STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	
CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS, T-MOBILE NORTHEAST, LLC AND NEW CINGULAR WIRELESS PCS, LLC JOINT PETITION FOR A DECLARATORY RULING, PURSUANT TO CONNECTICUT GENERAL STATUTES §4-176 AND §16-50k, FOR THE PROPOSED INSTALLATION OF A TEMPORARY TELECOMMUNICATIONS FACILITY AND ASSOCIATED EQUIPMENT LOCATED AT 1052 BOSTON POST ROAD, MILFORD, CONNECTICUT	:	PETITION NO. 1375
	:	AUGUST 1, 2019

RESPONSES OF CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS TO CONNECTICUT SITING COUNCIL INTERROGATORIES, SET ONE

On July 19, 2019, the Connecticut Siting Council ("Council") issued Interrogatories to Cellco Partnership d/b/a Verizon Wireless, T-Mobile Northeast, LLC and New Cingular Wireless PCS, LLC, (collectively the "Petitioners") relating to Petition No. 1375, the proposed installation of a temporary tower at 1052 Boston Post Road in Milford Connecticut. Below are the Petitioners' responses.

Question No. 1

Page 1 of the Petition notes that, "Three (3) natural gas back-up generators for use by the Petitioners, will be located at grade on the west side of the Property. The new hotel, including all new wireless facility antennas, equipment and generators, was approved by the Milford Planning and Zoning Commission on January 2, 2019." Is it correct to say that such backup generators are only associated with the future permanent wireless facility installations? Is any backup power proposed for the proposed temporary facility? If yes, please indicate the type (i.e. battery

backup) and estimated full-load run time for each carrier, as applicable.

Response

The three backup generators referenced in the Petition are for use by the three wireless carriers that will install antennas on the roof of the new hotel building. The Petitioners do not intend to install a generator to provide backup power to the temporary ballast tower. Backup power to the individual carriers' equipment at the temporary tower site will be provided by batteries associate with each facility. Cellco's batteries will provide four (4) hours of backup power; AT&T's batteries will provide four (4) hours of backup power; and T-Mobile's batteries will provide one (1) hour of backup power but has the capability to upgrade the battery system to provide additional backup power if necessary.

Question No. 2

Under Attachment 6 of the Petition, the Federal Airways & Aerospace (FAA) Summary Report (FAA Report) notes that, "NR (Notice Required) – Exceeds BDR Rwy 24, TERPS analysis required." The FAA Report also notes that, "Notice is required. Height exceeds FAA IFR straight-in screening criteria. The maximum height to avoid notice is: 106 ft AMSL." Has or would the Petitioner comply with such analysis and/or notice requirements for FAA, as applicable?

Response

Yes. The Petitioner will comply with all FAA notice requirements.

Question No. 3

Under Attachment 4 of the Petition, in the Structural Analysis Report dated June 12, 2019, Ballasted Foundation Analysis Results Summary, it indicates a 100.6 percent maximum stress ratio for the shear loading on the ballasted foundation. Please provide a revised structural

analysis report with any necessary changes, revisions and/or recommended reinforcements to ensure that the final stress ratio will not exceed 100 percent.

Response

An updated Structural Analysis is attached as Exhibit 1.

Question No. 4

Under Attachment 3 of the Petition, referencing Sheet T-1, please respond to the following:

a. The "Verizon Scope of Work Info" notes that nine remote radio heads (RRHs) are proposed. However, Sheet A-2 and the Structural Analysis (under Appurtenances Configuration) indicate six RRHs. Please correct Sheet T-1 as applicable.

b. The "Verizon Scope of Work Info" notes that six triplexers are proposed for the tower, and six triplexers are proposed within the lease area (i.e. near ground level). However, Sheet A-2 and the Structural Analysis (under Appurtenances Configuration) do not show triplexers on the tower. Please correct Sheet T-1 as applicable.

c. The "AT&T Scope of Work Info" notes that there would be nine panel antennas and 15 RRHs. The Structural Analysis and Sheet A-2 indicate six panel antennas and 9 RRHs. Please correct Sheet T-1, as applicable.

Response

An updated set of project plans are attached as Exhibit 2.

Question No. 5

Page 1 of the Calculated Radio Frequency Exposure Report indicates that nine panel antennas are proposed for AT&T. Were six panel antennas for AT&T intended?

Response

An updated Calculated Radio Frequency Exposure Report is attached as Exhibit 3.

Question No. 6

On February 15, 2019, under Petition No. 1357, the Council approved Cellco's Centralized Radio Access Network (C-RAN) building at the 1052 Boston Post Road parcel. Describe how Cellco would connect and utilize the C-RAN during the period of use of the temporary tower?

Response

As described in the Cellco's Petition No. 1357, the purpose of a C-RAN is to allow several existing cell sites in a particular geographic area (traditional macro cell sites and small cells), to connect to a centralized hub. By doing so, Cellco can deploy less cell site hardware at each individual facility location, giving it more flexibility in the selection of new cell site locations. The C-RAN that Cellco will install at 1052 Boston Post Road will not be connected to the temporary COW, but will be connected (ultimately) to the new cell site on the roof of the Fairfield Inn.

EXHIBIT 1

STRUCTURAL ANALYSIS REPORT

For

FOREST HEIGHTS CT RELO

1052 Boston Post Road
Milford, CT 06460

Antennas Mounted to the Temporary Monopole

Prepared for:

verizon

20 Alexander Drive
Wallingford, CT 06492

Dated: July 31, 2019 (Rev.2)
June 12, 2019 (Rev.1)
April 23, 2019

Prepared by:

HDG HUDSON Design Group LLC

45 Beechwood Drive
North Andover, MA 01845
(P) 978.557.5553 (F) 978.336.5586
www.hudsondesigngroupllc.com

HUDSON
Design Group LLC

SCOPE OF WORK:

Hudson Design Group LLC (HDG) has been authorized by Verizon to conduct a structural evaluation of the 117' monopole supporting the proposed Verizon's antennas located at elevation 123' above the ground level.

This report represents this office's findings, conclusions and recommendations pertaining to the support of Verizon's existing and proposed antennas listed below.

Drawings of the existing monopole prepared by Ambor Structures, dated June 29, 2015, were available for our use.

TOWER SUMMARY:

Based on our evaluation, we have determined that the existing monopole structure and base referenced above **IS IN CONFORMANCE** with the ANSI/TIA-222-G Standard for the loading considered under the criteria listed in this report. The monopole structure is rated at **82.4%** - (Section L5 from EL.8.17 to EL.46.96' Controlling).

FOUNDATION SUMMARY:

Based on our evaluation, we have determined that the existing monopole foundation **is in conformance** with the ANSI/TIA-222-G Standard for the loading considered under the criteria listed in this report. The foundation is rated at **95.5%** - (Shear Controlling).

HUDSON
Design Group LLC

APPURTENANCES CONFIGURATION:

Tenant	Appurtenances	Elev.	Mount
VERIZON	**(9) MX06FRO660 Antennas**	123'	**T-Arm**
VERIZON	**(3) B2/B66A RRH-BR049 RRHs**	123'	**T-Arm**
VERIZON	**(3) B5/B13 RRH-BR04C RRHs**	123'	**T-Arm**
VERIZON	**(2) OVPs**	123'	**T-Arm**
T-Mobile	(3) AIR32 B66A/B2A Antennas	104'	Ring Mount
AT&T	(3) EPBQ-654L8H8 Antenna	70'	Low-Profile Platform
AT&T	(3) HPA6R-BU8A Antennas	70'	Low-Profile Platform
AT&T	(3) 4415 RRH's	70'	Low-Profile Platform
AT&T	(3) 4415 B30 RRH's	70'	Low-Profile Platform
AT&T	(3) B5/B12 4449 RRH's	70'	Low-Profile Platform
AT&T	(2) Squid Surge Arrestors	70'	Low-Profile Platform

Proposed VERIZON Appurtenances shown in Bold.

VERIZON EXISTING/PROPOSED COAX CABLES:

Tenant	Coax Cables	Elev.	Mount
VERIZON	**(6) 1-5/8" Coax Cables**	125'	Inside Monopole
VERIZON	**(2) Hybrid Cables**	125'	Inside Monopole
T-Mobile	(3) Hybrid Cables	104'	Face of Monopole
AT&T	(6) 1-1/4" Coax Cables	70'	Face of Monopole
AT&T	(1) Fiber Cable	70'	Face of Monopole
AT&T	(4) DC Power Cables	70'	Face of Monopole

Proposed VERIZON Coax Cables shown in Bold.

HUDSON
Design Group LLC

ANALYSIS RESULTS SUMMARY:

Component	Max. Stress Ratio	Elev. of Component (ft)	Pass/Fail	Comments
Pole Section-L1	26.9 %	115.67 -125.67	PASS	
Pole Section-L2	61.1 %	105.67 – 115.67	PASS	
Pole Section-L3	68.2 %	85.67 – 105.67	PASS	
Pole Section-L4	73.6 %	46.96 – 85.67	PASS	
Pole Section-L5	**82.4 %**	8.17 – 46.96	PASS	**Controlling**
Base Plate	63.8 %	0	PASS	

BALLASTED FOUNDATION ANALYSIS RESULTS SUMMARY:

	Design Reactions*	Proposed Reactions	Max. Stress Ratio	Pass/Fail	Comments
Moment	2997 k-ft	2132.6 k-ft	71.2%	PASS	****w/ 251,000 lbs of ballast**
Shear	35.1 k	33.5 k	95.5 %	PASS	

**** Design Reactions have been multiplied by a factor of 1.35.***
***** Ballast to be 2'x2'x6' Concrete Waste Block, 3,600 lbs each.***

HUDSON
Design Group LLC

DESIGN CRITERIA:

1. EIA/TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures

2. 2018 Connecticut State Building Code

   County: New Haven
   City/Town: Milford
   Wind Load: 97 mph (3 second gust)
   Structural Class: II
   Exposure Category: B
   Topographic Category: 1
   Ice Thickness: 0.75 inch

3. Approximate height above grade to proposed antennas: 123'

Calculations and referenced documents are attached

ASSUMPTIONS:

1. The monopole dimensions, member sizes and material strength are as indicated in the construction drawings prepared by Ambor Structures, dated June 29, 2015.

2. The appurtenances configuration is as stated in the previous structural analysis reports. All antennas, coax cables and waveguide cables are assumed to be properly installed and supported as per the manufacturer's requirements.

3. The monopole and foundation are properly constructed and maintained. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities.

4. The support mounts and platforms are not analyzed and are considered adequate to support the loading. The analysis is limited to the primary support structure itself.

5. All prior structural modification, if any, are assumed to be as per the data supplied (if available), and installed properly.

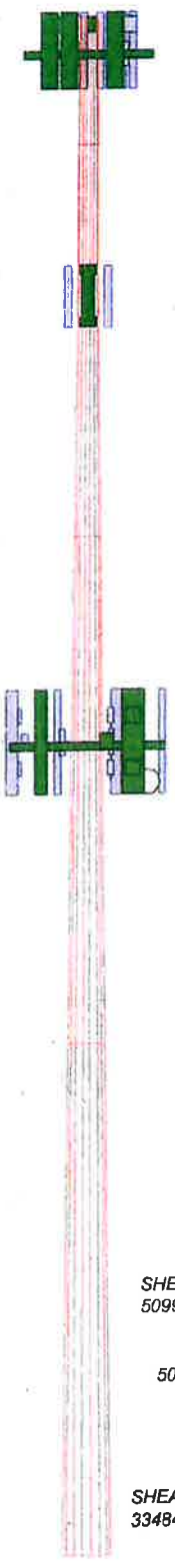
SUPPORT RECOMMENDATIONS:

HDG recommends that the proposed antennas, RRHs and distribution box be mounted on the existing steel platform supported by the monopole.

HUDSON
Design Group LLC

CALCULATIONS

Section	1	2	3	4	5
Length (ft)	10.00	10.00	20.00	38.71	38.79
Number of Sides	18	18	18	18	18
Thickness (in)	0.1570	0.1570	0.1970	0.2760	0.3150
Top Dia (in)	15.7500	17.7200	17.7200	23.6200	33.8600
Bot Dia (in)	17.7200	17.7200	23.6200	33.8600	44.0900
Grade				A572-65	
Weight (lb)	281.1	297.8	871.2	3284.5	5101.9



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
2' Standoff T-Arm (5' face width) (Verizon)	123	Junction Box	122.67
		Ring Mount (T-Mobile)	104
2' Standoff T-Arm (5' face width)	123	Ring Mount	104
2' Standoff T-Arm (5' face width)	123	AIR32 B66A/B2A Antenna w/Mounting Pipe	104
MX06FRO660 Antenna w/Mounting Pipe	123	AIR32 B66A/B2A Antenna w/Mounting Pipe	104
MX06FRO660 Antenna w/Mounting Pipe	123	AIR32 B66A/B2A Antenna w/Mounting Pipe	104
MX06FRO660 Antenna w/Mounting Pipe	123	PIROD 13' Low Profile Platform (Monopole) (ATT)	70
MX06FRO660 Antenna w/Mounting Pipe	123	EPBQ-654L8H8-L2 w/Mounting Pipe	70
MX06FRO660 Antenna w/Mounting Pipe	123	HPA65R-BU8A w/Mounting Pipe	70
		4415 RRH	70
MX06FRO660 Antenna w/Mounting Pipe	123	4415 RRH	70
		4449 RRH	70
MX06FRO660 Antenna w/Mounting Pipe	123	EPBQ-654L8H8-L2 w/Mounting Pipe	70
MX06FRO660 Antenna w/Mounting Pipe	123	HPA65R-BU8A w/Mounting Pipe	70
		4415 RRH	70
MX06FRO660 Antenna w/Mounting Pipe	123	4415 RRH	70
		4449 RRH	70
B2/B66A RRH-BRO049 RRH	123	EPBQ-654L8H8-L2 w/Mounting Pipe	70
B2/B66A RRH-BRO049 RRH	123	HPA65R-BU8A w/Mounting Pipe	70
B2/B66A RRH-BRO049 RRH	123	4415 RRH	70
B5/B13 RRH-BR04C RRH	123	4415 RRH	70
B5/B13 RRH-BR04C RRH	123	4449 RRH	70
B5/B13 RRH-BR04C RRH	123	Squid Surge DC6-48-60-18-8F	70
Junction Box	122.67	Squid Surge DC6-48-60-18-8F	70

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 115 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 82.4%

ALL REACTIONS ARE FACTORED

AXIAL 40157 lb

SHEAR 5099 lb

MOMENT 349829 lb-ft

TORQUE 1236 lb-ft
50 mph WIND - 0.7500 in ICE

AXIAL 20234 lb

SHEAR 33484 lb

MOMENT 2132583 lb-ft

TORQUE 8904 lb-ft
REACTIONS - 115 mph WIND

Hudson Design Group LLC
45 Beechwood Drive
North Andover, MA 01845
Phone: (978) 557-5553
FAX: (978) 336-5586

Job: FOREST HEIGHTS CT RELO			
Project:			
Client: VERIZON	Drawn by: SO		App'd:
Code: TIA-222-G	Date: 07/31/19		Scale: NTS
Path:			Dwg No. E-1

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in New Haven County, Connecticut.
Basic wind speed of 115 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	125.67-115.67	10.00	0.00	18	15.7500	17.7200	0.1570	0.6280	A572-65 (65 ksi)
L2	115.67-105.67	10.00	0.00	18	17.7200	17.7200	0.1570	0.6280	A572-65 (65 ksi)
L3	105.67-85.67	20.00	0.00	18	17.7200	23.6200	0.1970	0.7880	A572-65 (65 ksi)
L4	85.67-46.96	38.71	0.00	18	23.6200	33.8600	0.2760	1.1040	A572-65 (65 ksi)
L5	46.96-8.17	38.79		18	33.8600	44.0900	0.3150	1.2600	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	15.9687	7.7703	238.6894	5.5355	8.0010	29.8324	477.6928	3.8859	2.4957	15.896
	17.9691	8.7520	341.0673	6.2349	9.0018	37.8890	682.5835	4.3768	2.8424	18.104
L2	17.9691	8.7520	341.0673	6.2349	9.0018	37.8890	682.5835	4.3768	2.8424	18.104
	17.9691	8.7520	341.0673	6.2349	9.0018	37.8890	682.5835	4.3768	2.8424	18.104
L3	17.9630	10.9567	425.0460	6.2207	9.0018	47.2181	850.6514	5.4794	2.7720	14.071
	23.9540	14.6459	1015.1685	8.3152	11.9990	84.6047	2031.6729	7.3243	3.8104	19.342
L4	23.9418	20.4499	1407.9242	8.2871	11.9990	117.3372	2817.7010	10.2269	3.6714	13.302

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L5	34.3398	29.4204	4192.2842	11.9223	17.2009	243.7250	8390.0848	14.7130	5.4736	19.832
	34.3338	33.5386	4768.0227	11.9085	17.2009	277.1964	9542.3193	16.7725	5.4050	17.159
	44.7216	43.7667	10595.7912	15.5401	22.3977	473.0745	21205.5246	21.8875	7.2054	22.874

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
L1 125.67-115.67				1	1	1			
L2 115.67-105.67				1	1	1			
L3 105.67-85.67				1	1	1			
L4 85.67-46.96				1	1	1			
L5 46.96-8.17				1	1	1			

Monopole Base Plate Data

Base Plate Data

Base plate is square	
Base plate is grouted	
Anchor bolt grade	A615-75
Anchor bolt size	2.2500 in
Number of bolts	12
Embedment length	5.0000 in
f'_c	3 ksi
Grout space	0.0000 in
Base plate grade	A572-60
Base plate thickness	2.7500 in
Bolt circle diameter	54.0000 in
Outer diameter	60.0000 in
Inner diameter	42.0000 in
Base plate type	Plain Plate

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
********** Hybrid Cable (T-Mobile) **********	C	No	Surface Ar (CaAa)	104.00 - 8.17	3	3	0.000 0.000	1.2500		1.70
DC Cable (AT&T)	C	No	Surface Ar (CaAa)	70.00 - 8.17	4	4	0.000 0.000	0.9570		0.88
Fiber Cable (AT&T)	C	No	Surface Ar (CaAa)	70.00 - 8.17	1	1	0.000 0.000	1.2500		0.48
LCF114-50J (1-1/4 FOAM) (AT&T)	C	No	Surface Af (CaAa)	70.00 - 8.17	6	1	0.000 0.000	1.5800	4.9612	0.70

