Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

January 28, 2019

Melanie A. Bachman
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: **Notice of Exempt Modification for Verizon: 806382**
Verizon Site ID: NG1897
74 Goodrich Lane, Portland, CT 06480
Latitude: 41° 36' 29.9" / Longitude: -72° 35' 29.56"

Dear Ms. Bachman:

Verizon currently maintains twelve (12) antennas at the 158-foot level of the existing 160-foot monopole tower 74 Goodrich Lane, Portland, CT. The tower is owned by Crown Castle. The tower and property is owned by Crown Castle. Verizon now intends to replace (9) RRU's with (6) new RRU's at the 158-foot level of the tower.

This facility was approved by the Connecticut Siting Council in Docket No. 58 on July 11, 1986. This approval was given without conditions.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 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.S.C.A. § 16-50j-73, a copy of this letter is being sent to Ms. Susan S. Branfield, First Selectman, Town of Portland, and Crown Castle is the tower and property owner.

1. The proposed modifications will not result in an increase in the height of the existing tower.

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, Verizon respectfully submits that the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: Nesmet Badawi.

Sincerely,
Nesmet

Nesmet Badawi
Real Estate Specialist
1200 MacArthur Blvd Suite 200, Mahwah NJ 07430
201-300-9621
Nesmet.Badawi.Contractor @crowncastle.com

Attachments:

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc:

Ms. Susan S. Branfield, First Selectman
Town of Portland
33 E Main St
Portland, CT 0648

Dan Bourret,
Zoning Enforcement Officer
33 East Main Street
Portland, CT 0648

DOCKET NO. 58

AN APPLICATION OF HARTFORD CELLULAR COMPANY FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION, MAINTENANCE, AND OPERATION OF FACILITIES TO PROVIDE CELLULAR SERVICE IN HARTFORD, TOLLAND, AND MIDDLESEX COUNTIES.	:	CONNECTICUT SITING COUNCIL
	:	July 11, 1986

FINDINGS OF FACT

1. Hartford Cellular Company (Hartford), in accordance with provisions of sections 16-50g to 16-50z of the Connecticut General Statutes (CGS), applied to the Connecticut Siting Council (Council) on January 15, 1986, for a certificate of environmental compatibility and public need (certificate) for the construction, maintenance, and operation of telecommunication towers and associated equipment buildings to provide Domestic Public Cellular Radio Telecommunication Service (cellular service) in the Hartford New England County Metropolitan Area (Hartford NECMA). (Record)
2. Cellular tower sites were proposed for the towns of Bloomfield (two), Glastonbury, Haddam, Hartford, Middlefield, Portland, Rocky Hill, Somers, and Willington, Connecticut. (Hartford 1, p. 2)
3. On April 14, 1986, the applicant amended its application to include a proposed tower site in the Town of Vernon. On May 12, 1986, the applicant withdrew one of its proposed Bloomfield sites and proposed a substitute tower site in the Town of Windsor. (Hartford 1, Exhibit 7, p. 4; Hartford 17, p. 2)
4. The application was accompanied by proof of service as required by section 16-501 of the CGS. (Record)
5. The fee as prescribed by section 16-50v-1 of the Regulations of State Agencies (RSA) accompanied the application. (Record)

6. Affidavits of newspaper notice as required by section 16-501 of the CGS were supplied by the applicant. Newspaper notices of this application were published twice by the applicant in the Hartford Courant, Manchester Journal-Inquirer, the Middletown Press, and the Willimantic Chronicle. Notice of the amendment for a proposed Vernon tower site was published twice by the applicant in the Hartford Courant and the Manchester Journal Inquirer. Notice of the amendment for a proposed Windsor site was published twice in the Hartford Courant. (Hartford 1, p. 5; Hartford 7, p. 2; Hartford 17, p. 3)

7. The Council and its staff inspected the proposed tower sites in the towns of Bloomfield and Hartford on March 18, 1986; in Willington and Somers on April 15, 1986; in Portland, Glastonbury, Haddam, Rocky Hill and Middlefield on April 17, 1986; and in Vernon on May 21, 1986. (Record)

8. Pursuant to section 16-50m of the CGS, the Council, after giving due notice thereof, held public hearings on this application on March 18, 1986, at 7:00 P.M. in the Bloomfield Town Hall in Bloomfield; on April 15, 1986, at 7:00 P.M. in the Center School in Willington; on April 17, 1986, at 7:00 P.M. in the Portland Public Library in Portland; and on May 21, 1986, at 7:00 P.M. in the Vernon Center Middle School in Vernon. (Record)

9. The following state agency filed written comments with the Council pursuant to section 16-50j of the CGS: the Department of Environmental Protection (DEP). (Record)

10. The parties to the proceeding are the applicant and those persons and organizations whose names are listed in the Decision and Order which accompanies these findings. (Record)

11. The Council took administrative notice of its complete record in Docket 56; in Docket 40, of Sections I-IV of the application and the Council's Findings of Fact, Opinion, and Decision and Order; in Docket 51, of the Council's Findings of Fact, Opinion, and Decision and Order; in Docket 11, of the Council's Findings of Fact, Opinion, and Decision and Order, and Volume #1 of the Application; in Docket 24, of the Council's Findings of Fact, Opinion, and Decision and Order; and of the Public Utility Environmental Standards Act, CGS 16-50g-z. (Record)

12. Exhibits in this application are as follows:

1) Application dated January 15, 1986; 2) Responses to Pre-Hearing Questions Set #1, dated March 14, 1986; 3) Responses to Pre-hearing Questions Set #2, dated March 18, 1986; 4) Responses to Questions dated April 4, 1986; 5) Responses to Questions dated April 11, 1986; 6) Zoning regulations of specified communities; 7) Amendement to application with Vernon site, dated April 14, 1986; 8) Site-line graphics from Talcott Mountain Science Center Observatory; 9) Dimension of spire atop Heublein Tower; 10) Responses to questions in Peter Cubeta letter dated April 9, 1986; 11) Two sets of 15½"x20" coverage maps; 12) Report on three Portland site alternates; 13) Response dated May 21, 1986, on Rosenfeld property; 14) Response dated April 15, 1986; 15) Response dated April 17, 1986; 16) Response dated May 9, 1986; 17) Amendment to application with Windsor site, dated May 12, 1986; 18) Response dated May 21, 1986; 19) Visibility from

Portland, CT : Commercial Property Record Card

[Back to Search Results]

[Start a New Search][Help with Printing]

Search For Properties

Parcel ID

Street Name

GOODRICH LANE

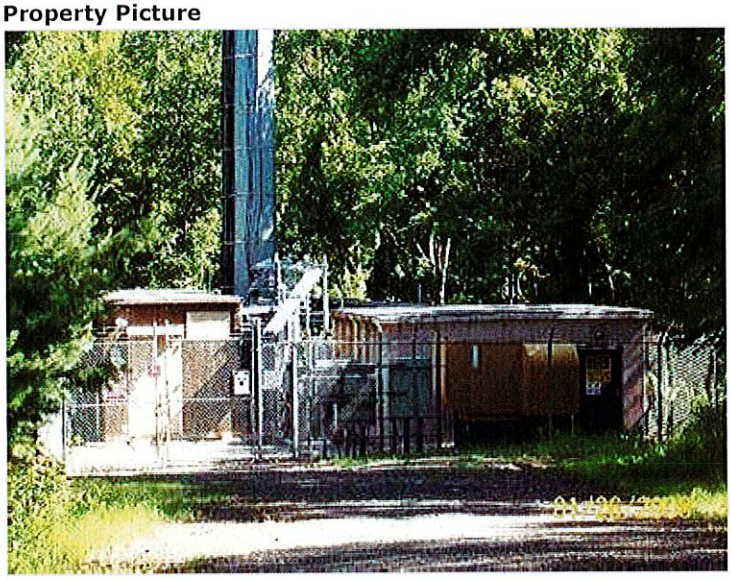
Search | Reset Search

Parcel ID	Card	Map-Block-Lot	Location	Zoning	State Class	Acres
00354100	1	084/0009	74 GOODRICH LANE	R25	431 - n/a	0.083

Owner Information

Hale Joan J Crown Atlantic Llc
Pmb 353
4017 Washington Rd
Mcmurray PA 15317

Property Picture



Deed Information

Book/Page: 284/47
Deed Date: 1992/12/23

Building Information

Building No: 0
Year Built: 0
No of Units: 0
Structure Type:
Grade:
Living Units: 0
Identical Units: 0
Net Leasable Area: 0

Valuation

Land: $68,300
Building: $161,950
Total: $230,250
Net Assessment: $161,180

Sales History

Book/Page	Date	Price	Type	Validity

Permit History

Date	Purpose	Price
2015/11/12	REPLC ANTN	$15,000
2014/11/19	ADD REPLA 3 ANT	$15,000

Out Building Information

Structure Code	Width	Lgth/SqFt	Year	RCNLD
Fence Chain	8	260	1996	$4,050
Cell Tower	1	160	1978	$140,400
Shed Frame	1	200	1978	$6,930
Shed Frame	1	96	2000	$1,300
Paving Conc Slab	1	2640	1996	$9,270

Exterior/Interior Information

Levels	Size	Use Type	Ext. Walls	Const. Type	Partitions	Heating	A/C	Plumbing	Condition	Func. Utility	Unadj. RCNLD

Building Sketch

	Descriptor/Area

Notice

The information delivered through this on-line database is provided in the spirit of open access to government information and is intended as an enhanced service and convenience for citizens of Portland, CT.

The providers of this database: Tyler/CLT, Big Room Studios, and Portland, CT assume no liability for any error or omission in the information provided herein.

Revaluation October 1, 2011. Data is updated in February, April, July and October.

Comments regarding this service should be directed to: assessor@portlandct.org

BUILT BY bigRoom STUDIOS


806382
876364
Meadow Rd
Golf Club Rd
TPC at River Highlands
Geer St
Woodside Rd
Field Rd
Vinci Dr
Shadow Ln
Cromwell
Main St
Nooks Hill Rd
Chelsea Dr
Hillside Rd
West St
Timber Hill Rd
Diane Dr
South St
River Rd
Round Meadow
Dead Mans Swamp
Connecticut River
Wangunk Meadows
Isinglass Hill Rd
Hales Brook
Paley Farms Rd
Glastonbury Tpke
Appletree Ln
Thompson Hill Rd
E Cotton Hill Rd
Reservoir Rd
Portland Reservoir
Reservoir Brook
Old Marlborough Tpke
South Rd
Wilcox Hill Rd
Meadow Rd
Main St-CT-17A
Gospel Ln
Carr Brook
Sumner St
Bartlett St
William St
Rose Hill Rd
Quarry Ridge Golf Course
Portland Golf Club
Fairway Dr
Portland Course West
Cox Rd
Stephen Tom Rd
Great Hill Rd
Wood Choppers Rd
Midwood Farm Rd
N Mulford Rd
Mulford Rd
Buck Brook
Stocking Brook
Rattlesnake Brook
Green River
Penfield
2 km
1 mi
Crown Castle | Earthstar Geographics | Esri, HERE, DeLorme, NGA, USGS, NPS
CCIsites

Site Name: Portland, CT
Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissable Exposure*
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)
VZW PCS	1970	1	6200	6200	160	0.0871	1.0
VZW Cellular LTE	869	1	2100	2100	160	0.0295	0.579333333
VZW Cellular	869	3	394	1182	160	0.0166	0.579333333
VZW AWS	2145	1	6100	6100	160	0.0857	1.0
VZW 700	746	1	2300	2300	160	0.0323	0.497333333

Total Percentage of Maximum Permissible Exposure

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Section 1.13101 based on NCRP Report 86, 1986 a

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

Absolute worst case maximum values used, including the following assumptions:
1. closest accessible point is distance from antenna to base of pole;
2. continuous transmission from all available channels at full power for indefinite time period; and,
3. all RF energy is assumed to be directed solely to the base of the pole.

Fraction of MPE
(%)
8.71%
5.09%
2.87%
8.57%
6.50%

31.73%

and generally on ANSI/IEEE C95.1-1992

Badawi, Nesmet (Contractor)

From: TrackingUpdates@fedex.com
Sent: Tuesday, January 29, 2019 10:40 AM
To: Badawi, Nesmet (Contractor)
Subject: FedEx Shipment 774326665941 Delivered

Your package has been delivered

Tracking # 774326665941

Ship date:
Mon, 1/28/2019

Nesmet Badawi
Crown Castle
MAHWAH, NJ 07430
US

Delivered

Delivery date:
Tue, 1/29/2019 10:38 am

Ms. Susan S. Branfield,
Town of Portland
33 E Main ST
PORTLAND, CT 06480
US

Shipment Facts

Our records indicate that the following package has been delivered.

Tracking number:	774326665941
Status:	Delivered: 01/29/2019 10:38 AM Signed for By: P.LEE
Reference:	1766.6680
Signed for by:	P.LEE
Delivery location:	PORTLAND, CT
Delivered to:	Receptionist/Front Desk
Service type:	FedEx Priority Overnight®
Packaging type:	FedEx® Envelope
Number of pieces:	1
Weight:	1.00 lb.

Special handling/Services:	Direct Signature Required
	Deliver Weekday
Standard transit:	1/29/2019 by 10:30 am

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 9:40 AM CST on 01/29/2019.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above.

Standard transit is the date and time the package is scheduled to be delivered by, based on the selected service, destination and ship date. Limitations and exceptions may apply. Please see the FedEx Service Guide for terms and conditions of service, including the FedEx Money-Back Guarantee, or contact your FedEx Customer Support representative.

Thank you for your business.

Badawi, Nesmet (Contractor)

From: TrackingUpdates@fedex.com
Sent: Tuesday, January 29, 2019 10:40 AM
To: Badawi, Nesmet (Contractor)
Subject: FedEx Shipment 774326527032 Delivered

Your package has been delivered

Tracking # 774326527032

Ship date:
Mon, 1/28/2019

Nesmet Badawi
Crown Castle
MAHWAH, NJ 07430
US

Delivered

Delivery date:
Tue, 1/29/2019 10:38 am

Dan Bourret
Zoning Enforcement Officer
33 East Main Street
PORTLAND, CT 06480
US

Shipment Facts

Our records indicate that the following package has been delivered.

Tracking number:	774326527032
Status:	Delivered: 01/29/2019 10:38 AM Signed for By: P.LEE
Reference:	1766.6680
Signed for by:	P.LEE
Delivery location:	PORTLAND, CT
Delivered to:	Receptionist/Front Desk
Service type:	FedEx Priority Overnight®
Packaging type:	FedEx® Envelope
Number of pieces:	1
Weight:	1.00 lb.

Special handling/Services:	Direct Signature Required
	Deliver Weekday
Standard transit:	1/29/2019 by 10:30 am

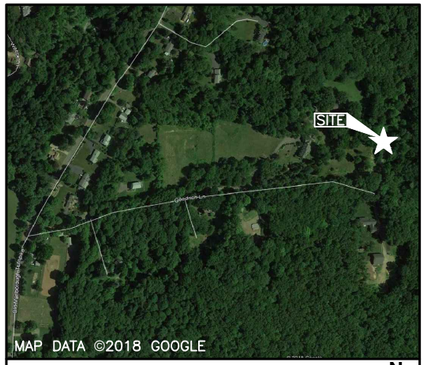
Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 9:40 AM CST on 01/29/2019.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above.

Standard transit is the date and time the package is scheduled to be delivered by, based on the selected service, destination and ship date. Limitations and exceptions may apply. Please see the FedEx Service Guide for terms and conditions of service, including the FedEx Money-Back Guarantee, or contact your FedEx Customer Support representative.

Thank you for your business.



LOCUS MAP **SCALE: N.T.S.** N

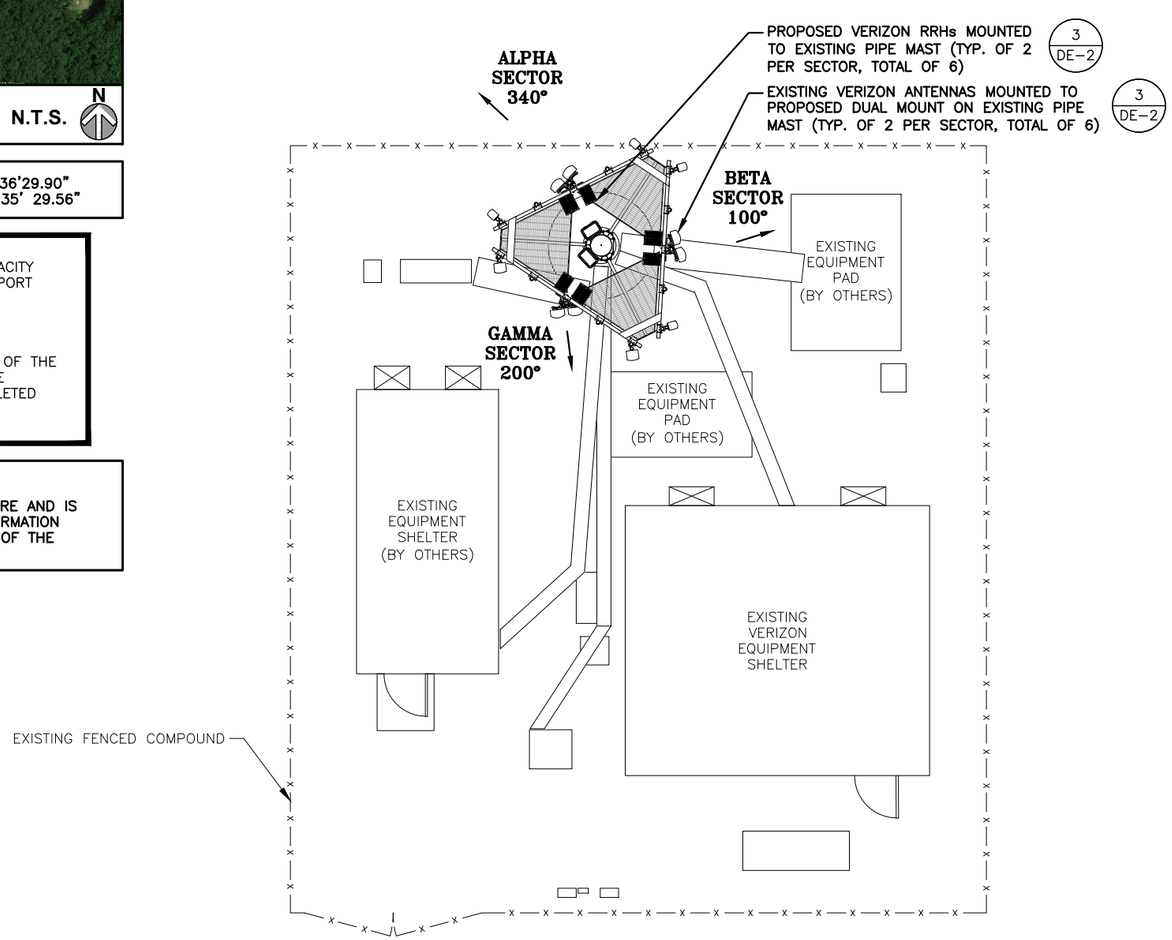
APPROXIMATE SITE COORDINATES: LAT: N41°36'29.90" LONG: W72°35' 29.56"

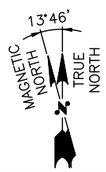
STRUCTURAL NOTE:
A STRUCTURAL ANALYSIS OF THE CAPACITY OF THE EXISTING STRUCTURE TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY B+T GROUP
DATED: JANUARY 11, 2019

A MOUNT ANALYSIS OF THE CAPACITY OF THE EXISTING STRUCTURE TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY ADVANTAGE ENGINEERS
DATED: JANUARY 18, 2019

DESIGN EXHIBIT

THIS PLAN IS DIAGRAMMATIC IN NATURE AND IS INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION AND SIZE OF THE PROPOSED ANTENNA UPGRADE.





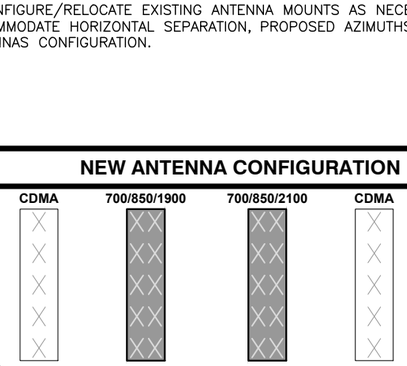
COMPOUND PLAN 1 DE-1
22x34 SCALE: 3/16"=1'-0"
11x17 SCALE: 3/32"=1'-0"

GRAPHIC SCALE
0 2'-8" 5'-4" 10'-8" 16'-0"

SCOPE

1. (6) 850/CDMA (SBNHH-1D65B) ANTENNAS TO REMAIN AND BE RELOCATED TO NEW DOUBLE MOUNTS
2. (6) 700/CDMA ANTENNAS TO REMAIN
3. (3) 700 LTE RRHs TO BE REMOVED
4. (3) 1900 LTE RRHs TO BE REMOVED
5. (3) 2100 LTE RRHS TO BE REMOVED
6. INSTALL (3) NEW B2/B66A SAMSUNG RRHs
7. INSTALL (3) NEW B5/B13 SAMSUNG RRHs
8. INSTALL (3) NEW COMMSCOPE BSAMNT-SDS-2-2 ANTENNA BRACKETS
9. (42) EXISTING 1/2" COAX JUMPER CABLES TO REMAIN
10. (12) EXISTING 1-5/8" COAX CABLES TO REMAIN
11. (2) EXISTING 1-1/4" HYBRID CABLES TO REMAIN
12. (1) 1X1 FIBER JUMPER TO BE REMOVED
13. (2) EXISTING 1x1 FIBER JUMPERS TO REMAIN
14. (2) EXISTING OVP TO REMAIN
15. ALL RELOCATED ANTENNAS TO MATCH EXISTING CONDITION & HEIGHTS.
16. RECONFIGURE/RELOCATE EXISTING ANTENNA MOUNTS AS NECESSARY TO ACCOMMODATE HORIZONTAL SEPARATION, PROPOSED AZIMUTHS, AND ANTENNAS CONFIGURATION.

NEW ANTENNA CONFIGURATION

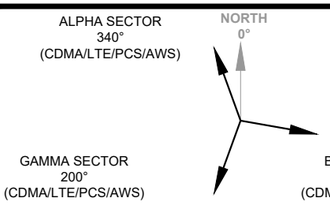


NOTE:
VIEW IS FROM BEHIND ANTENNA ARRAY LOOKING OUTWARDS

NOTES

1. NORTH SHOWN AS APPROXIMATE.
2. SOME EXISTING & PROPOSED INFORMATION NOT SHOWN FOR CLARITY.
3. ANTENNAS WILL BE PAINTED PER VERIZON WIRELESS & BUILDING OWNER'S APPROVAL.
4. PRIOR TO COMMENCEMENT OF ANY WORK, PROPOSED ANTENNA INSTALLATION IS PURSUANT TO FINDINGS DICTATED IN STRUCTURAL ANALYSIS, STRUCTURAL ANALYSIS TO VERIFY CAPACITY OF EXISTING STRUCTURE TO ENSURE STRUCTURAL INTEGRITY FOLLOWING INSTALLATION OF PROPOSED ANTENNAS, COAX CABLES AND REQUIRED HARDWARE. COPY OF STRUCTURAL ANALYSIS TO BE SENT TO DESIGN ENGINEER.
5. CONTRACTOR SHALL FIELD VERIFY SCOPE OF WORK, VERIZON WIRELESS ANTENNA MOUNT LOCATION AND ANTENNAS TO BE INSTALLED.
6. CONTRACTOR SHALL NOTIFY ENGINEERS IF FILED CONDITIONS DIFFER FROM DESIGN.
7. RAD CENTERS MEASURED IN THE FIELD WITH LASER BY HDG. RAD CENTERS MAY NOT MATCH RF ANTENNA DESIGN SHEET.

