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@po.state.ct.us
www.ct.gov/csc

June 9, 2005

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

RE: **EM-VER-014-050523** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 21 Acorn Road, Branford, Connecticut.

Dear Attorney Baldwin:

At a public meeting held on June 8, 2005, the Connecticut Siting Council (Council) acknowledged your notice to modify these existing telecommunications facilities, 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 May 23, 2005 and additional information dated May 25, 2005, including the placement of all necessary equipment and shelters within the tower compounds. 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 existing facility sites that would not increase tower heights, extend the boundaries of the tower sites, increase noise levels at the tower site boundaries by six decibels, and increase the total radio frequencies electromagnetic radiation power densities measured at the tower site boundaries to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. These facilities have also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on these towers.

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

Thank you for your attention and cooperation.

Very truly yours,

Pamela B. Katz, P.E.
Chairman

PBK/jkl

c: The Honorable John E. Opie, First Selectman, Town of Branford
Justine K. Gillen, Zoning Enforcement Officer, Town of Branford
Thomas J. Regan, Esq., Brown Rudnick Berlack Israels LLP
Thomas F. Flynn, III, Nextel Communications
Christopher B. Fisher, Esq., Cuddy & Feder LLP

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

May 25, 2005

Michael Perrone
Siting Analyst
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **EM-VER-014-050523 – Branford, Connecticut**

Dear Mr. Perrone:

As a follow-up to our telephone conversation yesterday, enclosed please find twenty-one (21) copies of a new cover sheet for the plans submitted with the above-referenced Notice of Exempt Modification. As you know, the cover sheet with the prior submission included an incorrect site key map. I apologize for the confusion. Please contact me if you need any additional information regarding this matter.

Sincerely,

Kenneth C. Baldwin

KCB/kmd
Enclosures
cc: Sandy M. Carter

Cellco Partnership

d.b.a. verizon wireless

BRANFORD-3

21 ACORN ROAD
BRANFORD, CONNECTICUT 06405

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STRUCTURAL NOTE:

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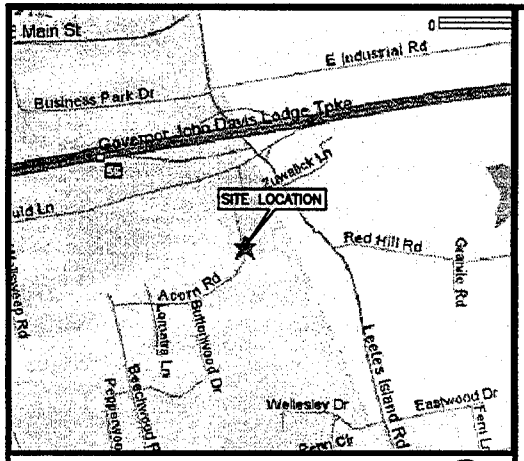

LOCATION MAP
BRANFORD, CT

1500 0 1500

SCALE: 1" = 1,500'±

DIRECTIONS (FROM HARTFORD, CT):
TAKE I-91 S. MERGE ONTO I-95 N. TAKE I-95 N TO EXIT 56. TAKE FIRST TWO RIGHT TURNS. TURN LEFT ONTO ACORN RD. SITE IS ON LEFT.

PROJECT SUMMARY

SITE NAME:	BRANFORD
SITE ADDRESS:	21 ACORN ROAD BRANFORD, CONNECTICUT 06405
PROPERTY OWNER:	SPRINT SITES USA EAST REGION – NORTHEAST DISTRICT OFFICE 535 EAST CRESCENT AVENUE RAMSEY, NJ 07446
LESSEE:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 99 EAST RIVER DRIVE EAST HARTFORD, CT 06108
APPLICANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 99 EAST RIVER DRIVE EAST HARTFORD, CT 06108
CONTACT PERSON:	SANDY CARTER CELLCO PARTNERSHIOP (860) 803-8219
COORDINATES:	LATITUDE: 41°-17'-39.00" N (NAD 83) LONGITUDE: 72°-45'-43.00" W (NAD 83) COORDINATES TAKEN FROM RF ENGINEER

SHEET INDEX

NOTE:
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A	03/18/05	RPG	PRELIMINARY SITING COUNCIL

Dewberry-Goodkind, Inc.
A Dewberry Company
59 Elm Street, Suite 101
New Haven, CT 06510
p. (203) 776-2277
f. (203) 776-2288
Engineers
Planners
Surveyors

SCALE: AS SHOWN
DESIGNED BY: CKD
DATE: 03/05/05

TITLE SHEET

Cellco Partnership
d.b.a. verizon wireless

SITE NAME: BRANFORD-3
21 ACORN ROAD
BRANFORD, CT 06405

PROJECT: 1997001212
LOCATION CODE: 117599

SHEET NO. T - 1

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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Phone: (860) 827-2935 Fax: (860) 827-2950
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www.ct.gov/csc

May 23, 2005

The Honorable Michael J. Doody
Mayor
Town of North Branford
1599 Foxon Road
North Branford, CT 06471

RE: **EM-VER-014-050523** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 21 Acorn Road, Branford, Connecticut.

Dear Mayor Doody:

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

The Council will consider this item at the next meeting scheduled for June 8, 2005 at 1:30 p.m. in Hearing Room One, Ten Franklin Square, New Britain, Connecticut.

If you have any questions or comments regarding this proposal, please call me or inform the council by June 7, 2005.

Thank you for your cooperation and consideration.

Very truly yours,

SDP/RKS

S. Derek Phelps
Executive Director

SDP/jkl

Enclosure: Notice of Intent

c: Carol Zeeb, Town Planner, Town of North Branford
Karl Kilduff, Town Manager, Town of North Branford

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-014-050523

May 23, 2005

Via Hand Delivery

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

Re: **Notice of Exempt Modification- Antenna Co-location**
21 Acorn Road, Branford, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") intends to install antennas on the existing 150-foot monopole tower owned by Sprint Sites, USA at 21 Acorn Road in Branford, 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 Branford First Selectman, John E. Opie.

The existing facility consists of a 150-foot self-supporting monopole tower capable of supporting multiple carriers within a fenced compound. The tower currently supports Sprint antennas at the 147-foot level; AT&T antennas at the 140-foot level; Nextel at the 130-foot level; and Cingular antennas at the 105-foot level. Cellco proposes to install twelve (12) panel-type antennas at the 116-foot level on the tower and associated equipment within a secured room in the existing equipment building near the base of the tower. (See Tab 1- Project Plans).

The planned modifications to the Branford 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 116-foot level on the 150-foot tower.

2. The proposed installation of Cellco equipment within the existing equipment building will not require an extension of the fenced compound or leased area.

3. The proposed antenna modification 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 the proposed Cellco antennas would be 9.81% of the FCC standard. A copy of the general 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 existing and proposed antennas and associated equipment.

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

Sincerely,

Kenneth C. Baldwin

Attachments
cc: John E. Opie, First Selectman
Sandy M. Carter

Cellco Partnership

d.b.a. verizon wireless

BRANFORD-3

21 ACORN ROAD
BRANFORD, CONNECTICUT 06405

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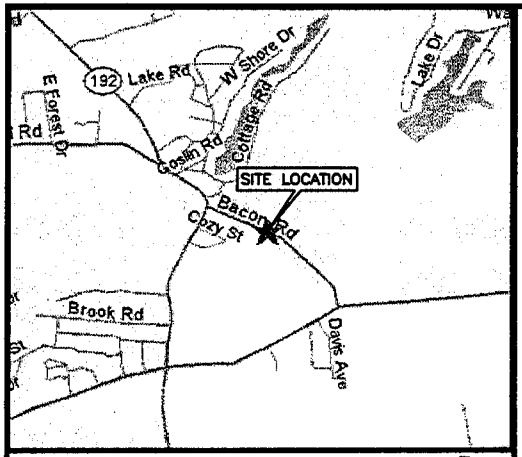

LOCATION MAP
ENFIELD, CT

1500 0 1500

SCALE: 1" = 1,500'±

DIRECTIONS (FROM HARTFORD, CT):
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SITE ADDRESS:	21 ACORN ROAD BRANFORD, CONNECTICUT 06405
PROPERTY OWNER:	SPRINT SITES USA EAST REGION – NORTHEAST DISTRICT OFFICE 535 EAST CRESCENT AVENUE RAMSEY, NJ 07446
LESSEE:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 99 EAST RIVER DRIVE EAST HARTFORD, CT 06108
APPLICANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 99 EAST RIVER DRIVE EAST HARTFORD, CT 06108
CONTACT PERSON:	SANDY CARTER CELLCO PARTNERSHIOP (860) 803-8219
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SCALE: AS SHOWN
DESIGNED BY: CKD
DATE: 03/05/05

