.29	1900 MHz LTE	1000	0.53%
AT&T 700 MHz LTE Antenna 3	4	736.31	173.0	3.54	700 MHz LTE	467	0.76%
AT&T 850 MHz LTE Antenna 3	2	885.24	173.0	2.13	850 MHz LTE	567	0.38%
AT&T 2300 MHz LTE WCS Antenna 3	2	1153.78	173.0	2.77	2300 MHz LTE WCS	1000	0.28%
AT&T 850 MHz 5G Antenna 3	2	553.27	173.0	1.33	850 MHz 5G	567	0.23%
						Total:	**3.63%**

Table 6: AT&T Maximum Sector MPE Power Values

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the AT&T facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

AT&T Sector	Power Density Value (%)
Sector A:	3.63 %
Sector B:	3.63 %
Sector C:	3.63 %
AT&T Maximum Total (per sector):	3.63 %
Site Total:	8.66 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **8.66 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

Ryan McManus
Senior RF EME Compliance Manager
Centerline Communications, LLC
95 Ryan Drive, Suite 1
Raynham, MA 02767

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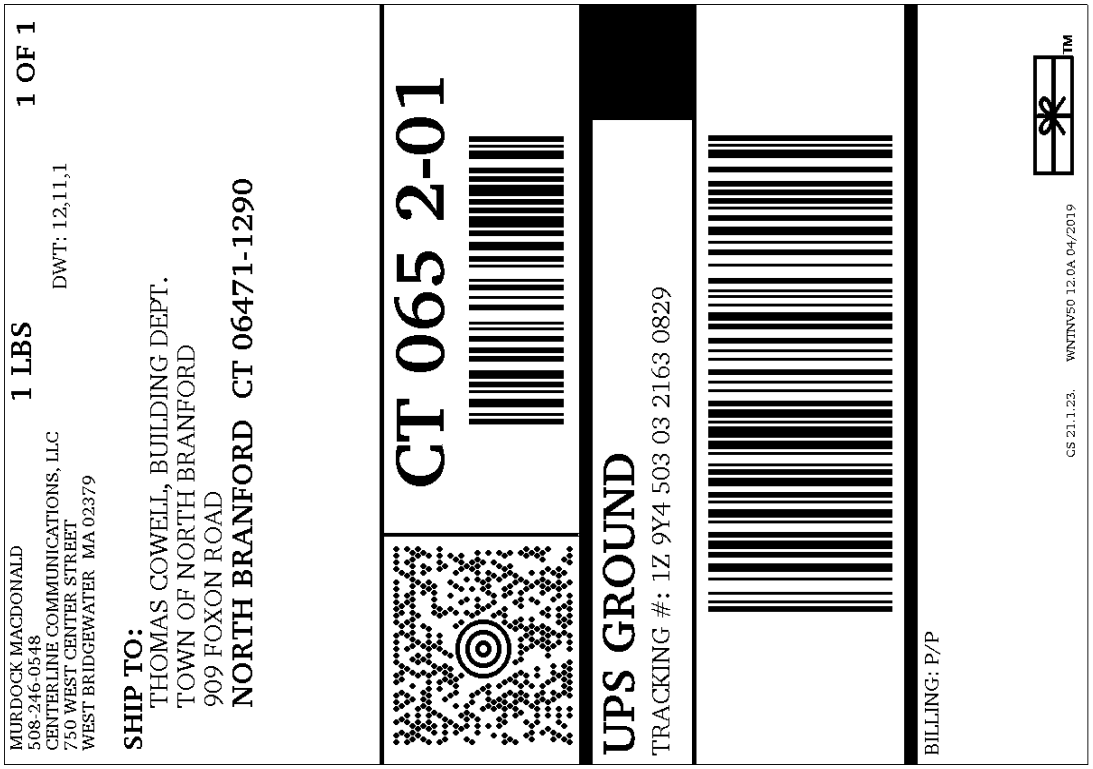

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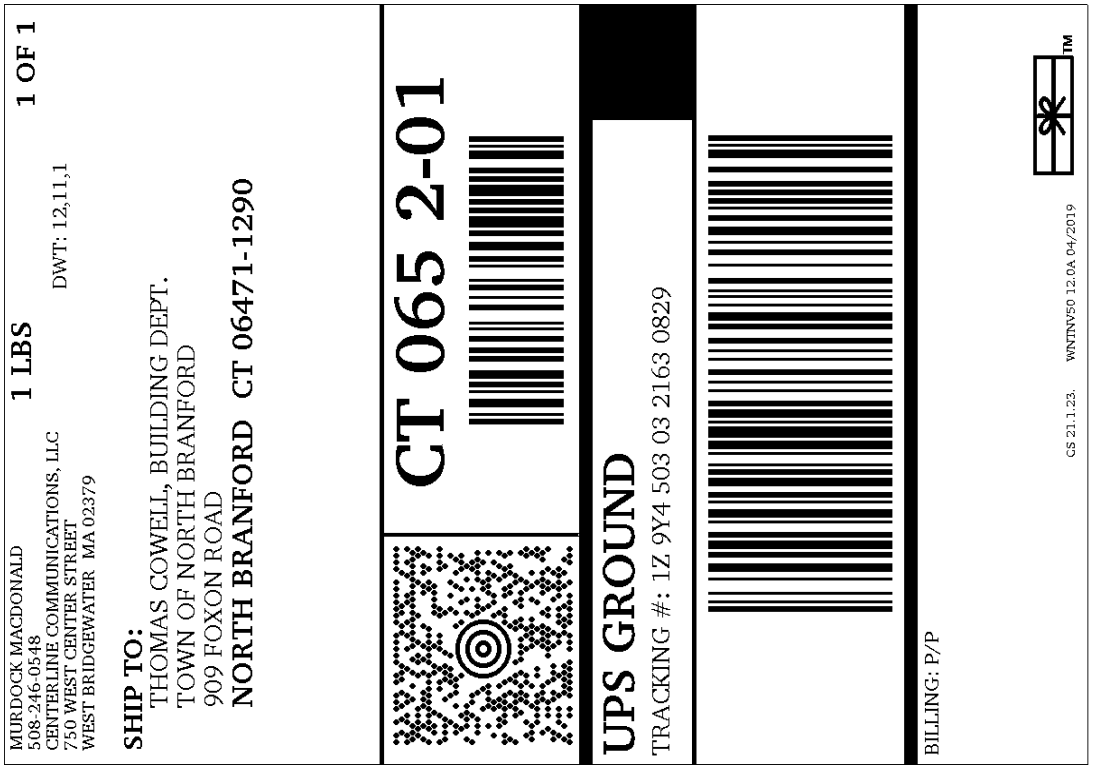

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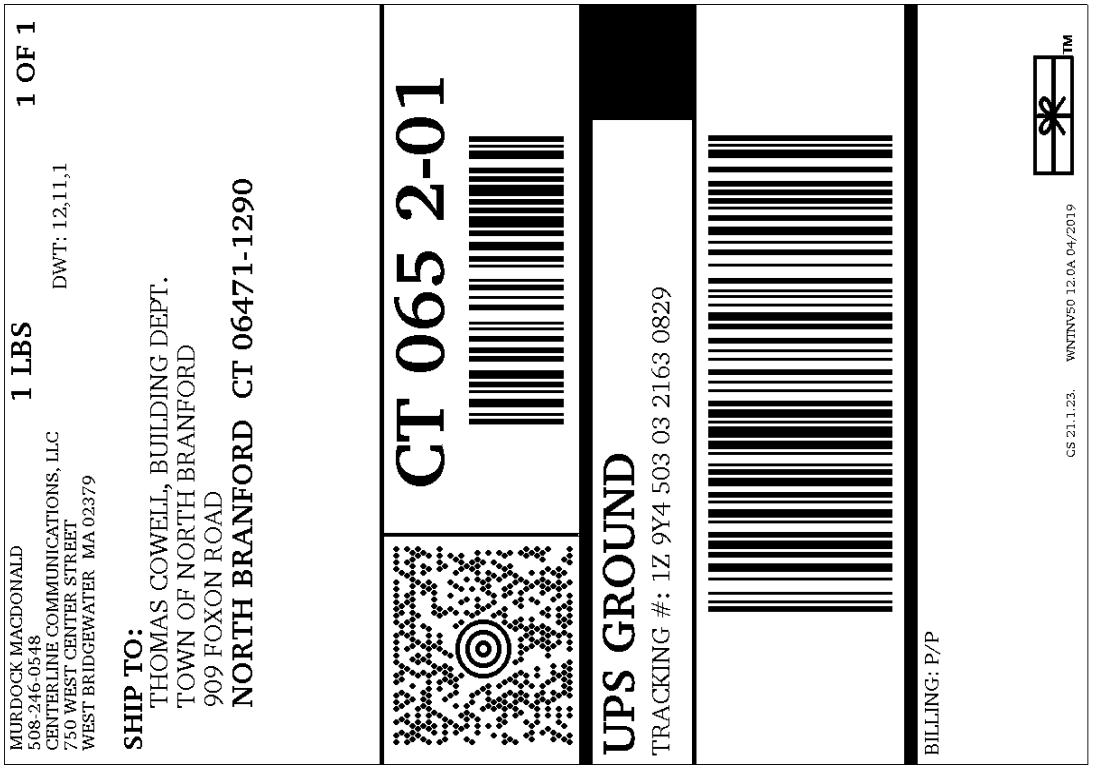

