STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square
New Britain, Connecticut 06051
Phone: (860) 827-2935
Fax: (860) 827-2950

August 6, 2002

Michele G. Briggs
Manager of Real Estate
SNET Mobility LLC
500 Enterprise Drive, 3rd Floor
Rocky Hill, CT 06067

RE: **EM-CING-033-020722** - Southwestern Bell Mobile Systems, LLC notice of intent to modify an existing telecommunications facility located at 179 Shunpike Road, Cromwell, Connecticut.

Dear Ms. Briggs:

At a public meeting held on August 1, 2002, 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 July 22, 2002. 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,

Mortimer A. Gelston
Chairman

MAG/laf

c: Honorable Stanley A. Terry, Jr., First Selectman, Town of Cromwell
Frederic Curtin, Zoning Enforcement Officer, Town of Cromwell
Cromwell Fire District
Christopher B. Fisher, Esq, Cuddy & Feder & Worby LLP
Stephen J. Humes, Esq., LeBoeuf, Lamb, Greene & MacRae

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Town of Cromwell

Memo

RECEIVED
AUG 02 2002
CONNECTICUT
SITING COUNCIL

To: Stan Terry, First Selectman

From: Craig Minor, Town Planner

Date: 07/25/02

Re: Southwestern Bell Mobile Proposal to Modify Cromwell Fire District Telecommunications Tower at 179 Shunpike Road

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Thank you for forwarding to me the letter from Southwestern Bell Mobile (SBC) of July 22, 2002 regarding the Cromwell Fire District's tower at 179 Shunpike Road. My comments are as follows.

As you know, the Connecticut Siting Council has near-total jurisdiction over approving the construction and modification of telecommunication towers. Local municipalities are given the opportunity to comment and request modifications to plans.

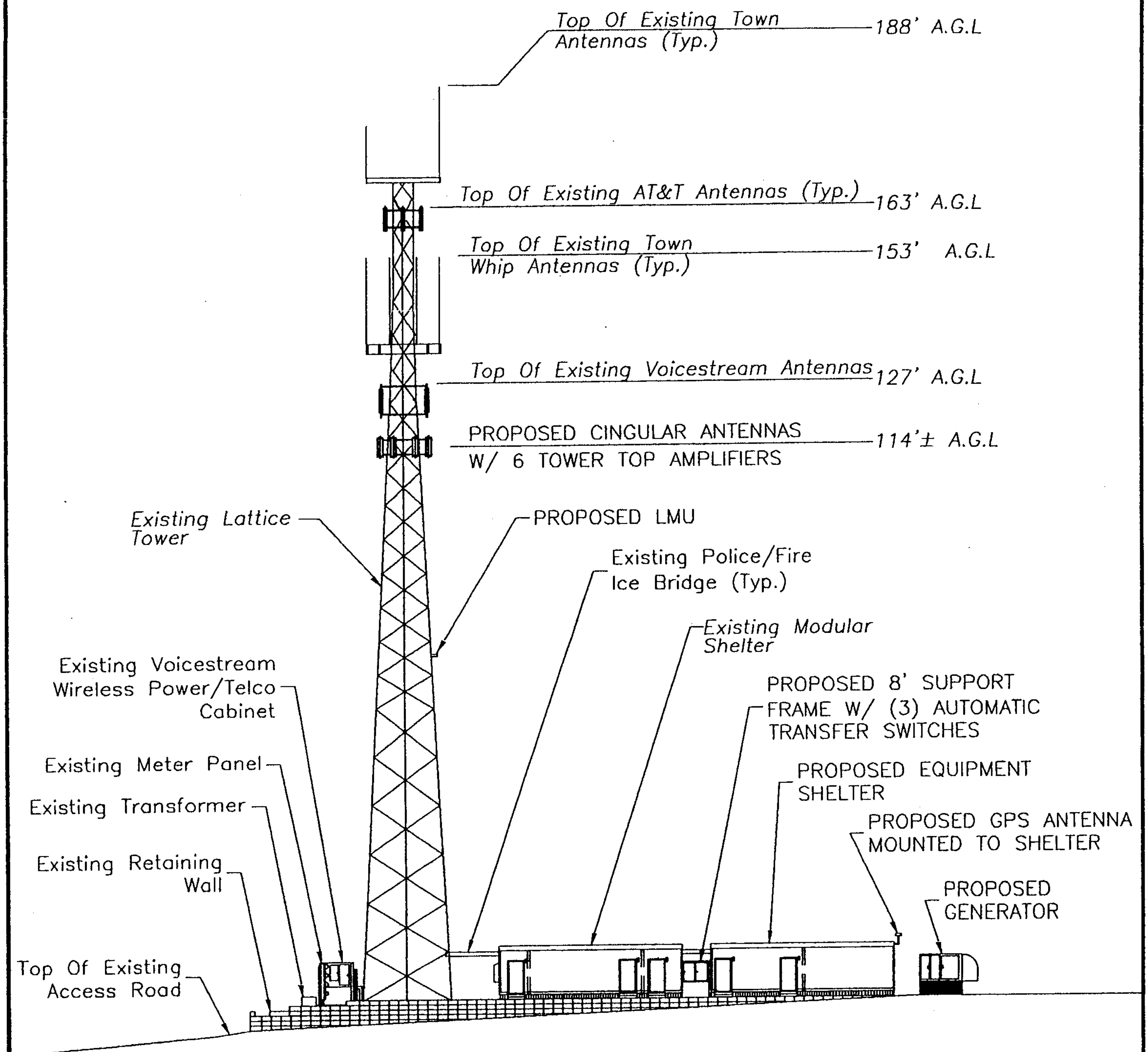
This is a proposal for SBC to add its antennae to the existing tower. These new antennae would be located approximately 2/3 of the way up the tower. The proposal also involves SBC constructing an additional equipment room 12' x 38' in size, and a new generator on a pad set into (excavated from) the side of the hill. See attached drawings submitted by SBC.

The additional antennas will be no more noticeable than the existing "Voicestream" and "AT&T" antennas, so I don't have any concern there. However, the new equipment room will be only 20' from the back of Lot 12 on Black Birch Drive, and the excavated generator pad will be about 40' from the back of Lots 9 and 10 on Twin Oaks Drive. The plan doesn't indicate any plantings or other screening and I am not familiar with how dense the existing vegetation is on Lots 9, 10 and 12..

If they haven't already done so, I recommend SBC be directed by either the Connecticut Siting Council or the Cromwell Fire District to discuss this plan with the owners of these lots and to discuss the need, if any, for screening.

cc:
P&Z
Cromwell Fire District
file

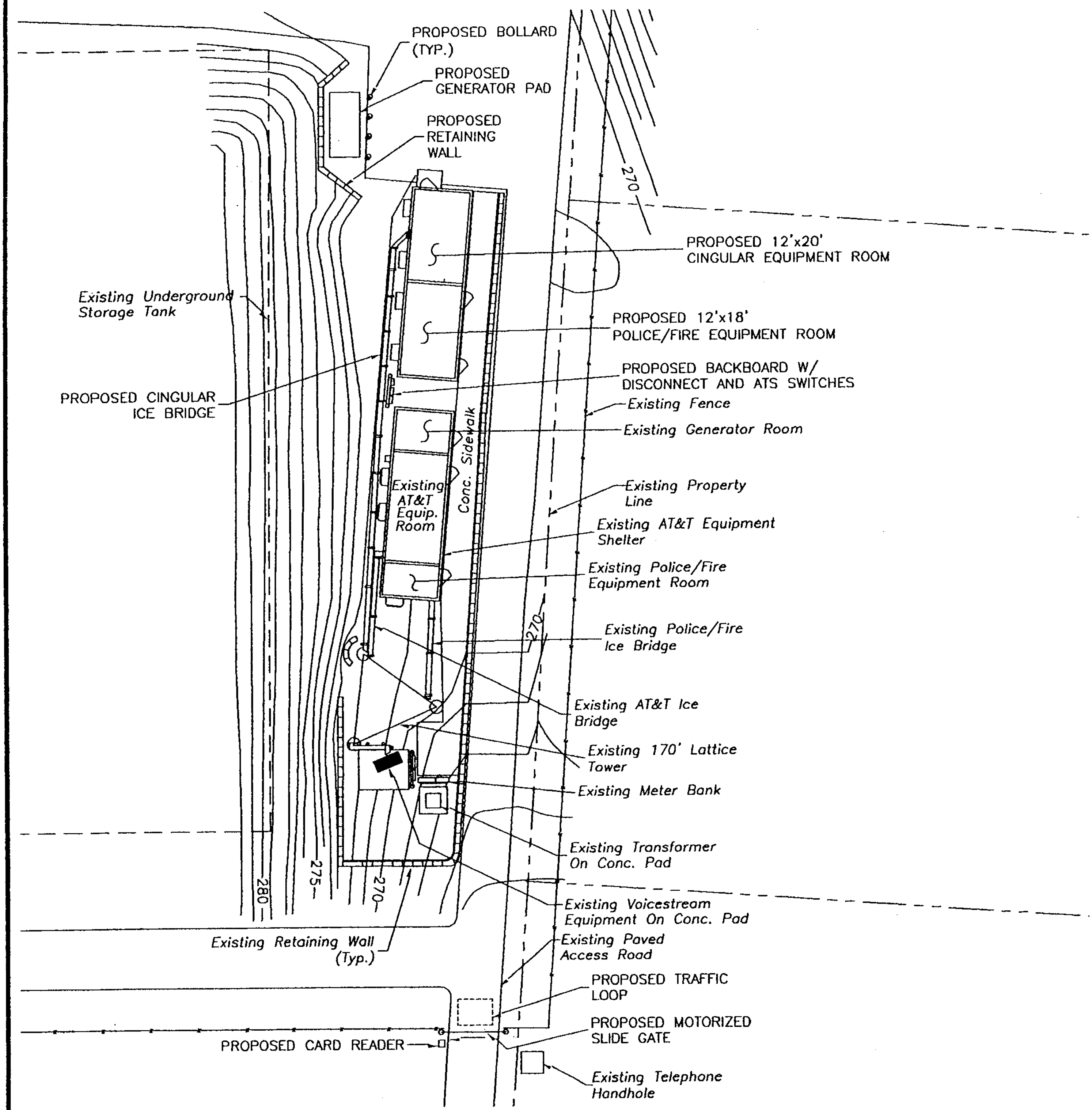
RAD. CENTER: 114± FT. (AGL)



REVISED 7/19/02

DESIGN EXHIBIT	NORTH	SITE NAME: CROMWELL FIRE DEPARTMENT	MGI #: 15364
		ADDRESS: 179 SHUNPIKE ROAD, CROMWELL, CT 06416	TASK #: 1244
		DRAWN: MDJ / CHECKED: GMP / SCALE: N.T.S.	DATE: 7/10/02
Maguire Group Inc. Architects Engineers Planners, One Court Street, New Britain, Connecticut 06051		THIS DRAWING AND ALL DATA CONTAINED HEREIN IS FOR INFORMATIONAL PURPOSES ONLY. NOT INTENDED FOR DESIGN OR CONSTRUCTION USE. ALL DATA SHOULD BE VERIFIED	cingular WIRELESS

RAD. CENTER: ______________ FT. (AGL)



PARTIAL SITE PLAN

DESIGN EXHIBIT

NORTH

SITE NAME: CROMWELL FIRE DEPARTMENT

ADDRESS: 179 SHUNPIKE ROAD
CROMWELL, CT 06416

DRAWN: MDJ | CHECKED: GMP | SCALE: N.T.S.

MGI #: 15364
TASK #: 1244
DATE: 4/02/02

Maguire Group Inc.
Architects Engineers Planners
One Court Street
New Britain, Connecticut 06051

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cingular WIRELESS

Southwestern Bell Mobile Systems, LLC
500 Enterprise Drive
Rocky Hill, Connecticut 06067-3900
Phone: (860) 513-7700
Fax: (860) 513-7190

Michele G. Briggs
Manager of Real Estate

July 22, 2002

Honorable Stanley A. Terry, Jr., First Selectman
Cromwell Town Hall
41 West Street
Cromwell, Connecticut 06416

Re: Notice of Exempt Modification – Existing Telecommunications Tower Facility at 179 Shunpike Road, Cromwell, Connecticut

Dear Mr. Terry:

Southwestern Bell Mobile Systems, LLC ("SBMS") (formerly SNET Mobility, LLC formerly Springwich Cellular Limited Partnership) intends to install telecommunications antennas and associated equipment at an existing multicarrier telecommunications tower at 179 Shunpike Road in Cromwell, Connecticut.

The facility is owned and operated by the Cromwell Fire District ("Fire District"), with offices at 322 Main Street, Cromwell, CT 06416. The Fire District and SBMS have entered into an agreement concerning the modification and sharing of the facility.

A Notice of Exempt Modification has been filed with the Connecticut Siting Council as required by Regulations of Connecticut State Agencies ("R.C.S.A.") Section 16-50j-73. Please accept this letter as notification to the Town of Cromwell under Section 16-50j-73 of construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2).

The attached letter fully sets forth the SBMS proposal. However, if you have any questions or require any further information on the plans for the site or the Siting Council's procedures, please contact the undersigned or Mr. Derek Phelps, Executive Director of the Connecticut Siting Council, at (860) 827-2935.

Sincerely,

Michele G. Briggs / SLL

Michele G. Briggs
Manager of Real Estate

Enclosure

EM-CING-033-020722

Southwestern Bell Mobile Systems, LLC
500 Enterprise Drive
Rocky Hill, Connecticut 06067-3900
Phone: (860) 513-7700
Fax: (860) 513-7190

Michele G. Briggs
Manager of Real Estate

July 22, 2002

RECEIVED
JUL 22 2002
CONNECTICUT
SITING COUNCIL

Mr. Mortimer A. Gelston, Chairman
Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051

Re: **Notice of Exempt Modification – Existing Telecommunications Tower Facility at 179 Shunpike Road, Cromwell, Connecticut**

Dear Chairman Gelston:

Southwestern Bell Mobile Systems, LLC ("SBMS") (formerly SNET Mobility, LLC; formerly Springwich Cellular Limited Partnership) intends to install telecommunications antennas and associated equipment at an existing multicarrier telecommunications tower at 179 Shunpike Road in Cromwell, Connecticut.

The facility is owned and operated by the Cromwell Fire District ("Fire District"), with a principal address of 322 Main Street, Cromwell, CT 06416. The Fire District erected the 170-foot high, self-supporting lattice tower in 1999 for the purpose of meeting its and the Town's communications needs as well as generating revenue from co-located commercial carriers.

The Fire District and SBMS have agreed to the proposed shared use of this tower pursuant to mutually acceptable terms and conditions. The Fire District has authorized SBMS to apply for all necessary permits, approvals, and authorizations which may be required for the proposed shared use of this facility.

SBMS is licensed by the Federal Communications Commission ("FCC") to provide cellular mobile telephone service in the Hartford, CT Metropolitan Statistical Area, which includes the area to be served by SBMS' proposed installation. The public need for cellular service has been predetermined by the FCC.

Please accept this letter as notification to the Council, pursuant to R.C.S.A. Section 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter is being sent to the First Selectman of the Town of Cromwell.

Attached to this notice are a site location map, a proposed site plan, the proposed tower profile, and structural information.

The existing facility is located west of Shunpike Road (Route 3), with coordinates of 41° 37' 23.6" N and 72° 40' 44.5" W (NAD 83). The site is a wooded hilltop with a clearing for a large, buried water storage tank owned by the Fire District. The tower and associated equipment buildings lie immediately north of the water tank. The entire Fire District parcel is surrounded by a chain link security fence topped with barbed wire; however, the Tower facility is not separately fenced.

The 170 foot tower was designed to support multiple antenna arrays. At the present time, the Tower is shared by the Town of Cromwell (fire, police, ambulance), AT&T Wireless ("AT&T"), and VoiceStream Wireless ("VoiceStream").

- The Town of Cromwell operates redundant whip antenna arrays with centerlines at 180 feet above ground level ("AGL") and 142 feet AGL. The lower array is held in reserve should there be a failure of the upper array, and there is no reason to expect that they would ever operate simultaneously.
- AT&T operates 12 panel antennas with centerlines at 160 feet AGL.
- VoiceStream operates six panel antennas with centerlines at 125 feet AGL.

On January 25, 2001, the Council approved tower sharing application TS-SCLP-033-010104 in which SBMS' predecessor-in-interest presented a plan for additional shared use of the Fire District's tower. The original plan called for the existing equipment building to accommodate our telecommunications equipment and for an existing indoor power generator to be replaced by an outdoor generator. Although no construction took place pursuant to the approved TS-SCLP-033-010104, it was subsequently determined that the existing building was, in reality, inadequate to accommodate anticipated telecommunications development at the site.

As shown on the attached site plan, SBMS now proposes to construct an additional 12' x 38' equipment building just west of the existing building for equipment belonging to SBMS and future carrier(s). It will be a prefabricated structure designed to match the existing building.

As before, a power generator presently occupying the westernmost room of the original building, as well as an outdoor propane tank used to fuel the existing generator, will be removed from the facility. SBMS will install a replacement electric power generator (Kohler diesel-powered) on a concrete pad to be built just west of the new building.

For its antenna array, SBMS proposes to install up to twelve CSS DUO4-8670 panel antennas, approximately 48 inches in height, with the center of radiation approximately 114 feet above ground level AGL. Associated equipment to be installed on the tower are up to six ADC Co. dual-band tower top amplifiers ("TTA's"; small metal boxes approximately 26 pounds apiece) immediately behind the antennas, and one Nokia Emergency-911 location measurement unit antenna ("LMU"; approximately 9 inches high and 9 ounces in weight). A small GPS antenna will be mounted to the top of the equipment building.

With the "GSM" configuration, SBMS will broadcast up to:

- 2 channels, 296 Watts ERP, 880 - 894 MHz;
- 2 channels, 427 Watts ERP, 1930 -1935 MHz.

A structural analysis report (attached) shows that the tower currently is not structurally capable of supporting the proposed SBMS telecommunications equipment. However, a plan for strengthening the tower has been developed (attached), and SBMS will not install its equipment on the tower until it has been re-enforced in accordance with these specifications.

Statutory Considerations

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

1. The height of the overall structure will be unaffected.

2. The proposed changes will not affect the property boundaries. All new construction will take place on property owned by Fire District and within the existing fence.

3. The proposed additions will not increase the noise level at the existing facility by six decibels or more. Except for noise resulting from construction, the only additional sound will be from equipment cooling systems.

4. Operation of the additional antennas will not increase the total radio frequency electromagnetic radiation power density, measured at the tower base, to or above the standard adopted by the State of Connecticut and the FCC. The "worst-case" exposure calculation in accordance with FCC OET Bulletin No. 65 (1997) for a point of

interest at the base of the tower in relation to the operation of the currently proposed antenna array is as follows:

Company	Centerline Height (feet)	Frequency (MHz)	Number of Channels	Power Per Channel (Watts)	Power Density† (mW/cm^2)	Standard Limits (mW/cm^2)	Percent of Limit
AT&T *	160	D: 1945 E: 1985	8	100	0.0112	1.0000	1.12
Town of Cromwell *	142 ±	Cumulative					1.30
VoiceStream *	125	1930 - 1950	4	268	0.0247	1.0000	2.47
SBMS GSM	114	881 - 894	2	296	0.0164	1.5867	1.03
SBMS GSM	114	1931 - 1935	2	427	0.0236	1.0000	2.36
Total							**8.29%**

* Power density parameters taken from VoiceStream's application to the Council in TS-VoiceStream-033-000609, approved June 20, 2000. Town data utilize lower set of redundant antennas for worst-case analysis. Note for VoiceStream calculation that ERP = EIRP / 1.64.

† Please note that the standard power density equation provided by the Council in its memo of January 22, 2001 incorporates a ground reflection factor of 2.56 (i.e., the square of 1.6) as described in FCC OET Bulletin No. 65.

As the table demonstrates, the cumulative "worst-case" exposure would be approximately 8.3 % of the ANSI/IEEE standard, as calculated for mixed frequency sites. Total power density levels resulting from SBMS' use of the tower facility would thus remain well within applicable standards.

For the foregoing reasons, SBMS respectfully submits that proposed changes to implement expanded shared use at the Cromwell site constitute an exempt modification under R.C.S.A. Section 16-50j-72(b)(2).

Please feel free to call me at (860) 513-7700 with questions concerning this application. Thank you for your consideration in this matter.

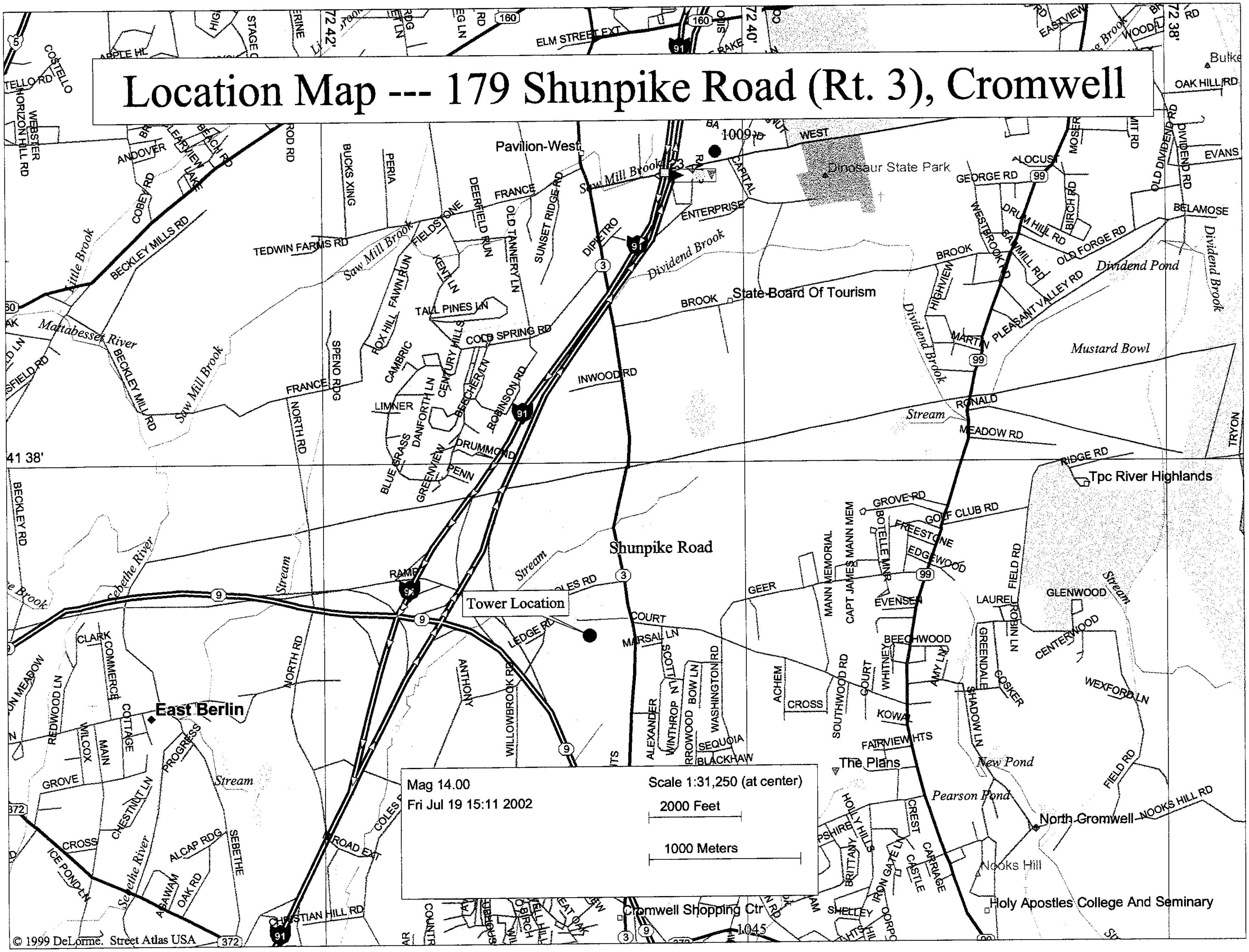
Respectfully yours,

Michele G. Briggs/SLL

Michele G. Briggs
Manager of Real Estate

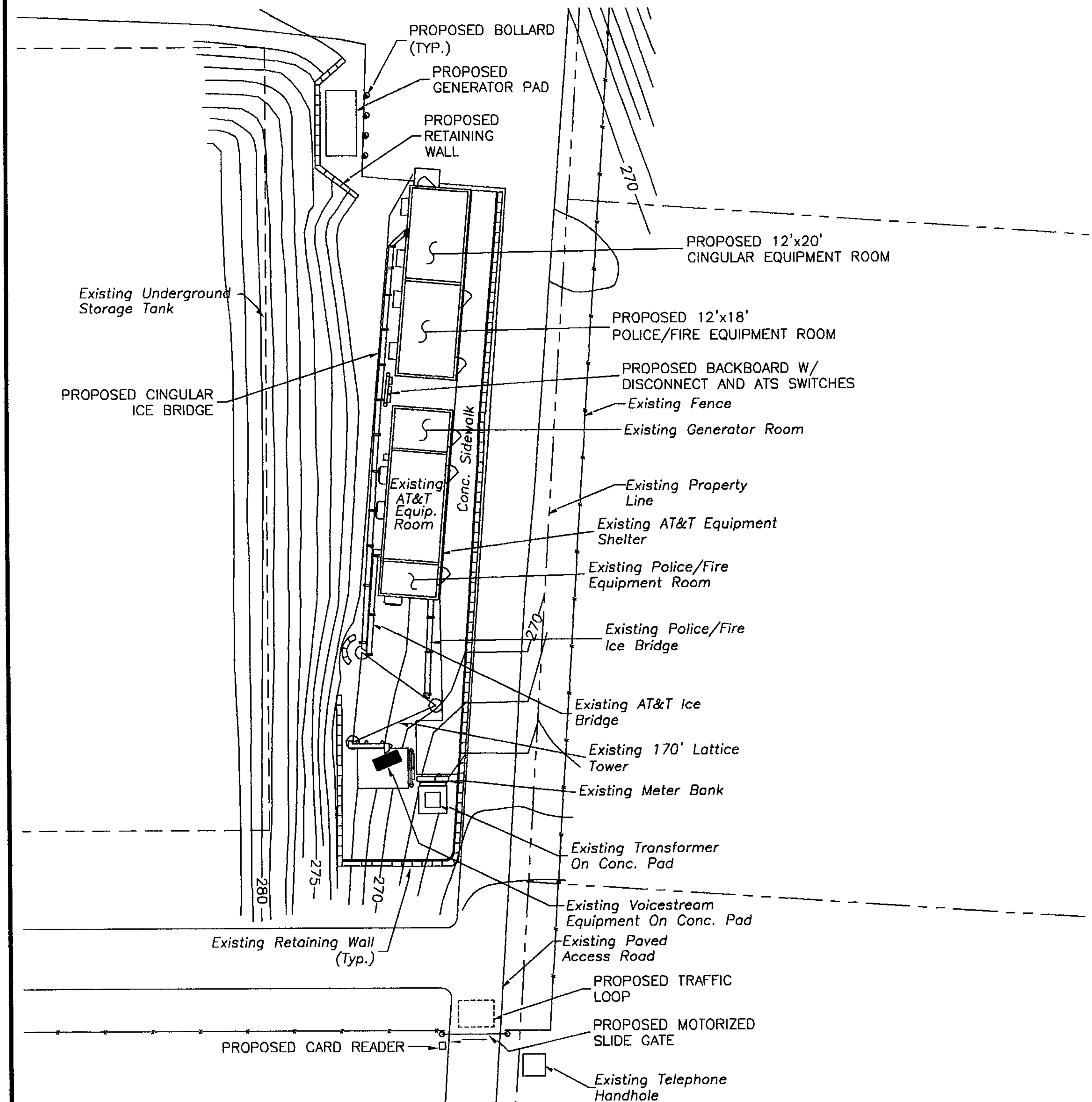
Enclosures

cc: Honorable Stanley A. Terry, Jr., First Selectman, Town of Cromwell



Location Map --- 179 Shunpike Road (Rt. 3), Cromwell
Tower Location
Shunpike Road
Dinosaur State Park
State Board Of Tourism
Tpc River Highlands
Pavilion-West
East Berlin
The Plans
North Gromwell
Nooks Hill
Holy Apostles College And Seminary
Cromwell Shopping Ctr
Mag 14.00
Fri Jul 19 15:11 2002
Scale 1:31,250 (at center)
2000 Feet
1000 Meters

RAD. CENTER: ______________FT. (AGL)



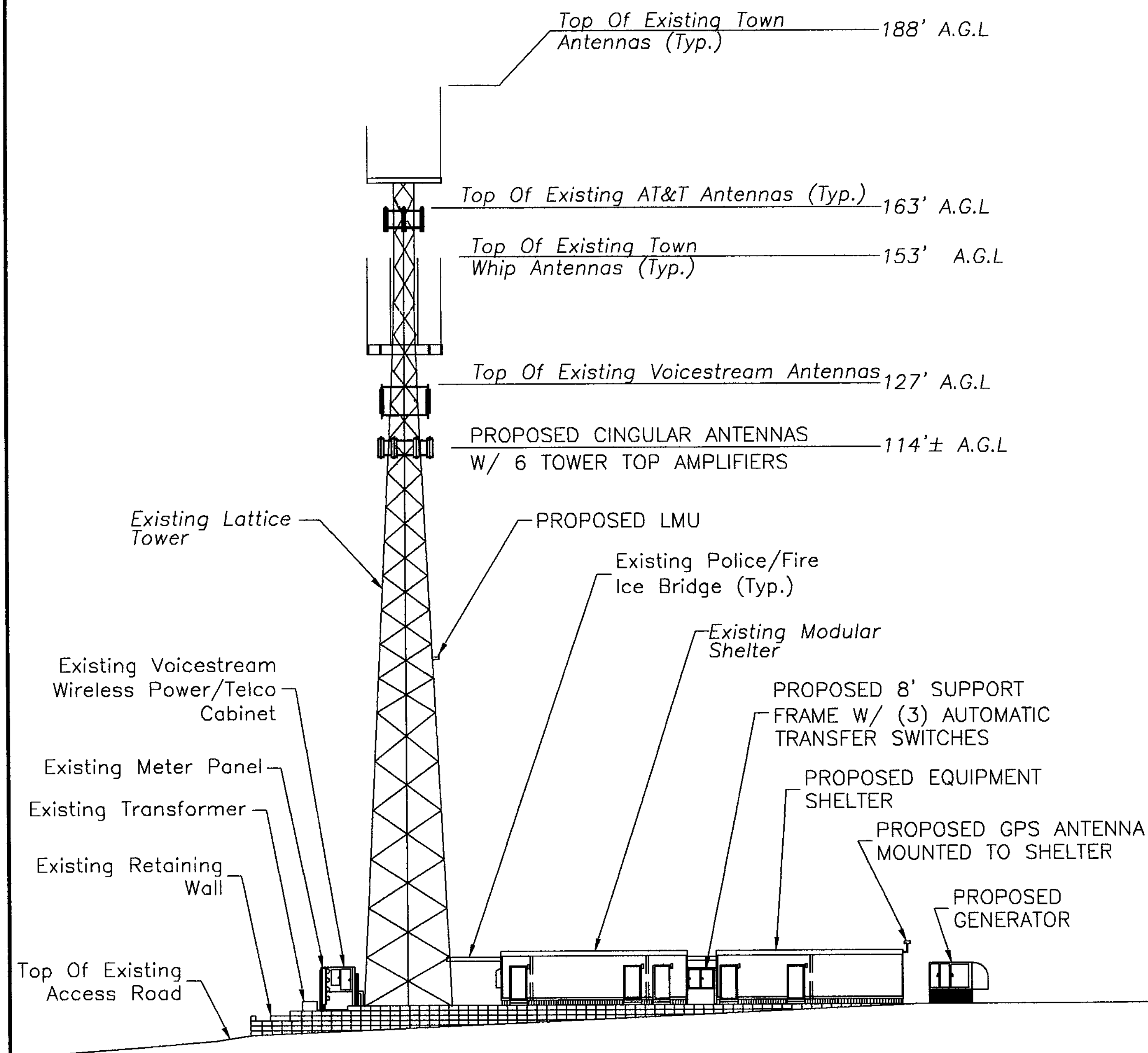
PARTIAL SITE PLAN

DESIGN EXHIBIT	NORTH	SITE NAME: CROMWELL FIRE DEPARTMENT		MGI #: 15364
		ADDRESS: 179 SHUNPIKE ROAD CROMWELL, CT 06416		TASK #: 1244
		DRAWN: MDJ	CHECKED: GMP	SCALE: N.T.S.
				DATE: 4/02/02