TITLE SHEET

Cellco Partnership d.b.a. verizon wireless

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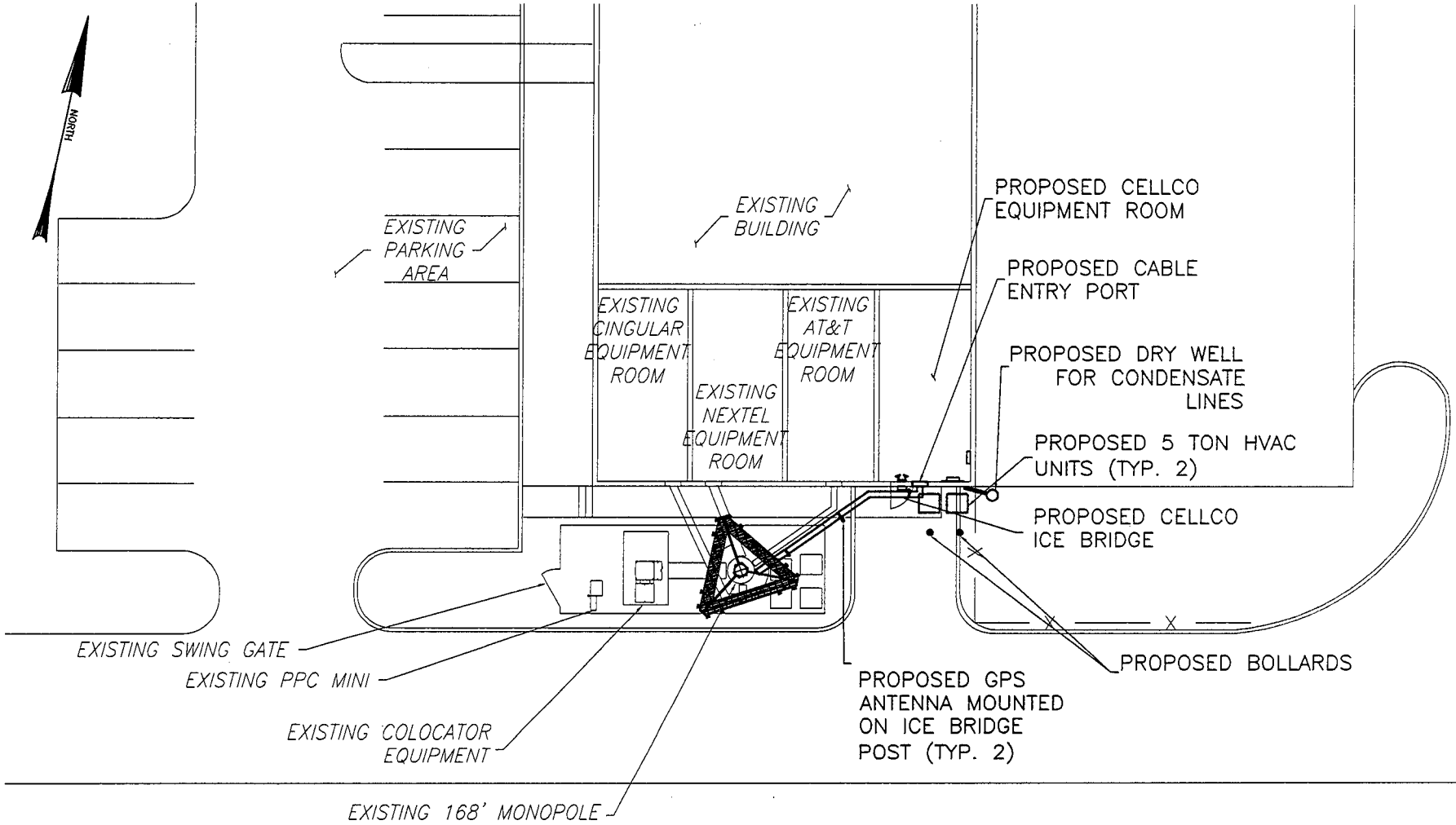
21 ACORN ROAD
BRANFORD, CT 06405

PROJECT: 1997001212
LOCATION CODE: 117599

SHEET NO. T - 1



PARTIAL SITE PLAN

20' 0 20'

SCALE: 1" = 20'

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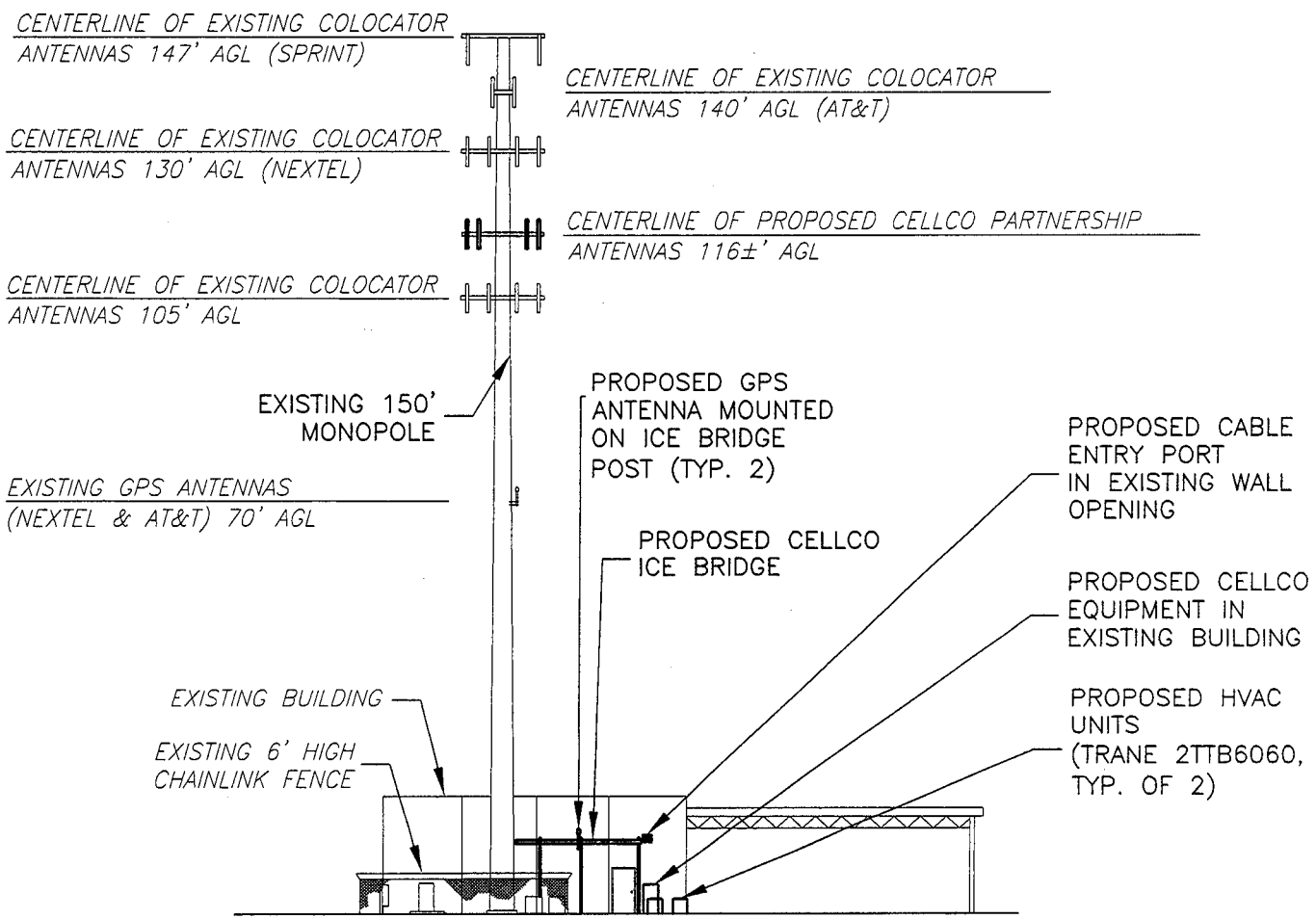
PARTIAL SITE PLAN

Cellco Partnership
d.b.a. verizon wireless

SITE NAME: BRANFORD-3
21 ACORN ROAD
BRANFORD, CT 06405

PROJECT: 1997001212
LOCATION CODE: 117599

SHEET NO. S - 1



MONOPOLE ELEVATION
(LOOKING NORTHWEST)

30' 0 30'

SCALE: 1" = 30'

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Surveyors

SCALE: AS SHOWN

DESIGNED BY: CKD

DATE: 03/05/05

MONOPOLE ELEVATION

Cellco Partnership
d.b.a. verizon wireless

SITE NAME: BRANFORD-3
21 ACORN ROAD
BRANFORD, CT 06405

PROJECT: 1997001212
LOCATION CODE: 117599

SHEET NO. S - 2

General Power Density

Site Name: Branford 3, CT
Tower Height: 116 FT

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissable Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)	(%)
Verizon	880	9	200	1800	116	0.0481	0.586	8.21%
Verizon	1900	3	200	600	116	0.0160	1	1.60%
Total Percentage of Maximum Permissible Exposure								**9.81%**

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Part 1 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

MHz = Megahertz
mW/cm^2 = milliwatts per square centimeter
ERP = Effective Radiated Power

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF 147' MONOPOLE FOR NEW ANTENNA ARRANGEMENT

21 Acorn Road
Branford, Connecticut

prepared for

Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

prepared by

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

36930848.00000
VZ1-146

May 19, 2005

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 147' steel monopole structure located at 21 Acorn Road in Branford, Connecticut. The analysis was conducted in accordance with the TIA/EIA-222-F standard for wind velocity of 85 mph and 74 mph concurrent with ½" 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 Verizon Wireless additions are listed below:

(2) Antel LPA80090/4CF, (4) Decibel DB844H90E-XY, and (6) Antel LPA185090/8CF_2 antennas mounted on a new low-profile platform with (12) 1 5/8" coax cables within the monopole	Verizon Wireless (proposed)	@ 116' elevation

The results of the analysis indicate the steel monopole structure is in compliance with the proposed loading conditions. **The steel monopole structure is structurally adequate under the TIA/EIA-222-F wind load classification specified above and the existing and proposed antenna loadings.**

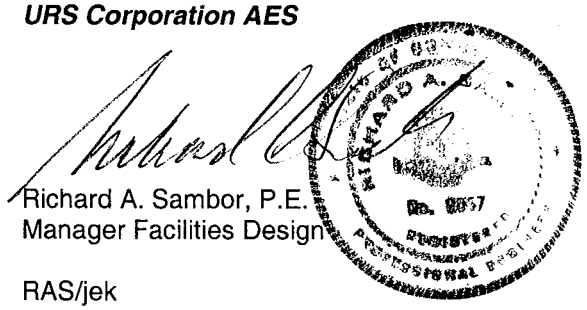
This analysis was based on:

1. The tower structure's capacity not including any assessment of the condition of the tower.
2. Tower geometry and member sizes taken from original construction drawings and structural calculations prepared by Paul J. Ford and Company job number 29297-566, signed and stamped September 29, 1997.
3. Antenna inventory as specified in section 2 of this report.

