ORIG

EM-CLEARWIRE-054-090930

September 29, 2009

S. Derek Phelps, Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

Re: Notice of Exempt Modification
Clearwire Corporation Notice to make an Exempt Modification to an Existing Facility at 577 Bell Street, Glastonbury, CT
Clearwire Site Number CT-HFD0079A

Dear Mr. Phelps,

Pursuant to Conn. Agency Regulations Sections 16-50j-73 and 16-50j-72(b), Clearwire Corporation (Clearwire) hereby gives notice to the Connecticut Siting Council (Council) and the Town of Wethersfield, CT. of Clearwire's intent to make an exempt modification to an existing monopole tower (tower) located at 577 Bell Street, Glastonbury, CT. Specifically, Clearwire plans to add three (3) antennas to the tower, one (1) per sector and to add three (3) microwave dishes, one (1) per sector for backhaul at the 55' AGL. Pursuant to the Council's regulations, (Conn. Agency Regulations Section 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. A copy of this notice has been sent to Town Manager Richard Johnson of the Town of Glastonbury, CT.

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 three (3) WiMAX antennas, three (3) dishes and to install additional WiMAX related electronic equipment at the base of the tower.

The tower is a 92' lattice tower located at 577 Bell Street, Glastonbury, Connecticut (Latitude 41-43-00 N Longitude 73-33-00 W). The tower is owned by Comcast. Currently, Cingular, Pocket Comcast and the Town of Glastonbury are located on the tower, as well as a number of other public service antennas. Presently, Clearwire is not located at the site. Clearwire's base station equipment will be located on the ground next to the tower. A site plan with the tower elevations and site plan specifications is attached.

Clearwire will add three (3) antennas, one (1) to each sector, and mount three (3) microwave dishes, one (1) above each of those antennas. The center line for the microwave dishes will be 55'. Nine coaxial cables will be added to the structure, 2 per antenna and one per microwave dish. These cables will be on one leg of the tower and bundled so that there will be

no additional wind loading. To confirm that the tower can support these changes, Clearwire commissioned Bay State Design Inc. to perform a structural analysis of the tower and the proposed changes. According to that structural dated September 29, 2009 and attached hereto, the structure is not sufficient to support the proposed loading but will be modified in accordance with the proposed modifications. The tower, with the additions and the modifications will be at less than 100% of its capacity.

Within the existing compound, Clearwire will install one (1) WiMAX radio and power cabinet on the existing pad at the site. The new equipment will be adjacent to the existing tower. Excluding brief, construction related noise during the addition of this equipment, the proposed changes to the tower will not increase noise levels at the site.

The addition of new WiMAX antennas and microwave 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 base of the tower will be well 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 WiMAX antennas and dishes, measured at the base of the tower, indicates that the WiMAX antennas and dishes will emit .065% of the NCRP's standard for maximum permissible exposure. The cumulative power density analysis indicates that all the antennas on the structure will emit 44.915% of the NRCP's standard for maximum permissible exposure. Therefore, the power density levels will be well below the FCC mandated radio frequency exposure limits in all locations around the base of the tower. The power density analysis is attached.

In conclusion, Clearwire's proposed plan to add three (3) WiMAX antennas, three (3) microwave dishes and the 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 compound at the site, will not increase the noise levels at the site and the radio frequency electromagnetic radiation power density will stay within all applicable standards.

Respectfully Submitted,

Thomas F. Flynn III
Site Development Project Manager
Maxton Technology Inc.
1296 Blue Hills Avenue
Bloomfield, CT 06002
508-821-6974
Tom.Flynn@maxtontech.com
Agent for Clearwire Corporation

Cc: Town Manager Richard Johnson

CLEAR

4400 Carillon Point
Kirkland, WA 98033

To: Connecticut Siting Council
From: Praveen Meesarapu – Radio Frequency Engineer
Cc: Cameron Syme
Subject: Power Density Report for CT-HFD0079
Date: September 29, 2009

---

1. Introduction:

This report is the result of Electromagnetic Field Intensities (EMF – Power Densities) study for the Clearwire broadband antenna installation on a Self Support Tower at 577 Bell Street, Glastonbury, CT, 06033. 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 VHLP2.5-11 with 30" Diameter.
5) The Clearwire Panel antenna centerline is 55 feet.
6) The Clearwire Microwave dish centerline is 55 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 577 Bell Street, Glastonbury, CT is 0.000677 mW/cm^2. This value represents 0.065% 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 44.85 %. The combined Power Density for this site is 44.915% of the M.P.E. standard.

CLEAR

4400 Carillon Point
Kirkland, WA 98033

To: Connecticut Siting Council
From: Praveen Meesarapu – Radio Frequency Engineer
Cc: Cameron Syme
Subject: Power Density Report for CT-HFD0079
Date: September 29, 2009

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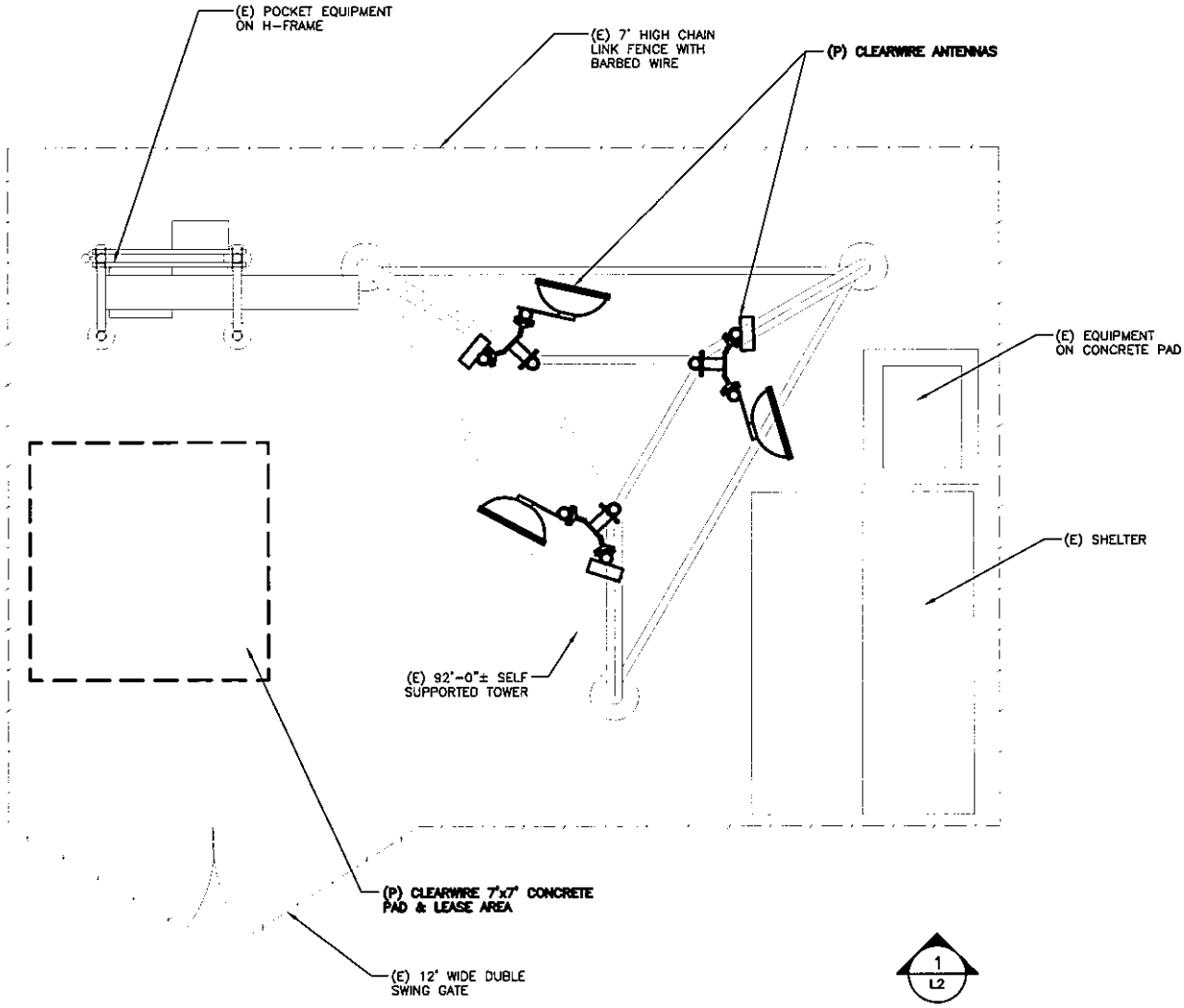


