

August 10, 2016

VIA EMAIL AND OVERNIGHT DELIVERY

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

RE: T-Mobile Northeast LLC - CT11365D
Notice of Exempt Modification
239 East Middle Turnpike, Manchester, CT
LAT: 41.784444 N
LNG: -72.511667 W

Dear Ms. Bachman:

T-Mobile Northeast LLC ("T-Mobile") currently maintains nine (9) antennas and three (3) RRH's at the 163' level on the existing 184' monopole located at 239 East Middle Turnpike in Manchester, CT. The tower is owned by the Town of Manchester. T-Mobile now intends to replace three (3) existing antennas with three (3) new 1900 MHz antennas. These antennas would be installed at the 132' level of the tower. T-Mobile will also install one (1) hybrid cable inside the monopole. See the plans attached as **Exhibit A**. With modifications, the existing facility is structurally capable of supporting T-Mobile's proposed installation as indicated in the Structural Analysis Report prepared by Tectonic Engineering and attached as **Exhibit B**.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. 16-50j-72(b)(2). In accordance with R.C.S.A. 16-50j-73, a copy of this letter is being sent to the Town's General Manager, Scott Shanley.

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

1. The proposed modifications will not result in an increase in the height of the existing structure. T-Mobile's existing antennas are at a centerline of 163' AGL; the replacement antennas will be installed at the same level. The attached tower drawing confirms that the proposed modification will not increase the height of the tower.
2. The proposed modifications will not require the extension of the site boundary or lease area, as depicted on the attached site plan. T-Mobile's equipment will be located entirely within the existing compound area.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria. The incremental effect of the proposed changes will be negligible.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard. As indicated in the attached power density calculations, T-Mobile's operations at the site will result in a power density of 2.53%; the combined site operations will result in a total power density of 9.54% as evidenced by the power density calculations attached as **Exhibit C**.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

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

Respectfully submitted,

By: 
Eric Dahl, Agent for T-Mobile
edahl@comcast.net
860-227-1975

Attachments

cc: Scott Shanley, General Manager, Town of Manchester

EXHIBIT A

TECTONIC
 Practical Solutions. Exceptional Service.
 1000 North Main Street, Suite 200
 Westport, CT 06880
 Phone: (860) 439-4887
 Fax: (860) 439-4887
 www.tectonicingineering.com

Mobile
 30 GIBBETT ROAD
 BLOOMFIELD, CT 06002

VERTICAL
 Structural Engineering & Surveying
 1000 North Main Street, Suite 200
 Westport, CT 06880
 Phone: (860) 439-4887
 Fax: (860) 439-4887
 www.vertical-engineering.com

| | |
|----------------------|-------------|
| APPROVALS | |
| T-MOBILE LANDLORD | DESIGNED BY |
| CONSTRUCTION | DATE |
| PROJECT NUMBER | REVISION |
| DATE | BY |
| REVISION | DATE |
| BY | DATE |
| DATE | DATE |

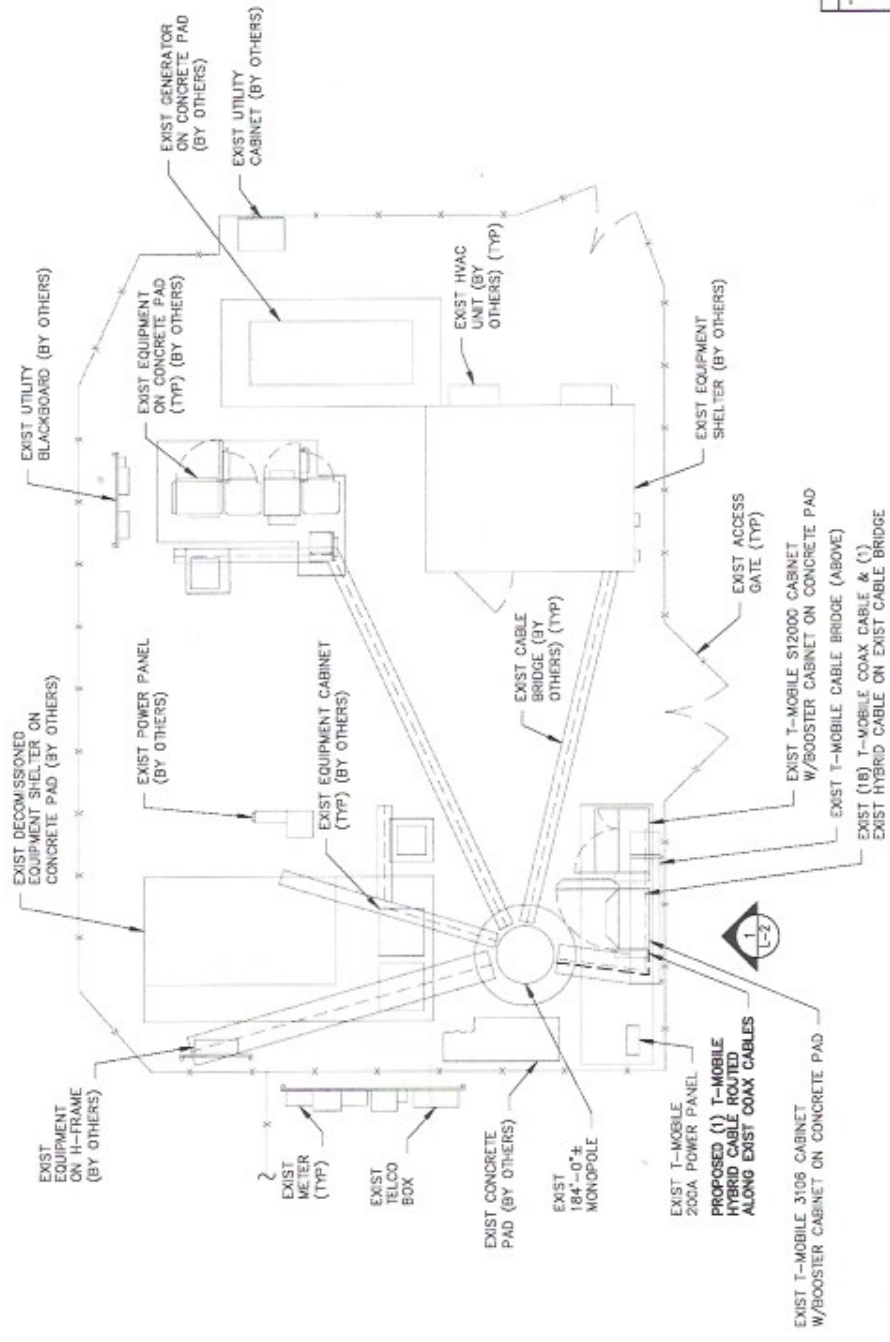
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CT11365D
 CT3865/MANCHESTER PD_MP
 239 EAST MIDDLE TPK
 MANCHESTER, CT 06040

