STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051
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E-Mail: siting.council@po.state.ct.us
www.ct.gov/csc

December 2, 2004

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597

RE: **EM-VER-158-041115** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 880 Post Road East, Westport, Connecticut.

Dear Attorney Baldwin:

At a public meeting held on December 1, 2004, the Connecticut Siting Council (Council) acknowledged your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies.

The proposed modifications are to be implemented as specified here and in your notice dated November 15, 2004, including the placement of all necessary equipment and shelters within the tower compound. 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. 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. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

Pamela B. Katz, P.E.
Chairman

PBK/laf

c: The Honorable Diane G. Farrell, First Selectwoman, Town of Westport
Katherine Barnard, Director, Planning & Zoning, Town of Westport
Brian Benito, Bureau of Police Support, Telecommunications
Christopher B. Fisher, Esq., Cuddy & Feder LLP
Michele G. Briggs, Southwestern Bell Mobile Systems, LLC
Stephen J. Humes, Esq., McCarter & English, LLP

ROBINSON & COLE LLP

EM-VER-158-041115

KENNETH C. BALDWIN

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November 15, 2004

Via Hand Delivery

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

Re: **Notice of Exempt Modification- Microwave Antenna Replacement**
Connecticut State Police Tower, 880 Post Road East
Westport, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains a wireless telecommunication facility on the Connecticut State Police tower at 880 Post Road East, Westport, Connecticut. The Cellco facility consists of twelve (12) panel antennas at the 155-foot level and a microwave dish antenna at the 177-foot level of the 180-foot tower. Equipment associated with the antennas is located on the ground near the base of the tower.

The Connecticut Siting Council ("the Council") approved this facility in Docket No. 123. Cellco now intends to replace the existing microwave dish antenna and relocate it to the 170-foot level of the tower. (See Tab 1- Microwave Antenna Specification Sheet).

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 the Westport First Selectwoman, Diane Goss Farrell.

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

1. The proposed modification will not increase the overall height of the existing tower. Cellco's replacement microwave antenna will be mounted at the 170-foot level on the 180-foot tower.

2. The proposed replacement of the microwave antenna will not require an extension of the site boundaries.

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

4. The operation of the replacement antennas will not increase radio frequency (RF) power density levels at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. Pursuant to the FCC RF Exposure Compliance Assessment and Report prepared by Pinnacle Telecom Group, the RF levels at the site will remain significantly below FCC Standards. A copy of the report is included behind Tab 2.

Also included behind Tab 3 is a Structural Analysis Summary, prepared by URS Corporation, verifying that the tower can accommodate the proposed microwave antenna replacement and related equipment.

For the foregoing reasons, Cellco respectfully submits that the proposed microwave antenna replacement at the Westport facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

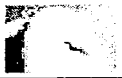
Kenneth C. Baldwin

Attachments
cc: Diane Goss Farrell, First Selectwoman
Sandy M. Carter

Refer to page 75 for Elliptical Waveguide ordering information

*6.425 - 7.125 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in² (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** - TEGLAR Long Life Radome Included – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
UHX6-65	6 (1.8)	1717 1718	A	B	–	3	2	39.1	39.5	40.0	1.7	30	70	1.06 (30.7)
UHX8-65	8 (2.4)	2581 2584	A	A	–	3	2	41.6	42.0	42.4	1.3	30	76	1.06 (30.7)
UHX10-65	10 (3.0)	2582 2583	A	A	–	3	2	43.6	44.0	44.4	1.0	32	80	1.06 (30.7)
UHX12-65	12 (3.7)	1715 1716	A	A	–	3	2	45.2	45.7	46.1	0.9	38	78	1.06 (30.7)
UHX15-65	15 (4.6)	1709 1710	A	A	–	2	2	46.6	46.9	47.3	0.7	30	75	1.06 (30.7)
HSX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
HSX6-64	6 (1.8)	2454 2452	A	A	–	3	2	39.1	39.6	40.0	1.7	40	70	1.07 (29.4)
HSX8-64	8 (2.4)	2456 2458	A	A	–	3	2	41.6	42.0	42.4	1.3	40	75	1.06 (30.7)
HSX10-64	10 (3.0)	2461 2459	A	A	–	3	2	43.2	43.6	44.0	1.0	40	77	1.06 (30.7)
HSX12-64	12 (3.7)	2470 2471	A	A	–	3	2	45.2	45.7	46.1	0.8	40	78	1.06 (30.7)
HSX15-64	15 (4.6)	2488 2486	A	A	–	3	2	46.9	47.4	47.8	0.7	40	79	1.06 (30.7)
HPX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
HPX4-65	4 (1.2)	2649	–	–	–	2	2	35.4	35.9	36.3	2.7	30	58	1.08 (28.3)
HPX6-65	6 (1.8)	2794	B	B	–	2	2	39.1	39.5	39.9	1.7	30	64	1.07 (29.4)
HPX8-65	8 (2.4)	2654	A	A	–	2	2	41.6	42.0	42.4	1.3	34	68	1.06 (30.7)
HPX10-65	10 (3.0)	2655	A	A	–	3	2	43.6	44.0	44.4	1.0	34	70	1.06 (30.7)
HPX12-65	12 (3.7)	2656	A	A	–	2	2	45.0	45.4	45.9	0.8	30	71	1.06 (30.7)
HPX15-65	15 (4.6)	2657	A	A	–	2	2	46.6	46.9	47.3	0.7	30	71	1.06 (30.7)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR137G and PDR70													
HP4-65	4 (1.2)	1081B	–	–	–	2	2	35.5	36.0	36.4	2.7	30	58	1.08 (28.3)
HP6-65	6 (1.8)	1700J	A	A	–	2	2	39.4	39.8	40.2	1.7	30	64	1.06 (30.7)
HP8-65	8 (2.4)	2696F	A	A	–	2	2	41.9	42.3	42.8	1.3	30	66	1.06 (30.7)
HP10-65	10 (3.0)	2690G	A	A	–	2	2	43.6	43.9	44.3	1.0	27	70	1.06 (30.7)
HP12-65	12 (3.7)	2691G	A	A	–	2	2	45.2	45.6	46.1	0.8	30	71	1.06 (30.7)
HP15-65	15 (4.6)	2692F	A	A	–	2	2	46.8	47.1	47.6	0.7	30	71	1.06 (30.7)
PARX **PAR** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PARX6-65**	6 (1.8)	4381	A	B	–	1	2	38.2	38.4	38.7	1.8	30	59	1.08 (28.3)
PARX8-65**	8 (2.4)	4382	A	A	–	1	2	40.9	41.2	41.3	1.3	30	60	1.08 (28.3)
PARX10-65	10 (3.0)	4383	A	A	–	1	2	43.3	43.6	44.0	1.1	35	60	1.06 (30.7)
PARX12-65	12 (3.7)	4384	A	A	–	1	2	45.1	45.5	45.9	0.9	35	60	1.06 (30.7)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PAR6-65**	6 (1.8)	1290	A	B	–	1	2	38.7	38.8	39.0	1.8	30	59	1.06 (30.7)
PAR8-65**	8 (2.4)	2570	A	A	–	1	2	41.0	41.3	41.6	1.3	30	60	1.06 (30.7)
PAR10-65	10 (3.0)	1257	A	A	–	1	2	43.4	43.6	43.8	1.0	30	63	1.06 (30.7)
PAR12-65	12 (3.7)	2430	A	A	–	1	2	44.9	45.3	45.5	0.8	30	64	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
* Multiband antennas available in this frequency band. See pages 93-94.
** Uses focal plane type reflector and feed system

Continued on next page

PINNACLE TELECOM GROUP
Consulting and Engineering Services

FCC RF EXPOSURE COMPLIANCE ASSESSMENT AND REPORT

PREPARED FOR

VERIZON WIRELESS

880 POST ROAD EAST
WESTPORT, CT

OCTOBER 5, 2004

14 RIDGEDALE AVENUE, SUITE 262 • CEDAR KNOLLS, NJ 07927 • 973-451-1630

Contents

Introduction and Summary

Verizon Wireless has asked Pinnacle Telecom Group to provide an independent expert assessment of potential radiofrequency (RF) exposure and compliance with federal RF safety limits, related to the replacement of, and changed mounting height for, a point-to-point microwave radio dish at an antenna site at 880 Post Road East (Unit 1) in Westport, CT.

The FCC requires all wireless system operators to perform an assessment of potential human exposure to radiofrequency (RF) fields whenever antenna operations are added or modified at a site, and to ensure compliance with the Maximum Permissible Exposure (MPE) limits in the FCC's regulations.

In this case, it should be noted that the FCC regulations "categorically exclude" point-to-point microwave radio antenna operations from the need for a specific demonstration of compliance. (See Appendix A.) Because of their common use of highly directional antennas and extremely low transmitter power, point-to-point microwave radio systems are well known to cause RF exposure levels that are insignificantly low – and, with that in mind, the FCC automatically considers such operations to be in compliance.

In this case, though, Verizon Wireless has requested a specific mathematical analysis, and the results here provide a clear demonstration that the RF levels are indeed insignificantly low and that the FCC is correct in excluding the RF emissions from point-to-point microwave systems from consideration as a potential RF safety risk.

The compliance assessment described herein employs a mathematical analysis of potential RF exposure levels that will be caused by the Verizon Wireless microwave dish antenna at ground level around the site. The analysis employs standard FCC formulas for predicting the effects of the antenna in a very conservative manner, intentionally overstating the RF levels that will actually occur in order to ensure great confidence in the conclusions regarding satisfaction of the RF compliance limit.

The result of the analysis is as follows:

- The calculated maximum potential RF exposure at ground level resulting from the microwave dish antenna operation is only 0.001 percent (i.e., 1/1000th of one percent) of the FCC limit for acceptable continuous exposure of the general population. That incremental contribution to the environment is immeasurably low, and it effectively has no impact on the RF levels in the area surrounding the site. Even directly in front of the antenna and at the same height, the maximum potential RF exposure level is only 1.03 percent of the same FCC limit.
- Therefore, for reasons related to the FCC categorical exclusion as well as the results of the mathematical analysis, the Verizon Wireless operation of a point-to-point microwave dish at this site is in clear compliance with the FCC regulations and RF exposure limits. Moreover, because of the conservatism employed in this compliance assessment, the RF levels that will actually be caused by the dish antenna operation will be even lower than the calculations here indicate.

The remainder of this report provides the following:

- technical data on the proposed point-to-point microwave dish operation;
- a description of the applicable FCC mathematical model for determining RF compliance, and application of the relevant data to that model; and
- analysis of the results, and a compliance conclusion for the site.

In addition, three Appendices are included. Appendix A provides background on the FCC limits for RF exposure. Appendix B provides a list of key FCC references on RF exposure and site compliance. Appendix C provides a summary of the qualifications of the expert certifying RF compliance in this case.

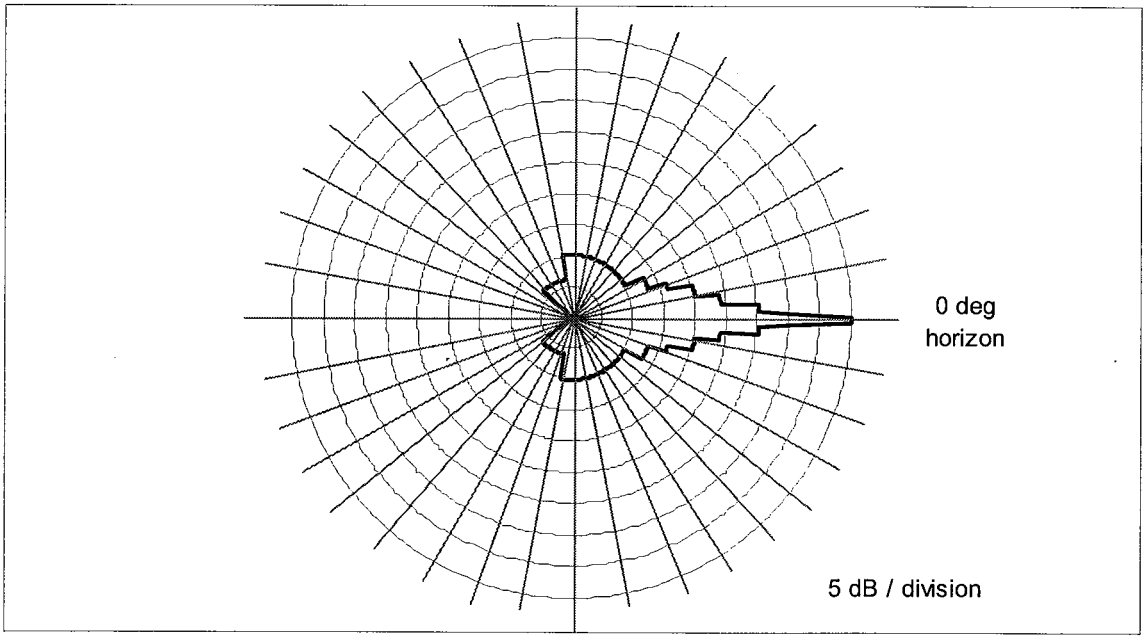
Technical Data

Relevant data for the proposed Verizon Wireless point-to-point microwave dish antenna operation at the site is summarized in the table below.

Technical Data	
Transmitting Frequency	6,805 MHz (6.805 GHz)
Antenna Centerline Height (AGL)	51.9 meters (170.23 feet)
Antenna Type	Parabolic Dish (6-foot diameter)
Antenna Manufacturer	Andrew Corp.
Antenna Model Number / Max. Gain	HP6-65 / 39.8 dBi
Effective Isotropically Radiated Power	64.1 dBm
Input Power to Antenna	270 milliwatts (0.270 watt)

Note that dish antennas are highly directional in terms of their radiated emissions, and the radiation pattern (vertical-plane discrimination relative to the antenna's main beam gain) represents a key factor in calculating RF levels and assessing compliance. A diagram illustrating the worst-case radiation pattern allowed by the FCC (see section 101.115 of the regulations) is shown below. Note that in these types of pattern diagrams, the antenna is effectively pointed at the three o'clock position, and the pattern is described in decibel units.

6 GHz Parabolic Dish Antenna – FCC "Standard B" Radiation Pattern



Technical Analysis

FCC Office of Engineering and Technology Bulletin 65 ("OET Bulletin 65"; see list of references in Appendix B) provides guidelines for computational models and their application to calculating potential exposure levels at various points around a wireless transmitting antenna. The computational models are intentionally very conservative, and significantly overestimate the potential exposure levels, and additional assumptions can be incorporated to make the calculations even more conservative. Thus, if the calculations demonstrate the MPE limits are still not exceeded even under extreme worst-case assumptions, there can be great confidence that no RF health hazard exists.

Potential RF exposure levels at street level have a direct relationship to input power to the antenna (which we will assume is constant and at its maximum), effective antenna gain in the direction of interest, and an assumed ground reflection factor (conservative assumed to be a "perfect" 100 percent). The levels are inversely proportional to the square of the distance from the antenna.

According to the FCC, the applicable formula for calculations of potential RF exposure levels is as follows:

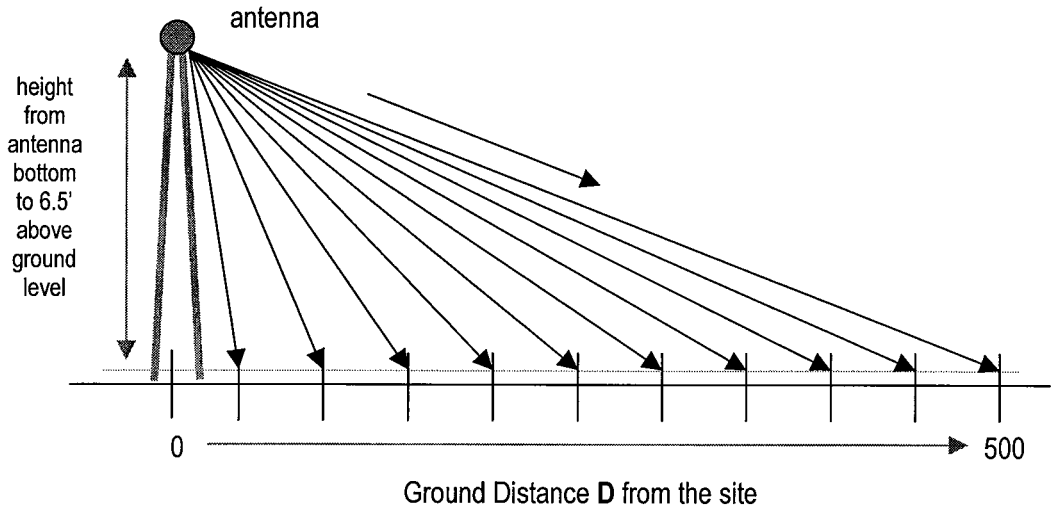
$$MPE\% = (100 * EIRP * 1000 * 10^{-AntDisc(a)} * 4) / (MPE * 4\pi * R^2 * 30.48^2)$$

where

MPE%	=	RF level expressed as a percentage of the applicable MPE limit
100	=	factor to convert to a percentage
EIRP	=	Max. effective radiated power per sector, in watts, a function of transmitter power per RF channel, channels per sector, line loss, and maximum effective antenna gain
1000	=	factor to convert watts into milliwatts
AntDisc(a)	=	numeric factor representing the antenna's downward angle discrimination of the point of interest
4 (in numerator)	=	the factor to account for a 100-percent-efficient energy reflection from the ground

MPE	=	MPE limit applicable to general public exposure at the frequency of interest, in this case 1.0 mW/cm2
R	=	straight-line distance to the point of interest, feet
30.48^2	=	factor to convert R from feet to centimeters (twice)

The MPE% calculations are performed out to a distance of 500 feet from the facility to points 6.5 feet (approximately two meters, the FCC-recommended standing height) off the ground, as illustrated in the diagram below.



At each distance point along the ground, an MPE% calculation is made and the results – expressed as a percentage of the FCC limit – are compared with 100 percent. Any calculated result exceeding 100 percent is, by definition, higher than the limit and represent non-compliance. If all results are below 100 percent, that indicates compliance with the federal regulations on controlling exposure.

Note that the following conservative methodology and assumptions are incorporated into the MPE% calculations:

1. The antenna is assumed to be operating continuously at maximum power.
2. The antenna is hypothetically assumed to be pointed directly overhead all points of interest at ground level, ignoring the effects of antenna pattern discrimination in the horizontal plane.
3. The worst-case permitted antenna radiation pattern is applied in the calculations.
4. The potential RF exposure at ground level is assumed to be 100-percent enhanced (increased) via a "perfect" field reflection from the ground itself.

The net result of these conservative assumptions is to intentionally overstate the potential exposure levels (versus that which will actually occur), and the purpose of this conservatism is to allow very "safe-side" conclusions about compliance.

The table on the next page provides the results of the MPE% calculations, with the maximum result highlighted in bold.

As indicated, the worst-case overall result at ground level is only 0.001 percent of the FCC limit – which is insignificantly low and effectively has no impact on the RF levels in the surrounding environment.

This is a natural result of the directionality of the antenna and the use of extremely low transmitter power. Indeed, when one calculates the power density right at the face of the antenna (dividing the power by the aperture surface area, and assuming perfect illumination efficiency), the result is only 1.03 percent of the same FCC RF exposure limit.

Ground Distance (ft)	Verizon Wireless Microwave Dish Ground-Level MPE%
0	**0.0010**
20	**0.0010**
40	**0.0010**
60	0.0009
80	0.0008
100	0.0008
120	0.0007
140	0.0006
160	0.0005
180	0.0005
200	0.0004
220	0.0004
240	0.0003
260	0.0003
280	0.0005
300	0.0005
320	0.0004
340	0.0004
360	0.0004
380	0.0003
400	0.0003
420	0.0003
440	0.0005
460	0.0005
480	0.0004
500	0.0004

Compliance Conclusion

The FCC RF exposure regulations have been constructed in such a manner that continuous human exposure to levels up to and including 100 percent of the MPE limit is considered acceptable and completely safe. The calculations presented here indicate that the maximum contribution of the point-to-point microwave dish antenna is only 0.001 percent of the FCC limit. (Even directly in front of the antenna, the RF level is only 1.03 percent of the same FCC limit.) These insignificantly low results provides not only clear evidence of compliance, but also helps explain why the FCC "categorically excludes" point-to-point microwave operations from the need for specific demonstrations of compliance like this one.

Certification

The undersigned hereby certifies as follows:

1. I have read and fully understand the FCC regulations concerning RF safety and the control of human exposure to RF fields (47 CFR 1.1301 *et seq*).
2. To the best of my knowledge, the statements and information disclosed in this report are true, complete and accurate.
3. The analysis of antenna RF compliance provided herein is consistent with the applicable FCC regulations, additional guidelines issued by the FCC, and industry practice.
4. The results of the analysis indicate that the RF exposure levels from the subject antenna are in full compliance with the FCC regulations concerning RF exposure.

Daniel J. Collins
Chief Technical Officer

10/5/04
Date

Appendix A: Background on the FCC RF Exposure Limits

As directed by the Telecommunications Act of 1996, the FCC has established limits for maximum continuous human exposure to RF fields.

