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KENNETH C. BALDWIN

280 Trumbull Street
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Also admitted in Massachusetts

December 28, 2012

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

Re: **EM-VER-084-121018 – 434 Boston Post Road, Milford, Connecticut**
EM-VER-111-120626 – 42 South Street, Plymouth, Connecticut
EM-VER-119-120924 – 2 West Street, Rocky Hill, Connecticut
EM-VER-155-120829 – 3114 Albany Avenue, West Hartford, Connecticut
EM-VER-164-121018 – 750 Rainbow Road, Windsor, Connecticut
EM-VER-093-120725 – 100 Pond Lily Avenue, New Haven, Connecticut

Completion of Construction Activity

Dear Ms. Roberts:

The purpose of this letter is to notify the Siting Council that construction activity associated with the above-referenced Cellco Partnership d/b/a Verizon Wireless telecommunications facilities has been completed.

If you have any questions or need any additional information regarding this facility please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Copy to:
Sandy M. Carter

12012134-v1

ROBINSON & COLE LLP

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Hartford, CT 06103-3597
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Also admitted in Massachusetts

October 24, 2012

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

Re: **EM-VER-158-111214 – Bayberry Lane, Westport, Connecticut**
EM-VER-033-120620 – 201 Main Street, Cromwell, Connecticut
EM-VER-155-120615 – 570 New Park Avenue, West Hartford, Connecticut
EM-VER-151-120802 – 940 Meriden Road, Waterbury, Connecticut
EM-VER-110-120806 – 335 Washington Street, Plainville, Connecticut
EM-VER-011-120525 – 811 Blue Hills Avenue, Bloomfield, Connecticut
EM-VER-017-120904 – 1191 Terryville Avenue, Bristol, Connecticut
EM-VER-155-120829 – 3114 Albany Avenue, West Hartford, Connecticut

Completion of Construction Activity

Dear Ms. Roberts:

The purpose of this letter is to notify the Siting Council that construction activity associated with the above-referenced Cellco Partnership d/b/a Verizon Wireless telecommunications facility modifications has been completed.

If you have any questions or need any additional information regarding this facility please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Copy to:
Sandy M. Carter

11801779-v1

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

September 21, 2012

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103

RE: **EM-VER-155-120829-** Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 3114 Albany Avenue, West Hartford, Connecticut.

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Not less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated August 28, 2012. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

LRoberts

Linda Roberts
Executive Director

LR/CDM/jbw

c: The Honorable Scott Slifka, Mayor, Town of West Hartford
Ronald VanWinkleMilagros Limsom, Town Planner, Town of West Hartford
Milagros Limsom,Town Planner, Town of West Hartford
Grain Communications

Martin, David C.

From: Dan Goulet <Dan.Goulet@csquaredsystems.com>
Sent: Friday, September 07, 2012 11:00 AM
To: Martin, David C.
Cc: Keith Vellante
Subject: VZW West Hartford - Talcott 2
Attachments: Talcott2_CT_RFEReport_20120820R1.pdf

Importance: High

David,

Attached is the revised report to correct the typo found in Table 3 of Pg. 6 of the report. (EIRP for 750MHz shown as 20541 instead of correct value **2054.1**). Please use the attached report for Talcott 2 to replace the one previously submitted in its entirety.

Thanks

Dan Goulet
C Squared Systems
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support@csquaredsystems.com

RADIO FREQUENCY EXPOSURE REPORT

TALCOTT 2 CT

3114 ALBANY AVE
WEST HARTFORD, CT 06117

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List of Figures

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed modifications to the existing Verizon Wireless antenna arrays on one of the guyed towers located at 3114 Albany Avenue in West Hartford, CT. Verizon Wireless, AT&T, T-Mobile, Pocket, two FM radio stations (WCCC and WMNR), CH38 and Public Safety operators all have antennas mounted on the tower. Figure 1 below is a view of the subject tower and an adjacent tower.

Verizon Wireless is proposing the following modifications:

1) Install two 700 MHz LTE panel antennas (one per sector; beta and gamma sectors);
2) Replace four existing 850 MHz Cellular panel antennas, with four 850 MHz Cellular antennas (two per sector; beta and gamma sectors);
3) Replace four existing 1900 MHz PCS panel antennas, with two dual-band 1900/2100 MHz PCS/AWS antennas (one per sector; beta and gamma sectors);

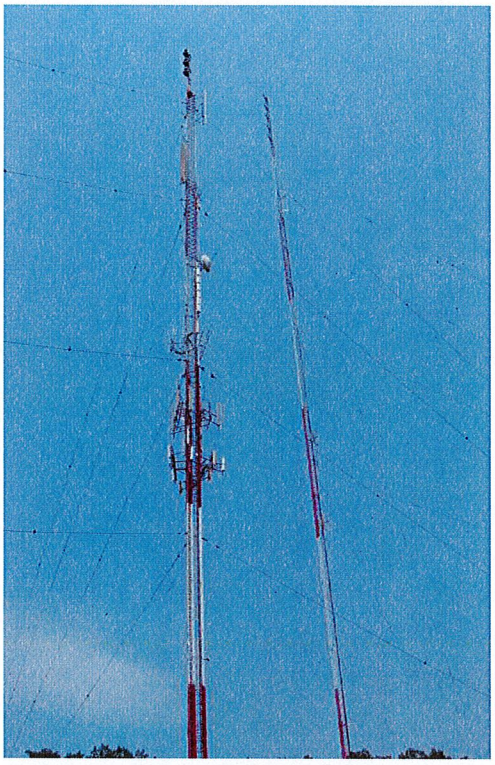


Figure 1: View of Talcott 2

Site Address	3114 Albany Ave, West Hartford, CT
Latitude	41° 47' 48" N
Longitude	72° 47' 50" W
Site Elevation AMSL	716'
Cellular License Information	KNKA404
PCS License Information	KNLH251/WPOJ730
LTE License Information	WQJQ689
AWS License Information	WQGA715
Name of Individual Conducting Survey	Daniel Brown
Date and Time of Survey	8/17/2012; 12:30 PM – 2:00 PM

Table 1: Site Specific Data

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/cm2). 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 provided they are fully aware of the potential for exposure, and are able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels considered 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. Facility Photos, Equipment & Signage

Figure 2 shows the access road gate and signage to the Talcott 2 Facility.

Figure 2: Tower Access Road Gate and Signage

Figures 3 and 4 below show the compound facility and posted RF signage. Verizon Wireless' equipment is located at the base of the tower inside of the compound. At the time of the survey, access to the equipment building was not permitted.

Figure 3: Talcott 2 Compound Facility

Figure 4: Compound Facility and RF Signage

4. Measurement Procedure

Frequencies from 300 KHz to 50 GHz were measured using the Narda Probe EA 5091, E-Field, shaped, FCC probe in conjunction with the NBM550 survey meter. The EA 5091 probe is "shaped" such that in a mixed signal environment (i.e.: more than one frequency band is used in a particular location), it accurately measures the percent of MPE.

From FCC OET Bulletin No. 65 - Edition 97-01 – "A useful characteristic of broadband probes used in multiple-frequency RF environments is a frequency-dependent response that corresponds to the variation in MPE limits with frequency. Broadband probes having such a "shaped" response permit direct assessment of compliance at sites where RF fields result from antennas transmitting over a wide range of frequencies. Such probes can express the composite RF field as a percentage of the applicable MPEs".

Probe Description - As suggested in FCC OET Bulletin No. 65 - Edition 97-01, the response of the measurement instrument should be essentially isotropic, (i.e., independent of orientation or rotation angle of the probe). For this reason, the Narda EA 5091 probe was used for these measurements.

Sampling Description - At each measurement location, a spatially averaged measurement is collected over the height of an average human body. The NBM550 survey meter performs a time average measurement while the user slowly moves the probe over a distance range of 20 cm to 200 cm (about 6 feet) above ground level. The results recorded at each measurement location include average values over the spatial distance.

Instrumentation Information - A summary of specifications for the equipment used is provided in the table below.

Manufacturer	Narda Microwave			
Probe	EA 5091, Serial# 01088			
Calibration Date	May 2011			
Calibration Interval	24 Months			
Meter	NBM550, Serial# B-1149			
Calibration Date	October 2010			
Calibration Interval	24 Months			
Probe Specifications	**Frequency Range**	**Field Measured**	**Standard**	**Measurement Range**
	300 KHz-50 GHz	Electric Field	U.S. FCC 1997 Occupational/Controlled	0.5 – 600 % of Standard

Table 2: Instrumentation Information

Instrument Measurement Uncertainty - The total measurement uncertainty of the NARDA measurement probe and meter is no greater than ±2 dB. The factors which contribute to this include the probe's frequency response deviation, calibration uncertainty, ellipse ratio, and isotropic response. Every effort is taken to reduce the overall uncertainty during measurement collection including pointing the probe directly at the likely highest source of emissions.

5. RF Exposure Prediction Methods

The emission field calculation results displayed in Table 4 was 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 = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Off Beam Loss is determined by the selected antenna patterns

Ground reflection factor of 1.6

These calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. 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 higher than the actual signal levels will be from the finished modifications.

6. Proposed Antenna Inventory

Table 3 below lists the proposed Verizon Wireless antenna configuration. The parameters listed in Table 3 were used in the calculations shown in Table 4.

TX Freq. (MHz)	Input Power per Antenna (Watts)	Ant Gain (dBi)	EIRP per Antenna (Watts)	Antenna Model	Horiz. Beam Width	Vert. Beam Width	Length (ft)	Antenna Centerline Height (ft)
850	90	16.1	3666.42	SC-E 6014 REV2	60	18	3.5	130
750	40	17.1	2051.4	SLCP 2x6015	55	11	6.5	130
1900	112	18.1	7231	SACP 2x5516	55	7	4.5	130
2100	40	18.1	2583		55	7	4.5	130
850	90	16.1	3666	SC-E 6014 REV2	60	18	3.5	130

Table 3: Future Verizon Wireless Antenna Configuration[1]

7. Nearby RF Sources

At the time of the survey, no other nearby RF sources were identified that would significantly contribute to the measurements recorded in the area of this facility.

[1] Transmit power assumes 0 dB of cable loss.

8. Survey Results

Measured and calculated results are detailed in the table below. Measurements were recorded on August 17, 2012 between the hours of 12:30 PM and 2:00 PM. The calculated % MPE contribution from the proposed 750 MHz LTE, 850 MHz Cellular and 1900/2100 MHz PCS/AWS technologies were then added to the measured % MPE values in the "Composite % MPE" column. These calculated values incorporate the antenna patterns of the specific antenna models specified by Verizon Wireless to determine the "Off Beam Loss" factor shown in the power density formula from Section 5.[2] All % MPE values are in reference to the FCC Uncontrolled/General Population exposure limit.

Please note that the measurements already include the % MPE contribution from the current Verizon Wireless 850 MHz and 1900MHz antennas. The specific contribution of just the existing Verizon Wireless antennas at each measurement point cannot be isolated from other RF sources however, and may vary over time depending on the traffic served by this facility. Therefore, the composite %MPE values listed below assume Verizon Wireless' 850/1900 MHz proposed configuration is a new addition to the site, instead of a modification to an existing system to ensure a worst-case analysis.

Table 4 below lists the 23 measurements taken in the vicinity of the Talcott 2 facility in West Hartford, CT. The highest composite (measured + calculated) power density is at location 18. This measurement point is approximately 1,290 feet west of the tower. The composite (measured + calculated) % MPE for this location is **12.04%** of the FCC Uncontrolled/General Population limit.

Meas. Point	Latitude	Longitude	Dist. From Site	Measured % MPE (Uncontrolled / General)	Calculated % MPE (750MHz LTE)	Calculated % MPE (850MHz Cellular)	Calculated % MPE (1900MHz PCS)	Calculated % MPE (2100MHz AWS)	Composite % MPE (Uncontrolled / General)
1	41.796876	-72.796771	17'	1.00%	0.01%	0.04%	0.00%	0.00%	1.05%
2	41.796959	-72.796787	41'	1.68%	0.03%	0.03%	0.00%	0.00%	1.74%
3	41.796960	-72.796904	46'	1.30%	0.04%	0.04%	0.01%	0.00%	1.39%
4	41.796870	-72.797091	74'	1.98%	0.03%	0.04%	0.03%	0.01%	2.09%
5	41.796640	-72.796951	85'	3.04%	0.03%	0.08%	0.04%	0.01%	3.20%
6	41.796667	-72.796780	68'	3.21%	0.03%	0.03%	0.02%	0.01%	3.30%
7	41.796732	-72.796678	58'	3.12%	0.03%	0.04%	0.01%	0.00%	3.20%
8	41.796545	-72.796552	134'	5.37%	0.02%	0.37%	0.03%	0.01%	5.80%
9	41.796763	-72.796364	129'	4.40%	0.02%	0.39%	0.03%	0.01%	4.86%
10	41.796265	-72.796654	219'	5.95%	0.05%	0.74%	0.02%	0.01%	6.76%
11	41.795785	-72.796688	391'	2.65%	0.52%	1.51%	0.02%	0.01%	4.70%
12	41.795727	-72.796372	428'	2.50%	0.45%	1.27%	0.02%	0.01%	4.25%
13	41.795679	-72.796878	428'	2.52%	0.47%	1.31%	0.08%	0.03%	4.40%
14	41.797640	-72.799154	697'	2.30%	0.19%	0.53%	0.32%	0.11%	3.45%
15	41.799572	-72.799965	1312'	1.81%	0.06%	0.16%	0.09%	0.03%	2.15%
16	41.799470	-72.800874	1461'	1.57%	0.04%	0.13%	0.07%	0.03%	1.84%
17	41.798530	-72.799172	887'	1.81%	0.12%	0.34%	0.20%	0.07%	2.54%
18	**41.797535**	**-72.801465**	**1289'**	**11.69%**	**0.06%**	**0.16%**	**0.10%**	**0.03%**	**12.04%**
19	41.796657	-72.801603	1304'	1.61%	0.06%	0.16%	0.09%	0.03%	1.95%
20	41.797497	-72.800241	961'	1.61%	0.10%	0.28%	0.17%	0.06%	2.23%
21	41.796972	-72.798538	470'	2.11%	0.40%	1.10%	0.23%	0.08%	3.92%
22	41.794013	-72.796217	1049'	3.46%	0.08%	0.24%	0.14%	0.05%	3.97%
23	41.793183	-72.794181	1520'	2.12%	0.04%	0.11%	0.07%	0.02%	2.36%

Table 4: Measured & Calculated Results [3]

[2] See Attachment C for the specifications and pattern of the antennas used in this analysis.

[3] For all %MPE calculations in Table 4, the difference between ground elevation at the guyed wire tower and at the specific measurement point was factored into the calculations, and is based upon estimates from Google Earth™. The ground elevation of the tower is 716'.

Figure 5 below is an aerial view of the Talcott 2 facility location and the surrounding area. Labeled points indicate the locations of the measurements recorded on August 17, 2012, as listed above in Table 4.

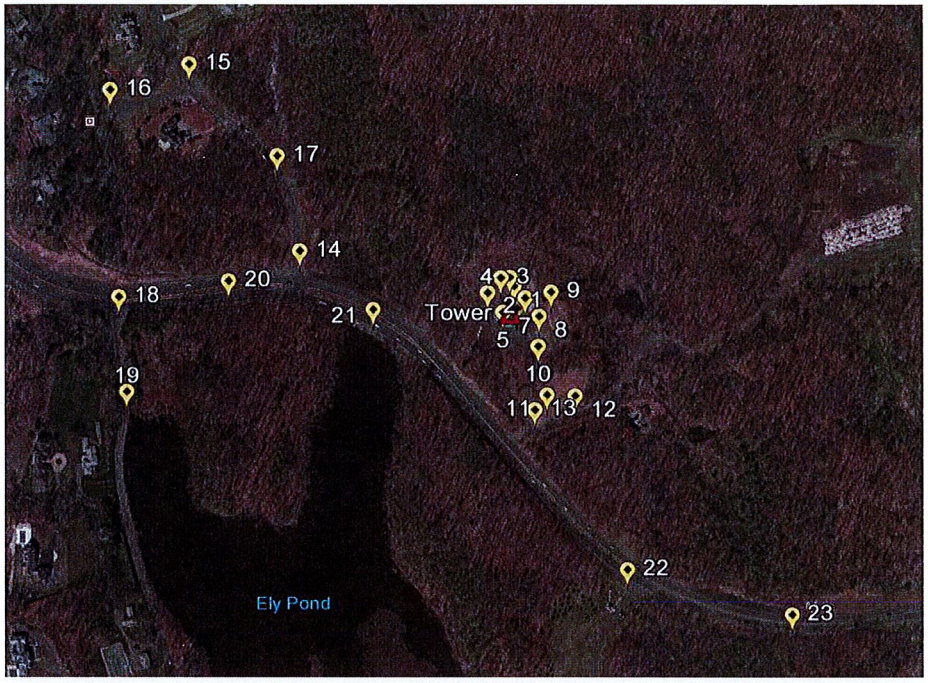


Figure 5: Aerial View of the Facility & All Measurement Locations

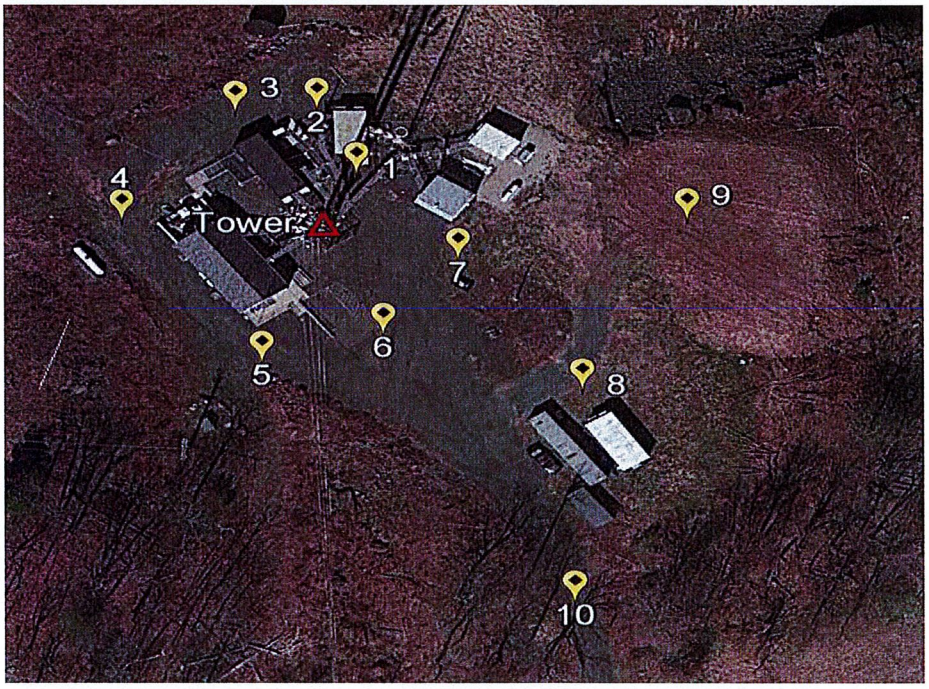


Figure 6: Measurement Locations (Zoomed View)

9. Summary of Findings

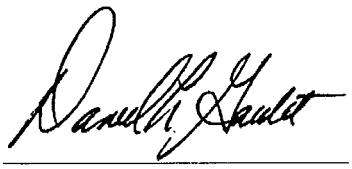
A number of publicly accessible areas around 3114 Albany Avenue in West Hartford, CT were surveyed and found to be well within the mandated General Population/Uncontrolled limits for Maximum Permissible Exposure, as delineated in the Federal Communications Commission's Radio Frequency exposure rules published in 47 CFR 1.1307(b)(1)-(b)(3).

The highest spatially averaged %MPE measurement of all surveyed points, based on the 1997 FCC standard for exposure to the general population is **11.69%** MPE. This measurement was taken at Point 18, approximately 1,290 feet west of the Talcott 2 Tower. The highest composite (measured + calculated) power density is **12.04%** MPE with the proposed Verizon Wireless antenna configuration and is calculated to occur at Point 18, approximately 1,290 feet west of the tower.

The above analysis verifies that both currently and with Verizon Wireless's planned modifications, the facility does not approach power density levels that would be considered harmful at ground level, as outlined by the FCC in the OET Bulletin 65 Ed. 97-01.

10. 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, ANSI/IEEE Std. C95.7 and FCC OET Bulletin 65 Edition 97-01.



Dan Goulet
C Squared Systems, LLC

August 20, 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

IEEE Std C95.7-2005, IEEE Recommended Practice for Radio Frequency Safety Programs, 3 kHz to 300 GHz. IEEE-SA Standards Board

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

(A) Limits for Occupational/Controlled Exposure[4]

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 Exposure[5]

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 5: FCC Limits for Maximum Permissible Exposure

[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

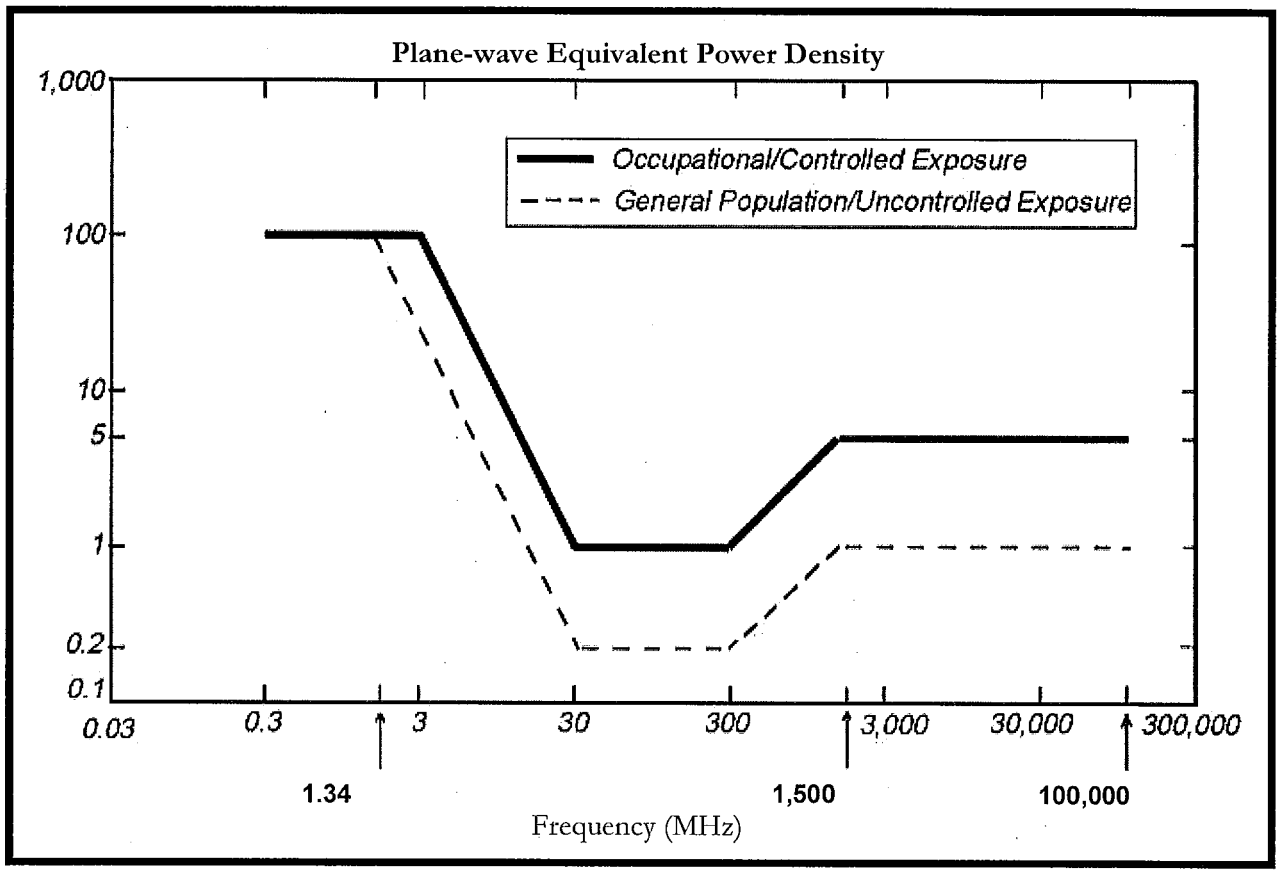
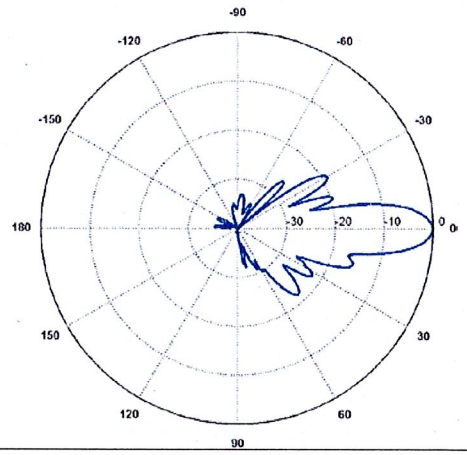


Figure 7: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Antenna Model Data Sheets and Vertical Patterns

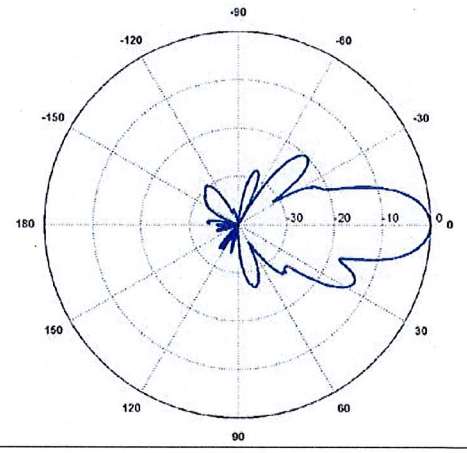
700 MHz

Manufacturer:	Swedcom
Model #:	SLCP 2x6015
Frequency Band:	700-800 MHz
Gain:	15.0 dBd
Vertical Beamwidth:	11°
Horizontal Beamwidth:	55°
Polarization:	Circular
Size L x W x D:	77.0" x 14.0" x 11.0"



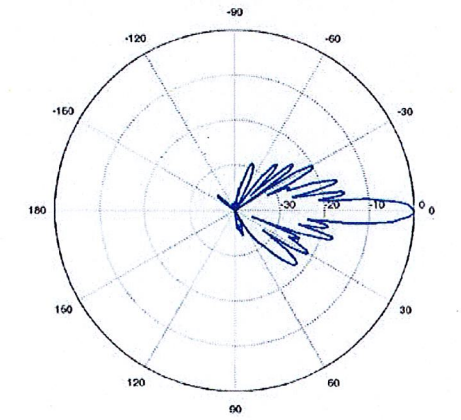
850 MHz

Manufacturer:	Swedcom
Model #:	SC-E 6014 REV2
Frequency Band:	800-960 MHz
Gain:	14.0 dBd
Vertical Beamwidth:	18°
Horizontal Beamwidth:	60°
Polarization:	Vertical
Size L x W x D:	43.0" x 8.5" x 8.0"



1900/2100 MHz

Manufacturer:	Swedcom
Model #:	SACP 2x5516
Frequency Band:	1710-2170 MHz
Gain:	16.0 dBd
Vertical Beamwidth:	7°
Horizontal Beamwidth:	55°
Polarization:	Circular
Size L x W x D:	56.0" x 9.7" x 6.5"



ROBINSON & COLE

EM-VER-155-120829

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ORIGINAL

August 28, 2012

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10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap**
3114 Albany Avenue, West Hartford, Connecticut

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains eight (8) wireless telecommunications antennas at the 128-foot level on an existing 346-foot tower at the above-referenced address. The tower is owned by Grain Communications. Cellco's use of the tower was approved by the Council in 2001. Cellco now intends to replace all of its antennas with four (4) model SC-E 6014 rev 2 cellular antennas; two (2) model SACP 2x5516 PCS antennas; and two (2) model SLCP 2x6015 LTE antennas, all at the same 128-foot level. Cellco also intends to install four (4) coax cable diplexers behind its antennas. Attached behind Tab 1 are the specifications for the replacement antennas and diplexers.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Ronald Van Winkle, Town Manager of the Town of West Hartford. A copy of this letter is also being sent to Marlin Tower LLC, the owner of the property on which the tower is located.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and diplexers will be located at the 128-foot level on the existing 346-foot tower.

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundaries.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A Radio Frequency Exposure Report for Cellco's modified facility is included behind Tab 2.

Also attached is a Structural Analysis Report confirming that the tower and foundation can support Cellco's proposed modifications. (See Tab 3).

