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

March 3, 2017

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

Notice of Exempt Modification
181 A Norman Road, Griswold, CT 06351
41 36 3.95 N
-71 57 15.57 W
T-Mobile #: CT11152C_L700

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 148-foot level of the existing 160-foot Self Support Tower at 181 A Norman Road. The tower is owned by SBA Towers II LLC. The property is owned by Stuart R. Norman, Ernest Norman and Priscilla Forschler. T-Mobile intends to replace three (3) existing antennas with three (3) new L700MHz antennas. These antennas would be installed at the 148-foot level of the tower. T-Mobile's full scope of proposed work is as follows:

Remove:

- None

Remove and Replace:

- Remove (3) RFS APXC18-209015C panel antennas and replace with (3) Commscope LNX-6515DS-A1M panel antennas

Install:

- (6) 1-1/4" lines
- (3) Commscope ATSBT-TOP-FR-4G Smart Bias Ts
- (3) RFS ATMAA1412D-1A20 TMAs

Existing Equipment to Remain (including entitlements):

- (3) RFS APXC18-209015C panel antennas
- (3) 10.5' T-Frames
- (6) 1-5/8 lines

This facility was originally approved by the Town of Griswold's Planning and Zoning Commission on June 8, 1998 under Case No: ZP 12-98. Approval was for a 160' tower that met all FCC and FAA regulations. There were no further conditions placed on the tower or compound. This proposed modification is in full compliance.

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 Kevin Skulczyck, First Selectman for the Town of Griswold, Mario J. Tristany, Jr., Town Planner for the Town of Griswold, and the property owners, Stuart R. Norman, Ernest Norman and Priscilla Forschler. (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 with certain modifications.

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: Kevin Skulczyck, First Selectman – as elected official
Town of Griswold, 28 Main Street, Jewett City, CT 06351
Mario J. Tristany, Jr., Town Planner – as representative for respective planning and zoning department
Town of Griswold, 28 Main Street, Jewett City, CT 06351
Stuart R. Norman, Ernest Norman and Priscilla Forschler – as property owners
257 Norman Road Griswold CT 06351

POWER DENSITY

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APXV18-209015-C	Make / Model:	RFS APXV18-209015-C	Make / Model:	RFS APXV18-209015-C
Gain:	15.7 dBd	Gain:	15.7 dBd	Gain:	15.7 dBd
Height (AGL):	148	Height (AGL):	148	Height (AGL):	148
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):	180	Total TX Power(W):	180	Total TX Power(W):	180
ERP (W):	4,268.47	ERP (W):	4,268.47	ERP (W):	4,268.47
Antenna A1 MPE%	0.76	Antenna B1 MPE%	0.76	Antenna C1 MPE%	0.76
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Commscope LNX-6515DS-A1M	Make / Model:	Commscope LNX-6515DS-A1M	Make / Model:	Commscope LNX-6515DS-A1M
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	148	Height (AGL):	148	Height (AGL):	148
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power(W):	30	Total TX Power(W):	30	Total TX Power(W):	30
ERP (W):	703.27	ERP (W):	703.27	ERP (W):	703.27
Antenna A2 MPE%	0.27	Antenna B2 MPE%	0.27	Antenna C2 MPE%	0.27

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**1.03 %**
MetroPCS	0.32 %
Verizon Wireless	2.63 %
AT&T	2.87 %
Fire Dept	1.88 %
Site Total MPE %:	**8.73 %**

T-Mobile Sector A Total:	1.03 %
T-Mobile Sector B Total:	1.03 %
T-Mobile Sector C Total:	1.03 %
Site Total:	8.73 %

T-Mobile _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	1,422.82	148	5.07	PCS - 1900 MHz	1000	0.51%
T-Mobile PCS - 1900 MHz GSM	2	711.41	148	2.54	PCS - 1900 MHz	1000	0.25%
T-Mobile 700 MHz LTE	1	703.27	148	1.25	700 MHz	467	0.27%
						Total:	**1.03%**

Recent Sales in Neighborhood	Previous Parcel	Next Parcel	Field Definitions	Return to Main Search	Griswold Home

Owner and Parcel Information

Owner Name	NORMAN ERNEST R & STUART R & FORSCHLER PRISCILLA M	**Today's Date**	January 23, 2017
Mailing Address	257 NORMAN RD	**Parcel ID**	10810 (Account #: 04129801)
	GRISWOLD, CT 06351	**Subdivison**	TOWER COMPOUND
Location Address	181 A NORMAN RD	**Census Tract**	7091
Map / Block / Lot	38 / 69 / 6A	**Acreage**	0.08
Use Class / Description	4310 TEL REL TW	**Parcel Map**	
Assessing Neighborhood	0050A	**Utilities**	Well,Septic

Current Appraised Value Information

Building Value	XF Value	OB Value	Land Value	Special Land Value	Total Appraised Value	Net Appraised Value	Current Assessment
$ 0	$ 0	$ 126,900	$ 150,000		$ 276,900	$ 276,900	$ 193,830

Assessment History

Year	Building	OB/Misc	Land	Total Assessment
Current	0	$ 88,830	$ 105,000	$ 193,830
2016	0	$ 88,830	$ 105,000	$ 193,830
2015	0	$ 85,050	$ 105,000	$ 190,050

Land Information

Use	Class	Zoning	Area	Value
TEL REL TW	I		3600 SF	$ 150,000

Building Information

No Building Information available for this parcel.

Out Buildings / Extra Features

Description	Sub Description	Area	Year Built	Value
CELL TOWER		160 HEIGHT	1999	$ 86,400
FENCE-6' CHAIN		240 L.F.	1999	$ 2,700
CELL EQUIP SHELTER		72 S.F.	1999	$ 5,400
CELL EQUIP SHELTER		432 S.F.	1999	$ 32,400

Sale Information

Sale Date	Sale Price	Deed Book/Page	Sale Qualification	Reason	Vacant or Improved	Owner
03/27/1992		144/ 50	Unqualified	Probate Certificate		NORMAN ERNEST R & STUART R & FORSCHLER PRISCILLA M

Permit Information

Permit ID	Issue Date	Type	Description	Amount	Inspection Date	% Complete	Date Complete	Comments
125-13	01/23/2013	AD	3ANT/6REMOTE RADIO	$ 25,000		0		
47-99	08/27/1999	CM	8X11 OB	$ 500		100	10/01/1999	8 X 11 QUINN VALLEY OB
8-99	07/12/1999	CM	24X36 OB	$ 45,000	09/01/1999	100	09/10/1999	8-99 COMP CO
242-98	04/15/1999	CM	TOWER/FENCE	$ 170,100	07/12/1999	100	07/12/1999	5-99 CO

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

T-Mobile Existing Facility

Site ID: CT11152C

Griswold/ I-395 X85/ BMW
257 Norman Road
Griswold, CT 06351

February 28, 2017

EBI Project Number: 6217000727

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	8.73 %

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

EBI Consulting
environmental | engineering | due diligence

February 28, 2017

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

Emissions Analysis for Site: **CT11152C – Griswold/ I-395 X85/ BMW**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **257 Norman Road, Griswold, 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 public 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 public 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 limit for the 700 MHz Band is approximately 467 $\mu W/cm^2$, and the general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) 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 **257 Norman Road, Griswold, 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, 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) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

3) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

4) Since all radios are ground mounted there are additional cabling losses accounted for. For each ground mounted RF path the following losses were calculated. 0.90 dB of additional cable loss for all ground mounted 700 MHz Channels and 1.95 dB of additional cable loss for all ground mounted 1900 MHz channels were factored into the calculations used for this analysis. This is based on manufacturers Specifications for 160 feet of 1-1/4” coax cable on each 1900 MHz path and 160 feet of 1-5/8” coax cable on each 700 MHz path.

5) 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.

6) 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 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.

7) The antennas used in this modeling are the **RFS APXV18-209015-C** for 1900 MHz (PCS) channels and the **Commscope LNX-6515DS-A1M** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **RFS APXV18-209015-C** has a maximum gain of **15.7 dBd** at its main lobe at 1900 MHz. The **Commscope LNX-6515DS-A1M** has a maximum gain of **14.6 dBd** at its main lobe at 700 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

8) The antenna mounting height centerline of the proposed antennas is **148 feet** above ground level (AGL).

9) 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.

10) All calculations were done with respect to uncontrolled / general public threshold limits.

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T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APXV18-209015-C	Make / Model:	RFS APXV18-209015-C	Make / Model:	RFS APXV18-209015-C
Gain:	15.7 dBd	Gain:	15.7 dBd	Gain:	15.7 dBd
Height (AGL):	148	Height (AGL):	148	Height (AGL):	148
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):	180	Total TX Power(W):	180	Total TX Power(W):	180
ERP (W):	4,268.47	ERP (W):	4,268.47	ERP (W):	4,268.47
Antenna A1 MPE%	0.76	Antenna B1 MPE%	0.76	Antenna C1 MPE%	0.76
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Commscope LNX-6515DS-A1M	Make / Model:	Commscope LNX-6515DS-A1M	Make / Model:	Commscope LNX-6515DS-A1M
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	148	Height (AGL):	148	Height (AGL):	148
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power(W):	30	Total TX Power(W):	30	Total TX Power(W):	30
ERP (W):	703.27	ERP (W):	703.27	ERP (W):	703.27
Antenna A2 MPE%	0.27	Antenna B2 MPE%	0.27	Antenna C2 MPE%	0.27

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**1.03 %**
MetroPCS	0.32 %
Verizon Wireless	2.63 %
AT&T	2.87 %
Fire Dept	1.88 %
Site Total MPE %:	**8.73 %**

T-Mobile Sector A Total:	1.03 %
T-Mobile Sector B Total:	1.03 %
T-Mobile Sector C Total:	1.03 %
Site Total:	8.73 %

T-Mobile _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	1,422.82	148	5.07	PCS - 1900 MHz	1000	0.51%
T-Mobile PCS - 1900 MHz GSM	2	711.41	148	2.54	PCS - 1900 MHz	1000	0.25%
T-Mobile 700 MHz LTE	1	703.27	148	1.25	700 MHz	467	0.27%
						Total:	**1.03%**

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public 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 public exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	1.03 %
Sector B:	1.03 %
Sector C:	1.03 %
T-Mobile Per Sector Maximum:	1.03 %
Site Total:	8.73 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **8.73%** of the allowable FCC established general public 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 Network Services, Inc.

Existing 160' Self-Support Tower
SBA Site Name: Griswold 2, CT
SBA Site ID: CT10012-A-02
Carrier Name: T-Mobile
Carrier Site Name: CT11152C/Griswold/I-395
App # 54341, v1

Site Location: 181 A Norman Road
Griswold, CT 06351

Latitude: 41.601097
Longitude: -71.954325

ACGI Job # 17-0376
(Refer to previous ACGI Job # 16-0261, dated 03/18/2016;
ACGI # 16-2850, dated 08/10/2016; ACGI # 16-3553, dated 10/12/2016)

ANALYSIS RESULTS		
Tower Components	97.1%	**Pass**
Tower Foundation	99.7%	**Pass**
Net change in Tower stress ratio	+1.1 %	**Change from previous SA by Allpro Consulting Group, Inc., ACGI # 16-3553, dated 10/12/2016**

Prepared By:
Dejian Xu, EIT
Staff Engineer

02/09/2017
Approved By
Joji M. George, PE.
CT PE# 24444

TABLE OF CONTENTS

1. ANALYSIS SUMMARY

The existing 160' Self-support Tower located in Griswold, Connecticut was analyzed by Allpro Consulting Group, Inc. (ACGI) for the existing and the proposed T-Mobile antennas, radios and coaxes as authorized by SBA Communication Corp. Based on the results of the analysis, the existing tower with below 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 the* 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:	Rohn Industries, Inc. FDH Velocitel Inc. Allpro Consulting Group, Inc.	Original Tower Design by Rohn Industries, Inc., Rohn File No. 37696SP001, date April 6, 1999 Previous structural analysis by FDH Velocitel Inc., Project # 15BVKZ1400, dated July 10, 2015 Previous structural analysis by Allpro Consulting Group, Inc., ACGI # 16-0261, dated 03/18/2016; ACGI # 16-2850, dated 08/10/2016.; ACGI # 16-3553, dated 10/12/2016
Foundation Data:	FDH Velocitel Inc.	Dispersive Wave Propagation Testing and Rebar Investigation by FDH Velocitel, Inc., Project # 16BDGF1500, dated 03/03/2016
Geotechnical Report:	FDH Velocitel Inc.	Geotechnical Evaluation of Subsurface Conditions by FDH Velocitel Inc., Project # 16BDCN1600, dated 03/04/2016
Loading Data:	Allpro Consulting Group, Inc. SBA Communication Corp.	Existing loading as per previous structural analysis by Allpro Consulting Group, Inc., ACGI Job # 16-3553, dated 10/12/2016. Proposed final loading for T-Mobile as per Application ID # 54341, v1 downloaded from SBA portal
Authorization:	SBA Communication Corp.	

3. ANALYSIS METHODS & DATA

The analysis was performed in accordance with Telecommunication Industry Association specification TIA-222-G-Addendum 2. 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:	Griswold 2, CT
SBA Site Number:	CT10012-A-02
Carrier Site Name:	T-Mobile/CT11152C/Griswold/I-395
City, State:	Griswold, CT
County:	New London
Code Wind Load Requirement:	TIA-222-G (132 mph ultimate wind speed equal to 102 mph nominal wind speed) & 2016 Connecticut State Building Code (IBC 2012)
Wind Load Used:	TIA-222-G Code: • Nominal wind speed of 102 mph (3 second gust wind speed) • Structure Class II. • Exposure Category C. • Topographic Category 1. • Crest Height 0.00 ft. • A wind speed of 50 mph is used in combination with ice. • Nominal ice thickness of 0.75 in.
Seismic Check:	Spectral Response Acceleration at Short Period (Ss) is 0.169 g which less than 1.000 g. Therefore, no seismic check is required as per TIA-222-G section 2.7.3

TOWER DATA	
Tower Type:	3 Sided Self-support Tower
Height:	160'
Cross Section:	Triangular
Steel Strength:	Legs – 50 ksi, Braces – 36 ksi
Type of Foundation:	Individual concrete pad with square pedestal

TOWER HISTORY	
Tower Manufacturer / Model:	ROHN/ SSV TOWER
Date of Original Design:	04/06/1999
Previous Modifications:	N/A
Original Design Code Reqts:	TIA/EIA 222-F 1996, 90mph + 1/2" ice

4. CONCLUSIONS

RESULT SUMMARY		
MEMBER	*% Capacity*	*Pass/Fail*
Leg	**85.7 %**	**Pass**
Diagonal	**97.1 %**	**Pass**
Top Girt	**3.4 %**	**Pass**
Bolt Checks	**84.0 %**	**Pass**
Foundation (see attached MathCAD for details)	**Overturning: 25.2 %**	**Pass**
	Uplift: 99.7 %	**Pass**
	Bearing: 57.3 %	**Pass**
	Shear: 17.3 %	**Pass**
Tower Overall Rating = 99.7 % (Pass)		

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

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

5. ASSUMPTIONS

This analysis was completed based on the following assumptions:

- Tower has been properly maintained
- Tower erection was in accordance to manufacturer drawings
- 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 was constructed in accordance to manufacturer drawings
- 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

6. 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.

7. APPURTENANCE LISTING

EXISTING LOAD DESCRIPTION					
ELEV (ft.)	***Qty.***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in)***	***TENANT***
169±	2	Decibel 20' x 2"Dipoles	Direct Mount (@ 160')	(2) 7/8 (1) 1/2	Quinebaug Comm 911
163±	1	Andrew DB201-C Omni			
158±	6	Commscope SBNHH-1D65B Antennas	(3) 15' T-Frames (1)Sabre Universal Pipe Mount	(12) 1-5/8 (Double Stacked) (2) 1-5/8 Hybrid Fiber	Verizon
	3	Antel BXA-70080-4CF-EDIN-0 Antennas			
	3	Alcatel Lucent RH4x45-AWS RRH			
	3	Alcatel Lucent RH 2x60-700U RRH			
	3	Alcatel-Lucent RH 2x60-PCS RRH			
	2	RFS DB-T1-6Z-8AB-0Z ODU			
			(3) 10.5' T-Frames (@148')	(6) 1-5/8	T-Mobile
148±	**c**	Powerwave 63SSFL			
135±	9	Powerwave 7770 Antennas	(3) 12' T-Frames (@137')	(12) 1-1/4 (Triple Stacked) (2) 3/4 DC Cables (1) 1/2 Fiber	AT&T
	1	CCI HPA-65R-BUU-H6 Antenna			
	2	CCI HPA-65R-BUU-H8 Antennas			
	6	Powerwave LGP21401 TMAs			
	3	Ericsson RRUS 11-700			
	3	Ericsson RRUS 12			
	3	Ericsson RRU-A2 Module			
	6	Powerwave LGP21903 Diplexers			
	1	Raycap DC6-48-60-18-8F			
128±	6	Kathrein 742 351	(3) 12' T-Frames	(12) 1-5/8 (1) 3/8	Metro PCS
82±	1	Yagi	Direct Mount	(1) 1/2	Quinebaug Comm 911
76±	1	GPS	(1) 3' Standoff	(1) 1/2	Verizon
68±	1	6' Trombone	Direct Mount	(1) 1/2	Quinebaug Comm 911

T-MOBILE FINAL LOAD DESCRIPTION					
ELEV (ft.)	***Qty.***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in)***	***TENANT***
148±	3	RFS APXV18-209015-C Antennas	(3) 10.5' T-Frames	(6) 1-1/4 (6) 1-5/8	T-Mobile
	3	Commscope LNX-6515DS-A1M Antennas			
	3	RFS ATMAA1412D-1A20 TMAs			

Notes:

1. ACGI should be notified of any discrepancies found in the data listed in this report.
2. Notify Allpro Consulting Group, Inc. of any potential physical & other interference with existing antennas for a redesign.

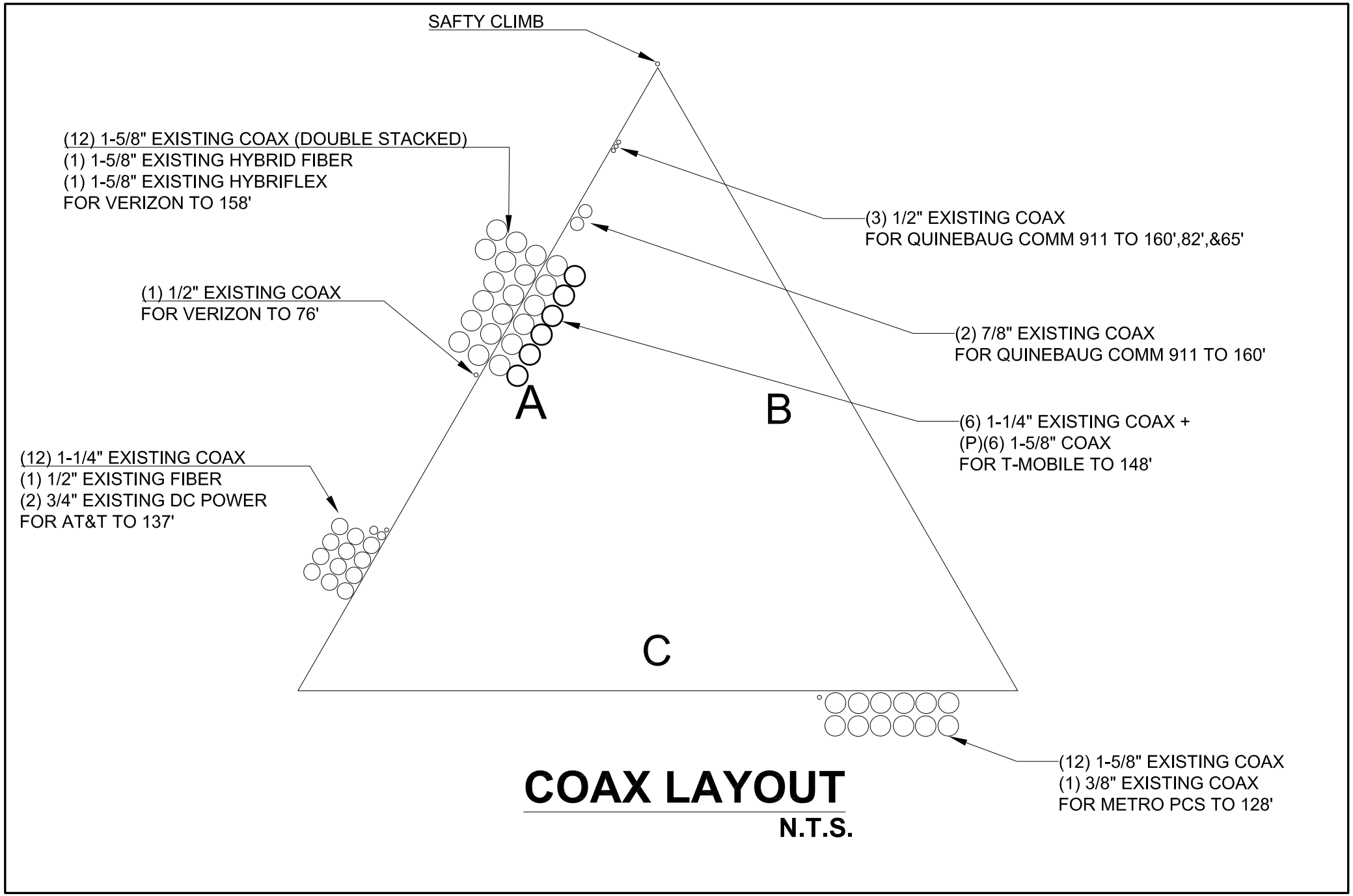
8. SUMMARY OF WORKING PERCENTAGE OF STRUCTURAL COMPONENTS

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	160 - 140	Leg	ROHN 2.5 STD	3	-22395.50	63560.30	35.2	Pass
T2	140 - 120	Leg	ROHN 3 STD	39	-59333.80	82509.00	71.9	Pass
T3	120 - 100	Leg	ROHN 3.5 EH	69	-95990.00	125723.00	76.4	Pass
T4	100 - 80	Leg	ROHN 4 EH	90	-130796.00	159903.00	81.8	Pass
T5	80 - 60	Leg	ROHN 5 EH	111	-164714.00	239378.00	68.8	Pass
T6	60 - 40	Leg	ROHN 6 EHS	132	-194979.00	244047.00	79.9	Pass
T7	40 - 20	Leg	ROHN 6 EH	147	-228323.00	303757.00	75.2	Pass
T8	20 - 0	Leg	ROHN 6 EH	162	-260383.00	303730.00	85.7	Pass
T1	160 - 140	Diagonal	L1 3/4x1 3/4x3/16	11	-3532.06	8788.95	40.2	Pass
							59.9 (b)	
T2	140 - 120	Diagonal	L2x2x3/16	48	-5647.30	7810.37	72.3	Pass
							82.6 (b)	
T3	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	75	-6253.18	9552.75	65.5	Pass
							79.5 (b)	
T4	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	96	-6632.57	7279.23	91.1	Pass
T5	80 - 60	Diagonal	L3x3x1/4	117	-7309.48	13051.40	56.0	Pass
							62.4 (b)	
T6	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	138	-8714.84	14294.60	61.0	Pass
							61.2 (b)	
T7	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	153	-9717.79	12044.30	80.7	Pass
T8	20 - 0	Diagonal	L3 1/2x3 1/2x1/4	168	-9842.35	10134.20	97.1	Pass
T1	160 - 140	Top Girt	L1 3/4x1 3/4x3/16	4	-105.33	3088.02	3.4	Pass
T2	140 - 120	Top Girt	L1 3/4x1 3/4x3/16	41	-102.77	3088.02	3.3	Pass
							Summary	
						Leg (T8)	85.7	Pass
						Diagonal (T8)	97.1	Pass
						Top Girt (T1)	3.4	Pass
						Bolt Checks	84.0	Pass
						RATING =	**97.1**	**Pass**

APPENDIX

COAX LAYOUT

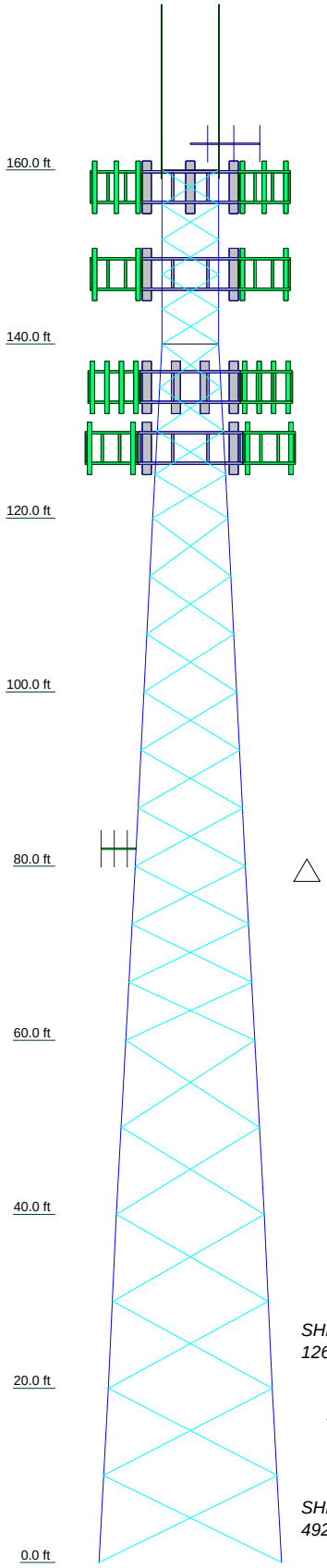


COAX LAYOUT

N.T.S.

