



EM-CING-065-081218

New Cingular Wireless PCS, LLC
500 Enterprise Drive
Rocky Hill, Connecticut 06067-3900
Phone: (860) 513-7636
Fax: (860) 513-7190

Steven L. Levine
Real Estate Consultant

ORIGINAL

December 18, 2008

RECEIVED
DEC 18 2008

CONNECTICUT
SITING COUNCIL

Honorable Daniel F. Caruso, Chairman,
and Members of the Connecticut Siting Council
Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051

**Re: Notice of Exempt Modification – Existing Town of Hartland Tower Facility at
Center Hill Road, Hartland, Connecticut**

Dear Chairman Caruso and Members of the Council:

New Cingular Wireless PCS, LLC ("AT&T") intends to install telecommunications antennas and associated equipment at an existing multicarrier telecommunications tower at Center Hill Road in Hartland, Connecticut. AT&T operates under licenses issued by the Federal Communications Commission ("FCC") to provide cellular and PCS mobile telephone service in Fairfield County, which includes the area to be served by AT&T's proposed installation.

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 1st Selectman of Hartland.

Existing Facility

The Hartland facility is located immediately west of CT Rte 181 (Center Hill Road), about 1 ¼ mile south of Hartland Center. Site coordinates (NAD83) are N41° 58' 43.3" and W72° 58' 55.8".

The facility is owned and operated by the Town of Hartland.

The Hartland facility was initially approved by local P&Z authorities. It came under jurisdiction of the Council pursuant to Verizon's notice in TS-VER-065-080201.

The facility consists of a 180-foot self-supporting lattice tower within a trapezoidal compound

surrounded by a chain link fence. The Town currently operates wireless communications equipment at the facility, and Verizon has been approved to co-locate.

Proposed Modifications

As shown on the attached drawings and as further described below, AT&T proposes to install up to six Powerwave 7770-panel antennas, or their functional equivalents, at a centerline height of 160 feet above ground level. AT&T also proposes to place a 12 x 20 ft prefabricated concrete equipment shelter at the base of the tower within the existing compound.

Attached to this Notice are a location map, site plans, a tower profile drawing, and a structural analysis report demonstrating that the tower is structurally capable of supporting the proposed AT&T telecommunications equipment at 160 feet above ground level.

Statutory Considerations

The changes to the Hartland 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 inside the existing fenced compound.
3. The proposed additions will not increase the noise level at the existing facility by six decibels or more.
4. Operation of AT&T's 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 before and after "worst-case" exposure calculations 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 proposed antenna array are 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
Verizon*	170	1970	3	485	0.0181	1.0000	1.81
Verizon*	170	875	9	300	0.0336	0.5833	5.76
AT&T GSM	160	1930-1935 1965-1970	2	427	0.0120	1.0000	1.20
AT&T GSM	160	880-894	4	296	0.0166	0.5867	2.83
AT&T UMTS	160	880-894	1	500	0.0070	0.5867	1.20
TOTAL							12.8%

* Power density parameters from Council records.

† 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 tables demonstrate, the cumulative "worst-case" power density would be 12.8 % of the ANSI/IEEE standard, as calculated for mixed frequency sites. Total power density levels resulting from AT&T's use of the tower facility would thus be within applicable standards.

For the foregoing reasons, New Cingular Wireless PCS, LLC respectfully submits that proposed changes at the Hartland facility constitute an exempt modification under R.C.S.A. Section 16-50j-72(b)(2).

Please feel free to call me with any questions concerning this notice. Thank you for your consideration in this matter.

Respectfully yours,

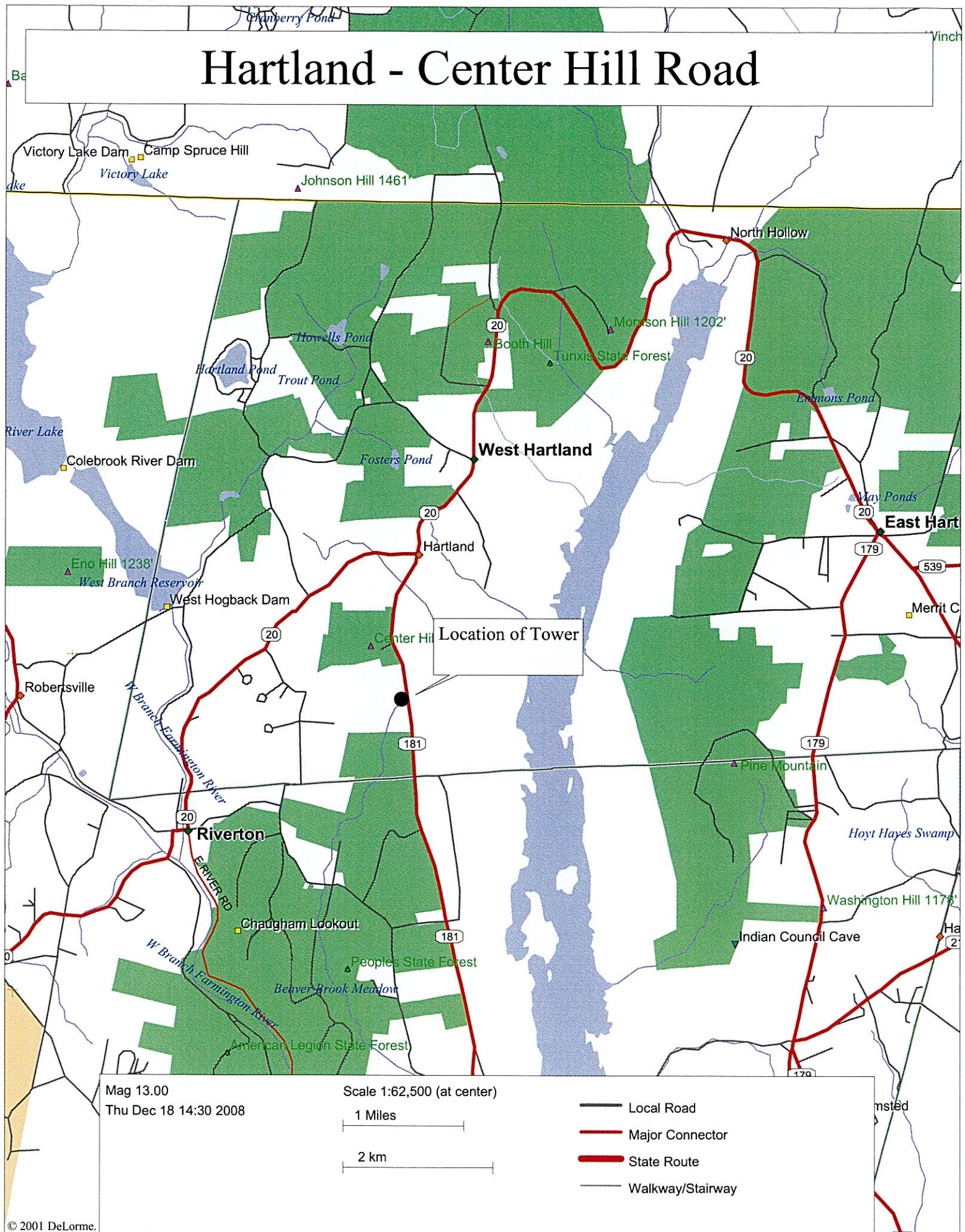


Steve Levine
Real Estate Consultant

Enclosures

cc: Honorable Wade E. Cole, 1st Selectman, Town of Hartland
Michele G. Briggs, Manager of Real Estate
Christopher B. Fisher, Esq.

Hartland - Center Hill Road



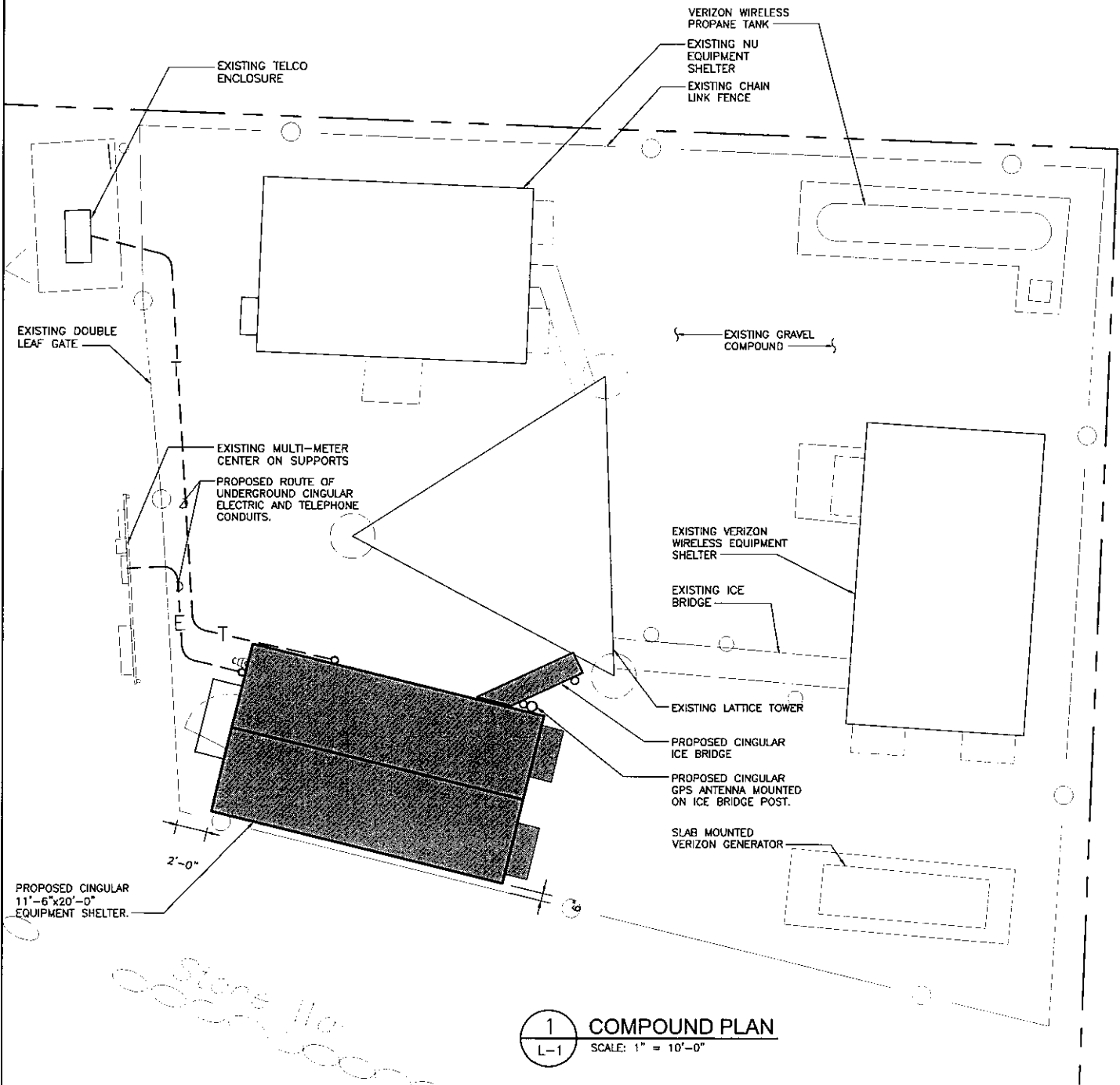
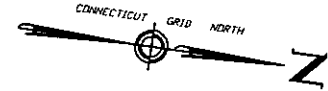
Mag 13.00
Thu Dec 18 14:30 2008

Scale 1:62,500 (at center)

1 Miles

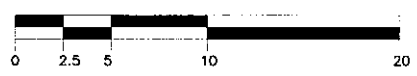
2 km

- Local Road
- Major Connector
- State Route
- Walkway/Stairway



Stone Hill
Access Road

1 COMPOUND PLAN
L-1 SCALE: 1" = 10'-0"



PROJECT NO.
36923848
Designed by:
Drawn by: PJS
Checked by:
Approved by:

URS CORPORATION AES
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
1-(860)-529-8882

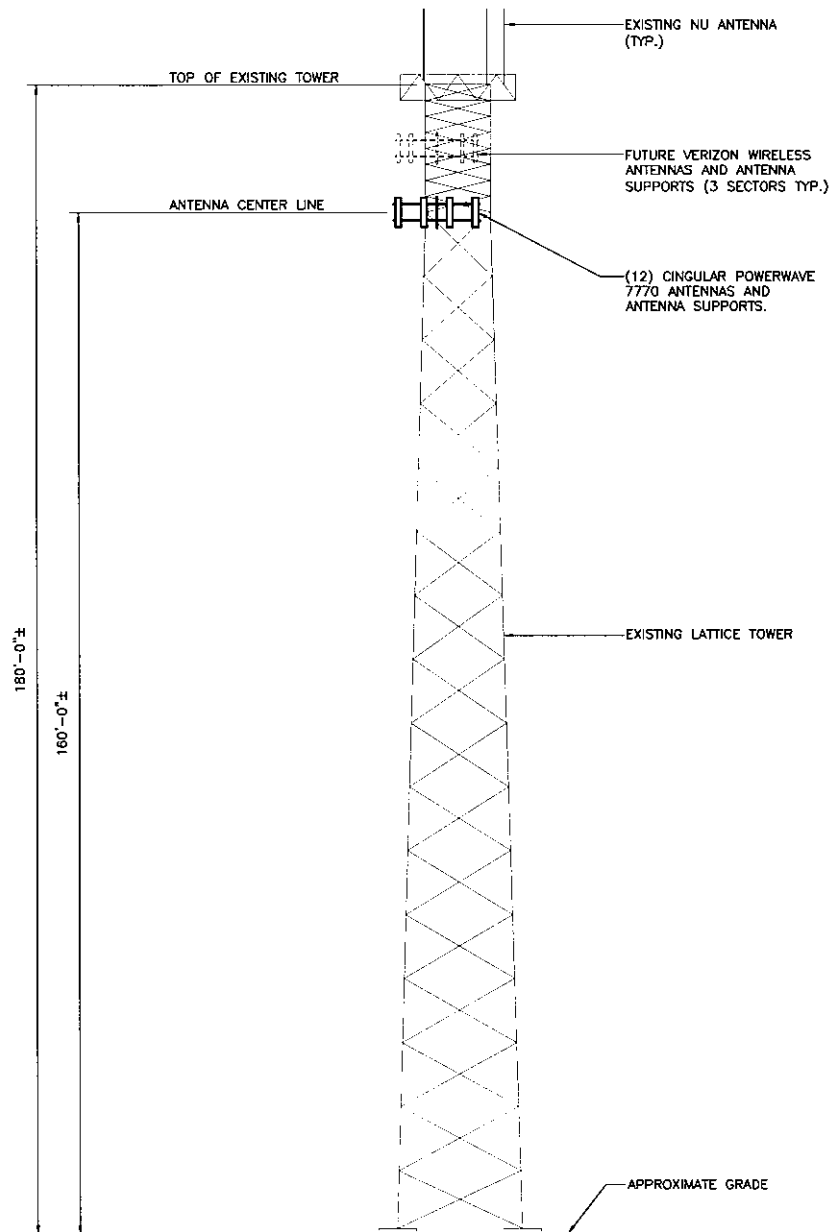


WEST HARTLAND
CENTER HILL ROAD
HARTLAND, CONNECTICUT 06027

SITE ADDRESS:

REV.	DATE:	DESCRIPTION
12/18/08	REVISED	
Scale: AS NOTED	Date: 8/20/08	
Job No. SAI-038	File No.	

Dwg. No.
L-1
Dwg. 1 of 2



1 TOWER ELEVATION
L-2 SCALE: 1"=30'-0"



PROJECT NO.
36923848

Designed by:

Drawn by: PJS

Checked by:

Approved by:

URS CORPORATION AES

500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
1-(860)-529-8882

cingular
WIRELESS



at&t
Your world delivered

SITE ADDRESS:

WEST HARTLAND
CENTER HILL ROAD
HARTLAND, CONNECTICUT 06027

REV.	DATE	DESCRIPTION
1	12/18/08	REVISED
Scale:	AS NOTED	Date: 8/20/08
Job No.	SAI-038	File No.

Dwg. No.

L-2

Dwg. 2 of 2



New Cingular Wireless PCS, LLC
500 Enterprise Drive
Rocky Hill, Connecticut 06067-3900
Phone: (860) 513-7636
Fax: (860) 513-7190

Steven L. Levine
Real Estate Consultant

December 18, 2008

Honorable Wade E. Cole
1st Selectman, Town of Hartland
Town Office Bldg. 22 South Rd.
East Hartland, CT 06027

**Re: Notice of Exempt Modification – Existing Town of Hartland Tower Facility at
Center Hill Road, Hartland, Connecticut**

Dear Mr. Cole:

New Cingular Wireless PCS, LLC ("AT&T") intends to install telecommunications antennas and associated equipment at an existing multicarrier telecommunications tower at Center Hill Road in Hartland.

The facility is owned and operated by Town of Hartland.

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 Hartland 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 AT&T 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 Mr. David Vivian at 860-218-5042 or Mr. Derek Phelps, Executive Director of the Connecticut Siting Council, at (860) 827-2935.

Sincerely,

Steve Levine
Real Estate Consultant

Enclosure

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 180' SELF SUPPORTING LATTICE TOWER AND ITS FOUNDATION FOR PROPOSED ANTENNA ARRANGEMENT

Address: Rt. 181
Hartland, CT

prepared for



*New Cingular Wireless PCS, LLC
now AT&T Mobility*

500 Enterprise Drive, Suite 3A
Rocky Hill, CT 06067

prepared by



URS CORPORATION
500 ENTERPRISE DRIVE, SUITE 3B
ROCKY HILL, CT 06067
TEL. 860-529-8882

36923848.00000
SAI-038

December 16, 2008

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 - **RISA TOWER FEEDLINE DISTRIBUTION CHART**
 - **RISA TOWER FEEDLINE PLAN**
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 - **ANCHOR BOLT ANALYSIS**
 - **FOUNDATION ANALYSIS**

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 180' self support lattice tower structure, located off Rt. 181 in Hartland, CT. The analysis was conducted in accordance with the 2005 Connecticut State Building Code and the TIA/EIA-222-F standard for a basic wind velocity of 80 mph (fastest mile) and 69 mph (fastest mile) concurrent with 0.50" ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report.

The proposed AT&T/Cingular Wireless installation is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
<u>Install:</u> <u>Alpha, Beta and Gamma Sectors</u> (6) Powerwave 7770 panel antennas (12) Powerwave LGP 21401 TMA's (6) Powerwave 7020 RET Units all on (3) 12' Valmont Lightweight T-Frames P/N 803444 (Note: Antenna pipes ordered separately) with (12) 1 5/8" coaxial cables on Valmont/PIROD T-Line Brackets P/N 125495 located inside of Leg C. Refer to coax feed line plan for location.	AT&T/Cingular (Proposed)	@ 160'

The results of the analysis indicate that the tower structure has the capacity to support the proposed loading conditions. The tower and its foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading.

This analysis is based on:

- 1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
- 2) Tower geometry and structural member sizes taken from the manufacturers original design documents prepared by Valmont Structures, on behalf of Roadrunner Installation Services, dated April 04, 2006.
- 3) Structural analysis performed by Natcomm Consulting Engineers Project No. 07076 (Rev 1) dated April 21, 2008.
- 4) Antenna and mount configuration as specified in Section 2 and 6.
- 5) Coaxial cable orientation as specified in Section 6 of this report.

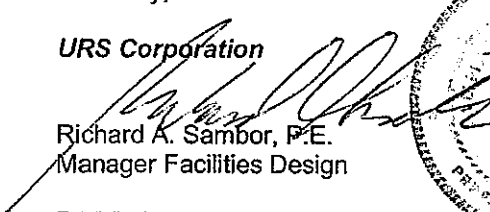
1. **EXECUTIVE SUMMARY - continued**

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

If you should have any questions, please call.

Sincerely,

URS Corporation


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



RAS/kab

cc: AA, DR, ICA – URS, CF/Book

2. INTRODUCTION

The subject tower is located off Rt. 181 in Hartland, CT. The structure is an existing 180' self supporting truss-legged steel tapered lattice tower designed and manufactured by Valmont Structures in 2006.