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

Sincerely,

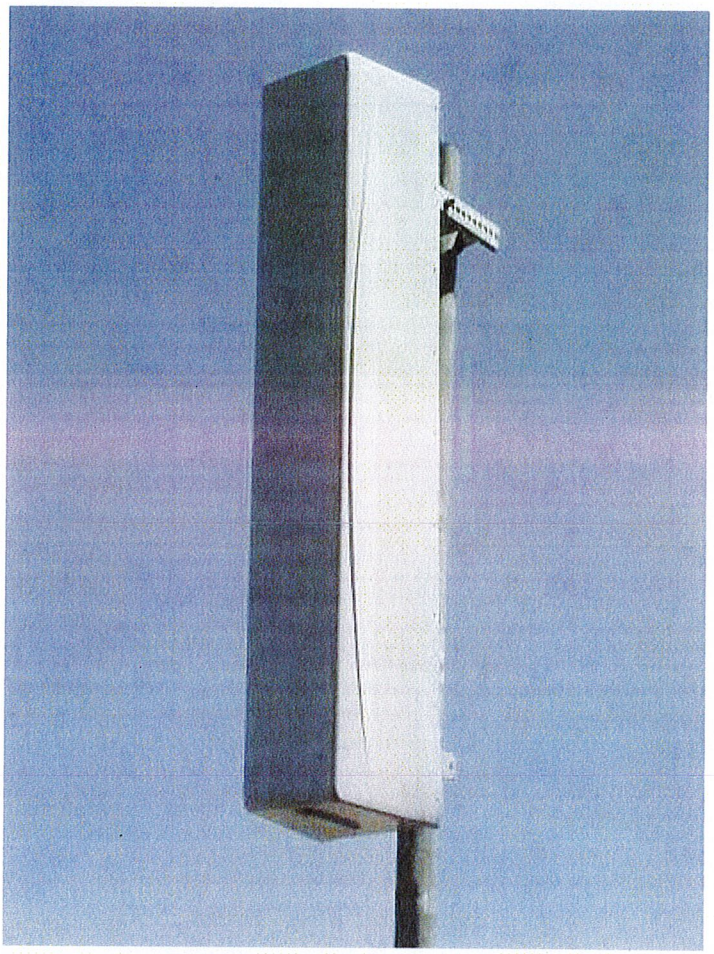
Kenneth C. Baldwin

Enclosures
Copy to:
Ronald Van Winkle, West Hartford Town Manager
Marlin Tower LLC
Sandy M. Carter

Swedcom

SC-E 6014 *rev2*

Enhanced 800 - 960 MHz log-periodic antenna



Features

- ❑ **Small size**
- ❑ **Aesthetically pleasing**
- ❑ **Suitable for TDMA/CDMA/GSM/3G**
- ❑ **High return loss**
- ❑ **Low intermodulation**
- ❑ **High front-to-back ratio**
- ❑ **Outstanding performance over the entire band (800 - 960 MHz)**
- ❑ **Upper side-lobe suppression**
- ❑ **Rugged design**
- ❑ **Dramatically improved signal to interference performance**

Electrical specifications

Frequency range:	**800-960 MHz**	
Impedance:	**50 ohm**	
Connector type:	**7/16 Din**	
Return loss:	**20 dB**	
Polarization:	**Vertical**	
Gain:	**14 dBd**	
Front-to-back ratio:	**> 30 dB**	
Upper side-lobe suppression:	**18 dB**	
Intermodulation (2x20W):	**IM5**	**160 dB**
	IM7/9	**170 dB**
Power rating:	**500 W**	
H-plane (-3 dB point):	**54 - 60°**	
V-plane (-3 dB point):	**16 - 18°**	
Lightning protection:	**DC grounded**	

Mechanical specifications

Overall height:	**43 in**	**[1092 mm]**
Width:	**8.5 in**	**[216 mm]**
Depth:	**8 in**	**[203 mm]**
Weight (excluding brackets):	**15 lbs**	**[6.8 Kg]**
Wind load measured up to:	**150 mph**	**[240 Km/h]**
Wind area (side of antenna):	**2.54 sq. ft.**	**[0.24 sq.m]**
Lateral thrust At 113 mph/ 180Km/h (worst case):	**122 lbs**	**[577 N]**

Materials

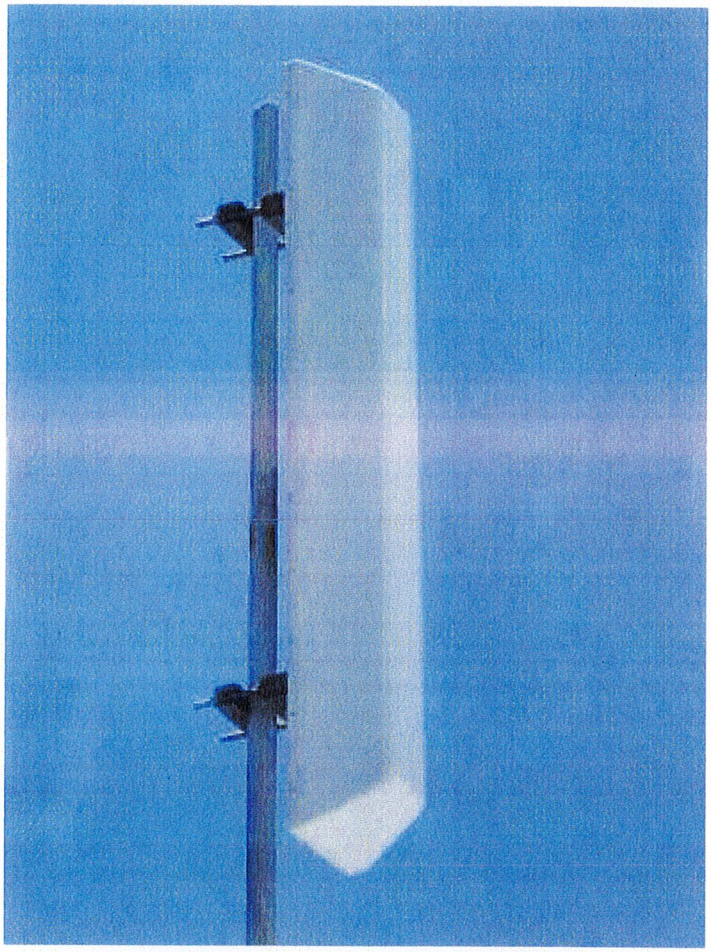
Radiating Elements:	**Aluminum**
Transformer (Power distribution)	**Ceramic PCB**
Chassis:	**Aluminum**
Radome:	**Grey Fiberglass/PVC**
Tilt-bracket:	**Hot dip galvanized steel**
Mounting bolts:	**Stainless steel**

The SC-E 6014 rev2 is made in the U.S.A.

Swedcom

SACP 2x5516

1710 -2170 MHz Dual (2x) CP log-periodic antenna



Features

- Transmit Diversity Gain
- Can be configured to combine space & polarization diversity
- Outstanding performance over the entire band (1710 - 2170 MHz)
- Excellent Axial Ratio
- Optimized for 4G & 3G systems
- Low intermodulation
- Improved Side-to-side rejection
- Fading reduction
- Excellent isolation between ports

Electrical specifications

Frequency range:	**1710-2170 MHz**	
Impedance:	**50 ohm**	
Connector type:	**7/16 Din**	
Return loss:	**18 dB**	
Polarization:	**Circular**	
Gain ea. port [Circular]:	**2x16 dBdC**	
Gain ea. port [Linear]:	**2x13 dBdL**	
Axial Ratio:	**2 dB**	
Isolation between ports (TX band):	**28 dB**	
Front-to-back ratio:	**30 dB**	
Intermodulation (2x20W):	**IM3**	**150 dB**
	IM5	**160 dB**
	IM7/9	**170 dB**
Power rating:	**2x 300 W**	
H-plane (-3 dB point):	**2x 55°**	
V-plane (-3 dB point):	**2x 7°**	
Lightning protection:	**DC grounded**	

Mechanical specifications

Overall height:	**56 in**	**[1422 mm]**
Width:	**9.7 in**	**[246 mm]**
Depth:	**6.5 in**	**[165 mm]**
Weight (excluding brackets):	**16 lbs**	**[7.2 Kg]**
Wind load measured up to:	**150 mph**	**[240 Km/h]**
Wind area (front of antenna):	**3.76 sq. ft.**	**[0.35 sq.m]**
Lateral thrust at 113 mph/ 180 Km/h (worst case):	**192 lbs**	**[855 N]**

Materials

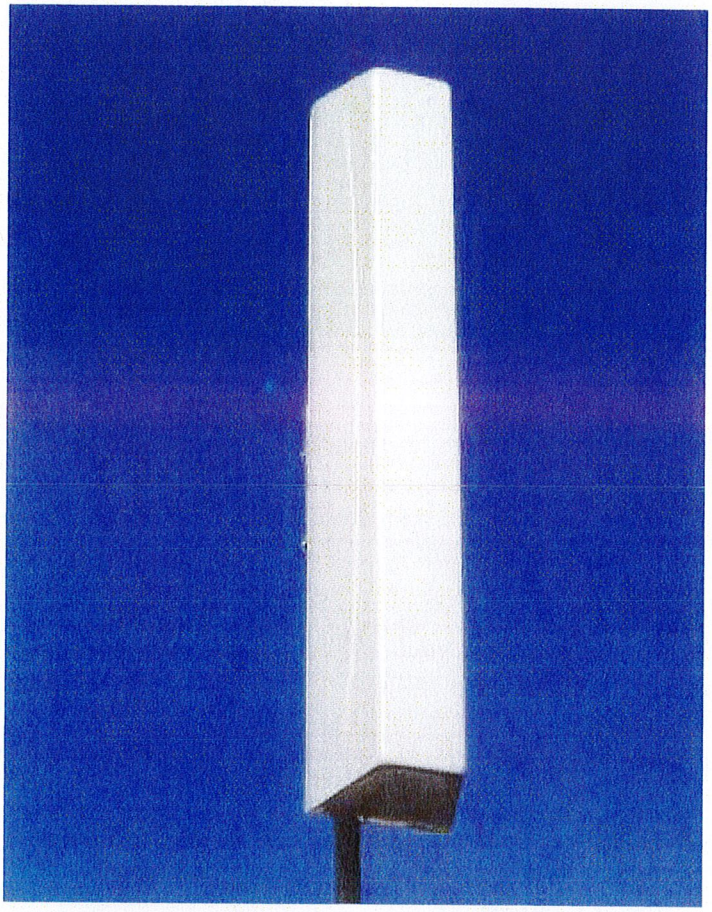
Radiating Elements:	**Silver plated brass**
Transformer (Power distribution)	**Ceramic PCB**
Chassis:	**Aluminum**
Radome:	**Grey Fiberglass/PVC**
Mounting bolts:	**Stainless steel**

The SACP 2x5516 is made in the U.S.A.

Swedcom

SLCP 2x6015

Dual (2x) Circularly Polarized log-periodic antenna



Features

- ❑ **Transmit Diversity Gain**
- ❑ **Can be configured to combine space & polarization diversity**
- ❑ **Outstanding performance over the entire band (700 - 800 MHz)**
- ❑ **Excellent Axial Ratio**
- ❑ **Optimized for 4G & 3G systems**
- ❑ **Low intermodulation**
- ❑ **Improved Side-to-side rejection**
- ❑ **Fading reduction**
- ❑ **Excellent isolation between ports**

Electrical specifications

Frequency range:	**700-800 MHz**	
Impedance:	**50 ohm**	
Connector type:	**7/16 Din**	
Return loss:	**18 dB**	
Polarization:	**Circular**	
Gain ea. port [Circular]:	**2x15 dBdC**	
Gain ea. port [Linear]:	**2x12 dBdL**	
Axial Ratio:	**2 dB**	
Isolation between ports (TX band):	**30 dB**	
Front-to-back ratio:	**30 dB**	
Intermodulation (2x20W):	**IM3**	**150 dB**
	IM5	**160 dB**
	IM7/9	**170 dB**
Power rating:	**2x 500 W**	
H-plane (-3 dB point):	**2x 55°**	
V-plane (-3 dB point):	**2x 11°**	
Lightning protection:	**DC grounded**	

Mechanical specifications

Overall height:	**77 in**	**[1956 mm]**
Width:	**14 in**	**[356 mm]**
Depth:	**11 in**	**[279 mm]**
Weight (excluding brackets):	**30 lbs**	**[13.6 Kg]**
Wind load measured up to:	**150 mph**	**[240 Km/h]**
Wind area (side of antenna):	**7.49 sq. ft.**	**[0.70 sq.m]**
Lateral thrust at 113 mph/ 180 Km/h (worst case):	**382 lbs**	**[1701 N]**

Materials

Radiating Elements:	**Aluminum**
Transformer (Power distribution)	**Ceramic PCB**
Chassis:	**Aluminum**
Radome:	**Grey Fiberglass/PVC**
Mounting bolts:	**Stainless steel**

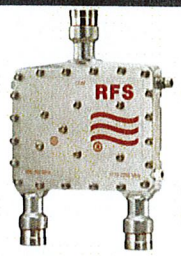
The SLCP 2x6015 is made in the U.S.A.

Product Data Sheet **FD9R6004/2C-3L**

ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Product Description

The ShareLite FD9R6004 Series of diplexers are designed to enable feeder sharing between systems in the 698-960 MHz range and in the 1710-2200 MHz range. The diplexer is equipped with in-line connector placement so it can be installed in the BTS cabinet or at the tower top. This is especially valuable in crowded sites or when the feeders are not easily accessible. Due to its wideband design, the FD9R6004 Series can accommodate many combining solutions between 698-960 MHz and 1710-2200 MHz systems such as LTE 700 MHz, Cellular 800 MHz with PCS, GSM900 with GSM1800, or GSM900 with UMTS. This diplexer features a highly selective filter. It provides a high level of isolation between ports, while keeping the insertion loss on both paths at an extremely low level. The FD9R6004 diplexers are available with various DC pass options, helpful in configurations with or without the Tower Mount Amplifiers installed.



Features/Benefits

- **LTE ready design**
- **Extremely Low Insertion Loss**
- **High level of Rejection between bands – Protection against interferences**
- **Extremely High Power Handling Capability**
- **Integrated DC block/bypass versions available**
- **Very compact & small size design – Easy installation and reduced tower load**
- **In-line long-neck connectors for easy connection & waterproofing**
- **Exceptional reliability & environmental protection (IP 67)**
- **Equipped with 1 * Breathable Vent – Prevent any humidity inside the product**
- **Mounting hardware for Wall and Pole mount provided (P/N SEM2-1A)**
- **Grounding already provided through the mounting bracket**
- **Kit available for easy dual mount**

Technical Specifications

Product Type	Diplexer/Cross Band Coupler
Application	LTE700, GSM900, UMTS, GSM1800, Cellular 800, PCS
Frequency Range 1, MHz	698-960
Frequency Range 2, MHz	1710-2200
Configuration	Sharelite Single diplexer, outdoor, DC pass in the 1710-2170MHz path, with mounting hardware SEM2-1A
Mounting	Wall Mounting: With 4 screws (maximum 6mm diameter); Pole Mounting: With included clamp set 40-110mm (1.57-4.33)
Return Loss All Ports Min/Typ, dB	19/23
Power Handling Continuous, Max, W	1250 at common port; 750 in low frequency path & 500 in high frequency path
Power Handling Peak, Max, W	15000 in low frequency path & 8000 in high frequency path
Impedance, Ohms	50
Insertion Loss, Path 1, dB	0.07 typ.
Insertion Loss, Path 2, dB	0.13 typ.
Rejection Between Bands Min/Typ, dB	58/64@698-960MHz; 57/70@1710-2200MHz
IMP Level at the COM Port, Typ, dBm	-112 @ 2x43
DC Pass in Low Frequency Path	No
DC Pass in High Frequency Path	Yes
Temperature Range, °C (°F)	-40 to +60 (-40 to +140)
Environmental	ETSI 300-019-2-4 Class 4.1E
Ingress Protection	IP 67
Lightning Protection	EN/IEC61000-4-5 Level 4
Connectors	In-line long-neck 7-16-Female
Weight, kg (lb)	1.2 (2.6)
Shipping Weight, kg (lb)	3.2 (7) for 2 * single units in 1 * box, 9.8 (21.6) for 6 * units = 3 * Boxes in 1 * overwrap
Dimensions, H x W x D, mm (in)	147 x 164 x 37 (5.8 x 6.5 x 1.5)
Shipping Dimensions, H x W x D, mm (in)	254 x 406 x 82 (10 x 16 x 3.2) for 2 * Single Units in 1 * box, 280 x 406 x 241 (11 x 16 x 9.5) for 6 * units = 3 * Boxes in 1 * overwrap
Volume, L	0.43
Housing	Aluminum

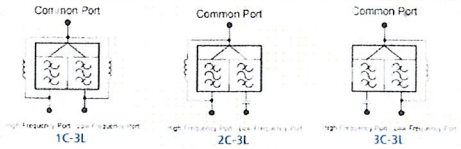
Notes

ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

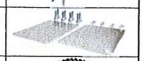
Other Documentation

FD9R6004/2C-3L Installation Instructions: Wideband_Diplexer_Installation_Rev5.pdf

Selection Guide Diplexer 698-960 / 1710-2200MHz					
	Model Number	Full DC Pass	DC Pass High Band	DC Pass Low Band	Mounting Hardware Included
Single	FD9R6004/1C-3L				X
	FD9R6004/2C-3L				X
	FD9R6004/3C-3L				X
Dual	KIT-FD9R6004/1C-DL				X
	KIT-FD9R6004/2C-DL				X
	KIT-FD9R6004/3C-DL				X



The FD9R6004 Series is upgradeable to a Dual Diplexer kit by means of 2 diplexers and mounting hardware kits SEM2-1A and SEM2-3

Mounting Hardware and Ground Cable Ordering Information		
Model Number	**Description**	
SEM2-1A	Mounting Hardware, Pole mount ø40-110mm (Included with the Single and Dual Diplexer) Wall Screws M6 (Not included with the product)	
SEM2-3	Assembly kit for 2 pcs of FD9R6004/xC-3L (Can be ordered separately but included with the Dual Diplexer Kit)	
CA020-2	Ground Cable, 2m, includes lugs (Optional)	
CA030-2	Ground Cable, 2m, includes lugs (Optional)	
SEM6	Mounting Hardware for 6 Diplexers, Tower Base (Optional)	

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

RADIO FREQUENCY EXPOSURE REPORT

TALCOTT 2 CT

3114 ALBANY AVE
WEST HARTFORD, CT 06117

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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 Verizon Wireless antenna arrays on one of the guyed towers located at 3114 Albany Avenue in West Hartford, CT. Verizon Wireless, AT&T, T-Mobile, Pocket, two FM radio stations (WCCC and WMNR), CH38 and Public Safety operators all have antennas mounted on the tower. Figure 1 below is a view of the subject tower and an adjacent tower.

Verizon Wireless is proposing the following modifications:

1) Install two 700 MHz LTE panel antennas (one per sector; beta and gamma sectors);
2) Replace four existing 850 MHz Cellular panel antennas, with four 850 MHz Cellular antennas (two per sector; beta and gamma sectors);
3) Replace four existing 1900 MHz PCS panel antennas, with two dual-band 1900/2100 MHz PCS/AWS antennas (one per sector; beta and gamma sectors);

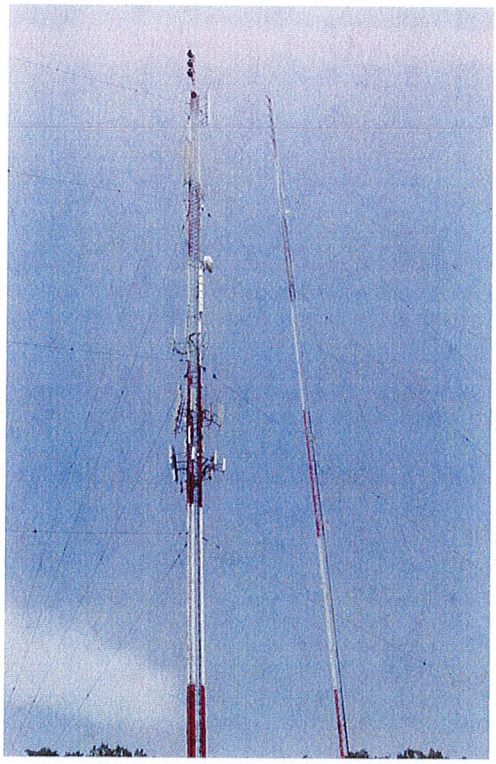


Figure 1: View of Talcott 2

Site Address	3114 Albany Ave, West Hartford, CT
Latitude	41° 47' 48" N
Longitude	72° 47' 50" W
Site Elevation AMSL	716'
Cellular License Information	KNKA404
PCS License Information	KNLH251/WPOJ730
LTE License Information	WQJQ689
AWS License Information	WQGA715
Name of Individual Conducting Survey	Daniel Brown
Date and Time of Survey	8/17/2012; 12:30 PM – 2:00 PM

Table 1: Site Specific Data

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/cm2). 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 provided they are fully aware of the potential for exposure, and are able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels considered 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. Facility Photos, Equipment & Signage

Figure 2 shows the access road gate and signage to the Talcott 2 Facility.

Figure 2: Tower Access Road Gate and Signage

Figures 3 and 4 below show the compound facility and posted RF signage. Verizon Wireless' equipment is located at the base of the tower inside of the compound. At the time of the survey, access to the equipment building was not permitted.

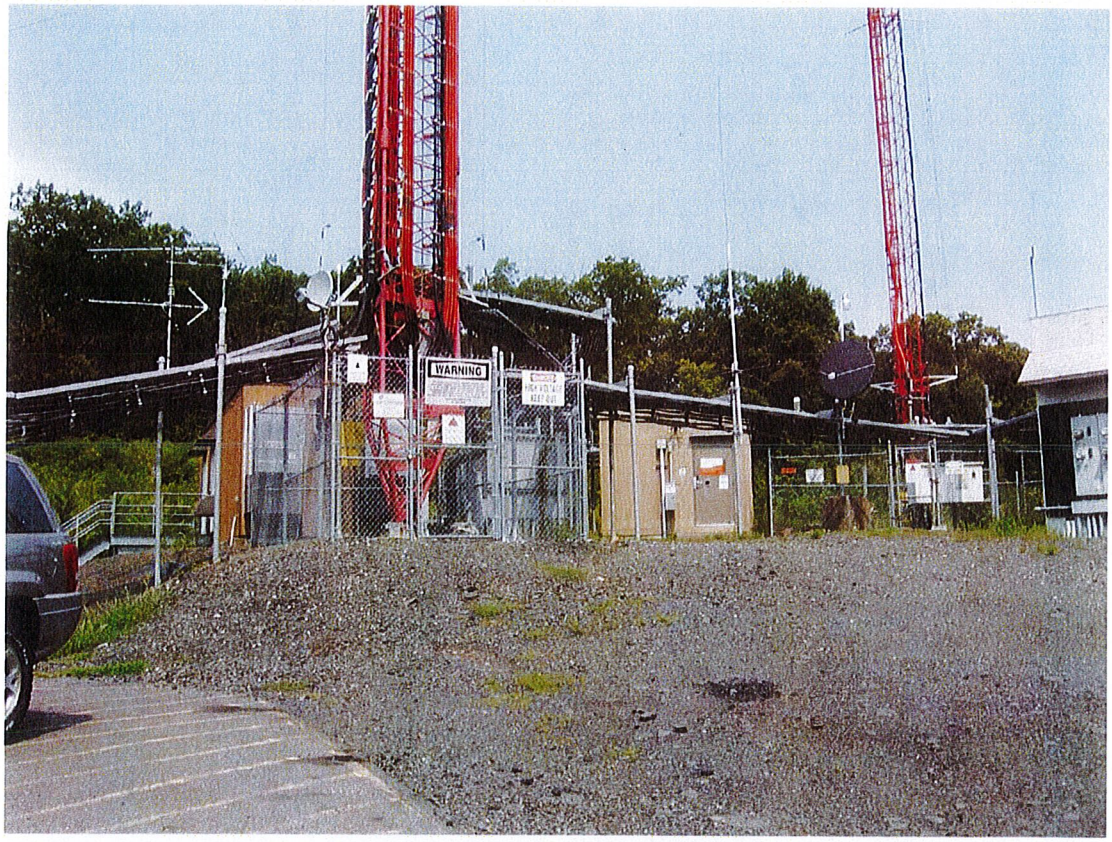


Figure 3: Talcott 2 Compound Facility

Figure 4: Compound Facility and RF Signage

4. Measurement Procedure

Frequencies from 300 KHz to 50 GHz were measured using the Narda Probe EA 5091, E-Field, shaped, FCC probe in conjunction with the NBM550 survey meter. The EA 5091 probe is "shaped" such that in a mixed signal environment (i.e.: more than one frequency band is used in a particular location), it accurately measures the percent of MPE.

From FCC OET Bulletin No. 65 - Edition 97-01 – "A useful characteristic of broadband probes used in multiple-frequency RF environments is a frequency-dependent response that corresponds to the variation in MPE limits with frequency. Broadband probes having such a "shaped" response permit direct assessment of compliance at sites where RF fields result from antennas transmitting over a wide range of frequencies. Such probes can express the composite RF field as a percentage of the applicable MPEs".

Probe Description - As suggested in FCC OET Bulletin No. 65 - Edition 97-01, the response of the measurement instrument should be essentially isotropic, (i.e., independent of orientation or rotation angle of the probe). For this reason, the Narda EA 5091 probe was used for these measurements.

Sampling Description - At each measurement location, a spatially averaged measurement is collected over the height of an average human body. The NBM550 survey meter performs a time average measurement while the user slowly moves the probe over a distance range of 20 cm to 200 cm (about 6 feet) above ground level. The results recorded at each measurement location include average values over the spatial distance.

Instrumentation Information - A summary of specifications for the equipment used is provided in the table below.

Manufacturer	Narda Microwave			
Probe	EA 5091, Serial# 01088			
Calibration Date	May 2011			
Calibration Interval	24 Months			
Meter	NBM550, Serial# B-1149			
Calibration Date	October 2010			
Calibration Interval	24 Months			
Probe Specifications	**Frequency Range**	**Field Measured**	**Standard**	**Measurement Range**
	300 KHz-50 GHz	Electric Field	U.S. FCC 1997 Occupational/Controlled	0.5 – 600 % of Standard

Table 2: Instrumentation Information

Instrument Measurement Uncertainty - The total measurement uncertainty of the NARDA measurement probe and meter is no greater than ±2 dB. The factors which contribute to this include the probe's frequency response deviation, calibration uncertainty, ellipse ratio, and isotropic response. Every effort is taken to reduce the overall uncertainty during measurement collection including pointing the probe directly at the likely highest source of emissions.

5. RF Exposure Prediction Methods

The emission field calculation results displayed in Table 4 was 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 = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Off Beam Loss is determined by the selected antenna patterns

Ground reflection factor of 1.6

These calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. 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 higher than the actual signal levels will be from the finished modifications.

6. Proposed Antenna Inventory

Table 3 below lists the proposed Verizon Wireless antenna configuration. The parameters listed in Table 3 were used in the calculations shown in Table 4.

TX Freq. (MHz)	Input Power per Antenna (Watts)	Ant Gain (dBi)	EIRP per Antenna (Watts)	Antenna Model	Horiz. Beam Width	Vert. Beam Width	Length (ft)	Antenna Centerline Height (ft)
850	90	16.1	3666.42	SC-E 6014 REV2	60	18	3.5	130
750	40	17.1	20514	SLCP 2x6015	55	11	6.5	130
1900	112	18.1	7231	SACP 2x5516.	55	7	4.5	130
2100	40	18.1	2583		55	7	4.5	130
850	90	16.1	3666	SC-E 6014 REV2	60	18	3.5	130

Table 3: Future Verizon Wireless Antenna Configuration[1]

7. Nearby RF Sources

At the time of the survey, no other nearby RF sources were identified that would significantly contribute to the measurements recorded in the area of this facility.

[1] Transmit power assumes 0 dB of cable loss.

8. Survey Results

Measured and calculated results are detailed in the table below. Measurements were recorded on August 17, 2012 between the hours of 12:30 PM and 2:00 PM. The calculated % MPE contribution from the proposed 750 MHz LTE, 850 MHz Cellular and 1900/2100 MHz PCS/AWS technologies were then added to the measured % MPE values in the "Composite % MPE" column. These calculated values incorporate the antenna patterns of the specific antenna models specified by Verizon Wireless to determine the "Off Beam Loss" factor shown in the power density formula from Section 5.[2] All % MPE values are in reference to the FCC Uncontrolled/General Population exposure limit.

Please note that the measurements already include the % MPE contribution from the current Verizon Wireless 850 MHz and 1900MHz antennas. The specific contribution of just the existing Verizon Wireless antennas at each measurement point cannot be isolated from other RF sources however, and may vary over time depending on the traffic served by this facility. Therefore, the composite %MPE values listed below assume Verizon Wireless' 850/1900 MHz proposed configuration is a new addition to the site, instead of a modification to an existing system to ensure a worst-case analysis.

Table 4 below lists the 23 measurements taken in the vicinity of the Talcott 2 facility in West Hartford, CT. The highest composite (measured + calculated) power density is at location 18. This measurement point is approximately 1,290 feet west of the tower. The composite (measured + calculated) % MPE for this location is **12.04%** of the FCC Uncontrolled/General Population limit.

Meas. Point	Latitude	Longitude	Dist. From Site	Measured % MPE (Uncontrolled / General)	Calculated % MPE (750MHz LTE)	Calculated % MPE (850MHz Cellular)	Calculated % MPE (1900MHz PCS)	Calculated % MPE (2100MHz AWS)	Composite % MPE (Uncontrolled / General)
1	41.796876	-72.796771	17'	1.00%	0.01%	0.04%	0.00%	0.00%	1.05%
2	41.796959	-72.796787	41'	1.68%	0.03%	0.03%	0.00%	0.00%	1.74%
3	41.796960	-72.796904	46'	1.30%	0.04%	0.04%	0.01%	0.00%	1.39%
4	41.796870	-72.797091	74'	1.98%	0.03%	0.04%	0.03%	0.01%	2.09%
5	41.796640	-72.796951	85'	3.04%	0.03%	0.08%	0.04%	0.01%	3.20%
6	41.796667	-72.796780	68'	3.21%	0.03%	0.03%	0.02%	0.01%	3.30%
7	41.796732	-72.796678	58'	3.12%	0.03%	0.04%	0.01%	0.00%	3.20%
8	41.796545	-72.796552	134'	5.37%	0.02%	0.37%	0.03%	0.01%	5.80%
9	41.796763	-72.796364	129'	4.40%	0.02%	0.39%	0.03%	0.01%	4.86%
10	41.796265	-72.796654	219'	5.95%	0.05%	0.74%	0.02%	0.01%	6.76%
11	41.795785	-72.796688	391'	2.65%	0.52%	1.51%	0.02%	0.01%	4.70%
12	41.795727	-72.796372	428'	2.50%	0.45%	1.27%	0.02%	0.01%	4.25%
13	41.795679	-72.796878	428'	2.52%	0.47%	1.31%	0.08%	0.03%	4.40%
14	41.797640	-72.799154	697'	2.30%	0.19%	0.53%	0.32%	0.11%	3.45%
15	41.799572	-72.799965	1312'	1.81%	0.06%	0.16%	0.09%	0.03%	2.15%
16	41.799470	-72.800874	1461'	1.57%	0.04%	0.13%	0.07%	0.03%	1.84%
17	41.798530	-72.799172	887'	1.81%	0.12%	0.34%	0.20%	0.07%	2.54%
18	**41.797535**	**-72.801465**	**1289'**	**11.69%**	**0.06%**	**0.16%**	**0.10%**	**0.03%**	**12.04%**
19	41.796657	-72.801603	1304'	1.61%	0.06%	0.16%	0.09%	0.03%	1.95%
20	41.797497	-72.800241	961'	1.61%	0.10%	0.28%	0.17%	0.06%	2.23%
21	41.796972	-72.798538	470'	2.11%	0.40%	1.10%	0.23%	0.08%	3.92%
22	41.794013	-72.796217	1049'	3.46%	0.08%	0.24%	0.14%	0.05%	3.97%
23	41.793183	-72.794181	1520'	2.12%	0.04%	0.11%	0.07%	0.02%	2.36%

Table 4: Measured & Calculated Results [3]

[2] See Attachment C for the specifications and pattern of the antennas used in this analysis.

[3] For all %MPE calculations in Table 4, the difference between ground elevation at the guyed wire tower and at the specific measurement point was factored into the calculations, and is based upon estimates from Google Earth™. The ground elevation of the tower is 716'.

Figure 5 below is an aerial view of the Talcott 2 facility location and the surrounding area. Labeled points indicate the locations of the measurements recorded on August 17, 2012, as listed above in Table 4.

