Alex Murshteyn, Site Acquisition
c/o New Cingular Wireless, PCS LLC (AT&T)
Centerline Communications, LLC
95 Ryan Drive, Suite 1
Raynham, MA 02767
Mobile: (508) 821-0159
AMurshteyn@centerlinecommunications.com

March 31, 2016

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

**RE: Notice of Exempt Modification // Site Number: CT5457 (Name: Griswold West)
181A Norman Road, Griswold (Jewett City), CT 06351 (181, 257& 297 Norman Road)
N 41.60129 // W 71.95385**

Dear Ms. Bachman:

New Cingular Wireless, PCS, LLC ("AT&T") currently maintains 9 antennas at the 135-foot level of the existing 160-foot self-supporting lattice tower at 181 A Norman Road, Griswold, CT. The tower is owned by SBA Towers II, LLC. The property is also owned by Ernest & Stuart R. Norman and Priscilla Forscler. AT&T now intends to replace 3 of its existing antennas with 3 new LTE (700/1900 band) antennas for its LTE upgrade. These antennas would be installed at the 135-foot level of the tower. AT&T also intends to install 3 remote radio units with A2 modules.

The current proposal involves an antenna swap only (three for three); no antennas will be added.

Please note that the attached drawings depict 3 future antennas leased from the tower owner and that the structural analysis reserves the load for them, yet these are not to be installed at this time.

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, as well as the tower owner, SBA Towers II, LLC and the ground owners, Ernest & Stuart R. Norman and Priscilla Forscler.

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

Attached to accommodate this filing are construction drawings dated March 30, 2016 by ComEx Consultants, a structural analysis dated March 18, 2016 by AllPro Consulting Group, Inc. and an Emissions Analysis Report dated February 22, 2016 by EBI Consulting.

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

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

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

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

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

6. The existing structure and its foundation can support the proposed loading, as shown in the attached structural analysis by AllPro Consulting Group, dated March 18, 2016.

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

Sincerely,

Alex Murshteyn, Site Acquisition
c/o New Cingular Wireless, PCS LLC (AT&T)
Centerline Communications, LLC
95 Ryan Drive, Suite 1
Raynham, MA 02767
Mobile: (508) 821-0159
AMurshteyn@centerlinecommunications.com

Attachments

cc: Kevin Skulczyck, First Selectman, Town of Griswold - as elected official
SBA Towers II, LLC - as tower owner
Ernest & Stuart R. Norman and Priscilla Forscler - as property owners

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-01
Carrier Name: AT&T
Carrier Site Name: CT5457
Site Location: 181 A Norman Road
Griswold, CT 06351

Latitude: 41.601097
Longitude: -71.954325

ACGI Job # 16-0261

ANALYSIS RESULTS		
Tower Components	**96.1%**	**Pass**
Tower Foundation	**99.9%**	**Pass**

Prepared By:
Jingcheng Li, EIT
Staff Engineer

03/18/2016
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 AT&T 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/EIA-222-F*, *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and the* 2003 International Building Code.

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.	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
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:	FDH Velocitel Inc. SBA Communication Corp.	Existing loading as per previous structural analysis by FDH Velocitel Inc., Project # 15BVKZ1400, dated July 10, 2015 Proposed final loading for AT&T as per Application ID # 29425, v2 downloaded from SBA portal
Authorization:	SBA Communication Corp.	

3. ANALYSIS METHODS & DATA

The analysis was performed in accordance with Telecommunication Industry Association specification TIA/EIA-222-F. 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/EIA-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-01
Carrier Site Name:	AT&T/CT5457
City, State:	Griswold, CT
County:	New London
Code Wind Load Requirement:	ANSI/TIA-222-F (85 mph basic wind speed) & 2003 International Building Code.
Wind Load Used:	ANSI/TIA-222-F Code: • Basic wind speed of 85 mph • A wind speed of 74 mph is used in combination with ice. • Nominal ice thickness of 0.5 in.

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	**89.6 %**	**Pass**
Diagonal	**96.1 %**	**Pass**
Top Girt	**4.7 %**	**Pass**
Bolt Checks	**85.1%**	**Pass**
Overall	**96.1%**	**Pass**

	FOUNDATION REACTIONS COMPARATION	
Direction	*% Capacity*	*Pass/Fail*
Overturning	**10.4 %**	**Pass**
Uplift	**98.0 %**	**Pass**
Net Soil Pressure	**99.9 %**	**Pass**
Horizontal Shear	**11.1 %**	**Pass**
Pedestal in Compression	**9.8 %**	**Pass**
Overall	**99.9 %**	**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 **less than allowable,** making it **in code compliance** under the EIA/TIA-222-F code and 2003 International Building Code requirements.

5. DISCLAIMER

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

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

6. 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±	3	Commscope LNX-6514DS-A1M	(3) 15' T-Frames (1)Sabre Universal Pipe Mount	(12) 1-5/8 (1) 1-5/8 Hybrid Fiber (1) 1-5/8 Hybriflex	Verizon
	3	Commscope HBXX-6517DS-A2M			
	3	Commscope HBXX-6516DS-A2M			
	3	Antel BXA-70080/4CF-EDIN-0			
	3	Alcatel Lucent RRH 2x60-AWS			
	3	Alcatel Lucent RRH 2x60-700U			
	3	Alcatel Lucent RRH 2x60-PCS			
	1	RFS DB-T1-6Z-8AB-0Z			
	1	RFS DB-T1-6Z-8AB-0Z			
149±	6	Powerwave 63SSFL	(3) 10.5' T-Frames (@148')	(6) 1-5/8	T-Mobile
148±	6	Dapa 59212			
135±	9	Powerwave 7770 Antennas	(3) 12' T-Frames (@137')	(12) 1-1/4 (2) 3/4 DC Cables (1) 1/2 Fiber	AT&T
	2	Powerwave P65-17-XLH-RR			
	1	KMW AM-X-CD-16-65-00T-RET			
	6	Powerwave LGP17201			
	6	Ericsson RRUS-11			
	6	Powerwave LGP21901			
	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

AT&T FINAL LOAD DESCRIPTION					
ELEV (ft.)	***Qty.***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in)***	***TENANT***
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			

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.

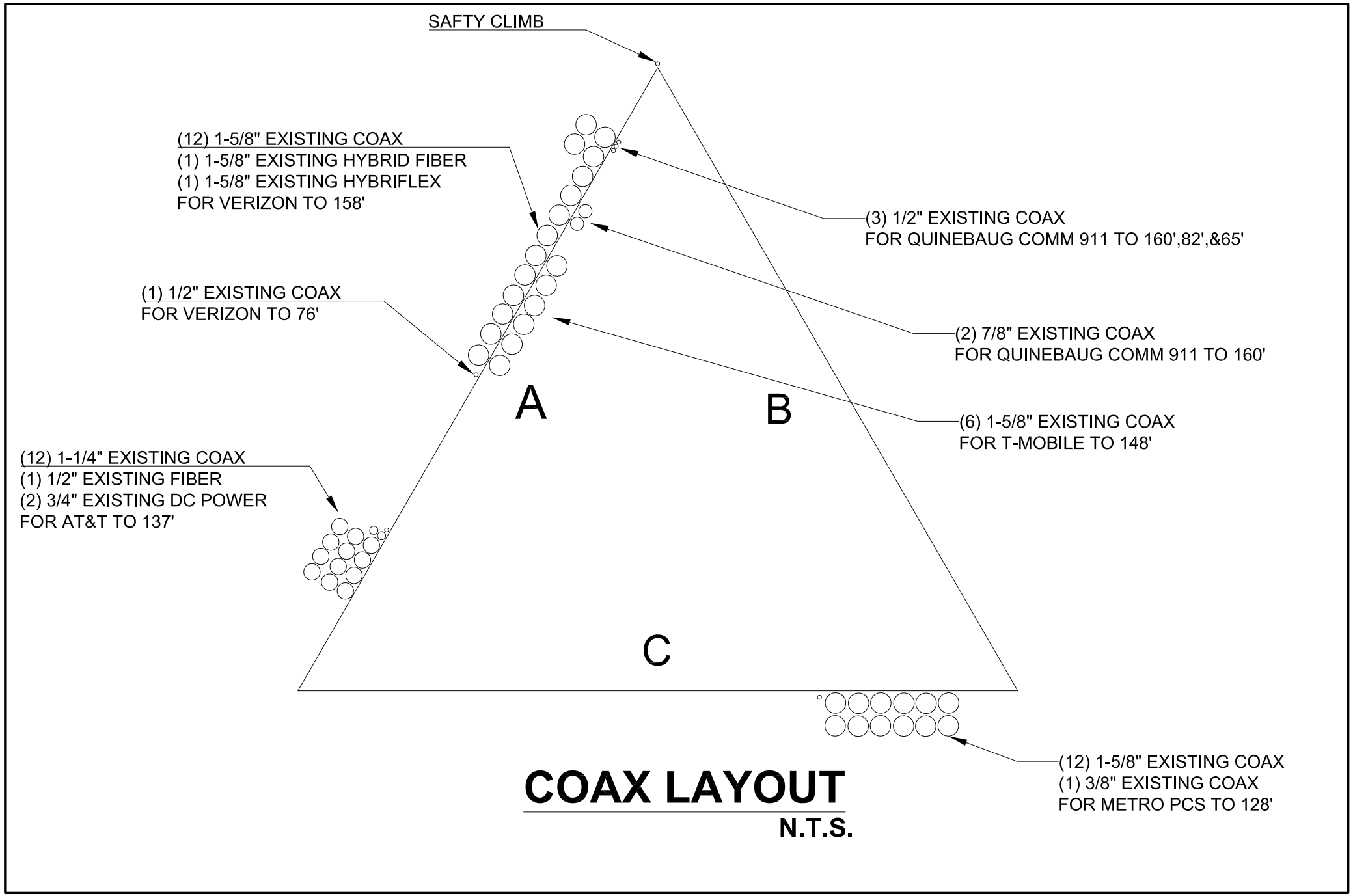
7. SUMMARY OF WORKING PERCENTAGE OF STRUCTURAL COMPONENTS

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	160 - 140	Leg	ROHN 2.5 STD	3	-21197.60	55076.63	38.5	Pass
		Diagonal	L1 3/4x1 3/4x3/16	11	-3468.93	7856.18	44.2	Pass
							50.4 (b)	
		Top Girt	L1 3/4x1 3/4x3/16	4	-100.09	2720.96	3.7	Pass
T2	140 - 120	Leg	ROHN 3 STD	39	-55146.30	71563.97	77.1	Pass
		Diagonal	L2x2x3/16	48	-5304.56	6881.97	77.1	Pass
							78.0 (b)	
		Top Girt	L1 3/4x1 3/4x3/16	41	-127.21	2720.96	4.7	Pass
T3	120 - 100	Leg	ROHN 3.5 EH	69	-88229.10	110268.15	80.0	Pass
		Diagonal	L2 1/2x2 1/2x3/16	75	-5617.50	8417.24	66.7	Pass
							82.8 (b)	
T4	100 - 80	Leg	ROHN 4 EH	90	-119636.00	139067.89	86.0	Pass
		Diagonal	L2 1/2x2 1/2x3/16	95	-5922.66	6413.97	92.3	Pass
T5	80 - 60	Leg	ROHN 5 EH	111	-150480.00	206284.41	72.9	Pass
		Diagonal	L3x3x1/4	116	-6167.34	11500.00	53.6	Pass
							76.7 (b)	
T6	60 - 40	Leg	ROHN 6 EHS	132	-177740.00	212189.60	83.8	Pass
		Diagonal	L3 1/2x3 1/2x1/4	137	-7100.44	12595.46	56.4	Pass
							65.0 (b)	
T7	40 - 20	Leg	ROHN 6 EH	147	-207710.00	264316.56	78.6	Pass
		Diagonal	L3 1/2x3 1/2x1/4	158	-8634.08	11543.86	74.8	Pass
T8	20 - 0	Leg	ROHN 6 EH	160	-236774.00	264296.57	89.6	Pass
		Diagonal	L3 1/2x3 1/2x1/4	173	-9337.84	9711.85	96.1	Pass
							Summary	
						Leg (T8)	89.6	Pass
						Diagonal (T8)	96.1	Pass
						Top Girt (T2)	4.7	Pass
						Bolt Checks	85.1	Pass
						RATING =	**96.1**	**Pass**

APPENDIX

COAX LAYOUT



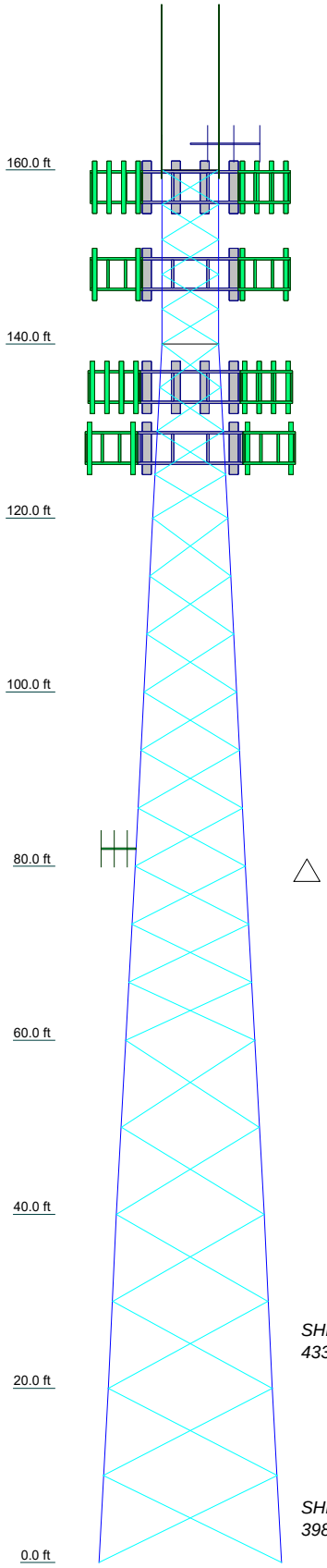
COAX LAYOUT

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
# Panels @ (ft)	5 @ 4	4 @ 5		9 @ 6.66667			6 @ 10	
Weight (lb)	921.8	1079.8	1469.5	1728.0	2731.0	2801.6	3290.8	3420.3

17442.5



MATERIAL STRENGTH

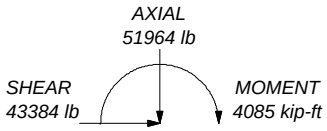
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

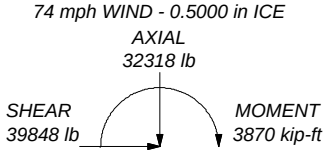
1. Tower is located in New London County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 96.1%

MAX. CORNER REACTIONS AT BASE:
DOWN: 242355 lb
SHEAR: 24471 lb

UPLIFT: -196649 lb
SHEAR: 21919 lb



TORQUE 21 kip-ft
74 mph WIND - 0.5000 in ICE



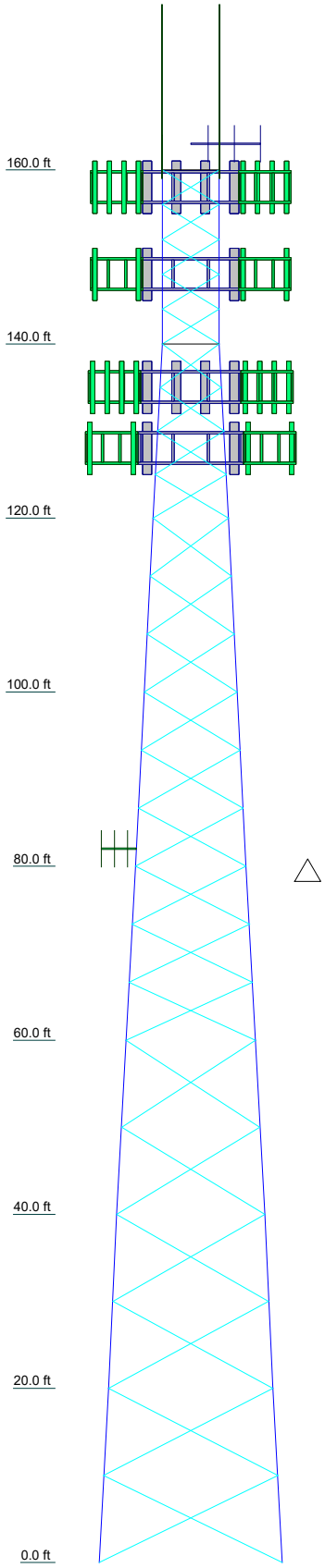
TORQUE 15 kip-ft
REACTIONS - 85 mph WIND

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

Job: ***CT10012-A-01***			
Project: ***16-0261***			
Client: SBA	Drawn by: J Li	App'd:	
Code: TIA/EIA-222-F	Date: 03/18/16	Scale: NTS	
Path: P:\2016\Structural\16-0261 CT10012-A-01 Griswold 2_CT_SA (SBA)\Tnx\CT10012-A-01 Griswold 2_AT&T_SA_03182016.eri		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)	6.58		8.59	10.65	12.74	14.83	16.92	18.88
# Panels @ (ft)	5 @ 4	4 @ 5		9 @ 6.66667			6 @ 10	
Weight (lb)	921.8	1079.8	1469.5	1728.0	2731.0	2801.6	3290.8	3420.3

17442.5



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Decibel 20' x 2" Dipoles (Quinebaug Comm 911)	160	10.5' T-Frame (T-Mobile)	148
Decibel 20' x 2" Dipoles (Quinebaug Comm 911)	160	10.5' T-Frame (T-Mobile)	148
DB201 C (Quinebaug Comm 911)	160	(2) 59212 (T-Mobile)	148
Lightning Rod	160	(2) 59212 (T-Mobile)	148
Beacon	160	12' T-Frame (ATI)	137
LNX-6514DS-A1M (Verizon)	158	12' T-Frame (ATI)	137
HBXX-6517DS-A2M (Verizon)	158	12' T-Frame (ATI)	137
HBXX-6517DS-A2M (Verizon)	158	HPA-65R-BUU-H8-K (ATI)	135
HBXX-6517DS-A2M (Verizon)	158	(2) LGP 21401 TMA (ATI)	135
HBXX-6516DS-A2M (Verizon)	158	(2) LGP 21401 TMA (ATI)	135
HBXX-6516DS-A2M (Verizon)	158	(2) LGP 21401 TMA (ATI)	135
HBXX-6516DS-A2M (Verizon)	158	(2) RRUS 11 (ATI)	135
BXA-70080-4CF-EDIN-0 (Verizon)	158	(2) RRUS 11 (ATI)	135
BXA-70080-4CF-EDIN-0 (Verizon)	158	(2) RRUS 11 (ATI)	135
BXA-70080-4CF-EDIN-0 (Verizon)	158	RRUS 12 AWS (ATI)	135
RRH2x60 AWS (Verizon)	158	RRUS 12 AWS (ATI)	135
RRH2x60 AWS (Verizon)	158	RRUS 12 AWS (ATI)	135
RRH2x60 AWS (Verizon)	158	RRUS A2 (ATI)	135
RRH2x60-700U (Verizon)	158	RRUS A2 (ATI)	135
RRH2x60-700U (Verizon)	158	RRUS A2 (ATI)	135
RRH2x60-700U (Verizon)	158	(2) LGP21903 Diplexer (ATI)	135
RRH2x60-PCS (Verizon)	158	(2) LGP21903 Diplexer (ATI)	135
RRH2x60-PCS (Verizon)	158	(2) LGP21903 Diplexer (ATI)	135
RRH2x60-PCS (Verizon)	158	DC6-48-60-18-8F (ATI)	135
DB-T1-6Z-8AB-0Z (Verizon)	158	(3) 7770 (ATI)	135
DB-T1-6Z-8AB-0Z (Verizon)	158	HPA-65R-BUU-H6 (ATI)	135
15' T-Frames (Verizon)	158	HPA-65R-BUU-H8-K (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	(2) 742 351 (Metro PCS)	128
LNX-6514DS-A1M (Verizon)	158	12' T-Frame (Metro PCS)	128
LNX-6514DS-A1M (Verizon)	158	12' T-Frame (Metro PCS)	128
(2) 63SSFL (T-Mobile)	149	12' T-Frame (Metro PCS)	128
(2) 63SSFL (T-Mobile)	149	(2) 742 351 (Metro PCS)	128
(2) 63SSFL (T-Mobile)	149	(2) 742 351 (Metro PCS)	128
(2) 59212 (T-Mobile)	148	Yagi (Quinebaug Comm 911)	82
10.5' T-Frame (T-Mobile)	148	3' Side Mount Standoff (Verizon)	76
		GPS (Verizon)	76
		6' Trombone (Quinebaug Comm 911)	68 - 65

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.

