COHEN and WOLF
P.C.
ATTORNEYS AT LAW

JULIE D. KOHLER

PLEASE REPLY TO: Bridgeport
WRITER'S DIRECT DIAL: (203) 337-4157
E-Mail Address: jkohler@cohenandwolf.com

May 2, 2014

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

Re: Notice of Exempt Modification
Crown Castle/T-Mobile co-location
Site ID CT11117
922 Danbury Road, Wilton

Dear Attorney Bachman:

This office represents T-Mobile Northeast LLC ("T-Mobile") and has been retained to file exempt modification filings with the Connecticut Siting Council on its behalf.

In this case, the Crown Castle ("Crown") owns the flagpole tower and related facility at 922 Danbury Road, Wilton, Connecticut (latitude 41.2563556 / longitude -73.433872). T-Mobile intends to replace three antennas and related equipment at this existing telecommunications facility in Wilton ("Wilton Facility"). Please accept this letter as notification, pursuant to R.C.S.A. § 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to the First Selectman William F. Brennan, and the property owner Remo – Wilton Asssociates.

The existing Wilton Facility consists of a 90 foot tall flagpole facility.[1] The facility currently supports the equipment of T-Mobile at a centerline of 85 feet.

T-Mobile plans to replace three antennas and replace them with three antennas at an elevation of 85 feet. (See the plans revised to April 17, 2014 attached hereto as Exhibit A). T-Mobile will also replace an equipment cabinet, replace three existing GMA with six proposed GMAs, and reuse existing coax cable. The existing Facility is structurally capable of supporting T-Mobile's proposed modifications, as indicated in the structural analysis dated April 24, 2014

[1] The online Connecticut Siting Council database does not include an approval by docket or petition for this facility so there are no specific limitation on the antenna configuration, however there has been at least one notice of intent filed, specifically EM-CING-161-111114.

COHEN and WOLF P.C. ATTORNEYS AT LAW

and attached hereto as Exhibit B.

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

1. The proposed modification will not increase the height of the tower. T-Mobile's replacement antennas will be installed at the 85 foot level. The enclosed tower drawing confirms that the proposed modification will not increase the height of the tower.

2. The installation of the T-Mobile replacement equipment in the existing compound, as reflected on the attached site plan, will not require an extension of the site boundaries. T-Mobile's proposed equipment will be located entirely within the existing compound and concrete pad as shown on Sheet L-1 of Exhibit A.

3. The proposed modification to the Facility will not increase the noise levels at the existing facility by six decibels or more.

4. The operation of the replacement antennas will not increase the total radio frequency (RF) power density, measured at the base of the tower, to a level at or above the applicable standard. According to a Radio Frequency Emissions Analysis Report prepared by EBI dated April 16, 2014 T-Mobile's operations would add 1.365% of the FCC Standard. Therefore, the calculated "worst case" power density for the planned combined operation at the site including all of the proposed antennas would be 6.695% of the FCC Standard as calculated for a mixed frequency site as evidenced by the engineering exhibit attached hereto as Exhibit C.

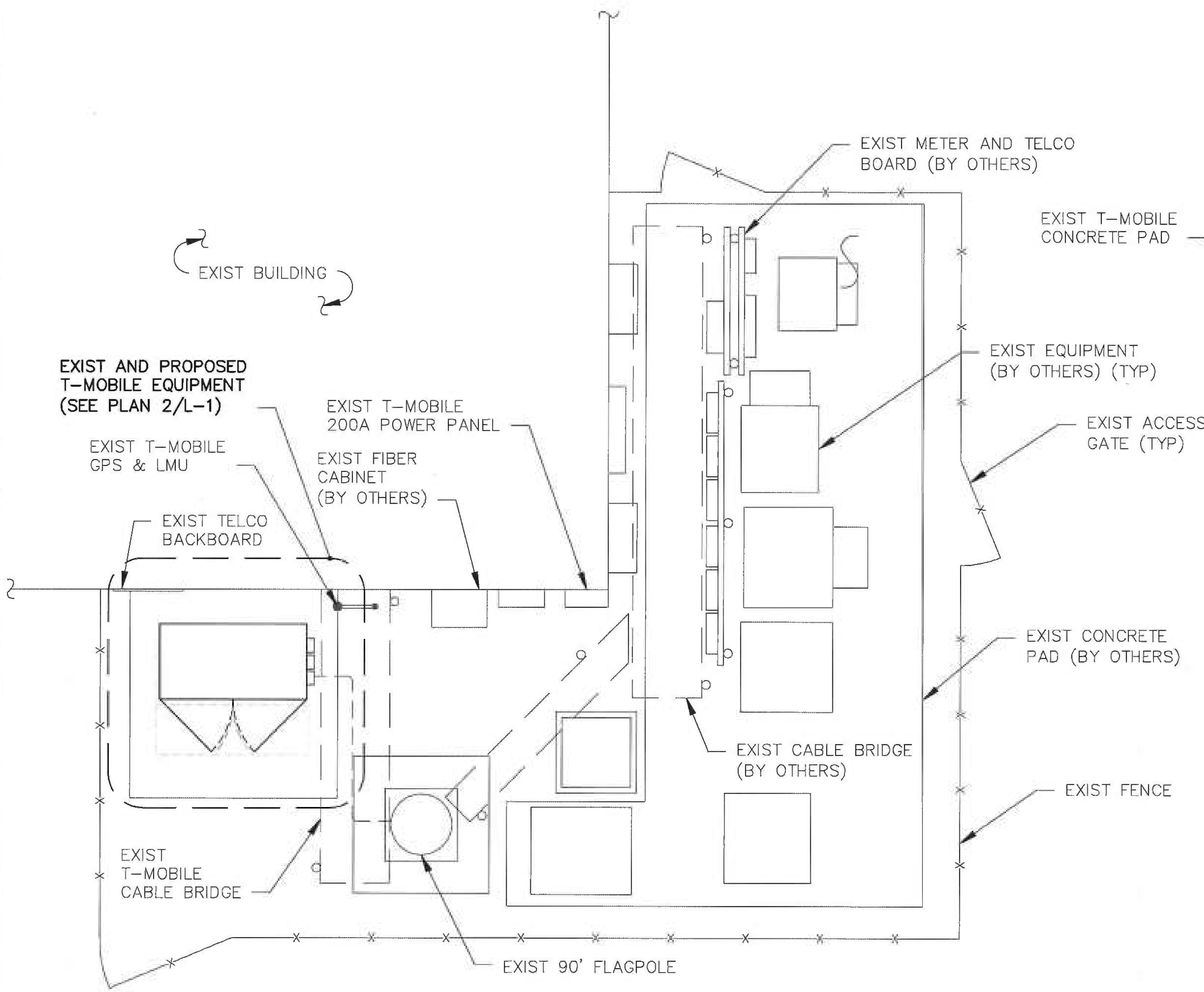
For the foregoing reasons, T-Mobile respectfully submits that the proposed replacement antennas and equipment at the Wilton Facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Julie D. Kohler, Esq.

cc: Town of Wilton, First Selectman William F. Brennan
Crown Castle Corporation
Remo-Wilton Associates LLC
Halene Fujimoto, HPC

