

**JULIE D. KOHLER**

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

February 27, 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 CT11092J  
36 Sugar Hollow Lake Road, Danbury**

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, Crown Castle owns the existing telecommunications tower and related facility at 36 Sugar Hollow Lake Road, Danbury Connecticut (Coordinates 41 20' 59.444"/ -73 28' 9.016"). T-Mobile intends to replace two existing antennas and add two antennas and related equipment at this existing telecommunications facility in Danbury ("Danbury 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 Mayor Mark Boughton, and the property owners, Danbury Lodge No. 120.

The existing Danbury Facility consists of a 105 foot tall monopole tower.<sup>1</sup> T-Mobile plans to replace two existing antennas, add two antennas, and replace one TMA (tower mounted amplifier) at a centerline of 105 feet. (See the plans revised to February 26, 2014 attached hereto as Exhibit A). T-Mobile will also install an equipment cabinet, install fiber and coax cable and reuse existing coax cables. The existing Danbury Facility is structurally capable of supporting T-Mobile's proposed modifications, as indicated in the structural analysis dated February 17, 2014 and attached hereto as Exhibit B.

<sup>1</sup> While the online docket for the Connecticut Siting Council does not provide a docket or petition number for the approval of this structure, it does reference this structure in connection with several towersharing requests, the most recent being TS-METROPCS-034-090929.

February 27, 2014  
Site ID CT11092J  
Page 2

The planned modifications to the Danbury 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 and additional antennas will be installed at a centerline of 105 feet, merely replacing and adding to existing antennas located at the same 105 foot elevation. The enclosed tower drawing confirms that the proposed modification will not increase the height of the tower.

2. The proposed modifications will not require an extension of the site boundaries. T-Mobile's equipment will be located entirely within the existing compound area.

3. The proposed modification to the Danbury 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 February 26, 2014, T-Mobile's operations would add 0.709% 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 13.899% 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 Danbury Facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Upon acknowledgement by the Council of this proposed exempt modification, T-Mobile shall commence construction approximately sixty days from the date of the Council's notice of acknowledgement.

Sincerely,



Julie D. Kohler, Esq.

cc: City of Danbury, Mayor Mark Boughton  
Crown Castle  
Danbury Lodge No. 120  
Halene Fujimoto, HPC Wireless

# **EXHIBIT A**

# 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

**Mobile**  
NORTHEAST LLC.

35 GRIFFIN ROAD SOUTH  
BLOOMFIELD, CT 06002

APPROVALS

T-MOBILE \_\_\_\_\_  
LANDLORD \_\_\_\_\_  
RF \_\_\_\_\_  
CONSTRUCTION \_\_\_\_\_

PROJECT NUMBER: 6644.CT11092J  
DESIGNED BY: JQ

REV DATE REVISION DRAWN BY

02/26/14 FOR COMMENT SF

REV	DATE	REVISION	DRAWN BY
0			
1	02/26/14	FOR COMMENT	SF

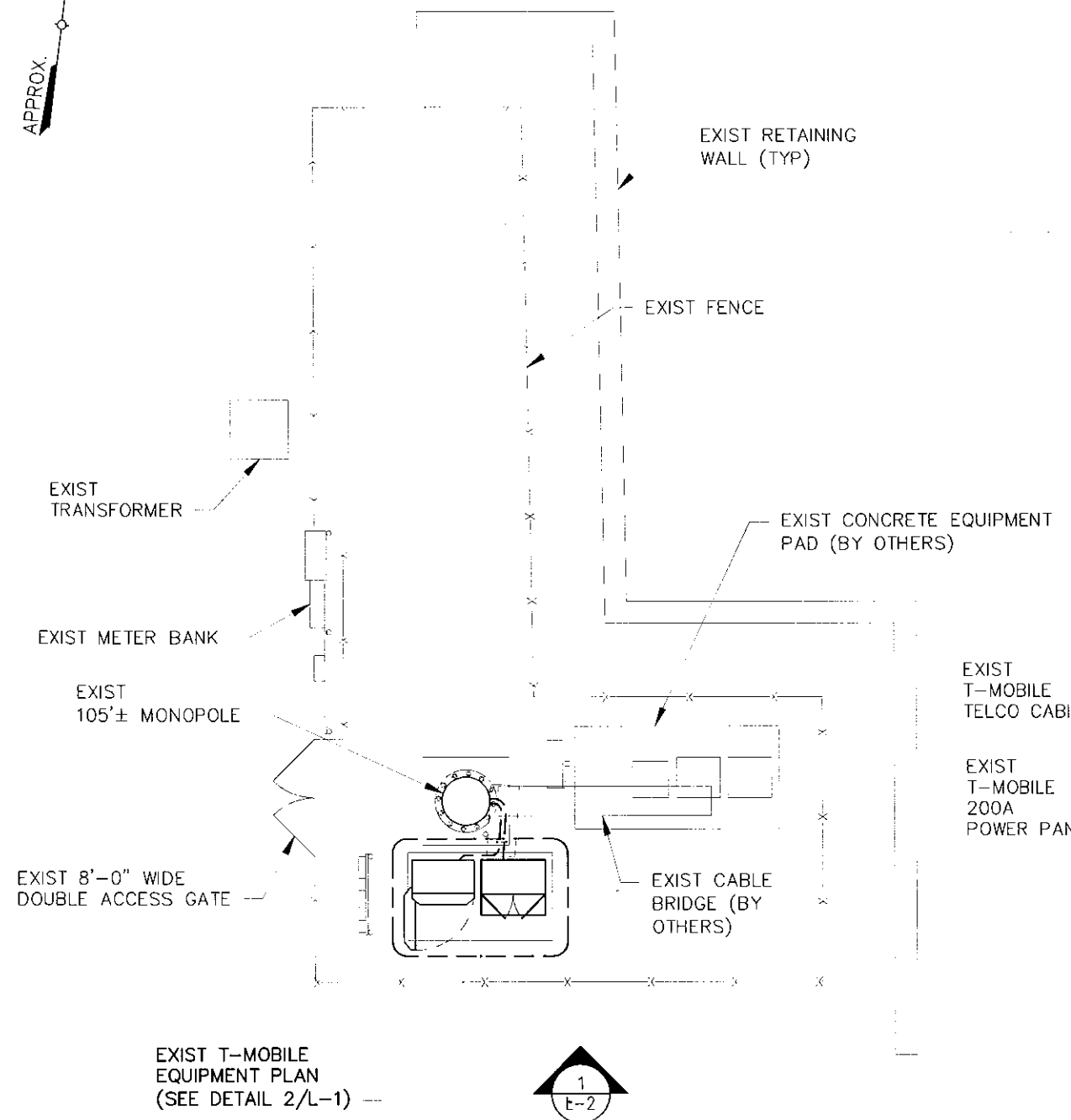
ISSUED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

SITE INFORMATION

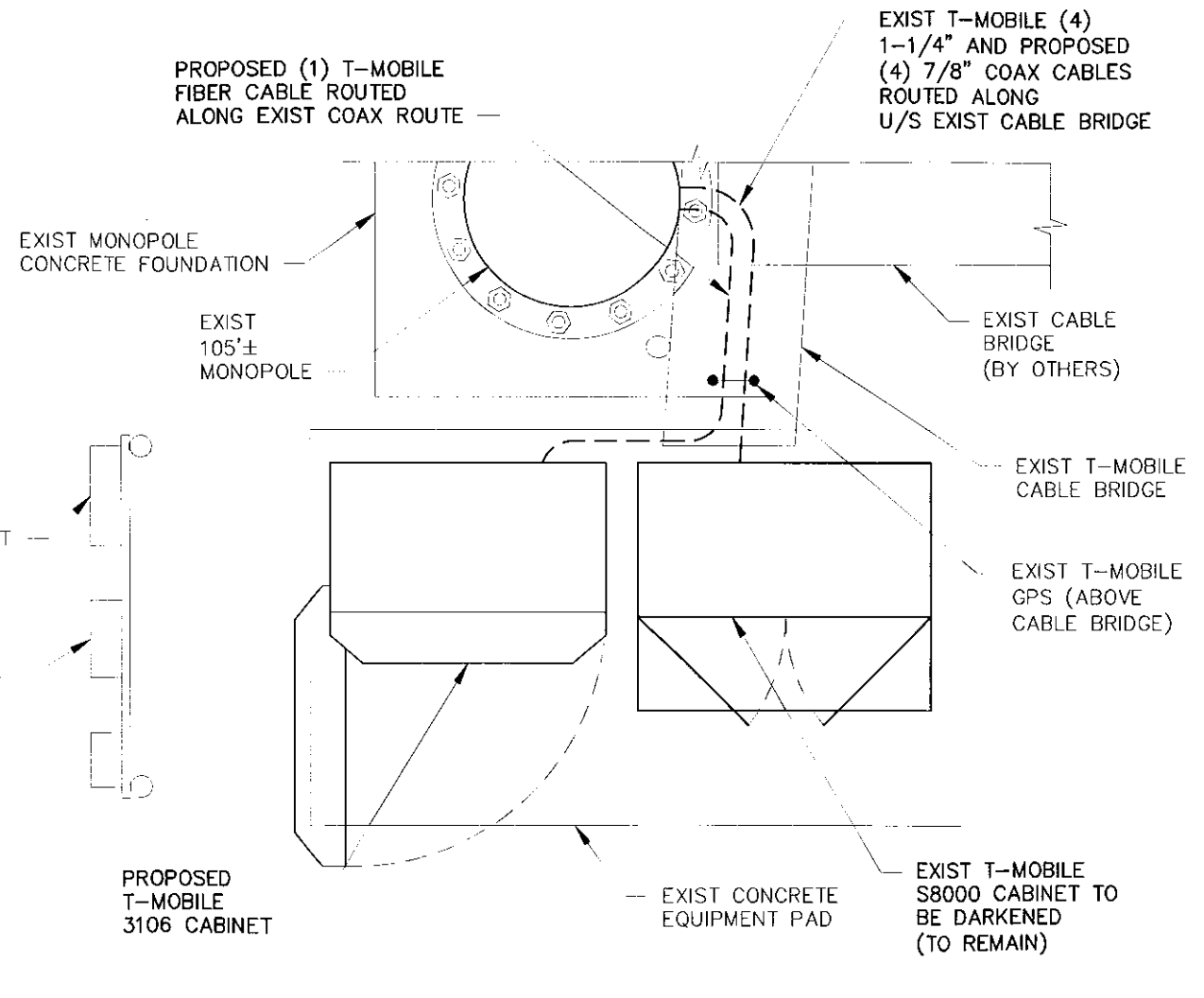
CT11092J  
DANBURY/RT 7  
36 SUGAR HOLLOW  
LAKE ROAD  
DANBURY, CT 06810

SHEET TITLE  
SITE PLAN AND  
EQUIPMENT PLAN

SHEET NUMBER  
L-1

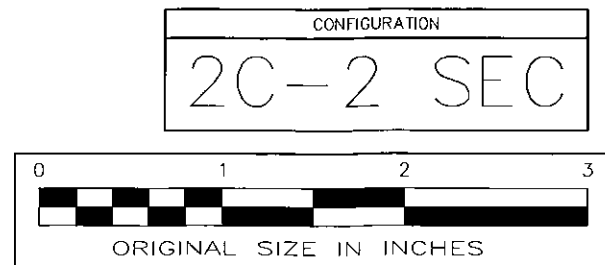


**1**  
L-1  
**SITE PLAN**  
SCALE: 3/32" = 1'-0"



**2**  
L-1  
**EQUIPMENT PLAN**  
SCALE: 3/8" = 1'-0"

STRUCTURAL NOTE:  
EXIST MOUNTS AND MONOPOLE TO BE VERIFIED FOR STRUCTURAL SUITABILITY BY A STATE LICENSED P.E.







