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

September 11, 2014

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

**Re: Notice of Exempt Modification**
**Florida Tower Partners/T-Mobile co-location**
**Site ID CTNH801B**
**123 Pine Orchard Road, Branford**

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, Florida Tower Partners owns the existing telecommunications tower and related facility at 123 Pine Orchard Road, Branford Connecticut (latitude 41.274558. longitude -72.793197). T-Mobile intends to replace six existing antennas, add three antennas and related equipment at this existing telecommunications facility in Branford ("Branford 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 James B. Cosgrove and the property owner, Malavasi Investments, LLC.

The existing Branford Facility consists of a 124 foot tall monopole tower.[1] T-Mobile plans to replace three existing antennas and TMAs (tower mounted amplifiers) with three antennas and three RRUs at a centerline of 120 feet. It also proposes to replace three antennas and add 3 antennas at a centerline of 122 feet. (See the plans revised to September 5, 2014 attached hereto as Exhibit A). T-Mobile will also install fiber cable, and reuse existing coax cables. The existing Branford Facility is structurally capable of supporting T-Mobile's proposed modifications, as indicated in the structural analysis dated September 8, 2014 and attached hereto as Exhibit B.

The planned modifications to the Branford Facility fall squarely within those activities

[1] The proposed modifications are consistent with the Decision and Order in Docket 386 (dated February 25, 2010).

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 proposed antennas will be installed at centerlines of 120 and 122 feet. 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 Branford Facility will not increase the noise levels at the existing facility by six decibels or more.

4. The operation of the replacement and additional 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 September 8, 2014, T-Mobile's operations would add 8.97% 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 63.16% 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 additional antennas at the Branford 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: Town of Branford, First Selectman James B. Cosgrove
Florida Tower Partners
Malavasi Investments, LLC
Sheldon Freincle, NSS

# EXHIBIT A


ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE'S STRUCTURAL & RF ENGINEERS. LOCATIONS OF POWER & TELEPHONE FACILITIES ARE SUBJECT TO APPROVAL BY UTILITY COMPANIES.

KEY MAP
SCALE: N.T.S

1
LE-1

PROJECT : L700
CONFIGURATION
702CU

| SUBMITTALS | |
|---|---|
| LE REV A | 08.22.14 |
| LE REV 0 | 09.05.14 |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

ATLANTIS GROUP
1340 Centre Street
Suite 203
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

# LEASE EXHIBIT

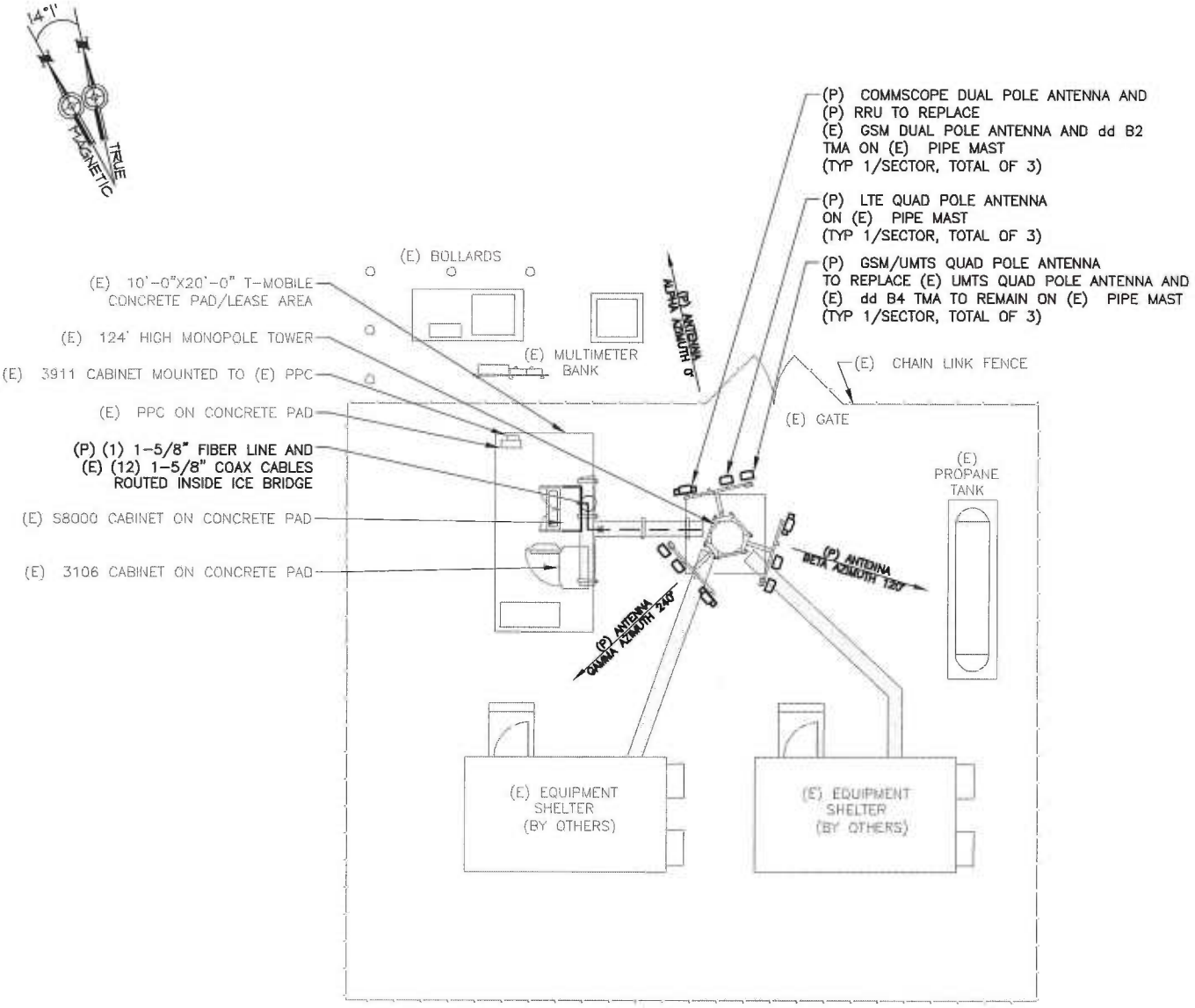
SITE NUMBER:
CTNH801B

SITE NAME:
AMTRAK / BRANFORD

SITE ADDRESS:
123 PINE ORCHARD ROAD
BRANFORD, CT, 06405

NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
STURBRIDGE, MA 01566
(508) 434-5237
FOR
T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX: (860) 692-7159

DRAWN BY: FG | CHECKED BY: SM




## SITE PLAN

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

1 / LE-2

ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE'S STRUCTURAL & RF ENGINEERS. LOCATIONS OF POWER & TELEPHONE FACILITIES ARE SUBJECT TO APPROVAL BY UTILITY COMPANIES.

