STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
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E-Mail: siting.council@ct.gov
Web Site: www.ct.gov/csc

VIA ELECTRONIC MAIL

June 16, 2020

Kristina Cottone
Smartlink, LLC
Building 3, Suite 102
North Billerica, MA 01862

RE: **EM-AT&T-009-200604** – AT&T Mobility, LLC notice of intent to modify an existing telecommunications facility located at 7 Stony Hill Road, Bethel, Connecticut.

Dear Ms. Cottone:

The Connecticut Siting Council (Council) is in receipt of your correspondence of June 12, 2020 submitted in response to the Council's June 12, 2020 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

s/ Melanie A. Bachman

Melanie A. Bachman
Executive Director

MAB/IN/emr

From: Kristina Cottone <kristina.cottone@smartlinkgroup.com>
Sent: Friday, June 12, 2020 3:30 PM
To: Robidoux, Evan <Evan.Robidoux@ct.gov>
Cc: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: RE: Council Incomplete Letter for EM-AT&T-009-200604 (Stony Hill Road, Bethel)

Hi Evan,

Sorry about that, it looks like this is an issue when I combine these pdf files, and the signatures disappear. The signatures are on the hard copies I sent to your office as well. Please see attached SA and MA signed.

Have a great weekend.

Kristina Cottone
Real Estate Specialist
Smartlink
c. 978-551-8627

PAUL J. FORD & COMPANY

Report Date:	May 21, 2019
Client:	Smartlink, LLC 85 Rangeway Rd North Billerica, MA 01862-2105
Utility Name:	Eversource
Structure:	Existing 140-ft Transmission Pole #10254
Line Reference:	Long Mountain - Plumtree - 345kV Line
Site Name:	AT&T – Bethel Stony Hill – AWS – CTL05176
Site Name:	Stony Hill - CTL05176
Site Address:	7 Stony Hill Rd
City, County, State:	Bethel, Fairfield County, CT
Latitude,Longitude:	41.415792, -73.401700
PJF Project:	A80618-0011.002.6190_R2

Paul J. Ford and Company is pleased to submit this "**Mount Modification Report**". The purpose of this analysis is to determine if the mount has sufficient capacity to support the proposed equipment described herein.

Analysis Criteria:

Reference Standard:	2018 Connecticut State Building Code with the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1.
Ultimate Wind Speed:	120 mph 3-second gust wind speed without ice
Nominal Wind Speed:	93 mph 3-second gust wind speed without ice
Ice Wind Speed:	50 mph 3-second gust wind speed with 0.75" ice
IBC Site Criteria:	Risk Category II, Topographic Category 1, Exposure Category C

Proposed Appurtenance Loads:

The mount was analyzed with the addition of the proposed appurtenance loads shown in Table 1 combined with the existing loads shown in Table 2 of this report.

Summary of Analysis Results:

Existing Antenna Mount: **Pass @ 80.0%***

***Sufficient upon completion of changes listed in the 'Recommendations' section of this report.**

We at Paul J. Ford and Company appreciate the opportunity of providing our continuing professional services to you and Smartlink, LLC. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully Submitted by:
Paul J. Ford and Company

Charles E. Carrillo, P.E.
Project Engineer
ccarrillo@pauljford.com

CEH

05/22/2019

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 140 ft transmission pole with an existing mount at the 145.0-ft centerline.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2018 Connecticut State Building Code based upon a nominal 3-second gust wind speed of 93 mph per section 1609.3.1 as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II, Exposure Category C and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1.0 were used in this analysis.

Table 1 – Proposed Antenna Information

Mounting Level (feet)	Center Line Elevation (feet)	Number of Antennas	Antenna Manufacturer	Antenna Model	Note
145.0	147.0	1	SitePro1	HRK12 (Assembly)	-
	145.0	3	CCI	HPA65R-BU6A (Antenna)	-
		6	CCI	TMABPD7823VG12A (TMA)	

Notes:
1) Proposed equipment

Table 2 – Existing Antenna Information

Mounting Level (feet)	Center Line Elevation (feet)	Number of Antennas	Antenna Manufacturer	Antenna Model	Note
145.0	145.0	3	Powerwave	7770 (Antenna)	1
		6	Powerwave	LGP 21401 (TMA)	
		3	Powerwave	P65-16-XLH-RR (Antenna)	2
		3	CCI	DTMABP7819VG12A (TMA)	
		3	Quintel	QS665112-2 (Antenna)	1
		6	Kaelus	TMA2117F00V1-1 (TMA)	
		1	SitePro1	RMV12-372 (Triple T-Arm)	3

Notes:
1) Existing equipment
2) Equipment to be removed and not considered in this analysis
3) To be relocated from elevation of 145' to elevation of 143'

3) ANALYSIS PROCEDURE

Table 3 – Documents Provided

Document	Remarks	Reference	Source
Mount Drawings	SitePro1, 07/13/2014	HRK12	Eversource
Site Photos	-	-	
RF Data Sheet	AT&T V5.0, 01/23/2019	Bethel Stony Hill AWS	AT&T
Previous Mount Analysis	PJF, 11/20/2018	80618-0011.001.6190	PJF
	PJF, 03/11/2019	80618-0011.001.6190_R1	
Mount Modification Drawings	PJF, 05/21/2019	80618-0011.002.6190_R2	

3.1) Analysis Method

RISA-3D (version 15.0.4), a commercially available analysis software package, was used to create a three-dimensional model of the mount and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) *The analysis of the existing transmission pole or the effect of the mount attachment to the tower is not within the current scope of work.*
2) *The antenna mounting system was properly fabricated, installed and maintained in good condition, twist free and plumb in accordance with its original design and manufacturer's specifications and all bolts are tightened as specified by the manufacturer and AISC requirements.*
3) *The configuration of antennas, mounts, and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.*
4) *All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.*
5) *This analysis will be required to be revised if the existing conditions in the field differ from those shown in the above referenced documents or assumed in this analysis. No allowance was made for any damaged, missing, or rusted members.*
6) *Steel grades have been assumed as follows:*
   - *a) Channel, Solid Round, Angle, Plate, Unistrut — ASTM A36 (GR 36)*
   - *b) Pipe — ASTM A53 (GR 35)*
   - *c) HSS (Rectangular) — ASTM 500 (GR B-46)*
   - *d) Connection Bolts — ASTM A325*
7) *This analysis was performed based on manufacturer's drawings and existing photos.*

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 – Mount Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Mount Pipes	145.0	80.0	Pass
1	Face Horizontal		63.6	Pass
1	Standoff		53.0	Pass
1	Handrail		41.4	Pass

Structural Rating (max from all components) =	80.0%

Notes:
1. See additional documentation in "Appendix A – RISA 3D Output" for calculations supporting the % capacity consumed.

4.1) Recommendations

- Install the proposed modifications referenced in Table 3 of this report.

5) CONCLUSION

The mount will have sufficient capacity to carry the proposed loading configuration once the recommendations are met and properly installed.

This analysis is presented based upon the assumptions listed herein and information provided by the wireless carrier. If the existing conditions are different than those presented here, Paul J. Ford and Company should be contacted to verify the validity of the conclusions presented here.

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

1) It is the responsibility of the client to ensure that the information provided to Paul J. Ford and Company is accurate and complete. Paul J. Ford and Company will rely on the accuracy and completeness of such information in performing or furnishing services under this project.

2) If the existing conditions are not as represented on the referenced drawings and/or documents, Paul J. Ford and Company should be contacted immediately to evaluate the significance of the deviation.

3) The mount has been analyzed according to the minimum design loads recommended by the Reference Standard. If additional design loads are required, Paul J. Ford and Company should be made aware of this prior to the start of the project.

4) The standard of care for all Professional Engineering Services performed or furnished by Paul J. Ford and Company under this project will be the skill and care used by members of the Consultant's profession practicing under similar circumstances at the same time and in the same locality.

5) All Services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. Paul J. Ford and Company is not responsible for the conclusions, opinions and/or recommendations made by others based on the information supplied herein.

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APPENDIX A

LOAD CALCULATIONS

Equipment Loads - TIA-222-G Calculations

Design Data as per TIA-222-G

Wind Speed w/o Ice:	$V := 93$	mph	User Input - See 2018 CT State Building Code - Appendix N
Wind Speed w/ Ice:	$Vi := 50$	mph	User Input - See Annex B of TIA-222-G
Radial Ice Thickness:	$ti := 0.75\ in$		User Input - See Annex B of TIA-222-G
Radial Ice Density:	$Id := 57\ pcf$		User Input - See Annex B of TIA-222-G
Height to Center of Antennas:	$z_{carrier\_1} := 145\ ft$		User Input
Structure Type:	$ST :=$ "Pole"		User Input
Structure Class:	$SC :=$ "III"		User Input - Table 2-1 - TIA-222-G
Exposure Category:	$Exp :=$ "C"		User Input - Section 2.6.5.1 - TIA-222-G
Wind Direction Probability Factor:	$Kd := 0.95$		User Input - Table 2-2 - TIA-222-G
Importance Factor, Wind:	$I_{wind} := 1.15$		User Input - Table 2-3 - TIA-222-G
Importance Factor, Ice:	$I_{Ice} := 1.25$		User Input - Table 2-3 - TIA-222-G
Importance Factor, Ice With Wind:	$I_{IcewWind} := 1$		User Input - Table 2-3 - TIA-222-G
Exposure Category Coefficient:	$Zg := 900\ ft$		User Input - Table 2-4 - TIA-222-G
Exposure Category Coefficient:	$\alpha := 9.5$		User Input - Table 2-4 - TIA-222-G
Gust Response Factor:	$G_H := 1$		
Velocity Pressure Coefficient:	$Kz_{carrier\_1} := 2.01 \left(\frac{z_{carrier\_1}}{Zg}\right)^{\frac{2}{\alpha}} = 1.37$		Section 2.6.5.2 - TIA-222-G
	$Kzt := 1.0$		Section 2.6.6.4 - TIA-222-G
Velocity Pressure w/o Ice:	$qz_{carrier\_1} := 0.00256 \cdot Kd \cdot Kz_{carrier\_1} \cdot Kzt \cdot V^2 \cdot I_{wind} \cdot psf = 33.11\ psf$		
Velocity Pressure w/ Ice:	$qz_{ice\_carrier\_1} := 0.00256 \cdot Kd \cdot Kz_{carrier\_1} \cdot Kzt \cdot Vi^2 \cdot I_{IcewWind} \cdot psf = 8.32\ psf$		
Height Escalation Factor for Ice Thickness:	$Kiz := \left(\frac{z_{carrier\_1}}{33\ ft}\right)^{0.1} = 1.16$		
Factored Ice Thickness:	$tiz := 2.0 \cdot ti \cdot I_{Ice} \cdot Kiz \cdot Kzt^{0.35} = 2.17\ in$		Section 2.6.8 - TIA-222-G

Standard Equipment Calculations - Equipment 1 (Front Wind)

Equipment Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Proposed Antenna CCI - HPA65R-BU6A	User Defined
Equipment Shape:	Flat	User Defined
Equipment Height:	$L_{eq\_1} := 71.1 \cdot in$	User Defined
Equipment Width:	$W_{eq\_1} := 11.7 \cdot in$	User Defined
Equipment Depth:	$D_{eq\_1} := 7.6\ in$	User Defined
Equipment Weight:	$WT_{eq\_1} := 41.9 \cdot lbf$	User Defined
Equipment Volume:	$V_{eq\_1} := L_{eq\_1} \cdot W_{eq\_1} \cdot D_{eq\_1} = 3.66\ ft^3$	
Equipment Quantity:	$N_{eq\_1} := 1$	User Defined
Equippment Aspect Ratio:	$Ar_{eq\_1} := \frac{L_{eq\_1}}{W_{eq\_1}} = 6.08$	
Mast Force Coefficient:	$Ca_{eq\_1} := 1.2 + \frac{(Ar_{eq\_1} - 2.5)}{4.5} \cdot 0.2 = 1.36$	As per Table 2-8 (Flat) - TIA-222-G

Equipment Wind Loads

Equipment Projected Area:	$SA_{eq\_1} := L_{eq\_1} \cdot W_{eq\_1} = 5.78\ ft^2$	
Equipment Wind Force (All):	$F_{eq\_1} := qz_{carrier\_1} \cdot G_H \cdot Ca_{eq\_1} \cdot SA_{eq\_1} \cdot N_{eq\_1} = 260\ lbf$	**BLC 7** Member Point Load

Equipment Wind Loads (w/ Ice)

Equipment Projected Area (w/ Ice):	$A\_ice_{eq\_1} := (L_{eq\_1} + 2 \cdot tiz) \cdot (W_{eq\_1} + 2 \cdot tiz) = 8\ ft^2$	
Equipment Wind Force (w/ Ice) (All):	$Fi_{eq\_1} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{eq\_1} \cdot A\_ice_{eq\_1} \cdot N_{eq\_1} = 95\ lbf$	**BLC 5** Member Point Load

Equipment Vertical Loads

Weight of Equipment (All):	$WT_{eq\_1} \cdot N_{eq\_1} = 41.9\ lbf$	**BLC 2** Member Point Load

Equipment Vertical Loads (Ice Only)

Volume of Ice on Equipment:	$V_{ice\_eq\_1} := (L_{eq\_1} + 2 \cdot tiz) \cdot (W_{eq\_1} + 2 \cdot tiz) \cdot (D_{eq\_1} + 2 \cdot tiz) - V_{eq\_1} = 4.71\ ft^3$	
Weight of Ice on Equipment (All):	$WT_{ice\_eq\_1} := V_{ice\_eq\_1} \cdot Id \cdot N_{eq\_1} = 269\ lbf$	**BLC 3** Member Point Load

Standard Equipment Calculations - Equipment 1 (Side Wind)

