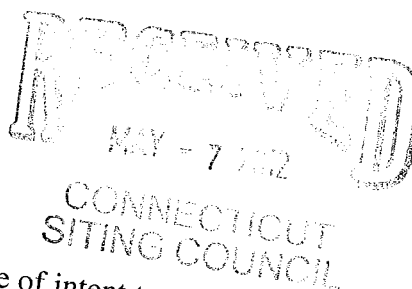




Wireless PCS, LLC
Enterprise Dr, STE 3A
Rocky Hill, CT 06067
Phone: (203)-410-4531
Douglas Talmadge
Real Estate Consultant

May, 7 2012

Ms. Linda Roberts
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051



RE: New Cingular Wireless PCS, LLC notice of intent to modify an existing telecommunications facility located at 69 Wheeler St, New Haven, CT 06512.

Dear Ms. Roberts:

In order to accommodate technological changes, implement Uniform Mobile Telecommunications System ("UMTS") and/or Long Term Evolution ("LTE") capabilities, and enhance system performance in the state of Connecticut, New Cingular Wireless PCS, LLC ("AT&T") plans to modify the equipment configurations at many of its existing cell sites. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and its attachments is being sent to the chief elected official of the municipality in which affected cell site is located.

UMTS offers services to mobile computer and phone users anywhere in the world. Based on the Global System for Mobile ("GSM") communication standard, UMTS is the planned worldwide standard for mobile users. UMTS, fully implemented, gives computer and phone users high-speed access to the internet as they travel. They have the same capabilities even when they roam, through both terrestrial wireless and satellite transmissions.

LTE is a new high-performance air interface for cellular mobile communications. It is designed to increase the capacity and speed of mobile telephone networks.

Attached is a summary of the planned modifications, including power density calculations reflecting the change in AT&T's operations at the site. Also included is documentation of the structural modification plans dated 4/26/12 that are to be completed prior to the proposed antenna installation as well as a passing structural report dated

4/26/12 referencing the required tower modifications on the modification drawings dated 4/26/12 and the revised antenna configuration on the drawings dated 5/3/12.

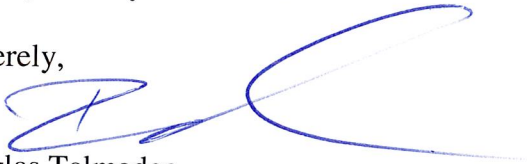
The changes to the facility do not constitute modification as defined Connecticut General Statutes ("C.G.S.") Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed or altered. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for the R.C.S.A. Section 16-50j-72(b)(2).

1. The height of the overall structure will not be affected.
2. The proposed changes will not extend the site boundaries. There will be no effect on the site compound as all equipment will be located in the existing AT&T shelter.
3. The proposed changes will not increase the noise level at the existing facility by 6 decibels or more.
4. Radio Frequency power density may increase due to the use of one or more GSM channels for UMTS transmissions. Moreover, LTE will utilize additional radio frequencies newly licensed by the FCC for cellular mobile communications. However, the changes will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site.

For the foregoing reasons New Cingular Wireless PCS, LLC respectfully submits that the proposed changes at the referenced site constitute exempt modifications under R.C.S.A. Section 16-50j-72(b)(2).

Please feel free to call me at (203)-410-4531 or email DTalmadge@Transcendwireless.com with questions concerning this matter.
Thank you for your consideration.

Sincerely,



Douglas Talmadge
Real Estate Consultant

APPENDIX C
Modification Drawings

*Calculations in this table are based upon Ref. 1:

$$k = 1 / (1 + (f_s / (n * f_c))) \quad [\text{Eqn. 10.3}]$$

$$f_c = F_c / (t t_2 + n * t t_1) * r * C_c \quad [\text{Eqn. 10.18}]$$

$$f_s = F_t / (t t_1 * r * C_t) \quad [\text{Eqn. 10.9}]$$

$$F_t = (12 * O T M - V * z * D b c) / (j * D b c) \quad [\text{Eqn. 10.24}]$$

$$F_c = F_t + V \quad [\text{Eqn. 10.27}]$$

Concrete Bearing Pressure:		==> Bearing Pressure Acceptable	
f _{cmax}	f _c * (2 * k * Dbc + t t 3) / (2 * k * Dbc) [Eqn. 10.30]	1707	psi
F _c Allow	Allowable Bearing Pressure	4000	psi

Check Bolting:		==> Bolting Acceptable	
P _{bolt}	f _s * A _{root}	121,110	lbs
P _{allow}	F _{bolt} * A _{root}	226,500	lbs

Check Bottom Plate for Compressive Loading - w/ Gussets:			
b	w _g	11.000	in
l	(D _o -D _s)/2	7.000	in
l/b	Calculated Ratio	0.636	
cc1	lookup from Ref. 1, Table 10.3	0.051	
cc2	lookup from Ref. 1, Table 10.3	0.243	
M _x	cc1 * f _{cmax} * b ² [Table 10.3]	10545.9	
M _y	-CC2 * f _{cmax} * l ² [Table 10.3]	-20356.5	
M _{max}	Maximum of Abs(M _x) or Abs(M _y)	20356.5	
t _b	(6 * M _{max} / F _b) ^{0.5} [Eqn. 10.32b]	1.462	in
Check Bottom Plate for Bolt Load - Single Baseplate w/ Gussets:			
b=	w _g	11.00	in
l=	(D _o -D _s)/2	7	in
b/l	Calculated Ratio	1.57	
Gama1	lookup from Ref. 1, Table 10.6	0.137	
Gama2	lookup from Ref. 1, Table 10.6	0.061	
a	+(D _o -D _b)/2	3	
e	Dimension from bolt ctr to nut flat	1.750	
M _y	+(P _{bolt} / (4 * PI())) * ((1+u) * LN(2 * l * SIN(PI() * a / l) / (PI() * e)) + 1) - (Gama1 * P _{bolt} / (4 * PI())) [Eqn. 10.40]	19,707	
t _t	(6 * M _{max} / f _b) ^{0.5} [Eqn. 10.41]	1.571	in
Local Stress in Shell (Single Baseplate w/ Gussets)			
t _s	((1.5 * P _{bolt} / Ngus * (D _o -D _s) / 2) / (PI() * F _b * h _g)) ^{0.5} [Jawaad & Faar, Eqn. 12.14]	0.485	in

Check Gusset (Single Baseplate):

x (in)	w(x) (in)	tg (Tens) (in)	tg (Comp) (in)	tg (Max) (in)
0.00	1.00	0.000	0.032	0.032
4.50	2.59	1.133	0.207	1.133
9.00	4.18	0.870	0.167	0.870
13.50	5.76	0.685	0.138	0.685
17.00	7.00	0.585	0.123	0.585
18.00	7.00	0.619	0.128	0.619
		tg min =		1.133

Note:

$$tg(\text{Tens}) = 6 * P_{bolt} / Ngus * ((D_{bc} - D_s) / 2) * x / (w(x)^2 * F_b * h_g)$$

$$tg(\text{Comp}) = 6 * f_c * w_g * (l / 2) * x / (F_b * h_g * w(x)^2) + f_c * w_g / (l * F_b)$$

$$tg(\text{Max}) = \text{Maximum of } tg(\text{Tens}) \text{ and } tg(\text{Comp})$$

<i>RISA</i>Tower All-Points Technology Corporation P.O. Box 1491 North Conway, NH 03860 Phone: (603) 496-5853 FAX: (603) 356-5214	Job	88' EEI Monopole with 10' Extension	Page	3 of 3
	Project	CT198740 New Haven	Date	13:39:20 12/10/08
	Client	HDG; AT&T Site #2037	Designed by	Rob Adair

Solution Summary

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	98 - 88	23.681	9	2.0768	0.0038
L2	88 - 45.67	19.367	9	2.0327	0.0038
L3	49.3367 - 0	5.941	9	1.1360	0.0009

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
98.00	(2) DR65-19-00DPQ	9	23.681	2.0768	0.0048	10354
90.00	8' x 2" omni whip	9	20.219	2.0493	0.0045	6538
88.00	(2) 7750.00	9	19.367	2.0327	0.0044	5380
80.00	(4) DB844G45ZAXY	9	16.062	1.9089	0.0039	3603

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail
L1	98 - 88	Pole	TP16.5x12.75x0.1875	1	-2825.17	46858.95	18.1	Pass
L2	88 - 45.67	Pole	TP25.16x16.5x0.1875	2	-5892.86	153420.30	93.3	Pass
L3	45.67 - 0	Pole	TP34x24.0349x0.25	3	-11449.50	553338.94	91.0	Pass
							Summary	
							Pole (L2)	Pass
							RATING = 93.3	Pass

RISATower All-Points Technology Corporation P.O. Box 1491 North Conway, NH 03860 Phone: (603) 496-5853 FAX: (603) 356-5214	Job	88' EEI Monopole with 10' Extension	Page	1 of 3
	Project	CT198740 New Haven	Date	13:39:20 12/10/08
	Client	HDG; AT&T Site #2037	Designed by	Rob Adair

Tower Input Data

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

The following design criteria apply:

Basic wind speed of 85 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

A wind speed of 74 mph is used in combination with ice.

Deflections calculated using a wind speed of 50 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	98.00-88.00	10.00	0.00	18	12.7500	16.5000	0.1875	0.7500	A572-65 (65 ksi)
L2	88.00-45.67	42.33	3.67	18	16.5000	25.1600	0.1875	0.7500	A572-65 (65 ksi)
L3	45.67-0.00	49.34		18	24.0349	34.0000	0.2500	1.0000	A572-65 (65 ksi)

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight plf
1 5/8	C	No	CaAa (Out Of Face)	98.00 - 6.00	1	No Ice	0.20	1.04
						1/2" Ice	0.21	2.55
1 5/8	B	No	Inside Pole	90.00 - 6.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 1/4	B	No	Inside Pole	80.00 - 6.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
1/2	C	No	Inside Pole	90.00 - 6.00	6	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
7/8	C	No	Inside Pole	90.00 - 6.00	1	No Ice	0.00	0.54
						1/2" Ice	0.00	0.54

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight lb
(2) DR65-19-00DPQ	A	From Face	4.00 0.00 0.00	0.0000	98.00	No Ice	8.40	3.53	32.00
						1/2" Ice	8.95	3.97	73.77
(2) DR65-19-00DPQ	B	From Face	4.00 0.00 0.00	0.0000	98.00	No Ice	8.40	3.53	32.00
						1/2" Ice	8.95	3.97	73.77

HUDSON DESIGN GROUP, LLC
98' MONOPOLE TOWER
NEW HAVEN, CONNECTICUT
AT&T SITE #2037



A recent photograph of the existing antennas currently installed.

Appendix B

Photographs

Appendix A

Tower Schematic

STRUCTURAL ANALYSIS:

Methodology:

The structural analysis was done in accordance with TIA/EIA-222, Revisions F and G (TIA), Structural Standards for Steel Antenna Towers and Antenna Supporting Structures; and the American Institute of Steel Construction (AISC), Manual of Steel Construction, Allowable Stress Design, Ninth Edition. The more stringent of the two TIA revisions, in this case Revision F, was used to compute the tower capacity values shown below.

The analysis was conducted using an 85 mph fastest mile wind speed (equivalent to 105 mph 3-second gust) and one-half inch of radial ice over the structure and associated appurtenances. The TIA Standard requires a basic wind speed of 85 miles per hour for New Haven County, Connecticut.

Two loading conditions were evaluated in accordance with TIA/EIA-222-F to determine tower capacity. The more demanding of the two cases is used to calculate tower capacity:

- Case 1 = Wind Load (without ice) + Tower Dead Load
- Case 2 = 0.75 Wind Load (with ice) + Ice Load + Tower Dead Load

The TIA/EIA standard permits a one-third increase in allowable stresses for towers less than 700-feet tall. Allowable stresses of tower members were increased by one-third when computing the tower capacity values shown below.

ANALYSIS RESULTS:

Our analysis indicates the tower requires base plate reinforcement to support the proposed extension and 6-panel antenna array. The following table summarizes the capacity of the pole:

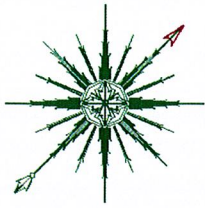
Elevation	Capacity
88'-98'	18%
46'-88'	93%
0'-46'	91%

The base foundation, reportedly a 26' by 18' by 3'-3" thick mat and pier, was evaluated from dimensions provided in the Tectonic structural analysis report. The foundation was found to meet the required safety factor with the proposed changes.

All-Points Technology Corporation

P.O. Box 1491
North Conway, NH 03860
(603) 496-5853

3 Saddlebrook Drive
Killingworth, CT 06419
(860) 663-1697



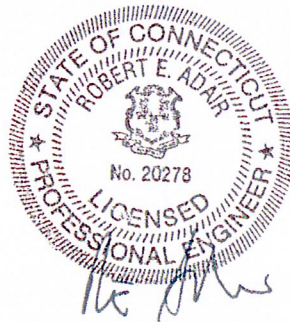
ALL-POINTS TECHNOLOGY CORPORATION, P.C.

**STRUCTURAL ANALYSIS REPORT
98' MONOPOLE TOWER
NEW HAVEN, CONNECTICUT**

Prepared for
Hudson Design Group, LLC

AT&T Site #2037

December 10, 2008



APT Project #CT198740



Structural Components

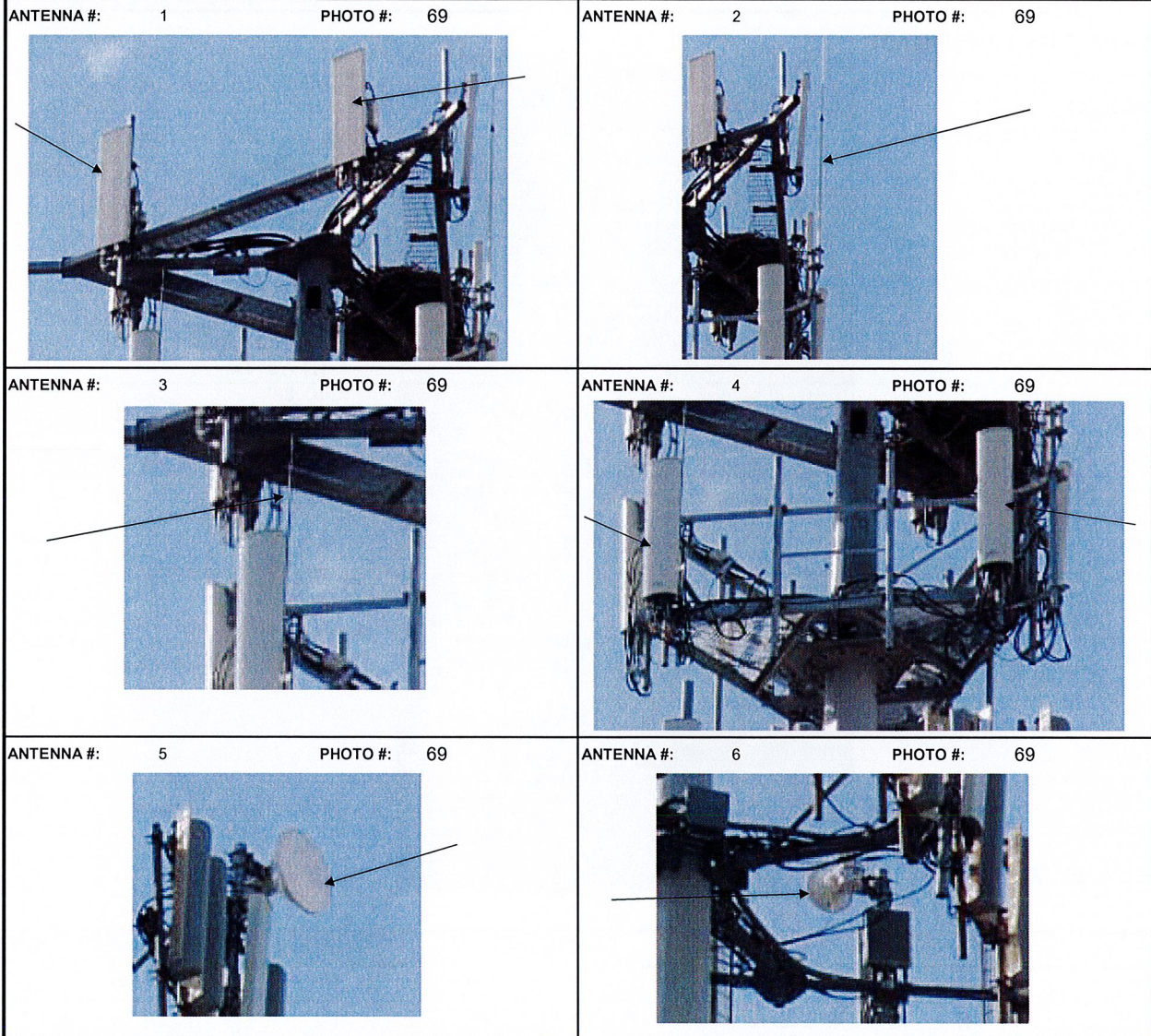
Bringing It All Together.

ANTENNA & COAX DETAILS

2400 Central Ave, Suite A-1 South Boulder, CO 80301 PH: 720-489-3764

CLIENT:	Centek Engineering	DATE AT SITE:	3/26/2012
SITE (ID):	69 Wheeler Street - 11118 CO10	TOWER TYPE:	18 Sided Monopole
ADDRESS:	69 Wheeler Street	TOWER HEIGHT:	98.0'
	New Haven, CT 06512	WEATHER:	Sun, 50°F, 20-30 mph NW wind
LEAD:	Jeff Ham	SUPPORT:	Ryan Hubert

ANTENNA HEIGHTS TAKEN WITH: TAPE



Antenna #	Elevation (ft.)	Quantity	Appurtenance	Coax	Owner	Azimuth (°)
1	98.0	6	APX16PV-16PVL-E-ACU Panels with (9) TMAs total on 12' platform mount	(18) 1-1/4" TX (1) 1/4" OD	T-Mobile	90/ 210/ 330
2	88.0	1	8' x 1" Whip Omni on 10' platform mount with handrails	(1) 7/8" TX	Unknown Building	0
3	88.0	1	6' x 1/2" Lightning Rod on 10' platform mount with handrails	N/A	N/A	120
4	88.0	6	Powerwave AXCM-824-960/1710-2170-65 panels with (1) TMA and (1) Diplexer each on 10' platform mount with handrails	(12) 7/8" TX	AT&T	60/ 180/ 300
5	79.0	1	2' Dish with (2) radios on 12' t-arm	(2) 1/2" TX	Clearwire	0
6	79.0	1	1' Dish with (2) radios on 12' t-arm	(2) 1/2" TX	Clearwire	240

Elevations of panels and dishes are to center line of antenna, all others are to base of antenna.