COMPOUND PLAN 1

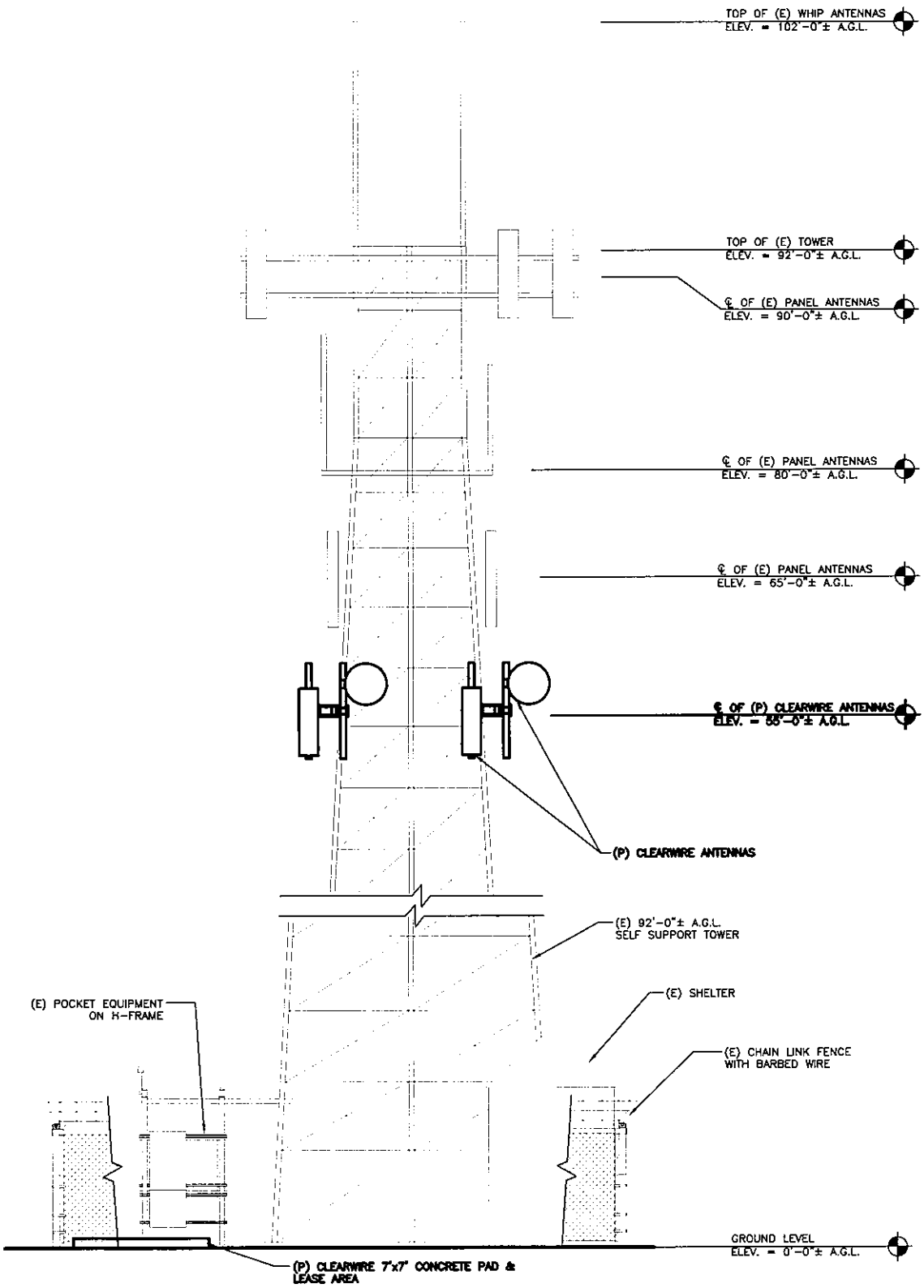
SCALE: N.T.S

MIXTON
241 BOSTON POST RD WEST
MARLBOROUGH, MA. 01752
Phone: 508-229-4100
Fax: 508-485-5321

BAY STATE DESIGN
Bay State Design, Inc.
Architects • Engineers
241 BOSTON POST RD WEST
MARLBOROUGH, MA. 01752
Phone: 508-229-4100
Fax: 508-485-5321

clearwire
5808 LAKE WASHINGTON BLVD.
NE SUITE 300
KIRKLAND, WA 98033

PROJECT LOCATION: GLASTONBURY CT-HFD0079-A 577 BELL ST GLASTONBURY, CT 06033	SITE TYPE: SELF SUPPORT		BSDA PROJ. #: 2908.073
	PROJECT MANAGER: JP	DRAWN BY: RS	SHEET: L1
APPROVED BY:	DATE: 09/08/09	REVISION: 1	



ELEVATION 1

SCALE: N.T.S

MAXTON
241 BOSTON POST RD WEST
MARLBOROUGH, MA. 01752
Phone: 508-229-4100
Fax: 508-485-5321

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PROJECT LOCATION: GLASTONBURY CT-HFD0079-A 577 BELL ST GLASTONBURY, CT 06033	SITE TYPE: SELF SUPPORT		BSDA PROJ. #: 2908.073
	PROJECT MANAGER: JP	DRAWN BY: RS	SHEET: L2
APPROVED BY:	DATE: 09/08/09	REVISION: 1	

BAY STATE
DESIGN

STRUCTURAL ANALYSIS REPORT

CT-HFD0079A

577 Bell St
Glastonbury, CT 06033

clearwire
wireless broadband

September 28, 2009

Gordon Govalet, P.E.

Bay State Design, Inc. 241 Boston Post Road Marlborough, MA 01752 TEL: (508) 229-4100 FAX: (508) 485-5321
Architects • Engineers

INTRODUCTION:

The purpose of this analysis is to determine the structural capability of the existing 92'-0" Self Support Tower at 577 Bell Street in Glastonbury, CT 06033, for the proposed loading of the following Clearwire wireless equipment at an elevation of 55'-0":

3	Argus 2300-2700MHz Remote Tilt Panel Antenna
3	Samsung WiMAX U-RAS Flexible RRU
3	Dragonwave 2'-0" Microwave Dish

In addition, a total of (6) lines of 5/16" coax and (3) lines of ½" coax will be run on the tower to the proposed antennas.

