Filed by:
Kri Pelletier, Property Specialist - SBA Communications
134 Flanders Rd., Suite 125, Westborough, MA 01581
508.251.0720 x 3804 - kpelletier@sbasite.com

October 3, 2018

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

Notice of Exempt Modification
1021 Blue Hills Avenue, Bloomfield, CT 06002
41.8201031 N
-72.6965269 W
T-Mobile #: CT11162B_L700 4x2

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) antennas at the 125-foot level of the existing 125-foot Self-Support Tower at 1021 Blue Hills Avenue. The tower is owned by SBA Towers, LLC. The property is owned by Blue Hills Fire District. T-Mobile plans to replace (6) existing antennas with (6) newer technology antennas at the 125-foot level. The full scope of proposed work is as follows:

Remove:
- (1) 1-5/8" coax
- (1) 1-5/8 fiber

Remove and Replace:
- Remove: (3) Commscope LNX-6515DS-A1M Panel Antennas
  - Replace with: (3) RFS APXVAARR24_43-U-NA20 Panel Antennas
- Remove: (3) Ericsson AIR21 B4A/B2P Panel Antennas
  - Replace with: (3) Ericsson AIR32 KRD901146-1_B66A Panel Antennas
- Remove (3) Ericsson KRY 112 144/1 TMA
  - Replace with: (3) Ericsson KRY 112 144/2 TMA
- Remove: (3) Ericsson S11B12
  - Replace with: (3) Ericsson Radio 4449 B71 + B12 RRU

Install:
- (3) PRK-FMA mount reinforcement kit
- (2) 1-1/4" hybrid

Existing Equipment to Remain (including entitlements):
- (3) Ericsson AIR21 B2A/B4P
- (1) Platform w/handrails
- (11) 1-5/8" coax

This facility was approved with Special Permit by the Board of Appeals of the Town of Bloomfield on December 1, 1997. The tower was to be located 12 feet from the property line at 1021 Blue Hills Ave with an 8' chain link fence placed around the tower. This modification complies with the aforementioned conditions.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16.50j-72(b)(2). In accordance with R.C.S.A. § 16.50j-73, a copy of this letter is being sent to Bloomfield's Mayor, Suzette DeBeatham-Brown, and Zoning Enforcement Officer, Michael Kosilla, as well as to the property owner, Blue Hills Fire District. (Separate notice is not being sent to tower owner, as it belongs to SBA.)

The planned modifications to the 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 structure.
2. The proposed modification will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.
5. The proposed modification will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

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

Sincerely,

Kri Pelletier
Property Specialist
SBA COMMUNICATIONS CORPORATION
134 Flanders Rd., Suite 125
Westborough, MA 01581

508.251.0720 x3804 + T
508.366.2610 + F
203.446.7700 + C
kpelletier@sbasite.com

Attachments

cc: The Honorable Suzette DeBeatham-Brown / with attachments
Bloomfield Town Hall, 800 Bloomfield Ave., Bloomfield, CT 06002
Michael Kosilla, Zoning Enforcement Officer / with attachments
Bloomfield Town Hall, 800 Bloomfield Ave., Bloomfield, CT 06002
Blue Hills Fire District / with attachments
1021 Blue Hills Avenue Bloomfield CT 06002-3715

POWER DENSITY

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR32 KRD901146-1 B66A	Make / Model:	Ericsson AIR32 KRD901146-1 B66A	Make / Model:	Ericsson AIR32 KRD901146-1 B66A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	125 feet	Height (AGL):	125 feet	Height (AGL):	125 feet
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	200	Total TX Power(W):	200	Total TX Power(W):	200
ERP (W):	7,780.90	ERP (W):	7,780.90	ERP (W):	7,780.90
Antenna A1 MPE%	**1.98**	Antenna B1 MPE%	**1.98**	Antenna C1 MPE%	**1.98**
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	125 feet	Height (AGL):	125 feet	Height (AGL):	125 feet
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	2	Channel Count	2	Channel Count	2
Total TX Power(W):	55	Total TX Power(W):	55	Total TX Power(W):	55
ERP (W):	2,139.75	ERP (W):	2,139.75	ERP (W):	2,139.75
Antenna A2 MPE%	**0.54**	Antenna B2 MPE%	**0.54**	Antenna C2 MPE%	**0.54**
Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Gain:	12.95 / 13.35 dBd	Gain:	12.95 / 13.35 dBd	Gain:	12.95 / 13.35 dBd
Height (AGL):	125 feet	Height (AGL):	125 feet	Height (AGL):	125 feet
Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,443.03	ERP (W):	2,443.03	ERP (W):	2,443.03
Antenna A3 MPE%	**1.47**	Antenna B3 MPE%	**1.47**	Antenna C3 MPE%	**1.47**

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**3.99 %**
AT&T	**6.21 %**
Verizon Wireless	**7.16 %**
MetroPCS	**2.55 %**
Clearwire	**0.15 %**
Sprint	**2.32 %**
Nextel	**0.44 %**
XM Satellite Radio	**0.16 %**
Page Net	**0.08 %**
Blue Hills FD	**1.75 %**
Site Total MPE %:	**24.81 %**

T-Mobile Sector A Total:	3.99 %
T-Mobile Sector B Total:	3.99 %
T-Mobile Sector C Total:	3.99 %
Site Total:	24.81 %

T-Mobile Maximum MPE Power Values (Per Sector)

T-Mobile _Frequency Band / Technology (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile PCS - 1900 MHz LTE	2	1,556.18	125	7.90	PCS - 1900 MHz	1000.00	0.78%
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	125	11.85	AWS - 2100 MHz	1000.00	1.19%
T-Mobile PCS - 1900 MHz GSM	1	583.57	125	1.48	PCS - 1900 MHz	1000.00	0.15%
T-Mobile AWS - 2100 MHz UMTS	1	1,556.18	125	3.95	AWS - 2100 MHz	1000.00	0.40%
T-Mobile 600 MHz LTE	2	788.97	125	4.01	600 MHz	400.00	1.00%
T-Mobile 700 MHz LTE	2	432.54	125	2.20	700 MHz	467.00	0.47%
						Total:	**3.99%**

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

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Town of Bloomfield, CT

Property Listing Report

Map Block Lot 130-2-14 | Account R90158

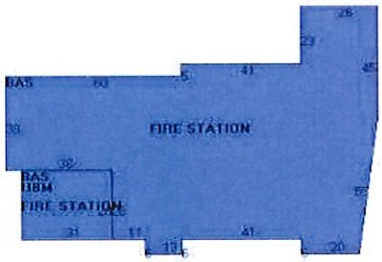
Property Information

Property Location	1021 BLUE HILLS AVE
Owner	BLUE HILLS FIRE DIST
Co-Owner	BLUE HILLS AVE COR
Mailing Address	ROCKWELL AVENUE BLOOMFIELD CT 06002
Land Use	922 Mun Bldg Com
Land Class	E
Zoning Code	GWB
Census Tract	
Sub Lot	

Neighborhood	
Acreage	1.23
Utilities	
Lot Setting/Desc	
Survey Map	
Foundation	

Photo

Sketch



Primary Construction Details

Year Built	1962
Stories	1
Building Style	Fire Station
Building Use	Commercial
Building Condition	D
Floors	Carpet
Total Rooms	

Bedrooms	
Full Bathrooms	
Half Bathrooms	
Bath Style	
Kitchen Style	
Roof Style	Gable
Roof Cover	Asphalt Shingl

Exterior Walls	Brick Veneer
Interior Walls	Drywall
Heating Type	Hot Water
Heating Fuel	Gas
AC Type	
Gross Bldg Area	10112
Total Living Area	9244

Report Created On 9/5/2018

Town of Bloomfield, CT

Property Listing Report | Map Block Lot 130-2-14 | Account R90158

Valuation Summary (Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	432500	302750
Extras	0	0
Outbuildings	0	0
Land	396800	277760
Total	829300	580510

Outbuilding and Extra Items

Type	Description

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	9244	9244
Basement	868	0
Total Area	10112	9244

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
BLUE HILLS FIRE DIST	91/ 376		0

Report Created On 9/5/2018

EBI Consulting
environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11162B

Bluehills/ Jn of RT-187_1
1021 Blue Hills Avenue
Bloomfield, CT 06002

September 26, 2018

EBI Project Number: 6218006383

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**24.81 %**

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

September 26, 2018

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CT11162B – Bluehills/ Jn of RT-187_1**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **1021 Blue Hills Avenue, Bloomfield, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) frequency bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **1021 Blue Hills Avenue, Bloomfield, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 1 GSM channels (PCS Band - 1900 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 15 Watts per Channel.

2) 1 UMTS channel (AWS Band – 2100 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

3) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

4) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

6) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

7) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

8) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antennas used in this modeling are the **Ericsson AIR32 KRD901146-1 B66A** & **Ericsson AIR21 B2A/B4P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **RFS APXVAARR24_43-U-NA20** for 600 MHz and 700 MHz channels. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antenna mounting height centerline of the proposed antennas is **125 feet** above ground level (AGL).

11) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR32 KRD901146-1 B66A	Make / Model:	Ericsson AIR32 KRD901146-1 B66A	Make / Model:	Ericsson AIR32 KRD901146-1 B66A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	125 feet	Height (AGL):	125 feet	Height (AGL):	125 feet
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	200	Total TX Power(W):	200	Total TX Power(W):	200
ERP (W):	7,780.90	ERP (W):	7,780.90	ERP (W):	7,780.90
Antenna A1 MPE%	**1.98**	Antenna B1 MPE%	**1.98**	Antenna C1 MPE%	**1.98**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	125 feet	Height (AGL):	125 feet	Height (AGL):	125 feet
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	2	Channel Count	2	Channel Count	2
Total TX Power(W):	55	Total TX Power(W):	55	Total TX Power(W):	55
ERP (W):	2,139.75	ERP (W):	2,139.75	ERP (W):	2,139.75
Antenna A2 MPE%	**0.54**	Antenna B2 MPE%	**0.54**	Antenna C2 MPE%	**0.54**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Gain:	12.95 / 13.35 dBd	Gain:	12.95 / 13.35 dBd	Gain:	12.95 / 13.35 dBd
Height (AGL):	125 feet	Height (AGL):	125 feet	Height (AGL):	125 feet
Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,443.03	ERP (W):	2,443.03	ERP (W):	2,443.03
Antenna A3 MPE%	**1.47**	Antenna B3 MPE%	**1.47**	Antenna C3 MPE%	**1.47**

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**3.99 %**
AT&T	**6.21** %
Verizon Wireless	**7.16** %
MetroPCS	**2.55** %
Clearwire	**0.15** %
Sprint	**2.32** %
Nextel	**0.44** %
XM Satellite Radio	**0.16** %
Page Net	**0.08** %
Blue Hills FD	**1.75** %
Site Total MPE %:	**24.81 %**

T-Mobile Sector A Total:	3.99 %
T-Mobile Sector B Total:	3.99 %
T-Mobile Sector C Total:	3.99 %
Site Total:	24.81 %

T-Mobile Maximum MPE Power Values (Per Sector)

T-Mobile _Frequency Band / Technology (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile PCS - 1900 MHz LTE	2	1,556.18	125	7.90	PCS - 1900 MHz	1000.00	0.78%
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	125	11.85	AWS - 2100 MHz	1000.00	1.19%
T-Mobile PCS - 1900 MHz GSM	1	583.57	125	1.48	PCS - 1900 MHz	1000.00	0.15%
T-Mobile AWS - 2100 MHz UMTS	1	1,556.18	125	3.95	AWS - 2100 MHz	1000.00	0.40%
T-Mobile 600 MHz LTE	2	788.97	125	4.01	600 MHz	400.00	1.00%
T-Mobile 700 MHz LTE	2	432.54	125	2.20	700 MHz	467.00	0.47%
						Total:	**3.99%**

Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector A:	3.99 %
Sector B:	3.99 %
Sector C:	3.99 %
T-Mobile Maximum MPE % (Per Sector):	3.99 %
Site Total:	24.81 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **24.81%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

ALLPRO
CONSULTING GROUP, INC.
9221 Lyndon B. Johnson Freeway, #204, Dallas, TX 75243 ★ PHONE 972-231-8893 ★ FAX 1-866-364-8375
www.allprocgi.com ★ e-mail: info@allprocgi.com

Tower Structural Analysis Report for
SBA Communications Corporation

Existing 125' Self Support Tower

SBA Site Name: Bloomfield
SBA Site Number: CT01725-A-04
Application #:88694, v2
Carrier Name: T-Mobile
Carrier Site ID: CT11162B / Bluehills/ Jn of Rt-187_1

Site Location:
1021 Blue Hills Avenue,
Bloomfield, CT 06002-3715
Hartford County

Latitude: 41.820119°
Longitude: -72.696514 °

ACGI Job # 18-5613
(Refer previous: ACGI# 16-4565 dated 12/08/2016)

ANALYSIS RESULTS		
Tower Components	91.4 %	**Pass**
Tower Foundation Capacity	51.4 %	**Pass**
Net Change in Stress	+4.4 %	**Change from previous SA by Allpro Consulting Group, Inc., ACGI #16-4565, dated 12/08/2016**
Net Change due to Mount Reinforcement	+0.4%	**Change due to reinforcing existing mount**

Prepared By:
Prakash Koirala, EIT

08/30/2018
Approved By:
Joji George, P.E.
CT PE# 24444

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1. ANALYSIS SUMMARY

The existing 125' Self Support Tower located in Bloomfield, CT was analyzed by Allpro Consulting Group, Inc (ACGI) for the existing loads and the proposed **T-Mobile** antennas and coaxes as authorized by SBA Communication Corp. Based on the results of the analysis, the existing tower with mentioned proposed and existing loading is found **to be in code compliance** with *TIA-222-G, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and 2016 Connecticut State Building Code (IBC 2012).*

2. SCOPE & SOURCE OF INFORMATION

The purpose of this structural analysis is to determine whether the existing structure is capable of supporting additional proposed loads.

SOURCE OF INFORMATION		
Tower Data:	Fred A. Nudd Corporation	Original Structural Design Report by Fred A. Nudd Corporation, Project# 5566A dated March 11, 1998.
	B&T Group	Previous failing structural analysis by B&T Group, Project Number: 101023.003.001 dated January 21, 2016.
	Allpro Consulting Group, Inc.	Previous modification report by Allpro Consulting Group, Inc., ACGI# 16-0291 dated 02/17/2016 Previous Structural Analysis by Allpro Consulting Group, Inc., ACGI# 16-0654 dated 02/24/2016 and ACGI# 16-4565, dated 12/08/2016
Geotechnical Report:	FDH Engineering, Inc.	Geotechnical Evaluation of Subsurface Conditions, Project Number 1206690EG1 dated 08/10/2012.
Loading Data:	Allpro Consulting Group, Inc.	Existing load is as per previous Structural Analysis by Allpro Consulting Group, Inc., ACGI# 16-4565, dated 12/08/2016
	SBA Communication Corp.	SBA site summary dated 11/15/2016 Proposed final T-Mobile is as per SBA Portal, Application# 88694, v2
Authorization:	SBA Communication Corp.	

3. ANALYSIS METHODS & DATA

The analysis was performed in accordance with Telecommunication Industry Association specification TIA-222-G. The tower was modeled using TNX Tower, a 3-D finite element program. TNX Tower is a general-purpose modeling, analysis, and design program created specifically for communication towers using the EIA-222-C, EIA-222-D, TIA/EIA-222-F or TIA-222-G standards. The 3-D model included the tower, with existing appurtenances and all proposed loads.

SITE DATA	
SBA Site Name:	Bloomfield
SBA Site Number:	CT01725-A-04
Carrier Site Name:	T-Mobile: CT11162B/Bluehills/Jn of Rt-187_1
City, State:	Bloomfield, CT
County:	Hartford
Code Wind Load Requirement:	ANSI/TIA-222-G &International Building Code (122 mph ultimate wind speed equivalent to 95 mph nominal wind speed)
Wind Load Used:	ANSI/TIA-222-G Code: • Nominal wind speed of 95 mph (3 second gust wind speed) • Structure Class II*. • Exposure Category B. • Topographic Category 1. • Crest Height 0.00 ft. • A wind speed of 50 mph is used in combination with ice • Nominal ice thickness of 1.0 in.
Seismic Requirement:	Spectral Response Acceleration at Short Period (Ss) is 0.180g which is less than 1.0g. Therefore, no seismic check is required as per TIA-222-G section 2.7.3

*This structural analysis is based upon the tower being classified as a class II; however, if a different classification is required subsequent to the date hereof, the tower classification will be changed to meet such requirement and a new structural analysis will be run.

TOWER DATA	
Tower Type:	Self - Support Tower
Height:	125.0'
Cross Section:	Triangular
Steel Strength:	Legs – 55 ksi Braces – 36 ksi
Type of Foundation:	Mat foundation

TOWER HISTORY	
Tower Manufacturer / Model:	Fred A. Nudd Corporation, Model: S9BPA
Date of Original Design:	March 11, 1998
Previous Modifications:	Previous modification report by Allpro Consulting Group, Inc., ACGI# 16-0291 dated 02/17/2016.
Original Design Code Requirements:	ANSI/TIA/EIA 222-E, Design wind & Ice: 80 mph/60 mph + 1/2" ice

4. CONCLUSIONS

RESULT SUMMARY		
MEMBER	***% Capacity***	***Pass/Acceptable***
Legs	**89.2 %**	**Pass**
Diagonals	**91.4 %**	**Pass**
Horizontals	**45.9 %**	**Pass**
Secondary Horizontals	**19.9 %**	**Pass**
Top Girt	**26.5 %**	**Pass**
Bottom girts	**23.3 %**	**Pass**
Bolt checks	**91.4 %**	**Pass**
Foundation (Overturning)	**51.4 %**	**Pass**
Foundation (Net soil bearing)	**17.7 %**	**Pass**
Foundation (Horizontal Shear)	**36.6 %**	**Pass**
Foundation (Uplift)	**46.1 %**	**Pass**
Foundation (Reinforcement)	**75.9 %**	**Pass**
OVERALL TOWER RATING = 91.4 % (Pass)		

MAXIMUM DISH ROTATION AT SERVICE WIND SPEED Twist and Sway (deg), 10 dB degradation limit					
Elev. (ft)	*MW Dish*	*Twist (deg)*	*Sway (deg)*	*Allowable (deg)*	*Result*
123±	**(E) (1) Andrew VHLP2.5 Dish**	**0.035**	**0.381**	**Carrier to provide**	**-**
117±	**(E) (1) Andrew VHLP2.5 Dish**	**0.020**	**0.372**	**Carrier to provide**	**-**

As per the results of the analysis, the existing tower **is in code compliance** for the proposed and existing antenna loads.

Maximum tower member stress **is more than allowable,** making **it in code compliance** under the TIA-222-G code and 2016 Connecticut State Building Code (2012 IBC).

The tower stress ratio is increased by 4.4% from the previous structural analysis by Allpro Consulting Group, Inc., ACGI# 16-4565, dated 12/08/2016 due to proposed T-Mobile loading.

5. DISCLAIMER

Installation procedures and related loading are not within the scope of this analysis. A contractor experienced in similar work should perform all installation work. The engineering services provided by Allpro Consulting Group, Inc. (ACGI) are limited to the computer analysis and calculations of the structure with the proposed and existing loads. This analysis is considered void if the loading mentioned in this report is changed or is different as installed. It is assumed that the existing structure is properly maintained and is in good condition free of any defects. Scope of this analysis does not include existing connections, except as noted in this report.

ACGI does not make any warranties, expressed or implied in connection with this engineering analysis report and disclaims any liability arising from deficiencies or any existing conditions of the original structure. ACGI will not be responsible for consequential or incidental damages sustained by any parties as a result of any data or conclusions included in this Report. The maximum liability of ACGI pursuant to this report shall be limited to the consulting fee received for the preparation of the report.

6. ASSUMPTIONS

This analysis was completed based on the following assumptions:

- Tower has been properly maintained.
- Tower erection was in accordance to manufacturer drawings and modification reports.
- Leg flanges have been properly designed by manufacturer to not be a limiting reaction.
- Welds have been properly designed and installed by manufacturer to not be a limiting reaction.
- Foundation data was not provided. It is assumed that the foundation is designed to resist the original tower reactions.
- Foundation does not have structural damage.
- Bolts have been properly tightened according to manufacturer specifications.
- Appurtenance, mount and transmission line sizes and weights are best estimates using the tnxTower database and manufacturer information.

