STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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

Daniel F. Caruso
Chairman

October 24, 2007

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

RE: **EM-VER-078-070925** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 497 Middle Turnpike, Mansfield, Connecticut.

Dear Attorney Baldwin:

At a public meeting held on October 16, 2007, the Connecticut Siting Council (Council) acknowledged your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies.

The proposed modifications are to be implemented as specified here and in your notice dated September 25, 2007, including the placement of all necessary equipment and shelters within the tower compound. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

Daniel F. Caruso
Daniel F. Caruso
Chairman

DFC/MP/cm

c: The Honorable Elizabeth Patterson, Mayor, Town of Mansfield
Gregory Padick, Town Planner, Town of Mansfield
Christopher B. Fisher, Esq., Cuddy & Feder LLP

G:\EM\BAM-VERIZON\Mansfield\dc101607.DOC

ROBINSON & COLE LLP

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

EM-VER-078-070925

September 25, 2007

Via Hand Delivery

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

Re: **Notice of Exempt Modification**
497 Middle Turnpike
Mansfield, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") intends to install antennas on the existing 120-foot self-supporting monopole tower owned by AT&T at 497 Middle Turnpike in Mansfield, Connecticut. Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Matthew Hart, Mansfield Town Manager. Pursuant to Siting Council directive a copy of the letter is also being sent to Bernard R. Brodin, owner of the property on which the tower is located.

The facility consists of a 120-foot self-supporting monopole tower capable of supporting multiple carriers within a fenced compound at 497 Middle Turnpike in Mansfield. AT&T antennas are currently located at the 120-foot level on the tower. Cellco intends to install twelve (12) panel-type antennas (six cellular and six PCS) at the 109-foot level on the tower and place a 12' x 30' equipment shelter on the ground near the base of the tower within the existing fenced compound. Cellco's back-up generator will be fueled by propane. A 1000-gallon propane tank will also be installed within the fenced compound. Attached behind Tab 1 are Project Plans for the proposed Cellco facility.

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

1. The proposed modification will not increase the overall height of the existing tower. Cellco's antennas will be mounted with their centerline at the 109-foot level on the 120-foot tower.

2. The proposed installation of a 12' x 30' equipment shelter will not require an extension of the fenced compound or lease area.

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

4. The operation of the antennas will not increase radio frequency (RF) power density levels at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. The worst-case RF power density calculations for AT&T and Cellco antennas would be 21.24% of the FCC standard. A copy of the power density calculations table is attached behind Tab 2.

Also attached, behind Tab 3, is a Structural Analysis confirming that the tower can support the AT&T and Cellco antennas and associated equipment.

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

Sincerely,

Kenneth C. Baldwin

Attachments
Copy to:
Matthew Hart, Mansfield Town Manager
Bernard R. Brodin
Sandy M. Carter

Cellco Partnership

d.b.a. verizon wireless

WIRELESS COMMUNICATIONS FACILITY

MANSFIELD

497 MIDDLE TURNPIKE

MANSFIELD, CT 06268

SITE DIRECTIONS

FROM: 99 EAST RIVER DRIVE, EAST HARTFORD, CONNECTICUT **TO:** 497 MIDDLE TURNPIKE, MANSFIELD, CONNECTICUT

1. START AT 99 E RIVER DR TOWARD E RIVER DR	<0.1 MI.
2. TURN LEFT ON E RIVER DR.	0.1 MI.
3. BEAR LEFT TO TAKE RAMP ONTO I-84 E TOWARD BOSTON	3.5 MI.
4. TAKE EXIT #59/PROVIDENCE ONTO I-384E	8.6 MI.
5. CONTINUE ON BOLTON RDUS-44 E)	0.5 MI.
6. CONTINUE TO FOLLOW US-44 E	9.3 MI.
7. ARRIVE AT 497 MIDDLE TURNPIKE	

GENERAL NOTES

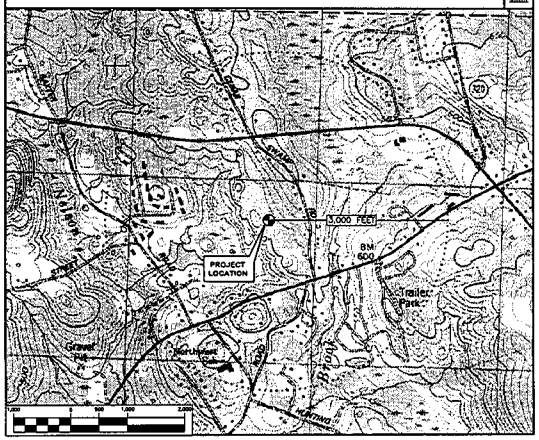
1. PROPOSED ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY CELLCO PARTNERSHIP.

PROJECT SCOPE

1. THE PROPOSED SCOPE OF WORK GENERALLY INCLUDES THE INSTALLATION OF A 12'x30' PREFABRICATED WIRELESS EQUIPMENT SHELTER ON A CONCRETE FOUNDATION AND A PROPANE TANK ON A 5'x15' CONCRETE PAD WITHIN THE EXISTING WIRELESS COMMUNICATIONS COMPOUND.
2. A TOTAL OF TWELVE (12) DIRECTIONAL PANEL ANTENNAS ARE PROPOSED TO BE MOUNTED ON AN EXISTING 120' TALL MONOPOLE TOWER AT A RAD CENTER ELEVATION OF 109' ABOVE TOWER BASE PLATE.
3. ELECTRIC AND TELCO UTILITIES SHALL BE ROUTED UNDERGROUND TO THE PROPOSED EQUIPMENT SHELTER FROM AN EXISTING UTILITY BACKBOARD LOCATED WITHIN THE FENCED COMPOUND.