Maguire Group Inc.
Architects Engineers Planners
One Court Street
New Britain, Connecticut 06051

cingular WIRELESS

RAD. CENTER: 114± FT. (AGL)



REVISED 7/19/02

DESIGN EXHIBIT	NORTH	SITE NAME: CROMWELL FIRE DEPARTMENT	
		ADDRESS: 179 SHUNPIKE ROAD CROMWELL, CT 06416	MGI #: 15364 TASK #: 1244
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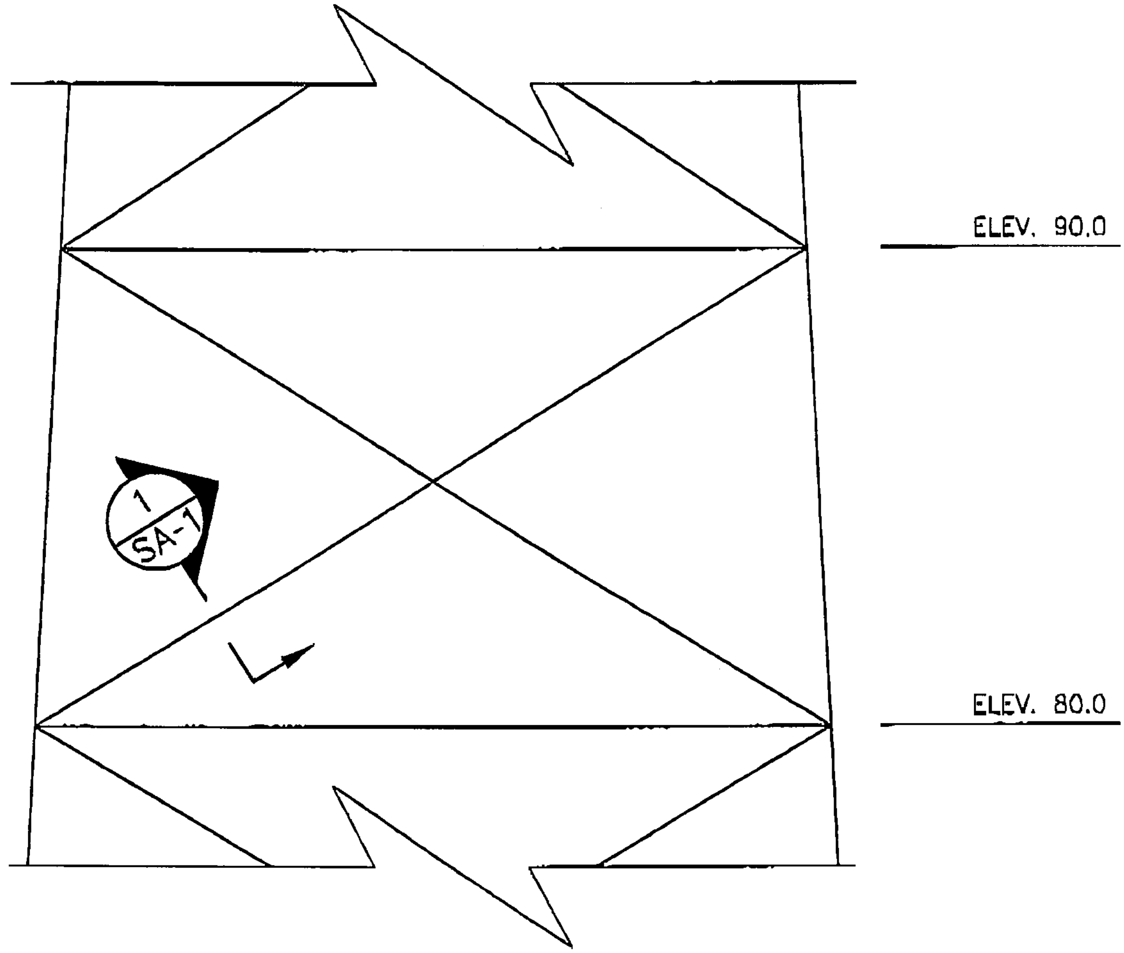
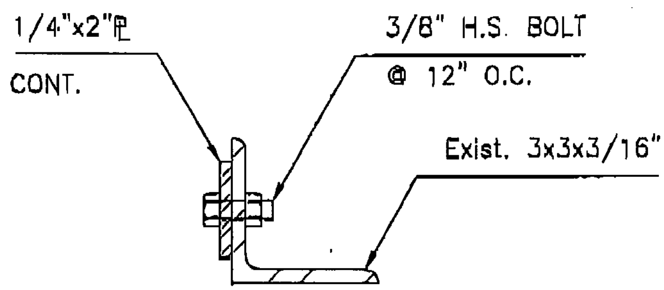
Maguire Group Inc. Architects Engineers Planners One Court Street New Britain, Connecticut 06051		THIS DRAWING AND ALL DATA CONTAINED HEREIN IS FOR INFORMATIONAL PURPOSES ONLY. NOT INTENDED FOR DESIGN OR CONSTRUCTION USE. ALL DATA SHOULD BE VERIFIED	cingular WIRELESS



PARTIAL ELEVATION

SCALE: 1/4" = 1'-0"



SECTION

SCALE: 3" = 1'-0"

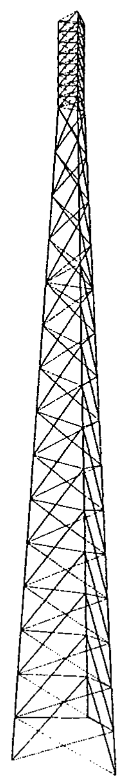
1
SA-1

CINGULAR WIRELESS CROMWELL COMMUNICATIONS TOWER			MAGUIRE GROUP	SA 1
REINFORCEMENT OF DIAGONAL MEMBERS				
BETWEEN ELEVATIONS 80' AND 90'				
MGCI No: 15364	DATE: July 22, 2002	DRAWN BY: JAM		
CONTRACT No:	DESIGNED BY: JAM	CHK'D BY: KAT		

Structural Analysis Report

For

Cingular Wireless



170' Communications Tower

Cromwell, Connecticut

MGI 15364.1251

July 15, 2002

MAGUIRE GROUP

Maguire Group Inc.
Architects/Engineers/Planners

One Court Street
New Britain, Connecticut 06051

Maguire Group Inc.
Architects, Engineers, Planners
One Court Street
New Britain, Connecticut 06051
(860) 224-9141

STRUCTURAL ANALYSIS REPORT
Of
170' COMMUNICATIONS TOWER
CROMWELL, CONNECTICUT

EXECUTIVE SUMMARY:

Maguire Group performed a structural analysis of the 170 foot tall self supporting tower located in Cromwell, Connecticut. The analysis was performed to determine the effect of installing 12 Cingular DOU4-8670 Cellular antennas and 6 ADC Cleargain amplifiers mounted on a low-profile platform at an elevation of 115 feet.

The proposed installation is intended to replace the original design set of 12 Allgon 7184 antennas at elevation 115 feet. Our analysis indicates the tower and its foundation are not capable of supporting the proposed antenna/amplifier system at elevation 115 feet, in addition to the antenna installations at the four other antenna elevations, as originally designed. However, the tower can be reinforced to carry the additional loading.

INTRODUCTION:

The tower is a 3 sided, self supporting lattice truss on a drilled pier foundation. The analysis was based on information included in a letter from Paul J. Ford and Company to ARCNET, including a sketch (Appendix "A") of the tower as built, together with antennas, platforms and cables proposed as of May 4, 2000. We were also provided with cut sheets of the newly proposed antennas and amplifiers. Maguire engineers did not visit the tower site. The cut sheets of the proposed antennas and amplifiers are shown in Appendix "B".

This analysis was conducted with the following antenna loads:

Elevation	115 ft	125 ft	135 ft	160 ft	170 ft
	12 CSS DOU4	6 RR90-12	1 TXRX	12 Allgon 7184	1 TXRX
			1 PD201-7		1 PD201-7
			2 PD1142		2 PD1142
			3 PD620		3 PD620
Cables	(12) – 1-5/8"	(6) – 1-5/8"	7 various dia.	(12) – 1-5/8"	7 various dia.

- Platforms were located at the same elevations as the antennas.
- Cables were not modified from the revised design. Forty four cables of various diameters were evenly distributed on the three faces of the tower.
- (12) DOU4-8679 panel antennas and 6 amplifiers were located at elevation 115'.

TOWER ANALYSIS:

The structural analysis was done according to TIA/EIA-222-F (EIA), Structural Standards for Steel Antenna Towers and Antenna Supporting Structures. EIA requires two loading conditions to be evaluated to determine the tower's capacity. The higher stresses resulting from the two cases is used to calculate the tower capacity:

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

Allowable stresses of tower members were increased by one-third according to TIA/EIA Paragraph 3.1.1.1.

Dead weights, ice loads, and wind load of the truss, antennas, platforms and cables were "hand calculated" on Mathcad sheets. These modeling calculations are shown in Appendix "C". An 85 mile per hour wind was applied according to section 16 of the TIA/EIA Standard for Middlesex County, Connecticut. For load case 2, one-half inch of radial ice covered the entire structure and all appurtenances, according to Annex A, 2.3.1.2 C.

Member properties and loads generated on the Mathcad sheets were input into a general purpose frame analysis program, RISA 3D, distributed by RISA Technologies. Results from the RISA 3D stiffness analysis are shown in Appendix "D".

Axial and bending forces were determined for each member of the model. These forces were fed back to the Mathcad sheet (Appendix "C", sheets 16 through 20) to compute axial stresses. The axial stresses were compared to allowable stresses, taking local buckling into account according to Paragraph 3.1.15.1 of TIA/EIA.

TOWER ANALYSIS RESULTS:

Our analysis determined the tower cannot support the proposed antenna/amplifier loads in addition to the loading proposed at the four other antenna elevations.

The following table summarizes the capacity of the tower legs and diagonals based on axial stresses. Note that the diagonals between 0 and 20 feet have a C/D ratio of 0.97 and the diagonals between 80 and 120 feet have a C/D ratio of 0.90.

	Capacity/Demand	
Elevation	Leg Members	Diagonal Members
150' – 170'	2.32	
120' – 150'	1.75	1.54
80' – 120'	1.08	0.90
60' – 80'	1.16	1.09
20' – 60'	1.07	1.05
0' – 20'	1.19	0.97

FOUNDATION ANALYSIS

As no soils information is available, the foundation is not analyzed.

CONCLUSIONS AND SUGGESTIONS:

As detailed above, our analysis indicates that the existing tower is not capable of supporting the antenna loading proposed by Cingular. We recommend reinforcing the six diagonal members located between elevations 80' and 90'.

LIMITATIONS:

This report is based on the following assumptions:

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

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

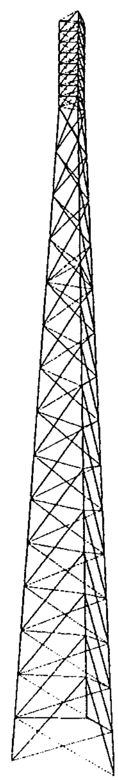
1. Adding or relocating antennas.
2. Installing antenna mounting gates or side arms.
3. Extending tower.

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

Structural Analysis Report

For

Cingular Wireless



170' Communications Tower

Cromwell, Connecticut

MGI 15364.1251

July 15, 2002

Maguire Group Inc.
Architects/Engineers/Planners

One Court Street
New Britain, Connecticut 06051

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Architects, Engineers, Planners
One Court Street
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(860) 224-9141

STRUCTURAL ANALYSIS REPORT
Of
170' COMMUNICATIONS TOWER
CROMWELL, CONNECTICUT

EXECUTIVE SUMMARY:

Maguire Group performed a structural analysis of the 170 foot tall self supporting tower located in Cromwell, Connecticut. The analysis was performed to determine the effect of installing 12 Cingular DOU4-8670 Cellular antennas and 6 ADC Cleargain amplifiers mounted on a low-profile platform at an elevation of 115 feet.

The proposed installation is intended to replace the original design set of 12 Allgon 7184 antennas at elevation 115 feet. Our analysis indicates the tower and its foundation are not capable of supporting the proposed antenna/amplifier system at elevation 115 feet, in addition to the antenna installations at the four other antenna elevations, as originally designed. However, the tower can be reinforced to carry the additional loading.

INTRODUCTION:

The tower is a 3 sided, self supporting lattice truss on a drilled pier foundation. The analysis was based on information included in a letter from Paul J. Ford and Company to ARCNET, including a sketch (Appendix "A") of the tower as built, together with antennas, platforms and cables proposed as of May 4, 2000. We were also provided with cut sheets of the newly proposed antennas and amplifiers. Maguire engineers did not visit the tower site. The cut sheets of the proposed antennas and amplifiers are shown in Appendix "B".

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			3 PD620		3 PD620
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- Case 2 = 0.75 Wind Load (with ice) + Ice Load + Tower Dead Load

Allowable stresses of tower members were increased by one-third according to TIA/EIA Paragraph 3.1.1.1.

Dead weights, ice loads, and wind load of the truss, antennas, platforms and cables were "hand calculated" on Mathcad sheets. These modeling calculations are shown in Appendix "C". An 85 mile per hour wind was applied according to section 16 of the TIA/EIA Standard for Middlesex County, Connecticut. For load case 2, one-half inch of radial ice covered the entire structure and all appurtenances, according to Annex A, 2.3.1.2 C.

Member properties and loads generated on the Mathcad sheets were input into a general purpose frame analysis program, RISA 3D, distributed by RISA Technologies. Results from the RISA 3D stiffness analysis are shown in Appendix "D".

Axial and bending forces were determined for each member of the model. These forces were fed back to the Mathcad sheet (Appendix "C", sheets 16 through 20) to compute axial stresses. The axial stresses were compared to allowable stresses, taking local buckling into account according to Paragraph 3.1.15.1 of TIA/EIA.

TOWER ANALYSIS RESULTS:

Our analysis determined the tower cannot support the proposed antenna/amplifier loads in addition to the loading proposed at the four other antenna elevations.

The following table summarizes the capacity of the tower legs and diagonals based on axial stresses. Note that the diagonals between 0 and 20 feet have a C/D ratio of 0.97 and the diagonals between 80 and 120 feet have a C/D ratio of 0.90.

	Capacity/Demand	
Elevation	Leg Members	Diagonal Members
150' – 170'	2.32	
120' – 150'	1.75	1.54
80' – 120'	1.08	0.90
60' – 80'	1.16	1.09
20' – 60'	1.07	1.05
0' – 20'	1.19	0.97

FOUNDATION ANALYSIS

As no soils information is available, the foundation is not analyzed.

CONCLUSIONS AND SUGGESTIONS:

As detailed above, our analysis indicates that the existing tower is not capable of supporting the antenna loading proposed by Cingular. We recommend reinforcing the six diagonal members located between elevations 80' and 90'.

LIMITATIONS:

This report is based on the following assumptions:

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

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

1. Adding or relocating antennas.
2. Installing antenna mounting gates or side arms.
3. Extending tower.

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

APPENDIX "A"

Tower Sections

And

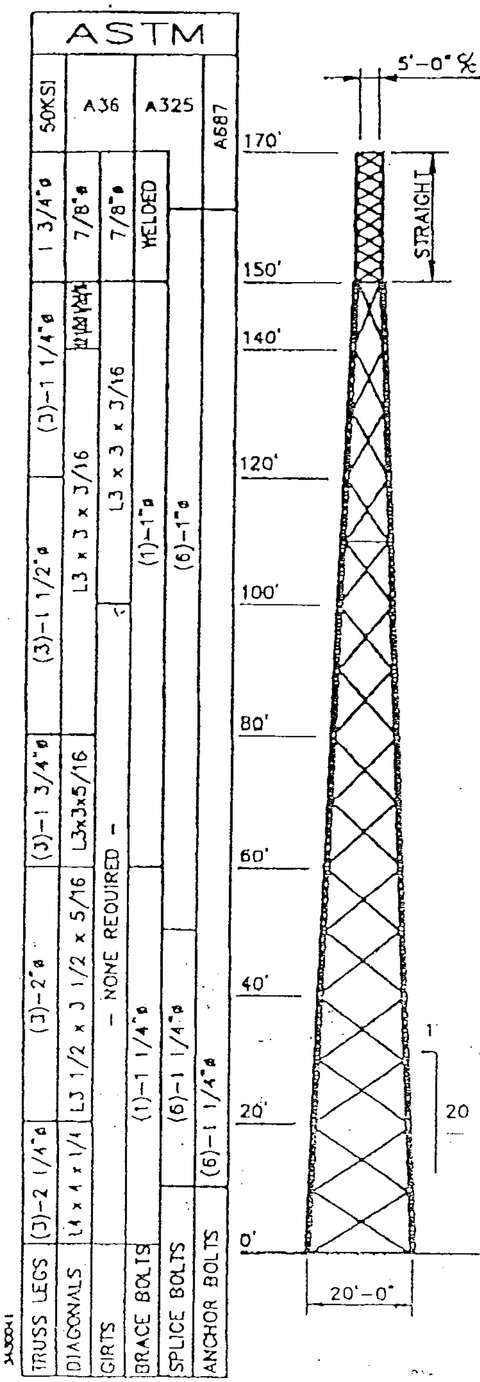
Revised Design

ARCNET
100 FILLEY ST. BLOOMFIELD, CONNECTICUT 06002
PH: (860) 692-7126 FAX: (860) 692-7159

THIS TOWER WAS MANUFACTURED BY PIROD INCORPORATED IN 1999

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street Suite 600 Columbus, Ohio 43215
PH (614)-221-6679 FAX (614)-221-0166

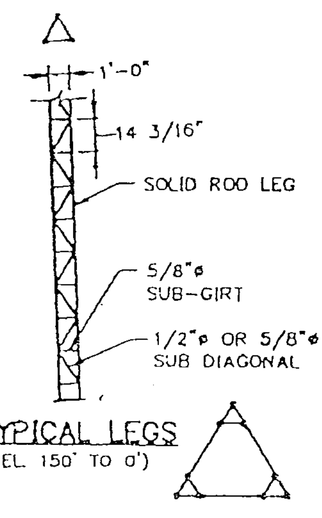
By KRH Date 5-5-2000
Job No. 34300-4
Revision No. ______ Date ______
Tower EXISTING 170 FT SELF SUPPORT
Location CROMWELL, CONNECTICUT
Site ROCKY HILL - #059C
EIA Min 85 MPH/74 MPH + 1/2" RADIAL ICE
Capacity 100 MPH/83 MPH + 1/2" RADIAL ICE
According to ANSI/EIA-222-F 1996



ANTENNA LIST

NO.	EL.	ANTENNA	COAX
1	TOP	PD620	1 1/4"
2,3	TOP	(2) PD620	(2)-7/8"
4,5	TOP	(2) PD1142	(2)-7/8"
6	TOP	PD201-7	7/8"
7	TOP	(1) TX/RX ANTENNA	1 5/8"
	TOP	9-ARM HALO MOUNT	
8-19	160'	(12) ALLGON 7184	(12)-1 5/8"
	160'	(3) PIROD T-FRAMES	
20	135'	PD620	7/8"
21,22	135'	(2) PD620	(2)-1/2"
23,24	135'	(2) PD1142	(2)-1/2"
25	135'	PD201-7	1/2"
26	135'	(1) TX/RX ANTENNA	1 1/4"
	135'	ANTENNA PLATFORM	
27-32	125'	(6) EMS RR90-17	(6)-1 5/8"
	125'	16' LOW PROFILE PLATFORM	
33-44	115'	(12) ALLGON 7184	(12)-1 5/8"
	115'	(3) PIROD T-FRAMES	

- 3/4" STEP RUNGS ONE FACE ONLY FROM 150' TO 170'
- COAX ASSUMED TO BE EQUALLY DISTRIBUTED TO ALL THREE TOWER FACES



TYPICAL LEGS
(EL. 150' TO 0')

INTERIOR BRACING
- NONE REQUIRED -

FOUNDATION REACTIONS

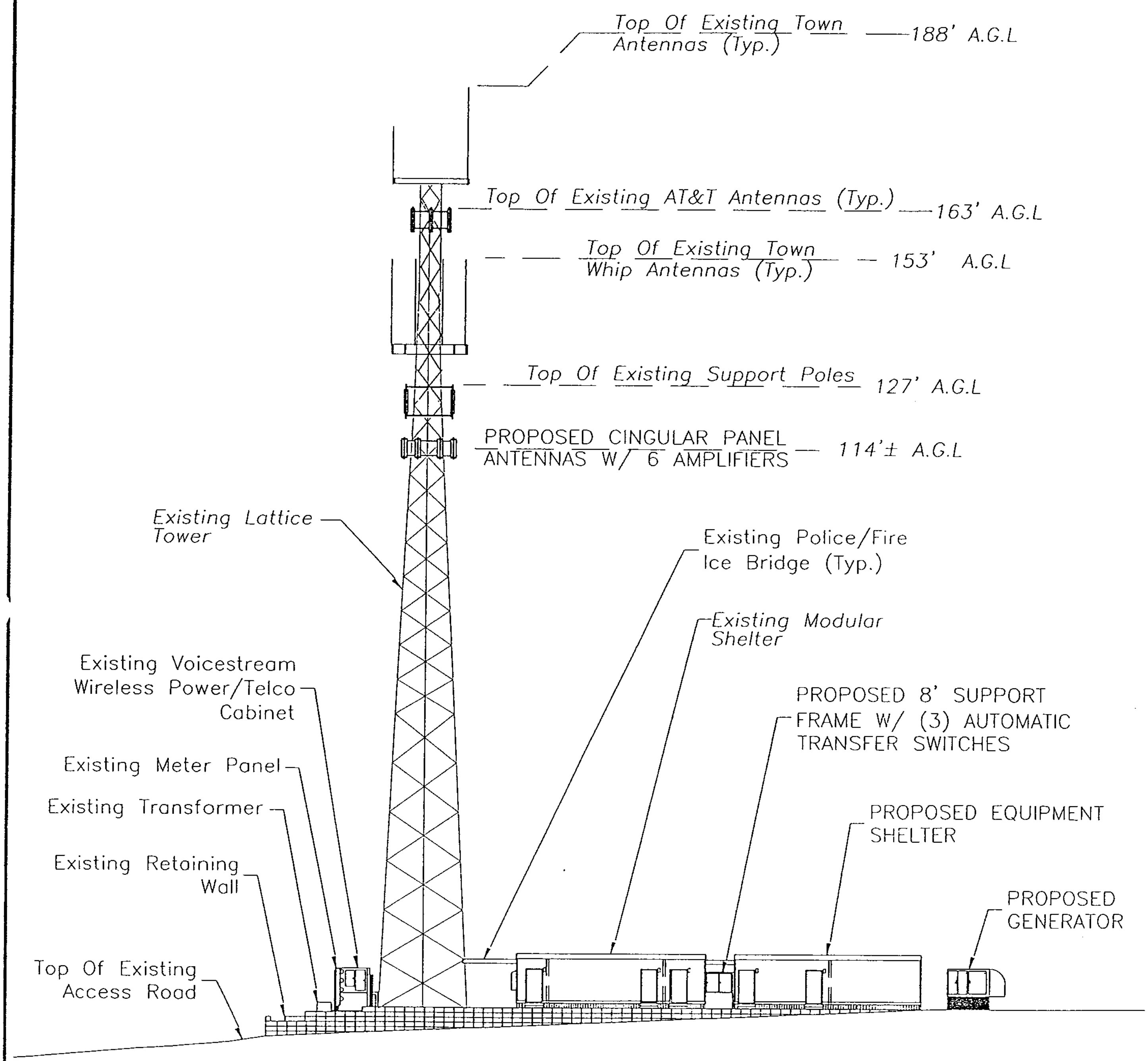
UPLIFT: 220 KIPS MAX ONE LEG
COMP: 262 KIPS MAX ONE LEG
HORIZ: 24 KIPS MAX ONE LEG

STATE OF CONNECTICUT PROFESSIONAL ENGINEER LICENSED

APPENDIX "B"

Proposed Antennas And Amplifiers

RAD. CENTER: 114± FT. (AGL)



DESIGN EXHIBIT	NORTH	SITE NAME: CROMWELL FIRE DEPARTMENT ADDRESS: 179 SHUNPIKE ROAD, CROMWELL, CT 06416	MGI #: 15364 TASK #: 1244 DATE: 4/02/02
Maguire Group Inc. Architects Engineers Planners One Court Street New Britain, Connecticut 06051		DRAWN: MDJ · CHECKED: GMP · SCALE: N.T.S. THIS DRAWING AND ALL DATA CONTAINED HEREIN IS FOR INFORMATIONAL PURPOSES ONLY. NOT INTENDED FOR DESIGN OR CONSTRUCTION USE. ALL DATA SHOULD BE VERIFIED	cingular WIRELESS

CSS Antenna

Directing our energies for you.

Dual Band Antenna DUO4- 8670

Electrical Specifications

Electrical Specifications	Cellular	PCS
Frequency Range	806-900 MHz	1850-1990 MHz
Gain	12.2 dBd ±0.5 dB	17.0 dBi ±0.5 dB
Electrical Downtilt Options	0, 2 or 6 Degrees	0 or 4 Degrees
VSWR	1.35:1 Maximum	1.35:1 Maximum
Front-to-Back at Horizon	> 25 dB	>30 dB
Upper Side Lobe Suppression	< -16 dB	< -18 dB
Elevation Beam (3-dB Points)	15 Degrees (±1 Degree)	7 Degrees (±1 Degree)
Azimuth Beam (3-dB Points)	86 Degrees (±4 Degrees)	70 Degrees (±4 Degrees)
Polarization	Vertical	Vertical
Impedance	50 Ohms	50 Ohms
Power Input Rating	500 Watts	250 Watts
Intermodulation Specification	<153dBc (<-110dBm at 2x20W)	<153dBc (<-110dBm at 2x20W)

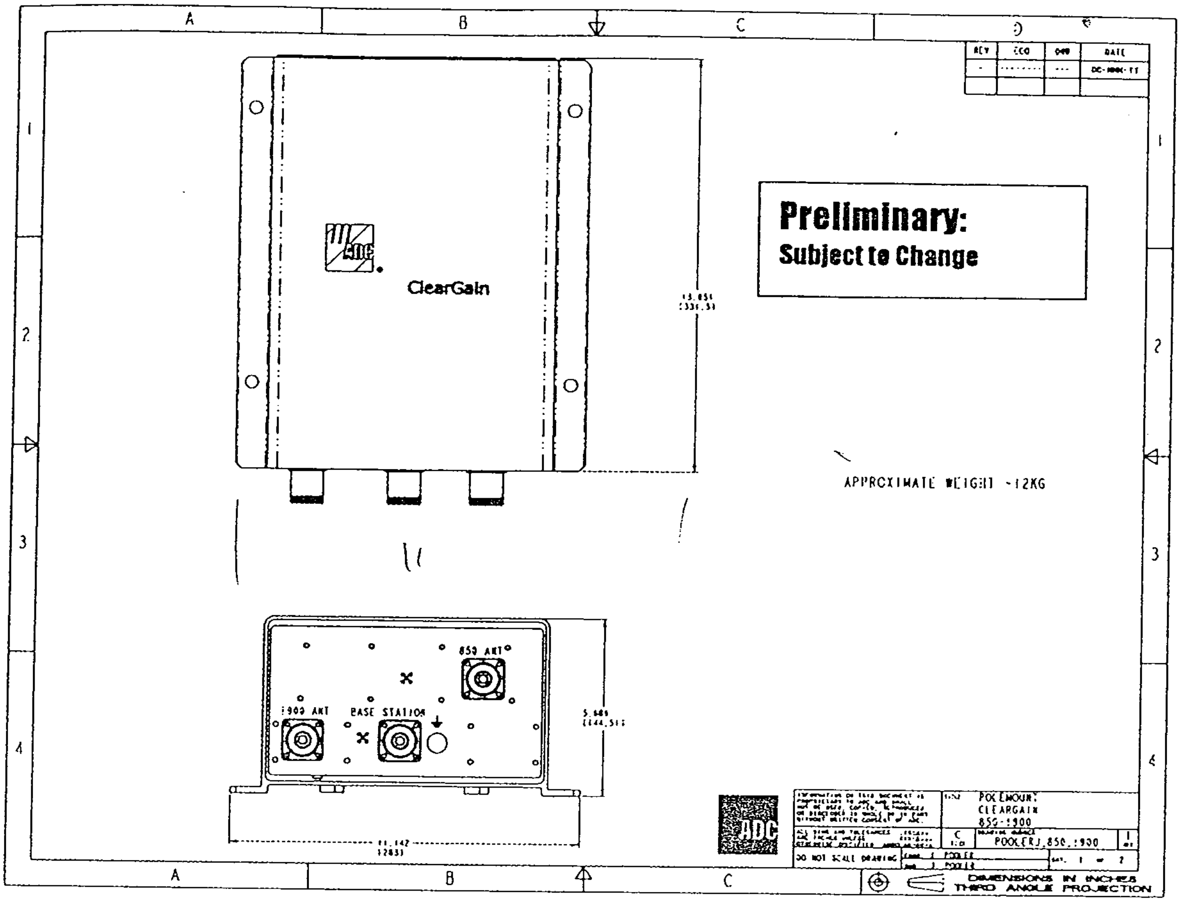
Mechanical Specifications

Input Connectors	Two 7/16 DIN Connectors (Silver Finish)
Antenna Dimensions	48 x 14 x 9 Inches (LxWxD)
Weight	31.4 lbs Maximum (Includes Brackets)
Lightning Protection	Direct Ground
RF Distribution	Cellular: Silver Plated Copper Alloy PCS: Printed Microstrip Substrate
Radome	Ultra High-Strength Luran
Weatherability	UV Stabilized, ASTM D1925
Radome Water Absorption	ASTM D570, 0.45%
Environmental	MIL-STD-810E
Wind Survival	Tested to 150 mph
Wind Loading (at 120 mph)	180 Front, 110 Side, 237 Rear (lbs)
Mounting Brackets	Fits 2.5 to 3 Inch Schedule 40 Pipe
Mechanical Downtilt Range	0-12 Degrees in 1 Degree Increments
Clamps/Bolts	Hot Dip Galvanized Steel/Stainless Steel

Ordering Information

Model	Options
DUO4- 8670-xy	x=Electrical Downtilt at 800 MHz in Degrees (0, 2 or 6) y=Electrical Downtilt at 1900 MHz in Degrees (0 or 4)

CSS Antenna, Inc.
Tel: 410-344-1010 Fax: 410-344-1007
www.cssantenna.com


Preliminary:
Subject to Change
ClearGain
APPROXIMATE WEIGHT ~12KG
850 ANT
1900 ANT
BASE STATION
CLEARGAIN
850-1900
DO NOT SCALE DRAWING
DIMENSIONS IN INCHES
THIRD ANGLE PROJECTION

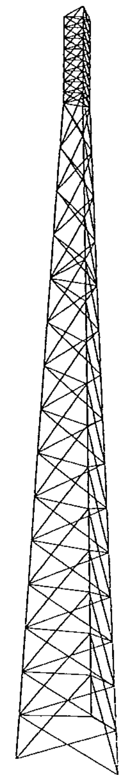
APPENDIX "C"

Proposed Tower Analysis

Description: 170 foot Self Supporting Tower, on spead footing foundation.