NORTHEAST LLC.  
35 GRIFFIN ROAD SOUTH  
BLOOMFIELD, CT 06002

APPROVALS

T-MOBILE \_\_\_\_\_  
LANDLORD \_\_\_\_\_  
RF \_\_\_\_\_  
CONSTRUCTION \_\_\_\_\_

PROJECT NUMBER 6644.CT11092J DESIGNED BY JQ

REV	DATE	REVISION	DRAWN BY
0	02/26/14	FOR COMMENT	SF

ISSUED BY	DATE

SITE INFORMATION

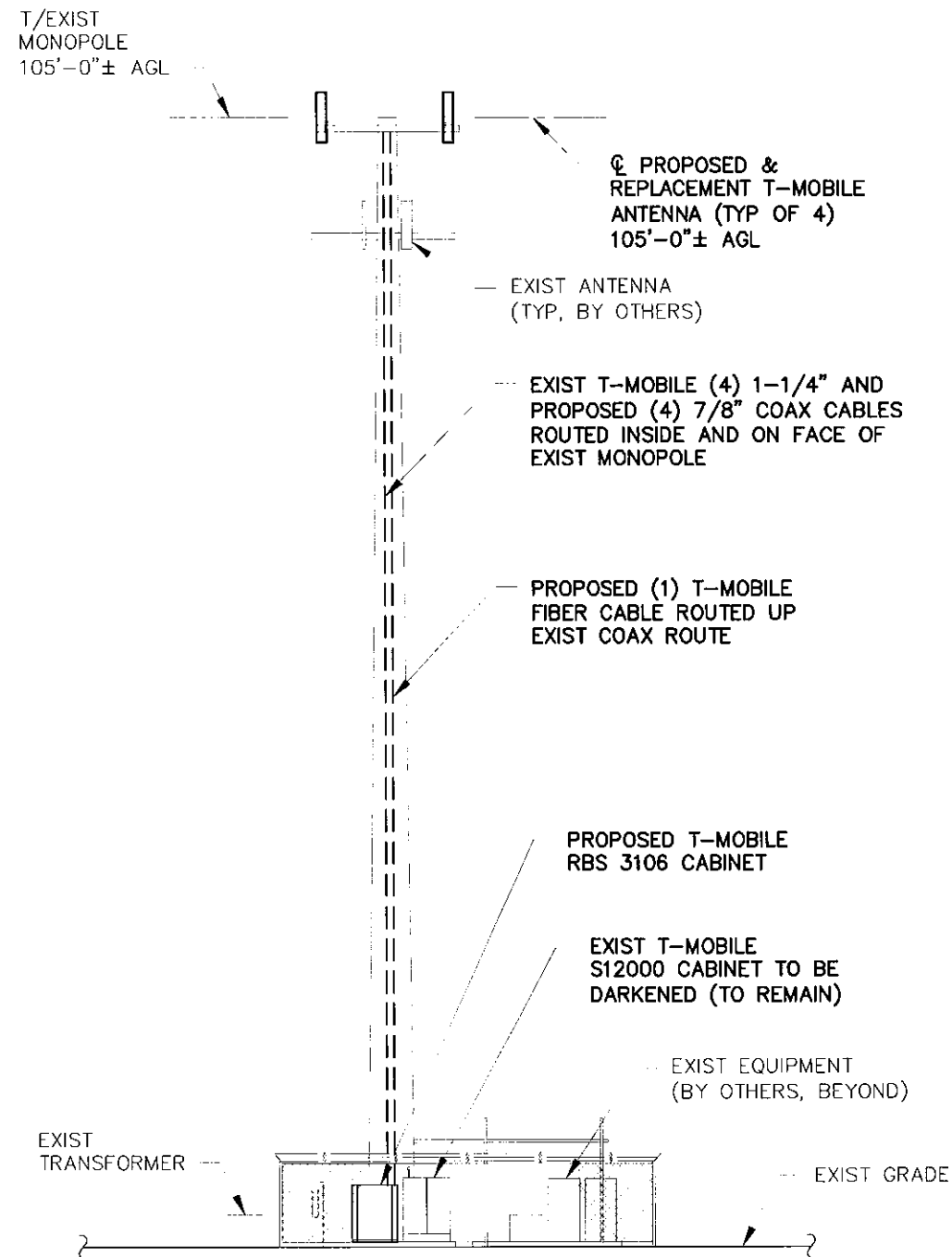
CT11092J  
DANBURY/RT 7  
36 SUGAR HOLLOW  
LAKE ROAD  
DANBURY, CT 06810

SHEET TITLE

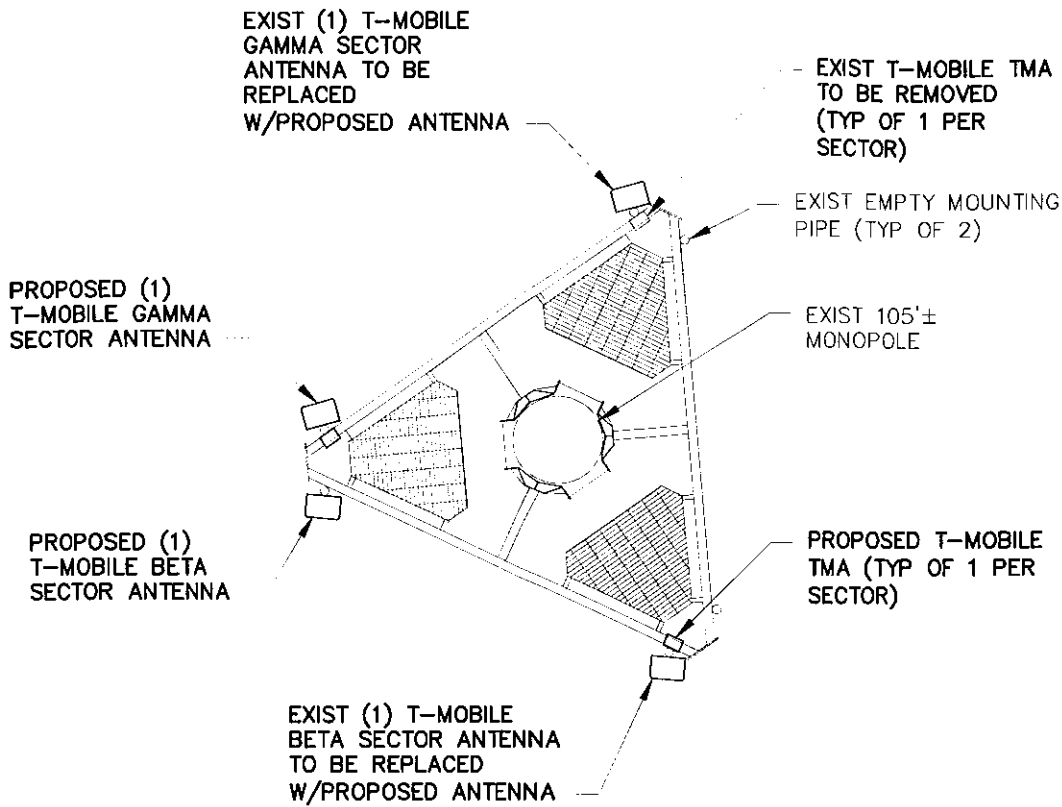
ELEVATION &  
ANTENNA PLAN

SHEET NUMBER

L-2

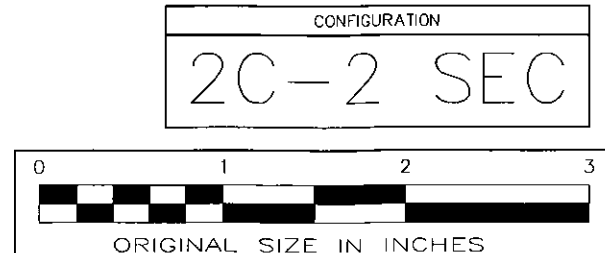


1 ELEVATION  
L-2 SCALE: 1/16" = 1'-0"



2 ANTENNA PLAN  
L-2 SCALE: 3/16" = 1'-0"

STRUCTURAL NOTE:  
EXIST MOUNTS AND MONOPOLE TO BE VERIFIED FOR STRUCTURAL SUITABILITY BY A STATE LICENSED P.E.



# **EXHIBIT B**

Date: February 17, 2014



Cheryl Schultz  
Crown Castle  
3530 Toringdon Way Suite 300  
Charlotte, NC 28277  
(704) 405-6632

GPD Group  
520 S. Main St., Suite 2531  
Akron, OH 44311  
(614) 859-1607  
dpalkovic@gpdgroup.com

**Subject:** Structural Analysis Report

**Carrier Designation:** T-Mobile Co-Locate  
Carrier Site Number: CT11092J  
Carrier Site Name: Danbury/Rt 7

**Crown Castle Designation:** Crown Castle BU Number: 823631  
Crown Castle Site Name: Danbury/Rt 7  
Crown Castle JDE Job Number: 259552  
Crown Castle Work Order Number: 709739  
Crown Castle Application Number: 216341 Rev. 3

**Engineering Firm Designation:** GPD Group Project Number: 2014777.823631.01

**Site Data:** 36 Sugar Hollow Lake Road, Danbury, Fairfield County, CT  
Latitude 41° 20' 59.444", Longitude -73° 28' 9.016"  
105 Foot - Monopole Tower

Dear Cheryl Schultz,

GPD Group 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 617083, in accordance with application 216341, 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/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building based upon a wind speed of 85 mph fastest mile.

We at GPD Group 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:

2/17/14

John N. Kabak, P.E.  
Connecticut #: PEN.0028336

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## 1) INTRODUCTION

The existing 105' monopole has five major sections connected by flanged connections. It has a round cross section, with a 42" diameter at the base and 18" diameter at the top. The structure is painted red and white and has obstruction lights located at the top of the tower.

This tower is a 105 ft Monopole tower designed by PIROD MANUFACTURES INC. in June of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

## 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, 38 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 Coax Cables	Coax Cable Size (in)	Note
105.0	105.0	2	Ericsson	ERICSSON AIR 21 B2A B4P	1	1-5/8	1
		2	Ericsson	ERICSSON AIR 21 B4A B2P			
		2	Ericsson	KRY 112 144/1			

Notes:

- 1) See Appendix B for the proposed coax layout.