PROJECT : L700

CONFIGURATION

702CU

| SUBMITTALS | |
|---|---|
| LE REV A | 08.22.14 |
| LE REV 0 | 09.05.14 |
| | |
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| | |
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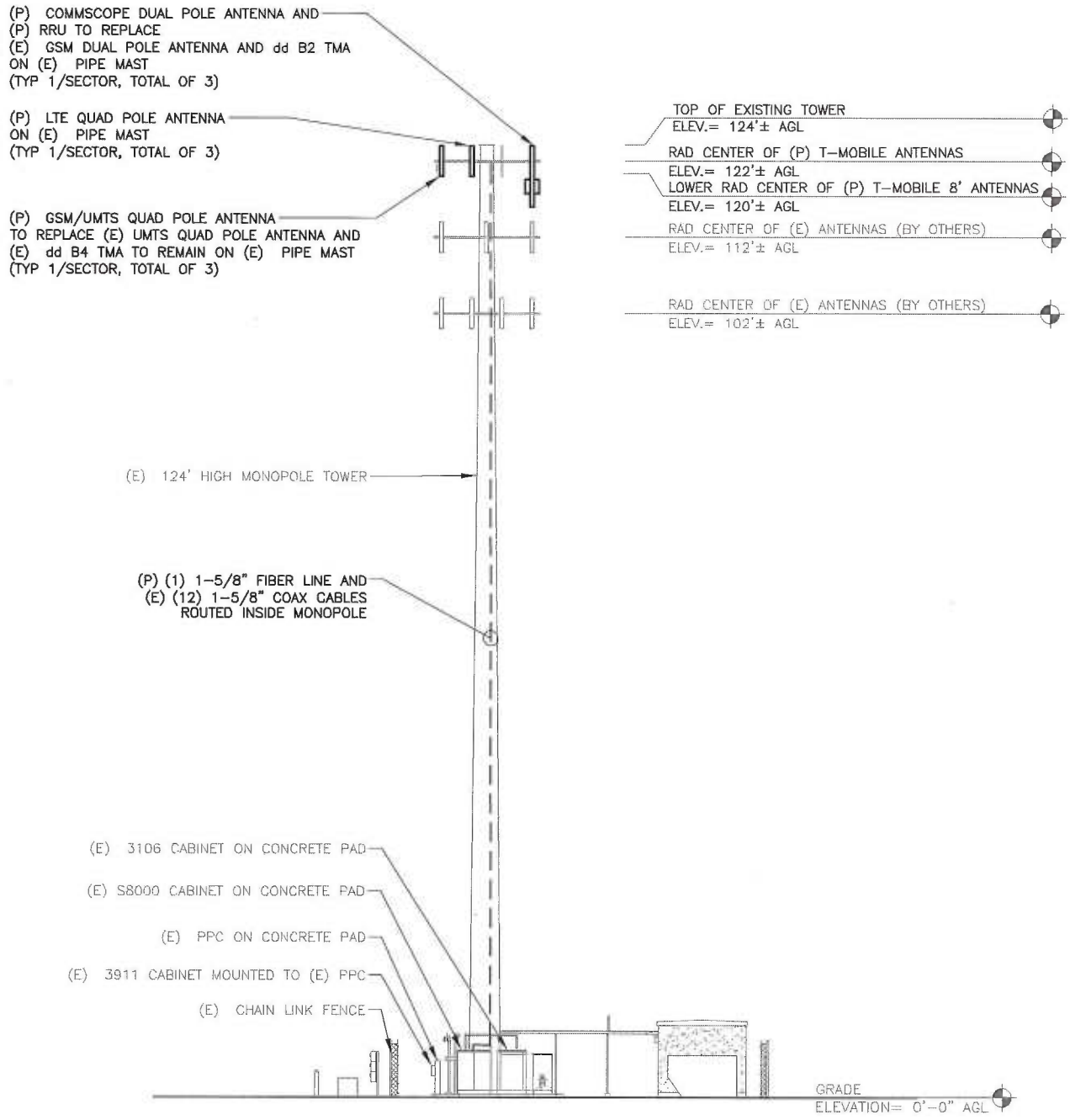


## ELEVATION

SCALE: 1" = 20'-0"

1 / LE-3

ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE'S STRUCTURAL & RF ENGINEERS. LOCATIONS OF POWER & TELEPHONE FACILITIES ARE SUBJECT TO APPROVAL BY UTILITY COMPANIES.

PROJECT : L700

CONFIGURATION

702CU

| SUBMITTALS | |
|---|---|
| LE REV A | 08.22.14 |
| LE REV 0 | 09.05.14 |
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FOR

T-MOBILE NORTHEAST, LLC
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BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX: (860) 692-7159


DRAWN BY: FG | CHECKED BY: SM

# EXHIBIT B

# Structural Analysis
# 124-ft Monopole

**Prepared For:**
**Florida Tower Partners, LLC**
**1001 3rd Ave West, Suite 420**
**Bradenton, FL 34205**

**MFP Project #40914-095**

**Site Location:**
**CT-1012 Branford II**
**New Haven Co., Connecticut**
**Lat/Long:** 41°16'29.1", -72°47'35.4"

**Analysis Type:**
**ANSI/TIA-222-G-2**
*Structure Rating - 71.7% Passing*

**September 8, 2014**


Michael F. Plahovinsak, P.E.
18301 State Route 161 W, Plain City, OH 43064
614-398-6250 - mike@mfpeng.com

## Project Summary:

I have completed a structural analysis of the existing monopole for the following new configuration:

- 122' – T-Mobile:
  - (6) Ericsson AIR-21 (122') + (3) Commscope LNX-6515DS Panel (CL 120')
  - (3) Ericsson RRUS-11-B12 + (3) Ericsson KRY-112-71 TMA
  - (18) 1 5/8" / T-Arm Mounts

The pole has been analyzed in accordance with the requirements of the International Building Code per IBC section 3108.4, and the recommendations of the Telecommunications Industry Association *"Structural Standard for Steel Antenna Supporting Structures"* **ANSI/TIA-222-G.**

This analysis may be considered a "Rigorous Structural Analysis" as defined in ANSI/TIA-222-G 15.5.2.

As indicated in the conclusions of this analysis, I have determined that the existing pole and foundation have *sufficient capacity* to support the existing, reserved and proposed antenna loads as detailed herein. Based on the results of my analysis, structural modifications are not required at this time.

## Source of Data:

| Resource | Source | Job Number | Date |
|---|---|---|---|
| Pole and Foundation Drawings | Sabre Towers | 11-05276 | 06/02/10 |
| Geotechnical Report | Terracon | J2105131 | 04/02/10 |

## Analysis Criteria:

International Building Code 2006-2012 Section 3108.4
Structural Standards for Steel Antenna Supporting Structures **ANSI/TIA-222-G 2**

- TIA-222-G Wind Speed 115 mph ($V_{asd}$ / 3-Second Gust)
- TIA-222-G Wind w/ ¾"" Ice 50 mph (3-Sec Gust)
- Operational Wind Speed 60 mph (3-Sec Gust)

| Structure Class | Exposure Category | Topographic Category |
|---|---|---|
| II (I = 1.0) | C | I |

## Appurtenance Listing:

| Status | Elev. | Antenna / Mounting | Coax | Owner |
|---|---|---|---|---|
| *Proposed* | *122'* | *(6) Ericsson AIR-21 Panel*<br>*(3) Andrew LNX-6515DS Panel (CL Elev. 120')*<br>*(3) RRUS-11-B12 + (3) KRY-112-71 TMA*<br>*T-Arm Mounts* | *(18) 1 5/8"* | *T-Mobile* |
| Existing | 112' | (9) P65-16-XLH-RR Panel + (6) TT08-19DB111-01 TMA<br>(6) RRUS-11 + (1) DC6-48-60-18-8F Raycap<br>T-Arm Mounts | (12) 1 5/8" + (3) 1/2" | AT&T |
| Existing | 102' | (6) BXA-70063/6CF + (3) DB846F65 + (3) MG-D3-800T<br>T-Arm Mounts | (18) 1 5/8" | Verizon |

All antenna lines assumed internally mounted, not exposed to the wind.

## Foundation Analysis:

The existing monopole foundation design was analyzed in conjunction with site specific geotechnical report. The existing foundation has sufficient capacity to support the pole with the proposed antenna configuration.