ANTENNA ORIENTATION



DESIGN EXHIBIT

PREPARED FOR: CELLCO PARTNERSHIP D.B.A.
verizon

CROWN CASTLE
CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 29554
LICENSED PROFESSIONAL ENGINEER

CONSTRUCTION DRAWINGS ARE VALID FOR SIX MONTHS AFTER ENGINEER OF RECORD'S STAMPED AND SIGNED SUBMITTAL DATE LISTED HEREIN

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

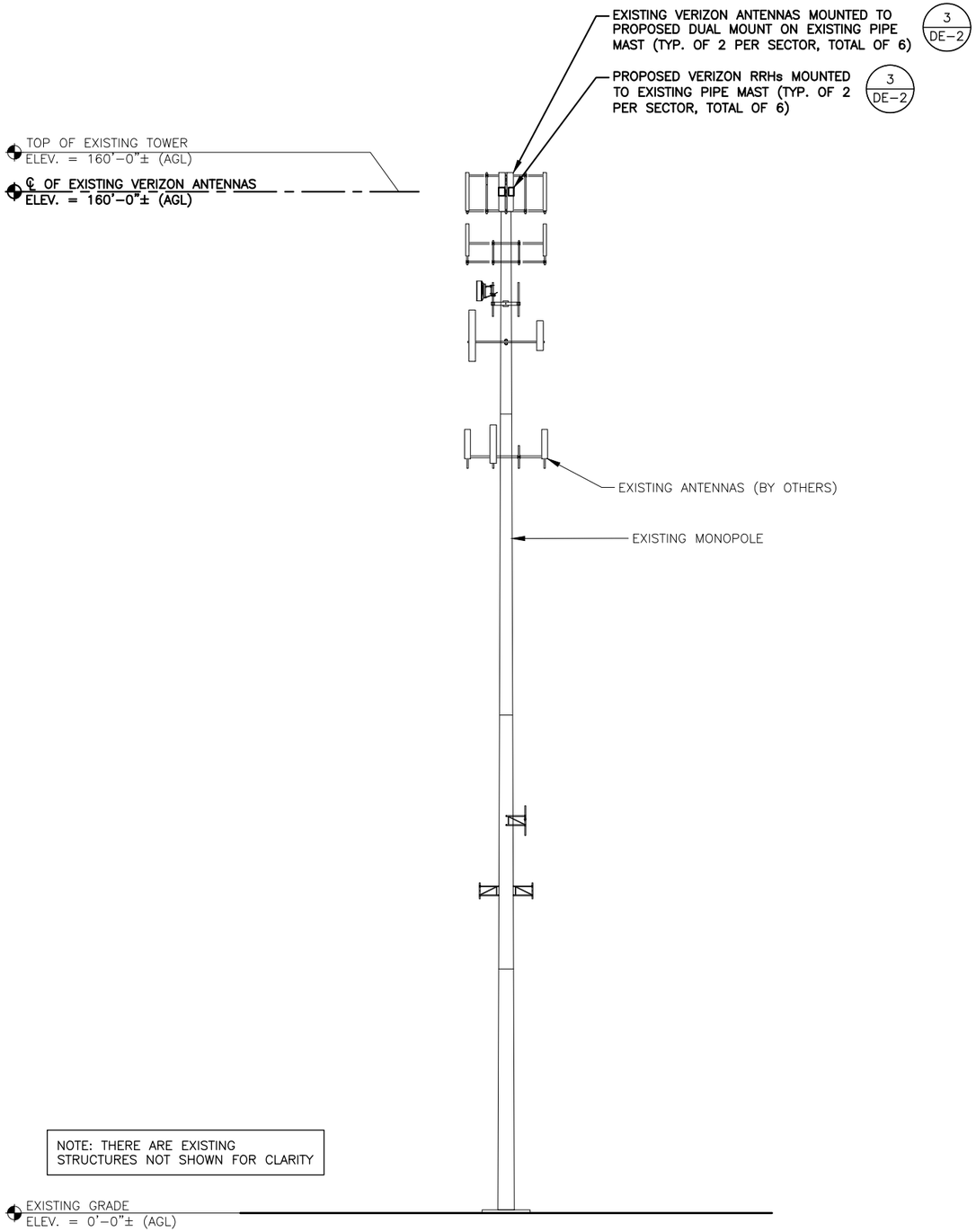
REV.	DATE	DESCRIPTION	BY
0	01/21/19	ISSUED FOR SUBMITTAL	DJM

SITE NAME:
PORTLAND CT
CROWN CASTLE SITE ID:
BU 806382

SITE ADDRESS:
74 GOODRICH LANE
PORTLAND, CT 06480

SHEET TITLE
COMPOUND PLAN

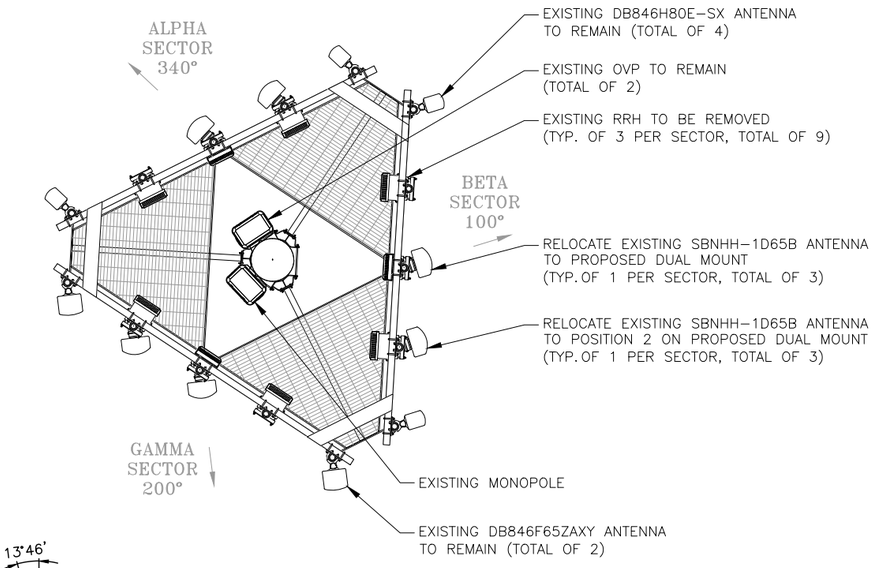
SHEET NUMBER
DE-1



TOWER ELEVATION 1 DE-2

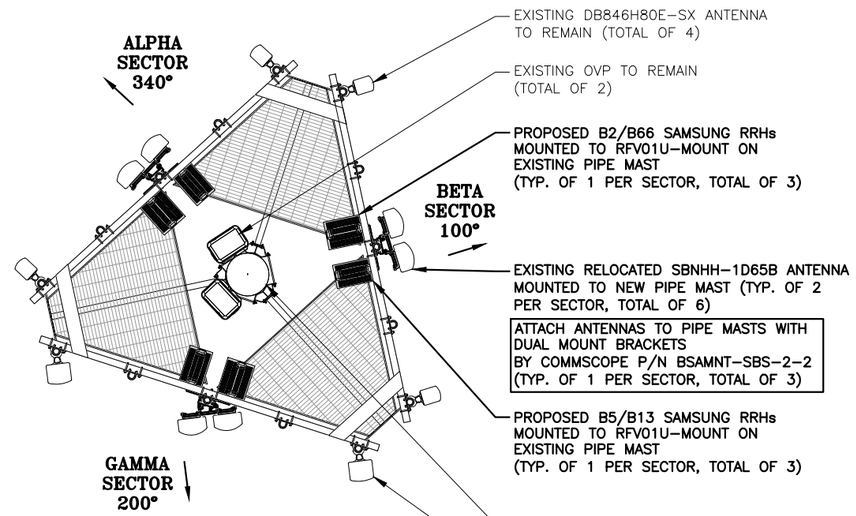
22x34 SCALE: 3/32"=1'-0"
11x17 SCALE: 3/64"=1'-0"

GRAPHIC SCALE
0 2'-8" 5'-4" 10'-8" 16'-0"



ANTENNA PLAN (EXISTING) 2 DE-2

SCALE: N.T.S



NOTE:
GC TO ROTATE EXISTING PLATFORM AS REQUIRED TO ACCOMMODATE PROPOSED ANTENNA MOUNT AND AZIMUTHS

ANTENNA PLAN (PROPOSED) 3 DE-2

SCALE: N.T.S

DESIGN EXHIBIT

PREPARED FOR: CELLCO PARTNERSHIP D.B.A.

verizon

CROWN CASTLE
CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 23954
LICENSED PROFESSIONAL ENGINEER

CONSTRUCTION DRAWINGS ARE VALID FOR SIX MONTHS AFTER ENGINEER OF RECORD'S STAMPED AND SIGNED SUBMITTAL DATE LISTED HEREIN

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

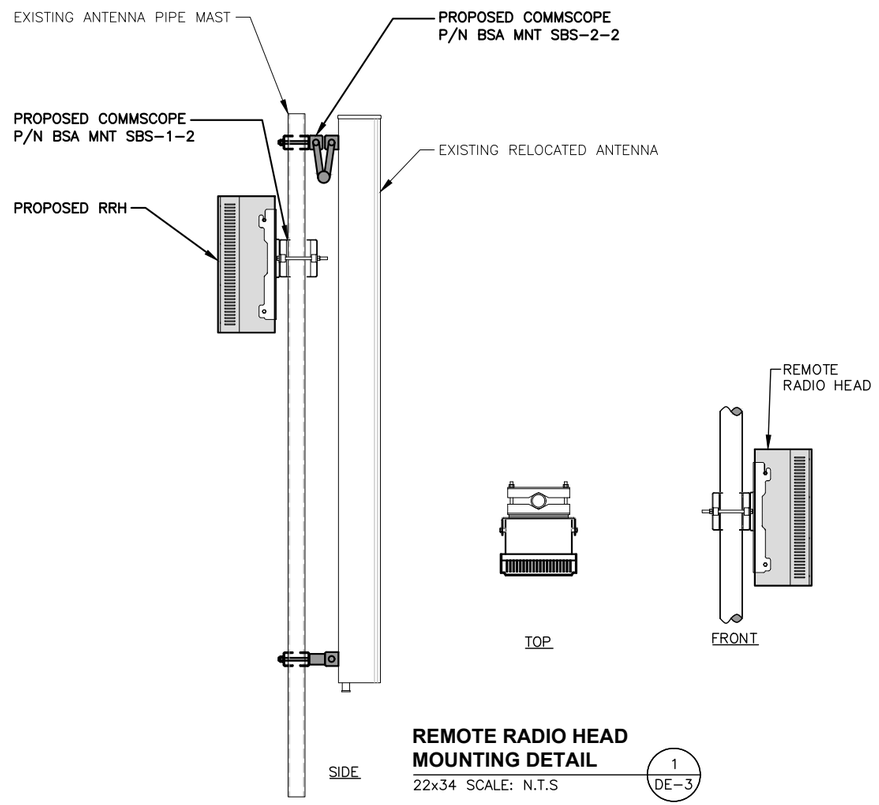
REV.	DATE	DESCRIPTION	BY
0	01/21/19	ISSUED FOR SUBMITTAL	DJM

SITE NAME:
PORTLAND CT
CROWN CASTLE SITE ID:
BU 806382

SITE ADDRESS:
74 GOODRICH LANE
PORTLAND, CT 06480

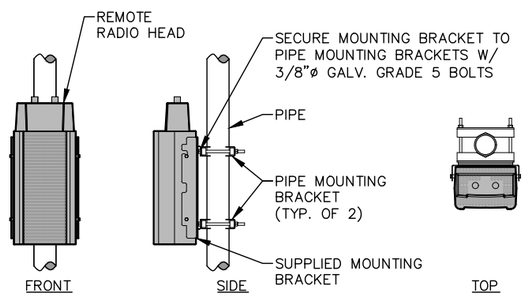
SHEET TITLE
ELEVATION AND ANTENNA PLAN

SHEET NUMBER
DE-2



REMOTE RADIO HEAD MOUNTING DETAIL (1)

22x34 SCALE: N.T.S — DE-3



REMOTE RADIO HEAD (2)

22x34 SCALE: N.T.S — DE-3

DESIGN EXHIBIT

PREPARED FOR: CELLCO PARTNERSHIP D.B.A.
verizon

CROWN CASTLE
CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
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FAX: (978) 336-5586

STATE OF CONNECTICUT
DEREK J. CREASER
No. 29551
LICENSED
PROFESSIONAL ENGINEER

CONSTRUCTION DRAWINGS ARE VALID FOR SIX MONTHS AFTER ENGINEER OF RECORD'S STAMPED AND SIGNED SUBMITTAL DATE LISTED HEREIN

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	01/21/19	ISSUED FOR SUBMITTAL	DJM

SITE NAME:
PORTLAND CT
CROWN CASTLE SITE ID:
BU 806382

SITE ADDRESS:
74 GOODRICH LANE
PORTLAND, CT 06480

SHEET TITLE
ANTENNA MOUNTING DETAIL

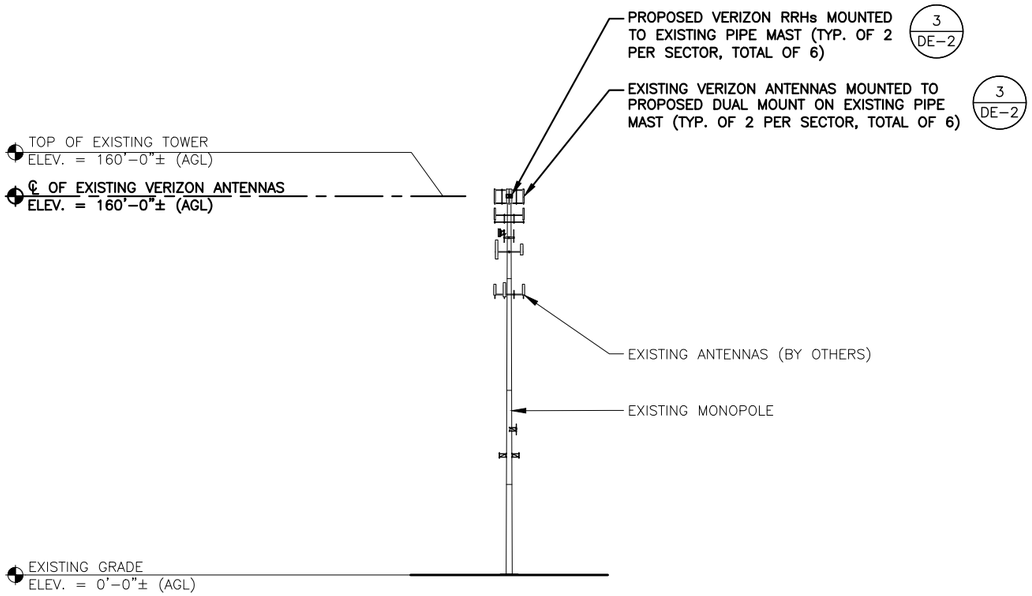
SHEET NUMBER
DE-3

BILL OF MATERIALS

SITE NAME: PORTLAND CT

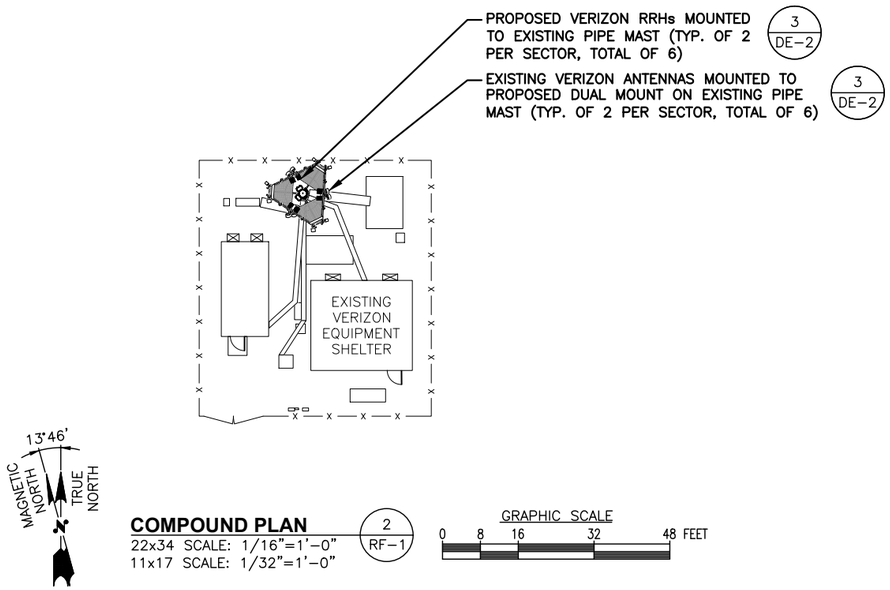
ITEM	DESCRIPTION	QTY	LENGTH	COMMENTS
1	ANTENNA–(EXISTING) CDMA 850 DB846F65ZAXY_869_0 (EXISTING)	3		MOUNTED TO SECTOR FRAME (EXISTING)
2	ANTENNA–LTE 700/850/1900/2100 SBNHH–1D65B (EXISTING)	3		**RELOCATED MOUNTED TO SECTOR FRAME (EXISTING)**
3	ANTENNA–LTE 700/850/1900/2100 SBNHH–1D65B (EXISTING)	3		**RELOCATED MOUNTED TO SECTOR FRAME (EXISTING)**
4	ANTENNA–(EXISTING) CDMA 850 DB846F65ZAXY_869_0 (EXISTING)	3		MOUNTED TO SECTOR FRAME (EXISTING)
5	6X12 HYBRID CABLE (EXISTING)	1	195 FT.	ROUTE FROM GROUND EQUIPMENT TO ANTENNA SECTOR
5	6X12 HYBRID CABLE (EXISTING)	1	195 FT.	ROUTE FROM GROUND EQUIPMENT TO ANTENNA SECTOR
6	1X1 HYBRID CABLE (EXISTING)	1	15 FT.	ROUTE FROM UPPER OVP TO RRHs
6	1X1 HYBRID CABLE (EXISTING)	1	15 FT.	ROUTE FROM UPPER OVP TO RRHs
6	1X1 HYBRID CABLE (EXISTING)	1	15 FT.	**TO BE REMOVED**
7	1/2" TOP COAX JUMPERS (EXISTING)	12	6 FT.	ROUTE FROM RRH TO ANTENNA (EXISTING)
7	1/2" TOP COAX JUMPERS (EXISTING)	12	6 FT.	ROUTE FROM RRH TO ANTENNA (EXISTING)
7	1/2" TOP COAX JUMPERS (EXISTING)	12	6 FT.	ROUTE FROM RRH TO ANTENNA (EXISTING)
8	**700/850 LTE RRH**	**3**		**B5/B13 SAMSUNG RRH PIPE MOUNTED**
8	**1900/2100 RRH**	**3**		**B2/B66A SAMSUNG RRH PIPE MOUNTED**
9				
10	UPPER OVP	1		MOUNTED TO MONOPOLE
10	UPPER OVP	1		MOUNTED TO MONOPOLE
11	LOWER OVP	2		MOUNTED INSIDE EQUIPMENT CABINET

* RF BOM IS COMPILED FOR ORDERING MATERIALS PER ANTENNA RECOMMENDATION DATA SHEET DATED 01/07/19



TOWER ELEVATION 1 RF–1
22x34 SCALE: 1/32"=1'–0"
11x17 SCALE: 1/64"=1'–0"

GRAPHIC SCALE
0 80 160 320 480 FEET



COMPOUND PLAN 2 RF–1
22x34 SCALE: 1/16"=1'–0"
11x17 SCALE: 1/32"=1'–0"

GRAPHIC SCALE
0 8 16 32 48 FEET

PREPARED FOR: CELLCO PARTNERSHIP D.B.A.
verizon

CROWN CASTLE
12 GILL STREET, SUITE 5800
WOBURN, MA 01801

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

CHECKED BY: BB

APPROVED BY: DJC

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	01/21/19	ISSUED FOR SUBMITTAL	DJM

SITE NAME:
PORTLAND CT
CROWN CASTLE SITE ID:
BU 806382

SITE ADDRESS:
74 GOODRICH LANE
PORTLAND, CT 06480

SHEET TITLE
RF PLUMBING DIAGRAM & BILL OF MATERIAL

SHEET NUMBER
RF-1

Date: **January 11th, 2019**

Denice Nicholson
Crown Castle
3 Corporate Park Drive Suite 101
Clifton Park, NY 12065

B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	NG1897
	Carrier Site Name:	Portland CT
Crown Castle Designation:	**Crown Castle BU Number:**	806382
	Crown Castle Site Name:	HRT 082 943274
	Crown Castle JDE Job Number:	552495
	Crown Castle Work Order Number:	1680098
	Crown Castle Order Number:	474606 Rev. 0
Engineering Firm Designation:	**B+T Group Project Number:**	81363.017.01
Site Data:	**74 Goodrich Lane, Portland, Middlesex County, CT** **Latitude *41° 36' 29.9"*, Longitude *-72° 35' 29.56"*** **160 Foot - Monopole**	

Dear Denice Nicholson,

B+T Group is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above-mentioned tower.

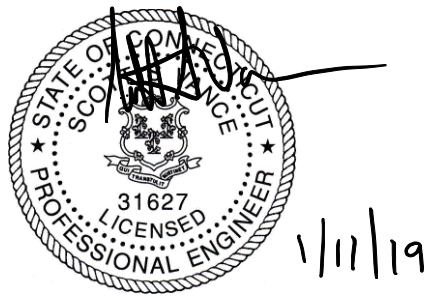
The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC7: Proposed Equipment Configuration **Sufficient Capacity**

This analysis utilizes an ultimate 3-second gust wind speed of 130 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Tharun Cheriyan, E.I.T.

Respectfully submitted by: B+T Engineering, Inc.
COA: PEC.0001564; Expires: 02/10/2019



Scott S. Vance, P.E.

tnxTower Report - version 8.0.5.0

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 160 ft. Monopole designed by Valmont in January of 1998. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F. This tower has been modified by B+T Group in May of 2013.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	130 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
158.0	160.0	6	Andrew	SBNHH-1D65B	8	1-5/8
		2	Decibel	DB846F65ZAXY		
		4	Decibel	DB846H80E-SX		
		2	Raycap	RRFDC-3315-PF-48		
		3	Samsung Telecomm.	RFV01U-D1A		
		3	Samsung Telecomm.	RFV01U-D2A		
	158.0	1	--	Platform Mount [LP 713-1]		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
150.0	152.0	3	Alcatel Lucent	1900MHZ RRH	4	1-1/4
		3	Alcatel Lucent	800MHZ RRH		
		3	Alcatel Lucent	RRH2X50-800		
		3	Alcatel Lucent	TD-RRH8X20-25		
		3	Commscope	DT465B-2XR		
		3	Rfs Celwave	APXVSPP18-C-A20		
	150.0	3	--	L 2-1/2x2-1/2x1/4		
		3	--	2.88” O.D Steel Pipe Mast		
		1	--	Platform Mount [LP 713-1]		
142.0	144.0	2	Radiowaves	HP3-11	2	1/2
	142.0	1	--	Side Arm Mount [SO 101-3]		
136.0	137.0	3	Commscope	SBNH-1D65C-SR	7	1-5/8
		3	Commscope	TMAT1921B78-21A		
		3	Ericsson	ERICSSON AIR 21 B4A B2P		
		3	Ericsson	RRUS 11 B12		
		3	Ericsson	RRUS 11 B2		
	136.0	1	--	T-Arm Mount [TA 602-3]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
118.0	120.0	3	Ericsson	RRUS 11 B12	12 2 1	1-1/4 3/4 3/8
		3	Ericsson	RRUS 12 B2		
		3	Kmw Comm.	AM-X-CD-16-65-00T-RET		
		6	Powerwave Tech.	7770.00		
		3	Powerwave Tech.	LGP21401		
		3	Powerwave Tech.	LGP21901		
		1	Raycap	DC6-48-60-18-8F		
	118.0	1	--	Platform Mount [LP 303-1]		
61.0	61.0	2	Lucent	KS24019-L112A	1	1/2
		1	--	Side Arm Mount [SO 701-1]		
50.0	50.0	2	--	Side Arm Mount [SO 701-1]	--	--

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Online Order Information	Verizon Wireless Co-locate, Rev# 0	474606	CCI Sites
Tower Manufacturer Drawing	Valmont, Order No: 16750-98	255193	CCI Sites
Tower Modification Drawing	B+T Group, Date: 05/29/2013	3865159	CCI Sites
Post Modification Inspection	TEP, Date: 09/17/2013	3996803	CCI Sites
Foundation Drawing	Valmont, Order No: 16750-98	301226	CCI Sites
Geotech Report	TGG, Project No. 067058	1041653	CCI Sites
Antenna Configuration	Crown CAD Package	Date: 01/09/2019	CCI Sites

3.1) Analysis Method

tnxTower (version 8.0.5.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Mount areas and weights are assumed based on photographs provided.