Equipment Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Proposed Antenna CCI - HPA65R-BU6A	User Defined
Equipment Shape:	Flat	User Defined
Equipment Height:	$L_{eq\_1} := 71.1 \cdot in$	User Defined
Equipment Width:	$W_{eq\_1} := 11.7 \cdot in$	User Defined
Equipment Depth:	$D_{eq\_1} := 7.6\ in$	User Defined
Equipment Weight:	$WT_{eq\_1} := 41.9 \cdot lbf$	User Defined
Equipment Volume:	$V_{eq\_1} := L_{eq\_1} \cdot W_{eq\_1} \cdot D_{eq\_1} = 3.66\ ft^3$	
Equipment Quantity:	$N_{eq\_1} := 1$	User Defined
Equippment Aspect Ratio:	$Ar_{eq\_1} := \frac{L_{eq\_1}}{D_{eq\_1}} = 9.36$	
Mast Force Coefficient:	$Ca_{eq\_1} := 1.4 + \frac{(Ar_{eq\_1} - 7)}{18} \cdot 0.6 = 1.48$	As per Table 2-8 (Flat) - TIA-222-G

Equipment Wind Loads

Equipment Projected Area:	$SA_{eq\_1} := L_{eq\_1} \cdot D_{eq\_1} = 3.75\ ft^2$	
Equipment Wind Force (All):	$F_{eq\_1} := qz_{carrier\_1} \cdot G_H \cdot Ca_{eq\_1} \cdot SA_{eq\_1} \cdot N_{eq\_1} = 184\ lbf$	**BLC 6** Member Point Load

Equipment Wind Loads (w/ Ice)

Equipment Projected Area (w/ Ice):	$A\_ice_{eq\_1} := (L_{eq\_1} + 2 \cdot tiz) \cdot (D_{eq\_1} + 2 \cdot tiz) = 6\ ft^2$	
Equipment Wind Force (w/ Ice) (All):	$Fi_{eq\_1} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{eq\_1} \cdot A\_ice_{eq\_1} \cdot N_{eq\_1} = 77\ lbf$	**BLC 4** Member Point Load

Equipment Vertical Loads

Weight of Equipment (All):	$WT_{eq\_1} \cdot N_{eq\_1} = 41.9\ lbf$	**BLC 2** Member Point Load

Standard Equipment Calculations - Equipment 2 (Front Wind)

Equipment Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Proposed TMA CCI - TMABPD7823VG12A	User Defined
Equipment Shape:	Flat	User Defined
Equipment Height:	$L_{eq\_2} := 10.63 \cdot in$	User Defined
Equipment Width:	$W_{eq\_2} := 11.04 \cdot in$	User Defined
Equipment Depth:	$D_{eq\_2} := 3.75\ in$	User Defined
Equipment Weight:	$WT_{eq\_2} := 25 \cdot lbf$	User Defined
Equipment Volume:	$V_{eq\_2} := L_{eq\_2} \cdot W_{eq\_2} \cdot D_{eq\_2} = 0.25\ ft^3$	
Equipment Quantity:	$N_{eq\_2} := 2$	User Defined
Equippment Aspect Ratio:	$Ar_{eq\_2} := \frac{L_{eq\_2}}{W_{eq\_2}} = 0.96$	
Mast Force Coefficient:	$Ca_{eq\_2} := 1.2$	As per Table 2-8 (Flat) - TIA-222-G

Equipment Wind Loads

Equipment Projected Area:	$SA_{eq\_2} := L_{eq\_2} \cdot W_{eq\_2} = 0.81\ ft^2$	
Equipment Wind Force (All):	$F_{eq\_2} := qz_{carrier\_1} \cdot G_H \cdot Ca_{eq\_2} \cdot SA_{eq\_2} \cdot N_{eq\_2} = 65\ lbf$	**BLC 7** Member Point Load

Equipment Wind Loads (w/ Ice)

Equipment Projected Area (w/ Ice):	$A\_ice_{eq\_2} := (L_{eq\_2} + 2 \cdot tiz) \cdot (W_{eq\_2} + 2 \cdot tiz) = 2\ ft^2$	
Equipment Wind Force (w/ Ice) (All):	$Fi_{eq\_2} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{eq\_2} \cdot A\_ice_{eq\_2} \cdot N_{eq\_2} = 32\ lbf$	**BLC 5** Member Point Load

Equipment Vertical Loads

Weight of Equipment (All):	$WT_{eq\_2} \cdot N_{eq\_2} = 50\ lbf$	**BLC 2** Member Point Load

Equipment Vertical Loads (Ice Only)

Volume of Ice on Equipment:	$V_{ice\_eq\_2} := (L_{eq\_2} + 2 \cdot tiz) \cdot (W_{eq\_2} + 2 \cdot tiz) \cdot (D_{eq\_2} + 2 \cdot tiz) - V_{eq\_2} = 0.83\ ft^3$	
Weight of Ice on Equipment (All):	$WT_{ice\_eq\_2} := V_{ice\_eq\_2} \cdot Id \cdot N_{eq\_2} = 94\ lbf$	**BLC 3** Member Point Load

Standard Equipment Calculations - Equipment 2 (Side Wind)

Equipment Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Proposed TMA CCI - TMABPD7823VG12A	User Defined
Equipment Shape:	Flat	User Defined
Equipment Height:	$L_{eq\_2} := 10.63 \cdot in$	User Defined
Equipment Width:	$W_{eq\_2} := 11.04 \cdot in$	User Defined
Equipment Depth:	$D_{eq\_2} := 3.75\ in$	User Defined
Equipment Weight:	$WT_{eq\_2} := 25 \cdot lbf$	User Defined
Equipment Volume:	$V_{eq\_2} := L_{eq\_2} \cdot W_{eq\_2} \cdot D_{eq\_2} = 0.25\ ft^3$	
Equipment Quantity:	$N_{eq\_2} := 2$	User Defined
Equippment Aspect Ratio:	$Ar_{eq\_2} := \frac{L_{eq\_2}}{D_{eq\_2}} = 2.83$	
Mast Force Coefficient:	$Ca_{eq\_2} := 1.2 + \frac{(Ar_{eq\_2} - 2.5)}{4.5} \cdot 0.2 = 1.21$	As per Table 2-8 (Flat) - TIA-222-G

Equipment Wind Loads

Equipment Projected Area:	$SA_{eq\_2} := L_{eq\_2} \cdot D_{eq\_2} = 0.28\ ft^2$	
Equipment Wind Force (All):	$F_{eq\_2} := qz_{carrier\_1} \cdot G_H \cdot Ca_{eq\_2} \cdot SA_{eq\_2} \cdot N_{eq\_2} = 22\ lbf$	BLC 6 Member Point Load

Equipment Wind Loads (w/ Ice)

Equipment Projected Area (w/ Ice):	$A\_ice_{eq\_2} := (L_{eq\_2} + 2 \cdot tiz) \cdot (D_{eq\_2} + 2 \cdot tiz) = 1\ ft^2$	
Equipment Wind Force (w/ Ice) (All):	$Fi_{eq\_2} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{eq\_2} \cdot A\_ice_{eq\_2} \cdot N_{eq\_2} = 17\ lbf$	BLC 4 Member Point Load

Equipment Vertical Loads

Weight of Equipment (All):	$WT_{eq\_2} \cdot N_{eq\_2} = 50\ lbf$	BLC 2 Member Point Load

Standard Equipment Calculations - Equipment 3 (Front Wind)

Equipment Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Existing Antenna Powerwave 7770	User Defined
Equipment Shape:	Flat	User Defined
Equipment Height:	$L_{eq\_3} := 55 \cdot in$	User Defined
Equipment Width:	$W_{eq\_3} := 11 \cdot in$	User Defined
Equipment Depth:	$D_{eq\_3} := 5\ in$	User Defined
Equipment Weight:	$WT_{eq\_3} := 35 \cdot lbf$	User Defined
Equipment Volume:	$V_{eq\_3} := L_{eq\_3} \cdot W_{eq\_3} \cdot D_{eq\_3} = 1.75\ ft^3$	
Equipment Quantity:	$N_{eq\_3} := 1$	User Defined
Equippment Aspect Ratio:	$Ar_{eq\_3} := \frac{L_{eq\_3}}{W_{eq\_3}} = 5$	
Mast Force Coefficient:	$Ca_{eq\_3} := 1.2 + \frac{(Ar_{eq\_3} - 2.5)}{4.5} \cdot 0.2 = 1.31$	As per Table 2-8 (Flat) - TIA-222-G

Equipment Wind Loads

Equipment Projected Area: $SA_{eq\_3} := L_{eq\_3} \cdot W_{eq\_3} = 4.2\ ft^2$

Equipment Wind Force (All): $F_{eq\_3} := qz_{carrier\_1} \cdot G_H \cdot Ca_{eq\_3} \cdot SA_{eq\_3} \cdot N_{eq\_3} = 182\ lbf$ — **BLC 7** Member Point Load

Equipment Wind Loads (w/ Ice)

Equipment Projected Area (w/ Ice): $A\_ice_{eq\_3} := (L_{eq\_3} + 2 \cdot tiz) \cdot (W_{eq\_3} + 2 \cdot tiz) = 6\ ft^2$

Equipment Wind Force (w/ Ice) (All): $Fi_{eq\_3} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{eq\_3} \cdot A\_ice_{eq\_3} \cdot N_{eq\_3} = 69\ lbf$ — **BLC 5** Member Point Load

Equipment Vertical Loads

Weight of Equipment (All): $WT_{eq\_3} \cdot N_{eq\_3} = 35\ lbf$ — **BLC 2** Member Point Load

Equipment Vertical Loads (Ice Only)

Volume of Ice on Equipment: $V_{ice\_eq\_3} := (L_{eq\_3} + 2 \cdot tiz) \cdot (W_{eq\_3} + 2 \cdot tiz) \cdot (D_{eq\_3} + 2 \cdot tiz) - V_{eq\_3} = 3.18\ ft^3$

Weight of Ice on Equipment (All): $WT_{ice\_eq\_3} := V_{ice\_eq\_3} \cdot Id \cdot N_{eq\_3} = 181\ lbf$ — **BLC 3** Member Point Load

Standard Equipment Calculations - Equipment 3 (Side Wind)

Standard Equipment Calculations - Equipment 3 (Side Wind)

Equipment Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Existing Antenna Powerwave 7770	User Defined
Equipment Shape:	Flat	User Defined
Equipment Height:	$L_{eq\_3} := 55 \cdot in$	User Defined
Equipment Width:	$W_{eq\_3} := 11 \cdot in$	User Defined
Equipment Depth:	$D_{eq\_3} := 5\ in$	User Defined
Equipment Weight:	$WT_{eq\_3} := 35 \cdot lbf$	User Defined
Equipment Volume:	$V_{eq\_3} := L_{eq\_3} \cdot W_{eq\_3} \cdot D_{eq\_3} = 1.75\ ft^3$	
Equipment Quantity:	$N_{eq\_3} := 1$	User Defined
Equippment Aspect Ratio:	$Ar_{eq\_3} := \frac{L_{eq\_3}}{D_{eq\_3}} = 11$	
Mast Force Coefficient:	$Ca_{eq\_3} := 1.4 + \frac{(Ar_{eq\_3} - 7)}{18} \cdot 0.6 = 1.53$	As per Table 2-8 (Flat) - TIA-222-G

Equipment Wind Loads

Equipment Projected Area:	$SA_{eq\_3} := L_{eq\_3} \cdot D_{eq\_3} = 1.91\ ft^2$	
Equipment Wind Force (All):	$F_{eq\_3} := qz_{carrier\_1} \cdot G_H \cdot Ca_{eq\_3} \cdot SA_{eq\_3} \cdot N_{eq\_3} = 97\ lbf$	**BLC 6** Member Point Load

Equipment Wind Loads (w/ Ice)

Equipment Projected Area (w/ Ice):	$A\_ice_{eq\_3} := (L_{eq\_3} + 2 \cdot tiz) \cdot (D_{eq\_3} + 2 \cdot tiz) = 4\ ft^2$	
Equipment Wind Force (w/ Ice) (All):	$Fi_{eq\_3} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{eq\_3} \cdot A\_ice_{eq\_3} \cdot N_{eq\_3} = 49\ lbf$	**BLC 4** Member Point Load

Equipment Vertical Loads

Weight of Equipment (All):	$WT_{eq\_3} \cdot N_{eq\_3} = 35\ lbf$	**BLC 2** Member Point Load

Standard Equipment Calculations - Equipment 4 (Front Wind)

Equipment Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Existing TMA Powerwave LGP 21401	User Defined
Equipment Shape:	Flat	User Defined
Equipment Height:	$L_{eq\_4} := 14.4 \cdot in$	User Defined
Equipment Width:	$W_{eq\_4} := 9.2 \cdot in$	User Defined
Equipment Depth:	$D_{eq\_4} := 2.6\ in$	User Defined
Equipment Weight:	$WT_{eq\_4} := 14.1 \cdot lbf$	User Defined
Equipment Volume:	$V_{eq\_4} := L_{eq\_4} \cdot W_{eq\_4} \cdot D_{eq\_4} = 0.2\ ft^3$	
Equipment Quantity:	$N_{eq\_4} := 2$	User Defined
Equippment Aspect Ratio:	$Ar_{eq\_4} := \frac{L_{eq\_4}}{W_{eq\_4}} = 1.57$	
Mast Force Coefficient:	$Ca_{eq\_4} := 1.2$	As per Table 2-8 (Flat) - TIA-222-G

Equipment Wind Loads

Equipment Projected Area:	$SA_{eq\_4} := L_{eq\_4} \cdot W_{eq\_4} = 0.92\ ft^2$	
Equipment Wind Force (All):	$F_{eq\_2} := qz_{carrier\_1} \cdot G_H \cdot Ca_{eq\_4} \cdot SA_{eq\_4} \cdot N_{eq\_4} = 73\ lbf$	BLC 7 Member Point Load