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

SITE NAME:	MANSFIELD
SITE ADDRESS:	497 MIDDLE TURNPIKE MANSFIELD, CT 06268
PROPERTY OWNER:	BERNARD R. BRODIN 108 COLEMAN RD. MANCHESTOR, CT 06040
LESSEE/ TENANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 99 EAST RIVER DRIVE EAST HARTFORD, CT 06108
CONTACT PERSON:	SANDY CARTER CELLCO PARTNERSHIP (860) 803-8219
TOWER COORDINATES:	LATITUDE: 41°-49'-33" LONGITUDE: 72°-16'-55" COORDINATES BASED ON CSC WEB LOG LAST UPDATED 07/26/07

SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	A
C-1	COMPOUND PLAN AND ELEVATION	A

REVISIONS		
A	08/29/07	CSC - REVIEW
00	09/10/07	CT SITING COUNCIL

Cellco Partnership
d.b.a. verizon wireless

NATCOMM LLC
CONSULTING ENGINEERS
p: 203.488.0580
f: 203.488.8587
w: natcomm.com
e: info@nat-eng.com
63-2 N. Branford Rd.
Branford, CT 06405

MANSFIELD

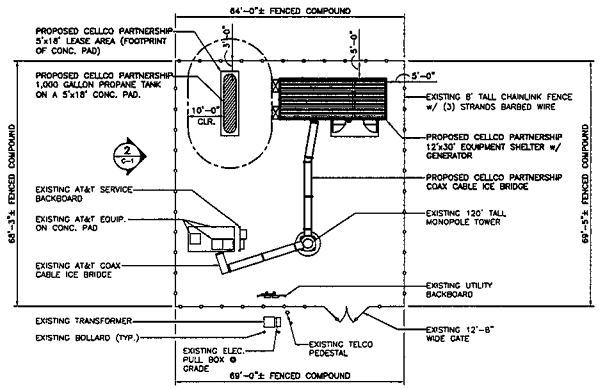
497 MIDDLE TURNPIKE
MANSFIELD, CT 06268

PROJECT NO:	07059
DRAWN BY:	DEB
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	08/08/07

TITLE SHEET

T-1

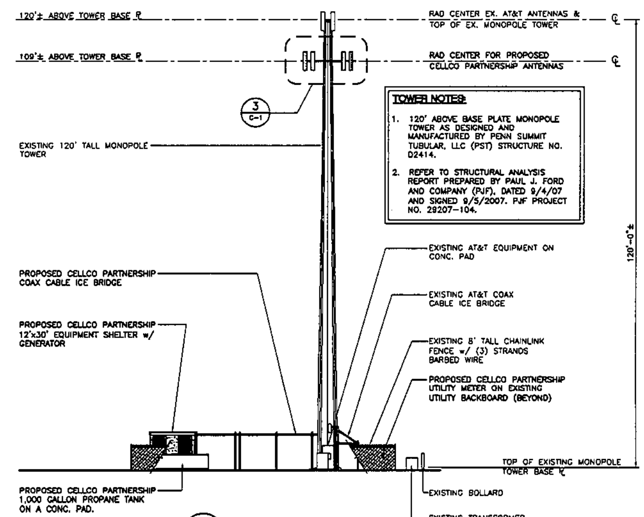
DWG. 1 OF 2



1 C-1 **COMPOUND PLAN**
SCALE: 1/16" = 1'-0"

TRUE NORTH

GRAPHIC SCALE
(IN FEET)
1/16 inch = 1 ft. 0 inch

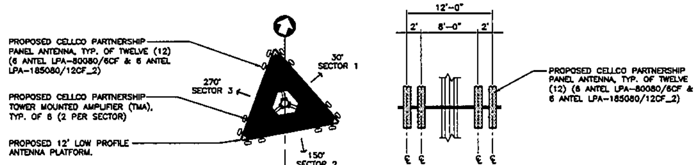


TOWER NOTES:

1. 120' ABOVE BASE PLATE MONOPOLE TOWER AS DESIGNED AND MANUFACTURED BY PENN SUMMIT TUBULAR, LLC (PST) STRUCTURE NO. D2414.
2. REFER TO STRUCTURAL ANALYSIS REPORT PREPARED BY PAUL J. FORD AND COMPANY (PJF), DATED 9/4/07 AND SIGNED 9/5/2007. PJF PROJECT NO. 29207-104.

2 C-1 **WEST ELEVATION**
SCALE: 1" = 15'

GRAPHIC SCALE
(IN FEET)
1 inch = 15 ft.



3 C-1 **ANTENNA MOUNTING CONFIGURATION**
NOT TO SCALE

REVISIONS		
A	08/29/07	CSC - REVIEW
00	09/10/07	CT SITING COUNCIL

Celico Partnership
d.b.a. verizon wireless

NATCOMM CONSULTING ENGINEERS
p: 203.488.0580
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63-2 N. Branford Rd.
Branford, CT 06405

PROFESSIONAL ENGINEER SEAL

MANSFIELD

497 MIDDLE TURNPIKE
MANSFIELD, CT 06268

PROJECT NO:	07059
DRAWN BY:	DEB
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	08/08/07

COMPOUND PLAN AND ELEVATION

C-1

DWG. 2 OF 2

	General	Power	Density					
Site Name: Mansfield								
Tower Height: Verizon @ 109Ft.								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*AT&T	12	250	120	0.0749	1945	1.0000	7.49%	
Verizon	**9**	**200**	**109**	**0.0545**	**875**	**0.5830**	9.34%	
Verizon PCS	**3**	**485**	**109**	**0.0440**	**1970**	**1.0000**	4.40%	
* Source: Siting Council								
								21.24%

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 1500 · Columbus, Ohio 43215

Structural Analysis Report

PJF Project No.: **29207-104**

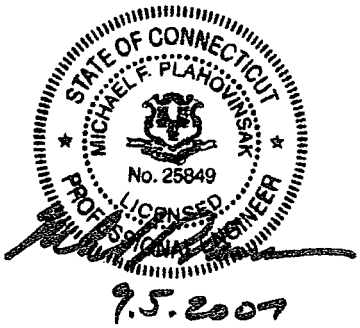
Structure: Existing 120-ft Monopole

Owner: Cingular Wireless
Manufacturer: PennSummit Tubular, LLC (2003)
Location: Tolland Co., Connecticut
Site Name: Mansfield Four Corners
PennSummit No.: 70036 / 20836

Prepared For:

Natcomm, Inc.
63-2 North Branford Rd.
Branford, CT 06405
Attn: Steve Dan Bolan

September 4, 2007



Analyzed by:
Michael F. Plahovinsak, P.E.
Project Manager
mplahovinsak@pjfweb.com

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215

Executive Summary

Design Standard:

Paul J. Ford and Company has analyzed the existing monopole in accordance with the Telecommunications Industry Association Standard TIA-222-G for the following *3-second gusted* design wind velocities:

100 mph Basic Wind Velocity without ice
50 mph Basic Wind Velocity with 1" radial ice
60 mph (Operational) Basic Wind Velocity without ice

Exposure Category B	*Structure Class II*	*Topography Category I*

Antenna Loads:

The existing monopole was analyzed for the following antenna loading:

Status	Elevation	Description	Coax	Owner
Reserved	120'	(6) Allgon 7250.03 Panel (6) Powerwave 7770.00 w/ (6) TMA's 12' Low Profile Platform	(12) 1 1/4"	Cingular
Proposed	109'	(6) Antel LPA-80080/6CF Panel (6) Antel LPA-185080/12 w/ (6) TMA's 12' Low Profile Platform	(12) 1 5/8"	Verizon

Coaxial cable for this analysis was assumed internally mounted and not exposed to the wind.