SITE PLAN

L-1

STRUCTURAL NOTE:
 THE PROPOSED DESIGN IS NOT FINAL AND MUST BE STRUCTURALLY ANALYZED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT.



RF CONFIGURATION
 792DB



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



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 1275 South Main Street, Suite 200
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 Phone: (860) 439-8881
 Fax: (860) 439-8882
 www.tectonicengineering.com



VERTICAL
 Structural Engineering & Surveying
 25 GERRITIN ROAD
 BLOOMFIELD, CT 06008

| | |
|-------------------|--------------|
| APPROVALS | |
| T-MOBILE LANDLORD | CONSTRUCTION |
| PROJECT NUMBER | DESIGNED BY |
| REV. DATE | REVISION |
| DATE FOR COMMENT | DRAWN BY |
| | IT |
| | DATE |

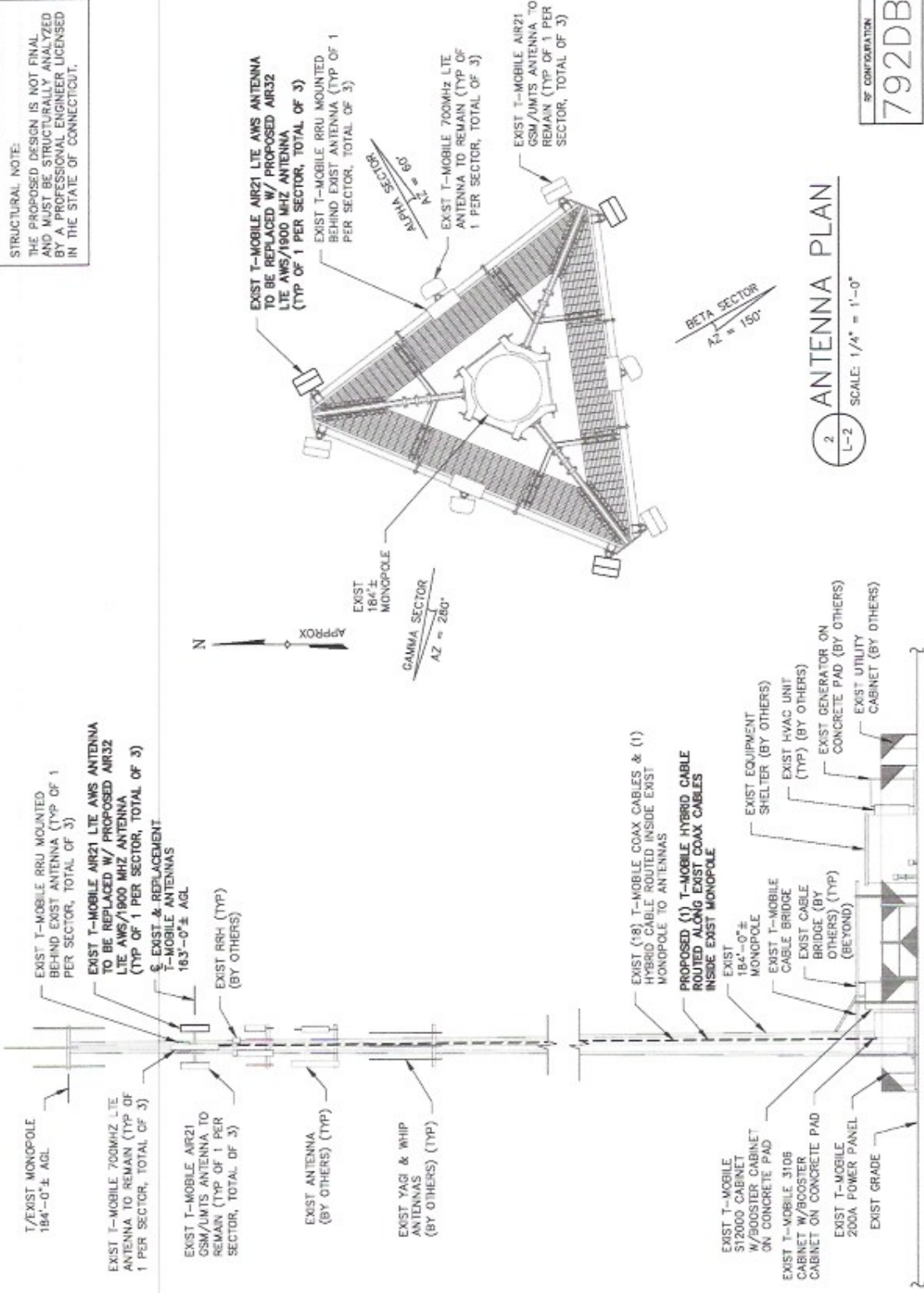
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CT11365D
 CT365/MANCHESTER PD_MP
 239 EAST MIDDLE TPK
 MANCHESTER, CT 06040

ELEVATION & ANTENNA PLAN
 SHEET NUMBER

L-2

STRUCTURAL NOTE:
 THE PROPOSED DESIGN IS NOT FINAL AND MUST BE STRUCTURALLY ANALYZED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT.



