COHEN and WOLF P.C.
ATTORNEYS AT LAW

RACHEL A. SCHWARTZMAN

Please Reply To: Bridgeport
Writer's Direct Dial: (203) 337-4110
E-Mail: rschwartzman@cohenandwolf.com

August 13, 2014

Attorney Melanie Bachman
Acting Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06501

Re: Notice of Exempt Modification
Citadel Broadcasting Company/MetroPCS co-location
CTNL223A
99 Briar Hill Road, Groton, CT

Dear Attorney Bachman:

This office represents MetroPCS Massachusetts, LLC, a Delaware limited liability company ("MetroPCS"), and has been retained to file exempt modification filings with the Connecticut Siting Council on its behalf.

In this case, the Citadel Broadcasting Company owns the existing guyed triangular telecommunications tower and related facility at 99 Briar Hill Road, Groton, CT (41.385139/ -72.06986111). MetroPCS intends to replace 3 existing antennas with 6 new antennas and related equipment at this existing telecommunications facility in Groton ("Groton 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 Mayor, Rita M. Schmidt, and the property owner, Citadel Broadcasting Company.

The existing Groton Facility consists of a 250-foot guyed triangular tower.[1] MetroPCS plans to replace 3 existing antennas on T-arm mounts with 6 new antennas on T-arm mounts at a centerline of 177 feet. (See the plans revised to April 28, 2014 attached hereto as **Exhibit A**). MetroPCS will also reuse an existing backup battery unit, upgrade a 6201 equipment cabinet, reuse an existing BTS cabinet which will remain off, reuse an existing PPC, reuse existing coax cables, and install fiber cable. The existing Groton Facility is structurally capable of supporting MetroPCS' proposed modifications, as indicated in the structural analysis dated May 29, 2014, and attached hereto as **Exhibit B**.

[1] The Groton Facility was approved at a height of 250 feet (Petition No. 913), which is consistent with this filing.

The planned modifications to the Groton 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. MetroPCS' existing antennas are at a centerline of 177 feet; the replacement antennas will be installed at the same 177 foot level. 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 on the site boundaries or lease area, as depicted on Sheet 2 of Exhibit A. MetroPCS' equipment will be located entirely within the existing compound area.

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

4. The operation of the replacement antennas will not increase the total radio frequency (RF) power density, measured at the base of the tower, to a level at or above the applicable standard. According to a Radio Frequency Emissions Analysis Report prepared by EBI dated August 7, 2014. MetroPCS' operations would add 0.386% 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 10.456% 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, MetroPCS respectfully submits that the proposed replacement antennas and equipment at the Groton Facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Upon acknowledgement of this exempt modification, MetroPCS shall commence construction approximately sixty days from the receipt of the Council's decision.

Sincerely,

Rachel A. Schwartzman, Esq.

cc: Town of Groton, Mayor Rita M. Schmidt
Citadel Broadcasting Company
Sheldon J. Freincle, Northeast Site Solutions

EXHIBIT A

KEY PLAN

N.T.S.

CONFIGURATION

5A

SUBMITTALS	
LE REV A	04.28.14

ATLANTIS GROUP
1340 Centre Street
Suite 212
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

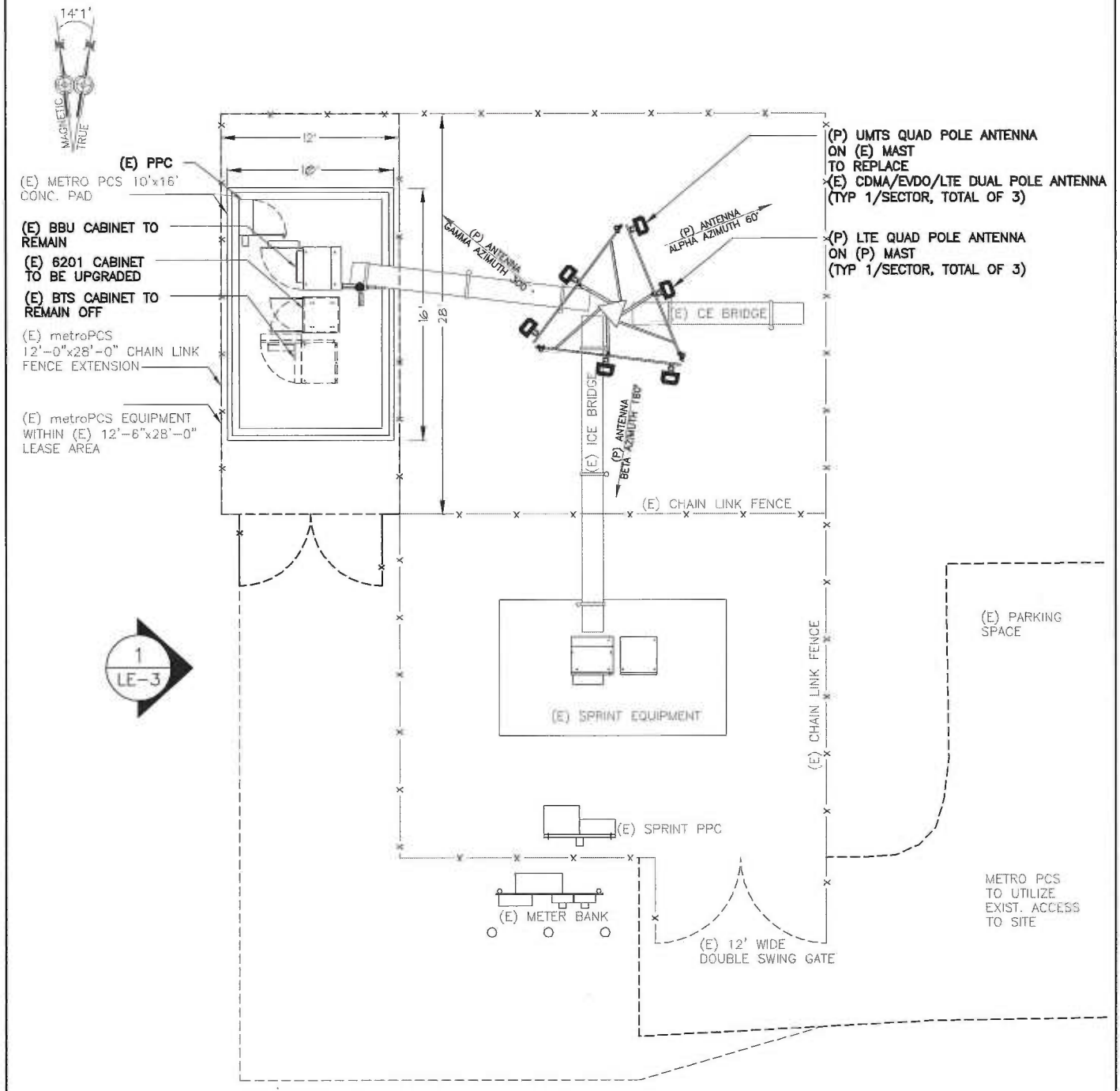
LEASE EXHIBIT

SITE NUMBER:
CTNL223A
SITE NAME:
CITADEL GROTON GUYED
SITE ADDRESS:
99 BRIAR HILL RD,
GROTON, CT

NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
STURBRIDGE, MA 01566
(508) 434-5237

FOR
metroPCS.
metroPCS WIRELESS, INC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

DRAWN BY: MB | CHECKED BY: SM



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.

SITE PLAN

SCALE: N.T.S.

1
LE-2

CONFIGURATION
5A

SUBMITTALS	
LE REV A	04.28.14

ATLANTIS GROUP
1340 Centre Street
Suite 212
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

LEASE EXHIBIT

SITE NUMBER:
CTNL223A
SITE NAME:
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SITE ADDRESS:
99 BRIAR HILL RD,
GROTON, CT