Design Code: TIA/EIA-222-F

Material properties:



Legs: A500 Gr.B Steel: $F_y := 50ksi$ Bracing Steel: A36 $F_{yx} := 36ksi$

Ice Density (2.1.2.2): $\gamma_{ice} := 56pcf$ $E_s = 29000\,ksi$

Design Criteria:

Overstress Factor for structures under 700 ft (3.1.1.1): $K_o := \frac{4}{3}$

Ice Thickness (Annex A 2.3.1.2C) : $T_i := .5in$

Allowable Combined Bending and Axial Stress for Compact Sections: $F_B := .6F_y$

Geometry: (Input sections from bottom to top) $F_B = 30\,ksi$

Elevation at the top of the pier or footing: $El_p := 0in$

Elevation at Top of Section: $EL_t := (20\ \ 60\ \ 80\ \ 120\ \ 150\ \ 170)^T\ ft$

Total Number of Sections: $nn := rows(EL_t)$ $nn = 6$ $k := 1..nn$ $k2 := 2..nn$

Elevation at Bottom of Section: $EL_{b_{k2}} := EL_{t_{k2-1}}$ $EL_b^T = (0.00\ \ 20.00\ \ 60.00\ \ 80.00\ \ 120.00\ \ 150.00)\,ft$

Top of Sloped section elevation: $EL_{ss} := 150ft$ $ind_{ss_k} := if(EL_{ss} = EL_{t_k}, k, 0)$ $ind_{ss}^T = (0\ \ 0\ \ 0\ \ 0\ \ 5\ \ 0)$

Number of sloped sections: $n := max(ind_{ss})$ $n = 5$ $i := 1..n$ $j := n + 1..nn$

Mid-point elevation of each section: $z := .5\cdot(EL_t + EL_b)$ $z^T = (10\ \ 40\ \ 70\ \ 100\ \ 135\ \ 160)\,ft$

Leg spread at the base: $Sp_1 := 20ft$

Joint coordinates at the base:

$x_1 := -.5\cdot Sp_1$ $x_1 = -10.000\,ft$ $y_1 := x_1\cdot tan(30deg)$ $y_1 = -5.774\,ft$

$x_2 := .5\cdot Sp_1$ $x_2 = 10.000\,ft$ $y_2 := x_1\cdot tan(30deg)$ $y_2 = -5.774\,ft$

$x_3 := 0ft$ $y_3 := x_2\cdot tan(60deg) + y_1$ $y_3 = 11.547\,ft$

Leg spread at the top of sloped section: $Sp_{n+1} := 5ft$

$x'_1 := -.5\cdot Sp_{n+1}$ $x'_1 = -2.500\,ft$ $y'_1 := x'_1\cdot tan(30deg)$ $y'_1 = -1.443\,ft$

$x'_2 := .5\cdot Sp_{n+1}$ $x'_2 = 2.500\,ft$ $y'_2 := x'_1\cdot tan(30deg)$ $y'_2 = -1.443\,ft$

$x'_3 := 0ft$ $y'_3 := x'_2\cdot tan(60deg) + y'_1$ $y'_3 = 2.887\,ft$

Intermediate leg spreads: $Sp_i := Sp_1 - \frac{EL_{b_i}}{EL_{t_n}} \cdot (Sp_1 - Sp_{n+1})$

Straight Sections: $Sp_{j+1} := Sp_{n+1}$ $Sp^T = (20.0 \;\; 18.0 \;\; 14.0 \;\; 12.0 \;\; 8.0 \;\; 5.0 \;\; 5.0)\,ft$

Leg Sizes: (3)2-1/4"ϕ, (3)2"ϕ, (3)1-3/4ϕ", (3)1-1/2ϕ", (3)1-1/4ϕ", 1-3/4"ϕ

Width of sub leg to wind: $B_L := (2.25 \;\; 2 \;\; 1.75 \;\; 1.5 \;\; 1.25 \;\; 1.75)^T\,in$

Number of sub legs in the section: $N_L := (3 \;\; 3 \;\; 3 \;\; 3 \;\; 3 \;\; 1)^T$

Sub Girt Length: $L_{sg} := (12 \;\; 12 \;\; 12 \;\; 12 \;\; 12 \;\; \varepsilon)^T\,in$

$y_{sg} := \frac{1}{3} \cdot L_{sg} \cdot \sin(60deg)$ $y_{sg}^T = (3.46 \;\; 3.46 \;\; 3.46 \;\; 3.46 \;\; 3.46 \;\; 0.00)\,in$

Gross Section Area: $G_{N_k} := \overrightarrow{\left[\left(EL_{t_k} - EL_{b_k}\right) \cdot \left[\left(Sp_k + Sp_{k+1}\right) \cdot .5 + L_{sg_k}\right]\right]}$ $G_N^T = (400 \;\; 680 \;\; 280 \;\; 440 \;\; 225 \;\; 100)\,ft$

With Ice: $G_{Ni_k} := \overrightarrow{\left[\left(EL_{t_k} - EL_{b_k}\right) \cdot \left[\left(Sp_k + Sp_{k+1}\right) \cdot .5 + L_{sg_k} + 2T_i\right]\right]}$ $G_{Ni}^T = (402 \;\; 683 \;\; 282 \;\; 443 \;\; 228 \;\; 102)\,ft^2$

Straight leg length: $L_{L_j} := EL_{t_j} - EL_{b_j}$

Sloped Legs: $L_{L_i} := \left(EL_{t_i} - EL_{b_i}\right) \cdot \sec\left(\frac{y_3 - y'_3}{EL_{t_n}}\right)$ $L_L^T = (20.03 \;\; 40.07 \;\; 20.03 \;\; 40.07 \;\; 30.05 \;\; 20.00)\,ft$

Leg sub-girt diameter : $B_{sg} := .625in$ Sub girt spacing: $S_{sg} := (14.1 \;\; 14.1 \;\; 14.1 \;\; 14.1 \;\; 14.1 \;\; \varepsilon)^T\,in$

Number of sub girts per section: $N_{sg_k} := \text{if}\left(L_{sg_k} = \varepsilon \cdot in, 0, \text{floor}\left(\frac{L_{L_k}}{S_{sg_k}}\right)\right)$ $N_{sg}^T = (17 \;\; 34 \;\; 17 \;\; 34 \;\; 25 \;\; 0)$

Leg sub diagonal: $B_{sd} := (.625 \;\; .625 \;\; .5 \;\; .5 \;\; .5 \;\; 0.)^T\,in$

Length of sub-diagonal: $L_{sd} := \overrightarrow{\sqrt{L_{sg}^2 + S_{sg}^2}}$ $L_{sd}^T = (18.5 \;\; 18.5 \;\; 18.5 \;\; 18.5 \;\; 18.5 \;\; 0.0)\,ir$

Leg wind area: $A_L := \overrightarrow{\left[N_L \cdot \left[L_L \cdot B_L + N_{sg} \cdot \left(L_{sg} \cdot B_{sg} + L_{sd} \cdot B_{sd}\right)\right]\right]}$ $A_L^T = (2595 \;\; 4830 \;\; 2117 \;\; 3873 \;\; 2609 \;\; 420)\,in^2$

Leg wind area with ice: $A_{L.i} := \overrightarrow{\left[N_L \cdot \left[L_L \cdot \left(B_L + 2T_i\right) + N_{sg} \cdot \left[L_{sg} \cdot \left(B_{sg} + 2T_i\right) + L_{sd} \cdot \left(B_{sd} + 2T_i\right)\right]\right]\right]}$

$A_{L.i}^T = (4873 \;\; 9385 \;\; 4394 \;\; 8428 \;\; 5980 \;\; 660)\,in^2$

Leg x-section Area: $A_{Lx} := \overrightarrow{\left(N_L \cdot .25 \cdot \pi \cdot B_L^2\right)}$ $A_{Lx}^T = (11.93 \;\; 9.42 \;\; 7.22 \;\; 5.30 \;\; 3.68 \;\; 2.41)\,in^2$

Sub Girt: $A_{sgx} := \overrightarrow{\left(N_L \cdot .25 \cdot \pi \cdot B_{sg}^2\right)}$ Diagonal: $A_{sdx} := \overrightarrow{\left(N_L \cdot .25 \cdot \pi \cdot B_{sd}^2\right)}$

Leg wt: $Wt_L := \gamma_s \cdot \overrightarrow{\left[\left[A_{Lx} \cdot L_L + N_{sg} \cdot \left(A_{sgx} \cdot L_{sg} + A_{sdx} \cdot L_{sd}\right)\right]\right]}$ $Wt_L^T = (949\ \ 1556\ \ 598\ \ 934\ \ 532\ \ 164)$ lbs

$wt_L := \overrightarrow{Wt_L \div L_L}$ $wt_L^T = (47\ \ 39.\ \ 30\ \ 23\ \ 18\ \ 8)$ plf

Ice per foot to sub legs: $ice_{sl} := \frac{\pi}{4} \cdot \overrightarrow{\left[\left(B_L + 2T_i\right)^2 - B_L^2\right]} \cdot \gamma_{ice}$ $ice_{sl}^T = (1.68\ \ 1.53\ \ 1.37\ \ 1.22\ \ 1.07\ \ 1.37)$ plf

Ice per foot to sub girts: $ice_{sg} := \frac{\pi}{4} \cdot \left[\left(B_{sg} + 2T_i\right)^2 - B_{sg}^2\right] \cdot \gamma_{ice}$ $ice_{sg} = 0.69$ plf

Ice per foot to sub diags: $ice_{sd} := \frac{\pi}{4} \cdot \left(\overrightarrow{\left[\left(\left(B_{sd} + 2T_i\right)\right)^2 - B_{sd}^2\right]}\right) \cdot \gamma_{ice}$ $ice_{sd}^T = (0.69\ \ 0.69\ \ 0.61\ \ 0.61\ \ 0.61\ \ 0.31)$ pl

Leg Ice Wt: $Ice_L := \left(\overrightarrow{\left(ice_{sl} \cdot L_L\right)} + \overrightarrow{\left(N_{sg} \cdot ice_{sg} \cdot L_{sg}\right)} + \overrightarrow{\left(N_{sg} \cdot ice_{sd} \cdot L_{sd}\right)}\right) \cdot 3$ $Ice_L^T = (190\ \ 362\ \ 166\ \ 313\ \ 219\ \ 82)$ lbs

$ice_L := \overrightarrow{Ice_L \div L_L}$ $ice_L^T = (9\ \ 9\ \ 8\ \ 8\ \ 7\ \ 4)$ plf

Number of Cross Braces per Section: $N_x := (2\ \ 4\ \ 2\ \ 4\ \ 3\ \ 8)^T$

Leg sections unbraced lengths: $L_u := \overrightarrow{L_L \div N_x}$ $L_u^T = (120.2\ \ 120.2\ \ 120.2\ \ 120.2\ \ 120.2\ \ 30.0)$ in

Leg moment of inertia: $I_{Lx} := \overrightarrow{\left(\frac{N_L \cdot \pi}{64} \cdot B_L^4 + \frac{6 \cdot \pi}{4} \cdot B_L^2 \cdot y_{sg}^2\right)}$ $I_{Lx}^T = (290\ \ 229\ \ 175\ \ 128\ \ 89\ \ 0)$ in^4

$x_{sg} := \frac{L_{sg}}{2}$ $x_{sg}^T = (6.00\ \ 6.00\ \ 6.00\ \ 6.00\ \ 6.00\ \ 0.00)$ in

$I_{Ly} := \overrightarrow{\left(\frac{N_L \cdot \pi}{64} \cdot B_L^4 + \frac{2 \cdot \pi}{4} \cdot B_L^2 \cdot x_{sg}^2\right)}$ $I_{Ly}^T = (290\ \ 229\ \ 175\ \ 128\ \ 89\ \ 0)$ in^4

Leg radius of gyration: $r_L := \sqrt{\overrightarrow{I_{Lx} \div A_{Lx}}}$ $r_L^T = (4.93\ \ 4.92\ \ 4.92\ \ 4.91\ \ 4.91\ \ 0.44)$ in

Global slenderness ratio: $KL\_r_G := \overrightarrow{L_u \div r_L}$ $KL\_r_G^T = (24.4\ \ 24.4\ \ 24.4\ \ 24.5\ \ 24.5\ \ 68.6)$

Element radius of gyration: $r_e := .25B_L$ $r_e^T = (0.56\ \ 0.50\ \ 0.44\ \ 0.38\ \ 0.31\ \ 0.44)$ in

Local slenderness ratio: $KL\_r_l := \overrightarrow{S_{sg} \div r_e}$ $KL\_r_l^T = (25.1\ \ 28.2\ \ 32.2\ \ 37.6\ \ 45.1\ \ 0.0)$

Governing slenderness ratio: $KL\_r_{L_k} := \max\left(KL\_r_{l_k}, KL\_r_{G_k}\right)$ $KL\_r_L^T = (25.1\ \ 28.2\ \ 32.2\ \ 37.6\ \ 45.1\ \ 68.6)$

Effective K-Factor to convert global to local slenderness ratio: $K_{eff} := \overrightarrow{\frac{KL\_r_L}{KL\_r_G}}$

$K_{eff}^T = (1.03\ \ 1.16\ \ 1.32\ \ 1.54\ \ 1.84\ \ 1.00)$

Diagonals:

Diagonal sections: L4x4x1/4", L3.5x3.5x5/16, L3x3x5/16, L3x3x3/16, L3x3x3/16, 7/8" rod

Sections with angle diagonals: $LD := (1\ \ 1\ \ 1\ \ 1\ \ 1\ \ 0)^T$ $\quad ld_k := \text{if}(LD_k = 1, k, 0)$ $\quad Ld := \max(ld)$ $\quad jd := Ld + 1..nn$

Width of diagonal to wind: $B_D := (4\ \ 3.5\ \ 3\ \ 3\ \ 3\ \ .875)^T$ in

Thickness of diagonal section: $T_D := (.25\ \ .3125\ \ .3125\ \ .1875\ \ .1875\ \ .1875)^T$ in

Diagonal x-sectional area: $A_{Dx} := (1.94\ \ 2.09\ \ 1.78\ \ 1.09\ \ 1.09\ \ .601)^T$ in^2

Diagonal weight per foot: $wt_d := (6.6\ \ 7.2\ \ 6.1\ \ 3.71\ \ 3.71\ \ 2.05)^T$ plf

Radius of gyration: $r_x := \left(1.25"\ \ 1.08"\ \ .922"\ \ .939"\ \ .939"\ \ .25 B_{D_6}\right)^T$

Radius of gyration: $r_z := \left(.795"\ \ .69"\ \ .589"\ \ .596"\ \ .596"\ \ .25 B_{D_6}\right)^T$

Length of diagonal: $L_{D_i} := \cos\left(\dfrac{y3 - y'3}{EL_{t_n}}\right)^{-1} \cdot \sqrt{\left[\left(\dfrac{L_{L_i}}{N_{x_i}}\right)^2 + \left(Sp_i - \dfrac{Sp_i - Sp_{i+1}}{2 \cdot N_{x_i}} - L_{sg_i}\right)^2\right]}$

$L_{D_j} := \sqrt{\left(L_{L_j} \div N_{x_j}\right)^2 + \left(Sp_j - B_{L_j}\right)^2}$ $\qquad L_D^T = (21.1\ \ 19.3\ \ 16.0\ \ 14.5\ \ 12.0\ \ 5.5)$ ft

Angle with Horizontal: $\alpha_{D_k} := \text{asin}\left[L_{L_k} \div \left(N_{x_k} \cdot L_{D_k}\right)\right]$ $\qquad \alpha_D^T = (28.4\ \ 31.2\ \ 38.6\ \ 43.6\ \ 56.9\ \ 27.2)$ deg

Member Offsets: $Offset := \overrightarrow{L_{sg} \div \left(2 \cdot \cos(\alpha_D)\right)}$ $\qquad Offset^T = (6.8\ \ 7.0\ \ 7.7\ \ 8.3\ \ 11.0\ \ 0.0)$ in

$LD1_k := \dfrac{Sp_k - L_{sg_k} - B_{L_k}}{(LD_k + 1) \cdot \cos\left(\alpha_{D_k}\right)}$ $\qquad KL\_r_{z_k} := LD1_k \div r_{z_k}$ $\qquad KL\_r_z^T = (161\ \ 171\ \ 168\ \ 151\ \ 127\ \ 300)$

$LD_x := .5 \cdot (LD1 + L_D)$ $\qquad KL\_r_{x_k} := LD_{x_k} \div r_{x_k}$ $\qquad KL\_r_x^T = (152\ \ 162\ \ 158\ \ 141\ \ 117\ \ 300)$

Total diagonal wind area of section: $A_D := 2 \cdot \overrightarrow{\left(N_x \cdot L_D \cdot B_D\right)}$ $\qquad A_D^T = (28.1\ \ 45.1\ \ 16.0\ \ 29.1\ \ 17.9\ \ 6.4)$ ft^2

With ice: $A_{D.i} := 2 \cdot \overrightarrow{\left[N_x \cdot L_D \cdot \left(B_D + 2T_i\right)\right]}$ $\qquad A_{D.i}^T = (35.1\ \ 58.0\ \ 21.4\ \ 38.8\ \ 23.9\ \ 13.7)$ ft^2

Total weight of diagonals: $Wt_D := 6 \cdot \overrightarrow{\left(wt_d \cdot N_x \cdot L_D\right)}$ $\qquad Wt_D^T = (1669\ \ 3341\ \ 1174\ \ 1294\ \ 799\ \ 537)$ lbs

Ice per ft for L sections: $ice_D := \gamma_{ice} \cdot \overrightarrow{\left(4 \cdot B_D \cdot T_i + \pi \cdot T_i^2 + 2T_i \cdot T_D\right)}$

for Round sections: $ice_{D_{jd}} := \dfrac{\pi}{4} \cdot \overrightarrow{\left[\left(B_{D_{jd}} + 2T_i\right)^2 - \left(B_{D_{jd}}\right)^2\right]} \cdot \gamma_{ice}$ $\qquad ice_D^T = (3.51\ \ 3.15\ \ 2.76\ \ 2.71\ \ 2.71\ \ 0.84)$ plf

Total ice weight in a section: $Ice_D := 2 \cdot 3 \overrightarrow{\left(N_x \cdot ice_D \cdot L_D\right)}$ $\qquad Ice_D^T = (889\ \ 1461\ \ 531\ \ 946\ \ 584\ \ 220)$ lbs

Horizontals:

Horzontal Sections: L3"x3"x3/16" $B_H := (0\ \ 0\ \ 0\ \ 0\ \ 3\ \ .875)^T$ in $T_H := .1875in$ $r_h := .296in$

$wt_h := (0\ \ 0\ \ 0\ \ 0\ \ 3.71\ \ 2.05)^T$ plf

Length of Horizontals: $L_H := (0\ \ 0\ \ 0\ \ 0\ \ Sp_5\ \ Sp_6)^T$ $L_H^T = (0\ \ 0\ \ 0\ \ 0\ \ 8\ \ 5)\,ft$

$N_H := \left(0\ \ 0\ \ 0\ \ 0\ \ N_{x_5}\ \ N_{x_6}\right)^T$ $N_H^T = (0\ \ 0\ \ 0\ \ 0\ \ 3\ \ 8)$

Total horizontal wind area of section: $A_H := \overrightarrow{(N_H \cdot B_H \cdot L_H)}$ $A_H^T = (0.0\ \ 0.0\ \ 0.0\ \ 0.0\ \ 6.0\ \ 2.9)\,ft^2$

with ice: $A_{H.i} := \overrightarrow{\left[N_H \cdot (B_H + 2T_i) \cdot L_H\right]}$ $A_{H.i}^T = (0.0\ \ 0.0\ \ 0.0\ \ 0.0\ \ 8.0\ \ 6.2)\,ft^2$

Total Weight: $Wt_H := 3 \cdot \overrightarrow{(wt_h \cdot N_H \cdot L_H)}$ $Wt_H^T = (0\ \ 0\ \ 0\ \ 0\ \ 267\ \ 246)\,lbs$

Ice per ft for L sections: $ice_H := \gamma_{ice} \cdot \overrightarrow{\left(4 \cdot B_H \cdot T_i + \pi \cdot T_i^2 + 2T_i \cdot T_H\right)}$ $ice_H^T = (0.38\ \ 0.38\ \ 0.38\ \ 0.38\ \ 2.71\ \ 1.06)\,plf$

for Round sections: $ice_{H_6} := \frac{\pi}{4} \cdot \overrightarrow{\left[\left(B_{D_6} + 2T_i\right)^2 - \left(B_{D_6}\right)^2\right]} \cdot \gamma_{ice}$ $ice_H^T = (0.38\ \ 0.38\ \ 0.38\ \ 0.38\ \ 2.71\ \ 0.84)\,plf$

Total ice weight in a section: $Ice_H := 3\overrightarrow{(N_H \cdot ice_H \cdot L_H)}$ $Ice_H^T = (0\ \ 0\ \ 0\ \ 0\ \ 195\ \ 101)\,lbs$

Cable and Linear Appurtenance Gravity Loads

Nominal Size	1/2"	7/8"	1-1/4"	1-5/8"
diameter	$D_4 := 0.58"$	$D_7 := 1.11"$	$D_{10} := 1.55"$	$D_{13} := 1.98"$
wt/ft	$w_4 := .25plf$	$w_7 := .54plf$	$w_{10} := .66plf$	$w_{13} := 1.04plf$

At elev. 170, we have five 7/8", one 1-1/4", and one 1-5/8" cable.

At elev. 160, we add twelve 1-5/8" cables

At Elev 135, we add five 1/2" cables, one 7/8", and one 1-1/4".

At elev. 125, we add six 1-5/8" cables

At Elev 115, we add 12 1-5/8" cables.

$W_{cbl_6} := L_{L_6} \cdot (5 \cdot w_7 + w_{10} + w_{13}) + 10' \cdot 12 \cdot w_{13}$

$W_{cbl_5} := L_{L_5} \cdot (5 \cdot w_7 + w_{10} + 13 \cdot w_{13}) + 15' \cdot (w_{10} + w_7 + 5w_4) + 5' \cdot 6 \cdot w_{13}$

$W_{cbl_4} := L_{L_4} \cdot (6 \cdot w_7 + 5w_4 + 2 \cdot w_{10} + 19 \cdot w_{13}) + 35' \cdot 12w_{13}$

$W_{cbl_3} := L_{L_3} \cdot (6 \cdot w_7 + 5w_4 + 2 \cdot w_{10} + 31 \cdot w_{13})$

$W_{cbl_2} := L_{L_2} \cdot (6 \cdot w_7 + 5w_4 + 2 \cdot w_{10} + 31 \cdot w_{13})$

$W_{cbl_1} := L_{L_1} \cdot (6 \cdot w_7 + 5w_4 + 2 \cdot w_{10} + 31 \cdot w_{13})$

$W_{cbl}^T = (762\ \ 1525\ \ 762\ \ 1461\ \ 575\ \ 213)\,l$

Dead loads (3) applied to the top of each section: $\left(\frac{1}{3} \cdot \overrightarrow{W_{cbl}}\right)^T = (254\ \ 508\ \ 254\ \ 487\ \ 192\ \ 71)\,lbs$

Cable Ice Volume:

$$v_4 := \frac{\pi}{4}\cdot\left[\left(D_4 + 2\cdot T_i\right)^2 - D_4^{\,2}\right] \qquad v_7 := \frac{\pi}{4}\cdot\left[\left(D_7 + 2\cdot T_i\right)^2 - D_7^{\,2}\right]$$

$$v_{10} := \frac{\pi}{4}\cdot\left[\left(D_{10} + 2\cdot T_i\right)^2 - D_{10}^{\,2}\right] \qquad v_{13} := \frac{\pi}{4}\cdot\left[\left(D_{13} + 2\cdot T_i\right)^2 - D_{13}^{\,2}\right]$$

$$Ice_{cbl_6} := \left[L_{L_6}\cdot\left(5v_7 + v_{10} + v_{13}\right) + 10'\cdot 12\cdot v_{13}\right]\cdot\gamma_{ice}$$

$$Ice_{cbl_5} := \left[L_{L_5}\cdot\left(5v_7 + v_{10} + 13\cdot v_{13}\right) + 15'\cdot\left(v_{10} + v_7 + 5v_4\right) + 5'\cdot 6\cdot v_{13}\right]\cdot\gamma_{ice}$$

$$Ice_{cbl_4} := \left[L_{L_4}\cdot\left(6\cdot v_7 + 5v_4 + 2\cdot v_{10} + 19\cdot v_{13}\right) + 35'\cdot 12v_{13}\right]\cdot\gamma_{ice}$$

$$Ice_{cbl_3} := L_{L_3}\cdot\left(6\cdot v_7 + 5v_4 + 2\cdot v_{10} + 31\cdot v_{13}\right)\cdot\gamma_{ice}$$

$$Ice_{cbl_2} := L_{L_2}\cdot\left(6\cdot v_7 + 5v_4 + 2\cdot v_{10} + 31\cdot v_{13}\right)\cdot\gamma_{ice}$$

$$Ice_{cbl_1} := L_{L_1}\cdot\left(6\cdot v_7 + 5v_4 + 2\cdot v_{10} + 31\cdot v_{13}\right)\cdot\gamma_{ice}$$

$$Ice_{cbl}^{\,T} = (1175 \quad 2351 \quad 1175 \quad 2259 \quad 906 \quad 335)\ \text{lbs}$$

Ice loads (3) applied to the top of each section: $\frac{Ice_{cbl}^{\,T}}{3} = (392 \quad 784 \quad 392 \quad 753 \quad 302 \quad 112)\ \text{lbs}$

Platform Gravity Loads:

Platform Elevations: $EL_{plat} := (115 \quad 125 \quad 135 \quad 160 \quad 170)^T\ \text{ft}$

Platform Weight: $W_{PL} := (350 \quad 690 \quad 690 \quad 350 \quad 2270)^T\ \text{lbs}$

Node Loads: $\frac{W_{PL}^{\,T}}{3} = (117 \quad 230 \quad 230 \quad 117 \quad 757)\ \text{lbs}$

Platform Weight w/ice: $W_{PLI} := (500 \quad 1030 \quad 1030 \quad 500 \quad 3330)^T\ \text{lbs}$

Ice Node Loads: $\frac{\left(W_{PLI} - W_{PL}\right)^T}{3} = (50 \quad 113 \quad 113 \quad 50 \quad 353)\ \text{lbs}$

Antenna Gravity Loads :

Antenna Elevs:	Antenna	Number:	Weight:	Dead Load	Weight w/ice	Antenna Ice
$EL_{ant_1} := 115ft$	CSS DOU4	$N_1 := 12$	$W_1 := 32lbs$	$N_1 \cdot W_1 = 384\,lbs$	$W'_1 := 53lbs$	$N_1 \cdot (W_1 - W'_1) = -252\,lbs$
$EL_{ant_2} := 125ft$	EMS RR90-12	$N_2 := 6$	$W_2 := 21lbs$	$N_2 \cdot W_2 = 126\,lbs$	$W'_2 := 55lbs$	$N_2 \cdot (W_2 - W'_2) = -204\,lbs$
$EL_{ant_3} := 135ft$	TXRX(1142)	$N_{3_1} := 1$	$W_{3_1} := 10lbs$		$W'_{3_1} := 20lbs$	
	PD201-7	$N_{3_2} := 1$	$W_{3_2} := 4lbs$		$W'_{3_2} := 8lbs$	
	PD1142	$N_{3_3} := 2$	$W_{3_3} := 10lbs$		$W'_{3_3} := 20lbs$	
	PD620	$N_{3_4} := 3$	$W_{3_4} := 53lbs$	$N_3 \cdot W_3 = 193\,lbs$	$W'_{3_4} := 106lbs$	$N_3 \cdot (W_3 - W'_3) = -193\,lbs$
$EL_{ant_4} := 160ft$	Allgon 7184	$N_4 := 12$	$W_4 := 10lbs$	$N_4 \cdot W_4 = 120\,lbs$	$W'_4 := 20lbs$	$N_4 \cdot (W_4 - W'_4) = -120\,lbs$
$EL_{ant_5} := 170ft$	TXRX(1142)	$N_{5_1} := 1$	$W_{5_1} := 10lbs$		$W'_{5_1} := 20lbs$	
	PD201-7	$N_{5_2} := 1$	$W_{5_2} := 4lbs$		$W'_{5_2} := 8lbs$	
	PD1142	$N_{5_3} := 2$	$W_{5_3} := 10lbs$		$W'_{5_3} := 20lbs$	
	PD620	$N_{5_4} := 3$	$W_{5_4} := 53lbs$	$N_5 \cdot W_5 = 193\,lbs$	$W'_{5_4} := 106lbs$	$N_5 \cdot (W_5 - W'_5) = -193\,lbs$

$$Wt_{ant} := N_1 \cdot W_1 + N_2 \cdot W_2 + N_3 \cdot W_3 + N_4 \cdot W_4 + N_5 \cdot W_5 \qquad Wt_{ant} = 1016\,lbs$$

$$Wt_{ant.i} := N_1 \cdot W'_1 + N_2 \cdot W'_2 + N_3 \cdot W'_3 + N_4 \cdot W'_4 + N_5 \cdot W'_5 \qquad Wt_{ant.i} = 1978\,lbs$$