This analysis may be affected if any assumptions are not valid or have been made in error. B+T Group should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	160 - 123.667	Pole	TP29.05x18.87x0.188	1	-10.487	990.374	78.1	Pass
L2	123.667 - 76.25	Pole	TP41.95x27.461x0.313	2	-22.227	2474.062	75.3	Pass
L3	76.25 - 37	Pole	TP52.32x39.715x0.344	3	-34.146	3314.493	82.4	Pass
L4	37 - 0	Pole	TP62x49.672x0.406	4	-51.868	4687.798	74.5	Pass
							Summary	
						Pole (L3)	82.4	Pass
						Rating =	82.4	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component		Elevation	% Capacity	Pass / Fail
1	Anchor Rods		Base	73.0	Pass
1	Base Plate		Base	38.0	Pass
1	Base Foundation	Structure	Base	46.1	Pass
		Soil	Base	62.9	Pass

Structure Rating (max from all components) =	82.4%

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.
2) Rating per TIA-222-H Section 15.5

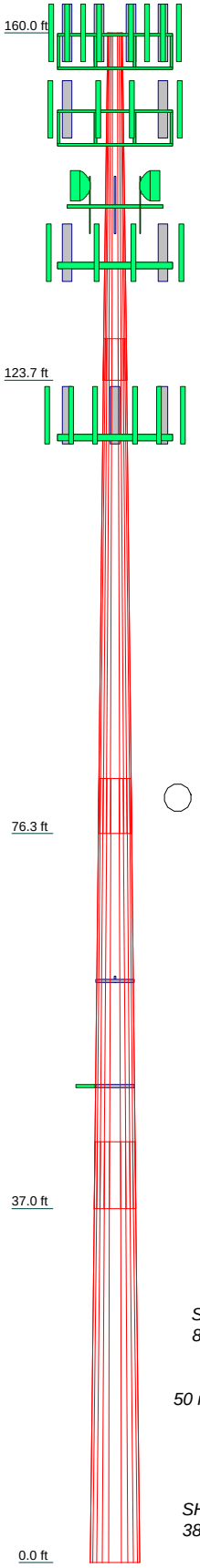
4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	36.333	12	0.188	4.333	18.870	29.050		1.8
2	51.750	12	0.313	5.750	27.461	41.950		6.1
3	45.000	12	0.344	7.000	39.715	52.320		7.7
4	44.000	12	0.406		49.672	62.000		10.9
							A572-65	26.5



ALL REACTIONS ARE FACTORED

AXIAL 86 K

SHEAR 8 K

MOMENT 957 kip-ft

TORQUE 0 kip-ft
50 mph WIND - 1.500 in ICE

AXIAL 52 K

SHEAR 38 K

MOMENT 4321 kip-ft

TORQUE 1 kip-ft
REACTIONS - 130 mph WIND

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TIA-222-H Annex S
9. TOWER RATING: 82.4%

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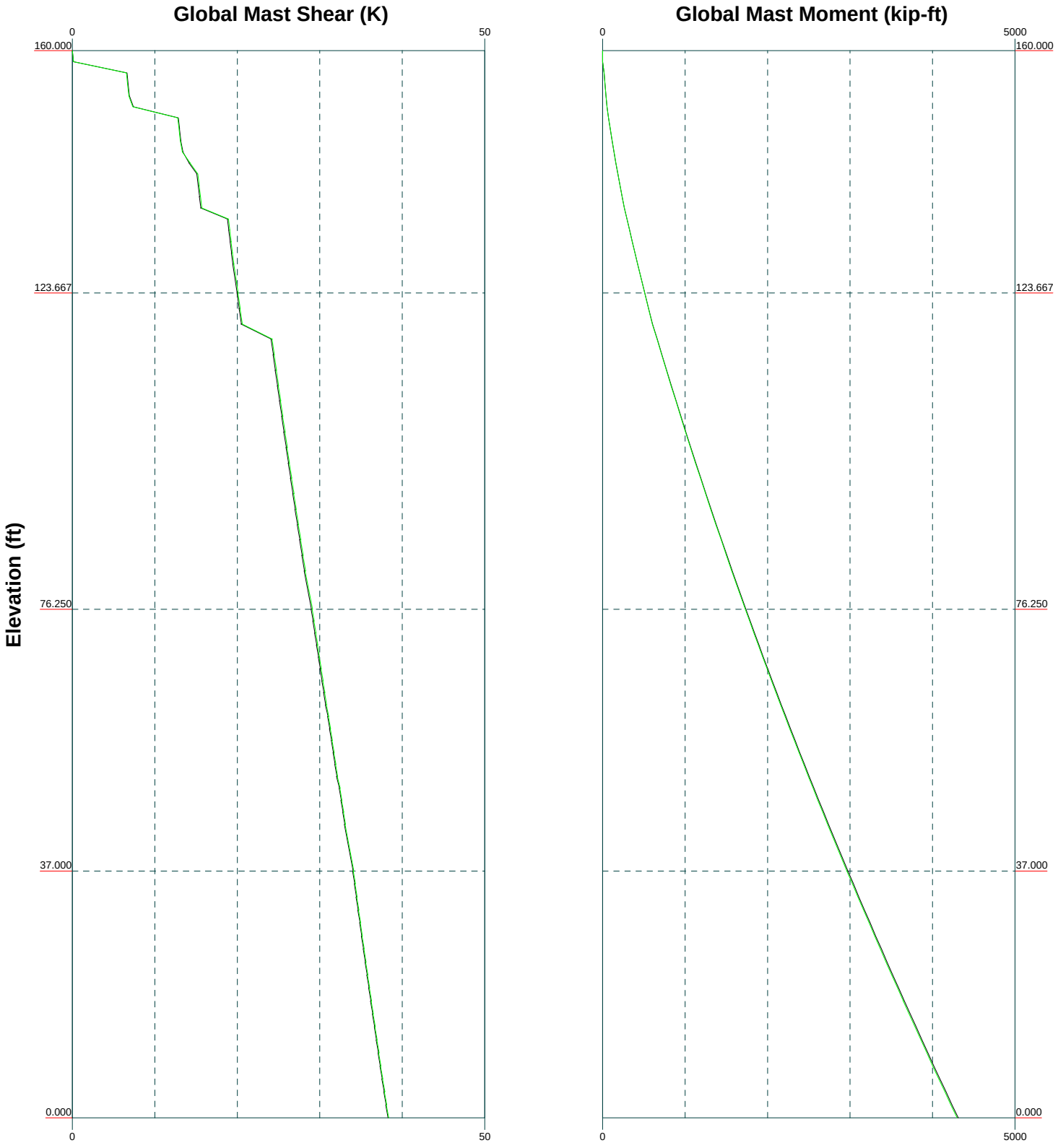
Job: 81363.017.01 - HRT 082 943274, CT (BU# 806382			
Project:			
Client: Crown Castle	Drawn by: Karthik	App'd:	
Code: TIA-222-H	Date: 01/11/19	Scale: NTS	
Path:		Dwg No. E-1	

TIA-222-H - 130 mph/50 mph 1.500 in Ice Exposure B

Maximum Values

Vx Vz Mx Mz



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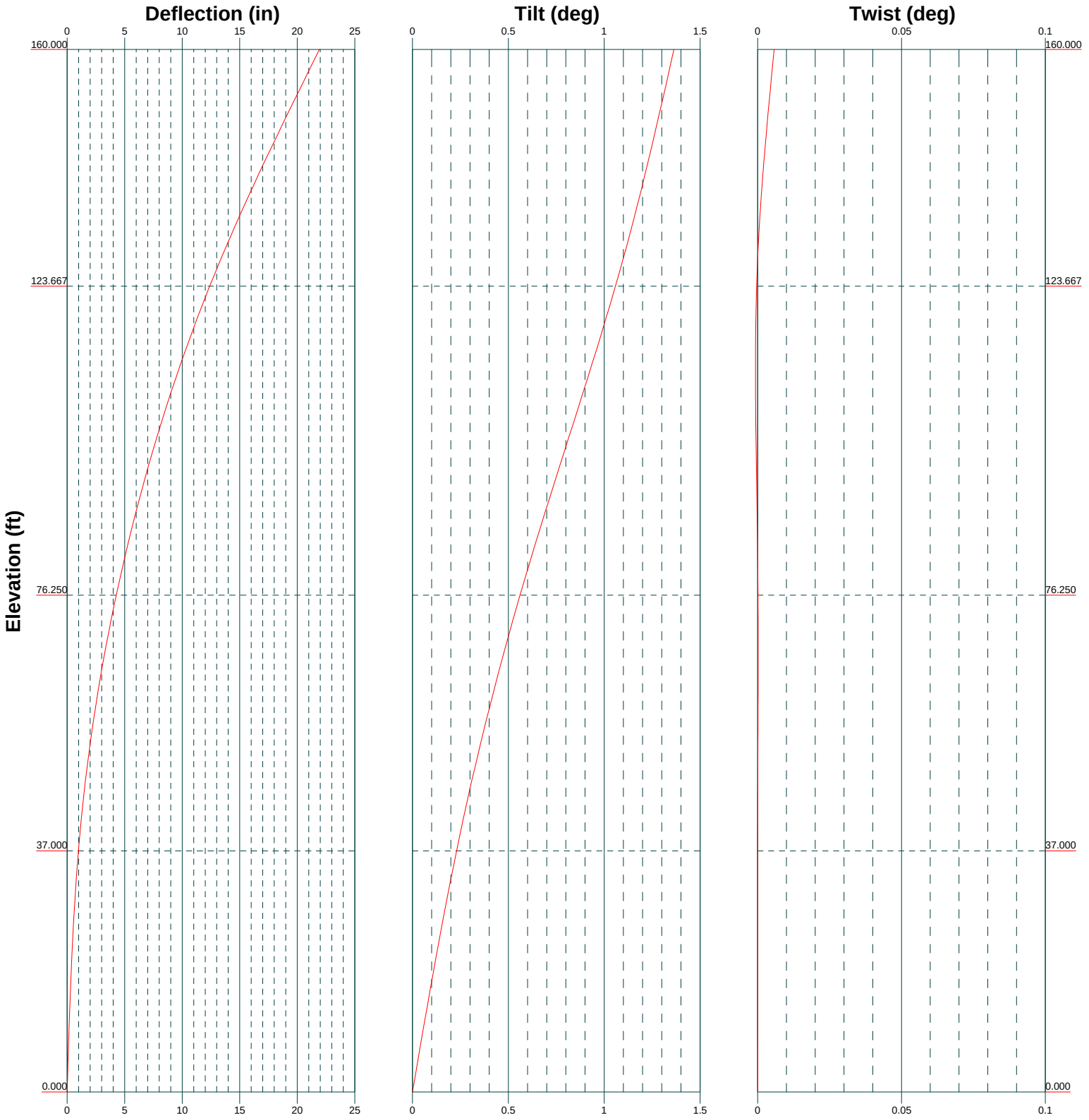
Job: 81363.017.01 - HRT 082 943274, CT (BU# 806382			
Project:			
Client: Crown Castle	Drawn by: Karthik	App'd:	
Code: TIA-222-H	Date: 01/11/19	Scale: NTS	
Path:		Dwg No. E-4	

TIA-222-H - Service - 60 mph

Maximum Values



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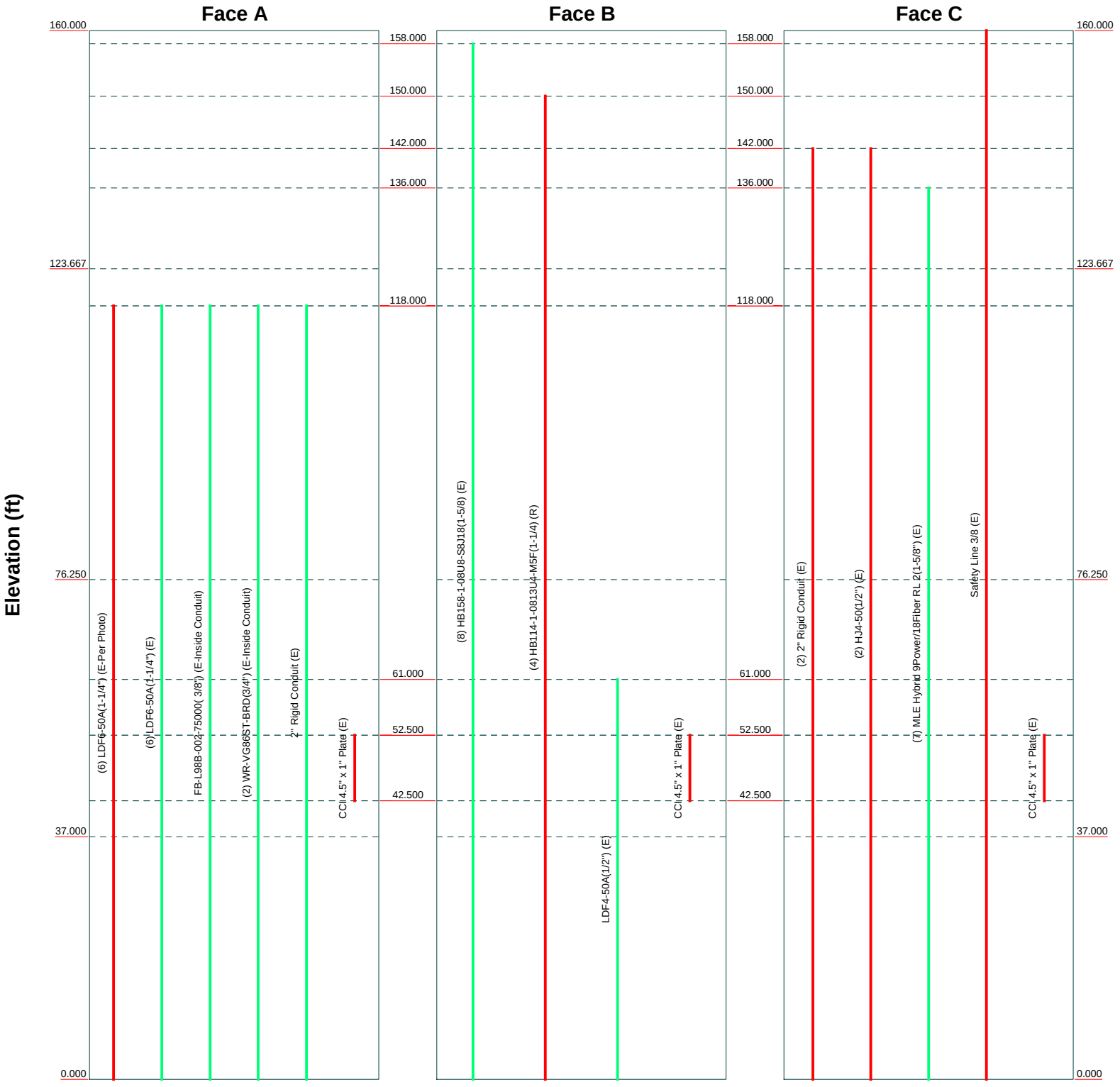
Phone: (918) 587-4630
FAX: (918) 295-0265

Job:	***81363.017.01 - HRT 082 943274, CT (BU# 806382***		
Project:			
Client: Crown Castle		Drawn by: Karthik	App'd:
Code: TIA-222-H		Date: 01/11/19	Scale: NTS
Path:			Dwg No. E-5

Feed Line Distribution Chart
0' - 160'

Round | Flat | App In Face | App Out Face | Truss Leg



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Phone: (918) 587-4630
FAX: (918) 295-0265

Job:	***81363.017.01 - HRT 082 943274, CT (BU# 806382***		
Project:			
Client: Crown Castle		Drawn by: Karthik	App'd:
Code: TIA-222-H		Date: 01/11/19	Scale: NTS
Path:			Dwg No. E-7

tnxTower	Job	Page
B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	81363.017.01 - HRT 082 943274, CT (BU# 806382)	1 of 20
	Project	Date 15:35:51 01/11/19
	Client Crown Castle	Designed by Karthik

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower is located in Middlesex County, Connecticut.
Tower base elevation above sea level: 317.000 ft.
Basic wind speed of 130 mph.
Risk Category II.
Exposure Category B.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.000 ft.
Nominal ice thickness of 1.500 in.
Ice thickness is considered to increase with height.
Ice density of 56.000 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 60 mph.
TIA-222-H Annex S.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.05.
Tower analysis based on target reliabilities in accordance with Annex S.
Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	√ Use Clear Spans For Wind Area	SR Leg Bolts Resist Compression
Use Code Stress Ratios	Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	√ Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	√ Use Azimuth Dish Coefficients	Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-H Bracing Resist. Exemption
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-H Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	√ Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric	Ignore KL/ry For 60 Deg. Angle Legs	Pole Without Linear Attachments
		Pole With Shroud Or No Appurtenances
		Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	160.000-123.667	36.333	4.333	12	18.870	29.050	0.188	0.750	A572-65 (65 ksi)
L2	123.667-76.250	51.750	5.750	12	27.461	41.950	0.313	1.250	A572-65 (65 ksi)
L3	76.250-37.000	45.000	7.000	12	39.715	52.320	0.344	1.375	A572-65 (65 ksi)
L4	37.000-0.000	44.000		12	49.672	62.000	0.406	1.625	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	19.470	11.280	502.514	6.688	9.775	51.410	1018.229	5.551	4.555	24.292
	30.009	17.426	1852.870	10.333	15.048	123.131	3754.417	8.576	7.283	38.842
L2	29.575	27.318	2569.965	9.719	14.225	180.668	5207.445	13.445	6.522	20.871
	43.320	41.898	9271.410	14.906	21.730	426.662	18786.390	20.621	10.405	33.296
L3	42.662	43.579	8622.350	14.095	20.572	419.122	17471.219	21.448	9.722	28.283
	54.044	57.531	19838.067	18.607	27.102	731.984	40197.302	28.315	13.101	38.111
L4	53.311	64.445	19964.737	17.637	25.730	775.933	40453.969	31.718	12.223	30.088
	64.044	80.572	39016.215	22.051	32.116	1214.853	79057.429	39.655	15.527	38.221

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 160.000-123.667				1	1	1			
L2 123.667-76.250				1	1	1			
L3 76.250-37.000				1	1	1			
L4 37.000-0.000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight klf
HB114-1-0813U4-M5F(1-1/4) (R) ***	B	No	Surface Ar (CaAa)	150.000 - 0.000	4	4	0.300 0.500	1.540		0.001
2" Rigid Conduit	C	No	Surface Ar	142.000 -	2	2	0.100	2.000		0.003

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight klf
(E)			(CaAa)	0.000			0.200			
HJ4-50(1/2")	C	No	Surface Ar	142.000 -	2	2	0.200	0.580		0.000
(E)			(CaAa)	0.000			0.250			
***										
LDF6-50A(1-1/4")	A	No	Surface Ar	118.000 -	6	6	-0.490	1.550		0.001
(E-Per Photo)			(CaAa)	0.000			-0.350			
***										
Safety Line 3/8	C	No	Surface Ar	160.000 -	1	1	-0.490	0.375		0.000
(E)			(CaAa)	0.000			-0.480			
***										
CCI 4.5" x 1" Plate	A	No	Surface Af	52.500 -	1	1	0.450	4.500	11.000	0.015
(E)			(CaAa)	42.500			0.500			
CCI 4.5" x 1" Plate	B	No	Surface Af	52.500 -	1	1	0.450	4.500	11.000	0.015
(E)			(CaAa)	42.500			0.500			
CCI 4.5" x 1" Plate	C	No	Surface Af	52.500 -	1	1	0.450	4.500	11.000	0.015
(E)			(CaAa)	42.500			0.500			
***										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
HB158-1-08U8-S8J	B	No	No	Inside Pole	158.000 - 0.000	8	No Ice	0.000	0.001
18(1-5/8)							1/2" Ice	0.000	0.001
(E)							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
***									
***									
MLE Hybrid	C	No	No	Inside Pole	136.000 - 0.000	7	No Ice	0.000	0.001
9Power/18Fiber RL							1/2" Ice	0.000	0.001
2(1-5/8")							1" Ice	0.000	0.001
(E)							2" Ice	0.000	0.001
LDF6-50A(1-1/4")	A	No	No	Inside Pole	118.000 - 0.000	6	No Ice	0.000	0.001
(E)							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
FB-L98B-002-75000	A	No	No	Inside Pole	118.000 - 0.000	1	No Ice	0.000	0.000
(3/8")							1/2" Ice	0.000	0.000
(E-Inside Conduit)							1" Ice	0.000	0.000
							2" Ice	0.000	0.000
WR-VG86ST-BRD(	A	No	No	Inside Pole	118.000 - 0.000	2	No Ice	0.000	0.001
3/4")							1/2" Ice	0.000	0.001
(E-Inside Conduit)							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
2" Rigid Conduit	A	No	No	Inside Pole	118.000 - 0.000	1	No Ice	0.000	0.003
(E)							1/2" Ice	0.000	0.003
							1" Ice	0.000	0.003
							2" Ice	0.000	0.003
***									
LDF4-50A(1/2")	B	No	No	Inside Pole	61.000 - 0.000	1	No Ice	0.000	0.000
(E)							1/2" Ice	0.000	0.000
							1" Ice	0.000	0.000
							2" Ice	0.000	0.000
***									

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	160.000-123.667	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	16.221	0.000	0.483
		C	0.000	0.000	10.822	0.000	0.212
L2	123.667-76.250	A	0.000	0.000	38.828	0.000	0.499
		B	0.000	0.000	29.209	0.000	0.721
		C	0.000	0.000	26.245	0.000	0.655
L3	76.250-37.000	A	0.000	0.000	44.002	0.000	0.622
		B	0.000	0.000	31.678	0.000	0.753
		C	0.000	0.000	29.225	0.000	0.695
L4	37.000-0.000	A	0.000	0.000	34.410	0.000	0.442
		B	0.000	0.000	22.792	0.000	0.568
		C	0.000	0.000	20.480	0.000	0.511

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	160.000-123.667	A	1.474	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	29.980	0.000	0.781
		C		0.000	0.000	37.409	0.000	0.577
L2	123.667-76.250	A	1.423	0.000	0.000	63.919	0.000	1.139
		B		0.000	0.000	53.984	0.000	1.257
		C		0.000	0.000	81.286	0.000	1.442
L3	76.250-37.000	A	1.345	0.000	0.000	68.757	0.000	1.292
		B		0.000	0.000	53.351	0.000	1.270
		C		0.000	0.000	75.048	0.000	1.405
L4	37.000-0.000	A	1.200	0.000	0.000	55.454	0.000	0.955
		B		0.000	0.000	40.932	0.000	0.944
		C		0.000	0.000	60.090	0.000	1.049

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	160.000-123.667	1.795	2.048	1.882	2.627
L2	123.667-76.250	-1.300	3.731	-0.779	4.102
L3	76.250-37.000	-1.604	3.791	-1.133	4.534
L4	37.000-0.000	-1.865	4.408	-1.346	5.277

