October 31, 2016

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

Re: **Notice of Exempt Modification – Antenna Swap**
Property Address: **68 Groton Long Point Rd Groton, CT 06340**
Applicant: **AT&T Mobility, LLC**

Dear Ms. Bachman:

On behalf of AT&T, please accept this application as notification pursuant to R.C.S.A. §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16-50j-72(b) (2).

AT&T currently maintains a wireless telecommunications facility consisting of nine (9) wireless telecommunication antennas at an antenna center line height of 133-feet on an existing 140 foot–self-support tower, owned by The Town of Groton at 45 Fort Hill Rd Groton, CT 06340. AT&T now intends to replace three (3) existing antennas with three (3) new antennas. These antennas would be installed at the 133- foot level of the tower. AT&T also plans to install three (3) new RRUS-32, one (1) fiber cable and two (2) power cables.

This facility was unanimously approved by the Town of Groton Planning and Zoning Commission at its meeting on March 12, 1996, with modifications on your site plan entitled Police Station Modification (Bell Atlantic NYNEX Mobile), Groton Long Point Road (See attachment with conditions)

The following is a list of subsequent decisions by the Connecticut Siting Council:

EM-CING-043-059-076-089-089-106-070703 – New Cingular Wireless PCS, LLC notice of intent to modify existing telecommunications facilities located at 1455 Forbes Street, East Hartford; 68 Groton Long Point Road, **Groton**; 8 Old Route 79, Madison; 167 Lester Street, New Britain; 200 Stanley Street, New Britain and 170 Ingham Hill Road, Old Saybrook, Connecticut.

EM-CING-059-110225 - New Cingular Wireless PCS, LLC notice of intent to modify an existing telecommunications facility located at 68 Groton Long Point Road, **Groton**, Connecticut.

Please accept this letter pursuant to Regulation of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-5I0j-72(b) (2). In accordance with R.C.S.A., a copy of this letter is being sent Bruce S. Flax (R), Mayor 632 Noank Road Mystic, CT 06355

The planned modifications to AT&T's facility fall squarely within those activities explicitly provided for in R.C.S.A. §16-50j-72(b) (2).

1. The proposed modifications will not result in an increase in the height of the existing tower. AT&T's replacement antennas will be installed at the 133-foot level of the 140-foot guyed tower.
2. The proposed modifications will not involve any changes to ground-mounted equipment and, therefore, will not require and extension of the site boundary.
3. The proposed modifications will not increase the noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative worst-case RF emissions calculation for AT&T's modified facility is provided in the RF Emissions Compliance Report, included in Tab 2.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The tower and its foundation can support AT&T's proposed modifications. (See Structural Analysis Report included in Tab 3).

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

Sincerely,

David Barbagallo

CC w/enclosures:

Bruce S. Flax, Mayor Town of Groton

StartAntennaData It is advisable to provide an ID (ant 1) for all antennas

ID	Name	(MHz) Freq	Trans Power	Trans Count	Coax Len	Coax Type	Other Losses	Input Power
1	AT&T MOB	850	18.53519	1	0			18.53519
1	AT&T MOB	1900	15.03143	1	0			15.03143
2	AT&T MOB	850	21.03764	1	0			21.03764
2	AT&T MOB	1900	147.2323	1	0			147.2323
3	AT&T MOB	737	54.07534	1	0			54.07534
3	AT&T MOB	2100	60.67363	1	0			60.67363
4	AT&T MOB	850	18.53519	1	0			18.53519
4	AT&T MOB	1900	15.03143	1	0			15.03143
5	AT&T MOB	850	21.03764	1	0			21.03764
5	AT&T MOB	1900	147.2323	1	0			147.2323
6	AT&T MOB	737	54.07534	1	0			54.07534
6	AT&T MOB	2100	60.67363	1	0			60.67363
7	AT&T MOB	850	18.53519	1	0			18.53519
7	AT&T MOB	1900	15.03143	1	0			15.03143
8	AT&T MOB	850	21.03764	1	0			21.03764
8	AT&T MOB	1900	147.2323	1	0			147.2323
9	AT&T MOB	737	54.07534	1	0			54.07534
9	AT&T MOB	2100	60.67363	1	0			60.67363

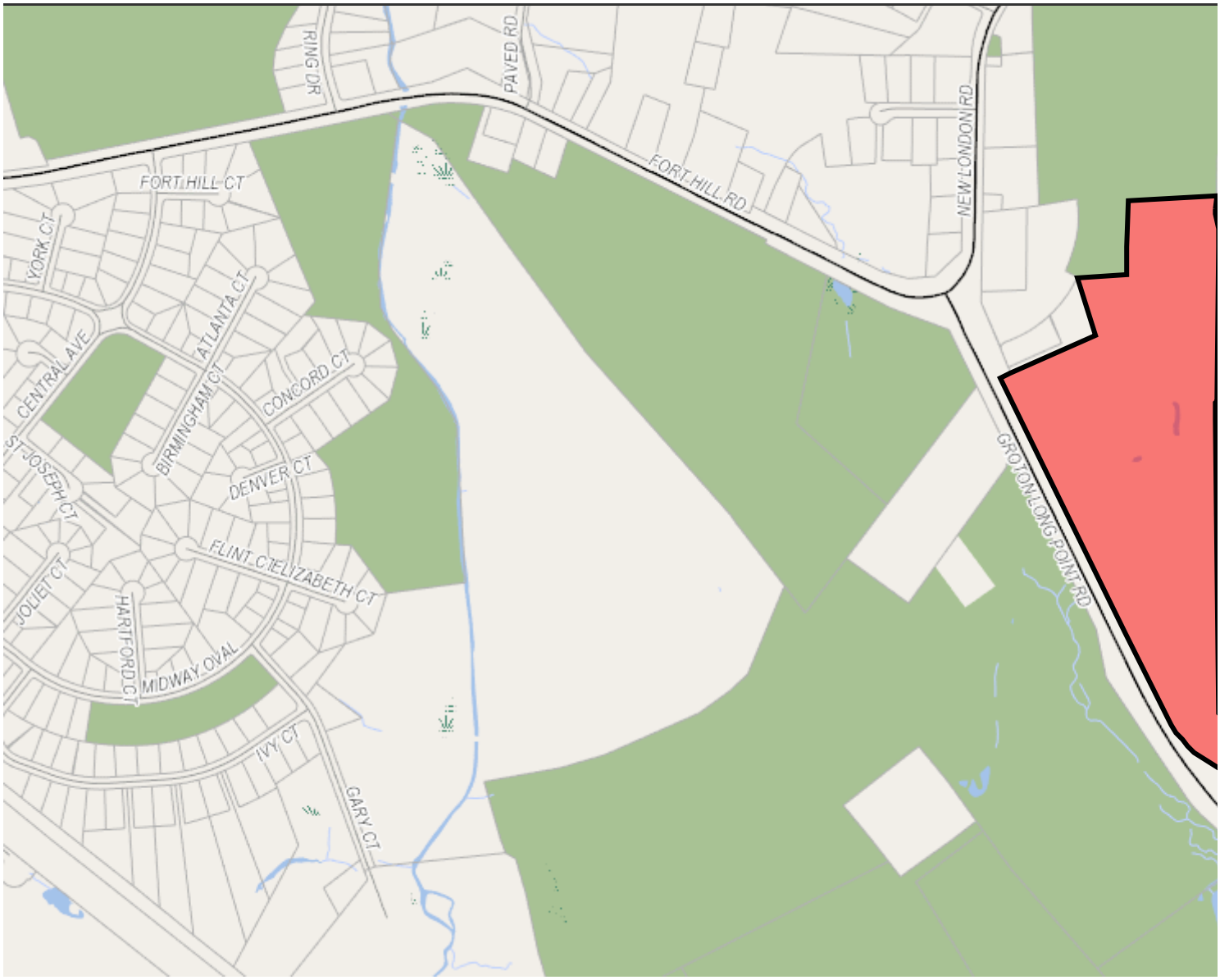
StartSymbolData

Calc Power	Mfg	Model	(ft) X	(ft) Y	(ft) Z	Type	(ft) Aper	dBd Gain
	Powerwav	7770	91.58	101.74	130.7085	Panel	4.583	11.51
	Powerwav	7770	91.58	101.74	130.7085	Panel	4.583	13.41
	Quintel	QS66512-2	94.46	99.46	130	Panel	6	10.96
	Quintel	QS66512-2	94.46	99.46	130	Panel	6	14.16
	KMW	AM-X-CD-1	96.98	97.14	131	Panel	4	11.66
	KMW	AM-X-CD-1	96.98	97.14	131	Panel	4	14.36
	Powerwav	7770	97.06	91.81	130.7085	Panel	4.583	11.51
	Powerwav	7770	97.06	91.81	130.7085	Panel	4.583	13.41
	Quintel	QS66512-2	92.74	91.09	130	Panel	6	10.96
	Quintel	QS66512-2	92.74	91.09	130	Panel	6	14.16
	KMW	AM-X-CD-1	88.66	90.25	131	Panel	4	11.66
	KMW	AM-X-CD-1	88.66	90.25	131	Panel	4	14.36
	Powerwav	7770	85.83	93.15	130.7085	Panel	4.583	11.51
	Powerwav	7770	85.83	93.15	130.7085	Panel	4.583	13.41
	Quintel	QS66512-2	85.71	96.44	130	Panel	6	10.96
	Quintel	QS66512-2	85.71	96.44	130	Panel	6	14.16
	KMW	AM-X-CD-1	85.67	99.64	131	Panel	4	11.66
	KMW	AM-X-CD-1	85.67	99.64	131	Panel	4	14.36

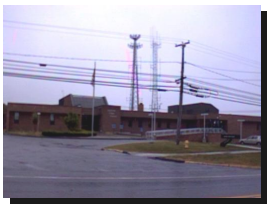
BWdth Pt Dir	Uptime Profile	ON flag
82;22	100%	ON•
86;22	100%	ON•
63;22	100%	ON•
68;22	100%	ON•
67;22	100%	ON•
62;22	100%	ON•
82;144	100%	ON•
86;144	100%	ON•
63;144	100%	ON•
68;144	100%	ON•
67;144	100%	ON•
62;144	100%	ON•
82;264	100%	ON•
86;264	100%	ON•
63;264	100%	ON•
68;264	100%	ON•
67;264	100%	ON•
62;264	100%	ON•

Tools

GrotonGIS Lite



68 GROTON LONG POINT RD



PIN: **260810364571 E**
TYPE: **EXEMPT**
DISTRICT: **POQUONNOCK BRIDGE FIRE DISTRICT**
ACREAGE: **28.74 AC.**
ZONING: **RS-20**

Get More Info | Zoom To Extent | Clear Selection

TOWN OF GROTON

PLANNING DEPARTMENT

45 Fort Hill Road
Groton, Connecticut 06340-4394
Telephone (860) 441 - 6610
Fax (860) 441 - 6638

July 31, 1996

Attorney Kenneth C. Baldwin
Robinson and Cole
One Commercial Plaza
280 Trumbull Street
Hartford, Connecticut 06103-3597

Dear Mr. Baldwin:

SUBJECT: Bell Atlantic Equipment Room Site Plan

As you requested, I am writing concerning the status of the above-named site plan. The site plan was approved by the Planning Commission on March 12, 1996. All of the modifications including technical items, required by the Planning Commission have been addressed. I spoke with the project architect this morning, and I anticipate final mylars will be recorded in Land Records in the near future.

If you have any questions, please feel free to call me.

Sincerely,

James S. Butler, AICP
Director of Planning

JSB:nb

Town of Groton

PLANNING DEPARTMENT

45 FORT HILL ROAD
TEL. (203) 441-6610

GROTON, CONNECTICUT 06340-4394
FAX (203) 441-6678

March 19, 1996

Kenneth C. Baldwin, Esq.
Robinson & Cole
One Commercial Plaza
Hartford, Connecticut 06103-3597

Dear Mr. Baldwin:

The Town of Groton Planning Commission, at its meeting on March 12, 1996, approved with modifications your site plan entitled Police Station Modification (Bell Atlantic NYNEX Mobile), Groton Long Point Road (see attachment).

It is strongly recommended that if your plan was approved with modifications, you submit the revised plan for final review to insure compliance with the Commission's approval. Following this review, two mylars and eight paper prints of the entire plan are to be submitted for the Chairman's signature.

Please note that this plan, after being signed by the Chairman of the Commission, must be filed by you or your representative in the Land Records Office at Town Hall, and until such filing has been done, no building permit can be issued. Please note as per the Zoning Regulations, "any approved site plan for which construction has not commenced or which is not otherwise put into effect within a period of one year shall become null and void, unless an extension of time is applied for by the applicant and granted by the Planning Commission."

If a building permit is involved, "Post Site Plan Approval Requirements and Procedures" and "Contractor's Punch List for Site Work" have been enclosed to assist you in the construction phase of your project.

Please note that any modification to this plan subsequent to Planning Commission approval requires resubmission of an application for site plan modification approval in the same manner as the original application.

If you have any questions, please do not hesitate to contact me.

Sincerely,

James S. Butler, AICP
Director of Planning

JSB:nb
Certified # 076 748 467

MOTION: To approve the Police Station (Bell Atlantic Mobile) modification, Groton Long Point Road, with the following modifications:

1. As agreed to by the applicant, a 5' wide concrete sidewalk be constructed along the Police Station frontage on Route 215, the details of which will be shown on the final site plan.

2. The existing tower to be removed be taken down prior to issuance of a Certificate of Site Plan Compliance and C.O. for the equipment room addition.

3. The existing storage trailers be removed from the site by the Town prior to the issuance of a Certificate of Site Plan Compliance and C.O. for the equipment room addition.

4. The new building addition be provided with a fire alarm system that is connected to the emergency dispatch center as required by the Fire Marshal.

5. All technical items raised by staff be addressed.

Motion made by Spinner, seconded by Steinford, so voted unanimously.

Technical Items

1. Parking calculations in site data table incorrect. Use calculations for entire site.

2. Wall is 5' - 8' high. Should we have some type of rail along the top of it? Public Works has recommended a 4' high chain link fence.

3. Why is concrete ramp walkway positioned where it is? Why not have it tie into cross-hatched area?

4. Plan specifies straw bale barrier to be used as an E&S control and refers to detail sheet; however, detail sheet shows a detail for silt fence. Which is it?

5. Cross-hatched spaces on either side of door will be parked in. Why not just sign them as reserved for "Police Vehicles Only"?

6. Dumpster pad should be poured right up to and at top of proposed bclc.

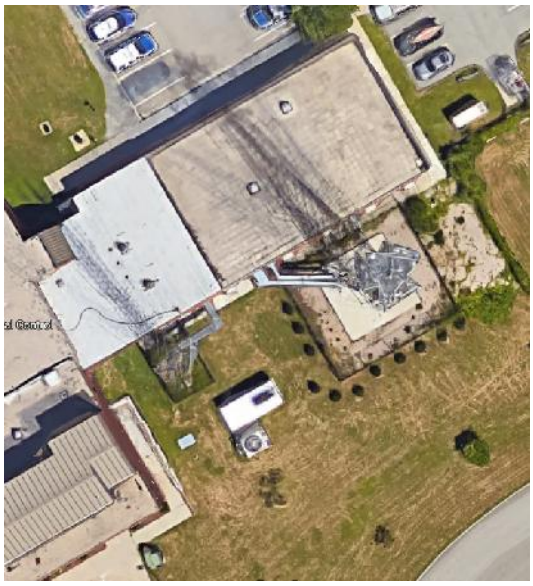
7. Show where existing leakoff is being removed.

8. Continue striping of parking spaces to the north up to sawcut line.

9. Show conduit to relocated light pole.

SITESAFE
RF COMPLIANCE EXPERTS
A BUSINESS OF FDH VELOCITEL

200 North Glebe Road, Suite 1000, Arlington, VA 22203-3728
703.276.1100 ● 703.276.1169 fax
info@sitesafe.com ● www.sitesafe.com



Smartlink LLC on behalf of AT&T Mobility, LLC
Site FA – 10035132
Site ID – CT2164 (3C)
USID – 65071
Site Name – New London Groton PD
Site Compliance Report

68 Groton Long Point Road
Groton, CT 06340

Latitude: N41-20-36.77
Longitude: W72-0-34.80
Structure Type: Self-Support

Report generated date: August 31, 2016
Report by: Kyle Green
Customer Contact: David Barbagallo

AT&T Mobility, LLC will be compliant when the remediation recommended in Section 5.2 or other appropriate remediation is implemented.

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Table of Contents

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1 General Site Summary

1.1 Report Summary

AT&T Mobility, LLC	Summary
Access to Antennas Locked?	Yes
RF Sign(s) @ access point(s)	Unknown
RF Sign(s) @ antennas	Unknown
Barrier(s) @ sectors	N/A
Max cumulative simulated RFE level on the Rooftop and Ground	<1% General Public Limit
FCC & AT&T Compliant?	Will Be Compliant

The following documents were provided by the client and were utilized to create this report:

RFDS: NEW-ENGLAND_CONNECTICUT_CTV2164_2017-LTE-Next-Carrier_LTE-3C_om636a_PTN_10035132_65071_03-16-2016_Preliminary-Approved_v1.00

CD's: 10035132_AE201_160803_CTL02164_REV0, MJP 8-15-2016

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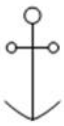
2 Scale Maps of Site

The following diagrams are included:

- Site Scale Map
- RF Exposure Diagram
- Elevation View

Scale Map Key		
 Existing Sign	Proposed Barrier	GPS Reading
 Proposed Sign	Existing Barrier	 Anchor Point

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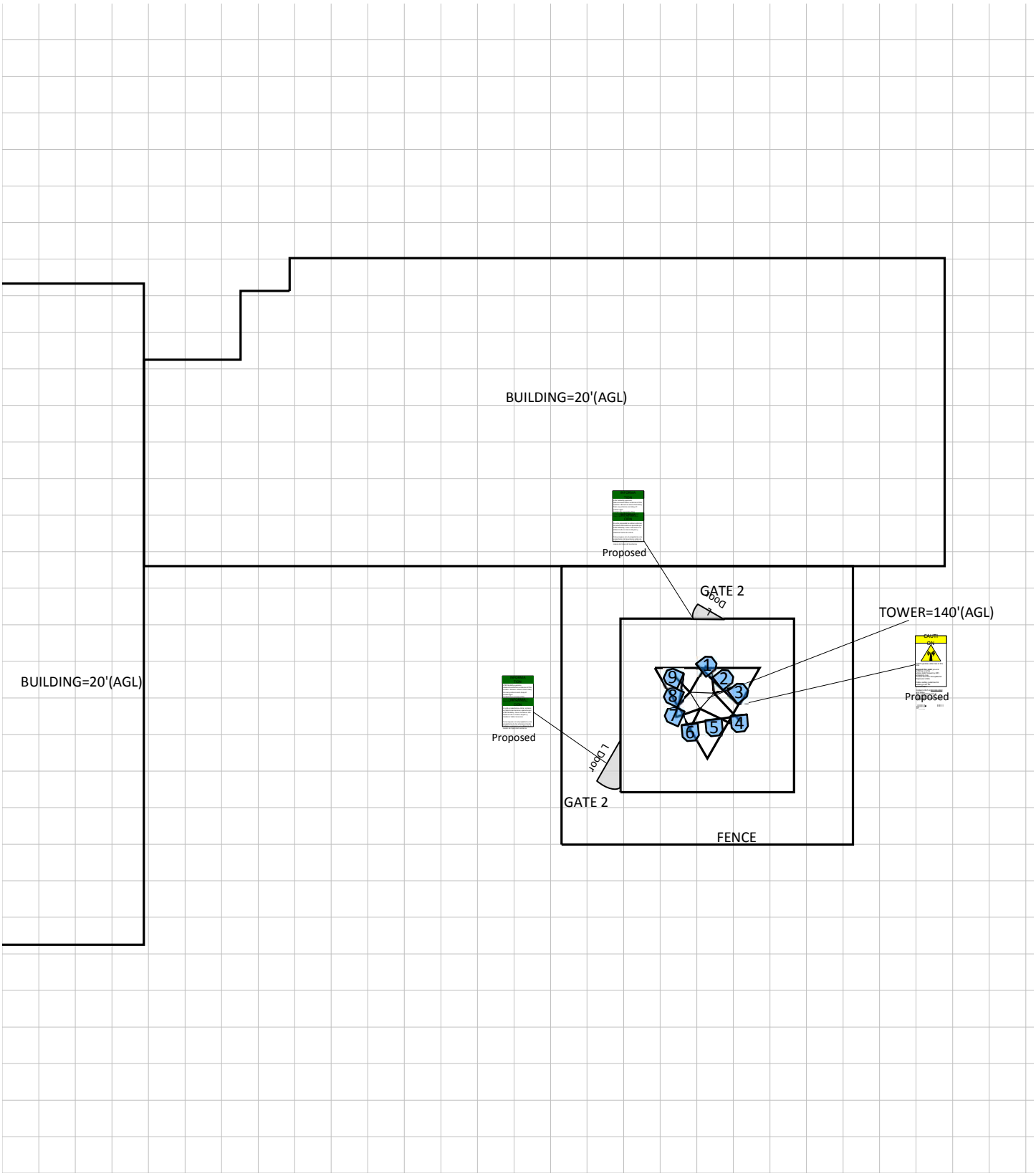
Site Scale Map For: New London Groton PD



(Feet)

0 11.8 23.5

www.sitesafe.com
Site Name:New London Groton PD
8/31/2016 12:06:57 PM

AT&T MOBILITY LLC	VERIZON WIRELESS	T-MOBILE	METROPCS	CRICKET COMMUNICATIONS	CLEARWIRE	SPRINT

3 Antenna Inventory

The following antenna inventory on this and the following page, were obtained by the customer and were utilized to create the site model diagrams:

Ant ID	Operator	Antenna Make & Model	Type	TX Freq (MHz)	Az (Deg)	Hor BW (Deg)	Ant Len (ft)	Ant Gain (dBd)	2G GSM Radio(s)	3G UMTS Radio(s)	4G Radio(s)	Total ERP (Watts)	X	Y	Z (AGL)
1	AT&T MOBILITY LLC	Powerwave 7770	Panel	850	22	82	4.6	11.51	0	1	0	262.4	91.6'	101.7'	130.7'
1	AT&T MOBILITY LLC	Powerwave 7770	Panel	1900	22	86	4.6	13.41	0	1	0	329.6	91.6'	101.7'	130.7'
2	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	850	22	63	6	10.96	1	0	0	262.4	94.5'	99.5'	130'
2	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	1900	22	68	6	14.16	0	0	1	3837.1	94.5'	99.5'	130'
3	AT&T MOBILITY LLC (Proposed)	KMW AM-X-CD-14-65-00T	Panel	737	22	67	4	11.66	0	0	1	792.5	97'	97.1'	131'
3	AT&T MOBILITY LLC (Proposed)	KMW AM-X-CD-14-65-00T	Panel	2100	22	62	4	14.36	0	0	1	1655.8	97'	97.1'	131'
4	AT&T MOBILITY LLC	Powerwave 7770	Panel	850	144	82	4.6	11.51	0	1	0	262.4	97.1'	91.8'	130.7'
4	AT&T MOBILITY LLC	Powerwave 7770	Panel	1900	144	86	4.6	13.41	0	1	0	329.6	97.1'	91.8'	130.7'
5	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	850	144	63	6	10.96	1	0	0	262.4	92.7'	91.1'	130'
5	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	1900	144	68	6	14.16	0	0	1	3837.1	92.7'	91.1'	130'
6	AT&T MOBILITY LLC (Proposed)	KMW AM-X-CD-14-65-00T	Panel	737	144	67	4	11.66	0	0	1	792.5	88.7'	90.3'	131'
6	AT&T MOBILITY LLC (Proposed)	KMW AM-X-CD-14-65-00T	Panel	2100	144	62	4	14.36	0	0	1	1655.8	88.7'	90.3'	131'
7	AT&T MOBILITY LLC	Powerwave 7770	Panel	850	264	82	4.6	11.51	0	1	0	262.4	85.8'	93.2'	130.7'
7	AT&T MOBILITY LLC	Powerwave 7770	Panel	1900	264	86	4.6	13.41	0	1	0	329.6	85.8'	93.2'	130.7'
8	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	850	264	63	6	10.96	1	0	0	262.4	85.7'	96.4'	130'
8	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	1900	264	68	6	14.16	0	0	1	3837.1	85.7'	96.4'	130'
9	AT&T MOBILITY LLC (Proposed)	KMW AM-X-CD-14-65-00T	Panel	737	264	67	4	11.66	0	0	1	792.5	85.7'	99.6'	131'
9	AT&T MOBILITY LLC (Proposed)	KMW AM-X-CD-14-65-00T	Panel	2100	264	62	4	14.36	0	0	1	1655.8	85.7'	99.6'	131'

NOTE: X, Y and Z indicate relative position of the bottom of the antenna to the origin location on the site, displayed in the model results diagram. Specifically, the Z reference indicates the bottom of the antenna height above the main site level unless otherwise indicated. The distance to the bottom of the antenna is calculated by subtracting half of the length of the antenna from the antenna centerline. Effective Radiated Power (ERP) is provided by the operator or based on Sitesafe experience. The values used in the modeling may be greater than are currently deployed. For other operators at this site the use of "Generic" as an antenna model or "Unknown" for a wireless operator means the information with regard to operator, their FCC license and/or antenna information was not available nor could it be secured while on site. Other operator's equipment, antenna models and powers used for modeling are based on obtained information or Sitesafe experience.

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4 Emission Predictions

In the RF Exposure Simulations below all heights are reflected with respect to main site level. In most rooftop cases this is the height of the main rooftop and in other cases this can be ground level. Each different height area, rooftop, or platform level is labeled with its height relative to the main site level. Emissions are calculated appropriately based on the relative height and location of that area to all antennas.

The Antenna Inventory heights are referenced to the same level.