TOWER ELEVATION DRAWING

Section	T1	T2	T3	T4	T5	T6	T7	T8			
Legs	ROHN 2.5 STD	ROHN 3 STD	ROHN 3.5 EH	ROHN 4 EH	ROHN 5 EH	ROHN 6 EHS	ROHN 6 EH				
Leg Grade	A572-50										
Diagonals	L1 3/4x1 3/4x3/16	L2x2x3/16	L2 1/2x2 1/2x3/16		L3x3x1/4		L3 1/2x3 1/2x1/4				
Diagonal Grade	A36						A572-50				
Top Girts	L1 3/4x1 3/4x3/16					N.A.					
Face Width (ft)	6.58		8.59	10.65	12.74	14.83	16.92	18.88	20.96		
# Panels @ (ft)	5 @ 4	4 @ 5	9 @ 6.66667				6 @ 10		17442.5		
Weight (lb)	921.8	1079.8	1469.5	1728.0	2731.0	2801.6	3290.6	3420.3			



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	160	10.5' T-Frame (T-Mobile)	148
Beacon	160	10.5' T-Frame (T-Mobile)	148
Decibel 20' x 2" Dipoles (Quinebaug Comm 911)	160	10.5' T-Frame (T-Mobile)	148
		12' T-Frame (ATI)	137
Decibel 20' x 2" Dipoles (Quinebaug Comm 911)	160	12' T-Frame (ATI)	137
		12' T-Frame (ATI)	137
DB201 C (Quinebaug Comm 911)	160	HPA-65R-BUU-H6 (ATI)	135
BXA-70080-4CF-EDIN-0 (Verizon)	158	HPA-65R-BUU-H8-K (ATI)	135
BXA-70080-4CF-EDIN-0 (Verizon)	158	HPA-65R-BUU-H8-K (ATI)	135
BXA-70080-4CF-EDIN-0 (Verizon)	158	(2) LGP 21401 TMA (ATI)	135
(2) SBNHH-1D65B (Verizon)	158	(2) LGP 21401 TMA (ATI)	135
(2) SBNHH-1D65B (Verizon)	158	(2) LGP 21401 TMA (ATI)	135
(2) SBNHH-1D65B (Verizon)	158	RRUS 11 (ATI)	135
B66A RRH4x45-4R (Verizon)	158	RRUS 11 (ATI)	135
B66A RRH4x45-4R (Verizon)	158	RRUS 11 (ATI)	135
B66A RRH4x45-4R (Verizon)	158	RRUS 12 AWS (ATI)	135
RRH2x60-700U (Verizon)	158	RRUS 12 AWS (ATI)	135
RRH2x60-700U (Verizon)	158	RRUS 12 AWS (ATI)	135
RRH2x60-700U (Verizon)	158	RRUS A2 (ATI)	135
RRH2x60-PCS (Verizon)	158	RRUS A2 (ATI)	135
RRH2x60-PCS (Verizon)	158	RRUS A2 (ATI)	135
RRH2x60-PCS (Verizon)	158	(2) LGP21903 Diplexer (ATI)	135
DB-T1-6Z-8AB-0Z (Verizon)	158	(2) LGP21903 Diplexer (ATI)	135
DB-T1-6Z-8AB-0Z (Verizon)	158	(2) LGP21903 Diplexer (ATI)	135
15' T-Frames (Verizon)	158	DC6-48-60-18-8F (ATI)	135
15' T-Frames (Verizon)	158	(3) 7770 (ATI)	135
15' T-Frames (Verizon)	158	(3) 7770 (ATI)	135
Sabre Universal Pipe Mount (Verizon)	158	(3) 7770 (ATI)	135
APXV18-209015-C (T-Mobile)	148	(2) 742 351 (Metro PCS)	128
APXV18-209015-C (T-Mobile)	148	(2) 742 351 (Metro PCS)	128
APXV18-209015-C (T-Mobile)	148	(2) 742 351 (Metro PCS)	128
LNX-6515DS-A1M (T-Mobile)	148	12' T-Frame (Metro PCS)	128
LNX-6515DS-A1M (T-Mobile)	148	12' T-Frame (Metro PCS)	128
LNX-6515DS-A1M (T-Mobile)	148	12' T-Frame (Metro PCS)	128
ATMAA1412D-1A20 (T-Mobile)	148	Yagi (Quinebaug Comm 911)	82
ATMAA1412D-1A20 (T-Mobile)	148	GPS (Verizon)	76
ATMAA1412D-1A20 (T-Mobile)	148	6' Trombone (Quinebaug Comm 911)	68

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

ALL
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U

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 102 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 97.1%

SHEAR: 26763 lb

AXIAL
110658 lb

SHEAR
12641 lb

MOMENT
1253 kip-ft

TORQUE 2 kip-ft
50 mph WIND - 0.7500 in ICE

AXIAL
39231 lb

SHEAR
49274 lb

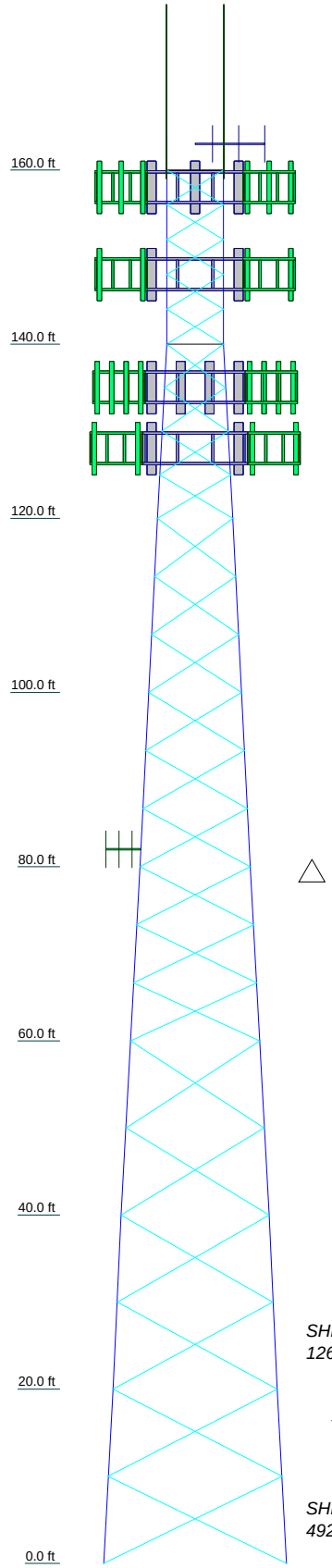
MOMENT
4629 kip-ft

TORQUE 6 kip-ft
REACTIONS - 102 mph WIND

Allpro Consulting Group, Inc.
9221 Lyndon B. Johnson Fwy, Suite# 204
Dallas, TX 75243
Phone: 972-231-8893
FAX: 866-364-8375

Job: ***CT10012-A-02***			
Project: ***17-0376***			
Client: SBA	Drawn by: Dejian Xu, EIT	App'd:	
Code: TIA-222-G	Date: 02/09/17	Scale: NTS	
Path:		Dwg No. E-1	

Section		T1	T2	T3	T4	T5	T6	T7	T8			
Legs		ROHN 2.5 STD	ROHN 3 STD	ROHN 3.5 EH	ROHN 4 EH	ROHN 5 EH	ROHN 6 EHS	ROHN 6 EH				
Leg Grade		A572-50										
Diagonals		L1 3/4x1 3/4x3/16	L2x2x3/16	L2 1/2x2 1/2x3/16		L3x3x1/4		L3 1/2x3 1/2x1/4				
Diagonal Grade		A36					A572-50					
Top Girts		L1 3/4x1 3/4x3/16					N.A.					
Face Width (ft)	20.96	6.58		8.59	10.65	12.74	14.83	16.92	18.88			
# Panels @ (ft)	17442.5	5 @ 4	4 @ 5		9 @ 6.66667			6 @ 10				
Weight (lb)		921.8	1079.8	1469.5	1728.0	2731.0	2801.6	3290.6	3420.3			



MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
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4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 97.1%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 268113 lb
SHEAR: 30212 lb

UPLIFT: -234033 lb
SHEAR: 26763 lb

AXIAL 110658 lb
SHEAR 12641 lb *MOMENT 1253 kip-ft*
TORQUE 2 kip-ft
50 mph WIND - 0.7500 in ICE

AXIAL 39231 lb
SHEAR 49274 lb *MOMENT 4629 kip-ft*
TORQUE 6 kip-ft
REACTIONS - 102 mph WIND

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Dallas, TX 75243
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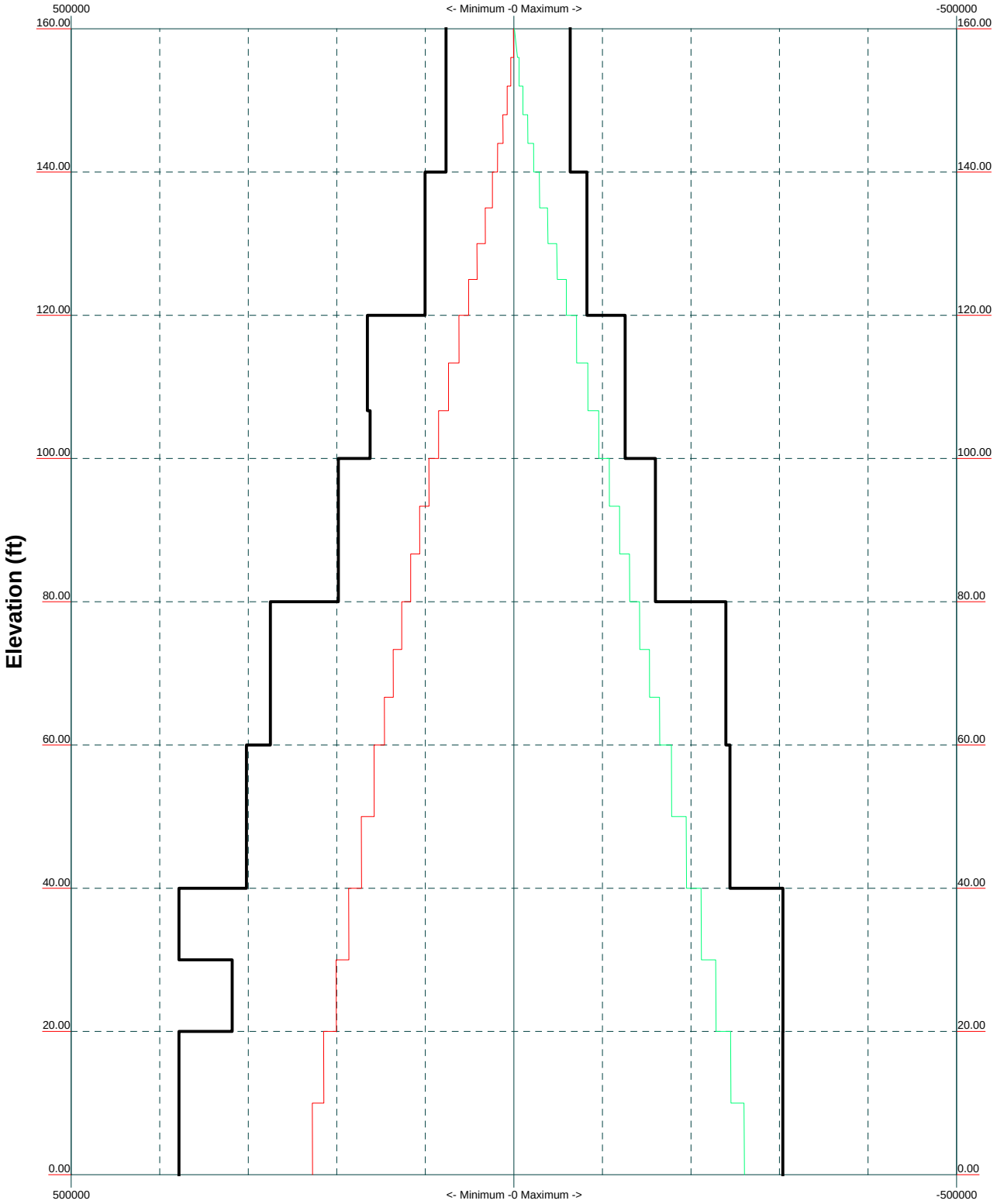
Job: ***CT10012-A-02***			
Project: ***17-0376***			
Client: SBA	Drawn by: Dejian Xu, EIT	App'd:	
Code: TIA-222-G	Date: 02/09/17	Scale: NTS	
Path:		Dwg No. E-1	

MISCELLANEOUS PLOTS

TIA-222-G - 102 mph/50 mph 0.7500 in Ice Exposure C

Leg Capacity ——— **Leg Compression (lb)**



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Project: ***17-0376***			
Client: SBA	Drawn by: Dejian Xu, EIT	App'd:	
Code: TIA-222-G	Date: 02/09/17	Scale: NTS	
Path:		Dwg No. E-3	

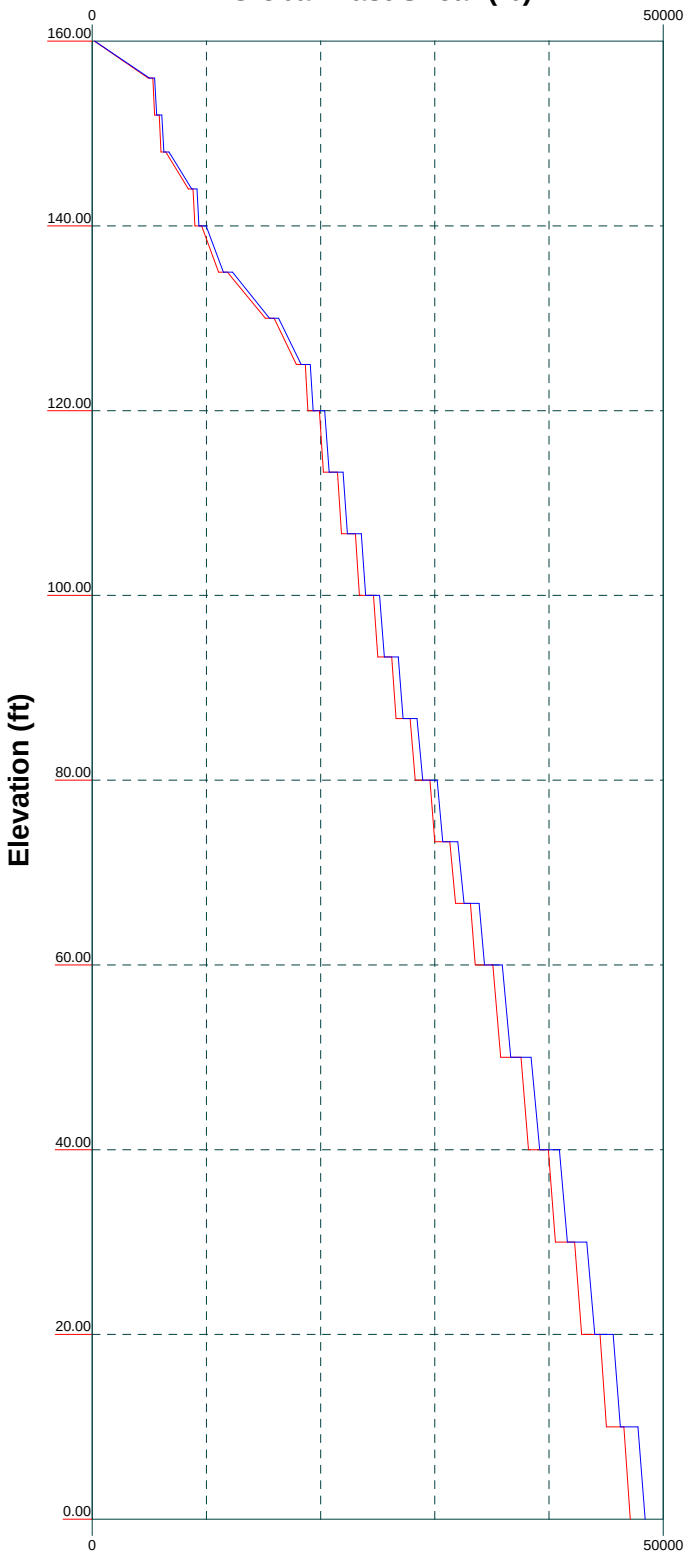
TIA-222-G - 102 mph/50 mph 0.7500 in Ice Exposure C

Vx Vz

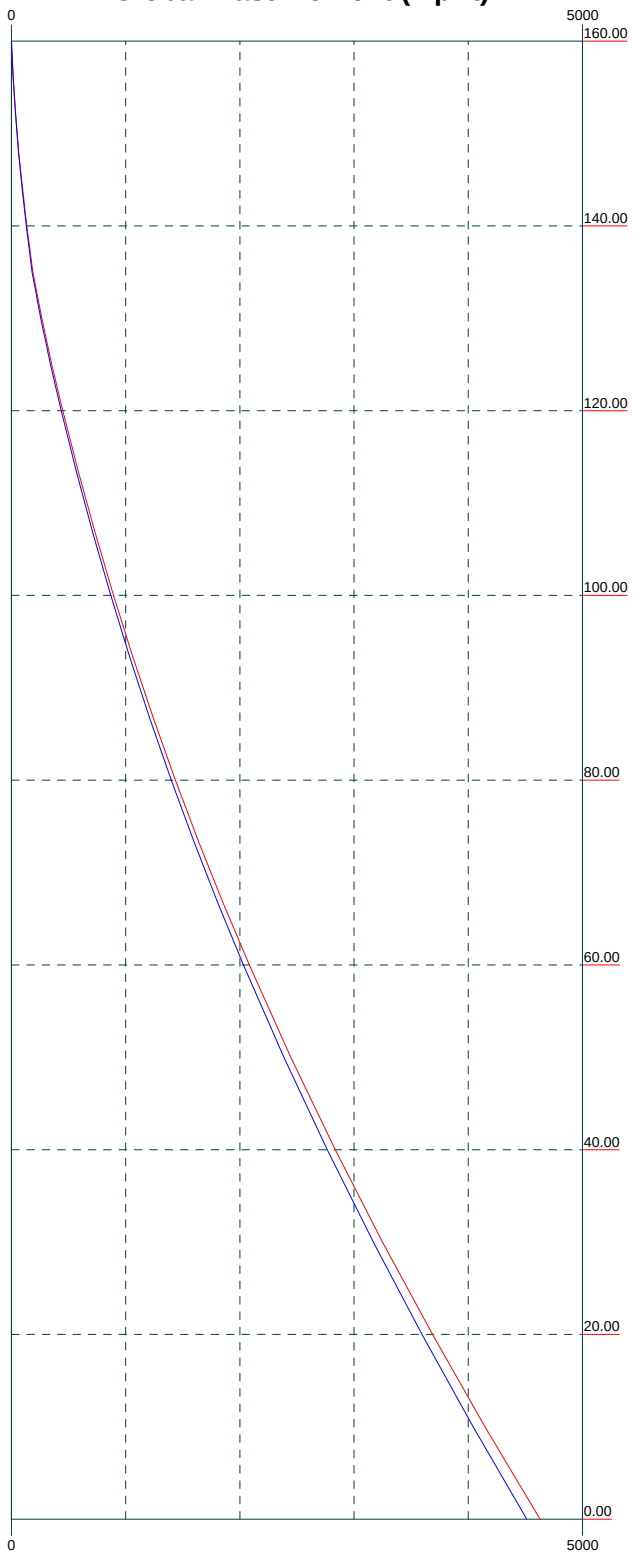
Maximum Values

Mx Mz

Global Mast Shear (lb)



Global Mast Moment (kip-ft)



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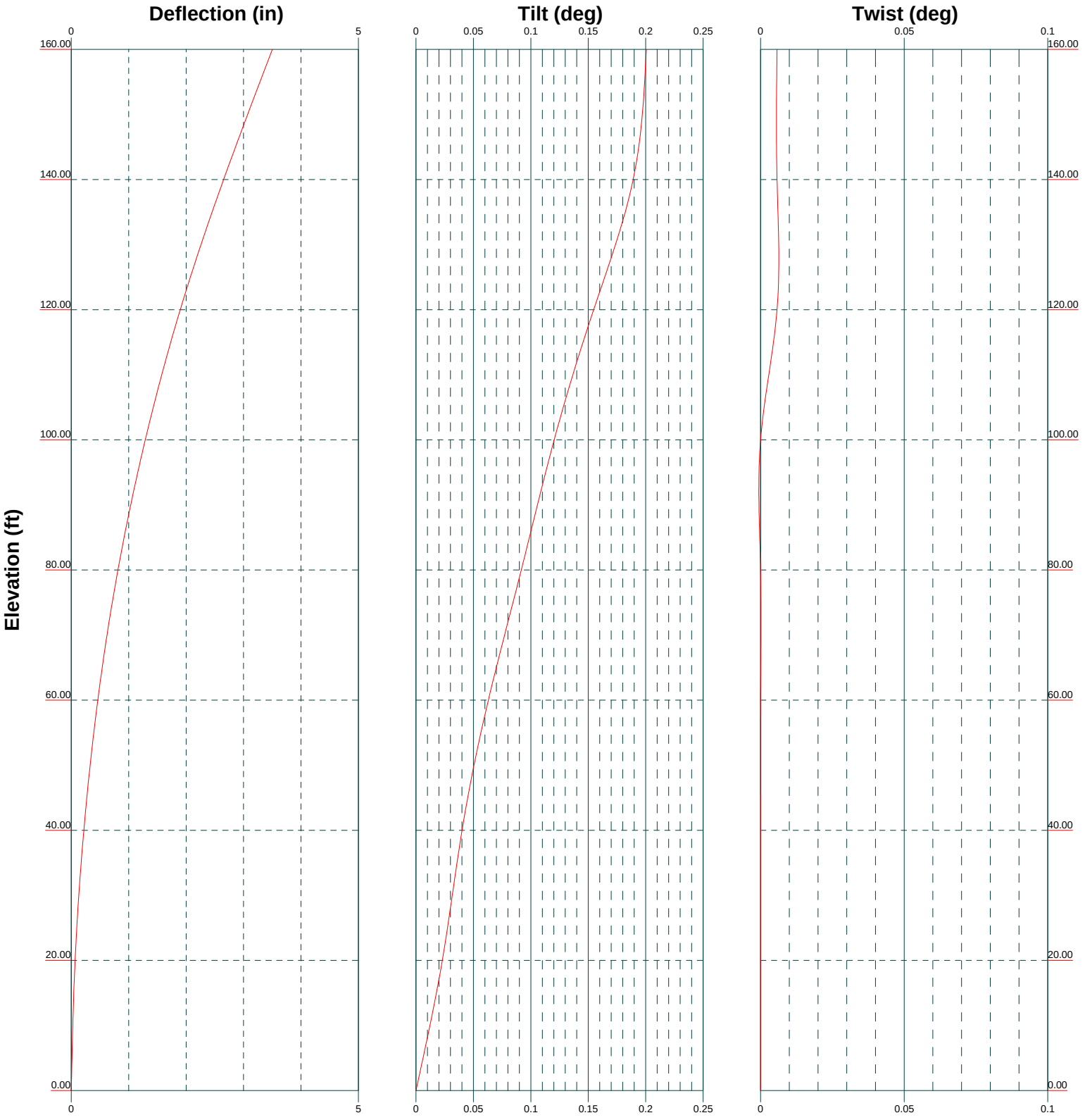
Job: ***CT10012-A-02***			
Project: ***17-0376***			
Client: SBA	Drawn by: Dejian Xu, EIT		App'd:
Code: TIA-222-G	Date: 02/09/17		Scale: NTS
Path:			Dwg No. E-4