The inventory is summarized in the table below:

<i>Antenna Type</i>	<i>Carrier</i>	<i>Mount</i>	<i>Antenna Centerline Elevation</i>	<i>Cable</i>
(1) 20' 4 Bay Dipole	Municipal (existing)	6 Arm Halo	190'	(1) 1-5/8"
(2) 20' x 3" Omni Whips	Municipal (existing)	6 Arm Halo	190'	(2) 1-5/8"
(6) Antel LPA 80080/6CF and (6) LPA 185080/12CF panel antennas	Verizon (existing)	(3) 12' Lightweight T-Frames	170'	(12) 1-5/8"
(6) Powerwave 7770 antennas, (12) Powerwave LGP21401 TMA's and (6) Powerwave 7020 RET units	AT&T (proposed)	(3) Valmont 12' Lightweight T-Frames P/N 803444	160'	(12) 1-5/8"
(12) RR90-17-00DP antennas	Reserved	(3) 12' Lightweight T-Frames	150'	(12) 1-5/8"
(12) RR90-17-00DP antennas	Reserved	(3) 12' Lightweight T-Frames	140'	(12) 1-5/8"

Note: AT&T/Cingular coaxial cables shall be located on Valmont/PiROD T-Line Brackets P/N 125495 (per original design documents) located inside of Leg C. Refer to Section 6 Tower Feed Line Plan for coaxial cable locations.

This structural analysis of the communications tower was performed by URS Corporation (URS) for AT&T/Cingular Wireless. The purpose of this analysis was to investigate the structural integrity of the existing tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

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

The analysis was conducted using RISA Tower 5.1.1. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

Load Condition 1 = 80 mph (fastest mile) Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 69 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

Please note that wind pressure is a function of velocity squared. Under Load Condition 2, a 25 percent reduction in wind pressure is allowed by code to account for the unlikelihood of the full wind pressure and ice load occurring at the same time. The same results may be achieved by utilizing a lower wind pressure without taking the 25 percent reduction, as shown above.

The TIA/EIA standard permits a one-third increase in allowable stresses for towers and uni-poles less than 700 feet tall. For the purposes of this analysis, in computing the load capacity the allowable stresses of the tower members were increased by one-third.

4. FINDINGS AND EVALUATION

The stresses on the tower structure were evaluated to compare with the allowable stress in accordance with AISC. The results of the analysis indicate that the calculated stresses under the proposed loading are **BELOW** the allowable stresses (see tables below). Additionally, the anchor bolts and foundation were found to be within the allowable limits.

TABLE 1: Tower Base Reactions:

For detailed proposed tower reactions, see drawing no. E-1 in section 6 of this report.

Base Reactions	Proposed Reactions
Axial Load (kips)	74
Shear per Leg (kips)	32
Total Shear (kips)	50
Uplift per Leg (kips)	254
Comp. per Leg (kips)	326
O.T. Moment (ft-kips)	5227

TABLE 2: Tower Component Stress vs. Capacity Summary:

Component/ (Section No.)	Existing Component Size	Controlling Component/Elevation	Stress (% capacity)	Pass/Fail
Tower Leg (T3)	PIROD Truss Leg	Compression/120'-140'	81.4%	Pass
Diagonal (T4)	L2 1/2x2 1/2x3/16	Compression/100'-120'	91.4%	Pass
Horizontal (T1)	3/4" SR	Compression/160'-180'	12.8%	Pass
Top Girt (T1)	7/8" SR	Compression/160'-180'	3.4%	Pass
Bottom Girt (T1)	7/8" SR	Compression/160'-180'	8.0%	Pass
Bolt Checks				
Leg (T7)	1" dia A325N	Tension/40'-60'	64.9%	Pass
Anchor Bolts		Tension	47%	Pass

TABLE 3: Foundation Summary

Foundation	Component	Stress (% capacity/FOS)	Pass/Fail	Comments:
Reinf. Concrete Pad and Pier	OTM	99.9%/2.002	Pass	Min. F.O.S of 2.0 req'd per IBC 2003 Section 3108.4.2

Note: OTM denotes overturning moment.

5. CONCLUSIONS

The results of the analysis indicate that the tower structure has the capacity to support the proposed loading conditions. The tower and its foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading.

Limitations/Assumptions:

This report is based on the following:

- 1) Tower inventory as listed in this report.
- 2) Tower is properly installed and maintained.
- 3) All members are as specified in the original design documents and are in good condition.
- 4) All required members are in place.
- 5) All bolts are in place and are properly tightened.
- 6) Tower is in plumb condition.
- 7) All member protective coatings are in good condition.
- 8) All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- 9) Foundations were properly constructed to support original design loads as specified in the original design documents.
- 10) All coaxial cable is installed as specified in Section 6 of this report

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

- A. Adding antennas
- B. Removing/replacing antennas
- C. Adding coaxial cables

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

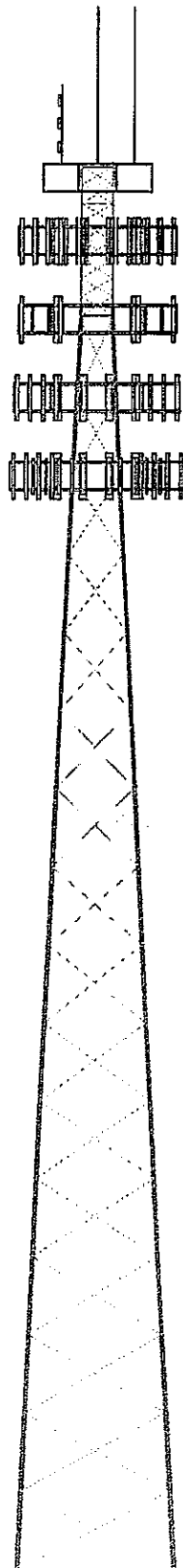
Ongoing and Periodic Inspection and Maintenance:

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

The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6. DRAWINGS AND DATA

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9
Legs	SR 1 1/2	Piled 105216		Piled 105217		Piled 105218	Piled 105219	Piled 105220	
Diagonals	SR 3/4		L2 1/2x3 1/2		A572-50	L3x3x3/16	L3x3x5/16	L3 1/2x3 1/2x5/16	
Diagonal Grade	A572-50					A36			
Top Girts	SR 7/8				N.A.	N.A.			
Bottom Girts	SR 7/8				N.A.	N.A.			
Horizontals	SR 3/4								
Face Width (ft)	8 @ 2.375	32	28	24	36	30	42	54	27.0
# Panels @ (ft)		6	5	10	12	14	16	18	
Weight (K)	0.8	140.0 ft	120.0 ft	100.0 ft	80.0 ft	60.0 ft	40.0 ft	20.0 ft	0.0 ft



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
20' x 3' Dia Omni (Municipal)	190	(2) 7770.00 w/ mount pipe (ATI/Cingular)	160
20' x 3' Dia Omni (Municipal)	190	(4) LPG 21401 TMA (ATI/Cingular)	160
10' Dipole (Municipal)	185	(4) LPG 21401 TMA (ATI/Cingular)	160
6 Arm Halo Mount	178	(4) LPG 21401 TMA (ATI/Cingular)	160
PIROD 12' Lightweight T-Frame (Verizon)	170	(4) LPG 21401 TMA (ATI/Cingular)	160
PIROD 12' Lightweight T-Frame (Verizon)	170	(2) 7020 RET Unit (ATI/Cingular)	160
PIROD 12' Lightweight T-Frame (Verizon)	170	(2) 7020 RET Unit (ATI/Cingular)	160
LPA-80080/6CF (Verizon)	170	(2) 7020 RET Unit (ATI/Cingular)	160
LPA-185080/12CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	150
LPA-185080/12CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	150
LPA-80080/6CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	150
LPA-80080/6CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	150
LPA-185080/12CF (Verizon)	170	(4) RR90-17-00DP (Future)	150
LPA-80080/6CF (Verizon)	170	(4) RR90-17-00DP (Future)	150
LPA-185080/12CF (Verizon)	170	(4) RR90-17-00DP (Future)	150
LPA-80080/6CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	140
LPA-185080/12CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	140
PIROD 12' Lightweight T-Frame (ATI/Cingular)	160	(4) RR90-17-00DP (Future)	140
PIROD 12' Lightweight T-Frame (ATI/Cingular)	160	(4) RR90-17-00DP (Future)	140
(2) 7770.00 w/ mount pipe (ATI/Cingular)	160	(4) RR90-17-00DP (Future)	140
(2) 7770.00 w/ mount pipe (ATI/Cingular)	160		

MATERIAL STRENGTH

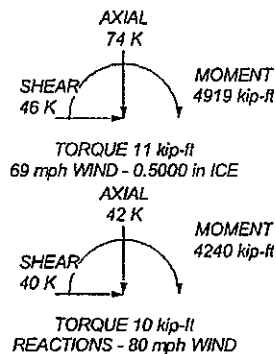
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 91.4%

MAX. CORNER REACTIONS AT BASE:

DOWN: 309 K
 UPLIFT: -236 K
 SHEAR: 30 K



URS Corporation		Job: U20.0 x180' Valmont Self-Support Lattice	
500 Enterprise Drive, Suite 3B		Project: Rt 181 West Hartland, CT	
Rocky Hill, CT 06067		Client: AT&T/Cingular - SA	Drawn by: Kevin Barker
Phone: (860) 529-8882		Code: TIA/EIA-222-F	Date: 12/16/08
FAX: (860) 529-3991		Scale: NTS	Dwg No: E-

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 180' SELF SUPPORTING LATTICE TOWER AND ITS FOUNDATION FOR PROPOSED ANTENNA ARRANGEMENT

Address: Rt. 181
Hartland, CT

prepared for

cingular
WIRELESS



at&t

New Cingular Wireless PCS, LLC

now AT&T Mobility

RECEIVED

500 Enterprise Drive, Suite 3A
Rocky Hill, CT 06067

DEC 18 2008

CONNECTICUT
SITING COUNCIL

prepared by

URS

URS CORPORATION
500 ENTERPRISE DRIVE, SUITE 3B
ROCKY HILL, CT 06067
TEL. 860-529-8882

36923848.00000
SAI-038

December 16, 2008

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The proposed AT&T/Cingular Wireless installation is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
<u>Install:</u> <u>Alpha, Beta and Gamma Sectors</u> (6) Powerwave 7770 panel antennas (12) Powerwave LGP 21401 TMA's (6) Powerwave 7020 RET Units all on (3) 12' Valmont Lightweight T-Frames P/N 803444 (Note: Antenna pipes ordered separately) with (12) 1 5/8" coaxial cables on Valmont/PIROD T-Line Brackets P/N 125495 located inside of Leg C. Refer to coax feed line plan for location.	AT&T/Cingular (Proposed)	@ 160'

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This analysis is based on:

- 1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
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- 4) Antenna and mount configuration as specified in Section 2 and 6.
- 5) Coaxial cable orientation as specified in Section 6 of this report.

1. **EXECUTIVE SUMMARY - continued**

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

If you should have any questions, please call.

Sincerely,

URS Corporation


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



RAS/kab

cc: AA, DR, ICA – URS, CF/Book

2. INTRODUCTION

The subject tower is located off Rt. 181 in Hartland, CT. The structure is an existing 180' self supporting truss-legged steel tapered lattice tower designed and manufactured by Valmont Structures in 2006.

The inventory is summarized in the table below:

Antenna Type	Carrier	Mount	Antenna Centerline Elevation	Cable
(1) 20' 4 Bay Dipole	Municipal (existing)	6 Arm Halo	190'	(1) 1-5/8"
(2) 20' x 3" Omni Whips	Municipal (existing)	6 Arm Halo	190'	(2) 1-5/8"
(6) Antel LPA 80080/6CF and (6) LPA 185080/12CF panel antennas	Verizon (existing)	(3) 12' Lightweight T-Frames	170'	(12) 1-5/8"
(6) Powerwave 7770 antennas, (12) Powerwave LGP21401 TMA's and (6) Powerwave 7020 RET units	AT&T (proposed)	(3) Valmont 12' Lightweight T-Frames P/N 803444	160'	(12) 1-5/8"
(12) RR90-17-00DP antennas	Reserved	(3) 12' Lightweight T-Frames	150'	(12) 1-5/8"
(12) RR90-17-00DP antennas	Reserved	(3) 12' Lightweight T-Frames	140'	(12) 1-5/8"

Note: AT&T/Cingular coaxial cables shall be located on Valmont/PIROD T-Line Brackets P/N 125495 (per original design documents) located inside of Leg C. Refer to Section 6 Tower Feed Line Plan for coaxial cable locations.

This structural analysis of the communications tower was performed by URS Corporation (URS) for AT&T/Cingular Wireless. The purpose of this analysis was to investigate the structural integrity of the existing tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

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

The analysis was conducted using RISA Tower 5.1.1. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

Load Condition 1 = 80 mph (fastest mile) Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 69 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

Please note that wind pressure is a function of velocity squared. Under Load Condition 2, a 25 percent reduction in wind pressure is allowed by code to account for the unlikelihood of the full wind pressure and ice load occurring at the same time. The same results may be achieved by utilizing a lower wind pressure without taking the 25 percent reduction, as shown above.

The TIA/EIA standard permits a one-third increase in allowable stresses for towers and uni-poles less than 700 feet tall. For the purposes of this analysis, in computing the load capacity the allowable stresses of the tower members were increased by one-third.

4. FINDINGS AND EVALUATION

The stresses on the tower structure were evaluated to compare with the allowable stress in accordance with AISC. The results of the analysis indicate that the calculated stresses under the proposed loading are **BELOW** the allowable stresses (see tables below). Additionally, the anchor bolts and foundation were found to be within the allowable limits.

TABLE 1: Tower Base Reactions:

For detailed proposed tower reactions, see drawing no. E-1 in section 6 of this report.

Base Reactions	Proposed Reactions
Axial Load (kips)	74
Shear per Leg (kips)	32
Total Shear (kips)	50
Uplift per Leg (kips)	254
Comp. per Leg (kips)	326
O.T. Moment (ft-kips)	5227

TABLE 2: Tower Component Stress vs. Capacity Summary:

Component/ (Section No.)	Existing Component Size	Controlling Component/Elevation	Stress (% capacity)	Pass/Fail
Tower Leg (T3)	PIROD Truss Leg	Compression/120'-140'	81.4%	Pass
Diagonal (T4)	L2 1/2x2 1/2x3/16	Compression/100'-120'	91.4%	Pass
Horizontal (T1)	3/4" SR	Compression/160'-180'	12.8%	Pass
Top Girt (T1)	7/8" SR	Compression/160'-180'	3.4%	Pass
Bottom Girt (T1)	7/8" SR	Compression/160'-180'	8.0%	Pass
Bolt Checks				
Leg (T7)	1" dia A325N	Tension/40'-60'	64.9%	Pass
Anchor Bolts		Tension	47%	Pass

TABLE 3: Foundation Summary

Foundation	Component	Stress (% capacity/FOS)	Pass/Fail	Comments:
Reinf. Concrete Pad and Pier	OTM	99.9%/2.002	Pass	Min. F.O.S of 2.0 req'd per IBC 2003 Section 3108.4.2

Note: OTM denotes overturning moment.

5. CONCLUSIONS

The results of the analysis indicate that the tower structure has the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading.**

Limitations/Assumptions:

This report is based on the following:

- 1) Tower inventory as listed in this report.
- 2) Tower is properly installed and maintained.
- 3) All members are as specified in the original design documents and are in good condition.
- 4) All required members are in place.
- 5) All bolts are in place and are properly tightened.
- 6) Tower is in plumb condition.
- 7) All member protective coatings are in good condition.
- 8) All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- 9) Foundations were properly constructed to support original design loads as specified in the original design documents.
- 10) All coaxial cable is installed as specified in Section 6 of this report

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

- A. Adding antennas
- B. Removing/replacing antennas
- C. Adding coaxial cables

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

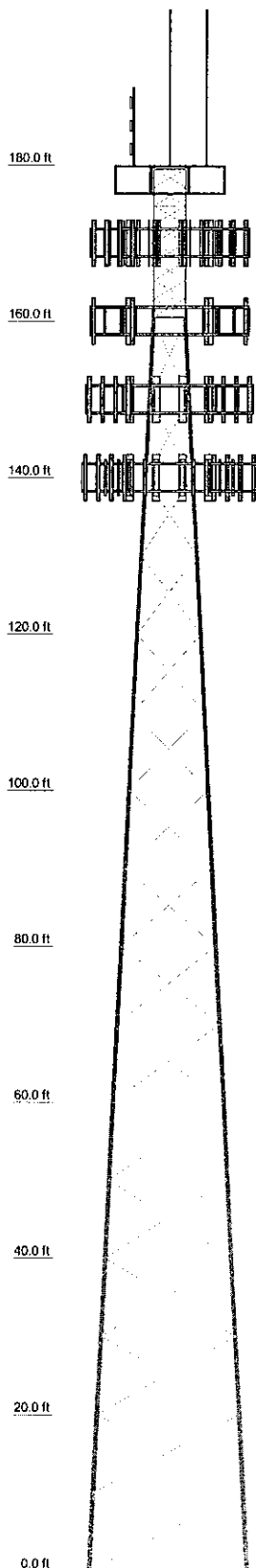
Ongoing and Periodic Inspection and Maintenance:

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

The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6. DRAWINGS AND DATA

RISA TOWER INPUT/OUTPUT SUMMARY

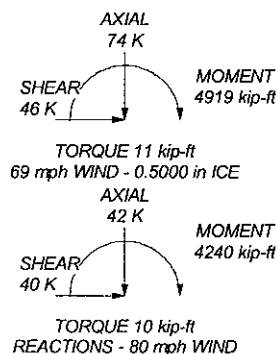


TYPE	ELEVATION	TYPE	ELEVATION
20" x 3" Dia Omni (Municipal)	190	(2) 7770.00 w/ mount pipe (ATI/Cingular)	160
20" x 3" Dia Omni (Municipal)	190		
10' Dipole (Municipal)	185	(4) LPG 21401 TMA (ATI/Cingular)	160
6 Arm Halo Mount	178		
PIROD 12' Lightweight T-Frame (Verizon)	170	(4) LPG 21401 TMA (ATI/Cingular)	160
PIROD 12' Lightweight T-Frame (Verizon)	170	(4) LPG 21401 TMA (ATI/Cingular)	160
PIROD 12' Lightweight T-Frame (Verizon)	170	(2) 7020 RET Unit (ATI/Cingular)	160
		(2) 7020 RET Unit (ATI/Cingular)	160
LPA-80080/6CF (Verizon)	170	(2) 7020 RET Unit (ATI/Cingular)	160
LPA-185080/12CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	150
LPA-185080/12CF (Verizon)	170		
LPA-80080/6CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	150
LPA-80080/6CF (Verizon)	170		
LPA-185080/12CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	150
LPA-185080/12CF (Verizon)	170		
LPA-80080/6CF (Verizon)	170	(4) RR90-17-00DP (Future)	150
LPA-80080/6CF (Verizon)	170	(4) RR90-17-00DP (Future)	150
LPA-80080/6CF (Verizon)	170	(4) RR90-17-00DP (Future)	150
LPA-185080/12CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	140
LPA-185080/12CF (Verizon)	170		
LPA-80080/6CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	140
PIROD 12' Lightweight T-Frame (ATI/Cingular)	160	PIROD 12' Lightweight T-Frame (Future)	140
PIROD 12' Lightweight T-Frame (ATI/Cingular)	160	(4) RR90-17-00DP (Future)	140
PIROD 12' Lightweight T-Frame (ATI/Cingular)	160	(4) RR90-17-00DP (Future)	140
		(4) RR90-17-00DP (Future)	140
(2) 7770.00 w/ mount pipe (ATI/Cingular)	160		
(2) 7770.00 w/ mount pipe (ATI/Cingular)	160		