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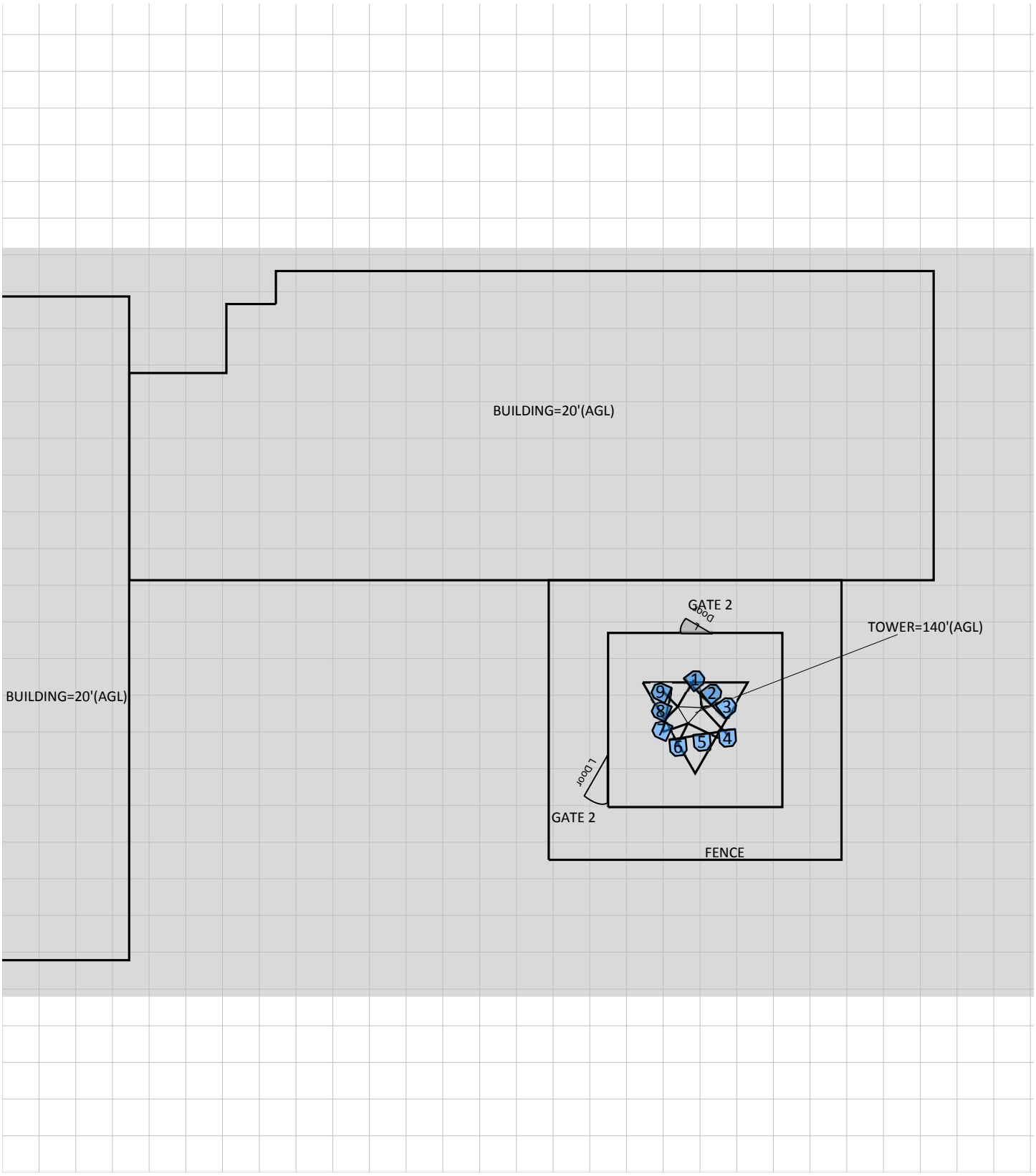
RF Exposure Simulation For: New London Groton PD



% of FCC Public Exposure Limit
Spatial average 0' - 6'

(Feet)

0 11.7 23.4

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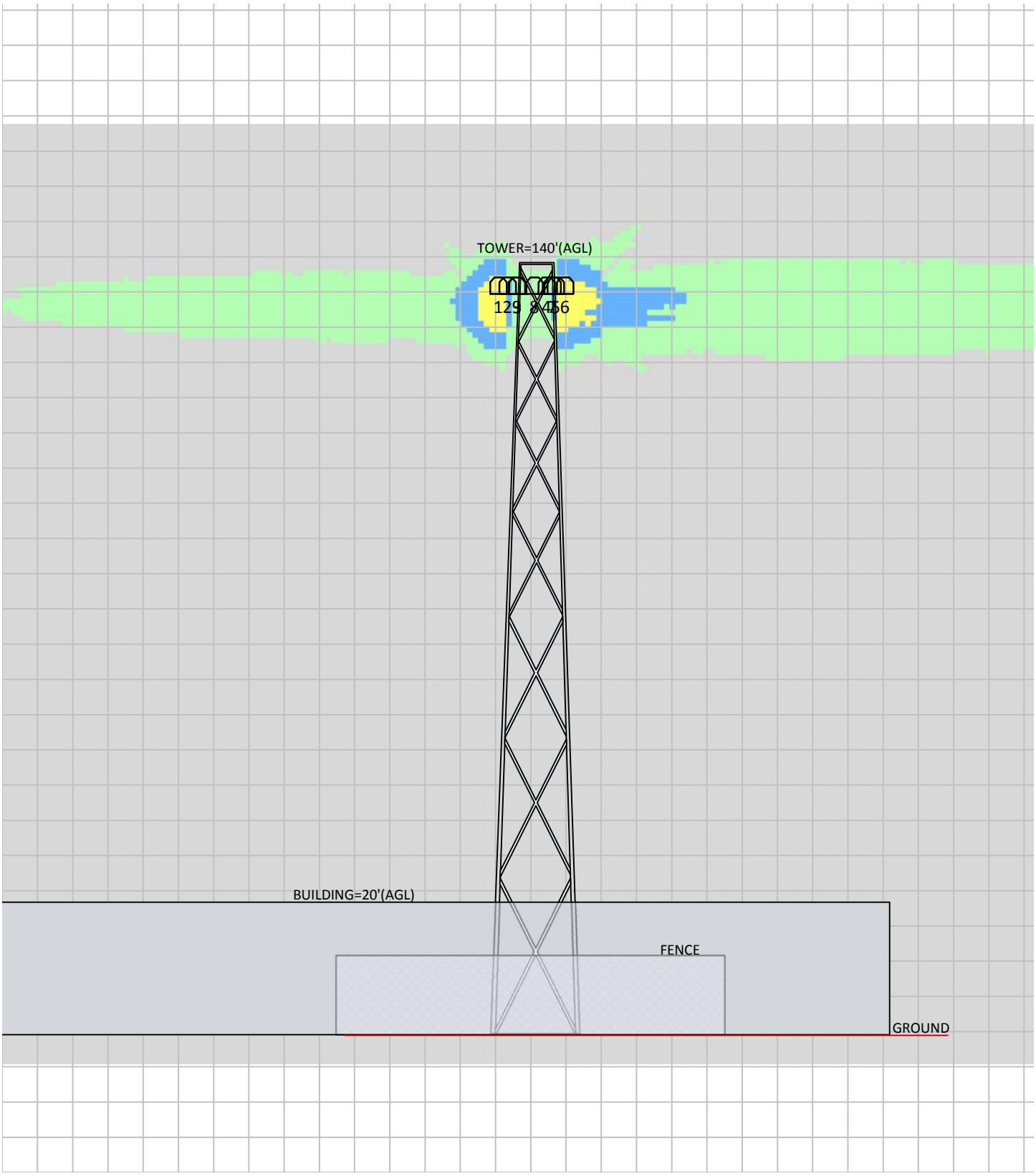
Site Name:New London Groton PD
8/31/2016 12:06:10 PM

>= 5000	>= 500	>= 100	>= 5	< 5

AT&T MOBILITY LLC	VERIZON WIRELESS	T-MOBILE	METROPCS	CRICKET COMMUNICATIONS	CLEARWIRE	SPRINT

SitesafeTC Version:1.0.0.0 - 0.0.0.249
Sitesafe OET-65 Model
Near Field Boundary: 1.5 * Aperture
Reflection Factor: 1
Spatially Averaged

RF Exposure Simulation For: New London Groton PD
Elevation View



% of FCC Public Exposure Limit
Spatial average 0' - 6'

(Feet)
0 12.2 24.4

www.sitesafe.com
Site Name:New London Groton PD
8/31/2016 12:16:39 PM

>= 5000	>= 500	>= 100	>= 5	< 5

AT&T MOBILITY LLC	VERIZON WIRELESS	T-MOBILE	METROPCS	CRICKET COMMUNICATIONS	CLEARWIRE	SPRINT

SitesafeTC Version:1.0.0.0 - 0.0.0.249
Sitesafe OET-65 Model
Near Field Boundary: 1.5 * Aperture
Reflection Factor: 1
Spatially Averaged

5 Site Compliance

5.1 Site Compliance Statement

Upon evaluation of the cumulative RF emission levels from all operators at this site, RF hazard signage and antenna locations, Sitesafe has determined that:

AT&T Mobility, LLC will be compliant when the remediation recommended in Section 5.2 or other appropriate remediation is implemented.

The compliance determination is based on General Public RFE levels derived from theoretical modeling, RF signage placement, proposed antenna inventory and the level of restricted access to the antennas at the site. Any deviation from the AT&T Mobility, LLC's proposed deployment plan could result in the site being rendered non-compliant.

Modeling is used for determining compliance and the percentage of MPE contribution.

5.2 Actions for Site Compliance

Based on FCC regulations, common industry practice, and our understanding of AT&T Mobility, LLC RF Safety Policy requirements, this section provides a statement of recommendations for site compliance. Recommendations have been proposed based on our understanding of existing access restrictions, signage, and an analysis of predicted RFE levels.

AT&T Mobility, LLC will be made compliant if the following changes are implemented:

Site Access Location

Information Sign 1 required at gate #1 and #2.
Yellow caution 2 sign required at the base of the tower.

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6 Engineer Certification

The professional engineer whose seal appears on the cover of this document hereby certifies and affirms that:

I am registered as a Professional Engineer in the jurisdiction indicated in the professional engineering stamp on the cover of this document; and

That I am an employee of Sitesafe, Inc., in Arlington, Virginia, at which place the staff and I provide RF compliance services to clients in the wireless communications industry; and

That I am thoroughly familiar with the Rules and Regulations of the Federal Communications Commission (FCC) as well as the regulations of the Occupational Safety and Health Administration (OSHA), both in general and specifically as they apply to the FCC Guidelines for Human Exposure to Radio-frequency Radiation; and

That I have thoroughly reviewed this Site Compliance Report and believe it to be true and accurate to the best of my knowledge as assembled by and attested to by Kyle Green.

August 31, 2016

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Appendix A – Statement of Limiting Conditions

Sitesafe has provided computer generated model(s) in this Site Compliance Report to show approximate dimensions of the site, and the model is included to assist the reader of the compliance report to visualize the site area, and to provide supporting documentation for Sitesafe's recommendations.

Sitesafe may note in the Site Compliance Report any adverse physical conditions, such as needed repairs, that Sitesafe became aware of during the normal research involved in creating this report. Sitesafe will not be responsible for any such conditions that do exist or for any engineering or testing that might be required to discover whether such conditions exist. Because Sitesafe is not an expert in the field of mechanical engineering or building maintenance, the Site Compliance Report must not be considered a structural or physical engineering report.

Sitesafe obtained information used in this Site Compliance Report from sources that Sitesafe considers reliable and believes them to be true and correct. Sitesafe does not assume any responsibility for the accuracy of such items that were furnished by other parties. When conflicts in information occur between data collected by Sitesafe provided by a second party and data collected by Sitesafe, the data will be used.

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Appendix B – Regulatory Background Information

FCC Rules and Regulations

In 1996, the Federal Communication Commission (FCC) adopted regulations for the evaluating of the effects of RF emissions in 47 CFR § 1.1307 and 1.1310. The guideline from the FCC Office of Engineering and Technology is Bulletin 65 ("OET Bulletin 65"), *Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields*, Edition 97-01, published August 1997. Since 1996 the FCC periodically reviews these rules and regulations as per their congressional mandate.

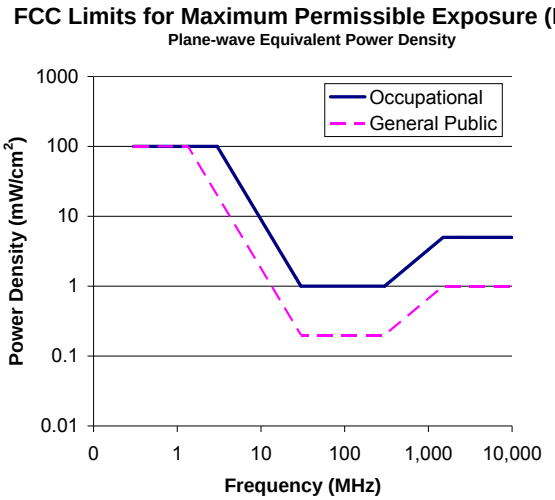
FCC regulations define two separate tiers of exposure limits: Occupational or "Controlled environment" and General Public or "Uncontrolled environment". The General Public limits are generally five times more conservative or restrictive than the Occupational limit. These limits apply to *accessible* areas where workers or the general public may be exposed to Radio Frequency (RF) electromagnetic fields.

Occupational or Controlled limits apply in situations in which persons are exposed as a consequence of their employment and where those persons exposed have been made fully aware of the potential for exposure and can exercise control over their exposure.

An area is considered a Controlled environment when access is limited to these aware personnel. Typical criteria are restricted access (i.e. locked or alarmed doors, barriers, etc.) to the areas where antennas are located coupled with proper RF warning signage. A site with Controlled environments is evaluated with Occupational limits.

All other areas are considered Uncontrolled environments. If a site has no access controls or no RF warning signage it is evaluated with General Public limits.

The theoretical modeling of the RF electromagnetic fields has been performed in accordance with OET Bulletin 65. The Maximum Permissible Exposure (MPE) limits utilized in this analysis are outlined in the following diagram:



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Limits for Occupational/Controlled Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

Limits for General Population/Uncontrolled Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz *Plane-wave equivalent power density

OSHA Statement

The General Duty clause of the OSHA Act (Section 5) outlines the occupational safety and health responsibilities of the employer and employee. The General Duty clause in Section 5 states:

(a) Each employer –

(1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;

(2) shall comply with occupational safety and health standards promulgated under this Act.

(b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.

OSHA has defined Radiofrequency and Microwave Radiation safety standards for workers who may enter hazardous RF areas. Regulation Standards 29 CFR § 1910.147 identify a generic Lock Out Tag Out procedure aimed to control the unexpected energization or start up of machines when maintenance or service is being performed.

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Appendix C – Safety Plan and Procedures

The following items are general safety recommendations that should be administered on a site by site basis as needed by the carrier.

General Maintenance Work: Any maintenance personnel required to work immediately in front of antennas and / or in areas indicated as above 100% of the Occupational MPE limits should coordinate with the wireless operators to disable transmitters during their work activities.

Training and Qualification Verification: All personnel accessing areas indicated as exceeding the General Population MPE limits should have a basic understanding of EME awareness and RF Safety procedures when working around transmitting antennas. Awareness training increases a workers understanding to potential RF exposure scenarios. Awareness can be achieved in a number of ways (e.g. videos, formal classroom lecture or internet based courses).

Physical Access Control: Access restrictions to transmitting antennas locations is the primary element in a site safety plan. Examples of access restrictions are as follows:

- Locked door or gate
- Alarmed door
- Locked ladder access
- Restrictive Barrier at antenna (e.g. Chain link with posted RF Sign)

RF Signage: Everyone should obey all posted signs at all times. RF signs play an important role in properly warning a worker prior to entering into a potential RF Exposure area.

Assume all antennas are active: Due to the nature of telecommunications transmissions, an antenna transmits intermittently. Always assume an antenna is transmitting. Never stop in front of an antenna. If you have to pass by an antenna, move through as quickly and safely as possible thereby reducing any exposure to a minimum.

Maintain a 3 foot clearance from all antennas: There is a direct correlation between the strength of an EME field and the distance from the transmitting antenna. The further away from an antenna, the lower the corresponding EME field is.

Site RF Emissions Diagram: Section 4 of this report contains an RF Diagram that outlines various theoretical Maximum Permissible Exposure (MPE) areas at the site. The modeling is a worst case scenario assuming a duty cycle of 100% for each transmitting antenna at full power. This analysis is based on one of two access control criteria: General Public criteria means the access to the site is uncontrolled and anyone can gain access. Occupational criteria means the access is restricted and only properly trained individuals can gain access to the antenna locations.

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Appendix D – RF Emissions

The RF Emissions Simulation(s) in this report display theoretical spatially averaged percentage of the Maximum Permissible Exposure for all systems at the site unless otherwise noted. These diagrams use modeling as prescribed in OET Bulletin 65 and assumptions detailed in Appendix E.

The key at the bottom of each RF Emissions Simulation indicates percentages displayed referenced to FCC General Public Maximum Permissible Exposure (MPE) limits. Color coding on the diagram is as follows:

- Areas indicated as Gray are predicted to be below 5% of the MPE limits. **Gray represents areas more than 20 times below the most conservative exposure limit**.
- Green represents areas are predicted to be between 5% and 100% of the MPE limits. **Green areas are accessible to anyone**.
- Blue represents areas predicted to exceed the General Public MPE limits but are less than Occupational limits. **Blue areas should be accessible only to RF trained workers**.
- Yellow represents areas predicted to exceed Occupational MPE limits. **Yellow areas should be accessible only to RF trained workers able to assess current exposure levels**.
- Red represents areas predicted to have exposure more than 10 times the Occupational MPE limits. **Red indicates that the RF levels must be reduced prior to access.** An RF Safety Plan is required which outlines how to reduce the RF energy in these areas prior to access.

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Appendix E – Assumptions and Definitions

General Model Assumptions

In this site compliance report, it is assumed that all antennas are operating at **full power at all times**. Software modeling was performed for all transmitting antennas located on the site. Sitesafe has further assumed a 100% duty cycle and maximum radiated power.

The modeling is based on recommendations from the FCC's OET-65 bulletin with the following variances per AT&T guidance. Reflection has not been considered in the modeling, i.e. the reflection factor is 1.0. The near / far field boundary has been set to 1.5 times the aperture height of the antenna and modeling beyond that point is the lesser of the near field cylindrical model and the far field model taking into account the gain of the antenna.

The site has been modeled with these assumptions to show the maximum RF energy density. Areas modeled with exposure greater than 100% of the General Public MPE level may not actually occur, but are shown as a prediction that could be realized. Sitesafe believes these areas to be safe for entry by occupationally trained personnel utilizing appropriate personal protective equipment (in most cases, a personal monitor).

Use of Generic Antennas

For the purposes of this report, the use of "Generic" as an antenna model, or "Unknown" for an operator means the information about a carrier, their FCC license and/or antenna information was not provided and could not be obtained while on site. In the event of unknown information, Sitesafe will use our industry specific knowledge of equipment, antenna models, and transmit power to model the site. If more specific information can be obtained for the unknown measurement criteria, Sitesafe recommends remodeling of the site utilizing the more complete and accurate data. Information about similar facilities is used when the service is identified and associated with a particular antenna. If no information is available regarding the transmitting service associated with an unidentified antenna, using the antenna manufacturer's published data regarding the antenna's physical characteristics makes more conservative assumptions.

Where the frequency is unknown, Sitesafe uses the closest frequency in the antenna's range that corresponds to the highest Maximum Permissible Exposure (MPE), resulting in a conservative analysis.

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Definitions

5% Rule – The rules adopted by the FCC specify that, in general, at multiple transmitter sites actions necessary to bring the area into compliance with the guidelines are the shared responsibility of all licensees whose transmitters produce field strengths or power density levels at the area in question in excess of 5% of the exposure limits. In other words, any wireless operator that contributes 5% or greater of the MPE limit in an area that is identified to be greater than 100% of the MPE limit is responsible taking corrective actions to bring the site into compliance.

Compliance – The determination of whether a site is safe or not with regards to Human Exposure to Radio Frequency Radiation from transmitting antennas.

Decibel (dB) – A unit for measuring power or strength of a signal.

Duty Cycle – The percent of pulse duration to the pulse period of a periodic pulse train. Also, may be a measure of the temporal transmission characteristic of an intermittently transmitting RF source such as a paging antenna by dividing average transmission duration by the average period for transmission. A duty cycle of 100% corresponds to continuous operation.

Effective (or Equivalent) Isotropic Radiated Power (EIRP) – The product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna.

Effective Radiated Power (ERP) – In a given direction, the relative gain of a transmitting antenna with respect to the maximum directivity of a half wave dipole multiplied by the net power accepted by the antenna from the connecting transmitter.

Gain (of an antenna) – The ratio of the maximum intensity in a given direction to the maximum radiation in the same direction from an isotropic radiator. Gain is a measure of the relative efficiency of a directional antennas as compared to an omni directional antenna.

General Population/Uncontrolled Environment – Defined by the FCC, as an area where exposure to RF energy may occur to persons who are **unaware** of the potential for exposure and who have no control of their exposure. General Population is also referenced as General Public.

Generic Antenna – For the purposes of this report, the use of "Generic" as an antenna model means the antenna information was not provided and could not be obtained while on site. In the event of unknown information, Sitesafe will use our industry specific knowledge of antenna models to select a worst case scenario antenna to model the site.

Isotropic Antenna – An antenna that is completely non-directional. In other words, an antenna that radiates energy equally in all directions.

Maximum Measurement – This measurement represents the single largest measurement recorded when performing a spatial average measurement.

Maximum Permissible Exposure (MPE) – The maximum levels of RF exposure a person may be exposed to without harmful effect and with acceptable safety factor.

Occupational/Controlled Environment – Defined by the FCC, as an area where Radio Frequency Radiation (RFR) exposure may occur to persons who are **aware** of the

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potential for exposure as a condition of employment or specific activity and can exercise control over their exposure.

OET Bulletin 65 – Technical guideline developed by the FCC's Office of Engineering and Technology to determine the impact of Radio Frequency radiation on Humans. The guideline was published in August 1997.

OSHA (Occupational Safety and Health Administration) – Under the Occupational Safety and Health Act of 1970, employers are responsible for providing a safe and healthy workplace for their employees. OSHA's role is to promote the safety and health of America's working men and women by setting and enforcing standards; providing training, outreach and education; establishing partnerships; and encouraging continual process improvement in workplace safety and health. For more information, visit www.osha.gov.

Radio Frequency (RF) – The frequencies of electromagnetic waves which are used for radio communications. Approximately 3 kHz to 300 GHz.

Radio Frequency Exposure (RFE) – The amount of RF power density that a person is or might be exposed to.

Spatial Average Measurement – A technique used to average a minimum of ten (10) measurements taken in a ten (10) second interval from zero (0) to six (6) feet. This measurement is intended to model the average power density an average sized human will be exposed to at a location.

Transmitter Power Output (TPO) – The radio frequency output power of a transmitter's final radio frequency stage as measured at the output terminal while connected to a load.

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Appendix F – References

The following references can be followed for further information about RF Health and Safety.

Sitesafe, Inc.
http://www.sitesafe.com
FCC Radio Frequency Safety
http://www.fcc.gov/encyclopedia/radio-frequency-safety
National Council on Radiation Protection and Measurements (NCRP)
http://www.ncrponline.org
Institute of Electrical and Electronics Engineers, Inc., (IEEE)
http://www.ieee.org
American National Standards Institute (ANSI)
http://www.ansi.org
Environmental Protection Agency (EPA)
http://www.epa.gov/radtown/wireless-tech.html
National Institutes of Health (NIH)
http://www.niehs.nih.gov/health/topics/agents/emf/
Occupational Safety and Health Agency (OSHA)
http://www.osha.gov/SLTC/radiofrequencyradiation/
International Commission on Non-Ionizing Radiation Protection (ICNIRP)
http://www.icnirp.org
World Health Organization (WHO)
http://www.who.int/peh-emf/en/
National Cancer Institute
http://www.cancer.gov/cancertopics/factsheet/Risk/cellphones
American Cancer Society (ACS)
http://www.cancer.org/docroot/PED/content/PED_1_3X_Cellular_Phone_Towers.asp?siteareа=PED
European Commission Scientific Committee on Emerging and Newly Identified Health Risks
http://ec.europa.eu/health/ph_risk/committees/04_scenihr/docs/scenihr_o_022.pdf
Fairfax County, Virginia Public School Survey
http://www.fcps.edu/fts/safety-security/RFEESurvey/
UK Health Protection Agency Advisory Group on Non-ionising Radiation
http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1317133826368
Norwegian Institute of Public Health
http://www.fhi.no/dokumenter/545eea7147.pdf

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PROJECT:	LTE 3C
SITE NUMBER:	CTL02164
FA NUMBER:	10035132
PTN NUMBER:	2051A066KT
PACE NUMBER:	MRCTB018309
SITE NAME:	NEW LONDONGROTON PD
SITE ADDRESS:	68 GROTON LONG POINT ROAD GROTON, CT

PROJECT INFORMATION

SITE NAME:	NEW LONDONGROTON PD
SITE NUMBER:	CTL02164
SITE ADDRESS:	68 GROTON LONG POINT ROAD GROTON, CT
FA NUMBER:	10035132
PTN NUMBER:	2051A066KT
PACE NUMBER:	MRCTB018309
USID NUMBER:	65071
APPLICANT:	AT&T WIRELESS 550 COCHITUATE ROAD SUITE 550 13 AND 14 FRAMINGHAM, MA 01701
OWNER:	TOWN OF GROTON 45 FORT HILL ROAD GROTON, CT 06340
JURISDICTION:	TOWN OF GROTON
COUNTY:	NEW LONDON
SITE COORDINATES FROM	(RFDS)
LATITUDE:	41.343548°
LONGITUDE:	-72.009667°
GROUND ELEV.:	160'
PROPOSED USE:	TELECOMMUNICATIONS FACILITY
AT&T RF MANAGER:	CAMERON SYME
PHONE:	(508) 596-7146
EMAIL:	cs6970@att.com

PROJECT CONSULTANTS

PROJECT MANAGER:	SMARTLINK
ADDRESS:	85 RANGEWAY ROAD, SUITE 102 NORTH BILLERICA, MA 01862
CONTACT:	RYAN BURGDORFER (508) 665-8005
EMAIL:	Ryan.Burgdorfer@Smartlinkllc.com
SITE AQUISITION:	SMARTLINK
ADDRESS:	85 RANGEWAY ROAD, SUITE 102 NORTH BILLERICA, MA 01862
CONTACT:	SHARON KEEFE (978) 930-3918
EMAIL:	Sharon.Keefe@Smartlinkllc.com
ENGINEER/ARCHITECT:	FULLERTON ENGINEERING
ADDRESS:	1100 E. WOODFIELD ROAD, SUITE 500 SCHAUMBURG, IL 60173
CONTACT:	MILEN DIMITROV (847) 908-8439
EMAIL:	MDimitrov@fullertonengineering.com
CONSTRUCTION:	SMARTLINK
ADDRESS:	85 RANGEWAY ROAD, SUITE 102 NORTH BILLERICA, MA 01862
CONTACT:	MARK DONNELLY (617) 515-2080
EMAIL:	mark.donnelly@smartlinkllc.com

SCOPE OF WORK

LTE 1900 WILL BE 3C AT THE SITE WITH BRONZE CONFIGURATION.
PROPOSED 3C PROJECT SCOPE HEREIN BASED ON RFDS ID # 1123639, VERSION 1.00 LAST UPDATED 03/22/16.

- (3) NEW ANTENNAS TO REPLACE (3) EXISTING ANTENNAS
- (3) NEW RRUS-32
- (1) NEW DC-6 FIBER SQUID
- (1) FIBER CABLE AND (2) DC POWER CABLES
- (1) NEW LTE DUS
- (1) NEW XMU CARD
- (3) NEW 25A BREAKERS

- CONTRACTOR SHALL FURNISH ALL MATERIAL WITH THE EXCEPTION OF AT&T SUPPLIED MATERIAL.
- ALL MATERIAL SHALL BE INSTALLED BY THE CONTRACTOR, UNLESS STATED OTHERWISE.

SITE LOCATION MAP

NO SCALE

DIRECTIONS

SCAN QR CODE FOR LINK
TO SITE LOCATION MAP

APPLICABLE BUILDING CODES AND STANDARDS

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES.