Tower Member Wind Loads: Wind Velocity (Section 16): $V := 85mph$

To account for shielding of the cables by the diagonals,

$$Shield := 1 - \overrightarrow{\left[\frac{N_x}{L_L} \cdot \left(\frac{2 \cdot B_D}{\cos(\alpha_D)}\right)\right]} \qquad Shield_6 := 1 \qquad Shield^T = (92\ \ 93\ \ 94\ \ 93\ \ 91\ \ 100)\,\%$$

Cable area per side, assuming 1/3 of the area to each side:

$$A_{C_6} := \frac{Shield_6}{3} \cdot \left[L_{L_6} \cdot (5D_7 + D_{10} + D_{13}) + 10' \cdot 12 \cdot D_{13}\right]$$

$$A_{C_5} := \frac{Shield_5}{3} \cdot \left[L_{L_5} \cdot (5D_7 + D_{10} + 13 \cdot D_{13}) + 15' \cdot (D_{10} + D_7 + 5D_4) + 5' \cdot 6 \cdot D_{13}\right]$$

$$A_{C_4} := \frac{Shield_4}{3} \cdot \left[L_{L_4} \cdot (6 \cdot D_7 + 5D_4 + 2 \cdot D_{10} + 19 \cdot D_{13}) + 35' \cdot 12 D_{13}\right]$$

$$A_{C_3} := \frac{Shield_3}{3} \cdot \left[L_{L_3} \cdot (6 \cdot D_7 + 5D_4 + 2 \cdot D_{10} + 31 \cdot D_{13})\right]$$

$$A_{C_2} := \frac{Shield_2}{3} \cdot \left[L_{L_2} \cdot (6 \cdot D_7 + 5D_4 + 2 \cdot D_{10} + 31 \cdot D_{13})\right]$$

$$A_{C_1} := \frac{Shield_1}{3} \cdot \left[L_{L_1} \cdot (6 \cdot D_7 + 5D_4 + 2 \cdot D_{10} + 31 \cdot D_{13})\right]$$

$$A_C^T = (38.1\ \ 76.8\ \ 38.6\ \ 73.7\ \ 28.7\ \ 11.6)\,ft^2$$

Solidity ratio: $e := \overrightarrow{\frac{(2A_L + A_D + A_H + A_C)}{G_N}}$ $\qquad e^T = (0.26\ \ 0.28\ \ 0.30\ \ 0.36\ \ 0.40\ \ 0.27)$

Round Component reduction factors: $R_{RA} := .51e^2 + .57$ $\qquad R_{RA}^T = (0.60\ \ 0.61\ \ 0.62\ \ 0.64\ \ 0.65\ \ 0.61)$

For the legs: $R_{LA_k} := 1$ $\quad R_{LA_6} := R_{RA_6}$ $\qquad R_{LA}^T = (1.00\ \ 1.00\ \ 1.00\ \ 1.00\ \ 1.00\ \ 0.61)$

For the diagonals: $R_{DA_k} := 1$ $\quad R_{DA_6} := R_{RA_6}$ $\qquad R_{DA}^T = (1.00\ \ 1.00\ \ 1.00\ \ 1.00\ \ 1.00\ \ 0.61)$

For the horizontals: $R_{HA_k} := 1$ $\quad R_{HA_6} := R_{RA_6}$ $\qquad R_{HA}^T = (1.00\ \ 1.00\ \ 1.00\ \ 1.00\ \ 1.00\ \ 0.61)$

Wind Direction Factors (Table 2): $D_R := 1$ $\quad D_{FN} := 1$ $\quad D_{F60} := .80$ $\quad D_{F90} := .85$

Effective projected area of structural components on each face:

Normal Wind:

Legs: $A_{LN} := \overrightarrow{(D_R \cdot A_L \cdot R_{LA})}$ $\qquad A_{LN}^T = (18.02\ \ 33.54\ \ 14.70\ \ 26.89\ \ 18.12\ \ 1.77)\,ft^2$

Diagonals: $A_{DN} := \overrightarrow{(D_{FN} \cdot A_D \cdot R_{DA})}$ $\qquad A_{DN}^T = (28.69\ \ 46.12\ \ 16.44\ \ 29.81\ \ 18.36\ \ 3.86)\,ft^2$

Horizontals: $A_{HN} := \overrightarrow{(D_{FN} \cdot A_H \cdot R_{HA})}$ $\qquad A_{HN}^T = (0.00\ \ 0.00\ \ 0.00\ \ 0.00\ \ 6.00\ \ 1.77)\,ft^2$

Cables: $A_{CN} := \overrightarrow{(A_C \cdot R_{RA})}$ $\qquad A_{CN}^T = (23.00\ \ 46.86\ \ 23.80\ \ 46.83\ \ 18.63\ \ 7.06)\,ft^2$

90° Wind:

Legs: $A_{L90} := \overrightarrow{(D_R \cdot A_L \cdot R_{LA})}$ $\qquad A_{L90}^T = (18.02\ \ 33.54\ \ 14.70\ \ 26.89\ \ 18.12\ \ 1.77)\,ft^2$

Diagonals: $A_{D90} := \overrightarrow{(D_{F90} \cdot A_D \cdot R_{DA})}$ $\qquad A_{D90}^T = (24.38\ \ 39.20\ \ 13.97\ \ 25.34\ \ 15.61\ \ 3.28)\,ft^2$

Horizontals: $A_{H90} := \overrightarrow{(D_{F90} \cdot A_H \cdot R_{HA})}$ $\qquad A_{H90}^T = (0.00\ \ 0.00\ \ 0.00\ \ 0.00\ \ 5.10\ \ 1.50)\,ft^2$

Cables: $A_{C90} := \overrightarrow{(A_C \cdot R_{RA})}$ $\qquad A_{C90}^T = (23.00\ \ 46.86\ \ 23.80\ \ 46.83\ \ 18.63\ \ 7.06)\,ft^2$

60° Wind:

Legs: $A_{L60} := \overrightarrow{(D_R \cdot A_L \cdot R_{LA})}$ $\qquad A_{L60}^T = (18.02\ \ 33.54\ \ 14.70\ \ 26.89\ \ 18.12\ \ 1.77)\,ft^2$

Diagonals: $A_{D60} := \overrightarrow{(D_{F60} \cdot A_D \cdot R_{DA})}$ $\qquad A_{D60}^T = (22.95\ \ 36.90\ \ 13.15\ \ 23.85\ \ 14.69\ \ 3.09)\,ft^2$

Horizontals: $A_{H60} := \overrightarrow{(D_{F60} \cdot A_H \cdot R_{HA})}$ $\qquad A_{H60}^T = (0.00\ \ 0.00\ \ 0.00\ \ 0.00\ \ 4.80\ \ 1.42)\,ft^2$

Cables: $A_{C60} := \overrightarrow{(A_C \cdot R_{RA})}$ $\qquad A_{C60}^T = (23.00\ \ 46.86\ \ 23.80\ \ 46.83\ \ 18.63\ \ 7.06)\,ft^2$

$C_{FA} := 3.4e^2 - 4.7e + 3.4$ $\qquad C_{FA}^T = (2.42 \;\; 2.35 \;\; 2.29 \;\; 2.15 \;\; 2.07 \;\; 2.39)$

For latticed structures, the Gust Response Factor (2.3.4.1): $G_H := .65 + \dfrac{.6}{\left[EL_{t_{nn}} \div (33ft)\right]^{1 \div 7}}$ $\qquad G_H = 1.12$

Exposure coeffficient (2.3.3): $K'_{z_k} := \min\left[\max\left[\left(\dfrac{z_k + El_p}{33ft}\right)^{2 \div 7}, 1\right], 2.58\right]$ $\qquad K'^T_z = (1.00 \;\; 1.06 \;\; 1.24 \;\; 1.37 \;\; 1.50 \;\; 1.57)$

Velocity pressure(2.3.3): $q := 0.00256psf \cdot K'_z \cdot (V \div mph)^2$ $\qquad \left(\overrightarrow{(q \cdot G_H)}\right)^T = (20.8 \;\; 22.0 \;\; 25.8 \;\; 28.6 \;\; 31.1 \;\; 32.7)\,psf$

Structural Components and Linear Appurtenances: $\left(\overrightarrow{(q \cdot G_H \cdot C_{FA})}\right)^T = (50.3 \;\; 51.7 \;\; 59.1 \;\; 61.5 \;\; 64.4 \;\; 77.9)\,psf$

Normal wind direction w/o ice:

Uniform wind to each leg: $w_{LN} := G_H \cdot \overrightarrow{\left[C_{FA} \cdot q \cdot \left[A_{LN} \div (3 \cdot L_L)\right]\right]}$ $\qquad w_{LN}^T = (15 \;\; 14 \;\; 14 \;\; 14 \;\; 13 \;\; 2)\,plf$

Uniform wind to each diagonal: $w_{DN} := G_H \cdot \overrightarrow{\left[(C_{FA} \cdot B_D \cdot D_{FN} \cdot R_{DA}) \cdot q\right]}$ $\qquad w_{DN}^T = (17 \;\; 15 \;\; 15 \;\; 15 \;\; 16 \;\; 3)\,plf$

Uniform wind to each horizontal: $w_{HN} := G_H \cdot \overrightarrow{\left[(C_{FA} \cdot B_H \cdot D_{FN} \cdot R_{HA}) \cdot q\right]}$ $\qquad w_{HN}^T = (0 \;\; 0 \;\; 0 \;\; 0 \;\; 16 \;\; 3)\,plf$

Uniform wind to the cables(2.3.2): $w_{CN} := G_H \cdot \overrightarrow{\left[C_{FA} \cdot (A_{CN} \div L_L) \cdot q\right]}$ $\qquad w_{CN}^T = (58 \;\; 60 \;\; 70 \;\; 72 \;\; 40 \;\; 28)\,plf$

90° direction:

Uniform wind to each leg: $w_{L90} := G_H \cdot \overrightarrow{\left[C_{FA} \cdot q \cdot \left[A_{L90} \div (3 \cdot L_L)\right]\right]}$ $\qquad w_{L90}^T = (15 \;\; 14 \;\; 14 \;\; 14 \;\; 13 \;\; 2)\,plf$

Uniform wind to each diagonal: $w_{D90} := G_H \cdot \overrightarrow{\left[(C_{FA} \cdot B_D \cdot D_{F90} \cdot R_{DA}) \cdot q\right]}$ $\qquad w_{D90}^T = (14 \;\; 13 \;\; 13 \;\; 13 \;\; 14 \;\; 3)\,plf$

Uniform wind to each horizontal: $w_{H90} := G_H \cdot \overrightarrow{\left[(C_{FA} \cdot B_H \cdot D_{F90} \cdot R_{HA}) \cdot q\right]}$ $\qquad w_{H90}^T = (0 \;\; 0 \;\; 0 \;\; 0 \;\; 14 \;\; 3)\,plf$

Uniform wind to the cables(2.3.2): $w_{C90} := G_H \cdot \overrightarrow{\left[C_{FA} \cdot (A_{C90} \div L_L) \cdot q\right]}$ $\qquad w_{C90}^T = (58 \;\; 60 \;\; 70 \;\; 72 \;\; 40 \;\; 28)\,plf$

60° direction:

Uniform wind to each leg: $w_{L60} := G_H \cdot \overrightarrow{\left[C_{FA} \cdot q \cdot \left[A_{L60} \div (3 \cdot L_L)\right]\right]}$ $\qquad w_{L60}^T = (15 \;\; 14 \;\; 14 \;\; 14 \;\; 13 \;\; 2)\,plf$

Uniform wind to each diagonal: $w_{D60} := G_H \cdot \overrightarrow{\left[(C_{FA} \cdot B_D \cdot D_{F60} \cdot R_{DA}) \cdot q\right]}$ $\qquad w_{D60}^T = (13 \;\; 12 \;\; 12 \;\; 12 \;\; 13 \;\; 3)\,plf$

Uniform wind to each horizontal: $w_{H60} := G_H \cdot \overrightarrow{\left[(C_{FA} \cdot B_H \cdot D_{F60} \cdot R_{HA}) \cdot q\right]}$ $\qquad w_{H60}^T = (0 \;\; 0 \;\; 0 \;\; 0 \;\; 13 \;\; 3)\,plf$

Uniform wind to the cables(2.3.2): $w_{C60} := G_H \cdot \overrightarrow{\left[C_{FA} \cdot (A_{C60} \div L_L) \cdot q\right]}$ $\qquad w_{C60}^T = (58 \;\; 60 \;\; 70 \;\; 72 \;\; 40 \;\; 28)\,plf$

Width of Linear Appurtenances with ice:

$DI_4 := D_4 + 2T_i$ $\quad$ $DI_7 := D_7 + 2T_i$ $\quad$ $DI_{10} := D_{10} + 2T_i$ $\quad$ $DI_{13} := D_{13} + 2T_i$

$DI_4 = 1.58\,in$ $\quad$ $DI_7 = 2.11\,in$ $\quad$ $DI_{10} = 2.55\,in$ $\quad$ $DI_{13} = 2.98\,in$

$$Shield := 1 - \overrightarrow{\left[\frac{N_x}{L_L}\cdot\left[\frac{2\cdot(B_D + 2T_i)}{\cos(\alpha_D)}\right]\right]} \qquad Shield_6 := 1 \qquad Shield^T = (91\ \ 91\ \ 92\ \ 91\ \ 88\ \ 100)\,\%$$

$$A_{C.i_6} := \frac{Shield_6}{3}\cdot\left[L_{L_6}\cdot(5DI_7 + DI_{10} + DI_{13}) + 10'\cdot 12\cdot DI_{13}\right]$$

$$A_{C.i_5} := \frac{Shield_5}{3}\cdot\left[L_{L_5}\cdot(5DI_7 + DI_{10} + 13\cdot DI_{13}) + 15'\cdot(DI_{10} + DI_7 + 5DI_4) + 5'\cdot 6\cdot DI_{13}\right]$$

$$A_{C.i_4} := \frac{Shield_4}{3}\cdot\left[L_{L_4}\cdot(6\cdot DI_7 + 5DI_4 + 2\cdot DI_{10} + 19\cdot DI_{13}) + 35'\cdot 12DI_{13}\right]$$

$$A_{C.i_3} := \frac{Shield_3}{3}\cdot\left[L_{L_3}\cdot(6\cdot DI_7 + 5DI_4 + 2\cdot DI_{10} + 31\cdot DI_{13})\right]$$

$$A_{C.i_2} := \frac{Shield_2}{3}\cdot\left[L_{L_2}\cdot(6\cdot DI_7 + 5DI_4 + 2\cdot DI_{10} + 31\cdot DI_{13})\right]$$

$$A_{C.i_1} := \frac{Shield_1}{3}\cdot\left[L_{L_1}\cdot(6\cdot DI_7 + 5DI_4 + 2\cdot DI_{10} + 31\cdot DI_{13})\right]$$

$$A_{C.i}^T = (59.5\ \ 120.0\ \ 60.2\ \ 115.0\ \ 45.1\ \ 18.9)\,ft^2$$

Solidity ratio w/ice: $e_i := \overrightarrow{\frac{(2A_{L.i} + A_{D.i} + A_{H.i} + A_{C.i})}{G_{Ni}}}$ $\qquad$ $e_i^T = (0.41\ \ 0.45\ \ 0.51\ \ 0.61\ \ 0.71\ \ 0.47)$

Round Component reduction factors:

$R_{RAi} := .51e_i^2 + .57$ $\qquad$ $R_{RAi}^T = (0.65\ \ 0.67\ \ 0.70\ \ 0.76\ \ 0.82\ \ 0.68)$

For the legs: $R_{LAi_k} := 1$ $\quad$ $R_{LAi_6} := R_{RAi_6}$ $\quad$ $R_{LA}^T = (1.00\ \ 1.00\ \ 1.00\ \ 1.00\ \ 1.00\ \ 0.61)$

For the diagonals: $R_{DAi_k} := 1$ $\quad$ $R_{DAi_6} := R_{RA_6}$ $\quad$ $R_{DAi}^T = (1.00\ \ 1.00\ \ 1.00\ \ 1.00\ \ 1.00\ \ 0.61)$

For the horizontals: $R_{HAi_k} := 1$ $\quad$ $R_{HAi_6} := R_{RAi_6}$ $\quad$ $R_{HAi}^T = (1.00\ \ 1.00\ \ 1.00\ \ 1.00\ \ 1.00\ \ 0.68)$

Effective projected area of structural components on each face:

Normal Wind:

Legs: $A_{LNi} := \overrightarrow{(D_R\cdot A_{L.i}\cdot R_{LAi})}$ $\qquad$ $A_{LNi}^T = (33.84\ \ 65.17\ \ 30.52\ \ 58.53\ \ 41.52\ \ 3.13)\,ft^2$

Diagonals: $A_{DNi} := \overrightarrow{(D_{FN}\cdot A_{D.i}\cdot R_{DAi})}$ $\qquad$ $A_{DNi}^T = (35.86\ \ 59.30\ \ 21.92\ \ 39.74\ \ 24.49\ \ 8.28)\,ft^2$

Horizontals: $A_{HNi} := \overrightarrow{(D_{FN}\cdot A_{H.i}\cdot R_{HAi})}$ $\qquad$ $A_{HNi}^T = (0.00\ \ 0.00\ \ 0.00\ \ 0.00\ \ 8.00\ \ 4.27)\,ft^2$

Cables: $A_{CNi} := \overrightarrow{(A_{C.i}\cdot R_{RAi})}$ $\qquad$ $A_{CNi}^T = (38.92\ \ 80.94\ \ 42.22\ \ 87.58\ \ 37.16\ \ 12.89)\,ft^2$

90° Wind:

Legs: $A_{L90i} := \overrightarrow{\left(D_R \cdot A_{L.i} \cdot R_{LAi}\right)}$ $\quad A_{L90i}^T = (33.84\ \ 65.17\ \ 30.52\ \ 58.53\ \ 41.52\ \ 3.13)\,ft^2$

Diagonals: $A_{D90i} := \overrightarrow{\left(D_{F90} \cdot A_{D.i} \cdot R_{DAi}\right)}$ $\quad A_{D90i}^T = (30.48\ \ 50.40\ \ 18.63\ \ 33.78\ \ 20.81\ \ 7.04)\,ft^2$

Horizontals: $A_{H90i} := \overrightarrow{\left(D_{F90} \cdot A_{H.i} \cdot R_{HAi}\right)}$ $\quad A_{H90i}^T = (0.00\ \ 0.00\ \ 0.00\ \ 0.00\ \ 6.80\ \ 3.63)\,ft^2$

Cables: $A_{C90i} := \overrightarrow{\left(A_{C.i} \cdot R_{RAi}\right)}$ $\quad A_{C90i}^T = (38.92\ \ 80.94\ \ 42.22\ \ 87.58\ \ 37.16\ \ 12.89)\,ft^2$

60° Wind:

Legs: $A_{L60i} := \overrightarrow{\left(D_R \cdot A_{L.i} \cdot R_{LAi}\right)}$ $\quad A_{L60i}^T = (33.84\ \ 65.17\ \ 30.52\ \ 58.53\ \ 41.52\ \ 3.13)\,ft^2$

Diagonals: $A_{D60i} := \overrightarrow{\left(D_{F60} \cdot A_{D.i} \cdot R_{DAi}\right)}$ $\quad A_{D60i}^T = (28.69\ \ 47.44\ \ 17.54\ \ 31.80\ \ 19.59\ \ 6.62)\,ft^2$

Horizontals: $A_{H60i} := \overrightarrow{\left(D_{F60} \cdot A_{H.i} \cdot R_{HAi}\right)}$ $\quad A_{H60i}^T = (0.00\ \ 0.00\ \ 0.00\ \ 0.00\ \ 6.40\ \ 3.42)\,ft^2$

Cables: $A_{C60i} := \overrightarrow{\left(A_{C.i} \cdot R_{RAi}\right)}$ $\quad A_{C60i}^T = (38.92\ \ 80.94\ \ 42.22\ \ 87.58\ \ 37.16\ \ 12.89)\,ft^2$

$C_{F.i} := 3.4e_i^2 - 4.7e_i + 3.4$ $\quad C_{F.i}^T = (2.05\ \ 1.97\ \ 1.89\ \ 1.80\ \ 1.78\ \ 1.94)$

Normal wind direction w/ice:

Uniform wind to each leg: $w_{LNi} := G_H \cdot \overrightarrow{\left[C_{F.i} \cdot q \cdot \left[A_{LNi} \div (3 \cdot L_L)\right]\right]}$ $\quad w_{LNi}^T = (24\ \ 23\ \ 25\ \ 25\ \ 25\ \ 3)\,plf$

Uniform wind to each diagonal: $w_{DNi} := G_H \cdot \overrightarrow{\left[\left[C_{F.i} \cdot (B_D + 2T_i) \cdot D_{FN} \cdot R_{DA}\right] \cdot q\right]}$ $\quad w_{DNi}^T = (18\ \ 16\ \ 16\ \ 17\ \ 18\ \ 6)\,plf$

Uniform wind to each horizontal: $w_{HNi} := G_H \cdot \overrightarrow{\left[\left[C_{F.i} \cdot \left[A_{H.i} \div (N_H \cdot L_H)\right] \cdot D_{FN} \cdot R_{HA}\right] \cdot q\right]}$ $\quad w_{HNi}^T = (0\ \ 0\ \ 0\ \ 0\ \ 18\ \ 6)\,plf$

Uniform wind to the cables(2.3.2): $w_{CNi} := G_H \cdot \overrightarrow{\left[C_{F.i} \cdot (A_{CNi} \div L_L) \cdot q\right]}$ $\quad w_{CNi}^T = (83\ \ 87\ \ 103\ \ 112\ \ 68\ \ 41)\,plf$

90° direction:

Uniform wind to each leg: $w_{L90i} := G_H \cdot \overrightarrow{\left[C_{F.i} \cdot q \cdot \left[A_{L90i} \div (3 \cdot L_L)\right]\right]}$ $\quad w_{L90i}^T = (24\ \ 23\ \ 25\ \ 25\ \ 25\ \ 3)\,plf$

Uniform wind to each diagonal: $w_{D90i} := G_H \cdot \overrightarrow{\left[\left[C_{F.i} \cdot (B_D + 2T_i) \cdot D_{F90} \cdot R_{DA}\right] \cdot q\right]}$ $\quad w_{D90i}^T = (15\ \ 14\ \ 14\ \ 15\ \ 16\ \ 5)\,plf$

Uniform wind to each horizontal: $w_{H90i} := G_H \cdot \overrightarrow{\left[\left[C_{F.i} \cdot \left[A_{H.i} \div (N_H \cdot L_H)\right] \cdot D_{F90} \cdot R_{HA}\right] \cdot q\right]}$ $\quad w_{H90i}^T = (0\ \ 0\ \ 0\ \ 0\ \ 16\ \ 5)\,plf$

Uniform wind to the cables(2.3.2): $w_{C90i} := G_H \cdot \overrightarrow{\left[C_{F.i} \cdot (A_{C90i} \div L_L) \cdot q\right]}$ $\quad w_{C90i}^T = (83\ \ 87\ \ 103\ \ 112\ \ 68\ \ 41)\,plf$

60° direction:

Uniform wind to each leg: $w_{L60i} := \overrightarrow{G_H \cdot \left[C_{F.i} \cdot q \cdot \left[A_{L60i} \div (3 \cdot L_L)\right]\right]}$ $\quad w_{L60i}^T = (24 \;\; 23 \;\; 25 \;\; 25 \;\; 25 \;\; 3)\,\text{plf}$

Uniform wind to each diagonal: $w_{D60i} := G_H \cdot \overrightarrow{\left[\left[C_{F.i} \cdot (B_D + 2T_i) \cdot D_{F60} \cdot R_{DA}\right] \cdot q\right]}$ $\quad w_{D60i}^T = (14 \;\; 13 \;\; 13 \;\; 14 \;\; 15 \;\; 5)\,\text{plf}$

Uniform wind to each horizontal: $w_{H60i} := G_H \cdot \overrightarrow{\left[\left[C_{F.i}\left[A_{H.i} \div (N_H \cdot L_H)\right]\right] \cdot D_{F60} \cdot R_{HA}\right] \cdot q}$ $\quad w_{H60i}^T = (0 \;\; 0 \;\; 0 \;\; 0 \;\; 15 \;\; 5)\,\text{plf}$

Uniform wind to the cables(2.3.2): $w_{C60i} := G_H \cdot \overrightarrow{\left[C_{F.i} \cdot (A_{C60i} \div L_L) \cdot q\right]}$ $\quad w_{C60i}^T = (83 \;\; 87 \;\; 103 \;\; 112 \;\; 68 \;\; 41)\,\text{plf}$

<u>Platform and Antenna Wind Loads:</u> $\quad jj := 1..\text{rows}(EL_{plat})$

Factored Wind area of the platforms: $C\_A_p := (13.9 \;\; 40.4 \;\; 40.4 \;\; 13.9 \;\; 91.0)^T\,\text{ft}^2$

$$K_z(z) := \min\left[\max\left[\left(\frac{z + El_p}{33\text{ft}}\right)^{2 \div 7}, 1\right], 2.58\right]$$

Exposure Coefficient: $Kx_{jj} := K_z\left(EL_{plat_{jj}} + El_p\right)$ $\quad Kx^T = (1.43 \;\; 1.46 \;\; 1.50 \;\; 1.57 \;\; 1.60)$

Wind Pressure: $q := 0.00256 \cdot \text{psf} \cdot Kx \cdot (V \div \text{mph})^2$ $\quad q^T = (26.4 \;\; 27.1 \;\; 27.7 \;\; 29.0 \;\; 29.5)\,\text{psf}$

Platform Wind Force to each leg: $\frac{1}{3} \cdot \left(\overrightarrow{(q \cdot G_H \cdot C\_A_p)}\right)^T = (138 \;\; 410 \;\; 419 \;\; 151 \;\; 1008)\,\text{lbs}$

Wind area of the platforms with ice: $C\_A_{p.i} := (19 \;\; 57.1 \;\; 57.1 \;\; 19 \;\; 131)^T\,\text{ft}^2$

Wind Force with ice: $\frac{1}{3} \cdot \left(\overrightarrow{(q \cdot G_H \cdot C\_A_{p.i})}\right)^T = (188 \;\; 579 \;\; 592 \;\; 207 \;\; 1451)\,\text{lbs}$

<u>CSS DOU4</u>

Directional Wind Factor: $C_d := 1$

Antenna Height: $H_{ant} := 48\text{in}$ $\quad$ Width: $W_{ant} := 14\text{in} \cdot C_d$ $\quad$ Aspect Ratio: $AR := \frac{H_{ant}}{W_{ant}}$ $\quad AR = 3.43$

Antenna Wind Factor: $C_a := \text{if}\left[AR \le 7, 1.4, \text{if}\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $\quad C_a = 1.40$

Factored Wind Area: $C\_A_1 := C_a \cdot H_{ant} \cdot W_{ant}$ $\quad C\_A_1 = 6.53\,\text{ft}^2$

<u>CSS DOU4 w/ice</u>

Antenna Height: $H'_{ant} := H_{ant} + 2T_i$ $\quad$ Width: $W'_{ant} := (W_{ant} + 2T_i) \cdot C_d$ $\quad$ Aspect Ratio: $AR := \frac{H'_{ant}}{W'_{ant}}$

Antenna Wind Factor: $C_a := \text{if}\left[AR \le 7, 1.4, \text{if}\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $\quad C_a = 1.40$

Factored Wind Area: $C\_A'_1 := C_a \cdot H'_{ant} \cdot W'_{ant}$ $\quad C\_A'_1 = 7.15\,\text{ft}^2$

EMS-RR90-12

Antenna Height: $H_{ant} := 48in$ Width: $W_{ant} := 12in \cdot C_d$ Aspect Ratio: $AR := \frac{H_{ant}}{W_{ant}}$ $AR = 4.00$

Antenna Wind Factor: $C_a := if\left[AR \le 7, 1.4, if\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $C_a = 1.40$

Factored Wind Area: $C\_A_2 := C_a \cdot H_{ant} \cdot W_{ant}$ $C\_A_2 = 5.60\, ft^2$

EMS-RR90-12 w/ice

Antenna Height: $H'_{ant} := H_{ant} + 2T_i$ Width: $W'_{ant} := (12in + 2T_i) \cdot C_d$ Aspect Ratio: $AR := \frac{H'_{ant}}{W'_{ant}}$

Antenna Wind Factor: $C_a := if\left[AR \le 7, 1.4, if\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $C_a = 1.40$

Factored Wind Area: $C\_A'_2 := C_a \cdot H'_{ant} \cdot W'_{ant}$ $C\_A'_2 = 6.19\, ft^2$

TXRX(1142)

Antenna Height: $H_{ant} := 192in$ Width: $W_{ant} := .28in \cdot C_d$ Aspect Ratio: $AR := \frac{H_{ant}}{W_{ant}}$ $AR = 685.71$

Antenna Wind Factor: $C_a := if\left[AR \le 7, 1.4, if\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $C_a = 2.00$

Factored Wind Area: $C\_A_{3_1} := C_a \cdot H_{ant} \cdot W_{ant}$ $C\_A_{3_1} = 0.75\, ft^2$

TXRX w/ice

Antenna Height: $H'_{ant} := H_{ant} + 2T_i$ Width: $W'_{ant} := (.28in + 2T_i) \cdot C_d$ Aspect Ratio: $AR := \frac{H'_{ant}}{W'_{ant}}$

Antenna Wind Factor: $C_a := if\left[AR \le 7, 1.4, if\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $C_a = 2.00$

Factored Wind Area: $C\_A'_{3_1} := C_a \cdot H'_{ant} \cdot W'_{ant}$ $C\_A'_{3_1} = 3.43\, ft^2$

PD201-7

Antenna Height: $H_{ant} := 93in$ Width: $W_{ant} := .29in \cdot C_d$ Aspect Ratio: $AR := \frac{H_{ant}}{W_{ant}}$ $AR = 320.69$