2 ANTENNA PLAN
 SCALE: 1/4" = 1'-0"

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

792DB



EXHIBIT B

STRUCTURAL ANALYSIS REPORT
[WITH REINFORCEMENT]

T-MOBILE L1900 UPGRADE
RF CONFIGURATION: 792DB

EXISTING 184' MONOPOLE

T-MOBILE SITE: CT11365D
CT365/MANCHESTER PD_MP

239 EAST MIDDLE TURNPIKE
MANCHESTER, CT 06040

REVISION 1

JULY 21, 2016
TEC W.O. 8250.CT11365D





STRUCTURAL ANALYSIS REPORT

| Project Information | | | |
|---------------------|------------------------------|------------------------|-----------|
| W.O. Number: | 8250.CT11365D | Report Date: | 7/21/2016 |
| Client: | T-Mobile | Revision: | 1 |
| Site Name: | CT365/ MANCHESTER PD_MP | | |
| Owner: | Manchester Police Department | | |
| Site Address: | 239 East Middle Turnpike | FCC Regulation Number: | - |
| City, State: | Manchester, CT 06040 | County: | Hartford |

| Structure Information | | | |
|-----------------------|---------------------------------------|--------------------------------|----------------------------|
| Structure Type: | Monopole | Manufacturer: | EEl |
| Structure Height: | 184 ft. | Year Built: | 2002 |
| Original Drawings: | Structure: No | Foundation: | No |
| Previous Analysis: | Yes | | |
| Documents provided: | | | |
| | <u>Item</u> | <u>By</u> | <u>No.</u> <u>Date</u> |
| | Structural Analysis Report (22 pages) | Malouf Engineering Intl., Inc. | CT00813M-0901 3/18/09 |
| | Structural Analysis Report (21 pages) | Hudson Design Group LLC | CT4XC827 9/25/15 |
| | Construction Drawings (9 sheets) | EBl Consulting | 81140813 11/18/15 |
| | RFDS (10 pages) | T-Mobile | CT11365D 4/8/16 |

| Inspection | | | |
|--------------------|-------------------------------|------------|-----------|
| Type: | Visual Inspection from Ground | Date: | 4/25/2016 |
| General Condition: | | | |
| | Tower: Good | | |
| | Foundation: Good | | |
| Finish: | Galvanized | Condition: | Intact |
| Observations: | None | | |

| Proposed Installation | | | | | |
|--|----------------|------------------|----------------------|---|-----------------------------------|
| T-Mobile is proposing to replace three (3) existing panel antennas with three (3) newer model antennas. The final T-Mobile configuration upon this upgrade will be as follows: | | | | | |
| Antennas: | | | | | |
| <u>Height (ft.)</u> | <u>Carrier</u> | <u>Qty</u> | <u>Manuf.</u> | <u>Model</u> | <u>Mount</u> |
| 163 | T-Mobile | 3 | Ericsson | AIR 21 B2A/B4P | Existing 14' Low Profile Platform |
| | | 3 | Ericsson | AIR 32 B66Aa/B2a | |
| | | 3 | Commscope | LNX-6515DS-VTM | |
| | | 3 | Generic | Twin AWS | |
| | | 3 | Ericsson | RRUS 11 B12 | |
| Cables: | | | | | |
| <u>Height (ft.)</u> | <u>Qty</u> | <u>Nom. Size</u> | <u>Location</u> | <u>Comments</u> | |
| 163 | 18 | 1-5/8" dia | Interior of the pole | Existing to remain | |
| 163 | 1 | Hybriflex | Interior of the pole | Existing to remain | |
| 163 | 1 | 6x12 Hybriflex | Interior of the pole | To be routed along the interior of the pole | |

| | | | |
|--------------|-------------------------|--------------|-----------|
| W.O. Number: | 8250.CT11365D | Report Date: | 7/21/2016 |
| Client: | T-Mobile | Revision: | 1 |
| Site Name: | CT365/ MANCHESTER PD_MP | | |

Analysis Criteria

Design Standard: ANSI/TIA-222-G-2005
 Building Code: 2005 Connecticut State Building Code w/ 2013 CT Supplemental Code

| | <u>Capacity (no ice)</u> | <u>Capacity w/ ice</u> | <u>Service</u> |
|-----------------------------|--------------------------|------------------------|----------------|
| Wind Speed (3-second gust): | 100 mph | 50 mph | 60 mph |
| Basic Ice Thickness: | 0 inch | 1.0 inch | 0 inch |

Structure Class: 3 Seismic: No
 Exposure Category: B
 Topo Category: 1

- Assumptions:
1. The tower was designed, manufactured, and constructed in accordance with the approved tower drawings
 2. The foundation was designed and constructed based on site-specific geotechnical information.
 3. The monopole has been properly maintained in accordance with industry standards, and slip jointed splices were assembled in accordance with the manufacturer's specifications.
 4. Tower geometry and appurtenances are solely based on the analysis reports provided by the client and a limited visual inspection from the ground.
 5. Anchor rods conform to ASTM A615-75 grade steel.
 6. Base plate and pole shaft conform to 60 ksi and 65 ksi steel, respectively.