ASSUMPTIONS:

All engineering services have been performed on the basis that the information used is current and accurate. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from drawings in the possession of Bay State Design, Inc., or generated by field inspections or measurements of the structure.

It is the responsibility of the client to ensure that the information provided to Bay State Design, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, BSD assumes that all structures were constructed in accordance with the drawings / specifications and are in good condition and have not significantly changed from the "as new" condition.

All services were performed to codes specified by the client. BSD does not imply to have met any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are different from the minimum values recommended by code, the client shall specify the exact requirement.

All services are performed in accordance with generally accepted engineering principles and practices. Bay State Design, Inc., is not responsible for the conclusions, opinions and recommendations made by others based on the information provided.

REFERENCES:

This structural analysis was evaluated using RISA Tower, a general-purpose modeling, analysis, and design program created specifically for communications towers in accordance with the following:

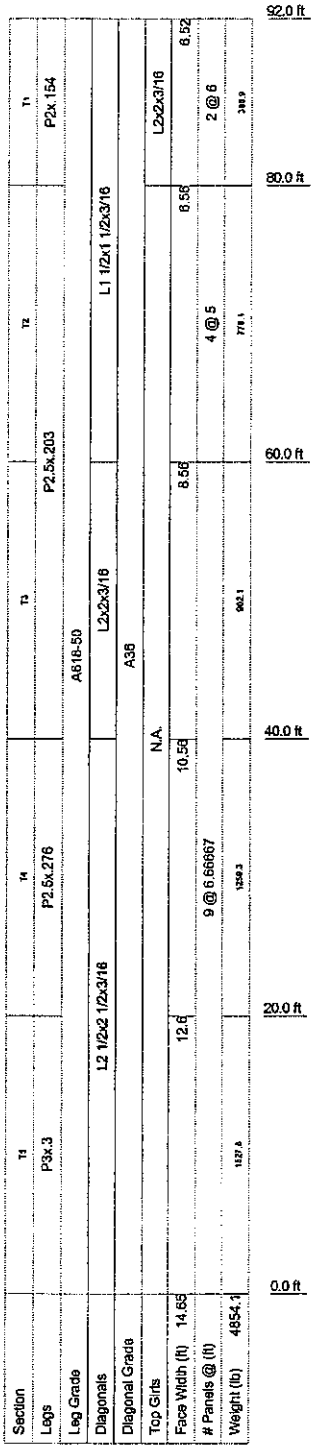
- TIA/EIA 222-F Structural Standards for Steel Antenna Tower and Antenna Supporting Structures
- International Building Code 2003 Edition with the CT Supplement
- CT State Building Code 2005

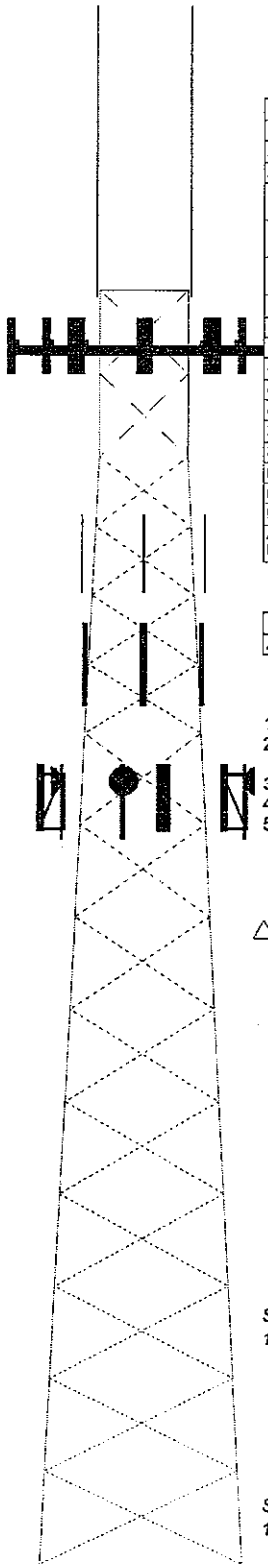
CONCLUSION:

Based on our analysis, Bay State Design, Inc. has concluded the above referenced tower and foundation are sufficient to support the proposed loading provided the following modifications are complete:

- Replace existing 2 x 2x 3/16 diagonals at elevation 20'-40' with 2 ½ x 2 ½ x 3/16 angles
- Replace existing 1 ¾ x 1 ¾ x 3/16 diagonals at elevation 40'-60' with 2 ½ x 2 ½ x 3/16 angles

Assuming these modifications are made, the tower is rated at 94.2% of its structural capacity.





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DB420	102	APXV18-206517S-C-w/mounting hardware	65
ASP-705	102		
ASPA685	102	APXV18-206517S-C-w/mounting hardware	65
Pirod 12' T-Frame Sector Mount (1)	88	2.5' Standoff Mount	55
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		2.5' Standoff Mount	55
Pirod 12' T-Frame Sector Mount (1)	88	LLPX310R w/3"x5.5' pipe	55
		LLPX310R w/3"x5.5' pipe	55
(3) DUO1417-8686	88	LLPX310R w/3"x5.5' pipe	55
(3) DUO1417-8686	88	U-RAS	55
(3) DUO1417-8686	88	U-RAS	55
(3) TMA 10' x 8" x 3"	88	U-RAS	55
(3) TMA 10' x 8" x 3"	88	3"x 5.5' pipe	55
(3) TMA 10' x 8" x 3"	88	3"x 5.5' pipe	55
Pirod 6' Side Mount Standoff (1)	79	3"x 5.5' pipe	55
PR-950	79	DragonWave	55
DB806-XT	73	DragonWave	55
DB806-XT	73	DragonWave	55
DB806-XT	73		
APXV18-206517S-C-w/mounting hardware	65		

MATERIAL STRENGTH

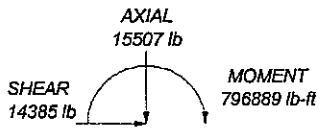
GRADE	Fy	Fu	GRADE	Fy	Fu
A618-50	50 ksi	70 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

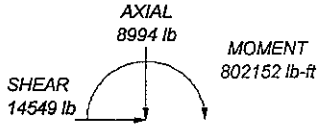
1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 60 mph wind.
5. TOWER RATING: 94.2%

△

MAX. CORNER REACTIONS AT BASE:
DOWN: 67979 lb
UPLIFT: -58066 lb
SHEAR: 8611 lb



TORQUE 2318 lb-ft
69 mph WIND - 0.5000 in ICE



TORQUE 1918 lb-ft
REACTIONS - 80 mph WIND

Bay State Design
241 Boston Post Road West
Marlborough, MA 01752
Phone: (508) 229-4100
FAX: (508) 485-5321

Job: **CT-HFD0079A-MOD**		
Project: **92 ft Self Supporting Tower**		
Client: Clearwire - CT	Drawn by: kw	App'd:
Code: TIA/EIA-222-F	Date: 09/25/09	Scale: NTS
Path: N:\PROJECTS\Clearwire-CT\CT-HFD0079A\CT-HFD0079A-MOD\CT-HFD0079A-MOD.eri		Dwg No. E-1

BSD

Bay State Design
241 Boston Post Road West
Marlborough, MA 01752
Phone: (508) 229-4100
FAX: (508) 485-5321