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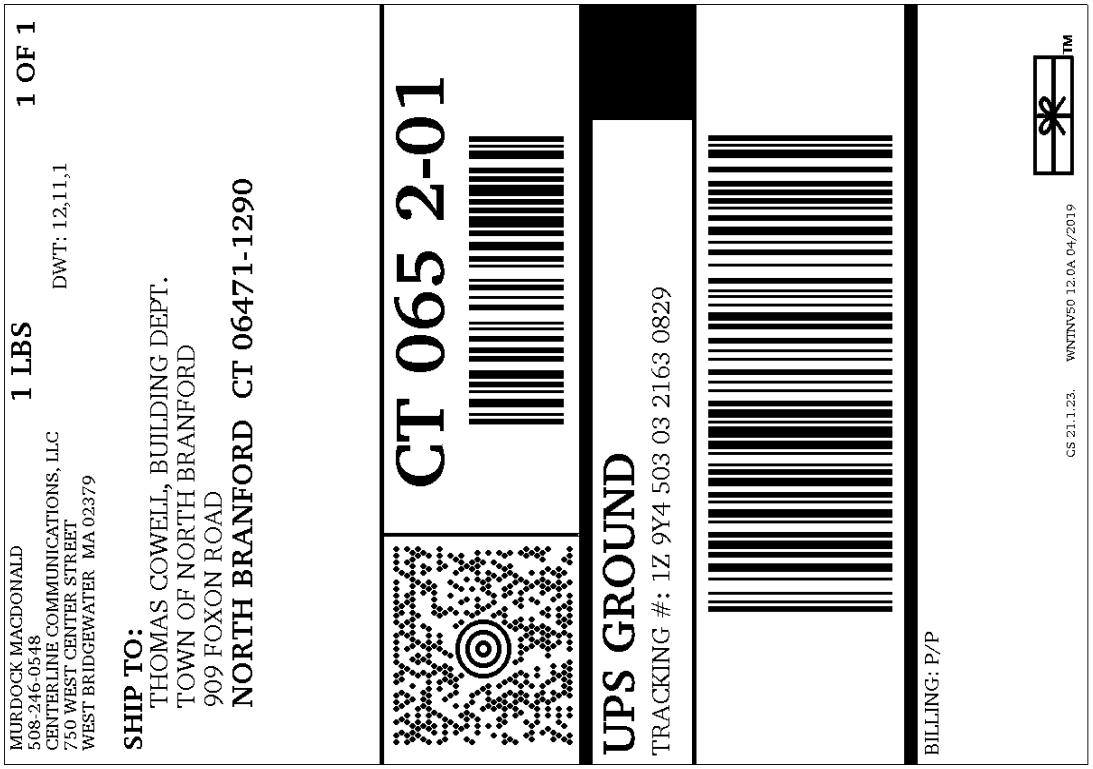

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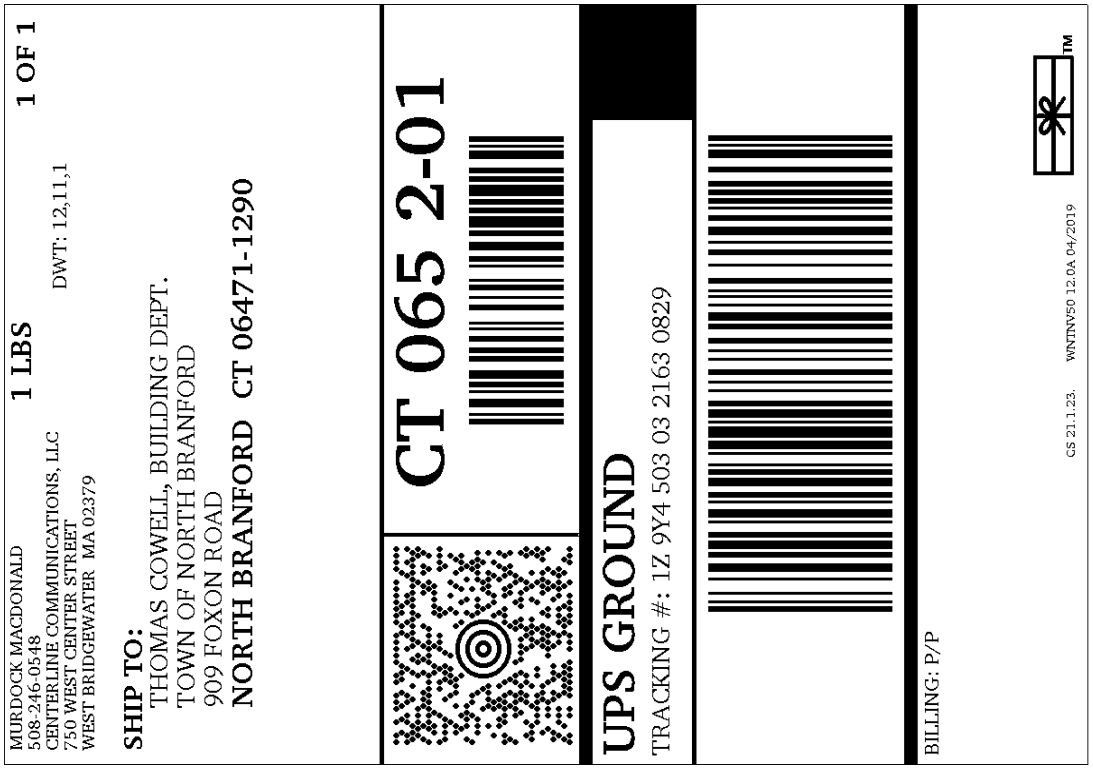

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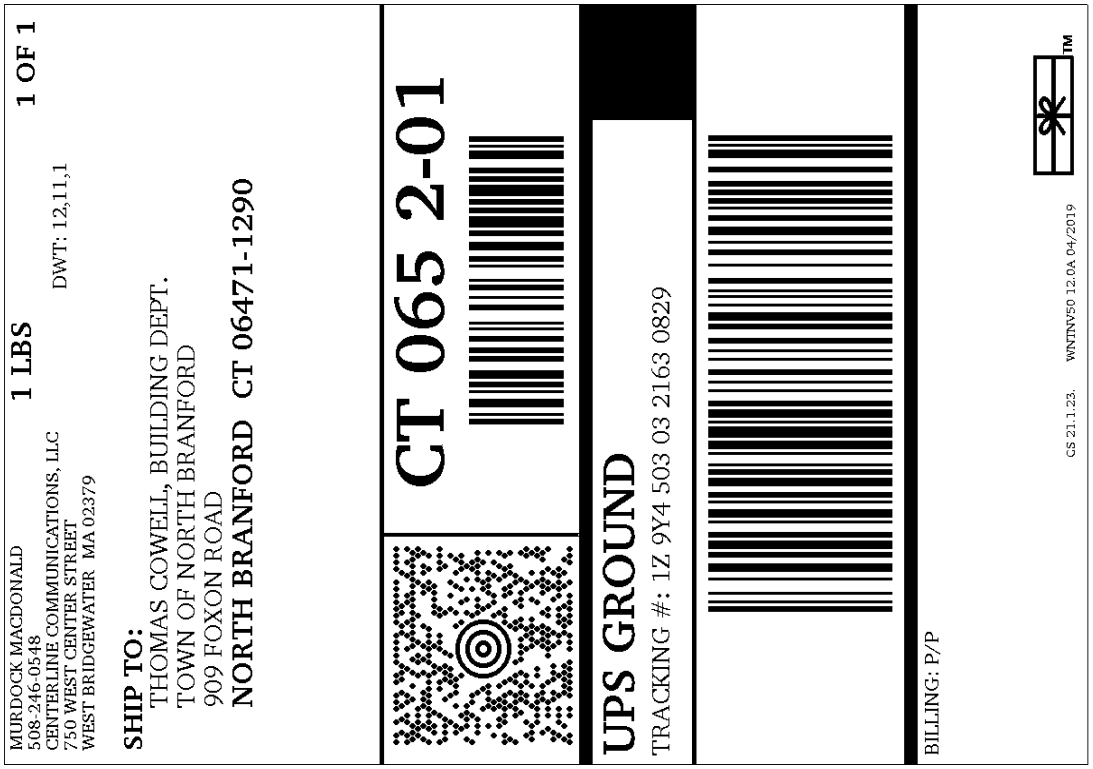