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LCF158-50J (1 5/8 FOAM) (VERIZON)	C	No	No	Inside Pole	123.00 - 8.17	6	No Ice	0.00	0.92
							1/2" Ice	0.00	0.92
							1" Ice	0.00	0.92
Hybrid Cable (VERIZON)	C	No	No	Inside Pole	123.00 - 8.17	2	No Ice	0.00	1.70
							1/2" Ice	0.00	1.70
							1" Ice	0.00	1.70

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
L1	125.67-115.67	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	65.38
L2	115.67-105.67	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	89.20
L3	105.67-85.67	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	6.874	0.000	271.88
L4	85.67-46.96	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	32.283	0.000	731.46
L5	46.96-8.17	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	44.459	0.000	861.60

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
L1	125.67-115.67	A	1.708	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	65.38
L2	115.67-105.67	A	1.693	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	89.20
L3	105.67-85.67	A	1.668	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	16.234	0.000	445.06
L4	85.67-46.96	A	1.607	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	113.786	0.000	2366.38
L5	46.96-8.17	A	1.470	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight lb
		C		0.000	0.000	163.271	0.000	3067.88

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	125.67-115.67	0.0000	0.0000	0.0000	0.0000
L2	115.67-105.67	0.0000	0.0000	0.0000	0.0000
L3	105.67-85.67	0.0000	2.5756	0.0000	2.3886
L4	85.67-46.96	0.0000	5.7586	0.0000	7.6467
L5	46.96-8.17	0.0000	7.4782	0.0000	10.2709

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L3	4	Hybrid Cable	85.67 - 104.00	1.0000	1.0000
L4	4	Hybrid Cable	46.96 - 85.67	1.0000	1.0000
L4	6	DC Cable	46.96 - 70.00	1.0000	1.0000
L4	7	Fiber Cable	46.96 - 70.00	1.0000	1.0000
L4	8	LCF114-50J (1-1/4 FOAM)	46.96 - 70.00	1.0000	1.0000
L5	4	Hybrid Cable	8.17 - 46.96	1.0000	1.0000
L5	6	DC Cable	8.17 - 46.96	1.0000	1.0000
L5	7	Fiber Cable	8.17 - 46.96	1.0000	1.0000
L5	8	LCF114-50J (1-1/4 FOAM)	8.17 - 46.96	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight lb
2' Standoff T-Arm (5' face width) (Verizon)	A	From Face	0.00 0.00 0.00	0.0000	123.00	No Ice 1/2" Ice 1" Ice	3.50 4.20 4.90	3.50 4.20 4.90	91.00 120.00 149.00
2' Standoff T-Arm (5' face width)	B	From Face	0.00 0.00	0.0000	123.00	No Ice 1/2" Ice	3.50 4.20	3.50 4.20	91.00 120.00

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
			0.00			1" Ice	4.90	4.90	149.00
2' Standoff T-Arm (5' face	C	From Face	0.00	0.0000	123.00	No Ice	3.50	3.50	91.00
width)			0.00			1/2" Ice	4.20	4.20	120.00
			0.00			1" Ice	4.90	4.90	149.00
MX06FRO660 Antenna	A	From Face	1.50	0.0000	123.00	No Ice	9.89	8.76	78.90
w/Mounting Pipe			3.00			1/2" Ice	10.36	9.71	163.62
			0.00			1" Ice	10.84	10.53	256.53
MX06FRO660 Antenna	A	From Face	1.50	0.0000	123.00	No Ice	9.89	8.76	78.90
w/Mounting Pipe			1.50			1/2" Ice	10.36	9.71	163.62
			0.00			1" Ice	10.84	10.53	256.53
MX06FRO660 Antenna	B	From Face	1.50	0.0000	123.00	No Ice	9.89	8.76	78.90
w/Mounting Pipe			3.00			1/2" Ice	10.36	9.71	163.62
			0.00			1" Ice	10.84	10.53	256.53
MX06FRO660 Antenna	B	From Face	1.50	0.0000	123.00	No Ice	9.89	8.76	78.90
w/Mounting Pipe			1.50			1/2" Ice	10.36	9.71	163.62
			0.00			1" Ice	10.84	10.53	256.53
MX06FRO660 Antenna	C	From Face	1.50	0.0000	123.00	No Ice	9.89	8.76	78.90
w/Mounting Pipe			3.00			1/2" Ice	10.36	9.71	163.62
			0.00			1" Ice	10.84	10.53	256.53
MX06FRO660 Antenna	C	From Face	1.50	0.0000	123.00	No Ice	9.89	8.76	78.90
w/Mounting Pipe			1.50			1/2" Ice	10.36	9.71	163.62
			0.00			1" Ice	10.84	10.53	256.53
MX06FRO660 Antenna	A	From Face	1.50	0.0000	123.00	No Ice	9.89	8.76	78.90
w/Mounting Pipe			-2.00			1/2" Ice	10.36	9.71	163.62
			0.00			1" Ice	10.84	10.53	256.53
MX06FRO660 Antenna	B	From Face	1.50	0.0000	123.00	No Ice	9.89	8.76	78.90
w/Mounting Pipe			-2.00			1/2" Ice	10.36	9.71	163.62
			0.00			1" Ice	10.84	10.53	256.53
MX06FRO660 Antenna	C	From Face	1.50	0.0000	123.00	No Ice	9.89	8.76	78.90
w/Mounting Pipe			-2.00			1/2" Ice	10.36	9.71	163.62
			0.00			1" Ice	10.84	10.53	256.53
B2/B66A RRH-BRO049	A	From Leg	1.00	0.0000	123.00	No Ice	1.88	1.25	98.00
RRH			3.00			1/2" Ice	2.05	1.39	116.34
			2.00			1" Ice	2.22	1.54	137.47
B2/B66A RRH-BRO049	B	From Leg	1.00	0.0000	123.00	No Ice	1.88	1.25	98.00
RRH			2.50			1/2" Ice	2.05	1.39	116.34
			2.00			1" Ice	2.22	1.54	137.47
B2/B66A RRH-BRO049	C	From Leg	1.00	0.0000	123.00	No Ice	1.88	1.25	98.00
RRH			2.50			1/2" Ice	2.05	1.39	116.34
			2.00			1" Ice	2.22	1.54	137.47
B5/B13 RRH-BR04C RRH	A	From Leg	1.00	0.0000	123.00	No Ice	1.88	1.01	82.00
			-2.00			1/2" Ice	2.05	1.14	98.43
			2.00			1" Ice	2.22	1.28	117.53
B5/B13 RRH-BR04C RRH	A	From Leg	1.00	0.0000	123.00	No Ice	1.88	1.01	82.00
			-2.00			1/2" Ice	2.05	1.14	98.43
			2.00			1" Ice	2.22	1.28	117.53
B5/B13 RRH-BR04C RRH	A	From Leg	1.00	0.0000	123.00	No Ice	1.88	1.01	82.00
			-2.00			1/2" Ice	2.05	1.14	98.43
			2.00			1" Ice	2.22	1.28	117.53
Junction Box	A	From Face	1.50	0.0000	122.67	No Ice	3.03	1.97	27.00
			2.00			1/2" Ice	3.25	2.16	53.35
			0.00			1" Ice	3.47	2.36	83.08
Junction Box	B	From Face	1.50	0.0000	122.67	No Ice	3.03	1.97	27.00
			2.00			1/2" Ice	3.25	2.16	53.35
			0.00			1" Ice	3.47	2.36	83.08
************									
Ring Mount	C	From Face	0.00	0.0000	104.00	No Ice	1.20	0.30	265.00

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
(T-Mobile)			0.00			1/2" Ice	1.34	0.38	273.88
			2.00			1" Ice	1.49	0.46	284.83
Ring Mount	C	From Face	0.00	0.0000	104.00	No Ice	1.20	0.30	265.00
			0.00			1/2" Ice	1.34	0.38	273.88
			-2.00			1" Ice	1.49	0.46	284.83
AIR32 B66A/B2A Antenna w/Mounting Pipe	A	From Face	1.00	0.0000	104.00	No Ice	6.58	5.90	150.45
			0.00			1/2" Ice	6.97	6.56	209.55
			0.00			1" Ice	7.37	7.24	275.40
AIR32 B66A/B2A Antenna w/Mounting Pipe	B	From Face	1.00	0.0000	104.00	No Ice	6.58	5.90	150.45
			0.00			1/2" Ice	6.97	6.56	209.55
			0.00			1" Ice	7.37	7.24	275.40
AIR32 B66A/B2A Antenna w/Mounting Pipe	C	From Face	1.00	0.0000	104.00	No Ice	6.58	5.90	150.45
			0.00			1/2" Ice	6.97	6.56	209.55
			0.00			1" Ice	7.37	7.24	275.40
**********									
**********									
PiROD 13' Low Profile Platform (Monopole) (AT&T)	C	None		0.0000	70.00	No Ice	15.70	15.70	1300.00
						1/2" Ice	20.10	20.10	1765.00
						1" Ice	24.50	24.50	2230.00
EPBQ-654L8H8-L2 w/Mounting Pipe	A	From Face	3.50	0.0000	70.00	No Ice	18.09	8.93	115.20
			-3.50			1/2" Ice	18.72	10.35	229.55
			0.00			1" Ice	19.36	11.61	354.16
HPA65R-BU8A w/Mounting Pipe	A	From Face	3.50	0.0000	70.00	No Ice	11.23	9.94	83.20
			3.50			1/2" Ice	11.85	11.37	170.99
			0.00			1" Ice	12.47	12.64	268.54
4415 RRH	A	From Face	3.00	0.0000	70.00	No Ice	1.64	0.68	44.00
			-3.50			1/2" Ice	1.80	0.79	56.43
			2.00			1" Ice	1.97	0.91	71.23
4415 RRH	A	From Face	3.00	0.0000	70.00	No Ice	1.64	0.68	44.00
			-3.50			1/2" Ice	1.80	0.79	56.43
			-2.00			1" Ice	1.97	0.91	71.23
4449 RRH	A	From Face	3.50	0.0000	70.00	No Ice	1.63	1.16	74.00
			-1.50			1/2" Ice	1.78	1.29	89.95
			0.00			1" Ice	1.95	1.44	108.51
EPBQ-654L8H8-L2 w/Mounting Pipe	B	From Face	3.50	0.0000	70.00	No Ice	18.09	8.93	115.20
			-3.50			1/2" Ice	18.72	10.35	229.55
			0.00			1" Ice	19.36	11.61	354.16
HPA65R-BU8A w/Mounting Pipe	B	From Face	3.50	0.0000	70.00	No Ice	11.23	9.94	83.20
			3.50			1/2" Ice	11.85	11.37	170.99
			0.00			1" Ice	12.47	12.64	268.54
4415 RRH	B	From Face	3.00	0.0000	70.00	No Ice	1.64	0.68	44.00
			-3.50			1/2" Ice	1.80	0.79	56.43
			2.00			1" Ice	1.97	0.91	71.23
4415 RRH	B	From Face	3.00	0.0000	70.00	No Ice	1.64	0.68	44.00
			-3.50			1/2" Ice	1.80	0.79	56.43
			-2.00			1" Ice	1.97	0.91	71.23
4449 RRH	B	From Face	3.50	0.0000	70.00	No Ice	1.63	1.16	74.00
			-1.50			1/2" Ice	1.78	1.29	89.95
			0.00			1" Ice	1.95	1.44	108.51
EPBQ-654L8H8-L2 w/Mounting Pipe	C	From Face	3.50	0.0000	70.00	No Ice	18.09	8.93	115.20
			-3.50			1/2" Ice	18.72	10.35	229.55
			0.00			1" Ice	19.36	11.61	354.16
HPA65R-BU8A w/Mounting Pipe	C	From Face	3.50	0.0000	70.00	No Ice	11.23	9.94	83.20
			3.50			1/2" Ice	11.85	11.37	170.99
			0.00			1" Ice	12.47	12.64	268.54
4415 RRH	C	From Face	3.00	0.0000	70.00	No Ice	1.64	0.68	44.00
			-3.50			1/2" Ice	1.80	0.79	56.43

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
			2.00			1" Ice	1.97	0.91	71.23
4415 RRH	C	From Face	3.00	0.0000	70.00	No Ice	1.64	0.68	44.00
			-3.50			1/2" Ice	1.80	0.79	56.43
			-2.00			1" Ice	1.97	0.91	71.23
4449 RRH	C	From Face	3.50	0.0000	70.00	No Ice	1.63	1.16	74.00
			-1.50			1/2" Ice	1.78	1.29	89.95
			0.00			1" Ice	1.95	1.44	108.51
Squid Surge DC6-48-60-18-8F	A	From Face	1.00	0.0000	70.00	No Ice	0.81	0.81	33.00
			0.00			1/2" Ice	1.30	1.30	48.38
			0.00			1" Ice	1.48	1.48	66.11
Squid Surge DC6-48-60-18-8F	B	From Face	1.00	0.0000	70.00	No Ice	0.81	0.81	33.00
			0.00			1/2" Ice	1.30	1.30	48.38
			0.00			1" Ice	1.48	1.48	66.11

Load Combinations

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

Comb. No.	Description
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	26	40156.52	-0.56	0.98
	Max. H_x	21	15175.42	33483.78	-0.02
	Max. H_z	2	20233.91	-0.00	22243.26
	Max. M_x	2	1718823.61	-0.00	22243.26
	Max. M_z	8	2131618.13	-33482.91	-0.03
	Max. Torsion	21	8904.38	33483.78	-0.02
	Min. Vert	15	15175.37	0.00	-22242.94
	Min. H_x	9	15175.42	-33483.78	-0.02
	Min. H_z	14	20233.91	-0.00	-22243.26
	Min. M_x	14	-1722320.83	-0.00	-22243.26
	Min. M_z	20	-2132582.37	33482.90	-0.03
	Min. Torsion	9	-8904.45	-33483.78	-0.02

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	16861.74	0.05	0.01	1436.31	390.07	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	20233.91	0.00	-22243.26	-1718823.61	488.23	-96.38
0.9 Dead+1.6 Wind 0 deg - No Ice	15175.37	-0.00	-22242.95	-1708556.47	360.97	-103.88
1.2 Dead+1.6 Wind 30 deg - No Ice	20234.08	11122.91	-19265.44	-1488529.16	-859927.54	-314.58
0.9 Dead+1.6 Wind 30 deg - No Ice	15175.56	11122.90	-19265.43	-1479718.63	-854712.05	-320.11
1.2 Dead+1.6 Wind 60 deg - No Ice	20234.08	23936.62	-13819.82	-924573.80	-1603953.27	2293.08
0.9 Dead+1.6 Wind 60 deg - No Ice	15175.56	23936.60	-13819.81	-919508.92	-1594540.44	2291.05
1.2 Dead+1.6 Wind 90 deg - No Ice	20233.88	33482.91	0.03	1737.63	-2131618.13	8901.69

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Ice						
0.9 Dead+1.6 Wind 90 deg - No Ice	15175.42	33483.78	0.02	1298.63	-2119755.27	8904.45
1.2 Dead+1.6 Wind 120 deg - No Ice	20234.08	23936.62	13819.82	928074.94	-1603950.93	2389.05
0.9 Dead+1.6 Wind 120 deg - No Ice	15175.56	23936.60	13819.81	922124.41	-1594538.73	2394.62
1.2 Dead+1.6 Wind 150 deg - No Ice	20234.08	11122.91	19265.44	1492029.32	-859922.90	-147.65
0.9 Dead+1.6 Wind 150 deg - No Ice	15175.56	11122.90	19265.43	1482333.40	-854708.66	-140.21
1.2 Dead+1.6 Wind 180 deg - No Ice	20233.91	0.00	22243.26	1722320.83	488.25	96.43
0.9 Dead+1.6 Wind 180 deg - No Ice	15175.37	-0.00	22242.94	1711169.04	360.98	103.92
1.2 Dead+1.6 Wind 210 deg - No Ice	20234.08	-11122.91	19265.44	1492025.28	860897.10	314.64
0.9 Dead+1.6 Wind 210 deg - No Ice	15175.56	-11122.90	19265.43	1482330.52	855428.80	320.16
1.2 Dead+1.6 Wind 240 deg - No Ice	20234.08	-23936.62	13819.82	928070.80	1604919.93	-2293.09
0.9 Dead+1.6 Wind 240 deg - No Ice	15175.56	-23936.60	13819.81	922121.47	1595255.16	-2291.08
1.2 Dead+1.6 Wind 270 deg - No Ice	20233.88	-33482.90	0.03	1737.64	2132582.37	-8901.58
0.9 Dead+1.6 Wind 270 deg - No Ice	15175.42	-33483.78	0.02	1298.63	2120468.37	-8904.38
1.2 Dead+1.6 Wind 300 deg - No Ice	20234.08	-23936.62	-13819.82	-924569.62	1604922.24	-2389.03
0.9 Dead+1.6 Wind 300 deg - No Ice	15175.56	-23936.60	-13819.81	-919505.96	1595256.85	-2394.61
1.2 Dead+1.6 Wind 330 deg - No Ice	20234.08	-11122.91	-19265.44	-1488525.09	860901.71	147.65
0.9 Dead+1.6 Wind 330 deg - No Ice	15175.56	-11122.90	-19265.43	-1479715.74	855432.17	140.19
1.2 Dead+1.0 Ice+1.0 Temp	40156.52	0.56	-0.98	8409.12	664.50	0.12
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	40156.51	0.01	-4148.16	-305177.65	725.92	-8.83
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	40156.51	2074.08	-3592.41	-263145.63	-156140.07	-49.17
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	40156.51	3801.80	-2194.98	-150624.96	-274980.09	248.73
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	40156.51	5099.50	-0.01	8553.12	-348273.29	1235.72
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	40156.51	3801.80	2194.96	167732.77	-274979.69	257.67
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	40156.51	2074.08	3592.39	280253.05	-156139.54	-33.64
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	40156.51	0.01	4148.14	322284.78	725.93	9.10
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	40156.51	-2074.07	3592.39	280252.86	157591.29	49.43
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	40156.51	-3801.79	2194.96	167732.59	276431.20	-248.47
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	40156.51	-5099.48	-0.01	8553.12	349724.62	-1235.46
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	40156.51	-3801.79	-2194.98	-150624.75	276431.60	-257.41
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	40156.51	-2074.07	-3592.41	-263145.43	157591.80	33.90
Dead+Wind 0 deg - Service	16861.73	0.00	-3385.49	-259731.36	407.75	-15.69