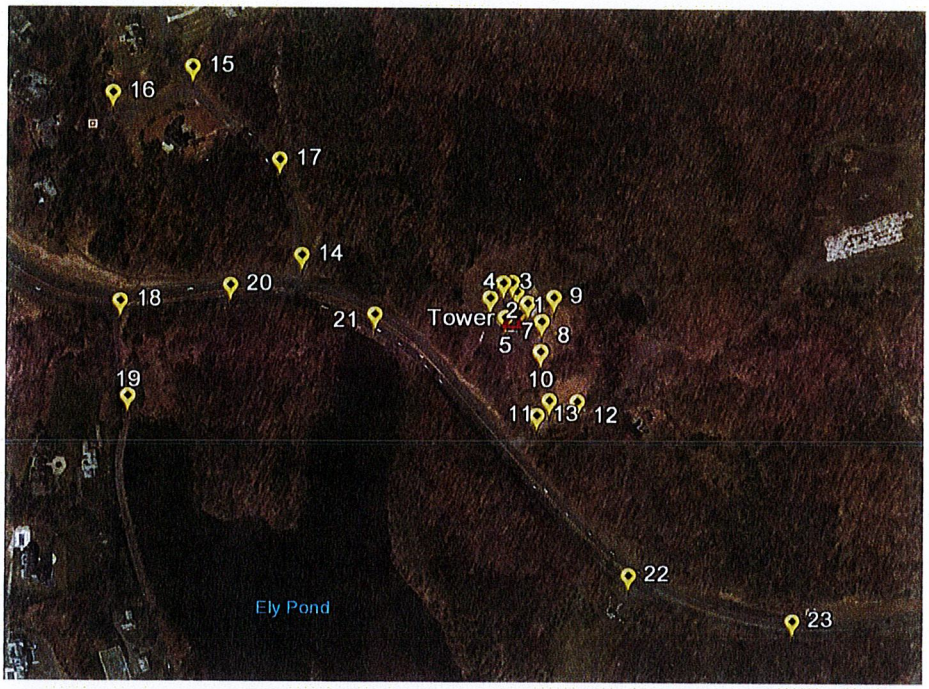


Figure 5: Aerial View of the Facility & All Measurement Locations

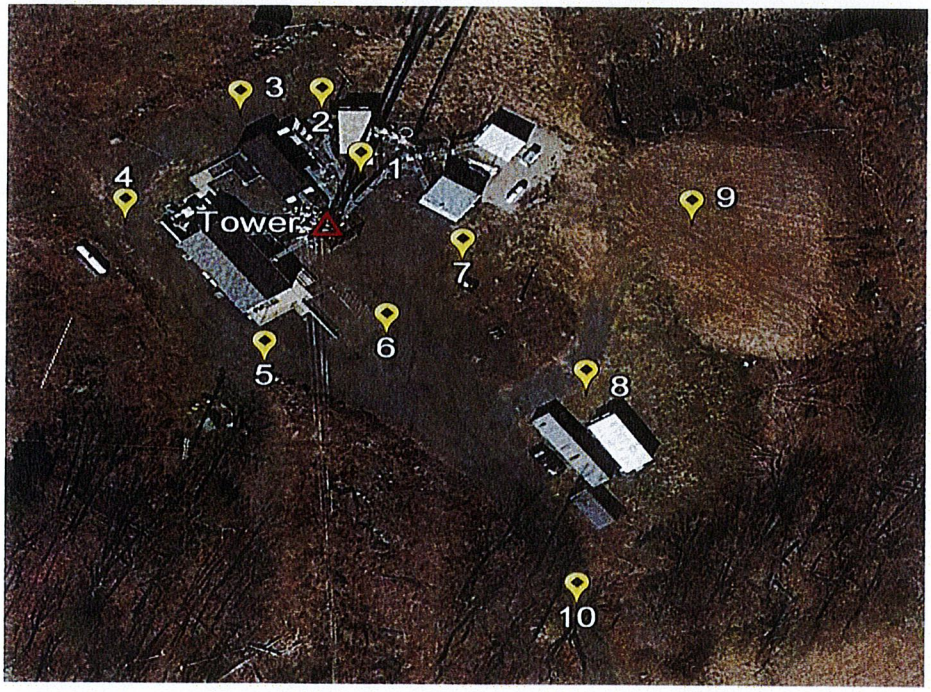


Figure 6: Measurement Locations (Zoomed View)

9. Summary of Findings

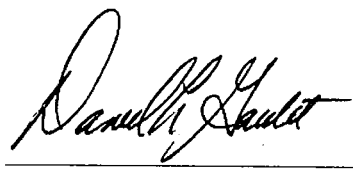
A number of publicly accessible areas around 3114 Albany Avenue in West Hartford, CT were surveyed and found to be well within the mandated General Population/Uncontrolled limits for Maximum Permissible Exposure, as delineated in the Federal Communications Commission's Radio Frequency exposure rules published in 47 CFR 1.1307(b)(1)-(b)(3).

The highest spatially averaged %MPE measurement of all surveyed points, based on the 1997 FCC standard for exposure to the general population is **11.69%** MPE. This measurement was taken at Point 18, approximately 1,290 feet west of the Talcott 2 Tower. The highest composite (measured + calculated) power density is **12.04%** MPE with the proposed Verizon Wireless antenna configuration and is calculated to occur at Point 18, approximately 1,290 feet west of the tower.

The above analysis verifies that both currently and with Verizon Wireless's planned modifications, the facility does not approach power density levels that would be considered harmful at ground level, as outlined by the FCC in the OET Bulletin 65 Ed. 97-01.

10. 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, ANSI/IEEE Std. C95.7 and FCC OET Bulletin 65 Edition 97-01.



Dan Goulet
C Squared Systems, LLC

August 20, 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

IEEE Std C95.7-2005, IEEE Recommended Practice for Radio Frequency Safety Programs, 3 kHz to 300 GHz. IEEE-SA Standards Board

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

(A) Limits for Occupational/Controlled Exposure[4]

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 Exposure[5]

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 5: FCC Limits for Maximum Permissible Exposure

[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

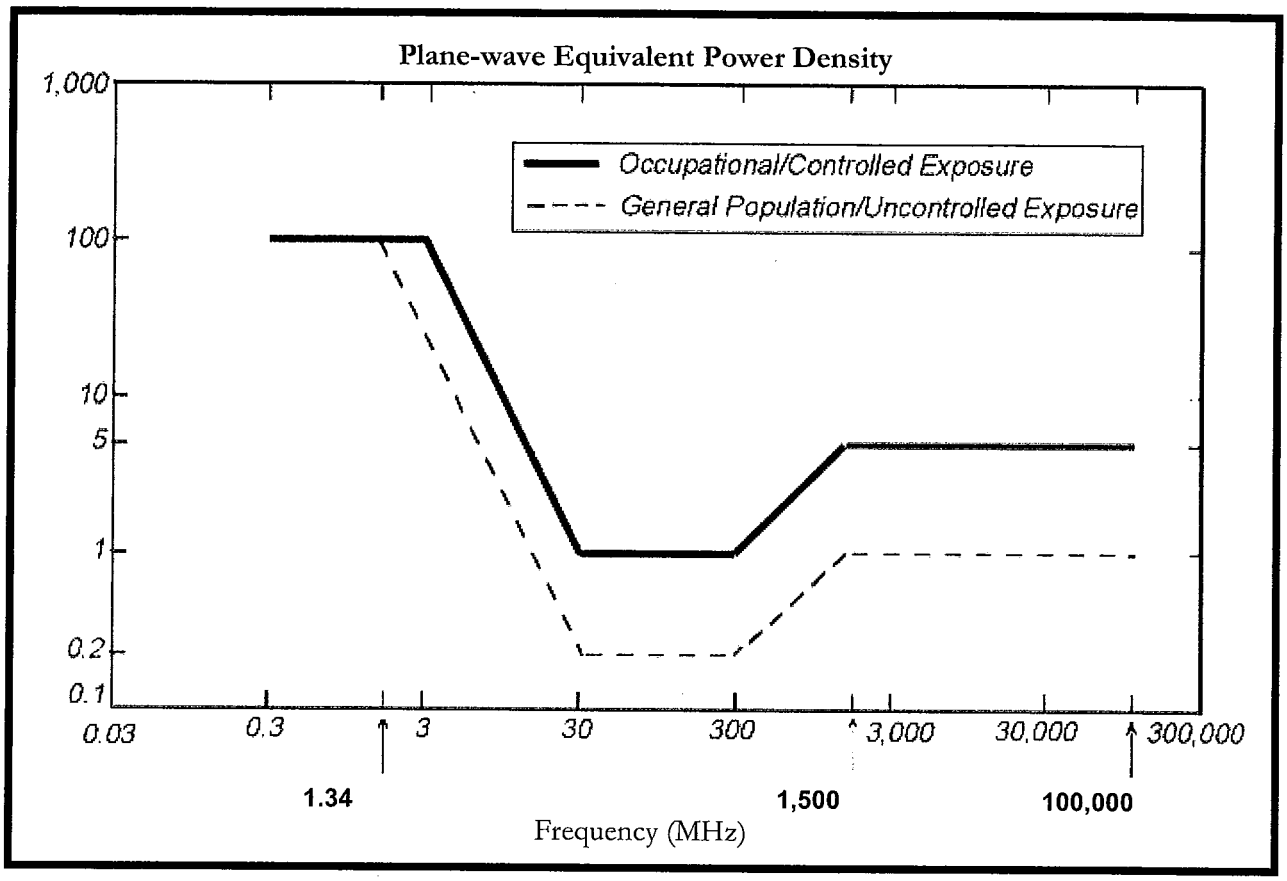
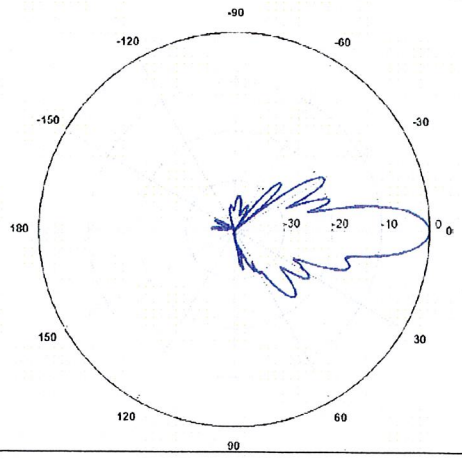


Figure 7: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Antenna Model Data Sheets and Vertical Patterns

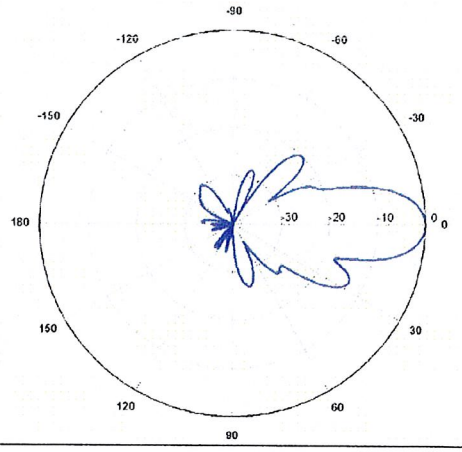
700 MHz

Manufacturer:	Swedcom
Model #:	SLCP 2x6015
Frequency Band:	700-800 MHz
Gain:	15.0 dBd
Vertical Beamwidth:	11°
Horizontal Beamwidth:	55°
Polarization:	Circular
Size L x W x D:	77.0" x 14.0" x 11.0"



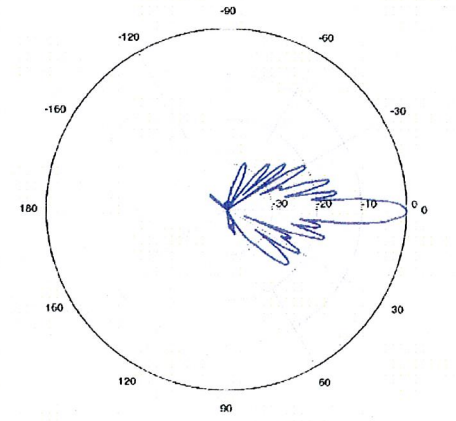
850 MHz

Manufacturer:	Swedcom
Model #:	SC-E 6014 REV2
Frequency Band:	800-960 MHz
Gain:	14.0 dBd
Vertical Beamwidth:	18°
Horizontal Beamwidth:	60°
Polarization:	Vertical
Size L x W x D:	43.0" x 8.5" x 8.0"



1900/2100 MHz

Manufacturer:	Swedcom
Model #:	SACP 2x5516
Frequency Band:	1710-2170 MHz
Gain:	16.0 dBd
Vertical Beamwidth:	7°
Horizontal Beamwidth:	55°
Polarization:	Circular
Size L x W x D:	56.0" x 9.7" x 6.5"



Date: **July 26, 2012**

J.R. Carroll
Grain Communications
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Sarasota, FL 34239

Tower Engineering Professionals
3703 Junction Blvd
Raleigh, NC 27603
(919) 661-6351
wjones@tepgroup.net

Subject: **Structural Analysis Report - Revision 2**

Carrier Designation:	**Verizon Reconfiguration**	
	Carrier Site Number:	N/A
	Carrier Site Name:	Talcott 2, CT
Grain Designation:	**Grain Site Number:**	0101-CT-000101
	Grain Site Name:	West Hartford
	FCC Designation #:	1226764
Engineering Firm Designation:	**TEP Project Number:**	112343
Site Data:	**3114 Albany Ave., West Hartford, Hartford County, CT 06117**	
	Latitude *41° 47' 48"*, Longitude *-72° 47' 50"*	
	311.3 ft - Guyed Tower w/ 35 ft Pipe Mast	

Dear Mr. Carroll,

Tower Engineering Professionals is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower.

The purpose of the analysis is to determine structural acceptability of the structure stress level. Based on our analysis we have determined the stress level for the structure and foundation, under the following load case, to be:

LC1: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table 1 for the existing and proposed loading.

Structure Capacity	Controlling Component
64.8%	Guy Anchor Lateral

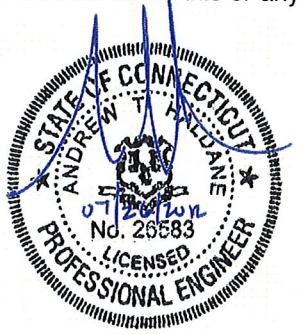
The analysis has been performed in accordance with the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, ASCE 7-05 Minimum Design Loads for Buildings and Other Structures, and the 2003 International Building Code.

All modifications and equipment proposed in this report shall be installed in accordance with the appurtenances listed in Table 1 and the attached drawings for the determined available structural capacity to be effective.

We at *Tower Engineering Professionals* appreciate the opportunity of providing our continuing professional services to you and *Grain Communications*. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Andrew T. Haldane, P.E.



Revision #	Date Issued	Description
0	July 18, 2011	Original structural analysis report
1	June 14, 2012	Revised structural report to include proposed AT&T loading
2	July 26, 2012	Structural analysis with revised Verizon loading

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 311.3 foot Model 60 guyed tower designed by Pirod in February of 2001. The tower was designed for a fastest mile wind speed of 80 mph with 0.5 in of radial ice per EIA/TIA-222-F for the appurtenances listed in Table 2. TEP visited the site in July of 2011 to collect existing steel and appurtenance information. All other information provided to TEP was assumed accurate and complete.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and ASCE 7-05 Minimum Design Loads for Buildings and Other Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1.0 inch escalating ice thickness, and 50 mph under service loads.

Table 1 - Existing and Proposed Antenna and Cable Information

Existing/ Proposed	Elevation (Ft)	Qty	Antenna Model	Mount Type	Qty Coax	Coax Size (in)	Coax Location	Owner/ Tenant
Existing	332.0	1	ERI 3 Bay FM w/ radomes	Arm	1	3	CA Face	WCCC
Existing	297.0	1	ACS 16R4	Arm	1	3	CA Face	WHCT
Existing	261.0	1	Decibel DB420-B	Sidearm	1	7/8	BC Face	Master Combiner
Existing	251.8	1	Antenna Concepts ACB16A	Pipe	1 1	1 5/8 3/8"ø	BC Face	WRDM
Existing	243.0	1	Antel WPA800120	Direct	2	7/8	Inside C Leg	Town of West Hartford
Existing	235.0	1	Scala 6'x3' Grid Dish	Direct	1	7/8	CA Face	WCCC
Existing	232.0	1	Radiowaves SP02-4.7NS	Direct	2 1	1/4"ø 3/8"ø	Inside C Leg	Town of West Hartford
Existing	220.0	2	Unknown Panel 34"x7"x24"	Pipe	2	3/8"ø	CA Face	SNEW ISP
Existing	220.0	1	Antel WPA800120	Direct	1	1 5/8	Inside C Leg	Town of West Hartford
Existing	213.0	1	Decibel DB420-B	Arm	1	1/2	BC Face	Master Combiner
Existing	196.0	1	Cablewave PA6-112	Arm	1	EW	BC Face	WRDM
Existing	180.0	6	Kathrein 601417	Pipe	1	1 5/8	BC Face	WRNT
Existing	165.0	1	Antel BCD80010	Sidearm	1	1 5/8	Inside C Leg	Town of West Hartford
Existing	164.5	1	Shively 6810 (1) Bay FM	Pipe	1	1/2	BC Face	91.9 FM
Existing	160.0	2	RFS APX16PV-16-PVL	Sector	8[2] 1	1 5/8[2] 1/4"ø	AB Face	T-Mobile
Existing	146.5	1	2'ø MW Dish w/o Radome	Pipe	1	3/8"ø	CA Face	SNEW ISP
Existing	145.0	1	1"ø x12' Omni	Sidearm	1	1 5/8	AB Face	Ham Radio
Existing	142.5	-	-	-	1[1]	1 5/8[1]	AB Face	-
Existing	140.5	-	-	-	1[1]	1 5/8[1]	AB Face	-
Existing	136.5	1	5'x10" Detuner	Direct	1	1/4"ø	CA Face	Ham Radio
Proposed	***128.0***	***2*** ***4*** ***2*** ***4***	***SLCP2X6015*** ***SC-E 6014 Rev 2*** ***SACP 2X5516*** ***FDR6004/2C-3L***	***Sector***	***8***	***1 5/8***	***BC Face***	***Verizon***
Existing	120.5	3	RFS APXV18-206517S	Pipe	6	1 5/8	CA Face	Metro PCS

Table 1 - Existing and Proposed Antenna and Cable Information - Continued

Existing/ Proposed	Elevation (Ft)	Qty	Antenna Model	Mount Type	Qty Coax	Coax Size (in)	Coax Location	Owner/ Tenant
Existing	112.0	2	KMW AM-X-CD-16-65-00T-RET	Sector	12[3]	1 5/8[3]	AB Face	AT&T
		4	Andrew SBNH-1D6565C					
		3	Kathrein 800-10121					
		6	CCI DTMABP7819VG12A					
		6	Ericsson RRU					
Existing	48.0	1	GPS	Direct	1	3/8"ø	CA Face	Metro PCS
Existing	21.0	1	14-Element 4.5-ft Yagi	Sidearm	1	1/2	C Leg	Ham Radio

Notes:
1) All unused coax and antennas are to be removed.
2) Coax stacked 4-on-4.
3) Coax stacked 6-on-6.

Table 2 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Quantity	Antenna Manufacturer	Antenna Model	Quantity Coax	Coax Size (in)	Coax Location
696.5	696.5	1	Dielectric	TFU-30GTH-RD-TV	1	6"	Unknown
640	640	1	ERI	3-Bay FM w/ radomes	1	3 1/8	Unknown
600	600	1	Celwave	PD220	1	1 5/8	Unknown
575	575	1	Celwave	PD220	1	1 5/8	Unknown
550	550	1	Celwave	PD220	1	1 5/8	Unknown
525	525	1	Celwave	PD220	1	1 5/8	Unknown
500	500	1	Celwave	PD220	1	1 5/8	Unknown
475	475	1	Celwave	PD220	1	1 5/8	Unknown
450	450	1	Celwave	PD220	1	1 5/8	Unknown
425	425	1	Celwave	PD220	1	1 5/8	Unknown
335	335	3	Celwave	PD220	3	1 5/8	Unknown
328.5	328.5	1	ERI	3-Bay FM w/ radomes	1	3 1/8	Unknown
310	310	3	Celwave	PD220	3	1 5/8	Unknown
300	300	1	ERI	1-Bay FM w/ radomes	1	3 1/8	Unknown
275	275	4	Celwave	PD220	4	7/8	Unknown
250	250	12	Allgon	ALP9212-N	12	1 5/8	Unknown
230	230	12	Allgon	ALP9212-N	12	1 5/8	Unknown
210	210	12	Allgon	ALP9212-N	12	1 5/8	Unknown
190	190	12	Allgon	ALP9212-N	12	1 5/8	Unknown
170	170	12	Allgon	ALP9212-N	12	1 5/8	Unknown
150	150	12	Allgon	ALP9212-N	12	1 5/8	Unknown
115	115	2	Scala	PR-950	2	7/8	Unknown

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Tower and Foundation Drawings	Pirod dated February 23, 2001 File No. A-117361-1	-	Grain
Previous Structural Analysis	Malouf Engineering dated August 28, 2008 ID No. CT01294G-08V0	-	Grain
Steel and Appurtenance Mapping	Tower Engineering Professionals dated July 12, 2011	112343	TEP
Correspondence	Correspondence from Grain Communications regarding the proposed loading	-	Grain

3.1) Analysis Method

tnxTower (version 6.0.4.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and foundations were built in accordance with the manufacturer's specifications.
2) The tower and foundations have been maintained in accordance with the manufacturer's specification.
3) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
4) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Table 1.
5) Serviceability with respect to antenna twist, tilt, roll, or lateral translation is not checked and is left to the carrier or tower owner to ensure conformance. See Table 6.
6) TEP did not analyze the antenna supporting mounts as part of this structural analysis report. TEP assumes that all antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts.
7) TEP assumes the geotechnical soil parameters used in the previous structural analysis by Malouf Engineering dated August 28, 2008 (No. CT01294G-08V0) are accurate and complete.
8) This report is not a construction document.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
T1	311.333 - 310.333	Leg	2 3/4	1	-10437.10	226136.78	14.8	Pass
		Top Girt	6x1	6	-130.48	30366.94	4.9	Pass
T2	310.333 - 299.167	Leg	2 3/4	8	-19543.90	195896.34	10.0 11.6 (b)	Pass
		Diagonal	7/8	23	-1422.85	9591.29	14.8	Pass
		Top Girt	1 1/4	10	-318.77	14854.02	2.1	Pass
		Bottom Girt	1 1/4	15	4263.26	36815.50	11.6	Pass
		Guy A@299.802	13/16	981	17473.30	40000.00	43.7	Pass
		Guy B@299.802	13/16	980	18773.50	40000.00	46.9	Pass
		Guy C@299.802	13/16	979	17574.40	40000.00	43.9	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
T3	299.167 - 279.167	Leg	2 3/4	41	-19276.30	203713.05	9.5 9.6 (b)	Pass
		Diagonal	7/8	95	-1702.06	10204.74	16.7	Pass
		Top Girt	1	45	-1763.19	6084.21	29.0	Pass
		Bottom Girt	1	47	-38.42	6084.21	0.6	Pass
		Mid Girt	1	50	106.96	23561.90	0.5	Pass
T4	279.167 - 259.167	Leg	2 3/4	101	-15896.60	152823.00	10.4 11.4 (b)	Pass
		Diagonal	7/8	115	-1177.88	10204.74	11.5	Pass
		Top Girt	1	103	-63.50	6084.21	1.0	Pass
		Bottom Girt	1	108	-182.35	6084.21	3.0	Pass
		Mid Girt	1	110	114.43	23561.90	0.5	Pass
T5	259.167 - 239.167	Leg	2 3/4	161	-31660.90	203713.05	15.5 18.8 (b)	Pass
		Diagonal	7/8	173	-2534.23	10204.74	24.8	Pass
		Top Girt	1	165	-157.43	6084.21	2.6	Pass
		Bottom Girt	1	168	-712.92	6084.21	11.7	Pass
		Mid Girt	1	169	122.12	23561.90	0.5	Pass
T6	239.167 - 219.167	Leg	2 3/4	221	-42022.40	203713.05	20.6	Pass
		Diagonal	7/8	237	-2919.17	10204.74	28.6	Pass
		Top Girt	1	225	-718.48	6084.21	11.8	Pass
		Bottom Girt	1	226	-402.36	6084.21	6.6	Pass
		Mid Girt	1	230	2268.86	23561.90	9.6	Pass
		Guy A@230.177	7/8	984	19669.90	46000.00	42.8	Pass
		Guy B@230.177	7/8	983	21028.80	46000.00	45.7	Pass
		Guy C@230.177	7/8	982	19699.60	46000.00	42.8	Pass
T7	219.167 - 199.167	Leg	2 3/4	281	-30521.70	152823.00	20.0 21.5 (b)	Pass
		Diagonal	7/8	339	-2674.13	10204.74	26.2	Pass
		Top Girt	1	285	-603.70	6084.21	9.9	Pass
		Bottom Girt	1	286	-241.94	6084.21	4.0	Pass
		Mid Girt	1	290	225.01	23561.90	1.0	Pass
T8	199.167 - 179.167	Leg	2 3/4	341	-32468.00	152823.00	21.2 23.2 (b)	Pass
		Diagonal	7/8	397	-1883.86	10204.74	18.5	Pass
		Top Girt	1	345	-371.63	6084.21	6.1	Pass
		Bottom Girt	1	348	153.04	23561.90	0.6	Pass
		Mid Girt	1	349	238.10	23561.90	1.0	Pass
T9	179.167 - 159.167	Leg	2 3/4	400	-35602.90	152823.00	23.3	Pass
		Diagonal	7/8	413	-2498.06	10204.74	24.5	Pass
		Top Girt	1	404	-79.24	6084.21	1.3	Pass
		Bottom Girt	1	406	-437.96	6084.21	7.2	Pass
		Mid Girt	1	409	250.57	23561.90	1.1	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
T10	159.167 - 139.167	Leg	3	461	-45539.40	185200.00	24.6 30.2 (b)	Pass
		Diagonal	1	477	-3721.01	16737.01	22.2	Pass
		Top Girt	1 1/4	463	-903.55	14984.65	6.0	Pass
		Bottom Girt	1 1/4	467	-645.31	14984.65	4.3	Pass
		Mid Girt	1 1/4	469	2677.98	36815.50	7.3	Pass
		Guy A@150.177	13/16	987	18088.60	40000.00	45.2	Pass
		Guy B@150.177	13/16	986	18915.50	40000.00	47.3	Pass
		Guy C@150.177	13/16	985	18042.60	40000.00	45.1	Pass
T11	139.167 - 119.167	Leg	3	521	-48468.70	178327.00	27.2 35.9 (b)	Pass
		Diagonal	7/8	579	-3395.51	10294.45	33.0	Pass
		Top Girt	1	525	-598.95	6137.69	9.8	Pass
		Bottom Girt	1	527	-121.94	6137.69	2.0	Pass
		Mid Girt	1	529	490.92	31408.01	1.6	Pass
T12	119.167 - 99.1667	Leg	3	581	-52225.80	178327.00	29.3 35.5 (b)	Pass
		Diagonal	7/8	593	-3033.85	10294.45	29.5	Pass
		Top Girt	1	583	185.07	23561.90	0.8	Pass
		Bottom Girt	1	586	-452.23	6137.69	7.4	Pass
		Mid Girt	1	589	378.65	23561.90	1.6	Pass
T13	99.1667 - 79.1667	Leg	3	641	-59543.20	178327.00	33.4 40.4 (b)	Pass
		Diagonal	7/8	695	-3166.48	10294.45	30.8	Pass
		Top Girt	1	645	-549.96	6137.69	9.0	Pass
		Bottom Girt	1	647	-342.60	6137.69	5.6	Pass
		Mid Girt	1	649	4483.07	23561.90	19.0	Pass
		Guy A@89.1667	3/4	990	14579.00	34000.00	42.9	Pass
		Guy B@89.1667	3/4	989	15266.50	34000.00	44.9	Pass
		Guy C@89.1667	3/4	988	14614.20	34000.00	43.0	Pass
T14	79.1667 - 59.1667	Leg	3	701	-61689.50	178327.00	34.6 44.7 (b)	Pass
		Diagonal	7/8	759	-2317.90	10294.45	22.5	Pass
		Top Girt	1	705	-198.85	6137.69	3.2	Pass
		Bottom Girt	1	707	-78.81	6137.69	1.3	Pass
		Mid Girt	1	709	442.72	23561.90	1.9	Pass
T15	59.1667 - 39.1667	Leg	3	761	-63716.20	178327.00	35.7 45.9 (b)	Pass
		Diagonal	7/8	819	-1390.35	10294.45	13.5	Pass
		Top Girt	1	763	229.12	23561.90	1.0	Pass
		Bottom Girt	1	768	260.23	23561.90	1.1	Pass
		Mid Girt	1	769	459.04	23561.90	1.9	Pass
T16	39.1667 - 19.1667	Leg	3	821	-65623.10	178327.00	36.8 44.3 (b)	Pass
		Diagonal	7/8	832	-1804.55	10294.45	17.5	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
		Top Girt	1	824	412.39	31408.01	1.3	Pass
		Bottom Girt	1	828	466.43	31408.01	1.5	Pass
		Mid Girt	1	829	475.83	23561.90	2.0	Pass
T17	19.1667 - 14.3958	Leg	3	881	-65809.70	178327.00	36.9	Pass
		Diagonal	1	895	-2191.19	16789.13	13.1	Pass
		Top Girt	1 1/4	883	728.27	49075.06	1.5	Pass
		Mid Girt	7/8	887	878.37	18039.60	4.9	Pass
T18	14.3958 - 11.8125	Leg	3	902	-65437.20	178327.00	36.7	Pass
		Diagonal	1	908	-2195.96	16295.52	13.5	Pass
		Top Girt	7/8	905	961.99	18039.60	5.3	Pass
T19	11.8125 - 9.47917	Leg	3	914	-66468.20	178327.00	37.3	Pass
		Diagonal	1 1/4	919	-2180.76	28639.64	7.6	Pass
		Horizontal	6x3/4	921	-1151.26	9695.17	11.9	Pass
		Redund Horz 1 Bracing	7/8	920	-1151.26	13483.20	8.5	Pass
T20	9.47917 - 7.14583	Leg	3	932	-65375.60	178327.00	36.7	Pass
		Diagonal	1 1/4	935	-2861.25	28639.64	10.0	Pass
		Horizontal	6x3/4	934	-1396.88	9695.17	14.4	Pass
		Redund Horz 1 Bracing	7/8	946	1789.99	18039.60	9.9	Pass
		Redund Diag 1 Bracing	7/8	947	-1246.97	11236.50	11.1	Pass
T21	7.14583 - 1.17708	Leg	3	956	-74695.90	176144.00	42.4	Pass
		Diagonal	1 1/4	964	-8819.23	22002.80	40.1	Pass
		Horizontal	6x3/4	958	7169.36	97200.00	7.4	Pass
		Bottom Girt	6x3/4	962	6413.79	97200.00	6.6	Pass
							Summary	
						Leg (T15)	45.9	Pass
						Diagonal (T21)	40.1	Pass
						Horizontal (T20)	14.4	Pass
						Top Girt (T3)	29.0	Pass
						Bottom Girt (T5)	11.7	Pass
						Mid Girt (T13)	19.0	Pass
						Redund Horz 1 Bracing (T20)	9.9	Pass
						Redund Diag 1 Bracing (T20)	11.1	Pass
						Guy A	45.2	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
						(T10)		
						Guy B (T10)	47.3	Pass
						Guy C (T10)	45.1	Pass
						Bolt Checks	45.9	Pass
						RATING =	**47.3**	**Pass**

Table 5 - Component Stresses vs. Capacity - Foundations

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
-	Mast Axial	-	45.6	Pass
-	Mast Lateral	-	55.1	Pass
-	Guy Anchor Lateral	-	64.8	Pass
-	Guy Anchor Uplift	-	48.9	Pass

Structure Rating (max from all components) =	**64.8%**

Table 6 - Dish Twist/Sway Results for 50 mph Service Wind Speed

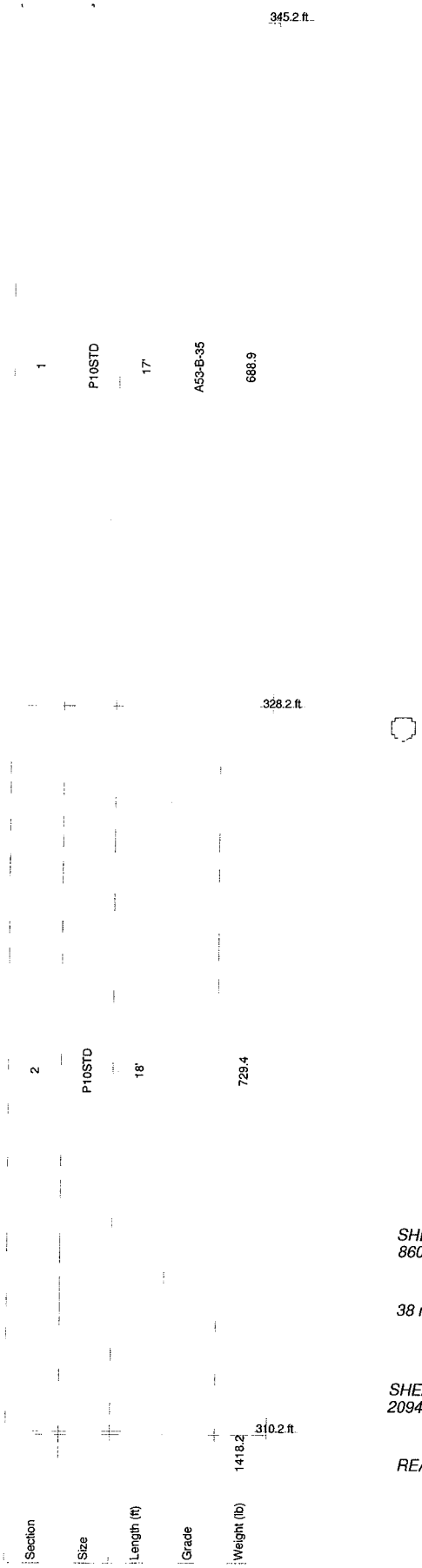
Elevation (ft)	Dish Model	Beam Deflection		
		Deflection (in)	Tilt (deg)	Twist (deg)
235	Scala 6'x3' Grid Dish	2.362	0.0258	0.6134
232	Radiowaves SP02-4.7NS	2.347	0.0236	0.6076
196	Cablewave PA6-112	2.251	0.0167	0.5355
146	2-ft Dish w/o Radome	2.005	0.0230	0.4152

4.1) Recommendations

1) If the load differs from that described in Table 1 of this report or Appendix B - "Coax Configuration," or the provisions of this analysis are found to be invalid, another structural analysis should be performed.