The FCC maximum permissible exposure (MPE) limits represent the consensus of federal agencies and independent experts responsible for RF safety matters. Those agencies include the National Council on Radiation Protection and Measurements (NCRP), the Occupational Health and Safety Administration (OSHA), the National Institute for Occupational Safety and Health (NIOSH), the American National Standards Institute (ANSI), the Environmental Protection Agency (EPA), and the Food and Drug Administration (FDA). In formulating its guidelines, the FCC also considered input from the public and technical community – notably the Institute of Electrical and Electronics Engineers (IEEE).

The FCC's RF exposure guidelines are incorporated in Section 1.301 *et seq* of its Rules and Regulations (47 CFR 1.1301-1.1310). Those guidelines specify MPE limits for both occupational and general population exposure.

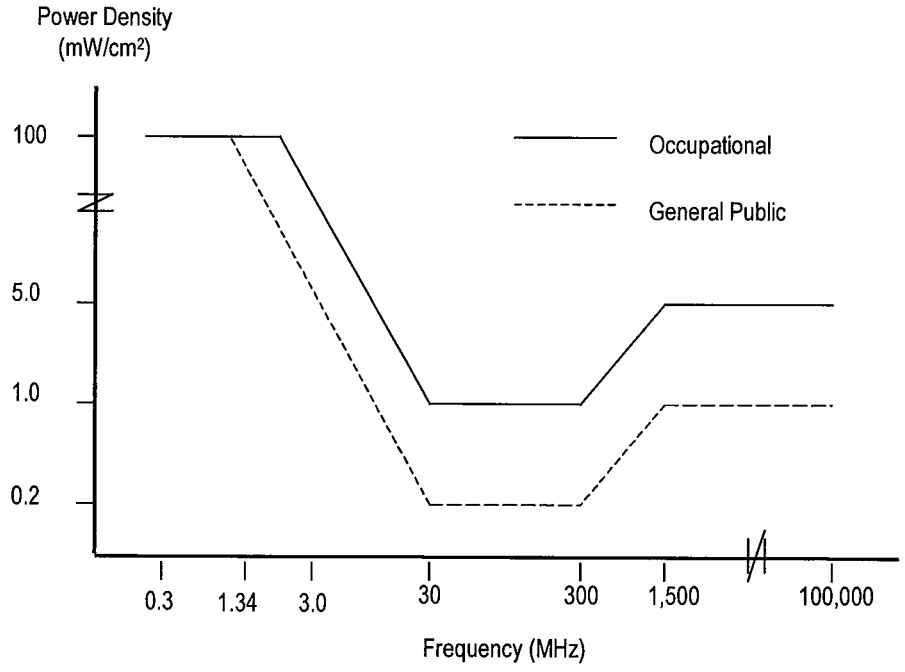
The specified continuous exposure MPE limits are based on known variation of human body susceptibility in different frequency ranges, and a Specific Absorption Rate (SAR) of 4 watts per kilogram, which is universally considered to accurately represent human capacity to dissipate incident RF energy (in the form of heat). The occupational MPE guidelines incorporate a safety factor of 10 or greater with respect to RF levels known to represent a health hazard, and an additional safety factor of five is applied to the MPE limits for general population exposure. Thus, the general population MPE limit has a built-in safety factor of more than 50. The limits were constructed to appropriately protect humans of both sexes and all ages and sizes and under all conditions – and continuous exposure at levels equal to or below the applicable MPE limits is considered to result in no adverse health effects or even health risk.

The reason for *two* tiers of MPE limits is based on an understanding and assumption that members of the general public are unlikely to have had appropriate RF safety training and may not be aware of the exposures they receive; occupational exposure in controlled environments, on the other hand, is assumed to involve individuals who have had such training, are aware of the exposures, and know how to maintain a safe personal work environment.

The FCC's RF exposure limits are expressed in two equivalent forms, using alternative units of field strength (expressed in volts per meter, or V/m), and power density (expressed in milliwatts per square centimeter, or mW/cm^2). The table on the next page lists the FCC limits for both occupational and general population exposures, using the mW/cm^2 reference, for the different radio frequency ranges.

Frequency Range (F) (MHz)	Occupational Exposure (mW/cm^2)	General Public Exposure (mW/cm^2)
0.3 - 1.34	100	100
1.34 - 3.0	100	$180 / F^2$
3.0 - 30	$900 / F^2$	$180 / F^2$
30 - 300	1.0	0.2
300 - 1,500	F / 300	F / 1500
1,500 - 100,000	5.0	1.0

The diagram below provides a graphical illustration of both the FCC's occupational and general population MPE limits.



Because the FCC's RF exposure limits are frequency-shaped, the exact MPE limits applicable to the instant situation depend on the frequency range used by the systems of interest.

The most appropriate method of determining RF compliance is to calculate the RF power density attributable to a particular system and compare that to the MPE limit applicable to the operating frequency in question. The result is usually expressed as a percentage of the MPE limit.

For potential exposure from multiple systems, the respective percentages of the MPE limits are added, and the total percentage compared to 100 (percent of the limit). If the result is less than 100, the total exposure is in compliance; if it is more than 100, exposure mitigation measures are necessary to achieve compliance.

FCC regulations provide that for some types of antenna operations, the potential RF exposure levels are well understood to represent no reasonable possibility for exceeding the FCC MPE limit, even on a collective basis. Section 1.1307 of the FCC regulations describes conditions under which specific demonstrations of compliance are required. Antenna operations not included in that list are considered "categorically excluded" from the requirement for routine demonstrations of compliance and, by virtue of that exclusion, are automatically deemed by the FCC to be in compliance. The reasons for the exclusion include the use of directional antennas, mounting locations apart from close public access, and the use of low power.

Appendix B: FCC References on RF Compliance

47 CFR, FCC Rules and Regulations, Part 1 (Practice and Procedure), Section 1.1310 (Radiofrequency radiation exposure limits).

47 CFR, FCC Rules and Regulations, Part 22 (Public Mobile Services).

47 CFR, FCC Rules and Regulations, Part 24 (Personal Communications Services).

FCC Second Memorandum Opinion and Order and Notice of Proposed Rulemaking (FCC 97-303), *In the Matter of Procedures for Reviewing Requests for Relief From State and Local Regulations Pursuant to Section 332(c)(7)(B)(v) of the Communications Act of 1934 (WT Docket 97-192), Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation (ET Docket 93-62), and Petition for Rulemaking of the Cellular Telecommunications Industry Association Concerning Amendment of the Commission's Rules to Preempt State and Local Regulation of Commercial Mobile Radio Service Transmitting Facilities*, released August 25, 1997.

FCC First Memorandum Opinion and Order, ET Docket 93-62, *In the Matter of Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, released December 24, 1996.

FCC Report and Order, ET Docket 93-62, *In the Matter of Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, released August 1, 1996.

FCC Office of Engineering and Technology (OET) Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 97-01, August 1997.

FCC Office of Engineering and Technology (OET) Bulletin 56, "Questions and Answers About Biological Effects and Potential Hazards of RF Radiation", edition 4, August 1999.

Appendix C: Summary of Expert Qualifications

Daniel J. Collins, Chief Technical Officer, Pinnacle Telecom Group, LLC

Synopsis:	• 32+ years of experience in all aspects of wireless system engineering, related regulation, and RF exposure • Has performed or led RF exposure compliance assessments on more than 7,000 antenna sites in the past seven years alone • Has provided testimony as an RF compliance expert more than 750 times in the past seven years alone • Have been accepted as an expert in New Jersey, Connecticut and 38 other states, as well as by the FCC
Education:	• B.E.E., City College of New York (Sch. Of Eng.), 1971 • M.B.A., 1982, Fairleigh Dickinson University, 1982 • Bronx High School of Science, 1966
Current Responsibilities:	• lead all PTG staff work involving RF safety and FCC compliance, microwave and satellite system engineering, and consulting on wireless technology and regulation
Prior Experience:	• Edwards & Kelcey, VP – RF Engineering and Chief Information Technology Officer, 1996-99 • Bellcore, Executive Director – Regulation and Public Policy, 1983-96 • AT&T (Corp. HQ), Director – Spectrum Management Policy and Practice, 1977-83 • AT&T Long Lines, Group Supervisor – Microwave Radio System Design, 1972-77
Specific RF Safety / Compliance Experience:	• Involved in RF exposure matters since 1972 • Have had lead corporate responsibility for RF safety and compliance at AT&T, Bellcore, Edwards & Kelcey, and PTG • While at AT&T, helped develop the mathematical models later adopted by the FCC for predicting RF exposure • Have been relied on for compliance by all major wireless carriers, as well as by state and local governments, and other consulting / engineering firms • Frequently-invited speaker on RF exposure and compliance issues at industry conferences
Other Background:	• Author, Microwave System Engineering (AT&T, 1974) • Co-author and executive editor, A Guide to New Technologies and Services (Bellcore, 1993) • National Spectrum Managers Association (NSMA) – three-term President and chair of the Board of Directors; earlier was founding member, twice-elected Vice President, long-time member of the Board, and was named an NSMA Fellow in 1991 • Listed in Who's Who in the Media and Communication and International Who's Who in Information Technology • Published more than 35 articles in industry magazines

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF 180' EXISTING SELF SUPPORTING LATTICE TOWER FOR PROPOSED ANTENNA MODIFICATION

Connecticut State Police Tower
880 Post Road East
Westport, Connecticut

prepared for

Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

prepared by

URS CORPORATION
795 BROOK STREET, BUILDING 5
ROCKY HILL, CT 06067
TEL. 860-529-8882

36929428.00000
VZ1-110

November 10, 2004

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1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the 180' self-supporting lattice tower located at 880 Post Road East in Westport, Connecticut. The analysis was conducted in accordance with the TIA/EIA-222-E standard for wind velocity of 90 mph concurrent with ½" ice design wind load. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Analysis Methodology and Loading Condition Section of this report. The proposed Verizon Wireless dish relocation is as follows:

Antenna and Mount	Carrier	Antenna Center Elevation
(1) PAR6-85 dish, leg mounted, with (1) 7/8" coaxial cable (relocated from 177')	**Verizon Wireless**	**@ 170'**

The results of the analysis indicate that the tower structure is in compliance with the proposed loading conditions. The tower and its foundation are considered feasible with the TIA/EIA-222-E wind load classification specified above and all the existing and proposed antenna loading.

This analysis is based on:

1) The tower structure's theoretical capacity not including any assessment of the condition of the tower.
2) Original tower report prepared by Rohn Industries, Inc., engineering file 26263DL and drawing C910693 dated February 1, 1991.
3) Antenna and mount configuration as specified on the following page of this report.
4) Soil investigation and foundation capacity report prepared by Dr. Clarence Welti, P.E., P.C., dated October 10, 2002.
5) Connecticut State Police wind loading requirements for 90 mph wind concurrent with ½" ice plus the dead load of the structure and any ancillary items without reduction factors.

This report is only valid as per the assumptions and data utilized in this report for antenna inventory, mounts and associated cables. The user of this report shall field verify the assumption of the antenna and mount configuration. Notify the engineer in writing immediately if any of the information in this report is found to be other than specified.

If you should have any questions, please call.

Sincerely,
URS Corporation AES

Richard A. Sambor, P.E.
Manager Facilities Design

RAS/ddm

cc: Mark Gauger – Verizon Wireless
D.R., CF – URS

2. INTRODUCTION

The subject tower is located at 880 Post Road East in Westport, Connecticut. The structure is a 180' self-supporting lattice tower manufactured by Rohn Industries Incorporated.

The tower is constructed of pipe legs, diagonal angle braces, horizontal braces, and inner horizontal braces. The tower sections are bolted together. The width of the face is 8'-6 ½" at the top and 27'-8 1/8" at the bottom. The tower geometry and structure member sizes were taken from Rohn Industries, Inc., engineering file 26263DL and drawing C910693 dated February 1, 1991.

The existing structure supports several communication antennas. The antenna and mount configuration is as follows:

ANTENNA & MOUNT DESCRIPTION	CARRIER	CENTERLINE ELEVATION
(2) PD1142 antennas on standoff mount with (2) 7/8" coaxial cables	CT State Police (existing)	@ 180'
(1) PA6-85 dish, leg mounted, with (1) EW63 coaxial cable	CT State Police (existing)	@ 177'
(1) PAR6-85 dish, leg mounted, with (1) 7/8" coaxial cable (relocated from 177')	**Verizon Wireless (proposed)**	**@ 170'**
(1) P6-F9 dish, leg mounted, with (1) 7/8" coaxial cable	CT State Police (existing)	@ 169'
(2) OGT9-806 antennas on standoff mount with (2) 1 5/8" coaxial cables	CT State Police (existing)	@ 160'
(2) AP11-850 antennas on standoff mount with (2) 1 5/8" coaxial cables	CT State Police (existing)	@ 160'
(1) DB222 antenna, leg mounted, with (1) 7/8" coaxial cable	CT State Police (existing)	@ 160'
(1) DB536 antenna on standoff mount with (1) 7/8" coaxial cable	CT State Police (existing)	@ 160'
(12) ALP9212 antennas on T-Frame with (12) 1 5/8" coaxial cables	Verizon Wireless (existing)	@ 155'
(9) Allgon 7184 antennas on T-frame with (9) 1 5/8" coaxial cables	AT&T Wireless (existing)	@ 145'
(9) ALP110-11 antenna on T-Frame with (9) 1 5/8" coaxial cables	Cingular Wireless (existing)	@ 135'
(3) D65-18-XXDPL2Q antennas, leg mounted, with (12) 1 5/8" coaxial cables	T-Mobile (existing)	@ 125'
(1) GPS antenna on standoff mount with (1) 7/8" coaxial cable	T-Mobile (existing)	@ 125'

This structural analysis of the communications tower was performed by URS Corporation, AES (URS) for Verizon Wireless. The purpose of this analysis was to analyze the existing tower for its existing and proposed antenna loads. This analysis was conducted to evaluate twist (rotation), sway (deflection) and stress on the tower, and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

Methodology:

The structural analysis was done in accordance with the TIA/EIA-222-E, Structural Standard for Steel Antenna Towers and Antenna Supporting Structures, the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

The analysis was conducted using ERI Tower 3.0. One load condition was evaluated as shown below which was compared to allowable stresses according to AISC and TIA/EIA. The load combination was investigated in ERI Tower 3.0 to determine the stress, sway and rotation.

Load Condition 1 = 90 mph Wind Load (with ½" radial ice) + Tower Dead Load

The TIA/EIA standard permits one-third increase in allowable stresses for towers and monopoles less than 700 feet tall. For purposes of this analysis, allowable stresses of tower members were increased by one-third in computing the load capacity; in addition, the appropriate "k" factors were assigned to each member.

4. FINDINGS AND EVALUATION

The combined axial and bending stresses on the tower structure were evaluated to compare with the allowable stress in accordance with AISC. The analysis indicates that the tower legs, diagonal members and horizontal members have sufficient capacity to carry the loads applied. The foundation reactions were below the allowable values in the foundation capacity report. The tower top twist and sway values were compared with the allowable values per the Connecticut State Police and found to be acceptable.

Tower Base Reactions:

Description	Current
Pier Compression (kips)	307
Pier Uplift (kips)	262
Overall Overturning (kip-ft)	6,821
Overall Shear (kips)	64

Tower Twist & Sway at Top:

Description	Current	Allowable
Tower Twist (degrees)	0.244	0.750
Tower Sway (degrees)	0.490	0.750

5. CONCLUSIONS

The results of the analysis indicate that the structure is in compliance with the loading conditions and the materials and member sizes for the tower. The tower is considered feasible with the TIA/EIA-222-E wind load classification specified above and the existing and proposed antenna loading.

Limitations/Assumptions:

This report is based on the following:

A. Tower is properly installed and maintained.

B. All members were as specified in the original Construction Documents and are in good condition.

C. All required members are in place.

D. All bolts are in place and are properly tightened.

E. Tower is in plumb condition.

F. All members protective coating is in good condition.

G. All tower members were properly designed, detailed, fabricated, installed, and have been properly maintained since erection.

URS is not responsible for any modifications completed prior to or hereafter in which URS is not or was not directly involved. Modifications include but are not limited to:

A. Removing/Replacing antennas
B. Adding antennas and amplifiers

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

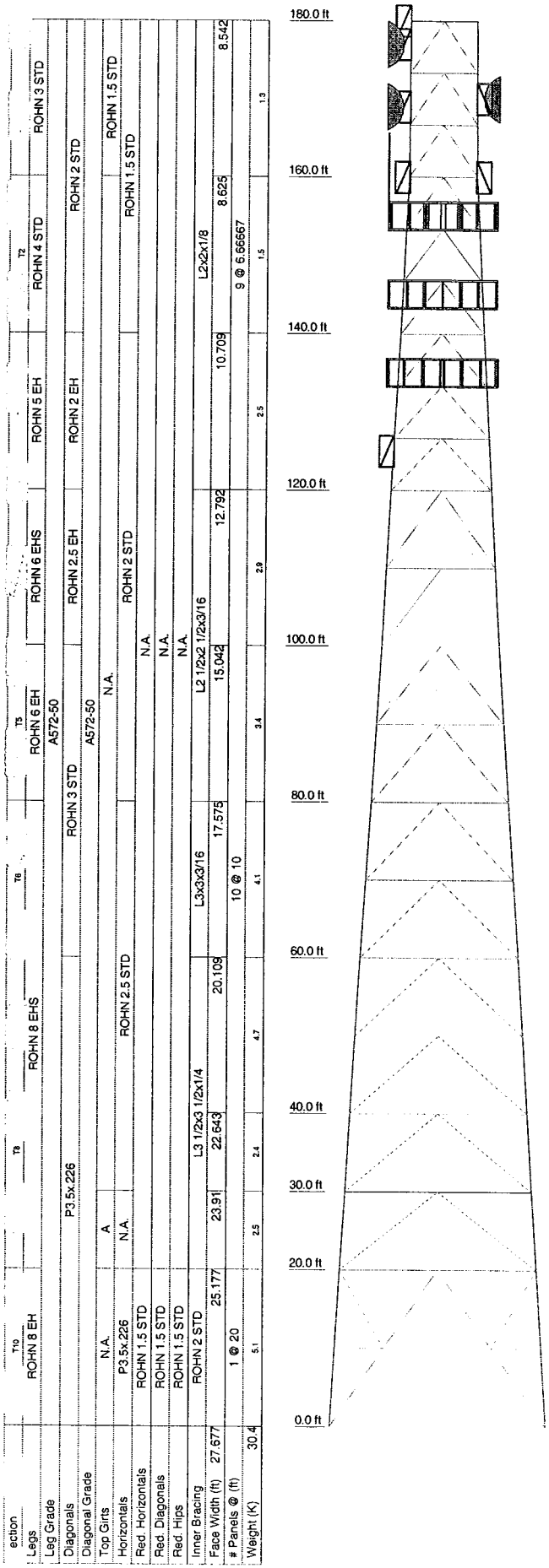
Ongoing and Periodic Inspection and Maintenance by the Owner:

After the Contractor has successfully completed the installation and the work has been accepted, the tower owner will be responsible for the ongoing and periodic inspection and maintenance of the tower and reinforcing system.