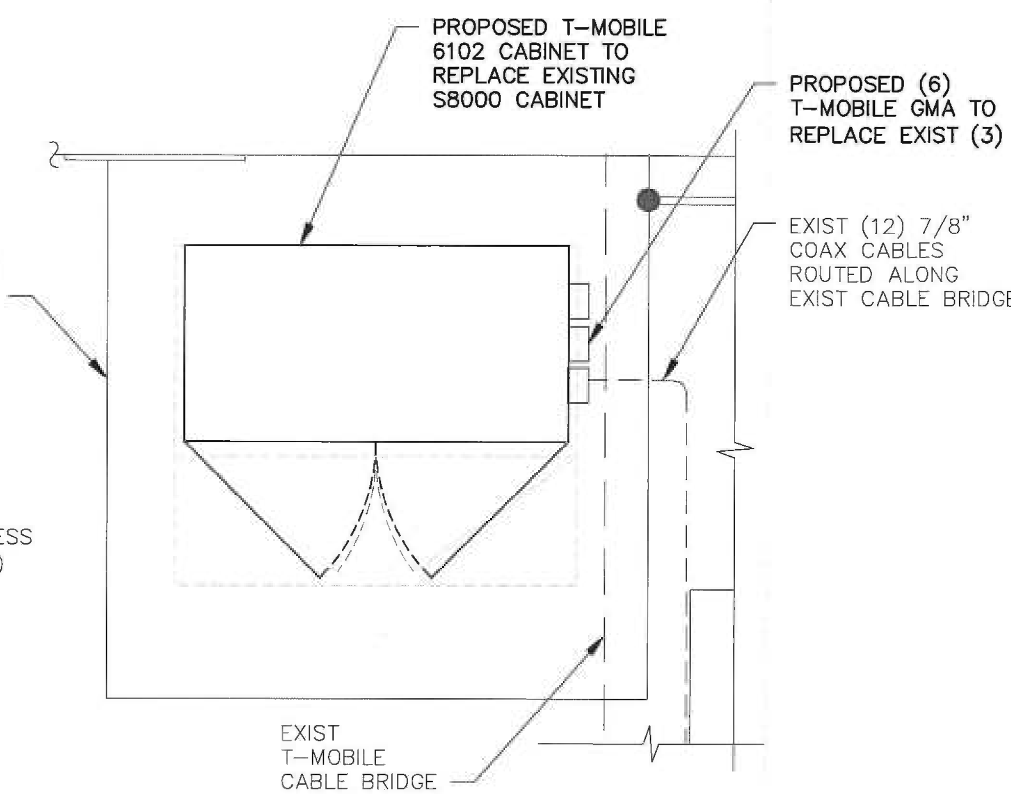
EXHIBIT A



1 L-1 SITE PLAN

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

STRUCTURAL NOTE:
PROPOSED INSTALLATION, EXIST MOUNTS AND FLAGPOLE TO BE STRUCTURALLY ANALYZED BY A STATE LICENSED P.E. (TO BE COORDINATED BY OTHERS)



2 L-1 EQUIPMENT PLAN

SCALE: 1/2" = 1'-0"

CONFIGURATION
4B
REFER TO LATEST T-MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3
ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • SURVEYING
• ENGINEERING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

T-Mobile NORTHEAST LLC.
T-MOBILE NORTHEAST, LLC. 4 SYLVAN DRIVE PARSIPPANY, NJ 07054 PHONE: (973) 686-6500

APPROVALS
T-MOBILE ______
LANDLORD ______
RF ______
CONSTRUCTION ______

PROJECT NUMBER	DESIGNED BY
6644.CT11117C	TN

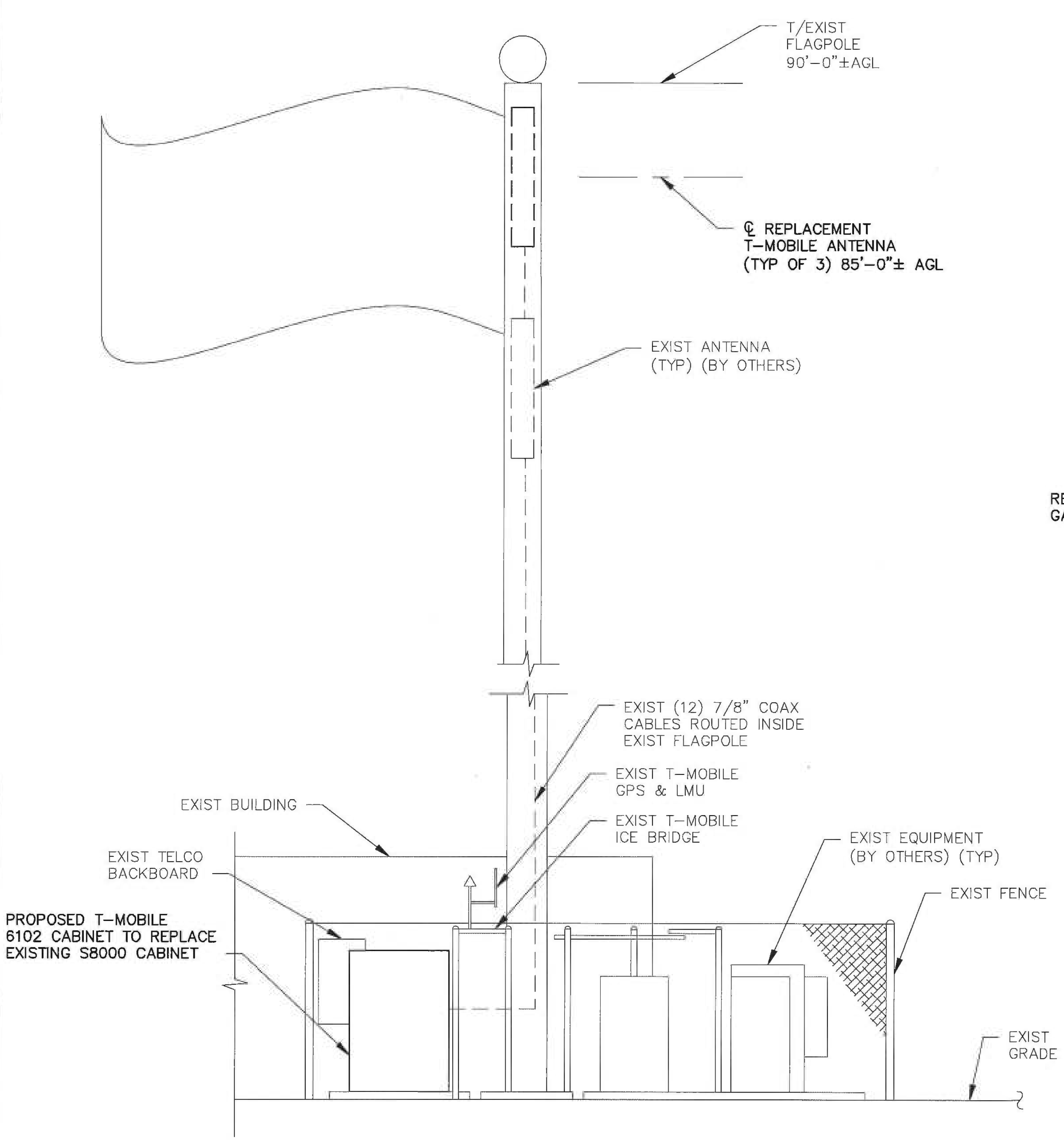
REV	DATE	REVISION	DRAWN BY
0	04/17/14	FOR COMMENT	AS

ISSUED BY	DATE

SITE INFORMATION
CT11117C
WILTON/GEORGETOWN/RT7
922 DANBURY ROAD
WILTON, CT 06897

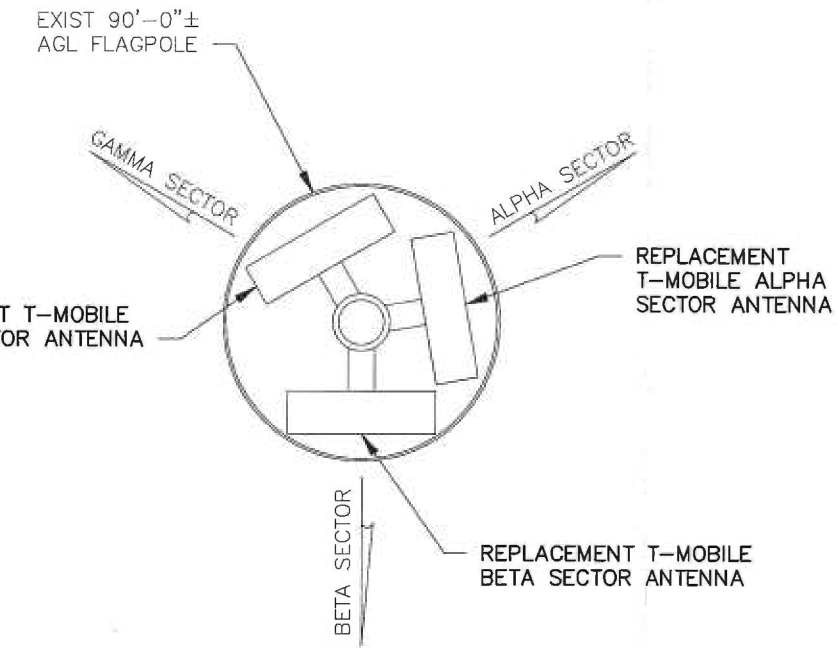
SHEET TITLE
SITE & EQUIPMENT PLANS

SHEET NUMBER
L-1



1 L2 ELEVATION

SCALE: 3/16" = 1'-0"



2 L-2 ANTENNA PLAN

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

CONFIGURATION

4B

REFER TO LATEST T-MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC

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1279 Route 300
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T-Mobile
NORTHEAST LLC.