NORTHEAST SITE SOLUTIONS
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(508) 434-5237
FOR
metroPCS.
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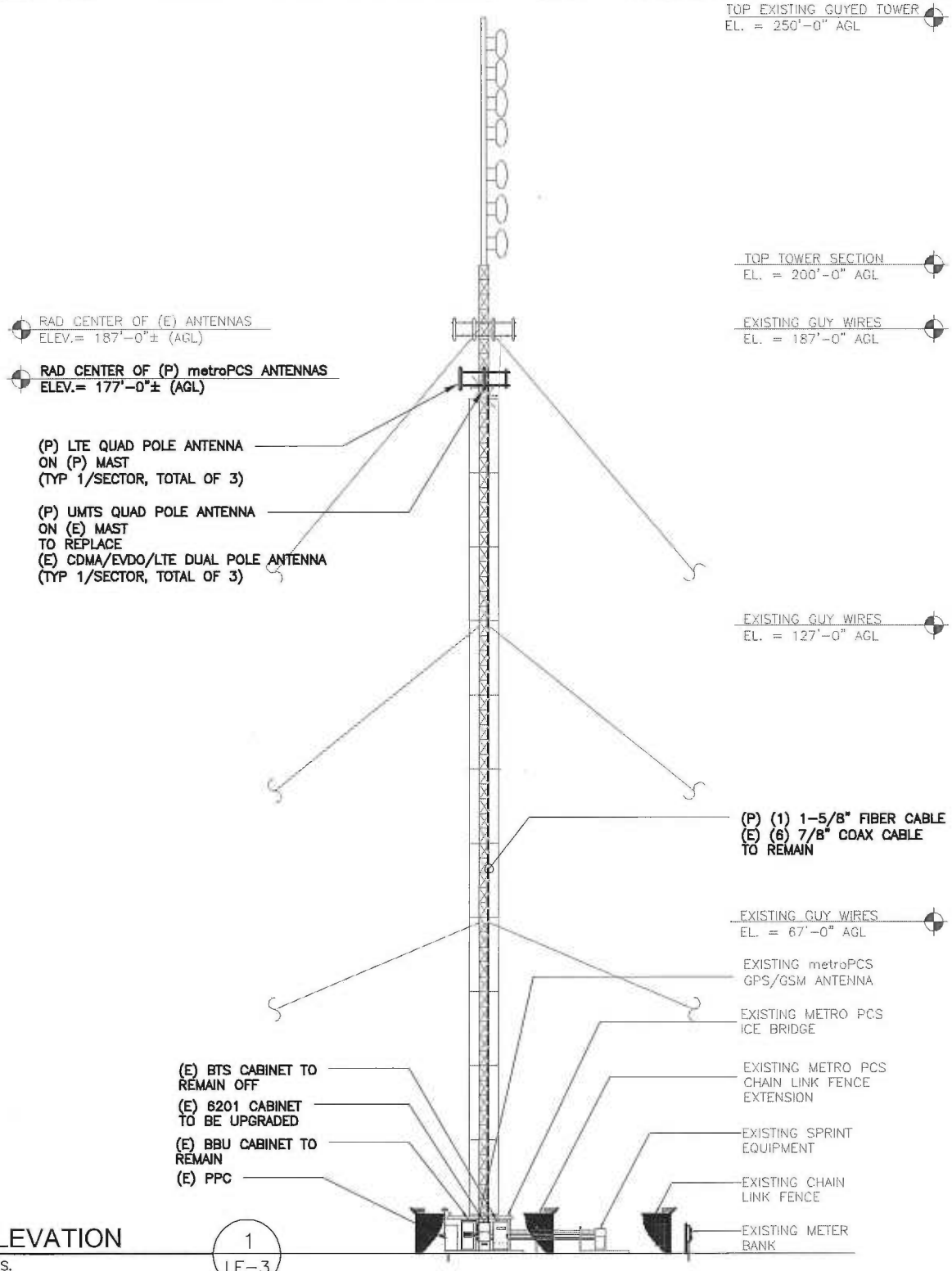
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

DRAWN BY: MB | CHECKED BY: SM



ELEVATION

N.T.S.

1
LE-3

CONFIGURATION
5A

SUBMITTALS	
LE REV A	04.28.14

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

LEASE EXHIBIT

SITE NUMBER:
CTNL223A
SITE NAME:
CITADEL GROTON GUYED
SITE ADDRESS:
99 BRIAR HILL RD,
GROTON, CT

NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
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(508) 434-5237
FOR
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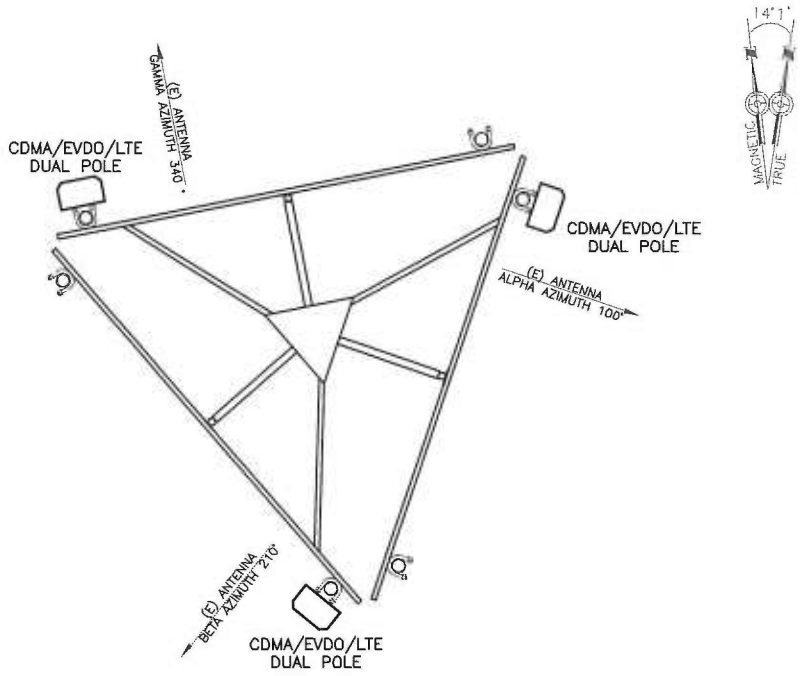
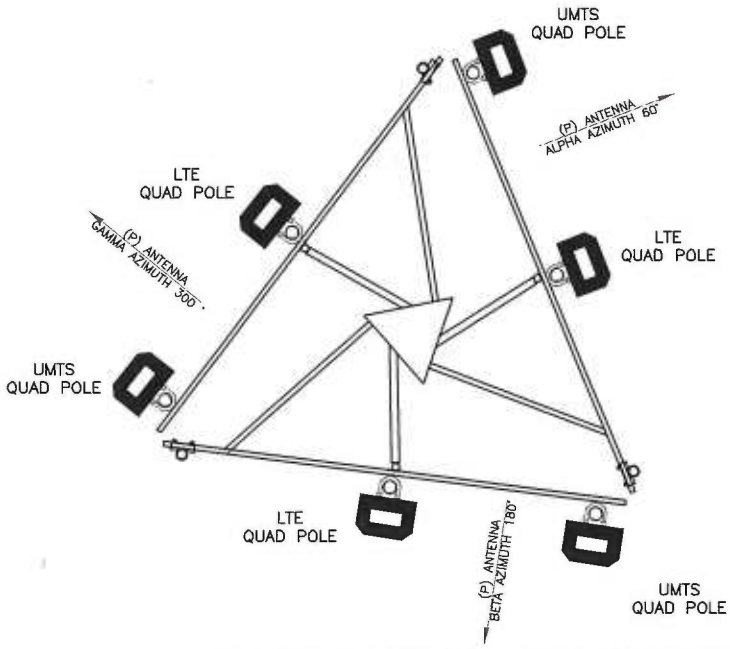


EXISTING ANTENNA CONFIGURATION



PROPOSED ANTENNA CONFIGURATION

CONFIGURATION

5A

SUBMITTALS	
LE REV A	04.28.14

ATLANTIS GROUP
1340 Centre Street
Suite 212
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

LEASE EXHIBIT

SITE NUMBER:
CTNL223A
SITE NAME:
CITADEL GROTON GUYED
SITE ADDRESS:
99 BRIAR HILL RD,
GROTON, CT

NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
STURBRIDGE, MA 01566
(508) 434-5237

FOR
metroPCS.

metroPCS WIRELESS, INC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

DRAWN BY: MB | CHECKED BY: SM

EXHIBIT B

STRUCTURAL ANALYSIS REPORT
GUYED TOWER

Prepared For:

metroPCS
Unlimit Yourself.

35 Griffin Road South
Bloomfield, CT 06002

Tower Rating

Tower:	**Pass (96.0 %)**
Foundation:	**Unknown**

Atlantis Group, Inc.
5-29-2014

STATE OF CONNECTICUT
DMITRIY V. ALBUL
No. 26795
LICENSED PROFESSIONAL ENGINEER

05/30/2014

CT Professional Engineer
License No: 26795

Site ID: CTNL223A
Site Name: Citadel Groton Guyed
99 Briar Hill Road
Groton, CT

Prepared By:
Atlantis Group, Inc.
1340 Centre Street, Suite 212
Newton, Massachusetts 02459
Phone: 617-965-0789, Fax: 617-965-0103

CONTENTS

1.0 SUBJECT AND REFERENCES

The purpose of this analysis is to evaluate the structural capacity of the existing 250 feet high guyed tower, located at 99 Briar Hill Road Groton, CT for the alteration and addition of wireless telecommunication appurtenances proposed by MetroPCS.

The structural analysis of the site is based on the following documents provided to us:

1. Reinforcement Design Report prepared by Armor Tower Engineering for HPC Wireless dated 06/27/2013.
2. Existing and proposed antenna information provided by MetroPCS.

1.1 STRUCTURE

The guyed tower is a 250 foot high, triangular tower manufactured by Sabre Communications. Solid rod legs are Z-braced with solid rod bracing the lower 200 feet and have a 50 foot tall pole mounted at the top of the tower. The tower is guyed at three (3) elevations at 186.7 feet, 126.7 feet, and 66.7 feet above grade level. All guy wires are terminated at anchors 160 feet away from the tower. Please refer to the tower elevation drawing in Appendix A, for details about the tower geometry.