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	6	HB114-1-0813U4-M5F(1-1/4")	123.67 - 150.00	1.0000	1.0000
L1	8	2" Rigid Conduit	123.67 - 142.00	1.0000	1.0000
L1	9	HJ4-50(1/2")	123.67 - 142.00	1.0000	1.0000
L1	21	Safety Line 3/8	123.67 - 160.00	1.0000	1.0000
L1	13	LDF6-50A(1-1/4")	123.67 - 118.00	1.0000	1.0000
L2	6	HB114-1-0813U4-M5F(1-1/4")	76.25 - 123.67	1.0000	1.0000
L2	8	2" Rigid Conduit	76.25 - 123.67	1.0000	1.0000
L2	9	HJ4-50(1/2")	76.25 - 123.67	1.0000	1.0000
L2	13	LDF6-50A(1-1/4")	76.25 - 118.00	1.0000	1.0000
L2	21	Safety Line 3/8	76.25 - 123.67	1.0000	1.0000
L2	23	CCI 4.5" x 1" Plate	76.25 - 52.50	1.0000	1.0000
L2	24	CCI 4.5" x 1" Plate	76.25 - 52.50	1.0000	1.0000
L2	25	CCI 4.5" x 1" Plate	76.25 - 52.50	1.0000	1.0000
L3	6	HB114-1-0813U4-M5F(1-1/4")	37.00 - 76.25	1.0000	1.0000
L3	8	2" Rigid Conduit	37.00 - 76.25	1.0000	1.0000
L3	9	HJ4-50(1/2")	37.00 - 76.25	1.0000	1.0000
L3	13	LDF6-50A(1-1/4")	37.00 - 76.25	1.0000	1.0000
L3	21	Safety Line 3/8	37.00 - 76.25	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) DB846H80E-SX w/ Mount Pipe (E)	A	From Leg	4.000 0.000 2.000		0.000	158.000	No Ice 1/2" Ice 1" Ice 2" Ice	5.331 5.888 6.412 7.481	7.735 8.930 9.843 11.682	0.041 0.099 0.165 0.323
(2) DB846H80E-SX w/ Mount Pipe (E)	B	From Leg	4.000 0.000 2.000		0.000	158.000	No Ice 1/2" Ice 1" Ice 2" Ice	5.331 5.888 6.412 7.481	7.735 8.930 9.843 11.682	0.041 0.099 0.165 0.323
(2) DB846F65ZAXY w/ Mount Pipe (E)	C	From Leg	4.000 0.000 2.000		0.000	158.000	No Ice 1/2" Ice 1" Ice 2" Ice	7.271 7.832 8.348 9.402	7.821 9.010 9.912 11.731	0.047 0.114 0.189 0.367
(2) SBNHH-1D65B w/	A	From Leg	4.000		0.000	158.000	No Ice	8.397	7.071	0.066

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Pipe			0.000			1/2" Ice	8.960	8.260	0.135
(E)			2.000			1" Ice	9.490	9.170	0.212
						2" Ice	10.569	11.006	0.394
(2) SBNHH-1D65B w/	B	From Leg	4.000	0.000	158.000	No Ice	8.397	7.071	0.066
Mount Pipe			0.000			1/2" Ice	8.960	8.260	0.135
(E)			2.000			1" Ice	9.490	9.170	0.212
						2" Ice	10.569	11.006	0.394
(2) SBNHH-1D65B w/	C	From Leg	4.000	0.000	158.000	No Ice	8.397	7.071	0.066
Mount Pipe			0.000			1/2" Ice	8.960	8.260	0.135
(E)			2.000			1" Ice	9.490	9.170	0.212
						2" Ice	10.569	11.006	0.394
RRFDC-3315-PF-48	A	From Leg	4.000	0.000	158.000	No Ice	3.364	2.192	0.021
(E)			0.000			1/2" Ice	3.597	2.395	0.050
			2.000			1" Ice	3.838	2.606	0.082
						2" Ice	4.343	3.049	0.158
RRFDC-3315-PF-48	C	From Leg	4.000	0.000	158.000	No Ice	3.364	2.192	0.021
(E)			0.000			1/2" Ice	3.597	2.395	0.050
			2.000			1" Ice	3.838	2.606	0.082
						2" Ice	4.343	3.049	0.158
(2) RFV01U-D1A	A	From Leg	4.000	0.000	158.000	No Ice	1.875	1.250	0.084
(P)			0.000			1/2" Ice	2.045	1.393	0.103
			2.000			1" Ice	2.223	1.543	0.124
						2" Ice	2.601	1.865	0.175
RFV01U-D1A	B	From Leg	4.000	0.000	158.000	No Ice	1.875	1.250	0.084
(P)			0.000			1/2" Ice	2.045	1.393	0.103
			2.000			1" Ice	2.223	1.543	0.124
						2" Ice	2.601	1.865	0.175
RFV01U-D2A	B	From Leg	4.000	0.000	158.000	No Ice	1.875	1.013	0.070
(P)			0.000			1/2" Ice	2.045	1.145	0.087
			2.000			1" Ice	2.223	1.284	0.106
						2" Ice	2.601	1.585	0.153
(2) RFV01U-D2A	C	From Leg	4.000	0.000	158.000	No Ice	1.875	1.013	0.070
(P)			0.000			1/2" Ice	2.045	1.145	0.087
			2.000			1" Ice	2.223	1.284	0.106
						2" Ice	2.601	1.585	0.153
6' x 2" Mount Pipe	C	From Leg	4.000	0.000	158.000	No Ice	1.425	1.425	0.022
(E)			0.000			1/2" Ice	1.925	1.925	0.033
			0.000			1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
Platform Mount [LP 713-1]	C	None		0.000	158.000	No Ice	31.270	31.270	1.510
(E)						1/2" Ice	39.680	39.680	1.929
						1" Ice	48.090	48.090	2.348
						2" Ice	64.910	64.910	3.186
***									
DT465B-2XR w/ Mount Pipe	A	From Leg	4.000	0.000	150.000	No Ice	9.336	7.634	0.084
(R)			0.000			1/2" Ice	9.905	8.820	0.160
			2.000			1" Ice	10.439	9.718	0.245
						2" Ice	11.530	11.543	0.442
DT465B-2XR w/ Mount Pipe	B	From Leg	4.000	0.000	150.000	No Ice	9.336	7.634	0.084
(R)			0.000			1/2" Ice	9.905	8.820	0.160
			2.000			1" Ice	10.439	9.718	0.245
						2" Ice	11.530	11.543	0.442
DT465B-2XR w/ Mount Pipe	C	From Leg	4.000	0.000	150.000	No Ice	9.336	7.634	0.084
(R)			0.000			1/2" Ice	9.905	8.820	0.160
			2.000			1" Ice	10.439	9.718	0.245
						2" Ice	11.530	11.543	0.442
APXVSPP18-C-A20 w/	A	From Leg	4.000	0.000	150.000	No Ice	8.262	6.946	0.083

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Pipe			0.000			1/2" Ice	8.822	8.127	0.151
(R)			2.000			1" Ice	9.346	9.021	0.227
						2" Ice	10.418	10.844	0.406
APXVSPP18-C-A20 w/	B	From Leg	4.000	0.000	150.000	No Ice	8.262	6.946	0.083
Mount Pipe			0.000			1/2" Ice	8.822	8.127	0.151
(R)			2.000			1" Ice	9.346	9.021	0.227
						2" Ice	10.418	10.844	0.406
APXVSPP18-C-A20 w/	C	From Leg	4.000	0.000	150.000	No Ice	8.262	6.946	0.083
Mount Pipe			0.000			1/2" Ice	8.822	8.127	0.151
(R)			2.000			1" Ice	9.346	9.021	0.227
						2" Ice	10.418	10.844	0.406
TD-RRH8X20-25	A	From Leg	4.000	0.000	150.000	No Ice	4.045	1.535	0.070
(R)			0.000			1/2" Ice	4.298	1.714	0.097
			2.000			1" Ice	4.557	1.901	0.128
						2" Ice	5.098	2.295	0.201
TD-RRH8X20-25	B	From Leg	4.000	0.000	150.000	No Ice	4.045	1.535	0.070
(R)			0.000			1/2" Ice	4.298	1.714	0.097
			2.000			1" Ice	4.557	1.901	0.128
						2" Ice	5.098	2.295	0.201
TD-RRH8X20-25	C	From Leg	4.000	0.000	150.000	No Ice	4.045	1.535	0.070
(R)			0.000			1/2" Ice	4.298	1.714	0.097
			2.000			1" Ice	4.557	1.901	0.128
						2" Ice	5.098	2.295	0.201
RRH2X50-800	A	From Leg	4.000	0.000	150.000	No Ice	1.701	1.282	0.053
(R)			0.000			1/2" Ice	1.864	1.428	0.070
			2.000			1" Ice	2.035	1.580	0.090
						2" Ice	2.398	1.908	0.138
RRH2X50-800	B	From Leg	4.000	0.000	150.000	No Ice	1.701	1.282	0.053
(R)			0.000			1/2" Ice	1.864	1.428	0.070
			2.000			1" Ice	2.035	1.580	0.090
						2" Ice	2.398	1.908	0.138
RRH2X50-800	C	From Leg	4.000	0.000	150.000	No Ice	1.701	1.282	0.053
(R)			0.000			1/2" Ice	1.864	1.428	0.070
			2.000			1" Ice	2.035	1.580	0.090
						2" Ice	2.398	1.908	0.138
800MHZ RRH	A	From Leg	4.000	0.000	150.000	No Ice	2.134	1.773	0.053
(R)			0.000			1/2" Ice	2.320	1.946	0.074
			2.000			1" Ice	2.512	2.127	0.098
						2" Ice	2.920	2.510	0.157
800MHZ RRH	B	From Leg	4.000	0.000	150.000	No Ice	2.134	1.773	0.053
(R)			0.000			1/2" Ice	2.320	1.946	0.074
			2.000			1" Ice	2.512	2.127	0.098
						2" Ice	2.920	2.510	0.157
800MHZ RRH	C	From Leg	4.000	0.000	150.000	No Ice	2.134	1.773	0.053
(R)			0.000			1/2" Ice	2.320	1.946	0.074
			2.000			1" Ice	2.512	2.127	0.098
						2" Ice	2.920	2.510	0.157
1900MHZ RRH	A	From Leg	4.000	0.000	150.000	No Ice	2.492	3.258	0.044
(R)			0.000			1/2" Ice	2.695	3.484	0.075
			2.000			1" Ice	2.906	3.718	0.110
						2" Ice	3.351	4.206	0.192
1900MHZ RRH	B	From Leg	4.000	0.000	150.000	No Ice	2.492	3.258	0.044
(R)			0.000			1/2" Ice	2.695	3.484	0.075
			2.000			1" Ice	2.906	3.718	0.110
						2" Ice	3.351	4.206	0.192
1900MHZ RRH	C	From Leg	4.000	0.000	150.000	No Ice	2.492	3.258	0.044
(R)			0.000			1/2" Ice	2.695	3.484	0.075

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.000			1" Ice	2.906	3.718	0.110
						2" Ice	3.351	4.206	0.192
(2) 6' x 2" Mount Pipe (E-Empty)	A	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.425 1.925 2.294 3.060	1.425 1.925 2.294 3.060	0.022 0.033 0.048 0.090
(2) 6' x 2" Mount Pipe (E-Empty)	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.425 1.925 2.294 3.060	1.425 1.925 2.294 3.060	0.022 0.033 0.048 0.090
(2) 6' x 2" Mount Pipe (E-Empty)	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.425 1.925 2.294 3.060	1.425 1.925 2.294 3.060	0.022 0.033 0.048 0.090
L 2.5x2.5x1/4x12' (R-Mmod)	A	From Leg	4.000 0.000 0.000	0.000	153.000	No Ice 1/2" Ice 1" Ice 2" Ice	5.000 6.363 7.738 10.525	0.500 1.842 3.196 5.941	0.062 0.079 0.106 0.191
L 2.5x2.5x1/4x12' (R-Mmod)	B	From Leg	4.000 0.000 0.000	0.000	153.000	No Ice 1/2" Ice 1" Ice 2" Ice	5.000 6.363 7.738 10.525	0.500 1.842 3.196 5.941	0.062 0.079 0.106 0.191
L 2.5x2.5x1/4x12' (R-Mmod)	C	From Leg	4.000 0.000 0.000	0.000	153.000	No Ice 1/2" Ice 1" Ice 2" Ice	5.000 6.363 7.738 10.525	0.500 1.842 3.196 5.941	0.062 0.079 0.106 0.191
8' x 2.875" Mount Pipe (R-Mmod)	A	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice	2.300 3.132 3.620 4.620	2.300 3.132 3.620 4.620	0.061 0.078 0.100 0.161
8' x 2.875" Mount Pipe (R-Mmod)	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice	2.300 3.132 3.620 4.620	2.300 3.132 3.620 4.620	0.061 0.078 0.100 0.161
8' x 2.875" Mount Pipe (R-Mmod)	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice	2.300 3.132 3.620 4.620	2.300 3.132 3.620 4.620	0.061 0.078 0.100 0.161
Platform Mount [LP 713-1] (E)	C	None		0.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice	31.270 39.680 48.090 64.910	31.270 39.680 48.090 64.910	1.510 1.929 2.348 3.186
***									
(2) 6' x 3" Mount Pipe (E)	A	From Leg	2.000 0.000 0.000	0.000	142.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.767 2.129 2.501 3.272	1.767 2.129 2.501 3.272	0.030 0.044 0.061 0.109
(2) 6' x 3" Mount Pipe (E)	B	From Leg	2.000 0.000 0.000	0.000	142.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.767 2.129 2.501 3.272	1.767 2.129 2.501 3.272	0.030 0.044 0.061 0.109
(2) 6' x 3" Mount Pipe (E)	C	From Leg	2.000 0.000 0.000	0.000	142.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.767 2.129 2.501 3.272	1.767 2.129 2.501 3.272	0.030 0.044 0.061 0.109
4' x 2" Horizontal Face Mount Pipe	B	From Face	0.500 0.000	0.000	145.000	No Ice 1/2" Ice	0.866 1.111	0.043 0.087	0.010 0.017

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(E-Dish Tie Back)			0.000			1" Ice	1.365	0.131	0.027
						2" Ice	1.901	0.219	0.057
4' x 2" Horizontal Face Mount Pipe	C	From Face	0.500 0.000	0.000	145.000	No Ice 1/2" Ice	0.866 1.111	0.043 0.087	0.010 0.017
(E-Dish Tie Back)			0.000			1" Ice	1.365	0.131	0.027
						2" Ice	1.901	0.219	0.057
J-Box - 1' x 1' x 4" (E-Per Photo)	C	From Leg	0.500 0.000 0.000	0.000	145.000	No Ice 1/2" Ice 1" Ice	2.133 2.315 2.504	1.200 1.343 1.493	0.020 0.039 0.061
						2" Ice	2.904	1.815	0.114
Side Arm Mount [SO 101-3] (E)	C	None		0.000	142.000	No Ice 1/2" Ice 1" Ice 2" Ice	7.500 8.900 10.300 13.100	7.500 8.900 10.300 13.100	0.252 0.333 0.414 0.576
***									
ERICSSON AIR 21 B4A B2P w/ Mount Pipe (E)	A	From Leg	4.000 0.000 1.000	0.000	136.000	No Ice 1/2" Ice 1" Ice 2" Ice	6.329 6.775 7.214 8.117	5.642 6.426 7.131 8.591	0.112 0.169 0.233 0.383
ERICSSON AIR 21 B4A B2P w/ Mount Pipe (E)	B	From Leg	4.000 0.000 1.000	0.000	136.000	No Ice 1/2" Ice 1" Ice 2" Ice	6.329 6.775 7.214 8.117	5.642 6.426 7.131 8.591	0.112 0.169 0.233 0.383
ERICSSON AIR 21 B4A B2P w/ Mount Pipe (E)	C	From Leg	4.000 0.000 1.000	0.000	136.000	No Ice 1/2" Ice 1" Ice 2" Ice	6.329 6.775 7.214 8.117	5.642 6.426 7.131 8.591	0.112 0.169 0.233 0.383
SBNH-1D65C-SR w/ Mount Pipe (E)	A	From Leg	4.000 0.000 1.000	0.000	136.000	No Ice 1/2" Ice 1" Ice 2" Ice	11.697 12.419 13.150 14.529	9.854 11.379 12.929 15.286	0.083 0.172 0.272 0.506
SBNH-1D65C-SR w/ Mount Pipe (E)	B	From Leg	4.000 0.000 1.000	0.000	136.000	No Ice 1/2" Ice 1" Ice 2" Ice	11.697 12.419 13.150 14.529	9.854 11.379 12.929 15.286	0.083 0.172 0.272 0.506
SBNH-1D65C-SR w/ Mount Pipe (E)	C	From Leg	4.000 0.000 1.000	0.000	136.000	No Ice 1/2" Ice 1" Ice 2" Ice	11.697 12.419 13.150 14.529	9.854 11.379 12.929 15.286	0.083 0.172 0.272 0.506
TMAT1921B78-21A (E)	A	From Leg	4.000 0.000 1.000	0.000	136.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.652 0.755 0.864 1.105	0.300 0.376 0.459 0.648	0.018 0.023 0.030 0.050
TMAT1921B78-21A (E)	B	From Leg	4.000 0.000 1.000	0.000	136.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.652 0.755 0.864 1.105	0.300 0.376 0.459 0.648	0.018 0.023 0.030 0.050
TMAT1921B78-21A (E)	C	From Leg	4.000 0.000 1.000	0.000	136.000	No Ice 1/2" Ice 1" Ice 2" Ice	0.652 0.755 0.864 1.105	0.300 0.376 0.459 0.648	0.018 0.023 0.030 0.050
RRUS 11 B12 (E)	A	From Leg	4.000 0.000 1.000	0.000	136.000	No Ice 1/2" Ice 1" Ice 2" Ice	2.833 3.043 3.259 3.715	1.182 1.330 1.485 1.826	0.051 0.072 0.095 0.153
RRUS 11 B12 (E)	B	From Leg	4.000 0.000	0.000	136.000	No Ice 1/2" Ice	2.833 3.043	1.182 1.330	0.051 0.072

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			1.000			1" Ice	3.259	1.485	0.095
						2" Ice	3.715	1.826	0.153
RRUS 11 B12	C	From Leg	4.000	0.000	136.000	No Ice	2.833	1.182	0.051
(E)			0.000			1/2" Ice	3.043	1.330	0.072
			1.000			1" Ice	3.259	1.485	0.095
						2" Ice	3.715	1.826	0.153
RRUS 11 B2	A	From Leg	4.000	0.000	136.000	No Ice	2.833	1.182	0.051
(E)			0.000			1/2" Ice	3.043	1.330	0.072
			1.000			1" Ice	3.259	1.485	0.095
						2" Ice	3.715	1.826	0.153
RRUS 11 B2	B	From Leg	4.000	0.000	136.000	No Ice	2.833	1.182	0.051
(E)			0.000			1/2" Ice	3.043	1.330	0.072
			1.000			1" Ice	3.259	1.485	0.095
						2" Ice	3.715	1.826	0.153
RRUS 11 B2	C	From Leg	4.000	0.000	136.000	No Ice	2.833	1.182	0.051
(E)			0.000			1/2" Ice	3.043	1.330	0.072
			1.000			1" Ice	3.259	1.485	0.095
						2" Ice	3.715	1.826	0.153
T-Arm Mount [TA 602-3]	C	None		0.000	136.000	No Ice	11.590	11.590	0.774
(E)						1/2" Ice	15.440	15.440	0.990
						1" Ice	19.290	19.290	1.206
						2" Ice	26.990	26.990	1.639
***									
AM-X-CD-16-65-00T-RET	A	From Leg	4.000	0.000	118.000	No Ice	8.262	6.304	0.074
w/ Mount Pipe			0.000			1/2" Ice	8.822	7.479	0.139
(E)			2.000			1" Ice	9.346	8.368	0.212
						2" Ice	10.418	10.179	0.385
AM-X-CD-16-65-00T-RET	B	From Leg	4.000	0.000	118.000	No Ice	8.262	6.304	0.074
w/ Mount Pipe			0.000			1/2" Ice	8.822	7.479	0.139
(E)			2.000			1" Ice	9.346	8.368	0.212
						2" Ice	10.418	10.179	0.385
AM-X-CD-16-65-00T-RET	C	From Leg	4.000	0.000	118.000	No Ice	8.262	6.304	0.074
w/ Mount Pipe			0.000			1/2" Ice	8.822	7.479	0.139
(E)			2.000			1" Ice	9.346	8.368	0.212
						2" Ice	10.418	10.179	0.385
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.000	0.000	118.000	No Ice	5.746	4.254	0.055
(E)			0.000			1/2" Ice	6.179	5.014	0.103
			2.000			1" Ice	6.607	5.711	0.157
						2" Ice	7.488	7.155	0.287
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.000	0.000	118.000	No Ice	5.746	4.254	0.055
(E)			0.000			1/2" Ice	6.179	5.014	0.103
			2.000			1" Ice	6.607	5.711	0.157
						2" Ice	7.488	7.155	0.287
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.000	0.000	118.000	No Ice	5.746	4.254	0.055
(E)			0.000			1/2" Ice	6.179	5.014	0.103
			2.000			1" Ice	6.607	5.711	0.157
						2" Ice	7.488	7.155	0.287
LGP21401	A	From Leg	4.000	0.000	118.000	No Ice	1.104	0.207	0.014
(E)			0.000			1/2" Ice	1.239	0.274	0.021
			2.000			1" Ice	1.381	0.348	0.030
						2" Ice	1.688	0.521	0.055
LGP21401	B	From Leg	4.000	0.000	118.000	No Ice	1.104	0.207	0.014
(E)			0.000			1/2" Ice	1.239	0.274	0.021
			2.000			1" Ice	1.381	0.348	0.030
						2" Ice	1.688	0.521	0.055
LGP21401	C	From Leg	4.000	0.000	118.000	No Ice	1.104	0.207	0.014
(E)			0.000			1/2" Ice	1.239	0.274	0.021