APPENDIX A

TNXTOWER OUTPUT



DESIGNED APPURTENANCE LOADING

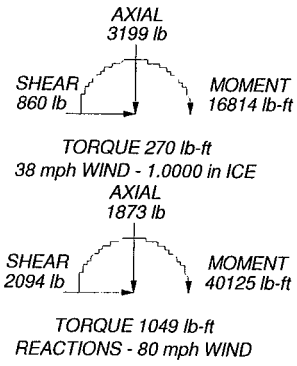
TYPE	ELEVATION	TYPE	ELEVATION
30" x 18" Dia	345.156	(3) 2.4" Dia x 18" Pipe	330.656
3 Bay/20' length/ Dielectric DCR	330.656		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 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 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.



Tower Engineering Professionals, Inc.

Tower Engineering Professionals
3703 Junction Boulevard
Raleigh, NC 27603
Phone: (919) 661-6351
FAX: (919) 661-6350

Job: ***West Hartford***			
Project: ***TEP# 112343 - Revision 2***			
Client: Grain Communications	Drawn by: wjones	App'd:	
Code: TIA/EIA-222-F	Date: 07/26/12	Scale: NTS	
Path: P:\2343 West Hartford\Structural\Rev 2\TNX\Mast\West Hartford Mast.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 Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 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		

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	345'1-29/32"-328' 1-29/32"	17'	P10STD	A53-B-35 (35 ksi)	
L2	328'1-29/32"-310' 1-29/32"	18'	P10STD	A53-B-35 (35 ksi)	

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
L1 345'1-29/32"-328'1-29/32"				1	1	1		
L2 328'1-29/32"-310'1-29/32"				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 ft²/ft	Weight plf
Step Pegs (5/8" SR) 7-in. w/30" step	B	No	CaAa (Out Of Face)	345'1-29/32" - 310'1-29/32"	1	No Ice	0.03	0.49
						1/2" Ice	0.13	0.97
						1" Ice	0.23	2.07
						2" Ice	0.43	6.09
						4" Ice	0.83	21.46
1/2" dia. coax	C	No	Inside Pole	345'1-29/32" - 310'1-29/32"	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
HJ8-50B (3 AIR)	A	No	CaAa (Out Of Face)	330'7-29/32" - 310'1-29/32"	1	No Ice	0.30	1.78
						1/2" Ice	0.40	3.92
						1" Ice	0.50	6.68
						2" Ice	0.70	14.02
						4" Ice	1.10	36.04

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight lb
L1	345'1-29/32"-328' 1-29/32"	A	0.000	0.000	0.000	0.752	4.45
		B	0.000	0.000	0.000	0.496	8.28
		C	0.000	0.000	0.000	0.000	2.55
L2	328'1-29/32"-310' 1-29/32"	A	0.000	0.000	0.000	5.418	32.04
		B	0.000	0.000	0.000	0.526	8.77
		C	0.000	0.000	0.000	0.000	2.70

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight lb
L1	345'1-29/32"-328' 1-29/32"	A	1.321	0.000	0.000	0.000	1.413	22.60
		B		0.000	0.000	0.000	4.989	57.09
		C		0.000	0.000	0.000	0.000	2.55
L2	328'1-29/32"-310'	A	1.313	0.000	0.000	0.000	10.145	161.59

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
	1-29/32"	B		0.000	0.000	0.000	5.252	59.84
		C		0.000	0.000	0.000	0.000	2.70

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	345'1-29/32"-328'1-2 9/32"	0.0351	-0.0411	0.2288	0.0573
L2	328'1-29/32"-310'1-2 9/32"	0.0277	-0.3139	0.1724	-0.2849

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
30" x 18" Dia	C	None		0.0000	345'1-29/32"	No Ice	3.00	3.00	55.00
						1/2" Ice	3.27	3.27	92.44
						1" Ice	3.56	3.56	133.39
						2" Ice	4.16	4.16	226.45
						4" Ice	5.49	5.49	461.43
*****									
3 Bay/20' length/ Dielectric DCR	C	From Leg	1.50 0' 0'	0.0000	330'7-29/32"	No Ice	9.80	9.80	324.00
						1/2" Ice	10.40	10.40	421.20
						1" Ice	11.00	11.00	518.40
						2" Ice	12.20	12.20	712.80
						4" Ice	14.60	14.60	1101.60
(3) 2.4" Dia x 18" Pipe	C	From Leg	0.75 0' 0'	0.0000	330'7-29/32"	No Ice	0.24	0.24	5.50
						1/2" Ice	0.36	0.36	8.45
						1" Ice	0.49	0.49	12.72
						2" Ice	0.78	0.78	25.80
						4" Ice	1.50	1.50	74.44

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice

Comb. No.	Description
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 Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	23	3198.88	744.56	-429.87
	Max. H_x	11	1872.53	2094.41	-0.00
	Max. H_z	2	1872.53	0.00	2094.41
	Max. M_x	2	39161.89	0.00	2094.41
	Max. M_z	5	38914.98	-2094.41	-0.00
	Max. Torsion	13	1048.56	1047.20	1813.81
	Min. Vert	1	1872.53	0.00	-0.00
	Min. H_x	5	1872.53	-2094.41	-0.00
	Min. H_z	8	1872.53	0.00	-2094.41
	Min. M_x	8	-39795.00	0.00	-2094.41
	Min. M_z	11	-40041.90	2094.41	-0.00
	Min. Torsion	7	-1048.56	-1047.20	-1813.81

Tower Mast Reaction Summary

Load Combination	Vertical	Shear$_x$	Shear$_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead Only	1872.53	-0.00	0.00	316.44	563.25	0.00
Dead+Wind 0 deg - No Ice	1872.53	-0.00	-2094.41	-39161.89	563.34	-917.30
Dead+Wind 30 deg - No Ice	1872.53	1047.20	-1813.81	-33872.74	-19175.82	-540.24
Dead+Wind 60 deg - No Ice	1872.53	1813.81	-1047.20	-19422.66	-33625.87	-18.42
Dead+Wind 90 deg - No Ice	1872.53	2094.41	0.00	316.49	-38914.98	508.34
Dead+Wind 120 deg - No Ice	1872.53	1813.81	1047.20	20055.67	-33625.94	898.88
Dead+Wind 150 deg - No Ice	1872.53	1047.20	1813.81	34505.82	-19175.89	1048.56
Dead+Wind 180 deg - No Ice	1872.53	-0.00	2094.41	39795.00	563.33	917.28
Dead+Wind 210 deg - No Ice	1872.53	-1047.20	1813.81	34505.93	20302.61	540.23
Dead+Wind 240 deg - No Ice	1872.53	-1813.81	1047.20	20055.78	34752.79	18.42
Dead+Wind 270 deg - No Ice	1872.53	-2094.41	0.00	316.48	40041.90	-508.32
Dead+Wind 300 deg - No Ice	1872.53	-1813.81	-1047.20	-19422.78	34752.73	-898.86
Dead+Wind 330 deg - No Ice	1872.53	-1047.20	-1813.81	-33872.86	20302.56	-1048.56
Dead+Ice+Temp	3198.88	-0.00	0.00	550.59	1006.18	0.00
Dead+Wind 0 deg+Ice+Temp	3198.88	-0.00	-859.75	-15115.63	1006.55	-234.82
Dead+Wind 30 deg+Ice+Temp	3198.88	429.87	-744.56	-13016.72	-6826.65	-136.41
Dead+Wind 60 deg+Ice+Temp	3198.88	744.56	-429.87	-7282.41	-12560.95	-1.45
Dead+Wind 90 deg+Ice+Temp	3198.88	859.75	0.00	550.79	-14659.86	133.90
Dead+Wind 120 deg+Ice+Temp	3198.88	744.56	429.87	8384.00	-12560.97	233.37
Dead+Wind 150 deg+Ice+Temp	3198.88	429.87	744.56	14118.32	-6826.67	270.31
Dead+Wind 180 deg+Ice+Temp	3198.88	-0.00	859.75	16217.23	1006.54	234.82
Dead+Wind 210 deg+Ice+Temp	3198.88	-429.87	744.56	14118.32	8839.76	136.41
Dead+Wind 240 deg+Ice+Temp	3198.88	-744.56	429.87	8384.01	14574.08	1.45
Dead+Wind 270 deg+Ice+Temp	3198.88	-859.75	0.00	550.78	16672.99	-133.89
Dead+Wind 300 deg+Ice+Temp	3198.88	-744.56	-429.87	-7282.43	14574.08	-233.36
Dead+Wind 330 deg+Ice+Temp	3198.88	-429.87	-744.56	-13016.74	8839.76	-270.30
Dead+Wind 0 deg - Service	1872.53	-0.00	-828.39	-15269.61	563.58	-358.36
Dead+Wind 30 deg - Service	1872.53	414.20	-717.41	-13181.44	-7229.53	-211.13
Dead+Wind 60 deg - Service	1872.53	717.41	-414.20	-7476.49	-12934.48	-7.34
Dead+Wind 90 deg - Service	1872.53	828.39	0.00	316.63	-15022.64	198.43
Dead+Wind 120 deg - Service	1872.53	717.41	414.20	8109.74	-12934.49	351.02
Dead+Wind 150 deg - Service	1872.53	414.20	717.41	13814.71	-7229.54	409.56
Dead+Wind 180 deg - Service	1872.53	-0.00	828.39	15902.88	563.58	358.36
Dead+Wind 210 deg - Service	1872.53	-414.20	717.41	13814.72	8356.71	211.13
Dead+Wind 240 deg - Service	1872.53	-717.41	414.20	8109.75	14061.68	7.34
Dead+Wind 270 deg - Service	1872.53	-828.39	0.00	316.62	16149.84	-198.42
Dead+Wind 300 deg - Service	1872.53	-717.41	-414.20	-7476.51	14061.67	-351.02
Dead+Wind 330 deg - Service	1872.53	-414.20	-717.41	-13181.46	8356.70	-409.56

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	-1872.53	0.00	0.00	1872.53	-0.00	0.000%
2	0.00	-1872.53	-2094.41	0.00	1872.53	2094.41	0.000%
3	1047.20	-1872.53	-1813.81	-1047.20	1872.53	1813.81	0.000%
4	1813.81	-1872.53	-1047.20	-1813.81	1872.53	1047.20	0.000%
5	2094.41	-1872.53	0.00	-2094.41	1872.53	-0.00	0.000%
6	1813.81	-1872.53	1047.20	-1813.81	1872.53	-1047.20	0.000%
7	1047.20	-1872.53	1813.81	-1047.20	1872.53	-1813.81	0.000%
8	0.00	-1872.53	2094.41	0.00	1872.53	-2094.41	0.000%
9	-1047.20	-1872.53	1813.81	1047.20	1872.53	-1813.81	0.000%
10	-1813.81	-1872.53	1047.20	1813.81	1872.53	-1047.20	0.000%
11	-2094.41	-1872.53	0.00	2094.41	1872.53	-0.00	0.000%
12	-1813.81	-1872.53	-1047.20	1813.81	1872.53	1047.20	0.000%
13	-1047.20	-1872.53	-1813.81	1047.20	1872.53	1813.81	0.000%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
14	0.00	-3198.88	0.00	0.00	3198.88	-0.00	0.000%
15	0.00	-3198.88	-859.75	0.00	3198.88	859.75	0.000%
16	429.87	-3198.88	-744.56	-429.87	3198.88	744.56	0.000%
17	744.56	-3198.88	-429.87	-744.56	3198.88	429.87	0.000%
18	859.75	-3198.88	0.00	-859.75	3198.88	-0.00	0.000%
19	744.56	-3198.88	429.87	-744.56	3198.88	-429.87	0.000%
20	429.87	-3198.88	744.56	-429.87	3198.88	-744.56	0.000%
21	0.00	-3198.88	859.75	0.00	3198.88	-859.75	0.000%
22	-429.87	-3198.88	744.56	429.87	3198.88	-744.56	0.000%
23	-744.56	-3198.88	429.87	744.56	3198.88	-429.87	0.000%
24	-859.75	-3198.88	0.00	859.75	3198.88	-0.00	0.000%
25	-744.56	-3198.88	-429.87	744.56	3198.88	429.87	0.000%
26	-429.87	-3198.88	-744.56	429.87	3198.88	744.56	0.000%
27	0.00	-1872.53	-828.39	0.00	1872.53	828.39	0.000%
28	414.20	-1872.53	-717.41	-414.20	1872.53	717.41	0.000%
29	717.41	-1872.53	-414.20	-717.41	1872.53	414.20	0.000%
30	828.39	-1872.53	0.00	-828.39	1872.53	-0.00	0.000%
31	717.41	-1872.53	414.20	-717.41	1872.53	-414.20	0.000%
32	414.20	-1872.53	717.41	-414.20	1872.53	-717.41	0.000%
33	0.00	-1872.53	828.39	0.00	1872.53	-828.39	0.000%
34	-414.20	-1872.53	717.41	414.20	1872.53	-717.41	0.000%
35	-717.41	-1872.53	414.20	717.41	1872.53	-414.20	0.000%
36	-828.39	-1872.53	0.00	828.39	1872.53	-0.00	0.000%
37	-717.41	-1872.53	-414.20	717.41	1872.53	414.20	0.000%
38	-414.20	-1872.53	-717.41	414.20	1872.53	717.41	0.000%

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	0.00016032
3	Yes	4	0.00000001	0.00008569
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00008967
6	Yes	4	0.00000001	0.00016876
7	Yes	4	0.00000001	0.00017933
8	Yes	4	0.00000001	0.00016436
9	Yes	4	0.00000001	0.00010803
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00009368
12	Yes	4	0.00000001	0.00015511
13	Yes	4	0.00000001	0.00019733
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00008081
16	Yes	4	0.00000001	0.00007116
17	Yes	4	0.00000001	0.00006710
18	Yes	4	0.00000001	0.00007040
19	Yes	4	0.00000001	0.00008284
20	Yes	4	0.00000001	0.00008942
21	Yes	4	0.00000001	0.00009095
22	Yes	4	0.00000001	0.00009015
23	Yes	4	0.00000001	0.00008678
24	Yes	4	0.00000001	0.00008678
25	Yes	4	0.00000001	0.00009173
26	Yes	4	0.00000001	0.00009188

27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	345.156 - 328.156	1.911	35	0.3493	0.0193
L2	328.156 - 310.156	0.705	35	0.3099	0.0170

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
345'1-29/32"	30" x 18" Dia	35	1.911	0.3493	0.0193	14963
330'7-29/32"	3 Bay/20' length/ Dielectric DCR	35	0.852	0.3300	0.0181	5233

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	345.156 - 328.156	4.656	10	0.8492	0.0495
L2	328.156 - 310.156	1.726	10	0.7537	0.0434

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
345'1-29/32"	30" x 18" Dia	10	4.656	0.8492	0.0495	6228
330'7-29/32"	3 Bay/20' length/ Dielectric DCR	10	2.084	0.8025	0.0463	2178

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 lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
L1	345.156 - 328.156 (1)	P10STD	17'	0'	0.0	21.000	11.9083	-1082.58	250074.00	0.004
L2	328.156 - 310.156 (2)	P10STD	18'	0'	0.0	21.000	11.9083	-1871.26	250074.00	0.007

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	345.156 - 328.156 (1)	P10STD	9603.17	3.854	23.100	0.167	0.00	0.000	23.100	0.000
L2	328.156 - 310.156 (2)	P10STD	40124.67	16.101	23.100	0.697	0.00	0.000	23.100	0.000

Pole Shear Design Data

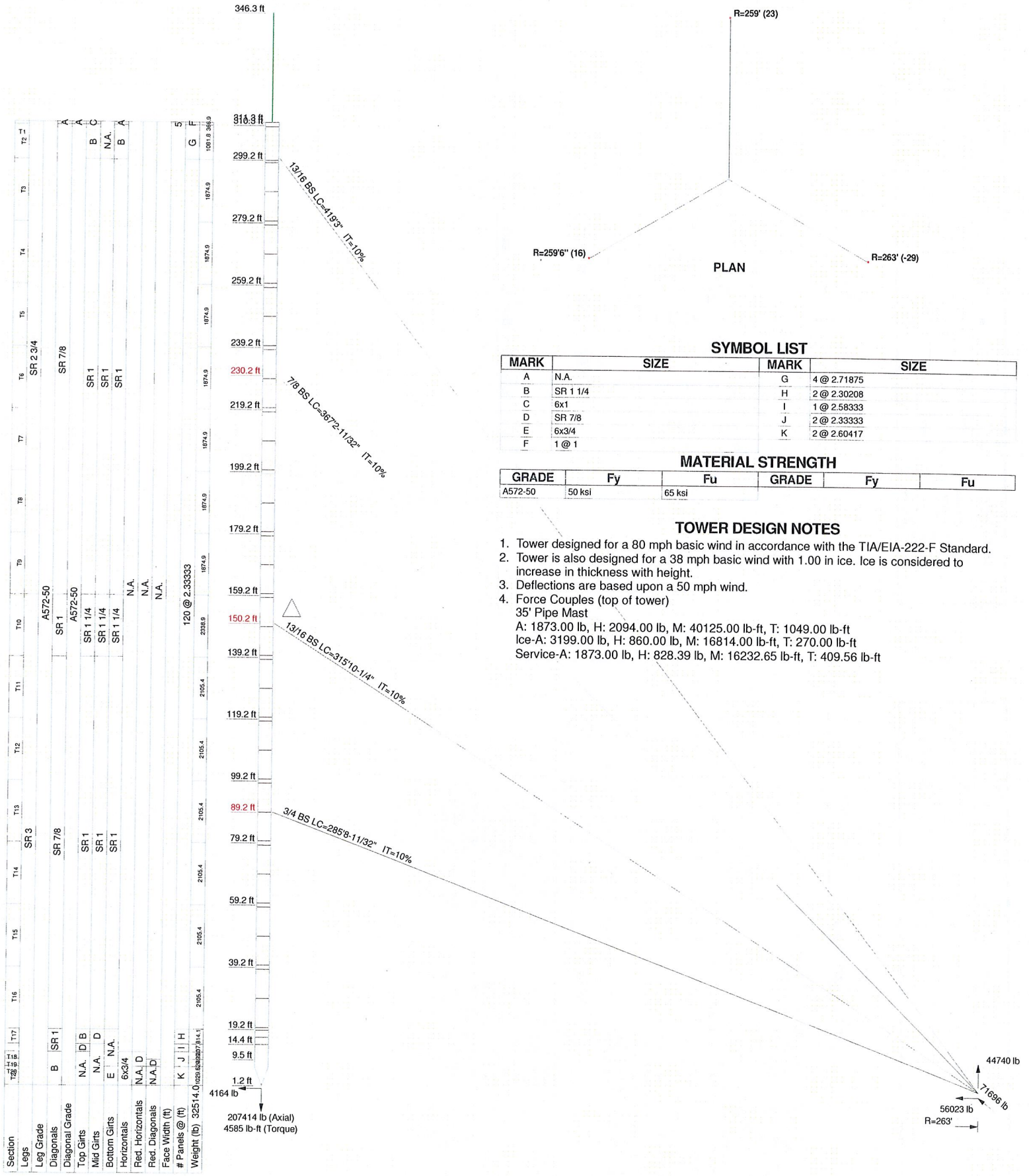
Section No.	Elevation ft	Size	Actual V lb	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T lb-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	345.156 - 328.156 (1)	P10STD	1290.43	0.217	14.000	0.015	0.83	0.000	14.000	0.000
L2	328.156 - 310.156 (2)	P10STD	2095.55	0.352	14.000	0.025	18.42	0.004	14.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	345.156 - 328.156 (1)	0.004	0.167	0.000	0.015	0.000	0.171 ✓	1.333	H1-3+VT ✓
L2	328.156 - 310.156 (2)	0.007	0.697	0.000	0.025	0.000	0.705 ✓	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	345.156 - 328.156	Pole	P10STD	1	-1082.58	333348.63	12.9	Pass
L2	328.156 - 310.156	Pole	P10STD	2	-1871.26	333348.63	52.9	Pass
							Summary	
						Pole (L2)	52.9	Pass
						RATING =	**52.9**	**Pass**



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	N.A.	G	4 @ 2.71875
B	SR 1 1/4	H	2 @ 2.30208
C	6x1	I	1 @ 2.58333
D	SR 7/8	J	2 @ 2.33333
E	6x3/4	K	2 @ 2.60417
F	1 @ 1		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
3. Deflections are based upon a 50 mph wind.
4. Force Couples (top of tower)
   35' Pipe Mast
   A: 1873.00 lb, H: 2094.00 lb, M: 40125.00 lb-ft, T: 1049.00 lb-ft
   Ice-A: 3199.00 lb, H: 860.00 lb, M: 16814.00 lb-ft, T: 270.00 lb-ft
   Service-A: 1873.00 lb, H: 828.39 lb, M: 16232.65 lb-ft, T: 409.56 lb-ft

Tower Engineering Professionals, Inc.

Tower Engineering Professionals
3703 Junction Boulevard
Raleigh, NC 27603
Phone: (919) 661-6351
FAX: (919) 661-6350

Job: *West Hartford*			
Project: *TEP# 112343 - Revision 2*			
Client: Grain Communications	Drawn by: wjones	App'd:	
Code: TIA/EIA-222-F	Date: 07/26/12	Scale: NTS	
Path: P:\2343_West Hartford\Structural\Rev 2\TNX\West Hartford Guyed Tower.eri		Dwg No. E-1	

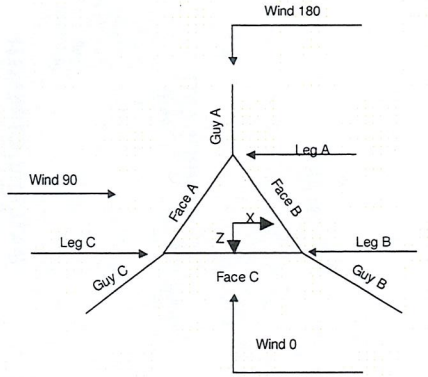
Tower Input Data

The main tower is a 3x guyed tower with an overall height of 311'4" above the ground line.
The base of the tower is set at an elevation of 1'2-1/8" above the ground line.
The face width of the tower is 5' at the top and tapered at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 80 mph.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Pressures are calculated at each section.
Safety factor used in guy design is 2.
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	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		



Corner & Starmount Guyed Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	311'3-31/32"-310' 3-31/32"			5'	1	1'
T2	310'3-31/32"-299' 2-1/32"			5'	1	11'2-1/32"
T3-T9	299'2-1/32"-159'2 -1/32"			5'	7	20'
T10	159'2-1/32"-139'2 -1/32"			5'	1	20'
T11-T16	139'2-1/32"-19'2-1/32"			5'	6	20'
T17	19'2-1/32"-14'4-1 3/16"			5'	1	4'9-1/4"
T18	14'4-13/16"-11'9-23/32"			5'	1	2'6-31/32"
T19	11'9-23/32"-9'5-3 /4"			5'	1	2'3-31/32"
T20	9'5-3/4"-7'1-13/1 6"			5'	1	2'3-31/32"
T21	7'1-13/16"-1'2-5/ 32"			5'	1	5'11-5/8"

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	311'3-31/32"-310' 3-31/32"	1'	X Brace	No	Yes	0.0000	0.0000
T2	310'3-31/32"-299' 2-1/32"	2'8-5/8"	X Brace	No	No	3.5000	0.0000
T3-T9	299'2-1/32"-159'2 -1/32"	2'3-31/32"	X Brace	No	No	8.0000	8.0000
T10	159'2-1/32"-139'2 -1/32"	2'3-31/32"	X Brace	No	No	8.0000	8.0000
T11-T16	139'2-1/32"-19'2- 1/32"	2'3-31/32"	X Brace	No	No	8.0000	8.0000
T17	19'2-1/32"-14'4-1 3/16"	2'3-19/32"	X Brace	No	No	2.0000	0.0000
T18	14'4-13/16"-11'9- 23/32"	2'6-31/32"	X Brace	No	No	0.0000	0.0000
T19	11'9-23/32"-9'5-3 /4"	2'3-31/32"	K1 Down	No	Yes	0.0000	0.0000
T20	9'5-3/4"-7'1-13/1 6"	2'3-31/32"	K1 Up	No	Yes	0.0000	0.0000
T21	7'1-13/16"-1'2-5/ 32"	2'7-3/16"	X Brace	No	Yes	3.0000	6.1250

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 311'3-31/32"-310' 3-31/32"	Solid Round	2 3/4	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T2 310'3-31/32"-299' 2-1/32"	Solid Round	2 3/4	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T3-T9 299'2-1/32"-159'2 -1/32"	Solid Round	2 3/4	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T10 159'2-1/32"-139'2 -1/32"	Solid Round	3	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T11-T16 139'2-1/32"-19'2- 1/32"	Solid Round	3	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T17 19'2-1/32"-14'4-1 3/16"	Solid Round	3	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T18 14'4-13/16"-11'9- 23/32"	Solid Round	3	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T19 11'9-23/32"-9'5-3 /4"	Solid Round	3	A572-50 (50 ksi)	Solid Round	1 1/4	A572-50 (50 ksi)
T20	Solid Round	3	A572-50	Solid Round	1 1/4	A572-50

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
9'5-3/4"-7'1-13/1 6"			(50 ksi)			(50 ksi)
T21 7'1-13/16"-1'2-5/ 32"	Solid Round	3	A572-50 (50 ksi)	Solid Round	1 1/4	A572-50 (50 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
T2 310'3-31/32"-299' 2-1/32"	Solid Round	1 1/4	A570-50 (50 ksi)	Solid Round	1 1/4	A572-50 (50 ksi)
T3-T9 299'2-1/32"-159'2 -1/32"	Solid Round	1	A570-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T10 159'2-1/32"-139'2 -1/32"	Solid Round	1 1/4	A570-50 (50 ksi)	Solid Round	1 1/4	A572-50 (50 ksi)
T11-T16 139'2-1/32"-19'2- 1/32"	Solid Round	1	A570-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T17 19'2-1/32"-14'4-1 3/16"	Solid Round	1 1/4	A570-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T18 14'4-13/16"-11'9- 23/32"	Solid Round	7/8	A570-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T21 7'1-13/16"-1'2-5/ 32"	Flat Bar		A36 (36 ksi)	Flat Bar	6x3/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 311'3-31/32"-310' 3-31/32"	None	Flat Bar		A572-50 (50 ksi)	Flat Bar	6x1	A36 (36 ksi)
T3-T9 299'2-1/32"-159'2 -1/32"	1	Solid Round	1	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T10 159'2-1/32"-139'2 -1/32"	1	Solid Round	1 1/4	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T11-T16 139'2-1/32"-19'2- 1/32"	1	Solid Round	1	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)

Tower Elevation	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
ft							
T17 19'2-1/32"-14'4-13/16"	1	Solid Round	7/8	A572-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T19 11'9-23/32"-9'5-3/4"	None	Flat Bar		A36 (36 ksi)	Flat Bar	6x3/4	A36 (36 ksi)
T20 9'5-3/4"-7'1-13/16"	None	Flat Bar		A36 (36 ksi)	Flat Bar	6x3/4	A36 (36 ksi)
T21 7'1-13/16"-1'2-5/32"	None	Flat Bar		A36 (36 ksi)	Flat Bar	6x3/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation	Redundant Bracing Grade	Redundant Type	Redundant Size	K Factor
ft				
T19 11'9-23/32"-9'5-3/4"	A572-50 (50 ksi)	Horizontal (1)	Solid Round	7/8	1
T20 9'5-3/4"-7'1-13/16"	A572-50 (50 ksi)	Horizontal (1) Diagonal (1)	Solid Round Solid Round	7/8 7/8	1 1

Tower Section Geometry *(cont'd)*

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft^2	in					in	in
T1 311'3-31/32"-310'3-31/32"	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 310'3-31/32"-299'2-1/32"	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3-T9 299'2-1/32"-159'2-1/32"	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 159'2-1/32"-139'2-1/32"	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T11-T16 139'2-1/32"-19'2-1/32"	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T17 19'2-1/32"-14'4-13/16"	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T18	0.00	0.0000	A36	1	1	1	36.0000	36.0000

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft^2	in					in	in
14'4-13/16"-11'9-23/32"			(36 ksi)					
T19 11'9-23/32"-9'5-3/4"	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T20 9'5-3/4"-7'1-13/16"	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T21 7'1-13/16"-1'2-5/32"	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors[1] X Brace Diags X	K Factors[1] X Brace Diags Y	K Factors[1] Single Diags X	K Factors[1] Single Diags Y	K Factors[1] Girts X	K Factors[1] Girts Y	K Factors[1] Horiz. X	K Factors[1] Horiz. Y	K Factors[1] Sec. Horiz. X	K Factors[1] Sec. Horiz. Y	K Factors[1] Inner Brace X	K Factors[1] Inner Brace Y
ft															
T1 311'3-31/32"-310'3-31/32"	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 310'3-31/32"-299'2-1/32"	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3-T9 299'2-1/32"-159'2-1/32"	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T10 159'2-1/32"-139'2-1/32"	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T11-T16 139'2-1/32"-19'2-1/32"	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T17 19'2-1/32"-14'4-13/16"	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T18 14'4-13/16"-11'9-23/32"	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T19 11'9-23/32"-9'5-3/4"	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T20 9'5-3/4"-7'1-13/16"	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T21 7'1-13/16"-1'2-5/32"	No	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 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		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 311'3-31/32"-310'3-31/32"	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75
T2 310'3-31/32"-299'2-1/32"	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75
T3-T9 299'2-1/32"-159'2-1/32"	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75
T10 159'2-1/32"-139'2-1/32"	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75
T11-T16 139'2-1/32"-19'2-1/32"	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75
T17 19'2-1/32"-14'4-13/16"	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75
T18 14'4-13/16"-11'9-23/32"	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75
T19 11'9-23/32"-9'5-3/4"	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75
T20 9'5-3/4"-7'1-13/16"	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75
T21 7'1-13/16"-1'2-5/32"	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 311'3-31/32"-310'3-31/32"	Flange	1.7500 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 310'3-31/32"-299'2-1/32"	Sleeve DS	0.8750 A325N	5	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3-T9 299'2-1/32"-159'2-1/32"	Sleeve DS	0.8750 A325N	5	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T10 159'2-1/32"-139'2-1/32"	Sleeve DS	0.8750 A325N	5	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11-T16 139'2-1/32"-19'2-1/32"	Sleeve DS	0.8750 A325N	5	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T17 19'2-1/32"-14'4-13/16"	Flange	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T18 14'4-13/16"-11'9-23/32"	Flange	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T19 11'9-23/32"-9'5-3/4"	Flange	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T20 9'5-3/4"-7'1-13/16"	Flange	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T21 7'1-13/16"-1'2-5/32"	Flange	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Guy Data