## Conclusion:

I have completed a structural analysis of the existing monopole and foundation in accordance with the project specifics outlined above. My analysis indicates that the existing monopole and foundation are structurally adequate when considering the existing plus proposed loading. Please refer to the attached calculations for an itemized listing of all member stress ratios. The existing pole is safe and adequate to support the proposed loads, and no structural reinforcing is required to support the above loading.

If you have any questions about the contents of this structural report or require any additional information, please feel free to contact my office.

Sincerely,

**Michael F. Plahovinsak, P.E.**

*mike@mfpeng.com - 614.398-6250*

## Standard Conditions for Providing Structural Consulting Services on Existing Structures

1. The following standard conditions are a general overview of key issues regarding the work product supplied.

2. If the existing conditions are not as represented in this structural report or attached sketches, I should be contacted to evaluate the significance of the deviation and revise the structural assessment accordingly.

3. The structural analysis has been performed assuming that the structure is in "like new" condition. No allowance was made for excessive corrosion, damaged or missing structural members, loose bolts, etc. If there are any known deficiencies in the structure that potentially compromise structural integrity, I should be made aware of the deficiencies. If I am aware of a deficiency that exists in a structure at the time of my analysis, a general explanation of the structural concern due to the deficiency will be included in the structural report, but the deficiency will not be reflected in capacity calculations.

4. The structural analysis provided is an assessment of the primary load carrying capacity of the structure. I provide a limited scope of service in that I have not verified the capacity of every weld, plate, connection detail, etc. In most cases, structural fabrication details are unknown at the time of my analysis, and the detailed field measurement of this information is beyond the scope of my services. In instances where I have not performed connection capacity calculations, it is assumed that existing manufactured connections develop the full capacity of the primary members being connected.

5. The structural integrity of the existing foundation system can only be verified if exact foundation sizes and soils conditions are known. I will not accept any responsibility for the adequacy of the existing foundations unless this site-specific data is supplied.

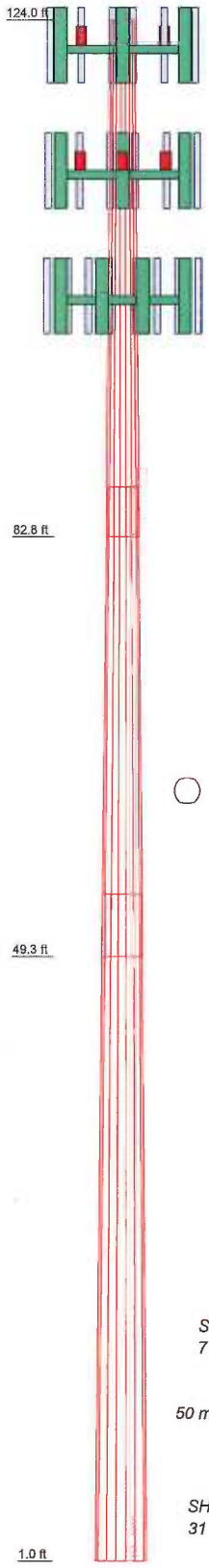
6. Miscellaneous items such as antenna mounts, coax supports, etc. have not been designed, detailed, or specified as part of my work. It is assumed that material of adequate size and strength will be purchased from a reputable component manufacturer. The attached report and sketches are schematic in nature and should not be used to fabricate or purchase hardware and accessories to be attached to the structure. I recommend field measurement of the structure before fabricating or purchasing new hardware and accessories. I am not responsible for proper fit and clearance of hardware and accessory items in the field.

7. The structural analysis has been performed considering minimum code requirements or recommendations. If alternate wind, ice, or deflection criteria are to be considered, then I shall be made aware of the alternate criteria.

Michael F. Plahovinsak, P.E. - 2014

mike@mfpeng.com

| Section | 1 | 2 | 3 |
|---|---|---|---|
| Length (ft) | 41.25 | 37.50 | 53.25 |
| Number of Sides | 18 | 18 | 18 |
| Thickness (in) | 0.1875 | 0.3125 | 0.3750 |
| Socket Length (ft) | 4.00 | 5.00 | |
| Top Dia (in) | 21.0000 | 29.9352 | 37.4350 |
| Bot Dia (in) | 31.3100 | 39.3100 | 50.7500 |
| Grade | | A572-65 | |
| Weight (K) | 2.2 | 4.3 | 9.4 |




*ALL REACTIONS ARE FACTORED*

*AXIAL 48 K*

*SHEAR 7 K* — *MOMENT 627 kip-ft*

*TORQUE 0 kip-ft*

*50 mph WIND - 0.7500 in ICE*

*AXIAL 33 K*

*SHEAR 31 K* — *MOMENT 2715 kip-ft*

*TORQUE 0 kip-ft*

*REACTIONS - 115 mph WIND*

## DESIGNED APPURTENANCE LOADING

| TYPE | ELEVATION | TYPE | ELEVATION |
|---|---|---|---|
| (2) Ericsson AIR 21 w/ mount pipe (T-Mobile) | 122 | (2) Ericsson RRUS-11 (ATT) | 112 |
| Ericsson RRUS11 B12 (T-Mobile) | 122 | (3) Powerwave P65-16-XLH-RR w/ mount pipe (ATT) | 112 |
| Ericsson KRY 112 71-2 TMA (T-Mobile) | 122 | (2) Powerwave TT08-19DB111 TMA (ATT) | 112 |
| (2) Ericsson AIR 21 w/ mount pipe (T-Mobile) | 122 | (2) Ericsson RRUS-11 (ATT) | 112 |
| Ericsson RRUS11 B12 (T-Mobile) | 122 | Raycap DC6-48-60-18-8F Supressor (ATT) | 112 |
| Ericsson KRY 112 71-2 TMA (T-Mobile) | 122 | 12' T-Arm Mounts (ATT) | 112 |
| (2) Ericsson AIR 21 w/ mount pipe (T-Mobile) | 122 | (2) Antel BXA-70063/6CF w/ mount pipe (Verizon) | 102 |
| Ericsson RRUS11 B12 (T-Mobile) | 122 | Decibel DB846F65ZAXY w/ mount pipe (Verizon) | 102 |
| Ericsson KRY 112 71-2 TMA (T-Mobile) | 122 | Rymsa MG-D3-800T w/ mount pipe (Verizon) | 102 |
| 12' T-Arm Mounts (T-Mobile) | 122 | (2) Antel BXA-70063/6CF w/ mount pipe (Verizon) | 102 |
| Andrew LNX-6515DS-VTM w/ mount pipe (T-Mobile) | 120 | Decibel DB846F65ZAXY w/ mount pipe (Verizon) | 102 |
| Andrew LNX-6515DS-VTM w/ mount pipe (T-Mobile) | 120 | Rymsa MG-D3-800T w/ mount pipe (Verizon) | 102 |
| Andrew LNX-6515DS-VTM w/ mount pipe (T-Mobile) | 120 | (2) Antel BXA-70063/6CF w/ mount pipe (Verizon) | 102 |
| (3) Powerwave P65-16-XLH-RR w/ mount pipe (ATT) | 112 | Decibel DB846F65ZAXY w/ mount pipe (Verizon) | 102 |
| (2) Powerwave TT08-19DB111 TMA (ATT) | 112 | Rymsa MG-D3-800T w/ mount pipe (Verizon) | 102 |
| (2) Ericsson RRUS-11 (ATT) | 112 | 12' T-Arm Mounts (Verizon) | 102 |
| (3) Powerwave P65-16-XLH-RR w/ mount pipe (ATT) | 112 | | |
| (2) Powerwave TT08-19DB111 TMA (ATT) | 112 | | |

## MATERIAL STRENGTH

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

## TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 115 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 71.7%