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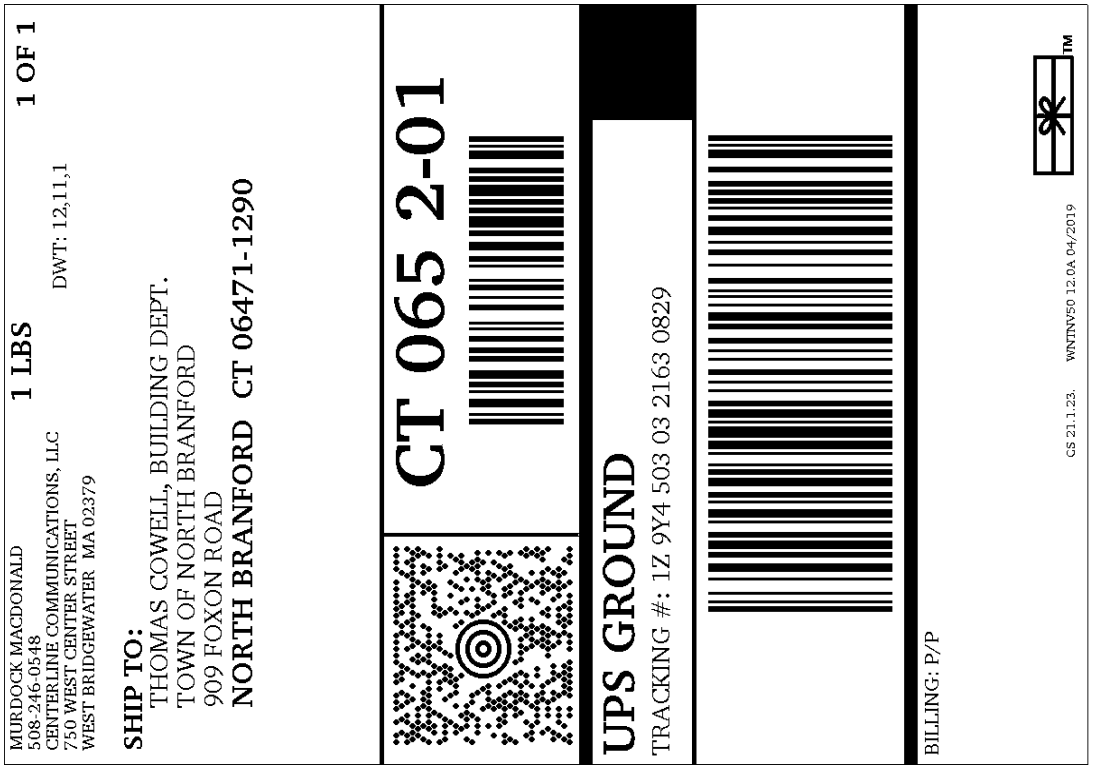

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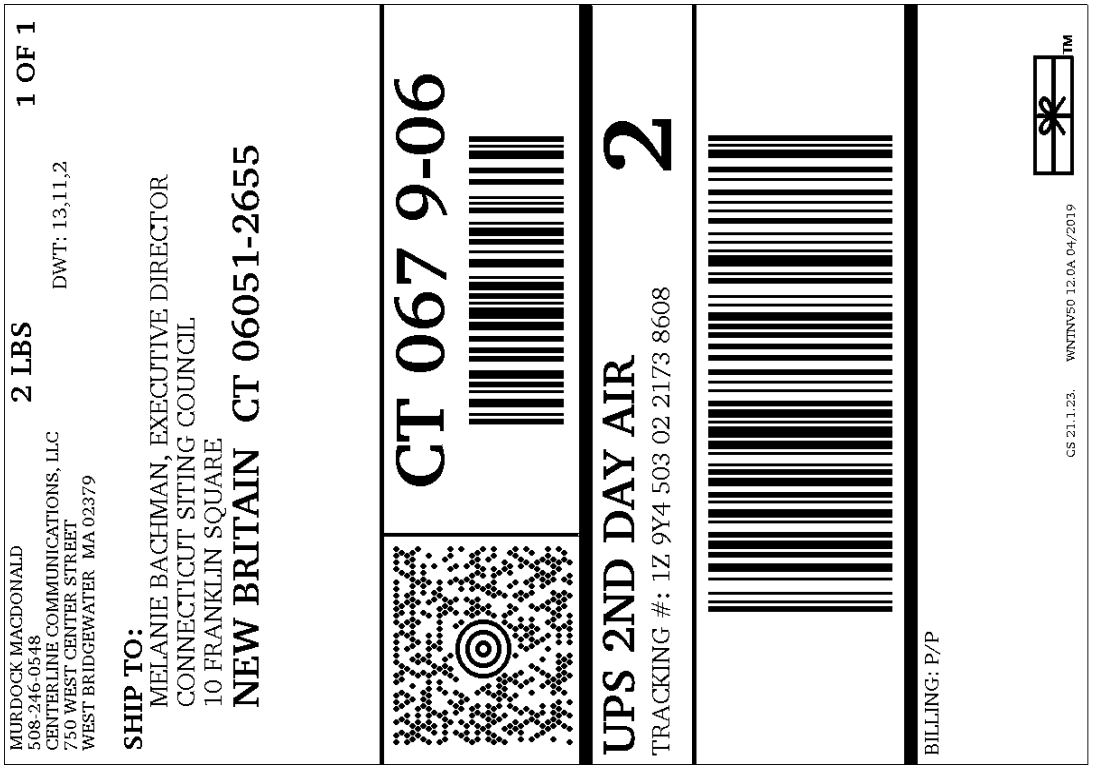

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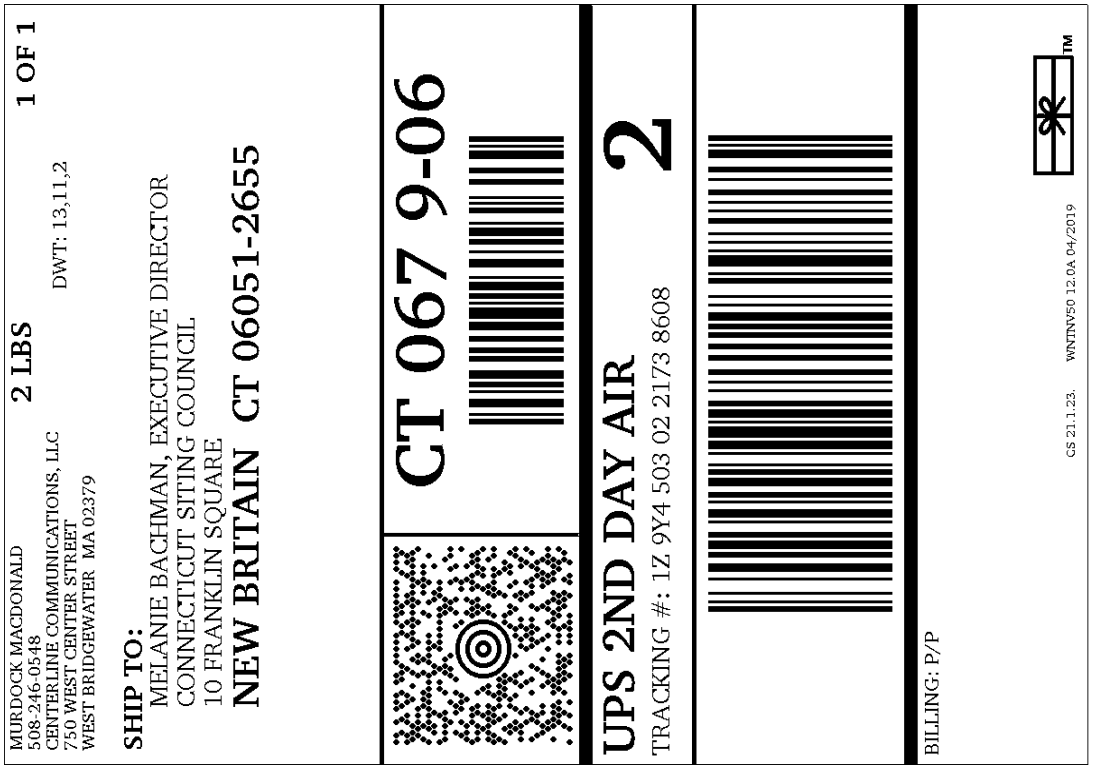

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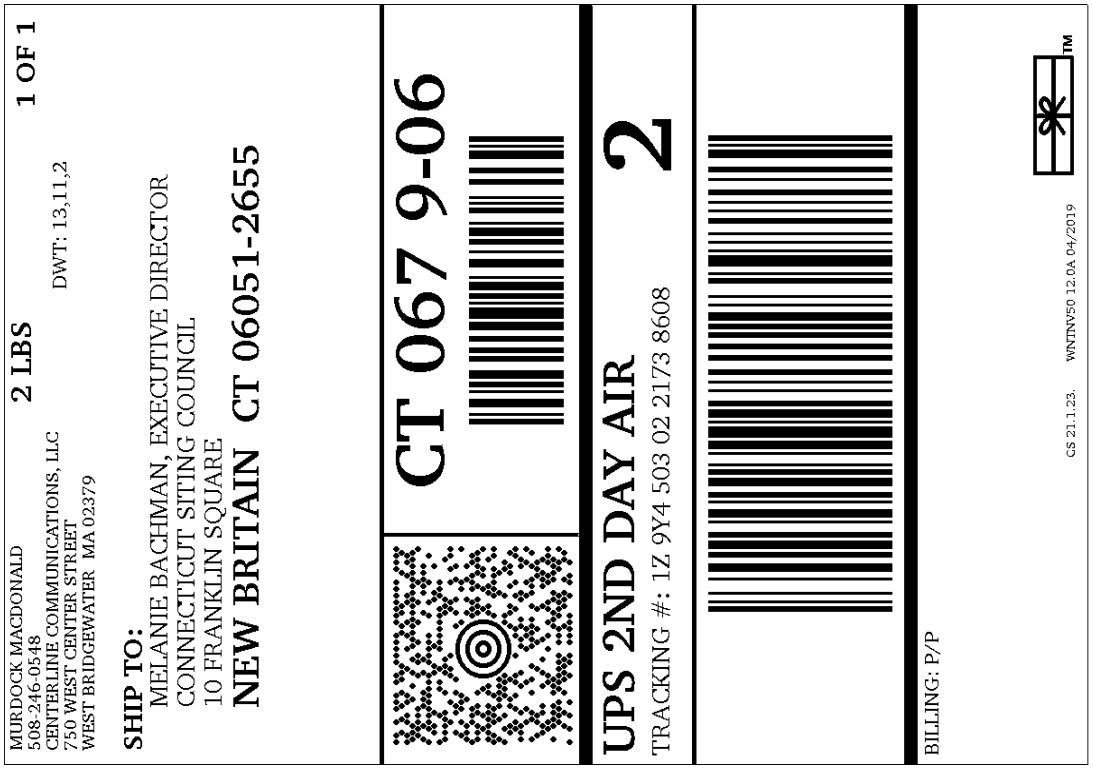

