EM-CLEARWIRE-044-091030 COUNCIL

In re: ORIGINAL

Clearwire Corporation's Notice to Make an Exempt Modification to an Existing Facility at 60 Commerce Street, East Haven, Connecticut.	:	**EXEMPT MODIFICATION NO. _____**
	:	October 30, 2009

NOTICE OF EXEMPT MODIFICATION

Pursuant to Conn. Agencies Regs. §§ 16-50j-73 and 16-50j-72(b), Clearwire Corporation ("Clearwire") hereby gives notice to the Connecticut Siting Council ("Council") and the Town of East Haven of Clearwire's intent to make an exempt modification to an existing monopole tower (the "Tower") located at 60 Commerce Street in East Haven, Connecticut. Specifically, Clearwire plans to add 3 WiMAX antennas, 3 Samsung Remote Radio Heads U-RAS ("Remote Radio Heads") and 3 Dragonwave dishes required for backhaul. Under the Council's regulations (Conn. Agencies Regs. § 16-50j-72(b)), Clearwire's plans do not constitute a modification subject to the Council's review because Clearwire will not change the height of the tower, will not extend the boundaries of the compound, will not increase the noise levels at the site, and will not increase the total radio frequency electromagnetic radiation power density at the site to levels above applicable standards.

Clearwire is currently developing a 4G wireless broadband network to provide high-speed wireless data and VoIP service within the State of Connecticut. Clearwire's 4G service leverages the WiMAX technology to enable enhanced wireless data communications. In order to accomplish the upgrade at this site, Clearwire plans to add 3 WiMAX antennas, 3 Remote Radio Heads, 3 dishes and install additional WiMAX-related electronic equipment at the base of the Tower.

BROWN RUDNICK LLP
CITYPLACE I
185 ASYLUM STREET
HARTFORD, CT 06103
(860) 509-6500

The Tower is a 70-foot monopole tower located at 60 Commerce Street in East Haven, Connecticut (latitude 41° 15' 4.44" N, longitude 72° 52' 55.54" W). The Tower is owned by TowerCo. Multiple carriers are currently located on the Tower. Presently, Sprint has 9 CDMA antennas spread over three sectors with an antenna centerline at 65 feet. Sprint's base station equipment is located adjacent to the base of the Tower. A site plan with the Tower specifications is attached.

Clearwire plans to remove 3 of Sprint's 9 existing antennas from the Tower. Clearwire plans to replace 3 of Sprint's antennas with 3 WiMAX antennas. Clearwire also proposes to locate 3 Remote Radio Heads (one per sector) and 3 Dragonwave dishes on the Tower. The new antennas, Remote Radio Heads and dishes will have the same centerline as the existing antennas – 65 feet. Six APD-D8 cables, 5/16" in diameter, will run to the new WiMAX antennas (two per panel). Additionally, 3 coax cables, ½" in diameter, will run to the new dishes (one per dish). To confirm that the Tower can support these changes, Clearwire commissioned Vertical Solutions, Inc. to perform a structural analysis of the Tower (attached). According to the structural analysis dated October 12, 2009, "... with the proposed appurtenance configuration, the tower and foundation **will** satisfy the structural strength requirements ..." (Page 1, Structural Analysis Report)(emphasis in original).

Within the existing compound Clearwire will install one WiMAX power cabinet in the existing 10' 6" by 19' (approximately) equipment shelter. Hence, no increase in the size of the shelter is necessary. Excluding brief, minor, construction-related noise during the addition of the antennas and dishes and the installation of the equipment cabinets, the proposed changes to the Tower will not increase noise levels at the site.

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The addition of the new WiMAX antennas, Remote Radio Heads and dishes will not adversely impact the health and safety of the surrounding community or the people working on the Tower. The total radio frequency exposure measured around the Tower will be below the National Council on Radiation Protection and Measurements' ("NCRP") standard adopted by the Federal Communications Commission ("FCC"). The worst-case power density analysis for the antennas, measured at the base of the Tower, indicates that the proposed antennas will emit .0002176% of the NCRP's standard for maximum permissible exposure. A cumulative power density analysis indicates that together, all of the antennas on the Tower will emit 74.32% of the NCRP's standard for maximum permissible exposure. Therefore, the power density levels will be below the FCC mandated radio frequency exposure limits in all locations around the Tower, even with extremely conservative assumptions. The power density analysis is attached.

In conclusion, Clearwire's proposed plan to add 3 WiMAX antennas, 3 Remote Radio Heads, 3 dishes and WiMAX associated base station equipment does not constitute a modification subject to the Council's jurisdiction because Clearwire will not increase the height of the Tower, will not extend the boundaries of the site, will not increase the noise levels at the site, and the total radio frequency electromagnetic radiation power density will stay within all applicable standards. *See* Conn. Agencies Regs. § 16-50j-72.

Clearwire Corporation

By: _____

Thomas J. Regan
Brown Rudnick LLP
185 Asylum Street, CityPlace I
Hartford, CT 06103-3402
Email - tregan@brownrudnick.com
Phone - 860.509.6522
Fax - 860.509.6622