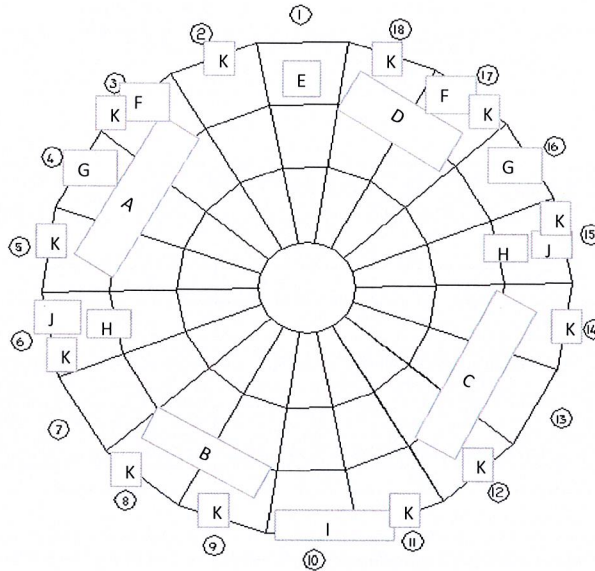


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LEAD:	Jeff Ham	SUPPORT:	Ryan Hubert

OBSTRUCTION DETAIL FOR ELEVATIONS:

0' to 70'

The safety climb is Face 1 and the rest are marked counter-clockwise looking down at pole



All obstruction elevations are from the top of the base plate to the center of the obstruction

Item	Obstruction	Flat #	Elev. (center)	Dimension	Photo #
A	Port Hole (occupied)	3/4/5	7-1/2'	32" x 12" x 1" thk	94
B	Port Hole (occupied)	8/9	3'	32" x 12" x 1" thk	96
C	Port Hole (occupied)	12/13/14	7-1/2'	32" x 12" x 1" thk	96
D	Port Hole (empty)	17/18	3'	32" x 12" x 1" thk	95
E	Safety Climb	1	10' - 170'	3/8"Ø	72
F	Step Pegs	17, 3	10' - 50'	2" x 2"	55
G	Step Pegs	16, 4	50' - 70'	2" x 2"	58, 70
H	Jacking Lugs	6, 15	40' - 50'	(4) 1-1/2"	61
I	Ice Bridge	10, 11	5'	10" x 3"	104
J	Ground Plate	6, 15	3'	4" x 4"	69
K	Stiffeners	2, 3, 5, 6, 8, 9, 11, 12, 14, 15, 17, 18,	0" - 18"	18" x 5" x 1"thk	97

Available Face Configuration	Modifications Required for Pole or Reinforcement
Face 6	Jacking lugs, pull off, and stiffener will need to be ground off and cold galvanized.
Face 12	Stiffener will need to be ground off and cold galvanized. Port on face 12/13/14 will need to be cut off face 12 and cold galvanized.
Face 18	Stiffener will need to be ground off and cold galvanized. Unoccupied port on face 17/18 will need to be cut off face 18 and cold galvanized.

Note: Bottom of ports at 70' exactly, recommend installing Switchblade directly below ports.



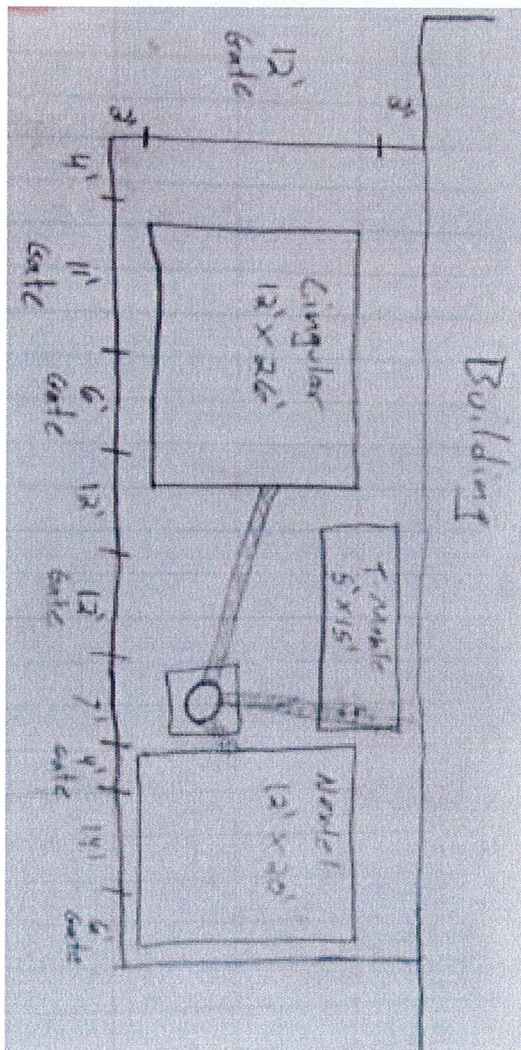
2400 Central Ave, Suite A-1 South

Boulder, CO 80301

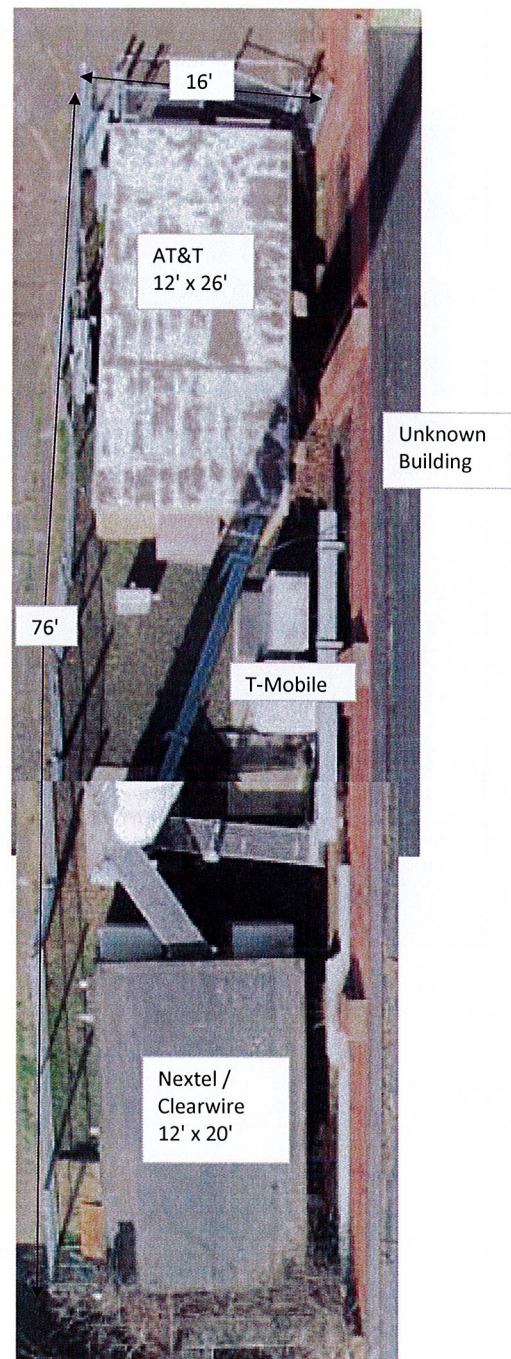
PH: 720-489-3764

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SITE (ID):	69 Wheeler Street - 11118 CO10	TOWER TYPE:	18 Sided Monopole
ADDRESS:	69 Wheeler Street	TOWER HEIGHT:	98.0'
	New Haven, CT 06512	WEATHER:	Sun, 50°F, 20-30 mph NW wind
LEAD:	Jeff Ham	SUPPORT:	Ryan Hubert

SITE ACCESS: 2WD Access
GATE COMBO: No Lock
POWER: Available
WATER: Not Available



North





2400 Central Ave, Suite A-1 South

Boulder, CO 80301

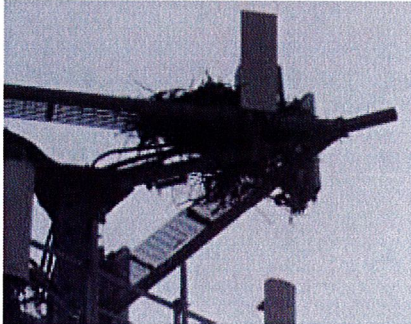
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LEAD:	Jeff Ham	SUPPORT:	Ryan Hubert

ISSUE #1: Large bird nest on top of tower.

RECOMMENDATION: Remove bird nest if found to be uninhabited.

PHOTO #: 44



ISSUE #2: Safety climb obstructed by mount at 79'.

RECOMMENDATION: Install competent climber sign at base of tower.

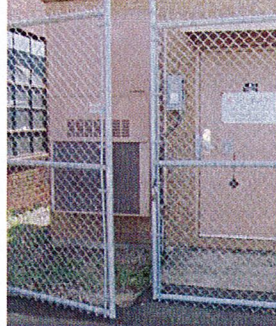
PHOTO #: 142



ISSUE #3: (2) Gates found unlocked upon arrival to site.

RECOMMENDATION: Install locks and chains at (2) unlocked gates.

PHOTO #: 120, 121



ISSUE #4: Trash and debris in compound.

RECOMMENDATION: Remove and properly dispose of all trash and debris in compound.

PHOTO #: 122, 125



ISSUE #5: Paint peeling around base of tower.

RECOMMENDATION: Wire brush to remove loose paint and apply (2) coats of similar color.

PHOTO #: 128



ISSUE #6: Grout chipping below base plate of tower.

RECOMMENDATION: Repair chips with 4000psi non-shrink grout and monitor grout for cracking.

PHOTO #: 132, 133





**Structural
Components**
Bringing It All Together.

REQUIRED SCOPE OF WORK

2400 Central Ave, Suite A-1 South

Boulder, CO 80301

PH: 720-489-3764

CLIENT:	Centek Engineering	DATE AT SITE:	3/26/2012
SITE (ID):	69 Wheeler Street - 11118 CO10	TOWER TYPE:	18 Sided Monopole
ADDRESS:	69 Wheeler Street	TOWER HEIGHT:	98.0'
	New Haven, CT 06512	WEATHER:	Sun, 50°F, 20-30 mph NW wind
LEAD:	Jeff Ham	SUPPORT:	Ryan Hubert

EXISTING TOWER INFORMATION

Data	Existing Information	Discrepancy	Scope of Work
Tower Mast Information	Centek Engineering Structural Analysis, Feb. 20, 2012	Yes	Map Steel
Antenna Information	Centek Engineering Structural Analysis, Feb. 20, 2012	Yes	Map Antennas
Foundation Information	Tectonic Structural Analysis Report, May 3, 2002	N/A	No Mapping Required
Soils Information	None	N/A	No Soil Information Required
Site Constraints	None	N/A	Compound Mapping
Reinforcement Constraints	None	N/A	Obstruction Mapping
Tower Condition	None	N/A	TIA/Maintenance Inspection

REPORT CONTENTS

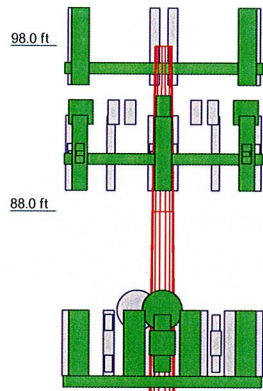
Mapping Cut Sheets	Required Yes/No	Field Work Completed By	# of Pages	Notes
Pre-Construction Summary	Yes	JH/RH	1	
TIA Maintenance Issues	Yes	JH/RH	2	
Compound Details	Yes	RH	1	
Monopole Details	Yes	JH/RH	1	
Obstructions on Pole Shaft	Yes	JH/RH	1	
Coax Map	Yes	JH	1	
Antenna & Coax Details	Yes	JH	2	
Site Photos	Yes	JH	10	

<i>RISA</i>Tower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	11118.CO10 - CT2037	Page	19 of 19
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	16:40:50 02/20/12
	Client	AT&T	Designed by	TJL

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
L1	98 - 88	Pole	TP16.5x12.75x0.188	1	-3.504	504.688	27.2	Pass
L2	88 - 45.67	Pole	TP25.16x16.5x0.188	2	-7.969	749.389	139.8	Fail X
L3	45.67 - 0	Pole	TP34x24.034x0.25	3	-15.013	1392.238	132.2	Fail X
Summary								
Pole (L2)							139.8	Fail X
RATING =							139.8	Fail X

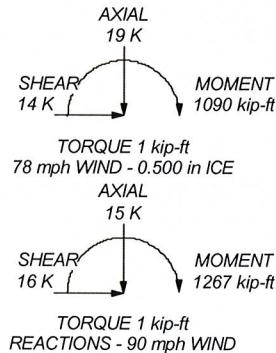
Program Version 5.4.1.8 - 4/8/2010 File:J:\Jobs\1111800.W\CO10- CT2037- 69 WHEELER STREET, NEW HAVEN,CT\Engineering\Calcs\ERI Files\Exist\98' EEI Monopole_ New Haven, CT.eri

Section	1	2	3	Grade	Weight (K)
Length (ft)	10,000	42,330	49,340	5.9	
Number of Sides	18	18	18		
Thickness (in)	0.188	0.188	0.250		
Socket Length (ft)		3,670			
Top Dia (in)	12,750	16,500	24,034		
Bot Dia (in)	16,500	25,160	34,000		
Grade		A572-65			
Weight (K)	0.3	1.8	3.8		



45.7 ft

0.0 ft



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	98	AM-X-CD-16-65-00T-RET (ATI - Proposed)	91.5
(2) APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	98	(2) 7750.00 (ATI - Existing)	91.5
(2) APX16DWV-16DWVS-E-A20 (T-Mobile - Existing)	98	(2) 7750.00 (ATI - Existing)	91.5
(2) ATMAA1412D-1A20 TMA (T-Mobile - Existing)	98	(2) 7750.00 (ATI - Existing)	91.5
(2) ATMAA1412D-1A20 TMA (T-Mobile - Existing)	98	(2) LGP21401 TMA (ATI - Existing)	91.5
(2) ATMAA1412D-1A20 TMA (T-Mobile - Existing)	98	(2) LGP21401 TMA (ATI - Existing)	91.5
(2) ATMAA1412D-1A20 TMA (T-Mobile - Existing)	98	(2) LGP21901 Diplexer (ATI - Existing)	91.5
(2) ATMAA1412D-1A20 TMA (T-Mobile - Existing)	98	(2) LGP21901 Diplexer (ATI - Existing)	91.5
EEL 14-ft Low Profile Platform (T-Mobile - Existing)	97	Valmont T-Arm (3) (ATI - Existing)	91.5
(2) RRUS-11 (ATI - Proposed)	94	ANT-18G-2-C (Clearwire - Existing)	82
(2) RRUS-11 (ATI - Proposed)	94	ANT-18G-2-C (Clearwire - Existing)	82
(2) RRUS-11 (ATI - Proposed)	94	(4) DB844G45ZAXY (Nextel - Existing)	80
DC6-48-60-18-8F Surge Arrestor (ATI - Proposed)	94	LLPX310R (Clearwire - Existing)	80
Valmont Uni-Tri Bracket (ATI - Proposed)	94	LLPX310R (Clearwire - Existing)	80
AM-X-CD-16-65-00T-RET (ATI - Proposed)	91.5	LLPX310R (Clearwire - Existing)	80
AM-X-CD-16-65-00T-RET (ATI - Proposed)	91.5	RRUS-11 (Clearwire - Existing)	80
		RRUS-11 (Clearwire - Existing)	80
		(3) DB844G45ZAXY (Nextel - Existing)	80
		(4) DB844G45ZAXY (Nextel - Existing)	80
		Valmont T-Arm (3) (Nextel - Existing)	78

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 90 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 78 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
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. TOWER RATING: 139.8%

Centek Engineering Inc.

63-2 North Branford Rd.

Branford, CT 06405

Phone: (203) 488-0580

FAX: (203) 488-8587

Job: **11118.CO10 - CT2037**

Project: **98-ft EEI Monopole - 69 Wheeler St., New Haven, CT**

Client: **AT&T**

Drawn by: **TJL**

App'd:

Code: **TIA/EIA-222-F**

Date: **02/20/12**

Scale: **NTS**

Path:

Dwg No. **E-1**

Structural Components, LLC

By: Rguerrero Job #: 120229 Sheet:
Date: 4/26/2012 Project: 11118.CO10 Subject:
Principal: CC Client: Centek

Monopole Splice Calculator
Assumptions / Criteria
ASCE/SEI 48-05
AISC
TIA
Notes:
Anchor bolt stress for TIA-222-G assumes detail type d connection per figure 4.4. Free length between concrete and leveling nut does not exceed 1" bolt diameter.

Height feet	bolt dia. in	bolt circle dia in	fy ksi	fu ksi	Per Piece A reinf only in ²	Per Piece Ix reinf only in ⁴	quantity n	dist centroid to centroid in	dist centroid to outer reinf. Fiber in	Properties Ax total in ²	Ix total in ⁴	Sx total in ³	LRFD Mmax k-ft	ASD Mmax k-ft	4/3rds Mmax k-ft
bolt	2.25	42	75	100	3.248	1.258	6	21	1.125	19.49	4304.23	194.54	1094.30	729.53	972.71
reinf	2.75	51.125	95	115	4.928	2.807	4	23.875	1.375	19.71	5624.10	222.74	1587.00	1058.00	1410.66
total			95	115			10	23.875	1.375	39.20	9928.33	393.20	2681.29	1787.53	2383.37

Max usable reinf stress 75.00 ksi O.K. "only applies when reinforcement anchor rods are installed"

Moment required 1297.0 k-ft
Axial required 20.0 k
Shear required 18.0 k

ASD	LRFD
Ω	ϕ
Allowable Stress	0.90
Axial Max Bolt	0.80
Axial Max reinf	324.8 k
Shear Max Bolt	566.8 k
Shear Max reinf	129.9 k
Stress at Bolt	2.3 ksi
Stress at reinf	2.7 ksi
Axial to Bolt	131.8 k
Axial to reinf	200.0 k
Shear to Bolt	1.8 k

Splice Plate Analysis
Odd/Even Active Bolt # Odd TRUE Even TRUE
Round or Square 1 (round=1,square=0) 1 (round=1,square=0)
Plate Thickness 1.5 in 1.5 in
Pole Base Diameter 34 in 34 in
Plate Yield 60 ksi 60 ksi
Bendline 24.66 in 24.66 in

ASD	ASD Ratings
Bending Stress	Plate 14.1 ksi
Allowable Stress	Bolt 40.0 ksi
Ratio	Reinforcement 0.352
	Plate 96%
	Bolt 70%
	Reinforcement 54%

Structural Components, LLC

By: RG Job #: 120229 Sheet:
Date: 04/05/12 Project: 66 Wheeler St Subject:
Principal: CC Client: Centek

Tapered Pole stress check and eq. thickness calculator

Assumptions / Criteria
Sided Pole
ASD 9th
F-code
Notes:
Zx is for circle with tube diameter (is slightly low)

Pole Yield Strength 65 ksi
Allowable Stress 1.333333
Pole Height 88 ft
Cc 93.84
Use top attachment point of VGX