**Table 2 – Existing and Reserved Antenna and Cable Information**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Coax Cables	Coax Cable Size (in)	Note
105.0	105.0	1		Platform Mount [LP 405-1]	8	1-5/8	1
		12	EMS Wireless	RR65-19-00DP	17	1-5/8	
		12	Remec	G20045A1			
		1	Andrew	HP4-102			
95.0	95.0	1		Platform Mount [LP 303-1]	12	1-5/8	
		3	Kathrein	742 351			
		3	Kathrein	800 10504			
		1	Maxrad	GPS-TMG-26NMS			
85.0	85.0	1		T-Arm Mount [TA 901-3]	12	7/8	
		4	Decibel	DB844H90E-XY			
		8	EMS Wireless	RV65-12-00DP			

Notes:

- 1) Equipment To Be Removed

**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)
105	105	6		DAPA48120	6	1-5/8
		1		LP Platform		
95	95	12		DAPA48120	12	1-5/8
		1		LP Platform		
85	85	12		DAPA48120	12	1-5/8
		1		LP Platform		

### 3) ANALYSIS PROCEDURE

**Table 4 - Documents Provided**

Document	Reference	Reference	Source
4-GEOTECHNICAL REPORTS	FPA CT-11-092-J, dated: 10/15/00	3528936	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PIROD Inc. File#: A-116418, dated: 06/07/00	3845210	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PIROD Inc. File#: A-116418, dated: 06/07/00	3528938	CCISITES

#### 3.1) Analysis Method

Tnx Tower (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.
- 4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
- 5) Mount sizes, weights, and manufacturers are best estimates based on site photos provided and were determined without the benefit of a site visit by GPD.
- 6) All member connections and foundation steel reinforcing are assumed designed to meet or exceed the load carrying capacity of the connected member and surrounding soils respectively unless otherwise specified in this report.
- 7) All equipment model numbers, quantities, and centerline elevations are as provided in the CCI CAD package dated 02/10/2014 with any adjustments as noted below.

This analysis may be affected if any assumptions are not valid or have been made in error. GPD Group 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	Grid Element	P (k)	Shear (k)	Capacity	Pass/Fail
L1	106 - 105	Pole	P18x.375	1	-0.07	697.49	0.0	Pass
L2	105 - 80	Pole	P18x.375	2	-7.17	697.49	42.5	Pass
L3	80 - 60	Pole	P24x3/8	3	-9.68	934.94	55.3	Pass
L4	60 - 40	Pole	P30x3/8	4	-12.73	1166.57	64.2	Pass
L5	40 - 20	Pole	P36x3/8	5	-16.23	1325.68	68.0	Pass
L6	20 - 0	Pole	P42x3/8	6	-19.99	1484.55	69.9	Pass
							Summary	
						Pole (L6)	69.9	Pass

**Table 6 - Tower Component Stresses vs. Capacity – LC5**

Notes	Component	Elevation (ft)	% Capacity	Pass/Fail
1	Anchor Rods	0	55.0	Pass
1	Base Plate	0	Adequate	Pass
1	Flange Plate	20	58.7	Pass
1	Base Foundation	0	25.9	Pass
1	Base Foundation Soil Interaction	0	34.3	Pass

Structure Ratio (max from all components)	69.9%
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Notes:

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

#### 4.1) Recommendations

The existing tower and its foundation are sufficient for the proposed loading and do not require modifications.

## 5) DISCLAIMER OF WARRANTIES

GPD GROUP has not performed a site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD GROUP in connection with this Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. All tower components have been assumed to only resist dead loads when no other loads are applied. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

GPD GROUP does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD GROUP provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the feasibility of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owner's responsibility to determine the amount of ice accumulation in excess of the code specified amount, if any, that should be considered in the structural analysis.

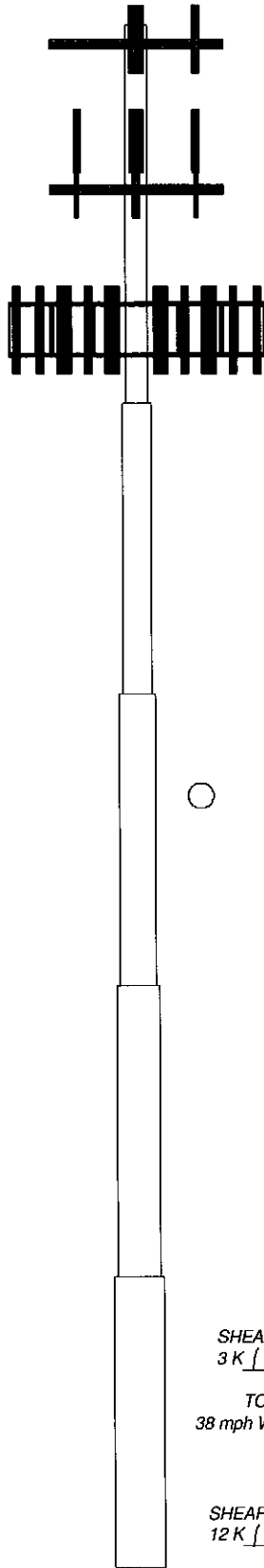
The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD GROUP, but are beyond the scope of this report.

Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

GPD GROUP makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD GROUP will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD GROUP pursuant to this report will be limited to the total fee received for preparation of this report.

**APPENDIX A**  
**TNXTOWER OUTPUT**

1	P18x375	1.09	106.0 ft
2	P18x375	25.00	106.0 ft
3	P24x3/8	20.00	80.0 ft
4	P30x3/8	20.00	60.0 ft
5	P36x3/8	20.00	40.0 ft
6	P42x3/8	20.00	20.0 ft
		12.3	0.0 ft
Section			
Size			
Length (ft)			
Grade	A53-B-42		
Weight (K)			



### DESIGNED APPURTENANCE LOADING

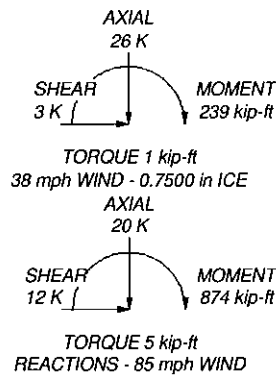
TYPE	ELEVATION	TYPE	ELEVATION
Flash Beacon	105	Platform Mount [LP 303-1]	95
Lightning Rod 4"x5/8"	105	GPS-TMG-26NMS	95
Platform Mount [LP 405-1]	105	742 351 w/ Mount Pipe	95
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	105	742 351 w/ Mount Pipe	95
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	105	800 10504 w/ Mount Pipe	95
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	105	800 10504 w/ Mount Pipe	95
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	105	(4) RV65-12-00DP w/ Mount Pipe	85
KRY 112 144/1	105	(4) DB844H90E-XY w/ Mount Pipe	85
KRY 112 144/1	105	(4) RV65-12-00DP w/ Mount Pipe	85
(2) Pipe Mount 5"x2.375"	105	T-Arm Mount [TA 901-3]	85
		Ice Shield (4' x 8')	83
		Ice Shield (4' x 8')	45


### MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 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: 69.9%



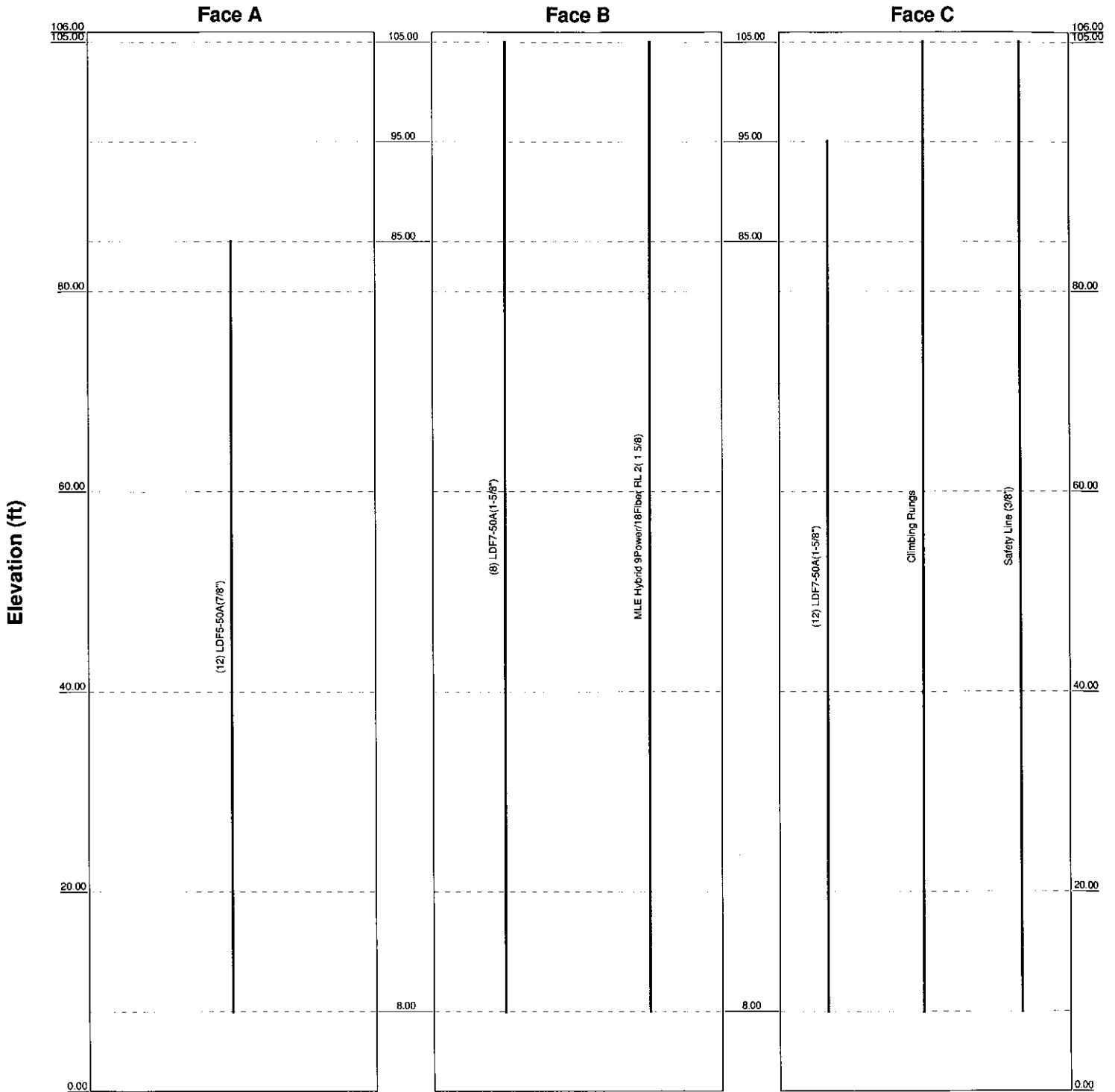
 <b>GPD Group</b> 520 S. Main St., Suite 2531 Akron, OH 44311 Phone: 330-572-2100 FAX: 330-572-2101	Job: <b>BU#: 823631 - Danbury/Rt. 7</b>		
	Project: <b>2014777.823631.01</b>		
	Client: Crown Castle	Drawn by: ahammada	App'd:
	Code: TIA/EIA-222-F	Date: 02/17/14	Scale: NTS
	Path: \\AKRN05.gpdco.com\TELECOM\Crown\823631\01\TNX\823631.er	Dwg No. E-1	