This report is only valid 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 assumptions of the antenna and mount configurations. Notify the engineer in writing immediately if any of the information in this report is found to be other than specified.

Should you have any questions, please contact us.

Sincerely,
URS Corporation AES



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

RAS/jek

cc: Alitz Abadjian – URS
CF/Book

2. INTRODUCTION

A structural analysis of the existing 147' steel monopole located at 21 Acorn Road in Branford, Connecticut was performed by URS Corporation AES (URS) for Verizon Wireless. The purpose of this analysis was to investigate the structural integrity of the monopole and foundation with its existing and proposed antenna loads.

The structure is self-supporting and was designed by Paul J. Ford and Company and manufactured by PennSummit Tubular, LLC. The tower geometry and member sizes were taken from original construction drawings and structural calculations prepared by Paul J. Ford and Company job number 29297-566, signed and stamped September 29, 1997.

The existing structure supports several communication antennas. The inventory is summarized below:

Antenna Type	Carrier	Mount	Antenna Centerline Elevation	Cable
(6) DB980H90E-M	Sprint (existing)	low-profile platform	147'	(6) 1 5/8" coax cables (within monopole)
(3) DB980H90E-M	Sprint (future)	low-profile platform (listed above)	147'	(3) 1 5/8" coax cables (within monopole)
(3) Allgon 7250.03	AT&T (existing)	Flush mount	140'	(6) 1 1/4" coax cables (within monopole)
(3) Allgon 7250.03	AT&T (future)	(3) 5' T-arms (to replace existing flush mount)	140'	(6) 1 1/4" coax cables (within monopole)
(12) Swedcom ALP 9212-N	Nextel (existing)	low-profile platform	130'	(12) 1 1/4" coax cables (within monopole)
(6) Antel LPA185090/8CF_2	**Verizon (proposed)**	**13' low-profile platform (Valmont p/n 852208)**	**116'**	**(6) 1 5/8" coax cables (within monopole)**
(2) Antel LPA80080/8CF	**Verizon (proposed)**	**low-profile platform (listed above)**	**116'**	**(2) 1 5/8" coax cables (within monopole)**
(4) Decibel DB844H90E-XY	**Verizon (proposed)**	**low-profile platform (listed above)**	**116'**	**(4) 1 5/8" coax cables (within monopole)**
(9) CSS DUO4-8670 with (6) TMA's	Cingular (existing)	low-profile platform	105'	(9) 7/8" coax cables (within monopole)
(2) GPS	Nextel (existing)	side arm mount	70'	(2) 1/2" coax cable (within the monopole)
(1) GPS	AT&T (existing)	side arm mount	70'	(1) 1/2" coax cable (within the monopole)

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with 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 ERI Tower 3.0. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

Load Condition 1 = 85 mph Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 74 mph 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 monopoles less than 700 feet tall. For the purposes of this analysis, in computing the load capacity the allowable stresses of the monopole members were increased by one-third.

4. FINDINGS AND EVALUATION

Combined axial and bending stresses on the steel monopole structure were evaluated to compare with allowable stresses in accordance with AISC. The calculated stresses under the proposed loading were below the allowable stresses. Detailed analysis and calculations for the proposed antenna arrangement and load condition are provided in section 6 of this report. No further analysis was conducted on the foundation since the shear and moment at the top of the foundation were below the original design.

5. CONCLUSIONS

The results of the analysis indicate the steel monopole structure is in compliance with the proposed loading conditions. **The steel monopole structure is structurally adequate under the TIA/EIA-222-F wind load classification specified above and the existing and proposed antenna loadings.**

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 within the monopole.

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.

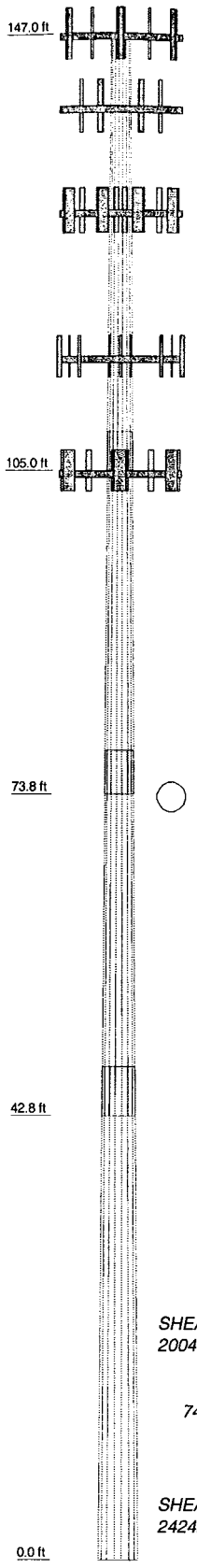
Ongoing and Periodic Inspection and Maintenance:

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.

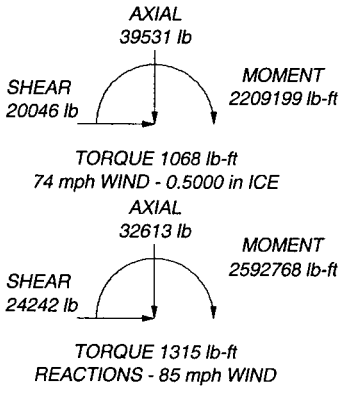
6. DRAWINGS AND DATA

ERI TOWER INPUT/OUTPUT SUMMARY



Section	1	2	3	4
Length (ft)	42.00	35.00	42.00	47.50
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.4375
Lap Splice (ft)	3.75	4.25	4.75	
Top Dia (in)	22.0000	28.0034	32.6073	37.0433
Bot Dia (in)	29.1410	33.9550	38.6010	45.1200
Grade	A607-60			
Weight (lb)	2871.5	3622.6	5029.6	9122.4

Total Weight: 20646.1



APPURTENANCES

TYPE	ELEVATION	TYPE	ELEVATION
Summit 14' Low Profile Platform (Sprint)	147	DB844H90E-XY (Verizon)	116
		DB844H90E-XY (Verizon)	116
(3) DB980H90E-M (Sprint)	147	LPA-185080/8CFx2 (Verizon)	116
(3) DB980H90E-M (Sprint)	147	LPA-185080/8CFx2 (Verizon)	116
(3) DB980H90E-M (Sprint)	147	LPA-185080/8CFx2 (Verizon)	116
5' Lightweight T-Frame (ATI)	140	LPA-185080/8CFx2 (Verizon)	116
5' Lightweight T-Frame (ATI)	140	LPA-185080/8CFx2 (Verizon)	116
5' Lightweight T-Frame (ATI)	140	LPA-185080/8CFx2 (Verizon)	116
7250.03 (ATI)	140	PiROD 13' Low Profile Platform (Verizon)	116
7250.03 (ATI)	140		
7250.03 (ATI)	140	(2) TMA (Cingular)	105
7250.03 (ATI)	140	Summit 14' Low Profile Platform (Cingular)	105
7250.03 (ATI)	140		
7250.03 (ATI)	140	(3) DU04-8670 (Cingular)	105
Summit 14' Low Profile Platform (Nextel)	130	(2) TMA (Cingular)	105
		(2) TMA (Cingular)	105
(4) ALP 9212-N (Nextel)	130	(3) DU04-8670 (Cingular)	105
(4) ALP 9212-N (Nextel)	130	(3) DU04-8670 (Cingular)	105
(4) ALP 9212-N (Nextel)	130	GPS (ATI)	70
LPA-80090/4CF (Verizon)	116	GPS (Nextel)	70
LPA-80090/4CF (Verizon)	116	GPS (Nextel)	70
DB844H90E-XY (Verizon)	116		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 98.2%

URS Corp. AES
500 Enterprise Dr, Suite 3B
Rocky Hill, CT 06067
Phone: (860) 529-8882
FAX: (860) 529-5566

Job: **147' Monopole**			
Project: **Branford, CT**			
Client: Verizon Wireless	Drawn by: Jed Kiernan		App'd:
Code: TIA/EIA-222-F	Date: 05/19/05		Scale: NT
Path: P:\Telecom\StructuralERI Files\Branford.eri			Dwg No. E-

ERI TOWER DETAILED OUTPUT

ERITower	Job	Page
	147' Monopole	1 of 17
URS Corp. AES 500 Enterprise Dr, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-5566	**Project** Branford, CT	**Date** 14:13:52 05/19/05
	Client Verizon Wireless	**Designed by** Jed Kiernan

Tower Input Data

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

Tower is located in New Haven County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	147.00-105.00	42.00	3.75	18	22.0000	29.1410	0.2500	1.0000	A607-60 (60 ksi)
L2	105.00-73.75	35.00	4.25	18	28.0034	33.9550	0.3125	1.2500	A607-60 (60 ksi)
L3	73.75-42.75	35.25	4.75	18	32.6073	38.6010	0.3750	1.5000	A607-60 (60 ksi)
L4	42.75-0.00	47.50		18	37.0433	45.1200	0.4375	1.7500	A607-60 (60 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	22.3394	17.2586	1031.4832	7.7212	11.1760	92.2945	2064.3237	8.6310	3.4320	13.728
	29.5905	22.9250	2417.5313	10.2563	14.8036	163.3067	4838.2436	11.4647	4.6888	18.755
L2	29.0829	27.4659	2660.7626	9.8303	14.2257	187.0387	5325.0263	13.7356	4.3786	14.012
	34.4788	33.3692	4771.5467	11.9431	17.2491	276.6252	9549.3719	16.6877	5.4261	17.363
L3	33.8441	38.3645	5035.5836	11.4425	16.5645	303.9983	10077.7932	19.1859	5.0789	13.544
	39.1965	45.4985	8399.4763	13.5702	19.6093	428.3413	16810.0048	22.7536	6.1338	16.357
L4	38.4349	50.8318	8605.4488	12.9951	18.8180	457.2984	17222.2209	25.4207	5.7496	13.142
	45.8160	62.0472	15650.7380	15.8623	22.9210	682.8134	31322.0697	31.0295	7.1711	16.391