Analysis Results

| <u>Element</u> | <u>% Usage</u> |
|-------------------|----------------|
| Tower | 86% |
| Base Plate | 68% |
| Stiffener Plates* | 84% |
| Anchor Rods | 82% |
| Foundation | 74% |

| <u>Service Load Deflections:</u> | <u>Max</u> | <u>%Allowable</u> |
|----------------------------------|---------------|-------------------|
| Horizontal: | 37.538 inches | 17% |
| Twist / Sway: | 1.893 deg | 47% |

**Upon completion of the reinforcement in conjunction with the proposed T-Mobile upgrade*

Foundation Reactions (Envelope):

| | | |
|--------------------|------|----------|
| Axial | 132 | kips |
| Shear | 36 | kips |
| Overturning Moment | 4761 | kips-ft. |

W.O. Number: 8250.CT11365D
Client: T-Mobile
Site Name: CT365/ MANCHESTER PD_MP

Report Date: 7/21/2016
Revision: 1

Conclusions

Based on our analysis, once the monopole is reinforced as shown in the drawings prepared by TECTONIC, it will have adequate capacity to support the proposed T-Mobile upgrade as described herein in accordance with current code requirements.

The existing monopole shaft reinforcement were determined to be ineffective. As such, it has not been included in this analysis.

Based on a review of the foundation information provided, the existing foundation has adequate capacity to support the additional load from the proposed upgraded installation.

Furthermore, based on our analysis, once the existing antenna support mount is reinforced as shown in the drawings prepared by TECTONIC, it will have sufficient capacity to support the proposed upgrade as referenced in this report. The member sizes of the existing platform will need to be field verified prior to the installation of the required modifications.

This analysis is solely based on the documents referenced in this report and information provided by T-Mobile. This analysis may be affected if any assumptions are not valid or have been made in error. TECTONIC should be notified to determine the effect on the structural integrity of the tower.

Any further changes to the antenna configuration or other appurtenances should be reviewed with respect to their effect on structural loads prior to implementation.

Prepared by: Ian Marinaccio
Structural Engineer

Reviewed by: Vinod Ramesh
Structural Engineer



Approved by:

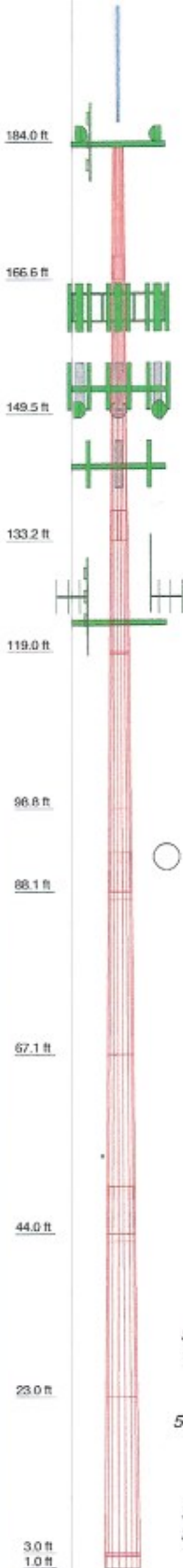
E. Iamiceli
Edward N. Iamiceli, P.E.
Senior Project Manager

Date:

7/25/16

TNX TOWER SUMMARY REPORT

| Section | Length (ft) | Number of Sides | Thickness (in) | Socket Length (ft) | Top Dia (in) | Bot Dia (in) | Grade | Weight (K) |
|---------|-------------|-----------------|----------------|--------------------|---------------|---------------|-------|------------|
| 1 | 17.380 | 18 | 0.188 | 2.920 | 15.500 | 19.300 | 0.6 | |
| 2 | 20.000 | 18 | 0.250 | 18.369 | 22.787 | 22.787 | 1.1 | |
| 3 | 16.360 | 18 | 0.250 | 9.800 | 22.787 | 26.401 | 1.1 | |
| 4 | 17.980 | 18 | 0.375 | 25.051 | 29.045 | 29.045 | 1.9 | |
| 5 | 0.250 | 18 | 0.375 | 29.045 | 29.000 | 29.045 | 0.0 | |
| 6 | 20.000 | 18 | 0.375 | 29.100 | 33.651 | 33.651 | 2.5 | |
| 7 | 5.360/6.660 | 18 | 0.375 | 4.890 | 34.037/33.631 | 35.364/35.882 | 1.5 | |
| 8 | 20.000 | 18 | 0.438 | 35.364 | 39.784 | 39.784 | 3.5 | |
| 9 | 23.060 | 18 | 0.438 | 6.110 | 39.794 | 44.903 | 4.6 | |
| 10 | 7.110 | 18 | 0.438 | 44.241 | 42.874 | 44.141 | 4.4 | |
| 11 | 20.000 | 18 | 0.438 | 44.241 | 48.647 | 48.647 | 4.3 | |
| 12 | 20.000 | 18 | 0.438 | 48.647 | 53.053 | 53.053 | 4.8 | |
| 13 | 20.000 | 18 | 0.438 | 48.647 | 53.053 | 53.053 | 4.8 | |