TIA-222-G - Service - 60 mph

Maximum Values



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Dallas, TX 75243
Phone: 972-231-8893
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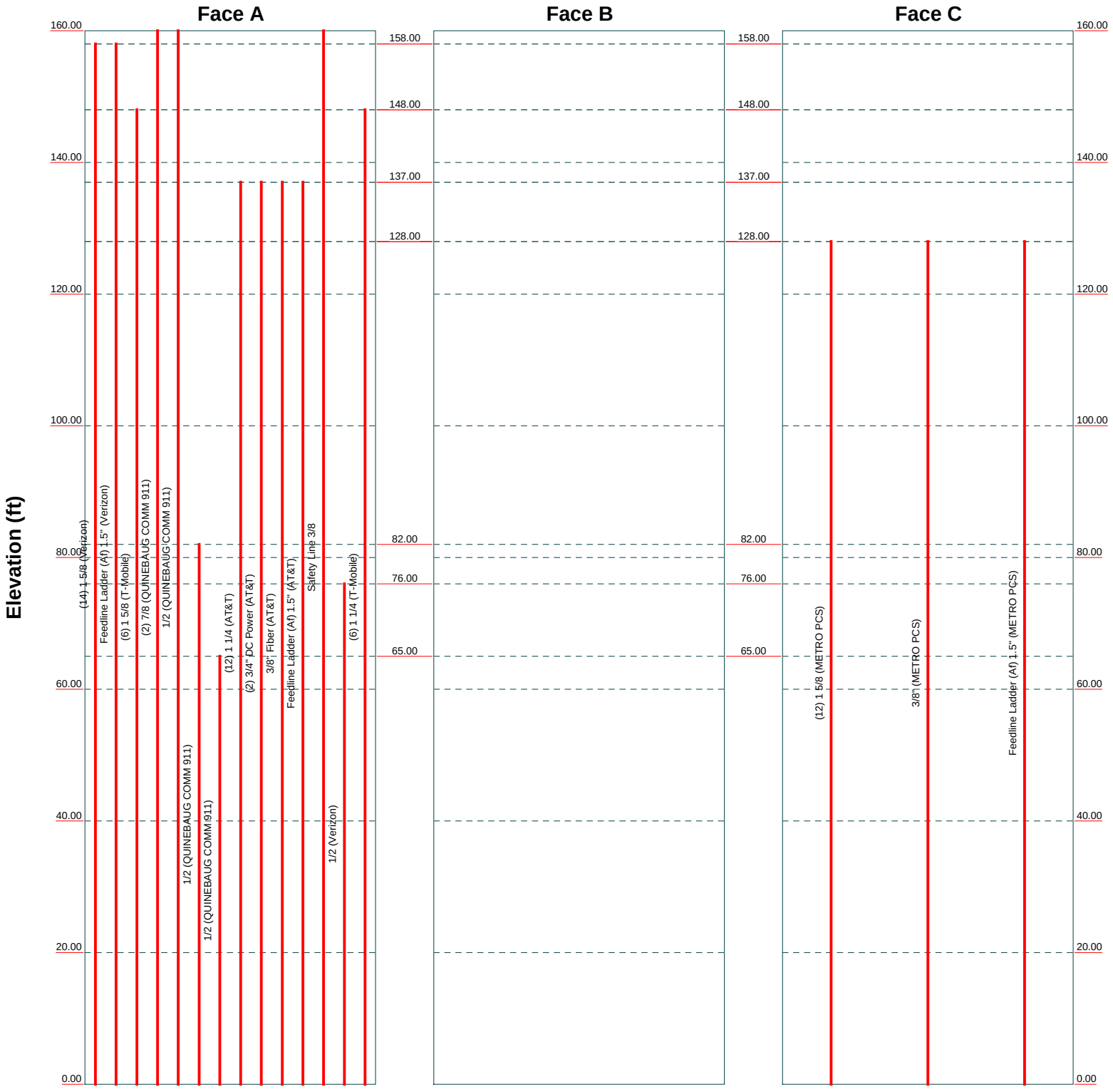
Job: ***CT10012-A-02***			
Project: ***17-0376***			
Client: SBA	Drawn by: Dejian Xu, EIT	App'd:	
Code: TIA-222-G	Date: 02/09/17	Scale: NTS	
Path:		Dwg No. E-5	

Feed Line Distribution Chart
0' - 160'

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



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Phone: 972-231-8893
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Job: **CT10012-A-02**			
Project: ***17-0376***			
Client: SBA	Drawn by: Dejian Xu, EIT	App'd:	
Code: TIA-222-G	Date: 02/09/17	Scale: NTS	
Path:		Dwg No. E-7	

CALCULATION PRINTOUT

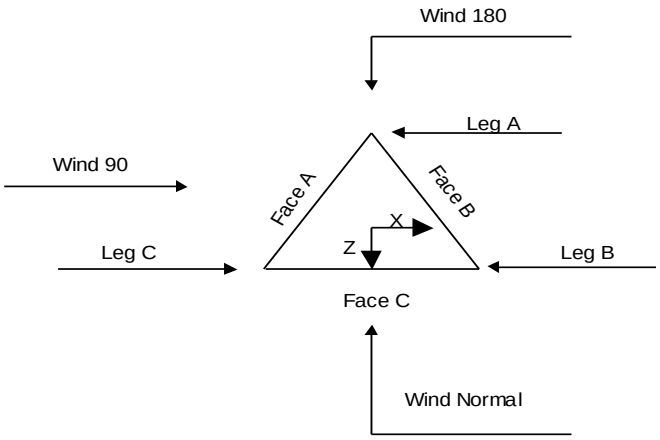
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 160.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 6.58 ft at the top and 20.96 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in New London County, Connecticut.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 102 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
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				



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	160.00-140.00			6.58	1	20.00
T2	140.00-120.00			6.58	1	20.00
T3	120.00-100.00			8.59	1	20.00
T4	100.00-80.00			10.65	1	20.00
T5	80.00-60.00			12.74	1	20.00
T6	60.00-40.00			14.83	1	20.00
T7	40.00-20.00			16.92	1	20.00
T8	20.00-0.00			18.88	1	20.00

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	160.00-140.00	4.00	X Brace	No	No	0.0000	0.0000
T2	140.00-120.00	5.00	X Brace	No	No	0.0000	0.0000
T3	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000
T4	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T5	80.00-60.00	6.67	X Brace	No	No	0.0000	0.0000
T6	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T7	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T8	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 160.00-140.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 140.00-120.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T3 120.00-100.00	Pipe	ROHN 3.5 EH	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 100.00-80.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 80.00-60.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Equal Angle	L3x3x1/4	A572-50 (50 ksi)
T6 60.00-40.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T7 40.00-20.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T8 20.00-0.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 160.00-140.00	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T2 140.00-120.00	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T2 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T3 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000

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
T4 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T5 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T6 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T7 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T8 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 160.00-140.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T2 140.00-120.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T3 120.00-100.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T4 100.00-80.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T5 80.00-60.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T6 60.00-40.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T7 40.00-20.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T8 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 160.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

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
T3 120.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 160.00-140.00	Flange	0.7500 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T2 140.00-120.00	Flange	0.8750 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T3 120.00-100.00	Flange	0.8750 A325N	4	0.6250 A325N	1	0.0000 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T4 100.00-80.00	Flange	1.0000 A325N	4	0.6250 A325N	1	0.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T5 80.00-60.00	Flange	1.0000 A325N	6	0.6250 A325N	1	0.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T6 60.00-40.00	Flange	1.0000 A325N	6	0.7500 A325N	1	0.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T7 40.00-20.00	Flange	1.0000 A325N	6	0.7500 A325N	1	0.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T8 20.00-0.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
1 5/8 (Verizon)	A	No	Ar (CaAa)	158.00 - 0.00	0.0000	0.27	14	6	0.5000	1.9800		0.00
Feedline Ladder (Af)	A	No	Af (CaAa)	158.00 - 0.00	0.0000	0.3	1	1	1.5000	1.5000		0.00
1.5" (Verizon)												
**********												
1 5/8 (T-Mobile)	A	No	Ar (CaAa)	148.00 - 0.00	-2.0000	0.27	6	6	0.5000	1.9800		0.00
**********												

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
7/8 (QUINEBAUG COMM 911)	A	No	Ar (CaAa)	160.00 - 0.00	-2.0000	0.3	2	2	0.5000	1.1100		0.00
1/2 (QUINEBAUG COMM 911)	A	No	Ar (CaAa)	160.00 - 0.00	-2.0000	0.34	1	1	0.5000	0.5800		0.00
1/2 (QUINEBAUG COMM 911)	A	No	Ar (CaAa)	82.00 - 0.00	-2.0000	0.34	1	1	0.5000	0.5800		0.00
1/2 (QUINEBAUG COMM 911) **********	A	No	Ar (CaAa)	65.00 - 0.00	-2.0000	0.34	1	1	0.5000	0.5800		0.00
1 1/4 (AT&T)	A	No	Ar (CaAa)	137.00 - 0.00	0.0000	-0.35	12	4	0.5000	1.5500		0.00
3/4" DC Power (AT&T)	A	No	Ar (CaAa)	137.00 - 0.00	0.0000	-0.33	2	1	0.5000	0.8650		0.00
3/8" Fiber (AT&T)	A	No	Ar (CaAa)	137.00 - 0.00	0.0000	-0.32	1	1	0.4400	0.4400		0.00
Feedline Ladder (Af) 1.5" (AT&T) **********	A	No	Af (CaAa)	137.00 - 0.00	0.0000	-0.35	1	1	1.5000	1.5000		0.00
Safety Line 3/8 **********	A	No	Ar (CaAa)	160.00 - 0.00	0.0000	0.5	1	1	0.3750	0.3750		0.00
1/2 (Verizon) **********	A	No	Ar (CaAa)	76.00 - 0.00	0.0000	0	1	1	0.5000	0.5800		0.00
1 5/8 (METRO PCS)	C	No	Ar (CaAa)	128.00 - 0.00	0.0000	-0.35	12	6	0.5000	1.9800		0.00
3/8" (METRO PCS)	C	No	Ar (CaAa)	128.00 - 0.00	0.0000	-0.32	1	1	0.4400	0.4400		0.00
Feedline Ladder (Af) 1.5" (METRO PCS) **********	C	No	Af (CaAa)	128.00 - 0.00	0.0000	-0.35	1	1	1.5000	1.5000		0.00
1 1/4 (T-Mobile)	A	No	Ar (CaAa)	148.00 - 0.00	-4.0000	0.27	6	6	0.5000	1.5500		0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	160.00-140.00	A	0.000	0.000	77.690	0.000	450.28
		B	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
		C	0.000	0.000	0.000	0.000	0.00
T2	140.00-120.00	A	0.000	0.000	148.709	0.000	822.70
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	21.360	0.000	134.08
T3	120.00-100.00	A	0.000	0.000	155.690	0.000	860.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	53.400	0.000	335.20
T4	100.00-80.00	A	0.000	0.000	155.806	0.000	860.70
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	53.400	0.000	335.20
T5	80.00-60.00	A	0.000	0.000	158.068	0.000	870.45
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	53.400	0.000	335.20
T6	60.00-40.00	A	0.000	0.000	159.170	0.000	875.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	53.400	0.000	335.20
T7	40.00-20.00	A	0.000	0.000	159.170	0.000	875.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	53.400	0.000	335.20
T8	20.00-0.00	A	0.000	0.000	159.170	0.000	875.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	53.400	0.000	335.20

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	160.00-140.00	A	1.745	0.000	0.000	127.321	0.000	2154.59
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	140.00-120.00	A	1.720	0.000	0.000	247.307	0.000	4103.71
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	27.351	0.000	540.85
T3	120.00-100.00	A	1.692	0.000	0.000	256.594	0.000	4235.30
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	67.962	0.000	1334.90
T4	100.00-80.00	A	1.658	0.000	0.000	255.344	0.000	4171.48
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	67.471	0.000	1314.74
T5	80.00-60.00	A	1.617	0.000	0.000	267.719	0.000	4261.22
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	66.871	0.000	1290.31
T6	60.00-40.00	A	1.564	0.000	0.000	271.096	0.000	4219.61
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	66.091	0.000	1258.93
T7	40.00-20.00	A	1.486	0.000	0.000	265.468	0.000	4035.96
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	64.956	0.000	1214.07
T8	20.00-0.00	A	1.331	0.000	0.000	254.310	0.000	3684.84
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	62.707	0.000	1127.84

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	160.00-140.00	-1.6778	-5.0895	-0.9312	-3.7127
T2	140.00-120.00	-2.2544	-2.2282	-1.9853	-1.6722
T3	120.00-100.00	-1.0662	-0.8220	-1.3129	-0.7049
T4	100.00-80.00	-1.2146	-0.9823	-1.5308	-0.8766
T5	80.00-60.00	-1.3607	-1.2304	-1.8870	-1.5209
T6	60.00-40.00	-1.5322	-1.4873	-2.2243	-2.0846
T7	40.00-20.00	-1.6814	-1.6556	-2.4469	-2.3019
T8	20.00-0.00	-1.8252	-1.8180	-2.6369	-2.4850

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	1 5/8	140.00 - 158.00	0.6000	0.6000
T1	3	Feedline Ladder (Af) 1.5"	140.00 - 158.00	0.6000	0.6000
T1	5	1 5/8	140.00 - 148.00	0.1000	0.1000
T1	7	7/8	140.00 - 160.00	0.6000	0.6000
T1	8	1/2	140.00 - 160.00	0.6000	0.6000
T1	17	Safety Line 3/8	140.00 - 160.00	0.6000	0.6000
T1	25	1 1/4	140.00 - 148.00	0.1000	0.1000
T2	1	1 5/8	120.00 - 140.00	0.6000	0.6000
T2	3	Feedline Ladder (Af) 1.5"	120.00 - 140.00	0.6000	0.6000
T2	5	1 5/8	120.00 - 140.00	0.1000	0.1000
T2	7	7/8	120.00 - 140.00	0.6000	0.6000
T2	8	1/2	120.00 - 140.00	0.6000	0.6000
T2	12	1 1/4	120.00 - 137.00	0.6000	0.6000
T2	13	3/4" DC Power	120.00 - 137.00	0.6000	0.6000
T2	14	3/8" Fiber	120.00 - 137.00	0.6000	0.6000
T2	15	Feedline Ladder (Af) 1.5"	120.00 - 137.00	0.6000	0.6000
T2	17	Safety Line 3/8	120.00 - 140.00	0.6000	0.6000
T2	21	1 5/8	120.00 - 128.00	0.6000	0.6000
T2	22	3/8"	120.00 - 128.00	0.6000	0.6000
T2	23	Feedline Ladder (Af) 1.5"	120.00 - 128.00	0.6000	0.6000
T2	25	1 1/4	120.00 -	0.1000	0.1000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			140.00		
T3	1	1 5/8	100.00 - 120.00	0.6000	0.6000
T3	3	Feedline Ladder (Af) 1.5"	100.00 - 120.00	0.6000	0.6000
T3	5	1 5/8	100.00 - 120.00	0.1000	0.1000
T3	7	7/8	100.00 - 120.00	0.6000	0.6000
T3	8	1/2	100.00 - 120.00	0.6000	0.6000
T3	12	1 1/4	100.00 - 120.00	0.6000	0.6000
T3	13	3/4" DC Power	100.00 - 120.00	0.6000	0.6000
T3	14	3/8" Fiber	100.00 - 120.00	0.6000	0.6000
T3	15	Feedline Ladder (Af) 1.5"	100.00 - 120.00	0.6000	0.6000
T3	17	Safety Line 3/8	100.00 - 120.00	0.6000	0.6000
T3	21	1 5/8	100.00 - 120.00	0.6000	0.6000
T3	22	3/8"	100.00 - 120.00	0.6000	0.6000
T3	23	Feedline Ladder (Af) 1.5"	100.00 - 120.00	0.6000	0.6000
T3	25	1 1/4	100.00 - 120.00	0.1000	0.1000
T4	1	1 5/8	80.00 - 100.00	0.6000	0.6000
T4	3	Feedline Ladder (Af) 1.5"	80.00 - 100.00	0.6000	0.6000
T4	5	1 5/8	80.00 - 100.00	0.1000	0.1000
T4	7	7/8	80.00 - 100.00	0.6000	0.6000
T4	8	1/2	80.00 - 100.00	0.6000	0.6000
T4	9	1/2	80.00 - 82.00	0.6000	0.6000
T4	12	1 1/4	80.00 - 100.00	0.6000	0.6000
T4	13	3/4" DC Power	80.00 - 100.00	0.6000	0.6000
T4	14	3/8" Fiber	80.00 - 100.00	0.6000	0.6000
T4	15	Feedline Ladder (Af) 1.5"	80.00 - 100.00	0.6000	0.6000
T4	17	Safety Line 3/8	80.00 - 100.00	0.6000	0.6000
T4	21	1 5/8	80.00 - 100.00	0.6000	0.6000
T4	22	3/8"	80.00 - 100.00	0.6000	0.6000
T4	23	Feedline Ladder (Af) 1.5"	80.00 - 100.00	0.6000	0.6000
T4	25	1 1/4	80.00 - 100.00	0.1000	0.1000
T5	1	1 5/8	60.00 - 80.00	0.6000	0.6000
T5	3	Feedline Ladder (Af) 1.5"	60.00 - 80.00	0.6000	0.6000
T5	5	1 5/8	60.00 - 80.00	0.1000	0.1000
T5	7	7/8	60.00 - 80.00	0.6000	0.6000
T5	8	1/2	60.00 - 80.00	0.6000	0.6000
T5	9	1/2	60.00 - 80.00	0.6000	0.6000
T5	10	1/2	60.00 - 65.00	0.6000	0.6000
T5	12	1 1/4	60.00 - 80.00	0.6000	0.6000
T5	13	3/4" DC Power	60.00 - 80.00	0.6000	0.6000
T5	14	3/8" Fiber	60.00 - 80.00	0.6000	0.6000
T5	15	Feedline Ladder (Af) 1.5"	60.00 - 80.00	0.6000	0.6000
T5	17	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T5	19	1/2	60.00 - 76.00	0.6000	0.6000
T5	21	1 5/8	60.00 - 80.00	0.6000	0.6000
T5	22	3/8"	60.00 - 80.00	0.6000	0.6000
T5	23	Feedline Ladder (Af) 1.5"	60.00 - 80.00	0.6000	0.6000
T5	25	1 1/4	60.00 - 80.00	0.1000	0.1000
T6	1	1 5/8	40.00 - 60.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T6	3	Feedline Ladder (Af) 1.5"	40.00 - 60.00	0.6000	0.6000
T6	5	1 5/8	40.00 - 60.00	0.1000	0.1000
T6	7	7/8	40.00 - 60.00	0.6000	0.6000
T6	8	1/2	40.00 - 60.00	0.6000	0.6000
T6	9	1/2	40.00 - 60.00	0.6000	0.6000
T6	10	1/2	40.00 - 60.00	0.6000	0.6000
T6	12	1 1/4	40.00 - 60.00	0.6000	0.6000
T6	13	3/4" DC Power	40.00 - 60.00	0.6000	0.6000
T6	14	3/8" Fiber	40.00 - 60.00	0.6000	0.6000
T6	15	Feedline Ladder (Af) 1.5"	40.00 - 60.00	0.6000	0.6000
T6	17	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T6	19	1/2	40.00 - 60.00	0.6000	0.6000
T6	21	1 5/8	40.00 - 60.00	0.6000	0.6000
T6	22	3/8"	40.00 - 60.00	0.6000	0.6000
T6	23	Feedline Ladder (Af) 1.5"	40.00 - 60.00	0.6000	0.6000
T6	25	1 1/4	40.00 - 60.00	0.1000	0.1000
T7	1	1 5/8	20.00 - 40.00	0.6000	0.6000
T7	3	Feedline Ladder (Af) 1.5"	20.00 - 40.00	0.6000	0.6000
T7	5	1 5/8	20.00 - 40.00	0.1000	0.1000
T7	7	7/8	20.00 - 40.00	0.6000	0.6000
T7	8	1/2	20.00 - 40.00	0.6000	0.6000
T7	9	1/2	20.00 - 40.00	0.6000	0.6000
T7	10	1/2	20.00 - 40.00	0.6000	0.6000
T7	12	1 1/4	20.00 - 40.00	0.6000	0.6000
T7	13	3/4" DC Power	20.00 - 40.00	0.6000	0.6000
T7	14	3/8" Fiber	20.00 - 40.00	0.6000	0.6000
T7	15	Feedline Ladder (Af) 1.5"	20.00 - 40.00	0.6000	0.6000
T7	17	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T7	19	1/2	20.00 - 40.00	0.6000	0.6000
T7	21	1 5/8	20.00 - 40.00	0.6000	0.6000
T7	22	3/8"	20.00 - 40.00	0.6000	0.6000
T7	23	Feedline Ladder (Af) 1.5"	20.00 - 40.00	0.6000	0.6000
T7	25	1 1/4	20.00 - 40.00	0.1000	0.1000
T8	1	1 5/8	0.00 - 20.00	0.6000	0.6000
T8	3	Feedline Ladder (Af) 1.5"	0.00 - 20.00	0.6000	0.6000
T8	5	1 5/8	0.00 - 20.00	0.1000	0.1000
T8	7	7/8	0.00 - 20.00	0.6000	0.6000
T8	8	1/2	0.00 - 20.00	0.6000	0.6000
T8	9	1/2	0.00 - 20.00	0.6000	0.6000
T8	10	1/2	0.00 - 20.00	0.6000	0.6000
T8	12	1 1/4	0.00 - 20.00	0.6000	0.6000
T8	13	3/4" DC Power	0.00 - 20.00	0.6000	0.6000
T8	14	3/8" Fiber	0.00 - 20.00	0.6000	0.6000
T8	15	Feedline Ladder (Af) 1.5"	0.00 - 20.00	0.6000	0.6000
T8	17	Safety Line 3/8	0.00 - 20.00	0.6000	0.6000
T8	19	1/2	0.00 - 20.00	0.6000	0.6000
T8	21	1 5/8	0.00 - 20.00	0.6000	0.6000
T8	22	3/8"	0.00 - 20.00	0.6000	0.6000
T8	23	Feedline Ladder (Af) 1.5"	0.00 - 20.00	0.6000	0.6000
T8	25	1 1/4	0.00 - 20.00	0.1000	0.1000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Lightning Rod	C	From Leg	0.00	0.0000	160.00	No Ice	0.25	0.25	30.00
			0.00			1/2" Ice	0.66	0.66	30.00
			2.00			1" Ice	0.97	0.97	40.00
Beacon	C	From Leg	0.00	0.0000	160.00	No Ice	2.00	2.00	20.00
			0.00			1/2" Ice	2.50	2.50	30.00
			4.00			1" Ice	3.00	3.00	40.00
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Decibel 20' x 2" Dipoles (Quinebaug Comm 911)	C	From Leg	0.00	0.0000	160.00	No Ice	4.00	4.00	35.00
			0.00			1/2" Ice	6.03	6.03	50.00
			9.00			1" Ice	8.05	8.05	65.00
Decibel 20' x 2" Dipoles (Quinebaug Comm 911)	B	From Leg	0.00	0.0000	160.00	No Ice	4.00	4.00	35.00
			0.00			1/2" Ice	6.03	6.03	50.00
			9.00			1" Ice	8.05	8.05	65.00
DB201 C (Quinebaug Comm 911)	A	From Leg	0.00	0.0000	160.00	No Ice	2.00	2.00	25.00
			0.00			1/2" Ice	2.83	2.83	40.00
			3.00			1" Ice	3.66	3.66	55.00
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BXA-70080-4CF-EDIN-0 (Verizon)	A	From Leg	3.00	0.0000	158.00	No Ice	3.57	2.79	12.00
			0.00			1/2" Ice	3.87	3.10	36.95
			0.00			1" Ice	4.18	3.41	66.07
BXA-70080-4CF-EDIN-0 (Verizon)	B	From Leg	3.00	0.0000	158.00	No Ice	3.57	2.79	12.00
			0.00			1/2" Ice	3.87	3.10	36.95
			0.00			1" Ice	4.18	3.41	66.07
BXA-70080-4CF-EDIN-0 (Verizon)	C	From Leg	3.00	0.0000	158.00	No Ice	3.57	2.79	12.00
			0.00			1/2" Ice	3.87	3.10	36.95
			0.00			1" Ice	4.18	3.41	66.07
(2) SBNHH-1D65B (Verizon)	A	From Leg	3.00	0.0000	158.00	No Ice	8.05	5.34	50.71
			0.00			1/2" Ice	8.51	5.79	100.63
			0.00			1" Ice	8.97	6.26	156.65
(2) SBNHH-1D65B (Verizon)	B	From Leg	3.00	0.0000	158.00	No Ice	8.05	5.34	50.71
			0.00			1/2" Ice	8.51	5.79	100.63
			0.00			1" Ice	8.97	6.26	156.65
(2) SBNHH-1D65B (Verizon)	C	From Leg	3.00	0.0000	158.00	No Ice	8.05	5.34	50.71
			0.00			1/2" Ice	8.51	5.79	100.63
			0.00			1" Ice	8.97	6.26	156.65
B66A RRH4x45-4R (Verizon)	A	From Leg	3.00	0.0000	158.00	No Ice	2.54	1.61	35.50
			0.00			1/2" Ice	2.75	1.79	55.62
			0.00			1" Ice	2.97	1.98	78.85
B66A RRH4x45-4R (Verizon)	B	From Leg	3.00	0.0000	158.00	No Ice	2.54	1.61	35.50
			0.00			1/2" Ice	2.75	1.79	55.62
			0.00			1" Ice	2.97	1.98	78.85
B66A RRH4x45-4R (Verizon)	C	From Leg	3.00	0.0000	158.00	No Ice	2.54	1.61	35.50
			0.00			1/2" Ice	2.75	1.79	55.62
			0.00			1" Ice	2.97	1.98	78.85
RRH2x60-700U (Verizon)	A	From Leg	3.00	0.0000	158.00	No Ice	1.22	1.87	40.00
			0.00			1/2" Ice	1.36	2.05	58.87
			0.00			1" Ice	1.52	2.24	77.42
RRH2x60-700U (Verizon)	B	From Leg	3.00	0.0000	158.00	No Ice	1.22	1.87	40.00
			0.00			1/2" Ice	1.36	2.05	58.87
			0.00			1" Ice	1.52	2.24	77.42
RRH2x60-700U (Verizon)	C	From Leg	3.00	0.0000	158.00	No Ice	1.22	1.87	40.00
			0.00			1/2" Ice	1.36	2.05	58.87
			0.00			1" Ice	1.52	2.24	77.42
RRH2x60-PCS (Verizon)	A	From Leg	3.00	0.0000	158.00	No Ice	1.22	1.87	40.00
			0.00			1/2" Ice	1.36	2.05	58.87
			0.00			1" Ice	1.52	2.24	77.42
RRH2x60-PCS	B	From Leg	3.00	0.0000	158.00	No Ice	1.22	1.87	40.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(Verizon)			0.00			1/2" Ice	1.36	2.05	58.87
			0.00			1" Ice	1.52	2.24	77.42
RRH2x60-PCS	C	From Leg	3.00	0.0000	158.00	No Ice	1.22	1.87	40.00
(Verizon)			0.00			1/2" Ice	1.36	2.05	58.87
			0.00			1" Ice	1.52	2.24	77.42
DB-T1-6Z-8AB-0Z	A	From Leg	3.00	0.0000	158.00	No Ice	5.60	2.33	44.00
(Verizon)			0.00			1/2" Ice	5.92	2.57	80.00
			0.00			1" Ice	6.24	2.81	116.00
DB-T1-6Z-8AB-0Z	B	From Leg	3.00	0.0000	158.00	No Ice	5.60	2.33	44.00
(Verizon)			0.00			1/2" Ice	5.92	2.57	80.00
			0.00			1" Ice	6.24	2.81	116.00
15' T-Frames	A	From Leg	1.50	0.0000	158.00	No Ice	14.03	7.50	639.00
(Verizon)			0.00			1/2" Ice	18.11	10.09	923.00
			0.00			1" Ice	22.18	12.67	1207.00
15' T-Frames	B	From Leg	1.50	0.0000	158.00	No Ice	14.03	7.50	639.00
(Verizon)			0.00			1/2" Ice	18.11	10.09	923.00
			0.00			1" Ice	22.18	12.67	1207.00
15' T-Frames	C	From Leg	1.50	0.0000	158.00	No Ice	14.03	7.50	639.00
(Verizon)			0.00			1/2" Ice	18.11	10.09	923.00
			0.00			1" Ice	22.18	12.67	1207.00
Sabre Universal Pipe Mount	C	From Leg	2.00	0.0000	158.00	No Ice	1.73	1.73	35.00
(Verizon)			0.00			1/2" Ice	2.09	2.09	50.00
			0.00			1" Ice	2.45	2.45	65.00
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APXV18-209015-C	A	From Leg	3.00	0.0000	148.00	No Ice	3.57	2.02	31.50
(T-Mobile)			0.00			1/2" Ice	3.91	2.35	51.46
			0.00			1" Ice	4.25	2.68	75.69
APXV18-209015-C	B	From Leg	3.00	0.0000	148.00	No Ice	3.57	2.02	31.50
(T-Mobile)			0.00			1/2" Ice	3.91	2.35	51.46
			0.00			1" Ice	4.25	2.68	75.69
APXV18-209015-C	C	From Leg	3.00	0.0000	148.00	No Ice	3.57	2.02	31.50
(T-Mobile)			0.00			1/2" Ice	3.91	2.35	51.46
			0.00			1" Ice	4.25	2.68	75.69
LNX-6515DS-A1M	A	From Leg	3.00	0.0000	148.00	No Ice	11.45	7.70	50.30
(T-Mobile)			0.00			1/2" Ice	12.06	8.29	116.17
			0.00			1" Ice	12.69	8.89	189.71
LNX-6515DS-A1M	B	From Leg	3.00	0.0000	148.00	No Ice	11.45	7.70	50.30
(T-Mobile)			0.00			1/2" Ice	12.06	8.29	116.17
			0.00			1" Ice	12.69	8.89	189.71
LNX-6515DS-A1M	C	From Leg	3.00	0.0000	148.00	No Ice	11.45	7.70	50.30
(T-Mobile)			0.00			1/2" Ice	12.06	8.29	116.17
			0.00			1" Ice	12.69	8.89	189.71
ATMAA1412D-1A20	A	From Leg	3.00	0.0000	148.00	No Ice	1.00	0.41	13.00
(T-Mobile)			0.00			1/2" Ice	1.13	0.50	20.62
			0.00			1" Ice	1.26	0.59	30.11
ATMAA1412D-1A20	B	From Leg	3.00	0.0000	148.00	No Ice	1.00	0.41	13.00
(T-Mobile)			0.00			1/2" Ice	1.13	0.50	20.62
			0.00			1" Ice	1.26	0.59	30.11
ATMAA1412D-1A20	C	From Leg	3.00	0.0000	148.00	No Ice	1.00	0.41	13.00
(T-Mobile)			0.00			1/2" Ice	1.13	0.50	20.62
			0.00			1" Ice	1.26	0.59	30.11
10.5' T-Frame	A	From Leg	0.00	0.0000	148.00	No Ice	6.04	1.68	200.00
(T-Mobile)			0.00			1/2" Ice	8.20	2.08	300.00
			0.00			1" Ice	10.37	2.49	400.00
10.5' T-Frame	B	From Leg	0.00	0.0000	148.00	No Ice	6.04	1.68	200.00
(T-Mobile)			0.00			1/2" Ice	8.20	2.08	300.00
			0.00			1" Ice	10.37	2.49	400.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
10.5' T-Frame	C	From Leg	0.00	0.0000	148.00	No Ice	6.04	1.68	200.00
(T-Mobile)			0.00			1/2" Ice	8.20	2.08	300.00
			0.00			1" Ice	10.37	2.49	400.00
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(3) 7770	A	From Leg	3.00	0.0000	135.00	No Ice	5.51	2.93	35.00
(AT&T)			0.00			1/2" Ice	5.87	3.27	67.63
			0.00			1" Ice	6.23	3.63	105.06
(3) 7770	B	From Leg	3.00	0.0000	135.00	No Ice	5.51	2.93	35.00
(AT&T)			0.00			1/2" Ice	5.87	3.27	67.63
			0.00			1" Ice	6.23	3.63	105.06
(3) 7770	C	From Leg	3.00	0.0000	135.00	No Ice	5.51	2.93	35.00
(AT&T)			0.00			1/2" Ice	5.87	3.27	67.63
			0.00			1" Ice	6.23	3.63	105.06
HPA-65R-BUU-H6	A	From Leg	3.00	0.0000	135.00	No Ice	9.49	5.49	43.00
(AT&T)			0.00			1/2" Ice	9.96	5.94	100.33
			0.00			1" Ice	10.43	6.41	163.95
HPA-65R-BUU-H8-K	B	From Leg	3.00	0.0000	135.00	No Ice	13.30	7.52	68.00
(AT&T)			0.00			1/2" Ice	13.99	8.09	141.77
			0.00			1" Ice	14.70	8.67	223.17
HPA-65R-BUU-H8-K	C	From Leg	3.00	0.0000	135.00	No Ice	13.30	7.52	68.00
(AT&T)			0.00			1/2" Ice	13.99	8.09	141.77
			0.00			1" Ice	14.70	8.67	223.17
(2) LGP 21401 TMA	A	From Leg	3.00	0.0000	135.00	No Ice	0.82	0.35	10.00
(AT&T)			0.00			1/2" Ice	0.94	0.44	15.81
			0.00			1" Ice	1.06	0.54	23.36
(2) LGP 21401 TMA	B	From Leg	3.00	0.0000	135.00	No Ice	0.82	0.35	10.00
(AT&T)			0.00			1/2" Ice	0.94	0.44	15.81
			0.00			1" Ice	1.06	0.54	23.36
(2) LGP 21401 TMA	C	From Leg	3.00	0.0000	135.00	No Ice	0.82	0.35	10.00
(AT&T)			0.00			1/2" Ice	0.94	0.44	15.81
			0.00			1" Ice	1.06	0.54	23.36
RRUS 11	A	From Leg	3.00	0.0000	135.00	No Ice	2.78	1.19	50.71
(AT&T)			0.00			1/2" Ice	2.99	1.33	71.51
			0.00			1" Ice	3.21	1.49	95.34
RRUS 11	B	From Leg	3.00	0.0000	135.00	No Ice	2.78	1.19	50.71
(AT&T)			0.00			1/2" Ice	2.99	1.33	71.51
			0.00			1" Ice	3.21	1.49	95.34
RRUS 11	C	From Leg	3.00	0.0000	135.00	No Ice	2.78	1.19	50.71
(AT&T)			0.00			1/2" Ice	2.99	1.33	71.51
			0.00			1" Ice	3.21	1.49	95.34
RRUS 12 AWS	A	From Leg	3.00	0.0000	135.00	No Ice	1.29	3.15	60.00
(AT&T)			0.00			1/2" Ice	1.43	3.36	81.22
			0.00			1" Ice	1.60	3.59	107.65
RRUS 12 AWS	B	From Leg	3.00	0.0000	135.00	No Ice	1.29	3.15	60.00
(AT&T)			0.00			1/2" Ice	1.43	3.36	81.22
			0.00			1" Ice	1.60	3.59	107.65
RRUS 12 AWS	C	From Leg	3.00	0.0000	135.00	No Ice	1.29	3.15	60.00
(AT&T)			0.00			1/2" Ice	1.43	3.36	81.22
			0.00			1" Ice	1.60	3.59	107.65
RRUS A2	A	From Leg	3.00	0.0000	135.00	No Ice	2.07	0.50	22.04
(AT&T)			0.00			1/2" Ice	2.25	0.61	34.65
			0.00			1" Ice	2.43	0.72	49.71
RRUS A2	B	From Leg	3.00	0.0000	135.00	No Ice	2.07	0.50	22.04
(AT&T)			0.00			1/2" Ice	2.25	0.61	34.65
			0.00			1" Ice	2.43	0.72	49.71
RRUS A2	C	From Leg	3.00	0.0000	135.00	No Ice	2.07	0.50	22.04
(AT&T)			0.00			1/2" Ice	2.25	0.61	34.65

