



Daniel F. Caruso
Chairman

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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Internet: ct.gov/csc

March 4, 2010

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

RE: **EM-VER-033-100108** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 100 Berlin Road, Cromwell, Connecticut.

Dear Attorney Baldwin:

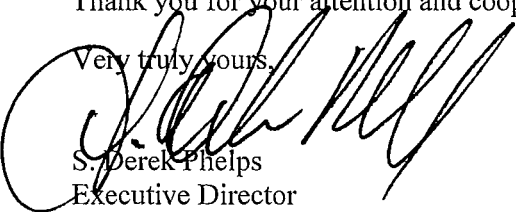
The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies.

The proposed modifications are to be implemented as specified here and in your notice dated January 8, 2010, including the placement of all necessary equipment and shelters within the tower compound. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

Thank you for your attention and cooperation.

Very truly yours,


S. Derek Phelps
Executive Director

SDP/MP/laf

c: The Honorable John M. Flanders, First Selectman, Town of Cromwell
Frederic Curtin, Zoning Enforcement Officer, Town of Cromwell
Shaner SPE Associates Limited Partnership

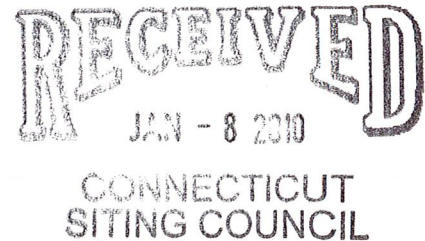
280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

EM-VER-033-100108

January 8, 2010

Via Hand Delivery

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



Re: **Notice of Exempt Modification – Antenna Swap**
100 Berlin Road, Cromwell, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains wireless telecommunications antennas at the 88-foot level on the existing sign support structure at the above-referenced address. The sign support structure and underlying property are owned by Shaner SPE Associates Limited Partnership. The Council approved the shared use of this structure for Cellco, AT&T, T-Mobile and Pocket Communications. Cellco now intends to modify its installation by replacing six of its cellular antennas with four (4) model DB846F65ZAXY cellular antennas and two (2) LPA-80080/6CF cellular antennas. Cellco also intends to install three (3) model BXA-70063-6CF LTE (700 MHz) antennas, for a total of fifteen antennas, all at the same 88-foot level on the sign support structure. Attached behind Tab 1 are the specifications for the proposed replacement antennas.

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 John M. Flanders, First Selectman for the Town of Cromwell.

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

1. The proposed modifications will not result in any increase in the overall height of the existing structure. Cellco’s new antennas will be located at the same 88-foot level on the existing structure.



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ROBINSON & COLE^{LLP}

S. Derek Phelps

January 8, 2010

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2. The proposed modifications will not involve any modifications to ground-mounted equipment and, therefore, will not require the extension of the site boundaries.

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

4. The operation of the replacement 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. A worst case cumulative power density table for Cellco's modified facility is included behind Tab 2.

Also attached is a Structural Analysis Report confirming that the tower and foundation can support Cellco's proposed antennas modification. (See Tab 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

John M. Flanders, Cromwell First Selectman

Sandy M. Carter

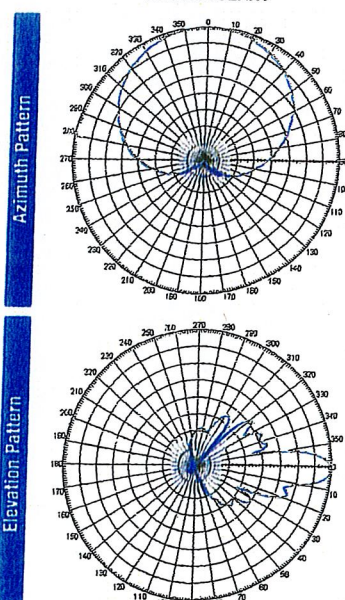
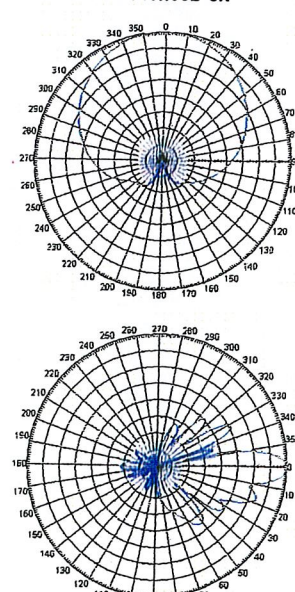
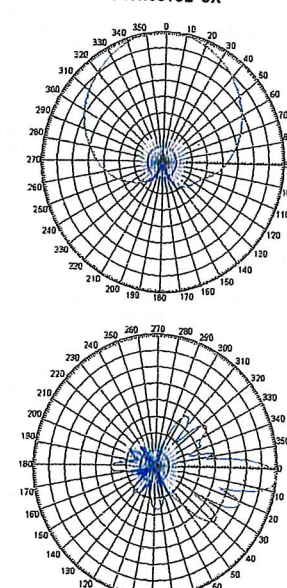


Vertically Polarized Directed Dipole® Panel Antennas

806 - 960 MHz
65° HORIZONTAL BEAMWIDTH

HORIZONTAL BEAMWIDTH	65°		65°	65°
FREQUENCY RANGE	806-960 MHz 14.5 & 14.8 dBd / 0° Tilt		806-896 MHz 14.5 dBd / 0° Tilt	806-896 MHz 14.3 dBd / 5° Tilt
MODEL	DB846F65ZAXY		DB846H65E-SX	846H65T5E-SX
TYPE	Directed Dipole*, No Screen		Directed Dipole*	Directed Dipole*
ELECTRICAL SPECIFICATIONS				
Frequency Range (MHz)	806-896	870-960	806-896	806-896
Gain (dBd/dBi)	14.5 / 16.6	14.8 / 16.9	14.5 / 16.6	14.3 / 16.4
Horizontal Beamwidth (Deg.)	65	60	65	65
Elevation Beamwidth (Deg.)	11	10.5	11	10.5
USLS (dB)	>15	>15	N/A	N/A
Null Fill (dB) – Below Peak	N/A	N/A	N/A	N/A
Beam Tilt (Deg.)	0	0	0	5
VSWR	<1.33:1	<1.33:1	<1.5:1	<1.5:1
Front-To-Back Ratio (dB)	40	40	30	40
Isolation (dB)	N/A	N/A	N/A	N/A
Max. Input Power (Watts)	500	500	500	500
Polarization	Vertical	Vertical	Vertical	Vertical
Connector Location	Back	Back	Back	Back
Connector Type	7-16 DIN - Female	7-16 DIN - Female	7-16 DIN - Female	7-16 DIN - Female
Optional Connectors	N/A	N/A	N/A	N/A
MECHANICAL SPECIFICATIONS				
Length (inch/mm)	72 / 1,829	72 / 1,829	72 / 1,829	72 / 1,829
Width (inch/mm)	10 / 254	10 / 254	20.5 / 521	20.5 / 521
Depth (inch/mm)	8.5 / 216	8.5 / 216	9 / 229	9 / 229
Net Weight (lbs/kg)	21 / 9.5	21 / 9.5	24 / 10.9	24 / 10.9
Max. Flat Plate Area (ft²/m²)	1.61 / 0.15	1.61 / 0.15	4.95 / 0.46	4.95 / 0.46
Max. Wind Load at 100 mph (lbf/N)	87 / 386	87 / 386	273 / 1,214	273 / 1,214
Max. Wind Speed (mph/kmh)	125 / 201	125 / 201	125 / 201	125 / 201
Radome Material	ABS, UV Resistant	ABS, UV Resistant	ABS, UV Resistant	ABS, UV Resistant
Reflector Material	Pass. Aluminum	Pass. Aluminum	Pass. Aluminum	Pass. Aluminum
Radiator Material	Aluminum	Aluminum	Brass	Brass
Hardware Material	Galvanized Steel	Galvanized Steel	Galvanized Steel	Galvanized Steel
Color	Light Gray	Light Gray	Light Gray	Light Gray
Std. Mounting Hardware	DB380	DB380	DB380	DB380
Optional Downtilt Kit	DB5083	DB5083	DB5083	DB5083
Optional Special Mounting	DB5084-AZ	DB5084-AZ	DB5084-AZ	DB5084-AZ

Specifications are subject to change. Please see our website for the latest information.

DB846F65ZAXY

DB846H65E-SX

846H65T5E-SX


Scale: 10° radials, 5 dB per division

Mechanical specifications

Length	1800 mm	70.9 in
Width	140 mm	5.5 in
Depth	335 mm	13.2 in
Depth with z-bracket	375 mm	14.8 in
Weight ⁴⁾	9.5 kg	21.0 lbs
Wind Area Fore/Aft ⁶⁾	0.25 m ²	2.7 ft ²
Wind Area Side ⁶⁾	0.61 m ²	6.6 ft ²
Max Wind Survivability ⁶⁾	>201 km/hr	>125 mph
Wind Load @ 100 mph (161 km/hr) ⁶⁾		
Fore/Aft	415 N	93 lbf
Side	878 N	198 lbf

Antenna consisting of aluminum alloy with brass feedlines covered by a gray, UV safe fiberglass radome. RoHS compliant.

Mounting & Downtilting

Mounting hardware attaches to pipe diameter Ø50-102 mm; Ø2.0-4.0 in. If the lock-down brace is used, the maximum diameter is Ø88.9 mm (3.5 in).

Mechanical downtilt angle 0-22°

Mounting & Downtilt Bracket Kit 21700000

Electrical specifications

Frequency Range	806-960 MHz
Impedance	50Ω
Connector ³⁾	NE or E-DIN Female 1 port / Center
VSWR ¹⁾	≤ 1.4:1
Polarization	Vertical
Gain ¹⁾	14 dBd
Power Rating ²⁾	500 W
Half Power Angle ¹⁾	
Horizontal Beamwidth	80°
Vertical Beamwidth	10°
Electrical downtilt ⁵⁾	0°
Null fill ¹⁾	10%
Lightning protection	Direct ground

1) Typical values.

2) Power rating limited by connector only.

3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.

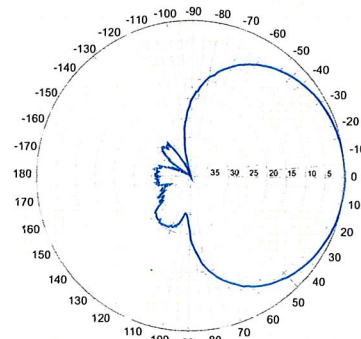
4) Antenna weight does not include brackets.

5) Add'l downtilts may be available. Check website for details.

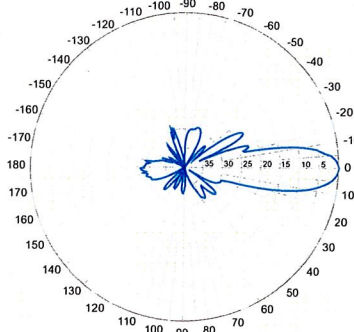
6) Values reflect installation with all three brackets utilized.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation-pattern¹⁾



Horizontal



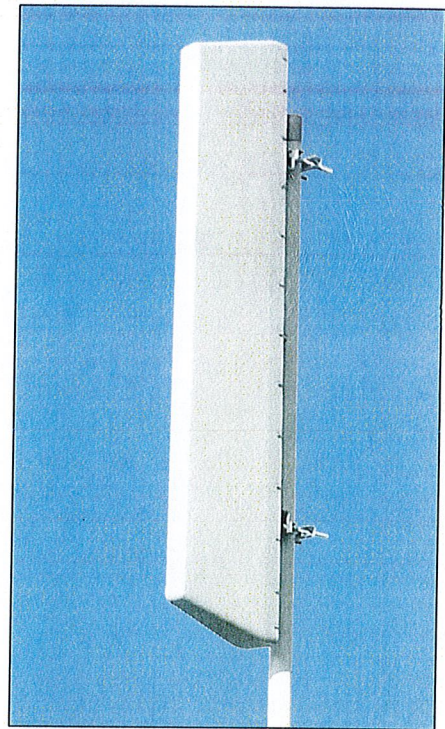
Vertical

Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the front-to-back ratio.

LPA-80080/6CF

When ordering replace " " with connector type.



Featuring our Exclusive
3T Technology™
Antenna Design:

- True log-periodic design allows for superior front-to-side characteristics to minimize sector overlap.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

Warranty:

This antenna is under a five-year limited warranty for repair or replacement.

Revision Date 08/18/08

806-960 MHz

Slant $\pm 45^\circ$ Dual Polarized FET Panel 63° / 14.5 dBd 696-900 MHz

Mechanical specifications

Length	1804 mm	71.0 in
Width	285 mm	11.2 in
Depth	114 mm	4.5 in
Depth with z-bracket	154 mm	6.1 in
Weight ⁴⁾	7.9 kg	17.0 lbs
Wind Area Fore/Aft	0.51 m ²	5.5 ft ²
Wind Area Side	0.21 m ²	2.2 ft ²
Max Wind Survivability	>201 km/hr	>125 mph
Wind Load @ 100 mph (161 km/hr)		
Fore/Aft	753 N	169 lbf
Side	351 N	79 lbf

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiberglass radome.

Mounting & Downtilting

Mounting hardware attaches to pipe diameter $\varnothing 50$ -160 mm; $\varnothing 2.0$ -6.3 in

Mounting Bracket Kit	36210002
Downtilt Bracket Kit	36114003

Electrical specifications

Frequency Range	696-900 MHz
Impedance	50 Ω
Connector ³⁾	NE or E-DIN Female 2 ports / Center
VSWR ¹⁾	$\leq 1.35:1$
Polarization	Slant $\pm 45^\circ$
Isolation Between Ports ¹⁾	< -25 dB
Gain ¹⁾	14.5 dBd 16.5 dBi
Power Rating ²⁾	500 W
Half Power Angle ¹⁾	
Horizontal Beamwidth	63°
Vertical Beamwidth	11°
Electrical downtilt ⁵⁾	0°
Null fill ¹⁾	5%
Lightning protection	Direct ground

Patented Dipole Design: U.S. Patent No. 6,608,600 B2

1) Typical values.

2) Power rating limited by connector only.

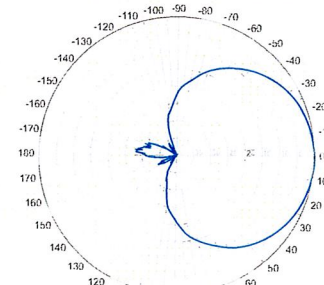
3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.

4) Antenna weight does not include brackets.

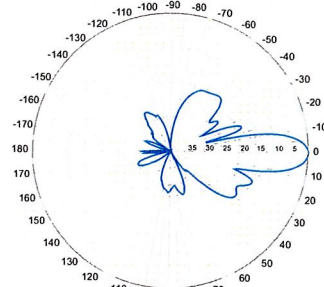
5) Add'l downtilts may be available. Check website for details.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation-pattern
750 MHz

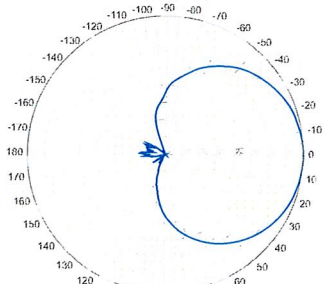


Horizontal

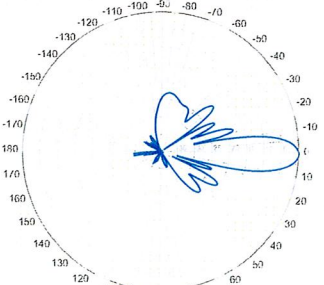


Vertical

850 MHz



Horizontal

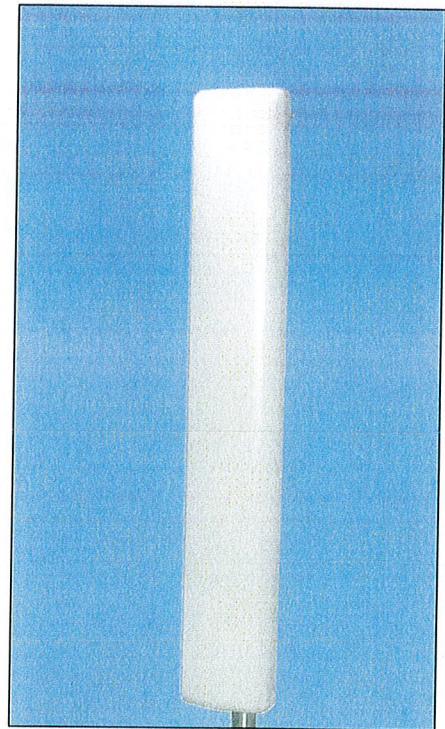


Vertical

696-900 MHz

BXA-70063/6CF

When ordering replace " " with connector type.



Featuring our Exclusive
3T Technology™
Antenna Design:

- Watercut brass feedline assembly for consistent performance.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

Warranty:

This antenna is under a five-year limited warranty for repair or replacement.

Revision Date: 01/08/09



Structural Analysis Report

82' Sign Structure w/ 111' Pipe Mast

Verizon Wireless Antenna Change Out

Verizon Site Ref: Cromwell SW

*100 Berlin Road
Cromwell, CT*

Natcomm Project No. 10001-CO-7

Date: December 3, 2009



Prepared for:

*Verizon Wireless
99 East River Road, 9th Floor
East Hartford, CT 06108*

p: 203.488.0580

f: 203.488.8587

w: nat-eng.com

63-2 N. Branford Rd.

Branford, CT 06405

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Introduction

The purpose of this report is to summarize the results of the non-linear, P- Δ structural analysis of the antenna installation proposed by Verizon Wireless on the existing 82-ft sign structure located in Cromwell, Connecticut.

The host structure is a 82-ft sign structure with a 111-ft pipe mast. The existing structure geometry, member sizes, foundation system and antenna and appurtenance information were obtained from a previous structural design report prepared by Natcomm job no. 09009.CO7 Rev. 1 dated April 30, 2009.

The structure is made up of two (2) W24x68 vertical steel legs, one (1) HSS18x0.5 steel pipe mast, L5x5x5/16 horizontal and diagonal steel bracing and WT6x15 steel bracing.

Verizon Wireless is proposing the removal of six (6) panel antennas and the installation of nine (9) panel antennas. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing structure was designed to support several communication antennas. The existing, proposed and future loads considered in this analysis consist of the following:

- T-MOBILE: (Existing)
Antennas: Six (6) RFS APX16DWV-16DWVS-E-A20 panel antennas and nine (9) Andrew OneBase Twin Dual Duplex TMA's on a low profile platform mounted on a 111-ft pipe mast with a RAD center elevation of 108-ft AGL.
Coax Cables: Eighteen (18) 1-5/8" $\varnothing$ coax cables, nine (9) within existing 111-ft pipe mast and nine (9) on the exterior of the pipe mast.
- AT&T: (Existing)
Antennas: Six (6) Powerwave 7770.00 panel antennas, six (6) Powerwave LPG21401 TMA's and six (6) Powerwave LPG13519 diplexers on pipe mounts with a RAD center elevation of 98-ft AGL.
Coax Cables: Twelve (12) 1-5/8" $\varnothing$ coax cables run on the exterior of existing sign structure.
- T-MOBILE (Existing/Reserved)
Antennas: One (1) VIC-100 GPS antenna on a side arm mounted to the leg of the sign structure with a RAD center elevation of 50-ft AGL.
Coax Cables: One (1) 1/2" $\varnothing$ coax cable run on the exterior of the existing sign structure.

- **POCKET WIRELESS (Existing/Reserved)**
Antennas: Three (3) RFS APXV18-206517S-C panel antennas mounted to the steel flanges (legs) of the existing sign structure with a RAD center elevation of 77-ft AGL.
Coax Cable: Six (6) 1-5/8" Ø coaxial cables vertically supported on the existing legs of the sign structure.
- **VERIZON: (Existing To Remain)**
Antennas: Six (6) Decibel 948F85T2E-M_2 panel antennas with a RAD center elevation of 88-ft AGL.
Coax Cables: Fifteen (15) 1-5/8" Ø coax cables run on the exterior of the existing sign structure.
- **VERIZON: (Existing To Remove)**
Antennas: Six (6) Swedcom ALP-9212 panel antennas with a RAD center elevation of 88-ft AGL.
- **VERIZON: (Proposed)**
Antennas: Four (4) Decibel DB846F65ZAXY, two (2) Antel LPA-80080/6CF, and three (3) Antel BXA-70063-6CF panel antennas with a RAD center elevation of 88-ft AGL.
Coax Cables: Three (3) 1-5/8" Ø coax cables run on the exterior of the existing sign structure.

Primary Assumptions Used in the Analysis

- The structure's theoretical capacity not including any assessment of the condition of the tower.
- The structure carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Structure is properly installed and maintained.
- Structure is in plumb condition.
- Structure loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original structure design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All structure members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled RISA-3D. The program analyzes the structure, considering the worst case loading condition.

The existing structure was analyzed for 85 mph basic wind speed (fastest mile) with no ice and 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

Structure Loading

Structure loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the structure and its components, and the application of ½" radial ice to the structure and its components.

Basic Wind Speed:	Middlesex; v = 85 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-96]
	Cromwell; v = 100 mph (3 second gust) equivalent to v = 80 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	TIA/EIA wind speed criteria controls..	
Load Cases:	<u>Load Case 1</u> ; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 2</u> ; 74 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 74 mph wind speed velocity represents 75% of the wind pressure generated by the 85 mph wind speed.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 3</u> ; Seismic – not checked	[Section 1614.5 of CT State Bldg. Code 2005] does not control in the design of this structure type

Structure Capacity

Member stresses were calculated utilizing the structural analysis software RISA-3D. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

Calculated stresses were found to be within allowable limits. In Load Case 6, per RISA-3D "Steel Code Checks", this structure was found to be at **97.8%** of its total capacity.

Tower Section	Location	Stress Ratio (percentage of capacity)	Result
Leg 2	1.25'	97.8%	PASS

Foundation and Anchors

The existing foundation consists of an 55-ft long (approx) x 8.5-ft wide x 3-ft deep reinforced concrete strip footing with concrete column pedestals. The sub-grade conditions used in the analysis of the existing foundation were based on normal soil values as permitted by EIA/TIA-222-F Section 7.1.3. The base of the sign structure is connected to the foundation by means of (20) 1"Ø, (assumed ASTM A-615-75) anchor bolts embedded into the existing concrete foundation. The base of the communications pipe structure is connected to the foundation by means of (10) 1.75"Ø, ASTM A615-75 anchor bolts embedded into the existing concrete foundation.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2	Proposed Loading	Result
Reinf. Conc. Pad w/ Pedestals	OTM	2.0	3.6	PASS

Note: OTM denotes Overturning Moment

- The structure anchor bolts, base plate and flange plates were found to be within allowable limits.

Structure Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts (Mast)	Tension	60.0%	PASS
Base Plate (Mast)	Bending	42.5%	PASS
Flange Bolts	Tension	25.6%	PASS
Flange Plate	Bending	22.7%	PASS
Anchor Bolts (Leg)	Tension	29.0%	PASS
Base Plate (Leg)	Bending	97.0%	PASS

Natcomm, Inc.
Structural Analysis
82' Sign Structure w/ 111' Pipe Mast
Cromwell, CT
December 3, 2009

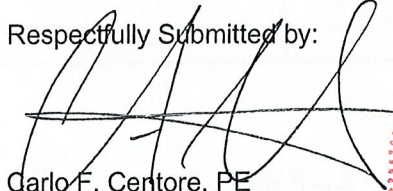
Conclusion

This analysis shows that the subject structure is adequate to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by Verizon Wireless. If the existing conditions are different than the information in this report, Natcomm, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:


Carlo F. Centore, PE
Principal ~ Structural Engineer



Prepared by:


Timothy J. Lynn, EIT
Structural Engineer

Natcomm, Inc.
Structural Analysis
82' Sign Structure w/ 111' Pipe Mast
Cromwell, CT
December 3, 2009

STANDARD CONDITIONS FOR FURNISHING OF
PROFESSIONAL ENGINEERING SERVICES ON
EXISTING STRUCTURES

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Natcomm, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Natcomm, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222.
- All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. Natcomm, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

Natcomm, Inc.
Structural Analysis
82' Sign Structure w/ 111' Pipe Mast
Cromwell, CT
December 3, 2009

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ RISA - 3 D

RISA-3D Structural Analysis Program is an integrated structural analysis and design software package for buildings, bridges, tower structures, etc.

Modeling Features:

- Comprehensive CAD-like graphic drawing/editing capabilities that let you draw, modify and load elements as well as snap, move, rotate, copy, mirror, scale, split, merge, mesh, delete, apply, etc.
- Versatile drawing grids (orthogonal, radial, skewed)
- Universal snaps and object snaps allow drawing without grids
- Versatile general truss generator
- Powerful graphic select/unselect tools including box, line, polygon, invert, criteria, spreadsheet selection, with locking
- Saved selections to quickly recall desired selections
- Modification tools that modify single items or entire selections
- Real spreadsheets with cut, paste, fill, math, sort, find, etc.
- Dynamic synchronization between spreadsheets and views so you can edit or view any data in the plotted views or in the spreadsheets
- Simultaneous view of multiple spreadsheets
- Constant in-stream error checking and data validation
- Unlimited undo/redo capability
- Generation templates for grids, disks, cylinders, cones, arcs, trusses, tanks, hydrostatic loads, etc.
- Support for all units systems & conversions at any time
- Automatic interaction with RISASection libraries
- Import DXF, RISA-2D, STAAD and ProSteel 3D files
- Export DXF, SDNF and ProSteel 3D files

Analysis Features:

- Static analysis and P-Delta effects
- Multiple simultaneous dynamic and response spectra analysis using Gupta, CQC or SRSS mode combinations
- Automatic inclusion of mass offset (5% or user defined) for dynamic analysis
- Physical member modeling that does not require members to be broken up at intermediate joints
- State of the art 3 or 4 node plate/shell elements
- High-end automatic mesh generation — draw a polygon with any number of sides to create a mesh of well-formed quadrilateral (NOT triangular) elements.
- Accurate analysis of tapered wide flanges - web, top and bottom flanges may all taper independently
- Automatic rigid diaphragm modeling
- Area loads with one-way or two-way distributions
- Multiple simultaneous moving loads with standard AASHTO loads and custom moving loads for bridges, cranes, etc.
- Torsional warping calculations for stiffness, stress and design
- Automatic Top of Member offset modeling
- Member end releases & rigid end offsets
- Joint master-slave assignments
- Joints detachable from diaphragms
- Enforced joint displacements

Natcomm, Inc.
Structural Analysis
82' Sign Structure w/ 111' Pipe Mast
Cromwell, CT
December 3, 2009

- 1-Way members, for tension only bracing, slipping, etc.
- 1-Way springs, for modeling soils and other effects
- Euler members that take compression up to their buckling load, then turn off.
- Stress calculations on any arbitrary shape
- Inactive members, plates, and diaphragms allows you to quickly remove parts of structures from consideration
- Story drift calculations provide relative drift and ratio to height
- Automatic self-weight calculations for members and plates
- Automatic subgrade soil spring generator

Graphics Features:

- Unlimited simultaneous model view windows
- Extraordinary "true to scale" rendering, even when drawing
- High-speed redraw algorithm for instant refreshing
- Dynamic scrolling stops right where you want
- Plot & print virtually everything with color coding & labeling
- Rotate, zoom, pan, scroll and snap views
- Saved views to quickly restore frequent or desired views
- Full render or wire-frame animations of deflected model and dynamic mode shapes with frame and speed control
- Animation of moving loads with speed control
- High quality customizable graphics printing

Design Features:

- Designs concrete, hot rolled steel, cold formed steel and wood
- ACI 1999/2002, BS 8110-97, CSA A23.3-94, IS456:2000, EC 2-1992 with consistent bar sizes through adjacent spans
- Exact integration of concrete stress distributions using parabolic or rectangular stress blocks
- Concrete beam detailing (Rectangular, T and L)
- Concrete column interaction diagrams
- Steel Design Codes: AISC ASD 9th, LRFD 2nd & 3rd, HSS Specification, CAN/CSA-S16.1-1994 & 2004, BS 5950-1-2000, IS 800-1984, Euro 3-1993 including local shape databases
- AISI 1999 cold formed steel design
- NDS 1991/1997/2001 wood design, including Structural Composite Lumber, multi-ply, full sawn
- Automatic spectra generation for UBC 1997, IBC 2000/2003
- Generation of load combinations: ASCE, UBC, IBC, BOCA, SBC, ACI
- Unbraced lengths for physical members that recognize connecting elements and full lengths of members
- Automatic approximation of K factors
- Tapered wide flange design with either ASD or LRFD codes
- Optimization of member sizes for all materials and all design codes, controlled by standard or user-defined lists of available sizes and criteria such as maximum depths
- Automatic calculation of custom shape properties
- Steel Shapes: AISC, HSS, CAN, ARBED, British, Euro, Indian, Chilean
- Light Gage Shapes: AISI, SSMA, Dale / Incor, Dietrich, Marino\WARE
- Wood Shapes: Complete NDS species/grade database
- Full seamless integration with RISAFoot (Ver 2 or better) for advanced footing design and detailing
- Plate force summation tool

Natcomm, Inc.
Structural Analysis
82' Sign Structure w/ 111' Pipe Mast
Cromwell, CT
December 3, 2009

Results Features:

- Graphic presentation of color-coded results and plotted designs
- Color contours of plate stresses and forces with quadratic smoothing, the contours may also be animated
- Spreadsheet results with sorting and filtering of: reactions, member & joint deflections, beam & plate forces/stresses, optimized sizes, code designs, concrete reinforcing, material takeoffs, frequencies and mode shapes
- Standard and user-defined reports
- Graphic member detail reports with force/stress/deflection diagrams and detailed design calculations and expanded diagrams that display magnitudes at any dialed location
- Saved solutions quickly restore analysis and design results.

Subject:

Wind Loading on Structural Members

Location:

Cromwell, CT

Rev. 0: 12/1/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

**Development of Design Heights, Exposure Coefficients,
and Velocity Pressures Per TIA/EIA**

Wind Speeds

Basic Wind Speed, V	V := 85	mph	
Basic Wind Speed with Ice, V _i	V _i := 74	mph	(per TIA/EIA-222-F Section 2.3.16)

Heights above ground level, z

Leg Member Section 1 =	z ₁ := 10	ft
Leg Member Section 2 =	z ₂ := 30	ft
Leg Member Section 3 =	z ₃ := 50	ft
Leg Member Section 4 =	z ₄ := 70	ft
Bracing Members =	z _{Br} := 40	ft

Exposure Coefficients, k_z

(per TIA/EIA-222-F Section 2.3.3)

Leg Member Section 1 =	$Kz_1 := \left(\frac{z_1}{33} \right)^{\frac{2}{7}} = 0.711$
Leg Member Section 2 =	$Kz_2 := \left(\frac{z_2}{33} \right)^{\frac{2}{7}} = 0.973$
Leg Member Section 3 =	$Kz_3 := \left(\frac{z_3}{33} \right)^{\frac{2}{7}} = 1.126$
Leg Member Section 4 =	$Kz_4 := \left(\frac{z_4}{33} \right)^{\frac{2}{7}} = 1.24$
Bracing Members =	$Kz_{Br} := \left(\frac{z_{Br}}{33} \right)^{\frac{2}{7}} = 1.057$

Velocity Pressure without ice, q_z

(per TIA/EIA-222-F Section 2.3.3)

Leg Member Section 1 =	$qz_1 := 0.00256 \cdot Kz_1 \cdot V^2 = 13.15$
Leg Member Section 2 =	$qz_2 := 0.00256 \cdot Kz_2 \cdot V^2 = 17.999$
Leg Member Section 3 =	$qz_3 := 0.00256 \cdot Kz_3 \cdot V^2 = 20.827$
Leg Member Section 4 =	$qz_4 := 0.00256 \cdot Kz_4 \cdot V^2 = 22.929$
Bracing Members =	$qz_{Br} := 0.00256 \cdot Kz_{Br} \cdot V^2 = 19.541$



Subject:

Wind Loading on Structural Members

Location:

Cromwell, CT

Rev. 0: 12/1/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Velocity Pressure with Ice, qz_{ICE}

(per TIA/EIA-222-F Section 2.3.3)

Leg Member Section 1 =

$$qz_{ICE1} := 0.00256 \cdot Kz_1 \cdot V_i^2 = 9.967$$

Leg Member Section 2 =

$$qz_{ICE2} := 0.00256 \cdot Kz_2 \cdot V_i^2 = 13.642$$

Leg Member Section 3 =

$$qz_{ICE3} := 0.00256 \cdot Kz_3 \cdot V_i^2 = 15.786$$

Leg Member Section 4 =

$$qz_{ICE4} := 0.00256 \cdot Kz_4 \cdot V_i^2 = 17.379$$

Bracing Members =

$$qz_{ICE_{Br}} := 0.00256 \cdot Kz_{Br} \cdot V_i^2 = 14.811$$

TIA/EIA Common Factors:

Gust Response Factor =

$$G_H := 1.69$$

(per TIA/EIA-222-F Section 2.3.4)

Gust Response Factor Multiplier =

$$m := 1.25$$

(per TIA/EIA-222-F Section 2.3.4.4)

Radial Ice Thickness =

$$I_r := 0.50$$

in

(per TIA/EIA-222-F Section 2.3.1)

Radial Ice Density =

$$I_d := 56.00$$

pcf

Subject:

Wind Loading on Structural Members

Location:

Cromwell, CT

Rev. 0: 12/1/09

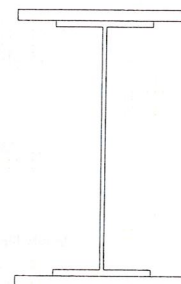
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on W24x68 w/ Plate

(per TIA/EIA-222-F-1996 Criteria)

W24x68 w/ Plate Data:

Shape = Flat
Depth = $d := 25.75$ in
Length = $L := 20$ ft
Flange Width = $b_f := 16$ in
Flange Thickness = $t_f := 2.585$ in
Web Thickness = $t_w := .415$ in
Member Cross Sectional Area = $A_{\text{member}} := 52.1$ in²



Gravity Loads (without ice)

Weight of the Member =

Self Weight

(Computed internally by Risa-3D)

plf **BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot =

$$A_{\text{member}} := 2(t_f + 2 \cdot l_r) \cdot (b_f + 2 \cdot l_r) + (d - 2t_f - 2l_r)(t_w + 2 \cdot l_r) - A_{\text{member}} = 97.5$$

Weight of Ice on Member =

$$W_{\text{ICE_member}} := l_d \cdot \frac{A_{\text{member}}}{144} = 38$$

plf **BLC 3**

Wind Perpendicular to Flange:

Member Aspect Ratio =

$$A_{\text{r_member}} := \frac{12L}{b_f} = 15.0$$

Member Force Coefficient =

$$C_{\text{a_member}} = 1.67 \quad (\text{per TIA/EIA-222-F Table 3})$$

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Flange Projected Surface Area =

$$A_{\text{member}} := \frac{b_f}{12} = 1.333 \quad \text{ft}$$

Section 1 Flange Wind Force =

$$qz_1 \cdot G_H \cdot C_{\text{a_member}} \cdot A_{\text{member}} = 49 \quad \text{plf} \quad \text{BLC 7}$$

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Flange Projected Surface Area w/ Ice =

$$A_{\text{ICE_member}} := \frac{(b_f + 2 \cdot l_r)}{12} = 1.417 \quad \text{ft}$$

Section 1 Flange Wind Force w/ Ice =

$$qz_{\text{ICE}_1} \cdot G_H \cdot C_{\text{a_member}} \cdot A_{\text{ICE_member}} = 40 \quad \text{plf} \quad \text{BLC 6}$$

Subject:

Wind Loading on Structural Members

Location:

Cromwell, CT

Rev. 0: 12/1/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Wind Perpendicular to Web

Member Aspect Ratio =

$$Ar_{\text{member}} := \frac{12L}{d} = 9.3$$

Member Force Coefficient =

$$Ca_{\text{member}} = 1.48 \quad (\text{per TIA/EIA-222-F Table 3})$$

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Web Projected Surface Area =

$$A_{\text{member}} := \frac{d}{12} = 2.146 \quad \text{ft}$$

Section 1 Web Wind Force =

$$qz_1 \cdot G_H \cdot Ca_{\text{member}} \cdot A_{\text{member}} = 70 \quad \text{plf} \quad \text{BLC 5}$$

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Web Projected Surface Area w/ Ice =

$$AICE_{\text{member}} := \frac{(d + 2 \cdot I_r)}{12} = 2.229 \quad \text{ft}$$

Section 1 Web Wind Force w/ Ice =

$$qzICE_1 \cdot G_H \cdot Ca_{\text{member}} \cdot AICE_{\text{member}} = 55 \quad \text{plf} \quad \text{BLC 4}$$

Subject:

Wind Loading on Structural Members

Location:

Cromwell, CT

Rev. 0: 12/1/09

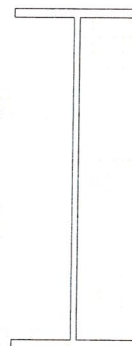
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on W24x68

(per TIA/EIA-222-F-1996 Criteria)

W24x68 Data:

Shape = Flat
Depth = $d := 23.75$ in
Length = $L := 20$ ft
Flange Width = $b_f := 9$ in
Flange Thickness = $t_f := .585$ in
Web Thickness = $t_w := .415$ in
Member Cross Sectional Area = $A_{member} := 20.1$ in²



Gravity Loads (without ice)

Weight of the Member =

Self Weight

(Computed internally by Risa-3D)

plf **BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot =

$$A_{i_member} := 2(t_f + 2 \cdot l_r) \cdot (b_f + 2 \cdot l_r) + (d - 2t_f - 2l_r)(t_w + 2 \cdot l_r) - A_{member} = 42.1$$

Weight of Ice on Member =

$$W_{ICE_member} := l_d \cdot \frac{A_{i_member}}{144} = 16$$

plf **BLC 3**

Wind Perpendicular to Flange:

Member Aspect Ratio =

$$A_{r_member} := \frac{12L}{b_f} = 26.7$$

Member Force Coefficient =

$$C_{a_member} = 2$$

(per TIA/EIA-222-F Table 3)

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Flange Projected Surface Area =

$$A_{member} := \frac{b_f}{12} = 0.75 \text{ ft}$$

Section 2 Flange Wind Force =

$$qz_2 \cdot G_H \cdot C_{a_member} \cdot A_{member} = 46$$

plf **BLC 7**

Section 3 Flange Wind Force =

$$qz_3 \cdot G_H \cdot C_{a_member} \cdot A_{member} = 53$$

plf **BLC 7**

Section 4 Flange Wind Force =

$$qz_4 \cdot G_H \cdot C_{a_member} \cdot A_{member} = 58$$

plf **BLC 7**

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Flange Projected Surface Area w/ Ice =

$$A_{ICE_member} := \frac{(b_f + 2 \cdot l_r)}{12} = 0.833 \text{ ft}$$

Section 2 Flange Wind Force w/ Ice =

$$qz_{ICE2} \cdot G_H \cdot C_{a_member} \cdot A_{ICE_member} = 38$$

plf **BLC 6**

Section 3 Flange Wind Force w/ Ice =

$$qz_{ICE3} \cdot G_H \cdot C_{a_member} \cdot A_{ICE_member} = 44$$

plf **BLC 6**

Section 4 Flange Wind Force w/ Ice =

$$qz_{ICE4} \cdot G_H \cdot C_{a_member} \cdot A_{ICE_member} = 49$$

plf **BLC 6**

Subject:

Wind Loading on Structural Members

Location:

Cromwell, CT

Rev. 0: 12/1/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Wind Perpendicular to Web

Member Aspect Ratio =

$$Ar_{\text{member}} := \frac{12L}{d} = 10.1$$

Member Force Coefficient =

$$Ca_{\text{member}} = 1.5 \quad (\text{per TIA/EIA-222-F Table 3})$$

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Web Projected Surface Area =

$$A_{\text{member}} := \frac{d}{12} = 1.979 \quad \text{ft}$$

Section 2 Web Wind Force =

$$qz_2 \cdot G_H \cdot Ca_{\text{member}} \cdot A_{\text{member}} = 91 \quad \text{plf} \quad \text{BLC 5}$$