Equipment Wind Loads (w/ Ice)

Equipment Projected Area (w/ Ice):	$A\_ice_{eq\_4} := (L_{eq\_4} + 2 \cdot tiz) \cdot (W_{eq\_4} + 2 \cdot tiz) = 2\ ft^2$	
Equipment Wind Force (w/ Ice) (All):	$Fi_{eq\_2} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{eq\_4} \cdot A\_ice_{eq\_4} \cdot N_{eq\_4} = 35\ lbf$	BLC 5 Member Point Load

Equipment Vertical Loads

Weight of Equipment (All):	$WT_{eq\_4} \cdot N_{eq\_4} = 28.2\ lbf$	BLC 2 Member Point Load

Equipment Vertical Loads (Ice Only)

Volume of Ice on Equipment:	$V_{ice\_eq\_4} := (L_{eq\_4} + 2 \cdot tiz) \cdot (W_{eq\_4} + 2 \cdot tiz) \cdot (D_{eq\_4} + 2 \cdot tiz) - V_{eq\_4} = 0.82\ ft^3$	
Weight of Ice on Equipment (All):	$WT_{ice\_eq\_4} := V_{ice\_eq\_4} \cdot Id \cdot N_{eq\_4} = 94\ lbf$	BLC 3 Member Point Load

Standard Equipment Calculations - Equipment 4 (Side Wind)

Standard Equipment Calculations - Equipment 4 (Side Wind)

Equipment Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Existing TMA Powerwave LGP 21401	User Defined
Equipment Shape:	Flat	User Defined
Equipment Height:	$L_{eq\_4} := 14.4 \cdot in$	User Defined
Equipment Width:	$W_{eq\_4} := 9.2 \cdot in$	User Defined
Equipment Depth:	$D_{eq\_4} := 2.6\ in$	User Defined
Equipment Weight:	$WT_{eq\_4} := 14.1 \cdot lbf$	User Defined
Equipment Volume:	$V_{eq\_4} := L_{eq\_4} \cdot W_{eq\_4} \cdot D_{eq\_4} = 0.2\ ft^3$	
Equipment Quantity:	$N_{eq\_4} := 2$	User Defined
Equippment Aspect Ratio:	$Ar_{eq\_4} := \frac{L_{eq\_4}}{D_{eq\_4}} = 5.54$	
Mast Force Coefficient:	$Ca_{eq\_4} := 1.2$	As per Table 2-8 (Flat) - TIA-222-G

Equipment Wind Loads

Equipment Projected Area:	$SA_{eq\_4} := L_{eq\_4} \cdot D_{eq\_4} = 0.26\ ft^2$	
Equipment Wind Force (All):	$F_{eq\_2} := qz_{carrier\_1} \cdot G_H \cdot Ca_{eq\_4} \cdot SA_{eq\_4} \cdot N_{eq\_4} = 21\ lbf$	BLC 6 Member Point Load

Equipment Wind Loads (w/ Ice)

Equipment Projected Area (w/ Ice):	$A\_ice_{eq\_4} := (L_{eq\_4} + 2 \cdot tiz) \cdot (D_{eq\_4} + 2 \cdot tiz) = 1\ ft^2$	
Equipment Wind Force (w/ Ice) (All):	$Fi_{eq\_2} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{eq\_4} \cdot A\_ice_{eq\_4} \cdot N_{eq\_4} = 18\ lbf$	BLC 4 Member Point Load

Equipment Vertical Loads

Weight of Equipment (All):	$WT_{eq\_4} \cdot N_{eq\_4} = 28.2\ lbf$	BLC 2 Member Point Load

Standard Equipment Calculations - Equipment 5 (Front Wind)

Standard Equipment Calculations - Equipment 5 (Front Wind)

Equipment Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Existing Antenna Quintel QS66512-2	User Defined
Equipment Shape:	Flat	User Defined
Equipment Height:	$L_{eq\_5} := 72 \cdot in$	User Defined
Equipment Width:	$W_{eq\_5} := 12 \cdot in$	User Defined
Equipment Depth:	$D_{eq\_5} := 9.6\ in$	User Defined
Equipment Weight:	$WT_{eq\_5} := 111 \cdot lbf$	User Defined
Equipment Volume:	$V_{eq\_5} := L_{eq\_5} \cdot W_{eq\_5} \cdot D_{eq\_5} = 4.8\ ft^3$	
Equipment Quantity:	$N_{eq\_5} := 1$	User Defined
Equippment Aspect Ratio:	$Ar_{eq\_5} := \frac{L_{eq\_5}}{W_{eq\_5}} = 6$	
Mast Force Coefficient:	$Ca_{eq\_5} := 1.2 + \frac{(Ar_{eq\_5} - 2.5)}{4.5} \cdot 0.2 = 1.36$	As per Table 2-8 (Flat) - TIA-222-G

Equipment Wind Loads

Equipment Projected Area:	$SA_{eq\_5} := L_{eq\_5} \cdot W_{eq\_5} = 6\ ft^2$	
Equipment Wind Force (All):	$F_{eq\_5} := qz_{carrier\_1} \cdot G_H \cdot Ca_{eq\_5} \cdot SA_{eq\_5} \cdot N_{eq\_5} = 269\ lbf$	**BLC 7** Member Point Load

Equipment Wind Loads (w/ Ice)

Equipment Projected Area (w/ Ice):	$A\_ice_{eq\_5} := (L_{eq\_5} + 2 \cdot tiz) \cdot (W_{eq\_5} + 2 \cdot tiz) = 9\ ft^2$	
Equipment Wind Force (w/ Ice) (All):	$Fi_{eq\_5} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{eq\_5} \cdot A\_ice_{eq\_5} \cdot N_{eq\_5} = 98\ lbf$	**BLC 5** Member Point Load

Equipment Vertical Loads

Weight of Equipment (All):	$WT_{eq\_5} \cdot N_{eq\_5} = 111\ lbf$	**BLC 2** Member Point Load

Equipment Vertical Loads (Ice Only)

Volume of Ice on Equipment:	$V_{ice\_eq\_5} := (L_{eq\_5} + 2 \cdot tiz) \cdot (W_{eq\_5} + 2 \cdot tiz) \cdot (D_{eq\_5} + 2 \cdot tiz) - V_{eq\_5} = 5.28\ ft^3$	
Weight of Ice on Equipment (All):	$WT_{ice\_eq\_5} := V_{ice\_eq\_5} \cdot Id \cdot N_{eq\_5} = 301\ lbf$	**BLC 3** Member Point Load

Standard Equipment Calculations - Equipment 5 (Side Wind)

Standard Equipment Calculations - Equipment 5 (Side Wind)

Equipment Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Existing Antenna Quintel QS66512-2	User Defined
Equipment Shape:	Flat	User Defined
Equipment Height:	$L_{eq\_5} := 72 \cdot in$	User Defined
Equipment Width:	$W_{eq\_5} := 12 \cdot in$	User Defined
Equipment Depth:	$D_{eq\_5} := 9.6\ in$	User Defined
Equipment Weight:	$WT_{eq\_5} := 111 \cdot lbf$	User Defined
Equipment Volume:	$V_{eq\_5} := L_{eq\_5} \cdot W_{eq\_5} \cdot D_{eq\_5} = 4.8\ ft^3$	
Equipment Quantity:	$N_{eq\_5} := 1$	User Defined
Equippment Aspect Ratio:	$Ar_{eq\_5} := \frac{L_{eq\_5}}{D_{eq\_5}} = 7.5$	
Mast Force Coefficient:	$Ca_{eq\_5} := 1.2 + \frac{(Ar_{eq\_5} - 2.5)}{4.5} \cdot 0.2 = 1.42$	As per Table 2-8 (Flat) - TIA-222-G

Equipment Wind Loads

Equipment Projected Area:	$SA_{eq\_5} := L_{eq\_5} \cdot D_{eq\_5} = 4.8\ ft^2$	
Equipment Wind Force (All):	$F_{eq\_5} := qz_{carrier\_1} \cdot G_H \cdot Ca_{eq\_5} \cdot SA_{eq\_5} \cdot N_{eq\_5} = 226\ lbf$	**BLC 6** Member Point Load

Equipment Wind Loads (w/ Ice)

Equipment Projected Area (w/ Ice):	$A\_ice_{eq\_5} := (L_{eq\_5} + 2 \cdot tiz) \cdot (D_{eq\_5} + 2 \cdot tiz) = 7\ ft^2$	
Equipment Wind Force (w/ Ice) (All):	$Fi_{eq\_5} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{eq\_5} \cdot A\_ice_{eq\_5} \cdot N_{eq\_5} = 88\ lbf$	**BLC 4** Member Point Load

Equipment Vertical Loads

Weight of Equipment (All):	$WT_{eq\_5} \cdot N_{eq\_5} = 111\ lbf$	**BLC 2** Member Point Load

Standard Equipment Calculations - Equipment 6 (Front Wind)

Standard Equipment Calculations - Equipment 6 (Front Wind)

Equipment Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Existing Antenna Kaelus TMA2117F00V1-1	User Defined
Equipment Shape:	Flat	User Defined
Equipment Height:	$L_{eq\_6} := 11.81 \cdot in$	User Defined
Equipment Width:	$W_{eq\_6} := 9.84 \cdot in$	User Defined
Equipment Depth:	$D_{eq\_6} := 4.65\ in$	User Defined
Equipment Weight:	$WT_{eq\_6} := 26 \cdot lbf$	User Defined
Equipment Volume:	$V_{eq\_6} := L_{eq\_6} \cdot W_{eq\_6} \cdot D_{eq\_6} = 0.31\ ft^3$	
Equipment Quantity:	$N_{eq\_6} := 2$	User Defined
Equippment Aspect Ratio:	$Ar_{eq\_6} := \frac{L_{eq\_6}}{W_{eq\_6}} = 1.2$	
Mast Force Coefficient:	$Ca_{eq\_6} := 1.2$	As per Table 2-8 (Flat) - TIA-222-G

Equipment Wind Loads

Equipment Projected Area: $SA_{eq\_6} := L_{eq\_6} \cdot W_{eq\_6} = 0.81\ ft^2$

Equipment Wind Force (All): $F_{eq\_6} := qz_{carrier\_1} \cdot G_H \cdot Ca_{eq\_6} \cdot SA_{eq\_6} \cdot N_{eq\_6} = 64\ lbf$ — **BLC 7** Member Point Load

Equipment Wind Loads (w/ Ice)

Equipment Projected Area (w/ Ice): $A\_ice_{eq\_6} := \left(L_{eq\_6} + 2 \cdot tiz\right) \cdot \left(W_{eq\_6} + 2 \cdot tiz\right) = 2\ ft^2$

Equipment Wind Force (w/ Ice) (All): $Fi_{eq\_6} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{eq\_6} \cdot A\_ice_{eq\_6} \cdot N_{eq\_6} = 32\ lbf$ — **BLC 5** Member Point Load

Equipment Vertical Loads

Weight of Equipment (All): $WT_{eq\_6} \cdot N_{eq\_6} = 52\ lbf$ — **BLC 2** Member Point Load

Equipment Vertical Loads (Ice Only)

Volume of Ice on Equipment: $V_{ice\_eq\_6} := \left(L_{eq\_6} + 2 \cdot tiz\right) \cdot \left(W_{eq\_6} + 2 \cdot tiz\right) \cdot \left(D_{eq\_6} + 2 \cdot tiz\right) - V_{eq\_6} = 0.88\ ft^3$

Weight of Ice on Equipment (All): $WT_{ice\_eq\_6} := V_{ice\_eq\_6} \cdot Id \cdot N_{eq\_6} = 100\ lbf$ — **BLC 3** Member Point Load

Standard Equipment Calculations - Equipment 6 (Side Wind)

Standard Equipment Calculations - Equipment 6 (Side Wind)

Equipment Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Existing Antenna Kaelus TMA2117F00V1-1	User Defined
Equipment Shape:	Flat	User Defined
Equipment Height:	$L_{eq\_6} := 11.81 \cdot in$	User Defined
Equipment Width:	$W_{eq\_6} := 9.84 \cdot in$	User Defined
Equipment Depth:	$D_{eq\_6} := 4.65\ in$	User Defined
Equipment Weight:	$WT_{eq\_6} := 26 \cdot lbf$	User Defined
Equipment Volume:	$V_{eq\_6} := L_{eq\_6} \cdot W_{eq\_6} \cdot D_{eq\_6} = 0.31\ ft^3$	
Equipment Quantity:	$N_{eq\_6} := 2$	User Defined
Equippment Aspect Ratio:	$Ar_{eq\_6} := \frac{L_{eq\_6}}{D_{eq\_6}} = 2.54$	
Mast Force Coefficient:	$Ca_{eq\_6} := 1.2 + \frac{(Ar_{eq\_6} - 2.5)}{4.5} \cdot 0.2 = 1.2$	As per Table 2-8 (Flat) - TIA-222-G

Equipment Wind Loads

Equipment Projected Area:	$SA_{eq\_6} := L_{eq\_6} \cdot D_{eq\_6} = 0.38\ ft^2$	
Equipment Wind Force (All):	$F_{eq\_6} := qz_{carrier\_1} \cdot G_H \cdot Ca_{eq\_6} \cdot SA_{eq\_6} \cdot N_{eq\_6} = 30\ lbf$	BLC 6 Member Point Load

Equipment Wind Loads (w/ Ice)

Equipment Projected Area (w/ Ice):	$A\_ice_{eq\_6} := (L_{eq\_6} + 2 \cdot tiz) \cdot (D_{eq\_6} + 2 \cdot tiz) = 1\ ft^2$	
Equipment Wind Force (w/ Ice) (All):	$Fi_{eq\_6} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{eq\_6} \cdot A\_ice_{eq\_6} \cdot N_{eq\_6} = 20\ lbf$	BLC 4 Member Point Load