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00			1" Ice	2.43	0.72	49.71
(2) LGP21903 Diplexer	A	From Leg	3.00	0.0000	135.00	No Ice	0.23	0.16	5.00
(AT&T)			0.00			1/2" Ice	0.29	0.21	7.42
			0.00			1" Ice	0.36	0.28	10.91
(2) LGP21903 Diplexer	B	From Leg	3.00	0.0000	135.00	No Ice	0.23	0.16	5.00
(AT&T)			0.00			1/2" Ice	0.29	0.21	7.42
			0.00			1" Ice	0.36	0.28	10.91
(2) LGP21903 Diplexer	C	From Leg	3.00	0.0000	135.00	No Ice	0.23	0.16	5.00
(AT&T)			0.00			1/2" Ice	0.29	0.21	7.42
			0.00			1" Ice	0.36	0.28	10.91
DC6-48-60-18-8F	A	From Leg	0.00	0.0000	135.00	No Ice	2.20	3.70	32.80
(AT&T)			0.00			1/2" Ice	2.40	3.94	64.11
			0.00			1" Ice	2.60	4.19	99.07
12' T-Frame	A	From Leg	1.50	0.0000	137.00	No Ice	13.46	6.72	260.00
(AT&T)			0.00			1/2" Ice	17.79	8.03	360.00
			0.00			1" Ice	22.12	9.34	460.00
12' T-Frame	B	From Leg	1.50	0.0000	137.00	No Ice	13.46	6.72	260.00
(AT&T)			0.00			1/2" Ice	17.79	8.03	360.00
			0.00			1" Ice	22.12	9.34	460.00
12' T-Frame	C	From Leg	1.50	0.0000	137.00	No Ice	13.46	6.72	260.00
(AT&T)			0.00			1/2" Ice	17.79	8.03	360.00
			0.00			1" Ice	22.12	9.34	460.00
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(2) 742 351	A	From Leg	3.00	0.0000	128.00	No Ice	5.39	1.73	35.30
(Metro PCS)			0.00			1/2" Ice	5.73	2.04	62.60
			0.00			1" Ice	6.08	2.36	94.37
(2) 742 351	B	From Leg	3.00	0.0000	128.00	No Ice	5.39	1.73	35.30
(Metro PCS)			0.00			1/2" Ice	5.73	2.04	62.60
			0.00			1" Ice	6.08	2.36	94.37
(2) 742 351	C	From Leg	3.00	0.0000	128.00	No Ice	5.39	1.73	35.30
(Metro PCS)			0.00			1/2" Ice	5.73	2.04	62.60
			0.00			1" Ice	6.08	2.36	94.37
12' T-Frame	A	From Leg	1.50	0.0000	128.00	No Ice	10.00	6.46	260.00
(Metro PCS)			0.00			1/2" Ice	12.50	7.92	360.00
			0.00			1" Ice	15.00	9.38	460.00
12' T-Frame	B	From Leg	1.50	0.0000	128.00	No Ice	10.00	6.46	260.00
(Metro PCS)			0.00			1/2" Ice	12.50	7.92	360.00
			0.00			1" Ice	15.00	9.38	460.00
12' T-Frame	C	From Leg	1.50	0.0000	128.00	No Ice	10.00	6.46	260.00
(Metro PCS)			0.00			1/2" Ice	12.50	7.92	360.00
			0.00			1" Ice	15.00	9.38	460.00
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Yagi	C	From Leg	0.00	0.0000	82.00	No Ice	2.08	2.08	30.00
(Quinebaug Comm 911)			0.00			1/2" Ice	3.78	3.78	52.87
			0.00			1" Ice	5.51	5.51	85.27
**********									
GPS	A	From Leg	3.00	0.0000	76.00	No Ice	0.16	0.16	2.00
(Verizon)			0.00			1/2" Ice	0.21	0.21	4.00
			0.00			1" Ice	0.28	0.28	6.00
**********									
6' Trombone	B	From Leg	0.00	0.0000	68.00	No Ice	2.00	2.00	40.00
(Quinebaug Comm 911)			0.00			1/2" Ice	2.83	2.83	55.00
			0.00			1" Ice	3.66	3.66	70.00
**********									

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	160 - 140	3.501	39	0.2024	0.0060
T2	140 - 120	2.653	39	0.1892	0.0055
T3	120 - 100	1.898	39	0.1548	0.0039
T4	100 - 80	1.289	39	0.1226	0.0027
T5	80 - 60	0.813	39	0.0907	0.0017
T6	60 - 40	0.462	39	0.0655	0.0011
T7	40 - 20	0.219	39	0.0411	0.0008
T8	20 - 0	0.067	39	0.0209	0.0004

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
160.00	Lightning Rod	39	3.501	0.2024	0.0060	196867
158.00	BXA-70080-4CF-EDIN-0	39	3.414	0.2017	0.0060	196867
148.00	APXV18-209015-C	39	2.986	0.1967	0.0058	82028
137.00	12' T-Frame	39	2.532	0.1850	0.0053	44694
135.00	(3) 7770	39	2.453	0.1819	0.0052	42063
128.00	(2) 742 351	39	2.184	0.1696	0.0046	34951
82.00	Yagi	39	0.854	0.0937	0.0018	36753
76.00	GPS	39	0.733	0.0852	0.0016	37881
68.00	6' Trombone	39	0.588	0.0752	0.0013	41023

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 140	16.022	2	0.9229	0.0278
T2	140 - 120	12.156	2	0.8633	0.0254
T3	120 - 100	8.704	2	0.7077	0.0181
T4	100 - 80	5.916	2	0.5611	0.0126
T5	80 - 60	3.731	2	0.4157	0.0079
T6	60 - 40	2.125	2	0.3002	0.0053
T7	40 - 20	1.009	2	0.1884	0.0035
T8	20 - 0	0.310	11	0.0957	0.0018

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
160.00	Lightning Rod	2	16.022	0.9229	0.0278	44215
158.00	BXA-70080-4CF-EDIN-0	2	15.628	0.9196	0.0277	44215
148.00	APXV18-209015-C	2	13.675	0.8974	0.0269	18423
137.00	12' T-Frame	2	11.603	0.8448	0.0245	9988
135.00	(3) 7770	2	11.240	0.8308	0.0239	9375
128.00	(2) 742 351	2	10.013	0.7750	0.0212	7731

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
82.00	Yagi	2	3.923	0.4291	0.0083	8025
76.00	GPS	2	3.365	0.3905	0.0072	8267
68.00	6' Trombone	2	2.702	0.3444	0.0061	8953

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	160	Leg	A325N	0.7500	4	4613.79	29820.60	0.155 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	3480.49	5811.33	0.599 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	1	103.67	5811.33	0.018 ✔	1	Member Block Shear
T2	140	Leg	A325N	0.8750	4	12799.20	40589.10	0.315 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	5644.25	6830.86	0.826 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	1	93.31	5811.33	0.016 ✔	1	Member Block Shear
T3	120	Leg	A325N	0.8750	4	21277.30	40589.10	0.524 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	6223.46	7830.00	0.795 ✔	1	Member Bearing
T4	100	Leg	A325N	1.0000	4	29145.20	53014.40	0.550 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	6579.84	7830.00	0.840 ✔	1	Member Bearing
T5	80	Leg	A325N	1.0000	6	24367.40	53014.40	0.460 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	7305.97	11700.00	0.624 ✔	1	Member Bearing
T6	60	Leg	A325N	1.0000	6	28714.90	53014.40	0.542 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	8651.71	14137.50	0.612 ✔	1	Member Bearing
T7	40	Leg	A325N	1.0000	6	33451.80	53014.40	0.631 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	9567.46	14137.50	0.677 ✔	1	Member Bearing
T8	20	Leg	A325N	1.0000	8	28445.90	53014.40	0.537 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	9683.34	14137.50	0.685 ✔	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	ROHN 2.5 STD	20.00	4.00	50.7 K=1.00	1.7040	-22400.00	63560.30	0.352 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	140 - 120	ROHN 3 STD	20.03	5.01	51.7 K=1.00	2.2285	-59320.10	82509.00	0.719 [1]
T3	120 - 100	ROHN 3.5 EH	20.04	6.68	61.3 K=1.00	3.6784	-95975.10	125723.00	0.763 [1]
T4	100 - 80	ROHN 4 EH	20.04	6.68	54.3 K=1.00	4.4074	-130780.00	159903.00	0.818 [1]
T5	80 - 60	ROHN 5 EH	20.04	6.68	43.6 K=1.00	6.1120	-164698.00	239378.00	0.688 [1]
T6	60 - 40	ROHN 6 EHS	20.04	10.02	54.0 K=1.00	6.7133	-194962.00	244047.00	0.799 [1]
T7	40 - 20	ROHN 6 EH	20.03	10.02	54.8 K=1.00	8.4049	-228306.00	303757.00	0.752 [1]
T8	20 - 0	ROHN 6 EH	20.04	10.02	54.8 K=1.00	8.4049	-260366.00	303730.00	0.857 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L1 3/4x1 3/4x3/16	7.70	3.59	125.4 K=1.00	0.6211	-3532.08	8788.95	0.402 [1]
T2	140 - 120	L2x2x3/16	9.72	4.72	143.8 K=1.00	0.7148	-5647.36	7810.37	0.723 [1]
T3	120 - 100	L2 1/2x2 1/2x3/16	12.28	6.02	146.1 K=1.00	0.9023	-6253.37	9552.75	0.655 [1]
T4	100 - 80	L2 1/2x2 1/2x3/16	14.07	6.90	167.3 K=1.00	0.9023	-6632.63	7279.23	0.911 [1]
T5	80 - 60	L3x3x1/4	15.94	7.79	157.9 K=1.00	1.4400	-7309.61	13051.40	0.560 [1]
T6	60 - 40	L3 1/2x3 1/2x1/4	19.21	9.45	163.4 K=1.00	1.6900	-8714.94	14294.60	0.610 [1]
T7	40 - 20	L3 1/2x3 1/2x1/4	20.93	10.30	178.0 K=1.00	1.6900	-9717.79	12044.30	0.807 [1]
T8	20 - 0	L3 1/2x3 1/2x1/4	22.76	11.23	194.1 K=1.00	1.6900	-9842.34	10134.20	0.971 [1]

[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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L1 3/4x1 3/4x3/16 KL/R > 200 (C) - 4	6.58	6.10	213.2 K=1.00	0.6211	-105.35	3088.02	0.034 [1] ✔
T2	140 - 120	L1 3/4x1 3/4x3/16 KL/R > 200 (C) - 41	6.58	6.10	213.2 K=1.00	0.6211	-102.87	3088.02	0.033 [1] ✔

[1] $P_u / \phi P_n$ controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	ROHN 2.5 STD	20.00	4.00	50.7	1.7040	18455.20	76682.30	0.241 [1] ✔
T2	140 - 120	ROHN 3 STD	20.03	5.01	51.7	2.2285	51196.70	100281.00	0.511 [1] ✔
T3	120 - 100	ROHN 3.5 EH	20.04	6.68	61.3	3.6784	85109.00	165529.00	0.514 [1] ✔
T4	100 - 80	ROHN 4 EH	20.04	6.68	54.3	4.4074	116581.00	198335.00	0.588 [1] ✔
T5	80 - 60	ROHN 5 EH	20.04	6.68	43.6	6.1120	146205.00	275039.00	0.532 [1] ✔
T6	60 - 40	ROHN 6 EHS	20.04	10.02	54.0	6.7133	172290.00	302097.00	0.570 [1] ✔
T7	40 - 20	ROHN 6 EH	20.03	10.02	54.8	8.4049	200711.00	378222.00	0.531 [1] ✔
T8	20 - 0	ROHN 6 EH	20.04	10.02	54.8	8.4049	227567.00	378222.00	0.602 [1] ✔

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L1 3/4x1 3/4x3/16	7.70	3.59	82.9	0.3604	3480.49	15675.30	0.222 [1] ✔
T2	140 - 120	L2x2x3/16	9.72	4.72	94.1	0.4307	5644.25	18733.90	0.301 [1] ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	12.28	6.02	94.7	0.5713	6223.46	24851.10	0.250 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T4	100 - 80	L2 1/2x2 1/2x3/16	14.07	6.90	108.3	0.5713	6579.84	24851.10	0.265 [1]
T5	80 - 60	L3x3x1/4	15.94	7.79	102.0	0.9394	7305.97	45794.50	0.160 [1]
T6	60 - 40	L3 1/2x3 1/2x1/4	19.21	9.45	105.5	1.1034	8651.71	53792.60	0.161 [1]
T7	40 - 20	L3 1/2x3 1/2x1/4	20.93	10.30	114.8	1.1034	9567.46	53792.60	0.178 [1]
T8	20 - 0	L3 1/2x3 1/2x1/4	22.76	11.23	125.1	1.1034	9683.34	53792.60	0.180 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L1 3/4x1 3/4x3/16	6.58	6.10	141.7	0.3604	103.67	15675.30	0.007 [1]
T2	140 - 120	L1 3/4x1 3/4x3/16	6.58	6.10	141.7	0.3604	93.31	15675.30	0.006 [1]

[1] $P_u / \phi P_n$ controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	160 - 140	Leg	ROHN 2.5 STD	3	-22400.00	63560.30	35.2	Pass
T2	140 - 120	Leg	ROHN 3 STD	39	-59320.10	82509.00	71.9	Pass
T3	120 - 100	Leg	ROHN 3.5 EH	69	-95975.10	125723.00	76.3	Pass
T4	100 - 80	Leg	ROHN 4 EH	90	-130780.00	159903.00	81.8	Pass
T5	80 - 60	Leg	ROHN 5 EH	111	-164698.00	239378.00	68.8	Pass
T6	60 - 40	Leg	ROHN 6 EHS	132	-194962.00	244047.00	79.9	Pass
T7	40 - 20	Leg	ROHN 6 EH	147	-228306.00	303757.00	75.2	Pass
T8	20 - 0	Leg	ROHN 6 EH	162	-260366.00	303730.00	85.7	Pass
T1	160 - 140	Diagonal	L1 3/4x1 3/4x3/16	11	-3532.08	8788.95	40.2 59.9 (b)	Pass
T2	140 - 120	Diagonal	L2x2x3/16	48	-5647.36	7810.37	72.3 82.6 (b)	Pass
T3	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	75	-6253.37	9552.75	65.5 79.5 (b)	Pass
T4	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	96	-6632.63	7279.23	91.1	Pass
T5	80 - 60	Diagonal	L3x3x1/4	117	-7309.61	13051.40	56.0 62.4 (b)	Pass
T6	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	138	-8714.94	14294.60	61.0 61.2 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T7	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	153	-9717.79	12044.30	80.7	Pass
T8	20 - 0	Diagonal	L3 1/2x3 1/2x1/4	168	-9842.34	10134.20	97.1	Pass
T1	160 - 140	Top Girt	L1 3/4x1 3/4x3/16	4	-105.35	3088.02	3.4	Pass
T2	140 - 120	Top Girt	L1 3/4x1 3/4x3/16	41	-102.87	3088.02	3.3	Pass
							Summary	
						Leg (T8)	85.7	Pass
						Diagonal (T8)	97.1	Pass
						Top Girt (T1)	3.4	Pass
						Bolt Checks	84.0	Pass
						RATING =	**97.1**	**Pass**

MATHCAD CALCULATION PRINTOUT

Existing 160 ft Self Supporting Tower Foundation Check

Customer Name: SBA Communications Corp
Customer Site Number: CT10012-A-02
Customer Site Name: Griswold 2, CT

Carrier Name: T-Mobile
Carrier Site ID/Name: CT11152C/Griswold/I-395
Site Location: 181 A Norman Road,
Griswold, CT 06351

Latitude: 41.601097
Longitude:-71.954325

ACGI Job # 17-0376

Ref. ACGI # 16-0261, dated 03/18/2016
ACGI # 16-2850, dated 08/10/2016
ACGI # 16-3553, dated 10/12/2016

By:

Allpro Consulting Group, Inc.
9221 Lyndon B. Johnson Freeway, #204
Dallas, TX 75243
Phone: 972-231-8893
Fax: 866-364-8375

INPUT DATA

-Foundation Reactions- G Code (factered)

(As per TNX Output)

Down load; $Pv := 268.13 \cdot kips$ Shear; $S := 30.21 \cdot kips$

Uplift load; $P_{up} := 234.02 \cdot kips$ Moment; $M := 0 \cdot ft\_K$

MATERIAL & SOIL PARAMETERS

Conforming to the design requirements as in ACI 318

Unit wt. of concrete, $\gamma_c := 0.150 kcf$

Concrete compressive strength, $f_c := 3000 \cdot psi$

Rebar yield strength, $f_y := 60000 \cdot psi$

Soil data as per Geotechnical report by FDH Engineering Inc. FDH Project No. 16BDCN1600 dated 03/04/2016.