Section 3 Web Wind Force =

$$qz_3 \cdot G_H \cdot Ca_{\text{member}} \cdot A_{\text{member}} = 105 \quad \text{plf} \quad \text{BLC 5}$$

Section 4 Web Wind Force =

$$qz_4 \cdot G_H \cdot Ca_{\text{member}} \cdot A_{\text{member}} = 115 \quad \text{plf} \quad \text{BLC 5}$$

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Web Projected Surface Area w/ Ice =

$$AICE_{\text{member}} := \frac{(d + 2 \cdot Ir)}{12} = 2.063 \quad \text{ft}$$

Section 2 Web Wind Force w/ Ice =

$$qzICE_2 \cdot G_H \cdot Ca_{\text{member}} \cdot AICE_{\text{member}} = 71 \quad \text{plf} \quad \text{BLC 4}$$

Section 3 Web Wind Force w/ Ice =

$$qzICE_3 \cdot G_H \cdot Ca_{\text{member}} \cdot AICE_{\text{member}} = 83 \quad \text{plf} \quad \text{BLC 4}$$

Section 4 Web Wind Force w/ Ice =

$$qzICE_4 \cdot G_H \cdot Ca_{\text{member}} \cdot AICE_{\text{member}} = 91 \quad \text{plf} \quad \text{BLC 4}$$

Subject:

Wind Loading on Structural Members

Location:

Cromwell, CT

Rev. 0: 12/1/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on WT 6x15

(per TIA/EIA-222-F-1996 Criteria)

WT 6x15 Data:

Shape = Flat

Depth = $d := 6.17$ in

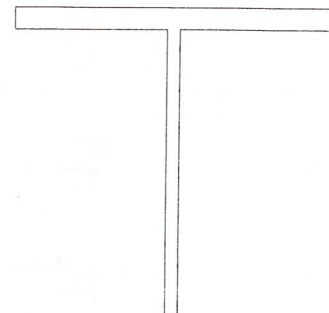
Length = $L := 10$ ft

Flange Width = $b_f := 6.52$ in

Flange Thickness = $t_f := 0.44$ in

Web Thickness = $t_w := 0.26$ in

Member Cross Sectional Area = $A_{member} := 4.4$ in²



Member Aspect Ratio = $Ar_{member} := \frac{12L}{b_f} = 18.4$

Member Force Coefficient = $Ca_{member} = 1.78$ (per TIA/EIA-222-F Table 3)

Gravity Loads (without ice)

Weight of the Member = Self Weight (Computed internally by Risa-3D) plf **BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot = $A_{i_{member}} := \left[(t_f + 2 \cdot l_r) \cdot (b_f + 2 \cdot l_r) + (d - t_f)(t_w + 2 \cdot l_r) - A_{member} \right] = 13.6$

Weight of Ice on Member = $W_{ICE_member} := l_d \cdot \frac{A_{i_{member}}}{144} = 5$ plf **BLC 3**

Wind Load (without ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Member Projected Surface Area = $A_{member} := \frac{b_f}{12} = 0.543$ ft

Total Member Wind Force = $qz_{Br} \cdot G_H \cdot Ca_{member} \cdot A_{member} = 32$ plf **BLC 5,7**

Wind Load (with ice) (per TIA/EIA-222-F-1996 Section 2.3.2)

Member Projected Surface Area w/ Ice = $A_{ICE_member} := \frac{(b_f + 2 \cdot l_r)}{12} = 0.627$ ft

Total Member Wind Force w/ Ice = $qz_{ICE_Br} \cdot G_H \cdot Ca_{member} \cdot A_{ICE_member} = 28$ plf **BLC 4,6**

Subject:

Wind Loading on Structural Members

Location:

Cromwell, CT

Rev. 0: 12/1/09

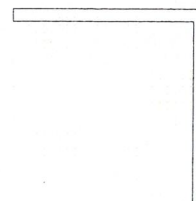
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on L5x5x5/16

(per TIA/EIA-222-F-1996 Criteria)

L5x5x5/16 Data:

Shape = Flat
Length = $L := 32$ ft
Width = $b := 5$ in
Thickness = $t := 0.3125$ in
Member Cross Sectional Area = $A_{\text{member}} := 3.03$ in²
Member Aspect Ratio = $Ar_{\text{member}} := \frac{12L}{b} = 76.8$



Member Force Coefficient =

$Ca_{\text{member}} = 2$ (per TIA/EIA-222-F Table 3)

Gravity Loads (without ice)

Weight of the Member =

Self Weight (Computed internally by Risa-3D) plf **BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot =

$A_{\text{ice_member}} := (b - t)(t + 2 \cdot l_r) + (b + 2 \cdot l_r)(t + 2 \cdot l_r) - A_{\text{member}} = 11$

Weight of Ice on Member =

$W_{\text{ICE_member}} := l_d \cdot \frac{A_{\text{ice_member}}}{144} = 4$ plf **BLC 3**

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Member Projected Surface Area =

$A_{\text{member}} := \frac{b}{12} = 0.417$ ft

Total Member Wind Force =

$qz_{Br} \cdot G_H \cdot Ca_{\text{member}} \cdot A_{\text{member}} = 28$ plf **BLC 7**

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Member Projected Surface Area w/ Ice =

$A_{\text{ICE_member}} := \frac{(b + 2 \cdot l_r)}{12} = 0.5$ ft

Total Member Wind Force w/ Ice =

$qz_{ICE_{Br}} \cdot G_H \cdot Ca_{\text{member}} \cdot A_{\text{ICE_member}} = 25$ plf **BLC 6**

Subject:

Wind Loading on Structural Members

Location:

Cromwell, CT

Rev. 0: 12/1/09

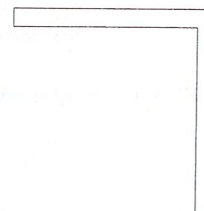
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on L3.5x3.5x5/16

(per TIA/EIA-222-F-1996 Criteria)

L3.5x3.5x5/16 Data:

Shape = Flat
Length = L := 20 ft
Width = b := 3.5 in
Thickness = t := 0.3125 in
Member Cross Sectional Area = $A_{\text{member}} := 2.09 \text{ in}^2$



Member Aspect Ratio = $A_{\text{r member}} := \frac{12L}{b} = 68.6$

Member Force Coefficient = $C_{\text{a member}} = 2$ (per TIA/EIA-222-F Table 3)

Gravity Loads (without ice)

Weight of the Member = Self Weight (Computed internally by Risa-3D) plf **BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot = $A_{\text{ice member}} := [(b - t)(t + 2 \cdot l_r) + (b + 2 \cdot l_r)(t + 2 \cdot l_r)] - A_{\text{member}} = 8$

Weight of Ice on Member = $W_{\text{ICE member}} := l_d \cdot \frac{A_{\text{ice member}}}{144} = 3$ plf **BLC 3**

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Member Projected Surface Area = $A_{\text{member}} := \frac{b}{12} = 0.292$ ft

Total Member Wind Force = $qz_{\text{Br}} \cdot G_H \cdot C_{\text{a member}} \cdot A_{\text{member}} = 19$ plf **BLC 7**

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Member Projected Surface Area w/ Ice = $A_{\text{ICE member}} := \frac{(b + 2 \cdot l_r)}{12} = 0.375$ ft

Total Member Wind Force w/ Ice = $qz_{\text{ICE Br}} \cdot G_H \cdot C_{\text{a member}} \cdot A_{\text{ICE member}} = 19$ plf **BLC 6**

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

**Development of Design Heights, Exposure Coefficients,
and Velocity Pressures Per TIA/EIA**

Wind Speeds

Basic Wind Speed, V	$V := 85$	mph	
Basic Wind Speed with Ice, V_i	$V_i := 74$	mph	(per TIA/EIA-222-F Section 2.3.16)

Heights above ground level, z

Mast =	$z_{\text{mast}} := 96.5$	ft
Verizon =	$z_{\text{vz}} := 88$	ft
AT&T =	$z_{\text{att}} := 98$	ft
T-Mobile =	$z_{\text{t_mb}} := 108$	ft
Pocket =	$z_{\text{pocket}} := 77$	ft
GPS =	$z_{\text{gps}} := 50$	ft

Exposure Coefficients, k_z

(per TIA/EIA-222-F Section 2.3.3)

Mast =	$Kz_{\text{mast}} := \left(\frac{z_{\text{mast}}}{33} \right)^{\frac{2}{7}} = 1.359$
Verizon =	$Kz_{\text{vz}} := \left(\frac{z_{\text{vz}}}{33} \right)^{\frac{2}{7}} = 1.323$
AT&T =	$Kz_{\text{att}} := \left(\frac{z_{\text{att}}}{33} \right)^{\frac{2}{7}} = 1.365$
T-Mobile =	$Kz_{\text{t_mb}} := \left(\frac{z_{\text{t_mb}}}{33} \right)^{\frac{2}{7}} = 1.403$
Pocket =	$Kz_{\text{pocket}} := \left(\frac{z_{\text{pocket}}}{33} \right)^{\frac{2}{7}} = 1.274$
GPS =	$Kz_{\text{gps}} := \left(\frac{z_{\text{gps}}}{33} \right)^{\frac{2}{7}} = 1.126$

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Velocity Pressure without ice, q_z

(per TIA/EIA-222-F Section 2.3.3)

$$\text{Mast} = q_{z_{\text{mast}}} := 0.00256 \cdot K_{z_{\text{mast}}} \cdot V^2 = 25.132$$

$$\text{Verizon} = q_{z_{\text{VZ}}} := 0.00256 \cdot K_{z_{\text{VZ}}} \cdot V^2 = 24.478$$

$$\text{AT\&T} = q_{z_{\text{att}}} := 0.00256 \cdot K_{z_{\text{att}}} \cdot V^2 = 25.243$$

$$\text{T-Mobile} = q_{z_{\text{t_mb}}} := 0.00256 \cdot K_{z_{\text{t_mb}}} \cdot V^2 = 25.953$$

$$\text{Pocket} = q_{z_{\text{pocket}}} := 0.00256 \cdot K_{z_{\text{pocket}}} \cdot V^2 = 23.562$$

$$\text{GPS} = q_{z_{\text{gps}}} := 0.00256 \cdot K_{z_{\text{gps}}} \cdot V^2 = 20.827$$

Velocity Pressure with ice, q_{zICE}

(per TIA/EIA-222-F Section 2.3.3)

$$\text{Mast} = q_{zICE_{\text{mast}}} := 0.00256 \cdot K_{z_{\text{mast}}} \cdot V_i^2 = 19.048$$

$$\text{Verizon} = q_{zICE_{\text{VZ}}} := 0.00256 \cdot K_{z_{\text{VZ}}} \cdot V_i^2 = 18.553$$

$$\text{AT\&T} = q_{zICE_{\text{att}}} := 0.00256 \cdot K_{z_{\text{att}}} \cdot V_i^2 = 19.132$$

$$\text{T-Mobile} = q_{zICE_{\text{t_mb}}} := 0.00256 \cdot K_{z_{\text{t_mb}}} \cdot V_i^2 = 19.671$$

$$\text{Pocket} = q_{zICE_{\text{pocket}}} := 0.00256 \cdot K_{z_{\text{pocket}}} \cdot V_i^2 = 17.858$$

$$\text{GPS} = q_{zICE_{\text{gps}}} := 0.00256 \cdot K_{z_{\text{gps}}} \cdot V_i^2 = 15.786$$

TIA/EIA Common Factors:

Gust Response Factor =	$G_H := 1.69$	(per TIA/EIA-222-F Section 2.3.4)
Gust Response Factor Multiplier =	$m := 1.25$	(per TIA/EIA-222-F Section 2.3.4.4)
Radial Ice Thickness =	$I_r := 0.50$ in	(per TIA/EIA-222-F Section 2.3.1)
Radial Ice Density =	$I_d := 56.00$ pcf	

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

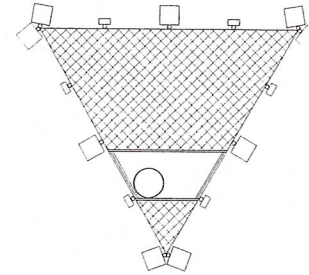
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on Antennas

(per TIA/EIA-222-F-1996 Criteria)

Antenna Data:

Antenna Model =	Antel BXA-70063/6CF	(Verizon)
Antenna Shape =	Flat	
Antenna Height =	$L_{ant} := 71.0$	in
Antenna Width =	$W_{ant} := 11.2$	in
Antenna Thickness =	$T_{ant} := 4.5$	in
Antenna Weight =	$WT_{ant} := 17.0$	lbs
Number of Antennas =	$N_{ant} := 3$	
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 6.3$	
Antenna Force Coefficient =	$Ca_{ant} = 1.4$	(per TIA/EIA-222-F-1996 Table 3)



Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.5$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 16.6$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{vz} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 959$	lbs BLC 5,7

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 6.1$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 18.3$	sf
Total Antenna Wind Force w/ Ice =	$F_{ICEant} := qz_{ICEvz} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 803$	lbs BLC 4,6

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 51$	lbs BLC 2
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Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3578$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1253$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 41$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 122$	lbs BLC 3

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

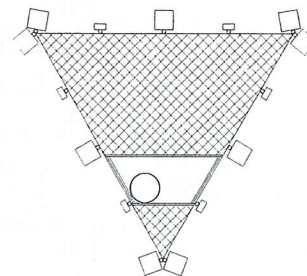
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on Antennas

(per TIA/EIA-222-F-1996 Criteria)

Antenna Data:

Antenna Model =	Antel LPA-80080/6CF	(Verizon)
Antenna Shape =	Flat	
Antenna Height =	$L_{ant} := 70.9$	in
Antenna Width =	$W_{ant} := 13.2$	in
Antenna Thickness =	$T_{ant} := 5.5$	in
Antenna Weight =	$WT_{ant} := 21.0$	lbs
Number of Antennas =	$N_{ant} := 2$	
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 5.4$	
Antenna Force Coefficient =	$Ca_{ant} := 1.4$	(per TIA/EIA-222-F-1996 Table 3)



Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 6.5$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 13$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{vz} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 753$	lbs BLC 5,7

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 7.1$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 14.2$	sf
Total Antenna Wind Force w/ Ice =	$F_{i_{ant}} := qz_{ICEvz} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 622$	lbs BLC 4,6

Gravity Load (without ice)

Weight of All Antennas =

$$WT_{ant} \cdot N_{ant} = 42 \quad \text{lbs} \quad \text{BLC 2}$$

Gravity Load (ice only)

Volume of Each Antenna =

$$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5147 \quad \text{cu in}$$

Volume of Ice on Each Antenna =

$$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1489 \quad \text{cu in}$$

Weight of Ice on Each Antenna =

$$W_{ICEant} := \frac{V_{ice}}{1728} \cdot \rho_d = 48 \quad \text{lbs}$$

Weight of Ice on All Antennas =

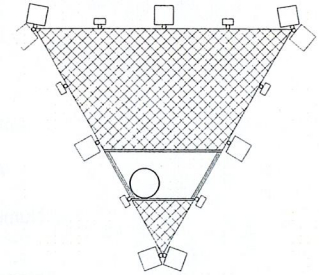
$$W_{ICEant} \cdot N_{ant} = 97 \quad \text{lbs} \quad \text{BLC 3}$$

Development of Wind & Ice Load on Antennas

(per TIA/EIA-222-F-1996 Criteria)

Antenna Data:

Antenna Model =	Decibel DB948F85T2E-M (Verizon)
Antenna Shape =	Flat
Antenna Height =	$L_{ant} := 48$ in
Antenna Width =	$W_{ant} := 7$ in
Antenna Thickness =	$T_{ant} := 3.5$ in
Antenna Weight =	$WT_{ant} := 8.5$ lbs
Number of Antennas =	$N_{ant} := 6$
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 6.9$
Antenna Force Coefficient =	$Ca_{ant} = 1.4$ (per TIA/EIA-222-F-1996 Table 3)



Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 2.3$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 14$	sf

Total Antenna Wind Force =	$F_{ant} := qz_{vz} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 811$	lbs	BLC 5,7
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Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 2.7$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 16.3$	sf

Total Antenna Wind Force w/ Ice =	$F_{ICEant} := qz_{ICEvz} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 717$	lbs	BLC 4,6
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Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 51$	lbs	BLC 2
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Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1176$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 588$	cu in

Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot \rho_d = 19$	lbs
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Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 114$	lbs	BLC 3
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Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

Prepared by: T.J.L. Checked by: C.F.C.
 Job No. 10001-CO.7

Development of Wind & Ice Load on Platform

(per TIA/EIA-222-F-1996 Criteria)

Platform Data:

Platform Model =

Valmount 13' Platform w/ Handrails

(Verizon)

Platform Shape =

Flat

(Force Coefficient Value
 Included in Area)

Platform Area =

$A_{plt} := 31.3$ sq ft

(Force Coefficient Value
 Included in Area)

Platform Area w/ Ice =

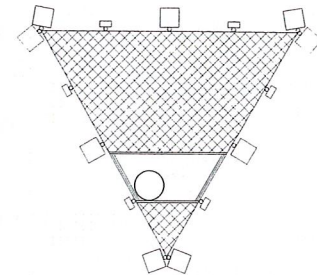
$A_{ICEplt} := 40.2$ sq ft

Platform Weight =

$WT_{plt} := 1822$ lbs

Platform Weight w/ Ice =

$WT_{ICEplt} := 2452$ lbs



Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Total Platform Wind Force =

$F_{plt} := qz_{vz} \cdot G_H \cdot A_{plt} = 1295$

lbs **BLC 5,7**

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Total Platform Wind Force w/ Ice =

$F_{plt} := qz_{ICEvz} \cdot G_H \cdot A_{ICEplt} = 1260$

lbs **BLC 4,6**

Gravity Load (without ice)

Weight of Platform =

$WT_{plt} = 1822$

lbs **BLC 2**

Gravity Load (ice only)

Weight of Ice on Platform =

$WT_{ICEplt} - WT_{plt} = 630$

lbs **BLC 3**

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on Antennas

(per TIA/EIA-222-F-1996 Criteria)

Antenna Data:

Antenna Model =	Powerwave 7770	(AT&T)
Antenna Shape =	Flat	
Antenna Height =	$L_{ant} := 55$	in
Antenna Width =	$W_{ant} := 11$	in
Antenna Thickness =	$T_{ant} := 5$	in
Antenna Weight =	$WT_{ant} := 35$	lbs
Number of Antennas =	$N_{ant} := 6$	
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 5.0$	
Antenna Force Coefficient =	$Ca_{ant} = 1.4$	(per TIA/EIA-222-F-1996 Table 3)

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.2$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 25.2$	sf

Total Antenna Wind Force =	$F_{ant} := qz_{att} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 1506$	lbs	BLC 5,7
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Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 4.7$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 28$	sf

Total Antenna Wind Force w/ Ice =	$F_{ICEant} := qz_{ICEatt} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 1267$	lbs	BLC 4,6
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Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 210$	lbs	BLC 2
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Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3025$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1007$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 33$	lbs

Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 196$	lbs	BLC 3
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Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

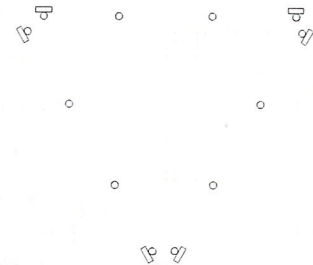
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on TMA's

(per TIA/EIA-222-F-1996 Criteria)

TMA Data:

TMA Model =	Powerwave LGP214	(AT&T)
TMA Shape =	Flat	
TMA Height =	$L_{TMA} := 14.4$	in
TMA Width =	$W_{TMA} := 9.2$	in
TMA Thickness =	$T_{TMA} := 2.6$	in
TMA Weight =	$WT_{TMA} := 14.1$	lbs
Number of TMA's =	$N_{TMA} := 6$	
TMA Aspect Ratio =	$Ar_{TMA} := \frac{L_{TMA}}{W_{TMA}} = 1.6$	
TMA Force Coefficient =	$Ca_{TMA} = 1.4$	(per TIA/EIA-222-F Table 3)



Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on TMA's

Surface Area for One TMA =	$SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.9$	sf
TMA Projected Surface Area =	$A_{TMA} := SA_{TMA} \cdot N_{TMA} = 5.5$	sf
Total TMA Wind Force =	$F_{TMA} := qz_{att} \cdot G_H \cdot Ca_{TMA} \cdot A_{TMA} = 330$	lbs BLC 5,7

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on TMA's

Surface Area for One TMA w/ Ice =	$SA_{ICETMA} := \frac{(L_{TMA} + 1) \cdot (W_{TMA} + 1)}{144} = 1.1$	sf
TMA Projected Surface Area w/ Ice =	$A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 6.5$	sf
Total TMA Wind Force w/ Ice =	$F_{ITMA} := qz_{ICE_{att}} \cdot G_H \cdot Ca_{TMA} \cdot A_{ICETMA} = 296$	lbs BLC 4,6

Gravity Load (without ice)

Weight of All TMA's =	$WT_{TMA} \cdot N_{TMA} = 85$	lbs BLC 2
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Gravity Load (ice only)

Volume of Each TMA =	$V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 344$	cu in
Volume of Ice on Each TMA =	$V_{ice} := (L_{TMA} + 1) \cdot (W_{TMA} + 1) \cdot (T_{TMA} + 1) - V_{TMA} = 221$	cu in
Weight of Ice on Each TMA =	$W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 7$	lbs
Weight of Ice on All TMA's	$W_{ICETMA} \cdot N_{TMA} = 43$	lbs BLC 3

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

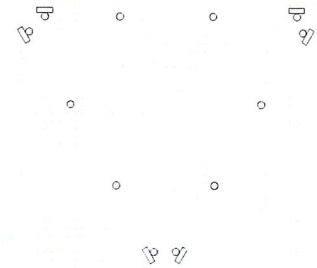
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on Diplexer

(per TIA/EIA-222-F-1996 Criteria)

Diplexer Data:

Diplexer Model =	Powerwave LGP219	(AT&T)
Diplexer Shape =	Flat	
Diplexer Height =	$L_{DP} := 4$	in
Diplexer Width =	$W_{DP} := 6$	in
Diplexer Thickness =	$T_{DP} := 3$	in
Diplexer Weight =	$WT_{DP} := 6$	lbs
Number of Diplexers =	$N_{DP} := 6$	
Diplexer Aspect Ratio =	$Ar_{DP} := \frac{L_{DP}}{W_{DP}} = 0.7$	
Diplexer Force Coefficient =	$Ca_{DP} = 1.4$	(per TIA/EIA-222-F Table 3)



Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Diplexers

Surface Area for One Diplexer =	$SA_{DP} := \frac{L_{DP} \cdot W_{DP}}{144} = 0.2$	sf
Diplexer Projected Surface Area =	$A_{DP} := SA_{DP} \cdot N_{DP} = 1$	sf
Total Diplexer Wind Force =	$F_{DP} := qz_{att} \cdot G_H \cdot Ca_{DP} \cdot A_{DP} = 60$	lbs BLC 5,7

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Diplexers

Surface Area for One Diplexer w/ Ice =	$SA_{ICEDP} := \frac{(L_{DP} + 1) \cdot (W_{DP} + 1)}{144} = 0.2$	sf
Diplexer Projected Surface Area w/ Ice =	$A_{ICEDP} := SA_{ICEDP} \cdot N_{DP} = 1.5$	sf
Total Diplexer Wind Force w/ Ice =	$F_{IDP} := qz_{ICE_{att}} \cdot G_H \cdot Ca_{DP} \cdot A_{ICEDP} = 66$	lbs BLC 4,6

Gravity Load (without ice)

Weight of All Diplexers =	$WT_{DP} \cdot N_{DP} = 36$	lbs BLC 2
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Gravity Load (ice only)

Volume of Each Diplexer =	$V_{DP} := L_{DP} \cdot W_{DP} \cdot T_{DP} = 72$	cu in
Volume of Ice on Each Diplexer =	$V_{ice} := (L_{DP} + 1) \cdot (W_{DP} + 1) \cdot (T_{DP} + 1) - V_{DP} = 68$	cu in
Weight of Ice on Each Diplexer =	$W_{ICEDP} := \frac{V_{ice}}{1728} \cdot Id = 2$	lbs
Weight of Ice on All Diplexers	$W_{ICEDP} \cdot N_{DP} = 13$	lbs BLC 3

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on Antenna Mounts

(per TIA/EIA-222-F-1996 Criteria)

Mount Data:

Mount Type:
Mount Shape =
Pipe Mount Length =
Exposed Pipe Mount Length =
4 inch Pipe Mount Linear Weight =
Pipe Mount Outside Diameter =
Number of Mounting Pipes =
Mount Aspect Ratio =
Mount Force Factor =

4" Φ Pipes (AT&T)
Round
 $L_{mnt} := 120$ in
 $L_{exp.mnt} := 65$ (Antennas shield top 55" of pipe)
 $W_{mnt} := 10.8$ plf
 $D_{mnt} := 4.5$ in
 $N_{mnt} := 12$

$$A_{r.mnt} := \frac{L_{mnt}}{D_{mnt}} = 27$$

$$C_{a.mnt} = 1.2 \quad (\text{per TIA/EIA-222-F Table 3})$$

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Surface Area for One Mount =

$$S_{A.mnt} := \frac{D_{mnt} \cdot L_{exp.mnt}}{144} = 2.031 \quad \text{sf}$$

Mount Projected Surface Area =

$$A_{mnt} := S_{A.mnt} \cdot N_{mnt} = 24.375 \quad \text{sf}$$

Total Mount Wind Force =

$$F_{mnt} := qz_{att} \cdot G_H \cdot C_{a.mnt} \cdot A_{mnt} = 1248 \quad \text{lbs} \quad \text{BLC 5,7}$$

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Surface Area for One Mount w/ Ice =

$$S_{A_{ICE}mnt} := \frac{(D_{mnt} + 2 \cdot I_r) \cdot L_{exp.mnt}}{144} = 2.483 \quad \text{sf}$$

Mount Projected Surface Area w/ Ice =

$$A_{ICEmnt} := S_{A_{ICE}mnt} \cdot N_{mnt} = 29.792 \quad \text{sf}$$

Total Mount Wind Force =

$$F_{I.mnt} := qz_{ICE} \cdot G_H \cdot C_{a.mnt} \cdot A_{ICEmnt} = 1156 \quad \text{lbs} \quad \text{BLC 4,6}$$

Gravity Loads (without ice)

(per TIA/EIA-222-F-1996)

Weight Each Pipe Mount =

$$W_{T.mnt} := W_{mnt} \cdot \frac{L_{mnt}}{12} = 108 \quad \text{lbs}$$

Weight of All Mounts =

$$W_{T.mnt} \cdot N_{mnt} = 1296 \quad \text{lbs} \quad \text{BLC 2}$$

Gravity Loads (ice only)

(per TIA/EIA-222-F-1996)

Volume of Each Pipe =

$$V_{mnt} := \frac{\pi}{4} \cdot D_{mnt}^2 \cdot L_{mnt} = 1909 \quad \text{cu in}$$

Volume of Ice on Each Pipe =

$$V_{ice} := \left[\frac{\pi}{4} \cdot (D_{mnt} + 1)^2 \cdot (L_{mnt} + 1) \right] - V_{mnt} = 966 \quad \text{cu in}$$

Weight of Ice each mount (incl. hardware) =

$$W_{ICEmnt} := \frac{V_{ice}}{1728} \cdot I_d = 31 \quad \text{lbs}$$

Weight of Ice on All Mounts =

$$W_{ICEmnt} \cdot N_{mnt} + 5 = 381 \quad \text{lbs} \quad \text{BLC 3}$$

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

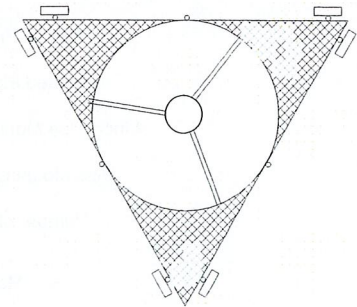
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on Antennas

(per TIA/EIA-222-F-1996 Criteria)

Antenna Data:

Antenna Model = RFS APX16DWV-16DWVS-E-A20 (T-Mobile)
Antenna Shape = Flat
Antenna Height = $L_{ant} := 55.9$ in
Antenna Width = $W_{ant} := 13$ in
Antenna Thickness = $T_{ant} := 3.15$ in
Antenna Weight = $WT_{ant} := 40.7$ lbs
Number of Antennas = $N_{ant} := 6$
Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.3$
Antenna Force Coefficient = $Ca_{ant} = 1.4$



(per TIA/EIA-222-F-1996 Table 3)

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$ sf
Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 30.3$ sf
Total Antenna Wind Force = $F_{ant} := qz_{tmb} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 1859$ lbs **BLC 5,7**

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 5.5$ sf
Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 33.2$ sf
Total Antenna Wind Force w/ Ice = $F_{ant} := qz_{ICEtmb} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 1545$ lbs **BLC 4,6**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 244$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2289$ cu in
Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1017$ cu in
Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 33$ lbs
Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 198$ lbs **BLC 3**

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

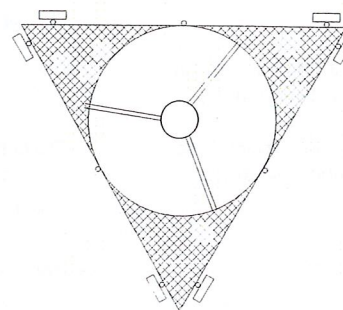
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on TMA's

(per TIA/EIA-222-F-1996 Criteria)

TMA Data:

TMA Model =	Andrew OneBase PCS Twin Dual Duplex TMA	(T-Mobile)
TMA Shape =	Flat	
TMA Height =	$L_{TMA} := 10.2$	in
TMA Width =	$W_{TMA} := 6.7$	in
TMA Thickness =	$T_{TMA} := 3.7$	in
TMA Weight =	$WT_{TMA} := 14.6$	lbs
Number of TMA's =	$N_{TMA} := 9$	
TMA Aspect Ratio =	$Ar_{TMA} := \frac{L_{TMA}}{W_{TMA}} = 1.5$	
TMA Force Coefficient =	$Ca_{TMA} = 1.4$	(per TIA/EIA-222-F Table 3)



Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on TMA's

Surface Area for One TMA =	$SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.5$	sf
TMA Projected Surface Area =	$A_{TMA} := SA_{TMA} \cdot N_{TMA} = 4.3$	sf
Total TMA Wind Force =	$F_{TMA} := qz_{att} \cdot G_H \cdot Ca_{TMA} \cdot A_{TMA} = 255$	lbs BLC 5,7

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on TMA's

Surface Area for One TMA w/ Ice =	$SA_{ICETMA} := \frac{(L_{TMA} + 1) \cdot (W_{TMA} + 1)}{144} = 0.6$	sf
TMA Projected Surface Area w/ Ice =	$A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 5.4$	sf
Total TMA Wind Force w/ Ice =	$F_{i,TMA} := qz_{ICE} \cdot G_H \cdot Ca_{TMA} \cdot A_{ICETMA} = 244$	lbs BLC 4,6

Gravity Load (without ice)

Weight of All TMA's =	$WT_{TMA} \cdot N_{TMA} = 131$	lbs BLC 2
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Gravity Load (ice only)

Volume of Each TMA =	$V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 253$	cu in
Volume of Ice on Each TMA =	$V_{ice} := (L_{TMA} + 1) \cdot (W_{TMA} + 1) \cdot (T_{TMA} + 1) - V_{TMA} = 152$	cu in
Weight of Ice on Each TMA =	$W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 5$	lbs
Weight of Ice on All TMA's	$W_{ICETMA} \cdot N_{TMA} = 44$	lbs BLC 3

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

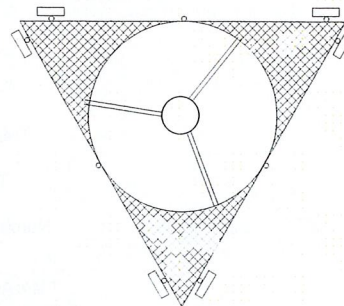
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on Platform

(per TIA/EIA-222-F-1996 Criteria)

Platform Data:

Platform Model =	Valmount 13' Low Profile Platform	(T-Mobile)
Platform Shape =	Flat	
(Force Coefficient Value Included in Area)	Platform Area =	$A_{plt} := 15.7$ sq ft
(Force Coefficient Value Included in Area)	Platform Area w/ Ice =	$A_{ICEplt} := 20.1$ sq ft
	Platform Weight =	$WT_{plt} := 1300$ lbs
	Platform Weight w/ Ice =	$WT_{ICEplt} := 1765$ lbs



Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Total Platform Wind Force =

$$F_{plt} := qZ_{Lmb} \cdot G_H \cdot A_{plt} = 689$$

lbs **BLC 5,7**

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Total Platform Wind Force w/ Ice =

$$F_{iplt} := qZ_{ICE} \cdot G_H \cdot A_{ICEplt} = 668$$

lbs **BLC 4,6**

Gravity Load (without ice)

Weight of Platform =

$$WT_{plt} = 1300$$

lbs **BLC 2**

Gravity Load (ice only)

Weight of Ice on Platform =

$$WT_{ICEplt} - WT_{plt} = 465$$

lbs **BLC 3**



Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on Antennas

(per TIA/EIA-222-F-1996 Criteria)

Antenna Data:

Antenna Model =	GPS VIC-100	(T-Mobile)
Antenna Shape =	Flat	
Antenna Height =	$L_{ant} := 3.9$	in
Antenna Width =	$W_{ant} := 3.5$	in
Antenna Thickness =	$T_{ant} := 3.5$	in
Antenna Weight =	$WT_{ant} := 8$	lbs
Number of Antennas =	$N_{ant} := 1$	
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.1$	
Antenna Force Coefficient =	$Ca_{ant} = 1.4$	(per TIA/EIA-222-F-1996 Table 3)

Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.1$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 0.1$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{pocket} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 5$	lbs BLC 5,7

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 0.2$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 0.2$	sf
Total Antenna Wind Force w/ Ice =	$F_{ant} := qz_{ICEpocket} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 6$	lbs BLC 4,6

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 8$	lbs BLC 2
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Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 48$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 51$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 2$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 2$	lbs BLC 3

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

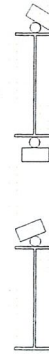
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on Antennas

(per TIA/EIA-222-F-1996 Criteria)

Antenna Data:

Antenna Model =	RFS APXV18-206517-S-C	(Pocket)	
Antenna Shape =	Flat		
Antenna Height =	$L_{ant} := 72.0$	in	
Antenna Width =	$W_{ant} := 6.8$	in	
Antenna Thickness =	$T_{ant} := 3.15$	in	
Antenna Weight =	$WT_{ant} := 32.5$	lbs	
Number of Antennas =	$N_{ant} := 3$		
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 10.6$		
Antenna Force Coefficient =	$Ca_{ant} = 1.52$		(per TIA/EIA-222-F-1996 Table 3)



Wind Load (without ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 3.4$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 10.2$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{pocket} \cdot G_H \cdot Ca_{ant} \cdot A_{ant} = 617$	lbs	BLC 5,7

Wind Load (with ice)

(per TIA/EIA-222-F-1996 Section 2.3.2)

Assumes Maximum Possible Wind Pressure on Antennas

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 4$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 11.9$	sf	
Total Antenna Wind Force w/ Ice =	$F_{ant} := qz_{ICE} \cdot qz_{pocket} \cdot G_H \cdot Ca_{ant} \cdot A_{ICEant} = 544$	lbs	BLC 4,6

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 98$	lbs	BLC 2
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Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1542$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 821$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 27$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 80$	lbs	BLC 3

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on Coax Cables

(per TIA/EIA-222-F-1996 Criteria)

Coax Cable Data:

Coax Type: Use HELIAX 1-5/8"

Shape: Round

Coax Outside Diameter = $D_{\text{coax}} := 1.98$ in

Coax Cable Length = $L_{\text{coax}} := 110$ ft

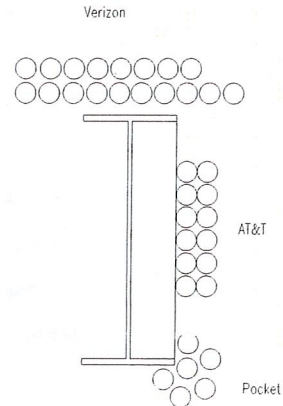
Weight of Coax per foot = $WT_{\text{coax}} := 1.04$ plf

Total Number of Coax = $N_{\text{coax}} := 36$

Number of Projected Coax = $NP_{\text{coax}} := 4$

Coax aspect ratio = $Ar_{\text{coax}} := L_{\text{coax}} \cdot \frac{12}{D_{\text{coax}}} = 667$

Coax Cable Force Factor = $Ca_{\text{coax}} = 1.2$ TIA/EIA-222-F Table 3



Wind Load (without ice)

per TIA/EIA-222-F Section 2.3.2

Surface Area for One Coax = $SA_{\text{coax}} := \frac{(2D_{\text{coax}})}{12} = 0.33$ ft

Coax Projected Surface Area = $A_{\text{coax}} := SA_{\text{coax}} \cdot NP_{\text{coax}} = 1.32$ ft

Coax Wind Force = $F_{\text{coax}} := Ca_{\text{coax}} \cdot qz_{\text{mast}} \cdot G_H \cdot A_{\text{coax}} = 67$ plf **BLC 5,7**

Wind Load (with ice)

per TIA/EIA-222-F Section 2.3.2

Surface Area for One Coax w/ Ice = $SA_{\text{ICEcoax}} := \frac{(2D_{\text{coax}} + 2 \cdot Ir)}{12} = 0.41$ ft

Coax Projected Surface Area w/ Ice = $A_{\text{ICEcoax}} := SA_{\text{ICEcoax}} \cdot NP_{\text{coax}} = 1.653$ ft

Coax Wind Force w/ Ice = $F_{\text{ICEcoax}} := Ca_{\text{coax}} \cdot qz_{\text{ICE}} \cdot G_H \cdot A_{\text{ICEcoax}} = 64$ plf **BLC 4,6**

Gravity Loads (without ice)

Weight of all cables w/o ice = $WT_{\text{coax}} \cdot N_{\text{coax}} = 37$ plf **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear Foot = $A_{\text{ice}} := \frac{\pi}{4} [(D_{\text{coax}} + 2 \cdot Ir)^2 - D_{\text{coax}}^2] = 3.9$ si

Ice Weight per Linear Foot = $WT_{\text{ice}} := Id \cdot \frac{A_{\text{ice}}}{144} = 2$ plf

Ice Weight All Coax per foot = $WT_{\text{ice}} \cdot N_{\text{coax}} = 55$ plf **BLC 3**

Subject:

Wind Loading on Antenna and Mounts

Location:

Cromwell, CT

Rev. 0: 12/1/09

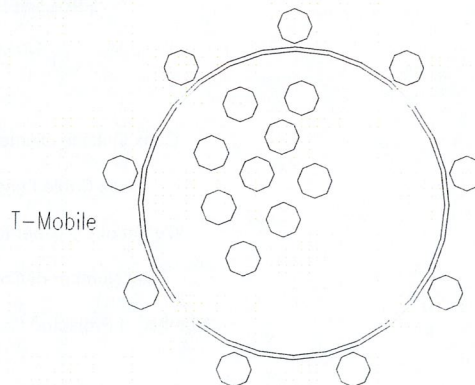
Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO.7

Development of Wind & Ice Load on Coax Cables

(per TIA/EIA-222-F-1996 Criteria)

Coax Cable Data:

Coax Type: Use HELIAX 1-5/8"
Shape: Round
Coax Outside Diameter = $D_{\text{coax}} := 1.98$ in
Coax Cable Length = $L_{\text{coax}} := 110$ ft
Weight of Coax per foot = $WT_{\text{coax}} := 1.04$ plf
Total Number of Coax = $N_{\text{coax}} := 18$
Number of Projected Coax = $NP_{\text{coax}} := 2$