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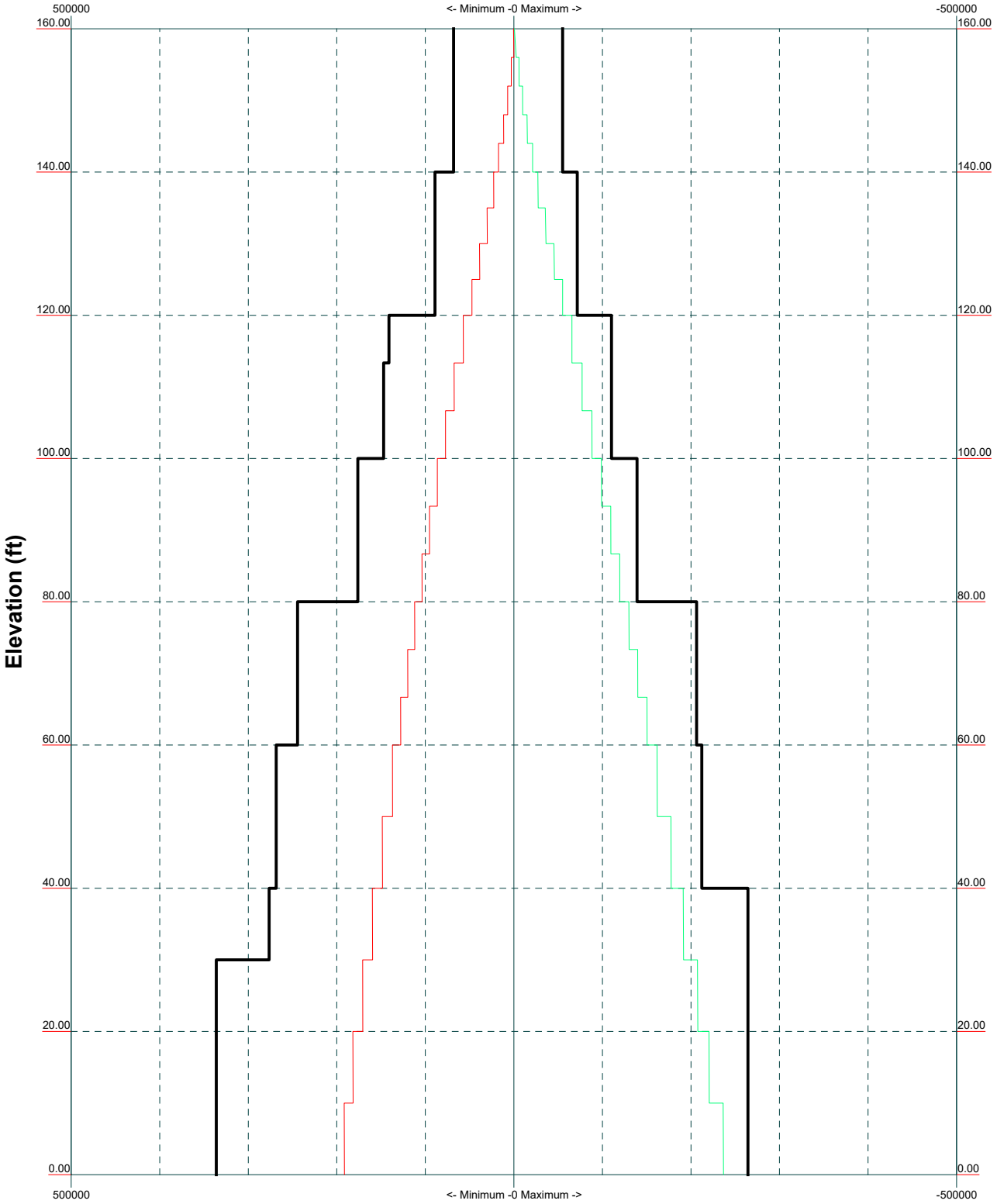
Phone: 972-231-8893
FAX: 866-364-8375

Job: ***CT10012-A-01***			
Project: ***16-0261***			
Client: SBA	Drawn by: J Li	App'd:	
Code: TIA/EIA-222-F	Date: 03/18/16	Scale: NTS	
Path: P:\2016\Structural\16-0261 CT10012-A-01 Griswold 2_CT_SA (SBA)\Tnx\CT10012-A-01 Griswold 2_AT&T_SA_03182016.eri		Dwg No. E-1	

MISCELLANEOUS PLOTS

TIA/EIA-222-F - 85 mph/74 mph 0.5000 in Ice

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



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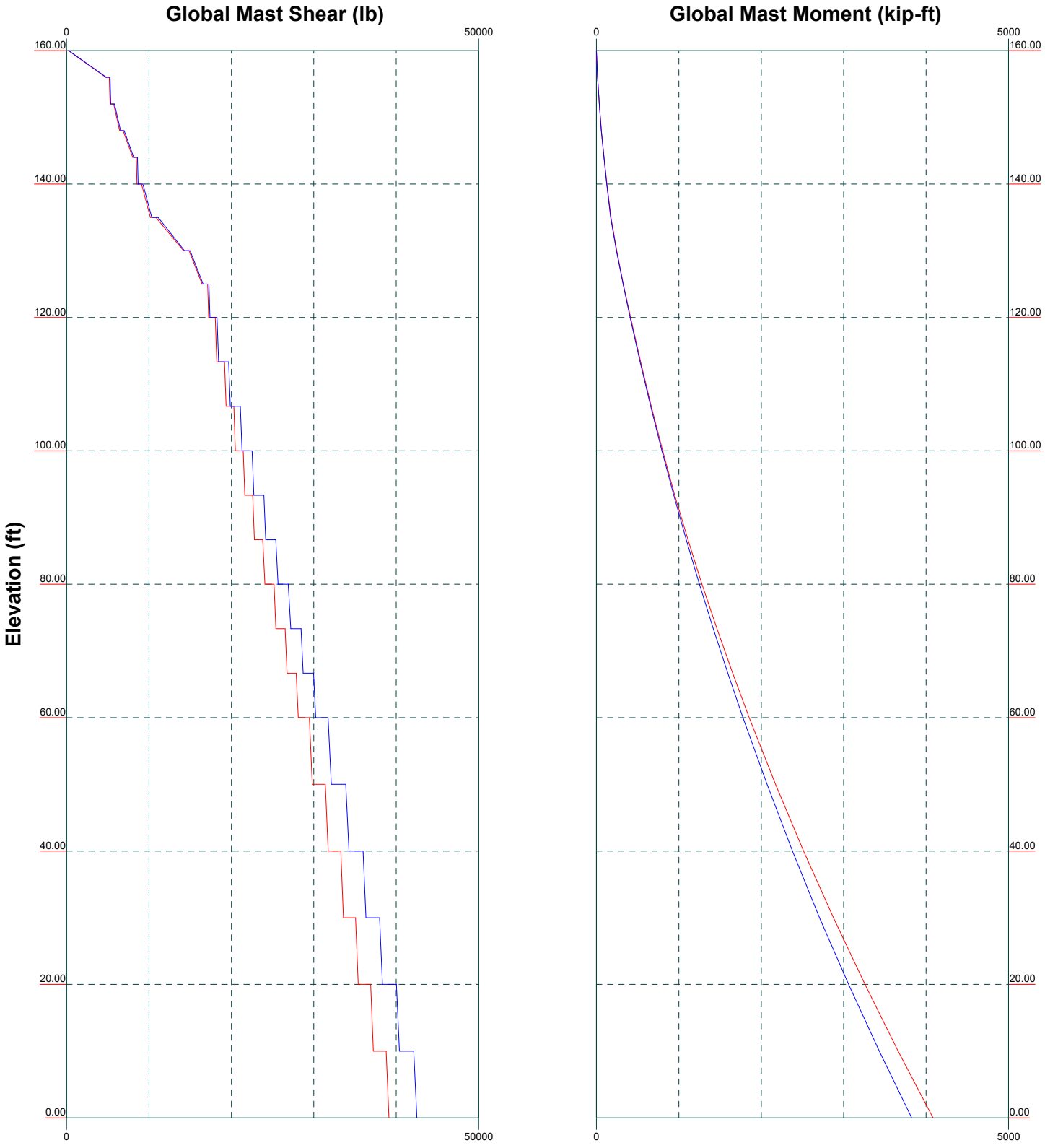
TIA/EIA-222-F - 85 mph/74 mph 0.5000 in Ice

Vx Vz

Maximum Values

Mx Mz

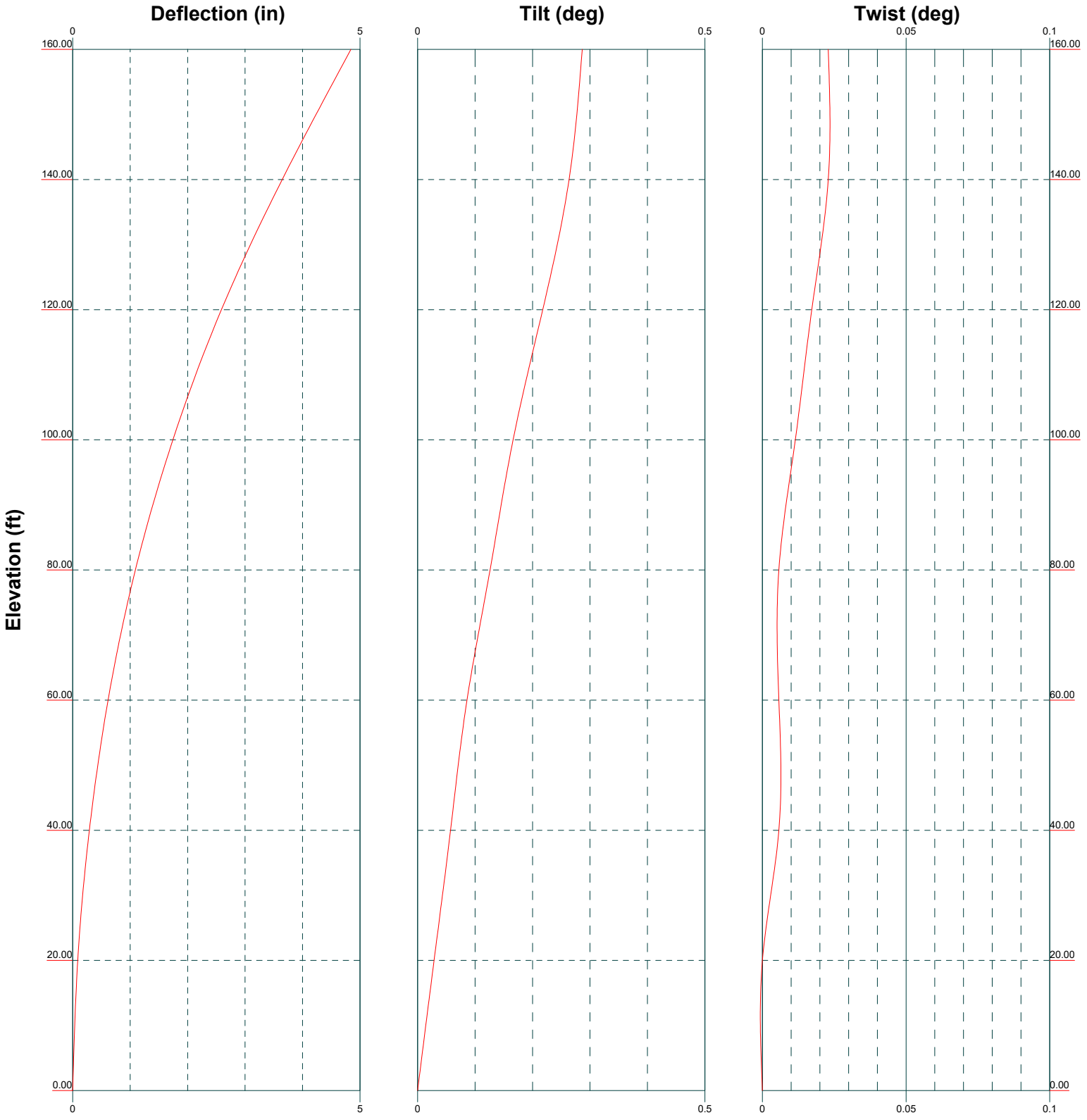


Allpro Consulting Group Inc.
9221 Lyndon B. Johnson Freeway, #204
Dallas, TX 75243
Phone: 972-231-8893
FAX: 866-364-8375

Job: ***CT10012-A-01***		
Project: ***16-0261***		
Client: SBA	Drawn by: J Li	App'd:
Code: TIA/EIA-222-F	Date: 03/18/16	Scale: NTS
Path: P:\2016\Structural\16-0261 CT10012-A-01 Griswold 2_CT_SA (SBA)\Tnx\CT10012-A-01 Griswold 2_AT&T_SA_03182016.eri		Dwg No. E-4

TIA/EIA-222-F - Service - 50 mph

Maximum Values



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Job: ***CT10012-A-01***		
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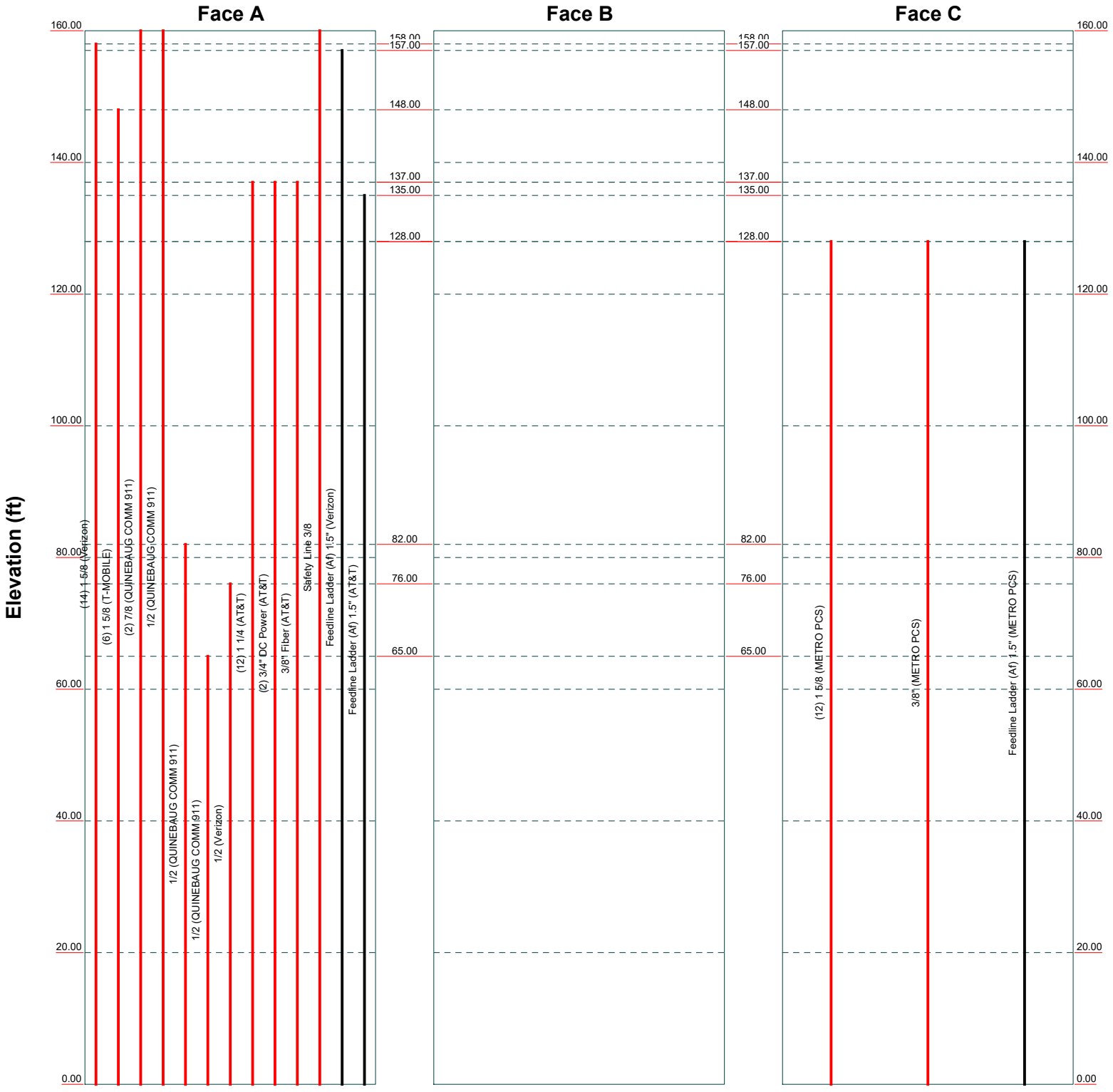
Client: SBA	Drawn by: J Li	App'd:
Code: TIA/EIA-222-F	Date: 03/18/16	Scale: NTS
Path: P:\2016\Structural\16-0261 CT10012-A-01 Griswold 2_CT_SA (SBA)\Tnx\CT10012-A-01 Griswold 2_AT&T_SA_03182016.eri		Dwg No. E-5

Feed Line Distribution Chart
0' - 160'

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



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Job: ***CT10012-A-01***		
Project: ***16-0261***		
Client: SBA	Drawn by: J Li	App'd:
Code: TIA/EIA-222-F	Date: 03/18/16	Scale: NTS
Path: P:\2016\Structural\16-0261 CT10012-A-01 Griswold 2_CT_SA (SBA)\Tnx\CT10012-A-01 Griswold 2_AT&T_SA_03182016.eri		Dwg No. E-7

CALCULATION PRINTOUT

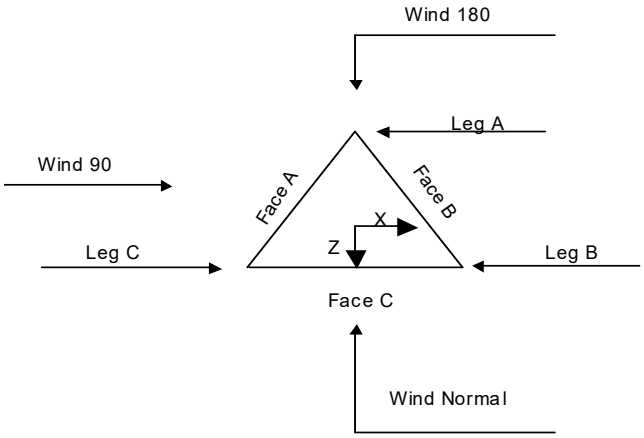
Tower Input Data

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/EIA-222-F standard.
The following design criteria apply:

Tower is located in New London County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
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 ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length 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 ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset 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	Yes	Ar (CfAe)	158.00 - 0.00	0.0000	0.2	14	12	0.5000	1.9800		0.00
1 5/8 (T-MOBILE)	A	Yes	Ar (CfAe)	148.00 - 0.00	-2.0000	0.1	6	6	0.5000	0.0100		0.00
7/8 (QUINEBAUG COMM 911)	A	Yes	Ar (CfAe)	160.00 - 0.00	-2.0000	0.25	2	2	0.5000	0.0100		0.00
1/2 (QUINEBAU	A	Yes	Ar (CfAe)	160.00 - 0.00	-2.0000	0.4	1	1	0.5000	0.0100		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
G COMM 911) 1/2 (QUINEBAU	A	Yes	Ar (CfAe)	82.00 - 0.00	-2.0000	0.4	1	1	0.5000	0.0100		0.00
G COMM 911) 1/2 (QUINEBAU	A	Yes	Ar (CfAe)	65.00 - 0.00	-2.0000	0.4	1	1	0.5000	0.0100		0.00
G COMM 911) 1/2 (Verizon)	A	Yes	Ar (CfAe)	76.00 - 0.00	0.0000	0	1	1	0.5000	0.5800		0.00
1 1/4 (AT&T)	A	Yes	Ar (CfAe)	137.00 - 0.00	0.0000	-0.35	12	4	0.5000	1.5500		0.00
3/4" DC Power (AT&T)	A	Yes	Ar (CfAe)	137.00 - 0.00	0.0000	-0.3	2	1	0.5000	0.8650		0.00
3/8" Fiber (AT&T)	A	Yes	Ar (CfAe)	137.00 - 0.00	0.0000	-0.28	1	1	0.4400	0.4400		0.00
Safety Line 3/8	A	Yes	Ar (CfAe)	160.00 - 0.00	0.0000	0.5	1	1	0.3750	0.3750		0.00
1 5/8 (METRO PCS)	C	Yes	Ar (CfAe)	128.00 - 0.00	0.0000	-0.35	12	6	0.5000	1.9800		0.00
3/8" (METRO PCS)	C	Yes	Ar (CfAe)	128.00 - 0.00	0.0000	-0.2	1	1	0.4400	0.4400		0.00
Feedline Ladder (Af) 1.5" (Verizon)	A	Yes	Af (CfAe)	157.00 - 0.00	0.0000	0.25	1	1	1.5000	1.5000	6.0000	0.00
Feedline Ladder (Af) 1.5" (AT&T)	A	Yes	Af (CfAe)	135.00 - 0.00	0.0000	-0.4	1	1	1.5000	1.5000	6.0000	0.00
Feedline Ladder (Af) 1.5" (METRO PCS)	C	Yes	Af (CfAe)	128.00 - 0.00	0.0000	-0.3	1	1	1.5000	1.5000	6.0000	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	36.355	2.125	0.000	0.000	414.40
		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	51.007	4.375	0.000	0.000	735.10
		B	0.000	0.000	0.000	0.000	0.00
		C	8.213	1.000	0.000	0.000	134.08
T3	120.00-100.00	A	52.883	5.000	0.000	0.000	781.00
		B	0.000	0.000	0.000	0.000	0.00
		C	20.533	2.500	0.000	0.000	335.20
T4	100.00-80.00	A	52.885	5.000	0.000	0.000	781.50
		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	20.533	2.500	0.000	0.000	335.20
T5	80.00-60.00	A	53.678	5.000	0.000	0.000	791.25
		B	0.000	0.000	0.000	0.000	0.00
		C	20.533	2.500	0.000	0.000	335.20
T6	60.00-40.00	A	53.883	5.000	0.000	0.000	796.00
		B	0.000	0.000	0.000	0.000	0.00
		C	20.533	2.500	0.000	0.000	335.20
T7	40.00-20.00	A	53.883	5.000	0.000	0.000	796.00
		B	0.000	0.000	0.000	0.000	0.00
		C	20.533	2.500	0.000	0.000	335.20
T8	20.00-0.00	A	53.883	5.000	0.000	0.000	796.00
		B	0.000	0.000	0.000	0.000	0.00
		C	20.533	2.500	0.000	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	0.500	10.802	46.539	0.000	0.000	885.74
		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	0.500	20.603	65.599	0.000	0.000	1556.78
		B		0.000	0.000	0.000	0.000	0.00
		C		2.947	9.711	0.000	0.000	291.33
T3	120.00-100.00	A	0.500	22.067	68.039	0.000	0.000	1656.53
		B		0.000	0.000	0.000	0.000	0.00
		C		7.367	24.278	0.000	0.000	728.31
T4	100.00-80.00	A	0.500	22.235	68.039	0.000	0.000	1657.65
		B		0.000	0.000	0.000	0.000	0.00
		C		7.367	24.278	0.000	0.000	728.31
T5	80.00-60.00	A	0.500	26.278	68.039	0.000	0.000	1685.13
		B		0.000	0.000	0.000	0.000	0.00
		C		7.367	24.278	0.000	0.000	728.31
T6	60.00-40.00	A	0.500	28.067	68.039	0.000	0.000	1697.19
		B		0.000	0.000	0.000	0.000	0.00
		C		7.367	24.278	0.000	0.000	728.31
T7	40.00-20.00	A	0.500	28.067	68.039	0.000	0.000	1697.19
		B		0.000	0.000	0.000	0.000	0.00
		C		7.367	24.278	0.000	0.000	728.31
T8	20.00-0.00	A	0.500	28.067	68.039	0.000	0.000	1697.19
		B		0.000	0.000	0.000	0.000	0.00
		C		7.367	24.278	0.000	0.000	728.31

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	160.00-140.00	A	0.000	3.060	3.564	5.355
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	140.00-120.00	A	0.000	3.851	4.836	7.612
		B	0.000	0.000	0.000	0.000

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
		C	0.000	0.569	0.804	1.125
T3	120.00-100.00	A	0.000	2.778	4.408	6.946
		B	0.000	0.000	0.000	0.000
		C	0.000	0.981	1.754	2.452
T4	100.00-80.00	A	0.000	2.632	4.168	6.579
		B	0.000	0.000	0.000	0.000
		C	0.000	0.927	1.658	2.318
T5	80.00-60.00	A	0.000	2.651	4.891	7.954
		B	0.000	0.000	0.000	0.000
		C	0.000	0.895	1.920	2.684
T6	60.00-40.00	A	0.000	1.916	4.061	6.705
		B	0.000	0.000	0.000	0.000
		C	0.000	0.634	1.589	2.221
T7	40.00-20.00	A	0.000	1.856	3.935	6.497
		B	0.000	0.000	0.000	0.000
		C	0.000	0.615	1.539	2.152
T8	20.00-0.00	A	0.000	1.813	3.844	6.347
		B	0.000	0.000	0.000	0.000
		C	0.000	0.601	1.504	2.102

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	-4.7182	-9.4082	-3.6770	-8.0577
T2	140.00-120.00	-5.9536	-5.9463	-5.1481	-5.7255
T3	120.00-100.00	-3.9009	-3.3772	-3.9865	-4.0683
T4	100.00-80.00	-4.3043	-3.8180	-4.4852	-4.6957
T5	80.00-60.00	-4.3586	-3.8915	-4.8346	-5.4663
T6	60.00-40.00	-4.8468	-4.3744	-5.6304	-6.6954
T7	40.00-20.00	-5.2571	-4.7901	-6.1452	-7.3500
T8	20.00-0.00	-5.6362	-5.1749	-6.6225	-7.9580

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft ft ft	°	ft		ft^2	ft^2	lb
Decibel 20' x 2" Dipoles	C	From Leg	0.00 0.00 9.00	0.0000	160.00	No Ice 1/2" Ice	4.00 6.03	4.00 6.03	35.00 50.00
(Quinebaug Comm 911)									
Decibel 20' x 2" Dipoles	B	From Leg	0.00 0.00 9.00	0.0000	160.00	No Ice 1/2" Ice	4.00 6.03	4.00 6.03	35.00 50.00
(Quinebaug Comm 911)									
DB201 C	A	From Leg	0.00 0.00 3.00	0.0000	160.00	No Ice 1/2" Ice	2.00 2.83	2.00 2.83	25.00 40.00
(Quinebaug Comm 911)									

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
LNX-6514DS-A1M	A	From Leg	3.00	0.0000	158.00	No Ice	8.43	5.42	31.30
(Verizon)			0.00			1/2" Ice	8.99	5.88	81.94
			0.00						
LNX-6514DS-A1M	B	From Leg	3.00	0.0000	158.00	No Ice	8.43	5.42	31.30
(Verizon)			0.00			1/2" Ice	8.99	5.88	81.94
			0.00						
LNX-6514DS-A1M	C	From Leg	3.00	0.0000	158.00	No Ice	8.43	5.42	31.30
(Verizon)			0.00			1/2" Ice	8.99	5.88	81.94
			0.00						
HBXX-6517DS-A2M	A	From Leg	3.00	0.0000	158.00	No Ice	8.74	5.24	43.00
(Verizon)			0.00			1/2" Ice	9.31	5.71	93.49
			0.00						
HBXX-6517DS-A2M	B	From Leg	3.00	0.0000	158.00	No Ice	8.74	5.24	43.00
(Verizon)			0.00			1/2" Ice	9.31	5.71	93.49
			0.00						
HBXX-6517DS-A2M	C	From Leg	3.00	0.0000	158.00	No Ice	8.74	5.24	43.00
(Verizon)			0.00			1/2" Ice	9.31	5.71	93.49
			0.00						
HBXX-6516DS-A2M	A	From Leg	3.00	0.0000	158.00	No Ice	5.94	3.28	30.60
(Verizon)			0.00			1/2" Ice	6.35	3.61	65.93
			0.00						
HBXX-6516DS-A2M	B	From Leg	3.00	0.0000	158.00	No Ice	5.94	3.28	30.60
(Verizon)			0.00			1/2" Ice	6.35	3.61	65.93
			0.00						
HBXX-6516DS-A2M	C	From Leg	3.00	0.0000	158.00	No Ice	5.94	3.28	30.60
(Verizon)			0.00			1/2" Ice	6.35	3.61	65.93
			0.00						
BXA-70080-4CF-EDIN-0	A	From Leg	3.00	0.0000	158.00	No Ice	3.69	2.79	12.00
(Verizon)			0.00			1/2" Ice	4.06	3.10	36.95
			0.00						
BXA-70080-4CF-EDIN-0	B	From Leg	3.00	0.0000	158.00	No Ice	3.69	2.79	12.00
(Verizon)			0.00			1/2" Ice	4.06	3.10	36.95
			0.00						
BXA-70080-4CF-EDIN-0	C	From Leg	3.00	0.0000	158.00	No Ice	3.69	2.79	12.00
(Verizon)			0.00			1/2" Ice	4.06	3.10	36.95
			0.00						
RRH2x60 AWS	A	From Leg	3.00	0.0000	158.00	No Ice	3.77	2.05	55.00
(Verizon)			0.00			1/2" Ice	4.08	2.32	78.12
			0.00						
RRH2x60 AWS	B	From Leg	3.00	0.0000	158.00	No Ice	3.77	2.05	55.00
(Verizon)			0.00			1/2" Ice	4.08	2.32	78.12
			0.00						
RRH2x60 AWS	C	From Leg	3.00	0.0000	158.00	No Ice	3.77	2.05	55.00
(Verizon)			0.00			1/2" Ice	4.08	2.32	78.12
			0.00						
RRH2x60-700U	A	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						
RRH2x60-700U	B	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						
RRH2x60-700U	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						
RRH2x60-PCS	A	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						

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
RRH2x60-PCS	B	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						
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						
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						
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						
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						
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						
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						
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						
******									
(2) 59212	A	From Leg	0.50	0.0000	148.00	No Ice	4.73	2.64	14.60
(T-Mobile)			0.00			1/2" Ice	5.17	3.10	38.26
			0.00						
(2) 59212	B	From Leg	0.50	0.0000	148.00	No Ice	4.73	2.64	14.60
(T-Mobile)			0.00			1/2" Ice	5.17	3.10	38.26
			0.00						
(2) 59212	C	From Leg	0.50	0.0000	148.00	No Ice	4.73	2.64	14.60
(T-Mobile)			0.00			1/2" Ice	5.17	3.10	38.26
			0.00						
(2) 63SSFL	A	From Leg	0.50	0.0000	149.00	No Ice	4.59	2.15	25.00
(T-Mobile)			0.00			1/2" Ice	5.14	2.48	45.00
			0.00						
(2) 63SSFL	B	From Leg	0.50	0.0000	149.00	No Ice	4.59	2.15	25.00
(T-Mobile)			0.00			1/2" Ice	5.14	2.48	45.00
			0.00						
(2) 63SSFL	C	From Leg	0.50	0.0000	149.00	No Ice	4.59	2.15	25.00
(T-Mobile)			0.00			1/2" Ice	5.14	2.48	45.00
			0.00						
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						
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						
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						
*******									
(3) 7770	A	From Leg	3.00	0.0000	135.00	No Ice	5.88	2.93	35.00
(AT&T)			0.00			1/2" Ice	6.31	3.27	67.63
			0.00						
(3) 7770	B	From Leg	3.00	0.0000	135.00	No Ice	5.88	2.93	35.00

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
(AT&T)			0.00					1/2" Ice	6.31	3.27	67.63
			0.00								
(3) 7770	C	From Leg	3.00			0.0000	135.00	No Ice	5.88	2.93	35.00
(AT&T)			0.00					1/2" Ice	6.31	3.27	67.63
			0.00								
HPA-65R-BUU-H6	A	From Leg	3.00			0.0000	135.00	No Ice	10.12	5.49	43.00
(AT&T)			0.00					1/2" Ice	10.69	5.94	100.33
			0.00								
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								
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								
(2) LGP 21401 TMA	A	From Leg	3.00			0.0000	135.00	No Ice	0.95	0.37	10.00
(AT&T)			0.00					1/2" Ice	1.09	0.48	15.81
			0.00								
(2) LGP 21401 TMA	B	From Leg	3.00			0.0000	135.00	No Ice	0.95	0.37	10.00
(AT&T)			0.00					1/2" Ice	1.09	0.48	15.81
			0.00								
(2) LGP 21401 TMA	C	From Leg	3.00			0.0000	135.00	No Ice	0.95	0.37	10.00
(AT&T)			0.00					1/2" Ice	1.09	0.48	15.81
			0.00								
(2) RRUS 11	A	From Leg	3.00			0.0000	135.00	No Ice	3.25	1.37	50.71
(AT&T)			0.00					1/2" Ice	3.49	1.55	71.51
			0.00								
(2) RRUS 11	B	From Leg	3.00			0.0000	135.00	No Ice	3.25	1.37	50.71
(AT&T)			0.00					1/2" Ice	3.49	1.55	71.51
			0.00								
(2) RRUS 11	C	From Leg	3.00			0.0000	135.00	No Ice	3.25	1.37	50.71
(AT&T)			0.00					1/2" Ice	3.49	1.55	71.51
			0.00								
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								
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								
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								
RRUS A2	A	From Leg	3.00			0.0000	135.00	No Ice	2.41	0.53	22.04
(AT&T)			0.00					1/2" Ice	2.62	0.67	34.65
			0.00								
RRUS A2	B	From Leg	3.00			0.0000	135.00	No Ice	2.41	0.53	22.04
(AT&T)			0.00					1/2" Ice	2.62	0.67	34.65
			0.00								
RRUS A2	C	From Leg	3.00			0.0000	135.00	No Ice	2.41	0.53	22.04
(AT&T)			0.00					1/2" Ice	2.62	0.67	34.65
			0.00								
(2) LGP21903 Diplexer	A	From Leg	3.00			0.0000	135.00	No Ice	0.27	0.18	5.00
(AT&T)			0.00					1/2" Ice	0.34	0.25	7.42
			0.00								
(2) LGP21903 Diplexer	B	From Leg	3.00			0.0000	135.00	No Ice	0.27	0.18	5.00
(AT&T)			0.00					1/2" Ice	0.34	0.25	7.42
			0.00								
(2) LGP21903 Diplexer	C	From Leg	3.00			0.0000	135.00	No Ice	0.27	0.18	5.00

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
(AT&T)			0.00 0.00			1/2" Ice	0.34	0.25	7.42
DC6-48-60-18-8F	A	From Leg	0.00	0.0000	135.00	No Ice	2.57	4.32	32.80
(AT&T)			0.00 0.00			1/2" Ice	2.80	4.60	64.11
12' T-Frame	A	From Leg	1.50	0.0000	137.00	No Ice	13.46	6.72	260.00
(AT&T)			0.00 0.00			1/2" Ice	17.79	8.03	360.00
12' T-Frame	B	From Leg	1.50	0.0000	137.00	No Ice	13.46	6.72	260.00
(AT&T)			0.00 0.00			1/2" Ice	17.79	8.03	360.00
12' T-Frame	C	From Leg	1.50	0.0000	137.00	No Ice	13.46	6.72	260.00
(AT&T)			0.00 0.00			1/2" Ice	17.79	8.03	360.00
******									
(2) 742 351	A	From Leg	3.00	0.0000	128.00	No Ice	5.89	1.73	35.30
(Metro PCS)			0.00 0.00			1/2" Ice	6.30	2.04	62.60
(2) 742 351	B	From Leg	3.00	0.0000	128.00	No Ice	5.89	1.73	35.30
(Metro PCS)			0.00 0.00			1/2" Ice	6.30	2.04	62.60
(2) 742 351	C	From Leg	3.00	0.0000	128.00	No Ice	5.89	1.73	35.30
(Metro PCS)			0.00 0.00			1/2" Ice	6.30	2.04	62.60
12' T-Frame	A	From Leg	1.50	0.0000	128.00	No Ice	10.00	6.46	260.00
(Metro PCS)			0.00 0.00			1/2" Ice	12.50	7.92	360.00
12' T-Frame	B	From Leg	1.50	0.0000	128.00	No Ice	10.00	6.46	260.00
(Metro PCS)			0.00 0.00			1/2" Ice	12.50	7.92	360.00
12' T-Frame	C	From Leg	1.50	0.0000	128.00	No Ice	10.00	6.46	260.00
(Metro PCS)			0.00 0.00			1/2" Ice	12.50	7.92	360.00
******									
Yagi	C	From Leg	0.00	0.0000	82.00	No Ice	2.08	2.08	30.00
(Quinebaug Comm 911)			0.00 0.00			1/2" Ice	3.78	3.78	52.87
******									
GPS	A	From Leg	3.00	0.0000	76.00	No Ice	0.16	0.16	2.00
(Verizon)			0.00 0.00			1/2" Ice	0.21	0.21	4.00
3' Side Mount Standoff	A	From Leg	1.50	0.0000	76.00	No Ice	2.19	0.42	50.00
(Verizon)			0.00 0.00			1/2" Ice	2.73	0.56	89.00
******									
6' Trombone	B	From Leg	0.00	0.0000	65.00 - 68.00	No Ice	2.00	2.00	40.00
(Quinebaug Comm 911)			0.00 0.00			1/2" Ice	2.83	2.83	55.00
Lightning Rod	C	From Leg	0.00	0.0000	160.00	No Ice	0.25	0.25	30.00
			0.00 2.00			1/2" Ice	0.66	0.66	30.00
Beacon	C	From Leg	0.00	0.0000	160.00	No Ice	2.00	2.00	20.00
			0.00 4.00			1/2" Ice	2.50	2.50	30.00

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	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	4.842	27	0.2855	0.0236
T2	140 - 120	3.646	27	0.2659	0.0211
T3	120 - 100	2.588	27	0.2154	0.0156
T4	100 - 80	1.744	27	0.1689	0.0112
T5	80 - 60	1.091	27	0.1238	0.0073
T6	60 - 40	0.616	27	0.0887	0.0049
T7	40 - 20	0.290	27	0.0553	0.0032
T8	20 - 0	0.088	27	0.0279	0.0016

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
160.00	Decibel 20' x 2" Dipoles	27	4.842	0.2855	0.0236	131186
158.00	LNX-6514DS-A1M	27	4.720	0.2843	0.0235	131186
149.00	(2) 63SSFL	27	4.175	0.2780	0.0226	59630
148.00	(2) 59212	27	4.115	0.2770	0.0225	54661
137.00	12' T-Frame	27	3.476	0.2598	0.0204	29947
135.00	(3) 7770	27	3.364	0.2552	0.0199	28268
128.00	(2) 742 351	27	2.988	0.2371	0.0179	23674
82.00	Yagi	27	1.148	0.1280	0.0076	26082
76.00	GPS	27	0.983	0.1161	0.0067	27040
68.00	6' Trombone	27	0.787	0.1021	0.0057	29484
66.50	6' Trombone	27	0.753	0.0995	0.0055	29992
65.00	6' Trombone	27	0.720	0.0970	0.0054	30519

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 140	14.255	15	0.8249	0.0787
T2	140 - 120	10.800	15	0.7710	0.0717
T3	120 - 100	7.722	15	0.6304	0.0549
T4	100 - 80	5.240	15	0.4991	0.0408
T5	80 - 60	3.299	15	0.3691	0.0274
T6	60 - 40	1.875	15	0.2661	0.0190
T7	40 - 20	0.889	15	0.1667	0.0127
T8	20 - 0	0.272	15	0.0845	0.0064