Guy Elevation ft	Guy Grade		Guy Size	Initial Tension lb	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Effciency %
299.802	BS	A	13/16	8000.00	10%	24000	1.390	376'9-27/32"	259'	0.0000	23'	100%
		B	13/16	8000.00	10%	24000	1.390	418'11-1/32"	263'	0.0000	-29'	100%
		C	13/16	8000.00	10%	24000	1.390	382'3-27/32"	259'6"	0.0000	16'	100%
230.177	BS	A	7/8	9200.00	10%	24000	1.610	329'1-29/32"	259'	0.0000	23'	100%
		B	7/8	9200.00	10%	24000	1.610	366'10-29/32	263'	0.0000	-29'	100%
		C	7/8	9200.00	10%	24000	1.610	"	259'6"	0.0000	16'	100%
								333'11-7/8"				
150.177	BS	A	13/16	8000.00	10%	24000	1.390	285'8-3/4"	259'	0.0000	23'	100%
		B	13/16	8000.00	10%	24000	1.390	315'7-5/16"	263'	0.0000	-29'	100%
		C	13/16	8000.00	10%	24000	1.390	289'4-3/16"	259'6"	0.0000	16'	100%
89.1667	BS	A	3/4	6800.00	10%	24000	1.180	264'3-27/32"	259'	0.0000	23'	100%
		B	3/4	6800.00	10%	24000	1.180	285'5-3/4"	263'	0.0000	-29'	100%
		C	3/4	6800.00	10%	24000	1.180	266'7-11/16"	259'6"	0.0000	16'	100%

Guy Data *(cont'd)*

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
299.802	Corner						
230.177	Corner						

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
150.177	Corner						
89.1667	Corner						

Guy Data *(cont'd)*

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
299'9-19/32"	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	
230'2-5/32"	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	
150'2-5/32"	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	
89'2-1/32"	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	

Guy Data *(cont'd)*

Guy Elevation ft	Cable Weight A lb	Cable Weight B lb	Cable Weight C lb	Cable Weight D lb	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
299.802	523.78	582.30	531.42		12'23/32" 6.0 sec/pulse	14'10-3/32" 6.7 sec/pulse	12'4-29/32" 6.1 sec/pulse	
230.177	529.96	590.73	537.73		9'3-27/32" 5.3 sec/pulse	11'6-3/8" 5.9 sec/pulse	9'7-3/32" 5.3 sec/pulse	
150.177	397.17	438.70	402.20		7'1/4" 4.6 sec/pulse	8'6-3/8" 5.0 sec/pulse	7'2-13/32" 4.6 sec/pulse	
89.1667	311.90	336.86	314.63		6'3/8" 4.2 sec/pulse	7'1/8" 4.6 sec/pulse	6'1-11/16" 4.3 sec/pulse	

Guy Data *(cont'd)*

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm K_x	Torque Arm K_y	Pull Off K_x	Pull Off K_y	Diagonal K_x	Diagonal K_y
299.802	No	No			1	1	1	1
230.177	No	No			1	1	1	1
150.177	No	No			1	1	1	1
89.1667	No	No			1	1	1	1

Guy Data *(cont'd)*

Guy Elevation ft	Torque-Arm Bolt Size in	Torque-Arm Number	Torque-Arm Net Width Deduct in	Torque-Arm U	Pull Off Bolt Size in	Pull Off Number	Pull Off Net Width Deduct in	Pull Off U	Diagonal Bolt Size in	Diagonal Number	Diagonal Net Width Deduct in	Diagonal U
299.802	0.6250 A325N	0	0.0000	0.75	0.0000 A325N	0	0.0000	1	0.0000 A325N	0	0.0000	1
230.177	0.6250 A325N	0	0.0000	0.75	0.0000 A325N	0	0.0000	1	0.0000 A325N	0	0.0000	1
150.177	0.6250 A325N	0	0.0000	0.75	0.0000 A325N	0	0.0000	1	0.0000 A325N	0	0.0000	1
89.1667	0.6250 A325N	0	0.0000	0.75	0.0000 A325N	0	0.0000	1	0.0000 A325N	0	0.0000	1

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
299.802	A	161'4-13/16"	26	6	1.2098
	B	135'4-13/16"	25	5	1.1846
	C	157'10-13/16"	26	6	1.2067
230.177	A	126'7-3/32"	24	5	1.1751
	B	100'7-3/32"	23	5	1.1431
	C	123'1-3/32"	24	5	1.1711
150.177	A	86'7-3/32"	22	5	1.1227
	B	60'7-3/32"	19	4	1.0756
	C	83'1-3/32"	21	5	1.1172
89.1667	A	56'31/32"	19	4	1.0657
	B	30'31/32"	16	4	1.0000
	C	52'6-31/32"	19	4	1.0575

Guy-Tensioning Information

Guy Elevation ft		H ft	V ft	Temperature At Time Of Tensioning: 0 F Initial Tension lb	0 F Intercept ft	20 F Initial Tension lb	20 F Intercept ft	40 F Initial Tension lb	40 F Intercept ft	60 F Initial Tension lb	60 F Intercept ft	80 F Initial Tension lb	80 F Intercept ft	100 F Initial Tension lb	100 F Intercept ft	120 F Initial Tension lb	120 F Intercept ft
299.802	A	256.11	276.80	9500	10.19	8990	10.76	8489	11.38	8000	12.06	7524	12.80	7064	13.62	6622	14.50
	B	260.11	328.80	9242	12.89	8820	13.49	8406	14.14	8000	14.84	7603	15.59	7217	16.40	6843	17.27
	C	256.61	283.80	9461	10.52	8964	11.10	8477	11.72	8000	12.41	7536	13.15	7087	13.97	6655	14.85
230.177	A	256.11	207.18	11485	7.49	10704	8.03	9941	8.64	9200	9.32	8487	10.09	7806	10.95	7146	11.95
	B	260.11	259.18	11083	9.60	10441	10.18	9813	10.82	9200	11.53	8607	12.31	8035	13.16	7490	14.10
	C	256.61	214.18	11426	7.75	10665	8.29	9922	8.90	9200	9.59	8504	10.36	7822	11.25	7195	12.21
150.177	A	256.11	127.18	10646	5.29	9737	5.78	8853	6.35	8000	7.02	7189	7.81	6431	8.72	5737	9.76
	B	260.11	179.18	10217	6.70	9457	7.23	8717	7.84	8000	8.53	7313	9.32	6663	10.21	6056	11.22
	C	256.61	134.18	10587	5.45	9699	5.95	8834	6.52	8000	7.20	7206	7.98	6462	8.89	5780	9.92
89.1667	A	256.11	66.17	9452	4.35	8539	4.81	7652	5.36	6800	6.03	5998	6.84	5261	7.79	4605	8.89
	B	260.11	118.17	9127	5.23	8327	5.73	7549	6.32	6800	7.01	6090	7.82	5429	8.76	4829	9.83
	C	256.61	73.17	9414	4.44	8514	4.90	7640	5.46	6800	6.14	6008	6.94	5280	7.89	4630	8.99

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
LDF7-50A (1-5/8 FOAM) (1-12)	B	Yes	Ar (CfAe)	112'1/8" - 1'2-5/32"	0.0000	-0.45	12	6	0.5000	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (15)	B	Yes	Ar (CfAe)	145'1/8" - 1'2-5/32"	0.0000	0.4	1	1	0.5000	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (16-23)	B	Yes	Ar (CfAe)	160'1/8" - 1'2-5/32"	0.0000	0.45	8	4	0.5000	1.9800		0.82
1/4 Coax (24)	B	Yes	Ar (CfAe)	160'1/8" - 1'2-5/32"	4.7100	0.43	1	1	0.5000	0.2500		0.10
LDF7-50A (1-5/8 FOAM) (25-28)	C	Yes	Ar (CfAe)	128'1/8" - 1'2-5/32"	0.0000	-0.45	5	5	0.5000	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (29)	C	Yes	Ar (CfAe)	251'9-1/8" - 128'1/8"	0.0000	-0.43	1	1	0.5000	1.9800		0.82
3/8" coax (30)	C	Yes	Ar (CfAe)	251'9-1/8" - 1'2-5/32"	0.0000	-0.39	1	1	0.5000	0.3750		0.07
EW71 (31)	C	Yes	Ar (CfAe)	196'1/8" - 1'2-5/32"	0.0000	-0.25	1	1	0.5000	1.1313	4.0779	0.45
LDF7-50A (1-5/8 FOAM) (32)	C	Yes	Ar (CfAe)	180'1/8" - 1'2-5/32"	0.0000	-0.2	1	1	0.5000	1.9800		0.82
1" Metal Conduit (33)	C	Yes	Ar (CfAe)	310'1/8" - 1'2-5/32"	0.0000	0	1	1	0.5000	1.0000		1.13
LDF7-50A (1-5/8 FOAM) (34-37)	C	Yes	Ar (CfAe)	128'1/8" - 1'2-5/32"	0.0000	0.25	4	4	0.5000	1.9800		0.82
LDF5-50A (7/8 FOAM) (38)	C	Yes	Ar (CfAe)	268'1/8" - 1'2-5/32"	0.0000	0.3	1	1	0.5000	1.0900		0.33
LDF4-50A (1/2 FOAM) (39)	C	Yes	Ar (CfAe)	164'5-5/32" - 1'2-5/32"	0.0000	0.45	2	2	0.5000	0.6300		0.15
LDF4-50A (1/2 FOAM) (40)	C	Yes	Ar (CfAe)	203'1/8" - 164'5-5/32"	0.0000	0.45	1	1	0.5000	0.6300		0.15
LDF4-50A (1/2 FOAM) (41)	C	Yes	Ar (CfAe)	21'1/8" - 1'2-5/32"	0.0000	0.5	1	1	0.5000	0.6300		0.15
1/4 Coax (42)	A	Yes	Ar (CfAe)	136'6-1/8" - 1'2-5/32"	0.0000	-0.48	1	1	0.5000	0.2500		0.10
1/8" coax (43)	A	Yes	Ar (CfAe)	141'6-1/8" - 1'2-5/32"	0.0000	-0.47	1	1	0.5000	0.1250		0.03
LDF5-50A (7/8 FOAM) (44)	A	Yes	Ar (CfAe)	135'1/8" - 1'2-5/32"	0.0000	-0.45	1	1	0.5000	1.0900		0.33
3/8" coax (45)	A	Yes	Ar (CfAe)	136'6-1/8" - 1'2-5/32"	1.2500	-0.45	3	3	0.5000	0.3750		0.07
3/8" coax (46-47)	A	Yes	Ar (CfAe)	225'6-1/8" - 136'6-1/8"	1.2500	-0.45	2	2	0.5000	0.3750		0.07
HJ8-50B (3 AIR) (48)	A	Yes	Ar (CfAe)	311'3-31/32" - 1'2-5/32"	0.0000	-0.4	1	1	0.5000	3.0100		1.78
LDF7-50A (1-5/8 FOAM) (49-54)	A	Yes	Ar (CfAe)	120'6-1/8" - 1'2-5/32"	0.0000	0.4	6	6	0.5000	1.9800		0.82
3/8" coax (55)	A	Yes	Ar (CfAe)	48'1/8" - 1'2-5/32"	1.2500	0.35	1	1	0.5000	0.3750		0.07

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
HJ8-50B (3 AIR) (56)	A	Yes	Ar (CfAe)	297'6-1/8" - 1'2-5/32"	0.0000	0.48	1	1	0.5000	3.0100		1.78
LDF5-50A (7/8 FOAM) (57)	A	Yes	Ar (CfAe)	243'1/8" - 1'2-5/32"	-1.0000	-0.45	1	1	0.5000	1.0900		0.33
1/4 Coax (58-59)	C	Yes	Ar (CfAe)	232'1/8" - 1'2-5/32"	-1.0000	0.45	2	2	0.5000	0.2500		0.10
3/8" coax (60)	A	Yes	Ar (CfAe)	232'1/8" - 1'2-5/32"	-1.0000	-0.45	1	1	0.5000	0.3750		0.07
LDF5-50A (7/8 FOAM) (61)	C	Yes	Ar (CfAe)	243'1/8" - 1'2-5/32"	-2.0000	0.5	1	1	0.5000	1.0900		0.33
LDF7-50A (1-5/8 FOAM) (63)	C	Yes	Ar (CfAe)	165'1/8" - 1'2-5/32"	-2.0000	0.5	2	2	0.5000	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (62)	C	Yes	Ar (CfAe)	220'1/8" - 165'1/8"	-2.0000	0.5	1	1	0.5000	1.9800		0.82
*****												
Safety Line 3/8	A	Yes	Ar (CfAe)	311'3-31/32" - 1'2-5/32"	0.0000	0	1	1	0.5000	0.3750		0.22
Ladder Steps	A	Yes	Ar (CfAe)	311'3-31/32" - 1'2-5/32"	0.0000	0	1	1	0.0000	1.6700		3.90
*****												
1/8" coax	A	Yes	Ar (CfAe)	311'3-31/32" - 1'2-5/32"	3.0000	0.5	1	1	0.2500	0.1250		0.03
1/8" coax	B	Yes	Ar (CfAe)	311'3-31/32" - 1'2-5/32"	3.0000	0.5	1	1	0.2500	0.1250		0.03
1/8" coax	C	Yes	Ar (CfAe)	311'3-31/32" - 1'2-5/32"	3.0000	0.5	1	1	0.2500	0.1250		0.03

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	311'3-31/32"-310' 3-31/32"	A	0.432	0.000	0.000	0.000	5.94
		B	0.010	0.000	0.000	0.000	0.03
		C	0.010	0.000	0.000	0.000	0.03
T2	310'3-31/32"-299' 2-1/32"	A	4.820	0.000	0.000	0.000	66.29
		B	0.116	0.000	0.000	0.000	0.35
		C	1.020	0.000	0.000	0.000	12.60
T3	299'2-1/32"-279'2-1/32"	A	13.235	0.000	0.000	0.000	151.37
		B	0.208	0.000	0.000	0.000	0.62
		C	1.875	0.000	0.000	0.000	23.22
T4	279'2-1/32"-259'2-1/32"	A	13.650	0.000	0.000	0.000	154.32
		B	0.208	0.000	0.000	0.000	0.62
		C	2.678	0.000	0.000	0.000	26.14
T5	259'2-1/32"-239'2-1/32"	A	13.999	0.000	0.000	0.000	155.59
		B	0.208	0.000	0.000	0.000	0.62
		C	6.512	0.000	0.000	0.000	42.36
T6	239'2-1/32"-219'2-1/32"	A	16.265	0.000	0.000	0.000	162.83
		B	0.208	0.000	0.000	0.000	0.62
		C	10.108	0.000	0.000	0.000	57.58
T7	219'2-1/32"-199'2-1/32"	A	17.342	0.000	0.000	0.000	165.42
		B	0.208	0.000	0.000	0.000	0.62

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
		C	13.768	0.000	0.000	0.000	75.30
T8	199'2-1/32"-179'2-1/32"	A	17.342	0.000	0.000	0.000	165.42
		B	0.208	0.000	0.000	0.000	0.62
		C	14.756	1.588	0.000	0.000	85.99
T9	179'2-1/32"-159'2-1/32"	A	17.342	0.000	0.000	0.000	165.42
		B	0.783	0.000	0.000	0.000	6.24
		C	19.157	1.886	0.000	0.000	108.70
T10	159'2-1/32"-139'2-1/32"	A	17.366	0.000	0.000	0.000	165.49
		B	14.789	0.000	0.000	0.000	138.61
		C	22.267	1.886	0.000	0.000	122.52
T11	139'2-1/32"-119'2-1/32"	A	21.223	0.000	0.000	0.000	180.91
		B	17.125	0.000	0.000	0.000	150.22
		C	33.940	1.886	0.000	0.000	180.54
T12	119'2-1/32"-99'2-1/32"	A	40.208	0.000	0.000	0.000	274.54
		B	29.840	0.000	0.000	0.000	276.60
		C	48.667	1.886	0.000	0.000	253.72
T13	99'2-1/32"-79'2-1/32"	A	40.208	0.000	0.000	0.000	274.54
		B	36.925	0.000	0.000	0.000	347.02
		C	48.667	1.886	0.000	0.000	253.72
T14	79'2-1/32"-59'2-1/32"	A	40.208	0.000	0.000	0.000	274.54
		B	36.925	0.000	0.000	0.000	347.02
		C	48.667	1.886	0.000	0.000	253.72
T15	59'2-1/32"-39'2-1/32"	A	40.485	0.000	0.000	0.000	275.20
		B	36.925	0.000	0.000	0.000	347.02
		C	48.667	1.886	0.000	0.000	253.72
T16	39'2-1/32"-19'2-1/32"	A	40.833	0.000	0.000	0.000	276.04
		B	36.925	0.000	0.000	0.000	347.02
		C	48.763	1.886	0.000	0.000	254.00
T17	19'2-1/32"-14'4-13/16"	A	9.740	0.000	0.000	0.000	65.85
		B	8.808	0.000	0.000	0.000	82.78
		C	11.859	0.450	0.000	0.000	61.24
T18	14'4-13/16"-11'9-2 3/32"	A	5.274	0.000	0.000	0.000	35.66
		B	4.769	0.000	0.000	0.000	44.82
		C	6.422	0.244	0.000	0.000	33.16
T19	11'9-23/32"-9'5-3/4"	A	4.764	0.000	0.000	0.000	32.20
		B	4.308	0.000	0.000	0.000	40.49
		C	5.800	0.220	0.000	0.000	29.95
T20	9'5-3/4"-7'1-13/16"	A	4.764	0.000	0.000	0.000	32.20
		B	4.308	0.000	0.000	0.000	40.49
		C	5.800	0.220	0.000	0.000	29.95
T21	7'1-13/16"-1'2-5/32"	A	12.186	0.000	0.000	0.000	82.38
		B	11.020	0.000	0.000	0.000	103.56
		C	14.837	0.563	0.000	0.000	76.61

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	311'3-31/32"-310'3-31/32"	A	1.309	1.304	0.000	0.000	0.000	22.59
		B		0.229	0.000	0.000	0.000	2.32
		C		0.229	0.000	0.000	0.000	2.32
T2	310'3-31/32"-299'2-1/32"	A	1.306	14.541	0.000	0.000	0.000	251.60
		B		2.546	0.000	0.000	0.000	25.83
		C		5.810	0.000	0.000	0.000	77.97
T3	299'2-1/32"-279'2-1/32"	A	1.298	34.502	0.000	0.000	0.000	605.41
		B		4.533	0.000	0.000	0.000	45.72
		C		10.525	0.000	0.000	0.000	141.16

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
T4	279'2-1/32"-259'2-1/32"	A	1.286	35.090	0.000	0.000	0.000	613.94
		B		4.496	0.000	0.000	0.000	44.99
		C		13.151	0.000	0.000	0.000	175.40
T5	259'2-1/32"-239'2-1/32"	A	1.275	36.058	0.000	0.000	0.000	623.27
		B		4.457	0.000	0.000	0.000	44.21
		C		25.425	0.000	0.000	0.000	340.75
T6	239'2-1/32"-219'2-1/32"	A	1.262	45.338	0.463	0.000	0.000	736.78
		B		4.414	0.000	0.000	0.000	43.38
		C		37.955	0.803	0.000	0.000	509.81
T7	219'2-1/32"-199'2-1/32"	A	1.248	49.998	1.458	0.000	0.000	794.46
		B		4.369	0.000	0.000	0.000	42.49
		C		47.433	1.250	0.000	0.000	647.04
T8	199'2-1/32"-179'2-1/32"	A	1.233	49.599	1.458	0.000	0.000	783.34
		B		4.319	0.000	0.000	0.000	41.54
		C		51.506	5.146	0.000	0.000	767.28
T9	179'2-1/32"-159'2-1/32"	A	1.217	49.161	1.458	0.000	0.000	771.22
		B		4.763	0.523	0.000	0.000	65.32
		C		58.056	7.542	0.000	0.000	904.33
T10	159'2-1/32"-139'2-1/32"	A	1.198	49.168	1.458	0.000	0.000	762.51
		B		18.041	12.400	0.000	0.000	653.63
		C		57.448	11.815	0.000	0.000	960.96
T11	139'2-1/32"-119'2-1/32"	A	1.178	61.064	4.112	0.000	0.000	924.93
		B		22.931	12.400	0.000	0.000	721.01
		C		59.959	24.564	0.000	0.000	1223.25
T12	119'2-1/32"-99'2-1/32"	A	1.154	68.634	23.583	0.000	0.000	1374.06
		B		27.207	25.672	0.000	0.000	1195.85
		C		63.127	40.651	0.000	0.000	1547.93
T13	99'2-1/32"-79'2-1/32"	A	1.127	67.526	23.583	0.000	0.000	1340.32
		B		29.303	33.067	0.000	0.000	1444.15
		C		62.112	40.589	0.000	0.000	1510.41
T14	79'2-1/32"-59'2-1/32"	A	1.093	66.173	23.583	0.000	0.000	1299.73
		B		28.739	33.067	0.000	0.000	1416.71
		C		60.872	40.514	0.000	0.000	1465.21
T15	59'2-1/32"-39'2-1/32"	A	1.049	66.241	23.583	0.000	0.000	1264.90
		B		28.008	33.067	0.000	0.000	1381.55
		C		59.264	40.417	0.000	0.000	1407.61
T16	39'2-1/32"-19'2-1/32"	A	1.000	66.417	23.583	0.000	0.000	1226.82
		B		27.192	33.067	0.000	0.000	1342.82
		C		57.871	40.308	0.000	0.000	1348.56
T17	19'2-1/32"-14'4-13/16"	A	1.000	15.843	5.626	0.000	0.000	292.65
		B		6.486	7.888	0.000	0.000	320.32
		C		14.754	9.615	0.000	0.000	330.96
T18	14'4-13/16"-11'9-2 3/32"	A	1.000	8.579	3.046	0.000	0.000	158.46
		B		3.512	4.271	0.000	0.000	173.45
		C		7.989	5.206	0.000	0.000	179.21
T19	11'9-23/32"-9'5-3/4"	A	1.000	7.749	2.751	0.000	0.000	143.13
		B		3.172	3.858	0.000	0.000	156.66
		C		7.216	4.703	0.000	0.000	161.87
T20	9'5-3/4"-7'1-13/16"	A	1.000	7.749	2.751	0.000	0.000	143.13
		B		3.172	3.858	0.000	0.000	156.66
		C		7.216	4.703	0.000	0.000	161.87
T21	7'1-13/16"-1'2-5/32"	A	1.000	19.821	7.038	0.000	0.000	366.13
		B		8.115	9.868	0.000	0.000	400.75
		C		18.458	12.029	0.000	0.000	414.06

Feed Line Shielding

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
T1	311'3-31/32"-310'3-31/32"	A	0.000	0.284	0.216	0.652
		B	0.000	0.050	0.005	0.114
		C	0.000	0.050	0.005	0.114
T2	310'3-31/32"-299'2-1/32"	A	0.377	4.283	0.000	0.000
		B	0.009	0.750	0.000	0.000
		C	0.080	1.711	0.000	0.000
T3	299'2-1/32"-279'2-1/32"	A	1.017	10.358	0.000	0.000
		B	0.016	1.361	0.000	0.000
		C	0.144	3.160	0.000	0.000
T4	279'2-1/32"-259'2-1/32"	A	1.049	10.468	0.000	0.000
		B	0.016	1.341	0.000	0.000
		C	0.206	3.923	0.000	0.000
T5	259'2-1/32"-239'2-1/32"	A	1.076	10.683	0.000	0.000
		B	0.016	1.320	0.000	0.000
		C	0.501	7.533	0.000	0.000
T6	239'2-1/32"-219'2-1/32"	A	1.250	13.469	0.000	0.000
		B	0.016	1.298	0.000	0.000
		C	0.777	11.398	0.000	0.000
T7	219'2-1/32"-199'2-1/32"	A	1.333	15.011	0.000	0.000
		B	0.016	1.274	0.000	0.000
		C	1.058	14.201	0.000	0.000
T8	199'2-1/32"-179'2-1/32"	A	1.333	14.763	0.000	0.000
		B	0.016	1.249	0.000	0.000
		C	1.256	16.714	0.000	0.000
T9	179'2-1/32"-159'2-1/32"	A	1.333	14.493	0.000	0.000
		B	0.060	1.513	0.000	0.000
		C	1.618	19.168	0.000	0.000
T10	159'2-1/32"-139'2-1/32"	A	1.549	14.960	0.000	0.000
		B	1.319	8.995	0.000	0.000
		C	2.154	20.860	0.000	0.000
T11	139'2-1/32"-119'2-1/32"	A	1.631	18.225	0.000	0.000
		B	1.316	9.880	0.000	0.000
		C	2.754	24.002	0.000	0.000
T12	119'2-1/32"-99'2-1/32"	A	3.091	25.414	0.000	0.000
		B	2.294	14.573	0.000	0.000
		C	3.886	28.953	0.000	0.000
T13	99'2-1/32"-79'2-1/32'	A	3.091	24.674	0.000	0.000
		B	2.839	16.891	0.000	0.000
		C	3.886	28.152	0.000	0.000
T14	79'2-1/32"-59'2-1/32'	A	3.091	23.785	0.000	0.000
		B	2.839	16.378	0.000	0.000
		C	3.886	27.189	0.000	0.000
T15	59'2-1/32"-39'2-1/32'	A	3.112	23.125	0.000	0.000
		B	2.839	15.724	0.000	0.000
		C	3.886	25.962	0.000	0.000
T16	39'2-1/32"-19'2-1/32'	A	3.139	22.411	0.000	0.000
		B	2.839	15.005	0.000	0.000
		C	3.894	24.724	0.000	0.000
T17	19'2-1/32"-14'4-13/16"	A	1.111	7.251	0.000	0.000
		B	1.004	4.855	0.000	0.000
		C	1.404	8.320	0.000	0.000
T18	14'4-13/16"-11'9-23/32"	A	0.532	3.611	0.000	0.000
		B	0.481	2.417	0.000	0.000
		C	0.672	4.143	0.000	0.000
T19	11'9-23/32"-9'5-3/4"	A	0.440	3.495	1.021	2.250
		B	0.398	2.340	0.923	1.506
		C	0.556	4.011	1.290	2.582
T20	9'5-3/4"-7'1-13/16"	A	0.643	4.970	1.021	2.250
		B	0.582	3.328	0.923	1.506
		C	0.813	5.703	1.290	2.582
T21	7'1-13/16"-1'2-5/32"	A	1.315	9.420	2.229	5.299

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
		B	1.189	6.307	2.015	3.548
		C	1.661	10.809	2.816	6.080

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	311'3-31/32"-310'3-31/32"	-0.5573	0.0751	-0.4748	-0.0020
T2	310'3-31/32"-299'2-1/32"	-3.0149	0.8517	-1.9145	0.4327
T3	299'2-1/32"-279'2-1/32"	-2.9587	-1.4803	-1.8795	-0.7606
T4	279'2-1/32"-259'2-1/32"	-3.1246	-1.4535	-2.0589	-0.6660
T5	259'2-1/32"-239'2-1/32"	-2.6176	-0.3816	-1.7027	0.2689
T6	239'2-1/32"-219'2-1/32"	-3.5283	0.8085	-2.4229	1.2069
T7	219'2-1/32"-199'2-1/32"	-4.9779	1.5764	-3.2166	1.6072
T8	199'2-1/32"-179'2-1/32"	-4.8019	2.0525	-3.3384	2.0350
T9	179'2-1/32"-159'2-1/32"	-4.2755	2.9018	-2.5804	2.2892
T10	159'2-1/32"-139'2-1/32"	-0.5464	4.3064	-0.2703	2.2128
T11	139'2-1/32"-119'2-1/32"	-0.0469	5.6957	-0.9056	3.0559
T12	119'2-1/32"-99'2-1/32"	0.2363	0.2562	-0.9003	1.0138
T13	99'2-1/32"-79'2-1/32'	0.3594	-1.0309	-0.8221	0.4906
T14	79'2-1/32"-59'2-1/32'	0.3594	-1.0309	-0.8118	0.4694
T15	59'2-1/32"-39'2-1/32'	0.3502	-1.0707	-0.8184	0.3179
T16	39'2-1/32"-19'2-1/32'	0.3228	-1.1109	-0.8548	0.1510
T17	19'2-1/32"-14'4-13/16"	0.1551	-0.9420	-0.9015	0.1951
T18	14'4-13/16"-11'9-23/32"	0.1593	-0.9672	-0.9727	0.2329
T19	11'9-23/32"-9'5-3/4"	0.1062	-0.6452	-0.3837	-0.0945
T20	9'5-3/4"-7'1-13/16"	0.0996	-0.6047	-0.0201	-0.3093
T21	7'1-13/16"-1'2-5/32"	0.0747	-0.2543	-0.4472	-0.1525

Force Couples At Top Of Tower *35' Pipe Mast*

Description	Shear	Vertical	Moment	Torque
	lb	lb	lb-ft	lb-ft
No Ice	2094.00	1873.00	40125.00	1049.00
With Ice	860.00	3199.00	16814.00	270.00

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft / ft / ft	°	ft		ft^2	ft^2	lb
1-ft Side Arm	C	From Leg	5.00 0' 0'	-90.0000	21'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.08 0.12 0.17 0.25 0.41	0.35 0.53 0.70 1.05 1.75	8.00 12.00 20.00 35.00 50.00
4.5-ft Yagi (Ant 1)	C	From Leg	1.00 0' 0'	-90.0000	21'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.50 2.22 2.94 4.38 7.26	1.50 2.22 2.94 4.38 7.26	37.00 44.00 51.00 65.00 93.00
*****									
1" dia. x 16" Pipe	C	From Leg	1.00 0' 0'	30.0000	48'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.11 0.20 0.30 0.56 1.20	0.11 0.20 0.30 0.56 1.20	1.51 2.83 5.22 13.83 50.58
GPS (Ant 2)	C	From Leg	1.00 0' 0'	0.0000	48'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.62 0.73 0.85 1.11 1.73	0.62 0.73 0.85 1.11 1.73	15.00 22.03 30.81 54.41 131.15
*****									
Sector Mount [SM 409-3]	C	None		0.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	22.47 31.99 41.51 60.55 98.63	22.47 31.99 41.51 60.55 98.63	1034.77 1500.50 1966.23 2897.69 4760.61
(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe (Ant 3-11)	B	From Leg	4.00 0' 1'	65.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.30 7.48 8.37 10.18 14.02	74.05 136.21 210.28 384.86 874.17
(2) SBNH-1D6565C w/ Mount Pipe (Ant 3-11)	C	From Leg	4.00 0' 1'	65.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.69 12.42 13.16 14.63 17.92	9.85 11.38 12.94 15.31 20.19	99.25 185.39 286.69 522.51 1168.58
(2) SBNH-1D6565C w/ Mount Pipe (Ant 3-11)	A	From Leg	4.00 0' 1'	75.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.69 12.42 13.16 14.63 17.92	9.85 11.38 12.94 15.31 20.19	99.25 185.39 286.69 522.51 1168.58
800 10121 w/ Mount Pipe (Ant 3-11)	A	From Leg	4.00 -3' 1'	75.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice	5.69 6.18 6.68 7.70	4.60 5.35 6.05 7.53	66.50 111.78 166.59 297.73