Job	Page
CT-HFD0079A-MOD	1 of 17
Project	**Date**
92 ft Self Supporting Tower	09:40:39 09/25/09
Client	**Designed by**
Clearwire - CT	kw

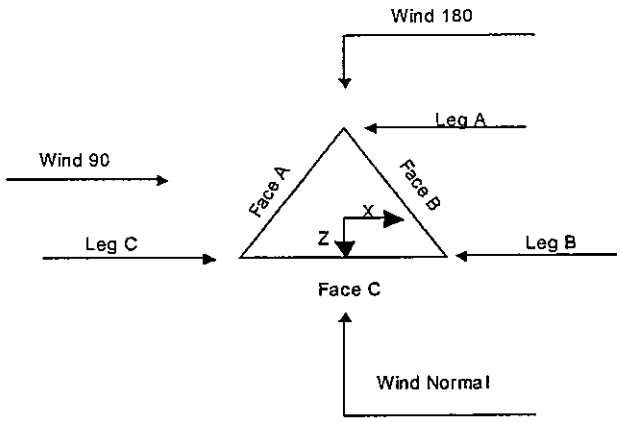
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 92.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 6.52 ft at the top and 14.65 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 60 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member 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	Use TIA-222-F Bracing Resist. Exemption
√ 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		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	92.00-80.00			6.52	1	12.00
T2	80.00-60.00			6.56	1	20.00
T3	60.00-40.00			8.56	1	20.00
T4	40.00-20.00			10.56	1	20.00
T5	20.00-0.00			12.60	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	92.00-80.00	6.00	X Brace	No	No	0.0000	0.0000
T2	80.00-60.00	5.00	X Brace	No	No	0.0000	0.0000
T3	60.00-40.00	6.67	X Brace	No	No	0.0000	0.0000
T4	40.00-20.00	6.67	X Brace	No	No	0.0000	0.0000
T5	20.00-0.00	6.67	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 92.00-80.00	Pipe	P2x.154	A618-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T2 80.00-60.00	Pipe	P2.5x.203	A618-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T3 60.00-40.00	Pipe	P2.5x.203	A618-50 (50 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T4 40.00-20.00	Pipe	P2.5x.276	A618-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 20.00-0.00	Pipe	P3x.3	A618-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 92.00-80.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft²	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
T1 92.00-80.00	0.00	0.2500	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T2 80.00-60.00	0.00	0.2500	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T3 60.00-40.00	0.00	0.2500	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T4 40.00-20.00	0.00	0.2500	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T5 20.00-0.00	0.00	0.2500	A36 (36 ksi)	1	1	1.05	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 92.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Single Diags X	K Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T2	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	0.5	1
40.00-20.00				1	1	1	1	1	1	1	1	1	1	0.5	1
T5 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	0.5	1
				1	1	1	1	1	1	1	1	1	1	0.5	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 92.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75	0.0000	1
T2 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75	0.0000	1
T3 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75	0.0000	1
T4 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75	0.0000	1
T5 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75	0.0000	1

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1 92.00-80.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 80.00-60.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 60.00-40.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 40.00-20.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 20.00-0.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1/2	A	No	Ar (CfAe)	73.00 - 6.00	-12.5000	0.27	1	1	0.5800	0.5800		0.25
1/2	A	No	Ar (CfAe)	73.00 - 6.00	-12.0000	0.22	1	1	0.5800	0.5800		0.25
FLC 158-50J (1 5/8 FOAM)	C	No	Ar (CfAe)	65.00 - 6.00	4.0000	0.43	6	6	2.0200	2.0200		0.92
7/8	A	No	Ar (CfAe)	92.00 - 6.00	-4.0000	0.35	3	3	1.1100	1.1100		0.54
1/2	B	No	Ar (CfAe)	55.00 - 6.00	-4.0000	0.35	3	3	0.5800	0.5800		0.25
1/2	B	No	Ar (CfAe)	55.00 - 6.00	-4.0000	0.3	6	6	0.5800	0.5800		0.25

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight plf
1 5/8	A	No	CaAa (In Face)	88.00 - 6.00	-4.0000	0.43	3	No Ice	0.20	1.04
								1/2" Ice	0.30	2.55
1 5/8	B	No	CaAa (In Face)	88.00 - 6.00	-4.0000	0.43	3	No Ice	0.20	1.04
								1/2" Ice	0.30	2.55
1 5/8	C	No	CaAa (In Face)	88.00 - 6.00	-4.0000	0.43	3	No Ice	0.20	1.04
								1/2" Ice	0.30	2.55

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 lb
T1	92.00-80.00	A	3.330	0.000	4.752	0.000	44.40
		B	0.000	0.000	4.752	0.000	24.96
		C	0.000	0.000	4.752	0.000	24.96
T2	80.00-60.00	A	6.807	0.000	11.880	0.000	101.30
		B	0.000	0.000	11.880	0.000	62.40
		C	5.050	0.000	11.880	0.000	90.00
T3	60.00-40.00	A	7.483	0.000	11.880	0.000	104.80
		B	6.525	0.000	11.880	0.000	96.15
		C	20.200	0.000	11.880	0.000	172.80
T4	40.00-20.00	A	7.483	0.000	11.880	0.000	104.80
		B	8.700	0.000	11.880	0.000	107.40
		C	20.200	0.000	11.880	0.000	172.80
T5	20.00-0.00	A	5.238	0.000	8.316	0.000	73.36
		B	6.090	0.000	8.316	0.000	75.18
		C	14.140	0.000	8.316	0.000	120.96

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 lb
T1	92.00-80.00	A	0.500	6.330	0.000	7.152	0.000	116.05
		B		0.000	0.000	7.152	0.000	61.20
		C		0.000	0.000	7.152	0.000	61.20
T2	80.00-60.00	A	0.500	13.973	0.000	17.880	0.000	268.06
		B		0.000	0.000	17.880	0.000	153.00

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 lb
		C		7.550	0.000	17.880	0.000	226.78
T3	60.00-40.00	A	0.500	15.817	0.000	17.880	0.000	280.80
		B		3.950	10.150	17.880	0.000	270.59
		C		30.200	0.000	17.880	0.000	448.13
T4	40.00-20.00	A	0.500	15.817	0.000	17.880	0.000	280.80
		B		5.267	13.533	17.880	0.000	309.79
		C		30.200	0.000	17.880	0.000	448.13
T5	20.00-0.00	A	0.500	11.072	0.000	12.516	0.000	196.56
		B		3.687	9.473	12.516	0.000	216.85
		C		21.140	0.000	12.516	0.000	313.69

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	92.00-80.00	-0.0713	-1.2060	-0.0886	-1.4991
T2	80.00-60.00	-1.1164	-0.3656	-1.1233	-0.7635
T3	60.00-40.00	-3.0884	2.2729	-3.0440	1.7169
T4	40.00-20.00	-3.0950	2.6131	-3.0849	1.9962
T5	20.00-0.00	-2.9672	2.4305	-3.0316	1.8731

Discrete Tower Loads

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 lb
DB420	A	From Leg	0.25 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice	3.33 5.99	3.33 5.99	34.00 44.20
ASP-705	B	From Leg	0.25 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice	5.88 8.01	5.88 8.01	25.00 67.70
ASPA685	C	From Leg	0.25 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice	5.25 7.38	5.25 7.38	21.50 60.30
Pirod 12' T-Frame Sector Mount (1)	A	From Leg	4.00 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	465.00 600.00
Pirod 12' T-Frame Sector Mount (1)	B	From Leg	4.00 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	465.00 600.00
Pirod 12' T-Frame Sector Mount (1)	C	From Leg	4.00 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	465.00 600.00
(3) DUO1417-8686	A	From Leg	4.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice	6.53 6.94	4.20 4.57	20.30 62.49