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
160.00	Decibel 20' x 2" Dipoles	15	14.255	0.8249	0.0787	46289
158.00	LNX-6514DS-A1M	15	13.903	0.8219	0.0783	46289
149.00	(2) 63SSFL	15	12.329	0.8045	0.0760	21040
148.00	(2) 59212	15	12.157	0.8018	0.0756	19287
137.00	12' T-Frame	15	10.306	0.7543	0.0697	10529
135.00	(3) 7770	15	9.983	0.7416	0.0681	9920
128.00	(2) 742 351	15	8.888	0.6912	0.0620	8267
82.00	Yagi	15	3.470	0.3811	0.0286	8978
76.00	GPS	15	2.974	0.3466	0.0253	9254
68.00	6' Trombone	15	2.386	0.3055	0.0218	10030
66.50	6' Trombone	15	2.285	0.2981	0.0213	10191
65.00	6' Trombone	15	2.186	0.2907	0.0207	10356

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	4349.73	19438.60	0.224 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	3423.19	5097.66	0.672 ✓	1.333	Member Bearing
		Top Girt	A325N	0.6250	1	99.58	5097.66	0.020 ✓	1.333	Member Bearing
T2	140	Leg	A325N	0.8750	4	11832.70	26458.10	0.447 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	5301.05	5097.66	1.040 ✓	1.333	Member Bearing
		Top Girt	A325N	0.6250	1	119.35	5097.66	0.023 ✓	1.333	Member Bearing
T3	120	Leg	A325N	0.8750	4	19308.60	26458.10	0.730 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	5628.53	5097.66	1.104 ✓	1.333	Member Bearing
T4	100	Leg	A325N	1.0000	4	25945.50	34557.50	0.751 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	5780.68	5097.66	1.134 ✓	1.333	Member Bearing
T5	80	Leg	A325N	1.0000	6	21316.30	34557.50	0.617 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	6589.80	6442.72	1.023 ✓	1.333	Bolt Shear
T6	60	Leg	A325N	1.0000	6	24762.00	34557.50	0.717 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	7916.65	9140.63	0.866 ✓	1.333	Member Bearing
T7	40	Leg	A325N	1.0000	6	28469.40	34557.50	0.824 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	9108.23	9140.63	0.996 ✓	1.333	Member Bearing
T8	20	Leg	A325N	1.0000	8	23956.80	34557.50	0.693 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	9954.37	9140.63	1.089 ✓	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio P / P_a
T1	160 - 140	ROHN 2.5 STD	20.00	4.00	50.7 K=1.00	24.247	1.7040	-21197.60	41317.80	0.513 ✓
T2	140 - 120	ROHN 3 STD	20.03	5.01	51.7 K=1.00	24.091	2.2285	-55146.30	53686.40	1.027 ✓
T3	120 - 100	ROHN 3.5 EH	20.04	6.68	61.3 K=1.00	22.488	3.6784	-88229.10	82721.80	1.067 ✓
T4	100 - 80	ROHN 4 EH	20.04	6.68	54.3 K=1.00	23.671	4.4074	-119636.00	104327.00	1.147 ✓
T5	80 - 60	ROHN 5 EH	20.04	6.68	43.6 K=1.00	25.320	6.1120	-150480.00	154752.00	0.972 ✓
T6	60 - 40	ROHN 6 EHS	20.04	10.02	54.0	23.712	6.7133	-177740.00	159182.00	1.117

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T7	40 - 20	ROHN 6 EH	20.03	10.02	54.8 K=1.00	23.592	8.4049	-207710.00	198287.00	1.048 ✔
T8	20 - 0	ROHN 6 EH	20.04	10.02	54.8 K=1.00	23.590	8.4049	-236774.00	198272.00	1.194 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	L1 3/4x1 3/4x3/16	7.70	3.59	125.4 K=1.00	9.489	0.6211	-3468.93	5893.61	0.589 ✔
T2	140 - 120	L2x2x3/16	9.72	4.72	143.8 K=1.00	7.222	0.7148	-5304.56	5162.77	1.027 ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	12.28	6.02	146.1 K=1.00	6.998	0.9023	-5617.50	6314.51	0.890 ✔
T4	100 - 80	L2 1/2x2 1/2x3/16	14.07	6.90	167.3 K=1.00	5.332	0.9023	-5922.66	4811.68	1.231 ✔
T5	80 - 60	L3x3x1/4	15.94	7.79	157.9 K=1.00	5.991	1.4400	-6167.34	8627.16	0.715 ✔
T6	60 - 40	L3 1/2x3 1/2x1/4	19.21	9.45	163.4 K=1.00	5.591	1.6900	-7100.44	9448.96	0.751 ✔
T7	40 - 20	L3 1/2x3 1/2x1/4	20.08	9.87	170.7 K=1.00	5.124	1.6900	-8634.08	8660.06	0.997 ✔
T8	20 - 0	L3 1/2x3 1/2x1/4	21.83	10.76	186.1 K=1.00	4.311	1.6900	-9337.84	7285.71	1.282 ✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	L1 3/4x1 3/4x3/16	6.58	6.10	213.2 K=1.00	3.287	0.6211	-100.09	2041.23	0.049 ✔
T2	140 - 120	KL/R > 200 (C) - 4 L1 3/4x1 3/4x3/16 KL/R > 200 (C) - 41	6.58	6.10	213.2 K=1.00	3.287	0.6211	-127.21	2041.23	0.062 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	ROHN 2.5 STD	20.00	4.00	50.7	30.000	1.7040	17398.90	51121.50	0.340 ✔
T2	140 - 120	ROHN 3 STD	20.03	5.01	51.7	30.000	2.2285	47330.70	66854.10	0.708 ✔
T3	120 - 100	ROHN 3.5 EH	20.04	6.68	61.3	30.000	3.6784	77234.30	110352.00	0.700 ✔
T4	100 - 80	ROHN 4 EH	20.04	6.68	54.3	30.000	4.4074	103782.00	132223.00	0.785 ✔
T5	80 - 60	ROHN 5 EH	20.04	6.68	43.6	30.000	6.1120	127898.00	183359.00	0.698 ✔
T6	60 - 40	ROHN 6 EHS	20.04	10.02	54.0	30.000	6.7133	148572.00	201398.00	0.738 ✔
T7	40 - 20	ROHN 6 EH	20.03	10.02	54.8	30.000	8.4049	170816.00	252148.00	0.677 ✔
T8	20 - 0	ROHN 6 EH	20.04	10.02	54.8	30.000	8.4049	191654.00	252148.00	0.760 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	L1 3/4x1 3/4x3/16	7.70	3.59	82.9	29.000	0.3604	3423.19	10450.20	0.328 ✔
T2	140 - 120	L2x2x3/16	9.72	4.72	94.1	29.000	0.4307	5301.05	12489.30	0.424 ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	11.15	5.47	86.2	29.000	0.5713	5628.53	16567.40	0.340 ✔
T4	100 - 80	L2 1/2x2 1/2x3/16	14.07	6.90	108.3	29.000	0.5713	5780.68	16567.40	0.349 ✔
T5	80 - 60	L3x3x1/4	15.94	7.79	102.0	32.500	0.9394	6589.80	30529.70	0.216 ✔
T6	60 - 40	L3 1/2x3 1/2x1/4	19.21	9.45	105.5	32.500	1.1034	7916.65	35861.70	0.221 ✔
T7	40 - 20	L3 1/2x3 1/2x1/4	20.93	10.30	114.8	32.500	1.1034	9108.23	35861.70	0.254 ✔
T8	20 - 0	L3 1/2x3 1/2x1/4	22.76	11.23	125.1	32.500	1.1034	9954.37	35861.70	0.278 ✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	L1 3/4x1 3/4x3/16	6.58	6.10	141.7	29.000	0.3604	99.58	10450.20	0.010 ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T2	140 - 120	L1 3/4x1 3/4x3/16	6.58	6.10	141.7	29.000	0.3604	119.35	10450.20	0.011 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T1	160 - 140	Leg	ROHN 2.5 STD	3	-21197.60	55076.63	38.5	Pass
		Diagonal	L1 3/4x1 3/4x3/16	11	-3468.93	7856.18	44.2	Pass
							50.4 (b)	
		Top Girt	L1 3/4x1 3/4x3/16	4	-100.09	2720.96	3.7	Pass
T2	140 - 120	Leg	ROHN 3 STD	39	-55146.30	71563.97	77.1	Pass
		Diagonal	L2x2x3/16	48	-5304.56	6881.97	77.1	Pass
							78.0 (b)	
		Top Girt	L1 3/4x1 3/4x3/16	41	-127.21	2720.96	4.7	Pass
T3	120 - 100	Leg	ROHN 3.5 EH	69	-88229.10	110268.15	80.0	Pass
		Diagonal	L2 1/2x2 1/2x3/16	75	-5617.50	8417.24	66.7	Pass
							82.8 (b)	
T4	100 - 80	Leg	ROHN 4 EH	90	-119636.00	139067.89	86.0	Pass
		Diagonal	L2 1/2x2 1/2x3/16	95	-5922.66	6413.97	92.3	Pass
T5	80 - 60	Leg	ROHN 5 EH	111	-150480.00	206284.41	72.9	Pass
		Diagonal	L3x3x1/4	116	-6167.34	11500.00	53.6	Pass
							76.7 (b)	
T6	60 - 40	Leg	ROHN 6 EHS	132	-177740.00	212189.60	83.8	Pass
		Diagonal	L3 1/2x3 1/2x1/4	137	-7100.44	12595.46	56.4	Pass
							65.0 (b)	
T7	40 - 20	Leg	ROHN 6 EH	147	-207710.00	264316.56	78.6	Pass
		Diagonal	L3 1/2x3 1/2x1/4	158	-8634.08	11543.86	74.8	Pass
T8	20 - 0	Leg	ROHN 6 EH	160	-236774.00	264296.57	89.6	Pass
		Diagonal	L3 1/2x3 1/2x1/4	173	-9337.84	9711.85	96.1	Pass
							Summary	
						Leg (T8)	89.6	Pass
						Diagonal (T8)	96.1	Pass
						Top Girt (T2)	4.7	Pass
						Bolt Checks	85.1	Pass
						RATING =	**96.1**	**Pass**

MATHCAD CALCULATION PRINTOUT

Spread Foot Foundation Check for 160' Self Supporting Tower

Customer Name: SBA Communication Corp
Customer Site Number: CT10012-A-01
Customer Site Name: Griswold 2, CT

Carrier Name: AT&T
Carrier Site Name & Number: CT5457
Site Location: 181 A Norman Road
Griswold, CT 06351

ACGI Job # 16-0261

By:

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

INPUT DATA

-Foundation Reactions- F Code (factered)

(As per TNX Output)

Down load; $Pv := 242.36 \cdot kips$ Shear; $S := 24.47 \cdot kips$

Uplift load; $P_{up} := 196.65 \cdot kips$ Moment; $M := 0 \cdot ft\_K$

MATERIAL & SOIL PARAMETERS

Conforming to the design requirements as in ACI 318

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

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, $Br_{ult} := 20ksf$ Assume safty factor 2

$Br_{allow} := 10ksf$

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

Cohesion of soil, $c_u := 0 \cdot ksf$ $cc := 3in$ (concrete cover)

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, $D_f := 11.8ft$ 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	$\frac{L}{2}$

$RM_N := PDL_N\cdot LEV_N$

$TRM := \sum_N RM_N$ $TRM = 1227.755\cdot ft\cdot kips$ Total resisting moment

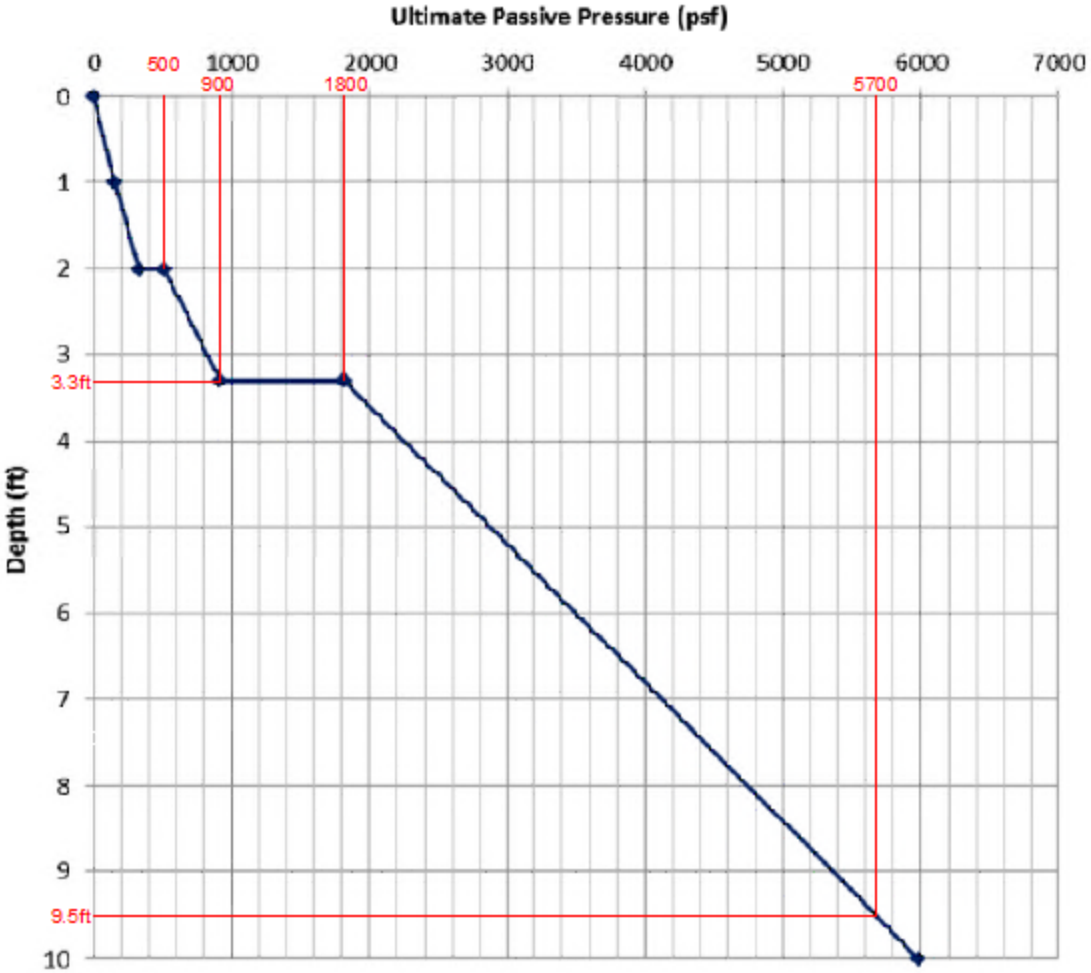
$TWT := PDL_1 + PDL_2 + PDL_3 + PDL_5$ $TWT = 331.834\cdot kips$ Total down load

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

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	$S = 24.47\cdot kips$	$L_{hs} := D_f + Ex_g$ $L_{hs} = 12.8\,ft$	$O_{hs} := L_{hs}\cdot S$ $O_{hs} = 313.216\cdot ft\_K$
3)Resisting Moment due to passive pressure on pier			

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

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

Satety Factor for passive pressure use $F_s := 2$ $M_{prallow} := \frac{M_{pr1} + M_{pr2}}{F_s} = 200.815\cdot kips\cdot ft$

Total Overturning Moment= $M_o := M + O_{hs} - M_{prallow}$ $M_o = 112.401 \cdot ft\_K$

Check Safety Factor against Overturning

$TWT_1 := TWT - PDL_2 = 302.3 \cdot kips$

$SF := \frac{TRM}{M_o}$ $SF = 10.923$ > 1.5 OK! Calculate eccentricity, ec $ec := \frac{M_o}{TWT_1}$ $ec = 0.372 \cdot ft$

Check location of eccentricity and determine pressure distribution under the footing

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

$P_{max1} := if\left[ec \le L_{loc}, \frac{TWT_1}{L \cdot B} \cdot \left[1 + \left(6 \cdot \frac{ec}{L}\right)\right], 4 \cdot \frac{TWT_1}{3 \cdot B \cdot (L - 2 \cdot ec)}\right]$ $P_{max1} = 11.519 \cdot ksf$ 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, $P_{net} = 9.985 \cdot ksf$ < $Br_{allow} = 10 \cdot ksf$ $\frac{P_{net}}{(Br_{allow})} = 99.855 \cdot \%$ OK!

$P_{min} := if\left[ec \le L_{loc}, \frac{TWT}{L \cdot B} \cdot \left[1 - \left(6 \cdot \frac{ec}{L}\right)\right], 0 \cdot ksf\right]$ $P_{min} = 5.79 \cdot ksf$

Check for horizontal shear

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

$P_{shr} = 221.043 \cdot kips$ > $S = 24.47 \cdot kips$ **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·ft	0·deg	105·pcf
1·ft	30·deg	115·pcf
7.5·ft	40·deg	135·pcf
2.3ft	40·deg	135pcf

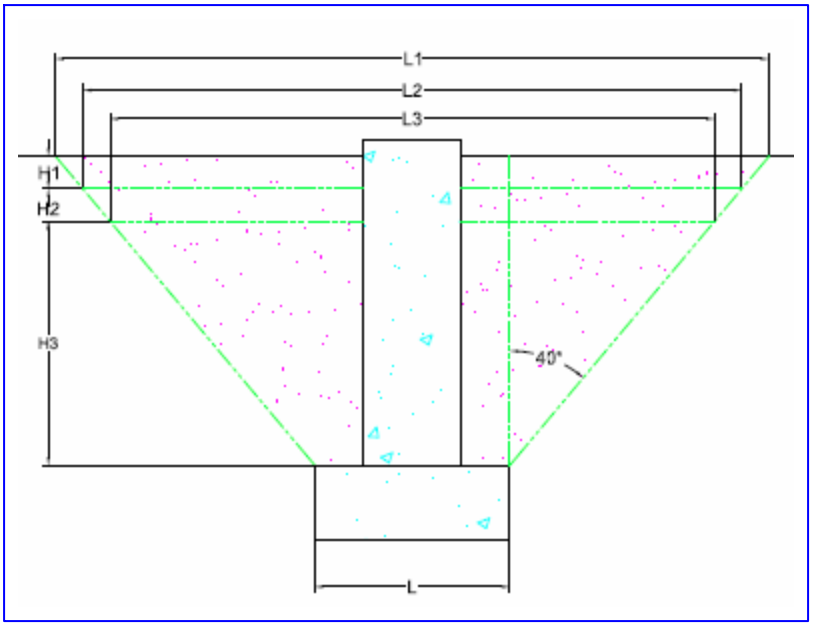
$K_s := 1$ For ϕ=40

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

Skin friction around Pad

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

Soil & Soil Wedge Weight



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

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

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

For Layer 0-1ft

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

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

For Layer 1ft-2ft

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

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

For Layer 2ft-9.5ft

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

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

Total uplift resisting force

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

$P_{ucap} := \frac{SKFUN_4}{2} + \frac{TWT1}{1.5}$ $P_{ucap} = 200.633 \cdot kips$ > $P_{up} = 196.65 \cdot kips$ $\frac{P_{up}}{P_{ucap}} = 98.015 \cdot \%$

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= $d := T_f - cc$ $d = 24.6 \cdot in$

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

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

shear on the face of concrete=

$$Shear_{wide} := \left(\frac{L - Ped_{size}}{2} - d\right) \cdot B \cdot \left[\frac{P_{maxf} + \left[P_{maxf} - \frac{P_{maxf} - P_{minf}}{L_{eff}} \cdot \left(\frac{L - Ped_{size}}{2} - d\right)\right]}{2}\right] \quad Shear_{wide} = -33.587 \cdot kips$$

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

Shear stress acting on concrete face= $\nu_{act1} := \frac{Shear_{wide}}{A_{shear}}$ $\nu_{act1} = -18.963 \cdot psi$ < $\nu_{wide} = 93.113 \cdot psi$ **O.K!**

Punching or two way shear in footing

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

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

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

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

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

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

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

Shear stress acting on the concrete face=

$$\nu_{act} := \frac{Pvf - Area_{col} \cdot P_{avg}}{Peri_{col} \cdot d} \quad \nu_{act} = 6.909 \cdot psi < \nu_{punch} = 186.226 \cdot psi \quad \textbf{O.K!}$$

Doesn't control

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-

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

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

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

$B := d_{bar}$ $d_{b_B} = 1 \cdot in$ 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!