7. APPURTENANCE LISTING

EXISTING LOAD DESCRIPTION					
ELEV (ft.)	***Qty.***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in)***	***TENANT***
135±	2	Cellwave PD455	(1) Platform w/ handrails @ 125.0'	(1) 1-1/4" (2) 1/2" (2) 7/8"	Blue Hills Fire & PD
	1	Cellwave AS MONR 31			
125±	5	Cellwave PD455			
	1	Cellwave PD165S			
125±	3	Commscope LNX-6515DS-A1M	(1) Platform w/ handrails @ 125.0'	(12) 1-5/8" Coax (1) 1-5/8" Fiber	T-Mobile
	3	Ericsson S11B12			
	3	Ericsson AIR21 B2A/B4P			
	3	Ericsson AIR21 B4A/B2P			
	3	Ericsson KRY 112 144/1			
120±	2	Samsung U-RAS Flexible	(3) Sector Frames @ 120'	(7) 5/16" (3) 1/2"	Clearwire
	2	Dragonwave HORIZON DUO			
	3	Kathrein 840 10054			
	2	Andrew VHLP2.5 dish			
	1	Motorola Timing 2000			
110±	3	Amphenol BXA-70063-4CF-EDIN-6 panel antenna	(3) Sector Frames @ 107'	(18) 1-5/8" + (2) 1-5/8" Hybrids + (2) 1/2" GPS line	Verizon
	9	Andrew SBNHH-1D65B panel antenna			
	3	Alcatel Lucent RRH2x60-AWS radio			
	3	Alcatel Lucent RRH2x60-700 radio			
	3	Alcatel Lucent RRH 4x45-PCS radio			
	2	Andrew GPS			
	1	RFS Cellwave DB-T1-6Z-8AB-0Z distribution box			
98±	6	Powerwave 7770 panel antenna	(3) Sector Frames @ 98'	(12) 7/8" (2) 3/4" DC* + (1) 1/2" Fiber* within 3" Flex conduits	AT&T
	2	CCI HPA-65R-BUU-H8 panel antenna			
	1	CCI HPA-65R-BUU-H6 panel antenna			
	6	Powerwave LGP21401 TMA			
	12	Powerwave 7020 RET			
	6	Ericsson RRUs 11			
	3	Ericsson RRUs 32 B2			
	6	Powerwave LGP21903 diplexer			
	3	Kathrein 782 10253			
	1	Raycap DC6-48-60-18-8F			
87±	3	Alcatel Lucent 1900MHz RRH	(3) Sector Frames @ 87'	(3) 1-1/4" (1) 0.7"	Sprint
	3	Alcatel Lucent 800MHZ RRH			
	3	Alcatel Lucent TD-RRH8x20-25			
	4	RFS ACU-A20-N			
	3	RFS APXVSPP18-C-A20			
	3	RFS APXVTM14-C-120			
	3	Samsung 800 MHz Filter			
75±	3	RFS Cellwave APXV18-206517S-C	Direct mount @ 75'	(6) 1-5/8"	Metro
65±	1	Nokia CS72188.01 LMU Antenna	(1) Standoff @ 65'	(1) 1/2''	AT&T

*The (1) ½" Fiber cable and (2) ¾" DC Power cable for AT&T are installed in (1) 3"flex conduit.

PROPOSED T-MOBILE LOAD DESCRIPTION					
ELEV (ft.)	***Qty***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in)***	***TENANT***
125'±	3	Ericsson AIR 21 B2A/B4P Antenna	(1) Platform w/ handrails @ 125' **(3) PRK-FMA mount reinforcement kit**	(**11**) 1-5/8" coax **(2) 1-1/4" Hybrid**	T-Mobile
	3	**RFS APXVAARR24_43-U-NA20 Antenna**			
	3	**Ericsson AIR32 KRD901146-1_B66A Antenna**			
	3	Ericsson KRY 112 144/2 TMA			
	3	**Ericsson Radio 4449 B71 + B12 RRU**			

Note: ACGI should be notified of any discrepancies found in the data listed in the above table. Notify ACGI of any potential physical or other interference with existing or proposed antenna for a redesign.

8. SUMMARY OF WORKING PERCENTAGE OF STRUCTURAL COMPONENTS

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
T1	125 - 120	Leg	P2.5x.203	3	-11.479	77.815	14.8	Pass
T2	120 - 100	Leg	P2.5x.203	25	-47.134	61.057	77.2	Pass
T3	100 - 80	Leg	P3.5x.226	53	-96.985	112.760	86.0	Pass
T4	80 - 60	Leg	P5x.258	80	-146.335	183.884	79.6	Pass
T5	60 - 40	Leg	P6x.28	101	-194.170	249.417	77.8	Pass
T6	40 - 20	Leg	P6x.28	122	-231.577	259.755	89.2	Pass
T7	20 - 0	Leg	P8x.322	143	-272.447	363.459	75.0	Pass
T1	125 - 120	Diagonal	5/8	15	4.195	9.940	42.2	Pass
T2	120 - 100	Diagonal	L1 1/2x1 1/2x3/16	38	-4.653	7.026	66.2 74.5 (b)	Pass
T3	100 - 80	Diagonal	L2x2x3/16	59	-6.012	11.293	53.2 73.2 (b)	Pass
T4	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	83	-6.897	14.057	49.1 71.0 (b)	Pass
T5	60 - 40	Diagonal	L2 1/2x2 1/2x3/16	104	-7.137	11.935	59.8 72.7 (b)	Pass
T6	40 - 20	Diagonal	L3x3x3/16	125	-9.505	12.270	77.5 91.4 (b)	Pass
T7	20 - 0	Diagonal	L3 1/2x3 1/2x1/4	146	-9.749	22.585	43.2 67.8 (b)	Pass
T1	125 - 120	Horizontal	L1 1/2x1 1/2x3/16	18	-3.303	7.190	45.9	Pass
T6	40 - 20	Secondary Horizontal	L3x3x1/4	130	-4.014	20.219	19.9	Pass
T1	125 - 120	Top Girt	L1 1/2x1 1/2x3/16	6	-1.904	7.190	26.5	Pass
T1	125 - 120	Bottom Girt	L1 1/2x1 1/2x3/16	9	-1.679	7.190	23.3	Pass
							Summary	
						Leg (T6)	89.2	Pass
						Diagonal (T6)	91.4	Pass
						Horizontal (T1)	45.9	Pass
						Secondary Horizontal (T6)	19.9	Pass
						Top Girt (T1)	26.5	Pass
						Bottom Girt (T1)	23.3	Pass
						Bolt Checks	91.4	Pass
						RATING =	**91.4**	**Pass**

APPENDIX

TOWER DATA

Exposure Category “B”

Topographical Category “1”

⚠ This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.

Hazards by Location

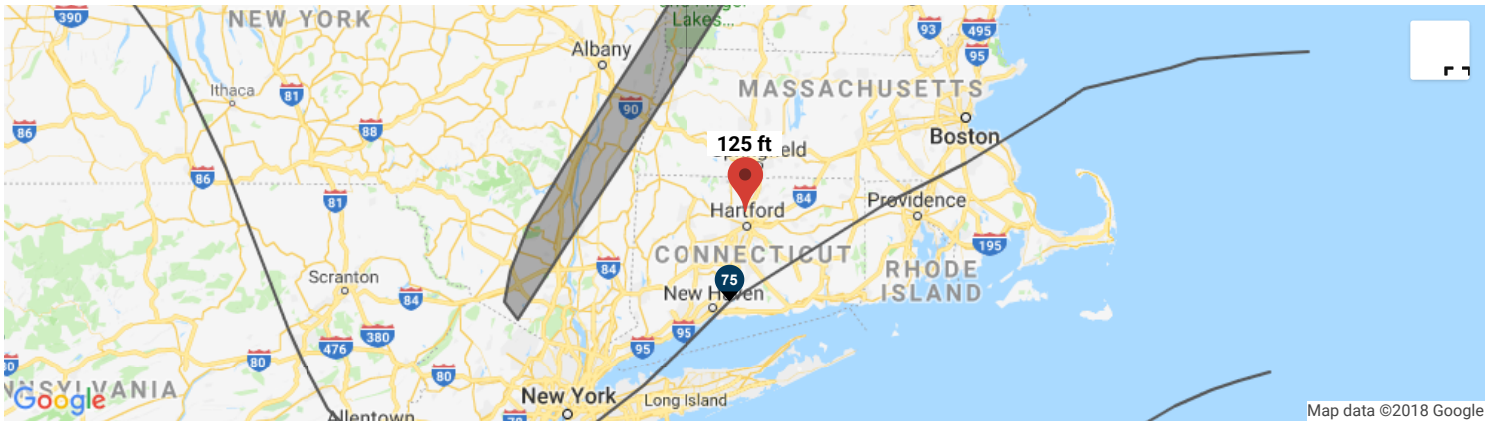
Search Information

Coordinates: 41.820119, -72.696514

Timestamp: 2018-08-28T16:33:39.815Z

Hazard Type: Wind

Map Results



Text Results

ASCE 7-16

MRI 10-Year	75 mph
MRI 25-Year	83 mph
MRI 50-Year	90 mph
MRI 100-Year	97 mph
Risk Category I	107 mph
Risk Category II	117 mph
Risk Category III	126 mph
Risk Category IV	⚠ 131 mph

You are in a wind-borne debris region if you are also within 1 mile of the coastal mean high water line.

ASCE 7-10

MRI 10-Year	77 mph
MRI 25-Year	86 mph
MRI 50-Year	92 mph
MRI 100-Year	99 mph
Risk Category I	111 mph
Risk Category II	122 mph
Risk Category III-IV	⚠ 131 mph

If the structure under consideration is a healthcare facility, you are in a wind-borne debris region. If other occupancy, use the Risk Category II basic wind speed contours to determine if you are in a wind-borne debris region.

ASCE 7-05

ASCE 7-05 Wind Speed ..... 98 mph

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

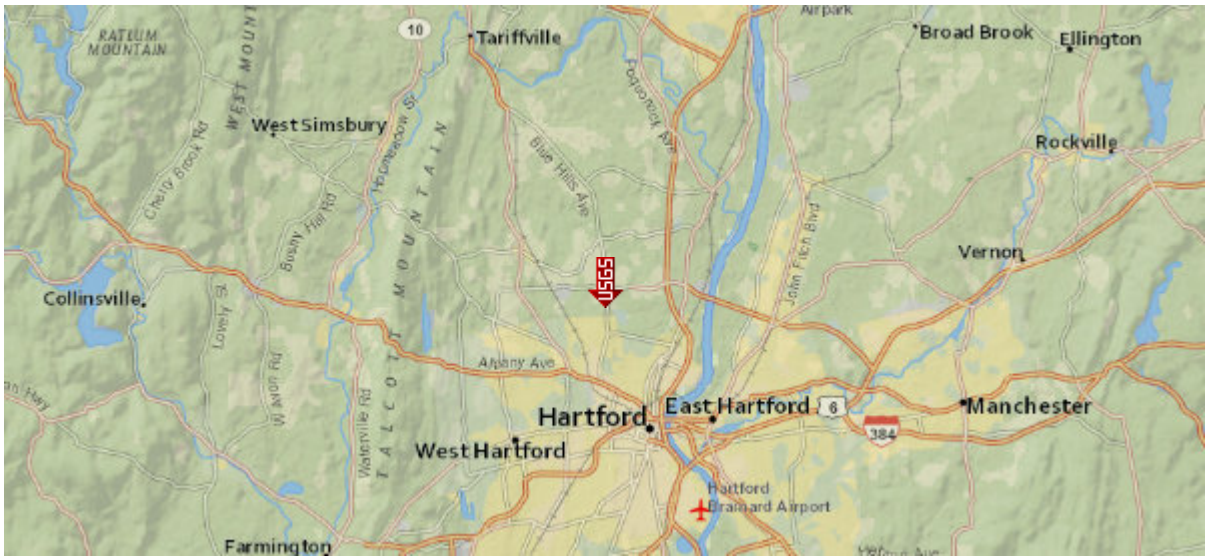
Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

While the information presented on this website is believed to be correct, ATC and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in the report should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. ATC does not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the report provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the report.

USGS Design Maps Summary Report

User–Specified Input

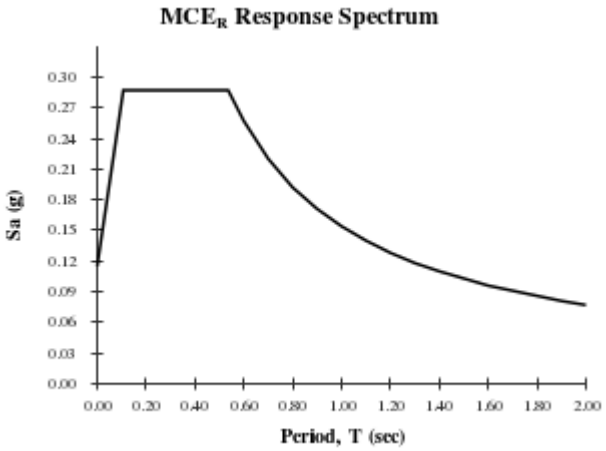
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	41.82012°N, 72.69651°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

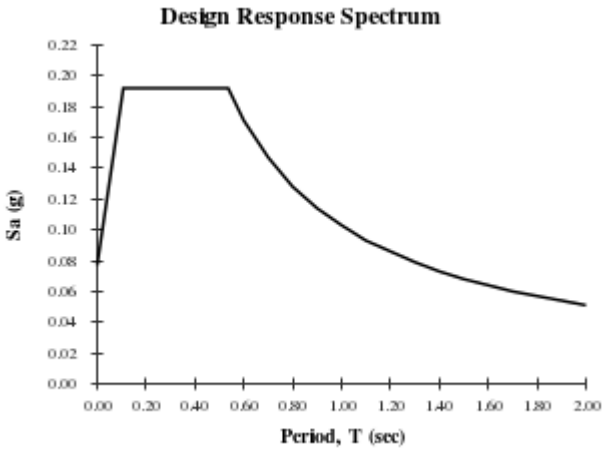


USGS–Provided Output

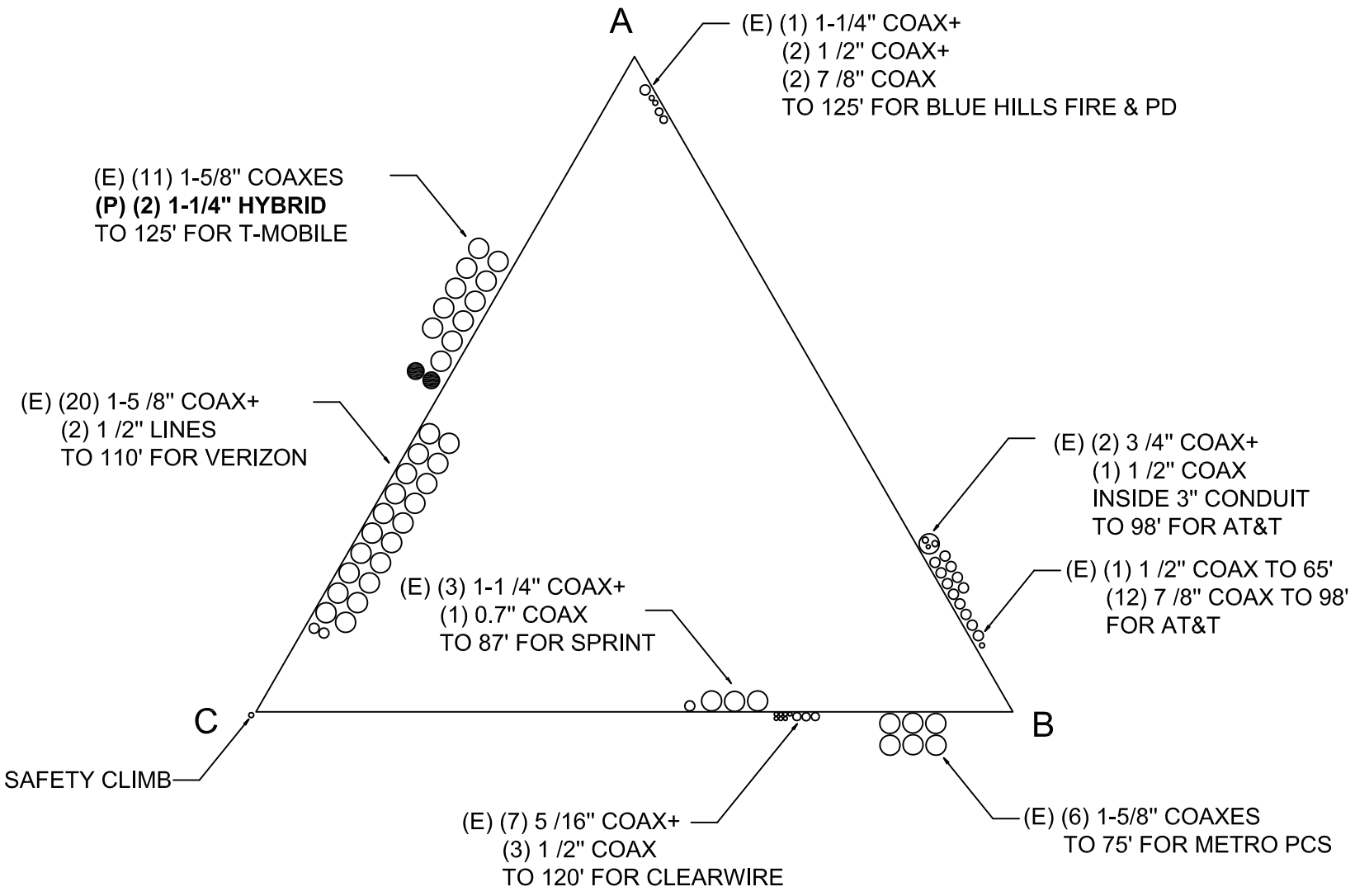
S_S =	0.180 g	S_{MS} =	0.287 g	S_{DS} =	0.192 g
S_1 =	0.064 g	S_{M1} =	0.154 g	S_{D1} =	0.103 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





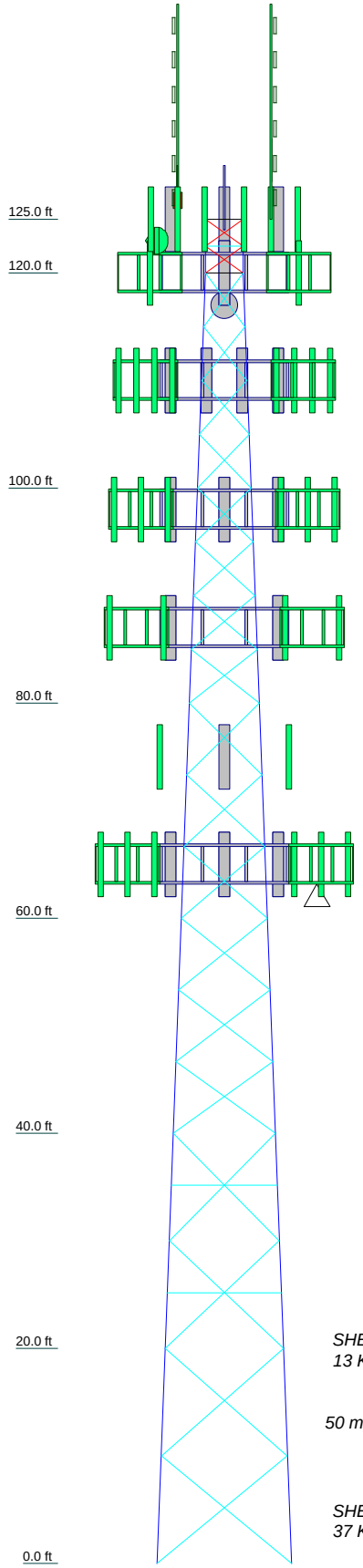
COAX LAYOUT



COAX LAYOUT
N.T.S

TOWER ELEVATION DRAWING

Section		T1	T2	T3	T4	T5	T6	T7
Legs			P2.5x.203	P3.5x.226	P5x.258		P6x.28	P8x.322
Leg Grade				A572-55				
Diagonals		SR 5/8	L1 1/2x1 1/2x3/16	L2x2x3/16	L2 1/2x2 1/2x3/16		L3x3x3/16	L3 1/2x3 1/2x1/4
Diagonal Grade					A36			
Top Girts	A				N.A.			
Bottom Girts	A				N.A.			
Horizontals	A				N.A.			
Sec. Horizontals	N.A.						L3x3x1/4	N.A.
Face Width (ft)	12.5	3.5		5	6.5	8	9.5	11
# Panels @ (ft)		2 @ 2.5	8 @ 5			6 @ 6.66667		4 @ 10
Weight (K)	10.3	0.2	0.7	1.0	1.5	1.8	2.2	2.9



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L1 1/2x1 1/2x3/16		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-55	55 ksi	70 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 95 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 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 0.000 ft
8. TOWER RATING: 91.4%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 284 K
SHEAR: 24 K

UPLIFT: -255 K
SHEAR: 22 K

AXIAL 150 K
SHEAR 13 K *MOMENT 1091 kip-ft*

TORQUE 2 kip-ft
50 mph WIND - 1.000 in ICE

AXIAL 42 K
SHEAR 37 K *MOMENT 2926 kip-ft*

TORQUE 9 kip-ft
REACTIONS - 95 mph WIND

Allpro Consulting Group Inc.
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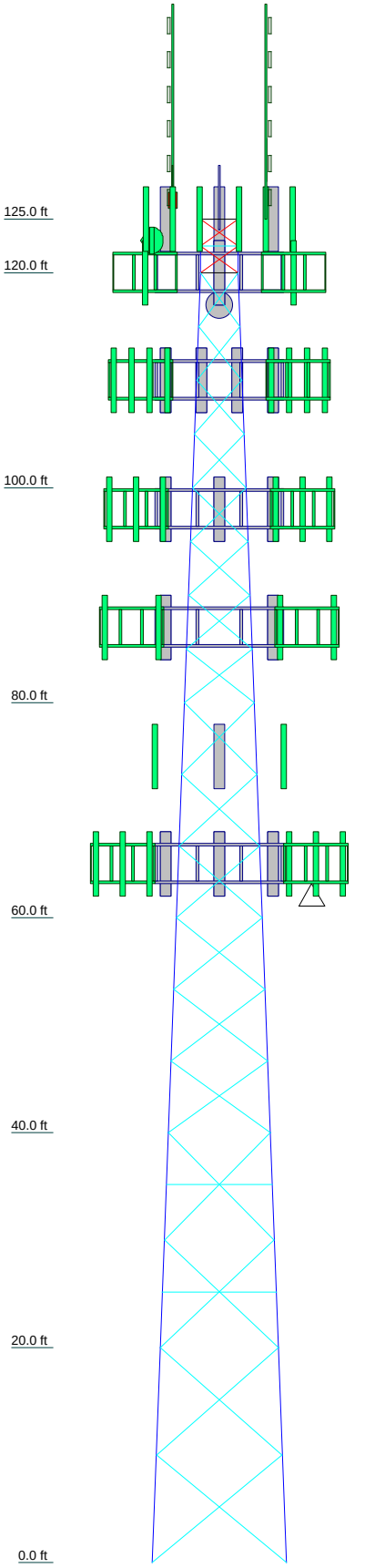
Dallas, TX, 75243
Phone: (972) 231-8893
FAX: (555) 555-1235