T-MOBILE NORTHEAST, LLC.
4 SYLVAN DRIVE
PARSIPPANY, NJ 07054
PHONE: (973) 686-5500

APPROVALS

T-MOBILE ____

LANDLORD ____

RF ____

CONSTRUCTION ____

PROJECT NUMBER	DESIGNED BY
6644.CT11117C	TN

REV	DATE	REVISION	DRAWN BY
0	04/17/14	FOR COMMENT	AS

ISSUED BY	DATE

SITE INFORMATION

CT11117C
WILTON/GEORGETOWN/RT7
922 DANBURY ROAD
WILTON, CT 06897

SHEET TITLE

ELEVATION & ANTENNA PLAN

SHEET NUMBER

L-2

EXHIBIT B

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **April 24, 2014**

Andrew Bazinet
Crown Castle
46 Broadway
Albany, NY 12204

Paul J. Ford and Company
250 East Broad St, Suite 600
Columbus, OH 43215
614.221.6679

Subject: **Structural Analysis Report**

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11117C
	Carrier Site Name:	Wilton/Georgetown/Rt7
Crown Castle Designation:	**Crown Castle BU Number:**	829115
	Crown Castle Site Name:	Wilton/Georgetown/Rt7
	Crown Castle JDE Job Number:	259553
	Crown Castle Work Order Number:	751467
	Crown Castle Application Number:	216340 Rev. 3
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37514-0960
Site Data:	**922 Danbury Road, Wilton, Fairfield County, CT**	
	Latitude *41° 15' 22.964"*, Longitude *-73° 26' 2.209"*	
	89.0625 Foot - Monopole Tower	

Dear Andrew Bazinet,

Paul J. Ford and Company is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 639862, in accordance with application 216340, revision 3.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Existing + Proposed Equipment — **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

We at *Paul J. Ford and Company* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Thomas J. Dehnke, E.I.T.
Structural Designer

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER

APR 2 5 2014

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **April 24, 2014**

Andrew Bazinet
Crown Castle
46 Broadway
Albany, NY 12204

Paul J. Ford and Company
250 East Broad St, Suite 600
Columbus, OH 43215
614.221.6679

Subject: **Structural Analysis Report**

Carrier Designation:	***T-Mobile*** **Co-Locate**	
	Carrier Site Number:	CT11117C
	Carrier Site Name:	Wilton/Georgetown/Rt7
Crown Castle Designation:	**Crown Castle BU Number:**	829115
	Crown Castle Site Name:	Wilton/Georgetown/Rt7
	Crown Castle JDE Job Number:	259553
	Crown Castle Work Order Number:	751467
	Crown Castle Application Number:	216340 Rev. 3
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37514-0960
Site Data:	**922 Danbury Road, Wilton, Fairfield County, CT** **Latitude *41° 15' 22.964"*, Longitude *-73° 26' 2.209"*** **89.0625 Foot - Monopole Tower**	

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Respectfully submitted by:

Thomas J. Dehnke, E.I.T.
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 89.0625 ft Monopole tower designed by Stealth in July of 2009. The tower was originally designed for a wind speed of 105 mph per TIA-222-G.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
85.0	85.0	3	rfs celwave	APX16DWV-16DWVS-C	--	--	--

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
85.0	85.0	6	andrew	ETW190VS12UB	12 (I)	7/8	1
		3	andrew	TMBXX-6516-R2M	--	--	2
76.0	76.0	3	andrew	ETW190VS12UB	6 (I)	7/8	1
		6	kaelus	DBC2046F1V2-1			
		3	powerwave technologies	P65-16-XLH-RR			

Notes:
1) Existing Equipment
2) Equipment To Be Removed
(I) Coax mounted internally and shielded from the wind. See coax layout in Appendix B.

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
--	--	--	--	--	--	--

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, 10/13/2000	3594542	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PJF, 31908-0121, 07/22/2009	3886758	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PJF, 31908-0121, 07/22/2009	3777970	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J. Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	90 - 70	Pole	MT 4" X 0.5	1	-1.32	329.78	76.0	Pass
L2	70 - 35.9375	Pole	P24x0.375	2	-5.00	779.12	21.9	Pass
L3	35.9375 - 1.9375	Pole	P24x0.375	3	-8.45	779.12	50.1	Pass
L4	1.9375 - 0.9375	Pole	P20x0.5	4	-8.56	857.44	56.5	Pass
							Summary	
						Pole (L1)	76.0	Pass
						Rating =	76.0	Pass

Table 6 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	46.0	Pass
1	Base Plate	0	48.7	Pass
1	Base Foundation Soil Interaction	0	99.4	Pass
1	Base Foundation Structural Steel	0	19.7	Pass
1	Flange Connection	1	33.8	Pass
1	Flange Connection	35.9	25.2	Pass

Structure Rating (max from all components) =	99.4%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

- Tower is located in Fairfield County, Connecticut.
- Basic wind speed of 85 mph.
- Nominal ice thickness of 0.7500 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 38 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 50 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.333.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
√ Escalate Ice
Always Use Max Kz
Use Special Wind Profile
Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
Add IBC .6D+W Combination

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
Use Clear Spans For KL/r
Retension Guys To Initial Tension
√ Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
SR Members Have Cut Ends
Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Use TIA-222-G Tension Splice Capacity Exemption

Treat Feedline Bundles As Cylinder
Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feedline Torque
Include Angle Block Shear Check

Poles

√ Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	90.00-70.00	20.00	MT 4" X 0.5	ASTM A513 D.O.M. (75 ksi)	
L2	70.00-35.94	34.06	P24x0.375	A53-B-35 (35 ksi)	
L3	35.94-1.94	34.00	P24x0.375	A53-B-35 (35 ksi)	
L4	1.94-0.94	1.00	P20x0.5	A53-B-35 (35 ksi)	

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight plf
LDF5-50A(7/8")	C	No	Inside Pole	85.94 - 0.94	12	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
						2" Ice	0.00	0.33
						4" Ice	0.00	0.33

Description	*Face or Leg*	*Allow Shield*	*Component Type*	*Placement* *ft*	*Total Number*		C_AA_A *ft²/ft*	*Weight* *plf*
LDF5-50A(7/8")	C	No	Inside Pole	76.94 - 0.94	6	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
						2" Ice	0.00	0.33
						4" Ice	0.00	0.33

User Defined Loads

Description	*Elevation* *ft*	*Offset From Centroid* *ft*	*Azimuth Angle* *°*		*Weight* *K*	F_x *K*	F_z *K*	*Wind Force* *K*	C_AA_C *ft²*
Flag	90.94	0.00	0.0000	No Ice	0.26	0.00	0.00	0.29	**6.92**
				Ice	0.41	0.00	0.00	0.07	**8.95**
				Service	0.26	0.00	0.00	0.12	**7.98**