$Mn := 5356.11547 \cdot in \cdot kips$

$0.9 \cdot Mn = 401.709 \cdot kips \cdot ft$ > $M = 0 \cdot kips \cdot ft$ **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= $P_{comp} := \phi_{compr} \cdot 0.85 \cdot f_c \cdot Area_{ped}$

$P_{comp} = 2478.6 \cdot kips$ > $Pv = 242.36 \cdot kips$ **O.K!**

SPREAD FOOTING DESIGN SUMMARY

Safety Factor against Overturning $SF = 10.923$ > 1.5 **O.K!** $\frac{1.5}{14.4} = 10.417 \cdot \%$

Uplift $P_{ucap} = 200.633 \cdot kips$ > $P_{up} = 196.65 \cdot kips$ OK! $\frac{P_{up}}{P_{ucap}} = 98.015 \cdot \%$

Net soil pressure, $P_{net} = 9.985 \cdot ksf$ < $Br_{allow} = 10 \cdot ksf$ OK! $\frac{P_{net}}{Br_{allow}} = 99.855 \cdot \%$

Check for horizontal shear $P_{shr} = 221.043 \cdot kips$ $S = 24.47 \cdot kips$ Since Pe.p > S it is safe!

$\frac{S}{P_{shr}} = 11.07 \cdot \%$

Check pedestal in compression

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

$P_{comp} = 2478.6 \cdot kips$ > $Pv = 242.36 \cdot kips$

$\frac{Pv}{P_{comp}} = 9.778 \cdot \%$

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

                 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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                             All Rights Reserved

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

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Rraju
allpro consulting group

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

Path to file locations:      P:\2016\Structural\16-0261 CT10012-A-01 Griswold 2, CT  SA
(SBA)\LPILE\
Name of input data file:     CT10012-A-01 Foundation.lpd
Name of output file:         CT10012-A-01 Foundation.lpo
Name of plot output file:    CT10012-A-01 Foundation.lpp
Name of runtime file:        CT10012-A-01 Foundation.lpr


