City Of Torrington

WATER POLLUTION CONTROL AUTHORITY
140 Main Street
Torrington, CT 06790-5245

Tel: (860) 485-9166
Fax: (860) 485-0730

October 16, 2003

State of Connecticut
Connecticut Siting Council
Attn: S. Derek Phelps
Ten Franklin Square
New Britain, CT 06051

RE: EM-VER-143-031001-B- Cellco Partnership d/b/a/ Verizon Wireless

Dear: Mr. Phelps

In response to your October 3, 2003 letter to Mayor Owen J. Quinn the City of Torrington Department of Works would like to address it's needs for placing a radio telemetry antenna for our Water Pollution Control Authority at the proposed site at 1925-1931 East Main Street.

Although we were not able to respond prior to your meeting on October 14, 2003, we wanted to let you know of our needs at this time. If you have any questions or need additional information please contact myself at (860) 4850-9166 or Robert Trottier, Assistant City Engineer at (860) 489-2234.

Sincerely,

Raymond E. Drew
Administrator WPCA

Cc: Jerry Rollett, Director of Public Works, City of Torrington
Martin Conner, City Planner
Robert Trottier, Assistant City Engineer, City of Torrington

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
Web Site: www.state.ct.us/csc/index.htm

October 15, 2003

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

RE: **EM-VER-143-031001-B** - Cellco Partnership d/b/a Verizon Wireless, notice of intent to modify an existing telecommunications facility located at 1925-1931 East Main Street, Torrington, Connecticut.

Dear Attorney Baldwin:

At a public meeting held on October 14, 2003, 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 with the condition that the modifications recommended in the Structural Analysis Report prepared by Daniel Blakeman (dated September 9, 2003) be implemented as part of the antenna installation.

The proposed modifications are to be implemented as specified here and in your notice dated October 1, 2003. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

Thank you for your attention and cooperation.

Very truly yours,

Pamela B. Katz, P.E.
Chairman

PBK/laf

c: Honorable Owen J. Quinn, Jr., Mayor, City of Torrington
Martin Connor, City Planner, City of Torrington
Sheila R. Becker, Regional Director of Compliance, SBA, Inc.
Thomas J. Regan, Esq., Brown Rudnick Berlack Israels
Thomas F. Flynn III, Nextel Communications
Stephen J. Humes, Esq., LeBoeuf, Lamb, Greene & MacRae

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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
Web Site: www.state.ct.us/csc/index.htm

October 3, 2003

Honorable Owen J. Quinn, Jr.
Mayor
City of Torrington
Municipal Building
140 Main Street
Torrington, CT 06790-5245

RE: **EM-VER-143-031001-B** – Cellco Partnership d/b/a Verizon Wireless, notice of intent to modify an existing telecommunications facility located at 1925-1931 East Main Street, Torrington, Connecticut.

Dear Mr. Quinn:

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 October 14, 2003, at 1:30 p.m. in Hearing Room One, Ten Franklin Square, New Britain, Connecticut.

Please call me or inform the Council if you have any questions or comments regarding this proposal.

Thank you for your cooperation and consideration.

Very truly yours,

SDP/ekz

S. Derek Phelps
Executive Director

SDP/ld

Enclosure: Notice of Intent

c: Martin Connor, City Planner, City of Torrington

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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

October 1, 2003

Via Hand Delivery

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

Re: **Notice of Exempt Modification**
1925 – 1931 East Main Street
Torrington, Connecticut

EM-VER-143-031001-B

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") intends to install antennas on an existing tower at 1925–1931 East Main Street, Torrington, 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 the Torrington Mayor, Owen J. Quinn, Jr.

The facility consists of a 153-foot self-supporting monopole tower, capable of supporting multiple carriers within an approximately 70' x 70' fenced site compound. The tower is owned and operated by SBA Towers, Inc. ("SBA") and is currently shared by Sprint PCS at the 151-foot level; Nextel at the 142-foot level; and T-Mobile at the 131-foot level. Cellco proposes to install twelve (12) panel-type antennas at the 123-foot level on the tower and a 12' x 30' single-story equipment shelter near the base of the tower. (See Attachment 1 - Project Plans)[1].

The planned modifications to the Torrington 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 123-foot level on the 153-foot tower.

[1] Also included on the project plans and in the engineer certification is a City of Torrington whip antenna located at the 102± foot level.

2. The proposed installation of twelve (12) panel-type antennas and a 12' x 30' equipment shelter will not require an extension of the site boundaries.

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

4. The operation of the 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 cumulative worst-case RF emissions levels for the existing carriers and Cellco's proposed PCS antennas would be 8.95% of the FCC Standard, as measured for mixed frequency sites (See Attachment 2).

Also included as Attachment 3 is an engineer's certification verifying that the tower can accommodate existing and Cellco antennas and related equipment.

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

Sincerely,

Kenneth C. Baldwin

Attachments

cc: Owen J. Quinn, Jr., Mayor
Sandy M. Carter

Cellco Partnership

d.b.a. verizon wireless

WIRELESS COMMUNICATIONS FACILITY

TORRINGTON EAST
1925-1931 EAST MAIN STREET
TORRINGTON, CT 06790

PROJECT SUMMARY

SITE NAME:	TORRINGTON EAST
SITE ADDRESS:	1925-1931 EAST MAIN STREET TORRINGTON, CONNECTICUT 06790
PROPERTY OWNER:	SBA TOWERS, INC. ONE TOWN CENTER ROAD, 3RD FLOOR BOCA RATON, FL 33486
LEASOR:	SBA TOWERS, INC. ONE TOWN CENTER ROAD, 3RD FLOOR BOCA RATON, FL 33486
LESSEE:	CELLCO PARTNERSHIP 99-101 EAST RIVER DR. EAST HARTFORD, CT 06108
APPLICANT:	CELLCO PARTNERSHIP 99-101 EAST RIVER DR. EAST HARTFORD, CT 06108
CONTACT PERSON:	SANDY CARTER CELLCO PARTNERSHIP (860) 803-8219
CENTER OF TOWER:	LATITUDE 41° 49' 24.3" LONGITUDE 73° 04' 44.0" GROUND ELEV. 1100'± A.M.S.L. COORDINATES WERE TAKEN USING A HAND HELD GPS