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 30 deg - Service	16861.73	1692.75	-2931.92	-224739.10	-130185.51	-49.26
Dead+Wind 60 deg - Service	16861.73	3642.96	-2103.27	-139165.07	-243153.20	348.37
Dead+Wind 90 deg - Service	16861.73	5096.38	-0.00	1454.79	-323393.32	1359.68
Dead+Wind 120 deg - Service	16861.73	3642.96	2103.26	142074.96	-243153.16	364.02
Dead+Wind 150 deg - Service	16861.73	1692.75	2931.91	227648.97	-130185.45	-22.06
Dead+Wind 180 deg - Service	16861.73	0.00	3385.48	262641.20	407.75	15.72
Dead+Wind 210 deg - Service	16861.73	-1692.74	2931.91	227648.89	131000.91	49.29
Dead+Wind 240 deg - Service	16861.73	-3642.96	2103.26	142074.88	243968.52	-348.34
Dead+Wind 270 deg - Service	16861.73	-5096.37	-0.00	1454.79	324208.59	-1359.64
Dead+Wind 300 deg - Service	16861.73	-3642.96	-2103.27	-139164.99	243968.55	-363.99
Dead+Wind 330 deg - Service	16861.73	-1692.74	-2931.92	-224739.02	131000.97	22.09

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-16861.74	0.00	-0.05	16861.74	-0.01	0.000%
2	0.00	-20234.09	-22245.95	-0.00	20233.91	22243.26	0.009%
3	0.00	-15175.57	-22245.95	0.00	15175.37	22242.95	0.011%
4	11122.97	-20234.09	-19265.56	-11122.91	20234.08	19265.44	0.000%
5	11122.97	-15175.57	-19265.56	-11122.90	15175.56	19265.43	0.001%
6	23936.73	-20234.09	-13819.88	-23936.62	20234.08	13819.82	0.000%
7	23936.73	-15175.57	-13819.88	-23936.60	15175.56	13819.81	0.000%
8	33485.87	-20234.09	0.00	-33482.91	20233.88	-0.03	0.008%
9	33485.87	-15175.57	0.00	-33483.78	15175.42	-0.02	0.006%
10	23936.73	-20234.09	13819.88	-23936.62	20234.08	-13819.82	0.000%
11	23936.73	-15175.57	13819.88	-23936.60	15175.56	-13819.81	0.000%
12	11122.97	-20234.09	19265.56	-11122.91	20234.08	-19265.44	0.000%
13	11122.97	-15175.57	19265.56	-11122.90	15175.56	-19265.43	0.001%
14	0.00	-20234.09	22245.95	-0.00	20233.91	-22243.26	0.009%
15	0.00	-15175.57	22245.95	0.00	15175.37	-22242.94	0.011%
16	-11122.97	-20234.09	19265.56	11122.91	20234.08	-19265.44	0.000%
17	-11122.97	-15175.57	19265.56	11122.90	15175.56	-19265.43	0.001%
18	-23936.73	-20234.09	13819.88	23936.62	20234.08	-13819.82	0.000%
19	-23936.73	-15175.57	13819.88	23936.60	15175.56	-13819.81	0.000%
20	-33485.87	-20234.09	0.00	33482.90	20233.88	-0.03	0.008%
21	-33485.87	-15175.57	0.00	33483.78	15175.42	-0.02	0.006%
22	-23936.73	-20234.09	-13819.88	23936.62	20234.08	13819.82	0.000%
23	-23936.73	-15175.57	-13819.88	23936.60	15175.56	13819.81	0.000%
24	-11122.97	-20234.09	-19265.56	11122.91	20234.08	19265.44	0.000%
25	-11122.97	-15175.57	-19265.56	11122.90	15175.56	19265.43	0.001%
26	0.00	-40156.52	0.00	-0.56	40156.52	0.98	0.003%
27	0.00	-40156.52	-4149.07	-0.01	40156.51	4148.16	0.002%
28	2074.53	-40156.52	-3593.20	-2074.08	40156.51	3592.41	0.002%
29	3802.60	-40156.52	-2195.43	-3801.80	40156.51	2194.98	0.002%
30	5100.46	-40156.52	0.00	-5099.50	40156.51	0.01	0.002%
31	3802.60	-40156.52	2195.43	-3801.80	40156.51	-2194.96	0.002%
32	2074.53	-40156.52	3593.20	-2074.08	40156.51	-3592.39	0.002%
33	0.00	-40156.52	4149.07	-0.01	40156.51	-4148.14	0.002%
34	-2074.53	-40156.52	3593.20	2074.07	40156.51	-3592.39	0.002%
35	-3802.60	-40156.52	2195.43	3801.79	40156.51	-2194.96	0.002%
36	-5100.46	-40156.52	0.00	5099.48	40156.51	0.01	0.002%
37	-3802.60	-40156.52	-2195.43	3801.79	40156.51	2194.98	0.002%
38	-2074.53	-40156.52	-3593.20	2074.07	40156.51	3592.41	0.002%
39	0.00	-16861.74	-3386.36	-0.00	16861.73	3385.49	0.005%
40	1693.18	-16861.74	-2932.67	-1692.75	16861.73	2931.92	0.005%
41	3643.74	-16861.74	-2103.71	-3642.96	16861.73	2103.27	0.005%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
42	5097.34	-16861.74	0.00	-5096.38	16861.73	0.00	0.005%
43	3643.74	-16861.74	2103.71	-3642.96	16861.73	-2103.26	0.005%
44	1693.18	-16861.74	2932.67	-1692.75	16861.73	-2931.91	0.005%
45	0.00	-16861.74	3386.36	-0.00	16861.73	-3385.48	0.005%
46	-1693.18	-16861.74	2932.67	1692.74	16861.73	-2931.91	0.005%
47	-3643.74	-16861.74	2103.71	3642.96	16861.73	-2103.26	0.005%
48	-5097.34	-16861.74	0.00	5096.37	16861.73	0.00	0.006%
49	-3643.74	-16861.74	-2103.71	3642.96	16861.73	2103.27	0.005%
50	-1693.18	-16861.74	-2932.67	1692.74	16861.73	2931.92	0.005%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	13	0.00000001	0.00000001
2	Yes	25	0.00006290	0.00007153
3	Yes	24	0.00006863	0.00008389
4	Yes	31	0.00000001	0.00008137
5	Yes	30	0.00000001	0.00009559
6	Yes	31	0.00000001	0.00008282
7	Yes	30	0.00000001	0.00009650
8	Yes	25	0.00006209	0.00009417
9	Yes	25	0.00004391	0.00007094
10	Yes	31	0.00000001	0.00008152
11	Yes	30	0.00000001	0.00009489
12	Yes	31	0.00000001	0.00008281
13	Yes	30	0.00000001	0.00009731
14	Yes	25	0.00006290	0.00007162
15	Yes	24	0.00006863	0.00008397
16	Yes	31	0.00000001	0.00008369
17	Yes	30	0.00000001	0.00009833
18	Yes	31	0.00000001	0.00008154
19	Yes	30	0.00000001	0.00009476
20	Yes	25	0.00006205	0.00009424
21	Yes	25	0.00004389	0.00007097
22	Yes	31	0.00000001	0.00008283
23	Yes	30	0.00000001	0.00009636
24	Yes	31	0.00000001	0.00008223
25	Yes	30	0.00000001	0.00009657
26	Yes	13	0.00000001	0.00000859
27	Yes	26	0.00000001	0.00001667
28	Yes	26	0.00000001	0.00002538
29	Yes	26	0.00000001	0.00002587
30	Yes	26	0.00000001	0.00001793
31	Yes	26	0.00000001	0.00002627
32	Yes	26	0.00000001	0.00002632
33	Yes	26	0.00000001	0.00001711
34	Yes	26	0.00000001	0.00002700
35	Yes	26	0.00000001	0.00002674
36	Yes	26	0.00000001	0.00001818
37	Yes	26	0.00000001	0.00002634
38	Yes	26	0.00000001	0.00002604
39	Yes	23	0.00000001	0.00004204
40	Yes	23	0.00000001	0.00003736
41	Yes	23	0.00000001	0.00003854
42	Yes	23	0.00000001	0.00004607

43	Yes	23	0.00000001	0.00003800
44	Yes	23	0.00000001	0.00003797
45	Yes	23	0.00000001	0.00004226
46	Yes	23	0.00000001	0.00003827
47	Yes	23	0.00000001	0.00003823
48	Yes	23	0.00000001	0.00004645
49	Yes	23	0.00000001	0.00003875
50	Yes	23	0.00000001	0.00003760

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	125.67 - 115.67	14.197	48	1.1615	0.0020
L2	115.67 - 105.67	11.781	48	1.1321	0.0015
L3	105.67 - 85.67	9.515	48	1.0158	0.0019
L4	85.67 - 46.96	5.840	48	0.7375	0.0026
L5	46.96 - 8.17	1.409	48	0.3501	0.0017

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
123.00	2' Standoff T-Arm (5' face width)	48	13.546	1.1589	0.0019	16269
122.67	Junction Box	48	13.466	1.1585	0.0018	16269
104.00	Ring Mount	48	9.164	0.9922	0.0020	3791
70.00	PiROD 13' Low Profile Platform (Monopole)	48	3.629	0.5609	0.0024	5243

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	125.67 - 115.67	92.967	20	7.5786	0.0132
L2	115.67 - 105.67	77.237	20	7.4009	0.0096
L3	105.67 - 85.67	62.446	20	6.6549	0.0123
L4	85.67 - 46.96	38.374	20	4.8441	0.0166
L5	46.96 - 8.17	9.265	20	2.3025	0.0111

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
123.00	2' Standoff T-Arm (5' face width)	20	88.731	7.5657	0.0123	2790
122.67	Junction Box	20	88.208	7.5633	0.0122	2790
104.00	Ring Mount	20	60.149	6.5025	0.0130	600
70.00	PiROD 13' Low Profile Platform (Monopole)	20	23.860	3.6880	0.0159	807

Base Plate Design Data

Plate Thickness in	Number of Anchor Bolts	Anchor Bolt Size in	Actual Allowable Ratio Bolt Tension lb	Actual Allowable Ratio Concrete Stress ksi	Actual Allowable Ratio Plate Stress ksi	Actual Allowable Ratio Stiffener Stress ksi	Controlling Condition	Critical Ratio
2.7500	12	2.2500	123717.00 223654.40 0.55	1.952 3.060 0.64	32.668 54.000 0.60		Conc fc	0.64 ✔

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	125.67 - 115.67 (1)	TP17.72x15.75x0.157	10.00	117.50	226.1	8.7520	-1446.88	38659.90	0.037
L2	115.67 - 105.67 (2)	TP17.72x17.72x0.157	10.00	117.50	226.1	8.7520	-1937.24	38659.90	0.050
L3	105.67 - 85.67 (3)	TP23.62x17.72x0.197	20.00	117.50	169.6	14.6459	-4448.30	115069.00	0.039
L4	85.67 - 46.96 (4)	TP33.86x23.62x0.276	38.71	117.50	118.3	29.4204	-12077.90	475195.00	0.025
L5	46.96 - 8.17 (5)	TP44.09x33.86x0.315	38.79	117.50	90.7	43.7667	-20201.20	1196820.00	0.017

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	125.67 - 115.67 (1)	TP17.72x15.75x0.157	52610.75	227636.67	0.231	0.00	227636.67	0.000
L2	115.67 - 105.67 (2)	TP17.72x17.72x0.157	127465.00	227636.67	0.560	0.00	227636.67	0.000

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L3	105.67 - 85.67 (3)	TP23.62x17.72x0.197	320685.00	499067.50	0.643	0.00	499067.50	0.000
L4	85.67 - 46.96 (4)	TP33.86x23.62x0.276	1013125.00	1427158.33	0.710	0.00	1427158.33	0.000
L5	46.96 - 8.17 (5)	TP44.09x33.86x0.315	2132583.33	2643175.00	0.807	0.00	2643175.00	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	125.67 - 115.67 (1)	TP17.72x15.75x0.157	7192.48	315490.00	0.023	146.85	456444.17	0.000
L2	115.67 - 105.67 (2)	TP17.72x17.72x0.157	7780.86	315490.00	0.025	146.61	456444.17	0.000
L3	105.67 - 85.67 (3)	TP23.62x17.72x0.197	10440.70	518360.00	0.020	378.52	1000625.00	0.000
L4	85.67 - 46.96 (4)	TP33.86x23.62x0.276	24434.10	1033650.00	0.024	2989.41	2861350.00	0.001
L5	46.96 - 8.17 (5)	TP44.09x33.86x0.315	33502.60	1467210.00	0.023	8901.58	5298566.67	0.002

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	125.67 - 115.67 (1)	0.037	0.231	0.000	0.023	0.000	0.269 ✔	1.000	4.8.2 ✔
L2	115.67 - 105.67 (2)	0.050	0.560	0.000	0.025	0.000	0.611 ✔	1.000	4.8.2 ✔
L3	105.67 - 85.67 (3)	0.039	0.643	0.000	0.020	0.000	0.682 ✔	1.000	4.8.2 ✔
L4	85.67 - 46.96 (4)	0.025	0.710	0.000	0.024	0.001	0.736 ✔	1.000	4.8.2 ✔
L5	46.96 - 8.17 (5)	0.017	0.807	0.000	0.023	0.002	0.824 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L1	125.67 - 115.67	Pole	TP17.72x15.75x0.157	1	-1446.88	38659.90	26.9	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L2	115.67 - 105.67	Pole	TP17.72x17.72x0.157	2	-1937.24	38659.90	61.1	Pass
L3	105.67 - 85.67	Pole	TP23.62x17.72x0.197	3	-4448.30	115069.00	68.2	Pass
L4	85.67 - 46.96	Pole	TP33.86x23.62x0.276	4	-12077.90	475195.00	73.6	Pass
L5	46.96 - 8.17	Pole	TP44.09x33.86x0.315	5	-20201.20	1196820.00	82.4	Pass
							Summary	
						Pole (L5)	82.4	Pass
						Base Plate	63.8	Pass
						RATING =	**82.4**	**Pass**

Program Version 8.0.5.0 - 11/28/2018 File:W:/STRUCTURAL DEPARTMENT/ANALYSIS SOFTWARE/TnxTower/Tnx Projects/VERIZON/CT/Forest Heights CT RELO/Rev2/Forest Heights CT RELO Rev2.eri

HUDSON
Design Group LLC

REFERENCE DOCUMENTS

C150110018
QUOTATION #

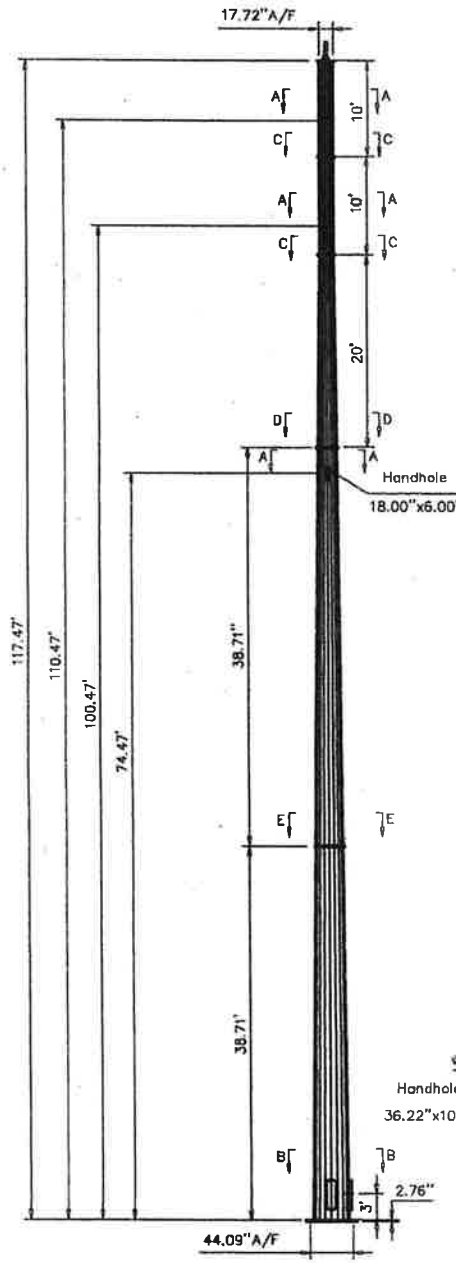
Design Output:

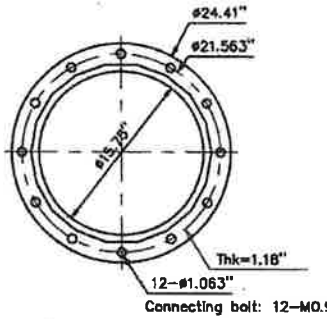
1. Material: Pole shaft: ASTM A572 GR65
   Baseplate,Connection Flange,Top Flange: Q345B or ASTM A572 GR50
2. Pole section has 18 sides
3. Finished: Finish Paint Over galvanizing per ASTM A123
   4'Lightning Rod : copper clad
4. Section information detail

Section #	1st	2nd	3rd	4th	5th
Thickness (in):	0.315	0.276	0.197	0.157	0.157
Length (ft):	38.714	38.714	20.0	10.0	10.0
Top (in):	33.86	23.62	17.72	17.72	17.72
Bottom (in):	44.09	33.86	23.62	17.72	17.72

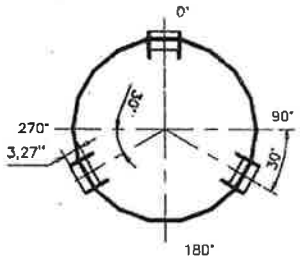
5.Charpy impact requirement

Material	Charpy V-Notch Test	
	Minimum Impact Energy(J)	Test Temperature(°C)
ASTM A572 GR65	34	-30
Q345B	34	20

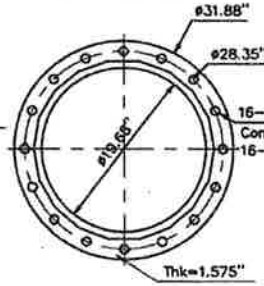




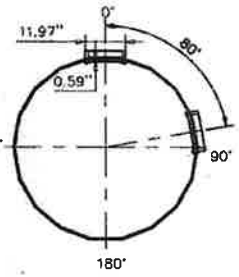
C-C
Connecting Flange 2



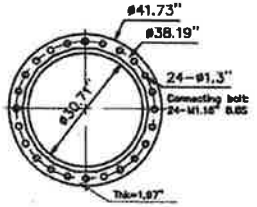
A_A



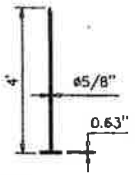
D-D
Connecting Flange 1

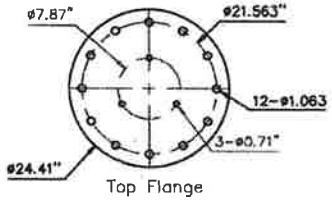


B_B

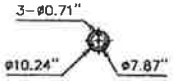


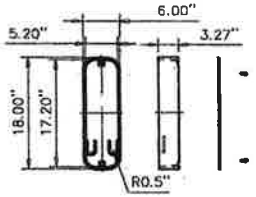
E-E
Connecting Flange 3



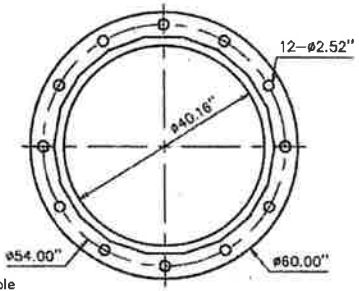


Top Flange



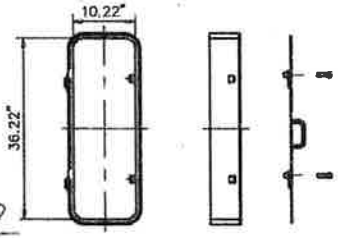


Handhole-18.00"x6.00"