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 147.00-105.00				1	1	1		
L2 105.00-73.75				1	1	1		
L3 73.75-42.75				1	1	1		
L4 42.75-0.00				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
1 5/8 (Sprint)	C	No	Inside Pole	147.00 - 2.50	9	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 1/4 (AT&T)	C	No	Inside Pole	140.00 - 6.00	6	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
1 1/4 (Nextel)	C	No	Inside Pole	130.00 - 10.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
1 5/8 (Verizon)	C	No	Inside Pole	116.00 - 0.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
7/8 (Cingular)	C	No	Inside Pole	105.00 - 10.00	9	No Ice	0.00	0.54
						1/2" Ice	0.00	0.54
1/2 (AT&T)	C	No	Inside Pole	70.00 - 6.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1/2 (Nextel)	C	No	Inside Pole	70.00 - 10.00	2	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	147.00-105.00	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	867.00
L2	105.00-73.75	A	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 lb
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1205.63
L3	73.75-42.75	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	1216.42
L4	42.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1499.90

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	147.00-105.00	A	0.500	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	867.00
L2	105.00-73.75	A	0.500	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	1205.63
L3	73.75-42.75	A	0.500	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	1216.42
L4	42.75-0.00	A	0.500	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	1499.90

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Summit 14' Low Profile Platform (Sprint)	C	None			0.0000	147.00	No Ice	17.30	17.30	1500.00
							1/2" Ice	22.10	22.10	2030.00
5' Lightweight T-Frame (AT&T)	A	None			0.0000	140.00	No Ice	4.70	4.70	175.00
							1/2" Ice	7.30	7.30	265.00
5' Lightweight T-Frame (AT&T)	B	None			0.0000	140.00	No Ice	4.70	4.70	175.00
							1/2" Ice	7.30	7.30	265.00
5' Lightweight T-Frame (AT&T)	C	None			0.0000	140.00	No Ice	4.70	4.70	175.00
							1/2" Ice	7.30	7.30	265.00
Summit 14' Low Profile Platform (Cingular)	C	None			0.0000	105.00	No Ice	17.30	17.30	1500.00
							1/2" Ice	22.10	22.10	2030.00
(3) DB980H90E-M (Sprint)	A	From Face	2.30	0.00	0.0000	147.00	No Ice	3.80	2.19	8.50
							1/2" Ice	4.18	2.56	28.62
			0.00							
(3) DB980H90E-M (Sprint)	B	From Face	2.30	0.00	0.0000	147.00	No Ice	3.80	2.19	8.50
							1/2" Ice	4.18	2.56	28.62
			0.00							

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(3) DB980H90E-M	C	From Face	2.30	0.0000	147.00	No Ice	3.80	2.19	8.50
(Sprint)			0.00			1/2" Ice	4.18	2.56	28.62
			0.00						
(4) ALP 9212-N	A	From Face	2.30	0.0000	130.00	No Ice	5.78	5.78	17.16
(Nextel)			0.00			1/2" Ice	6.20	6.20	62.42
			0.00						
(4) ALP 9212-N	B	From Face	2.30	0.0000	130.00	No Ice	5.78	5.78	17.16
(Nextel)			0.00			1/2" Ice	6.20	6.20	62.42
			0.00						
(4) ALP 9212-N	C	From Face	2.30	0.0000	130.00	No Ice	5.78	5.78	17.16
(Nextel)			0.00			1/2" Ice	6.20	6.20	62.42
			0.00						
(3) DU04-8670	A	From Face	2.30	0.0000	105.00	No Ice	6.53	4.20	31.40
(Cingular)			0.00			1/2" Ice	6.94	4.57	73.59
			0.00						
(3) DU04-8670	B	From Face	2.30	0.0000	105.00	No Ice	6.53	4.20	31.40
(Cingular)			0.00			1/2" Ice	6.94	4.57	73.59
			0.00						
(3) DU04-8670	C	From Face	2.30	0.0000	105.00	No Ice	6.53	4.20	31.40
(Cingular)			0.00			1/2" Ice	6.94	4.57	73.59
			0.00						
Summit 14' Low Profile Platform	C	None		0.0000	130.00	No Ice	17.30	17.30	1500.00
(Nextel)						1/2" Ice	22.10	22.10	2030.00
PiROD 13' Low Profile Platform	C	None		0.0000	116.00	No Ice	15.70	15.70	1300.00
(Verizon)						1/2" Ice	20.10	20.10	1765.00
(2) TMA	A	From Face	2.30	0.0000	105.00	No Ice	0.00	0.50	12.00
(Cingular)			0.00			1/2" Ice	0.00	0.75	16.00
			0.00						
(2) TMA	B	From Face	2.30	0.0000	105.00	No Ice	0.00	0.50	12.00
(Cingular)			0.00			1/2" Ice	0.00	0.75	16.00
			0.00						
(2) TMA	C	From Face	2.30	0.0000	105.00	No Ice	0.00	0.50	12.00
(Cingular)			0.00			1/2" Ice	0.00	0.75	16.00
			0.00						
LPA-80090/4CF	C	From Face	2.30	0.0000	116.00	No Ice	2.62	4.31	11.00
(Verizon)			6.00			1/2" Ice	2.92	4.68	37.51
			0.00						
LPA-80090/4CF	C	From Face	2.30	0.0000	116.00	No Ice	2.62	4.31	11.00
(Verizon)			-6.00			1/2" Ice	2.92	4.68	37.51
			0.00						
DB844H90E-XY	A	From Face	2.30	0.0000	116.00	No Ice	2.87	3.73	10.00
(Verizon)			6.00			1/2" Ice	3.18	4.10	35.38
			0.00						
DB844H90E-XY	A	From Face	2.30	0.0000	116.00	No Ice	2.87	3.73	10.00
(Verizon)			-6.00			1/2" Ice	3.18	4.10	35.38
			0.00						
DB844H90E-XY	B	From Face	2.30	0.0000	116.00	No Ice	2.87	3.73	10.00
(Verizon)			6.00			1/2" Ice	3.18	4.10	35.38
			0.00						
LPA-185080/8CFx2	A	From Face	2.30	0.0000	116.00	No Ice	2.09	2.79	7.00
(Verizon)			4.00			1/2" Ice	2.39	3.09	25.04
			0.00						
LPA-185080/8CFx2	A	From Face	2.30	0.0000	116.00	No Ice	2.09	2.79	7.00
(Verizon)			-4.00			1/2" Ice	2.39	3.09	25.04
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft / ft / ft	°	ft		ft^2	ft^2	lb
LPA-185080/8CFx2	B	From Face	2.30	0.0000	116.00	No Ice	2.09	2.79	7.00
(Verizon)			4.00			1/2" Ice	2.39	3.09	25.04
			0.00						
LPA-185080/8CFx2	B	From Face	2.30	0.0000	116.00	No Ice	2.09	2.79	7.00
(Verizon)			-4.00			1/2" Ice	2.39	3.09	25.04
			0.00						
LPA-185080/8CFx2	C	From Face	2.30	0.0000	116.00	No Ice	2.09	2.79	7.00
(Verizon)			4.00			1/2" Ice	2.39	3.09	25.04
			0.00						
LPA-185080/8CFx2	C	From Face	2.30	0.0000	116.00	No Ice	2.09	2.79	7.00
(Verizon)			-4.00			1/2" Ice	2.39	3.09	25.04
			0.00						
7250.03	A	From Face	2.30	0.0000	140.00	No Ice	4.00	1.87	15.40
(AT&T)			2.00			1/2" Ice	4.39	2.33	35.03
			0.00						
7250.03	A	From Face	2.30	0.0000	140.00	No Ice	4.00	1.87	15.40
(AT&T)			-2.00			1/2" Ice	4.39	2.33	35.03
			0.00						
7250.03	B	From Face	2.30	0.0000	140.00	No Ice	4.00	1.87	15.40
(AT&T)			2.00			1/2" Ice	4.39	2.33	35.03
			0.00						
7250.03	B	From Face	2.30	0.0000	140.00	No Ice	4.00	1.87	15.40
(AT&T)			-2.00			1/2" Ice	4.39	2.33	35.03
			0.00						
7250.03	C	From Face	2.30	0.0000	140.00	No Ice	4.00	1.87	15.40
(AT&T)			2.00			1/2" Ice	4.39	2.33	35.03
			0.00						
7250.03	C	From Face	2.30	0.0000	140.00	No Ice	4.00	1.87	15.40
(AT&T)			-2.00			1/2" Ice	4.39	2.33	35.03
			0.00						
GPS	A	From Face	2.00	0.0000	70.00	No Ice	1.00	1.00	10.00
(AT&T)			0.00			1/2" Ice	1.50	1.50	15.00
			0.00						
GPS	B	From Face	2.00	0.0000	70.00	No Ice	1.00	1.00	10.00
(Nextel)			0.00			1/2" Ice	1.50	1.50	15.00
			0.00						
GPS	C	From Face	2.00	0.0000	70.00	No Ice	1.00	1.00	10.00
(Nextel)			0.00			1/2" Ice	1.50	1.50	15.00
			0.00						

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation	z	K_Z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
L1 147.00-105.00	125.27	1.464	27	89.497	A	0.000	89.497	89.497	100.00	0.000	0.000
					B	0.000	89.497		100.00		

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face e	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	89.497		100.00		
L2 105.00-73.75	89.13	1.328	25	81.505	A	0.000	81.505	81.505	100.00	0.000	0.000
					B	0.000	81.505		100.00		
					C	0.000	81.505		100.00		
L3 73.75-42.75	58.17	1.176	22	92.911	A	0.000	92.911	92.911	100.00	0.000	0.000
					B	0.000	92.911		100.00		
					C	0.000	92.911		100.00		
L4 42.75-0.00	20.75	1	18	147.792	A	0.000	147.792	147.792	100.00	0.000	0.000
					B	0.000	147.792		100.00		
					C	0.000	147.792		100.00		