Coax aspect ratio = $Ar_{\text{coax}} := L_{\text{coax}} \cdot \frac{12}{D_{\text{coax}}} = 667$

Coax Cable Force Factor = $Ca_{\text{coax}} = 1.2$ TIA/EIA-222-F Table 3

Wind Load per TIA/EIA-222-F-1996 (without ice)

per TIA/EIA-222-F Section 2.3.2

Surface Area for One Coax = $SA_{\text{coax}} := \frac{(2D_{\text{coax}})}{12} = 0.33$ ft

Coax Projected Surface Area = $A_{\text{coax}} := SA_{\text{coax}} \cdot NP_{\text{coax}} = 0.66$ ft

Coax Wind Force = $F_{\text{coax}} := Ca_{\text{coax}} \cdot qz_{\text{mast}} \cdot G_H \cdot A_{\text{coax}} = 34$ plf **BLC 5,7**

Wind Load per TIA/EIA-222-F-1996 (with ice)

per TIA/EIA-222-F Section 2.3.2

Surface Area for One Coax w/ Ice = $SA_{\text{ICEcoax}} := \frac{(2D_{\text{coax}} + 2 \cdot Ir)}{12} = 0.41$ ft

Coax Projected Surface Area w/ Ice = $A_{\text{ICEcoax}} := SA_{\text{ICEcoax}} \cdot NP_{\text{coax}} = 0.827$ ft

Coax Wind Force w/ Ice = $Fi_{\text{coax}} := Ca_{\text{coax}} \cdot qz_{\text{ICE}} \cdot G_H \cdot A_{\text{ICEcoax}} = 32$ plf **BLC 4,6**

Gravity Loads (without ice)

Weight of all cables w/o ice = $WT_{\text{coax}} \cdot N_{\text{coax}} = 19$ plf **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{\text{coax}} := \frac{\pi}{4} [(D_{\text{coax}} + 2 \cdot Ir)^2 - D_{\text{coax}}^2] = 3.9$ si

Ice Weight per Linear Foot = $WTi_{\text{coax}} := Id \cdot \frac{Ai_{\text{coax}}}{144} = 2$ plf

Ice Weight All Coax per foot = $WTi_{\text{coax}} \cdot N_{\text{coax}} = 27$ plf **BLC 3**

Global

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation	Yes
Include Warping	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Vertical Axis	Y

Hot Rolled Steel Code	AISC: ASD 9th
Cold Formed Steel Code	AISI 99: ASD
Wood Code	NDS 91/97: ASD
Wood Temperature	< 100F
Concrete Code	ACI 2002

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parame Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections	Yes
Bad Framing Warnings	No
Unused Force Warnings	Yes

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (1E5 F)	Density[k/ft^3]	Yield[ksi]
1	A36 Gr.36	29000	11154	.3	.65	.49	36
2	A572 Gr.50	29000	11154	.3	.65	.49	50
3	A992	29000	11154	.3	.65	.49	50
4	A500 Gr.42	29000	11154	.3	.65	.49	42
5	A500 Gr.46	29000	11154	.3	.65	.49	46

Hot Rolled Steel Design Parameters

	Label	Shape	Length	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	Kyy	Kzz	Cm-...	Cm-...	Cb	y s...	z s...	Funci...
1	CROSSDIAG1	L5x5x5/...	15.207	Segment	Segment										Lateral
2	CROSSDIAG2	L5x5x5/...	15.207	Segment	Segment										Lateral
3	CROSSDIAG3	L5x5x5/...	15.207	Segment	Segment										Lateral
4	CROSSDIAG4	L5x5x5/...	15.207	Segment	Segment										Lateral
5	CROSSDIAG5	L3.5x3....	18.916	Segment	Segment										Lateral
6	CROSSDIAG6	L3.5x3....	18.916	Segment	Segment										Lateral
7	CROSSDIAG7	L5x5x5/...	33.126												Lateral
8	CROSSDIAG8	L5x5x5/...	33.126												Lateral
9	HORZ1	L5x5x5/...	13.509	Segment	Segment	12	20								Lateral
10	HORZ2	L5x5x5/...	13.509	Segment	Segment	12	20								Lateral
11	HORZ3	L5x5x5/...	13.509	Segment	Segment	12	20								Lateral
12	HORZ4	L5x5x5/...	13.509	Segment	Segment	12	20								Lateral
13	HORZ5	L5x5x5/...	13.509	Segment	Segment	12	20								Lateral
14	HORZ6	L5x5x5/...	13.509	Segment	Segment	12	20								Lateral
15	HORZ7	L5x5x5/...	13.509	Segment	Segment	12	20								Lateral
16	HORZ8	L5x5x5/...	13.509	Segment	Segment	12	20								Lateral
17	HORZ9	L5x5x5/...	13.509	Segment	Segment	12	20								Lateral
18	HORZ10	L5x5x5/...	13.509	Segment	Segment	12	20								Lateral
19	HORZ11	Tube8x...	13.5	1	1	1	1								Lateral
20	LEG1	W24x68	60	Segment	Segment	20	12								Lateral
21	LEG2	W24x68	60	Segment	Segment	20	12								Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Lengt...	Lbvy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	Kyy	Kzz	Cm-...	Cm-...	Cb	v s...	z s...	Funci...
22	LEG_W_PLT1	W24x6...	20.5	Segment	Segment	20.5	10.5								Lateral
23	LEG_W_PLT2	W24x6...	20.5	Segment	Segment	20.5	10.5								Lateral
24	WT1	WT6x15	10.091												Lateral
25	WT2	WT6x15	10.091												Lateral
26	WT3	WT6x15	10.091												Lateral
27	WT4	WT6x15	10.091												Lateral
28	WT5	WT6x15	10.091												Lateral
29	WT6	WT6x15	10.091												Lateral
30	WT7	WT6x15	10.091												Lateral
31	WT8	WT6x15	10.091												Lateral
32	WT9	WT6x15	10.091												Lateral
33	WT10	WT6x15	10.091												Lateral
34	WT11	WT6x15	10.091												Lateral
35	WT12	WT6x15	10.091												Lateral
36	WT13	WT6x15	10.091												Lateral
37	WT14	WT6x15	10.091												Lateral
38	WT15	WT6x15	10.091												Lateral
39	WT16	WT6x15	10.091												Lateral
40	WT17	WT6x15	10.091												Lateral
41	WT18	WT6x15	10.091												Lateral
42	WT19	WT6x15	10.091												Lateral
43	WT20	WT6x15	10.091												Lateral
44	Mast1	HSS18x...	29	Segment	Segment										Lateral
45	Mast2	HSS18x...	27.5	Segment	Segment										Lateral
46	Mast3	HSS18x...	27.5	Segment	Segment										Lateral
47	Mast4	HSS18x...	27	Segment	Segment										Lateral
48	Horz 12	Tube8x...	13.5	1	1	1	1								Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	W24x68	W24X68	Column	Wide Flange	A992	Typical	20.1	70.4	1830	1.87
2	L5x5x5/16	L5X5X5	Beam	Wide Flange	A36 Gr.36	Typical	3.03	7.42	7.42	.108
3	L3.5x3.5x5/16	L3.5X3.5X5	Beam	Wide Flange	A36 Gr.36	Typical	2.09	2.45	2.45	.073
4	Tube8x4x5/16	TU8X4X5	Beam	Wide Flange	A500 Gr.46	Typical	6.86	18.1	53.9	45.2
5	HSS18x0.5	HSS18X0.5	Column	Pipe	A500 Gr.42	Typical	25.6	985	985	1970
6	WT6x15	WT6X15	Beam	W Tee	A572 Gr.50	Typical	4.4	10.2	13.5	.228
7	W24x68 w/ pl	new	Column	Wide Flange	A992	Typical	52.1	753.067	6733.167	10

Member Primary Data

	Label	I Joint	J Joint	K ...	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	CROSSDI...	5	10			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
2	CROSSDI...	9	6			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
3	CROSSDI...	9	12			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
4	CROSSDI...	11	10			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
5	CROSSDI...	13	18			L3.5x3.5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
6	CROSSDI...	17	14			L3.5x3.5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
7	CROSSDI...	19	TOPLEG2			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
8	CROSSDI...	TOPLEG1	20			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
9	HORZ1	3	6			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
10	HORZ2	5	4			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
11	HORZ3	11	14			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
12	HORZ4	13	12			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
13	HORZ5	17	20			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
14	HORZ6	19	18			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
15	HORZ7	23	26			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K...	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
16	HORZ8	25	24			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
17	HORZ9	29	32			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
18	HORZ10	31	30			L5x5x5/16	Beam	Wide Fla...	A36 Gr.36	Typical
19	HORZ11	TOPLEG1	TOPLEG2			Tube8x4x5/16	Beam	Wide Fla...	A500 Gr...	Typical
20	LEG1	TOPPLT1	TOPLEG1		90	W24x68	Column	Wide Fla...	A992	Typical
21	LEG2	TOPPLT2	TOPLEG2		90	W24x68	Column	Wide Fla...	A992	Typical
22	LEG_W_P...	BOTLEG1	TOPPLT1		90	W24x68 w/ pl	Column	Wide Fla...	A992	Typical
23	LEG_W_P...	BOTLEG2	TOPPLT2		90	W24x68 w/ pl	Column	Wide Fla...	A992	Typical
24	WT1	1	MC1		270	WT6x15	Beam	W Tee	A572 Gr...	Typical
25	WT2	MC1	2		270	WT6x15	Beam	W Tee	A572 Gr...	Typical
26	WT3	MC1	7		90	WT6x15	Beam	W Tee	A572 Gr...	Typical
27	WT4	MC1	8		270	WT6x15	Beam	W Tee	A572 Gr...	Typical
28	WT5	MC2	7		90	WT6x15	Beam	W Tee	A572 Gr...	Typical
29	WT6	MC2	8		270	WT6x15	Beam	W Tee	A572 Gr...	Typical
30	WT7	MC2	15		90	WT6x15	Beam	W Tee	A572 Gr...	Typical
31	WT8	MC2	16		270	WT6x15	Beam	W Tee	A572 Gr...	Typical
32	WT9	16	MC3		90	WT6x15	Beam	W Tee	A572 Gr...	Typical
33	WT10	15	MC3		270	WT6x15	Beam	W Tee	A572 Gr...	Typical
34	WT11	21	MC3		270	WT6x15	Beam	W Tee	A572 Gr...	Typical
35	WT12	MC3	22		270	WT6x15	Beam	W Tee	A572 Gr...	Typical
36	WT13	21	MC4		270	WT6x15	Beam	W Tee	A572 Gr...	Typical
37	WT14	22	MC4		90	WT6x15	Beam	W Tee	A572 Gr...	Typical
38	WT15	MC4	27		90	WT6x15	Beam	W Tee	A572 Gr...	Typical
39	WT16	MC4	28		270	WT6x15	Beam	W Tee	A572 Gr...	Typical
40	WT17	MC5	27		90	WT6x15	Beam	W Tee	A572 Gr...	Typical
41	WT18	MC5	28		270	WT6x15	Beam	W Tee	A572 Gr...	Typical
42	WT19	MC5	33		90	WT6x15	Beam	W Tee	A572 Gr...	Typical
43	WT20	MC5	34		270	WT6x15	Beam	W Tee	A572 Gr...	Typical
44	Mast1	BOTMAST	FC1			HSS18x0.5	Column	Pipe	A500 Gr...	Typical
45	Mast2	FC1	FC2			HSS18x0.5	Column	Pipe	A500 Gr...	Typical
46	Mast3	FC2	FC3			HSS18x0.5	Column	Pipe	A500 Gr...	Typical
47	Mast4	FC3	TOPMAST			HSS18x0.5	Column	Pipe	A500 Gr...	Typical
48	Horz 12	TOPLEG1	TOPLEG2			Tube8x4x5/16	Beam	Wide Fla...	A500 Gr...	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Di...
1	1	0	12	0	0	
2	2	13.5	12	0	0	
3	3	0	23	0	0	
4	4	13.5	23	0	0	
5	5	0	23.5	0	0	
6	6	13.5	23.5	0	0	
7	7	0	25.75	0	0	
8	8	13.5	25.75	0	0	
9	9	0	30.5	0	0	
10	10	13.5	30.5	0	0	
11	11	0	37.5	0	0	
12	12	13.5	37.5	0	0	
13	13	0	38	0	0	
14	14	13.5	38	0	0	
15	15	0	39.5	0	0	
16	16	13.5	39.5	0	0	
17	17	0	51.25	0	0	
18	18	13.5	51.25	0	0	
19	19	0	51.75	0	0	
20	20	13.5	51.75	0	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Di...
21	21	0	53.25	0	0	
22	22	13.5	53.25	0	0	
23	23	0	55.25	0	0	
24	24	13.5	55.25	0	0	
25	25	0	55.75	0	0	
26	26	13.5	55.75	0	0	
27	27	0	67	0	0	
28	28	13.5	67	0	0	
29	29	0	75.5	0	0	
30	30	13.5	75.5	0	0	
31	31	0	76	0	0	
32	32	13.5	76	0	0	
33	33	0	80.75	0	0	
34	34	13.5	80.75	0	0	
35	35	6.75	23.25	0	0	
36	36	6.75	27	0	0	
37	37	6.75	34	0	0	
38	38	6.75	37.75	0	0	
39	39	6.75	44.625	0	0	
40	40	6.75	51.5	0	0	
41	41	6.75	55.5	0	0	
42	43	6.75	75.75	0	0	
43	BOTLEG1	0	1.5	0	0	
44	BOTLEG2	13.5	1.5	0	0	
45	BOTMAST	6.75	0	3	0	
46	MC1	6.75	18.875	3	0	
47	MC2	6.75	32.625	3	0	
48	MC3	6.75	46.375	3	0	
49	MC4	6.75	60.125	3	0	
50	MC5	6.75	73.875	3	0	
51	TOPLEG1	0	82	0	0	
52	TOPLEG2	13.5	82	0	0	
53	TOPMAST	6.75	111	3	0	
54	TOPPLT1	0	22	0	0	
55	TOPPLT2	13.5	22	0	0	
56	T_MOBILE	6.75	108	3	0	
57	POCKET	0	77	0	0	
58	POCKET2	13.5	77	0	0	
59	FC1	6.75	29	3	0	
60	FC2	6.75	56.5	3	0	
61	FC3	6.75	84	3	0	
62	GPS	0	50	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]	Footing
1	BOTLEG1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	
2	BOTMAST	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	
3	BOTLEG2	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	
4	TOPLEG1							
5	TOPLEG2							
6	FC3							
7	FC2							
8	FC1							

Joint Loads and Enforced Displacements (BLC 2 : Weight of Equipment)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	TOPLEG1	L	Y	-.026
2	TOPLEG2	L	Y	-.026
3	TOPLEG1	L	Y	-.021
4	TOPLEG2	L	Y	-.021
5	TOPLEG1	L	Y	-.042
6	TOPLEG2	L	Y	-.042
7	TOPLEG1	L	Y	-.026
8	TOPLEG2	L	Y	-.026
9	TOPLEG1	L	Y	-.911
10	TOPLEG2	L	Y	-.911
11	TOPLEG1	L	Y	-.105
12	TOPLEG2	L	Y	-.105
13	TOPLEG1	L	Y	-.043
14	TOPLEG2	L	Y	-.043
15	TOPLEG1	L	Y	-.018
16	TOPLEG2	L	Y	-.018
17	TOPLEG1	L	Y	-.648
18	TOPLEG2	L	Y	-.648
19	T MOBILE	L	Y	-.244
20	T MOBILE	L	Y	-.131
21	T MOBILE	L	Y	-1.3
22	GPS	L	Y	-.008
23	POCKET	L	Y	-.033
24	POCKET2	L	Y	-.066

Joint Loads and Enforced Displacements (BLC 3 : Weight of Ice)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	TOPLEG1	L	Y	-.061
2	TOPLEG2	L	Y	-.061
3	TOPLEG1	L	Y	-.049
4	TOPLEG2	L	Y	-.049
5	TOPLEG1	L	Y	-.098
6	TOPLEG2	L	Y	-.098
7	TOPLEG1	L	Y	-.057
8	TOPLEG2	L	Y	-.057
9	TOPLEG1	L	Y	-.315
10	TOPLEG2	L	Y	-.315
11	TOPLEG1	L	Y	-.098
12	TOPLEG2	L	Y	-.098
13	TOPLEG1	L	Y	-.022
14	TOPLEG2	L	Y	-.022
15	TOPLEG1	L	Y	-.007
16	TOPLEG2	L	Y	-.007
17	TOPLEG1	L	Y	-.191
18	TOPLEG2	L	Y	-.191
19	T MOBILE	L	Y	-.198
20	T MOBILE	L	Y	-.044
21	T MOBILE	L	Y	-.465
22	GPS	L	Y	-.002
23	POCKET	L	Y	-.027
24	POCKET2	L	Y	-.053

Joint Loads and Enforced Displacements (BLC 4 : TIA/EIA Wind with Ice (+X))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	TOPLEG1	L	X	.402
2	TOPLEG2	L	X	.402

Joint Loads and Enforced Displacements (BLC 4 : TIA/EIA Wind with Ice (+X)) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
3	TOPLEG1	L	X	.311
4	TOPLEG2	L	X	.311
5	TOPLEG1	L	X	.492
6	TOPLEG2	L	X	.492
7	TOPLEG1	L	X	.359
8	TOPLEG2	L	X	.359
9	TOPLEG1	L	X	.63
10	TOPLEG2	L	X	.63
11	TOPLEG1	L	X	.634
12	TOPLEG2	L	X	.634
13	TOPLEG1	L	X	.148
14	TOPLEG2	L	X	.148
15	TOPLEG1	L	X	.033
16	TOPLEG2	L	X	.033
17	TOPLEG1	L	X	.578
18	TOPLEG2	L	X	.578
19	T MOBILE	L	X	1.545
20	T MOBILE	L	X	.244
21	T MOBILE	L	X	.668
22	GPS	L	X	.006
23	POCKET	L	X	.181
24	POCKET2	L	X	.363
25	TOPLEG1	L	Y	5.25
26	TOPLEG2	L	Y	-5.25

Joint Loads and Enforced Displacements (BLC 5 : TIA/EIA Wind (+X))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	TOPLEG1	L	X	.48
2	TOPLEG2	L	X	.48
3	TOPLEG1	L	X	.377
4	TOPLEG2	L	X	.377
5	TOPLEG1	L	X	.582
6	TOPLEG2	L	X	.582
7	TOPLEG1	L	X	.406
8	TOPLEG2	L	X	.406
9	TOPLEG1	L	X	.648
10	TOPLEG2	L	X	.648
11	TOPLEG1	L	X	.753
12	TOPLEG2	L	X	.753
13	TOPLEG1	L	X	.165
14	TOPLEG2	L	X	.165
15	TOPLEG1	L	X	.03
16	TOPLEG2	L	X	.03
17	TOPLEG1	L	X	.624
18	TOPLEG2	L	X	.624
19	T MOBILE	L	X	1.859
20	T MOBILE	L	X	.255
21	T MOBILE	L	X	.689
22	GPS	L	X	.005
23	POCKET	L	X	.206
24	POCKET2	L	X	.411
25	TOPLEG1	L	Y	5.94
26	TOPLEG2	L	Y	-5.94

Joint Loads and Enforced Displacements (BLC 6 : TIA/EIA Wind with Ice(+Z))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*ft...
1	TOPLEG1	L	Z	.402

Company : Natcomm
 Designer : TJL
 Job Number : 10001-CO.7

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Joint Loads and Enforced Displacements (BLC 6 : TIA/EIA Wind with Ice(+Z)) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*ft...
2	TOPLEG2	L	Z	.402
3	TOPLEG1	L	Z	.311
4	TOPLEG2	L	Z	.311
5	TOPLEG1	L	Z	.492
6	TOPLEG2	L	Z	.492
7	TOPLEG1	L	Z	.359
8	TOPLEG2	L	Z	.359
9	TOPLEG1	L	Z	.63
10	TOPLEG2	L	Z	.63
11	TOPLEG1	L	Z	.634
12	TOPLEG2	L	Z	.634
13	TOPLEG1	L	Z	.148
14	TOPLEG2	L	Z	.148
15	TOPLEG1	L	Z	.033
16	TOPLEG2	L	Z	.033
17	TOPLEG1	L	Z	.578
18	TOPLEG2	L	Z	.578
19	T MOBILE	L	Z	1.545
20	T MOBILE	L	Z	.244
21	T MOBILE	L	Z	.668
22	GPS	L	Z	.006
23	POCKET	L	Z	.181
24	POCKET2	L	Z	.363
25	TOPLEG2	L	Mx	35.44
26	TOPLEG1	L	Mx	35.44

Joint Loads and Enforced Displacements (BLC 7 : TIA/EIA Wind (+Z))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*ft...
1	TOPLEG1	L	Z	.48
2	TOPLEG2	L	Z	.48
3	TOPLEG1	L	Z	.377
4	TOPLEG2	L	Z	.377
5	TOPLEG1	L	Z	.582
6	TOPLEG2	L	Z	.582
7	TOPLEG1	L	Z	.406
8	TOPLEG2	L	Z	.406
9	TOPLEG1	L	Z	.648
10	TOPLEG2	L	Z	.648
11	TOPLEG1	L	Z	.753
12	TOPLEG2	L	Z	.753
13	TOPLEG1	L	Z	.165
14	TOPLEG2	L	Z	.165
15	TOPLEG1	L	Z	.03
16	TOPLEG2	L	Z	.03
17	TOPLEG1	L	Z	.624
18	TOPLEG2	L	Z	.624
19	T MOBILE	L	Z	1.859
20	T MOBILE	L	Z	.255
21	T MOBILE	L	Z	.689
22	GPS	L	Z	.005
23	POCKET	L	Z	.206
24	POCKET2	L	Z	.411
25	TOPLEG1	L	Mx	40.1
26	TOPLEG2	L	Mx	40.1

Company : Natcomm
 Designer : TJL
 Job Number : 10001-CO.7

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Member Distributed Loads (BLC 2 : Weight of Equipment)

	Member Label	Direction	Start Magnitude[k/ft.deg]	End Magnitude[k/ft....]	Start Location[ft.%]	End Location[ft.%]
1	LEG2	Y	-.037	-.037	0	0
2	Mast1	Y	-.019	-.019	0	0
3	Mast2	Y	-.019	-.019	0	0
4	Mast3	Y	-.019	-.019	0	0
5	Mast4	Y	-.019	-.019	0	0

Member Distributed Loads (BLC 3 : Weight of Ice)

	Member Label	Direction	Start Magnitude[k/ft.deg]	End Magnitude[k/ft....]	Start Location[ft.%]	End Location[ft.%]
1	CROSSDIAG1	Y	-.004	-.004	0	0
2	CROSSDIAG2	Y	-.004	-.004	0	0
3	CROSSDIAG3	Y	-.004	-.004	0	0
4	CROSSDIAG4	Y	-.004	-.004	0	0
5	CROSSDIAG5	Y	-.003	-.003	0	0
6	CROSSDIAG6	Y	-.003	-.003	0	0
7	CROSSDIAG7	Y	-.004	-.004	0	0
8	CROSSDIAG8	Y	-.004	-.004	0	0
9	HORZ1	Y	-.004	-.004	0	0
10	HORZ2	Y	-.004	-.004	0	0
11	HORZ3	Y	-.004	-.004	0	0
12	HORZ4	Y	-.004	-.004	0	0
13	HORZ5	Y	-.004	-.004	0	0
14	HORZ6	Y	-.004	-.004	0	0
15	HORZ7	Y	-.004	-.004	0	0
16	HORZ8	Y	-.004	-.004	0	0
17	HORZ9	Y	-.004	-.004	0	0
18	HORZ10	Y	-.004	-.004	0	0
19	HORZ11	Y	-.004	-.004	0	0
20	LEG1	Y	-.016	-.016	0	0
21	LEG2	Y	-.016	-.016	0	0
22	LEG2	Y	-.055	-.055	0	0
23	LEG W PLT1	Y	-.038	-.038	0	0
24	LEG W PLT2	Y	-.038	-.038	0	0
25	Mast4	Y	-.011	-.011	0	0
26	Mast1	Y	-.011	-.011	0	0
27	Mast2	Y	-.011	-.011	0	0
28	Mast3	Y	-.011	-.011	0	0
29	WT1	Y	-.005	-.005	0	0
30	WT2	Y	-.005	-.005	0	0
31	WT3	Y	-.005	-.005	0	0
32	WT4	Y	-.005	-.005	0	0
33	WT5	Y	-.005	-.005	0	0
34	WT6	Y	-.005	-.005	0	0
35	WT7	Y	-.005	-.005	0	0
36	WT8	Y	-.005	-.005	0	0
37	WT9	Y	-.005	-.005	0	0
38	WT10	Y	-.005	-.005	0	0
39	WT11	Y	-.005	-.005	0	0
40	WT12	Y	-.005	-.005	0	0
41	WT13	Y	-.005	-.005	0	0
42	WT14	Y	-.005	-.005	0	0
43	WT15	Y	-.005	-.005	0	0
44	WT16	Y	-.005	-.005	0	0
45	WT17	Y	-.005	-.005	0	0
46	WT18	Y	-.005	-.005	0	0
47	WT19	Y	-.005	-.005	0	0
48	WT20	Y	-.005	-.005	0	0

Company : Natcomm
 Designer : TJL
 Job Number : 10001-CO.7

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Member Distributed Loads (BLC 3 : Weight of Ice) (Continued)

	Member Label	Direction	Start Magnitude[k/ft.deg]	End Magnitude[k/ft....	Start Location[ft.%]	End Location[ft.%]
49	Mast1	Y	-.027	-.027	0	0
50	Mast2	Y	-.027	-.027	0	0
51	Mast3	Y	-.027	-.027	0	0
52	Mast4	Y	-.027	-.027	0	0

Member Distributed Loads (BLC 4 : TIA/EIA Wind with Ice (+X))

	Member Label	Direction	Start Magnitude[k/ft.deg]	End Magnitude[k/ft....	Start Location[ft.%]	End Location[ft.%]
1	LEG1	X	.071	.071	0	20
2	LEG1	X	.083	.083	20	40
3	LEG1	X	.091	.091	40	60
4	LEG2	X	.064	.064	0	0
5	LEG W PLT1	X	.055	.055	0	0
6	Mast1	X	0	.009	0	0
7	Mast1	X	.032	.032	0	0
8	Mast2	X	.009	.018	0	0
9	Mast2	X	.032	.032	0	0
10	Mast3	X	.018	.027	0	0
11	Mast3	X	.032	.032	0	0
12	Mast4	X	.027	.036	0	0
13	Mast4	X	.032	.032	0	0
14	WT1	X	.028	.028	0	0
15	WT2	X	.028	.028	0	0
16	WT3	X	.028	.028	0	0
17	WT4	X	.028	.028	0	0
18	WT5	X	.028	.028	0	0
19	WT6	X	.028	.028	0	0
20	WT7	X	.028	.028	0	0
21	WT8	X	.028	.028	0	0
22	WT9	X	.028	.028	0	0
23	WT10	X	.028	.028	0	0
24	WT11	X	.028	.028	0	0
25	WT12	X	.028	.028	0	0
26	WT13	X	.028	.028	0	0
27	WT14	X	.028	.028	0	0
28	WT15	X	.028	.028	0	0
29	WT16	X	.028	.028	0	0
30	WT17	X	.028	.028	0	0
31	WT18	X	.028	.028	0	0
32	WT19	X	.028	.028	0	0
33	WT20	X	.028	.028	0	0

Member Distributed Loads (BLC 5 : TIA/EIA Wind (+X))

	Member Label	Direction	Start Magnitude[k/ft.deg]	End Magnitude[k/ft....	Start Location[ft.%]	End Location[ft.%]
1	LEG1	X	.115	.115	40	60
2	LEG1	X	.105	.105	20	40
3	LEG1	X	.091	.091	0	20
4	LEG2	X	.067	.067	0	0
5	LEG W PLT1	X	.07	.07	0	0
6	Mast1	X	0	.012	0	0
7	Mast1	X	.034	.034	0	0
8	Mast2	X	.012	.023	0	0
9	Mast2	X	.034	.034	0	0
10	Mast3	X	.023	.034	0	0
11	Mast3	X	.034	.034	0	0
12	Mast4	X	.034	.045	0	0
13	Mast4	X	.034	.034	0	0
14	WT1	X	.032	.032	0	0

Member Distributed Loads (BLC 5 : TIA/EIA Wind (+X)) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,...	Start Location[ft,%]	End Location[ft,%]
15	WT2	X	.032	.032	0	0
16	WT3	X	.032	.032	0	0
17	WT4	X	.032	.032	0	0
18	WT5	X	.032	.032	0	0
19	WT6	X	.032	.032	0	0
20	WT7	X	.032	.032	0	0
21	WT8	X	.032	.032	0	0
22	WT9	X	.032	.032	0	0
23	WT10	X	.032	.032	0	0
24	WT11	X	.032	.032	0	0
25	WT12	X	.032	.032	0	0
26	WT13	X	.032	.032	0	0
27	WT14	X	.032	.032	0	0
28	WT15	X	.032	.032	0	0
29	WT16	X	.032	.032	0	0
30	WT17	X	.032	.032	0	0
31	WT18	X	.032	.032	0	0
32	WT19	X	.032	.032	0	0
33	WT20	X	.032	.032	0	0

Member Distributed Loads (BLC 6 : TIA/EIA Wind with Ice(+Z))

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,...	Start Location[ft,%]	End Location[ft,%]
1	CROSSDIAG1	Z	.025	.025	0	0
2	CROSSDIAG2	Z	.025	.025	0	0
3	CROSSDIAG3	Z	.025	.025	0	0
4	CROSSDIAG4	Z	.025	.025	0	0
5	CROSSDIAG5	Z	.019	.019	0	0
6	CROSSDIAG6	Z	.019	.019	0	0
7	CROSSDIAG7	Z	.025	.025	0	0
8	CROSSDIAG8	Z	.025	.025	0	0
9	HORZ1	Z	.025	.025	0	0
10	HORZ2	Z	.025	.025	0	0
11	HORZ3	Z	.025	.025	0	0
12	HORZ4	Z	.025	.025	0	0
13	HORZ5	Z	.025	.025	0	0
14	HORZ6	Z	.025	.025	0	0
15	HORZ7	Z	.025	.025	0	0
16	HORZ8	Z	.025	.025	0	0
17	HORZ9	Z	.025	.025	0	0
18	HORZ10	Z	.025	.025	0	0
19	HORZ11	Z	.025	.025	0	0
20	LEG1	Z	.038	.038	0	20
21	LEG1	Z	.044	.044	20	40
22	LEG1	Z	.049	.049	40	60
23	LEG2	Z	.038	.038	0	20
24	LEG2	Z	.044	.044	20	40
25	LEG2	Z	.049	.049	40	60
26	LEG2	Z	.064	.064	0	0
27	LEG W PLT1	Z	.04	.04	0	0
28	LEG W PLT2	Z	.04	.04	0	0
29	Mast1	Z	0	.009	0	0
30	Mast1	Z	.032	.032	0	0
31	Mast2	Z	.009	.018	0	0
32	Mast2	Z	.032	.032	0	0
33	Mast3	Z	.018	.027	0	0
34	Mast3	Z	.032	.032	0	0
35	Mast4	Z	.027	.036	0	0

Company : Natcomm
 Designer : TJL
 Job Number : 10001-CO.7

82' Sign Structure with 111' Pipe Mast

Dec 3, 2009
 8:22 AM
 Checked By:

Member Distributed Loads (BLC 6 : TIA/EIA Wind with Ice(+Z)) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,deg]	Start Location[ft,%]	End Location[ft,%]
36	Mast4	Z	.032	.032	0	0
37	WT1	Z	.028	.028	0	0
38	WT2	Z	.028	.028	0	0
39	WT3	Z	.028	.028	0	0
40	WT4	Z	.028	.028	0	0
41	WT5	Z	.028	.028	0	0
42	WT6	Z	.028	.028	0	0
43	WT7	Z	.028	.028	0	0
44	WT8	Z	.028	.028	0	0
45	WT9	Z	.028	.028	0	0
46	WT10	Z	.028	.028	0	0
47	WT11	Z	.028	.028	0	0
48	WT12	Z	.028	.028	0	0
49	WT13	Z	.028	.028	0	0
50	WT14	Z	.028	.028	0	0
51	WT15	Z	.028	.028	0	0
52	WT16	Z	.028	.028	0	0
53	WT17	Z	.028	.028	0	0
54	WT18	Z	.028	.028	0	0
55	WT19	Z	.028	.028	0	0
56	WT20	Z	.028	.028	0	0

Member Distributed Loads (BLC 7 : TIA/EIA Wind (+Z))

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,deg]	Start Location[ft,%]	End Location[ft,%]
1	CROSSDIAG1	Z	.028	.028	0	0
2	CROSSDIAG2	Z	.028	.028	0	0
3	CROSSDIAG3	Z	.028	.028	0	0
4	CROSSDIAG4	Z	.028	.028	0	0
5	CROSSDIAG5	Z	.019	.019	0	0
6	CROSSDIAG6	Z	.019	.019	0	0
7	CROSSDIAG7	Z	.028	.028	0	0
8	CROSSDIAG8	Z	.028	.028	0	0
9	HORZ1	Z	.028	.028	0	0
10	HORZ2	Z	.028	.028	0	0
11	HORZ3	Z	.028	.028	0	0
12	HORZ4	Z	.028	.028	0	0
13	HORZ5	Z	.028	.028	0	0
14	HORZ6	Z	.028	.028	0	0
15	HORZ7	Z	.028	.028	0	0
16	HORZ8	Z	.028	.028	0	0
17	HORZ9	Z	.028	.028	0	0
18	HORZ10	Z	.028	.028	0	0
19	HORZ11	Z	.028	.028	0	0
20	LEG1	Z	.046	.046	0	20
21	LEG1	Z	.053	.053	20	40
22	LEG1	Z	.058	.058	40	60
23	LEG2	Z	.046	.046	0	20
24	LEG2	Z	.053	.053	20	40
25	LEG2	Z	.058	.058	40	60
26	LEG2	Z	.067	.067	0	0
27	LEG W_PLT1	Z	.049	.049	0	0
28	LEG W_PLT2	Z	.049	.049	0	0
29	Mast1	Z	0	.012	0	0
30	Mast1	Z	.034	.034	0	0
31	Mast2	Z	.012	.023	0	0
32	Mast2	Z	.034	.034	0	0
33	Mast3	Z	.023	.034	0	0

Member Distributed Loads (BLC 7 : TIA/EIA Wind (+Z)) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,deg]	End Magnitude[k/ft,deg]	Start Location[ft,%]	End Location[ft,%]
34	Mast3	Z	.034	.034	0	0
35	Mast4	Z	.034	.045	0	0
36	Mast4	Z	.034	.034	0	0
37	WT1	Z	.032	.032	0	0
38	WT2	Z	.032	.032	0	0
39	WT3	Z	.032	.032	0	0
40	WT4	Z	.032	.032	0	0
41	WT5	Z	.032	.032	0	0
42	WT6	Z	.032	.032	0	0
43	WT7	Z	.032	.032	0	0
44	WT8	Z	.032	.032	0	0
45	WT9	Z	.032	.032	0	0
46	WT10	Z	.032	.032	0	0
47	WT11	Z	.032	.032	0	0
48	WT12	Z	.032	.032	0	0
49	WT13	Z	.032	.032	0	0
50	WT14	Z	.032	.032	0	0
51	WT15	Z	.032	.032	0	0
52	WT16	Z	.032	.032	0	0
53	WT17	Z	.032	.032	0	0
54	WT18	Z	.032	.032	0	0
55	WT19	Z	.032	.032	0	0
56	WT20	Z	.032	.032	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Grav...	Z Gra...	Joint	Point	Distributed	Area (Mem...	Surfa...
1	Self Weight	None		-1						
2	Weight of Equipment	None				24		5		
3	Weight of Ice	None				24		52		
4	TIA/EIA Wind with Ice (+X)	None				26		33		
5	TIA/EIA Wind (+X)	None				26		33		
6	TIA/EIA Wind with Ice(+Z)	None				26		56		
7	TIA/EIA Wind (+Z)	None				26		56		

Load Combinations

	Description	Solve	PDel...	SR...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	TIA/EIA Wind + Ice in +X Direction	Yes			1	1	2	1	3	1	4	1						
2	TIA/EIA Wind in +X Direction	Yes			1	1	2	1	5	1								
3	TIA/EIA Wind + Ice in +Z Direction	Yes			1	1	2	1	3	1	6	1						
4	TIA/EIA Wind in +Z Direction	Yes			1	1	2	1	7	1								
5	TIA/EIA Wind + Ice in -Z' Direction	Yes			1	1	2	1	3	1	6	-1						
6	TIA/EIA Wind in -Z' Direction	Yes			1	1	2	1	7	-1								
7	Self Weight				1	1												

Envelope Member Section Forces

	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Mome...	lc	z-z Momen...	lc
1	CROSSDIAG1	1	max	.647	5	.089	1	.214	6	.003	6	.453	4	.377	2
2			min	-8.206	2	-.013	4	-.215	4	-.004	4	-.494	6	-.249	4
3		2	max	.622	5	.048	2	.108	6	.003	6	.098	6	.56	6
4			min	-8.224	2	-.048	4	-.108	4	-.004	4	-.062	4	-.601	4
5		3	max	.597	5	.248	6	.016	2	.004	6	.141	4	1.173	6
6			min	-8.438	2	-.172	4	-.013	4	-.004	4	-.219	6	-1.101	4
7		4	max	.472	4	.214	6	.093	4	.004	6	.293	6	.443	6

Envelope Member Section Forces (Continued)

Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Mome...	lc	z-z Momen...	lc
8		min	-8.456	2	-.207	4	-.094	6	-.004	4	-.262	4	-.484	4
9		max	.454	4	.179	6	.199	4	.004	6	.425	6	.513	4
10		min	-8.474	2	-.242	4	-.2	6	-.004	4	-.473	4	-.479	6
11	CROSSDIAG2	max	8.564	2	.221	4	.204	6	.003	4	.358	6	.209	4
12		min	-6.942	6	-.15	6	-.205	4	-.003	6	-.425	4	-.424	2
13		max	8.583	2	.186	4	.098	6	.003	4	.312	6	.725	6
14		min	-6.924	6	-.185	6	-.098	4	-.003	6	-.285	4	-.745	4
15		max	8.681	2	.151	4	.02	4	.003	4	.048	4	1.389	6
16		min	-6.906	6	-.22	6	-.02	6	-.003	6	-.198	2	-1.32	4
17		max	8.699	2	.05	2	.126	4	.003	4	.142	6	.739	6
18		min	-6.446	6	-.046	6	-.127	6	-.003	6	-.107	4	-.771	4
19		max	8.717	2	.016	2	.233	4	.003	4	.456	4	.427	6
20		min	-6.427	6	-.087	5	-.233	6	-.003	6	-.513	6	-.369	4
21	CROSSDIAG3	max	3.998	6	.143	3	.243	6	.004	6	.238	2	.323	3
22		min	-13.551	2	-.057	6	-.244	4	-.004	4	-.089	5	-.227	6
23		max	3.98	6	.102	4	.136	6	.004	6	.246	6	.482	6
24		min	-13.569	2	-.091	6	-.138	4	-.004	4	-.222	4	-.516	4
25		max	3.962	6	.068	4	.048	6	.004	6	.177	6	.998	6
26		min	-13.686	2	-.13	5	-.047	3	-.004	4	-.222	4	-.972	4
27		max	3.626	6	.017	3	.059	4	.004	6	.249	6	.895	6
28		min	-13.704	2	-.01	6	-.059	6	-.004	4	-.215	4	-.944	4
29		max	3.608	6	-.019	4	.166	4	.004	6	.082	4	.668	6
30		min	-13.722	2	-.056	5	-.165	6	-.004	4	-.125	6	-.636	4
31	CROSSDIAG4	max	13.451	2	.06	5	.191	6	.002	4	.176	4	.842	6
32		min	-5.66	6	.012	4	-.189	4	-.002	6	-.205	6	-.808	4
33		max	13.469	2	.013	6	.085	6	.002	4	.247	6	1.131	6
34		min	-5.642	6	-.024	3	-.083	4	-.002	6	-.206	4	-1.159	4
35		max	13.661	2	.152	5	.04	3	.003	4	.253	6	1.295	6
36		min	-5.624	6	-.085	4	-.04	5	-.003	6	-.297	4	-1.23	4
37		max	13.679	2	.115	6	.146	4	.003	4	.36	6	.688	6
38		min	-5.299	6	-.12	4	-.146	6	-.003	6	-.324	4	-.707	4
39		max	13.697	2	.081	6	.252	4	.003	4	.088	6	.206	3
40		min	-5.281	6	-.16	3	-.253	6	-.003	6	-.322	2	-1.112	6
41	CROSSDIAG5	max	10.708	6	.075	3	.195	5	.003	6	.286	4	.478	3
42		min	-12.949	2	-.017	6	-.195	3	-.003	4	-.333	5	-.423	5
43		max	10.684	6	.041	3	.105	5	.003	6	.078	5	.184	6
44		min	-12.972	2	-.044	5	-.105	3	-.003	4	-.046	4	-.224	4
45		max	10.661	6	.096	5	.021	5	.005	6	.009	2	.658	5
46		min	-13.046	2	-.04	1	-.022	3	-.004	4	-.082	3	-.603	4
47		max	10.492	6	.064	6	.069	4	.005	6	.173	5	.318	6
48		min	-13.07	2	-.058	4	-.069	6	-.004	4	-.138	4	-.378	3
49		max	10.468	6	.04	6	.159	4	.005	6	.009	4	.242	4
50		min	-13.093	2	-.089	3	-.159	6	-.004	4	-.095	1	-.238	6
51	CROSSDIAG6	max	14.28	2	.088	3	.169	6	.004	4	.057	4	.209	3
52		min	-1.033	4	-.03	6	-.17	4	-.004	6	-.134	5	-.117	6
53		max	14.304	2	.057	4	.079	6	.004	4	.162	5	.438	6
54		min	-1.009	4	-.054	6	-.08	4	-.004	6	-.131	4	-.444	3
55		max	14.377	2	.033	4	.017	3	.004	4	.053	6	.772	6
56		min	-1.034	4	-.086	5	-.017	5	-.004	6	-.113	3	-.707	4
57		max	14.401	2	.044	5	.107	3	.003	4	.122	5	.293	6
58		min	-1.011	4	-.045	3	-.107	5	-.003	6	-.086	4	-.31	4
59		max	14.424	2	.017	6	.197	3	.003	4	.24	4	.413	3
60		min	-.987	4	-.079	3	-.197	5	-.003	6	-.296	5	-.329	5
61	CROSSDIAG7	max	0	5	.097	3	0	1	.002	2	0	1	0	1
62		min	-24.446	2	0	5	-.464	4	-.002	4	0	1	0	1
63		max	0	5	.048	3	0	1	.002	2	.424	1	0	5
64		min	-24.524	2	0	5	-.232	4	-.002	4	-1.731	4	-2.342	4

Envelope Member Section Forces (Continued)

Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Mome...	lc	z-z Momen...	lc
65	3	max	0	5	0	1	0	1	.002	2	.566	1	0	5
66		min	-24.602	2	0	1	0	1	-.002	4	-2.308	4	-3.123	4
67	4	max	0	5	0	5	.232	4	.002	2	.424	1	0	5
68		min	-24.68	2	-.048	1	0	1	-.002	4	-1.731	4	-2.342	4
69	5	max	0	5	0	5	.464	4	.002	2	0	1	0	1
70		min	-24.758	2	-.097	1	0	1	-.002	4	0	1	0	1
71	CROSSDIAG8	max	0	1	.097	3	.464	6	.003	4	0	1	0	1
72		min	-4.065	6	0	1	-.464	4	-.003	6	0	1	0	1
73	2	max	0	1	.048	3	.232	6	.003	4	2.342	6	1.731	6
74		min	-3.987	6	0	1	-.232	4	-.003	6	-1.731	4	-2.342	4
75	3	max	0	1	0	1	0	1	.003	4	3.123	6	2.308	6
76		min	-3.909	6	0	1	0	1	-.003	6	-2.308	4	-3.123	4
77	4	max	0	1	0	1	.232	4	.003	4	2.342	6	1.731	6
78		min	-3.831	6	-.048	5	-.232	6	-.003	6	-1.731	4	-2.342	4
79	5	max	0	1	0	1	.464	4	.003	4	0	1	0	1
80		min	-3.753	6	-.097	5	-.464	6	-.003	6	0	1	0	1
81	HORZ1	max	5.186	4	.123	3	.187	6	0	6	0	1	0	1
82		min	-3.955	6	-.029	6	-.187	4	-.001	2	0	1	0	1
83	2	max	5.185	4	.08	4	.092	6	0	6	.228	5	.446	6
84		min	-3.956	6	-.064	6	-.093	4	-.001	2	-.102	4	-.565	4
85	3	max	7.723	4	.104	5	.002	4	0	6	.131	5	.764	6
86		min	-9.437	6	-.047	4	-.004	2	-.001	2	-.053	4	-.836	4
87	4	max	7.722	4	.067	6	.093	4	0	6	.224	5	.453	6
88		min	-9.439	6	-.082	4	-.093	6	-.001	2	-.098	4	-.572	4
89	5	max	7.72	4	.032	6	.188	4	0	6	0	1	0	1
90		min	-9.44	6	-.125	3	-.188	6	-.001	2	0	1	0	1
91	HORZ2	max	7.998	4	.127	3	.191	6	0	5	0	1	0	1
92		min	-9.635	6	-.034	6	-.191	4	-.001	2	0	1	0	1
93	2	max	8	4	.084	4	.097	6	0	5	.227	5	.467	6
94		min	-9.634	6	-.069	6	-.097	4	-.001	2	-.101	4	-.586	4
95	3	max	8.001	4	.049	4	.004	2	0	6	.138	5	.792	6
96		min	-9.633	6	-.106	5	-.002	4	-.001	2	-.06	4	-.863	4
97	4	max	5.464	4	.066	6	.096	4	0	6	.232	5	.46	6
98		min	-4.152	6	-.082	4	-.096	6	-.001	2	-.106	4	-.579	4
99	5	max	5.465	4	.032	6	.191	4	0	6	0	1	0	1
100		min	-4.15	6	-.125	3	-.191	6	-.001	2	0	1	0	1
101	HORZ3	max	1.399	3	.123	3	.186	6	0	6	0	1	0	1
102		min	-1.587	2	-.029	6	-.187	4	-.001	2	0	1	0	1
103	2	max	1.397	3	.08	4	.092	6	0	6	.229	5	.443	6
104		min	-1.588	2	-.064	6	-.092	4	-.001	2	-.101	4	-.566	4
105	3	max	3.856	4	.103	5	.002	4	.001	6	.134	5	.758	6
106		min	-5.477	6	-.047	4	-.004	2	-.001	2	-.052	4	-.836	4
107	4	max	3.854	4	.066	6	.093	4	.001	6	.226	5	.45	6
108		min	-5.478	6	-.082	4	-.093	6	-.001	2	-.098	4	-.572	4
109	5	max	3.853	4	.031	6	.188	4	.001	6	0	1	0	1
110		min	-5.479	6	-.125	3	-.187	6	-.001	2	0	1	0	1
111	HORZ4	max	5.518	4	.127	3	.192	6	0	6	0	1	0	1
112		min	-7.087	6	-.034	6	-.191	4	-.001	2	0	1	0	1
113	2	max	5.519	4	.084	4	.097	6	0	6	.23	5	.468	6
114		min	-7.085	6	-.069	6	-.097	4	-.001	2	-.101	4	-.587	4
115	3	max	5.521	4	.05	4	.004	2	0	6	.143	5	.793	6
116		min	-7.084	6	-.105	5	-.002	4	-.001	2	-.06	4	-.865	4
117	4	max	2.981	3	.066	6	.096	4	0	6	.233	5	.461	6
118		min	-1.626	6	-.082	4	-.096	6	-.001	2	-.104	4	-.581	4
119	5	max	2.983	3	.032	6	.191	4	0	6	0	1	0	1
120		min	-1.625	6	-.125	3	-.191	6	-.001	2	0	1	0	1
121	HORZ5	max	2.562	5	.084	3	.186	6	.001	6	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Mome...	lc	z-z Momen...	lc
122			min	-1.568	2	.016	6	-.187	4	-.001	2	0	1	0	1
123		2	max	2.56	5	.036	4	.091	6	.001	6	.328	6	.335	6
124			min	-1.57	2	-.019	6	-.093	4	-.001	2	-.207	4	-.461	4
125		3	max	2.559	5	.063	5	.005	2	.002	6	.342	6	.537	6
126			min	-3.09	1	-.039	1	-.003	6	-.002	2	-.268	4	-.622	4
127		4	max	1.227	4	.02	6	.093	4	.002	6	.326	6	.34	6
128			min	-3.091	1	-.037	4	-.092	6	-.002	2	-.205	4	-.465	4
129		5	max	1.226	4	-.014	6	.188	4	.002	6	0	1	0	1
130			min	-3.093	1	-.085	3	-.187	6	-.002	2	0	1	0	1
131	HORZ6	1	max	5.965	2	.087	3	.192	6	0	6	0	1	0	1
132			min	-5.055	6	.011	6	-.191	4	-.002	2	0	1	0	1
133		2	max	5.966	2	.039	4	.098	6	0	6	.331	6	.361	6
134			min	-5.054	6	-.024	6	-.097	4	-.002	2	-.209	4	-.479	4
135		3	max	7.344	2	.034	1	.003	6	0	6	.353	6	.58	6
136			min	-5.052	6	-.066	5	-.005	2	-.002	2	-.274	4	-.648	4
137		4	max	7.346	2	.022	6	.096	4	0	6	.333	6	.356	6
138			min	-2.022	6	-.038	4	-.097	6	-.002	2	-.211	4	-.474	4
139		5	max	7.347	2	-.013	6	.191	4	0	6	0	1	0	1
140			min	-2.021	6	-.086	3	-.192	6	-.002	2	0	1	0	1
141	HORZ7	1	max	4.776	6	.102	3	.186	6	.001	6	0	1	0	1
142			min	-2.231	4	-.008	6	-.187	4	-.002	2	0	1	0	1
143		2	max	4.775	6	.056	4	.091	6	.001	6	.271	6	.391	6
144			min	-2.232	4	-.043	6	-.093	4	-.002	2	-.159	4	-.51	4
145		3	max	4.774	6	.083	5	.002	4	.001	6	.231	6	.645	6
146			min	-3.795	2	-.022	4	-.005	2	-.002	2	-.173	4	-.716	4
147		4	max	.476	6	.043	6	.093	4	.001	6	.27	6	.394	6
148			min	-3.797	2	-.057	4	-.092	6	-.002	2	-.158	4	-.512	4
149		5	max	.474	6	.009	6	.188	4	.001	6	0	1	0	1
150			min	-3.798	2	-.103	3	-.186	6	-.002	2	0	1	0	1
151	HORZ8	1	max	3.059	2	.104	3	.192	6	0	6	0	1	0	1
152			min	-2.537	5	-.012	6	-.191	4	-.002	2	0	1	0	1
153		2	max	3.06	2	.059	4	.098	6	0	6	.276	6	.417	6
154			min	-2.536	5	-.047	6	-.096	4	-.002	2	-.161	4	-.525	4
155		3	max	4.645	2	.024	4	.005	2	0	6	.242	6	.691	6
156			min	-2.534	5	-.087	5	-.002	4	-.002	2	-.179	4	-.741	4
157		4	max	4.647	2	.046	6	.096	4	0	6	.277	6	.414	6
158			min	-.797	4	-.058	4	-.097	6	-.002	2	-.162	4	-.523	4
159		5	max	4.648	2	.011	6	.191	4	0	6	0	1	0	1
160			min	-.795	4	-.104	3	-.192	6	-.002	2	0	1	0	1
161	HORZ9	1	max	3.787	6	.074	3	.186	6	.001	6	0	1	0	1
162			min	-1.605	4	.026	6	-.188	4	-.002	2	0	1	0	1
163		2	max	3.786	6	.025	3	.092	6	.001	6	.352	6	.312	6
164			min	-1.606	4	-.009	6	-.094	4	-.002	2	-.238	4	-.436	4
165		3	max	3.785	6	.053	5	0	4	.001	6	.394	6	.482	6
166			min	-2.693	1	.011	4	-.005	2	-.002	2	-.333	4	-.562	4
167		4	max	1.316	6	.009	6	.094	4	.001	6	.351	6	.313	6
168			min	-2.695	1	-.025	3	-.092	6	-.002	2	-.238	4	-.435	4
169		5	max	1.314	6	-.026	6	.188	4	.001	6	0	1	0	1
170			min	-2.697	1	-.074	3	-.186	6	-.002	2	0	1	0	1
171	HORZ10	1	max	1.053	2	.074	3	.192	6	0	6	0	1	0	1
172			min	-1.953	3	.022	6	-.19	4	-.002	2	0	1	0	1
173		2	max	1.054	2	.026	3	.097	6	0	6	.357	6	.334	6
174			min	-1.951	3	-.013	6	-.095	4	-.002	2	-.24	4	-.442	4
175		3	max	2.643	1	-.01	4	.005	2	0	6	.405	6	.526	6
176			min	-1.949	3	-.056	5	0	4	-.002	2	-.337	4	-.575	4
177		4	max	2.645	1	.013	6	.095	4	0	6	.357	6	.334	6
178			min	-1.22	4	-.026	3	-.097	6	-.002	2	-.24	4	-.442	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Mome...	lc	z-z Momen...	lc
179		5	max	2.647	1	-.022	6	.19	4	0	6	0	1	0	1
180			min	-1.218	4	-.075	3	-.192	6	-.002	2	0	1	0	1
181	HORZ11	1	max	6.696	6	.262	3	.192	6	.4	6	.199	4	2.275	6
182			min	-5.049	4	.163	6	-.19	4	-.713	2	-.208	6	-1.176	4
183		2	max	6.696	6	.17	3	.097	6	.4	6	.28	6	1.856	6
184			min	-5.049	4	.085	6	-.096	4	-.713	2	-.284	4	-1.85	4
185		3	max	6.696	6	.082	4	.003	6	.4	6	.449	6	1.703	6
186			min	-5.049	4	.004	5	-.005	2	-.713	2	-.449	4	-2.258	4
187		4	max	6.696	6	.003	4	.093	4	.4	6	.299	6	1.817	6
188			min	-5.049	4	-.088	5	-.092	6	-.713	2	-.294	4	-2.4	4
189		5	max	6.696	6	-.076	4	.188	4	.4	6	.179	4	2.196	6
190			min	-5.049	4	-.18	5	-.186	6	-.713	2	-.169	6	-2.276	4
191	LEG1	1	max	235.848	6	14.005	6	3.13	4	.173	4	8.576	4	215.118	6
192			min	-217.709	4	-14.112	4	-3.144	6	-.174	6	-13.281	2	-218.632	4
193		2	max	191.677	6	6.144	6	1.46	2	.026	2	4.24	4	89.956	6
194			min	-177.468	4	-6.043	4	-.278	6	-.021	5	-3.771	6	-94.194	4
195		3	max	136.151	6	1.178	6	1.576	6	.054	6	2.077	4	44.505	6
196			min	-118.133	4	-.982	4	-3.263	2	-.067	4	-3.91	6	-51.462	4
197		4	max	90.509	6	.961	2	.56	6	.054	2	2.724	2	37.894	6
198			min	-75.624	4	-.251	4	-1.085	2	-.048	4	-1.013	6	-40.684	4
199		5	max	6.756	5	4.724	6	11.799	6	.064	2	4.55	6	40.899	6
200			min	-3.554	2	-4.721	4	-10.903	4	-.03	4	-2.352	4	-40.313	4
201	LEG2	1	max	237.778	6	17.732	6	4.207	6	.1	2	12.227	6	236.438	6
202			min	-215.215	4	-17.874	4	-4.118	4	-.083	4	-13.631	2	-238.015	4
203		2	max	194.846	6	5.908	6	1.31	2	.029	2	3.054	2	96.427	6
204			min	-177.129	4	-6.237	4	-.29	5	-.01	6	-2.351	4	-93.758	4
205		3	max	146.558	6	.573	6	3.15	6	.079	4	3.506	2	54.362	6
206			min	-128.03	4	-.864	4	-3.977	2	-.093	6	-1.289	4	-47.217	4
207		4	max	92.669	6	.522	6	.294	4	.068	4	2.842	2	34.086	6
208			min	-77.92	4	-.835	2	-.972	2	-.083	6	-.121	5	-30.854	4
209		5	max	30.672	2	4.712	6	13.838	4	.068	4	4.553	4	39.299	6
210			min	2.314	6	-4.715	4	-13.392	6	-.087	6	-4.391	6	-39.885	4
211	LEG_W_PLT1	1	max	248.17	6	18.929	6	5.312	6	.169	4	119.502	2	553.677	6
212			min	-222.411	4	-18.949	4	-15.526	2	-.171	6	-32.341	6	-558.465	4
213		2	max	247.261	6	18.678	6	5.312	6	.169	4	40.85	2	457.309	6
214			min	-223.319	4	-18.697	4	-15.167	2	-.171	6	-5.116	6	-461.998	4
215		3	max	246.353	6	18.427	6	5.312	6	.169	4	22.109	6	362.228	6
216			min	-224.228	4	-18.446	4	-14.809	2	-.171	6	-35.963	2	-366.817	4
217		4	max	236.756	6	14.256	6	3.13	4	.173	4	8.11	6	287.538	6
218			min	-216.801	4	-14.363	4	-3.144	6	-.174	6	-27.676	2	-291.6	4
219		5	max	235.848	6	14.005	6	3.13	4	.173	4	8.576	4	215.118	6
220			min	-217.709	4	-14.112	4	-3.144	6	-.174	6	-13.281	2	-218.632	4
221	LEG_W_PLT2	1	max	251.289	6	23.174	6	5.216	4	.098	2	118.483	2	656.836	6
222			min	-221.012	4	-23.189	4	-15.093	2	-.081	4	-25.913	4	-659.989	4
223		2	max	250.38	6	22.923	6	5.216	4	.098	2	41.133	2	538.711	6
224			min	-221.92	4	-22.937	4	-15.093	2	-.081	4	-.769	5	-541.791	4
225		3	max	249.472	6	22.672	6	5.216	4	.098	2	27.546	4	421.874	6
226			min	-222.829	4	-22.686	4	-15.093	2	-.081	4	-36.217	2	-424.88	4
227		4	max	238.687	6	17.983	6	4.207	6	.1	2	8.772	4	327.956	6
228			min	-214.306	4	-18.125	4	-4.118	4	-.083	4	-27.14	2	-330.264	4
229		5	max	237.778	6	17.732	6	4.207	6	.1	2	12.227	6	236.438	6
230			min	-215.215	4	-17.874	4	-4.118	4	-.083	4	-13.631	2	-238.015	4
231	WT1	1	max	12.74	6	.148	4	.162	1	.005	6	0	1	0	1
232			min	-25.348	2	-.148	6	.011	6	-.005	4	0	1	0	1
233		2	max	12.691	6	.074	4	.081	1	.005	6	.306	1	.279	6
234			min	-25.32	2	-.074	6	.005	6	-.005	4	.02	6	-.279	4
235		3	max	12.641	6	0	1	0	1	.005	6	.408	1	.372	6

Company : Natcomm
 Designer : TJL
 Job Number : 10001-CO.7

82' Sign Structure with 111' Pipe Mast

Dec 3, 2009

8:22 AM

Checked By: _____

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Mome...	lc	z-z Momen...	lc
236			min	-25.291	2	0	1	0	1	-.005	4	.027	6	-.372	4
237		4	max	12.591	6	.074	6	-.005	6	.005	6	.306	1	.279	6
238			min	-25.263	2	-.074	4	-.081	1	-.005	4	.02	6	-.279	4
239		5	max	12.541	6	.148	6	-.011	6	.005	6	0	1	0	1
240			min	-25.235	2	-.148	4	-.162	1	-.005	4	0	1	0	1
241	WT2	1	max	26.103	2	.148	4	.113	3	.003	4	0	1	0	1
242			min	-13.957	4	-.148	6	-.045	2	-.003	6	0	1	0	1
243		2	max	26.182	2	.074	4	.056	3	.003	4	.214	3	.279	6
244			min	-13.956	4	-.074	6	-.023	2	-.003	6	-.086	2	-.279	4
245		3	max	26.262	2	0	1	0	1	.003	4	.285	3	.372	6
246			min	-13.954	4	0	1	0	1	-.003	6	-.114	2	-.372	4
247		4	max	26.342	2	.074	6	.023	2	.003	4	.214	3	.279	6
248			min	-13.952	4	-.074	4	-.056	3	-.003	6	-.086	2	-.279	4
249		5	max	26.422	2	.148	6	.045	2	.003	4	0	1	0	1
250			min	-13.95	4	-.148	4	-.113	3	-.003	6	0	1	0	1
251	WT3	1	max	30.379	2	.148	4	.045	2	.007	4	0	1	0	1
252			min	-17.933	6	-.148	6	-.113	5	-.007	6	0	1	0	1
253		2	max	30.299	2	.074	4	.023	2	.007	4	.086	2	.279	6
254			min	-17.934	6	-.074	6	-.056	5	-.007	6	-.214	5	-.279	4
255		3	max	30.219	2	0	1	0	1	.007	4	.114	2	.372	6
256			min	-17.936	6	0	1	0	1	-.007	6	-.285	5	-.372	4
257		4	max	30.139	2	.074	6	.056	5	.007	4	.086	2	.279	6
258			min	-17.938	6	-.074	4	-.023	2	-.007	6	-.214	5	-.279	4
259		5	max	30.06	2	.148	6	.113	5	.007	4	0	1	0	1
260			min	-17.94	6	-.148	4	-.045	2	-.007	6	0	1	0	1
261	WT4	1	max	18.933	4	.148	4	.162	1	.005	6	0	1	0	1
262			min	-31.144	2	-.148	6	.011	4	-.005	4	0	1	0	1
263		2	max	18.884	4	.074	4	.081	1	.005	6	.306	1	.279	6
264			min	-31.115	2	-.074	6	.005	4	-.005	4	.02	4	-.279	4
265		3	max	18.834	4	0	1	0	1	.005	6	.408	1	.372	6
266			min	-31.087	2	0	1	0	1	-.005	4	.027	4	-.372	4
267		4	max	18.784	4	.074	6	-.005	4	.005	6	.306	1	.279	6
268			min	-31.059	2	-.074	4	-.081	1	-.005	4	.02	4	-.279	4
269		5	max	18.734	4	.148	6	-.011	4	.005	6	0	1	0	1
270			min	-31.031	2	-.148	4	-.162	1	-.005	4	0	1	0	1
271	WT5	1	max	37.376	6	.148	4	-.011	6	.009	6	0	1	0	1
272			min	-37.654	4	-.148	6	-.162	1	-.009	4	0	1	0	1
273		2	max	37.426	6	.074	4	-.005	6	.009	6	-.02	6	.279	6
274			min	-37.652	4	-.074	6	-.081	1	-.009	4	-.306	1	-.279	4
275		3	max	37.475	6	0	1	0	1	.009	6	-.027	6	.372	6
276			min	-37.651	4	0	1	0	1	-.009	4	-.408	1	-.372	4
277		4	max	37.525	6	.074	6	.081	1	.009	6	-.02	6	.279	6
278			min	-37.649	4	-.074	4	.005	6	-.009	4	-.306	1	-.279	4
279		5	max	37.575	6	.148	6	.162	1	.009	6	0	1	0	1
280			min	-37.647	4	-.148	4	.011	6	-.009	4	0	1	0	1
281	WT6	1	max	48.775	6	.148	4	.113	3	.005	4	0	1	0	1
282			min	-47.619	4	-.148	6	-.045	2	-.005	6	0	1	0	1
283		2	max	48.825	6	.074	4	.056	3	.005	4	.214	3	.279	6
284			min	-47.617	4	-.074	6	-.023	2	-.005	6	-.086	2	-.279	4
285		3	max	48.874	6	0	1	0	1	.005	4	.285	3	.372	6
286			min	-47.615	4	0	1	0	1	-.005	6	-.114	2	-.372	4
287		4	max	48.924	6	.074	6	.023	2	.005	4	.214	3	.279	6
288			min	-47.613	4	-.074	4	-.056	3	-.005	6	-.086	2	-.279	4
289		5	max	48.974	6	.148	6	.045	2	.005	4	0	1	0	1
290			min	-47.612	4	-.148	4	-.113	3	-.005	6	0	1	0	1
291	WT7	1	max	29.304	4	.148	4	.045	2	.011	4	0	1	0	1
292			min	-28.846	6	-.148	6	-.113	5	-.011	6	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Mome...	lc	z-z Momen...	lc
293		2	max	29.254	4	.074	4	.023	2	.011	4	.086	2	.279	6
294			min	-28.848	6	-.074	6	-.056	5	-.011	6	-.214	5	-.279	4
295		3	max	29.204	4	0	1	0	1	.011	4	.114	2	.372	6
296			min	-28.85	6	0	1	0	1	-.011	6	-.285	5	-.372	4
297		4	max	29.154	4	.074	6	.056	5	.011	4	.086	2	.279	6
298			min	-28.851	6	-.074	4	-.023	2	-.011	6	-.214	5	-.279	4
299		5	max	29.105	4	.148	6	.113	5	.011	4	0	1	0	1
300			min	-28.853	6	-.148	4	-.045	2	-.011	6	0	1	0	1
301	WT8	1	max	39.22	4	.148	4	.162	1	.008	6	0	1	0	1
302			min	-40.135	6	-.148	6	.011	4	-.008	4	0	1	0	1
303		2	max	39.171	4	.074	4	.081	1	.008	6	.306	1	.279	6
304			min	-40.136	6	-.074	6	.005	4	-.008	4	.02	4	-.279	4
305		3	max	39.121	4	0	1	0	1	.008	6	.408	1	.372	6
306			min	-40.138	6	0	1	0	1	-.008	4	.027	4	-.372	4
307		4	max	39.071	4	.074	6	-.005	4	.008	6	.306	1	.279	6
308			min	-40.14	6	-.074	4	-.081	1	-.008	4	.02	4	-.279	4
309		5	max	39.021	4	.148	6	-.011	4	.008	6	0	1	0	1
310			min	-40.142	6	-.148	4	-.162	1	-.008	4	0	1	0	1
311	WT9	1	max	45.302	6	.148	4	.045	2	.006	4	0	1	0	1
312			min	-44.314	4	-.148	6	-.113	3	-.006	2	0	1	0	1
313		2	max	45.253	6	.074	4	.023	2	.006	4	.086	2	.279	6
314			min	-44.316	4	-.074	6	-.056	3	-.006	2	-.214	3	-.279	4
315		3	max	45.203	6	0	1	0	1	.006	4	.114	2	.372	6
316			min	-44.317	4	0	1	0	1	-.006	2	-.285	3	-.372	4
317		4	max	45.153	6	.074	6	.056	3	.006	4	.086	2	.279	6
318			min	-44.319	4	-.074	4	-.023	2	-.006	2	-.214	3	-.279	4
319		5	max	45.103	6	.148	6	.113	3	.006	4	0	1	0	1
320			min	-44.321	4	-.148	4	-.045	2	-.006	2	0	1	0	1
321	WT10	1	max	36.023	6	.148	4	.162	1	.012	6	0	1	0	1
322			min	-36.599	4	-.148	6	.011	6	-.012	4	0	1	0	1
323		2	max	35.973	6	.074	4	.081	1	.012	6	.306	1	.279	6
324			min	-36.601	4	-.074	6	.005	6	-.012	4	.02	6	-.279	4
325		3	max	35.923	6	0	1	0	1	.012	6	.408	1	.372	6
326			min	-36.602	4	0	1	0	1	-.012	4	.027	6	-.372	4
327		4	max	35.874	6	.074	6	-.005	6	.012	6	.306	1	.279	6
328			min	-36.604	4	-.074	4	-.081	1	-.012	4	.02	6	-.279	4
329		5	max	35.824	6	.148	6	-.011	6	.012	6	0	1	0	1
330			min	-36.606	4	-.148	4	-.162	1	-.012	4	0	1	0	1
331	WT11	1	max	33.353	4	.148	4	.113	5	.014	4	0	1	0	1
332			min	-32.915	6	-.148	6	-.045	2	-.014	6	0	1	0	1
333		2	max	33.402	4	.074	4	.056	5	.014	4	.214	5	.279	6
334			min	-32.913	6	-.074	6	-.023	2	-.014	6	-.086	2	-.279	4
335		3	max	33.452	4	0	1	0	1	.014	4	.285	5	.372	6
336			min	-32.911	6	0	1	0	1	-.014	6	-.114	2	-.372	4
337		4	max	33.502	4	.074	6	.023	2	.014	4	.214	5	.279	6
338			min	-32.909	6	-.074	4	-.056	5	-.014	6	-.086	2	-.279	4
339		5	max	33.552	4	.148	6	.045	2	.014	4	0	1	0	1
340			min	-32.908	6	-.148	4	-.113	5	-.014	6	0	1	0	1
341	WT12	1	max	41.438	4	.148	4	.162	1	.009	6	0	1	0	1
342			min	-42.413	6	-.148	6	.011	4	-.009	4	0	1	0	1
343		2	max	41.388	4	.074	4	.081	1	.009	6	.306	1	.279	6
344			min	-42.415	6	-.074	6	.005	4	-.009	4	.02	4	-.279	4
345		3	max	41.338	4	0	1	0	1	.009	6	.408	1	.372	6
346			min	-42.417	6	0	1	0	1	-.009	4	.027	4	-.372	4
347		4	max	41.289	4	.074	6	-.005	4	.009	6	.306	1	.279	6
348			min	-42.418	6	-.074	4	-.081	1	-.009	4	.02	4	-.279	4
349		5	max	41.239	4	.148	6	-.011	4	.009	6	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Mome...	lc	z-z Momen...	lc
350			min	-42.42	6	-.148	4	-.162	1	-.009	4	0	1	0	1
351	WT13	1	max	32.094	6	.148	4	.162	1	.015	6	0	1	0	1
352			min	-30.791	4	-.148	6	.011	6	-.014	4	0	1	0	1
353		2	max	32.044	6	.074	4	.081	1	.015	6	.306	1	.279	6
354			min	-30.793	4	-.074	6	.005	6	-.014	4	.02	6	-.279	4
355		3	max	31.994	6	0	1	0	1	.015	6	.408	1	.372	6
356			min	-30.795	4	0	1	0	1	-.014	4	.027	6	-.372	4
357		4	max	31.945	6	.074	6	-.005	6	.015	6	.306	1	.279	6
358			min	-30.797	4	-.074	4	-.081	1	-.014	4	.02	6	-.279	4
359		5	max	31.895	6	.148	6	-.011	6	.015	6	0	1	0	1
360			min	-30.798	4	-.148	4	-.162	1	-.014	4	0	1	0	1
361	WT14	1	max	34.189	6	.148	4	.045	2	.006	4	0	1	0	1
362			min	-35.033	4	-.148	6	-.113	3	-.009	2	0	1	0	1
363		2	max	34.14	6	.074	4	.023	2	.006	4	.086	2	.279	6
364			min	-35.035	4	-.074	6	-.056	3	-.009	2	-.214	3	-.279	4
365		3	max	34.09	6	0	1	0	1	.006	4	.114	2	.372	6
366			min	-35.037	4	0	1	0	1	-.009	2	-.285	3	-.372	4
367		4	max	34.04	6	.074	6	.056	3	.006	4	.086	2	.279	6
368			min	-35.038	4	-.074	4	-.023	2	-.009	2	-.214	3	-.279	4
369		5	max	33.991	6	.148	6	.113	3	.006	4	0	1	0	1
370			min	-35.04	4	-.148	4	-.045	2	-.009	2	0	1	0	1
371	WT15	1	max	49.879	4	.148	4	.045	2	.01	4	0	1	0	1
372			min	-50.787	6	-.148	6	-.113	5	-.011	6	0	1	0	1
373		2	max	49.83	4	.074	4	.023	2	.01	4	.086	2	.279	6
374			min	-50.789	6	-.074	6	-.056	5	-.011	6	-.214	5	-.279	4
375		3	max	49.78	4	0	1	0	1	.01	4	.114	2	.372	6
376			min	-50.791	6	0	1	0	1	-.011	6	-.285	5	-.372	4
377		4	max	49.73	4	.074	6	.056	5	.01	4	.086	2	.279	6
378			min	-50.793	6	-.074	4	-.023	2	-.011	6	-.214	5	-.279	4
379		5	max	49.68	4	.148	6	.113	5	.01	4	0	1	0	1
380			min	-50.794	6	-.148	4	-.045	2	-.011	6	0	1	0	1
381	WT16	1	max	54.071	4	.148	4	.162	1	.007	2	0	1	0	1
382			min	-52.859	6	-.148	6	.011	4	-.003	4	0	1	0	1
383		2	max	54.021	4	.074	4	.081	1	.007	2	.306	1	.279	6
384			min	-52.861	6	-.074	6	.005	4	-.003	4	.02	4	-.279	4
385		3	max	53.972	4	0	1	0	1	.007	2	.408	1	.372	6
386			min	-52.863	6	0	1	0	1	-.003	4	.027	4	-.372	4
387		4	max	53.922	4	.074	6	-.005	4	.007	2	.306	1	.279	6
388			min	-52.864	6	-.074	4	-.081	1	-.003	4	.02	4	-.279	4
389		5	max	53.872	4	.148	6	-.011	4	.007	2	0	1	0	1
390			min	-52.866	6	-.148	4	-.162	1	-.003	4	0	1	0	1
391	WT17	1	max	49.567	6	.148	4	-.011	6	.017	6	0	1	0	1
392			min	-48.912	4	-.148	6	-.162	1	-.014	4	0	1	0	1
393		2	max	49.617	6	.074	4	-.005	6	.017	6	-.02	6	.279	6
394			min	-48.91	4	-.074	6	-.081	1	-.014	4	-.306	1	-.279	4
395		3	max	49.667	6	0	1	0	1	.017	6	-.027	6	.372	6
396			min	-48.908	4	0	1	0	1	-.014	4	-.408	1	-.372	4
397		4	max	49.716	6	.074	6	.081	1	.017	6	-.02	6	.279	6
398			min	-48.907	4	-.074	4	.005	6	-.014	4	-.306	1	-.279	4
399		5	max	49.766	6	.148	6	.162	1	.017	6	0	1	0	1
400			min	-48.905	4	-.148	4	.011	6	-.014	4	0	1	0	1
401	WT18	1	max	52.445	6	.148	4	.113	3	.005	4	0	1	0	1
402			min	-53.545	4	-.148	6	-.045	2	-.01	2	0	1	0	1
403		2	max	52.495	6	.074	4	.056	3	.005	4	.214	3	.279	6
404			min	-53.544	4	-.074	6	-.023	2	-.01	2	-.086	2	-.279	4
405		3	max	52.544	6	0	1	0	1	.005	4	.285	3	.372	6
406			min	-53.542	4	0	1	0	1	-.01	2	-.114	2	-.372	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Mome...	lc	z-z Momen...	lc
407		4	max	52.594	6	.074	6	.023	2	.005	4	.214	3	.279	6
408			min	-53.54	4	-.074	4	-.056	3	-.01	2	-.086	2	-.279	4
409		5	max	52.644	6	.148	6	.045	2	.005	4	0	1	0	1
410			min	-53.538	4	-.148	4	-.113	3	-.01	2	0	1	0	1
411	WT19	1	max	20.784	4	.148	4	.045	2	.015	2	0	1	0	1
412			min	-21.518	6	-.148	6	-.113	5	-.005	6	0	1	0	1
413		2	max	20.735	4	.074	4	.023	2	.015	2	.086	2	.279	6
414			min	-21.52	6	-.074	6	-.056	5	-.005	6	-.214	5	-.279	4
415		3	max	20.685	4	0	1	0	1	.015	2	.114	2	.372	6
416			min	-21.522	6	0	1	0	1	-.005	6	-.285	5	-.372	4
417		4	max	20.635	4	.074	6	.056	5	.015	2	.086	2	.279	6
418			min	-21.523	6	-.074	4	-.023	2	-.005	6	-.214	5	-.279	4
419		5	max	20.586	4	.148	6	.113	5	.015	2	0	1	0	1
420			min	-21.525	6	-.148	4	-.045	2	-.005	6	0	1	0	1
421	WT20	1	max	25.409	4	.148	4	.162	1	.015	2	0	1	0	1
422			min	-24.361	6	-.148	6	.011	4	-.01	6	0	1	0	1
423		2	max	25.359	4	.074	4	.081	1	.015	2	.306	1	.279	6
424			min	-24.363	6	-.074	6	.005	4	-.01	6	.02	4	-.279	4
425		3	max	25.31	4	0	1	0	1	.015	2	.408	1	.372	6
426			min	-24.365	6	0	1	0	1	-.01	6	.027	4	-.372	4
427		4	max	25.26	4	.074	6	-.005	4	.015	2	.306	1	.279	6
428			min	-24.367	6	-.074	4	-.081	1	-.01	6	.02	4	-.279	4
429		5	max	25.21	4	.148	6	-.011	4	.015	2	0	1	0	1
430			min	-24.368	6	-.148	4	-.162	1	-.01	6	0	1	0	1
431	Mast1	1	max	484.983	4	5.349	2	2.936	6	.083	2	91.901	4	63.223	2
432			min	-457.898	6	-.103	6	-2.902	4	-.047	6	-91.363	6	-.723	6
433		2	max	484.214	4	5.092	2	2.679	6	.083	2	71.78	4	25.363	2
434			min	-458.667	6	-.103	6	-2.645	4	-.047	6	-70.998	6	.002	4
435		3	max	483.444	4	4.812	2	2.399	6	.083	2	53.603	4	.769	5
436			min	-459.437	6	-.103	6	-2.366	4	-.047	6	-52.576	6	-10.552	2
437		4	max	439.754	4	.039	6	1.541	4	.077	2	47.893	4	1.108	6
438			min	-416.611	6	-2.658	2	-1.633	6	-.045	6	-46.984	6	-23.753	2
439		5	max	438.984	4	.039	6	1.863	4	.077	2	60.22	4	.856	5
440			min	-417.38	6	-2.981	2	-1.956	6	-.045	6	-59.978	6	-3.327	2
441	Mast2	1	max	438.984	4	.039	6	1.863	4	.077	2	60.22	4	.856	5
442			min	-417.38	6	-2.981	2	-1.956	6	-.045	6	-59.978	6	-3.327	2
443		2	max	333.311	4	.112	6	2.235	6	.068	2	59.866	4	7.598	2
444			min	-312.581	6	-.075	4	-2.201	4	-.04	6	-59.851	6	-.173	4
445		3	max	332.582	4	.112	6	1.89	6	.068	2	45.905	4	8.922	2
446			min	-313.31	6	-.366	2	-1.857	4	-.04	6	-45.662	6	-.447	6
447		4	max	225.465	4	3.055	2	2.604	6	.055	2	30.55	4	.514	3
448			min	-207.75	6	-.039	6	-2.67	4	-.032	6	-30.4	6	-.727	6
449		5	max	224.735	4	2.672	2	2.222	6	.055	2	13.499	4	.251	3
450			min	-208.479	6	-.039	6	-2.287	4	-.032	6	-13.798	6	-19.317	2
451	Mast3	1	max	224.735	4	2.672	2	2.222	6	.055	2	13.499	4	.251	3
452			min	-208.479	6	-.039	6	-2.287	4	-.032	6	-13.798	6	-19.317	2
453		2	max	108.166	4	.008	3	10.033	4	.034	2	37.885	4	11.759	2
454			min	-93.868	6	-12.523	2	-9.994	6	-.02	6	-38.294	6	-.242	6
455		3	max	107.437	4	.008	3	10.453	4	.034	2	108.297	4	99.286	2
456			min	-94.598	6	-12.943	2	-10.414	6	-.02	6	-108.438	6	-.083	6
457		4	max	7.264	3	5.246	2	5.246	6	0	1	129.23	4	129.23	2
458			min	5.27	2	0	3	-5.246	4	0	1	-129.23	6	0	3
459		5	max	6.273	3	4.788	2	4.788	6	0	1	94.731	4	94.731	2
460			min	4.54	2	0	3	-4.788	4	0	1	-94.731	6	0	3
461	Mast4	1	max	6.273	3	4.788	2	4.788	6	0	1	94.731	4	94.731	2
462			min	4.54	6	0	3	-4.788	4	0	1	-94.731	6	0	3
463		2	max	5.3	3	4.319	2	4.319	6	0	1	63.985	4	63.985	2