*Michael F. Plahovinsak, P.E.*
18301 State Route 161 W
Plain City, OH 43064
Phone: 614-398-6250
FAX: mike@mfpeng.com


| | | | |
|---|---|---|---|
| Job: *124-ft Monopole - MFP #40914-095* | | | |
| Project: *CT-1012 Branford II* | | | |
| Client: Florida Tower Partners | Drawn by: Mike | App'd: | |
| Code: TIA-222-G | Date: 09/08/14 | Scale: NTS | |
| Path: J:\Projects\409-Misc\40914-095\40914-095.eri | | Dwg No. E-1 | |

| tnxTower | Job | Page |
|---|---|---|
| | 124-ft Monopole - MFP #40914-095 | 1 of 7 |
| **Michael F. Plahovinsak, P.E.**<br>18301 State Route 161 W<br>Plain City, OH 43064<br>Phone: 614-398-6250<br>FAX: mike@mfpeng.com | **Project**<br>CT-1012 Branford II | **Date**<br>10:02:45 09/08/14 |
| | **Client**<br>Florida Tower Partners | **Designed by**<br>Mike |

## Tower Input Data

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

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

## Tapered Pole Section Geometry

| Section | Elevation<br>ft | Section Length<br>ft | Splice Length<br>ft | Number of Sides | Top Diameter<br>in | Bottom Diameter<br>in | Wall Thickness<br>in | Bend Radius<br>in | Pole Grade |
|---|---|---|---|---|---|---|---|---|---|
| L1 | 124.00-82.75 | 41.25 | 4.00 | 18 | 21.0000 | 31.3100 | 0.1875 | 0.7500 | A572-65 (65 ksi) |
| L2 | 82.75-49.25 | 37.50 | 5.00 | 18 | 29.9352 | 39.3100 | 0.3125 | 1.2500 | A572-65 (65 ksi) |
| L3 | 49.25-1.00 | 53.25 | | 18 | 37.4350 | 50.7500 | 0.3750 | 1.5000 | A572-65 (65 ksi) |

## Tapered Pole Properties

| Section | Tip Dia.<br>in | Area<br>$in^2$ | I<br>$in^4$ | r<br>in | C<br>in | I/C<br>$in^3$ | J<br>$in^4$ | It/Q<br>$in^2$ | w<br>in | w/t |
|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 21.3240 | 12.3860 | 677.8263 | 7.3884 | 10.6680 | 63.5383 | 1356.5444 | 6.1942 | 3.3660 | 17.952 |
| | 31.7930 | 18.5218 | 2266.5697 | 11.0485 | 15.9055 | 142.5024 | 4536.1217 | 9.2626 | 5.1806 | 27.63 |
| L2 | 31.4124 | 29.3821 | 3257.3930 | 10.5161 | 15.2071 | 214.2021 | 6519.0722 | 14.6938 | 4.7186 | 15.1 |
| | 39.9164 | 38.6806 | 7431.9828 | 13.8441 | 19.9695 | 372.1671 | 14873.7447 | 19.3440 | 6.3686 | 20.379 |
| L3 | 39.2820 | 44.1107 | 7654.0802 | 13.1563 | 19.0170 | 402.4863 | 15318.2319 | 22.0595 | 5.9286 | 15.81 |
| | 51.5329 | 59.9588 | 19222.9846 | 17.8831 | 25.7810 | 745.6260 | 38471.2633 | 29.9851 | 8.2720 | 22.059 |

## Feed Line/Linear Appurtenances - Entered As Area

| Description | Face or Leg | Allow Shield | Component Type | Placement ft | Total Number | | $C_AA_A$ $ft^2/ft$ | Weight plf |
|---|---|---|---|---|---|---|---|---|
| 1 5/8" (T-Mobile) | C | No | Inside Pole | 120.00 - 1.00 | 18 | No Ice | 0.00 | 0.92 |
| | | | | | | 1/2" Ice | 0.00 | 0.92 |
| | | | | | | 1" Ice | 0.00 | 0.92 |
| 1 5/8" (ATT) | C | No | Inside Pole | 113.00 - 1.00 | 12 | No Ice | 0.00 | 0.92 |
| | | | | | | 1/2" Ice | 0.00 | 0.92 |
| | | | | | | 1" Ice | 0.00 | 0.92 |
| 1/2" (ATT) | C | No | Inside Pole | 124.00 - 1.00 | 3 | No Ice | 0.00 | 0.15 |
| | | | | | | 1/2" Ice | 0.00 | 0.15 |
| | | | | | | 1" Ice | 0.00 | 0.15 |
| 1 5/8" (Verizon) | C | No | Inside Pole | 102.00 - 1.00 | 18 | No Ice | 0.00 | 0.92 |
| | | | | | | 1/2" Ice | 0.00 | 0.92 |
| | | | | | | 1" Ice | 0.00 | 0.92 |