Handhole
36.22"x10.24"

Baseplate



Handhole 36.22"x10.24"

4'Lightning Rod(copper clad)
Please find attached documents with the safety device

NO	PART NO.	DESCRIPTION	WEIGHT	QTY
10		Connecting Flange 3		2
9		Connecting Flange 2		4
8		Connecting Flange 1		2
7		4' Steel Lightning Rod		1
6		Top Cap		1
5		Safety Device		1
4		Step Bolts		1
3		Handhole 18.00"x6.00"		9
2		Hand Hole 36.22"x10.24"		2
1		Pole		1

Ambor Structures
ambarstructures.com

DWG SIZE	A4V CLASS CODE
CUSTOMER	BLUESKY
DESCRIPTION	120ft CP

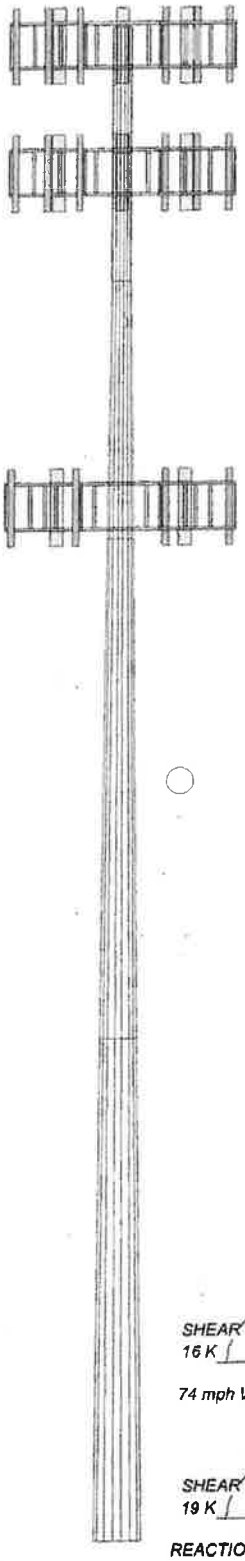
DRAWN	dwz	Jun.29.2015	MATERIAL	ORDER NO
ENGR	dwz	Jun.29.2015	THK(mm)	SCALE
CHECKED	WJ	Jun.29.2015	WT(kg)	VERSION: E
SPECIFICATIONS				

REV NO.	DATE	REVISION DESCRIPTION

STATE OF CONNECTICUT
MICHAEL T. DE SIMONE
No. 18082
LICENSED PROFESSIONAL ENGINEER
08/21/2015

Section	1	2	3	4	5
Length (ft)	10'	10'	20'	38'8-17/32"	38'9-1/8"
Number of Sides	18	18	18	18	18
Thickness (in)	0.16	0.16	0.20	0.28	0.32
Top Dia (in)	17.72	17.72	17.72	23.62	33.86
Bot Dia (in)	17.72	17.72	23.62	33.86	44.08
Grade				A572-65	
Weight (K)	0.3	0.3	0.9	3.3	5.1

117.5 ft
107.5 ft
97.5 ft
77.5 ft
38.8 ft
0.0 ft



DESIGNED APPURTENANCE LOADING

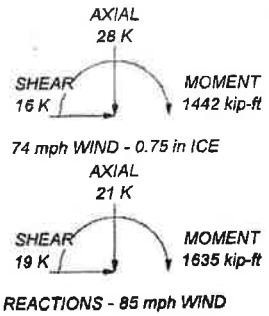
TYPE	ELEVATION	TYPE	ELEVATION
12' Low Profile	116	(12) TMABPDB7823	106
(6) OPA-65R-LCUU-H4	116	(12) TMABPDB7823	80
12' Low Profile	106	(12) OPA-65R-LCUU-H4	80
(12) OPA-65R-LCUU-H4	106	12' Low Profile	80

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield 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 0.75 in ice.
4. Deflections are based upon a 60 mph wind.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Tower will meet or exceed the required 100 mph (3-sec gust) wind speed for Bridgeport, CT.
8. IBC 2003 in conjunction with the 2005 CT supplement and 2013 Amendments.
9. TOWER RATING: 93.8%

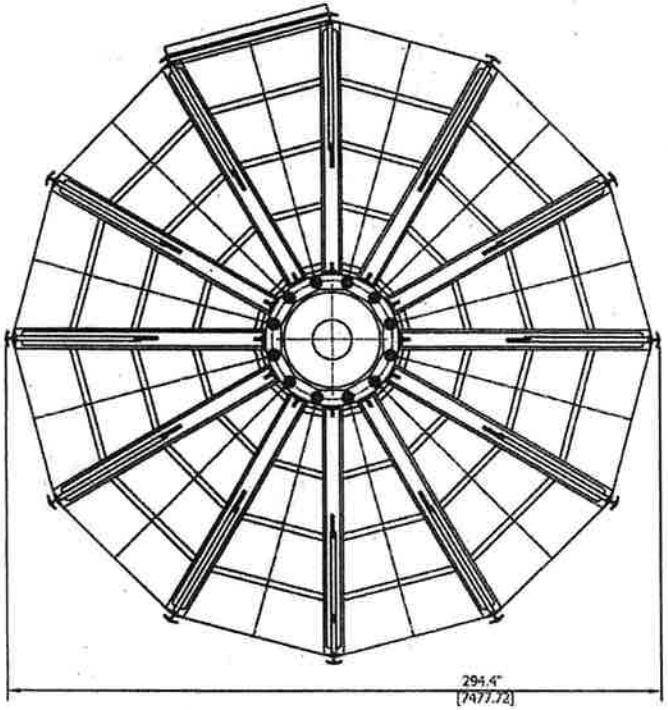


REACTIONS - 85 mph WIND

11/16/2015

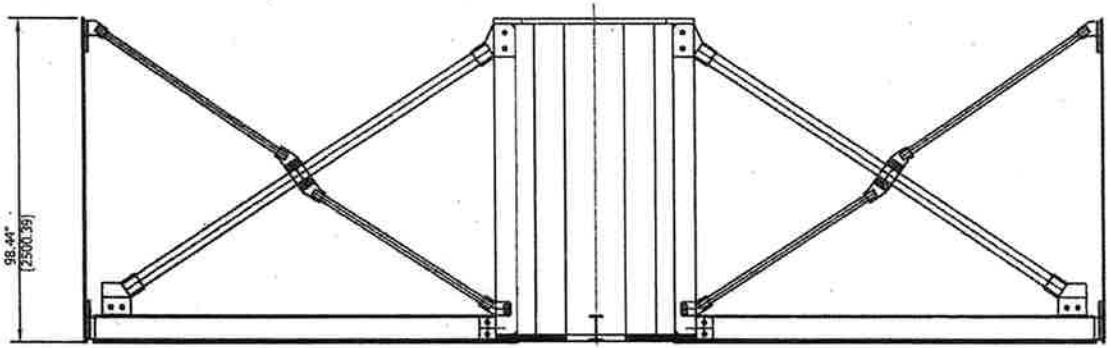
bennett&pless
Experience Structural Expertise
Bennett & Pless
550 River Drive
North Sioux City, SD 57049
Phone: 605-540-4621
FAX: 678-990-8701

Job: 120FT CP			
Project: Evergreen Street			
Client: BlueSky Tower	Drawn by: Chunhui Song		App'd:
Code: TIA/EIA-222-F	Date: 11/12/15		Scale: NTS
Path:			Dwg No. E-1



QuikBase 12-B

Capacity: 2500ft-kip
Ballast: Concrete Block
Non-Penetrating Foundation



AMBER STRUCTURES

370 Jackson St. Suite 475
St. Paul, MN 55101

Trusted provider of **monopoles** and innovative **structural solutions**

bennett & pless
Experience Structural Expertise
Atlanta, GA • Chattanooga, TN • North Kansas City, MO

STATE OF CONNECTICUT
MICHAEL T. DE BOER
No. 18022
LICENSED PROFESSIONAL ENGINEER
09/04/2015

SHEET INDEX:

PROJECT:	Evergreen Street 120ft Monopole
CUSTOMER:	Blue Sky Tower Partners, LLC SITE: 220 Evergreen Street Bridgeport, CT 06606 (Fairfield County)
CUSTOMER PO #:	
DESCRIPTION:	
DRAWING #:	
DRAWN:	KE July 16, 2015
ENGR:	
CHECKED:	
SPECS:	
VERSION:	A

PROJECT INFORMATION:

Date: September 4 2015
Customer: Blue Sky Tower Partners, LLC
Tower Design: 117ft 85mph Monopole with Ballasted Foundation
Site #: CT-5020

Site Location:
220 Evergreen Street
Bridgeport, CT 06606
Fairfield County, Conneticut
41.1978, -73.1908

Design Criteria:

WIND
85mph basic wind in accordance with TIA-222-F Standard. IBC 2003 in conjunction with the 2005 CT supplement and 2013 amendments.
74mph basic wind wit 0.75 in ice. Ice is considered to increase in thickness with height.

EXPOSURE
C

TOWER CLASS:
II

TOPOGRAPHIC CATEGORY:
1 with Crest Height: 0ft

Tower Reactions:
Moment: 2220 kip-ft
Shear: 26K
Axial: 25K

Ballast Requirement:
251,000lbs

Preferred Ballast Type:
Concrete waste block - 2ft x 2ft x 6ft; 3,600lbs

Qty per Sector (12):
6 blocks (can be stood on end to achieve ballast requirement within the space provided)

IF RELOCATED, ADDITIONAL CALCULATIONS WILL NEED TO BE RUN FOR VERIFICATION.

REV	DATE	REV DESCRIPTION

STRUCTURAL STEEL:
1. PROVIDE STRUCTURAL STEEL CONFORMING TO THE FOLLOWING STANDARDS:
   1.1. AISC MANUAL OF STEEL CONSTRUCTION, 13TH EDITION
   1.2. AISC 360-05, SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS
   1.3. AISC 303-05, CODE OF STANDARD PRACTICE FOR STRUCTURAL STEEL BUILDINGS AND BRIDGES
   1.4. AISC 326-02, DETAILING FOR STEEL CONSTRUCTION, 2ND EDITION

SHOP DRAWINGS:
1. SUBMIT SHOP DRAWINGS PREPARED IN ACCORDANCE WITH AISC 326-02.
2. PROVIDE COMPLETE WELDING INFORMATION USING AWS SYMBOLS.
3. USE PREQUALIFIED WELDED JOINTS PER AISC AND AWS D1.1 "STRUCTURAL WELDING CODE."
4. DO NOT BEGIN FABRICATION UNTIL SHOP DRAWINGS ARE COMPLETED AND REVIEWED BY THE STRUCTURAL ENGINEER OF RECORD.

UNLESS NOTED OTHERWISE PROVIDE STRUCTURAL STEEL CONFORMING TO:

1.	WIDE FLANGE SHAPES:	ASTM A992 OR EQUIVALENT
2.	CHANNELS, ANGLES AND PLATES:	ASTM A36 OR EQUIVALENT
3.	HOLLOW STEEL SECTIONS (HSS):	ASTM A500, GRADE B OR EQUIVALENT
4.	STRUCTURAL PIPES:	ASTM A53, TYPE E OR S, GRADE B
5.	HEADED STUDS:	ASTM A 29
6.	DEFORMED BAR ANCHORS (DBA):	ASTM A 496
7.	ANCHOR RODS	ASTM F 1554, GRADE 36.

BOLTED CONNECTIONS:
1. UNLESS NOTED OTHERWISE, MAKE ALL CONNECTIONS WITH 3/4" DIAMETER ASTM A 325 BOLTS OR EQUIVALENT.
2. ASSEMBLE AND INSPECT BOLTED CONNECTIONS IN ACCORDANCE WITH AISC "SPECIFICATION FOR JOINTS USING ASTM A 325 OR ASTM A 490 BOLTS", 2004. PROVIDE SNUG TIGHT JOINTS.

WELDED CONNECTIONS:
a. MAKE ALL WELDED CONNECTIONS IN ACCORDANCE WITH AWS D1.1-04 "STRUCTURAL WELDING CODE", USING TYPE E70XX ELECTRODES.
b. EMPLOY ONLY CERTIFIED WELDERS.
c. MAINTAIN PROOF OF CERTIFICATION AT THE JOB SITE.

PROVIDE CONNECTIONS FOR BEAMS WHICH CANNOT CONFORM TO THE TYPICAL CONNECTION DETAILS IN ACCORDANCE WITH THE FOLLOWING:
1. WHERE MEMBER REACTIONS ARE NOT SHOWN ON THE DRAWINGS, DETAIL CONNECTIONS FOR THE MAXIMUM UNIFORM LOAD SHOWN IN THE MAXIMUM TOTAL UNIFORM LOAD TABLES, IN TABLE 3-6 OF THE AISC STEEL CONSTRUCTION MANUAL FOR THE SPAN SHOWN ON THE DRAWING.
2. WHERE MEMBER REACTIONS ARE SHOWN, PROVIDE CONNECTIONS TO DEVELOP THE REACTIONS SHOWN.
3. WHERE CONNECTIONS ARE SUBJECT TO ECCENTRICITY, DETAIL CONNECTIONS THAT ACCOUNT FOR THE ECCENTRICITY.

PROVIDE SPECIAL CONNECTIONS BETWEEN STEEL FRAMING COMPONENTS NOT DETAILED BY THE STRUCTURAL ENGINEER OF RECORD DESIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE WHERE THE PROJECT IS TO BE CONSTRUCTED INCLUDING BUT NOT LIMITED TO BRACE END CONNECTIONS, MOMENT RESISTING CONNECTIONS, MODIFIED BEAM SEAT CONNECTIONS, AND MEMBER SPLICE CONNECTIONS.
1. DO NOT USE GAS CUTTING TORCHES TO CORRECT FABRICATION ERRORS IN STRUCTURAL STEEL FRAMING.
2. PROVIDE TEMPORARY BRACING FOR STRUCTURAL STEEL FRAMING UNTIL ALL PERMANENT BRACING, MOMENT CONNECTIONS, AND FLOOR/ROOF DECKS (DIAPHRAGMS) ARE COMPLETELY INSTALLED.
3. PAINT STRUCTURAL STEEL IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS. DO NOT PAINT STEEL SURFACES TO BE ENCASED IN CONCRETE, SURFACES TO RECEIVE FIREPROOFING, CONNECTIONS DESIGNATED AS FRICTION TYPE, SURFACES TO BE WELDED, OR SURFACES RECEIVING WELDED STUDS OR DEFORMED BAR ANCHORS ("DBA's") IN THE FIELD..

AMBOR STRUCTURES
370 Jackson St. Suite 475, St. Paul, MN 55101
http://amborstructures.com

Trusted provider of **monopoles** and innovative **structural solutions**

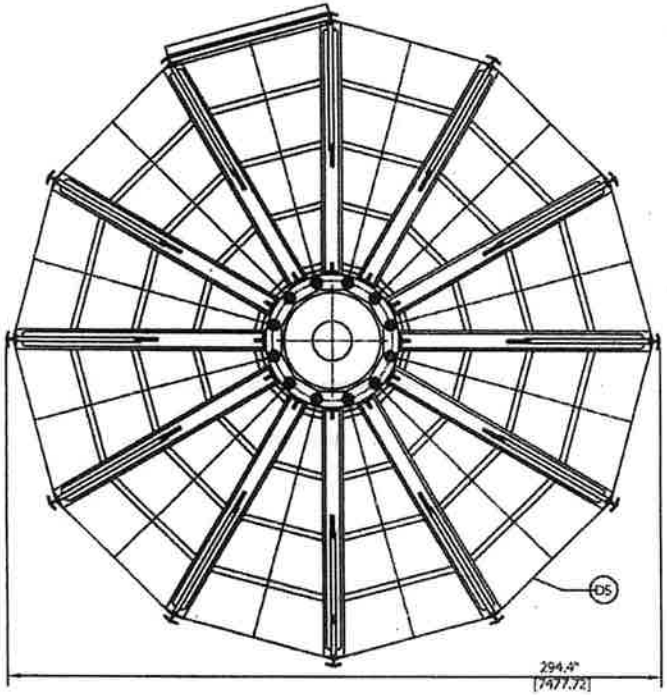
STATE OF CONNECTICUT
MICHAEL T. DE BOER
No. 18062
LICENSED PROFESSIONAL ENGINEER
09/04/2015

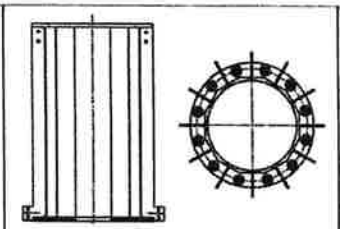
bennett & pless
Experience Structural Expertise
Atlanta, GA•Chattanooga, TN•North Sioux City, SD

PROJECT: Evergreen Street 120ft Monopole
CUSTOMER: Blue Sky Tower Partners, LLC
SITE: 220 Evergreen Street Bridgeport, CT 06606 (Fairfield County)
CUSTOMER PO #:

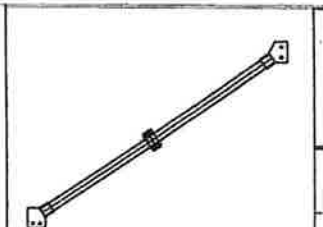
DESCRIPTION:
DRAWING#: KE July 16, 2015
DRAWN:
ENGR:
CHECKED:
SHEET:
VERSION:

N1

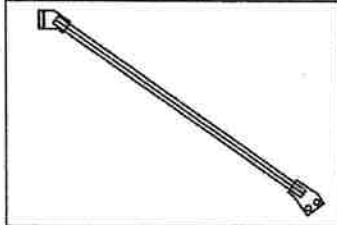




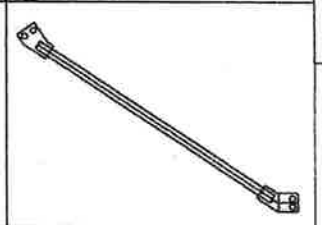
D2- Base Pedestal



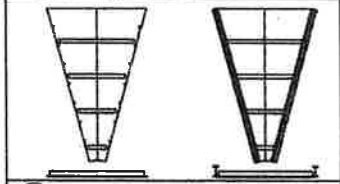
D3- Primary Angle Pipe



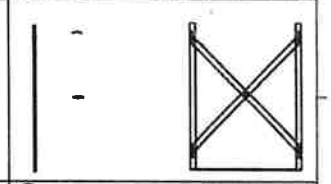
D4- Secondary Angle Pipe (top)



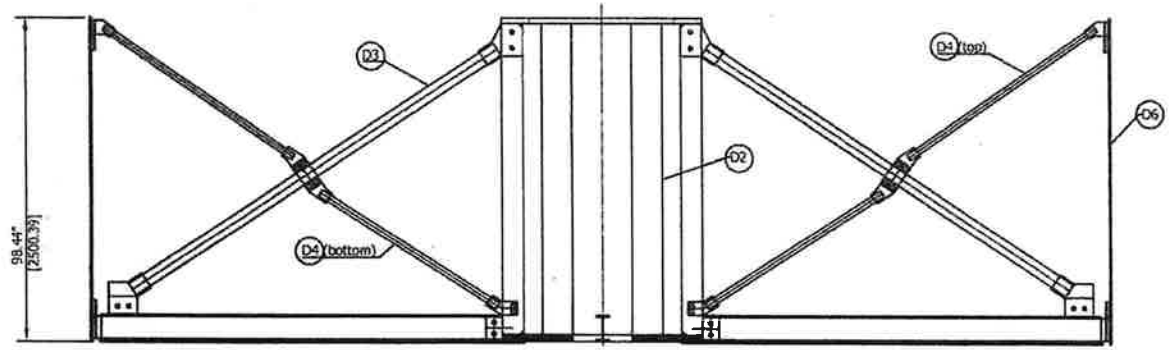
D4- Secondary Angle Pipe (Bottom)



D5- Floor Plates



D6- Perimeter Frame



D1

AMBER STRUCTURES

370 Jackson St. Suite 475
St. Paul, MN 55101

Trusted provider of **monopoles** and innovative **structural solutions**

bennett & pless
Experience Structural Expertise
Atlanta, GA • Chattanooga, TN • North Sioux City, SD

09/04/2015

DRAWING INDEX:

PROJECT: Evergreen Street 120ft Monopole

CUSTOMER:

Blue Sky Tower Partners, LLC

SITE:
220 Evergreen Street
Bridgeport, CT 06606 (Fairfield County)

CUSTOMER PO #:

DESCRIPTION:

DRAWING #:

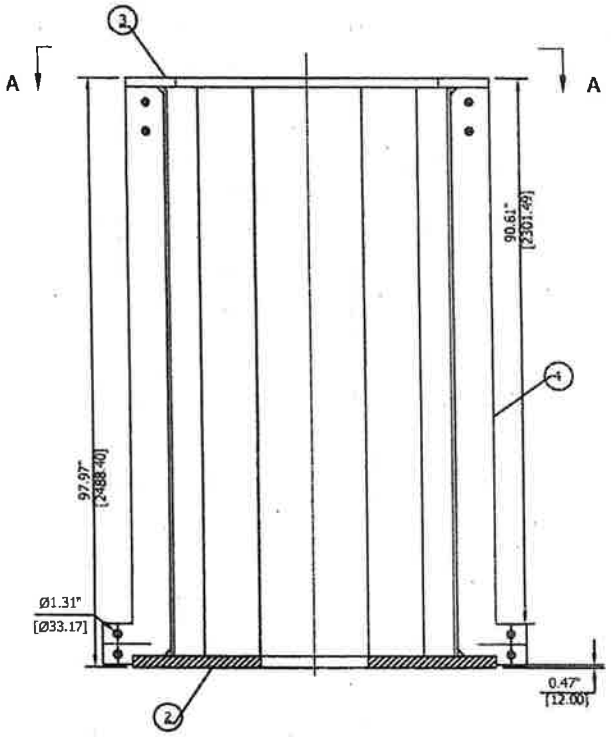
DRAWN: KE July 16, 2015

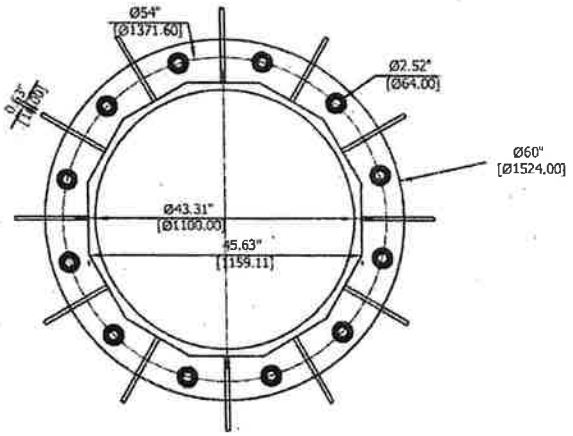
ENGR:

CHECKED:

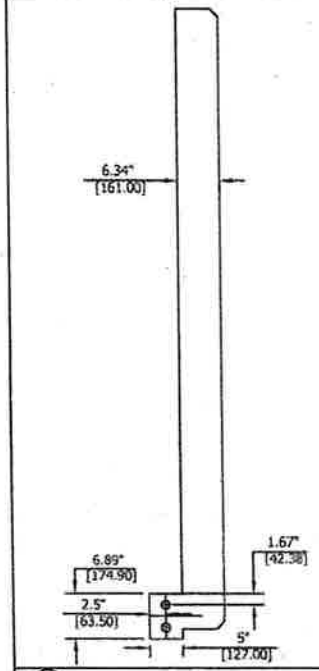
SPECS:

VERSION: A

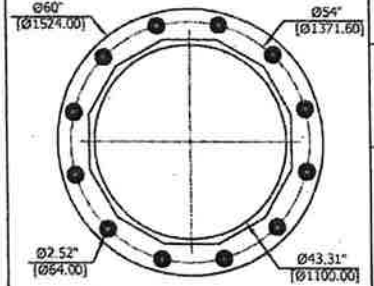




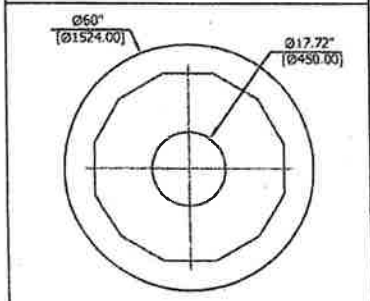
A-A



4 - Stiffener



3 - Top Flange



2 - Bottom Flange

Material Notes:

1. Pedestal Shaft - 12mm thk
2. Pedestal Bottom Plate - 50mm thk
3. Pedestal Top Flange - 40mm thk
4. Stiffener Plate - 16mm thk

02

AMBOR STRUCTURES

370 Jackson St. Suite 475, St. Paul, MN 55101
http://amborstructures.com

Trusted provider of **monopoles** and innovative **structural solutions**

STATE OF CONNECTICUT
MICHAEL T. DE BRETT
No. 18052
LICENSED
PROFESSIONAL ENGINEER
09/04/2015

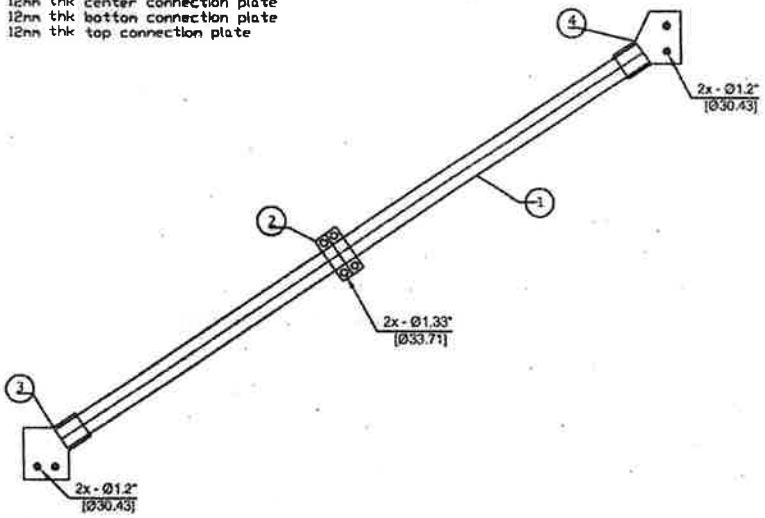
bennett & pless

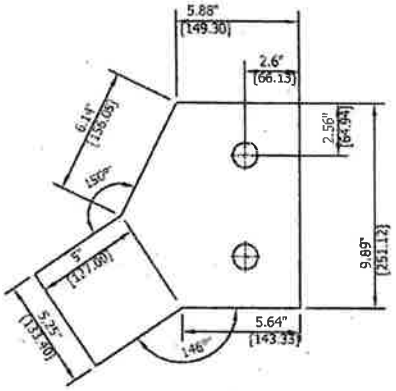
Experience Structural Expertise
Atlanta, GA•Chattanooga, TN•North Sioux City, SD

PROJECT: Evergreen Street 120ft Monopole
CUSTOMER: Blue Sky Tower Partners, LLC
SITE: 220 Evergreen Street
Bridgeport, CT 06606 (Fairfield County)
CUSTOMER PO #:

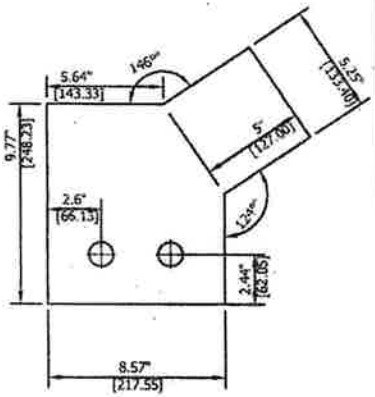
DESCRIPTION:
DRAWING#:
DRAWN: KE July 16, 2015
ENGR:
CHECKED:
SPECS:
VERSION: A

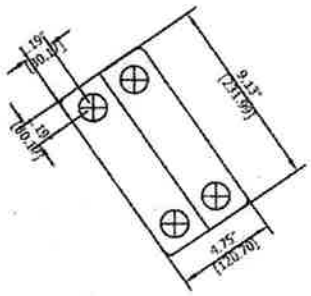
Material NOTES:
1. 108mm x 14mm Pipe
2. 12mm thk center connection plate
3. 12mm thk botton connection plate
4. 12mm thk top connection plate

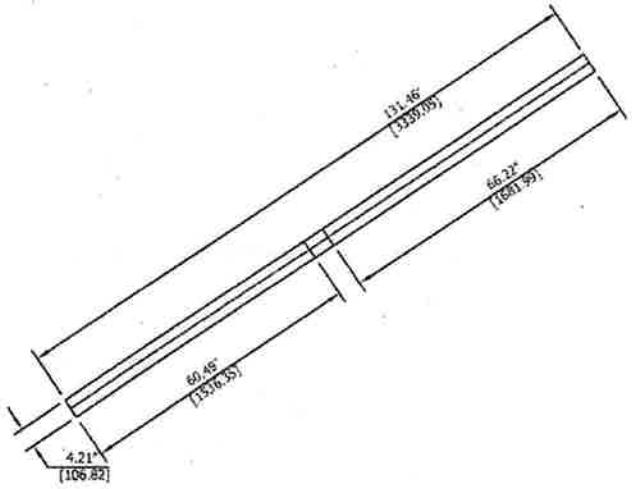




4 12mm thk top connection plate







03 (3) 12mm thk botton connection plate | (2) 12mm thk center connection plate | (1) 108mm x 14mm pipe

AMBOR STRUCTURES

370 Jackson St, Suite 475, St. Paul, MN 55101
http://amborstructures.com

Trusted provider of **monopoles** and innovative **structural solutions**

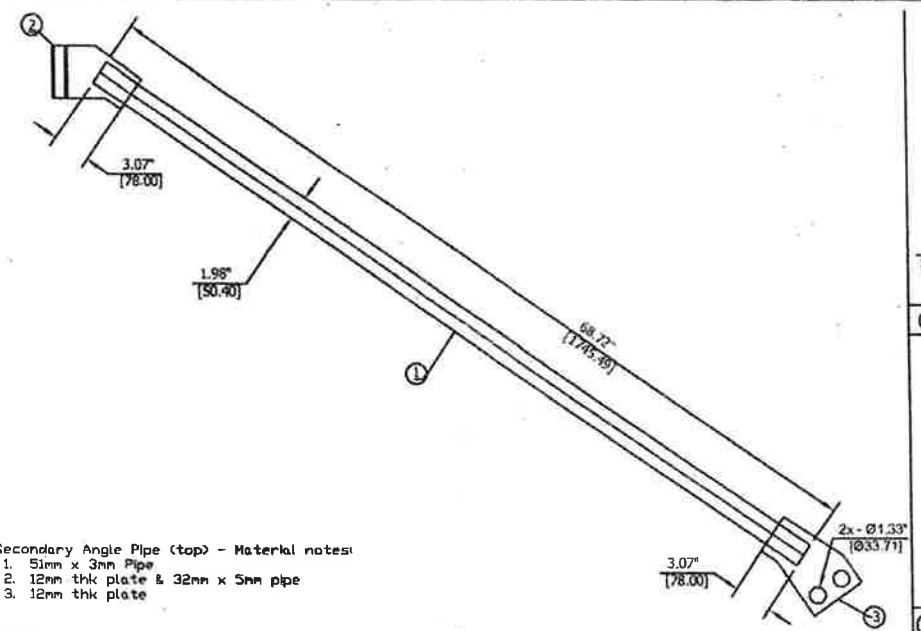
STATE OF CONNECTICUT
MICHAEL T. DE BOER
No. 18022
LICENSED PROFESSIONAL ENGINEER
09/04/2015

bennett & pless

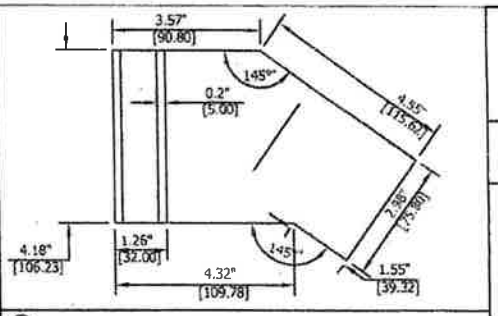
Experience Structural Expertise
Atlanta, GA•Chattanooga, TN•North Sioux City, SD

PROJECT: Evergreen Street 120Ft Monopole
CUSTOMER: Blue Sky Tower Partners, LLC
SITE: 220 Evergreen Street Bridgeport, CT 06606 (Fairfield County)
CUSTOMER PO #:

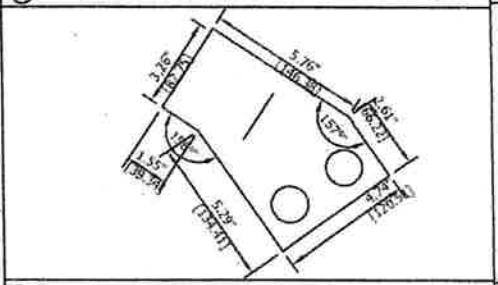
DESCRIPTION:	
DRAWING#:	
DRAWN: KE	July 16, 2015
ENGR:	VERSION:
CHECKED:	
SPECS:	



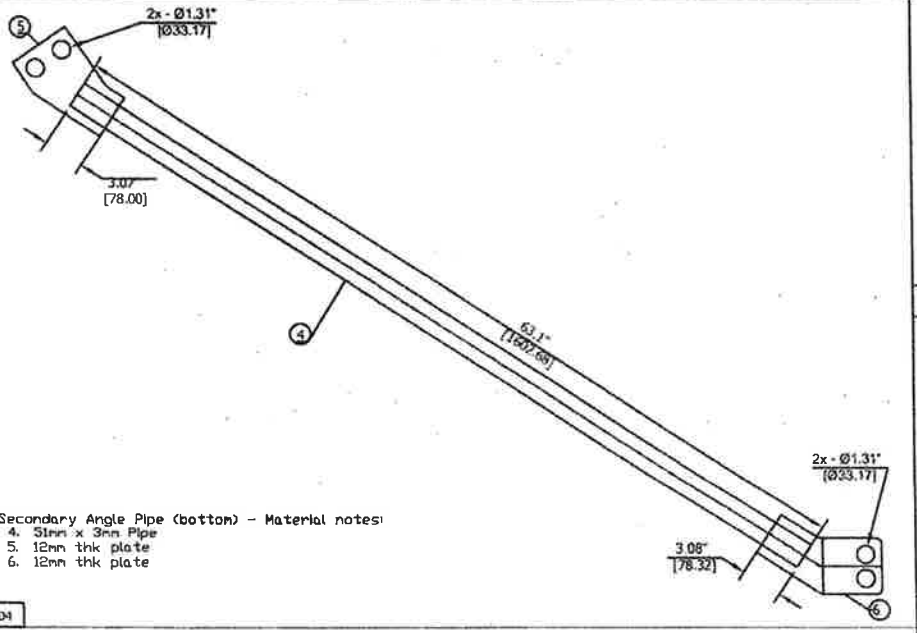
Secondary Angle Pipe (top) - Material notes:
1. 51mm x 3mm Pipe
2. 12mm thk plate & 32mm x 5mm pipe
3. 12mm thk plate



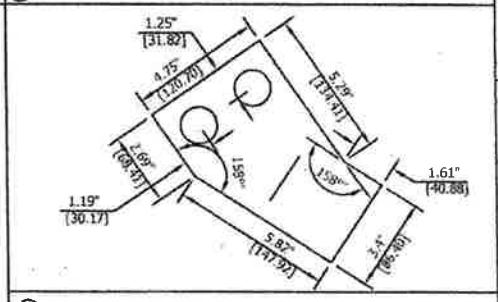
(2) - Top connection plate



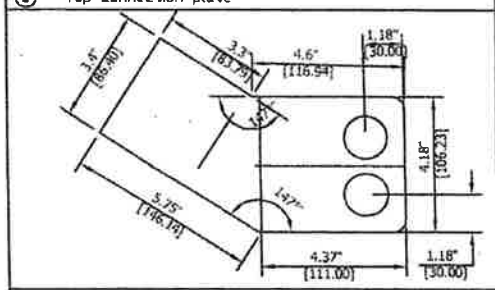
(3) - Bottom connection plate



Secondary Angle Pipe (bottom) - Material notes:
4. 51mm x 3mm Pipe
5. 12mm thk plate
6. 12mm thk plate