BROWN RUDNICK LLP
CITYPLACE I
185 ASYLUM STREET
HARTFORD, CT 06103
(860) 509-6500

Certificate of Service

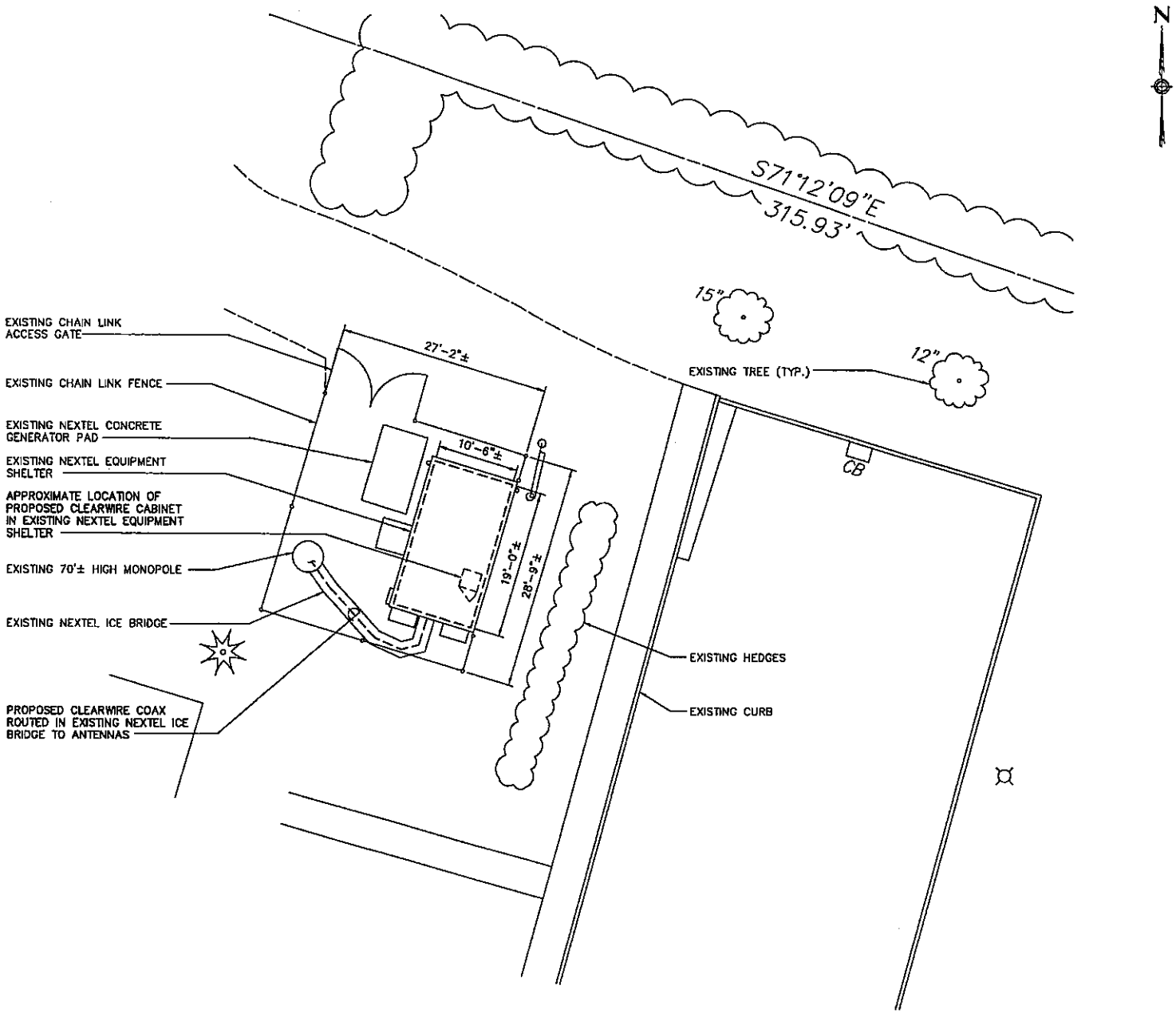
This is to certify that on this 30th day of October, 2009, the foregoing Notice of Exempt Modification was sent, via first class mail, to the following:

Town of East Haven
Town Hall
Mayor April Capone Almon
250 Main Street
East Haven, CT 06512

By: _____
Thomas J. Regan

40265971 v1 - 025064/0017

BROWN RUDNICK LLP
CITYPLACE I
185 ASYLUM STREET
HARTFORD, CT 06103
(860) 509-6500



1 / SC-1 PARTIAL SITE PLAN
SCALE: 1" = 20'-0"