The owner shall refer to TIA/EIA-222-E, for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system is performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-E. It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6.) DRAWINGS AND DATA

ERI TOWER INPUT / OUPUT DATA



APPURTENANCES

TYPE	ELEVATION	TYPE	ELEVATION
PD1142 (State Police)	180	Pirod 15' T-Frame Sector Mount (1) (Verizon Wireless)	155
PD1142 (State Police)	180	(4) ALP 9212 (Verizon Wireless)	155
Standoff (State Police)	180	(4) ALP 9212 (Verizon Wireless)	155
Standoff (State Police)	180	(4) ALP 9212 (Verizon Wireless)	155
Valmont Single Dish Standoff (1) (State Police)	177	(3) Allgon 7184 (ATI Wireless)	145
PA6-85 (State Police)	177	(3) Allgon 7184 (ATI Wireless)	145
Valmont Single Dish Standoff (1) (Verizon Wireless)	170	(3) Allgon 7184 (ATI Wireless)	145
PAR6-105 (Verizon Wireless)	170	Pirod 15' T-Frame Sector Mount (1) (ATI Wireless)	145
Valmont Single Dish Standoff (1) (State Police)	169	Pirod 15' T-Frame Sector Mount (1) (ATI Wireless)	145
P6-F9 (State Police)	169	Pirod 15' T-Frame Sector Mount (1) (ATI Wireless)	145
AP11-850 (State Police)	160	(3) ALP110-11 (Cingular)	135
DB222 (State Police)	160	(3) ALP110-11 (Cingular)	135
DB536 (State Police)	160	Pirod 15' T-Frame Sector Mount (1) (Cingular)	135
Standoff (State Police)	160	Pirod 15' T-Frame Sector Mount (1) (Cingular)	135
Standoff (State Police)	160	Pirod 15' T-Frame Sector Mount (1) (Cingular)	135
Standoff (State Police)	160	(3) ALP110-11 (Cingular)	135
Standoff (State Police)	160	Standoff (State Police)	125
OGT9-806 (State Police)	160	DR65-18-XXDPL2Q (T-Mobile)	125
AP11-850 (State Police)	160	GPS (T-Mobile)	125
OGT9-806 (State Police)	160	DR65-18-XXDPL2Q (T-Mobile)	125
Pirod 15' T-Frame Sector Mount (1) (Verizon Wireless)	155	DR65-18-XXDPL2Q (T-Mobile)	125
Pirod 15' T-Frame Sector Mount (1) (Verizon Wireless)	155		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	ROHN 2.5 STD		

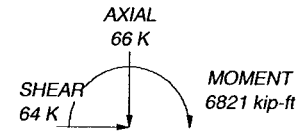
MATERIAL STRENGTH

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

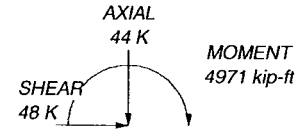
TOWER DESIGN NOTES

1. Tower designed for a 90 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 90 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 86.2%

MAX PIER FORCES:
DOWN: 307 K
UPLIFT: -262 K
SHEAR: 39 K



TORQUE 21 kip-ft
90 mph WIND - 0.5000 in ICE



TORQUE 14 kip-ft
REACTIONS - 90 mph WIND

URS Corp. AES
795 Brook Street
Rocky Hill, CT 06067
Phone: (860) 529-8882
FAX: (860) 529-5566

Job: ***180' Lattice Tower***			
Project: ***Westport, Connecticut***			
Client: VZ1-110	Drawn by: Daniel D. McClure	App'd:	
Code: TIA/EIA-222-F	Date: 11/10/04	Scale: NTS	
Path: P:\Telecom\F12\ERI Files\180' Self-Supported Lattice Tower.eri		Dwg No. E-1	

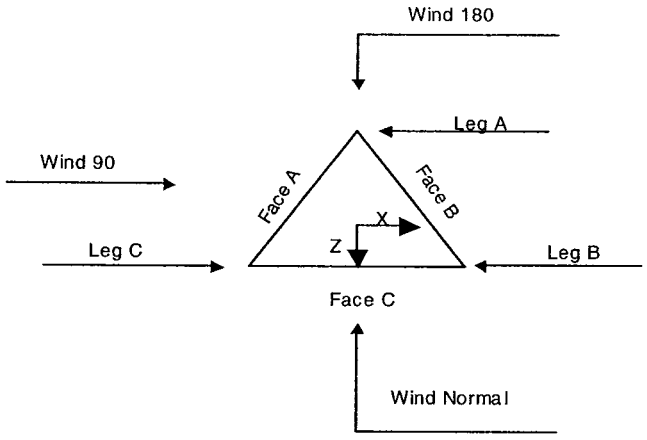
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 8.54 ft at the top and 27.68 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 90 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 90 mph is used in combination with ice.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in 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		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.00-160.00			8.54	1	20.00
T2	160.00-140.00			8.63	1	20.00
T3	140.00-120.00			10.71	1	20.00
T4	120.00-100.00			12.79	1	20.00
T5	100.00-80.00			15.04	1	20.00
T6	80.00-60.00			17.58	1	20.00
T7	60.00-40.00			20.11	1	20.00
T8	40.00-30.00			22.64	1	10.00
T9	30.00-20.00			23.91	1	10.00
T10	20.00-0.00			25.18	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180.00-160.00	6.67	K Brace Down	No	Yes	0.0000	0.0000
T2	160.00-140.00	6.67	K Brace Down	No	Yes	0.0000	0.0000
T3	140.00-120.00	6.67	K Brace Down	No	Yes	0.0000	0.0000
T4	120.00-100.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T5	100.00-80.00	10.00	K Brace Down	No	Yes	0.0000	0.0000

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
T6	80.00-60.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T7	60.00-40.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T8	40.00-30.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T9	30.00-20.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T10	20.00-0.00	20.00	K1 Down	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-160.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T2 160.00-140.00	Pipe	ROHN 4 STD	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T3 140.00-120.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Pipe	ROHN 2 EH	A572-50 (50 ksi)
T4 120.00-100.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)
T5 100.00-80.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T6 80.00-60.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T7 60.00-40.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Pipe	P3.5x.226	A572-50 (50 ksi)
T8 40.00-30.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Pipe	P3.5x.226	A572-50 (50 ksi)
T9 30.00-20.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Pipe	P3.5x.226	A572-50 (50 ksi)
T10 20.00-0.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Pipe	P3.5x.226	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
T9 30.00-20.00	Pipe	ROHN 2.5 STD	A36 (36 ksi)	Single Angle		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 180.00-	None	Flat Bar		A36	Pipe	ROHN 1.5 STD	A572-50

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
160.00				(36 ksi)			(50 ksi)
T2 160.00-140.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)
T3 140.00-120.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T4 120.00-100.00	None	Single Angle		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T5 100.00-80.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T6 80.00-60.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T7 60.00-40.00	None	Single Angle		A36 (36 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T8 40.00-30.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T9 30.00-20.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T10 20.00-0.00	None	Flat Bar		A36 (36 ksi)	Pipe	P3.5x.226	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T1 180.00-160.00	Solid Round		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T2 160.00-140.00	Solid Round		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T3 140.00-120.00	Solid Round		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T4 120.00-100.00	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 100.00-80.00	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 80.00-60.00	Solid Round		A36 (36 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T7 60.00-40.00	Single Angle		A36 (36 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T8 40.00-30.00	Solid Round		A36 (36 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T9 30.00-20.00	Solid Round		A36 (36 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T10 20.00-0.00	Solid Round		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T10 20.00-0.00	A572-50 (50 ksi)	Horizontal (1)	Pipe	ROHN 1.5 STD	0.8
		Diagonal (1)	Pipe	ROHN 1.5 STD	0.8
		Hip (1)	Pipe	ROHN 1.5 STD	0.8

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 40.00-30.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 30.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 180.00-160.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 160.00-140.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 140.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 120.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 60.00-	Yes	Yes	1	1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
40.00				1	1	1	1	1	1	1
T8 40.00-30.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T9 30.00-20.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T10 20.00-0.00	Yes	Yes	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 Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 180.00-160.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 160.00-140.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 140.00-120.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 120.00-100.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 100.00-80.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 80.00-60.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 60.00-40.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 40.00-30.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 30.00-20.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 20.00-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Connection Offsets Diagonal Vert. Top in	Diagonal Horiz. Top in	Diagonal Vert. Bot. in	Diagonal Horiz. Bot. in	K-Bracing Vert. Top in	K-Bracing Horiz. Top in	K-Bracing Vert. Bot. in	K-Bracing Horiz. Bot. in
T1 180.00-160.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T2 160.00-140.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T3 140.00-120.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T4 120.00-100.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T5 100.00-80.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T6 80.00-60.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T7 60.00-40.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T8 40.00-30.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T9 30.00-20.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T10 20.00-0.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
7/8 (State Police)	C	No	Ar (CfAe)	180.00 - 0.00	1	1	1.1100	1.1100		0.54
7/8 (State Police)	C	No	Ar (CfAe)	180.00 - 0.00	1	1	1.1100	1.1100		0.54
1 5/8 (AT&T Wireless)	B	No	Ar (CfAe)	145.00 - 0.00	9	9	1.9800	1.9800		1.04
1 5/8 (Cingular)	A	No	Ar (CfAe)	135.00 - 0.00	9	6	1.9800	1.9800		1.04
1 5/8 (Verizon Wireless)	C	No	Ar (CfAe)	155.00 - 0.00	12	12	1.9800	1.9800		1.04
1 5/8 (T-Mobile)	A	No	Ar (CfAe)	125.00 - 0.00	12	6	1.9800	1.9800		1.04
1/2 (T-Mobile)	A	No	Ar (CfAe)	125.00 - 0.00	1	1	0.5800	0.5800		0.25
1 5/8 (State Police)	B	No	Ar (CfAe)	160.00 - 0.00	2	2	1.9800	1.9800		1.04
1 5/8 (State Police)	B	No	Ar (CfAe)	160.00 - 0.00	2	2	1.9800	1.9800		1.04
7/8 (State Police)	C	No	Ar (CfAe)	160.00 - 0.00	2	2	1.1100	1.1100		0.54
7/8 (State Police)	A	No	Ar (CfAe)	169.00 - 0.00	1	1	1.1100	1.1100		0.54
7/8 (Verizon Wireless)	A	No	Ar (CfAe)	177.00 - 0.00	1	1	1.1100	1.1100		0.54
EW63 (State Police)	C	No	Ar (CfAe)	177.00 - 0.00	1	1	1.5742	1.5742		0.51

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	2.405	0.000	0.000	0.000	0.01
		B	0.000	0.000	0.000	0.000	0.00
		C	5.930	0.000	0.000	0.000	0.03

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T2	160.00-140.00	A	3.700	0.000	0.000	0.000	0.02
		B	20.625	0.000	0.000	0.000	0.13
		C	39.724	0.000	0.000	0.000	0.24
T3	140.00-120.00	A	23.742	0.000	0.000	0.000	0.23
		B	42.900	0.000	0.000	0.000	0.27
		C	49.624	0.000	0.000	0.000	0.30
T4	120.00-100.00	A	44.267	0.000	0.000	0.000	0.46
		B	42.900	0.000	0.000	0.000	0.27
		C	49.624	0.000	0.000	0.000	0.30
T5	100.00-80.00	A	44.267	0.000	0.000	0.000	0.46
		B	42.900	0.000	0.000	0.000	0.27
		C	49.624	0.000	0.000	0.000	0.30
T6	80.00-60.00	A	44.267	0.000	0.000	0.000	0.46
		B	42.900	0.000	0.000	0.000	0.27
		C	49.624	0.000	0.000	0.000	0.30
T7	60.00-40.00	A	44.267	0.000	0.000	0.000	0.46
		B	42.900	0.000	0.000	0.000	0.27
		C	49.624	0.000	0.000	0.000	0.30
T8	40.00-30.00	A	22.133	0.000	0.000	0.000	0.23
		B	21.450	0.000	0.000	0.000	0.14
		C	24.812	0.000	0.000	0.000	0.15
T9	30.00-20.00	A	22.133	0.000	0.000	0.000	0.23
		B	21.450	0.000	0.000	0.000	0.14
		C	24.812	0.000	0.000	0.000	0.15
T10	20.00-0.00	A	44.267	0.000	0.000	0.000	0.46
		B	42.900	0.000	0.000	0.000	0.27
		C	49.624	0.000	0.000	0.000	0.30

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	0.500	4.572	0.000	0.000	0.000	0.04
		B		0.000	0.000	0.000	0.000	0.00
		C		10.680	0.000	0.000	0.000	0.09
T2	160.00-140.00	A	0.500	7.033	0.000	0.000	0.000	0.06
		B		31.042	0.000	0.000	0.000	0.32
		C		63.057	0.000	0.000	0.000	0.62
T3	140.00-120.00	A	0.500	37.492	0.000	0.000	0.000	0.56
		B		64.567	0.000	0.000	0.000	0.66
		C		77.957	0.000	0.000	0.000	0.77
T4	120.00-100.00	A	0.500	69.267	0.000	0.000	0.000	1.15
		B		64.567	0.000	0.000	0.000	0.66
		C		77.957	0.000	0.000	0.000	0.77
T5	100.00-80.00	A	0.500	69.267	0.000	0.000	0.000	1.15
		B		64.567	0.000	0.000	0.000	0.66
		C		77.957	0.000	0.000	0.000	0.77
T6	80.00-60.00	A	0.500	69.267	0.000	0.000	0.000	1.15
		B		64.567	0.000	0.000	0.000	0.66
		C		77.957	0.000	0.000	0.000	0.77
T7	60.00-40.00	A	0.500	69.267	0.000	0.000	0.000	1.15
		B		64.567	0.000	0.000	0.000	0.66
		C		77.957	0.000	0.000	0.000	0.77
T8	40.00-30.00	A	0.500	34.633	0.000	0.000	0.000	0.58
		B		32.283	0.000	0.000	0.000	0.33
		C		38.979	0.000	0.000	0.000	0.39
T9	30.00-20.00	A	0.500	34.633	0.000	0.000	0.000	0.58

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		32.283	0.000	0.000	0.000	0.33
		C		38.979	0.000	0.000	0.000	0.39
T10	20.00-0.00	A	0.500	69.267	0.000	0.000	0.000	1.15
		B		64.567	0.000	0.000	0.000	0.66
		C		77.957	0.000	0.000	0.000	0.77

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
GPS	C	From Face	3.00	0.0000	125.00	No Ice	0.44	0.44	0.00
(T-Mobile)			0.00			1/2" Ice	0.62	0.62	0.00
			0.00						
(3) Allgon 7184	A	From Face	3.00	0.0000	145.00	No Ice	2.89	1.42	0.01
(AT&T Wireless)			0.00			1/2" Ice	3.21	1.74	0.02
			0.00						
(3) Allgon 7184	B	From Face	3.00	0.0000	145.00	No Ice	2.89	1.42	0.01
(AT&T Wireless)			0.00			1/2" Ice	3.21	1.74	0.02
			0.00						
(3) Allgon 7184	C	From Face	3.00	0.0000	145.00	No Ice	2.89	1.42	0.01
(AT&T Wireless)			0.00			1/2" Ice	3.21	1.74	0.02
			0.00						
(4) ALP 9212	A	From Face	3.00	0.0000	155.00	No Ice	5.46	5.46	0.02
(Verizon Wireless)			0.00			1/2" Ice	6.09	6.09	0.05
			0.00						
(4) ALP 9212	B	From Face	3.00	0.0000	155.00	No Ice	5.46	5.46	0.02
(Verizon Wireless)			0.00			1/2" Ice	6.09	6.09	0.05
			0.00						
(4) ALP 9212	C	From Face	3.00	0.0000	155.00	No Ice	5.46	5.46	0.02
(Verizon Wireless)			0.00			1/2" Ice	6.09	6.09	0.05
			0.00						
OGT9-806	A	From Leg	3.00	0.0000	160.00	No Ice	2.15	2.15	0.02
(State Police)			0.00			1/2" Ice	3.25	3.25	0.03
			0.00						
OGT9-806	A	From Leg	3.00	0.0000	160.00	No Ice	2.15	2.15	0.02
(State Police)			0.00			1/2" Ice	3.25	3.25	0.03
			0.00						
AP11-850	B	From Leg	3.00	0.0000	160.00	No Ice	4.96	2.25	0.01
(State Police)			0.00			1/2" Ice	5.36	2.57	0.04
			0.00						
AP11-850	B	From Leg	3.00	0.0000	160.00	No Ice	4.96	2.25	0.01
(State Police)			0.00			1/2" Ice	5.36	2.57	0.04
			0.00						
DB222	C	From Leg	3.00	0.0000	160.00	No Ice	1.60	1.60	0.02
(State Police)			0.00			1/2" Ice	2.88	2.88	0.02
			0.00						
DB536	C	From Leg	3.00	0.0000	160.00	No Ice	2.83	2.83	0.02
(State Police)			0.00			1/2" Ice	3.99	3.99	0.04
			0.00						
PD1142	B	From Leg	3.00	0.0000	180.00	No Ice	1.35	1.35	0.03
(State Police)			0.00			1/2" Ice	3.16	3.16	0.04
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
PD1142	C	From Leg	3.00	0.0000	180.00	No Ice	1.35	1.35	0.03
(State Police)			0.00			1/2" Ice	3.16	3.16	0.04
			0.00						
(3) ALP110-11	A	From Face	3.00	0.0000	135.00	No Ice	3.28	3.28	0.00
(Cingular)			0.00			1/2" Ice	3.61	3.61	0.03
			0.00						
(3) ALP110-11	B	From Face	3.00	0.0000	135.00	No Ice	3.28	3.28	0.00
(Cingular)			0.00			1/2" Ice	3.61	3.61	0.03
			0.00						
(3) ALP110-11	C	From Face	3.00	0.0000	135.00	No Ice	3.28	3.28	0.00
(Cingular)			0.00			1/2" Ice	3.61	3.61	0.03
			0.00						
DR65-18-XXDPL2Q	A	From Face	3.00	0.0000	125.00	No Ice	6.30	2.42	0.02
(T-Mobile)			0.00			1/2" Ice	6.73	2.76	0.06
			0.00						
DR65-18-XXDPL2Q	B	From Face	3.00	0.0000	125.00	No Ice	6.30	2.42	0.02
(T-Mobile)			0.00			1/2" Ice	6.73	2.76	0.06
			0.00						
DR65-18-XXDPL2Q	C	From Face	3.00	0.0000	125.00	No Ice	6.30	2.42	0.02
(T-Mobile)			0.00			1/2" Ice	6.73	2.76	0.06
			0.00						
Pirod 15' T-Frame Sector	A	From Face	1.00	0.0000	155.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Verizon Wireless)			0.00						
Pirod 15' T-Frame Sector	B	From Face	1.00	0.0000	155.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Verizon Wireless)			0.00						
Pirod 15' T-Frame Sector	C	From Face	1.00	0.0000	155.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Verizon Wireless)			0.00						
Pirod 15' T-Frame Sector	A	From Face	1.00	0.0000	145.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(AT&T Wireless)			0.00						
Pirod 15' T-Frame Sector	B	From Face	1.00	0.0000	145.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(AT&T Wireless)			0.00						
Pirod 15' T-Frame Sector	C	From Face	1.00	0.0000	145.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(AT&T Wireless)			0.00						
Pirod 15' T-Frame Sector	A	From Face	1.00	0.0000	135.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Cingular)			0.00						
Pirod 15' T-Frame Sector	B	From Face	1.00	0.0000	135.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Cingular)			0.00						
Pirod 15' T-Frame Sector	C	From Face	1.00	0.0000	135.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Cingular)			0.00						
Standoff	A	From Leg	1.00	0.0000	160.00	No Ice	0.52	0.52	0.02
(State Police)			0.00			1/2" Ice	0.79	0.79	0.02
			0.00						
Standoff	A	From Leg	1.00	0.0000	160.00	No Ice	0.52	0.52	0.02
(State Police)			0.00			1/2" Ice	0.79	0.79	0.02
			0.00						
Standoff	B	From Leg	1.00	0.0000	160.00	No Ice	0.52	0.52	0.02
(State Police)			0.00			1/2" Ice	0.79	0.79	0.02
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert (ft / ft / ft)	Azimuth Adjustment (°)	Placement (ft)		C_AA_A Front (ft^2)	C_AA_A Side (ft^2)	Weight (K)
Standoff (State Police)	B	From Leg	1.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	0.52 0.79	0.52 0.79	0.02 0.02
Standoff (State Police)	C	From Leg	1.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	0.52 0.79	0.52 0.79	0.02 0.02
Standoff (State Police)	A	From Leg	1.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	0.52 0.79	0.52 0.79	0.02 0.02
Standoff (State Police)	C	From Leg	1.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	0.52 0.79	0.52 0.79	0.02 0.02
Standoff (State Police)	C	From Leg	1.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	0.52 0.79	0.52 0.79	0.02 0.02
Valmont Single Dish Standoff (1) (Verizon Wireless)	B	From Leg	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
Valmont Single Dish Standoff (1) (State Police)	C	From Leg	1.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
Valmont Single Dish Standoff (1) (State Police)	C	From Leg	1.00 0.00 0.00	0.0000	169.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral / Vert (ft)	Azimuth Adjustment (°)	3 dB Beam Width (°)	Elevation (ft)	Outside Diameter (ft)		Aperture Area (ft^2)	Weight (K)
PA6-85 (State Police)	C	Paraboloid w/o Radome	From Leg	1.00 0.00 0.00	Worst		177.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.23 0.27
P6-F9 (State Police)	C	Grid	From Leg	1.00 0.00 0.00	Worst		169.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.20 0.24
PAR6-105 (Verizon Wireless)	B	Grid	From Leg	1.00 0.00 0.00	Worst		170.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.20 0.24

Tower Pressures - No Ice

$G_H = 1.121$

Section Elevation	z	K_Z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T1 180.00-160.00	170.00	1.597	33	177.503	A	0.000	27.104	11.667	43.04	0.000	0.000
					B	0.000	24.699		47.24		
					C	0.000	30.629		38.09		
T2 160.00-140.00	150.00	1.541	32	200.850	A	0.000	32.525	15.027	46.20	0.000	0.000
					B	0.000	49.450		30.39		
					C	0.000	68.549		21.92		
T3 140.00-120.00	130.00	1.48	31	244.294	A	0.000	59.117	18.577	31.42	0.000	0.000
					B	0.000	78.275		23.73		
					C	0.000	84.999		21.86		
T4 120.00-100.00	110.00	1.411	29	289.399	A	0.000	82.868	22.130	26.71	0.000	0.000
					B	0.000	81.501		27.15		
					C	0.000	88.225		25.08		
T5 100.00-80.00	90.00	1.332	28	337.234	A	0.000	87.195	22.142	25.39	0.000	0.000
					B	0.000	85.828		25.80		
					C	0.000	92.552		23.92		
T6 80.00-60.00	70.00	1.24	26	391.244	A	0.000	97.205	28.827	29.66	0.000	0.000
					B	0.000	95.838		30.08		
					C	0.000	102.562		28.11		
T7 60.00-40.00	50.00	1.126	23	441.924	A	0.000	101.875	28.827	28.30	0.000	0.000
					B	0.000	100.508		28.68		
					C	0.000	107.232		26.88		
T8 40.00-30.00	35.00	1.017	21	239.967	A	0.000	51.881	14.413	27.78	0.000	0.000
					B	0.000	51.197		28.15		
					C	0.000	54.559		26.42		
T9 30.00-20.00	25.00	1	21	252.637	A	0.000	52.518	14.413	27.44	0.000	0.000
					B	0.000	51.835		27.81		
					C	0.000	55.196		26.11		
T10 20.00-0.00	10.00	1	21	542.943	A	0.000	103.332	28.825	27.90	0.000	0.000
					B	0.000	101.965		28.27		
					C	0.000	108.689		26.52		