BSD	Job: CT-HFD0079A-MOD	Page: 7 of 17
Bay State Design 241 Boston Post Road West Marlborough, MA 01752 Phone: (508) 229-4100 FAX: (508) 485-5321	Project: 92 ft Self Supporting Tower	Date: 09:40:39 09/25/09
	Client: Clearwire - CT	Designed by: kw

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(3) DUO1417-8686	B	From Leg	4.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice	6.53 6.94	4.20 4.57	20.30 62.49
(3) DUO1417-8686	C	From Leg	4.50 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice	6.53 6.94	4.20 4.57	20.30 62.49
(3) TMA 10' x 8" x 3"	A	From Leg	4.00 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice	0.78 0.90	0.29 0.38	15.00 20.06
(3) TMA 10' x 8" x 3"	B	From Leg	4.00 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice	0.78 0.90	0.29 0.38	15.00 20.06
(3) TMA 10' x 8" x 3"	C	From Leg	4.00 0.00 0.00	0.0000	88.00	No Ice 1/2" Ice	0.78 0.90	0.29 0.38	15.00 20.06
Pirod 6' Side Mount Standoff (1)	A	From Leg	2.00 0.00 0.00	0.0000	79.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	70.00 130.00
PR-950	A	From Leg	4.00 0.00 0.00	0.0000	79.00	No Ice 1/2" Ice	6.35 11.43	6.35 11.43	38.00 49.40
DB806-XT	A	From Leg	1.00 0.00 0.00	0.0000	73.00	No Ice 1/2" Ice	1.14 1.68	1.14 1.68	21.00 29.93
DB806-XT	B	From Leg	1.00 0.00 0.00	0.0000	73.00	No Ice 1/2" Ice	1.14 1.68	1.14 1.68	21.00 29.93
DB806-XT	C	From Leg	1.00 0.00 0.00	0.0000	73.00	No Ice 1/2" Ice	1.14 1.68	1.14 1.68	21.00 29.93
APXV18-206517S-C-w/mou nting hardware	A	From Leg	0.25 0.00 0.00	30.0000	65.00	No Ice 1/2" Ice	5.17 5.62	4.46 5.39	53.90 93.96
APXV18-206517S-C-w/mou nting hardware	B	From Leg	0.25 0.00 0.00	30.0000	65.00	No Ice 1/2" Ice	5.17 5.62	4.46 5.39	53.90 93.96
APXV18-206517S-C-w/mou nting hardware	C	From Leg	0.25 0.00 0.00	30.0000	65.00	No Ice 1/2" Ice	5.17 5.62	4.46 5.39	53.90 93.96
2.5' Standoff Mount	A	From Leg	2.50 0.00 0.00	0.0000	55.00	No Ice 1/2" Ice	1.50 2.71	1.50 2.71	40.00 71.00
2.5' Standoff Mount	B	From Leg	2.50 0.00 0.00	0.0000	55.00	No Ice 1/2" Ice	1.50 2.71	1.50 2.71	40.00 71.00
2.5' Standoff Mount	C	From Leg	2.50 0.00 0.00	0.0000	55.00	No Ice 1/2" Ice	1.50 2.71	1.50 2.71	40.00 71.00
LLPX310R w/3"x5.5' pipe	A	From Leg	2.50 1.50 1.00	0.0000	55.00	No Ice 1/2" Ice	5.45 5.92	3.65 4.26	70.69 117.66
LLPX310R w/3"x5.5' pipe	B	From Leg	2.50 1.50 1.00	0.0000	55.00	No Ice 1/2" Ice	5.45 5.92	3.65 4.26	70.69 117.66
LLPX310R w/3"x5.5' pipe	C	From Leg	2.50 1.50 1.00	0.0000	55.00	No Ice 1/2" Ice	5.45 5.92	3.65 4.26	70.69 117.66

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
U-RAS	A	From Leg	2.50 1.50 -1.50	0.0000	55.00	No Ice 1/2" Ice	1.80 1.99	0.78 0.92	33.00 44.58
U-RAS	B	From Leg	2.50 1.50 -1.50	0.0000	55.00	No Ice 1/2" Ice	1.80 1.99	0.78 0.92	33.00 44.58
U-RAS	C	From Leg	2.50 1.50 -1.50	0.0000	55.00	No Ice 1/2" Ice	1.80 1.99	0.78 0.92	33.00 44.58
3"x 5.5' pipe	A	From Leg	2.50 -1.50 0.00	0.0000	55.00	No Ice 1/2" Ice	1.71 2.04	1.71 2.04	42.00 55.95
3"x 5.5' pipe	B	From Leg	2.50 -1.50 0.00	0.0000	55.00	No Ice 1/2" Ice	1.71 2.04	1.71 2.04	42.00 55.95
3"x 5.5' pipe	C	From Leg	2.50 -1.50 0.00	0.0000	55.00	No Ice 1/2" Ice	1.71 2.04	1.71 2.04	42.00 55.95

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 lb
DragonWave	A	Paraboloid w/o Radome	From Leg	2.50 -1.50 1.50	Worst		55.00	2.20	No Ice 1/2" Ice	3.80 4.10	27.00 48.00
DragonWave	B	Paraboloid w/o Radome	From Leg	2.50 -1.50 1.50	Worst		55.00	2.20	No Ice 1/2" Ice	3.80 4.10	27.00 48.00
DragonWave	C	Paraboloid w/o Radome	From Leg	2.50 -1.50 1.50	Worst		55.00	2.20	No Ice 1/2" Ice	3.80 4.10	27.00 48.00

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 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

Comb. No.	Description
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 Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	92 - 80	Leg	Max Tension	4	3099.88	-523.55	-3.37
			Max. Compression	15	-4825.49	-115.95	0.76
			Max. Mx	10	-1685.13	-753.48	3.52
			Max. My	11	-695.30	-1.67	775.37
			Max. Vy	2	-648.57	523.32	0.03
			Max. Vx	11	644.80	-1.67	-493.23
		Diagonal	Max Tension	11	1737.91	0.00	0.00
			Max. Compression	11	-1790.72	0.00	0.00
			Max. Mx	16	951.56	9.10	-0.31
			Max. My	11	-1785.02	1.85	1.86
			Max. Vy	16	7.69	9.10	-0.31
			Max. Vx	11	-0.42	0.00	0.00
		Top Girt	Max Tension	8	74.77	0.00	0.00
			Max. Compression	19	-132.09	0.00	0.00
			Max. Mx	14	-72.30	-23.87	0.00
			Max. My	24	-68.49	0.00	0.02
			Max. Vy	14	-14.64	0.00	0.00
			Max. Vx	24	-0.01	0.00	0.00
T2	80 - 60	Leg	Max Tension	12	15596.31	-21.82	-2.56
			Max. Compression	15	-18880.03	210.55	4.47
			Max. Mx	15	-18880.03	210.55	4.47
			Max. My	18	-1599.20	-28.10	-288.75
			Max. Vy	21	-117.74	-66.28	-0.73