Envelope Member Section Forces (Continued)

Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Mome...	lc	z-z Momen...	lc
464		min	3.824	6	0	3	-4.319	4	0	1	-63.985	6	0	3
465	3	max	4.328	3	3.832	2	3.832	6	0	1	36.463	4	36.463	2
466		min	3.107	6	0	3	-3.832	4	0	1	-36.463	6	0	3
467	4	max	3.355	3	3.327	2	3.327	6	0	1	12.29	4	12.29	2
468		min	2.391	6	0	3	-3.327	4	0	1	-12.29	6	0	3
469	5	max	0	1	0	1	0	1	0	1	0	1	0	1
470		min	0	1	0	1	0	1	0	1	0	1	0	1
471	Horz 12	1	max	6.696	6	.239	4	.003	6	.4	.217	6	2.275	6
472		min	-5.049	4	.162	5	-.005	2	-.713	2	-.226	4	-1.176	4
473	2	max	6.696	6	.16	4	.003	6	.4	6	.227	6	1.856	6
474		min	-5.049	4	.083	5	-.005	2	-.713	2	-.231	4	-1.85	4
475	3	max	6.696	6	.082	4	.003	6	.4	6	.236	6	1.703	6
476		min	-5.049	4	.004	5	-.005	2	-.713	2	-.236	4	-2.258	4
477	4	max	6.696	6	.003	4	.003	6	.4	6	.246	6	1.817	6
478		min	-5.049	4	-.075	5	-.005	2	-.713	2	-.241	4	-2.4	4
479	5	max	6.696	6	-.076	4	.003	6	.4	6	.256	6	2.196	6
480		min	-5.049	4	-.153	5	-.005	2	-.713	2	-.246	4	-2.276	4

Envelope Member Section Stresses

	Member	Sec		Axial[ksi]	lc	y Shear...	lc	z Shear...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
1	CROSSDIAG1	1	max	.214	5	.068	1	.165	6	.862	4	1.307	2	3.112	4	3.824	6
2			min	-2.708	2	-.01	4	-.165	4	-1.307	2	-.862	4	-3.394	6	-3.507	4
3		2	max	.205	5	.037	2	.083	6	2.086	4	1.942	6	.673	6	.481	4
4			min	-2.714	2	-.037	4	-.083	4	-1.942	6	-2.086	4	-.427	4	-.758	6
5		3	max	.197	5	.191	6	.013	2	3.821	4	4.068	6	.967	4	1.697	6
6			min	-2.785	2	-.132	4	-.01	4	-4.068	6	-3.821	4	-1.506	6	-1.09	4
7		4	max	.156	4	.164	6	.071	4	1.68	4	1.537	6	2.013	6	2.032	4
8			min	-2.791	2	-.159	4	-.072	6	-1.537	6	-1.68	4	-1.803	4	-2.269	6
9		5	max	.15	4	.137	6	.153	4	1.663	6	1.779	4	2.924	6	3.663	4
10			min	-2.797	2	-.186	4	-.154	6	-1.779	4	-1.663	6	-3.25	4	-3.295	6
11	CROSSDIAG2	1	max	2.827	2	.17	4	.157	6	1.473	2	.725	4	2.458	6	3.291	4
12			min	-2.291	6	-.115	6	-.157	4	-.725	4	-1.473	2	-2.92	4	-2.77	6
13		2	max	2.833	2	.143	4	.075	6	2.586	4	2.516	6	2.147	6	2.207	4
14			min	-2.285	6	-.142	6	-.075	4	-2.516	6	-2.586	4	-1.959	4	-2.419	6
15		3	max	2.865	2	.116	4	.015	4	4.579	4	4.819	6	.327	4	1.536	2
16			min	-2.279	6	-.169	6	-.015	6	-4.819	6	-4.579	4	-1.363	2	-.368	4
17		4	max	2.871	2	.039	2	.097	4	2.674	4	2.563	6	.974	6	.828	4
18			min	-2.127	6	-.036	6	-.097	6	-2.563	6	-2.674	4	-.735	4	-1.098	6
19		5	max	2.877	2	.012	2	.179	4	1.279	4	1.481	6	3.135	4	3.97	6
20			min	-2.121	6	-.067	5	-.179	6	-1.481	6	-1.279	4	-3.523	6	-3.533	4
21	CROSSDIAG3	1	max	1.319	6	.11	3	.187	6	.786	6	1.122	3	1.634	2	.687	5
22			min	-4.472	2	-.043	6	-.188	4	-1.122	3	-.786	6	-.61	5	-1.842	2
23		2	max	1.313	6	.079	4	.105	6	1.79	4	1.673	6	1.688	6	1.72	4
24			min	-4.478	2	-.07	6	-.106	4	-1.673	6	-1.79	4	-1.526	4	-1.902	6
25		3	max	1.307	6	.052	4	.037	6	3.373	4	3.464	6	1.216	6	1.716	4
26			min	-4.517	2	-.1	5	-.036	3	-3.464	6	-3.373	4	-1.523	4	-1.37	6
27		4	max	1.197	6	.013	3	.046	4	3.275	4	3.106	6	1.71	6	1.666	4
28			min	-4.523	2	-.007	6	-.045	6	-3.106	6	-3.275	4	-1.478	4	-1.927	6
29		5	max	1.191	6	-.015	4	.127	4	2.207	4	2.316	6	.562	4	.966	6
30			min	-4.529	2	-.043	5	-.127	6	-2.316	6	-2.207	4	-.857	6	-.633	4
31	CROSSDIAG4	1	max	4.439	2	.046	5	.147	6	2.805	4	2.923	6	1.207	4	1.587	6
32			min	-1.868	6	.009	4	-.145	4	-2.923	6	-2.805	4	-1.408	6	-1.36	4
33		2	max	4.445	2	.01	6	.065	6	4.021	4	3.925	6	1.697	6	1.595	4
34			min	-1.862	6	-.019	3	-.064	4	-3.925	6	-4.021	4	-1.415	4	-1.912	6
35		3	max	4.509	2	.117	5	.03	3	4.268	4	4.493	6	1.739	6	2.299	4
36			min	-1.856	6	-.065	4	-.031	5	-4.493	6	-4.268	4	-2.041	4	-1.96	6

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	lc	y Shear...	lc	z Shear...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
37		4	max	4.515	2	.089	6	.112	4	2.453	4	2.387	6	2.476	6	2.506	4
38			min	-1.749	6	-.092	4	-.112	6	-2.387	6	-2.453	4	-2.224	4	-2.79	6
39		5	max	4.521	2	.062	6	.194	4	.387	6	.715	3	.604	6	2.495	2
40			min	-1.743	6	-.123	3	-.194	6	-.715	3	-.387	6	-2.214	2	-.681	6
41	CROSSDIAG5	1	max	5.123	6	.083	3	.214	5	3.07	5	3.472	3	4.083	4	5.624	5
42			min	-6.196	2	-.018	6	-.214	3	-3.472	3	-3.07	5	-4.757	5	-4.827	4
43		2	max	5.112	6	.045	3	.115	5	1.627	4	1.339	6	1.112	5	.783	4
44			min	-6.207	2	-.048	5	-.116	3	-1.339	6	-1.627	4	-.662	4	-1.315	5
45		3	max	5.101	6	.105	5	.023	5	4.384	4	4.779	5	.122	2	1.378	3
46			min	-6.242	2	-.044	1	-.024	3	-4.779	5	-4.384	4	-1.166	3	-.144	2
47		4	max	5.02	6	.07	6	.075	4	2.746	3	2.307	6	2.476	5	2.338	4
48			min	-6.254	2	-.063	4	-.076	6	-2.307	6	-2.746	3	-1.978	4	-2.927	5
49		5	max	5.009	6	.044	6	.174	4	1.727	6	1.758	4	.13	4	1.598	1
50			min	-6.265	2	-.098	3	-.175	6	-1.758	4	-1.727	6	-1.351	1	-.154	4
51	CROSSDIAG6	1	max	6.833	2	.097	3	.186	6	.853	6	1.519	3	.815	4	2.264	5
52			min	-.494	4	-.032	6	-.186	4	-1.519	3	-.853	6	-1.915	5	-.963	4
53		2	max	6.844	2	.062	4	.087	6	3.225	3	3.179	6	2.308	5	2.217	4
54			min	-.483	4	-.059	6	-.088	4	-3.179	6	-3.225	3	-1.875	4	-2.729	5
55		3	max	6.879	2	.036	4	.019	3	5.139	4	5.612	6	.762	6	1.913	3
56			min	-.495	4	-.094	5	-.019	5	-5.612	6	-5.139	4	-1.618	3	-.9	6
57		4	max	6.89	2	.049	5	.117	3	2.252	4	2.129	6	1.746	5	1.45	4
58			min	-.484	4	-.049	3	-.118	5	-2.129	6	-2.252	4	-1.226	4	-2.064	5
59		5	max	6.901	2	.019	6	.216	3	2.391	5	3.002	3	3.427	4	4.995	5
60			min	-.472	4	-.086	3	-.216	5	-3.002	3	-2.391	5	-4.225	5	-4.051	4
61	CROSSDIAG7	1	max	0	5	.074	3	0	1	0	1	0	1	0	1	0	1
62			min	-8.068	2	0	5	-.356	4	0	1	0	1	0	1	0	1
63		2	max	0	5	.037	3	0	1	8.127	4	0	5	2.915	1	13.404	4
64			min	-8.094	2	0	5	-.178	4	0	5	-8.127	4	-11.895	4	-3.285	1
65		3	max	0	5	0	1	0	1	10.836	4	0	5	3.887	1	17.872	4
66			min	-8.119	2	0	1	0	1	0	5	-10.836	4	-15.861	4	-4.38	1
67		4	max	0	5	0	5	.178	4	8.127	4	0	5	2.915	1	13.404	4
68			min	-8.145	2	-.037	1	0	1	0	5	-8.127	4	-11.895	4	-3.285	1
69		5	max	0	5	0	5	.356	4	0	1	0	1	0	1	0	1
70			min	-8.171	2	-.074	1	0	1	0	1	0	1	0	1	0	1
71	CROSSDIAG8	1	max	0	1	.074	3	.356	6	0	1	0	1	0	1	0	1
72			min	-1.342	6	0	1	-.356	4	0	1	0	1	0	1	0	1
73		2	max	0	1	.037	3	.178	6	8.127	4	6.006	6	16.096	6	13.404	4
74			min	-1.316	6	0	1	-.178	4	-6.006	6	-8.127	4	-11.895	4	-18.137	6
75		3	max	0	1	0	1	0	1	10.836	4	8.008	6	21.461	6	17.872	4
76			min	-1.29	6	0	1	0	1	-8.008	6	-10.836	4	-15.861	4	-24.183	6
77		4	max	0	1	0	1	.178	4	8.127	4	6.006	6	16.096	6	13.404	4
78			min	-1.264	6	-.037	5	-.178	6	-6.006	6	-8.127	4	-11.895	4	-18.137	6
79		5	max	0	1	0	1	.356	4	0	1	0	1	0	1	0	1
80			min	-1.239	6	-.074	5	-.356	6	0	1	0	1	0	1	0	1
81	HORZ1	1	max	1.712	4	.094	3	.144	6	0	1	0	1	0	1	0	1
82			min	-1.305	6	-.023	6	-.144	4	0	1	0	1	0	1	0	1
83		2	max	1.711	4	.061	4	.071	6	1.962	4	1.546	6	1.568	5	.792	4
84			min	-1.306	6	-.049	6	-.071	4	-1.546	6	-1.962	4	-.703	4	-1.767	5
85		3	max	2.549	4	.08	5	.002	4	2.9	4	2.65	6	.898	5	.41	4
86			min	-3.115	6	-.036	4	-.003	2	-2.65	6	-2.9	4	-.364	4	-1.012	5
87		4	max	2.548	4	.051	6	.071	4	1.986	4	1.573	6	1.538	5	.758	4
88			min	-3.115	6	-.063	4	-.071	6	-1.573	6	-1.986	4	-.672	4	-1.733	5
89		5	max	2.548	4	.025	6	.144	4	0	1	0	1	0	1	0	1
90			min	-3.116	6	-.096	3	-.144	6	0	1	0	1	0	1	0	1
91	HORZ2	1	max	2.64	4	.097	3	.147	6	0	1	0	1	0	1	0	1
92			min	-3.18	6	-.026	6	-.147	4	0	1	0	1	0	1	0	1
93		2	max	2.64	4	.065	4	.074	6	2.033	4	1.621	6	1.562	5	.784	4

Envelope Member Section Stresses (Continued)

Member	Sec		Axial[ksi]	lc	y Shear...	lc	z Shear...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
94		min	-3.18	6	-.053	6	-.074	4	-1.621	6	-2.033	4	-.696	4	-1.76	5
95		max	2.641	4	.038	4	.003	2	2.994	4	2.747	6	.945	5	.463	4
96		min	-3.179	6	-.081	5	-.002	4	-2.747	6	-2.994	4	-.411	4	-1.065	5
97		max	1.803	4	.051	6	.074	4	2.009	4	1.595	6	1.591	5	.819	4
98		min	-1.37	6	-.063	4	-.074	6	-1.595	6	-2.009	4	-.727	4	-1.793	5
99		max	1.804	4	.024	6	.146	4	0	1	0	1	0	1	0	1
100		min	-1.37	6	-.096	3	-.146	6	0	1	0	1	0	1	0	1
101	HORZ3	max	.462	3	.095	3	.143	6	0	1	0	1	0	1	0	1
102		min	-.524	2	-.022	6	-.143	4	0	1	0	1	0	1	0	1
103		max	.461	3	.061	4	.071	6	1.963	4	1.538	6	1.572	5	.779	4
104		min	-.524	2	-.049	6	-.071	4	-1.538	6	-1.963	4	-.692	4	-1.771	5
105		max	1.272	4	.079	5	.002	4	2.9	4	2.629	6	.924	5	.405	4
106		min	-1.807	6	-.036	4	-.003	2	-2.629	6	-2.9	4	-.359	4	-1.041	5
107		max	1.272	4	.051	6	.071	4	1.986	4	1.562	6	1.551	5	.755	4
108		min	-1.808	6	-.063	4	-.071	6	-1.562	6	-1.986	4	-.67	4	-1.748	5
109		max	1.272	4	.024	6	.144	4	0	1	0	1	0	1	0	1
110		min	-1.808	6	-.096	3	-.144	6	0	1	0	1	0	1	0	1
111	HORZ4	max	1.821	4	.098	3	.147	6	0	1	0	1	0	1	0	1
112		min	-2.339	6	-.026	6	-.147	4	0	1	0	1	0	1	0	1
113		max	1.822	4	.065	4	.075	6	2.037	4	1.622	6	1.581	5	.785	4
114		min	-2.338	6	-.053	6	-.074	4	-1.622	6	-2.037	4	-.696	4	-1.781	5
115		max	1.822	4	.038	4	.003	2	3.002	4	2.75	6	.983	5	.464	4
116		min	-2.338	6	-.081	5	-.002	4	-2.75	6	-3.002	4	-.412	4	-1.108	5
117		max	.984	3	.051	6	.074	4	2.015	4	1.598	6	1.601	5	.809	4
118		min	-.537	6	-.063	4	-.074	6	-1.598	6	-2.015	4	-.718	4	-1.805	5
119		max	.984	3	.024	6	.146	4	0	1	0	1	0	1	0	1
120		min	-.536	6	-.096	3	-.147	6	0	1	0	1	0	1	0	1
121	HORZ5	max	.846	5	.064	3	.143	6	0	1	0	1	0	1	0	1
122		min	-.518	2	.012	6	-.144	4	0	1	0	1	0	1	0	1
123		max	.845	5	.027	4	.07	6	1.598	4	1.162	6	2.253	6	1.606	4
124		min	-.518	2	-.015	6	-.071	4	-1.162	6	-1.598	4	-1.425	4	-2.539	6
125		max	.844	5	.048	5	.004	2	2.157	4	1.864	6	2.351	6	2.071	4
126		min	-1.02	1	-.03	1	-.002	6	-1.864	6	-2.157	4	-1.838	4	-2.649	6
127		max	.405	4	.016	6	.071	4	1.614	4	1.179	6	2.237	6	1.588	4
128		min	-1.02	1	-.028	4	-.071	6	-1.179	6	-1.614	4	-1.41	4	-2.521	6
129		max	.405	4	-.011	6	.144	4	0	1	0	1	0	1	0	1
130		min	-1.021	1	-.065	3	-.143	6	0	1	0	1	0	1	0	1
131	HORZ6	max	1.969	2	.067	3	.148	6	0	1	0	1	0	1	0	1
132		min	-1.668	6	.009	6	-.147	4	0	1	0	1	0	1	0	1
133		max	1.969	2	.03	4	.075	6	1.66	4	1.253	6	2.275	6	1.615	4
134		min	-1.668	6	-.018	6	-.074	4	-1.253	6	-1.66	4	-1.433	4	-2.563	6
135		max	2.424	2	.026	1	.002	6	2.249	4	2.011	6	2.426	6	2.124	4
136		min	-1.667	6	-.051	5	-.004	2	-2.011	6	-2.249	4	-1.885	4	-2.734	6
137		max	2.424	2	.017	6	.074	4	1.644	4	1.236	6	2.291	6	1.632	4
138		min	-.667	6	-.029	4	-.075	6	-1.236	6	-1.644	4	-1.448	4	-2.581	6
139		max	2.425	2	-.01	6	.146	4	0	1	0	1	0	1	0	1
140		min	-.667	6	-.066	3	-.147	6	0	1	0	1	0	1	0	1
141	HORZ7	max	1.576	6	.078	3	.143	6	0	1	0	1	0	1	0	1
142		min	-.736	4	-.006	6	-.144	4	0	1	0	1	0	1	0	1
143		max	1.576	6	.043	4	.07	6	1.77	4	1.358	6	1.863	6	1.229	4
144		min	-.737	4	-.033	6	-.071	4	-1.358	6	-1.77	4	-1.091	4	-2.099	6
145		max	1.575	6	.064	5	.001	4	2.484	4	2.239	6	1.585	6	1.336	4
146		min	-1.253	2	-.017	4	-.004	2	-2.239	6	-2.484	4	-1.185	4	-1.786	6
147		max	.157	6	.033	6	.071	4	1.778	4	1.367	6	1.854	6	1.22	4
148		min	-1.253	2	-.044	4	-.07	6	-1.367	6	-1.778	4	-1.083	4	-2.089	6
149		max	.157	6	.007	6	.144	4	0	1	0	1	0	1	0	1
150		min	-1.253	2	-.079	3	-.143	6	0	1	0	1	0	1	0	1

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	lc	y Shear...	lc	z Shear...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
151	HORZ8	1	max	1.009	2	.08	3	.148	6	0	1	0	1	0	1	0	1
152			min	-.837	5	-.009	6	-.147	4	0	1	0	1	0	1	0	1
153		2	max	1.01	2	.045	4	.075	6	1.822	4	1.447	6	1.894	6	1.246	4
154			min	-.837	5	-.036	6	-.074	4	-1.447	6	-1.822	4	-1.106	4	-2.134	6
155		3	max	1.533	2	.018	4	.004	2	2.572	4	2.398	6	1.666	6	1.386	4
156			min	-.836	5	-.067	5	-.001	4	-2.398	6	-2.572	4	-1.23	4	-1.877	6
157		4	max	1.534	2	.035	6	.074	4	1.814	4	1.437	6	1.903	6	1.254	4
158			min	-.263	4	-.045	4	-.075	6	-1.437	6	-1.814	4	-1.113	4	-2.145	6
159		5	max	1.534	2	.009	6	.146	4	0	1	0	1	0	1	0	1
160			min	-.262	4	-.08	3	-.147	6	0	1	0	1	0	1	0	1
161	HORZ9	1	max	1.25	6	.057	3	.143	6	0	1	0	1	0	1	0	1
162			min	-.53	4	.02	6	-.145	4	0	1	0	1	0	1	0	1
163		2	max	1.249	6	.019	3	.07	6	1.511	4	1.083	6	2.416	6	1.843	4
164			min	-.53	4	-.007	6	-.072	4	-1.083	6	-1.511	4	-1.636	4	-2.722	6
165		3	max	1.249	6	.041	5	0	4	1.95	4	1.673	6	2.707	6	2.581	4
166			min	-.889	1	.008	4	-.004	2	-1.673	6	-1.95	4	-2.291	4	-3.05	6
167		4	max	.434	6	.007	6	.072	4	1.511	4	1.084	6	2.415	6	1.844	4
168			min	-.889	1	-.019	3	-.07	6	-1.084	6	-1.511	4	-1.636	4	-2.721	6
169		5	max	.434	6	-.02	6	.145	4	0	1	0	1	0	1	0	1
170			min	-.89	1	-.056	3	-.143	6	0	1	0	1	0	1	0	1
171	HORZ10	1	max	.347	2	.057	3	.147	6	0	1	0	1	0	1	0	1
172			min	-.644	3	.017	6	-.146	4	0	1	0	1	0	1	0	1
173		2	max	.348	2	.02	3	.075	6	1.533	4	1.16	6	2.453	6	1.856	4
174			min	-.644	3	-.01	6	-.073	4	-1.16	6	-1.533	4	-1.647	4	-2.764	6
175		3	max	.872	1	-.008	4	.004	2	1.994	4	1.825	6	2.783	6	2.606	4
176			min	-.643	3	-.043	5	0	4	-1.825	6	-1.994	4	-2.312	4	-3.136	6
177		4	max	.873	1	.01	6	.073	4	1.533	4	1.159	6	2.454	6	1.855	4
178			min	-.403	4	-.02	3	-.075	6	-1.159	6	-1.533	4	-1.646	4	-2.765	6
179		5	max	.874	1	-.017	6	.146	4	0	1	0	1	0	1	0	1
180			min	-.402	4	-.057	3	-.147	6	0	1	0	1	0	1	0	1
181	HORZ11	1	max	.976	6	.052	3	.077	6	1.047	4	2.026	6	.264	4	.276	6
182			min	-.736	4	.033	6	-.076	4	-2.026	6	-1.047	4	-.276	6	-.264	4
183		2	max	.976	6	.034	3	.039	6	1.648	4	1.653	6	.371	6	.377	4
184			min	-.736	4	.017	6	-.038	4	-1.653	6	-1.648	4	-.377	4	-.371	6
185		3	max	.976	6	.016	4	.001	6	2.011	4	1.517	6	.595	6	.595	4
186			min	-.736	4	0	5	-.002	2	-1.517	6	-2.011	4	-.595	4	-.595	6
187		4	max	.976	6	0	4	.037	4	2.137	4	1.618	6	.397	6	.39	4
188			min	-.736	4	-.018	5	-.037	6	-1.618	6	-2.137	4	-.39	4	-.397	6
189		5	max	.976	6	-.015	4	.075	4	2.027	4	1.955	6	.238	4	.225	6
190			min	-.736	4	-.036	5	-.074	6	-1.955	6	-2.027	4	-.225	6	-.238	4
191	LEG1	1	max	11.734	6	1.422	6	.298	4	17.01	4	16.737	6	6.553	4	10.147	2
192			min	-10.831	4	-1.433	4	-.3	6	-16.737	6	-17.01	4	-10.147	2	-6.553	4
193		2	max	9.536	6	.624	6	.139	2	7.329	4	6.999	6	3.239	4	2.881	6
194			min	-8.829	4	-.614	4	-.026	6	-6.999	6	-7.329	4	-2.881	6	-3.239	4
195		3	max	6.774	6	.12	6	.15	6	4.004	4	3.463	6	1.587	4	2.987	6
196			min	-5.877	4	-.1	4	-.311	2	-3.463	6	-4.004	4	-2.987	6	-1.587	4
197		4	max	4.503	6	.098	2	.053	6	3.165	4	2.948	6	2.081	2	.774	6
198			min	-3.762	4	-.025	4	-.103	2	-2.948	6	-3.165	4	-.774	6	-2.081	2
199		5	max	.336	5	.48	6	1.125	6	3.137	4	3.182	6	3.476	6	1.797	4
200			min	-.177	2	-.479	4	-1.039	4	-3.182	6	-3.137	4	-1.797	4	-3.476	6
201	LEG2	1	max	11.83	6	1.801	6	.401	6	18.518	4	18.396	6	9.342	6	10.415	2
202			min	-10.707	4	-1.815	4	-.393	4	-18.396	6	-18.518	4	-10.415	2	-9.342	6
203		2	max	9.694	6	.6	6	.125	2	7.295	4	7.502	6	2.333	2	1.796	4
204			min	-8.812	4	-.633	4	-.028	5	-7.502	6	-7.295	4	-1.796	4	-2.333	2
205		3	max	7.291	6	.058	6	.3	6	3.674	4	4.23	6	2.679	2	.985	4
206			min	-6.37	4	-.088	4	-.379	2	-4.23	6	-3.674	4	-.985	4	-2.679	2
207		4	max	4.61	6	.053	6	.028	4	2.401	4	2.652	6	2.171	2	.093	5

Envelope Member Section Stresses (Continued)

Member	Sec		Axial[ksi]	lc	y Shear...	lc	z Shear...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
208		min	-3.877	4	-.085	2	-.093	2	-2.652	6	-2.401	4	-.093	5	-2.171	2
209		max	1.526	2	.478	6	1.319	4	3.103	4	3.058	6	3.479	4	3.355	6
210		min	.115	6	-.479	4	-1.277	6	-3.058	6	-3.103	4	-3.355	6	-3.479	4
211	LEG_W_PLT1	max	4.763	6	1.925	6	.504	6	11.794	4	11.693	6	8.569	2	2.319	6
212		min	-4.269	4	-1.927	4	-1.474	2	-11.693	6	-11.794	4	-2.319	6	-8.569	2
213		max	4.746	6	1.899	6	.504	6	9.757	4	9.658	6	2.929	2	.367	6
214		min	-4.286	4	-1.901	4	-1.44	2	-9.658	6	-9.757	4	-.367	6	-2.929	2
215		max	4.728	6	1.874	6	.504	6	7.747	4	7.65	6	1.585	6	2.579	2
216		min	-4.304	4	-1.875	4	-1.406	2	-7.65	6	-7.747	4	-2.579	2	-1.585	6
217		max	4.544	6	1.449	6	.297	4	6.158	4	6.073	6	.582	6	1.985	2
218		min	-4.161	4	-1.46	4	-.299	6	-6.073	6	-6.158	4	-1.985	2	-.582	6
219		max	4.527	6	1.424	6	.297	4	4.617	4	4.543	6	.615	4	.952	2
220		min	-4.179	4	-1.435	4	-.299	6	-4.543	6	-4.617	4	-.952	2	-.615	4
221	LEG_W_PLT2	max	4.823	6	2.356	6	.495	4	13.939	4	13.872	6	8.496	2	1.858	4
222		min	-4.242	4	-2.358	4	-1.433	2	-13.872	6	-13.939	4	-1.858	4	-8.496	2
223		max	4.806	6	2.331	6	.495	4	11.442	4	11.377	6	2.95	2	.055	5
224		min	-4.26	4	-2.332	4	-1.433	2	-11.377	6	-11.442	4	-.055	5	-2.95	2
225		max	4.788	6	2.305	6	.495	4	8.973	4	8.91	6	1.975	4	2.597	2
226		min	-4.277	4	-2.307	4	-1.433	2	-8.91	6	-8.973	4	-2.597	2	-1.975	4
227		max	4.581	6	1.828	6	.4	6	6.975	4	6.926	6	.629	4	1.946	2
228		min	-4.113	4	-1.843	4	-.391	4	-6.926	6	-6.975	4	-1.946	2	-.629	4
229		max	4.564	6	1.803	6	.4	6	5.027	4	4.993	6	.877	6	.977	2
230		min	-4.131	4	-1.817	4	-.391	4	-4.993	6	-5.027	4	-.977	2	-.877	6
231	WT1	max	2.896	6	.11	4	.068	1	0	1	0	1	0	1	0	1
232		min	-5.761	2	-.11	6	.004	6	0	1	0	1	0	1	0	1
233		max	2.884	6	.055	4	.034	1	.315	4	1.216	6	1.174	1	-.077	6
234		min	-5.754	2	-.055	6	.002	6	-.315	6	-1.216	4	.077	6	-1.174	1
235		max	2.873	6	0	1	0	1	.42	4	1.621	6	1.565	1	-.103	6
236		min	-5.748	2	0	1	0	1	-.42	6	-1.621	4	.103	6	-1.565	1
237		max	2.862	6	.055	6	-.002	6	.315	4	1.216	6	1.174	1	-.077	6
238		min	-5.742	2	-.055	4	-.034	1	-.315	6	-1.216	4	.077	6	-1.174	1
239		max	2.85	6	.11	6	-.004	6	0	1	0	1	0	1	0	1
240		min	-5.735	2	-.11	4	-.068	1	0	1	0	1	0	1	0	1
241	WT2	max	5.932	2	.11	4	.047	3	0	1	0	1	0	1	0	1
242		min	-3.172	4	-.11	6	-.019	2	0	1	0	1	0	1	0	1
243		max	5.951	2	.055	4	.024	3	.315	4	1.216	6	.819	3	.328	2
244		min	-3.172	4	-.055	6	-.009	2	-.315	6	-1.216	4	-.328	2	-.819	3
245		max	5.969	2	0	1	0	1	.42	4	1.621	6	1.092	3	.438	2
246		min	-3.171	4	0	1	0	1	-.42	6	-1.621	4	-.438	2	-1.092	3
247		max	5.987	2	.055	6	.009	2	.315	4	1.216	6	.819	3	.328	2
248		min	-3.171	4	-.055	4	-.024	3	-.315	6	-1.216	4	-.328	2	-.819	3
249		max	6.005	2	.11	6	.019	2	0	1	0	1	0	1	0	1
250		min	-3.171	4	-.11	4	-.047	3	0	1	0	1	0	1	0	1
251	WT3	max	6.904	2	.11	4	.019	2	0	1	0	1	0	1	0	1
252		min	-4.076	6	-.11	6	-.047	5	0	1	0	1	0	1	0	1
253		max	6.886	2	.055	4	.009	2	.315	4	1.216	6	.328	2	.819	5
254		min	-4.076	6	-.055	6	-.024	5	-.315	6	-1.216	4	-.819	5	-.328	2
255		max	6.868	2	0	1	0	1	.42	4	1.621	6	.438	2	1.092	5
256		min	-4.076	6	0	1	0	1	-.42	6	-1.621	4	-1.092	5	-.438	2
257		max	6.85	2	.055	6	.024	5	.315	4	1.216	6	.328	2	.819	5
258		min	-4.077	6	-.055	4	-.009	2	-.315	6	-1.216	4	-.819	5	-.328	2
259		max	6.832	2	.11	6	.047	5	0	1	0	1	0	1	0	1
260		min	-4.077	6	-.11	4	-.019	2	0	1	0	1	0	1	0	1
261	WT4	max	4.303	4	.11	4	.068	1	0	1	0	1	0	1	0	1
262		min	-7.078	2	-.11	6	.004	4	0	1	0	1	0	1	0	1
263		max	4.292	4	.055	4	.034	1	.315	4	1.216	6	1.174	1	-.077	4
264		min	-7.072	2	-.055	6	.002	4	-.315	6	-1.216	4	.077	4	-1.174	1

Envelope Member Section Stresses (Continued)

Member	Sec		Axial[ksi]	lc	y Shear...	lc	z Shear...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
265	3	max	4.28	4	0	1	0	1	.42	4	1.621	6	1.565	1	-.103	4
266		min	-7.065	2	0	1	0	1	-.42	6	-1.621	4	.103	4	-1.565	1
267	4	max	4.269	4	.055	6	-.002	4	.315	4	1.216	6	1.174	1	-.077	4
268		min	-7.059	2	-.055	4	-.034	1	-.315	6	-1.216	4	.077	4	-1.174	1
269	5	max	4.258	4	.11	6	-.004	4	0	1	0	1	0	1	0	1
270		min	-7.052	2	-.11	4	-.068	1	0	1	0	1	0	1	0	1
271	WT5	1	max	8.495	6	.11	4	-.004	6	0	1	0	1	0	1	0
272		min	-8.558	4	-.11	6	-.068	1	0	1	0	1	0	1	0	1
273	2	max	8.506	6	.055	4	-.002	6	.315	4	1.216	6	-.077	6	1.174	1
274		min	-8.557	4	-.055	6	-.034	1	-.315	6	-1.216	4	-.174	1	.077	6
275	3	max	8.517	6	0	1	0	1	.42	4	1.621	6	-.103	6	1.565	1
276		min	-8.557	4	0	1	0	1	-.42	6	-1.621	4	-1.565	1	.103	6
277	4	max	8.528	6	.055	6	.034	1	.315	4	1.216	6	-.077	6	1.174	1
278		min	-8.557	4	-.055	4	.002	6	-.315	6	-1.216	4	-1.174	1	.077	6
279	5	max	8.54	6	.11	6	.068	1	0	1	0	1	0	1	0	1
280		min	-8.556	4	-.11	4	.004	6	0	1	0	1	0	1	0	1
281	WT6	1	max	11.085	6	.11	4	.047	3	0	1	0	1	0	1	0
282		min	-10.822	4	-.11	6	-.019	2	0	1	0	1	0	1	0	1
283	2	max	11.096	6	.055	4	.024	3	.315	4	1.216	6	.819	3	.328	2
284		min	-10.822	4	-.055	6	-.009	2	-.315	6	-1.216	4	-.328	2	-.819	3
285	3	max	11.108	6	0	1	0	1	.42	4	1.621	6	1.092	3	.438	2
286		min	-10.822	4	0	1	0	1	-.42	6	-1.621	4	-.438	2	-1.092	3
287	4	max	11.119	6	.055	6	.009	2	.315	4	1.216	6	.819	3	.328	2
288		min	-10.821	4	-.055	4	-.024	3	-.315	6	-1.216	4	-.328	2	-.819	3
289	5	max	11.13	6	.11	6	.019	2	0	1	0	1	0	1	0	1
290		min	-10.821	4	-.11	4	-.047	3	0	1	0	1	0	1	0	1
291	WT7	1	max	6.66	4	.11	4	.019	2	0	1	0	1	0	1	0
292		min	-6.556	6	-.11	6	-.047	5	0	1	0	1	0	1	0	1
293	2	max	6.649	4	.055	4	.009	2	.315	4	1.216	6	.328	2	.819	5
294		min	-6.556	6	-.055	6	-.024	5	-.315	6	-1.216	4	-.819	5	-.328	2
295	3	max	6.637	4	0	1	0	1	.42	4	1.621	6	.438	2	1.092	5
296		min	-6.557	6	0	1	0	1	-.42	6	-1.621	4	-1.092	5	-.438	2
297	4	max	6.626	4	.055	6	.024	5	.315	4	1.216	6	.328	2	.819	5
298		min	-6.557	6	-.055	4	-.009	2	-.315	6	-1.216	4	-.819	5	-.328	2
299	5	max	6.615	4	.11	6	.047	5	0	1	0	1	0	1	0	1
300		min	-6.558	6	-.11	4	-.019	2	0	1	0	1	0	1	0	1
301	WT8	1	max	8.914	4	.11	4	.068	1	0	1	0	1	0	1	0
302		min	-9.122	6	-.11	6	.004	4	0	1	0	1	0	1	0	1
303	2	max	8.902	4	.055	4	.034	1	.315	4	1.216	6	1.174	1	-.077	4
304		min	-9.122	6	-.055	6	.002	4	-.315	6	-1.216	4	.077	4	-1.174	1
305	3	max	8.891	4	0	1	0	1	.42	4	1.621	6	1.565	1	-.103	4
306		min	-9.122	6	0	1	0	1	-.42	6	-1.621	4	.103	4	-1.565	1
307	4	max	8.88	4	.055	6	-.002	4	.315	4	1.216	6	1.174	1	-.077	4
308		min	-9.123	6	-.055	4	-.034	1	-.315	6	-1.216	4	.077	4	-1.174	1
309	5	max	8.869	4	.11	6	-.004	4	0	1	0	1	0	1	0	1
310		min	-9.123	6	-.11	4	-.068	1	0	1	0	1	0	1	0	1
311	WT9	1	max	10.296	6	.11	4	.019	2	0	1	0	1	0	1	0
312		min	-10.071	4	-.11	6	-.047	3	0	1	0	1	0	1	0	1
313	2	max	10.285	6	.055	4	.009	2	.315	4	1.216	6	.328	2	.819	3
314		min	-10.072	4	-.055	6	-.024	3	-.315	6	-1.216	4	-.819	3	-.328	2
315	3	max	10.273	6	0	1	0	1	.42	4	1.621	6	.438	2	1.092	3
316		min	-10.072	4	0	1	0	1	-.42	6	-1.621	4	-1.092	3	-.438	2
317	4	max	10.262	6	.055	6	.024	3	.315	4	1.216	6	.328	2	.819	3
318		min	-10.073	4	-.055	4	-.009	2	-.315	6	-1.216	4	-.819	3	-.328	2
319	5	max	10.251	6	.11	6	.047	3	0	1	0	1	0	1	0	1
320		min	-10.073	4	-.11	4	-.019	2	0	1	0	1	0	1	0	1
321	WT10	1	max	8.187	6	.11	4	.068	1	0	1	0	1	0	1	0

Envelope Member Section Stresses (Continued)