## Discrete Tower Loads

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft / Vert ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight K |
|---|---|---|---|---|---|---|---|---|---|
| (2) Ericsson AIR 21 w/ mount pipe | A | From Face | 3.00<br>0.00 | 0.0000 | 122.00 | No Ice<br>1/2" Ice | 6.61<br>7.08 | 5.50<br>6.22 | 0.11<br>0.16 |
| (T-Mobile) | | | 0.00 | | | 1" Ice | 7.55 | 6.95 | 0.22 |
| Andrew LNX-6515DS-VTM w/ mount pipe | A | From Face | 3.00<br>0.00 | 0.0000 | 120.00 | No Ice<br>1/2" Ice | 11.45<br>12.06 | 9.60<br>11.02 | 0.08<br>0.16 |
| (T-Mobile) | | | 0.00 | | | 1" Ice | 12.69 | 12.29 | 0.26 |
| Ericsson RRUS11 B12 | A | From Face | 3.00 | 0.0000 | 122.00 | No Ice | 3.31 | 1.36 | 0.06 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 3.55 | 1.54 | 0.08 |
| | | | 0.00 | | | 1" Ice | 3.80 | 1.73 | 0.10 |
| Ericsson KRY 112 71-2 TMA | A | From Face | 3.00 | 0.0000 | 122.00 | No Ice | 0.68 | 0.45 | 0.01 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 0.80 | 0.56 | 0.02 |
| | | | 0.00 | | | 1" Ice | 0.93 | 0.68 | 0.03 |
| (2) Ericsson AIR 21 w/ mount pipe | B | From Face | 3.00<br>0.00 | 0.0000 | 122.00 | No Ice<br>1/2" Ice | 6.61<br>7.08 | 5.50<br>6.22 | 0.11<br>0.16 |
| (T-Mobile) | | | 0.00 | | | 1" Ice | 7.55 | 6.95 | 0.22 |
| Andrew LNX-6515DS-VTM w/ mount pipe | B | From Face | 3.00<br>0.00 | 0.0000 | 120.00 | No Ice<br>1/2" Ice | 11.45<br>12.06 | 9.60<br>11.02 | 0.08<br>0.16 |
| (T-Mobile) | | | 0.00 | | | 1" Ice | 12.69 | 12.29 | 0.26 |
| Ericsson RRUS11 B12 | B | From Face | 3.00 | 0.0000 | 122.00 | No Ice | 3.31 | 1.36 | 0.06 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 3.55 | 1.54 | 0.08 |
| | | | 0.00 | | | 1" Ice | 3.80 | 1.73 | 0.10 |
| Ericsson KRY 112 71-2 TMA | B | From Face | 3.00 | 0.0000 | 122.00 | No Ice | 0.68 | 0.45 | 0.01 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 0.80 | 0.56 | 0.02 |
| | | | 0.00 | | | 1" Ice | 0.93 | 0.68 | 0.03 |
| (2) Ericsson AIR 21 w/ mount pipe | C | From Face | 3.00<br>0.00 | 0.0000 | 122.00 | No Ice<br>1/2" Ice | 6.61<br>7.08 | 5.50<br>6.22 | 0.11<br>0.16 |
| (T-Mobile) | | | 0.00 | | | 1" Ice | 7.55 | 6.95 | 0.22 |
| Andrew LNX-6515DS-VTM w/ mount pipe | C | From Face | 3.00<br>0.00 | 0.0000 | 120.00 | No Ice<br>1/2" Ice | 11.45<br>12.06 | 9.60<br>11.02 | 0.08<br>0.16 |
| (T-Mobile) | | | 0.00 | | | 1" Ice | 12.69 | 12.29 | 0.26 |
| Ericsson RRUS11 B12 | C | From Face | 3.00 | 0.0000 | 122.00 | No Ice | 3.31 | 1.36 | 0.06 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 3.55 | 1.54 | 0.08 |
| | | | 0.00 | | | 1" Ice | 3.80 | 1.73 | 0.10 |
| Ericsson KRY 112 71-2 TMA | C | From Face | 3.00 | 0.0000 | 122.00 | No Ice | 0.68 | 0.45 | 0.01 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft / Vert ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight K |
|---|---|---|---|---|---|---|---|---|---|
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 0.80 | 0.56 | 0.02 |
| | | | 0.00 | | | 1" Ice | 0.93 | 0.68 | 0.03 |
| 12' T-Arm Mounts | C | None | | 0.0000 | 122.00 | No Ice | 12.00 | 12.00 | 1.14 |
| (T-Mobile) | | | | | | 1/2" Ice | 18.00 | 18.00 | 1.27 |
| | | | | | | 1" Ice | 24.00 | 24.00 | 0.47 |
| ** | | | | | | | | | |
| (3) Powerwave | A | From Face | 3.00 | 0.0000 | 112.00 | No Ice | 8.40 | 6.13 | 0.09 |
| P65-16-XLH-RR w/ mount | | | 0.00 | | | 1/2" Ice | 8.95 | 7.07 | 0.15 |
| pipe | | | 0.00 | | | 1" Ice | 9.51 | 7.90 | 0.22 |
| (ATT) | | | | | | | | | |
| (2) Powerwave | A | From Face | 3.00 | 0.0000 | 112.00 | No Ice | 0.92 | 0.75 | 0.02 |
| TT08-19DB111 TMA | | | 0.00 | | | 1/2" Ice | 1.06 | 0.88 | 0.03 |
| (ATT) | | | 0.00 | | | 1" Ice | 1.21 | 1.02 | 0.04 |
| (2) Ericsson RRUS-11 | A | From Face | 3.00 | 0.0000 | 112.00 | No Ice | 2.55 | 0.92 | 0.05 |
| (ATT) | | | 0.00 | | | 1/2" Ice | 2.77 | 1.07 | 0.06 |
| | | | 0.00 | | | 1" Ice | 2.99 | 1.23 | 0.08 |
| (3) Powerwave | B | From Face | 3.00 | 0.0000 | 112.00 | No Ice | 8.40 | 6.13 | 0.09 |
| P65-16-XLH-RR w/ mount | | | 0.00 | | | 1/2" Ice | 8.95 | 7.07 | 0.15 |
| pipe | | | 0.00 | | | 1" Ice | 9.51 | 7.90 | 0.22 |
| (ATT) | | | | | | | | | |
| (2) Powerwave | B | From Face | 3.00 | 0.0000 | 112.00 | No Ice | 0.92 | 0.75 | 0.02 |
| TT08-19DB111 TMA | | | 0.00 | | | 1/2" Ice | 1.06 | 0.88 | 0.03 |
| (ATT) | | | 0.00 | | | 1" Ice | 1.21 | 1.02 | 0.04 |
| (2) Ericsson RRUS-11 | B | From Face | 3.00 | 0.0000 | 112.00 | No Ice | 2.55 | 0.92 | 0.05 |
| (ATT) | | | 0.00 | | | 1/2" Ice | 2.77 | 1.07 | 0.06 |
| | | | 0.00 | | | 1" Ice | 2.99 | 1.23 | 0.08 |
| (3) Powerwave | C | From Face | 3.00 | 0.0000 | 112.00 | No Ice | 8.40 | 6.13 | 0.09 |
| P65-16-XLH-RR w/ mount | | | 0.00 | | | 1/2" Ice | 8.95 | 7.07 | 0.15 |
| pipe | | | 0.00 | | | 1" Ice | 9.51 | 7.90 | 0.22 |
| (ATT) | | | | | | | | | |
| (2) Powerwave | C | From Face | 3.00 | 0.0000 | 112.00 | No Ice | 0.92 | 0.75 | 0.02 |
| TT08-19DB111 TMA | | | 0.00 | | | 1/2" Ice | 1.06 | 0.88 | 0.03 |
| (ATT) | | | 0.00 | | | 1" Ice | 1.21 | 1.02 | 0.04 |
| (2) Ericsson RRUS-11 | C | From Face | 3.00 | 0.0000 | 112.00 | No Ice | 2.55 | 0.92 | 0.05 |
| (ATT) | | | 0.00 | | | 1/2" Ice | 2.77 | 1.07 | 0.06 |
| | | | 0.00 | | | 1" Ice | 2.99 | 1.23 | 0.08 |
| Raycap DC6-48-60-18-8F | C | From Face | 3.00 | 0.0000 | 112.00 | No Ice | 1.47 | 1.47 | 0.03 |
| Supressor | | | 0.00 | | | 1/2" Ice | 1.67 | 1.67 | 0.05 |
| (ATT) | | | 0.00 | | | 1" Ice | 1.88 | 1.88 | 0.07 |
| 12' T-Arm Mounts | C | None | | 0.0000 | 112.00 | No Ice | 12.00 | 12.00 | 1.14 |
| (ATT) | | | | | | 1/2" Ice | 18.00 | 18.00 | 1.27 |
| | | | | | | 1" Ice | 24.00 | 24.00 | 0.47 |
| ** | | | | | | | | | |
| (2) Antel BXA-70063/6CF w/ | A | From Face | 3.00 | 0.0000 | 102.00 | No Ice | 7.75 | 5.18 | 0.04 |
| mount pipe | | | 0.00 | | | 1/2" Ice | 8.29 | 6.11 | 0.09 |
| (Verizon) | | | 0.00 | | | 1" Ice | 8.85 | 6.92 | 0.16 |
| Decibel DB846F65ZAXY w/ | A | From Face | 3.00 | 0.0000 | 102.00 | No Ice | 7.03 | 7.58 | 0.04 |
| mount pipe | | | 0.00 | | | 1/2" Ice | 7.54 | 8.54 | 0.11 |
| (Verizon) | | | 0.00 | | | 1" Ice | 8.08 | 9.38 | 0.18 |
| Rymsa MG-D3-800T w/ | A | From Face | 3.00 | 0.0000 | 102.00 | No Ice | 3.48 | 3.32 | 0.03 |
| mount pipe | | | 0.00 | | | 1/2" Ice | 3.85 | 3.96 | 0.06 |
| (Verizon) | | | 0.00 | | | 1" Ice | 4.24 | 4.60 | 0.10 |
| (2) Antel BXA-70063/6CF w/ | B | From Face | 3.00 | 0.0000 | 102.00 | No Ice | 7.75 | 5.18 | 0.04 |
| mount pipe | | | 0.00 | | | 1/2" Ice | 8.29 | 6.11 | 0.09 |
| (Verizon) | | | 0.00 | | | 1" Ice | 8.85 | 6.92 | 0.16 |
| Decibel DB846F65ZAXY w/ | B | From Face | 3.00 | 0.0000 | 102.00 | No Ice | 7.03 | 7.58 | 0.04 |
| mount pipe | | | 0.00 | | | 1/2" Ice | 7.54 | 8.54 | 0.11 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft / Vert ft / ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight K |
|---|---|---|---|---|---|---|---|---|---|
| (Verizon) | | | 0.00 | | | 1" Ice | 8.08 | 9.38 | 0.18 |
| Rymsa MG-D3-800T w/ | B | From Face | 3.00 | 0.0000 | 102.00 | No Ice | 3.48 | 3.32 | 0.03 |
| mount pipe | | | 0.00 | | | 1/2" Ice | 3.85 | 3.96 | 0.06 |
| (Verizon) | | | 0.00 | | | 1" Ice | 4.24 | 4.60 | 0.10 |
| (2) Antel BXA-70063/6CF w/ | C | From Face | 3.00 | 0.0000 | 102.00 | No Ice | 7.75 | 5.18 | 0.04 |
| mount pipe | | | 0.00 | | | 1/2" Ice | 8.29 | 6.11 | 0.09 |
| (Verizon) | | | 0.00 | | | 1" Ice | 8.85 | 6.92 | 0.16 |
| Decibel DB846F65ZAXY w/ | C | From Face | 3.00 | 0.0000 | 102.00 | No Ice | 7.03 | 7.58 | 0.04 |
| mount pipe | | | 0.00 | | | 1/2" Ice | 7.54 | 8.54 | 0.11 |
| (Verizon) | | | 0.00 | | | 1" Ice | 8.08 | 9.38 | 0.18 |
| Rymsa MG-D3-800T w/ | C | From Face | 3.00 | 0.0000 | 102.00 | No Ice | 3.48 | 3.32 | 0.03 |
| mount pipe | | | 0.00 | | | 1/2" Ice | 3.85 | 3.96 | 0.06 |
| (Verizon) | | | 0.00 | | | 1" Ice | 4.24 | 4.60 | 0.10 |
| 12' T-Arm Mounts | C | None | | 0.0000 | 102.00 | No Ice | 12.00 | 12.00 | 1.14 |
| (Verizon) | | | | | | 1/2" Ice | 18.00 | 18.00 | 1.27 |
| | | | | | | 1" Ice | 24.00 | 24.00 | 0.47 |