GENERAL NOTES

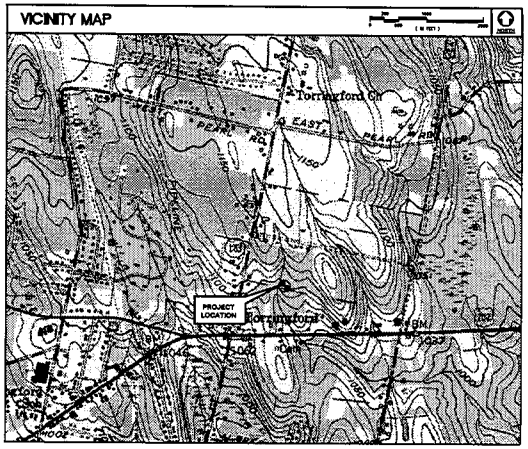
1. PROPOSED AND EXISTING ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY CELLCO PARTNERSHIP.

SITE DIRECTIONS

FROM: 99-101 EAST RIVER DR.,EAST HARTFORD, CT.
TO: 197 NORTH STREET, EASTON, CT

START OUT GOING WEST ON US-44W/CONNECTICUT BLVD. STAY STRAIGHT TO GO ONTO I-84E. MERGE ONTO CT-8N VIA EXIT NUMBER 20 TOWARD TORRINGTON. TAKE THE CT-202 EXIT NUMBER 44 TOWARD DOWNTOWN TORRINGTON. TURN SHARP LEFT ONTO EAST MAIN ST.

VICINITY MAP



LEGEND

SYMBOL	DESCRIPTION
	SECTION OR DETAIL NUMBER SHEET WHERE DETAIL/SECTION OCCURS
1	ELEVATION NUMBER
	SHEET WHERE ELEVATION OCCURS

SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	00
C-1	COMPOUND PLAN AND ELEVATION	00

REVISIONS		
00	08/15/03	SITING COUNCIL REVIEW
01	09/03/03	REVISED SITING COUNCIL
02	09/30/03	FINAL SITING COUNCIL

Cellco Partnership
d.b.a. verizon wireless

Natcomm, LLC - Engineering Consultants
Natcomm, LLC
63-2 North Branford Road
Branford, Connecticut 06405
Tel. (203) 488-0580
Fax (203) 488-8587
Consulting Engineers - Project Management
Civil - Structural - Mechanical - Electrical

PROFESSIONAL ENGINEER SEAL

TORRINGTON EAST

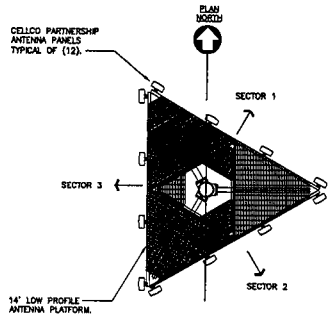
1925-1931 EAST MAIN ST.
TORRINGTON, CT 06470

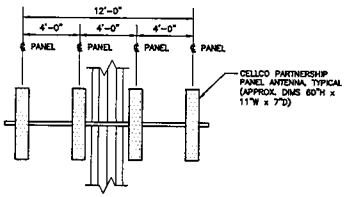
PROJECT NO:	03063
DRAWN BY:	CMS
CHECKED BY:	AAJ
SCALE:	AS NOTED
DATE:	07/14/03

TITLE SHEET

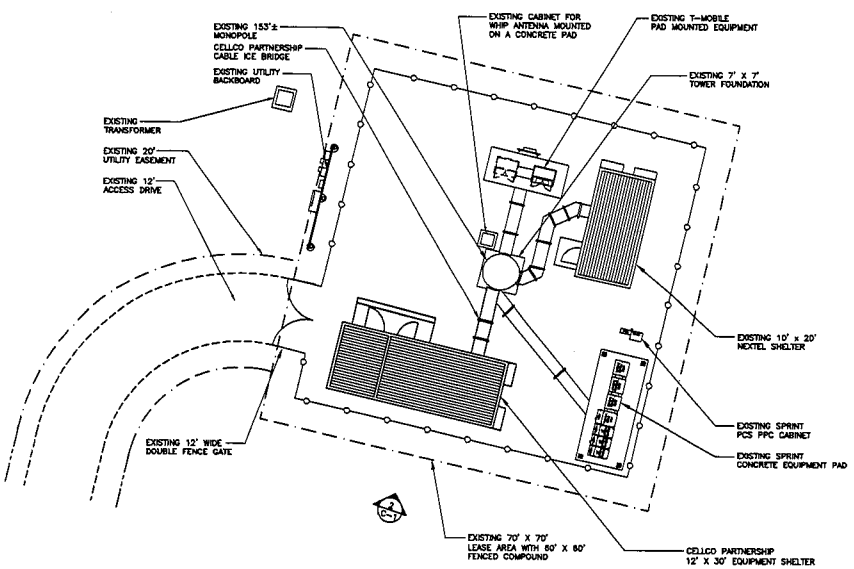
T-1

DWG. 1 OF 2

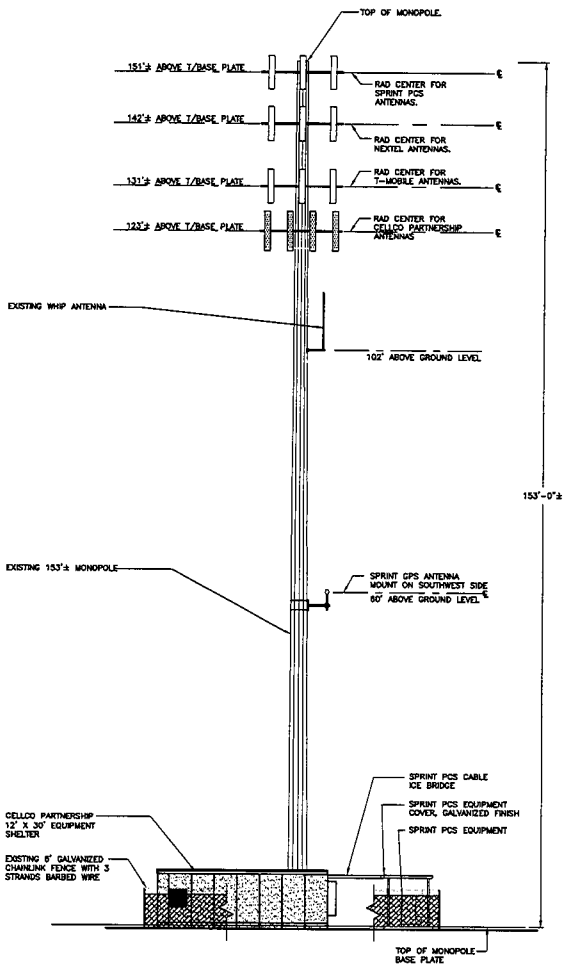




3 / C-1 **MONOPOLE ANTENNA MOUNTING CONFIGURATION**
NOT TO SCALE



1 / C-1 **COMPOUND PLAN**
SCALE: 1" = 10'-0"