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft / ft / ft	°	ft		ft^2	ft^2	lb
						4" Ice	9.86	10.83	675.20
800 10121 w/ Mount Pipe (Ant 3-11)	B	From Leg	4.00 -3' 1'	65.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.69 6.18 6.68 7.70 9.86	4.60 5.35 6.05 7.53 10.83	66.50 111.78 166.59 297.73 675.20
800 10121 w/ Mount Pipe (Ant 3-11)	C	From Leg	4.00 -3' 1'	65.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.69 6.18 6.68 7.70 9.86	4.60 5.35 6.05 7.53 10.83	66.50 111.78 166.59 297.73 675.20
(2) DTMA (TMA) (Ant 3-11)	A	From Leg	3.75 0' 1'	75.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.71 0.83 0.97 1.26 1.95	0.41 0.52 0.64 0.90 1.54	14.30 19.33 25.98 44.90 110.65
(2) DTMA (TMA) (Ant 3-11)	B	From Leg	3.75 0' 1'	65.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.71 0.83 0.97 1.26 1.95	0.41 0.52 0.64 0.90 1.54	14.30 19.33 25.98 44.90 110.65
(2) DTMA (TMA) (Ant 3-11)	C	From Leg	3.75 0' 1'	65.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.71 0.83 0.97 1.26 1.95	0.41 0.52 0.64 0.90 1.54	14.30 19.33 25.98 44.90 110.65
(2) RRUS-11 (Ant 3-11)	A	From Leg	3.75 -3' 1'	75.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	47.62 68.42 92.25 149.81 309.89
(2) RRUS-11 (Ant 3-11)	B	From Leg	3.75 -3' 1'	65.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	47.62 68.42 92.25 149.81 309.89
(2) RRUS-11 (Ant 3-11)	C	From Leg	3.75 -3' 1'	65.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	47.62 68.42 92.25 149.81 309.89
2.4" Dia. x 5-ft Pipe	A	From Leg	4.00 3' 1'	0.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.20 1.50 1.81 2.47 3.93	1.20 1.50 1.81 2.47 3.93	18.30 27.45 40.05 76.23 196.71
2.4" Dia. x 5-ft Pipe	B	From Leg	4.00 3' 1'	0.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.20 1.50 1.81 2.47 3.93	1.20 1.50 1.81 2.47 3.93	18.30 27.45 40.05 76.23 196.71
2.4" Dia. x 5-ft Pipe	C	From Leg	4.00 3' 1'	0.0000	111'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.20 1.50 1.81 2.47 3.93	1.20 1.50 1.81 2.47 3.93	18.30 27.45 40.05 76.23 196.71
*****									

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
APXV18-206517S w/ Mount Pipe (Ant 12-14)	A	From Leg	0.50 0' 0'	0.0000	120'6-1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.17 5.62 6.08 7.02 9.12	4.46 5.39 6.20 7.87 11.40	54.40 94.46 145.15 270.63 648.84
APXV18-206517S w/ Mount Pipe (Ant 12-14)	B	From Leg	0.50 0' 0'	0.0000	120'6-1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.17 5.62 6.08 7.02 9.12	4.46 5.39 6.20 7.87 11.40	54.40 94.46 145.15 270.63 648.84
APXV18-206517S w/ Mount Pipe (Ant 12-14)	C	From Leg	0.50 0' 0'	0.0000	120'6-1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.17 5.62 6.08 7.02 9.12	4.46 5.39 6.20 7.87 11.40	54.40 94.46 145.15 270.63 648.84
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Sector Mount [SM 411-3]	C	None		0.0000	128'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	21.88 30.68 39.48 57.08 92.28	21.88 30.68 39.48 57.08 92.28	1069.05 1484.97 1900.89 2732.73 4396.41
SLCP 2x6015 w/ Mount Pipe	A	From Leg	2.25 0' 0'	40.0000	128'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.62 11.27 11.91 13.22 15.94	9.90 11.20 12.22 14.29 18.65	55.55 141.93 241.01 468.01 1071.73
SLCP 2x6015 w/ Mount Pipe	B	From Leg	2.25 0' 0'	40.0000	128'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.62 11.27 11.91 13.22 15.94	9.90 11.20 12.22 14.29 18.65	55.55 141.93 241.01 468.01 1071.73
SC-E 6014-DIN w/mount pipe	A	From Leg	2.25 0' 0'	40.0000	128'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.13 4.67 5.16 6.19 8.39	4.77 5.60 6.32 7.80 10.97	36.90 77.52 127.31 246.63 595.06
SC-E 6014-DIN w/mount pipe	B	From Leg	2.25 0' 0'	40.0000	128'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.13 4.67 5.16 6.19 8.39	4.77 5.60 6.32 7.80 10.97	36.90 77.52 127.31 246.63 595.06
(2) SC-E 6014-DIN w/mount pipe	C	From Leg	2.25 0' 0'	40.0000	128'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.13 4.67 5.16 6.19 8.39	4.77 5.60 6.32 7.80 10.97	36.90 77.52 127.31 246.63 595.06
SACP 2x5516 w/ Mount Pipe	A	From Leg	2.25 0' 0'	40.0000	128'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.52 6.02 6.53 7.56 9.74	5.02 5.81 6.53 8.08 11.48	36.68 83.22 139.50 274.00 660.34
SACP 2x5516 w/ Mount Pipe	B	From Leg	2.25 0' 0'	40.0000	128'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.52 6.02 6.53 7.56 9.74	5.02 5.81 6.53 8.08 11.48	36.68 83.22 139.50 274.00 660.34
FD9R6004/2C-3L	A	From Leg	2.25	40.0000	128'1/8"	No Ice	0.37	0.08	3.10

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
			0' 0'			1/2" Ice 1" Ice 2" Ice 4" Ice	0.45 0.54 0.75 1.28	0.14 0.20 0.34 0.74	5.40 8.79 19.61 62.87
FD9R6004/2C-3L	B	From Leg	2.25 0' 0'	40.0000	128'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.37 0.45 0.54 0.75 1.28	0.08 0.14 0.20 0.34 0.74	3.10 5.40 8.79 19.61 62.87
(2) FD9R6004/2C-3L	C	From Leg	2.25 0' 0'	40.0000	128'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.37 0.45 0.54 0.75 1.28	0.08 0.14 0.20 0.34 0.74	3.10 5.40 8.79 19.61 62.87
*****									
30" Sidearm Mount	B	From Leg	1.25 0' 0'	0.0000	145'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.35 0.48 0.61 0.87 1.39	1.79 2.65 3.51 5.23 8.66	22.53 32.24 41.96 61.40 100.27
12-ft x 1" Omni (Ant 23)	B	From Leg	2.50 0' 6'	0.0000	145'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.20 2.42 3.65 6.17 9.69	1.20 2.42 3.65 6.17 9.69	15.00 26.10 44.78 105.51 324.71
*****									
2.4" Dia x 4-ft Mount Pipe (Ant 24)	A	From Leg	0.50 0' 0'	0.0000	146'6-1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.87 1.12 1.37 1.91 3.24	0.87 1.12 1.37 1.91 3.24	14.64 22.02 32.24 61.82 161.77
12"x4.5"x6.25" TMA (Ant 24)	A	From Leg	0.25 0' 0'	0.0000	146'6-1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.53 0.64 0.76 1.02 1.66	0.73 0.85 0.98 1.27 1.95	15.00 20.86 28.39 49.24 119.51
*****									
Sector Mount [SM 408-3]	C	None		0.0000	160'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	22.45 33.50 44.55 66.65 110.85	22.45 33.50 44.55 66.65 110.85	1019.41 1474.67 1929.93 2840.45 4661.49
APX16PV-16PVL w/ Mount Pipe	A	From Leg	2.50 -8' 0'	0.0000	160'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.02 7.59 8.12 9.23 11.58	3.41 4.23 4.93 6.38 9.48	61.50 106.01 160.30 290.48 668.01
APX16PV-16PVL w/ Mount Pipe	C	From Leg	2.50 -8' 0'	0.0000	160'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.02 7.59 8.12 9.23 11.58	3.41 4.23 4.93 6.38 9.48	61.50 106.01 160.30 290.48 668.01
TMA 11"x7"x4"	A	From Leg	2.25 -8' 0'	0.0000	160'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.75 0.87 1.00 1.28 1.96	0.43 0.53 0.64 0.89 1.48	15.00 20.57 27.77 47.80 115.85

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
TMA 11"x7"x4"	C	From Leg	2.25 -8' 0'	0.0000	160'1/8"	No Ice	0.75	0.43	15.00
						1/2" Ice	0.87	0.53	20.57
						1" Ice	1.00	0.64	27.77
						2" Ice	1.28	0.89	47.80
						4" Ice	1.96	1.48	115.85
(2) 2.4" x 7-ft Pipe	A	From Leg	2.25 4' 0'	0.0000	160'1/8"	No Ice	1.66	1.66	43.92
						1/2" Ice	2.39	2.39	56.50
						1" Ice	2.83	2.83	73.76
						2" Ice	3.71	3.71	122.89
						4" Ice	5.58	5.58	283.92
(3) 2.4" x 7-ft Pipe	B	From Leg	2.25 0' 0'	0.0000	160'1/8"	No Ice	1.66	1.66	43.92
						1/2" Ice	2.39	2.39	56.50
						1" Ice	2.83	2.83	73.76
						2" Ice	3.71	3.71	122.89
						4" Ice	5.58	5.58	283.92
(2) 2.4" x 7-ft Pipe	C	From Leg	2.25 4' 0'	0.0000	160'1/8"	No Ice	1.66	1.66	43.92
						1/2" Ice	2.39	2.39	56.50
						1" Ice	2.83	2.83	73.76
						2" Ice	3.71	3.71	122.89
						4" Ice	5.58	5.58	283.92
*****									
2.4" Dia. x 10-ft Mount Pipe	C	From Leg	0.50 0' 0'	0.0000	164'6-1/8"	No Ice	2.38	2.38	36.60
						1/2" Ice	3.40	3.40	54.45
						1" Ice	4.45	4.45	78.81
						2" Ice	5.91	5.91	147.64
						4" Ice	8.47	8.47	370.06
6812 (Ant 27)	C	From Leg	1.00 0' 0'	0.0000	164'6-1/8"	No Ice	0.20	0.20	3.00
						1/2" Ice	0.36	0.36	3.90
						1" Ice	0.52	0.52	4.80
						2" Ice	0.84	0.84	6.60
						4" Ice	1.48	1.48	10.20
*****									
36" Standoff	A	From Leg	1.50 0' 0'	15.0000	165'1/8"	No Ice	0.72	2.08	38.53
						1/2" Ice	0.94	2.88	57.77
						1" Ice	1.16	3.67	77.02
						2" Ice	1.59	5.26	115.51
						4" Ice	2.45	8.44	192.49
BCD-80010 (Ant 28)	A	From Leg	3.00 0' 6'	0.0000	165'1/8"	No Ice	2.95	2.95	26.50
						1/2" Ice	4.11	4.11	48.29
						1" Ice	5.29	5.29	77.42
						2" Ice	7.16	7.16	158.32
						4" Ice	10.03	10.03	414.92
*****									
2.4"x25' Mt. Pipe	B	From Leg	0.50 0' 0'	0.0000	180'1/8"	No Ice	5.95	5.95	91.50
						1/2" Ice	8.48	8.48	135.77
						1" Ice	11.02	11.02	195.71
						2" Ice	16.16	16.16	363.20
						4" Ice	26.64	26.64	892.90
(6) 601417	B	From Leg	1.00 0' 0'	35.0000	192'6-1/8" - 167'6-1/8"	No Ice	7.30	2.65	50.00
						1/2" Ice	7.68	2.96	89.69
						1" Ice	8.07	3.27	133.81
						2" Ice	8.88	3.92	236.08
						4" Ice	10.60	5.32	502.28
*****									
4.5" Dia x 6' Dish Mount (Ant 30)	B	From Leg	1.00 0' 0'	0.0000	196'1/8"	No Ice	2.25	2.25	64.80
						1/2" Ice	2.62	2.62	83.90
						1" Ice	3.00	3.00	107.27

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
						2" Ice	3.78	3.78	167.45
						4" Ice	5.56	5.56	345.85
T.S. 3"x3"x6.5' (Ant 30)	C	From Face	0.00 -1'6" 0'	0.0000	196'1/8"	No Ice	3.25	3.25	57.07
						1/2" Ice	3.77	3.77	75.28
						1" Ice	4.24	4.24	99.13
						2" Ice	5.21	5.21	164.53
						4" Ice	7.23	7.23	371.55
2.4" Dia. x 6.5' Mount Pipe (Ant 30)	B	From Face	0.00 0' 0'	0.0000	196'1/8"	No Ice	1.54	1.54	23.73
						1/2" Ice	2.16	2.16	38.31
						1" Ice	2.58	2.58	58.57
						2" Ice	3.47	3.47	107.37
						4" Ice	5.49	5.49	269.57
*****									
Side Arm Mount [SO 306-1]	C	From Leg	2.00 0' 0'	0.0000	203'1/8"	No Ice	0.98	2.18	42.00
						1/2" Ice	1.70	3.80	62.37
						1" Ice	2.42	5.42	82.75
						2" Ice	3.86	8.66	123.49
						4" Ice	6.74	15.14	204.99
DB420-B (Ant 31)	C	From Leg	4.00 0' 10'	0.0000	203'1/8"	No Ice	3.33	3.33	34.00
						1/2" Ice	5.99	5.99	44.20
						1" Ice	8.66	8.66	54.40
						2" Ice	13.99	13.99	74.80
						4" Ice	24.64	24.64	115.60
*****									
WPA-800120-8CF (Ant 32)	B	From Leg	0.00 0' 0'	30.0000	220'1/8"	No Ice	6.45	6.45	16.80
						1/2" Ice	7.02	7.02	56.31
						1" Ice	7.61	7.61	102.89
						2" Ice	8.79	8.79	218.05
						4" Ice	11.26	11.26	541.77
*****									
TMA 6"x6"x2"	A	From Leg	0.75 0' 0'	15.0000	225'6-1/8"	No Ice	0.35	0.12	20.00
						1/2" Ice	0.43	0.17	22.43
						1" Ice	0.52	0.24	25.96
						2" Ice	0.73	0.39	37.11
						4" Ice	1.25	0.81	81.19
TMA 6"x6"x2"	B	From Leg	0.75 0' 0'	15.0000	225'6-1/8"	No Ice	0.35	0.12	20.00
						1/2" Ice	0.43	0.17	22.43
						1" Ice	0.52	0.24	25.96
						2" Ice	0.73	0.39	37.11
						4" Ice	1.25	0.81	81.19
2'10" x 7" x 2" Panel w/ 48" Mt. Pipe (Ant 33)	A	From Leg	1.00 0' 0'	15.0000	225'6-1/8"	No Ice	2.60	1.79	43.16
						1/2" Ice	2.94	2.25	66.26
						1" Ice	3.29	2.72	95.00
						2" Ice	4.03	3.71	168.82
						4" Ice	5.70	6.19	397.72
2'10" x 7" x 2" Panel w/ 48" Mt. Pipe (Ant 34)	B	From Leg	1.00 0' 0'	15.0000	225'6-1/8"	No Ice	2.60	1.79	43.16
						1/2" Ice	2.94	2.25	66.26
						1" Ice	3.29	2.72	95.00
						2" Ice	4.03	3.71	168.82
						4" Ice	5.70	6.19	397.72
(2) 1" x 8" Pipe	A	From Leg	0.33 0' 0'	15.0000	225'6-1/8"	No Ice	0.05	0.05	0.14
						1/2" Ice	0.10	0.10	0.85
						1" Ice	0.17	0.17	2.23
						2" Ice	0.33	0.33	7.57
						4" Ice	0.80	0.80	32.92
(2) 1" x 8" Pipe	B	From Leg	0.33 0'	15.0000	225'6-1/8"	No Ice	0.05	0.05	0.14
						1/2" Ice	0.10	0.10	0.85

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
			0'			1" Ice	0.17	0.17	2.23
						2" Ice	0.33	0.33	7.57
						4" Ice	0.80	0.80	32.92
*****									
TMA 12"x12"x2" (Ant 35)	B	From Leg	1.00 0' 0'	0.0000	232'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.40 1.56 1.73 2.09 2.92	0.23 0.33 0.43 0.67 1.24	14.00 21.10 30.07 54.44 134.30
*****									
TMA 18"x6"x6"	B	From Leg	1.00 0' 0'	0.0000	243'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.05 1.21 1.38 1.74 2.57	1.05 1.21 1.38 1.74 2.57	20.00 29.17 40.48 70.30 164.15
WPA-800120-8CF w/ Mount Pipe (Ant 37)	B	From Leg	1.00 0' 0'	0.0000	243'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.48 7.07 7.66 8.86 11.35	8.75 10.16 11.23 13.41 17.99	63.12 124.94 198.62 379.17 895.64
*****									
2.4"x25' Mt. Pipe	C	From Leg	0.50 0' 0'	0.0000	251'9-1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.95 8.48 11.02 16.16 26.64	5.95 8.48 11.02 16.16 26.64	91.50 135.77 195.71 363.20 892.90
Antenna Concepts ACB16A w/ Mount (Ant 38)	C	From Leg	2.50 0' 0'	0.0000	251'9-1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	19.29 24.18 29.07 38.84 58.40	14.11 18.33 22.56 31.00 47.88	200.00 300.00 400.00 600.00 1000.00
*****									
Side Arm Mount [SO 305-1]	C	From Leg	1.50 0' 0'	0.0000	251'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.94 1.48 2.02 3.10 5.26	1.41 2.17 2.93 4.45 7.49	30.00 43.27 56.54 83.07 136.14
DB420-B (Ant 39)	C	From Leg	3.00 0' 10'	0.0000	251'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.33 5.99 8.66 13.99 24.64	3.33 5.99 8.66 13.99 24.64	34.00 44.20 54.40 74.80 115.60
*****									
(4) L2.5x2.5x0.25, 10-ft Length	B	From Leg	0.00 0' 0'	-60.0000	309'6-1/8" - 284'6-1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.17 5.31 6.46 8.62 11.59	4.17 5.31 6.46 8.62 11.59	41.00 64.73 96.76 186.48 474.03
2.9"x22-ft Mt. Pipe	B	From Leg	5.00 0' 0'	0.0000	297'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.38 8.61 10.86 15.41 24.69	6.38 8.61 10.86 15.41 24.69	127.60 173.68 233.65 395.85 893.63
ACS 16R4	B	From Leg	5.00 0' 0'	0.0000	297'1/8"	No Ice 1/2" Ice 1" Ice 2" Ice	33.33 36.19 39.06 44.84	10.42 13.22 16.04 21.72	100.00 212.83 345.97 674.00

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
						4" Ice	54.56	33.22	1582.44
*****									
Control Box 12"x13.5"x6.5" (Appurt 1)	C	From Face	0.25 2' 0'	0.0000	5'8-5/32"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.58 1.74 1.92 2.31 3.17	0.76 0.88 1.02 1.31 1.99	50.00 61.69 75.65 111.15 217.94
Detuning Box 29"x24"x12" (Appurt 2)	C	From Face	0.50 2' 0'	0.0000	10'6-1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.77 7.11 7.47 8.21 9.79	3.38 3.65 3.93 4.52 5.79	50.00 95.31 145.02 258.44 546.74
Detuner (Appurt 3)	C	From Leg	0.00 0' 0'	30.0000	136'6-1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.25 2.10 2.94 4.64 8.03	3.08 5.26 7.44 11.80 20.52	25.00 50.00 75.00 125.00 225.00
Control Box 12"x13.5"x6.5" (Appurt 4)	B	From Leg	0.25 0' 0'	0.0000	141'6-1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.58 1.74 1.92 2.31 3.17	0.76 0.88 1.02 1.31 1.99	50.00 61.69 75.65 111.15 217.94
CC806-12 (Appurt 5)	C	From Face	0.00 -2' 0'	0.0000	236'6-1/8"	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.22 7.00 8.79 12.43 17.95	5.22 7.00 8.79 12.43 17.95	49.00 86.64 135.39 266.77 669.44
****									

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 lb
2-ft Dish w/o Radome (Ant 24)	A	Paraboloid w/o Radome	From Leg	1.50 0' 0'	70.0000		146'6-1/8"	2.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.14 3.41 3.68 4.21 5.28	39.00 58.00 77.00 115.00 191.00
*****											
6-FT MW w/ Radome (Ant 30)	C	Paraboloid w/Radome	From Leg	1.50 0' 0'	0.0000		196'1/8"	6.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	28.27 29.07 29.86 31.44 34.60	590.00 740.00 890.00 1190.00 1790.00
*****											
SP2-4.7NS (Ant 35)	B	Paraboloid w/o Radome	From Leg	1.50 0' 0'	60.0000		232'1/8"	2.00	No Ice 1/2" Ice 1" Ice	3.14 3.41 3.68	22.00 39.00 56.00

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter		Aperture Area	Weight
				ft	°	°	ft	ft		ft^2	lb
									2" Ice	4.21	90.00
									4" Ice	5.28	158.00
*****											
6-ft x 3-ft Grid (Ant 36)	B	Grid	From Leg	1.00 0' 0'	30.0000		235'1/8"	4.79	No Ice	19.63	125.00
									1/2" Ice	20.29	229.18
									1" Ice	20.95	358.36
									2" Ice	22.27	566.72
									4" Ice	24.91	983.44

Force Totals (Does not include forces on guys)

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques lb-ft
Leg Weight	20674.44			
Bracing Weight	11839.57			
Total Member Self-Weight	32514.00			
Guy Weight	5497.36			
Total Weight	55653.93			
Wind 0 deg - No Ice		-457.27	-39845.99	4071.24
Wind 30 deg - No Ice		19191.31	-34221.02	8110.90
Wind 60 deg - No Ice		33777.18	-19426.32	10095.75
Wind 90 deg - No Ice		39435.36	590.74	9686.84
Wind 120 deg - No Ice		34500.05	20326.77	7467.65
Wind 150 deg - No Ice		20197.74	34395.62	3163.27
Wind 180 deg - No Ice		525.21	39415.50	-1185.74
Wind 210 deg - No Ice		-19197.25	33954.51	-5120.24
Wind 240 deg - No Ice		-33865.07	19391.76	-7530.93
Wind 270 deg - No Ice		-39239.77	-525.46	-7772.81
Wind 300 deg - No Ice		-34156.86	-20259.03	-4794.50
Wind 330 deg - No Ice		-19974.99	-34541.03	-605.21
Member Ice	20380.48			
Guy Ice	10617.48			
Total Weight Ice	130370.40			
Wind 0 deg - Ice		-210.12	-19452.73	173.51
Wind 30 deg - Ice		9345.67	-16803.75	2489.68
Wind 60 deg - Ice		16482.73	-9530.64	3918.80
Wind 90 deg - Ice		19177.63	140.20	4542.05
Wind 120 deg - Ice		16753.36	9775.73	4179.76
Wind 150 deg - Ice		9709.41	16713.01	2514.68
Wind 180 deg - Ice		108.61	19196.02	456.95
Wind 210 deg - Ice		-9468.64	16598.96	-1642.11
Wind 240 deg - Ice		-16585.92	9552.06	-3240.86
Wind 270 deg - Ice		-19194.59	-294.54	-3421.68
Wind 300 deg - Ice		-16601.02	-9852.60	-2897.80
Wind 330 deg - Ice		-9696.92	-16819.86	-1691.25
Total Weight	55653.93			
Wind 0 deg - Service		-178.62	-15575.27	1590.12
Wind 30 deg - Service		7501.82	-13376.62	3168.11
Wind 60 deg - Service		13203.24	-7593.62	3943.45
Wind 90 deg - Service		15414.86	230.76	3783.72
Wind 120 deg - Service		13485.61	7945.36	2916.84
Wind 150 deg - Service		7894.95	13444.82	1235.44
Wind 180 deg - Service		205.16	15407.10	-463.39
Wind 210 deg - Service		-7504.14	13272.51	-2000.30

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques lb-ft
Wind 240 deg - Service		-13237.57	7580.12	-2941.97
Wind 270 deg - Service		-15338.46	-205.26	-3036.46
Wind 300 deg - Service		-13351.55	-7918.90	-1873.06
Wind 330 deg - Service		-7807.94	-13501.62	-236.61

Load Combinations

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

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	311.333 - 310.333	2.996	37	0.0496	0.7155
T2	310.333 - 299.167	2.983	37	0.0491	0.7148
T3	299.167 - 279.167	2.869	37	0.0427	0.7113
T4	279.167 - 259.167	2.710	37	0.0394	0.6856
T5	259.167 - 239.167	2.546	37	0.0370	0.6535
T6	239.167 - 219.167	2.387	37	0.0287	0.6211
T7	219.167 - 199.167	2.301	37	0.0157	0.5817
T8	199.167 - 179.167	2.260	37	0.0158	0.5419
T9	179.167 - 159.167	2.185	37	0.0218	0.4971
T10	159.167 - 139.167	2.067	37	0.0249	0.4420
T11	139.167 - 119.167	1.974	37	0.0234	0.3999
T12	119.167 - 99.1667	1.874	37	0.0368	0.3486
T13	99.1667 - 79.1667	1.670	37	0.0520	0.2989
T14	79.1667 - 59.1667	1.434	37	0.0583	0.2552
T15	59.1667 - 39.1667	1.177	37	0.0725	0.2151
T16	39.1667 - 19.1667	0.837	37	0.0901	0.1758
T17	19.1667 - 14.3958	0.415	37	0.1045	0.1391
T18	14.3958 - 11.8125	0.306	37	0.1068	0.1326
T19	11.8125 - 9.47917	0.247	37	0.1078	0.1298
T20	9.47917 - 7.14583	0.193	37	0.1087	0.1280
T21	7.14583 - 1.17708	0.139	37	0.1092	0.1258

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
309'6-1/8"	(4) L2.5x2.5x0.25, 10-ft Length	37	2.973	0.0487	0.7143	27773
304'6-1/8"	(4) L2.5x2.5x0.25, 10-ft Length	37	2.918	0.0458	0.7127	32679
299'9-19/32"	Guy	37	2.875	0.0430	0.7115	56690
299'6-1/8"	(4) L2.5x2.5x0.25, 10-ft Length	37	2.872	0.0429	0.7114	58725
297'1/8"	2.9"x22-ft Mt. Pipe	37	2.851	0.0418	0.7099	75810
294'6-1/8"	(4) L2.5x2.5x0.25, 10-ft Length	37	2.830	0.0410	0.7078	91204
289'6-1/8"	(4) L2.5x2.5x0.25, 10-ft Length	37	2.790	0.0400	0.7018	138573
284'6-1/8"	(4) L2.5x2.5x0.25, 10-ft Length	37	2.751	0.0395	0.6944	285923
251'9-1/8"	2.4"x25' Mt. Pipe	37	2.483	0.0349	0.6420	172646
251'1/8"	Side Arm Mount [SO 305-1]	37	2.476	0.0347	0.6408	149353
243'1/8"	TMA 18"x6"x6"	37	2.413	0.0310	0.6278	61297
236'6-1/8"	CC806-12	37	2.370	0.0269	0.6162	51179
235'1/8"	6-ft x 3-ft Grid	37	2.362	0.0258	0.6134	52754
232'1/8"	SP2-4.7NS	37	2.347	0.0236	0.6076	57077
230'2-5/32"	Guy	37	2.338	0.0223	0.6039	58858
225'6-1/8"	TMA 6"x6"x2"	37	2.320	0.0190	0.5945	63550
220'1/8"	WPA-800120-8CF	37	2.303	0.0159	0.5834	72530
203'1/8"	Side Arm Mount [SO 306-1]	37	2.268	0.0149	0.5496	103317
196'1/8"	6-FT MW w/ Radome	37	2.251	0.0167	0.5355	67837
192'6-1/8"	(6) 601417	37	2.241	0.0177	0.5283	64189
187'6-1/8"	(6) 601417	37	2.223	0.0192	0.5174	59803
182'6-1/8"	(6) 601417	37	2.201	0.0208	0.5056	56121
180'1/8"	2.4"x25' Mt. Pipe	37	2.189	0.0216	0.4993	56439
177'6-1/8"	(6) 601417	37	2.176	0.0223	0.4927	61912
172'6-1/8"	(6) 601417	37	2.147	0.0236	0.4786	98260
167'6-1/8"	(6) 601417	37	2.117	0.0245	0.4643	261172
165'1/8"	36" Standoff	37	2.102	0.0248	0.4573	304015
164'6-1/8"	2.4" Dia. x 10-ft Mount Pipe	37	2.099	0.0249	0.4559	257489
160'1/8"	Sector Mount [SM 408-3]	37	2.072	0.0249	0.4441	117583
150'2-5/32"	Guy	37	2.021	0.0235	0.4225	135352

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
146'6-1/8"	2-ft Dish w/o Radome	37	2.005	0.0230	0.4152	149031
145'1/8"	30" Sidearm Mount	37	1.998	0.0229	0.4122	155458
141'6-1/8"	Control Box 12"x13.5"x6.5"	37	1.983	0.0230	0.4050	179399
136'6-1/8"	Detuner	37	1.964	0.0243	0.3938	295402
128'1/8"	Sector Mount [SM 411-3]	37	1.928	0.0293	0.3723	53093
120'6-1/8"	APXV18-206517S w/ Mount Pipe	37	1.884	0.0356	0.3522	31778
111'1/8"	Sector Mount [SM 409-3]	37	1.801	0.0439	0.3276	45334
89'2-1/32"	Guy	37	1.553	0.0553	0.2765	322012
48'1/8"	1" dia. x 16" Pipe	37	0.998	0.0824	0.1933	50043
21'1/8"	1-ft Side Arm	37	0.457	0.1035	0.1419	91794
10'6-1/8"	Detuning Box 29"x24"x12"	37	0.217	0.1083	0.1287	283684
5'8-5/32"	Control Box 12"x13.5"x6.5"	37	0.104	0.1095	0.1244	Inf

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	311.333 - 310.333	9.036	12	0.1723	1.6839
T2	310.333 - 299.167	8.994	12	0.1712	1.6821
T3	299.167 - 279.167	8.594	12	0.1552	1.6733
T4	279.167 - 259.167	8.000	12	0.1436	1.6121
T5	259.167 - 239.167	7.408	12	0.1340	1.5347
T6	239.167 - 219.167	6.842	12	0.1091	1.4568
T7	219.167 - 199.167	6.484	12	0.0697	1.3623
T8	199.167 - 179.167	6.346	13	0.0647	1.2685
T9	179.167 - 159.167	6.217	13	0.0765	1.1619
T10	159.167 - 139.167	6.047	2	0.0815	1.0288
T11	139.167 - 119.167	5.951	2	0.0753	0.9279
T12	119.167 - 99.1667	5.751	2	0.1069	0.8060
T13	99.1667 - 79.1667	5.203	2	0.1512	0.6881
T14	79.1667 - 59.1667	4.495	2	0.1808	0.5860
T15	59.1667 - 39.1667	3.674	2	0.2287	0.4933
T16	39.1667 - 19.1667	2.597	2	0.2821	0.4027
T17	19.1667 - 14.3958	1.284	2	0.3242	0.3182
T18	14.3958 - 11.8125	0.947	2	0.3309	0.3034
T19	11.8125 - 9.47917	0.763	2	0.3338	0.2968
T20	9.47917 - 7.14583	0.596	2	0.3362	0.2927
T21	7.14583 - 1.17708	0.428	2	0.3376	0.2877

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
309'6-1/8"	(4) L2.5x2.5x0.25, 10-ft Length	12	8.960	0.1702	1.6808	10939
304'6-1/8"	(4) L2.5x2.5x0.25, 10-ft Length	12	8.771	0.1630	1.6768	12928
299'9-19/32"	Guy	12	8.615	0.1560	1.6740	23628
299'6-1/8"	(4) L2.5x2.5x0.25, 10-ft Length	12	8.605	0.1556	1.6737	24571
297'1/8"	2.9"x22-ft Mt. Pipe	12	8.527	0.1527	1.6702	32497
294'6-1/8"	(4) L2.5x2.5x0.25, 10-ft Length	12	8.450	0.1504	1.6650	39310
289'6-1/8"	(4) L2.5x2.5x0.25, 10-ft Length	12	8.301	0.1472	1.6509	59711