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

               Date:  March 18, 2016     Time:  10:31:23


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

16-0261 CT10012-A-01 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 =   -196649.00  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
      1042677.  2.780473E+11    0.00000375    0.00000979    2.61132467   27.22430942    3196.01844
      1042677.  2.085355E+11    0.00000500  5.364418E-12    0.00000107       0.00000    4639.99984
      1042677.  1.668284E+11    0.00000625  6.705523E-12    0.00000107       0.00000    5799.99981
      1042677.  1.390236E+11    0.00000750  8.046627E-12    0.00000107       0.00000    6959.99977
      1042677.  1.191631E+11    0.00000875  9.387732E-12    0.00000107       0.00000    8119.99973
      1042677.  1.042677E+11    0.00001000  1.072884E-11    0.00000107       0.00000    9279.99969
      1042677.  9.268243E+10    0.00001125  1.206994E-11    0.00000107       0.00000   10439.99965
      1042677.  8.341418E+10    0.00001250  1.341105E-11    0.00000107       0.00000   11599.99961
      1042677.  7.583108E+10    0.00001375  1.475215E-11    0.00000107       0.00000   12759.99957
      1042677.  6.951182E+10    0.00001500  1.609325E-11    0.00000107       0.00000   13919.99953
      1042677.  6.416476E+10    0.00001625  1.743436E-11    0.00000107       0.00000   15079.99949
      1042677.  5.958156E+10    0.00001750  1.877546E-11    0.00000107       0.00000   16239.99946
```

1042677.	5.560946E+10	0.00001875	2.011657E-11	0.00000107	0.00000	17399.99942
1042677.	5.213387E+10	0.00002000	2.145767E-11	0.00000107	0.00000	18559.99938
1042677.	4.906717E+10	0.00002125	2.279878E-11	0.00000107	0.00000	19719.99934
1042677.	4.634121E+10	0.00002250	2.413988E-11	0.00000107	0.00000	20879.99930
1042677.	4.390220E+10	0.00002375	2.548099E-11	0.00000107	0.00000	22039.99926
1042677.	4.170709E+10	0.00002500	2.682209E-11	0.00000107	0.00000	23199.99922
1042677.	3.972104E+10	0.00002625	2.816319E-11	0.00000107	0.00000	24359.99918
1042677.	3.791554E+10	0.00002750	2.950430E-11	0.00000107	0.00000	25519.99914
1042677.	3.626704E+10	0.00002875	3.084540E-11	0.00000107	0.00000	26679.99911
1042677.	3.475591E+10	0.00003000	3.218651E-11	0.00000107	0.00000	27839.99907
1042677.	3.336567E+10	0.00003125	3.352761E-11	0.00000107	0.00000	28999.99903
1042677.	3.208238E+10	0.00003250	3.486872E-11	0.00000107	0.00000	30159.99899
1042677.	3.089414E+10	0.00003375	3.620982E-11	0.00000107	0.00000	31319.99895
1042677.	2.979078E+10	0.00003500	3.755093E-11	0.00000107	0.00000	32479.99891
1042677.	2.876351E+10	0.00003625	3.889203E-11	0.00000107	0.00000	33639.99887
1042677.	2.780473E+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	0.00000470	0.11761701	0.00000	36983.56427
1114596.	2.702050E+10	0.00004125	0.00002720	0.65950692	46.49074713	37491.06485
1153039.	2.713034E+10	0.00004250	0.00004970	1.16952145	115.05719	37998.56481
1201897.	2.747193E+10	0.00004375	0.00006987	1.59704196	175.58354	38573.75301
1255389.	2.789754E+10	0.00004500	0.00008892	1.97590935	231.98452	39181.43830
1307162.	2.826296E+10	0.00004625	0.00010835	2.34265745	288.85439	39777.91070
1369135.	2.882390E+10	0.00004750	0.00012529	2.63777983	337.73332	40446.45828
1426750.	2.926667E+10	0.00004875	0.00014329	2.93920434	389.10896	41084.69987
1556156.	3.036403E+10	0.00005125	0.00017561	3.42661965	479.68965	42467.18655
1691391.	3.146774E+10	0.00005375	0.00020624	3.83706200	563.60776	43898.97961
1820285.	3.236062E+10	0.00005625	0.00023625	4.19999921	644.10213	45348.75128
1967775.	3.349404E+10	0.00005875	0.00026550	4.51922929	720.92344	46820.36309
2113002.	3.449799E+10	0.00006125	0.00029400	4.80000079	794.18040	48313.99860
2253328.	3.534632E+10	0.00006375	0.00032162	5.04504526	863.70321	49832.97258
2394973.	3.615053E+10	0.00006625	0.00034993	5.28194439	933.54126	51332.06433
2543053.	3.698986E+10	0.00006875	0.00037595	5.46832359	996.28093	52897.52985
2687468.	3.771885E+10	0.00007125	0.00040314	5.65808666	1060.60348	54428.97844
2831277.	3.839019E+10	0.00007375	0.00043045	5.83666813	1123.85876	55956.82603
2972938.	3.898935E+10	0.00007625	0.00045750	5.99999964	1185.11968	57492.50079
3125335.	3.968679E+10	0.00007875	0.00048234	6.12488973	1240.05060	59092.28308
3258947.	4.011011E+10	0.00008125	0.00050795	6.25167453	1295.57334	60000.00000
3375959.	4.030996E+10	0.00008375	0.00053235	6.35647166	1347.28338	60000.00000
3492555.	4.049340E+10	0.00008625	0.00055686	6.45629919	1398.10694	60000.00000
3584955.	4.039386E+10	0.00008875	0.00057930	6.52736270	1443.57706	60000.00000
3648749.	3.998629E+10	0.00009125	0.00059925	6.56715381	1483.04816	60000.00000
3709808.	3.957129E+10	0.00009375	0.00061875	6.59999907	1520.89779	60000.00000
3777993.	3.925188E+10	0.00009625	0.00063618	6.60966361	1553.99976	60000.00000
3841558.	3.890185E+10	0.00009875	0.00065587	6.64174283	1590.93409	60000.00000
3904942.	3.856733E+10	0.00010125	0.00067561	6.67272985	1627.26497	60000.00000
3968147.	3.824720E+10	0.00010375	0.00069541	6.70271266	1662.98864	60000.00000
4031169.	3.794042E+10	0.00010625	0.00071525	6.73176849	1698.10067	60000.00000
4094006.	3.764604E+10	0.00010875	0.00073515	6.75996602	1732.59627	60000.00000
4156658.	3.736321E+10	0.00011125	0.00075510	6.78737175	1766.47130	60000.00000
4219119.	3.709116E+10	0.00011375	0.00077510	6.81404150	1799.72055	60000.00000
4244981.	3.651596E+10	0.00011625	0.00079107	6.80491769	1825.50345	60000.00000
4270491.	3.596203E+10	0.00011875	0.00080704	6.79614580	1850.82925	60000.00000
4295923.	3.543030E+10	0.00012125	0.00082304	6.78795755	1875.74806	60000.00000
4321276.	3.491940E+10	0.00012375	0.00083906	6.78031862	1900.25771	60000.00000
4346548.	3.442810E+10	0.00012625	0.00085512	6.77319896	1924.35628	60000.00000
4371738.	3.395525E+10	0.00012875	0.00087120	6.76656854	1948.04138	60000.00000
4396846.	3.349978E+10	0.00013125	0.00088730	6.76040161	1971.31099	60000.00000
4421871.	3.306072E+10	0.00013375	0.00090344	6.75467455	1994.16311	60000.00000
4446814.	3.263716E+10	0.00013625	0.00091960	6.74936593	2016.59575	60000.00000

4471674.	3.222828E+10	0.00013875	0.00093579	6.74445641	2038.60702	60000.00000
4496448.	3.183326E+10	0.00014125	0.00095201	6.73992240	2060.19384	60000.00000
4521139.	3.145140E+10	0.00014375	0.00096826	6.73575103	2081.35495	60000.00000
4545745.	3.108202E+10	0.00014625	0.00098454	6.73192298	2102.08755	60000.00000
4570262.	3.072445E+10	0.00014875	0.00100085	6.72842109	2122.38900	60000.00000
4619039.	3.004253E+10	0.00015375	0.00103356	6.72235072	2161.69129	60000.00000
4667464.	2.940135E+10	0.00015875	0.00106639	6.71743476	2199.24250	60000.00000
4715532.	2.879714E+10	0.00016375	0.00109935	6.71358311	2235.02304	60000.00000
4763236.	2.822658E+10	0.00016875	0.00113243	6.71071637	2269.01263	60000.00000
4810570.	2.768674E+10	0.00017375	0.00116565	6.70876586	2301.19055	60000.00000
4857529.	2.717499E+10	0.00017875	0.00119900	6.70766938	2331.53505	60000.00000
4900561.	2.666972E+10	0.00018375	0.00123176	6.70347011	2359.40691	60000.00000
4913804.	2.603340E+10	0.00018875	0.00125865	6.66836965	2380.64301	60000.00000
4926874.	2.542903E+10	0.00019375	0.00128562	6.63545144	2400.67987	60000.00000
4939769.	2.485418E+10	0.00019875	0.00131266	6.60455668	2419.50766	60000.00000
4940195.	2.424636E+10	0.00020375	0.00134475	6.59999907	2440.39411	60000.00000
4967954.	2.379858E+10	0.00020875	0.00137501	6.58686697	2458.36764	60000.00000
4980013.	2.329831E+10	0.00021375	0.00140166	6.55748284	2472.76931	60000.00000
4991901.	2.282012E+10	0.00021875	0.00142840	6.52980888	2485.98054	60000.00000
5003620.	2.236255E+10	0.00022375	0.00145521	6.50373995	2497.99046	60000.00000
5015163.	2.192421E+10	0.00022875	0.00148211	6.47917306	2508.78711	60000.00000
5026533.	2.150388E+10	0.00023375	0.00150910	6.45602238	2518.35907	60000.00000
5037723.	2.110041E+10	0.00023875	0.00153617	6.43419993	2526.69373	60000.00000
5048732.	2.071275E+10	0.00024375	0.00156332	6.41363275	2533.77883	60000.00000
5059558.	2.033993E+10	0.00024875	0.00159057	6.39425004	2539.60151	60000.00000
5070201.	1.998109E+10	0.00025375	0.00161791	6.37599170	2544.14876	60000.00000
5080655.	1.963538E+10	0.00025875	0.00164534	6.35879552	2547.40688	60000.00000
5090918.	1.930206E+10	0.00026375	0.00167286	6.34260786	2549.36199	60000.00000
5100983.	1.898040E+10	0.00026875	0.00170048	6.32738149	2549.91155	60000.00000
5110585.	1.866880E+10	0.00027375	0.00172820	6.31306708	2545.31268	60000.00000
5120083.	1.836801E+10	0.00027875	0.00175602	6.29962599	2540.69622	60000.00000
5129473.	1.807744E+10	0.00028375	0.00178394	6.28701746	2541.98497	60000.00000
5138753.	1.779655E+10	0.00028875	0.00181197	6.27520502	2545.60048	60000.00000
5147921.	1.752484E+10	0.00029375	0.00184010	6.26415646	2548.14875	60000.00000
5156974.	1.726184E+10	0.00029875	0.00186833	6.25383961	2549.61521	60000.00000
5165889.	1.700704E+10	0.00030375	0.00189670	6.24427807	2549.30365	60000.00000
5174594.	1.675982E+10	0.00030875	0.00192524	6.23560488	2545.08625	60000.00000
5183216.	1.652021E+10	0.00031375	0.00195388	6.22749817	2540.85289	60000.00000
5191748.	1.628784E+10	0.00031875	0.00198260	6.21993220	2537.16761	60000.00000
5200194.	1.606238E+10	0.00032375	0.00201142	6.21289194	2541.48888	60000.00000
5208551.	1.584350E+10	0.00032875	0.00204034	6.20635808	2544.93960	60000.00000
5216817.	1.563091E+10	0.00033375	0.00206935	6.20031345	2547.50794	60000.00000
5224991.	1.542433E+10	0.00033875	0.00209847	6.19474304	2549.18173	60000.00000
5233069.	1.522347E+10	0.00034375	0.00212769	6.18962967	2549.94834	60000.00000
5240961.	1.502784E+10	0.00034875	0.00215708	6.18517721	2547.43888	60000.00000
5256451.	1.465213E+10	0.00035875	0.00221619	6.17754257	2539.70119	60000.00000
5271676.	1.429607E+10	0.00036875	0.00227563	6.17120612	2536.43786	60000.00000
5286627.	1.395809E+10	0.00037875	0.00233541	6.16609919	2543.88210	60000.00000
5301297.	1.363678E+10	0.00038875	0.00239554	6.16216385	2548.42957	60000.00000
5315673.	1.333084E+10	0.00039875	0.00245604	6.15934646	2549.99961	60000.00000
5329521.	1.303858E+10	0.00040875	0.00251714	6.15813839	2543.08730	60000.00000
5343176.	1.275982E+10	0.00041875	0.00257852	6.15766633	2536.00373	60000.00000
5354723.	1.248915E+10	0.00042875	0.00263855	6.15404212	2531.36475	60000.00000
5355085.	1.220532E+10	0.00043875	0.00268921	6.12924778	2537.19085	60000.00000
5355399.	1.193404E+10	0.00044875	0.00274000	6.10585248	2541.95141	60000.00000
5355662.	1.167447E+10	0.00045875	0.00279093	6.08376825	2545.62833	60000.00000
5355874.	1.142587E+10	0.00046875	0.00284199	6.06291783	2548.20323	60000.00000
5356035.	1.118754E+10	0.00047875	0.00289320	6.04323041	2549.65703	60000.00000
5356115.	1.095880E+10	0.00048875	0.00294460	6.02475750	2549.01409	60000.00000
5356115.	1.073908E+10	0.00049875	0.00299630	6.00762355	2544.68119	60000.00000

5356115.	1.052799E+10	0.00050875	0.00305250	5.99999964	2539.55974	60000.00000
5356115.	1.032504E+10	0.00051875	0.00311250	5.99999964	2533.77132	60000.00000
5356115.	1.012977E+10	0.00052875	0.00317250	5.99999964	2527.98290	60000.00000
5356115.	9.941746E+09	0.00053875	0.00323250	5.99999964	2523.61269	60000.00000
5356115.	9.760575E+09	0.00054875	0.00329250	5.99999964	2531.55387	60000.00000
5358427.	9.590026E+09	0.00055875	0.00335240	5.99982369	2538.05608	60000.00000
5358427.	9.421410E+09	0.00056875	0.00340338	5.98395789	2541.61619	60000.00000
5358427.	9.258621E+09	0.00057875	0.00345445	5.96880877	2544.56213	60000.00000
5358427.	9.101362E+09	0.00058875	0.00350562	5.95434201	2546.88376	60000.00000
5358427.	8.949356E+09	0.00059875	0.00355689	5.94052970	2548.57091	60000.00000
5358427.	8.802344E+09	0.00060875	0.00360827	5.92733967	2549.61263	60000.00000
5358427.	8.660084E+09	0.00061875	0.00365975	5.91474831	2549.99795	60000.00000
5358427.	8.522349E+09	0.00062875	0.00371162	5.90317190	2546.94971	60000.00000
5358427.	8.388927E+09	0.00063875	0.00376356	5.89206970	2543.62748	60000.00000
5358427.	8.259618E+09	0.00064875	0.00381555	5.88138378	2540.29682	60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 5356.11547 in-kip

Axial Thrust Force = 242355.00 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
344756.08381	2.758049E+11	0.00000125	0.00009390	75.11625159	286.02843	2577.96412
689435.78608	2.757743E+11	0.00000250	0.00011659	46.63414228	351.76456	3090.97532
1033994.	2.757318E+11	0.00000375	0.00013935	37.15992773	416.74636	3606.14214
1377505.	2.755010E+11	0.00000500	0.00016217	32.43409646	480.91318	4122.94399
1720837.	2.753338E+11	0.00000625	0.00018507	29.61054575	544.30875	4641.91142
2061095.	2.748126E+11	0.00000750	0.00020797	27.72968638	606.74903	5161.20679
2400971.	2.743967E+11	0.00000875	0.00023098	26.39807904	668.48279	5683.51256
2734316.	2.734316E+11	0.00001000	0.00025387	25.38693559	728.88905	6202.21132
3065573.	2.724954E+11	0.00001125	0.00027679	24.60387647	788.40946	6722.01470
3065573.	2.452458E+11	0.00001250	0.00027470	21.97568715	781.93133	6516.18659
3065573.	2.229507E+11	0.00001375	0.00029128	21.18423593	824.19138	6852.21408
3065573.	2.043715E+11	0.00001500	0.00030753	20.50182617	865.06225	7178.29438
3065573.	1.886506E+11	0.00001625	0.00032347	19.90559900	904.67045	7495.51353
3065573.	1.751756E+11	0.00001750	0.00033914	19.37963498	943.15521	7805.16475
3065573.	1.634972E+11	0.00001875	0.00035461	18.91269672	980.67024	8108.77884
3065573.	1.532786E+11	0.00002000	0.00036994	18.49682343	1017.38558	8408.15759
3141076.	1.478153E+11	0.00002125	0.00038483	18.10947168	1052.62009	8694.96192
3231517.	1.436230E+11	0.00002250	0.00039980	17.76888049	1087.64456	9285.80548
3318139.	1.397111E+11	0.00002375	0.00041443	17.44984353	1121.45422	10021.42027
3405168.	1.362067E+11	0.00002500	0.00042916	17.16630185	1155.07762	10754.43116
3488781.	1.329059E+11	0.00002625	0.00044354	16.89682996	1187.51909	11497.28819
3573700.	1.299527E+11	0.00002750	0.00045814	16.65949738	1220.05689	12234.05084
3654690.	1.271197E+11	0.00002875	0.00047228	16.42708933	1251.18628	12983.91427