## Load Combinations

| Comb. No. | Description |
|---|---|
| 1 | Dead Only |
| 2 | 1.2 Dead+1.6 Wind 0 deg - No Ice |
| 3 | 0.9 Dead+1.6 Wind 0 deg - No Ice |
| 4 | 1.2 Dead+1.6 Wind 90 deg - No Ice |
| 5 | 0.9 Dead+1.6 Wind 90 deg - No Ice |
| 6 | 1.2 Dead+1.6 Wind 180 deg - No Ice |
| 7 | 0.9 Dead+1.6 Wind 180 deg - No Ice |
| 8 | 1.2 Dead+1.0 Ice+1.0 Temp |
| 9 | 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp |
| 10 | 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp |
| 11 | 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp |
| 12 | Dead+Wind 0 deg - Service |
| 13 | Dead+Wind 90 deg - Service |
| 14 | Dead+Wind 180 deg - Service |

## Maximum Member Forces

| Section No. | Elevation ft | Component Type | Condition | Gov. Load Comb. | Axial K | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|---|---|---|---|---|---|---|---|
| L1 | 124 - 82.75 | Pole | Max Tension | 6 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 8 | -19.59 | 0.00 | -0.44 |
| | | | Max. Mx | 4 | -9.84 | -494.98 | -0.13 |
| | | | Max. My | 6 | -9.83 | 0.00 | -495.13 |
| | | | Max. Vy | 4 | 20.63 | -494.98 | -0.13 |
| | | | Max. Vx | 6 | 20.63 | 0.00 | -495.13 |
| | | | Max. Torque | 4 | | | -0.43 |
| L2 | 82.75 - 49.25 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 8 | -28.59 | 0.00 | -0.44 |
| | | | Max. Mx | 4 | -16.63 | -1230.08 | -0.15 |
| | | | Max. My | 6 | -16.63 | 0.00 | -1230.23 |

| Section No. | Elevation ft | Component Type | Condition | Gov. Load Comb. | Axial K | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|---|---|---|---|---|---|---|---|
| | | | Max. Vy | 4 | 24.64 | -1230.08 | -0.15 |
| | | | Max. Vx | 6 | 24.64 | 0.00 | -1230.23 |
| | | | Max. Torque | 4 | | | -0.43 |
| L3 | 49.25 - 1 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 8 | -48.32 | 0.00 | -0.44 |
| | | | Max. Mx | 4 | -32.49 | -2715.24 | -0.15 |
| | | | Max. My | 6 | -32.49 | 0.00 | -2715.39 |
| | | | Max. Vy | 4 | 30.93 | -2715.24 | -0.15 |
| | | | Max. Vx | 6 | 30.93 | 0.00 | -2715.39 |
| | | | Max. Torque | 4 | | | -0.43 |

## Maximum Tower Deflections - Service Wind

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|---|---|---|---|---|---|
| L1 | 124 - 82.75 | 10.487 | 14 | 0.7572 | 0.0007 |
| L2 | 86.75 - 49.25 | 5.035 | 14 | 0.5681 | 0.0003 |
| L3 | 54.25 - 1 | 1.907 | 14 | 0.3350 | 0.0001 |

## Critical Deflections and Radius of Curvature - Service Wind

| Elevation ft | Appurtenance | Gov. Load Comb. | Deflection in | Tilt ° | Twist ° | Radius of Curvature ft |
|---|---|---|---|---|---|---|
| 122.00 | (2) Ericsson AIR 21 w/ mount pipe | 14 | 10.173 | 0.7483 | 0.0007 | 51396 |
| 120.00 | Andrew LNX-6515DS-VTM w/ mount pipe | 14 | 9.859 | 0.7394 | 0.0006 | 51396 |
| 112.00 | (3) Powerwave P65-16-XLH-RR w/ mount pipe | 14 | 8.614 | 0.7031 | 0.0005 | 21415 |
| 102.00 | (2) Antel BXA-70063/6CF w/ mount pipe | 14 | 7.112 | 0.6546 | 0.0004 | 11681 |

## Maximum Tower Deflections - Design Wind

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|---|---|---|---|---|---|
| L1 | 124 - 82.75 | 69.073 | 6 | 4.9893 | 0.0045 |
| L2 | 86.75 - 49.25 | 33.182 | 6 | 3.7455 | 0.0017 |
| L3 | 54.25 - 1 | 12.571 | 6 | 2.2087 | 0.0007 |

## Critical Deflections and Radius of Curvature - Design Wind

| Elevation<br>ft | Appurtenance | Gov. Load Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of Curvature<br>ft |
|---|---|---|---|---|---|---|
| 122.00 | (2) Ericsson AIR 21 w/ mount pipe | 6 | 67.005 | 4.9309 | 0.0043 | 7912 |
| 120.00 | Andrew LNX-6515DS-VTM w/ mount pipe | 6 | 64.939 | 4.8723 | 0.0041 | 7912 |
| 112.00 | (3) Powerwave P65-16-XLH-RR w/ mount pipe | 6 | 56.748 | 4.6337 | 0.0034 | 3295 |
| 102.00 | (2) Antel BXA-70063/6CF w/ mount pipe | 6 | 46.860 | 4.3147 | 0.0027 | 1796 |