clearwire
4400 CARILLON POINT
KIRKLAND, WA 98033

TRANSCEND WIRELESS, LLC
10 INDUSTRIAL AVENUE
MAHWAH, NJ 07430

A&E FIRM
URS CORPORATION AES
500 ENTERPRISE DRIVE, SUITE 3B
ROCKY HILL, CONNECTICUT
1-(860)-529-8882

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	10/29/09	REVIEW	PD	JCF	ICA

NOT TO SCALE | DESIGNED BY: JCF | DRAWN BY: PD

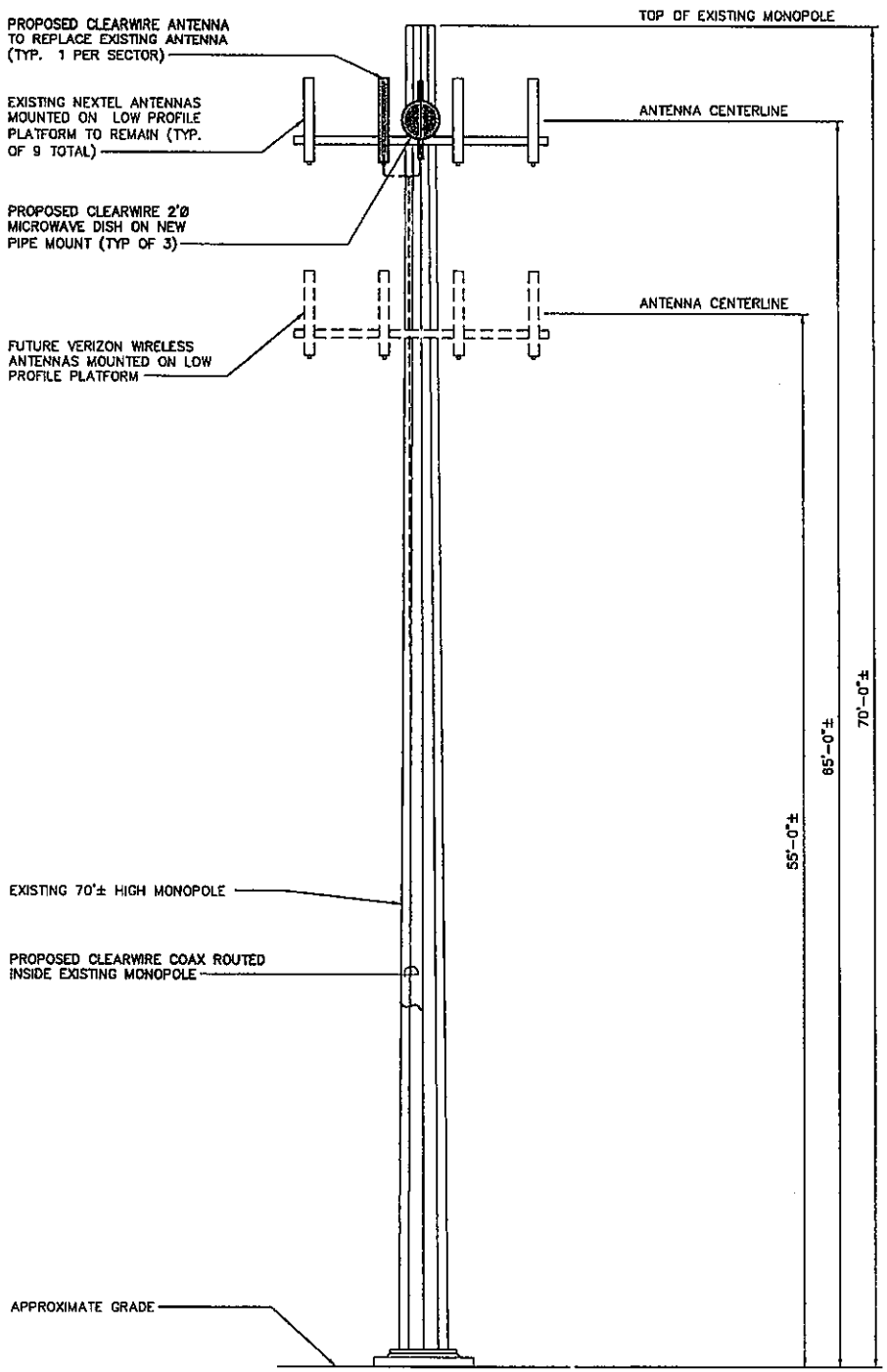
A&E SEAL

LATITUDE: 41°-14'-59"
LONGITUDE: 72°-52'-58"

NEW HAVEN TWEED
CT-NHN0115

60 COMMERCE DRIVE
EAST HAVEN, CT 06512

PROJECT NO.	DRAWING NAME	DATE	SHEET NO.	REV
TW3-032 36924371	SC-1	10/29/09	1 OF 2	A



1 / SC-2 TOWER ELEVATION

SCALE: 1" = 10'-0"

clearwire
4400 CARILLON POINT
KIRKLAND, WA 98033

TRANSCEND WIRELESS, LLC
10 INDUSTRIAL AVENUE
MAHWAH, NJ 07430

A&E FIRM
URS CORPORATION AES
500 ENTERPRISE DRIVE, SUITE 3B
ROCKY HILL, CONNECTICUT
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NO.	DATE	REVISIONS	BY	CHK	APP'D
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A&E SEAL

LATITUDE: 41°-14'-59"
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NEW HAVEN TWEED
CT-NHN0115

60 COMMERCE DRIVE
EAST HAVEN, CT 06512

PROJECT NO.	DRAWING NAME	DATE	SHEET NO.	REV
TW3-032 36924371	SC-2	10/29/09	2 OF 2	A

TowerCo

PASS
(Foundation, 99% capacity)

vertical solutions

October 12, 2009

Mr. Stephen Rambeau
TowerCo, LLC
5000 Valleystone Drive
Cary, NC 27519
(919) 653-5722

Vertical Solutions, Inc.
PO Box 579
Holly Springs, NC 27540
(888) 321-6167
operations@verticalsolutions-inc.com

Subject:	**Rigorous Structural Analysis**
Carrier Designation	**Sprint Nextel/Clearwire, Reconfiguration** **Site Number: CT-NHN0115-CT3672** **Site Name: New Haven Tweed**
TowerCo Designation	**Site Number: CT2024** **Site Name: New Haven Tweed**
Engineering Firm Designation	**Vertical Solutions Project: 091121.02 Rev. 0**
Site Data	**60 Commerce St., East Haven, New Haven County, CT 06512** **Latitude: N41° 15' 4.44"±; Longitude: W72° 52' 55.54"±** **Elevation: 10-ft, Topography Category: 1;** **Exposure Category: "C"; Structure Class II;** **70-ft Self Supporting Pole Structure (Monopole)**

Dear Mr. Rambeau,

To your request, we present our structural analysis.

Our work indicates that with the proposed appurtenance configuration, the tower and foundation **will** satisfy the structural strength requirements of EIA/TIA-222-F-1996, *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures* (industry standard) and the *2003 International Building Code* (local building code) for:

- 90-mph fastest mile basic wind speed
- 78-mph fastest mile basic wind speed with 1/2" radial ice

We trust you find our work satisfactory. Please do not hesitate to call should you have any questions.