# Feed Line Distribution Chart

## 0' - 106'

Round
Flat
App In Face
App Out Face
Truss Leg



<p><b>GPD Group</b> 520 S. Main St., Suite 2531 Akron, OH 44311 Phone: 330-572-2100 FAX: 330-572-2101</p>	<b>Job: BU#: 823631 - Danbury/Rt. 7</b>		
	Project: 2014777.823631.01		
	Client: Crown Castle	Drawn by: ahammada	App'd:
	Code: TIA/EIA-222-F	Date: 02/17/14	Scale: NTS
	Path: \\AKRN05.gpdco.com\TELECOM\Crown\823631\01\TNX\823631.dwg	Dwg No. E-7	

## Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

- 1) Tower is located in Fairfield County, Connecticut.
- 2) Basic wind speed of 85 mph.
- 3) Nominal ice thickness of 0.7500 in.
- 4) Ice thickness is considered to increase with height.
- 5) Ice density of 56 pcf.
- 6) A wind speed of 38 mph is used in combination with ice.
- 7) Temperature drop of 50 °F.
- 8) Deflections calculated using a wind speed of 50 mph.
- 9) A non-linear (P-delta) analysis was used.
- 10) Pressures are calculated at each section.
- 11) Stress ratio used in pole design is 1.333.
- 12) 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 ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
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## Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	106.00-105.00	1.00	P18x.375	A53-B-42 (42 ksi)	
L2	105.00-80.00	25.00	P18x.375	A53-B-42 (42 ksi)	
L3	80.00-60.00	20.00	P24x3/8	A53-B-42 (42 ksi)	
L4	60.00-40.00	20.00	P30x3/8	A53-B-42 (42 ksi)	
L5	40.00-20.00	20.00	P36x3/8	A53-B-42 (42 ksi)	
L6	20.00-0.00	20.00	P42x3/8	A53-B-42 (42 ksi)	

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor $A_r$	Adjust. Factor $A_r$	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft <sup>2</sup>	in					in	in
L1 106.00-105.00				1	1	1		
L2 105.00-80.00				1	1	1		
L3 80.00-60.00				1	1	1		
L4 60.00-40.00				1	1	1		
L5 40.00-20.00				1	1	1		
L6 20.00-0.00				1	1	1		

**Feed Line/Linear Appurtenances - Entered As Area**

Description	Face or Shield Leg	Allow Shield	Component Type	Placement ft	Total Number		$C_A A_A$ ft <sup>2</sup> /ft	Weight plf
LDF7-50A(1-5/8")	B	No	Inside Pole	105.00 - 8.00	8	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	B	No	Inside Pole	105.00 - 8.00	1	No Ice	0.00	1.07
						1/2" Ice	0.00	1.07
						1" Ice	0.00	1.07
						2" Ice	0.00	1.07
						4" Ice	0.00	1.07
LDF7-50A(1-5/8")	C	No	Inside Pole	95.00 - 8.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
LDF5-50A(7/8")	A	No	Inside Pole	85.00 - 8.00	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
Climbing Rungs	C	No	CaAa (Out Of Face)	105.00 - 8.00	1	No Ice	0.13	7.12
						1/2" Ice	0.23	8.24
						1" Ice	0.33	9.97
						2" Ice	0.53	15.26
						4" Ice	0.93	33.18
Safety Line (3/8")	C	No	CaAa (Out Of Face)	105.00 - 8.00	1	No Ice	0.04	0.22
						1/2" Ice	0.14	0.75
						1" Ice	0.24	1.28
						2" Ice	0.44	2.34
						4" Ice	0.84	4.46

**Feed Line/Linear Appurtenances Section Areas**

Tower Section n	Tower Elevation ft	Face	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_A A_A$ In Face ft <sup>2</sup>	$C_A A_A$ Out Face ft <sup>2</sup>	Weight K
L1	106.00-105.00	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	0.00
L2	105.00-80.00	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.000	0.19
		C	0.000	0.000	0.000	4.270	0.33
L3	80.00-60.00	A	0.000	0.000	0.000	0.000	0.08
		B	0.000	0.000	0.000	0.000	0.15

Tower Section n	Tower Elevation ft	Face	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_A A_A$ In Face ft <sup>2</sup>	$C_A A_A$ Out Face ft <sup>2</sup>	Weight K
L4	60.00-40.00	C	0.000	0.000	0.000	3.416	0.34
		A	0.000	0.000	0.000	0.000	0.08
		B	0.000	0.000	0.000	0.000	0.15
L5	40.00-20.00	C	0.000	0.000	0.000	3.416	0.34
		A	0.000	0.000	0.000	0.000	0.08
		B	0.000	0.000	0.000	0.000	0.15
L6	20.00-0.00	C	0.000	0.000	0.000	3.416	0.34
		A	0.000	0.000	0.000	0.000	0.05
		B	0.000	0.000	0.000	0.000	0.09
		C	0.000	0.000	0.000	2.050	0.21

### Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section n	Tower Elevation ft	Face or Leg	Ice Thickness in	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_A A_A$ In Face ft <sup>2</sup>	$C_A A_A$ Out Face ft <sup>2</sup>	Weight K
L1	106.00-105.00	A	0.862	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	0.00
L2	105.00-80.00	A	0.849	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	0.000	0.19
		C		0.000	0.000	0.000	12.758	0.41
L3	80.00-60.00	A	0.821	0.000	0.000	0.000	0.000	0.08
		B		0.000	0.000	0.000	0.000	0.15
		C		0.000	0.000	0.000	9.983	0.41
L4	60.00-40.00	A	0.788	0.000	0.000	0.000	0.000	0.08
		B		0.000	0.000	0.000	0.000	0.15
		C		0.000	0.000	0.000	9.723	0.40
L5	40.00-20.00	A	0.750	0.000	0.000	0.000	0.000	0.08
		B		0.000	0.000	0.000	0.000	0.15
		C		0.000	0.000	0.000	9.416	0.40
L6	20.00-0.00	A	0.750	0.000	0.000	0.000	0.000	0.05
		B		0.000	0.000	0.000	0.000	0.09
		C		0.000	0.000	0.000	5.650	0.24

### Feed Line Center of Pressure

Section	Elevation ft	$CP_x$ in	$CP_z$ in	$CP_x$ Ice in	$CP_z$ Ice in
L1	106.00-105.00	0.0000	0.0000	0.0000	0.0000
L2	105.00-80.00	-0.1992	0.1150	-0.4621	0.2668
L3	80.00-60.00	-0.2044	0.1180	-0.4920	0.2840
L4	60.00-40.00	-0.2077	0.1199	-0.5064	0.2924
L5	40.00-20.00	-0.2099	0.1212	-0.5103	0.2946
L6	20.00-0.00	-0.1293	0.0747	-0.3287	0.1898

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	$C_A A_A$ Front ft <sup>2</sup>	$C_A A_A$ Side ft <sup>2</sup>	Weight K
Flash Beacon	A	From Leg	4.00 0.00	0.0000	105.00	No Ice 1/2" 4.50	3.00 4.50	0.10 0.15