Height feet	tube dia in	original thick in	sides n	fy ksi	Per Piece A reinf only in ²	Per Piece lx reinf only in ⁴	quantity n	dist face to centroid in	dist face to outer reinf. Fiber in	eq. thick in	flat width in	Original inner flat in	Equiv. inner flat in	Original Properties A in ²	Ix in ⁴	Sx in ³	Reinforced Properties Ax total in ²	Ix total in ⁴	Sx total in ³	Equivalent Thickness Properties A in ²	Ix in ⁴	Sx in ³
88	16.50	0.1875	18	65	4.75	5.8131	0	1.0398	3.5	0.1875	2.91	2.84	2.84	9.71	322.91	36.14	9.71	322.91	36.14	9.71	322.91	36.14
85	17.00	0.1875	18	65	4.75	5.8131	0	1.0398	3.5	0.1875	3.00	2.93	2.93	10.01	353.52	41.59	10.01	353.52	41.59	10.01	353.52	41.59
82.4714	17.50	0.1875	18	65	4.75	5.8131	0	1.0398	3.5	0.1875	3.09	3.02	3.02	10.30	386.01	44.12	10.30	386.01	44.12	10.30	386.01	44.12
80.4571	18.00	0.1875	18	65	4.75	5.8131	0	1.0398	3.5	0.1875	3.17	3.11	3.11	10.60	420.43	46.71	10.60	420.43	46.71	10.60	420.43	46.71
77.9428	18.50	0.1875	18	65	4.75	5.8131	0	1.0398	3.5	0.1875	3.26	3.20	3.20	10.90	456.84	49.39	10.90	456.84	49.39	10.90	456.84	49.39
75.4285	19.00	0.1875	18	65	4.75	5.8131	0	1.0398	3.5	0.1875	3.35	3.28	3.28	11.20	495.29	52.14	11.20	495.29	52.14	11.20	495.29	52.14
72.9142	19.50	0.1875	18	65	4.75	5.8131	0	1.0398	3.5	0.1875	3.44	3.37	3.37	11.49	535.84	54.96	11.49	535.84	54.96	11.49	535.84	54.96
70.3999	20.00	0.1875	18	65	4.75	5.8131	0	1.0398	3.5	0.1875	3.53	3.46	3.46	11.79	578.54	57.85	11.79	578.54	57.85	11.79	578.54	57.85
67.8856	20.50	0.1875	18	65	4.75	5.8131	3	1.0398	3.5	0.324	3.61	3.55	3.50	12.09	623.46	60.83	26.34	1540.33	112.02	20.75	610.52	60.83
65.3713	21.00	0.1875	18	65	4.75	5.8131	3	1.0398	3.5	0.324	3.70	3.64	3.59	12.39	670.64	63.87	26.64	1628.18	116.30	21.26	658.38	63.87
62.857	21.50	0.1875	18	65	4.75	5.8131	3	1.0398	3.5	0.324	3.79	3.72	3.68	12.68	720.14	66.99	26.93	1719.24	120.65	21.78	707.46	66.99
60.3427	22.00	0.1875	18	65	4.75	5.8131	3	1.0398	3.5	0.324	3.88	3.81	3.76	12.98	772.03	70.18	27.23	1813.56	125.07	22.29	759.24	70.18
57.8284	22.50	0.1875	18	65	4.75	5.8131	3	1.0398	3.5	0.324	3.97	3.90	3.85	13.28	826.34	73.45	27.53	1911.22	129.57	22.80	813.44	73.45
55.3141	23.00	0.1875	18	65	4.75	5.8131	3	1.0398	3.5	0.324	4.06	3.99	3.94	13.58	883.15	76.80	27.83	2012.25	134.15	23.32	869.83	76.80
52.7998	23.50	0.1875	18	65	4.75	5.8131	3	1.0398	3.5	0.324	4.14	4.08	4.03	13.87	942.50	80.21	28.12	2116.72	138.80	23.83	928.67	80.21
50.2855	24.00	0.1875	18	65	4.75	5.8131	3	1.0398	3.5	0.324	4.23	4.17	4.12	14.17	1004.45	83.70	28.42	2224.68	143.53	24.35	990.02	83.70
47.7712	24.50	0.1875	18	65	4.75	5.8131	3	1.0398	3.5	0.324	4.32	4.25	4.21	14.47	1068.06	87.27	28.72	2336.19	148.33	24.66	1053.67	87.27
45.2569	25.00	0.25	18	65	4.75	5.8131	3	1.0398	3.5	0.349	4.41	4.32	4.28	14.76	1133.23	90.87	29.02	2452.28	153.17	24.97	1118.26	90.87
42.7426	25.50	0.25	18	65	4.75	5.8131	3	1.0398	3.5	0.349	4.50	4.41	4.37	20.04	1598.77	125.24	34.29	2960.37	182.18	27.86	1582.51	125.24
40.2283	26.00	0.25	18	65	4.75	5.8131	3	1.0398	3.5	0.349	4.58	4.50	4.46	20.43	1693.52	130.27	34.68	3106.69	188.28	28.41	1677.17	130.27
37.714	26.50	0.25	18	65	4.75	5.8131	3	1.0398	3.5	0.349	4.67	4.58	4.55	20.83	1784.09	135.40	35.08	3257.73	194.46	28.97	1768.22	135.40
35.1907	27.00	0.25	18	65	4.75	5.8131	3	1.0398	3.5	0.349	4.76	4.67	4.64	21.23	1886.58	140.64	35.48	3413.57	200.80	29.52	1867.62	140.64
32.6654	27.50	0.25	18	65	4.75	5.8131	3	1.0398	3.5	0.349	4.85	4.76	4.73	21.62	2007.04	145.97	35.87	3574.28	207.20	30.07	1987.25	145.97
30.1411	28.00	0.25	18	65	4.75	5.8131	3	1.0398	3.5	0.349	4.94	4.85	4.81	22.02	2119.56	151.40	36.27	3739.93	213.71	30.63	2077.48	151.40
27.6168	28.50	0.25	18	65	4.75	5.8131	3	1.0398	3.5	0.349	5.03	4.94	4.90	22.42	2236.20	156.83	36.67	3910.60	220.31	31.18	2198.11	156.83
25.1425	29.00	0.25	18	65	4.75	5.8131	3	1.0398	3.5	0.349	5.11	5.03	4.99	22.81	2357.05	162.55	37.06	4066.36	227.02	31.74	2328.65	162.55
22.6182	29.50	0.25	18	65	4.75	5.8131	3	1.0398	3.5	0.349	5.20	5.11	5.08	23.21	2482.18	168.28	37.46	4267.29	232.62	32.29	2460.13	168.28
20.1139	30.00	0.25	18	65	4.75	5.8131	3	1.0398	3.5	0.349	5.29	5.20	5.17	23.61	2611.65	174.11	37.86	4453.47	240.73	32.84	2609.68	174.11
17.5999	30.50	0.25	18	65	4.75	5.8131	4	1.0398	3.5	0.38	5.38	5.29	5.24	24.00	2745.99	180.04	43.00	4716.61	289.18	33.39	2711.17	180.04
15.0853	31.00	0.25	18	65	4.75	5.8131	4	1.0398	3.5	0.38	5.47	5.38	5.33	24.40	2883.96	186.06	43.40	4864.47	298.07	33.83	2839.39	186.06
12.571	31.50	0.25	18	65	4.75	5.8131	4	1.0398	3.5	0.38	5.55	5.47	5.42	24.80	3026.94	192.19	43.80	5016.61	307.47	34.27	2998.62	192.19
10.0597	32.00	0.25	18	65	4.75	5.8131	4	1.0398	3.5	0.38	5.64	5.55	5.51	25.19	3174.57	198.41	44.19	5164.41	316.85	34.71	3159.85	198.41
7.5424	32.50	0.25	18	65	4.75	5.8131	4	1.0398	3.5	0.38	5.73	5.64	5.60	25.59	3326.92	204.73	44.59	5318.47	326.32	35.14	3319.08	204.73
5.0281	33.00	0.25	18	65	4.75	5.8131	4	1.0398	3.5	0.38	5.82	5.73	5.68	25.99	3484.07	211.16	44.99	5476.54	336.82	35.54	3478.23	211.16
2.5138	33.50	0.25	18	65	4.75	5.8131	4	1.0398	3.5	0.38	5.91	5.82	5.77	26.38	3646.10	217.68	45.38	5647.45	347.31	35.95	3637.38	217.68
0	34.00	0.25	18	65	4.75	5.8131	4	1.0398	3.5	0.38	6.00	5.91	5.86	26.78	3813.03	224.30	45.78	5816.26	357.38	36.33	3800.51	224.30

tnxTower Stuctural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	17 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
	Client	Centek	Designed by	kjackson

Section No.	Elevation ft	Ratio P P_a	Ratio f_{bx} F_{bx}	Ratio f_{by} F_{by}	Ratio f_v F_v	Ratio f_{vt} F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L5	28.604 - 27.17	0.010	1.197	0.000	0.039	0.000	1.207 ✓	1.333	H1-3+VT ✓
	27.17 - 25.736	0.010	1.205	0.000	0.039	0.000	1.215 ✓	1.333	H1-3+VT ✓
	25.736 - 24.302	0.010	1.212	0.000	0.039	0.000	1.222 ✓	1.333	H1-3+VT ✓
	24.302 - 22.868	0.010	1.219	0.000	0.038	0.000	1.229 ✓	1.333	H1-3+VT ✓
	22.868 - 21.434	0.010	1.225	0.000	0.038	0.000	1.236 ✓	1.333	H1-3+VT ✓
	21.434 - 20	0.010	1.231	0.000	0.038	0.000	1.242 ✓	1.333	H1-3+VT ✓
	20 - 19	0.009	1.138	0.000	0.035	0.000	1.148 ✓	1.333	H1-3+VT ✓
	19 - 18	0.010	1.142	0.000	0.035	0.000	1.152 ✓	1.333	H1-3+VT ✓
	18 - 17	0.010	1.146	0.000	0.035	0.000	1.156 ✓	1.333	H1-3+VT ✓
	17 - 16	0.010	1.149	0.000	0.035	0.000	1.159 ✓	1.333	H1-3+VT ✓
	16 - 15	0.010	1.152	0.000	0.035	0.000	1.162 ✓	1.333	H1-3+VT ✓
	15 - 14	0.010	1.156	0.000	0.034	0.000	1.166 ✓	1.333	H1-3+VT ✓
	14 - 13	0.010	1.159	0.000	0.034	0.000	1.169 ✓	1.333	H1-3+VT ✓
	13 - 12	0.010	1.162	0.000	0.034	0.000	1.172 ✓	1.333	H1-3+VT ✓
	12 - 11	0.010	1.165	0.000	0.034	0.000	1.175 ✓	1.333	H1-3+VT ✓
	11 - 10	0.010	1.168	0.000	0.034	0.000	1.178 ✓	1.333	H1-3+VT ✓
	10 - 9	0.010	1.170	0.000	0.034	0.000	1.181 ✓	1.333	H1-3+VT ✓
	9 - 8	0.010	1.173	0.000	0.034	0.000	1.183 ✓	1.333	H1-3+VT ✓
	8 - 7	0.010	1.175	0.000	0.034	0.000	1.186 ✓	1.333	H1-3+VT ✓
	7 - 6	0.010	1.178	0.000	0.034	0.000	1.188 ✓	1.333	H1-3+VT ✓
	6 - 5	0.010	1.180	0.000	0.034	0.000	1.191 ✓	1.333	H1-3+VT ✓
	5 - 4	0.010	1.182	0.000	0.034	0.000	1.193 ✓	1.333	H1-3+VT ✓
	4 - 3	0.010	1.185	0.000	0.034	0.000	1.195 ✓	1.333	H1-3+VT ✓
	3 - 2	0.011	1.187	0.000	0.033	0.000	1.198 ✓	1.333	H1-3+VT ✓
	2 - 1	0.011	1.189	0.000	0.033	0.000	1.200 ✓	1.333	H1-3+VT ✓
	1 - 0	0.011	1.191	0.000	0.033	0.000	1.202 ✓	1.333	H1-3+VT ✓

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	15 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
	Client	Centek	Designed by	kjackson

Section No.	Elevation ft	Ratio P_a	Ratio f_{bx}	Ratio f_{by}	Ratio f_v	Ratio f_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L2	88 - 87	0.010	0.389	0.000	0.056	0.000	0.399	1.333	H1-3+VT ✓
	87 - 86	0.010	0.434	0.000	0.056	0.000	0.444	1.333	H1-3+VT ✓
	86 - 85	0.010	0.477	0.000	0.056	0.000	0.487	1.333	H1-3+VT ✓
	85 - 84	0.010	0.518	0.000	0.055	0.000	0.529	1.333	H1-3+VT ✓
	84 - 83	0.010	0.558	0.000	0.055	0.000	0.568	1.333	H1-3+VT ✓
	83 - 82	0.010	0.596	0.000	0.055	0.000	0.606	1.333	H1-3+VT ✓
	82 - 81	0.010	0.635	0.000	0.057	0.001	0.646	1.333	H1-3+VT ✓
	81 - 80	0.010	0.672	0.000	0.057	0.001	0.683	1.333	H1-3+VT ✓
	80 - 79	0.010	0.731	0.000	0.082	0.002	0.744	1.333	H1-3+VT ✓
	79 - 78	0.011	0.788	0.000	0.082	0.002	0.800	1.333	H1-3+VT ✓
	78 - 77	0.013	0.848	0.000	0.088	0.002	0.863	1.333	H1-3+VT ✓
	77 - 76	0.013	0.906	0.000	0.088	0.002	0.921	1.333	H1-3+VT ✓
	76 - 75	0.013	0.962	0.000	0.087	0.002	0.977	1.333	H1-3+VT ✓
	75 - 74	0.013	1.015	0.000	0.086	0.002	1.030	1.333	H1-3+VT ✓
	74 - 73	0.013	1.066	0.000	0.086	0.002	1.081	1.333	H1-3+VT ✓
	73 - 72	0.013	1.116	0.000	0.085	0.002	1.131	1.333	H1-3+VT ✓
	72 - 71	0.013	1.163	0.000	0.085	0.002	1.178	1.333	H1-3+VT ✓
	71 - 70	0.013	1.208	0.000	0.084	0.002	1.223	1.333	H1-3+VT ✓
L3	70 - 68.934	0.008	0.741	0.000	0.049	0.001	0.749	1.333	H1-3+VT ✓
	68.934 - 67.868	0.008	0.767	0.000	0.049	0.001	0.776	1.333	H1-3+VT ✓
	67.868 - 66.802	0.008	0.792	0.000	0.048	0.001	0.801	1.333	H1-3+VT ✓
	66.802 - 65.736	0.008	0.816	0.000	0.048	0.001	0.825	1.333	H1-3+VT ✓
	65.736 - 64.67	0.008	0.840	0.000	0.048	0.001	0.848	1.333	H1-3+VT ✓
	64.67 - 63.604	0.008	0.862	0.000	0.048	0.001	0.871	1.333	H1-3+VT ✓
	63.604 - 62.538	0.008	0.883	0.000	0.047	0.001	0.892	1.333	H1-3+VT ✓
	62.538 - 61.472	0.008	0.904	0.000	0.047	0.001	0.913	1.333	H1-3+VT ✓

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	13 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
	Client	Centek	Designed by	kjackson

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L3	72 - 71	TP24.313x20.07x0.324	12.893	1.101	26.000	0.085	0.427	0.044	26.000	0.002
	71 - 70		12.936	1.093	26.000	0.084	0.427	0.043	26.000	0.002
	70 - 68.934		13.007	0.634	26.000	0.049	0.427	0.025	26.000	0.001
	68.934 - 67.868		13.081	0.631	26.000	0.049	0.427	0.024	26.000	0.001
	67.868 - 66.802		13.155	0.628	26.000	0.048	0.426	0.024	26.000	0.001
	66.802 - 65.736		13.229	0.625	26.000	0.048	0.426	0.023	26.000	0.001
	65.736 - 64.67		13.304	0.622	26.000	0.048	0.426	0.023	26.000	0.001
	64.67 - 63.604		13.378	0.619	26.000	0.048	0.426	0.022	26.000	0.001
	63.604 - 62.538		13.454	0.616	26.000	0.047	0.426	0.022	26.000	0.001
	62.538 - 61.472		13.529	0.614	26.000	0.047	0.426	0.021	26.000	0.001
	61.472 - 60.406		13.605	0.611	26.000	0.047	0.426	0.021	26.000	0.001
	60.406 - 59.34		13.681	0.608	26.000	0.047	0.426	0.021	26.000	0.001
	59.34 - 58.274		13.758	0.606	26.000	0.047	0.426	0.020	26.000	0.001
	58.274 - 57.208		13.835	0.603	26.000	0.046	0.426	0.020	26.000	0.001
	57.208 - 56.142		13.912	0.601	26.000	0.046	0.426	0.019	26.000	0.001
	56.142 - 55.076		13.989	0.599	26.000	0.046	0.426	0.019	26.000	0.001
	55.076 - 54.01		14.067	0.597	26.000	0.046	0.426	0.019	26.000	0.001
	54.01 - 52.944		14.146	0.594	26.000	0.046	0.425	0.018	26.000	0.001
	52.944 - 51.878		14.224	0.592	26.000	0.046	0.425	0.018	26.000	0.001
	51.878 - 50.812		14.303	0.590	26.000	0.045	0.425	0.018	26.000	0.001
	50.812 - 49.746		14.382	0.588	26.000	0.045	0.425	0.017	26.000	0.001
	49.746 - 48.68		14.462	0.586	26.000	0.045	0.425	0.017	26.000	0.001
	48.68 - 47.246		14.550	0.542	26.000	0.042	0.425	0.015	26.000	0.001
	47.246 - 45.812		14.637	0.539	26.000	0.041	0.425	0.015	26.000	0.001
	45.812 - 44.378		14.725	0.536	26.000	0.041	0.425	0.015	26.000	0.001
	44.378 - 42.944		14.813	0.533	26.000	0.041	0.425	0.014	26.000	0.001
	42.944 - 41.51		14.901	0.530	26.000	0.041	0.425	0.014	26.000	0.001
	41.51 - 40.076		14.990	0.527	26.000	0.041	0.425	0.014	26.000	0.001
	40.076 - 38.642		15.079	0.524	26.000	0.040	0.425	0.013	26.000	0.001
	38.642 - 37.208		15.169	0.522	26.000	0.040	0.424	0.013	26.000	0.001
	37.208 - 35.774		15.258	0.519	26.000	0.040	0.424	0.013	26.000	0.000
	35.774 - 34.34		15.349	0.517	26.000	0.040	0.424	0.013	26.000	0.000
	34.34 - 32.906		15.439	0.514	26.000	0.040	0.424	0.012	26.000	0.000
	32.906 - 31.472		15.530	0.512	26.000	0.039	0.424	0.012	26.000	0.000
	31.472 - 30.038		15.622	0.510	26.000	0.039	0.424	0.012	26.000	0.000
	30.038 - 28.604		15.713	0.507	26.000	0.039	0.424	0.012	26.000	0.000
	28.604 - 27.17		15.806	0.505	26.000	0.039	0.424	0.011	26.000	0.000
	27.17 - 25.736		15.898	0.503	26.000	0.039	0.424	0.011	26.000	0.000
	25.736 -		15.991	0.501	26.000	0.039	0.424	0.011	26.000	0.000
L4		TP30.02x24.313x0.349								

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	11 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
	Client	Centek	Designed by	kjackson

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	57.208									
	57.208 - 56.142		413.487	38.861	39.000	0.996	0.000	0.000	39.000	0.000
	56.142 - 55.076		428.352	39.505	39.000	1.013	0.000	0.000	39.000	0.000
	55.076 - 54.01		443.299	40.125	39.000	1.029	0.000	0.000	39.000	0.000
	54.01 - 52.944		458.331	40.723	39.000	1.044	0.000	0.000	39.000	0.000
	52.944 - 51.878		473.445	41.300	39.000	1.059	0.000	0.000	39.000	0.000
	51.878 - 50.812		488.643	41.857	39.000	1.073	0.000	0.000	39.000	0.000
	50.812 - 49.746		503.926	42.394	39.000	1.087	0.000	0.000	39.000	0.000
L4	49.746 - 48.68	TP30.02x24.313x0.349	519.293	42.912	39.000	1.100	0.000	0.000	39.000	0.000
	48.68 - 47.246		540.083	40.584	39.000	1.041	0.000	0.000	39.000	0.000
	47.246 - 45.812		560.998	41.174	39.000	1.056	0.000	0.000	39.000	0.000
	45.812 - 44.378		582.038	41.734	39.000	1.070	0.000	0.000	39.000	0.000
	44.378 - 42.944		603.204	42.268	39.000	1.084	0.000	0.000	39.000	0.000
	42.944 - 41.51		624.496	42.775	39.000	1.097	0.000	0.000	39.000	0.000
	41.51 - 40.076		645.914	43.258	39.000	1.109	0.000	0.000	39.000	0.000
	40.076 - 38.642		667.460	43.717	39.000	1.121	0.000	0.000	39.000	0.000
	38.642 - 37.208		689.133	44.154	39.000	1.132	0.000	0.000	39.000	0.000
	37.208 - 35.774		710.935	44.570	39.000	1.143	0.000	0.000	39.000	0.000
	35.774 - 34.34		732.865	44.966	39.000	1.153	0.000	0.000	39.000	0.000
	34.34 - 32.906		754.925	45.343	39.000	1.163	0.000	0.000	39.000	0.000
	32.906 - 31.472		777.114	45.702	39.000	1.172	0.000	0.000	39.000	0.000
	31.472 - 30.038		799.434	46.044	39.000	1.181	0.000	0.000	39.000	0.000
	30.038 - 28.604		821.886	46.370	39.000	1.189	0.000	0.000	39.000	0.000
	28.604 - 27.17		844.467	46.680	39.000	1.197	0.000	0.000	39.000	0.000
	27.17 - 25.736		867.183	46.976	39.000	1.205	0.000	0.000	39.000	0.000
	25.736 - 24.302		890.033	47.258	39.000	1.212	0.000	0.000	39.000	0.000
	24.302 - 22.868		913.008	47.526	39.000	1.219	0.000	0.000	39.000	0.000
	22.868 - 21.434		936.125	47.782	39.000	1.225	0.000	0.000	39.000	0.000
	21.434 - 20		959.375	48.026	39.000	1.231	0.000	0.000	39.000	0.000
L5	20 - 19	TP34x30.02x0.38	975.667	44.396	39.000	1.138	0.000	0.000	39.000	0.000
	19 - 18		992.025	44.541	39.000	1.142	0.000	0.000	39.000	0.000
	18 - 17		1008.44	44.680	39.000	1.146	0.000	0.000	39.000	0.000
			2							
	17 - 16		1024.92	44.815	39.000	1.149	0.000	0.000	39.000	0.000
			5							
	16 - 15		1041.46	44.945	39.000	1.152	0.000	0.000	39.000	0.000
			7							
	15 - 14		1058.08	45.071	39.000	1.156	0.000	0.000	39.000	0.000
			3							
	14 - 13		1074.75	45.192	39.000	1.159	0.000	0.000	39.000	0.000
			8							
	13 - 12		1091.49	45.310	39.000	1.162	0.000	0.000	39.000	0.000
			2							

tnxTower Stuctural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	Page
	SC #120229	9 of 18
	Project 98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date 14:55:17 04/26/12
	Client Centek	Designed by kjackson