3735492.	1.245164E+11	0.00003000	0.00048644	16.21468627	1281.98950	13733.22294
3817335.	1.221547E+11	0.00003125	0.00050080	16.02558839	1312.85585	14476.81052
3895890.	1.198735E+11	0.00003250	0.00051473	15.83783591	1342.41226	15232.83966
3974265.	1.177560E+11	0.00003375	0.00052868	15.66454160	1371.65109	15988.32991
4054584.	1.158452E+11	0.00003500	0.00054300	15.51433361	1401.32395	16732.95139
4131063.	1.139604E+11	0.00003625	0.00055673	15.35811102	1429.37956	17494.78579
4207369.	1.121965E+11	0.00003750	0.00057048	15.21278250	1457.12535	18256.09903
4283502.	1.105420E+11	0.00003875	0.00058425	15.07729876	1484.56032	19016.88552
4362112.	1.090528E+11	0.00004000	0.00059856	14.96389282	1512.74033	19761.88433
4436680.	1.075559E+11	0.00004125	0.00061212	14.83925164	1539.06198	20528.54523

4511081.	1.061431E+11	0.00004250	0.00062570	14.72236097	1565.08018	21294.69011
4585315.	1.048072E+11	0.00004375	0.00063930	14.61255777	1590.79366	22060.31733
4659379.	1.035418E+11	0.00004500	0.00065292	14.50925410	1616.20129	22825.42340
4733275.	1.023411E+11	0.00004625	0.00066655	14.41192639	1641.30197	23590.00373
4809389.	1.012503E+11	0.00004750	0.00068079	14.33233774	1667.17156	24337.20477
4882033.	1.001443E+11	0.00004875	0.00069424	14.24080145	1691.24001	25107.06694
5026830.	9.808448E+10	0.00005125	0.00072120	14.07217634	1738.47478	26645.22792
5170968.	9.620405E+10	0.00005375	0.00074823	13.92059290	1784.49924	28181.27581
5322189.	9.461668E+10	0.00005625	0.00077625	13.80000079	1830.82918	29688.74872
5459000.	9.291915E+10	0.00005875	0.00080308	13.66941369	1873.78418	31230.73643
5599880.	9.142661E+10	0.00006125	0.00082995	13.55019271	1915.48448	32771.47019
5740103.	9.004084E+10	0.00006375	0.00085690	13.44151390	1955.97324	34310.00118
5879663.	8.874963E+10	0.00006625	0.00088392	13.34219921	1995.24035	35846.29977
6018548.	8.754252E+10	0.00006875	0.00091102	13.25124013	2033.27526	37380.33998
6159514.	8.644932E+10	0.00007125	0.00093942	13.18489516	2071.73295	38876.71038
6296277.	8.537324E+10	0.00007375	0.00096637	13.10335386	2106.79865	40415.20194
6432371.	8.435896E+10	0.00007625	0.00099340	13.02823913	2140.63336	41951.30622
6567787.	8.340047E+10	0.00007875	0.00102052	12.95895445	2173.22592	43484.98777
6702518.	8.249253E+10	0.00008125	0.00104772	12.89498055	2204.56528	45016.20208
6836553.	8.163049E+10	0.00008375	0.00107500	12.83585608	2234.63962	46544.91455
6969884.	8.081025E+10	0.00008625	0.00110238	12.78117764	2263.43725	48071.07943
7102497.	8.002814E+10	0.00008875	0.00112984	12.73058259	2290.94569	49594.66305
7234385.	7.928093E+10	0.00009125	0.00115739	12.68375337	2317.15264	51115.61764
7365537.	7.856573E+10	0.00009375	0.00118504	12.64040673	2342.04544	52633.89421
7495941.	7.787991E+10	0.00009625	0.00121278	12.60028517	2365.61072	54149.45401
7627727.	7.724281E+10	0.00009875	0.00124248	12.58206117	2389.31402	55608.12232
7756305.	7.660549E+10	0.00010125	0.00127022	12.54538572	2409.94478	57123.61118
7884121.	7.599153E+10	0.00010375	0.00129806	12.51146972	2429.22916	58636.11547
8008703.	7.537603E+10	0.00010625	0.00132588	12.47887123	2447.06705	60000.00000
8109538.	7.457046E+10	0.00010875	0.00135253	12.43704379	2462.80219	60000.00000
8209731.	7.379533E+10	0.00011125	0.00137927	12.39794147	2477.28288	60000.00000
8309273.	7.304855E+10	0.00011375	0.00140611	12.36140120	2490.49577	60000.00000
8408152.	7.232819E+10	0.00011625	0.00143305	12.32727063	2502.42690	60000.00000
8461148.	7.125178E+10	0.00011875	0.00145725	12.27154934	2511.98012	60000.00000
8513668.	7.021582E+10	0.00012125	0.00148152	12.21871197	2520.48783	60000.00000
8565757.	6.921824E+10	0.00012375	0.00150587	12.16861904	2527.94155	60000.00000
8617407.	6.825669E+10	0.00012625	0.00153029	12.12111390	2534.33110	60000.00000
8668613.	6.732903E+10	0.00012875	0.00155479	12.07605493	2539.64618	60000.00000
8719369.	6.643329E+10	0.00013125	0.00157937	12.03331339	2543.87629	60000.00000
8775624.	6.561214E+10	0.00013375	0.00160500	12.00000036	2547.11398	60000.00000
8823764.	6.476157E+10	0.00013625	0.00163194	11.97752559	2549.22177	60000.00000
8872515.	6.394606E+10	0.00013875	0.00165638	11.93785679	2549.97949	60000.00000
8920609.	6.315475E+10	0.00014125	0.00168090	11.90020072	2546.63678	60000.00000
8968266.	6.238794E+10	0.00014375	0.00170552	11.86446297	2548.18427	60000.00000
9015536.	6.164469E+10	0.00014625	0.00173022	11.83055556	2549.58098	60000.00000
9062395.	6.092367E+10	0.00014875	0.00175501	11.79841840	2549.68686	60000.00000
9154590.	5.954205E+10	0.00015375	0.00180494	11.73943985	2548.02742	60000.00000
9212646.	5.803242E+10	0.00015875	0.00185184	11.66514266	2549.96917	60000.00000
9247387.	5.647259E+10	0.00016375	0.00189682	11.58360779	2545.71101	60000.00000
9281400.	5.500089E+10	0.00016875	0.00194203	11.50832784	2549.02299	60000.00000
9314699.	5.360978E+10	0.00017375	0.00198749	11.43877280	2549.42866	60000.00000
9370129.	5.242030E+10	0.00017875	0.00203775	11.40000093	2545.98852	60000.00000
9383863.	5.106864E+10	0.00018375	0.00208396	11.34129274	2549.03419	60000.00000
9413778.	4.987432E+10	0.00018875	0.00212907	11.27984011	2549.98416	60000.00000
9442847.	4.873727E+10	0.00019375	0.00217449	11.22318757	2544.38469	60000.00000
9471531.	4.765550E+10	0.00019875	0.00222009	11.17027295	2547.04381	60000.00000
9499821.	4.662489E+10	0.00020375	0.00226587	11.12084305	2549.34993	60000.00000
9527659.	4.564148E+10	0.00020875	0.00231185	11.07474124	2549.36455	60000.00000
9554819.	4.470091E+10	0.00021375	0.00235811	11.03210700	2544.14434	60000.00000
9581676.	4.380195E+10	0.00021875	0.00240453	10.99211848	2545.50981	60000.00000

9608225.	4.294179E+10	0.00022375	0.00245110	10.95461690	2548.37473	60000.00000
9634458.	4.211785E+10	0.00022875	0.00249783	10.91945422	2549.81879	60000.00000
9660201.	4.132706E+10	0.00023375	0.00254478	10.88676775	2547.57896	60000.00000
9685525.	4.056764E+10	0.00023875	0.00259194	10.85629141	2542.72763	60000.00000
9710619.	3.983843E+10	0.00024375	0.00263923	10.82760465	2544.23455	60000.00000
9735475.	3.913759E+10	0.00024875	0.00268665	10.80060875	2547.36281	60000.00000
9749899.	3.842325E+10	0.00025375	0.00274050	10.79999936	2549.58223	60000.00000
9788489.	3.782991E+10	0.00025875	0.00279196	10.79018247	2548.55637	60000.00000
9811957.	3.720173E+10	0.00026375	0.00283931	10.76514995	2544.19776	60000.00000
9835271.	3.659636E+10	0.00026875	0.00288677	10.74147356	2539.81913	60000.00000
9858428.	3.601252E+10	0.00027375	0.00293435	10.71909106	2543.59988	60000.00000
9881427.	3.544906E+10	0.00027875	0.00298205	10.69794238	2546.62340	60000.00000
9900469.	3.489152E+10	0.00028375	0.00302867	10.67373383	2548.61014	60000.00000
9904759.	3.430220E+10	0.00028875	0.00307074	10.63458860	2549.56132	60000.00000
9909001.	3.373277E+10	0.00029375	0.00311287	10.59701622	2549.97945	60000.00000
9913088.	3.318188E+10	0.00029875	0.00315517	10.56124198	2547.86153	60000.00000
9917109.	3.264892E+10	0.00030375	0.00319755	10.52692902	2544.90002	60000.00000
9921100.	3.213312E+10	0.00030875	0.00323998	10.49387777	2541.93037	60000.00000
9925068.	3.163368E+10	0.00031375	0.00328246	10.46203458	2538.95222	60000.00000
9929007.	3.114983E+10	0.00031875	0.00332499	10.43133938	2537.96710	60000.00000
9932514.	3.067958E+10	0.00032375	0.00336784	10.40259898	2540.87176	60000.00000
9933845.	3.021702E+10	0.00032875	0.00341222	10.37936461	2543.61800	60000.00000
9935130.	2.976818E+10	0.00033375	0.00345666	10.35702717	2545.88261	60000.00000
9936364.	2.933244E+10	0.00033875	0.00350117	10.33554590	2547.65931	60000.00000
9937552.	2.890924E+10	0.00034375	0.00354574	10.31489074	2548.94206	60000.00000
9938689.	2.849803E+10	0.00034875	0.00359039	10.29502523	2549.72435	60000.00000
9940680.	2.770921E+10	0.00035875	0.00368003	10.25793564	2547.22772	60000.00000
9942395.	2.696243E+10	0.00036875	0.00377004	10.22383082	2541.43873	60000.00000
9942395.	2.625055E+10	0.00037875	0.00386325	10.19999993	2535.08684	60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 9888.75794 in-kip

The analysis ended normally.

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

AT&T Existing Facility

Site ID: CT5457

Griswold West
181 A Norman Road
Jewett City, CT 6351

February 22, 2016

EBI Project Number: 6216000680

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	6.72 %

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

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February 22, 2016

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

Emissions Analysis for Site: **CT5457 – Griswold West**

EBI Consulting was directed to analyze the proposed AT&T facility located at **181 A Norman Road, Jewett City, CT**, for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (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 limits for the 700 and 850 MHz Bands are approximately 467 $\mu W/cm^2$ and 567 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed AT&T Wireless antenna facility located at **181 A Norman Road, Jewett City, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

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

1) 2 LTE channels (700 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 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) 2 GSM channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 2 UMTS channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

5) 2 UMTS 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.

6) 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.

7) For the following calculations the sample point was the top of a six 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.

8) The antennas used in this modeling are the **CCI HPA-65R-BUU-H6, CCI HPA-65R-BUU-H8 and the Powerwave 7770.00** for transmission in the 700 MHz, 850 MHz and1900 MHz (PCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antenna mounting height centerline of the proposed antennas is **135 feet** above ground level (AGL).

10) 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.

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

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AT&T Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	CCI OPA-65R-BUU-H6	Make / Model:	CCI OPA-65R-BUU-H8	Make / Model:	CCI OPA-65R-BUU-H8
Gain:	11.95 / 14.75 dBd	Gain:	13.15 / 14.95 dBd	Gain:	13.15 / 14.95 dBd
Height (AGL):	135 feet	Height (AGL):	135 feet	Height (AGL):	135 feet
Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240	Total TX Power(W):	240	Total TX Power(W):	240
ERP (W):	5,462.56	ERP (W):	6,229.75	ERP (W):	6,229.75
Antenna A1 MPE%	**1.64**	Antenna B1 MPE%	**1.96**	Antenna C1 MPE%	**1.96**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00
Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd
Height (AGL):	135 feet	Height (AGL):	135 feet	Height (AGL):	135 feet
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,140.89	ERP (W):	2,140.89	ERP (W):	2,140.89
Antenna A2 MPE%	**0.60**	Antenna B2 MPE%	**0.60**	Antenna C2 MPE%	**0.60**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00
Gain:	11.4 dBd	Gain:	11.4 dBd	Gain:	11.4 dBd
Height (AGL):	135 feet	Height (AGL):	135 feet	Height (AGL):	135 feet
Frequency Bands	850 MHz	Frequency Bands	850 MHz	Frequency Bands	850 MHz
Channel Count	2	Channel Count	2	Channel Count	2
Total TX Power(W):	60	Total TX Power(W):	60	Total TX Power(W):	60
ERP (W):	828.23	ERP (W):	828.23	ERP (W):	828.23
Antenna A3 MPE%	**0.32**	Antenna B3 MPE%	**0.32**	Antenna C3 MPE%	**0.32**

Site Composite MPE%	
Carrier	**MPE%**
AT&T – Max per sector	**2.87 %**
Fire Dept	1.88 %
MetroPCS	0.32 %
Verizon Wireless	1.49 %
T-Mobile / Voicestream	0.16 %
Site Total MPE %:	**6.72 %**

AT&T Sector 1 Total:	2.56 %
AT&T Sector 2 Total:	2.87 %
AT&T Sector 3 Total:	2.87 %
Site Total:	6.72 %

AT&T _ Max Sector (Sectors B & C)	**# Channels**	**Watts ERP (Per Channel)**	**Height (feet)**	**Total Power Density ($\mu W/cm^2$)**	**Frequency (MHz)**	**Allowable MPE ($\mu W/cm^2$)**	**Calculated % MPE**
AT&T 700 MHz LTE	2	1239.23	135	5.35	700	467	1.15 %
AT&T 1900 MHz (PCS) LTE	2	1875.65	135	8.10	1900	1000	0.81 %
AT&T 850 MHz UMTS	2	414.12	135	1.79	850	567	0.32 %
AT&T 1900 MHz (PCS) UMTS	2	656.33	135	2.84	1900	1000	0.28 %
AT&T 850 MHz GSM	2	414.12	135	1.79	850	567	0.32 %
						Total:	2.87 %

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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 AT&T 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:

AT&T Sector	Power Density Value (%)
Sector 1:	2.56 %
Sector 2:	2.87 %
Sector 3 :	2.87 %
AT&T Maximum Total (per sector):	2.87 %
Site Total:	6.72 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **6.72%** 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.

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803

PROJECT INFORMATION

SCOPE OF WORK:
- REMOVE (1) ANTENNA PER SECTOR (TOTAL OF 3 ANTENNAS)
- INSTALL (1) ANTENNA PER SECTOR (TOTAL OF 3 NEW ANTENNAS)
- ADD (1) RRH PER SECTOR (TOTAL OF 3 NEW RRHs)
- ADD (1) A-2 MODULE PER SECTOR (TOTAL OF 3 NEW A-2 MODULES)
- UPGRADE DUL21 TO DUS41

SITE ADDRESS:	181 A NORMAN ROAD JEWETT CITY, CT 06351
LATITUDE:	41.6012750 41° 36' 04.59"N
LONGITUDE:	-71.93585 71° 57' 13.86"W
USID:	24526
TOWER OWNER:	TBD
TYPE OF SITE:	SELF-SUPPORT TOWER/OUTDOOR EQUIPMENT
TOWER HEIGHT:	160-0"±
RAD CENTER:	135'-0"±
CURRENT USE:	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY
PROPOSED USE:	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY

at&t MOBILITY

FA CODE: 10071049
SITE NUMBER: CT5457
SITE NAME: GRISWOLD WEST

PROJECT TEAM

CLIENT REPRESENTATIVE
COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD, BILLERICA, MA 01821
CONTACT: DAVID COOPER
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ENGINEERING:
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ADDRESS: 115 ROUTE 46, SUITE E39, MOUNTAIN LAKES, NJ 07046
CONTACT: NICHOLAS D. BARILE, P.E.
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RF ENGINEER:
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ADDRESS: 550 COCHITUATE ROAD, SUITE 550 13 & 14, FRAMINGHAM, MA 01701
CONTACT: CAMERON SYME
PHONE: 508-596-7146
EMAIL: cs6970@att.com

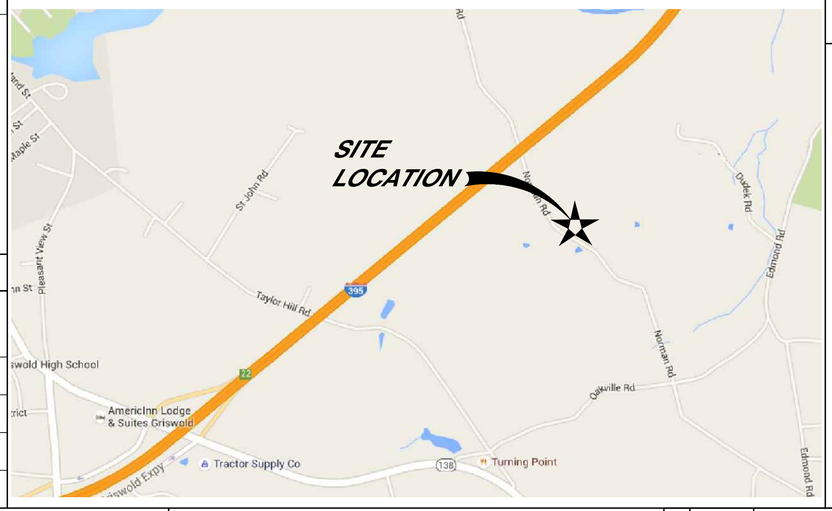
CONSTRUCTION MANAGEMENT:
COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD, BILLERICA, MA 01821
CONTACT: GRZEGORZ "GREG" DORMAN
PHONE: 484-683-1750
EMAIL: gdorman@empiretelecomm.com

DRAWING INDEX

		REV.
T-1	TITLE SHEET	1
GN-1	GROUNDING & GENERAL NOTES	1
A-1	COMPOUND LAYOUTS	1
A-2	EQUIPMENT LAYOUTS	1
A-3	ANTENNA LAYOUTS & ELEVATIONS	1
A-4	DETAILS	1
A-5	ANTENNA MOUNTING DETAILS	1
G-1	GROUNDING DETAILS	1

VICINITY MAP

FROM ROCKY HILL, HEAD SOUTHWEST ON CONCRIB LN. TURN LEFT ONTO SOLO DR. TURN RIGHT ONTO GILBERT AVE. TURN RIGHT ONTO STATE HWY 411. TURN LEFT TO MERGE ONTO I-91 N. TAKE EXIT 25-26 TO MERGE ONTO CT-3 N. TAKE THE EXIT ONTO CT-2 E. KEEP LEFT AT FORK FOR CT-2 E. TAKE EXIT 28N FOR CT-164 TOWARD CT-138. CONTINUE STRAIGHT ONTO GRISWOLD EXPY. TURN RIGHT ONTO CT-138 E. TURN LEFT ONTO OAKVILLE RD. TURN LEFT ONTO NORMAN RD. SITE WILL BE ON RIGHT.



GENERAL NOTES

1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY, AND COPYRIGHTED WORK OF AT&T. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.

2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.

3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE AT&T REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

APPROVALS

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE SUBCONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN, ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AMD MAY IMPOSE CHANGES OR SITE MODIFICATIONS.

DISCIPLINE:	NAME:	DATE:
SITE ACQUISITION:		
CONSTRUCTION MANAGER:		
AT&T PROJECT MANAGER:		

CALL BEFORE YOU DIG! STOP - 1-800-922-4455 - CONNECTICUT ONE CALL SYSTEM, INC.

CONNECTICUT LAW REQUIRES TWO WORKING DAYS NOTICE PRIOR TO ANY EARTH MOVING ACTIVITIES BY CALLING 800-922-4455 OR DIAL 811

COM-EX Consultants
115 ROUTE 46
SUITE E39
MOUNTAIN LAKES, NJ 07046
PHONE: 862.209.4300
FAX: 862.209.4301

EMPIRE telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT5457
SITE NAME: GRISWOLD WEST
181 A NORMAN ROAD
JEWETT CITY, CT 06351
NEW LONDON COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	03/30/16	REVISED PER CLIENT COMMENTS	KCD	NDB	NDB
0	03/22/16	ISSUED AS FINAL	JW	NDB	NDB

SCALE: AS SHOWN | DESIGNED BY: JW | DRAWN BY: JW

SEAL: STATE OF CONNECTICUT, NICHOLAS D. BARILE, 25643, REGISTERED PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER CT LICENSE NO. 25643

AT&T

DRAWING TITLE: TITLE SHEET

JOB NUMBER	DRAWING NUMBER	REV
15168-EMP	T-1	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) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.

2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.

3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS. TESTS SHALL BE PERFORMED IN ACCORDANCE WITH 25471-000-3PS-EG00-0001, DESIGN & TESTING OF FACILITY GROUNDING FOR CELL SITES.

4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.

5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS; 2 AWG STRANDED COPPER FOR OUTDOOR BTS.

6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.

7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.

8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED WITH STAINLESS STEEL HARDWARE 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 ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.

11. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.

12. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.

13. ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF ANSI/TIA 222. FOR TOWERS BEING BUILT TO REV-G OF THE STANDARD, THE WIRE SIZE OF THE BURIED GROUND RING AND CONNECTIONS BETWEEN THE TOWER AND THE BURIED GROUND RING SHALL BE CHANGED FROM 2 AWG TO 2/0 AWG. IN ADDITION, THE MINIMUM LENGTH OF THE GROUND RODS SHALL BE INCREASED FROM EIGHT FEET (8') TO TEN FEET (10').

14. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE ½" OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID TINNED COPPER GROUND WIRE, PER NEC 250.50.

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   - CONTRACTOR – EMPIRE TELECOM
   - SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   - OWNER – AT&T MOBILITY
   - OEM – ORIGINAL EQUIPMENT MANUFACTURER

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. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

7. 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.

8. 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. ROUTING OF TRENCHING SHALL BE APPROVED BY CONTRACTOR

9. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.

10. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OFF 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.

11. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

12. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.

13. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS UNLESS OTHERWISE SPECIFIED. ALL CONCRETING WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.

14. 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). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCH UP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.

15. CONSTRUCTION SHALL COMPLY WITH SPECIFICATION 25741-000-3APS-A00Z-00002, "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T MOBILITY SITES."

16. 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.

17. 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 MAY NEED TO BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.

18. SINCE THE CELL SITE MAY BE 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 REQUIRED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

19. 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.
   - INTERNATIONAL BUILDING CODE: IBC 2009 WITH LOCAL & COUNTY AMENDMENTS
   - NATIONAL ELECTRICAL CODE: NEC 2011 WITH LOCAL & COUNTY AMENDMENTS
   - FIRE/LIFE SAFETY CODE: NFPA-101 2009 WITH LOCAL & COUNTY AMENDMENTS

20. 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, THIRTEENTH EDITION
   - AMERICAN SOCIETY OF TESTING OF MATERIALS, ASTM
   - TELECOMMUNICATIONS INDUSTRY ASSOCIATION (ANSI/TIA-222-G-1), STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES:
   - TIA 607, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS
   - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, OSHA
   - INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) 81, GUIDE FOR MEASURING EARTH RESISTIVELY, GROUND IMPEDANCE, AND EARTH SURFACE POTENTIALS OF A GROUND SYSTEM IEEE 1100 (1999) RECOMMENDED PRACTICE FOR POWERING AND GROUNDING OF ELECTRONIC EQUIPMENT
   - TELCORDIA GR-1503, COAXIAL CABLE CONNECTIONS

21. 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.

23. INFORMATION SHOWN ON THIS SET OF PLANS TAKEN FROM DRAWINGS PREPARED BY HUDSON DESIGN GROUP FOR A RECENT UPGRADE DATED 11/02/2012. CONTRACTOR TO NOTIFY DESIGN ENGINEER OF ANY DISCREPANCIES PRIOR TO COMMENCEMENT OF CONSTRUCTION.

COM-EX Consultants
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PHONE: 862.209.4300
FAX: 862.209.4301

EMPIRE telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT5457

SITE NAME: GRISWOLD WEST

181 A NORMAN ROAD
JEWETT CITY, CT 06351
NEW LONDON COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	03/30/16	REVISED PER CLIENT COMMENTS	KCD	NDB	NDB
0	03/22/16	ISSUED AS FINAL	JW	NDB	NDB

SCALE: AS SHOWN | DESIGNED BY: JW | DRAWN BY: JW

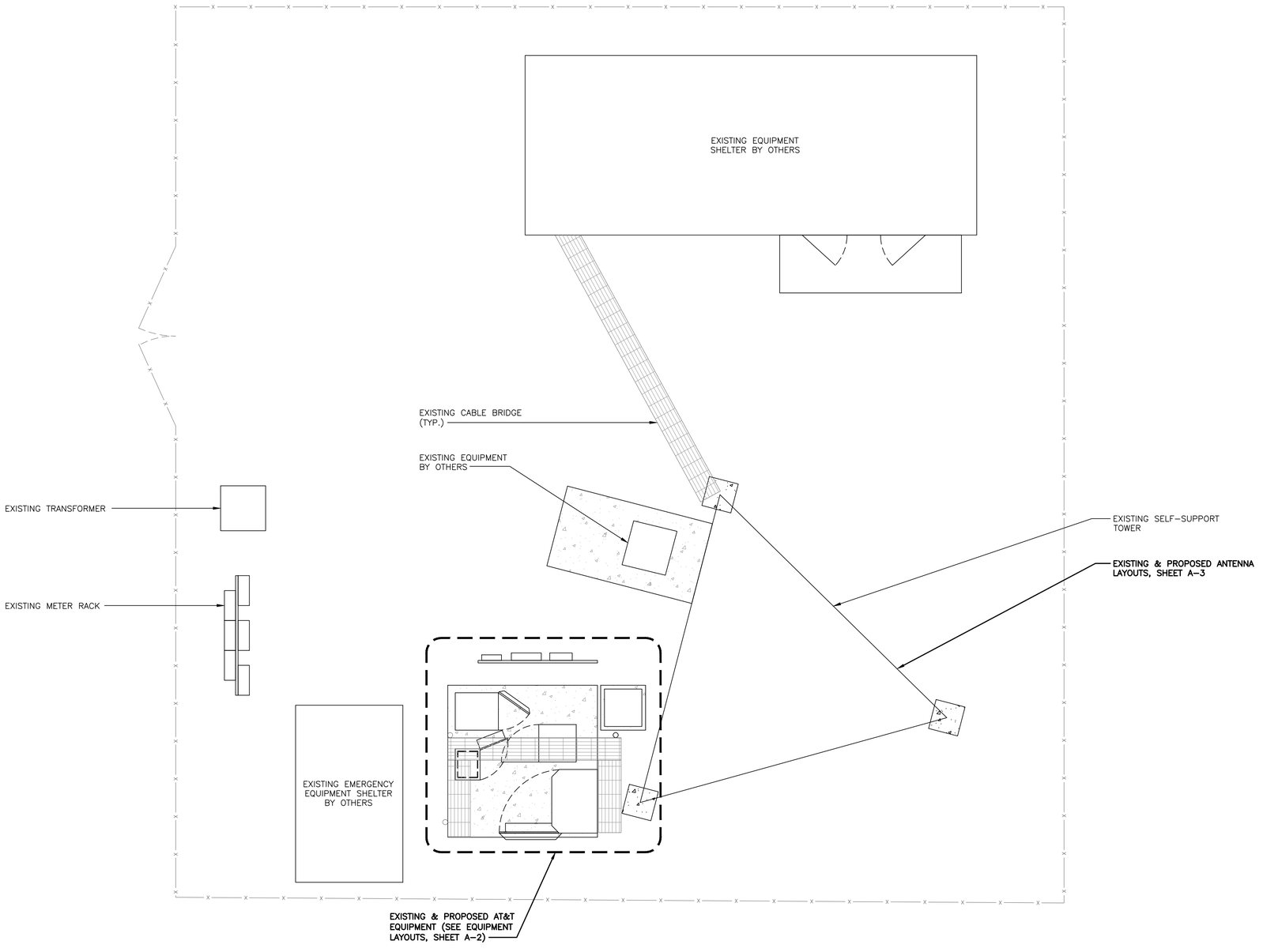
SEAL:

STATE OF CONNECTICUT
DOUGLAS G. BASIL
LICENSED PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER
CT LICENSE NO. 23643

AT&T

DRAWING TITLE:
GROUNDING NOTES & GENERAL NOTES

JOB NUMBER	DRAWING NUMBER	REV
15168-EMP	GN-1	1



NORTH

COMPOUND LAYOUT

SCALE: 1/8" = 1'-0"

0 4 8 16

GRAPHIC SCALE: 1/8"=1'-0"

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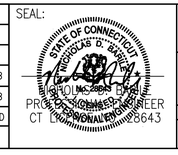
0	03/22/16	ISSUED AS FINAL	JW	NDB	NDB

SCALE: AS SHOWN | DESIGNED BY: JW | DRAWN BY: JW

SEAL:



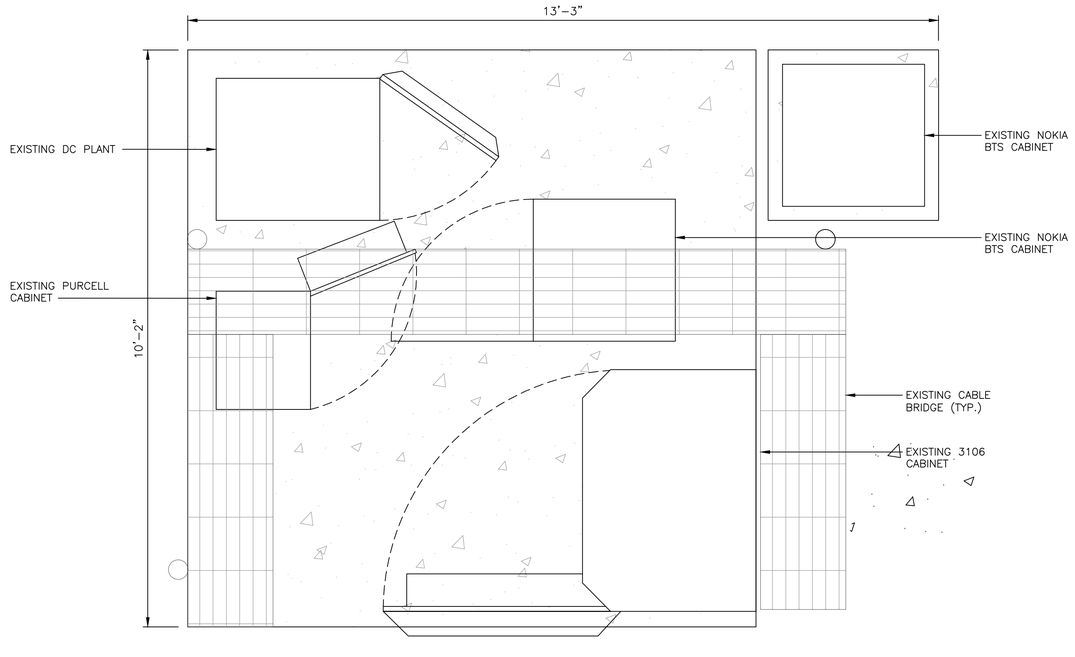
PROFESSIONAL ENGINEER

AT&T

DRAWING TITLE:

COMPOUND LAYOUT

JOB NUMBER	DRAWING NUMBER	REV
15168-EMP	A-1	1



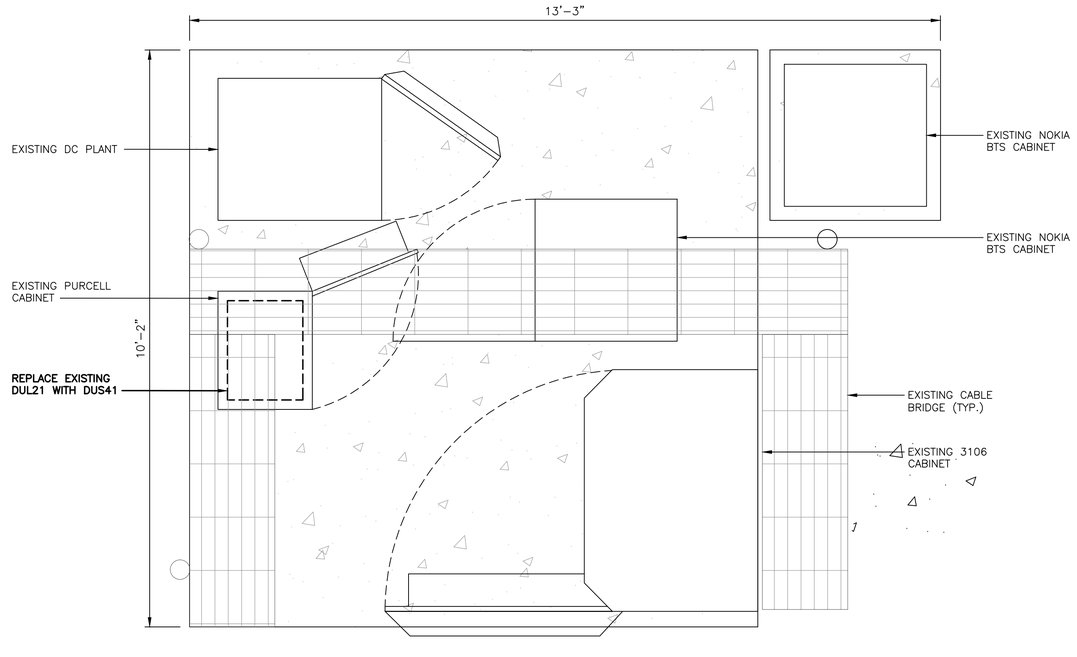
NORTH

EXISTING EQUIPMENT LAYOUT

SCALE: 3/4" = 1'-0"

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

GRAPHIC SCALE: 3/4"=1'-0"



NORTH

EXISTING EQUIPMENT LAYOUT

SCALE: 3/4" = 1'-0"

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

GRAPHIC SCALE: 3/4"=1'-0"

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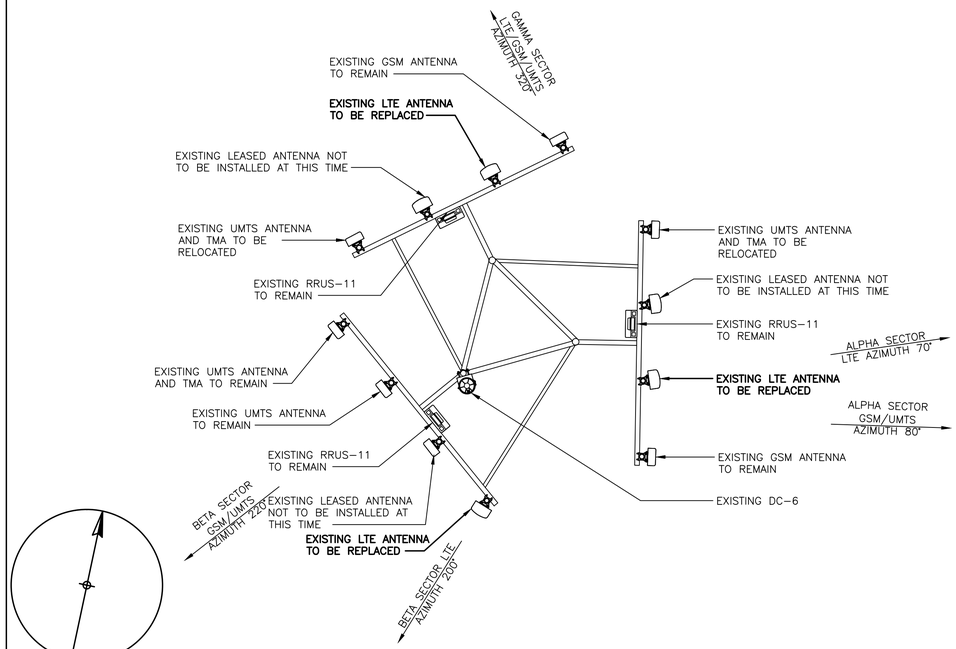
SEAL:

STATE OF CONNECTICUT
DOUGLAS B. BERRY
LICENSED
PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER
CT LICENSE NO. 28643

AT&T

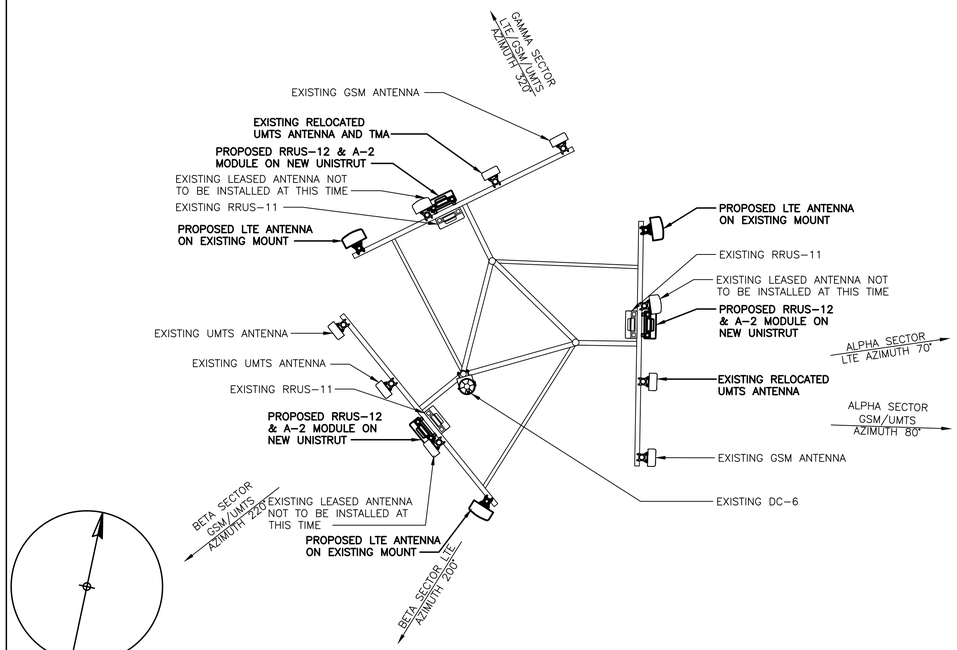
DRAWING TITLE:
EQUIPMENT LAYOUTS

JOB NUMBER	DRAWING NUMBER	REV
15168-EMP	A-2	1



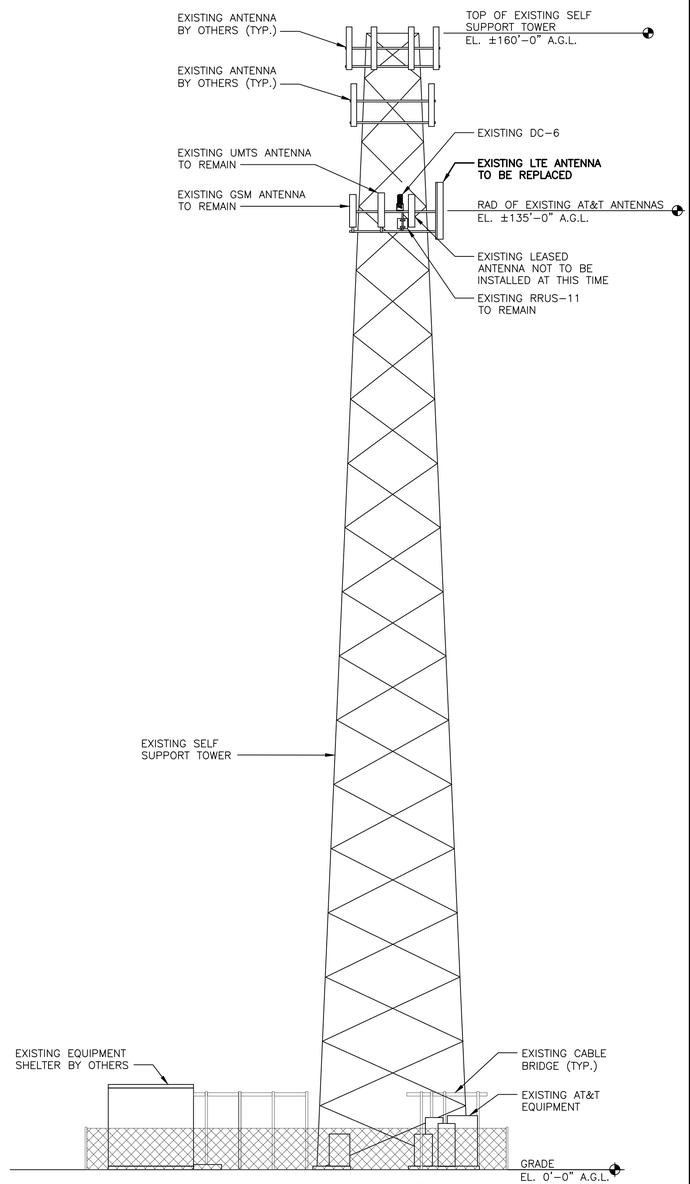
EXISTING ANTENNA LAYOUT

SCALE: N.T.S.



PROPOSED ANTENNA LAYOUT

SCALE: N.T.S.

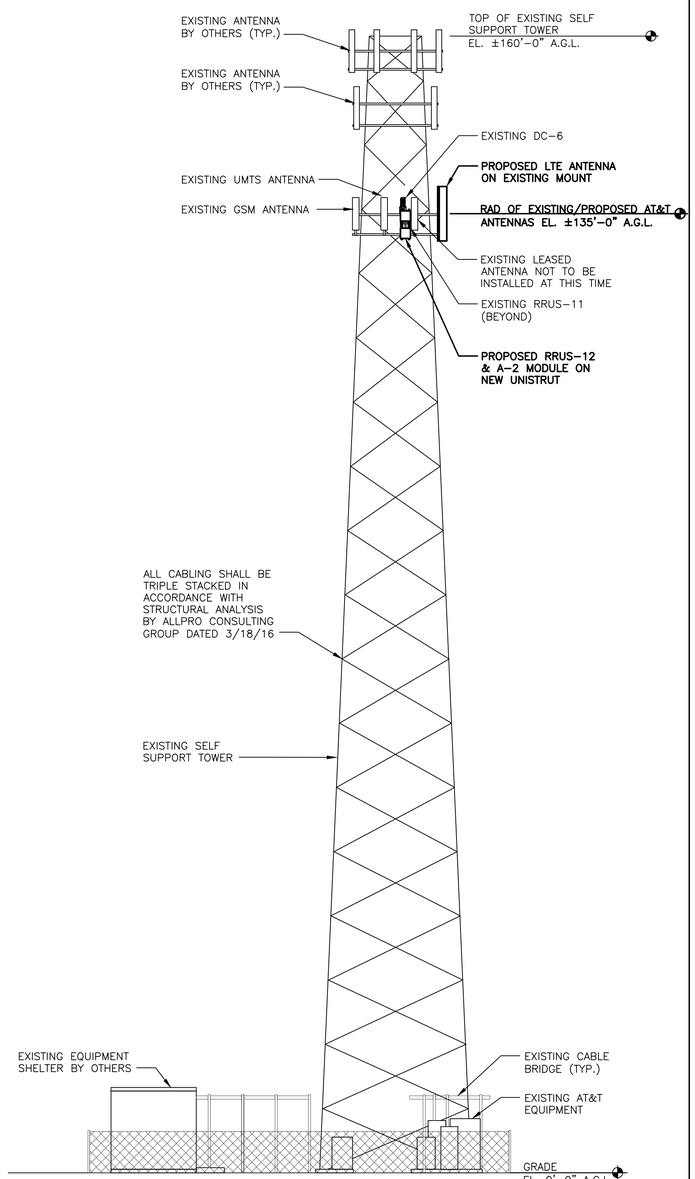


EXISTING TOWER ELEVATION

SCALE: 3/32" = 1'-0"

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

GRAPHIC SCALE: 3/32"=1'-0"



PROPOSED TOWER ELEVATION

SCALE: 3/32" = 1'-0"

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

GRAPHIC SCALE: 3/32"=1'-0"

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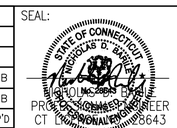
SCALE: AS SHOWN | DESIGNED BY: JW | DRAWN BY: JW

SEAL:

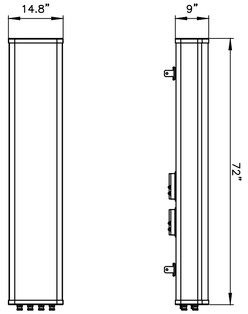


AT&T

DRAWING TITLE:

ANTENNA LAYOUTS & ELEVATIONS

JOB NUMBER	DRAWING NUMBER	REV
15168-EMP	A-3	1



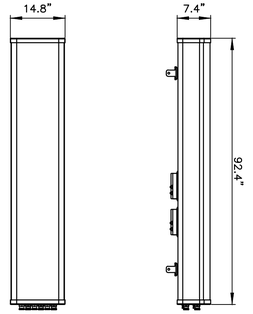
FRONT VIEW SIDE VIEW

BOTTOM VIEW

MANUFACTURER	CCI
MODEL	HPA-65R-BUU-H6
WEIGHT	51 LBS

LTE ANTENNA DETAIL

SCALE: N.T.S.



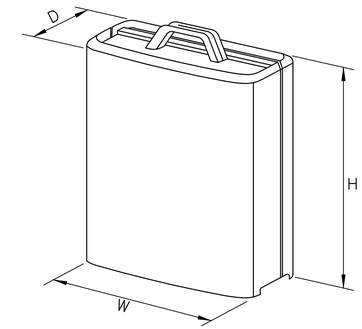
FRONT VIEW SIDE VIEW

BOTTOM VIEW

MANUFACTURER	CCI
MODEL	HPA-65R-BUU-H8
WEIGHT	68.0 LBS

LTE ANTENNA DETAIL

SCALE: N.T.S.

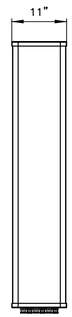


MODEL	L x W x H	WEIGHT
*RRUS-11	17" x 17.8" x 7.2"	55 LBS
RRUS-12	20.4" x 18.5" x 7.5"	58 LBS
A2 MODULE	16.4" x 15.2" x 3.4"	22 LBS

* DENOTES EXISTING

RRUS DETAIL

SCALE: N.T.S.



FRONT VIEW SIDE VIEW

BOTTOM VIEW

MANUFACTURER	POWERWAVE
MODEL	7770.00
WEIGHT	35.0 LBS

FUTURE ANTENNA DETAIL

SCALE: N.T.S.

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SCALE: AS SHOWN | DESIGNED BY: JW | DRAWN BY: JW

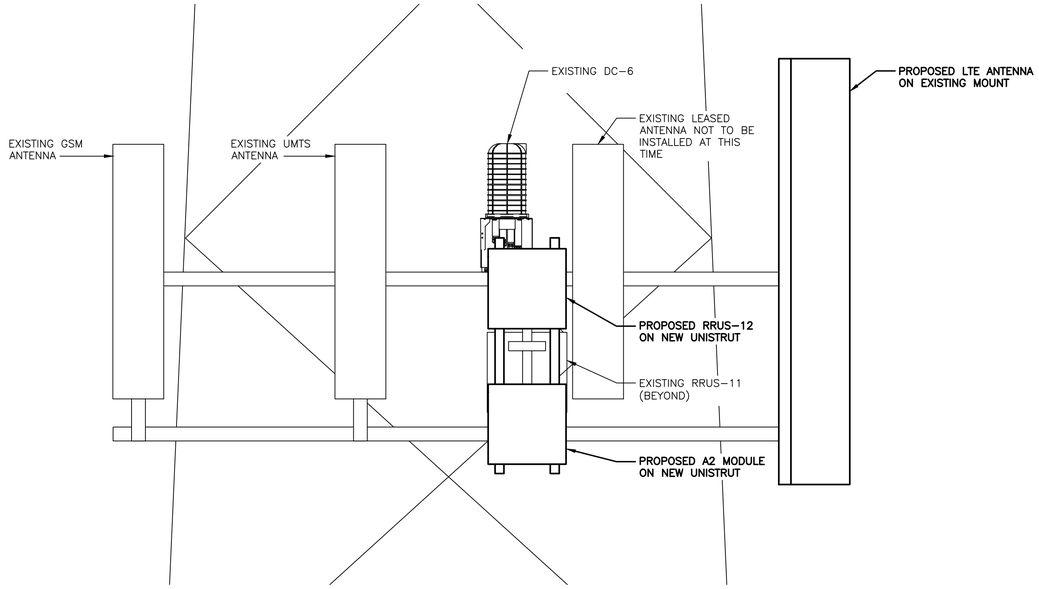
SEAL:

SHEDLOCK SPAR, LLC
PROFESSIONAL ENGINEER
CT LICENSE NO. 23643

AT&T

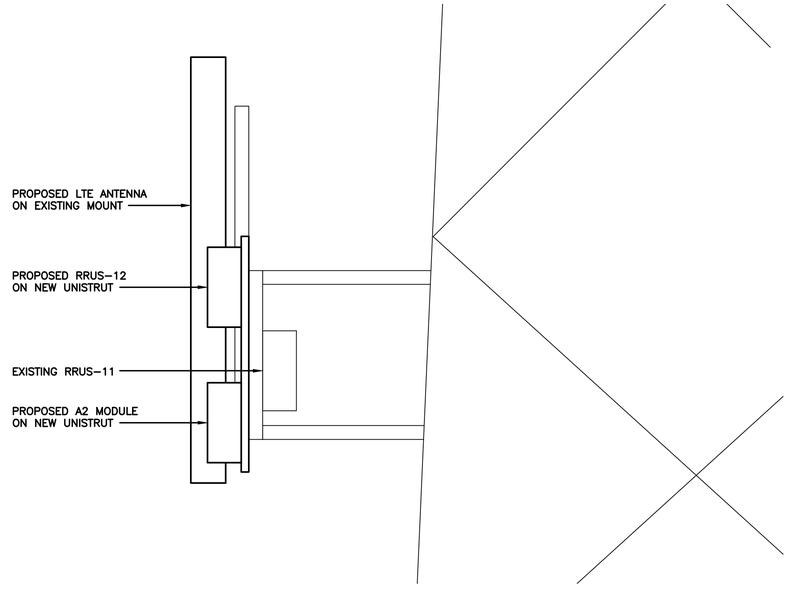
DRAWING TITLE: DETAILS

JOB NUMBER	DRAWING NUMBER	REV
15168-EMP	A-4	1



PROPOSED ANTENNA MOUNTING DETAIL (FRONT VIEW)

SCALE: N.T.S.



PROPOSED ANTENNA MOUNTING DETAIL (SIDE VIEW)

SCALE: N.T.S.

EXISTING ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770	55"x11"x5"
	A2	–	–	–
	A3	KMW	AM-X-CD-16-65-00T-RET	72"X11.8"X5.9"
	A4	POWERWAVE	7770	55"x11"x5"
BETA	B1	KMW	AM-X-CD-17-65-00T-RET	96"X11.8"X6"
	B2	–	–	–
	B3	POWERWAVE	7770	55"x11"x5"
	B4	POWERWAVE	7770	55"x11"x5"
GAMMA	C1	POWERWAVE	7770	55"x11"x5"
	C2	–	–	–
	C3	KMW	AM-X-CD-17-65-00T-RET	96"x11.8"x6"
	C4	POWERWAVE	7770	55"x11"x5"

FINAL ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	**A1**	**CCI**	**HPA-65R-BUU-H6**	**72"x14.8"x9"**
	A2	–	–	–
	A3	POWERWAVE	7770	55"x11"x5"
	A4	POWERWAVE	7770	55"x11"x5"
BETA	**B1**	**CCI**	**HPA-65R-BUU-H8**	**92.4"x14.8"x7.4"**
	B2	–	–	–
	B3	POWERWAVE	7770	55"x11"x5"
	B4	POWERWAVE	7770	55"x11"x5"
GAMMA	**C1**	**CCI**	**HPA-65R-BUU-H8**	**92.4"x14.8"x7.4"**
	C2	–	–	–
	C3	POWERWAVE	7770	55"x11"x5"
	C4	POWERWAVE	7770	55"x11"x5"

PROPOSED RRU SCHEDULE

SECTOR	MAKE	MODEL	SIZE (INCHES)	ADDITIONAL COMPONENT	SIZE (INCHES)
ALPHA	ERICSSON	RRUS-11 (EXISTING)	17"x17.8"x7.2"		
	ERICSSON	**RRUS-12**	**19.7"x16.9"x7.2"**	**ERICSSON A2 MODULE**	**16.4"x15.2"x3.4"**
BETA	ERICSSON	RRUS-11 (EXISTING)	17"X17.8"X7.2"		
	ERICSSON	**RRUS-12**	**19.7"x16.9"x7.2"**	**ERICSSON A2 MODULE**	**16.4"x15.2"x3.4"**
GAMMA	ERICSSON	RRUS-11 (EXISTING)	17"X17.8"X7.2"		
	ERICSSON	**RRUS-12**	**19.7"x16.9"x7.2"**	**ERICSSON A2 MODULE**	**16.4"x15.2"x3.4"**

PROJECT OWNER IS RESPONSIBLE FOR PROVIDING A STRUCTURAL STABILITY ANALYSIS TO DETERMINE THE CAPACITY AND SUITABILITY OF THE EXISTING ANTENNA SUPPORT STRUCTURE TO SAFELY CARRY ALL ADDITIONAL LOADS IMPOSED BY THE PROPOSED EQUIPMENT AS SHOWN HEREIN. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR INCORPORATING ANY REQUIRED STRUCTURAL MODIFICATIONS INTO THEIR SCOPE OF WORK.

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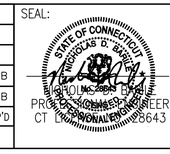
SCALE: AS SHOWN | DESIGNED BY: JW | DRAWN BY: JW

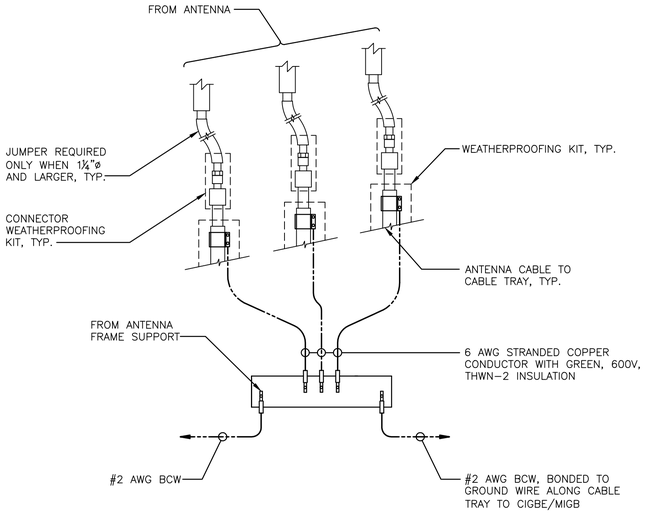
SEAL:



AT&T

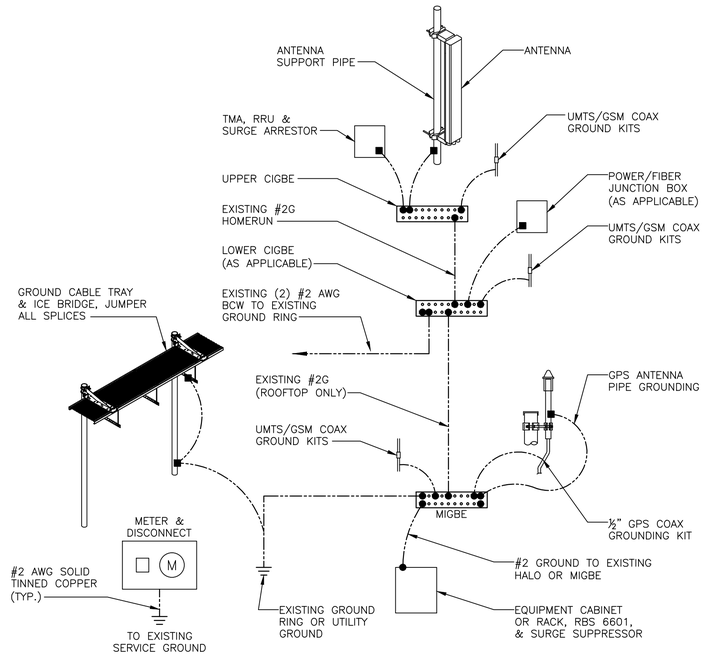
DRAWING TITLE:
ANTENNA MOUNTING DETAILS

JOB NUMBER	DRAWING NUMBER	REV
15168-EMP	A-5	1



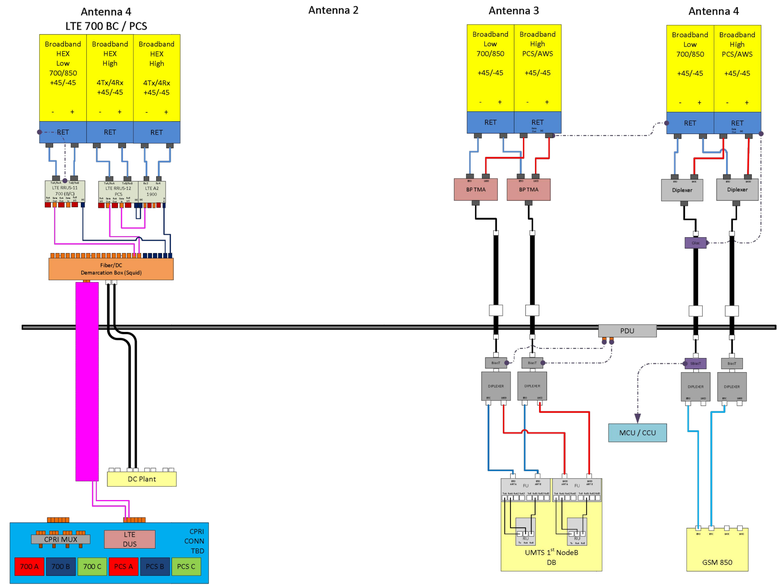
GROUND WIRE TO GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.



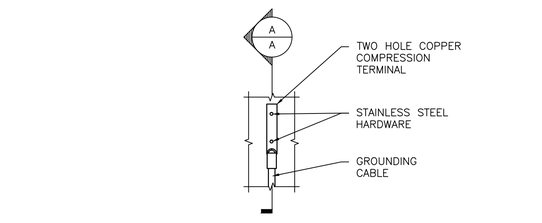
GROUNDING RISER DIAGRAM

SCALE: N.T.S.



TYPICAL PLUMBING DIAGRAM (PER SECTOR)

SCALE: N.T.S.

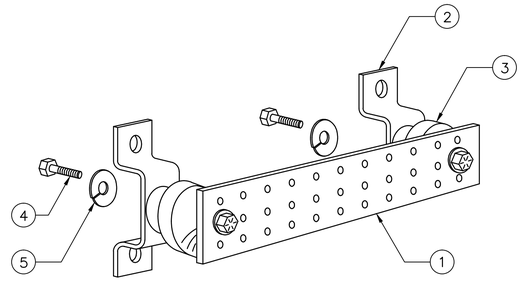


NOTE:

1. "DOUBLING UP" OR "STACKING" OF CONNECTIONS 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.



ITEM NO.	QTY.	DESCRIPTION
1	1	SOLID GROUND BAR (20"x 4"x ¼")
2	2	WALL MOUNTING BRACKET
3	2	INSULATORS
4	4	⅝"-11x1" H.H.C.S.
5	4	⅝" LOCK WASHER

NOTES:

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

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

SECTION "A" – SURGE ABSORBERS
- INTERIOR GROUND RING (#2)
- EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2)
- METALLIC COLD WATER PIPE (IF AVAILABLE) (#2)
- BUILDING STEEL (IF AVAILABLE) (#2)

GROUND BAR DETAIL

SCALE: N.T.S.

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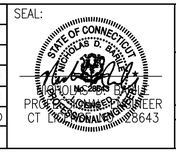

AT&T

DRAWING TITLE:

GROUNDING DETAILS

JOB NUMBER	DRAWING NUMBER	REV
15168-EMP	G-1	1