Equipment Vertical Loads

Weight of Equipment (All):	$WT_{eq\_6} \cdot N_{eq\_6} = 52\ lbf$	BLC 2 Member Point Load

Standard Equipment Calculations - Mount Member 1 (Front/Side Wind)

Pipe Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Mounting Pipes	User Defined
Pipe Height:	$L_{pipe\_1} := 96 \cdot in$	User Defined
Pipe Diameter:	$W_{pipe\_1} := 2.375 \cdot in$	User Defined
Pipe Weight:	$WT_{pipe\_1} := 29.3 \cdot lbf$	User Defined
Pipe Volume:	$V_{pipe\_1} := L_{pipe\_1} \cdot \frac{\left(\left(W_{pipe\_1}\right)^2 \cdot \pi\right)}{4} = 0.25\ ft^3$	
Pipe Quantity:	$N_{pipe\_1} := 1$	User Defined
Pipe Aspect Ratio:	$Ar_{pipe\_1} := \frac{L_{pipe\_1}}{W_{pipe\_1}} = 40.42$	
Pipe Force Coefficient:	$Ca_{pipe\_1} := 1.2$	As per Table 2-8 (Round)-TIA-222-G

Pipe Wind Loads

Pipe Projected Area:	$SA_{pipe\_1} := L_{pipe\_1} \cdot W_{pipe\_1} = 1.58\ ft^2$	
Pipe Wind Force (All):	$F_{pipe\_1} := qz_{carrier\_1} \cdot G_H \cdot Ca_{pipe\_1} \cdot SA_{pipe\_1} = 63\ lbf$	BLC 6/7
Pipe Wind Force (Distributed):	$\frac{F_{pipe\_1}}{L_{pipe\_1}} = 7.9\ plf$	BLC 6/7

Pipe Wind Loads (w/ Ice)

Pipe Projected Area (w/ Ice):	$A\_ice_{pipe\_1} := \left(L_{pipe\_1} + 2 \cdot tiz\right) \cdot \left(W_{pipe\_1} + 2 \cdot tiz\right) = 4.69\ ft^2$	
Pipe Wind Force (w/ Ice) (All):	$Fi_{pipe\_1} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{pipe\_1} \cdot A\_ice_{pipe\_1} = 47\ lbf$	BLC 4/5
Pipe Wind Force (w/ Ice) (Distributed):	$\frac{Fi_{pipe\_1}}{L_{pipe\_1}} = 5.8\ plf$	BLC 4/5

Pipe Vertical Loads

Weight of Pipe (All):	$WT_{pipe\_1} = 29\ lbf$	BLC 2
Weight of Pipe (Distributed):	$\frac{WT_{pipe\_1}}{L_{pipe\_1}} = 3.7\ plf$	BLC 2

Pipe Vertical Loads (Ice Only)

Volume of Ice on Pipe:	$V_{ice\_pipe\_1} := \left(L_{pipe\_1} + 2 \cdot tiz\right) \cdot \left(\frac{\left(W_{pipe\_1} + 2 \cdot tiz\right)^2 \cdot \pi}{4}\right) - V_{pipe\_1} = 1.82\ ft^3$	
Weight of Ice on Pipe (All):	$WT_{ice\_pipe\_1} := V_{ice\_pipe\_1} \cdot Id = 103\ lbf$	BLC 3
Weight of Ice on Pipe (Distributed):	$\frac{WT_{ice\_pipe\_1}}{L_{pipe\_1}} = 12.9\ plf$	BLC 3

Standard Equipment Calculations - Mount Member 2 (Front/Side Wind)

Pipe Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Pipe Boom	User Defined
Pipe Height:	$L_{pipe\_2} := 150 \cdot in$	User Defined
Pipe Diameter:	$W_{pipe\_2} := 3.5 \cdot in$	User Defined
Pipe Weight:	$WT_{pipe\_2} := 94.75 \cdot lbf$	User Defined
Pipe Volume:	$V_{pipe\_2} := L_{pipe\_2} \cdot \frac{\left(\left(W_{pipe\_2}\right)^2 \cdot \pi\right)}{4} = 0.84\ ft^3$	
Pipe Aspect Ratio:	$Ar_{pipe\_2} := \frac{L_{pipe\_2}}{W_{pipe\_2}} = 42.86$	
Pipe Force Coefficient:	$Ca_{pipe\_2} := 1.2$	As per Table 2-8 (Round)-TIA-222-G

Pipe Wind Loads

Pipe Projected Area:	$SA_{pipe\_2} := L_{pipe\_2} \cdot W_{pipe\_2} = 3.65\ ft^2$	
Pipe Wind Force (All):	$F_{pipe\_2} := qz_{carrier\_1} \cdot G_H \cdot Ca_{pipe\_2} \cdot SA_{pipe\_2} = 145\ lbf$	BLC 6/7
Pipe Wind Force (Distributed):	$\frac{F_{pipe\_2}}{L_{pipe\_2}} = 11.6\ plf$	BLC 6/7

Pipe Wind Loads (w/ Ice)

Pipe Projected Area (w/ Ice):	$A\_ice_{pipe\_2} := \left(L_{pipe\_2} + 2 \cdot tiz\right) \cdot \left(W_{pipe\_2} + 2 \cdot tiz\right) = 8.41\ ft^2$	
Pipe Wind Force (w/ Ice) (All):	$Fi_{pipe\_2} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{pipe\_2} \cdot A\_ice_{pipe\_2} = 84\ lbf$	BLC 4/5
Pipe Wind Force (w/ Ice) (Distributed):	$\frac{Fi_{pipe\_2}}{L_{pipe\_2}} = 6.7\ plf$	BLC 4/5

Pipe Vertical Loads

Weight of Pipe (All):	$WT_{pipe\_2} = 95\ lbf$	BLC 2
Weight of Pipe (Distributed):	$\frac{WT_{pipe\_2}}{L_{pipe\_2}} = 7.6\ plf$	BLC 2

Pipe Vertical Loads (Ice Only)

Volume of Ice on Pipe:	$V_{ice\_pipe\_2} := \left(L_{pipe\_2} + 2 \cdot tiz\right) \cdot \left(\frac{\left(W_{pipe\_2} + 2 \cdot tiz\right)^2 \cdot \pi}{4}\right) - V_{pipe\_2} = 3.49\ ft^3$	
Weight of Ice on Pipe (All):	$WT_{ice\_pipe\_2} := V_{ice\_pipe\_2} \cdot Id = 199\ lbf$	BLC 3
Weight of Ice on Pipe (Distributed):	$\frac{WT_{ice\_pipe\_2}}{L_{pipe\_2}} = 15.9\ plf$	BLC 3

Standard Equipment Calculations - Mount Member 3 (Front/Side Wind)

Pipe Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Vertical Pipe	User Defined
Pipe Height:	$L_{pipe\_3} := 18 \cdot in$	User Defined
Pipe Diameter:	$W_{pipe\_3} := 4.5 \cdot in$	User Defined
Pipe Weight:	$WT_{pipe\_3} := 16.2 \cdot lbf$	User Defined
Pipe Volume:	$V_{pipe\_3} := L_{pipe\_3} \cdot \frac{\left(\left(W_{pipe\_3}\right)^2 \cdot \pi\right)}{4} = 0.17\ ft^3$	
Pipe Aspect Ratio:	$Ar_{pipe\_3} := \frac{L_{pipe\_3}}{W_{pipe\_3}} = 4$	
Pipe Force Coefficient:	$Ca_{pipe\_3} := 0.7 + \frac{\left(Ar_{pipe\_3} - 2.5\right)}{4.5} \cdot 0.1 = 0.73$	As per Table 2-8 (Round)-TIA-222-G

Pipe Wind Loads

Pipe Projected Area:	$SA_{pipe\_3} := L_{pipe\_3} \cdot W_{pipe\_3} = 0.56\ ft^2$	
Pipe Wind Force (All):	$F_{pipe\_3} := qz_{carrier\_1} \cdot G_H \cdot Ca_{pipe\_3} \cdot SA_{pipe\_3} = 14\ lbf$	BLC 6/7
Pipe Wind Force (Distributed):	$\frac{F_{pipe\_3}}{L_{pipe\_3}} = 9.1\ plf$	BLC 6/7

Pipe Wind Loads (w/ Ice)

Pipe Projected Area (w/ Ice):	$A\_ice_{pipe\_3} := \left(L_{pipe\_3} + 2 \cdot tiz\right) \cdot \left(W_{pipe\_3} + 2 \cdot tiz\right) = 1.37\ ft^2$	
Pipe Wind Force (w/ Ice) (All):	$Fi_{pipe\_3} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{pipe\_3} \cdot A\_ice_{pipe\_3} = 8\ lbf$	BLC 4/5
Pipe Wind Force (w/ Ice) (Distributed):	$\frac{Fi_{pipe\_3}}{L_{pipe\_3}} = 5.6\ plf$	BLC 4/5

Pipe Vertical Loads

Weight of Pipe (All):	$WT_{pipe\_3} = 16\ lbf$	BLC 2
Weight of Pipe (Distributed):	$\frac{WT_{pipe\_3}}{L_{pipe\_3}} = 10.8\ plf$	BLC 2

Pipe Vertical Loads (Ice Only)

Volume of Ice on Pipe:	$V_{ice\_pipe\_3} := \left(L_{pipe\_3} + 2 \cdot tiz\right) \cdot \left(\frac{\left(W_{pipe\_3} + 2 \cdot tiz\right)^2 \cdot \pi}{4}\right) - V_{pipe\_3} = 0.63\ ft^3$	
Weight of Ice on Pipe (All):	$WT_{ice\_pipe\_3} := V_{ice\_pipe\_3} \cdot Id = 36\ lbf$	BLC 3
Weight of Ice on Pipe (Distributed):	$\frac{WT_{ice\_pipe\_3}}{L_{pipe\_3}} = 23.9\ plf$	BLC 3

Standard Equipment Calculations - Mount Member 4 (Front/Side Wind)

Pipe Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	HSS Arm Member	User Defined
HSS Height:	$L_{member\_4} := 33.75 \cdot in$	User Defined
HSS Width:	$W_{member\_4} := 4 \cdot in$	User Defined
HSS Weight:	$WT_{member\_4} := 34.3 \cdot lbf$	User Defined
HSS Volume:	$V_{member\_4} := L_{member\_4} \cdot W_{member\_4}^{2} = 0.31\ ft^3$	
HSS Aspect Ratio:	$Ar_{member\_4} := \frac{L_{member\_4}}{W_{member\_4}} = 8.44$	
HSS Force Coefficient:	$Ca_{member\_4} := 1.4 + \frac{(Ar_{member\_4} - 7)}{18} \cdot 0.6 = 1.45$	As per Table 2-8 (Flat)-TIA-222-G

HSS Wind Loads

HSS Projected Area:	$SA_{member\_4} := L_{member\_4} \cdot W_{member\_4} = 0.94\ ft^2$	
HSS Wind Force (All):	$F_{member\_4} := qz_{carrier\_1} \cdot G_H \cdot Ca_{member\_4} \cdot SA_{member\_4} = 45\ lbf$	BLC 6/7
HSS Wind Force (All):	$\frac{F_{member\_4}}{L_{member\_4}} = 16\ plf$	BLC 6/7

HSS Wind Loads (w/ Ice)

HSS Projected Area (w/ Ice):	$A\_ice_{member\_4} := (L_{member\_4} + 2 \cdot tiz) \cdot (W_{member\_4} + 2 \cdot tiz) = 2.21\ ft^2$	
HSS Wind Force (w/ Ice) (All):	$Fi_{member\_4} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{member\_4} \cdot A\_ice_{member\_4} = 27\ lbf$	BLC 4/5
HSS Wind Force (w/ Ice) (Distributed):	$\frac{Fi_{member\_4}}{L_{member\_4}} = 9.5\ plf$	BLC 4/5

HSS Vertical Loads

Weight of HSS (All):	$WT_{member\_4} = 34\ lbf$	BLC 2
Weight of HSS (Distributed):	$\frac{WT_{member\_4}}{L_{member\_4}} = 12.2\ plf$	BLC 2

HSS Vertical Loads (Ice Only)

Volume of Ice on HSS Arm:	$V_{ice\_member\_4} := (L_{member\_4} + 2 \cdot tiz) \cdot (W_{member\_4} + 2 \cdot tiz)^{2} - V_{member\_4} = 1.22\ ft^3$	
Weight of Ice on HSS (All):	$WT_{ice\_member\_4} := V_{ice\_member\_4} \cdot Id = 70\ lbf$	BLC 3
Weight of Ice on HSS (Distributed):	$\frac{WT_{ice\_member\_4}}{L_{member\_4}} = 24.8\ plf$	BLC 3

Standard Equipment Calculations - Mount Member 5 (Front/Side Wind)

Standard Equipment Calculations - Mount Member 5 (Front/Side Wind)

Pipe Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Proposed Handrail Member 1	User Defined
Pipe Height:	$L_{pipe\_5} := 150 \cdot in$	User Defined
Pipe Diameter:	$W_{pipe\_5} := 2.375 \cdot in$	User Defined
Pipe Weight:	$WT_{pipe\_5} := 45.75 \cdot lbf$	User Defined
Pipe Volume:	$V_{pipe\_5} := L_{pipe\_5} \cdot \frac{\left(\left(W_{pipe\_1}\right)^2 \cdot \pi\right)}{4} = 0.38\ ft^3$	
Pipe Quantity:	$N_{pipe\_5} := 1$	User Defined
Pipe Aspect Ratio:	$Ar_{pipe\_5} := \frac{L_{pipe\_5}}{W_{pipe\_5}} = 63.16$	
Pipe Force Coefficient:	$Ca_{pipe\_5} := 1.2$	As per Table 2-8 (Round)-TIA-222-G