## Pole Design Data

| Section No. | Elevation<br>ft | Size | L<br>ft | $L_u$<br>ft | Kl/r | A<br>$in^2$ | $P_u$<br>K | $\phi P_n$<br>K | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| L1 | 124 - 82.75 (1) | TP31.31x21x0.1875 | 41.25 | 0.00 | 0.0 | 17.9268 | -9.83 | 1129.50 | 0.009 |
| L2 | 82.75 - 49.25 (2) | TP39.31x29.9352x0.3125 | 37.50 | 0.00 | 0.0 | 37.4408 | -16.63 | 2637.07 | 0.006 |
| L3 | 49.25 - 1 (3) | TP50.75x37.435x0.375 | 53.25 | 0.00 | 0.0 | 59.9588 | -32.49 | 4071.82 | 0.008 |

## Pole Bending Design Data

| Section No. | Elevation<br>ft | Size | $M_{ux}$<br>kip-ft | $\phi M_{nx}$<br>kip-ft | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | $M_{uy}$<br>kip-ft | $\phi M_{ny}$<br>kip-ft | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ |
|---|---|---|---|---|---|---|---|---|
| L1 | 124 - 82.75 (1) | TP31.31x21x0.1875 | 495.13 | 700.78 | 0.707 | 0.00 | 700.78 | 0.000 |
| L2 | 82.75 - 49.25 (2) | TP39.31x29.9352x0.3125 | 1230.23 | 2046.08 | 0.601 | 0.00 | 2046.08 | 0.000 |
| L3 | 49.25 - 1 (3) | TP50.75x37.435x0.375 | 2715.39 | 4219.63 | 0.644 | 0.00 | 4219.63 | 0.000 |

## Pole Shear Design Data

| Section No. | Elevation<br>ft | Size | Actual $V_u$<br>K | $\phi V_n$<br>K | Ratio $\frac{V_u}{\phi V_n}$ | Actual $T_u$<br>kip-ft | $\phi T_n$<br>kip-ft | Ratio $\frac{T_u}{\phi T_n}$ |
|---|---|---|---|---|---|---|---|---|
| L1 | 124 - 82.75 (1) | TP31.31x21x0.1875 | 20.63 | 559.86 | 0.037 | 0.00 | 1403.27 | 0.000 |
| L2 | 82.75 - 49.25 (2) | TP39.31x29.9352x0.3125 | 24.64 | 1309.08 | 0.019 | 0.00 | 4097.16 | 0.000 |
| L3 | 49.25 - 1 (3) | TP50.75x37.435x0.375 | 30.93 | 2019.58 | 0.015 | 0.00 | 8449.58 | 0.000 |

| tnxTower | Job | Page |
|---|---|---|
| | 124-ft Monopole - MFP #40914-095 | 7 of 7 |
| **Michael F. Plahovinsak, P.E.**<br>18301 State Route 161 W<br>Plain City, OH 43064<br>Phone: 614-398-6250<br>FAX: mike@mfpeng.com | **Project**<br>CT-1012 Branford II | **Date**<br>10:02:45 09/08/14 |
| | **Client**<br>Florida Tower Partners | **Designed by**<br>Mike |

## Pole Interaction Design Data

| Section No. | Elevation ft | Ratio $\frac{P_u}{\phi P_n}$ | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ | Ratio $\frac{V_u}{\phi V_n}$ | Ratio $\frac{T_u}{\phi T_n}$ | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|---|---|---|---|---|---|---|---|---|---|
| L1 | 124 - 82.75 (1) | 0.009 | 0.707 | 0.000 | 0.037 | 0.000 | 0.717 ✔ | 1.000 | 4.8.2 ✔ |
| L2 | 82.75 - 49.25 (2) | 0.006 | 0.601 | 0.000 | 0.019 | 0.000 | 0.608 ✔ | 1.000 | 4.8.2 ✔ |
| L3 | 49.25 - 1 (3) | 0.008 | 0.644 | 0.000 | 0.015 | 0.000 | 0.652 ✔ | 1.000 | 4.8.2 ✔ |

## Section Capacity Table

| Section No. | Elevation ft | Component Type | Size | Critical Element | P K | $\phi P_{allow}$ K | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| L1 | 124 - 82.75 | Pole | TP31.31x21x0.1875 | 1 | -9.83 | 1129.50 | 71.7 | Pass |
| L2 | 82.75 - 49.25 | Pole | TP39.31x29.9352x0.3125 | 2 | -16.63 | 2637.07 | 60.8 | Pass |
| L3 | 49.25 - 1 | Pole | TP50.75x37.435x0.375 | 3 | -32.49 | 4071.82 | 65.2 | Pass |
| | | | | | | | Summary | |
| | | | | | | Pole (L1) | 71.7 | Pass |
| | | | | | | **RATING =** | **71.7** | **Pass** |

*Michael F. Plahovinsak, P.E.*
*18301 State Route 161 W*
*Plain City, OH 43064*
*Phone: 614-398-6250*
*email: mike@mfpeng.com*

| Job | Page |
|---|---|
| 124-ft monopole - MFP #40914-095 | BP-G |
| **Project** | **Date** |
| CT-1012 Branford II | 9/7/2014 |
| **Client** | **Designed by** |
| FLORIDA TOWER PARTNERS | Mike |

# Anchor Rod and Base Plate Calculation

**ANSI/TIA-222-G-2**

| *Factored Base Reactions:* | | *Pole Shape:* | *Anchor Rods:* | *Base Plate:* |
|---|---|---|---|---|
| Moment: | 2715 ft-kips | 18-Sided | (16) 2.25 in. A615 GR. 75 | 2.75 in. x 57 in. Round |
| Shear: | 31 kips | ***Pole Dia. ($D_f$):*** | Anchor Rods Evenly Spaced | fy = 50 ksi |
| Axial: | 33 kips | 50.75 in | On a 57.75 in Bolt Circle | |

***Anchor Rod Calculation According to TIA-222-G section 4.9.9***

| | | |
|---|---|---|
| $\phi$ = | 0.80 | TIA 4.9.9 |
| $I_{bolts}$ = | 6670.13 $in^2$ | Momet of Inertia |
| $P_u$ = | 141 kips | Tension Force |
| $V_u$ = | 2 kips | Shear Force |
| $R_{nt}$ = | 325.00 kips | Nominal Tensile Strength |
| $\eta$ = | 0.50 | for detail type (d) |

*The following Interation Equation Shall Be Satisfied:*

$$\left( \frac{P_u + \frac{V_u}{\eta}}{\phi R_{nt}} \right) \leq 1.0$$

$$0.557 \leq 1$$

***Base Plate Calculation According to TIA-222-G***

| | | |
|---|---|---|
| $\phi$ = | 0.90 | TIA 4.7 |
| $M_{PL}$ = | 339.9 in-kip | Plate Moment |
| L = | 10.0 in | Section Length |
| Z = | 18.8 | Plastic Section Modulus |
| $M_P$ = | 942.0 in-kip | Plastic Moment |
| $\phi M_n$= | 847.8 in-kip | Factored Resistance |

*Calculated Moment vs Factored Resistance*

339.87 in-kip $\leq$ 848 in-kip

| | |
|---|---|
| **Anchor Rods Are Adequate** | **55.7%** ☑ |
| **Base Plate is Adequate** | **40.1%** ☑ |

## Monopole Spread Footing Calculation

**ANSI/TIA-222-G-2**

| **Factored Base Reactions:** | | **Footing Dimensions:** | | **Concrete:** | |
|---|---|---|---|---|---|
| Moment: | 2715 ft-kips | 24.5 ft x 24.5 ft | 7 ft Square Pier | fc = 4000 psi | |
| Shear: | 31 kips | x 2 ft thick | w/6 in Reveal | Steel fy = 60 ksi | |
| Axial: | 33 kips | Bearing 5.5 ft B.G. | 51.7 Yd3 Concrete | f = 0.75 | |
| Soil Backfill | 100 pcf | Ultimate Bearing: | 6000 psf | Water Table | 6.5 |