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 91.4%

DOWN: 309 K
UPLIFT: -236 K
SHEAR: 30 K



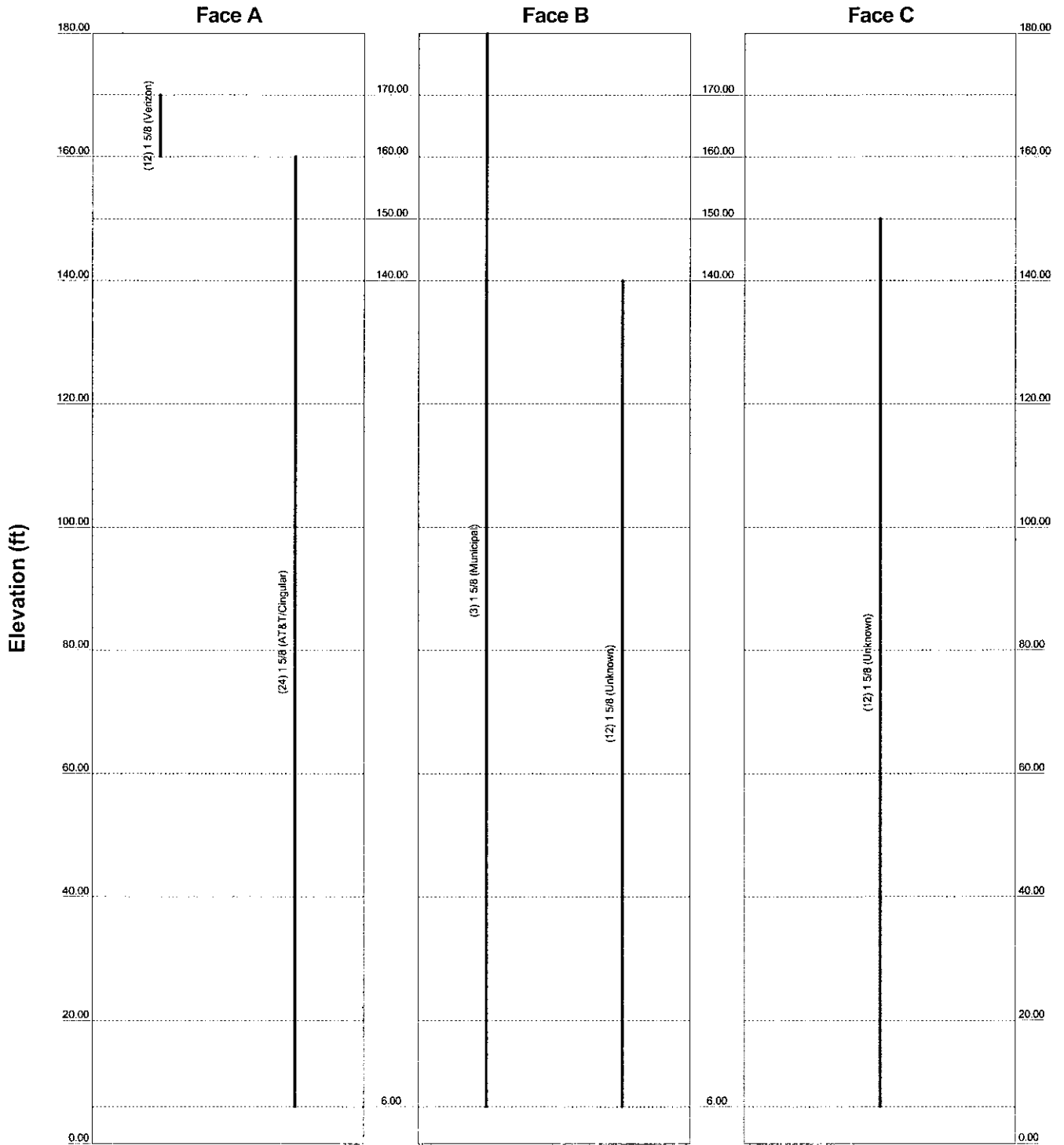
Job: U20.0 x180' Valmont Self-Support Lattice			
Project: Rt 181 West Hartland, CT			
Client: AT&T/Cingular - SA	Drawn by: Kevin Barker	App'd:	
Code: TIA/EIA-222-F	Date: 12/16/08	Scale: NTS	
Path: D:\P&P\Exam\200\BPPC\100\180' Self-Support Lattice\CT15A1078.mxd		Dwg No.	E-1

RISA TOWER FEEDLINE DISTRIBUTION CHART

Feedline Distribution Chart

0' - 180'

Round Flat App In Face App Out Face Truss Leg

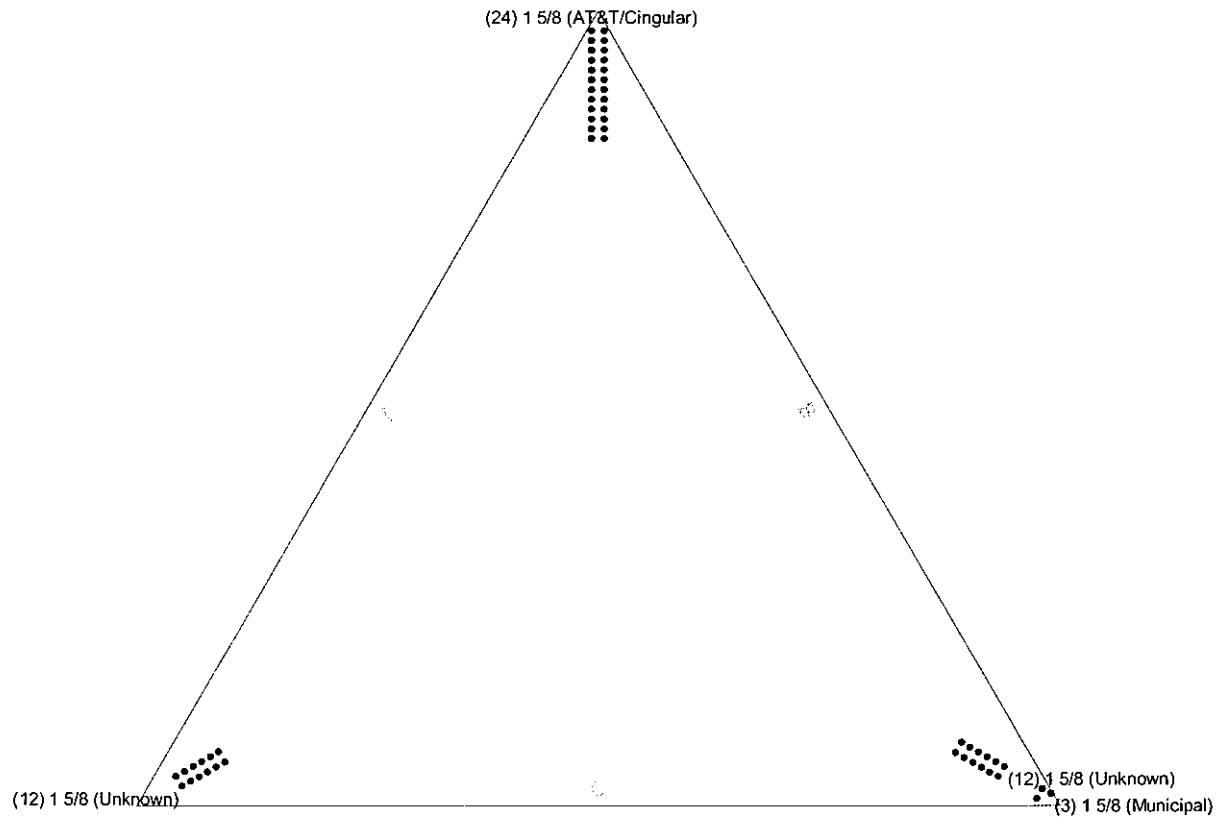


URS Corporation		Job: U20.0 x180' Valmont Self-Support Lattice	
500 Enterprise Drive, Suite 3B		Project: Rt 181 West Hartland, CT	
Rocky Hill, CT 06067		Client: AT&T/Cingular - SA	Drawn by: Kevin Barker
Phone: (860) 529-8882		Code: TIA/EIA-222-F	Date: 12/16/08
FAX: (860) 529-3991		Path: P:\OPER\Feed\180 PROD U20 x180 Lattice Hartland CT\SA\0381.en	Scale: NTS
		Dwg No. E-7	

RISA TOWER FEEDLINE PLAN

Feedline Plan

Round _____ Flat _____ App In Face _____ App Out Face _____ Truss-Leg _____



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Client: AT&T/Cingular - SA	Drawn by: Kevin Barker	App'd:	
Code: TIA/EIA-222-F	Date: 12/16/08	Scale: NTS	
Path: P:\09\FRI Files\100 PROD U20 x180 Lattice Hartland, CT (SAK-038).en	Dwg No. E-7		

RISA TOWER DETAILED OUTPUT

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	U20.0 x180' Valmont Self-Support Lattice	Page	1 of 32
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	Client	AT&T/Cingular - SAI	Designed by	Kevin Barker

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.

The base of the tower is set at an elevation of 0.00 ft above the ground line.

The face width of the tower is 4.00 ft at the top and 20.00 ft at the base.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Basic wind speed of 80 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

A wind speed of 69 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

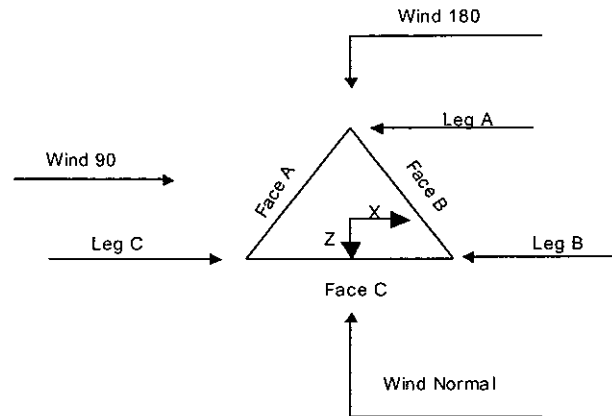
Stress ratio used in tower member design is 1.333.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	√ Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	√ SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	√ All Leg Panels Have Same Allowable
Escalate Ice	Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
√ Leg Bolts Arc At Top Of Section	SR Members Have Cut Ends	Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		

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Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.00-160.00		V4 106778	4.00	1	20.00
T2	160.00-140.00		U6.0 105245	4.00	1	20.00
T3	140.00-120.00		U8.0 105216	6.00	1	20.00
T4	120.00-100.00		U10.0 105217 L2 1/2x3/16	8.00	1	20.00
T5	100.00-80.00		U12.0 105218	10.00	1	20.00
T6	80.00-60.00		U14.0 105218	12.00	1	20.00
T7	60.00-40.00		U16.0 105219	14.00	1	20.00
T8	40.00-20.00		U18.0 105219	16.00	1	20.00
T9	20.00-0.00		U20.0 105219 L3.5x5/16	18.00	1	20.00

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180.00-160.00	2.38	X Bracc	No	Steps	6.0000	6.0000
T2	160.00-140.00	10.00	X Bracc	No	No	0.0000	0.0000
T3	140.00-120.00	10.00	X Bracc	No	No	0.0000	0.0000
T4	120.00-100.00	10.00	X Bracc	No	No	0.0000	0.0000
T5	100.00-80.00	10.00	X Bracc	No	No	0.0000	0.0000
T6	80.00-60.00	10.00	X Bracc	No	No	0.0000	0.0000

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	U20.0 x180' Valmont Self-Support Lattice	Page	3 of 32
	Project	Rt 181 West Hartland, CT	Date	13:16:39 12/16/08
	Client	AT&T/Cingular - SAI	Designed by	Kevin Barker

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T7	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T8	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T9	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry (cont'd)

Tower Elevation	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
ft						
T1 180.00-160.00	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 160.00-140.00	Truss Leg	Pirol 105216	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 140.00-120.00	Truss Leg	Pirol 105216	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 120.00-100.00	Truss Leg	Pirol 105217	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 100.00-80.00	Truss Leg	Pirol 105218	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T6 80.00-60.00	Truss Leg	Pirol 105218	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T7 60.00-40.00	Truss Leg	Pirol 105219	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T8 40.00-20.00	Truss Leg	Pirol 105219	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T9 20.00-0.00	Truss Leg	Pirol 105220	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
ft						
T1 180.00-160.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
ft							
T1 180.00-160.00	None	Solid Round		A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)

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	Client	Designed by
	AT&T/Cingular - SAI	Kevin Barker

Tower Section Geometry (cont'd)

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
ft	ft ²	in						
T1 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1.02	36.0000	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T5 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T6 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T7 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T8 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T9 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	K Factors ¹							
			Legs	X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
T1 180.00-160.00	Yes	Yes	1	1	1	1	1	1	1	1
T2 160.00-140.00	Yes	Yes	1	1	1	1	1	1	1	1
T3 140.00-120.00	Yes	Yes	1	1	1	1	1	1	1	1
T4 120.00-100.00	Yes	Yes	1	1	1	1	1	1	1	1
T5 100.00-80.00	Yes	Yes	1	1	1	1	1	1	1	1
T6 80.00-60.00	Yes	Yes	1	1	1	1	1	1	1	1
T7 60.00-40.00	Yes	Yes	1	1	1	1	1	1	1	1
T8 40.00-20.00	Yes	Yes	1	1	1	1	1	1	1	1
T9 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1

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

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	U20.0 x180' Valmont Self-Support Lattice	Page	5 of 32
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	Client	AT&T/Cingular - SAI	Designed by	Kevin Barker

Tower Section Geometry (cont'd)

Truss-Leg K Factors						
Tower Elevation ft	Leg Panels	Truss-Legs Used As Leg Members		Truss-Legs Used As Inner Members		
		X Brace Diagonals	Z Brace Diagonals	Leg Panels	X Brace Diagonals	Z Brace Diagonals
T2 160.00-140.00	1	0.5	0.85	1	0.5	0.85
T3 140.00-120.00	1	0.5	0.85	1	0.5	0.85
T4 120.00-100.00	1	0.5	0.85	1	0.5	0.85
T5 100.00-80.00	1	0.5	0.85	1	0.5	0.85
T6 80.00-60.00	1	0.5	0.85	1	0.5	0.85
T7 60.00-40.00	1	0.5	0.85	1	0.5	0.85
T8 40.00-20.00	1	0.5	0.85	1	0.5	0.85
T9 20.00-0.00	1	0.5	0.85	1	0.5	0.85

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width	U	Net Width	U	Net Width	U	Net Width	U	Net Width	U	Net Width	U	Net Width	U
	Deduct		Deduct		Deduct		Deduct		Deduct		Deduct		Deduct	
	in		in		in		in		in		in		in	
T1 180.00-160.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 160.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry (cont'd)

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Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.00-160.00	Flange	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 160.00-140.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 120.00-100.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 100.00-80.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 80.00-60.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T7 60.00-40.00	Flange	1.0000 A325N	6	1.2500 A325N	1	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T8 40.00-20.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T9 20.00-0.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Municipal)	B	No	Ar (Leg)	180.00 - 6.00	0.0000	0.02	3	2	0.5000 1.0000	1.9800		1.04
1 5/8 (Unknown)	C	No	Ar (Leg)	150.00 - 6.00	0.0000	0.08	12	6	0.5000 1.0000	1.9800		1.04
1 5/8 (Verizon)	A	No	Ar (Leg)	170.00 - 160.00	0.0000	0.08	12	12	0.5000 1.0000	1.9800		1.04
1 5/8 (Unknown)	B	No	Ar (Leg)	140.00 - 6.00	0.0000	0.1	12	6	0.5000 1.0000	1.9800		1.04
1 5/8 (AT&T/Cingular)	A	No	Ar (Leg)	160.00 - 6.00	0.0000	0.08	24	12	0.5000 1.0000	1.9800		1.04

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _M A _A In Face ft ²	C _M A _A Out Face ft ²	Weight K
T1	180.00-160.00	A	19.800	0.000	0.000	0.000	0.12
		B	26.400	0.000	0.000	0.000	0.06
		C	6.600	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	49.500	0.000	0.000	0.000	0.50
		B	46.200	0.000	0.000	0.000	0.06
		C	16.500	0.000	0.000	0.000	0.12
T3	140.00-120.00	A	59.400	0.000	0.000	0.000	0.50
		B	66.000	0.000	0.000	0.000	0.31
		C	46.200	0.000	0.000	0.000	0.25

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Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	C_{MA} In Face ft ²	C_{MA} Out Face ft ²	Weight K
T4	120.00-100.00	A	59.400	0.000	0.000	0.000	0.50
		B	66.000	0.000	0.000	0.000	0.31
		C	46.200	0.000	0.000	0.000	0.25
T5	100.00-80.00	A	59.400	0.000	0.000	0.000	0.50
		B	66.000	0.000	0.000	0.000	0.31
		C	46.200	0.000	0.000	0.000	0.25
T6	80.00-60.00	A	59.400	0.000	0.000	0.000	0.50
		B	66.000	0.000	0.000	0.000	0.31
		C	46.200	0.000	0.000	0.000	0.25
T7	60.00-40.00	A	59.400	0.000	0.000	0.000	0.50
		B	66.000	0.000	0.000	0.000	0.31
		C	46.200	0.000	0.000	0.000	0.25
T8	40.00-20.00	A	59.400	0.000	0.000	0.000	0.50
		B	66.000	0.000	0.000	0.000	0.31
		C	46.200	0.000	0.000	0.000	0.25
T9	20.00-0.00	A	41.580	0.000	0.000	0.000	0.35
		B	46.200	0.000	0.000	0.000	0.22
		C	32.340	0.000	0.000	0.000	0.17

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{MA} In Face ft ²	C_{MA} Out Face ft ²	Weight K
T1	180.00-160.00	A	0.500	2.483	22.733	0.000	0.000	0.32
		B		7.450	26.867	0.000	0.000	0.16
		C		4.967	4.133	0.000	0.000	0.00
T2	160.00-140.00	A	0.500	7.450	55.800	0.000	0.000	1.30
		B		9.933	49.600	0.000	0.000	0.16
		C		7.450	14.467	0.000	0.000	0.32
T3	140.00-120.00	A	0.500	9.933	66.133	0.000	0.000	1.30
		B		14.900	70.267	0.000	0.000	0.80
		C		14.900	45.467	0.000	0.000	0.65
T4	120.00-100.00	A	0.500	9.933	66.133	0.000	0.000	1.30
		B		14.900	70.267	0.000	0.000	0.80
		C		14.900	45.467	0.000	0.000	0.65
T5	100.00-80.00	A	0.500	9.933	66.133	0.000	0.000	1.30
		B		14.900	70.267	0.000	0.000	0.80
		C		14.900	45.467	0.000	0.000	0.65
T6	80.00-60.00	A	0.500	9.933	66.133	0.000	0.000	1.30
		B		14.900	70.267	0.000	0.000	0.80
		C		14.900	45.467	0.000	0.000	0.65
T7	60.00-40.00	A	0.500	9.933	66.133	0.000	0.000	1.30
		B		14.900	70.267	0.000	0.000	0.80
		C		14.900	45.467	0.000	0.000	0.65
T8	40.00-20.00	A	0.500	9.933	66.133	0.000	0.000	1.30
		B		14.900	70.267	0.000	0.000	0.80
		C		14.900	45.467	0.000	0.000	0.65
T9	20.00-0.00	A	0.500	6.953	46.293	0.000	0.000	0.91
		B		10.430	49.187	0.000	0.000	0.56
		C		10.430	31.827	0.000	0.000	0.45

Feed Line Center of Pressure

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Section	Elevation	CP _X	CP _Z	CP _X	CP _Z
	ft	in	in	Ice in	Ice in
T1	180.00-160.00	1.8051	-4.5378	0.7213	-3.6712
T2	160.00-140.00	-0.4396	-4.4254	-0.5907	-3.7949
T3	140.00-120.00	0.8935	-2.5792	0.3667	-2.5511
T4	120.00-100.00	1.1139	-3.2156	0.4582	-3.1873
T5	100.00-80.00	1.2900	-3.7239	0.5348	-3.7208
T6	80.00-60.00	1.4994	-4.3285	0.6221	-4.3277
T7	60.00-40.00	1.6667	-4.8112	0.6917	-4.8119
T8	40.00-20.00	1.8574	-5.3617	0.7713	-5.3660
T9	20.00-0.00	1.5890	-4.5871	0.6587	-4.5825