Results:

The monopole and foundation have sufficient capacity to support the above antenna loading while meeting the local minimum wind requirements.

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215

Project Description:

Paul J. Ford and Company has analyzed the existing monopole in accordance with the Telecommunications Industry Association, TIA-222-G, "Structural Standard for Antenna Supporting Structures and Antennas" The TIA standard was developed by professional engineers experienced in the design of communication structures.

Pole History:

Paul J. Ford and Company designed the monopole and foundation for PennSummit Tubular, LLC in 2003 per PJF #29203-309. The monopole was designed in accordance with TIA/EIA-222-F for an 85 mph design wind for the following antenna loading:

Elevation	Description
119.5'	(6) Allgon 7920 Panel Tri-Antenna Mount
110'	(6) 48" x 12" x 3" Panel 10' T-Arm Mounts
100'	(6) 48" x 12" x 3" Panel 10' T-Arm Mounts
90'	(6) 48" x 12" x 3" Panel 10' T-Arm Mounts
80'	(3) 48" x 12" x 3" Panel Tri-Antenna Mount
70'	(3) 48" x 12" x 3" Panel Tri-Antenna Mount

Structural Analysis:

Our analysis was completed according to the recommendations of the TIA-222-G 2006 and the requirements of the Connecticut Building Code. This code requires a minimum design wind velocity of 100 mph (no ice) for the City of Mansfield. Our analysis was completed in compliance with the minimum wind requirements under the following load cases:

100 mph Basic Wind Velocity without ice
50 mph Basic Wind Velocity with 1" radial ice
60 mph (Operational) Basic Wind Velocity without ice

Exposure Category B	*Structure Class II*	*Topography Category I*

Existing & Proposed Antenna Loading:

Our analysis was completed using the following existing and proposed antenna loading:

Status	Elevation	Description	Coax	Owner
Reserved	120'	(6) Allgon 7250.03 Panel (6) Powerwave 7770.00 w/ (6) TMA's 12' Low Profile Platform	(12) 1 1/4"	Cingular
Proposed	109'	(6) Antel LPA-80080/6CF Panel (6) Antel LPA-185080/12 w/ (6) TMA's 12' Low Profile Platform	(12) 1 5/8"	Verizon

Coaxial cable for this analysis was assumed internally mounted and not exposed to the wind.

Results:

When the new antenna configuration is considered, the monopole has sufficient capacity to safely support the new loading while maintaining the minimum wind rating:

Member	Elevation	Percent Capacity
Shaft #1	75'	53.3%
Shaft #2	40'	38.0%
Shaft #3	0'	34.7%
Base Plate	0'	30.0%
Anchor Bolts	0'	28.4%

The existing drilled pier foundation has sufficient capacity to support the new loading while maintaining the minimum required safety factors. ☑

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215

Conclusion:

The existing monopole and foundation have sufficient capacity to support the new antenna loading while meeting the minimum wind requirements of this analysis.

If you have any questions concerning our analysis, or if we can be of further service to you, please feel free to contact us at (614) 221-6679.

Sincerely,

Paul J. Ford and Company

Michael F. Plahovinsak, P.E.
Project Manager

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215

STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING STRUCTURES BY PAUL J. FORD AND COMPANY

1. Paul J. Ford and Company has not made a field inspection to verify the monopole dimensions or the antenna/coax loading. If the existing conditions are not as represented on these sketches, we should be contacted immediately to reevaluate any conclusions stated in this report.

2. No allowance was made for any damaged, missing, or rusted monopole parts. The analysis of this pole assumes that no physical deterioration has occurred in any of the structural components of the pole and that all the pole members have the same capacity as the day the pole was erected.

3. It is not possible to have all of the very detailed information to perform a thorough analysis of every structural sub-component of an existing monopole. The structural analysis provided by Paul J. Ford and Company verifies the adequacy of the main structural members of the monopole. Paul J. Ford and Company provides a limited scope of service in that we cannot verify the adequacy of every weld, plate, connection detail, etc.

4. It is the owner's responsibility to determine the amount of ice accumulation, if any, that shall be used in the structural analysis.

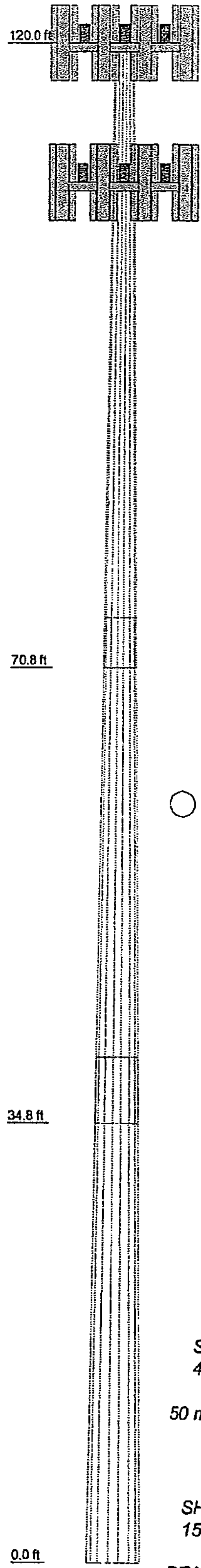
5. The monopole has been analyzed according to the minimum basic design wind velocity recommended by the Telecommunications Industry Association Standard TIA-222-G. If the owner or local or state agencies require a higher design wind velocity, Paul J. Ford and Company should be made aware of this requirement.

6. The enclosed sketches are a schematic representation of the monopole we have analyzed. If any material is fabricated from these sketches, the fabricator shall be responsible for field verifying the existing conditions and for proper fit and clearance in the field.

7. Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

8. Installation of new hand hole ports and/or cable access ports will not reduce the structural capacity of the monopole shaft, if the hand hole frames and/or cable access ports are properly designed and installed in accordance to proper procedures. Paul J. Ford and Company recommends that new hand holes and/or cable access port hole frames be purchased from the original pole manufacturer. The new hand hole and/or cable access frames shall be installed per the original manufacturer's installation procedures. Paul J. Ford and Company will design and provide installation procedures for new hand holes and/or cable access ports if required, as an additional scope of services.