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.000			1" Ice	1.381	0.348	0.030
						2" Ice	1.688	0.521	0.055
RRUS 12 B2	A	From Leg	4.000	0.000	118.000	No Ice	3.143	1.282	0.049
(E)			0.000			1/2" Ice	3.363	1.434	0.073
			2.000			1" Ice	3.590	1.595	0.099
						2" Ice	4.067	1.950	0.162
RRUS 12 B2	B	From Leg	4.000	0.000	118.000	No Ice	3.143	1.282	0.049
(E)			0.000			1/2" Ice	3.363	1.434	0.073
			2.000			1" Ice	3.590	1.595	0.099
						2" Ice	4.067	1.950	0.162
RRUS 12 B2	C	From Leg	4.000	0.000	118.000	No Ice	3.143	1.282	0.049
(E)			0.000			1/2" Ice	3.363	1.434	0.073
			2.000			1" Ice	3.590	1.595	0.099
						2" Ice	4.067	1.950	0.162
RRUS 11 B12	A	From Leg	4.000	0.000	118.000	No Ice	2.833	1.182	0.051
(E)			0.000			1/2" Ice	3.043	1.330	0.072
			2.000			1" Ice	3.259	1.485	0.095
						2" Ice	3.715	1.826	0.153
RRUS 11 B12	B	From Leg	4.000	0.000	118.000	No Ice	2.833	1.182	0.051
(E)			0.000			1/2" Ice	3.043	1.330	0.072
			2.000			1" Ice	3.259	1.485	0.095
						2" Ice	3.715	1.826	0.153
RRUS 11 B12	C	From Leg	4.000	0.000	118.000	No Ice	2.833	1.182	0.051
(E)			0.000			1/2" Ice	3.043	1.330	0.072
			2.000			1" Ice	3.259	1.485	0.095
						2" Ice	3.715	1.826	0.153
LGP21901	A	From Leg	4.000	0.000	118.000	No Ice	0.231	0.158	0.006
(E)			0.000			1/2" Ice	0.294	0.213	0.008
			2.000			1" Ice	0.365	0.276	0.011
						2" Ice	0.528	0.423	0.022
LGP21901	B	From Leg	4.000	0.000	118.000	No Ice	0.231	0.158	0.006
(E)			0.000			1/2" Ice	0.294	0.213	0.008
			2.000			1" Ice	0.365	0.276	0.011
						2" Ice	0.528	0.423	0.022
LGP21901	C	From Leg	4.000	0.000	118.000	No Ice	0.231	0.158	0.006
(E)			0.000			1/2" Ice	0.294	0.213	0.008
			2.000			1" Ice	0.365	0.276	0.011
						2" Ice	0.528	0.423	0.022
DC6-48-60-18-8F	C	From Leg	4.000	0.000	118.000	No Ice	1.212	1.212	0.033
(E)			0.000			1/2" Ice	1.892	1.892	0.055
			2.000			1" Ice	2.105	2.105	0.080
						2" Ice	2.570	2.570	0.138
3' x 2" Pipe Mount	A	From Leg	4.000	0.000	118.000	No Ice	0.583	0.583	0.011
(E-For TMA)			0.000			1/2" Ice	0.770	0.770	0.017
			2.000			1" Ice	0.967	0.967	0.024
						2" Ice	1.388	1.388	0.047
3' x 2" Pipe Mount	B	From Leg	4.000	0.000	118.000	No Ice	0.583	0.583	0.011
(E-For TMA)			0.000			1/2" Ice	0.770	0.770	0.017
			2.000			1" Ice	0.967	0.967	0.024
						2" Ice	1.388	1.388	0.047
(2) 3' x 2" Pipe Mount	C	From Leg	4.000	0.000	118.000	No Ice	0.583	0.583	0.011
(E-For TMA)			0.000			1/2" Ice	0.770	0.770	0.017
			2.000			1" Ice	0.967	0.967	0.024
						2" Ice	1.388	1.388	0.047
Platform Mount [LP 303-1]	C	None		0.000	118.000	No Ice	14.660	14.660	1.250
(E)						1/2" Ice	18.870	18.870	1.481
						1" Ice	23.080	23.080	1.713

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	31.500	31.500	2.175
***									
KS24019-L112A	A	From Leg	3.000	0.000	61.000	No Ice	0.141	0.141	0.005
(E)			0.000			1/2" Ice	0.198	0.198	0.007
			0.000			1" Ice	0.262	0.262	0.009
						2" Ice	0.415	0.415	0.018
2' x 2" Pipe Mount	A	From Leg	3.000	0.000	61.000	No Ice	0.023	0.023	0.007
(E)			0.000			1/2" Ice	0.049	0.049	0.008
			0.000			1" Ice	0.085	0.085	0.009
						2" Ice	0.186	0.186	0.013
Side Arm Mount [SO 701-1]	A	From Leg	1.500	0.000	61.000	No Ice	0.850	1.670	0.065
(E)			0.000			1/2" Ice	1.140	2.340	0.079
			0.000			1" Ice	1.430	3.010	0.093
						2" Ice	2.010	4.350	0.121
***									
2' x 2" Pipe Mount	A	From Leg	3.000	0.000	50.000	No Ice	0.023	0.023	0.007
(E-Empty)			0.000			1/2" Ice	0.049	0.049	0.008
			0.000			1" Ice	0.085	0.085	0.009
						2" Ice	0.186	0.186	0.013
2' x 2" Pipe Mount	C	From Leg	3.000	0.000	50.000	No Ice	0.023	0.023	0.007
(E-Empty)			0.000			1/2" Ice	0.049	0.049	0.008
			0.000			1" Ice	0.085	0.085	0.009
						2" Ice	0.186	0.186	0.013
Side Arm Mount [SO 701-1]	A	From Leg	1.500	0.000	50.000	No Ice	0.850	1.670	0.065
(E-Empty)			0.000			1/2" Ice	1.140	2.340	0.079
			0.000			1" Ice	1.430	3.010	0.093
						2" Ice	2.010	4.350	0.121
Side Arm Mount [SO 701-1]	C	From Leg	1.500	0.000	50.000	No Ice	0.850	1.670	0.065
(E-Empty)			0.000			1/2" Ice	1.140	2.340	0.079
			0.000			1" Ice	1.430	3.010	0.093
						2" Ice	2.010	4.350	0.121
***									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
Radiowaves HP3-11	B	Paraboloid	From	2.000	70.000		142.000	3.167	No Ice	7.876	0.050
(E)		w/Shroud (HP)	Leg	0.000					1/2" Ice	8.296	0.093
				2.000					1" Ice	8.716	0.135
									2" Ice	9.556	0.220
Radiowaves HP3-11	C	Paraboloid	From	2.000	78.000		142.000	3.167	No Ice	7.876	0.050
(E)		w/Shroud (HP)	Leg	0.000					1/2" Ice	8.296	0.093
				2.000					1" Ice	8.716	0.135
									2" Ice	9.556	0.220
***											

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	160 - 123.667	Pole	Max Tension	2	0.000	-0.001	-0.000
			Max. Compression	26	-26.962	0.769	-0.891
			Max. Mx	8	-10.517	-424.319	0.809
			Max. My	2	-10.498	-1.714	425.102
			Max. Vy	8	19.464	-424.319	0.809
			Max. Vx	2	-19.589	-1.714	425.102
			Max. Torque	9			-1.605
L2	123.667 - 76.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-46.401	1.511	-1.801
			Max. Mx	8	-22.246	-1565.441	-1.480
			Max. My	2	-22.234	-2.134	1571.835
			Max. Vy	8	28.153	-1565.441	-1.480
			Max. Vx	2	-28.279	-2.134	1571.835
			Max. Torque	9			-1.762
L3	76.25 - 37	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-63.006	2.084	-1.451
			Max. Mx	8	-34.154	-2727.847	-2.846
			Max. My	2	-34.149	-2.301	2738.939
			Max. Vy	8	33.041	-2727.847	-2.846
			Max. Vx	2	-33.121	-2.301	2738.939
			Max. Torque	9			-1.755
L4	37 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-86.083	2.329	-1.961
			Max. Mx	8	-51.869	-4297.585	-5.435
			Max. My	2	-51.869	-2.352	4311.825
			Max. Vy	8	38.283	-4297.585	-5.435
			Max. Vx	2	-38.361	-2.352	4311.825
			Max. Torque	11			-1.436

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	33	86.083	-0.013	-8.003
	Max. H_x	20	51.889	38.211	-0.032
	Max. H_z	2	51.889	0.001	38.333
	Max. M_x	2	4311.825	0.001	38.333
	Max. M_z	8	4297.585	-38.256	-0.053
	Max. Torsion	21	1.167	38.211	-0.032
	Min. Vert	7	38.917	-33.103	19.291
	Min. H_x	8	51.889	-38.256	-0.053
	Min. H_z	14	51.889	-0.062	-38.307
	Min. M_x	14	-4308.956	-0.062	-38.307
	Min. M_z	20	-4291.611	38.211	-0.032
	Min. Torsion	11	-1.435	-33.081	-19.214

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	43.241	0.000	0.000	0.367	0.289	0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	51.889	-0.001	-38.333	-4311.825	-2.352	-0.977
0.9 Dead+1.0 Wind 0 deg - No Ice	38.917	-0.001	-38.333	-4271.306	-2.396	-0.981
1.2 Dead+1.0 Wind 30 deg - No Ice	51.889	19.104	-33.294	-3750.024	-2147.518	-0.626
0.9 Dead+1.0 Wind 30 deg - No Ice	38.917	19.104	-33.294	-3714.767	-2127.357	-0.627
1.2 Dead+1.0 Wind 60 deg - No Ice	51.889	33.103	-19.291	-2176.869	-3719.127	0.536
0.9 Dead+1.0 Wind 60 deg - No Ice	38.917	33.103	-19.291	-2156.424	-3684.168	0.537
1.2 Dead+1.0 Wind 90 deg - No Ice	51.889	38.256	0.053	5.435	-4297.585	1.416
0.9 Dead+1.0 Wind 90 deg - No Ice	38.917	38.256	0.053	5.288	-4257.191	1.418
1.2 Dead+1.0 Wind 120 deg - No Ice	51.889	33.081	19.214	2161.204	-3712.996	1.432
0.9 Dead+1.0 Wind 120 deg - No Ice	38.917	33.081	19.214	2140.729	-3678.118	1.435
1.2 Dead+1.0 Wind 150 deg - No Ice	51.889	19.043	33.195	3733.268	-2133.452	1.385
0.9 Dead+1.0 Wind 150 deg - No Ice	38.917	19.043	33.195	3697.970	-2113.472	1.389
1.2 Dead+1.0 Wind 180 deg - No Ice	51.889	0.062	38.307	4308.956	-6.085	1.404
0.9 Dead+1.0 Wind 180 deg - No Ice	38.917	0.062	38.307	4268.232	-6.133	1.407
1.2 Dead+1.0 Wind 210 deg - No Ice	51.889	-19.041	33.209	3738.279	2138.812	0.808
0.9 Dead+1.0 Wind 210 deg - No Ice	38.917	-19.041	33.209	3702.906	2118.558	0.810
1.2 Dead+1.0 Wind 240 deg - No Ice	51.889	-33.106	19.207	2165.232	3720.322	-0.418
0.9 Dead+1.0 Wind 240 deg - No Ice	38.917	-33.106	19.207	2144.677	3685.164	-0.418
1.2 Dead+1.0 Wind 270 deg - No Ice	51.889	-38.211	0.032	8.157	4291.611	-1.164
0.9 Dead+1.0 Wind 270 deg - No Ice	38.917	-38.211	0.032	7.936	4251.094	-1.167
1.2 Dead+1.0 Wind 300 deg - No Ice	51.889	-32.979	-19.189	-2156.560	3698.540	-0.798
0.9 Dead+1.0 Wind 300 deg - No Ice	38.917	-32.979	-19.189	-2136.363	3663.629	-0.801
1.2 Dead+1.0 Wind 330 deg - No Ice	51.889	-18.983	-33.204	-3733.747	2125.174	-0.820
0.9 Dead+1.0 Wind 330 deg - No Ice	38.917	-18.983	-33.204	-3698.675	2105.099	-0.824
1.2 Dead+1.0 Ice+1.0 Temp	86.083	-0.000	0.000	1.961	2.329	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	86.083	-0.003	-8.008	-953.160	2.211	-0.259
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	86.083	3.993	-6.950	-827.931	-473.441	-0.198
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	86.083	6.921	-4.023	-479.137	-821.918	0.027
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	86.083	7.998	0.012	3.208	-950.120	0.222
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	86.083	6.920	4.014	480.729	-821.030	0.273
1.2 Dead+1.0 Wind 150	86.083	3.987	6.936	829.154	-471.296	0.306

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 180	86.083	0.013	8.003	956.663	1.098	0.333
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 210	86.083	-3.982	6.936	829.835	476.696	0.230
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 240	86.083	-6.921	4.008	481.070	826.947	-0.007
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 270	86.083	-7.991	0.003	3.251	953.864	-0.178
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 300	86.083	-6.902	-4.010	-475.871	823.251	-0.162
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 330	86.083	-3.977	-6.937	-825.218	474.632	-0.208
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	43.241	-0.000	-7.691	-860.645	-0.235	-0.199
Dead+Wind 30 deg - Service	43.241	3.833	-6.680	-748.474	-428.564	-0.127
Dead+Wind 60 deg - Service	43.241	6.641	-3.870	-434.354	-742.364	0.110
Dead+Wind 90 deg - Service	43.241	7.675	0.011	1.384	-857.857	0.289
Dead+Wind 120 deg - Service	43.241	6.637	3.855	431.816	-741.128	0.292
Dead+Wind 150 deg - Service	43.241	3.821	6.660	745.705	-425.748	0.283
Dead+Wind 180 deg - Service	43.241	0.013	7.685	860.660	-0.982	0.286
Dead+Wind 210 deg - Service	43.241	-3.820	6.663	746.710	427.287	0.164
Dead+Wind 240 deg - Service	43.241	-6.642	3.853	432.622	743.062	-0.086
Dead+Wind 270 deg - Service	43.241	-7.666	0.006	1.924	857.124	-0.238
Dead+Wind 300 deg - Service	43.241	-6.617	-3.850	-430.291	738.700	-0.163
Dead+Wind 330 deg - Service	43.241	-3.808	-6.662	-745.207	424.562	-0.167

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-43.241	0.000	0.000	43.241	0.000	0.000%
2	-0.001	-51.889	-38.333	0.001	51.889	38.333	0.000%
3	-0.001	-38.917	-38.333	0.001	38.917	38.333	0.000%
4	19.104	-51.889	-33.294	-19.104	51.889	33.294	0.000%
5	19.104	-38.917	-33.294	-19.104	38.917	33.294	0.000%
6	33.103	-51.889	-19.291	-33.103	51.889	19.291	0.000%
7	33.103	-38.917	-19.291	-33.103	38.917	19.291	0.000%
8	38.256	-51.889	0.053	-38.256	51.889	-0.053	0.000%
9	38.256	-38.917	0.053	-38.256	38.917	-0.053	0.000%
10	33.081	-51.889	19.214	-33.081	51.889	-19.214	0.000%
11	33.081	-38.917	19.214	-33.081	38.917	-19.214	0.000%
12	19.043	-51.889	33.195	-19.043	51.889	-33.195	0.000%
13	19.043	-38.917	33.195	-19.043	38.917	-33.195	0.000%
14	0.062	-51.889	38.307	-0.062	51.889	-38.307	0.000%
15	0.062	-38.917	38.307	-0.062	38.917	-38.307	0.000%
16	-19.041	-51.889	33.209	19.041	51.889	-33.209	0.000%
17	-19.041	-38.917	33.209	19.041	38.917	-33.209	0.000%
18	-33.106	-51.889	19.207	33.106	51.889	-19.207	0.000%
19	-33.106	-38.917	19.207	33.106	38.917	-19.207	0.000%
20	-38.211	-51.889	0.032	38.211	51.889	-0.032	0.000%
21	-38.211	-38.917	0.032	38.211	38.917	-0.032	0.000%
22	-32.979	-51.889	-19.189	32.979	51.889	19.189	0.000%
23	-32.979	-38.917	-19.189	32.979	38.917	19.189	0.000%
24	-18.983	-51.889	-33.204	18.983	51.889	33.204	0.000%
25	-18.983	-38.917	-33.204	18.983	38.917	33.204	0.000%
26	0.000	-86.083	0.000	0.000	86.083	-0.000	0.000%
27	-0.003	-86.083	-8.008	0.003	86.083	8.008	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
28	3.993	-86.083	-6.950	-3.993	86.083	6.950	0.000%
29	6.921	-86.083	-4.023	-6.921	86.083	4.023	0.000%
30	7.998	-86.083	0.012	-7.998	86.083	-0.012	0.000%
31	6.920	-86.083	4.014	-6.920	86.083	-4.014	0.000%
32	3.987	-86.083	6.936	-3.987	86.083	-6.936	0.000%
33	0.013	-86.083	8.003	-0.013	86.083	-8.003	0.000%
34	-3.982	-86.083	6.935	3.982	86.083	-6.936	0.000%
35	-6.921	-86.083	4.008	6.921	86.083	-4.008	0.000%
36	-7.991	-86.083	0.003	7.991	86.083	-0.003	0.000%
37	-6.902	-86.083	-4.010	6.902	86.083	4.010	0.000%
38	-3.977	-86.083	-6.937	3.977	86.083	6.937	0.000%
39	-0.000	-43.241	-7.691	0.000	43.241	7.691	0.000%
40	3.833	-43.241	-6.680	-3.833	43.241	6.680	0.000%
41	6.641	-43.241	-3.870	-6.641	43.241	3.870	0.000%
42	7.675	-43.241	0.011	-7.675	43.241	-0.011	0.000%
43	6.637	-43.241	3.855	-6.637	43.241	-3.855	0.000%
44	3.821	-43.241	6.660	-3.821	43.241	-6.660	0.000%
45	0.013	-43.241	7.685	-0.013	43.241	-7.685	0.000%
46	-3.820	-43.241	6.663	3.820	43.241	-6.663	0.000%
47	-6.642	-43.241	3.853	6.642	43.241	-3.853	0.000%
48	-7.666	-43.241	0.006	7.666	43.241	-0.006	0.000%
49	-6.617	-43.241	-3.850	6.617	43.241	3.850	0.000%
50	-3.808	-43.241	-6.662	3.808	43.241	6.662	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00040516
3	Yes	4	0.00000001	0.00021692
4	Yes	5	0.00000001	0.00071848
5	Yes	5	0.00000001	0.00029684
6	Yes	5	0.00000001	0.00071612
7	Yes	5	0.00000001	0.00029548
8	Yes	4	0.00000001	0.00080260
9	Yes	4	0.00000001	0.00048084
10	Yes	5	0.00000001	0.00073569
11	Yes	5	0.00000001	0.00030610
12	Yes	5	0.00000001	0.00069839
13	Yes	5	0.00000001	0.00028885
14	Yes	4	0.00000001	0.00056723
15	Yes	4	0.00000001	0.00032807
16	Yes	5	0.00000001	0.00072494
17	Yes	5	0.00000001	0.00030058
18	Yes	5	0.00000001	0.00073026
19	Yes	5	0.00000001	0.00030257
20	Yes	4	0.00000001	0.00076069
21	Yes	4	0.00000001	0.00045271
22	Yes	5	0.00000001	0.00070333
23	Yes	5	0.00000001	0.00029139
24	Yes	5	0.00000001	0.00072052
25	Yes	5	0.00000001	0.00029976
26	Yes	4	0.00000001	0.00001546
27	Yes	5	0.00000001	0.00028822
28	Yes	5	0.00000001	0.00033655

29	Yes	5	0.00000001	0.00033628
30	Yes	5	0.00000001	0.00028731
31	Yes	5	0.00000001	0.00033892
32	Yes	5	0.00000001	0.00033635
33	Yes	5	0.00000001	0.00029056
34	Yes	5	0.00000001	0.00034187
35	Yes	5	0.00000001	0.00034205
36	Yes	5	0.00000001	0.00028944
37	Yes	5	0.00000001	0.00033588
38	Yes	5	0.00000001	0.00033767
39	Yes	4	0.00000001	0.00004133
40	Yes	4	0.00000001	0.00019969
41	Yes	4	0.00000001	0.00019671
42	Yes	4	0.00000001	0.00005312
43	Yes	4	0.00000001	0.00021933
44	Yes	4	0.00000001	0.00018770
45	Yes	4	0.00000001	0.00004667
46	Yes	4	0.00000001	0.00020883
47	Yes	4	0.00000001	0.00021169
48	Yes	4	0.00000001	0.00004951
49	Yes	4	0.00000001	0.00019103
50	Yes	4	0.00000001	0.00020752

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 123.667	21.924	40	1.362	0.003
L2	128 - 76.25	13.398	40	1.099	0.002
L3	82 - 37	5.003	40	0.619	0.000
L4	44 - 0	1.353	40	0.283	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
158.000	(2) DB846H80E-SX w/ Mount Pipe	40	21.363	1.346	0.003	28788
153.000	L 2.5x2.5x1/4x12'	40	19.964	1.308	0.003	20563
150.000	DT465B-2XR w/ Mount Pipe	40	19.132	1.285	0.003	14394
145.000	4' x 2" Horizontal Face Mount Pipe	40	17.761	1.245	0.002	9596
144.000	Radiowaves HP3-11	40	17.491	1.237	0.002	8996
142.000	(2) 6' x 3" Mount Pipe	40	16.954	1.221	0.002	7996
136.000	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	40	15.381	1.171	0.002	5997
118.000	AM-X-CD-16-65-00T-RET w/ Mount Pipe	40	11.148	1.001	0.001	4792
61.000	KS24019-L112A	40	2.641	0.421	0.000	6208
50.000	2' x 2" Pipe Mount	40	1.743	0.330	0.000	6183

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 123.667	109.792	4	6.834	0.017
L2	128 - 76.25	67.143	4	5.516	0.009
L3	82 - 37	25.079	4	3.107	0.002
L4	44 - 0	6.780	4	1.420	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
158.000	(2) DB846H80E-SX w/ Mount Pipe	4	106.985	6.758	0.016	5914
153.000	L 2.5x2.5x1/4x12'	4	99.991	6.565	0.014	4223
150.000	DT465B-2XR w/ Mount Pipe	4	95.826	6.448	0.014	2955
145.000	4' x 2" Horizontal Face Mount Pipe	4	88.973	6.250	0.012	1969
144.000	Radiowaves HP3-11	4	87.619	6.209	0.012	1846
142.000	(2) 6' x 3" Mount Pipe	4	84.932	6.128	0.012	1640
136.000	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	4	77.063	5.876	0.010	1228
118.000	AM-X-CD-16-65-00T-RET w/ Mount Pipe	4	55.878	5.024	0.007	974
61.000	KS24019-L112A	4	13.237	2.112	0.001	1241
50.000	2' x 2" Pipe Mount	4	8.738	1.652	0.001	1235

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	160 - 123.667 (1)	TP29.05x18.87x0.188	36.333	0.000	0.0	16.693	-10.487	943.213	0.011
L2	123.667 - 76.25 (2)	TP41.95x27.461x0.313	51.750	0.000	0.0	40.278	-22.227	2356.250	0.009
L3	76.25 - 37 (3)	TP52.32x39.715x0.344	45.000	0.000	0.0	55.361	-34.146	3156.660	0.011
L4	37 - 0 (4)	TP62x49.672x0.406	44.000	0.000	0.0	80.572	-51.868	4464.570	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	160 - 123.667 (1)	TP29.05x18.87x0.188	427.621	531.888	0.804	0.000	531.888	0.000
L2	123.667 -	TP41.95x27.461x0.313	1576.908	2023.500	0.779	0.000	2023.500	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	76.25 (2)							
L3	76.25 - 37 (3)	TP52.32x39.715x0.344	2746.058	3219.825	0.853	0.000	3219.825	0.000
L4	37 - 0 (4)	TP62x49.672x0.406	4321.400	5609.658	0.770	0.000	5609.658	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	160 - 123.667 (1)	TP29.05x18.87x0.188	19.646	292.958	0.067	0.150	712.485	0.000
L2	123.667 - 76.25 (2)	TP41.95x27.461x0.313	28.335	706.875	0.040	0.309	2488.867	0.000
L3	76.25 - 37 (3)	TP52.32x39.715x0.344	33.176	971.584	0.034	0.626	4274.492	0.000
L4	37 - 0 (4)	TP62x49.672x0.406	38.414	1414.040	0.027	0.626	7661.250	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	160 - 123.667 (1)	0.011	0.804	0.000	0.067	0.000	0.820 ✔	1.050	4.8.2 ✔
L2	123.667 - 76.25 (2)	0.009	0.779	0.000	0.040	0.000	0.790 ✔	1.050	4.8.2 ✔
L3	76.25 - 37 (3)	0.011	0.853	0.000	0.034	0.000	0.865 ✔	1.050	4.8.2 ✔
L4	37 - 0 (4)	0.012	0.770	0.000	0.027	0.000	0.783 ✔	1.050	4.8.2 ✔