Discrete Tower Loads

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		C_AA_A *Front* *ft²*	C_AA_A *Side* *ft²*	*Weight* *K*
Canister Load1	C	None		0.0000	90.00	No Ice	5.68	5.68	0.06
						1/2"	5.93	5.93	0.13
						Ice	6.18	6.18	0.21
						1" Ice	6.67	6.67	0.37
						2" Ice	7.65	7.65	0.72
						4" Ice			
Canister Load2	C	None		0.0000	80.00	No Ice	11.58	11.58	0.12
						1/2"	12.08	12.08	0.27
						Ice	12.57	12.57	0.42
						1" Ice	13.55	13.55	0.75
						2" Ice	15.52	15.52	1.47
						4" Ice			
Canister Load3	C	None		0.0000	70.00	No Ice	5.90	5.90	0.26
						1/2"	6.15	6.15	0.33
						Ice	6.39	6.39	0.41
						1" Ice	6.88	6.88	0.57
						2" Ice	7.87	7.87	0.94
						4" Ice			
***									
Truck Ball	C	None		0.0000	90.75	No Ice	1.41	1.41	0.05
						1/2"	1.58	1.58	0.07
						Ice	1.75	1.75	0.09
						1" Ice	2.11	2.11	0.13
						2" Ice	2.95	2.95	0.25
						4" Ice			
**									
(2) ETW190VS12UB	A	From Leg	4.00	0.0000	85.94	No Ice	0.00	0.00	0.01
			0.00			1/2"	0.00	0.00	0.02
			0.00			Ice	0.00	0.00	0.03
						1" Ice	0.00	0.00	0.04
						2" Ice	0.00	0.00	0.11
						4" Ice			
(2) ETW190VS12UB	B	From Leg	4.00	0.0000	85.94	No Ice	0.00	0.00	0.01
			0.00			1/2"	0.00	0.00	0.02
			0.00			Ice	0.00	0.00	0.03
						1" Ice	0.00	0.00	0.04
						2" Ice	0.00	0.00	0.11
						4" Ice			
(2) ETW190VS12UB	C	From Leg	4.00	0.0000	85.94	No Ice	0.00	0.00	0.01
			0.00			1/2"	0.00	0.00	0.02
			0.00			Ice	0.00	0.00	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	0.00	0.00	0.04
						2" Ice	0.00	0.00	0.11
						4" Ice			
APX16DWV-16DWVS-C	A	From Leg	4.00 0.00 0.00	0.0000	85.94	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00	0.04 0.07 0.11 0.20 0.46
APX16DWV-16DWVS-C	B	From Leg	4.00 0.00 0.00	0.0000	85.94	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00	0.04 0.07 0.11 0.20 0.46
APX16DWV-16DWVS-C	C	From Leg	4.00 0.00 0.00	0.0000	85.94	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00	0.04 0.07 0.11 0.20 0.46
***									
P65-16-XLH-RR	A	From Leg	4.00 0.00 0.00	0.0000	76.94	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00	0.05 0.10 0.15 0.28 0.61
P65-16-XLH-RR	B	From Leg	4.00 0.00 0.00	0.0000	76.94	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00	0.05 0.10 0.15 0.28 0.61
P65-16-XLH-RR	C	From Leg	4.00 0.00 0.00	0.0000	76.94	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00	0.05 0.10 0.15 0.28 0.61
ETW190VS12UB	A	From Leg	4.00 0.00 0.00	0.0000	76.94	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00	0.01 0.02 0.03 0.04 0.11
ETW190VS12UB	B	From Leg	4.00 0.00 0.00	0.0000	76.94	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00	0.01 0.02 0.03 0.04 0.11
ETW190VS12UB	C	From Leg	4.00 0.00 0.00	0.0000	76.94	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00	0.01 0.02 0.03 0.04 0.11
(2) DBC2046F1V2-1	A	From Leg	4.00 0.00 0.00	0.0000	76.94	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00	0.01 0.01 0.02 0.03 0.09
(2) DBC2046F1V2-1	B	From Leg	4.00	0.0000	76.94	No Ice	0.00	0.00	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
			0.00			1/2" Ice	0.00	0.00	0.01
			0.00			1" Ice	0.00	0.00	0.02
						2" Ice	0.00	0.00	0.03
						4" Ice	0.00	0.00	0.09
(2) DBC2046F1V2-1	C	From Leg	4.00	0.0000	76.94	No Ice	0.00	0.00	0.01
			0.00			1/2" Ice	0.00	0.00	0.01
			0.00			1" Ice	0.00	0.00	0.02
						2" Ice	0.00	0.00	0.03
						4" Ice	0.00	0.00	0.09

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 90.00-70.00	80.00	1.288	24	6.667	A	0.000	0.000	0.000	0.00	0.000	0.000
					B	0.000	0.000		0.00	0.000	0.000
					C	0.000	0.000		0.00	0.000	0.000
L2 70.00-35.94	53.36	1.147	21	68.125	A	0.000	68.125	68.125	100.00	0.000	0.000
					B	0.000	68.125		100.00	0.000	0.000
					C	0.000	68.125		100.00	0.000	0.000
L3 35.94-1.94	18.94	1	18	68.000	A	0.000	68.000	68.000	100.00	0.000	0.000
					B	0.000	68.000		100.00	0.000	0.000
					C	0.000	68.000		100.00	0.000	0.000
L4 1.94-0.94	1.44	1	18	1.667	A	0.000	1.667	1.667	100.00	0.000	0.000
					B	0.000	1.667		100.00	0.000	0.000
					C	0.000	1.667		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 90.00-70.00	80.00	1.288	5	0.8341	9.447	A	0.000	0.000	0.000	0.00	0.000	0.000
						B	0.000	0.000		0.00	0.000	0.000
						C	0.000	0.000		0.00	0.000	0.000
L2 70.00-35.94	53.36	1.147	4	0.7945	72.636	A	0.000	72.636	72.636	100.00	0.000	0.000
						B	0.000	72.636		100.00	0.000	0.000
						C	0.000	72.636		100.00	0.000	0.000
L3 35.94-1.94	18.94	1	4	0.7500	72.250	A	0.000	72.250	72.250	100.00	0.000	0.000
						B	0.000	72.250		100.00	0.000	0.000
						C	0.000	72.250		100.00	0.000	0.000
L4 1.94-0.94	1.44	1	4	0.7500	1.792	A	0.000	1.792	1.792	100.00	0.000	0.000
						B	0.000	1.792		100.00	0.000	0.000
						C	0.000	1.792		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 90.00-70.00	80.00	1.288	8	6.667	A	0.000	0.000	0.000	0.00	0.000	0.000
					B	0.000	0.000		0.00	0.000	0.000
					C	0.000	0.000		0.00	0.000	0.000
L2 70.00-35.94	53.36	1.147	7	68.125	A	0.000	68.125	68.125	100.00	0.000	0.000
					B	0.000	68.125		100.00	0.000	0.000
					C	0.000	68.125		100.00	0.000	0.000
L3 35.94-1.94	18.94	1	6	68.000	A	0.000	68.000	68.000	100.00	0.000	0.000
					B	0.000	68.000		100.00	0.000	0.000
					C	0.000	68.000		100.00	0.000	0.000
L4 1.94-0.94	1.44	1	6	1.667	A	0.000	1.667	1.667	100.00	0.000	0.000
					B	0.000	1.667		100.00	0.000	0.000
					C	0.000	1.667		100.00	0.000	0.000

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	90 - 70	Pole	Max Tension	15	0.00	0.00	-0.00
			Max. Compression	14	-2.61	0.00	0.00
			Max. Mx	5	-1.32	-17.86	0.00
			Max. My	2	-1.32	0.00	17.86

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	5	1.13	-11.22	0.00
			Max. Vx	2	-1.13	0.00	11.22
			Max. Torque	4			0.00
L2	70 - 35.9375	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-7.24	0.00	0.00
			Max. Mx	5	-5.00	-88.15	0.00
			Max. My	2	-5.00	0.00	88.15
			Max. Vy	5	2.78	-88.15	0.00
			Max. Vx	2	-2.78	0.00	88.15
			Max. Torque	3			-0.00
L3	35.9375 - 1.9375	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-11.43	0.00	0.00
			Max. Mx	5	-8.45	-203.38	0.00
			Max. My	2	-8.45	0.00	203.38
			Max. Vy	5	3.98	-203.38	0.00
			Max. Vx	2	-3.98	0.00	203.38
			Max. Torque	3			-0.00
L4	1.9375 - 0.9375	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-11.56	0.00	0.00
			Max. Mx	5	-8.56	-207.36	0.00
			Max. My	2	-8.56	0.00	207.36
			Max. Vy	5	4.00	-207.36	0.00
			Max. Vx	2	-4.00	0.00	207.36
			Max. Torque	3			-0.00

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	90 - 70	10.422	27	2.2903	0.0000
L2	70 - 35.9375	3.394	30	0.3527	0.0000
L3	35.9375 - 1.9375	1.116	30	0.2653	0.0000
L4	1.9375 - 0.9375	0.001	29	0.0142	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
90.94	Flag	27	10.422	2.2903	0.0000	2826
90.75	Truck Ball	27	10.422	2.2903	0.0000	2826
90.00	Canister Load1	27	10.422	2.2903	0.0000	2826
85.94	(2) ETW190VS12UB	30	8.774	1.8218	0.0000	2826
80.00	Canister Load2	30	6.483	1.1771	0.0000	1412
76.94	P65-16-XLH-RR	30	5.407	0.8806	0.0000	1081
70.00	Canister Load3	30	3.394	0.3527	0.0000	760

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	90 - 70	28.768	2	6.2322	0.0000
L2	70 - 35.9375	9.578	2	0.9929	0.0000
L3	35.9375 - 1.9375	3.155	2	0.7492	0.0000
L4	1.9375 - 0.9375	0.004	4	0.0401	0.0000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
90.94	Flag	2	28.768	6.2322	0.0000	1054
90.75	Truck Ball	2	28.768	6.2322	0.0000	1054
90.00	Canister Load1	2	28.768	6.2322	0.0000	1054
85.94	(2) ETW190VS12UB	2	24.272	4.9653	0.0000	1054
80.00	Canister Load2	2	18.021	3.2223	0.0000	526
76.94	P65-16-XLH-RR	2	15.084	2.4205	0.0000	402
70.00	Canister Load3	2	9.578	0.9929	0.0000	282