2 / C-1 **ELEVATION**
SCALE: 1" = 10'-0"

REVISIONS		
00	09/15/03	SITING COUNCIL REVIEW
01	09/30/03	REVISED SITING COUNCIL
02	09/30/03	FINAL SITING COUNCIL

Cellco Partnership
d.b.a. verizon wireless

Natcomm, LLC
63-2 North Branford Road
Branford, Connecticut 06405
Tel. (203) 488-0580
Fax (203) 488-8587
Consulting Engineers - Project Management
Civil- Structural- Mechanical- Electrical

TORRINGTON EAST

1925-1931 EAST MAIN ST.
TORRINGTON, CT 06470

PROJECT NO:	03063
DRAWN BY:	CMS
CHECKED BY:	AAJ
SCALE:	AS NOTED
DATE:	07/14/03

COMPOUND PLAN AND ELEVATION

C-1
DWG. 2 OF 2

Site Name: Torrington E, CT

Cumulative Power Density

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)	(%)
Sprint	1950	11	122	1342	151	0.0212	1	2.12%
Nextel	851	9	100	900	142	0.0161	0.567	2.83%
T-Mobile	1935	6	205	1230	131	0.0258	1	2.58%
Verizon	1970	3	200	600	123	0.0143	1	1.43%
Total Percentage of Maximum Permissible Exposure								**8.95%**

*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

Absolute worst case scenario, maximum values used.

VERTICAL STRUCTURES, INC.

September 24, 2003

Mr. David Patrick
SBA Network Services
121 Boone Ridge Drive
Johnson City, TN 37615

Subject: **Structural Analysis Report Addendum Letter**
SBA Site Number CT01499
SBA Site Name "Torrington, CT"
153' Nudd MJ-160 Monopole Tower
VSI Job Number 2003-007-015

Dear Mr. Patrick:

Vertical Structures is pleased to provide you with this addendum letter to the September 9, 2003 report on the results of the structural analysis performed on the 153' tall monopole tower at SBA's Torrington site in Connecticut. The purpose of the analysis was to determine the suitability of the tower upon adding twelve (12) proposed Decibel DB950G65E-M panel antennas on a low profile platform at 123' for Verizon. We concluded that the tower is structurally inadequate to support the proposed and existing loading as considered in the study and recommended modifications to remedy the deficiencies. Upon completing the modifications the tower will be completely adequate for the proposed loading.

Please, feel free to call if there are any questions. We appreciate the opportunity to provide this report and would ask that you consider Vertical Structures again on any future projects requiring material, engineering, and construction services.

Respectfully Submitted:

Daniel Blakeman, P.E.
Project Engineer

309 Spangler Drive • Suite E • Richmond, Kentucky 40475 • (859) 624-8360 • Fax (859) 624-8369

VERTICAL STRUCTURES, INC.

September 9, 2003

Mr. David Patrick
SBA Network Services
121 Boone Ridge Drive
Johnson City, TN 37615

Subject: **Structural Analysis Report**
SBA Site Number CT01499
SBA Site Name "Torrington, CT"
153' Nudd MJ-160 Monopole Tower
VSI Job Number 2003-007-015

Dear Mr. Patrick:

Vertical Structures is pleased to provide you with the results of the structural analysis performed on the 153' tall monopole tower at SBA's Torrington site in Connecticut. The purpose of the analysis was to determine the suitability of the tower upon adding twelve (12) proposed Decibel DB950G65E-M panel antennas on a low profile platform at 123' for Verizon. We have concluded that the tower is structurally inadequate to support the proposed and existing loading as considered in this study.

Please, feel free to call if there are any questions. We appreciate the opportunity to provide this report and would ask that you consider Vertical Structures again on any future projects requiring material, engineering, and construction services.

Respectfully Submitted:

Daniel Blakeman, P.E.
Project Engineer

STATE OF CONNECTICUT
JOHN IRVING MATHIS
NO 14220
LICENSED
PROFESSIONAL ENGINEER

309 Spangler Drive • Suite E • Richmond, Kentucky 40475 • (859) 624-8360 • Fax (859) 624-8369

TABLE OF CONTENTS

Introduction

The 153' Nudd MJ-160 monopole tower was designed and manufactured in 2000 for SBA, Inc. The tower consists of four (4) 18-sided tapered polygon tubes joined via slip joint connections and is founded on a 29' x 29' x 4' thick mat, buried 8' deep.

Analysis Criteria

The Torrington monopole tower was analyzed in accordance with the current EIA-222-F publication, "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures." The proposed and existing antennas, lines and mounts considered in this analysis are listed in Table 1. The applied forces for this analysis were derived from an 80 MPH basic wind speed with no ice accumulation and a reduced 69 MPH basic wind speed with a 1/2" of radial ice accumulation. The EIA minimum basic wind speed for Litchfield County, Connecticut is 80 MPH. The original design loads are listed in Table 2. The tower was originally designed for an 80 MPH basic wind speed with no ice accumulation and a reduced 69 MPH basic wind speed with a 1/2" of radial ice accumulation. All coax are assumed to be run in the pole interior.