Tower Pressure - With Ice

$G_H = 1.121$

Section Elevation	z	K_Z	q_z	t_Z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	in	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T1 180.00-160.00	170.00	1.597	33	0.5000	179.170	A	0.000	38.505	15.000	38.96	0.000	0.000
						B	0.000	33.933		44.20		
						C	0.000	44.614		33.62		
T2 160.00-140.00	150.00	1.541	32	0.5000	202.519	A	0.000	45.456	18.366	40.40	0.000	0.000
						B	0.000	69.464		26.44		
						C	0.000	101.480		18.10		
T3 140.00-120.00	130.00	1.48	31	0.5000	245.963	A	0.000	83.279	21.916	26.32	0.000	0.000
						B	0.000	110.354		19.86		
						C	0.000	123.744		17.71		
T4 120.00-100.00	110.00	1.411	29	0.5000	291.068	A	0.000	117.309	25.470	21.71	0.000	0.000
						B	0.000	112.609		22.62		
						C	0.000	126.000		20.21		
T5 100.00-80.00	90.00	1.332	28	0.5000	338.904	A	0.000	122.286	25.485	20.84	0.000	0.000
						B	0.000	117.586		21.67		
						C	0.000	130.977		19.46		
T6 80.00-60.00	70.00	1.24	26	0.5000	392.914	A	0.000	132.959	32.169	24.19	0.000	0.000
						B	0.000	128.259		25.08		

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	0.000	141.649		22.71		
T7 60.00-40.00	50.00	1.126	23	0.5000	443.594	A	0.000	138.351	32.169	23.25	0.000	0.000
						B	0.000	133.651		24.07		
						C	0.000	147.041		21.88		
T8 40.00-30.00	35.00	1.017	21	0.5000	240.802	A	0.000	70.399	16.085	22.85	0.000	0.000
						B	0.000	68.049		23.64		
						C	0.000	74.744		21.52		
T9 30.00-20.00	25.00	1	21	0.5000	253.472	A	0.000	71.225	16.085	22.58	0.000	0.000
						B	0.000	68.875		23.35		
						C	0.000	75.570		21.28		
T10 20.00-0.00	10.00	1	21	0.5000	544.613	A	0.000	140.972	32.167	22.82	0.000	0.000
						B	0.000	136.272		23.60		
						C	0.000	149.662		21.49		

Tower Pressure - Service

$G_H = 1.121$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 180.00-160.00	170.00	1.597	10	177.503	A	0.000	27.104	11.667	43.04	0.000	0.000
					B	0.000	24.699		47.24		
					C	0.000	30.629		38.09		
T2 160.00-140.00	150.00	1.541	10	200.850	A	0.000	32.525	15.027	46.20	0.000	0.000
					B	0.000	49.450		30.39		
					C	0.000	68.549		21.92		
T3 140.00-120.00	130.00	1.48	9	244.294	A	0.000	59.117	18.577	31.42	0.000	0.000
					B	0.000	78.275		23.73		
					C	0.000	84.999		21.86		
T4 120.00-100.00	110.00	1.411	9	289.399	A	0.000	82.868	22.130	26.71	0.000	0.000
					B	0.000	81.501		27.15		
					C	0.000	88.225		25.08		
T5 100.00-80.00	90.00	1.332	9	337.234	A	0.000	87.195	22.142	25.39	0.000	0.000
					B	0.000	85.828		25.80		
					C	0.000	92.552		23.92		
T6 80.00-60.00	70.00	1.24	8	391.244	A	0.000	97.205	28.827	29.66	0.000	0.000
					B	0.000	95.838		30.08		
					C	0.000	102.562		28.11		
T7 60.00-40.00	50.00	1.126	7	441.924	A	0.000	101.875	28.827	28.30	0.000	0.000
					B	0.000	100.508		28.68		
					C	0.000	107.232		26.88		
T8 40.00-30.00	35.00	1.017	7	239.967	A	0.000	51.881	14.413	27.78	0.000	0.000
					B	0.000	51.197		28.15		
					C	0.000	54.559		26.42		
T9 30.00-20.00	25.00	1	6	252.637	A	0.000	52.518	14.413	27.44	0.000	0.000
					B	0.000	51.835		27.81		
					C	0.000	55.196		26.11		
T10 20.00-0.00	10.00	1	6	542.943	A	0.000	103.332	28.825	27.90	0.000	0.000
					B	0.000	101.965		28.27		
					C	0.000	108.689		26.52		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.04	1.25	A	0.153	2.762	0.582	1	1	15.772	1.79	89.51	C
			B	0.139	2.812	0.58	1	1	14.322			
			C	0.173	2.69	0.585	1	1	17.924			
T2 160.00-140.00	0.39	1.50	A	0.162	2.728	0.583	1	1	18.974	3.39	169.39	C
			B	0.246	2.449	0.601	1	1	29.715			
			C	0.341	2.192	0.629	1	1	43.145			
T3 140.00-120.00	0.80	2.52	A	0.242	2.462	0.6	1	1	35.462	4.02	200.93	C
			B	0.32	2.243	0.622	1	1	48.715			
			C	0.348	2.176	0.632	1	1	53.697			
T4 120.00-100.00	1.04	2.93	A	0.286	2.333	0.612	1	1	50.700	4.08	203.86	C
			B	0.282	2.346	0.61	1	1	49.752			
			C	0.305	2.283	0.617	1	1	54.470			
T5 100.00-80.00	1.04	3.40	A	0.259	2.412	0.604	1	1	52.674	4.12	206.24	C
			B	0.255	2.424	0.603	1	1	51.758			
			C	0.274	2.366	0.608	1	1	56.310			
T6 80.00-60.00	1.04	4.10	A	0.248	2.442	0.601	1	1	58.467	4.29	214.70	C
			B	0.245	2.453	0.601	1	1	57.561			
			C	0.262	2.402	0.605	1	1	62.055			
T7 60.00-40.00	1.04	4.70	A	0.231	2.497	0.597	1	1	60.830	4.14	207.11	C
			B	0.227	2.507	0.596	1	1	59.941			
			C	0.243	2.46	0.6	1	1	64.342			
T8 40.00-30.00	0.52	2.44	A	0.216	2.543	0.594	1	1	30.809	1.93	192.82	C
			B	0.213	2.552	0.593	1	1	30.371			
			C	0.227	2.507	0.596	1	1	32.537			
T9 30.00-20.00	0.52	2.50	A	0.208	2.57	0.592	1	1	31.093	1.93	193.32	C
			B	0.205	2.579	0.591	1	1	30.659			
			C	0.218	2.535	0.594	1	1	32.806			
T10 20.00-0.00	1.04	5.11	A	0.19	2.629	0.588	1	1	60.808	3.87	193.56	C
			B	0.188	2.637	0.588	1	1	59.954			
			C	0.2	2.595	0.59	1	1	64.174			
Sum Weight:	7.46	30.44						OTM	2816.87 kip-ft	33.57		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.04	1.25	A	0.153	2.762	0.582	0.825	1	15.772	1.79	89.51	C
			B	0.139	2.812	0.58	0.825	1	14.322			
			C	0.173	2.69	0.585	0.825	1	17.924			
T2 160.00-140.00	0.39	1.50	A	0.162	2.728	0.583	0.825	1	18.974	3.39	169.39	C
			B	0.246	2.449	0.601	0.825	1	29.715			
			C	0.341	2.192	0.629	0.825	1	43.145			
T3 140.00-120.00	0.80	2.52	A	0.242	2.462	0.6	0.825	1	35.462	4.02	200.93	C
			B	0.32	2.243	0.622	0.825	1	48.715			
			C	0.348	2.176	0.632	0.825	1	53.697			
T4 120.00-100.00	1.04	2.93	A	0.286	2.333	0.612	0.825	1	50.700	4.08	203.86	C
			B	0.282	2.346	0.61	0.825	1	49.752			
			C	0.305	2.283	0.617	0.825	1	54.470			
T5 100.00-80.00	1.04	3.40	A	0.259	2.412	0.604	0.825	1	52.674	4.12	206.24	C
			B	0.255	2.424	0.603	0.825	1	51.758			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.274	2.366	0.608	0.825	1	56.310			
T6 80.00-60.00	1.04	4.10	A	0.248	2.442	0.601	0.825	1	58.467	4.29	214.70	C
			B	0.245	2.453	0.601	0.825	1	57.561			
			C	0.262	2.402	0.605	0.825	1	62.055			
T7 60.00-40.00	1.04	4.70	A	0.231	2.497	0.597	0.825	1	60.830	4.14	207.11	C
			B	0.227	2.507	0.596	0.825	1	59.941			
			C	0.243	2.46	0.6	0.825	1	64.342			
T8 40.00-30.00	0.52	2.44	A	0.216	2.543	0.594	0.825	1	30.809	1.93	192.82	C
			B	0.213	2.552	0.593	0.825	1	30.371			
			C	0.227	2.507	0.596	0.825	1	32.537			
T9 30.00-20.00	0.52	2.50	A	0.208	2.57	0.592	0.825	1	31.093	1.93	193.32	C
			B	0.205	2.579	0.591	0.825	1	30.659			
			C	0.218	2.535	0.594	0.825	1	32.806			
T10 20.00-0.00	1.04	5.11	A	0.19	2.629	0.588	0.825	1	60.808	3.87	193.56	C
			B	0.188	2.637	0.588	0.825	1	59.954			
			C	0.2	2.595	0.59	0.825	1	64.174			
Sum Weight:	7.46	30.44						OTM	2816.87 kip-ft	33.57		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.04	1.25	A	0.153	2.762	0.582	0.8	1	15.772	1.79	89.51	C
			B	0.139	2.812	0.58	0.8	1	14.322			
			C	0.173	2.69	0.585	0.8	1	17.924			
T2 160.00-140.00	0.39	1.50	A	0.162	2.728	0.583	0.8	1	18.974	3.39	169.39	C
			B	0.246	2.449	0.601	0.8	1	29.715			
			C	0.341	2.192	0.629	0.8	1	43.145			
T3 140.00-120.00	0.80	2.52	A	0.242	2.462	0.6	0.8	1	35.462	4.02	200.93	C
			B	0.32	2.243	0.622	0.8	1	48.715			
			C	0.348	2.176	0.632	0.8	1	53.697			
T4 120.00-100.00	1.04	2.93	A	0.286	2.333	0.612	0.8	1	50.700	4.08	203.86	C
			B	0.282	2.346	0.61	0.8	1	49.752			
			C	0.305	2.283	0.617	0.8	1	54.470			
T5 100.00-80.00	1.04	3.40	A	0.259	2.412	0.604	0.8	1	52.674	4.12	206.24	C
			B	0.255	2.424	0.603	0.8	1	51.758			
			C	0.274	2.366	0.608	0.8	1	56.310			
T6 80.00-60.00	1.04	4.10	A	0.248	2.442	0.601	0.8	1	58.467	4.29	214.70	C
			B	0.245	2.453	0.601	0.8	1	57.561			
			C	0.262	2.402	0.605	0.8	1	62.055			
T7 60.00-40.00	1.04	4.70	A	0.231	2.497	0.597	0.8	1	60.830	4.14	207.11	C
			B	0.227	2.507	0.596	0.8	1	59.941			
			C	0.243	2.46	0.6	0.8	1	64.342			
T8 40.00-30.00	0.52	2.44	A	0.216	2.543	0.594	0.8	1	30.809	1.93	192.82	C
			B	0.213	2.552	0.593	0.8	1	30.371			
			C	0.227	2.507	0.596	0.8	1	32.537			
T9 30.00-20.00	0.52	2.50	A	0.208	2.57	0.592	0.8	1	31.093	1.93	193.32	C
			B	0.205	2.579	0.591	0.8	1	30.659			
			C	0.218	2.535	0.594	0.8	1	32.806			
T10 20.00-0.00	1.04	5.11	A	0.19	2.629	0.588	0.8	1	60.808	3.87	193.56	C
			B	0.188	2.637	0.588	0.8	1	59.954			
			C	0.2	2.595	0.59	0.8	1	64.174			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
Sum Weight:	7.46	30.44						OTM	2816.87 kip-ft	33.57		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.04	1.25	A	0.153	2.762	0.582	0.85	1	15.772	1.79	89.51	C
			B	0.139	2.812	0.58	0.85	1	14.322			
			C	0.173	2.69	0.585	0.85	1	17.924			
T2 160.00-140.00	0.39	1.50	A	0.162	2.728	0.583	0.85	1	18.974	3.39	169.39	C
			B	0.246	2.449	0.601	0.85	1	29.715			
			C	0.341	2.192	0.629	0.85	1	43.145			
T3 140.00-120.00	0.80	2.52	A	0.242	2.462	0.6	0.85	1	35.462	4.02	200.93	C
			B	0.32	2.243	0.622	0.85	1	48.715			
			C	0.348	2.176	0.632	0.85	1	53.697			
T4 120.00-100.00	1.04	2.93	A	0.286	2.333	0.612	0.85	1	50.700	4.08	203.86	C
			B	0.282	2.346	0.61	0.85	1	49.752			
			C	0.305	2.283	0.617	0.85	1	54.470			
T5 100.00-80.00	1.04	3.40	A	0.259	2.412	0.604	0.85	1	52.674	4.12	206.24	C
			B	0.255	2.424	0.603	0.85	1	51.758			
			C	0.274	2.366	0.608	0.85	1	56.310			
T6 80.00-60.00	1.04	4.10	A	0.248	2.442	0.601	0.85	1	58.467	4.29	214.70	C
			B	0.245	2.453	0.601	0.85	1	57.561			
			C	0.262	2.402	0.605	0.85	1	62.055			
T7 60.00-40.00	1.04	4.70	A	0.231	2.497	0.597	0.85	1	60.830	4.14	207.11	C
			B	0.227	2.507	0.596	0.85	1	59.941			
			C	0.243	2.46	0.6	0.85	1	64.342			
T8 40.00-30.00	0.52	2.44	A	0.216	2.543	0.594	0.85	1	30.809	1.93	192.82	C
			B	0.213	2.552	0.593	0.85	1	30.371			
			C	0.227	2.507	0.596	0.85	1	32.537			
T9 30.00-20.00	0.52	2.50	A	0.208	2.57	0.592	0.85	1	31.093	1.93	193.32	C
			B	0.205	2.579	0.591	0.85	1	30.659			
			C	0.218	2.535	0.594	0.85	1	32.806			
T10 20.00-0.00	1.04	5.11	A	0.19	2.629	0.588	0.85	1	60.808	3.87	193.56	C
			B	0.188	2.637	0.588	0.85	1	59.954			
			C	0.2	2.595	0.59	0.85	1	64.174			
Sum Weight:	7.46	30.44						OTM	2816.87 kip-ft	33.57		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.13	1.84	A	0.215	2.547	0.594	1	1	22.855	2.43	121.60	C
			B	0.189	2.632	0.588	1	1	19.963			
			C	0.249	2.44	0.602	1	1	26.840			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T2 160.00-140.00	1.00	2.15	A	0.224	2.516	0.596	1	1	27.078	4.82	240.90	C
			B	0.343	2.188	0.63	1	1	43.763			
			C	0.501	1.899	0.698	1	1	70.838			
T3 140.00-120.00	2.00	3.31	A	0.339	2.198	0.628	1	1	52.338	5.64	282.01	C
			B	0.449	1.976	0.673	1	1	74.231			
			C	0.503	1.896	0.699	1	1	86.508			
T4 120.00-100.00	2.59	3.73	A	0.403	2.058	0.653	1	1	76.584	5.51	275.29	C
			B	0.387	2.091	0.646	1	1	72.784			
			C	0.433	2.003	0.666	1	1	83.862			
T5 100.00-80.00	2.59	4.32	A	0.361	2.147	0.636	1	1	77.823	5.48	273.98	C
			B	0.347	2.179	0.631	1	1	74.243			
			C	0.386	2.091	0.646	1	1	84.634			
T6 80.00-60.00	2.59	5.21	A	0.338	2.199	0.628	1	1	83.551	5.58	278.84	C
			B	0.326	2.228	0.624	1	1	80.078			
			C	0.361	2.147	0.636	1	1	90.129			
T7 60.00-40.00	2.59	5.97	A	0.312	2.265	0.62	1	1	85.724	5.34	266.90	C
			B	0.301	2.293	0.616	1	1	82.369			
			C	0.331	2.216	0.626	1	1	92.053			
T8 40.00-30.00	1.29	3.11	A	0.292	2.317	0.614	1	1	43.196	2.48	248.16	C
			B	0.283	2.343	0.611	1	1	41.559			
			C	0.31	2.269	0.619	1	1	46.277			
T9 30.00-20.00	1.29	3.19	A	0.281	2.348	0.61	1	1	43.467	2.49	248.69	C
			B	0.272	2.374	0.608	1	1	41.852			
			C	0.298	2.301	0.615	1	1	46.501			
T10 20.00-0.00	2.59	6.31	A	0.259	2.411	0.604	1	1	85.171	5.01	250.32	C
			B	0.25	2.437	0.602	1	1	82.026			
			C	0.275	2.365	0.609	1	1	91.071			
Sum Weight:	18.65	39.14						OTM	3824.53 kip-ft	44.77		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.13	1.84	A	0.215	2.547	0.594	0.825	1	22.855	2.43	121.60	C
			B	0.189	2.632	0.588	0.825	1	19.963			
			C	0.249	2.44	0.602	0.825	1	26.840			
T2 160.00-140.00	1.00	2.15	A	0.224	2.516	0.596	0.825	1	27.078	4.82	240.90	C
			B	0.343	2.188	0.63	0.825	1	43.763			
			C	0.501	1.899	0.698	0.825	1	70.838			
T3 140.00-120.00	2.00	3.31	A	0.339	2.198	0.628	0.825	1	52.338	5.64	282.01	C
			B	0.449	1.976	0.673	0.825	1	74.231			
			C	0.503	1.896	0.699	0.825	1	86.508			
T4 120.00-100.00	2.59	3.73	A	0.403	2.058	0.653	0.825	1	76.584	5.51	275.29	C
			B	0.387	2.091	0.646	0.825	1	72.784			
			C	0.433	2.003	0.666	0.825	1	83.862			
T5 100.00-80.00	2.59	4.32	A	0.361	2.147	0.636	0.825	1	77.823	5.48	273.98	C
			B	0.347	2.179	0.631	0.825	1	74.243			
			C	0.386	2.091	0.646	0.825	1	84.634			
T6 80.00-60.00	2.59	5.21	A	0.338	2.199	0.628	0.825	1	83.551	5.58	278.84	C
			B	0.326	2.228	0.624	0.825	1	80.078			
			C	0.361	2.147	0.636	0.825	1	90.129			
T7 60.00-40.00	2.59	5.97	A	0.312	2.265	0.62	0.825	1	85.724	5.34	266.90	C
			B	0.301	2.293	0.616	0.825	1	82.369			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.331	2.216	0.626	0.825	1	92.053			
T8 40.00-30.00	1.29	3.11	A	0.292	2.317	0.614	0.825	1	43.196	2.48	248.16	C
			B	0.283	2.343	0.611	0.825	1	41.559			
			C	0.31	2.269	0.619	0.825	1	46.277			
T9 30.00-20.00	1.29	3.19	A	0.281	2.348	0.61	0.825	1	43.467	2.49	248.69	C
			B	0.272	2.374	0.608	0.825	1	41.852			
			C	0.298	2.301	0.615	0.825	1	46.501			
T10 20.00-0.00	2.59	6.31	A	0.259	2.411	0.604	0.825	1	85.171	5.01	250.32	C
			B	0.25	2.437	0.602	0.825	1	82.026			
			C	0.275	2.365	0.609	0.825	1	91.071			
Sum Weight:	18.65	39.14						OTM	3824.53 kip-ft	44.77		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.13	1.84	A	0.215	2.547	0.594	0.8	1	22.855	2.43	121.60	C
			B	0.189	2.632	0.588	0.8	1	19.963			
			C	0.249	2.44	0.602	0.8	1	26.840			
T2 160.00-140.00	1.00	2.15	A	0.224	2.516	0.596	0.8	1	27.078	4.82	240.90	C
			B	0.343	2.188	0.63	0.8	1	43.763			
			C	0.501	1.899	0.698	0.8	1	70.838			
T3 140.00-120.00	2.00	3.31	A	0.339	2.198	0.628	0.8	1	52.338	5.64	282.01	C
			B	0.449	1.976	0.673	0.8	1	74.231			
			C	0.503	1.896	0.699	0.8	1	86.508			
T4 120.00-100.00	2.59	3.73	A	0.403	2.058	0.653	0.8	1	76.584	5.51	275.29	C
			B	0.387	2.091	0.646	0.8	1	72.784			
			C	0.433	2.003	0.666	0.8	1	83.862			
T5 100.00-80.00	2.59	4.32	A	0.361	2.147	0.636	0.8	1	77.823	5.48	273.98	C
			B	0.347	2.179	0.631	0.8	1	74.243			
			C	0.386	2.091	0.646	0.8	1	84.634			
T6 80.00-60.00	2.59	5.21	A	0.338	2.199	0.628	0.8	1	83.551	5.58	278.84	C
			B	0.326	2.228	0.624	0.8	1	80.078			
			C	0.361	2.147	0.636	0.8	1	90.129			
T7 60.00-40.00	2.59	5.97	A	0.312	2.265	0.62	0.8	1	85.724	5.34	266.90	C
			B	0.301	2.293	0.616	0.8	1	82.369			
			C	0.331	2.216	0.626	0.8	1	92.053			
T8 40.00-30.00	1.29	3.11	A	0.292	2.317	0.614	0.8	1	43.196	2.48	248.16	C
			B	0.283	2.343	0.611	0.8	1	41.559			
			C	0.31	2.269	0.619	0.8	1	46.277			
T9 30.00-20.00	1.29	3.19	A	0.281	2.348	0.61	0.8	1	43.467	2.49	248.69	C
			B	0.272	2.374	0.608	0.8	1	41.852			
			C	0.298	2.301	0.615	0.8	1	46.501			
T10 20.00-0.00	2.59	6.31	A	0.259	2.411	0.604	0.8	1	85.171	5.01	250.32	C
			B	0.25	2.437	0.602	0.8	1	82.026			
			C	0.275	2.365	0.609	0.8	1	91.071			
Sum Weight:	18.65	39.14						OTM	3824.53 kip-ft	44.77		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.13	1.84	A	0.215	2.547	0.594	0.85	1	22.855	2.43	121.60	C
			B	0.189	2.632	0.588	0.85	1	19.963			
			C	0.249	2.44	0.602	0.85	1	26.840			
T2 160.00-140.00	1.00	2.15	A	0.224	2.516	0.596	0.85	1	27.078	4.82	240.90	C
			B	0.343	2.188	0.63	0.85	1	43.763			
			C	0.501	1.899	0.698	0.85	1	70.838			
T3 140.00-120.00	2.00	3.31	A	0.339	2.198	0.628	0.85	1	52.338	5.64	282.01	C
			B	0.449	1.976	0.673	0.85	1	74.231			
			C	0.503	1.896	0.699	0.85	1	86.508			
T4 120.00-100.00	2.59	3.73	A	0.403	2.058	0.653	0.85	1	76.584	5.51	275.29	C
			B	0.387	2.091	0.646	0.85	1	72.784			
			C	0.433	2.003	0.666	0.85	1	83.862			
T5 100.00-80.00	2.59	4.32	A	0.361	2.147	0.636	0.85	1	77.823	5.48	273.98	C
			B	0.347	2.179	0.631	0.85	1	74.243			
			C	0.386	2.091	0.646	0.85	1	84.634			
T6 80.00-60.00	2.59	5.21	A	0.338	2.199	0.628	0.85	1	83.551	5.58	278.84	C
			B	0.326	2.228	0.624	0.85	1	80.078			
			C	0.361	2.147	0.636	0.85	1	90.129			
T7 60.00-40.00	2.59	5.97	A	0.312	2.265	0.62	0.85	1	85.724	5.34	266.90	C
			B	0.301	2.293	0.616	0.85	1	82.369			
			C	0.331	2.216	0.626	0.85	1	92.053			
T8 40.00-30.00	1.29	3.11	A	0.292	2.317	0.614	0.85	1	43.196	2.48	248.16	C
			B	0.283	2.343	0.611	0.85	1	41.559			
			C	0.31	2.269	0.619	0.85	1	46.277			
T9 30.00-20.00	1.29	3.19	A	0.281	2.348	0.61	0.85	1	43.467	2.49	248.69	C
			B	0.272	2.374	0.608	0.85	1	41.852			
			C	0.298	2.301	0.615	0.85	1	46.501			
T10 20.00-0.00	2.59	6.31	A	0.259	2.411	0.604	0.85	1	85.171	5.01	250.32	C
			B	0.25	2.437	0.602	0.85	1	82.026			
			C	0.275	2.365	0.609	0.85	1	91.071			
Sum Weight:	18.65	39.14						OTM	3824.53 kip-ft	44.77		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.04	1.25	A	0.153	2.762	0.582	1	1	15.772	0.55	27.63	C
			B	0.139	2.812	0.58	1	1	14.322			
			C	0.173	2.69	0.585	1	1	17.924			
T2 160.00-140.00	0.39	1.50	A	0.162	2.728	0.583	1	1	18.974	1.05	52.28	C
			B	0.246	2.449	0.601	1	1	29.715			
			C	0.341	2.192	0.629	1	1	43.145			
T3 140.00-120.00	0.80	2.52	A	0.242	2.462	0.6	1	1	35.462	1.24	62.02	C
			B	0.32	2.243	0.622	1	1	48.715			
			C	0.348	2.176	0.632	1	1	53.697			
T4 120.00-100.00	1.04	2.93	A	0.286	2.333	0.612	1	1	50.700	1.26	62.92	C
			B	0.282	2.346	0.61	1	1	49.752			
			C	0.305	2.283	0.617	1	1	54.470			
T5 100.00-80.00	1.04	3.40	A	0.259	2.412	0.604	1	1	52.674	1.27	63.66	C
			B	0.255	2.424	0.603	1	1	51.758			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.274	2.366	0.608	1	1	56.310			
T6 80.00-60.00	1.04	4.10	A	0.248	2.442	0.601	1	1	58.467	1.33	66.27	C
			B	0.245	2.453	0.601	1	1	57.561			
			C	0.262	2.402	0.605	1	1	62.055			
T7 60.00-40.00	1.04	4.70	A	0.231	2.497	0.597	1	1	60.830	1.28	63.92	C
			B	0.227	2.507	0.596	1	1	59.941			
			C	0.243	2.46	0.6	1	1	64.342			
T8 40.00-30.00	0.52	2.44	A	0.216	2.543	0.594	1	1	30.809	0.60	59.51	C
			B	0.213	2.552	0.593	1	1	30.371			
			C	0.227	2.507	0.596	1	1	32.537			
T9 30.00-20.00	0.52	2.50	A	0.208	2.57	0.592	1	1	31.093	0.60	59.67	C
			B	0.205	2.579	0.591	1	1	30.659			
			C	0.218	2.535	0.594	1	1	32.806			
T10 20.00-0.00	1.04	5.11	A	0.19	2.629	0.588	1	1	60.808	1.19	59.74	C
			B	0.188	2.637	0.588	1	1	59.954			
			C	0.2	2.595	0.59	1	1	64.174			
Sum Weight:	7.46	30.44						OTM	869.40 kip-ft	10.36		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.04	1.25	A	0.153	2.762	0.582	0.825	1	15.772	0.55	27.63	C
			B	0.139	2.812	0.58	0.825	1	14.322			
			C	0.173	2.69	0.585	0.825	1	17.924			
T2 160.00-140.00	0.39	1.50	A	0.162	2.728	0.583	0.825	1	18.974	1.05	52.28	C
			B	0.246	2.449	0.601	0.825	1	29.715			
			C	0.341	2.192	0.629	0.825	1	43.145			
T3 140.00-120.00	0.80	2.52	A	0.242	2.462	0.6	0.825	1	35.462	1.24	62.02	C
			B	0.32	2.243	0.622	0.825	1	48.715			
			C	0.348	2.176	0.632	0.825	1	53.697			
T4 120.00-100.00	1.04	2.93	A	0.286	2.333	0.612	0.825	1	50.700	1.26	62.92	C
			B	0.282	2.346	0.61	0.825	1	49.752			
			C	0.305	2.283	0.617	0.825	1	54.470			
T5 100.00-80.00	1.04	3.40	A	0.259	2.412	0.604	0.825	1	52.674	1.27	63.66	C
			B	0.255	2.424	0.603	0.825	1	51.758			
			C	0.274	2.366	0.608	0.825	1	56.310			
T6 80.00-60.00	1.04	4.10	A	0.248	2.442	0.601	0.825	1	58.467	1.33	66.27	C
			B	0.245	2.453	0.601	0.825	1	57.561			
			C	0.262	2.402	0.605	0.825	1	62.055			
T7 60.00-40.00	1.04	4.70	A	0.231	2.497	0.597	0.825	1	60.830	1.28	63.92	C
			B	0.227	2.507	0.596	0.825	1	59.941			
			C	0.243	2.46	0.6	0.825	1	64.342			
T8 40.00-30.00	0.52	2.44	A	0.216	2.543	0.594	0.825	1	30.809	0.60	59.51	C
			B	0.213	2.552	0.593	0.825	1	30.371			
			C	0.227	2.507	0.596	0.825	1	32.537			
T9 30.00-20.00	0.52	2.50	A	0.208	2.57	0.592	0.825	1	31.093	0.60	59.67	C
			B	0.205	2.579	0.591	0.825	1	30.659			
			C	0.218	2.535	0.594	0.825	1	32.806			
T10 20.00-0.00	1.04	5.11	A	0.19	2.629	0.588	0.825	1	60.808	1.19	59.74	C
			B	0.188	2.637	0.588	0.825	1	59.954			
			C	0.2	2.595	0.59	0.825	1	64.174			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
Sum Weight:	7.46	30.44						OTM	869.40 kip-ft	10.36		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.04	1.25	A	0.153	2.762	0.582	0.8	1	15.772	0.55	27.63	C
			B	0.139	2.812	0.58	0.8	1	14.322			
			C	0.173	2.69	0.585	0.8	1	17.924			
T2 160.00-140.00	0.39	1.50	A	0.162	2.728	0.583	0.8	1	18.974	1.05	52.28	C
			B	0.246	2.449	0.601	0.8	1	29.715			
			C	0.341	2.192	0.629	0.8	1	43.145			
T3 140.00-120.00	0.80	2.52	A	0.242	2.462	0.6	0.8	1	35.462	1.24	62.02	C
			B	0.32	2.243	0.622	0.8	1	48.715			
			C	0.348	2.176	0.632	0.8	1	53.697			
T4 120.00-100.00	1.04	2.93	A	0.286	2.333	0.612	0.8	1	50.700	1.26	62.92	C
			B	0.282	2.346	0.61	0.8	1	49.752			
			C	0.305	2.283	0.617	0.8	1	54.470			
T5 100.00-80.00	1.04	3.40	A	0.259	2.412	0.604	0.8	1	52.674	1.27	63.66	C
			B	0.255	2.424	0.603	0.8	1	51.758			
			C	0.274	2.366	0.608	0.8	1	56.310			
T6 80.00-60.00	1.04	4.10	A	0.248	2.442	0.601	0.8	1	58.467	1.33	66.27	C
			B	0.245	2.453	0.601	0.8	1	57.561			
			C	0.262	2.402	0.605	0.8	1	62.055			
T7 60.00-40.00	1.04	4.70	A	0.231	2.497	0.597	0.8	1	60.830	1.28	63.92	C
			B	0.227	2.507	0.596	0.8	1	59.941			
			C	0.243	2.46	0.6	0.8	1	64.342			
T8 40.00-30.00	0.52	2.44	A	0.216	2.543	0.594	0.8	1	30.809	0.60	59.51	C
			B	0.213	2.552	0.593	0.8	1	30.371			
			C	0.227	2.507	0.596	0.8	1	32.537			
T9 30.00-20.00	0.52	2.50	A	0.208	2.57	0.592	0.8	1	31.093	0.60	59.67	C
			B	0.205	2.579	0.591	0.8	1	30.659			
			C	0.218	2.535	0.594	0.8	1	32.806			
T10 20.00-0.00	1.04	5.11	A	0.19	2.629	0.588	0.8	1	60.808	1.19	59.74	C
			B	0.188	2.637	0.588	0.8	1	59.954			
			C	0.2	2.595	0.59	0.8	1	64.174			
Sum Weight:	7.46	30.44						OTM	869.40 kip-ft	10.36		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 180.00-160.00	0.04	1.25	A	0.153	2.762	0.582	0.85	1	15.772	0.55	27.63	C
			B	0.139	2.812	0.58	0.85	1	14.322			
			C	0.173	2.69	0.585	0.85	1	17.924			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T2 160.00-140.00	0.39	1.50	A	0.162	2.728	0.583	0.85	1	18.974	1.05	52.28	C
			B	0.246	2.449	0.601	0.85	1	29.715			
			C	0.341	2.192	0.629	0.85	1	43.145			
T3 140.00-120.00	0.80	2.52	A	0.242	2.462	0.6	0.85	1	35.462	1.24	62.02	C
			B	0.32	2.243	0.622	0.85	1	48.715			
			C	0.348	2.176	0.632	0.85	1	53.697			
T4 120.00-100.00	1.04	2.93	A	0.286	2.333	0.612	0.85	1	50.700	1.26	62.92	C
			B	0.282	2.346	0.61	0.85	1	49.752			
			C	0.305	2.283	0.617	0.85	1	54.470			
T5 100.00-80.00	1.04	3.40	A	0.259	2.412	0.604	0.85	1	52.674	1.27	63.66	C
			B	0.255	2.424	0.603	0.85	1	51.758			
			C	0.274	2.366	0.608	0.85	1	56.310			
T6 80.00-60.00	1.04	4.10	A	0.248	2.442	0.601	0.85	1	58.467	1.33	66.27	C
			B	0.245	2.453	0.601	0.85	1	57.561			
			C	0.262	2.402	0.605	0.85	1	62.055			
T7 60.00-40.00	1.04	4.70	A	0.231	2.497	0.597	0.85	1	60.830	1.28	63.92	C
			B	0.227	2.507	0.596	0.85	1	59.941			
			C	0.243	2.46	0.6	0.85	1	64.342			
T8 40.00-30.00	0.52	2.44	A	0.216	2.543	0.594	0.85	1	30.809	0.60	59.51	C
			B	0.213	2.552	0.593	0.85	1	30.371			
			C	0.227	2.507	0.596	0.85	1	32.537			
T9 30.00-20.00	0.52	2.50	A	0.208	2.57	0.592	0.85	1	31.093	0.60	59.67	C
			B	0.205	2.579	0.591	0.85	1	30.659			
			C	0.218	2.535	0.594	0.85	1	32.806			
T10 20.00-0.00	1.04	5.11	A	0.19	2.629	0.588	0.85	1	60.808	1.19	59.74	C
			B	0.188	2.637	0.588	0.85	1	59.954			
			C	0.2	2.595	0.59	0.85	1	64.174			
Sum Weight:	7.46	30.44						OTM	869.40 kip-ft	10.36		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	14.03					
Bracing Weight	16.41					
Total Member Self-Weight	30.44			2.35	1.62	
Total Weight	43.80			2.35	1.62	
Wind 0 deg - No Ice		0.00	-47.57	-4957.29	1.62	-8.33
Wind 30 deg - No Ice		23.79	-41.20	-4292.82	-2478.20	-1.65
Wind 45 deg - No Ice		33.64	-33.64	-3504.64	-3505.37	1.98
Wind 60 deg - No Ice		41.20	-23.79	-2477.47	-4293.55	5.47
Wind 90 deg - No Ice		47.57	0.00	2.35	-4958.02	11.13
Wind 120 deg - No Ice		41.20	23.79	2482.17	-4293.55	13.80
Wind 135 deg - No Ice		33.64	33.64	3509.35	-3505.37	13.76
Wind 150 deg - No Ice		23.79	41.20	4297.53	-2478.20	12.78
Wind 180 deg - No Ice		0.00	47.57	4961.99	1.62	8.33
Wind 210 deg - No Ice		-23.79	41.20	4297.53	2481.44	1.65
Wind 225 deg - No Ice		-33.64	33.64	3509.35	3508.62	-1.98
Wind 240 deg - No Ice		-41.20	23.79	2482.17	4296.79	-5.47
Wind 270 deg - No Ice		-47.57	0.00	2.35	4961.26	-11.13
Wind 300 deg - No Ice		-41.20	-23.79	-2477.47	4296.79	-13.80
Wind 315 deg - No Ice		-33.64	-33.64	-3504.64	3508.62	-13.76
Wind 330 deg - No Ice		-23.79	-41.20	-4292.82	2481.44	-12.78