BUILDING CODE:	2003 INTERNATIONAL BUILDING CODE
ELECTRICAL CODE:	2011 NATIONAL ELECTRIC CODE

- FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.
- ADA ACCESS REQUIREMENTS ARE NOT REQUIRED.
- THIS FACILITY DOES NOT REQUIRE POTABLE WATER AND WILL NOT PRODUCE ANY SEWAGE

DRAWING INDEX

T1	TITLE SHEET
SP1	NOTES AND SPECIFICATIONS
SP2	NOTES AND SPECIFICATIONS
A1	COMPOUND PLAN
A2	EQUIPMENT PLAN
A3	ELEVATIONS
A4	ANTENNA PLANS
A5	EQUIPMENT DETAILS
A6	ANTENNA & CABLE CONFIGURATION
A7	CABLE NOTES AND COLOR CODING
A8	GROUNDING DETAILS

NOTE: DRAWING SCALES ARE FOR 11"x17" SHEETS UNLESS OTHERWISE NOTED

at&t
550 COCHITUATE ROAD
SUITE 550 13 AND 14
FRAMINGHAM, MA 01701

smartlink
1362 MELLON ROAD
SUITE 140
HANOVER, MD 21076

FULLERTON ENGINEERING·DESIGN
1100 E. WOODFIELD ROAD, SUITE 500
SCHAUMBURG, ILLINOIS 60173
TEL: 847-908-8400
COA# PEC.0001444
www.FullertonEngineering.com

REV	DATE	DESCRIPTION	BY
0	08/03/16	90% REVIEW	VV
1	08/16/16	FOR PERMIT	KC

I HEREBY CERTIFY THAT THESE DRAWING WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND CONTROL, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF COMPLY WITH THE REQUIREMENTS OF ALL APPLICABLE CODES.

SITE NAME
NEW LONDONGROTON PD

SITE NUMBER:
CTL02164

SITE ADDRESS
68 GROTON LONG POINT ROAD
GROTON, CT

SHEET NAME
TITLE SHEET

SHEET NUMBER
T1

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FEC# 2016.0200.0026

GENERAL CONSTRUCTION

1. FOR THE PURPOSE OF CONSTRUCTION DRAWINGS, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR/CM – SMARTLINK
   OWNER – AT&T WIRELESS
2. ALL SITE WORK SHALL BE COMPLETED AS INDICATED ON THE DRAWINGS AND AT&T PROJECT SPECIFICATIONS.
3. GENERAL CONTRACTOR SHALL VISIT THE SITE AND SHALL FAMILIARIZE HIMSELF WITH ALL CONDITIONS AFFECTING THE PROPOSED WORK AND SHALL MAKE PROVISIONS. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIMSELF WITH ALL CONTRACT DOCUMENTS, FIELD CONDITIONS, DIMENSIONS, AND CONFIRMING THAT THE WORK MAY BE ACCOMPLISHED AS SHOWN PRIOR TO PROCEEDING WITH CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.
4. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. GENERAL CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF WORK.
5. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES, AND APPLICABLE REGULATIONS.
6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
7. PLANS ARE NOT TO BE SCALED. THESE PLANS ARE INTENDED TO BE A DIAGRAMMATIC OUTLINE ONLY UNLESS OTHERWISE NOTED. DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS OTHERWISE NOTED. SPACING BETWEEN EQUIPMENT IS THE MINIMUM REQUIRED CLEARANCE. THEREFORE, IT IS CRITICAL TO FIELD VERIFY DIMENSIONS, SHOULD THERE BE ANY QUESTIONS REGARDING THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE ENGINEER PRIOR TO PROCEEDING WITH THE WORK. DETAILS ARE INTENDED TO SHOW DESIGN INTENT. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF WORK AND PREPARED BY THE ENGINEER PRIOR TO PROCEEDING WITH WORK.
8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
9. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE ENGINEER PRIOR TO PROCEEDING.
10. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF WORK AREA, ADJACENT AREAS AND BUILDING OCCUPANTS THAT ARE LIKELY TO BE AFFECTED BY THE WORK UNDER THIS CONTRACT. WORK SHALL CONFIRM TO ALL OSHA REQUIREMENTS AND THE LOCAL JURISDICTION.
11. GENERAL CONTRACTOR SHALL COORDINATE WORK AND SCHEDULE WORK ACTIVITIES WITH OTHER DISCIPLINES.
12. ERECTION SHALL BE DONE IN A WORKMANLIKE MANNER BY COMPETENT EXPERIENCED WORKMAN IN ACCORDANCE WITH APPLICABLE CODES AND THE BEST ACCEPTED PRACTICE. ALL MEMBERS SHALL BE LAID PLUMB AND TRUE AS INDICATED ON THE DRAWINGS.
13. SEAL PENETRATIONS THROUGH FIRE RATED AREAS WITH UL LISTED MATERIALS APPROVED BY LOCAL JURISDICTION. CONTRACTOR SHALL KEEP AREA CLEAN, HAZARD FREE, AND DISPOSE OF ALL DEBRIS.
14. WORK PREVIOUSLY COMPLETED IS REPRESENTED BY LIGHT SHADED LINES AND NOTES. THE SCOPE OF WORK FOR THIS PROJECT IS REPRESENTED BY DARK SHADED LINES AND NOTES. CONTRACTOR SHALL NOTIFY THE GENERAL CONTRACTOR OF ANY EXISTING CONDITIONS THAT DEVIATE FROM THE DRAWINGS PRIOR TO BEGINNING CONSTRUCTION.
15. CONTRACTOR SHALL PROVIDE WRITTEN NOTICE TO THE CONSTRUCTION MANAGER 48 HOURS PRIOR TO COMMENCEMENT OF WORK.
16. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
17. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
18. GENERAL CONTRACTOR SHALL COORDINATE AND MAINTAIN ACCESS FOR ALL TRADES AND CONTRACTORS TO THE SITE AND/OR BUILDING.
19. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR SECURITY OF THE SITE FOR THE DURATION OF CONSTRUCTION UNTIL JOB COMPLETION.
20. THE GENERAL CONTRACTOR SHALL MAINTAIN IN GOOD CONDITION ONE COMPLETE SET OF PLANS WITH ALL REVISIONS, ADDENDA, AND CHANGE ORDERS ON THE PREMISES AT ALL TIMES.
21. THE GENERAL CONTRACTOR SHALL PROVIDE PORTABLE FIRE EXTINGUISHERS WITH A RATING OF NOT LESS THAN 2–A OT 2–A:10–B:C AND SHALL BE WITHIN 25 FEET OF TRAVEL DISTANCE TO ALL PORTIONS OF WHERE THE WORK IS BEING COMPLETED DURING CONSTRUCTION.
22. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY THE ENGINEER. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS SHALL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION, B) CONFINED SPACE, C) ELECTRICAL SAFETY, AND D) TRENCHING & EXCAVATION.
23. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED, CAPPED, PLUGGED OR OTHERWISE DISCONNECTED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, AS DIRECTED BY THE RESPONSIBLE ENGINEER, AND SUBJECT TO THE APPROVAL OF THE OWNER AND/OR LOCAL UTILITIES.
24. THE AREAS OF THE OWNER'S PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION.
25. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO THE EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE FEDERAL AND LOCAL JURISDICTION FOR EROSION AND SEDIMENT CONTROL.
26. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUNDING. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
27. THE SUBGRADE SHALL BE BROUGHT TO A SMOOTH UNIFORM GRADE AND COMPACTED TO 95 PERCENT STANDARD PROCTOR DENSITY UNDER PAVEMENT AND STRUCTURES AND 80 PERCENT STANDARD PROCTOR DENSITY IN OPEN SPACE. ALL TRENCHES IN PUBLIC RIGHT OF WAY SHALL BE BACKFILLED WITH FLOWABLE FILL OR OTHER MATERIAL PRE–APPROVED BY THE LOCAL JURISDICTION.
28. ALL NECESSARY RUBBISH, STUMPS, DEBRIS, STICKS, STONES, AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN A LAWFUL MANNER.
29. ALL BROCHURES, OPERATING AND MAINTENANCE MANUALS, CATALOGS, SHOP DRAWINGS, AND OTHER DOCUMENTS SHALL BE TURNED OVER TO THE GENERAL CONTRACTOR AT COMPLETION OF CONSTRUCTION AND PRIOR TO PAYMENT.
30. CONTRACTOR SHALL SUBMIT A COMPLETE SET OF AS–BUILT REDLINES TO THE GENERAL CONTRACTOR UPON COMPLETION OF PROJECT AND PRIOR TO FINAL PAYMENT.
31. CONTRACTOR SHALL LEAVE PREMISES IN A CLEAN CONDITION.
32. THE PROPOSED FACILITY WILL BE UNMANNED AND DOES NOT REQUIRE POTABLE WATER OR SEWER SERVICE, AND IS NOT FOR HUMAN HABITAT (NO HANDICAP ACCESS REQUIRED).
33. OCCUPANCY IS LIMITED TO PERIODIC MAINTENANCE AND INSPECTION, APPROXIMATELY 2 TIMES PER MONTH, BY AT&T TECHNICIANS.
34. NO OUTDOOR STORAGE OR SOLID WASTE CONTAINERS ARE PROPOSED.
35. ALL MATERIAL SHALL BE FURNISHED AND WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST REVISION AT&T MOBILITY GROUNDING STANDARD "TECHNICAL SPECIFICATION FOR CONSTRUCTION OF GSM/GPRS WIRELESS SITES" AND "TECHNICAL SPECIFICATION FOR FACILITY GROUNDING". IN CASE OF A CONFLICT BETWEEN THE CONSTRUCTION SPECIFICATION AND THE DRAWINGS, THE DRAWINGS SHALL GOVERN.
36. CONTRACTORS SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS REQUIRED FOR CONSTRUCTION. IF CONTRACTOR CANNOT OBTAIN A PERMIT, THEY MUST NOTIFY THE GENERAL CONTRACTOR IMMEDIATELY.
37. CONTRACTOR SHALL REMOVE ALL TRASH AND DEBRIS FROM THE SITE ON A DAILY BASIS.
38. INFORMATION SHOWN ON THESE DRAWINGS WAS OBTAINED FROM SITE VISITS AND/OR DRAWINGS PROVIDED BY THE SITE OWNER. CONTRACTORS SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
39. NO WHITE STROBE LIGHTS ARE PERMITTED. LIGHTING IF REQUIRED, WILL MEET FAA STANDARDS AND REQUIREMENTS.

ANTENNA MOUNTING

40. DESIGN AND CONSTRUCTION OF ANTENNA SUPPORTS SHALL CONFORM TO CURRENT ANSI/TIA–222 OR APPLICABLE LOCAL CODES.
41. ALL STEEL MATERIALS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT–DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS", UNLESS NOTED OTHERWISE.
42. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC–COATING (HOT–DIP) ON IRON AND STEEL HARDWARE", UNLESS NOTED OTHERWISE.
43. DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED BY COLD GALVANIZING IN ACCORDANCE WITH ASTM A780.
44. ALL ANTENNA MOUNTS SHALL BE INSTALLED WITH LOCK NUTS, DOUBLE NUTS AND SHALL BE TORQUED TO MANUFACTURER'S RECOMMENDATIONS.
45. CONTRACTOR SHALL INSTALL ANTENNA PER MANUFACTURER'S RECOMMENDATION FOR INSTALLATION AND GROUNDING.
46. ALL UNUSED PORTS ON ANY ANTENNAS SHALL BE TERMINATED WITH A 50–OHM LOAD TO ENSURE ANTENNAS PERFORM AS DESIGNED.
47. PRIOR TO SETTING ANTENNA AZIMUTHS AND DOWNTILTS, ANTENNA CONTRACTOR SHALL CHECK THE ANTENNA MOUNT FOR TIGHTNESS AND ENSURE THAT THEY ARE PLUMB. ANTENNA AZIMUTHS SHALL BE SET FROM TRUE NORTH AND BE ORIENTED WITHIN +/– 5% AS DEFINED BY THE RFDS. ANTENNA DOWNTILTS SHALL BE WITHIN +/– 0.5% AS DEFINED BY THE RFDS. REFER TO ND–00246.
48. JUMPERS FROM THE TMA'S MUST TERMINATE TO OPPOSITE POLARIZATION'S IN EACH SECTOR.
49. CONTRACTOR SHALL RECORD THE SERIAL #, SECTOR, AND POSITION OF EACH ACTUATOR INSTALLED AT THE ANTENNAS AND PROVIDE THE INFORMATION TO AT&T.
50. TMA'S SHALL BE MOUNTED ON PIPE DIRECTLY BEHIND ANTENNAS AS CLOSE TO ANTENNA AS FEASIBLE IN A VERTICAL POSITION.

TORQUE REQUIREMENTS

51. ALL RF CONNECTIONS SHALL BE TIGHTENED BY A TORQUE WRENCH.
52. ALL RF CONNECTIONS, GROUNDING HARDWARE AND ANTENNA HARDWARE SHALL HAVE A TORQUE MARK INSTALLED IN A CONTINUOUS STRAIGHT LINE FROM BOTH SIDES OF THE CONNECTION.
    A. RF CONNECTION BOTH SIDES OF THE CONNECTOR.
    B. GROUNDING AND ANTENNA HARDWARE ON THE NUT SIDE STARTING FROM THE THREADS TO THE SOLID SURFACE. EXAMPLE OF SOLID SURFACE: GROUND BAR, ANTENNA BRACKET METAL.

FIBER & POWER CABLE MOUNTING

53. THE FIBER OPTIC TRUNK CABLES SHALL BE INSTALLED INTO CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY. WHEN INSTALLING FIBER OPTIC TRUNK CABLES INTO A CABLE TRAY SYSTEM, THEY SHALL BE INSTALLED INTO AN INTER DUCT AND A PARTITION BARRIER SHALL BE INSTALLED BETWEEN THE 600 VOLT CABLES AND THE INTER DUCT IN ORDER TO SEGREGATE CABLE TYPES. OPTIC FIBER TRUNK CABLES SHALL HAVE APPROVED CABLE RESTRAINTS EVERY (60) SIXTY FEET AND SECURELY FASTENED TO THE CABLE TRAY SYSTEM. NFPA 70 (NEC) ARTICLE 770 RULES SHALL APPLY.
54. THE TYPE TC–ER CABLES SHALL BE INSTALLED INTO CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY AND SHALL BE SECURED AT INTERVALS NOT EXCEEDING (6) SIX FEET. AN EXCEPTION; WHERE TYPE TC–ER CABLES ARE NOT SUBJECT TO PHYSICAL DAMAGE, CABLES SHALL BE PERMITTED TO MAKE A TRANSITION BETWEEN CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY WHICH ARE SERVING UTILIZATION EQUIPMENT OR DEVICES, A DISTANCE (6) SIX FEET SHALL NOT BE EXCEEDED WITHOUT CONTINUOUS SUPPORTING. NFPA 70 (NEC) ARTICLES 336 AND 392 RULES SHALL APPLY.
55. WHEN INSTALLING OPTIC FIBER TRUNK CABLES OR TYPE TC–ER CABLES INTO CONDUITS, NFPA 70 (NEC) ARTICLE 300 RULES SHALL APPLY.

COAXIAL CABLE NOTES

62. TYPES AND SIZES OF THE ANTENNA CABLE ARE BASED ON ESTIMATED LENGTHS. PRIOR TO

    ORDERING CABLE, CONTRACTOR SHALL VERIFY ACTUAL LENGTH BASED ON CONSTRUCTION LAYOUT AND NOTIFY THE PROJECT MANAGER IF ACTUAL LENGTHS EXCEED ESTIMATED LENGTHS.
63. CONTRACTOR SHALL VERIFY THE DOWN–TILT OF EACH ANTENNA WITH A DIGITAL LEVEL.
64. CONTRACTOR SHALL CONFIRM COAX COLOR CODING PRIOR TO CONSTRUCTION.
65. ALL JUMPERS TO THE ANTENNAS FROM THE MAIN TRANSMISSION LINE SHALL BE 1/2" DIA. LDF AND SHALL NOT EXCEED 6'–0".
66. ALL COAXIAL CABLE SHALL BE SECURED TO THE DESIGNED SUPPORT STRUCTURE, IN AN APPROVED MANNER, AT DISTANCES NOT TO EXCEED 4'–0" OC.
67. CONTRACTOR SHALL FOLLOW ALL MANUFACTURER'S RECOMMENDATIONS REGARDING BOTH THE INSTALLATION AND GROUNDING OF ALL COAXIAL CABLES, CONNECTORS, ANTENNAS, AND ALL OTHER EQUIPMENT.
68. CONTRACTOR SHALL GROUND ALL EQUIPMENT. INCLUDING ANTENNAS, RET MOTORS, TMA'S, COAX CABLES, AND RET CONTROL CABLES AS A COMPLETE SYSTEM. GROUNDING SHALL BE EXECUTED BY QUALIFIED WIREMEN IN COMPLIANCE WITH MANUFACTURER'S SPECIFICATION AND RECOMMENDATION.
69. CONTRACTOR SHALL PROVIDE STRAIN–RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES, COAX CABLES, AND RET CONTROL CABLES. CABLE STRAIN–RELIEFS AND CABLE SUPPORTS SHALL BE APPROVED FOR THE PURPOSE. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
70. CONTRACTOR TO VERIFY THAT EXISTING COAX HANGERS ARE STACKABLE SNAP IN HANGERS. IF EXISTING HANGERS ARE NOT STACKABLE SNAP IN HANGERS THE CONTRACTOR SHALL REPLACE EXISTING HANGERS WITH NEW SNAP IN HANGERS IF APPLICABLE.

GENERAL CABLE AND EQUIPMENT NOTES

71. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY ANTENNA, TMAS, DIPLEXERS, AND COAX CONFIGURATION, MAKE AND MODELS PRIOR TO INSTALLATION.
72. ALL CONNECTIONS FOR HANGERS, SUPPORTS, BRACING, ETC. SHALL BE INSTALLED PER TOWER MANUFACTURER'S RECOMMENDATIONS.
73. CONTRACTOR SHALL REFERENCE THE TOWER STRUCTURAL ANALYSIS/DESIGN DRAWINGS FOR DIRECTIONS ON CABLE DISTRIBUTION/ROUTING.
74. ALL OUTDOOR RF CONNECTORS/CONNECTIONS SHALL BE WEATHERPROOFED, EXCEPT THE RET CONNECTORS, USING BUTYL TAPE AFTER INSTALLATION AND FINAL CONNECTIONS ARE MADE. BUTYL TAPE SHALL HAVE A MINIMUM OF ONE–HALF TAPE WIDTH OVERLAP ON EACH TURN AND EACH LAYER SHALL BE WRAPPED THREE TIMES. WEATHERPROOFING SHALL BE SMOOTH WITHOUT BUCKLING. BUTYL BLEEDING IS NOT ALLOWED.
75. IF REQUIRED TO PAINT ANTENNAS AND/OR COAX:
    A. TEMPERATURE SHALL BE ABOVE 50° F.
    B. PAINT COLOR MUST BE APPROVED BY BUILDING OWNER/LANDLORD.
    C. FOR REGULATED TOWERS, FAA/FCC APPROVED PAINT IS REQUIRED.
    D. DO NOT PAINT OVER COLOR CODING OR ON EQUIPMENT MODEL NUMBERS
76. ALL CABLES SHALL BE GROUNDED WITH COAXIAL CABLE GROUND KITS. FOLLOW THE MANUFACTURER'S RECOMMENDATIONS.
    A. GROUNDING AT THE ANTENNA LEVEL.
    B. GROUNDING AT MID LEVEL, TOWERS WHICH ARE OVER 200'–0", ADDITIONAL CABLE GROUNDING REQUIRED.
    C. GROUNDING AT BASE OF TOWER PRIOR TO TURNING HORIZONTAL.
    D. GROUNDING OUTSIDE THE EQUIPMENT SHELTER AT ENTRY PORT.
    E. GROUNDING INSIDE THE EQUIPMENT SHELTER AT THE ENTRY PORT.
77. ALL PROPOSED GROUND BAR DOWNLEADS ARE TO BE TERMINATED TO THE EXISTING ADJACENT GROUND BAR DOWNLEADS A MINIMUM DISTANCE OF 4'–0" BELOW GROUND BAR. TERMINATIONS MAY BE EXOTHERMIC OR COMPRESSION.

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STATE OF CONNECTICUT · HENRY M. BELLAGAMBA · 25358 · LICENSED PROFESSIONAL ENGINEER

SITE NAME
NEW LONDONGROTON PD

SITE NUMBER:
CTL02164

SITE ADDRESS
68 GROTON LONG POINT ROAD
GROTON, CT

SHEET NAME
NOTES AND SPECIFICATIONS

SHEET NUMBER
SP1

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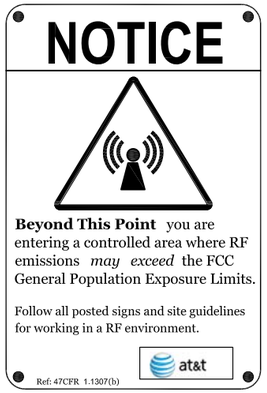
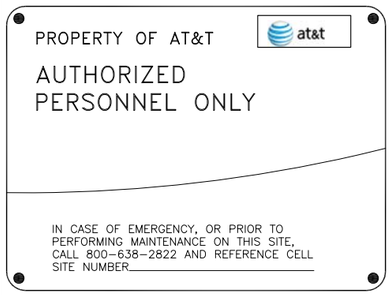


ALERTING SIGNS

ALERTING SIGN



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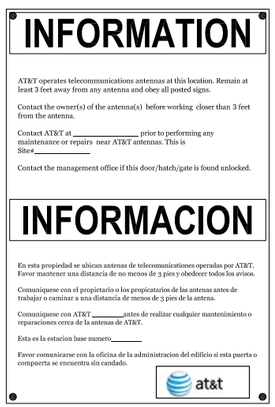

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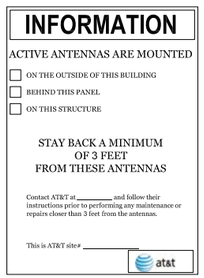

INFO SIGN #2

INFO SIGN #3

ALERTING SIGN
(FOR CELL SITE BATTERIES)

ALERTING SIGN
(FOR DIESEL FUEL)

ALERTING SIGN
(FOR PROPANE)

GENERAL SIGNAGE GUIDELINES

STRUCURE TYPLE	INFO SIGN #1	INFO SIGN #2	INFO SIGN #3	INFO SIGN #4	STRIPING	NOTICE SIGN	CAUTION SIGN
TOWERS							
MONOPOLE/MONOPINE/MONOPALM	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS	CLIMBING SIDE OF THE TOWER	ON BACKSIDE OF ANTENNAS	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS			AT THE HEIGHT OF THE FIRST CLIMBING STEP, MIN 9 FT ABOVE GROUND
SEC TOWERS/TOWERS WITH HIGH VOLTAGE	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS	CLIMBING SIDE OF THE TOWER	ON BACKSIDE OF ANTENNAS	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS			
LIGHT POLES/FLAG POLES	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS	ON THE POLE, NO LESS THAN 3FT BELOW THE ANTENNA AND LESS THAN 9FT ABOVE GROUND	ON BACKSIDE OF ANTENNAS	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS			
UTILITY WOOD POLES (JPA)	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS	ON THE POLE, NO LESS THAN 3FT BELOW THE ANTENNA AND LESS THAN 9FT ABOVE GROUND	ON BACKSIDE OF ANTENNAS	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS		IF GP MAX VALUE OF MPE AT ANTENNA LEVEL IS: 0-99%; NOTICE SIGN; OVER 99%: CAUTION SIGN AT NO LESS THAN 3FT BELOW ANTENNA AND 9FT ABOVE GROUND	
MICROCELLS MOUNTED ON NON-JPA POLES	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS	ON THE POLE, NO LESS THAN 3FT BELOW THE ANTENNA AND LESS THAN 9FT ABOVE GROUND	ON BACKSIDE OF ANTENNAS	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS		NOTICE OR CAUTION SIGN AT NO LESS THAN 9FT ABOVE GROUND: ONLY IF THE EXPOSURE EXCEEDS 90% OF THE GENERAL PUBLIC EXPOSURE AT EXPOSURE AT 6FT ABOVE GROUND OR AT OUTSIDE OF SURFACE OF ADJACENT BUILDING	
TOWERS							
AT ALL ACCESS POINTS TO THE ROOF	X			X			
ON ANTENNAS	X		X	X			
CONCEALED ANTENNAS	X	X		X			
ANTENNAS MOUNTED FACING OUTSIDE THE BUILDING	X	X		X			
ANTENNAS ON SUPPORT STRUCTURE	X	X		X			
ROOFVIEW GRAPH							
RADIATION AREA IS WITHIN 3FT FROM ANTENNA	X	ADJACENT TO EACH ANTENNA		X		EITHER NOTICE OR CAUTION SIGN (BASED ON ROOFVIEW RESULTS) AT ANTENNA /BARRIER	
RADIATION AREA IS BEYOND 3FT FROM ANTENNA	X	ADJACENT TO EACH ANTENNA		X	DIAGONAL, YELLOW STRIPING AS TO ROOFVIEW GRAPH		
CHURCH STEEPLES	ACCESS TO STEEPLE	ADJACENT TO ANTENNAS IF ANTENNAS ARE CONCEALED	ON BACKSIDE OF ANTENNAS	ACCESS TO STEEPLE			CAUTION SIGN AT THE ANTENNAS
WATER STATIONS	ACCESS TO LADDER	ADJACENT TO ANTENNAS IF ANTENNAS ARE CONCEALED	ON BACKSIDE OF ANTENNAS	ACCESS TO LADDER			CAUTION SIGN BESIDE INFO SIGN #1, MIN. 9FT ABOVE GROUND

NOTES FOR ROOFTOP SITES:

1. EITHER NOTICE OR CAUTION SIGNS NEED TO BE POSTED AT EACH SECTOR AS CLOSE AS POSSIBLE TO: THE OUTER EDGE OF THE STRIPED OFF AREA OR THE OUTER ANTENNAS OF THE SECTOR
2. IF ROOFVIEWS SHOWS: ONLY BLUE = NOTICE SIGN, BLUE AND YELLOW = CAUTION SIGN, ONLY YELLOW = CAUTION SIGN TO BE INSTALLED
3. SHOULD THE REQUIRED STRIPING AREAS INTERFERE WITH ANY STRUCTURE OR EQUIPMENT (A/C, VENTS, ROOF HATCH, DOORS, OTHER ANTENNAS, DISHES, ETC.). PLEASE NOTIFY AT&T TO MODIFY THE STRIPING AREA, PRIOR TO STARTING THE WORK.