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
20' x 3" Dia Omni (Municipal)	A	From Leg	3.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 6.00 8.03	6.00 8.03	0.05 0.09
20' x 3" Dia Omni (Municipal)	B	From Leg	3.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 6.00 8.03	6.00 8.03	0.05 0.09
10' Dipole (Municipal)	C	From Leg	3.00 0.00 0.00	0.0000	185.00	No Ice 1/2" Ice 4.00 6.00	4.00 6.00	0.05 0.07
6 Arm Halo Mount	C	None		0.0000	178.00	No Ice 1/2" Ice 41.70 53.60	41.70 53.60	2.40 3.20
PiROD 12' Lightweight T- Frame (Verizon)	A	From Leg	1.50 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 10.20 16.20	10.20 16.20	0.25 0.35
PiROD 12' Lightweight T- Frame (Verizon)	B	From Leg	1.50 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 10.20 16.20	10.20 16.20	0.25 0.35
PiROD 12' Lightweight T- Frame (Verizon)	C	From Leg	1.50 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 10.20 16.20	10.20 16.20	0.25 0.35
PiROD 12' Lightweight T- Frame (AT&T/Cingular)	A	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice 10.20 16.20	10.20 16.20	0.25 0.35
PiROD 12' Lightweight T- Frame (AT&T/Cingular)	B	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice 10.20 16.20	10.20 16.20	0.25 0.35
PiROD 12' Lightweight T- Frame (AT&T/Cingular)	C	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice 10.20 16.20	10.20 16.20	0.25 0.35
PiROD 12' Lightweight T- Frame (Future)	A	From Leg	1.50 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 10.20 16.20	10.20 16.20	0.25 0.35
PiROD 12' Lightweight T- Frame (Future)	B	From Leg	1.50 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 10.20 16.20	10.20 16.20	0.25 0.35
PiROD 12' Lightweight T- Frame	C	From Leg	1.50 0.00	0.0000	150.00	No Ice 1/2" Ice 10.20 16.20	10.20 16.20	0.25 0.35

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _M A ₁ Front ft ²	C _M A ₁ Side ft ²	Weight K
(Future)			0.00						
(4) RR90-17-00DP	A	From Leg	3.00	0.0000	150.00	No Ice	4.36	1.97	0.02
(Future)			0.00			1/2" Ice	4.77	2.31	0.04
(4) RR90-17-00DP	B	From Leg	3.00	0.0000	150.00	No Ice	4.36	1.97	0.02
(Future)			0.00			1/2" Ice	4.77	2.31	0.04
(4) RR90-17-00DP	C	From Leg	3.00	0.0000	150.00	No Ice	4.36	1.97	0.02
(Future)			0.00			1/2" Ice	4.77	2.31	0.04
PiROD 12' Lightweight T- Frame	A	From Leg	1.50	0.0000	140.00	No Ice	10.20	10.20	0.25
(Future)			0.00			1/2" Ice	16.20	16.20	0.35
PiROD 12' Lightweight T- Frame	B	From Leg	1.50	0.0000	140.00	No Ice	10.20	10.20	0.25
(Future)			0.00			1/2" Ice	16.20	16.20	0.35
PiROD 12' Lightweight T- Frame	C	From Leg	1.50	0.0000	140.00	No Ice	10.20	10.20	0.25
(Future)			0.00			1/2" Ice	16.20	16.20	0.35
(4) RR90-17-00DP	A	From Leg	3.00	0.0000	140.00	No Ice	4.36	1.97	0.02
(Future)			0.00			1/2" Ice	4.77	2.31	0.04
(4) RR90-17-00DP	B	From Leg	3.00	0.0000	140.00	No Ice	4.36	1.97	0.02
(Future)			0.00			1/2" Ice	4.77	2.31	0.04
(4) RR90-17-00DP	C	From Leg	3.00	0.0000	140.00	No Ice	4.36	1.97	0.02
(Future)			0.00			1/2" Ice	4.77	2.31	0.04
LPA-80080/6CF	A	From Leg	3.00	0.0000	170.00	No Ice	4.32	10.48	0.04
(Verizon)			-6.00			1/2" Ice	4.76	11.50	0.10
LPA-185080/12CF	A	From Leg	3.00	0.0000	170.00	No Ice	3.53	5.95	0.03
(Verizon)			-4.00			1/2" Ice	3.96	6.86	0.07
LPA-185080/12CF	A	From Leg	3.00	0.0000	170.00	No Ice	3.53	5.95	0.03
(Verizon)			4.00			1/2" Ice	3.96	6.86	0.07
LPA-80080/6CF	A	From Leg	3.00	0.0000	170.00	No Ice	4.32	10.48	0.04
(Verizon)			6.00			1/2" Ice	4.76	11.50	0.10
LPA-80080/6CF	B	From Leg	3.00	0.0000	170.00	No Ice	4.32	10.48	0.04
(Verizon)			-6.00			1/2" Ice	4.76	11.50	0.10
LPA-185080/12CF	B	From Leg	3.00	0.0000	170.00	No Ice	3.53	5.95	0.03
(Verizon)			-4.00			1/2" Ice	3.96	6.86	0.07
LPA-185080/12CF	B	From Leg	3.00	0.0000	170.00	No Ice	3.53	5.95	0.03
(Verizon)			4.00			1/2" Ice	3.96	6.86	0.07
LPA-80080/6CF	B	From Leg	3.00	0.0000	170.00	No Ice	4.32	10.48	0.04
(Verizon)			6.00			1/2" Ice	4.76	11.50	0.10
LPA-80080/6CF	C	From Leg	3.00	0.0000	170.00	No Ice	4.32	10.48	0.04
(Verizon)			-6.00			1/2" Ice	4.76	11.50	0.10
LPA-185080/12CF	C	From Leg	3.00	0.0000	170.00	No Ice	3.53	5.95	0.03
(Verizon)			-4.00			1/2" Ice	3.96	6.86	0.07

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{MA} Front ft ²	C _{MA} Side ft ²	Weight K
LPA-185080/12CF (Verizon)	C	From Leg	0.00 3.00 4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	3.53 3.96	5.95 6.86	0.03 0.07
LPA-80080/6CF (Verizon)	C	From Leg	3.00 6.00 0.00	0.0000	170.00	No Ice 1/2" Ice	4.32 4.76	10.48 11.50	0.04 0.10
(2) 7770.00 w/ mount pipe (AT&T/Cingular)	A	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	5.99 6.45	4.26 4.91	0.06 0.11
(2) 7770.00 w/ mount pipe (AT&T/Cingular)	B	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	5.99 6.45	4.26 4.91	0.06 0.11
(2) 7770.00 w/ mount pipe (AT&T/Cingular)	C	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	5.99 6.45	4.26 4.91	0.06 0.11
(4) LPG 21401 TMA (AT&T/Cingular)	A	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(4) LPG 21401 TMA (AT&T/Cingular)	B	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(4) LPG 21401 TMA (AT&T/Cingular)	C	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) 7020 RET Unit (AT&T/Cingular)	A	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	0.40 0.49	0.20 0.27	0.00 0.00
(2) 7020 RET Unit (AT&T/Cingular)	B	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	0.40 0.49	0.20 0.27	0.00 0.00
(2) 7020 RET Unit (AT&T/Cingular)	C	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	0.40 0.49	0.20 0.27	0.00 0.00

Truss-Leg Properties

Section Designation	Area in ²	Area Ice in ²	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in ²
Pirol 105216	1998.0891	3357.4497	0.51	0.43	6.9378	11.6578	3.6816
Pirol 105216	1998.0891	3357.4497	0.51	0.43	6.9378	11.6578	3.6816
Pirol 105217	2130.7479	3520.4599	0.62	0.44	7.3984	12.2238	5.3014
Pirol 105218	2263.4687	3690.8612	0.75	0.46	7.8593	12.8155	7.2158
Pirol 105218	2263.4687	3690.8612	0.75	0.46	7.8593	12.8155	7.2158
Pirol 105219	2441.8688	3942.2854	0.94	0.49	8.4787	13.6885	9.4248
Pirol 105219	2441.8688	3942.2854	0.94	0.49	8.4787	13.6885	9.4248
Pirol 105220	2578.8005	4132.5504	1.12	0.50	8.9542	14.3491	11.9282

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Tower Pressures - No Ice

$$G_H = 1.121$$

Section Elevation	z	K _z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _M A _A In Face ft ²	C _M A _A Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
T1 180.00-160.00	170.00	1.597	26	82.500	A	0.000	29.872	5.000	16.74	0.000	0.000
					B	0.000	36.472		13.71	0.000	0.000
					C	0.000	18.367		27.22	0.000	0.000
T2 160.00-140.00	150.00	1.541	25	122.111	A	7.894	72.665	23.165	28.76	0.000	0.000
					B	7.894	69.365		29.98	0.000	0.000
					C	7.894	39.665		48.71	0.000	0.000
T3 140.00-120.00	130.00	1.48	24	162.111	A	8.723	82.565	23.165	25.38	0.000	0.000
					B	8.723	89.165		23.66	0.000	0.000
					C	8.723	69.365		29.66	0.000	0.000
T4 120.00-100.00	110.00	1.411	23	202.528	A	9.970	84.103	24.703	26.26	0.000	0.000
					B	9.970	90.703		24.54	0.000	0.000
					C	9.970	70.903		30.54	0.000	0.000
T5 100.00-80.00	90.00	1.332	22	242.945	A	13.520	85.641	26.241	26.46	0.000	0.000
					B	13.520	92.241		24.81	0.000	0.000
					C	13.520	72.441		30.53	0.000	0.000
T6 80.00-60.00	70.00	1.24	20	282.945	A	15.144	85.641	26.241	26.04	0.000	0.000
					B	15.144	92.241		24.44	0.000	0.000
					C	15.144	72.441		29.96	0.000	0.000
T7 60.00-40.00	50.00	1.126	18	323.362	A	16.830	87.709	28.309	27.08	0.000	0.000
					B	16.830	94.309		25.47	0.000	0.000
					C	16.830	74.509		30.99	0.000	0.000
T8 40.00-20.00	30.00	1	16	363.362	A	18.566	87.709	28.309	26.64	0.000	0.000
					B	18.566	94.309		25.08	0.000	0.000
					C	18.566	74.509		30.42	0.000	0.000
T9 20.00-0.00	10.00	1	16	403.780	A	23.735	71.477	29.897	31.40	0.000	0.000
					B	23.735	76.097		29.95	0.000	0.000
					C	23.735	62.237		34.78	0.000	0.000

Tower Pressure - With Ice

$$G_H = 1.121$$

Section Elevation	z	K _z	q _z	I _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _M A _A In Face ft ²	C _M A _A Out Face ft ²
ft	ft		psf	in	ft ²		ft ²	ft ²	ft ²			
T1 180.00-160.00	170.00	1.597	20	0.5000	84.167	A	22.733	22.543	8.333	18.41	0.000	0.000
						B	26.867	27.510		15.33	0.000	0.000
						C	4.133	28.982		25.16	0.000	0.000
T2 160.00-140.00	150.00	1.541	19	0.5000	123.780	A	63.694	49.532	38.924	34.38	0.000	0.000
						B	57.494	52.015		35.54	0.000	0.000
						C	22.360	49.532		54.14	0.000	0.000
T3 140.00-120.00	130.00	1.48	18	0.5000	163.780	A	74.856	52.346	38.924	30.60	0.000	0.000
						B	78.989	57.313		28.56	0.000	0.000
						C	54.189	57.313		34.91	0.000	0.000
T4 120.00-100.00	110.00	1.411	17	0.5000	204.197	A	76.104	54.735	40.814	31.19	0.000	0.000
						B	80.237	59.702		29.17	0.000	0.000
						C	55.437	59.702		35.45	0.000	0.000
T5 100.00-80.00	90.00	1.332	16	0.5000	244.614	A	79.653	57.229	42.789	31.26	0.000	0.000
						B	83.786	62.196		29.31	0.000	0.000

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	Page
	U20.0 x180' Valmont Self-Support Lattice	12 of 32
	Project	Date
	Rt 181 West Hartland, CT	13:16:39 12/16/08
	Client	Designed by
	AT&T/Cingular - SAI	Kevin Barker

Section Elevation	z	K _z	q _z	t _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	in	ft ²		ft ²	ft ²	ft ²			
T6 80.00-60.00	70.00	1.24	15	0.5000	284.614	C	58.986	62.196	42.789	35.31	0.000	0.000
						A	81.278	57.771		30.77	0.000	0.000
						B	85.411	62.737		28.88	0.000	0.000
T7 60.00-40.00	50.00	1.126	14	0.5000	325.031	C	60.611	62.737	45.704	34.69	0.000	0.000
						A	82.963	61.248		31.69	0.000	0.000
						B	87.097	66.214		29.81	0.000	0.000
T8 40.00-20.00	30.00	1	12	0.5000	365.031	C	62.297	66.214	45.704	35.56	0.000	0.000
						A	84.700	61.826		31.19	0.000	0.000
						B	88.833	66.793		29.37	0.000	0.000
T9 20.00-0.00	10.00	1	12	0.5000	405.448	C	64.033	66.793	47.910	34.94	0.000	0.000
						A	70.028	61.645		36.39	0.000	0.000
						B	72.921	65.121		34.71	0.000	0.000
						C	55.561	65.121		39.70	0.000	0.000

Tower Pressure - Service

$$G_H = 1.121$$

Section Elevation	z	K _z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
T1 180.00-160.00	170.00	1.597	10	82.500	A	0.000	29.872	5.000	16.74	0.000	0.000
					B	0.000	36.472		13.71	0.000	0.000
					C	0.000	18.367		27.22	0.000	0.000
T2 160.00-140.00	150.00	1.541	10	122.111	A	7.894	72.665	23.165	28.76	0.000	0.000
					B	7.894	69.365		29.98	0.000	0.000
					C	7.894	39.665		48.71	0.000	0.000
T3 140.00-120.00	130.00	1.48	9	162.111	A	8.723	82.565	23.165	25.38	0.000	0.000
					B	8.723	89.165		23.66	0.000	0.000
					C	8.723	69.365		29.66	0.000	0.000
T4 120.00-100.00	110.00	1.411	9	202.528	A	9.970	84.103	24.703	26.26	0.000	0.000
					B	9.970	90.703		24.54	0.000	0.000
					C	9.970	70.903		30.54	0.000	0.000
T5 100.00-80.00	90.00	1.332	9	242.945	A	13.520	85.641	26.241	26.46	0.000	0.000
					B	13.520	92.241		24.81	0.000	0.000
					C	13.520	72.441		30.53	0.000	0.000
T6 80.00-60.00	70.00	1.24	8	282.945	A	15.144	85.641	26.241	26.04	0.000	0.000
					B	15.144	92.241		24.44	0.000	0.000
					C	15.144	72.441		29.96	0.000	0.000
T7 60.00-40.00	50.00	1.126	7	323.362	A	16.830	87.709	28.309	27.08	0.000	0.000
					B	16.830	94.309		25.47	0.000	0.000
					C	16.830	74.509		30.99	0.000	0.000
T8 40.00-20.00	30.00	1	6	363.362	A	18.566	87.709	28.309	26.64	0.000	0.000
					B	18.566	94.309		25.08	0.000	0.000
					C	18.566	74.509		30.42	0.000	0.000
T9 20.00-0.00	10.00	1	6	403.780	A	23.735	71.477	29.897	31.40	0.000	0.000
					B	23.735	76.097		29.95	0.000	0.000
					C	23.735	62.237		34.78	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	U20.0 x180' Valmont Self-Support Lattice	Page	13 of 32
	Project	Rt 181 West Hartland, CT	Date	13:16:39 12/16/08
	Client	AT&T/Cingular - SAI	Designed by	Kevin Barker

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 180.00- 160.00	0.19	0.80	A	0.362	2.144	0.637	1	1	19.024	1.42	71.17	B
			B	0.442	1.987	0.67	1	1	24.424			
			C	0.223	2.522	0.595	1	1	10.933			
T2 160.00- 140.00	0.69	1.95	A	0.66	1.779	0.792	1	1	65.441	3.30	164.77	A
			B	0.633	1.787	0.774	1	1	61.592			
			C	0.389	2.085	0.647	1	1	33.571			
T3 140.00- 120.00	1.06	1.99	A	0.563	1.831	0.732	1	1	69.137	3.73	186.33	B
			B	0.604	1.802	0.756	1	1	76.127			
			C	0.482	1.925	0.688	1	1	56.468			
T4 120.00- 100.00	1.06	2.38	A	0.464	1.95	0.68	1	1	67.163	3.61	180.25	B
			B	0.497	1.904	0.696	1	1	73.101			
			C	0.399	2.065	0.651	1	1	56.151			
T5 100.00- 80.00	1.06	2.96	A	0.408	2.048	0.655	1	1	69.612	3.67	183.33	B
			B	0.435	1.998	0.667	1	1	75.012			
			C	0.354	2.163	0.634	1	1	59.437			
T6 80.00- 60.00	1.06	3.03	A	0.356	2.157	0.635	1	1	69.501	3.57	178.59	B
			B	0.38	2.106	0.643	1	1	74.498			
			C	0.31	2.271	0.619	1	1	59.976			
T7 60.00- 40.00	1.06	4.21	A	0.323	2.236	0.623	1	1	71.499	3.45	172.40	B
			B	0.344	2.186	0.63	1	1	76.268			
			C	0.282	2.344	0.611	1	1	62.332			
T8 40.00- 20.00	1.06	4.34	A	0.292	2.316	0.614	1	1	72.387	3.21	160.28	B
			B	0.311	2.268	0.619	1	1	76.964			
			C	0.256	2.419	0.603	1	1	63.530			
T9 20.00-0.00	0.74	5.29	A	0.236	2.481	0.598	1	1	66.503	3.12	156.04	B
			B	0.247	2.446	0.601	1	1	69.482			
			C	0.213	2.553	0.593	1	1	60.648			
Sum Weight:	7.98	26.97						OTM	2497.10 kip-ft	29.06		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 180.00- 160.00	0.19	0.80	A	0.362	2.144	0.637	0.8	1	19.024	1.42	71.17	B
			B	0.442	1.987	0.67	0.8	1	24.424			
			C	0.223	2.522	0.595	0.8	1	10.933			
T2 160.00- 140.00	0.69	1.95	A	0.66	1.779	0.792	0.8	1	63.863	3.22	160.79	A
			B	0.633	1.787	0.774	0.8	1	60.014			
			C	0.389	2.085	0.647	0.8	1	31.992			
T3 140.00- 120.00	1.06	1.99	A	0.563	1.831	0.732	0.8	1	67.392	3.64	182.06	B
			B	0.604	1.802	0.756	0.8	1	74.382			
			C	0.482	1.925	0.688	0.8	1	54.724			
T4 120.00- 100.00	1.06	2.38	A	0.464	1.95	0.68	0.8	1	65.169	3.51	175.34	B
			B	0.497	1.904	0.696	0.8	1	71.107			
			C	0.399	2.065	0.651	0.8	1	54.157			
T5 100.00- 80.00	1.06	2.96	A	0.408	2.048	0.655	0.8	1	66.908	3.53	176.72	B
			B	0.435	1.998	0.667	0.8	1	72.308			
			C	0.354	2.163	0.634	0.8	1	56.733			
T6 80.00- 60.00	1.06	3.03	A	0.356	2.157	0.635	0.8	1	66.473	3.43	171.33	B
			B	0.38	2.106	0.643	0.8	1	71.469			
			C	0.31	2.271	0.619	0.8	1	56.947			
T7 60.00- 40.00	1.06	4.21	A	0.323	2.236	0.623	0.8	1	68.133	3.30	164.79	B
			B	0.344	2.186	0.63	0.8	1	72.902			

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	U20.0 x180' Valmont Self-Support Lattice	Page	14 of 32
	Project	Rt 181 West Hartland, CT	Date	13:16:39 12/16/08
	Client	AT&T/Cingular - SAI	Designed by	Kevin Barker

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T8 40.00- 20.00	1.06	4.34	C	0.282	2.344	0.611	0.8	1	58.966	3.05	152.55	B
			A	0.292	2.316	0.614	0.8	1	68.674			
			B	0.311	2.268	0.619	0.8	1	73.251			
T9 20.00-0.00	0.74	5.29	C	0.256	2.419	0.603	0.8	1	59.817	2.91	145.38	B
			A	0.236	2.481	0.598	0.8	1	61.756			
			B	0.247	2.446	0.601	0.8	1	64.735			
Sum Weight:	7.98	26.97	C	0.213	2.553	0.593	0.8	1	55.902	28.00		
								OTM	2426.82			
									kip-ft			