2.0 EXISTING AND PROPOSED CONFIGURATION

Antennas and Appurtenances:

The analysis is based on the following existing and proposed appurtenances:

Existing Configuration of MetroPCS Appurtenances:
(Existing Antennas to be removed, the feedlines to remain)

Sector	RAD Center (ft.)	Antennas		Mount	Feed Lines
Alpha	177	CDMA/EVDO/LTE	(1) APX18-206517S	(1) T-Frame	(6) 7/8"
Beta	177	CDMA/EVDO/LTE	(1) APX18-206517S	(1) T-Frame	
Gamma	177	CDMA/EVDO/LTE	(1) APX18-206517S	(1) T-Frame	

Proposed Configuration of MetroPCS Appurtenances:

Sector	RAD Center (ft.)	Antennas		Mount	Feed Lines
Alpha	177	GSM/UMTS Antenna LTE Antenna	(1) AIR21 B2A/B4P (1) AIR21 B4A/B2P	(1) T-Frame	(6) 7/8" + (1) 1 5/8" Hybrid
Beta	177	GSM/UMTS Antenna LTE Antenna	(1) AIR21 B2A/B4P (1) AIR21 B4A/B2P	(1) T-Frame	
Gamma	177	GSM/UMTS Antenna LTE Antenna	(1) AIR21 B2A/B4P (1) AIR21 B4A/B2P	(1) T-Frame	

Existing and Remaining Appurtenances by Others:

RAD Center (ft.) Carrier	Antenna & TMA	Mount	Feed Lines
238	(1) 6810 FM Antenna	Pole Mounted	(1) 1 5/8"
215	(1) 6810 FM Antenna	Pole Mounted	(1) 1 5/8"
199	(1) PR-950 Dish	Leg Mounted	(1) 7/8"
187 Sprint	(2)APXVSSP18-C-A20 Antennas (1)P40-16-XLPP-RR-A Antenna (3) ALU 1900 MHz RRHs (3) ALU 800 MHz RRHs	(1) Tri-Sector Frame	(6) 1 5/8" + (3) 1 1/4 Hybrid
172	(1) PR-950 Dish	Leg Mounted	(1) 7/8"
150	(1) 4' Grid Dish	Leg Mounted	(1) 1 5/8"
127	(1) 8' Omni	Sidearm Mount	(1) 1/2"

3.0 CODES AND LOADING

The tower was analyzed per ANSI/TIA-222-F as referenced by the 2005 Connecticut Building Code with 2011 Supplement, which is the adopted building code. The following wind loading was used in compliance with the standard for New London County, CT.

- Basic wind speed 85 mph (W) without ice [fastest-mile speed equivalent to 115 mph 3-second gust].
- Basic wind speed 74 mph (W_i) with 1/2" radial non-escalating ice.

The following load combinations were used with wind blowing at 0°, 60° and 90°, measured from a line normal to each face of the guyed tower.

- D + Dg + W
- D + Dg + I + W_i + 1.0Ti

D: Dead Load of structure and appurtenances, except guy wires
W: Wind Load, without ice
W_i: Wind Load with ice
I: Ice Gravity Load
Dg: Dead Load of guy assemblies

4.0 STANDARD CONDITIONS FOR ENGINEERING SERVICES ON EXISTING STRUCTURES

The analysis is based on the information provided to Atlantis Group and is assumed to be current and correct. Unless otherwise noted, the structure and the foundation system are assumed to be in good condition, free of defects and can achieve theoretical strength.

It is assumed that the structure has been maintained and shall be maintained during its service. The superstructure and the foundation system are assumed to be designed with proper engineering practice and fabricated, constructed and erected in accordance with the design documents. Atlantis Group will accept no liability which may arise due to any existing deficiency in design, material, fabrication, erection, construction, etc. or lack of maintenance.

Contractor should inspect the condition of the existing structure, mounts and connections and notify Atlantis Group for any discrepancies and deficiencies before proceeding with the construction.

The evaluation results presented in this report are only applicable for the previously mentioned existing and proposed additions and alterations. Any deviation of the proposed equipment and placement, etc., will require Atlantis Group to generate an additional structural evaluation.

5.0 ANALYSIS and ASSUMPTIONS

The tower was analyzed by utilizing tnxTower, a non-linear 3-Dimensional finite element program, a product of Tower Numerics, Inc. Software output for this analysis is provided in Appendix A of this report.

Tower member sizes, geometry and existing antenna loading are based on a structural analysis dated June 2013 and may not be up to date. This analysis assumes that the modifications outlined in that report have been properly installed. We recommend a tower mapping to document that all provided information is accurate and that all members and connections are in good condition.

6.0 RESULTS and CONCLUSION

Based on an analysis per ANSI/TIA-222-F, the existing tower is found to have **adequate** structural capacity for the proposed changes by metroPCS. For the aforementioned load combinations and as a maximum, the guy cables to 66.7' will be stressed to **96%** of capacity. Maximum usage of tower legs and bracing is 70.2% and 92.4%, respectively. Due to a complete lack of subsurface information, the foundation system could not be analyzed in this study.

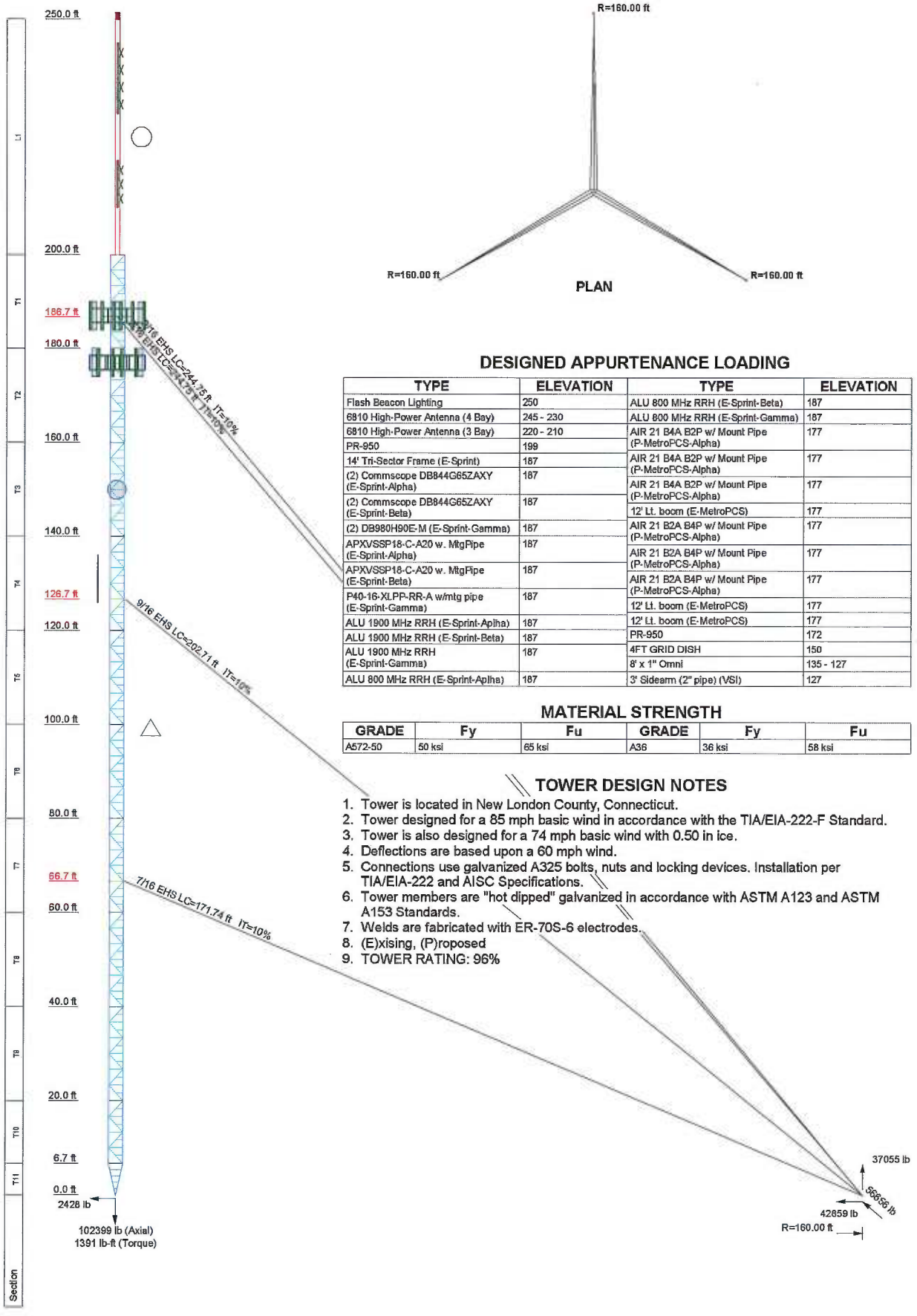
Therefore, the proposed additions and alterations by metroPCS can be implemented with the conditions outlined in this report.

Should you have any questions or need any clarifications about this report, please contact us at (617) 965-0789.

Sincerely,
Atlantis Group, Inc.