Table 1 – Proposed and Existing Loads

Elev.	Carrier	Status	Antennas	Feedlines	Mounts
151'	Sprint	Existing	(6) EMS RR90-17-02DP Panels	(6) 1 5/8" Coax	(1) 14' L.P. Platform
141.5'	Nextel	Existing	(12) DB844H90E-XY Panels	(12) 1 1/4" Coax	(1) 14' L.P. Platform
131'	Omnipoint	Existing	(6) EMS RR90-17-02DP Panels	(12) 1 5/8" Coax	(1) 14' L.P. Platform
123'	**Verizon**	**Proposed**	**(12) DB950G65E-M Panels**	**(12) 1 5/8" Coax**	**(1) 14' L.P. Platform**
102'	TPD	Existing	(1) 8' Omni	(1) 1/2" Coax	(1) 3' Sidearm
58'		Existing	(1) GPS	(1) 5/8" Coax	

Table 2 – Original Design Loads

Elev.	Carrier	Status	Antennas	Feedlines	Mounts
165'	Co-Lo	Design	(12) DB896 Panels	(12) 1 5/8" Coax	(1) 14' L.P. Platform
155'	Co-Lo	Design	(12) DB896 Panels	(12) 1 5/8" Coax	(1) 14' L.P. Platform
145'	Co-Lo	Design	(12) DB896 Panels	(12) 1 5/8" Coax	(1) 14' L.P. Platform
135'	Co-Lo	Design	(12) DB896 Panels	(12) 1 5/8" Coax	(1) 14' L.P. Platform
125'	Co-Lo	Design	(12) DB896 Panels	(12) 1 5/8" Coax	(1) 14' L.P. Platform

Analysis Procedures

No site visit was performed by Vertical Structures. All structural information, material specifications and foundation details were taken directly from the original Nudd tower design drawings. Existing and proposed loads were provided by SBA.

ERI Tower (Version 2.0), a commercially available software program, was used to create a three-dimensional model of the tower and calculate member stresses for various dead, live, wind, and ice load cases.

Analysis Conclusions

The Torrington monopole tower is found to be inadequate for the intended loading at the wind and ice conditions considered. Analysis results are listed in Table 3.

Table 3 – Tower Component Stresses vs. Capacity

Section Number	Elevation	Combined Stress Ratio	Allowable Stress Ratio	Percent Used
1	153' – 150'	.038	1.333	3.8
2	150' – 110'	0.577	1.333	43.4
3	110' – 65'	0.870	1.333	65.2
4	65' – 21'	1.101	1.333	82.6
5	21' – 0'	0.935	1.333	70.1
Base Plate – Bending				125.0
Anchor Bolts – Tension				68.1
Foundation – Moment (comparing design load to actual load)				81.5

Modification (A), listed in Table 4, is required to remedy the deficiencies in the Torrington tower identified in this analysis. Tower rework drawings depicting the required modifications have been provided in Appendix A.

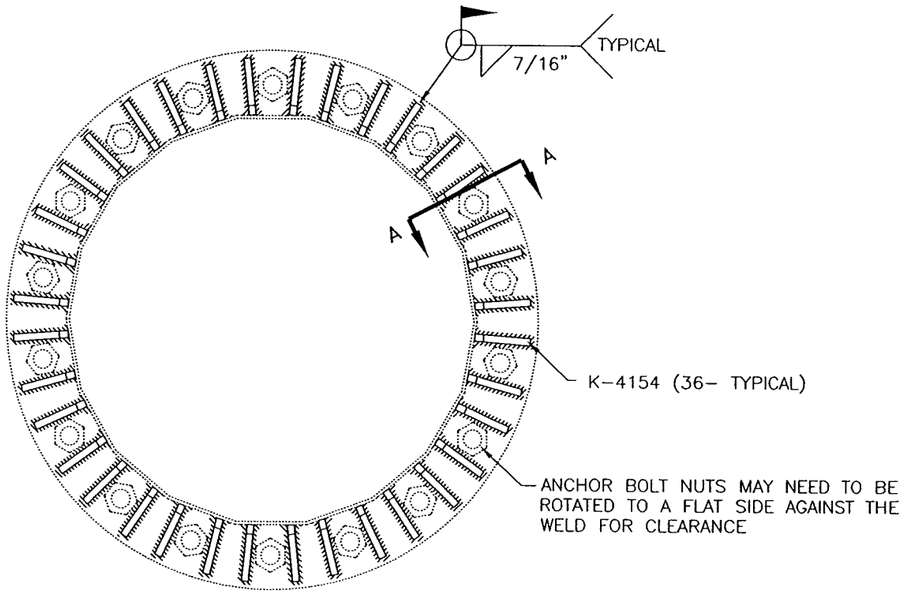
Table 4 – Required Modifications

(A) **Install two (2) intermediate flange stiffener in every space between the existing 2" diameter anchor bolts. The total number of new stiffeners required is thirty-six (36).**

BILL OF MATERIALS		
MARK NO.	QTY.	DESCRIPTION
K-4154	36	BASE PLATE REIN., PL 6" X 3/4" X 1'-0"

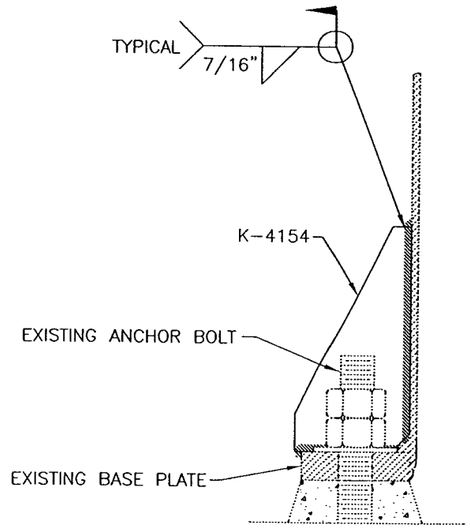
NOTES:

1. ANY HARDWARE REMOVED DURING THE INSTALLATION OF THE MATERIAL TO THE TOWER MUST BE REPLACED WITH NEW HARDWARE.
2. WELDER MUST BE AWS CERTIFIED.
3. SURFACES TO BE CLEARED OF GALVANIZATION BEFORE FIELD WELDING ANY MATERIAL.
4. COLD GALVANIZE ANY MATERAL AFTER FIELD WELDING.
5. THIS DRAWING DEPICTS THE REWORK REQUIRED TO REMEDY THE DEFICIENCIES FOUND IN THE TORRINGTON, CT TOWER PER THE REPORT PUBLISHED BY VERTICAL STRUCTURES ON 9-9-03, JOB# 2003-007-015.