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face e	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.00-105.00	125.27	1.464	20	0.5000	92.997	A	0.000	92.997	92.997	100.00	0.000	0.000
						B	0.000	92.997		100.00		
						C	0.000	92.997		100.00		
L2 105.00-73.75	89.13	1.328	18	0.5000	84.109	A	0.000	84.109	84.109	100.00	0.000	0.000
						B	0.000	84.109		100.00		
						C	0.000	84.109		100.00		
L3 73.75-42.75	58.17	1.176	16	0.5000	95.494	A	0.000	95.494	95.494	100.00	0.000	0.000
						B	0.000	95.494		100.00		
						C	0.000	95.494		100.00		
L4 42.75-0.00	20.75	1	14	0.5000	151.355	A	0.000	151.355	151.355	100.00	0.000	0.000
						B	0.000	151.355		100.00		
						C	0.000	151.355		100.00		

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face e	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.00-105.00	125.27	1.464	9	89.497	A	0.000	89.497	89.497	100.00	0.000	0.000
					B	0.000	89.497		100.00		
					C	0.000	89.497		100.00		
L2 105.00-73.75	89.13	1.328	8	81.505	A	0.000	81.505	81.505	100.00	0.000	0.000
					B	0.000	81.505		100.00		
					C	0.000	81.505		100.00		
L3 73.75-42.75	58.17	1.176	8	92.911	A	0.000	92.911	92.911	100.00	0.000	0.000
					B	0.000	92.911		100.00		
					C	0.000	92.911		100.00		
L4 42.75-0.00	20.75	1	6	147.792	A	0.000	147.792	147.792	100.00	0.000	0.000
					B	0.000	147.792		100.00		
					C	0.000	147.792		100.00		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 147.00-105.00	867.00	2871.46	A	1	0.65	1	1	1	89.497	2658.61	63.30	C
			B	1	0.65	1	1	1	89.497			
			C	1	0.65	1	1	1	89.497			
L2 105.00-73.75	1205.63	3622.64	A	1	0.65	1	1	1	81.505	2196.53	70.29	C
			B	1	0.65	1	1	1	81.505			
			C	1	0.65	1	1	1	81.505			
L3 73.75-42.75	1216.42	5029.60	A	1	0.65	1	1	1	92.911	2212.33	71.37	C
			B	1	0.65	1	1	1	92.911			
			C	1	0.65	1	1	1	92.911			
L4 42.75-0.00	1499.90	9122.43	A	1	0.65	1	1	1	147.792	3002.82	70.24	C
			B	1	0.65	1	1	1	147.792			
			C	1	0.65	1	1	1	147.792			
Sum Weight:	4788.94	20646.12						OTM	719819.34 lb-ft	10070.28		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 147.00-105.00	867.00	2871.46	A	1	0.65	1	1	1	89.497	2658.61	63.30	C
			B	1	0.65	1	1	1	89.497			
			C	1	0.65	1	1	1	89.497			
L2 105.00-73.75	1205.63	3622.64	A	1	0.65	1	1	1	81.505	2196.53	70.29	C
			B	1	0.65	1	1	1	81.505			
			C	1	0.65	1	1	1	81.505			
L3 73.75-42.75	1216.42	5029.60	A	1	0.65	1	1	1	92.911	2212.33	71.37	C
			B	1	0.65	1	1	1	92.911			
			C	1	0.65	1	1	1	92.911			
L4 42.75-0.00	1499.90	9122.43	A	1	0.65	1	1	1	147.792	3002.82	70.24	C
			B	1	0.65	1	1	1	147.792			
			C	1	0.65	1	1	1	147.792			
Sum Weight:	4788.94	20646.12						OTM	719819.34 lb-ft	10070.28		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 147.00-105.00	867.00	2871.46	A	1	0.65	1	1	1	89.497	2658.61	63.30	C
			B	1	0.65	1	1	1	89.497			
			C	1	0.65	1	1	1	89.497			
L2 105.00-	1205.63	3622.64	A	1	0.65	1	1	1	81.505	2196.53	70.29	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
73.75			B	1	0.65	1	1	1	81.505			
			C	1	0.65	1	1	1	81.505			
L3 73.75-42.75	1216.42	5029.60	A	1	0.65	1	1	1	92.911	2212.33	71.37	C
			B	1	0.65	1	1	1	92.911			
			C	1	0.65	1	1	1	92.911			
L4 42.75-0.00	1499.90	9122.43	A	1	0.65	1	1	1	147.792	3002.82	70.24	C
			B	1	0.65	1	1	1	147.792			
			C	1	0.65	1	1	1	147.792			
Sum Weight:	4788.94	20646.12						OTM	719819.34 lb-ft	10070.28		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 147.00-105.00	867.00	3547.23	A	1	0.65	1	1	1	92.997	2071.94	49.33	C
			B	1	0.65	1	1	1	92.997			
			C	1	0.65	1	1	1	92.997			
L2 105.00-73.75	1205.63	4235.92	A	1	0.65	1	1	1	84.109	1700.03	54.40	C
			B	1	0.65	1	1	1	84.109			
			C	1	0.65	1	1	1	84.109			
L3 73.75-42.75	1216.42	5727.26	A	1	0.65	1	1	1	95.494	1705.38	55.01	C
			B	1	0.65	1	1	1	95.494			
			C	1	0.65	1	1	1	95.494			
L4 42.75-0.00	1499.90	10230.17	A	1	0.65	1	1	1	151.355	2306.40	53.95	C
			B	1	0.65	1	1	1	151.355			
			C	1	0.65	1	1	1	151.355			
Sum Weight:	4788.94	23740.57						OTM	558135.05 lb-ft	7783.76		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 147.00-105.00	867.00	3547.23	A	1	0.65	1	1	1	92.997	2071.94	49.33	C
			B	1	0.65	1	1	1	92.997			
			C	1	0.65	1	1	1	92.997			
L2 105.00-73.75	1205.63	4235.92	A	1	0.65	1	1	1	84.109	1700.03	54.40	C
			B	1	0.65	1	1	1	84.109			
			C	1	0.65	1	1	1	84.109			
L3 73.75-42.75	1216.42	5727.26	A	1	0.65	1	1	1	95.494	1705.38	55.01	C
			B	1	0.65	1	1	1	95.494			
			C	1	0.65	1	1	1	95.494			
L4 42.75-0.00	1499.90	10230.17	A	1	0.65	1	1	1	151.355	2306.40	53.95	C
			B	1	0.65	1	1	1	151.355			
			C	1	0.65	1	1	1	151.355			
Sum Weight:	4788.94	23740.57						OTM	558135.05	7783.76		

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
									lb-ft			

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1 147.00-105.00	867.00	3547.23	A	1	0.65	1	1	1	92.997	2071.94	49.33	C
			B	1	0.65	1	1	1	92.997			
			C	1	0.65	1	1	1	92.997			
L2 105.00-73.75	1205.63	4235.92	A	1	0.65	1	1	1	84.109	1700.03	54.40	C
			B	1	0.65	1	1	1	84.109			
			C	1	0.65	1	1	1	84.109			
L3 73.75-42.75	1216.42	5727.26	A	1	0.65	1	1	1	95.494	1705.38	55.01	C
			B	1	0.65	1	1	1	95.494			
			C	1	0.65	1	1	1	95.494			
L4 42.75-0.00	1499.90	10230.17	A	1	0.65	1	1	1	151.355	2306.40	53.95	C
			B	1	0.65	1	1	1	151.355			
			C	1	0.65	1	1	1	151.355			
Sum Weight:	4788.94	23740.57						OTM	558135.05 lb-ft	7783.76		

Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1 147.00-105.00	867.00	2871.46	A	1	0.65	1	1	1	89.497	919.93	21.90	C
			B	1	0.65	1	1	1	89.497			
			C	1	0.65	1	1	1	89.497			
L2 105.00-73.75	1205.63	3622.64	A	1	0.65	1	1	1	81.505	760.04	24.32	C
			B	1	0.65	1	1	1	81.505			
			C	1	0.65	1	1	1	81.505			
L3 73.75-42.75	1216.42	5029.60	A	1	0.65	1	1	1	92.911	765.51	24.69	C
			B	1	0.65	1	1	1	92.911			
			C	1	0.65	1	1	1	92.911			
L4 42.75-0.00	1499.90	9122.43	A	1	0.65	1	1	1	147.792	1039.04	24.30	C
			B	1	0.65	1	1	1	147.792			
			C	1	0.65	1	1	1	147.792			
Sum Weight:	4788.94	20646.12						OTM	249072.43 lb-ft	3484.53		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.00-105.00	867.00	2871.46	A	1	0.65	1	1	1	89.497	919.93	21.90	C
			B	1	0.65	1	1	1	89.497			
			C	1	0.65	1	1	1	89.497			
L2 105.00-73.75	1205.63	3622.64	A	1	0.65	1	1	1	81.505	760.04	24.32	C
			B	1	0.65	1	1	1	81.505			
			C	1	0.65	1	1	1	81.505			
L3 73.75-42.75	1216.42	5029.60	A	1	0.65	1	1	1	92.911	765.51	24.69	C
			B	1	0.65	1	1	1	92.911			
			C	1	0.65	1	1	1	92.911			
L4 42.75-0.00	1499.90	9122.43	A	1	0.65	1	1	1	147.792	1039.04	24.30	C
			B	1	0.65	1	1	1	147.792			
			C	1	0.65	1	1	1	147.792			
Sum Weight:	4788.94	20646.12						OTM	249072.43 lb-ft	3484.53		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 147.00-105.00	867.00	2871.46	A	1	0.65	1	1	1	89.497	919.93	21.90	C
			B	1	0.65	1	1	1	89.497			
			C	1	0.65	1	1	1	89.497			
L2 105.00-73.75	1205.63	3622.64	A	1	0.65	1	1	1	81.505	760.04	24.32	C
			B	1	0.65	1	1	1	81.505			
			C	1	0.65	1	1	1	81.505			
L3 73.75-42.75	1216.42	5029.60	A	1	0.65	1	1	1	92.911	765.51	24.69	C
			B	1	0.65	1	1	1	92.911			
			C	1	0.65	1	1	1	92.911			
L4 42.75-0.00	1499.90	9122.43	A	1	0.65	1	1	1	147.792	1039.04	24.30	C
			B	1	0.65	1	1	1	147.792			
			C	1	0.65	1	1	1	147.792			
Sum Weight:	4788.94	20646.12						OTM	249072.43 lb-ft	3484.53		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	20646.12					
Bracing Weight	0.00					
Total Member Self-Weight	20646.12			76.02	-0.24	
Total Weight	32613.48			76.02	-0.24	
Wind 0 deg - No Ice		0.00	-24242.22	-2496257.94	-0.24	4.03
Wind 30 deg - No Ice		12121.11	-20994.38	-2161812.60	-1248167.22	670.52
Wind 60 deg - No Ice		20994.38	-12121.11	-1248090.96	-2161888.86	1157.35
Wind 90 deg - No Ice		24242.22	0.00	76.02	-2496334.19	1334.07
Wind 120 deg - No Ice		20994.38	12121.11	1248242.99	-2161888.86	1153.33