For Leg A With smallest computed thickness, consider this as worst case

Unit wt. of soil, $\gamma_s := 0.130 \cdot kcf$ Average Soil Weight

Ultimate Bearing Capacity, $Br_{ult} := 20 ksf$ (as per geotechnical report)

Internal angle of friction for soil, $\phi := 40 \cdot deg$

Cohesion of soil, $c_u := 0 \cdot ksf$

Coefficient of Friction $C_f := 0.45$

PRELIMINARY DIMENSIONS

Type of pedestal Pe.t=0 for circular,=1 for rectangular/square $Pe_t := 1$

Footing Dimensions, LxB $L := 6 \cdot ft$ $B := L$ Thickness of footing, $T_f := 2.3 \cdot ft$

Depth of footing, $D_f := 11.8 ft$ Extension above the grade, $Ex_g := 1 \cdot ft$

Pedestal diameter/size $Ped_{size} := 3 \cdot ft$

Depth of soil neglected: $L_{neg} := 1 \cdot ft$

CALCULATIONS

Determine footing size

$P_{ave} := 6.16ksf$ average passive pressure on footing. As per Geotechnical Report Figure 2

Calculate safety against overturning and location of resultant on the base

$Area_{ped} := if\left(Pe_t = 1, Ped_{size}^2, \frac{\pi}{4}\cdot Ped_{size}^2\right)$ $Area_{ped} = 9\,ft^2$

Resisting Moments

$N := 1 .. 5$

Component	Down load value, kips	Lever arm, ft
"Soil Weight"	$\left[L\cdot B\cdot\left(D_f - T_f\right) - Area_{ped}\cdot\left(D_f - T_f\right)\right]\cdot\gamma_s$	$\frac{L}{2}$
"Soil Wedge Weight"	$\left(D_f - T_f\right)\cdot\frac{1}{2}\cdot\left[\left(D_f - T_f\right)\cdot\tan(\phi)\right]\cdot B\cdot\gamma_s$	$L + \left(D_f - T_f\right)\cdot\frac{\tan(\phi)}{3}$
"Concrete Weight"	$L\cdot B\cdot T_f\cdot\gamma_c + Area_{ped}\cdot\gamma_c\cdot\left(D_f + Ex_g - T_f\right)$	$\frac{L}{2}$
"Passive Pressure"	$T_f\cdot B\cdot P_{ave}$	$\frac{T_f}{3}$
"Vertical load"	Pv	$\frac{L}{2}$

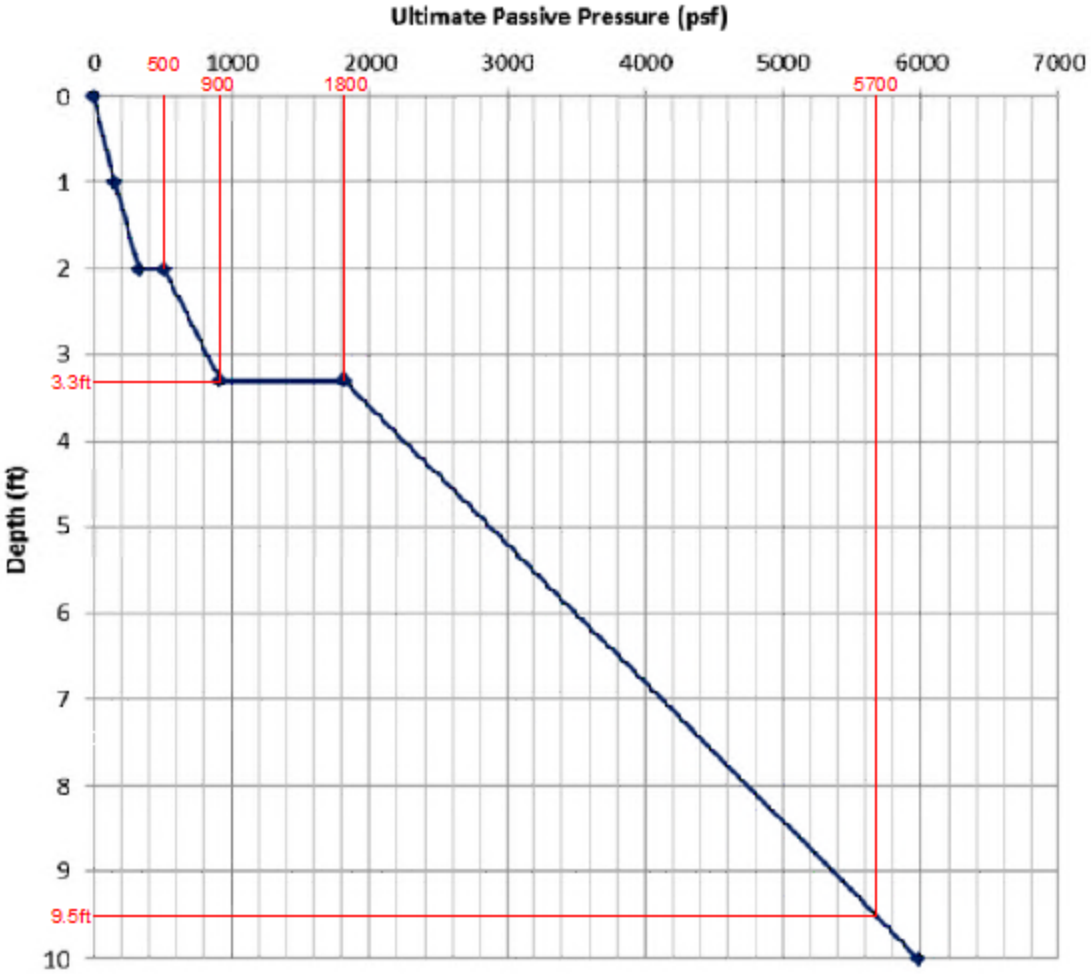
$RM_N := PDL_N\cdot LEV_N$

$TRM := \sum_N RM_N$ $TRM = 1305.065\cdot ft\cdot kips$

$TWT := PDL_1 + PDL_2 + PDL_3 + PDL_5$ $TWT = 357.604\cdot kips$ Total down load

Net soil weight removed $S_{w1} := L\cdot B\cdot D_f\cdot\gamma_s$ $S_{w1} = 55.224\cdot kips$

FIGURE 2: ULTIMATE PASSIVE RESISTANCE vs. DEPTH



2ft-3.3ft passive pressure on pedestal

As per Geotechnical Report Figure 2

resisting force $F_{pr1} := \frac{(0.5ksf + 0.9ksf)\cdot(3.3ft - 2ft)\cdot Ped_{size}}{2} = 2.73\cdot kips$

resisting moment arm $L_{pr1} := T_f + 9.5ft - \frac{(2ft + 3.3ft)}{2} = 9.15\,ft$

$M_{pr1} := F_{pr1}\cdot L_{pr1} = 24.98\cdot kips\cdot ft$

3.3ft-9.5ft passive pressure on pedestal

resisting force $F_{pr2} := \frac{(5.7ksf + 1.8ksf)\cdot(9.5ft - 3.3ft)\cdot Ped_{size}}{2} = 69.75\cdot kips$

resisting moment arm $L_{pr2} := T_f + 9.5ft - \frac{(9.5ft + 3.3ft)}{2} = 5.4\,ft$

$M_{pr2} := F_{pr2}\cdot L_{pr2} = 376.65\cdot kips\cdot ft$

$M_{pr} := M_{pr1} + M_{pr2} = 401.63\cdot kips\cdot ft$

Total resisting moment $M_r := TRM + M_{pr} = 1706.694 \cdot kip \cdot ft$

Overturning Moments

component	value, kips	lever arm, ft	Overturning Moment ft-kips
1) Moment on foundation	-	-	$M = 0 \cdot ft\_K$
2) Moment due to horizontal shear	$S = 30.21 \cdot kips$	$L_{hs} := D_f + Ex_g$	$O_{hs} := L_{hs} \cdot S \quad L_{hs} = 12.8\,ft$ $O_{hs} = 386.688 \cdot ft\_K$
Total Overturning Moment=	$M_o := M + O_{hs}$		$M_o = 386.688 \cdot ft\_K$

Check Safety Factor against Overturning

$SF := \frac{0.9 M_r}{M_o}$ $SF = 3.972$ > 1.0 OK!

$TWT_1 := TWT - PDL_2$ (exclude soil wedge weight for bearing check)

$M_{o\_red} := M_o - 0.75\left(M_{pr} + RM_4\right) = 36.586 \cdot kip \cdot ft$ (exclude overturning moment resist from lateral force)

Calculate eccentricity, ec $ec := \frac{M_{o\_red}}{TWT_1}$ $ec = 0.112 \cdot ft$ $\phi_{bearing} := 0.75$

Check location of eccentricity and determine pressure distribution under the footing

$L_{loc} := \frac{L}{6}$ $L_{loc} = 1\,ft$ For net bearing calcs $T_{w1} := S_{w1}$ $T_{w1} = 55.224 \cdot kips$

$P_{max1} := if\left[ec \le L_{loc}, \frac{TWT_1}{L \cdot B} \cdot \left[1 + \left(6 \cdot \frac{ec}{L}\right)\right], 4 \cdot \frac{TWT_1}{3 \cdot B \cdot (L - 2 \cdot ec)}\right]$ $P_{max1} = 10.129 \cdot ksf$ Gross soil pressure

$P_{max2} := \left(\frac{T_{w1}}{L \cdot B}\right)$ $P_{max2} = 1.534 \cdot ksf$ In-situ soil pressure $P_{net} := P_{max1} - P_{max2}$ $P_{max} := P_{net}$

Net soil pressure, $P_{net} = 8.595 \cdot ksf$ < $\phi_{bearing} Br_{ult} = 15 \cdot ksf$ $\frac{P_{net}}{\phi_{bearing} Br_{ult}} = 57.302 \cdot \%$ OK!

$P_{min} := if\left[ec \le L_{loc}, \frac{TWT}{L \cdot B} \cdot \left[1 - \left(6 \cdot \frac{ec}{L}\right)\right], 0 \cdot ksf\right]$ $P_{min} = 8.826 \cdot ksf$

Check for horizontal shear

$P_{tw} := \left(PDL_1 + PDL_3 + PDL_5\right) \cdot C_f$ $P_{shr} := 0.75\left(PDL_4 + P_{tw}\right)$

$P_{shr} = 174.48 \cdot kips$ > $S = 30.21 \cdot kips$ **OK!**

Check for uplift

Number of soil layers $NSL := 4$ $j := 1 .. NSL$

Neglected soil height $L_{ngl} := 3.3 \cdot ft$ $k := 1 .. NSL$

$\alpha := 0.4$ Estimated cohesion $i := 1 .. NSL$

Height $H_j :=$	PHI $\phi_j :=$	Soil Dens $\gamma s_j :=$
$1 \cdot ft$	$0 \cdot deg$	$105 \cdot pcf$
$1 \cdot ft$	$30 \cdot deg$	$115 \cdot pcf$
$7.5 \cdot ft$	$40 \cdot deg$	$135 \cdot pcf$
$2.3 ft$	$40 \cdot deg$	$135 pcf$

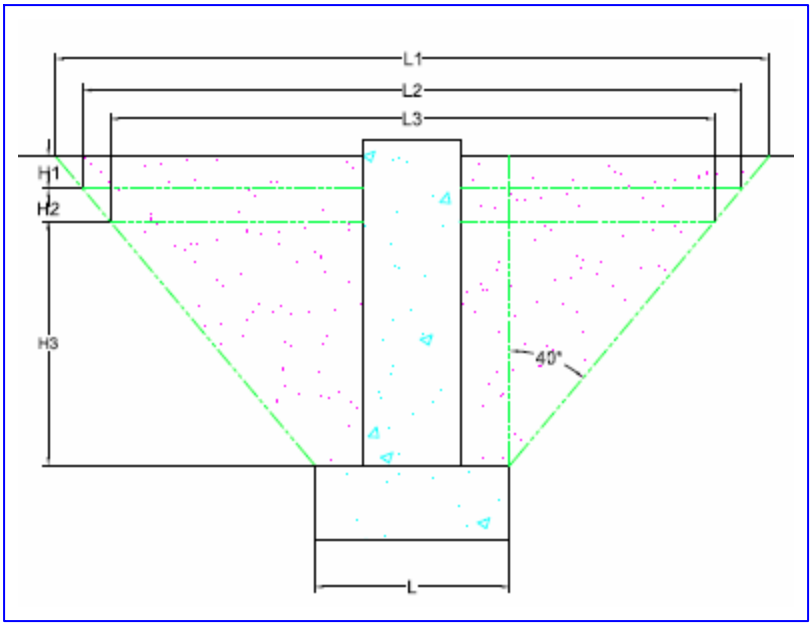
$K_s := 1$ For ϕ=40

$\sigma 1v_4 := \gamma s_1 \cdot H_1 + \gamma s_2 \cdot H_2 + \gamma s_3 \cdot H_3 + \gamma s_4 \cdot \frac{H_4}{2}$ $SK4 := K_s \cdot \sigma 1v_4 \cdot \tan(\phi_4 \cdot 0.8)$ $SK4 = 0.867 \cdot ksf$

Skin friction around Pad

$SKFUN_4 := 4 \cdot L \cdot H_4 \cdot (SK4)$

Soil & Soil Wedge Weight



$L_3 := L + 2 \cdot H_3 \cdot \tan(\phi_3) = 18.586 ft$

$L_2 := L_3 + 2 \cdot H_2 \cdot \tan(\phi_2) = 19.741 ft$

$L_1 := L_2 + 2 \cdot H_1 \cdot \tan(\phi_1) = 19.741 ft$

For Layer 0-1ft

$V_{soil1} := \frac{1}{6} \cdot H_1 \cdot \left[L_2^2 + (L_2 + L_1)^2 + L_1^2 \right]$

$W_{soil1} := \gamma s_1 \cdot (V_{soil1} - Area_{ped} \cdot H_1)$

For Layer 1ft-2ft

$V_{soil2} := \frac{1}{6} \cdot H_2 \cdot \left[L_2^2 + (L_2 + L_3)^2 + L_3^2 \right]$

$W_{soil2} := \gamma s_2 \cdot (V_{soil2} - Area_{ped} \cdot H_2)$

For Layer 2ft-9.5ft

$V_{soil3} := \frac{1}{6} \cdot H_3 \cdot \left[L^2 + (L + L_3)^2 + L_3^2 \right]$

$W_{soil3} := \gamma s_3 \cdot (V_{soil3} - Area_{ped} \cdot H_3)$

Total uplift resisting force

$TWT1 := W_{soil1} + W_{soil2} + W_{soil3} + PDL_3$ PDL3 is concrete weight

$P_{ucap} := 0.75(SKFUN_4 + TWT1)$ $P_{ucap} = 234.687 \cdot kips$ < $P_{up} = 234.02 \cdot kips$ $\frac{P_{up}}{P_{ucap}} = 99.716 \cdot \%$

Concrete Design Calculations

General Input parameters

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

Reduction factors as per respective ACI sections

$\phi_{shear} := 0.85$ as per ACI 9.3.2.3

$\phi_{compr} := 0.75$ 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 3.1.13 $RC_{fac} := 1.0$

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

Single shear in footing

Allowable shear stress in concrete for wide beam shear criteria=

$\nu_{wide} := 2 \cdot \phi_{shear} \cdot \sqrt{f_c \cdot psi}$ $\nu_{wide} = 93.113 \cdot psi$

Effective depth of steel= $d := T_f - cc$ $d = 24.6 \cdot in$

$L_{eff} := if(ec \le L_{loc}, L, L - 2 \cdot ec)$ $L_{eff} = 6\,ft$

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

shear on the face of concrete=

$$Shear_{wide} := \left(\frac{L - Ped_{size}}{2} - d\right) \cdot B \cdot \left[\frac{P_{maxf} + \left[P_{maxf} - \frac{P_{maxf} - P_{minf}}{L_{eff}} \cdot \left(\frac{L - Ped_{size}}{2} - d\right)\right]}{2}\right] \quad Shear_{wide} = -28.33 \cdot kips$$

Area of concrete in shear= $A_{shear} := B \cdot d$ $A_{shear} = 1771.2 \cdot in^2$

Shear stress acting on concrete face= $\nu_{act1} := \frac{Shear_{wide}}{A_{shear}}$ $\nu_{act1} = -15.995 \cdot psi$ < $\nu_{wide} = 93.113 \cdot psi$ **O.K!**

Punching or two way shear in footing

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

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

$\nu_{punch} = 186.226\cdot psi$

$P_{avg} := \frac{P_{maxf} + P_{minf}}{2}$

$Area_{col} := if\left[Pe_t = 0, \frac{\pi}{4}\cdot\left(Ped_{size} + d\right)^2, \left(Ped_{size} + d\right)^2\right]$

$Peri_{col} := if\left[Pe_t = 0, 2\cdot\pi\cdot\frac{Ped_{size} + d}{2}, 4\cdot\left(Ped_{size} + d\right)\right]$

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

Shear stress acting on the concrete face=

$\nu_{act} := \frac{Pvf - Area_{col}\cdot P_{avg}}{Peri_{col}\cdot d}$ $\nu_{act} = 7.713\cdot psi$ < $\nu_{punch} = 186.226\cdot psi$ **O.K!**

Design pedestal steel

Effective diameter/size= $D_{eff} := Ped_{size} - cc\cdot 2$ $D_{eff} = 30\cdot in$ $h := Ped_{size}$ $h = 36\cdot in$

$D_{pier} := Ped_{size}$

Effective pier diameter $D_{eff} := D_{pier} - cc\cdot 2$ $D_{eff} = 2.5\,ft$

-Minimum required area of steel per ACI-

$Area_{stlmin} := 0.005\cdot\frac{\pi}{4}\cdot D_{pier}^2$ -(ACI 10.8.4) & (ACI 10.9.1)

$Area_{stlmin} = 5.089\cdot in^2$

-Rebar details-

Selected rebar size $d_{bar} := 8$

-Rebar details-

$No := (0\ \ 1\ \ 2\ \ 3\ \ 4\ \ 5\ \ 6\ \ 7\ \ 8\ \ 9\ \ 10\ \ 11\ \ 12\ \ 13\ \ 14\ \ 15\ \ 16\ \ 17\ \ 18)^T$

$d_b := (0\ \ 0\ \ 0\ \ 0.375\ \ 0.5\ \ 0.625\ \ 0.75\ \ 0.875\ \ 1.00\ \ 1.125\ \ 1.25\ \ 1.41\ \ 0\ \ 0\ \ 1.693\ \ 0\ \ 0\ \ 0\ \ 2.257)^T\cdot in$

$A_b := (0\ \ 0\ \ 0\ \ 0.11\ \ 0.20\ \ 0.31\ \ 0.44\ \ 0.60\ \ 0.79\ \ 1.00\ \ 1.27\ \ 1.56\ \ 0\ \ 0\ \ 2.25\ \ 0\ \ 0\ \ 0\ \ 4.00)^T\cdot in^2$

$B := d_{bar}$ $d_{b_B} = 1\cdot in$ Bar area= $Area_{abar} := A_{b_B}$ $Area_{abar} = 0.79\cdot in^2$

-Number of vertical rebars required-

$NRB := ceil\left(\frac{Area_{stlmin}}{Area_{abar}}\right)$ $NRB = 7$ $Area_{stluse} := Area_{abar}\cdot NRB$ $Area_{stluse} = 5.53\cdot in^2$

Rebar used $NRB := 12$ $Area_{stluse1} := Area_{abar}\cdot NRB = 9.48\cdot in^2$ OK!

$Mn := 4863.04063 \cdot in \cdot kips$

$0.9 \cdot Mn = 364.728 \cdot kips \cdot ft$ > $M_{o\_red} = 36.586 \cdot kips \cdot ft$ **OK**

Use ($NRB = 12$) $d_{bar} = 8$ vertical bars

Vertical bar spacing $S_{bar} := D_{eff} \cdot \frac{\pi}{NRB} - d_{b_B}$ $S_{bar} = 6.854 \cdot in$

Check pedestal in compression

Allowable compressive load on column ACI 10.15= $P_{comp} := \phi_{compr} \cdot 0.85 \cdot f_c \cdot Area_{ped}$

$P_{comp} = 2478.6 \cdot kips$ > $Pv = 268.13 \cdot kips$ **O.K!**

SPREAD FOOTING CHECK SUMMARY

Safety Factor against Overturning $SF = 3.972$ > 1.0 **O.K!** $\frac{1.0}{SF} = 25.175 \cdot \%$

Uplift $P_{ucap} = 234.687 \cdot kips$ > $P_{up} = 234.02 \cdot kips$ $\frac{P_{up}}{P_{ucap}} = 99.716 \cdot \%$ OK!