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C <sub>A</sub> A <sub>A</sub> Front ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Side ft <sup>2</sup>	Weight K	
			2.00						
						Ice	6.00	6.00	0.20
						1" Ice	9.00	9.00	0.30
						2" Ice	15.00	15.00	0.50
						4" Ice			
Lightning Rod 4'x5/8"	C	None		0.0000	105.00	No Ice	0.25	0.25	0.00
						1/2"	0.66	0.66	0.01
						Ice	0.97	0.97	0.01
						1" Ice	1.49	1.49	0.03
						2" Ice	2.68	2.68	0.11
						4" Ice			
Platform Mount [LP 405-1]	C	None		0.0000	105.00	No Ice	20.80	20.80	1.80
						1/2"	28.10	28.10	2.07
						Ice	35.40	35.40	2.33
						1" Ice	50.00	50.00	2.86
						2" Ice	79.20	79.20	3.93
						4" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice	6.90	5.72	0.11
						1/2"	7.46	6.63	0.17
						Ice	8.00	7.42	0.24
						1" Ice	9.10	9.07	0.39
						2" Ice	11.44	12.58	0.82
						4" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice	6.90	5.72	0.11
						1/2"	7.46	6.63	0.17
						Ice	8.00	7.42	0.24
						1" Ice	9.10	9.07	0.39
						2" Ice	11.44	12.58	0.82
						4" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice	6.90	5.72	0.11
						1/2"	7.46	6.63	0.17
						Ice	8.00	7.42	0.24
						1" Ice	9.10	9.07	0.39
						2" Ice	11.44	12.58	0.82
						4" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice	6.90	5.72	0.11
						1/2"	7.46	6.63	0.17
						Ice	8.00	7.42	0.24
						1" Ice	9.10	9.07	0.39
						2" Ice	11.44	12.58	0.82
						4" Ice			
KRY 112 144/1	A	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice	0.41	0.20	0.01
						1/2"	0.50	0.27	0.01
						Ice	0.59	0.35	0.02
						1" Ice	0.81	0.53	0.03
						2" Ice	1.36	1.00	0.08
						4" Ice			
KRY 112 144/1	B	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice	0.41	0.20	0.01
						1/2"	0.50	0.27	0.01
						Ice	0.59	0.35	0.02
						1" Ice	0.81	0.53	0.03
						2" Ice	1.36	1.00	0.08
						4" Ice			
(2) Pipe Mount 5'x2.375"	C	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice	1.19	1.19	0.02
						1/2"	1.50	1.50	0.03
						Ice	1.81	1.81	0.04
						1" Ice	2.46	2.46	0.08
						2" Ice	3.92	3.92	0.20
						4" Ice			
Platform Mount [LP 303-1]	C	None		0.0000	95.00	No Ice	14.66	14.66	1.25
						1/2"	18.87	18.87	1.48
						Ice	23.08	23.08	1.71
						1" Ice	31.50	31.50	2.18
						2" Ice	48.34	48.34	3.10
						4" Ice			
GPS-TMG-26NMS	A	From Leg	4.00	0.0000	95.00	No Ice	0.16	0.16	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>A</sub> A <sub>A</sub> Front ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Side ft <sup>2</sup>	Weight K	
			0.00			1/2"	0.21	0.21	0.00
			0.00			Ice	0.28	0.28	0.01
						1" Ice	0.44	0.44	0.01
						2" Ice	0.86	0.86	0.05
						4" Ice			
742 351 w/ Mount Pipe	A	From Leg	4.00	0.0000	95.00	No Ice	6.06	2.92	0.05
			0.00			1/2"	6.52	3.54	0.09
			3.00			Ice	6.98	4.17	0.14
						1" Ice	7.95	5.48	0.25
						2" Ice	10.00	8.35	0.59
						4" Ice			
742 351 w/ Mount Pipe	B	From Leg	4.00	0.0000	95.00	No Ice	6.06	2.92	0.05
			0.00			1/2"	6.52	3.54	0.09
			3.00			Ice	6.98	4.17	0.14
						1" Ice	7.95	5.48	0.25
						2" Ice	10.00	8.35	0.59
						4" Ice			
742 351 w/ Mount Pipe	C	From Leg	4.00	0.0000	95.00	No Ice	6.06	2.92	0.05
			0.00			1/2"	6.52	3.54	0.09
			3.00			Ice	6.98	4.17	0.14
						1" Ice	7.95	5.48	0.25
						2" Ice	10.00	8.35	0.59
						4" Ice			
800 10504 w/ Mount Pipe	A	From Leg	4.00	0.0000	95.00	No Ice	3.47	3.06	0.04
			0.00			1/2"	3.84	3.69	0.07
			0.00			Ice	4.23	4.34	0.10
						1" Ice	5.08	5.68	0.20
						2" Ice	6.99	8.61	0.50
						4" Ice			
800 10504 w/ Mount Pipe	B	From Leg	4.00	0.0000	95.00	No Ice	3.47	3.06	0.04
			0.00			1/2"	3.84	3.69	0.07
			0.00			Ice	4.23	4.34	0.10
						1" Ice	5.08	5.68	0.20
						2" Ice	6.99	8.61	0.50
						4" Ice			
800 10504 w/ Mount Pipe	C	From Leg	4.00	0.0000	95.00	No Ice	3.47	3.06	0.04
			0.00			1/2"	3.84	3.69	0.07
			0.00			Ice	4.23	4.34	0.10
						1" Ice	5.08	5.68	0.20
						2" Ice	6.99	8.61	0.50
						4" Ice			
(4) RV65-12-00DP w/ Mount Pipe	A	From Leg	4.00	0.0000	85.00	No Ice	1.34	0.80	0.02
			0.00			1/2"	1.56	1.06	0.03
			0.00			Ice	1.80	1.35	0.05
						1" Ice	2.32	2.03	0.09
						2" Ice	3.53	3.62	0.23
						4" Ice			
(4) DB844H90E-XY w/ Mount Pipe	B	From Leg	4.00	0.0000	85.00	No Ice	4.01	5.63	0.04
			0.00			1/2"	4.75	6.83	0.09
			0.00			Ice	5.46	7.88	0.14
						1" Ice	6.71	9.65	0.27
						2" Ice	9.38	13.41	0.66
						4" Ice			
(4) RV65-12-00DP w/ Mount Pipe	C	From Leg	4.00	0.0000	85.00	No Ice	1.34	0.80	0.02
			0.00			1/2"	1.56	1.06	0.03
			0.00			Ice	1.80	1.35	0.05
						1" Ice	2.32	2.03	0.09
						2" Ice	3.53	3.62	0.23
						4" Ice			
T-Arm Mount [TA 901-3]	C	None		0.0000	85.00	No Ice	17.50	17.50	0.75
						1/2"	20.70	20.70	1.00
						Ice	23.90	23.90	1.26
						1" Ice	30.30	30.30	1.76
						2" Ice	43.10	43.10	2.76
						4" Ice			



Description	Face or Leg	Offset Type	Offsets:			Placement ft	C <sub>A</sub> A <sub>A</sub> Front ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Side ft <sup>2</sup>	Weight K
			Horz Lateral ft ft ft	Azimuth Adjustmen t °					
Ice Shield (4' x 8")	B	From Leg	0.00	0.0000	83.00	No Ice	0.08	0.47	0.04
			0.00			1/2"	0.14	0.79	0.05
			0.00			Ice	0.21	1.12	0.07
						1" Ice	0.38	1.81	0.12
						2" Ice	0.82	3.28	0.28
Ice Shield (4' x 8")	B	From Leg	0.00	0.0000	45.00	No Ice	0.08	0.47	0.04
			0.00			1/2"	0.14	0.79	0.05
			0.00			Ice	0.21	1.12	0.07
						1" Ice	0.38	1.81	0.12
						2" Ice	0.82	3.28	0.28
			4" Ice						

**Load Combinations**

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

**Maximum Tower Deflections - Service Wind**

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	106 - 105	9.725	28	0.8283	0.0220
L2	105 - 80	9.551	28	0.8283	0.0220
L3	80 - 60	5.452	28	0.6819	0.0128
L4	60 - 40	2.948	28	0.4875	0.0063
L5	40 - 20	1.260	28	0.3030	0.0031
L6	20 - 0	0.310	28	0.1410	0.0012

**Critical Deflections and Radius of Curvature - Service Wind**

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.00	Flash Beacon	28	9.551	0.8283	0.0220	29045
95.00	Platform Mount [LP 303-1]	28	7.835	0.7982	0.0198	13458
85.00	(4) RV65-12-00DP w/ Mount Pipe	28	6.208	0.7266	0.0152	7104
83.00	Ice Shield (4' x 8")	28	5.900	0.7091	0.0142	6506
45.00	Ice Shield (4' x 8")	28	1.611	0.3472	0.0037	6537

**Maximum Tower Deflections - Design Wind**

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	106 - 105	27.931	3	2.3647	0.0638
L2	105 - 80	27.436	3	2.3647	0.0638
L3	80 - 60	15.702	3	1.9598	0.0371
L4	60 - 40	8.498	3	1.4042	0.0183
L5	40 - 20	3.635	3	0.8737	0.0088
L6	20 - 0	0.894	3	0.4067	0.0034

**Critical Deflections and Radius of Curvature - Design Wind**

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.00	Flash Beacon	3	27.436	2.3647	0.0638	11630
95.00	Platform Mount [LP 303-1]	3	22.532	2.2820	0.0573	4931
85.00	(4) RV65-12-00DP w/ Mount Pipe	3	17.869	2.0846	0.0440	2514
83.00	Ice Shield (4' x 8")	3	16.986	2.0361	0.0411	2295
45.00	Ice Shield (4' x 8")	3	4.647	1.0008	0.0107	2274

**Compression Checks**

**Pole Design Data**

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
L1	106 - 105 (1)	P18x.375	1.00	0.00	0.0	25.200	20.7640	-0.07	523.25	0.000
L2	105 - 80 (2)	P18x.375	25.00	0.00	0.0	25.200	20.7640	-7.17	523.25	0.014
L3	80 - 60 (3)	P24x3/8	20.00	0.00	0.0	25.200	27.8325	-9.68	701.38	0.014
L4	60 - 40 (4)	P30x3/8	20.00	0.00	0.0	25.075	34.9011	-12.73	875.15	0.015
L5	40 - 20 (5)	P36x3/8	20.00	0.00	0.0	23.696	41.9697	-16.23	994.51	0.016
L6	20 - 0 (6)	P42x3/8	20.00	0.00	0.0	22.711	49.0383	-19.99	1113.69	0.018

### Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M <sub>x</sub> kip-ft	Actual f <sub>bx</sub> ksi	Allow. F <sub>bx</sub> ksi	Ratio f <sub>bx</sub> F <sub>bx</sub>	Actual M <sub>y</sub> kip-ft	Actual f <sub>by</sub> ksi	Allow. F <sub>by</sub> ksi	Ratio f <sub>by</sub> F <sub>by</sub>
L1	106 - 105 (1)	P18x.375	0.02	0.003	27.720	0.000	0.00	0.000	27.720	0.000
L2	105 - 80 (2)	P18x.375	113.57	15.205	27.720	0.549	0.00	0.000	27.720	0.000
L3	80 - 60 (3)	P24x3/8	269.75	19.999	27.720	0.721	0.00	0.000	27.720	0.000
L4	60 - 40 (4)	P30x3/8	447.99	21.057	25.075	0.840	0.00	0.000	25.075	0.000
L5	40 - 20 (5)	P36x3/8	648.90	21.049	23.696	0.888	0.00	0.000	23.696	0.000
L6	20 - 0 (6)	P42x3/8	873.59	20.726	22.711	0.913	0.00	0.000	22.711	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f <sub>v</sub> ksi	Allow. F <sub>v</sub> ksi	Ratio f <sub>v</sub> F <sub>v</sub>	Actual T kip-ft	Actual f <sub>vt</sub> ksi	Allow. F <sub>vt</sub> ksi	Ratio f <sub>vt</sub> F <sub>vt</sub>
L1	106 - 105 (1)	P18x.375	0.04	0.004	16.800	0.000	0.00	0.000	16.800	0.000
L2	105 - 80 (2)	P18x.375	7.28	0.701	16.800	0.042	4.95	0.331	16.800	0.020
L3	80 - 60 (3)	P24x3/8	8.35	0.600	16.800	0.036	4.40	0.163	16.800	0.010
L4	60 - 40 (4)	P30x3/8	9.48	0.543	16.800	0.032	4.41	0.104	15.644	0.007
L5	40 - 20 (5)	P36x3/8	10.62	0.506	16.800	0.030	4.40	0.071	13.324	0.005
L6	20 - 0 (6)	P42x3/8	11.86	0.484	16.800	0.029	4.39	0.052	11.870	0.004

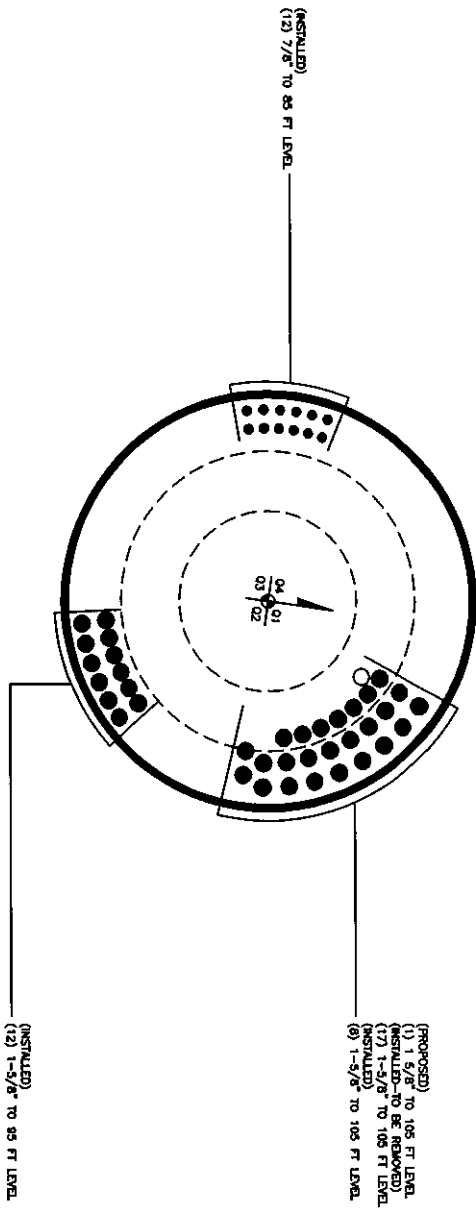
### Pole Interaction Design Data

Section No.	Elevation ft	Ratio P P <sub>a</sub>	Ratio f <sub>bx</sub> F <sub>bx</sub>	Ratio f <sub>by</sub> F <sub>by</sub>	Ratio f <sub>v</sub> F <sub>v</sub>	Ratio f <sub>vt</sub> F <sub>vt</sub>	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	106 - 105 (1)	0.000	0.000	0.000	0.000	0.000	0.000	1.333	H1-3+VT ✓
L2	105 - 80 (2)	0.014	0.549	0.000	0.042	0.020	0.566	1.333	H1-3+VT ✓
L3	80 - 60 (3)	0.014	0.721	0.000	0.036	0.010	0.737	1.333	H1-3+VT ✓
L4	60 - 40 (4)	0.015	0.840	0.000	0.032	0.007	0.856	1.333	H1-3+VT ✓
L5	40 - 20 (5)	0.016	0.888	0.000	0.030	0.005	0.906	1.333	H1-3+VT ✓
L6	20 - 0 (6)	0.018	0.913	0.000	0.029	0.004	0.932	1.333	H1-3+VT ✓