Section	Length (ft)	Number of Sides	Thickness (in)	Lap Splice (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	49.25	18	0.1875	4.00	18.0000	32.2830	A607-65	2.5
2	40.00	18	0.3125	5.25	30.7480	42.3480	A607-65	4.0
3	40.00	18	0.3750		40.2005	51.8000	A607-65	7.4
								14.8



DESIGNED APPURTENANCE LOADING

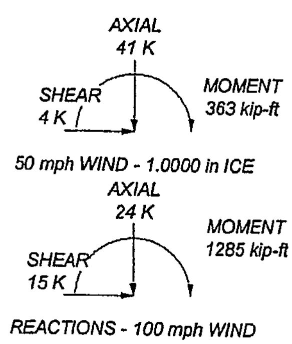
TYPE	ELEVATION	TYPE	ELEVATION
(2) Allgon 7250.xx	120	(2) Antel LPA-80080/6CF	109
(2) Powerwave 7770	120	(2) Antel LPA-185080/12CF	109
(2) TMA	120	(2) TMA	109
(2) Allgon 7250.xx	120	(2) Antel LPA-80080/6CF	109
(2) Powerwave 7770	120	(2) Antel LPA-185080/12CF	109
(2) TMA	120	(2) TMA	109
(2) Allgon 7250.xx	120	(2) Antel LPA-80080/6CF	109
(2) Powerwave 7770	120	(2) Antel LPA-185080/12CF	109
(2) TMA	120	(2) TMA	109
12' Low Profile Platform	120	12' Low Profile Platform	109

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Tolland County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 100 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. TOWER RATING: 53.3%



Paul J Ford and Company
250 E. Broad Street Suite 1500
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: *120-ft Monopole / PJF #29207-104*			
Project: *Mansfield Four Corners*			
Client: PennSummit (#70036 / #20836)	Drawn by: Michael Plahovinsak	App'd:	
Code: TIA-222-G	Date: 09/04/07	Scale: NTS	
Path: G:\TOWER\292_PennSummit\29207-104.eri		Dwg No. E-1	

Tower Input Data

There is a pole section.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Tolland County, Connecticut.
Basic wind speed of 100 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	120.00-70.75	49.25	4.00	18	18.0000	32.2830	0.1875	0.7500	A607-65 (65 ksi)
L2	70.75-34.75	40.00	5.25	18	30.7480	42.3480	0.3125	1.2500	A607-65 (65 ksi)
L3	34.75-0.00	40.00		18	40.2005	51.8000	0.3750	1.5000	A607-65

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
									(65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	18.2777	10.6007	424.9328	6.3234	9.1440	46.4712	850.4248	5.3013	2.8380	15.136
	32.7810	19.1008	2485.8681	11.3939	16.3998	151.5795	4975.0072	9.5522	5.3518	28.543
L2	32.4002	30.1882	3532.9214	10.8046	15.6200	226.1799	7070.4916	15.0970	4.8616	15.557
	43.0013	41.6940	9307.7144	14.9226	21.5128	432.6597	18627.6761	20.8509	6.9032	22.09
L3	42.3666	47.4023	9498.5908	14.1381	20.4219	465.1190	19009.6800	23.7057	6.4153	17.107
	52.5991	61.2086	20450.2462	18.2559	26.3144	777.1504	40927.4014	30.6101	8.4568	22.551

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 120.00-70.75				1	1	1		
L2 70.75-34.75				1	1	1		
L3 34.75-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF6-50 (1 1/4" foam)	C	No	Inside Pole	120.00 - 0.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
***						1" Ice	0.00	0.66
LDF7-50A (1 5/8" foam)	C	No	Inside Pole	109.00 - 0.00	12	No Ice	0.00	0.92
						1/2" Ice	0.00	0.92
						1" Ice	0.00	0.92

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	120.00-70.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.81
L2	70.75-34.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.68
L3	34.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	0.000	0.000	0.000	0.000	0.66

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	120.00-70.75	A	2.219	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.81
L2	70.75-34.75	A	2.094	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.68
L3	34.75-0.00	A	1.869	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.66

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	120.00-70.75	0.0000	0.0000	0.0000	0.0000
L2	70.75-34.75	0.0000	0.0000	0.0000	0.0000
L3	34.75-0.00	0.0000	0.0000	0.0000	0.0000