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
L3	74 - 73	TP24.313x20.07x0.324	21.320	0.000	0.0	39.000	11.479	-5.773	447.660	0.013
	73 - 72					39.000	11.597	-5.858	452.264	0.013
	72 - 71					39.000	11.715	-5.944	456.867	0.013
	71 - 70					39.000	11.833	-6.031	461.470	0.013
	70 - 68.934					39.000	20.524	-6.157	800.454	0.008
	68.934 - 67.868					39.000	20.743	-6.279	808.962	0.008
	67.868 - 66.802					39.000	20.961	-6.403	817.470	0.008
	66.802 - 65.736					39.000	21.179	-6.528	825.978	0.008
	65.736 - 64.67					39.000	21.397	-6.654	834.486	0.008
	64.67 - 63.604					39.000	21.615	-6.782	842.994	0.008
	63.604 - 62.538					39.000	21.833	-6.910	851.502	0.008
	62.538 - 61.472					39.000	22.052	-7.040	860.010	0.008
	61.472 - 60.406					39.000	22.270	-7.172	868.518	0.008
	60.406 - 59.34					39.000	22.488	-7.304	877.026	0.008
	59.34 - 58.274					39.000	22.706	-7.438	885.535	0.008
	58.274 - 57.208					39.000	22.924	-7.572	894.043	0.008
	57.208 - 56.142					39.000	23.142	-7.708	902.551	0.009
	56.142 - 55.076					39.000	23.361	-7.845	911.059	0.009
	55.076 - 54.01					39.000	23.579	-7.984	919.567	0.009
	54.01 - 52.944					39.000	23.797	-8.123	928.075	0.009
	52.944 - 51.878					39.000	24.015	-8.263	936.583	0.009
	51.878 - 50.812					39.000	24.233	-8.405	945.091	0.009
	50.812 - 49.746					39.000	24.451	-8.547	953.599	0.009
	49.746 - 48.68					39.000	24.669	-8.691	962.107	0.009
L4	48.68 - 47.246	TP30.02x24.313x0.349	28.680	0.000	0.0	39.000	26.861	-8.892	1047.590	0.008
	47.246 - 45.812					39.000	27.177	-9.097	1059.920	0.009
	45.812 - 44.378					39.000	27.493	-9.305	1072.250	0.009
	44.378 - 42.944					39.000	27.810	-9.514	1084.580	0.009
	42.944 - 41.51					39.000	28.126	-9.725	1096.900	0.009
	41.51 - 40.076					39.000	28.442	-9.938	1109.230	0.009
	40.076 - 38.642					39.000	28.758	-10.153	1121.560	0.009
	38.642 - 37.208					39.000	29.074	-10.370	1133.890	0.009
	37.208 - 35.774					39.000	29.390	-10.589	1146.220	0.009
	35.774 - 34.34					39.000	29.706	-10.809	1158.540	0.009
	34.34 - 32.906					39.000	30.022	-11.031	1170.870	0.009
	32.906 - 31.472					39.000	30.338	-11.256	1183.200	0.010
	31.472 - 30.038					39.000	30.655	-11.482	1195.530	0.010
	30.038 - 28.604					39.000	30.971	-11.709	1207.860	0.010
	28.604 - 27.17					39.000	31.287	-11.939	1220.190	0.010
	27.17 - 25.736					39.000	31.603	-12.171	1232.510	0.010
	25.736 - 24.302					39.000	31.919	-12.404	1244.840	0.010
	24.302 - 22.868					39.000	32.235	-12.639	1257.170	0.010
	22.868 - 21.434					39.000	32.551	-12.875	1269.500	0.010
	21.434 - 20					39.000	32.867	-13.114	1281.830	0.010
L5	20 - 19	TP34x30.02x0.38	20.000	0.000	0.0	39.000	35.989	-13.295	1403.590	0.009
	19 - 18					39.000	36.229	-13.471	1412.950	0.010
	18 - 17					39.000	36.470	-13.649	1422.310	0.010
	17 - 16					39.000	36.709	-13.827	1431.670	0.010
	16 - 15					39.000	36.950	-14.006	1441.030	0.010
	15 - 14					39.000	37.189	-14.186	1450.390	0.010
	14 - 13					39.000	37.430	-14.367	1459.750	0.010
	13 - 12					39.000	37.669	-14.549	1469.110	0.010
	12 - 11					39.000	37.910	-14.732	1478.470	0.010
	11 - 10					39.000	38.150	-14.916	1487.830	0.010
	10 - 9					39.000	38.390	-15.100	1497.190	0.010
	9 - 8					39.000	38.630	-15.286	1506.550	0.010
	8 - 7					39.000	38.870	-15.472	1515.920	0.010
	7 - 6					39.000	39.110	-15.659	1525.280	0.010
	6 - 5					39.000	39.350	-15.848	1534.640	0.010
	5 - 4					39.000	39.590	-16.037	1544.000	0.010

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	7 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
	Client	Centek	Designed by	kjackson

<i>Comb. No.</i>	<i>Description</i>
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Tower Deflections - Service Wind

<i>Section No.</i>	<i>Elevation ft</i>	<i>Horz. Deflection in</i>	<i>Gov. Load Comb.</i>	<i>Tilt °</i>	<i>Twist °</i>
L1	98 - 88	22.582	44	2.052	0.002
L2	88 - 70	18.314	44	2.011	0.002
L3	70 - 48.68	11.390	44	1.595	0.002
L4	48.68 - 20	5.350	44	1.092	0.001
L5	20 - 0	0.849	44	0.410	0.000

Critical Deflections and Radius of Curvature - Service Wind

<i>Elevation ft</i>	<i>Appurtenance</i>	<i>Gov. Load Comb.</i>	<i>Deflection in</i>	<i>Tilt °</i>	<i>Twist °</i>	<i>Radius of Curvature ft</i>
98.000	(2) APX16DWV-16DWVS-E-A20	44	22.582	2.052	0.002	9103
97.000	EEI 14-ft Low Profile Platform	44	22.151	2.051	0.002	9103
94.000	(2) RRUS-11	44	20.860	2.048	0.002	9103
91.500	AM-X-CD-16-65-00T-RET	44	19.791	2.039	0.002	7010
82.000	ANT-18G-2-C	44	15.859	1.908	0.002	3240
80.000	(3) DB844G4SZAXY	44	15.069	1.862	0.002	2956
78.000	Valmont T-Arm (3)	44	14.295	1.811	0.002	2717

Maximum Tower Deflections - Design Wind

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	5 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
	Client	Centek	Designed by	kjackson

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
7770 (AT&T - Existing)	A	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
7770 (AT&T - Existing)	B	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
7770 (AT&T - Existing)	C	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
(2) LGP21401 TMA (AT&T - Existing)	A	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	0.953 1.093	0.367 0.480	0.018 0.023
(2) LGP21401 TMA (AT&T - Existing)	B	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	0.953 1.093	0.367 0.480	0.018 0.023
(2) LGP21401 TMA (AT&T - Existing)	C	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	0.953 1.093	0.367 0.480	0.018 0.023
(2) LGP21901 Diplexer (AT&T - Existing)	A	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	0.233 0.302	0.117 0.166	0.006 0.008
(2) LGP21901 Diplexer (AT&T - Existing)	B	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	0.233 0.302	0.117 0.166	0.006 0.008
(2) LGP21901 Diplexer (AT&T - Existing)	C	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	0.233 0.302	0.117 0.166	0.006 0.008
Valmont T-Arm (3) (AT&T - Existing) ***	C	None		0.000	91.500	No Ice 1/2" Ice	21.000 29.000	21.000 29.000	1.008 1.236
(3) DB844G45ZAXY (Nextel - Existing)	A	From Face	3.000 0.000 0.000	0.000	80.000	No Ice 1/2" Ice	7.000 7.413	3.967 4.337	0.021 0.064
(4) DB844G45ZAXY (Nextel - Existing)	B	From Face	3.000 0.000 0.000	0.000	80.000	No Ice 1/2" Ice	7.000 7.413	3.967 4.337	0.021 0.064
(4) DB844G45ZAXY (Nextel - Existing)	C	From Face	3.000 0.000 0.000	0.000	80.000	No Ice 1/2" Ice	7.000 7.413	3.967 4.337	0.021 0.064
LLPX310R (Clearwire - Existing)	A	From Face	3.000 0.000 0.000	0.000	80.000	No Ice 1/2" Ice	4.900 5.254	1.940 2.207	0.029 0.055
LLPX310R (Clearwire - Existing)	B	From Face	3.000 0.000 0.000	0.000	80.000	No Ice 1/2" Ice	4.900 5.254	1.940 2.207	0.029 0.055
LLPX310R (Clearwire - Existing)	C	From Face	3.000 0.000 0.000	0.000	80.000	No Ice 1/2" Ice	4.900 5.254	1.940 2.207	0.029 0.055
RRUS-11 (Clearwire - Existing)	A	From Face	3.000 0.000 0.000	0.000	80.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070
RRUS-11 (Clearwire - Existing)	B	From Face	3.000 0.000 0.000	0.000	80.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070
RRUS-11 (Clearwire - Existing)	C	From Face	3.000 0.000 0.000	0.000	80.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	3 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
	Client	Centek	Designed by	kjackson

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _{AA} A _A ft ² /ft	Weight klf
(Clearwire - Existing)						1/2" Ice	0.000
2" Rigid Conduit	C	No	Inside Pole	79.000 - 0.000	1	No Ice	0.000
(Clearwire - Existing)						1/2" Ice	0.000
SWITCHBLADE	C	No	CaAa (Out Of Face)	70.000 - 0.000	1	No Ice	0.562
						1/2" Ice	0.674

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} A _A In Face ft ²	C _{AA} A _A Out Face ft ²	Weight K
L1	98.000-88.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.125
L2	88.000-70.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.503
L3	70.000-48.680	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	11.992	0.764
L4	48.680-20.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	16.132	1.028
L5	20.000-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	11.250	0.714

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} A _A In Face ft ²	C _{AA} A _A Out Face ft ²	Weight K
L1	98.000-88.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.125
L2	88.000-70.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.503
L3	70.000-48.680	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	14.361	0.764
L4	48.680-20.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	19.319	1.028
L5	20.000-0.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	13.472	0.714

Discrete Tower Loads

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	1 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
	Client	Centek	Designed by	kjackson

Tower Input Data

There is a pole section.

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

The following design criteria apply:

Basic wind speed of 90 mph.

Nominal ice thickness of 0.500 in.

Ice density of 56 pcf.

A wind speed of 78 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

Weld together tower sections have flange connections..

Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..

Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..

Welds are fabricated with ER-70S-6 electrodes..

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	Use Azimuth Dish Coefficients	Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	√ Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	98.000-88.000	10.000	0.000	18	12.750	16.500	0.250	1.000	A572-65 (65 ksi)
L2	88.000-70.000	18.000	0.000	18	16.500	20.070	0.188	0.750	A572-65 (65 ksi)
L3	70.000-48.680	21.320	0.000	18	20.070	24.313	0.324	1.296	A572-65 (65 ksi)

APPENDIX A

Tower Profile and Calculations

2 RESULTS

The analysis was performed using tnxTower v6.0.0.8, a structural analysis program developed by Tower Numerics, Inc. specifically for the communication tower industry.

2.1 TOWER MEMBER STRESS LEVELS

The tower has the following stress ratios in its structural members.

Elev. (ft)	Member	Stress Ratio After Modifications
0-98	Pole	0.94
88	Flange/Bolts	0.20
0	Base Plate	0.96
0	Anchor Bolts	0.70
0	Reinforcement	0.54

Stress ratio (SR) criteria:

SR $\leq$ 1.00 is completely within code limits.

SR $\leq$ 1.05 is considered within acceptable tolerance of code limits.

SR $>$ 1.05 is outside acceptable tolerance of code limits and requires structural modifications.

2.2 FOUNDATION REACTIONS

The reactions listed below are for the design wind speed listed. Foundation reactions are actual loads and are not reduced for wind pressures.

Reaction Type	Capacity	No Ice Reaction	Iced Reaction	Foundation Status
Moment (ft-kips)	3079.64	1297	1113	Passes (governed by overturning moment)
Shear (kips)	---	18	15	
Axial (kips)	---	17	20	

2.3 TOWER DEFLECTION

The deflections are listed below for critical tower elevations using the serviceability wind speed listed.

Elev. (ft)	Displacement (in)	Sway (deg)	Twist (deg)
98.0	22.582	2.052	0.002
91.5	19.791	2.039	0.002
82.0	15.859	1.908	0.002



C Squared Systems, LLC
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Calculated Radio Frequency Emissions

at&t

CT2037

(New Haven Wheeler Street)

69 Wheeler Street, New Haven, CT 06512

May 4, 2012

Table of Contents

1. Introduction.....	1
2. FCC Guidelines for Evaluating RF Radiation Exposure Limits.....	1
3. RF Exposure Prediction Methods.....	2
4. Calculation Results.....	3
5. Conclusion.....	4
6. Statement of Certification.....	4
Attachment A: References.....	5
Attachment B: FCC Limits for Maximum Permissible Exposure (MPE).....	6
Attachment C: AT&T's Antenna Model Data Sheets and Electrical Patterns.....	8

List of Tables

Table 1: Carrier Information.....	3
Table 2: FCC Limits for Maximum Permissible Exposure (MPE).....	6

List of Figures

Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE).....	7
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Systems

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed modifications to the existing AT&T antennas mounted on the monopole tower located at 69 Wheeler Street in East Haven, CT. The coordinates of the tower are 41-17-45.47 N, 72-53-52.55 W.

AT&T is proposing the following modifications:

- 1) Install three 700 MHz LTE antennas (one per sector).

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{1.6^2 \times \text{EIRP}}{4\pi \times R^2} \right) \times \text{Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power

$$R = \text{Radial Distance} = \sqrt{H^2 + V^2}$$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity and power, and that all channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not take into account actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the finished modifications.

Systems

4. Calculation Results

Table 1 below outlines the power density information for the site. Because the proposed AT&T antennas are directional in nature, the majority of the RF power is focused out towards the horizon. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the tower. Please refer to Attachment C for the vertical pattern of the proposed AT&T antennas. The calculated results for AT&T in Table 1 include a nominal 10 dB off-beam pattern loss to account for the lower relative gain below the antennas.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm ²)	Limit	%MPE
Nextel	80	851	24	100	0.1348	0.5673	23.77%
Clearwire	68	2496	2	153	0.0238	1.0000	2.38%
Clearwire	68	11000	1	211	0.0164	1.0000	1.64%
T-Mobile UMTS	98	2100	2	770	0.0577	1.0000	5.77%
T-Mobile GSM	98	1945	8	164	0.0491	1.0000	4.91%
AT&T UMTS	91.5	880	2	565	0.0049	0.5867	0.83%
AT&T UMTS	91.5	1900	2	875	0.0075	1.0000	0.75%
AT&T LTE	91.5	750	1	1117	0.0048	0.5000	0.96%
AT&T GSM	91.5	880	1	296	0.0013	0.5867	0.22%
AT&T GSM	91.5	1900	4	525	0.0090	1.0000	0.90%
						Total	42.12%

Table 1: Carrier Information^{1 2 3}

¹ The existing CSC filing for AT&T should be removed and replaced with the updated AT&T technologies and values provided in Table 1. The power density information for carriers other than AT&T was taken directly from the CSC database dated 3/29/2012. Please note that %MPE values listed are rounded to two decimal points. The total %MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not identically match the total value reflected in the table.

² In the case where antenna models are not uniform across all 3 sectors for the same frequency band, the antenna model with the highest gain was used for the calculations to present a worse-case scenario.

³ Antenna height listed for AT&T is in reference to the Structural Components structural analysis report dated 4/26/2012.

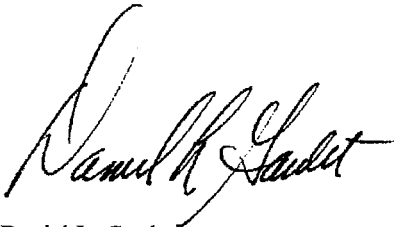
5. Conclusion

The above analysis verifies that emissions from the existing site will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the cumulative power density from the proposed transmit antennas at the existing facility is well below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at ground level is **42.12% of the FCC limit**.

As noted previously, obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the finished modifications.

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.