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P <sub>allow</sub> K	% Capacity	Pass Fail
L1	106 - 105	Pole	P18x.375	1	-0.07	697.49	0.0	Pass
L2	105 - 80	Pole	P18x.375	2	-7.17	697.49	42.5	Pass
L3	80 - 60	Pole	P24x3/8	3	-9.68	934.94	55.3	Pass
L4	60 - 40	Pole	P30x3/8	4	-12.73	1166.57	64.2	Pass
L5	40 - 20	Pole	P36x3/8	5	-16.23	1325.68	68.0	Pass
L6	20 - 0	Pole	P42x3/8	6	-19.99	1484.55	69.9	Pass
Summary							ELC:	Load Case
								5
Pole (L6)							69.9	Pass
Rating =							69.9	Pass

**APPENDIX B**  
**BASE LEVEL DRAWING**



(PROPOSED)  
 (1) 1 5/8" TO 105 FT LEVEL.  
 (INSTALLED--TO BE REMOVED)  
 (17) 1-5/8" TO 105 FT LEVEL  
 (INSTALLED)  
 (9) 1-5/8" TO 105 FT LEVEL.

(INSTALLED)  
 (12) 1-5/8" TO 95 FT LEVEL.

BUSINESS UNIT: 822631 TOWER ID: C-BASE LEVEL

CROWN REGION ADDRESS  
 USA

25. 7/8" N  
 20. 5/8" N  
 15. 3/8" N  
 10. 1/8" N  
 5. 1/16" N  
 100000 / ORDER # FOR PER ORDER # 708687  
 11/20/20 11/20/20  
 11/19/21 11/19/21  
 11/19/21 11/19/21  
 11/19/21 11/19/21  
 11/19/21 11/19/21  
 11/19/21 11/19/21  
 11/19/21 11/19/21

DRAWN BY: SJS  
 CHECKED BY: SJS  
 DRAWING DATE: 2024/13

SITE NUMBER:  
 SITE NAME:  
 SITE NAME:  
 DANDUWY/RT 7  
 BUSINESS UNIT NUMBER:  
 622631  
 SITE ADDRESS:  
 26 SUGAR HOLLOW LAKE ROAD  
 DANBURY, CT 06811  
 WINDFELD COUNTY  
 USA  
 SHEET TITLE:  
 BASE LEVEL  
 SHEET NUMBER



**APPENDIX C**  
**ADDITIONAL CALCULATIONS**



**Mat Foundation Analysis**  
**Danbury/Rt 7 / BU#: 823631**  
**GPD Project # 2014777.823631.01**

Code	
Bearing On	
Foundation Type	
Pier Type	
Reinforcing Known	
Max Capacity	

Moment, M	k-ft
Axial, P	k
Shear, V	k

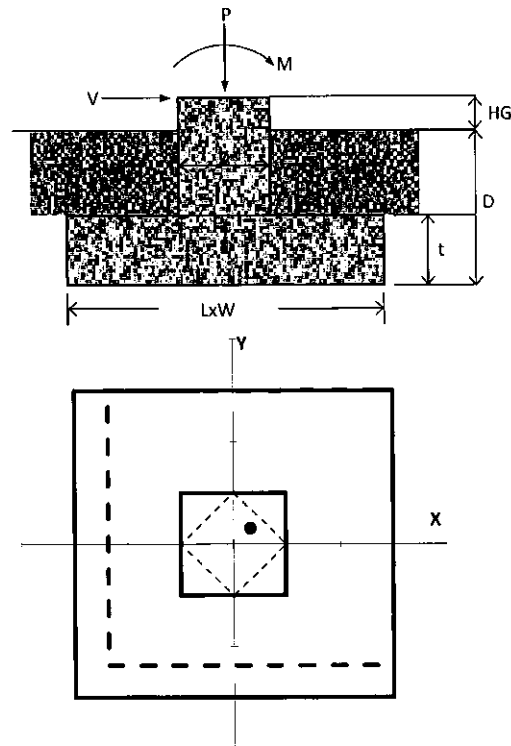
Pier Diameter, $\phi$	ft
Pad Length, L	ft
Pad Width, W	ft
Pad Thickness, t	ft
Depth, D	ft
Height Above Grade, HG	ft

Rebar Fy	ksi
Concrete Fc'	ksi
Clear Cover	in
Reinforced Top & Bottom?	
Pad Reinforcing Size	
Pad Quantity Per Layer	
Pier Rebar Size	
Pier Quantity of Rebar	

Soil Type	
Soil Unit Weight	pcf
Angle of Friction, $\phi$	°
Bearing Type	
Ultimate Bearing	ksf
Water Table Depth	ft
Frost Depth	ft

Qxmax	2.04	ksf	1.2D+1.6W
Qymax	2.04	ksf	1.2D+1.6W
Qmax @ 45°	1.86	ksf	1.2D+1.6W
Q <sub>(all) Gross</sub>	12.00	ksf	
<b>Controlling Capacity</b>	<b>17.0%</b>	<b>Pass</b>	

FS(ot)x	2.92	≥1.0	0.9D+1.6W
FS(ot)y	2.92	≥1.0	0.9D+1.6W
<b>Controlling Capacity</b>	<b>34.3%</b>	<b>Pass</b>	





REINFORCED

Tower Reactions		
Moment		k-ft
Axial		k
Shear		k

Overall Capacities		
Reinforcement Capacity	25.9%	OK
As Min Met?	No	
Controlling Capacity	25.9%	OK

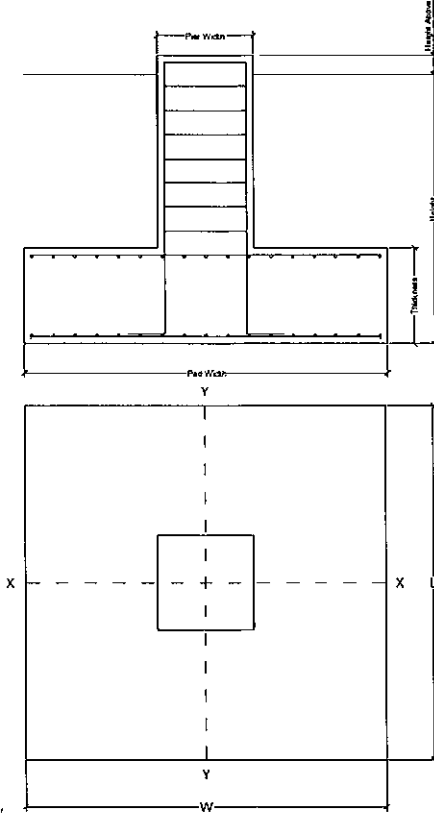
Pad & Pier Geometry		
Height		ft
Height above Grade		ft
Pad Length, L		ft
Pad Width, W		ft
Pad Thickness		ft
Pier Shape		
Round Pier Diameter		ft

Pad & Pier Reinforcing		
Reinforcing Known		
$f_c'$		ksi
Clear Cover		in
Rebar $F_y$		ksi
Pad Rebar Size		
Pad Rebar Quantity		
Pier Rebar Size		
Pier Rebar Quantity		

Unit Weights		
Concrete Unit Weight		pcf
Soil Unit Weight		pcf

Orthogonal Bearing		
$Q_{max}$		ksf
$Q_{min}$		ksf

Pad Moment Capacity		
$\phi$ (bending)=	0.55	
$M_u$ =	7.97 k-ft	
$\phi M_n$ =	62.26 k-ft	
Moment Capacity	12.8%	OK
One-Way (Wide-Beam) Shear		
$V_u$ =	4.24 psi	
$\phi V_n$ =	82.16 psi	
Shear Capacity	5.2%	OK
Two-Way (Punching) Shear		
$V_u$ =	42.49 psi	
$\phi V_n$ =	164.32 psi	
Shear Capacity	25.9%	OK
Pier Compression		
$P_u$ =	26.00 k	
$\phi P_n$ =	4227.16 k	
Compression Capacity	0.6%	OK



Per Section 10.5.3,

Per Section 10.5.3, the section can be checked as reinforced

Per Section 10.5.3, the section can be checked as reinforced

# Stiffened or Unstiffened, UngROUTed, Circular Base Plate - Any Rod Material

## TIA Rev F

### Site Data

BU#: 823631
Site Name: Danbury/Rt 7
App #: 216341 Rev. 3
Pole Manufacturer: <b>Pirod</b>

Reactions		
Moment:	874	ft-kips
Axial:	20	kips
Shear:	12	kips

Anchor Rod Data		
Qty:	32	
Diam:	1	in
Rod Material:	Other	
Strength (Fu):	150	ksi
Yield (Fy):	105	ksi
Bolt Circle:	45	in

If No stiffeners, Criteria: **AISC ASD** <-Only Applicable to Unstiffened Cases

### Anchor Rod Results

Maximum Rod Tension:	28.5 Kips
Allowable Tension:	51.8 Kips
Anchor Rod Stress Ratio:	55.0% Pass

Rigid
Service, ASD
Fty*ASIF

Plate Data		
Diam:	48.125	in
Thick:	1.25	in
Grade:	36	ksi
Single-Rod B-eff:	4.17	in

### Base Plate Results

Base Plate Stress:	Flexural Check	Rohn/Pirod, OK
Allowable Plate Stress:		36.0 ksi
Base Plate Stress Ratio:		Rohn/Pirod, OK

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length:
16.16

Stiffener Data (Welding at both sides)		
Config:	2	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.375	in
Fillet V. Weld:	0.375	in
Width:	3	in
Height:	5	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