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) Allgon 7250.xx	A	From Face	3.00	0.00	0.0000	120.00	No Ice	4.00	1.87	0.02
				0.00			1/2" Ice	4.39	2.33	0.04
				0.00			1" Ice	4.78	2.70	0.06
(2) Powerwave 7770	A	From Face	3.00	0.00	0.0000	120.00	No Ice	5.88	2.93	0.04
				0.00			1/2" Ice	6.31	3.27	0.07
				0.00			1" Ice	6.75	3.63	0.11
(2) TMA	A	From Face	3.00	0.00	0.0000	120.00	No Ice	1.50	1.50	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	2.00	2.00	0.07
			0.00			1" Ice	3.00	3.00	0.07
(2) Allgon 7250.xx	B	From Face	3.00	0.0000	120.00	No Ice	4.00	1.87	0.02
			0.00			1/2" Ice	4.39	2.33	0.04
			0.00			1" Ice	4.78	2.70	0.06
(2) Powerwave 7770	B	From Face	3.00	0.0000	120.00	No Ice	5.88	2.93	0.04
			0.00			1/2" Ice	6.31	3.27	0.07
			0.00			1" Ice	6.75	3.63	0.11
(2) TMA	B	From Face	3.00	0.0000	120.00	No Ice	1.50	1.50	0.05
			0.00			1/2" Ice	2.00	2.00	0.07
			0.00			1" Ice	3.00	3.00	0.07
(2) Allgon 7250.xx	C	From Face	3.00	0.0000	120.00	No Ice	4.00	1.87	0.02
			0.00			1/2" Ice	4.39	2.33	0.04
			0.00			1" Ice	4.78	2.70	0.06
(2) Powerwave 7770	C	From Face	3.00	0.0000	120.00	No Ice	5.88	2.93	0.04
			0.00			1/2" Ice	6.31	3.27	0.07
			0.00			1" Ice	6.75	3.63	0.11
(2) TMA	C	From Face	3.00	0.0000	120.00	No Ice	1.50	1.50	0.05
			0.00			1/2" Ice	2.00	2.00	0.07
			0.00			1" Ice	3.00	3.00	0.07
12' Low Profile Platform	C	None		0.0000	120.00	No Ice	18.64	18.64	1.10
						1/2" Ice	20.25	20.25	1.70
						1" Ice	21.86	21.86	2.30
***									
(2) Antel LPA-80080/6CF	A	From Face	3.00	0.0000	109.00	No Ice	4.33	9.09	0.02
			0.00			1/2" Ice	4.76	9.64	0.07
			0.00			1" Ice	5.21	10.20	0.12
(2) Antel LPA-185080/12CF	A	From Face	3.00	0.0000	109.00	No Ice	3.53	4.57	0.01
			0.00			1/2" Ice	3.96	5.01	0.04
			0.00			1" Ice	4.40	5.46	0.07
(2) TMA	A	From Face	3.00	0.0000	109.00	No Ice	1.50	1.50	0.05
			0.00			1/2" Ice	2.00	2.00	0.07
			0.00			1" Ice	3.00	3.00	0.07
(2) Antel LPA-80080/6CF	B	From Face	3.00	0.0000	109.00	No Ice	4.33	9.09	0.02
			0.00			1/2" Ice	4.76	9.64	0.07
			0.00			1" Ice	5.21	10.20	0.12
(2) Antel LPA-185080/12CF	B	From Face	3.00	0.0000	109.00	No Ice	3.53	4.57	0.01
			0.00			1/2" Ice	3.96	5.01	0.04
			0.00			1" Ice	4.40	5.46	0.07
(2) TMA	B	From Face	3.00	0.0000	109.00	No Ice	1.50	1.50	0.05
			0.00			1/2" Ice	2.00	2.00	0.07
			0.00			1" Ice	3.00	3.00	0.07
(2) Antel LPA-80080/6CF	C	From Face	3.00	0.0000	109.00	No Ice	4.33	9.09	0.02
			0.00			1/2" Ice	4.76	9.64	0.07
			0.00			1" Ice	5.21	10.20	0.12
(2) Antel LPA-185080/12CF	C	From Face	3.00	0.0000	109.00	No Ice	3.53	4.57	0.01
			0.00			1/2" Ice	3.96	5.01	0.04
			0.00			1" Ice	4.40	5.46	0.07
(2) TMA	C	From Face	3.00	0.0000	109.00	No Ice	1.50	1.50	0.05
			0.00			1/2" Ice	2.00	2.00	0.07
			0.00			1" Ice	3.00	3.00	0.07
12' Low Profile Platform	C	None		0.0000	109.00	No Ice	19.03	19.03	1.10
						1/2" Ice	20.53	20.53	1.70
						1" Ice	22.03	22.03	2.30

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 70.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-19.44	0.00	0.00
			Max. Mx	8	-7.30	-344.72	0.00
			Max. My	14	-7.30	0.00	-344.72
			Max. Vy	8	9.97	-344.72	0.00
			Max. Vx	14	9.97	0.00	-344.72
			Max. Torque	16			-0.00
L2	70.75 - 34.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-27.29	0.00	0.00
			Max. Mx	8	-13.50	-732.63	0.00
			Max. My	14	-13.50	0.00	-732.63
			Max. Vy	8	12.38	-732.63	0.00
			Max. Vx	14	12.38	0.00	-732.63
			Max. Torque	16			-0.00
L3	34.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-40.55	0.00	0.00
			Max. Mx	8	-24.31	-1284.84	0.00
			Max. My	2	-24.31	0.00	1284.84
			Max. Vy	8	15.28	-1284.84	0.00
			Max. Vx	2	-15.28	0.00	1284.84
			Max. Torque	16			-0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	40.55	0.00	0.00
	Max. H_x	21	18.24	15.27	0.00
	Max. H_z	3	18.24	0.00	15.27
	Max. M_x	2	1284.84	0.00	15.27
	Max. M_z	8	1284.84	-15.27	0.00
	Max. Torsion	12	0.00	-7.64	-13.23
	Min. Vert	9	18.24	-15.27	0.00
	Min. H_x	9	18.24	-15.27	0.00
	Min. H_z	15	18.24	0.00	-15.27
	Min. M_x	14	-1284.84	0.00	-15.27
	Min. M_z	20	-1284.84	15.27	0.00
	Min. Torsion	16	-0.00	7.64	-13.23

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	20.27	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	24.32	0.00	-15.27	-1284.84	0.00	0.00
0.9 Dead+1.6 Wind 0 deg - No Ice	18.24	0.00	-15.27	-1279.35	0.00	0.00
1.2 Dead+1.6 Wind 30 deg - No Ice	24.32	7.64	-13.23	-1112.78	-642.47	0.00
0.9 Dead+1.6 Wind 30 deg - No	18.24	7.64	-13.23	-1108.01	-639.71	0.00

Load Combination	Vertical K	Shear$_x$ K	Shear$_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Ice						
1.2 Dead+1.6 Wind 60 deg - No Ice	24.32	13.23	-7.64	-642.47	-1112.78	-0.00
0.9 Dead+1.6 Wind 60 deg - No Ice	18.24	13.23	-7.64	-639.71	-1108.01	-0.00
1.2 Dead+1.6 Wind 90 deg - No Ice	24.32	15.27	0.00	0.00	-1284.84	0.00
0.9 Dead+1.6 Wind 90 deg - No Ice	18.24	15.27	0.00	0.00	-1279.35	0.00
1.2 Dead+1.6 Wind 120 deg - No Ice	24.32	13.23	7.64	642.47	-1112.78	0.00
0.9 Dead+1.6 Wind 120 deg - No Ice	18.24	13.23	7.64	639.71	-1108.01	0.00
1.2 Dead+1.6 Wind 150 deg - No Ice	24.32	7.64	13.23	1112.78	-642.47	-0.00
0.9 Dead+1.6 Wind 150 deg - No Ice	18.24	7.64	13.23	1108.01	-639.71	-0.00
1.2 Dead+1.6 Wind 180 deg - No Ice	24.32	0.00	15.27	1284.84	0.00	0.00
0.9 Dead+1.6 Wind 180 deg - No Ice	18.24	0.00	15.27	1279.35	0.00	0.00
1.2 Dead+1.6 Wind 210 deg - No Ice	24.32	-7.64	13.23	1112.78	642.47	0.00
0.9 Dead+1.6 Wind 210 deg - No Ice	18.24	-7.64	13.23	1108.01	639.71	0.00
1.2 Dead+1.6 Wind 240 deg - No Ice	24.32	-13.23	7.64	642.47	1112.78	-0.00
0.9 Dead+1.6 Wind 240 deg - No Ice	18.24	-13.23	7.64	639.71	1108.01	-0.00
1.2 Dead+1.6 Wind 270 deg - No Ice	24.32	-15.27	0.00	0.00	1284.84	0.00
0.9 Dead+1.6 Wind 270 deg - No Ice	18.24	-15.27	0.00	0.00	1279.35	0.00
1.2 Dead+1.6 Wind 300 deg - No Ice	24.32	-13.23	-7.64	-642.47	1112.78	0.00
0.9 Dead+1.6 Wind 300 deg - No Ice	18.24	-13.23	-7.64	-639.71	1108.01	0.00
1.2 Dead+1.6 Wind 330 deg - No Ice	24.32	-7.64	-13.23	-1112.78	642.47	-0.00
0.9 Dead+1.6 Wind 330 deg - No Ice	18.24	-7.64	-13.23	-1108.01	639.71	-0.00
1.2 Dead+1.0 Ice+1.0 Temp	40.55	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	40.55	0.00	-4.39	-363.46	0.00	0.00
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	40.55	2.20	-3.80	-314.77	-181.73	0.00
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	40.55	3.80	-2.20	-181.73	-314.77	-0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	40.55	4.39	0.00	0.00	-363.46	0.00
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	40.55	3.80	2.20	181.73	-314.77	0.00
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	40.55	2.20	3.80	314.77	-181.73	-0.00
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	40.55	0.00	4.39	363.46	0.00	0.00
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	40.55	-2.20	3.80	314.77	181.73	0.00
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	40.55	-3.80	2.20	181.73	314.77	-0.00
1.2 Dead+1.0 Wind 270	40.55	-4.39	0.00	0.00	363.46	0.00