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Member Ice	8.70					
Total Weight Ice	66.23			3.07	1.65	
Wind 0 deg - Ice		0.00	-64.01	-6796.90	1.65	-9.27
Wind 30 deg - Ice		32.01	-55.44	-5885.88	-3398.34	1.47
Wind 45 deg - Ice		45.27	-45.27	-4805.24	-4806.66	6.88
Wind 60 deg - Ice		55.44	-32.01	-3396.92	-5887.30	11.82
Wind 90 deg - Ice		64.01	0.00	3.07	-6798.32	19.00
Wind 120 deg - Ice		55.44	32.01	3403.05	-5887.30	21.09
Wind 135 deg - Ice		45.27	45.27	4811.37	-4806.66	19.99
Wind 150 deg - Ice		32.01	55.44	5892.01	-3398.34	17.52
Wind 180 deg - Ice		0.00	64.01	6803.04	1.65	9.27
Wind 210 deg - Ice		-32.01	55.44	5892.01	3401.63	-1.47
Wind 225 deg - Ice		-45.27	45.27	4811.37	4809.95	-6.88
Wind 240 deg - Ice		-55.44	32.01	3403.05	5890.60	-11.82
Wind 270 deg - Ice		-64.01	0.00	3.07	6801.62	-19.00
Wind 300 deg - Ice		-55.44	-32.01	-3396.92	5890.60	-21.09
Wind 315 deg - Ice		-45.27	-45.27	-4805.24	4809.95	-19.99
Wind 330 deg - Ice		-32.01	-55.44	-5885.88	3401.63	-17.52
Total Weight	43.80			2.35	1.62	
Wind 0 deg - Service		0.00	-14.68	-1528.40	1.62	-2.57
Wind 30 deg - Service		7.34	-12.72	-1323.32	-763.75	-0.51
Wind 45 deg - Service		10.38	-10.38	-1080.05	-1080.78	0.61
Wind 60 deg - Service		12.72	-7.34	-763.02	-1324.05	1.69
Wind 90 deg - Service		14.68	0.00	2.35	-1529.13	3.43
Wind 120 deg - Service		12.72	7.34	767.73	-1324.05	4.26
Wind 135 deg - Service		10.38	10.38	1084.76	-1080.78	4.25
Wind 150 deg - Service		7.34	12.72	1328.02	-763.75	3.95
Wind 180 deg - Service		0.00	14.68	1533.11	1.62	2.57
Wind 210 deg - Service		-7.34	12.72	1328.02	767.00	0.51
Wind 225 deg - Service		-10.38	10.38	1084.76	1084.03	-0.61
Wind 240 deg - Service		-12.72	7.34	767.73	1327.29	-1.69
Wind 270 deg - Service		-14.68	0.00	2.35	1532.37	-3.43
Wind 300 deg - Service		-12.72	-7.34	-763.02	1327.29	-4.26
Wind 315 deg - Service		-10.38	-10.38	-1080.05	1084.03	-4.25
Wind 330 deg - Service		-7.34	-12.72	-1323.32	767.00	-3.95