SIGNAGE GUIDELINES CHART

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GROTON, CT

SHEET NAME
NOTES AND SPECIFICATIONS

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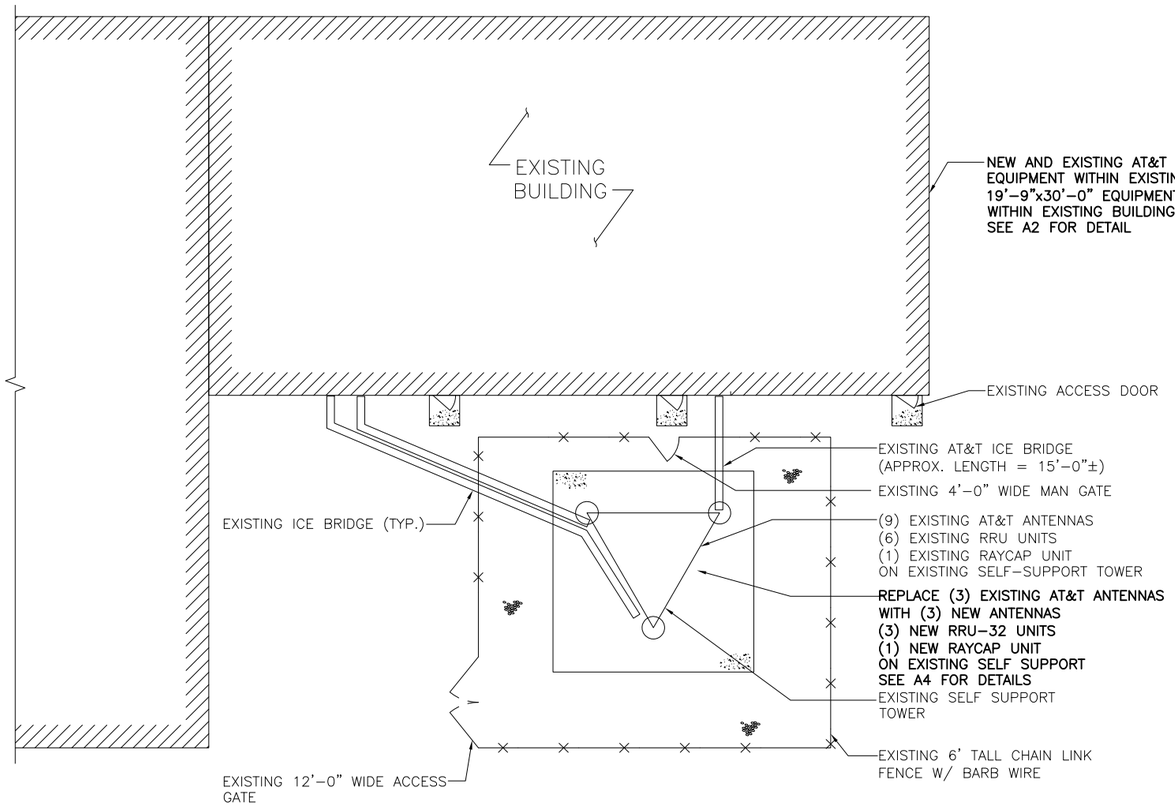
ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
AGL	ABOVE GRADE LEVEL
AMSL	ABOVE MEAN SEA LEVEL
APPROX	APPROXIMATE
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BLDG	BUILDING
BTS	BASE TRANSMISSION STATION
℄	CENTERLINE
CLR	CLEAR
COL	COLUMN
CONC	CONCRETE
CND	CONDUIT
DWG	DRAWING
FT	FOOT(FEET)
EGB	EQUIPMENT GROUND BAR
ELEC	ELECTRICAL
EMT	ELECTRICAL METALLIC TUBING
ELEV	ELEVATION
EQUIP	EQUIPMENT
(E)	EXISTING
EXT	EXTERIOR
FND	FOUNDATION
F	FIBER
FIF	FACILITY INTERFACE FRAME
GA	GAUGE
GALV	GALVANIZED
GPS	GLOBAL POSITIONING SYSTEM
GND	GROUND
GSM	GLOBAL SYSTEM FOR MOBILE COMMUNICATION
LTE	LONG TERM EVOLUTION
MAX	MAXIMUM
MCPA	MULTI-CARRIER POWER AMPLIFIER
MFR	MANUFACTURER
MGB	MASTER GROUND BAR
MIN	MINIMUM
MTS	MANUAL TRANSFER SWITCH
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
OE/OT	OVERHEAD ELECTRIC/TELCO
PPC	POWER PROTECTION CABINET
PL	PROPERY LINE
RBS	RADIO BASED STATION
RET	REMOTE ELECTRIC TILT
RRU	REMOTE RADIO UNIT
RGS	RIGID GALVANIZED STEEL
IN	INCH(ES)
INT	INTERIOR
LB(S), #	POUND(S)
SF	SQUARE FOOT
STL	STEEL
TMA	TOWER MOUNTED AMPLIFIER
TYP	TYPICAL
UE/UT	UNDERGROUND ELECTRIC/TELCO
UNO	UNLESS NOTED OTHERWISE
UMTS	UNIVERSAL MOBILE TELE-COMMUNICATION SYSTEM
VIF	VERIFY IN FIELD
W/	WITH
XFMR	TRANSFORMER

SYMBOLS

- REVISION
- WORK POINT
- UTILITY POLE
- COMPRESSED STONE
- BRICK
- CONCRETE
- EARTH
- GRAVEL
- MASONRY
- STEEL
- CENTERLINE
- PROPERTY LINE
- LEASE LINE
- EASEMENT LINE
- CHAIN LINK FENCE
- WOOD FENCE
- UE — BELOW GRADE ELECTRIC
- UT — BELOW GRADE TELEPHONE
- OE/OT — OVERHEAD ELECTRIC/TELEPHONE
- SECTION REFERENCE (S-1 / A)



COMPOUND PLAN — SCALE: 1" = 20'-0" — 1

SITE PHOTO 1 — SCALE: N.T.S. — 2

SITE PHOTO 2 — SCALE: N.T.S. — 3

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SHEET NAME
COMPOUND PLAN

SHEET NUMBER
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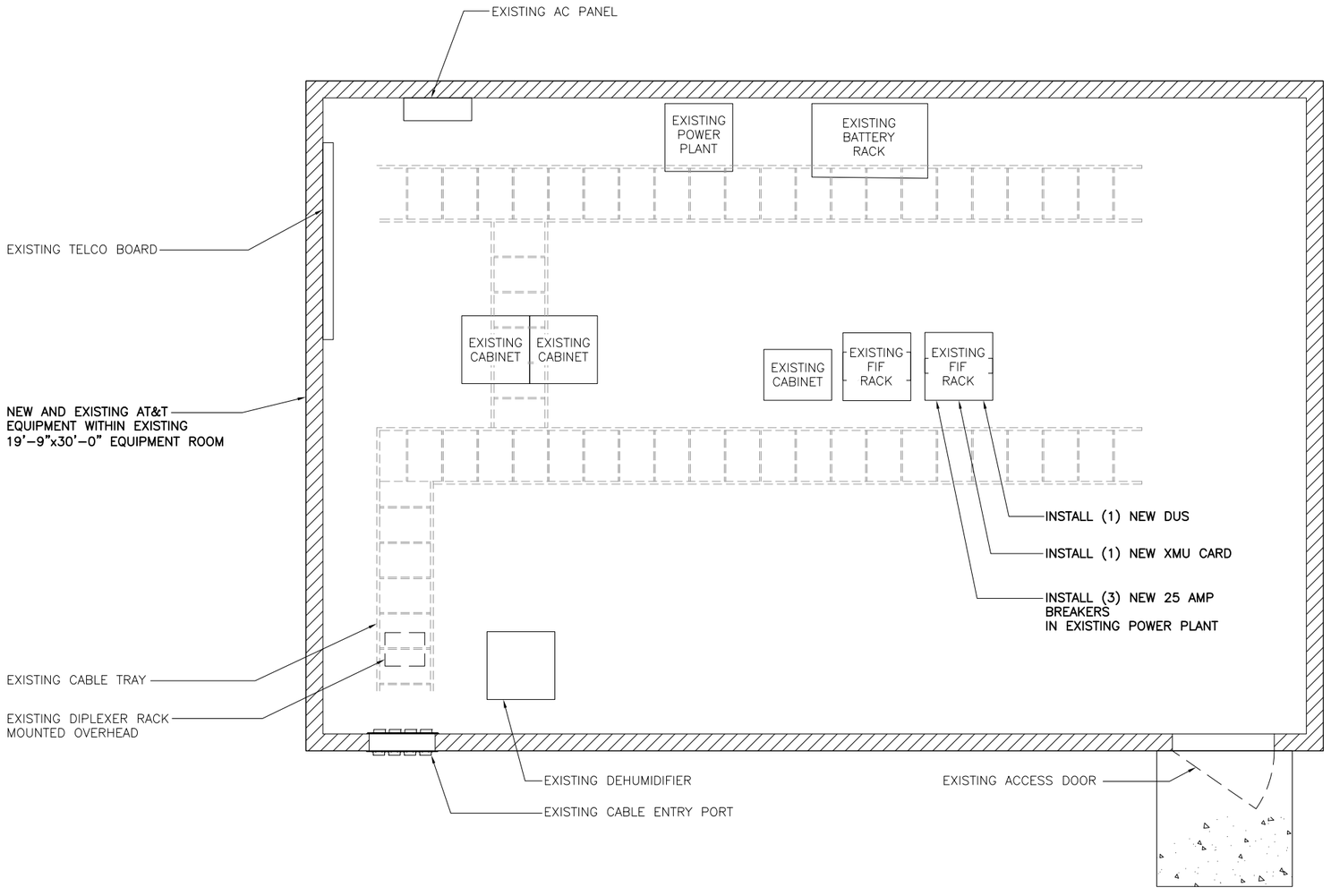

EQUIPMENT PLAN

SCALE: 1/4" = 1'-0" | 1

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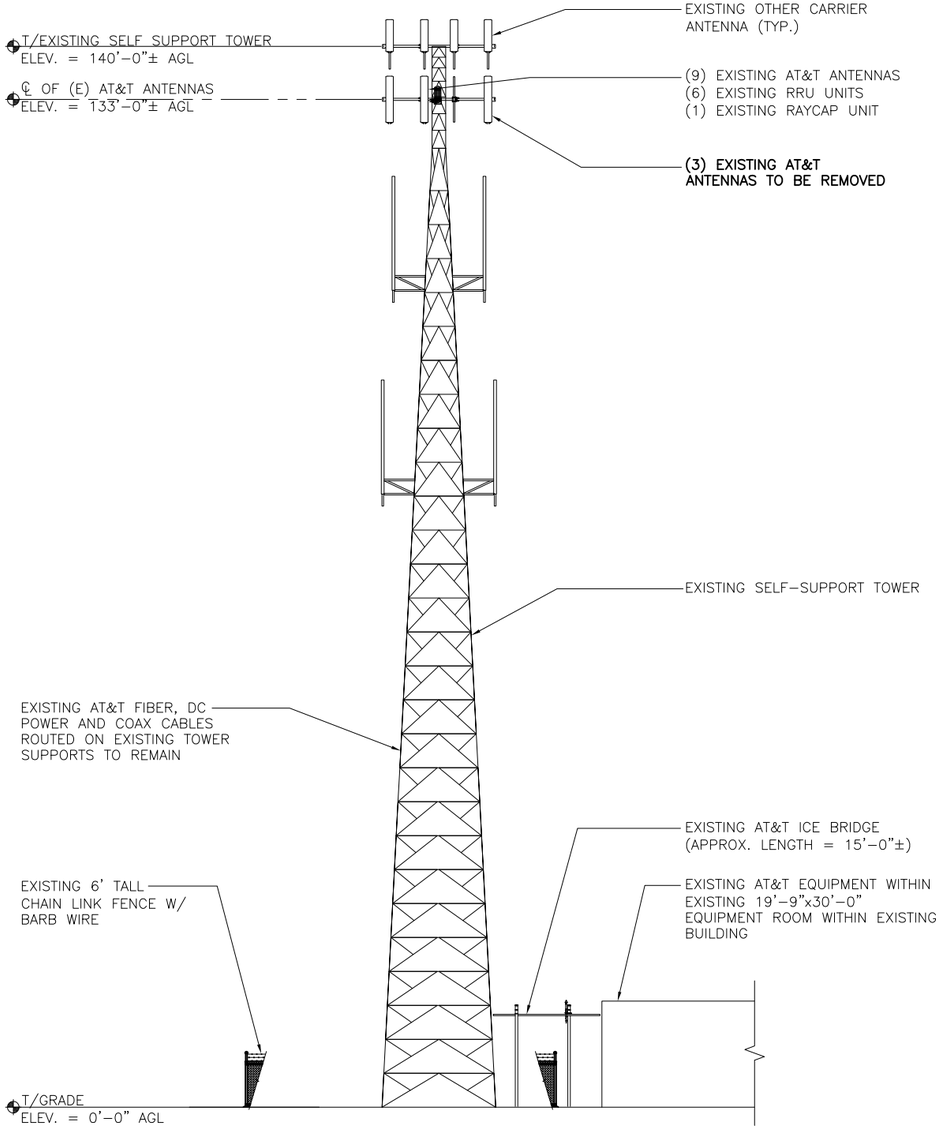
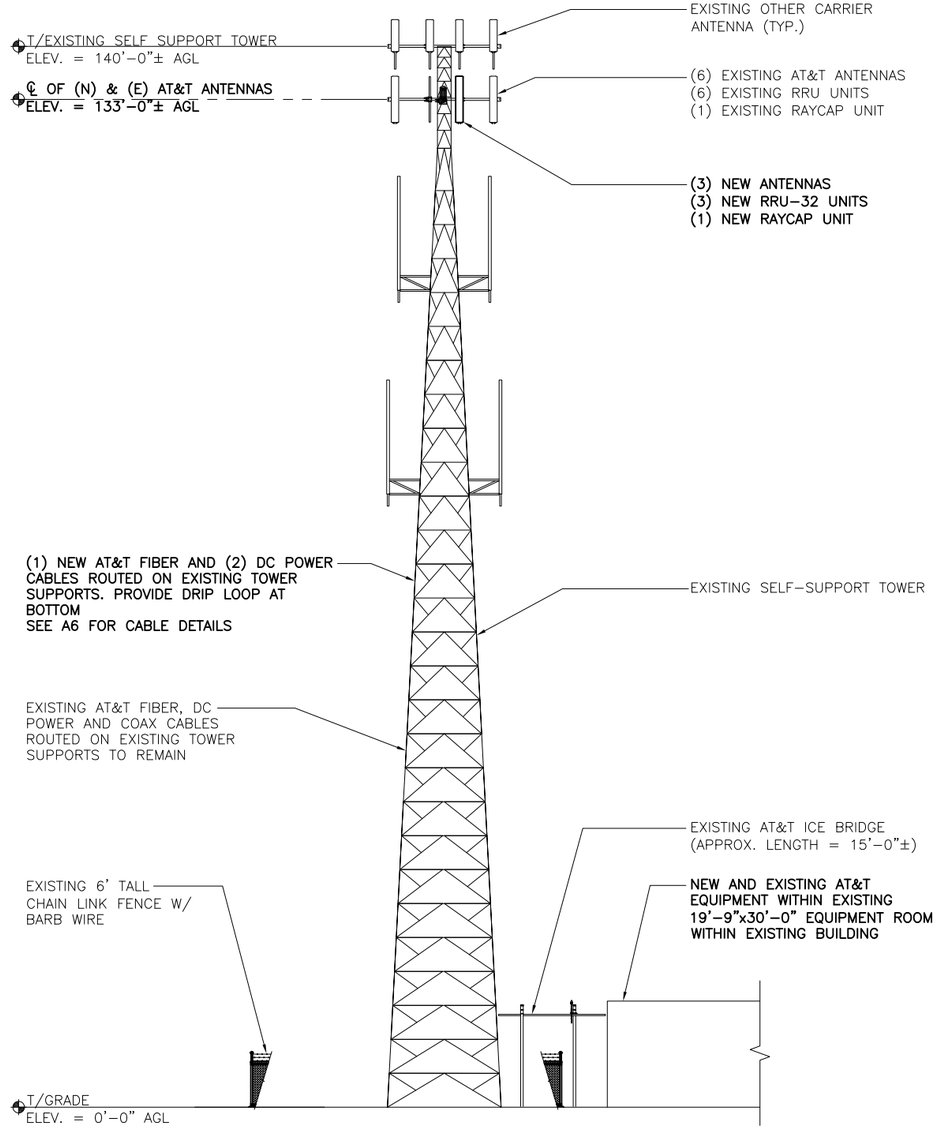
2. CALCULATIONS FOR THE ANTENNA MOUNTS WERE PREPARED BY FULLERTON AND THOSE CALCULATIONS CERTIFY THE CAPACITY OF THE STRUCTURE TO SUPPORT THE NEW EQUIPMENT
3. CABLES NOT SHOWN FOR CLARITY



EXISTING ELEVATION SCALE: 1" = 20'-0" 1



NEW ELEVATION SCALE: 1" = 20'-0" 2

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STATE OF CONNECTICUT · HENRY M. BELLAGAMBA · 25358 · LICENSED PROFESSIONAL ENGINEER

SITE NAME
NEW LONDONGROTON PD

SITE NUMBER:
CTL02164

SITE ADDRESS
68 GROTON LONG POINT ROAD
GROTON, CT

SHEET NAME
ELEVATIONS

SHEET NUMBER
A3

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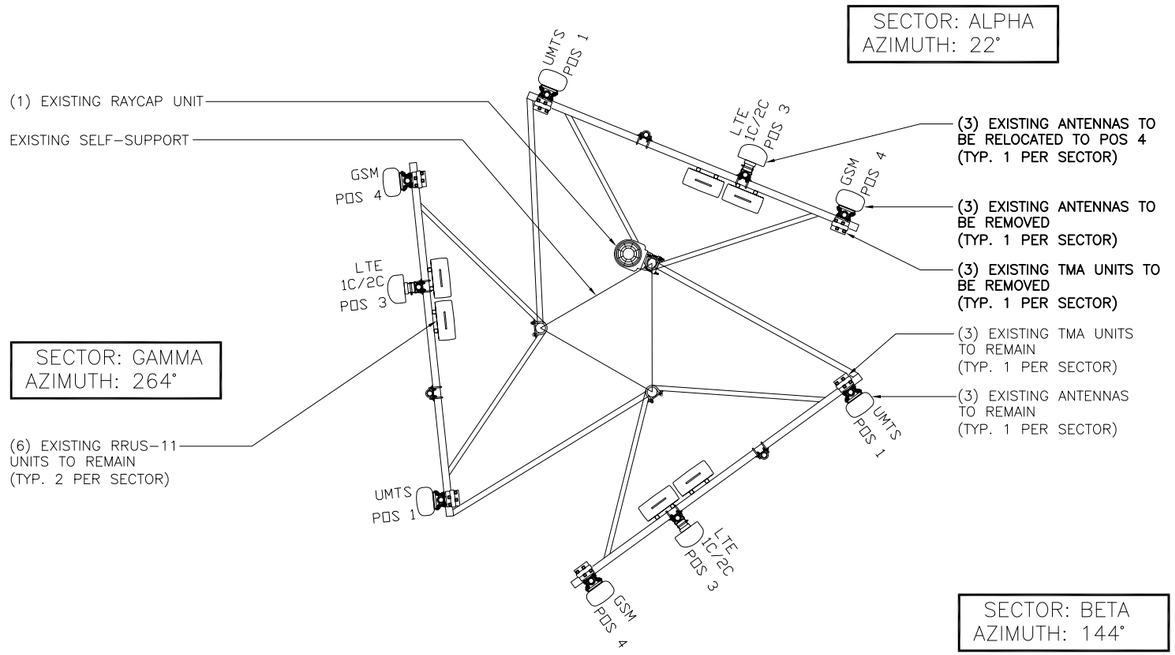
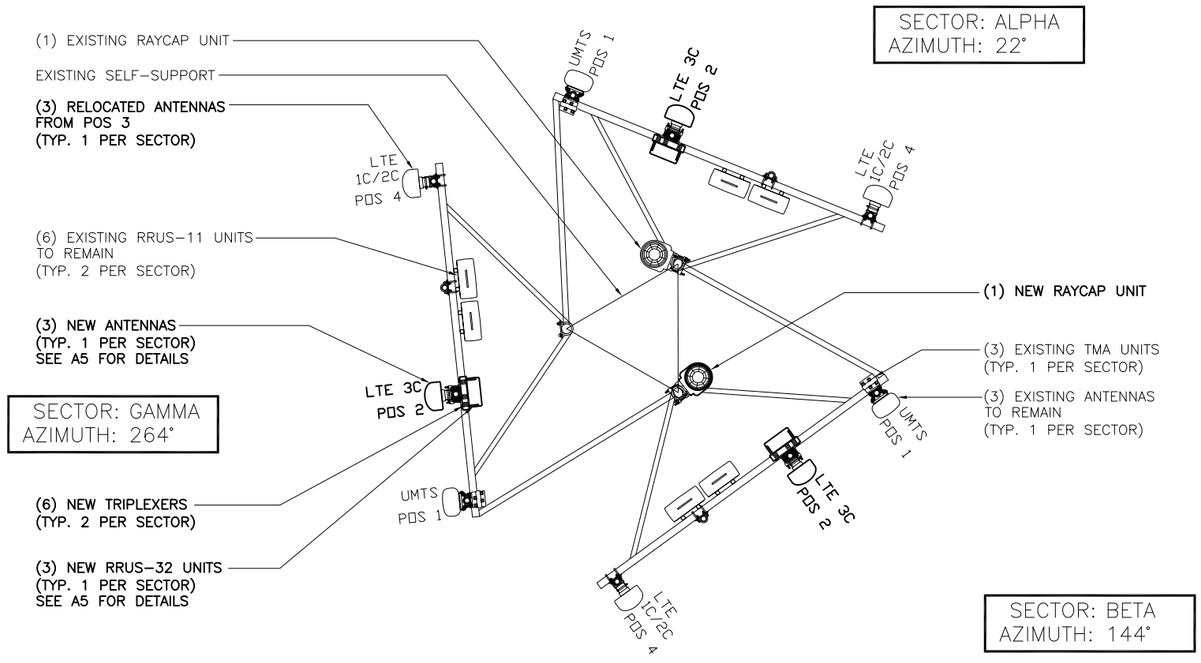


EXISTING ANTENNA PLAN — SCALE: 3/16" = 1'-0" — 1



FINAL ANTENNA PLAN — SCALE: 3/16" = 1'-0" — 2

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smartlink
1362 MELLON ROAD
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GROTON, CT

SHEET NAME
ANTENNA PLANS

SHEET NUMBER
A4

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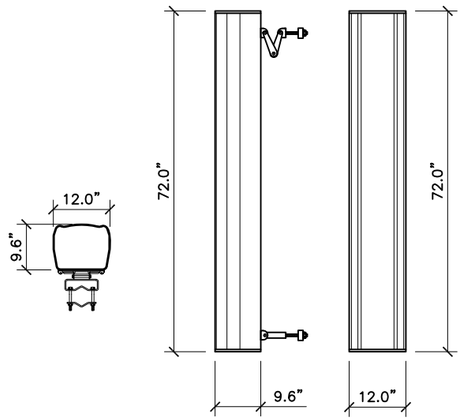


PLAN VIEW SIDE VIEW FRONT VIEW

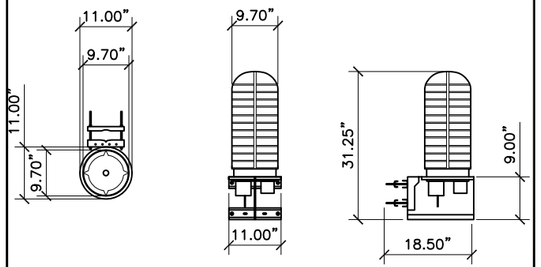
QUINTEL – QS66512-2

MULTISERVE MULITBAND 12 PORT ANTENNA
WITH QTILT AND INTERNAL RET

FREQUENCY RANGE	2x698–806 MHz
	2x824–894 MHz
	4x1850–1990 MHz
	4x1695–1780 +2110–2400 MHz
ANTENNA	111 Lbs
BRACKET	15 Lbs
TOTAL WEIGHT	126 Lbs

ANTENNA SPEC SCALE: N.T.S. 1

NOMINAL OPERATING VOLTAGE:	48 VDC
NOMINAL DISCHARGE CURRENT:	20 kA 8/20ms
MAXIMUM DISCHARGE CURRENT:	60 kA 8/20ms
MAXIMUM CONTINUOUS OPERATING VOLTAGE:	75 VDC
VOLTAGE PROTECTION RATING:	400 V
WIND LOADING:	150 MPH SUSTAINED (105.7 lbs) 195 MPH GUST (213.6 lbs)



PLAN VIEW FRONT VIEW SIDE VIEW

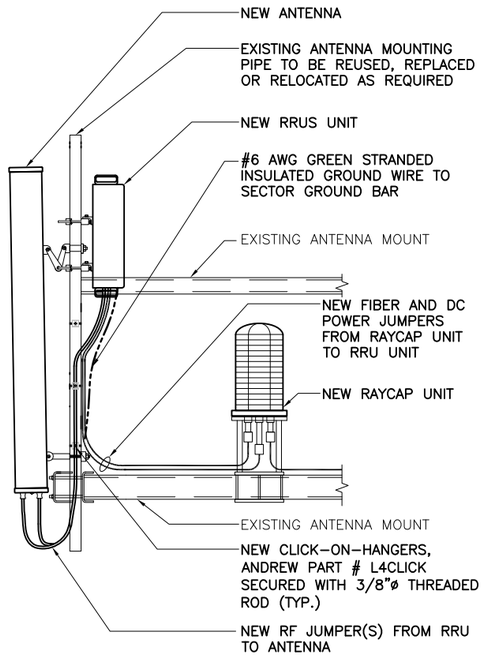
RAYCAP – DC6-48-60-0-8F

TOWER DC OVER VOLTAGE PROTECTION POWER CONNECTION SOLUTION

UNIT WEIGHT 32.8 Lbs

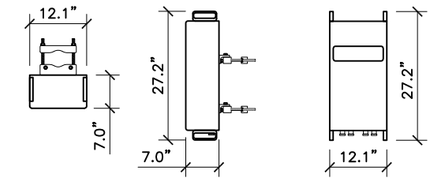
CONTRACTOR TO USE "THREAD LUBRICANT" ON MOUNTING BOLTS DURING INSTALLATION ON EXISTING STRUCTURAL MEMBER

RAYCAP SPEC SCALE: N.T.S. 2



ANTENNA SCHEMATIC SCALE: N.T.S. 3

NOT USED SCALE: N.T.S. 4



PLAN VIEW SIDE VIEW FRONT VIEW

ERICSSON – RRUS 32 B30

UNIT WEIGHT 60 Lbs

RRU SPEC SCALE: N.T.S. 5

NOT USED SCALE: N.T.S. 6

NOT USED SCALE: N.T.S. 7

NOT USED SCALE: N.T.S. 8

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SITE NAME
NEW LONDONGROTON PD

SITE NUMBER:
CTL02164

SITE ADDRESS
68 GROTON LONG POINT ROAD
GROTON, CT

SHEET NAME
EQUIPMENT DETAILS

SHEET NUMBER
A5

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FINAL ANTENNA CONFIGURATION AND CABLE SCHEDULE
SUPPLIED BY AT&T WIRELESS, FROM RF CONFIG. DATED (03/22/16)