Sincerely,

Holly R. Sanford, E.I.
Structural Engineer In Training

STATE OF CONNECTICUT
MICHAEL L. LASSITER
No. 25064
LICENSED
PROFESSIONAL ENGINEER

Michael L. Lassiter, S.E., P.E., C.W.I.
Structural Engineer, Civil Engineer, Certified Weld Inspector and President

OCT 12 2009

Table 1: Existing, Proposed and Reserved Appurtenance Configuration

Elevation (AGL, ft)	Carrier	Mount	Equipment	Coax	Location
65[1,2]	Sprint Nextel	(3) T-Arms	(6) Andrew DB844G45ZAXY (3) EMS RR65-18-VDPL2	(12) 1 5/8	Inside
	Clearwire		***(3) Argus LLPX310R*** ***(3) Dragonwave A-ANT-23G-2-C*** ***(3) Samsung FDD_R6_RRH*** ***16" x 11.6" x 5"***	***(6) 5/16*** ***(3) 1/2***	***Inside***
55	Verizon Wireless	(3) T-Arms	(6) Decibel DB846F65ZAXY (3) Antel BXA-185063/8CF (3) Antel BXA-70063/6CF	(12) 1 5/8	Inside

1 – Design loading [EPA=56.2 sq ft]. Existing and proposed equipment [EPA=72.1 sq ft].; Maximum Reserved load [EPA=92.4 sq.ft.]. Existing and proposed loading listed above and used in analysis.
2 – Sprint Nextel will remove (3) Andrew DB844G45ZAXY antennas and (3) 1 5/8 coax prior to installation of the proposed loading. Therefore this loading was omitted above and not considered in analysis.

Table 2: Computed Deflection, Tilt and Twist at Service Wind

Elevation (AGL, ft)	Equipment	Deflection (in)	Tilt (deg)	Twist (deg)
65	A-ANT-23G-2-C	7.685	0.8934	0.0011

Table 3: Tower Structure Results – Percent Capacity Utilized:

Elevation (ft)	Shaft	Result	Connections	Result
70 to 30.917	66	O. K.	--	--
30.917 to 0	94	O. K.	51	O. K.

1 –Utilization of 105% or less considered acceptable.

Table 4: Foundation Results, Percent Capacity Utilized

Component[1]	Design Foundation	Analysis Requirements	Percent Utilized	Result
Horizontal	*13 k*	*12.9 k*	**99**	**O. K.**
Moment	*729 k-ft*	*632k-ft*	87	O. K.

1 – Reactions obtained from the analysis were compared with the design reactions.

Attachments:

- Project History
- Coax Configuration
- Program input and output
- Base plate and anchor rod calculations

Project History, 091121.03 New Haven Tweed CT2024

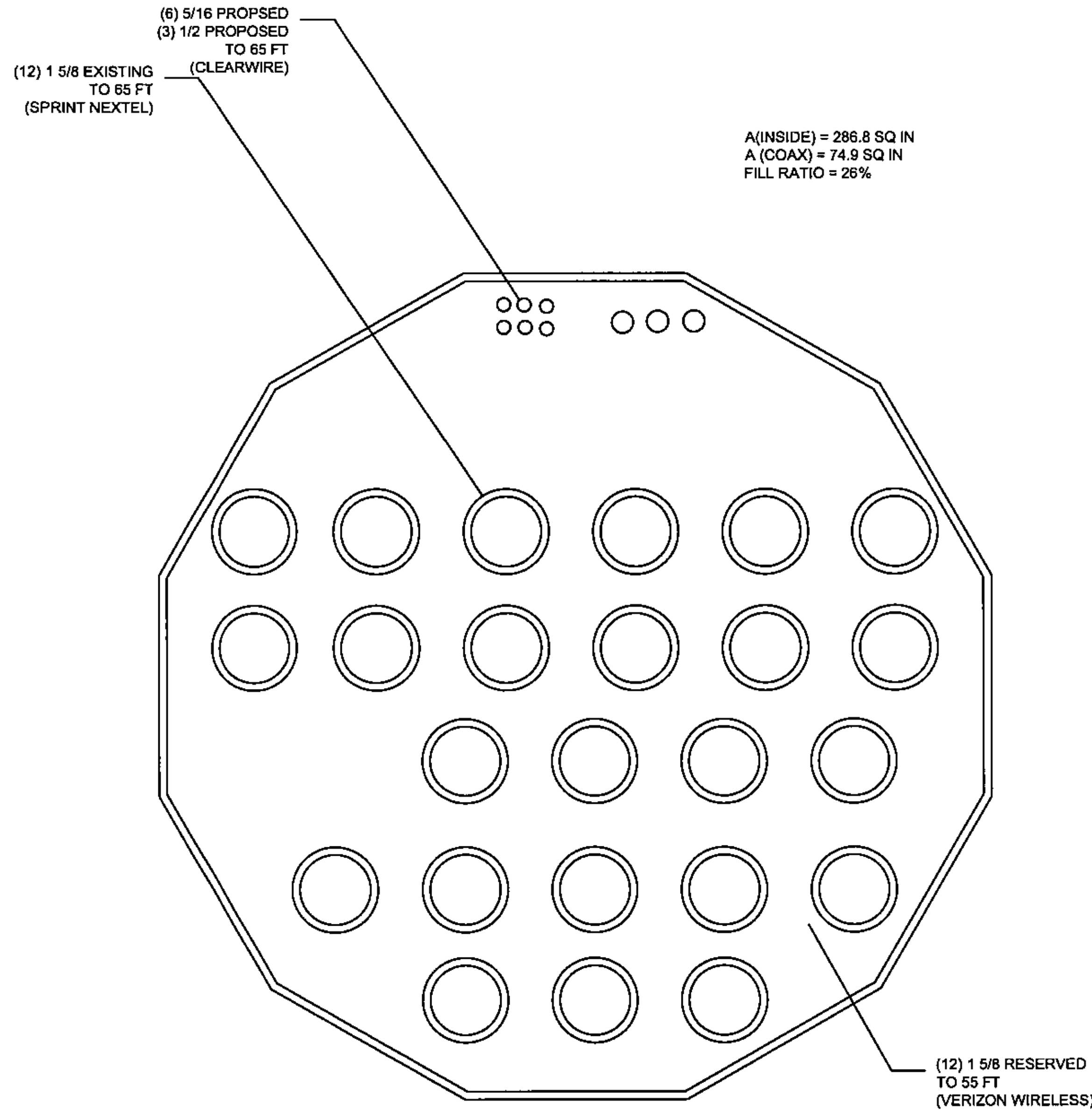
TowerCo File No.	VSi File ID	By: / For:	Description
353178	20051011_TFD_ CT2024.pdf	Valmont / Nextel	Tower and Foundation Design Drawings
714962	20081101_TEP_ CT2024.pdf	SiteMaster / TowerCo	Tower Elevation Profile
719745	20081101_SIR_ CT2024.pdf	SiteMaster / TowerCo	Site Inspection Report
--	20091005_CTA_CT2024.doc	Clearwire / TowerCo	Co-location Application
--	20091005_CTA_CT2024.doc	Clearwire / TowerCo	Co-location Application