Pipe Wind Loads

Pipe Projected Area:	$SA_{pipe\_5} := L_{pipe\_5} \cdot W_{pipe\_5} = 2.47\ ft^2$	
Pipe Wind Force (All):	$F_{pipe\_5} := qz_{carrier\_1} \cdot G_H \cdot Ca_{pipe\_5} \cdot SA_{pipe\_5} = 98\ lbf$	BLC 6/7
Pipe Wind Force (Distributed):	$\frac{F_{pipe\_5}}{L_{pipe\_5}} = 7.9\ plf$	BLC 6/7

Pipe Wind Loads (w/ Ice)

Pipe Projected Area (w/ Ice):	$A\_ice_{pipe\_5} := \left(L_{pipe\_5} + 2 \cdot tiz\right) \cdot \left(W_{pipe\_5} + 2 \cdot tiz\right) = 7.21\ ft^2$	
Pipe Wind Force (w/ Ice) (All):	$Fi_{pipe\_5} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{pipe\_5} \cdot A\_ice_{pipe\_5} = 72\ lbf$	BLC 4/5
Pipe Wind Force (w/ Ice) (Distributed):	$\frac{Fi_{pipe\_5}}{L_{pipe\_5}} = 5.8\ plf$	BLC 4/5

Pipe Vertical Loads

Weight of Pipe (All):	$WT_{pipe\_5} = 46\ lbf$	BLC 2
Weight of Pipe (Distributed):	$\frac{WT_{pipe\_5}}{L_{pipe\_5}} = 3.7\ plf$	BLC 2

Pipe Vertical Loads (Ice Only)

Volume of Ice on Pipe:	$V_{ice\_pipe\_5} := \left(L_{pipe\_5} + 2 \cdot tiz\right) \cdot \left(\frac{\left(W_{pipe\_5} + 2 \cdot tiz\right)^2 \cdot \pi}{4}\right) - V_{pipe\_5} = 2.79\ ft^3$	
Weight of Ice on Pipe (All):	$WT_{ice\_pipe\_5} := V_{ice\_pipe\_5} \cdot Id = 159\ lbf$	BLC 3
Weight of Ice on Pipe (Distributed):	$\frac{WT_{ice\_pipe\_5}}{L_{pipe\_5}} = 12.7\ plf$	BLC 3

Standard Equipment Calculations - Mount Member 6 (Front/Side Wind)

Standard Equipment Calculations - Mount Member 6 (Front/Side Wind)

Pipe Properties

Antenna Carrier:	AT&T	User Defined
Equipment Model:	Proposed Handrail Member 2	User Defined
Single Angle Length:	$L_{member\_6} := 24.437 \cdot in$	User Defined
Single Angle Width:	$W_{member\_6} := 2 \cdot in$	User Defined
Single Angle Weight:	$WT_{member\_6} := 4.97 \cdot lbf$	User Defined
Single Angle Volume:	$V_{member\_6} := L_{member\_6} \cdot W_{member\_6}^{2} = 0.06\ ft^3$	
Single Angle Aspect Ratio:	$Ar_{member\_6} := \frac{L_{member\_6}}{W_{member\_6}} = 12.22$	
Single Angle Force Coefficient:	$Ca_{member\_6} := 1.4 + \frac{\langle Ar_{member\_6} - 7 \rangle}{18} \cdot 0.6 = 1.57$	As per Table 2-8 (Flat)-TIA-222-G

Single Angle Wind Loads

Single Angle Projected Area:	$SA_{member\_6} := L_{member\_6} \cdot W_{member\_6} = 0.34\ ft^2$	
Single Angle Wind Force (All):	$F_{member\_6} := qz_{carrier\_1} \cdot G_H \cdot Ca_{member\_6} \cdot SA_{member\_6} = 18\ lbf$	BLC 6/7
Single Angle Wind Force (All):	$\frac{F_{member\_6}}{L_{member\_6}} = 8.7\ plf$	BLC 6/7

Single Angle Wind Loads (w/ Ice)

Single Angle Projected Area (w/ Ice):	$A\_ice_{member\_6} := \langle L_{member\_6} + 2 \cdot tiz \rangle \cdot \langle W_{member\_6} + 2 \cdot tiz \rangle = 1.27\ ft^2$	
Single Angle Wind Force (w/ Ice) (All):	$Fi_{member\_6} := qz_{ice\_carrier\_1} \cdot G_H \cdot Ca_{member\_6} \cdot A\_ice_{member\_6} = 17\ lbf$	BLC 4/5
Single Angle Wind Force (w/ Ice) (Distributed):	$\frac{Fi_{member\_6}}{L_{member\_6}} = 8.2\ plf$	BLC 4/5

Single Angle Vertical Loads

Weight of Single Angle (All):	$WT_{member\_6} = 5\ lbf$	BLC 2
Weight of Single Angle (Distributed):	$\frac{WT_{member\_6}}{L_{member\_6}} = 2.4\ plf$	BLC 2

Single Angle Vertical Loads (Ice Only)

Volume of Ice on Single Angle:	$V_{ice\_member\_6} := \langle L_{member\_6} + 2 \cdot tiz \rangle \cdot \langle W_{member\_6} + 2 \cdot tiz \rangle^{2} - V_{member\_6} = 0.61\ ft^3$	
Weight of Ice on Single Angle (All):	$WT_{ice\_member\_6} := V_{ice\_member\_6} \cdot Id = 35\ lbf$	BLC 3
Weight of Ice on Single Angle (Distributed):	$\frac{WT_{ice\_member\_6}}{L_{member\_6}} = 17.2\ plf$	BLC 3

General Information for use in Risa-3D

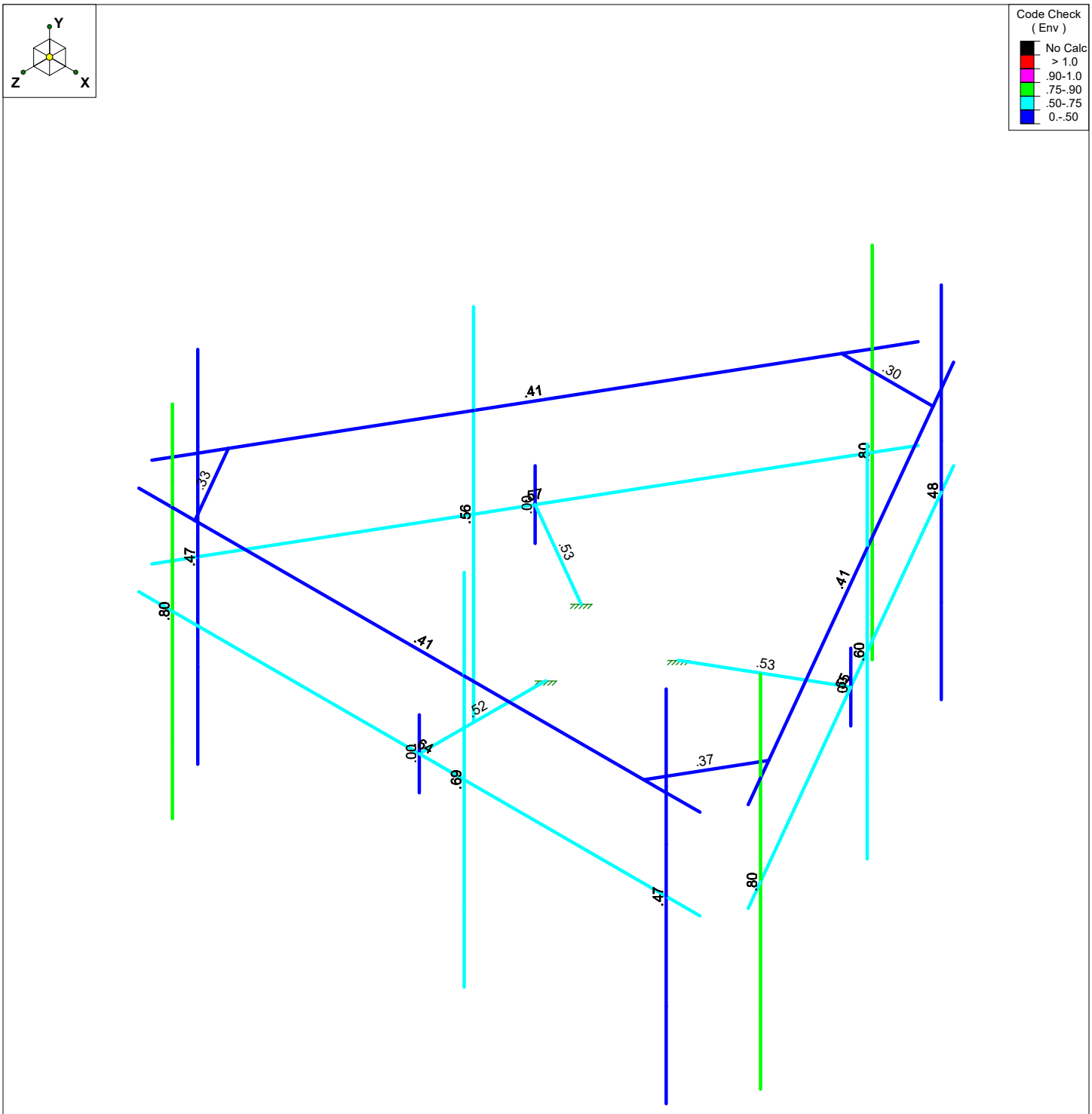
Risa-3D Basic Load Cases	Description
1	Self Weight (Mast)
2	Weight of Appurtenances
3	Weight of Ice Only
4	TIA Wind with Ice - X
5	TIA Wind with Ice - Z
6	TIA Wind - X
7	TIA Wind - Z

Load Combination	Description	Wind Factor	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	1.2D + 1.6W (0)	1.6	Y	1	1.2	2	1.2	6	1.6				
2	1.2D + 1.6W (30)	1.6	Y	1	1.2	2	1.2	6	1.39	7	0.8		
3	1.2D + 1.6W (60)	1.6	Y	1	1.2	2	1.2	6	0.8	7	1.39		
4	1.2D + 1.6W (90)	1.6	Y	1	1.2	2	1.2	7	1.6				
5	1.2D + 1.6W (120)	1.6	Y	1	1.2	2	1.2	6	-0.8	7	1.39		
6	1.2D + 1.6W (150)	1.6	Y	1	1.2	2	1.2	6	-1.39	7	0.8		
7	1.2D + 1.6W (180)	1.6	Y	1	1.2	2	1.2	6	-1.6				
8	1.2D + 1.6W (210)	1.6	Y	1	1.2	2	1.2	6	-1.39	7	-0.8		
9	1.2D + 1.6W (240)	1.6	Y	1	1.2	2	1.2	6	-0.8	7	-1.39		
10	1.2D + 1.6W (270	1.6	Y	1	1.2	2	1.2	7	-1.6				
11	1.2D + 1.6W (300)	1.6	Y	1	1.2	2	1.2	6	0.8	7	-1.39		
12	1.2D + 1.6W (330)	1.6	Y	1	1.2	2	1.2	6	1.39	7	-0.8		
13	1.2D+1.0Di+1.0Wi (0)	1.0	Y	1	1.2	2	1.2	3	1.0	4	1.0		
14	1.2D+1.0Di+1.0Wi (30)	1.0	Y	1	1.2	2	1.2	3	1.0	4	0.866	5	0.5
15	1.2D+1.0Di+1.0Wi (60)	1.0	Y	1	1.2	2	1.2	3	1.0	4	0.5	5	0.866
16	1.2D+1.0Di+1.0Wi (90)	1.0	Y	1	1.2	2	1.2	3	1.0	5	1.0		
17	1.2D+1.0Di+1.0Wi (120)	1.0	Y	1	1.2	2	1.2	3	1.0	4	-0.5	5	0.866
18	1.2D+1.0Di+1.0Wi (150)	1.0	Y	1	1.2	2	1.2	3	1.0	4	-0.866	5	0.5
19	1.2D+1.0Di+1.0Wi (180)	1.0	Y	1	1.2	2	1.2	3	1.0	4	-1.0		
20	1.2D+1.0Di+1.0Wi (210)	1.0	Y	1	1.2	2	1.2	3	1.0	4	-0.866	5	-0.5
21	1.2D+1.0Di+1.0Wi (240)	1.0	Y	1	1.2	2	1.2	3	1.0	4	-0.5	5	-0.866
22	1.2D+1.0Di+1.0Wi (270)	1.0	Y	1	1.2	2	1.2	3	1.0	5	-1.0		
23	1.2D+1.0Di+1.0Wi (300)	1.0	Y	1	1.2	2	1.2	3	1.0	4	0.5	5	-0.866
24	1.2D+1.0Di+1.0Wi (330)	1.0	Y	1	1.2	2	1.2	3	1.0	4	0.866	5	-0.5

Where:
BLC = Basic Load Case
D = Dead Load
Di = Dead Load of Ice
W = Wind Load
Wi = Wind Load w/ Ice