SECTOR	ANTENNA NUMBER	ANTENNA STATUS & TYPE	ANTENNA MODEL NUMBER	ANTENNA VENDOR	TMA/RRU UNIT	AZIMUTH	ANTENNA CL FROM GROUND	CABLE FEEDER TYPE	CABLE FEEDER LENGTH	RAYCAP UNIT
ALPHA	A-1	(E) UMTS ANTENNA	7770	POWERWAVE	(1) EXISTING TMA UNIT(S)	144°	133'-0"	7/8"ø LDF5-50A	163'-0"	(1) (E) DC6-48-60-18-8F UNIT **(1) (N) DC6-48-60-18-8F UNIT**
								7/8"ø LDF5-50A	163'-0"	
	A-2	**(N) GSM/LTE3C ANTENNA**	**QS66512-2**	**QUINTEL**	**(1) NEW RRUS-32 UNIT(S)**	22°	133'-0"	7/8"ø LDF5-50A	163'-0"	
								(1) NEW FIBER CABLE (2) NEW DC POWER CABLES	**163'-0"**	
	A-3	-	-	-	-	-	-	-		
	A-4	(E) LTE1C/2C ANTENNA	AM-X-CD-14-65-00T-RET	ANDREW	(2) EXISTING RRUS-11 UNIT(S)	144°	133'-0"	(1) EXISTING FIBER CABLE	163'-0"	
								(2) EXISTING DC POWER CABLES	163'-0"	
BETA	B-1	(E) UMTS ANTENNA	7770	POWERWAVE	(1) EXISTING TMA UNIT(S)	264°	133'-0"	7/8"ø LDF5-50A	163'-0"	
								7/8"ø LDF5-50A	163'-0"	
	B-2	**(N) GSM/LTE3C ANTENNA**	**QS66512-2**	**QUINTEL**	**(1) NEW RRUS-32 UNIT(S)**	144°	133'-0"	7/8"ø LDF5-50A	163'-0"	
								SEE ANTENNA A-2 FOR CABLE TYPE AND LENGTH		
	B-3	-	-	-	-	-	-	-		
	B-4	(E) LTE1C/2C ANTENNA	AM-X-CD-14-65-00T-RET	ANDREW	(2) EXISTING RRUS-11 UNIT(S)	264°	133'-0"	SEE ANTENNA A-4 FOR CABLE TYPE AND LENGTH		
GAMMA	C-1	(E) UMTS ANTENNA	7770	POWERWAVE	(1) EXISTING TMA UNIT(S)	22°	133'-0"	7/8"ø LDF5-50A	163'-0"	
								7/8"ø LDF5-50A	163'-0"	
	C-2	**(N) GSM/LTE3C ANTENNA**	**QS66512-2**	**QUINTEL**	**(1) NEW RRUS-32 UNIT(S)**	264°	133'-0"	7/8"ø LDF5-50A	163'-0"	
								SEE ANTENNA A-2 FOR CABLE TYPE AND LENGTH		
	C-3	-	-	-	-	-	-	-		
	C-4	(E) LTE1C/2C ANTENNA	AM-X-CD-14-65-00T-RET	ANDREW	(2) EXISTING RRUS-11 UNIT(S)	22°	133'-0"	SEE ANTENNA A-4 FOR CABLE TYPE AND LENGTH		

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STATE OF CONNECTICUT · HENRY M. BELLAGAMBA · 25358 · LICENSED PROFESSIONAL ENGINEER

SITE NAME
NEW LONDONGROTON PD

SITE NUMBER:
CTL02164

SITE ADDRESS
68 GROTON LONG POINT ROAD
GROTON, CT

SHEET NAME
ANTENNA & CABLE CONFIGURATION

SHEET NUMBER
A6

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1. CONTRACTOR IS TO REFER TO AT&T'S MOST CURRENT RADIO FREQUENCY DATA SHEET (RFDS) PRIOR TO CONSTRUCTION.
2. THE SIZE, HEIGHT, AND DIRECTION OF THE ANTENNAS SHALL BE ADJUSTED TO ACHIEVE THE AZIMUTHS SPECIFIED AND LIMIT SHADOWING AND TO MEET THE SYSTEM REQUIREMENTS.
3. CONTRACTOR SHALL VERIFY THE HEIGHT OF THE ANTENNA WITH THE AT&T WIRELESS PROJECT MANAGER.
4. VERIFY TYPE AND SIZE OF TOWER LEG PRIOR TO ORDERING ANY ANTENNA MOUNT.
5. UNLESS NOTED OTHERWISE THE CONTRACTOR MUST PROVIDE ALL MATERIAL NECESSARY.
6. ANTENNA AZIMUTHS ARE DEGREES OFF OF TRUE NORTH, BEARING CLOCKWISE, IN WHICH ANTENNA FACE IS DIRECTED. ALL ANTENNAS (AND SUPPORTING STRUCTURES AS PRACTICAL) SHALL BE ACCURATELY ORIENTED IN THE SPECIFIED DIRECTION.
7. CONTRACTOR SHALL VERIFY ALL RF INFORMATION PRIOR TO CONSTRUCTION.
8. SWEEP TEST SHALL BE PERFORMED BY GENERAL CONTRACTOR AND SUBMITTED TO AT&T WIRELESS CONSTRUCTION SPECIALIST. TEST SHALL BE PERFORMED PER AT&T WIRELESS STANDARDS.
9. CABLE LENGTHS WERE DETERMINED BASED ON THE DESIGN DRAWING. CONTRACTOR TO VERIFY ACTUAL LENGTH DURING PRE-CONSTRUCTION WALK.
10. CONTRACTOR TO USE ROSENBERGER FIBER LINE HANGER COMPONENTS (OR ENGINEER APPROVED EQUAL).

ANTENNA AND CABLING NOTES

SCALE: N.T.S. | 1

RF, DC, & COAX CABLE MARKING LOCATIONS TABLE	
NO	LOCATIONS
1	EACH TOP-JUMPER SHALL BE COLOR CODED WITH (1) SET OF 3" WIDE BANDS.
2	EACH MAIN COAX SHALL BE COLOR CODED WITH (1) SET OF 3" WIDE BANDS NEAR THE TOP-JUMPER CONNECTION AND WITH (1) SET OF 3/4" WIDE COLOR BANDS JUST PRIOR TO ENTERING THE BTS OR TRANSMITTER BUILDING.
3	CABLE ENTRY PORT ON THE INTERIOR OF THE SHELTER.
4	ALL BOTTOM JUMPERS SHALL BE COLOR CODED WITH (1) SET OF 3/4" WIDE BANDS ON EACH END OF THE BOTTOM JUMPER.
5	ALL BOTTOM JUMPERS SHALL BE COLOR CODED WITH (1) SET OF 3/4" WIDE BANDS ON EACH END OF THE BOTTOM JUMPER.

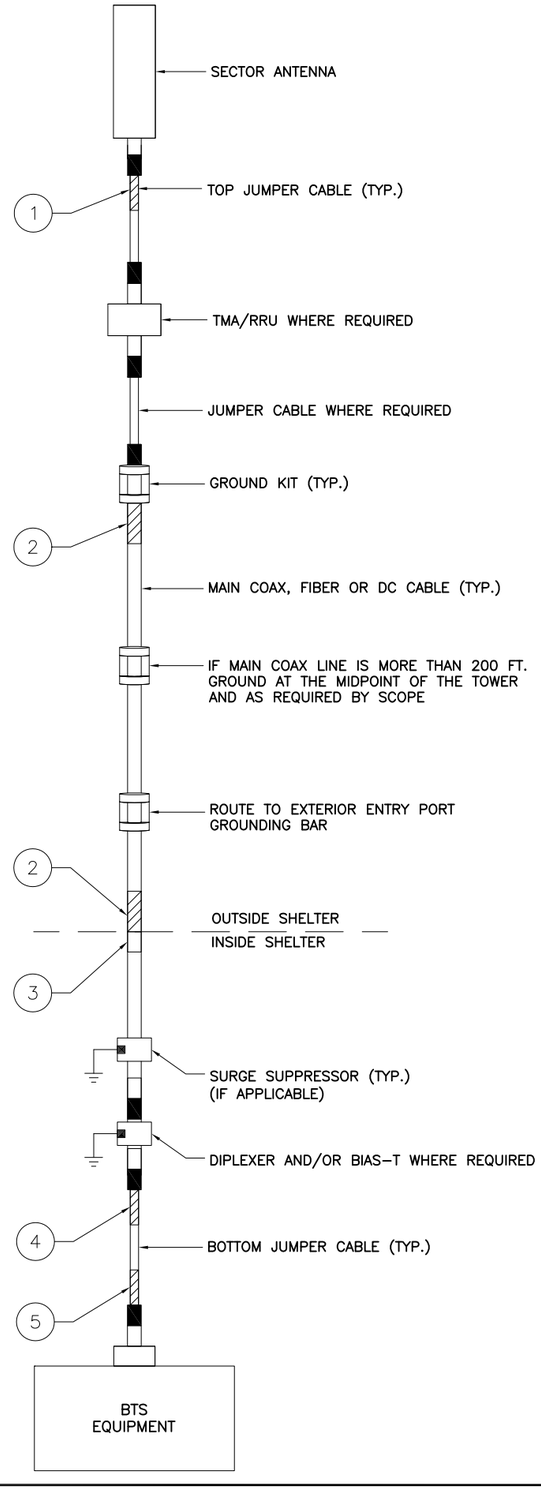
CABLE MARKING DIAGRAM

SCALE: N.T.S. | 2

1. THE ANTENNA SYSTEM COAX SHALL BE LABELED WITH VINYL TAPE.
2. THE STANDARD IS BASED ON EIGHT COLORED TAPES-RED, BLUE, GREEN, YELLOW, ORANGE, BROWN, WHITE, AND VIOLET. THESE TAPES MUST BE 3/4" WIDE & UV RESISTANT SUCH AS SCOTCH 35 VINYL ELECTRICAL COLOR CODING TAPE AND SHOULD BE READILY AVAILABLE TO THE ELECTRICIAN OR CONTRACTOR ON SITE.
3. USING COLOR BANDS ON THE CABLES, MARK ALL RF CABLE BY SECTOR AND CABLE NUMBER AS SHOWN ON "CABLE COLOR CHART".
4. WHEN AN EXISTING COAXIAL LINE THAT IS INTENDED TO BE A SHARED LINE BETWEEN TECHNOLOGIES IS ENCOUNTERED, THE CONTRACTOR SHALL REMOVE THE EXISTING COLOR CODING SCHEME AND REPLACE IT WITH THE COLOR CODING STANDARD. IN THE ABSENCE OF AN EXISTING COLOR CODING AND TAGGING SCHEME, OR WHEN INSTALLING PROPOSED COAXIAL CABLES, THIS GUIDELINE SHALL BE IMPLEMENTED AT THAT SITE REGARDLESS OF TECHNOLOGY.
5. ALL COLOR CODE TAPE SHALL BE 3M-35 AND SHALL BE INSTALLED USING A MINIMUM OF (3) THREE WRAPS OF TAPE AND SHALL BE NEATLY TRIMMED AND SMOOTHED OUT SO AS TO AVOID UNRAVELING.
6. ALL COLOR BANDS INSTALLED AT THE TOP OF THE TOWER SHALL BE A MINIMUM OF 3" WIDE, AND SHALL HAVE A MINIMUM OF 3/4" OF SPACE BETWEEN EACH COLOR.
7. ALL COLOR CODES SHALL BE INSTALLED SO AS TO ALIGN NEATLY WITH ONE ANOTHER FROM SIDE-TO-SIDE.
8. IF EXISTING CABLES AT THE SITE ALREADY HAVE A COLOR CODING SCHEME AND THEY ARE NOT INTENDED TO BE REUSED OR SHARED WITH THE NEW TECHNOLOGY, THE EXISTING COLOR CODING SCHEME SHALL REMAIN UNTOUCHED.

CABLE MARKING NOTES

SCALE: N.T.S. | 3



CABLE COLOR CODING DIAGRAM

SCALE: N.T.S. | 4

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SITE NUMBER:
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SITE ADDRESS
68 GROTON LONG POINT ROAD
GROTON, CT

SHEET NAME
CABLE NOTES AND COLOR CODING

SHEET NUMBER
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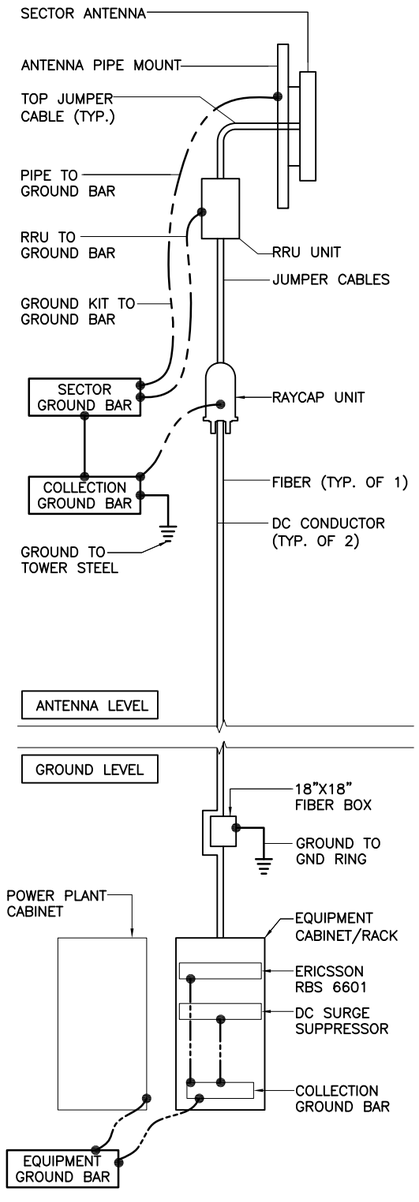
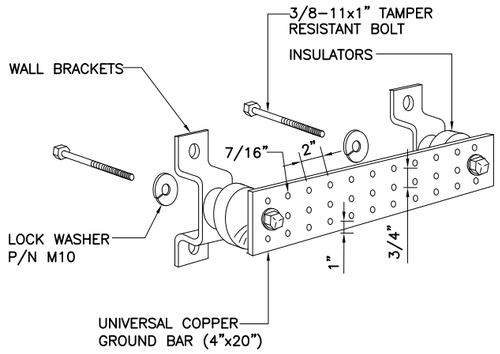
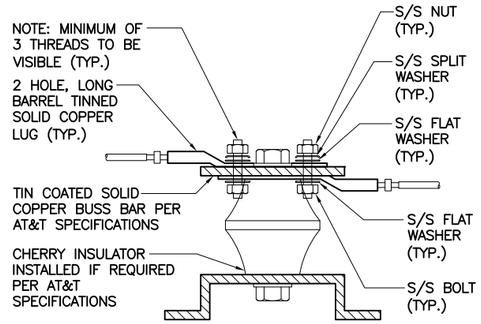


GROUNDING SCHEMATIC SCALE: N.T.S. 1



GROUND BAR DETAIL SCALE: N.T.S. 2

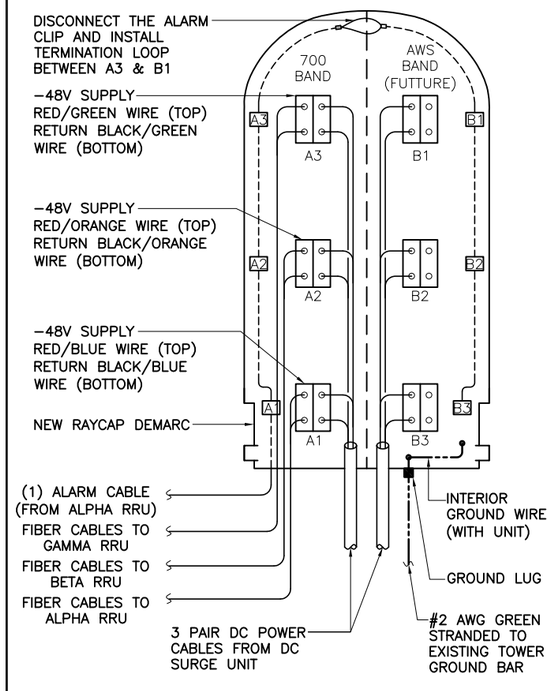


NOTES:

1. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING SPLIT WASHERS.
2. COAT WIRE END WITH ANTI-OXIDATION COMPOUND PRIOR TO INSERTION INTO LUG BARREL AND CRIMPING.
3. APPLY ANTI-OXIDATION COMPOUND BETWEEN ALL LUGS AND BUSS BARS PRIOR TO MATING AND BOLTING.

LUG DETAIL SCALE: N.T.S. 3

EXOTHERMIC WELD DETAILS SCALE: N.T.S. 4



RAYCAP DC POWER AND ALARM DET. SCALE: N.T.S. 5

NOT USED SCALE: N.T.S. 6

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SHEET NAME
GROUNDING DETAILS

SHEET NUMBER
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FEC# 2016.0200.0026

STRUCTURAL CALCULATIONS

Prepared for: Smartlink / AT&T LTE 3C

New Antenna Installation
on Existing Self-Support Tower

Site No. CTL02164
FA No. 10035132
Site Name: New Londongroton PD
68 Groton Long Point Road
Groton, CT 06340

October 24, 2016

Henry M. Bellagamba, P.E.

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ENGINEERING · DESIGN

Fullerton Engineering Consultants, Inc.
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Schaumburg, IL 60173
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Project Number: 2016.0200.0026

Summary

The rigorous structural analysis was performed by Fullerton Engineering Consultants, as requested by the client, to determine the conformance of existing structure with the 2012 International Building Code and the industry standard, TIA-222-G (Structural Standard for Steel Antenna Supporting Structures and Antennas). The analysis considers the tower properties, existing antennas and proposed antennas and the required loading criteria.

Conclusion

- **The tower member stresses are in conformance for the loading considered.**
- **The tower foundation is in conformance for the loading considered.**

Analysis Data

The following is based on information provided by the client, field investigation, and other determination by Fullerton Engineering Consultants or third parties.

Configuration	140', 3-sided self-support tower with a 2.5' top and 16.7' bottom face width.
References	Tower Appurtenances Mapping Report by Hudson Design Group, LLC., dated 01/06/2011. Original Foundation Drawings by Paul J. Ford and Company, project #20598-09, dated 06/02/1998. Original Tower Drawings ROHN, Inc., dated 04/02/1997. Geotechnical Report prepared by FDH Velocitel, project #16PTWP1600, dated 10/12/2016 Site visit pictures dated 05/10/2016 Tower Elevation drawing (S-1) by GEM Inc., dated 04/16/2005

Appurtenance Loading Schedule

ELEV. (FT.=AGL)	APPURTENANCE	TRANSMISSION LINES
	Proposed AT&T	
133’	(3) Quintel QS66512-2 (3) RRUS-32 (1) Raycap DC6-48-60-18-8F Mounted on existing (3) T-Arm Frames	(1) 3/8” Fiber (2) 3/4” DC Power
	Existing AT&T (to be removed prior antenna installation)	
133’	(3) Powerwave 7770 (3) Powerwave TT19-08BP111-001 TMA Mounted on existing (3) T-Arm Frames	
	Existing AT&T (to remain)	
133’	(3) Powerwave 7770 (3) KMW AM-X-CD-14-65-00T-RET (6) RRUS-11 (3) Powerwave TT19-08BP111-001 TMA (1) Raycap DC6-48-60-18-8F Mounted on existing (3) T-Arm Frames	(1) 3/8” Fiber (2) 3/4” DC Power (12) 7/8” Coaxial
	Existing (to remain)	
145’ 143’	(1) Flash Beacon Lighting (1) Lightning Rod Mounted on top of tower	(1) 1/2” Coaxial
143’	(6) DB846 (6) DB948 Mounted on existing (1) Rotatable Platform w/ handrail	(12) 1-5/8” Coaxial
121’	(1) DB212 DiPole Mounted on tower leg	(1) 7/8” Coaxial
119’	(1) DB212 DiPole Mounted on tower leg	
110’	(1) DB212 DiPole Mounted on tower leg	(1) 7/8” Coaxial
110’	(1) DB540 Whip Mounted on existing (1) stand-off mount frames	(1) 1-1/4” Coaxial
104’	(1) DB212 DiPole Mounted on tower leg	(1) 7/8” Coaxial
112.5’ 89.5’	(1) PD340 4-bay DiPole (1) PD340 4-bay DiPole Mounted on existing (1) stand-off mount frames	(2) 1-1/4” Coaxial
108.25’ 93.75’	(1) DB810T3 Whip (1) DB810T3 Whip Mounted on existing (1) stand-off mount frames	(2) 1-5/8” Coaxial
101’	(2) PD1121 DiPole Mounted on tower leg	(1) 1-1/4” Coaxial

96’	(1) DB212 DiPole Mounted on tower leg	
90’	(1) DB212 DiPole Mounted on tower leg	(1) 7/8” Coaxial
80’	(1) 3’Ø Dish Mounted on dish pipe mount to tower leg	(1) 1/2” Coaxial
68’	(1) DB212 DiPole Mounted on tower leg	
67’	(2) Obstruction Lights Mounted on tower legs	(1) 1/2” Coaxial
66’	(1) CCTV camera Mounted on tower leg	(2) 3/4” Coaxial
65.5’	(1) PD340 4-bay DiPole Mounted on existing (1) stand-off mount frame	(1) 7/8” Coaxial
64’ 44’	(1) PD220 Whip (1) PD220 Whip Mounted on existing (1) stand-off mount frames	(2) 7/8” Coaxial
58’	(1) 3’Ø Dish Mounted on dish pipe mount to tower leg	(1) 1/2” Coaxial
44’	(1) 2’Ø Dish (1) 18”x12” Panel Mounted on existing (1) stand-off mount frame	(1) 3/8” Coaxial
40’	(1) 3’Ø Dish Mounted on dish pipe mount to tower leg	(1) 1/2” Coaxial
40’	(1) BA1012 Whip Mounted on existing (1) stand-off mount frame	(1) 7/8” Coaxial
37’	(1) 2’Ø Dish (1) 18”x12” Panel Mounted on existing (1) stand-off mount frame	(2) 3/8” Coaxial (1) 1/2" Coaxial

Results

The results of the structural analysis are summarized as follows:

Tower Mast	The tower leg members are **adequate** for new loads, with a maximum stress ratio of 99.7% @ Elev. 100'-120' AGL. The tower main diagonal members are **adequate** for new loads, with a maximum stress ratio of 101.7% @ Elev. 40'-60' AGL. The minor 1.7% 'overstress' can be neglected by engineering judgment. The tower top girt members are **adequate** for new loads, with a maximum stress ratio of 10.9% @ Elev. 140' AGL. The tower main leg bolts are **adequate** for new loads, with a maximum stress ratio of 76.7% @ Elev. 40' AGL. The tower main diagonal bolts are **adequate** for new loads, with a maximum stress ratio of 93.1% @ Elev. 40'-60' AGL.
Anchor Bolts	The tower anchor bolts are **adequate** for new loads, with a maximum stress ratio of 94.9%
Foundation	The tower foundation is **adequate** for new loads.

Assumptions

This analysis is based on the theoretical capacity of the members and is not a condition assessment of the tower. The analysis is based solely on the information supplied, and the results, in turn, are only as accurate as data extracted from this information. Fullerton has been instructed by the client to assume the information supplied is accurate, and Fullerton has made no independent determination of its accuracy. The exception to the previous statement is if Fullerton has been contracted by the client to provide an independent structural mapping report of the tower and related appurtenances, in which case Fullerton has made an independent determination of the accuracy of the information resulting from the mapping report.

- The tower member sizes and geometry are considered accurate as supplied. The material grade is as per data supplied and/or as assumed and stated in the materials section.
- The existing tower is assumed to have been properly maintained in accordance with the TIA/EIA standard and/or its original manufacturer's recommendations. The existing tower is assumed to be in good condition with no structural defects and with no deterioration to its member capacities.
- The antenna configuration is as supplied and/or stated in the analysis section. It is assumed to be complete and accurate. All antennas, mounts, remote radios, cables and cable supports are assumed to be properly installed and supported as per the manufacturer's requirements.
- The antennas, mounts, remote radios, cables and cable supports and lines stated in the appurtenance loading schedule represent Fullerton's understanding of the overall antenna configuration. If the actual configuration is different than above, then this analysis is invalid. Please refer to this report for the projected wind areas used in the calculations for antennas and mounts. If variations or discrepancies are identified, please inform Fullerton.
- Some assumptions are made regarding antenna and mount sizes and their projected areas based on a best interpretation of the data supplied and a best knowledge of antenna type and industry practice.
- The existing foundation is assumed to be in good condition with no structural defects and with no deterioration to its member capacities.
- The soil parameters are as per data supplied, or as assumed, and stated in the calculations.
- All welds and connections are assumed to develop at least the member capacity, unless determined otherwise and explicitly stated in this report.
- All prior structural modifications, if any, are assumed to be as per date supplied/ available, to be properly installed and to be fully effective.

Scope and Limitations

The engineering services rendered by Fullerton Engineering Consultants, Inc. (Fullerton) in connection with this structural analysis are limited to an analysis of the structure, size and capacity of its members. Fullerton does not analyze the fabrication, including welding and connection capacities, except as included in this report.

The information and conclusions contained in this report were determined by application of the current engineering standards and analysis procedures and formulae, and Fullerton assumes no obligation to revise any of the information or conclusions contained in this report in the event such engineering and analysis procedures and formulae are hereafter modified or revised.

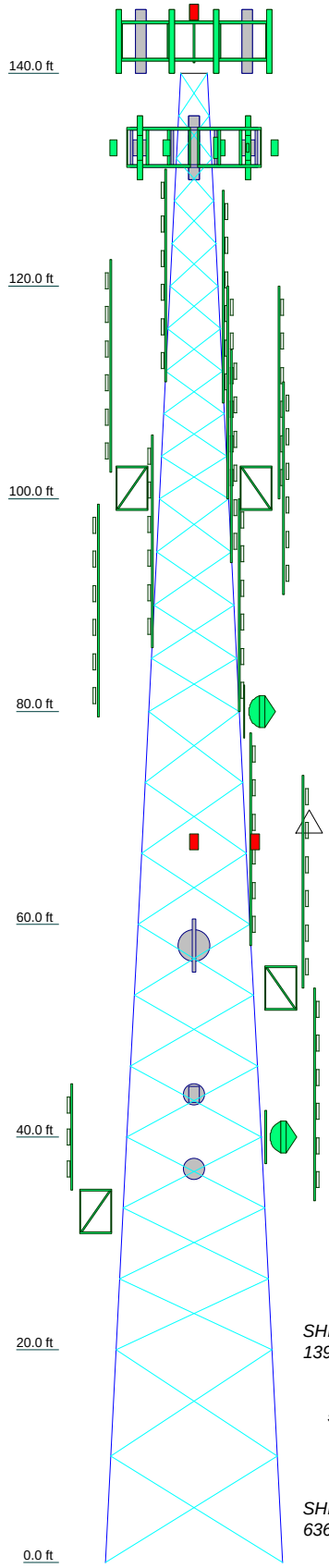
Fullerton makes no warranties, expressed or implied in connection with this report and disclaims any liability arising from original design, material, fabrication and erection deficiencies or the “as-built” condition of this tower. Fullerton will not be responsible whatsoever for or on account of consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report.

Installation procedures and loading are not within the scope of this report and should be performed and evaluated by a competent tower erection contractor.