(5) - Top connection plate



(6) - Bottom connection plate

D1

AMBOR STRUCTURES

370 Jackson St. Suite 475, St. Paul, MN 55101
http://amborstructures.com

Trusted provider of **monopoles** and innovative **structural solutions**

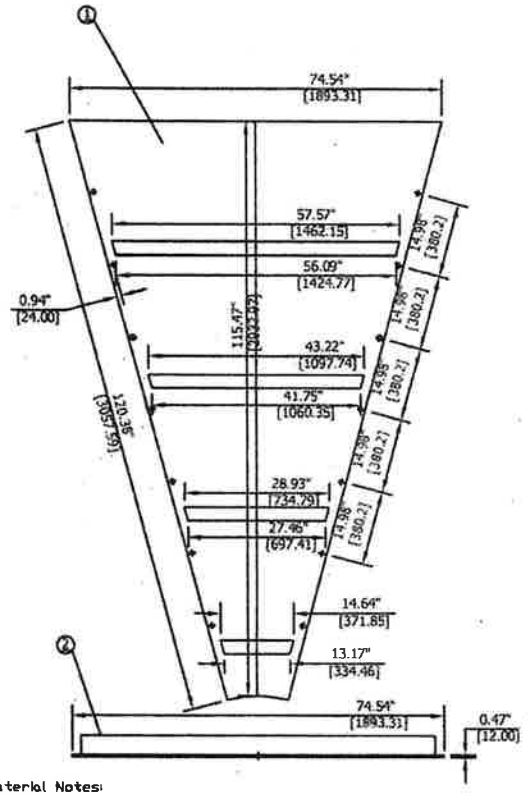
STATE OF CONNECTICUT
MICHAEL T. DE BOER
No. 18062
LICENSED PROFESSIONAL ENGINEER
09/04/2015

bennett & pless

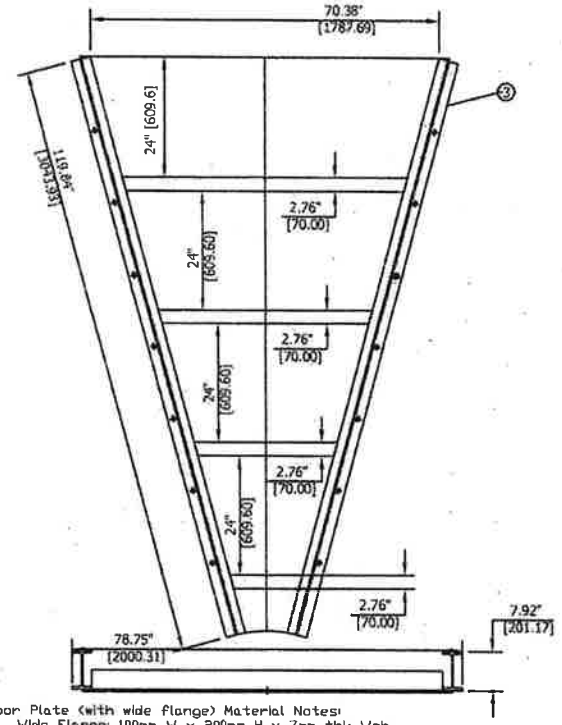
Experience Structural Expertise
Atlanta, GA•Chattanooga, TN•North Sioux City, SD

PROJECT: Evergreen Street 120ft Monopole
CUSTOMER: Blue Sky Tower Partners, LLC
SITE: 220 Evergreen Street
Bridgeport, CT 06606 (Fairfield County)
CUSTOMER PO #:

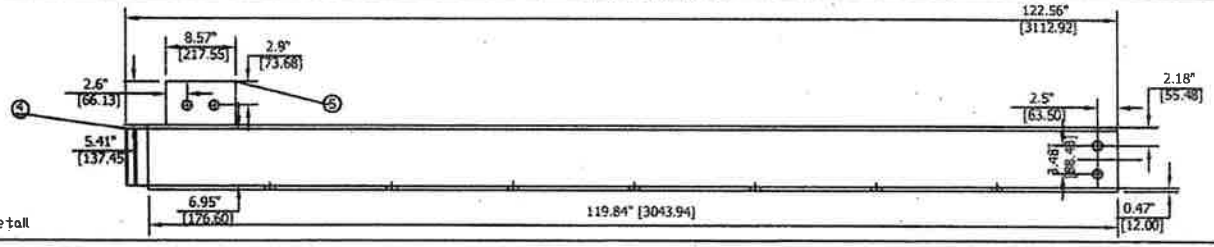
DESCRIPTION:	
DRAWING#:	
DRAWN: KE	July 16, 2015
ENGR:	VERSION:
CHECKED:	
SPECS:	



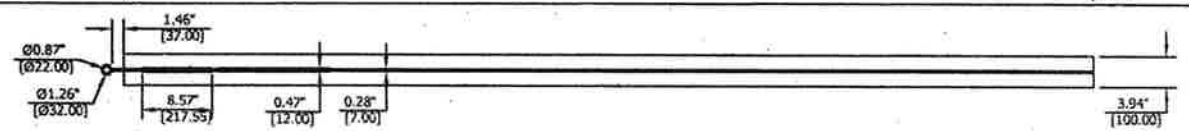
Floor Plate Material Notes:
1. 12mm thk Plate
2. Square tube Stiffeners - 70mm x 70mm x 7mm thk



Floor Plate (with wide flange) Material Notes:
3. Wide Flange: 100mm W x 200mm H x 7mm thk Web
4. 32mm x 5mm Pipe
5. 12mm thk plate



③ - Wide Flange Detail



DS ③ - Top View

AMBER STRUCTURES

370 Jackson St. Suite 475, St. Paul, MN 55101
http://amberstructures.com

Trusted provider of **monopoles** and innovative **structural solutions**

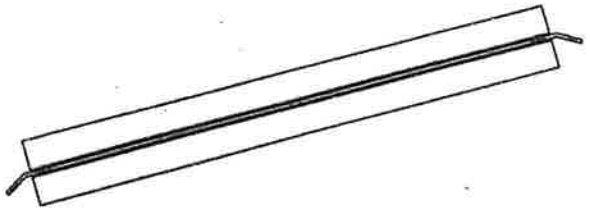
STATE OF CONNECTICUT
MICHAEL T. DEBOER
No. 18072
LICENSED PROFESSIONAL ENGINEER
09/04/2015

bennett & pless

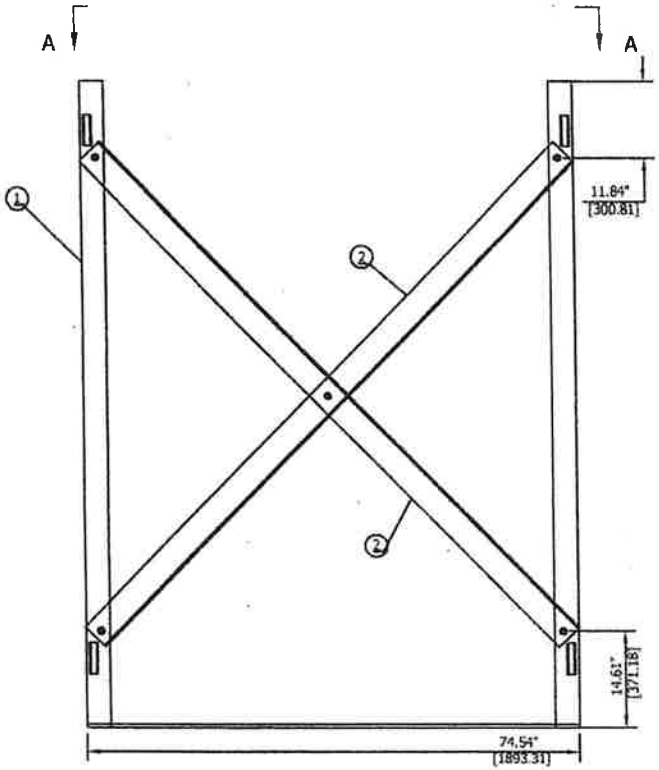
Experience Structural Expertise
Atlanta, GA•Chattanooga, TN•North Sioux City, SD

PROJECT: Evergreen Street 120Ft Monopole
CUSTOMER: Blue Sky Tower Partners, LLC
SITE: 220 Evergreen Street Bridgeport, CT 06606 (Fairfield County)
CUSTOMER PO #:

DESCRIPTION:
DRAWING#:
DRAWN: KE July 16, 2015
ENGR:
CHECKED:
SPECS:
VERSION:

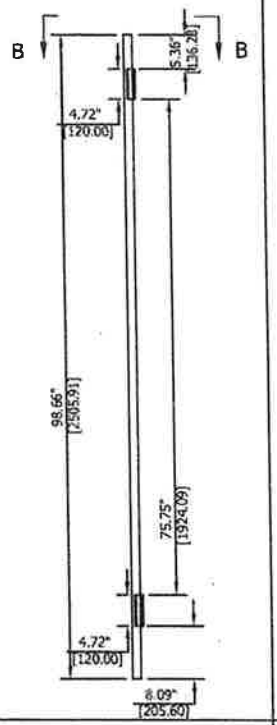


A-A Top View

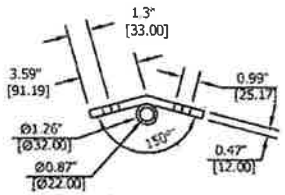


Perimeter Bracing Material Notes:
1. Posts - 12mm Thk Plate (Posts - bent to 150°) & 32mm x 5mm Pipe
2. X-Bracing - 110mm x 110mm x 7mm Angle Iron

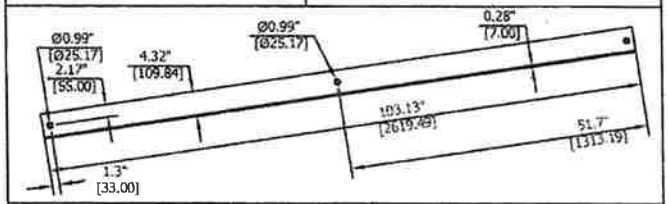
D6



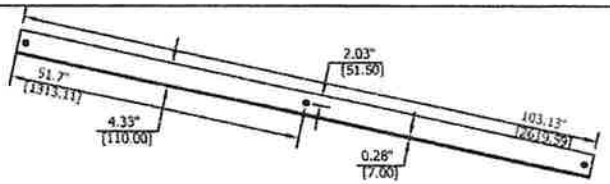
1 - Perimeter Post



B-B Top View



2 - X Bracing



2 - X Bracing

AMBER STRUCTURES

370 Jackson St, Suite 475, St. Paul, MN 55101
http://amberstructures.com

Trusted provider of **monopoles** and innovative **structural solutions**

STATE OF CONNECTICUT
MICHAEL T. DE BOER
No. 18062
LICENSED PROFESSIONAL ENGINEER

09/04/2015

bennett & pless

Experience: **Structural Expertise**
Atlanta, GA•Chattanooga, TN•North Sioux City, SD

PROJECT:	Evergreen Street 120ft Monopole
CUSTOMER:	Blue Sky Tower Partners, LLC
SITE:	220 Evergreen Street Bridgeport, CT 06606 (Fairfield County)
CUSTOMER PO #:	
DESCRIPTION:	
DRAWING#:	
DRAWN:	KE July 16, 2015
ENGR:	
CHECKED:	
SPECS:	
VERSION:	

EXHIBIT 2

CELLCO PARTNERSHIP

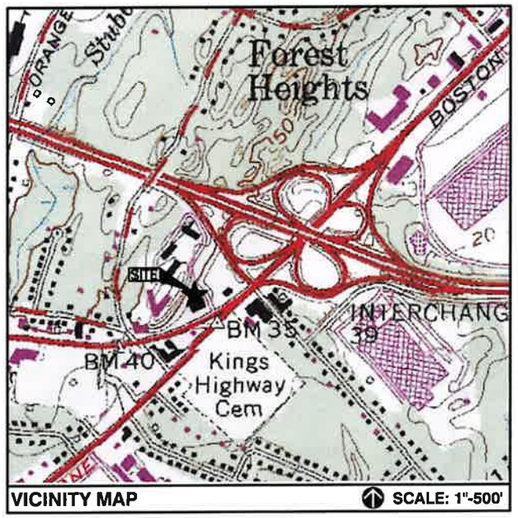
d.b.a. verizon

WIRELESS COMMUNICATIONS FACILITY

FOREST HEIGHTS CT RELO

TEMPORARY SITE

1052 BOSTON POST ROAD
MILFORD, CT 06460



VICINITY MAP — SCALE: 1"-500'

DIRECTIONS TO SITE:

GET ON I-91 S FROM CT-68 E
HEAD NORTH ON ALEXANDER DR TOWARD BARNES INDUSTRIAL RD S
TURN RIGHT ONTO BARNES INDUSTRIAL RD S
TURN RIGHT ONTO CT-68 E
TURN RIGHT ONTO THE INTERSTATE 91 S RAMP TO NEW HAVEN
FOLLOW I-91 S AND I-95 S TO US-1 S/BOSTON POST RD IN MILFORD. TAKE EXIT 39A FROM I-95 S
MERGE ONTO I-91 S
MERGE ONTO I-95 S
TAKE EXIT 39A TO MERGE ONTO US-1 S/BOSTON POST RD
MERGE ONTO US-1 S/BOSTON POST RD
DESTINATION WILL BE ON THE RIGHT
1052 BOSTON POST RD, MILFORD, CT 06460

CONSULTANT TEAM

PROJECT ENGINEER

HUDSON DESIGN GROUP, LLC
45 BEECHWOOD DRIVE
NORTH ANDOVER, MA 01845
TEL: 1-(978)-557-5553
FAX: 1-(978)-336-5586

MEP ENGINEER

HUDSON DESIGN GROUP, LLC
45 BEECHWOOD DRIVE NORTH
ANDOVER, MA 01845
TEL: 1-(978)-557-5553
FAX: 1-(978)-336-5586

PROJECT SUMMARY

VERIZON SITE NAME:	FOREST HEIGHTS CT RELO
AT&T SITE NAME:	CT2327
T-MOBILE SITE NAME:	CTNH007
SITE ADDRESS:	1052 BOSTON POST ROAD MILFORD, CT 06460
PROPERTY OWNER:	TURNPIKE LODGE INC C/O A L CRAFT 1052 BOSTON POST ROAD MILFORD, CT 06460
APPLICANT:	CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS 20 ALEXANDER DRIVE WALLINGFORD, CT 06492
CO-APPLICANT:	AT&T 550 COCHITUATE ROAD FRAMINGHAM, MA 01701
CO-APPLICANT:	T-MOBILE NORTHEAST LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
LEGAL/REGULATORY COUNSEL:	KENNETH C. BALDWIN ESQ. ROBINSON + COLE LLP (860)275-8345
LATITUDE:	N41° 13' 58.31"
LONGITUDE:	W73° 02' 41.98"

VERIZON SCOPE OF WORK INFO.

VERIZON WIRELESS IS PROPOSING TO INSTALL THE FOLLOWING IMPROVEMENTS TO PROPOSED TELECOMMUNICATION SITE:

- NEW ANTENNAS: (3) ANTENNAS PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (9) ANTENNAS.
- NEW RRHs: (2) RRH PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (6) RRHs
- NEW OVPs: (2) OVPs TOTAL WITH ASSOCIATED CABLING AND APPURTENANCE

ITEMS LISTED ABOVE TO BE MOUNTED ON PROPOSED TEMPORARY TOWER.

- NEW EQUIPMENT CABINETS: (2) EQUIPMENT CABINETS ON PROPOSED CELL ON WHEELS (COW)

ITEMS LISTED ABOVE TO BE INSTALLED WITHIN PROPOSED TEMPORARY 40'x50' FENCED COMPOUND

- POWER AND TELCO SERVICES WILL BE ROUTED UNDERGROUND FROM LANDLORD PROVIDED METER CENTER TO PROPOSED EQUIPMENT. FINAL UTILITY ROUTING TO BE DETERMINED/VERIFIED BY UTILITY COMPANIES.

SHEET INDEX

SHT. NO.	DESCRIPTION
T-1	TITLE SHEET
C-1	ABUTTERS PLAN
A-1	COMPOUND PLAN
A-2	ANTENNA LAYOUTS & ELEVATION

T-MOBILE SCOPE OF WORK INFO.

T-MOBILE IS PROPOSING TO INSTALL THE FOLLOWING IMPROVEMENTS TO PROPOSED TELECOMMUNICATION SITE:

NEW ANTENNAS: (1) ANTENNA PER SECTOR WITH
(3) SECTORS, FOR A TOTAL OF
(3) ANTENNAS WITH ASSOCIATED CABLING AND APPURTENANCE ITEMS LISTED ABOVE TO BE MOUNTED ON THE PROPOSED TEMPORARY TOWER.

AT&T SCOPE OF WORK INFO.

AT&T IS PROPOSING TO INSTALL THE FOLLOWING IMPROVEMENTS TO PROPOSED TELECOMMUNICATION SITE:

- NEW ANTENNAS: (2) ANTENNAS PER SECTOR WITH
  (3) SECTORS, FOR A TOTAL OF
  (6) ANTENNAS.
- NEW RRHs: (3) RRHs PER SECTOR WITH
  (3) SECTORS, FOR A TOTAL OF
  (9) RRHs
- NEW OVPs: (2) SURGE ARRESTORS (SQUIDS) TOTAL WITH ASSOCIATED CABLING AND APPURTENANCE

ITEMS LISTED ABOVE TO BE MOUNTED ON THE PROPOSED TEMPORARY TOWER.