### b/Le>2, Stiffeners are not fully effective

### Stiffener Results N/A for Rohn / Pirod

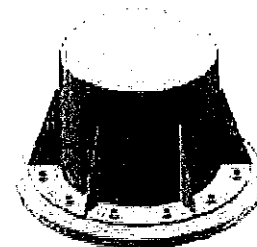
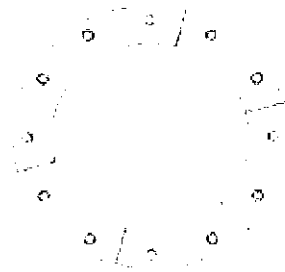
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A

### Pole Results

Pole Punching Shear Check:	N/A
----------------------------	-----

Pole Data		
Diam:	42	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

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#: 823631  
 Site Name: Danbury/Rt 7  
 App #: 216341 Rev. 3

## Reactions

Moment:	106.1	ft-kips
Axial:	6.97	kips
Shear:	7.06	kips
Exterior Flange Run, T+Q:	14.72	kips

Manufacturer: Pirod

Elevation: 80 feet

## Bolt Data

Qty:	16		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
Circle:	21	in	

## Interior Flange Bolt Results

Maximum Bolt Tension: 14.7 Kips, Ext. T=Interior T  
 Allowable Tension: 46.1 Kips  
 Bolt Stress Ratio: 32.0% Pass

## Plate Data

Plate Outer Diam:	23.25	in
Plate Inner Diam:	18	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.57	in

## Interior Flange Plate Results

Flexural Check  
 Controlling Bolt Axial Force: 15.6 Kips, Ext. C= Interior C  
 Plate Stress: Rohn/Pirod OK  
 Allowable Plate Stress: 36.0 ksi  
 Plate Stress Ratio: Rohn/Pirod OK

## Stiffener Data (Welding at Both Sides)

Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

n/a

## Stiffener Results

N/A for Rohn / Pirod  
 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

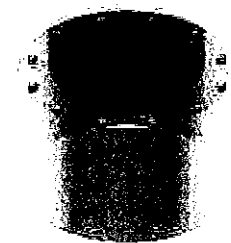
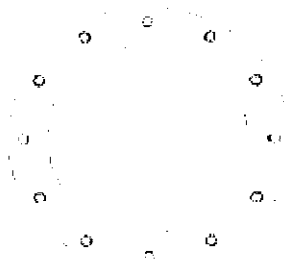
Pole OuterDiam:	24	in
Thick:	0.375	in
Pole Inner Diam:	23.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	80	ksi

## 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, Exterior Flange Plate - Any Bolt Material TIA Rev F

## Site Data

BU#: 823631  
 Site Name: Danbury/Rt 7  
 App #: 216341 Rev. 3

Reactions		
Moment:	106.1	ft-kips
Axial:	6.97	kips
Shear:	7.06	kips
Elevation:	80	feet

Pole Manufacturer:	Pirod
--------------------	-------

Bolt Data		
Qty:	16	
Diameter (in.):	1	Bolt Fu: 120
Bolt Material:	A325	Bolt Fy: 92
N/A:	75	Bolt Fty: 44.00
N/A:	55	
Circle (in.):	21	

If No stiffeners: Criteria: **AISC ASD** <-Only Applicable to Unstiffened Cases

## Flange Bolt Results

Bolt Tension Capacity, B: 46.07 kips  
 Max Bolt directly applied T: 14.72 Kips  
 Min. PL "tc" for B cap. w/o Pry: 1.474 in  
 Min PL "treq" for actual T w/ Pry: 0.639 in  
 Min PL "t1" for actual T w/o Pry: 0.833 in  
 T allowable with Prying: 41.75 kips  
 Prying Force, Q: 0.00 kips  
 Total Bolt Tension=T+Q: 14.72 kips  
 Prying Bolt Stress Ratio=(T+Q)/(B): 32.0% Pass

Rigid
Service, ASD
Fty*ASIF

0≤α'≤1 case

Plate Data		
Diam:	24	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.53	in

**Exterior Flange Plate Results** Flexural Check  
 Compression Side Plate Stress: Rohn/Pirod, OK  
 Allowable Plate Stress: 36.0 ksi  
 Compression Plate Stress Ratio: Rohn/Pirod, OK

Rigid
Service ASD
0.75*Fy*ASIF
Comp. Y.L. Length:
10.82

## No Prying

Tension Side Stress Ratio, (treq/t)^2: 26.2% Pass

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

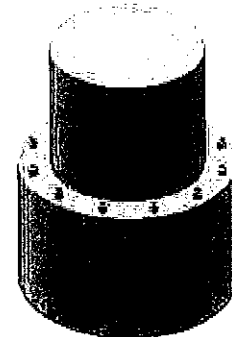
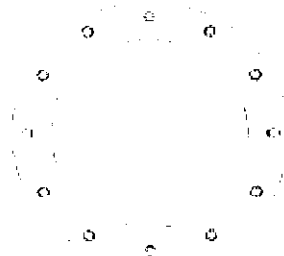
## Pole Results

Pole Punching Shear Check: N/A

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.25	in
Fillet V. Weld:	0.25	in
Width:	3	in
Height:	8	in
Thick:	0.5	in
Notch:	0.375	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	18	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

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#: 823631  
 Site Name: Danbury/Rt 7  
 App #: 216341 Rev. 3

## Reactions

Moment:	257.9	ft-kips
Axial:	9.48	kips
Shear:	8.14	kips
Exterior Flange Run, T+Q:	22.45	kips

Manufacturer: Pirod

Elevation: 60 feet

## Bolt Data

Qty:	20		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	Bolt Fty:	44.00
N/A:	75		
Circle:	27		

## Interior Flange Bolt Results

Maximum Bolt Tension: 22.5 Kips, Ext. T=Interior T  
 Allowable Tension: 46.1 Kips  
 Bolt Stress Ratio: 48.7% Pass

## Plate Data

Plate Outer Diam:	29.25	in
Plate Inner Diam:	24	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.59	in

## Interior Flange Plate Results

Controlling Bolt Axial Force: 23.4 Kips, Ext. C= Interior C  
 Plate Stress: Rohn/Pirod OK  
 Allowable Plate Stress: 19.2 ksi  
 Plate Stress Ratio: Rohn/Pirod OK

## Stiffener Data (Welding at Both Sides)

Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	5	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

## Stiffener Results

N/A for Rohn / Pirod  
 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

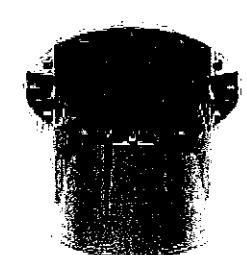
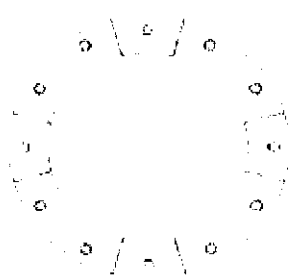
Pole Punching Shear Check: N/A

## Pole Data

Pole OuterDiam:	30	in
Thick:	0.375	in
Pole Inner Diam:	29.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	80	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, Exterior Flange Plate - Any Bolt Material TIA Rev F

## Site Data

BU#: 823631  
 Site Name: Danbury/Rt 7  
 App #: 216341 Rev. 3

Reactions		
Moment:	257.91	ft-kips
Axial:	9.48	kips
Shear:	8.14	kips
Elevation:	60	feet

Pole Manufacturer:	Pirod
--------------------	-------

Bolt Data		
Qty:	20	
Diameter (in.):	1	Bolt Fu: 120
Bolt Material:	A325	Bolt Fy: 92
N/A:	75	<-- Disregard Bolt Fty: 44.00
N/A:	55	<-- Disregard
Circle (in.):	27	

Plate Data		
Diam:	30	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.77	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.25	in
Fillet V. Weld:	0.25	in
Width:	3	in
Height:	8	in
Thick:	0.5	in
Notch:	0.375	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	24	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu:	80	ksi
Reinf. Fillet Weld:	0	"0" if None

Stress Increase Factor	
ASIF:	1.333

If No stiffeners, Criteria: **AISC ASD** <-Only Applicable to Unstiffened Cases

## Flange Bolt Results

Bolt Tension Capacity, B: 46.07 kips  
 Max Bolt directly applied T: 22.45 Kips  
 Min. PL "tc" for B cap. w/o Pry: 1.427 in  
 Min PL "treq" for actual T w/ Pry: 0.760 in  
 Min PL "t1" for actual T w/o Pry: 0.996 in  
 T allowable with Prying: 42.49 kips  
 Prying Force, Q: 0.00 kips  
 Total Bolt Tension=T+Q: 22.45 kips  
 Prying Bolt Stress Ratio=(T+Q)/(B): 48.7% Pass

Rigid
Service, ASD
Fty*ASIF

0 ≤ α ≤ 1 case

## Exterior Flange Plate Results

Flexural Check  
 Compression Side Plate Stress: Rohn/Pirod, OK  
 Allowable Plate Stress: 36.0 ksi  
 Compression Plate Stress Ratio: Rohn/Pirod, OK

Rigid
Service ASD
0.75*Fy*ASIF
Comp. Y.L. Length:
12.37

## No Prying

Tension Side Stress Ratio, (treq/t)^2: 37.0% Pass

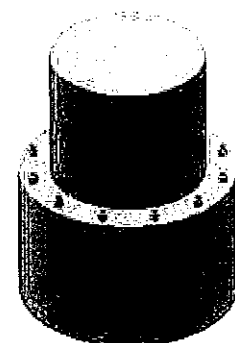
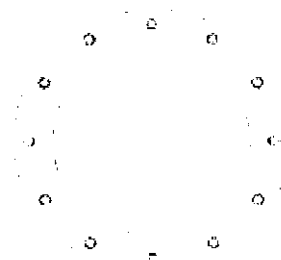
n/a

## Stiffener Results

N/A for Rohn / Pirod  
 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



\* 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#: 823631  
 Site Name: Danbury/Rt 7  
 App #: 216341 Rev. 3

Manufacturer: **Pirot**

## Reactions

Moment:	431.74	ft-kips
Axial:	12.49	kips
Shear:	9.25	kips
Exterior Flange Run, T+Q:	26.69	kips

Elevation: **40** feet

## Bolt Data

Qty:	24		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	Bolt Fty:	44.00
N/A:	75		
Circle:	33		

## Interior Flange Bolt Results

Maximum Bolt Tension: 26.7 Kips, Ext. Flange T+Q  
 Allowable Tension: 46.1 Kips  
 Bolt Stress Ratio: 57.9% Pass

## Plate Data

Plate Outer Diam:	35.25	in
Plate Inner Diam:	30	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.61	in

## Interior Flange Plate Results

Flexural Check  
 Controlling Bolt Axial Force: 26.7 Kips, Ext. Flange T+Q  
 Plate Stress: Rohn/Pirot OK  
 Allowable Plate Stress: 36.0 ksi  
 Plate Stress Ratio: Rohn/Pirot OK

## Stiffener Data (Welding at Both Sides)

Config:	2	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	5	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