PLAN VIEW @ BASE PLATE

STEPBOLTS, SAFETY CLIMB, AND PORTS NOT DRAWN FOR CLARIFICATION



SECTION "A-A"

REV.	DESCRIPTION	DATE	BY
A	ORIGINAL RELEASE	9-9-03	JAC

VERTICAL STRUCTURES, INC.
P.O. Box 1496
Richmond, KY 40476
Phone: (859) 624-8360
Fax: (859) 624-8369
Email: engineering@verticalstructures.com

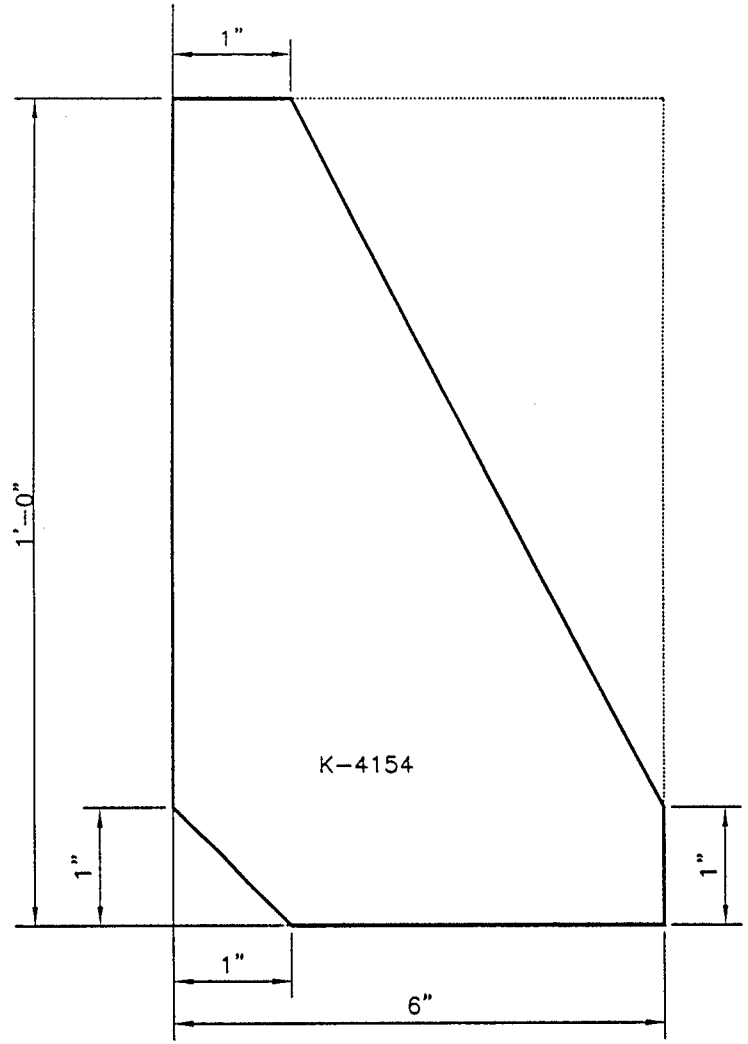
FOR

SBA

2003 MODIFICATIONS
TOWER REWORK FOR A
153' MONOPOLE
SITE: TORRINGTON, CT

DRAFTSPERSON:	DATE
J. COMBS	9-9-03
CHK'D BY:	DATE
ENGR: JCB	DATE 9-9-03

SHEET 1 OF 1 | B TA2003007015-T1 | SCALE: NONE



MARK NO. K-4154

MATERIAL: PL 6" X 3/4" X 1'-0"

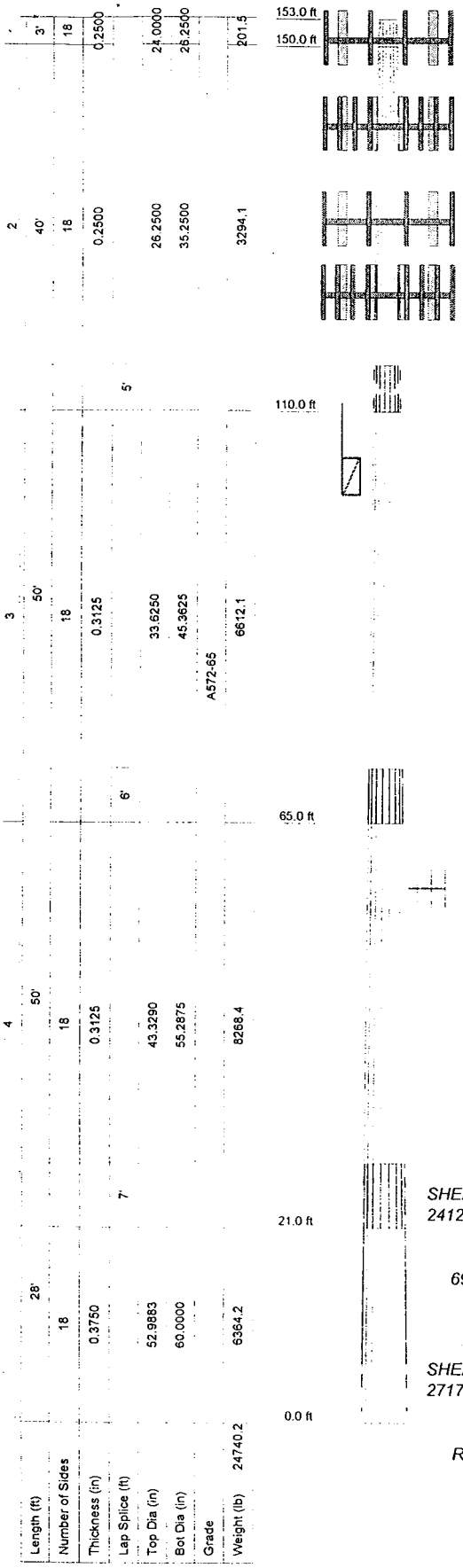
50 KSI STEEL

REV.	DESCRIPTION	DRAWN BY	APP'D BY
A	REVISED TITLE BLOCK	JAC 11-1-02	
-	ORIGINALLY DRAWN	JAC 5-10-02	JIM 5-23-02

VERTICAL STRUCTURES, INC.
P.O. Box 1496
Richmond, KY 40476
Phone: (859) 624-8360
Fax: (859) 624-8369
Email: engineering@verticalstructures.com