Daniel L. Goulet
C Squared Systems, LLC

May 4, 2012

Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave. IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure⁴

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure⁵

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 2: FCC Limits for Maximum Permissible Exposure (MPE)

⁴ Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

⁵ General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Systems

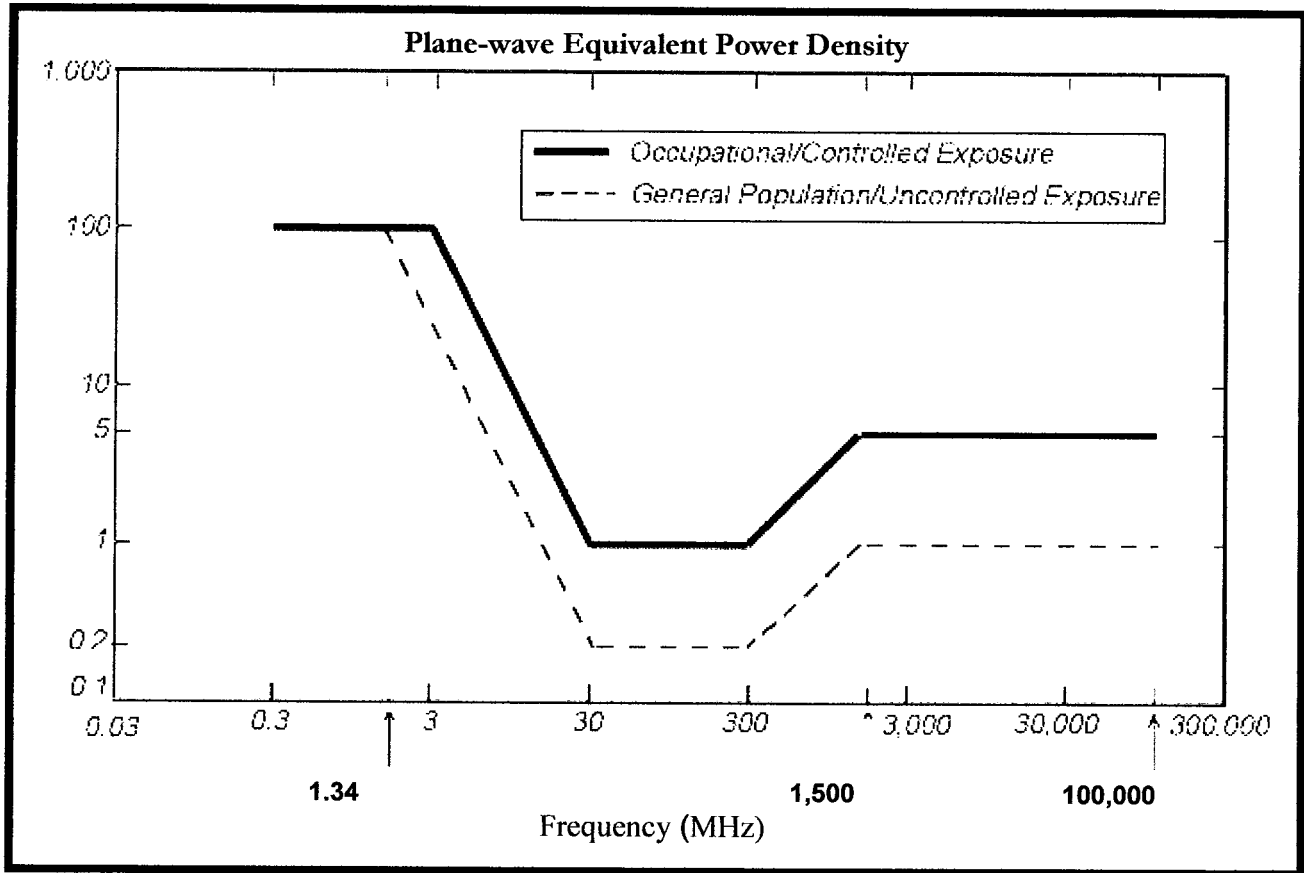
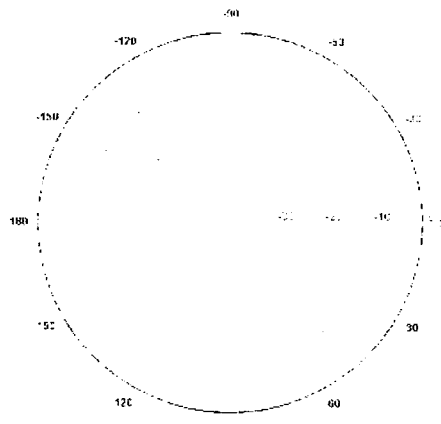
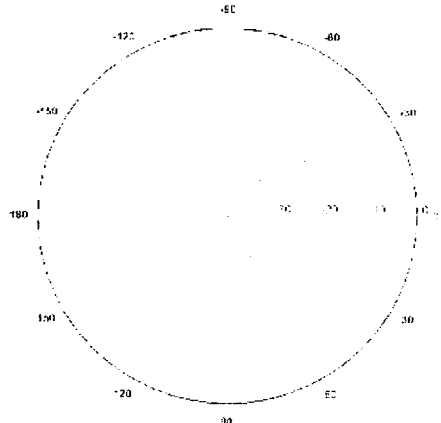
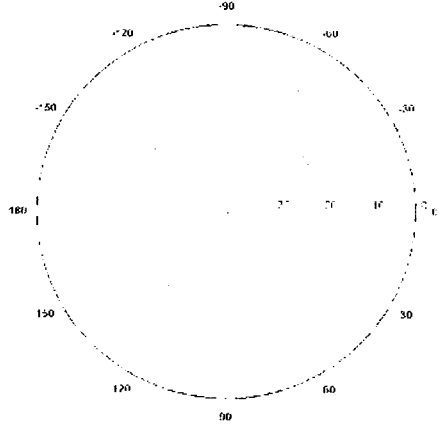


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: AT&T's Antenna Model Data Sheets and Electrical Patterns

700 MHz Manufacturer: KMW Model #: AM-X-CD-16-65-00T-RET Frequency Band: 698-894 MHz Gain: 13.4 dBd Vertical Beamwidth: 12.3° Horizontal Beamwidth: 65° Polarization: Dual Slant $\pm 45^\circ$ Size L x W x D: 72.0" x 11.8" x 5.9"	
850 MHz Manufacturer: Powerwave Model #: 7750.00 Frequency Band: 824-896 MHz Gain: 12.5 dBd Vertical Beamwidth: 14.9° Horizontal Beamwidth: 69° Polarization: Dual Linear $\pm 45^\circ$ Size L x W x D: 63.0" x 11.0" x 4.0"	
1900 MHz Manufacturer: Powerwave Model #: 7750.00 Frequency Band: 1850-1990 MHz Gain: 15.6 dBd Vertical Beamwidth: 6.6° Horizontal Beamwidth: 65° Polarization: Dual Linear $\pm 45^\circ$ Size L x W x D: 63.0" x 11.0" x 4.0"	



Structural Components, LLC
2400 Central Ave.
Suite A-1 South
Boulder, CO 80301

Voice: 866-386-7622
Fax: 303-962-3577

April 26, 2012

Jason R. Mead
Centek Engineering, Inc.
63-2 North Branford Rd
Branford, CT 06405

Re: Structural Analysis Report
Structure: 98ft Monopole
Site Address: 69 Wheeler St, New Haven, CT 06512
Lat: 41 17 45.45N, 72 53 52.49W
Site Name: 69 Wheeler St
Site Number: 11118.CO10 – CT2037
SC Number: 120229
Status: **Passes with completed modifications (96% Capacity)**

Dear Mr. Mead:

Per your request, Structural Components, LLC has completed a structural analysis for the above referenced project to verify the tower's compliance to the following design criteria:

Standard:	TIA/EIA-222-F <i>Structural Standards for Steel Antenna Towers and Antenna Supporting Structures</i>
Building Code:	2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)
Design Basic Wind Speed without Ice:	90 mph fastest mile (Per Appendix K of the 2005 CT Building Code Supplement)
Design Basic Wind Speed with Ice:	78 mph fastest mile
Ice Thickness:	1/2" radial
Serviceability Basic Wind Speed:	50 mph fastest mile
Allowable Stress Increase:	1.33

Please refer to the following structural analysis report, which gives complete details of the tower loading, results, information provided, modifications required and necessary assumptions.

We trust you find this report satisfactory. Please do not hesitate to contact us if you should have any questions or concerns.

Best Regards,
Structural Components LLC


5-2-2012

Ryan Guerrero
Structural Engineering Mgr.



Reviewed by:
Carlo F. Centore, P.E.
Centek Engineering, Inc.
License: CT PE #0016694
Expires: 01/31/2013

1 LOADING CONFIGURATION

The following antennas, mounts, transmission lines, and other appurtenances were considered for the structural analysis.

Elev. (ft) ⁽¹⁾	Appurtenance	Line	I/O ⁽²⁾	Notes
98.0	(6) APX16DWV-16DWVS-E-A20 (6) ATMAA1412	(12) 1-5/8"	I	T-Mobile
97.0	(1) LP Platform			
94.0	(6) RRUS-11 (1) DC6 Surge Arrestor (1) Tri Bracket	(2) #8 copper (1) RG6 Fiber	I	AT&T Proposed
91.5	(2) AM-X-CD-16-65-00T-RET (1) AM-X-CD-14-65-00T-RET (3) Powerwave 7770 (6) LGP21401 (3) T-Arm			
91.5	(3) 7750.00 (6) LGP219 Diplexer	(12) 7/8"	I	AT&T Existing
82.0	(2) ANT-18G-2-C	(1) 2" Conduit (1) 1/2"	I	Clearwire
80.0	(3) LLPX310R (3) RRUS-11			
80.0	(11) DB844G45ZAXY	(12) 1-5/8"	I	Nextel
78.0	(3) T-Arms			

- 1) Elevations reference centerline of panel, yagi, and dish antennas, and base of whip antennas, in relation to the base of the tower.
- 2) All lines are located within the monopole (I) and have been considered as fully shielded from the wind.
- 3) The loading listed in the above table reflects the final appurtenance configuration as provided by Centek Engineering and may not reflect the current tower loading.
- 4) The proposed monopole reinforcement has also been included in the wind loading of the tower from 0-70ft.

3 PROVIDED INFORMATION AND ASSUMPTIONS

Information about the tower was provided by Centek Engineering.. Structural Components, LLC visited the site on 3/26/2012.

Data	Document	Author	Date	File
Tower	Mapping Report tnxTower Analysis	Structural Components, LLC Centek Engineering, Inc.	03/27/2012 2/20/2012	120229 11118.CO10- CT2037
Existing and Proposed Loads	tnxTower Analysis	Centek Engineering, Inc.	02/20/2012	11118.CO10- CT2037
Foundation	Structural Analysis Report	All Points Technology	12/10/2008	CT198740
Soils	Not Provided	---	---	---

The following assumptions were made in order to complete the analysis. These assumptions must be checked. If they do not accurately represent the existing or proposed tower, foundation, soil, and loading conditions, we must be notified so that we can make the appropriate changes to our analysis, conclusions, and recommendations.

1. The tower and foundation are constructed as shown in the provided drawings, previous structural analysis reports, mapping reports, photos, and/or other documents.
2. The tower and foundation are in good condition with no corrosion, damage or fatiguing which could reduce the carrying capacity of the tower.
3. The tower has been properly maintained in accordance with industry standards.
4. The tower and foundation have not been modified except as indicated in the provided information or in this report.
5. The foundation was properly designed and constructed for the original design reactions.

4 REQUIRED STRUCTURAL MODIFICATIONS

Provided the assumptions outlined are accurate, we recommend the following modifications:

1. Install (4) Switchblade with 2-3/4" anchor rod base terminations from 0-20ft.
2. Install (3) sides of Switchblade monopole reinforcement from 20ft to 70ft.

Once the above upgrades are completed, the tower will be in structural compliance with the proposed antenna installation.

See Appendix C for Modification Drawings.

5 CONCLUSIONS

With the proposed loadings listed and the installed required structural modifications as outlined the tower and foundations satisfy the structural strength requirements of the standards and codes listed.

A passing letter of structural compliance with the standards and codes will be provided upon Structural Components review and approval of the completed structure.

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	Page
	SC #120229	2 of 18
	Project 98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date 14:55:17 04/26/12
	Client Centek	Designed by kjackson

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L4	48.680-20.000	28.680	0.000	18	24.313	30.020	0.349	1.396	A572-65 (65 ksi)
L5	20.000-0.000	20.000		18	30.020	34.000	0.380	1.520	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ³	w in	w/t
L1	12.947	9.919	195.801	4.438	6.477	30.230	391.859	4.960	1.804	7.216
L2	16.755	12.894	430.174	5.769	8.382	51.321	860.915	6.448	2.464	9.856
	16.755	9.708	326.368	5.791	8.382	38.937	653.165	4.855	2.574	13.728
	20.380	11.833	590.961	7.058	10.196	57.963	1182.699	5.917	3.202	17.079
L3	20.380	20.306	1000.292	7.010	10.196	98.111	2001.900	10.155	2.962	9.142
	24.688	24.669	1793.534	8.516	12.351	145.215	3589.427	12.337	3.709	11.447
L4	24.688	26.545	1925.890	8.507	12.351	155.932	3854.314	13.275	3.665	10.501
	30.483	32.867	3655.665	10.533	15.250	239.713	7316.140	16.437	4.669	13.379
L5	30.483	35.749	3967.917	10.522	15.250	260.189	7941.055	17.878	4.615	12.144
	34.525	40.550	5790.567	11.935	17.272	335.257	11588.754	20.279	5.315	13.987

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 98.000-88.000				1	1	1		
L2 88.000-70.000				1	1	1		
L3 70.000-48.680				1	1	1		
L4 48.680-20.000				1	1	1		
L5 20.000-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight klf
RG6-Fiber (AT&T - Propsoed)	C	No	Inside Pole	88.000 - 3.000	1	No Ice	0.000	0.001
#8 AWG Copper Wire (AT&T - Propsoed)	C	No	Inside Pole	88.000 - 3.000	2	1/2" Ice	0.000	0.001
1 5/8 (T-Mobile - Existing)	C	No	Inside Pole	98.000 - 0.000	12	No Ice	0.000	0.000
7/8 (AT&T - Existing)	C	No	Inside Pole	88.000 - 0.000	12	1/2" Ice	0.000	0.001
1 5/8 (Nextel - Existing)	C	No	Inside Pole	79.000 - 0.000	12	No Ice	0.000	0.001
1/2	C	No	Inside Pole	79.000 - 0.000	2	1/2" Ice	0.000	0.001
						No Ice	0.000	0.000

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	4 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
	Client	Centek	Designed by	kjackson

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
(2) APX16DWV-16DWVS-E-A 20 (T-Mobile - Existing)	A	From Face	3.000 0.000 0.000	0.000	98.000	No Ice 1/2" Ice	7.065 7.516	2.150 2.490	0.041 0.074
(2) APX16DWV-16DWVS-E-A 20 (T-Mobile - Existing)	B	From Face	3.000 0.000 0.000	0.000	98.000	No Ice 1/2" Ice	7.065 7.516	2.150 2.490	0.041 0.074
(2) APX16DWV-16DWVS-E-A 20 (T-Mobile - Existing)	C	From Face	3.000 0.000 0.000	0.000	98.000	No Ice 1/2" Ice	7.065 7.516	2.150 2.490	0.041 0.074
(2) ATMAA1412D-1A20 TMA (T-Mobile - Existing)	A	From Face	3.000 0.000 0.000	0.000	98.000	No Ice 1/2" Ice	1.167 1.314	0.467 0.575	0.013 0.021
(2) ATMAA1412D-1A20 TMA (T-Mobile - Existing)	B	From Face	3.000 0.000 0.000	0.000	98.000	No Ice 1/2" Ice	1.167 1.314	0.467 0.575	0.013 0.021
(2) ATMAA1412D-1A20 TMA (T-Mobile - Existing)	C	From Face	3.000 0.000 0.000	0.000	98.000	No Ice 1/2" Ice	1.167 1.314	0.467 0.575	0.013 0.021
EEI 14-ft Low Profile Platform (T-Mobile - Existing)	A	None		0.000	97.000	No Ice 1/2" Ice	16.500 20.000	16.500 20.000	1.550 1.800
*** (2) RRUS-11 (AT&T - Proposed)	A	From Face	0.000 0.000 0.000	0.000	94.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070
(2) RRUS-11 (AT&T - Proposed)	B	From Face	0.000 0.000 0.000	0.000	94.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070
(2) RRUS-11 (AT&T - Proposed)	C	From Face	0.000 0.000 0.000	0.000	94.000	No Ice 1/2" Ice	2.994 3.226	1.246 1.412	0.050 0.070
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	C	From Face	0.000 0.000 0.000	0.000	94.000	No Ice 1/2" Ice	2.228 2.447	2.228 2.447	0.020 0.039
Valmont Uni-Tri Bracket (AT&T - Proposed)	C	None		0.000	94.000	No Ice 1/2" Ice	1.750 1.940	1.750 1.940	0.290 0.306
AM-X-CD-16-65-00T-RET (AT&T - Proposed)	A	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	6.652 7.088	4.132 4.537	0.033 0.075
AM-X-CD-16-65-00T-RET (AT&T - Proposed)	B	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	6.652 7.088	4.132 4.537	0.033 0.075
AM-X-CD-14-65-00T-RET (AT&T - Proposed)	C	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	5.507 5.899	2.828 3.137	0.036 0.068
7750.00 (AT&T - Existing)	A	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
7750.00 (AT&T - Existing)	B	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068
7750.00 (AT&T - Existing)	C	From Face	3.000 0.000 0.000	0.000	91.500	No Ice 1/2" Ice	5.882 6.314	2.928 3.273	0.035 0.068

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	Page
	SC #120229	6 of 18
	Project 98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date 14:55:17 04/26/12
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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CAA Front ft ²	CAA Side ft ²	Weight K
Valmont T-Arm (3) (Nextel - Existing)	C	None		0.000	78.000	No Ice 1/2" Ice	21.000 29.000	1.008 1.236

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K
ANT-18G-2-C (Clearwire - Existing)	A	Paraboloid w/Radome	From Face	1.000 0.000 0.000	Worst		82.000	2.500	No Ice 1/2" Ice	4.910 5.240 0.040 0.070
ANT-18G-2-C (Clearwire - Existing)	C	Paraboloid w/Radome	From Face	1.000 0.000 0.000	Worst		82.000	2.500	No Ice 1/2" Ice	4.910 5.240 0.040 0.070

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	8 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
	Client	Centek	Designed by	kjackson

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	98 - 88	72.763	11	6.620	0.007
L2	88 - 70	59.040	11	6.488	0.007
L3	70 - 48.68	36.758	11	5.150	0.005
L4	48.68 - 20	17.282	11	3.528	0.002
L5	20 - 0	2.744	11	1.327	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
98.000	(2) APX16DWV-16DWVS-E-A20	11	72.763	6.620	0.007	2899
97.000	EEI 14-ft Low Profile Platform	11	71.377	6.619	0.007	2899
94.000	(2) RRUS-11	11	67.227	6.607	0.008	2899
91.500	AM-X-CD-16-65-00T-RET	11	63.790	6.578	0.008	2232
82.000	ANT-18G-2-C	11	51.145	6.157	0.007	1027
80.000	(3) DB844G45ZAXY	11	48.602	6.008	0.007	936
78.000	Valmont T-Arm (3)	11	46.111	5.847	0.006	860

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
L1	98 - 97	TP16.5x12.75x0.25	10.000	0.000	0.0	39.000	10.216	-0.187	398.436	0.000
	97 - 96					39.000	10.514	-1.678	410.041	0.004
	96 - 95					39.000	10.811	-1.722	421.646	0.004
	95 - 94					39.000	11.109	-1.768	433.251	0.004
	94 - 93					39.000	11.407	-2.330	444.856	0.005
	93 - 92					39.000	11.704	-2.378	456.461	0.005
	92 - 91					39.000	12.002	-3.520	468.066	0.008
	91 - 90					39.000	12.299	-3.572	479.671	0.007
	90 - 89					39.000	12.597	-3.624	491.276	0.007
	89 - 88					39.000	12.894	-3.678	502.881	0.007
L2	88 - 87	TP20.07x16.5x0.188	18.000	0.000	0.0	39.000	9.826	-3.739	383.214	0.010
	87 - 86					39.000	9.944	-3.801	387.818	0.010
	86 - 85					39.000	10.062	-3.864	392.421	0.010
	85 - 84					39.000	10.180	-3.928	397.024	0.010
	84 - 83					39.000	10.298	-3.992	401.628	0.010
	83 - 82					39.000	10.416	-4.058	406.231	0.010
	82 - 81					39.000	10.534	-4.161	410.834	0.010
	81 - 80					39.000	10.652	-4.229	415.437	0.010
	80 - 79					39.000	10.770	-4.392	420.041	0.010
	79 - 78					39.000	10.888	-4.466	424.644	0.011
	78 - 77					39.000	11.006	-5.449	429.247	0.013
	77 - 76					39.000	11.124	-5.528	433.851	0.013
	76 - 75					39.000	11.242	-5.608	438.454	0.013
	75 - 74					39.000	11.360	-5.690	443.057	0.013