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 150 deg - No Ice		12121.11	20994.38	2161964.63	-1248167.22	663.55
Wind 180 deg - No Ice		0.00	24242.22	2496409.97	-0.24	-4.03
Wind 210 deg - No Ice		-12121.11	20994.38	2161964.63	1248166.74	-670.52
Wind 240 deg - No Ice		-20994.38	12121.11	1248242.99	2161888.38	-1157.35
Wind 270 deg - No Ice		-24242.22	0.00	76.02	2496333.71	-1334.07
Wind 300 deg - No Ice		-20994.38	-12121.11	-1248090.96	2161888.38	-1153.33
Wind 330 deg - No Ice		-12121.11	-20994.38	-2161812.60	1248166.74	-663.55
Member Ice	3094.45					
Total Weight Ice	39531.04			259.28	-0.85	
Wind 0 deg - Ice		0.00	-20045.78	-2096627.87	-0.85	3.32
Wind 30 deg - Ice		10022.89	-17360.15	-1815698.26	-1048444.43	546.23
Wind 60 deg - Ice		17360.15	-10022.89	-1048184.30	-1815958.39	942.78
Wind 90 deg - Ice		20045.78	0.00	259.28	-2096888.00	1086.71
Wind 120 deg - Ice		17360.15	10022.89	1048702.85	-1815958.39	939.46
Wind 150 deg - Ice		10022.89	17360.15	1816216.82	-1048444.43	540.48
Wind 180 deg - Ice		0.00	20045.78	2097146.43	-0.85	-3.32
Wind 210 deg - Ice		-10022.89	17360.15	1816216.82	1048442.72	-546.23
Wind 240 deg - Ice		-17360.15	10022.89	1048702.85	1815956.69	-942.78
Wind 270 deg - Ice		-20045.78	0.00	259.28	2096886.30	-1086.71
Wind 300 deg - Ice		-17360.15	-10022.89	-1048184.30	1815956.69	-939.46
Wind 330 deg - Ice		-10022.89	-17360.15	-1815698.26	1048442.72	-540.48
Total Weight	32613.48			76.02	-0.24	
Wind 0 deg - Service		0.00	-8388.31	-863707.36	-0.24	1.39
Wind 30 deg - Service		4194.16	-7264.49	-747982.33	-431891.93	232.01
Wind 60 deg - Service		7264.49	-4194.16	-431815.67	-748058.59	400.47
Wind 90 deg - Service		8388.31	0.00	76.02	-863783.62	461.62
Wind 120 deg - Service		7264.49	4194.16	431967.70	-748058.59	399.07
Wind 150 deg - Service		4194.16	7264.49	748134.36	-431891.93	229.60
Wind 180 deg - Service		0.00	8388.31	863859.39	-0.24	-1.39
Wind 210 deg - Service		-4194.16	7264.49	748134.36	431891.45	-232.01
Wind 240 deg - Service		-7264.49	4194.16	431967.70	748058.10	-400.47
Wind 270 deg - Service		-8388.31	0.00	76.02	863783.13	-461.62
Wind 300 deg - Service		-7264.49	-4194.16	-431815.67	748058.10	-399.07
Wind 330 deg - Service		-4194.16	-7264.49	-747982.33	431891.45	-229.60

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
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

Comb. No.	Description
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 lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	147 - 105	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-12147.83	-0.85	-259.28
			Max. Mx	5	-7476.10	-313655.69	-0.74
			Max. My	8	-7476.10	-0.02	-313730.93
			Max. Vy	5	13730.75	-313655.69	-0.74
			Max. Vx	8	13730.85	-0.02	-313730.93
			Max. Torque	11			1324.97
L2	105 - 73.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-20081.51	-0.85	-259.28
			Max. Mx	5	-13827.39	-867595.95	-46.52
			Max. My	8	-13827.42	-0.16	-867670.58
			Max. Vy	5	19544.26	-867595.95	-46.52
			Max. Vx	8	19544.61	-0.16	-867670.58
			Max. Torque	11			1324.15
L3	73.75 - 42.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26773.52	-0.85	-259.28
			Max. Mx	5	-20242.07	-1498708.35	-67.83
			Max. My	8	-20242.10	-0.22	-1498781.89
			Max. Vy	5	21705.80	-1498708.35	-67.83
			Max. Vx	8	21706.19	-0.22	-1498781.89
			Max. Torque	11			1320.41
L4	42.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-39531.04	-3.41	-259.28
			Max. Mx	5	-32590.91	-2592695.83	-69.79
			Max. My	8	-32590.91	0.43	-2592768.07
			Max. Vy	5	24272.57	-	-69.79

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
						2592695.83	
			Max. Vx	8	24272.57	0.43	-2592768.07
			Max. Torque	11			1317.05

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	21	39531.04	2.39	-20045.80
	Max. H_x	11	32613.48	24242.22	-0.00
	Max. H_z	2	32613.49	0.58	24242.23
	Max. M_x	2	2592607.12	0.58	24242.23
	Max. M_z	5	2592695.83	-24242.22	-0.00
	Max. Torsion	11	1315.14	24242.22	-0.00
	Min. Vert	1	32613.48	0.64	0.00
	Min. H_x	5	32613.48	-24242.22	-0.00
	Min. H_z	8	32613.49	0.58	-24242.23
	Min. M_x	8	-2592768.07	0.58	-24242.23
	Min. M_z	11	-2592695.32	24242.22	-0.00
	Min. Torsion	5	-1315.14	-24242.22	-0.00

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	32613.48	-0.64	0.00	76.02	0.48	0.00
Dead+Wind 0 deg - No Ice	32613.49	-0.58	-24242.23	-2592607.12	0.43	3.97
Dead+Wind 30 deg - No Ice	32613.48	12121.11	-20994.38	-2245262.84	-1296343.41	661.01
Dead+Wind 60 deg - No Ice	32613.48	20994.38	-12121.11	-1296275.80	-2245335.99	1140.92
Dead+Wind 90 deg - No Ice	32613.48	24242.22	0.00	69.42	-2592695.83	1315.14
Dead+Wind 120 deg - No Ice	32613.48	20994.38	12121.11	1296420.16	-2245345.57	1136.95
Dead+Wind 150 deg - No Ice	32613.48	12121.11	20994.38	2245418.26	-1296352.99	654.12
Dead+Wind 180 deg - No Ice	32613.49	-0.58	24242.23	2592768.07	0.43	-3.97
Dead+Wind 210 deg - No Ice	32613.48	-12121.11	20994.38	2245418.23	1296352.53	-661.00
Dead+Wind 240 deg - No Ice	32613.48	-20994.38	12121.11	1296420.13	2245345.08	-1140.92
Dead+Wind 270 deg - No Ice	32613.48	-24242.22	0.00	69.42	2592695.32	-1315.14
Dead+Wind 300 deg - No Ice	32613.48	-20994.38	-12121.11	-1296275.77	2245335.50	-1136.95
Dead+Wind 330 deg - No Ice	32613.48	-12121.11	-20994.38	-2245262.81	1296342.95	-654.13
Dead+Ice+Temp	39531.04	2.27	0.00	259.28	-3.41	0.00
Dead+Wind 0 deg+Ice+Temp	39531.04	-2.39	-20045.80	-2208634.42	1.79	3.26
Dead+Wind 30 deg+Ice+Temp	39531.04	10022.89	-17360.15	-1912699.54	-1104455.78	536.81
Dead+Wind 60 deg+Ice+Temp	39531.04	17360.15	-10022.89	-1104184.28	-1912976.00	926.51
Dead+Wind 90 deg+Ice+Temp	39531.04	20045.80	-0.00	272.43	-2208917.64	1067.97
Dead+Wind 120 deg+Ice+Temp	39531.04	17360.15	10022.89	1104734.05	-1912984.55	923.25
Dead+Wind 150 deg+Ice+Temp	39531.04	10022.89	17360.15	1913259.19	-1104464.33	531.15
Dead+Wind 180 deg+Ice+Temp	39531.04	-2.39	20045.80	2209199.00	1.79	-3.26
Dead+Wind 210 deg+Ice+Temp	39531.04	-10022.89	17360.15	1913259.16	1104462.52	-536.79
Dead+Wind 240 deg+Ice+Temp	39531.04	-17360.15	10022.89	1104734.02	1912982.71	-926.51
Dead+Wind 270 deg+Ice+Temp	39531.04	-20045.80	-0.00	272.43	2208915.78	-1067.97
Dead+Wind 300 deg+Ice+Temp	39531.04	-17360.15	-10022.89	-1104184.25	1912974.16	-923.25