DESIGNED APPURTENANCE LOADING

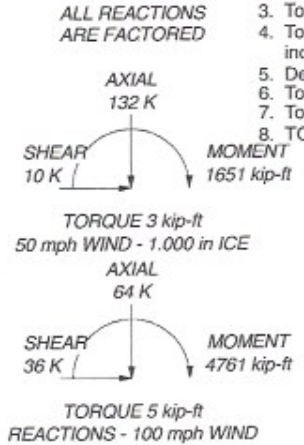
| TYPE | ELEVATION | TYPE | ELEVATION |
|--------------------------------|-----------|------------------------------------|-----------|
| Lightning Rod 2" x 21" | 184 | 860 10025 | 153 |
| 13' Low Profile Platform | 184 | Panel Antenna - 18" x 18" | 153 |
| 20'-4 Bay Dipole | 184 | APXVSP18-C-A20 w/ Mount pipe | 153 |
| 20'-4 Bay Dipole | 184 | APXVSP18-C-A20 w/ Mount pipe | 153 |
| 9' x 2' STD Pipe | 184 | TD-RRH8x20-25 | 151 |
| 9' x 2' STD Pipe | 184 | TD-RRH8x20-25 | 151 |
| 9' x 2' STD Pipe | 184 | Ring Mount | 151 |
| 5' x 2.5' STD Pipe | 184 | TD-RRH8x20-25 | 151 |
| 5' x 2.5' STD Pipe | 184 | 5' x 2.5' STD Pipe | 150 |
| 2' Dish | 184 | 5' x 2.5' STD Pipe | 150 |
| 2' Dish | 184 | 5' x 2.5' STD Pipe | 150 |
| AIR 32 B66Aa B2a w/ Mount Pipe | 163 | VHLP2-11 | 150 |
| 14 ft Handrail kit | 163 | Andrew VHLP2-11 | 150 |
| 14' Low Profile Platform | 163 | VHLP2-11 | 150 |
| AIR21 B4A/B2P w/ Mount Pipe | 163 | RRUS 11 | 143 |
| AIR21 B4A/B2P w/ Mount Pipe | 163 | RRUS 11 | 143 |
| AIR21 B4A/B2P w/ Mount Pipe | 163 | (2) DC6-48-60-18-RF | 143 |
| LNX-6515DS-VTM w/ Mount Pipe | 163 | OPA-65R-LCUU-H6 w/ Mount Pipe | 143 |
| LNX-6515DS-VTM w/ Mount Pipe | 163 | OPA-65R-LCUU-H8 w/ Mount Pipe | 143 |
| LNX-6515DS-VTM w/ Mount Pipe | 163 | OPA-65R-LCUU-H8 w/ Mount Pipe | 143 |
| Twin AWS TMA | 163 | RRUS 32 | 143 |
| Twin AWS TMA | 163 | RRUS 32 | 143 |
| RRUS 11 | 163 | RRUS E2 | 143 |
| RRUS 11 | 163 | RRUS E2 | 143 |
| RRUS 11 | 163 | RRUS E2 | 143 |
| AIR 32 B66Aa B2a w/ Mount Pipe | 163 | RRUS A2 | 143 |
| AIR 32 B66Aa B2a w/ Mount Pipe | 163 | RRUS A2 | 143 |
| APXVSP18-C-A20 w/ Mount pipe | 153 | RRUS A2 | 143 |
| (2) 1900MHz RRH | 153 | 13' Low Profile Platform | 143 |
| (2) 1900MHz RRH | 153 | 800 10121 w/ Mount Pipe | 143 |
| (2) 1900MHz RRH | 153 | 800 10121 w/ Mount Pipe | 143 |
| 800 MHz RRH | 153 | 800 10121 w/ Mount Pipe | 143 |
| 800 MHz RRH | 153 | RRUS 11 | 143 |
| 800 MHz RRH | 153 | 3' Yagi antenna w/mount pipe | 123 |
| 13' Low Profile Platform | 153 | 3' Yagi antenna w/ mount pipe | 123 |
| APXVTM14-C-120 w/ Mount Pipe | 153 | 13' Low Profile Platform | 123 |
| APXVTM14-C-120 w/ Mount Pipe | 153 | 20'-4 Bay Dipole | 123 |
| APXVTM14-C-120 w/ Mount Pipe | 153 | 9' x 2' STD Pipe | 123 |
| 800 10504 w/ Mount Pipe | 153 | 10' x 2' Omni Antenna w/mount pipe | 123 |
| 800 10504 w/ Mount Pipe | 153 | 10' x 2' Omni Antenna w/mount pipe | 123 |
| 800 10504 w/ Mount Pipe | 153 | GPS A | 54 |
| 860 10025 | 153 | SO 301-1 | 54 |
| 860 10025 | 153 | | |

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

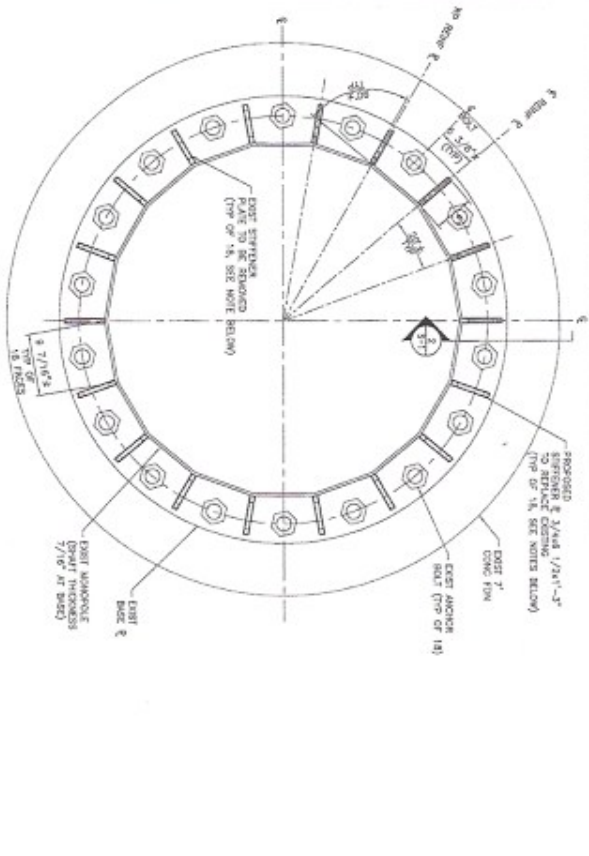
1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 100 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class III.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TOWER RATING: 85.5%