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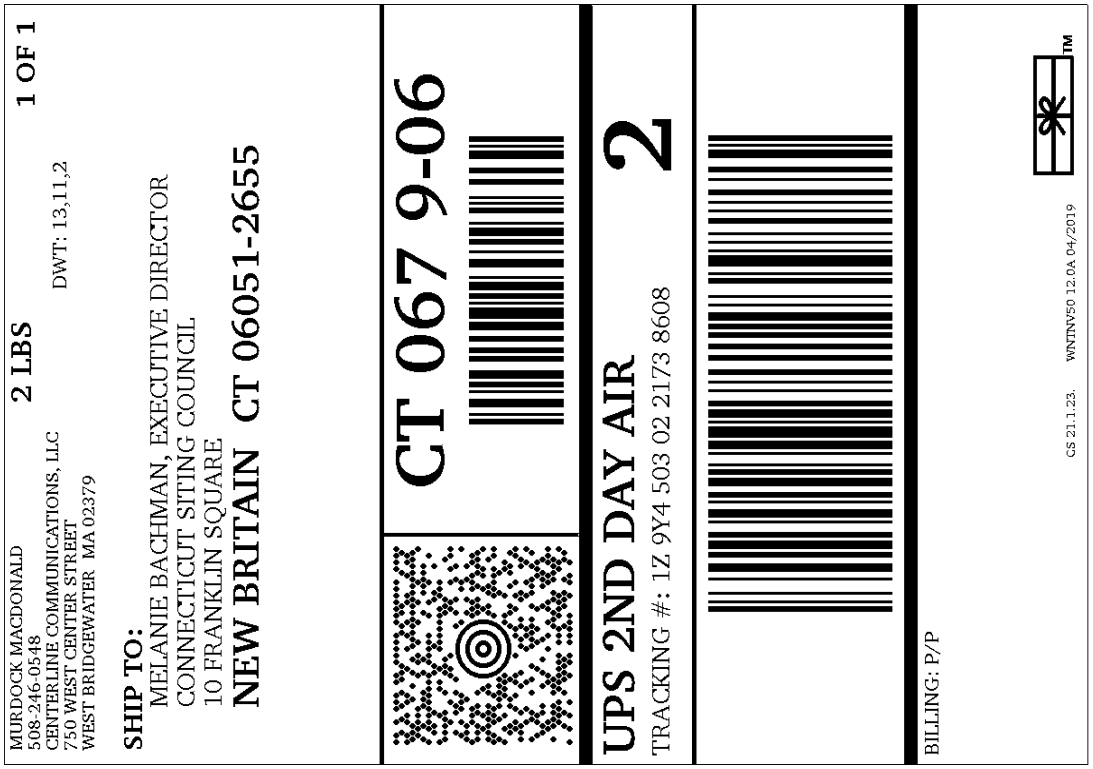

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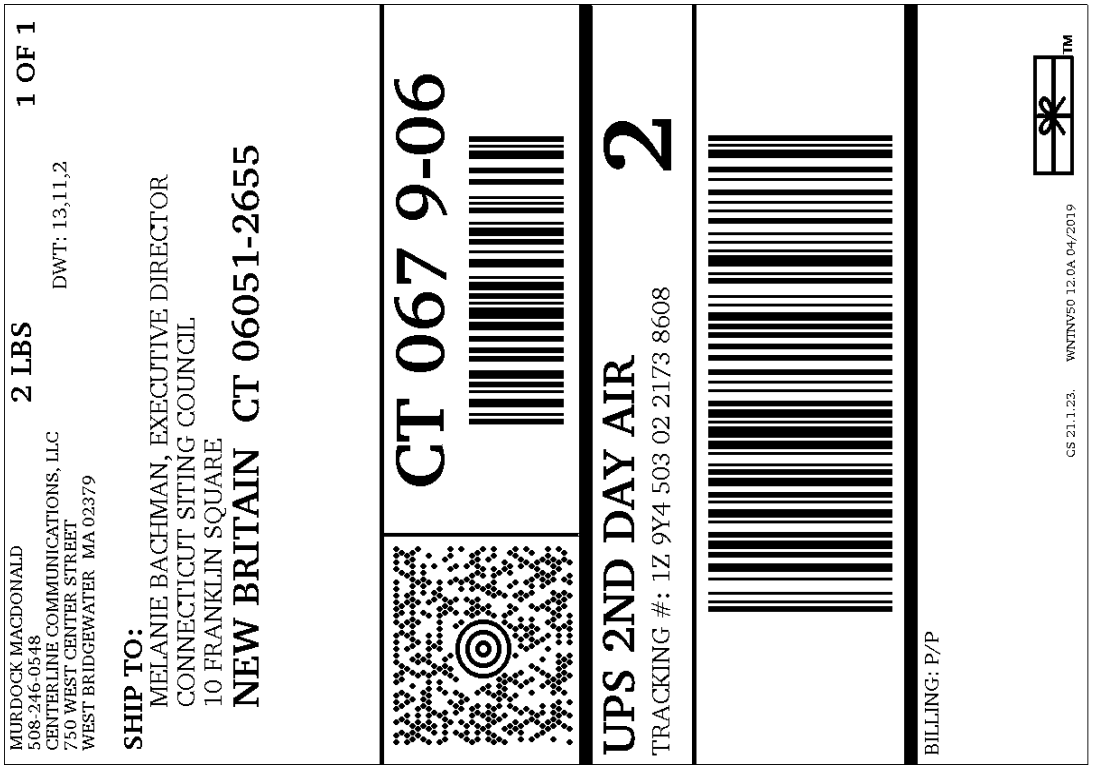

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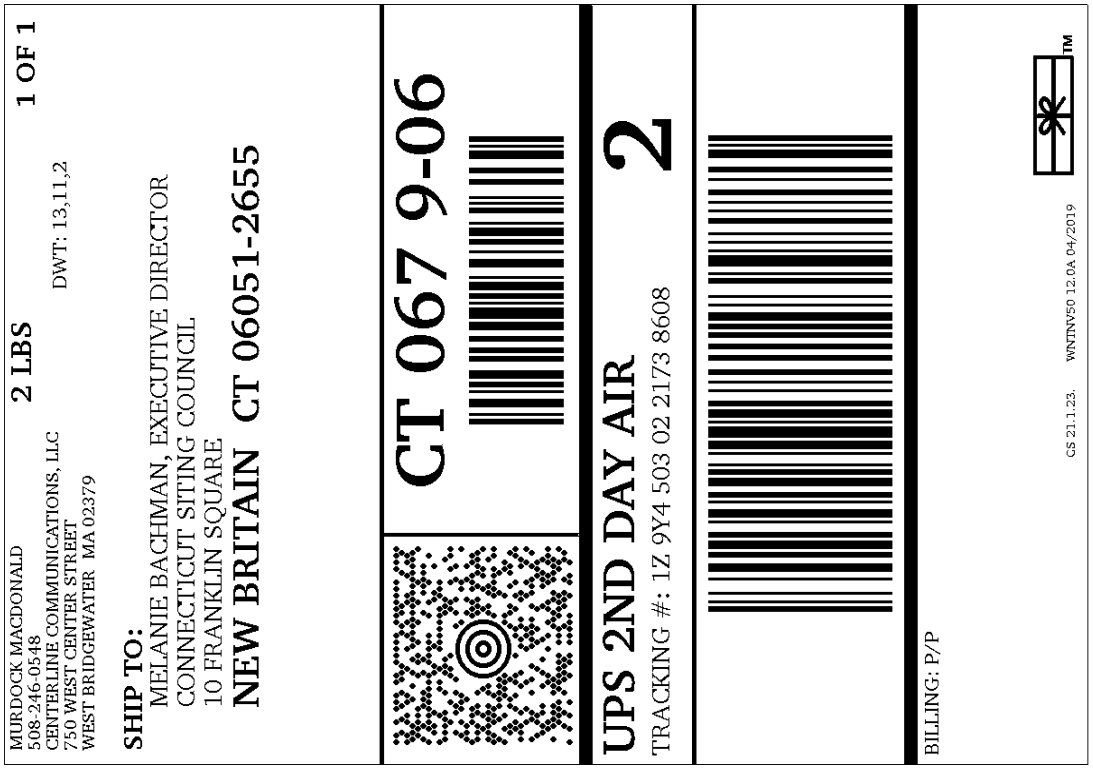