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
deg+1.0 Ice+1.0 Temp 1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	40.55	-3.80	-2.20	-181.73	314.77	0.00
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	40.55	-2.20	-3.80	-314.77	181.73	-0.00
Dead+Wind 0 deg - Service	20.27	0.00	-3.07	-257.94	0.00	0.00
Dead+Wind 30 deg - Service	20.27	1.54	-2.66	-223.39	-128.97	0.00
Dead+Wind 60 deg - Service	20.27	2.66	-1.54	-128.97	-223.39	-0.00
Dead+Wind 90 deg - Service	20.27	3.07	0.00	0.00	-257.94	0.00
Dead+Wind 120 deg - Service	20.27	2.66	1.54	128.97	-223.39	0.00
Dead+Wind 150 deg - Service	20.27	1.54	2.66	223.39	-128.97	-0.00
Dead+Wind 180 deg - Service	20.27	0.00	3.07	257.94	0.00	0.00
Dead+Wind 210 deg - Service	20.27	-1.54	2.66	223.39	128.97	0.00
Dead+Wind 240 deg - Service	20.27	-2.66	1.54	128.97	223.39	-0.00
Dead+Wind 270 deg - Service	20.27	-3.07	0.00	0.00	257.94	0.00
Dead+Wind 300 deg - Service	20.27	-2.66	-1.54	-128.97	223.39	0.00
Dead+Wind 330 deg - Service	20.27	-1.54	-2.66	-223.39	128.97	-0.00

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-20.27	0.00	0.00	20.27	0.00	0.000%
2	0.00	-24.32	-15.27	0.00	24.32	15.27	0.004%
3	0.00	-18.24	-15.27	0.00	18.24	15.27	0.004%
4	7.64	-24.32	-13.23	-7.64	24.32	13.23	0.001%
5	7.64	-18.24	-13.23	-7.64	18.24	13.23	0.001%
6	13.23	-24.32	-7.64	-13.23	24.32	7.64	0.001%
7	13.23	-18.24	-7.64	-13.23	18.24	7.64	0.001%
8	15.27	-24.32	0.00	-15.27	24.32	0.00	0.004%
9	15.27	-18.24	0.00	-15.27	18.24	0.00	0.004%
10	13.23	-24.32	7.64	-13.23	24.32	-7.64	0.001%
11	13.23	-18.24	7.64	-13.23	18.24	-7.64	0.001%
12	7.64	-24.32	13.23	-7.64	24.32	-13.23	0.001%
13	7.64	-18.24	13.23	-7.64	18.24	-13.23	0.001%
14	0.00	-24.32	15.27	0.00	24.32	-15.27	0.004%
15	0.00	-18.24	15.27	0.00	18.24	-15.27	0.004%
16	-7.64	-24.32	13.23	7.64	24.32	-13.23	0.001%
17	-7.64	-18.24	13.23	7.64	18.24	-13.23	0.001%
18	-13.23	-24.32	7.64	13.23	24.32	-7.64	0.001%
19	-13.23	-18.24	7.64	13.23	18.24	-7.64	0.001%
20	-15.27	-24.32	0.00	15.27	24.32	0.00	0.004%
21	-15.27	-18.24	0.00	15.27	18.24	0.00	0.004%
22	-13.23	-24.32	-7.64	13.23	24.32	7.64	0.001%
23	-13.23	-18.24	-7.64	13.23	18.24	7.64	0.001%
24	-7.64	-24.32	-13.23	7.64	24.32	13.23	0.001%
25	-7.64	-18.24	-13.23	7.64	18.24	13.23	0.001%
26	0.00	-40.55	0.00	0.00	40.55	0.00	0.000%
27	0.00	-40.55	-4.39	0.00	40.55	4.39	0.001%
28	2.20	-40.55	-3.81	-2.20	40.55	3.80	0.001%
29	3.81	-40.55	-2.20	-3.80	40.55	2.20	0.001%
30	4.39	-40.55	0.00	-4.39	40.55	0.00	0.001%
31	3.81	-40.55	2.20	-3.80	40.55	-2.20	0.001%
32	2.20	-40.55	3.81	-2.20	40.55	-3.80	0.001%
33	0.00	-40.55	4.39	0.00	40.55	-4.39	0.001%
34	-2.20	-40.55	3.81	2.20	40.55	-3.80	0.001%
35	-3.81	-40.55	2.20	3.80	40.55	-2.20	0.001%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
36	-4.39	-40.55	0.00	4.39	40.55	0.00	0.001%
37	-3.81	-40.55	-2.20	3.80	40.55	2.20	0.001%
38	-2.20	-40.55	-3.81	2.20	40.55	3.80	0.001%
39	0.00	-20.27	-3.07	0.00	20.27	3.07	0.004%
40	1.54	-20.27	-2.66	-1.54	20.27	2.66	0.004%
41	2.66	-20.27	-1.54	-2.66	20.27	1.54	0.004%
42	3.07	-20.27	0.00	-3.07	20.27	0.00	0.004%
43	2.66	-20.27	1.54	-2.66	20.27	-1.54	0.004%
44	1.54	-20.27	2.66	-1.54	20.27	-2.66	0.004%
45	0.00	-20.27	3.07	0.00	20.27	-3.07	0.004%
46	-1.54	-20.27	2.66	1.54	20.27	-2.66	0.004%
47	-2.66	-20.27	1.54	2.66	20.27	-1.54	0.004%
48	-3.07	-20.27	0.00	3.07	20.27	0.00	0.004%
49	-2.66	-20.27	-1.54	2.66	20.27	1.54	0.004%
50	-1.54	-20.27	-2.66	1.54	20.27	2.66	0.004%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	10	0.00000001	0.00014341
3	Yes	10	0.00000001	0.00012432
4	Yes	11	0.00000001	0.00010894
5	Yes	11	0.00000001	0.00008985
6	Yes	11	0.00000001	0.00010894
7	Yes	11	0.00000001	0.00008985
8	Yes	10	0.00000001	0.00014341
9	Yes	10	0.00000001	0.00012432
10	Yes	11	0.00000001	0.00010894
11	Yes	11	0.00000001	0.00008985
12	Yes	11	0.00000001	0.00010894
13	Yes	11	0.00000001	0.00008985
14	Yes	10	0.00000001	0.00014341
15	Yes	10	0.00000001	0.00012432
16	Yes	11	0.00000001	0.00010894
17	Yes	11	0.00000001	0.00008985
18	Yes	11	0.00000001	0.00010894
19	Yes	11	0.00000001	0.00008985
20	Yes	10	0.00000001	0.00014341
21	Yes	10	0.00000001	0.00012432
22	Yes	11	0.00000001	0.00010894
23	Yes	11	0.00000001	0.00008985
24	Yes	11	0.00000001	0.00010894
25	Yes	11	0.00000001	0.00008985
26	Yes	6	0.00000001	0.00000001
27	Yes	11	0.00000001	0.00010544
28	Yes	11	0.00000001	0.00010931
29	Yes	11	0.00000001	0.00010931
30	Yes	11	0.00000001	0.00010544
31	Yes	11	0.00000001	0.00010931
32	Yes	11	0.00000001	0.00010931
33	Yes	11	0.00000001	0.00010544
34	Yes	11	0.00000001	0.00010931
35	Yes	11	0.00000001	0.00010931
36	Yes	11	0.00000001	0.00010544