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	10 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
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Section No.	Elevation ft	Size	L ft	L _n ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
	4 - 3					39.000	39.830	-16.227	1553.360	0.010
	3 - 2					39.000	40.070	-16.418	1562.720	0.011
	2 - 1					39.000	40.310	-16.610	1572.080	0.011
	1 - 0					39.000	40.550	-16.802	1581.440	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} F _{by}
L1	98 - 97	TP16.5x12.75x0.25	1.602	0.599	39.000	0.015	0.000	0.000	39.000	0.000
	97 - 96		4.204	1.484	39.000	0.038	0.000	0.000	39.000	0.000
	96 - 95		6.845	2.283	39.000	0.059	0.000	0.000	39.000	0.000
	95 - 94		9.527	3.008	39.000	0.077	0.000	0.000	39.000	0.000
	94 - 93		13.114	3.926	39.000	0.101	0.000	0.000	39.000	0.000
	93 - 92		16.734	4.756	39.000	0.122	0.000	0.000	39.000	0.000
	92 - 91		22.061	5.961	39.000	0.153	0.000	0.000	39.000	0.000
	91 - 90		29.079	7.479	39.000	0.192	0.000	0.000	39.000	0.000
	90 - 89		36.141	8.858	39.000	0.227	0.000	0.000	39.000	0.000
	89 - 88		43.248	10.112	39.000	0.259	0.000	0.000	39.000	0.000
L2	88 - 87	TP20.07x16.5x0.188	50.401	15.160	39.000	0.389	0.000	0.000	39.000	0.000
	87 - 86		57.598	16.914	39.000	0.434	0.000	0.000	39.000	0.000
	86 - 85		64.840	18.594	39.000	0.477	0.000	0.000	39.000	0.000
	85 - 84		72.126	20.204	39.000	0.518	0.000	0.000	39.000	0.000
	84 - 83		79.458	21.748	39.000	0.558	0.000	0.000	39.000	0.000
	83 - 82		86.834	23.228	39.000	0.596	0.000	0.000	39.000	0.000
	82 - 81		94.696	24.764	39.000	0.635	0.000	0.000	39.000	0.000
	81 - 80		102.553	26.225	39.000	0.672	0.000	0.000	39.000	0.000
	80 - 79		114.028	28.520	39.000	0.731	0.000	0.000	39.000	0.000
	79 - 78		125.547	30.720	39.000	0.788	0.000	0.000	39.000	0.000
	78 - 77		138.150	33.080	39.000	0.848	0.000	0.000	39.000	0.000
	77 - 76		150.798	35.342	39.000	0.906	0.000	0.000	39.000	0.000
	76 - 75		163.489	37.512	39.000	0.962	0.000	0.000	39.000	0.000
	75 - 74		176.224	39.595	39.000	1.015	0.000	0.000	39.000	0.000
	74 - 73		189.003	41.593	39.000	1.066	0.000	0.000	39.000	0.000
L3	73 - 72	TP24.313x20.07x0.324	201.826	43.511	39.000	1.116	0.000	0.000	39.000	0.000
	72 - 71		214.691	45.352	39.000	1.163	0.000	0.000	39.000	0.000
	71 - 70		227.600	47.120	39.000	1.208	0.000	0.000	39.000	0.000
	70 - 68.934		241.423	28.899	39.000	0.741	0.000	0.000	39.000	0.000
	68.934 - 67.868		255.324	29.919	39.000	0.767	0.000	0.000	39.000	0.000
	67.868 - 66.802		269.303	30.898	39.000	0.792	0.000	0.000	39.000	0.000
	66.802 - 65.736		283.362	31.840	39.000	0.816	0.000	0.000	39.000	0.000
	65.736 - 64.67		297.498	32.745	39.000	0.840	0.000	0.000	39.000	0.000
	64.67 - 63.604		311.715	33.616	39.000	0.862	0.000	0.000	39.000	0.000
	63.604 - 62.538		326.012	34.453	39.000	0.883	0.000	0.000	39.000	0.000
	62.538 - 61.472		340.388	35.259	39.000	0.904	0.000	0.000	39.000	0.000
	61.472 - 60.406		354.845	36.035	39.000	0.924	0.000	0.000	39.000	0.000
	60.406 - 59.34		369.383	36.781	39.000	0.943	0.000	0.000	39.000	0.000
	59.34 - 58.274		384.003	37.501	39.000	0.962	0.000	0.000	39.000	0.000
	58.274 -		398.703	38.194	39.000	0.979	0.000	0.000	39.000	0.000

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	12 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
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Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	12 - 11		1108.30 0	45.423	39.000	1.165	0.000	0.000	39.000	0.000
	11 - 10		1125.16 7	45.533	39.000	1.168	0.000	0.000	39.000	0.000
	10 - 9		1142.10 0	45.638	39.000	1.170	0.000	0.000	39.000	0.000
	9 - 8		1159.10 0	45.740	39.000	1.173	0.000	0.000	39.000	0.000
	8 - 7		1176.16 7	45.839	39.000	1.175	0.000	0.000	39.000	0.000
	7 - 6		1193.30 0	45.935	39.000	1.178	0.000	0.000	39.000	0.000
	6 - 5		1210.49 2	46.026	39.000	1.180	0.000	0.000	39.000	0.000
	5 - 4		1227.75 8	46.115	39.000	1.182	0.000	0.000	39.000	0.000
	4 - 3		1245.08 3	46.201	39.000	1.185	0.000	0.000	39.000	0.000
	3 - 2		1262.47 5	46.284	39.000	1.187	0.000	0.000	39.000	0.000
	2 - 1		1279.94 2	46.364	39.000	1.189	0.000	0.000	39.000	0.000
	1 - 0		1297.46 7	46.441	39.000	1.191	0.000	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	98 - 97	TP16.5x12.75x0.25	1.622	0.159	26.000	0.012	0.000	0.000	26.000	0.000
	97 - 96		2.621	0.249	26.000	0.019	0.000	0.000	26.000	0.000
	96 - 95		2.661	0.246	26.000	0.019	0.000	0.000	26.000	0.000
	95 - 94		2.702	0.243	26.000	0.019	0.000	0.000	26.000	0.000
	94 - 93		3.598	0.315	26.000	0.024	0.032	0.005	26.000	0.000
	93 - 92		3.641	0.311	26.000	0.024	0.032	0.004	26.000	0.000
	92 - 91		6.994	0.583	26.000	0.045	0.079	0.010	26.000	0.000
	91 - 90		7.040	0.572	26.000	0.044	0.000	0.000	26.000	0.000
	90 - 89		7.085	0.562	26.000	0.043	0.000	0.000	26.000	0.000
	89 - 88		7.131	0.553	26.000	0.043	0.000	0.000	26.000	0.000
L2	88 - 87	TP20.07x16.5x0.188	7.176	0.730	26.000	0.056	0.000	0.000	26.000	0.000
	87 - 86		7.221	0.726	26.000	0.056	0.000	0.000	26.000	0.000
	86 - 85		7.266	0.722	26.000	0.056	0.000	0.000	26.000	0.000
	85 - 84		7.311	0.718	26.000	0.055	0.000	0.000	26.000	0.000
	84 - 83		7.356	0.714	26.000	0.055	0.000	0.000	26.000	0.000
	83 - 82		7.401	0.711	26.000	0.055	0.000	0.000	26.000	0.000
	82 - 81		7.838	0.744	26.000	0.057	0.249	0.032	26.000	0.001
	81 - 80		7.883	0.740	26.000	0.057	0.249	0.031	26.000	0.001
	80 - 79		11.499	1.068	26.000	0.082	0.427	0.052	26.000	0.002
	79 - 78		11.545	1.060	26.000	0.082	0.427	0.051	26.000	0.002
	78 - 77		12.630	1.147	26.000	0.088	0.427	0.050	26.000	0.002
	77 - 76		12.674	1.139	26.000	0.088	0.427	0.049	26.000	0.002
	76 - 75		12.718	1.131	26.000	0.087	0.427	0.048	26.000	0.002
	75 - 74		12.762	1.123	26.000	0.086	0.427	0.047	26.000	0.002
	74 - 73		12.806	1.116	26.000	0.086	0.427	0.046	26.000	0.002
	73 - 72		12.849	1.108	26.000	0.085	0.427	0.045	26.000	0.002

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	Page
	SC #120229	14 of 18
	Project 98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date 14:55:17 04/26/12
	Client Centek	Designed by kjackson

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L5	24.302	TP34x30.02x0.38	16.084	0.499	26.000	0.038	0.424	0.011	26.000	0.000
	24.302 - 22.868									
	22.868 - 21.434									
	21.434 - 20									
	20 - 19									
	19 - 18									
	18 - 17									
	17 - 16									
	16 - 15									
	15 - 14									
	14 - 13									
	13 - 12									
	12 - 11									
	11 - 10									
	10 - 9									
	9 - 8									
	8 - 7									
	7 - 6									
	6 - 5									
	5 - 4									
	4 - 3									
	3 - 2									
	2 - 1									
	1 - 0									

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P P_a	Ratio f_{bx} F_{bx}	Ratio f_{by} F_{by}	Ratio f_v F_v	Ratio f_{vt} F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	98 - 97	0.000	0.015	0.000	0.012	0.000	0.016	1.333	H1-3+VT ✓
	97 - 96	0.004	0.038	0.000	0.019	0.000	0.042	1.333	H1-3+VT ✓
	96 - 95	0.004	0.059	0.000	0.019	0.000	0.063	1.333	H1-3+VT ✓
	95 - 94	0.004	0.077	0.000	0.019	0.000	0.081	1.333	H1-3+VT ✓
	94 - 93	0.005	0.101	0.000	0.024	0.000	0.106	1.333	H1-3+VT ✓
	93 - 92	0.005	0.122	0.000	0.024	0.000	0.127	1.333	H1-3+VT ✓
	92 - 91	0.008	0.153	0.000	0.045	0.000	0.161	1.333	H1-3+VT ✓
	91 - 90	0.007	0.192	0.000	0.044	0.000	0.200	1.333	H1-3+VT ✓
	90 - 89	0.007	0.227	0.000	0.043	0.000	0.235	1.333	H1-3+VT ✓
	89 - 88	0.007	0.259	0.000	0.043	0.000	0.267	1.333	H1-3+VT ✓

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	16 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
	Client	Centek	Designed by	kjackson

Section No.	Elevation ft	Ratio P P_a	Ratio f_{bx} F_{bx}	Ratio f_{by} F_{by}	Ratio f_v F_v	Ratio f_{vt} F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	61.472 - 60.406	0.008	0.924	0.000	0.047	0.001	0.933	1.333	H1-3+VT ✓
	60.406 - 59.34	0.008	0.943	0.000	0.047	0.001	0.952	1.333	H1-3+VT ✓
	59.34 - 58.274	0.008	0.962	0.000	0.047	0.001	0.971	1.333	H1-3+VT ✓
	58.274 - 57.208	0.008	0.979	0.000	0.046	0.001	0.988	1.333	H1-3+VT ✓
	57.208 - 56.142	0.009	0.996	0.000	0.046	0.001	1.006	1.333	H1-3+VT ✓
	56.142 - 55.076	0.009	1.013	0.000	0.046	0.001	1.022	1.333	H1-3+VT ✓
	55.076 - 54.01	0.009	1.029	0.000	0.046	0.001	1.038	1.333	H1-3+VT ✓
	54.01 - 52.944	0.009	1.044	0.000	0.046	0.001	1.053	1.333	H1-3+VT ✓
	52.944 - 51.878	0.009	1.059	0.000	0.046	0.001	1.068	1.333	H1-3+VT ✓
	51.878 - 50.812	0.009	1.073	0.000	0.045	0.001	1.083	1.333	H1-3+VT ✓
	50.812 - 49.746	0.009	1.087	0.000	0.045	0.001	1.097	1.333	H1-3+VT ✓
	49.746 - 48.68	0.009	1.100	0.000	0.045	0.001	1.110	1.333	H1-3+VT ✓
L4	48.68 - 47.246	0.008	1.041	0.000	0.042	0.001	1.050	1.333	H1-3+VT ✓
	47.246 - 45.812	0.009	1.056	0.000	0.041	0.001	1.065	1.333	H1-3+VT ✓
	45.812 - 44.378	0.009	1.070	0.000	0.041	0.001	1.079	1.333	H1-3+VT ✓
	44.378 - 42.944	0.009	1.084	0.000	0.041	0.001	1.093	1.333	H1-3+VT ✓
	42.944 - 41.51	0.009	1.097	0.000	0.041	0.001	1.106	1.333	H1-3+VT ✓
	41.51 - 40.076	0.009	1.109	0.000	0.041	0.001	1.119	1.333	H1-3+VT ✓
	40.076 - 38.642	0.009	1.121	0.000	0.040	0.001	1.130	1.333	H1-3+VT ✓
	38.642 - 37.208	0.009	1.132	0.000	0.040	0.001	1.142	1.333	H1-3+VT ✓
	37.208 - 35.774	0.009	1.143	0.000	0.040	0.000	1.152	1.333	H1-3+VT ✓
	35.774 - 34.34	0.009	1.153	0.000	0.040	0.000	1.163	1.333	H1-3+VT ✓
	34.34 - 32.906	0.009	1.163	0.000	0.040	0.000	1.172	1.333	H1-3+VT ✓
	32.906 - 31.472	0.010	1.172	0.000	0.039	0.000	1.182	1.333	H1-3+VT ✓
	31.472 - 30.038	0.010	1.181	0.000	0.039	0.000	1.191	1.333	H1-3+VT ✓
	30.038 - 28.604	0.010	1.189	0.000	0.039	0.000	1.199	1.333	H1-3+VT ✓

tnxTower Structural Components, LLC 2400 Central Ave. Suite A-1 South Boulder, CO 80301 Phone: (800) 584-8839 FAX: (303) 962-3577	Job	SC #120229	Page	18 of 18
	Project	98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date	14:55:17 04/26/12
	Client	Centek	Designed by	kjackson

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

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF* P_{allow} K	% Capacity	Pass Fail
L1	98 - 88	Pole	TP16.5x12.75x0.25	1	-3.678	670.340	20.0	Pass
L2	88 - 70	Pole	TP20.07x16.5x0.188	2	-6.031	615.139	91.8	Pass
L3	70 - 48.68	Pole	TP24.313x20.07x0.324	3	-8.691	1282.489	83.3	Pass
L4	48.68 - 20	Pole	TP30.02x24.313x0.349	4	-13.114	1708.679	93.2	Pass
L5	20 - 0	Pole	TP34x30.02x0.38	5	-16.802	2108.059	90.2	Pass
							Summary	
							Pole (L4)	93.2 Pass
							RATING =	93.2 Pass

Structural Components, LLC

By: Rguerrero
Date: 4/26/2012
Principal: CC

Job #: 120229
Project: 11118.CO10
Client: Centek

Sheet:
Subject:

Monopole Splice Calculator
Assumptions / Criteria

ASCE/SEI 48-05

ALSC

TIA

Notes:

Anchor bolt stress for TIA-222-G assumes detail type d connection per figure 4-4. Free length between concrete and leveling nut does not exceed 1" bolt diameter.

Splice at 88ft

Height feet	bolt dia. in	bolt circle dia in	fy ksi	fu ksi	Per Piece A reinf only in ²	Per Piece Ix reinf only in ⁴	quantity n	dist centroid to centroid in	dist centroid to outer reinf. Fiber in	Properties Ax total in ²	Ix total in ⁴	Sx total in ³	LRFD Mmax k-ft	ASD Mmax k-ft	4/3rds Mmax k-ft
							12	12.875	0.5	7.27	603.06	45.09	287.44	191.63	255.50
							0	15.125	1.375	0.00	0.00	0.00	0.00	0.00	0.00
							12	15.125	1.375	7.27	603.06	36.55	287.44	191.63	255.50

Max usable reinf stress 75.00 ksi **O.K.** "only applies when reinforcement anchor rods are installed"

Moment required 43.3 k-ft

Axial required 3.7 k

Shear required 7.2 k

	LRFD	LRFD
Ω	2.00	φ
Allowable Stress	1.33	φ _t
Axial Max Bolt	41.2 k	Axial Max Bolt
Axial Max reinf	374.6 k	Axial Max reinf
Shear Max Bolt	24.2 k	Shear Max Bolt
Stress at Bolt	19.2 ksi	Stress at Bolt
Stress at reinf	0.0 ksi	Stress at reinf
Axial to Bolt	7.0 k	Axial to Bolt
Axial to reinf	0.0 k	Axial to reinf
Shear to Bolt	0.6 k	Shear to Bolt

Splice Plate Analysis

Odd/Even Active Bolt #

Round or Square 1 (round=1,square=0)

Plate Thickness 1.5 in

Pole Base Diameter 16.5 in

Plate Yield 60 ksi

Bendline 19.77 in

Odd TRUE

Even TRUE

1 (round=1,square=0)

1.5 in

16.5 in

60 ksi

19.77 in

ASD Ratings

Plate	12%
Bolt	20%
Reinforcement	N/A

2.2 ksi

40.0 ksi

0.055

ASD

Bending Stress

Allowable Stress

Ratio

0.113

APPENDIX B

Data Provided for Analysis

<i>RISATower</i> Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	Page
	11118.CO10 - CT2037	18 of 19
	Project 98-ft EEI Monopole - 69 Wheeler St., New Haven, CT	Date 16:40:50 02/20/12
	Client AT&T	Designed by TJL

Pole Design Data

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P	Allow. P _a	Ratio P
	ft		ft	ft		ksi	in ²	K	K	P _a
L1	98 - 88 (1)	TP16.5x12.75x0.188	10.000	0.000	0.0	39.000	9.708	-3.504	378.611	0.009
L2	88 - 45.67 (2)	TP25.16x16.5x0.188	42.330	0.000	0.0	39.000	14.415	-7.969	562.182	0.014
L3	45.67 - 0 (3)	H1-3+VT (1.86 CR) - 2 TP34x24.034x0.25 H1-3+VT (1.76 CR) - 3	49.340	0.000	0.0	39.000	26.781	-15.013	1044.440	0.014

Pole Bending Design Data

Section No.	Elevation	Size	Actual M _x	Actual f _{bx}	Allow. F _{bx}	Ratio f _{bx}	Actual M _y	Actual f _{by}	Allow. F _{by}	Ratio f _{by}
	ft		kip-ft	ksi	ksi	F _{bx}	kip-ft	ksi	ksi	F _{by}
L1	98 - 88 (1)	TP16.5x12.75x0.188	44.541	13.727	39.000	0.352	0.000	0.000	39.000	0.000
L2	88 - 45.67 (2)	TP25.16x16.5x0.188	517.423	72.058	39.000	1.848	0.000	0.000	39.000	0.000
L3	45.67 - 0 (3)	TP34x24.034x0.25	1267.19	68.149	39.000	1.747	0.000	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation	Size	Actual V	Actual f _v	Allow. F _v	Ratio f _v	Actual T	Actual f _{vt}	Allow. F _{vt}	Ratio f _{vt}
	ft		K	ksi	ksi	F _v	kip-ft	ksi	ksi	F _{vt}
L1	98 - 88 (1)	TP16.5x12.75x0.188	7.361	0.758	26.000	0.058	0.032	0.005	26.000	0.000
L2	88 - 45.67 (2)	TP25.16x16.5x0.188	14.179	0.984	26.000	0.076	0.529	0.036	26.000	0.001
L3	45.67 - 0 (3)	TP34x24.034x0.25	16.202	0.605	26.000	0.047	0.524	0.014	26.000	0.001

Pole Interaction Design Data

Section No.	Elevation	Ratio P	Ratio f _{bx}	Ratio f _{by}	Ratio f _v	Ratio f _{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	ft	P _a	F _{bx}	F _{by}	F _v	F _{vt}			
L1	98 - 88 (1)	0.009	0.352	0.000	0.058	0.000	0.362	1.333	H1-3+VT ✓
L2	88 - 45.67 (2)	0.014	1.848	0.000	0.076	0.001	1.863 ✗	1.333	H1-3+VT ✗
L3	45.67 - 0 (3)	0.014	1.747	0.000	0.047	0.001	1.762 ✗	1.333	H1-3+VT ✗

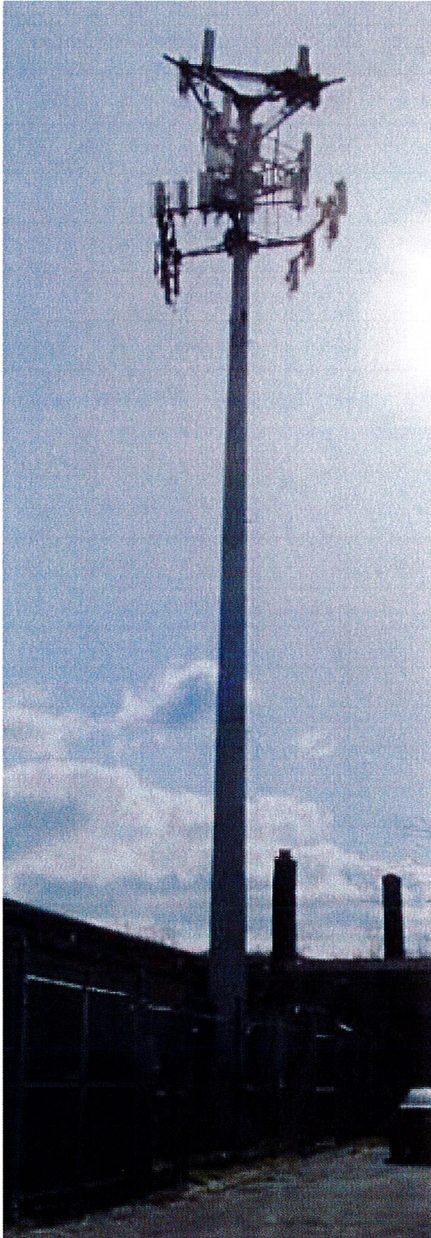
Section Capacity Table



**Structural
Components**
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Structural Components, LLC Voice: 720-304-8839
2400 Central Ave, Suite A-1 South Fax: 720-489-3764
Boulder, CO 80301

**MONOPOLE
PRE-CONSTRUCTION AND TIA INSPECTION REPORT**



**69 Wheeler Street
Site # 11118 CO10**

PREPARED FOR:
CEN TEK engineering

PREPARED BY:
Jeff Ham
Field Engineer
Structural Components, LLC
SC Job # 120229

DATE:
March 27, 2012





2400 Central Ave, Suite A-1 South

Boulder, CO 80301

PH: 720-489-3764

CLIENT:	Centek Engineering	DATE AT SITE:	3/26/2012
SITE (ID):	69 Wheeler Street - 11118 CO10	TOWER TYPE:	18 Sided Monopole
ADDRESS:	69 Wheeler Street	TOWER HEIGHT:	98.0'
	New Haven, CT 06512	WEATHER:	Sun, 50°F, 20-30 mph NW wind
LEAD:	Jeff Ham	SUPPORT:	Ryan Hubert

1. TOWER MAST

- * Section 3 is 0.259" thk, not 0.188" as listed in structural analysis.
- * See "Monopole Details" page for complete tower mast information.