Job: ***CT01725-A-04/Bloomfield, CT***			
Project: ***ACGI# 18-5613***			
Client: SBA Network Services	Drawn by: Prakash Koirala	App'd:	
Code: TIA-222-G	Date: 08/28/18	Scale: NTS	
Path: P:\2018\Structural\18-5613 CT01725-A-04_Bloomfield_125' SST_T-Mobile\Tnx Tower\CT01725-A-04_Bloomfield_AT&T.tnx.16 ERI		Dwg No. E-1	

Section	T1	T2	T3	T4	T5	T6	T7		
Legs		P2.5x.203	P3.5x.226	P5x.258		P6x.28	P8x.322		
Leg Grade					A572-55				
Diagonals	SR 5/8	L1 1/2x1 1/2x3/16	L2x2x3/16	L2 1/2x2 1/2x3/16		L3x3x3/16	L3 1/2x3 1/2x1/4		
Diagonal Grade					A36				
Top Girts	A			N.A.					
Bottom Girts	A			N.A.					
Horizontals	A			N.A.					
Sec. Horizontals	N.A.					L3x3x1/4	N.A.		
Face Width (ft)	3.5		5	6.5	8	9.5	11		12.5
# Panels @ (ft)	2 @ 2.5		8 @ 5		6 @ 6.66667		4 @ 10		10.3
Weight (K)	0.2	0.7	1.0	1.5	1.8	2.2	2.9		



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION
Lightning Rod 5/8" x 5' (E)	125
Flash Beacon Lighting (E)	125
(2) PD455 (Blue-Hills Fire District)	125
(3) PD455 (Blue-Hills Fire District _ Bloomfield Police)	125
(2) PD455 (Blue-Hills Fire District)	125
Cellwave AS MONR 31 (Blue-Hills Fire District)	125
Cellwave PD165S (Blue-Hills Fire District)	125
AIR21 B2A/B4P w/ Mount Pipe (T-Mobile)	125
AIR21 B2A/B4P w/ Mount Pipe (T-Mobile)	125
AIR21 B2A/B4P w/ Mount Pipe (T-Mobile)	125
KRY 112 144/2 (T-Mobile)	125
KRY 112 144/2 (T-Mobile)	125
KRY 112 144/2 (T-Mobile)	125
APXVAARR24_43-U-NA20 (T-Mobile)	125
APXVAARR24_43-U-NA20 (T-Mobile)	125
APXVAARR24_43-U-NA20 (T-Mobile)	125
AIR 32 KRD901146-1_B66A_B2A (T-Mobile)	125
AIR 32 KRD901146-1_B66A_B2A (T-Mobile)	125
AIR 32 KRD901146-1_B66A_B2A (T-Mobile)	125
Radio 4449 B71+B12 (T-Mobile)	125
Radio 4449 B71+B12 (T-Mobile)	125
Radio 4449 B71+B12 (T-Mobile)	125
Reinforced Platform mount w/ handrails + Reinforcement Kit (T-Mobile)	125
Sector Mount [SM 402-3] (E-2PIPIES/SEC)	120
Motorola Timing 2000 (Clearwire)	120
840 10054 w/ Mount Pipe (Clearwire)	120
840 10054 w/ Mount Pipe (Clearwire)	120
840 10054 w/ Mount Pipe (Clearwire)	120
U-RAS (Clearwire)	120
U-RAS (Clearwire)	120
HORIZON DUO (Clearwire)	120
HORIZON DUO (Clearwire)	120
4' x 2" Pipe Mount (Clearwire)	120
4' x 2" Pipe Mount (Clearwire)	120
4' x 2" Pipe Mount (Clearwire)	120
VHLP2.5 (Clearwire)	120
VHLP2.5 (Clearwire)	120
RRH2x60-700 (Verizon)	110
RRH2x60-700 (Verizon)	110
RRH 4x45-PCS (Verizon)	110
RRH 4x45-PCS (Verizon)	110
RRH 4x45-PCS (Verizon)	110
Sector Mount [SM 802-3] (E)	110
GPS_A (Verizon)	110
GPS_A (Verizon)	110
BXA-70063-4CF-EDIN-6 w/ Mount Pipe (Verizon)	110
BXA-70063-4CF-EDIN-6 w/ Mount Pipe (Verizon)	110
BXA-70063-4CF-EDIN-6 w/ Mount Pipe (Verizon)	110
DB-T1-6Z-8AB-0Z (Verizon)	110
(3) SBNHH-1D65B w/ Mount Pipe (Verizon)	110
(3) SBNHH-1D65B w/ Mount Pipe (Verizon)	110
(3) SBNHH-1D65B w/ Mount Pipe (Verizon)	110

TYPE	ELEVATION
RRH2x60-AWS (Verizon)	110
RRH2x60-AWS (Verizon)	110
RRH2x60-AWS (Verizon)	110
RRH2x60-700 (Verizon)	110
Sector Mount [SM 802-3] (E)	98
(2) 7770.00 w/ Mount Pipe (ATI)	98
(4) 7020 RET (ATI)	98
(4) 7020 RET (ATI)	98
(4) 7020 RET (ATI)	98
RRUS 32 B2 (ATI)	98
RRUS 32 B2 (ATI)	98
RRUS 32 B2 (ATI)	98
(2) LGP21901 Diplexer (ATI)	98
(2) LGP21901 Diplexer (ATI)	98
(2) LGP21901 Diplexer (ATI)	98
Kathrein 782 10253 (ATI)	98
Kathrein 782 10253 (ATI)	98
Kathrein 782 10253 (ATI)	98
(2) 7770.00 w/ Mount Pipe (ATI)	98
(2) 7770.00 w/ Mount Pipe (ATI)	98
HPA-65R-BUU-H8 (ATI)	98
HPA-65R-BUU-H8 (ATI)	98
HPA-65R-BUU-H6 (ATI)	98
(2) LGP21401 (ATI)	98
(2) LGP21401 (ATI)	98
(2) LGP21401 (ATI)	98
(2) RRUS-11 (ATI)	98
(2) RRUS-11 (ATI)	98
(2) RRUS-11 (ATI)	98
DC6-48-60-18-8F (ATI)	98
Sector Mount [SM 502-3] (E)	87
APXVSPP18-C-A20 w/ Mount Pipe (Sprint)	87
APXVSPP18-C-A20 w/ Mount Pipe (Sprint)	87
APXVSPP18-C-A20 w/ Mount Pipe (Sprint)	87
APXVTM14-C-120 w/ Mount Pipe (Sprint)	87
APXVTM14-C-120 w/ Mount Pipe (Sprint)	87
APXVTM14-C-120 w/ Mount Pipe (Sprint)	87
TD-RRH8x20-25 (Sprint)	87
TD-RRH8x20-25 (Sprint)	87
TD-RRH8x20-25 (Sprint)	87
1900MHz RRH (Sprint)	87
1900MHz RRH (Sprint)	87
1900MHz RRH (Sprint)	87
800MHZ RRH (Sprint)	87
800MHZ RRH (Sprint)	87
800MHZ RRH (Sprint)	87
800 MHz Filter (Sprint)	87
800 MHz Filter (Sprint)	87
800 MHz Filter (Sprint)	87
(2) ACU-A20-N (Sprint)	87
ACU-A20-N (Sprint)	87
ACU-A20-N (Sprint)	87
(2) 4' x 2" Pipe Mount (E)	87
(2) 4' x 2" Pipe Mount (E)	87
(2) 4' x 2" Pipe Mount (E)	87
APXV18-206517S-C w/ Mount Pipe (MetroPCS)	75
APXV18-206517S-C w/ Mount Pipe (MetroPCS)	75
APXV18-206517S-C w/ Mount Pipe (MetroPCS)	75
CS72188.01 LMU antenna (ATI)	65
Sector Mount [SM 802-3] (E)	65

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L1 1/2x1 1/2x3/16		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-55	55 ksi	70 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

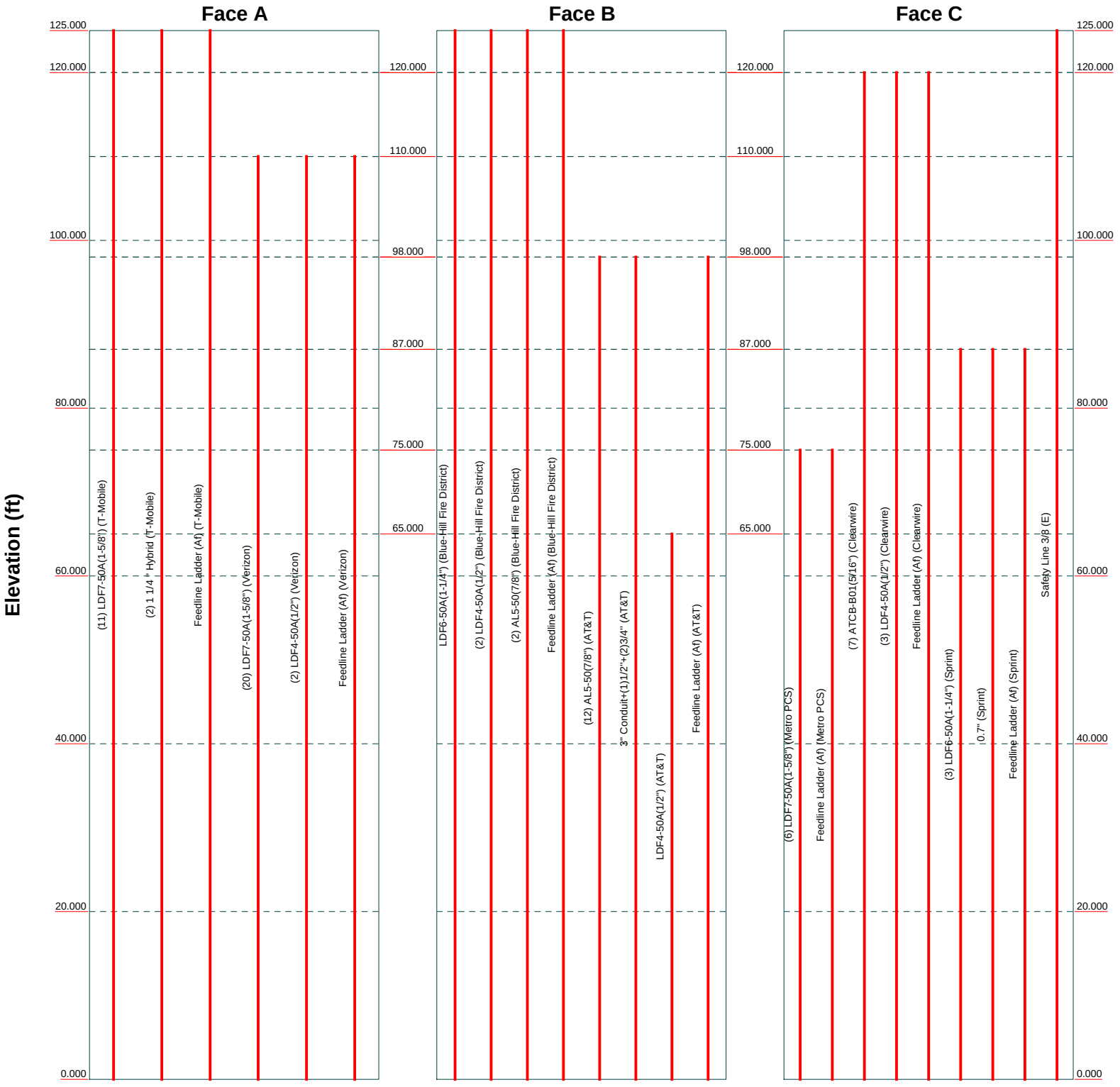
Allpro Consulting Group Inc.
9221 Lyndeon B. Johnson Freeway, #204
Dallas, TX, 75243
Phone: (972) 231-8893
FAX: (555) 555-1235

Job: *CT01725-A-04/Bloomfield, CT*			
Project: *ACGI# 18-5613*			
Client: SBA Network Services	Drawn by: Prakash Koirala	App'd:	
Code: TIA-222-G	Date: 08/28/18	Scale: NTS	
Path: P:\2018\Structural\18-5613 CT01725-A-04_Bloomfield_125' SST_T-Mobile\Tnx Tower\CT01725-A-04_Bloomfield_AT&T_tnx.16_ERI		Dwg No. E-1	

MISCELLANEOUS PLOTS

Feed Line Distribution Chart
0' - 125'

Round | Flat | App In Face | App Out Face | Truss Leg



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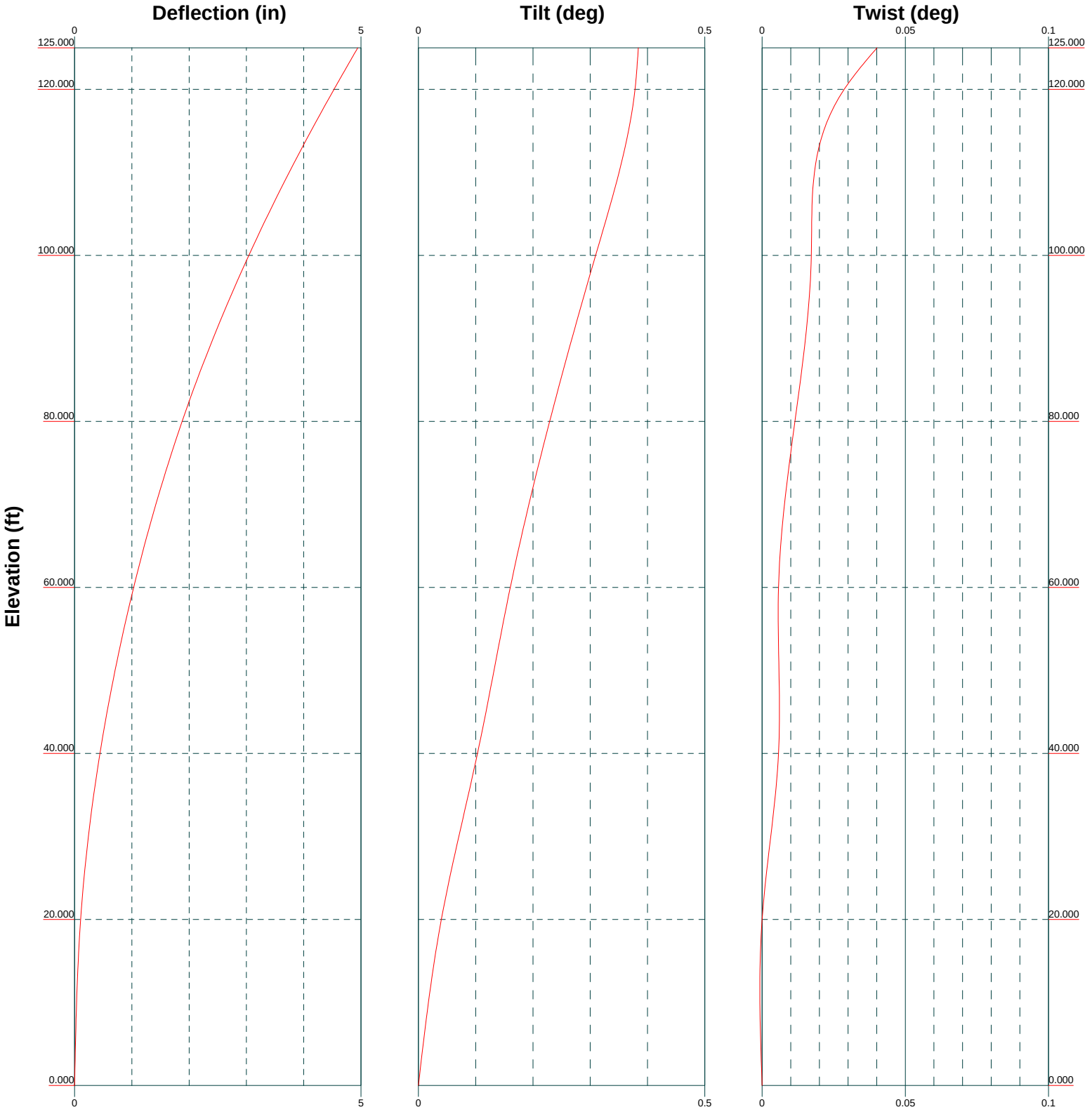
Code: TIA-222-G	Date: 08/28/18	Scale: NTS	
Path: P:\2018\Structural\18-5613 CT01725-A-04_Bloomfield_125' SST_T-Mobile\Tmx Tower\CT01725-A-04_Bloomfield_AT&T.tmx.16.ERI		Dwg No. E-7	

TIA-222-G - Service - 60 mph

Maximum Values



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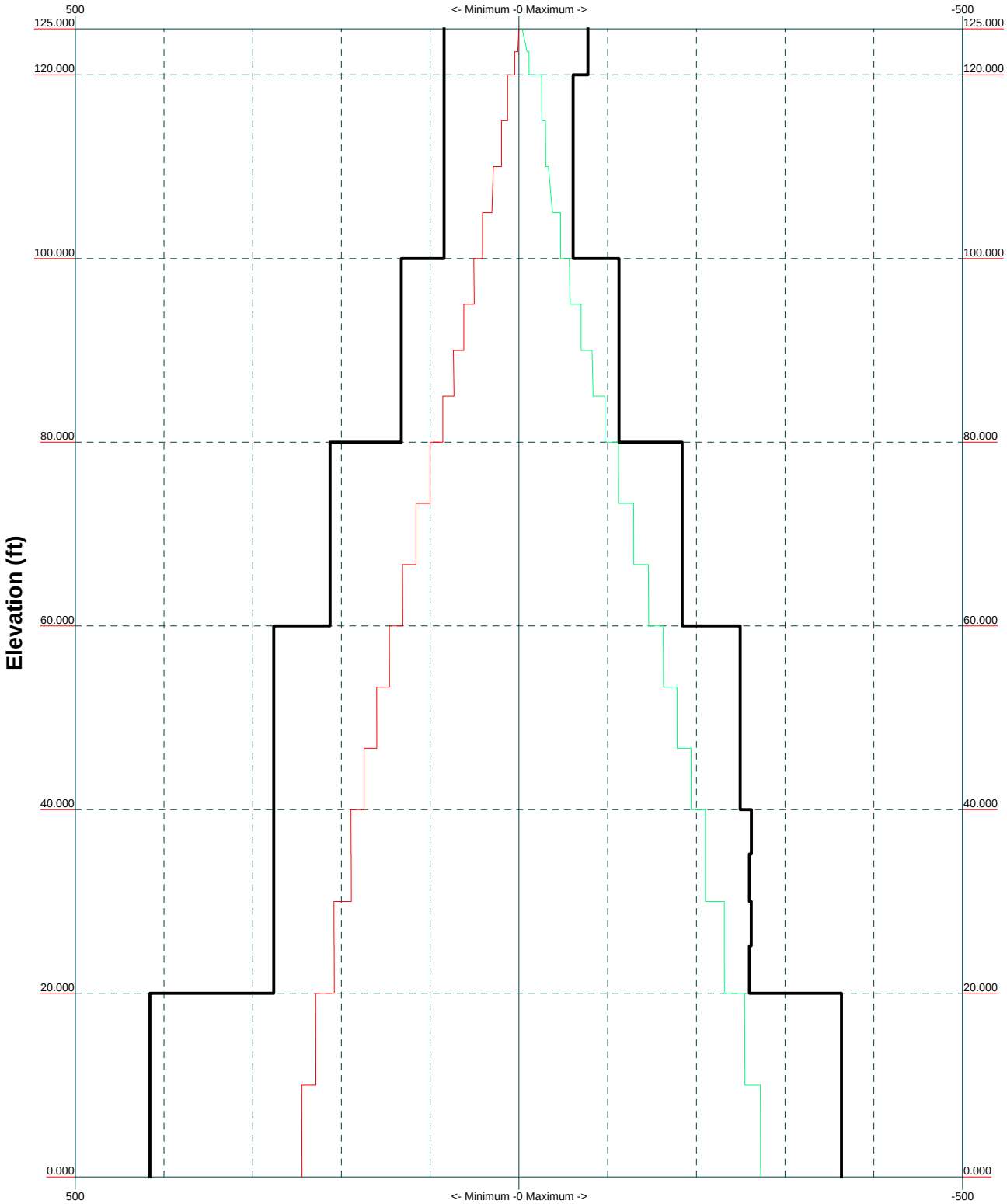
Project: ***ACGI# 18-5613***			
Client: SBA Network Services	Drawn by: Prakash Koirala	App'd:	
Code: TIA-222-G	Date: 08/28/18	Scale: NTS	
Path: P:\2018\Structural\18-5613 CT01725-A-04_Bloomfield_125' SST_T-Mobile\Tnx Tower\CT01725-A-04_Bloomfield_AT&T.tnx.16.ERI		Dwg No. E-5	