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
284'6-1/8"	(4) L2.5x2.5x0.25, 10-ft Length	12	8.155	0.1452	1.6331	108028
251'9-1/8"	2.4"x25' Mt. Pipe	12	7.185	0.1274	1.5070	40540
251'1/8"	Side Arm Mount [SO 305-1]	12	7.163	0.1266	1.5042	36828
243'1/8"	TMA 18"x6"x6"	12	6.938	0.1158	1.4729	18648
236'6-1/8"	CC806-12	12	6.781	0.1038	1.4450	15829
235'1/8"	6-ft x 3-ft Grid	12	6.748	0.1006	1.4382	16150
232'1/8"	SP2-4.7NS	12	6.687	0.0941	1.4242	17033
230'2-5/32"	Guy	12	6.653	0.0901	1.4155	17625
225'6-1/8"	TMA 6"x6"x2"	12	6.574	0.0803	1.3930	19336
220'1/8"	WPA-800120-8CF	12	6.495	0.0709	1.3663	22419
203'1/8"	Side Arm Mount [SO 306-1]	13	6.352	0.0633	1.2866	33632
196'1/8"	6-FT MW w/ Radome	13	6.336	0.0662	1.2535	22411
192'6-1/8"	(6) 601417	13	6.322	0.0681	1.2363	21176
187'6-1/8"	(6) 601417	13	6.292	0.0712	1.2105	19690
182'6-1/8"	(6) 601417	13	6.251	0.0745	1.1824	18436
180'1/8"	2.4"x25' Mt. Pipe	13	6.226	0.0760	1.1672	18392
177'6-1/8"	(6) 601417	13	6.198	0.0775	1.1512	19647
172'6-1/8"	(6) 601417	13	6.134	0.0801	1.1174	27054
167'6-1/8"	(6) 601417	2	6.083	0.0818	1.0827	45229
165'1/8"	36" Standoff	2	6.073	0.0821	1.0658	68104
164'6-1/8"	2.4" Dia. x 10-ft Mount Pipe	2	6.071	0.0822	1.0624	75768
160'1/8"	Sector Mount [SM 408-3]	2	6.050	0.0817	1.0338	42779
150'2-5/32"	Guy	2	6.005	0.0769	0.9818	47009
146'6-1/8"	2-ft Dish w/o Radome	2	5.988	0.0752	0.9644	52027
145'1/8"	30" Sidearm Mount	2	5.981	0.0748	0.9572	54402
141'6-1/8"	Control Box 12"x13.5"x6.5"	2	5.964	0.0746	0.9400	62932
136'6-1/8"	Detuner	2	5.937	0.0771	0.9133	48043
128'1/8"	Sector Mount [SM 411-3]	2	5.873	0.0889	0.8621	16585
120'6-1/8"	APXV18-206517S w/ Mount Pipe	2	5.775	0.1039	0.8145	10799
111'1/8"	Sector Mount [SM 409-3]	2	5.564	0.1267	0.7560	14553
89'2-1/32"	Guy	2	4.859	0.1655	0.6354	52220
48'1/8"	1" dia. x 16" Pipe	2	3.107	0.2590	0.4429	17489
21'1/8"	1-ft Side Arm	2	1.412	0.3212	0.3247	33643
10'6-1/8"	Detuning Box 29"x24"x12"	2	0.670	0.3352	0.2945	108620
5'8-5/32"	Control Box 12"x13.5"x6.5"	2	0.322	0.3384	0.2845	494586

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	311.333	Leg	A325N	1.7500	2	4485.74	105828.00	0.042 ✔	1.333	Bolt Tension
T2	310.333	Leg	A325N	0.8750	5	3908.77	25255.50	0.155 ✔	1.333	Bolt DS
T3	299.167	Leg	A325N	0.8750	5	3244.34	25255.50	0.128 ✔	1.333	Bolt DS
T4	279.167	Leg	A325N	0.8750	5	3846.93	25255.50	0.152 ✔	1.333	Bolt DS
T5	259.167	Leg	A325N	0.8750	5	6332.17	25255.50	0.251 ✔	1.333	Bolt DS
T6	239.167	Leg	A325N	0.8750	5	6450.75	25255.50	0.255 ✔	1.333	Bolt DS
T7	219.167	Leg	A325N	0.8750	5	7252.58	25255.50	0.287 ✔	1.333	Bolt DS
T8	199.167	Leg	A325N	0.8750	5	7813.57	25255.50	0.309 ✔	1.333	Bolt DS
T9	179.167	Leg	A325N	0.8750	5	7723.59	25255.50	0.306 ✔	1.333	Bolt DS

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
T10	159.167	Leg	A325N	0.8750	5	10156.80	25255.50	0.402 ✔	1.333	Bolt DS
T11	139.167	Leg	A325N	0.8750	5	12080.60	25255.50	0.478 ✔	1.333	Bolt DS
T12	119.167	Leg	A325N	0.8750	5	11943.70	25255.50	0.473 ✔	1.333	Bolt DS
T13	99.1667	Leg	A325N	0.8750	5	13605.10	25255.50	0.539 ✔	1.333	Bolt DS
T14	79.1667	Leg	A325N	0.8750	5	15057.70	25255.50	0.596 ✔	1.333	Bolt DS
T15	59.1667	Leg	A325N	0.8750	5	15460.30	25255.50	0.612 ✔	1.333	Bolt DS
T16	39.1667	Leg	A325N	0.8750	5	14921.20	25255.50	0.591 ✔	1.333	Bolt DS

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T lb	Allowable T_a lb	Required S.F.	Actual S.F.
T2	299'9-19/32" (A) (981)	13/16 BS	8000.00	79999.92	17473.30	40000.00	2.000	4.578 ✔
	299'9-19/32" (B) (980)	13/16 BS	8000.00	79999.92	18773.50	40000.00	2.000	4.261 ✔
	299'9-19/32" (C) (979)	13/16 BS	8000.00	79999.92	17574.40	40000.00	2.000	4.552 ✔
T6	230'2-5/32" (A) (984)	7/8 BS	9200.00	92000.13	19669.90	46000.00	2.000	4.677 ✔
	230'2-5/32" (B) (983)	7/8 BS	9200.00	92000.13	21028.80	46000.00	2.000	4.375 ✔
	230'2-5/32" (C) (982)	7/8 BS	9200.00	92000.13	19699.60	46000.00	2.000	4.670 ✔
T10	150'2-5/32" (A) (987)	13/16 BS	8000.00	79999.92	18088.60	40000.00	2.000	4.423 ✔
	150'2-5/32" (B) (986)	13/16 BS	8000.00	79999.92	18915.50	40000.00	2.000	4.229 ✔
	150'2-5/32" (C) (985)	13/16 BS	8000.00	79999.92	18042.60	40000.00	2.000	4.434 ✔
T13	89'2-1/32" (A) (990)	3/4 BS	6800.00	67999.85	14579.00	34000.00	2.000	4.664 ✔
	89'2-1/32" (B) (989)	3/4 BS	6800.00	67999.85	15266.50	34000.00	2.000	4.454 ✔
	89'2-1/32" (C) (988)	3/4 BS	6800.00	67999.85	14614.20	34000.00	2.000	4.653 ✔

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	Mast Stability Index	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	311.333 - 310.333	2 3/4	1'	1'	17.5 K=1.00	1.00	28.562	5.9396	-10437.10	169645.00	0.062
T2	310.333 - 299.167	2 3/4	11'2-1/32"	2'8-5/8"	47.5 K=1.00	1.00	24.742	5.9396	-19543.90	146959.00	0.133
T3	299.167 - 279.167	2 3/4	20'	2'3-31/32"	40.7 K=1.00	1.00	25.730	5.9396	-19276.30	152823.00	0.126
T4	279.167 - 259.167	2 3/4	20'	2'3-31/32"	40.7 K=1.00	1.00	25.730	5.9396	-15896.60	152823.00	0.104*
T5	259.167 - 239.167	2 3/4	20'	2'3-31/32"	40.7 K=1.00	1.00	25.730	5.9396	-31660.90	152823.00	0.207
T6	239.167 - 219.167	2 3/4	20'	2'3-31/32"	40.7 K=1.00	1.00	25.730	5.9396	-42022.40	152823.00	0.275
T7	219.167 - 199.167	2 3/4	20'	2'3-31/32"	40.7 K=1.00	1.00	25.730	5.9396	-30521.70	152823.00	0.200*
T8	199.167 - 179.167	2 3/4	20'	2'3-31/32"	40.7 K=1.00	1.00	25.730	5.9396	-32468.00	152823.00	0.212*
T9	179.167 - 159.167	2 3/4	20'	2'3-31/32"	40.7 K=1.00	1.00	25.730	5.9396	-35602.90	152823.00	0.233*
T10	159.167 - 139.167	3	20'	2'3-31/32"	37.3 K=1.00	1.00	26.201	7.0686	-45539.40	185200.00	0.246*
T11	139.167 - 119.167	3	20'	2'3-31/32"	37.3 K=1.00	0.96	25.228	7.0686	-48468.70	178327.00	0.272*
T12	119.167 - 99.1667	3	20'	2'3-31/32"	37.3 K=1.00	0.96	25.228	7.0686	-52225.80	178327.00	0.293*
T13	99.1667 - 79.1667	3	20'	2'3-31/32"	37.3 K=1.00	0.96	25.228	7.0686	-59543.20	178327.00	0.334*
T14	79.1667 - 59.1667	3	20'	2'3-31/32"	37.3 K=1.00	0.96	25.228	7.0686	-61689.50	178327.00	0.346*
T15	59.1667 - 39.1667	3	20'	2'3-31/32"	37.3 K=1.00	0.96	25.228	7.0686	-63716.20	178327.00	0.357*
T16	39.1667 - 19.1667	3	20'	2'3-31/32"	37.3 K=1.00	0.96	25.228	7.0686	-65623.10	178327.00	0.368*
T17	19.1667 - 14.3958	3	4'9-1/4"	2'3-19/32"	36.8 K=1.00	0.96	25.228	7.0686	-65809.70	178327.00	0.369*
T18	14.3958 - 11.8125	3	2'6-31/32"	2'6-31/32"	41.3 K=1.00	0.98	25.228	7.0686	-65437.20	178327.00	0.367*
T19	11.8125 - 9.47917	3	2'3-31/32"	1'2-1/32"	18.7 K=1.00	0.89	25.228	7.0686	-66468.20	178327.00	0.373*
T20	9.47917 - 7.14583	3	2'3-31/32"	1'2-1/32"	18.7 K=1.00	0.89	25.228	7.0686	-65375.60	178327.00	0.367*
T21	7.14583 - 1.17708	3	6'7-9/16"	2'10-11/16"	46.3 K=1.00	1.00	24.919	7.0686	-74695.90	176144.00	0.424*

* DL controls

Leg Bending Design Data (Compression)

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	311.333 - 310.333	2 3/4	862.42	-5.069	37.500	0.135	0.00	0.000	37.500	0.000
T2	310.333 -	2 3/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	299.167									
T3	299.167 - 279.167	2 3/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T4	279.167 - 259.167	2 3/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T5	259.167 - 239.167	2 3/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T6	239.167 - 219.167	2 3/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T7	219.167 - 199.167	2 3/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T8	199.167 - 179.167	2 3/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T9	179.167 - 159.167	2 3/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T10	159.167 - 139.167	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T11	139.167 - 119.167	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T12	119.167 - 99.1667	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T13	99.1667 - 79.1667	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T14	79.1667 - 59.1667	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T15	59.1667 - 39.1667	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T16	39.1667 - 19.1667	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T17	19.1667 - 14.3958	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T18	14.3958 - 11.8125	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T19	11.8125 - 9.47917	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T20	9.47917 - 7.14583	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T21	7.14583 - 1.17708	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000

Leg Interaction Design Data (Compression)

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	311.333 - 310.333	2 3/4	0.062	0.135	0.000	0.197 ✓	1.333	H1-3 ✓
T2	310.333 - 299.167	2 3/4	0.133	0.000	0.000	0.133 ✓	1.333	H1-3 ✓
T3	299.167 - 279.167	2 3/4	0.126	0.000	0.000	0.126 ✓	1.333	H1-3 ✓
T4	279.167 - 259.167	2 3/4	0.104	0.000	0.000	0.104* ✓	1.000	H1-3 ✓
T5	259.167 - 239.167	2 3/4	0.207	0.000	0.000	0.207 ✓	1.333	H1-3 ✓

Section No.	Elevation ft	Size	Ratio P/Pa	Ratio fbx/Fbx	Ratio fby/Fby	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T6	239.167 - 219.167	2 3/4	0.275	0.000	0.000	0.275	1.333	H1-3
T7	219.167 - 199.167	2 3/4	0.200	0.000	0.000	0.200*	1.000	H1-3
T8	199.167 - 179.167	2 3/4	0.212	0.000	0.000	0.212*	1.000	H1-3
T9	179.167 - 159.167	2 3/4	0.233	0.000	0.000	0.233*	1.000	H1-3
T10	159.167 - 139.167	3	0.246	0.000	0.000	0.246*	1.000	H1-3
T11	139.167 - 119.167	3	0.272	0.000	0.000	0.272*	1.000	H1-3
T12	119.167 - 99.1667	3	0.293	0.000	0.000	0.293*	1.000	H1-3
T13	99.1667 - 79.1667	3	0.334	0.000	0.000	0.334*	1.000	H1-3
T14	79.1667 - 59.1667	3	0.346	0.000	0.000	0.346*	1.000	H1-3
T15	59.1667 - 39.1667	3	0.357	0.000	0.000	0.357*	1.000	H1-3
T16	39.1667 - 19.1667	3	0.368	0.000	0.000	0.368*	1.000	H1-3
T17	19.1667 - 14.3958	3	0.369	0.000	0.000	0.369*	1.000	H1-3
T18	14.3958 - 11.8125	3	0.367	0.000	0.000	0.367*	1.000	H1-3
T19	11.8125 - 9.47917	3	0.373	0.000	0.000	0.373*	1.000	H1-3
T20	9.47917 - 7.14583	3	0.367	0.000	0.000	0.367*	1.000	H1-3
T21	7.14583 - 1.17708	3	0.424	0.000	0.000	0.424*	1.000	H1-3

* DL controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	La ft	Kl/r	Fa ksi	A in²	Actual P lb	Allow. Pa lb	Ratio P/Pa
T2	310.333 - 299.167	7/8	5'8-9/32"	2'8-5/8"	111.7 K=0.75	11.966	0.6013	-1422.85	7195.27	0.198
T3	299.167 - 279.167	7/8	5'6-1/4"	2'7-9/16"	108.3 K=0.75	12.731	0.6013	-1702.06	7655.47	0.222
T4	279.167 - 259.167	7/8	5'6-1/4"	2'7-9/16"	108.3 K=0.75	12.731	0.6013	-1177.88	7655.47	0.154
T5	259.167 - 239.167	7/8	5'6-1/4"	2'7-9/16"	108.3 K=0.75	12.731	0.6013	-2534.23	7655.47	0.331
T6	239.167 - 219.167	7/8	5'6-1/4"	2'7-9/16"	108.3 K=0.75	12.731	0.6013	-2919.17	7655.47	0.381
T7	219.167 - 199.167	7/8	5'6-1/4"	2'7-9/16"	108.3 K=0.75	12.731	0.6013	-2674.13	7655.47	0.349
T8	199.167 - 179.167	7/8	5'6-1/4"	2'7-9/16"	108.3 K=0.75	12.731	0.6013	-1883.86	7655.47	0.246

Section No.	Elevation ft	Size	L ft	La ft	Kl/r	Fa ksi	A in²	Actual P lb	Allow. Pa lb	Ratio P/Pa
T9	179.167 - 159.167	7/8	5'6-1/4"	2'7-9/16"	108.3 K=0.75	12.731	0.6013	-2498.06	7655.47	0.326
T10	159.167 - 139.167	1	5'6-1/4"	2'7-7/16"	94.4 K=0.75	15.987	0.7854	-3721.01	12555.90	0.296
T11	139.167 - 119.167	7/8	5'6-1/4"	2'7-7/16"	107.8 K=0.75	12.843	0.6013	-3395.51	7722.77	0.440
T12	119.167 - 99.1667	7/8	5'6-1/4"	2'7-7/16"	107.8 K=0.75	12.843	0.6013	-3033.85	7722.77	0.393
T13	99.1667 - 79.1667	7/8	5'6-1/4"	2'7-7/16"	107.8 K=0.75	12.843	0.6013	-3166.48	7722.77	0.410
T14	79.1667 - 59.1667	7/8	5'6-1/4"	2'7-7/16"	107.8 K=0.75	12.843	0.6013	-2317.90	7722.77	0.300
T15	59.1667 - 39.1667	7/8	5'6-1/4"	2'7-7/16"	107.8 K=0.75	12.843	0.6013	-1390.35	7722.77	0.180
T16	39.1667 - 19.1667	7/8	5'6-1/4"	2'7-7/16"	107.8 K=0.75	12.843	0.6013	-1804.55	7722.77	0.234
T17	19.1667 - 14.3958	1	5'6"	2'7-5/16"	94.1 K=0.75	16.037	0.7854	-2191.19	12595.00	0.174
T18	14.3958 - 11.8125	1	5'7-9/16"	2'8-1/32"	96.2 K=0.75	15.565	0.7854	-2195.96	12224.70	0.180
T19	11.8125 - 9.47917	1 1/4	3'5-1/32"	3'3"	87.3 K=0.70	17.508	1.2272	-2180.76	21485.10	0.102
T20	9.47917 - 7.14583	1 1/4	3'5-1/32"	3'3"	87.3 K=0.70	17.508	1.2272	-2861.25	21485.10	0.133
T21	7.14583 - 1.17708	1 1/4	3'31/32"	2'4-29/32"	85.3 K=0.92	17.930	1.2272	-8819.23	22002.80	0.401*

* DL controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	La ft	Kl/r	Fa ksi	A in²	Actual P lb	Allow. Pa lb	Ratio P/Pa
T19	11.8125 - 9.47917	6x3/4 KL/R > 200 (C) - 916	5'	4'9"	263.3 K=1.00	2.154	4.5000	-1151.26	9695.17	0.119*
T20	9.47917 - 7.14583	6x3/4 KL/R > 200 (C) - 934	5'	4'9"	263.3 K=1.00	2.154	4.5000	-1396.88	9695.17	0.144*

* DL controls

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	311.333 - 310.333	6x1	5'	4'9-1/4"	198.3 K=1.00	3.797	6.0000	-130.48	22780.90	0.006
T2	310.333 - 299.167	1 1/4	5'	4'9-1/4"	128.2 K=0.70	9.080	1.2272	-318.77	11143.30	0.029
T3	299.167 - 279.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-1763.19	4564.30	0.386
T4	279.167 - 259.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-63.50	4564.30	0.014
T5	259.167 - 239.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-157.43	4564.30	0.034
T6	239.167 - 219.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-718.48	4564.30	0.157
T7	219.167 - 199.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-603.70	4564.30	0.132
T8	199.167 - 179.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-371.63	4564.30	0.081
T9	179.167 - 159.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-79.24	4564.30	0.017
T10	159.167 - 139.167	1 1/4	5'	4'9"	127.7 K=0.70	9.160	1.2272	-903.55	11241.30	0.080
T11	139.167 - 119.167	1	5'	4'9"	159.6 K=0.70	5.863	0.7854	-598.95	4604.42	0.130
T13	99.1667 - 79.1667	1	5'	4'9"	159.6 K=0.70	5.863	0.7854	-549.96	4604.42	0.119
T14	79.1667 - 59.1667	1	5'	4'9"	159.6 K=0.70	5.863	0.7854	-198.85	4604.42	0.043
T16	39.1667 - 19.1667	1	5'	4'9"	159.6 K=0.70	5.863	0.7854	-46.34	4604.42	0.010
T17	19.1667 - 14.3958	1 1/4	5'	4'9"	127.7 K=0.70	9.160	1.2272	-24.79	11241.30	0.002

Top Girt Bending Design Data

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{bv}}{F_{by}}$
T1	311.333 - 310.333	6x1	706.37	-1.413	27.000	0.052	-16.92	-0.203	27.000	0.008
T2	310.333 - 299.167	1 1/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T3	299.167 - 279.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T4	279.167 - 259.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T5	259.167 - 239.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T6	239.167 - 219.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T7	219.167 - 199.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T8	199.167 - 179.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T9	179.167 - 159.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T10	159.167 - 139.167	1 1/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{bv}}{F_{by}}$
T11	139.167 - 119.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T13	99.1667 - 79.1667	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T14	79.1667 - 59.1667	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T16	39.1667 - 19.1667	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T17	19.1667 - 14.3958	1 1/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000

Top Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	311.333 - 310.333	6x1	0.006	0.052	0.008	0.066 ✓	1.333	H1-3 ✓
T2	310.333 - 299.167	1 1/4	0.029	0.000	0.000	0.029 ✓	1.333	H1-3 ✓
T3	299.167 - 279.167	1	0.386	0.000	0.000	0.386 ✓	1.333	H1-3 ✓
T4	279.167 - 259.167	1	0.014	0.000	0.000	0.014 ✓	1.333	H1-3 ✓
T5	259.167 - 239.167	1	0.034	0.000	0.000	0.034 ✓	1.333	H1-3 ✓
T6	239.167 - 219.167	1	0.157	0.000	0.000	0.157 ✓	1.333	H1-3 ✓
T7	219.167 - 199.167	1	0.132	0.000	0.000	0.132 ✓	1.333	H1-3 ✓
T8	199.167 - 179.167	1	0.081	0.000	0.000	0.081 ✓	1.333	H1-3 ✓
T9	179.167 - 159.167	1	0.017	0.000	0.000	0.017 ✓	1.333	H1-3 ✓
T10	159.167 - 139.167	1 1/4	0.080	0.000	0.000	0.080 ✓	1.333	H1-3 ✓
T11	139.167 - 119.167	1	0.130	0.000	0.000	0.130 ✓	1.333	H1-3 ✓
T13	99.1667 - 79.1667	1	0.119	0.000	0.000	0.119 ✓	1.333	H1-3 ✓
T14	79.1667 - 59.1667	1	0.043	0.000	0.000	0.043 ✓	1.333	H1-3 ✓
T16	39.1667 - 19.1667	1	0.010	0.000	0.000	0.010 ✓	1.333	H1-3 ✓
T17	19.1667 - 14.3958	1 1/4	0.002	0.000	0.000	0.002 ✓	1.333	H1-3 ✓

Bottom 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 $\frac{P}{P_a}$
T3	299.167 - 279.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-38.42	4564.30	0.008 ✓
T4	279.167 - 259.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-182.35	4564.30	0.040 ✓
T5	259.167 - 239.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-712.92	4564.30	0.156 ✓
T6	239.167 - 219.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-402.36	4564.30	0.088 ✓
T7	219.167 - 199.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-241.94	4564.30	0.053 ✓
T9	179.167 - 159.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-437.96	4564.30	0.096 ✓
T10	159.167 - 139.167	1 1/4	5'	4'9"	127.7 K=0.70	9.160	1.2272	-645.31	11241.30	0.057 ✓
T11	139.167 - 119.167	1	5'	4'9"	159.6 K=0.70	5.863	0.7854	-121.94	4604.42	0.026 ✓
T12	119.167 - 99.1667	1	5'	4'9"	159.6 K=0.70	5.863	0.7854	-452.23	4604.42	0.098 ✓
T13	99.1667 - 79.1667	1	5'	4'9"	159.6 K=0.70	5.863	0.7854	-342.60	4604.42	0.074 ✓
T14	79.1667 - 59.1667	1	5'	4'9"	159.6 K=0.70	5.863	0.7854	-78.81	4604.42	0.017 ✓
T16	39.1667 - 19.1667	1	5'	4'9"	159.6 K=0.70	5.863	0.7854	-43.99	4604.42	0.010 ✓

Mid 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 $\frac{P}{P_a}$
T5	259.167 - 239.167	1	5'	4'9-1/4"	160.3 K=0.70	5.811	0.7854	-1.23	4564.30	0.000 ✓

Redundant Horizontal (1) 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 $\frac{P}{P_a}$
T19	11.8125 - 9.47917	7/8	1'3"	1'1-9/16"	61.7 K=1.00	22.423	0.6013	-1151.26	13483.20	0.085* ✓
T20	9.47917 - 7.14583	7/8	1'3"	1'1-9/16"	61.7 K=1.00	22.423	0.6013	-1132.34	13483.20	0.084* ✓

* DL controls

Redundant Diagonal (1) 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 $\frac{P}{P_a}$
T20	9.47917 - 7.14583	7/8	1'8-17/32"	1'6-15/32"	81.6 K=0.97	18.686	0.6013	-1246.97	11236.50	0.111* ✓

* DL controls

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	311.333 - 310.333	2 3/4	1'	1'	17.5	30.000	5.9396	8971.47	178187.00	0.050
T2	310.333 - 299.167	2 3/4	11'2-1/32"	2'8-5/8"	47.5	32.500	3.4123	13173.20	110900.00	0.119
T3	299.167 - 279.167	2 3/4	20'	2'3-31/32"	40.7	32.500	3.4123	1476.11	110900.00	0.013
T5	259.167 - 239.167	2 3/4	20'	2'3-31/32"	40.7	32.500	3.4123	6011.08	110900.00	0.054
T6	239.167 - 219.167	2 3/4	20'	2'3-31/32"	40.7	32.500	3.4123	11349.30	110900.00	0.102
T11	139.167 - 119.167	3	20'	2'3-31/32"	37.3	32.500	4.3026	3269.53	139833.00	0.023
T12	119.167 - 99.1667	3	20'	2'3-31/32"	37.3	32.500	4.3026	3593.39	139833.00	0.026

Leg Bending Design Data (Tension)

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{bv}}{F_{by}}$
T1	311.333 - 310.333	2 3/4	772.65	4.541	37.500	0.121	0.00	0.000	37.500	0.000
T2	310.333 - 299.167	2 3/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T3	299.167 - 279.167	2 3/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T5	259.167 - 239.167	2 3/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T6	239.167 - 219.167	2 3/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T11	139.167 - 119.167	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T12	119.167 -	3	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	99.1667									

Leg Interaction Design Data (Tension)

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	311.333 - 310.333	2 3/4	0.050	0.121	0.000	0.171 ✓	1.333	H2-1 ✓
T2	310.333 - 299.167	2 3/4	0.119	0.000	0.000	0.119 ✓	1.333	H2-1 ✓
T3	299.167 - 279.167	2 3/4	0.013	0.000	0.000	0.013 ✓	1.333	H2-1 ✓
T5	259.167 - 239.167	2 3/4	0.054	0.000	0.000	0.054 ✓	1.333	H2-1 ✓
T6	239.167 - 219.167	2 3/4	0.102	0.000	0.000	0.102 ✓	1.333	H2-1 ✓
T11	139.167 - 119.167	3	0.023	0.000	0.000	0.023 ✓	1.333	H2-1 ✓
T12	119.167 - 99.1667	3	0.026	0.000	0.000	0.026 ✓	1.333	H2-1 ✓

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 $\frac{P}{P_a}$
T2	310.333 - 299.167	7/8	5'8-9/32"	2'8-5/8"	149.0	30.000	0.6013	1762.36	18039.60	0.098 ✓
T3	299.167 - 279.167	7/8	5'6-1/4"	2'7-9/16"	144.4	30.000	0.6013	1358.72	18039.60	0.075 ✓
T4	279.167 - 259.167	7/8	5'6-1/4"	2'7-9/16"	144.4	30.000	0.6013	1091.89	18039.60	0.061 ✓
T5	259.167 - 239.167	7/8	5'6-1/4"	2'7-9/16"	144.4	30.000	0.6013	2460.64	18039.60	0.136 ✓
T6	239.167 - 219.167	7/8	5'6-1/4"	2'7-9/16"	144.4	30.000	0.6013	3480.49	18039.60	0.193 ✓
T7	219.167 - 199.167	7/8	5'6-1/4"	2'7-9/16"	144.4	30.000	0.6013	2559.22	18039.60	0.142 ✓
T8	199.167 - 179.167	7/8	5'6-1/4"	2'7-9/16"	144.4	30.000	0.6013	1668.82	18039.60	0.093 ✓
T9	179.167 - 159.167	7/8	5'6-1/4"	2'7-9/16"	144.4	30.000	0.6013	2352.21	18039.60	0.130 ✓
T10	159.167 - 139.167	1	5'6-1/4"	2'7-7/16"	125.8	30.000	0.7854	3681.53	23561.90	0.156 ✓
T11	139.167 - 119.167	7/8	5'6-1/4"	2'7-7/16"	143.8	30.000	0.6013	3210.57	18039.60	0.178 ✓

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 $\frac{P}{P_a}$
T12	119.167 - 99.1667	7/8	5'6-1/4"	2'7-7/16"	143.8	30.000	0.6013	2823.82	18039.60	0.157 ✓
T13	99.1667 - 79.1667	7/8	5'6-1/4"	2'7-7/16"	143.8	30.000	0.6013	2934.16	18039.60	0.163 ✓
T14	79.1667 - 59.1667	7/8	5'6-1/4"	2'7-7/16"	143.8	30.000	0.6013	2083.54	18039.60	0.115 ✓
T15	59.1667 - 39.1667	7/8	5'6-1/4"	2'7-7/16"	143.8	30.000	0.6013	1108.47	18039.60	0.061 ✓
T16	39.1667 - 19.1667	7/8	5'6-1/4"	2'7-7/16"	143.8	30.000	0.6013	1597.87	18039.60	0.089 ✓
T17	19.1667 - 14.3958	1	5'6"	2'7-5/16"	125.5	30.000	0.7854	1453.17	23561.90	0.062 ✓
T18	14.3958 - 11.8125	1	5'7-9/16"	2'8-1/32"	128.3	30.000	0.7854	1120.77	23561.90	0.048 ✓
T19	11.8125 - 9.47917	1 1/4	3'5-1/32"	3'3"	124.8	30.000	1.2272	2034.78	36815.50	0.055 ✓
T20	9.47917 - 7.14583	1 1/4	3'5-1/32"	3'3"	124.8	30.000	1.2272	2532.57	36815.50	0.069 ✓

Horizontal 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 $\frac{P}{P_a}$
T19	11.8125 - 9.47917	6x3/4	5'	4'9"	263.3	21.600	4.5000	2222.20	97200.00	0.023 ✓
T20	9.47917 - 7.14583	6x3/4	5'	4'9"	263.3	21.600	4.5000	13803.50	97200.00	0.142* ✓
T21	7.14583 - 1.17708	6x3/4	4'9-15/32"	4'6-15/32"	251.7	21.600	4.5000	7169.36	97200.00	0.074* ✓

* DL controls

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	311.333 - 310.333	6x1	5'	4'9-1/4"	198.3	21.600	6.0000	85.26	129600.00	0.001
T2	310.333 - 299.167	1 1/4	5'	4'9-1/4"	183.2	30.000	1.2272	134.90	36815.50	0.004
T4	279.167 - 259.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	124.93	23561.90	0.005
T5	259.167 - 239.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	230.07	23561.90	0.010
T6	239.167 - 219.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	304.12	23561.90	0.013

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 $\frac{P}{P_a}$
T7	219.167 - 199.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	687.49	23561.90	0.029
T8	199.167 - 179.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	411.79	23561.90	0.017
T9	179.167 - 159.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	246.25	23561.90	0.010
T10	159.167 - 139.167	1 1/4	5'	4'9"	182.4	30.000	1.2272	583.96	36815.50	0.016
T11	139.167 - 119.167	1	5'	4'9"	228.0	30.000	0.7854	868.03	23561.90	0.037
T12	119.167 - 99.1667	1	5'	4'9"	228.0	30.000	0.7854	185.07	23561.90	0.008*
T13	99.1667 - 79.1667	1	5'	4'9"	228.0	30.000	0.7854	825.61	23561.90	0.035
T14	79.1667 - 59.1667	1	5'	4'9"	228.0	30.000	0.7854	551.49	23561.90	0.023
T15	59.1667 - 39.1667	1	5'	4'9"	228.0	30.000	0.7854	229.12	23561.90	0.010*
T16	39.1667 - 19.1667	1	5'	4'9"	228.0	30.000	0.7854	412.39	23561.90	0.018
T17	19.1667 - 14.3958	1 1/4	5'	4'9"	182.4	30.000	1.2272	728.27	36815.50	0.020
T18	14.3958 - 11.8125	7/8	5'	4'9"	260.6	30.000	0.6013	961.99	18039.60	0.053*