2. ANTENNA INFORMATION

- * Antenna and mount elevations vary slightly from what is listed in structural analysis.
- * T-Mobile has (18) 1-1/4" TX lines, not (12) as listed in structural analysis.
- * Nextel has (4) 1/2" TX lines, not (2) as listed in structural analysis.
- * Clearwire has (2) 2-3/8" OD conduit lines, not (1) as listed in structural analysis.
- * T-Mobile has (9) TMSs at 98', not (6) as listed in structural analysis.
- * Lightning rod and Omni at 88' are not listed in structural analysis.
- * AT&T antennas are mounted on a low profile platform and not t-arms as listed in structural analysis.
- * See "Antenna and Coax" sheets for complete line and antenna information.

3. FOUNDATION INFORMATION

- * Not requested to complete full foundation mapping.
- * Size of foundation above grade verified at site visit.

4. SOILS INFORMATION

- * Not requested to complete geotechnical investigation.
- * No soil information provided by client

5. SITE CONSTRAINTS

- * Site is easily accessible.
- * Compound has little extra space, work around base of tower may be difficult.

6. PROPOSED REINFORCEMENT

- * (3) Faces of Switchblade Reinforcement with base terminations from 0' to 70'.

7. REINFORCEMENT CONSTRAINTS

- * Portholes on faces 3, 4, 5, 8, 9, 12, 13, 14, 17, and 18 make these faces unusable.
- * Faces 1, 2, 6, 7, 10, 11, 15, and 16 are open for Switchblade Reinforcement with limited obstructions.
- * See "Monopole Obstructions" sheet for complete details.

8. TIA/MAINTENANCE ISSUES

- * Full TIA Inspection completed at site visit.
- * See "TIA/Maintenance Issues" sheet for complete details.

2400 Central Ave, Suite A-1 South Boulder, CO 80301 PH: 720-489-3764

CLIENT:	Centek Engineering	DATE AT SITE:	3/26/2012
SITE (ID):	69 Wheeler Street - 11118 CO10	TOWER TYPE:	18 Sided Monopole
ADDRESS:	69 Wheeler Street	TOWER HEIGHT:	98.0'
	New Haven, CT 06512	WEATHER:	Sun, 50°F, 20-30 mph NW wind
LEAD:	Jeff Ham	SUPPORT:	Ryan Hubert

ISSUE #7: Lightning rod is not tallest appurtenance on tower.
RECOMMENDATION: Move existing 6' x 1/2" lightning rod to top of tower.

PHOTO #: 139



ISSUE #8: No locking devise on anchor rods.
RECOMMENDATION: Install second nut on top of existing anchor rod nut.

PHOTO #: 130



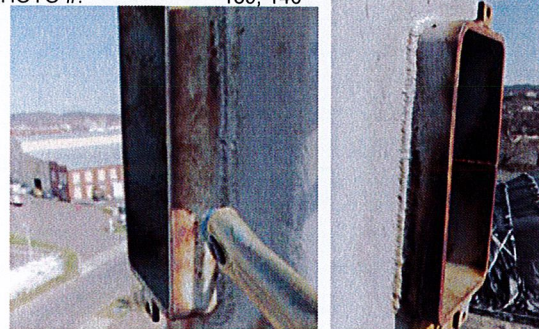
ISSUE #9: Missing step peg at 70'.
RECOMMENDATION: Install new step peg to bracket at 70'.

PHOTO #: 141



ISSUE #10: Level II rust on ports at 70' 6".
RECOMMENDATION: Remove rust with wire brush or similar. Cold-galvanize affected areas with minimum (2) coats of 95% ZRC paint.

PHOTO #: 139, 140



ISSUE #
RECOMMENDATION:
PHOTO #:

ISSUE #
RECOMMENDATION:
PHOTO #:



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MONOPOLE DETAILS

2400 Central Ave, Suite A-1 South Boulder, CO 80301 PH: 720-489-3764

CLIENT:	Centek Engineering	DATE AT SITE:	3/26/2012
SITE (ID):	69 Wheeler Street - 11118 CO10	TOWER TYPE:	18 Sided Monopole
ADDRESS:	69 Wheeler Street	TOWER HEIGHT:	98.0'
	New Haven, CT 06512	WEATHER:	Sun, 50°F, 20-30 mph NW wind
LEAD:	Jeff Ham	SUPPORT:	Ryan Hubert

SPLICE ELEVATIONS TAKEN WITH:	LASER	TAPE MEASURE
SHAFT THICKNESSES TAKEN WITH:	THICKNESS GAUGE	CALIPERS

SECTION DETAILS

Shaft Section (Top to bottom)	Bottom Elevation (ft)	Top Elevation (ft)	Section Length (ft)	Overlap At Top* (in)	Thickness (in)	Diameter (F/F)	
						Bottom (in)	Top (in)*
1	88.00	98.00	10.00	N/A	0.259	16.00	13.00
2	45.50	88.00	42.50	N/A	0.194	25.43	16.50
3	0.00	48.68	48.68	38.15	0.259	34.00	24.77

* This information was not verified in the field. The overlap is assumed to be 1.5 times the diameter at the splice elevation.

BASEPLATE DETAILS

Plate Shape	Outer Width	Corner Length	Thickness	ID Plate	Grout Yes/No	Void or Grout Space
Round	48"	N/A	1-1/2"	24"	Yes	4-1/4"

ANCHOR ROD DETAILS

Quantity	Diameter	Type	Bolt Circle	c/c Spacing	Symmetric or Corners
6	2-1/4"	Unk.	42"	21-1/2"	Symmetric

TOP FLANGE PLATE DETAILS

Elevation	Plate Shape	OD Plate	ID Plate	Thickness	# Holes	Hole Diameter	Hole Circle
88'	Circular	28-1/2"	Unk.	1-1/2"	12	1-1/8"	25-3/4"
98'	Circular	29"	Unk.	1"	24	1-1/8"	27-1/2"

PHOTO OF BASEPLATE

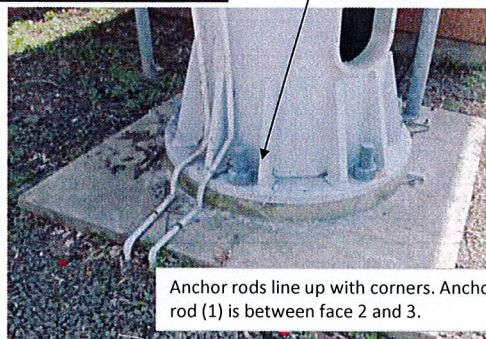


PHOTO OF TOP FLANGE



CLIENT: Centek Engineering

DATE AT SITE: 3/26/2012

SITE (ID): 69 Wheeler Street - 11118 CO10

TOWER TYPE: 18 Sided Monopole

ADDRESS: 69 Wheeler Street

TOWER HEIGHT: 98.0'

New Haven, CT 06512

WEATHER: Sun, 50°F, 20-30 mph NW wind

LEAD: Jeff Ham

SUPPORT: Ryan Hubert

COAX LAYOUT ON TOWER MAST

Clearwire

(2) 2-3/8" OD Conduit

(4) 1/2" TX

To: 79'

Nextel

(12) 7/8" TX

To: 79'

T-Mobile

(18) 1-1/4" TX

(1) 1/4" OD

To: 98'

AT&T

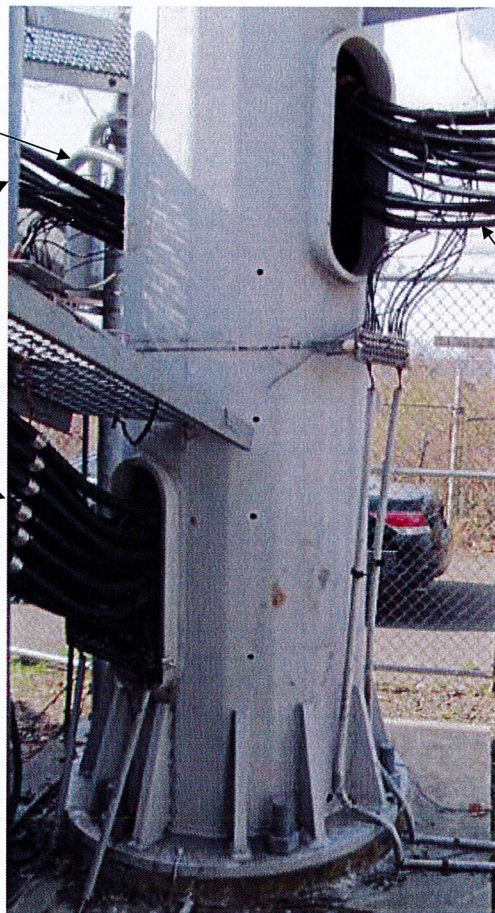
(12) 7/8" TX

To: 88'

Unknown Building

(1) 7/8" TX

To: 88'



PORT HOLE DETAILS

Elevation	Number	Face(s)	Dimensions	Weld Size	Occupied?	Photo #
3'	2	8/9, 17/18	32" x 12" x 4" x 1" thk	1/2"	Yes, No	28, 90
7-1/2'	2	3/4/5, 12/13/14	32" x 12" x 4" x 1" thk	1/2"	Yes	75, 92
70-1/2'	3	4/5/6, 10/11/12, 16/17/18	12" x 6" x 3" x 3/8" thk	1/4"	No	322
79-1/2'	3	4/5/6, 10/11/12, 16/17/18	9" x 6" x 3" x 1/2" thk	1/4"	Yes	283
89'	3	5/6, 11/12, 17/18/1	12" x 6" x 3" x 1/2" thk	1/4"	Yes	301
96'	3	5/6, 11/12, 17/18/2	12" x 6" x 3" x 1/2" thk	1/4"	Yes	180



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ANTENNA & COAX DETAILS

2400 Central Ave, Suite A-1 South

Boulder, CO 80301

PH: 720-489-3764

CLIENT: Centek Engineering
SITE (ID): 69 Wheeler Street - 11118 CO10
ADDRESS: 69 Wheeler Street
New Haven, CT 06512
LEAD: Jeff Ham

DATE AT SITE: 3/26/2012
TOWER TYPE: 18 Sided Monopole
TOWER HEIGHT: 98.0'
WEATHER: Sun, 50°F, 20-30 mph NW wind
SUPPORT: Ryan Hubert

ANTENNA HEIGHTS TAKEN WITH: TAPE

ANTENNA #: 7 PHOTO #: 69



ANTENNA #: 8 PHOTO #: 69



ANTENNA #: 3 PHOTO #: ##

ANTENNA #: PHOTO #:

ANTENNA #: PHOTO #:

ANTENNA #: PHOTO #:

Antenna #	Elevation (ft.)	Quantity	Appurtenance	Coax	Owner	Azimuth (°)
7	79.0	11	DB844H65E-XY Panels on (3) 12' t-arms	(12) 7/8" TX	Nextel	80/ 250/ 350
8	79.0	3	Argus LLPX310R-V1 Panels with (1) Samsung RHH TMA each on (3) 12' t-arms	(2) 2-3/8" Conduit	Clearwire	80/ 250/ 350

Elevations of panels and dishes are to center line of antenna, all others are to base of antenna.

**STRUCTURAL ANALYSIS REPORT
98' MONOPOLE TOWER
NEW HAVEN, CONNECTICUT
prepared for
Hudson Design Group, LLC**

EXECUTIVE SUMMARY:

All-Points Technology Corporation, P.C. (APT) performed a structural analysis of this 98-foot monopole tower located in New Haven, Connecticut. The analysis was performed for AT&T Mobility's proposed replacement of nine existing panel antennas currently installed on a 12' mounting platform at 88' with six antennas and associated equipment as detailed below. Waveguide cables are to be three additional 1-5/8" cables installed inside the pole. The analysis assumed that all antennas, mounts and feed lines currently installed at 70' will be removed.

Our analysis indicates the tower meets the requirements of the Connecticut State Building Code with the proposed antenna changes. The tower foundation was evaluated and found to be adequately sized.

INTRODUCTION:

A structural analysis of this communications tower was performed by APT for Hudson Design Group, LLC. The tower is located at 69 Wheeler Street in New Haven, Connecticut.

APT previously visited the tower site on November 21, 2006 to verify satisfactory completion of base plate reinforcement. This analysis also relied on information previously provided by T-Mobile, which included a structural analysis conducted by Tectonic Engineering Consultants dated May 3, 2002, and Engineered Endeavors Incorporated (EEI) design drawings.

The structure is a 98-foot galvanized steel, three section monopole manufactured by EEI. The analysis was conducted for the following antenna inventory (proposed changes in **bold text**):

Antenna	Elev.	Mount	Coax.
(6) DR65-19-00DPQ panels ¹	98'	14' low-profile platform	(12) 1-5/8"
(6) 7750 panels, (6) TMAs, (6) diplexers, (6) RETs ²	91'	12' platform w/rails	(12) 1-5/8"
8' x 2" omnidirectional whip	92'	On above platform	7/8"
(12) DB844G45 panels	80'	(3) 12' T-arms	(12) 1-1/4"

¹ Currently three panel antennas installed.

² Currently nine CSS DUO1417-8670 panels installed fed by nine 1-5/8" lines.

All-Points Technology Corporation

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North Conway, NH 03860
(603) 496-5853

3 Saddlebrook Drive
Killingworth, CT 06419
(860) 663-1697

Base reactions imposed with the proposed antenna changes were calculated to be as follows:

Compression:	11.5 kips
Total Shear:	11.8 kips
Overturning Moment:	860 ft-kips

CONCLUSIONS AND SUGGESTIONS:

As detailed above, our analysis indicates that the existing 98' monopole tower located at 69 Wheeler Street in New Haven, Connecticut meets the requirements of the Connecticut State Building Code with AT&T Mobility's proposed antenna and associated equipment changes.

LIMITATIONS:

This report is based on the following:

1. Tower is properly installed and maintained.
2. All members are in new condition.
3. All bolts are in place and are properly tightened.
4. Tower is in plumb condition.
5. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
6. Record drawings accurately reflect tower dimensions and height.

All-Points Technology Corporation, P.C. (APT) is not responsible for any modifications completed prior to or hereafter which APT is not or was not directly involved. Modifications include but are not limited to:

1. Adding or relocating antennas.
2. Installing antenna mounts or waveguide cables.
3. Reinforcing tower in any manner.
4. Extending tower.

APT hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon the information contained and set forth herein. If you are aware of any information which conflicts with that which is contained herein, or you are aware of any defects arising from original design, material, fabrication, or erection deficiencies, you should disregard this report and immediately contact APT. APT disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

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HUDSON DESIGN GROUP, LLC
98' MONOPOLE TOWER
NEW HAVEN, CONNECTICUT
AT&T SITE #2037

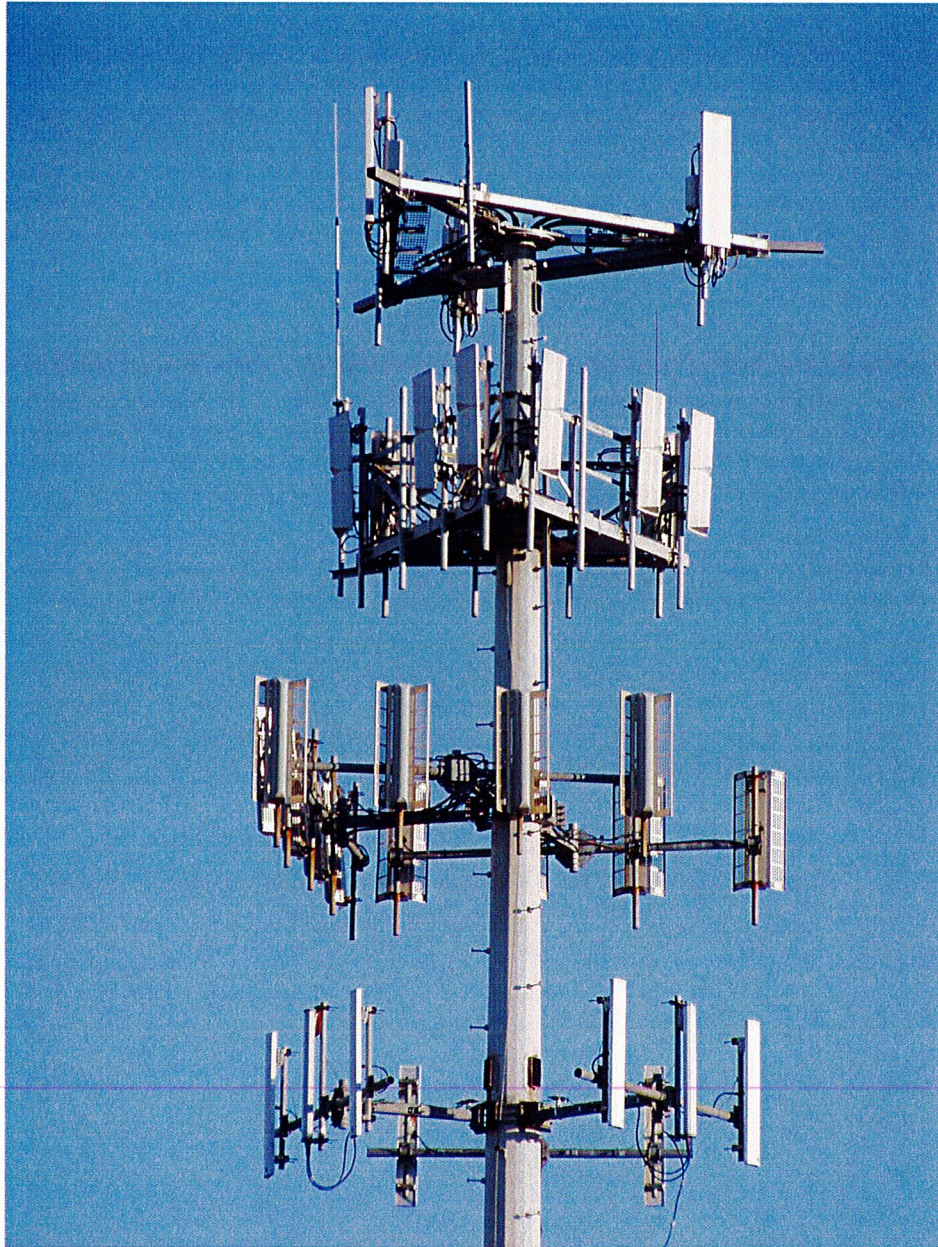


Photo of existing antennas on 98' monopole tower.