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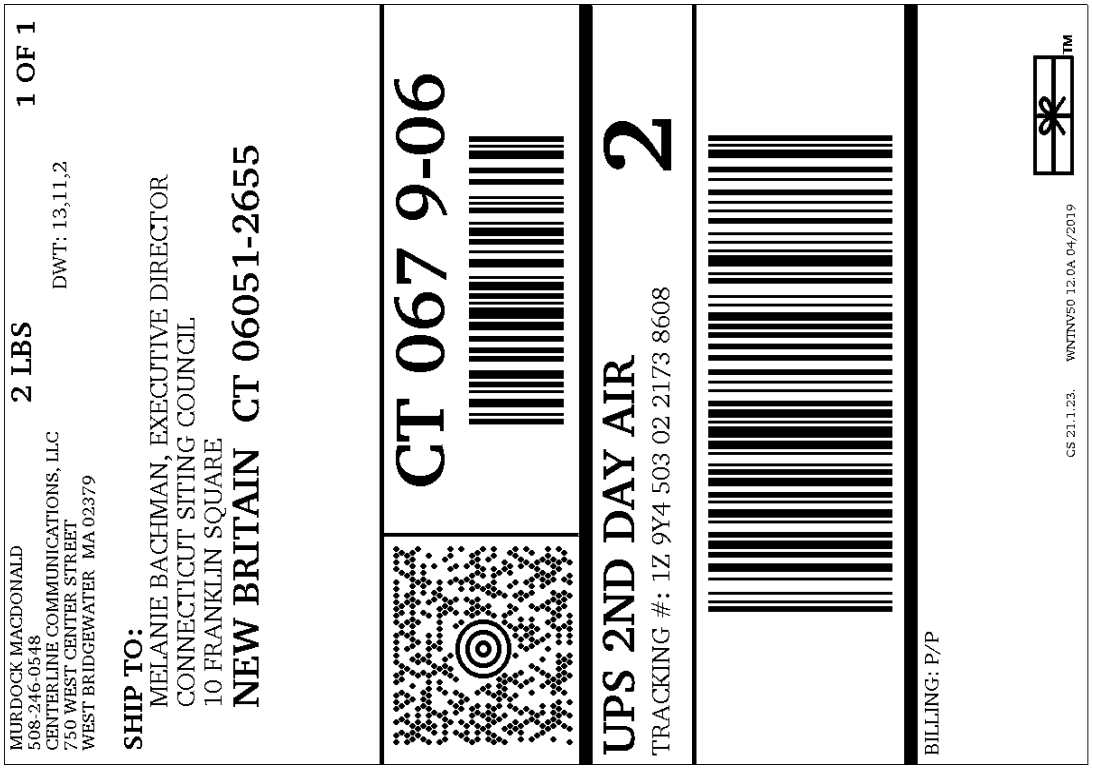

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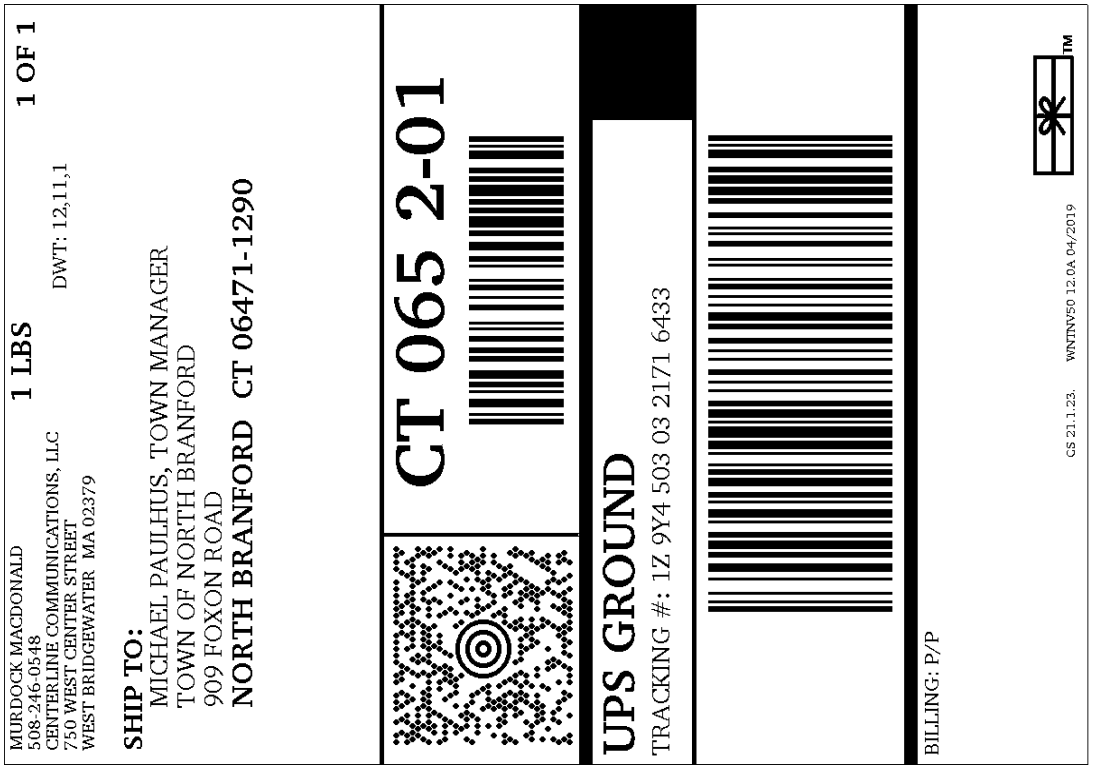

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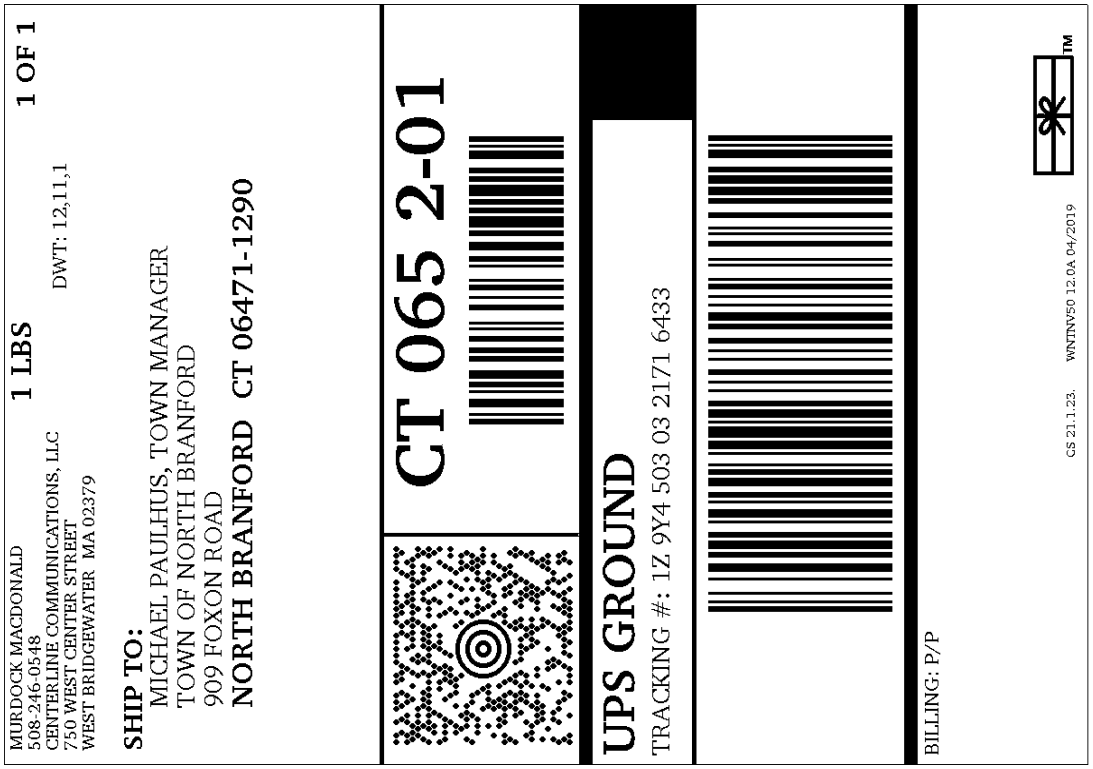

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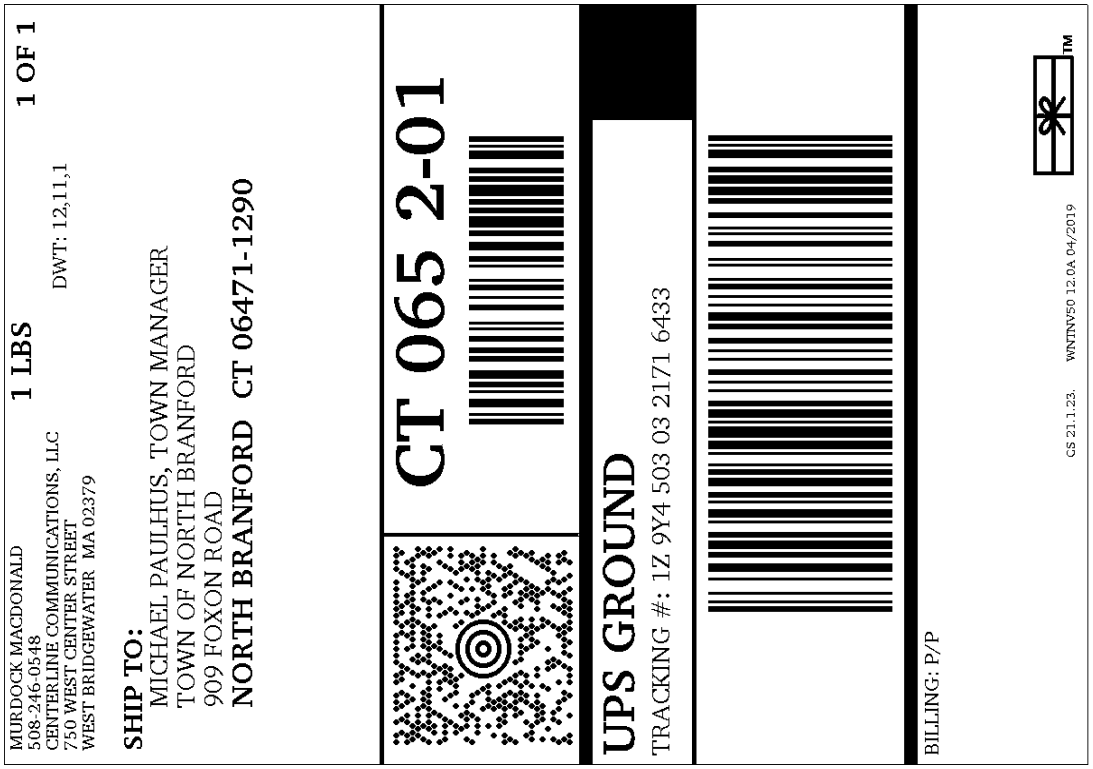