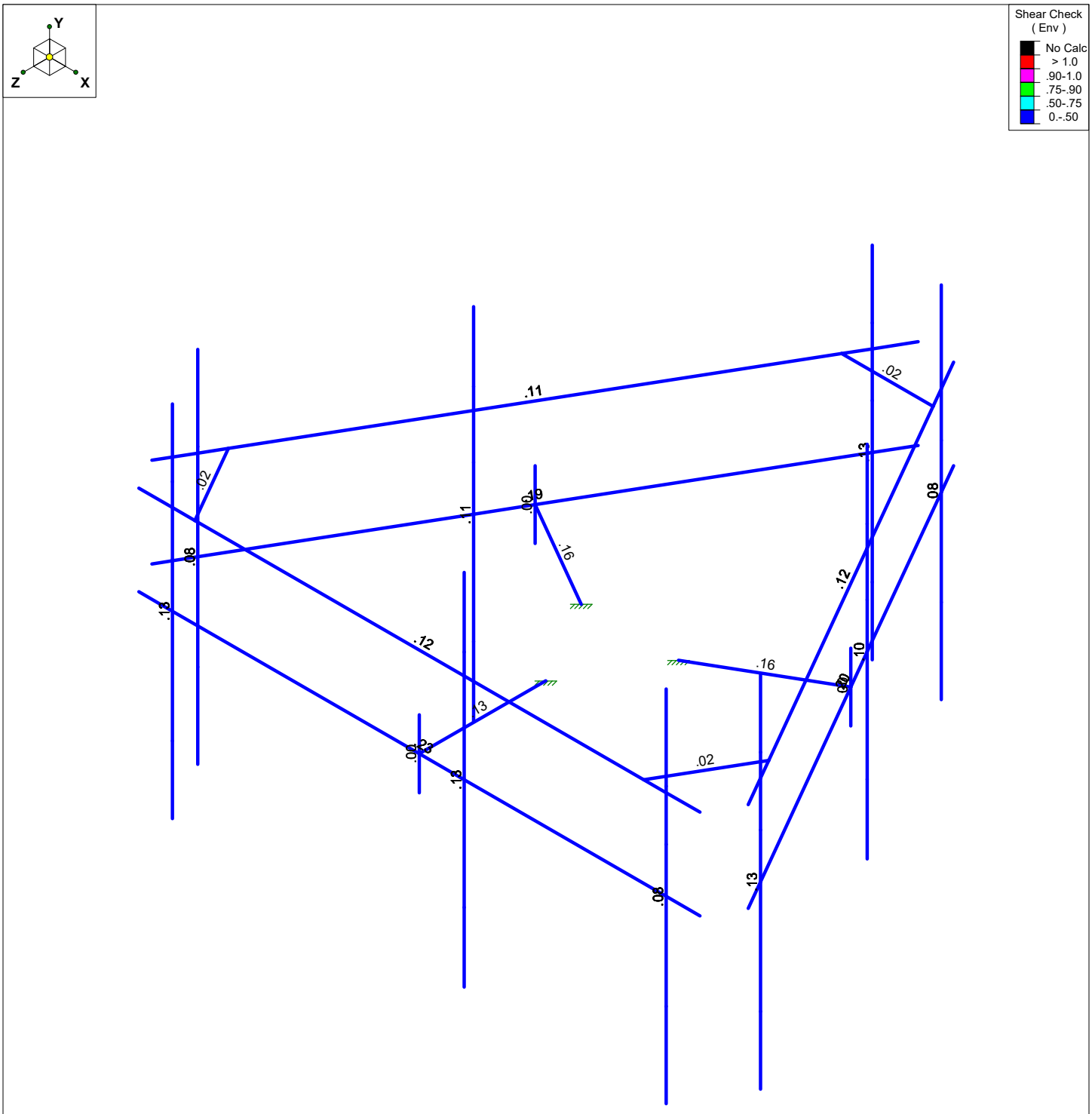
APPENDIX B

RISA 3D OUTPUT



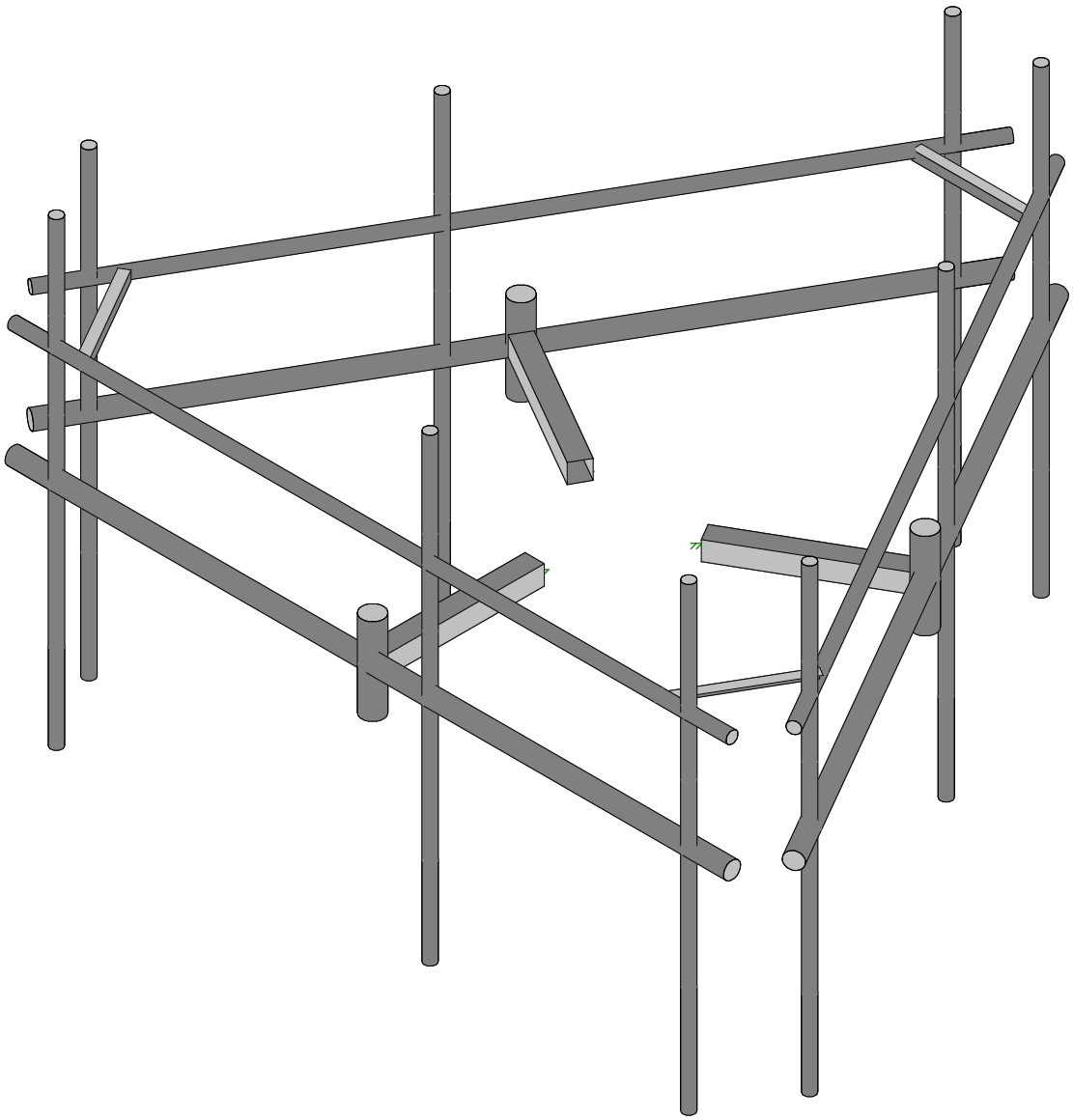
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Paul J Ford & Company	Bethel Stony Hill - AWS	SK - 1
CEC		May 2, 2019 at 2:40 PM
A80618-0011.002.6190		A80618-0011.002.6190_R2 - Hand...



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Paul J Ford & Company	Bethel Stony Hill - AWS	SK - 2
CEC		May 2, 2019 at 2:40 PM
A80618-0011.002.6190		A80618-0011.002.6190_R2 - Hand...



Envelope Only Solution

Paul J Ford & Company	Bethel Stony Hill - AWS	SK - 3
CEC		May 2, 2019 at 2:40 PM
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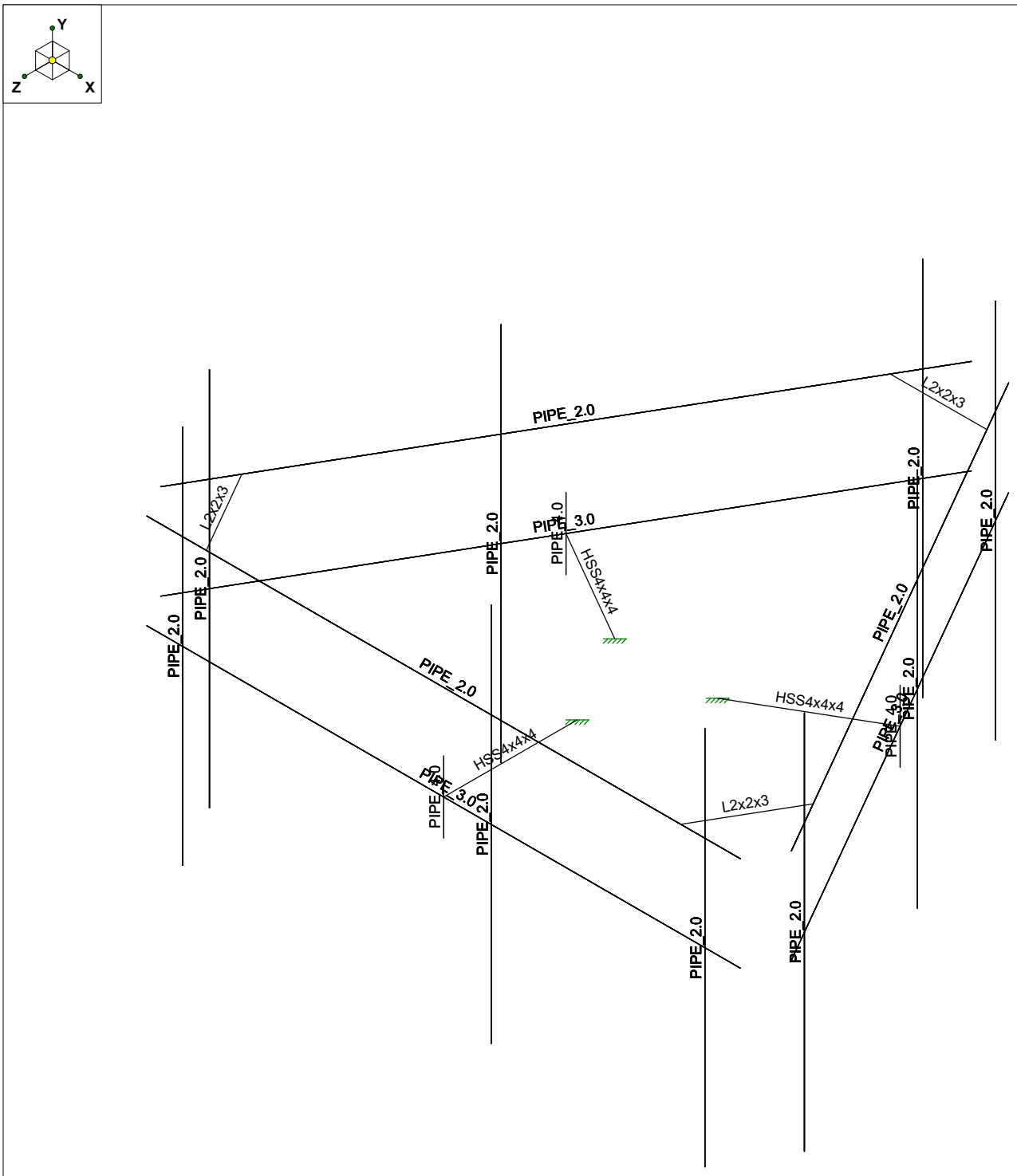
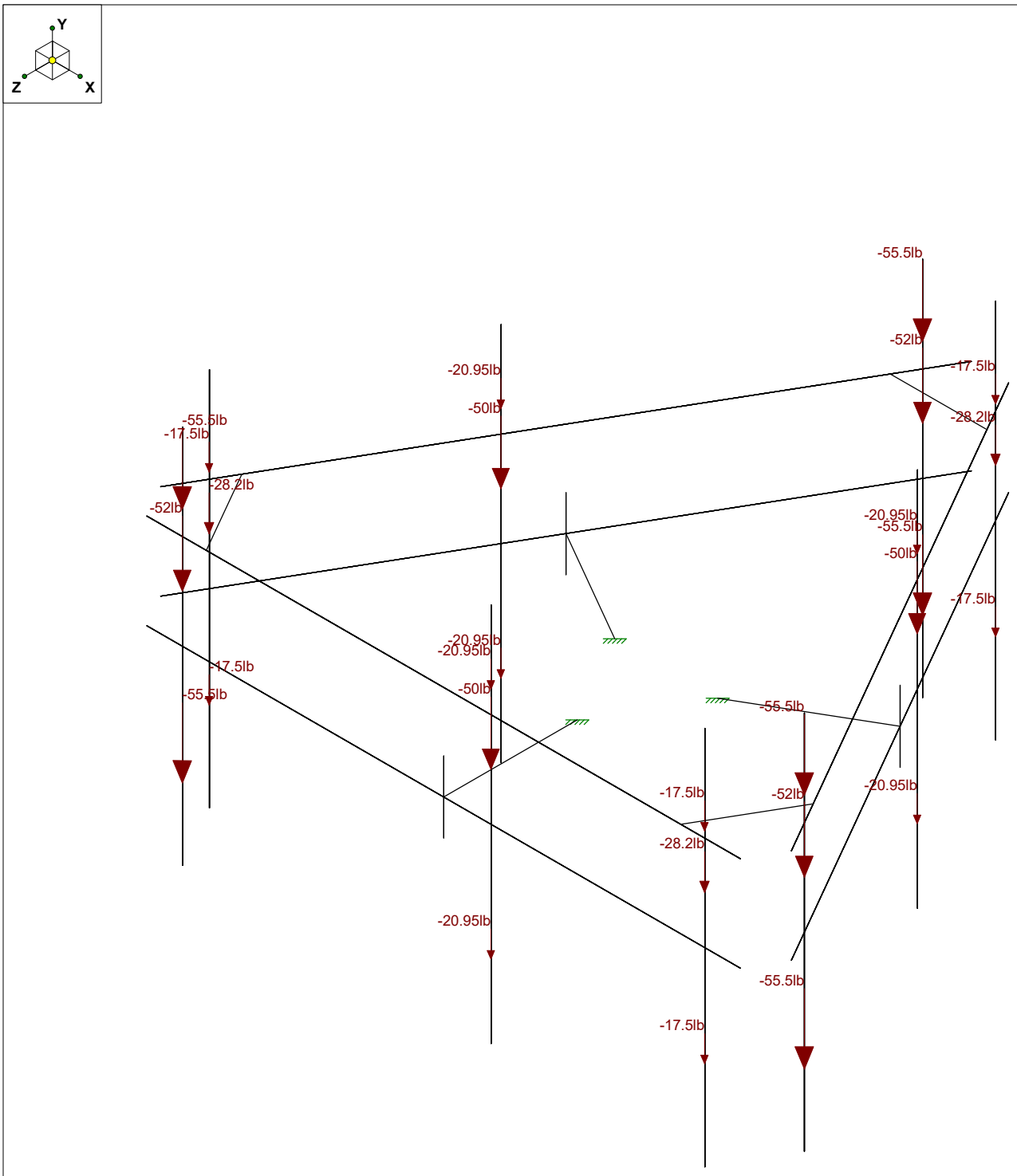


Envelope Only Solution

Paul J Ford & Company	Bethel Stony Hill - AWS	SK - 4
CEC		May 2, 2019 at 2:41 PM
A80618-0011.002.6190		A80618-0011.002.6190_R2 - Hand...