05/30/2014

APPENDIX A
CALCULATIONS



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Flash Beacon Lighting	250	ALU 800 MHz RRH (E-Sprint-Beta)	187
6810 High-Power Antenna (4 Bay)	245 - 230	ALU 800 MHz RRH (E-Sprint-Gamma)	187
6810 High-Power Antenna (3 Bay)	220 - 210	AIR 21 B4A B2P w/ Mount Pipe (P-MetroPCS-Alpha)	177
PR-950	199	AIR 21 B4A B2P w/ Mount Pipe (P-MetroPCS-Alpha)	177
14' Tri-Sector Frame (E-Sprint)	187	AIR 21 B4A B2P w/ Mount Pipe (P-MetroPCS-Alpha)	177
(2) Commscope DB844G65ZAXY (E-Sprint-Alpha)	187	12' Lt. boom (E-MetroPCS)	177
(2) Commscope DB844G65ZAXY (E-Sprint-Beta)	187	AIR 21 B2A B4P w/ Mount Pipe (P-MetroPCS-Alpha)	177
(2) DB980H90E-M (E-Sprint-Gamma)	187	AIR 21 B2A B4P w/ Mount Pipe (P-MetroPCS-Alpha)	177
APXVSSP18-C-A20 w. MtgPipe (E-Sprint-Alpha)	187	AIR 21 B2A B4P w/ Mount Pipe (P-MetroPCS-Alpha)	177
APXVSSP18-C-A20 w. MtgPipe (E-Sprint-Beta)	187	12' Lt. boom (E-MetroPCS)	177
P40-16-XLPP-RR-A w/mtg pipe (E-Sprint-Gamma)	187	12' Lt. boom (E-MetroPCS)	177
ALU 1900 MHz RRH (E-Sprint-Alpha)	187	PR-950	172
ALU 1900 MHz RRH (E-Sprint-Beta)	187	4FT GRID DISH	150
ALU 1900 MHz RRH (E-Sprint-Gamma)	187	8' x 1" Omni	135 - 127
ALU 800 MHz RRH (E-Sprint-Alpha)	187	3' Sidearm (2" pipe) (VSI)	127

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 60 mph wind.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. (E)xising, (P)roposed
9. TOWER RATING: 96%

Atlantis Group, Inc.
1340 Centre Street, Suite 212
Newton, Massachusetts 02459
Phone: 617-965-0789
FAX: 617-965-0103

Job: ***250' Guyed Tower Analysis***			
Project: ***Site CTNL223A***			
Client: Metro PCS	Drawn by: dalbul	App'd:	
Code: TIA/EIA-222-F	Date: 05/30/14	Scale: NTS	
Path: Y:\		Dwg No. E-1	

ATLANTIS GROUP **Atlantis Group, Inc.** 340 Centre Street, Suite 212 Newton, Massachusetts 02459 Phone: 617-965-0789 FAX: 617-965-0103	**Job** 250' Guyed Tower Analysis	**Page** 1 of 14
	Project Site CTNL223A	**Date** 11:17:10 05/30/14
	Client Metro PCS	**Designed by** dalbul

Guy-Tensioning Information

				Temperature At Time Of Tensioning													
				0 F		20 F		40 F		60 F		80 F		100 F		120 F	
Guy Elevation		H	V	Initial Tension	Intercept	Initial Tension	Intercept	Initial Tension	Intercept	Initial Tension	Intercept	Initial Tension	Intercept	Initial Tension	Intercept	Initial Tension	Intercept
ft		ft	ft	lb	ft	lb	ft	lb	ft	lb	ft	lb	ft	lb	ft	lb	ft
186.667	A	158.30	186.67	4125	4.79	3915	5.05	3706	5.33	3500	5.64	3296	5.98	3096	6.36	2900	6.78
	B	158.30	186.67	4125	4.79	3915	5.05	3706	5.33	3500	5.64	3296	5.98	3096	6.36	2900	6.78
	C	158.30	186.67	4125	4.79	3915	5.05	3706	5.33	3500	5.64	3296	5.98	3096	6.36	2900	6.78
126.667	A	158.27	126.67	4415	3.09	4106	3.32	3801	3.58	3500	3.89	3205	4.24	2919	4.65	2643	5.13
	B	158.27	126.67	4415	3.09	4106	3.32	3801	3.58	3500	3.89	3205	4.24	2919	4.65	2643	5.13
	C	158.27	126.67	4415	3.09	4106	3.32	3801	3.58	3500	3.89	3205	4.24	2919	4.65	2643	5.13
66.6667	A	158.27	66.67	2843	2.06	2584	2.26	2330	2.51	2080	2.81	1837	3.18	1605	3.63	1388	4.20
	B	158.27	66.67	2843	2.06	2584	2.26	2330	2.51	2080	2.81	1837	3.18	1605	3.63	1388	4.20
	C	158.27	66.67	2843	2.06	2584	2.26	2330	2.51	2080	2.81	1837	3.18	1605	3.63	1388	4.20

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	200	Leg	A325N	0.7500	3	7871	19439	0.405 ✔	1.333	Bolt Tension
T2	180	Leg	A325N	0.7500	3	1423	19439	0.073 ✔	1.333	Bolt Tension
T3	160	Leg	A325N	0.7500	3	1541	19439	0.079 ✔	1.333	Bolt Tension
T4	140	Leg	A325N	0.7500	3	631	19439	0.032 ✔	1.333	Bolt Tension
T5	120	Leg	A325N	0.7500	3	0	19439	0.000 ✔	1.333	Bolt Tension
T6	100	Leg	A325N	0.7500	3	0	19438	0.000 ✔	1.333	Bolt Tension
T7	80	Leg	A325N	0.7500	3	0	19438	0.000 ✔	1.333	Bolt Tension
T8	60	Leg	A325N	0.7500	3	0	19438	0.000 ✔	1.333	Bolt Tension
T9	40	Leg	A325N	0.7500	3	0	19438	0.000 ✔	1.333	Bolt Tension
T10	20	Leg	A325N	0.7500	3	0	19439	0.000 ✔	1.333	Bolt Tension
T11	6.7	Leg	A325N	0.7500	3	0	19439	0.000 ✔	1.333	Bolt Tension

Guy Design Data

Section No.	Elevation ft	Initial Tension lb	Breaking Load lb	Actual T lb	Allowable T_a lb	Required S.F.	Actual S.F.
T1	186.67 (A) (464)	3500	35000	16004	17500	2.000	2.187 ✔
	186.67 (A) (465)	3500	35000	15861	17500	2.000	2.207 ✔
	186.67 (B) (460)	3500	35000	15735	17500	2.000	2.224 ✔
	186.67 (B) (461)	3500	35000	16034	17500	2.000	2.183 ✔

Section No.	Elevation ft	Initial Tension lb	Breaking Load lb	Actual T lb	Allowable T_a lb	Required S.F.	Actual S.F.
	186.67 (C) (456)	3500	35000	16021	17500	2.000	2.185 ✔
	186.67 (C) (457)	3500	35000	15875	17500	2.000	2.205 ✔
T4	126.67 (A) (470)	3500	35000	16396	17500	2.000	2.135 ✔
	126.67 (B) (469)	3500	35000	16276	17500	2.000	2.150 ✔
	126.67 (C) (468)	3500	35000	16257	17500	2.000	2.153 ✔
T7	66.67 (A) (473)	2080	20800	9988	10400	2.000	2.082 ✔
	66.67 (B) (472)	2080	20800	9948	10400	2.000	2.091 ✔
	66.67 (C) (471)	2080	20800	9933	10400	2.000	2.094 ✔

Compression Checks

Pole Design Data

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
L1	250 - 200 (1)	50.00	50.00	138.4	7.794	19.2423	-4143	149972	0.028

Pole Bending Design Data

Section No.	Elevation ft	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	250 - 200 (1)	92582	-19.590	33.000	0.594	0	0.000	33.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	250 - 200 (1)	0.028	0.594	0.000	0.621 ✔	1.066	H1-3 ✔

Leg Design Data (Compression)

ATLANTIS GROUP

Atlantis Group, Inc.
340 Centre Street, Suite 212
Newton, Massachusetts 02459
Phone: 617-965-0789
FAX: 617-965-0103

Job	Page
250' Guyed Tower Analysis	3 of 14
Project	**Date**
Site CTNL223A	11:17:10 05/30/14
Client	**Designed by**
Metro PCS	dalbul

Section No.	Elevation ft	L ft	L_u ft	Kl/r	Mast Stability Index	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	200 - 180	20.00	3.33	80.0 K=1.00	1.00	19.012	3.1416	-55875	59729	0.935
T2	180 - 160	20.00	3.33	80.0 K=1.00	1.00	19.012	3.1416	-44934	59729	0.752
T3	160 - 140	20.00	3.33	80.0 K=1.00	1.00	19.012	3.1416	-39693	59729	0.665
T4	140 - 120	20.00	3.33	80.0 K=1.00	1.00	19.012	3.1416	-51164	59729	0.857
T5	120 - 100	20.00	3.33	80.0 K=1.00	1.00	19.012	3.1416	-41937	59729	0.702
T6	100 - 80	20.00	3.33	80.0 K=1.00	1.00	19.012	3.1416	-38719	59729	0.648
T7	80 - 60	20.00	3.33	80.0 K=1.00	1.00	19.012	3.1416	-38788	59729	0.649
T8	60 - 40	20.00	3.33	80.0 K=1.00	1.00	19.012	3.1416	-52450	59729	0.878
T9	40 - 20	20.00	3.33	80.0 K=1.00	1.00	19.012	3.1416	-53573	59729	0.897
T10	20 - 6.7	13.30	3.33	70.9 K=1.00	1.00	20.764	3.9761	-49142	82560	0.595
T11	6.7 - 0	6.92	1.38	29.5 K=1.00	0.92	24.923	3.9761	-41485	99096	0.419

Leg Bending Design Data (Compression)

Section No.	Elevation ft	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	200 - 180	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T2	180 - 160	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T3	160 - 140	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T4	140 - 120	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T5	120 - 100	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T6	100 - 80	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T7	80 - 60	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T8	60 - 40	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T9	40 - 20	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T10	20 - 6.7	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T11	6.7 - 0	0	0.000	37.500	0.000	0	0.000	37.500	0.000