DWN BY	DATE	APP'D BY	DATE
JAC	5-10-02	Axel	11-5-02

WEIGHT	FABRICATIN DETAIL
15.30#	MARK NO. K-4154



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Nudd 14' Boom (3)	151	(2) RR90-17-02DP w/Mount Pipe	131
(2) DB980H90E-M w/Mount Pipe	151	(2) RR90-17-02DP w/Mount Pipe	131
(2) DB980H90E-M w/Mount Pipe	151	Nudd 14' Boom (3)	123
(2) DB980H90E-M w/Mount Pipe	151	(4) DB950G65E-M w/Mount Pipe	123
Nudd 14' Boom (3)	141.5	(4) DB950G65E-M w/Mount Pipe	123
(4) DB844H90E-XY w/Mount Pipe	141.5	(4) DB950G65E-M w/Mount Pipe	123
(4) DB844H90E-XY w/Mount Pipe	141.5	8' Omni	102
(4) DB844H90E-XY w/Mount Pipe	141.5	Pirod 3' Side Mount Standoff (1)	102
Nudd 14' Boom (3)	131	Generic GPS	58
(2) RR90-17-02DP w/Mount Pipe	131		

MATERIAL STRENGTH

GRADE	YIELD	GRADE	YIELD
A572-65	65 ksi		

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 82.6%

Vertical Structures, Inc.
309 Spangler Drive, Suite E
Richmond, KY 40475
Phone: (859) 624-8360
FAX: (859) 624-8369

Job: *Torrington, CT (CT01499)*			
Project: *VSI Job No. 2003-007-015*			
Client: SBA	Drawn by: dblakeman	App'd:	
Code: TIA/EIA-222-F	Date: 09/09/03	Scale: NTS	
Path: E:\Torrington.eri		Dwg No. E-1	

Tower Input Data

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

Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads and feedline supports 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	√	Consider Feedline Torque
√	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		Poles
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Include Shear-Torsion Interaction
√	Include Bolts In Member Capacity	√	Autocalc Torque Arm Areas		Always Use Sub-Critical Flow
√	Leg Bolts Are At Top Of Section		SR Members Have Cut Ends	√	Use Top Mounted Sockets

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	153'-150'	3'	0'	18	24.0000	26.2500	0.2500	1.0000	A572-65 (65 ksi)
L2	150'-110'	40'	5'	18	26.2500	35.2500	0.2500	1.0000	A572-65 (65 ksi)
L3	110'-65'	50'	6'	18	33.6250	45.3625	0.3125	1.2500	A572-65 (65 ksi)
L4	65'-21'	50'	7'	18	43.3290	55.2875	0.3125	1.2500	A572-65 (65 ksi)
L5	21'-0'	28'		18	52.9883	60.0000	0.3750	1.5000	A572-65 (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	24.3702	18.8456	1342.9976	8.4313	12.1920	110.1540	2687.7623	9.4246	3.7840	15.136
	26.6549	20.6310	1761.9940	9.2300	13.3350	132.1330	3526.3065	10.3175	4.1800	16.72
L2	26.6549	20.6310	1761.9940	9.2300	13.3350	132.1330	3526.3065	10.3175	4.1800	16.72
	35.7938	27.7725	4298.2188	12.4250	17.9070	240.0301	8602.0932	13.8889	5.7640	23.056
L3	35.3356	33.0418	4632.5069	11.8259	17.0815	271.2002	9271.1093	16.5241	5.3680	17.178
	46.0623	44.6840	11457.2075	15.9927	23.0441	497.1851	22929.4908	22.3462	7.4338	23.788
L4	45.4546	42.6670	9974.6946	15.2709	22.0111	453.1659	19962.5142	21.3375	7.0759	22.643
	56.1404	54.5283	20820.4498	19.5161	28.0861	741.3093	41668.2958	27.2693	9.1806	29.378
L5	55.5857	62.6230	21900.9279	18.6777	26.9181	813.6146	43830.6736	31.3174	8.6659	23.109
	60.9256	70.9687	31875.7797	21.1669	30.4800	1045.7933	63793.5023	35.4911	9.9000	26.4

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 153'-150'				1	1	1		
L2 150'-110'				1	1	1		
L3 110'-65'				1	1	1		
L4 65'-21'				1	1	1		
L5 21'-0'				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	151' - 5'	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
LDF6-50A (1-1/4 FOAM)	C	No	Inside Pole	141'6" - 5'	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	131' - 5'	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	123' - 5'	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
LDF4-50A (1/2 FOAM)	C	No	Inside Pole	102' - 5'	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
LDF4.5-50 (5.8 FOAM)	C	No	Inside Pole	58' - 5'	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15

Description	Face	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15

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	153'-150'	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	4.92
L2	150'-110'	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	780.84
L3	110'-65'	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	1468.95
L4	65'-21'	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	1443.03
L5	21'-0'	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	525.12

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face	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	153'-150'	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	4.92
L2	150'-110'	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	780.84
L3	110'-65'	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	1468.95
L4	65'-21'	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	1443.03
L5	21'-0'	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	525.12