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice

Comb. No.	Description
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice
19	Dead+Wind 0 deg+Ice
20	Dead+Wind 30 deg+Ice
21	Dead+Wind 45 deg+Ice
22	Dead+Wind 60 deg+Ice
23	Dead+Wind 90 deg+Ice
24	Dead+Wind 120 deg+Ice
25	Dead+Wind 135 deg+Ice
26	Dead+Wind 150 deg+Ice
27	Dead+Wind 180 deg+Ice
28	Dead+Wind 210 deg+Ice
29	Dead+Wind 225 deg+Ice
30	Dead+Wind 240 deg+Ice
31	Dead+Wind 270 deg+Ice
32	Dead+Wind 300 deg+Ice
33	Dead+Wind 315 deg+Ice
34	Dead+Wind 330 deg+Ice
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	27	5.55	-0.66	0.10
			Max. Compression	30	-7.17	0.27	-0.11
			Max. Mx	32	-0.10	-1.16	0.66
			Max. My	21	-0.55	0.30	1.88
			Max. Vy	22	0.80	-0.66	-0.35
			Max. Vx	25	1.09	-0.17	-0.82
		Diagonal	Max Tension	23	7.45	0.00	0.00
			Max. Compression	23	-7.54	0.00	0.00
			Max. Mx	31	7.45	0.02	0.00
			Max. Vy	31	0.01	0.00	0.00
		Horizontal	Max Tension	32	4.17	-0.01	0.00
			Max. Compression	24	-4.10	-0.01	-0.00
			Max. Mx	27	-1.21	-0.01	-0.01
			Max. My	32	-1.99	-0.01	-0.01
			Max. Vy	27	-0.01	-0.01	-0.01
		Top Girt	Max Tension	33	0.84	-0.01	0.00
			Max. Compression	25	-0.84	-0.01	-0.00
			Max. Mx	27	-0.58	-0.01	-0.00
			Max. Vy	27	-0.01	-0.01	-0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Inner Bracing	Max Tension	24	0.07	0.00	0.00
			Max. Compression	24	-0.07	0.00	0.00
			Max. Mx	18	-0.00	-0.01	0.00
			Max. Vy	18	0.01	0.00	0.00
T2	160 - 140	Leg	Max Tension	27	31.07	-0.56	0.00
			Max. Compression	30	-37.19	1.13	0.03
			Max. Mx	22	11.08	1.50	-0.03
			Max. My	20	-2.04	-0.03	1.48
			Max. Vy	22	1.66	-1.16	-0.03
			Max. Vx	28	-1.64	-0.03	1.14
		Diagonal	Max Tension	23	11.10	0.00	0.00
			Max. Compression	23	-11.21	0.00	0.00
			Max. Mx	31	11.08	0.03	0.00
			Max. Vy	31	-0.01	0.00	0.00
		Horizontal	Max Tension	23	6.97	-0.01	-0.00
			Max. Compression	23	-6.97	-0.01	-0.00
			Max. Mx	27	-1.19	-0.02	-0.01
			Max. My	32	-2.44	-0.02	-0.01
			Max. Vy	27	-0.02	-0.02	-0.01
		Inner Bracing	Max Tension	23	0.12	0.00	0.00
			Max. Compression	23	-0.12	0.00	0.00
			Max. Mx	18	0.00	-0.01	0.00
			Max. Vy	18	0.01	0.00	0.00
T3	140 - 120	Leg	Max Tension	27	69.52	-0.45	-0.00
			Max. Compression	30	-80.98	1.19	0.02
			Max. Mx	27	69.37	-1.21	-0.02
			Max. My	26	-4.06	-0.03	-1.22
			Max. Vy	27	1.13	-0.94	0.00
			Max. Vx	31	1.10	-0.02	-0.87
		Diagonal	Max Tension	23	13.03	0.00	0.00
			Max. Compression	23	-13.19	0.00	0.00
			Max. Mx	31	12.83	0.05	0.00
			Max. Vy	31	-0.02	0.00	0.00
		Horizontal	Max Tension	23	8.95	-0.03	-0.00
			Max. Compression	23	-8.91	-0.03	-0.00
			Max. Mx	27	-0.78	-0.04	-0.02
			Max. My	22	-0.22	-0.04	-0.02
			Max. Vy	27	-0.02	-0.04	-0.02
		Inner Bracing	Max Tension	23	0.15	0.00	0.00
			Max. Compression	23	-0.15	0.00	0.00
			Max. Mx	18	-0.00	-0.02	0.00
			Max. Vy	18	0.01	0.00	0.00
T4	120 - 100	Leg	Max Tension	27	103.06	-1.22	0.00
			Max. Compression	30	-117.99	1.20	0.01
			Max. Mx	27	102.86	-1.23	-0.00
			Max. My	31	-6.16	-0.02	-1.25
			Max. Vy	32	0.47	-1.22	-0.01
			Max. Vx	23	-0.47	-0.02	1.25
		Diagonal	Max Tension	23	16.01	0.00	0.00
			Max. Compression	23	-16.26	0.00	0.00
			Max. Mx	31	15.48	0.12	0.00
			Max. Vy	31	0.04	0.00	0.00
		Horizontal	Max Tension	23	9.33	-0.04	-0.00
			Max. Compression	23	-9.39	-0.04	-0.00
			Max. Mx	27	-0.88	-0.06	-0.02
			Max. My	22	-0.06	-0.05	-0.02
			Max. Vy	27	-0.03	-0.06	-0.02
		Inner Bracing	Max Tension	23	0.16	0.00	0.00
			Max. Compression	23	-0.16	0.00	0.00
			Max. Mx	18	-0.00	-0.03	0.00
			Max. Vy	18	0.02	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T5	100 - 80	Leg	Max Tension	27	138.35	-1.22	0.00
			Max. Compression	30	-157.80	1.44	0.02
			Max. Mx	27	138.10	-1.48	-0.01
			Max. My	26	-10.13	-0.02	-1.50
			Max. Vy	22	0.49	-1.48	-0.02
			Max. Vx	34	-0.49	-0.02	1.50
		Diagonal	Max Tension	23	14.23	0.00	0.00
			Max. Compression	23	-14.52	0.00	0.00
			Max. Mx	31	13.87	0.15	0.00
			Max. Vy	31	-0.04	0.00	0.00
		Horizontal	Max Tension	23	9.20	-0.05	-0.00
			Max. Compression	23	-9.25	-0.05	-0.00
			Max. Mx	27	-0.78	-0.07	-0.01
			Max. My	22	-0.33	-0.06	-0.02
			Max. Vy	27	-0.03	-0.07	-0.01
		Inner Bracing	Max Tension	23	0.16	0.00	0.00
			Max. Compression	23	-0.16	0.00	0.00
			Max. Mx	18	-0.00	-0.04	0.00
			Max. Vy	18	0.02	0.00	0.00
T6	80 - 60	Leg	Max Tension	27	169.08	-1.71	0.00
			Max. Compression	30	-193.55	1.83	0.01
			Max. Mx	27	168.76	-1.87	-0.01
			Max. My	26	-12.64	-0.02	-1.86
			Max. Vy	27	0.50	-1.71	0.00
			Max. Vx	31	0.49	-0.03	-1.68
		Diagonal	Max Tension	23	13.71	0.00	0.00
			Max. Compression	23	-14.10	0.00	0.00
			Max. Mx	31	13.63	0.18	0.00
			Max. Vy	31	-0.05	0.00	0.00
		Horizontal	Max Tension	23	9.78	-0.09	-0.00
			Max. Compression	23	-9.78	-0.09	-0.00
			Max. Mx	27	-0.71	-0.12	-0.02
			Max. My	22	-0.05	-0.12	-0.02
			Max. Vy	27	-0.05	-0.12	-0.02
		Inner Bracing	Max Tension	23	0.17	0.00	0.00
			Max. Compression	23	-0.17	0.00	0.00
			Max. Mx	18	-0.01	-0.07	0.00
			Max. Vy	18	0.03	0.00	0.00
T7	60 - 40	Leg	Max Tension	27	197.73	-1.69	0.00
			Max. Compression	30	-227.71	1.47	0.00
			Max. Mx	27	183.63	-1.87	-0.01
			Max. My	26	-13.56	-0.02	-1.86
			Max. Vy	22	-0.48	-1.87	-0.01
			Max. Vx	34	0.47	-0.02	1.86
		Diagonal	Max Tension	23	13.65	0.00	0.00
			Max. Compression	23	-14.21	0.00	0.00
			Max. Mx	31	13.61	0.25	0.00
			Max. Vy	31	-0.07	0.00	0.00
		Horizontal	Max Tension	23	10.42	-0.12	-0.00
			Max. Compression	23	-10.33	-0.12	-0.00
			Max. Mx	27	-0.56	-0.15	-0.02
			Max. My	32	-1.03	-0.14	-0.02
			Max. Vy	27	-0.06	-0.15	-0.02
		Inner Bracing	Max Tension	23	0.18	0.00	0.00
			Max. Compression	23	-0.18	0.00	0.00
			Max. Mx	18	-0.01	-0.13	0.00
			Max. Vy	18	0.05	0.00	0.00
T8	40 - 30	Leg	Max Tension	27	211.40	-1.57	-0.00
			Max. Compression	30	-244.29	2.41	-0.01
			Max. Mx	30	-244.29	2.41	-0.01
			Max. My	26	-16.41	-0.04	-1.74

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	30	-0.49	2.41	-0.01
			Max. Vx	26	-0.48	-0.04	-1.74
		Diagonal	Max Tension	23	13.63	0.00	0.00
			Max. Compression	23	-14.26	0.00	0.00
			Max. Mx	31	13.62	0.28	0.00
			Max. Vy	31	-0.07	0.00	0.00
		Horizontal	Max Tension	23	10.69	-0.13	-0.00
			Max. Compression	23	-10.60	-0.13	-0.00
			Max. Mx	27	-0.64	-0.16	-0.02
			Max. My	32	-0.95	-0.16	-0.02
			Max. Vy	27	-0.06	-0.16	-0.02
		Inner Bracing	Max Tension	23	0.18	0.00	0.00
			Max. Compression	23	-0.18	0.00	0.00
			Max. Mx	18	-0.01	-0.14	0.00
			Max. Vy	18	0.05	0.00	0.00
T9	30 - 20	Leg	Max Tension	27	224.64	-2.21	0.01
			Max. Compression	30	-260.48	-1.66	0.05
			Max. Mx	30	-260.03	2.41	-0.01
			Max. My	26	-18.26	-0.47	-4.29
			Max. Vy	30	0.80	2.41	-0.01
			Max. Vx	26	0.73	-0.47	-4.29
		Diagonal	Max Tension	23	13.66	0.00	0.00
			Max. Compression	23	-14.34	0.00	0.00
			Max. Mx	31	13.65	0.30	0.00
			Max. Vy	31	-0.07	0.00	0.00
		Top Girt	Max Tension	23	11.02	-0.14	-0.00
			Max. Compression	23	-10.80	-0.14	-0.00
			Max. Mx	27	0.02	-0.17	-0.02
			Max. My	32	-0.27	-0.17	-0.02
			Max. Vy	27	-0.06	-0.17	-0.02
		Inner Bracing	Max Tension	23	0.19	0.00	0.00
			Max. Compression	23	-0.19	0.00	0.00
			Max. Mx	18	-0.01	-0.16	0.00
			Max. Vy	18	0.05	0.00	0.00
T10	20 - 0	Leg	Max Tension	27	234.90	0.53	-0.04
			Max. Compression	30	-275.57	0.00	0.00
			Max. Mx	30	-275.14	7.55	-0.09
			Max. My	26	-19.58	-0.47	-4.29
			Max. Vy	30	-1.32	7.55	-0.09
			Max. Vx	26	-1.05	-0.47	-4.29
		Diagonal	Max Tension	23	21.58	-0.22	0.04
			Max. Compression	23	-22.16	0.00	0.00
			Max. Mx	31	10.22	-0.28	0.06
			Max. My	31	-21.04	0.02	-0.13
			Max. Vy	31	0.06	-0.28	0.06
			Max. Vx	23	0.01	0.00	0.00
		Horizontal	Max Tension	23	11.70	-0.25	-0.00
			Max. Compression	23	-11.92	-0.25	-0.00
			Max. Mx	27	-0.85	-0.38	-0.04
			Max. My	19	1.10	-0.13	0.04
			Max. Vy	27	0.10	-0.38	-0.04
		Redund Horz 1 Bracing	Max Tension	30	4.14	0.00	0.00
			Max. Compression	30	-4.14	0.00	0.00
			Max. Mx	18	0.31	0.02	0.00
			Max. Vy	18	-0.01	0.00	0.00
		Redund Diag 1 Bracing	Max Tension	30	3.78	0.00	0.00
			Max. Compression	30	-3.78	0.00	0.00
			Max. Mx	24	3.78	0.03	0.00
			Max. Vy	24	-0.01	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Redund Hip 1 Bracing	Max Tension	1	0.00	0.00	0.00
			Max. Compression	27	-0.04	0.00	0.00
			Max. Mx	18	-0.01	0.02	0.00
			Max. Vy	18	-0.01	0.00	0.00
		Inner Bracing	Max Tension	23	0.21	0.00	0.00
			Max. Compression	23	-0.21	0.00	0.00
			Max. Mx	18	-0.01	0.11	0.00
			Max. Vy	18	-0.03	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	306.62	33.52	-19.07
	Max. H_x	30	306.62	33.52	-19.07
	Max. H_z	21	-252.53	-28.73	18.20
	Min. Vert	22	-262.22	-30.66	17.41
	Min. H_x	22	-262.22	-30.66	17.41
	Min. H_z	29	296.93	31.66	-19.79
Leg B	Max. Vert	24	306.50	-33.61	-18.90
	Max. H_x	32	-262.34	30.76	17.24
	Max. H_z	33	-252.65	28.87	17.96
	Min. Vert	32	-262.34	30.76	17.24
	Min. H_x	24	306.50	-33.61	-18.90
	Min. H_z	25	296.81	-31.80	-19.56
Leg A	Max. Vert	19	306.37	-0.19	38.56
	Max. H_x	31	21.95	5.37	1.84
	Max. H_z	19	306.37	-0.19	38.56
	Min. Vert	27	-262.47	0.20	-35.26
	Min. H_x	23	21.95	-5.37	1.84
	Min. H_z	27	-262.47	0.20	-35.26

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	43.80	0.00	0.00	2.35	1.62	0.00
Dead+Wind 0 deg - No Ice	43.80	-0.00	-47.57	-4965.55	1.66	-8.35
Dead+Wind 30 deg - No Ice	43.80	23.79	-41.20	-4299.97	-2482.32	-1.65
Dead+Wind 45 deg - No Ice	43.80	33.64	-33.64	-3510.47	-3511.22	1.99
Dead+Wind 60 deg - No Ice	43.80	41.20	-23.79	-2481.49	-4300.64	5.48
Dead+Wind 90 deg - No Ice	43.80	47.57	0.00	2.39	-4966.28	11.13
Dead+Wind 120 deg - No Ice	43.80	41.20	23.79	2486.35	-4300.69	13.82
Dead+Wind 135 deg - No Ice	43.80	33.64	33.64	3515.23	-3511.19	13.78
Dead+Wind 150 deg - No Ice	43.80	23.79	41.20	4304.72	-2482.30	12.81
Dead+Wind 180 deg - No Ice	43.80	0.00	47.57	4970.15	1.70	8.34
Dead+Wind 210 deg - No Ice	43.80	-23.79	41.20	4304.69	2485.58	1.65
Dead+Wind 225 deg - No Ice	43.80	-33.64	33.64	3515.20	3514.46	-1.99
Dead+Wind 240 deg - No Ice	43.80	-41.20	23.79	2486.33	4303.95	-5.48
Dead+Wind 270 deg - No Ice	43.80	-47.57	0.00	2.39	4969.54	-11.14

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 300 deg - No Ice	43.80	-41.20	-23.79	-2481.43	4303.93	-13.81
Dead+Wind 315 deg - No Ice	43.80	-33.64	-33.64	-3510.45	3514.50	-13.78
Dead+Wind 330 deg - No Ice	43.80	-23.79	-41.20	-4299.96	2485.62	-12.81
Dead+Ice	66.23	0.00	0.00	3.07	1.65	-0.00
Dead+Wind 0 deg+Ice	66.23	-0.00	-64.01	-6814.18	1.70	-9.29
Dead+Wind 30 deg+Ice	66.23	32.01	-55.44	-5900.83	-3406.98	1.52
Dead+Wind 45 deg+Ice	66.23	45.26	-45.26	-4817.42	-4818.90	6.92
Dead+Wind 60 deg+Ice	66.23	55.44	-32.01	-3405.50	-5902.29	11.84
Dead+Wind 90 deg+Ice	66.23	64.01	0.00	3.16	-6815.61	18.97
Dead+Wind 120 deg+Ice	66.23	55.44	32.01	3411.79	-5902.23	21.10
Dead+Wind 135 deg+Ice	66.23	45.27	45.26	4823.68	-4818.83	20.03
Dead+Wind 150 deg+Ice	66.23	32.01	55.44	5907.04	-3406.92	17.58
Dead+Wind 180 deg+Ice	66.23	0.00	64.01	6820.34	1.69	9.29
Dead+Wind 210 deg+Ice	66.23	-32.01	55.44	5907.00	3410.28	-1.52
Dead+Wind 225 deg+Ice	66.23	-45.27	45.26	4823.63	4822.17	-6.92
Dead+Wind 240 deg+Ice	66.23	-55.44	32.01	3411.75	5905.56	-11.84
Dead+Wind 270 deg+Ice	66.23	-64.01	0.00	3.15	6818.92	-18.98
Dead+Wind 300 deg+Ice	66.23	-55.44	-32.01	-3405.48	5905.63	-21.10
Dead+Wind 315 deg+Ice	66.23	-45.26	-45.26	-4817.39	4822.26	-20.03
Dead+Wind 330 deg+Ice	66.23	-32.01	-55.44	-5900.80	3410.36	-17.58
Dead+Wind 0 deg - Service	43.80	0.00	-14.68	-1530.95	1.63	-2.57
Dead+Wind 30 deg - Service	43.80	7.34	-12.72	-1325.53	-765.02	-0.51
Dead+Wind 45 deg - Service	43.80	10.38	-10.38	-1081.88	-1082.58	0.61
Dead+Wind 60 deg - Service	43.80	12.72	-7.34	-764.30	-1326.27	1.69
Dead+Wind 90 deg - Service	43.80	14.68	0.00	2.37	-1531.69	3.44
Dead+Wind 120 deg - Service	43.80	12.72	7.34	769.02	-1326.26	4.27
Dead+Wind 135 deg - Service	43.80	10.38	10.38	1086.58	-1082.59	4.25
Dead+Wind 150 deg - Service	43.80	7.34	12.72	1330.25	-765.03	3.95
Dead+Wind 180 deg - Service	43.80	0.00	14.68	1535.68	1.63	2.58
Dead+Wind 210 deg - Service	43.80	-7.34	12.72	1330.25	768.28	0.51
Dead+Wind 225 deg - Service	43.80	-10.38	10.38	1086.58	1085.85	-0.61
Dead+Wind 240 deg - Service	43.80	-12.72	7.34	769.02	1329.51	-1.69
Dead+Wind 270 deg - Service	43.80	-14.68	0.00	2.37	1534.94	-3.44
Dead+Wind 300 deg - Service	43.80	-12.72	-7.34	-764.29	1329.53	-4.27
Dead+Wind 315 deg - Service	43.80	-10.38	-10.38	-1081.88	1085.84	-4.26
Dead+Wind 330 deg - Service	43.80	-7.34	-12.72	-1325.53	768.29	-3.95

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-43.80	0.00	0.00	43.80	0.00	0.000%
2	0.00	-43.80	-47.57	0.00	43.80	47.57	0.000%
3	23.79	-43.80	-41.20	-23.79	43.80	41.20	0.000%
4	33.64	-43.80	-33.64	-33.64	43.80	33.64	0.000%
5	41.20	-43.80	-23.79	-41.20	43.80	23.79	0.000%
6	47.57	-43.80	0.00	-47.57	43.80	-0.00	0.000%
7	41.20	-43.80	23.79	-41.20	43.80	-23.79	0.000%
8	33.64	-43.80	33.64	-33.64	43.80	-33.64	0.000%
9	23.79	-43.80	41.20	-23.79	43.80	-41.20	0.000%
10	0.00	-43.80	47.57	-0.00	43.80	-47.57	0.000%
11	-23.79	-43.80	41.20	23.79	43.80	-41.20	0.000%
12	-33.64	-43.80	33.64	33.64	43.80	-33.64	0.000%
13	-41.20	-43.80	23.79	41.20	43.80	-23.79	0.000%
14	-47.57	-43.80	0.00	47.57	43.80	-0.00	0.000%
15	-41.20	-43.80	-23.79	41.20	43.80	23.79	0.000%
16	-33.64	-43.80	-33.64	33.64	43.80	33.64	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
17	-23.79	-43.80	-41.20	23.79	43.80	41.20	0.000%
18	0.00	-66.23	0.00	0.00	66.23	0.00	0.000%
19	0.00	-66.23	-64.01	0.00	66.23	64.01	0.000%
20	32.01	-66.23	-55.44	-32.01	66.23	55.44	0.001%
21	45.27	-66.23	-45.27	-45.26	66.23	45.26	0.001%
22	55.44	-66.23	-32.01	-55.44	66.23	32.01	0.001%
23	64.01	-66.23	0.00	-64.01	66.23	-0.00	0.001%
24	55.44	-66.23	32.01	-55.44	66.23	-32.01	0.001%
25	45.27	-66.23	45.27	-45.27	66.23	-45.26	0.001%
26	32.01	-66.23	55.44	-32.01	66.23	-55.44	0.001%
27	0.00	-66.23	64.01	-0.00	66.23	-64.01	0.001%
28	-32.01	-66.23	55.44	32.01	66.23	-55.44	0.001%
29	-45.27	-66.23	45.27	45.27	66.23	-45.26	0.001%
30	-55.44	-66.23	32.01	55.44	66.23	-32.01	0.000%
31	-64.01	-66.23	0.00	64.01	66.23	-0.00	0.001%
32	-55.44	-66.23	-32.01	55.44	66.23	32.01	0.001%
33	-45.27	-66.23	-45.27	45.26	66.23	45.26	0.001%
34	-32.01	-66.23	-55.44	32.01	66.23	55.44	0.001%
35	0.00	-43.80	-14.68	0.00	43.80	14.68	0.000%
36	7.34	-43.80	-12.72	-7.34	43.80	12.72	0.000%
37	10.38	-43.80	-10.38	-10.38	43.80	10.38	0.000%
38	12.72	-43.80	-7.34	-12.72	43.80	7.34	0.000%
39	14.68	-43.80	0.00	-14.68	43.80	-0.00	0.000%
40	12.72	-43.80	7.34	-12.72	43.80	-7.34	0.000%
41	10.38	-43.80	10.38	-10.38	43.80	-10.38	0.000%
42	7.34	-43.80	12.72	-7.34	43.80	-12.72	0.000%
43	0.00	-43.80	14.68	0.00	43.80	-14.68	0.000%
44	-7.34	-43.80	12.72	7.34	43.80	-12.72	0.000%
45	-10.38	-43.80	10.38	10.38	43.80	-10.38	0.000%
46	-12.72	-43.80	7.34	12.72	43.80	-7.34	0.000%
47	-14.68	-43.80	0.00	14.68	43.80	-0.00	0.000%
48	-12.72	-43.80	-7.34	12.72	43.80	7.34	0.000%
49	-10.38	-43.80	-10.38	10.38	43.80	10.38	0.000%
50	-7.34	-43.80	-12.72	7.34	43.80	12.72	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	0.00000001
3	Yes	4	0.00000001	0.00000203
4	Yes	4	0.00000001	0.00000176
5	Yes	4	0.00000001	0.00000149
6	Yes	4	0.00000001	0.00000227
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000121
9	Yes	4	0.00000001	0.00000167
10	Yes	4	0.00000001	0.00000150
11	Yes	4	0.00000001	0.00000202
12	Yes	4	0.00000001	0.00000144
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000227
15	Yes	4	0.00000001	0.00000152
16	Yes	4	0.00000001	0.00000153
17	Yes	4	0.00000001	0.00000167