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	90 - 70 (1)	MT 4" X 0.5	20.00	0.00	0.0	45.000	5.4978	-1.32	247.40	0.005
L2	70 - 35.9375 (2)	P24x0.375	34.06	0.00	0.0	21.000	27.8325	-5.00	584.48	0.009
L3	35.9375 - 1.9375 (3)	P24x0.375	34.00	0.00	0.0	21.000	27.8325	-8.45	584.48	0.014
L4	1.9375 - 0.9375 (4)	P20x0.5	1.00	0.00	0.0	21.000	30.6305	-8.56	643.24	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	90 - 70 (1)	MT 4" X 0.5	17.86	49.899	49.500	1.008	0.00	0.000	49.500	0.000
L2	70 - 35.9375 (2)	P24x0.375	88.15	6.536	23.100	0.283	0.00	0.000	23.100	0.000
L3	35.9375 - 1.9375 (3)	P24x0.375	203.38	15.078	23.100	0.653	0.00	0.000	23.100	0.000
L4	1.9375 - 0.9375 (4)	P20x0.5	207.36	17.080	23.100	0.739	0.00	0.000	23.100	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	90 - 70 (1)	MT 4" X 0.5	1.08	0.393	30.000	0.013	0.00	0.000	30.000	0.000
L2	70 - 35.9375 (2)	P24x0.375	2.78	0.200	14.000	0.014	0.00	0.000	14.000	0.000
L3	35.9375 - 1.9375 (3)	P24x0.375	3.98	0.286	14.000	0.020	0.00	0.000	14.000	0.000
L4	1.9375 - 0.9375 (4)	P20x0.5	4.00	0.261	14.000	0.019	0.00	0.000	14.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria

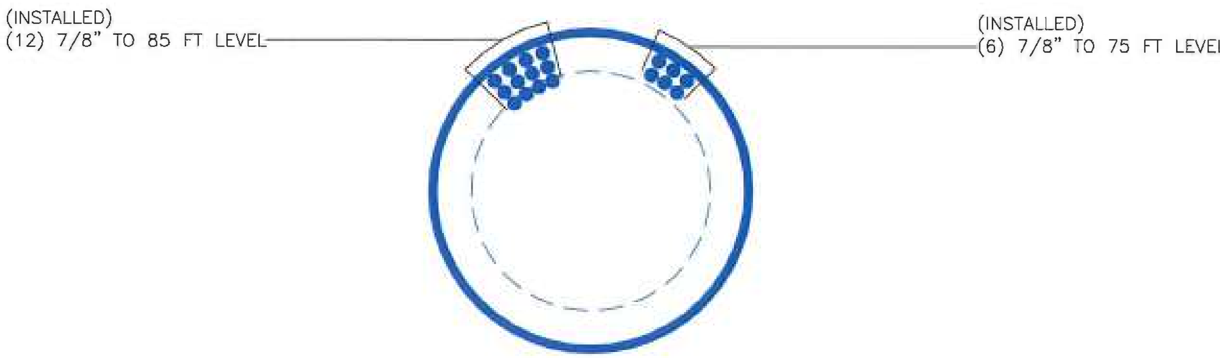
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	90 - 70 (1)	0.005	1.008	0.000	0.013	0.000	1.014 ✔	1.333	H1-3+VT ✔
L2	70 - 35.9375 (2)	0.009	0.283	0.000	0.014	0.000	0.292 ✔	1.333	H1-3+VT ✔
L3	35.9375 - 1.9375 (3)	0.014	0.653	0.000	0.020	0.000	0.668 ✔	1.333	H1-3+VT ✔
L4	1.9375 - 0.9375 (4)	0.013	0.739	0.000	0.019	0.000	0.753 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF^*P_{allow} K	% Capacity	Pass Fail
L1	90 - 70	Pole	MT 4" X 0.5	1	-1.32	329.78	76.0	Pass
L2	70 - 35.9375	Pole	P24x0.375	2	-5.00	779.12	21.9	Pass
L3	35.9375 - 1.9375	Pole	P24x0.375	3	-8.45	779.12	50.1	Pass
L4	1.9375 - 0.9375	Pole	P20x0.5	4	-8.56	857.44	56.5	Pass
							Summary	
						Pole (L1)	76.0	Pass
						RATING =	**76.0**	**Pass**

APPENDIX B

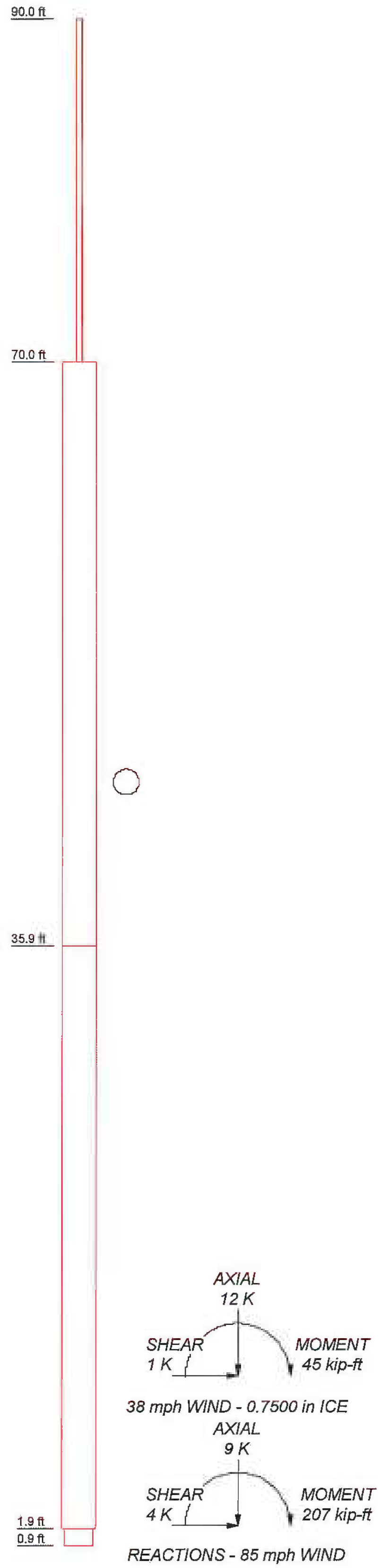
BASE LEVEL DRAWING


(INSTALLED)
(12) 7/8" TO 85 FT LEVEL
(INSTALLED)
(6) 7/8" TO 75 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Section	Size	Length (ft)	Grade	Weight (K)
1	MT 4" X 0.5	20.00	ASTM A513 D.O.M.	0.4
2	P24x0.375	34.06	A53-B-35	3.2
3	P24x0.375	34.00		3.2
4	P20x0.5	1.00		6.90.1



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Flag	90.9375	P65-16-XLH-RR	76.9375
Truck Ball	90.75	P65-16-XLH-RR	76.9375
Canister Load1	90	P65-16-XLH-RR	76.9375
(2) ETW190VS12UB	85.9375	ETW190VS12UB	76.9375
(2) ETW190VS12UB	85.9375	ETW190VS12UB	76.9375
(2) ETW190VS12UB	85.9375	ETW190VS12UB	76.9375
APX16DWV-16DWVS-C	85.9375	(2) DBC2046F1V2-1	76.9375
APX16DWV-16DWVS-C	85.9375	(2) DBC2046F1V2-1	76.9375
APX16DWV-16DWVS-C	85.9375	(2) DBC2046F1V2-1	76.9375
Canister Load2	80	Canister Load3	70

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
ASTM A513 D.O.M.	75 ksi	85 ksi	A53-B-35	35 ksi	58 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 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 76%

Paul J. Ford and Company 250 East Broad St, Suite 600 Columbus, OH 43215 Phone: 614.221.6679 FAX:	Job: **90-ft Flag Pole: 927 Danbury Rd.: Wilton, CT**		
	Project: **31908-0121**		
	Client: ATTW-80583W-33R5	Drawn by: TDehnke	App'd:
	Code: TIA/EIA-222-F	Date: 04/25/14	Scale: NTS
	Path:		Dwg No. E-1

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /G

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#:	
Site Name:	
App #:	

Base Reactions

TIA Revision:	F	
Unfactored Moment, M:	207	ft-kips
Unfactored Axial, P:	9	kips
Unfactored Shear, V:	4	kips

Anchor Rod Data

Qty:	4	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	27	in

Anchor Rod Results

TIA F --> Maximum Rod Tension	89.8 Kips	
Allowable Tension:	195.0 Kips	
Anchor Rod Stress Ratio:	46.0%	Pass

Plate Data

W=Side:	25.5	in
Thick:	2.25	in
Grade:	50	ksi
Clip Distance:	1.75	in

Base Plate Results	Flexural Check	
Base Plate Stress:	24.3 ksi	
Allowable PL Bending Stress:	50.0 ksi	
Base Plate Stress Ratio:	48.7%	Pass