Section 1

Structural Calculations

Section	T1	T2	T3	T4	T5	T6	T7
Legs	ROHN 2.5 EH	ROHN 3 EH	ROHN 4 EH	ROHN 5 EH	ROHN 6 EHS	ROHN 6 EH	ROHN 8 EHS
Leg Grade	A572-50						
Diagonals	L2x2x1/4			L2 1/2x2 1/2x1/4		L3x3x1/4	L3 1/2x3 1/2x1/4
Diagonal Grade	A36						A572-50
Top Girts	L2x2x1/4			N.A.			
Face Width (ft)	2.5	4.521	6.5625	8.5625	10.5625	12.6042	14.6563
# Panels @ (ft)	10 @ 4		4 @ 5	9 @ 6.66667			2 @ 10
Weight (lb)	1046.0	1335.8	1676.1	2205.0	2464.8	3210.5	3435.0
15373.2							



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 120 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

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 369514 lb
SHEAR: 38886 lb

UPLIFT: -337472 lb
SHEAR: 36188 lb

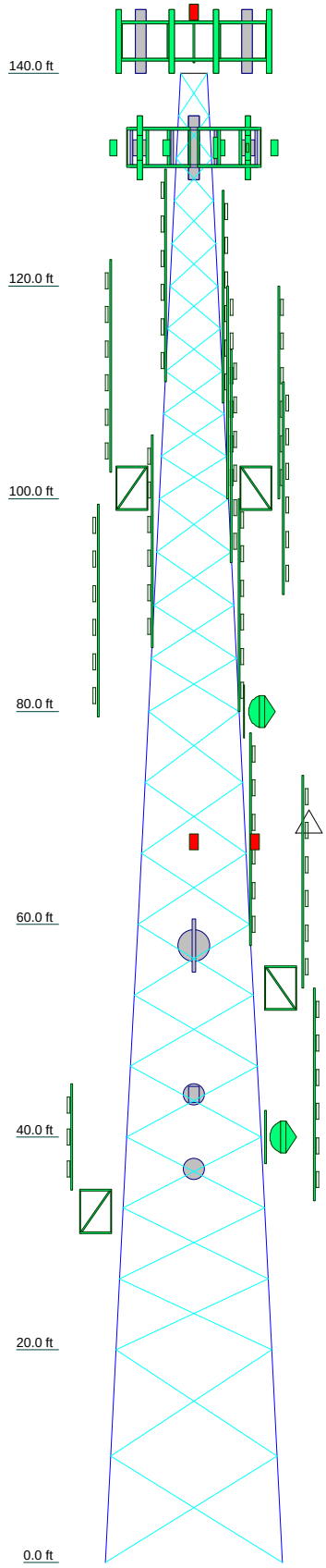
AXIAL 109035 lb
SHEAR 13970 lb *MOMENT 1189460 lb-ft*
TORQUE 2991 lb-ft
50 mph WIND - 0.7500 in ICE

AXIAL 35493 lb
SHEAR 63653 lb *MOMENT 5248634 lb-ft*
TORQUE 9199 lb-ft
REACTIONS - 120 mph WIND

Fullerton Engineering Consultants
1100 E. Woodfield Road, Suite 500
Schaumburg, IL 60173
Phone: (847) 908-8400
FAX: fax@fullertonengineering.com

Job: CTL02164			
Project: 140 ft. Self-Support Tower			
Client: AT&T	Drawn by: VY		App'd:
Code: TIA-222-G	Date: 12/04/15		Scale: NTS
Path:			Dwg No. E-1

Section	T1	T2	T3	T4	T5	T6	T7
Legs	ROHN 2.5 EH	ROHN 3 EH	ROHN 4 EH	ROHN 5 EH	ROHN 6 EHS	ROHN 6 EH	ROHN 8 EHS
Leg Grade	A572-50						
Diagonals	L2x2x1/4	L2x2x1/4		L2 1/2x2 1/2x1/4		L3x3x1/4	L3 1/2x3 1/2x1/4
Diagonal Grade	A36						A572-50
Top Girts	L2x2x1/4	N.A.					
Face Width (ft)	2.5	4.521	6.5625	8.5625	10.5625	12.6042	14.6563
# Panels @ (ft)	10 @ 4		4 @ 5	9 @ 6.66667			2 @ 10
Weight (lb)	1046.0	1335.8	1676.1	2205.0	2464.8	3210.5	3435.0



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Flash Beacon Lighting	145	DB212 DiPole	110
Lightning Rod 5/8x4'	143	DB540	110
PiROD 13' Rotatable Platform w/handrails (Lattice)	143	DB810T3	108.25
(2) DB846	143	DB212 DiPole	104
(2) DB846	143	SO308-1	101
(2) DB846	143	(2) PD1121	101
(2) DB948	143	SO308-1	101
(2) DB948	143	SO308-1	101
(2) DB948	143	DB212 DiPole	96
SM502-1	133	DB810T3	93.75
SM502-1	133	DB212 DiPole	90
SM502-1	133	PD340	89.5
KMW AM-X-CD-14-65-00T	133	3" x 60" Dish Pipe Mount	80
KMW AM-X-CD-14-65-00T	133	3' Dish w/ Radome	80
KMW AM-X-CD-14-65-00T	133	DB212 DiPole	68
Powerwave 7770.00	133	Obstruction Light	67
Powerwave 7770.00	133	Obstruction Light	67
Powerwave 7770.00	133	CPD Camera	66
(2) RRUS-11	133	PD340	65.5
(2) RRUS-11	133	PD220	64
(2) RRUS-11	133	3" x 60" Dish Pipe Mount	58
Powerwave TT19-08BP111-001 TMA	133	3' HP Dish	58
Powerwave TT19-08BP111-001 TMA	133	SO308-1	54
Powerwave TT19-08BP111-001 TMA	133	SO308-1	54
Raycap DC6-48-60-18-8F	133	PD220	44
Quintel QS66512-2	133	18"x12" Panel	44
Quintel QS66512-2	133	SO312-1	44
Quintel QS66512-2	133	2' Dish w/o Radome	44
RRUS-32 B30	133	3" x 60" Dish Pipe Mount	40
RRUS-32 B30	133	(2) BA1012	40
RRUS-32 B30	133	3' Dish w/ Radome	40
Raycap DC6-48-60-18-8F	133	18"x12" Panel	37
DB212 DiPole	121	SO312-1	37
DB212 DiPole	119	2' Dish w/o Radome	37
PD340	112.5	SO308-1	33

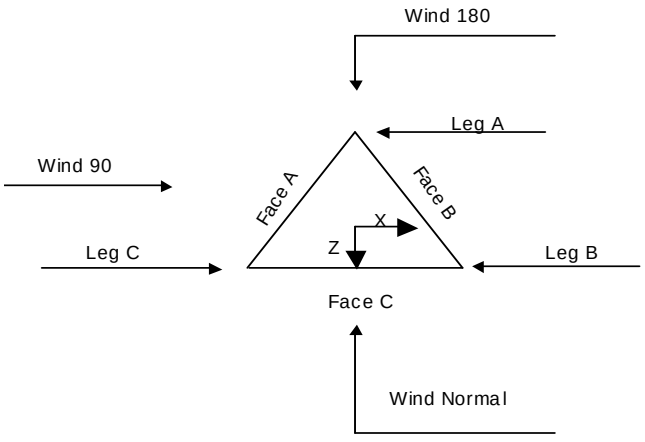
Fullerton Engineering Consultants
1100 E. Woodfield Road, Suite 500
Schaumburg, IL 60173
Phone: (847) 908-8400
FAX: fax@fullertonengineering.com

Job: CTL02164			
Project: 140 ft. Self-Support Tower			
Client: AT&T	Drawn by: VY	App'd:	
Code: TIA-222-G	Date: 04/27/16	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 140.00 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 2.50 ft at the top and 16.70 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in New London County, Connecticut.
Basic wind speed of 120 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.



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	140.00-120.00			2.50	1	20.00
T2	120.00-100.00			4.52	1	20.00
T3	100.00-80.00			6.56	1	20.00
T4	80.00-60.00			8.56	1	20.00
T5	60.00-40.00			10.56	1	20.00
T6	40.00-20.00			12.60	1	20.00
T7	20.00-0.00			14.66	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	140.00-120.00	4.00	X Brace	No	No	0.0000	0.0000
T2	120.00-100.00	4.00	X Brace	No	No	0.0000	0.0000
T3	100.00-80.00	5.00	X Brace	No	No	0.0000	0.0000
T4	80.00-60.00	6.67	X Brace	No	No	0.0000	0.0000
T5	60.00-40.00	6.67	X Brace	No	No	0.0000	0.0000
T6	40.00-20.00	6.67	X Brace	No	No	0.0000	0.0000
T7	20.00-0.00	10.00	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 140.00-120.00	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T2 120.00-100.00	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T3 100.00-80.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T4 80.00-60.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T5 60.00-40.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T6 40.00-20.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Equal Angle	L3x3x1/4	A572-50 (50 ksi)
T7 20.00-0.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A572-50 (50 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 140.00-120.00	Equal Angle	L2x2x1/4	A36 (36 ksi)	Flat Bar		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
T1 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T2 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T3 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T4 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T5 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T6 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T7 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	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 140.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 120.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 20.00-0.00	Yes	Yes	1	1 1	1 1	1 1	1 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 140.00-120.00	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 120.00-100.00	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 100.00-80.00	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 80.00-60.00	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 60.00-40.00	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
T6 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
T7 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 140.00-120.00	Flange	0.7500 A325X	4	0.6250 A325X	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 120.00-100.00	Flange	0.8750 A325X	4	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 100.00-80.00	Flange	1.0000 A325X	4	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 80.00-60.00	Flange	1.0000 A325X	6	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 60.00-40.00	Flange	1.0000 A325X	6	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 40.00-20.00	Flange	1.0000 A325X	8	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 20.00-0.00	Flange	1.0000 A354-BC (1/4" to 2-1/2")	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF4-50A (1/2 FOAM)	B	No	Ar (CaAa)	140.00 - 6.00	0.0000	0.25	1	1	0.6300	0.6300		0.15
LDF5-50A (7/8 FOAM)	B	No	Ar (CaAa)	121.00 - 6.00	0.0000	0.25	1	1	1.0900	1.0900		0.33
LDF5-50A	B	No	Ar (CaAa)	110.00 - 6.00	0.0000	0.25	1	1	1.0900	1.0900		0.33

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
(7/8 FOAM)												
LDF6-50A (1-1/4 FOAM)	B	No	Ar (CaAa)	110.00 - 6.00	0.0000	0.3	1	1	1.5500	1.5500		0.66
LDF5-50A (7/8 FOAM)	B	No	Ar (CaAa)	104.00 - 6.00	0.0000	0.25	1	1	1.0900	1.0900		0.33
LDF6-50A (1-1/4 FOAM)	B	No	Ar (CaAa)	101.00 - 6.00	0.0000	0.3	1	1	1.5500	1.5500		0.66
LDF6-50A (1-1/4 FOAM)	B	No	Ar (CaAa)	101.00 - 6.00	0.0000	0.3	1	1	1.5500	1.5500		0.66
LDF7-50A (1-5/8 FOAM)	B	No	Ar (CaAa)	101.00 - 6.00	0.0000	0.3	2	2	1.9800	1.9800		0.82
LDF5-50A (7/8 FOAM)	B	No	Ar (CaAa)	90.00 - 6.00	0.0000	0.2	1	1	1.0900	1.0900		0.33
LDF4-50A (1/2 FOAM)	B	No	Ar (CaAa)	67.00 - 6.00	0.0000	0.2	1	1	0.6300	0.6300		0.15
0 3/4	B	No	Ar (CaAa)	66.00 - 6.00	0.0000	0.2	1	1	0.7500	0.7500		0.30
LDF5-50A (7/8 FOAM)	B	No	Ar (CaAa)	54.00 - 6.00	0.0000	0.2	3	3	1.0900	1.0900		0.33
LDF2-50A (3/8 FOAM)	B	No	Ar (CaAa)	44.00 - 6.00	0.0000	0.3	1	1	0.4400	0.4400		0.08
LDF2-50A (3/8 FOAM)	B	No	Ar (CaAa)	37.00 - 6.00	0.0000	0.3	2	2	0.4400	0.4400		0.08
LDF4-50A (1/2 FOAM)	B	No	Ar (CaAa)	37.00 - 6.00	0.0000	0.3	1	1	0.6300	0.6300		0.15
LDF5-50A (7/8 FOAM)	B	No	Ar (CaAa)	33.00 - 6.00	0.0000	0.3	1	1	1.0900	1.0900		0.33
LDF7-50A (1-5/8 FOAM)	C	No	Ar (CaAa)	140.00 - 6.00	0.0000	0	12	12	1.9800	1.9800		0.82
LDF7-50A (1-5/8 FOAM)	A	No	Ar (CaAa)	133.00 - 6.00	0.0000	-0.25	12	12	1.9800	1.9800		0.82
3/4" DC power cable	A	No	Ar (CaAa)	133.00 - 6.00	0.0000	-0.3	2	2	0.7500	0.7500		0.40
3/8" Fiber	A	No	Ar (CaAa)	133.00 - 6.00	0.0000	-0.3	1	1	0.4000	0.4000		0.08
LDF4P-50A (1/2 FOAM)	A	No	Ar (CaAa)	80.00 - 6.00	0.0000	-0.25	1	1	0.6300	0.6300		0.15
LDF4P-50A (1/2 FOAM)	A	No	Ar (CaAa)	58.00 - 6.00	0.0000	0.3	1	1	0.6300	0.6300		0.15
LDF4P-50A (1/2 FOAM)	A	No	Ar (CaAa)	40.00 - 6.00	0.0000	-0.25	1	1	0.6300	0.6300		0.15
Proposed												
3/4" DC power cable	A	No	Ar (CaAa)	133.00 - 6.00	0.0000	-0.3	2	2	0.7500	0.7500		0.40
3/8" Fiber	A	No	Ar (CaAa)	133.00 - 6.00	0.0000	-0.3	1	1	0.4000	0.4000		0.08

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight plf
Feedline Ladder (Af)	B	No	CaAa (In Face)	140.00 - 6.00	0.0000	0.25	1	No Ice	0.50	8.40
								1/2" Ice	0.61	13.50
								1" Ice	0.72	18.60
Feedline Ladder (Af)	C	No	CaAa (In Face)	140.00 - 6.00	0.0000	0	1	No Ice	0.50	8.40
								1/2" Ice	0.61	13.50
								1" Ice	0.72	18.60

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight plf
Feedline Ladder (Af)	A	No	CaAa (In Face)	140.00 - 6.00	0.0000	-0.25	1	No Ice	0.50	8.40
								1/2" Ice	0.61	13.50
								1" Ice	0.72	18.60

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 lb
T1	140.00-120.00	A	0.000	0.000	45.828	0.000	318.80
		B	0.000	0.000	11.369	0.000	171.33
		C	0.000	0.000	57.520	0.000	364.80
T2	120.00-100.00	A	0.000	0.000	65.120	0.000	400.00
		B	0.000	0.000	17.222	0.000	191.78
		C	0.000	0.000	57.520	0.000	364.80
T3	100.00-80.00	A	0.000	0.000	65.120	0.000	400.00
		B	0.000	0.000	36.110	0.000	266.50
		C	0.000	0.000	57.520	0.000	364.80
T4	80.00-60.00	A	0.000	0.000	66.380	0.000	403.00
		B	0.000	0.000	38.091	0.000	272.65
		C	0.000	0.000	57.520	0.000	364.80
T5	60.00-40.00	A	0.000	0.000	67.514	0.000	405.70
		B	0.000	0.000	44.714	0.000	292.98
		C	0.000	0.000	57.520	0.000	364.80
T6	40.00-20.00	A	0.000	0.000	68.900	0.000	409.00
		B	0.000	0.000	51.364	0.000	309.76
		C	0.000	0.000	57.520	0.000	364.80
T7	20.00-0.00	A	0.000	0.000	48.230	0.000	286.30
		B	0.000	0.000	36.806	0.000	219.10
		C	0.000	0.000	40.264	0.000	255.36

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 lb
T1	140.00-120.00	A	1.720	0.000	0.000	130.682	0.000	2103.40
		B		0.000	0.000	26.241	0.000	627.01
		C		0.000	0.000	140.846	0.000	2444.47
T2	120.00-100.00	A	1.692	0.000	0.000	190.636	0.000	2915.24
		B		0.000	0.000	48.024	0.000	923.50
		C		0.000	0.000	140.562	0.000	2415.59
T3	100.00-80.00	A	1.658	0.000	0.000	189.563	0.000	2866.77
		B		0.000	0.000	111.971	0.000	1763.89
		C		0.000	0.000	140.227	0.000	2381.58
T4	80.00-60.00	A	1.617	0.000	0.000	195.978	0.000	2899.58
		B		0.000	0.000	119.693	0.000	1832.60
		C		0.000	0.000	139.818	0.000	2340.01
T5	60.00-40.00	A	1.564	0.000	0.000	200.819	0.000	2896.67
		B		0.000	0.000	145.705	0.000	2075.40
		C		0.000	0.000	139.286	0.000	2286.09
T6	40.00-20.00	A	1.486	0.000	0.000	205.668	0.000	2861.73
		B		0.000	0.000	176.811	0.000	2297.69
		C		0.000	0.000	138.512	0.000	2207.87
T7	20.00-0.00	A	1.331	0.000	0.000	139.223	0.000	1826.87

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 lb
		B		0.000	0.000	119.631	0.000	1450.44
		C		0.000	0.000	95.886	0.000	1437.43

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	140.00-120.00	-1.1527	1.6814	-0.9744	1.4024
T2	120.00-100.00	-1.8326	2.3078	-1.4905	1.9961
T3	100.00-80.00	-1.2917	2.9644	-0.9154	2.5721
T4	80.00-60.00	-1.5075	3.5673	-1.1020	3.1583
T5	60.00-40.00	-1.3354	3.9827	-0.8825	3.4136
T6	40.00-20.00	-1.0994	4.4857	-0.6175	3.8833
T7	20.00-0.00	-0.9964	4.4229	-0.6983	4.1684

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.4470
T1	2	LDF4-50A (1/2 FOAM)	120.00 - 140.00	0.6000	0.4470
T1	3	LDF5-50A (7/8 FOAM)	120.00 - 121.00	0.6000	0.4470
T1	18	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.4470
T1	19	LDF7-50A (1-5/8 FOAM)	120.00 - 140.00	0.6000	0.4470
T1	20	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.4470
T1	21	LDF7-50A (1-5/8 FOAM)	120.00 - 133.00	0.6000	0.4470
T1	22	3/4" DC power cable	120.00 - 133.00	0.6000	0.4470
T1	23	3/8" Fiber	120.00 - 133.00	0.6000	0.4470
T1	28	3/4" DC power cable	120.00 - 133.00	0.6000	0.4470
T1	29	3/8" Fiber	120.00 - 133.00	0.6000	0.4470
T2	1	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.5741
T2	2	LDF4-50A (1/2 FOAM)	100.00 - 120.00	0.6000	0.5741
T2	3	LDF5-50A (7/8 FOAM)	100.00 - 120.00	0.6000	0.5741
T2	4	LDF5-50A (7/8 FOAM)	100.00 - 110.00	0.6000	0.5741
T2	5	LDF6-50A (1-1/4 FOAM)	100.00 -	0.6000	0.5741

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			110.00		
T2	6	LDF5-50A (7/8 FOAM)	100.00 - 104.00	0.6000	0.5741
T2	7	LDF6-50A (1-1/4 FOAM)	100.00 - 101.00	0.6000	0.5741
T2	8	LDF6-50A (1-1/4 FOAM)	100.00 - 101.00	0.6000	0.5741
T2	9	LDF7-50A (1-5/8 FOAM)	100.00 - 101.00	0.6000	0.5741
T2	18	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.5741
T2	19	LDF7-50A (1-5/8 FOAM)	100.00 - 120.00	0.6000	0.5741
T2	20	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.5741
T2	21	LDF7-50A (1-5/8 FOAM)	100.00 - 120.00	0.6000	0.5741
T2	22	3/4" DC power cable	100.00 - 120.00	0.6000	0.5741
T2	23	3/8" Fiber	100.00 - 120.00	0.6000	0.5741
T2	28	3/4" DC power cable	100.00 - 120.00	0.6000	0.5741
T2	29	3/8" Fiber	100.00 - 120.00	0.6000	0.5741
T3	1	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T3	2	LDF4-50A (1/2 FOAM)	80.00 - 100.00	0.6000	0.6000
T3	3	LDF5-50A (7/8 FOAM)	80.00 - 100.00	0.6000	0.6000
T3	4	LDF5-50A (7/8 FOAM)	80.00 - 100.00	0.6000	0.6000
T3	5	LDF6-50A (1-1/4 FOAM)	80.00 - 100.00	0.6000	0.6000
T3	6	LDF5-50A (7/8 FOAM)	80.00 - 100.00	0.6000	0.6000
T3	7	LDF6-50A (1-1/4 FOAM)	80.00 - 100.00	0.6000	0.6000
T3	8	LDF6-50A (1-1/4 FOAM)	80.00 - 100.00	0.6000	0.6000
T3	9	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.6000
T3	10	LDF5-50A (7/8 FOAM)	80.00 - 90.00	0.6000	0.6000
T3	18	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T3	19	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.6000
T3	20	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T3	21	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.6000
T3	22	3/4" DC power cable	80.00 - 100.00	0.6000	0.6000
T3	23	3/8" Fiber	80.00 - 100.00	0.6000	0.6000
T3	28	3/4" DC power cable	80.00 - 100.00	0.6000	0.6000
T3	29	3/8" Fiber	80.00 - 100.00	0.6000	0.6000
T4	1	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T4	2	LDF4-50A (1/2 FOAM)	60.00 - 80.00	0.6000	0.6000
T4	3	LDF5-50A (7/8 FOAM)	60.00 - 80.00	0.6000	0.6000
T4	4	LDF5-50A (7/8 FOAM)	60.00 - 80.00	0.6000	0.6000
T4	5	LDF6-50A (1-1/4 FOAM)	60.00 - 80.00	0.6000	0.6000
T4	6	LDF5-50A (7/8 FOAM)	60.00 - 80.00	0.6000	0.6000
T4	7	LDF6-50A (1-1/4 FOAM)	60.00 - 80.00	0.6000	0.6000
T4	8	LDF6-50A (1-1/4 FOAM)	60.00 - 80.00	0.6000	0.6000
T4	9	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.6000
T4	10	LDF5-50A (7/8 FOAM)	60.00 - 80.00	0.6000	0.6000
T4	11	LDF4-50A (1/2 FOAM)	60.00 - 67.00	0.6000	0.6000
T4	12	0 3/4	60.00 - 66.00	0.6000	0.6000
T4	18	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T4	19	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.6000
T4	20	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T4	21	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.6000
T4	22	3/4" DC power cable	60.00 - 80.00	0.6000	0.6000
T4	23	3/8" Fiber	60.00 - 80.00	0.6000	0.6000
T4	24	LDF4P-50A (1/2 FOAM)	60.00 - 80.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T4	28	3/4" DC power cable	60.00 - 80.00	0.6000	0.6000
T4	29	3/8" Fiber	60.00 - 80.00	0.6000	0.6000
T5	1	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T5	2	LDF4-50A (1/2 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	3	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	4	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	5	LDF6-50A (1-1/4 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	6	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	7	LDF6-50A (1-1/4 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	8	LDF6-50A (1-1/4 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	9	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	10	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	11	LDF4-50A (1/2 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	12	0 3/4	40.00 - 60.00	0.6000	0.6000
T5	13	LDF5-50A (7/8 FOAM)	40.00 - 54.00	0.6000	0.6000
T5	14	LDF2-50A (3/8 FOAM)	40.00 - 44.00	0.6000	0.6000
T5	18	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T5	19	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	20	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T5	21	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	22	3/4" DC power cable	40.00 - 60.00	0.6000	0.6000
T5	23	3/8" Fiber	40.00 - 60.00	0.6000	0.6000
T5	24	LDF4P-50A (1/2 FOAM)	40.00 - 60.00	0.6000	0.6000
T5	25	LDF4P-50A (1/2 FOAM)	40.00 - 58.00	0.6000	0.6000
T5	28	3/4" DC power cable	40.00 - 60.00	0.6000	0.6000
T5	29	3/8" Fiber	40.00 - 60.00	0.6000	0.6000
T6	1	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	2	LDF4-50A (1/2 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	3	LDF5-50A (7/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	4	LDF5-50A (7/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	5	LDF6-50A (1-1/4 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	6	LDF5-50A (7/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	7	LDF6-50A (1-1/4 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	8	LDF6-50A (1-1/4 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	9	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	10	LDF5-50A (7/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	11	LDF4-50A (1/2 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	12	0 3/4	20.00 - 40.00	0.6000	0.6000
T6	13	LDF5-50A (7/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	14	LDF2-50A (3/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	15	LDF2-50A (3/8 FOAM)	20.00 - 37.00	0.6000	0.6000
T6	16	LDF4-50A (1/2 FOAM)	20.00 - 37.00	0.6000	0.6000
T6	17	LDF5-50A (7/8 FOAM)	20.00 - 33.00	0.6000	0.6000
T6	18	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	19	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	20	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	21	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	22	3/4" DC power cable	20.00 - 40.00	0.6000	0.6000
T6	23	3/8" Fiber	20.00 - 40.00	0.6000	0.6000
T6	24	LDF4P-50A (1/2 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	25	LDF4P-50A (1/2 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	26	LDF4P-50A (1/2 FOAM)	20.00 - 40.00	0.6000	0.6000
T6	28	3/4" DC power cable	20.00 - 40.00	0.6000	0.6000
T6	29	3/8" Fiber	20.00 - 40.00	0.6000	0.6000
T7	1	Feedline Ladder (Af)	6.00 - 20.00	0.6000	0.6000
T7	2	LDF4-50A (1/2 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	3	LDF5-50A (7/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	4	LDF5-50A (7/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	5	LDF6-50A (1-1/4 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	6	LDF5-50A (7/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	7	LDF6-50A (1-1/4 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	8	LDF6-50A (1-1/4 FOAM)	6.00 - 20.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T7	9	LDF7-50A (1-5/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	10	LDF5-50A (7/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	11	LDF4-50A (1/2 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	12	0 3/4	6.00 - 20.00	0.6000	0.6000
T7	13	LDF5-50A (7/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	14	LDF2-50A (3/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	15	LDF2-50A (3/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	16	LDF4-50A (1/2 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	17	LDF5-50A (7/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	18	Feedline Ladder (Af)	6.00 - 20.00	0.6000	0.6000
T7	19	LDF7-50A (1-5/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	20	Feedline Ladder (Af)	6.00 - 20.00	0.6000	0.6000
T7	21	LDF7-50A (1-5/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	22	3/4" DC power cable	6.00 - 20.00	0.6000	0.6000
T7	23	3/8" Fiber	6.00 - 20.00	0.6000	0.6000
T7	24	LDF4P-50A (1/2 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	25	LDF4P-50A (1/2 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	26	LDF4P-50A (1/2 FOAM)	6.00 - 20.00	0.6000	0.6000
T7	28	3/4" DC power cable	6.00 - 20.00	0.6000	0.6000
T7	29	3/8" Fiber	6.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Flash Beacon Lighting	B	None			0.0000	145.00	No Ice	2.70	2.70	50.00
							1/2" Ice	3.10	3.10	70.00
							1" Ice	3.50	3.50	90.00
Lightning Rod 5/8x4'	A	None			0.0000	143.00	No Ice	0.25	0.25	31.00
							1/2" Ice	0.66	0.66	33.82
							1" Ice	0.97	0.97	39.29
PiROD 13' Rotatable Platform w/handrails (Lattice)	C	None			0.0000	143.00	No Ice	38.90	38.90	2166.00
							1/2" Ice	48.80	48.80	2888.00
							1" Ice	58.70	58.70	3610.00
(2) DB846	A	From Leg	4.00	0.00	0.0000	143.00	No Ice	7.27	7.82	55.55
							1/2" Ice	7.83	9.01	122.93
				0.00			1" Ice	8.35	9.91	198.25
(2) DB846	B	From Leg	4.00	0.00	0.0000	143.00	No Ice	7.27	7.82	55.55
							1/2" Ice	7.83	9.01	122.93
				0.00			1" Ice	8.35	9.91	198.25
(2) DB846	C	From Leg	4.00	0.00	0.0000	143.00	No Ice	7.27	7.82	55.55
							1/2" Ice	7.83	9.01	122.93
				0.00			1" Ice	8.35	9.91	198.25
(2) DB948	A	From Leg	4.00	0.00	0.0000	143.00	No Ice	5.78	5.46	50.55
							1/2" Ice	6.42	6.49	106.49
				0.00			1" Ice	6.94	7.24	168.94
(2) DB948	B	From Leg	4.00	0.00	0.0000	143.00	No Ice	5.78	5.46	50.55
							1/2" Ice	6.42	6.49	106.49
				0.00			1" Ice	6.94	7.24	168.94
(2) DB948	C	From Leg	4.00		0.0000	143.00	No Ice	5.78	5.46	50.55