Member	Sec		Axial[ksi]	lc	y Shear...	lc	z Shear...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
322		min	-8.318	4	-.11	6	.004	6	0	1	0	1	0	1	0	1
323	2	max	8.176	6	.055	4	.034	1	.315	4	1.216	6	1.174	1	-.077	6
324		min	-8.318	4	-.055	6	.002	6	-.315	6	-1.216	4	.077	6	-1.174	1
325	3	max	8.164	6	0	1	0	1	.42	4	1.621	6	1.565	1	-.103	6
326		min	-8.319	4	0	1	0	1	-.42	6	-1.621	4	.103	6	-1.565	1
327	4	max	8.153	6	.055	6	-.002	6	.315	4	1.216	6	1.174	1	-.077	6
328		min	-8.319	4	-.055	4	-.034	1	-.315	6	-1.216	4	.077	6	-1.174	1
329	5	max	8.142	6	.11	6	-.004	6	0	1	0	1	0	1	0	1
330		min	-8.32	4	-.11	4	-.068	1	0	1	0	1	0	1	0	1
331	WT11	1	max	7.58	4	.11	4	.047	5	0	1	0	1	0	1	0
332		min	-7.481	6	-.11	6	-.019	2	0	1	0	1	0	1	0	1
333	2	max	7.591	4	.055	4	.024	5	.315	4	1.216	6	.819	5	.328	2
334		min	-7.48	6	-.055	6	-.009	2	-.315	6	-1.216	4	-.328	2	-.819	5
335	3	max	7.603	4	0	1	0	1	.42	4	1.621	6	1.092	5	.438	2
336		min	-7.48	6	0	1	0	1	-.42	6	-1.621	4	-.438	2	-1.092	5
337	4	max	7.614	4	.055	6	.009	2	.315	4	1.216	6	.819	5	.328	2
338		min	-7.479	6	-.055	4	-.024	5	-.315	6	-1.216	4	-.328	2	-.819	5
339	5	max	7.625	4	.11	6	.019	2	0	1	0	1	0	1	0	1
340		min	-7.479	6	-.11	4	-.047	5	0	1	0	1	0	1	0	1
341	WT12	1	max	9.418	4	.11	4	.068	1	0	1	0	1	0	1	0
342		min	-9.639	6	-.11	6	.004	4	0	1	0	1	0	1	0	1
343	2	max	9.406	4	.055	4	.034	1	.315	4	1.216	6	1.174	1	-.077	4
344		min	-9.64	6	-.055	6	.002	4	-.315	6	-1.216	4	.077	4	-1.174	1
345	3	max	9.395	4	0	1	0	1	.42	4	1.621	6	1.565	1	-.103	4
346		min	-9.64	6	0	1	0	1	-.42	6	-1.621	4	.103	4	-1.565	1
347	4	max	9.384	4	.055	6	-.002	4	.315	4	1.216	6	1.174	1	-.077	4
348		min	-9.641	6	-.055	4	-.034	1	-.315	6	-1.216	4	.077	4	-1.174	1
349	5	max	9.372	4	.11	6	-.004	4	0	1	0	1	0	1	0	1
350		min	-9.641	6	-.11	4	-.068	1	0	1	0	1	0	1	0	1
351	WT13	1	max	7.294	6	.11	4	.068	1	0	1	0	1	0	1	0
352		min	-6.998	4	-.11	6	.004	6	0	1	0	1	0	1	0	1
353	2	max	7.283	6	.055	4	.034	1	.315	4	1.216	6	1.174	1	-.077	6
354		min	-6.998	4	-.055	6	.002	6	-.315	6	-1.216	4	.077	6	-1.174	1
355	3	max	7.271	6	0	1	0	1	.42	4	1.621	6	1.565	1	-.103	6
356		min	-6.999	4	0	1	0	1	-.42	6	-1.621	4	.103	6	-1.565	1
357	4	max	7.26	6	.055	6	-.002	6	.315	4	1.216	6	1.174	1	-.077	6
358		min	-6.999	4	-.055	4	-.034	1	-.315	6	-1.216	4	.077	6	-1.174	1
359	5	max	7.249	6	.11	6	-.004	6	0	1	0	1	0	1	0	1
360		min	-7	4	-.11	4	-.068	1	0	1	0	1	0	1	0	1
361	WT14	1	max	7.77	6	.11	4	.019	2	0	1	0	1	0	1	0
362		min	-7.962	4	-.11	6	-.047	3	0	1	0	1	0	1	0	1
363	2	max	7.759	6	.055	4	.009	2	.315	4	1.216	6	.328	2	.819	3
364		min	-7.962	4	-.055	6	-.024	3	-.315	6	-1.216	4	-.819	3	-.328	2
365	3	max	7.748	6	0	1	0	1	.42	4	1.621	6	.438	2	1.092	3
366		min	-7.963	4	0	1	0	1	-.42	6	-1.621	4	-1.092	3	-.438	2
367	4	max	7.736	6	.055	6	.024	3	.315	4	1.216	6	.328	2	.819	3
368		min	-7.963	4	-.055	4	-.009	2	-.315	6	-1.216	4	-.819	3	-.328	2
369	5	max	7.725	6	.11	6	.047	3	0	1	0	1	0	1	0	1
370		min	-7.964	4	-.11	4	-.019	2	0	1	0	1	0	1	0	1
371	WT15	1	max	11.336	4	.11	4	.019	2	0	1	0	1	0	1	0
372		min	-11.543	6	-.11	6	-.047	5	0	1	0	1	0	1	0	1
373	2	max	11.325	4	.055	4	.009	2	.315	4	1.216	6	.328	2	.819	5
374		min	-11.543	6	-.055	6	-.024	5	-.315	6	-1.216	4	-.819	5	-.328	2
375	3	max	11.314	4	0	1	0	1	.42	4	1.621	6	.438	2	1.092	5
376		min	-11.543	6	0	1	0	1	-.42	6	-1.621	4	-1.092	5	-.438	2
377	4	max	11.302	4	.055	6	.024	5	.315	4	1.216	6	.328	2	.819	5
378		min	-11.544	6	-.055	4	-.009	2	-.315	6	-1.216	4	-.819	5	-.328	2

Envelope Member Section Stresses (Continued)

Member	Sec		Axial[ksi]	lc	y Shear...	lc	z Shear...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
379	5	max	11.291	4	.11	6	.047	5	0	1	0	1	0	1	0	1
380		min	-11.544	6	-.11	4	-.019	2	0	1	0	1	0	1	0	1
381	WT16	1	max	12.289	4	.11	4	.068	1	0	1	0	1	0	1	0
382		min	-12.013	6	-.11	6	.004	4	0	1	0	1	0	1	0	1
383		2	max	12.278	4	.055	4	.034	1	.315	4	1.216	6	1.174	1	-.077
384		min	-12.014	6	-.055	6	.002	4	-.315	6	-1.216	4	.077	4	-1.174	1
385		3	max	12.266	4	0	1	0	1	.42	4	1.621	6	1.565	1	-.103
386		min	-12.014	6	0	1	0	1	-.42	6	-1.621	4	.103	4	-1.565	1
387		4	max	12.255	4	.055	6	-.002	4	.315	4	1.216	6	1.174	1	-.077
388		min	-12.015	6	-.055	4	-.034	1	-.315	6	-1.216	4	.077	4	-1.174	1
389		5	max	12.244	4	.11	6	-.004	4	0	1	0	1	0	1	0
390		min	-12.015	6	-.11	4	-.068	1	0	1	0	1	0	1	0	1
391	WT17	1	max	11.265	6	.11	4	-.004	6	0	1	0	1	0	1	0
392		min	-11.116	4	-.11	6	-.068	1	0	1	0	1	0	1	0	1
393		2	max	11.277	6	.055	4	-.002	6	.315	4	1.216	6	-.077	6	1.174
394		min	-11.116	4	-.055	6	-.034	1	-.315	6	-1.216	4	-1.174	1	.077	6
395		3	max	11.288	6	0	1	0	1	.42	4	1.621	6	-.103	6	1.565
396		min	-11.116	4	0	1	0	1	-.42	6	-1.621	4	-1.565	1	.103	6
397		4	max	11.299	6	.055	6	.034	1	.315	4	1.216	6	-.077	6	1.174
398		min	-11.115	4	-.055	4	.002	6	-.315	6	-1.216	4	-1.174	1	.077	6
399		5	max	11.31	6	.11	6	.068	1	0	1	0	1	0	1	0
400		min	-11.115	4	-.11	4	.004	6	0	1	0	1	0	1	0	1
401	WT18	1	max	11.919	6	.11	4	.047	3	0	1	0	1	0	1	0
402		min	-12.169	4	-.11	6	-.019	2	0	1	0	1	0	1	0	1
403		2	max	11.931	6	.055	4	.024	3	.315	4	1.216	6	.819	3	.328
404		min	-12.169	4	-.055	6	-.009	2	-.315	6	-1.216	4	-.328	2	-.819	3
405		3	max	11.942	6	0	1	0	1	.42	4	1.621	6	1.092	3	.438
406		min	-12.169	4	0	1	0	1	-.42	6	-1.621	4	-.438	2	-1.092	3
407		4	max	11.953	6	.055	6	.009	2	.315	4	1.216	6	.819	3	.328
408		min	-12.168	4	-.055	4	-.024	3	-.315	6	-1.216	4	-.328	2	-.819	3
409		5	max	11.965	6	.11	6	.019	2	0	1	0	1	0	1	0
410		min	-12.168	4	-.11	4	-.047	3	0	1	0	1	0	1	0	1
411	WT19	1	max	4.724	4	.11	4	.019	2	0	1	0	1	0	1	0
412		min	-4.891	6	-.11	6	-.047	5	0	1	0	1	0	1	0	1
413		2	max	4.712	4	.055	4	.009	2	.315	4	1.216	6	.328	2	.819
414		min	-4.891	6	-.055	6	-.024	5	-.315	6	-1.216	4	-.819	5	-.328	2
415		3	max	4.701	4	0	1	0	1	.42	4	1.621	6	.438	2	1.092
416		min	-4.891	6	0	1	0	1	-.42	6	-1.621	4	-1.092	5	-.438	2
417		4	max	4.69	4	.055	6	.024	5	.315	4	1.216	6	.328	2	.819
418		min	-4.892	6	-.055	4	-.009	2	-.315	6	-1.216	4	-.819	5	-.328	2
419		5	max	4.679	4	.11	6	.047	5	0	1	0	1	0	1	0
420		min	-4.892	6	-.11	4	-.019	2	0	1	0	1	0	1	0	1
421	WT20	1	max	5.775	4	.11	4	.068	1	0	1	0	1	0	1	0
422		min	-5.537	6	-.11	6	.004	4	0	1	0	1	0	1	0	1
423		2	max	5.763	4	.055	4	.034	1	.315	4	1.216	6	1.174	1	-.077
424		min	-5.537	6	-.055	6	.002	4	-.315	6	-1.216	4	.077	4	-1.174	1
425		3	max	5.752	4	0	1	0	1	.42	4	1.621	6	1.565	1	-.103
426		min	-5.537	6	0	1	0	1	-.42	6	-1.621	4	.103	4	-1.565	1
427		4	max	5.741	4	.055	6	-.002	4	.315	4	1.216	6	1.174	1	-.077
428		min	-5.538	6	-.055	4	-.034	1	-.315	6	-1.216	4	.077	4	-1.174	1
429		5	max	5.73	4	.11	6	-.004	4	0	1	0	1	0	1	0
430		min	-5.538	6	-.11	4	-.068	1	0	1	0	1	0	1	0	1
431	Mast1	1	max	18.945	4	.418	2	.229	6	.079	6	6.932	2	10.076	4	10.018
432		min	-17.887	6	-.008	6	-.227	4	-6.932	2	-.079	6	-10.018	6	-10.076	4
433		2	max	18.915	4	.398	2	.209	6	0	4	2.781	2	7.87	4	7.785
434		min	-17.917	6	-.008	6	-.207	4	-2.781	2	0	4	-7.785	6	-7.87	4
435		3	max	18.885	4	.376	2	.187	6	1.157	2	.084	5	5.877	4	5.765

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	lc	y Shear...	lc	z Shear...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
436			min	-17.947	6	-.008	6	-.185	4	-.084	5	-1.157	2	-5.765	6	-5.877	4
437		4	max	17.178	4	.003	6	.12	4	2.604	2	.121	6	5.251	4	5.151	6
438			min	-16.274	6	-.208	2	-.128	6	-.121	6	-2.604	2	-5.151	6	-5.251	4
439		5	max	17.148	4	.003	6	.146	4	.365	2	.094	5	6.603	4	6.576	6
440			min	-16.304	6	-.233	2	-.153	6	-.094	5	-.365	2	-6.576	6	-6.603	4
441	Mast2	1	max	17.148	4	.003	6	.146	4	.365	2	.094	5	6.603	4	6.576	6
442			min	-16.304	6	-.233	2	-.153	6	-.094	5	-.365	2	-6.576	6	-6.603	4
443		2	max	13.02	4	.009	6	.175	6	.019	4	.833	2	6.564	4	6.562	6
444			min	-12.21	6	-.006	4	-.172	4	-.833	2	-.019	4	-6.562	6	-6.564	4
445		3	max	12.991	4	.009	6	.148	6	.049	6	.978	2	5.033	4	5.007	6
446			min	-12.239	6	-.029	2	-.145	4	-.978	2	-.049	6	-5.007	6	-5.033	4
447		4	max	8.807	4	.239	2	.203	6	.08	6	.056	3	3.35	4	3.333	6
448			min	-8.115	6	-.003	6	-.209	4	-.056	3	-.08	6	-3.333	6	-3.35	4
449		5	max	8.779	4	.209	2	.174	6	2.118	2	.028	3	1.48	4	1.513	6
450			min	-8.144	6	-.003	6	-.179	4	-.028	3	-2.118	2	-1.513	6	-1.48	4
451	Mast3	1	max	8.779	4	.209	2	.174	6	2.118	2	.028	3	1.48	4	1.513	6
452			min	-8.144	6	-.003	6	-.179	4	-.028	3	-2.118	2	-1.513	6	-1.48	4
453		2	max	4.225	4	0	3	.784	4	.027	6	1.289	2	4.154	4	4.199	6
454			min	-3.667	6	-.978	2	-.781	6	-1.289	2	-.027	6	-4.199	6	-4.154	4
455		3	max	4.197	4	0	3	.817	4	.009	6	10.886	2	11.874	4	11.89	6
456			min	-3.695	6	-1.011	2	-.814	6	-10.886	2	-.009	6	-11.89	6	-11.874	4
457		4	max	.284	3	.41	2	.41	6	0	3	14.169	2	14.169	4	14.169	6
458			min	.206	2	0	3	-.41	4	-14.169	2	0	3	-14.169	6	-14.169	4
459		5	max	.245	3	.374	2	.374	6	0	3	10.387	2	10.387	4	10.387	6
460			min	.177	2	0	3	-.374	4	-10.387	2	0	3	-10.387	6	-10.387	4
461	Mast4	1	max	.245	3	.374	2	.374	6	0	3	10.387	2	10.387	4	10.387	6
462			min	.177	6	0	3	-.374	4	-10.387	2	0	3	-10.387	6	-10.387	4
463		2	max	.207	3	.337	2	.337	6	0	3	7.016	2	7.016	4	7.016	6
464			min	.149	6	0	3	-.337	4	-7.016	2	0	3	-7.016	6	-7.016	4
465		3	max	.169	3	.299	2	.299	6	0	3	3.998	2	3.998	4	3.998	6
466			min	.121	6	0	3	-.299	4	-3.998	2	0	3	-3.998	6	-3.998	4
467		4	max	.131	3	.26	2	.26	6	0	3	1.348	2	1.348	4	1.348	6
468			min	.093	6	0	3	-.26	4	-1.348	2	0	3	-1.348	6	-1.348	4
469		5	max	0	1	0	1	0	1	0	1	0	1	0	1	0	1
470			min	0	1	0	1	0	1	0	1	0	1	0	1	0	1
471	Horz 12	1	max	.976	6	.048	4	.001	6	1.047	4	2.026	6	.288	6	.3	4
472			min	-.736	4	.032	5	-.002	2	-2.026	6	-1.047	4	-.3	4	-.288	6
473		2	max	.976	6	.032	4	.001	6	1.648	4	1.653	6	.301	6	.306	4
474			min	-.736	4	.017	5	-.002	2	-1.653	6	-1.648	4	-.306	4	-.301	6
475		3	max	.976	6	.016	4	.001	6	2.011	4	1.517	6	.314	6	.313	4
476			min	-.736	4	0	5	-.002	2	-1.517	6	-2.011	4	-.313	4	-.314	6
477		4	max	.976	6	0	4	.001	6	2.137	4	1.618	6	.326	6	.319	4
478			min	-.736	4	-.015	5	-.002	2	-1.618	6	-2.137	4	-.319	4	-.326	6
479		5	max	.976	6	-.015	4	.001	6	2.027	4	1.955	6	.339	6	.326	4
480			min	-.736	4	-.031	5	-.002	2	-1.955	6	-2.027	4	-.326	4	-.339	6

Envelope Joint Reactions

Joint			X [k]	lc	Y [k]	lc	Z [k]	lc	MX [k-ft]	lc	MY [k-ft]	lc	MZ [k-ft]	lc
1	BOTLEG1	max	5.312	6	248.17	6	18.929	6	553.677	6	.169	4	119.502	2
2		min	-15.526	2	-222.411	4	-18.949	4	-558.465	4	-.171	6	-32.341	6
3	BOTMAST	max	.103	6	484.983	4	2.936	6	91.363	6	.083	2	63.223	2
4		min	-5.349	2	-457.898	6	-2.902	4	-91.901	4	-.047	6	-.723	6
5	BOTLEG2	max	5.216	4	251.289	6	23.174	6	656.836	6	.098	2	118.483	2
6		min	-15.093	2	-221.012	4	-23.189	4	-659.989	4	-.081	4	-25.913	4
7	Totals:	max	0	3	57.367	5	45.039	6						
8		min	-35.968	2	41.561	4	-45.039	4						

Envelope Joint Displacements

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation...	lc	Y Rotation...	lc	Z Rotation ...	lc
1	1	max	.303	2	.019	4	.249	4	3.561e-3	4	1.362e-3	6	3.082e-4	6
2		min	-.066	6	-.021	6	-.247	6	-3.525e-3	6	-1.348e-3	4	-2.719e-3	2
3	2	max	.303	2	.019	4	.293	4	4.175e-3	4	6.425e-4	4	9.82e-5	6
4		min	-.039	4	-.021	6	-.292	6	-4.151e-3	6	-7.811e-4	2	-2.717e-3	2
5	3	max	.508	2	.04	4	.895	4	6.274e-3	4	3.605e-3	6	4.745e-4	6
6		min	-.049	6	-.044	6	-.886	6	-6.198e-3	6	-3.567e-3	4	-5.391e-4	4
7	4	max	.508	2	.04	4	1.046	4	7.217e-3	4	1.708e-3	4	3.691e-4	4
8		min	-.041	6	-.045	6	-1.04	6	-7.172e-3	6	-2.061e-3	2	-3.317e-4	6
9	5	max	.508	2	.043	4	.934	4	6.547e-3	4	4.065e-3	6	8.604e-4	6
10		min	-.053	6	-.047	6	-.924	6	-6.467e-3	6	-4.022e-3	4	-9.339e-4	4
11	6	max	.507	2	.042	4	1.091	4	7.51e-3	4	1.926e-3	4	9.376e-4	4
12		min	-.037	6	-.047	6	-1.085	6	-7.463e-3	6	-2.324e-3	2	-9.118e-4	6
13	7	max	.493	2	.053	4	1.13	4	7.661e-3	4	4.598e-3	6	8.427e-4	6
14		min	-.087	6	-.058	6	-1.118	6	-7.561e-3	6	-4.568e-3	4	-8.534e-4	4
15	8	max	.492	2	.052	4	1.315	4	8.683e-3	4	2.272e-3	4	9.075e-4	4
16		min	-.005	4	-.058	6	-1.307	6	-8.629e-3	6	-2.297e-3	2	-9.312e-4	6
17	9	max	.563	2	.07	4	1.628	4	9.606e-3	4	5.985e-3	6	7.297e-4	4
18		min	-.068	6	-.077	6	-1.609	6	-9.463e-3	6	-5.981e-3	4	-1.393e-3	2
19	10	max	.564	2	.069	4	1.873	4	1.068e-2	4	3.169e-3	4	1.103e-3	6
20		min	-.038	6	-.077	6	-1.862	6	-1.062e-2	6	-3.127e-3	6	-1.424e-3	2
21	11	max	.647	2	.096	4	2.535	4	1.174e-2	4	6.628e-3	6	7.714e-4	6
22		min	-.065	6	-.105	6	-2.501	6	-1.153e-2	6	-6.476e-3	4	-1.295e-3	2
23	12	max	.647	2	.095	4	2.871	4	1.283e-2	4	7.823e-3	4	4.075e-4	4
24		min	-.062	6	-.105	6	-2.856	6	-1.28e-2	6	-3.392e-3	2	-1.208e-3	2
25	13	max	.655	2	.098	4	2.607	4	1.187e-2	4	7.731e-3	6	8.936e-4	6
26		min	-.07	6	-.106	6	-2.571	6	-1.164e-2	6	-7.56e-3	4	-1.375e-3	2
27	14	max	.655	2	.097	4	2.949	4	1.295e-2	4	3.719e-3	4	5.023e-4	4
28		min	-.06	6	-.107	6	-2.934	6	-1.293e-2	6	-3.652e-3	6	-1.275e-3	2
29	15	max	.68	2	.103	4	2.824	4	1.221e-2	4	8.105e-3	6	7.981e-4	6
30		min	-.087	6	-.112	6	-2.784	6	-1.197e-2	6	-7.924e-3	4	-1.306e-3	2
31	16	max	.678	2	.102	4	3.186	4	1.329e-2	4	3.976e-3	4	5.081e-4	4
32		min	-.049	6	-.113	6	-3.17	6	-1.328e-2	6	-3.9e-3	6	-1.212e-3	2
33	17	max	.859	2	.133	4	4.706	4	1.43e-2	4	1.203e-2	6	1.901e-4	6
34		min	-.092	6	-.145	6	-4.621	6	-1.388e-2	6	-1.175e-2	4	-2.234e-3	2
35	18	max	.855	2	.132	4	5.215	4	1.528e-2	4	6.573e-3	4	1.047e-3	6
36		min	-.086	6	-.146	6	-5.208	6	-1.543e-2	6	-6.416e-3	6	-2.139e-3	2
37	19	max	.873	2	.135	4	4.793	4	1.437e-2	4	1.189e-2	6	3.112e-4	6
38		min	-.093	6	-.146	6	-4.705	6	-1.394e-2	6	-1.157e-2	4	-2.38e-3	2
39	20	max	.868	2	.133	4	5.307	4	1.534e-2	4	6.358e-3	4	1.07e-3	6
40		min	-.093	6	-.148	6	-5.301	6	-1.551e-2	6	-6.162e-3	6	-2.307e-3	2
41	21	max	.917	2	.138	4	5.053	4	1.458e-2	4	1.147e-2	6	6.415e-4	6
42		min	-.102	6	-.151	6	-4.957	6	-1.412e-2	6	-1.104e-2	4	-2.368e-3	2
43	22	max	.913	2	.137	4	5.585	4	1.553e-2	4	5.734e-3	4	7.471e-4	6
44		min	-.111	6	-.152	6	-5.582	6	-1.573e-2	6	-5.426e-3	6	-2.469e-3	2
45	23	max	.97	2	.141	4	5.407	4	1.484e-2	4	1.111e-2	6	6.064e-4	6
46		min	-.119	6	-.154	6	-5.299	6	-1.435e-2	6	-1.054e-2	4	-2.062e-3	2
47	24	max	.969	2	.14	4	5.961	4	1.577e-2	4	5.013e-3	4	3.244e-4	6
48		min	-.122	6	-.156	6	-5.964	6	-1.601e-2	6	-5.604e-3	2	-2.133e-3	2
49	25	max	.982	2	.142	4	5.496	4	1.491e-2	4	1.102e-2	6	5.432e-4	6
50		min	-.122	6	-.155	6	-5.385	6	-1.44e-2	6	-1.041e-2	4	-2.023e-3	2
51	26	max	.981	2	.141	4	6.056	4	1.583e-2	4	4.832e-3	4	3.086e-4	6
52		min	-.124	6	-.157	6	-6.06	6	-1.607e-2	6	-5.716e-3	2	-2.049e-3	2
53	27	max	1.227	2	.159	4	7.601	4	1.623e-2	4	9.e-3	6	4.901e-4	6
54		min	-.172	6	-.176	6	-7.411	6	-1.558e-2	6	-8.204e-3	2	-2.026e-3	2
55	28	max	1.22	2	.159	4	8.269	4	1.688e-2	4	8.334e-4	3	2.27e-4	6
56		min	-.156	6	-.179	6	-8.318	6	-1.728e-2	6	-8.223e-3	2	-2.053e-3	2

Envelope Joint Displacements (Continued)

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation...	lc	Y Rotation...	lc	Z Rotation ...	lc
57	29	max	1.445	2	.161	4	9.303	4	1.716e-2	4	8.315e-3	6	5.444e-4	4
58		min	-.205	6	-.18	6	-9.045	6	-1.648e-2	6	-1.064e-2	2	-1.724e-3	2
59	30	max	1.445	2	.16	4	10.028	4	1.763e-2	4	4.162e-3	6	9.367e-4	6
60		min	-.204	6	-.182	6	-10.12	6	-1.807e-2	6	-1.065e-2	2	-1.763e-3	2
61	31	max	1.455	2	.161	4	9.407	4	1.722e-2	4	8.275e-3	6	6.484e-4	4
62		min	-.203	6	-.18	6	-9.144	6	-1.653e-2	6	-1.079e-2	2	-1.649e-3	2
63	32	max	1.455	2	.16	4	10.134	4	1.768e-2	4	4.372e-3	6	1.002e-3	6
64		min	-.21	6	-.183	6	-10.229	6	-1.812e-2	6	-1.079e-2	2	-1.677e-3	2
65	33	max	1.533	2	.162	4	10.403	4	1.778e-2	4	7.892e-3	6	9.172e-4	6
66		min	-.196	6	-.183	6	-10.101	6	-1.71e-2	6	-1.215e-2	2	-1.17e-3	2
67	34	max	1.532	2	.16	4	11.154	4	1.82e-2	4	6.368e-3	6	1.038e-3	4
68		min	-.238	6	-.184	6	-11.275	6	-1.865e-2	6	-1.215e-2	2	-1.091e-3	2
69	35	max	.508	2	.015	4	1.075	4	6.842e-3	4	9.7e-4	6	-2.394e-6	4
70		min	-.045	6	-.066	5	-1.091	6	-6.771e-3	6	-1.785e-3	2	-3.246e-4	2
71	36	max	.532	2	.051	4	1.531	4	8.699e-3	4	1.274e-3	6	1.123e-5	4
72		min	-.049	6	-.056	6	-1.518	6	-8.595e-3	6	-2.354e-3	2	-4.379e-4	2
73	37	max	.602	2	.095	4	2.428	4	1.162e-2	4	1.967e-3	6	5.529e-5	4
74		min	-.058	6	-.104	6	-2.409	6	-1.148e-2	6	-3.641e-3	2	-3.745e-4	2
75	38	max	.651	2	.07	4	2.823	4	1.229e-2	4	2.215e-3	6	-4.762e-6	6
76		min	-.064	6	-.122	6	-2.824	6	-1.217e-2	6	-3.931e-3	2	-6.98e-4	2
77	39	max	.747	2	.116	4	4.285	4	1.428e-2	4	3.149e-3	6	4.535e-5	4
78		min	-.077	6	-.128	6	-4.249	6	-1.415e-2	6	-5.461e-3	2	-6.84e-4	2
79	40	max	.864	2	.164	4	5.122	4	1.476e-2	4	3.654e-3	6	-7.322e-6	6
80		min	-.091	6	-.221	6	-5.101	6	-1.463e-2	6	-6.216e-3	2	-9.376e-4	2
81	41	max	.975	2	.146	4	5.831	4	1.531e-2	4	4.134e-3	6	-6.734e-6	4
82		min	-.122	6	-.2	6	-5.802	6	-1.517e-2	6	-6.999e-3	2	-9.809e-4	2
83	43	max	1.45	2	.208	4	9.845	4	1.742e-2	4	6.667e-3	6	-7.423e-6	4
84		min	-.206	6	-.269	6	-9.785	6	-1.729e-2	6	-1.131e-2	2	-1.133e-3	2
85	BOTLEG1	max	0	2	0	4	0	4	0	4	0	6	0	6
86		min	0	6	0	6	0	6	0	6	0	4	0	2
87	BOTLEG2	max	0	2	0	4	0	4	0	4	0	4	0	4
88		min	0	4	0	6	0	6	0	6	0	2	0	2
89	BOTMAST	max	0	2	0	6	0	4	0	4	0	6	0	6
90		min	0	6	0	4	0	6	0	6	0	2	0	2
91	MC1	max	.337	2	.14	6	.809	4	6.341e-3	4	5.863e-6	6	1.804e-5	4
92		min	0	6	-.148	4	-.801	6	-6.26e-3	6	-1.028e-5	2	-1.416e-3	2
93	MC2	max	.46	2	.233	6	2.144	4	1.014e-2	4	9.926e-6	6	6.77e-5	4
94		min	-.007	4	-.245	4	-2.118	6	-1.002e-2	6	-1.721e-5	2	-5.546e-4	2
95	MC3	max	.596	2	.302	6	4.146	4	1.378e-2	4	1.354e-5	6	6.071e-5	4
96		min	-.018	4	-.319	4	-4.1	6	-1.365e-2	6	-2.336e-5	2	-1.137e-3	2
97	MC4	max	.768	2	.349	6	6.579	4	1.529e-2	4	1.647e-5	6	3.645e-5	4
98		min	-.026	4	-.369	4	-6.512	6	-1.516e-2	6	-2.835e-5	2	-4.507e-4	2
99	MC5	max	.993	2	.369	6	9.385	4	2.049e-2	4	1.824e-5	6	3.367e-5	4
100		min	-.031	4	-.393	4	-9.3	6	-2.039e-2	6	-3.139e-5	2	-4.473e-3	2
101	TOPLEG1	max	1.55	2	.162	4	10.672	4	1.793e-2	4	7.814e-3	6	1.166e-3	6
102		min	-.215	6	-.183	6	-10.36	6	-1.725e-2	6	-1.257e-2	2	-1.191e-3	2
103	TOPLEG2	max	1.548	2	.16	4	11.429	4	1.834e-2	4	6.939e-3	6	1.399e-3	4
104		min	-.22	6	-.185	6	-11.557	6	-1.879e-2	6	-1.257e-2	2	-1.173e-3	6
105	TOPMAST	max	6.617	2	.367	6	22.146	4	3.195e-2	4	1.824e-5	6	3.367e-5	4
106		min	-.046	4	-.395	4	-22.014	6	-3.185e-2	6	-3.139e-5	2	-1.593e-2	2
107	TOPPLT1	max	.502	2	.036	4	.822	4	5.7e-3	4	2.686e-3	6	1.762e-4	4
108		min	-.048	6	-.039	6	-.813	6	-5.634e-3	6	-2.658e-3	4	-9.353e-4	2
109	TOPPLT2	max	.503	2	.036	4	.961	4	6.595e-3	4	1.271e-3	4	6.791e-4	6
110		min	-.038	6	-.04	6	-.955	6	-6.555e-3	6	-1.537e-3	2	-9.494e-4	2
111	T MOBILE	max	6.043	2	.367	6	20.995	4	3.195e-2	4	1.824e-5	6	3.367e-5	4
112		min	-.045	4	-.395	4	-20.867	6	-3.185e-2	6	-3.139e-5	2	-1.593e-2	2
113	POCKET	max	1.474	2	.161	4	9.614	4	1.733e-2	4	8.194e-3	6	7.324e-4	4

Envelope Joint Displacements (Continued)

Joint			X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation...	lc	Y Rotation...	lc	Z Rotation ...	lc
114	POCKET2	min	-.197	6	-.181	6	-9.343	6	-1.665e-2	6	-1.107e-2	2	-1.513e-3	2
115		max	1.474	2	.16	4	10.346	4	1.778e-2	4	4.792e-3	6	1.002e-3	6
116		min	-.223	6	-.183	6	-10.447	6	-1.822e-2	6	-1.108e-2	2	-1.534e-3	2
117	FC1	max	.438	2	.208	6	1.729	4	8.973e-3	4	8.855e-6	6	5.862e-5	4
118		min	-.004	4	-.22	4	-1.709	6	-8.855e-3	6	-1.538e-5	2	-5.148e-4	2
119	FC2	max	.737	2	.336	6	5.917	4	1.511e-2	4	1.569e-5	6	3.923e-5	4
120		min	-.024	4	-.356	4	-5.855	6	-1.498e-2	6	-2.704e-5	2	-8.899e-4	2
121	FC3	max	1.94	2	.369	6	12.279	4	2.662e-2	4	1.824e-5	6	3.367e-5	4
122		min	-.036	4	-.394	4	-12.181	6	-2.652e-2	6	-3.139e-5	2	-1.06e-2	2
123	GPS	max	.829	2	.13	4	4.493	4	1.412e-2	4	1.162e-2	6	1.511e-4	4
124		min	-.09	6	-.142	6	-4.414	6	-1.372e-2	6	-1.135e-2	4	-1.778e-3	2

Envelope AISC ASD Steel Code Checks

Member	Shape	Code Check	Loc[ft]	lc	Shear Ch...	Loc[ft]	lc	Fa...Ft ...	Fb y-y [ksi]	Fb.....	AS...
1	CROS... L5X5X5	.097	15.207	2	.018	7.603	y 6	17...28... Code check based ...			H2...
2	CROS... L5X5X5	.164	15.207	2	.015	0	y 4	17...28... Code check based ...			H1...
3	CROS... L5X5X5	.157	15.207	2	.017	0	z 4	17...28... Code check based ...			H2...
4	CROS... L5X5X5	.257	15.207	2	.016	15.207	z 4	17...28... Code check based ...			H1...
5	CROS... L3.5X3.5X5	.696	0	6	.021	18.916	z 6	7... 28... Code check based ...			H1...
6	CROS... L3.5X3.5X5	.938	18.916	2	.020	18.916	z 6	7... 28... Code check based ...			H1...
7	CROS... L5X5X5	.284	33.126	2	.022	0	z 4	1... 28... Code check based ...			H2...
8	CROS... L5X5X5	.047	0	6	.025	0	z 6	1... 28... Code check based ...			H2...
9	HORZ1 L5X5X5	.135	6.755	4	.009	13.509	z 6	18...28... Code check based ...			H1...
10	HORZ2 L5X5X5	.139	6.755	4	.008	13.509	z 6	18...28... Code check based ...			H1...
11	HORZ3 L5X5X5	.067	6.755	4	.010	13.509	z 6	18...28... Code check based ...			H1...
12	HORZ4 L5X5X5	.096	6.755	4	.009	13.509	z 6	18...28... Code check based ...			H1...
13	HORZ5 L5X5X5	.045	0	5	.010	13.509	z 6	18...28... Code check based ...			H1...
14	HORZ6 L5X5X5	.128	13.509	2	.009	13.509	z 6	18...28... Code check based ...			H1...
15	HORZ7 L5X5X5	.083	0	6	.010	13.509	z 6	18...28... Code check based ...			H1...
16	HORZ8 L5X5X5	.081	13.509	2	.009	0	z 6	18...28... Code check based ...			H1...
17	HORZ9 L5X5X5	.066	0	6	.010	13.509	z 6	18...28... Code check based ...			H1...
18	HORZ... L5X5X5	.046	13.509	1	.009	0	z 6	18...28... Code check based ...			H1...
19	HORZ... TU8X4X5	.086	8.016	4	.021	0	y 2	36...36... 40.47	40...1		H2...
20	LEG1 W24X68	.863	.625	6	.083	15.625	y 6	39...39... 49.987	38...		H1...
21	LEG2 W24X68	.978	1.25	6	.082	0	y 4	39...39... 49.987	38...		H1...
22	LEG... new	.463	0	6	.076	5.339	y 4	35...39... 49.987	39...		H1...
23	LEG... new	.509	0	6	.093	0	y 4	35...39... 49.987	39...		H1...
24	WT1 WT6X15	.204	5.045	6	.008	0	y 4	19...39... 28.322	28...1 1 1		H1...
25	WT2 WT6X15	.333	5.256	2	.007	0	y 4	19...39... 28.322	28...1 1 1		H1...
26	WT3 WT6X15	.382	4.94	2	.010	0	y 6	19...39... 28.322	28...1 1 1		H1...
27	WT4 WT6X15	.240	4.94	4	.008	10.091	y 4	19...39... 28.322	28...1 1 1		H1...
28	WT5 WT6X15	.508	5.045	6	.012	0	y 6	19...39... 28.322	28...1 1 1		H1...
29	WT6 WT6X15	.647	5.045	6	.008	10.091	y 4	19...39... 28.322	28...1 1 1		H1...
30	WT7 WT6X15	.362	4.94	4	.014	10.091	y 6	19...39... 28.322	28...1 1 1		H1...
31	WT8 WT6X15	.480	4.94	4	.011	10.091	y 6	19...39... 28.322	28...1 1 1		H1...
32	WT9 WT6X15	.602	5.045	6	.009	10.091	y 4	19...39... 28.322	28...1 1 1		H1...
33	WT10 WT6X15	.489	5.045	6	.015	0	y 6	19...39... 28.322	28...1 1 1		H1...
34	WT11 WT6X15	.413	5.151	4	.016	10.091	y 4	19...39... 28.322	28...1 1 1		H1...
35	WT12 WT6X15	.506	4.94	4	.012	10.091	y 6	19...39... 28.322	28...1 1 1		H1...
36	WT13 WT6X15	.442	5.045	6	.017	0	y 6	19...39... 28.322	28...1 1 1		H1...
37	WT14 WT6X15	.467	5.045	6	.010	0	y 4	19...39... 28.322	28...1 1 1		H1...
38	WT15 WT6X15	.606	4.94	4	.014	0	y 6	19...39... 28.322	28...1 1 1		H1...
39	WT16 WT6X15	.656	4.94	4	.009	10.091	z 2	19...39... 28.322	28...1 1 1		H1...
40	WT17 WT6X15	.657	5.045	6	.019	0	y 6	19...39... 28.322	28...1 1 1		H1...
41	WT18 WT6X15	.692	5.045	6	.011	10.091	y 2	19...39... 28.322	28...1 1 1		H1...
42	WT19 WT6X15	.262	4.94	4	.015	10.091	y 2	19...39... 28.322	28...1 1 1		H1...

Company : Natcomm
 Designer : TJL
 Job Number : 10001-CO.7

82' Sign Structure with 111' Pipe Mast

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Envelope AISC ASD Steel Code Checks (Continued)

Member	Shape	Code Check	Loc[ft]	lc	Shear Ch...	Loc[ft]	lc	Fa...Ft...	Fb y-y [ksi]	Fb..... AS...
43	WT20	WT6X15	.316	4.94	4	.015	0	z 2 19...39...	28.322	28...1 1 1 H1...
44	Mast1	HSS18X0.5	.837	0	4	.019	0	2 29...33...	36.951	36...1 H1...
45	Mast2	HSS18X0.5	.709	3.438	4	.011	17.474	2 33...33...	36.951	36... H1...
46	Mast3	HSS18X0.5	.554	17.188	4	.046	17.188	2 31...33...	36.951	36... H1...
47	Mast4	HSS18X0.5	.286	0	4	.017	0	6 28...33...	36.951	36... 6 H1...
48	Horz 12	TU8X4X5	.084	0	6	.021	0	y 2 36...36...	40.47	40... H1...