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 180.00- 160.00	0.19	0.80	A	0.362	2.144	0.637	0.85	1	19.024	1.42	71.17	B
			B	0.442	1.987	0.67	0.85	1	24.424			
			C	0.223	2.522	0.595	0.85	1	10.933			
T2 160.00- 140.00	0.69	1.95	A	0.66	1.779	0.792	0.85	1	64.257	3.24	161.79	A
			B	0.633	1.787	0.774	0.85	1	60.408			
			C	0.389	2.085	0.647	0.85	1	32.387			
T3 140.00- 120.00	1.06	1.99	A	0.563	1.831	0.732	0.85	1	67.828	3.66	183.13	B
			B	0.604	1.802	0.756	0.85	1	74.818			
			C	0.482	1.925	0.688	0.85	1	55.160			
T4 120.00- 100.00	1.06	2.38	A	0.464	1.95	0.68	0.85	1	65.667	3.53	176.57	B
			B	0.497	1.904	0.696	0.85	1	71.605			
			C	0.399	2.065	0.651	0.85	1	54.655			
T5 100.00- 80.00	1.06	2.96	A	0.408	2.048	0.655	0.85	1	67.584	3.57	178.37	B
			B	0.435	1.998	0.667	0.85	1	72.984			
			C	0.354	2.163	0.634	0.85	1	57.409			
T6 80.00- 60.00	1.06	3.03	A	0.356	2.157	0.635	0.85	1	67.230	3.46	173.14	B
			B	0.38	2.106	0.643	0.85	1	72.226			
			C	0.31	2.271	0.619	0.85	1	57.704			
T7 60.00- 40.00	1.06	4.21	A	0.323	2.236	0.623	0.85	1	68.975	3.33	166.70	B
			B	0.344	2.186	0.63	0.85	1	73.744			
			C	0.282	2.344	0.611	0.85	1	59.808			
T8 40.00- 20.00	1.06	4.34	A	0.292	2.316	0.614	0.85	1	69.602	3.09	154.48	B
			B	0.311	2.268	0.619	0.85	1	74.179			
			C	0.256	2.419	0.603	0.85	1	60.745			
T9 20.00-0.00	0.74	5.29	A	0.236	2.481	0.598	0.85	1	62.943	2.96	148.05	B
			B	0.247	2.446	0.601	0.85	1	65.922			
			C	0.213	2.553	0.593	0.85	1	57.088			
Sum Weight:	7.98	26.97						OTM	2444.39	28.27		
									kip-ft			

Tower Forces - With Ice - Wind Normal To Face

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	Page
	U20.0 x180' Valmont Self-Support Lattice	15 of 32
	Project	Date
	Rt 181 West Hartland, CT	13:16:39 12/16/08
	Client	Designed by
	AT&T/Cingular - SAI	Kevin Barker

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 180.00- 160.00	0.48	1.09	A	0.538	1.856	0.718	1	1	38.910	1.90	94.92	B
			B	0.646	1.783	0.783	1	1	48.403			
			C	0.393	2.077	0.649	1	1	22.941			
T2 160.00- 140.00	1.78	3.55	A	0.915	1.946	0.997	1	1	113.063	4.67	233.49	A
			B	0.885	1.903	0.969	1	1	107.905			
			C	0.581	1.817	0.742	1	1	59.115			
T3 140.00- 120.00	2.75	3.62	A	0.777	1.801	0.878	1	1	120.797	4.95	247.74	B
			B	0.832	1.843	0.923	1	1	131.902			
			C	0.681	1.776	0.806	1	1	100.406			
T4 120.00- 100.00	2.75	4.09	A	0.641	1.784	0.779	1	1	118.764	4.44	221.79	B
			B	0.685	1.776	0.81	1	1	128.567			
			C	0.564	1.831	0.732	1	1	99.148			
T5 100.00- 80.00	2.75	4.82	A	0.56	1.835	0.73	1	1	121.413	4.32	216.25	B
			B	0.597	1.806	0.752	1	1	130.535			
			C	0.495	1.906	0.695	1	1	102.223			
T6 80.00- 60.00	2.75	4.95	A	0.489	1.915	0.692	1	1	121.239	4.16	207.81	B
			B	0.521	1.875	0.708	1	1	129.840			
			C	0.433	2.002	0.666	1	1	102.381			
T7 60.00- 40.00	2.75	6.26	A	0.444	1.984	0.67	1	1	124.023	3.98	199.06	B
			B	0.472	1.94	0.683	1	1	132.352			
			C	0.395	2.073	0.65	1	1	105.318			
T8 40.00- 20.00	2.75	6.45	A	0.401	2.061	0.652	1	1	125.021	3.69	184.62	B
			B	0.426	2.014	0.663	1	1	133.097			
			C	0.358	2.152	0.636	1	1	106.481			
T9 20.00-0.00	1.92	7.60	A	0.325	2.232	0.624	1	1	108.481	3.44	172.07	B
			B	0.34	2.194	0.629	1	1	113.890			
			C	0.298	2.302	0.615	1	1	95.623			
Sum Weight:	20.65	42.42						OTM	3179.69 kip-ft	35.56		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 180.00- 160.00	0.48	1.09	A	0.538	1.856	0.718	0.8	1	34.363	1.69	84.38	B
			B	0.646	1.783	0.783	0.8	1	43.030			
			C	0.393	2.077	0.649	0.8	1	22.115			
T2 160.00- 140.00	1.78	3.55	A	0.915	1.946	0.997	0.8	1	100.325	4.14	207.19	A
			B	0.885	1.903	0.969	0.8	1	96.407			
			C	0.581	1.817	0.742	0.8	1	54.643			
T3 140.00- 120.00	2.75	3.62	A	0.777	1.801	0.878	0.8	1	105.826	4.36	218.07	B
			B	0.832	1.843	0.923	0.8	1	116.105			
			C	0.681	1.776	0.806	0.8	1	89.568			
T4 120.00- 100.00	2.75	4.09	A	0.641	1.784	0.779	0.8	1	103.543	3.88	194.10	B
			B	0.685	1.776	0.81	0.8	1	112.520			
			C	0.564	1.831	0.732	0.8	1	88.060			
T5 100.00- 80.00	2.75	4.82	A	0.56	1.835	0.73	0.8	1	105.483	3.77	188.49	B
			B	0.597	1.806	0.752	0.8	1	113.778			
			C	0.495	1.906	0.695	0.8	1	90.426			
T6 80.00- 60.00	2.75	4.95	A	0.489	1.915	0.692	0.8	1	104.984	3.61	180.47	B
			B	0.521	1.875	0.708	0.8	1	112.758			
			C	0.433	2.002	0.666	0.8	1	90.259			
T7 60.00- 40.00	2.75	6.26	A	0.444	1.984	0.67	0.8	1	107.431	3.46	172.86	B
			B	0.472	1.94	0.683	0.8	1	114.932			

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	U20.0 x180' Valmont Self-Support Lattice	Page	16 of 32
	Project	Rt 181 West Hartland, CT	Date	13:16:39 12/16/08
	Client	AT&T/Cingular - SAI	Designed by	Kevin Barker

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T8 40.00- 20.00	2.75	6.45	C	0.395	2.073	0.65	0.8	1	92.858	3.20	159.98	B
			A	0.401	2.061	0.652	0.8	1	108.081			
			B	0.426	2.014	0.663	0.8	1	115.330			
T9 20.00-0.00	1.92	7.60	C	0.358	2.152	0.636	0.8	1	93.674	3.00	150.04	B
			A	0.325	2.232	0.624	0.8	1	94.476			
			B	0.34	2.194	0.629	0.8	1	99.306			
Sum Weight:	20.65	42.42	C	0.298	2.302	0.615	0.8	OTM	84.511	31.11		
									2793.26 kip-ft			

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 180.00- 160.00	0.48	1.09	A	0.538	1.856	0.718	0.85	1	35.500	1.74	87.02	B
			B	0.646	1.783	0.783	0.85	1	44.373			
			C	0.393	2.077	0.649	0.85	1	22.321			
T2 160.00- 140.00	1.78	3.55	A	0.915	1.946	0.997	0.85	1	103.509	4.28	213.76	A
			B	0.885	1.903	0.969	0.85	1	99.281			
			C	0.581	1.817	0.742	0.85	1	55.761			
T3 140.00- 120.00	2.75	3.62	A	0.777	1.801	0.878	0.85	1	109.569	4.51	225.49	B
			B	0.832	1.843	0.923	0.85	1	120.054			
			C	0.681	1.776	0.806	0.85	1	92.277			
T4 120.00- 100.00	2.75	4.09	A	0.641	1.784	0.779	0.85	1	107.348	4.02	201.03	B
			B	0.685	1.776	0.81	0.85	1	116.532			
			C	0.564	1.831	0.732	0.85	1	90.832			
T5 100.00- 80.00	2.75	4.82	A	0.56	1.835	0.73	0.85	1	109.465	3.91	195.43	B
			B	0.597	1.806	0.752	0.85	1	117.967			
			C	0.495	1.906	0.695	0.85	1	93.375			
T6 80.00- 60.00	2.75	4.95	A	0.489	1.915	0.692	0.85	1	109.048	3.75	187.31	B
			B	0.521	1.875	0.708	0.85	1	117.029			
			C	0.433	2.002	0.666	0.85	1	93.289			
T7 60.00- 40.00	2.75	6.26	A	0.444	1.984	0.67	0.85	1	111.579	3.59	179.41	B
			B	0.472	1.94	0.683	0.85	1	119.287			
			C	0.395	2.073	0.65	0.85	1	95.973			
T8 40.00- 20.00	2.75	6.45	A	0.401	2.061	0.652	0.85	1	112.316	3.32	166.14	B
			B	0.426	2.014	0.663	0.85	1	119.772			
			C	0.358	2.152	0.636	0.85	1	96.876			
T9 20.00-0.00	1.92	7.60	A	0.325	2.232	0.624	0.85	1	97.977	3.11	155.55	B
			B	0.34	2.194	0.629	0.85	1	102.952			
			C	0.298	2.302	0.615	0.85	1	87.289			
Sum Weight:	20.65	42.42						OTM	2889.87 kip-ft	32.22		

Tower Forces - Service - Wind Normal To Face

RISA Tower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	Page
	U20.0 x180' Valmont Self-Support Lattice	17 of 32
	Project	Date
	Rt 181 West Hartland, CT	13:16:39 12/16/08
	Client	Designed by
	AT&T/Cingular - SAI	Kevin Barker

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 180.00-160.00	0.19	0.80	A	0.362	2.144	0.637	1	1	19.024	0.56	27.80	B
			B	0.442	1.987	0.67	1	1	24.424			
			C	0.223	2.522	0.595	1	1	10.933			
T2 160.00-140.00	0.69	1.95	A	0.66	1.779	0.792	1	1	65.441	1.29	64.36	A
			B	0.633	1.787	0.774	1	1	61.592			
			C	0.389	2.085	0.647	1	1	33.571			
T3 140.00-120.00	1.06	1.99	A	0.563	1.831	0.732	1	1	69.137	1.46	72.78	B
			B	0.604	1.802	0.756	1	1	76.127			
			C	0.482	1.925	0.688	1	1	56.468			
T4 120.00-100.00	1.06	2.38	A	0.464	1.95	0.68	1	1	67.163	1.41	70.41	B
			B	0.497	1.904	0.696	1	1	73.101			
			C	0.399	2.065	0.651	1	1	56.151			
T5 100.00-80.00	1.06	2.96	A	0.408	2.048	0.655	1	1	69.612	1.43	71.61	B
			B	0.435	1.998	0.667	1	1	75.012			
			C	0.354	2.163	0.634	1	1	59.437			
T6 80.00-60.00	1.06	3.03	A	0.356	2.157	0.635	1	1	69.501	1.40	69.76	B
			B	0.38	2.106	0.643	1	1	74.498			
			C	0.31	2.271	0.619	1	1	59.976			
T7 60.00-40.00	1.06	4.21	A	0.323	2.236	0.623	1	1	71.499	1.35	67.35	B
			B	0.344	2.186	0.63	1	1	76.268			
			C	0.282	2.344	0.611	1	1	62.332			
T8 40.00-20.00	1.06	4.34	A	0.292	2.316	0.614	1	1	72.387	1.25	62.61	B
			B	0.311	2.268	0.619	1	1	76.964			
			C	0.256	2.419	0.603	1	1	63.530			
T9 20.00-0.00	0.74	5.29	A	0.236	2.481	0.598	1	1	66.503	1.22	60.95	B
			B	0.247	2.446	0.601	1	1	69.482			
			C	0.213	2.553	0.593	1	1	60.648			
Sum Weight:	7.98	26.97						OTM	975.43 kip-ft	11.35		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 180.00-160.00	0.19	0.80	A	0.362	2.144	0.637	0.8	1	19.024	0.56	27.80	B
			B	0.442	1.987	0.67	0.8	1	24.424			
			C	0.223	2.522	0.595	0.8	1	10.933			
T2 160.00-140.00	0.69	1.95	A	0.66	1.779	0.792	0.8	1	63.863	1.26	62.81	A
			B	0.633	1.787	0.774	0.8	1	60.014			
			C	0.389	2.085	0.647	0.8	1	31.992			
T3 140.00-120.00	1.06	1.99	A	0.563	1.831	0.732	0.8	1	67.392	1.42	71.12	B
			B	0.604	1.802	0.756	0.8	1	74.382			
			C	0.482	1.925	0.688	0.8	1	54.724			
T4 120.00-100.00	1.06	2.38	A	0.464	1.95	0.68	0.8	1	65.169	1.37	68.49	B
			B	0.497	1.904	0.696	0.8	1	71.107			
			C	0.399	2.065	0.651	0.8	1	54.157			
T5 100.00-80.00	1.06	2.96	A	0.408	2.048	0.655	0.8	1	66.908	1.38	69.03	B
			B	0.435	1.998	0.667	0.8	1	72.308			
			C	0.354	2.163	0.634	0.8	1	56.733			
T6 80.00-60.00	1.06	3.03	A	0.356	2.157	0.635	0.8	1	66.473	1.34	66.92	B
			B	0.38	2.106	0.643	0.8	1	71.469			
			C	0.31	2.271	0.619	0.8	1	56.947			
T7 60.00-40.00	1.06	4.21	A	0.323	2.236	0.623	0.8	1	68.133	1.29	64.37	B
			B	0.344	2.186	0.63	0.8	1	72.902			

RISA Tower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	U20.0 x180' Valmont Self-Support Lattice	Page	18 of 32
	Project	Rt 181 West Hartland, CT	Date	13:16:39 12/16/08
	Client	AT&T/Cingular - SAI	Designed by	Kevin Barker

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T8 40.00-20.00	1.06	4.34	C	0.282	2.344	0.611	0.8	1	58.966	1.19	59.59	B
			A	0.292	2.316	0.614	0.8	1	68.674			
			B	0.311	2.268	0.619	0.8	1	73.251			
T9 20.00-0.00	0.74	5.29	C	0.256	2.419	0.603	0.8	1	59.817	1.14	56.79	B
			A	0.236	2.481	0.598	0.8	1	61.756			
			B	0.247	2.446	0.601	0.8	1	64.735			
Sum Weight:	7.98	26.97	C	0.213	2.553	0.593	0.8	OTM	55.902	10.94		
									947.98 kip-ft			

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 180.00-160.00	0.19	0.80	A	0.362	2.144	0.637	0.85	1	19.024	0.56	27.80	B
			B	0.442	1.987	0.67	0.85	1	24.424			
			C	0.223	2.522	0.595	0.85	1	10.933			
T2 160.00-140.00	0.69	1.95	A	0.66	1.779	0.792	0.85	1	64.257	1.26	63.20	A
			B	0.633	1.787	0.774	0.85	1	60.408			
			C	0.389	2.085	0.647	0.85	1	32.387			
T3 140.00-120.00	1.06	1.99	A	0.563	1.831	0.732	0.85	1	67.828	1.43	71.53	B
			B	0.604	1.802	0.756	0.85	1	74.818			
			C	0.482	1.925	0.688	0.85	1	55.160			
T4 120.00-100.00	1.06	2.38	A	0.464	1.95	0.68	0.85	1	65.667	1.38	68.97	B
			B	0.497	1.904	0.696	0.85	1	71.605			
			C	0.399	2.065	0.651	0.85	1	54.655			
T5 100.00-80.00	1.06	2.96	A	0.408	2.048	0.655	0.85	1	67.584	1.39	69.68	B
			B	0.435	1.998	0.667	0.85	1	72.984			
			C	0.354	2.163	0.634	0.85	1	57.409			
T6 80.00-60.00	1.06	3.03	A	0.356	2.157	0.635	0.85	1	67.230	1.35	67.63	B
			B	0.38	2.106	0.643	0.85	1	72.226			
			C	0.31	2.271	0.619	0.85	1	57.704			
T7 60.00-40.00	1.06	4.21	A	0.323	2.236	0.623	0.85	1	68.975	1.30	65.12	B
			B	0.344	2.186	0.63	0.85	1	73.744			
			C	0.282	2.344	0.611	0.85	1	59.808			
T8 40.00-20.00	1.06	4.34	A	0.292	2.316	0.614	0.85	1	69.602	1.21	60.35	B
			B	0.311	2.268	0.619	0.85	1	74.179			
			C	0.256	2.419	0.603	0.85	1	60.745			
T9 20.00-0.00	0.74	5.29	A	0.236	2.481	0.598	0.85	1	62.943	1.16	57.83	B
			B	0.247	2.446	0.601	0.85	1	65.922			
			C	0.213	2.553	0.593	0.85	OTM	57.088			
Sum Weight:	7.98	26.97							954.84 kip-ft	11.04		

Force Totals

RISA Tower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	U20.0 x180' Valmont Self-Support Lattice	Page	19 of 32
	Project	Rt 181 West Hartland, CT	Date	13:16:39 12/16/08
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Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	18.84					
Bracing Weight	8.13					
Total Member Self-Weight	26.97			-10.46	-2.17	
Total Weight	41.99			-10.46	-2.17	
Wind 0 deg - No Ice		0.00	-39.72	-4220.92	-2.17	3.22
Wind 30 deg - No Ice		19.46	-33.71	-3611.18	-2081.05	-2.21
Wind 60 deg - No Ice		33.48	-19.33	-2080.55	-3587.67	-6.88
Wind 90 deg - No Ice		38.92	0.00	-10.46	-4159.92	-9.83
Wind 120 deg - No Ice		34.39	19.86	2094.78	-3648.54	-10.37
Wind 150 deg - No Ice		19.46	33.71	3590.26	-2081.05	-7.63
Wind 180 deg - No Ice		0.00	38.65	4129.72	-2.17	-3.10
Wind 210 deg - No Ice		-19.46	33.71	3590.26	2076.71	2.21
Wind 240 deg - No Ice		-34.39	19.86	2094.78	3644.20	7.15
Wind 270 deg - No Ice		-38.92	0.00	-10.46	4155.58	9.83
Wind 300 deg - No Ice		-33.48	-19.33	-2080.55	3583.33	9.98
Wind 330 deg - No Ice		-19.46	-33.71	-3611.18	2076.71	7.63
Member Ice	15.45					
Total Weight Ice	73.75			-27.53	-5.49	
Wind 0 deg - Ice		0.00	-45.98	-4882.20	-5.49	1.49
Wind 30 deg - Ice		21.32	-36.93	-3980.80	-2287.92	-4.18
Wind 60 deg - Ice		35.97	-20.77	-2261.64	-3875.10	-8.30
Wind 90 deg - Ice		42.65	0.00	-27.53	-4570.34	-10.71
Wind 120 deg - Ice		39.82	22.99	2399.81	-4209.76	-10.98
Wind 150 deg - Ice		21.32	36.93	3925.75	-2287.92	-6.54
Wind 180 deg - Ice		0.00	41.54	4440.71	-5.49	-1.32
Wind 210 deg - Ice		-21.32	36.93	3925.75	2276.93	4.18
Wind 240 deg - Ice		-39.82	22.99	2399.81	4198.77	9.49
Wind 270 deg - Ice		-42.65	0.00	-27.53	4559.35	10.71
Wind 300 deg - Ice		-35.97	-20.77	-2261.64	3864.11	9.62
Wind 330 deg - Ice		-21.32	-36.93	-3980.80	2276.93	6.54
Total Weight	41.99			-10.46	-2.17	
Wind 0 deg - Service		0.00	-15.51	-1644.71	0.00	1.26
Wind 30 deg - Service		7.60	-13.17	-1406.53	-812.06	-0.86
Wind 60 deg - Service		13.08	-7.55	-808.63	-1400.59	-2.69
Wind 90 deg - Service		15.20	0.00	0.00	-1624.12	-3.84
Wind 120 deg - Service		13.44	7.76	822.36	-1424.36	-4.05
Wind 150 deg - Service		7.60	13.17	1406.53	-812.06	-2.98
Wind 180 deg - Service		0.00	15.10	1617.26	0.00	-1.21
Wind 210 deg - Service		-7.60	13.17	1406.53	812.06	0.86
Wind 240 deg - Service		-13.44	7.76	822.36	1424.36	2.79
Wind 270 deg - Service		-15.20	0.00	0.00	1624.12	3.84
Wind 300 deg - Service		-13.08	-7.55	-808.63	1400.59	3.90
Wind 330 deg - Service		-7.60	-13.17	-1406.53	812.06	2.98