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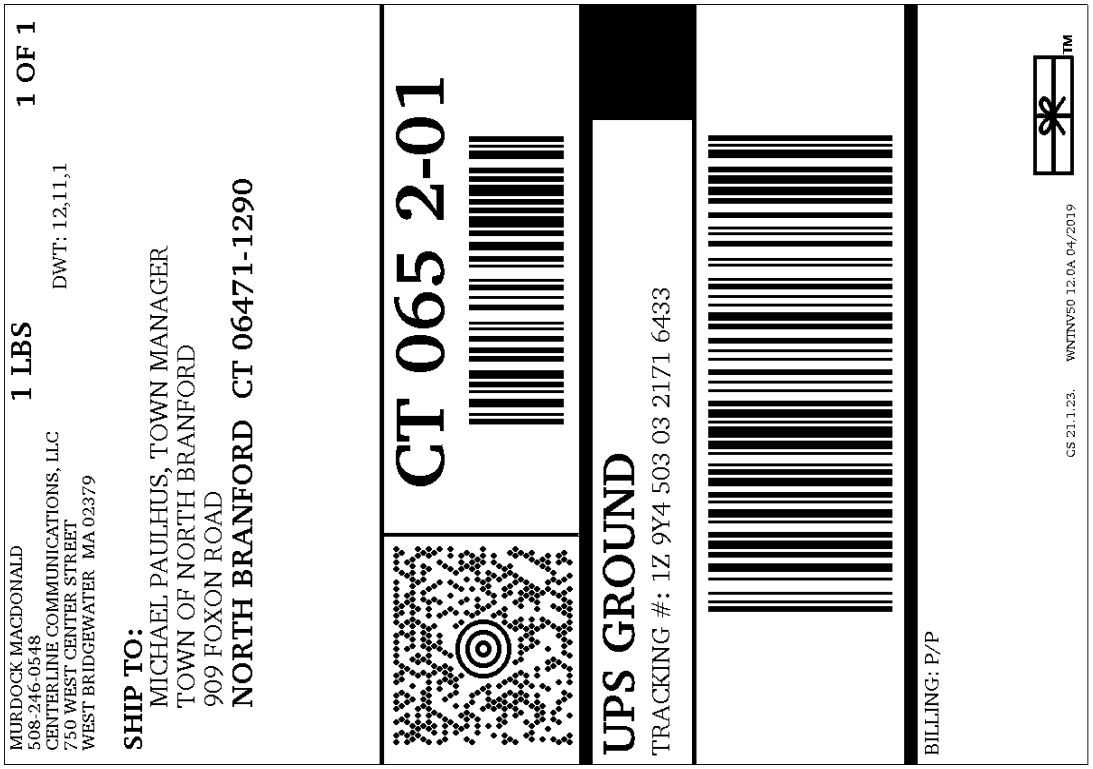

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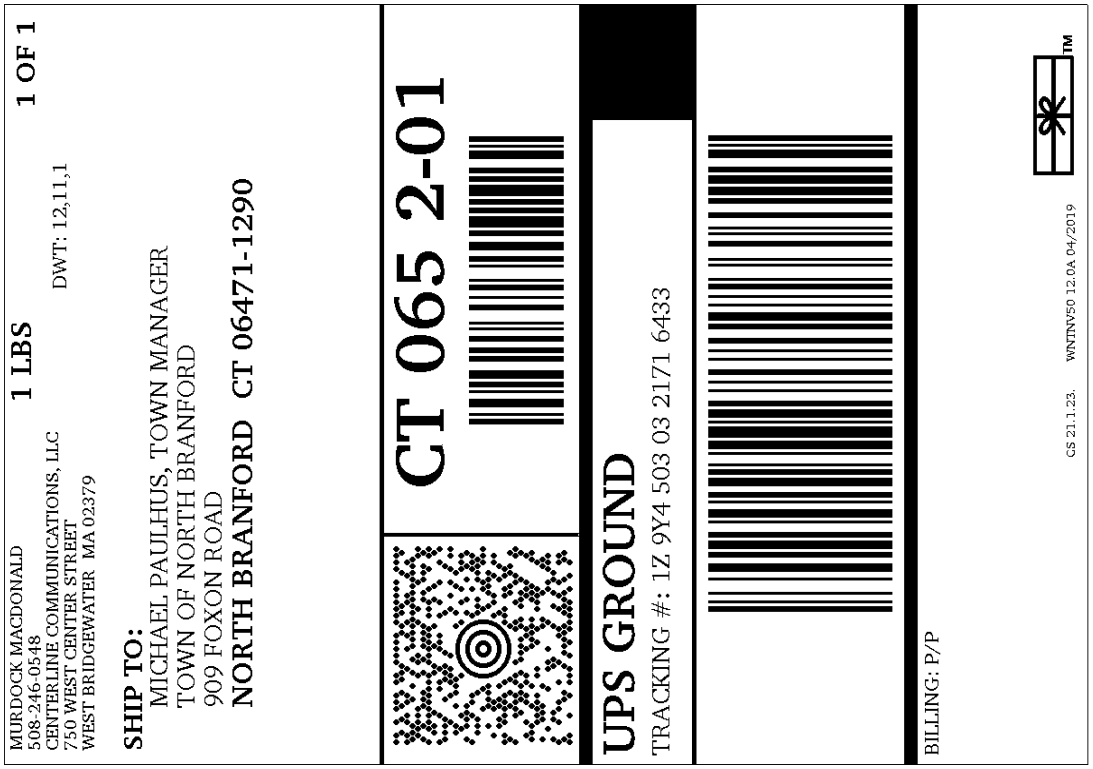

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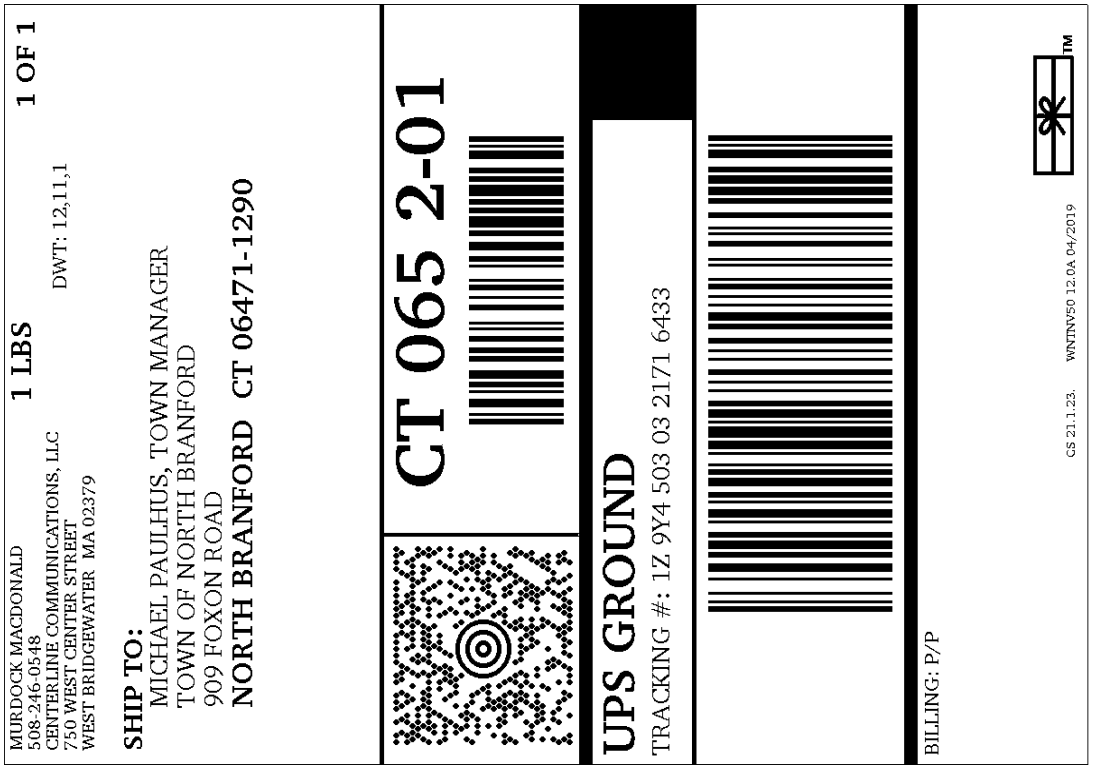