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 lb
			0.00			1/2" Ice	6.42	6.49	106.49
			0.00			1" Ice	6.94	7.24	168.94
SM502-1	A	From Leg	2.00	0.0000	133.00	No Ice	15.35	14.00	557.70
			0.00			1/2" Ice	21.29	20.81	741.30
			0.00			1" Ice	27.23	27.62	924.90
SM502-1	B	From Leg	2.00	0.0000	133.00	No Ice	15.35	14.00	557.70
			0.00			1/2" Ice	21.29	20.81	741.30
			0.00			1" Ice	27.23	27.62	924.90
SM502-1	C	From Leg	2.00	0.0000	133.00	No Ice	15.35	14.00	557.70
			0.00			1/2" Ice	21.29	20.81	741.30
			0.00			1" Ice	27.23	27.62	924.90
KMW AM-X-CD-14-65-00T	A	From Leg	4.00	0.0000	133.00	No Ice	5.47	4.25	71.90
			0.00			1/2" Ice	5.96	5.06	119.74
			0.00			1" Ice	6.42	5.74	173.71
KMW AM-X-CD-14-65-00T	B	From Leg	4.00	0.0000	133.00	No Ice	5.47	4.25	71.90
			0.00			1/2" Ice	5.96	5.06	119.74
			0.00			1" Ice	6.42	5.74	173.71
KMW AM-X-CD-14-65-00T	C	From Leg	4.00	0.0000	133.00	No Ice	5.47	4.25	71.90
			0.00			1/2" Ice	5.96	5.06	119.74
			0.00			1" Ice	6.42	5.74	173.71
Powerwave 7770.00	A	From Leg	4.00	0.0000	133.00	No Ice	8.30	7.66	89.20
			0.00			1/2" Ice	9.01	8.88	165.07
			0.00			1" Ice	9.67	9.94	248.72
Powerwave 7770.00	B	From Leg	4.00	0.0000	133.00	No Ice	8.30	7.66	89.20
			0.00			1/2" Ice	9.01	8.88	165.07
			0.00			1" Ice	9.67	9.94	248.72
Powerwave 7770.00	C	From Leg	4.00	0.0000	133.00	No Ice	8.30	7.66	89.20
			0.00			1/2" Ice	9.01	8.88	165.07
			0.00			1" Ice	9.67	9.94	248.72
(2) RRUS-11	A	From Leg	4.00	0.0000	133.00	No Ice	2.52	1.07	55.00
			0.00			1/2" Ice	2.72	1.21	74.32
			0.00			1" Ice	2.92	1.36	96.56
(2) RRUS-11	B	From Leg	4.00	0.0000	133.00	No Ice	2.52	1.07	55.00
			0.00			1/2" Ice	2.72	1.21	74.32
			0.00			1" Ice	2.92	1.36	96.56
(2) RRUS-11	C	From Leg	4.00	0.0000	133.00	No Ice	2.52	1.07	55.00
			0.00			1/2" Ice	2.72	1.21	74.32
			0.00			1" Ice	2.92	1.36	96.56
Powerwave TT19-08BP111-001 TMA	A	From Leg	4.00	0.0000	133.00	No Ice	0.55	0.45	16.00
			0.00			1/2" Ice	0.65	0.53	21.80
			0.00			1" Ice	0.75	0.63	29.22
Powerwave TT19-08BP111-001 TMA	B	From Leg	4.00	0.0000	133.00	No Ice	0.55	0.45	16.00
			0.00			1/2" Ice	0.65	0.53	21.80
			0.00			1" Ice	0.75	0.63	29.22
Powerwave TT19-08BP111-001 TMA	C	From Leg	4.00	0.0000	133.00	No Ice	0.55	0.45	16.00
			0.00			1/2" Ice	0.65	0.53	21.80
			0.00			1" Ice	0.75	0.63	29.22
Raycap DC6-48-60-18-8F	A	From Leg	0.50	0.0000	133.00	No Ice	0.83	0.83	22.00
			0.00			1/2" Ice	1.34	1.34	37.91
			0.00			1" Ice	1.52	1.52	56.21
DB212 DiPole	C	From Leg	0.50	0.0000	121.00	No Ice	2.40	2.40	16.00
			0.00			1/2" Ice	5.42	5.42	39.91
			0.00			1" Ice	8.45	8.45	82.37
DB212 DiPole	B	From Leg	0.50	0.0000	119.00	No Ice	2.40	2.40	16.00
			0.00			1/2" Ice	5.42	5.42	39.91
			0.00			1" Ice	8.45	8.45	82.37
DB212 DiPole	B	From Leg	0.50	0.0000	110.00	No Ice	2.40	2.40	16.00

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 lb
			0.00			1/2" Ice	5.42	5.42	39.91
			0.00			1" Ice	8.45	8.45	82.37
SO308-1	B	From Leg	3.00	0.0000	101.00	No Ice	0.98	3.03	53.00
			0.00			1/2" Ice	1.70	5.22	78.75
			0.00			1" Ice	2.42	7.41	104.50
DB540	B	From Leg	6.00	0.0000	110.00	No Ice	4.50	4.50	66.00
			0.00			1/2" Ice	6.33	6.33	99.30
			0.00			1" Ice	8.18	8.18	144.00
DB212 DiPole	B	From Leg	0.50	0.0000	104.00	No Ice	2.40	2.40	16.00
			0.00			1/2" Ice	5.42	5.42	39.91
			0.00			1" Ice	8.45	8.45	82.37
SO308-1	C	From Leg	3.00	0.0000	101.00	No Ice	0.98	3.03	53.00
			0.00			1/2" Ice	1.70	5.22	78.75
			0.00			1" Ice	2.42	7.41	104.50
PD340	C	From Leg	6.00	0.0000	112.50	No Ice	3.38	3.38	40.00
			0.00			1/2" Ice	5.65	5.65	67.65
			0.00			1" Ice	7.93	7.93	109.35
PD340	C	From Leg	6.00	0.0000	89.50	No Ice	3.38	3.38	40.00
			0.00			1/2" Ice	5.65	5.65	67.65
			0.00			1" Ice	7.93	7.93	109.35
SO308-1	A	From Leg	3.00	0.0000	101.00	No Ice	0.98	3.03	53.00
			0.00			1/2" Ice	1.70	5.22	78.75
			0.00			1" Ice	2.42	7.41	104.50
DB810T3	A	From Leg	6.00	0.0000	108.25	No Ice	3.63	3.63	35.00
			0.00			1/2" Ice	5.10	5.10	61.88
			0.00			1" Ice	6.60	6.60	98.03
DB810T3	A	From Leg	6.00	0.0000	93.75	No Ice	3.63	3.63	35.00
			0.00			1/2" Ice	5.10	5.10	61.88
			0.00			1" Ice	6.60	6.60	98.03
(2) PD1121	B	From Leg	6.00	0.0000	101.00	No Ice	0.41	0.41	3.00
			0.00			1/2" Ice	1.52	1.52	11.00
			0.00			1" Ice	2.63	2.63	19.00
DB212 DiPole	C	From Leg	0.50	0.0000	96.00	No Ice	2.40	2.40	16.00
			0.00			1/2" Ice	5.42	5.42	39.91
			0.00			1" Ice	8.45	8.45	82.37
DB212 DiPole	B	From Leg	0.50	0.0000	90.00	No Ice	2.40	2.40	16.00
			0.00			1/2" Ice	5.42	5.42	39.91
			0.00			1" Ice	8.45	8.45	82.37
3" x 60" Dish Pipe Mount	B	From Leg	0.50	0.0000	80.00	No Ice	1.29	1.29	37.90
			0.00			1/2" Ice	1.80	1.80	50.63
			0.00			1" Ice	2.12	2.12	66.93
DB212 DiPole	B	From Leg	0.50	0.0000	68.00	No Ice	2.40	2.40	16.00
			0.00			1/2" Ice	5.42	5.42	39.91
			0.00			1" Ice	8.45	8.45	82.37
Obstruction Light	A	From Leg	1.00	0.0000	67.00	No Ice	0.80	0.80	10.00
			0.00			1/2" Ice	0.94	0.94	21.94
			0.00			1" Ice	1.09	1.09	35.86
Obstruction Light	B	From Leg	1.00	0.0000	67.00	No Ice	0.80	0.80	10.00
			0.00			1/2" Ice	0.94	0.94	21.94
			0.00			1" Ice	1.09	1.09	35.86
CPD Camera	A	From Leg	0.50	0.0000	66.00	No Ice	3.49	3.47	41.00
			0.00			1/2" Ice	3.88	4.06	74.00
			0.00			1" Ice	4.27	4.65	107.00
SO308-1	A	From Leg	3.00	0.0000	54.00	No Ice	0.98	3.03	53.00
			0.00			1/2" Ice	1.70	5.22	78.75
			0.00			1" Ice	2.42	7.41	104.50
PD340	A	From Leg	6.00	0.0000	65.50	No Ice	3.38	3.38	40.00

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 lb
			0.00			1/2" Ice	5.65	5.65	67.65
			0.00			1" Ice	7.93	7.93	109.35
SO308-1	B	From Leg	3.00	0.0000	54.00	No Ice	0.98	3.03	53.00
			0.00			1/2" Ice	1.70	5.22	78.75
			0.00			1" Ice	2.42	7.41	104.50
PD220	B	From Leg	6.00	0.0000	64.00	No Ice	3.56	3.56	23.00
			0.00			1/2" Ice	7.13	7.13	46.00
			0.00			1" Ice	10.70	10.70	69.00
PD220	B	From Leg	6.00	0.0000	44.00	No Ice	3.56	3.56	23.00
			0.00			1/2" Ice	7.13	7.13	46.00
			0.00			1" Ice	10.70	10.70	69.00
3" x 60" Dish Pipe Mount	A	From Leg	0.50	0.0000	58.00	No Ice	1.33	1.33	37.90
			0.00			1/2" Ice	1.80	1.80	50.63
			0.00			1" Ice	2.12	2.12	66.93
SO312-1	A	From Leg	2.00	0.0000	44.00	No Ice	2.97	4.03	70.00
			0.00			1/2" Ice	4.39	6.12	106.38
			0.00			1" Ice	5.81	8.21	142.76
18"x12" Panel	A	From Leg	4.00	0.0000	44.00	No Ice	1.80	0.51	20.00
			0.00			1/2" Ice	1.97	0.63	31.02
			0.00			1" Ice	2.15	0.75	44.37
3" x 60" Dish Pipe Mount	B	From Leg	0.50	0.0000	40.00	No Ice	1.37	1.37	37.90
			0.00			1/2" Ice	1.80	1.80	50.63
			0.00			1" Ice	2.12	2.12	66.93
SO312-1	A	From Leg	2.00	0.0000	37.00	No Ice	2.97	4.03	70.00
			0.00			1/2" Ice	4.39	6.12	106.38
			0.00			1" Ice	5.81	8.21	142.76
18"x12" Panel	A	From Leg	4.00	0.0000	37.00	No Ice	1.80	0.51	20.00
			0.00			1/2" Ice	1.97	0.63	31.02
			0.00			1" Ice	2.15	0.75	44.37
SO308-1	C	From Leg	3.00	0.0000	33.00	No Ice	0.98	3.03	53.00
			0.00			1/2" Ice	1.70	5.22	78.75
			0.00			1" Ice	2.42	7.41	104.50
(2) BA1012	C	From Leg	6.00	0.0000	40.00	No Ice	0.25	0.25	2.00
			0.00			1/2" Ice	0.36	0.36	5.08
			0.00			1" Ice	0.47	0.47	9.38
Proposed									
Quintel QS66512-2	A	From Leg	4.00	0.0000	133.00	No Ice	8.37	8.46	151.55
			0.00			1/2" Ice	8.93	9.66	227.24
			0.00			1" Ice	9.46	10.55	311.07
Quintel QS66512-2	B	From Leg	4.00	0.0000	133.00	No Ice	8.37	8.46	151.55
			0.00			1/2" Ice	8.93	9.66	227.24
			0.00			1" Ice	9.46	10.55	311.07
Quintel QS66512-2	C	From Leg	4.00	0.0000	133.00	No Ice	8.37	8.46	151.55
			0.00			1/2" Ice	8.93	9.66	227.24
			0.00			1" Ice	9.46	10.55	311.07
RRUS-32 B30	A	From Leg	4.00	0.0000	133.00	No Ice	2.74	1.67	60.00
			0.00			1/2" Ice	2.96	1.86	81.11
			0.00			1" Ice	3.19	2.05	105.42
RRUS-32 B30	B	From Leg	4.00	0.0000	133.00	No Ice	2.74	1.67	60.00
			0.00			1/2" Ice	2.96	1.86	81.11
			0.00			1" Ice	3.19	2.05	105.42
RRUS-32 B30	C	From Leg	4.00	0.0000	133.00	No Ice	2.74	1.67	60.00
			0.00			1/2" Ice	2.96	1.86	81.11
			0.00			1" Ice	3.19	2.05	105.42
Raycap DC6-48-60-18-8F	B	From Leg	0.50	0.0000	133.00	No Ice	0.83	0.83	22.00
			0.00			1/2" Ice	1.34	1.34	37.91
			0.00			1" Ice	1.52	1.52	56.21

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
3' Dish w/ Radome	B	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		80.00	3.00	No Ice 1/2" Ice 1" Ice	7.07 7.47 7.86	45.00 83.35 121.69
3' HP Dish	A	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	0.0000		58.00	3.00	No Ice 1/2" Ice 1" Ice	7.07 7.47 7.86	50.00 88.35 126.69
2' Dish w/o Radome	A	Paraboloid w/o Radome	From Leg	1.00 0.00 0.00	0.0000		44.00	2.00	No Ice 1/2" Ice 1" Ice	3.14 3.41 3.68	40.00 57.50 75.01
3' Dish w/ Radome	B	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		40.00	3.00	No Ice 1/2" Ice 1" Ice	7.07 7.47 7.86	45.00 83.35 121.69
2' Dish w/o Radome	A	Paraboloid w/o Radome	From Leg	1.00 0.00 0.00	0.0000		37.00	2.00	No Ice 1/2" Ice 1" Ice	3.14 3.41 3.68	40.00 57.50 75.01

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	8724.29					
Bracing Weight	6648.92					
Total Member Self-Weight	15373.22			7183.68	1301.69	
Total Weight	29577.63			7183.68	1301.69	
Wind 0 deg - No Ice		-45.39	-39442.30	-3207115.36	3708.80	821.67
Wind 30 deg - No Ice		17276.13	-30196.56	-2493652.05	-1433884.09	3041.50
Wind 60 deg - No Ice		30909.10	-17997.51	-1477531.13	-2556096.66	4559.71
Wind 90 deg - No Ice		34646.23	-17.63	5840.80	-2857117.12	4718.84
Wind 120 deg - No Ice		33879.75	19983.18	1622033.87	-2762137.06	5186.24
Wind 150 deg - No Ice		19699.61	34563.07	2836279.37	-1620224.50	2795.49
Wind 180 deg - No Ice		-15.53	37852.48	3120240.08	2638.58	-744.73
Wind 210 deg - No Ice		-17312.30	30330.86	2513231.56	1440209.34	-3685.17
Wind 240 deg - No Ice		-32384.30	19067.37	1553895.00	2651534.70	-5708.09
Wind 270 deg - No Ice		-34764.11	-34.10	5594.06	2866965.32	-4922.81
Wind 300 deg - No Ice		-32593.14	-18951.86	-1548038.51	2683496.18	-4114.80
Wind 330 deg - No Ice		-19820.88	-34474.00	-2819479.08	1628781.91	-1947.85
Member Ice	20729.59					
Total Weight Ice	103119.64			57169.17	15206.01	
Wind 0 deg - Ice		-8.18	-13623.04	-1031333.59	15503.39	1477.27
Wind 30 deg - Ice		6190.80	-10761.44	-809030.62	-483734.06	2457.86
Wind 60 deg - Ice		10259.56	-5946.12	-421784.85	-812109.08	2688.24
Wind 90 deg - Ice		12439.35	-4.74	56697.45	-981942.10	2400.09
Wind 120 deg - Ice		11793.49	6889.14	602931.47	-924022.47	1681.45
Wind 150 deg - Ice		6950.89	12118.54	1023374.58	-540507.22	221.46
Wind 180 deg - Ice		-4.28	13394.16	1131488.73	15675.83	-1443.66

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 210 deg - Ice		-6197.14	10790.88	924514.24	514866.13	-2599.09
Wind 240 deg - Ice		-10478.44	6120.45	545688.51	855881.54	-2907.09
Wind 270 deg - Ice		-12463.47	-5.90	57038.63	1013838.67	-2441.74
Wind 300 deg - Ice		-11613.19	-6722.70	-479513.13	943449.06	-1496.20
Wind 330 deg - Ice		-6976.77	-12098.35	-908460.46	572181.89	-38.58
Total Weight	29577.63			7183.68	1301.69	
Wind 0 deg - Service		-11.35	-9860.57	-806188.28	-983.96	205.42
Wind 30 deg - Service		4319.03	-7549.14	-627822.45	-360382.18	760.37
Wind 60 deg - Service		7727.27	-4499.38	-373792.22	-640935.32	1139.93
Wind 90 deg - Service		8661.56	-4.41	-2949.24	-716190.44	1179.71
Wind 120 deg - Service		8469.94	4995.80	401099.03	-692445.42	1296.56
Wind 150 deg - Service		4924.90	8640.77	704660.40	-406967.28	698.87
Wind 180 deg - Service		-3.88	9463.12	775650.58	-1251.51	-186.18
Wind 210 deg - Service		-4328.08	7582.72	623898.45	358141.18	-921.29
Wind 240 deg - Service		-8096.07	4766.84	384064.31	660972.52	-1427.02
Wind 270 deg - Service		-8691.03	-8.52	-3010.93	714830.17	-1230.70
Wind 300 deg - Service		-8148.29	-4737.97	-391419.07	668962.89	-1028.70
Wind 330 deg - Service		-4955.22	-8618.50	-709279.21	405284.32	-486.96

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

Comb. No.	Description
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
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 lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	140 - 120	Leg	Max Tension	15	57451.61	-179.91	-9.30
			Max. Compression	18	-63242.05	173.01	11.72
			Max. Mx	22	17835.73	905.28	5.00
			Max. My	4	-2621.53	-13.05	987.29
			Max. Vy	22	1638.42	-727.81	5.00
			Max. Vx	20	-1769.77	-0.00	0.00
		Diagonal	Max Tension	8	5965.91	36.26	-10.81
			Max. Compression	8	-6145.24	0.00	0.00
			Max. Mx	18	4756.13	64.03	2.48
			Max. My	8	-6091.65	-33.13	-17.28
			Max. Vy	18	-27.94	64.03	2.48
			Max. Vx	8	7.03	0.00	0.00
		Top Girt	Max Tension	2	993.31	0.00	0.00
			Max. Compression	14	-1138.27	0.00	0.00
			Max. Mx	33	-206.00	-10.61	0.00
			Max. My	29	83.55	0.00	0.31
			Max. Vy	33	-16.97	0.00	0.00
			Max. Vx	29	-0.50	0.00	0.00
T2	120 - 100	Leg	Max Tension	15	109759.25	-277.92	-18.96
			Max. Compression	18	-118655.11	400.04	21.38
			Max. Mx	2	-118071.13	400.72	-4.49
			Max. My	16	-4251.05	-3.67	431.37
			Max. Vy	18	-154.44	336.31	53.80
			Max. Vx	24	-263.29	-8.83	358.45
		Diagonal	Max Tension	8	5744.93	0.00	0.00
			Max. Compression	8	-5916.82	0.00	0.00
			Max. Mx	18	4286.76	53.69	2.09
			Max. My	22	-4386.59	-18.47	4.74
			Max. Vy	35	-29.75	33.24	2.75
			Max. Vx	35	-1.74	0.00	0.00
T3	100 - 80	Leg	Max Tension	15	156172.08	-495.99	-11.66
			Max. Compression	18	-168555.46	756.90	-4.66
			Max. Mx	10	-168267.32	757.18	-19.40
			Max. My	12	-5612.33	-5.15	-798.51
			Max. Vy	6	-150.36	-534.69	17.44
			Max. Vx	12	-258.14	-5.78	-586.40

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
		Diagonal	Max Tension	8	7136.69	0.00	0.00
			Max. Compression	8	-7367.26	0.00	0.00
			Max. Mx	18	5372.69	43.19	1.00
			Max. My	22	-6099.74	-5.53	5.40
			Max. Vy	33	35.78	38.37	-4.57
			Max. Vx	31	2.05	0.00	0.00
T4	80 - 60	Leg	Max Tension	15	199599.89	-877.47	37.67
			Max. Compression	18	-215885.68	1105.43	-6.16
			Max. Mx	14	198393.64	-1122.34	32.54
			Max. My	16	-6693.08	3.06	1225.15
			Max. Vy	22	-198.57	-738.82	20.90
			Max. Vx	18	232.63	-384.61	666.65
		Diagonal	Max Tension	20	8873.70	0.00	0.00
			Max. Compression	20	-9200.85	0.00	0.00
			Max. Mx	18	6477.14	73.54	2.50
			Max. My	35	-67.13	63.03	9.43
			Max. Vy	33	51.41	69.50	8.68
			Max. Vx	35	-2.92	0.00	0.00
T5	60 - 40	Leg	Max Tension	15	244114.26	-1184.12	21.38
			Max. Compression	18	-264937.81	1638.18	-81.65
			Max. Mx	18	-264937.81	1638.18	-81.65
			Max. My	16	-8099.14	-15.31	1583.56
			Max. Vy	19	-239.45	1438.85	-44.47
			Max. Vx	16	250.58	-15.31	1583.56
		Diagonal	Max Tension	20	9724.03	0.00	0.00
			Max. Compression	20	-10079.61	0.00	0.00
			Max. Mx	35	1841.99	90.77	-10.38
			Max. My	35	-218.24	84.78	11.79
			Max. Vy	33	59.36	90.24	11.44
			Max. Vx	35	3.23	0.00	0.00
T6	40 - 20	Leg	Max Tension	15	288551.92	-1011.79	-5.06
			Max. Compression	18	-314581.02	2439.22	32.03
			Max. Mx	2	-313843.32	2441.60	-1.40
			Max. My	16	-8832.61	44.46	1410.58
			Max. Vy	29	513.28	-2252.19	-13.89
			Max. Vx	12	-199.40	9.86	-1338.20
		Diagonal	Max Tension	20	10847.99	0.00	0.00
			Max. Compression	20	-11153.58	0.00	0.00
			Max. Mx	35	1671.67	128.17	-14.10
			Max. My	34	-1839.29	114.74	15.85
			Max. Vy	33	74.37	110.42	14.07
			Max. Vx	34	-3.96	0.00	0.00
T7	20 - 0	Leg	Max Tension	15	326867.66	-2184.02	-10.77
			Max. Compression	18	-357209.29	0.00	0.10
			Max. Mx	35	-104385.67	2526.75	-45.43
			Max. My	12	-12112.87	-155.29	-5402.11
			Max. Vy	29	-432.80	-2252.19	-13.89
			Max. Vx	12	-696.90	-155.30	-5402.11
		Diagonal	Max Tension	21	12704.41	0.00	0.00
			Max. Compression	20	-13329.72	0.00	0.00
			Max. Mx	33	568.66	204.24	-21.75
			Max. My	20	-12458.75	-24.16	40.38
			Max. Vy	33	90.16	204.24	-21.75
			Max. Vx	20	-5.53	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	18	369513.53	33806.28	-19215.14
	Max. H_x	18	369513.53	33806.28	-19215.14
	Max. H_z	5	-302948.08	-27329.99	17869.53
	Min. Vert	7	-335340.31	-31226.40	17759.31
	Min. H_x	7	-335340.31	-31226.40	17759.31
	Min. H_z	18	369513.53	33806.28	-19215.14
Leg B	Max. Vert	10	369370.16	-33799.64	-19248.67
	Max. H_x	23	-336769.97	31377.07	17875.09
	Max. H_z	25	-304351.54	27457.62	18022.32
	Min. Vert	23	-336769.97	31377.07	17875.09
	Min. H_x	10	369370.16	-33799.64	-19248.67
	Min. H_z	10	369370.16	-33799.64	-19248.67
Leg A	Max. Vert	2	368783.55	48.48	38914.93
	Max. H_x	21	8599.50	3613.88	570.58
	Max. H_z	2	368783.55	48.48	38914.93
	Min. Vert	15	-337471.63	-42.00	-36187.76
	Min. H_x	9	8572.23	-3611.71	557.26
	Min. H_z	15	-337471.63	-42.00	-36187.76

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	29577.63	0.00	-0.00	7184.04	1302.09	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	35493.15	-72.63	-63168.80	-5162469.84	5433.78	1296.47
0.9 Dead+1.6 Wind 0 deg - No Ice	26619.86	-72.63	-63168.80	-5158471.23	5036.55	1300.78
1.2 Dead+1.6 Wind 30 deg - No Ice	35493.15	31470.59	-54946.14	-4522772.42	-2600799.05	4928.59
0.9 Dead+1.6 Wind 30 deg - No Ice	26619.86	31470.59	-54946.15	-4519527.42	-2598066.48	4920.76
1.2 Dead+1.6 Wind 60 deg - No Ice	35493.15	52011.39	-30272.20	-2495423.90	-4312930.65	7363.20
0.9 Dead+1.6 Wind 60 deg - No Ice	26619.86	52011.39	-30272.20	-2494586.37	-4308116.99	7346.23
1.2 Dead+1.6 Wind 90 deg - No Ice	35493.15	63184.34	-28.21	6524.55	-5219262.93	7608.95
0.9 Dead+1.6 Wind 90 deg - No Ice	26619.86	63184.34	-28.21	4354.03	-5213399.25	7586.23
1.2 Dead+1.6 Wind 120 deg - No Ice	35493.15	54359.44	32060.76	2615987.64	-4460561.89	8381.90
0.9 Dead+1.6 Wind 120 deg - No Ice	26619.86	54359.44	32060.76	2610713.84	-4455616.11	8360.18
1.2 Dead+1.6 Wind 150 deg - No Ice	35493.15	31519.38	55300.93	4556508.49	-2605070.80	4564.24
0.9 Dead+1.6 Wind 150 deg - No Ice	26619.86	31519.38	55300.93	4548899.39	-2602342.17	4548.83
1.2 Dead+1.6 Wind 180 deg - No Ice	35493.15	-24.84	60625.09	5017257.40	3718.13	-1173.89
0.9 Dead+1.6 Wind 180 deg - No Ice	26619.86	-24.84	60625.09	5009056.40	3321.78	-1178.08
1.2 Dead+1.6 Wind 210 deg - No Ice	35493.15	-31528.46	55161.03	4548498.47	2609842.11	-5955.83
0.9 Dead+1.6 Wind 210 deg - No Ice	26619.86	-31528.46	55161.03	4540895.15	2606322.82	-5947.96