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 330 deg+Ice+Temp	39531.04	-10022.89	-17360.15	-1912699.51	1104453.97	-531.17
Dead+Wind 0 deg - Service	32613.48	-0.68	-8388.31	-898372.18	0.51	1.39
Dead+Wind 30 deg - Service	32613.48	4194.16	-7264.49	-778005.74	-449228.31	231.15
Dead+Wind 60 deg - Service	32613.48	7264.49	-4194.16	-449148.23	-778086.49	398.97
Dead+Wind 90 deg - Service	32613.48	8388.31	0.00	80.08	-898453.85	459.89
Dead+Wind 120 deg - Service	32613.48	7264.49	4194.16	449309.04	-778087.65	397.58
Dead+Wind 150 deg - Service	32613.48	4194.16	7264.49	778167.89	-449229.47	228.74
Dead+Wind 180 deg - Service	32613.48	-0.68	8388.31	898535.00	0.51	-1.39
Dead+Wind 210 deg - Service	32613.48	-4194.16	7264.49	778167.88	449228.96	-231.14
Dead+Wind 240 deg - Service	32613.48	-7264.49	4194.16	449309.03	778087.13	-398.97
Dead+Wind 270 deg - Service	32613.48	-8388.31	0.00	80.08	898453.33	-459.89
Dead+Wind 300 deg - Service	32613.48	-7264.49	-4194.16	-449148.22	778085.97	-397.58
Dead+Wind 330 deg - Service	32613.48	-4194.16	-7264.49	-778005.73	449227.80	-228.74

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.00	-32613.48	0.00	0.64	32613.48	0.00	0.002%
2	0.00	-32613.48	-24242.22	0.58	32613.49	24242.23	0.001%
3	12121.11	-32613.48	-20994.38	-12121.11	32613.48	20994.38	0.000%
4	20994.38	-32613.48	-12121.11	-20994.38	32613.48	12121.11	0.000%
5	24242.22	-32613.48	0.00	-24242.22	32613.48	-0.00	0.000%
6	20994.38	-32613.48	12121.11	-20994.38	32613.48	-12121.11	0.000%
7	12121.11	-32613.48	20994.38	-12121.11	32613.48	-20994.38	0.000%
8	0.00	-32613.48	24242.22	0.58	32613.49	-24242.23	0.001%
9	-12121.11	-32613.48	20994.38	12121.11	32613.48	-20994.38	0.000%
10	-20994.38	-32613.48	12121.11	20994.38	32613.48	-12121.11	0.000%
11	-24242.22	-32613.48	0.00	24242.22	32613.48	-0.00	0.000%
12	-20994.38	-32613.48	-12121.11	20994.38	32613.48	12121.11	0.000%
13	-12121.11	-32613.48	-20994.38	12121.11	32613.48	20994.38	0.000%
14	0.00	-39531.04	0.00	-2.27	39531.04	0.00	0.006%
15	0.00	-39531.04	-20045.78	2.39	39531.04	20045.80	0.005%
16	10022.89	-39531.04	-17360.15	-10022.89	39531.04	17360.15	0.000%
17	17360.15	-39531.04	-10022.89	-17360.15	39531.04	10022.89	0.000%
18	20045.78	-39531.04	0.00	-20045.80	39531.04	0.00	0.000%
19	17360.15	-39531.04	10022.89	-17360.15	39531.04	-10022.89	0.000%
20	10022.89	-39531.04	17360.15	-10022.89	39531.04	-17360.15	0.000%
21	0.00	-39531.04	20045.78	2.39	39531.04	-20045.80	0.005%
22	-10022.89	-39531.04	17360.15	10022.89	39531.04	-17360.15	0.000%
23	-17360.15	-39531.04	10022.89	17360.15	39531.04	-10022.89	0.000%
24	-20045.78	-39531.04	0.00	20045.80	39531.04	0.00	0.000%
25	-17360.15	-39531.04	-10022.89	17360.15	39531.04	10022.89	0.000%
26	-10022.89	-39531.04	-17360.15	10022.89	39531.04	17360.15	0.000%
27	0.00	-32613.48	-8388.31	0.68	32613.48	8388.31	0.002%
28	4194.16	-32613.48	-7264.49	-4194.16	32613.48	7264.49	0.000%
29	7264.49	-32613.48	-4194.16	-7264.49	32613.48	4194.16	0.000%
30	8388.31	-32613.48	0.00	-8388.31	32613.48	-0.00	0.000%
31	7264.49	-32613.48	4194.16	-7264.49	32613.48	-4194.16	0.000%
32	4194.16	-32613.48	7264.49	-4194.16	32613.48	-7264.49	0.000%
33	0.00	-32613.48	8388.31	0.68	32613.48	-8388.31	0.002%
34	-4194.16	-32613.48	7264.49	4194.16	32613.48	-7264.49	0.000%
35	-7264.49	-32613.48	4194.16	7264.49	32613.48	-4194.16	0.000%
36	-8388.31	-32613.48	0.00	8388.31	32613.48	-0.00	0.000%
37	-7264.49	-32613.48	-4194.16	7264.49	32613.48	4194.16	0.000%
38	-4194.16	-32613.48	-7264.49	4194.16	32613.48	7264.49	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00002397
2	Yes	4	0.00000001	0.00035035
3	Yes	6	0.00000001	0.00006055
4	Yes	6	0.00000001	0.00005836
5	Yes	5	0.00000001	0.00006392
6	Yes	6	0.00000001	0.00006118
7	Yes	6	0.00000001	0.00005893
8	Yes	4	0.00000001	0.00035037
9	Yes	6	0.00000001	0.00005892
10	Yes	6	0.00000001	0.00006119
11	Yes	5	0.00000001	0.00006392
12	Yes	6	0.00000001	0.00005836
13	Yes	6	0.00000001	0.00006054
14	Yes	4	0.00000001	0.00002271
15	Yes	5	0.00000001	0.00056590
16	Yes	6	0.00000001	0.00017045
17	Yes	6	0.00000001	0.00016638
18	Yes	5	0.00000001	0.00057620
19	Yes	6	0.00000001	0.00017172
20	Yes	6	0.00000001	0.00016754
21	Yes	5	0.00000001	0.00056607
22	Yes	6	0.00000001	0.00016752
23	Yes	6	0.00000001	0.00017173
24	Yes	5	0.00000001	0.00057620
25	Yes	6	0.00000001	0.00016639
26	Yes	6	0.00000001	0.00017043
27	Yes	4	0.00000001	0.00012484
28	Yes	5	0.00000001	0.00011232
29	Yes	5	0.00000001	0.00010428
30	Yes	4	0.00000001	0.00028569
31	Yes	5	0.00000001	0.00011487
32	Yes	5	0.00000001	0.00010631
33	Yes	4	0.00000001	0.00012488
34	Yes	5	0.00000001	0.00010629
35	Yes	5	0.00000001	0.00011489
36	Yes	4	0.00000001	0.00028569
37	Yes	5	0.00000001	0.00010430
38	Yes	5	0.00000001	0.00011229

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 105	35.955	33	1.9942	0.0034
L2	108.75 - 73.75	20.578	33	1.7537	0.0028
L3	78 - 42.75	10.611	33	1.2839	0.0014
L4	47.5 - 0	3.945	33	0.7650	0.0007

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	Summit 14' Low Profile Platform	33	35.955	1.9942	0.0034	34907
140.00	5' Lightweight T-Frame	33	33.027	1.9655	0.0034	24933
130.00	(4) ALP 9212-N	33	28.891	1.9181	0.0033	10266
116.00	PiROD 13' Low Profile Platform	33	23.314	1.8232	0.0030	5629
105.00	Summit 14' Low Profile Platform	33	19.215	1.7108	0.0027	4411
70.00	GPS	33	8.514	1.1305	0.0011	3260

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 105	103.550	8	5.7466	0.0097
L2	108.75 - 73.75	59.299	8	5.0544	0.0081
L3	78 - 42.75	30.595	8	3.7018	0.0040
L4	47.5 - 0	11.379	8	2.2064	0.0019

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	Summit 14' Low Profile Platform	8	103.550	5.7466	0.0097	12337
140.00	5' Lightweight T-Frame	8	95.126	5.6669	0.0096	8812
130.00	(4) ALP 9212-N	8	83.226	5.5337	0.0094	3626
116.00	PiROD 13' Low Profile Platform	8	67.174	5.2595	0.0087	1985
105.00	Summit 14' Low Profile Platform	8	55.375	4.9270	0.0077	1553
70.00	GPS	8	24.552	3.2895	0.0032	1138

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
L1	147 - 105 (1)	TP29.141x22x0.25	42.00	147.00	175.9	4.828	22.4191	-7476.10	108236.00	0.069
L2	105 - 73.75 (2)	TP33.955x28.0034x0.3125	35.00	147.00	150.9	6.554	32.6523	-13827.40	214013.00	0.065
L3	73.75 - 42.75 (3)	TP38.601x32.6073x0.375	35.25	147.00	132.8	8.468	44.5372	-20242.10	377140.00	0.054
L4	42.75 - 0 (4)	TP45.12x37.0433x0.4375	47.50	147.00	111.2	12.075	62.0472	-32590.90	749218.00	0.043

ERITower	Job: 147' Monopole	Page: 17 of 17
URS Corp. AES 500 Enterprise Dr, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-5566	Project: Branford, CT	Date: 14:13:52 05/19/05
	Client: Verizon Wireless	Designed by: Jed Kiernan