TIA-222-G - 95 mph/50 mph 1.000 in Ice Exposure B

Leg Capacity ——— **Leg Compression (K)**



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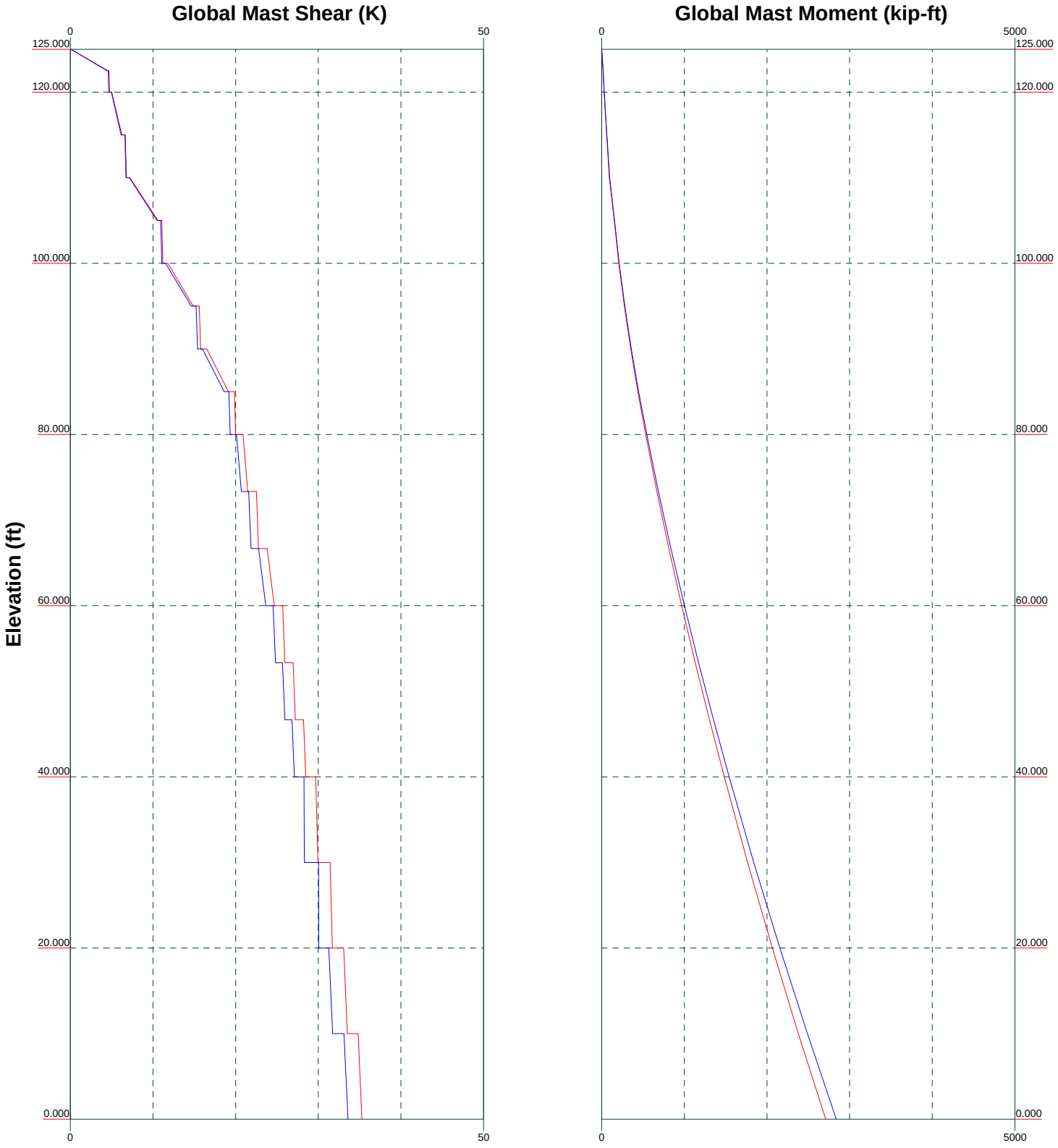
Job: ***CT01725-A-04/Bloomfield, CT***			
Project: ***ACGI# 18-5613***			
Client: SBA Network Services	Drawn by: Prakash Koirala	App'd:	
Code: TIA-222-G	Date: 08/28/18	Scale: NTS	
Path: P:\2018\Structural\18-5613 CT01725-A-04_Bloomfield_125'_SST_T-Mobile\Tnx Tower\CT01725-A-04_Bloomfield_AT&T.tnx.16_ERI		Dwg No. E-3	

TIA-222-G - 95 mph/50 mph 1.000 in Ice Exposure B

Maximum Values

Vx Vz Mx Mz



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Job: ***CT01725-A-04/Bloomfield, CT***			
Project: ***ACGI# 18-5613***			
Client: SBA Network Services	Drawn by: Prakash Koirala	App'd:	
Code: TIA-222-G	Date: 08/28/18	Scale: NTS	
Path: P:\2018\Structural\18-5613 CT01725-A-04_Bloomfield_125'_SST_T-Mobile\Tnx Tower\CT01725-A-04_Bloomfield_AT&T.tnx.16.ERI		Dwg No. E-4	

TNX TOWER CALCULATION PRINTOUT

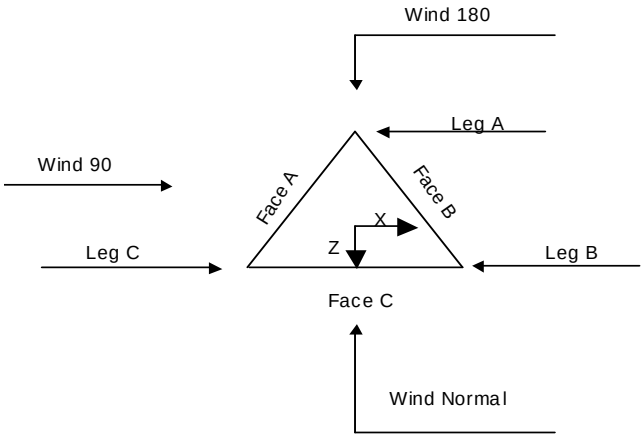
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 125.000 ft above the ground line.
The base of the tower is set at an elevation of 0.000 ft above the ground line.
The face width of the tower is 3.500 ft at the top and 12.500 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 95 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.000 ft.
Nominal ice thickness of 1.000 in.
Ice thickness is considered to increase with height.
Ice density of 56.000 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	125.000-120.000			3.500	1	5.000
T2	120.000-100.000			3.500	1	20.000
T3	100.000-80.000			5.000	1	20.000
T4	80.000-60.000			6.500	1	20.000
T5	60.000-40.000			8.000	1	20.000
T6	40.000-20.000			9.500	1	20.000
T7	20.000-0.000			11.000	1	20.000

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	125.000-120.000	2.500	TX Brace	No	Yes	0.000	0.000
T2	120.000-100.000	5.000	X Brace	No	No	0.000	0.000
T3	100.000-80.000	5.000	X Brace	No	No	0.000	0.000
T4	80.000-60.000	6.667	X Brace	No	No	0.000	0.000
T5	60.000-40.000	6.667	X Brace	No	No	0.000	0.000
T6	40.000-20.000	10.000	X Brace	No	Yes	0.000	0.000
T7	20.000-0.000	10.000	X Brace	No	No	0.000	0.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 125.000-120.000	Pipe	P2.5x.203	A572-55 (55 ksi)	Solid Round	5/8	A36 (36 ksi)
T2 120.000-100.000	Pipe	P2.5x.203	A572-55 (55 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T3 100.000-80.000	Pipe	P3.5x.226	A572-55 (55 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T4 80.000-60.000	Pipe	P5x.258	A572-55 (55 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 60.000-40.000	Pipe	P6x.28	A572-55 (55 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 40.000-20.000	Pipe	P6x.28	A572-55 (55 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T7 20.000-0.000	Pipe	P8x.322	A572-55 (55 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 125.000-120.000	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 125.000-120.000	None	Single Angle		A36 (36 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T6 40.000-20.000	Single Angle	L3x3x1/4	A36 (36 ksi)	Solid Round		A572-50 (50 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 125.000-120.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T2 120.000-100.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T3 100.000-80.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T4 80.000-60.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T5 60.000-40.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T6 40.000-20.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T7 20.000-0.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000

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 125.000-120.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 120.000-100.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 100.000-80.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 80.000-60.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 60.000-40.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 40.000-20.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 20.000-0.000	Yes	No	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 125.000-120.000	0.000	1	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T2 120.000-100.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T3 100.000-80.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T4 80.000-60.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T5 60.000-40.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T6 40.000-20.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T7 20.000-0.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	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 125.000-120.000	Flange	0.750 A325N	4	0.500 A325X	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T2 120.000-100.000	Flange	0.750 A325N	6	0.500 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T3 100.000-80.000	Flange	1.000 A325N	6	0.500 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T4 80.000-60.000	Flange	1.000 A325N	8	0.500 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T5 60.000-40.000	Flange	1.000 A325N	8	0.625 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T6 40.000-20.000	Flange	1.250 A325N	8	0.625 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T7 20.000-0.000	Flange	1.500 A36	8	0.625 A325X	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 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 klf
LDF7-50A(1-5/8") (T-Mobile)	A	No	Ar (CaAa)	125.000 - 0.000	0.000	0	11	6	0.500	1.980		0.001
1 1/4 " Hybrid (T-Mobile)	A	No	Ar (CaAa)	125.000 - 0.000	0.000	-0.1	2	1	1.550	1.550		0.001
Feedline Ladder (Af) (T-Mobile) **#**	A	No	Af (CaAa)	125.000 - 0.000	0.000	0	1	1	3.000	1.500		0.008
LDF6-50A(1-1/4") (Blue-Hill Fire District)	B	No	Ar (CaAa)	125.000 - 0.000	-0.500	-0.45	1	1	0.850 0.750	1.550		0.001
LDF4-50A(1/2") (Blue-Hill Fire District)	B	No	Ar (CaAa)	125.000 - 0.000	-0.500	-0.44	2	2	0.630	0.630		0.000
AL5-50(7/8") (Blue-Hill Fire District)	B	No	Ar (CaAa)	125.000 - 0.000	-0.500	-0.41	2	2	0.850 0.750	1.100		0.000
Feedline Ladder (Af) (Blue-Hill Fire District) **#**	B	No	Af (CaAa)	125.000 - 0.000	-0.500	-0.45	1	1	3.000	3.000		0.008
LDF7-50A(1-5/8") (Verizon)	A	No	Ar (CaAa)	110.000 - 0.000	-3.000	-0.3	20	10	0.500	1.980		0.001
LDF4-50A(1/2") (Verizon)	A	No	Ar (CaAa)	110.000 - 0.000	-1.500	-0.4	2	1	0.500	0.630		0.000
Feedline Ladder (Af) (Verizon) **#**	A	No	Af (CaAa)	110.000 - 0.000	-0.500	-0.3	1	1	3.000	1.500		0.008
LDF7-50A(1-5/8") (Metro PCS)	C	No	Ar (CaAa)	75.000 - 0.000	0.000	-0.42	6	3	0.500	1.980		0.001
Feedline Ladder (Af) (Metro PCS)	C	No	Af (CaAa)	75.000 - 0.000	0.000	-0.42	1	1	3.000	3.000		0.008
ATCB-B01(5/16") (Clearwire)	C	No	Ar (CaAa)	120.000 - 0.000	0.000	-0.25	7	4	0.315	0.315		0.000
LDF4-50A(1/2") (Clearwire)	C	No	Ar (CaAa)	120.000 - 0.000	0.000	-0.22	3	3	0.500	0.630		0.000
Feedline Ladder (Af) (Clearwire) **#**	C	No	Af (CaAa)	120.000 - 0.000	0.000	0.05	1	1	3.000	3.000		0.008
AL5-50(7/8") (AT&T)	B	No	Ar (CaAa)	98.000 - 0.000	0.000	0.39	12	8	0.850 0.750	1.100		0.000
3" Conduit+(1)1/2"+(2)3/4" (AT&T)	B	No	Ar (CaAa)	98.000 - 0.000	0.000	0.27	1	1	3.000	3.000		0.004
LDF4-50A(1/2") (AT&T)	B	No	Ar (CaAa)	65.000 - 0.000	0.000	0.42	1	1	0.500	0.630		0.000
Feedline	B	No	Af (CaAa)	98.000 - 0.000	0.000	0.35	1	1	3.000	3.000		0.008

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 klf
Ladder (Af) (AT&T) **#**												
LDF6-50A(1-1/4") (Sprint)	C	No	Ar (CaAa)	87.000 - 0.000	-0.500	-0.15	3	3	0.850 0.750	1.550		0.001
0.7" (Sprint)	C	No	Ar (CaAa)	87.000 - 0.000	-0.500	-0.13	1	1	0.630	0.700		0.000
Feedline Ladder (Af) (Sprint) **#**	C	No	Af (CaAa)	87.000 - 0.000	-0.500	0	1	1	3.000	3.000		0.008
Safety Line 3/8 (E)	C	No	Ar (CaAa)	125.000 - 0.000	0.000	0	1	1	0.375	0.375		0.000

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight klf
#							

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	125.000-120.000	A	0.000	0.000	13.690	0.000	0.094
		B	0.000	0.000	5.005	0.000	0.049
		C	0.000	0.000	0.188	0.000	0.001
T2	120.000-100.000	A	0.000	0.000	98.120	0.000	0.626
		B	0.000	0.000	20.020	0.000	0.198
		C	0.000	0.000	18.940	0.000	0.192
T3	100.000-80.000	A	0.000	0.000	141.480	0.000	0.877
		B	0.000	0.000	58.180	0.000	0.471
		C	0.000	0.000	26.185	0.000	0.266
T4	80.000-60.000	A	0.000	0.000	141.480	0.000	0.877
		B	0.000	0.000	62.735	0.000	0.502
		C	0.000	0.000	64.960	0.000	0.603
T5	60.000-40.000	A	0.000	0.000	141.480	0.000	0.877
		B	0.000	0.000	63.680	0.000	0.504
		C	0.000	0.000	73.400	0.000	0.670
T6	40.000-20.000	A	0.000	0.000	141.480	0.000	0.877
		B	0.000	0.000	63.680	0.000	0.504
		C	0.000	0.000	73.400	0.000	0.670
T7	20.000-0.000	A	0.000	0.000	141.480	0.000	0.877
		B	0.000	0.000	63.680	0.000	0.504
		C	0.000	0.000	73.400	0.000	0.670

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	125.000-120.000	A	2.280	0.000	0.000	23.550	0.000	0.497
		B		0.000	0.000	18.938	0.000	0.314
		C		0.000	0.000	2.468	0.000	0.038
T2	120.000-100.000	A	2.256	0.000	0.000	148.642	0.000	3.237
		B		0.000	0.000	75.216	0.000	1.238
		C		0.000	0.000	72.963	0.000	1.174
T3	100.000-80.000	A	2.211	0.000	0.000	201.949	0.000	4.424
		B		0.000	0.000	150.765	0.000	2.796
		C		0.000	0.000	92.936	0.000	1.536
T4	80.000-60.000	A	2.156	0.000	0.000	200.036	0.000	4.325
		B		0.000	0.000	159.739	0.000	2.931
		C		0.000	0.000	170.561	0.000	3.066
T5	60.000-40.000	A	2.085	0.000	0.000	197.550	0.000	4.198
		B		0.000	0.000	164.266	0.000	2.934
		C		0.000	0.000	180.726	0.000	3.238
T6	40.000-20.000	A	1.981	0.000	0.000	193.936	0.000	4.017
		B		0.000	0.000	160.068	0.000	2.778
		C		0.000	0.000	175.767	0.000	3.068
T7	20.000-0.000	A	1.775	0.000	0.000	186.775	0.000	3.672
		B		0.000	0.000	151.742	0.000	2.482
		C		0.000	0.000	165.934	0.000	2.747

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	125.000-120.000	-3.546	-6.189	-0.641	-2.810
T2	120.000-100.000	-4.863	-2.791	-3.353	-3.416
T3	100.000-80.000	-1.770	0.730	-1.228	-0.513
T4	80.000-60.000	1.754	3.015	2.060	2.351
T5	60.000-40.000	3.039	3.946	3.680	3.407
T6	40.000-20.000	3.237	4.281	4.071	3.802
T7	20.000-0.000	3.667	4.837	4.536	4.288

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	LDF7-50A(1-5/8")	120.00 - 125.00	0.6000	0.1231
T1	2	1 1/4 " Hybrid	120.00 - 125.00	0.6000	0.1231
T1	3	Feedline Ladder (Af)	120.00 - 125.00	0.6000	0.1231
T1	5	LDF6-50A(1-1/4")	120.00 - 125.00	1.0000	1.0000
T1	6	LDF4-50A(1/2")	120.00 - 125.00	0.6000	0.1231
T1	7	AL5-50(7/8")	120.00 -	0.6000	0.1231

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			125.00		
T1	8	Feedline Ladder (Af)	120.00 - 125.00	0.6000	0.1231
T1	31	Safety Line 3/8	120.00 - 125.00	0.6000	0.1231
T2	1	LDF7-50A(1-5/8")	100.00 - 120.00	0.6000	0.4915
T2	2	1 1/4 " Hybrid	100.00 - 120.00	0.6000	0.4915
T2	3	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.4915
T2	5	LDF6-50A(1-1/4")	100.00 - 120.00	1.0000	1.0000
T2	6	LDF4-50A(1/2")	100.00 - 120.00	0.6000	0.4915
T2	7	AL5-50(7/8")	100.00 - 120.00	0.6000	0.4915
T2	8	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.4915
T2	10	LDF7-50A(1-5/8")	100.00 - 110.00	0.6000	0.4915
T2	11	LDF4-50A(1/2")	100.00 - 110.00	0.6000	0.4915
T2	12	Feedline Ladder (Af)	100.00 - 110.00	0.6000	0.4915
T2	18	ATCB-B01(5/16")	100.00 - 120.00	0.6000	0.4915
T2	19	LDF4-50A(1/2")	100.00 - 120.00	0.6000	0.4915
T2	20	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.4915
T2	31	Safety Line 3/8	100.00 - 120.00	0.6000	0.4915
T3	1	LDF7-50A(1-5/8")	80.00 - 100.00	0.6000	0.5434
T3	2	1 1/4 " Hybrid	80.00 - 100.00	0.6000	0.5434
T3	3	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.5434
T3	5	LDF6-50A(1-1/4")	80.00 - 100.00	1.0000	1.0000
T3	6	LDF4-50A(1/2")	80.00 - 100.00	0.6000	0.5434
T3	7	AL5-50(7/8")	80.00 - 100.00	0.6000	0.5434
T3	8	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.5434
T3	10	LDF7-50A(1-5/8")	80.00 - 100.00	0.6000	0.5434
T3	11	LDF4-50A(1/2")	80.00 - 100.00	0.6000	0.5434
T3	12	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.5434
T3	18	ATCB-B01(5/16")	80.00 - 100.00	0.6000	0.5434
T3	19	LDF4-50A(1/2")	80.00 - 100.00	0.6000	0.5434
T3	20	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.5434
T3	22	AL5-50(7/8")	80.00 - 98.00	0.6000	0.5434
T3	23	3" Conduit+(1)1/2"+(2)3/4"	80.00 - 98.00	0.6000	0.5434
T3	25	Feedline Ladder (Af)	80.00 - 98.00	0.6000	0.5434
T3	27	LDF6-50A(1-1/4")	80.00 - 87.00	0.6000	0.5434
T3	28	0.7"	80.00 - 87.00	0.6000	0.5434
T3	29	Feedline Ladder (Af)	80.00 - 87.00	0.6000	0.5434
T3	31	Safety Line 3/8	80.00 - 100.00	0.6000	0.5434
T4	1	LDF7-50A(1-5/8")	60.00 - 80.00	0.6000	0.6000
T4	2	1 1/4 " Hybrid	60.00 - 80.00	0.6000	0.6000
T4	3	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T4	5	LDF6-50A(1-1/4")	60.00 - 80.00	1.0000	1.0000
T4	6	LDF4-50A(1/2")	60.00 - 80.00	0.6000	0.6000
T4	7	AL5-50(7/8")	60.00 - 80.00	0.6000	0.6000
T4	8	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T4	10	LDF7-50A(1-5/8")	60.00 - 80.00	0.6000	0.6000
T4	11	LDF4-50A(1/2")	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	12	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T4	14	LDF7-50A(1-5/8")	60.00 - 75.00	0.6000	0.6000
T4	15	Feedline Ladder (Af)	60.00 - 75.00	0.6000	0.6000
T4	18	ATCB-B01(5/16")	60.00 - 80.00	0.6000	0.6000
T4	19	LDF4-50A(1/2")	60.00 - 80.00	0.6000	0.6000
T4	20	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T4	22	AL5-50(7/8")	60.00 - 80.00	0.6000	0.6000
T4	23	3" Conduit+(1)1/2"+(2)3/4"	60.00 - 80.00	0.6000	0.6000
T4	24	LDF4-50A(1/2")	60.00 - 65.00	0.6000	0.6000
T4	25	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T4	27	LDF6-50A(1-1/4")	60.00 - 80.00	0.6000	0.6000
T4	28	0.7"	60.00 - 80.00	0.6000	0.6000
T4	29	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T4	31	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T5	1	LDF7-50A(1-5/8")	40.00 - 60.00	0.6000	0.6000
T5	2	1 1/4 " Hybrid	40.00 - 60.00	0.6000	0.6000
T5	3	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T5	5	LDF6-50A(1-1/4")	40.00 - 60.00	1.0000	1.0000
T5	6	LDF4-50A(1/2")	40.00 - 60.00	0.6000	0.6000
T5	7	AL5-50(7/8")	40.00 - 60.00	0.6000	0.6000
T5	8	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T5	10	LDF7-50A(1-5/8")	40.00 - 60.00	0.6000	0.6000
T5	11	LDF4-50A(1/2")	40.00 - 60.00	0.6000	0.6000
T5	12	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T5	14	LDF7-50A(1-5/8")	40.00 - 60.00	0.6000	0.6000
T5	15	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T5	18	ATCB-B01(5/16")	40.00 - 60.00	0.6000	0.6000
T5	19	LDF4-50A(1/2")	40.00 - 60.00	0.6000	0.6000
T5	20	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T5	22	AL5-50(7/8")	40.00 - 60.00	0.6000	0.6000
T5	23	3" Conduit+(1)1/2"+(2)3/4"	40.00 - 60.00	0.6000	0.6000
T5	24	LDF4-50A(1/2")	40.00 - 60.00	0.6000	0.6000
T5	25	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T5	27	LDF6-50A(1-1/4")	40.00 - 60.00	0.6000	0.6000
T5	28	0.7"	40.00 - 60.00	0.6000	0.6000
T5	29	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T5	31	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T6	1	LDF7-50A(1-5/8")	20.00 - 40.00	0.6000	0.6000
T6	2	1 1/4 " Hybrid	20.00 - 40.00	0.6000	0.6000
T6	3	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	5	LDF6-50A(1-1/4")	20.00 - 40.00	1.0000	1.0000
T6	6	LDF4-50A(1/2")	20.00 - 40.00	0.6000	0.6000
T6	7	AL5-50(7/8")	20.00 - 40.00	0.6000	0.6000
T6	8	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	10	LDF7-50A(1-5/8")	20.00 - 40.00	0.6000	0.6000
T6	11	LDF4-50A(1/2")	20.00 - 40.00	0.6000	0.6000
T6	12	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	14	LDF7-50A(1-5/8")	20.00 - 40.00	0.6000	0.6000
T6	15	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	18	ATCB-B01(5/16")	20.00 - 40.00	0.6000	0.6000
T6	19	LDF4-50A(1/2")	20.00 - 40.00	0.6000	0.6000
T6	20	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	22	AL5-50(7/8")	20.00 - 40.00	0.6000	0.6000
T6	23	3" Conduit+(1)1/2"+(2)3/4"	20.00 - 40.00	0.6000	0.6000
T6	24	LDF4-50A(1/2")	20.00 - 40.00	0.6000	0.6000
T6	25	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	27	LDF6-50A(1-1/4")	20.00 - 40.00	0.6000	0.6000
T6	28	0.7"	20.00 - 40.00	0.6000	0.6000
T6	29	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T6	31	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T7	1	LDF7-50A(1-5/8")	0.00 - 20.00	0.6000	0.6000
T7	2	1 1/4 " Hybrid	0.00 - 20.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T7	3	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T7	5	LDF6-50A(1-1/4")	0.00 - 20.00	1.0000	1.0000
T7	6	LDF4-50A(1/2")	0.00 - 20.00	0.6000	0.6000
T7	7	AL5-50(7/8")	0.00 - 20.00	0.6000	0.6000
T7	8	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T7	10	LDF7-50A(1-5/8")	0.00 - 20.00	0.6000	0.6000
T7	11	LDF4-50A(1/2")	0.00 - 20.00	0.6000	0.6000
T7	12	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T7	14	LDF7-50A(1-5/8")	0.00 - 20.00	0.6000	0.6000
T7	15	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T7	18	ATCB-B01(5/16")	0.00 - 20.00	0.6000	0.6000
T7	19	LDF4-50A(1/2")	0.00 - 20.00	0.6000	0.6000
T7	20	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T7	22	AL5-50(7/8")	0.00 - 20.00	0.6000	0.6000
T7	23	3" Conduit+(1)1/2"+(2)3/4"	0.00 - 20.00	0.6000	0.6000
T7	24	LDF4-50A(1/2")	0.00 - 20.00	0.6000	0.6000
T7	25	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T7	27	LDF6-50A(1-1/4")	0.00 - 20.00	0.6000	0.6000
T7	28	0.7"	0.00 - 20.00	0.6000	0.6000
T7	29	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T7	31	Safety Line 3/8	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Lightning Rod 5/8" x 5'	B	From Leg	3.000	0.000	125.000	No Ice	0.313	0.313	0.031
(E)			0.000			1/2" Ice	0.826	0.826	0.035
			5.500			1" Ice	1.322	1.322	0.041
Flash Beacon Lighting	C	From Leg	3.000	0.000	125.000	No Ice	2.700	2.700	0.050
(E)			0.000			1/2" Ice	3.100	3.100	0.070
			1.000			1" Ice	3.500	3.500	0.090
#									
(2) PD455	A	From Leg	3.000	0.000	125.000	No Ice	3.560	3.560	0.023
(Blue-Hills Fire District)			0.000			1/2" Ice	7.130	7.130	0.046
			10.000			1" Ice	10.700	10.700	0.069
(3) PD455	B	From Leg	3.000	0.000	125.000	No Ice	3.560	3.560	0.023
(Blue-Hills Fire District &			0.000			1/2" Ice	7.130	7.130	0.046
Bloomfield Police)			10.000			1" Ice	10.700	10.700	0.069
(2) PD455	C	From Leg	3.000	0.000	125.000	No Ice	3.560	3.560	0.023
(Blue-Hills Fire District)			0.000			1/2" Ice	7.130	7.130	0.046
			10.000			1" Ice	10.700	10.700	0.069
Cellwave AS MONR 31	A	From Leg	3.000	0.000	125.000	No Ice	0.944	0.944	0.022
(Blue-Hills Fire District)			0.000			1/2" Ice	1.393	1.393	0.033
			2.000			1" Ice	1.801	1.801	0.047
Cellwave PD165S	C	From Leg	3.000	0.000	125.000	No Ice	0.944	0.944	0.022
(Blue-Hills Fire District)			0.000			1/2" Ice	1.393	1.393	0.033
			2.000			1" Ice	1.801	1.801	0.047
#									
AIR21 B2A/B4P w/ Mount	A	From Leg	3.000	0.000	125.000	No Ice	6.533	4.356	0.070