Net soil pressure, $P_{net} = 8.595 \cdot ksf$ < $\phi_{bearing} Br_{ult} = 15 \cdot ksf$ OK! $\frac{P_{net}}{\phi_{bearing} Br_{ult}} = 57.302 \cdot \%$

Check for horizontal shear $P_{shr} = 174.48 \cdot kips$ > $S = 30.21 \cdot kips$ OK! $\frac{S}{P_{shr}} = 17.314 \cdot \%$

Check pedestal in compression

Allowable compressive load on column ACI 10.15= $P_{comp} = 2478.6 \cdot kips$ > $Pv = 268.13 \cdot kips$

$\frac{Pv}{P_{comp}} = 10.818 \cdot \%$

```
================================================================================

                LPILE Plus for Windows, Version 5.0 (5.0.47)

               Analysis of Individual Piles and Drilled Shafts
              Subjected to Lateral Loading Using the p-y Method

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================================================================================

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--------------------------------------------------------------------------------
                           Files Used for Analysis
--------------------------------------------------------------------------------

Path to file locations:      P:\2017\Structural\17-0376 CT10012-A-02 Griswold 2, CT Structural
Analysis (SBA)\L-Pile\
Name of input data file:     CT10012-A-02 Foundation.lpd
Name of output file:         CT10012-A-02 Foundation.lpo
Name of plot output file:    CT10012-A-02 Foundation.lpp
Name of runtime file:        CT10012-A-02 Foundation.lpr


--------------------------------------------------------------------------------
                         Time and Date of Analysis
--------------------------------------------------------------------------------

               Date:  February  8, 2017     Time:  17:29:47


--------------------------------------------------------------------------------
                               Problem Title
--------------------------------------------------------------------------------

17-0376 CT10012-A-02 Griswold 2


--------------------------------------------------------------------------------
                               Program Options
--------------------------------------------------------------------------------

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 2:
- Computation of Ultimate Bending Moment of Cross Section (Section Design)



--------------------------------------------------------------------------------
   Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness
--------------------------------------------------------------------------------
```

```
Number of sections =  1



Pile Section No.  1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter                        =      36.0000 in

Material Properties:

Compressive Strength of Concrete        =        3.000 kip/in**2
Yield Stress of Reinforcement           =         60. kip/in**2
Modulus of Elasticity of Reinforcement =       29000. kip/in**2
Number of Reinforcing Bars              =          12
Area of Single Bar                      =      0.79000 in**2
Number of Rows of Reinforcing Bars      =            7
Area of Steel                           =        9.480 in**2
Area of Shaft                           =     1017.876 in**2
Percentage of Steel Reinforcement       =        0.931 percent
Cover Thickness (edge to bar center)    =        4.000 in

Unfactored Axial Squash Load Capacity  =      3140.21 kip

Distribution and Area of Steel Reinforcement

 Row          Area of        Distance to
Number     Reinforcement   Centroidal Axis
              in**2             in
------     -------------   ---------------
   1            0.790              14.000
   2            1.580              12.124
   3            1.580               7.000
   4            1.580               0.000
   5            1.580              -7.000
   6            1.580             -12.124
   7            0.790             -14.000


Axial Thrust Force =   -235000.00  lbs

    Bending       Bending       Bending       Maximum     Neutral Axis Max. Concrete  Max. Steel
    Moment       Stiffness     Curvature      Strain       Position       Stress        Stress
    in-lbs        lb-in2        rad/in        in/in         inches         psi           psi
 ------------- ------------- ------------- ------------- ------------- ------------- -------------
  354664.19131  2.837314E+11    0.00000125  1.341105E-12    0.00000107       0.00000    1159.99996
  700285.14474  2.801141E+11    0.00000250  2.682209E-12    0.00000107       0.00000    2319.99992
      1036863.  2.764968E+11    0.00000375  4.023314E-12    0.00000107       0.00000    3479.99988
      1036863.  2.073726E+11    0.00000500  5.364418E-12    0.00000107       0.00000    4639.99984
      1036863.  1.658981E+11    0.00000625  6.705523E-12    0.00000107       0.00000    5799.99981
      1036863.  1.382484E+11    0.00000750  8.046627E-12    0.00000107       0.00000    6959.99977
      1036863.  1.184986E+11    0.00000875  9.387732E-12    0.00000107       0.00000    8119.99973
      1036863.  1.036863E+11    0.00001000  1.072884E-11    0.00000107       0.00000    9279.99969
      1036863.  9.216559E+10    0.00001125  1.206994E-11    0.00000107       0.00000   10439.99965
      1036863.  8.294903E+10    0.00001250  1.341105E-11    0.00000107       0.00000   11599.99961
      1036863.  7.540821E+10    0.00001375  1.475215E-11    0.00000107       0.00000   12759.99957
      1036863.  6.912419E+10    0.00001500  1.609325E-11    0.00000107       0.00000   13919.99953
      1036863.  6.380695E+10    0.00001625  1.743436E-11    0.00000107       0.00000   15079.99949
      1036863.  5.924931E+10    0.00001750  1.877546E-11    0.00000107       0.00000   16239.99946
```

1036863.	5.529935E+10	0.00001875	2.011657E-11	0.00000107	0.00000	17399.99942
1036863.	5.184314E+10	0.00002000	2.145767E-11	0.00000107	0.00000	18559.99938
1036863.	4.879355E+10	0.00002125	2.279878E-11	0.00000107	0.00000	19719.99934
1036863.	4.608279E+10	0.00002250	2.413988E-11	0.00000107	0.00000	20879.99930
1036863.	4.365738E+10	0.00002375	2.548099E-11	0.00000107	0.00000	22039.99926
1036863.	4.147451E+10	0.00002500	2.682209E-11	0.00000107	0.00000	23199.99922
1036863.	3.949954E+10	0.00002625	2.816319E-11	0.00000107	0.00000	24359.99918
1036863.	3.770410E+10	0.00002750	2.950430E-11	0.00000107	0.00000	25519.99914
1036863.	3.606480E+10	0.00002875	3.084540E-11	0.00000107	0.00000	26679.99911
1036863.	3.456210E+10	0.00003000	3.218651E-11	0.00000107	0.00000	27839.99907
1036863.	3.317961E+10	0.00003125	3.352761E-11	0.00000107	0.00000	28999.99903
1036863.	3.190347E+10	0.00003250	3.486872E-11	0.00000107	0.00000	30159.99899
1036863.	3.072186E+10	0.00003375	3.620982E-11	0.00000107	0.00000	31319.99895
1036863.	2.962465E+10	0.00003500	3.755093E-11	0.00000107	0.00000	32479.99891
1036863.	2.860311E+10	0.00003625	3.889203E-11	0.00000107	0.00000	33639.99887
1036863.	2.764968E+10	0.00003750	4.023314E-11	0.00000107	0.00000	34799.99883
1044009.	2.694216E+10	0.00003875	4.157424E-11	0.00000107	0.00000	35959.99879
1077686.	2.694216E+10	0.00004000	4.291534E-11	0.00000107	0.00000	37119.99876
1111364.	2.694216E+10	0.00004125	4.425645E-11	0.00000107	0.00000	38279.99872
1145042.	2.694216E+10	0.00004250	4.559755E-11	0.00000107	0.00000	39439.99868
1178720.	2.694216E+10	0.00004375	4.693866E-11	0.00000107	0.00000	40599.99864
1212397.	2.694216E+10	0.00004500	4.827976E-11	0.00000107	0.00000	41759.99860
1246075.	2.694216E+10	0.00004625	4.962087E-11	0.00000107	0.00000	42919.99856
1279753.	2.694216E+10	0.00004750	2.058354E-07	0.00433338	0.00000	44074.03077
1313430.	2.694216E+10	0.00004875	0.00002271	0.46576130	0.00000	44581.52996
1398965.	2.729688E+10	0.00005125	0.00006617	1.29106200	157.45565	45641.15911
1498989.	2.788816E+10	0.00005375	0.00010587	1.96960080	274.79947	46809.88476
1612064.	2.865892E+10	0.00005625	0.00014239	2.53136265	379.97544	48070.71467
1734116.	2.951686E+10	0.00005875	0.00017660	3.00594628	476.09857	49398.61903
1858813.	3.034797E+10	0.00006125	0.00021008	3.42995203	568.03184	50747.54771
1994116.	3.128024E+10	0.00006375	0.00024065	3.77484763	649.94226	52181.25045
2125933.	3.208956E+10	0.00006625	0.00027210	4.10710680	732.48421	53589.22105
2268254.	3.299279E+10	0.00006875	0.00030045	4.37016714	805.13658	55086.97927
2405521.	3.376170E+10	0.00007125	0.00033020	4.63439047	879.87262	56544.19068
2550208.	3.457910E+10	0.00007375	0.00035756	4.84832561	947.01643	58070.64360
2691487.	3.529819E+10	0.00007625	0.00038592	5.06125867	1015.21058	59568.29176
2813690.	3.572940E+10	0.00007875	0.00041262	5.23962772	1077.95956	60000.00000
2927910.	3.603582E+10	0.00008125	0.00043871	5.39950025	1137.96734	60000.00000
3049782.	3.641531E+10	0.00008375	0.00046143	5.50964034	1188.99340	60000.00000
3122071.	3.619793E+10	0.00008625	0.00048224	5.59122241	1234.75842	60000.00000
3186473.	3.590392E+10	0.00008875	0.00050237	5.66052639	1278.22487	60000.00000
3250686.	3.562395E+10	0.00009125	0.00052256	5.72668469	1321.09100	60000.00000
3314706.	3.535686E+10	0.00009375	0.00054281	5.78995264	1363.35080	60000.00000
3378532.	3.510163E+10	0.00009625	0.00056312	5.85056627	1404.99965	60000.00000
3442161.	3.485733E+10	0.00009875	0.00058349	5.90873587	1446.03241	60000.00000
3505590.	3.462311E+10	0.00010125	0.00060392	5.96465027	1486.44359	60000.00000
3560173.	3.431492E+10	0.00010375	0.00062250	5.99999964	1522.39789	60000.00000
3635719.	3.421853E+10	0.00010625	0.00064106	6.03351438	1557.69824	60000.00000
3699215.	3.401577E+10	0.00010875	0.00066104	6.07853043	1595.11705	60000.00000
3735310.	3.357582E+10	0.00011125	0.00067785	6.09302294	1625.81492	60000.00000
3761509.	3.306821E+10	0.00011375	0.00069352	6.09692180	1653.89805	60000.00000
3787634.	3.258180E+10	0.00011625	0.00070923	6.10088289	1681.59700	60000.00000
3813686.	3.211525E+10	0.00011875	0.00072496	6.10490406	1708.90985	60000.00000
3839663.	3.166732E+10	0.00012125	0.00074071	6.10898530	1735.83503	60000.00000
3865565.	3.123689E+10	0.00012375	0.00075650	6.11312234	1762.37000	60000.00000
3891390.	3.082289E+10	0.00012625	0.00077231	6.11731517	1788.51310	60000.00000
3917139.	3.042438E+10	0.00012875	0.00078815	6.12156165	1814.26212	60000.00000
3942811.	3.004047E+10	0.00013125	0.00080402	6.12586176	1839.61528	60000.00000
3968407.	2.967033E+10	0.00013375	0.00081992	6.13021553	1864.57074	60000.00000
3993924.	2.931320E+10	0.00013625	0.00083584	6.13462079	1889.12614	60000.00000

4019363.	2.896838E+10	0.00013875	0.00085180	6.13907754	1913.27955	60000.00000
4044722.	2.863520E+10	0.00014125	0.00086778	6.14358366	1937.02850	60000.00000
4070003.	2.831306E+10	0.00014375	0.00088380	6.14814126	1960.37142	60000.00000
4095202.	2.800138E+10	0.00014625	0.00089984	6.15274608	1983.30529	60000.00000
4120321.	2.769964E+10	0.00014875	0.00091591	6.15740240	2005.82890	60000.00000
4170312.	2.712398E+10	0.00015375	0.00094815	6.16685665	2049.63375	60000.00000
4219973.	2.658251E+10	0.00015875	0.00098052	6.17650402	2091.76791	60000.00000
4269296.	2.607204E+10	0.00016375	0.00101301	6.18634236	2132.21208	60000.00000
4318276.	2.558978E+10	0.00016875	0.00104564	6.19636953	2170.94620	60000.00000
4366910.	2.513330E+10	0.00017375	0.00107839	6.20658982	2207.95073	60000.00000
4392868.	2.457549E+10	0.00017875	0.00110654	6.19041717	2237.99110	60000.00000
4406755.	2.398234E+10	0.00018375	0.00113222	6.16176689	2264.06835	60000.00000
4420497.	2.341985E+10	0.00018875	0.00115798	6.13497484	2289.07251	60000.00000
4434088.	2.288562E+10	0.00019375	0.00118379	6.10989940	2312.99490	60000.00000
4447531.	2.237752E+10	0.00019875	0.00120968	6.08641827	2335.82766	60000.00000
4460822.	2.189360E+10	0.00020375	0.00123562	6.06441557	2357.56164	60000.00000
4473959.	2.143214E+10	0.00020875	0.00126164	6.04379046	2378.18831	60000.00000
4486943.	2.099155E+10	0.00021375	0.00128773	6.02445281	2397.69906	60000.00000
4499769.	2.057037E+10	0.00021875	0.00131388	6.00631464	2416.08406	60000.00000
4499769.	2.011070E+10	0.00022375	0.00134250	5.99999964	2434.94122	60000.00000
4510792.	1.971931E+10	0.00022875	0.00137250	5.99999964	2453.21752	60000.00000
4537925.	1.941358E+10	0.00023375	0.00140250	5.99999964	2469.91412	60000.00000
4551153.	1.906242E+10	0.00023875	0.00142898	5.98524964	2483.24866	60000.00000
4563039.	1.872016E+10	0.00024375	0.00145523	5.97016275	2495.26385	60000.00000
4574764.	1.839101E+10	0.00024875	0.00148156	5.95602429	2506.12297	60000.00000
4586327.	1.807420E+10	0.00025375	0.00150798	5.94278705	2515.81449	60000.00000
4597723.	1.776898E+10	0.00025875	0.00153449	5.93040168	2524.32596	60000.00000
4608954.	1.747471E+10	0.00026375	0.00156109	5.91882956	2531.64523	60000.00000
4620012.	1.719074E+10	0.00026875	0.00158778	5.90802777	2537.75917	60000.00000
4630900.	1.691653E+10	0.00027375	0.00161457	5.89796412	2542.65482	60000.00000
4641613.	1.665153E+10	0.00027875	0.00164145	5.88860428	2546.31849	60000.00000
4652150.	1.639524E+10	0.00028375	0.00166843	5.87991822	2548.73617	60000.00000
4662505.	1.614720E+10	0.00028875	0.00169550	5.87187588	2549.89338	60000.00000
4672510.	1.590642E+10	0.00029375	0.00172268	5.86445582	2547.33305	60000.00000
4682281.	1.567291E+10	0.00029875	0.00174997	5.85762799	2542.81064	60000.00000
4691954.	1.544676E+10	0.00030375	0.00177736	5.85137522	2538.26955	60000.00000
4701528.	1.522762E+10	0.00030875	0.00180485	5.84567606	2541.70200	60000.00000
4710997.	1.501513E+10	0.00031375	0.00183246	5.84050906	2545.33418	60000.00000
4720364.	1.480898E+10	0.00031875	0.00186018	5.83586133	2547.93813	60000.00000
4729623.	1.460887E+10	0.00032375	0.00188802	5.83171356	2549.49849	60000.00000
4738770.	1.441451E+10	0.00032875	0.00191598	5.82806361	2549.86908	60000.00000
4747695.	1.422530E+10	0.00033375	0.00194415	5.82516038	2545.71696	60000.00000
4756540.	1.404145E+10	0.00033875	0.00197242	5.82262838	2541.54788	60000.00000
4765305.	1.386271E+10	0.00034375	0.00200078	5.82045901	2537.36138	60000.00000
4773987.	1.368885E+10	0.00034875	0.00202925	5.81864154	2537.53312	60000.00000
4791094.	1.335497E+10	0.00035875	0.00208650	5.81602800	2545.10102	60000.00000
4807854.	1.303825E+10	0.00036875	0.00214418	5.81473196	2549.22147	60000.00000
4824159.	1.273705E+10	0.00037875	0.00220241	5.81493366	2547.38178	60000.00000
4839997.	1.245015E+10	0.00038875	0.00226119	5.81655800	2539.70233	60000.00000
4855581.	1.217701E+10	0.00039875	0.00232033	5.81901920	2531.95865	60000.00000
4857333.	1.188338E+10	0.00040875	0.00236787	5.79296100	2538.26452	60000.00000
4858148.	1.160155E+10	0.00041875	0.00241481	5.76670754	2543.15171	60000.00000
4858901.	1.133271E+10	0.00042875	0.00246191	5.74205482	2546.74880	60000.00000
4859593.	1.107599E+10	0.00043875	0.00250917	5.71890628	2549.03159	60000.00000
4860217.	1.083057E+10	0.00044875	0.00255660	5.69716537	2549.97452	60000.00000
4860682.	1.059549E+10	0.00045875	0.00260440	5.67717540	2546.19812	60000.00000
4861089.	1.037032E+10	0.00046875	0.00265236	5.65836990	2541.46973	60000.00000
4861465.	1.015450E+10	0.00047875	0.00270042	5.64056647	2536.72317	60000.00000
4861808.	9.947434E+09	0.00048875	0.00274859	5.62370718	2531.95813	60000.00000
4862119.	9.748610E+09	0.00049875	0.00279686	5.60774052	2527.17414	60000.00000

4862396.	9.557535E+09	0.00050875	0.00284524	5.59261715	2528.77633	60000.00000
4862638.	9.373760E+09	0.00051875	0.00289374	5.57829201	2534.50303	60000.00000
4862844.	9.196868E+09	0.00052875	0.00294235	5.56472433	2539.35435	60000.00000
4863016.	9.026480E+09	0.00053875	0.00299107	5.55187762	2543.31641	60000.00000
4863151.	8.862234E+09	0.00054875	0.00303992	5.53971541	2546.37457	60000.00000
4863250.	8.703803E+09	0.00055875	0.00308889	5.52820766	2548.51397	60000.00000
4863310.	8.550875E+09	0.00056875	0.00313798	5.51732218	2549.71898	60000.00000
4863310.	8.403127E+09	0.00057875	0.00318726	5.50714266	2549.07398	60000.00000
4863310.	8.260399E+09	0.00058875	0.00323684	5.49781501	2545.11333	60000.00000
4863310.	8.122438E+09	0.00059875	0.00328648	5.48891008	2541.14102	60000.00000
4863310.	7.989010E+09	0.00060875	0.00333620	5.48040640	2537.15709	60000.00000
4863310.	7.859895E+09	0.00061875	0.00338598	5.47228682	2533.16132	60000.00000
4863310.	7.734887E+09	0.00062875	0.00343583	5.46453416	2529.15356	60000.00000
4863310.	7.613793E+09	0.00063875	0.00348574	5.45713127	2525.13381	60000.00000
4863310.	7.496432E+09	0.00064875	0.00353573	5.45006740	2521.10145	60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 4863.04063 in-kip

Axial Thrust Force = 269000.00 lbs

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi	Max. Steel Stress psi
343144.10987	2.745153E+11	0.00000125	0.00010192	81.53333151	309.76939	2810.58327
686211.63769	2.744847E+11	0.00000250	0.00012461	49.84288180	375.15885	3323.60893
1029158.	2.744420E+11	0.00000375	0.00014737	39.29931557	439.79379	3838.80057
1372279.	2.744558E+11	0.00000500	0.00017022	34.04379952	503.68322	4356.35093
1713836.	2.742138E+11	0.00000625	0.00019311	30.89831078	566.72631	4875.31883
2052552.	2.736736E+11	0.00000750	0.00021602	28.80288327	628.81512	5394.62711
2391427.	2.733060E+11	0.00000875	0.00023903	27.31776559	690.18992	5916.88302
2726586.	2.726586E+11	0.00001000	0.00026204	26.20358670	750.55937	6439.04014
3057127.	2.717446E+11	0.00001125	0.00028498	25.33194387	809.78472	6959.54669
3057127.	2.445701E+11	0.00001250	0.00028671	22.93712604	813.30750	6864.70819
3057127.	2.223365E+11	0.00001375	0.00030394	22.10455763	856.82231	7219.19236
3057127.	2.038085E+11	0.00001500	0.00032065	21.37671769	898.49141	7558.87219
3057127.	1.881309E+11	0.00001625	0.00033705	20.74175084	938.86439	7889.55008
3057127.	1.746930E+11	0.00001750	0.00035319	20.18213260	978.07312	8212.43230
3107722.	1.657452E+11	0.00001875	0.00036910	19.68542612	1016.26290	8528.95045
3204627.	1.602314E+11	0.00002000	0.00038460	19.23002994	1052.98044	8833.41737
3300594.	1.553221E+11	0.00002125	0.00040007	18.82663858	1089.17355	9136.91602
3394822.	1.508810E+11	0.00002250	0.00041544	18.46415198	1124.71629	9437.85917
3483928.	1.466917E+11	0.00002375	0.00043039	18.12186992	1158.82968	9726.43791
3573990.	1.429596E+11	0.00002500	0.00044549	17.81952274	1192.85767	10280.84601
3659717.	1.394178E+11	0.00002625	0.00046018	17.53079474	1225.56031	11014.68250
3747014.	1.362551E+11	0.00002750	0.00047510	17.27650845	1258.36922	11741.98451
3829769.	1.332094E+11	0.00002875	0.00048955	17.02782905	1289.71625	12483.04753
3912322.	1.304107E+11	0.00003000	0.00050402	16.80055153	1320.72272	13223.52017
3995689.	1.278620E+11	0.00003125	0.00051864	16.59634960	1351.67317	13959.55818
4075664.	1.254051E+11	0.00003250	0.00053286	16.39572895	1381.38890	14707.02547
4155445.	1.231243E+11	0.00003375	0.00054711	16.21054924	1410.77277	15453.92494
4236607.	1.210459E+11	0.00003500	0.00056161	16.04587662	1440.31193	16193.43523
4314184.	1.190120E+11	0.00003625	0.00057562	15.87917411	1468.46800	16947.01821
4391574.	1.171086E+11	0.00003750	0.00058965	15.72409308	1496.30083	17700.04878
4471942.	1.154050E+11	0.00003875	0.00060425	15.59366047	1524.90420	18436.62404
4547476.	1.136869E+11	0.00004000	0.00061807	15.45178235	1551.56976	19195.93248
4622831.	1.120686E+11	0.00004125	0.00063191	15.31895292	1577.92000	19954.70257

4698006.	1.105413E+11	0.00004250	0.00064576	15.19437611	1603.95367	20712.93144
4773001.	1.090972E+11	0.00004375	0.00065963	15.07734811	1629.66959	21470.61458
4850916.	1.077981E+11	0.00004500	0.00067417	14.98152673	1656.26538	22209.10761
4924388.	1.064733E+11	0.00004625	0.00068784	14.87226427	1680.88851	22972.57555
4997688.	1.052145E+11	0.00004750	0.00070153	14.76914299	1705.20132	23735.50554
5070812.	1.040166E+11	0.00004875	0.00071524	14.67169082	1729.20240	24497.89710
5216533.	1.017860E+11	0.00005125	0.00074272	14.49214804	1776.26476	26021.04497
5364281.	9.980057E+10	0.00005375	0.00077098	14.34383476	1823.25128	27521.54757
5506881.	9.790011E+10	0.00005625	0.00079818	14.18986523	1867.03994	29052.78234
5648794.	9.614969E+10	0.00005875	0.00082546	14.05029809	1909.58852	30581.80462
5790011.	9.453080E+10	0.00006125	0.00085281	13.92338455	1950.88659	32108.58820
5930524.	9.302783E+10	0.00006375	0.00088024	13.80765474	1990.92394	33633.09830
6072710.	9.166355E+10	0.00006625	0.00090857	13.71418941	2030.85139	35131.61360
6210671.	9.033703E+10	0.00006875	0.00093578	13.61137283	2067.78046	36662.32542
6347936.	8.909383E+10	0.00007125	0.00096308	13.51691186	2103.45427	38190.68086
6484498.	8.792540E+10	0.00007375	0.00099046	13.42997611	2137.86204	39716.63860
6620346.	8.682421E+10	0.00007625	0.00101793	13.34983814	2170.99210	41240.17042
6755471.	8.578376E+10	0.00007875	0.00104547	13.27586925	2202.83312	42761.23360
6889863.	8.479831E+10	0.00008125	0.00107311	13.20751369	2233.37303	44279.79587
7026144.	8.389426E+10	0.00008375	0.00110220	13.16057932	2264.04078	45756.24297
7158427.	8.299626E+10	0.00008625	0.00112972	13.09823191	2291.58102	47278.04743
7289978.	8.214059E+10	0.00008875	0.00115734	13.04043782	2317.81489	48797.17317
7420784.	8.132366E+10	0.00009125	0.00118505	12.98684084	2342.72939	50313.57242
7550834.	8.054223E+10	0.00009375	0.00121286	12.93712127	2366.31100	51827.20154
7680119.	7.979344E+10	0.00009625	0.00124076	12.89099801	2388.54625	53338.00182
7808623.	7.907467E+10	0.00009875	0.00126876	12.84821141	2409.42067	54845.93458
7936338.	7.838358E+10	0.00010125	0.00129686	12.80853617	2428.92006	56350.93567
8063248.	7.771806E+10	0.00010375	0.00132507	12.77176416	2447.02938	57852.95459
8189342.	7.707616E+10	0.00010625	0.00135338	12.73770869	2463.73328	59351.93511
8300418.	7.632568E+10	0.00010875	0.00138105	12.69929516	2478.62081	60000.00000
8399938.	7.550506E+10	0.00011125	0.00140824	12.65833247	2491.87331	60000.00000
8498759.	7.471436E+10	0.00011375	0.00143553	12.62001979	2503.80706	60000.00000
8595521.	7.393996E+10	0.00011625	0.00146475	12.59999979	2515.08784	60000.00000
8682422.	7.311514E+10	0.00011875	0.00149182	12.56272352	2524.11443	60000.00000
8734019.	7.203315E+10	0.00012125	0.00151627	12.50527918	2531.08629	60000.00000
8785173.	7.099130E+10	0.00012375	0.00154079	12.45079601	2536.98434	60000.00000
8835873.	6.998712E+10	0.00012625	0.00156539	12.39910448	2541.79774	60000.00000
8886115.	6.901837E+10	0.00012875	0.00159007	12.35005224	2545.51554	60000.00000
8935892.	6.808299E+10	0.00013125	0.00161483	12.30349982	2548.12648	60000.00000
8985196.	6.717903E+10	0.00013375	0.00163968	12.25931418	2549.61902	60000.00000
9033969.	6.630436E+10	0.00013625	0.00166462	12.21737945	2549.23024	60000.00000
9082066.	6.545633E+10	0.00013875	0.00168964	12.17758191	2547.10226	60000.00000
9129747.	6.463538E+10	0.00014125	0.00171475	12.13981855	2549.02108	60000.00000
9177006.	6.384004E+10	0.00014375	0.00173995	12.10399497	2549.92512	60000.00000
9223693.	6.306799E+10	0.00014625	0.00176526	12.07017124	2547.49466	60000.00000
9269903.	6.231868E+10	0.00014875	0.00179067	12.03814781	2547.39039	60000.00000
9378775.	6.100016E+10	0.00015375	0.00184500	12.00000036	2549.97597	60000.00000
9451682.	5.953815E+10	0.00015875	0.00189661	11.94715011	2546.93761	60000.00000
9485123.	5.792441E+10	0.00016375	0.00194197	11.85934103	2549.56048	60000.00000
9517711.	5.640125E+10	0.00016875	0.00198760	11.77839839	2547.56620	60000.00000
9549459.	5.496091E+10	0.00017375	0.00203352	11.70372999	2547.06323	60000.00000
9580647.	5.359802E+10	0.00017875	0.00207965	11.63442600	2549.51541	60000.00000
9611129.	5.230547E+10	0.00018375	0.00212604	11.57027185	2548.14807	60000.00000
9640842.	5.107731E+10	0.00018875	0.00217269	11.51095426	2545.29813	60000.00000
9670104.	4.991022E+10	0.00019375	0.00221953	11.45565999	2548.50622	60000.00000
9698904.	4.879952E+10	0.00019875	0.00226657	11.40410578	2549.92710	60000.00000
9732751.	4.776810E+10	0.00020375	0.00232066	11.38975704	2544.92488	60000.00000
9759378.	4.675151E+10	0.00020875	0.00236719	11.33982074	2545.72673	60000.00000
9785694.	4.578102E+10	0.00021375	0.00241388	11.29298508	2548.51318	60000.00000
9811684.	4.485341E+10	0.00021875	0.00246073	11.24905050	2549.86584	60000.00000