Table Note:

Files name format YYYYMMDD-XXX-ZZZZZZ.pdf

Where:

YYYY=year
MM=month
DD=day published/issued
XXX=file describer
ZZZZZZ=TowerCo Site ID



COAX CONFIGURATION PLAN - 55 FT

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

DRAWN BY: HRS CHECKED BY: MLL

SHEET NUMBER: QP-P

REVISION: 2

VSI #: 091121.03

REV	DATE
2	10/12/2009
1	10/05/2009
0	09/02/2009

PREPARED FOR:

TowerCo

5000 Valley Stone Drive
Cary, NC 27519
Office: (919) 469-5559
Fax: (919) 469-5530
www.towerco.com

PROJECT NAME:

NEW HAVEN TWEED

TOWERCO JOB #:

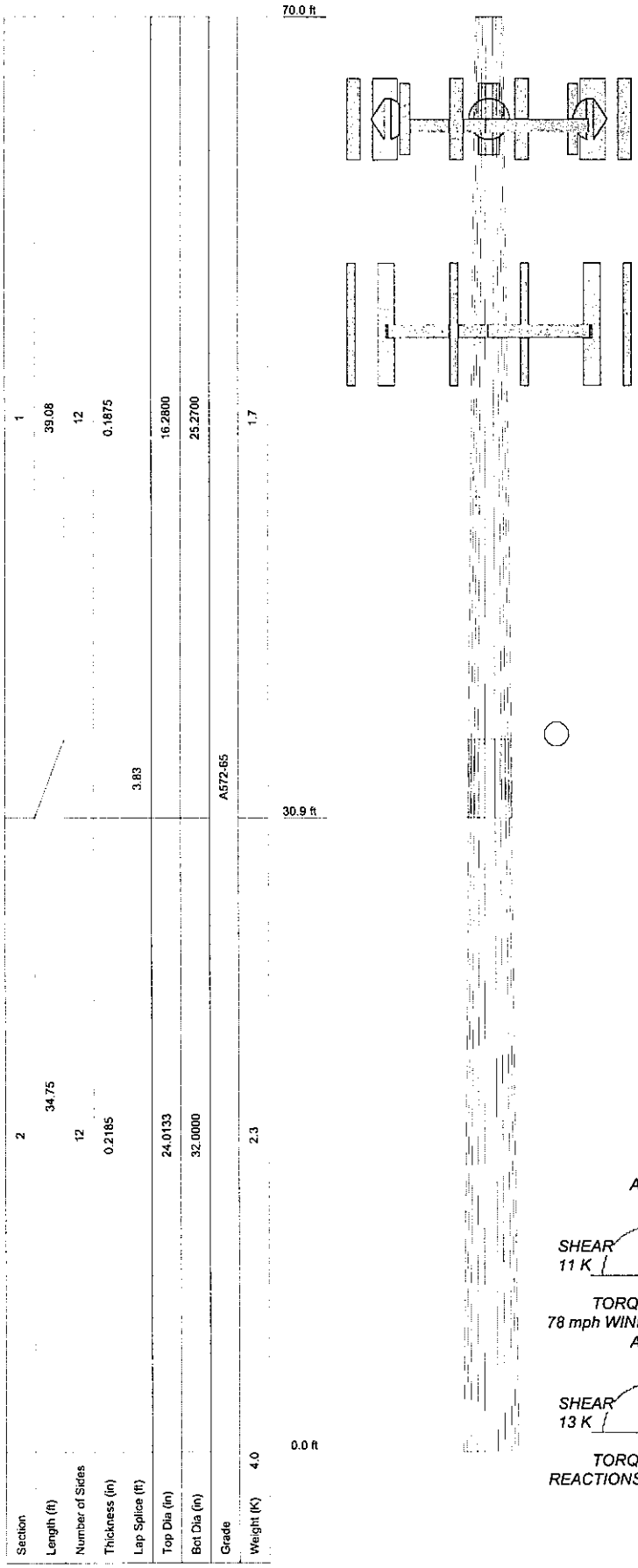
CT2024

PREPARED BY:

vertical solutions

2002 Production Drive
Apex, NC 27539
Office: (888) 321-6167
Fax: (919) 321-1768
www.verticalsolutions-inc.com

Section	1	2
Length (ft)	39.08	34.75
Number of Sides	12	12
Thickness (in)	0.1875	0.2185
Lap Splice (ft)	3.83	
Top Dia (in)	16.2800	24.0133
Bot Dia (in)	25.2700	32.0000
Grade	A572-65	
Weight (K)	1.7	2.3