TECTONIC Practical Solutions. Exceptional Service. **TECTONIC** 1279 Route 300 Newburgh, NY 12550 Phone: (845) 567-6656 FAX: (845) 567-8703

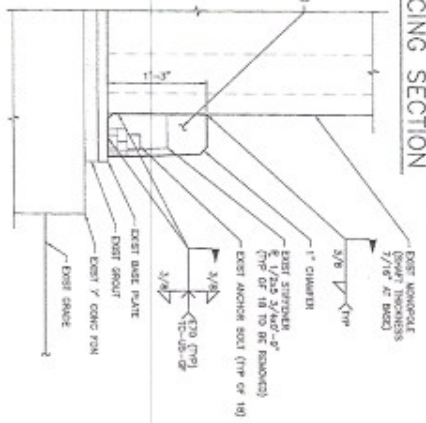
Job: **8250.CT11365D R1**
 Project: **CT365/MANCHESTER PD_MP**
 Client: T-Mobile Drawn by: Ian Marinaccio App'd:
 Code: TIA-222-G Date: 07/11/16 Scale: N
 Path: [unclear] Dwg No. E

REINFORCEMENT DRAWINGS



- NOTES:
1. LOCATION OF PROPOSED REINFORCING IS BASED ON A LIMITED VISUAL INSPECTION FROM GROUND. AS SUCH, CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF REINFORCING AND FOR THE PROTECTION OF THE EXISTING STRUCTURE FROM DAMAGE DURING INSTALLATION OF STEEL AND INSTALL NEW STRUCTURES.

1 MONOPOLE REINFORCING SECTION
SCALE: 1/2" = 1'-0"



2 BASE REINFORCING SECTION
SCALE: 1/2" = 1'-0"

MONOPOLE REINFORCING NOTES

- GENERAL
1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE 2006 CONNECTICUT STATE W/2013 CT SUPPLEMENTAL CODE AND THE 2006 INTERNATIONAL BUILDING CODES AND BEING DESIGNED TO SUPPORT THE AIRWAYS AND CABLES LISTED IN THE MONOPOLE DESIGN DRAWINGS AND BEING CONSULTED WITH THE DESIGNER'S OFFICE, SECTION 1, DATED 7/27/16.
 2. STRUCTURAL ANALYSIS REPORT BY TESTING ENGINEERING & SURVEYING CONSULTANTS P.C., SECTION 1, DATED 7/27/16.
 3. MONOPOLE REINFORCING IS DESIGNED IN CONFORMANCE TO AISC 360-10, STRUCTURAL STEEL DESIGN FOR AMERICAN STRUCTURAL STEEL AND ALUMINUM.
 4. CONTRACTOR SHALL VERIFY THE EXISTING STRUCTURE PRIOR TO STARTING ANY WORK. IF CONDITIONS OR MATERIALS FOUND IN THE FIELD DIFFER FROM THOSE INDICATED, CONTACT THE ENGINEER FOR APPROVAL.
 5. CONTRACTOR SHALL VERIFY CONSTRUCTION IN WRITING AND SHALL RECEIVE IN WRITING APPROVAL TO PROCEED BEFORE COMMENCING ANY WORK.
 6. CONTRACTOR SHALL VERIFY AND OBTAIN THE BEST CONSTRUCTION DETAILS AND ATTACHED PROCEDURES AND FOR CONSTRUCTION ALL PORTIONS OF THE WORK UNDER CONTRACT, UNLESS OTHERWISE NOTED.
 7. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION DETAILS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR CONSTRUCTION ALL PORTIONS OF THE WORK UNDER CONTRACT, UNLESS OTHERWISE NOTED.
 8. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF THE WORK AND SHALL CONSIDER ALL SAFETY MEASURES THAT ARE NECESSARY TO PROTECT THE PUBLIC AND THE WORKERS FROM THE RISK OF COLLAPSE OR FAILURE OF ANY PART OF THE WORK.
 9. ALL MONOPOLE REINFORCING SHALL BE COMPLETED PRIOR TO INSTALLATION OF PROPOSED AIRWAYS, MOISTS, AND CABLES.
 10. ALL WORK SHALL BE PERFORMED IN DRY WEATHER, WITH WIND SPEEDS LESS THAN 10 MPH.
 11. PROTECT EXISTING CABLES AND EQUIPMENT FROM DAMAGE DURING INSTALLATION OF AIRWAYS AND REINFORCING.
 12. FOUNDATION SYSTEM SHALL BE CHECKED AND UNMOVED AS DIRECTED BY THE CONSTRUCTION MANAGER.
- STEEL
1. DESIGN AND CONSTRUCTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION FOR STRUCTURAL STEEL BUILDING, 2005.
 2. ALL STEEL MATERIALS SHALL BE QUALIFIED AFTER FABRICATION IN ACCORDANCE WITH ASTM A133 2002 (HOT-DIP GALVANIZED AND UNCOATED) AND ASTM A108 2002 (HOT-DIP GALVANIZED AND UNCOATED) AND ASTM A109 2002 (HOT-DIP GALVANIZED AND UNCOATED).
 3. ALL BOLT HEADS SHALL BE CHILLED OR FINISHED WITH 1/16" LAYER OF DIAPHRAGM TYPICAL ON STRUCTURAL CONNECTIONS.
 4. CONTRACTOR SHALL VERIFY THE QUALITY OF THE WORK AND SHALL CONSIDER ALL SAFETY MEASURES THAT ARE NECESSARY TO PROTECT THE PUBLIC AND THE WORKERS FROM THE RISK OF COLLAPSE OR FAILURE OF ANY PART OF THE WORK.
 5. CONTRACTOR SHALL VERIFY AND OBTAIN THE BEST CONSTRUCTION DETAILS AND ATTACHED PROCEDURES AND FOR CONSTRUCTION ALL PORTIONS OF THE WORK UNDER CONTRACT, UNLESS OTHERWISE NOTED.
 6. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF THE WORK AND SHALL CONSIDER ALL SAFETY MEASURES THAT ARE NECESSARY TO PROTECT THE PUBLIC AND THE WORKERS FROM THE RISK OF COLLAPSE OR FAILURE OF ANY PART OF THE WORK.
 7. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF THE WORK AND SHALL CONSIDER ALL SAFETY MEASURES THAT ARE NECESSARY TO PROTECT THE PUBLIC AND THE WORKERS FROM THE RISK OF COLLAPSE OR FAILURE OF ANY PART OF THE WORK.
 8. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF THE WORK AND SHALL CONSIDER ALL SAFETY MEASURES THAT ARE NECESSARY TO PROTECT THE PUBLIC AND THE WORKERS FROM THE RISK OF COLLAPSE OR FAILURE OF ANY PART OF THE WORK.
 9. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF THE WORK AND SHALL CONSIDER ALL SAFETY MEASURES THAT ARE NECESSARY TO PROTECT THE PUBLIC AND THE WORKERS FROM THE RISK OF COLLAPSE OR FAILURE OF ANY PART OF THE WORK.
 10. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF THE WORK AND SHALL CONSIDER ALL SAFETY MEASURES THAT ARE NECESSARY TO PROTECT THE PUBLIC AND THE WORKERS FROM THE RISK OF COLLAPSE OR FAILURE OF ANY PART OF THE WORK.
 11. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF THE WORK AND SHALL CONSIDER ALL SAFETY MEASURES THAT ARE NECESSARY TO PROTECT THE PUBLIC AND THE WORKERS FROM THE RISK OF COLLAPSE OR FAILURE OF ANY PART OF THE WORK.
 12. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF THE WORK AND SHALL CONSIDER ALL SAFETY MEASURES THAT ARE NECESSARY TO PROTECT THE PUBLIC AND THE WORKERS FROM THE RISK OF COLLAPSE OR FAILURE OF ANY PART OF THE WORK.
 13. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF THE WORK AND SHALL CONSIDER ALL SAFETY MEASURES THAT ARE NECESSARY TO PROTECT THE PUBLIC AND THE WORKERS FROM THE RISK OF COLLAPSE OR FAILURE OF ANY PART OF THE WORK.