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vx	24	-248.54	7.79	45.57
		Diagonal	Max Tension	9	1883.24	0.00	0.00
			Max. Compression	22	-2034.90	0.00	0.00
			Max. Mx	26	752.40	14.09	-1.13
			Max. My	17	-1811.25	9.89	2.97
			Max. Vy	26	10.17	14.09	-1.13
			Max. Vx	17	-0.88	0.00	0.00
T3	60 - 40	Leg	Max Tension	12	28823.13	-6.18	7.12
			Max. Compression	15	-34289.56	-4.92	6.31
			Max. Mx	17	22860.33	-281.65	0.06
			Max. My	13	-1188.71	-9.74	255.69
			Max. Vy	4	271.12	-246.53	-1.00
			Max. Vx	13	-254.58	-5.36	204.32
		Diagonal	Max Tension	22	2921.83	0.00	0.00
			Max. Compression	22	-2906.81	0.00	0.00
			Max. Mx	25	2010.69	31.16	-2.02
			Max. My	17	-2523.03	16.30	4.73
			Max. Vy	25	16.30	31.16	-2.02
			Max. Vx	17	-1.21	0.00	0.00
T4	40 - 20	Leg	Max Tension	12	42811.95	-70.84	6.49
			Max. Compression	23	-49873.72	303.36	0.40
			Max. Mx	15	-49707.31	305.13	4.78
			Max. My	13	-2379.23	-8.27	125.59
			Max. Vy	15	-89.63	305.13	4.78
			Max. Vx	7	44.10	-8.26	-125.48
		Diagonal	Max Tension	16	3159.20	0.00	0.00
			Max. Compression	16	-3384.17	0.00	0.00
			Max. Mx	23	2141.19	66.73	-3.99
			Max. My	17	-2935.71	40.26	5.70
			Max. Vy	25	26.75	66.46	-4.09
			Max. Vx	17	-1.40	0.00	0.00
T5	20 - 0	Leg	Max Tension	12	55967.24	-94.00	5.92
			Max. Compression	23	-65991.66	0.00	0.13
			Max. Mx	17	50097.22	-490.92	-0.08
			Max. My	13	-2928.15	-11.54	219.11
			Max. Vy	17	-146.11	-490.92	-0.08
			Max. Vx	13	68.04	-11.54	219.11
		Diagonal	Max Tension	16	3816.17	0.00	0.00
			Max. Compression	16	-3731.36	0.00	0.00
			Max. Mx	25	2028.77	77.58	4.42
			Max. My	22	-3704.47	51.42	-8.60
			Max. Vy	25	29.34	77.58	4.42
			Max. Vx	22	1.77	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	23	67979.00	6666.73	-3947.47
	Max. H_x	10	66223.05	7416.69	-4343.57
	Max. H_z	16	-47836.42	-6216.25	4402.09
	Min. Vert	4	-57913.43	-6673.77	3914.23
	Min. H_x	17	-55706.94	-7409.28	4375.12
	Min. H_z	10	66223.05	7416.69	-4343.57
Leg B	Max. Vert	19	67619.72	-6700.77	-3875.31
	Max. H_x	25	-56066.09	7449.61	4318.36

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
	Max. H_z	25	-56066.09	7449.61	4318.36
	Min. Vert	12	-58066.32	6710.79	3855.44
	Min. H_x	6	66070.11	-7452.55	-4276.10
	Min. H_z	6	66070.11	-7452.55	-4276.10
Leg A	Max. Vert	15	67719.96	-79.52	7742.57
	Max. H_x	11	3002.70	1309.34	229.58
	Max. H_z	2	66156.59	-76.36	8593.67
	Min. Vert	8	-57979.87	69.42	-7737.90
	Min. H_x	5	3002.74	-1312.44	229.71
	Min. H_z	21	-55965.88	69.33	-8608.83

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	8994.38	-0.00	-0.00	-83.28	1118.63	0.00
Dead+Wind 0 deg - No Ice	8994.36	-0.01	-14548.86	-801308.72	1122.58	-1918.27
Dead+Wind 30 deg - No Ice	8994.36	7022.26	-12163.93	-676140.20	-389156.60	-1835.47
Dead+Wind 60 deg - No Ice	8994.36	12018.06	-6938.69	-386955.21	-668945.56	-1357.17
Dead+Wind 90 deg - No Ice	8994.36	14045.41	0.42	-58.55	-779499.58	-511.69
Dead+Wind 120 deg - No Ice	8994.36	12599.72	7274.39	400523.30	-692762.43	570.27
Dead+Wind 150 deg - No Ice	8994.36	7023.14	12163.43	675934.68	-389218.97	1313.68
Dead+Wind 180 deg - No Ice	8994.36	-0.00	13877.29	773644.35	1122.69	1784.40
Dead+Wind 210 deg - No Ice	8994.36	-7023.15	12163.42	675932.57	391463.14	1835.47
Dead+Wind 240 deg - No Ice	8994.36	-12599.71	7274.38	400521.34	695004.12	1348.07
Dead+Wind 270 deg - No Ice	8994.36	-14045.40	0.42	-58.13	781739.75	511.70
Dead+Wind 300 deg - No Ice	8994.36	-12018.05	-6938.68	-386952.75	671186.76	-427.19
Dead+Wind 330 deg - No Ice	8994.36	-7022.26	-12163.92	-676137.95	391400.31	-1313.68
Dead+Ice+Temp	15506.85	0.01	0.01	672.24	2630.22	0.03
Dead+Wind 0 deg+Ice+Temp	15506.82	0.01	-14385.37	-793601.84	2633.67	-1942.60
Dead+Wind 30 deg+Ice+Temp	15506.82	7000.09	-12125.50	-674476.55	-387119.34	-2318.01
Dead+Wind 60 deg+Ice+Temp	15506.82	12026.87	-6943.79	-386818.55	-668501.77	-2152.41
Dead+Wind 90 deg+Ice+Temp	15506.82	14001.06	0.42	694.56	-776939.30	-1413.41
Dead+Wind 120 deg+Ice+Temp	15506.82	12458.17	7192.63	397801.47	-685233.08	-219.73
Dead+Wind 150 deg+Ice+Temp	15506.82	7000.96	12125.02	675780.77	-387184.55	908.81
Dead+Wind 180 deg+Ice+Temp	15506.82	0.01	13887.47	775634.16	2634.26	1839.97
Dead+Wind 210 deg+Ice+Temp	15506.82	-7000.94	12125.01	675779.20	392451.68	2318.01
Dead+Wind 240 deg+Ice+Temp	15506.82	-12458.13	7192.63	397800.06	690497.38	2162.33
Dead+Wind 270 deg+Ice+Temp	15506.82	-14001.02	0.43	695.72	782201.82	1413.41
Dead+Wind 300 deg+Ice+Temp	15506.82	-12026.83	-6943.78	-386815.28	673765.22	312.43
Dead+Wind 330 deg+Ice+Temp	15506.82	-7000.07	-12125.49	-674473.69	392385.08	-908.81
Dead+Wind 0 deg - Service	8994.38	0.00	-8183.61	-450766.33	1120.84	-1079.05
Dead+Wind 30 deg - Service	8994.38	3950.13	-6842.14	-380362.42	-218419.51	-1032.66
Dead+Wind 60 deg - Service	8994.38	6760.26	-3903.05	-217702.82	-375801.09	-763.47
Dead+Wind 90 deg - Service	8994.38	7900.54	0.13	-76.61	-437979.84	-287.61
Dead+Wind 120 deg - Service	8994.38	7087.23	4091.80	225254.81	-389182.33	320.75
Dead+Wind 150 deg - Service	8994.38	3950.41	6841.99	380181.66	-218439.00	738.67
Dead+Wind 180 deg - Service	8994.38	0.00	7806.09	435147.65	1120.96	1003.77
Dead+Wind 210 deg - Service	8994.38	-3950.40	6841.99	380181.04	220680.55	1032.65
Dead+Wind 240 deg - Service	8994.38	-7087.22	4091.80	225254.28	391423.05	758.32
Dead+Wind 270 deg - Service	8994.38	-7900.53	0.13	-76.37	440220.03	287.62
Dead+Wind 300 deg - Service	8994.38	-6760.25	-3903.05	-217701.96	378041.56	-240.28
Dead+Wind 330 deg - Service	8994.38	-3950.13	-6842.13	-380361.64	220660.75	-738.68