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+ Wind 0 deg - No Ice
3	Dead+ Wind 30 deg - No Ice
4	Dead+ Wind 60 deg - No Ice
5	Dead+ Wind 90 deg - No Ice
6	Dead+ Wind 120 deg - No Ice
7	Dead+ Wind 150 deg - No Ice
8	Dead+ Wind 180 deg - No Ice

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	Project	Rt 181 West Hartland, CT	Date	13:16:39 12/16/08
	Client	AT&T/Cingular - SAI	Designed by	Kevin Barker

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	4	21.47	0.25	-0.14
			Max. Compression	15	-26.34	0.02	1.31
			Max. Mx	23	-26.04	1.12	-0.68
			Max. My	15	-26.34	0.02	1.31
			Max. Vy	23	-2.78	1.12	-0.68
			Max. Vx	15	-3.23	0.02	1.31
		Diagonal	Max Tension	26	2.70	0.00	0.00
			Max. Compression	20	-2.74	0.00	0.00
			Max. Mx	19	0.35	-0.00	-0.00
			Max. My	5	-2.13	-0.00	0.00
			Max. Vy	19	-0.00	-0.00	-0.00
			Max. Vx	5	0.00	0.00	0.00
		Horizontal	Max Tension	21	0.58	0.00	0.00
			Max. Compression	2	-0.37	0.00	0.00
			Max. Mx	14	0.12	0.00	0.00
			Max. My	18	0.06	0.00	-0.00
			Max. Vy	14	-0.00	0.00	0.00
			Max. Vx	18	0.00	0.00	0.00
		Top Girt	Max Tension	23	0.15	0.00	0.00
			Max. Compression	17	-0.19	0.00	0.00
			Max. Mx	14	0.01	0.01	0.00
			Max. My	18	0.03	0.00	-0.00
			Max. Vy	14	-0.01	0.00	0.00

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	AT&T/Cingular - SAI	Kevin Barker

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T2	160 - 140	Bottom Girt	Max. Vx	18	0.00	0.00	0.00
			Max Tension	21	0.53	0.00	0.00
			Max. Compression	2	-0.43	0.00	0.00
			Max. Mx	14	0.06	0.01	0.00
			Max. My	18	0.06	0.00	-0.00
			Max. Vy	14	-0.01	0.00	0.00
		Leg	Max. Vx	18	0.00	0.00	0.00
			Max Tension	17	44.69	-2.20	0.05
			Max. Compression	15	-55.83	3.27	-0.00
			Max. Mx	15	-55.83	3.27	-0.00
			Max. My	18	-3.68	-0.21	3.28
			Max. Vy	21	-0.75	-2.18	0.01
		Diagonal	Max. Vx	18	0.91	-0.21	3.28
			Max Tension	20	6.70	0.00	0.00
			Max. Compression	20	-6.84	0.00	0.00
			Max. Mx	15	5.44	0.06	0.00
			Max. My	26	-5.64	-0.02	-0.02
			Max. Vy	15	-0.02	0.06	0.00
T3	140 - 120	Leg	Max. Vx	26	0.00	0.00	0.00
			Max Tension	17	81.44	-3.37	0.05
			Max. Compression	15	-100.01	3.90	0.00
			Max. Mx	15	-100.01	3.90	0.00
			Max. My	18	-7.28	-0.12	4.19
			Max. Vy	21	-0.75	-2.93	-0.00
		Diagonal	Max. Vx	24	-0.59	0.13	-2.40
			Max Tension	20	7.18	0.00	0.00
			Max. Compression	20	-7.47	0.00	0.00
			Max. Mx	15	5.69	0.08	-0.00
			Max. My	25	-6.25	-0.01	-0.01
			Max. Vy	15	-0.02	0.08	-0.00
		Leg	Max. Vx	25	0.00	0.00	0.00
			Max Tension	17	113.91	-3.79	0.03
			Max. Compression	15	-139.81	4.33	-0.00
			Max. Mx	15	-139.81	4.33	-0.00
			Max. My	18	-10.80	-0.02	4.31
			Max. Vy	21	0.15	-4.12	0.01
T4	120 - 100	Diagonal	Max. Vx	18	-0.17	-0.02	4.31
			Max Tension	20	6.79	0.00	0.00
			Max. Compression	20	-6.98	0.00	0.00
			Max. Mx	15	5.38	0.07	-0.00
			Max. My	19	-0.42	0.04	0.01
			Max. Vy	15	-0.02	0.07	-0.00
		Leg	Max. Vx	19	0.00	0.00	0.00
			Max Tension	17	142.18	-3.95	0.02
			Max. Compression	15	-176.15	4.28	0.00
			Max. Mx	15	-158.03	4.33	-0.00
			Max. My	18	-11.48	-0.02	4.31
			Max. Vy	21	-0.14	-4.12	0.01
		Diagonal	Max. Vx	24	-0.19	-0.02	-4.30
			Max Tension	20	6.72	0.00	0.00
			Max. Compression	20	-6.93	0.00	0.00
			Max. Mx	15	5.65	0.09	-0.00
			Max. My	18	-3.30	0.04	0.01
			Max. Vy	17	0.03	0.08	0.01
T5	100 - 80	Leg	Max. Vx	18	-0.00	0.00	0.00
			Max Tension	17	167.33	-3.63	0.02
			Max. Compression	15	-209.44	5.43	-0.01
			Max. Mx	15	-209.44	5.43	-0.01
			Max. My	18	-16.21	0.04	4.73
			Max. Vy	23	-0.27	5.41	-0.08
		Diagonal	Max. Vx	24	0.15	0.04	-4.72
T6	80 - 60	Leg					
		Diagonal					

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T7	60 - 40	Diagonal	Max Tension	20	6.75	0.00	0.00
			Max. Compression	20	-7.02	0.00	0.00
		Leg	Max. Mx	15	5.70	0.10	-0.01
			Max. My	25	-5.87	0.02	-0.01
			Max. Vy	17	0.03	0.09	0.01
			Max. Vx	25	0.00	0.00	0.00
			Max Tension	17	190.50	-3.69	0.01
			Max. Compression	15	-241.78	3.61	0.00
			Max. Mx	15	-225.02	5.43	-0.01
			Max. My	18	-16.93	0.04	4.73
			Max. Vy	21	-0.24	-4.93	0.02
			Max. Vx	24	-0.21	0.04	-4.72
		Diagonal	Max Tension	20	7.11	0.00	0.00
			Max. Compression	20	-7.36	0.00	0.00
T8	40 - 20	Leg	Max. Mx	15	6.21	0.13	-0.01
			Max. My	25	-6.00	0.06	-0.01
			Max. Vy	17	0.05	0.13	0.01
			Max. Vx	25	0.00	0.00	0.00
			Max Tension	17	210.96	-1.59	0.02
			Max. Compression	15	-273.05	-0.24	-0.00
		Diagonal	Max. Mx	17	210.37	-9.38	0.04
			Max. My	16	-20.66	2.05	-4.38
			Max. Vy	21	0.88	-9.35	0.01
			Max. Vx	18	0.21	2.08	4.36
			Max Tension	20	8.24	0.00	0.00
			Max. Compression	20	-7.76	0.00	0.00
T9	20 - 0	Leg	Max. Mx	15	7.24	0.14	-0.01
			Max. My	25	-6.54	0.07	-0.02
			Max. Vy	17	0.05	0.14	0.01
			Max. Vx	25	0.00	0.00	0.00
			Max Tension	17	228.26	4.28	0.03
			Max. Compression	15	-304.03	-0.00	0.00
		Diagonal	Max. Mx	15	-285.45	12.23	0.01
			Max. My	16	-25.92	8.07	-6.78
			Max. Vy	21	-1.48	-9.35	0.01
			Max. Vx	18	0.77	8.10	6.74
			Max Tension	20	11.47	0.00	0.00
			Max. Compression	20	-9.76	0.00	0.00
		Leg	Max. Mx	17	2.97	0.22	0.02
			Max. My	25	-8.86	0.14	-0.03
			Max. Vy	17	0.07	0.22	0.02
			Max. Vx	25	0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	23	305.94	21.11	-12.53
	Max. H _x	10	257.80	22.39	-13.17
	Max. H _z	17	-236.47	-26.29	15.43
	Min. Vert	17	-236.47	-26.29	15.43
	Min. H _x	17	-236.47	-26.29	15.43
	Min. H _z	10	257.80	22.39	-13.17
Leg B	Max. Vert	19	306.49	-21.09	-12.58
	Max. H _x	25	-235.92	26.26	15.46
	Max. H _z	25	-235.92	26.26	15.46

RISATower

URS Corporation
 500 Enterprise Drive, Suite 3B
 Rocky Hill, CT 06067
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Project

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Client

AT&T/Cingular - SAI

Designed by

Kevin Barker

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg A	Min. Vert	25	-235.92	26.26	15.46
	Min. H _x	6	258.02	-22.35	-13.26
	Min. H _z	6	258.02	-22.35	-13.26
	Max. Vert	15	308.61	0.05	24.60
	Max. H _x	24	26.19	1.90	-4.19
	Max. H _z	2	258.82	0.09	26.00
	Min. Vert	21	-233.80	-0.03	-30.43
	Min. H _x	19	-115.03	-1.90	-18.64
	Min. H _z	21	-233.80	-0.03	-30.43

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _y K	Overturning Moment, M _x kip-ft	Overturning Moment, M _y kip-ft	Torque kip-ft
Dead Only	41.99	0.00	0.00	-10.41	-2.17	0.00
Dead+ Wind 0 deg - No Ice	41.99	0.00	-39.72	-4240.39	-2.19	3.23
Dead+ Wind 30 deg - No Ice	41.99	19.46	-33.71	-3627.90	-2090.71	-2.22
Dead+ Wind 60 deg - No Ice	41.99	33.48	-19.33	-2090.20	-3604.35	-6.93
Dead+ Wind 90 deg - No Ice	41.99	38.92	-0.00	-10.49	-4179.24	-9.90
Dead+ Wind 120 deg - No Ice	41.99	34.39	19.86	2104.49	-3665.43	-10.43
Dead+ Wind 150 deg - No Ice	41.99	19.46	33.71	3606.98	-2090.72	-7.65
Dead+ Wind 180 deg - No Ice	41.99	0.00	38.65	4148.99	-2.19	-3.11
Dead+ Wind 210 deg - No Ice	41.99	-19.46	33.71	3606.99	2086.35	2.22
Dead+ Wind 240 deg - No Ice	41.99	-34.39	19.86	2104.49	3661.06	7.20
Dead+ Wind 270 deg - No Ice	41.99	-38.92	-0.00	-10.49	4174.88	9.90
Dead+ Wind 300 deg - No Ice	41.99	-33.48	-19.33	-2090.21	3599.99	10.04
Dead+ Wind 330 deg - No Ice	41.99	-19.46	-33.71	-3627.90	2086.34	7.65
Dead+ Ice+Temp	73.75	-0.00	0.00	-27.51	-5.50	-0.00
Dead+ Wind 0 deg+Ice+Temp	73.75	-0.00	-45.98	-4919.47	-5.53	1.52
Dead+ Wind 30 deg+Ice+Temp	73.75	21.32	-36.93	-4011.52	-2305.62	-4.22
Dead+ Wind 60 deg+Ice+Temp	73.75	35.97	-20.77	-2279.18	-3905.20	-8.44
Dead+ Wind 90 deg+Ice+Temp	73.75	42.65	-0.00	-27.73	-4605.69	-10.91
Dead+ Wind 120 deg+Ice+Temp	73.75	39.82	22.99	2418.21	-4241.98	-11.15
Dead+ Wind 150 deg+Ice+Temp	73.75	21.32	36.93	3956.19	-2305.61	-6.63
Dead+ Wind 180 deg+Ice+Temp	73.75	-0.00	41.54	4475.31	-5.54	-1.35
Dead+ Wind 210 deg+Ice+Temp	73.75	-21.32	36.93	3956.19	2294.54	4.22
Dead+ Wind 240 deg+Ice+Temp	73.75	-39.82	22.99	2418.20	4230.91	9.64
Dead+ Wind 270 deg+Ice+Temp	73.75	-42.65	-0.00	-27.73	4594.63	10.91
Dead+ Wind 300 deg+Ice+Temp	73.75	-35.97	-20.77	-2279.18	3894.14	9.79
Dead+ Wind 330 deg+Ice+Temp	73.75	-21.32	-36.93	-4011.52	2294.55	6.63
Dead+ Wind 0 deg - Service	41.99	0.00	-15.51	-1662.82	-2.18	1.26
Dead+ Wind 30 deg - Service	41.99	7.60	-13.17	-1423.55	-818.03	-0.87
Dead+ Wind 60 deg - Service	41.99	13.08	-7.55	-822.87	-1409.31	-2.71
Dead+ Wind 90 deg - Service	41.99	15.20	-0.00	-10.46	-1633.88	-3.87
Dead+ Wind 120 deg - Service	41.99	13.44	7.76	815.72	-1433.17	-4.07
Dead+ Wind 150 deg - Service	41.99	7.60	13.17	1402.64	-818.03	-2.99
Dead+ Wind 180 deg - Service	41.99	0.00	15.10	1614.36	-2.18	-1.21
Dead+ Wind 210 deg - Service	41.99	-7.60	13.17	1402.64	813.67	0.87
Dead+ Wind 240 deg - Service	41.99	-13.44	7.76	815.72	1428.81	2.81
Dead+ Wind 270 deg - Service	41.99	-15.20	-0.00	-10.47	1629.52	3.87
Dead+ Wind 300 deg - Service	41.99	-13.08	-7.55	-822.87	1404.95	3.92
Dead+ Wind 330 deg - Service	41.99	-7.60	-13.17	-1423.56	813.67	2.99

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Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-41.99	0.00	0.00	41.99	0.00	0.000%
2	0.00	-41.99	-39.72	-0.00	41.99	39.72	0.000%
3	19.46	-41.99	-33.71	-19.46	41.99	33.71	0.000%
4	33.48	-41.99	-19.33	-33.48	41.99	19.33	0.000%
5	38.92	-41.99	0.00	-38.92	41.99	0.00	0.001%
6	34.39	-41.99	19.86	-34.39	41.99	-19.86	0.000%
7	19.46	-41.99	33.71	-19.46	41.99	-33.71	0.000%
8	0.00	-41.99	38.65	0.00	41.99	-38.65	0.000%
9	-19.46	-41.99	33.71	19.46	41.99	-33.71	0.000%
10	-34.39	-41.99	19.86	34.39	41.99	-19.86	0.000%
11	-38.92	-41.99	0.00	38.92	41.99	0.00	0.001%
12	-33.48	-41.99	-19.33	33.48	41.99	19.33	0.000%
13	-19.46	-41.99	-33.71	19.46	41.99	33.71	0.000%
14	0.00	-73.75	0.00	0.00	73.75	-0.00	0.000%
15	0.00	-73.75	-45.98	0.00	73.75	45.98	0.000%
16	21.32	-73.75	-36.93	-21.32	73.75	36.93	0.000%
17	35.97	-73.75	-20.77	-35.97	73.75	20.77	0.000%
18	42.65	-73.75	0.00	-42.65	73.75	0.00	0.000%
19	39.82	-73.75	22.99	-39.82	73.75	-22.99	0.000%
20	21.32	-73.75	36.93	-21.32	73.75	-36.93	0.000%
21	0.00	-73.75	41.54	0.00	73.75	-41.54	0.000%
22	-21.32	-73.75	36.93	21.32	73.75	-36.93	0.000%
23	-39.82	-73.75	22.99	39.82	73.75	-22.99	0.000%
24	-42.65	-73.75	0.00	42.65	73.75	0.00	0.000%
25	-35.97	-73.75	-20.77	35.97	73.75	20.77	0.000%
26	-21.32	-73.75	-36.93	21.32	73.75	36.93	0.000%
27	0.00	-41.99	-15.51	0.00	41.99	15.51	0.000%
28	7.60	-41.99	-13.17	-7.60	41.99	13.17	0.000%
29	13.08	-41.99	-7.55	-13.08	41.99	7.55	0.000%
30	15.20	-41.99	0.00	-15.20	41.99	0.00	0.000%
31	13.44	-41.99	7.76	-13.44	41.99	-7.76	0.000%
32	7.60	-41.99	13.17	-7.60	41.99	-13.17	0.000%
33	0.00	-41.99	15.10	-0.00	41.99	-15.10	0.000%
34	-7.60	-41.99	13.17	7.60	41.99	-13.17	0.000%
35	-13.44	-41.99	7.76	13.44	41.99	-7.76	0.000%
36	-15.20	-41.99	0.00	15.20	41.99	0.00	0.000%
37	-13.08	-41.99	-7.55	13.08	41.99	7.55	0.000%
38	-7.60	-41.99	-13.17	7.60	41.99	13.17	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000119
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001

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11	Yes	4	0.00000001	0.00000119
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000139
16	Yes	4	0.00000001	0.00000198
17	Yes	4	0.00000001	0.00000293
18	Yes	4	0.00000001	0.00000224
19	Yes	4	0.00000001	0.00000151
20	Yes	4	0.00000001	0.00000195
21	Yes	4	0.00000001	0.00000203
22	Yes	4	0.00000001	0.00000198
23	Yes	4	0.00000001	0.00000148
24	Yes	4	0.00000001	0.00000225
25	Yes	4	0.00000001	0.00000298
26	Yes	4	0.00000001	0.00000195
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	7.280	27	0.4065	0.0384
T2	160 - 140	5.590	27	0.3717	0.0295
T3	140 - 120	4.082	27	0.3204	0.0191
T4	120 - 100	2.848	27	0.2456	0.0131
T5	100 - 80	1.903	27	0.1869	0.0090
T6	80 - 60	1.181	27	0.1421	0.0063
T7	60 - 40	0.646	27	0.0967	0.0039
T8	40 - 20	0.291	27	0.0618	0.0024
T9	20 - 0	0.079	27	0.0270	0.0011

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
190.00	20' x 3" Dia Omni	27	7.280	0.4065	0.0384	94747
185.00	10' Dipole	27	7.280	0.4065	0.0384	94747
178.00	6 Arm Halo Mount	27	7.108	0.4033	0.0376	94747
170.00	PiROD 12' Lightweight T-Frame	27	6.423	0.3901	0.0342	47373
160.00	PiROD 12' Lightweight T-Frame	27	5.590	0.3717	0.0295	24299
150.00	PiROD 12' Lightweight T-Frame	27	4.806	0.3495	0.0241	19775

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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
140.00	PiROD 12' Lightweight T-Frame	27	4.082	0.3204	0.0191	17079

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
T1	180 - 160	21.117	15	1.1573	0.1000
T2	160 - 140	16.304	15	1.0644	0.0805
T3	140 - 120	11.972	15	0.9256	0.0541
T4	120 - 100	8.388	15	0.7164	0.0370
T5	100 - 80	5.619	15	0.5486	0.0254
T6	80 - 60	3.493	15	0.4184	0.0175
T7	60 - 40	1.914	15	0.2854	0.0108
T8	40 - 20	0.862	15	0.1825	0.0068
T9	20 - 0	0.235	15	0.0800	0.0031

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
190.00	20' x 3" Dia Omni	15	21.117	1.1573	0.1000	36375
185.00	10' Dipole	15	21.117	1.1573	0.1000	36375
178.00	6 Arm Halo Mount	15	20.627	1.1486	0.0983	36375
170.00	PiROD 12' Lightweight T-Frame	15	18.677	1.1133	0.0912	18187
160.00	PiROD 12' Lightweight T-Frame	15	16.304	1.0644	0.0805	9302
150.00	PiROD 12' Lightweight T-Frame	15	14.057	1.0047	0.0671	7390
140.00	PiROD 12' Lightweight T-Frame	15	11.972	0.9256	0.0541	6271