Leg Interaction Design Data (Compression)

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	200 - 180	0.935	0.000	0.000	0.935 ✔	1.333	H1-3 ✔
T2	180 - 160	0.752	0.000	0.000	0.752 ✔	1.333	H1-3 ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T3	160 - 140	0.665	0.000	0.000	0.665 ✔	1.333	H1-3 ✔
T4	140 - 120	0.857	0.000	0.000	0.857 ✔	1.333	H1-3 ✔
T5	120 - 100	0.702	0.000	0.000	0.702 ✔	1.333	H1-3 ✔
T6	100 - 80	0.648	0.000	0.000	0.648 ✔	1.333	H1-3 ✔
T7	80 - 60	0.649	0.000	0.000	0.649 ✔	1.333	H1-3 ✔
T8	60 - 40	0.878	0.000	0.000	0.878 ✔	1.333	H1-3 ✔
T9	40 - 20	0.897	0.000	0.000	0.897 ✔	1.333	H1-3 ✔
T10	20 - 6.7	0.595	0.000	0.000	0.595 ✔	1.333	H1-3 ✔
T11	6.7 - 0	0.419	0.000	0.000	0.419 ✔	1.333	H1-3 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	200 - 180	4.48	4.24	142.3 K=0.70	7.374	0.7854	-7131	5791	1.231 ✔
T2	180 - 160	4.48	4.24	142.3 K=0.70	7.374	0.7854	-6393	5791	1.104 ✔
T3	160 - 140	4.48	4.24	142.3 K=0.70	7.374	0.7854	-2892	5791	0.499 ✔
T4	140 - 120	4.48	4.24	142.3 K=0.70	7.374	0.7854	-5220	5791	0.901 ✔
T5	120 - 100	4.48	4.24	142.3 K=0.70	7.374	0.7854	-4386	5791	0.757 ✔
T6	100 - 80	4.48	4.24	142.3 K=0.70	7.374	0.7854	-1522	5791	0.263 ✔
T7	80 - 60	4.48	4.24	142.3 K=0.70	7.374	0.7854	-4227	5791	0.730 ✔
T8	60 - 40	4.48	4.24	142.3 K=0.70	7.374	0.7854	-3482	5791	0.601 ✔
T9	40 - 20	4.48	4.24	142.3 K=0.70	7.374	0.7854	-2032	5791	0.351 ✔
T10	20 - 6.7	4.48	4.20	112.9 K=0.70	11.725	1.2272	-3330	14389	0.231 ✔

Horizontal Design Data (Compression)

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Job	Page
250' Guyed Tower Analysis	5 of 14
Project	**Date**
Site CTNL223A	11:17:10 05/30/14
Client	**Designed by**
Metro PCS	dalbul

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	200 - 180	3.00	2.83	108.8 K=0.70	12.615	0.6013	-968	7586	0.128 ✓
T2	180 - 160	3.00	2.83	108.8 K=0.70	12.615	0.6013	-778	7586	0.103 ✓
T3	160 - 140	3.00	2.83	108.8 K=0.70	12.615	0.6013	-688	7586	0.091 ✓
T4	140 - 120	3.00	2.83	108.8 K=0.70	12.615	0.6013	-886	7586	0.117 ✓
T5	120 - 100	3.00	2.83	108.8 K=0.70	12.615	0.6013	-726	7586	0.096 ✓
T6	100 - 80	3.00	2.83	108.8 K=0.70	12.615	0.6013	-671	7586	0.088 ✓
T7	80 - 60	3.00	2.83	108.8 K=0.70	12.615	0.6013	-672	7586	0.089 ✓
T8	60 - 40	3.00	2.83	108.8 K=0.70	12.615	0.6013	-908	7586	0.120 ✓
T9	40 - 20	3.00	2.83	108.8 K=0.70	12.615	0.6013	-928	7586	0.122 ✓
T10	20 - 6.7	3.00	2.81	108.0 K=0.70	12.803	0.6013	-851	7699	0.111 ✓
T11	6.7 - 0	2.40	2.21	122.6 K=1.00	9.930	9.0000	-736	89373	0.008 ✓

Secondary Horizontal Design Data (Compression)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	200 - 180	1.50	1.42	90.1 K=0.99	16.924	0.4418	0	7477	0.000 ✓
T2	180 - 160	1.50	1.42	90.1 K=0.99	16.924	0.4418	0	7477	0.000 ✓
T3	160 - 140	1.50	1.42	90.1 K=0.99	16.924	0.4418	0	7477	0.000 ✓
T4	140 - 120	1.50	1.42	90.1 K=0.99	16.924	0.4418	0	7477	0.000 ✓
T5	120 - 100	1.50	1.42	90.1 K=0.99	16.924	0.4418	0	7477	0.000 ✓
T6	100 - 80	1.50	1.42	90.1 K=0.99	16.924	0.4418	0	7477	0.000 ✓
T7	80 - 60	1.50	1.42	90.1 K=0.99	16.924	0.4418	0	7477	0.000 ✓
T8	60 - 40	1.50	1.42	90.1 K=0.99	16.924	0.4418	0	7477	0.000 ✓
T9	40 - 20	1.50	1.42	90.1 K=0.99	16.924	0.4418	0	7477	0.000 ✓
T10	20 - 6.7	1.50	1.41	90.0 K=1.00	16.938	0.4418	0	7483	0.000 ✓

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Job	Page
250' Guyed Tower Analysis	6 of 14
Project Site CTNL223A	**Date** 11:17:10 05/30/14
Client Metro PCS	**Designed by** dalbul

Top Girt Design Data (Compression)

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	200 - 180	3.00	2.83	108.8 K=0.70	11.833	0.6013	0	7115	0.000 ✓
T2	180 - 160	3.00	2.83	108.8 K=0.70	11.833	0.6013	-105	7115	0.015 ✓
T3	160 - 140	3.00	2.83	108.8 K=0.70	11.833	0.6013	-79	7115	0.011 ✓
T4	140 - 120	3.00	2.83	108.8 K=0.70	11.833	0.6013	-60	7115	0.008 ✓
T5	120 - 100	3.00	2.83	108.8 K=0.70	11.833	0.6013	-35	7115	0.005 ✓
T6	100 - 80	3.00	2.83	108.8 K=0.70	11.833	0.6013	-27	7115	0.004 ✓
T7	80 - 60	3.00	2.83	108.8 K=0.70	11.833	0.6013	-15	7115	0.002 ✓
T8	60 - 40	3.00	2.83	108.8 K=0.70	11.833	0.6013	-4	7115	0.001 ✓

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	200 - 180	3.00	2.83	108.8 K=1.00	12.615	1.2272	-8176	15481	0.528
T4	140 - 120	3.00	2.83	108.8 K=1.00	30.000	1.2272	0	15481	0.000*
T7	80 - 60	3.00	2.83	108.8 K=1.00	30.000	1.2272	0	15481	0.000*

* DL controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	200 - 180	6	-0.378	37.500	0.010	0	0.000	37.500	0.000
T4	140 - 120	6	-0.378	37.500	0.010	0	0.000	37.500	0.000
T7	80 - 60	6	-0.378	37.500	0.010	0	0.000	37.500	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Ratio P/Pa	Ratio fbx/Fbx	Ratio fby/Fby	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	200 - 180	0.528	0.010	0.000	0.538 ✔	1.333	H1-3 ✔
T4	140 - 120	0.000	0.010	0.000	0.010* ✔	1.000	H1-3 ✔
T7	80 - 60	0.000	0.010	0.000	0.010* ✔	1.000	H1-3 ✔

* DL controls

Torque-Arm Top Design Data

Section No.	Elevation ft	L ft	Lu ft	Kl/r	Fa ksi	A in²	Actual P lb	Allow. Pa lb	Ratio P/Pa
T1	200 - 180 (458)	3.00	2.92	45.4 K=1.00	18.747	7.0274	-4506	131745	0.034
T1	200 - 180 (459)	3.00	2.92	45.4 K=1.00	18.747	7.0274	-3344	131745	0.025
T1	200 - 180 (462)	3.00	2.92	45.4 K=1.00	18.747	7.0274	-3101	131745	0.024
T1	200 - 180 (463)	3.00	2.92	45.4 K=1.00	18.747	7.0274	-3178	131745	0.024
T1	200 - 180 (466)	3.00	2.92	45.4 K=1.00	18.747	7.0274	-4576	131745	0.035
T1	200 - 180 (467)	3.00	2.92	45.4 K=1.00	18.747	7.0274	-4556	131745	0.035