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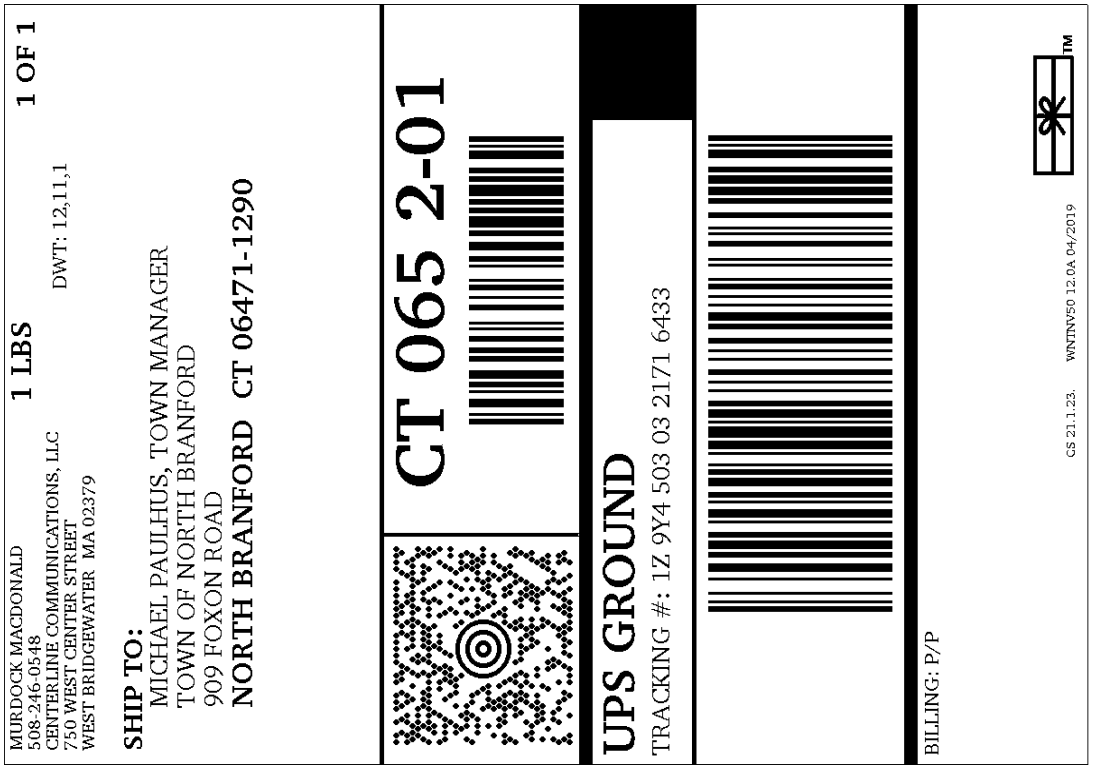

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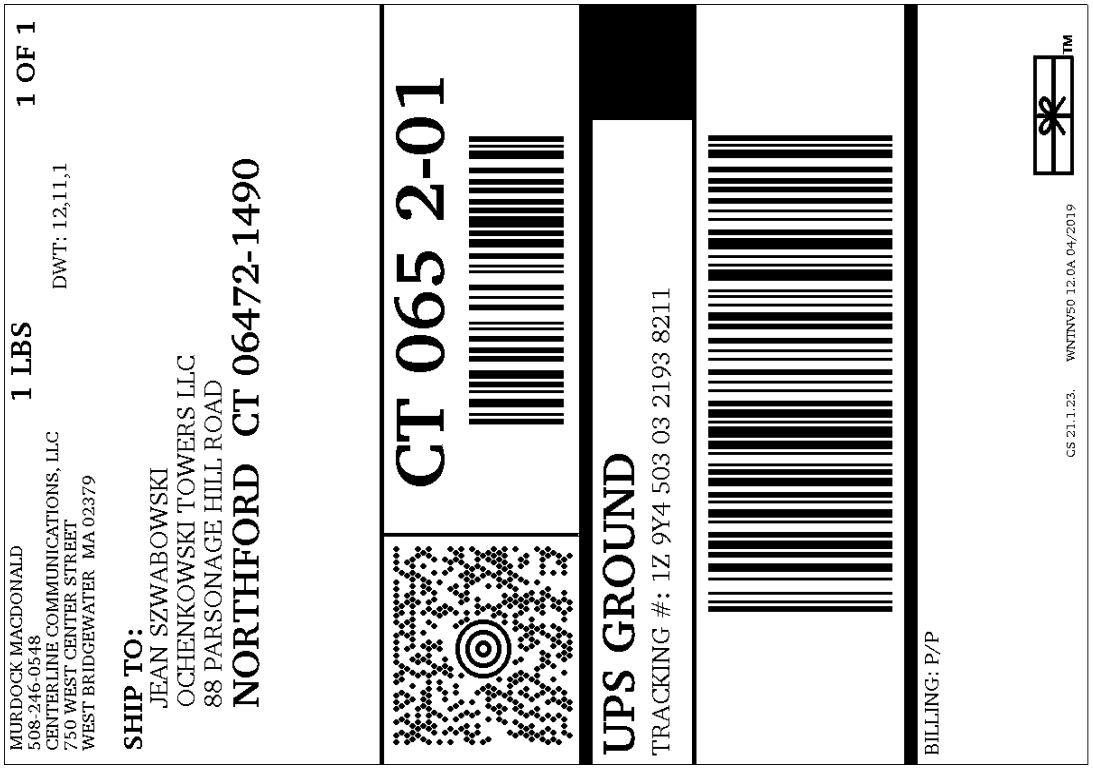

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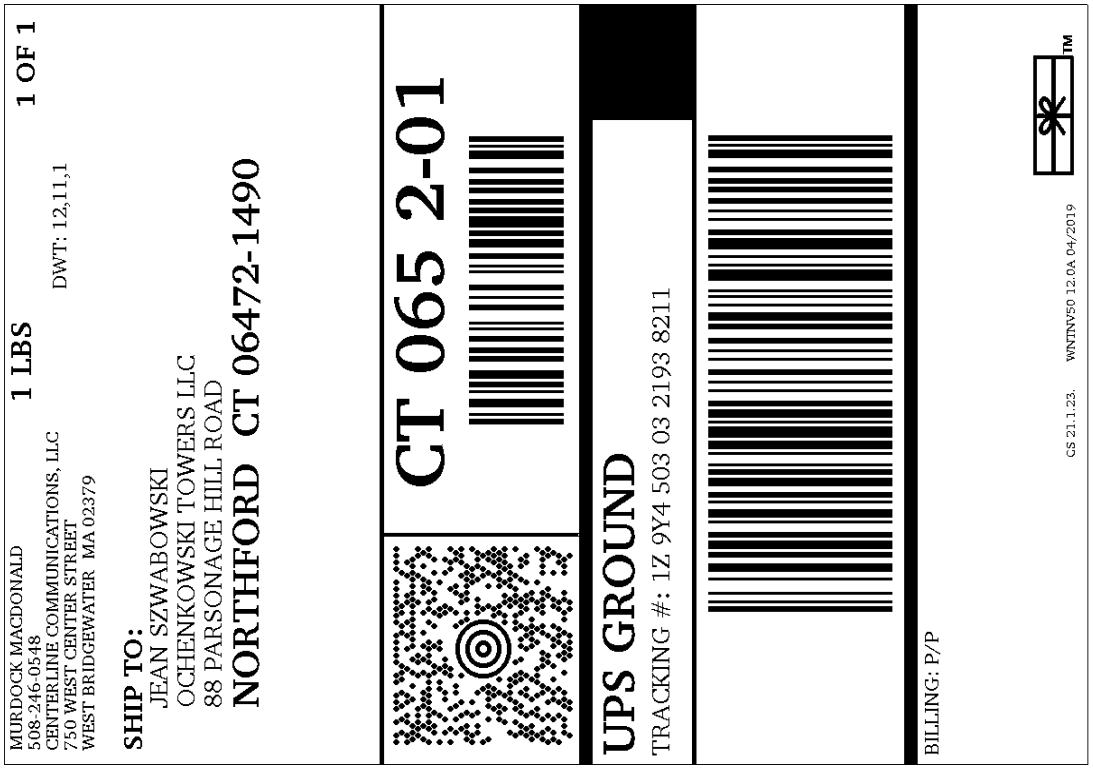

UPS CampusShip: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   Customers with a Daily Pickup
   Your driver will pickup your shipment(s) as usual.

   Customers without a Daily Pickup
   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the Resources area of CampusShip and select UPS Locations.
   Schedule a same day or future day Pickup to have a UPS driver pickup all your CampusShip packages.
   Hand the package to any UPS driver in your area.

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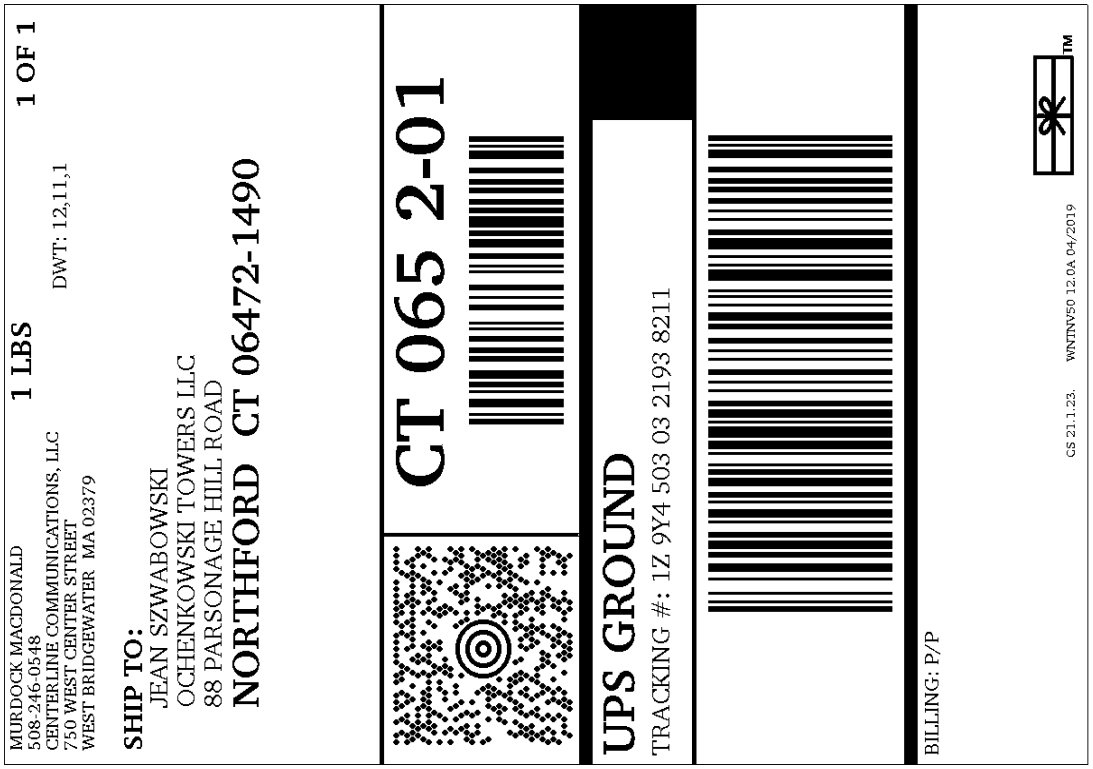