PREPARED FOR: CELLCO PARTNERSHIP D.B.A.
verizon

at&t
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 648-1116

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

STATE OF CONNECTICUT — DANIEL P. HAMM — No. 21178 — LICENSED PROFESSIONAL ENGINEER

Daniel P. Hamm

CHECKED BY: DJR

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
3	07/31/19	ADDED T-MOBILE SOW.	SLY
2	06/10/19	REVISED PER COMMENTS	GA
1	04/22/19	REVISED PER COMMENTS	GA
0	04/08/19	ISSUED FOR REVIEW	GA

SITE NAME:
FOREST HEIGHTS CT RELO
(TEMPORARY SITE)
CT2327
CTNH007
SITE ADDRESS:
1052 BOSTON POST ROAD
MILFORD, CT 06460
NEW HAVEN COUNTY

SHEET TITLE
TITLE SHEET

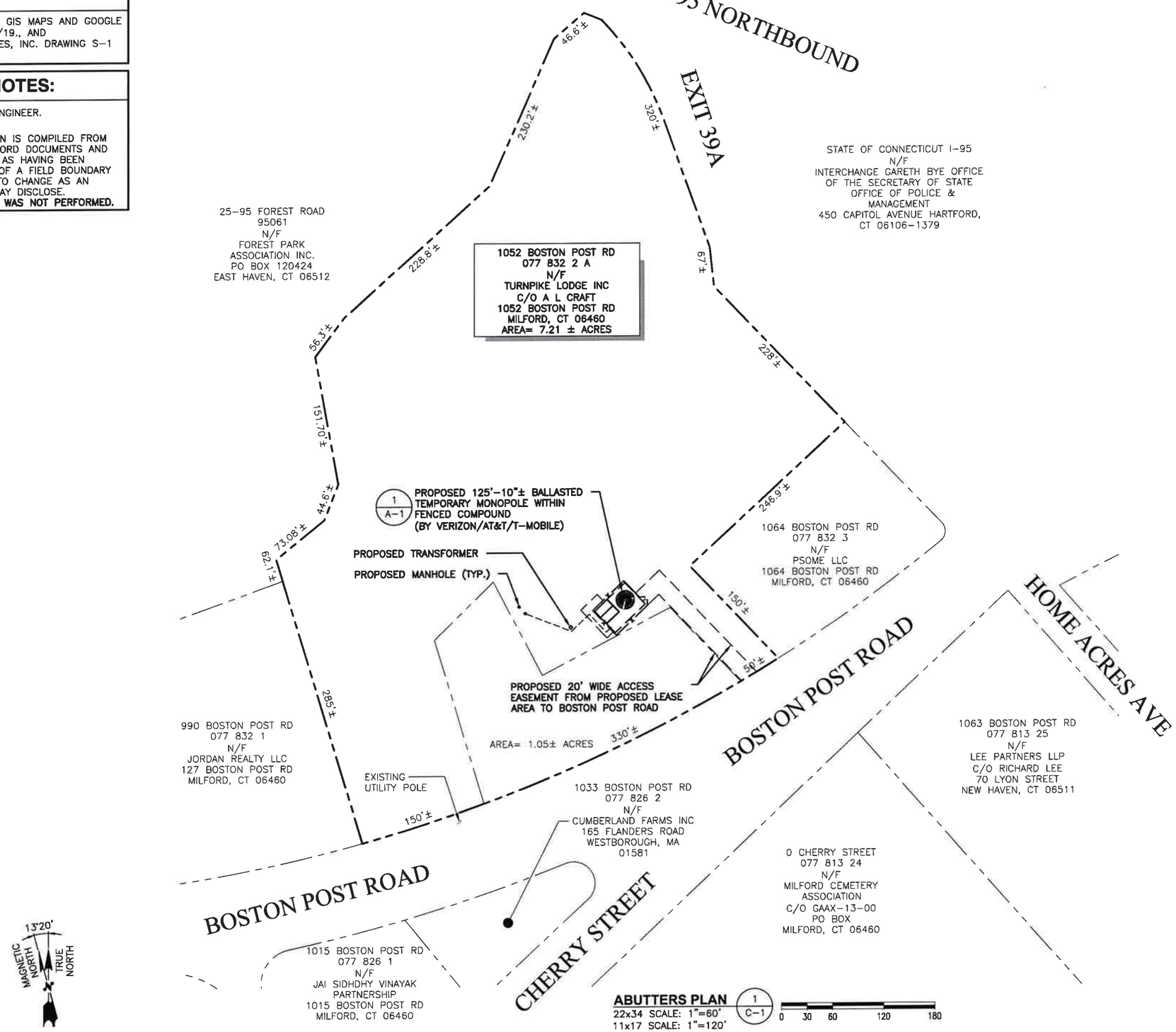
SHEET NUMBER
T-1

SOURCE:

CITY OF MILFORD, CT ONLINE GIS MAPS AND GOOGLE EARTH ACCESSED ON 04/02/19., AND SPATH–BJORKLUND ASSOCIATES, INC. DRAWING S–1 DATED 08/23/18.

SITE SPECIFIC NOTES:

1. VERIFY AZIMUTHS W/ RF ENGINEER.
2. PROPERTY LINE INFORMATION IS COMPILED FROM ASSESSORS PLAN AND RECORD DOCUMENTS AND IS NOT TO BE CONSTRUED AS HAVING BEEN OBTAINED AS THE RESULT OF A FIELD BOUNDARY SURVEY, AND IS SUBJECT TO CHANGE AS AN ACCURATE FIELD SURVEY MAY DISCLOSE. **A FULL BOUNDARY SURVEY WAS NOT PERFORMED.**



PREPARED FOR: CELLCO PARTNERSHIP D.B.A.

verizon

at&t
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 648-1116

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

STATE OF CONNECTICUT
DANIEL P. HAMM
No. 21178
LICENSED PROFESSIONAL ENGINEER

Daniel P. Hamm

CHECKED BY: DJR

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
3	07/31/19	ADDED T–MOBILE SOW.	SLY
2	06/10/19	REVISED PER COMMENTS	GA
1	04/22/19	REVISED PER COMMENTS	GA
0	04/08/19	ISSUED FOR REVIEW	GA

SITE NAME:
FOREST HEIGHTS CT RELO (TEMPORARY SITE)
CT2327
CTNH007
SITE ADDRESS:
1052 BOSTON POST ROAD
MILFORD, CT 06460
NEW HAVEN COUNTY

SHEET TITLE
ABUTTERS PLAN

SHEET NUMBER
C-1

PROPOSED MULTI METER CENTER AND TELCO HOFFMAN BOX ON H-FRAME (BY LANDLORD)

PROPOSED POWER AND TELCO SERVICE ROUTED UNDERGROUND FROM H-FRAME TO EQUIPMENT WITHIN 10' WIDE UTILITY EASEMENT

PROPOSED 10' WIDE UTILITY EASEMENT

PROPOSED T-MOBILE TEMPORARY 6'X6' SMARTMOD WALK-IN CABINET ON HELICAL SUPPORT SYSTEM WITHIN 10'X20' LEASE AREA

PROPOSED EROSION CONTROL SILT SOCK PER 2002 CONNECTICUT GUIDELINES FOR SOIL AND SEDIMENT CONTROL

PROPOSED TEMPORARY CABLE TRAY ON SLEEPERS (VERIZON, AT&T & T-MOBILE)

PROPOSED 40'X50' CHAIN LINK FENCE COMPOUND

PROPOSED 125'-10" BALLASTED TEMPORARY MONOPOLE (BY VERIZON/AT&T/T-MOBILE)

PROPOSED AT&T TEMPORARY 6'X6' SMARTMOD WALK-IN CABINET ON HELICAL SUPPORT SYSTEM WITHIN 10'X20' LEASE AREA

PROPOSED 14'-0"± WIDE GATE

PROPOSED VERIZON TEMPORARY EQUIPMENT ON SUPERCOW TRUCK WITHIN 1272 SQ. FT. LEASE AREA

PROPOSED 20' WIDE ACCESS EASEMENT FROM PROPOSED LEASE AREA TO BOSTON POST ROAD

3'-0"±

40'-0"±

50'-0"±

MAGNETIC NORTH 13°21' TRUE NORTH

4 / A-2

COMPOUND PLAN (1 / A-1)

22x34 SCALE: 1/4"=1'-0"
11x17 SCALE: 1/8"=1'-0"

0 2'-0" 4'-0" 8'-0" 12'-0"

NOTE:

AN ANALYSIS OF THE CAPACITY OF THE TEMPORARY STRUCTURE TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY HUDSON DESIGN GROUP, LLC.
DATED: JULY 31, 2019 (REV. 2)

PREPARED FOR: CELLCO PARTNERSHIP D.B.A.
verizon

at&t
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 648-1116

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

STATE OF CONNECTICUT
DANIEL P. HAMM
No. 21179
LICENSED PROFESSIONAL ENGINEER

Daniel P. Hamm

CHECKED BY: DJR

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
3	07/31/19	ADDED T-MOBILE SOW.	SLY
2	06/10/19	REVISED PER COMMENTS	GA
1	04/22/19	REVISED PER COMMENTS	GA
0	04/08/19	ISSUED FOR REVIEW	GA

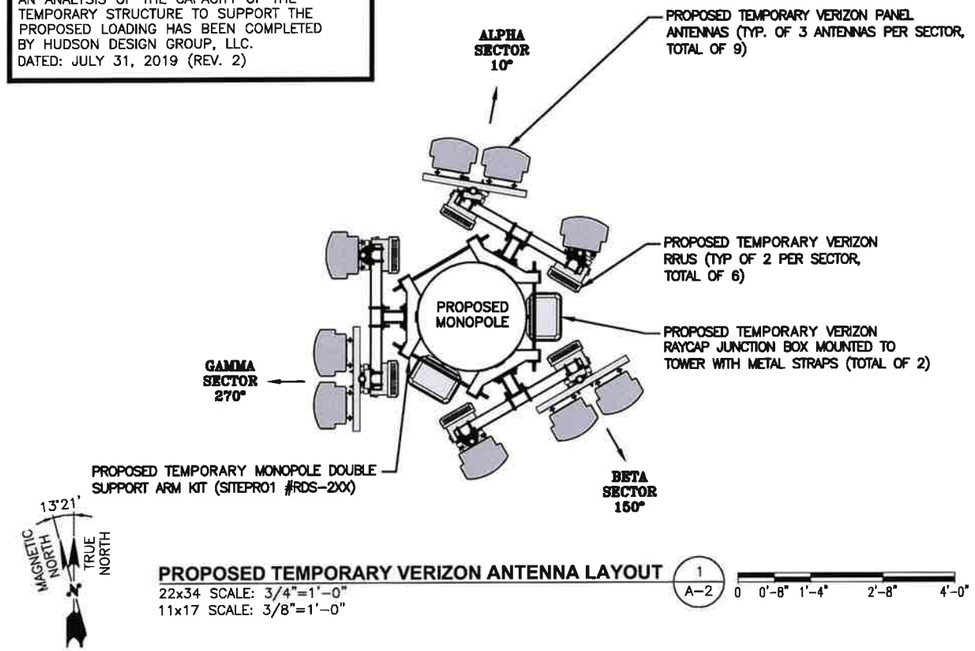
SITE NAME:
FOREST HEIGHTS CT RELO
(TEMPORARY SITE)
CT2327
CTNH007
SITE ADDRESS:
1052 BOSTON POST ROAD
MILFORD, CT 06460
NEW HAVEN COUNTY

SHEET TITLE
COMPOUND PLAN

SHEET NUMBER
A-1

NOTE:

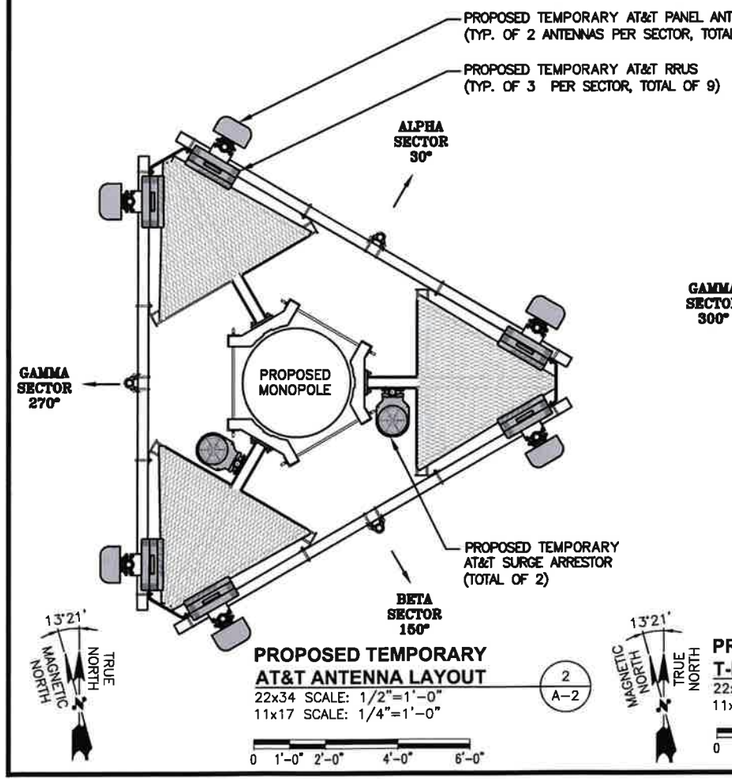
AN ANALYSIS OF THE CAPACITY OF THE TEMPORARY STRUCTURE TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY HUDSON DESIGN GROUP, LLC.
DATED: JULY 31, 2019 (REV. 2)



PROPOSED TEMPORARY VERIZON ANTENNA LAYOUT (1 / A-2)

22x34 SCALE: 3/4"=1'-0"
11x17 SCALE: 3/8"=1'-0"

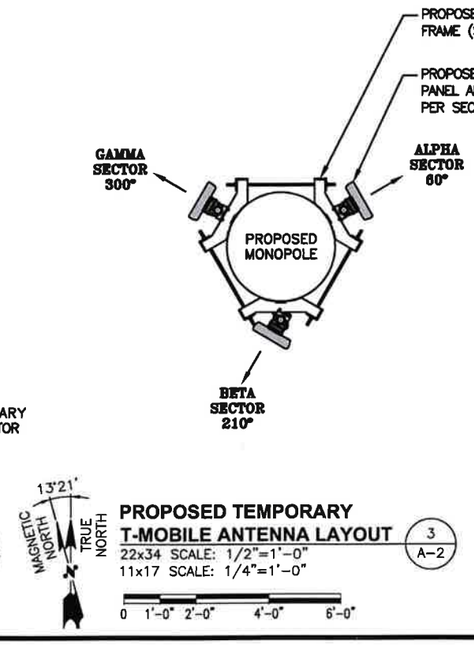
0 0'-8" 1'-4" 2'-8" 4'-0"



PROPOSED TEMPORARY AT&T ANTENNA LAYOUT (2 / A-2)

22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"

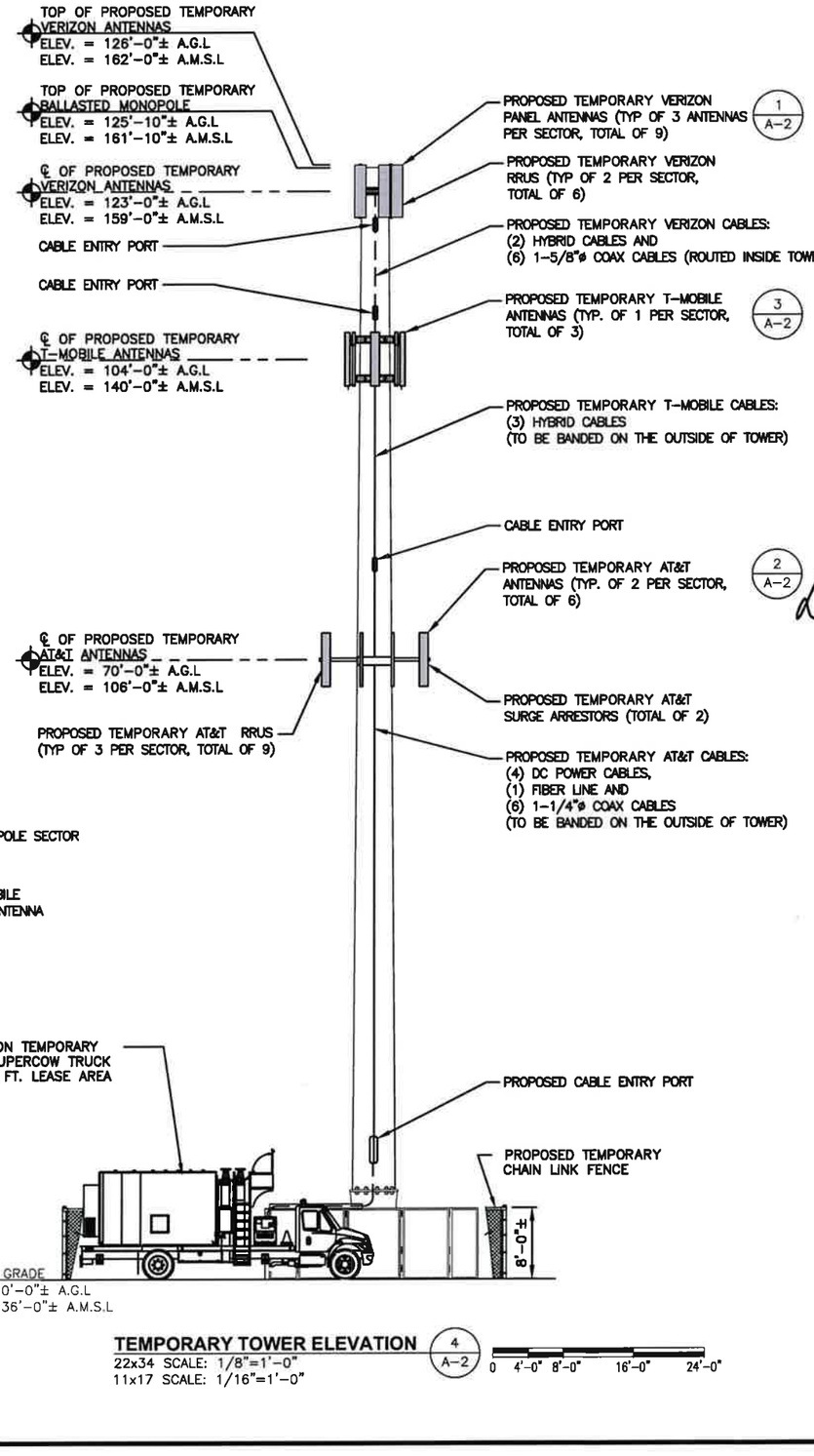
0 1'-0" 2'-0" 4'-0" 6'-0"



PROPOSED TEMPORARY T-MOBILE ANTENNA LAYOUT (3 / A-2)

22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"

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



TEMPORARY TOWER ELEVATION (4 / A-2)

22x34 SCALE: 1/8"=1'-0"
11x17 SCALE: 1/16"=1'-0"

0 4'-0" 8'-0" 16'-0" 24'-0"

PREPARED FOR: CELLCO PARTNERSHIP D.B.A.

verizon

at&t
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 648-1116

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

STATE OF CONNECTICUT — DANIEL P. HAMM — No. 21178 — LICENSED PROFESSIONAL ENGINEER

Daniel P. Hamm

CHECKED BY: DJR

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
3	07/31/19	ADDED T-MOBILE SOW.	SLV
2	06/10/19	REVISED PER COMMENTS	GA
1	04/22/19	REVISED PER COMMENTS	GA
0	04/08/19	ISSUED FOR REVIEW	GA

SITE NAME:
FOREST HEIGHTS CT RELO
(TEMPORARY SITE)
CT2327
CTNH007
SITE ADDRESS:
1052 BOSTON POST ROAD
MILFORD, CT 06460
NEW HAVEN COUNTY

SHEET TITLE
ANTENNA LAYOUTS & ELEVATION

SHEET NUMBER
A-2

EXHIBIT 3

C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
603-644-2800
support@csquaredsystems.com

Calculated Radio Frequency Exposure Report

Verizon Site – Forest Heights CT Relo

T-Mobile Site – CTCOW07A

AT&T Site – CT5981 Milford Temp

1052 Boston Post Road, Milford, CT 06460

July 31, 2019

Table of Contents

List of Tables

List of Figures

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the antenna arrays to be mounted on the proposed temporary monopole at 1052 Boston Post Road in Milford, CT. The coordinates of the proposed tower are 41° 13' 58.35" N, 73° 2' 41.96" W.