PL Ref. Data

Yield Line (in):	16.06
Max PL Length:	16.06

Stiffener Data (Welding at both sides)

Configuration:	Unstiffened	
Weld Type:		**
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi
Clear Space between Stiffeners at B.C.		in

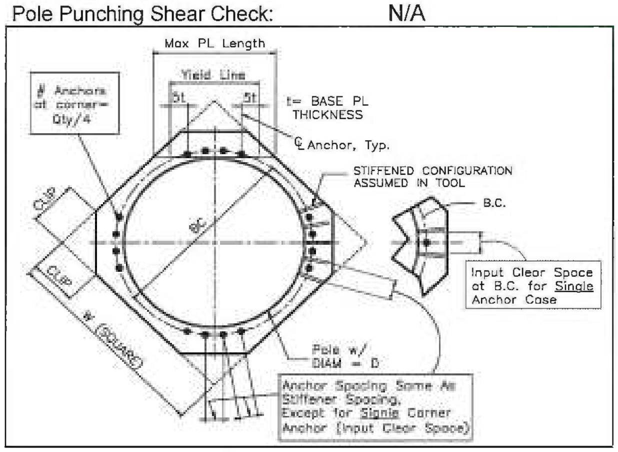
N/A - Unstiffened

Stiffener Results

Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A

Pole Results

Pole Punching Shear Check:	N/A



Pole Data

Diam:	20	in
Thick:	0.5	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round

Stress Increase Factor

ASD ASIF:	1.333

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data	
BU#:	
Site Name:	
App #:	
Manufacturer:	Other

Reactions		
Moment:	207	ft-kips
Axial:	9	kips
Shear:	4	kips
Exterior Flange Run, T+Q:	0	kips

Elevation: 1 feet

PLATE CHECK ONLY

Plate Data		
Plate Outer Diam:	23.25	in
Plate Inner Diam:	20	in (Hole @ Ctr)
Thick:	2	in
Grade:	50	ksi
Effective Width:	3.04	in

Interior Flange Plate Results	Flexural Check
Controlling Bolt Axial Force:	21.1 Kips, Ext. C= Interior C
Plate Stress:	16.9 ksi
Allowable Plate Stress:	50.0 ksi
Plate Stress Ratio:	33.8% Pass

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

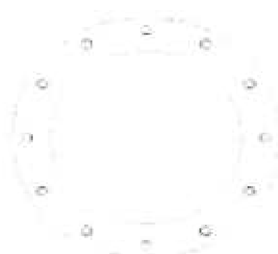
Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Pole OuterDiam:	24	in
Thick:	0.375	in
Pole Inner Diam:	23.25	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	50	ksi



Stress Increase Factor	
ASIF:	1.333

* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#:	
Site Name:	
App #:	

Manufacturer:	Other

Reactions

Moment:	88.31	ft-kips
Axial:	8.54	kips
Shear:	2.75	kips
Exterior Flange Run, T+Q:	0	kips

Elevation: 35.9375 feet

Bolt Data

Qty:	12			
Diam:	1.25		Bolt Fu:	105
Bolt Material:	A325		Bolt Fy:	81
N/A:	100	<-- Disregard	Bolt Fty:	
N/A:	75	<-- Disregard		44.00
Circle:	18.75	in		

Interior Flange Bolt Results

Maximum Bolt Tension:	18.1	Kips, Ext. T=Interior T
Allowable Tension:	72.0	Kips
Bolt Stress Ratio:	25.2%	Pass

Plate Data

Plate Outer Diam:	23.25	in
Plate Inner Diam:	15	in (Hole @ Ctr)
Thick:	2.25	in
Grade:	50	ksi
Effective Width:	6.09	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	19.6	Kips, Ext. C= Interior C
Plate Stress:	8.6	ksi
Allowable Plate Stress:	50.0	ksi
Plate Stress Ratio:	17.1%	Pass

Stiffener Data (Welding at Both Sides)

Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data

Pole OuterDiam:	24	in
Thick:	0.375	in
Pole Inner Diam:	23.25	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	50	ksi

Stress Increase Factor

ASIF:	1.333	

* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

BASE FLANGE DESIGN

PLATE STEEL: ASTM A 572 GR 50 Fy = 50 KSI
Fu WELD: 70 KSI

BASE LOADS:

MOMENT =	17.97	(ft-kips)
SHEAR =	1.08	(kips)
AXIAL =	1.41	(kips)

SIZE FLANGE BOLTS

BOLT CIRCLE	# BOLTS	I	BOLT FORCE (TENSION)	USE BOLT Φ	BOLT TENSILE CAPACITY
(in)		(in^2)	(kips)	(in)	(kips)
19.000	6	270.75	7.57	3/4	25.92

STIFFENER

SPINE OD	C/C OF STIFF.	SHEAR IN STIFFENER	STIFF. THK	STIFF. HT	STIFF. CAPACITY
(in)	(in)	(k)	(in)	(in)	(kips)
4	8.500	26.96	0.50	6.50	86.67

T/C LOAD AT C/C OF IN STIFFENER	STIFF. THK	STIFF. HT	TEN. CAPACITY OF STIFF.	COMP. CAPACITY OF STIFF.
(k)	(in)	(in)	(kips)	(kips)
12.68	0.50	3.50	70.00	68.44

b / t(STIFF) = 13.00 127 / SQRT(FY) = 17.96 OK

WELD

SPINE OD (g)	w/ STIFF	h	D	d	Iweld of STIFF + PIPE	Sweld	Rw
(in)	(in)	(in)	(in)	(in)	(in^4)	(in^3)	(k/in)
4	4.00	12.00	10.39	3.46	534.63	102.89	2.10

w	fw
(in)	(k/in)
1/4	4.95

PLATE BENDING

C/C STIFF.	MOMENT ARM	BENDING MOMENT	SPOKE WIDTH	PLATE THK	fb	Fb
(in)	(in)	(kip-in)	(in)	(in)	(ksi)	(ksi)
8.500	5.25	40.96	3.5	1.75	22.93	50.00

WELD OF PLATE TO BASE POLE

BOLT FORCE (COMPRESSION)	GROOVE WELD	fw	WELD LENGT H	WELD CAPACITY AT PLATE EDGE		
(kips)	(in)	(k/in)	(in)	(kips)		
7.80	1/4	3.50	13.38	46.84	<	BOLT COMP.

TOP PLATE TO BASE POLE

BASE POLE TOP ID	MOMENT ARM	BENDING MOMENT	fb	Fb
(in)	(in)	(kip-in)	(ksi)	(ksi)
25.56	3.28	25.59	14.32	50

*1/3 RD INCREASE IN ALLOWABLE STEEL STRESSES IS USED FOR THIS DESIGN

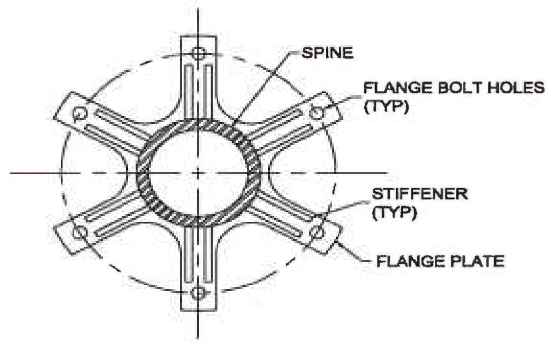
CCI Flagpole Tool

CROWN CASTLE

Site Data	
BU#:	829115
Site Name:	
App #:	

Code		
Code:	TIA/EIA 222-F	
Ice Thickness:	0.75	in
Windspeed (V):	85	mph
Ice Wind Speed (V):	37.6	mph

Tower Information		
Total Tower Height:	89.0625	ft
Base Tower Height:	69.0625	ft
Total Canister Length:	20	ft
Number of Canister Assembly Sections:	2	



FLANGE PLATE
(TYPE 3: SOLIDITY RATIO 0.5)

Canister Section Number *:	Canister Assembly Length (ft):	Canister Assembly Diameter (in):	Number of Sides Canister Section	Plate Type:	Mating Flange Plate Thickness (in)**:	Mating Flange Plate Diameter (in):	Solidity Ratio	Plate Weight (Kip):	Canister Weight (Kip)
1	10	23.125	Round	3	0.00	23.125	0.5	0.000	0.121
2	10	24	Round	3	1.50	24	0.5	0.192	0.126

* Sections are numbered from the top of the tower down ** Mating Flange Plate Thickness at the bottom of canister section