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
1.2 Dead+1.6 Wind 240 deg - No Ice	35493.15	-54371.70	31983.98	2612316.33	4465075.87	-9198.68
0.9 Dead+1.6 Wind 240 deg - No Ice	26619.86	-54371.70	31983.98	2607045.26	4459339.88	-9181.27
1.2 Dead+1.6 Wind 270 deg - No Ice	35493.15	-63372.96	-54.56	6130.00	5234028.48	-7935.49
0.9 Dead+1.6 Wind 270 deg - No Ice	26619.86	-63372.96	-54.56	3959.73	5227367.61	-7912.76
1.2 Dead+1.6 Wind 300 deg - No Ice	35493.15	-52300.88	-30410.65	-2502889.64	4333299.69	-6669.15
0.9 Dead+1.6 Wind 300 deg - No Ice	26619.86	-52300.88	-30410.65	-2502047.01	4327684.95	-6647.95
1.2 Dead+1.6 Wind 330 deg - No Ice	35493.15	-31713.42	-55158.40	-4535235.99	2617844.73	-3210.65
0.9 Dead+1.6 Wind 330 deg - No Ice	26619.86	-31713.41	-55158.40	-4531982.41	2614313.37	-3195.25
1.2 Dead+1.0 Ice+1.0 Temp	109035.16	0.00	-0.00	59500.55	15776.33	-0.31
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	109035.16	-8.18	-13721.65	-1050927.94	16098.31	1434.25
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	109035.16	6947.64	-12072.31	-918235.52	-547574.34	2481.09
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	109035.16	11636.97	-6741.38	-488621.26	-931432.99	2771.60
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	109035.16	13923.34	-4.74	59094.66	-1112636.49	2523.59
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	109035.16	11853.18	6923.60	617549.84	-944560.53	1808.51
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	109035.16	6950.89	12118.54	1039357.10	-547740.99	320.89
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	109035.16	-4.28	13492.77	1155717.10	16279.58	-1401.11
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	109035.16	-6953.97	12101.76	1038522.44	579902.86	-2623.48
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	109035.16	-11855.86	6915.70	617417.32	976543.56	-2991.17
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	109035.16	-13947.46	-5.90	59435.90	1145739.94	-2565.19
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	109035.16	-11672.88	-6757.16	-489244.62	965057.13	-1622.18
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	109035.16	-6976.77	-12098.35	-919646.18	580621.16	-137.82
Dead+Wind 0 deg - Service	29577.63	-11.35	-9870.12	-800186.63	1911.49	203.00
Dead+Wind 30 deg - Service	29577.63	4917.28	-8585.33	-700306.57	-405010.04	761.90
Dead+Wind 60 deg - Service	29577.63	8126.78	-4730.03	-383760.26	-672328.93	1148.71
Dead+Wind 90 deg - Service	29577.63	9872.55	-4.41	6880.88	-813850.65	1194.79
Dead+Wind 120 deg - Service	29577.63	8493.66	5009.49	414312.15	-695395.47	1307.89
Dead+Wind 150 deg - Service	29577.63	4924.90	8640.77	717297.22	-405687.31	704.52
Dead+Wind 180 deg - Service	29577.63	-3.88	9472.67	789229.22	1643.46	-183.84
Dead+Wind 210 deg - Service	29577.63	-4926.32	8618.91	716046.61	408557.80	-922.74
Dead+Wind 240 deg - Service	29577.63	-8495.58	4997.50	413739.17	698226.33	-1435.95
Dead+Wind 270 deg - Service	29577.63	-9902.02	-8.52	6819.10	818282.97	-1245.80
Dead+Wind 300 deg - Service	29577.63	-8172.01	-4751.66	-384926.77	677636.18	-1039.86
Dead+Wind 330 deg - Service	29577.63	-4955.22	-8618.50	-702253.65	409797.84	-492.70

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-29577.63	-0.00	-0.00	29577.63	0.00	0.000%
2	-72.63	-35493.15	-63168.80	72.63	35493.15	63168.80	0.000%
3	-72.63	-26619.86	-63168.80	72.63	26619.86	63168.80	0.000%
4	31470.58	-35493.15	-54946.14	-31470.59	35493.15	54946.14	0.000%
5	31470.58	-26619.86	-54946.14	-31470.59	26619.86	54946.15	0.000%
6	52011.39	-35493.15	-30272.20	-52011.39	35493.15	30272.20	0.000%
7	52011.39	-26619.86	-30272.20	-52011.39	26619.86	30272.20	0.000%
8	63184.33	-35493.15	-28.21	-63184.34	35493.15	28.21	0.000%
9	63184.33	-26619.86	-28.21	-63184.34	26619.86	28.21	0.000%
10	54359.44	-35493.15	32060.76	-54359.44	35493.15	-32060.76	0.000%
11	54359.44	-26619.86	32060.76	-54359.44	26619.86	-32060.76	0.000%
12	31519.38	-35493.15	55300.92	-31519.38	35493.15	-55300.93	0.000%
13	31519.38	-26619.86	55300.92	-31519.38	26619.86	-55300.93	0.000%
14	-24.84	-35493.15	60625.09	24.84	35493.15	-60625.09	0.000%
15	-24.84	-26619.86	60625.09	24.84	26619.86	-60625.09	0.000%
16	-31528.47	-35493.15	55161.02	31528.46	35493.15	-55161.03	0.000%
17	-31528.47	-26619.86	55161.02	31528.46	26619.86	-55161.03	0.000%
18	-54371.70	-35493.15	31983.98	54371.70	35493.15	-31983.98	0.000%
19	-54371.70	-26619.86	31983.98	54371.70	26619.86	-31983.98	0.000%
20	-63372.95	-35493.15	-54.55	63372.96	35493.15	54.56	0.000%
21	-63372.95	-26619.86	-54.55	63372.96	26619.86	54.56	0.000%
22	-52300.87	-35493.15	-30410.64	52300.88	35493.15	30410.65	0.000%
23	-52300.87	-26619.86	-30410.64	52300.88	26619.86	30410.65	0.000%
24	-31713.40	-35493.15	-55158.40	31713.42	35493.15	55158.40	0.000%
25	-31713.40	-26619.86	-55158.40	31713.41	26619.86	55158.40	0.000%
26	0.00	-109035.16	-0.00	-0.00	109035.16	0.00	0.000%
27	-8.18	-109035.16	-13721.65	8.18	109035.16	13721.65	0.000%
28	6947.64	-109035.16	-12072.32	-6947.64	109035.16	12072.31	0.000%
29	11636.98	-109035.16	-6741.38	-11636.97	109035.16	6741.38	0.000%
30	13923.34	-109035.16	-4.74	-13923.34	109035.16	4.74	0.000%
31	11853.18	-109035.16	6923.60	-11853.18	109035.16	-6923.60	0.000%
32	6950.89	-109035.16	12118.54	-6950.89	109035.16	-12118.54	0.000%
33	-4.28	-109035.16	13492.77	4.28	109035.16	-13492.77	0.000%
34	-6953.97	-109035.16	12101.76	6953.97	109035.16	-12101.76	0.000%
35	-11855.86	-109035.16	6915.70	11855.86	109035.16	-6915.70	0.000%
36	-13947.46	-109035.16	-5.90	13947.46	109035.16	5.90	0.000%
37	-11672.88	-109035.16	-6757.16	11672.88	109035.16	6757.16	0.000%
38	-6976.77	-109035.16	-12098.35	6976.77	109035.16	12098.35	0.000%
39	-11.35	-29577.63	-9870.12	11.35	29577.63	9870.12	0.000%
40	4917.28	-29577.63	-8585.33	-4917.28	29577.63	8585.33	0.000%
41	8126.78	-29577.63	-4730.03	-8126.78	29577.63	4730.03	0.000%
42	9872.55	-29577.63	-4.41	-9872.55	29577.63	4.41	0.000%
43	8493.66	-29577.63	5009.49	-8493.66	29577.63	-5009.49	0.000%
44	4924.90	-29577.63	8640.77	-4924.90	29577.63	-8640.77	0.000%
45	-3.88	-29577.63	9472.67	3.88	29577.63	-9472.67	0.000%
46	-4926.32	-29577.63	8618.91	4926.32	29577.63	-8618.91	0.000%
47	-8495.58	-29577.63	4997.50	8495.58	29577.63	-4997.50	0.000%
48	-9902.02	-29577.63	-8.52	9902.02	29577.63	8.52	0.000%
49	-8172.01	-29577.63	-4751.66	8172.01	29577.63	4751.66	0.000%
50	-4955.22	-29577.63	-8618.50	4955.22	29577.63	8618.50	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001

2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000186
5	Yes	4	0.00000001	0.00000180
6	Yes	4	0.00000001	0.00000077
7	Yes	4	0.00000001	0.00000073
8	Yes	4	0.00000001	0.00000164
9	Yes	4	0.00000001	0.00000162
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000193
13	Yes	4	0.00000001	0.00000185
14	Yes	4	0.00000001	0.00000077
15	Yes	4	0.00000001	0.00000073
16	Yes	4	0.00000001	0.00000188
17	Yes	4	0.00000001	0.00000182
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000164
21	Yes	4	0.00000001	0.00000162
22	Yes	4	0.00000001	0.00000079
23	Yes	4	0.00000001	0.00000074
24	Yes	4	0.00000001	0.00000192
25	Yes	4	0.00000001	0.00000183
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00001324
28	Yes	4	0.00000001	0.00001343
29	Yes	4	0.00000001	0.00001363
30	Yes	4	0.00000001	0.00001372
31	Yes	4	0.00000001	0.00001374
32	Yes	4	0.00000001	0.00001414
33	Yes	4	0.00000001	0.00001434
34	Yes	4	0.00000001	0.00001424
35	Yes	4	0.00000001	0.00001398
36	Yes	4	0.00000001	0.00001405
37	Yes	4	0.00000001	0.00001399
38	Yes	4	0.00000001	0.00001368
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		*°*	*°*
T1	140 - 120	3.508	46	0.2685	0.0092
T2	120 - 100	2.441	46	0.2249	0.0082
T3	100 - 80	1.605	46	0.1652	0.0058
T4	80 - 60	0.990	46	0.1188	0.0039
T5	60 - 40	0.548	46	0.0833	0.0026

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T6	40 - 20	0.246	44	0.0502	0.0015
T7	20 - 0	0.068	44	0.0234	0.0007

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.00	Flash Beacon Lighting	46	3.508	0.2685	0.0092	65670
143.00	Lightning Rod 5/8x4'	46	3.508	0.2685	0.0092	65670
133.00	SM502-1	46	3.119	0.2548	0.0089	46907
121.00	DB212 DiPole	46	2.490	0.2276	0.0082	17787
119.00	DB212 DiPole	46	2.393	0.2222	0.0081	17106
112.50	PD340	46	2.097	0.2031	0.0074	18233
110.00	DB212 DiPole	46	1.991	0.1954	0.0071	18931
108.25	DB810T3	46	1.919	0.1900	0.0069	19452
104.00	DB212 DiPole	46	1.753	0.1769	0.0063	20845
101.00	SO308-1	46	1.641	0.1680	0.0059	21881
96.00	DB212 DiPole	46	1.466	0.1544	0.0054	23272
93.75	DB810T3	46	1.392	0.1487	0.0051	23825
90.00	DB212 DiPole	46	1.273	0.1398	0.0047	24805
89.50	PD340	46	1.258	0.1386	0.0046	24942
80.00	3' Dish w/ Radome	46	0.990	0.1188	0.0039	27813
68.00	DB212 DiPole	46	0.706	0.0970	0.0031	31760
67.00	Obstruction Light	46	0.685	0.0952	0.0030	32134
66.00	CPD Camera	46	0.664	0.0935	0.0030	32518
65.50	PD340	46	0.654	0.0927	0.0029	32713
64.00	PD220	46	0.624	0.0901	0.0028	33312
58.00	3' HP Dish	46	0.512	0.0798	0.0025	35471
54.00	SO308-1	44	0.444	0.0730	0.0022	36519
44.00	2' Dish w/o Radome	44	0.296	0.0564	0.0017	39309
40.00	3' Dish w/ Radome	44	0.246	0.0502	0.0015	40049
37.00	2' Dish w/o Radome	44	0.211	0.0458	0.0014	39660
33.00	SO308-1	44	0.169	0.0401	0.0012	38597

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	140 - 120	22.285	12	1.7032	0.0588
T2	120 - 100	15.520	12	1.4269	0.0523
T3	100 - 80	10.215	12	1.0485	0.0373
T4	80 - 60	6.305	12	0.7547	0.0252
T5	60 - 40	3.492	12	0.5298	0.0165
T6	40 - 20	1.567	12	0.3196	0.0099
T7	20 - 0	0.433	12	0.1490	0.0042

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.00	Flash Beacon Lighting	12	22.285	1.7032	0.0588	10377
143.00	Lightning Rod 5/8x4'	12	22.285	1.7032	0.0588	10377
133.00	SM502-1	12	19.823	1.6164	0.0573	7412
121.00	DB212 DiPole	12	15.830	1.4437	0.0528	2810
119.00	DB212 DiPole	12	15.215	1.4096	0.0517	2703
112.50	PD340	12	13.340	1.2887	0.0473	2881
110.00	DB212 DiPole	12	12.667	1.2399	0.0454	2992
108.25	DB810T3	12	12.210	1.2054	0.0440	3075
104.00	DB212 DiPole	12	11.151	1.1227	0.0405	3296
101.00	SO308-1	12	10.444	1.0666	0.0381	3460
96.00	DB212 DiPole	12	9.333	0.9800	0.0343	3680
93.75	DB810T3	12	8.860	0.9440	0.0327	3767
90.00	DB212 DiPole	12	8.107	0.8876	0.0301	3921
89.50	PD340	12	8.010	0.8803	0.0298	3942
80.00	3' Dish w/ Radome	12	6.305	0.7547	0.0252	4393
68.00	DB212 DiPole	12	4.500	0.6166	0.0198	5012
67.00	Obstruction Light	12	4.366	0.6057	0.0194	5070
66.00	CPD Camera	12	4.234	0.5948	0.0190	5128
65.50	PD340	12	4.169	0.5894	0.0187	5158
64.00	PD220	12	3.978	0.5731	0.0181	5248
58.00	3' HP Dish	12	3.262	0.5081	0.0157	5576
54.00	SO308-1	12	2.829	0.4647	0.0143	5739
44.00	2' Dish w/o Radome	12	1.888	0.3592	0.0111	6173
40.00	3' Dish w/ Radome	12	1.567	0.3196	0.0099	6288
37.00	2' Dish w/o Radome	12	1.346	0.2913	0.0090	6228
33.00	SO308-1	12	1.079	0.2554	0.0078	6063

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	140	Leg	A325X	0.7500	4	14362.90	29820.60	0.482	1	Bolt Tension
		Diagonal	A325X	0.6250	1	5965.91	9107.81	0.655	1	Member Block Shear
		Top Girt	A325N	0.6250	1	993.31	9107.81	0.109	1	Member Block Shear
T2	120	Leg	A325X	0.8750	4	27440.70	40589.10	0.676	1	Bolt Tension
		Diagonal	A325X	0.6250	1	5744.93	9107.81	0.631	1	Member Block Shear
T3	100	Leg	A325X	1.0000	4	39043.00	53014.40	0.736	1	Bolt Tension
		Diagonal	A325X	0.6250	1	7136.69	9107.81	0.784	1	Member Block Shear
T4	80	Leg	A325X	1.0000	6	33266.60	53014.40	0.628	1	Bolt Tension
		Diagonal	A325X	0.6250	1	8873.70	10440.00	0.850	1	Member Bearing
T5	60	Leg	A325X	1.0000	6	40685.70	53014.40	0.767	1	Bolt Tension
		Diagonal	A325X	0.6250	1	9724.03	10440.00	0.931	1	Member Bearing
T6	40	Leg	A325X	1.0000	8	36069.00	53014.40	0.680	1	Bolt Tension
		Diagonal	A325X	0.6250	1	10848.00	11700.00	0.927	1	Member Bearing
T7	20	Diagonal	A325X	0.7500	1	12704.40	14137.50	0.899	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	ROHN 2.5 EH	20.03	4.01	52.0 K=1.00	2.2535	-63242.10	83196.20	0.760 [1]
T2	120 - 100	ROHN 3 EH	20.03	4.01	42.3 K=1.00	3.0159	-118655.00	119063.00	0.997 [1]
T3	100 - 80	ROHN 4 EH	20.03	5.01	40.7 K=1.00	4.4074	-168555.00	175711.00	0.959 [1]
T4	80 - 60	ROHN 5 EH	20.03	6.68	43.6 K=1.00	6.1120	-215886.00	239388.00	0.902 [1]
T5	60 - 40	ROHN 6 EHS	20.03	6.68	36.0 K=1.00	6.7133	-264938.00	274767.00	0.964 [1]
T6	40 - 20	ROHN 6 EH	20.04	6.68	36.5 K=1.00	8.4049	-314581.00	343094.00	0.917 [1]
T7	20 - 0	ROHN 8 EHS	20.03	10.02	41.2 K=1.00	9.7193	-357209.00	386390.00	0.924 [1]

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L2x2x1/4	5.32	2.53	88.3 K=1.14	0.9380	-6145.24	20164.00	0.305 [1]
T2	120 - 100	L2x2x1/4	7.51	3.58	112.5 K=1.02	0.9380	-5916.82	15606.10	0.379 [1]
T3	100 - 80	L2x2x1/4	9.70	4.66	143.0 K=1.00	0.9380	-7367.26	10368.80	0.711 [1]
T4	80 - 60	L2 1/2x2 1/2x1/4	12.21	5.91	144.4 K=1.00	1.1900	-9200.85	12893.70	0.714 [1]
T5	60 - 40	L2 1/2x2 1/2x1/4	13.96	6.74	164.7 K=1.00	1.1900	-10079.60	9908.19	1.017 [1]
T6	40 - 20	4.8.1 (1.02 CR) - 121 L3x3x1/4	15.79	7.66	155.3 K=1.00	1.4400	-11153.60	13492.60	0.827 [1]
T7	20 - 0	L3 1/2x3 1/2x1/4	19.03	9.26	160.1 K=1.00	1.6900	-13329.70	14898.90	0.895 [1]

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L2x2x1/4	2.50	2.02	91.0 K=1.47	0.9380	-1138.27	19650.60	0.058 [1]

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	ROHN 2.5 EH	20.03	4.01	52.0	2.2535	57451.60	101409.00	0.567 [1]
T2	120 - 100	ROHN 3 EH	20.03	4.01	42.3	3.0159	109763.00	135717.00	0.809 [1]
T3	100 - 80	ROHN 4 EH	20.03	5.01	40.7	4.4074	156172.00	198335.00	0.787 [1]
T4	80 - 60	ROHN 5 EH	20.03	6.68	43.6	6.1120	199600.00	275039.00	0.726 [1]
T5	60 - 40	ROHN 6 EHS	20.03	6.68	36.0	6.7133	244114.00	302097.00	0.808 [1]
T6	40 - 20	ROHN 6 EH	20.04	6.68	36.5	8.4049	288552.00	378222.00	0.763 [1]
T7	20 - 0	ROHN 8 EHS	20.03	10.02	41.2	9.7193	326868.00	437369.00	0.747 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L2x2x1/4	5.32	2.53	52.2	0.5629	5965.91	24485.10	0.244 [1]
T2	120 - 100	L2x2x1/4	7.51	3.58	73.0	0.5629	5744.93	24485.10	0.235 [1]
T3	100 - 80	L2x2x1/4	9.70	4.66	94.1	0.5629	7136.69	24485.10	0.291 [1]
T4	80 - 60	L2 1/2x2 1/2x1/4	12.21	5.91	94.1	0.7519	8873.70	32706.60	0.271 [1]
T5	60 - 40	L2 1/2x2 1/2x1/4 4.8.1 (1.01 CR) - 122	13.96	6.74	107.0	0.7519	9724.03	32706.60	0.297 [1]
T6	40 - 20	L3x3x1/4	15.79	7.66	100.4	0.9394	10848.00	45794.50	0.237 [1]
T7	20 - 0	L3 1/2x3 1/2x1/4	19.03	9.26	103.4	1.1034	12704.40	53792.60	0.236 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L2x2x1/4	2.50	2.02	44.5	0.5629	993.31	24485.10	0.041 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	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 lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	140 - 120	Leg	ROHN 2.5 EH	1	-63242.10	83196.20	76.0	Pass
T2	120 - 100	Leg	ROHN 3 EH	37	-118655.00	119063.00	99.7	Pass
T3	100 - 80	Leg	ROHN 4 EH	70	-168555.00	175711.00	95.9	Pass
T4	80 - 60	Leg	ROHN 5 EH	97	-215886.00	239388.00	90.2	Pass
T5	60 - 40	Leg	ROHN 6 EHS	118	-264938.00	274767.00	96.4	Pass
T6	40 - 20	Leg	ROHN 6 EH	139	-314581.00	343094.00	91.7	Pass
T7	20 - 0	Leg	ROHN 8 EHS	160	-357209.00	386390.00	92.4	Pass
T1	140 - 120	Diagonal	L2x2x1/4	20	-6145.24	20164.00	30.5	Pass
							65.5 (b)	
T2	120 - 100	Diagonal	L2x2x1/4	41	-5916.82	15606.10	37.9	Pass
							63.1 (b)	
T3	100 - 80	Diagonal	L2x2x1/4	74	-7367.26	10368.80	71.1	Pass
							78.4 (b)	
T4	80 - 60	Diagonal	L2 1/2x2 1/2x1/4	100	-9200.85	12893.70	71.4	Pass
							85.0 (b)	
T5	60 - 40	Diagonal	L2 1/2x2 1/2x1/4	121	-10079.60	9908.19	101.7	OK
T6	40 - 20	Diagonal	L3x3x1/4	142	-11153.60	13492.60	82.7	Pass
							92.7 (b)	
T7	20 - 0	Diagonal	L3 1/2x3 1/2x1/4	163	-13329.70	14898.90	89.5	Pass
							89.9 (b)	
T1	140 - 120	Top Girt	L2x2x1/4	4	-1138.27	19650.60	5.8	Pass
							10.9 (b)	
							Summary	
							Leg (T2) 99.7	Pass
							Diagonal (T5) 101.7	OK
							Top Girt (T1) 10.9	Pass
							Bolt Checks 93.1	Pass
							RATING = 101.7	**OK**

Self Support Tower Anchor Rod Check

Anchor Rods assumed to be (8) 1"ϕ ASTM A354-Grade BC Bolts

$Pu := 369.51kip$ — *Max Tension force for Detail type A,B, or C Connections*

$Vu := 38.89kip$ — *Shear force Corresponfing to Max Tension or COmpression Force*

$Fub := 125ksi$ — *Steel Grade of Anchor Bolts*

$Dbolt := 1.0in$ — *Diameter of Anchor Bolt*

$Nbolt := 8$ — *Number of Anchor Bolts*

$\eta := 0.5$ — *η is dependent on Anchor Rod Detail Type per Figure 4-4 TIA Rev.G*

$Anet := 0.75\left(\frac{\pi}{4}\right)\cdot(Dbolt)^2$ $\quad Anet = 0.59\cdot in^2$ — *Net Area of Bolt taken as 0.75 x unthreaded Area*

$Rnt := Fub\cdot Anet$ $\quad Rnt = 73.6\cdot kip$ — *Nominal Tensile Strength of Anchor Rod per Section 4.9.6.1*

$$StressRatio := \frac{\left(Pu+\frac{Vu}{\eta}\right)}{0.8\cdot Rnt}$$ — *Interaction Equation*

$StressRatio = 94.9\cdot\%$ — *<100%, okay*

This check assumes the clear distance from the top of the concrete foundation to bottom leveling nut does not exceed the diameter of the anchor rod.

Section II

Foundation

Foundation Analysis

Foundation Dimension & Properties

$\gamma_{conc} := 150pcf$ — *Density of Concrete*

$\gamma_{soil} := 115pcf$ — *Density of Soil*

$top := 6in$ — *Height of pier above grade*

$H_f := 4.5ft$ — *Mat Thickness*

$H_g := H_f - top$ $\quad H_g = 4\,ft$ — *Depth from grade to the bottom of foundation*

$D := 26.5ft$ — *Side of Square shape of Foundation*

$A_1 := D^2$ $\quad A_1 = 702.25\,ft^2$ — *Area of Square shape of Foundation*

Soil Properties

$P_{ultimate} := 15.0ksf$ — *Ultimate Bearing Pressure - Per Soil Report*

$D_n := 1.0ft$ — *Soil Depth Neglected*

$D_w := \infty \cdot ft$ — *Depth of Water*

$P_{p.ultimate} := 1.437ksf$ — *Ultimate Passive Pressure - Per Soil Report*

Factored Ractions (based on Tnx calculations)

Maximum Reactions (wind without ice load case)

$P := 35.5kip$ — *Max Total Axial Reaction*

$V := 63.65kip$ — *Max Total Shear Reaction*

$M := 5248.63kip \cdot ft$ — *Max Total Moment Reaction*

Foundation Capacity

$W_{mat} := A_1 \cdot H_f \cdot \gamma_{conc}$ $\quad W_{mat} = 474.02 \cdot kip$ *Weight of mat foundation*

$W_{soil} := 0kip$ *No Soil Weight above mat*

OTM Check

$\phi_o := 0.75$ *Soil Reduction Factor for Overturning*

$M_{ot} := M + (H_f) \cdot V$ $\quad M_{ot} = 5535.05 \cdot kip \cdot ft$

$M_{res} := \left(P + 1.2 \cdot W_{mat} + W_{soil}\right) \cdot \frac{D}{2}$

$\frac{\phi_o \cdot M_{res}}{M_{ot}} = 1.08$ *>1.0 Acceptable*

OTMCheck = "Foundation is adequate for OTM,"

Soil Bearing Pressure Check

$\phi_s := 0.75$ *Soil bearing resistance factor per TIA-222-G 9.4.1*

$S_{found} := \frac{D^3}{6} = 3101.6 \cdot ft^3$ *Square Mat Foundation Section Modulus*

$P_{soil} := \left[\frac{P + 1.2 \cdot \left(W_{mat} + W_{soil}\right)}{A_1} + \frac{M_{ot}}{S_{found}}\right]$ $\quad P_{soil} = 2645.13 \cdot psf$

$\frac{P_{soil}}{\phi_s \cdot P_{ultimate}} = 0.24$ *< 1. OK*

SoilCheck = "Foundation is adequate for soil bearing pressure."

Check Lateral Capacity

$\phi_{lat} := 0.75$ — *Soil Reduction Factor for Lateral*

$\mu := 0.35$ — *Coefficient of Friction - Per Soil Report*

$T_e := \text{if}\left(D_n < H_g - H_f, H_f, H_g - D_n\right)$ $\quad T_e = 3\,\text{ft}$ — *Effective Pad Thickness*

$A_e := D \cdot T_e$ $\quad A_e = 79.5\,\text{ft}^2$ — *Effective Pad Area*

$S_{all} := \left[P_{p.ultimate} \cdot A_e + \left[P + 0.9 \cdot \left(W_{mat} + W_{soil}\right)\right] \cdot \mu\right]$ $\quad S_{all} = 275.98 \cdot \text{kip}$ — *Lateral Capacity*

$\dfrac{V}{\phi_{lat} \cdot S_{all}} = 0.31$ — *< 1. OK*

LateralCapacityCheck = "Lateral Capacity is adequate."