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
2' Standoff T-Arm (10' face width)	65	Dragonwave A-ANT-23G-2-C	65
2' Standoff T-Arm (10' face width)	65	Dragonwave A-ANT-23G-2-C	65
2' Standoff T-Arm (10' face width)	65	Dragonwave A-ANT-23G-2-C	65
(2) DB844G45ZAXY w/Mount Pipe	65	BXA-185063/8CF with MP	55
(2) DB844G45ZAXY w/Mount Pipe	65	BXA-185063/8CF with MP	55
(2) DB844G45ZAXY w/Mount Pipe	65	BXA-185063/8CF with MP	55
RR65-18-VDPL2	65	2' Standoff T-Arm (10' face width)	55
RR65-18-VDPL2	65	2' Standoff T-Arm (10' face width)	55
RR65-18-VDPL2	65	2' Standoff T-Arm (10' face width)	55
Argus LLPX310R w Mount Pipe	65	(2) DB846F65ZAXY w/Mount Pipe	55
Argus LLPX310R w Mount Pipe	65	(2) DB846F65ZAXY w/Mount Pipe	55
Argus LLPX310R w Mount Pipe	65	(2) DB846F65ZAXY w/Mount Pipe	55
Samsung FDD_R6_RRH 16" x 11.6" x 5"	65	BXA-70063/6CF with MP	55
		BXA-70063/6CF with MP	55
Samsung FDD_R6_RRH 16" x 11.6" x 5"	65	BXA-70063/6CF with MP	55
Samsung FDD_R6_RRH 16" x 11.6" x 5"	65		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 90 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 78 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 94.1%

Vertical Solutions, Inc.
2002 Production Drive
Apex, NC 27539
Phone: 888-321-6167
FAX: 919-321-1768

Job: *New Haven Tweed CT2024*		
Project: *091121.03*		
Client: TowerCo	Drawn by: hsanford	App'd:
Code: TIA/EIA-222-F	Date: 10/12/09	Scale: NTS
Path: L:\2009\1121 New Haven Tweed CT\Task 3\Models\091121.03-.eri		Dwg No. E-1

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in New Haven County, Connecticut.
Basic wind speed of 90 mph.
Nominal ice thickness of 0.5000 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.
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	70.00-30.92	39.08	3.83	12	16.2800	25.2700	0.1875	0.7500	A572-65 (65 ksi)
L2	30.92-0.00	34.75		12	24.0133	32.0000	0.2185	0.8740	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^2	w in	w/t
L1	16.8543	9.7158	321.1542	5.7611	8.4330	38.0829	650.7455	4.7818	3.8605	20.59
	26.1614	15.1436	1216.0615	8.9795	13.0899	92.9010	2464.0704	7.4532	6.2699	33.439
L2	25.7724	16.7413	1209.8752	8.5185	12.4389	97.2655	2451.5353	8.2396	5.8500	26.773
	33.1288	22.3605	2882.8128	11.3778	16.5760	173.9149	5841.3602	11.0052	7.9904	36.569

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 70.00-30.92				1	1	1		
L2 30.92-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	65.00 - 0.00	15	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	55.00 - 0.00	12	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	70.00-30.92	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.66
L2	30.92-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.68

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 In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	70.00-30.92	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.66
L2	30.92-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.68

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Offsets: Horz ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
2' Standoff T-Arm (10' face width)	A	From Leg	2.00			0.0000	65.00	No Ice	5.50	5.50	0.13
			0.00					1/2" Ice	6.90	6.90	0.17
			0.00								
2' Standoff T-Arm (10' face width)	B	From Leg	2.00			0.0000	65.00	No Ice	5.50	5.50	0.13
			0.00					1/2" Ice	6.90	6.90	0.17
			0.00								
2' Standoff T-Arm (10' face width)	C	From Leg	2.00			0.0000	65.00	No Ice	5.50	5.50	0.13
			0.00					1/2" Ice	6.90	6.90	0.17
			0.00								
2' Standoff T-Arm (10' face width)	A	From Leg	2.00			0.0000	55.00	No Ice	5.50	5.50	0.13
			0.00					1/2" Ice	6.90	6.90	0.17
			0.00								
2' Standoff T-Arm (10' face width)	B	From Leg	2.00			0.0000	55.00	No Ice	5.50	5.50	0.13
			0.00					1/2" Ice	6.90	6.90	0.17
			0.00								
2' Standoff T-Arm (10' face width)	C	From Leg	2.00			0.0000	55.00	No Ice	5.50	5.50	0.13
			0.00					1/2" Ice	6.90	6.90	0.17
			0.00								
(2) DB844G45ZAXY w/Mount Pipe	A	From Leg	4.00			0.0000	65.00	No Ice	7.71	5.63	0.05
			0.00					1/2" Ice	8.44	6.73	0.11
			0.00								
(2) DB844G45ZAXY w/Mount Pipe	B	From Leg	4.00			0.0000	65.00	No Ice	7.71	5.63	0.05
			0.00					1/2" Ice	8.44	6.73	0.11
			0.00								
(2) DB844G45ZAXY w/Mount Pipe	C	From Leg	4.00			0.0000	65.00	No Ice	7.71	5.63	0.05
			0.00					1/2" Ice	8.44	6.73	0.11
			0.00								
RR65-18-VDPL2	A	From Leg	4.00			0.0000	65.00	No Ice	4.36	1.97	0.02
			0.00					1/2" Ice	4.77	2.31	0.04
			0.00								
RR65-18-VDPL2	B	From Leg	4.00			0.0000	65.00	No Ice	4.36	1.97	0.02
			0.00					1/2" Ice	4.77	2.31	0.04
			0.00								
RR65-18-VDPL2	C	From Leg	4.00			0.0000	65.00	No Ice	4.36	1.97	0.02
			0.00					1/2" Ice	4.77	2.31	0.04
			0.00								
(2) DB846F65ZAXY w/Mount Pipe	A	From Leg	4.00			0.0000	55.00	No Ice	7.27	7.82	0.05
			0.00					1/2" Ice	7.88	9.01	0.11
			0.00								
(2) DB846F65ZAXY w/Mount Pipe	B	From Leg	4.00			0.0000	55.00	No Ice	7.27	7.82	0.05
			0.00					1/2" Ice	7.88	9.01	0.11
			0.00								
(2) DB846F65ZAXY w/Mount Pipe	C	From Leg	4.00			0.0000	55.00	No Ice	7.27	7.82	0.05
			0.00					1/2" Ice	7.88	9.01	0.11
			0.00								
BXA-70063/6CF with MP	A	From Leg	4.00			0.0000	55.00	No Ice	7.75	6.10	0.04
			0.00					1/2" Ice	8.29	7.04	0.10
			0.00								
BXA-70063/6CF with MP	B	From Leg	4.00			0.0000	55.00	No Ice	7.75	6.10	0.04
			0.00					1/2" Ice	8.29	7.04	0.10
			0.00								
BXA-70063/6CF with MP	C	From Leg	4.00			0.0000	55.00	No Ice	7.75	6.10	0.04
			0.00					1/2" Ice	8.29	7.04	0.10
			0.00								
BXA-185063/8CF with MP	A	From Leg	4.00			0.0000	55.00	No Ice	3.18	3.44	0.03
			0.00					1/2" Ice	3.56	4.05	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
BXA-185063/8CF witih MP	B	From Leg	4.00	0.0000	55.00	No Ice	3.18	3.44	0.03
			0.00			1/2" Ice	3.56	4.05	0.06
			0.00						
BXA-185063/8CF witih MP	C	From Leg	4.00	0.0000	55.00	No Ice	3.18	3.44	0.03
			0.00			1/2" Ice	3.56	4.05	0.06
			0.00						
***									
Argus LLPX310R w Mount Pipe	A	From Leg	4.00	0.0000	65.00	No Ice	5.05	3.27	0.04
			0.00			1/2" Ice	5.46	3.82	0.08
			0.00						
Argus LLPX310R w Mount Pipe	B	From Leg	4.00	0.0000	65.00	No Ice	5.05	3.27	0.04
			0.00			1/2" Ice	5.46	3.82	0.08
			0.00						
Argus LLPX310R w Mount Pipe	C	From Leg	4.00	0.0000	65.00	No Ice	5.05	3.27	0.04
			0.00			1/2" Ice	5.46	3.82	0.08
			0.00						
Samsung FDD_R6_RRH 16" x 11.6" x 5"	A	From Leg	4.00	0.0000	65.00	No Ice	1.72	0.83	0.02
			0.00			1/2" Ice	1.90	0.97	0.03
			0.00						
Samsung FDD_R6_RRH 16" x 11.6" x 5"	B	From Leg	4.00	0.0000	65.00	No Ice	1.72	0.83	0.02
			0.00			1/2" Ice	1.90	0.97	0.03
			0.00						
Samsung FDD_R6_RRH 16" x 11.6" x 5"	C	From Leg	4.00	0.0000	65.00	No Ice	1.72	0.83	0.02
			0.00			1/2" Ice	1.90	0.97	0.03
			0.00						