37	Yes	11	0.00000001	0.00010931
38	Yes	11	0.00000001	0.00010931
39	Yes	9	0.00000001	0.00011645
40	Yes	9	0.00000001	0.00011154
41	Yes	9	0.00000001	0.00011154
42	Yes	9	0.00000001	0.00011645
43	Yes	9	0.00000001	0.00011154
44	Yes	9	0.00000001	0.00011154
45	Yes	9	0.00000001	0.00011645
46	Yes	9	0.00000001	0.00011154
47	Yes	9	0.00000001	0.00011154
48	Yes	9	0.00000001	0.00011645
49	Yes	9	0.00000001	0.00011154
50	Yes	9	0.00000001	0.00011154

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 70.75	7.087	45	0.5979	0.0000
L2	74.75 - 34.75	2.382	48	0.3262	0.0000
L3	40 - 0	0.639	42	0.1486	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	(2) Allgon 7250.xx	45	7.087	0.5979	0.0000	59986
109.00	(2) Antel LPA-80080/6CF	45	5.802	0.5327	0.0000	27266

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 70.75	35.322	14	2.9813	0.0000
L2	74.75 - 34.75	11.872	14	1.6260	0.0000
L3	40 - 0	3.183	12	0.7406	0.0000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	(2) Allgon 7250.xx	14	35.322	2.9813	0.0000	12075

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
109.00	(2) Antel LPA-80080/6CF	14	28.917	2.6457	0.0000	5488

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
L1	120 - 70.75 (1)	TP32.283x18x0.1875	49.25	0.00	0.0	18.4105	-7.30	972.93	0.007
L2	70.75 - 34.75 (2)	TP42.348x30.748x0.3125	40.00	0.00	0.0	40.1838	-13.50	2220.16	0.006
L3	34.75 - 0 (3)	TP51.8x40.2005x0.375	40.00	0.00	0.0	61.2086	-24.31	3381.78	0.007

Pole Bending Design Data

Section No.	Elevation	Size	M_{ux}	ϕM_{nx}	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy}	ϕM_{ny}	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	ft		kip-ft	kip-ft		kip-ft	kip-ft	
L1	120 - 70.75 (1)	TP32.283x18x0.1875	344.72	656.77	0.525	0.00	656.77	0.000
L2	70.75 - 34.75 (2)	TP42.348x30.748x0.3125	732.68	1958.65	0.374	0.00	1958.65	0.000
L3	34.75 - 0 (3)	TP51.8x40.2005x0.375	1284.93	3788.61	0.339	0.00	3788.61	0.000

Pole Shear Design Data

Section No.	Elevation	Size	Actual V_u	ϕV_n	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u	ϕT_n	Ratio $\frac{T_u}{\phi T_n}$
	ft		K	K		kip-ft	kip-ft	
L1	120 - 70.75 (1)	TP32.283x18x0.1875	9.97	315.95	0.032	0.00	189155.84	0.000
L2	70.75 - 34.75 (2)	TP42.348x30.748x0.3125	12.38	705.36	0.018	0.00	1612449.96	0.000
L3	34.75 - 0 (3)	TP51.8x40.2005x0.375	15.28	1074.42	0.014	0.00	6030450.01	0.000

Pole Interaction Design Data

Section No.	Elevation	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	ft								

Section No.	Elevation ft	Ratio $P_u/\phi P_n$	Ratio $M_{ux}/\phi M_{nx}$	Ratio $M_{uy}/\phi M_{ny}$	Ratio $V_u/\phi V_n$	Ratio $T_u/\phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 70.75 (1)	0.007	0.525	0.000	0.032	0.000	0.533 ✓	1.000	4.10-1a ✓
L2	70.75 - 34.75 (2)	0.006	0.374	0.000	0.018	0.000	0.380 ✓	1.000	4.10-1a ✓
L3	34.75 - 0 (3)	0.007	0.339	0.000	0.014	0.000	0.347 ✓	1.000	4.10-1a ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	120 - 70.75	Pole	TP32.283x18x0.1875	1	-7.30	972.93	53.3	Pass
L2	70.75 - 34.75	Pole	TP42.348x30.748x0.3125	2	-13.50	2220.16	38.0	Pass
L3	34.75 - 0	Pole	TP51.8x40.2005x0.375	3	-24.31	3381.78	34.7	Pass
							Summary	
						Pole (L1)	53.3	Pass
						RATING =	**53.3**	**Pass**