* DL controls

Top Girt Bending Design Data

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	311.333 - 310.333	6x1	-728.60	1.457	27.000	0.054	-22.85	0.274	27.000	0.010
T2	310.333 - 299.167	1 1/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T4	279.167 - 259.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T5	259.167 - 239.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T6	239.167 - 219.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T7	219.167 - 199.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T8	199.167 - 179.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T9	179.167 - 159.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T10	159.167 - 139.167	1 1/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T11	139.167 - 119.167	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T12	119.167 - 99.1667	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T13	99.1667 - 79.1667	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T14	79.1667 - 59.1667	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T15	59.1667 - 39.1667	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T16	39.1667 - 19.1667	1	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T17	19.1667 - 14.3958	1 1/4	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000
T18	14.3958 - 11.8125	7/8	0.00	0.000	37.500	0.000	0.00	0.000	37.500	0.000

Top Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	311.333 - 310.333	6x1	0.001	0.054	0.010	0.065 ✓	1.333	H2-1 ✓
T2	310.333 - 299.167	1 1/4	0.004	0.000	0.000	0.004 ✓	1.333	H2-1 ✓
T4	279.167 - 259.167	1	0.005	0.000	0.000	0.005 ✓	1.333	H2-1 ✓
T5	259.167 - 239.167	1	0.010	0.000	0.000	0.010 ✓	1.333	H2-1 ✓
T6	239.167 - 219.167	1	0.013	0.000	0.000	0.013 ✓	1.333	H2-1 ✓
T7	219.167 - 199.167	1	0.029	0.000	0.000	0.029 ✓	1.333	H2-1 ✓
T8	199.167 - 179.167	1	0.017	0.000	0.000	0.017 ✓	1.333	H2-1 ✓
T9	179.167 - 159.167	1	0.010	0.000	0.000	0.010 ✓	1.333	H2-1 ✓
T10	159.167 - 139.167	1 1/4	0.016	0.000	0.000	0.016 ✓	1.333	H2-1 ✓
T11	139.167 - 119.167	1	0.037	0.000	0.000	0.037 ✓	1.333	H2-1 ✓
T12	119.167 - 99.1667	1	0.008	0.000	0.000	0.008* ✓	1.000	H2-1 ✓
T13	99.1667 - 79.1667	1	0.035	0.000	0.000	0.035 ✓	1.333	H2-1 ✓
T14	79.1667 - 59.1667	1	0.023	0.000	0.000	0.023 ✓	1.333	H2-1 ✓
T15	59.1667 - 39.1667	1	0.010	0.000	0.000	0.010* ✓	1.000	H2-1 ✓
T16	39.1667 - 19.1667	1	0.018	0.000	0.000	0.018 ✓	1.333	H2-1 ✓
T17	19.1667 - 14.3958	1 1/4	0.020	0.000	0.000	0.020 ✓	1.333	H2-1 ✓
T18	14.3958 - 11.8125	7/8	0.053	0.000	0.000	0.053* ✓	1.000	H2-1 ✓

* DL controls

Bottom 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 $\frac{P}{P_a}$
T2	310.333 - 299.167	1 1/4	5'	4'9-1/4"	183.2	30.000	1.2272	4263.26	36815.50	0.116*
T3	299.167 - 279.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	152.25	23561.90	0.006
T4	279.167 - 259.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	257.58	23561.90	0.011
T5	259.167 - 239.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	648.37	23561.90	0.028
T6	239.167 - 219.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	861.20	23561.90	0.037
T7	219.167 - 199.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	515.49	23561.90	0.022
T8	199.167 - 179.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	153.04	23561.90	0.006*
T9	179.167 - 159.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	550.49	23561.90	0.023
T10	159.167 - 139.167	1 1/4	5'	4'9"	182.4	30.000	1.2272	1145.62	36815.50	0.031
T11	139.167 - 119.167	1	5'	4'9"	228.0	30.000	0.7854	386.65	23561.90	0.016
T12	119.167 - 99.1667	1	5'	4'9"	228.0	30.000	0.7854	729.70	23561.90	0.031
T13	99.1667 - 79.1667	1	5'	4'9"	228.0	30.000	0.7854	569.78	23561.90	0.024
T14	79.1667 - 59.1667	1	5'	4'9"	228.0	30.000	0.7854	357.61	23561.90	0.015
T15	59.1667 - 39.1667	1	5'	4'9"	228.0	30.000	0.7854	260.23	23561.90	0.011*
T16	39.1667 - 19.1667	1	5'	4'9"	228.0	30.000	0.7854	466.43	23561.90	0.020
T21	7.14583 - 1.17708	6x3/4	5-5/32"	2-5/32"	9.8	21.600	4.5000	6413.79	97200.00	0.066*

* DL controls

Mid 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 $\frac{P}{P_a}$
T3	299.167 - 279.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	106.96	23561.90	0.005*
T4	279.167 - 259.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	114.43	23561.90	0.005*

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 $\frac{P}{P_a}$
T5	259.167 - 239.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	122.12	23561.90	0.005*
T6	239.167 - 219.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	2268.86	23561.90	0.096*
T7	219.167 - 199.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	225.01	23561.90	0.010*
T8	199.167 - 179.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	238.10	23561.90	0.010*
T9	179.167 - 159.167	1	5'	4'9-1/4"	229.0	30.000	0.7854	250.57	23561.90	0.011*
T10	159.167 - 139.167	1 1/4	5'	4'9"	182.4	30.000	1.2272	2677.98	36815.50	0.073*
T11	139.167 - 119.167	1	5'	4'9"	228.0	30.000	0.7854	490.92	23561.90	0.021
T12	119.167 - 99.1667	1	5'	4'9"	228.0	30.000	0.7854	378.65	23561.90	0.016*
T13	99.1667 - 79.1667	1	5'	4'9"	228.0	30.000	0.7854	4483.07	23561.90	0.190*
T14	79.1667 - 59.1667	1	5'	4'9"	228.0	30.000	0.7854	442.72	23561.90	0.019*
T15	59.1667 - 39.1667	1	5'	4'9"	228.0	30.000	0.7854	459.04	23561.90	0.019*
T16	39.1667 - 19.1667	1	5'	4'9"	228.0	30.000	0.7854	475.83	23561.90	0.020*
T17	19.1667 - 14.3958	7/8	5'	4'9"	260.6	30.000	0.6013	878.37	18039.60	0.049*

* DL controls

Redundant Horizontal (1) 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 $\frac{P}{P_a}$
T19	11.8125 - 9.47917	7/8	1'3"	1'1-9/16"	61.7	30.000	0.6013	1151.26	18039.60	0.064*
T20	9.47917 - 7.14583	7/8	1'3"	1'1-9/16"	61.7	30.000	0.6013	1789.99	18039.60	0.099*

* DL controls

Redundant Diagonal (1) 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 $\frac{P}{P_a}$
T20	9.47917 -	7/8	1'8-17/32"	1'6-15/32"	84.4	30.000	0.6013	774.46	18039.60	0.043*

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 P / P_a
	7.14583									✓

* DL controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T1	311.333 - 310.333	Leg	2 3/4	1	-10437.10	226136.78	14.8	Pass
		Top Girt	6x1	6	-130.48	30366.94	4.9	Pass
T2	310.333 - 299.167	Leg	2 3/4	8	-19543.90	195896.34	10.0	Pass
							11.6 (b)	
		Diagonal	7/8	23	-1422.85	9591.29	14.8	Pass
		Top Girt	1 1/4	10	-318.77	14854.02	2.1	Pass
		Bottom Girt	1 1/4	15	4263.26	36815.50	11.6	Pass
		Guy A@299.802	13/16	981	17473.30	40000.00	43.7	Pass
		Guy B@299.802	13/16	980	18773.50	40000.00	46.9	Pass
		Guy C@299.802	13/16	979	17574.40	40000.00	43.9	Pass
T3	299.167 - 279.167	Leg	2 3/4	41	-19276.30	203713.05	9.5	Pass
							9.6 (b)	
		Diagonal	7/8	95	-1702.06	10204.74	16.7	Pass
		Top Girt	1	45	-1763.19	6084.21	29.0	Pass
		Bottom Girt	1	47	-38.42	6084.21	0.6	Pass
		Mid Girt	1	50	106.96	23561.90	0.5	Pass
T4	279.167 - 259.167	Leg	2 3/4	101	-15896.60	152823.00	10.4	Pass
							11.4 (b)	
		Diagonal	7/8	115	-1177.88	10204.74	11.5	Pass
		Top Girt	1	103	-63.50	6084.21	1.0	Pass
		Bottom Girt	1	108	-182.35	6084.21	3.0	Pass
		Mid Girt	1	110	114.43	23561.90	0.5	Pass
T5	259.167 - 239.167	Leg	2 3/4	161	-31660.90	203713.05	15.5	Pass
							18.8 (b)	
		Diagonal	7/8	173	-2534.23	10204.74	24.8	Pass
		Top Girt	1	165	-157.43	6084.21	2.6	Pass
		Bottom Girt	1	168	-712.92	6084.21	11.7	Pass
		Mid Girt	1	169	122.12	23561.90	0.5	Pass
T6	239.167 - 219.167	Leg	2 3/4	221	-42022.40	203713.05	20.6	Pass
		Diagonal	7/8	237	-2919.17	10204.74	28.6	Pass
		Top Girt	1	225	-718.48	6084.21	11.8	Pass
		Bottom Girt	1	226	-402.36	6084.21	6.6	Pass
		Mid Girt	1	230	2268.86	23561.90	9.6	Pass
		Guy A@230.177	7/8	984	19669.90	46000.00	42.8	Pass
		Guy B@230.177	7/8	983	21028.80	46000.00	45.7	Pass
		Guy C@230.177	7/8	982	19699.60	46000.00	42.8	Pass
T7	219.167 - 199.167	Leg	2 3/4	281	-30521.70	152823.00	20.0	Pass
							21.5 (b)	
		Diagonal	7/8	339	-2674.13	10204.74	26.2	Pass
		Top Girt	1	285	-603.70	6084.21	9.9	Pass
		Bottom Girt	1	286	-241.94	6084.21	4.0	Pass
		Mid Girt	1	290	225.01	23561.90	1.0	Pass
T8	199.167 - 179.167	Leg	2 3/4	341	-32468.00	152823.00	21.2	Pass
							23.2 (b)	
		Diagonal	7/8	397	-1883.86	10204.74	18.5	Pass
		Top Girt	1	345	-371.63	6084.21	6.1	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
		Bottom Girt	1	348	153.04	23561.90	0.6	Pass
		Mid Girt	1	349	238.10	23561.90	1.0	Pass
T9	179.167 - 159.167	Leg	2 3/4	400	-35602.90	152823.00	23.3	Pass
		Diagonal	7/8	413	-2498.06	10204.74	24.5	Pass
		Top Girt	1	404	-79.24	6084.21	1.3	Pass
		Bottom Girt	1	406	-437.96	6084.21	7.2	Pass
		Mid Girt	1	409	250.57	23561.90	1.1	Pass
T10	159.167 - 139.167	Leg	3	461	-45539.40	185200.00	24.6	Pass
							30.2 (b)	
		Diagonal	1	477	-3721.01	16737.01	22.2	Pass
		Top Girt	1 1/4	463	-903.55	14984.65	6.0	Pass
		Bottom Girt	1 1/4	467	-645.31	14984.65	4.3	Pass
		Mid Girt	1 1/4	469	2677.98	36815.50	7.3	Pass
		Guy A@150.177	13/16	987	18088.60	40000.00	45.2	Pass
		Guy B@150.177	13/16	986	18915.50	40000.00	47.3	Pass
		Guy C@150.177	13/16	985	18042.60	40000.00	45.1	Pass
T11	139.167 - 119.167	Leg	3	521	-48468.70	178327.00	27.2	Pass
							35.9 (b)	
		Diagonal	7/8	579	-3395.51	10294.45	33.0	Pass
		Top Girt	1	525	-598.95	6137.69	9.8	Pass
		Bottom Girt	1	527	-121.94	6137.69	2.0	Pass
		Mid Girt	1	529	490.92	31408.01	1.6	Pass
T12	119.167 - 99.1667	Leg	3	581	-52225.80	178327.00	29.3	Pass
							35.5 (b)	
		Diagonal	7/8	593	-3033.85	10294.45	29.5	Pass
		Top Girt	1	583	185.07	23561.90	0.8	Pass
		Bottom Girt	1	586	-452.23	6137.69	7.4	Pass
		Mid Girt	1	589	378.65	23561.90	1.6	Pass
T13	99.1667 - 79.1667	Leg	3	641	-59543.20	178327.00	33.4	Pass
							40.4 (b)	
		Diagonal	7/8	695	-3166.48	10294.45	30.8	Pass
		Top Girt	1	645	-549.96	6137.69	9.0	Pass
		Bottom Girt	1	647	-342.60	6137.69	5.6	Pass
		Mid Girt	1	649	4483.07	23561.90	19.0	Pass
		Guy A@89.1667	3/4	990	14579.00	34000.00	42.9	Pass
		Guy B@89.1667	3/4	989	15266.50	34000.00	44.9	Pass
		Guy C@89.1667	3/4	988	14614.20	34000.00	43.0	Pass
T14	79.1667 - 59.1667	Leg	3	701	-61689.50	178327.00	34.6	Pass
							44.7 (b)	
		Diagonal	7/8	759	-2317.90	10294.45	22.5	Pass
		Top Girt	1	705	-198.85	6137.69	3.2	Pass
		Bottom Girt	1	707	-78.81	6137.69	1.3	Pass
		Mid Girt	1	709	442.72	23561.90	1.9	Pass
T15	59.1667 - 39.1667	Leg	3	761	-63716.20	178327.00	35.7	Pass
							45.9 (b)	
		Diagonal	7/8	819	-1390.35	10294.45	13.5	Pass
		Top Girt	1	763	229.12	23561.90	1.0	Pass
		Bottom Girt	1	768	260.23	23561.90	1.1	Pass
		Mid Girt	1	769	459.04	23561.90	1.9	Pass
T16	39.1667 - 19.1667	Leg	3	821	-65623.10	178327.00	36.8	Pass
							44.3 (b)	
		Diagonal	7/8	832	-1804.55	10294.45	17.5	Pass
		Top Girt	1	824	412.39	31408.01	1.3	Pass
		Bottom Girt	1	828	466.43	31408.01	1.5	Pass
		Mid Girt	1	829	475.83	23561.90	2.0	Pass
T17	19.1667 - 14.3958	Leg	3	881	-65809.70	178327.00	36.9	Pass
		Diagonal	1	895	-2191.19	16789.13	13.1	Pass
		Top Girt	1 1/4	883	728.27	49075.06	1.5	Pass
		Mid Girt	7/8	887	878.37	18039.60	4.9	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T18	14.3958 - 11.8125	Leg	3	902	-65437.20	178327.00	36.7	Pass
		Diagonal	1	908	-2195.96	16295.52	13.5	Pass
		Top Girt	7/8	905	961.99	18039.60	5.3	Pass
T19	11.8125 - 9.47917	Leg	3	914	-66468.20	178327.00	37.3	Pass
		Diagonal	1 1/4	919	-2180.76	28639.64	7.6	Pass
		Horizontal	6x3/4	921	-1151.26	9695.17	11.9	Pass
		Redund Horz 1 Bracing	7/8	920	-1151.26	13483.20	8.5	Pass
T20	9.47917 - 7.14583	Leg	3	932	-65375.60	178327.00	36.7	Pass
		Diagonal	1 1/4	935	-2861.25	28639.64	10.0	Pass
		Horizontal	6x3/4	934	-1396.88	9695.17	14.4	Pass
		Redund Horz 1 Bracing	7/8	946	1789.99	18039.60	9.9	Pass
		Redund Diag 1 Bracing	7/8	947	-1246.97	11236.50	11.1	Pass
T21	7.14583 - 1.17708	Leg	3	956	-74695.90	176144.00	42.4	Pass
		Diagonal	1 1/4	964	-8819.23	22002.80	40.1	Pass
		Horizontal	6x3/4	958	7169.36	97200.00	7.4	Pass
		Bottom Girt	6x3/4	962	6413.79	97200.00	6.6	Pass
							Summary	
							Leg (T15)	45.9	Pass
							Diagonal (T21)	40.1	Pass
							Horizontal (T20)	14.4	Pass
							Top Girt (T3)	29.0	Pass
							Bottom Girt (T5)	11.7	Pass
							Mid Girt (T13)	19.0	Pass
							Redund Horz 1 Bracing (T20)	9.9	Pass
							Redund Diag 1 Bracing (T20)	11.1	Pass
							Guy A (T10)	45.2	Pass
							Guy B (T10)	47.3	Pass
							Guy C (T10)	45.1	Pass
							Bolt Checks	45.9	Pass
							RATING =	**47.3**	**Pass**

APPENDIX B

COAX CONFIGURATION

TOWER ENGINEERING PROFESSIONALS

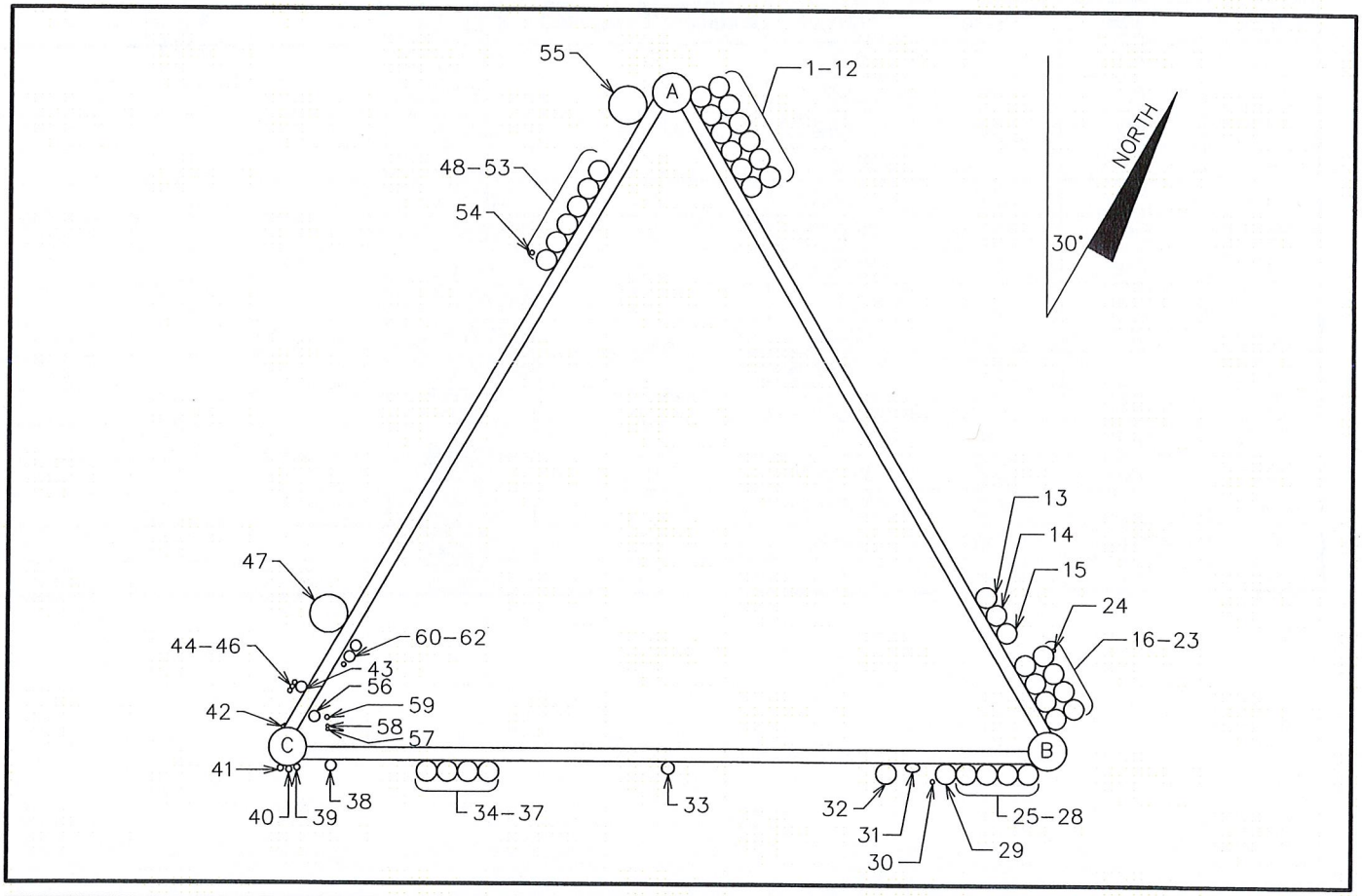
TOWER MAPPING

Site Name WEST HARTFORD

TEP # 112343

Client # GRAIN COMMUNICATIONS

TRANSMISSION CABLES



Coax #	Type	Size	Height	Existing/Proposed	Carrier	Notes
1-12	FH	1 5/8	113'-111'	EXISTING	AT&T	
13	FH	1 5/8	113'-142.5'	EXISTING	N/A	
14	FH	1 5/8	113'-140.5'	EXISTING	BLDG 2	
15	FH	1 5/8	113'-145'	EXISTING	HAM	
16-23	FH	1 5/8	113'-160'	EXISTING	T-MOBILE	
24	SM	1/4	113'-160'	EXISTING	T-MOBILE	
25-28	FH	1 5/8	113'-128'	PROPOSED	VERIZON	
29	FH	1 5/8	113'-251.75'	EXISTING	UNKNOWN	
30	SM	3/8	113'-251.75'	EXISTING	UNKNOWN	
31	EW	1 1/8" x 1 1/16"	113'-196'	EXISTING	UNKNOWN	
32	FH	1 5/8	113'-180'	EXISTING	UNKNOWN	
33	MC	1"Ø	111'-310'	EXISTING	OWNER	LIGHTS
34-37	FH	1 5/8	113'-128'	PROPOSED	VERIZON	
38	FH	7/8	113'-261'	EXISTING	MASTER COMBINER	
39	FH	1/2	113'-164.5'	EXISTING	91.9 FM	

TOWER ENGINEERING PROFESSIONALS

TOWER MAPPING
Site Name WEST HARTFORD
TEP # 112343
Client # GRAIN COMMUNICATIONS

TRANSMISSION CABLES (CONTINUED)

Coax #	Type	Size	Height	Existing/Proposed	Carrier	Notes
40	FH	1/2	13'-213'	31	COMBINER	
41	FH	1/2	13'-21'	1	HAM RADIO	
42	RB	1/4	13'-136.5'	APT 3	UPPER SKIRT CONTROL BOX	
43	FH	7/8	13'-235'	36	WCCC	
44	SM	3/8	13'-146.5'	24	SNEW 158	
45-46	SM	3/8	13'-220'	34	SNEW 158	
47	FH	3"Ø	13'-332'	41	WCCC	
48-53	FH	1 5/8	13'-120.5'	12-14	METRO PCS	
54	SM	3/8	13'-48'	2	METRO PCS	
55	FH	3"Ø	13'-297.5'	40	WHCT CH38	
56	FH	7/8	13'-243'	APPURT 5 & ANT 37	TOWN OF W HARTFORD	
57-58	SM	1/4	13'-232'	35	TOWN OF W HARTFORD	
59	SM	3/8	13'-232'	35	TOWN OF W HARTFORD	
60	FH	7/8	13'-243'	APPURT 5 & ANT 37	TOWN OF W HARTFORD	
61	FH	1 5/8	13'-220'	32	TOWN OF W HARTFORD	
62	FH	1 5/8	13'-165'	28	TOWN OF W HARTFORD	

APPENDIX C

ADDITIONAL CALCULATIONS

Project Name:	West Hartford	Engineer:	WAJ
Project Number:	TEP# 112343 - Rev 2	Check:	REG
Client Site Number:	0101-CT-000101	Date:	07/26/12

Input:

Foundation:

Pier Shape:	Round	
d:	3.50	ft - pier diameter
L:	2.50	ft - pier length
l:	0.50	ft - pier extension above grade
B:	8.00	ft - width of pad
t:	2.00	ft - thickness of pad
γ_c:	150.00	pcf - unit weight of concrete
γ_w:	62.40	pcf - unit weight of water

Code: TIA-F

Loads:

P:	207.41	kip - maximum axial reaction
V:	4.16	kip - maximum shear reaction

Soil:

t_1:	1.50	ft - thickness of soil layer (t/ pad)
γ_1:	105.00	pcf - effective unit weight of soil
ϕ_1:	30.00	deg - friction angle of soil layer
t_2:	0.50	ft - thickness of soil layer
γ_2:	105.00	pcf - effective unit weight of soil
ϕ_2:	30.00	deg - friction angle of soil layer
t_3:		ft - thickness of soil layer
γ_3:		pcf - effective unit weight of soil
ϕ_3:		deg - friction angle of soil layer
t_4:		ft - thickness of soil layer
γ_4:		pcf - effective unit weight of soil
ϕ_4:		deg - friction angle of soil layer
t_5:		ft - thickness of soil layer
γ_5:		pcf - effective unit weight of soil
ϕ_5:		deg - friction angle of soil layer
q_{ult}:	16.00	ksf - ultimate end bearing capacity
FS:	2.00	- factor of safety for bearing
Net?	No	
f_s:	0.00	ksf - ultimate skin friction on sides of pad
μ:	0.00	- friction factor along base of foundation
F_{lat}:	315.00	psf - ultimate lateral resistance per foot
D_w:	99.00	ft - depth to water table

Bearing Capacity:

Foundation is Adequate in Bearing 45.6%

q_{max}:	3.64	ksf
q_{all}:	8.00	ksf

Lateral Capacity:

Foundation is Adequate in Lateral 55.1%

V:	4.16	kip
V_{all}:	7.56	kip

Project Name:	West Hartford	Engineer:	WAJ
Project Number:	TEP# 112343 - Rev 2	Check:	REG
Client Site Number:	0101-CT-000101	Date:	7/26/2012

Input:

Concrete pad:

f'_c:	3000.00	psi - concrete compressive strength
f_y:	60.00	ksi - yield strength of reinforcing steel
cover:	3.00	in - clear cover to reinforcement
R/F:	5	- bar size for flexural reinforcement
Qty. of R/F:	12	- quantity of reinforcing bars
A_s:	3.72	in^2 - quantity of reinforcing bars
α:	40.00	- 40 for interior columns
β:	1.00	- ratio of long side to short side (pier)
β:	0.85	- concrete strength ratio
ε_c:	0.003	- maximum concrete strain (typically 0.003)
ϕ_v:	0.75	- strength reduction factor for shear per ACI318
ϕ_f:	0.9	- strength reduction factor for flexure per ACI318
LF:	1.30	- load factor for TIA-F

Shear Capacity:

Foundation is Adequate in Shear 19.1%

V_u:	125.38	kip - ultimate punching shear
ϕV_c:	656.05	kip - punching shear resistance
V_u:	20.65	kip - ultimate one-way shear
ϕV_c:	160.70	kip - one-way shear resistance

Flexural Capacity:

Foundation is Adequate in Flexure 28.9%

M_{max}:	93.24	kip-ft
$\phi_f M_n$:	322.98	kip-ft

Deadman Anchor Analysis: A, B, C - Inner

Project Name: West Hartford
Job #: TEP# 112343 Rev 2
Client: Grain Communications
Analysis by: WAJ
Checked by: REG
Code: TIA - F

Anchor Block is Adequate for Uplift	48.9%
Anchor Block is Adequate for Lateral	64.8%

Loads

U_{max}: 44.74 kips - maximum uplift reaction
H_{max}: 56.02 kips - maximum horizontal reaction

Capacity

U_{all}: 91.58 kips - allowable uplift
H_{all}: 86.48 kips - allowable horizontal

Foundation Input

Guy Path: A, B, C
Anchor Ring: Inner

W_b: 4.00 ft - width of anchor block
L_b: 20.50 ft - length of anchor block
T_b: 3.75 ft - thickness of anchor block
d: 6.25 ft - depth from t/ grade to t/ anchor block
b: 10.00 ft - depth from t/ grade to b/ anchor block

Ultimate Soil Properties

D_w: 99.00 ft - depth from t/ grade to water table

Geotechnical Firm:
Report:
Date:
Notes:

Layer	Begin (ft)	End (ft)	ϕ Friction Angle (deg)	c Ult. Cohesion (psf)	γ Eff. Unit Weight (pcf)	f_s Ult. Skin Friction (ksf)	μ Friction Factor
1	0.00	10.00	28.00	0.00	100.00	0.00	0.00
2							
3							
4							
5							
6							

Analysis Criteria

Uplift:

F_{s_sides}=	0.00	Yes
F_{s_front}=	0.00	Yes
F_{s_back}=	0.00	No

Horizontal:

F_{s_sides} =	0.00	Yes
F_{s_top} =	0.00	No
F_{s_bottom} =	0.00	No
$F_{\perp} \cdot \mu$ =	0.00	Yes

Project Name:	West Hartford	**Engineer:**	WAJ
Project Number:	TEP# 112343 Rev 2	**Check:**	REG
Client Site Number:	0101-CT-000101	**Date:**	07/26/12

PiRod Leg Splice Connections

Input - Properties

Elevation:	160	ft - elevation of leg splice connection
F_y:	50.00	ksi - yield stress of leg
F_u:	65.00	ksi - tensile stress of leg
D_t:	2.75	in - diameter of leg above splice
D_b:	3.00	in - diameter of leg below splice
d_{bolt}:	0.875	in - bolt diameter
Type:	A325-N	- bolt type (X - threads excluded, N - threads included)
n:	5	- number of bolts

Input - Loads

Code:	TIA-F	- select version of the TIA
T_u:		kips - maximum leg tension load
P_u:	35.60	kips - maximum leg compression load
ASIF:	1.33	- stress increase factor
U:	1.00	- shear lag coefficient
ϕ_t:	0.90	< = = DISREGARD
ϕ_t:	0.75	< = = DISREGARD
ϕ_b:	0.75	< = = DISREGARD

Leg Capacity:

2.75 inch diameter leg above splice

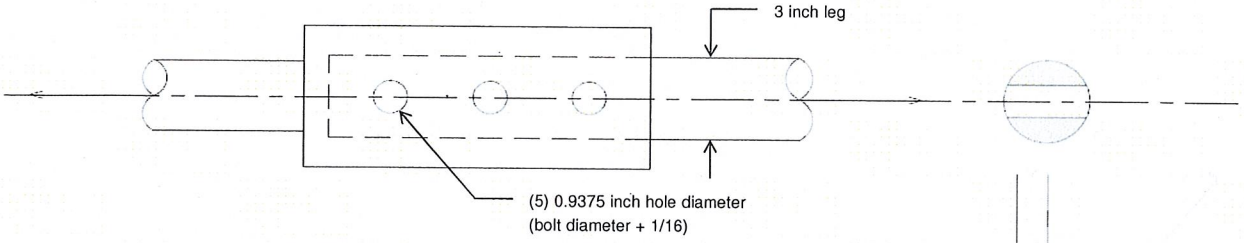
Gross Allowable Tension = ASIF(0.6)(Fy)(Ag) = 1.333(0.6)(50 ksi)(5.9396 in2) = **237.58** kips

3 inch diameter leg below splice

An = Net Area = (Db/2)^2(θ - sin(θ)) = 4.30 in²

Gross Allowable Tension = ASIF(0.6)(Fy)(Ag) = 1.333(0.6)(50 ksi)(7.0686 in2) = 282.74 kips

Net Allowable Tension = ASIF(0.5)(U)(Fu)(An) = 1.333(0.5)(1)(65 ksi)(4.3026 in2) = **186.44** kips



Bolt Capacity:

Allowable Load = (1.333)(21 ksi)(0.601 in2)(5)(2 shear planes) = **168.37** kips

Summary:

		Stress Ratio
Leg Above Tension:	**0.00 < 237.58 (Pass)**	0.0%
Leg Below Tension:	**0.00 < 186.44 (Pass)**	0.0%
Leg Compression:	**35.60 < 168.37 (Pass)**	**21.1%**
Leg Splice Bolts:	**35.60 < 168.37 (Pass)**	**21.1%**