SPECIAL INSPECTIONS REQUIRED

1. STRUCTURAL STEEL - WELDING
2. FINAL INSPECTION

ALL SPECIAL INSPECTIONS SHALL BE PERFORMED BY TESTING DURING THE COURSE OF CONSTRUCTION. CONTRACTOR SHALL NOTIFY TESTING NOT LESS THAN 7 DAYS IN ADVANCE OF PERFORMING WORK REQUIRING SPECIAL INSPECTION. IF TESTING IS NOT NOTIFIED, CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL TESTING/INSPECTION REQUIRED TO APPROVE SITE AT TECHNICIAN'S DISCRETION.

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CONSULTANT
7922DB
NOTE TO LATEST E-MOBILE PER DATA SHEET FOR FINAL PER DESIGN & BIDD

MONOPOLE REINFORCING PARTIAL ELEVATION, SECTION & NOTES
S-1

CT11365D
CT365/MANCHESKI PO_MP
239 EAST MIDDLE PKWY
MANCHESTER, CT 06040

TECTONIC
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NORTHBURY, ILL.
36 GORFAN ROAD SOUTH
BLOOMFIELD, CT 06006

VERTICAL
1000
MANCHESTER, CT 06040

LABORER
BY
CONTRACTOR
OPERATIONAL
REV. NO.
REVISIONS
DATE
BY

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

EXHIBIT C



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

T-Mobile Existing Facility

Site ID: CT11365D

CT365/ Manchester PD_MP
239 East Middle Tpk
Manchester, CT 06040

August 5, 2016

EBI Project Number: 6216003515

| Site Compliance Summary | |
|--|------------------|
| Compliance Status: | COMPLIANT |
| Site total MPE% of FCC general public allowable limit: | 9.54 % |

August 5, 2016

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

Emissions Analysis for Site: **CT11365D – CT365/ Manchester PD_MP**

EBC Consulting was directed to analyze the proposed T-Mobile facility located at **239 East Middle Tpk, Manchester, 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 700 MHz Band is approximately 467 $\mu\text{W}/\text{cm}^2$, and the general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (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 **239 East Middle Tpk, Manchester, 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 (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 3) 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.
- 4) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 5) 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
- 6) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.



- 7) Since the 2100 MHz UMTS radios are ground mounted there are additional cabling losses accounted for. For each 2100 MHz UMTS ground mounted RF path an additional 2.0 dB of additional cable loss was factored into the calculations. This is based on manufacturers Specifications for 189 feet of 1-5/8" coax cable on each path.
- 8) 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.
- 9) For the following calculations the sample point was the top of a 6-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.
- 10) The antennas used in this modeling are the **Ericsson AIR32 B66Aa/B2A & Ericsson AIR21 B2A/B4P** 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 AIR32 B66Aa/B2A** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Ericsson AIR21 B2A/B4P** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe at 700 MHz. 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.
- 11) The antenna mounting height centerline of the proposed antennas is **163 feet** above ground level (AGL).
- 12) 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.
- 13) All calculations were done with respect to uncontrolled / general public threshold limits.