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	-0.00	-8994.38	-0.00	0.00	8994.38	0.00	0.000%
2	-0.00	-8994.38	-14552.31	0.01	8994.36	14548.86	0.020%
3	7024.62	-8994.38	-12167.01	-7022.26	8994.36	12163.93	0.023%
4	12021.78	-8994.38	-6940.78	-12018.06	8994.36	6938.69	0.026%
5	14049.25	-8994.38	-0.00	-14045.41	8994.36	-0.42	0.023%
6	12602.67	-8994.38	7276.15	-12599.72	8994.36	-7274.39	0.020%
7	7024.62	-8994.38	12167.01	-7023.14	8994.36	-12163.43	0.023%
8	0.00	-8994.38	13881.56	0.00	8994.36	-13877.29	0.026%
9	-7024.62	-8994.38	12167.01	7023.15	8994.36	-12163.42	0.023%
10	-12602.67	-8994.38	7276.15	12599.71	8994.36	-7274.38	0.020%
11	-14049.25	-8994.38	-0.00	14045.40	8994.36	-0.42	0.023%
12	-12021.78	-8994.38	-6940.78	12018.05	8994.36	6938.68	0.026%
13	-7024.62	-8994.38	-12167.01	7022.26	8994.36	12163.92	0.023%
14	-0.00	-15506.85	-0.00	-0.01	15506.85	-0.01	0.000%
15	-0.00	-15506.85	-14391.21	-0.01	15506.82	14385.37	0.028%
16	7003.63	-15506.85	-12130.64	-7000.09	15506.82	12125.50	0.030%
17	12032.65	-15506.85	-6947.06	-12026.87	15506.82	6943.79	0.032%
18	14007.26	-15506.85	-0.00	-14001.06	15506.82	-0.42	0.030%
19	12463.15	-15506.85	7195.60	-12458.17	15506.82	-7192.63	0.027%
20	7003.63	-15506.85	12130.64	-7000.96	15506.82	-12125.02	0.030%
21	-0.00	-15506.85	13894.11	-0.01	15506.82	-13887.47	0.032%
22	-7003.63	-15506.85	12130.64	7000.94	15506.82	-12125.01	0.030%
23	-12463.15	-15506.85	7195.60	12458.13	15506.82	-7192.63	0.028%
24	-14007.26	-15506.85	-0.00	14001.02	15506.82	-0.43	0.030%
25	-12032.65	-15506.85	-6947.06	12026.83	15506.82	6943.78	0.032%
26	-7003.63	-15506.85	-12130.64	7000.07	15506.82	12125.49	0.030%
27	-0.00	-8994.38	-8185.67	-0.00	8994.38	8183.61	0.017%
28	3951.35	-8994.38	-6843.94	-3950.13	8994.38	6842.14	0.018%
29	6762.25	-8994.38	-3904.19	-6760.26	8994.38	3903.05	0.019%
30	7902.70	-8994.38	-0.00	-7900.54	8994.38	-0.13	0.018%
31	7089.00	-8994.38	4092.84	-7087.23	8994.38	-4091.80	0.017%
32	3951.35	-8994.38	6843.94	-3950.41	8994.38	-6841.99	0.018%
33	0.00	-8994.38	7808.38	-0.00	8994.38	-7806.09	0.019%
34	-3951.35	-8994.38	6843.94	3950.40	8994.38	-6841.99	0.018%
35	-7089.00	-8994.38	4092.84	7087.22	8994.38	-4091.80	0.017%
36	-7902.70	-8994.38	-0.00	7900.53	8994.38	-0.13	0.018%
37	-6762.25	-8994.38	-3904.19	6760.25	8994.38	3903.05	0.019%
38	-3951.35	-8994.38	-6843.94	3950.13	8994.38	6842.13	0.018%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00027065
3	Yes	4	0.00000001	0.00031207
4	Yes	4	0.00000001	0.00034739
5	Yes	4	0.00000001	0.00031156
6	Yes	4	0.00000001	0.00027056
7	Yes	4	0.00000001	0.00031191
8	Yes	4	0.00000001	0.00034698
9	Yes	4	0.00000001	0.00031176
10	Yes	4	0.00000001	0.00027054

11	Yes	4	0.00000001	0.00031154
12	Yes	4	0.00000001	0.00034736
13	Yes	4	0.00000001	0.00031220
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00045996
16	Yes	4	0.00000001	0.00049908
17	Yes	4	0.00000001	0.00053450
18	Yes	4	0.00000001	0.00049857
19	Yes	4	0.00000001	0.00045947
20	Yes	4	0.00000001	0.00049863
21	Yes	4	0.00000001	0.00053356
22	Yes	4	0.00000001	0.00049827
23	Yes	4	0.00000001	0.00045950
24	Yes	4	0.00000001	0.00049860
25	Yes	4	0.00000001	0.00053453
26	Yes	4	0.00000001	0.00049950
27	Yes	4	0.00000001	0.00028647
28	Yes	4	0.00000001	0.00030897
29	Yes	4	0.00000001	0.00032937
30	Yes	4	0.00000001	0.00030885
31	Yes	4	0.00000001	0.00028614
32	Yes	4	0.00000001	0.00030859
33	Yes	4	0.00000001	0.00032876
34	Yes	4	0.00000001	0.00030842
35	Yes	4	0.00000001	0.00028613
36	Yes	4	0.00000001	0.00030883
37	Yes	4	0.00000001	0.00032935
38	Yes	4	0.00000001	0.00030913

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
T1	92 - 80	2.530	27	0.2136	0.0108
T2	80 - 60	1.986	27	0.2057	0.0115
T3	60 - 40	1.156	27	0.1710	0.0055
T4	40 - 20	0.524	35	0.1110	0.0027
T5	20 - 0	0.147	35	0.0512	0.0013

Critical Deflections and Radius of Curvature - Service Wind

Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft			*in*	°	°	*ft*
102.00	DB420	27	2.530	0.2136	0.0108	154510
88.00	Pirod 12' T-Frame Sector Mount (1)	27	2.347	0.2115	0.0114	154510
79.00	Pirod 6' Side Mount Standoff (1)	27	1.942	0.2047	0.0114	58616
73.00	DB806-XT	27	1.680	0.1971	0.0100	38857
65.00	APXV18-206517S-C-w/mounting hardware	27	1.349	0.1826	0.0072	26741
56.50	DragonWave	35	1.029	0.1617	0.0046	21631
55.00	2.5' Standoff Mount	35	0.976	0.1575	0.0043	21311