9837157.	4.396495E+10	0.00022375	0.00250783	11.20817792	2547.21976	60000.00000
9862234.	4.311359E+10	0.00022875	0.00255513	11.16995966	2542.34372	60000.00000
9887074.	4.229764E+10	0.00023375	0.00260256	11.13396442	2545.41526	60000.00000
9911669.	4.151485E+10	0.00023875	0.00265014	11.10006344	2548.15250	60000.00000
9936019.	4.076316E+10	0.00024375	0.00269786	11.06814516	2549.67198	60000.00000
9960027.	4.004031E+10	0.00024875	0.00274577	11.03825462	2548.76579	60000.00000
9983604.	3.934425E+10	0.00025375	0.00279390	11.01043689	2544.26967	60000.00000
10007007.	3.867442E+10	0.00025875	0.00284215	10.98413837	2540.88201	60000.00000
10030231.	3.802931E+10	0.00026375	0.00289051	10.95927751	2544.67949	60000.00000
10053271.	3.740752E+10	0.00026875	0.00293899	10.93578351	2547.47209	60000.00000
10076127.	3.680777E+10	0.00027375	0.00298760	10.91359413	2549.24409	60000.00000
10098792.	3.622885E+10	0.00027875	0.00303632	10.89264500	2549.97901	60000.00000
10121056.	3.566892E+10	0.00028375	0.00308529	10.87326014	2546.70095	60000.00000
10143134.	3.512774E+10	0.00028875	0.00313437	10.85497391	2542.56378	60000.00000
10150420.	3.455462E+10	0.00029375	0.00317916	10.82265866	2539.18154	60000.00000
10150420.	3.397630E+10	0.00029875	0.00322650	10.79999936	2541.08874	60000.00000
10161930.	3.345491E+10	0.00030375	0.00328050	10.79999936	2545.20397	60000.00000
10170350.	3.294041E+10	0.00030875	0.00332750	10.77732289	2547.39784	60000.00000
10171450.	3.241896E+10	0.00031375	0.00337212	10.74778640	2548.76692	60000.00000
10172500.	3.191372E+10	0.00031875	0.00341681	10.71941078	2549.63347	60000.00000
10173499.	3.142393E+10	0.00032375	0.00346158	10.69214451	2549.99044	60000.00000
10174331.	3.094854E+10	0.00032875	0.00350655	10.66632450	2547.66277	60000.00000
10175107.	3.048721E+10	0.00033375	0.00355161	10.64152372	2544.75902	60000.00000
10175855.	3.003942E+10	0.00033875	0.00359671	10.61760056	2541.84663	60000.00000
10176575.	2.960458E+10	0.00034375	0.00364187	10.59451854	2538.92548	60000.00000
10177268.	2.918213E+10	0.00034875	0.00368707	10.57224548	2535.99534	60000.00000
10178567.	2.837231E+10	0.00035875	0.00377763	10.52999103	2539.91379	60000.00000
10179746.	2.760609E+10	0.00036875	0.00386841	10.49059689	2544.66483	60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 10081.89660 in-kip

The analysis ended normally.

SITE NAME: GRISWOLD/ I-395 X85/ BMW

T-MOBILE E911 ADDRESS:
257 NORMAN ROAD
GRISWOLD, CT 06351

SBA BUSINESS ADDRESS:
181 A NORMAN ROAD
GRISWOLD, CT 06351

SITE NUMBER: CT11152C

PROJECT: T-MOBILE L700

CONFIGURATION: 704G

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 ALL REQUIRED STRUCTURAL MODIFICATIONS, RE-BUNDLING OF COAXIAL CABLES OR OTHER SPECIAL MODIFICATIONS AS OUTLINED THEREIN.
2. ENGINEER-OF-RECORD HAS MADE A VISUAL ASSESSMENT ONLY OF EXISTING ANTENNA MOUNT ASSEMBLIES, WITHOUT THE BENEFIT OF A RIGOROUS ANTENNA MOUNT STRUCTURAL ANALYSIS, AND RECOMMENDS THAT EXISTING AND PROPOSED TOWER TOP EQUIPMENT BE INSTALLED AS DEPICTED HEREIN. STRUCTURAL DETAILS AS DEPICTED HEREIN FOR MODIFICATION OF EXISTING ANTENNA MOUNT ASSEMBLIES ARE PRELIMINARY ONLY AND THAT FINAL CONSTRUCTION DETAILS MAY BE SUBJECT TO CHANGE PENDING THE COMPLETION OF A SEPARATE SUPPLEMENTAL ANTENNA MOUNT STRUCTURAL ASSESSMENT, SUPPLEMENTAL STRUCTURAL MAPPING/CONDITIONS ASSESSMENT REPORT AND/OR SUPPLEMENTAL RIGOROUS ANTENNA MOUNT STRUCTURAL ANALYSIS.
3. PROTERRA DESIGN GROUP ASSUMES THAT THE 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).
T-MOBILE E911 ADDRESS:	257 NORMAN ROAD GRISWOLD, CT 06351
SBA BUSINESS ADDRESS:	181A NORMAN ROAD GRISWOLD, CT 06351
LATITUDE:	41.601284 (FROM T-MOBLE RFDS)
LONGITUDE:	-71.953890 (FROM T-MOBLE RFDS)
JURISDICTION:	TOWN OF GRISWOLD
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY
TOWER OWNER:	SBA TOWERS II, LLC
SBA SITE ID:	CT10012-A
SBA SITE NAME:	GRISWOLD 2, CT
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	1
GN-1	GENERAL NOTES	1
A-1	COMPOUND & ELEVATION PLAN	1
A-2	EXISTING & PROPOSED ANTENNA PLAN	1
A-3	DETAILS	1
S-1	STRUCTURAL DETAILS	1
E-1	ONE-LINE DIAGRAM & GROUNDING DETAILS	1

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134 FLANDERS ROAD, SUITE 125
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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
3-2-17

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

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257 NORMAN ROAD
GRISWOLD, CT 06351

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

GROUNDING NOTES

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

GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

   CONTRACTOR – SBA COMMUNICATIONS CORP.
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T-MOBILE
2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.
5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
6. "KITTING LIST" SUPPLIED WITH THE BID PACKAGE IDENTIFIES ITEMS THAT WILL BE SUPPLIED BY CONTRACTOR. ITEMS NOT INCLUDED IN THE BILL OF MATERIALS AND KITTING LIST SHALL BE SUPPLIED BY THE SUBCONTRACTOR.
7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.
9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR.
10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CUR\BS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
13. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.
14. ANY NEW CONCRETE NEEDED FOR CONSTRUCTION SHALL BE AIR-ENTRAINED AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS. ALL CONCRETE WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.
15. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (FY = 36 KSI) UNLESS OTHERWISE NOTED. PIPES SHALL BE ASTM A53 TYPE E (FY = 35 KSI). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCHUP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.
16. CONSTRUCTION SHALL COMPLY WITH UMTS SPECIFICATIONS AND "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF T-MOBILE SITES."
17. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
18. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
19. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.
20. APPLICABLE BUILDING CODES:
    SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.

    BUILDING CODE: 2016 CONNECTICUT STATE BUILDING CODE WITH AMENDMENTS

    ELECTRICAL CODE: 2014 NATIONAL ELECTRICAL CODE AND AMENDMENTS

SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:

AMERICAN CONCRETE INSTITUTE (ACI) 318; BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE;

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

MANUAL OF STEEL CONSTRUCTION, ASD, NINTH EDITION;

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-G, STRUCTURAL STANDARDS FOR STEEL

ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES; REFER TO ELECTRICAL DRAWINGS FOR SPECIFIC ELECTRICAL STANDARDS.

FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

ABBREVIATIONS

AGL	ABOVE GRADE LEVEL	EQ	EQUAL	REQ	REQUIRED
AWG	AMERICAN WIRE GAUGE	G.C.	GENERAL CONTRACTOR	RF	RADIO FREQUENCY
BTCW	BARE TINNED SOLID COPPER WIRE	GRC	GALVANIZED RIGID CONDUIT	TBD	TO BE DETERMINED
BGR	BURIED GROUND RING	MGB	MASTER GROUND BAR	TBR	TO BE REMOVED
BTS	BASE TRANSCEIVER STATION	MIN	MINIMUM	TBRR	TO BE REMOVED AND REPLACED
EXISTING	EXISTING OR (E)	PROPOSED	NEW OR (P)	TYP	TYPICAL
EGB	EQUIPMENT GROUND BAR	N.T.S.	NOT TO SCALE	VIF	VERIFY IN FIELD
EGR	EQUIPMENT GROUND RING	RAD	RADIATION CENTERLINE (ANTENNA)		
		REF	REFERENCE		

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4 Bay Road, Building A
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Hadley, MA 01035 Ph:(413)320-4918

STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
3-2-17

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

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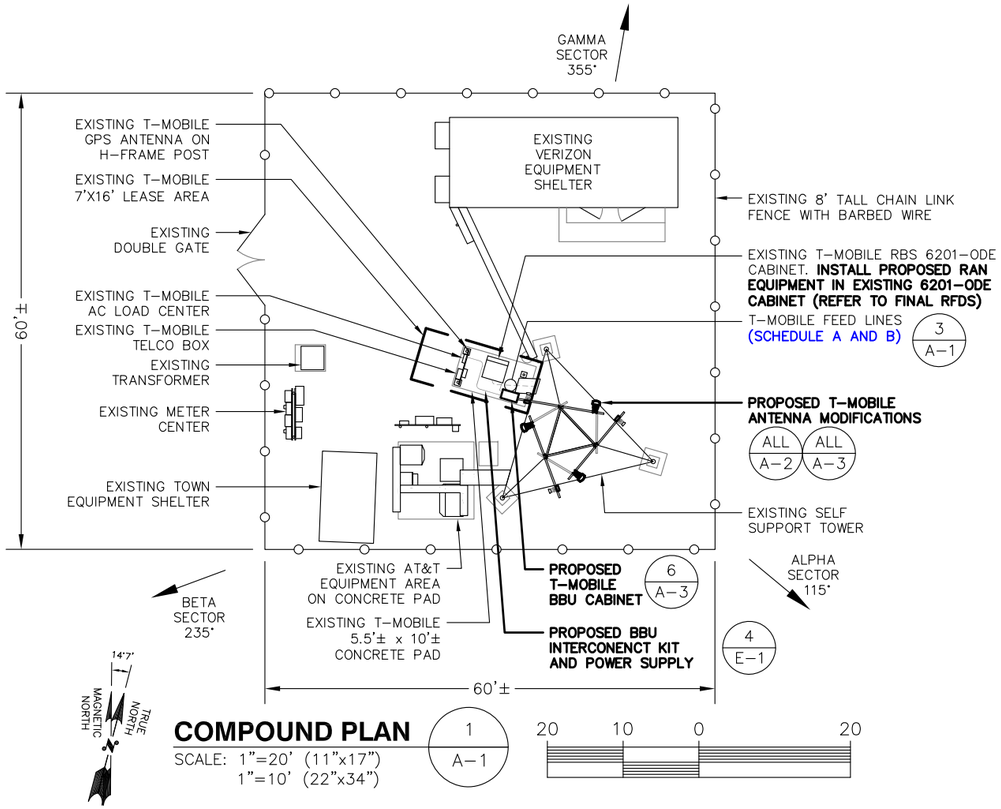
SHEET TITLE
GENERAL NOTES

SHEET NUMBER
GN-1



COMPOUND PLAN

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

1 / A-1

20 10 0 20

ANTENNA MOUNT STRUCTURAL DESIGN NOTE:
ENGINEER-OF-RECORD HAS MADE A VISUAL ASSESSMENT ONLY OF EXISTING ANTENNA MOUNT ASSEMBLIES, WITHOUT THE BENEFIT OF A RIGOROUS ANTENNA MOUNT STRUCTURAL ANALYSIS, AND RECOMMENDS THAT EXISTING AND PROPOSED TOWER TOP EQUIPMENT BE INSTALLED AS DEPICTED HEREIN. STRUCTURAL DETAILS AS DEPICTED HEREIN FOR MODIFICATION OF EXISTING ANTENNA MOUNT ASSEMBLIES ARE PRELIMINARY ONLY AND THAT FINAL CONSTRUCTION DETAILS MAY BE SUBJECT TO CHANGE PENDING THE COMPLETION OF A SEPARATE SUPPLEMENTAL ANTENNA MOUNT STRUCTURAL ASSESSMENT, SUPPLEMENTAL STRUCTURAL MAPPING/CONDITIONS ASSESSMENT REPORT AND/OR SUPPLEMENTAL RIGOROUS ANTENNA MOUNT STRUCTURAL ANALYSIS.

SPECIAL PRE-CONSTRUCTION WORK NOTE (SBA-PROVIDED TOWER STRUCTURAL ANALYSIS SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS):
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.

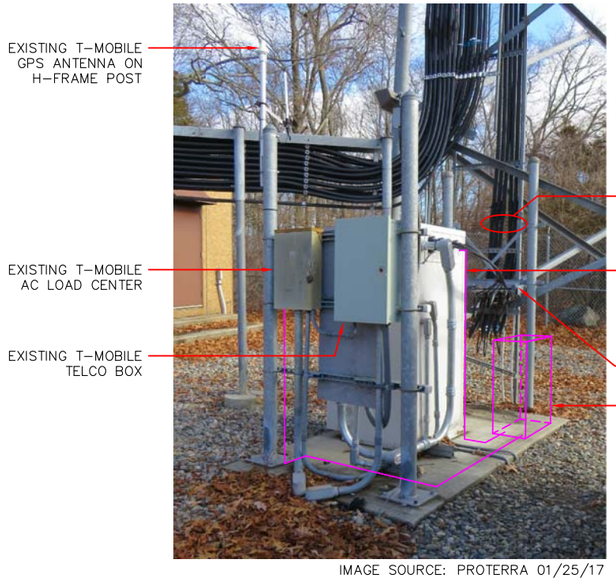


IMAGE SOURCE: PROTERRA 01/25/17

EQUIPMENT PHOTO DETAIL

SCALE: N.T.S.

2 / A-1

℄ OF PROPOSED T-MOBILE ANTENNAS
ELEV.= 148'± AGL (SBA DATABASE)
ALL A-2 ALL A-3

EXISTING 162'± SELF SUPPORT TOWER
3 A-1 T-MOBILE FEED LINES

FEEDLINE SCHEDULE	FEEDLINE DESCRIPTION	LOCATION
A	EXISTING: TO REMAIN: (6) 1⅝" COAX TO 148' RAD	UP CABLE GUIDE ON SELF SUPPORT TOWER TO RAD
B	PROPOSED: (6) 1⅝" COAX TO 148' RAD	UP CABLE GUIDE 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

T-MOBILE FEED LINES (REFER TO SBA-PROVIDED STRUCTURAL ANALYSIS FOR SPECIAL FEEDLINE INSTALLATION REQUIREMENTS, STACKING, BUNDLING, SHIELDING, MOUNTING AND RELOCATION OF EXISTING OR PROPOSED FEEDLINES)

IMAGE SOURCE: PROTERRA 01/25/17

FEEDLINE PHOTO DETAIL AT TOWER BASE

SCALE: N.T.S.

3 / A-1

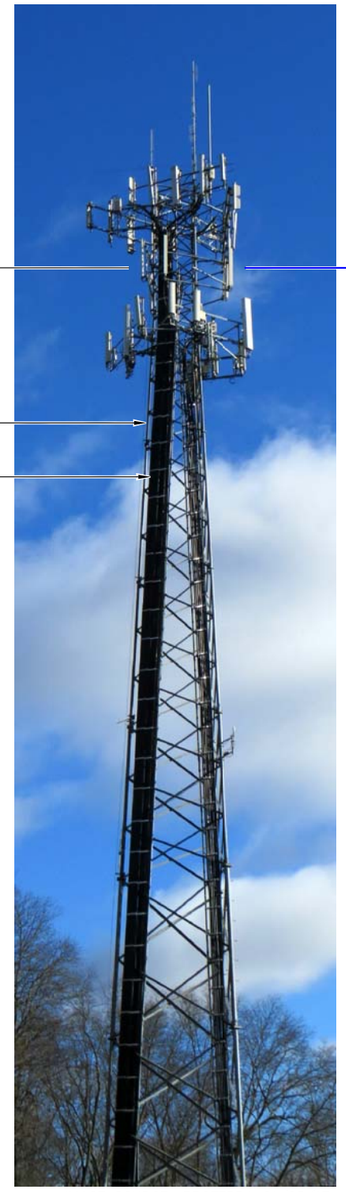


IMAGE SOURCE: PROTERRA 01/25/17

PARTIAL ELEVATION PHOTO DETAIL

SCALE: N.T.S.

4 / A-1

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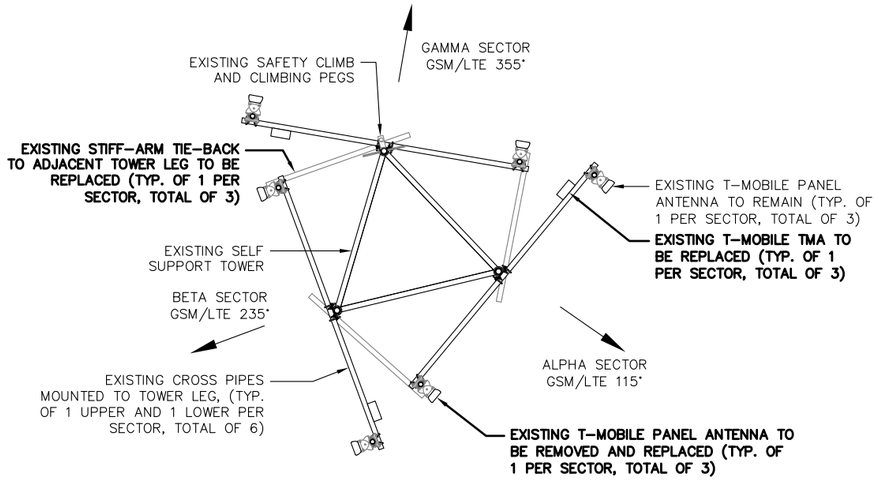
SHEET NUMBER
A-1

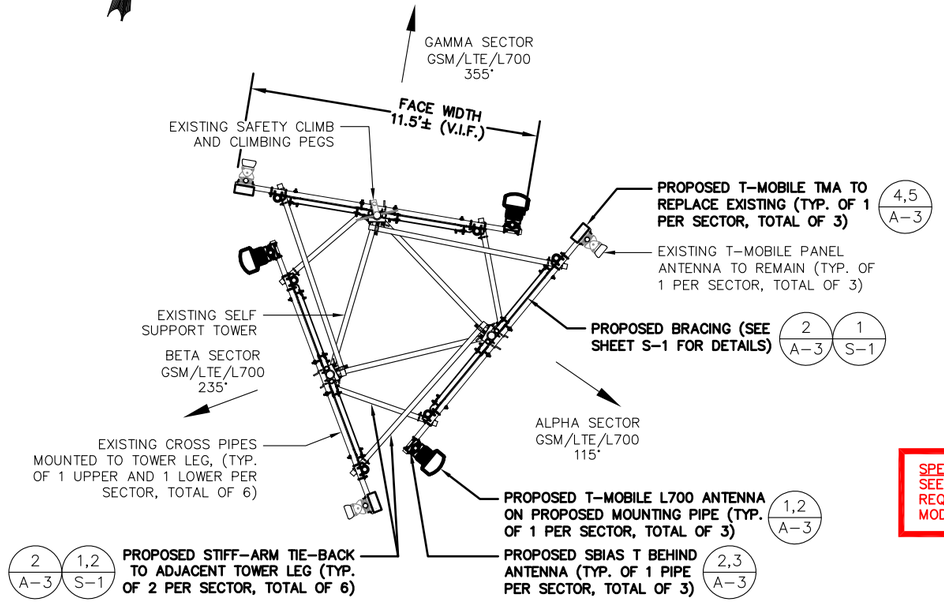


14°7' MAGNETIC NORTH / TRUE NORTH

EXISTING ANTENNA PLAN

1 / A-2

SCALE: N.T.S.



SPECIAL WORK NOTE:
SEE SHEET S-1 FOR REQUIRED MOUNT MODIFICATIONS

14°7' MAGNETIC NORTH / TRUE NORTH

PROPOSED ANTENNA PLAN

2 / A-2

SCALE: N.T.S.

ANTENNA MOUNT STRUCTURAL DESIGN NOTE:
ENGINEER-OF-RECORD HAS MADE A VISUAL ASSESSMENT ONLY OF EXISTING ANTENNA MOUNT ASSEMBLIES, WITHOUT THE BENEFIT OF A RIGOROUS ANTENNA MOUNT STRUCTURAL ANALYSIS, AND RECOMMENDS THAT EXISTING AND PROPOSED TOWER TOP EQUIPMENT BE INSTALLED AS DEPICTED HEREIN. STRUCTURAL DETAILS AS DEPICTED HEREIN FOR MODIFICATION OF EXISTING ANTENNA MOUNT ASSEMBLIES ARE PRELIMINARY ONLY AND THAT FINAL CONSTRUCTION DETAILS MAY BE SUBJECT TO CHANGE PENDING THE COMPLETION OF A SEPARATE SUPPLEMENTAL ANTENNA MOUNT STRUCTURAL ASSESSMENT, SUPPLEMENTAL STRUCTURAL MAPPING/CONDITIONS ASSESSMENT REPORT AND/OR SUPPLEMENTAL RIGOROUS ANTENNA MOUNT STRUCTURAL ANALYSIS.

SPECIAL PRE-CONSTRUCTION WORK NOTE (SBA-PROVIDED TOWER STRUCTURAL ANALYSIS SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS):
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.

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

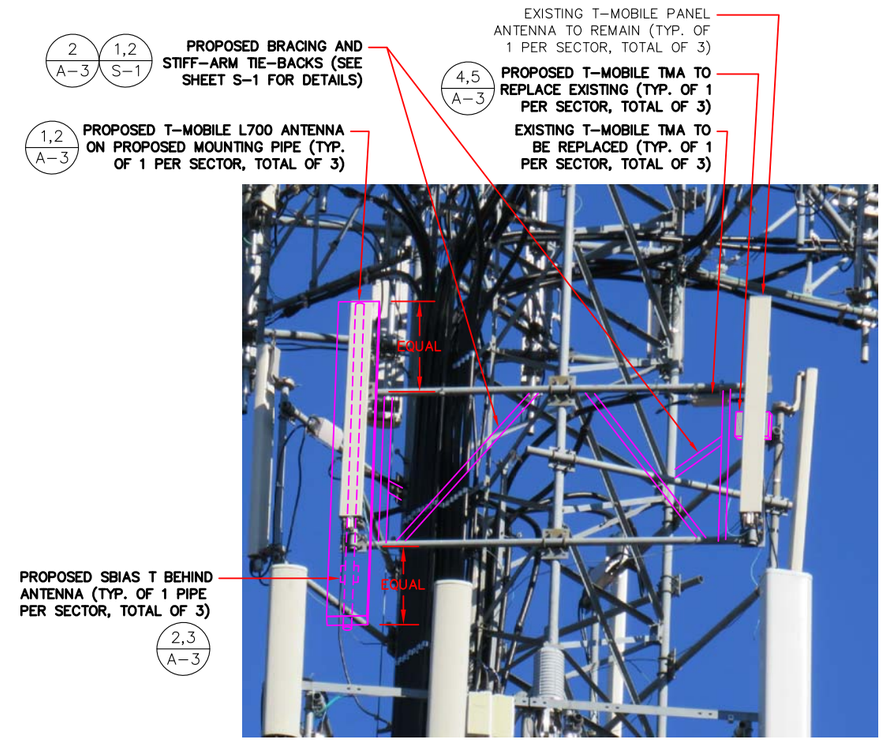


IMAGE SOURCE: PROTERRA 01/25/17
NOTE: ONE SECTOR SHOWN FOR CLARITY

ANTENNA PHOTO DETAIL

3 / A-2

SCALE: N.T.S.