Company : Natcomm
Designer : TJL
Job Number : 10001-CO.7

82' Sign Structure with 111' Pipe Mast

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Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOTLEG1	-13.392	-112.603	-1.372	52.368	.085	103.393
2	1	BOTMAST	-4.665	18.254	-.02	-.789	.072	55.005
3	1	BOTLEG2	-13.165	151.716	1.392	-58.028	.085	103.282
4	1	Totals:	-31.222	57.367	0			
5	1	COG (ft):	X: 8.641	Y: 51.773	Z: 1.066			

Company : Natcomm
Designer : TJL
Job Number : 10001-CO.7

82' Sign Structure with 111' Pipe Mast

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Joint Reactions

LC		Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOTLEG1	-15.526	-135.313	-1.55	61.578	.098	119.502
2	2	BOTMAST	-5.349	13.181	-.035	-.809	.083	63.223
3	2	BOTLEG2	-15.093	163.692	1.586	-66.172	.098	118.483
4	2	Totals:	-35.968	41.561	0			
5	2	COG (ft):	X: 9.044	Y: 50.734	Z: 1.08			

Company : Natcomm
Designer : TJL
Job Number : 10001-CO.7

82' Sign Structure with 111' Pipe Mast

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Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	BOTLEG1	-4.492	-190.733	-16.536	-489.754	.155	27.478
2	3	BOTMAST	-.082	434.082	-2.579	-81.322	.036	.621
3	3	BOTLEG2	4.573	-185.982	-20.57	-586.328	-.071	-22.456
4	3	Totals:	0	57.367	-39.686			
5	3	COG (ft):	X: 7.405	Y: 51.773	Z: 1.066			

Company : Natcomm
Designer : TJL
Job Number : 10001-CO.7

82' Sign Structure with 111' Pipe Mast

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Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	4	BOTLEG1	-5.128	-222.411	-18.949	-558.465	.169	31.117
2	4	BOTMAST	-.087	484.983	-2.902	-91.901	.038	.636
3	4	BOTLEG2	5.216	-221.012	-23.189	-659.989	-.081	-25.913
4	4	Totals:	0	41.561	-45.039			
5	4	COG (ft):	X: 7.115	Y: 50.734	Z: 1.08			

Company : Natcomm
Designer : TJL
Job Number : 10001-CO.7

82' Sign Structure with 111' Pipe Mast

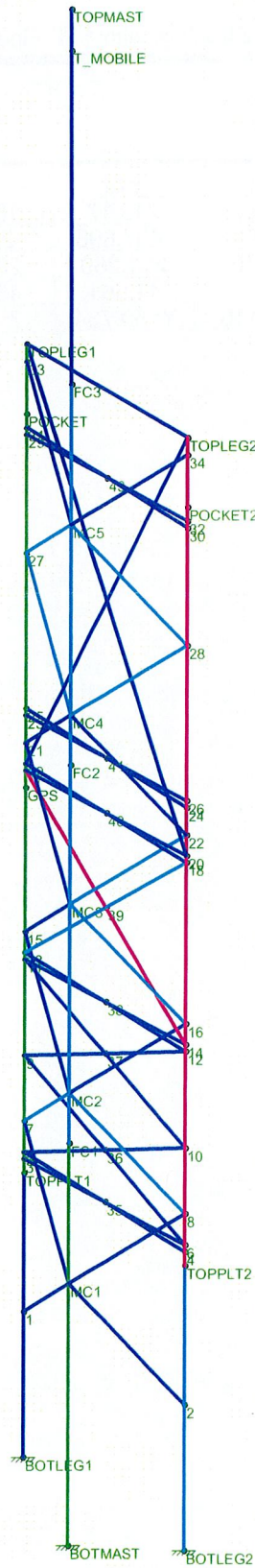
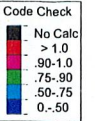
Dec 3, 2009
8:30 AM
Checked By: _____

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	5	BOTLEG1	4.742	223.977	16.512	483.859	-.157	-29.034
2	5	BOTMAST	.099	-396.973	2.621	80.574	-.045	-.668
3	5	BOTLEG2	-4.841	230.363	20.553	581.999	.069	24.04
4	5	Totals:	0	57.367	39.686			
5	5	COG (ft):	X: 7.405	Y: 51.773	Z: 1.066			

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	6	BOTLEG1	5.312	248.17	18.929	553.677	-.171	-32.341
2	6	BOTMAST	.103	-457.898	2.936	91.363	-.047	-.723
3	6	BOTLEG2	-5.415	251.289	23.174	656.836	.079	27.01
4	6	Totals:	0	41.561	45.039			
5	6	COG (ft):	X: 7.115	Y: 50.734	Z: 1.08			



Solution: Envelope

Natcomm

TJL

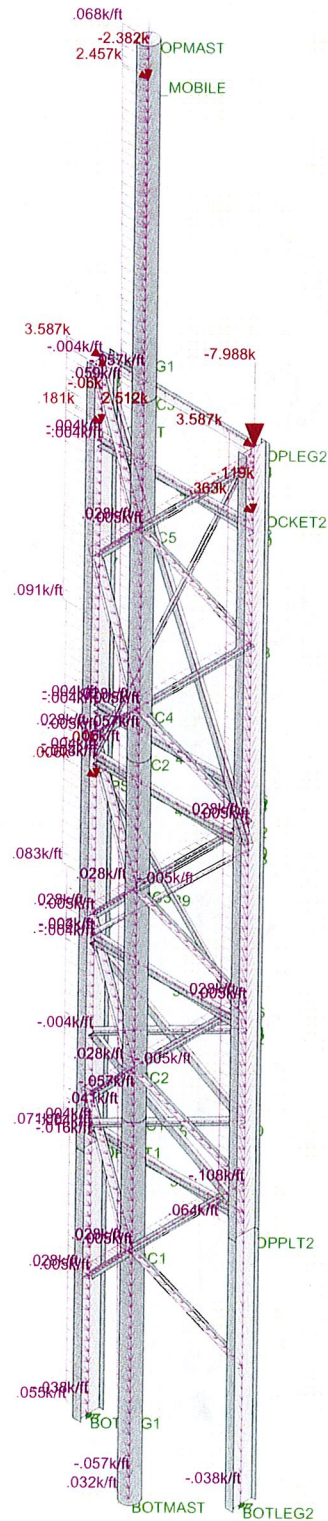
10001-CO.7

82' Sign Structure with 111' Pipe Mast

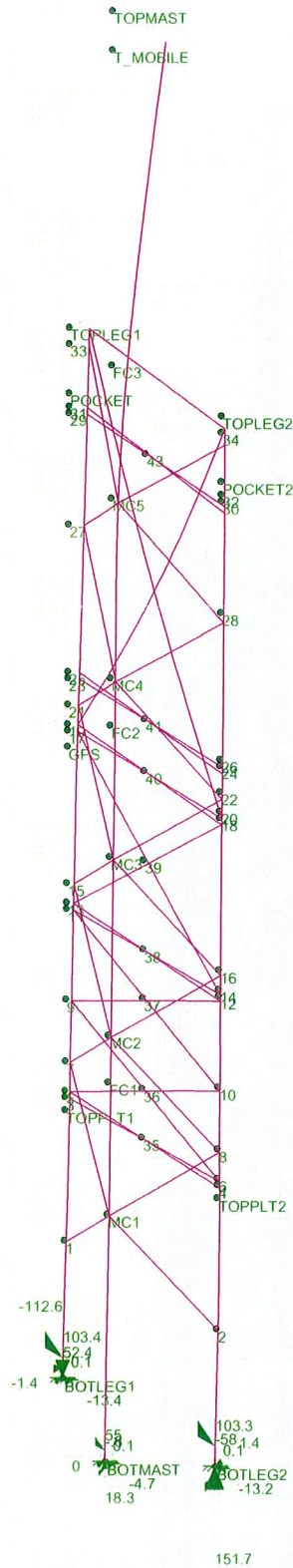
Unity Check

Dec 3, 2009 at 8:23 AM

82' Sign Structure.r3d

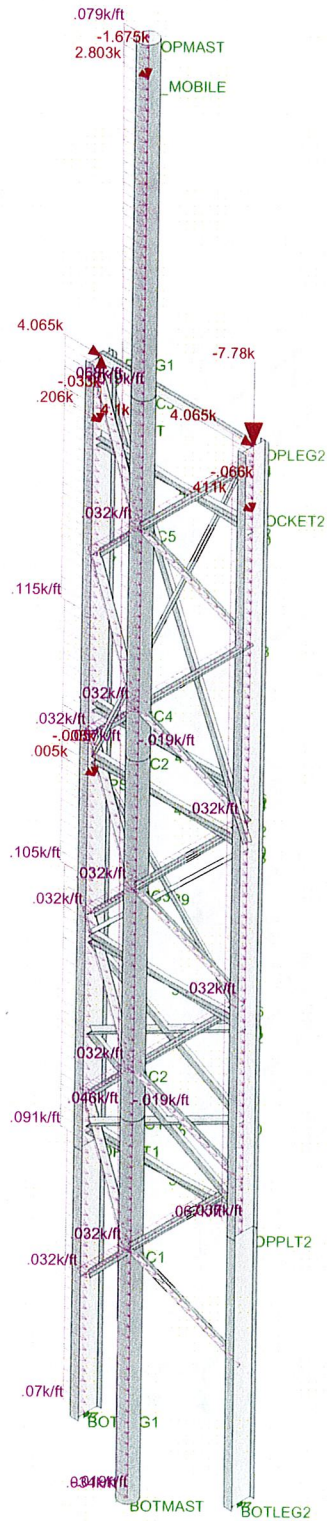


Natcomm	82' Sign Structure with 111' Pipe Mast	
TJL		Dec 3, 2009 at 8:24 AM
10001-CO.7		82' Sign Structure.r3d



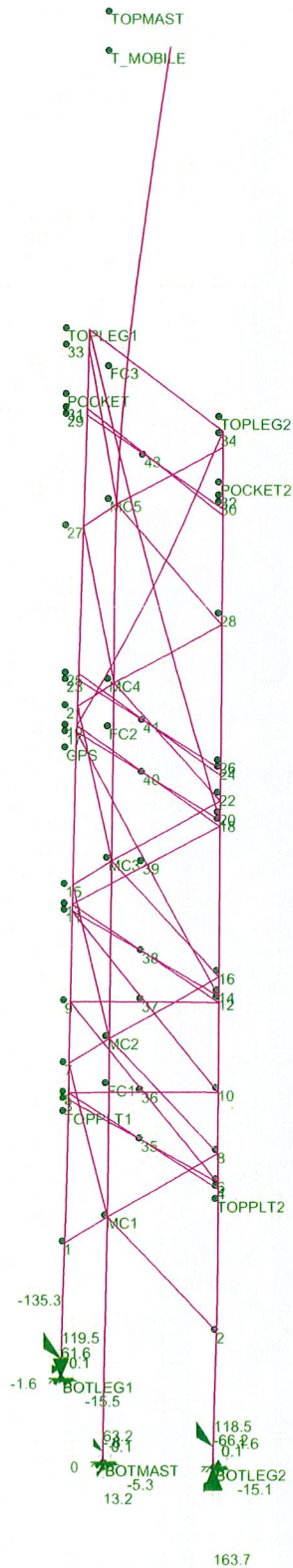
Results for LC 1, TIA/EIA Wind + Ice in +X Direction
Reaction units are k and k-ft

Natcomm	82' Sign Structure with 111' Pipe Mast LC # 1 Reactions and Deflected Shape	
TJL		Dec 3, 2009 at 8:27 AM
10001-CO.7		82' Sign Structure.r3d



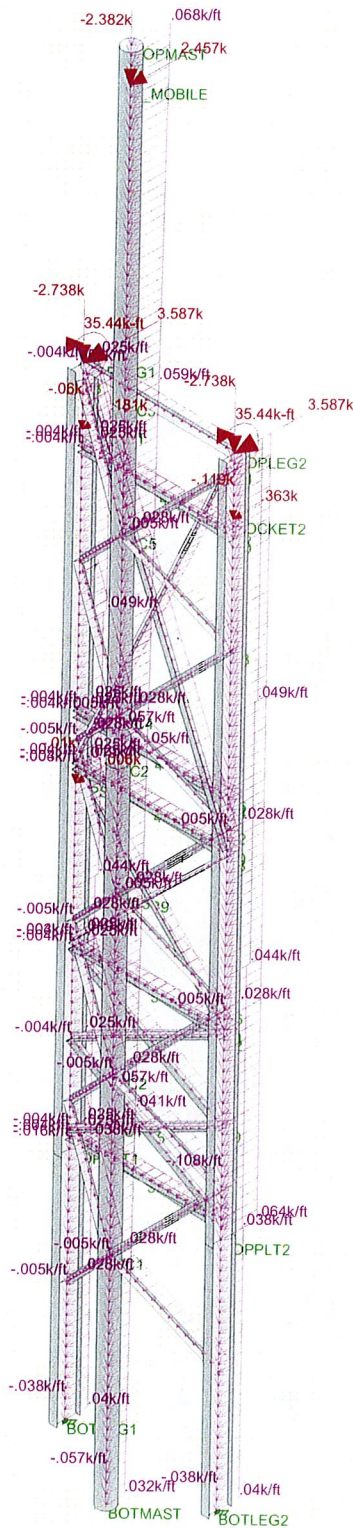
Loads: LC 2, TIA/EIA Wind in +X Direction

Natcomm	82' Sign Structure with 111' Pipe Mast	
TJL		Dec 3, 2009 at 8:24 AM
10001-CO.7		LC # 2 Loads 82' Sign Structure.r3d

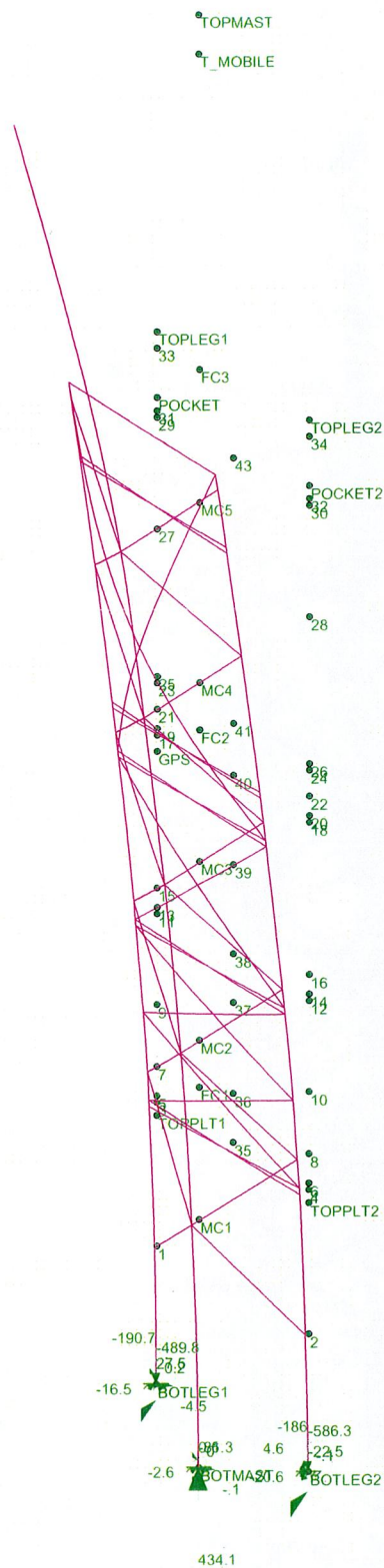


Results for LC 2, TIA/EIA Wind in +X Direction
Reaction units are k and k-ft

Natcomm	82' Sign Structure with 111' Pipe Mast LC # 2 Reactions and Deflected Shape	
TJL		Dec 3, 2009 at 8:27 AM
10001-CO.7		82' Sign Structure.r3d

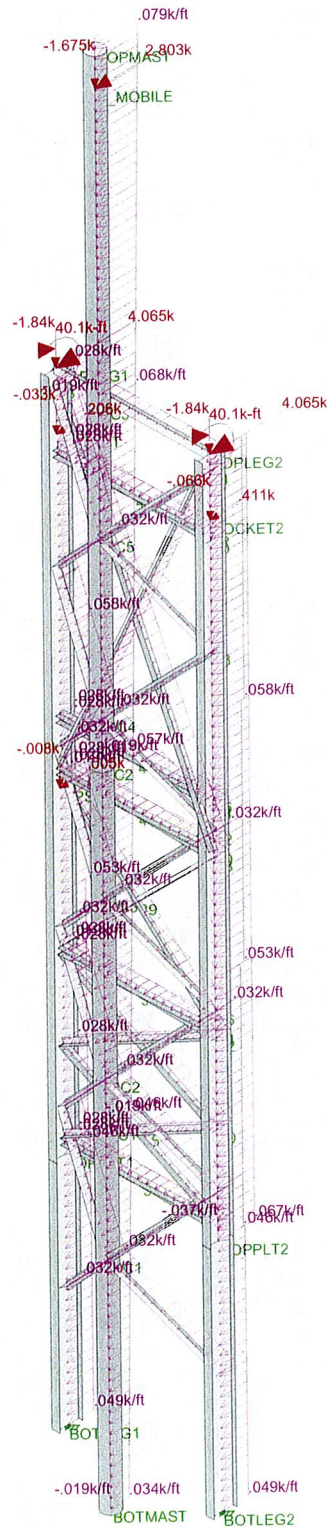


Natcomm	82' Sign Structure with 111' Pipe Mast	
TJL		Dec 3, 2009 at 8:24 AM
10001-CO.7		LC # 3 Loads 82' Sign Structure.r3d



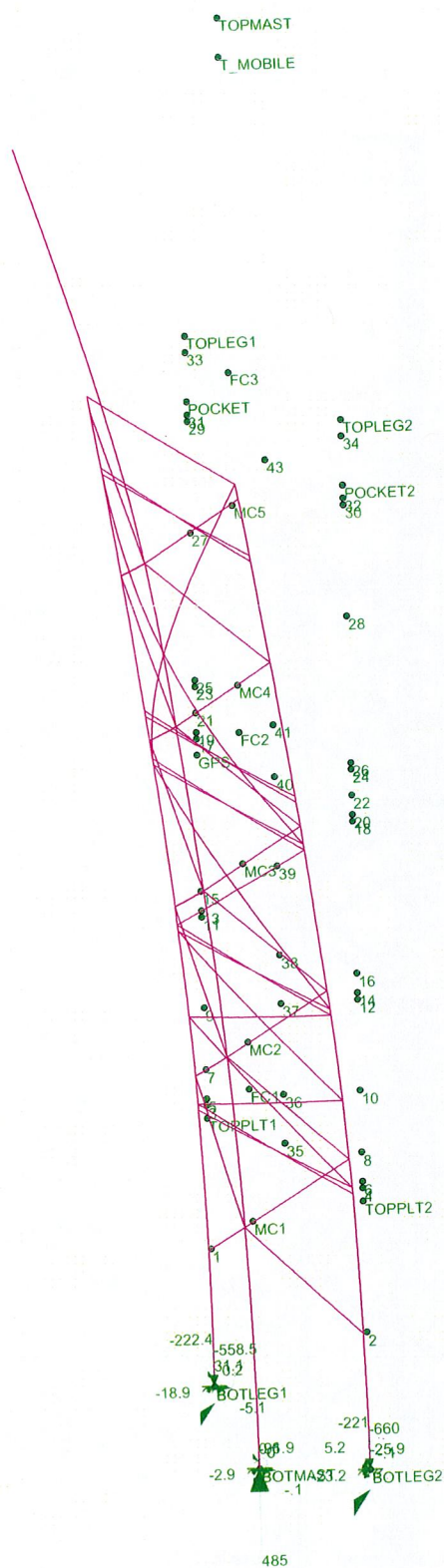
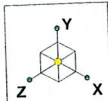
Results for LC 3, TIA/EIA Wind + Ice in +Z Direction
Reaction units are k and k-ft

Natcomm	82' Sign Structure with 111' Pipe Mast LC # 3 Reactions and Deflected Shape	
TJL		Dec 3, 2009 at 8:28 AM
10001-CO.7		82' Sign Structure.r3d



Loads: LC 4, TIA/EIA Wind in +Z Direction

Loads: LC 4, TIA/EIA Wind in +Z Direction		
Natcomm	82' Sign Structure with 111' Pipe Mast	
TJL		Dec 3, 2009 at 8:25 AM
10001-CO.7		82' Sign Structure.r3d
	LC # 4 Loads	



Results for LC 4, TIA/EIA Wind in +Z Direction
Reaction units are k and k-ft

Natcomm

TJL

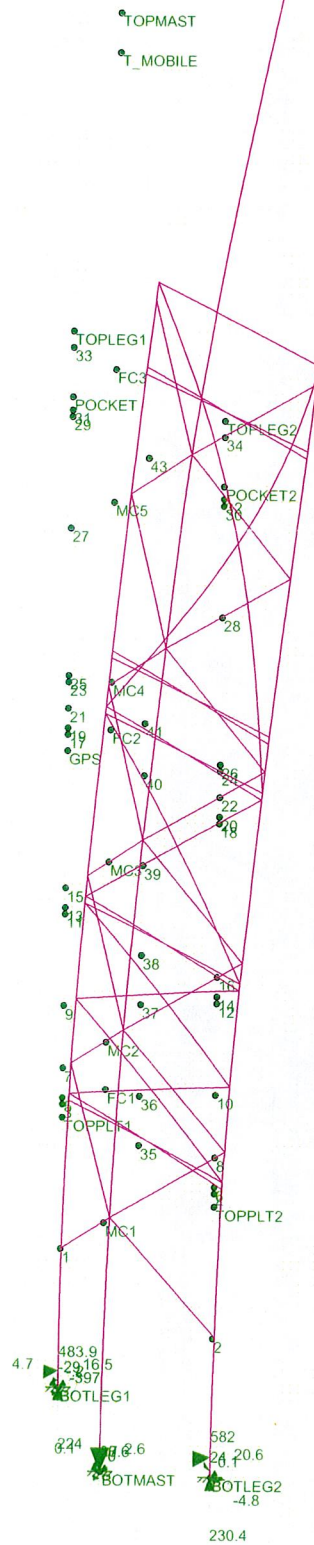
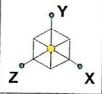
10001-CO.7

82' Sign Structure with 111' Pipe Mast

LC # 4 Reactions and Deflected Shape

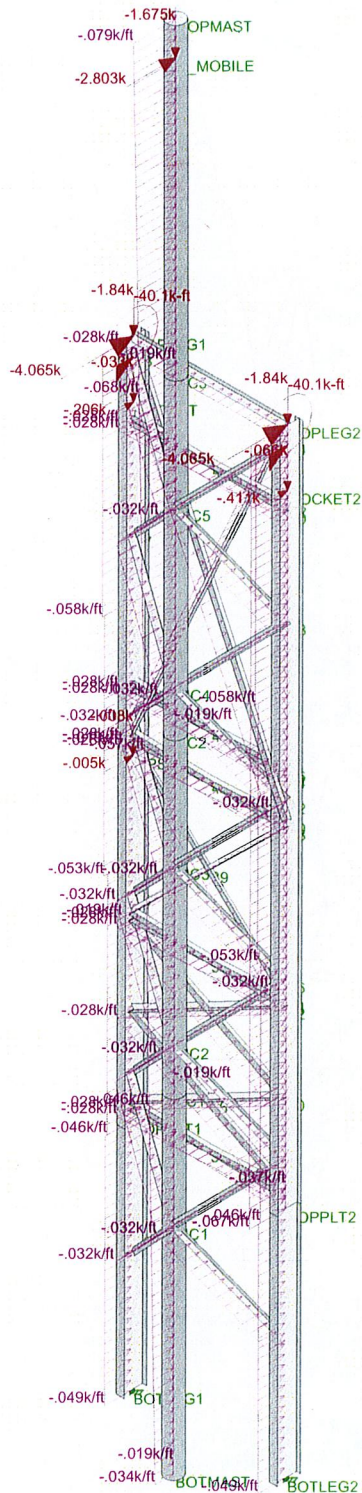
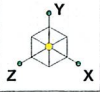
Dec 3, 2009 at 8:29 AM

82' Sign Structure.r3d



Results for LC 5, TIA/EIA Wind + Ice in -Z' Direction
Reaction units are k and k-ft

Natcomm	82' Sign Structure with 111' Pipe Mast LC # 5 Reactions and Deflected Shape	Dec 3, 2009 at 8:29 AM 82' Sign Structure.r3d
TJL		
10001-CO.7		



Loads: LC 6, TIA/EIA Wind in -Z' Direction

Natcomm

82' Sign Structure with 111' Pipe Mast

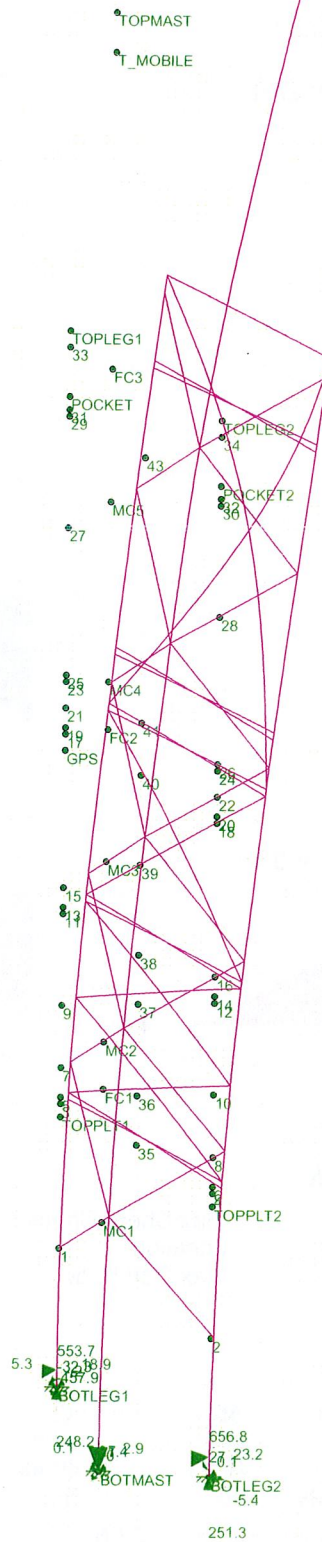
TJL

Dec 3, 2009 at 8:25 AM

10001-CO.7

LC # 6 Loads

82' Sign Structure.r3d



Results for LC 6, TIA/EIA Wind in -Z' Direction
Reaction units are k and k-ft

Natcomm	82' Sign Structure with 111' Pipe Mast LC # 6 Reactions and Deflected Shape	
TJL		Dec 3, 2009 at 8:30 AM
10001-CO.7		82' Sign Structure.r3d

Column: **Mast4**

Shape: **HSS18X0.5**

Material: **A500 Gr.42**

Length: **27 ft**

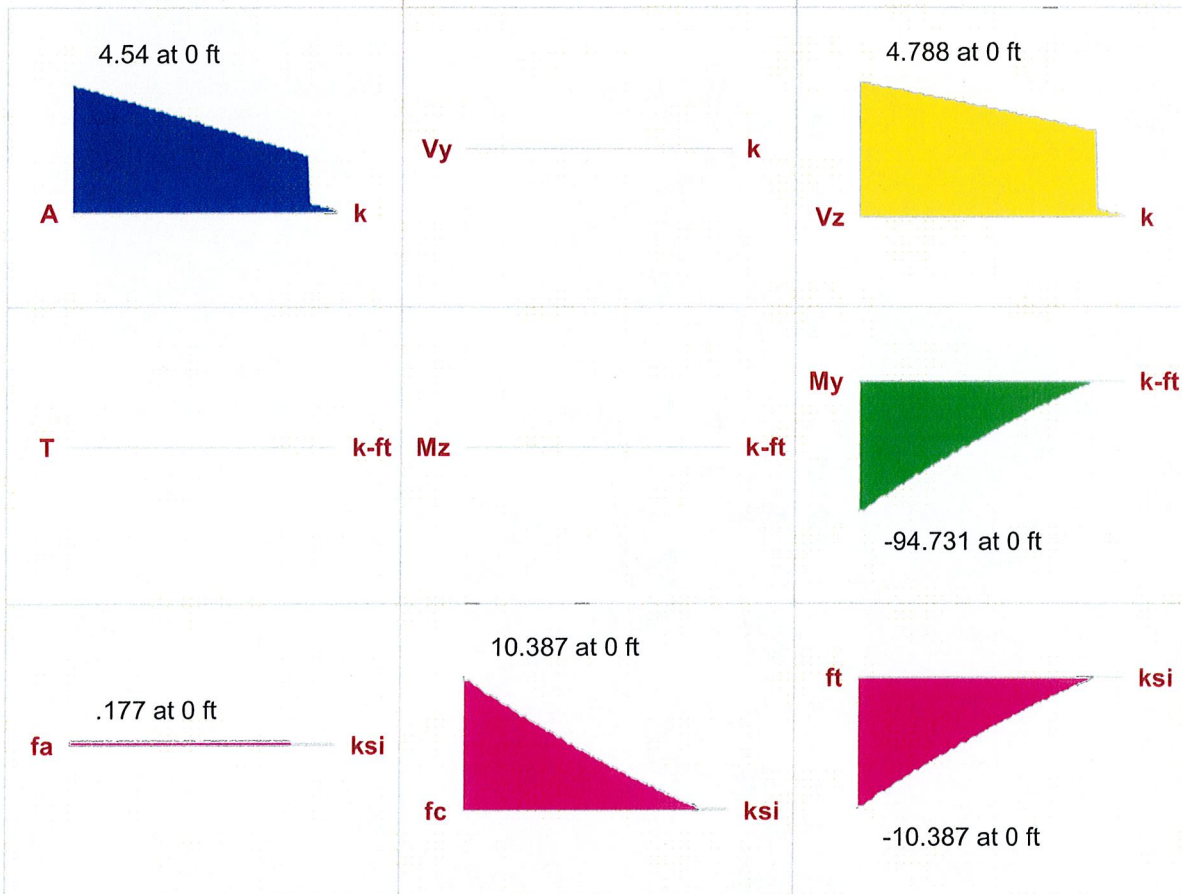
I Joint: **FC3**

J Joint: **TOPMAST**

LC 6: TIA/EIA Wind in -Z' Direction

Code Check: **0.286 (bending)**

Report Based On 97 Sections



AISC ASD 9th Ed. Code Check

Max Bending Check **0.286**

Location **0 ft**

Equation **H1-2**

Max Shear Check

0.017 (s)

Location

0 ft

Max Defl Ratio

L/33

Compact

Allowables Increase: **1.333**

Fy **42 ksi**
Fa **28.518 ksi**
Ft **33.592 ksi**
Fby **36.951 ksi**
Fbz **36.951 ksi**
Fvy **22.394 ksi**
Fvz **22.394 ksi**
Cb **1.75**

Cm	.85	Y-Y	.6
Lb	24 ft	Z-Z	24 ft
KL/r	46.43		46.43
Sway	No		No
L Comp Flange	24 ft		
Torque Length	NC		

Subject:

ANCHOR BOLT AND BASEPLATE MAST

Location:

Cromwell, CT

Rev. 0: 12/3/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO7

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 92-ft-kips	(Input From Risa-3D LC #6)
Shear Force =	Shear := 3-kips	(Input From Risa-3D LC #6)
Axial Force =	Axial := -458-kips	(Input From Risa-3D LC #6)

Anchor Bolt Data:

Use ASTM A615 Grade 75	
Number of Anchor Bolts =	N := 10
Diameter of Bolt Circle =	D _{bc} := 24-in
Bolt "Column" Distance =	l := 3-in
Bolt Ultimate Strenght =	F _u := 100-ksi
Bolt Yeild Strenght =	F _y := 75-ksi
Bolt Modulus =	E := 29000-ksi
Diameter of Anchor Bolts =	D := 1.75-in
Threads per Inch =	n := 4

Base Plate Data:

Use ASTM A572 Mod 50	
Plate Yield Strength =	F _{ybp} := 50-ksi
Base Plate Thickness =	t _{bp} := 2.0-in
Base Plate Diameter =	D _{bp} := 30-in
Outer Pole Diameter =	D _{pole} := 18-in

Subject:

ANCHOR BOLT AND BASEPLATE MAST

Location:

Cromwell, CT

Rev. 0: 12/3/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO7

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =:

$$R_{bc} := \frac{D_{bc}}{2} = 12 \cdot \text{in}$$

Distance to Bolts =

$$i := 1 \dots N$$

$$d_i := \begin{cases} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N} \right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{cases}$$

$d_1 = 7.05 \cdot \text{in}$	$d_6 = -7.05 \cdot \text{in}$
$d_2 = 11.41 \cdot \text{in}$	$d_7 = -11.41 \cdot \text{in}$
$d_3 = 11.41 \cdot \text{in}$	$d_8 = -11.41 \cdot \text{in}$
$d_4 = 7.05 \cdot \text{in}$	$d_9 = -7.05 \cdot \text{in}$
$d_5 = 0.00 \cdot \text{in}$	$d_{10} = -0.00 \cdot \text{in}$

Critical Distances For Bending in Plate:

Outer Pole Radius =

$$R_{pole} := \frac{D_{pole}}{2} = 9 \cdot \text{in}$$

Moment Arms of Bolts about Neutral Axis =

$$MA_i := \text{if}(d_i \geq R_{pole}, d_i - R_{pole}, 0 \cdot \text{in})$$

$MA_1 = 0.00 \cdot \text{in}$	$MA_6 = 0.00 \cdot \text{in}$
$MA_2 = 2.41 \cdot \text{in}$	$MA_7 = 0.00 \cdot \text{in}$
$MA_3 = 2.41 \cdot \text{in}$	$MA_8 = 0.00 \cdot \text{in}$
$MA_4 = 0.00 \cdot \text{in}$	$MA_9 = 0.00 \cdot \text{in}$
$MA_5 = 0.00 \cdot \text{in}$	$MA_{10} = 0.00 \cdot \text{in}$

Effective Width of Baseplate for Bending =

$$W_{eff} := .9 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2} \right)^2 - \left(\frac{D_{pole}}{2} \right)^2} = 21.6 \cdot \text{in}$$

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia =

$$I_p := \sum_i (d_i)^2 = 720 \cdot \text{in}^2$$

Gross Area of Bolt =

$$A_g := \frac{\pi}{4} \cdot D^2 = 2.405 \cdot \text{in}^2$$

Net Area of Bolt =

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot \text{in}}{n} \right)^2 = 1.782 \cdot \text{in}^2$$

Net Diameter =

$$D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 1.506 \cdot \text{in}$$

Radius of Gyration of Bolt =

$$r := \frac{D_n}{4} = 0.377 \cdot \text{in}$$

Section Modulus of Bolt =

$$S_x := \frac{\pi \cdot D_n^3}{32} = 0.336 \cdot \text{in}^3$$

Check Anchor Bolt Tension Force:

Maximum Tensile Force =

$$T_{\text{Max}} := OM \cdot \frac{R_{bc}}{I_p} - \frac{\text{Axial}}{N} = 64.2 \cdot \text{kips}$$

Allowable Tensile Force =

$$T_{\text{ALL.Gross}} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 105.8 \cdot \text{kips} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

$$T_{\text{ALL.Net}} := 1.333 \cdot (0.60 \cdot A_n \cdot F_y) = 106.912 \cdot \text{kips} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Bolt Tension % of Capacity =

$$\frac{T_{\text{Max}}}{T_{\text{ALL.Net}}} = 60.0\% \quad \text{Bolts are "upset bolts". Use net area per AISC}$$

Condition1 =

$$\text{Condition1} := \text{if} \left(\frac{T_{\text{Max}}}{T_{\text{ALL.Net}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$$

Condition1 = "OK"

Check Anchor Bolt Bending Stress:

Maximum Bending Moment =

$$M_x := \left(\frac{\text{Shear}}{N} \right) \cdot l = 0.075 \cdot \text{ft-kips}$$

Maximum Bending Stress =

$$f_{bx} := \frac{M_x}{S_x} = 2.7 \cdot \text{ksi}$$

Allowable Bending Stress =

$$F_{bx} := 1.333 \cdot 0.6 \cdot F_y = 60 \cdot \text{ksi} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Check Combined Stress Requirement:

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."

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \text{ in}$$

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

Check Anchor Bolt Compression/Combined Stress:

Maximum Compressive Force =

$$C_{Max} := OM \cdot \frac{R_{bc}}{l_p} + \frac{Axial}{N} = -27.4 \text{ kips}$$

Maximum Compressive Stress =

$$f_a := \frac{C_{Max}}{A_n} = -15.4 \text{ ksi}$$

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} = 87.364$$

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

Allowable Compressive Stress =

$$F_a := 1.333 \cdot F_a = 60 \text{ ksi} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Combined Stress % of Capacity =

$$\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \right) = -25.6 \%$$

Condition 2 =

$$\text{Condition2} := \text{if } \left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \right) \leq 1.00, \text{"OK"}, \text{"Overstressed"}$$

Condition2 = "OK"

Base Plate Analysis:

Force from Bolts =
$$C_i := \frac{OM \cdot d_i}{I_p} + \frac{|Axial|}{N}$$

$C_1 = 56.6 \cdot \text{kips}$

$C_6 = 35.0 \cdot \text{kips}$

$C_2 = 63.3 \cdot \text{kips}$

$C_7 = 28.3 \cdot \text{kips}$

$C_3 = 63.3 \cdot \text{kips}$

$C_8 = 28.3 \cdot \text{kips}$

$C_4 = 56.6 \cdot \text{kips}$

$C_9 = 35.0 \cdot \text{kips}$

$C_5 = 45.8 \cdot \text{kips}$

$C_{10} = 45.8 \cdot \text{kips}$

Maximum Bending Stress in Plate =
$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{(W_{eff} t_{bp}^2)} = 21.2 \cdot \text{ksi}$$

Allowable Bending Stress in Plate =
$$F_{bp} := 1.33 \cdot 0.75 \cdot F_y = 49.9 \cdot \text{ksi}$$

Plate Bending Stress % of Capacity =
$$\frac{f_{bp}}{F_{bp}} = 42.5 \cdot \%$$

Condition3 =
$$\text{Condition3} := \text{if} \left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed" \right)$$

Condition3 = "Ok"

Subject:

FLANGE BOLTS AND PLATE MAST

Location:

Cromwell, CT

Rev. 0: 12/3/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001- CO7

Flange Bolt and Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 95.0-ft-kips	(Input From Risa-3D LC #6)
Shear Force =	Shear := 5.0-kips	(Input From Risa-3D LC #6)
Axial Force =	Axial := 4.5-kips	(Input From Risa-3D LC #6)

Flange Bolt Data:

Use ASTM A325

Number of Flange Bolts =	N := 20
Diameter of Bolt Circle =	D _{bc} := 21.0-in
Bolt "Column" Distance =	l := .125-in
Bolt Ultimate Strenght =	F _u := 120-ksi
Bolt Yield Strenght =	F _y := 92-ksi
Bolt Modulus =	E := 29000-ksi
Diameter of Flange Bolts =	D := 1.00-in
Threads per Inch =	n := 8

Plate Data:

Use ASTM A572 Mod 50

Plate Yield Strength =	F _{ybp} := 50-ksi
Plate Thickness =	t _{bp} := 1.25-in
Plate Diameter =	D _{bp} := 24.00-in
Outer Pole Diameter =	D _{pole} := 18.00-in

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle = $R_{bc} := \frac{D_{bc}}{2} = 10.5 \cdot \text{in}$

Distance to Bolts = $i := 1 \dots N$

$$d_i := \begin{cases} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N} \right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{cases}$$

$d_1 = 3.24 \cdot \text{in}$	$d_6 = 9.99 \cdot \text{in}$
$d_2 = 6.17 \cdot \text{in}$	$d_7 = 8.49 \cdot \text{in}$
$d_3 = 8.49 \cdot \text{in}$	$d_8 = 6.17 \cdot \text{in}$
$d_4 = 9.99 \cdot \text{in}$	$d_9 = 3.24 \cdot \text{in}$
$d_5 = 10.50 \cdot \text{in}$	$d_{10} = 0.00 \cdot \text{in}$

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 9 \cdot \text{in}$

Moment Arms of Bolts about Neutral Axis = $MA_i := \text{if}(d_i \geq R_{pole}, d_i - R_{pole}, 0 \cdot \text{in})$

$MA_1 = 0.00 \cdot \text{in}$	$MA_6 = 0.99 \cdot \text{in}$
$MA_2 = 0.00 \cdot \text{in}$	$MA_7 = 0.00 \cdot \text{in}$
$MA_3 = 0.00 \cdot \text{in}$	$MA_8 = 0.00 \cdot \text{in}$
$MA_4 = 0.99 \cdot \text{in}$	$MA_9 = 0.00 \cdot \text{in}$
$MA_5 = 1.50 \cdot \text{in}$	$MA_{10} = 0.00 \cdot \text{in}$

Effective Width of plate for Bending =

$$W_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2} \right)^2 - \left(\frac{D_{pole}}{2} \right)^2} = 12.7 \cdot \text{in}$$

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia =

$$I_p := \sum_i (d_i)^2 = 1102.5 \cdot \text{in}^2$$

Gross Area of Bolt =

$$A_g := \frac{\pi}{4} \cdot D^2 = 0.785 \cdot \text{in}^2$$

Net Area of Bolt =

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot \text{in}}{n} \right)^2 = 0.606 \cdot \text{in}^2$$

Net Diameter =

$$D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 0.878 \cdot \text{in}$$

Radius of Gyration of Bolt =

$$r := \frac{D_n}{4} = 0.22 \cdot \text{in}$$

Section Modulus of Bolt =

$$S_x := \frac{\pi \cdot D_n^3}{32} = 0.066 \cdot \text{in}^3$$

Check Flange Bolt Tension Force:

Maximum Tensile Force =

$$T_{\text{Max}} := OM \cdot \frac{R_{bc}}{I_p} - \frac{\text{Axial}}{N} = 10.6 \cdot \text{kips}$$

Allowable Tensile Force =

$$T_{\text{ALL.Gross}} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 41.5 \cdot \text{kips} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Bolt Tension % of Capacity =

$$\frac{T_{\text{Max}}}{T_{\text{ALL.Gross}}} = 0.256 \quad \text{Bolts are "upset bolts". Use net area per AISC}$$

Condition1 =

$$\text{Condition1} := \text{if} \left(\frac{T_{\text{Max}}}{T_{\text{ALL.Gross}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$$

Condition1 = "OK"

Check Flange Bolt Bending Stress:

Maximum Bending Moment =

$$M_x := \left(\frac{\text{Shear}}{N} \right) \cdot l = 2.604 \times 10^{-3} \cdot \text{ft-kips}$$

Maximum Bending Stress =

$$f_{bx} := \frac{M_x}{S_x} = 0.5 \cdot \text{ksi}$$

Allowable Bending Stress =

$$F_{bx} := 1.333 \cdot 0.6 \cdot F_y = 73.6 \cdot \text{ksi} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Check Combined Stress Requirement:

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."