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Pipe			0.000			1/2" Ice	6.978	4.775	0.112
(T-Mobile)			0.000			1" Ice	7.432	5.202	0.159
AIR21 B2A/B4P w/ Mount	B	From Leg	3.000	0.000	125.000	No Ice	6.533	4.356	0.070
Pipe			0.000			1/2" Ice	6.978	4.775	0.112
(T-Mobile)			0.000			1" Ice	7.432	5.202	0.159
AIR21 B2A/B4P w/ Mount	C	From Leg	3.000	0.000	125.000	No Ice	6.533	4.356	0.070
Pipe			0.000			1/2" Ice	6.978	4.775	0.112
(T-Mobile)			0.000			1" Ice	7.432	5.202	0.159
KRY 112 144/2	A	From Leg	3.000	0.000	125.000	No Ice	0.408	0.204	0.011
(T-Mobile)			0.000			1/2" Ice	0.497	0.273	0.014
			0.000			1" Ice	0.594	0.351	0.019
KRY 112 144/2	B	From Leg	3.000	0.000	125.000	No Ice	0.408	0.204	0.011
(T-Mobile)			0.000			1/2" Ice	0.497	0.273	0.014
			0.000			1" Ice	0.594	0.351	0.019
KRY 112 144/2	C	From Leg	3.000	0.000	125.000	No Ice	0.408	0.204	0.011
(T-Mobile)			0.000			1/2" Ice	0.497	0.273	0.014
			0.000			1" Ice	0.594	0.351	0.019
#									
840 10054 w/ Mount Pipe	A	From Leg	3.000	0.000	120.000	No Ice	5.413	2.385	0.051
(Clearwire)			0.000			1/2" Ice	5.833	2.917	0.088
			0.000			1" Ice	6.263	3.466	0.129
840 10054 w/ Mount Pipe	B	From Leg	3.000	0.000	120.000	No Ice	5.413	2.385	0.051
(Clearwire)			0.000			1/2" Ice	5.833	2.917	0.088
			0.000			1" Ice	6.263	3.466	0.129
840 10054 w/ Mount Pipe	C	From Leg	3.000	0.000	120.000	No Ice	5.413	2.385	0.051
(Clearwire)			0.000			1/2" Ice	5.833	2.917	0.088
			0.000			1" Ice	6.263	3.466	0.129
U-RAS	A	From Leg	3.000	0.000	120.000	No Ice	1.804	0.778	0.030
(Clearwire)			0.000			1/2" Ice	1.988	0.918	0.045
			0.000			1" Ice	2.180	1.067	0.058
U-RAS	B	From Leg	3.000	0.000	120.000	No Ice	1.804	0.778	0.030
(Clearwire)			0.000			1/2" Ice	1.988	0.918	0.045
			0.000			1" Ice	2.180	1.067	0.058
HORIZON DUO	A	From Leg	3.000	0.000	120.000	No Ice	0.547	0.343	0.007
(Clearwire)			0.000			1/2" Ice	0.648	0.426	0.012
			0.000			1" Ice	0.759	0.518	0.018
HORIZON DUO	C	From Leg	3.000	0.000	120.000	No Ice	0.547	0.343	0.007
(Clearwire)			0.000			1/2" Ice	0.648	0.426	0.012
			0.000			1" Ice	0.759	0.518	0.018
4' x 2" Pipe Mount	A	From Leg	3.000	0.000	120.000	No Ice	0.785	0.785	0.029
(Clearwire)			0.000			1/2" Ice	1.028	1.028	0.035
			0.000			1" Ice	1.281	1.281	0.044
4' x 2" Pipe Mount	B	From Leg	3.000	0.000	120.000	No Ice	0.785	0.785	0.029
(Clearwire)			0.000			1/2" Ice	1.028	1.028	0.035
			0.000			1" Ice	1.281	1.281	0.044
4' x 2" Pipe Mount	C	From Leg	3.000	0.000	120.000	No Ice	0.785	0.785	0.029
(Clearwire)			0.000			1/2" Ice	1.028	1.028	0.035
			0.000			1" Ice	1.281	1.281	0.044
Sector Mount [SM 402-3]	C	None		0.000	120.000	No Ice	18.910	18.910	0.851
(E-2PIPIES/SEC)						1/2" Ice	26.780	26.780	1.233
						1" Ice	34.650	34.650	1.616
#									
GPS_A	A	From Leg	3.000	0.000	110.000	No Ice	0.297	0.297	0.001
(Verizon)			0.000			1/2" Ice	0.374	0.374	0.005
			3.000			1" Ice	0.459	0.459	0.010
GPS_A	B	From Leg	3.000	0.000	110.000	No Ice	0.297	0.297	0.001
(Verizon)			0.000			1/2" Ice	0.374	0.374	0.005

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			3.000			1" Ice	0.459	0.459	0.010
BXA-70063-4CF-EDIN-6 w/ Mount Pipe (Verizon)	A	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	5.399 5.844 6.299	3.693 4.295 4.913	0.028 0.070 0.118
BXA-70063-4CF-EDIN-6 w/ Mount Pipe (Verizon)	B	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	5.399 5.844 6.299	3.693 4.295 4.913	0.028 0.070 0.118
BXA-70063-4CF-EDIN-6 w/ Mount Pipe (Verizon)	C	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	5.399 5.844 6.299	3.693 4.295 4.913	0.028 0.070 0.118
DB-T1-6Z-8AB-0Z (Verizon)	C	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	5.600 5.915 6.240	2.333 2.558 2.791	0.044 0.080 0.120
(3) SBNHH-1D65B w/ Mount Pipe (Verizon)	A	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	8.637 9.293 9.917	7.071 8.260 9.170	0.066 0.135 0.212
(3) SBNHH-1D65B w/ Mount Pipe (Verizon)	B	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	8.637 9.293 9.917	7.071 8.260 9.170	0.066 0.135 0.212
(3) SBNHH-1D65B w/ Mount Pipe (Verizon)	C	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	8.637 9.293 9.917	7.071 8.260 9.170	0.066 0.135 0.212
RRH2x60-AWS (Verizon)	A	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	3.957 4.272 4.596	1.816 2.075 2.360	0.060 0.083 0.109
RRH2x60-AWS (Verizon)	B	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	3.957 4.272 4.596	1.816 2.075 2.360	0.060 0.083 0.109
RRH2x60-AWS (Verizon)	C	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	3.957 4.272 4.596	1.816 2.075 2.360	0.060 0.083 0.109
RRH2x60-700 (Verizon)	A	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	3.957 4.272 4.596	1.816 2.075 2.360	0.060 0.083 0.109
RRH2x60-700 (Verizon)	B	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	3.957 4.272 4.596	1.816 2.075 2.360	0.060 0.083 0.109
RRH2x60-700 (Verizon)	C	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	3.957 4.272 4.596	1.816 2.075 2.360	0.060 0.083 0.109
RRH 4x45-PCS (Verizon)	A	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	2.698 2.936 3.183	2.771 3.011 3.260	0.060 0.084 0.111
RRH 4x45-PCS (Verizon)	B	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	2.698 2.936 3.183	2.771 3.011 3.260	0.060 0.084 0.111
RRH 4x45-PCS (Verizon)	C	From Leg	3.000 0.000 3.000	0.000	110.000	No Ice 1/2" Ice 1" Ice	2.698 2.936 3.183	2.771 3.011 3.260	0.060 0.084 0.111
Sector Mount [SM 802-3] (E) **#**	C	None		0.000	110.000	No Ice 1/2" Ice 1" Ice	24.410 31.390 38.370	24.410 31.390 38.370	0.930 1.362 1.794
(2) 7770.00 w/ Mount Pipe (AT&T)	A	From Leg	3.000 0.000 0.000	0.000	98.000	No Ice 1/2" Ice 1" Ice	6.119 6.626 7.128	4.254 5.014 5.711	0.055 0.103 0.157
(2) 7770.00 w/ Mount Pipe	B	From Leg	3.000	0.000	98.000	No Ice	6.119	4.254	0.055

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(AT&T)			0.000			1/2" Ice	6.626	5.014	0.103
			0.000			1" Ice	7.128	5.711	0.157
(2) 7770.00 w/ Mount Pipe	C	From Leg	3.000	0.000	98.000	No Ice	6.119	4.254	0.055
(AT&T)			0.000			1/2" Ice	6.626	5.014	0.103
			0.000			1" Ice	7.128	5.711	0.157
HPA-65R-BUU-H8	A	From Leg	3.000	0.000	98.000	No Ice	12.976	7.516	0.068
(AT&T)			0.000			1/2" Ice	13.558	8.087	0.142
			0.000			1" Ice	14.147	8.666	0.223
HPA-65R-BUU-H8	B	From Leg	3.000	0.000	98.000	No Ice	12.976	7.516	0.068
(AT&T)			0.000			1/2" Ice	13.558	8.087	0.142
			0.000			1" Ice	14.147	8.666	0.223
HPA-65R-BUU-H6	C	From Leg	3.000	0.000	98.000	No Ice	9.486	5.486	0.043
(AT&T)			0.000			1/2" Ice	9.956	5.942	0.100
			0.000			1" Ice	10.434	6.405	0.164
(2) LGP21401	A	From Leg	3.000	0.000	98.000	No Ice	1.288	0.233	0.014
(AT&T)			0.000			1/2" Ice	1.445	0.313	0.021
			0.000			1" Ice	1.611	0.403	0.030
(2) LGP21401	B	From Leg	3.000	0.000	98.000	No Ice	1.288	0.233	0.014
(AT&T)			0.000			1/2" Ice	1.445	0.313	0.021
			0.000			1" Ice	1.611	0.403	0.030
(2) LGP21401	C	From Leg	3.000	0.000	98.000	No Ice	1.288	0.233	0.014
(AT&T)			0.000			1/2" Ice	1.445	0.313	0.021
			0.000			1" Ice	1.611	0.403	0.030
(2) RRUS-11	A	From Leg	3.000	0.000	98.000	No Ice	3.249	1.373	0.048
(AT&T)			0.000			1/2" Ice	3.491	1.551	0.068
			0.000			1" Ice	3.741	1.738	0.092
(2) RRUS-11	B	From Leg	3.000	0.000	98.000	No Ice	3.249	1.373	0.048
(AT&T)			0.000			1/2" Ice	3.491	1.551	0.068
			0.000			1" Ice	3.741	1.738	0.092
(2) RRUS-11	C	From Leg	3.000	0.000	98.000	No Ice	3.249	1.373	0.048
(AT&T)			0.000			1/2" Ice	3.491	1.551	0.068
			0.000			1" Ice	3.741	1.738	0.092
DC6-48-60-18-8F	C	From Leg	3.000	0.000	98.000	No Ice	1.467	1.467	0.019
(AT&T)			0.000			1/2" Ice	1.667	1.667	0.037
			0.000			1" Ice	1.878	1.878	0.057
CS72188.01 LMU antenna	C	From Leg	3.000	0.000	65.000	No Ice	0.200	0.200	0.000
(AT&T)			0.000			1/2" Ice	0.300	0.300	0.000
			0.000			1" Ice	0.400	0.400	0.001
Sector Mount [SM 802-3]	C	None		0.000	98.000	No Ice	24.410	24.410	0.930
(E)						1/2" Ice	31.390	31.390	1.362
						1" Ice	38.370	38.370	1.794
#									
#									
APXVSPP18-C-A20 w/	A	From Leg	3.000	0.000	87.000	No Ice	8.498	6.946	0.083
Mount Pipe			0.000			1/2" Ice	9.149	8.127	0.151
(Sprint)			0.000			1" Ice	9.767	9.021	0.227
APXVSPP18-C-A20 w/	B	From Leg	3.000	0.000	87.000	No Ice	8.498	6.946	0.083
Mount Pipe			0.000			1/2" Ice	9.149	8.127	0.151
(Sprint)			0.000			1" Ice	9.767	9.021	0.227
APXVSPP18-C-A20 w/	C	From Leg	3.000	0.000	87.000	No Ice	8.498	6.946	0.083
Mount Pipe			0.000			1/2" Ice	9.149	8.127	0.151
(Sprint)			0.000			1" Ice	9.767	9.021	0.227
APXVTM14-C-120 w/	A	From Leg	3.000	0.000	87.000	No Ice	7.134	4.959	0.077
Mount Pipe			0.000			1/2" Ice	7.662	5.754	0.131
(Sprint)			0.000			1" Ice	8.183	6.472	0.193
APXVTM14-C-120 w/	B	From Leg	3.000	0.000	87.000	No Ice	7.134	4.959	0.077
Mount Pipe			0.000			1/2" Ice	7.662	5.754	0.131

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(Sprint)			0.000			1" Ice	8.183	6.472	0.193
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	3.000	0.000	87.000	No Ice	7.134	4.959	0.077
			0.000			1/2" Ice	7.662	5.754	0.131
(Sprint)			0.000			1" Ice	8.183	6.472	0.193
TD-RRH8x20-25	A	From Leg	3.000	0.000	87.000	No Ice	4.720	1.703	0.070
(Sprint)			0.000			1/2" Ice	5.014	1.920	0.097
			0.000			1" Ice	5.316	2.145	0.128
TD-RRH8x20-25	B	From Leg	3.000	0.000	87.000	No Ice	4.720	1.703	0.070
(Sprint)			0.000			1/2" Ice	5.014	1.920	0.097
			0.000			1" Ice	5.316	2.145	0.128
TD-RRH8x20-25	C	From Leg	3.000	0.000	87.000	No Ice	4.720	1.703	0.070
(Sprint)			0.000			1/2" Ice	5.014	1.920	0.097
			0.000			1" Ice	5.316	2.145	0.128
1900MHz RRH	A	From Leg	3.000	0.000	87.000	No Ice	2.907	3.801	0.044
(Sprint)			0.000			1/2" Ice	3.145	4.065	0.075
			0.000			1" Ice	3.391	4.337	0.110
1900MHz RRH	B	From Leg	3.000	0.000	87.000	No Ice	2.907	3.801	0.044
(Sprint)			0.000			1/2" Ice	3.145	4.065	0.075
			0.000			1" Ice	3.391	4.337	0.110
1900MHz RRH	C	From Leg	3.000	0.000	87.000	No Ice	2.907	3.801	0.044
(Sprint)			0.000			1/2" Ice	3.145	4.065	0.075
			0.000			1" Ice	3.391	4.337	0.110
800MHZ RRH	A	From Leg	3.000	0.000	87.000	No Ice	2.490	2.068	0.053
(Sprint)			0.000			1/2" Ice	2.706	2.271	0.074
			0.000			1" Ice	2.931	2.481	0.098
800MHZ RRH	B	From Leg	3.000	0.000	87.000	No Ice	2.490	2.068	0.053
(Sprint)			0.000			1/2" Ice	2.706	2.271	0.074
			0.000			1" Ice	2.931	2.481	0.098
800MHZ RRH	C	From Leg	3.000	0.000	87.000	No Ice	2.490	2.068	0.053
(Sprint)			0.000			1/2" Ice	2.706	2.271	0.074
			0.000			1" Ice	2.931	2.481	0.098
800 MHz Filter	A	From Leg	3.000	0.000	87.000	No Ice	1.820	0.604	0.009
(Sprint)			0.000			1/2" Ice	2.008	0.747	0.019
			0.000			1" Ice	2.205	0.899	0.032
800 MHz Filter	B	From Leg	3.000	0.000	87.000	No Ice	1.820	0.604	0.009
(Sprint)			0.000			1/2" Ice	2.008	0.747	0.019
			0.000			1" Ice	2.205	0.899	0.032
800 MHz Filter	C	From Leg	3.000	0.000	87.000	No Ice	1.820	0.604	0.009
(Sprint)			0.000			1/2" Ice	2.008	0.747	0.019
			0.000			1" Ice	2.205	0.899	0.032
(2) ACU-A20-N	A	From Leg	3.000	0.000	87.000	No Ice	0.078	0.136	0.001
(Sprint)			0.000			1/2" Ice	0.121	0.189	0.002
			0.000			1" Ice	0.173	0.251	0.004
ACU-A20-N	B	From Leg	3.000	0.000	87.000	No Ice	0.078	0.136	0.001
(Sprint)			0.000			1/2" Ice	0.121	0.189	0.002
			0.000			1" Ice	0.173	0.251	0.004
ACU-A20-N	C	From Leg	3.000	0.000	87.000	No Ice	0.078	0.136	0.001
(Sprint)			0.000			1/2" Ice	0.121	0.189	0.002
			0.000			1" Ice	0.173	0.251	0.004
(2) 4' x 2" Pipe Mount (E)	A	From Leg	3.000	0.000	87.000	No Ice	0.785	0.785	0.029
			0.000			1/2" Ice	1.028	1.028	0.035
			0.000			1" Ice	1.281	1.281	0.044
(2) 4' x 2" Pipe Mount (E)	B	From Leg	3.000	0.000	87.000	No Ice	0.785	0.785	0.029
			0.000			1/2" Ice	1.028	1.028	0.035
			0.000			1" Ice	1.281	1.281	0.044
(2) 4' x 2" Pipe Mount (E)	C	From Leg	3.000	0.000	87.000	No Ice	0.785	0.785	0.029
			0.000			1/2" Ice	1.028	1.028	0.035