Verizon, T-Mobile, and AT&T are proposed to locate the following equipment:

- Verizon – Nine (9) multi-band antennas (three per sector) to support its LTE network and legacy CDMA network;
- T-Mobile – Three (3) antennas (one per sector) to support its LTE network and legacy GSM network;
- AT&T – Six (6) multi-band antennas (two per sector) to support its LTE network and legacy UMTS network;

This report considers the planned antenna configurations of each operator to calculate the % MPE (Maximum Permissible Exposure) of the proposed installation.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

3. RF Exposure Calculation Methods

The power density calculation results were generated using the following formula as outlined in FCC bulletin OET 65, and Connecticut Siting Council recommendations:

$$\text{Power Density} = \left(\frac{1.6^2 \times 1.64 \times \text{ERP}}{4\pi \times R^2}\right) \text{X Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power = 1.64 x ERP

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna

V = Vertical Distance from radiation center of antenna

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity and power, and that all antenna channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not consider actual terrain elevations which could attenuate the signal. As a result, the calculated power density and corresponding % MPE levels reported below are much higher than the actual levels will be from the final installation.

4. Calculation Results

Table 1 below outlines the power density information for the proposed installation. All proposed antennas are directional in nature; therefore, the majority of the RF power is focused out towards the horizon. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the tower. Please refer to Attachments C, D, and E for the vertical patterns of the proposed Verizon, T-Mobile, and AT&T antennas, respectively. The calculated results in Table 1 include a nominal 10 dB off-beam pattern loss to account for the lower relative gain below the antennas.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm^2)	Limit	% MPE
Verizon LTE	123	751	1	2686	0.0071	0.5007	1.41%
Verizon LTE	123	869	1	1935	0.0051	0.5793	0.88%
Verizon CDMA	123	869	3	198	0.0016	0.5793	0.27%
Verizon LTE	123	1900	1	6153	0.0162	1.0000	1.62%
Verizon LTE	123	2100	1	6443	0.0169	1.0000	1.69%
T-Mobile LTE	104	2100	1	4615	0.0173	1.0000	1.73%
T-Mobile LTE	104	1900	1	3077	0.0115	1.0000	1.15%
T-Mobile GSM	104	1900	1	1538	0.0058	1.0000	0.58%
AT&T LTE	70	734	1	3794	0.0333	0.4893	6.81%
AT&T LTE	70	880	1	4066	0.0357	0.5867	6.09%
AT&T UMTS	70	880	1	845	0.0074	0.5867	1.27%
AT&T LTE	70	1900	1	5743	0.0504	1.0000	5.04%
AT&T LTE	70	2300	1	5877	0.0516	1.0000	5.16%
						Total	**33.69%**

Table 1: Proposed Tower % MPE [1] [2]

[1] In the case where antenna models are not uniform across all 3 sectors for the same frequency band, the antenna model with the highest gain was used for the calculations to present a worse-case scenario.

[2] Antenna heights listed are in reference to the Hudson Design Group site drawings dated 5/28//2019 (Rev. 3).

5. Conclusion

The above analysis concludes that RF exposure at ground level from the proposed temporary tower will be below the maximum power density limits as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Using the conservative calculation methods discussed herein, the highest expected percent of Maximum Permissible Exposure at ground level from the proposed installation is **33.69% of the FCC General Population/Uncontrolled limit**.

As noted previously, the calculated % MPE levels are more conservative (higher) than the actual levels will be from the finished installation.

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in FCC OET Bulletin 65 Edition 97-01, ANSI/IEEE Std. C95.1, and ANSI/IEEE Std. C95.3.

Keith Vellante

July 31, 2019
Date

Report Prepared By: Keith Vellante
Director of RF Services
C Squared Systems, LLC

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

IEEE C95.1-2005, IEEE Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz IEEE-SA Standards Board

IEEE C95.3-2002 (R2008), IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure[3]

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

(B) Limits for General Population/Uncontrolled Exposure[4]

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

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

Table 2: FCC Limits for Maximum Permissible Exposure (MPE)

[3] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure

[4] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

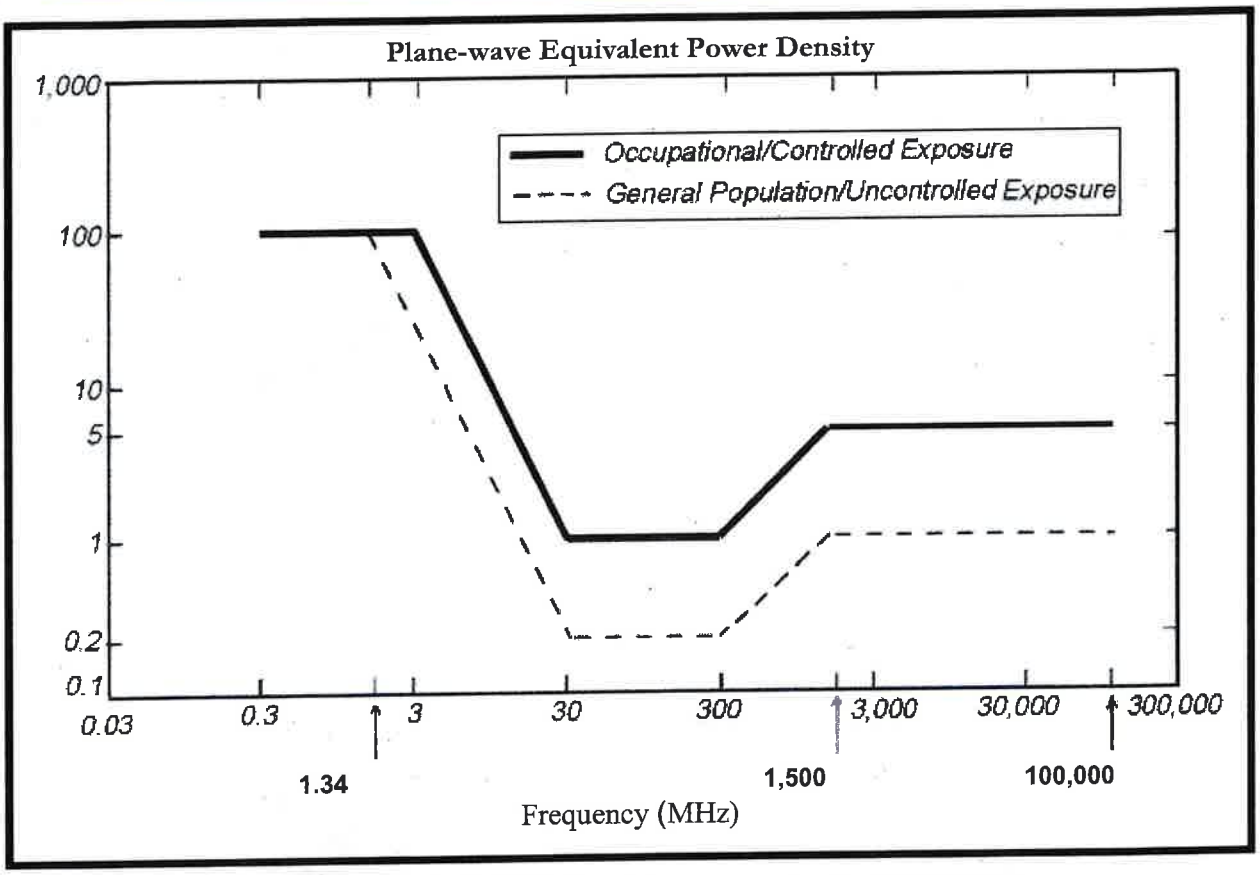
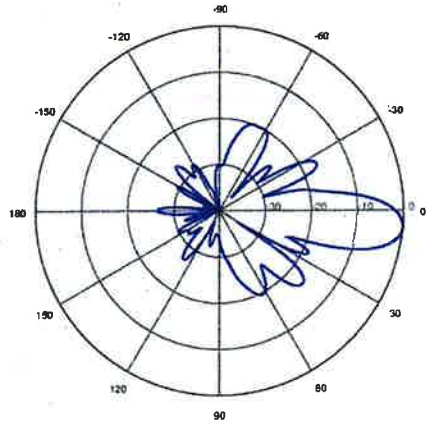


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Verizon Antenna Data Sheets and Electrical Patterns

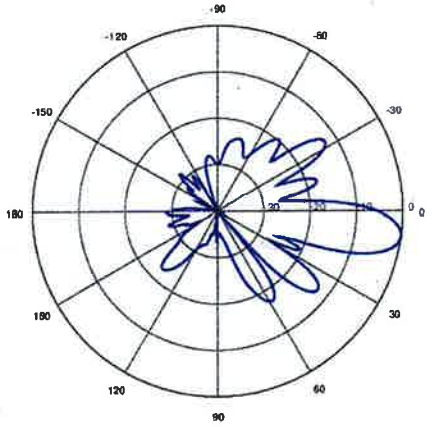
751 MHz

Manufacturer:	JMA
Model #:	MX06FRO660-03
Frequency Band:	698-798 MHz
Gain:	12.25 dBd
Vertical Beamwidth:	13.1°
Horizontal Beamwidth:	60.5°
Polarization:	±45°
Dimensions (L x W x D):	71.3" x 15.4" x 10.7"



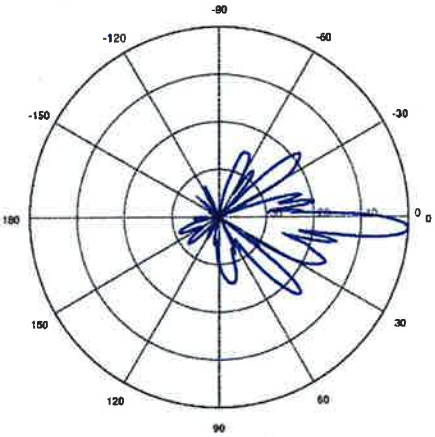
870 MHz

Manufacturer:	JMA
Model #:	MX06FRO660-03
Frequency Band:	824-894 MHz
Gain:	11.85 dBd
Vertical Beamwidth:	11.8°
Horizontal Beamwidth:	53°
Polarization:	±45°
Dimensions (L x W x D):	71.3" x 15.4" x 10.7"



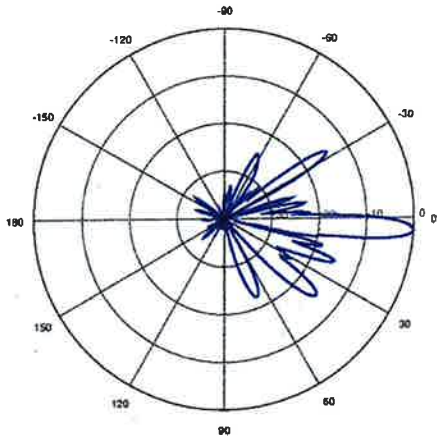
1900 MHz

Manufacturer:	JMA
Model #:	MX06FRO660-03
Frequency Band:	1850-1990 MHz
Gain:	15.85 dBd
Vertical Beamwidth:	5.5°
Horizontal Beamwidth:	55°
Polarization:	±45°
Dimensions (L x W x D):	71.3" x 15.4" x 10.7"



2100 MHz

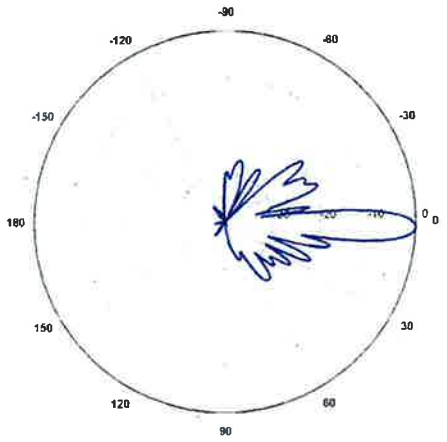
Manufacturer:	JMA
Model #:	MX06FRO660-03
Frequency Band:	1920-2180 MHz
Gain:	16.05 dBd
Vertical Beamwidth:	5.5°
Horizontal Beamwidth:	55.5°
Polarization:	±45°
Dimensions (L x W x D):	71.3" x 15.4" x 10.7"



Attachment D: T-Mobile Antenna Data Sheets and Electrical Patterns

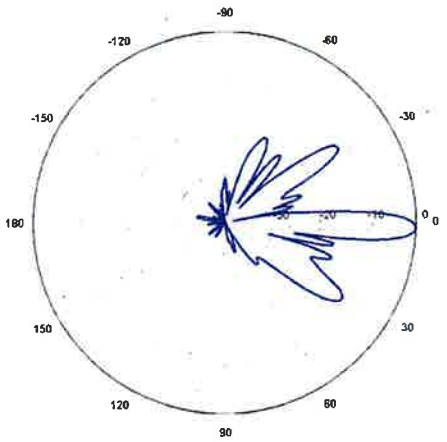
1900 MHz

Manufacturer:	Ericsson
Model #:	AIR32 B2A B66A
Frequency Band:	1850-1990 MHz
Gain:	15.85 dBd
Vertical Beamwidth:	6°
Horizontal Beamwidth:	63°
Polarization:	±45°
Dimensions (L x W x D):	59.3" x 12.9" x 8.7"



2100 MHz

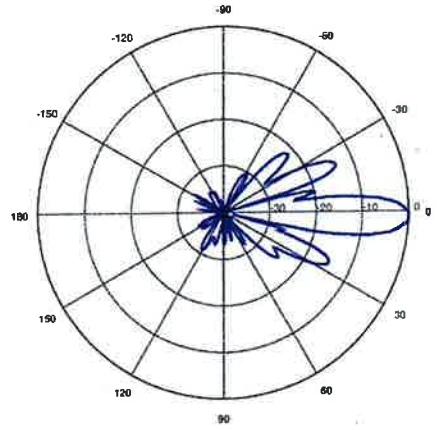
Manufacturer:	Ericsson
Model #:	AIR32 B2A B66A
Frequency Band:	2110-2180 MHz
Gain:	15.85 dBd
Vertical Beamwidth:	6°
Horizontal Beamwidth:	61°
Polarization:	±45°
Dimensions (L x W x D):	59.3" x 12.9" x 8.7"



Attachment E: AT&T Antenna Data Sheets and Electrical Patterns

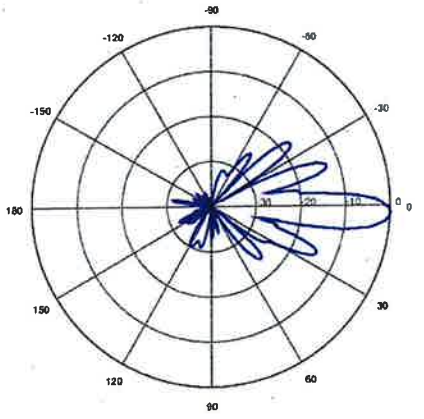
734 MHz

Manufacturer:	KMW
Model #:	EPBQ-654L8H8-L2
Frequency Band:	698-806 MHz
Gain:	13.75 dBd
Vertical Beamwidth:	9.3°
Horizontal Beamwidth:	67°
Polarization:	±45°
Dimensions (L x W x D):	96.0" x 21.0" x 6.3"



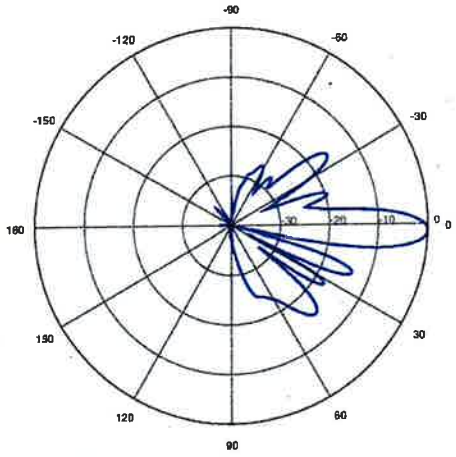
880 MHz (LTE)

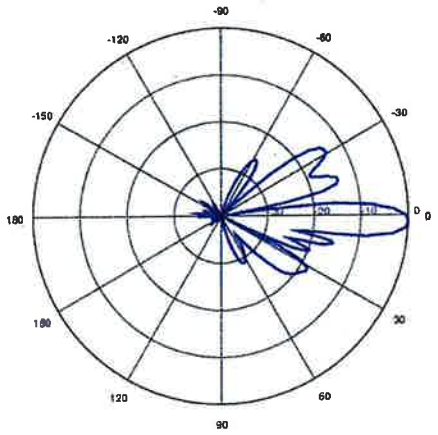
Manufacturer:	KMW
Model #:	EPBQ-654L8H8-L2
Frequency Band:	806-894 MHz
Gain:	14.05 dBd
Vertical Beamwidth:	8.7°
Horizontal Beamwidth:	66°
Polarization:	±45°
Dimensions (L x W x D):	96.0" x 21.0" x 6.3"



880 MHz (UMTS)

Manufacturer:	CCI
Model #:	HPA65R-BU8A
Frequency Band:	824-896 MHz
Gain:	13.25 dBd
Vertical Beamwidth:	8.1°
Horizontal Beamwidth:	67°
Polarization:	±45°
Dimensions (L x W x D):	96.0" x 11.7" x 7.7"



1900 MHz Manufacturer: KMW Model #: EPBQ-654L8H8-L2 Frequency Band: 1910-2180 MHz Gain: 15.55 dBd Vertical Beamwidth: 7.4° Horizontal Beamwidth: 60° Polarization: ±45° Dimensions (L x W x D): 96.0" x 21.0" x 6.3"	
2300 MHz Manufacturer: KMW Model #: EPBQ-654L8H8-L2 Frequency Band: 2300-2400 MHz Gain: 15.65 dBd Vertical Beamwidth: 6.8° Horizontal Beamwidth: 60° Polarization: ±45° Dimensions (L x W x D): 96.0" x 21.0" x 6.3"