**Foundation Weight**

| | |
|---|---|
| Weight of Pole | 33.0 kips |
| Weight of Concrete | 209.475 kips |
| Weight of Soil | 192.9375 kips |
| Bouyancy of Water | 37.5 kips |
| Total | 472.9 kips |

**Overturning Resistance:**

| | | |
|---|---|---|
| Overturning Moment ($M_u$) | 2901 ft-kips | 2715 ft-kips + (31 kips x 6 ft) |
| Resisting Moment ($R_s$) | 5792.6342 ft-kips | 472.8681 kips x 24.5 ft / 2 |
| $\phi \times R_s > M_u$ | $M_{overturning} / f M_{resist}$ | **66.8%** **OK** |

**Soil Bearing Pressure:**

| | | |
|---|---|---|
| Eccentricity (e) | 6.13 ft | 2901 ft-kips / 472.8681 kips |
| 6(e) | 36.8 ft > | 24.5 ft 6e > 24.5 |
| Maximum Soil Bearing | 2464.7938 psf | Calculated across corners |
| Soil Overburden | -612.4 psf | Overburden - Bouyancy |
| Net Soil Bearing | 1852.3938 psf | |
| Resisting Soil Bearing ($R_s$) | 6000 psf | |
| Net Soil Bearing < $\phi \times R_s$ | Net Bearing / f $R_s$ | **41.2%** **OK** |

**Bending Moment in Pier:**

| | | |
|---|---|---|
| Bending Moment | 2839 ft-kips | 2715 ft-kips + (31 kips x 4 ft) |
| Min. Pier Steel | 27.7 $in^2$ | 1/2% (Based on Round Pier) |

**Bending Moment in Footing:**

| | | |
|---|---|---|
| Max Bending Moment | 1659.7173 ft-kips | Σ Moments about pier face |
| Min. Footing Steel | 0.52 $in^2/ft$ | 0.18% |

# EXHIBIT C

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CTNH801B

Amtrak Branford
123 Pine Orchard Road
Branford, CT 06405

**September 8, 2014**

**EBI Project Number: 62144621**

| Site Compliance Summary | |
|---|---|
| Compliance Status: | COMPLIANT |
| Site total MPE% of FCC general public allowable limit: | 63.16 % |

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September 8, 2014

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

Emissions Analysis for Site: **CTNH801B – Amtrak Branford**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **123 Pine Orchard Road, Branford, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the 700 MHz Band is 467 $\mu W/cm^2$, and the general population exposure limit for the PCS and AWS bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

## CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **123 Pine Orchard Road, Branford, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

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

1) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel

2) **2** UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

5) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

6) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

7) The antennas used in this modeling are the **Ericsson AIR21 B4A/B2P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR21 B4A/B2P** has a maximum gain of **15.9 dBd** at its main lobe. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

8) The antenna mounting height centerline of the proposed antennas is **122 feet** above ground level (AGL).

9) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

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## T-Mobile Site Inventory and Power Data

| Sector: | A | Sector: | B | Sector: | C |
|---|---|---|---|---|---|
| Antenna #: | 1 | Antenna #: | 1 | Antenna #: | 1 |
| Make / Model: | Ericsson AIR21 B4A/B2P | Make / Model: | Ericsson AIR21 B4A/B2P | Make / Model: | Ericsson AIR21 B4A/B2P |
| Gain: | 15.9 dBd | Gain: | 15.9 dBd | Gain: | 15.9 dBd |
| Height (AGL): | 122 | Height (AGL): | 122 | Height (AGL): | 122 |
| Frequency Bands | 1900 MHz(PCS) / 2100 MHz (AWS) | Frequency Bands | 1900 MHz(PCS) / 2100 MHz (AWS) | Frequency Bands | 1900 MHz(PCS) / 2100 MHz (AWS) |
| Channel Count | 2 | Channel Count | 2 | # PCS Channels: | 2 |
| Total TX Power: | 120 | Total TX Power: | 120 | # AWS Channels: | 120 |
| ERP (W): | 1,906.06 | ERP (W): | 1,906.06 | ERP (W): | 1,906.06 |
| Antenna A1 MPE% | 1.25 | Antenna B1 MPE% | 1.25 | Antenna C1 MPE% | 1.25 |
| Antenna #: | 2 | Antenna #: | 2 | Antenna #: | 2 |
| Make / Model: | Ericsson AIR21 B4A/B2P | Make / Model: | Ericsson AIR21 B4A/B2P | Make / Model: | Ericsson AIR21 B4A/B2P |
| Gain: | 15.9 dBd | Gain: | 15.9 dBd | Gain: | 15.9 dBd |
| Height (AGL): | 122 | Height (AGL): | 122 | Height (AGL): | 122 |
| Frequency Bands | 1900 MHz(PCS) / 2100 MHz (AWS) | Frequency Bands | 1900 MHz(PCS) / 2100 MHz (AWS) | Frequency Bands | 1900 MHz(PCS) / 2100 MHz (AWS) |
| Channel Count | 4 | Channel Count | 4 | Channel Count | 4 |
| Total TX Power: | 120 | Total TX Power: | 120 | Total TX Power: | 120 |
| ERP (W): | 1,906.06 | ERP (W): | 1,906.06 | ERP (W): | 1,906.06 |
| Antenna A2 MPE% | 1.25 | Antenna B2 MPE% | 1.25 | Antenna C2 MPE% | 1.25 |
| Antenna #: | 3 | Antenna #: | 3 | Antenna #: | 3 |
| Make / Model: | Commscope LNX-6515DS-VTM | Make / Model: | Commscope LNX-6515DS-VTM | Make / Model: | Commscope LNX-6515DS-VTM |
| Gain: | 14.6 dBd | Gain: | 14.6 dBd | Gain: | 14.6 dBd |
| Height (AGL): | 122 | Height (AGL): | 122 | Height (AGL): | 122 |
| Frequency Bands | 700 Mhz | Frequency Bands | 700 Mhz | Frequency Bands | 700 Mhz |
| Channel Count | 1 | Channel Count | 1 | Channel Count | 1 |
| Total TX Power: | 30 | Total TX Power: | 30 | Total TX Power: | 30 |
| ERP (W): | 445.37 | ERP (W): | 445.37 | ERP (W): | 445.37 |
| Antenna A3 MPE% | 0.49 | Antenna B3 MPE% | 0.49 | Antenna C3 MPE% | 0.49 |

| Site Composite MPE% | |
|---|---|
| **Carrier** | **MPE%** |
| T-Mobile | **8.97** |
| AT&T | 12.11 % |
| Verizon Wireless | 42.08 % |
| **Site Total MPE %:** | **63.16 %** |

| | |
|---|---|
| T-Mobile Sector 1 Total: | 2.99 % |
| T-Mobile Sector 2 Total: | 2.99 % |
| T-Mobile Sector 3 Total: | 2.99 % |
| | |
| Site Total: | 63.16 % |

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## Summary

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

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

| T-Mobile Sector | Power Density Value (%) |
|---|---|
| Sector 1: | 2.99 % |
| Sector 2: | 2.99 % |
| Sector 3 : | 2.99 % |
| T-Mobile Total: | 8.97 % |
| | |
| Site Total: | 63.16 % |
| | |
| Site Compliance Status: | **COMPLIANT** |

The anticipated composite MPE value for this site assuming all carriers present is **63.16%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director

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