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Actual Mx lb-ft	Actual fbx ksi	Allow. Fbx ksi	Ratio fbx/Fbx	Actual My lb-ft	Actual fby ksi	Allow. Fby ksi	Ratio fby/Fby
T1	200 - 180 (458)	-36041	-14.945	21.600	0.692	0	-0.000	21.600	0.000
T1	200 - 180 (459)	-36677	-15.209	21.600	0.704	0	-0.000	21.600	0.000
T1	200 - 180 (462)	-36528	-15.147	21.600	0.701	0	-0.000	21.600	0.000
T1	200 - 180 (463)	-36546	-15.154	21.600	0.702	0	-0.000	21.600	0.000
T1	200 - 180 (466)	-36027	-14.939	21.600	0.692	0	-0.000	21.600	0.000
T1	200 - 180 (467)	-36099	-14.969	21.600	0.693	0	-0.000	21.600	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Ratio P/Pa	Ratio fbx/Fbx	Ratio fby/Fby	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	200 - 180 (458)	0.034	0.692	0.000	0.726 ✔	1.333	H1-3 ✔
T1	200 - 180 (459)	0.025	0.704	0.000	0.729 ✔	1.333	H1-3 ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	200 - 180 (462)	0.024	0.701	0.000	0.725 ✔	1.333	H1-3 ✔
T1	200 - 180 (463)	0.024	0.702	0.000	0.726 ✔	1.333	H1-3 ✔
T1	200 - 180 (466)	0.035	0.692	0.000	0.726 ✔	1.333	H1-3 ✔
T1	200 - 180 (467)	0.035	0.693	0.000	0.728 ✔	1.333	H1-3 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	200 - 180	20.00	3.33	80.0	30.000	3.1416	51102	94248	0.542
T2	180 - 160	20.00	3.33	80.0	30.000	3.1416	17170	94248	0.182
T3	160 - 140	20.00	3.33	80.0	30.000	3.1416	4624	94248	0.049
T4	140 - 120	20.00	3.33	80.0	30.000	3.1416	13689	94248	0.145

Leg Bending Design Data (Tension)

Section No.	Elevation ft	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	200 - 180	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T2	180 - 160	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T3	160 - 140	0	0.000	37.500	0.000	0	0.000	37.500	0.000
T4	140 - 120	0	0.000	37.500	0.000	0	0.000	37.500	0.000

Leg Interaction Design Data (Tension)

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	200 - 180	0.542	0.000	0.000	0.542 ✔	1.333	H2-1 ✔
T2	180 - 160	0.182	0.000	0.000	0.182 ✔	1.333	H2-1 ✔
T3	160 - 140	0.049	0.000	0.000	0.049 ✔	1.333	H2-1 ✔
T4	140 - 120	0.145	0.000	0.000	0.145 ✔	1.333	H2-1 ✔

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Job	Page
250' Guyed Tower Analysis	9 of 14
Project Site CTNL223A	**Date** 11:17:10 05/30/14
Client Metro PCS	**Designed by** dalbul

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

Diagonal Design Data (Tension)

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	200 - 180	4.48	4.24	203.3	30.000	0.7854	6804	23562	0.289 ✔
T2	180 - 160	4.48	4.24	203.3	30.000	0.7854	6175	23562	0.262 ✔
T3	160 - 140	4.48	4.24	203.3	30.000	0.7854	2569	23562	0.109 ✔
T4	140 - 120	4.48	4.24	203.3	30.000	0.7854	4810	23562	0.204 ✔
T5	120 - 100	4.48	4.24	203.3	30.000	0.7854	3889	23562	0.165 ✔
T6	100 - 80	4.48	4.24	203.3	30.000	0.7854	1091	23562	0.046 ✔
T7	80 - 60	4.48	4.24	203.3	30.000	0.7854	3728	23562	0.158 ✔
T8	60 - 40	4.48	4.24	203.3	30.000	0.7854	2947	23562	0.125 ✔
T9	40 - 20	4.48	4.24	203.3	30.000	0.7854	1412	23562	0.060 ✔
T10	20 - 6.7	4.48	4.20	161.2	30.000	1.2272	2977	36816	0.081 ✔

Horizontal Design Data (Tension)

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	200 - 180	3.00	2.83	155.4	30.000	0.6013	968	18040	0.054 ✔
T2	180 - 160	3.00	2.83	155.4	30.000	0.6013	999	18040	0.055 ✔
T3	160 - 140	3.00	2.83	155.4	30.000	0.6013	688	18040	0.038 ✔
T4	140 - 120	3.00	2.83	155.4	30.000	0.6013	886	18040	0.049 ✔
T5	120 - 100	3.00	2.83	155.4	30.000	0.6013	726	18040	0.040 ✔
T6	100 - 80	3.00	2.83	155.4	30.000	0.6013	671	18040	0.037 ✔
T7	80 - 60	3.00	2.83	155.4	30.000	0.6013	672	18040	0.037 ✔
T8	60 - 40	3.00	2.83	155.4	30.000	0.6013	908	18040	0.050

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Job	Page
250' Guyed Tower Analysis	10 of 14
Project Site CTNL223A	**Date** 11:17:10 05/30/14
Client Metro PCS	**Designed by** dalbul

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T9	40 - 20	3.00	2.83	155.4	30.000	0.6013	928	18040	0.051 ✔
T10	20 - 6.7	3.00	2.81	154.3	30.000	0.6013	851	18040	0.047 ✔
T11	6.7 - 0	2.40	2.21	122.6	30.000	9.0000	736	270000	0.003 ✔

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	200 - 180	1.50	1.42	90.7	30.000	0.4418	0	13254	0.000 ✔
T2	180 - 160	1.50	1.42	90.7	30.000	0.4418	0	13254	0.000 ✔
T3	160 - 140	1.50	1.42	90.7	30.000	0.4418	0	13254	0.000 ✔
T4	140 - 120	1.50	1.42	90.7	30.000	0.4418	0	13254	0.000 ✔
T5	120 - 100	1.50	1.42	90.7	30.000	0.4418	0	13254	0.000 ✔
T6	100 - 80	1.50	1.42	90.7	30.000	0.4418	0	13254	0.000 ✔
T7	80 - 60	1.50	1.42	90.7	30.000	0.4418	0	13254	0.000 ✔
T8	60 - 40	1.50	1.42	90.7	30.000	0.4418	0	13254	0.000 ✔
T9	40 - 20	1.50	1.42	90.7	30.000	0.4418	0	13254	0.000 ✔
T10	20 - 6.7	1.50	1.41	90.0	30.000	0.4418	0	13254	0.000 ✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	200 - 180	3.00	2.83	155.4	21.600	0.6013	0	12989	0.000 ✔
T2	180 - 160	3.00	2.83	155.4	21.600	0.6013	326	12989	0.025 ✔
T3	160 - 140	3.00	2.83	155.4	21.600	0.6013	322	12989	0.025 ✔
T4	140 - 120	3.00	2.83	155.4	21.600	0.6013	312	12989	0.024 ✔

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Job	Page
250' Guyed Tower Analysis	11 of 14
Project	**Date**
Site CTNL223A	11:17:10 05/30/14
Client	**Designed by**
Metro PCS	dalbul

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T5	120 - 100	3.00	2.83	155.4	21.600	0.6013	336	12989	0.026 ✔
T6	100 - 80	3.00	2.83	155.4	21.600	0.6013	347	12989	0.027 ✔
T7	80 - 60	3.00	2.83	155.4	21.600	0.6013	341	12989	0.026 ✔
T8	60 - 40	3.00	2.83	155.4	21.600	0.6013	347	12989	0.027 ✔
T9	40 - 20	3.00	2.83	155.4	21.600	0.6013	357	12989	0.027 ✔
T10	20 - 6.7	3.00	2.83	155.4	21.600	0.6013	378	12989	0.029 ✔
T11	6.7 - 0	3.00	2.81	154.3	21.600	0.6013	5899	12989	0.454 ✔

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	200 - 180	3.00	2.83	108.8	30.000	1.2272	8308	36816	0.226
T4	140 - 120	3.00	2.83	108.8	30.000	1.2272	7451	36816	0.202
T7	80 - 60	3.00	2.83	108.8	30.000	1.2272	5461	36816	0.148

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	200 - 180	6	0.378	37.500	0.010	0	0.000	37.500	0.000
T4	140 - 120	6	0.378	37.500	0.010	0	0.000	37.500	0.000
T7	80 - 60	6	0.378	37.500	0.010	0	0.000	37.500	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	200 - 180	0.226	0.010	0.000	0.236 ✔	1.333	H2-1 ✔
T4	140 - 120	0.202	0.010	0.000	0.212 ✔	1.333	H2-1 ✔
T7	80 - 60	0.148	0.010	0.000	0.158 ✔	1.333	H2-1 ✔

Torque-Arm Top Design Data

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	200 - 180 (458)	3.00	2.92	45.4	21.600	7.0274	305	151792	0.002
T1	200 - 180 (459)	3.00	2.92	45.4	21.600	7.0274	55	151792	0.000
T1	200 - 180 (462)	3.00	2.92	45.4	21.600	7.0274	393	151792	0.003
T1	200 - 180 (463)	3.00	2.92	45.4	21.600	7.0274	221	151792	0.001
T1	200 - 180 (466)	3.00	2.92	45.4	21.600	7.0274	116	151792	0.001
T1	200 - 180 (467)	3.00	2.92	45.4	21.600	7.0274	181	151792	0.001