T-MOBILE NORTHEAST LLC
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STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
3-2-17

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

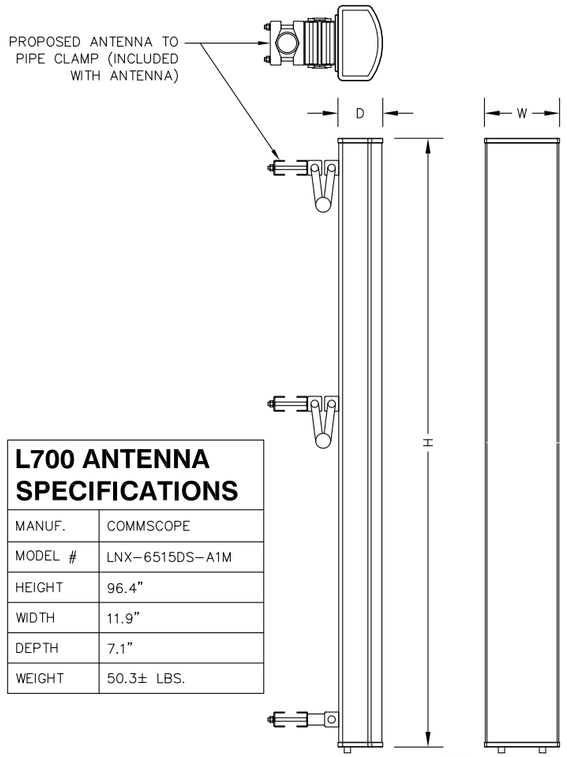
REV.	DATE	DESCRIPTION	BY
1	03/02/17	ISSUED FOR CONSTRUCTION	JEB
0	02/01/17	ISSUED FOR REVIEW	TBD/JEB

SITE NUMBER:
CT11152C
SITE NAME:
GRISWOLD/ I-395 X85/ BMW

SITE ADDRESS:
257 NORMAN ROAD
GRISWOLD, CT 06351

SHEET TITLE
EXISTING & PROPOSED ANTENNA PLAN

SHEET NUMBER
A-2

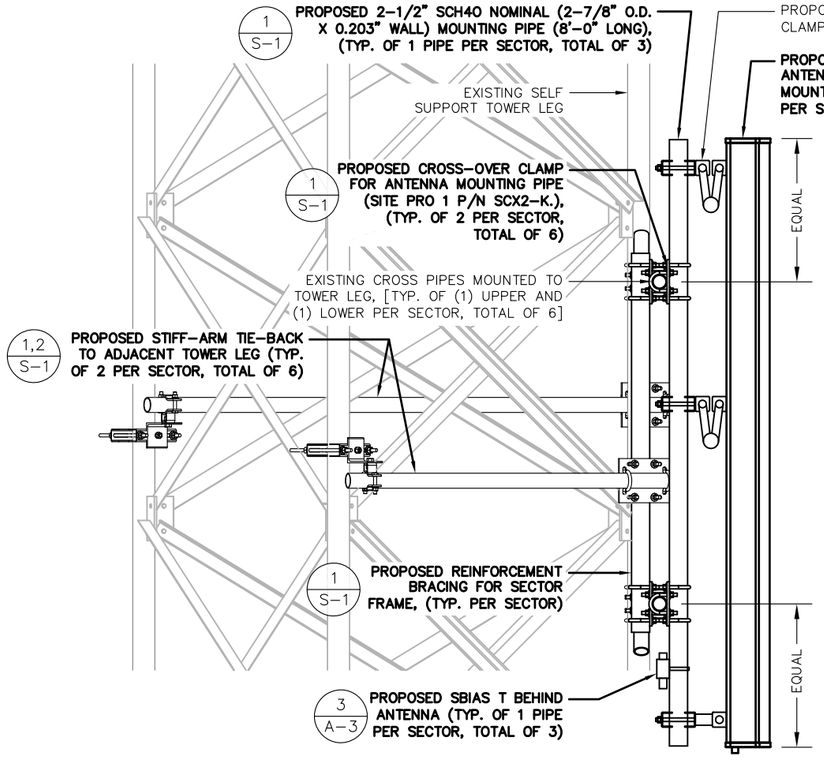


L700 ANTENNA SPECIFICATIONS

MANUF.	COMMSCOPE
MODEL #	LNX-6515DS-A1M
HEIGHT	96.4"
WIDTH	11.9"
DEPTH	7.1"
WEIGHT	50.3± LBS.

L700 ANTENNA DETAIL
SCALE: N.T.S.

1 / A-3



PROPOSED ANTENNA MOUNTING DETAIL
SCALE: N.T.S.

2 / A-3

SPECIAL WORK NOTE:
SEE SHEET S-1 FOR REQUIRED MOUNT MODIFICATIONS

SPECIAL WORK NOTE:
VERTICALLY CENTER THE PIPE MAST AND THE PROPOSED ANTENNAS BETWEEN THE EXISTING MOUNTING RAILS

ANTENNA MOUNT STRUCTURAL DESIGN NOTE:
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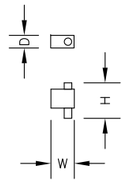
SBT SPECIFICATIONS

MANUF.	COMMSCOPE
MODEL #	ATSBT-TOP-FM-4G
HEIGHT	5.63"
WIDTH	3.7"
DEPTH	2.0"
WEIGHT	1.8 LBS.

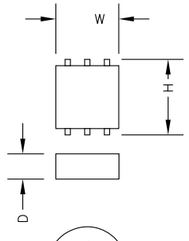


SMART BIAS TEE (SBT)
SCALE: N.T.S.

3 / A-3

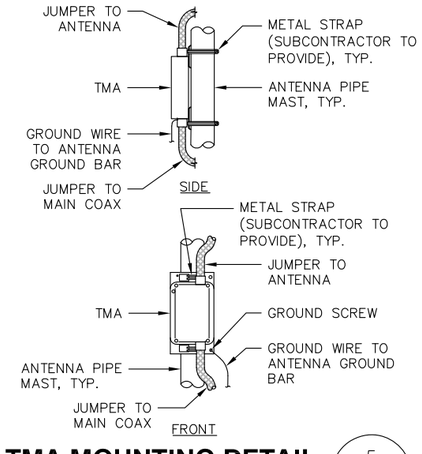
TWIN TMA SPECIFICATIONS

MANUF.	RFS
MODEL #	ATMAA1412D-1A20
HEIGHT	12"
WIDTH	10"
DEPTH	4"
WEIGHT	13 LBS



TWIN TMA
SCALE: N.T.S.

4 / A-3

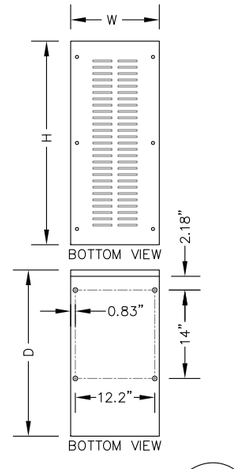


TMA MOUNTING DETAIL
SCALE: N.T.S.

5 / A-3

BBU SPECIFICATIONS

MANUF.	PTS
MODEL #	PTS8003
HEIGHT	32.3"
WIDTH	14.0"
DEPTH	26.3"
WEIGHT WITHOUT BATTERIES	60 LBS.
MOUNT BASE WITH (4) $\frac{1}{2}$" DROP-IN ANCHORS WITH 2" MINIMUM EMBEDMENT (INSTALL PER MANUFACTURER'S INSTALLATION GUIDELINES)	



BATTERY BACKUP UNIT CABINET (BBU)
SCALE: N.T.S.

6 / A-3

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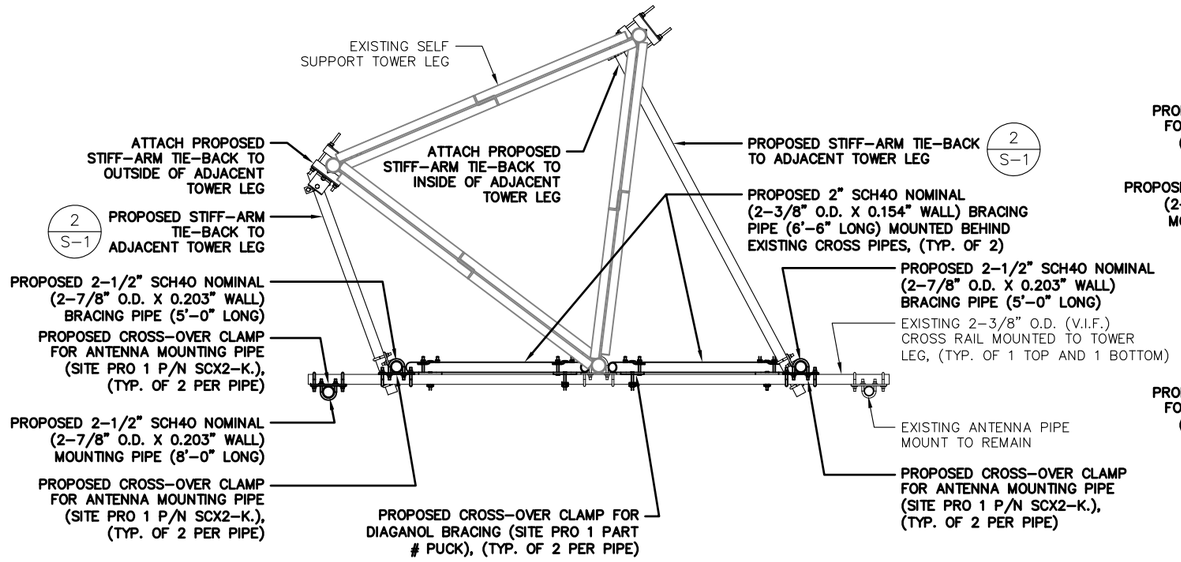
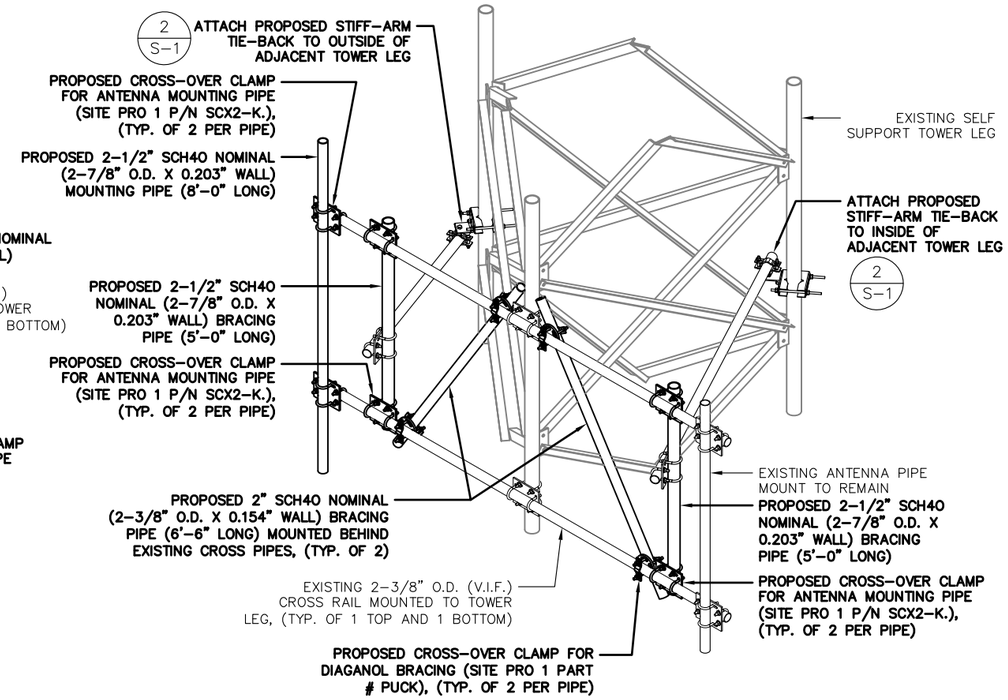
SITE ADDRESS:
257 NORMAN ROAD
GRISWOLD, CT 06351

SHEET TITLE
DETAILS

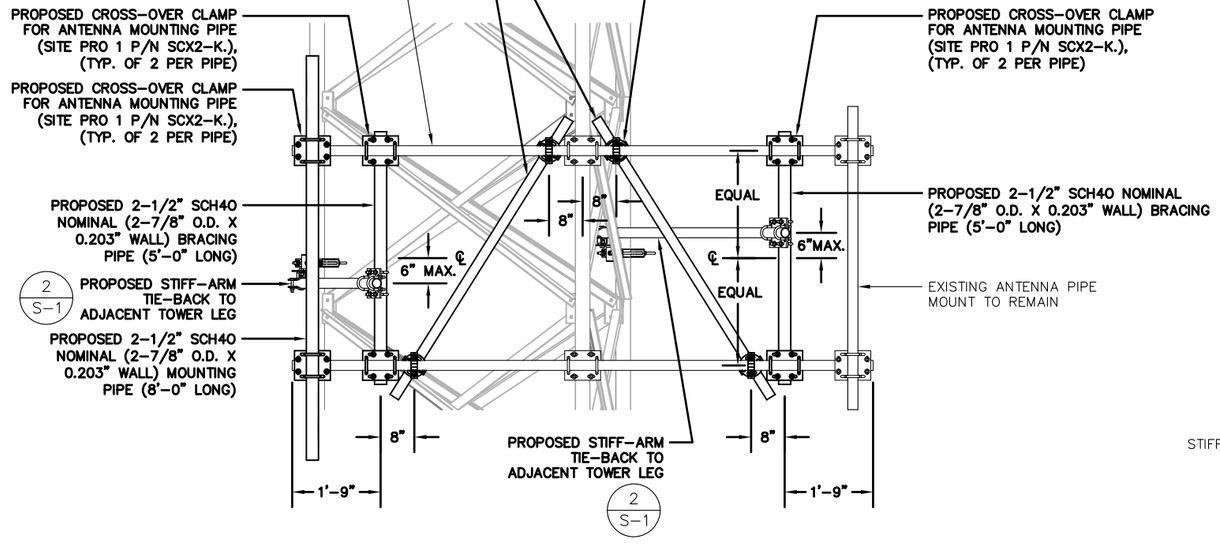
SHEET NUMBER
A-3



PLAN VIEW



ISOMETRIC

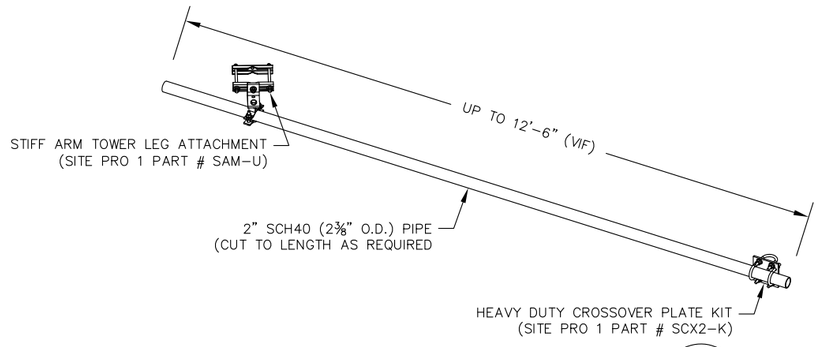


ELEVATION

TYPICAL SECTOR FRAME REINFORCEMENT DETAIL

1 S-1

SCALE: N.T.S.



PROPOSED STIFF ARM DETAIL

2 S-1

SCALE: N.T.S.

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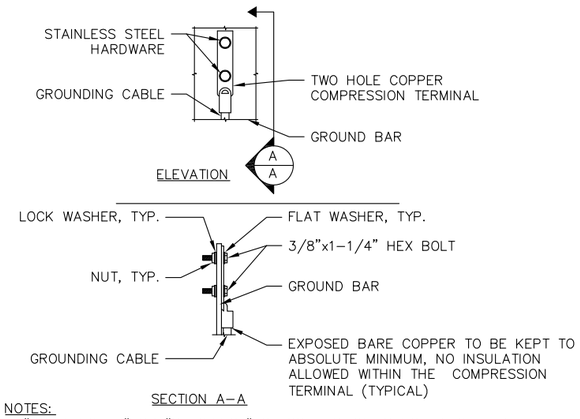
SHEET TITLE
STRUCTURAL DETAILS

SHEET NUMBER
S-1

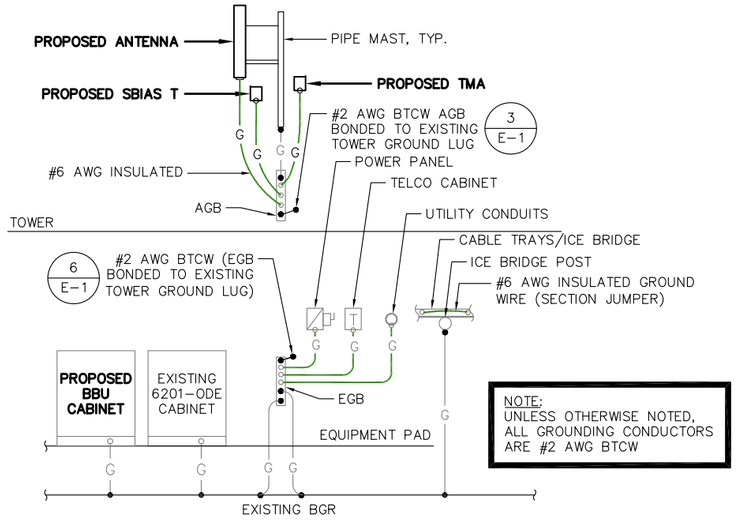


NOTES:
1. "DOUBLING UP" OR "STACKING " OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB.

TYPICAL GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.

1 / E-1

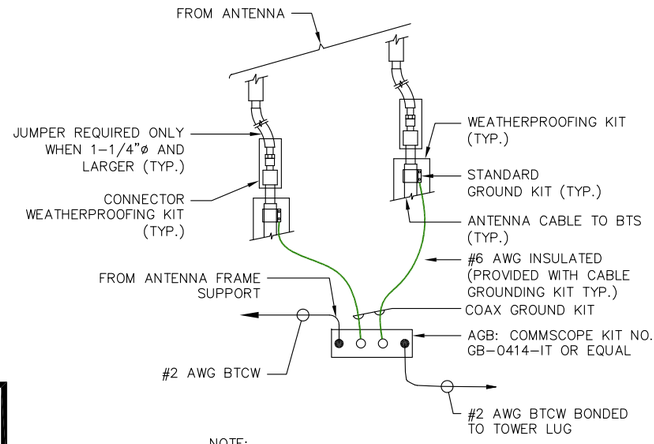


NOTE:
UNLESS OTHERWISE NOTED, ALL GROUNDING CONDUCTORS ARE #2 AWG BTCW

TYPICAL GROUNDING RISER DIAGRAM

SCALE: N.T.S.

2 / E-1

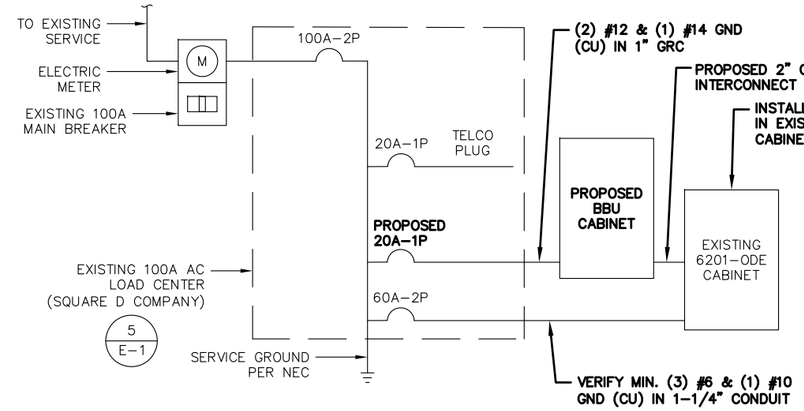


NOTE:
INSTALL CABLE GROUND KIT ABOVE HORIZONTAL BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO AGB/EGB.

TOWER TOP CABLE GROUNDING DETAIL

SCALE: N.T.S.

3 / E-1

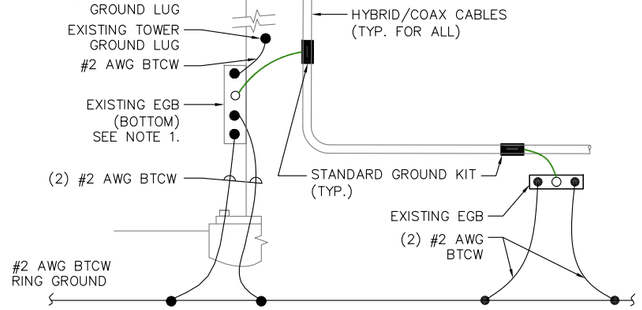


ONE LINE POWER SCHEMATIC

SCALE: N.T.S.

4 / E-1

IMAGE SOURCE: PROTERRA 01/25/17



NOTE:
1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER, ANTENNA LOCATION, AND CONNECTION ORIENTATION. PROVIDE ADDITIONAL AGB/EGB AS REQUIRED.
2. A SEPARATE GROUND BAR TO BE USED FOR GPS ANTENNA IF REQUIRED

ELECTRICAL LEGEND

A	AMPERE
V	VOLT
KWH	KILOWATT - HOUR
C	CONDUIT
GRC	GALVANIZED RIGID CONDUIT
BTCW	BARE TINNED (SOLID) COPPER WIRE (#2 AWG, UNLESS NOTES OTHERWISE)
G	GROUND
⏚	GROUND
MGB	MASTER GROUND BAR — ○ MECHANICAL CONNECTION ● CADWELD CONNECTION
AGB/EGB	EQUIPMENT GROUND BAR/ANTENNA GROUND BAR
—G—	GROUND COPPER WIRE, SIZE AS NOTED
	EXPOSED WIRING
	INSULATED GROUNDING CONDUCTOR (#6 AWG STRANDED, UNLESS NOTED OTHERWISE)
⊙	5/8"x10' COPPER CLAD STAINLESS STEEL GROUND ROD
	● EXOTHERMIC (CAD WELD) OR ○ MECHANICAL (COMPRESSION TYPE) CONNECTION
PPC	POWER PROTECTION CABINET
⊠	OMNI-DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALL

CONTRACTOR NOTE:
G.C. TO VERIFY THAT THE EXISTING CONDUITS AND WIRE SIZES ARE ADEQUATE FOR THE PROPOSED LOADING IN ACCORDANCE WITH NEC AND INCLUDE ELECTRICAL UPGRADES IN THE SCOPE OF WORK AS REQUIRED.

PHOTO DETAIL: PPC PANEL

SCALE: N.T.S.

5 / E-1

TOWER BOTTOM CABLE GROUNDING DETAIL

SCALE: N.T.S.

6 / E-1

ELECTRICAL & GROUNDING NOTES:

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) 2014 AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATIONS INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. RIGID STEEL CONDUITS SHALL BE GROUNDED AT BOTH ENDS.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THHN INSULATION AS REQUIRED BY NEC.
8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL ROOM AND PROPOSED CELL SITE POWER PEDESTAL AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROPOSED CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON DRAWING A-1. PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.
11. GROUNDING SHALL COMPLY WITH NEC ART. 250.
12. GROUND COAXIAL CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURERS COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
13. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE DRAWING.
14. ALL GROUND CONNECTIONS TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.
15. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.
16. CONNECTIONS TO MGB SHALL BE ARRANGED IN THREE MAIN GROUPS: SURGE PRODUCERS (COAXIAL CABLE GROUND KITS, TELCO AND POWER PANEL GROUND); (GROUNDING ELECTRODE RING OR BUILDING STEEL); NON-SURGING OBJECTS (EGB GROUND IN BTS UNIT).
17. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LYGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
18. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.
19. BOMD ANTENNA MOUNTING BRACKETS, COAXIAL CABLE GROUND KITS, AND ALNA TO EGB PLACED NEAR THE ANTENNA LOCATION.
20. BOND ANTENNA EGB'S AND MGB TO WATER MAIN/GROUND RING.
21. TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION.
22. BOND ANY METAL OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.
23. VERIFY PROPOSED SERVICE UPGRADE WITH LOCAL UTILITY COMPANY PRIOR TO CONSTRUCTION.

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SHEET TITLE
ONE-LINE DIAGRAM & GROUNDING DETAILS

SHEET NUMBER
E-1