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
Dragonwave A-ANT-23G-2-C	A	Paraboloid w/Radome	From Leg	4.00	0.0000		65.00	2.00	No Ice	3.14	0.04
				0.00					1/2" Ice	3.41	0.06
				0.00							
Dragonwave A-ANT-23G-2-C	B	Paraboloid w/Radome	From Leg	4.00	0.0000		65.00	2.00	No Ice	3.14	0.04
				0.00					1/2" Ice	3.41	0.06
				0.00							
Dragonwave A-ANT-23G-2-C	C	Paraboloid w/Radome	From Leg	4.00	0.0000		65.00	2.00	No Ice	3.14	0.04
				0.00					1/2" Ice	3.41	0.06
				0.00							

Load Combinations

Comb. No.	Description

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

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	70 - 30.917	8.713	27	0.9514	0.0012
L2	34.75 - 0	2.415	27	0.6238	0.0003

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
65.00	Dragonwave A-ANT-23G-2-C	27	7.685	0.8934	0.0011	18087
55.00	2' Standoff T-Arm (10' face width)	27	5.695	0.7832	0.0008	6029

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	70 - 30.917	28.200	2	3.0798	0.0039
L2	34.75 - 0	7.818	2	2.0198	0.0011

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
65.00	Dragonwave A-ANT-23G-2-C	2	24.873	2.9419	0.0034	5613
55.00	2' Standoff T-Arm (10' face width)	2	18.434	2.6600	0.0025	1870

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 $\frac{P}{P_a}$
L1	70 - 30.917 (1)	TP25.27x16.28x0.1875	39.08	0.00	0.0	37.624	14.6112	-3.63	549.74	0.007
L2	30.917 - 0 (2)	TP32x24.0133x0.2185	34.75	0.00	0.0	35.042	22.3605	-7.24	783.56	0.009

Pole Bending Design Data

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 $\frac{f_{by}}{F_{by}}$
L1	70 - 30.917 (1)	TP25.27x16.28x0.1875	234.46	32.540	37.624	0.865	0.00	0.000	37.624	0.000
L2	30.917 - 0 (2)	TP32x24.0133x0.2185	632.16	43.619	35.042	1.245	0.00	0.000	35.042	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	70 - 30.917 (1)	TP25.27x16.28x0.1875	10.08	0.690	26.000	0.054	0.00	0.000	26.000	0.000
L2	30.917 - 0 (2)	TP32x24.0133x0.2185	12.89	0.577	26.000	0.045	0.00	0.000	26.000	0.000