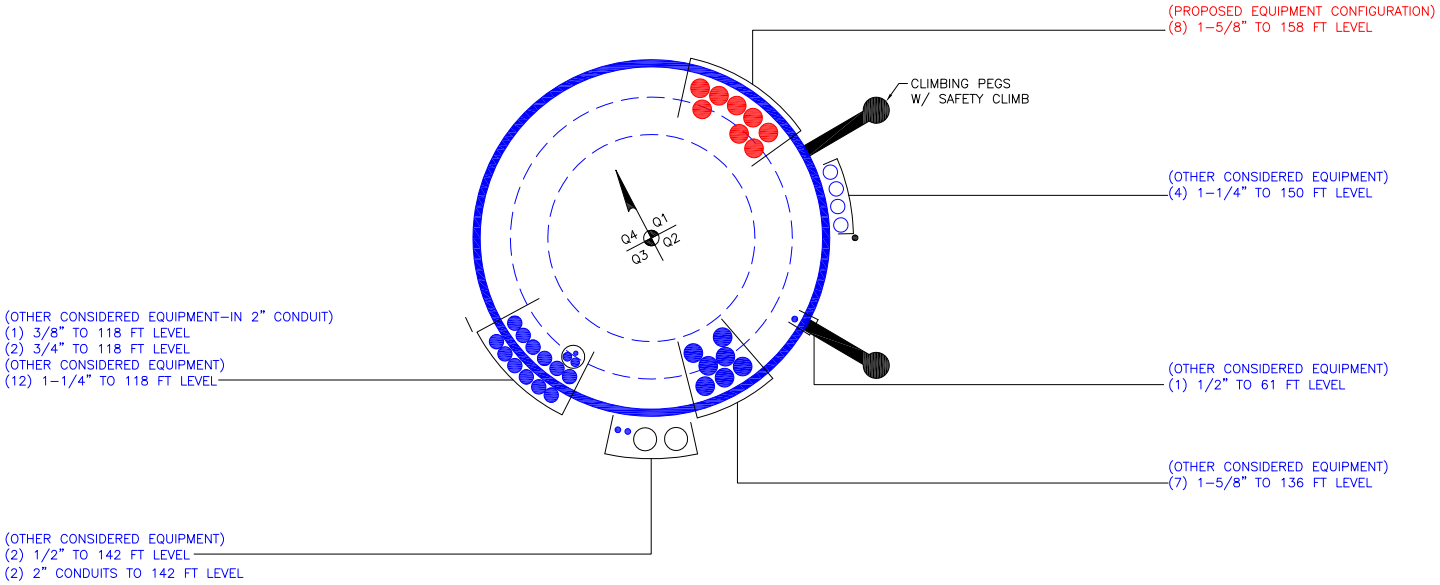
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	160 - 123.667	Pole	TP29.05x18.87x0.188	1	-10.487	990.374	78.1	Pass
L2	123.667 - 76.25	Pole	TP41.95x27.461x0.313	2	-22.227	2474.062	75.3	Pass
L3	76.25 - 37	Pole	TP52.32x39.715x0.344	3	-34.146	3314.493	82.4	Pass
L4	37 - 0	Pole	TP62x49.672x0.406	4	-51.868	4687.798	74.5	Pass
						Summary		
						Pole (L3)	82.4	Pass
						RATING =	**82.4**	**Pass**

Program Version 8.0.5.0

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT:806382

APPENDIX C

ADDITIONAL CALCULATIONS

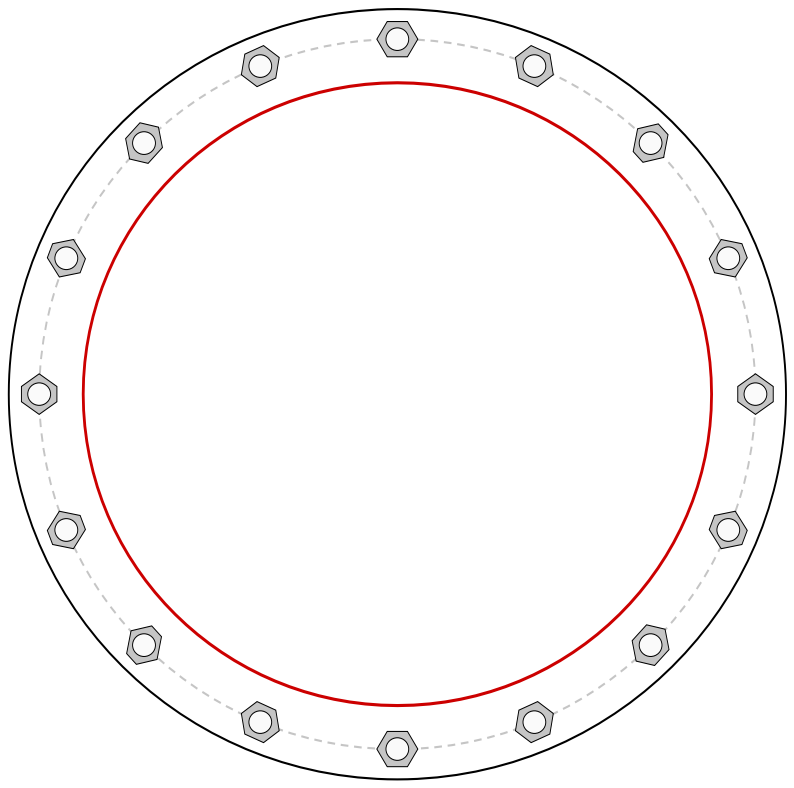
Monopole Base Plate Connection

Site Info	
BU #	806382
Site Name	HRT 082 943274, CT
Order #	474606 Rev. 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	0

Applied Loads	
Moment (kip-ft)	4321.00
Axial Force (kips)	52.00
Shear Force (kips)	38.00

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(16) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 70.69" BC

Base Plate Data

76.69" OD x 2.75" Plate (S-128; Fy=60 ksi, Fu=80 ksi)

Stiffener Data

N/A

Pole Data

62" x 0.40625" 12-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_c = 186.55	ϕPn_c = 243.75	**Stress Rating**
Vu = 2.38	ϕVn = 73.13	**73.0%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	21.52	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**38.0%**	**Pass**

Drilled Pier Foundation

BU # :	806382
Site Name:	HRT 082 943274, CT
Order Number:	474606 Rev. 0

TIA-222 Revison:	H
Tower Type:	Monopole

Applied Loads	Comp.	Uplift
Moment (kip-ft)	4321	
Axial Force (kips)	52	
Shear Force (kips)	38	

Material Properties		
Concrete Strength, f'c:	4	ksi
Rebar Strength, Fy:	60	ksi

Pier Design Data		
Depth	20	ft
Ext. Above Grade	0.5	ft
Pier Section 1		
From 0.5' above grade to 20' below grade		
Pier Diameter	7.5	ft
Rebar Quantity	36	
Rebar Size	11	
Clear Cover to Ties	4	in
Tie Size	5	

Analysis Results		
Soil Lateral Capacity	*Compression*	*Uplift*
$D_{v=0}$ (ft from TOC)	4.87	-
Soil Safety Factor	2.01	-
Max Moment (kip-ft)	4549.06	-
Rating*	*62.9%*	-
Soil Vertical Capacity	*Compression*	*Uplift*
Skin Friction (kips)	390.26	-
End Bearing (kips)	1079.34	-
Weight of Concrete (kips)	163.02	-
Total Capacity (kips)	1469.60	-
Axial (kips)	215.02	-
Rating*	*13.9%*	-
Reinforced Concrete Capacity	*Compression*	*Uplift*
Critical Depth (ft from TOC)	4.52	-
Critical Moment (kip-ft)	4547.98	-
Critical Moment Capacity	9386.77	-
Rating*	*46.1%*	-

Soil Interaction Rating*	**62.9%**
Structural Foundation Rating*	**46.1%**

*Rating per TIA-222-H Section 15.5

Check Limitation	
Apply TIA-222-H Section 15.5:	☑

Soil Profile

Groundwater Depth	n/a	ft	# of Layers	4

Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ_{soil} (pcf)	$\gamma_{concrete}$ (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	1	1	100	150	0	0	0.000	0.000					Cohesionless
2	1	6	5	110	150		34	0.187	0.187				6	Cohesionless
3	6	9.5	3.5	115	150		38	0.702	0.702				11	Cohesionless
4	9.5	20	10.5	145	150		45	1.780	1.780			32.575	50	Cohesionless

Date: **January 18, 2019**

Chanhdara Ratsavong
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Subject:	**Mount Analysis Report**	
Carrier Designation:	***Verizon* Co-Locate**	
	Carrier Site Number:	NG1897
	Carrier Site Name:	PORTLAND CT
Crown Castle Designation:	**Crown Castle BU Number:**	806382
	Crown Castle Site Name:	HRT 082 943274
	Crown Castle JDE Job Number:	552495
	Crown Castle Order Number:	474606, Rev. 0
Engineering Firm Designation:	**Advantage Engineers Project Number:**	18E045A.001
Site Data:	**74 GOODRICH LANE, PORTLAND, MIDDLESEX COUNTY, CT 06480**	
	Latitude *41° 36' 29.90"*, Longitude *-72° 35' 29.56"*	
Structure Information:	**Tower Height & Type:**	160 ft Monopole
	Mount Elevation:	158 ft
	Mount Type:	12'-10" Platform

Dear Chanhdara Ratsavong,

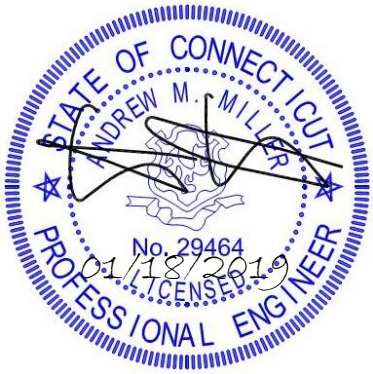
Advantage Engineers is pleased to submit this **"Mount Analysis Report"** to determine the structural integrity of *Verizon's* antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

Mount Type (12'-10" Platform) **Sufficient Capacity**

The analysis has been performed in accordance with the TIA-222-H Standard. This analysis utilizes an ultimate 3-second gust wind speed of 130 mph from the 2018 Connecticut State Building Code. Exposure Category B with a maximum topographic factor, Kzt, of 1.0 and Risk Category II were used in this analysis.

Mount structural analysis prepared by: Drew Mundt, EIT
Respectfully Submitted by: Advantage Engineers



Andrew Miller, P.E.
Engineering Director
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TABLE OF CONTENTS

1) INTRODUCTION

This mount is an existing 12'-10" platform designed by Valmont. This mount is installed at the 158 ft elevation of the 160 ft Monopole**.**

2) ANALYSIS CRITERIA

Building Code:	2018 CT State Building Code (2015 IBC)
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	130 mph
Exposure Category:	B
Topographic Factor:	1.0
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Live Loading Wind Speed:	30 mph
Man Live Load at Mid/End-Points:	250 lb
Man Live Load at Mount Pipes:	500 lb

Table 1 - Proposed Equipment Loading Information

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
158.0	160.0	6	Andrew	SBNHH-1D65B	LP 713-1
		2	Decibel	DB846F65ZAXY	
		4	Decibel	DB846H80E-SX	
		3	Samsung	RFV01U-D1A	
		3	Samsung	RFV01U-D2A	
		2	Raycap	RRFDC-3315-PF-48	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Online Order Information	Verizon Co-Locate, Rev. 0	474606	CCI Sites
Mount Manufacturer Drawing	Valmont 12'-10" Low Profile Platform	TEC Valmont Platform	On File
Antenna Configuration	Crown CAD Package	Date: 01/09/2019	CCI Sites

3.1) Analysis Method

RISA-3D (Version 13.0), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 *Tower Mount Analysis* (Revision B).

3.2) Assumptions

1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
2) The configuration of antennas, mounts, and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
3) 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.
4) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM 500 (GR B-46)
Pipe	ASTM A53 (GR 35)
Connection Bolts	ASTM A325

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle should be notified to determine the effect on the structural integrity of the antenna mounting system.

4) ANALYSIS RESULTS

Table 3 - Mount Component Stresses vs. Capacity (12'-10" Platform, All Sectors)

Notes	Component	Mount Centerline (ft)	% Capacity	Pass / Fail
1 & 2	Pipe Mounts	158.0	41.1	Pass
	Face Channel		28.5	Pass
	Handrail		33.9	Pass
	Standoff Tube		43.8	Pass
	Grating Angles		87.3	Pass
	Collar Bolts		75.9	Pass

Structure Rating (max from all components) =	**87.3%**

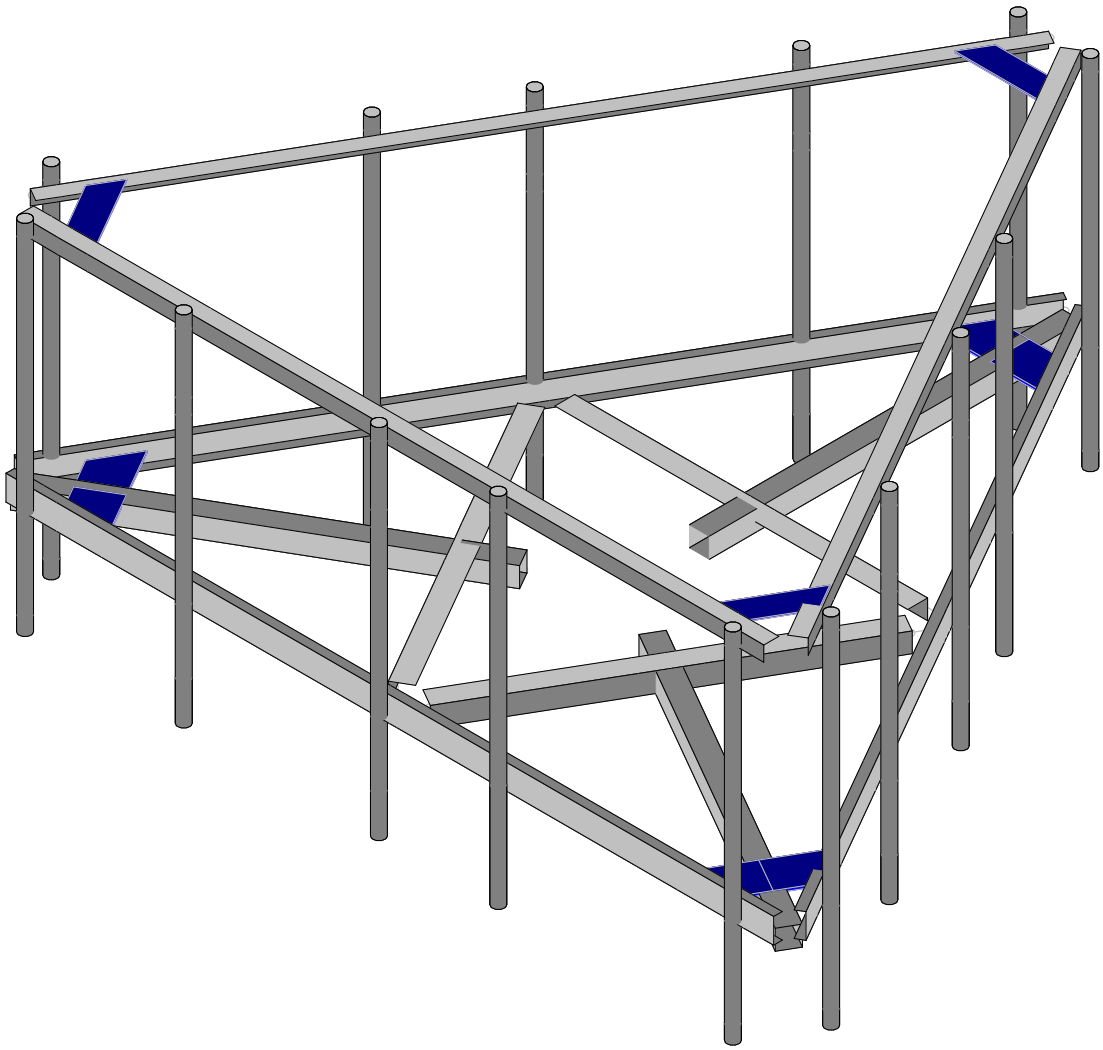
Notes:
1) See additional documentation in "Appendix C - Analysis Output" for calculations supporting the % capacity consumed.
2) All sectors are typical

4.1) Recommendations

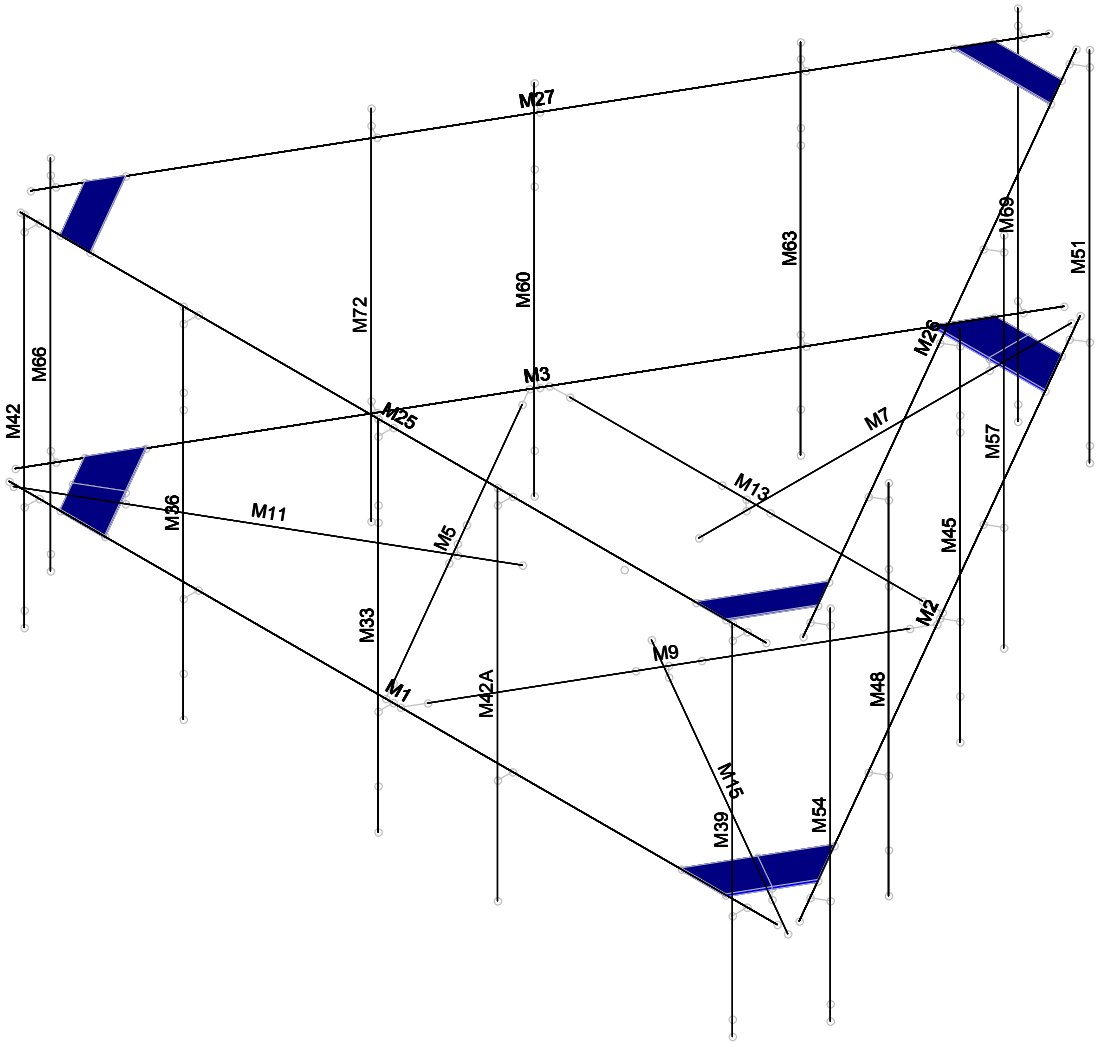
The existing mount has sufficient capacity to support the existing and proposed loading under the TIA-222-H standard. No modifications are necessary.

APPENDIX A

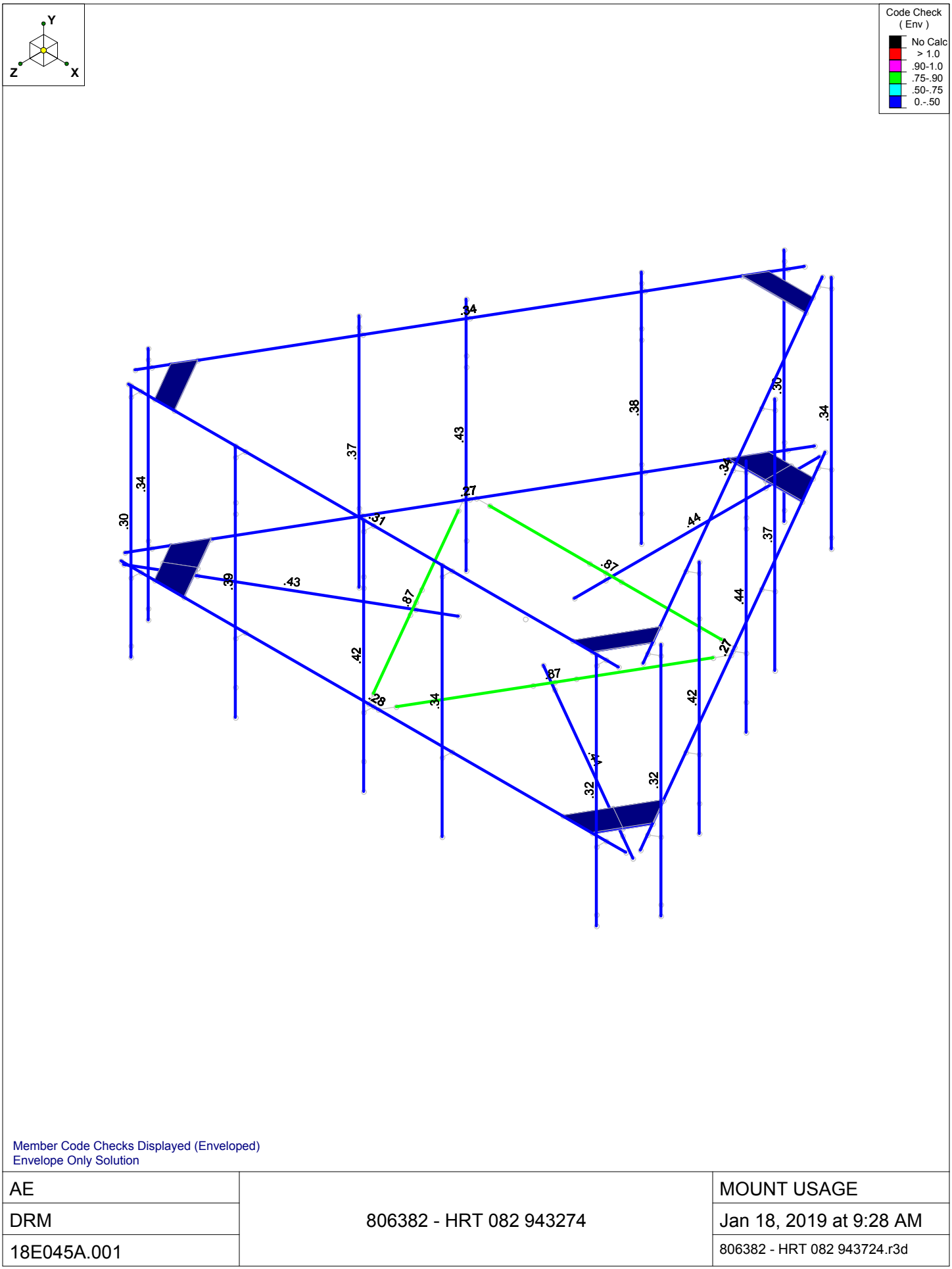
WIRE FRAME AND RENDERED MODELS



AE	806382 - HRT 082 943274	MOUNT MEMBERS
DRM		Jan 18, 2019 at 9:26 AM
18E045A.001		806382 - HRT 082 943724.r3d



AE	806382 - HRT 082 943274	MOUNT LABELS
DRM		Jan 18, 2019 at 9:27 AM
18E045A.001		806382 - HRT 082 943724.r3d



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

AE	806382 - HRT 082 943274	MOUNT USAGE
DRM		Jan 18, 2019 at 9:28 AM
18E045A.001		806382 - HRT 082 943724.r3d

APPENDIX B

SOFTWARE INPUT CALCULATIONS

Site Specific Inputs Per ANSI/TIA-222-H:

		ANSI/TIA-222-H Reference:
Location:	Portland, Middlesex County, CT	
Basic Wind Speed:	$V := 130$ mph	Appendix N 2018 CT Building Code
Maintenance Wind Speed:	$V_m := 30$ mph	Section 16.3, pg. 16-2
Basic Wind Speed with Ice:	$V_i := 50$ mph	ASCE 7 Hazards Report
Design Ice Thickness:	$t_i := 2 \cdot 0.75\text{in} = 1.5 \cdot \text{in}$	ASCE 7 Hazards Report
RAD Center:	$z := 160\text{ft}$	
Ground Elevation of Base:	$z_s := 317$ ft	ASCE 7 Hazards Report
Risk Category:	$Cat := \text{"II"}$	Table 2-1, pg. 2-40
Exposure Category:	$Exp := \text{"B"}$	Section 2.6.5.1, pg. 2-8
Topographic Category:	$Topo := \text{"1"}$	Section 2.6.6.2, pg. 2-9
Crest Height:	$H := 0\text{ft}$	
Design Spectral Response: (Soil Class D)	$S_{DS.} := 0.192$	ASCE 7 Hazards Report
	$S_{D1.} := 0.1$	ASCE 7 Hazards Report
Seismic Design Category:	$SDC := \text{"B"}$	ASCE 7 Hazards Report

Wind Velocity Calculation (No Ice):

Gust Effect Factor:	$G_h := 1.0$	Section 16.6, pg. 16-3
Wind Directionality Factor:	$K_d := 0.95$	Section 16.6, pg. 16-3
Ground Elevation Factor:	$K_e := e^{-0.0000362 \cdot z_s} = 0.99$	Section 2.6.8, pg. 2-12

Velocity Pressure Coefficient Function:

$$Kz(z) := \left| \begin{array}{l} \alpha \leftarrow \left| \begin{array}{l} 7.0 \text{ if } Exp = \text{"B"} \\ 9.5 \text{ if } Exp = \text{"C"} \\ 11.5 \text{ if } Exp = \text{"D"} \end{array} \right. \\ z_g \leftarrow \left| \begin{array}{l} 1200\text{ft} \text{ if } Exp = \text{"B"} \\ 900\text{ft} \text{ if } Exp = \text{"C"} \\ 700\text{ft} \text{ if } Exp = \text{"D"} \end{array} \right. \\ K_{z\_min} \leftarrow \left| \begin{array}{l} 0.70 \text{ if } Exp = \text{"B"} \\ 0.85 \text{ if } Exp = \text{"C"} \\ 1.03 \text{ if } Exp = \text{"D"} \end{array} \right. \\ K_z \leftarrow \max\left[2.01 \left(\frac{z}{z_g} \right)^{\frac{2}{\alpha}}, K_{z\_min} \right] \\ K_z \leftarrow \min\left(K_z, 2.01 \right) \end{array} \right.$$

Table 2-4, pg. 2-41

Table 2-4, pg. 2-41

Section 2.6.5.2, pg. 2-9

$K_z := Kz(z) = 1.13$

Topographic Factor:

$$Kzt(z) := K_{zt} \leftarrow \left| \begin{array}{l} 1.0 \text{ if } Topo = \text{"1"} \\ \text{otherwise} \\ \quad K_c \leftarrow \left| \begin{array}{l} 0.90 \text{ if } Exp = \text{"B"} \\ 1.00 \text{ if } Exp = \text{"C"} \\ 1.10 \text{ if } Exp = \text{"D"} \end{array} \right. \\ \quad K_t \leftarrow \left| \begin{array}{l} 0.43 \text{ if } Topo = \text{"2"} \\ 0.53 \text{ if } Topo = \text{"3"} \\ 0.72 \text{ if } Topo = \text{"4"} \end{array} \right. \\ \quad f \leftarrow \left| \begin{array}{l} 1.25 \text{ if } Topo = \text{"2"} \\ 2.00 \text{ if } Topo = \text{"3"} \\ 1.50 \text{ if } Topo = \text{"4"} \end{array} \right. \\ \quad K_h \leftarrow e^{\left(\frac{f \cdot z}{H} \right)} \\ \quad \left(1 + \frac{K_c \cdot K_t}{K_h} \right)^2 \end{array} \right.$$

Section 2.6.6.2, pg. 2-9

Table 2-4, pg. 2-41

Table 2-5, pg. 2-42

Table 2-5, pg. 2-42

Section 2.6.6.2.1, pg. 2-10

Section 2.6.6.2.1, pg. 2-10

$K_{zt} := Kzt(z) = 1$

Velocity Pressure:

$q_z := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 \cdot psf = 45.92 \cdot psf$

Section 2.6.11.6, pg. 2-24

Maintenance Velocity Pressure:

$q_{zm} := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V_m^{\ 2} \cdot psf = 2.45 \cdot psf$

Section 2.6.11.6, pg. 2-24

Wind Velocity Calculation (With Ice)

ANSI/TIA-222-G Reference:

Ice Density: $\rho_i := 56pcf$ — Section 2.6.10, pg. 2-13

Importance Factor for Ice Loads:

$$I_{ice} := \begin{cases} 1.00 & \text{if Cat = "II"} \\ 1.15 & \text{if Cat = "III"} \end{cases}$$

Design Ice Thickness: Section 2.6.10, pg. 2-13

$$t_{iz.}(z) := \left| \begin{array}{l} K_{iz.} \leftarrow \left(\frac{z}{33ft}\right)^{0.10} \\ K_{iz} \leftarrow \min(K_{iz.}, 1.4) \\ t_i \cdot I_{ice} \cdot K_{iz} \cdot (K_{zt})^{0.35} \end{array} \right. \qquad \boxed{t_{iz} := t_{iz.}(z) = 1.76 \cdot in}$$

Velocity Pressure: $\boxed{q_{zi} := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V_i^2 psf = 6.79 \cdot psf}$ — Section 2.6.11.6, pg. 2-24

Wind Loads on Appurtenances:

Shielding Factor: $K_a := 0.9$ — Section 16.6, pg. 16-3

Force Coefficient Function, Flat: Table 2-8, pg. 2-46

$$Ca(h,d) := \begin{cases} 1.2 & \text{if } \frac{h}{d} \le 2.5 \\ 1.2 + \frac{0.2}{4.5}\left(\frac{h}{d} - 2.5\right) & \text{if } 2.5 < \frac{h}{d} < 7 \\ 1.4 + \frac{0.6}{18}\left(\frac{h}{d} - 7\right) & \text{if } 7 \le \frac{h}{d} < 25 \\ 2 & \text{otherwise} \end{cases}$$

Force Coefficient Function, Round: Table 2-8, pg. 2-46

$$Ca_{round}(l,d) := \begin{cases} 0.70 & \text{if } \frac{l}{d} \le 2.5 \\ 0.70 + \frac{0.1}{4.5}\left(\frac{l}{d} - 2.5\right) & \text{if } 2.5 < \frac{l}{d} < 7 \\ 0.8 + \frac{0.4}{18}\left(\frac{l}{d} - 7\right) & \text{if } 7 \le \frac{l}{d} < 25 \\ 1.2 & \text{otherwise} \end{cases}$$

Wind Force on Appurtenance (No Ice):

Appurtenance Front Area:
Appurtenance Side Area:
Front Force Coefficient:
Side Force Coefficient:
Front Effective Wind Area:
Side Effective Wind Area:
Design Wind Force:

$$Fapp(H,W,D) := \left| \begin{array}{l} A_{front} \leftarrow H \cdot W \\ A_{side} \leftarrow H \cdot D \\ C_{a\_front} \leftarrow Ca(H,W) \\ C_{a\_side} \leftarrow Ca(H,D) \\ EPA_N \leftarrow C_{a\_front} \cdot A_{front} \\ EPA_T \leftarrow C_{a\_side} \cdot A_{side} \\ F \leftarrow K_a q_z \cdot G_h \cdot \max(EPA_N, EPA_T) \end{array} \right.$$

Section 2.6.11.2, pg. 2-18

Wind Force on Appurtenance (Ice):

$Fapp\_i(H, W, D) :=$

Appurtenance Height with Ice: $H_i \leftarrow H + 2 \cdot t_{iz}$

Appurtenance Width with Ice: $W_i \leftarrow W + 2 \cdot t_{iz}$

Appurtenance Depth with Ice: $D_i \leftarrow D + 2 \cdot t_{iz}$

Appurtenance Front Area: $A_{front} \leftarrow H_i \cdot W_i$

Appurtenance Side Area: $A_{side} \leftarrow H_i \cdot D_i$

Front Force Coefficient: $C_{a\_front} \leftarrow Ca_{round}(H_i, W_i)$

Side Force Coefficient: $C_{a\_side} \leftarrow Ca_{round}(H_i, D_i)$

Front Effective Wind Area: $EPA_N \leftarrow C_{a\_front} \cdot A_{front}$

Side Effective Wind Area: $EPA_T \leftarrow C_{a\_side} \cdot A_{side}$

Design Wind Force: $F_i \leftarrow K_a q_{zi} \cdot G_h \cdot \max(EPA_N, EPA_T)$ Section 2.6.11.2, pg. 2-18

Appurtenance Dead Load (Ice):

$DLapp\_i(H, W, D) :=$

Appurtenance Height with Ice: $H_i \leftarrow H + 2 \cdot t_{iz}$

Largest Out-to-Out Dimension: $D_c \leftarrow \sqrt{W^2 + D^2}$ Figure 2-4, pg. 2-51

Ice Cross-Sectional Area: $A_{ice\_ant} \leftarrow \pi \cdot t_{iz} \cdot (D_c + t_{iz})$ Section 2.6.10, pg. 2-14

Additional Ice Dead Load: $DL_{ice} \leftarrow (A_{ice\_ant} \cdot H_i) \cdot \rho_i$

Wind Force on Appurtenance (Maintenance Load):

$Fmaint(H, W, D) :=$

Appurtenance Front Area: $A_{front} \leftarrow H \cdot W$

Appurtenance Side Area: $A_{side} \leftarrow H \cdot D$

Front Force Coefficient: $C_{a\_front} \leftarrow Ca(H, W)$

Side Force Coefficient: $C_{a\_side} \leftarrow Ca(H, D)$

Front Effective Wind Area: $EPA_N \leftarrow C_{a\_front} \cdot A_{front}$

Side Effective Wind Area: $EPA_T \leftarrow C_{a\_side} \cdot A_{side}$

Design Wind Force: $F_m \leftarrow K_a q_{zm} \cdot G_h \cdot \max(EPA_N, EPA_T)$ Section 2.6.11.2, pg. 2-18

Panel Antennas:

Existing SBNHH-1D65B:

Appurtenance Dimensions: $H_{ant} := 72.0in$ $W_{ant} := 11.9in$ $D_{ant} := 7.1in$ $DL_{ant} := 40.6lbf$

Total Ice Dead Load: $DL_i := DLapp\_i(H_{ant}, W_{ant}, D_{ant}) = 210.85\,lbf$

Design Wind Force (No Ice): $WL := Fapp(H_{ant}, W_{ant}, D_{ant}) = 333.92\,lbf$

Design Wind Force (Ice): $WL_i := Fapp\_i(H_{ant}, W_{ant}, D_{ant}) = 37.23\,lbf$

Maintenance Wind Force $WL_m := Fmaint(H_{ant}, W_{ant}, D_{ant}) = 17.78\,lbf$

Existing DB846F65ZAXY:

Appurtenance Dimensions: $H_{ant} := 72.0in$ $W_{ant} := 10.0in$ $D_{ant} := 8.5in$ $DL_{ant} := 21.0lbf$

Total Ice Dead Load: $DL_i := DLapp\_i(H_{ant}, W_{ant}, D_{ant}) = 200.95\,lbf$

Design Wind Force (No Ice): $WL := Fapp(H_{ant}, W_{ant}, D_{ant}) = 290.7\,lbf$

Design Wind Force (Ice): $WL_i := Fapp\_i(H_{ant}, W_{ant}, D_{ant}) = 33.3\,lbf$

Maintenance Wind Force $WL_m := Fmaint(H_{ant}, W_{ant}, D_{ant}) = 15.48\,lbf$

Existing DB846H80E-SX:

Appurtenance Dimensions: $H_{ant} := 72.5in$ $W_{ant} := 6.6in$ $D_{ant} := 8.25in$ $DL_{ant} := 15lbf$

Total Ice Dead Load: $DL_i := DLapp\_i(H_{ant}, W_{ant}, D_{ant}) = 167.5\,lbf$

Design Wind Force (No Ice): $WL := Fapp(H_{ant}, W_{ant}, D_{ant}) = 250.58\,lbf$

Design Wind Force (Ice): $WL_i := Fapp\_i(H_{ant}, W_{ant}, D_{ant}) = 29.92\,lbf$

Maintenance Wind Force $WL_m := Fmaint(H_{ant}, W_{ant}, D_{ant}) = 13.34\,lbf$

Additional Appurtenances:

Existing RRFDC-3315-PF-48:

Appurtenance Dimensions: $H_{mdb} := 25.66in$ $W_{mdb} := 15.73in$ $D_{mdb} := 10.25in$ $DL_{mdb} := 32.0lbf$

Total Ice Dead Load: $DL_i := DLapp\_i(H_{mdb}, W_{mdb}, D_{mdb}) = 107.11\,lbf$

Design Wind Force (No Ice): $WL := Fapp(H_{mdb}, W_{mdb}, D_{mdb}) = 139.02\,lbf$

Design Wind Force (Ice): $WL_i := Fapp\_i(H_{mdb}, W_{mdb}, D_{mdb}) = 16.69\,lbf$

Maintenance Wind Force $WL_m := Fmaint(H_{mdb}, W_{mdb}, D_{mdb}) = 7.4\,lbf$

Proposed RFV01U-D1A:

Appurtenance Dimensions: $H_{rrh} := 15in$ $W_{rrh} := 15in$ $D_{rrh} := 10in$ $DL_{rrh} := 84.4lbf$

Total Ice Dead Load: $DL_i := DLapp\_i(H_{rrh}, W_{rrh}, D_{rrh}) = 65.5\,lbf$

Design Wind Force (No Ice): $WL := Fapp(H_{rrh}, W_{rrh}, D_{rrh}) = 77.5\,lbf$

Design Wind Force (Ice): $WL_i := Fapp\_i(H_{rrh}, W_{rrh}, D_{rrh}) = 10.19\,lbf$

Maintenance Wind Force $WL_m := Fmaint(H_{rrh}, W_{rrh}, D_{rrh}) = 4.13\,lbf$

Proposed RFV01U-D2A:

Appurtenance Dimensions: $H_{rrh} := 15in$ $W_{rrh} := 15in$ $D_{rrh} := 8.1in$ $DL_{rrh} := 70.3lbf$

Total Ice Dead Load: $DL_i := DLapp\_i(H_{rrh}, W_{rrh}, D_{rrh}) = 62.25\,lbf$

Design Wind Force (No Ice): $WL := Fapp(H_{rrh}, W_{rrh}, D_{rrh}) = 77.5\,lbf$

Design Wind Force (Ice): $WL_i := Fapp\_i(H_{rrh}, W_{rrh}, D_{rrh}) = 10.19\,lbf$

Maintenance Wind Force $WL_m := Fmaint(H_{rrh}, W_{rrh}, D_{rrh}) = 4.13\,lbf$

Mount Members:

Force Coefficient: $C_{a\_flat} := 2.0$ Table 2-9, pg. 2-46

Force Coefficient: $C_{a\_round} := 1.2$ Table 2-9, pg. 2-46

Flat Mount Members:

Linear Wind Load: $Flin_f(w_f) := F \leftarrow q_z \cdot G_h \cdot K_a \cdot (C_{a\_flat} \cdot w_f)$ Section 2.6.11.2, pg. 2-18

Width with ice:
Linear Wind Load with Ice:

$$Flin\_i_f(w_f) := \begin{| } w_i \leftarrow w_f + 2t_{iz} \\ F \leftarrow q_{zi} \cdot G_h \cdot K_a \cdot (C_{a\_round} \cdot w_i) \end{|}$$

Section 2.6.11.2, pg. 2-18

Largest Out-to-Out Dimension:
Cross-Sectional Area of Ice:
Linear Dead Load of Ice:

$$DL\_i_f(w_f) := \begin{| } D_c \leftarrow \sqrt{w_f^2 + w_f^2} \\ A_{ice} \leftarrow \pi \cdot t_{iz} \cdot (D_c + t_{iz}) \\ DL_{ice} \leftarrow \rho_i \cdot A_{ice} \end{|}$$

Figure 2-4, pg. 2-51
Section 2.6.10, pg. 2-14

Double Angles:

Largest Out-to-Out Dimension:
Cross-Sectional Area of Ice:
Linear Dead Load of Ice:

$$DL\_i_{f\_2L}(w_f) := \begin{| } D_c \leftarrow w_f \\ A_{ice} \leftarrow \pi \cdot t_{iz} \cdot (D_c + t_{iz}) \\ DL_{ice} \leftarrow \rho_i \cdot A_{ice} \end{|}$$

Figure 2-4, pg. 2-51
Section 2.6.10, pg. 2-14

Linear Wind Load: $Flin_{fm}(w_f) := F \leftarrow q_{zm} \cdot G_h \cdot K_a \cdot (C_{a\_flat} \cdot w_f)$ Section 2.6.11.2, pg. 2-18

Round Mount Members:

Linear Wind Load: $Flin_r(\phi_r) := F \leftarrow q_z \cdot G_h \cdot K_a \cdot (C_{a\_round} \cdot \phi_r)$ Section 2.6.11.2, pg. 2-18

Width with ice:
Linear Wind Load with Ice:

$$Flin\_i_r(\phi_r) := \begin{| } \phi_i \leftarrow \phi_r + 2t_{iz} \\ F \leftarrow q_{zi} \cdot G_h \cdot K_a \cdot (C_{a\_round} \cdot \phi_i) \end{|}$$

Section 2.6.11.2, pg. 2-18

Largest Out-to-Out Dimension:
Cross-Sectional Area of Ice:
Linear Dead Load of Ice:

$$DL\_i_r(\phi_r) := \begin{| } D_c \leftarrow \phi_r \\ A_{ice} \leftarrow \pi \cdot t_{iz} \cdot (D_c + t_{iz}) \\ DL_{ice} \leftarrow \rho_i \cdot A_{ice} \end{|}$$

Figure 2-4, pg. 2-51
Section 2.6.10, pg. 2-14

Linear Wind Load: $Flin_{rm}(\phi_r) := F \leftarrow q_{zm} \cdot G_h \cdot K_a \cdot (C_{a\_round} \cdot \phi_r)$ Section 2.6.11.2, pg. 2-18

Flat Mount Members

5" Channel:

Dimensions: $w_f := 5in$

Linear Dead Load of Ice: $DL_i := DL\_i_f(w_f) = 18.94 \cdot plf$

Linear Wind Load: $WL := Flin_f(w_f) = 34.44 \cdot plf$

Linear Wind Load with Ice: $WL_i := Flin\_i_f(w_f) = 5.21 \cdot plf$

Linear Wind Load (Maintenace): $W_m := Flin_{fm}(w_f) = 1.83 \cdot plf$

4" Tube/Angle:

Dimensions: $w_f := 4in$

Linear Dead Load of Ice: $DL_i := DL\_i_f(w_f) = 15.91 \cdot plf$

Linear Wind Load: $WL := Flin_f(w_f) = 27.55 \cdot plf$

Linear Wind Load with Ice: $WL_i := Flin\_i_f(w_f) = 4.59 \cdot plf$

Linear Wind Load (Maintenace): $W_m := Flin_{fm}(w_f) = 1.47 \cdot plf$

3" Angle:

Dimensions: $w_f := 3in$

Linear Dead Load of Ice: $DL_i := DL\_i_f(w_f) = 12.87 \cdot plf$

Linear Wind Load: $WL := Flin_f(w_f) = 20.67 \cdot plf$

Linear Wind Load with Ice: $WL_i := Flin\_i_f(w_f) = 3.98 \cdot plf$

Linear Wind Load (Maintenace): $W_m := Flin_{fm}(w_f) = 1.1 \cdot plf$

Round Mount Members

2" SCH. 40 Pipe:

Dimensions: $\phi_r := 2.375in$

Linear Dead Load of Ice: $DL_i := DL\_i_r(\phi_r) = 8.87 \cdot plf$

Linear Wind Load: $WL := Flin_r(\phi_r) = 9.82 \cdot plf$

Linear Wind Load with Ice: $WL_i := Flin\_i_r(\phi_r) = 3.6 \cdot plf$

Linear Wind Load (Maintenace): $W_m := Flin_{fm}(\phi_r) = 0.87 \cdot plf$

Grating:

Dead Load: $DL := 5psf$

Area Dead Load of Ice: $DL_i := \rho_i \cdot 2 \cdot t_{iz}$ $DL_i = 16.39 \cdot psf$

Bolt Connection Check:

Use 5/8" A325N Bolts: — AISC 360-05 13th Ed. Reference:

Bolt diameter:	$d := 0.625in$	
Ultimate strength:	$F_u := 120ksi$	Table 2-5, pg. 2-41
Nominal shear strength:	$F_{nv} := 0.4 \cdot F_u = 48 \cdot ksi$	Table J3.2, pg. 16.1-104
Nominal tensile strength:	$F_{nt} := 0.75 \cdot F_u = 90 \cdot ksi$	Table J3.2, pg. 16.1-104
Bolt area:	$A_b := 0.25 \cdot d^2 \cdot \pi = 0.31 \cdot in^2$	
Nominal anchor shear strength:	$R_{nv} := F_{nv} \cdot A_b = 14726.22 \cdot lbf$	Equation (J3-1), pg 16.1-108
Nominal anchor tensile strength:	$R_{nt} := F_{nt} \cdot A_b = 27611.65 \cdot lbf$	Equation (J3-1), pg 16.1-108
LRFD reduction factor:	$\phi := 0.75$	

Check Bolt Capacity:

$$\begin{aligned}
&IntZ(X, Y, Z) := \\
&\quad v \leftarrow \sqrt{X^2 + Z^2} \\
&\quad t \leftarrow \begin{cases} |Y| & \text{if } Y > 0 \\ 0 & \text{otherwise} \end{cases} \\
&\quad Usg_V \leftarrow \frac{v \cdot lbf}{\phi \cdot R_{nv}} \\
&\quad Usg_T \leftarrow \frac{t \cdot lbf}{\phi \cdot R_{nt}} \\
&\quad Int \leftarrow Usg_T^{\,2} + Usg_V^{\,2} \qquad \text{Equation (C-J3-5a), pg. 16.1-345} \\
&\quad \text{return } \max(Usg_V, Usg_T, Int) \text{ if } Usg_V \geq 1.0 \\
&\quad R'_{nt} \leftarrow R_{nt} \cdot \sqrt{1 - (Usg_V)^2} \\
&\quad Usg'_T \leftarrow \frac{t \cdot lbf}{\phi \cdot R'_{nt}} \qquad \text{Equation (C-J3-8a), pg. 16-1-346} \\
&\quad \text{return } \max(Int, Usg_V, Usg'_T)
\end{aligned}$$

$anchorCheck(LC, IntZ) = 75.94 \cdot \%$

APPENDIX C

SOFTWARE ANALYSIS OUTPUT

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[k/ft^3]	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
8	SAE J429 Gr.2	29000	11154	.3	.65	.49	57	1.5	74	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	2" Pipe Mount	PIPE 2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
2	Face Channel	C5x6.7	Beam	Channel	A36 Gr.36	Typical	1.97	.47	7.48	.055
3	Standoff Tube	HSS4x4x4	Beam	SquareTube	A500 Gr.B ...	Typical	3.37	7.8	7.8	12.8
4	Grating Angles	L4x4x4	Beam	Single Angle	A36 Gr.36	Typical	1.93	3	3	.044
5	Handrail	L3x3x4	Beam	Single Angle	A36 Gr.36	Typical	1.44	1.23	1.23	.031