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	153'-150'	0.0000	0.0000	0.0000	0.0000
L2	150'-110'	0.0000	0.0000	0.0000	0.0000
L3	110'-65'	0.0000	0.0000	0.0000	0.0000
L4	65'-21'	0.0000	0.0000	0.0000	0.0000
L5	21'-0'	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft	deg	ft		ft^2	ft^2	lb
Nudd 14' Boom (3)	C	None		0.0000	151'	No Ice	47.00	47.00	1600.00
						1/2" Ice	67.00	67.00	2050.00
						1" Ice	87.00	87.00	2500.00
						2" Ice	127.00	127.00	3400.00
						4" Ice	207.00	207.00	5200.00
(2) DB980H90E-M w/Mount Pipe	A	From Leg	4.00 0' 0'	0.0000	151'	No Ice	4.27	3.86	34.05
						1/2" Ice	4.86	4.95	69.84
						1" Ice	5.37	5.75	116.19
						2" Ice	6.42	7.39	231.29
						4" Ice	8.86	10.87	585.45
(2) DB980H90E-M w/Mount Pipe	B	From Leg	4.00 0' 0'	0.0000	151'	No Ice	4.27	3.86	34.05
						1/2" Ice	4.86	4.95	69.84
						1" Ice	5.37	5.75	116.19
						2" Ice	6.42	7.39	231.29
						4" Ice	8.86	10.87	585.45
(2) DB980H90E-M w/Mount Pipe	C	From Leg	4.00 0' 0'	0.0000	151'	No Ice	4.27	3.86	34.05
						1/2" Ice	4.86	4.95	69.84
						1" Ice	5.37	5.75	116.19
						2" Ice	6.42	7.39	231.29
						4" Ice	8.86	10.87	585.45
Nudd 14' Boom (3)	C	None		0.0000	141'6"	No Ice	47.00	47.00	1600.00
						1/2" Ice	67.00	67.00	2050.00
						1" Ice	87.00	87.00	2500.00
						2" Ice	127.00	127.00	3400.00
						4" Ice	207.00	207.00	5200.00
(4) DB844H90E-XY w/Mount Pipe	A	From Leg	4.00 0' 0'	0.0000	141'6"	No Ice	3.58	5.40	35.55
						1/2" Ice	4.20	6.49	76.59
						1" Ice	4.73	7.30	127.74
						2" Ice	5.86	8.96	251.11
						4" Ice	8.27	12.49	616.43
(4) DB844H90E-XY w/Mount Pipe	B	From Leg	4.00 0' 0'	0.0000	141'6"	No Ice	3.58	5.40	35.55
						1/2" Ice	4.20	6.49	76.59
						1" Ice	4.73	7.30	127.74
						2" Ice	5.86	8.96	251.11
						4" Ice	8.27	12.49	616.43
(4) DB844H90E-XY w/Mount Pipe	C	From Leg	4.00 0' 0'	0.0000	141'6"	No Ice	3.58	5.40	35.55
						1/2" Ice	4.20	6.49	76.59
						1" Ice	4.73	7.30	127.74
						2" Ice	5.86	8.96	251.11
						4" Ice	8.27	12.49	616.43

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft	deg	ft		ft^2	ft^2	lb
Nudd 14' Boom (3)	C	None		0.0000	131'	No Ice	47.00	47.00	1600.00
						1/2" Ice	67.00	67.00	2050.00
						1" Ice	87.00	87.00	2500.00
						2" Ice	127.00	127.00	3400.00
						4" Ice	207.00	207.00	5200.00
(2) RR90-17-02DP w/Mount Pipe	A	From Leg	4.00 0' 0'	0.0000	131'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.91 5.57 6.14 7.32 9.81	3.64 4.70 5.48 7.08 10.47	43.55 81.64 130.14 249.13 609.39
(2) RR90-17-02DP w/Mount Pipe	B	From Leg	4.00 0' 0'	0.0000	131'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.91 5.57 6.14 7.32 9.81	3.64 4.70 5.48 7.08 10.47	43.55 81.64 130.14 249.13 609.39
(2) RR90-17-02DP w/Mount Pipe	C	From Leg	4.00 0' 0'	0.0000	131'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.91 5.57 6.14 7.32 9.81	3.64 4.70 5.48 7.08 10.47	43.55 81.64 130.14 249.13 609.39
Nudd 14' Boom (3)	C	None		0.0000	123'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	47.00 67.00 87.00 127.00 207.00	47.00 67.00 87.00 127.00 207.00	1600.00 2050.00 2500.00 3400.00 5200.00
(4) DB950G65E-M w/Mount Pipe	A	From Leg	4.00 0' 0'	0.0000	123'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.60 7.27 7.86 9.08 11.65	5.90 7.01 7.84 9.60 13.41	40.55 95.17 160.90 316.45 758.19
(4) DB950G65E-M w/Mount Pipe	B	From Leg	4.00 0' 0'	0.0000	123'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.60 7.27 7.86 9.08 11.65	5.90 7.01 7.84 9.60 13.41	40.55 95.17 160.90 316.45 758.19
(4) DB950G65E-M w/Mount Pipe	C	From Leg	4.00 0' 0'	0.0000	123'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.60 7.27 7.86 9.08 11.65	5.90 7.01 7.84 9.60 13.41	40.55 95.17 160.90 316.45 758.19
8' Omni	C	From Leg	3.00 0' 4'	0.0000	102'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.60 2.42 3.24 4.23 6.32	1.60 2.42 3.24 4.23 6.32	20.00 32.45 50.14 101.86 274.93
Pirod 3' Side Mount Standoff (1)	C	From Leg	1.50 0' 0'	0.0000	102'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.80 2.88 7.10 11.48 20.24	1.70 2.88 7.10 11.48 20.24	40.00 75.00 128.00 206.00 362.00
Generic GPS	B	From Leg	1.00 0' 0'	0.0000	58'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.00 2.50 3.00 4.00 6.00	2.00 2.50 3.00 4.00 6.00	20.00 40.00 60.00 100.00 180.00