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	92 - 80	4.490	2	0.3787	0.0279
T2	80 - 60	3.526	2	0.3647	0.0285
T3	60 - 40	2.053	2	0.3035	0.0138
T4	40 - 20	0.931	10	0.1971	0.0068
T5	20 - 0	0.260	10	0.0909	0.0029

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
102.00	DB420	2	4.490	0.3787	0.0279	88144
88.00	Pirod 12' T-Frame Sector Mount (1)	2	4.166	0.3750	0.0288	88144
79.00	Pirod 6' Side Mount Standoff (1)	2	3.448	0.3629	0.0281	33387
73.00	DB806-XT	2	2.983	0.3495	0.0243	22056
65.00	APXV18-206517S-C-w/mounting hardware	2	2.396	0.3240	0.0176	15142
56.50	DragonWave	10	1.827	0.2871	0.0118	12226
55.00	2.5' Standoff Mount	10	1.734	0.2797	0.0111	12040

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	92	Leg	A325N	0.6250	4	226.23	13494.80	0.017 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	1790.72	4123.34	0.434 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	132.09	4123.34	0.032 ✔	1.333	Bolt Shear
T2	80	Leg	A325N	0.6250	4	1665.14	13498.80	0.123 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	2034.90	4123.34	0.494 ✔	1.333	Bolt Shear
T3	60	Leg	A325N	0.6250	4	4804.96	13498.30	0.356 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	2921.83	4123.34	0.709 ✔	1.333	Bolt Shear
T4	40	Leg	A325N	0.6250	4	8393.42	13499.00	0.622 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	3384.17	4123.34	0.821 ✔	1.333	Bolt Shear
T5	20	Leg	A325N	0.7500	4	11821.30	19438.60	0.608 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	3816.17	4123.34	0.926 ✔	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	92 - 80	P2x.154	12.00	6.00	91.5 K=1.00	16.619	1.0745	-4825.49	17858.20	0.270 ✔
T2	80 - 60	P2.5x.203	20.03	5.01	63.4 K=1.00	22.122	1.7040	-18880.00	37697.80	0.501 ✔
T3	60 - 40	P2.5x.203	20.03	6.68	84.6 K=1.00	18.081	1.7040	-34289.60	30810.90	1.113 ✔
T4	40 - 20	P2.5x.276	20.03	6.68	86.7 K=1.00	17.634	2.2535	-49873.70	39739.10	1.255 ✔
T5	20 - 0	P3x.3	20.03	6.68	70.5 K=1.00	20.840	3.0159	-65991.70	62852.90	1.050 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	92 - 80	L1 1/2x1 1/2x3/16	8.88	4.20	171.8 K=1.00	5.061	0.5273	-1790.72	2668.66	0.671 ✔
T2	80 - 60	L1 1/2x1 1/2x3/16	9.70	4.74	193.9 K=1.00	3.970	0.5273	-2034.90	2093.55	0.972 ✔
T3	60 - 40	L2x2x3/16	12.21	6.05	184.1 K=1.00	4.404	0.7150	-2784.41	3148.80	0.884 ✔
T4	40 - 20	L2 1/2x2 1/2x3/16	13.96	6.92	167.8 K=1.00	5.305	0.9020	-3384.17	4784.90	0.707 ✔
T5	20 - 0	L2 1/2x2 1/2x3/16	15.17	7.50	181.8 K=1.00	4.518	0.9020	-3731.36	4074.96	0.916 ✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	92 - 80	L2x2x3/16	6.52	6.09	185.6 K=1.00	4.336	0.7150	-132.09	3100.54	0.043 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	92 - 80	P2x.154	12.00	6.00	91.5	30.000	1.0745	3099.88	32235.90	0.096 ✔
T2	80 - 60	P2.5x.203	20.03	5.01	63.4	30.000	1.7040	15549.60	51121.50	0.304 ✔
T3	60 - 40	P2.5x.203	20.03	6.68	84.6	30.000	1.7040	28823.10	51121.50	0.564 ✔
T4	40 - 20	P2.5x.276	20.03	6.68	86.7	30.000	2.2535	42811.90	67606.20	0.633 ✔
T5	20 - 0	P3x.3	20.03	6.68	70.5	30.000	3.0159	55967.20	90477.90	0.619 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	92 - 80	L1 1/2x1 1/2x3/16	8.88	4.20	113.4	29.000	0.3076	1737.91	8920.90	0.195 ✔
T2	80 - 60	L1 1/2x1 1/2x3/16	9.70	4.74	127.6	29.000	0.3076	1883.24	8920.90	0.211 ✔
T3	60 - 40	L2x2x3/16	12.21	6.05	119.8	29.000	0.4484	2921.83	13002.40	0.225 ✔
T4	40 - 20	L2 1/2x2 1/2x3/16	13.36	6.63	104.0	29.000	0.5886	3159.20	17069.70	0.185 ✔
T5	20 - 0	L2 1/2x2 1/2x3/16	15.79	7.81	122.2	29.000	0.5886	3816.17	17069.70	0.224 ✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	92 - 80	L2x2x3/16	6.52	6.09	123.0	29.000	0.4484	74.77	13002.40	0.006 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T1	92 - 80	Leg	P2x.154	3	-4825.49	23804.98	20.3	Pass
		Diagonal	L1 1/2x1 1/2x3/16	7	-1790.72	3557.32	50.3	Pass
		Top Girt	L2x2x3/16	6	-132.09	4133.02	3.2	Pass

BSD	Job: CT-HFD0079A-MOD	Page: 17 of 17
Bay State Design 241 Boston Post Road West Marlborough, MA 01752 Phone: (508) 229-4100 FAX: (508) 485-5321	Project: 92 ft Self Supporting Tower	Date: 09:40:39 09/25/09
	Client: Clearwire - CT	Designed by: kw

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T2	80 - 60	Leg	P2.5x.203	21	-18880.00	50251.17	37.6	Pass
		Diagonal	L1 1/2x1 1/2x3/16	27	-2034.90	2790.70	72.9	Pass
T3	60 - 40	Leg	P2.5x.203	48	-34289.60	41070.93	83.5	Pass
		Diagonal	L2x2x3/16	54	-2784.41	4197.35	66.3	Pass
T4	40 - 20	Leg	P2.5x.276	67	-49873.70	52972.22	94.2	Pass
		Diagonal	L2 1/2x2 1/2x3/16	74	-3384.17	6378.27	53.1	Pass
							61.6 (b)	
T5	20 - 0	Leg	P3x.3	88	-65991.70	83782.91	78.8	Pass
		Diagonal	L2 1/2x2 1/2x3/16	101	-3731.36	5431.92	68.7	Pass
							69.4 (b)	
							Summary	
						Leg (T4)	94.2	Pass
						Diagonal (T2)	72.9	Pass
						Top Girt (T1)	3.2	Pass
						Bolt Checks	69.4	Pass
						RATING =	**94.2**	**Pass**

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BAY STATE DESIGN

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Project _____ Job No. _____ Page _____ of _____

Computed by _____ Date _____

Detail _____ Checked by _____ Date _____

CT-HFD0079A

20' ~ 40' Diagonal

Replace L 2×2×3/16 ⇒ L 2 1/2 × 2 1/2 × 3/16

40' ~ 60' Diagonal

Replace L 1 3/4 × 1 3/4 × 3/16 ⇒ L 2×2×3/16