Antenna Wind Factor: $C_a := if\left[AR \le 7, 1.4, if\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $C_a = 2.00$

Factored Wind Area: $C\_A_{3_2} := C_a \cdot H_{ant} \cdot W_{ant}$ $C\_A_{3_2} = 0.375\, ft^2$

PD201-7 w/ice

Antenna Height: $H'_{ant} := H_{ant} + 2T_i$ Width: $W'_{ant} := (.29in + 2T_i) \cdot C_d$ Aspect Ratio: $AR := \frac{H'_{ant}}{W'_{ant}}$

Antenna Wind Factor: $C_a := if\left[AR \le 7, 1.4, if\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $C_a = 2.00$

Factored Wind Area: $C\_A'_{3_2} := C_a \cdot H'_{ant} \cdot W'_{ant}$ $C\_A'_{3_2} = 1.68\, ft^2$

PD1142

Antenna Height: $H_{ant} := 192in$ Width: $W_{ant} := .28in \cdot C_d$ Aspect Ratio: $AR := \frac{H_{ant}}{W_{ant}}$ $AR = 685.71$

Antenna Wind Factor: $C_a := if\left[AR \le 7, 1.4, if\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $C_a = 2.00$

Factored Wind Area: $C\_A3_3 := C_a \cdot H_{ant} \cdot W_{ant}$ $C\_A3_3 = 0.75ft^2$

PD1142 w/ice

Antenna Height: $H'_{ant} := H_{ant} + 2T_i$ Width: $W'_{ant} := (.28in + 2T_i) \cdot C_d$ Aspect Ratio: $AR := \frac{H'_{ant}}{W'_{ant}}$

Antenna Wind Factor: $C_a := if\left[AR \le 7, 1.4, if\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $C_a = 2.00$

Factored Wind Area: $C\_A'3_3 := C_a \cdot H'_{ant} \cdot W'_{ant}$ $C\_A'3_3 = 3.43ft^2$

PD620

Antenna Height: $H_{ant} := 252in$ Width: $W_{ant} := .68in \cdot C_d$ Aspect Ratio: $AR := \frac{H_{ant}}{W_{ant}}$ $AR = 370.59$

Antenna Wind Factor: $C_a := if\left[AR \le 7, 1.4, if\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $C_a = 2.00$

Factored Wind Area: $C\_A3_4 := C_a \cdot H_{ant} \cdot W_{ant}$ $C\_A3_4 = 2.38 ft^2$

PD620 w/ice

Antenna Height: $H'_{ant} := H_{ant} + 2T_i$ Width: $W'_{ant} := (.68in + 2T_i) \cdot C_d$ Aspect Ratio: $AR := \frac{H'_{ant}}{W'_{ant}}$

Antenna Wind Factor: $C_a := if\left[AR \le 7, 1.4, if\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $C_a = 2.00$

Factored Wind Area: $C\_A'3_4 := C_a \cdot H'_{ant} \cdot W'_{ant}$ $C\_A'3_4 = 5.90 ft^2$

$C\_A5 := C\_A3$ $C\_A'5 := C\_A'3$

Allgon 7184

Directional Wind Factor: $C_d := 1$

Antenna Height: $H_{ant} := 51.3in$ Width: $W_{ant} := 5.4in \cdot C_d$ Aspect Ratio: $AR := \frac{H_{ant}}{W_{ant}}$ $AR = 9.50$

Antenna Wind Factor: $C_a := if\left[AR \le 7, 1.4, if\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $C_a = 1.483$

Factored Wind Area: $C\_A4 := C_a \cdot H_{ant} \cdot W_{ant}$ $C\_A4 = 2.85 ft^2$

Allgon 7184 w/ice

Antenna Height: $H'_{ant} := H_{ant} + 2T_i$ Width: $W'_{ant} := (W_{ant} + 2T_i) \cdot C_d$ Aspect Ratio: $AR := \frac{H'_{ant}}{W'_{ant}}$

Antenna Wind Factor: $C_a := if\left[AR \le 7, 1.4, if\left[AR \ge 25, 2, 1.4 + .6 \cdot \frac{(AR - 7)}{25 - 7}\right]\right]$ $C_a = 1.44$

Factored Wind Area: $C\_A'_4 := C_a \cdot H'_{ant} \cdot W'_{ant}$ $C\_A'_4 = 3.35\,ft^2$

Antenna Elevs:	Antenna	Number:	Factored Wind Area	Total Area	Factored Wind Area w/ice	Total Area w/ice
$EL_{ant_1} = 115.0\,ft$	CSS DOU4	$N_1 = 12$	$A_1 := C\_A_1$	$N_1 \cdot A_1 = 78.4\,ft^2$	$Y_1 := C\_A'_1$	$N_1 \cdot Y_1 = 85.7\,ft^2$
$EL_{ant_2} = 125.0\,ft$	RR90-12	$N_2 = 6$	$A_2 := C\_A_2$	$N_2 \cdot A_2 = 33.6\,ft^2$	$Y_2 := C\_A'_2$	$N_2 \cdot Y_2 = 37.2\,ft^2$
$EL_{ant_3} = 135.0\,ft$	TXRX PD201-7 PD1142 PD620	$N_3 = \begin{pmatrix} 1 \\ 1 \\ 2 \\ 3 \end{pmatrix}$	$A_3 := C\_A_3$	$\overrightarrow{(N_3 \cdot A_3)} = \begin{pmatrix} 0.7 \\ 0.4 \\ 1.5 \\ 7.1 \end{pmatrix} ft^2$	$Y_3 := C\_A'_3$	$\overrightarrow{(N_3 \cdot Y_3)} = \begin{pmatrix} 3.4 \\ 1.7 \\ 6.9 \\ 17.7 \end{pmatrix} ft^2$
$EL_{ant_4} = 160.0\,ft$	Allgon 7184	$N_4 = 12$	$A_4 := C\_A_4$	$N_4 \cdot A_4 = 34.2\,ft^2$	$Y_4 := C\_A'_4$	$N_4 \cdot Y_4 = 40.1\,ft^2$
$EL_{ant_5} = 170.0\,ft$	TXRX PD201-7 PD1142 PD620	$N_5 = \begin{pmatrix} 1 \\ 1 \\ 2 \\ 3 \end{pmatrix}$	$A_5 := C\_A_5$	$\overrightarrow{(N_5 \cdot A_5)} = \begin{pmatrix} 0.7 \\ 0.4 \\ 1.5 \\ 7.1 \end{pmatrix} ft^2$	$Y_5 := C\_A'_5$	$\overrightarrow{(N_5 \cdot Y_5)} = \begin{pmatrix} 3.4 \\ 1.7 \\ 6.9 \\ 17.7 \end{pmatrix} ft^2$

Factored Antenna Area w/o ice: $C\_A_{ant} := \left(N_1 \cdot A_1 \;\; N_2 \cdot A_2 \;\; \sum \overrightarrow{(N_3 \cdot A_3)} \;\; N_4 \cdot A_4 \;\; \sum \overrightarrow{(N_5 \cdot A_5)}\right)^T$ $kk := 1..rows(EL_{a}$

Exposure Coefficient: $K'x_{kk} := K_z\left(EL_{ant_{kk}} + El_p\right)$ $K'x^T = (1.43 \;\; 1.46 \;\; 1.50 \;\; 1.57 \;\; 1.60)$

Wind Pressure: $q_{ant} := 0.00256 \cdot psf \cdot K'x \cdot (V \div mph)$ $q_{ant}^T = (26.4 \;\; 27.1 \;\; 27.7 \;\; 29.0 \;\; 29.5)\,psf$

Antenna Wind Force: $\frac{1}{3} \cdot \left(\overrightarrow{(q_{ant} \cdot G_H \cdot C\_A_{ant})}\right)^T = (777 \;\; 341 \;\; 101 \;\; 373 \;\; 108)\,lbs$

Factored Antenna Area w/ice: $C\_A_{ant.i} := \left(N_1 \cdot Y_1 \;\; N_2 \cdot Y_2 \;\; \sum \overrightarrow{(N_3 \cdot Y_3)} \;\; N_4 \cdot Y_4 \;\; \sum \overrightarrow{(N_5 \cdot Y_5)}\right)^T$

Wind Force with ice: $\frac{1}{3} \cdot \left(\overrightarrow{(q_{ant} \cdot G_H \cdot C\_A_{ant.i})}\right)^T = (849 \;\; 377 \;\; 308 \;\; 437 \;\; 329)\,lbs$

Check the tower leg at the base of section 1:

		Global	Local
$P_{L_1} := 370kips$	Effective Length Factor	$K_x := 1$	$K_y := 1$
	Unsupported Length	$L_x := 10 \cdot ft$	$L_y := S_{sg_1}$

$A_x := A_{Lx_1}$ $\qquad A_x = 11.93\,in^2$ $\qquad r_x := r_{L_1}$ $\qquad r_y := r_{e_1}$

$$KL\_R := \max\left(\left(\frac{K_x \cdot L_x}{r_x} \quad \frac{K_y \cdot L_y}{r_y}\right)\right) \qquad KL\_R = 25.1 \qquad C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E_s}{F_y}} \qquad C_c = 107.00$$

$$F'_{ex} := \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot \left(\frac{K_x \cdot L_x}{r_x}\right)^2} \qquad F'_{ex} = 252.17\,ksi \qquad F'_{ey} := \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot \left(\frac{K_y \cdot L_y}{r_y}\right)^2} \qquad F'_{ey} = 237.66\,ksi$$

$$F_a := if\left[KL\_R < C_c, \frac{\left[\left(1 - \frac{KL\_R^2}{2 \cdot C_c^2}\right) \cdot F_y\right]}{\frac{5}{3} + \frac{3 \cdot KL\_R}{8 \cdot C_c} - \frac{KL\_R^3}{8 \cdot C_c^3}}, \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot KL\_R^2}\right] \qquad F_a = 27.74\,ksi \qquad L_{all_1} := K_o \cdot F_a \cdot A_x \qquad L_{all_1} = 441\,kips$$

$if\left(P_{L_1} \le L_{all_1}, OK, NG\right) = "O.K."$

Check the tower leg at the base of section 2:

		Global	Local
$P_{L_2} := 322kips$	Effective Length Factor	$K_x := 1$	$K_y := 1$
	Unsupported Length	$L_x := 10 \cdot ft$	$L_y := S_{sg_2}$

$A_x := A_{Lx_2}$ $\qquad A_x = 9.42\,in^2$ $\qquad r_x := r_{L_2}$ $\qquad r_y := r_{e_2}$

$$KL\_R := \max\left(\left(\frac{K_x \cdot L_x}{r_x} \quad \frac{K_y \cdot L_y}{r_y}\right)\right) \qquad KL\_R = 28.2 \qquad C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E_s}{F_y}} \qquad C_c = 107.00$$

$$F'_{ex} := \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot \left(\frac{K_x \cdot L_x}{r_x}\right)^2} \qquad F'_{ex} = 251.48\,ksi \qquad F'_{ey} := \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot \left(\frac{K_y \cdot L_y}{r_y}\right)^2} \qquad F'_{ey} = 187.78\,ksi$$

$$F_a := if\left[KL\_R < C_c, \frac{\left[\left(1 - \frac{KL\_R^2}{2 \cdot C_c^2}\right) \cdot F_y\right]}{\frac{5}{3} + \frac{3 \cdot KL\_R}{8 \cdot C_c} - \frac{KL\_R^3}{8 \cdot C_c^3}}, \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot KL\_R^2}\right] \qquad F_a = 27.4\,ksi \qquad L_{all_2} := K_o \cdot F_a \cdot A_x \qquad L_{all_2} = 344\,kips$$

$if\left(P_{L_2} \le L_{all_2}, OK, NG\right) = "O.K."$

Check the tower leg at the base of section 3:

		Global	Local
$P_{L_3} := 223\text{kips}$	Effective Length Factor	$K_x := 1$	$K_y := 1$
	Unsupported Length	$L_x := 10\cdot ft$	$L_y := S_{sg_3}$

$A_x := A_{Lx_3}$ $\quad A_x = 7.22\,in^2$ $\quad r_x := r_{L_3}$ $\quad r_y := r_{e_3}$

$$KL\_R := \max\left(\left(\frac{K_x \cdot L_x}{r_x} \quad \frac{K_y \cdot L_y}{r_y}\right)\right) \qquad KL\_R = 32.2 \qquad C_c := \sqrt{\frac{2\cdot\pi^2\cdot E_s}{F_y}} \qquad C_c = 107.00$$

$$F'_{ex} := \frac{12\cdot\pi^2\cdot E_s}{23\cdot\left(\frac{K_x\cdot L_x}{r_x}\right)^2} \qquad F'_{ex} = 250.87\,ksi \qquad F'_{ey} := \frac{12\cdot\pi^2\cdot E_s}{23\cdot\left(\frac{K_y\cdot L_y}{r_y}\right)^2} \qquad F'_{ey} = 143.77\,ksi$$

$$F_a := \text{if}\left[KL\_R < C_c, \frac{\left[\left(1-\frac{KL\_R^2}{2\cdot C_c^2}\right)\cdot F_y\right]}{\frac{5}{3}+\frac{3\cdot KL\_R}{8\cdot C_c}-\frac{KL\_R^3}{8\cdot C_c^3}}, \frac{12\cdot\pi^2\cdot E_s}{23\cdot KL\_R^2}\right] \qquad F_a = 26.9\,ksi \qquad L_{all_3} := K_o\cdot F_a\cdot A_x \qquad L_{all_3} = 259\,kips$$

$\text{if}\left(P_{L_3} \le L_{all_3}, OK, NG\right) = \text{"O.K."}$

Check the tower leg at the base of section 4:

		Global	Local
$P_{L_4} := 171.7\text{kips}$	Effective Length Factor	$K_x := 1$	$K_y := 1$
	Unsupported Length	$L_x := 10\cdot ft$	$L_y := S_{sg_4}$

$A_x := A_{Lx_4}$ $\quad A_x = 5.30\,in^2$ $\quad r_x := r_{L_4}$ $\quad r_y := r_{e_4}$

$$KL\_R := \max\left(\left(\frac{K_x \cdot L_x}{r_x} \quad \frac{K_y \cdot L_y}{r_y}\right)\right) \qquad KL\_R = 37.6 \qquad C_c := \sqrt{\frac{2\cdot\pi^2\cdot E_s}{F_y}} \qquad C_c = 107.00$$

$$F'_{ex} := \frac{12\cdot\pi^2\cdot E_s}{23\cdot\left(\frac{K_x\cdot L_x}{r_x}\right)^2} \qquad F'_{ex} = 250.34\,ksi \qquad F'_{ey} := \frac{12\cdot\pi^2\cdot E_s}{23\cdot\left(\frac{K_y\cdot L_y}{r_y}\right)^2} \qquad F'_{ey} = 105.63\,ksi$$

$$F_a := \text{if}\left[KL\_R < C_c, \frac{\left[\left(1-\frac{KL\_R^2}{2\cdot C_c^2}\right)\cdot F_y\right]}{\frac{5}{3}+\frac{3\cdot KL\_R}{8\cdot C_c}-\frac{KL\_R^3}{8\cdot C_c^3}}, \frac{12\cdot\pi^2\cdot E_s}{23\cdot KL\_R^2}\right] \qquad F_a = 26.2\,ksi \qquad L_{all_4} := K_o\cdot F_a\cdot A_x \qquad L_{all_4} = 185\,kips$$

$\text{if}\left(P_{L_4} \le L_{all_4}, OK, NG\right) = \text{"O.K."}$

Check the tower leg at the base of section 5:

		Global	Local
$P_{L_5} := 70.3kips$	Effective Length Factor	$K_x := 1$	$K_y := 1$
	Unsupported Length	$L_x := 10 \cdot ft$	$L_y := S_{sg_5}$

$A_x := A_{Lx_5}$ $\quad A_x = 3.68\,in^2$ $\quad r_x := r_{L_5}$ $\quad r_y := r_{e_5}$

$$KL\_R := max\left(\left(\frac{K_x \cdot L_x}{r_x} \quad \frac{K_y \cdot L_y}{r_y}\right)\right) \qquad KL\_R = 45.1 \qquad C_c = 107.00$$

$$F'_{ex} := \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot \left(\frac{K_x \cdot L_x}{r_x}\right)^2} \qquad F'_{ex} = 249.90\,ksi \qquad F'_{ey} := \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot \left(\frac{K_y \cdot L_y}{r_y}\right)^2} \qquad F'_{ey} = 73.35\,ksi$$

$$F_a := if\left[KL\_R < C_c, \frac{\left[\left(1 - \frac{KL\_R^2}{2 \cdot C_c^2}\right) \cdot F_y\right]}{\frac{5}{3} + \frac{3 \cdot KL\_R}{8 \cdot C_c} - \frac{KL\_R^3}{8 \cdot C_c^3}}, \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot KL\_R^2}\right] \qquad F_a = 25.1\,ksi$$

$L_{all_5} := K_o \cdot F_a \cdot A_x \qquad L_{all_5} = 123\,kips$

$if\left(P_{L_5} \le L_{all_5}, OK, NG\right) = "O.K."$

Check the tower leg at the base of section 6:

		Global	Local
$P_{L_6} := 29.3kips$	Effective Length Factor	$K_x := 1$	$K_y := 1$
	Unsupported Length	$L_x := 2.5 \cdot ft$	$L_y := 1ft$

$A_x := A_{Lx_6}$ $\quad A_x = 2.41\,in^2$ $\quad r_x := r_{L_6}$ $\quad r_y := r_{e_6}$

$$KL\_R := max\left(\left(\frac{K_x \cdot L_x}{r_x} \quad \frac{K_y \cdot L_y}{r_y}\right)\right) \qquad KL\_R = 68.6 \qquad C_c = 107.00$$

$$F'_{ex} := \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot \left(\frac{K_x \cdot L_x}{r_x}\right)^2} \qquad F'_{ex} = 31.76\,ksi \qquad F'_{ey} := \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot \left(\frac{K_y \cdot L_y}{r_y}\right)^2} \qquad F'_{ey} = 198.49\,ksi$$

$$F_a := if\left[KL\_R < C_c, \frac{\left[\left(1 - \frac{KL\_R^2}{2 \cdot C_c^2}\right) \cdot F_y\right]}{\frac{5}{3} + \frac{3 \cdot KL\_R}{8 \cdot C_c} - \frac{KL\_R^3}{8 \cdot C_c^3}}, \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot KL\_R^2}\right] \qquad F_a = 21.2\,ksi$$

$L_{all_6} := K_o \cdot F_a \cdot A_x \qquad L_{all_6} = 68\,kip$

$if\left(P_{L_6} \le L_{all_6}, OK, NG\right) = "O.K."$

Maximum uplift force due to Moment minus 1/3 Dead and Ice Loads will occur with the wind at 60° to a face.

$T := 329\text{kips}$ As this is less than the maximum compressive force, the leg will not fail in tension.

Diagonals $F_y := 36\text{ksi}$

Section 1: maximum compressive force for member 19, load case 20 (90 deg wind) is $P_{D_1} := 15.32\text{kips}$ $A_x := A_{Dx_1}$

$KL\_R := \max\left(\left(KL\_r_{x_1} \quad KL\_r_{z_1}\right)\right)$ $KL\_R = 161.4$ $C_c := \sqrt{\dfrac{2\cdot\pi^2\cdot E_s}{F_y}}$ $C_c = 126.099$

$$F_a := \text{if}\left[KL\_R < C_c, \frac{\left[\left(1 - \dfrac{KL\_R^2}{2\cdot C_c^{\,2}}\right)\cdot F_y\right]}{\dfrac{5}{3} + \dfrac{3\cdot KL\_R}{8\cdot C_c} - \dfrac{KL\_R^3}{8\cdot C_c^{\,3}}}, \frac{12\cdot\pi^2\cdot E_s}{23\cdot KL\_R^2}\right]$$

$F_a = 5.7\,\text{ksi}$ $D_{all_1} := K_o\cdot F_a\cdot A_x$ $D_{all_1} = 14.8\,\text{kips}$

$\text{if}\left(P_{D_1} \le D_{all_1}, OK, NG\right) = \text{"N.G."}$

Section 2: maximum compressive force for member 31, load case 20 (90 deg wind) is $P_{D_2} := 13.47\text{kips}$ $A_x := A_{Dx_2}$

$KL\_R := \max\left(\left(KL\_r_{x_2} \quad KL\_r_{z_2}\right)\right)$ $KL\_R = 171.1$ $C_c = 126.099$

$$F_a := \text{if}\left[KL\_R < C_c, \frac{\left[\left(1 - \dfrac{KL\_R^2}{2\cdot C_c^{\,2}}\right)\cdot F_y\right]}{\dfrac{5}{3} + \dfrac{3\cdot KL\_R}{8\cdot C_c} - \dfrac{KL\_R^3}{8\cdot C_c^{\,3}}}, \frac{12\cdot\pi^2\cdot E_s}{23\cdot KL\_R^2}\right]$$

$F_a = 5.1\,\text{ksi}$ $D_{all_2} := K_o\cdot F_a\cdot A_x$ $D_{all_2} = 14.2\,\text{kips}$

$\text{if}\left(P_{D_2} \le D_{all_2}, OK, NG\right) = \text{"O.K."}$

Section 3: maximum compressive force for member 55, load case 20 (90 deg wind) is $P_{D_3} := 11.53\text{kips}$ $A_x := A_{Dx_3}$

$KL\_R := \max\left(\left(KL\_r_{x_3} \quad KL\_r_{z_3}\right)\right)$ $KL\_R = 167.6$ $C_c = 126.099$

$$F_a := \text{if}\left[KL\_R < C_c, \frac{\left[\left(1 - \dfrac{KL\_R^2}{2\cdot C_c^{\,2}}\right)\cdot F_y\right]}{\dfrac{5}{3} + \dfrac{3\cdot KL\_R}{8\cdot C_c} - \dfrac{KL\_R^3}{8\cdot C_c^{\,3}}}, \frac{12\cdot\pi^2\cdot E_s}{23\cdot KL\_R^2}\right]$$

$F_a = 5.3\,\text{ksi}$ $D_{all_3} := K_o\cdot F_a\cdot A_x$ $D_{all_3} = 12.6\,\text{kips}$

$\text{if}\left(P_{D_3} \le D_{all_3}, OK, NG\right) = \text{"O.K."}$

Section 4: maximum compressive force for member 67, load case 20 (90 deg wind) is $P_{D_4} := 10.56\text{kips}$ $A_x := A_{Dx_4}$

$KL\_R := \max\left(\left(KL\_r_{x_4} \;\; KL\_r_{z_4}\right)\right)$ $KL\_R = 151.1$ $C_c = 126.099$

$$F_a := \text{if}\left[KL\_R < C_c, \frac{\left[\left(1 - \frac{KL\_R^2}{2 \cdot C_c^2}\right) \cdot F_y\right]}{\frac{5}{3} + \frac{3 \cdot KL\_R}{8 \cdot C_c} - \frac{KL\_R^3}{8 \cdot C_c^3}}, \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot KL\_R^2}\right]$$

$F_a = 6.5\,\text{ksi}$ $D_{all_4} := K_o \cdot F_a \cdot A_x$ $D_{all_4} = 9.5\,\text{kips}$

$\text{if}\left(P_{D_4} \le D_{all_4}, OK, NG\right) = \text{"N.G."}$

Section 5: maximum compressive force for member 93, load case 20 (90 deg wind) is $P_{D_5} := 8.71\text{kips}$ $A_x := A_{Dx_5}$

$KL\_R := \max\left(\left(KL\_r_{x_5} \;\; KL\_r_{z_5}\right)\right)$ $KL\_R = 127.0$ $C_c = 126.099$

$$F_a := \text{if}\left[KL\_R < C_c, \frac{\left[\left(1 - \frac{KL\_R^2}{2 \cdot C_c^2}\right) \cdot F_y\right]}{\frac{5}{3} + \frac{3 \cdot KL\_R}{8 \cdot C_c} - \frac{KL\_R^3}{8 \cdot C_c^3}}, \frac{12 \cdot \pi^2 \cdot E_s}{23 \cdot KL\_R^2}\right]$$

$F_a = 9.3\,\text{ksi}$ $D_{all_5} := K_o \cdot F_a \cdot A_x$ $D_{all_5} = 13.4\,\text{kips}$

$\text{if}\left(P_{D_5} \le D_{all_5}, OK, NG\right) = \text{"O.K."}$

Capacity/Demand Ratios for the Tower Legs: $\left(\overrightarrow{\frac{L_{all}}{P_L}}\right)^T = (119 \;\; 107 \;\; 116 \;\; 108 \;\; 175 \;\; 232)\,\%$

Capacity/Demand Ratios for the Tower Diagonals $\left(\overrightarrow{\frac{D_{all}}{P_D}}\right)^T = (97 \;\; 105 \;\; 109 \;\; 90 \;\; 154)\,\%$

The Diagonal at the base of the 4th level has 90% of the required strength. It is only the bottom panel of the 4th level that is overstressed. These could be reinforced by running a 3/8" bead along the inside of these six angles.

APPENDIX "D"

Selected Stiffness Analysis Results

Envelope Member Section Forces

Member Label	Section		Axial (k)	Lc	Shear y-y (k)	Lc	Shear z-z (k)	Lc	Torque (k-ft)	Lc	Moment y-y (k-ft)	Lc	Moment z-z (k-ft)	Lc
M19	1	max	15.327	20	.134	11	.041	11	.044	11	0	11	0	4
		min	-2.411	17	-.177	4	-.09	17	-.056	4	0	4	0	11
	2	max	14.739	20	.175	4	.094	17	.038	11	0	4	0	4
		min	-2.53	17	-.133	11	-.048	11	-.048	4	0	4	0	4
M20	1	max	14.6	17	.087	7	.036	17	.039	11	0	11	0	11
		min	-13.858	24	-.04	4	-.024	7	-.049	4	0	4	0	4
	2	max	15.215	17	.043	4	.03	7	.054	7	0	4	0	4
		min	-13.874	24	-.085	7	-.041	17	-.001	11	0	4	0	4
M21	1	max	15.215	17	.049	11	.066	20	.054	7	0	4	0	4
		min	-13.874	24	-.055	7	-.005	11	-.001	4	0	7	0	7
	2	max	14.6	17	.058	7	.003	11	.049	4	0	4	0	4
		min	-13.858	24	-.045	11	-.058	7	-.039	11	0	4	0	4
M22	1	max	2.439	24	.133	11	.048	11	.048	4	0	11	0	11
		min	-14.737	20	-.175	4	-.094	17	-.038	11	0	4	0	4
	2	max	2.805	24	.177	4	.09	17	.056	4	0	4	0	4
		min	-14.653	20	-.134	11	-.041	11	-.044	11	0	4	0	4
M23	1	max	11.723	24	.106	7	.141	7	.057	4	0	4	0	4
		min	-11.877	17	-.12	4	-.042	4	-.045	11	0	11	0	11
	2	max	11.336	24	.119	4	.05	4	0	11	0	4	0	4
		min	-11.977	17	-.105	7	-.142	7	-.047	7	0	4	0	4
M24	1	max	11.336	24	.078	11	.062	24	.001	4	0	17	0	7
		min	-11.977	17	-.129	7	-.104	7	-.047	7	0	7	0	4
	2	max	11.723	24	.132	7	.1	7	.045	11	0	4	0	4
		min	-11.877	17	-.078	11	-.058	24	-.057	4	0	4	0	4
M25	1	max	13.42	20	.128	11	.038	11	.046	11	0	11	0	11
		min	-.499	24	-.17	4	-.084	17	-.059	4	0	4	0	4
	2	max	12.866	20	.168	4	.089	17	.04	11	0	4	0	4
		min	-.829	24	-.127	11	-.045	11	-.05	4	0	4	0	4
M26	1	max	11.235	17	.079	7	.037	17	.041	11	0	4	0	11
		min	-11	24	-.035	4	-.028	7	-.052	4	0	7	0	4
	2	max	11.805	17	.039	4	.034	7	.058	7	0	4	0	4
		min	-11.016	24	-.077	7	-.043	17	-.001	11	0	4	0	4
M27	1	max	11.805	17	.045	11	.068	7	.058	7	0	17	0	7
		min	-11.016	24	-.047	7	-.008	11	-.002	4	0	24	0	4
	2	max	11.235	17	.051	7	.006	11	.052	4	0	4	0	4
		min	-11	24	-.041	11	-.06	7	-.041	11	0	4	0	4
M28	1	max	.5	17	.127	11	.045	11	.05	4	0	11	0	4
		min	-13.305	20	-.168	4	-.089	17	-.04	11	0	4	0	11
	2	max	.619	17	.17	4	.084	17	.059	4	0	4	0	4
		min	-13.239	20	-.128	11	-.038	11	-.046	11	0	4	0	4
M29	1	max	11.756	24	.101	7	.135	7	.061	4	0	11	0	4
		min	-12.245	17	-.116	4	-.041	4	-.048	11	0	4	0	11
	2	max	11.381	24	.115	4	.049	4	.001	11	0	4	0	4
		min	-12.316	17	-.099	7	-.137	7	-.05	7	0	4	0	4
M30	1	max	11.381	24	.075	11	.059	24	.001	4	0	24	0	7
		min	-12.316	17	-.122	7	-.102	7	-.05	7	0	7	0	17
	2	max	11.756	24	.126	7	.097	7	.048	11	0	4	0	4
		min	-12.245	17	-.075	11	-.055	24	-.061	4	0	4	0	4