Bolt Design Data

Section No.	Elevation	Component Type	Bolt Grade	Bolt Size	Number Of Bolts	Maximum Load per Bolt	Allowable Load	Ratio Load Allowable	Allowable Ratio	Criteria
	ft			in		K	K			
T2	160	Leg	A325N	1.0000	6	4.52	34.56	0.131 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	6.70	9.52	0.705 ✓	1.333	Member Bearing
T3	140	Leg	A325N	1.0000	6	10.59	34.56	0.306 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	7.18	9.52	0.754 ✓	1.333	Member Bearing
T4	120	Leg	A325N	1.0000	6	16.49	34.56	0.477 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	6.79	9.52	0.713 ✓	1.333	Member Bearing
T5	100	Leg	A325N	1.0000	6	21.46	34.56	0.621 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	6.72	9.52	0.706 ✓	1.333	Member Bearing

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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load Allowable	Allowable Ratio	Criteria
T6	80	Lcg	A325N	1.0000	6	25.86	34.56	0.748 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	6.75	9.52	0.710 ✓	1.333	Member Bearing
T7	60	Lcg	A325N	1.0000	6	29.88	34.56	0.865 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	7.11	20.39	0.348 ✓	1.333	Member Bearing
T8	40	Lcg	A325N	1.2500	6	33.62	54.00	0.623 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	8.24	20.39	0.404 ✓	1.333	Member Bearing
T9	20	Lcg	A325N	1.2500	6	37.39	53.99	0.693 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	11.47	20.39	0.563 ✓	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	180 - 160	1 1/2	20.00	2.38	76.0 K=1.00	19.800	1.7672	-26.34	34.99	0.753 ✓
T2	160 - 140	Pirol 105216	20.03	10.02	45.4 K=1.00	25.051	3.6816	-55.83	92.23	0.605 ✓
T3	140 - 120	Pirol 105216	20.03	10.02	45.4 K=1.00	25.051	3.6816	-100.01	92.23	1.084 ✓
T4	120 - 100	Pirol 105217	20.03	10.02	37.8 K=1.00	26.132	5.3014	-139.81	138.54	1.009 ✓
T5	100 - 80	Pirol 105218	20.03	10.02	32.4 K=1.00	26.848	7.2158	-176.15	193.73	0.909 ✓
T6	80 - 60	Pirol 105218	20.03	10.02	32.4 K=1.00	26.848	7.2158	-209.44	193.73	1.081 ✓
T7	60 - 40	Pirol 105219	20.03	10.02	28.4 K=1.00	27.351	9.4248	-241.78	257.78	0.938 ✓
T8	40 - 20	Pirol 105219	20.03	10.02	28.4 K=1.00	27.351	9.4248	-273.05	257.78	1.059 ✓
T9	20 - 0	Pirol 105220	20.03	10.02	25.2 K=1.00	27.723	11.9282	-304.03	330.69	0.919 ✓

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L _d ft	Kl/r	F _a ksi	A in ²	Actual V K	Allow. V _a K	Stress Ratio
T2	160 - 140	0.5	1.48	121.0	10.133	0.1963	0.45	2.23	0.201

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Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in ²	Actual V K	Allow. V_a K	Stress Ratio
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	0.75	2.23	0.338 ✓
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	0.19	2.26	0.082 ✓
T5	100 - 80	0.5	1.46	119.0	10.423	0.1963	0.19	2.29	0.085 ✓
T6	80 - 60	0.5	1.46	119.0	10.423	0.1963	0.27	2.29	0.117 ✓
T7	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.25	4.69	0.053 ✓
T8	40 - 20	0.625	1.45	94.4	13.671	0.3068	0.88	4.69	0.188 ✓
T9	20 - 0	0.625	1.43	93.6	13.766	0.3068	1.48	4.73	0.313 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in ²	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	3/4	4.65	2.25	129.8 K=0.90	8.865	0.4418	-2.74	3.92	0.699 ✓
T2	160 - 140	L2 1/2x2 1/2x3/16	11.42	5.00	121.3 K=1.00	10.097	0.9020	-6.84	9.11	0.751 ✓
T3	140 - 120	L2 1/2x2 1/2x3/16	12.50	5.65	136.9 K=1.00	7.965	0.9020	-7.38	7.18	1.027 ✓
T4	120 - 100	L2 1/2x2 1/2x3/16	13.80	6.35	153.9 K=1.00	6.306	0.9020	-6.93	5.69	1.218 ✓
T5	100 - 80	L3x3x3/16	15.24	7.10	143.0 K=1.00	7.302	1.0900	-6.92	7.96	0.869 ✓
T6	80 - 60	L3x3x3/16	16.80	7.90	159.1 K=1.00	5.898	1.0900	-7.02	6.43	1.092 ✓
T7	60 - 40	L3x3x5/16	18.45	8.70	177.2 K=1.00	4.756	1.7800	-7.26	8.47	0.858 ✓
T8	40 - 20	L3x3x5/16	19.30	9.14	186.1 K=1.00	4.311	1.7800	-7.76	7.67	1.011 ✓
T9	20 - 0	L3 1/2x3 1/2x5/16	21.03	10.01	174.1 K=1.00	4.928	2.0900	-9.76	10.30	0.948 ✓

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in ²	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	3/4	4.00	3.88	173.6 K=0.70	4.955	0.4418	-0.37	2.19	0.170 ✓

RISATower

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
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Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	180 - 160	7/8	4.00	3.88	148.8 K=0.70	6.744	0.6013	-0.19	4.06	0.046 ✓

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	180 - 160	7/8	4.00	3.88	148.8 K=0.70	6.744	0.6013	-0.43	4.06	0.107 ✓

Tension Checks**Leg Design Data (Tension)**

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	180 - 160	1 1/2	20.00	2.38	76.0	30.000	1.7672	21.47	53.01	0.405
T2	160 - 140	Pirol 105216	20.03	10.02	45.4	30.000	3.6816	44.22	110.45	0.400 ✓
T3	140 - 120	Pirol 105216	20.03	10.02	45.4	30.000	3.6816	81.44	110.45	0.737 ✓
T4	120 - 100	Pirol 105217	20.03	10.02	37.8	30.000	5.3014	113.91	159.04	0.716 ✓
T5	100 - 80	Pirol 105218	20.03	10.02	32.4	30.000	7.2158	142.18	216.47	0.657 ✓
T6	80 - 60	Pirol 105218	20.03	10.02	32.4	30.000	7.2158	167.33	216.47	0.773 ✓
T7	60 - 40	Pirol 105219	20.03	10.02	28.4	30.000	9.4248	190.50	282.74	0.674 ✓
T8	40 - 20	Pirol 105219	20.03	10.02	28.4	30.000	9.4248	210.96	282.74	0.746 ✓
T9	20 - 0	Pirol 105220	20.03	10.02	25.2	30.000	11.9282	228.26	357.85	0.638 ✓

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Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in ²	Actual V K	Allow. V_a K	Stress Ratio
T2	160 - 140	0.5	1.48	121.0	10.133	0.1963	0.45	2.23	0.201 ✓
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	0.75	2.23	0.338 ✓
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	0.19	2.26	0.082 ✓
T5	100 - 80	0.5	1.46	119.0	10.423	0.1963	0.19	2.29	0.085 ✓
T6	80 - 60	0.5	1.46	119.0	10.423	0.1963	0.27	2.29	0.117 ✓
T7	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.25	4.69	0.053 ✓
T8	40 - 20	0.625	1.45	94.4	13.671	0.3068	0.88	4.69	0.188 ✓
T9	20 - 0	0.625	1.43	93.6	13.766	0.3068	1.48	4.73	0.313 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in ²	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	3/4	4.65	2.25	144.2	30.000	0.4418	2.70	13.25	0.204 ✓
T2	160 - 140	L2 1/2x2 1/2x3/16	11.42	5.00	80.1	21.600	0.9020	6.70	19.48	0.344 ✓
T3	140 - 120	L2 1/2x2 1/2x3/16	11.93	5.40	86.2	21.600	0.9020	7.18	19.48	0.368 ✓
T4	120 - 100	L2 1/2x2 1/2x3/16	13.13	6.04	96.0	21.600	0.9020	6.79	19.48	0.348 ✓
T5	100 - 80	L3x3x3/16	14.50	6.75	88.6	21.600	1.0900	6.72	23.54	0.285 ✓
T6	80 - 60	L3x3x3/16	16.01	7.52	98.4	21.600	1.0900	6.75	23.54	0.287 ✓
T7	60 - 40	L3x3x5/16	17.62	8.29	110.8	21.600	1.7800	7.11	38.45	0.185 ✓
T8	40 - 20	L3x3x5/16	20.16	9.56	127.4	21.600	1.7800	8.24	38.45	0.214 ✓
T9	20 - 0	L3 1/2x3 1/2x5/16	21.92	10.45	118.6	21.600	2.0900	11.47	45.14	0.254 ✓

Horizontal Design Data (Tension)

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Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P	Allow. P _a	Ratio P
	ft		ft	ft		ksi	in ²	K	K	$\frac{P}{P_a}$
T1	180 - 160	3/4	4.00	3.88	248.0	30.000	0.4418	0.58	13.25	0.044 ✓

Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P	Allow. P _a	Ratio P
	ft		ft	ft		ksi	in ²	K	K	$\frac{P}{P_a}$
T1	180 - 160	7/8	4.00	3.88	212.6	30.000	0.6013	0.15	18.04	0.008 ✓

Bottom Girt Design Data (Tension)

Section No.	Elevation	Size	L	L _u	Kl/r	F _a	A	Actual P	Allow. P _a	Ratio P
	ft		ft	ft		ksi	in ²	K	K	$\frac{P}{P_a}$
T1	180 - 160	7/8	4.00	3.88	212.6	30.000	0.6013	0.53	18.04	0.029 ✓

Section Capacity Table

Section No.	Elevation	Component Type	Size	Critical Element	P	SF*P _{allow}	% Capacity	Pass Fail
	ft				K	K		
T1	180 - 160	Leg	1 1/2	3	-26.34	46.64	56.5	Pass
T2	160 - 140	Leg	Pirol 105216	67	-55.83	122.94	45.4	Pass
T3	140 - 120	Leg	Pirol 105216	82	-100.01	122.94	81.4	Pass
T4	120 - 100	Leg	Pirol 105217	97	-139.81	184.67	75.7	Pass
T5	100 - 80	Leg	Pirol 105218	112	-176.15	258.24	68.2	Pass
T6	80 - 60	Leg	Pirol 105218	127	-209.44	258.24	81.1	Pass
T7	60 - 40	Leg	Pirol 105219	142	-241.78	343.62	70.4	Pass
T8	40 - 20	Leg	Pirol 105219	157	-273.05	343.62	79.5	Pass
T9	20 - 0	Leg	Pirol 105220	172	-304.03	440.81	69.0	Pass
T1	180 - 160	Diagonal	3/4	12	-2.74	5.22	52.5	Pass
T2	160 - 140	Diagonal	L2 1/2x2 1/2x3/16	70	-6.84	12.14	56.4	Pass
T3	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	85	-7.38	9.58	77.0	Pass
T4	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	100	-6.93	7.58	91.4	Pass
T5	100 - 80	Diagonal	L3x3x3/16	115	-6.92	10.61	65.2	Pass
T6	80 - 60	Diagonal	L3x3x3/16	130	-7.02	8.57	81.9	Pass
T7	60 - 40	Diagonal	L3x3x5/16	145	-7.26	11.28	64.3	Pass
T8	40 - 20	Diagonal	L3x3x5/16	166	-7.76	10.23	75.8	Pass
T9	20 - 0	Diagonal	L3 1/2x3 1/2x5/16	181	-9.76	13.73	71.1	Pass
T1	180 - 160	Horizontal	3/4	16	-0.37	2.92	12.8	Pass
T1	180 - 160	Top Girt	7/8	5	-0.19	5.41	3.4	Pass
T1	180 - 160	Bottom Girt	7/8	7	-0.43	5.41	8.0	Pass
							Summary	
							Leg (T3)	81.4 Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
						Diagonal (T4)	91.4	Pass
						Horizontal (T1)	12.8	Pass
						Top Girt (T1)	3.4	Pass
						Bottom Girt (T1)	8.0	Pass
						Bolt Checks	64.9	Pass
						RATING =	91.4	Pass

Program Version 5.3.1.0 - 10/3/2008 File:P:/08/ERI Files/180 PiROD U20 x180 Lattice_Hartland_CT (SAI-038).cri

ANCHOR BOLT ANALYSIS



Job	180' PiRod Self-Supporting Tower, E. Hartland, CT	Project No.	SAI-038	Page	of
Description	Anchor Bolt Analysis	Computed by	KAB	Sheet	1 of 3
		Checked by		Date	12/16/08
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ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	Uplift := 236-kips	user input
Shear:	Shear := 46-kips	user input
Compression:	Compression := 309-kips	user input

Anchor Bolt Data:

Use ASTM A687

Number of Anchor Bolts = N	$N_{\text{min}} := 6$	user input
Bolt Ultimate Strength:	$F_u := 150\text{-ksi}$	user input
Bolt Yield Strength:	$F_y := 105\text{-ksi}$	user input
Bolt Modulus:	$E := 29000\text{-ksi}$	user input
Thickness of Anchor Bolts	$D := 1.25\text{in}$	user input
Threads per Inch:	$n := 8$	user input
Coefficient of Friction:	$\mu := 0.55$	user input (for baseplate with grout ASCE 10-97)

Anchor Bolt Area:

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \quad A_g = 1.227 \cdot \text{in}^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot \text{in}}{n} \right)^2 \quad A_n = 1.000 \cdot \text{in}^2$$

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$$\text{AllowableTension} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) \quad \text{AllowableTension} = 81.0 \cdot \text{kips}$$

Note: 1.333 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{\text{net.area}} := 1.33 \cdot (0.60 \cdot A_n \cdot F_y) \quad F_{\text{net.area}} = 83.8 \cdot \text{kips}$$

Note: 1.333 increase allowed per TIA/EIA

Applied Tension:

$$\text{MaxTension} := \frac{\text{Uplift}}{N} \quad \text{MaxTension} = 39.3 \cdot \text{kips}$$

Check Stresses:

$$\frac{\text{MaxTension}}{F_{\text{net.area}}} = 0.47$$

$$\text{Condition1} := \text{if} \left(\frac{\text{MaxTension}}{F_{\text{net.area}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$$

$$\text{Condition1} = \text{"OK"}$$

Check Anchor Bolt Area:

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

Required Area:

$$A_{s1} := \frac{\text{Uplift}}{F_y} + \frac{\text{Shear}}{\mu \cdot 0.85 \cdot F_y} \quad A_{s1} = 3.2 \cdot \text{in}^2$$

$$A_{s2} := \left| \frac{\text{Shear} - (0.3 \cdot \text{Compression})}{\mu \cdot 0.85 \cdot F_y} \right| \quad A_{s2} = 1.0 \cdot \text{in}^2$$

Provided Area:

$$A_{\text{provided}} := A_n \cdot N \quad A_{\text{provided}} = 6.0 \cdot \text{in}^2$$

$$\text{Condition2} := \text{if} \left(\frac{A_{s1}}{A_{\text{provided}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right) \quad \frac{A_{s1}}{A_{\text{provided}}} = 0.5$$

Condition2 = "OK"

$$\text{Condition3} := \text{if} \left(\frac{A_{s2}}{A_{\text{provided}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right) \quad \frac{A_{s2}}{A_{\text{provided}}} = 0.2$$

Condition3 = "OK"

FOUNDATION ANALYSIS

PIER AND MAT FOUNDATION ANALYSIS - 3 PIERS

TOWER FORCES:

Moment Caused by Tower $M_t := 4919 \cdot \text{kip} \cdot \text{ft}$
 Shear at Base of Tower $S_t := 46 \cdot \text{kip}$
 Max Compressive Force $C_t := 309 \cdot \text{kip}$
 Max Uplift $U_t := 236 \cdot \text{kip}$
 Height of Tower $H_t := 180 \cdot \text{ft}$
 Width of Tower at Base $W_t := 20.0 \cdot \text{ft}$
 Weight of Tower $WT_t := 1.0 \cdot \text{kip}$

NOTE: Weight of Tower is incorporated into the other loads listed above and is therefore set equal to one for programming.

FOOTING DIMENSIONS:

Width of Footing $W_f := 28.5 \cdot \text{ft}$
 Overall Depth of Footing $D_f := 6.0 \cdot \text{ft}$
 Length of Pier $L_p := 3.75 \cdot \text{ft}$
 Extension of Pier Above Grade $L_{pag} := 0.5 \cdot \text{ft}$
 Diameter of Pier $d_p := 5.0 \cdot \text{ft}$
 Thickness of Footing $T_f := 2.75 \cdot \text{ft}$
 Reinforcement Cover: $C_{vr} := 3 \cdot \text{in}$

MATERIAL PROPERTIES:

Compressive Strength of Concrete	$f_c := 3500 \cdot \text{psi}$	Unit Weight of Soil	$\gamma_{\text{soil}} := 120 \cdot \text{pcf}$
Yield Strength of Steel Reinforcement	$f_y := 60000 \cdot \text{psi}$	Unit Weight of Concrete	$\gamma_{\text{conc}} := 150 \cdot \text{pcf}$
Internal Friction Angle of Soil	$\phi_s := 30 \cdot \text{deg}$	Depth to Neglect	$n := 0 \cdot \text{ft}$
Allowable Bearing Capacity	$q_s := 3000 \cdot \text{psf}$	Cohesion of Clay Type Soil	$c_{\text{max}} := 0 \cdot \text{ksf}$
		Note: Use 0 for Sandy Soil	

Coefficient of Lateral Soil Pressure:

$$K_p := \frac{1 + \sin(\phi_s)}{1 - \sin(\phi_s)} \quad K_p = 3$$

Is foundation subject to buoyancy (Yes=1/N=0):

Bouyancy := 0

What is Position of Center of Tower with respect to Center of Pad?