Flag on Tower:	Yes	
Flag Width:	18	ft
Flag Height:	12	ft
Flag Elevation(z):	90	ft

Truck Ball on Tower:	Yes	
Diameter of Ball:	18	in

Geometry : Base Tower + Spine

37514-0960.eri *(last saved 04/24 3:30 pm)*

Pole Height Above Base (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Bend Radius (in)	Pole Material	Delete
89.0625	20		0	4	4	0.5	n/a	A36	[x]
69.0625	34.0625		0	24	24	0.375	n/a	verwrite=A STM A513 D.O.M.	[x]
35	34		0	24	24	0.375	n/a	A53-B-35	[x]
1	1		0	20	20	0.5	n/a	A53-B-35	[x]

Discrete Loads: Truck Ball	Apply C_aA_A at Elevation(z) (ft)	C_aA_A No Ice (ft^2)	C_aA_A 1/2" Ice (ft^2)	C_aA_A 1" Ice (ft^2)	C_aA_A 2" Ice (ft^2)	C_aA_A 4" Ice (ft^2)	Weight No Ice (Kip)	Weight 1/2" Ice (Kip)
	89.8125	1.414	1.575	1.745	2.112	2.950	0.05	0.067

Discrete Loads : C_FA_F for Canister Assembly								
Canister Loading	Apply C_FA_F at Elevation(z) (ft)	C_FA_F No Ice (ft^2)	C_FA_F 1/2" Ice (ft^2)	C_FA_F 1" Ice (ft^2)	C_FA_F 2" Ice (ft^2)	C_FA_F 4" Ice (ft^2)	Canister Assembly Weight No Ice (Kip)	Canister Assembly Weight 1/2" Ice (Kip)
Canister Load 1	89.0625	5.685	5.931	6.177	6.668	7.652	0.061	0.133
Canister Load 2	79.0625	11.585	12.077	12.568	13.552	15.518	0.123	0.270
Canister Load 3	69.0625	5.900	6.146	6.392	6.883	7.867	0.255	0.330

User Forces: Flag Force Calculation Per ANSI/NAAMM FP 1001-07	
$Wind_{FORCE}$=	0.289 Kip
Weight=	0.262 Kip
$Wind_{FORCE, ICE}$=	0.073 Kip
$Weight_{ICE}$=	0.413 Kip
$W_{FORCE, SERVICE WIND}$=	0.115 Kip
Weight=	0.262 Kip

←Flag force should be included at the top of the flag attachment elevation. If the attachment of the flag to the halyard distributes forces equally to the pole, apply flag forces accordingly in tnx file.

Deflection Check Required:	Yes	Import Deflection Results
3% Spine Deflection Check		
Allowable (3%) Horizontal Spine Deflection (inches)	Actual Deflection ***(inches)	Sufficient/ Insufficient
7.200	7.069	Sufficient

*** Relative deflection under service level wind speed

PJF job no. **37514-0960** Project name **BU# 829115**

Foundation Loads:

Pole weight or tower leg compression =	**9**	(kips)
Horizontal load at top of pier =	**4**	(kips)
Overturning moment at top of pier=	**207**	(ft-kips)

Design criteria:

Safety factor against overturning =	**1.5**

Soil Properties:

Soil density =	**100**	(pcf)
Allowable soil bearing =	**2**	(ksf)
Depth to water table =	**99**	(ft)

Dimensions:

Pier shape (round or square)	**S**	("R" or "S")
Pier width =	**4**	(ft)
Pier height above grade =	**0.5**	(ft)
depth to bottom of footing =	**7**	(ft)
Footing thickness =	**2.5**	(ft)
Footing width =	**10.5**	(ft)
Footing length =	**10.5**	(ft)

Concrete:

Concrete strength =	**3**	(ksi)
Rebar strength =	**60**	(ksi)
ultimate load factor =	**1.3**	

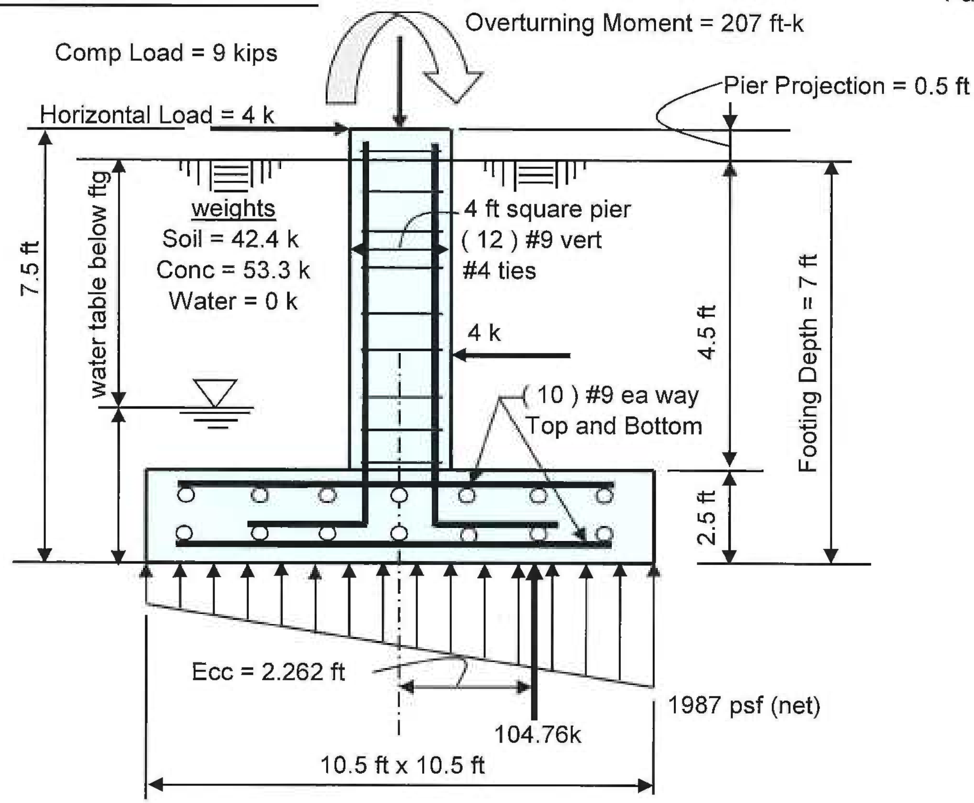
Reinforcing Steel:

	Pad	
minimum cover over rebar =	**3**	inches
size of pad rebar =	**#9**	bar
quantity of pad rebar =	**10**	(ea direction)

Reinforcing Steel:

	Pier	
size of vert rebar in pier=	**#9**	bar
vertical rebar quantity =	**12**	
size of pier ties =	**#4**	bar
minimum cover over rebar =	**3**	inches