Envelope Member Section Forces

Member Label	Section		Axial (k)	Lc	Shear y-y (k)	Lc	Shear z-z (k)	Lc	Torque (k-ft)	Lc	Moment y-y (k-ft)	Lc	Moment z-z (k-ft)	Lc
M31	1	max	13.471	20	.114	11	.032	11	.08	11	0	11	0	11
		min	-.763	4	-.144	4	-.074	4	-.102	4	0	4	0	4
	2	max	12.986	20	.141	4	.079	4	.068	11	0	4	0	4
		min	-.806	17	-.111	11	-.039	11	-.086	4	0	4	0	4
M37	1	max	12.745	20	.108	11	.03	11	.082	11	0	11	0	11
		min	-.294	4	-.137	4	-.07	4	-.104	4	0	4	0	4
	2	max	12.278	20	.135	4	.075	4	.07	11	0	4	0	4
		min	-.342	17	-.106	11	-.038	11	-.089	4	0	4	0	4
M33	1	max	12.55	17	.04	11	.063	7	.101	7	0	24	0	7
		min	-11.588	24	-.037	7	-.01	11	-.003	4	0	17	0	17
	2	max	12.058	17	.042	7	.006	11	.089	4	0	4	0	4
		min	-11.56	24	-.035	11	-.055	7	-.07	11	0	4	0	4
M32	1	max	12.058	17	.071	7	.034	17	.07	11	0	24	0	4
		min	-11.56	24	-.024	4	-.024	7	-.089	4	0	7	0	11
	2	max	12.55	17	.03	4	.03	7	.101	7	0	4	0	4
		min	-11.588	24	-.069	7	-.041	17	-.002	11	0	4	0	4
M43	1	max	12.349	20	.103	11	.028	11	.083	11	0	11	0	11
		min	-.555	4	-.131	4	-.066	4	-.105	4	0	4	0	4
	2	max	11.907	20	.128	4	.072	4	.072	11	0	4	0	4
		min	-.617	17	-.101	11	-.036	11	-.091	4	0	4	0	4
M49	1	max	12.056	20	.098	11	.027	11	.085	11	0	11	0	24
		min	-.12	4	-.125	4	-.062	4	-.107	4	0	4	0	17
	2	max	11.637	20	.122	4	.069	4	.075	11	0	4	0	4
		min	-.132	4	-.096	11	-.036	11	-.095	4	0	4	0	4
M39	1	max	11.585	17	.037	11	.063	7	.105	7	0	24	0	17
		min	-10.861	24	-.033	7	-.012	11	-.003	4	0	7	0	7
	2	max	11.125	17	.039	7	.007	11	.091	4	0	4	0	4
		min	-10.832	24	-.031	11	-.055	7	-.072	11	0	4	0	4
M38	1	max	11.125	17	.067	7	.033	17	.072	11	0	11	0	11
		min	-10.832	24	-.021	4	-.026	7	-.091	4	0	17	0	4
	2	max	11.585	17	.027	4	.032	7	.105	7	0	4	0	4
		min	-10.861	24	-.063	7	-.04	17	-.002	11	0	4	0	4
M44	1	max	10.942	17	.062	7	.031	17	.074	11	0	11	0	4
		min	-10.607	24	-.017	4	-.028	7	-.094	4	0	4	0	7
	2	max	11.371	17	.024	4	.033	7	.107	7	0	4	0	4
		min	-10.638	24	-.058	7	-.039	17	-.003	11	0	4	0	4
M45	1	max	11.371	17	.034	11	.062	7	.107	7	0	24	0	7
		min	-10.638	24	-.029	7	-.013	11	-.003	4	0	17	0	24
	2	max	10.942	17	.036	7	.008	11	.094	4	0	4	0	4
		min	-10.607	24	-.027	11	-.054	7	-.074	11	0	4	0	4
M36	1	max	10.733	24	.066	11	.053	11	.002	4	0	17	0	7
		min	-11.324	17	-.108	7	-.089	7	-.087	7	0	7	0	24
	2	max	11.058	24	.114	7	.086	7	.082	11	0	4	0	4
		min	-11.26	17	-.064	11	-.047	24	-.104	4	0	4	0	4
M35	1	max	11.058	24	.088	7	.124	7	.104	4	0	11	0	4
		min	-11.26	17	-.099	4	-.031	4	-.082	11	0	4	0	11
	2	max	10.733	24	.099	4	.04	4	.002	11	0	4	0	4
		min	-11.324	17	-.084	7	-.124	7	-.087	7	0	4	0	4
M51	1	max	10.846	17	.032	11	.06	7	.11	7	0	17	0	7
		min	-10.17	24	-.025	7	-.014	11	-.003	4	0	24	0	17
	2	max	10.443	17	.034	7	.008	11	.098	4	0	4	0	4
		min	-10.136	24	-.024	11	-.052	7	-.078	11	0	4	0	4

Envelope Member Section Forces, (continued)

Member Label	Section		Axial (k)	Lc	Shear y-y (k)	Lc	Shear z-z (k)	Lc	Torque (k-ft)	Lc	Moment y-y (k-ft)	Lc	Moment z-z (k-ft)	Lc
M50	1	max	10.443	17	.059	7	.029	17	.078	11	0	17	0	4
		min	-10.136	24	-.014	4	-.029	7	-.098	4	0	24	0	11
	2	max	10.846	17	.022	4	.034	7	.11	7	0	4	0	4
		min	-10.17	24	-.053	7	-.038	17	-.003	11	0	4	0	4
M41	1	max	10.732	24	.083	7	.119	7	.106	4	0	11	0	4
		min	-11.071	17	-.095	4	-.03	4	-.084	11	0	4	0	11
	2	max	10.42	24	.096	4	.04	4	.002	11	0	4	0	4
		min	-11.114	17	-.078	7	-.119	7	-.09	7	0	4	0	4
M42	1	max	10.42	24	.063	11	.051	11	.002	4	0	24	0	7
		min	-11.114	17	-.101	7	-.086	7	-.09	7	0	7	0	17
	2	max	10.732	24	.108	7	.084	7	.084	11	0	4	0	4
		min	-11.071	17	-.062	11	-.045	24	-.106	4	0	4	0	4
M54	1	max	9.96	24	.058	11	.049	11	.003	4	0	24	0	24
		min	-10.487	17	-.088	4	-.081	7	-.098	7	0	7	0	17
	2	max	10.247	24	.096	7	.079	7	.087	11	0	4	0	4
		min	-10.474	17	-.056	11	-.04	24	-.11	4	0	4	0	4
M53	1	max	10.247	24	.073	7	.109	7	.11	4	0	11	0	4
		min	-10.474	17	-.087	4	-.029	4	-.087	11	0	4	0	11
	2	max	9.96	24	.088	4	.042	4	.002	11	0	4	0	4
		min	-10.487	17	-.067	7	-.108	7	-.098	7	0	4	0	4
M48	1	max	9.943	24	.061	11	.05	11	.003	4	0	24	0	20
		min	-10.515	17	-.095	7	-.084	7	-.093	7	0	7	0	17
	2	max	10.244	24	.103	7	.081	7	.086	11	0	4	0	4
		min	-10.488	17	-.059	11	-.043	24	-.108	4	0	4	0	4
M47	1	max	10.244	24	.078	7	.114	7	.108	4	0	11	0	11
		min	-10.488	17	-.091	4	-.029	4	-.086	11	0	4	0	4
	2	max	9.943	24	.092	4	.041	4	.002	11	0	4	0	4
		min	-10.515	17	-.073	7	-.114	7	-.093	7	0	4	0	4
M34	1	max	.71	24	.111	11	.039	11	.086	4	0	11	0	4
		min	-13.078	20	-.141	4	-.079	4	-.068	11	0	4	0	11
	2	max	.981	24	.144	4	.074	4	.102	4	0	4	0	4
		min	-13.018	20	-.114	11	-.032	11	-.08	11	0	4	0	4
M46	1	max	.465	24	.101	11	.036	11	.091	4	0	11	0	24
		min	-12.077	20	-.128	4	-.072	4	-.072	11	0	4	0	17
	2	max	.69	24	.131	4	.066	4	.105	4	0	4	0	4
		min	-12.051	20	-.103	11	-.028	11	-.083	11	0	4	0	4
M40	1	max	.168	11	.106	11	.038	11	.089	4	0	11	0	7
		min	-12.548	20	-.135	4	-.075	4	-.07	11	0	4	0	17
	2	max	.372	24	.137	4	.07	4	.104	4	0	4	0	4
		min	-12.508	20	-.108	11	-.03	11	-.082	11	0	4	0	4
M52	1	max	.042	11	.096	11	.036	11	.095	4	0	11	0	4
		min	-11.793	20	-.122	4	-.069	4	-.075	11	0	4	0	11
	2	max	.214	24	.125	4	.062	4	.107	4	0	4	0	4
		min	-11.78	20	-.098	11	-.027	11	-.085	11	0	4	0	4

Envelope Member Section Forces

Member Label	Section		Axial (k)	Lc	Shear y-y (k)	Lc	Shear z-z (k)	Lc	Torque (k-ft)	Lc	Moment y-y (k-ft)	Lc	Moment z-z (k-ft)	Lc
M55	1	max	11.534	20	.093	11	.026	11	.073	11	0	11	0	20
		min	-.821	4	-.117	4	-.055	4	-.093	4	0	4	0	17
	2	max	11.163	20	.116	4	.062	4	.067	11	0	4	0	4
		min	-.885	17	-.091	11	-.035	11	-.084	4	0	4	0	4
M61	1	max	11.188	20	.088	11	.024	11	.077	11	0	20	0	20
		min	-.075	4	-.111	4	-.051	4	-.096	4	0	24	0	24
	2	max	10.834	20	.11	4	.059	4	.071	11	0	4	0	4
		min	-.091	17	-.087	11	-.033	11	-.09	4	0	4	0	4
M57	1	max	10.764	17	.03	11	.057	7	.096	7	0	20	0	20
		min	-10.101	24	-.024	4	-.014	11	-.003	4	0	24	0	24
	2	max	10.409	17	.031	7	.008	11	.087	4	0	4	0	4
		min	-10.057	24	-.023	11	-.05	7	-.069	11	0	4	0	4
M56	1	max	10.409	17	.051	7	.025	17	.069	11	0	24	0	17
		min	-10.057	24	-.016	4	-.033	7	-.087	4	0	17	0	24
	2	max	10.764	17	.024	4	.037	7	.096	7	0	4	0	4
		min	-10.101	24	-.045	20	-.033	17	-.003	11	0	4	0	4
M62	1	max	9.668	17	.047	7	.022	17	.074	11	0	24	0	17
		min	-9.467	24	-.012	4	-.035	7	-.093	4	0	17	0	24
	2	max	10.001	17	.021	4	.038	7	.101	7	0	4	0	4
		min	-9.513	24	-.041	20	-.032	17	-.003	11	0	4	0	4
M63	1	max	10.001	17	.027	11	.056	7	.101	7	0	7	0	17
		min	-9.513	24	-.021	4	-.014	11	-.004	4	0	24	0	7
	2	max	9.668	17	.029	7	.007	11	.093	4	0	4	0	4
		min	-9.467	24	-.019	11	-.051	7	-.074	11	0	4	0	4
M66	1	max	9.318	24	.055	11	.046	11	.003	4	0	17	0	17
		min	-9.812	17	-.08	4	-.076	7	-.095	7	0	7	0	7
	2	max	9.57	24	.082	7	.075	7	.079	11	0	4	0	4
		min	-9.84	17	-.052	11	-.035	11	-.1	4	0	4	0	4
M65	1	max	9.57	24	.064	7	.096	7	.1	4	0	20	0	20
		min	-9.84	17	-.078	4	-.028	4	-.079	11	0	24	0	24
	2	max	9.318	24	.08	4	.043	4	.003	11	0	4	0	4
		min	-9.812	17	-.058	7	-.095	7	-.095	7	0	4	0	4
M59	1	max	9.415	24	.069	7	.101	7	.096	4	0	4	0	4
		min	-9.57	17	-.081	4	-.029	4	-.076	11	0	24	0	11
	2	max	9.154	24	.083	4	.042	4	.002	11	0	4	0	4
		min	-9.554	17	-.064	7	-.101	7	-.088	7	0	4	0	4
M60	1	max	9.154	24	.056	11	.046	11	.003	4	0	17	0	24
		min	-9.554	17	-.083	4	-.08	7	-.088	7	0	20	0	17
	2	max	9.415	24	.088	7	.078	7	.076	11	0	4	0	4
		min	-9.57	17	-.054	11	-.037	11	-.096	4	0	4	0	4
M58	1	max	.817	24	.091	11	.035	11	.084	4	0	17	0	24
		min	-11.218	20	-.116	4	-.062	4	-.067	11	0	7	0	17
	2	max	.995	24	.117	4	.055	4	.093	4	0	4	0	4
		min	-11.234	20	-.093	11	-.026	11	-.073	11	0	4	0	4
M64	1	max	-.014	11	.087	11	.033	11	.09	4	0	24	0	11
		min	-11.026	20	-.11	4	-.059	4	-.071	11	0	17	0	7
	2	max	.108	11	.111	4	.051	4	.096	4	0	4	0	4
		min	-11.054	20	-.088	11	-.024	11	-.077	11	0	4	0	4

Envelope Member Section Forces

Member Label	Section		Axial (k)	Lc	Shear y-y (k)	Lc	Shear z-z (k)	Lc	Torque (k-ft)	Lc	Moment y-y (k-ft)	Lc	Moment z-z (k-ft)	Lc
M67	1	max	10.564	20	.083	11	.025	11	.019	11	0	4	0	11
		min	-.958	17	-.104	4	-.044	17	-.023	4	0	11	0	4
	2	max	10.259	20	.104	4	.051	17	.018	11	0	4	0	4
		min	-.987	17	-.082	11	-.034	11	-.022	4	0	4	0	4
M73	1	max	10.128	20	.078	11	.023	11	.02	11	0	7	0	24
		min	-.378	24	-.099	4	-.041	17	-.025	4	0	17	0	4
	2	max	9.834	20	.098	4	.049	4	.018	11	0	4	0	4
		min	-.501	24	-.078	11	-.033	11	-.023	4	0	4	0	4
M68	1	max	9.678	17	.039	20	.021	17	.018	11	0	4	0	4
		min	-9.281	24	-.019	4	-.036	7	-.023	4	0	20	0	20
	2	max	9.962	17	.023	4	.042	7	.025	7	0	4	0	4
		min	-9.353	24	-.034	20	-.025	17	0	11	0	4	0	4
M69	1	max	9.962	17	.024	24	.051	7	.025	7	0	24	0	17
		min	-9.353	24	-.023	4	-.013	11	0	4	0	17	0	24
	2	max	9.678	17	.026	7	.011	11	.023	4	0	4	0	4
		min	-9.281	24	-.02	24	-.044	7	-.018	11	0	4	0	4
M80	1	max	9.663	17	.029	20	.02	17	.02	11	0	24	0	4
		min	-9.094	24	-.012	4	-.04	7	-.025	4	0	17	0	24
	2	max	9.921	17	.019	4	.045	7	.027	7	0	4	0	4
		min	-9.17	24	-.024	20	-.024	17	0	11	0	4	0	4
M81	1	max	9.921	17	.019	11	.053	7	.027	7	0	17	0	20
		min	-9.17	24	-.019	4	-.014	11	-.001	4	0	24	0	17
	2	max	9.663	17	.017	7	.012	11	.025	4	0	4	0	4
		min	-9.094	24	-.013	11	-.047	7	-.02	11	0	4	0	4
M79	1	max	9.838	20	.074	11	.021	11	.02	11	0	20	0	20
		min	-2.06	17	-.093	4	-.037	4	-.025	4	0	11	0	11
	2	max	9.553	20	.093	4	.044	4	.019	11	0	4	0	4
		min	-2.096	17	-.074	11	-.029	11	-.023	4	0	4	0	4
M86	1	max	9.558	17	.028	20	.018	17	.02	11	0	17	0	24
		min	-8.841	24	-.014	4	-.037	7	-.024	4	0	24	0	17
	2	max	9.81	17	.022	4	.041	7	.027	7	0	4	0	4
		min	-8.922	24	-.023	20	-.022	17	0	11	0	4	0	4
M87	1	max	9.81	17	.021	11	.047	7	.027	7	0	17	0	24
		min	-8.922	24	-.022	4	-.014	11	-.001	4	0	24	0	17
	2	max	9.558	17	.019	7	.011	11	.024	4	0	4	0	4
		min	-8.841	24	-.014	11	-.041	7	-.02	11	0	4	0	4
M85	1	max	9.12	20	.07	11	.022	11	.02	11	0	17	0	24
		min	-2.986	17	-.088	4	-.037	4	-.025	4	0	24	0	4
	2	max	8.846	20	.088	4	.043	4	.018	11	0	4	0	4
		min	-3.019	17	-.07	11	-.029	11	-.023	4	0	4	0	4
M77	1	max	8.912	24	.056	7	.083	7	.026	4	0	20	0	20
		min	-9.328	17	-.069	4	-.031	4	-.02	11	0	24	0	24
	2	max	8.686	24	.066	4	.04	4	0	11	0	4	0	4
		min	-9.241	17	-.054	7	-.085	7	-.025	7	0	4	0	4
M78	1	max	8.686	24	.048	11	.038	11	.001	4	0	17	0	20
		min	-9.241	17	-.066	4	-.076	7	-.025	7	0	24	0	17
	2	max	8.912	24	.069	4	.072	7	.02	11	0	4	0	4
		min	-9.328	17	-.049	11	-.031	24	-.026	4	0	4	0	4
M74	1	max	8.549	17	.035	20	.02	17	.019	11	0	4	0	4
		min	-8.534	24	-.017	4	-.036	7	-.024	4	0	11	0	11
	2	max	8.82	17	.021	4	.042	7	.026	7	0	4	0	4
		min	-8.607	24	-.03	20	-.025	17	0	11	0	4	0	4

Envelope Member Section Forces, (continued)

Member Label	Section		Axial (k)	Lc	Shear y-y (k)	Lc	Shear z-z (k)	Lc	Torque (k-ft)	Lc	Moment y-y (k-ft)	Lc	Moment z-z (k-ft)	Lc
M75	1	max	8.82	17	.022	11	.051	7	.026	7	0	20	0	7
		min	-8.607	24	-.021	4	-.014	11	-.001	4	0	24	0	17
	2	max	8.549	17	.024	7	.011	11	.024	4	0	4	0	4
		min	-8.534	24	-.017	24	-.043	7	-.019	11	0	4	0	4
M71	1	max	8.522	24	.061	7	.087	7	.024	4	0	24	0	7
		min	-8.588	17	-.072	4	-.032	4	-.019	11	0	20	0	4
	2	max	8.288	24	.07	4	.041	4	0	11	0	4	0	4
		min	-8.506	17	-.059	7	-.089	7	-.024	7	0	4	0	4
M72	1	max	8.288	24	.05	11	.039	24	.001	4	0	17	0	17
		min	-8.506	17	-.07	4	-.079	7	-.024	7	0	7	0	24
	2	max	8.522	24	.072	4	.075	7	.019	11	0	4	0	4
		min	-8.588	17	-.051	11	-.034	24	-.024	4	0	4	0	4
M90	1	max	7.455	20	.043	11	.034	11	.001	4	0	24	0	24
		min	-5.639	17	-.06	4	-.069	7	-.025	7	0	17	0	20
	2	max	7.637	20	.061	4	.068	7	.021	11	0	4	0	4
		min	-5.733	17	-.044	11	-.027	24	-.026	4	0	4	0	4
M83	1	max	7.288	24	.052	7	.078	7	.026	4	0	4	0	17
		min	-7.093	17	-.066	4	-.029	4	-.021	11	0	20	0	24
	2	max	7.066	24	.064	4	.039	4	0	11	0	4	0	4
		min	-6.995	17	-.05	7	-.079	7	-.025	7	0	4	0	4
M84	1	max	7.066	24	.047	11	.037	11	.001	4	0	17	0	17
		min	-6.995	17	-.064	4	-.071	7	-.025	7	0	24	0	24
	2	max	7.288	24	.066	4	.068	7	.021	11	0	4	0	4
		min	-7.093	17	-.048	11	-.03	24	-.026	4	0	4	0	4
M89	1	max	6.159	24	.047	7	.076	7	.026	4	0	24	0	11
		min	-6.887	20	-.061	4	-.027	4	-.021	11	0	17	0	4
	2	max	5.948	24	.06	4	.038	4	.001	11	0	4	0	4
		min	-6.883	20	-.047	7	-.076	7	-.025	7	0	4	0	4
M88	1	max	3.415	24	.07	11	.029	11	.023	4	0	24	0	17
		min	-8.272	20	-.088	4	-.043	4	-.018	11	0	20	0	20
	2	max	3.515	24	.088	4	.037	4	.025	4	0	4	0	4
		min	-8.372	20	-.07	11	-.022	11	-.02	11	0	4	0	4
M82	1	max	2.323	24	.074	11	.029	11	.023	4	0	24	0	4
		min	-9.197	20	-.093	4	-.044	4	-.019	11	0	20	0	11
	2	max	2.429	24	.093	4	.037	4	.025	4	0	4	0	4
		min	-9.296	20	-.074	11	-.021	11	-.02	11	0	4	0	4
M70	1	max	1.029	24	.082	11	.034	11	.022	4	0	4	0	11
		min	-10.168	20	-.104	4	-.051	17	-.018	11	0	11	0	4
	2	max	1.166	24	.104	4	.044	17	.023	4	0	4	0	4
		min	-10.251	20	-.083	11	-.025	11	-.019	11	0	4	0	4
M76	1	max	.256	4	.078	11	.033	11	.023	4	0	4	0	24
		min	-10.166	20	-.098	4	-.049	4	-.018	11	0	11	0	17
	2	max	.266	17	.099	4	.041	17	.025	4	0	4	0	4
		min	-10.255	20	-.078	11	-.023	11	-.02	11	0	4	0	4

Envelope Member Section Forces

Member Label	Section		Axial (k)	Lc	Shear y-y (k)	Lc	Shear z-z (k)	Lc	Torque (k-ft)	Lc	Moment y-y (k-ft)	Lc	Moment z-z (k-ft)	Lc
M93	1	max	8.709	17	.017	11	.05	7	.028	7	0	24	0	17
		min	-7.846	24	-.017	4	-.016	11	-.002	4	0	17	0	20
	2	max	8.456	17	.019	7	.013	11	.025	4	0	4	0	4
		min	-7.747	24	-.008	11	-.044	7	-.02	11	0	4	0	4
M92	1	max	8.456	17	.028	20	.019	17	.02	11	0	20	0	24
		min	-7.747	24	-.007	4	-.04	7	-.025	4	0	24	0	17
	2	max	8.709	17	.017	4	.044	7	.028	7	0	4	0	4
		min	-7.846	24	-.021	20	-.024	17	-.001	11	0	4	0	4
M96	1	max	7.312	20	.043	11	.037	11	.002	4	0	20	0	20
		min	-3.672	17	-.058	4	-.067	7	-.026	7	0	17	0	17
	2	max	7.485	20	.06	4	.065	7	.021	11	0	4	0	4
		min	-3.795	17	-.044	11	-.027	11	-.026	4	0	4	0	4
M91	1	max	7.4	20	.07	11	.02	11	.02	11	0	24	0	4
		min	-3.802	17	-.086	4	-.033	4	-.025	4	0	17	0	11
	2	max	7.113	20	.086	4	.041	4	.018	11	0	4	0	4
		min	-3.835	17	-.069	11	-.03	11	-.023	4	0	4	0	4
M99	1	max	6.581	17	.018	11	.047	7	.026	7	0	20	0	17
		min	-6.12	24	-.02	4	-.016	11	-.002	4	0	17	0	24
	2	max	6.328	17	.02	7	.013	24	.023	4	0	4	0	4
		min	-6.011	24	-.008	11	-.04	7	-.018	11	0	4	0	4
M98	1	max	6.328	17	.026	20	.016	17	.018	11	0	20	0	20
		min	-6.011	24	-.009	4	-.038	7	-.023	4	0	4	0	4
	2	max	6.581	17	.02	4	.043	7	.026	7	0	4	0	4
		min	-6.12	24	-.018	11	-.022	17	-.001	11	0	4	0	4
M97	1	max	6.053	20	.066	11	.02	11	.018	11	0	17	0	17
		min	-2.178	17	-.082	4	-.032	4	-.023	4	0	24	0	24
	2	max	5.771	20	.081	4	.041	4	.017	11	0	4	0	4
		min	-2.211	17	-.066	11	-.031	11	-.021	4	0	4	0	4
M105	1	max	5.25	17	.016	11	.05	7	.023	7	0	24	0	17
		min	-4.652	24	-.017	4	-.016	11	-.001	4	0	17	0	20
	2	max	4.986	17	.012	7	.013	11	.019	4	0	4	0	4
		min	-4.527	24	-.004	17	-.046	7	-.016	11	0	4	0	4
M104	1	max	4.986	17	.02	20	.018	17	.016	11	0	17	0	24
		min	-4.527	24	-.003	4	-.043	7	-.019	4	0	20	0	17
	2	max	5.25	17	.017	4	.046	7	.023	7	0	4	0	4
		min	-4.652	24	-.016	11	-.023	17	-.001	11	0	4	0	4
M102	1	max	4.973	20	.04	11	.035	11	.002	4	0	24	0	20
		min	-3.81	17	-.054	4	-.065	7	-.024	7	0	17	0	11
	2	max	5.15	20	.056	4	.064	7	.02	11	0	4	0	4
		min	-3.935	17	-.042	11	-.024	11	-.024	4	0	4	0	4
M108	1	max	4.324	20	.04	11	.034	11	.002	4	0	17	0	17
		min	-2.168	17	-.052	4	-.059	7	-.021	7	0	24	0	20
	2	max	4.483	20	.055	4	.06	7	.017	11	0	4	0	4
		min	-2.317	17	-.041	11	-.022	11	-.021	4	0	4	0	4
M103	1	max	4.472	20	.063	11	.017	11	.016	11	0	17	0	24
		min	-2.148	17	-.078	4	-.027	4	-.02	4	0	24	0	20
	2	max	4.177	20	.077	4	.036	4	.014	11	0	4	0	4
		min	-2.186	17	-.062	11	-.026	11	-.018	4	0	4	0	4
M94	1	max	4.237	24	.069	11	.03	11	.023	4	0	17	0	4
		min	-6.502	20	-.086	4	-.041	4	-.018	11	0	24	0	20
	2	max	4.323	24	.086	4	.033	4	.025	4	0	4	0	4
		min	-6.634	20	-.07	11	-.02	11	-.02	11	0	4	0	4

Envelope Member Section Forces, (continued)

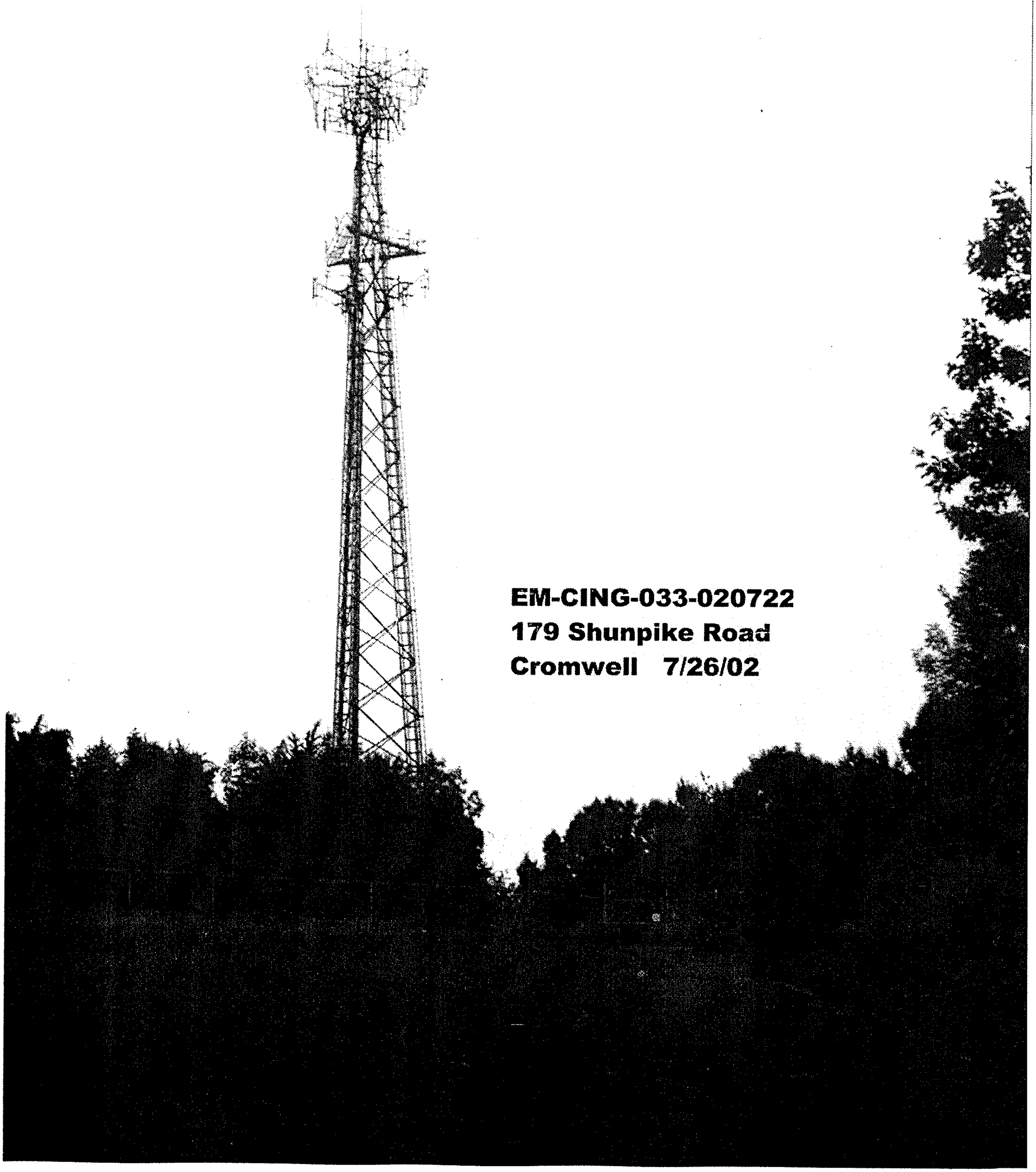
Member Label	Section		Axial (k)	Lc	Shear y-y (k)	Lc	Shear z-z (k)	Lc	Torque (k-ft)	Lc	Moment y-y (k-ft)	Lc	Moment z-z (k-ft)	Lc
M95	1	max	4.268	24	.046	7	.073	7	.026	4	0	24	0	17
		min	-6.719	20	-.06	4	-.028	4	-.021	11	0	7	0	20
	2	max	4.046	24	.058	4	.041	4	.001	11	0	4	0	4
		min	-6.701	20	-.044	7	-.072	7	-.026	7	0	4	0	4
M101	1	max	4.067	24	.042	7	.07	7	.024	4	0	17	0	17
		min	-4.812	20	-.056	4	-.025	4	-.02	11	0	24	0	24
	2	max	3.848	24	.054	4	.04	4	.001	11	0	4	0	4
		min	-4.784	20	-.04	11	-.069	7	-.024	7	0	4	0	4
M107	1	max	2.649	24	.041	11	.065	7	.021	4	0	20	0	17
		min	-3.94	20	-.055	4	-.023	4	-.017	11	0	17	0	24
	2	max	2.42	24	.052	4	.039	4	.001	11	0	4	0	4
		min	-3.912	20	-.04	11	-.063	7	-.021	7	0	4	0	4
M106	1	max	2.473	24	.062	11	.026	11	.018	4	0	24	0	17
		min	-3.767	20	-.077	4	-.036	4	-.014	11	0	17	0	24
	2	max	2.539	24	.078	4	.027	4	.02	4	0	4	0	4
		min	-3.928	20	-.063	11	-.017	11	-.016	11	0	4	0	4
M100	1	max	2.32	24	.066	11	.031	11	.021	4	0	17	0	24
		min	-5.581	20	-.081	4	-.041	4	-.017	11	0	24	0	17
	2	max	2.399	24	.082	4	.032	4	.023	4	0	4	0	4
		min	-5.718	20	-.066	11	-.02	11	-.018	11	0	4	0	4