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	147 - 105 (1)	TP29.141x22x0.25	313730.83	-24.110	36.000	0.670	0.00	0.000	36.000	0.000
L2	105 - 73.75 (2)	TP33.955x28.0034x0.3125	867666.67	-39.318	36.000	1.092	0.00	0.000	36.000	0.000
L3	73.75 - 42.75 (3)	TP38.601x32.6073x0.375	1498783.33	-43.830	36.000	1.217	0.00	0.000	36.000	0.000
L4	42.75 - 0 (4)	TP45.12x37.0433x0.4375	2592766.67	-45.566	36.000	1.266	0.00	0.000	36.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	147 - 105 (1)	TP29.141x22x0.25	0.069	0.670	0.000	0.739 ✔	1.333	H1-3 ✔
L2	105 - 73.75 (2)	TP33.955x28.0034x0.3125	0.065	1.092	0.000	1.157 ✔	1.333	H1-3 ✔
L3	73.75 - 42.75 (3)	TP38.601x32.6073x0.375	0.054	1.217	0.000	1.271 ✔	1.333	H1-3 ✔
L4	42.75 - 0 (4)	TP45.12x37.0433x0.4375	0.043	1.266	0.000	1.309 ✔	1.333	H1-3 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	147 - 105	Pole	TP29.141x22x0.25	1	-7476.10	144278.58	55.4	Pass
L2	105 - 73.75	Pole	TP33.955x28.0034x0.3125	2	-13827.40	285279.32	86.8	Pass
L3	73.75 - 42.75	Pole	TP38.601x32.6073x0.375	3	-20242.10	502727.60	95.4	Pass
L4	42.75 - 0	Pole	TP45.12x37.0433x0.4375	4	-32590.90	998707.55	98.2	Pass
							Summary	
						Pole (L4)	98.2	Pass
						RATING =	**98.2**	**Pass**

ANCHOR BOLT AND BASEPLATE ANALYSIS

ANCHOR BOLT AND BASEPLATE ANALYSIS

Input Data

Tower Reactions:

Overturning Moment:	$OM := 2593 \cdot kips \cdot ft$	*user input*
Shear Force:	$Shear := 24.3 \cdot kips$	*user input*
Axial Force:	$Axial := 33 \cdot kips$	*user input*

Anchor Bolt Data:

Use ASTM 615 Grade 75

Number of Anchor Bolts = N	$N := 16$	*user input*
Bolt Ultimate Strength:	$F_u := 100 \cdot ksi$	*user input*
Bolt Allowable Strength:	$Fy := 75 \cdot (ksi)$	*user input*
Diameter Of Anchor Bolts	$D := 2.25in$	*user input*
Threaded length per inch	$n := 4.5$	*user input*
Bolt "Column" Distance:	$l := 3.285in$	*user input*
Bolt Modulus:	$E := 29000 \cdot ksi$	*user input*

Base Plate Data:

Plate Yield Strength:	$Fy_{bp} := 50 \cdot 10^3 \cdot \frac{lb}{in^2}$	*user input*
Base Plate Thickness:	$PlateThicknessProvide := 3 \cdot in$	*user input*

Geometric Layout Data:

Distance from the center of gravity of the group to bolt in question = d(i)

Distances for loading condition (see detail):

$d_1 := 25.8263 \cdot in$ *user input*

$d_2 := 24.4674 \cdot in$ *user input*

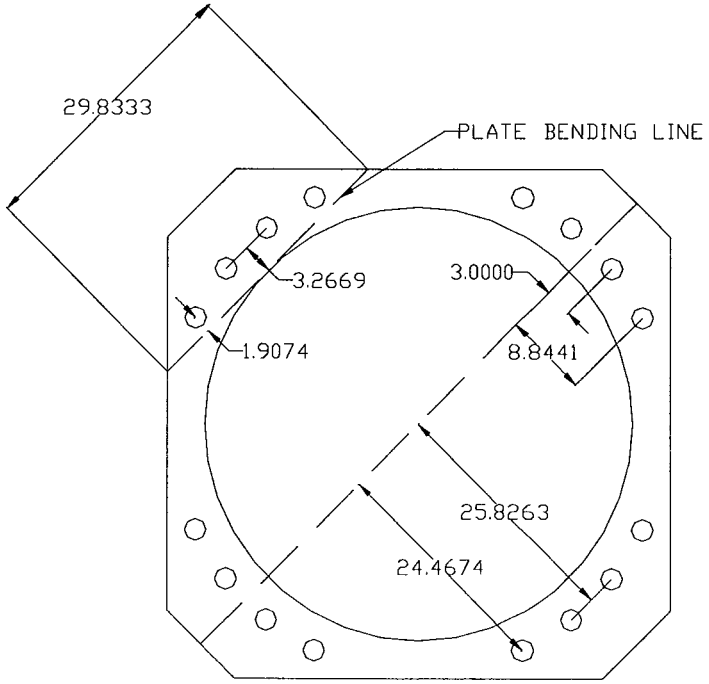
$d_3 := 8.8441 \cdot in$ *user input*

$d_4 := 3.0000 \cdot in$ *user input*

$MomentArm_1 := 3.2669 \cdot in$ *user input*

$MomentArm_2 := 1.9074 \cdot in$ *user input*

$EffectiveWidth := 29.8333 \cdot in$ *user input*



DETAIL - ANCHOR BOLT AND PLATE

Anchor Bolt Section Properties:

Polar Moment of Inertia (J) divided by Area (A) = Σd

$$\Sigma d := (d_1)^2 \cdot 4 + (d_2)^2 \cdot 4 + (d_3)^2 \cdot 4 + (d_4)^2 \cdot 4 \qquad \Sigma d = 5.41 \times 10^3\ in^2$$

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \qquad A_g = 3.98\ in^2$$

Net Area of Bolt:

$$A_{net} := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 \qquad A_{net} = 3.25\ in^2$$

Net Diameter:

$$D_n := \frac{2 \cdot \sqrt{A_{net}}}{\sqrt{\pi}} \qquad D_n = 2.03\ in$$

Radius of Gyration of Bolt:

$$r := \frac{D_n}{4} \qquad r = 0.51\ in$$

Section Modulus of Bolt:

$$S_x := \frac{\pi \cdot D_n^{\ 3}}{32} \qquad S_x = 0.83\ in^3$$

Anchor Bolt Bending Stress:

Maximum Applied Bending:

$$M_x := \left(\frac{Shear}{N} \right) \cdot l \qquad M_x = 0.42\ kips \cdot ft$$

$$f_{bx} := \frac{M_x}{S_x} \qquad f_{bx} = 6.04\ ksi$$

Allowable Bending

$$F_{bx} := 1.33 \cdot 0.60 \cdot Fy \qquad F_{bx} = 59.85\ ksi$$

Note: 1.33 increase allowed per TIA/EIA

Anchor Bolt Tensile Stress Check:

Maximum Tensile Force (Gross Area):

$AllowableTension := 1.33 \cdot (0.33 \cdot A_g \cdot F_u)$ $AllowableTension = 174.51\ kips$

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$F_{net.area} := 1.33 \cdot (0.60 \cdot A_{net} \cdot Fy)$ $F_{net.area} = 194.37\ kips$

Note: 1.33 increase allowed per TIA/EIA

Maximum Applied Tension:

$$MaxTension := \frac{OM \cdot d_1}{\Sigma d} - \frac{Axial}{N}$$ $MaxTension = 146.44\ kips$

Check Stresses:

Note: Bolts supplied are "upset bolts." Use net area for checking per AISC.

$AnchorBoltStress := if(F_{net.area} > MaxTension, "Not Overstressed", "Overstressed")$

$AnchorBoltStress = "Not\ Overstressed"$

$$PercentStressed := 100 \cdot \frac{MaxTension}{F_{net.area}}$$

$PercentStressed = 75.34$

Note: Shear Stress is negligible

Check Compression & Combined Stresses (if required):

Check to see if a complete combined stress analysis is required:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required."

Set the clear space between the plate and bolt to zero if a combined stress analysis is not required and set the bending stress to zero:

$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0.0\,\text{in} & \text{otherwise} \end{cases}$ $\quad l = 0$ $\qquad f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0.0\,\text{ksi} & \text{otherwise} \end{cases}$ $\quad f_{bx} = 0\,\text{ksi}$

Allowable Compressive Force:

$K := 0.65$

$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Fy}}$ $\quad C_c = 87.36$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^{\,2}}\right] \cdot Fy}{\dfrac{5}{3} + \dfrac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \dfrac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^{\,3}}} & \text{if } \dfrac{K \cdot l}{r} \le C_c \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \dfrac{K \cdot l}{r} > C_c \end{cases} \qquad F_a = 45\,\text{ksi}$$

$F_a := 1.33 \cdot F_a$ Note: 1.33 increase allowed per TIA/EIA $\quad F_a = 59.85\,\text{ksi}$

Applied Compressive Force:

$\text{MaxCompression} := \frac{OM \cdot d_1}{\Sigma d} + \frac{\text{Axial}}{N}$ $\quad \text{MaxCompression} = 150.56\,\text{kips}$

$f_a := \frac{\text{MaxCompression}}{A_{net}}$ $\quad f_a = 46.36\,\text{ksi}$

Check Combined Stresses:

$\text{StressRatio} := \frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}}$ $\quad \text{StressRatio} = 0.775$

$\text{Condition} := \text{if}(\text{StressRatio} \le 1.0, \text{"Not Overstressed"}, \text{"Overstressed"})$

Condition = "Not Overstressed"

Base Plate Analysis:

Force From Bolt(s):

$$C_1 := \frac{OM \cdot d_1}{\Sigma d} + \frac{Axial}{N} \qquad C_1 = 150.56 \times 10^3\ lb$$

$$C_2 := \frac{OM \cdot d_2}{\Sigma d} + \frac{Axial}{N} \qquad C_2 = 142.75 \times 10^3\ lb$$

Bending Stress In Plate:

$$f_{bp} := \frac{6 \cdot \left(2 \cdot C_1 \cdot MomentArm_1 + 2 \cdot C_2 \cdot MomentArm_2\right)}{EffectiveWidth \cdot PlateThicknessProvide^2} \qquad f_{bp} = 34.15\ ksi$$

Check Stresses:

$$BasePlateRatio := \frac{f_{bp}}{1.33 \cdot 0.75 Fy_{bp}} \qquad BasePlateRatio = 0.68$$

BasePlateStress := if(BasePlateRatio < 1, "Not Over Stress", "Is Over Stress")

BasePlateStress = "Not Over Stress"