## b/Le>2, Stiffeners are not fully effective

Stiffener Results N/A for Rohn / Pirot  
 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

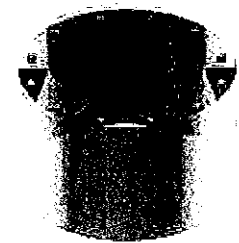
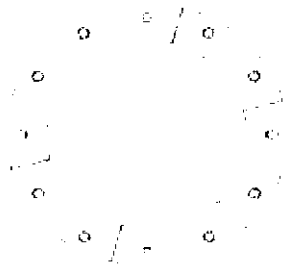
Pole Punching Shear Check: N/A

## Pole Data

Pole OuterDiam:	36	in
Thick:	0.375	in
Pole Inner Diam:	35.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	80	ksi

## Stress Increase Factor

ASIF:	1.333
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\* 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, Exterior Flange Plate - Any Bolt Material TIA Rev F

## Site Data

BU#: 823631  
 Site Name: Danbury/Rt 7  
 App #: 216341 Rev. 3

Reactions		
Moment:	431.74	ft-kips
Axial:	12.49	kips
Shear:	9.25	kips
Elevation:	40	feet

Pole Manufacturer:	Pirod
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Bolt Data		
Qty:	24	
Diameter (in.):	1	Bolt Fu: 120
Bolt Material:	A325	Bolt Fy: 92
N/A:	75	<-- Disregard Bolt Fty: 44.00
N/A:	55	<-- Disregard
Circle (in.):	33	

Plate Data		
Diam:	36	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.93	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.25	in
Fillet V. Weld:	0.25	in
Width:	3	in
Height:	8	in
Thick:	0.5	in
Notch:	0.375	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	30	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu:	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor	
ASIF:	1.333

If No stiffeners Criteria: **AISC ASD** <-Only Applicable to Unstiffened Cases

### Flange Bolt Results

Bolt Tension Capacity, B: 46.07 kips  
 Max Bolt directly applied T: 25.65 Kips  
 Min. PL "tc" for B cap. w/o Pry: 1.398 in  
 Min PL "treq" for actual T w/ Pry: 0.793 in  
 Min PL "t1" for actual T w/o Pry: 1.043 in  
 T allowable with Prying: 42.98 kips  
 Prying Force, Q: 0.00 kips  
 Total Bolt Tension=T+Q: 25.65 kips  
 Prying Bolt Stress Ratio=(T+Q)/(B): 55.7% Pass

Rigid
Service, ASD
Fty*ASIF

0 ≤ α ≤ 1 case

### Exterior Flange Plate Results

Flexural Check: Rigid  
 Compression Side Plate Stress: Rohn/Pirod, OK  
 Allowable Plate Stress: 36.0 ksi  
 Compression Plate Stress Ratio: Rohn/Pirod, OK

Rigid
Service ASD
0.75*Fy*ASIF
Comp. Y.L. Length: 13.75

### No Prying

Tension Side Stress Ratio, (treq/t)^2: 40.3% Pass

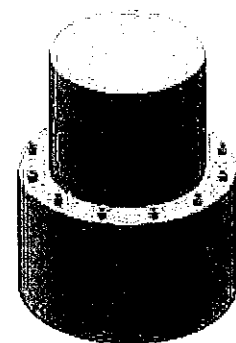
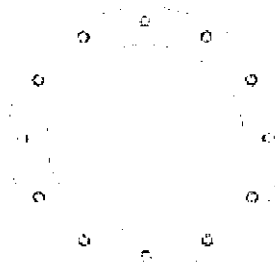
n/a

### Stiffener Results

N/A for Rohn / Pirod  
 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



\* 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, Exterior Flange Plate - Any Bolt Material TIA Rev F

## Site Data

BU#: 823631  
 Site Name: Danbury/Rt 7  
 App #: 216341 Rev. 3

Reactions		
Moment:	628.09	ft-kips
Axial:	15.98	kips
Shear:	10.39	kips
Elevation:	20	feet

Pole Manufacturer:	Pirod
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If No stiffeners: Criteria: **AISC ASD** <-Only Applicable to Unstiffened Cases

Bolt Data		
Qty:	28	
Diameter (in.):	1	Bolt Fu: 120
Bolt Material:	A325	Bolt Fy: 92
N/A:	75	<-- Disregard Bolt Fty: 44.00
N/A:	55	<-- Disregard
Circle (in.):	39	

## Flange Bolt Results

Bolt Tension Capacity, B: 46.07 kips  
 Max Bolt directly applied T: 27.04 Kips  
 Min. PL "tc" for B cap. w/o Pry: Stiffened in  
 Min PL "treq" for actual T w/ Pry: Stiffened in  
 Min PL "t1" for actual T w/o Pry: Stiffened in  
 T allowable: 46.07 kips <-- B, Stiffened  
 Prying Force, Q: 0.00 kips Stiffened  
 Total Bolt Tension=T+Q: 27.04 kips  
 Non-Prying Bolt Stress Ratio, T/B: 58.7% Pass

Stiffened
Service, ASD
Fty*ASIF

Plate Data		
Diam:	42	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.04	in

## Exterior Flange Plate Results

Flexural Check: Stiffened  
 Compression Side Plate Stress: Rohn/Pirod, OK  
 Allowable Plate Stress: 36.0 ksi  
 Compression Plate Stress Ratio: Rohn/Pirod, OK  
 Stiffened  
 Tension Side Stress Ratio, (treq/t)^2: N/A

Stiffened
Service, ASD
0.75*Fy*ASIF
Comp. Y.L. Length: N/A, Roark

## Stiffener Data (Welding at Both Sides)

Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.25	in
Fillet V. Weld:	0.25	in
Width:	3	in
Height:	8	in
Thick:	0.5	in
Notch:	0.375	in
Grade:	36	ksi
Weld str.:	70	ksi

## Stiffener Results

N/A for Rohn / Pirod  
 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

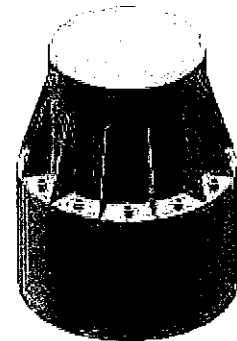
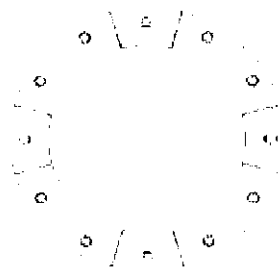
## Pole Results

Pole Punching Shear Check: N/A

Pole Data		
Diam:	36	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu:	80	ksi
Reinf. Fillet Weld	0	"0" if None

## Stress Increase Factor

ASIF:	1.333
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\* 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#: 823631  
 Site Name: Danbury/Rt 7  
 App #: 216341 Rev. 3

Manufacturer:	Pirod
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Bolt Data		
Qty:	28	
Diam:	1	Bolt Fu: 120
Bolt Material:	A325	Bolt Fy: 92
N/A:	100	<-- Disregard Bolt Fty: 44.00
N/A:	75	<-- Disregard
Circle:	39	in

Plate Data		
Plate Outer Diam:	41.25	in
Plate Inner Diam:	36	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.63	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	42	in
Thick:	0.375	in
Pole Inner Diam:	41.25	in
Grade:	42	ksi
# of Sides:	0	*0" IF Round
Fu	80	ksi

Stress Increase Factor	
ASIF:	1.333

## Reactions

Moment:	628.09	ft-kips
Axial:	15.98	kips
Shear:	10.39	kips
Exterior Flange Run, T+Q:	27.04	kips

Elevation: 20 feet

## Interior Flange Bolt Results

Maximum Bolt Tension:	27.0 Kips, Ext. Flange T+Q
Allowable Tension:	46.1 Kips
Bolt Stress Ratio:	58.7% Pass

## Interior Flange Plate Results

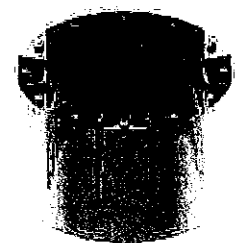
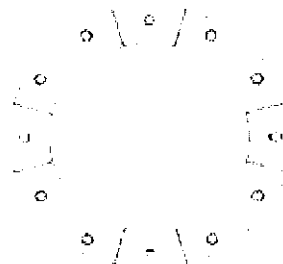
Controlling Bolt Axial Force:	28.2 Kips, Ext. C= Interior C	Flexural Check
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress:	36.0 ksi	
Plate Stress Ratio:	Rohn/Pirod	OK

## Stiffener Results

N/A for Rohn / Pirod	
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
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\* 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

# **EXHIBIT C**



# EBI Consulting

environmental | engineering | due diligence

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

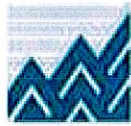
T-Mobile Existing Facility

Site ID: CT11092J

Danbury / Route 7  
36 Sugar Hollow Lake Road  
Danbury, CT 06810

**February 26, 2014**

**EBI Project Number: 62141035**



February 26, 2014

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

Re: Emissions Values for Site: **CT11092J - Danbury / Route 7**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at 36 Sugar Hollow Lake Road, Danbury, 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 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The number of  $\mu\text{W}/\text{cm}^2$  calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The general population exposure limit for the cellular band is  $567 \mu\text{W}/\text{cm}^2$ , and the general population exposure limit for the PCS and AWS bands is  $1000 \mu\text{W}/\text{cm}^2$ . Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.





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

Additional details can be found in FCC OET 65.

## CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 36 Sugar Hollow Lake Road, Danbury, 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 Ericsson AIR21 for LTE, UMTS and GSM. This is based on feedback from the carrier with regards to anticipated antenna selection. This antenna has a 15.6 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 **105 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 calculation were done with respect to uncontrolled / general public threshold limits

Site ID	CT11092J - Danbury / Route 7
Site Address	36 Sugar Hollow Lake Road, Danbury, CT 06810
Site Type	Monopole

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 (dBi)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	105	99	None	0	0	48.326044	1.772625	0.17726%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-	0	0	0	-3.95	105	99	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	105	99	1-5/8"	0	0	24.163022	0.886312	0.088633%
2b	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	105	99	1-5/8"	0	0	24.163022	0.886312	0.088633%
Sector total Power Density Value: 0.3555%																	

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 (dBi)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	105	99	None	0	0	48.326044	1.772625	0.17726%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-	0	0	0	-3.95	105	99	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	105	99	1-5/8"	0	0	24.163022	0.886312	0.088633%
2b	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	105	99	1-5/8"	0	0	24.163022	0.886312	0.088633%
Sector total Power Density Value: 0.3555%																	

Site Composite MPE %	
Carrier	MPE %
T-Mobile	0.709%
MetroPCS	5.300%
Nextel	7.890%
<b>Total Site MPE %</b>	<b>13.895%</b>



## 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 **0.709% (0.355% from each sector)** of the allowable FCC established general public limit considering both sectors simultaneously.

The anticipated composite MPE value for this site assuming all carriers present is **13.899%** 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