Loads: BLC 2, Weight of Appurtenances
Envelope Only Solution

Paul J Ford & Company	Bethel Stony Hill - AWS	SK - 5
CEC		May 2, 2019 at 2:41 PM
A80618-0011.002.6190		A80618-0011.002.6190_R2 - Hand...

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (in/sec^2)	386.4
Wall Mesh Size (in)	24
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	None
Cold Formed Steel Code	None
Wood Code	None
Wood Temperature	< 100F
Concrete Code	None
Masonry Code	None
Aluminum Code	None - Building

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (in)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	4
Cd X	4
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Ru...
1	M1	N3	N2			PIPE_2.0	None	None	A53 Gr.B	Typical
2	M4	N11	N15		90	PIPE_2.0	None	None	A53 Gr.B	Typical
3	M6	N14	N18		90	PIPE_2.0	None	None	A53 Gr.B	Typical
4	M7	N12	N16		90	PIPE_2.0	None	None	A53 Gr.B	Typical
5	M7A	N24A	N23A			PIPE_3.0	None	None	A53 Gr.B	Typical
6	M8	N26	N25			PIPE_4.0	None	None	A53 Gr.B	Typical
7	M9	N22A	N27			HSS4x4x4	None	None	A500 Gr.B Rect	Typical
8	M10	N36	N35			PIPE_2.0	None	None	A53 Gr.B	Typical
9	M13	N43	N46		210	PIPE_2.0	None	None	A53 Gr.B	Typical
10	M14	N45	N48		210	PIPE_2.0	None	None	A53 Gr.B	Typical
11	M15	N44	N47		210	PIPE_2.0	None	None	A53 Gr.B	Typical
12	M16	N57	N56			PIPE_3.0	None	None	A53 Gr.B	Typical
13	M17	N59	N58			PIPE_4.0	None	None	A53 Gr.B	Typical
14	M18	N55	N60			HSS4x4x4	None	None	A500 Gr.B Rect	Typical
15	M19	N69	N68			PIPE_2.0	None	None	A53 Gr.B	Typical
16	M22	N76	N79		330	PIPE_2.0	None	None	A53 Gr.B	Typical
17	M23	N78	N81		330	PIPE_2.0	None	None	A53 Gr.B	Typical
18	M24	N77	N80		330	PIPE_2.0	None	None	A53 Gr.B	Typical
19	M25	N90	N89			PIPE_3.0	None	None	A53 Gr.B	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Ru...
20	M26	N92	N91			PIPE_4.0	None	None	A53 Gr.B	Typical
21	M27	N88	N93			HSS4x4x4	None	None	A500 Gr.B Rect	Typical
22	M28	N105	N100		90	L2x2x3	Beam	None	A36 Gr.36	Typical
23	M29	N103	N101		90	L2x2x3	Beam	None	A36 Gr.36	Typical
24	M30	N104	N102		90	L2x2x3	Beam	None	A36 Gr.36	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Analysis ...	Inactive	Seismic Design ...
1	M1						Yes			None
2	M4						Yes			None
3	M6						Yes			None
4	M7						Yes			None
5	M7A						Yes			None
6	M8						Yes			None
7	M9						Yes			None
8	M10						Yes			None
9	M13						Yes			None
10	M14						Yes			None
11	M15						Yes			None
12	M16						Yes			None
13	M17						Yes			None
14	M18						Yes			None
15	M19						Yes			None
16	M22						Yes			None
17	M23						Yes			None
18	M24						Yes			None
19	M25						Yes			None
20	M26						Yes			None
21	M27						Yes			None
22	M28	OOOOOX	OOOOOX				Yes			None
23	M29	OOOOOX	OOOOOX				Yes			None
24	M30	OOOOOX	OOOOOX				Yes			None

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	PIPE_2.0	150			Lbyy						Lateral
2	M4	PIPE_2.0	96									Lateral
3	M6	PIPE_2.0	96									Lateral
4	M7	PIPE_2.0	96									Lateral
5	M7A	PIPE_3.0	150			Lbyy						Lateral
6	M8	PIPE_4.0	18			Lbyy						Lateral
7	M9	HSS4x4x4	33.75			Lbyy						Lateral
8	M10	PIPE_2.0	150			Lbyy						Lateral
9	M13	PIPE_2.0	96									Lateral
10	M14	PIPE_2.0	96									Lateral
11	M15	PIPE_2.0	96									Lateral
12	M16	PIPE_3.0	150			Lbyy						Lateral
13	M17	PIPE_4.0	18			Lbyy						Lateral
14	M18	HSS4x4x4	33.75			Lbyy						Lateral
15	M19	PIPE_2.0	150			Lbyy						Lateral
16	M22	PIPE_2.0	96									Lateral
17	M23	PIPE_2.0	96									Lateral
18	M24	PIPE_2.0	96									Lateral
19	M25	PIPE_3.0	150			Lbyy						Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
20	M26	PIPE_4.0	18			Lbyy						Lateral
21	M27	HSS4x4x4	33.75			Lbyy						Lateral
22	M28	L2x2x3	24.437									Lateral
23	M29	L2x2x3	24.437									Lateral
24	M30	L2x2x3	24.437									Lateral

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

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/...
1	EQ1TOP	L	Y	-20.95
2	EQ1BOT	L	Y	-20.95
3	EQ2	L	Y	-50
4	EQ3TOP	L	Y	-17.5
5	EQ3BOT	L	Y	-17.5
6	EQ4	L	Y	-28.2
7	EQ5TOP	L	Y	-55.5
8	EQ5BOT	L	Y	-55.5
9	EQ6	L	Y	-52
10	N40	L	Y	-52
11	N41	L	Y	-28.2
12	N42	L	Y	-50
13	N49	L	Y	-17.5
14	N50	L	Y	-17.5
15	N51	L	Y	-20.95
16	N52	L	Y	-20.95
17	N53	L	Y	-55.5
18	N54	L	Y	-55.5
19	N73	L	Y	-52
20	N74	L	Y	-28.2
21	N75	L	Y	-50
22	N82	L	Y	-17.5
23	N83	L	Y	-17.5
24	N84	L	Y	-20.95
25	N85	L	Y	-20.95
26	N86	L	Y	-55.5
27	N87	L	Y	-55.5

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

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/...
1	EQ1TOP	L	Y	-134.5
2	EQ1BOT	L	Y	-134.5
3	EQ2	L	Y	-94
4	EQ3TOP	L	Y	-90.5
5	EQ3BOT	L	Y	-90.5
6	EQ4	L	Y	-94
7	EQ5TOP	L	Y	-150.5
8	EQ5BOT	L	Y	-150.5
9	EQ6	L	Y	-100
10	N40	L	Y	-100
11	N41	L	Y	-94
12	N42	L	Y	-94
13	N49	L	Y	-90.5
14	N50	L	Y	-90.5
15	N51	L	Y	-134.5
16	N52	L	Y	-134.5
17	N53	L	Y	-150.5

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

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/...
18	N54	L	Y	-150.5
19	N73	L	Y	-100
20	N74	L	Y	-94
21	N75	L	Y	-94
22	N82	L	Y	-90.5
23	N83	L	Y	-90.5
24	N84	L	Y	-134.5
25	N85	L	Y	-134.5
26	N86	L	Y	-150.5
27	N87	L	Y	-150.5

Joint Loads and Enforced Displacements (BLC 4 : TIA Wind with Ice - X)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/...
1	EQ2	L	X	17
2	EQ1TOP	L	X	38.5
3	EQ1BOT	L	X	38.5
4	EQ3TOP	L	X	24.5
5	EQ3BOT	L	X	24.5
6	EQ4	L	X	18
7	EQ5TOP	L	X	44
8	EQ5BOT	L	X	44
9	EQ6	L	X	20
10	N40	L	X	20
11	N41	L	X	18
12	N42	L	X	17
13	N49	L	X	24.5
14	N50	L	X	24.5
15	N51	L	X	38.5
16	N52	L	X	38.5
17	N53	L	X	44
18	N54	L	X	44
19	N73	L	X	20
20	N74	L	X	18
21	N75	L	X	17
22	N82	L	X	24.5
23	N83	L	X	24.5
24	N84	L	X	38.5
25	N85	L	X	38.5
26	N86	L	X	44
27	N87	L	X	44

Joint Loads and Enforced Displacements (BLC 5 : TIA Wind with Ice - Z)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/...
1	EQ2	L	Z	32
2	EQ1TOP	L	Z	47.5
3	EQ1BOT	L	Z	47.5
4	EQ3TOP	L	Z	34.5
5	EQ3BOT	L	Z	34.5
6	EQ4	L	Z	35
7	EQ5TOP	L	Z	49
8	EQ5BOT	L	Z	49
9	EQ6	L	Z	32
10	N40	L	Z	32
11	N41	L	Z	35
12	N42	L	Z	32
13	N49	L	Z	34.5

Joint Loads and Enforced Displacements (BLC 5 : TIA Wind with Ice - Z) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/...
14	N50	L	Z	34.5
15	N51	L	Z	47.5
16	N52	L	Z	47.5
17	N53	L	Z	49
18	N54	L	Z	49
19	N73	L	Z	32
20	N74	L	Z	35
21	N75	L	Z	32
22	N82	L	Z	34.5
23	N83	L	Z	34.5
24	N84	L	Z	47.5
25	N85	L	Z	47.5
26	N86	L	Z	49
27	N87	L	Z	49

Joint Loads and Enforced Displacements (BLC 6 : TIA Wind - X)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/...
1	EQ2	L	X	22
2	EQ1TOP	L	X	92
3	EQ1BOT	L	X	92
4	EQ3TOP	L	X	48.5
5	EQ3BOT	L	X	48.5
6	EQ4	L	X	21
7	EQ5TOP	L	X	113
8	EQ5BOT	L	X	113
9	EQ6	L	X	30
10	N40	L	X	30
11	N41	L	X	21
12	N42	L	X	22
13	N49	L	X	48.5
14	N50	L	X	48.5
15	N51	L	X	92
16	N52	L	X	92
17	N53	L	X	113
18	N54	L	X	113
19	N73	L	X	30
20	N74	L	X	21
21	N75	L	X	22
22	N82	L	X	48.5
23	N83	L	X	48.5
24	N84	L	X	92
25	N85	L	X	92
26	N86	L	X	113
27	N87	L	X	113

Joint Loads and Enforced Displacements (BLC 7 : TIA Wind - Z)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/...
1	EQ2	L	Z	65
2	EQ1TOP	L	Z	130
3	EQ1BOT	L	Z	130
4	EQ3TOP	L	Z	91
5	EQ3BOT	L	Z	91
6	EQ4	L	Z	73
7	EQ5TOP	L	Z	134.5
8	EQ5BOT	L	Z	134.5
9	EQ6	L	Z	64

Joint Loads and Enforced Displacements (BLC 7 : TIA Wind - Z) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,k-ft), (in,rad), (lb*s^2/...
10	N40	L	Z	64
11	N41	L	Z	73
12	N42	L	Z	65
13	N49	L	Z	91
14	N50	L	Z	91
15	N51	L	Z	130
16	N52	L	Z	130
17	N53	L	Z	134.5
18	N54	L	Z	134.5
19	N73	L	Z	64
20	N74	L	Z	73
21	N75	L	Z	65
22	N82	L	Z	91
23	N83	L	Z	91
24	N84	L	Z	130
25	N85	L	Z	130
26	N86	L	Z	134.5
27	N87	L	Z	134.5