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			1" Ice	1.281	1.281	0.044
Sector Mount [SM 502-3]	C	None		0.000	87.000	No Ice	33.020	33.020	1.673
(E)						1/2" Ice	47.360	47.360	2.224
						1" Ice	61.700	61.700	2.775
#									
APXV18-206517S-C w/	A	From Leg	3.000	0.000	75.000	No Ice	5.404	4.700	0.052
Mount Pipe			0.000			1/2" Ice	5.960	5.860	0.097
(MetroPCS)			0.000			1" Ice	6.481	6.734	0.150
APXV18-206517S-C w/	B	From Leg	3.000	0.000	75.000	No Ice	5.404	4.700	0.052
Mount Pipe			0.000			1/2" Ice	5.960	5.860	0.097
(MetroPCS)			0.000			1" Ice	6.481	6.734	0.150
APXV18-206517S-C w/	C	From Leg	3.000	0.000	75.000	No Ice	5.404	4.700	0.052
Mount Pipe			0.000			1/2" Ice	5.960	5.860	0.097
(MetroPCS)			0.000			1" Ice	6.481	6.734	0.150
#									
#									
***									
Motorola Timing 2000	C	From Leg	3.000	0.000	120.000	No Ice	0.073	0.073	0.700
(Clearwire)			0.000			1/2" Ice	0.119	0.119	2.092
			0.000			1" Ice	0.165	0.165	3.484
***									
(4) 7020 RET	A	From Leg	3.000	0.000	98.000	No Ice	0.344	0.100	0.002
(AT&T)			0.000			1/2" Ice	0.422	0.145	0.005
			0.000			1" Ice	0.507	0.197	0.009
(4) 7020 RET	B	From Leg	3.000	0.000	98.000	No Ice	0.344	0.100	0.002
(AT&T)			0.000			1/2" Ice	0.422	0.145	0.005
			0.000			1" Ice	0.507	0.197	0.009
(4) 7020 RET	C	From Leg	3.000	0.000	98.000	No Ice	0.344	0.100	0.002
(AT&T)			0.000			1/2" Ice	0.422	0.145	0.005
			0.000			1" Ice	0.507	0.197	0.009
RRUS 32 B2	A	From Leg	3.000	0.000	98.000	No Ice	3.517	2.512	0.053
(AT&T)			0.000			1/2" Ice	3.863	2.826	0.079
			0.000			1" Ice	4.209	3.140	0.105
RRUS 32 B2	B	From Leg	3.000	0.000	98.000	No Ice	3.517	2.512	0.053
(AT&T)			0.000			1/2" Ice	3.863	2.826	0.079
			0.000			1" Ice	4.209	3.140	0.105
RRUS 32 B2	C	From Leg	3.000	0.000	98.000	No Ice	3.517	2.512	0.053
(AT&T)			0.000			1/2" Ice	3.863	2.826	0.079
			0.000			1" Ice	4.209	3.140	0.105
(2) LGP21901 Diplexer	A	From Leg	3.000	0.000	98.000	No Ice	1.946	0.518	0.031
(AT&T)			0.000			1/2" Ice	2.190	0.677	0.042
			0.000			1" Ice	2.434	0.836	0.053
(2) LGP21901 Diplexer	B	From Leg	3.000	0.000	98.000	No Ice	1.946	0.518	0.031
(AT&T)			0.000			1/2" Ice	2.190	0.677	0.042
			0.000			1" Ice	2.434	0.836	0.053
(2) LGP21901 Diplexer	C	From Leg	3.000	0.000	98.000	No Ice	1.946	0.518	0.031
(AT&T)			0.000			1/2" Ice	2.190	0.677	0.042
			0.000			1" Ice	2.434	0.836	0.053
Kathrein 782 10253	A	From Leg	3.000	0.000	98.000	No Ice	0.125	0.071	0.003
(AT&T)			0.000			1/2" Ice	0.195	0.129	0.004
			0.000			1" Ice	0.265	0.187	0.005
Kathrein 782 10253	B	From Leg	3.000	0.000	98.000	No Ice	0.125	0.071	0.003
(AT&T)			0.000			1/2" Ice	0.195	0.129	0.004
			0.000			1" Ice	0.265	0.187	0.005
Kathrein 782 10253	C	From Leg	3.000	0.000	98.000	No Ice	0.125	0.071	0.003
(AT&T)			0.000			1/2" Ice	0.195	0.129	0.004
			0.000			1" Ice	0.265	0.187	0.005

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* *K*
***									
Sector Mount [SM 802-3] (E)	C	None		0.000	65.000	No Ice 1/2" Ice 1" Ice	24.410 31.390 38.370	24.410 31.390 38.370	0.930 1.362 1.794
***									
APXVAARR24_43-U-NA20 (T-Mobile)	A	From Leg	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	20.243 20.890 21.544	8.889 9.487 10.092	0.128 0.241 0.362
APXVAARR24_43-U-NA20 (T-Mobile)	B	From Leg	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	20.243 20.890 21.544	8.889 9.487 10.092	0.128 0.241 0.362
APXVAARR24_43-U-NA20 (T-Mobile)	C	From Leg	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	20.243 20.890 21.544	8.889 9.487 10.092	0.128 0.241 0.362
AIR 32 KRD901146-1_B66A_B2A (T-Mobile)	A	From Leg	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	6.510 6.887 7.271	4.712 5.068 5.431	0.132 0.178 0.229
AIR 32 KRD901146-1_B66A_B2A (T-Mobile)	A	From Leg	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	6.510 6.887 7.271	4.712 5.068 5.431	0.132 0.178 0.229
AIR 32 KRD901146-1_B66A_B2A (T-Mobile)	A	From Leg	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	6.510 6.887 7.271	4.712 5.068 5.431	0.132 0.178 0.229
Radio 4449 B71+B12 (T-Mobile)	A	From Leg	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	1.732 1.896 2.067	1.152 1.291 1.436	0.074 0.091 0.110
Radio 4449 B71+B12 (T-Mobile)	B	From Leg	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	1.732 1.896 2.067	1.152 1.291 1.436	0.074 0.091 0.110
Radio 4449 B71+B12 (T-Mobile)	C	From Leg	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	1.732 1.896 2.067	1.152 1.291 1.436	0.074 0.091 0.110
Reinforced Platform mount w/ handrails + Reinforcement Kit (T-Mobile)	C	None		0.000	125.000	No Ice 1/2" Ice 1" Ice	38.835 59.172 79.509	38.835 59.172 79.509	1.800 2.340 2.880

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* *K*
VHLP2.5 (Clearwire)	A	Paraboloid w/Radome	From Leg	4.000 0.000 -3.000	0.000		120.000	2.500	No Ice 1/2" Ice 1" Ice	4.909 5.241 5.574	0.048 0.075 0.102
VHLP2.5 (Clearwire)	C	Paraboloid w/Radome	From Leg	4.000 0.000 3.000	0.000		120.000	2.500	No Ice 1/2" Ice 1" Ice	4.909 5.241 5.574	0.048 0.075 0.102
#											

Load Combinations

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

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	125 - 120	4.944	49	0.383	0.043
T2	120 - 100	4.529	49	0.378	0.026
T3	100 - 80	3.042	49	0.308	0.015
T4	80 - 60	1.878	49	0.228	0.012
T5	60 - 40	1.032	43	0.161	0.008
T6	40 - 20	0.443	43	0.104	0.005
T7	20 - 0	0.106	43	0.042	0.002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
125.000	Lightning Rod 5/8" x 5'	49	4.944	0.383	0.043	19250
123.000	VHLP2.5	49	4.777	0.381	0.035	19250
120.000	840 10054 w/ Mount Pipe	49	4.529	0.378	0.026	19250
117.000	VHLP2.5	49	4.287	0.372	0.020	16061
110.000	GPS_A	49	3.747	0.351	0.017	15407
98.000	(2) 7770.00 w/ Mount Pipe	49	2.911	0.300	0.015	14648
87.000	APXVSPP18-C-A20 w/ Mount Pipe	49	2.248	0.254	0.013	14540
75.000	APXV18-206517S-C w/ Mount Pipe	49	1.638	0.210	0.011	15502
65.000	CS72188.01 LMU antenna	43	1.217	0.177	0.009	18048

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	125 - 120	19.611	10	1.490	0.166
T2	120 - 100	18.012	10	1.474	0.106
T3	100 - 80	12.210	10	1.220	0.062
T4	80 - 60	7.576	10	0.911	0.049
T5	60 - 40	4.166	10	0.650	0.034
T6	40 - 20	1.786	10	0.419	0.020
T7	20 - 0	0.428	10	0.171	0.007

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
125.000	Lightning Rod 5/8" x 5'	10	19.611	1.490	0.166	5459
123.000	VHLP2.5	10	18.968	1.485	0.139	5459
120.000	840 10054 w/ Mount Pipe	10	18.012	1.474	0.106	5459
117.000	VHLP2.5	10	17.076	1.454	0.083	4530
110.000	GPS_A	10	14.978	1.375	0.070	4239
98.000	(2) 7770.00 w/ Mount Pipe	10	11.692	1.187	0.060	3823
87.000	APXVSPP18-C-A20 w/ Mount Pipe	10	9.056	1.016	0.053	3732
75.000	APXV18-206517S-C w/ Mount Pipe	10	6.615	0.840	0.045	3932

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
65.000	CS72188.01 LMU antenna	10	4.915	0.710	0.038	4556

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	125	Leg	A325N	0.750	4	1.201	29.821	0.040 ✔	1	Bolt Tension
T2	120	Leg	A325N	0.750	6	6.843	29.821	0.229 ✔	1	Bolt Tension
		Diagonal	A325X	0.500	1	4.443	5.966	0.745 ✔	1	Member Block Shear
T3	100	Leg	A325N	1.000	6	14.281	53.014	0.269 ✔	1	Bolt Tension
		Diagonal	A325X	0.500	1	5.858	8.005	0.732 ✔	1	Member Block Shear
T4	80	Leg	A325N	1.000	8	16.397	53.014	0.309 ✔	1	Bolt Tension
		Diagonal	A325X	0.500	1	6.897	9.719	0.710 ✔	1	Bolt Shear
T5	60	Leg	A325N	1.000	8	21.824	53.014	0.412 ✔	1	Bolt Tension
		Diagonal	A325X	0.625	1	6.935	9.534	0.727 ✔	1	Member Block Shear
T6	40	Leg	A325N	1.250	8	26.030	82.835	0.314 ✔	1	Bolt Tension
		Diagonal	A325X	0.625	1	8.945	9.787	0.914 ✔	1	Member Bearing
T7	20	Leg	A36	1.500	8	30.593	57.653	0.531 ✔	1	Bolt Tension
		Diagonal	A325X	0.625	1	8.852	13.050	0.678 ✔	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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 120	P2.5x.203	5.000	2.500	31.7 K=1.00	1.704	-11.479	77.815	0.148 [1] ✔
T2	120 - 100	P2.5x.203	20.019	5.005	63.4 K=1.00	1.704	-47.134	61.057	0.772 [1] ✔
T3	100 - 80	P3.5x.226	20.019	5.005	44.9 K=1.00	2.680	-96.985	112.760	0.860 [1] ✔
T4	80 - 60	P5x.258	20.019	6.673	42.6 K=1.00	4.300	-146.335	183.884	0.796 [1] ✔
T5	60 - 40	P6x.28	20.019	6.673	35.7 K=1.00	5.581	-194.170	249.417	0.778 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T6	40 - 20	P6x.28	20.019	5.181	27.7 K=1.00	5.581	-231.577	259.755	0.892 [1] ✔
T7	20 - 0	P8x.322	20.019	10.009	40.9 K=1.00	8.399	-272.447	363.459	0.750 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	120 - 100	L1 1/2x1 1/2x3/16	6.686	3.176	129.9 K=1.00	0.527	-4.653	7.026	0.662 [1] ✔
T3	100 - 80	L2x2x3/16	8.054	3.798	116.8 K=1.01	0.715	-6.012	11.293	0.532 [1] ✔
T4	80 - 60	L2 1/2x2 1/2x3/16	10.224	4.836	117.9 K=1.01	0.902	-6.897	14.057	0.491 [1] ✔
T5	60 - 40	L2 1/2x2 1/2x3/16	11.403	5.380	130.5 K=1.00	0.902	-7.137	11.935	0.598 [1] ✔
T6	40 - 20	L3x3x3/16	14.592	7.039	141.7 K=1.00	1.090	-9.505	12.270	0.775 [1] ✔
T7	20 - 0	L3 1/2x3 1/2x1/4	15.718	7.501	129.7 K=1.00	1.690	-9.749	22.585	0.432 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 120	L1 1/2x1 1/2x3/16	3.500	3.260	128.2 K=0.96	0.527	-3.303	7.190	0.459 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T6	40 - 20	L3x3x1/4	10.612	10.060	126.0 K=0.97	1.440	-4.014	20.219	0.199 [1]

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

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 120	L1 1/2x1 1/2x3/16	3.500	3.260	128.2 K=0.96	0.527	-1.904	7.190	0.265 [1] ✔

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 120	L1 1/2x1 1/2x3/16	3.500	3.260	128.2 K=0.96	0.527	-1.679	7.190	0.233 [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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 120	P2.5x.203	5.000	2.500	31.7	1.704	4.804	84.350	0.057 [1] ✔
T2	120 - 100	P2.5x.203	20.019	5.005	63.4	1.704	41.056	84.350	0.487 [1] ✔
T3	100 - 80	P3.5x.226	20.019	5.005	44.9	2.680	85.684	132.637	0.646 [1] ✔
T4	80 - 60	P5x.258	20.019	6.673	42.6	4.300	131.172	212.843	0.616 [1] ✔
T5	60 - 40	P6x.28	20.019	6.673	35.7	5.581	174.592	276.277	0.632 [1] ✔
T6	40 - 20	P6x.28	20.019	4.828	25.8	5.581	208.494	276.277	0.755 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	20 - 0	P8x.322	20.019	10.009	40.9	8.399	244.746	415.763	0.589 [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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 120	5/8	4.301	4.007	307.7	0.307	4.195	9.940	0.422 [1]
T2	120 - 100	L1 1/2x1 1/2x3/16	6.686	3.176	87.0	0.308	4.443	13.381	0.332 [1]
T3	100 - 80	L2x2x3/16	8.054	3.798	76.5	0.448	5.858	19.499	0.300 [1]
T4	80 - 60	L2 1/2x2 1/2x3/16	10.224	4.836	76.6	0.589	6.583	25.616	0.257 [1]
T5	60 - 40	L2 1/2x2 1/2x3/16	11.403	5.380	85.0	0.571	6.935	24.851	0.279 [1]
T6	40 - 20	L3x3x3/16	14.056	6.780	88.3	0.712	8.945	30.968	0.289 [1]
T7	20 - 0	L3 1/2x3 1/2x1/4	15.718	7.501	84.1	1.127	8.852	49.019	0.181 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 120	L1 1/2x1 1/2x3/16	3.500	3.260	85.7	0.527	0.199	17.086	0.012 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

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

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T6	40 - 20	L3x3x1/4	10.612	10.060	129.8	1.440	4.014	46.656	0.086 [1] ✔

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 120	L1 1/2x1 1/2x3/16	3.500	3.260	85.7	0.527	0.730	17.086	0.043 [1] ✔

[1] $P_u / \phi P_n$ controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 120	L1 1/2x1 1/2x3/16	3.500	3.260	85.7	0.527	0.290	17.086	0.017 [1] ✔

[1] $P_u / \phi P_n$ controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	125 - 120	Leg	P2.5x.203	3	-11.479	77.815	14.8	Pass
T2	120 - 100	Leg	P2.5x.203	25	-47.134	61.057	77.2	Pass
T3	100 - 80	Leg	P3.5x.226	53	-96.985	112.760	86.0	Pass
T4	80 - 60	Leg	P5x.258	80	-146.335	183.884	79.6	Pass
T5	60 - 40	Leg	P6x.28	101	-194.170	249.417	77.8	Pass
T6	40 - 20	Leg	P6x.28	122	-231.577	259.755	89.2	Pass
T7	20 - 0	Leg	P8x.322	143	-272.447	363.459	75.0	Pass
T1	125 - 120	Diagonal	5/8	15	4.195	9.940	42.2	Pass
T2	120 - 100	Diagonal	L1 1/2x1 1/2x3/16	38	-4.653	7.026	66.2 74.5 (b)	Pass
T3	100 - 80	Diagonal	L2x2x3/16	59	-6.012	11.293	53.2 73.2 (b)	Pass
T4	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	83	-6.897	14.057	49.1 71.0 (b)	Pass
T5	60 - 40	Diagonal	L2 1/2x2 1/2x3/16	104	-7.137	11.935	59.8 72.7 (b)	Pass
T6	40 - 20	Diagonal	L3x3x3/16	125	-9.505	12.270	77.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
							91.4 (b)	
T7	20 - 0	Diagonal	L3 1/2x3 1/2x1/4	146	-9.749	22.585	43.2	Pass
							67.8 (b)	
T1	125 - 120	Horizontal	L1 1/2x1 1/2x3/16	18	-3.303	7.190	45.9	Pass
T6	40 - 20	Secondary Horizontal	L3x3x1/4	130	-4.014	20.219	19.9	Pass
T1	125 - 120	Top Girt	L1 1/2x1 1/2x3/16	6	-1.904	7.190	26.5	Pass
T1	125 - 120	Bottom Girt	L1 1/2x1 1/2x3/16	9	-1.679	7.190	23.3	Pass
							Summary	
							Leg (T6) 89.2	Pass
							Diagonal (T6) 91.4	Pass
							Horizontal (T1) 45.9	Pass
							Secondary Horizontal (T6) 19.9	Pass
							Top Girt (T1) 26.5	Pass
							Bottom Girt (T1) 23.3	Pass
							Bolt Checks 91.4	Pass
							RATING = **91.4**	**Pass**

MATHCAD CALCULATION PRINTOUT

Existing 125 ft Self Support Tower Foundation Check

Customer Name: SBA Communications Corp
Customer Site Number: CT01725-A-04
Customer Site Name: Bloomfield

ACGI Job # 18-5613
(Previous Job #16-4565, dated 12/08/2016)

Foundation check

-Foundation Reactions-

(As per TNX output, Factored, G Code)

Total Shear	$S := 37 \cdot kips$	Compression on Pedestal:	$P_c := 284 \cdot kips$
Moment	$M := 2926 \cdot ft\_K$	Uplift on Pedestal:	$P_{up} := 255 \cdot kips$
Down load, Tower weight	$Pv := 42kips$	Shear on Pedestal:	$Sh := 24 \cdot kips$

-Soil Properties- **Soil data as per Report of Geotechnical Evaluation of Subsurface Conditions by FDH Engineering, Project# 1206690EG1 dated 08/10/2012.**

Allowable Bearing Capacity	$Brg_{allw} := 5.0 \cdot ksf$	Safety Factor $SF := 2.0$	(Estimated)
Internal friction angle,	$\phi := 30deg$	$Brg_{uc} := SF \cdot Brg_{allw} = 10 \cdot ksf$	
Unit wt. of soil,	$\gamma_s := 0.110 \cdot kcf$		
Alowable Passive Pressure	see next page		
Cohesion of soil,	$c_u := 0 \cdot ksf$		
Friction Factor	$FF := 0.3$		(Estimated)
Depth to be neglected	$L_{neg} := 0 \cdot ft$		

-Material Parameters-

Conforming to the design requirements as in ACI 318-011

Unit wt. of concrete,	$\gamma_c := 0.150 \cdot kcf$
Concrete compressive strength,	$f_c := 3000 \cdot psi$
Rebar yield strength,	$f_y := 60000 \cdot psi$

DIMENSIONS

Tower face width $TWFW := 12.5 \cdot ft$ Tower ht. $Tw_{ht} := 125 \cdot ft$

The tower location is eccentric by $L_{pe} := 0 \cdot ft$ with respect to the mat foundation center towards the base

Type of column, col.t=0 for circular,=1 for rectangular/square $col_t := 0$

Depth of mat,	$D_f := 4.25 \cdot ft$		
Thickness of mat,	$T_f := 4.25 \cdot ft$		
Pedestal size,	$Ped_s := 0 \cdot ft$	No. of pedestals	$Nped := 0$
Extension above the grade,	$E_g := 0 \cdot ft$		

Mat Dimensions, LxB $L := 29 \cdot ft$ x $B := L$ $B = 29\,ft$ $Brg_{allw} = 5 \cdot ksf$

- Foundation Dimensions as per Original Foundation Design by Fred A. Nudd Corporation, Dwg# 97-5566-2 dated 12/16/1997.