T-Mobile Site Inventory and Power Data

| Sector: | A | Sector: | B | Sector: | C |
|--------------------|--------------------------------|--------------------|--------------------------------|--------------------|--------------------------------|
| Antenna #: | 1 | Antenna #: | 1 | Antenna #: | 1 |
| Make / Model: | Ericsson AIR32 B66Aa/B2A | Make / Model: | Ericsson AIR32 B66Aa/B2A | Make / Model: | Ericsson AIR32 B66Aa/B2A |
| Gain: | 15.9 dBd | Gain: | 15.9 dBd | Gain: | 15.9 dBd |
| Height (AGL): | 163 | Height (AGL): | 163 | Height (AGL): | 163 |
| 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(W): | 240 | Total TX Power(W): | 240 | Total TX Power(W): | 240 |
| ERP (W): | 9,337.08 | ERP (W): | 9,337.08 | ERP (W): | 9,337.08 |
| Antenna A1 MPE% | 1.36 | Antenna B1 MPE% | 1.36 | Antenna C1 MPE% | 1.36 |
| Antenna #: | 2 | Antenna #: | 2 | Antenna #: | 2 |
| Make / Model: | Ericsson AIR21 B2A/B4P | Make / Model: | Ericsson AIR21 B2A/B4P | Make / Model: | Ericsson AIR21 B2A/B4P |
| Gain: | 15.9 dBd | Gain: | 15.9 dBd | Gain: | 15.9 dBd |
| Height (AGL): | 163 | Height (AGL): | 163 | Height (AGL): | 163 |
| 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 | 6 | Channel Count | 6 | Channel Count | 6 |
| Total TX Power(W): | 180 | Total TX Power(W): | 180 | Total TX Power(W): | 180 |
| ERP (W): | 6,141.37 | ERP (W): | 6,141.37 | ERP (W): | 6,141.37 |
| Antenna A2 MPE% | 0.90 | Antenna B2 MPE% | 0.90 | Antenna C2 MPE% | 0.90 |
| 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): | 163 | Height (AGL): | 163 | Height (AGL): | 163 |
| Frequency Bands | 700 MHz | Frequency Bands | 700 MHz | Frequency Bands | 700 MHz |
| Channel Count | 1 | Channel Count | 1 | Channel Count | 1 |
| Total TX Power(W): | 30 | Total TX Power(W): | 30 | Total TX Power(W): | 30 |
| ERP (W): | 865.21 | ERP (W): | 865.21 | ERP (W): | 865.21 |
| Antenna A3 MPE% | 0.27 | Antenna B3 MPE% | 0.27 | Antenna C3 MPE% | 0.27 |

| Site Composite MPE% | |
|---------------------------|--------|
| Carrier | MPE% |
| T-Mobile (Per Sector Max) | 2.53 % |
| Town MFRE | 0.11 % |
| Town MPD - ch 1 | 0.01 % |
| Town MPD - ch 2 | 0.02 % |
| Town MFD | 0.03 % |
| Town services intercity | 0.06 % |
| RAFS I/2 | 0.19 % |
| Town public works | 0.08 % |
| Town Services EOC | 0.08 % |
| Town FD | 0.08 |
| town SP hotline | 0.11 |
| Town Vol FD | 0.07 |
| Town Service - School | 0.02 |
| Htfd City FD | 0.08 |
| Tolland MUT | 0.08 |
| Sprint | 0.47 |
| Clearwire | 0.09 |
| Verizon | 3.51 |
| AT&T | 1.91 |
| Site Total MPE %: | 9.54 % |

| | |
|--------------------------|--------|
| T-Mobile Sector A Total: | 2.53 % |
| T-Mobile Sector B Total: | 2.53 % |
| T-Mobile Sector C Total: | 2.53 % |
| Site Total: | 9.54 % |



T-Mobile Per Sector Maximum Values

| T-Mobile _per sector | # Channels | Watts ERP (Per Channel) | Height (feet) | Total Power Density ($\mu\text{W}/\text{cm}^2$) | Frequency (MHz) | Allowable MPE ($\mu\text{W}/\text{cm}^2$) | Calculated % MPE |
|------------------------------|------------|-------------------------|---------------|---|-----------------|---|------------------|
| T-Mobile AWS - 2100 MHz LTE | 2 | 2,334.27 | 163 | 6.81 | AWS - 2100 MHz | 1000 | 0.68% |
| T-Mobile PCS - 1900 MHz LTE | 2 | 2,334.27 | 163 | 6.81 | PCS - 1900 MHz | 1000 | 0.68% |
| T-Mobile AWS - 2100 MHz UMTS | 2 | 736.41 | 163 | 2.15 | AWS - 2100 MHz | 1000 | 0.21% |
| T-Mobile PCS - 1950 MHz UMTS | 2 | 1,167.14 | 163 | 3.40 | PCS - 1950 MHz | 1000 | 0.34% |
| T-Mobile PCS - 1950 MHz GSM | 2 | 1,167.14 | 163 | 3.40 | PCS - 1950 MHz | 1000 | 0.34% |
| T-Mobile 700 MHz LTE | 1 | 865.21 | 163 | 1.26 | 700 MHz | 467 | 0.27% |
| | | | | | | Total*: | 2.53% |

NOTE: Totals may vary by .01% due to summing of remainders

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 A: | 2.53 % |
| Sector B: | 2.53 % |
| Sector C: | 2.53 % |
| T-Mobile Per Sector Maximum: | 2.53 % |
| Site Total: | 9.54 % |
| Site Compliance Status: | COMPLIANT |

The anticipated composite MPE value for this site assuming all carriers present is **9.54%** 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.