1=Offset
2=Not Offset

Pos_{tower} := 1

Adjusted Unit Weights: $\gamma_c := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{conc}} - 62.4 \cdot \text{pcf}, \gamma_{\text{conc}})$
 $\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{soil}} - 62.4 \cdot \text{pcf}, \gamma_{\text{soil}})$

$\gamma_c = 150 \cdot \text{pcf}$

$\gamma_s = 120 \cdot \text{pcf}$

STEEL REINFORCING:

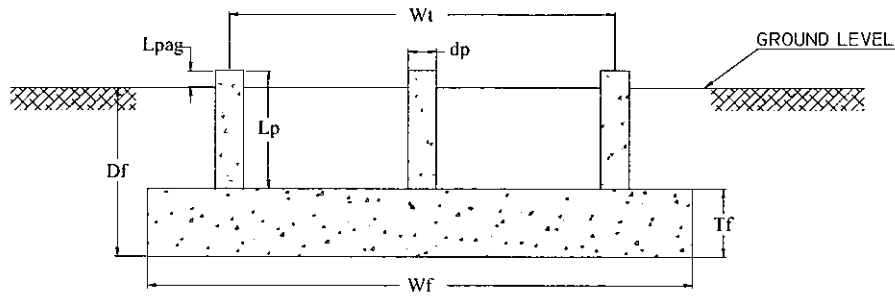
PIER REINFORCEMENT:

Bar Size	BS _{pier} := 8	Bar Diameter	$d_{\text{bpier}} := 1.000 \cdot \text{in}$
Number of Bars	NB _{pier} := 18	Bar Area	$A_{\text{bpier}} := 0.790 \cdot \text{in}^2$

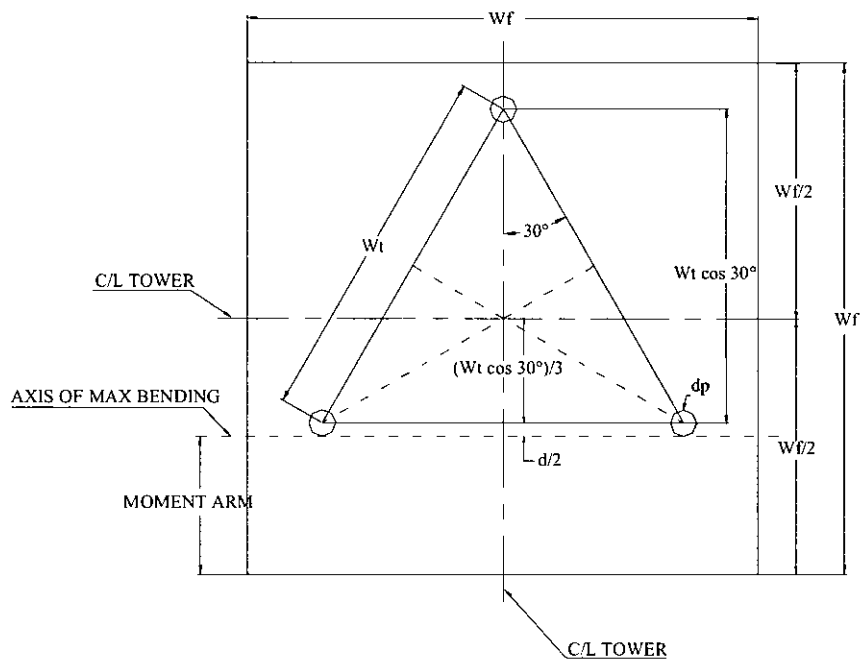
PAD REINFORCEMENT:

Bar Size	BS _{pad} := 9	Bar Diameter	$d_{\text{bpad}} := 1.128 \cdot \text{in}$
Number of Bars	NB _{pad} := 35	Bar Area	$A_{\text{bpad}} := 1.000 \cdot \text{in}^2$

FOUNDATION OVERVIEW



ELEVATION



PLAN

STABILITY OF FOOTING

Factor of Safety Req'd: $FS_{req} := 2.0$

Passive Pressure:

$$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} \quad P_{pn} = 0 \cdot \text{ksf}$$

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} \quad P_{pt} = 1.17 \cdot \text{ksf}$$

$$P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}] \quad P_{top} = 1.17 \cdot \text{ksf}$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} \quad P_{bot} = 2.16 \cdot \text{ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} \quad P_{ave} = 1.665 \cdot \text{ksf}$$

Shear:

$$T_{pp} := \text{if}[n < (D_f - T_f), T_f, (D_f - n)] \quad T_{pp} = 2.75 \cdot \text{ft}$$

$$A_{pp} := W_f \cdot T_{pp} \quad A_{pp} = 78.375 \cdot \text{ft}^2$$

Ultimate Shear:

$$S_u := P_{ave} \cdot A_{pp} \quad S_u = 130.4944 \cdot \text{kip}$$

Weight of Concrete Pad:

$$WT_c := (W_f^2 \cdot T_f) \cdot \gamma_c \quad WT_c = 335.0531 \cdot \text{kip}$$

Weight of Soil above Footing:

$$WT_{s1} := W_f^2 \cdot (D_f - T_f - n) \cdot \gamma_s \quad WT_{s1} = 316.7775 \cdot \text{kip}$$

Weight of Soil Wedge at back face:

$$WT_{s2} := \left[\frac{(D_f - n)^2 \cdot \tan(\phi_s)}{2} \cdot W_f \right] \cdot \gamma_s \quad WT_{s2} = 35.5417 \cdot \text{kip}$$

Distance to center of Tower Leg from Edge of Footing:

$$X_{t1} := \frac{W_f}{2} - \frac{W_t \cdot \cos(30 \cdot \text{deg})}{2} \quad X_{t2} := \frac{W_f}{2} - \frac{W_t \cdot \cos(30 \cdot \text{deg})}{3}$$

$$X_t := \text{if}(\text{Pos}_{tower} = 1, X_{t1}, X_{t2}) \quad X_t = 5.5897 \cdot \text{ft}$$

Additional Offset of Footing:

$$X_{off1} := \frac{W_f}{2} - \left(\frac{W_t \cdot \cos(30 \cdot \text{deg})}{3} + X_t \right) \quad X_{off2} := 0$$

$$X_{off} := \text{if}(\text{Pos}_{tower} = 1, X_{off1}, X_{off2}) \quad X_{off} = 2.8868 \cdot \text{ft}$$

Resisting Moment:

$$M_r := (WT_c + WT_{s1}) \cdot \frac{W_f}{2} + WT_t \cdot \left(\frac{W_f}{2} - X_{off} \right) + S_u \cdot \frac{T_{pp}}{3} + WT_{s2} \cdot \left(W_f + \frac{T_{pp} \cdot \tan(\phi_s)}{3} \right)$$

$$M_r = 10451.3175 \cdot \text{kip} \cdot \text{ft}$$

Overturning Moment:

$$M_{ot} := M_t + S_t \cdot (L_p + T_f) + WT_t \cdot X_{off} \quad M_{ot} = 5220.8868 \cdot \text{kip} \cdot \text{ft}$$

Factor of Safety:

$$FS := \frac{M_r}{M_{ot}} \quad FS = 2.002$$

$$\text{SafetyCheck} := \text{if}(FS > FS_{req}, \text{"Okay"}, \text{"No Good"}) \quad \text{SafetyCheck} = \text{"Okay"}$$

BEARING PRESSURE CHECK:

Pressure Applied:

$$\text{LOAD}_{\text{tot}} := \text{WT}_c + \text{WT}_{s1} + \text{WT}_t$$

$$\text{LOAD}_{\text{tot}} = 652.8306 \cdot \text{kip}$$

$$A_{\text{mat}} := W_f^2$$

$$A_{\text{mat}} = 812.25 \cdot \text{ft}^2$$

$$S := \frac{W_f^3}{6}$$

$$S = 3858.1875 \cdot \text{ft}^3$$

$$P_{\text{max}} := \frac{\text{LOAD}_{\text{tot}}}{A_{\text{mat}}} + \frac{M_{\text{ot}}}{S}$$

$$P_{\text{max}} = 2.1569 \cdot \text{ksf}$$

$$P_{\text{min}} := \frac{\text{LOAD}_{\text{tot}}}{A_{\text{mat}}} - \frac{M_{\text{ot}}}{S}$$

$$P_{\text{min}} = -0.5495 \cdot \text{ksf}$$

$$\text{MaxPressure} := \text{if}(P_{\text{max}} < q_s, \text{"Okay"}, \text{"No Good"})$$

$$\text{MaxPressure} = \text{"Okay"}$$

$$\text{MinPressure} := \text{if}((P_{\text{min}} \geq 0) \cdot (P_{\text{min}} < q_s), \text{"Okay"}, \text{"No Good"})$$

$$\text{MinPressure} = \text{"No Good"}$$

Distance to Resultant of Pressure Distribution:

$$X_p := \frac{P_{\text{max}}}{\frac{P_{\text{max}} - P_{\text{min}}}{W_f} \cdot \frac{1}{3}}$$

$$X_p = 7.5713 \cdot \text{ft}$$

Distance to Kern:

$$X_k := \frac{W_f}{3}$$

$$X_k = 9.5 \cdot \text{ft}$$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity:

$$e := \frac{M_{\text{ot}}}{\text{LOAD}_{\text{tot}}}$$

$$e = 7.9973$$

Adjusted Soil Pressure:

$$q_a := \frac{2 \cdot \text{LOAD}_{\text{tot}}}{3 \cdot W_f \left(\frac{W_f}{2} - e \right)}$$

$$q_a = 2.4423 \cdot \text{ksf}$$

Revised Maximum:

$$q_{\text{max}} := \text{if}(X_p < X_k, q_a, P_{\text{max}})$$

$$q_{\text{max}} = 2.4423 \cdot \text{kip}$$

$$\text{PressureCheck} := \text{if}(q_{\text{max}} < q_s, \text{"Okay"}, \text{"No Good"})$$

$$\text{PressureCheck} = \text{"Okay"}$$

CHECK PUNCHING AND BEAM SHEAR:

Load Factor: (EIA 3.1.1) $LF := \text{if} \left[H_t \leq 700 \cdot \text{ft}, 1.333, \text{if} \left[H_t \geq 1200, 1.7, 1.333 + \left(\frac{H_t - 700}{1200 - 700} \right) \cdot 0.4 \right] \right]$ $LF = 1.333$

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$$\phi_c := .85 \quad (\text{ACI 9.3.2.3})$$

$$d := T_f - C_{vr} - .5 \cdot \text{in}$$

$$d = 29.5 \cdot \text{in}$$

Factored load: $FL := LF \cdot \frac{C_t}{W_f^2}$ $FL = 0.5071 \cdot \text{ksf}$

$$V_{req} := \frac{FL \cdot (X_t - 0.5 \cdot d_p - d) \cdot W_f}{\phi_c} \quad V_{req} = 10.7359 \cdot \text{kip}$$

ACI 11.3.1.1 $V_{Avail} := 2 \cdot \sqrt{f_c \cdot \text{psi}} \cdot W_f \cdot d$ $V_{Avail} = 1193.7466 \cdot \text{kip}$

BeamShearCheck := if($V_{req} < V_{Avail}$, "Okay", "No Good") $\text{BeamShearCheck} = \text{"Okay"}$

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.12.2.1)

$$b_o := (d_p + d) \cdot \pi \quad b_o = 23.431 \cdot \text{ft}$$

$$V_{req} := FL \cdot \frac{W_f^2 - (d_p + d)^2 \cdot \frac{\pi}{4}}{\phi_c} \quad V_{req} = 458.52 \cdot \text{kip}$$

$$V_{Avail} := 4 \cdot \sqrt{f_c \cdot \text{psi}} \cdot b_o \cdot d \quad V_{Avail} = 1962.8582 \cdot \text{kip}$$

PunchingShearCheck := if($V_{req} < V_{Avail}$, "Okay", "No Good") $\text{PunchingShearCheck} = \text{"Okay"}$

TENSILE REINFORCEMENT IN PAD:

$$\phi_m := .90 \text{ per ACI 9.3.2.2}$$

Applied Moments:

$$M_{nT} := LF \cdot \left[U_t \cdot \left(W_t \cdot \sin(60 \cdot \text{deg}) - \frac{d_p}{2} \right) + S_t \cdot (D_f + L_{\text{pag}}) \right] - W_{T_t} \cdot X_{\text{off}}$$

$$M_{nS} := -1 \cdot \left[\frac{1}{2} \cdot \left(\frac{W_f}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot \text{deg}) - \frac{d_p}{2} \right)^2 \cdot W_t \cdot [\gamma_s \cdot (T_{pp} - T_f)] + W_{T_{s2}} \cdot \left[\frac{W_f}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot \text{deg}) - \frac{d_p}{2} + (D_f - n) \cdot \tan(\phi_s) \right] \right]$$

$$M_{nC} := -1 \cdot \left[\frac{1}{2} \cdot \left(\frac{W_f}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot \text{deg}) - \frac{d_p}{2} \right)^2 \cdot W_t \cdot (\gamma_c \cdot T_f) \right]$$

$$\text{Design Moment: } M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} \quad M_n = 3383.803 \cdot \text{kips} \cdot \text{ft}$$

Required Reinforcement:

$$\text{ACI 10.2.7.3} \quad \beta := \text{if } f_c \leq 4000 \cdot \text{psi}, .85, \text{if } f_c \geq 8000 \cdot \text{psi}, .65, .85 - \left(\frac{\frac{f_c}{\text{psi}} - 4000}{1000} \right) \cdot .05 \quad \beta = 0.85$$

$$\text{Effective Width: } b_{\text{eff}} := W_t \cdot \cos(30 \cdot \text{deg}) + d_p \quad b_{\text{eff}} = 267.8461 \cdot \text{in}$$

$$A_s := \frac{M_n}{\phi_m \cdot f_y \cdot d} \quad A_s = 25.49 \cdot \text{in}^2$$

$$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{\text{eff}}} \quad a = 1.9193 \cdot \text{in}$$

$$A_{s_{\text{req}}} := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2} \right)} \quad A_s = 23.7124 \cdot \text{in}^2$$

$$\rho := \frac{A_s}{b_{\text{eff}} \cdot d} \quad \rho = 0.003$$

Temperature and Shrinkage: $\rho_{sh} := \text{if}(f_y \geq 60000 \cdot \text{psi}, 0.0018, 0.0020)$ $\rho_{sh} = 0.0018$
 (ACI 7.12.2.1b)

Area Required: $A_s := \text{if}\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right)$ $A_s = 23.7124 \cdot \text{in}^2$

Area Provided: $A_{sprov} := A_{bpad} \cdot NB_{pad}$ $A_{sprov} = 35 \cdot \text{in}^2$

PadReinforcement := $\text{if}(A_{sprov} > A_s, \text{"Okay"}, \text{"No Good"})$ PadReinforcement = "Okay"

DEVELOPMENT LENGTH OF PAD REINFORCEMENT:

TENSION (ACI 12.2.3)

Bar Spacing: $B_{sPad} := \frac{W_f - 2 \cdot C_{vr} - NB_{pad} \cdot d_{bpad}}{NB_{pad} - 1}$ $B_{sPad} = 8.7212 \cdot \text{in}$

Development Length Factors:

Reinforcement Location Factor	$\alpha := 1.0$
Coating Factor	$\beta := 1.0$
Concrete strength Factor	$\lambda := 1.0$
Reinforcement Size Factor	$\gamma := 1.0$

Spacing or Cover Dimension: $c := \text{if}\left(C_{vr} < \frac{B_{sPad}}{2}, C_{vr}, \frac{B_{sPad}}{2}\right)$ $c = 3 \cdot \text{in}$

Transverse Reinforcement Index $k_{tr} := 0$

Development Length: $L_{dbt} := \frac{3}{40} \cdot \frac{f_y}{\sqrt{f_c \cdot \text{psi}}} \cdot \frac{\alpha \cdot \beta \cdot \gamma \cdot \lambda}{c + k_{tr}} \cdot d_{bpad}$ $L_{dbt} = 32.2608 \cdot \text{in}$
 $L_{dbmin} := 12 \cdot \text{in}$

Minimum Development Length: $L_{dbtCheck} := \text{if}(L_{dbt} \geq L_{dbmin}, \text{"Use L.dbt"}, \text{"Use L.dbmin"})$ $L_{dbtCheck} = \text{"Use L.dbt"}$
 (ACI 12.2.1)

Available Length in Pad: $L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - C_{vr}$ $L_{Pad} = 48 \cdot \text{in}$

$L_{padTension} := \text{if}(L_{Pad} > L_{dbt}, \text{"Okay"}, \text{"No Good"})$ $L_{padTension} = \text{"Okay"}$

REINFORCEMENT IN PIER:

Pier Area:	$A_p := \frac{\pi \cdot d_p^2}{4}$	$A_p = 2827.4334 \cdot \text{in}^2$
(ACI 10.8.4 and 10.9.1)	$A_{smin} := 0.01 \cdot 0.5 \cdot A_p$	$A_{smin} = 14.1372 \cdot \text{in}^2$
	$A_{sprov} := N_{Bpier} \cdot A_{Bpier}$	$A_{sprov} = 14.22 \cdot \text{in}^2$
	$\text{SteelAreaCheck} := \text{if}(A_{sprov} > A_{smin}, \text{"Okay"}, \text{"No Good"})$	$\text{SteelAreaCheck} = \text{"Okay"}$

NOTE: Anchor Bolts are not accounted for in reinforcement calculation and will provide additional reinforcement to satisfy minimum requirement of steel.

Bar Spacing In Pier:	$B_{SPier} := \frac{d_p \cdot \pi}{N_{Bpier}} - d_{Bpier}$	$B_{SPier} = 9.472 \cdot \text{in}$
Diameter of Reinforcement Cage:	$\text{Diam}_{cage} := d_p - 2 \cdot C_{vr}$	$\text{Diam}_{cage} = 54 \cdot \text{in}$
Maximum Moment in Pier:	$M_p := (S_t \cdot L_p) \cdot LF$	$M_p = 2759.31 \cdot \text{kips} \cdot \text{in}$

Pier Check evaluated from outside program and results are listed below;

(defined variables)

$$(f_c \ f_y \ c1 \ \text{Spiral}) = (3 \ 60 \ 4 \ 0)$$

The required input is column diameter in inches, number of reinforcing bars, bar size number, factored axial load in kips and moment in kip inches:

$$(D \ N_{\text{bars}} \ n \ P_u \ M_{xu}) := (60 \ 18 \ 8 \ 310 \ 2100)$$

Clears any previous output:

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) := (0 \ 0 \ 0 \ 0)$$

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) := \phi P_n (D, N, n, P_u, M_{xu})^T$$

The Output is given as useable axial load in kips, moment capacity in kip inches, splicing stress in ksi, and reinforcement ratio:

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) = (4159.0074 \ 28173.9208 \ -22.834 \ 0.005)$$

Column size and reinforcement may be changed to match capacity to the applied load.

$$\text{AxialLoadCheck} := \text{if}(\phi P_n \geq P_u, \text{"Okay"}, \text{"No Good"})$$

$$\text{AxialLoadCheck} = \text{"Okay"}$$

$$\text{BendingCheck} := \text{if}(\phi M_{xn} \geq M_{xu}, \text{"Okay"}, \text{"No Good"})$$

$$\text{BendingCheck} = \text{"Okay"}$$

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DEVELOPMENT LENGTH OF PIER REINFORCEMENT:

TENSION (ACI 12.2.3)

Spacing and Cover: $C_{vr} = 3 \cdot \text{in}$ $B_{sPier} = 9.472 \cdot \text{in}$

Factors for development:

Reinforcement Location Factor	$\alpha_w = 1.0$
Coating Factor	$\beta_w = 1.0$
Concrete strength Factor	$\lambda_w = 1.0$
Reinforcement Size Factor	$\gamma_w = 1.0$

Spacing or Cover Dimension: $c_w := \text{if} \left(C_{vr} < \frac{B_{sPier}}{2}, C_{vr}, \frac{B_{sPier}}{2} \right)$ $c = 3 \cdot \text{in}$

Transverse Reinforcement: As allowed by ACI 12.2.4 $k_{tr} = 0$

$$L_{dbt} = \frac{3}{40} \cdot \frac{f_y}{\sqrt{f_c \cdot \text{psi}}} \cdot \frac{\alpha \cdot \beta \cdot \gamma \cdot \lambda}{c + k_{tr}} \cdot d_{bpier} \quad L_{dbt} = 25.3546 \cdot \text{in}$$

Minimum Development Length: (ACI 12.2.1)

$$L_{dbmin} = 12 \cdot \text{in}$$

$$L_{dbtCheck} := \text{if}(L_{dbt} \geq L_{dbmin}, "Use L.dbt", "Use L.dbmin") \quad L_{dbtCheck} = "Use L.dbt"$$

COMPRESSION: (ACI 12.3.2)

$$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot \text{psi}}} \quad L_{dbc1} = 20.2837 \cdot \text{in}$$

$$L_{dbmin} := 0.0003 \cdot \frac{\text{in}^2}{\text{lb}} \cdot (d_{bpier} \cdot f_y) \quad L_{dbmin} = 18 \cdot \text{in}$$

$$L_{dbc} := \text{if}(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}) \quad L_{dbc} = 20.2837 \cdot \text{in}$$

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Available Length in Pier:	$L_{\text{pier}} := L_p - 3 \cdot \text{in}$	$L_{\text{pier}} = 42 \cdot \text{in}$
	$L_{\text{piertension}} := \text{if}(L_{\text{pier}} > L_{\text{dbt}}, \text{"Okay"}, \text{"No Good"})$	$L_{\text{piertension}} = \text{"Okay"}$
	$L_{\text{piercompression}} := \text{if}(L_{\text{pier}} > L_{\text{dbc}}, \text{"Okay"}, \text{"No Good"})$	$L_{\text{piercompression}} = \text{"Okay"}$
Available Length in Pad:	$L_{\text{pad}} := T_f - 3 \cdot \text{in}$	$L_{\text{pad}} = 30 \cdot \text{in}$
	$L_{\text{padtension}} := \text{if}(L_{\text{pad}} > L_{\text{dbt}}, \text{"Okay"}, \text{"No Good"})$	$L_{\text{padtension}} = \text{"Okay"}$
	$L_{\text{padcompression}} := \text{if}(L_{\text{pad}} > L_{\text{dbc}}, \text{"Okay"}, \text{"No Good"})$	$L_{\text{padcompression}} = \text{"Okay"}$

NOTE: Anchor bolts and plate provided, OK