Total volume of concrete = 13.2 cu yd



Summary of analysis results

Maximum Net Soil Bearing = 1.987 ksf Allowable Net Soil Bearing = 2 ksf **Soil Bearing Stress Ratio = 0.99 Okay**	Ult Bending Shear Capacity = 110 psi Ult Bending Shear Stress = 12 psi **Bending Shear Stress Ratio = 0.11 Okay**
Ftg Overturning Resistance = 550 ft-kips Overturning Moment = 237 ft-kips Required Overturning Safety Factor = 1.5 Overturning Safety Factor = 2.321 **Ratio = 0.65 Okay**	Pad Bending Moment Capacity= 1097 ft-k Pad Bending Moment = 82 ft-k **Bending Moment Stress Ratio = 0.07 OK**

```
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                    oo    oo             oo
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```

General Information:

File Name: C:\Users\tdehnke\Desktop\37514-0960.col
Project:
Column: Engineer:
Code: ACI 318-08 Units: English

Run Option: Investigation Slenderness: Not considered
Run Axis: X-axis Column Type: Structural

Material Properties:

f'c = 3 ksi fy = 60 ksi
Ec = 3122.02 ksi Es = 29000 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.85

Section:

Rectangular: Width = 48 in Depth = 48 in

Gross section area, Ag = 2304 in^2
Ix = 442368 in^4 Iy = 442368 in^4
rx = 13.8564 in ry = 13.8564 in
Xo = 0 in Yo = 0 in

Reinforcement:

Bar Set: ASTM A615

Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)
# 3	0.38	0.11	# 4	0.50	0.20	# 5	0.63	0.31
# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
# 9	1.13	1.00	# 10	1.27	1.27	# 11	1.41	1.56
# 14	1.69	2.25	# 18	2.26	4.00			

Confinement: Tied; #4 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

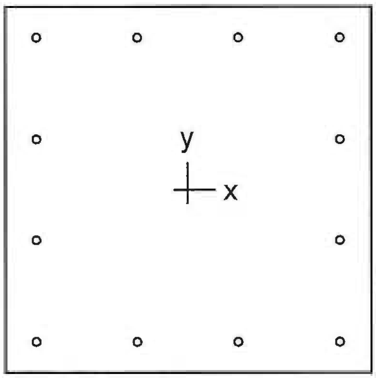
Layout: Rectangular
Pattern: All Sides Equal (Cover to transverse reinforcement)
Total steel area: As = 12.00 in^2 at rho = 0.52% (Note: rho < 1.0%)
Minimum clear spacing = 12.16 in

12 #9 Cover = 3 in

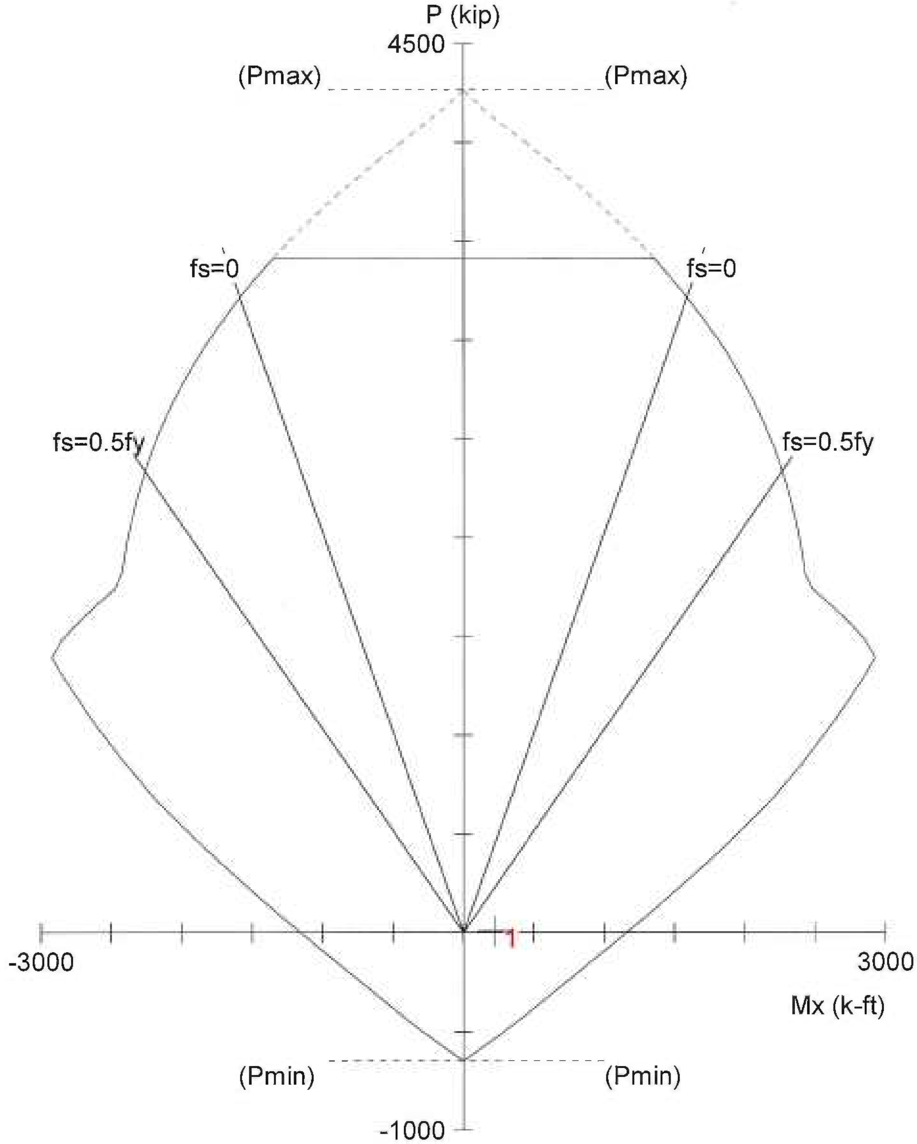
Factored Loads and Moments with Corresponding Capacities:

No.	Pu kip	Mux k-ft	PhiMnx k-ft	PhiMn/Mu	NA depth in	Dt depth in	eps_t	Phi
1	9.00	225.00	1166.97	5.187	4.43	43.94	0.02674	0.900

*** End of output ***



48 x 48 in



Code: ACI 318-08

Units: English

Run axis: About X-axis

Run option: Investigation

Slenderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 04/25/14

Time: 10:12:38

spColumn v4.80. Licensed to: Paul J. Ford and Company. License ID: 60478-1036166-4-1E6CD-22701

File: C:\Users\tdehnke\Desktop\37514-0960.col

Project:

Column:		Engineer:	
f'c = 3 ksi	fy = 60 ksi	Ag = 2304 in^2	12 #9 bars
Ec = 3122 ksi	Es = 29000 ksi	As = 12.00 in^2	rho = 0.52%
fc = 2.55 ksi		Xo = 0.00 in	Ix = 442368 in^4
e_u = 0.003 in/in		Yo = 0.00 in	Iy = 442368 in^4
Beta1 = 0.85		Min clear spacing = 12.16 in	Clear cover = 3.50 in

Confinement: Tied

phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

EXHIBIT C

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

T-Mobile Existing Facility

Site ID: CT11117C

Wilton / Georgetown / Route 7

922 Danbury Road
Wilton, CT 06897

April 16, 2014

EBI Project Number: 62142540

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

EBI Consulting
environmental | engineering | due diligence

April 16, 2014

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

Re: Emissions Values for Site: **CT11117C - Wilton / Georgetown / Route 7**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at 922 Danbury Road, Wilton, CT, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

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

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter (μW/cm2). The general population exposure limit for the cellular band is 567 μW/cm2, and the general population exposure limit for the PCS and AWS bands is 1000 μW/cm2. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 922 Danbury Road, Wilton, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, the actual antenna pattern gain value in the direction of the sample area was used. For this report the sample point is a 6 foot person standing at the base of the tower

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

1) 2 GSM channels (1940.000 MHz—to 1950.000 MHz) were considered for each sector of the proposed installation.
2) 2 UMTS channels (2110.000 MHz to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation.
3) 2 LTE channels (2110.000 MHz to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation.
4) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
5) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The actual gain in this direction was used per the manufactures supplied specifications.
6) The antenna used in this modeling is the RFS APX16DWV-16DWVS-C-A20 for LTE, UMTS and GSM. This is based on feedback from the carrier with regards to anticipated antenna selection. This antenna has a 16.3 dBd gain value at its main lobe. Actual antenna gain values were used for all calculations as per the manufacturers specifications.

7) The antenna mounting height centerline of the proposed antennas is **85 feet** above ground level (AGL).
8) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

Site ID	CT11117C - Wilton / Georgetown / Route 7
Site Address	922 Danbury Road, Wilton, CT 06897
Site Type	Monopole

Sector 1

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	RFS	APX16DWV-16DWVS-E-A20	Passive	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.25	85	79	7/8"	1.2	0	21.535316	1.240518	0.12405%
1B	RFS	APX16DWV-16DWVS-E-A20	Passive	AWS - 2100 MHz	UMTS/LTE	40	4	160	-3.25	85	79	7/8"	1.2	0	57.42751	3.308048	0.33080%
												Sector total Power Density Value:			0.455%		

Sector 2

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	RFS	APX16DWV-16DWVS-E-A20	Passive	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.25	85	79	7/8"	1.2	0	21.535316	1.240518	0.12405%
1B	RFS	APX16DWV-16DWVS-E-A20	Passive	AWS - 2100 MHz	UMTS/LTE	40	4	160	-3.25	85	79	1-5/8"	1.2	0	57.42751	3.308048	0.33080%
												Sector total Power Density Value:			0.455%		

Sector 3

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	RFS	APX16DWV-16DWVS-E-A20	Passive	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.25	85	79	7/8"	1.2	0	21.535316	1.240518	0.12405%
1B	RFS	APX16DWV-16DWVS-E-A20	Passive	AWS - 2100 MHz	UMTS/LTE	40	4	160	-3.25	85	79	1-5/8"	1.2	0	57.42751	3.308048	0.33080%
												Sector total Power Density Value:			0.455%		

Site Composite MPE %

Carrier	MPE %
T-Mobile	1.365%
AT&T	5.330%
Total Site MPE %	6.695%

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Summary

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

The anticipated Maximum Composite contributions from the T-Mobile facility are **1.365% (0.455% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously.

The anticipated composite MPE value for this site assuming all carriers present is **6.695%** of the allowable FCC established general public limit. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803