-Reinforcement Data-

Typical concrete cover	$cc := 3in$
Vertical rebar size	$d_{bar} := 8$

MAT SIZING CALCULATIONS

Check of mat size

$K_p := \tan\left(45\cdot deg + \frac{\phi}{2}\right)^2 \qquad K_p = 3$

$P_{pave} := \frac{(D_f - T_f - L_{neg})\cdot K_p\cdot\gamma_s + (D_f - L_{neg})\cdot K_p\cdot\gamma_s}{2} = 0.701\cdot ksf$

Calculate safety against overturning and location of resultant on the base

Resisting Moments about mid axis parallel to base

$Area_{ped} := if\left(col_t = 1, Ped_s^2, \frac{\pi}{4}\cdot Ped_s^2\right) \qquad Area_{ped} = 0$

component	value, kips	lever arm, ft	resisting moment, ft-kips
1) Concrete wt.	$C_w := L\cdot B\cdot T_f\cdot(\gamma_c) + Area_{ped}\cdot\gamma_c\cdot(D_f + E_g - T_f)\cdot Nped$	$L_c := \frac{L}{2}$	$R_c := C_w\cdot L_c$
	$C_w = 536.137\cdot kips$	$L_c = 14.5\,ft$	$R_c = 7773.994\cdot ft\_K$
2) Soil wt.	$S_w := \left[L\cdot B\cdot(D_f - T_f) - Area_{ped}\cdot(D_f - T_f)\cdot Nped\right]\cdot\gamma_s$	$L_s := \frac{L}{2}$	$R_s := S_w\cdot L_s$
	$S_w = 0\cdot kips$	$L_s = 14.5\,ft$	$R_s = 0\cdot ft\_K$
3) Wt. of soil wedge	$W_w := (D_f)\cdot\frac{1}{2}\cdot(D_f\cdot\tan(\phi))\cdot B\cdot(\gamma_s)$	$L_w := \left(L + D_f\cdot\frac{\tan(\phi)}{3}\right)$	$R_w := W_w\cdot L_w$
	$W_w = 16.633\cdot kips$	$L_w = 29.818\,ft$	$R_w = 495.97\cdot ft\_K$
4) Passive pressure	$Pe_p := T_f\cdot B\cdot P_{pave}$	$L_p := \frac{T_f}{3}$	$R_p := Pe_p\cdot L_p$
	$Pe_p = 86.429\cdot kips$	$L_p = 1.417\,ft$	$R_p = 122.441\cdot ft\_K$
5) Vertical	$Pv = 42\cdot kips$		
	$S_{w1} := L\cdot B\cdot D_f\cdot\gamma_s$ $S_{w1} = 393.167\cdot kips$ <--- for net calcs	$L_v := \frac{L}{2}$	$R_v := Pv\cdot L_v$
Total weight=	$T_w := C_w + S_w + W_w + Pv$ $T_w = 594.771\cdot kips$	$L_v = 14.5\,ft$	$R_v = 609\cdot ft\_K$

Total resisting Moment= $M_r := R_c + R_s + R_w + R_p + R_v$ $M_r = 9001.405\cdot ft\_K$

Overturning Moments

component	value, kips	lever arm, ft	Overturning Moment ft-kips
1) Moment on foundation due to eccentric location of tower	$Pv = 42\cdot kips$	$L_{pe} = 0$	$M_{pe} := L_{pe}\cdot Pv$ $M_{pe} = 0\cdot ft\_K$
2) Moment on foundation	-	-	$M = 2926\cdot ft\_K$
3) Moment due to horizontal shear	$S_t := S$	$L_{hs} := D_f + E_g$	$O_{hs} := L_{hs}\cdot S_t$
		$L_{hs} = 4.25\,ft$	$O_{hs} = 157.25\cdot ft\_K$

Total Overturning Moment= $M_o := M + O_{hs} + M_{pe}$ $M_o = 3083.25 \cdot ft\_K$

Check Safety Factor against Overturning about mid axis parallel to base

$SF := \frac{M_r}{M_o}$ $SF = 2.919$ > 1.5 OK!

Calculate eccentricity, e $e := \frac{L}{2} - \frac{M_r - M_o}{T_w}$ $e = 4.55\,ft$

Check location of eccentricity and determine pressure distribution under the mat

$L_{loc} := \frac{L}{6}$ $L_{loc} = 4.833\,ft$

For net bearing calcs $T_{w1} := S_{w1} + W_w$ $T_{w1} = 409.801 \cdot kips$

$P_{max1} := if\left[e \le L_{loc}, \frac{T_w}{L \cdot B} \cdot \left[1 + \left(6 \cdot \frac{e}{L}\right)\right], 4 \cdot \frac{T_w}{3 \cdot B \cdot (L - 2 \cdot e)}\right]$ $P_{max1} = 1.373 \cdot ksf$

$P_{max2} := \left(\frac{T_{w1}}{L \cdot B}\right)$ $P_{max2} = 0.487 \cdot ksf$ $P_{net} := P_{max1} - P_{max2}$ $P_{max} := P_{net}$

Net soil pressure, $P_{net} = 0.886 \cdot ksf$ < $Brg_{allw} = 5 \cdot ksf$ **Pass!** $\frac{P_{net}}{0.75 Brg_{uc}} = 11.809 \cdot \%$

$P_{min} := if\left[e \le L_{loc}, \frac{T_w}{L \cdot B} \cdot \left[1 - \left(6 \cdot \frac{e}{L}\right)\right], 0 \cdot ksf\right]$ $P_{min} = 0.042 \cdot ksf$

Check for horizontal shear $P_{hor} := Pe_p + Pv \cdot 0.35$

$P_{hor} = 101.129 \cdot kips$ $S = 37 \cdot kips$ Since P.hor > S it is safe! $\frac{S}{P_{hor}} = 36.587 \cdot \%$

Check for uplift

Component	Down load value, kips	
1) Soil Weight	$S_{w1} := \left[L \cdot B \cdot (D_f - T_f) - Area_{ped} \cdot (D_f - T_f) \cdot Nped\right] \cdot \gamma_s$	$S_{w1} = 0 \cdot kips$
2) Wt. of soil wedge	$W_{w1} := (D_f) \cdot \frac{1}{2} \cdot (D_f \cdot \tan(\phi)) \cdot B \cdot (\gamma_s)$	$W_{w1} = 16.633 \cdot kips$
3)Concrete wt.	$C_{w1} := L \cdot B \cdot T_f \cdot (\gamma_c) + Area_{ped} \cdot \gamma_c \cdot (D_f + E_g - T_f) \cdot Nped$	$C_{w1} = 536.137 \cdot kips$

Total down load:

$TWT1 := S_{w1} + W_{w1} + C_{w1}$ $TWT1 = 552.771 \cdot kips$ Total down load

Skin friction around footing:

$SKF := FF \cdot c_u \cdot (L + B) \cdot 2 \cdot 2 \cdot ft$ $SKF = 0 \cdot kips$

$T_{down} := (TWT1 + SKF)$ $T_{down} = 552.771 \cdot kips$ > $P_{up} = 255 \cdot kips$ $\frac{P_{up}}{T_{down}} = 46.131 \cdot \%$ **OK!**

REINFORCED CONCRETE CHECK CALCULATIONS

General Input parameters

Concrete Cover, $cc := 3.0 \cdot in$

Reduction factors as per respective ACI sections

$\phi_{shear} := 0.75$ as per ACI 9.3.2.3

$\phi_{compr} := 0.65$ as per ACI 9.3.2.2

$\phi_{axten} := 0.9$ as per ACI 9.3.2.2 a

Reinforced concrete load factor as per EIA 3.1.16 $RC_{fac} := 1.0$

(Loads already factored under TIA-222-G Code)

Check for wide beam or single shear in mat

Allowable shear stress in concrete for wide beam shear criteria =

$\nu_{wide} := 2 \cdot \phi_{shear} \cdot \sqrt{f_c \cdot psi}$ $\nu_{wide} = 82.158 \cdot psi$

Effective depth of stee $d := T_f - cc$ $d = 48 \cdot in$ $L_{eff} := if\left(e \le L_{loc}, L, L - 2 \cdot e\right)$ $L_{eff} = 29\,ft$

$$dist := if\left[Nped = 3, \left(\frac{L}{2} - \frac{1}{3} \cdot \sin(60 \cdot deg) \cdot TWFW - \frac{1}{2} \cdot Ped_s - d\right), \left(\frac{L}{2} - \frac{TWFW}{2} - \frac{1}{2} \cdot Ped_s - d\right)\right]$$

Factor load by RC $P_{maxf} := P_{max} \cdot RC_{fac}$ $P_{minf} := P_{min} \cdot RC_{fac}$

shear on the face of concrete=

$$Shear_{wide} := (dist) \cdot B \cdot \left[\frac{P_{maxf} + \left[P_{maxf} - \frac{P_{maxf} - P_{minf}}{L_{eff}} \cdot (dist)\right]}{2}\right] \qquad Shear_{wide} = 101.533 \cdot kips$$

Area of concrete in shear= $A_{shear} := B \cdot d$ $A_{shear} = 16704 \cdot in^2$

Shear stress acting on concrete fa $\nu_{act} := \frac{Shear_{wide}}{A_{shear}}$ $\nu_{act} = 6.078 \cdot psi$

$\nu_{act} = 6.078 \cdot psi$ < $\nu_{wide} = 82.158 \cdot psi$ **O.K!**

Check for punching or two-way shear in mat

Calculate allowable shear stress in concrete for punching/two-way shear

$\beta := \frac{L}{B}$ $\beta = 1$ $\nu_{punch} := if\left[\left(2 + \frac{4}{\beta}\right) \cdot \phi_{shear} \cdot \sqrt{f_c \cdot psi} \le 4 \cdot \phi_{shear} \cdot \sqrt{f_c \cdot psi}, \left(2 + \frac{4}{\beta}\right) \cdot \phi_{shear} \cdot \sqrt{f_c \cdot psi}, 4 \cdot \phi_{shear} \cdot \sqrt{f_c \cdot psi}\right]$

$\nu_{punch} = 164.317 \cdot psi$ $Area_{col} := if\left[col_t = 0, \frac{\pi}{4} \cdot \left(Ped_s + d\right)^2, \left(Ped_s + d\right)^2\right]$

$P_{avg} := \frac{P_{maxf} + P_{minf}}{2}$ $Peri_{col} := if\left[col_t = 0, 2 \cdot \pi \cdot \frac{Ped_s + d}{2}, 4 \cdot \left(Ped_s + d\right)\right]$

Factor vertical load $Pvf := RC_{fac} \cdot Pv$

Shear stress acting on the concrete face= $\nu_{act} := \frac{P_c - Area_{col} \cdot P_{avg}}{Peri_{col} \cdot d \cdot 4}$

$\nu_{act} = 9.608 \cdot psi$ < $\nu_{punch} = 164.317 \cdot psi$ **O.K!**

Check of mat footing

$C_{wped} := Area_{ped} \cdot \gamma_c \cdot (D_f + E_g - T_f) \cdot Nped$ Wt. of concrete pedestals

$P_{upnet} := P_{up} - \frac{C_{wped} + S_w \cdot 0.95}{Nped}$ $P_{upnet} = 255 \cdot kips$

Net uplift acting at mat level creating bending moment in the slab. Soil wt. reduced by 5 % to account for variation in compaction . ACI 9.3.2.2

Calculate bending moment for mat design:

$\phi_{bend} := 0.9$ $Langle := if(Nped = 3, \sin(60 \cdot deg), 1)$

$\beta_1 := if\left[f_c \le 4000 \cdot psi, 0.85, if\left[f_c \ge 8000 \cdot psi, 0.65, 0.85 - \left(\frac{f_c}{psi} - 4000\right) \cdot 0.05\right]\right]$ ACI 10.2.7.3

$B_{mo} := RC_{fac} \cdot \left[(TWFW \cdot P_{upnet}) \cdot Langle + S_t \cdot (D_f + E_g)\right]$ $B_{mo} = 3344.75 \cdot ft\_K$

$B_{mo1} := \frac{P_{max} - P_{min}}{(L - 2 \cdot e) \cdot 2} \cdot \left(TWFW \cdot Langle \cdot \frac{1}{3} + \frac{Ped_s}{2}\right) \cdot \left[\left[(L - 2 \cdot e) - \left(TWFW \cdot Langle \cdot \frac{1}{3} + \frac{Ped_s}{2}\right)\right]^2 \cdot 0.5\right] \cdot B$

$W_e := TWFW \cdot Langle + Ped_s$ $W_e = 12.5\,ft$

Reinforcement middle bandwidth.

$B_{mo1} = 317217.357\,ft \cdot lb$

required R_u $R_u := \frac{B_{mo}}{\phi_{bend} \cdot B \cdot d^2}$ $R_u = 55.621 \cdot psi$ $m := \frac{f_y}{\beta_1 \cdot f_c}$ $m = 23.529$

required

$\rho := \frac{1}{m} \cdot \left[1 - \sqrt{1 - \left(\frac{2 \cdot m \cdot R_u}{f_y}\right)}\right]$ $\rho = 0.001$

Required area of steel for mat =

$Ast_f := \rho \cdot B \cdot d$ $Ast_f = 15.658 \cdot in^2$

minimum area of steel required,

$Ast_{minf} := .0018 \cdot B \cdot T_f$ $Ast_{minf} = 31.946 \cdot in^2$ per ACI 10.5.3 & 7.12

$Ast_{fuse} := if(Ast_f > Ast_{minf}, Ast_f, Ast_{minf})$ $Ast_{fuse} = 31.946 \cdot in^2$

Bar size provided = $f_{bar} := 8$ $f_{dia} := \frac{f_{bar}}{8} \cdot in$ $f_{dia} = 1 \cdot in$

Bar area = $f_{abar} := \pi \cdot \frac{f_{dia}^2}{4}$ $f_{abar} = 0.785 \cdot in^2$

Number of bars required = $Nf_{bars} := if\left(Ast_{fuse} = Ast_{minf}, ceil\left(\frac{Ast_{fuse}}{f_{abar}}\right), ceil\left(\frac{Ast_{fuse}}{f_{abar}} \cdot \frac{L}{W_e}\right)\right)$ $Nf_{bars} = 41$

Used $Nf_{bars\_used} := 27 \cdot 2 = 54$ > $Nf_{bars} = 41$

($Nf_{bars\_used} = 54$) # $f_{bar} = 8$ bars at the Top and Bottom of the mat is OK!

Reinforcement ratio, $Reinf_{ratio} := \frac{Nf_{bars}}{Nf_{bars\_used}} = 75.926 \cdot \%$

Foundation Check Summary

-Foundation Reactions-

Shear; $S = 37 \cdot kips$

Down load; $Pv = 42 \cdot kips$

Uplift load; $P_{up} = 255 \cdot kips$

Moment; $M = 2926 \cdot ft\_K$

Stability Calculations

Safety Factor against Overturning, $SF = 2.919$ > 1.5 OK!

$\frac{1.5}{SF} = 51.379 \cdot \%$

Net soil pressure, $P_{net} = 0.886 \cdot ksf$ < $Brg_{allw} = 5 \cdot ksf$ **OK!**

$\frac{P_{net}}{Brg_{allw}} = 17.713 \cdot \%$

Check for horizontal shear, $P_{hor} = 101.129 \cdot kips$ > $S = 37 \cdot kips$ **OK!**

$\frac{S}{P_{hor}} = 36.587 \cdot \%$

Check for Uplift, $T_{down} = 552.771 \cdot kips$ > $P_{up} = 255 \cdot kips$ **OK!**

$\frac{P_{up}}{T_{down}} = 46.131 \cdot \%$

Steel Reinforcement Check, $Reinf_{ratio} = 75.926 \cdot \%$ OK!

SITE NAME: BLUEHILLS/ JN OF RT-187_1

1021 BLUE HILLS AVENUE
BLOOMFIELD, CT 06002

SITE NUMBER: CT11162B

PROJECT: T-MOBILE L600

CONFIGURATION: 67D92DB

T-MOBILE TECHNICIAN SITE SAFETY NOTES

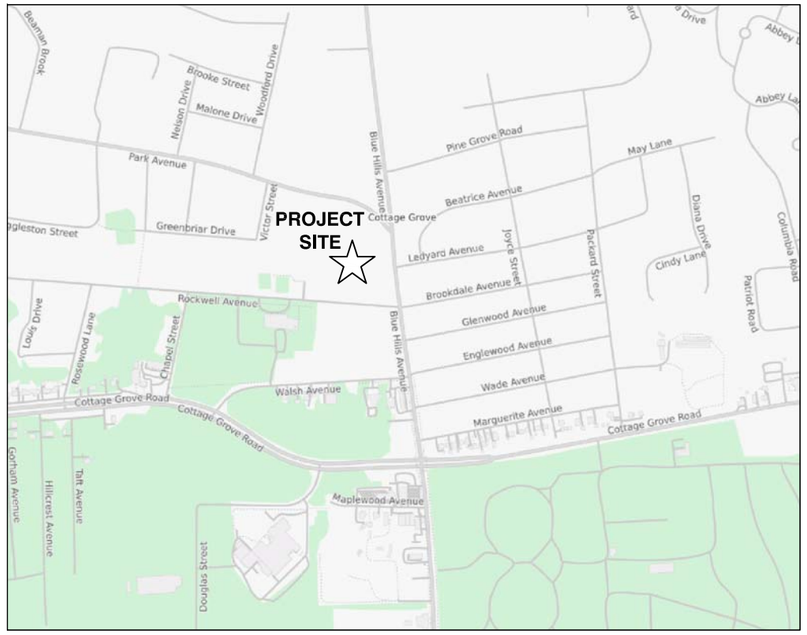
LOCATION	SPECIAL RESTRICTIONS
ANTENNA/TMA	
SECTOR A:	ACCESS NOT PERMITTED
SECTOR B:	ACCESS NOT PERMITTED
SECTOR C:	ACCESS NOT PERMITTED
GPS/LMU:	UNRESTRICTED*
(*CAUTION: OSHA-APPROVED PORTABLE 8' STEP-LADDER REQUIRED)	
RADIO CABINETS:	UNRESTRICTED
PPC DISCONNECT:	UNRESTRICTED
MAIN CIRCUIT D/C:	UNRESTRICTED
NIU/T DEMARC:	UNRESTRICTED
OTHER/SPECIAL:	NONE

GENERAL NOTES

1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY AND COPYRIGHTED WORK OF T-MOBILE NORTHEAST, LLC. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.
2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE T-MOBILE NORTHEAST. LLC REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

SPECIAL CONSTRUCTION NOTES

1. TOWER OWNER SHALL PROVIDE GLOBAL STRUCTURAL STABILITY ANALYSIS OF EXISTING ANTENNA SUPPORT STRUCTURE. GENERAL CONTRACTOR SCOPE OF WORK SHALL INCLUDE TO FURNISH, INSTALL AND COMPLETE ALL REQUIRED STRUCTURAL MODIFICATIONS, RE-BUNDLING OF COAXIAL CABLES OR OTHER SPECIAL MODIFICATIONS AS OUTLINED THEREIN.
2. GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL SPECIAL OR SUPPLEMENTAL ADDITIONAL TOWER-MOUNTED EQUIPMENT PER RECOMMENDATIONS FROM SBA-PROVIDED TOWER STRUCTURAL ANALYSIS FOR ANY SPECIAL SHIELDING OF TOWER TOP EQUIPMENT AND FOR ANY SPECIAL FEEDLINE BUNDLING OR RELOCATION.
3. PROTERRA DESIGN GROUP ASSUMES THAT THE SELF-SUPPORT TOWER IS PROPERLY CONSTRUCTED AND MAINTAINED. ALL STRUCTURAL MEMBERS AND THEIR CONNECTION ARE ASSUMED TO BE IN GOOD CONDITION AND ARE FREE FROM DEFECTS WITH NO DETERIORATION TO ITS MEMBER CAPACITIES.



PROJECT INFORMATION

SCOPE OF WORK:	UNMANNED TELECOMMUNICATIONS FACILITY T-MOBILE EQUIPMENT MODERNIZATION
ZONING JURISDICTION:	SPECIAL ZONING NOTE (ELIGIBLE FACILITY REQUEST): BASED ON INFORMATION PROVIDED BY T-MOBILE REGULATORY COMPLIANCE PROFESSIONALS AND LEGAL COUNSEL, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS CONSIDERED AN ELIGIBLE FACILITY UNDER THE MIDDLE CLASS TAX RELIEF AND JOB CREATION ACT OF 2012, 47 USC 1455(A), SECTION 6409(A), AND IS SUBJECT TO AN ELIGIBLE FACILITY REQUEST, EXPEDITED REVIEW AND LIMITED/PARTIAL ZONING PRE-EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW OR ADMINISTRATIVE REVIEW).
SITE ADDRESS:	1021 BLUE HILLS AVENUE BLOOMFIELD, CT 06002
LATITUDE:	41° 49' 12.43" N (41.8201°) (FROM SBA RECORD)
LONGITUDE:	72° 41' 47.45" W (-72.6965°) (FROM SBA RECORD)
JURISDICTION:	TOWN OF BLOOMFIELD
BUILDING CODE:	2016 CONNECTICUT STATE BUILDING CODE WITH AMENDMENTS (IBC 2012 BASED)
ELECTRICAL CODE:	2014 NATIONAL ELECTRICAL CODE AND AMENDMENTS
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY
TOWER OWNER:	SBA TOWERS, LLC
SBA SITE ID:	CT01725-A
SBA SITE NAME:	BLOOMFIELD
SBA REGIONAL SITE MANAGER:	STEPHEN ROTH (860) 539-4920

APPROVALS

PROJECT MANAGER	DATE
CONSTRUCTION	DATE
RF ENGINEERING	DATE
ZONING / SITE ACQ.	DATE
OPERATIONS	DATE
TOWER OWNER	DATE

DIG SAFE SYSTEM
(MA, ME, NH, RI, VT):
1-888-344-7233

CALL BEFORE YOU DIG
(CT): 1-800-922-4455

UNDERGROUND SERVICE ALERT

DRAWING INDEX

SHEET NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
Z-1	COMPOUND PLAN	0
Z-2	ELEVATIONS	0
Z-3	EXISTING & PROPOSED ANTENNA PLAN	0

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
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OFFICE: (508) 286-2700

SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 Ph: (413)320-4918

STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: 8/22/18 JMM/TEJ

APPROVED BY: JMM/TEJ

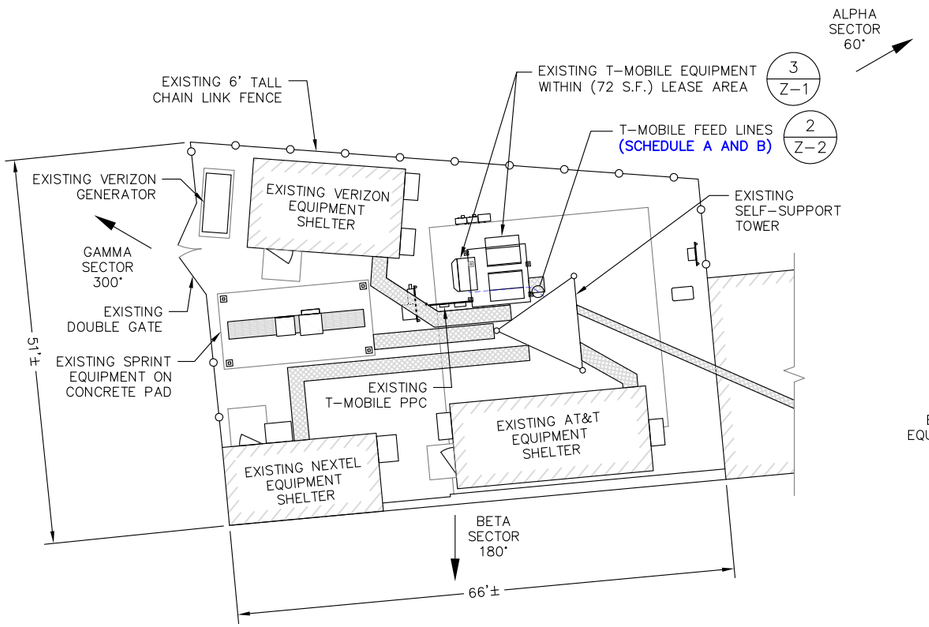
SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	08/22/18	ISSUED FOR PERMITTING	PN