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 $\frac{f_{vt}}{F_{vt}}$

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	70 - 30.917 (1)	0.007	0.865	0.000	0.054	0.000	0.872 ✓	1.333	H1-3+VT ✓
L2	30.917 - 0 (2)	0.009	1.245	0.000	0.045	0.000	1.254 ✓	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	70 - 30.917	Pole	TP25.27x16.28x0.1875	1	-3.63	732.80	65.4	Pass
L2	30.917 - 0	Pole	TP32x24.0133x0.2185	2	-7.24	1044.49	94.1	Pass
							Summary	
						Pole (L2)	94.1	Pass
						RATING =	**94.1**	**Pass**

vertical solutions

VSi Job No.: 091121.03
Date: 10/12/2009
Calculated by: HRS

FLANGE PLATE DESIGN, DEFORMATION METHOD, TIA-222-G

Input -

$M_u := 632kip \cdot ft$ = factored moment reaction at top of base plate

$V_{ut} := 12.89kip$ = factored shear reaction at top of base plate

$\eta := 0.50$ = coefficient per Figure 4.4

$F_{ub} := 100 \cdot ksi$ = specified minimum tensile strength of bolt

$\phi := 0.75$

$b_{eff} := 12.56 \cdot in$ = effective width of base plate in flexure

$t := 2.0 \cdot in$ = thickness of base plate

$F_y := 60 \cdot ksi$ = yield stress of base plate

$d_b := 2.25 \cdot in$

$n := 4.5$

$A_n := \frac{\pi}{4} \cdot \left(d_b - \frac{0.9743 \cdot in}{n} \right)^2$

$\phi R_{nt} := \phi \cdot F_{ub} \cdot A_n$

$\phi R_{nt} = 243.576 \cdot kip$

CONSTANTS:

$psi \equiv \frac{lb}{in^2}$

$ksi \equiv 1000 \cdot psi$

$kip \equiv 1000 \cdot lb$

$$Q := \begin{pmatrix} 2 \\ 4 \\ 2 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \quad d := \begin{pmatrix} 1 \cdot 12 + 7 + \frac{9}{16} \\ 1 \cdot 12 + 1 + \frac{13}{16} \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \cdot in \quad A := \begin{pmatrix} 3.25 \\ 3.25 \\ 3.25 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} in^2 \quad \phi R_{nt} := \begin{pmatrix} 243.5 \\ 243.5 \\ 243.5 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} kip$$

$V_{utn} := V_{ut}$

$V_{un} := \frac{V_{utn}}{\sum \overrightarrow{(Q)}}$

$$V_u := \begin{pmatrix} V_{un} \\ V_{un} \\ V_{un} \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

ϕR_{nt} = nominal tension strength

d = distance from center

A = area of fastener

Q = quantity of fasteners

$\sum \overrightarrow{(Q)} = 8$

$sumQAd := \sum \overrightarrow{(Q \cdot d^2 \cdot A)}$

$sumQAd = 4968 \cdot in^4$

$P_u := \frac{M_u \cdot \overrightarrow{(d \cdot A)}}{sumQAd}$

$r := \begin{pmatrix} \overrightarrow{\left(\frac{P_u + \frac{V_u}{\eta}}{\phi R_{nt}} \right)} \end{pmatrix}$

[section 4.9.9]

$$P_u = \begin{pmatrix} 97.062 \\ 68.533 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \cdot kip \quad V_u = \begin{pmatrix} 1.611 \\ 1.611 \\ 1.611 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \cdot kip \quad r = \begin{pmatrix} 41.185 \\ 29.468 \\ 1.323 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \cdot \%$$

$$\underset{\sim}{m} := \begin{pmatrix} 3 + \frac{9}{16} \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \cdot in \qquad M_{PL} := \overrightarrow{\left[\left(\frac{Q}{2}\right) \cdot P_u \cdot m\right]} \qquad M_{PL} = \begin{pmatrix} 28.815 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \cdot kip \cdot ft \qquad \sum M_{PL} = 345.8 \cdot kip \cdot in$$

$$S_{PL} := \frac{b_{eff} \cdot t^2}{6}$$

$$Z_{PL} := 1.5 \cdot S_{PL}$$

$$\phi M_n := 0.9 \cdot F_y \cdot Z_{PL}$$

$$r_b := \frac{\sum M_{PL}}{\phi M_n} \qquad r_b = 51 \cdot \%$$

without Stiffeners

To: CSC
From: Mark Brauer – Radio Frequency Engineer
Cc: Cameron Syme
Subject: Power Density Report for CT-NHN0115
Date: October 28, 2009

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1. Introduction:

This report is the result of Electromagnetic Field Intensities (EMF – Power Densities) study for the Clearwire broadband antenna installation on a Monopole Tower at 60 Commerce St, East Haven, CT. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from locations surrounding the transmitting location:

2: Discussion:

The following assumptions were used in the calculations:

1) The emissions from Clearwire transmitters are in the (2496 – 2960) Frequency Band
2) The emissions from the Clearwire Microwave dishes are in the 11 GHz Frequency Band
3) The model number for Clearwire Antenna is Argus LLPX310R
4) The model number for the Microwave dish is Andrew VHLP2-23 with 24" Diameter.
5) The Clearwire Panel antenna centerline is 65 feet.
6) The Clearwire Microwave dish centerline is 65 feet.
7) The Maximum Transmit power from any Clearwire panel antenna is 251 Watts Effective Isotropic Radiated Power (EiRP) assuming 2 channels per sector.
8) The Maximum Transmit power from any Clearwire Microwave Dish is 346 Watts Effective Isotropic Radiated Power (EiRP) assuming 1 channel per dish.
9) All antennas are simultaneously transmitting and receiving 24 hours per day.
10) The average ground level of the studied area does not change significantly with respect to the transmitting location.

Equations given in "FCC OET Bulletin 65, Edition 97-01" were used with the above information to perform the calculations.

3: Conclusion:

Based on the above worst case assumptions, the power density calculation from the Clearwire antenna installation on a Self Support Tower at 60 Commerce St, East Haven, CT is 0.000022 mW/cm^2. This value represents 0.002176% of the Maximum Permissible Exposure (MPE) standard of 1 milliwatt per square centimeter (mW/cm^2) set forth in the FCC/ANSI/IEEE C95-1-1991. Furthermore, the proposed antenna location for Clearwire will not interfere with existing public safety communications, AM or FM radio broadcasts, TV, Police Communications, HAM Radio communications or any other signals in the area.

The combined Power Density from all other carriers is 74.31 %. The combined Power Density for this site is 74.32 % of the M.P.E. standard.