Envelope Member Section Forces

Member Label	Section		Axial (k)	Lc	Shear y-y (k)	Lc	Shear z-z (k)	Lc	Torque (k-ft)	Lc	Moment y-y (k-ft)	Lc	Moment z-z (k-ft)	Lc
M115	1	max	2.989	20	.01	24	-.001	7	.037	11	0	4	0	4
		min	-.051	17	-.013	17	-.008	17	-.046	4	0	4	0	4
	2	max	2.963	20	.013	17	.008	17	.037	11	0	4	0	4
		min	-.059	17	-.01	24	.001	7	-.046	4	0	4	0	4
M109	1	max	2.978	20	.01	24	-.001	7	.047	11	0	4	0	4
		min	-.234	11	-.013	17	-.008	17	-.059	4	0	4	0	4
	2	max	2.952	20	.013	17	.008	17	.047	11	0	4	0	4
		min	-.235	11	-.01	24	.001	7	-.059	4	0	4	0	4
M121	1	max	2.835	20	.01	24	-.001	7	.033	11	0	4	0	4
		min	-.045	4	-.013	17	-.008	17	-.041	4	0	4	0	4
	2	max	2.809	20	.013	17	.008	17	.033	11	0	4	0	4
		min	-.05	4	-.01	24	.001	7	-.041	4	0	4	0	4
M127	1	max	2.677	20	.01	24	-.001	7	.028	11	0	4	0	4
		min	-.105	17	-.013	17	-.008	17	-.035	4	0	4	0	4
	2	max	2.651	20	.013	17	.008	17	.028	11	0	4	0	4
		min	-.113	17	-.01	24	.001	7	-.035	4	0	4	0	4
M117	1	max	2.67	17	.009	24	.013	20	.036	7	0	4	0	4
		min	-2.625	24	-.003	17	.001	11	-.017	11	0	4	0	4
	2	max	2.643	17	.003	17	-.001	11	.036	7	0	4	0	4
		min	-2.613	24	-.009	24	-.013	20	-.017	11	0	4	0	4
M116	1	max	2.643	17	.01	20	.006	17	.036	7	0	4	0	4
		min	-2.613	24	-.003	17	-.002	7	-.021	4	0	4	0	4
	2	max	2.67	17	.003	17	.002	7	.036	7	0	4	0	4
		min	-2.625	24	-.01	20	-.006	17	-.021	4	0	4	0	4
M113	1	max	2.662	24	.004	11	.013	20	.032	4	0	4	0	4
		min	-2.687	17	-.013	17	.001	11	-.044	7	0	4	0	4
	2	max	2.642	24	.013	17	-.001	11	.032	4	0	4	0	4
		min	-2.676	17	-.004	11	-.013	20	-.044	7	0	4	0	4
M114	1	max	2.642	24	.004	11	.006	17	.026	11	0	4	0	4
		min	-2.676	17	-.013	17	-.002	7	-.044	7	0	4	0	4
	2	max	2.662	24	.013	17	.002	7	.026	11	0	4	0	4
		min	-2.687	17	-.004	11	-.006	17	-.044	7	0	4	0	4
M120	1	max	2.54	24	.004	11	.006	17	.02	11	0	4	0	4
		min	-2.605	17	-.013	17	-.002	7	-.035	7	0	4	0	4
	2	max	2.561	24	.013	17	.002	7	.02	11	0	4	0	4
		min	-2.617	17	-.004	11	-.006	17	-.035	7	0	4	0	4
M119	1	max	2.561	24	.004	11	.013	20	.024	4	0	4	0	4
		min	-2.617	17	-.013	17	.001	11	-.035	7	0	4	0	4
	2	max	2.54	24	.013	17	-.001	11	.024	4	0	4	0	4
		min	-2.605	17	-.004	11	-.013	20	-.035	7	0	4	0	4
M122	1	max	2.485	17	.01	20	.006	17	.032	7	0	4	0	4
		min	-2.443	24	-.003	17	-.002	7	-.019	4	0	4	0	4
	2	max	2.513	17	.003	17	.002	7	.032	7	0	4	0	4
		min	-2.455	24	-.01	20	-.006	17	-.019	4	0	4	0	4
M123	1	max	2.513	17	.009	24	.013	20	.032	7	0	4	0	4
		min	-2.455	24	-.003	17	.001	11	-.015	11	0	4	0	4
	2	max	2.485	17	.003	17	-.001	11	.032	7	0	4	0	4
		min	-2.443	24	-.009	24	-.013	20	-.015	11	0	4	0	4
M111	1	max	2.478	17	.009	24	.013	20	.048	7	0	4	0	4
		min	-2.446	24	-.003	17	.001	11	-.021	11	0	4	0	4
	2	max	2.451	17	.003	17	-.001	11	.048	7	0	4	0	4
		min	-2.434	24	-.009	24	-.013	20	-.021	11	0	4	0	4

Envelope Member Section Forces, (continued)

Member Label	Section		Axial (k)	Lc	Shear y-y (k)	Lc	Shear z-z (k)	Lc	Torque (k-ft)	Lc	Moment y-y (k-ft)	Lc	Moment z-z (k-ft)	Lc
M110	1	max	2.451	17	.01	20	.006	17	.047	7	0	4	0	4
		min	-2.434	24	-.003	17	-.002	7	-.026	4	0	4	0	4
	2	max	2.478	17	.003	17	.002	7	.047	7	0	4	0	4
		min	-2.446	24	-.01	20	-.006	17	-.026	4	0	4	0	4
M126	1	max	2.424	24	.004	11	.006	17	.017	11	0	4	0	4
		min	-2.454	17	-.013	17	-.002	7	-.031	7	0	4	0	4
	2	max	2.444	24	.013	17	.002	7	.017	11	0	4	0	4
		min	-2.466	17	-.004	11	-.006	17	-.031	7	0	4	0	4
M125	1	max	2.444	24	.004	11	.013	20	.022	4	0	4	0	4
		min	-2.466	17	-.013	17	.001	11	-.031	7	0	4	0	4
	2	max	2.424	24	.013	17	-.001	11	.022	4	0	4	0	4
		min	-2.454	17	-.004	11	-.013	20	-.031	7	0	4	0	4
M129	1	max	2.408	17	.009	24	.013	20	.028	7	0	4	0	4
		min	-2.375	24	-.003	17	.001	11	-.013	11	0	4	0	4
	2	max	2.381	17	.003	17	-.001	11	.028	7	0	4	0	4
		min	-2.363	24	-.009	24	-.013	20	-.013	11	0	4	0	4
M128	1	max	2.381	17	.01	20	.006	17	.028	7	0	4	0	4
		min	-2.363	24	-.003	17	-.002	7	-.017	4	0	4	0	4
	2	max	2.408	17	.003	17	.002	7	.028	7	0	4	0	4
		min	-2.375	24	-.01	20	-.006	17	-.017	4	0	4	0	4
M131	1	max	2.255	24	.004	11	.013	20	.019	4	0	4	0	4
		min	-2.287	17	-.013	17	.001	11	-.027	7	0	4	0	4
	2	max	2.235	24	.013	17	-.001	11	.019	4	0	4	0	4
		min	-2.275	17	-.004	11	-.013	20	-.027	7	0	4	0	4
M132	1	max	2.235	24	.004	11	.006	17	.015	11	0	4	0	4
		min	-2.275	17	-.013	17	-.002	7	-.027	7	0	4	0	4
	2	max	2.255	24	.013	17	.002	7	.015	11	0	4	0	4
		min	-2.287	17	-.004	11	-.006	17	-.027	7	0	4	0	4
M133	1	max	2.025	20	.01	24	-.001	7	.025	11	0	4	0	4
		min	-.226	4	-.013	17	-.008	17	-.031	4	0	4	0	4
	2	max	1.998	20	.013	17	.008	17	.025	11	0	4	0	4
		min	-.232	4	-.01	24	.001	7	-.031	4	0	4	0	4
M134	1	max	1.856	17	.01	20	.006	17	.025	7	0	4	0	4
		min	-1.836	24	-.003	17	-.002	7	-.015	4	0	4	0	4
	2	max	1.883	17	.003	17	.002	7	.025	7	0	4	0	4
		min	-1.848	24	-.01	20	-.006	17	-.015	4	0	4	0	4
M135	1	max	1.883	17	.009	24	.013	20	.025	7	0	4	0	4
		min	-1.848	24	-.003	17	.001	11	-.012	11	0	4	0	4
	2	max	1.856	17	.003	17	-.001	11	.025	7	0	4	0	4
		min	-1.836	24	-.009	24	-.013	20	-.012	11	0	4	0	4
M139	1	max	1.865	20	.01	24	-.001	7	.023	11	0	4	0	4
		min	-.068	11	-.013	17	-.008	17	-.029	4	0	4	0	4
	2	max	1.839	20	.013	17	.008	17	.023	11	0	4	0	4
		min	-.07	11	-.01	24	.001	7	-.029	4	0	4	0	4
M145	1	max	1.741	20	.01	24	-.001	7	.022	11	0	4	0	4
		min	-.088	4	-.013	17	-.008	17	-.027	4	0	4	0	4
	2	max	1.715	20	.013	17	.008	17	.022	11	0	4	0	4
		min	-.093	4	-.01	24	.001	7	-.027	4	0	4	0	4
M138	1	max	1.636	24	.004	11	.006	17	.013	11	0	4	0	4
		min	-1.664	17	-.013	17	-.002	7	-.024	7	0	4	0	4
	2	max	1.657	24	.013	17	.002	7	.013	11	0	4	0	4
		min	-1.676	17	-.004	11	-.006	17	-.024	7	0	4	0	4
M137	1	max	1.657	24	.004	11	.013	20	.017	4	0	4	0	4

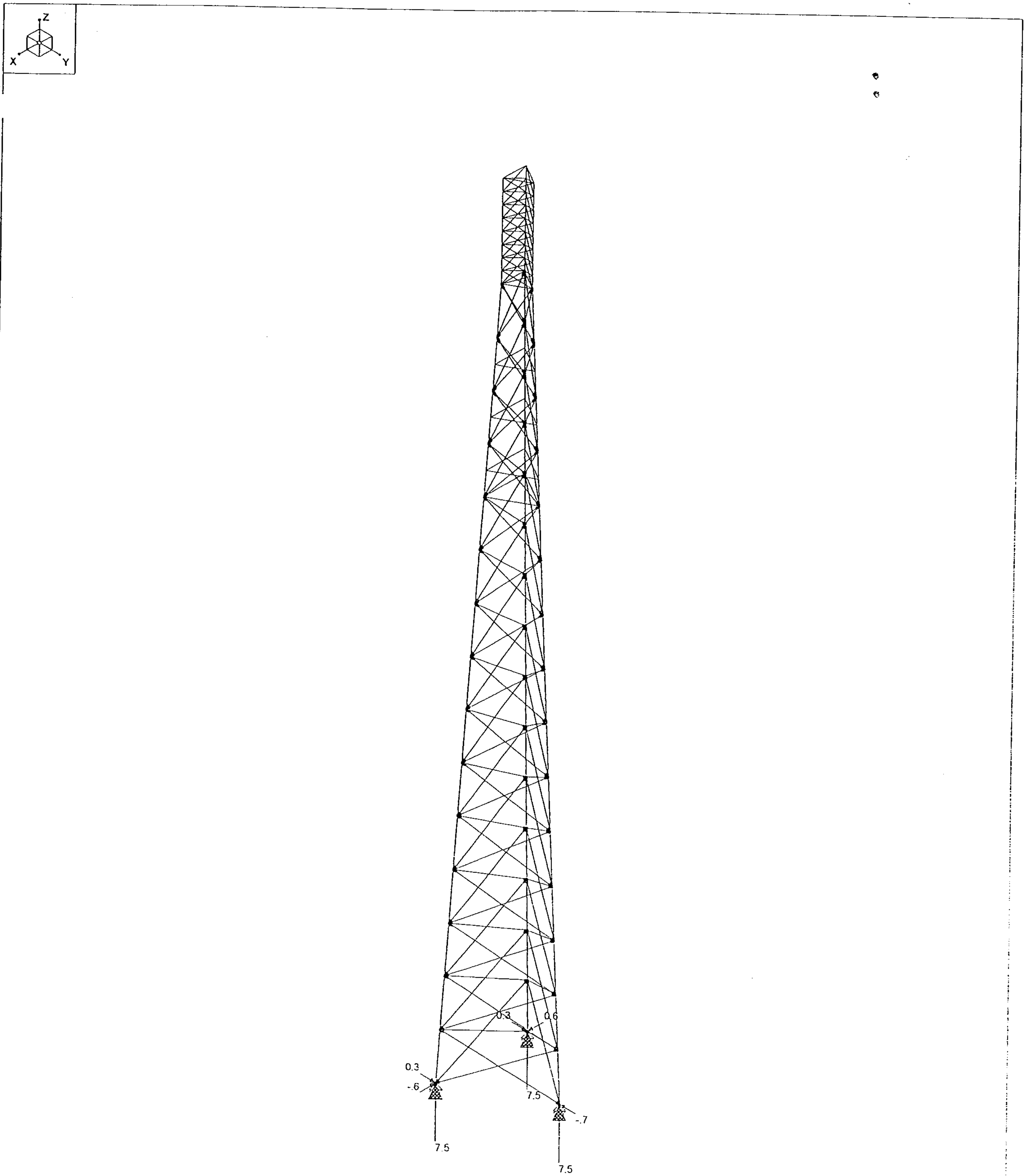

EM-CING-033-020722
179 Shunpike Road
Cromwell 7/26/02

Envelope Member Section Forces, (continued)

Member Label	Section		Axial (k)	Lc	Shear y-y (k)	Lc	Shear z-z (k)	Lc	Torque (k-ft)	Lc	Moment y-y (k-ft)	Lc	Moment z-z (k-ft)	Lc
		min	-1.676	17	-.013	17	.001	11	-.024	7	0	4	0	4
	2	max	1.636	24	.013	17	-.001	11	.017	4	0	4	0	4
		min	-1.664	17	-.004	11	-.013	20	-.024	7	0	4	0	4
M143	1	max	1.635	24	.004	11	.013	20	.015	4	0	4	0	4
		min	-1.645	17	-.013	17	.001	11	-.022	7	0	4	0	4
	2	max	1.614	24	.013	17	-.001	11	.015	4	0	4	0	4
		min	-1.633	17	-.004	11	-.013	20	-.022	7	0	4	0	4
M144	1	max	1.614	24	.004	11	.006	17	.012	11	0	4	0	4
		min	-1.633	17	-.013	17	-.002	7	-.022	7	0	4	0	4
	2	max	1.635	24	.013	17	.002	7	.012	11	0	4	0	4
		min	-1.645	17	-.004	11	-.006	17	-.022	7	0	4	0	4
M141	1	max	1.613	17	.009	24	.013	20	.023	7	0	4	0	4
		min	-1.583	24	-.003	17	.001	11	-.011	11	0	4	0	4
	2	max	1.586	17	.003	17	-.001	11	.023	7	0	4	0	4
		min	-1.571	24	-.009	24	-.013	20	-.011	11	0	4	0	4
M140	1	max	1.586	17	.01	20	.006	17	.023	7	0	4	0	4
		min	-1.571	24	-.003	17	-.002	7	-.014	4	0	4	0	4
	2	max	1.613	17	.003	17	.002	7	.023	7	0	4	0	4
		min	-1.583	24	-.01	20	-.006	17	-.014	4	0	4	0	4
M151	1	max	1.58	20	.01	24	-.001	7	.021	11	0	4	0	4
		min	-.056	17	-.013	17	-.008	17	-.026	4	0	4	0	4
	2	max	1.554	20	.013	17	.008	17	.021	11	0	4	0	4
		min	-.064	17	-.01	24	.001	7	-.026	4	0	4	0	4
M146	1	max	1.531	17	.01	20	.006	17	.021	7	0	4	0	4
		min	-1.531	24	-.003	17	-.002	7	-.013	4	0	4	0	4
	2	max	1.559	17	.003	17	.002	7	.021	7	0	4	0	4
		min	-1.543	24	-.01	20	-.006	17	-.013	4	0	4	0	4
M147	1	max	1.559	17	.009	24	.013	20	.021	7	0	4	0	4
		min	-1.543	24	-.003	17	.001	11	-.011	11	0	4	0	4
	2	max	1.531	17	.003	17	-.001	11	.021	7	0	4	0	4
		min	-1.531	24	-.009	24	-.013	20	-.011	11	0	4	0	4
M150	1	max	1.455	24	.004	11	.006	17	.011	11	0	4	0	4
		min	-1.479	17	-.013	17	-.002	7	-.021	7	0	4	0	4
	2	max	1.476	24	.013	17	.002	7	.011	11	0	4	0	4
		min	-1.491	17	-.004	11	-.006	17	-.021	7	0	4	0	4
M149	1	max	1.476	24	.004	11	.013	20	.014	4	0	4	0	4
		min	-1.491	17	-.013	17	.001	11	-.021	7	0	4	0	4
	2	max	1.455	24	.013	17	-.001	11	.014	4	0	4	0	4
		min	-1.479	17	-.004	11	-.013	20	-.021	7	0	4	0	4
M152	1	max	1.385	17	.01	20	.006	17	.02	7	0	4	0	4
		min	-1.375	24	-.003	17	-.002	7	-.013	4	0	4	0	4
	2	max	1.412	17	.003	17	.002	7	.02	7	0	4	0	4
		min	-1.387	24	-.01	20	-.006	17	-.013	4	0	4	0	4
M153	1	max	1.412	17	.009	24	.013	20	.02	7	0	4	0	4
		min	-1.387	24	-.003	17	.001	11	-.01	11	0	4	0	4
	2	max	1.385	17	.003	17	-.001	11	.02	7	0	4	0	4
		min	-1.375	24	-.009	24	-.013	20	-.01	11	0	4	0	4
M155	1	max	1.333	24	.004	11	.013	20	.013	4	0	4	0	4
		min	-1.322	17	-.013	17	.001	11	-.02	7	0	4	0	4
	2	max	1.312	24	.013	17	-.001	11	.013	4	0	4	0	4
		min	-1.31	17	-.004	11	-.013	20	-.02	7	0	4	0	4
M156	1	max	1.312	24	.004	11	.006	17	.01	11	0	4	0	4
		min	-1.31	17	-.013	17	-.002	7	-.02	7	0	4	0	4

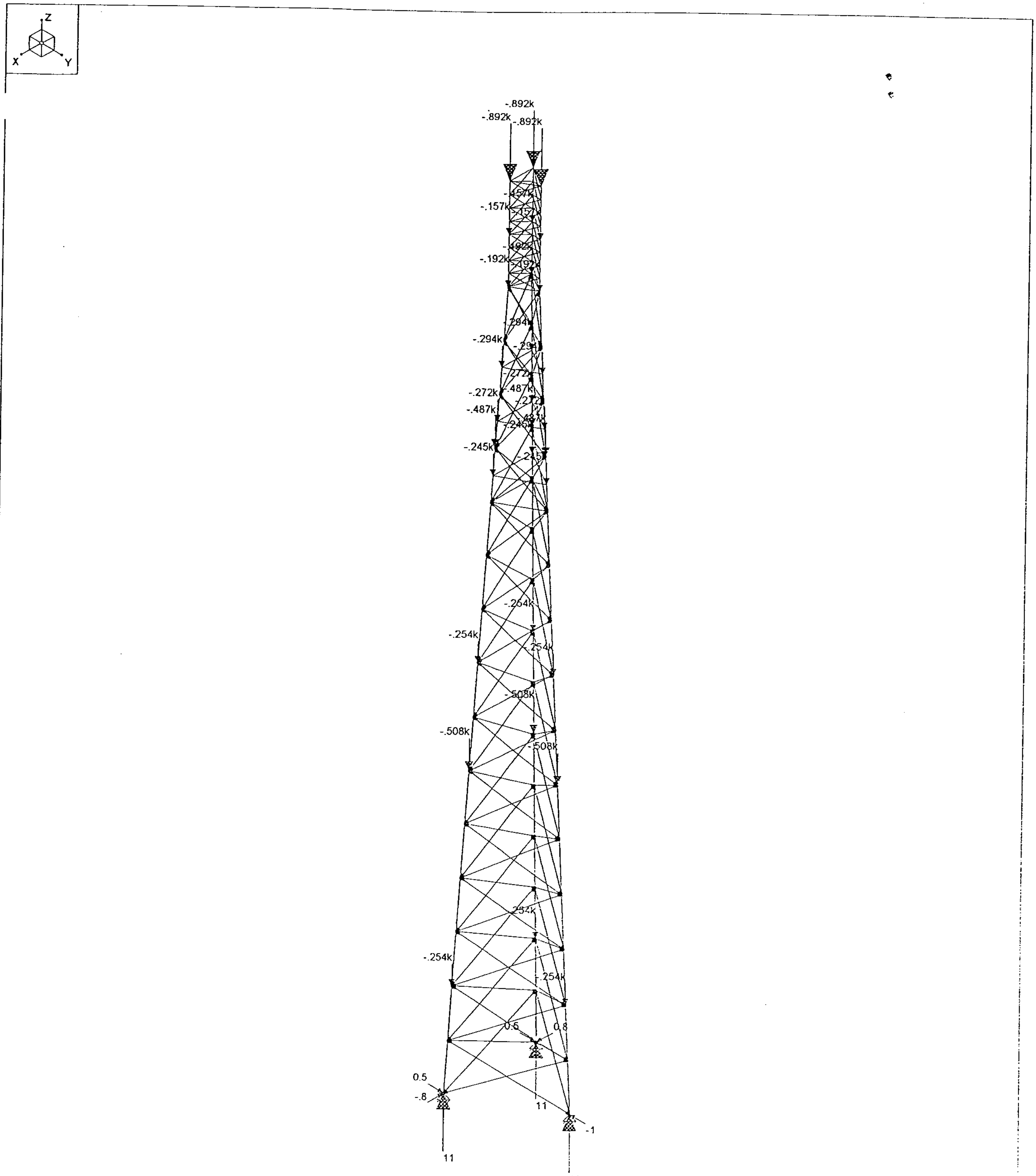
Envelope Member Section Forces, (continued)

Member Label	Section		Axial (k)	Lc	Shear y-y (k)	Lc	Shear z-z (k)	Lc	Torque (k-ft)	Lc	Moment y-y (k-ft)	Lc	Moment z-z (k-ft)	Lc
	2	max	1.333	24	.013	17	.002	7	.01	11	0	4	0	4
		min	-1.322	17	-.004	11	-.006	17	-.02	7	0	4	0	4
M112	1	max	.293	4	.01	24	-.002	11	.059	4	0	4	0	4
		min	-2.939	20	-.013	17	-.012	20	-.047	11	0	4	0	4
	2	max	.298	4	.013	17	.012	20	.059	4	0	4	0	4
		min	-2.95	20	-.01	24	.002	11	-.047	11	0	4	0	4
M136	1	max	.211	11	.01	24	-.002	11	.031	4	0	4	0	4
		min	-2.011	20	-.013	17	-.012	20	-.025	11	0	4	0	4
	2	max	.213	11	.013	17	.012	20	.031	4	0	4	0	4
		min	-2.022	20	-.01	24	.002	11	-.025	11	0	4	0	4
M130	1	max	.122	24	.01	24	-.002	11	.035	4	0	4	0	4
		min	-2.656	20	-.013	17	-.012	20	-.028	11	0	4	0	4
	2	max	.126	24	.013	17	.012	20	.035	4	0	4	0	4
		min	-2.667	20	-.01	24	.002	11	-.028	11	0	4	0	4
M142	1	max	.08	4	.01	24	-.002	11	.029	4	0	4	0	4
		min	-1.838	20	-.013	17	-.012	20	-.023	11	0	4	0	4
	2	max	.085	4	.013	17	.012	20	.029	4	0	4	0	4
		min	-1.849	20	-.01	24	.002	11	-.023	11	0	4	0	4
M148	1	max	.078	11	.01	24	-.002	11	.027	4	0	4	0	4
		min	-1.734	20	-.013	17	-.012	20	-.022	11	0	4	0	4
	2	max	.08	11	.013	17	.012	20	.027	4	0	4	0	4
		min	-1.746	20	-.01	24	.002	11	-.022	11	0	4	0	4
M154	1	max	.069	24	.01	24	-.002	11	.026	4	0	4	0	4
		min	-1.547	20	-.013	17	-.012	20	-.021	11	0	4	0	4
	2	max	.073	24	.013	17	.012	20	.026	4	0	4	0	4
		min	-1.559	20	-.01	24	.002	11	-.021	11	0	4	0	4
M118	1	max	.057	24	.01	24	-.002	11	.046	4	0	4	0	4
		min	-2.978	20	-.013	17	-.012	20	-.037	11	0	4	0	4
	2	max	.061	24	.013	17	.012	20	.046	4	0	4	0	4
		min	-2.99	20	-.01	24	.002	11	-.037	11	0	4	0	4
M124	1	max	.022	11	.01	24	-.002	11	.041	4	0	4	0	4
		min	-2.814	20	-.013	17	-.012	20	-.033	11	0	4	0	4
	2	max	.024	11	.013	17	.012	20	.041	4	0	4	0	4
		min	-2.825	20	-.01	24	.002	11	-.033	11	0	4	0	4



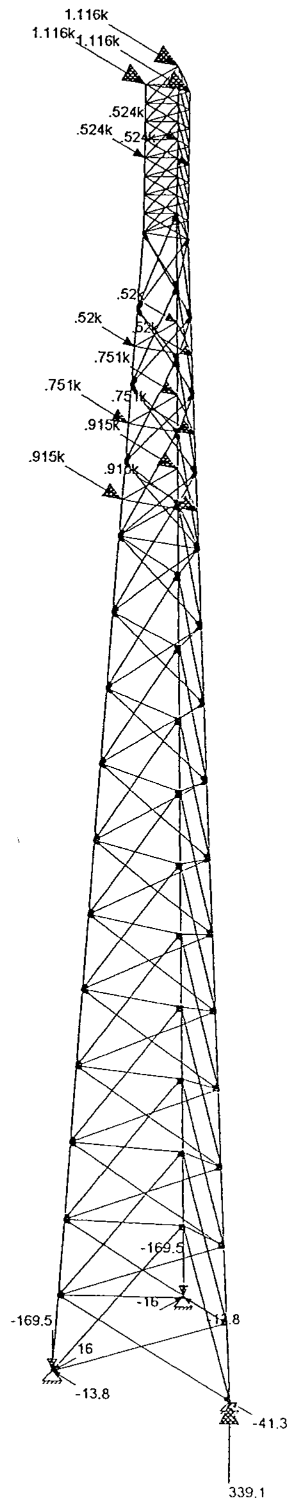
Results for LC 2, Frame Weight
Reaction units are k and k-ft

James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 13, 2002
Jim Mieczkowski		4:49 PM
15364.1251	Frame Dead Load	cromsn002.r3d



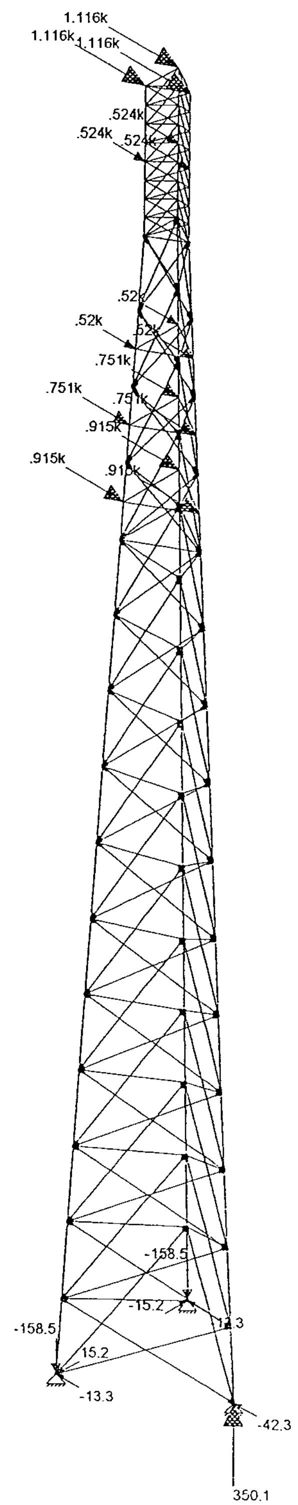
Loads: DL (Dead Load
Results for LC 1, Dead Weight
Reaction units are k and k-ft

James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 13, 2002
Jim Mieczkowski		4:52 PM
15364.1251	All Dead Loads	cromsn002.r3d



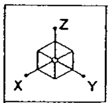
Loads: WL (Wind Load
Results for LC 3, Wind Normal to a Face
Reaction units are k and k-ft

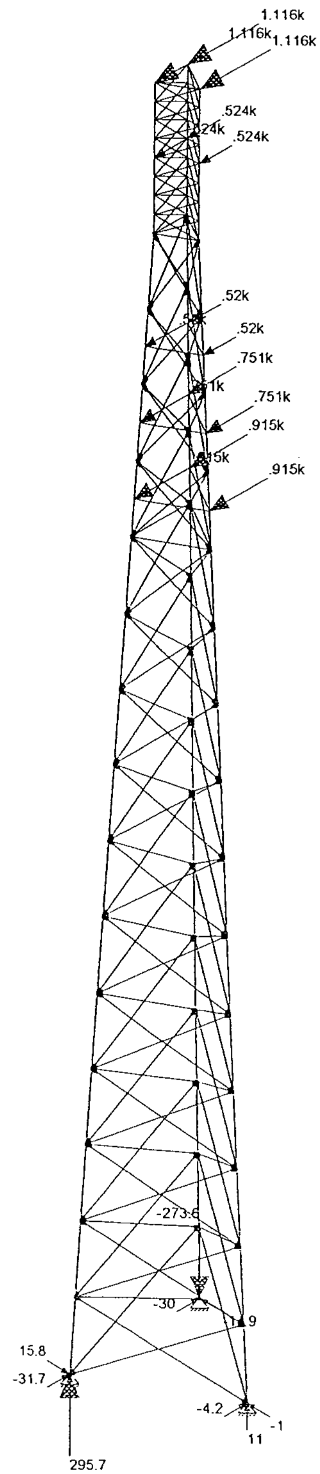
James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 13, 2002
Jim Mieczkowski		4:57 PM
15364.1251	Normal Wind Loads (Wind to Frame not shown)	cromsn002.r3d



Loads: WL (Wind Load
Results for LC 4, Dead+Normal Wind
Reaction units are k and k-ft