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS

250 E. Broad Street, Suite 1500
Columbus, Ohio 43215
Phone: (614) 221-6679
FAX: (614) 448-4105

Job	Date
	9/4/2007
Project: 120 ft Monopole	
Client: PennSummit	

Monopole Bolt & Plate Analysis

Design/Analysis in Accordance with TIA/EIA-222-G

Factored Resultant Loads:

Moment = 1285.00 ft-k
Shear = 15.0 k
Axial = 24.0 k

Flange Plate Geometry

Shaft Shape	18-Sides	Plate Shape	Square	Bolt Type	ASTM A615 (Gr75)
Base Diameter (D_f)	51.80 in	Plate Thickness	3.00 in	Bolt Size	2 1/4 in
Base Diameter (D_p)	52.60 in	Plate Width	57.00 in	Bolt Quantity	16
Plate Elevation	0.00 ft	Plate Strength	55 ksi	Bolt Circle	59.00 in

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Bolt Stress

Bolt Tension (P_{u1})	65.34 k	
Moment of Inertia	6962.00 in^2	
Bolt Compression (P_{u2})	66.84 k	
Bolt Shear (V_u)	0.94 k	
Net Bolt Area (An)	3.25 in^2	
Min Tensile Strength (F_{ub})	100.00 ksi	
Tensile Capacity (ϕR_{nt})	243.75 k	$\phi R_{nt} = 0.75 * F_{ub} * A_n$
n (Base Detail d)	0.40	

$$\left| \frac{Pu + \frac{Vu}{n}}{\phi P \eta \tau} \right| = 0.284 < 1.0$$

Bolts Are Stressed to 28.4% of Capacity

Plate Stress

Plate Moment	962.48 in-k			
Effective Plate Width	28.81 in			
Plastic Section Modulus (Z)	64.82			
Plastic Moment (M_p)	3565.26 in-k			
Factored Resistance (ϕM_n)	3208.73 in-k	>	962.48 in-k	OK

Flange Plate is Stressed to 30.0% of Capacity

PJF_Pole (tm) - Monopole Design Program
Windows Version 3.04.0000 Tue Sep 4, 2007 - 9:19:30 am
(c) 1993 to 2000 PAUL J. FORD AND COMPANY, Columbus, Ohio

Job No.....: 29203-0309 Design No: #20836 Engineer : MFP
Description : 120-Ft Monopole - CT-822, MANSFIELD, TOLLAND CO., CT
Design..... : 85 mph / 74 mph + 1/2" radial ice
Owner..... : AT&T Client: PennSummit Tubular, LLC
Status..... : Final Design Revision: 1 Rev. Date : 10/13/2003

S U M M A R Y O F C U R R E N T C A I S S O N D E S I G N

Diameter (ft) .....:	7.00	Compression (kips):	24.00	Friction S.F .....:	2.00
Min. Depth (ft) ...:	17.50	Horizontal (kips) :	15.00	Lateral S.F .....:	2.00
Depth Used (ft) ...:	22.00	Uplift (kips) ....:	0.00	Concrete S.F .....:	1.30
Rebar Area (in^2) .:	31.20	Moment (Ft-kips) .:	1285.0	Concrete F'c (psi) :	3000.0
Rebar Used .....:	(20)#11	Full Cohesion (ft):	21.00	Steel Cover (in) ..:	4.00
Water at (ft) .....:	13.00	Rock at (ft) .....:	99.00		

SOIL PROFILE :

Soil Layer	Layer Thickness (ft)	Unit Weight (pcf)	Ult. Skin Friction (psf)	Allowable Bearing (psf)	Friction Angle- Phi (deg)	Passive Coeff.- KP	Cohesion (c) (psf)
1	4.00	100.00	0.00	0.00	0.00	1.000	0.00
2	9.00	130.00	0.00	0.00	32.00	3.255	0.00
3	8.00	57.00	0.00	3000.00	32.00	3.255	0.00
4	10.00	57.00	0.00	3000.00	32.00	3.255	0.00

LATERAL / MOMENT CAPACITY (CHECK) :	Min Design	Actual Design	
Caisson Diameter (ft) .....:	7.00	7.00	
Height Above Grade (ft) .....:	0.50	0.50	
Depth Below Grade (ft) .....:	17.50	22.00	
Concrete Volume (CY) .....:	25.66	32.07	
Applied Moment From Loads (Working), Mwork(Ft-kip):	1483.75	1524.25	
Resisting Moment From Soil (Ult), Mult(Ft-kip) ...:	3034.97	7373.42	Soil
Moment S.F. (Mult / Mwork) .....:	2.05	4.84	
Applied Horizontal Load (Working), Hwork (Kips) ..:	15.00	15.00	41.3%
Horizontal Soil Resistance (Ultimate), Hult (Kips):	30.49	31.56	
Horizontal S.F. (Hult / Hwork) .....:	2.03	2.10	
Center of Rotation (from grade) (ft) .....:	12.75	15.45	
Inflection Point (Max Design Moment Location (ft) :	5.00	5.00	
Maximum Factored Design Moment for Reinf. (Ft-kip):	2031.80	2031.80	
Area Steel Required From Loads (in^2) .....:	12.00	12.00	Steel
ACI Minimum Steel (0.5%) (in^2) .....:	27.71	27.71	
Area Reinf. Steel Provided (in^2) .....:	31.20	31.20	38.5%

UPLIFT CAPACITY CHECK :			
Actual Uplift on Caisson (Kips) .....:	0.00	0.00	
Allowable Uplift Capacity (Kips) .....:	74.48	86.62	

COMPRESSION CAPACITY CHECK :			
Actual Compression on Caisson (Kips) .....:	24.00	24.00	
Total Compression (Includes Concrete Wt.) (Kips) .:	60.56	69.22	
Allowable Compression Capacity (Kips) .....:	115.45	115.45	

CAISSON DESIGN:
USE: 7.00 ft Diameter X 22.50 ft Long (Concrete Volume = 32.07 CY)
Reinf: (20)#11 Vert, w/Closed Ties: (12)#5 @6.0", remaining ties @18.0" (ASTM A615)