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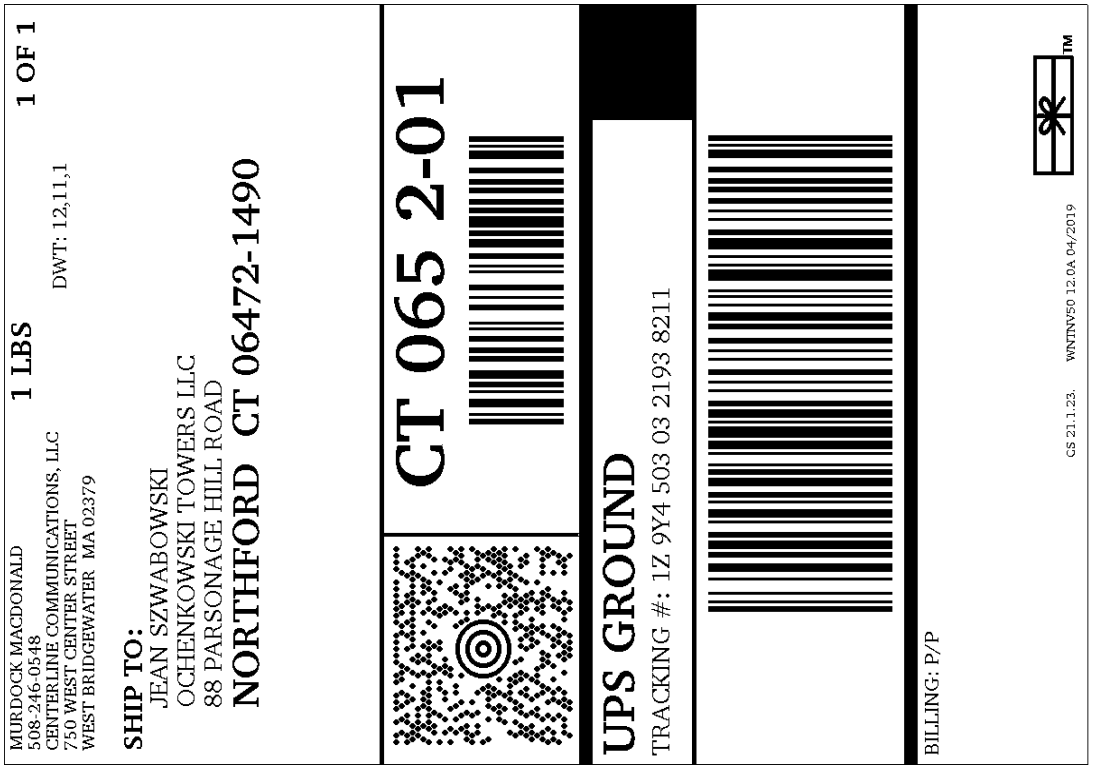

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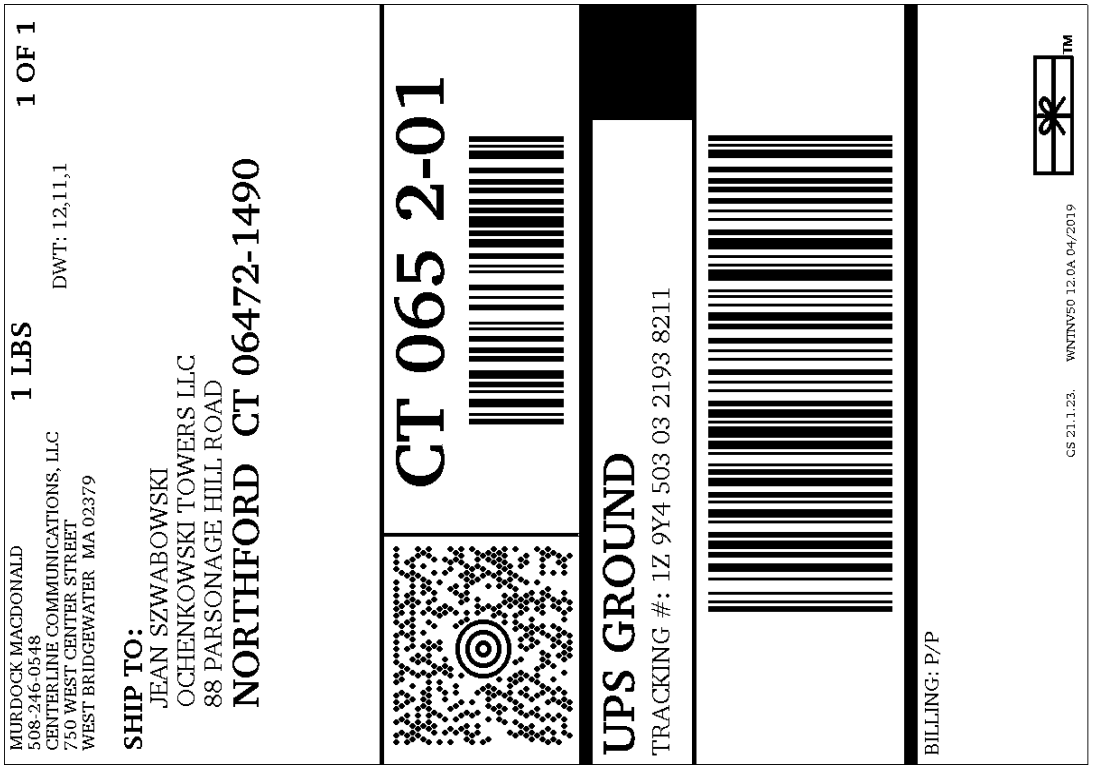

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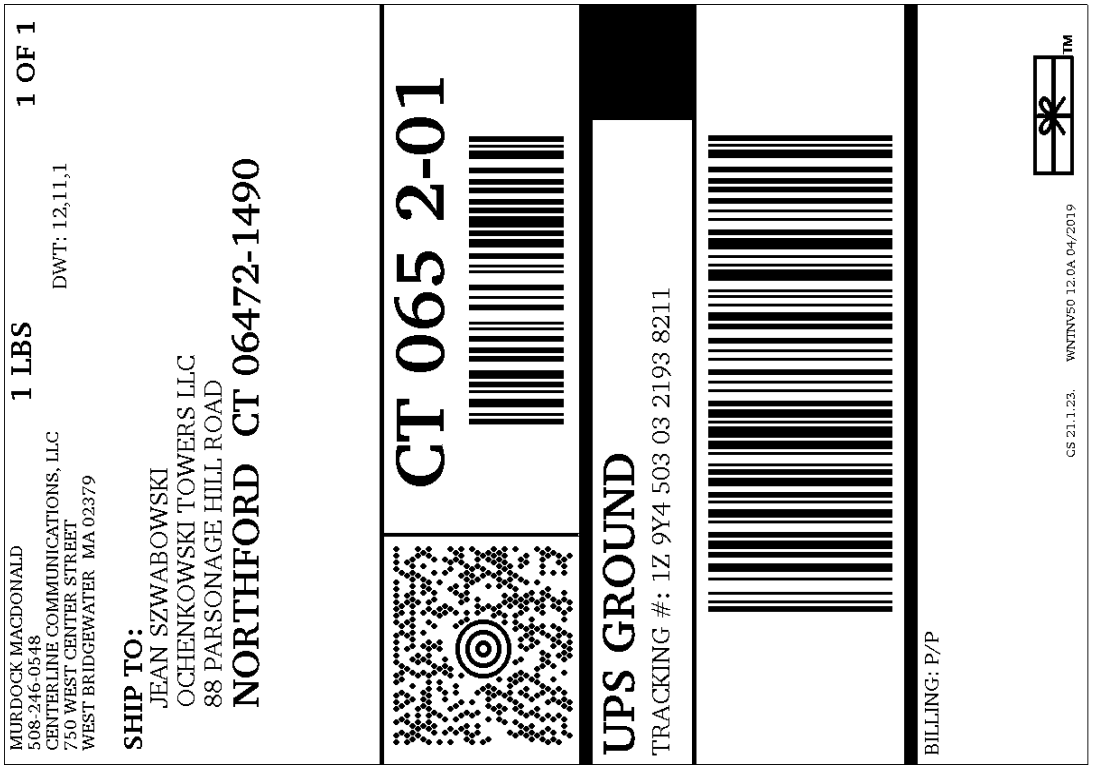

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