Appendix C

Calculations

<i>RISATower</i> <i>All-Points Technology Corporation</i> <i>P.O. Box 1491</i> <i>North Conway, NH 03860</i> <i>Phone: (603) 496-5853</i> <i>FAX: (603) 356-5214</i>	Job	88' EEI Monopole with 10' Extension	Page	2 of 3
	Project	CT198740 New Haven	Date	13:39:20 12/10/08
	Client	HDG; AT&T Site #2037	Designed by	Rob Adair

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	Placement ft		C _A A ₁ Front ft ²	C _A A ₁ Side ft ²	Weight lb
(2) DR65-19-00DPQ	C	From Face	4.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	8.40 8.95	3.53 3.97	32.00 73.77
14' low-profile platform	C	None		0.0000	98.00	No Ice 1/2" Ice	9.80 10.93	8.49 9.47	1200.00 2063.51
8' x 2" omni whip	A	From Leg	5.00 0.00 2.00	0.0000	90.00	No Ice 1/2" Ice	1.60 2.42	1.60 2.42	50.00 62.45
(2) 7750.00	A	From Leg	5.00 0.00 3.00	0.0000	88.00	No Ice 1/2" Ice	6.10 6.54	3.06 3.42	40.00 73.74
(2) 7750.00	B	From Leg	5.00 0.00 3.00	0.0000	88.00	No Ice 1/2" Ice	6.10 6.54	3.06 3.42	40.00 73.74
(2) 7750.00	C	From Leg	5.00 0.00 3.00	0.0000	88.00	No Ice 1/2" Ice	6.10 6.54	3.06 3.42	40.00 73.74
(2) LGP2140X TMA	A	From Leg	5.00 0.00 3.00	0.0000	88.00	No Ice 1/2" Ice	1.26 1.42	0.38 0.49	20.00 27.13
(2) LGP2140X TMA	C	From Leg	5.00 0.00 3.00	0.0000	88.00	No Ice 1/2" Ice	1.26 1.42	0.38 0.49	20.00 27.13
(2) LGP2140X TMA	C	From Leg	5.00 0.00 3.00	0.0000	88.00	No Ice 1/2" Ice	1.26 1.42	0.38 0.49	20.00 27.13
(2) LGP21903 Diplexer	A	From Leg	5.00 0.00 3.00	0.0000	88.00	No Ice 1/2" Ice	0.27 0.34	0.13 0.18	6.00 8.41
(2) LGP21903 Diplexer	B	From Leg	5.00 0.00 3.00	0.0000	88.00	No Ice 1/2" Ice	0.27 0.34	0.13 0.18	6.00 8.41
(2) LGP21903 Diplexer	C	From Leg	5.00 0.00 3.00	0.0000	88.00	No Ice 1/2" Ice	0.27 0.34	0.13 0.18	6.00 8.41
(2) 7020.00 RET-RCU	A	From Leg	5.00 0.00 3.00	0.0000	88.00	No Ice 1/2" Ice	0.40 0.49	0.12 0.17	5.00 7.94
(2) 7020.00 RET-RCU	B	From Leg	5.00 0.00 3.00	0.0000	88.00	No Ice 1/2" Ice	0.40 0.49	0.12 0.17	5.00 7.94
(2) 7020.00 RET-RCU	C	From Leg	5.00 0.00 3.00	0.0000	88.00	No Ice 1/2" Ice	0.40 0.49	0.12 0.17	5.00 7.94
12' platform w/rails	C	None		0.0000	88.00	No Ice 1/2" Ice	12.60 13.60	10.91 11.78	1300.00 1969.34
(4) DB844G45ZAXY	A	From Leg	4.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	7.00 7.41	3.97 4.34	21.00 64.04
(4) DB844G45ZAXY	B	From Leg	4.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	7.00 7.41	3.97 4.34	21.00 64.04
(4) DB844G45ZAXY	C	From Leg	4.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	7.00 7.41	3.97 4.34	21.00 64.04
12' T-arm	C	None		0.0000	80.00	No Ice 1/2" Ice	3.20 4.03	3.20 4.03	250.00 814.57

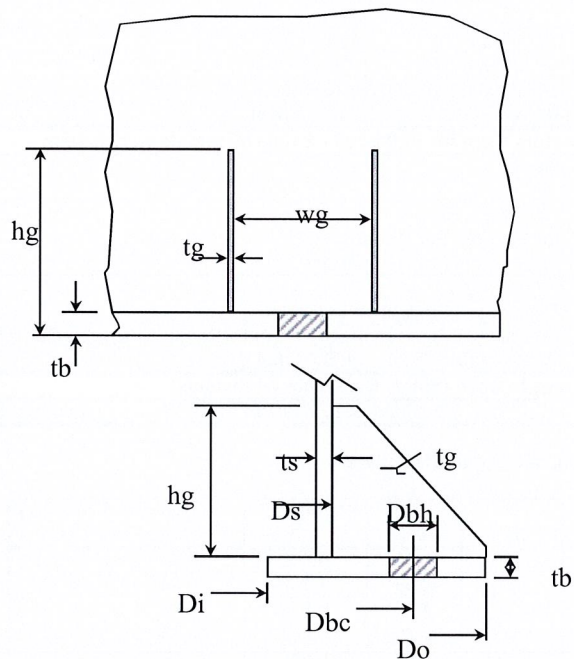
All-Points Technology Corp., P.C.

P.O. Box 1491
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Client: **HDG for AT&T**
Job: **New Haven, CT**
Calculated By: **R. Adair**

Site No.: **2037**
APT Job No.: **CT198740**
Date: **10-Dec-08**

General Parameters		
Ds	Diameter of Skirt	34.0 in
Do	Outer Diameter of Base Ring	48.0 in
Di	Inner Diameter of Base Ring	24.0 in
Dbc	Bolt Circle Diameter	42.0 in
Dbolt	Nominal Bolt Diameter	2.25 in
Nbolt	Number of Bolts	6
Dbh	Diameter of Bolt Hole	2.3750 in
Loadings		
OTM	Overturing Moment	859,610 ft-lbs
V	Vertical Load (+ is Compressive)	11,849 lbs
Material Properties		
Es	Modulus of Elasticity of Steel	29,000,000 psi
Ec	Modulus of Elasticity of Concrete	3,000,000 psi
u	Poissons Ratio for Steel	0.30
Fc(ult)	Ultimate Compressive Strength	4,000 psi
Fc(allow)	Allowable Compressive Strength	4,000 psi
Fbolt	Allowable Bolt Stress	75,000 psi
Fy	Yield Stress of Top & Bottom Plates	60,000 psi
Increase	Increase for Wind or Seismic?	1.33
Fb	Allow Bending Stress ($F_y \cdot 0.6$)	47,880 psi
Gusset Dimensions		
Ngus	# of Gussets per bolt (0, 1, or 2)	2
wg	Gusset Spacing	11 in
hg	Height of Gusset	18 in
Program Output		
tb	Minimum Base Plate Thickness	1.462 in
tg	Minimum Gusset Thickness	1.133 in
Bolting	Actual Load/ Allowable Load	0.535 OK
Concrete	Actual Load / Allowable Load	0.427 OK



Calculated Parameters		
n	Es / Ec	9.66666667
Aroot	Root area of Bolt	3.02 in^2
tt1	Nbolt*Aroot/(3.14159*Dbc)	0.137 in
tt3	(Do-Di)/2	12.0 in
tt2	tt3-tt1	11.863 in

Iteratively Solve for Compressive and Tensile Loads on Compression Plate*									
Iteration #	k	Cc	Ct	z	j	fc psi	fs psi	Ft lbs	Fc lbs
1	0.340	1.614	2.354	0.429	0.783	4,000	75,000	307,329	319,178
2	0.132	0.979	2.813	0.473	0.769	714	45,263	312,001	323,850
3	0.231	1.312	2.593	0.452	0.778	1,194	38,463	308,857	320,706
4	0.171	1.121	2.725	0.465	0.773	883	41,300	310,554	322,403
5	0.203	1.226	2.655	0.458	0.776	1,039	39,519	309,437	321,286
6	0.185	1.166	2.695	0.462	0.774	946	40,409	310,059	321,908
7	0.195	1.200	2.673	0.460	0.775	997	39,890	309,690	321,539
8	0.189	1.180	2.686	0.461	0.775	968	40,173	309,901	321,750
9	0.192	1.191	2.679	0.461	0.775	984	40,011	309,782	321,631
10	0.190	1.185	2.683	0.461	0.775	975	40,103	309,849	321,698

All-Points Technology Corp., P.C.

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(603) 496-5853

Client: **Hudson Design Group, LLC**
Job: **New Haven**
Calculated By: **R. Adair**

Site No.: **2037**
Job No.: **CT198740**
Date: **10-Dec-08**

Program assumes:

Mat is square in plan view.
Water table is below bottom of mat.
Unit weight of concrete = 150 pcf
Unit weight of soil = 100 pcf

Information to be provided:

Pier is round or square in plan dimension ("R" or "S")	Shape = s
OTM = Overturning Moment to be resisted	OTM = 860 ft-kips
P = Download reaction	P = 28.6 kips
V = Shear reaction	V = 11.8 kips
H = Height from ground surface to top of mat (if buried)	H = 1.0 ft.
P _M = Projection of pier above mat	P _M = 2.0 ft.
y = Thickness of mat	y = 3.25 ft.
x = Width of mat	x = 21.63 ft.
d = Diameter of round pier	d = 0.0 ft.
s = Size of square pier	s = 6.0 ft.

Mass of tower and appurtenances (below)

Results:

<u>Component</u>	<u>Mass</u>	<u>Moment Arm</u>	<u>Moment Resist.</u>
Pier	10.8 kips	10.81665 ft.	116.8 ft-kips
Overburden	45.8 kips	10.81665 ft.	495.0 ft-kips
Mat	228.2 kips	10.81665 ft.	2467.8 ft-kips
Tower Dead Load	kips	10.81665 ft.	0.0 ft-kips
Antenna Dead Load	kips	10.81665 ft.	0.0 ft-kips

Overturning Moment Resistance : 3079.64 ft-kips
Factor of Safety = 3.34
Concrete Quantity = 60.3 c.y.

SATISFACTORY



C Squared Systems, LLC
65 Dartmouth Drive, Unit A3
Auburn, NH 03032
(603) 644-2800
support@csquaredsystems.com

Calculated Radio Frequency Emissions

at&t

CT2037

(New Haven Wheeler Street)

69 Wheeler Street, New Haven, CT 06512

May 4, 2012

Table of Contents

1. Introduction.....	1
2. FCC Guidelines for Evaluating RF Radiation Exposure Limits.....	1
3. RF Exposure Prediction Methods.....	2
4. Calculation Results	3
5. Conclusion	4
6. Statement of Certification.....	4
Attachment A: References.....	5
Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)	6
Attachment C: AT&T's Antenna Model Data Sheets and Electrical Patterns	8

List of Tables

Table 1: Carrier Information.....	3
Table 2: FCC Limits for Maximum Permissible Exposure (MPE)	6

List of Figures

Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE).....	7
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1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed modifications to the existing AT&T antennas mounted on the monopole tower located at 69 Wheeler Street in East Haven, CT. The coordinates of the tower are 41-17-45.47 N, 72-53-52.55 W.

AT&T is proposing the following modifications:

- 1) Install three 700 MHz LTE antennas (one per sector).

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{1.6^2 \times EIRP}{4\pi \times R^2} \right) \times \text{Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power

$$R = \text{Radial Distance} = \sqrt{H^2 + V^2}$$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity and power, and that all channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not take into account actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the finished modifications.

Systems

4. Calculation Results

Table 1 below outlines the power density information for the site. Because the proposed AT&T antennas are directional in nature, the majority of the RF power is focused out towards the horizon. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the tower. Please refer to Attachment C for the vertical pattern of the proposed AT&T antennas. The calculated results for AT&T in Table 1 include a nominal 10 dB off-beam pattern loss to account for the lower relative gain below the antennas.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm ²)	Limit	%MPE
Nextel	80	851	24	100	0.1348	0.5673	23.77%
Clearwire	68	2496	2	153	0.0238	1.0000	2.38%
Clearwire	68	11000	1	211	0.0164	1.0000	1.64%
T-Mobile UMTS	98	2100	2	770	0.0577	1.0000	5.77%
T-Mobile GSM	98	1945	8	164	0.0491	1.0000	4.91%
AT&T UMTS	91.5	880	2	565	0.0049	0.5867	0.83%
AT&T UMTS	91.5	1900	2	875	0.0075	1.0000	0.75%
AT&T LTE	91.5	750	1	1117	0.0048	0.5000	0.96%
AT&T GSM	91.5	880	1	296	0.0013	0.5867	0.22%
AT&T GSM	91.5	1900	4	525	0.0090	1.0000	0.90%
						Total	42.12%

Table 1: Carrier Information^{1 2 3}

¹ The existing CSC filing for AT&T should be removed and replaced with the updated AT&T technologies and values provided in Table 1. The power density information for carriers other than AT&T was taken directly from the CSC database dated 3/29/2012. Please note that %MPE values listed are rounded to two decimal points. The total %MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not identically match the total value reflected in the table.

² In the case where antenna models are not uniform across all 3 sectors for the same frequency band, the antenna model with the highest gain was used for the calculations to present a worse-case scenario.

³ Antenna height listed for AT&T is in reference to the Structural Components structural analysis report dated 4/26/2012.

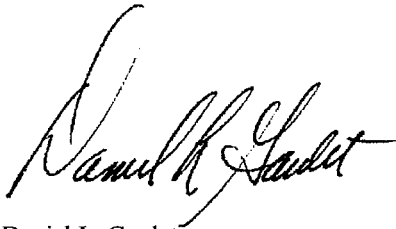
5. Conclusion

The above analysis verifies that emissions from the existing site will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the cumulative power density from the proposed transmit antennas at the existing facility is well below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at ground level is **42.12% of the FCC limit**.

As noted previously, obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the finished modifications.

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.



Daniel L. Goulet
C Squared Systems, LLC

May 4, 2012

Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave. IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure⁴

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure⁵

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 2: FCC Limits for Maximum Permissible Exposure (MPE)

⁴ Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

⁵ General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

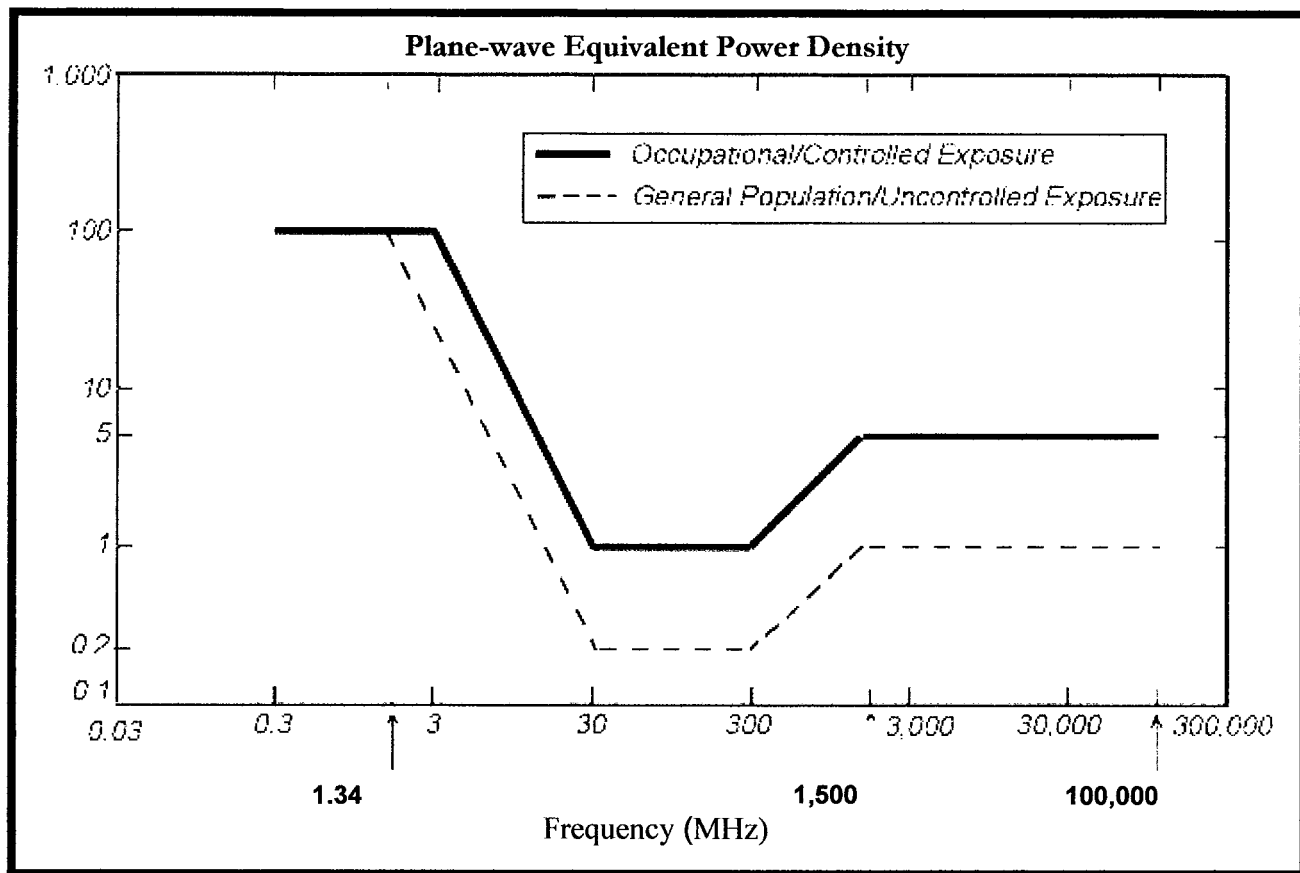
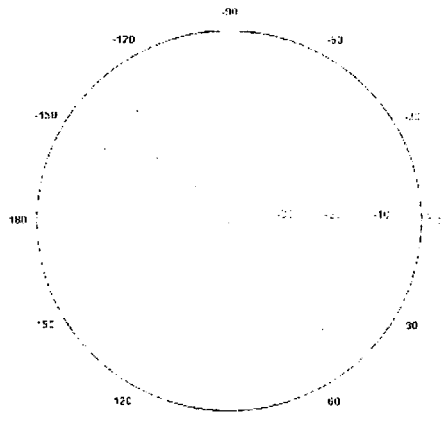
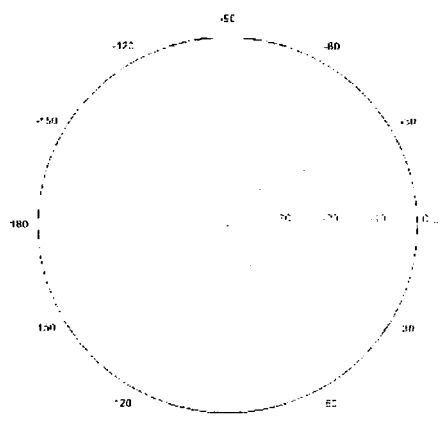


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: AT&T's Antenna Model Data Sheets and Electrical Patterns

700 MHz Manufacturer: KMW Model #: AM-X-CD-16-65-00T-RET Frequency Band: 698-894 MHz Gain: 13.4 dBd Vertical Beamwidth: 12.3° Horizontal Beamwidth: 65° Polarization: Dual Slant $\pm 45^\circ$ Size L x W x D: 72.0" x 11.8" x 5.9"	
850 MHz Manufacturer: Powerwave Model #: 7750.00 Frequency Band: 824-896 MHz Gain: 12.5 dBd Vertical Beamwidth: 14.9° Horizontal Beamwidth: 69° Polarization: Dual Linear $\pm 45^\circ$ Size L x W x D: 63.0" x 11.0" x 4.0"	
1900 MHz Manufacturer: Powerwave Model #: 7750.00 Frequency Band: 1850-1990 MHz Gain: 15.6 dBd Vertical Beamwidth: 6.6° Horizontal Beamwidth: 65° Polarization: Dual Linear $\pm 45^\circ$ Size L x W x D: 63.0" x 11.0" x 4.0"	