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

	Member Label	Direction	Start Magnitude[lb/ft,F,ksf]	End Magnitude[lb/ft,F,ksf]	Start Location[in,%]	End Location[in,%]
1	M4	Y	-12.9	-12.9	0	0
2	M6	Y	-12.9	-12.9	0	0
3	M7	Y	-12.9	-12.9	0	0
4	M7A	Y	-15.9	-15.9	0	0
5	M8	Y	-23.9	-23.9	0	0
6	M9	Y	-24.8	-24.8	0	0
7	M13	Y	-12.9	-12.9	0	0
8	M14	Y	-12.9	-12.9	0	0
9	M15	Y	-12.9	-12.9	0	0
10	M16	Y	-15.9	-15.9	0	0
11	M17	Y	-23.9	-23.9	0	0
12	M18	Y	-24.8	-24.8	0	0
13	M22	Y	-12.9	-12.9	0	0
14	M23	Y	-12.9	-12.9	0	0
15	M24	Y	-12.9	-12.9	0	0
16	M25	Y	-15.9	-15.9	0	0
17	M26	Y	-23.9	-23.9	0	0
18	M27	Y	-24.8	-24.8	0	0
19	M1	Y	-12.7	-12.7	0	0
20	M10	Y	-12.7	-12.7	0	0
21	M19	Y	-12.7	-12.7	0	0
22	M28	Y	-17.2	-17.2	0	0
23	M29	Y	-17.2	-17.2	0	0
24	M30	Y	-17.2	-17.2	0	0

Member Distributed Loads (BLC 4 : TIA Wind with Ice - X)

	Member Label	Direction	Start Magnitude[lb/ft,F,ksf]	End Magnitude[lb/ft,F,ksf]	Start Location[in,%]	End Location[in,%]
1	M4	X	5.8	5.8	0	0
2	M6	X	5.8	5.8	0	0
3	M7	X	5.8	5.8	0	0
4	M8	X	5.6	5.6	0	0
5	M9	X	9.5	9.5	0	0
6	M13	X	5.8	5.8	0	0
7	M14	X	5.8	5.8	0	0

Member Distributed Loads (BLC 4 : TIA Wind with Ice - X) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,ksf]	End Magnitude[lb/ft,F,ksf]	Start Location[in,%]	End Location[in,%]
8	M15	X	5.8	5.8	0	0
9	M17	X	5.6	5.6	0	0
10	M18	X	9.5	9.5	0	0
11	M22	X	5.8	5.8	0	0
12	M23	X	5.8	5.8	0	0
13	M24	X	5.8	5.8	0	0
14	M26	X	5.6	5.6	0	0
15	M27	X	9.5	9.5	0	0
16	M7A	X	6.7	6.7	0	0
17	M16	X	6.7	6.7	0	0
18	M25	X	6.7	6.7	0	0
19	M1	X	5.8	5.8	0	0
20	M10	X	5.8	5.8	0	0
21	M19	X	5.8	5.8	0	0
22	M28	X	8.2	8.2	0	0
23	M29	X	8.2	8.2	0	0
24	M30	X	8.2	8.2	0	0

Member Distributed Loads (BLC 5 : TIA Wind with Ice - Z)

	Member Label	Direction	Start Magnitude[lb/ft,F,ksf]	End Magnitude[lb/ft,F,ksf]	Start Location[in,%]	End Location[in,%]
1	M4	Z	5.8	5.8	0	0
2	M6	Z	5.8	5.8	0	0
3	M7	Z	5.8	5.8	0	0
4	M7A	Z	6.7	6.7	0	0
5	M8	Z	5.6	5.6	0	0
6	M13	Z	5.8	5.8	0	0
7	M14	Z	5.8	5.8	0	0
8	M15	Z	5.8	5.8	0	0
9	M16	Z	6.7	6.7	0	0
10	M17	Z	5.6	5.6	0	0
11	M22	Z	5.8	5.8	0	0
12	M23	Z	5.8	5.8	0	0
13	M24	Z	5.8	5.8	0	0
14	M25	Z	6.7	6.7	0	0
15	M26	Z	5.6	5.6	0	0
16	M9	Z	9.5	9.5	0	0
17	M18	Z	9.5	9.5	0	0
18	M27	Z	9.5	9.5	0	0
19	M1	Z	5.8	5.8	0	0
20	M10	Z	5.8	5.8	0	0
21	M19	Z	5.8	5.8	0	0
22	M28	Z	8.2	8.2	0	0
23	M29	Z	8.2	8.2	0	0
24	M30	Z	8.2	8.2	0	0

Member Distributed Loads (BLC 6 : TIA Wind - X)

	Member Label	Direction	Start Magnitude[lb/ft,F,ksf]	End Magnitude[lb/ft,F,ksf]	Start Location[in,%]	End Location[in,%]
1	M4	X	7.9	7.9	0	0
2	M6	X	7.9	7.9	0	0
3	M7	X	7.9	7.9	0	0
4	M8	X	9.1	9.1	0	0
5	M9	X	16	16	0	0
6	M13	X	7.9	7.9	0	0
7	M14	X	7.9	7.9	0	0
8	M15	X	7.9	7.9	0	0
9	M17	X	9.1	9.1	0	0

Member Distributed Loads (BLC 6 : TIA Wind - X) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,ksf]	End Magnitude[lb/ft,F,ksf]	Start Location[in,%]	End Location[in,%]
10	M18	X	16	16	0	0
11	M22	X	7.9	7.9	0	0
12	M23	X	7.9	7.9	0	0
13	M24	X	7.9	7.9	0	0
14	M26	X	9.1	9.1	0	0
15	M27	X	16	16	0	0
16	M7A	X	11.6	11.6	0	0
17	M16	X	11.6	11.6	0	0
18	M25	X	11.6	11.6	0	0
19	M1	X	7.9	7.9	0	0
20	M10	X	7.9	7.9	0	0
21	M19	X	7.9	7.9	0	0
22	M28	X	8.7	8.7	0	0
23	M29	X	8.7	8.7	0	0
24	M30	X	8.7	8.7	0	0

Member Distributed Loads (BLC 7 : TIA Wind - Z)

	Member Label	Direction	Start Magnitude[lb/ft,F,ksf]	End Magnitude[lb/ft,F,ksf]	Start Location[in,%]	End Location[in,%]
1	M4	Z	7.9	7.9	0	0
2	M6	Z	7.9	7.9	0	0
3	M7	Z	7.9	7.9	0	0
4	M7A	Z	11.6	11.6	0	0
5	M8	Z	9.1	9.1	0	0
6	M13	Z	7.9	7.9	0	0
7	M14	Z	7.9	7.9	0	0
8	M15	Z	7.9	7.9	0	0
9	M16	Z	11.6	11.6	0	0
10	M17	Z	9.1	9.1	0	0
11	M22	Z	7.9	7.9	0	0
12	M23	Z	7.9	7.9	0	0
13	M24	Z	7.9	7.9	0	0
14	M25	Z	11.6	11.6	0	0
15	M26	Z	9.1	9.1	0	0
16	M9	Z	16	16	0	0
17	M18	Z	16	16	0	0
18	M27	Z	16	16	0	0
19	M1	Z	7.9	7.9	0	0
20	M10	Z	7.9	7.9	0	0
21	M19	Z	7.9	7.9	0	0
22	M28	Z	8.7	8.7	0	0
23	M29	Z	8.7	8.7	0	0
24	M30	Z	8.7	8.7	0	0

Basic Load Cases

	BLC Description	Category	X Grav...	Y Grav...	Z Grav...	Joint	Point	Distrib...	Area(...	Surfac...
1	Self Weight	None		-1.1						
2	Weight of Appurtenances	None				27				
3	Weight of Ice Only	None				27		24		
4	TIA Wind with Ice - X	None				27		24		
5	TIA Wind with Ice - Z	None				27		24		
6	TIA Wind - X	None				27		24		
7	TIA Wind - Z	None				27		24		

Load Combinations

	Description	S...	PDelta	SRSS	B...	Fa...	B...	Fac...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D + 1.6W (0 deg)	Y...	Y		1	1.2	2	1.2	6	1.6																
2	1.2D + 1.6W (30 deg)	Y...	Y		1	1.2	2	1.2	6	1.39	7	.8														
3	1.2D + 1.6W (60 deg)	Y...	Y		1	1.2	2	1.2	6	.8	7	1.39														
4	1.2D + 1.6W (90 deg)	Y...	Y		1	1.2	2	1.2	7	1.6																
5	1.2D + 1.6W (120 deg)	Y...	Y		1	1.2	2	1.2	6	-.8	7	1.39														
6	1.2D + 1.6W (150 deg)	Y...	Y		1	1.2	2	1.2	6	-1....	7	.8														
7	1.2D + 1.6W (180 deg)	Y...	Y		1	1.2	2	1.2	6	-1.6																
8	1.2D + 1.6W (210 deg)	Y...	Y		1	1.2	2	1.2	6	-1....	7	-.8														
9	1.2D + 1.6W (240 deg)	Y...	Y		1	1.2	2	1.2	6	-.8	7	-1....														
10	1.2D + 1.6W (270 deg)	Y...	Y		1	1.2	2	1.2	7	-1.6																
11	1.2D + 1.6W (300 deg)	Y...	Y		1	1.2	2	1.2	6	.8	7	-1....														
12	1.2D + 1.6W (330 deg)	Y...	Y		1	1.2	2	1.2	6	1.39	7	-.8														
13	1.2D + 1.0Di + 1.0Wi (0 deg)	Y...	Y		1	1.2	2	1.2	3	1	4	1														
14	1.2D + 1.0Di + 1.0Wi (30 deg)	Y...	Y		1	1.2	2	1.2	3	1	4	.866	5	.5												
15	1.2D + 1.0Di + 1.0Wi (60 deg)	Y...	Y		1	1.2	2	1.2	3	1	4	.5	5	.866												
16	1.2D + 1.0Di + 1.0Wi (90 deg)	Y...	Y		1	1.2	2	1.2	3	1	5	1														
17	1.2D + 1.0Di + 1.0Wi (120 deg)	Y...	Y		1	1.2	2	1.2	3	1	4	-.5	5	.866												
18	1.2D + 1.0Di + 1.0Wi (150 deg)	Y...	Y		1	1.2	2	1.2	3	1	4	-.8...	5	.5												
19	1.2D + 1.0Di + 1.0Wi (180 deg)	Y...	Y		1	1.2	2	1.2	3	1	4	-1														
20	1.2D + 1.0Di + 1.0Wi (210 deg)	Y...	Y		1	1.2	2	1.2	3	1	4	-.8...	5	-.5												
21	1.2D + 1.0Di + 1.0Wi (240 deg)	Y...	Y		1	1.2	2	1.2	3	1	4	-.5	5	-.8...												
22	1.2D + 1.0Di + 1.0Wi (270 deg)	Y...	Y		1	1.2	2	1.2	3	1	5	-1														
23	1.2D + 1.0Di + 1.0Wi (300 deg)	Y...	Y		1	1.2	2	1.2	3	1	4	.5	5	-.8...												
24	1.2D + 1.0Di + 1.0Wi (330 deg)	Y...	Y		1	1.2	2	1.2	3	1	4	.866	5	-.5												

Envelope AISC 14th(360-10): LRFD Steel Code Checks

	Mem...	Shape	Code Check	Loc[in]	LC	Shear ...	Loc[...	Dir	LC	phi*Pn...	phi*Pn...	phi*Mn ...	phi*Mn...	Cb	Eqn
1	M4	PIPE_2.0	.800	48	24	.130	48		23	14916....	32130	1.872	1.872	1...	H...
2	M22	PIPE_2.0	.800	48	16	.130	48		15	14916....	32130	1.872	1.872	1...	H...
3	M13	PIPE_2.0	.799	48	20	.128	48		19	14916....	32130	1.872	1.872	1...	H...
4	M6	PIPE_2.0	.693	48	10	.127	48		10	14916....	32130	1.872	1.872	1...	H...
5	M7A	PIPE_3.0	.636	75	10	.229	75		10	28250....	65205	5.749	5.749	1...	H...
6	M14	PIPE_2.0	.604	48	5	.102	48		5	14916....	32130	1.872	1.872	1...	H...
7	M25	PIPE_3.0	.567	75	3	.190	75		14	28250....	65205	5.749	5.749	1...	H...
8	M23	PIPE_2.0	.561	48	3	.111	48		3	14916....	32130	1.872	1.872	1...	H...
9	M16	PIPE_3.0	.552	75	6	.202	75		6	28250....	65205	5.749	5.749	1...	H...
10	M27	HSS4x4x4	.530	33.75	23	.162	33.75	z	11	134974...	139518	16.181	16.181	1...	H...
11	M18	HSS4x4x4	.527	33.75	15	.161	33.75	z	3	134974...	139518	16.181	16.181	1...	H...
12	M9	HSS4x4x4	.517	33.75	19	.129	33.75	z	7	134974...	139518	16.181	16.181	1...	H...
13	M15	PIPE_2.0	.482	48	16	.083	48		17	14916....	32130	1.872	1.872	1...	H...
14	M24	PIPE_2.0	.473	48	24	.081	48		13	14916....	32130	1.872	1.872	1...	H...
15	M7	PIPE_2.0	.472	48	20	.082	48		21	14916....	32130	1.872	1.872	1...	H...
16	M10	PIPE_2.0	.414	87.5	17	.122	14.0...		11	6295.4...	32130	1.872	1.872	2...	H...
17	M1	PIPE_2.0	.412	87.5	21	.121	135....		11	6295.4...	32130	1.872	1.872	2...	H...
18	M19	PIPE_2.0	.407	87.5	13	.109	14.0...		7	6295.4...	32130	1.872	1.872	2...	H...
19	M29	L2x2x3	.375	0	11	.022	0	z	11	19004....	23392.8	.558	1.239	1...	H...
20	M28	L2x2x3	.331	0	3	.022	0	y	4	19004....	23392.8	.558	1.239	1...	H...
21	M30	L2x2x3	.298	24.4...	7	.018	0	y	8	19004....	23392.8	.558	1.239	1...	H...
22	M26	PIPE_4.0	.000	9	11	.000	9		11	92571....	93240	10.631	10.631	1...	H...
23	M17	PIPE_4.0	.000	9	3	.000	9		3	92571....	93240	10.631	10.631	1...	H...
24	M8	PIPE_4.0	.000	9	6	.000	9		6	92571....	93240	10.631	10.631	1...	H...