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
Total Member Self-Weight	24740.22			135.20	132.50	
Wind 0 deg - No Ice	36821.88	1.66	-27175.27	-2930623.65	-36.33	-247.53
Wind 30 deg - No Ice	36821.88	13590.03	-23535.31	-2538060.83	-1465490.60	-47.44
Wind 60 deg - No Ice	36821.88	23536.96	-13589.07	-1465390.43	-2538232.35	165.36
Wind 90 deg - No Ice	36821.88	27177.19	-1.66	-33.63	-2930821.29	333.86
Wind 120 deg - No Ice	36821.88	23535.31	13586.20	1465368.41	-2538063.53	412.89
Wind 150 deg - No Ice	36821.88	13587.16	23533.65	2538162.39	-1465198.19	381.29
Wind 180 deg - No Ice	36821.88	-1.66	27175.27	2930894.04	301.32	247.53
Wind 210 deg - No Ice	36821.88	-13590.03	23535.31	2538331.22	1465755.59	47.44
Wind 240 deg - No Ice	36821.88	-23536.96	13589.07	1465660.82	2538497.34	-165.36
Wind 270 deg - No Ice	36821.88	-27177.19	1.66	304.02	2931086.28	-333.86
Wind 300 deg - No Ice	36821.88	-23535.31	-13586.20	-1465098.02	2538328.52	-412.89
Wind 330 deg - No Ice	36821.88	-13587.16	-23533.65	-2537892.00	1465463.18	-381.29
Member Ice	4068.00			245.72	222.26	
Wind 0 deg - Ice	44348.55	0.00	-24125.71	-2694060.22	222.26	-337.13
Wind 30 deg - Ice	44348.55	12062.86	-20893.48	-2333091.67	-1346930.71	-105.13
Wind 60 deg - Ice	44348.55	20893.48	-12062.86	-1346907.25	-2333115.13	155.03
Wind 90 deg - Ice	44348.55	24125.71	0.00	245.72	-2694083.68	373.65
Wind 120 deg - Ice	44348.55	20893.48	12062.86	1347398.69	-2333115.13	492.15
Wind 150 deg - Ice	44348.55	12062.86	20893.48	2333583.11	-1346930.71	478.79
Wind 180 deg - Ice	44348.55	0.00	24125.71	2694551.66	222.26	337.13
Wind 210 deg - Ice	44348.55	-12062.86	20893.48	2333583.11	1347375.23	105.13
Wind 240 deg - Ice	44348.55	-20893.48	12062.86	1347398.69	2333559.65	-155.03
Wind 270 deg - Ice	44348.55	-24125.71	0.00	245.72	2694528.20	-373.65
Wind 300 deg - Ice	44348.55	-20893.48	-12062.86	-1346907.25	2333559.65	-492.15
Wind 330 deg - Ice	44348.55	-12062.86	-20893.48	-2333091.67	1347375.23	-478.79
Wind 0 deg - Service	36821.88	0.65	-10615.34	-1144692.48	66.55	-96.69
Wind 30 deg - Service	36821.88	5308.60	-9193.48	-991347.63	-572376.53	-18.53
Wind 60 deg - Service	36821.88	9194.13	-5308.23	-572335.75	-991416.27	64.60
Wind 90 deg - Service	36821.88	10616.09	-0.65	69.25	-1144771.33	130.41
Wind 120 deg - Service	36821.88	9193.48	5307.11	572491.92	-991350.33	161.29
Wind 150 deg - Service	36821.88	5307.48	9192.83	991552.07	-572262.30	148.94
Wind 180 deg - Service	36821.88	-0.65	10615.34	1144962.87	198.44	96.69
Wind 210 deg - Service	36821.88	-5308.60	9193.48	991618.02	572641.52	18.53
Wind 240 deg - Service	36821.88	-9194.13	5308.23	572606.14	991681.26	-64.60
Wind 270 deg - Service	36821.88	-10616.09	0.65	201.14	1145036.32	-130.41
Wind 300 deg - Service	36821.88	-9193.48	-5307.11	-572221.53	991615.32	-161.29
Wind 330 deg - Service	36821.88	-5307.48	-9192.83	-991281.68	572527.30	-148.94

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	153 - 150 (1)	TP26.25x24x0.25	3'	153'	204.8	3.559	20.0359	-2679.36	71317.10	0.038*
L2	150 - 110 (2)	TP35.25x26.25x0.25	40'	153'	152.7	6.407	26.8798	-14621.70	172206.00	0.085
L3	110 - 65 (3)	TP45.3625x33.625x0.3125	50'	153'	118.5	10.633	43.2869	-18298.80	460276.00	0.040
L4	65 - 21 (4)	TP55.2875x43.329x0.3125	50'	153'	97.0	15.861	52.8677	-28105.60	838534.00	0.034
L5	21 - 0 (5)	TP60x52.9883x0.375	28'	153'	86.7	19.448	70.9687	-36814.80	1380210.00	0.027

* DL controls

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	153 - 150 (1)	TP26.25x24x0.25	0.00	-0.000	39.000	0.000	0.00	0.000	39.000	0.000
L2	150 - 110 (2)	TP35.25x26.25x0.25	359862.50	-19.210	39.000	0.493	0.00	0.000	39.000	0.000
L3	110 - 65 (3)	TP45.3625x33.625x0.3125	1258150.00	-32.365	39.000	0.830	0.00	0.000	39.000	0.000
L4	65 - 21 (4)	TP55.2875x43.329x0.3125	2274500.00	-39.175	36.706	1.067	0.00	0.000	36.706	0.000
L5	21 - 0 (5)	TP60x52.9883x0.375	3007441.67	-34.509	38.001	0.908	0.00	0.000	38.001	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	153 - 150 (1)	TP26.25x24x0.25	0.038	0.000	0.000	0.038* ✔	1.000	H1-3 ✔
L2	150 - 110 (2)	TP35.25x26.25x0.25	0.085	0.493	0.000	0.577 ✔	1.333	H1-3 ✔
L3	110 - 65 (3)	TP45.3625x33.625x0.3125	0.040	0.830	0.000	0.870 ✔	1.333	H1-3 ✔
L4	65 - 21 (4)	TP55.2875x43.329x0.3125	0.034	1.067	0.000	1.101 ✔	1.333	H1-3 ✔
L5	21 - 0 (5)	TP60x52.9883x0.375	0.027	0.908	0.000	0.935 ✔	1.333	H1-3 ✔

* DL controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	153 - 150	Pole	TP26.25x24x0.25	1	-2679.36	71317.10	3.8	Pass
L2	150 - 110	Pole	TP35.25x26.25x0.25	2	-14621.70	229550.59	43.3	Pass
L3	110 - 65	Pole	TP45.3625x33.625x0.3125	3	-18298.80	613547.88	65.2	Pass
L4	65 - 21	Pole	TP55.2875x43.329x0.3125	4	-28105.60	1117765.78	82.6	Pass
L5	21 - 0	Pole	TP60x52.9883x0.375	5	-36814.80	1839819.85	70.1	Pass
							Summary	
						Pole (L4)	82.6	Pass
						RATING =	**82.6**	**Pass**