SITE NUMBER:
CT11162B
SITE NAME:
BLUEHILLS/ JN OF RT-187_1
SITE ADDRESS:
1021 BLUE HILLS AVENUE
BLOOMFIELD, CT 06002

SHEET TITLE
TITLE SHEET

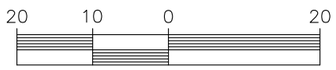
SHEET NUMBER
T-1



COMPOUND PLAN

1 / Z-1

SCALE: 1"=20' (11"x17")
1"=10' (22"x34")



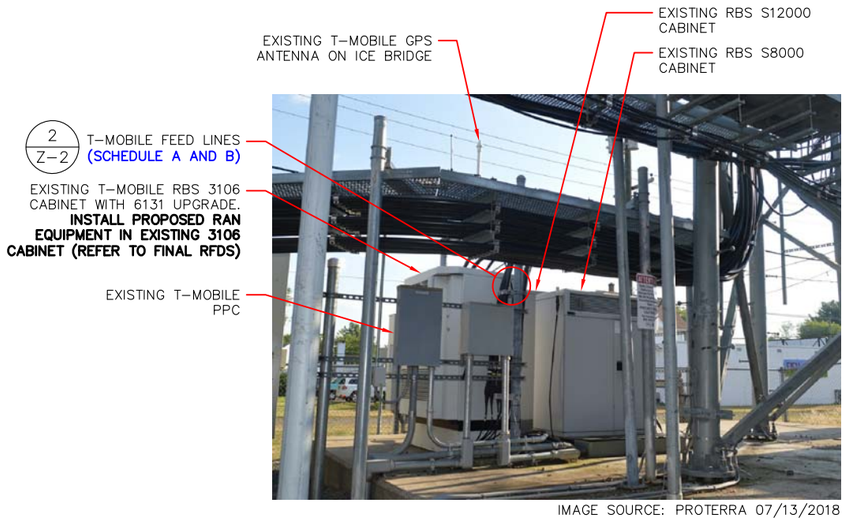
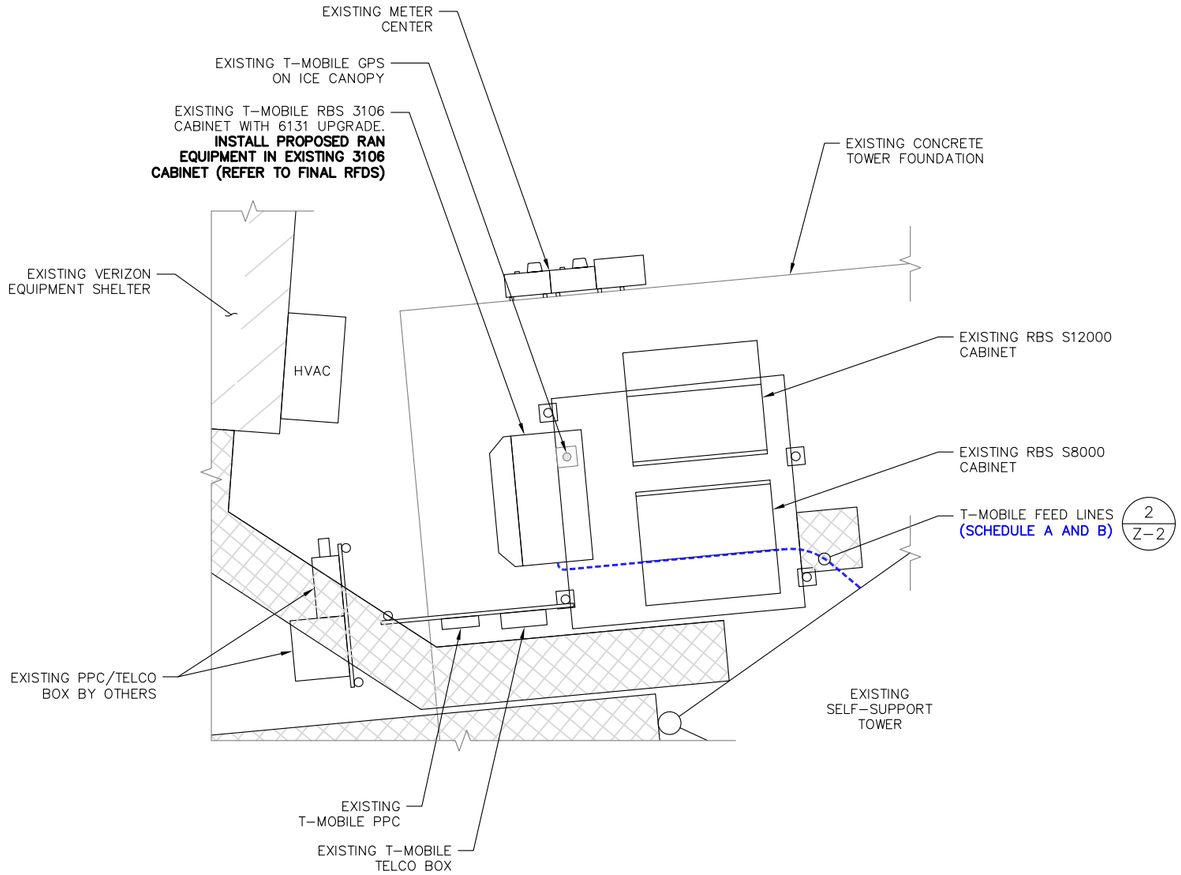


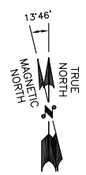
IMAGE SOURCE: PROTERRA 07/13/2018

EQUIPMENT PHOTO DETAIL

2 / Z-1

SCALE: N.T.S.

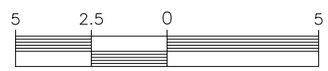




GROUND EQUIPMENT PLAN

3 / Z-1

SCALE: 1"=5' (11"x17")
1"=2.5' (22"x34")



T-MOBILE NORTHEAST LLC
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STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: 9/22/18 JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

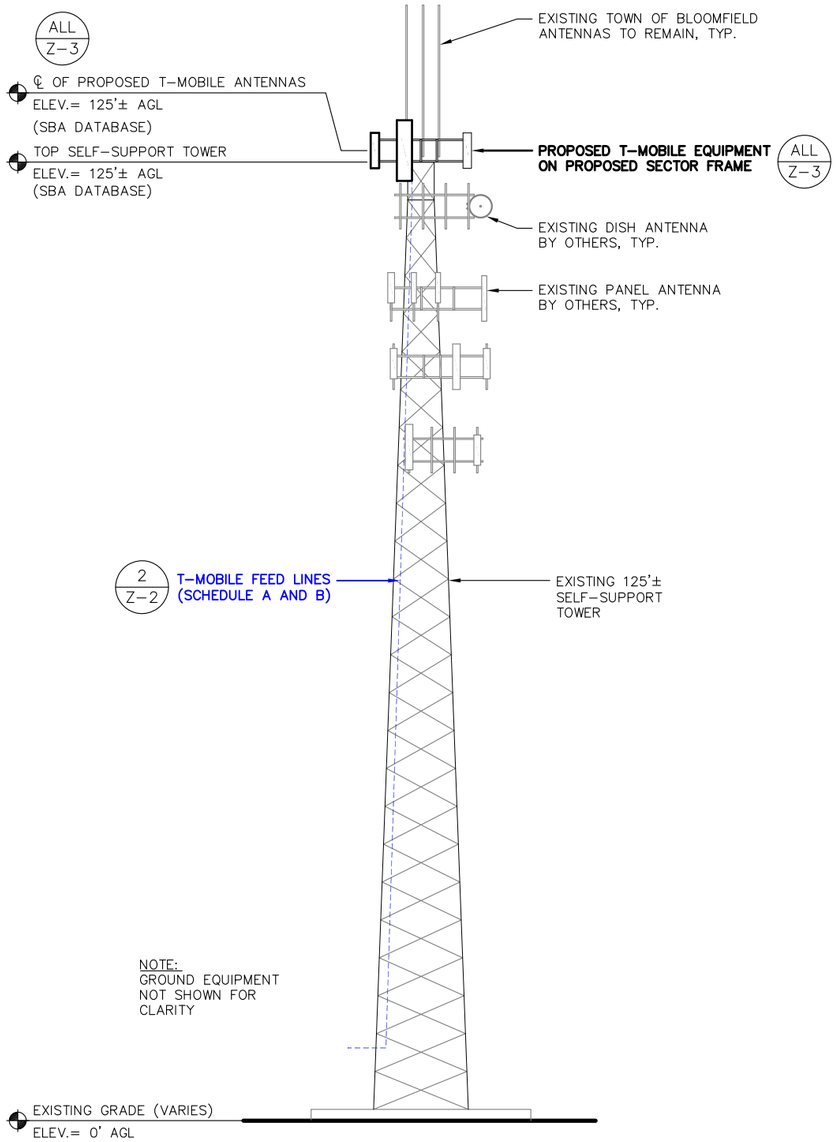
REV.	DATE	DESCRIPTION	BY
0	08/22/18	ISSUED FOR PERMITTING	PN

SITE NUMBER:
CT11162B
SITE NAME:
BLUEHILLS/ JN OF RT-187_1

SITE ADDRESS:
1021 BLUE HILLS AVENUE
BLOOMFIELD, CT 06002

SHEET TITLE
COMPOUND PLAN

SHEET NUMBER
Z-1



ELEVATION DETAIL

1
Z-2

SCALE: 1"=20' (11"x17")
1"=10' (22"x34")

20 10 0 20

FEEDLINE SCHEDULE	FEEDLINE DESCRIPTION	LOCATION
A	EXISTING TO REMAIN: (11) 1⅝" COAX TO 125' RAD	UP CABLE LADDER ON SELF-SUPPORT TOWER TO RAD
B	PROPOSED: (2) 6 X 12 HYBRID TO 125' RAD	UP CABLE LADDER ON SELF-SUPPORT TOWER TO RAD

NOTE: EXISTING T-MOBILE EQUIPMENT FEEDLINE INVENTORY BASED ON OBSERVED FIELD CONDITIONS. RFDS AND FEEDLINE LEASING ENTITLEMENTS MAY DIFFER

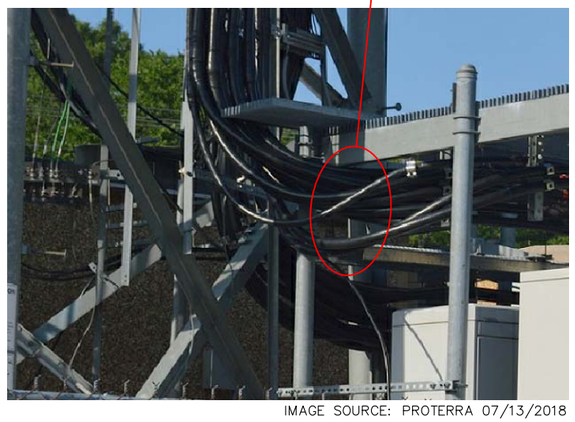


IMAGE SOURCE: PROTERRA 07/13/2018

FEEDLINE PHOTO DETAIL AT TOWER BASE

2
Z-2

SCALE: N.T.S.

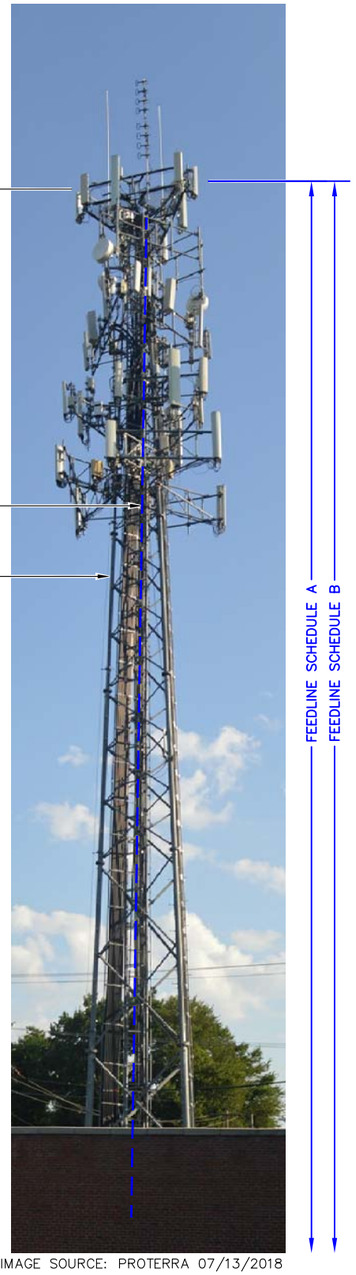


IMAGE SOURCE: PROTERRA 07/13/2018

PARTIAL ELEVATION PHOTO DETAIL

3
Z-2

SCALE: N.T.S.

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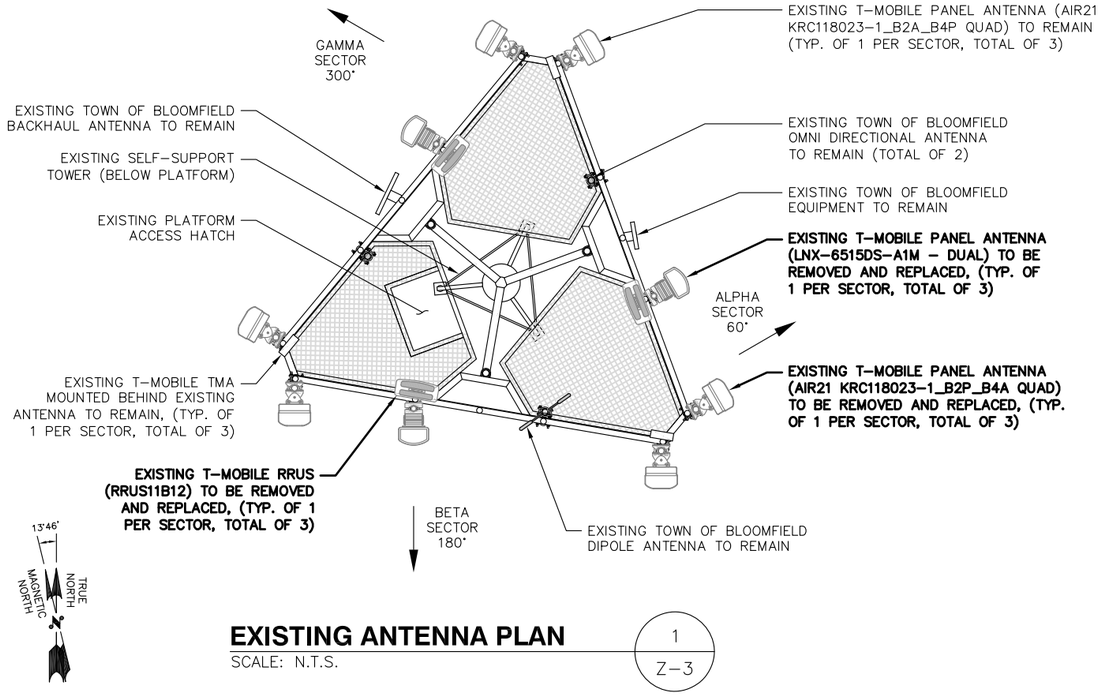
CT11162B
SITE NAME:
BLUEHILLS/ JN OF RT-187_1

SITE ADDRESS:
1021 BLUE HILLS AVENUE
BLOOMFIELD, CT 06002

SHEET TITLE
ELEVATIONS

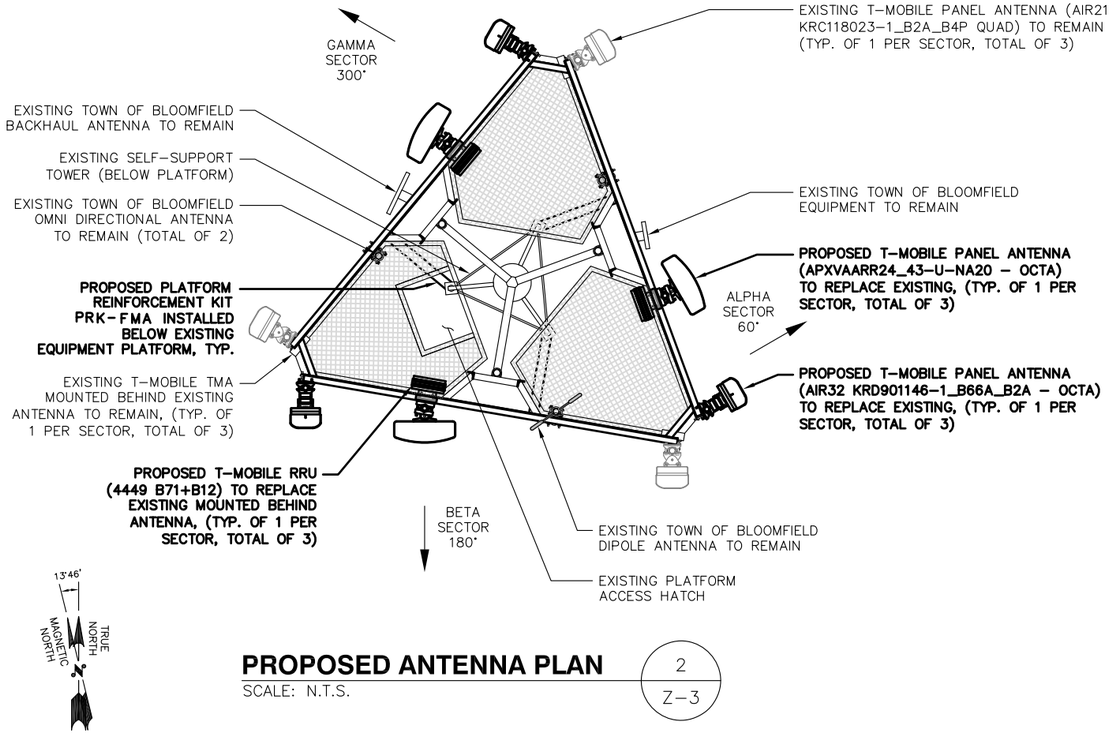
SHEET NUMBER
Z-2



EXISTING ANTENNA PLAN

SCALE: N.T.S.

1 / Z-3



PROPOSED ANTENNA PLAN

SCALE: N.T.S.

2 / Z-3

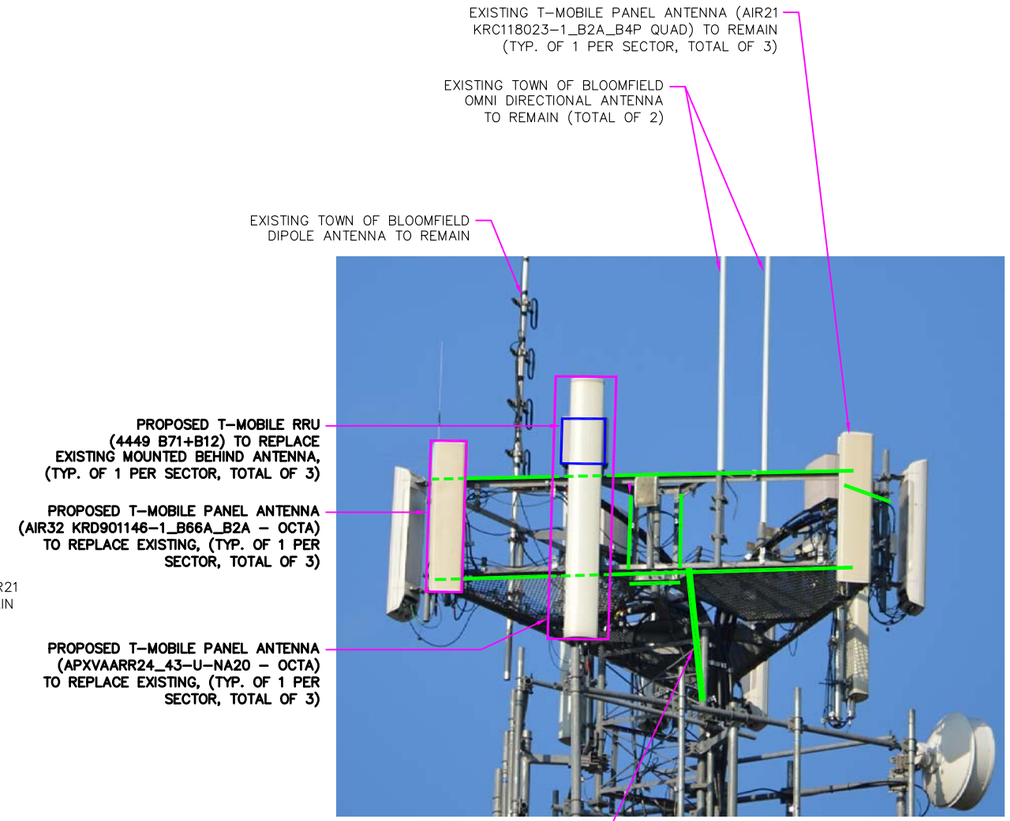


IMAGE SOURCE: PROTERRA 07/13/2018
NOTE: ONLY SECTOR SHOWN FOR CLARITY

ANTENNA PHOTO DETAIL

SCALE: N.T.S.

3 / Z-3

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SHEET TITLE
EXISTING & PROPOSED ANTENNA PLAN

SHEET NUMBER
Z-3