18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000227
20	Yes	4	0.00016953	0.00000465
21	Yes	4	0.00000001	0.00000405
22	Yes	4	0.00000001	0.00000362
23	Yes	4	0.00019617	0.00000560
24	Yes	4	0.00000001	0.00000241
25	Yes	4	0.00000001	0.00000283
26	Yes	4	0.00000001	0.00000395
27	Yes	4	0.00000001	0.00000360
28	Yes	4	0.00016860	0.00000463
29	Yes	4	0.00000001	0.00000328
30	Yes	4	0.00000001	0.00000229
31	Yes	4	0.00019593	0.00000560
32	Yes	4	0.00000001	0.00000370
33	Yes	4	0.00000001	0.00000360
34	Yes	4	0.00000001	0.00000395
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
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
T1	180 - 160	2.463	44	0.1088	0.0517
T2	160 - 140	2.001	44	0.1059	0.0355
T3	140 - 120	1.546	44	0.0963	0.0195
T4	120 - 100	1.133	44	0.0852	0.0122
T5	100 - 80	0.789	44	0.0698	0.0080
T6	80 - 60	0.508	45	0.0551	0.0050
T7	60 - 40	0.290	44	0.0412	0.0032
T8	40 - 30	0.133	43	0.0265	0.0019
T9	30 - 20	0.077	37	0.0190	0.0014
T10	20 - 0	0.037	37	0.0114	0.0009

Critical Deflections and Radius of Curvature - Service Wind

Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft			*in*	°	°	*ft*
180.00	PD1142	44	2.463	0.1088	0.0517	Inf

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
177.00	PA6-85	44	2.394	0.1086	0.0493	Inf
170.00	PAR6-105	44	2.232	0.1080	0.0437	925508
169.00	P6-F9	44	2.209	0.1079	0.0429	841348
160.00	OGT9-806	44	2.001	0.1059	0.0355	611007
155.00	(4) ALP 9212	44	1.885	0.1040	0.0312	395374
145.00	(3) Allgon 7184	44	1.657	0.0990	0.0229	153080
135.00	(3) ALP110-11	44	1.438	0.0937	0.0169	95342
125.00	GPS	44	1.230	0.0883	0.0135	69457

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	11.099	29	0.4900	0.2440
T2	160 - 140	9.001	29	0.4806	0.1757
T3	140 - 120	6.934	29	0.4362	0.0968
T4	120 - 100	5.065	29	0.3845	0.0606
T5	100 - 80	3.516	29	0.3143	0.0396
T6	80 - 60	2.258	29	0.2474	0.0250
T7	60 - 40	1.282	29	0.1847	0.0157
T8	40 - 30	0.585	27	0.1187	0.0094
T9	30 - 20	0.337	22	0.0849	0.0067
T10	20 - 0	0.159	22	0.0509	0.0043

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	PD1142	29	11.099	0.4900	0.2440	942338
177.00	PA6-85	29	10.784	0.4900	0.2346	942338
170.00	PAR6-105	29	10.050	0.4888	0.2120	471173
169.00	P6-F9	29	9.945	0.4884	0.2086	428338
160.00	OGT9-806	29	9.001	0.4806	0.1757	395305
155.00	(4) ALP 9212	29	8.476	0.4721	0.1551	98108
145.00	(3) Allgon 7184	29	7.439	0.4488	0.1140	30790
135.00	(3) ALP110-11	29	6.441	0.4240	0.0837	19488
125.00	GPS	29	5.505	0.3989	0.0667	14992

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 3 STD	20.00	6.67	68.8 K=1.00	21.168	2.2285	-7.17	47.17	0.152 ✓
T2	160 - 140	ROHN 4 STD	20.04	6.68	53.1 K=1.00	23.861	3.1741	-37.19	75.74	0.491 ✓
T3	140 - 120	ROHN 5 EH	20.04	6.68	43.6 K=1.00	25.320	6.1120	-80.98	154.75	0.523 ✓
T4	120 - 100	ROHN 6 EHS	20.04	10.02	54.0 K=1.00	23.709	6.7133	-117.99	159.16	0.741 ✓
T5	100 - 80	ROHN 6 EH	20.05	10.03	54.8 K=1.00	23.582	8.4049	-157.80	198.21	0.796 ✓
T6	80 - 60	ROHN 8 EHS	20.05	10.03	41.2 K=1.00	25.661	9.7193	-193.56	249.41	0.776 ✓
T7	60 - 40	ROHN 8 EHS	20.05	10.03	41.2 K=1.00	25.661	9.7193	-227.71	249.41	0.913 ✓
T8	40 - 30	ROHN 8 EHS	10.03	10.03	41.2 K=1.00	25.661	9.7193	-244.29	249.41	0.979 ✓
T9	30 - 20	ROHN 8 EHS	10.03	10.03	41.2 K=1.00	25.661	9.7193	-260.48	249.41	1.044 ✓
T10	20 - 0	ROHN 8 EH	20.05	10.03	41.8 K=1.00	25.576	12.7627	-275.57	326.43	0.844 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 2 STD	7.94	7.67	117.0 K=1.00	10.918	1.0745	-7.54	11.73	0.643 ✓
T2	160 - 140	ROHN 2 STD	8.55	8.25	125.8 K=1.00	9.431	1.0745	-11.21	10.13	1.106 ✓
T3	140 - 120	ROHN 2 EH	9.24	8.91	139.4 K=1.00	7.681	1.4773	-13.02	11.35	1.148 ✓
T4	120 - 100	ROHN 2.5 EH	12.52	12.06	156.6 K=1.00	6.090	2.2535	-15.77	13.72	1.149 ✓
T5	100 - 80	ROHN 3 STD	13.32	12.90	133.0 K=1.00	8.438	2.2285	-14.20	18.80	0.755 ✓
T6	80 - 60	ROHN 3 STD	14.19	13.68	141.1 K=1.00	7.504	2.2285	-14.07	16.72	0.841 ✓
T7	60 - 40	P3.5x.226	15.11	14.63	131.3 K=1.00	8.656	2.6795	-14.21	23.20	0.613 ✓
T8	40 - 30	P3.5x.226	15.59	15.12	135.8 K=1.00	8.103	2.6795	-14.26	21.71	0.657 ✓
T9	30 - 20	P3.5x.226	16.08	15.62	140.2 K=1.00	7.592	2.6795	-14.34	20.34	0.705 ✓
T10	20 - 0	P3.5x.226	24.33	12.17	109.2 K=1.00	12.519	2.6795	-22.16	33.55	0.661 ✓

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 1.5 STD	8.60	4.15	80.0 K=1.00	19.004	0.7995	-4.10	15.19	0.270 ✓
T2	160 - 140	ROHN 1.5 STD	10.01	4.82	92.9 K=1.00	16.309	0.7995	-6.97	13.04	0.534 ✓
T3	140 - 120	ROHN 2 STD	12.10	5.82	88.7 K=1.00	17.220	1.0745	-8.91	18.50	0.482 ✓
T4	120 - 100	ROHN 2 STD	13.92	6.68	101.9 K=1.00	14.269	1.0745	-9.39	15.33	0.612 ✓
T5	100 - 80	ROHN 2 STD	16.31	7.88	120.1 K=1.00	10.352	1.0745	-9.25	11.12	0.832 ✓
T6	80 - 60	ROHN 2.5 STD	18.84	9.06	114.8 K=1.00	11.336	1.7040	-9.78	19.32	0.506 ✓
T7	60 - 40	ROHN 2.5 STD	21.38	10.33	130.8 K=1.00	8.725	1.7040	-10.33	14.87	0.695 ✓
T8	40 - 30	ROHN 2.5 STD	22.64	10.96	138.8 K=1.00	7.746	1.7040	-10.60	13.20	0.803 ✓
T10	20 - 0	P3.5x.226	25.18	12.23	109.8 K=1.00	12.390	2.6795	-11.92	33.20	0.359 ✓

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 1.5 STD	8.54	4.13	79.5 K=1.00	19.110	0.7995	-0.84	15.28	0.055 ✓
T9	30 - 20	ROHN 2.5 STD	23.91	11.60	146.9 K=1.00	6.923	1.7040	-10.80	11.80	0.916 ✓

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T10	20 - 0	ROHN 1.5 STD	6.29	5.93	91.5 K=0.80	16.611	0.7995	-4.14	13.28	0.312 ✓

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T10	20 - 0	ROHN 1.5 STD	11.50	10.77	166.1 K=0.80	5.412	0.7995	-3.78	4.33	0.875 ✓

Redundant Hip (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T10	20 - 0	ROHN 1.5 STD	6.29	6.29	97.1 K=0.80	15.381	0.7995	-0.04	12.30	0.003 ✓

Inner Bracing Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/8	4.30	4.30	129.8 K=1.00	8.869	0.4844	-0.07	4.30	0.017 ✓
T2	160 - 140	L2x2x1/8	5.01	5.01	151.1 K=1.00	6.537	0.4844	-0.12	3.17	0.038 ✓
T3	140 - 120	L2x2x1/8	6.05	6.05	182.6 K=1.00	4.479	0.4844	-0.15	2.17	0.071 ✓
T4	120 - 100	L2 1/2x2 1/2x3/16	6.96	6.96	168.7 K=1.00	5.248	0.9020	-0.16	4.73	0.034 ✓
T5	100 - 80	L2 1/2x2 1/2x3/16	8.15	8.15	197.7 K=1.00	3.821	0.9020	-0.16	3.45	0.046 ✓
T6	80 - 60	L3x3x3/16	9.42	9.42	189.7 K=1.00	4.150	1.0900	-0.17	4.52	0.037 ✓
T7	60 - 40	L3 1/2x3 1/2x1/4	10.69	10.69	184.8 K=1.00	4.372	1.6900	-0.18	7.39	0.024 ✓
T8	40 - 30	L3 1/2x3 1/2x1/4	11.32	11.32	195.8 K=1.00	3.897	1.6900	-0.18	6.59	0.028 ✓
T9	30 - 20	L3 1/2x3 1/2x1/4	11.96	11.96	206.7 K=1.00	3.495	1.6900	-0.19	5.91	0.032 ✓
T10	20 - 0	ROHN 2 STD	12.59	12.59	191.9 K=1.00	4.054	1.0745	-0.21	4.36	0.047 ✓

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 3 STD	20.00	6.67	68.8	30.000	2.2285	5.55	66.85	0.083 ✓
T2	160 - 140	ROHN 4 STD	20.04	6.68	53.1	30.000	3.1741	31.07	95.22	0.326 ✓
T3	140 - 120	ROHN 5 EH	20.04	6.68	43.6	30.000	6.1120	69.52	183.36	0.379 ✓
T4	120 - 100	ROHN 6 EHS	20.04	10.02	54.0	30.000	6.7133	103.06	201.40	0.512 ✓
T5	100 - 80	ROHN 6 EH	20.05	10.03	54.8	30.000	8.4049	138.35	252.15	0.549 ✓
T6	80 - 60	ROHN 8 EHS	20.05	10.03	41.2	30.000	9.7193	169.08	291.58	0.580 ✓
T7	60 - 40	ROHN 8 EHS	20.05	10.03	41.2	30.000	9.7193	197.73	291.58	0.678 ✓
T8	40 - 30	ROHN 8 EHS	10.03	10.03	41.2	30.000	9.7193	211.40	291.58	0.725 ✓
T9	30 - 20	ROHN 8 EHS	10.03	10.03	41.2	30.000	9.7193	224.64	291.58	0.770 ✓
T10	20 - 0	ROHN 8 EH	20.05	10.03	41.8	30.000	12.7627	234.90	382.88	0.613 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 2 STD	7.94	7.67	117.0	30.000	1.0745	7.45	32.24	0.231 ✓
T2	160 - 140	ROHN 2 STD	8.55	8.25	125.8	30.000	1.0745	11.10	32.24	0.344 ✓
T3	140 - 120	ROHN 2 EH	9.00	8.67	135.7	30.000	1.4773	13.03	44.32	0.294 ✓
T4	120 - 100	ROHN 2.5 EH	12.19	11.73	152.3	30.000	2.2535	16.01	67.61	0.237 ✓
T5	100 - 80	ROHN 3 STD	12.91	12.49	128.8	30.000	2.2285	14.23	66.85	0.213 ✓
T6	80 - 60	ROHN 3 STD	13.74	13.24	136.5	30.000	2.2285	13.71	66.85	0.205 ✓
T7	60 - 40	P3.5x.226	14.64	14.16	127.1	30.000	2.6795	13.65	80.39	0.170 ✓
T8	40 - 30	P3.5x.226	15.59	15.12	135.8	30.000	2.6795	13.63	80.39	0.170 ✓
T9	30 - 20	P3.5x.226	16.08	15.62	140.2	30.000	2.6795	13.66	80.39	0.170 ✓
T10	20 - 0	P3.5x.226	24.33	12.17	109.2	30.000	2.6795	21.58	80.39	0.268 ✓

ERITower	Job	Page
	180' Lattice Tower	37 of 40
URS Corp. AES 795 Brook Street Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-5566	**Project** Westport, Connecticut	**Date** 15:01:14 11/10/04
	Client VZ1-110	**Designed by** Daniel D. McClure

Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
T1	180 - 160	ROHN 1.5 STD	8.60	4.15	80.0	30.000	0.7995	4.17	23.98	0.174 ✓
T2	160 - 140	ROHN 1.5 STD	10.01	4.82	92.9	30.000	0.7995	6.97	23.98	0.291 ✓
T3	140 - 120	ROHN 2 STD	12.10	5.82	88.7	30.000	1.0745	8.95	32.24	0.278 ✓
T4	120 - 100	ROHN 2 STD	13.92	6.68	101.9	30.000	1.0745	9.33	32.24	0.290 ✓
T5	100 - 80	ROHN 2 STD	16.31	7.88	120.1	30.000	1.0745	9.20	32.24	0.285 ✓
T6	80 - 60	ROHN 2.5 STD	18.84	9.06	114.8	30.000	1.7040	9.78	51.12	0.191 ✓
T7	60 - 40	ROHN 2.5 STD	21.38	10.33	130.8	30.000	1.7040	10.42	51.12	0.204 ✓
T8	40 - 30	ROHN 2.5 STD	22.64	10.96	138.8	30.000	1.7040	10.69	51.12	0.209 ✓
T10	20 - 0	P3.5x.226	25.18	12.23	109.8	30.000	2.6795	11.70	80.39	0.146 ✓

Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
T1	180 - 160	ROHN 1.5 STD	8.54	4.13	79.5	30.000	0.7995	0.84	23.98	0.035 ✓
T9	30 - 20	ROHN 2.5 STD	23.91	11.60	146.9	21.600	1.7040	11.02	36.81	0.299 ✓

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
T10	20 - 0	ROHN 1.5 STD	6.29	5.93	114.4	30.000	0.7995	4.14	23.98	0.173 ✓

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T10	20 - 0	ROHN 1.5 STD	11.50	10.77	207.6	30.000	0.7995	3.78	23.98	0.158 ✓

Inner Bracing Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/8	4.30	4.30	82.4	21.600	0.4844	0.07	10.46	0.007 ✓
T2	160 - 140	L2x2x1/8	5.01	5.01	95.9	21.600	0.4844	0.12	10.46	0.012 ✓
T3	140 - 120	L2x2x1/8	6.05	6.05	115.9	21.600	0.4844	0.15	10.46	0.015 ✓
T4	120 - 100	L2 1/2x2 1/2x3/16	6.96	6.96	107.3	21.600	0.9020	0.16	19.48	0.008 ✓
T5	100 - 80	L2 1/2x2 1/2x3/16	8.15	8.15	125.8	21.600	0.9020	0.16	19.48	0.008 ✓
T6	80 - 60	L3x3x3/16	9.42	9.42	120.4	21.600	1.0900	0.17	23.54	0.007 ✓
T7	60 - 40	L3 1/2x3 1/2x1/4	10.69	10.69	117.7	30.000	1.6900	0.18	50.70	0.004 ✓
T8	40 - 30	L3 1/2x3 1/2x1/4	11.32	11.32	124.6	30.000	1.6900	0.18	50.70	0.004 ✓
T9	30 - 20	L3 1/2x3 1/2x1/4	11.96	11.96	131.6	30.000	1.6900	0.19	50.70	0.004 ✓
T10	20 - 0	ROHN 2 STD	12.59	12.59	191.9	30.000	1.0745	0.21	32.24	0.006 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	180 - 160	Leg	ROHN 3 STD	1	-7.17	62.88	11.4	Pass
		Diagonal	ROHN 2 STD	9	-7.54	15.64	48.2	Pass
		Horizontal	ROHN 1.5 STD	7	-4.10	20.25	20.3	Pass
		Top Girt	ROHN 1.5 STD	4	-0.84	20.37	4.1	Pass
		Inner Bracing	L2x2x1/8	18	-0.07	5.73	1.2	Pass
T2	160 - 140	Leg	ROHN 4 STD	40	-37.19	100.96	36.8	Pass
		Diagonal	ROHN 2 STD	45	-11.21	13.51	83.0	Pass
		Horizontal	ROHN 1.5 STD	43	-6.97	17.38	40.1	Pass
		Inner Bracing	L2x2x1/8	52	-0.12	4.22	2.9	Pass
T3	140 - 120	Leg	ROHN 5 EH	79	-80.98	206.29	39.3	Pass
		Diagonal	ROHN 2 EH	84	-13.02	15.13	86.1	Pass
		Horizontal	ROHN 2 STD	82	-8.91	24.67	36.1	Pass
		Inner Bracing	L2x2x1/8	93	-0.15	2.89	5.3	Pass
T4	120 - 100	Leg	ROHN 6 EHS	118	-117.99	212.17	55.6	Pass
		Diagonal	ROHN 2.5 EH	123	-15.77	18.30	86.2	Pass
		Horizontal	ROHN 2 STD	121	-9.39	20.44	45.9	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
		Inner Bracing	L2 1/2x2 1/2x3/16	130	-0.16	6.31	2.6	Pass
T5	100 - 80	Leg	ROHN 6 EH	145	-157.80	264.21	59.7	Pass
		Diagonal	ROHN 3 STD	150	-14.20	25.07	56.6	Pass
		Horizontal	ROHN 2 STD	148	-9.25	14.83	62.4	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	157	-0.16	4.59	3.5	Pass
T6	80 - 60	Leg	ROHN 8 EHS	172	-193.56	332.46	58.2	Pass
		Diagonal	ROHN 3 STD	177	-14.07	22.29	63.1	Pass
		Horizontal	ROHN 2.5 STD	175	-9.78	25.75	38.0	Pass
		Inner Bracing	L3x3x3/16	184	-0.17	6.03	2.8	Pass
T7	60 - 40	Leg	ROHN 8 EHS	199	-227.71	332.46	68.5	Pass
		Diagonal	P3.5x.226	204	-14.21	30.92	45.9	Pass
		Horizontal	ROHN 2.5 STD	202	-10.33	19.82	52.1	Pass
		Inner Bracing	L3 1/2x3 1/2x1/4	211	-0.18	9.85	1.8	Pass
T8	40 - 30	Leg	ROHN 8 EHS	226	-244.29	332.46	73.5	Pass
		Diagonal	P3.5x.226	231	-14.26	28.94	49.3	Pass
		Horizontal	ROHN 2.5 STD	229	-10.60	17.60	60.2	Pass
		Inner Bracing	L3 1/2x3 1/2x1/4	238	-0.18	8.78	2.1	Pass
T9	30 - 20	Leg	ROHN 8 EHS	241	-260.48	332.46	78.3	Pass
		Diagonal	P3.5x.226	248	-14.34	27.12	52.9	Pass
		Top Girt	ROHN 2.5 STD	244	-10.80	15.73	68.7	Pass
		Inner Bracing	L3 1/2x3 1/2x1/4	253	-0.19	7.87	2.4	Pass
T10	20 - 0	Leg	ROHN 8 EH	256	-275.57	435.13	63.3	Pass
		Diagonal	P3.5x.226	263	-22.16	44.72	49.6	Pass
		Horizontal	P3.5x.226	259	-11.92	44.25	26.9	Pass
		Redund Horz 1 Bracing	ROHN 1.5 STD	261	-4.14	17.70	23.4	Pass
		Redund Diag 1 Bracing	ROHN 1.5 STD	262	-3.78	5.77	65.6	Pass
		Redund Hip 1 Bracing	ROHN 1.5 STD	281	-0.04	16.39	0.2	Pass
		Inner Bracing	ROHN 2 STD	285	-0.21	5.81	3.6	Pass
							Summary	
						Leg (T9)	78.3	Pass
						Diagonal (T4)	86.2	Pass
						Horizontal (T5)	62.4	Pass
						Top Girt (T9)	68.7	Pass
						Redund Horz 1 Bracing (T10)	23.4	Pass
						Redund Diag 1 Bracing (T10)	65.6	Pass
						Redund Hip 1 Bracing (T10)	0.2	Pass
						Inner Bracing (T3)	5.3	Pass
						RATING =	**86.2**	**Pass**