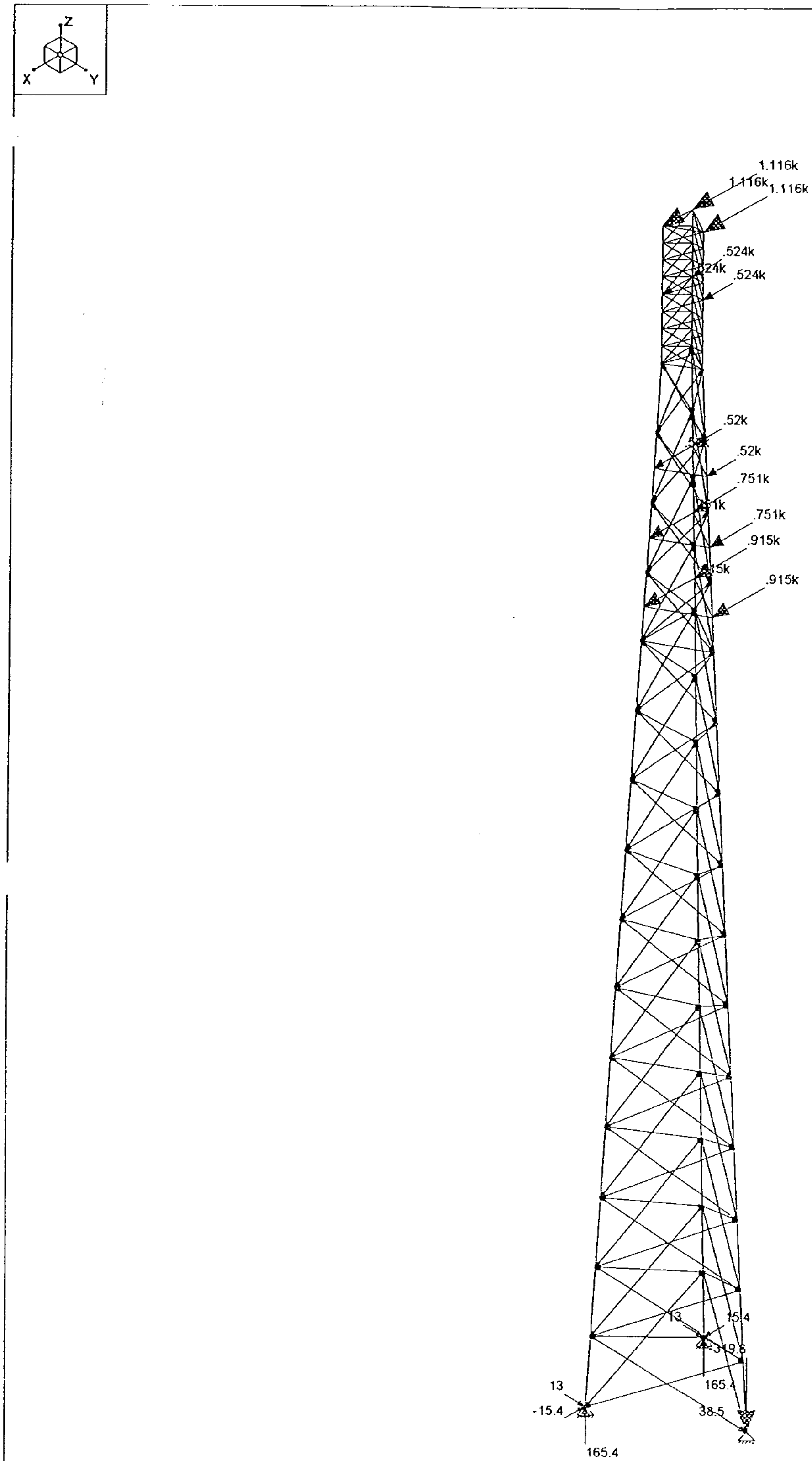
James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 13, 2002
Jim Mieczkowski		4:57 PM
15364.1251	Normal Wind Loads (Wind to Frame not shown)	cromsn002.r3d





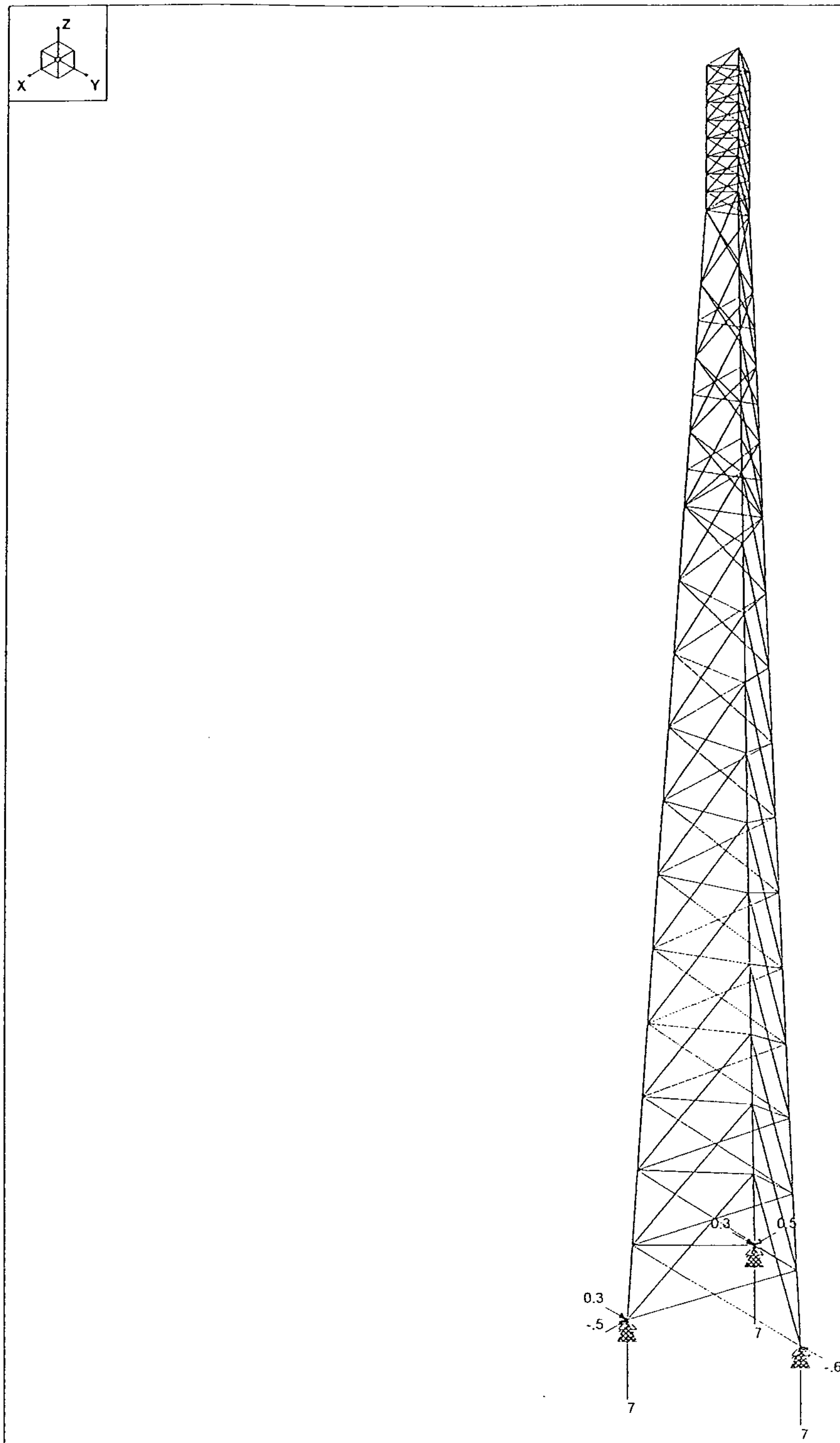
Loads: EL (Earthquake Load
Results for LC 7, Dead+90° Wind
Reaction units are k and k-ft

James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 13, 2002
Jim Mieczkowski		5:03 PM
15364.1251	Dead + 90 degree Wind Loads	cromsn002.r3d



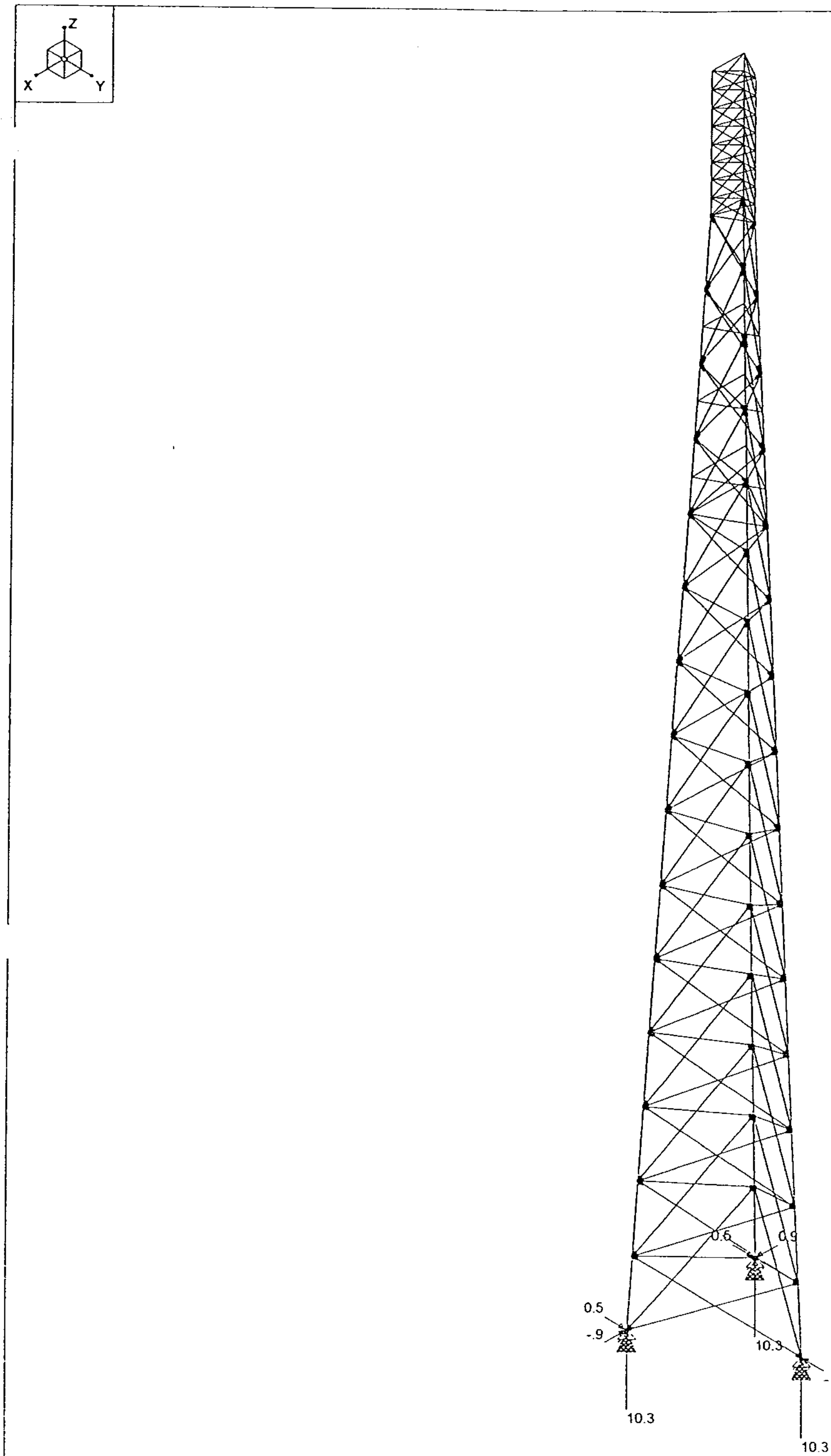
Loads: EL (Earthquake Load
Results for LC 11, Dead+60° Wind
Reaction units are k and k-ft

James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 13, 2002
Jim Mieczkowski		5:04 PM
15364.1251	Dead + 60 degree Wind Loads	cromsn002.r3d



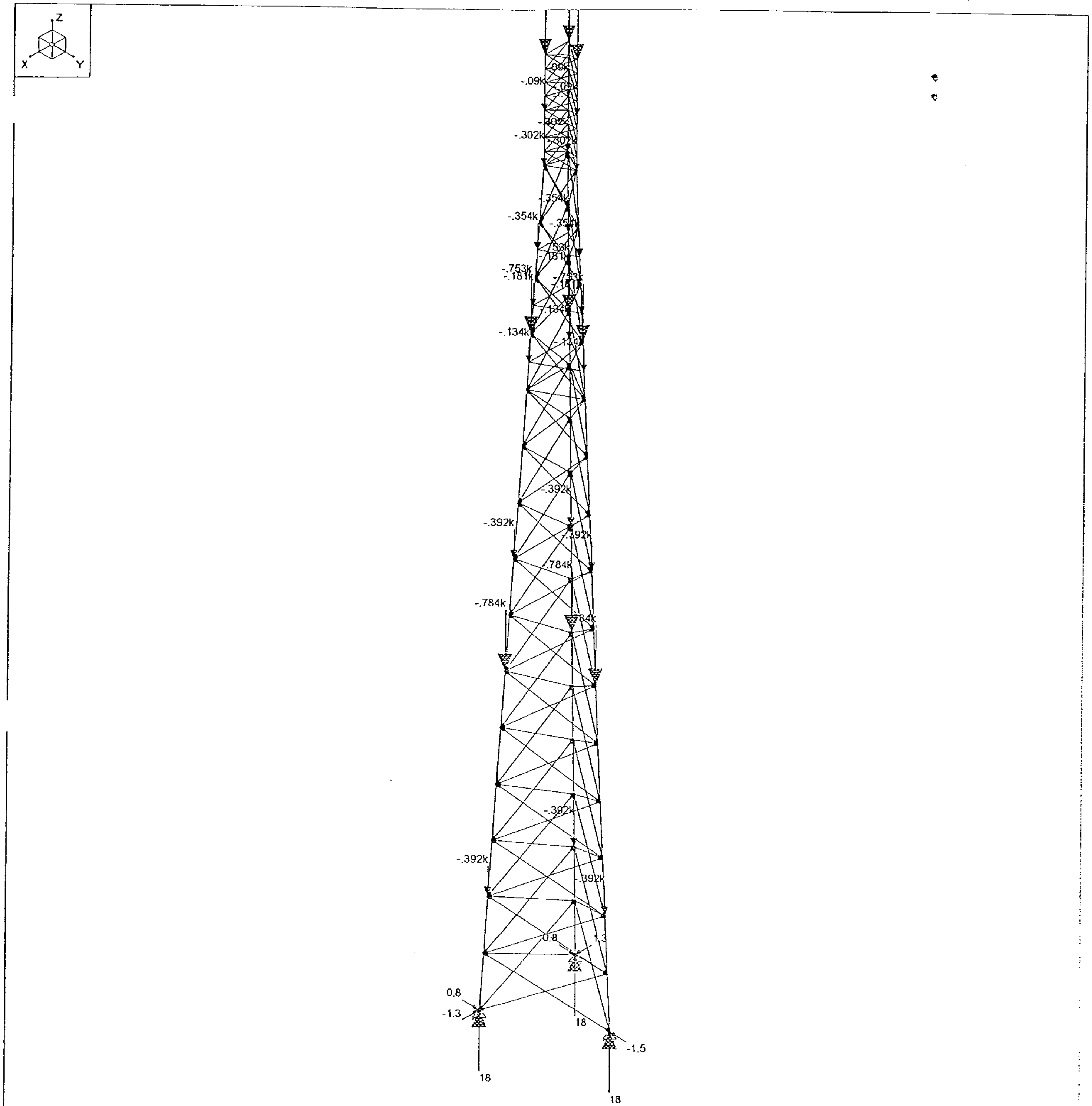
Loads: LC 13, Frame with Ice
Results for LC 14, Ice
Reaction units are k and k-ft

James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 12, 2002
Jim Mieczkowski		11:41 AM
15364.1251	Ice on Frame	cromsn002.r3d



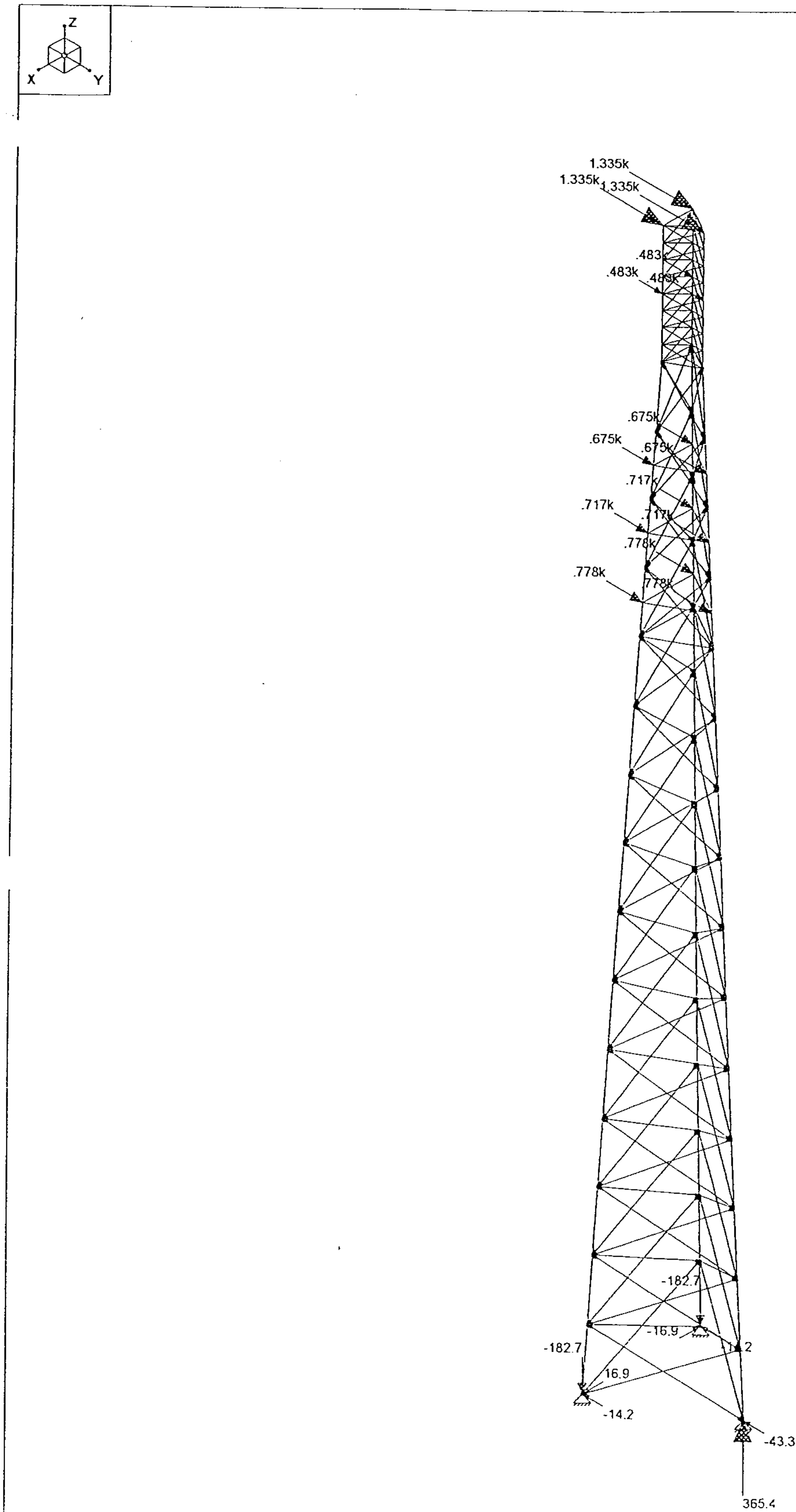
Results for LC 13, Frame with Ice
Reaction units are k and k-ft

James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 13, 2002
Jim Mieczkowski		5:19 PM
15364.1251	Frame DL + Ice on Frame	cromsn002.r3d



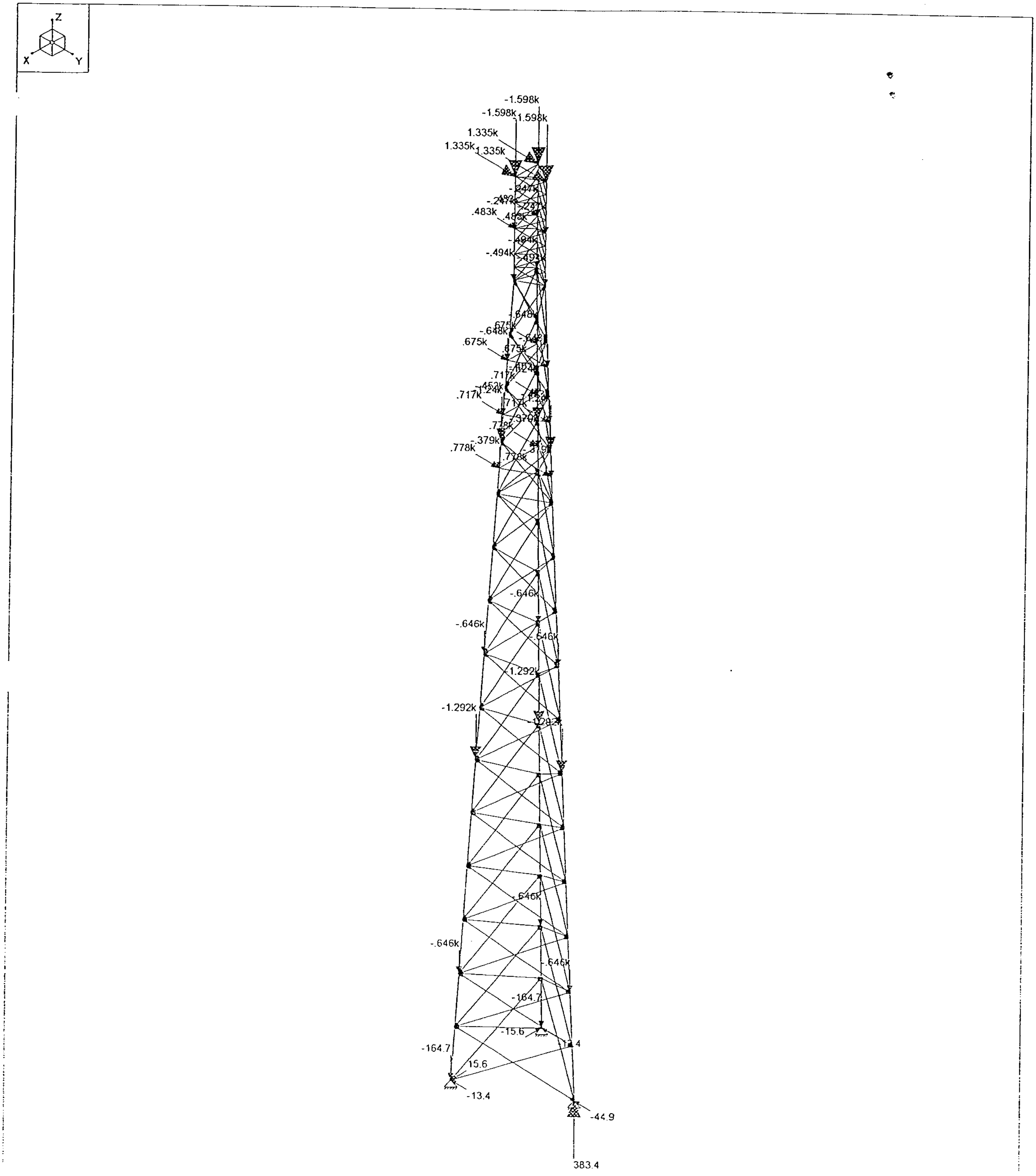
Loads: IL (Impact Load)
Results for LC 15, Dead+Ice
Reaction units are k and k-ft

James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 13, 2002
Jim Mieczkowski		5:20 PM
15364.1251	All Dead Loads + All Ice Loads	cromsn002.r3d



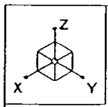
Loads: LC 16, Normal Wind on Ice
Results for LC 16, Normal Wind on Ice
Reaction units are k and k-ft

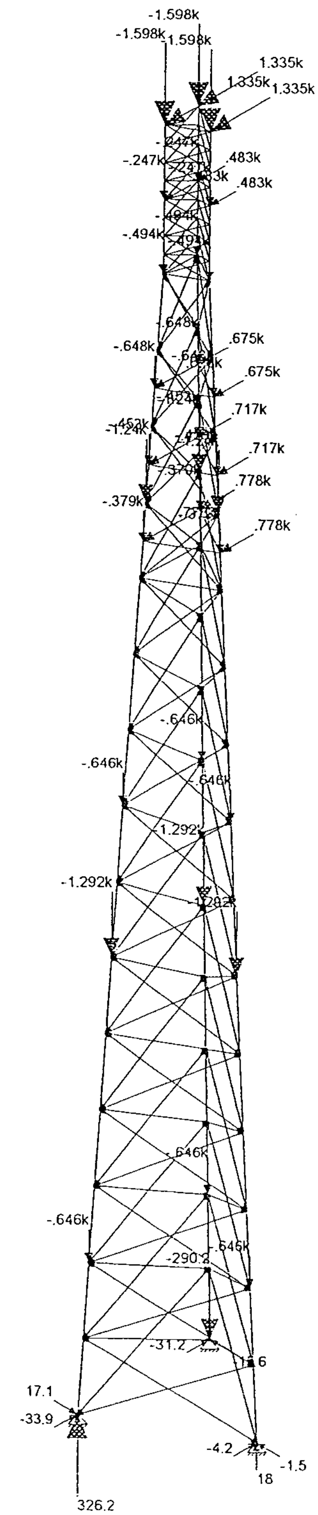
James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 13, 2002
Jim Mieczkowski		5:31 PM
15364.1251	Normal Wind on Ice (Wind to Frame not shown)	cromsn002.r3d



Loads: LC 17, Dead+Ice+.75N Wind
Results for LC 17, Dead+Ice+.75N Wind
Reaction units are k and k-ft

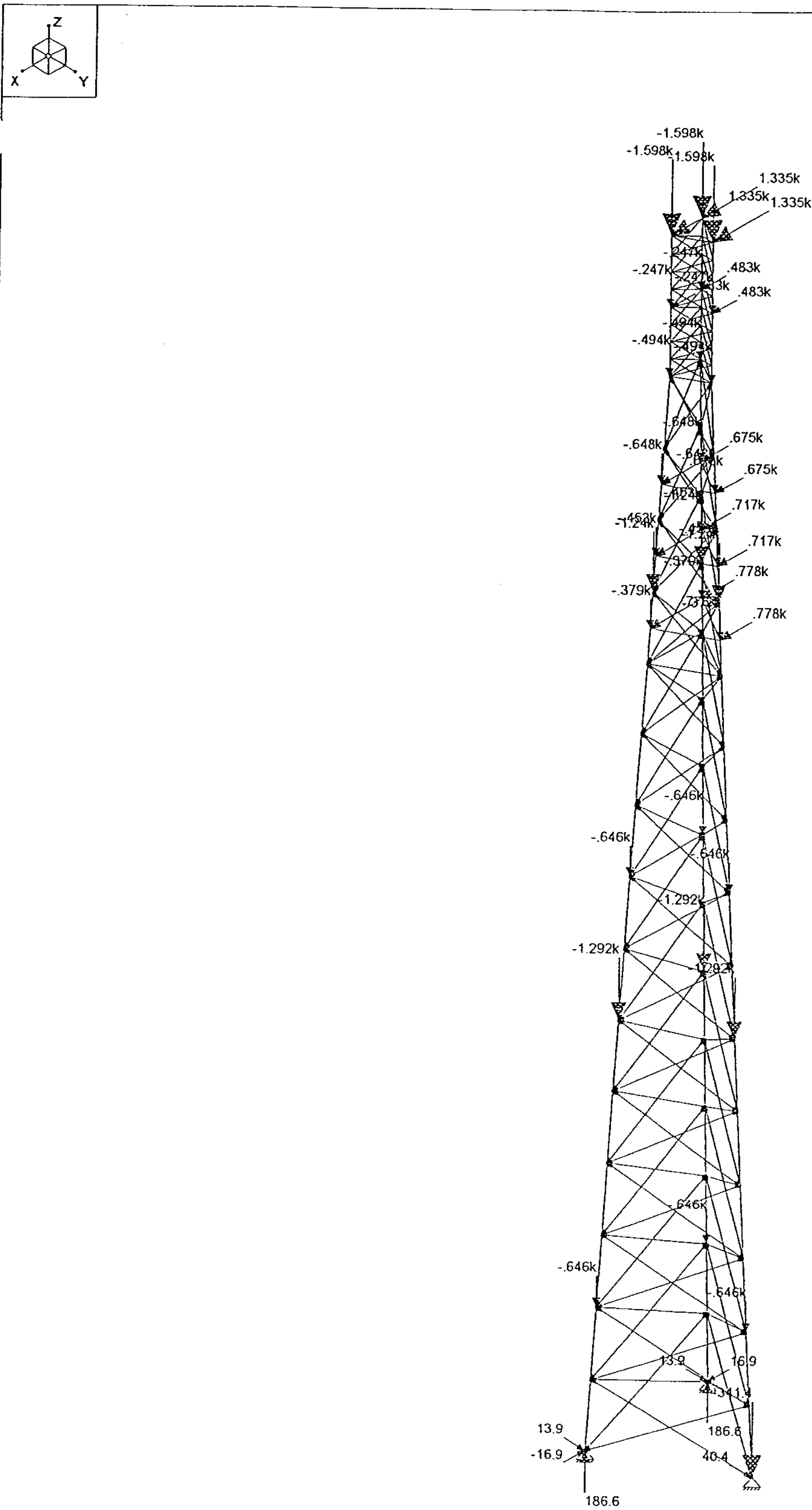
James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 13, 2002
Jim Mieczkowski		5:32 PM
15364.1251	Dead Load + Ice Load + Normal Wind on Ice	cromsn002.r3d





Loads: LC 20, Dead+Ice+90° Wind
Results for LC 20, Dead+Ice+90° Wind
Reaction units are k and k-ft

James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 13, 2002
Jim Mieczkowski		5:36 PM
15364.1251	Dead Load + Ice Load + .75 x 90 degree Wind on Ice	cromsn002.r3d



Loads: LC 20, Dead+Ice+90° Wind
Results for LC 24, Dead+Ice+60° Wind
Reaction units are k and k-ft

James A. Mieczkowski, P.E.	Cromwell Cellphone Tower	July 13, 2002
Jim Mieczkowski		5:37 PM
15364.1251	.33 x (DL + Ice Load) + .75 x 60 degree Wind on Ice	cromsn002.r3d