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	200 - 180 (458)	-36411	25.977	21.600	1.203	0	0.000	21.600	0.000
T1	200 - 180 (459)	-36218	25.839	21.600	1.196	0	0.000	21.600	0.000
T1	200 - 180 (462)	-36574	26.093	21.600	1.208	0	0.000	21.600	0.000
T1	200 - 180 (463)	-36361	25.942	21.600	1.201	0	0.000	21.600	0.000
T1	200 - 180 (466)	-36056	25.724	21.600	1.191	0	0.000	21.600	0.000
T1	200 - 180 (467)	-36455	26.008	21.600	1.204	0	0.000	21.600	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	200 - 180 (458)	0.002	1.203	0.000	1.205 ✔	1.333	H2-1 ✔
T1	200 - 180 (459)	0.000	1.196	0.000	1.197 ✔	1.333	H2-1 ✔
T1	200 - 180 (462)	0.003	1.208	0.000	1.211 ✔	1.333	H2-1 ✔
T1	200 - 180 (463)	0.001	1.201	0.000	1.202 ✔	1.333	H2-1 ✔
T1	200 - 180 (466)	0.001	1.191	0.000	1.192 ✔	1.333	H2-1 ✔
T1	200 - 180 (467)	0.001	1.204	0.000	1.205 ✔	1.333	H2-1 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail

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Job	Page
250' Guyed Tower Analysis	13 of 14
Project	**Date**
Site CTNL223A	11:17:10 05/30/14
Client	**Designed by**
Metro PCS	dalbul

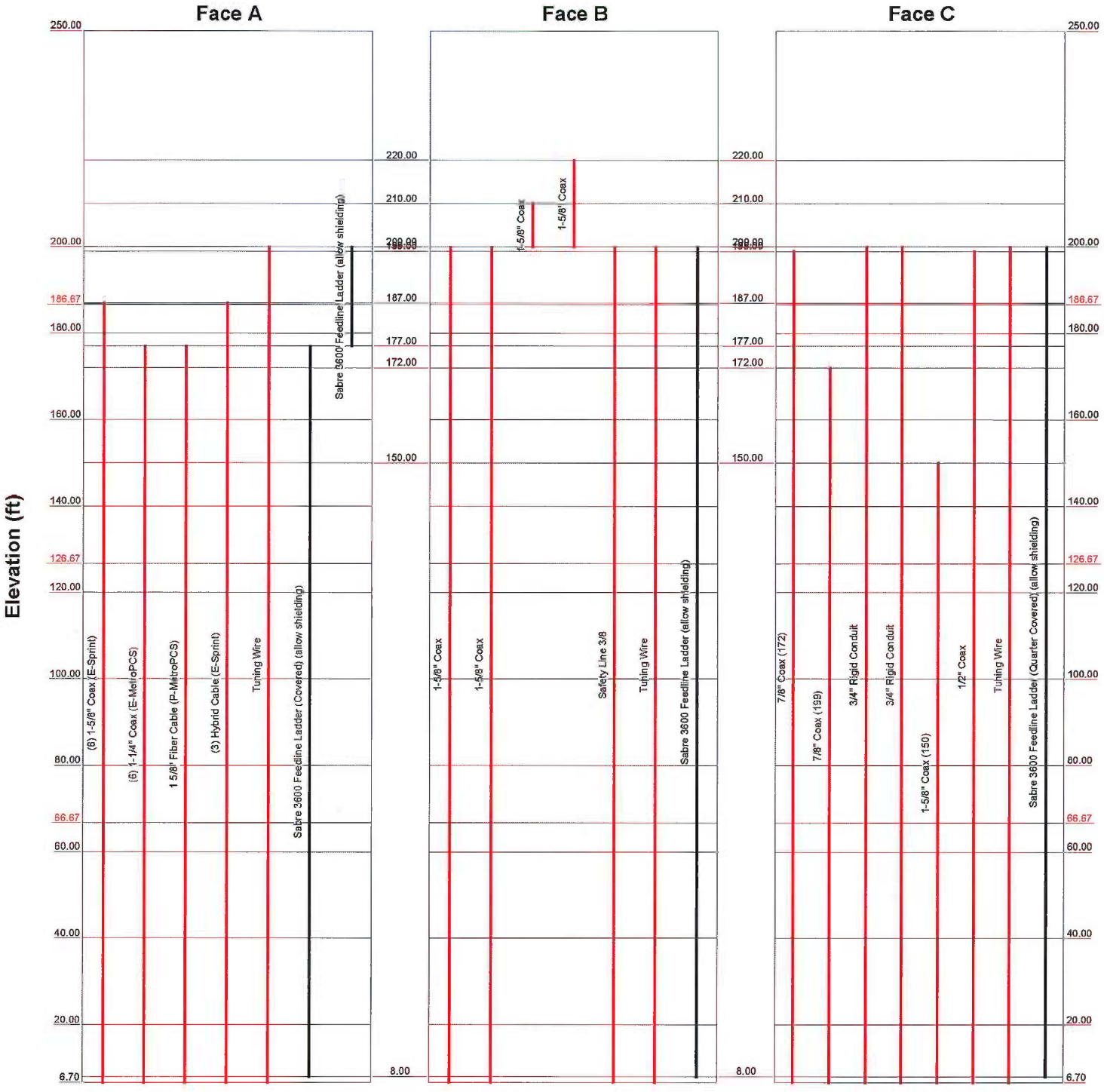
Section No.	Elevation ft	Component Type	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	250 - 200	Pole	1	-4143	159930	58.3	Pass
T1	200 - 180	Leg	4	-55875	79619	70.2	Pass
T2	180 - 160	Leg	49	-44934	79619	56.4	Pass
T3	160 - 140	Leg	92	-39693	79619	49.9	Pass
T4	140 - 120	Leg	137	-51164	79619	64.3	Pass
T5	120 - 100	Leg	182	-41937	79619	52.7	Pass
T6	100 - 80	Leg	227	-38719	79619	48.6	Pass
T7	80 - 60	Leg	272	-38788	79619	48.7	Pass
T8	60 - 40	Leg	317	-52450	79619	65.9	Pass
T9	40 - 20	Leg	362	-53573	79619	67.3	Pass
T10	20 - 6.7	Leg	408	-49142	110053	44.7	Pass
T11	6.7 - 0	Leg	440	-41485	132094	31.4	Pass
T1	200 - 180	Diagonal	10	-7131	7720	92.4	Pass
T2	180 - 160	Diagonal	90	-6393	7720	82.8	Pass
T3	160 - 140	Diagonal	99	-2892	7720	37.5	Pass
T4	140 - 120	Diagonal	152	-5220	7720	67.6	Pass
T5	120 - 100	Diagonal	225	-4386	7720	56.8	Pass
T6	100 - 80	Diagonal	234	-1522	7720	19.7	Pass
T7	80 - 60	Diagonal	285	-4227	7720	54.8	Pass
T8	60 - 40	Diagonal	358	-3482	7720	45.1	Pass
T9	40 - 20	Diagonal	370	-2032	7720	26.3	Pass
T10	20 - 6.7	Diagonal	415	-3330	19180	17.4	Pass
T1	200 - 180	Horizontal	14	-968	10112	9.6	Pass
T2	180 - 160	Horizontal	58	-778	10112	7.7	Pass
T3	160 - 140	Horizontal	102	-688	10112	6.8	Pass
T4	140 - 120	Horizontal	147	-886	10112	8.8	Pass
T5	120 - 100	Horizontal	192	-726	10112	7.2	Pass
T6	100 - 80	Horizontal	244	-671	10112	6.6	Pass
T7	80 - 60	Horizontal	282	-672	10112	6.6	Pass
T8	60 - 40	Horizontal	327	-908	10112	9.0	Pass
T9	40 - 20	Horizontal	372	-928	10112	9.2	Pass
T10	20 - 6.7	Horizontal	417	-851	10262	8.3	Pass
T11	6.7 - 0	Horizontal	445	-736	335796	3.0	Pass
T1	200 - 180	Secondary Horizontal	46	0	9967	0.0	Pass
T2	180 - 160	Secondary Horizontal	84	0	9967	0.0	Pass
T3	160 - 140	Secondary Horizontal	129	0	9967	0.0	Pass
T4	140 - 120	Secondary Horizontal	174	0	9967	0.0	Pass
T5	120 - 100	Secondary Horizontal	191	0	9967	0.0	Pass
T6	100 - 80	Secondary Horizontal	250	0	9967	0.0	Pass
T7	80 - 60	Secondary Horizontal	281	0	9967	0.0	Pass
T8	60 - 40	Secondary Horizontal	340	0	9967	0.0	Pass
T9	40 - 20	Secondary Horizontal	385	0	9967	0.0	Pass
T10	20 - 6.7	Secondary Horizontal	430	0	9975	0.0	Pass
T1	200 - 180	Top Girt	6	0	9485	0.0	Pass
T2	180 - 160	Top Girt	52	326	17314	1.9	Pass
T3	160 - 140	Top Girt	97	322	17314	1.9	Pass
T4	140 - 120	Top Girt	142	312	17314	1.8	Pass
T5	120 - 100	Top Girt	187	336	17314	1.9	Pass
T6	100 - 80	Top Girt	232	347	17314	2.0	Pass
T7	80 - 60	Top Girt	277	341	17314	2.0	Pass
T8	60 - 40	Top Girt	322	347	17314	2.0	Pass
T9	40 - 20	Top Girt	367	357	17314	2.1	Pass
T10	20 - 6.7	Top Girt	412	378	17314	2.2	Pass
T11	6.7 - 0	Top Girt	442	5899	17314	34.1	Pass
T1	200 - 180	Guy A@186.667	464	16004	17500	91.5	Pass
T4	140 - 120	Guy A@126.667	470	16396	17500	93.7	Pass
T7	80 - 60	Guy A@66.6667	473	9988	10400	96.0	Pass
T1	200 - 180	Guy B@186.667	461	16034	17500	91.6	Pass
T4	140 - 120	Guy B@126.667	469	16276	17500	93.0	Pass
T7	80 - 60	Guy B@66.6667	472	9948	10400	95.7	Pass
T1	200 - 180	Guy C@186.667	456	16021	17500	91.6	Pass