Element Map

Section No.	Section Elevation ft	Component Type	Element List
T1	180.00-160.00	Leg	1-3
		Diagonal	8-9,11-12,14-15,20-21,23-24,26-27,31-36
		Horizontal	7,10,13,19,22,25
		Top Girt	4-6
		Inner Bracing	16-18,28-30,37-39
T2	160.00-140.00	Leg	40-42
		Diagonal	44-45,47-48,50-51,56-57,59-60,62-63,68-69,71-72,74-75
		Horizontal	43,46,49,55,58,61,67,70,73
		Inner Bracing	52-54,64-66,76-78
T3	140.00-120.00	Leg	79-81
		Diagonal	83-84,86-87,89-90,95-96,98-99,101-102,107-108,110-111,113-114
		Horizontal	82,85,88,94,97,100,106,109,112
		Inner Bracing	91-93,103-105,115-117
T4	120.00-100.00	Leg	118-120
		Diagonal	122-123,125-126,128-129,134-135,137-138,140-141
		Horizontal	121,124,127,133,136,139
		Inner Bracing	130-132,142-144
T5	100.00-80.00	Leg	145-147
		Diagonal	149-150,152-153,155-156,161-162,164-165,167-168
		Horizontal	148,151,154,160,163,166
		Inner Bracing	157-159,169-171
T6	80.00-60.00	Leg	172-174
		Diagonal	176-177,179-180,182-183,188-189,191-192,194-195
		Horizontal	175,178,181,187,190,193
		Inner Bracing	184-186,196-198
T7	60.00-40.00	Leg	199-201
		Diagonal	203-204,206-207,209-210,215-216,218-219,221-222
		Horizontal	202,205,208,214,217,220
		Inner Bracing	211-213,223-225
T8	40.00-30.00	Leg	226-228
		Diagonal	230-231,233-234,236-237
		Horizontal	229,232,235
		Inner Bracing	238-240
T9	30.00-20.00	Leg	241-243
		Diagonal	247-252
		Top Girt	244-246
		Inner Bracing	253-255
T10	20.00-0.00	Leg	256-258
		Diagonal	260,263,267,270,275,278
		Horizontal	259,266,274
		Redund Horz 1 Bracing	261,264,268,271,276,279
		Redund Diag 1 Bracing	262,265,269,272,277,280
		Redund Hip 1 Bracing	273,281-282
		Inner Bracing	283-285
			Total number of elements: 285

ANCHOR BOLT EVALUATION

URS

Job	180' Self-Supported Tower	Project No.	VZ1-110	Page	of
Description	Anchor Bolts and Base Plate Analysis	Computed by		Sheet 1	of 1
		Checked by		Date	11/10/04
				Date	

Based on the ASCE 10-97 Design of Latticed Steel Transmission Structures

ALLOWABLE STRESS

$F_u := 125 \cdot \frac{10^3 \cdot lb}{in^2}$ A354 Gr. BC

* ncrease allowable by 1.333 per TIA/EIA

$Fy := 109 \cdot \frac{10^3 \cdot lb}{in^2}$ *

$n := 8$ n is the number of threads per inch

$Uplift := 262000lb$ $Compression := 307000 \cdot lb$ $Shear := 64000 \cdot lb$

$BoltDiamiter := 1 \cdot in$ * $NumberOfBolts := 10$ $\mu := 0.55$ coefficient of friction

$As1 := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy}$ * $As1 = 3.66\,in^2$

$As2 := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right|$ * $As2 = 0.55\,in^2$

$Anet := \frac{\pi}{4} \cdot \left(BoltDiamiter - \frac{0.9743 \cdot in}{n} \right)^2$ * $Anet = 0.61\,in^2$

$Aprovided := Anet \cdot NumberOfBolts$ $Aprovided = 6.06\,in^2$

$StressRatio1 := \frac{As1}{Aprovided}$ * $StressRatio1 = 0.6$

Acceptable

$StressRatio2 := \frac{As2}{Aprovided}$ * $StressRatio2 = 0.09$

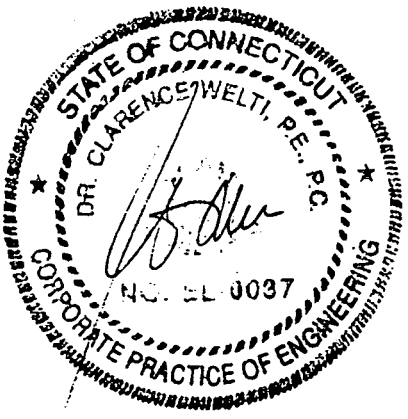
SOIL INVESTIGATION AND FOUNDATION CAPACITY REPORT

DR. CLARENCE WELTI, P.E., P.C.

GEOTECHNICAL ENGINEERING

227 Williams Street • P.O. Box 397
Glastonbury, CT 06033

(860) 633-4623 / FAX (860) 657-2514



October 10, 2002

Mr. Mohsen Sahirad
URS Corporation
500 Enterprise Drive; Suite 3B
Rocky Hill, CT 06067

Re: Telecommunications Tower; 880 Post Road; Westport, CT ; Evaluation of Existing Foundation for Increased Design Loads

Dear Mohsen:

1.0 Herewith are boring data pertaining to the above. Two borings were drilled to a maximum depth of 12 feet. One boring was drilled 10 feet into bedrock and the second boring was drilled to the top of bedrock. The two borings are shown on the attached photo. Boring B-1 was about 11 feet from the tower leg and boring B-2 was about 15 feet from the tower leg. Considering that the rock outcrops at the third leg, the two borings define rock sufficiently to permit a reasonable interpolation of rock at the actual leg foundations. The former police station site is undergoing environmental remediation. *The borings were drilled by Clarence Welti Associates, Inc. and sampling was conducted by this firm solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.*

2.0 The purpose of this study is to assess the capability of tower legs to receive the proposed revised loadings. The load summary, including initial and revised design loadings is as follows:

Loading Type	Original Reaction	Revised Reactions
Uplift	276.7 kips	324 kips
Download	319.9 kips	374 kips
Shear	41.0 kips	48 kips

3.0 The initial boring data (1990 data from Test Craig Laboratories) indicated bedrock over the entire site. It is understood that there is information indicating that two of the legs were placed in earth instead of rock. The recent boring tends to belie this. The analyses for uplift (which is the only critical item on the above reaction schedule) have been done for both earth and rock. The reference for both analyses is FHWA-1F-025 Publication "Drilled Shafts: Construction Procedures and Design Methods".

3.0.1 The tower legs were each placed on 4.5 feet diameter shafts installed 27 feet deep into either earth or rock. The design uplift was and is based on an effective length of 21 feet.

3.1 Regarding the shaft in earth analysis there were no deep blow counts in the borings, since rock was encountered within 2 feet of grade. It is however reasonable to assume the N value (blows per 12" on split spoon) will be about 60 in the till overlying rock. Using the procedure indicated on the attached calculations the ultimate uplift capacity would be 831 kips. Design capacity would be ½ of this value or 415 kips. In reviewing the reference you cited (Foundation Engineering by Das, 4th edition) a similar ultimate load capacity can also be found if one assumes an angle of internal friction of about 40° (which would be typical for N = 60) and a δ/ϕ ratio of 1.0 (relative density of soil ≥ 85+%).

3.2 Regarding the shaft in rock the friction is defined in the attached calculations. The ultimate uplift of the shaft placed the Straits Schist rock formation would be about 10 kips/sf. With a factor of safety of 3 (using 3 kips/sf) the allowable loading would be 888 kips.

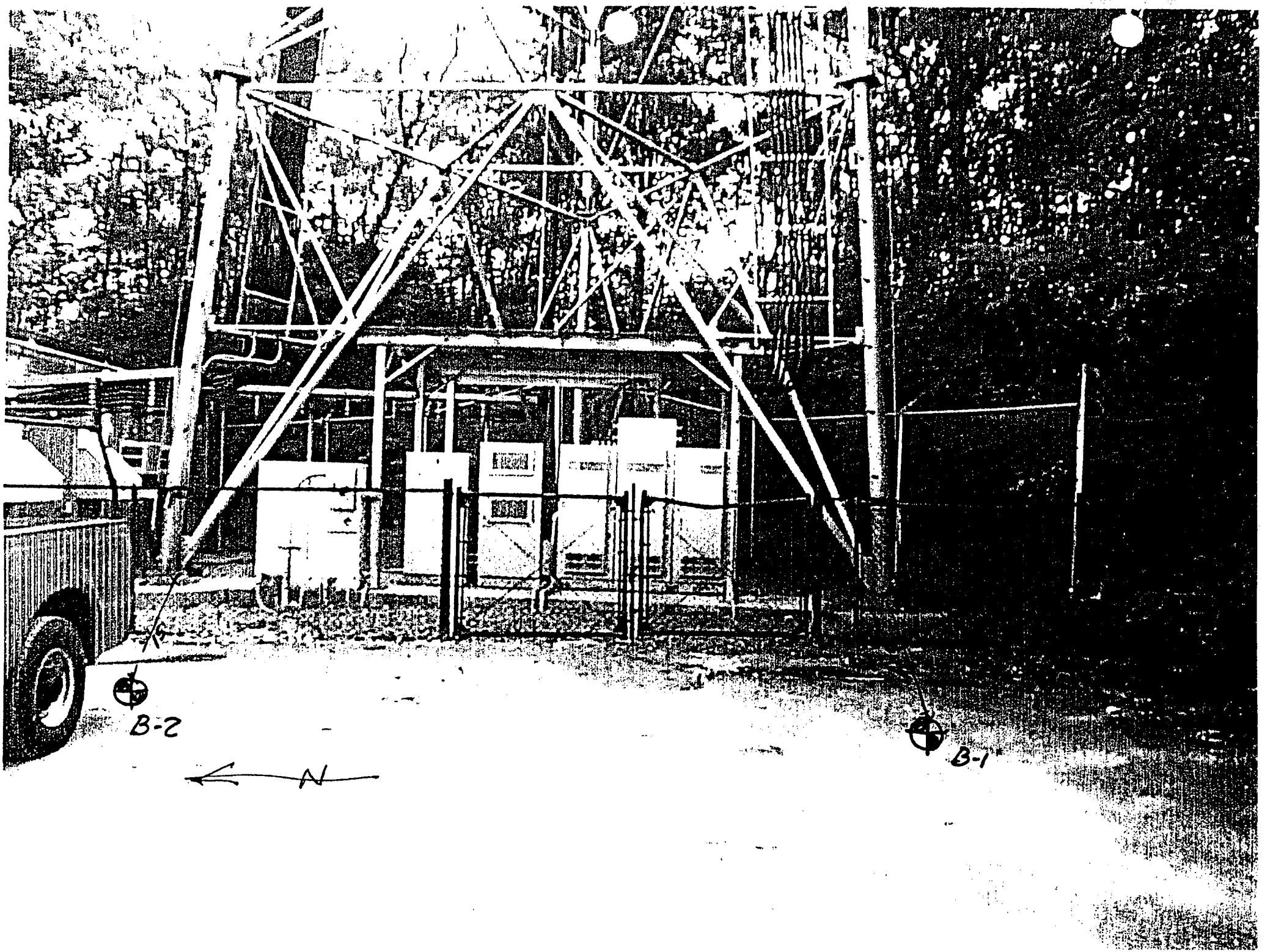
4.0 In summary it is believed that the shafts are in rock. The rock is a Schist with steep foliation and may have been drilled with only moderate effort. If the actual shaft are in earth there would have to have been a deep depression between the rock outcrop (which was cut down about 5 feet at the east leg) and the boring locations west of the two west legs, which indicated rock at 2 feet below grade similar to the original borings on the site. If there was a depression in the rock, the soil would be glacial till similar to what is being excavated to the northwest of the site at the old State Police Station. The analyses included herewith indicate that with either rock or till overburden the shafts have adequate capacity for the revised loading.

If you have any questions, please call me.

Very truly yours.

Clarence Welti, PhD, P. E.
Pres. Dr. Clarence Welti, P. E., P.C.

A:\urstoweranalysis9/04/02


B-2
B-1
N

CLARENCE WELTI ASSOC., INC.
P.O. BOX 397
GLASTONBURY, CONN 06033

CLIENT
URS CORPORATION

PROJECT NAME
CELL TOWER SITE
LOCATION
880 POST ROAD
WESTPORT, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	NX
SIZE I.D.	3.75"		1.5"	2.0"
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET
LINE & STA.
N. COORDINATE
E. COORDINATE

SURFACE ELEV
HOLE NO. B-1

GROUND WATER OBSERVATIONS
AT 2.0 FT. AFTER 0 HOURS
AT FT. AFTER HOURS

START DATE 10/7/02
FINISH DATE 10/7/02

DEPTH	SAMPLE NO.	SAMPLE BLOWS/6"	SAMPLE DEPTH	A	STRATUM DESCRIPTION + REMARKS	ELEV
0	1	4-13-20-60	0.00'-1.50'		ASPHALT .10	
					BR. FINE-CRS. SAND AND FINE GRAVEL - FILL .80	
					GRAY ROCK FRAGMENTS, LITTLE SILT AND FINE SAND 1.5	
					GRAY ROCK FRAGMENTS 2.0	
					CORED ROCK -	
5					RUN #1 2.0' - 7.0' RECOVERED 50"	
					RUN #2 7.0' - 12.0' RECOVERED 60"	
10						
					BOTTOM OF BORING @ 12.0' 12.0	
					NOTE: BORING WAS DRILLED 11.0' WEST OF TOWER LEG	
15						
20						
25						
30						
35						

LEGEND: COL. A:
SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON
PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: BROMLEY
INSPECTOR:

SHEET 1 OF 1 | HOLE NO. B-1

CLARENCE WELTI ASSOC., INC.
P.O. BOX 397
GLASTONBURY, CONN 06033

CLIENT
URS CORPORATION

PROJECT NAME
CELL TOWER SITE
LOCATION
880 POST ROAD
WESTPORT, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	
SIZE I.D.	3.75"		1.5"	
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET
LINE & STA.
N. COORDINATE
E. COORDINATE

SURFACE ELEV
HOLE NO. B-2

GROUND WATER OBSERVATIONS
AT none FT AFTER 0 HOURS
AT FT AFTER HOURS

START DATE 10/7/02
FINISH DATE 10/7/02

DEPTH	SAMPLE NO.	SAMPLE BLOWS/6"	SAMPLE DEPTH	A	STRATUM DESCRIPTION + REMARKS	ELEV
0	1	1-8-12-60	0.00'-1.50'		DARK BR. FINE-CRS. SAND, SOME FINE-MED. GRAVEL, TRACE SILT - FILL (1.0)	
					BR./GRAY ROCK FRAGMENTS. SILT AND FINE SAND (1.5)	
					GRAY ROCK FRAGMENTS (2.0)	
					AUGER REFUSAL @ 2.0'	
					NOTE: BORING WAS DRILLED 15'WEST OF TOWER LEG	
5						
10						
15						
20						
25						
30						
35						

LEGEND: COL. A:
SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON
PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: BROMLEY
INSPECTOR:

SHEET 1 OF 1 | HOLE NO. B-2

DR. CLARENCE WELTI, PE, PC
P.O. BOX 397
GLASTONBURY, CONNECTICUT 06033 • (860) 633-4623

CLIENT URS.
PROJECT Communication Tower Westport
SUBJECT Assessment of Capacity
BY CW DATE 10/ /02 SHEET NO.

Reference: Drilled Shafts Construction Procedures & Design Methods PUBLICATION No FHWA-IF-99-025

Material: "Intermediate Geo-material" N > 50/12 (IGM)

(1) $f_{max} = \sigma_{v1}' K_{0i} \tan \phi_i'$

σ_{v1}': vertical effective stress at middle of layer 1 ≈ 1.8 ksf

K_{0i}: design value of earth pressure coefficient at rest

ϕ_i': design value of angle of internal friction in IGM

(2) $\phi_1' = \tan^{-1}\left\{\left[\dfrac{N_{60}(\text{LAYER }i)}{12.3 + 20.3\left(\frac{\sigma_{v1}}{p_a}\right)}\right]^{0.34}\right\}$ p_a 2 ksf or 14.7 psi; $N_{60}(\text{LAYER }i) = 60$

$= \tan^{-1}\left\{\left[\dfrac{60}{12.3 + 20.3 \times 0.9}\right]^{.34}\right\} = \tan^{-1}(1.96)^{.34} = 51.5°$

(3) $K_{0i} = (1 - \sin\phi_1')\left[\dfrac{0.2\, p_a\, N_{60}(\text{layer})}{\sigma_{v1}}\right]^{\sin\phi}$

$= (1 - .78)\left[\dfrac{.2 \times 2 \times 60}{1.8}\right]^{.78} = 1.65$

f_a = (from (1)) = 3.73 ksf × 0.75 (uplift) = 2.8 ksf

21' × 4.5 × π × 2.8 = 831 KIPS ULTIMATE UPLIFT CAPACITY

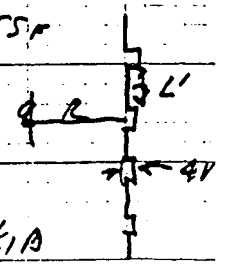
FOR SHAFT IN ROCK

q_u? 5200 psi × 333 TSF

$f_{max} = 0.8\left[\dfrac{\Delta R}{R}\left(\dfrac{L'}{L}\right)\right]^{0.45} q_u$

L = 27'

ΔR: 0.5' L' = 0.2'



f_{max}: 5.37 TSF = 10.78 ksf

21' × π × 4.5 = 296 SF

Assume 1/3 for f_{all} ≈ 3 ksf. Q = 888 kip

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square
New Britain, Connecticut 06051
Phone: (860) 827-2935
Fax: (860) 827-2950

November 16, 2004

The Honorable Diane G. Farrell
First Selectwoman
Town of Westport
110 Myrtle Avenue
Westport, CT 06880

RE: **EM-VER-158-041115** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 880 Post Road East, Westport, Connecticut.

Dear Ms. Farrell:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

The Council will consider this item at the next meeting scheduled for December 1, 2004 at 1:30 p.m. in Hearing Room One, Ten Franklin Square, New Britain, Connecticut.

If you have any questions or comments regarding this proposal, please call me or inform the council by November 30, 2004.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/cm

Enclosure: Notice of Intent

c: Katherine Barnard, Director, Planning & Zoning, Town of Westport

WESTPORT CONNECTICUT
PLANNING & ZONING
TOWN HALL, 110 MYRTLE AVENUE
WESTPORT, CONNECTICUT 06880
(203) 341-1030 • (203) 341-1079
(203) 454-6145 - fax

November 19, 2004

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

Re: EM-VER-158-041115
Modification to an existing telecommunications tower
880 Post Road East, Westport

Dear Mr. Phelps:

The Westport Planning and Zoning staff has reviewed the material submitted for the above referenced application and has no concerns, questions or comments regarding the proposed modification to the existing tower at 880 Post Road East in Westport.

Sincerely,

Katherine Barnard
Director Planning and Zoning

Cc: Diane G. Farrell
First Selectwoman