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n = 0 \cdot \text{in} \\ 0 & \text{otherwise} \end{cases}$$

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

Check Flange Bolt Compression/Combined Stress:

Maximum Compressive Force =

$$C_{Max} := OM \cdot \frac{R_{bc}}{I_p} + \frac{Axial}{N} = 11.1 \cdot \text{kips}$$

Maximum Compressive Stress =

$$f_a := \frac{C_{Max}}{A_n} = 18.3 \cdot \text{ksi}$$

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} = 78.881$$

$$F_a := \begin{cases} \frac{\left[1 - \frac{\left(\frac{K \cdot l}{r} \right)^2}{2 \cdot C_c^2} \right] \cdot F_y}{\frac{5}{3} + \frac{3 \cdot \left(\frac{K \cdot l}{r} \right)}{8 \cdot C_c} - \frac{\left(\frac{K \cdot l}{r} \right)^3}{8 \cdot C_c^3}} \cdot F_y & \text{if } \frac{K \cdot l}{r} \leq C_c = 55.2 \cdot \text{ksi} \\ \frac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r} \right)^2} & \text{if } \frac{K \cdot l}{r} > C_c \end{cases}$$

Allowable Compressive Stress =

$$F_a := 1.333 \cdot F_a = 73.6 \cdot \text{ksi} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Combined Stress % of Capacity =

$$\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \right) = 0.249$$

Condition 2 =

$$\text{Condition2} := \text{if} \left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$$

Condition2 = "OK"

Subject:

FLANGE BOLTS AND PLATE MAST

Location:

Cromwell, CT

Rev. 0: 12/3/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001- CO7

Plate Analysis:

Force from Bolts =
$$C_i := \frac{OM \cdot d_i}{I_p} + \frac{|Axial|}{N}$$

$C_1 = 3.6 \text{ kips}$

$C_6 = 10.6 \text{ kips}$

$C_2 = 6.6 \text{ kips}$

$C_7 = 9.0 \text{ kips}$

$C_3 = 9.0 \text{ kips}$

$C_8 = 6.6 \text{ kips}$

$C_4 = 10.6 \text{ kips}$

$C_9 = 3.6 \text{ kips}$

$C_5 = 11.1 \text{ kips}$

$C_{10} = 0.2 \text{ kips}$

Maximum Bending Stress in Plate =
$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{(W_{eff} t_{bp})^2} = 11.3 \text{ ksi}$$

Allowable Bending Stress in Plate =
$$F_{bp} := 1.33 \cdot 0.75 \cdot F_y = 49.9 \text{ ksi}$$

Plate Bending Stresse % of Capacity =
$$\frac{f_{bp}}{F_{bp}} = 0.227$$

Condition3 =
$$\text{Condition3} := \text{if} \left(\frac{f_{bp}}{F_{bp}} < 1.00, \text{"Ok"}, \text{"Overstressed"} \right)$$

Condition3 = "Ok"

Subject:

ANCHOR BOLT AND BASE PLATE
ANALYSIS

Location:

Cromwell, CT

Rev. 0: 12/3/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO7

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 660-ft-kips	(Input From Risa-3D LC # 4)
Shear Force =	Shear := 24-kips	(Input From Risa-3D LC # 4)
Axial Force =	Axial := -222-kips	(Input From Risa-3D LC # 4)

Anchor Bolt Data:

Use ASTM A36

Number of Anchor Bolts =	N := 20	(User Input)
Bolt Ultimate Strenght =	$F_u := 100\text{-ksi}$	(User Input)
Bolt Yeild Strenght =	$F_y := 75\text{-ksi}$	(User Input)
Bolt Modulus =	E := 29000-ksi	(User Input)
Diameter of Anchor Bolts =	$D_b := 1.5\text{-in}$	(User Input)
Threads per Inch =	$n_b := 4$	(User Input)

Base Plate Data:

Use ASTM 36

Plate Yield Strength =	$F_{y_{bp}} := 36\text{-ksi}$	(User Input)
Base Plate Thickness =	$t_{bp} := 1.5\text{-in}$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

$$d_1 := 17.125\text{in} \quad (\text{User Input})$$

$$d_2 := 11.25\text{in} \quad (\text{User Input})$$

$$d_3 := 4.9375\text{in} \quad (\text{User Input})$$

Number of Bolts at Distance:

$$N_1 := 12$$

$$N_2 := 4$$

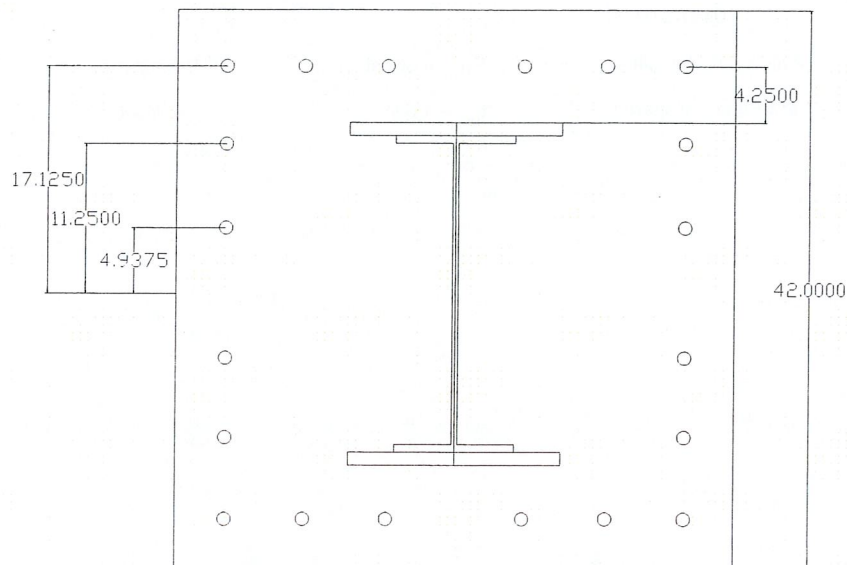
$$N_3 := 4$$

Critical Distances For Bending in Plate:

$$m_{a1} := 4.25\text{in} \quad (\text{User Input})$$

Effective Width of Baseplate for Bending =

$$B_{\text{eff}} := 42\text{in} \quad (\text{User Input})$$



ANCHOR BOLT AND PLATE GEOMETRY

Base Plate Analysis:

Length of Base Plate =

$$D := 42\text{in}$$

Width of Base Plate =

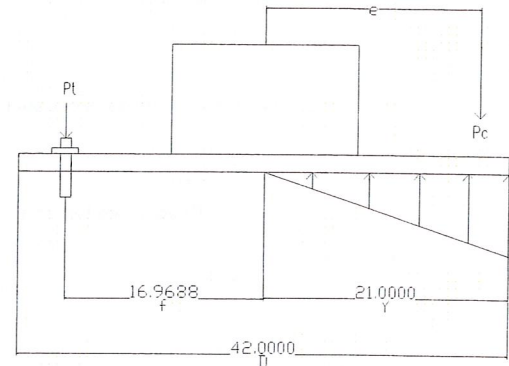
$$B := 42\text{in}$$

Length of Stress Distribution =

$$Y := 21\text{in}$$

Distance from NA to Bolts in Tension =

$$f := 17\text{in}$$



Modular Ratio =

$$n := \frac{E_s}{57 \cdot \sqrt{E_c}} = 9.29$$

Area of Steel in Tension Zone =

$$A_s := 7.5\text{in}^2$$

$$K_1 := \frac{6n \cdot A_s}{B} = 0.829\text{ft}$$

Eccentricity =

$$e := \frac{\left(K_1 \cdot f^2 + K_1 \cdot \frac{D}{2} \cdot f - K_1 \cdot f \cdot Y + \frac{3}{2} \cdot D \cdot Y^2 - Y^3 \right)}{\left(3 \cdot Y^2 + K_1 \cdot Y - K_1 \cdot \frac{D}{2} - K_1 \cdot f \right)} = 18.546\text{in}$$

Compression Force =

$$P_c := \frac{OM}{e} = 427\text{kips}$$

Uplift Force =

$$P_t := -P_c \cdot \left[\frac{\left(\frac{D}{2} - \frac{Y}{3} - e \right)}{\left(\frac{D}{2} - \frac{Y}{3} + f \right)} \right] = 63\text{kips}$$

Bearing Force on Grout =

$$\sigma_c := 2 \cdot \frac{(P_c + P_t)}{Y \cdot B} = 1110\text{psi}$$

Total Uplift Force =

$$F := P_t - 6 \cdot \frac{\text{Axial}}{N} = 129\text{kips}$$

Applied Bending Stress in Plate =

$$f_{bp} := \frac{6 \cdot (F \cdot m a_1)}{B_{eff} t_{bp}^2} = 34.87\text{ksi}$$

Subject:

ANCHOR BOLT AND BASE PLATE
ANALYSIS

Location:

Cromwell, CT

Rev. 0: 12/3/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO7

Allowable Bending Stress in Plate =

$$F_{bp} := 1.33 \cdot 0.75 \cdot F_{ybp} = 35.9 \text{ ksi}$$

Plate Bending Stress % of Capacity =

$$\frac{f_{bp}}{F_{bp}} = 0.97$$

Check Plate Bending Stress

$$\text{Plate_Bending_Stress} := \text{if} \left(\frac{f_{bp}}{F_{bp}} < 1.00, \text{"Ok"}, \text{"Overstressed"} \right)$$

Plate_Bending_Stress = "Ok"

Allowable Bearing Capacity of Grout =

$$\sigma_{all} := 3000 \text{ psi}$$

Bearing Percent of Capacity =

$$\frac{\sigma_c}{\sigma_{all}} = 0.37$$

$$\text{Grout_Bearing_Capacity} := \text{if} (\sigma_{all} > \sigma_c, \text{"OK"}, \text{"NG"})$$

Grout_Bearing_Capacity = "OK"

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia =

$$I_p := \left[(d_1)^2 \cdot N_1 + (d_2)^2 \cdot N_2 + (d_3)^2 \cdot N_3 \right] = 4123 \cdot \text{in}^2$$

Gross Area of Bolt =

$$A_g := \frac{\pi}{4} \cdot D_b^2 = 1.767 \cdot \text{in}^2$$

Net Area of Bolt =

$$A_n := \frac{\pi}{4} \cdot \left(D_b - \frac{0.9743 \cdot \text{in}}{n_b} \right)^2 = 1.24 \cdot \text{in}^2$$

Net Diameter =

$$D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 1.256 \cdot \text{in}$$

Radius of Gyration of Bolt =

$$r := \frac{D_n}{4} = 0.314 \cdot \text{in}$$

Section Modulus of Bolt =

$$S_x := \frac{\pi \cdot D_n^3}{32} = 0.195 \cdot \text{in}^3$$

Check Anchor Bolt Tension Force:

Maximum Tensile Force =

$$T_{\text{Max}} := \frac{P_t}{6} - \frac{\text{Axial}}{N} = 21.5 \cdot \text{kips}$$

Allowable Tensile Force (Gross Area) =

$$T_{\text{ALL.Gross}} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 77.7 \cdot \text{kips} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Allowable Tensile Force (Net Area) =

$$T_{\text{ALL.Net}} := 1.333 \cdot (0.60 \cdot A_n \cdot F_y) = 74.4 \cdot \text{kips} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Bolt Tension % of Capacity =

$$\frac{T_{\text{Max}}}{T_{\text{ALL.Net}}} \cdot 100 = 29 \quad \text{Bolts are "upset bolts". Use net area per AISC}$$

Condition1 =

$$\text{Bolt_Tension} := \text{if} \left(\frac{T_{\text{Max}}}{T_{\text{ALL.Net}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$$

Bolt_Tension = "OK"

Note Shear stress is negligible

Subject:

FOUNDATION

Location:

Cromwell, CT

Rev. 0: 12/3/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO7

Foundation Check

Base Reactions:

$$OM_1 := 559 \cdot \text{kip} \cdot \text{ft}$$

$$\text{Axial}_1 := -222 \cdot \text{kips}$$

$$\text{Shear}_1 := 19 \cdot \text{kips}$$

$$OM_2 := 660 \cdot \text{kip} \cdot \text{ft}$$

$$\text{Axial}_2 := -222 \cdot \text{kips}$$

$$\text{Shear}_2 := 23 \cdot \text{kips}$$

$$OM_m := 92 \cdot \text{kip} \cdot \text{ft}$$

$$\text{Axial}_m := 485 \cdot \text{kips}$$

$$\text{Shear}_m := 3 \cdot \text{kips}$$

Foundation Data:

$$D1 := 1.29 \cdot \text{ft}$$

$$D2 := 2 \cdot \text{ft}$$

$$D3 := 3 \cdot \text{ft}$$

$$D4 := 3 \cdot \text{ft}$$

$$D_{\text{tot}} := 7.17 \cdot \text{ft}$$

$$W1 := 6 \cdot \text{ft}$$

$$W2 := 21.5 \cdot \text{ft}$$

$$W3 := 26.5 \cdot \text{ft}$$

$$W4 := 55 \cdot \text{ft}$$

$$L1 := 6 \cdot \text{ft}$$

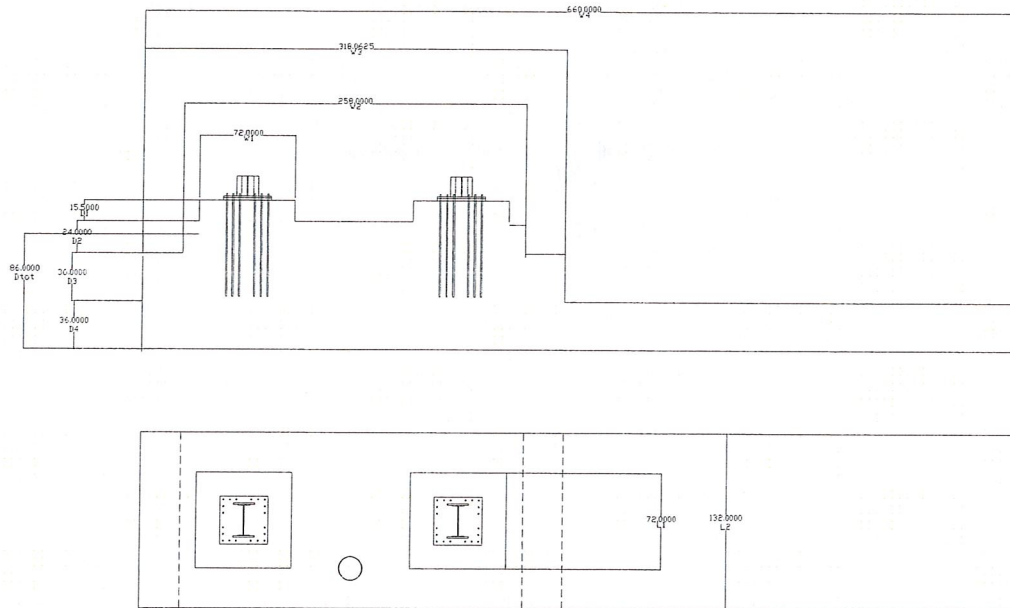
$$L2 := 11 \cdot \text{ft}$$

Material Data;

$$\gamma_{\text{conc}} := 150 \cdot \text{pcf}$$

$$\gamma_{\text{soil}} := 100 \cdot \text{pcf}$$

$$\Phi_s := 30 \cdot \text{deg}$$



Volume of Concrete =

$$V_c := (D1 \cdot W1 \cdot L1) + (D2 \cdot W2 + D3 \cdot W3 + D4 \cdot W4) \cdot L2 = 3209 \cdot \text{ft}^3$$

Volume of Soil Above Footing =

$$V_{s1} := [(D2 - 10 \cdot \text{in}) \cdot (W3 - W2) + [(D2 - 10 \cdot \text{in}) + D3] \cdot (W4 - W3)] \cdot L2 = 1370 \cdot \text{ft}^3$$

Volume of Soil Wedge at Back Face =

$$V_{s2} := D_{\text{tot}}^2 \cdot W4 \cdot \tan(\Phi_s) = 1632 \cdot \text{ft}^3$$

Volume of Soil Wedge at Back Face Corners =

$$V_{s3} := 2 \cdot \left[\left(D_{\text{tot}} \right)^3 \cdot \frac{\tan(\Phi_s)}{3} \right] = 142 \cdot \text{ft}^3$$

Weight of Concrete =

$$W_c := V_c \cdot \gamma_{\text{conc}} = 481 \cdot \text{kips}$$

Weight of Soil Above Footing =

$$W_{s1} := V_{s1} \cdot \gamma_{\text{soil}} = 137 \cdot \text{kips}$$

Weight of Soil Wedge at Back Face =

$$W_{s2} := V_{s2} \cdot \gamma_{\text{soil}} = 163 \cdot \text{kips}$$

Weight of Soil Wedge at Back Face Corners =

$$W_{s3} := V_{s3} \cdot \gamma_{\text{soil}} = 14 \cdot \text{kips}$$

Subject:

FOUNDATION

Location:

Cromwell, CT

Rev. 0: 12/3/09

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001-CO7

$$M_r := (W_c + W_{s1} + Axial_1 + Axial_2 + Axial_m) \cdot \frac{L2}{2} + (W_{s2} + W_{s3}) \left(L2 + \frac{D_{tot} \tan(\Phi_s)}{2} \right) = 5946 \text{ kip}\cdot\text{ft}$$

$$M_{ot} := OM_1 + OM_2 + OM_m + (Shear_1 + Shear_2 + Shear_m) \cdot D_{tot} = 1634 \text{ kip}\cdot\text{ft}$$

$$FS := \frac{M_r}{M_{ot}} = 3.6$$

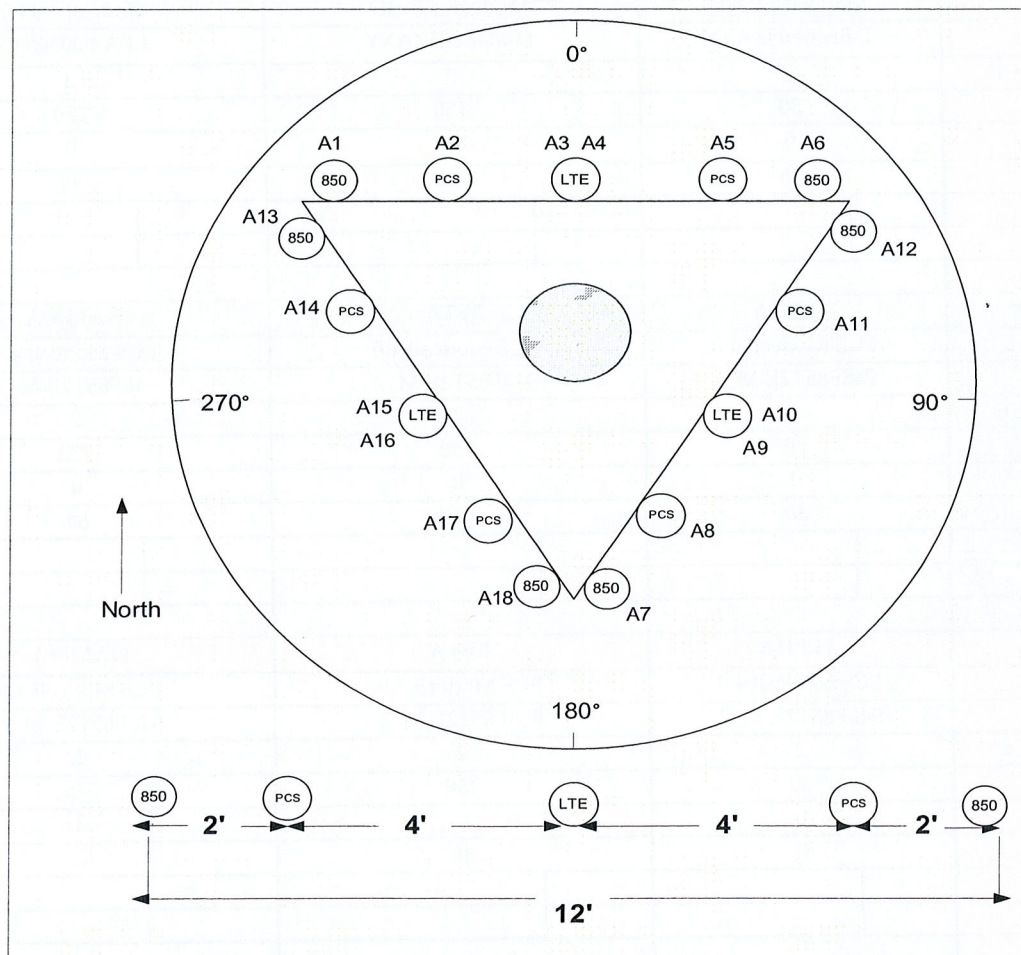
$$\text{Condition1} := \text{if} \left(\frac{M_r}{M_{ot}} > 2, \text{"OK"}, \text{"Overstressed"} \right)$$

Condition1 = "OK"

SITE NAME	CROMWELL SW CT		ECP - CELL #		8	155
LATITUDE		41-36-22.36 N		LONGITUDE	72-42-04.34 W	
Additional Comments:				ORIENTATION		
				STRUCTURE TYPE		SIGN
700 Mhz - LTE ANTENNA ADD		ALPHA	BETA		GAMMA	
EQUIPMENT TYPE		Lucent		Lucent		Lucent
ANTENNA TYPE		BXA-70063-6CF		BXA-70063-6CF		BXA-70063-6CF
QTY OF ANTENNAS PER FACE		1		1		1
ORIENTATION (DEG)		30		150		270
DOWN TILT (MECH/DEG)		0		0		0
RAD CTR (FT AGL)		88		88		88
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
MCPA BRICKS (QTY)						
850 Cellular - Current Config		ALPHA	BETA		GAMMA	
EQUIPMENT TYPE		Modcell 4.0 HD		Modcell 4.0 HD		Modcell 4.0 HD
ANTENNA TYPE		ALP9212		ALP9212		ALP9212
QTY OF ANTENNAS PER FACE		2		2		2
ORIENTATION (DEG)		30		150		270
DOWN TILT (MECH/DEG)		0		0		0
RAD CTR (FT AGL)		88		88		88
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
MCPA BRICKS (QTY)						
850 Cellular - Future Config		ALPHA	BETA		GAMMA	
EQUIPMENT TYPE		Modcell 4.0 HD		Modcell 4.0 HD		Modcell 4.0 HD
ANTENNA TYPE		DB846F65ZAXY		DB846F65ZAXY		LPA-80080/6CF
QTY OF ANTENNAS PER FACE		2		2		2
ORIENTATION (DEG)		30		150		270
DOWN TILT (MECH/DEG)		0		2		0
RAD CTR (FT AGL)		88		88		88
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
MCPA BRICKS (QTY)						
1900 Cellular - Current Config		ALPHA	BETA		GAMMA	
EQUIPMENT TYPE		PCS Modcell 4.0		PCS Modcell 4.0		PCS Modcell 4.0
ANTENNA TYPE		948F85T2E-M_2		948F85T2E-M_2		948F85T2E-M_2
QTY OF ANTENNAS PER FACE		2		2		2
ORIENTATION (DEG)		30		150		270
DOWN TILT (MECH/DEG)		0		0		0
RAD CTR (FT AGL)		88		88		88
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
MCPA BRICKS (QTY)						
1900 Cellular - Future Config		ALPHA	BETA		GAMMA	
EQUIPMENT TYPE		PCS Modcell 4.0		PCS Modcell 4.0		PCS Modcell 4.0
ANTENNA TYPE		948F85T2E-M_2		948F85T2E-M_2		948F85T2E-M_2
QTY OF ANTENNAS PER FACE		2		2		2
ORIENTATION (DEG)		30		150		270
DOWN TILT (MECH/DEG)		0		0		0
RAD CTR (FT AGL)		88		88		88
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
MCPA BRICKS (QTY)						

NUMBER OF CABLE'S NEEDED								ESTIMATED CABLE LENGTH			
MAINLINE SIZE		1 5/8"		TOTAL # OF MAINLINES		18		MAINLINE (FT)		115	
JUMPER SIZE		1/2 "		TOTAL # OF TOP JUMPERS		18		TOP JUMPER (FT)		10	
TX / RX FREQUENCIES								TX POWER OUTPUT			
Cellular A-Band				PCS F-Band		700 Mhz C - B		Cellular (Watts)		20	
TX - 869-880,890-891.5 MHz				TX - 1970-1975		TX - 746-757		PCS (Watts)		16	
RX - 824-835,845-846.5 MHz				RX - 1890-1895		RX - 776-787		LTE (Watts)		40	
ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE	A8	1900	Tx2/Rx0	BLUE/ WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE	A9	700	Tx2/Rx0	BLUE/ ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN
RF ENGINEER						RF MANAGER		INITIALS		DATE	
Prepared By : Dany Bustamante						Steve Weatherbee		DB		11/25/2009	

Site Configuration



Mechanical specifications

Length	1800 mm	70.9 in
Width	140 mm	5.5 in
Depth	335 mm	13.2 in
Depth with z-bracket	375 mm	14.8 in
Weight ⁴⁾	9.5 kg	21.0 lbs
Wind Area Fore/Aft ⁶⁾	0.25 m ²	2.7 ft ²
Wind Area Side ⁶⁾	0.61 m ²	6.6 ft ²
Max Wind Survivability ⁶⁾	>201 km/hr	>125 mph
Wind Load @ 100 mph (161 km/hr) ⁶⁾		
Fore/Aft	415 N	93 lbf
Side	878 N	198 lbf

Antenna consisting of aluminum alloy with brass feedlines covered by a gray, UV safe fiberglass radome. RoHS compliant.

Mounting & Downtilting

Mounting hardware attaches to pipe diameter Ø50-102 mm; Ø2.0-4.0 in. If the lock-down brace is used, the maximum diameter is Ø88.9 mm (3.5 in).

Mechanical downtilt angle 0-22°

Mounting & Downtilt Bracket Kit 21700000

Electrical specifications

Frequency Range	806-960 MHz
Impedance	50Ω
Connector ³⁾	NE or E-DIN Female 1 port / Center
VSWR ¹⁾	≤ 1.4:1
Polarization	Vertical
Gain ¹⁾	14 dBd
Power Rating ²⁾	500 W
Half Power Angle ¹⁾	
Horizontal Beamwidth	80°
Vertical Beamwidth	10°
Electrical downtilt ⁵⁾	0°
Null fill ¹⁾	10%
Lightning protection	Direct ground

1) Typical values.

2) Power rating limited by connector only.

3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.

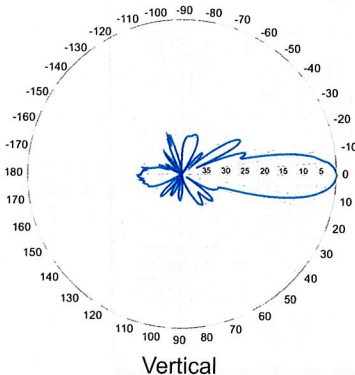
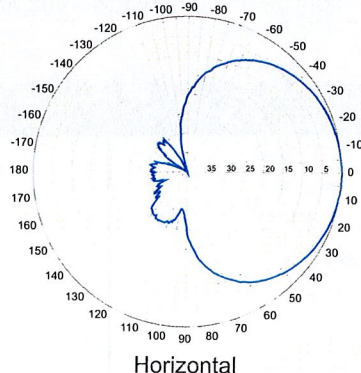
4) Antenna weight does not include brackets.

5) Add'l downtilts may be available. Check website for details.

6) Values reflect installation with all three brackets utilized.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation-pattern¹⁾

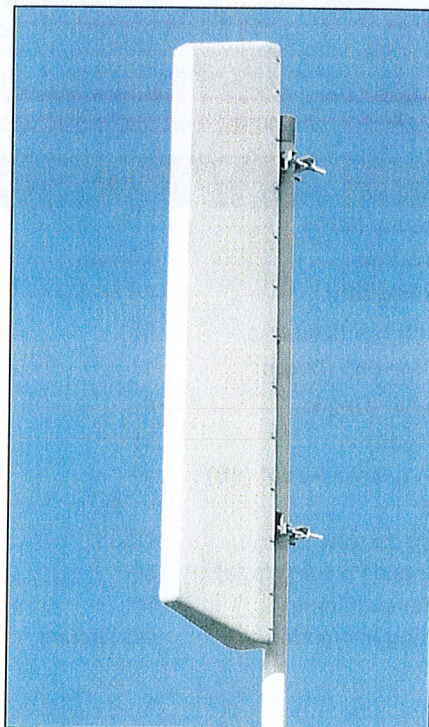


Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the front-to-back ratio.

LPA-80080/6CF

When ordering replace " " with connector type.



Featuring our Exclusive
3T Technology™
Antenna Design:

- True log-periodic design allows for superior front-to-side characteristics to minimize sector overlap.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

Warranty:

This antenna is under a five-year limited warranty for repair or replacement.

Revision Date: 08/18/08

806-960 MHz



DB846F65ZAXY

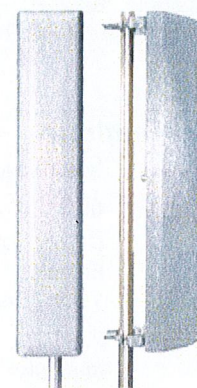
Directed Dipole Antenna

Decibel®
Base Station Antennas

- Exceptional azimuth roll off reducing soft hand offs and improving capacity
- Strong null filling for below horizon RF penetration
- Extremely rugged, reliable design yet lightweight for low tower loading
- Air dielectric feed system

ELECTRICAL

Frequency (MHz) :	806 - 896	870 - 960
Polarization :	Vertical	Vertical
Gain (dBd/dBi) :	14.5/16.6	14.8/16.9
Azimuth BW (Deg.):	65	60
Elevation BW (Deg.):	11	10.5
Beam Tilt (Deg.):	0	0
USLS* (dB) :	15	15
Front-To-Back Ratio* (dB) :	40	40
VSWR :	<1.33:1	<1.33:1
PIM3 @ 2 x 20w (dBc) :	-150	-150
Max. Input Power (Watts) :	500	500
Impedance (Ohms) :	50	50
Lightning Protection :	DC Ground	DC Ground



MECHANICAL

Weight :	9.5 kg (21 lb)
Dimensions (LxWxD) :	1,829 x 254 x 216 mm (72 x 10 x 8.5 in)
Max. Wind Area :	0.15 m ² (1.6 ft ²)
Max. Wind Load (@ 100 mph) :	386.9 N (87 lbf)
Max. Wind Speed :	241 km/h (150 mph)
Hardware Material :	Galvanized Steel
Connector Type :	7-16 DIN - Female (1, Back)
Color :	Light Gray
Standard Mounting Hardware :	DB380
Standard Downtilt Mounting Hardware :	DB5083

Andrew Corporation
2601 Telecom Parkway
Richardson, Texas U.S.A 75082-3521
Tel: 214.631.0310

Fax: 214.631.4706
Toll Free Tel: 1.800.676.5342
Fax: 1.800.229.4706
www.andrew.com

* - Indicates Typical
4/13/2007
dbtech@andrew.com

Information correct at date of issue but may be subject to change without notice.



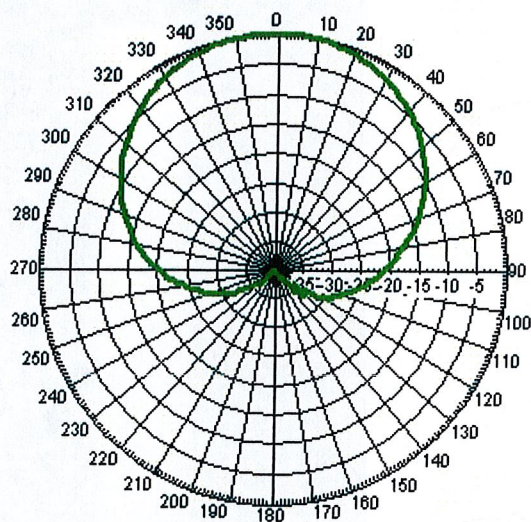
DB846F65ZAXY

Directed Dipole Antenna

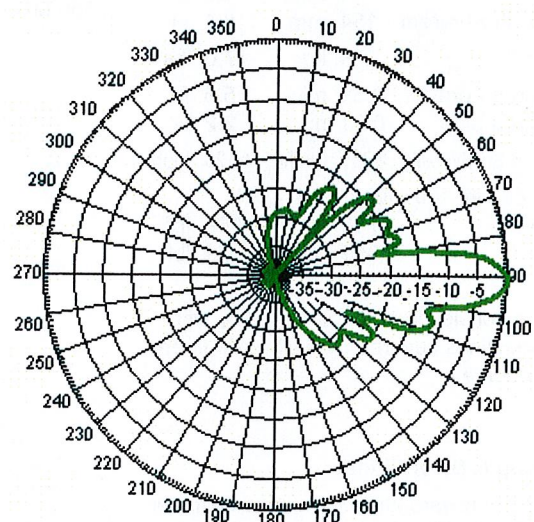
Decibel®
Base Station Antennas

AZIMUTH PATTERN

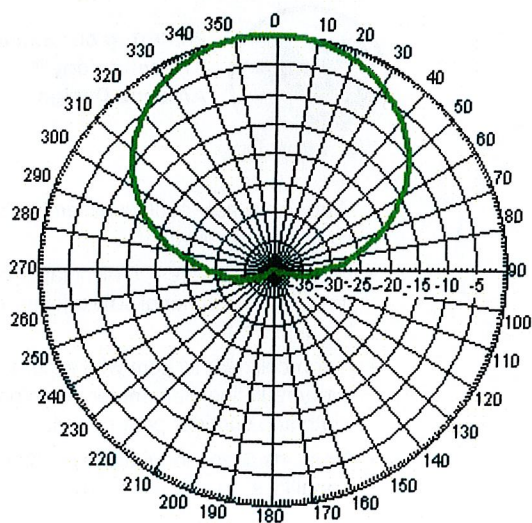
ELEVATION PATTERN



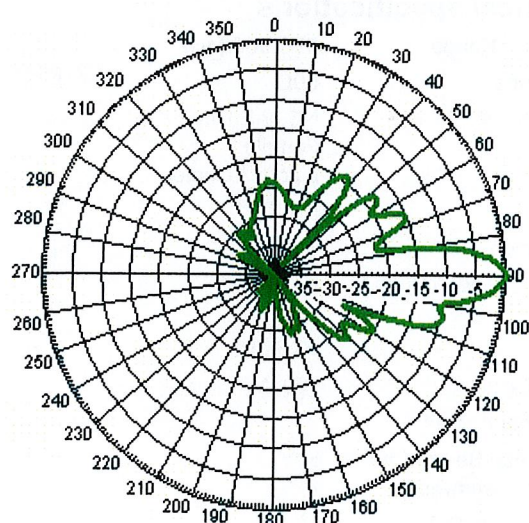
Freq: 850 MHz, Tilt: 0



Freq: 850 MHz, Tilt: 0



Freq: 940 MHz, Tilt: 0



Freq: 940 MHz, Tilt: 0

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* - Indicates Typical
4/13/2007
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Information correct at date of issue but may be subject to change without notice.

Mechanical specifications

Length	1804 mm	71.0 in
Width	285 mm	11.2 in
Depth	114 mm	4.5 in
Depth with z-bracket	154 mm	6.1 in
Weight ⁴⁾	7.9 kg	17.0 lbs
Wind Area Fore/Aft	0.51 m ²	5.5 ft ²
Wind Area Side	0.21 m ²	2.2 ft ²
Max Wind Survivability	>201 km/hr	>125 mph
Wind Load @ 100 mph (161 km/hr)		
Fore/Aft	753 N	169 lbf
Side	351 N	79 lbf

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiber-glass radome.

Mounting & Downtilting

Mounting hardware attaches to pipe diameter $\varnothing 50$ -160 mm; $\varnothing 2.0$ -6.3 in

Mounting Bracket Kit	36210002
Downtilt Bracket Kit	36114003

Electrical specifications

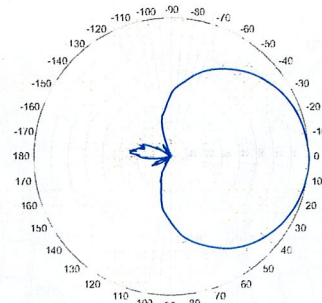
Frequency Range	696-900 MHz
Impedance	50 Ω
Connector ³⁾	NE or E-DIN Female 2 ports / Center
VSWR ¹⁾	$\leq 1.35:1$
Polarization	Slant $\pm 45^\circ$
Isolation Between Ports ¹⁾	< -25 dB
Gain ¹⁾	14.5 dBd 16.5 dBi
Power Rating ²⁾	500 W
Half Power Angle ¹⁾	
Horizontal Beamwidth	63°
Vertical Beamwidth	11°
Electrical downtilt ⁵⁾	0°
Null fill ¹⁾	5%
Lightning protection	Direct ground

Patented Dipole Design: U.S. Patent No. 6,608,600 B2

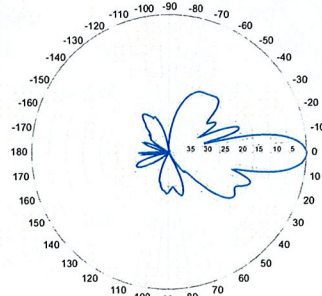
- 1) Typical values.
- 2) Power rating limited by connector only.
- 3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.
- 4) Antenna weight does not include brackets.
- 5) Add'l downtilts may be available. Check website for details.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation-pattern¹⁾
750 MHz

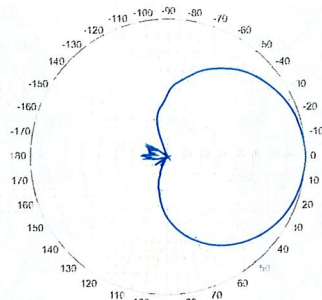


Horizontal

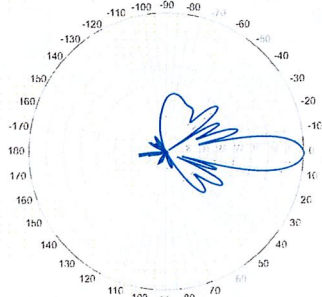


Vertical

850 MHz



Horizontal

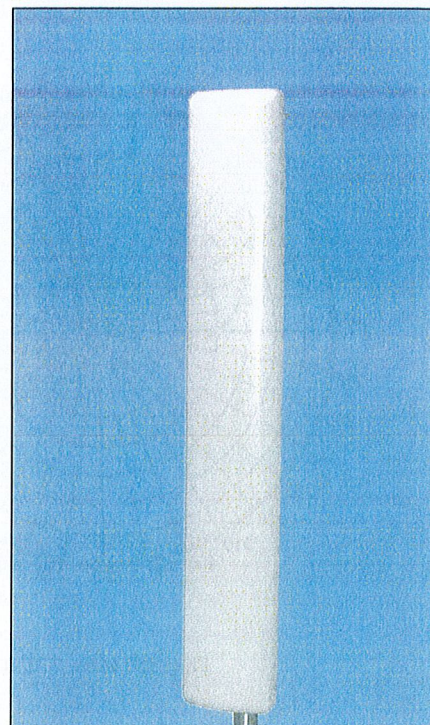


Vertical

696-900 MHz

BXA-70063/6CF

When ordering replace " " with connector type.



Featuring our Exclusive
3T Technology™
Antenna Design:

- Watercut brass feedline assembly for consistent performance.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

Warranty:

This antenna is under a five-year limited warranty for repair or replacement.

Revision Date: 01/08/09