ATLANTIS GROUP **Atlantis Group, Inc.** 340 Centre Street, Suite 212 Newton, Massachusetts 02459 Phone: 617-965-0789 FAX: 617-965-0103	**Job** 250' Guyed Tower Analysis	**Page** 14 of 14
	Project Site CTNL223A	**Date** 11:17:10 05/30/14
	Client Metro PCS	**Designed by** dalbul

Section No.	Elevation ft	Component Type	Critical Element	P lb	SF*P_{allow} lb	% Capacity	Pass Fail
T4	140 - 120	Guy C@126.667	468	16257	17500	92.9	Pass
T7	80 - 60	Guy C@66.6667	471	9933	10400	95.5	Pass
T1	200 - 180	Top Guy Pull-Off@186.667	21	-8176	20636	40.4	Pass
T4	140 - 120	Top Guy Pull-Off@126.667	155	7451	49075	15.9	Pass
T7	80 - 60	Top Guy Pull-Off@66.6667	290	5461	49075	11.9	Pass
T1	200 - 180	Torque Arm Top@186.667	462	-3101	175616	90.8	Pass
						Summary	
					Pole (L1)	58.3	Pass
					Leg (T1)	70.2	Pass
					Diagonal (T1)	92.4	Pass
					Horizontal (T1)	9.6	Pass
					Secondary Horizontal (T1)	0.0	Pass
					Top Girt (T11)	34.1	Pass
					Guy A (T7)	96.0	Pass
					Guy B (T7)	95.7	Pass
					Guy C (T7)	95.5	Pass
					Top Guy Pull-Off (T1)	40.4	Pass
					Torque Arm Top (T1)	90.8	Pass
					Bolt Checks	30.4	Pass
					RATING =	**96.0**	**Pass**

Feed Line Distribution Chart
6'8-13/32" - 250'

Round | Flat | App In Face | App Out Face | Truss Leg



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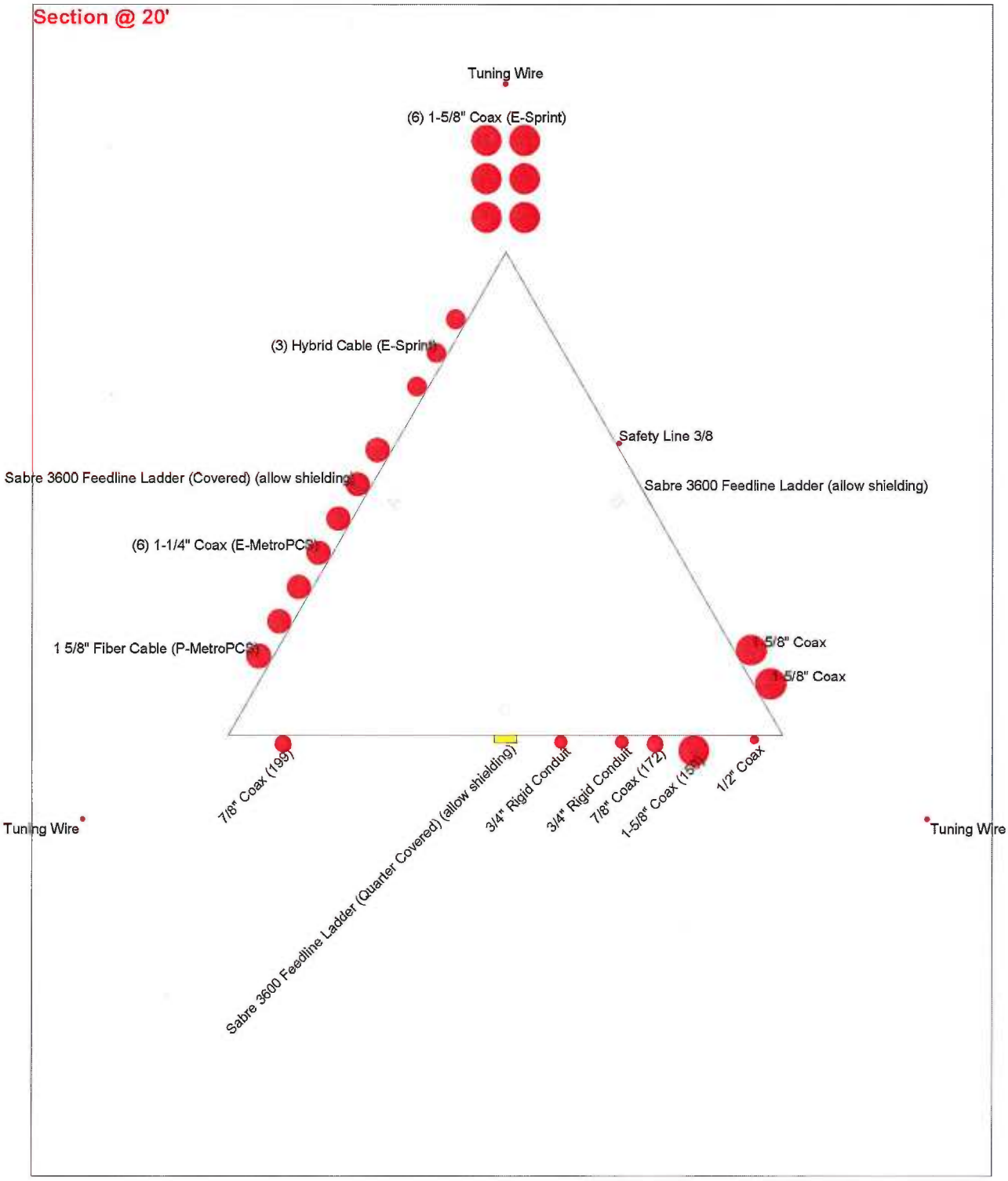
Job: ***250' Guyed Tower Analysis***			
Project: ***Site CTNL223A***			
Client: Metro PCS	Drawn by: dalbul	App'd:	
Code: TIA/EIA-222-F	Date: 05/30/14	Scale: NTS	
Path: \\A		Dwg No. E-7	

Feed Line Plan
20'

Round Flat App In Face App Out Face



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		Project: ***Site CTNL223A***	
		Client: Metro PCS	Drawn by: dalbul / App'd:
		Code: TIA/EIA-222-F	Date: 05/30/14 / Scale: NTS
		Path: Y:\	Dwg No. E-7

EXHIBIT C

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

MetroPCS Existing Facility

Site ID: CTNL223A

Citadel Groton Guyed

99 Briar Road
Groton, CT 06340

August 7, 2014

EBI Project Number: 62144084

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

EBI Consulting
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August 7, 2014

MetroPCS USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Re: Emissions Values for Site: **CTNL223A - Citadel Groton Guyed**

EBI Consulting was directed to analyze the proposed MetroPCS facility located at 99 Briar Road, Groton, CT, for the purpose of determining whether the emissions from the Proposed MetroPCS Antenna Installation located on this property are within specified federal limits.

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

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

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

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

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 MetroPCS Wireless antenna facility located at 99 Briar Road, Groton, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since MetroPCS 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 / UMTS channels (1935.000 MHz to 1945.000 MHz / 1983.000 MHz to 1984.000 MHz) were considered for each sector of the proposed installation.
2) 4 UMTS / LTE channels (2110.000 to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation
3) 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.
4) 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.
5) 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

6) The antenna mounting height centerline of the proposed antennas is **177 feet** above ground level (AGL)
7) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

Site ID	CTNL223A - Citadel Groton Guyed
Site Addresss	99 Briar Road, Groton, CT 06340
Site Type	Guyed Tower

Sector 1

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	177	171	None	0	0	48.326044	0.594148	0.05941%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	177	171	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	177	171	None	0	0	24.163022	0.297074	0.02971%
1b	Ericsson	AIR21 B4A/B2P	Passive	AWS - 2100 MHz	UMTS	40	2	80	-3.95	177	171	None	0	0	32.217363	0.396099	0.03961%
														Sector total Power Density Value:		0.129%	

Sector 2

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	177	171	None	0	0	48.326044	0.594148	0.05941%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	177	171	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	177	171	None	0	0	24.163022	0.297074	0.02971%
1b	Ericsson	AIR21 B4A/B2P	Passive	AWS - 2100 MHz	UMTS	40	2	80	-3.95	177	171	None	0	0	32.217363	0.396099	0.03961%
														Sector total Power Density Value:		0.129%	

Sector 3

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	177	171	None	0	0	48.326044	0.594148	0.05941%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	177	171	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	177	171	None	0	0	24.163022	0.297074	0.02971%
1b	Ericsson	AIR21 B4A/B2P	Passive	AWS - 2100 MHz	UMTS	40	2	80	-3.95	177	171	None	0	0	32.217363	0.396099	0.03961%
														Sector total Power Density Value:		0.129%	

Site Composite MPE %	
Carrier	MPE %
MetroPCS	0.386%
WSUB	2.540%
WQGN	0.790%
WNLC	1.760%
Sprint	4.980%
Total Site MPE %	**10.456%**

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Summary

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

The anticipated Maximum Composite contributions from the MetroPCS facility are **0.386% (0.129% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **10.456%** 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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