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	Face Chann...	154.5			Lbyy						Lateral
2	M2	Face Chann...	154.5			Lbyy						Lateral
3	M3	Face Chann...	154.5			Lbyy						Lateral
4	M5	Grating Ang...	71									Lateral
5	M7	Standoff Tu...	75			Lbyy						Lateral
6	M9	Grating Ang...	71									Lateral
7	M11	Standoff Tu...	75			Lbyy						Lateral
8	M13	Grating Ang...	71									Lateral
9	M15	Standoff Tu...	75			Lbyy						Lateral
10	M25	Handrail	150			Lbyy						Lateral
11	M26	Handrail	150			Lbyy						Lateral
12	M27	Handrail	150			Lbyy						Lateral
13	M33	2" Pipe Mou...	72			Lbyy						Lateral
14	M36	2" Pipe Mou...	72			Lbyy						Lateral
15	M39	2" Pipe Mou...	72			Lbyy						Lateral
16	M42	2" Pipe Mou...	72			Lbyy						Lateral
17	M42A	2" Pipe Mou...	72			Lbyy						Lateral
18	M45	2" Pipe Mou...	72			Lbyy						Lateral
19	M48	2" Pipe Mou...	72			Lbyy						Lateral
20	M51	2" Pipe Mou...	72			Lbyy						Lateral
21	M54	2" Pipe Mou...	72			Lbyy						Lateral
22	M57	2" Pipe Mou...	72			Lbyy						Lateral
23	M60	2" Pipe Mou...	72			Lbyy						Lateral
24	M63	2" Pipe Mou...	72			Lbyy						Lateral
25	M66	2" Pipe Mou...	72			Lbyy						Lateral
26	M69	2" Pipe Mou...	72			Lbyy						Lateral
27	M72	2" Pipe Mou...	72			Lbyy						Lateral

Joint Loads and Enforced Displacements (BLC 1 : DL)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N146	L	Y	-20.3
2	N147	L	Y	-20.3

Joint Loads and Enforced Displacements (BLC 1 : DL) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
3	N148	L	Y	-20.3
4	N149	L	Y	-20.3
5	N95	L	Y	-10.5
6	N101	L	Y	-10.5
7	N164B	L	Y	-10.5
8	N165B	L	Y	-10.5
9	N164C	L	Y	-84.4
10	N173A	L	Y	-70.3
11	N133	L	Y	-10.5
12	N139	L	Y	-10.5
13	N142	L	Y	-20.3
14	N143	L	Y	-20.3
15	N144	L	Y	-20.3
16	N145	L	Y	-20.3
17	N146A	L	Y	-10.5
18	N147A	L	Y	-10.5
19	N148A	L	Y	-84.4
20	N149A	L	Y	-70.3
21	N171	L	Y	-10.5
22	N177	L	Y	-10.5
23	N180	L	Y	-20.3
24	N181	L	Y	-20.3
25	N182	L	Y	-20.3
26	N183	L	Y	-20.3
27	N184	L	Y	-10.5
28	N185	L	Y	-10.5
29	N186	L	Y	-84.4
30	N187	L	Y	-70.3

Joint Loads and Enforced Displacements (BLC 2 : DLi)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N146	L	Y	-105.42
2	N147	L	Y	-105.42
3	N148	L	Y	-105.42
4	N149	L	Y	-105.42
5	N95	L	Y	-100.48
6	N101	L	Y	-100.48
7	N164B	L	Y	-100.48
8	N165B	L	Y	-100.48
9	N164C	L	Y	-65.5
10	N173A	L	Y	-62.25
11	N133	L	Y	-100.48
12	N139	L	Y	-100.48
13	N142	L	Y	-105.42
14	N143	L	Y	-105.42
15	N144	L	Y	-105.42
16	N145	L	Y	-105.42
17	N146A	L	Y	-100.48
18	N147A	L	Y	-100.48
19	N148A	L	Y	-65.5
20	N149A	L	Y	-62.25
21	N171	L	Y	-100.48
22	N177	L	Y	-100.48
23	N180	L	Y	-105.42
24	N181	L	Y	-105.42
25	N182	L	Y	-105.42

Joint Loads and Enforced Displacements (BLC 2 : DLi) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
26	N183	L	Y	-105.42
27	N184	L	Y	-100.48
28	N185	L	Y	-100.48
29	N186	L	Y	-65.5
30	N187	L	Y	-62.25

Joint Loads and Enforced Displacements (BLC 3 : WLX)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N146	L	X	166.96
2	N147	L	X	166.96
3	N148	L	X	166.96
4	N149	L	X	166.96
5	N95	L	X	145.35
6	N101	L	X	145.35
7	N164B	L	X	145.35
8	N165B	L	X	145.35
9	N164C	L	X	77.5
10	N173A	L	X	77.5
11	N133	L	X	145.35
12	N139	L	X	145.35
13	N142	L	X	166.96
14	N143	L	X	166.96
15	N144	L	X	166.96
16	N145	L	X	166.96
17	N146A	L	X	145.35
18	N147A	L	X	145.35
19	N148A	L	X	77.5
20	N149A	L	X	77.5
21	N171	L	X	145.35
22	N177	L	X	145.35
23	N180	L	X	166.96
24	N181	L	X	166.96
25	N182	L	X	166.96
26	N183	L	X	166.96
27	N184	L	X	145.35
28	N185	L	X	145.35
29	N186	L	X	77.5
30	N187	L	X	77.5

Joint Loads and Enforced Displacements (BLC 4 : WLZ)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N146	L	Z	166.96
2	N147	L	Z	166.96
3	N148	L	Z	166.96
4	N149	L	Z	166.96
5	N95	L	Z	145.35
6	N101	L	Z	145.35
7	N164B	L	Z	145.35
8	N165B	L	Z	145.35
9	N164C	L	Z	77.5
10	N173A	L	Z	77.5
11	N133	L	Z	145.35
12	N139	L	Z	145.35
13	N142	L	Z	166.96
14	N143	L	Z	166.96
15	N144	L	Z	166.96

Joint Loads and Enforced Displacements (BLC 4 : WLZ) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
16	N145	L	Z	166.96
17	N146A	L	Z	145.35
18	N147A	L	Z	145.35
19	N148A	L	Z	77.5
20	N149A	L	Z	77.5
21	N171	L	Z	145.35
22	N177	L	Z	145.35
23	N180	L	Z	166.96
24	N181	L	Z	166.96
25	N182	L	Z	166.96
26	N183	L	Z	166.96
27	N184	L	Z	145.35
28	N185	L	Z	145.35
29	N186	L	Z	77.5
30	N187	L	Z	77.5

Joint Loads and Enforced Displacements (BLC 5 : WLXi)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N146	L	X	18.61
2	N147	L	X	18.61
3	N148	L	X	18.61
4	N149	L	X	18.61
5	N95	L	X	16.65
6	N101	L	X	16.65
7	N164B	L	X	16.65
8	N165B	L	X	16.65
9	N164C	L	X	10.19
10	N173A	L	X	10.19
11	N133	L	X	16.65
12	N139	L	X	16.65
13	N142	L	X	18.61
14	N143	L	X	18.61
15	N144	L	X	18.61
16	N145	L	X	18.61
17	N146A	L	X	16.65
18	N147A	L	X	16.65
19	N148A	L	X	10.19
20	N149A	L	X	10.19
21	N171	L	X	16.65
22	N177	L	X	16.65
23	N180	L	X	18.61
24	N181	L	X	18.61
25	N182	L	X	18.61
26	N183	L	X	18.61
27	N184	L	X	16.65
28	N185	L	X	16.65
29	N186	L	X	10.19
30	N187	L	X	10.19

Joint Loads and Enforced Displacements (BLC 6 : WLZi)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N146	L	Z	18.61
2	N147	L	Z	18.61
3	N148	L	Z	18.61
4	N149	L	Z	18.61
5	N95	L	Z	16.65

Joint Loads and Enforced Displacements (BLC 6 : WLZi) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
6	N101	L	Z	16.65
7	N164B	L	Z	16.65
8	N165B	L	Z	16.65
9	N164C	L	Z	10.19
10	N173A	L	Z	10.19
11	N133	L	Z	16.65
12	N139	L	Z	16.65
13	N142	L	Z	18.61
14	N143	L	Z	18.61
15	N144	L	Z	18.61
16	N145	L	Z	18.61
17	N146A	L	Z	16.65
18	N147A	L	Z	16.65
19	N148A	L	Z	10.19
20	N149A	L	Z	10.19
21	N171	L	Z	16.65
22	N177	L	Z	16.65
23	N180	L	Z	18.61
24	N181	L	Z	18.61
25	N182	L	Z	18.61
26	N183	L	Z	18.61
27	N184	L	Z	16.65
28	N185	L	Z	16.65
29	N186	L	Z	10.19
30	N187	L	Z	10.19

Joint Loads and Enforced Displacements (BLC 7 : WLXm)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N146	L	X	8.89
2	N147	L	X	8.89
3	N148	L	X	8.89
4	N149	L	X	8.89
5	N95	L	X	7.74
6	N101	L	X	7.74
7	N164B	L	X	7.74
8	N165B	L	X	7.74
9	N164C	L	X	4.13
10	N173A	L	X	4.13
11	N133	L	X	7.74
12	N139	L	X	7.74
13	N142	L	X	8.89
14	N143	L	X	8.89
15	N144	L	X	8.89
16	N145	L	X	8.89
17	N146A	L	X	7.74
18	N147A	L	X	7.74
19	N148A	L	X	4.13
20	N149A	L	X	4.13
21	N171	L	X	7.74
22	N177	L	X	7.74
23	N180	L	X	8.89
24	N181	L	X	8.89
25	N182	L	X	8.89
26	N183	L	X	8.89
27	N184	L	X	7.74
28	N185	L	X	7.74

Joint Loads and Enforced Displacements (BLC 7 : WLXm) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
29	N186	L	X	4.13
30	N187	L	X	4.13

Joint Loads and Enforced Displacements (BLC 8 : WLZm)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N146	L	Z	8.89
2	N147	L	Z	8.89
3	N148	L	Z	8.89
4	N149	L	Z	8.89
5	N95	L	Z	7.74
6	N101	L	Z	7.74
7	N164B	L	Z	7.74
8	N165B	L	Z	7.74
9	N164C	L	Z	4.13
10	N173A	L	Z	4.13
11	N133	L	Z	7.74
12	N139	L	Z	7.74
13	N142	L	Z	8.89
14	N143	L	Z	8.89
15	N144	L	Z	8.89
16	N145	L	Z	8.89
17	N146A	L	Z	7.74
18	N147A	L	Z	7.74
19	N148A	L	Z	4.13
20	N149A	L	Z	4.13
21	N171	L	Z	7.74
22	N177	L	Z	7.74
23	N180	L	Z	8.89
24	N181	L	Z	8.89
25	N182	L	Z	8.89
26	N183	L	Z	8.89
27	N184	L	Z	7.74
28	N185	L	Z	7.74
29	N186	L	Z	4.13
30	N187	L	Z	4.13

Joint Loads and Enforced Displacements (BLC 12 : Lm)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N98	L	Y	-250
2	N99	L	Y	-250
3	N136	L	Y	-250
4	N137	L	Y	-250
5	N174	L	Y	-250
6	N175	L	Y	-250

Member Distributed Loads (BLC 2 : DLi)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
1	M1	Y	-18.94	-18.94	0	0
2	M2	Y	-18.94	-18.94	0	0
3	M3	Y	-18.94	-18.94	0	0
4	M5	Y	-15.91	-15.91	0	0
5	M7	Y	-15.91	-15.91	0	0
6	M9	Y	-15.91	-15.91	0	0
7	M11	Y	-15.91	-15.91	0	0

Member Distributed Loads (BLC 2 : DLi) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
8	M13	Y	-15.91	-15.91	0	0
9	M15	Y	-15.91	-15.91	0	0
10	M25	Y	-12.87	-12.87	0	0
11	M26	Y	-12.87	-12.87	0	0
12	M27	Y	-12.87	-12.87	0	0
13	M33	Y	-8.87	-8.87	0	0
14	M36	Y	-8.87	-8.87	0	0
15	M39	Y	-8.87	-8.87	0	0
16	M42	Y	-8.87	-8.87	0	0
17	M42A	Y	-8.87	-8.87	0	0
18	M45	Y	-8.87	-8.87	0	0
19	M48	Y	-8.87	-8.87	0	0
20	M51	Y	-8.87	-8.87	0	0
21	M54	Y	-8.87	-8.87	0	0
22	M57	Y	-8.87	-8.87	0	0
23	M60	Y	-8.87	-8.87	0	0
24	M63	Y	-8.87	-8.87	0	0
25	M66	Y	-8.87	-8.87	0	0
26	M69	Y	-8.87	-8.87	0	0
27	M72	Y	-8.87	-8.87	0	0

Member Distributed Loads (BLC 3 : WLX)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
1	M1	PX	34.44	34.44	0	0
2	M2	PX	34.44	34.44	0	0
3	M3	PX	34.44	34.44	0	0
4	M5	PX	27.55	27.55	0	0
5	M7	PX	27.55	27.55	0	0
6	M9	PX	27.55	27.55	0	0
7	M11	PX	27.55	27.55	0	0
8	M13	PX	27.55	27.55	0	0
9	M15	PX	27.55	27.55	0	0
10	M25	PX	20.67	20.67	0	0
11	M26	PX	20.67	20.67	0	0
12	M27	PX	20.67	20.67	0	0
13	M33	PX	9.82	9.82	0	0
14	M36	PX	9.82	9.82	0	0
15	M39	PX	9.82	9.82	0	0
16	M42	PX	9.82	9.82	0	0
17	M42A	PX	9.82	9.82	0	0
18	M45	PX	9.82	9.82	0	0
19	M48	PX	9.82	9.82	0	0
20	M51	PX	9.82	9.82	0	0
21	M54	PX	9.82	9.82	0	0
22	M57	PX	9.82	9.82	0	0
23	M60	PX	9.82	9.82	0	0
24	M63	PX	9.82	9.82	0	0
25	M66	PX	9.82	9.82	0	0
26	M69	PX	9.82	9.82	0	0
27	M72	PX	9.82	9.82	0	0

Member Distributed Loads (BLC 4 : WLZ)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
1	M1	PZ	34.44	34.44	0	0
2	M2	PZ	34.44	34.44	0	0
3	M3	PZ	34.44	34.44	0	0

Member Distributed Loads (BLC 4 : WLZ) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
4	M5	PZ	27.55	27.55	0	0
5	M7	PZ	27.55	27.55	0	0
6	M9	PZ	27.55	27.55	0	0
7	M11	PZ	27.55	27.55	0	0
8	M13	PZ	27.55	27.55	0	0
9	M15	PZ	27.55	27.55	0	0
10	M25	PZ	20.67	20.67	0	0
11	M26	PZ	20.67	20.67	0	0
12	M27	PZ	20.67	20.67	0	0
13	M33	PZ	9.82	9.82	0	0
14	M36	PZ	9.82	9.82	0	0
15	M39	PZ	9.82	9.82	0	0
16	M42	PZ	9.82	9.82	0	0
17	M42A	PZ	9.82	9.82	0	0
18	M45	PZ	9.82	9.82	0	0
19	M48	PZ	9.82	9.82	0	0
20	M51	PZ	9.82	9.82	0	0
21	M54	PZ	9.82	9.82	0	0
22	M57	PZ	9.82	9.82	0	0
23	M60	PZ	9.82	9.82	0	0
24	M63	PZ	9.82	9.82	0	0
25	M66	PZ	9.82	9.82	0	0
26	M69	PZ	9.82	9.82	0	0
27	M72	PZ	9.82	9.82	0	0

Member Distributed Loads (BLC 5 : WLXi)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
1	M1	PX	5.21	5.21	0	0
2	M2	PX	5.21	5.21	0	0
3	M3	PX	5.21	5.21	0	0
4	M5	PX	4.59	4.59	0	0
5	M7	PX	4.59	4.59	0	0
6	M9	PX	4.59	4.59	0	0
7	M11	PX	4.59	4.59	0	0
8	M13	PX	4.59	4.59	0	0
9	M15	PX	4.59	4.59	0	0
10	M25	PX	3.98	3.98	0	0
11	M26	PX	3.98	3.98	0	0
12	M27	PX	3.98	3.98	0	0
13	M33	PX	3.6	3.6	0	0
14	M36	PX	3.6	3.6	0	0
15	M39	PX	3.6	3.6	0	0
16	M42	PX	3.6	3.6	0	0
17	M42A	PX	3.6	3.6	0	0
18	M45	PX	3.6	3.6	0	0
19	M48	PX	3.6	3.6	0	0
20	M51	PX	3.6	3.6	0	0
21	M54	PX	3.6	3.6	0	0
22	M57	PX	3.6	3.6	0	0
23	M60	PX	3.6	3.6	0	0
24	M63	PX	3.6	3.6	0	0
25	M66	PX	3.6	3.6	0	0
26	M69	PX	3.6	3.6	0	0
27	M72	PX	3.6	3.6	0	0

Member Distributed Loads (BLC 6 : WLZi)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
1	M1	PZ	5.21	5.21	0	0
2	M2	PZ	5.21	5.21	0	0
3	M3	PZ	5.21	5.21	0	0
4	M5	PZ	4.59	4.59	0	0
5	M7	PZ	4.59	4.59	0	0
6	M9	PZ	4.59	4.59	0	0
7	M11	PZ	4.59	4.59	0	0
8	M13	PZ	4.59	4.59	0	0
9	M15	PZ	4.59	4.59	0	0
10	M25	PZ	3.98	3.98	0	0
11	M26	PZ	3.98	3.98	0	0
12	M27	PZ	3.98	3.98	0	0
13	M33	PZ	3.6	3.6	0	0
14	M36	PZ	3.6	3.6	0	0
15	M39	PZ	3.6	3.6	0	0
16	M42	PZ	3.6	3.6	0	0
17	M42A	PZ	3.6	3.6	0	0
18	M45	PZ	3.6	3.6	0	0
19	M48	PZ	3.6	3.6	0	0
20	M51	PZ	3.6	3.6	0	0
21	M54	PZ	3.6	3.6	0	0
22	M57	PZ	3.6	3.6	0	0
23	M60	PZ	3.6	3.6	0	0
24	M63	PZ	3.6	3.6	0	0
25	M66	PZ	3.6	3.6	0	0
26	M69	PZ	3.6	3.6	0	0
27	M72	PZ	3.6	3.6	0	0

Member Distributed Loads (BLC 7 : WLXm)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
1	M1	PX	1.83	1.83	0	0
2	M2	PX	1.83	1.83	0	0
3	M3	PX	1.83	1.83	0	0
4	M5	PX	1.47	1.47	0	0
5	M7	PX	1.47	1.47	0	0
6	M9	PX	1.47	1.47	0	0
7	M11	PX	1.47	1.47	0	0
8	M13	PX	1.47	1.47	0	0
9	M15	PX	1.47	1.47	0	0
10	M25	PX	1.1	1.1	0	0
11	M26	PX	1.1	1.1	0	0
12	M27	PX	1.1	1.1	0	0
13	M33	PX	.87	.87	0	0
14	M36	PX	.87	.87	0	0
15	M39	PX	.87	.87	0	0
16	M42	PX	.87	.87	0	0
17	M42A	PX	.87	.87	0	0
18	M45	PX	.87	.87	0	0
19	M48	PX	.87	.87	0	0
20	M51	PX	.87	.87	0	0
21	M54	PX	.87	.87	0	0
22	M57	PX	.87	.87	0	0
23	M60	PX	.87	.87	0	0
24	M63	PX	.87	.87	0	0
25	M66	PX	.87	.87	0	0
26	M69	PX	.87	.87	0	0

Member Distributed Loads (BLC 7 : WLXm) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
27	M72	PX	.87	.87	0	0

Member Distributed Loads (BLC 8 : WLZm)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
1	M1	PZ	1.83	1.83	0	0
2	M2	PZ	1.83	1.83	0	0
3	M3	PZ	1.83	1.83	0	0
4	M5	PZ	1.47	1.47	0	0
5	M7	PZ	1.47	1.47	0	0
6	M9	PZ	1.47	1.47	0	0
7	M11	PZ	1.47	1.47	0	0
8	M13	PZ	1.47	1.47	0	0
9	M15	PZ	1.47	1.47	0	0
10	M25	PZ	1.1	1.1	0	0
11	M26	PZ	1.1	1.1	0	0
12	M27	PZ	1.1	1.1	0	0
13	M33	PZ	.87	.87	0	0
14	M36	PZ	.87	.87	0	0
15	M39	PZ	.87	.87	0	0
16	M42	PZ	.87	.87	0	0
17	M42A	PZ	.87	.87	0	0
18	M45	PZ	.87	.87	0	0
19	M48	PZ	.87	.87	0	0
20	M51	PZ	.87	.87	0	0
21	M54	PZ	.87	.87	0	0
22	M57	PZ	.87	.87	0	0
23	M60	PZ	.87	.87	0	0
24	M63	PZ	.87	.87	0	0
25	M66	PZ	.87	.87	0	0
26	M69	PZ	.87	.87	0	0
27	M72	PZ	.87	.87	0	0

Member Distributed Loads (BLC 14 : BLC 1 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
1	M1	Y	-.22	-1.484	61.8	80.34
2	M1	Y	-1.484	-5.003	80.34	98.88
3	M1	Y	-5.003	-7.51	98.88	117.42
4	M1	Y	-7.51	-5.067	117.42	135.96
5	M1	Y	-5.067	-.22	135.96	154.5
6	M3	Y	-.221	-5.058	0	18.54
7	M3	Y	-5.058	-7.4	18.54	37.08
8	M3	Y	-7.4	-4.967	37.08	55.62
9	M3	Y	-4.967	-1.542	55.62	74.16
10	M3	Y	-1.542	-.221	74.16	92.7
11	M4	Y	-.622	-.622	1.287	3.767
12	M5	Y	-1.338	-4.796	0	14.2
13	M5	Y	-4.796	-7.732	14.2	28.4
14	M5	Y	-7.732	-7.673	28.4	42.6
15	M5	Y	-7.673	-4.783	42.6	56.8
16	M5	Y	-4.783	-1.538	56.8	71
17	M6	Y	-.626	-.626	.23	2.714
18	M35	Y	-.526	-.526	0	3
19	M1	Y	-.221	-5.057	0	18.54
20	M1	Y	-5.057	-7.4	18.54	37.08
21	M1	Y	-7.4	-4.966	37.08	55.62
22	M1	Y	-4.966	-1.542	55.62	74.16

Member Distributed Loads (BLC 14 : BLC 1 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
23	M1	Y	-1.542	-.221	74.16	92.7
24	M2	Y	-.22	-1.484	61.8	80.34
25	M2	Y	-1.484	-5.003	80.34	98.88
26	M2	Y	-5.003	-7.51	98.88	117.42
27	M2	Y	-7.51	-5.068	117.42	135.96
28	M2	Y	-5.068	-.22	135.96	154.5
29	M8	Y	-.622	-.622	1.287	3.767
30	M9	Y	-1.338	-4.796	0	14.2
31	M9	Y	-4.796	-7.732	14.2	28.4
32	M9	Y	-7.732	-7.673	28.4	42.6
33	M9	Y	-7.673	-4.783	42.6	56.8
34	M9	Y	-4.783	-1.538	56.8	71
35	M10	Y	-.626	-.626	.23	2.714
36	M47	Y	-.526	-.526	0	3
37	M2	Y	-.221	-5.058	0	18.54
38	M2	Y	-5.058	-7.4	18.54	37.08
39	M2	Y	-7.4	-4.966	37.08	55.62
40	M2	Y	-4.966	-1.542	55.62	74.16
41	M2	Y	-1.542	-.221	74.16	92.7
42	M3	Y	-.22	-1.484	61.8	80.34
43	M3	Y	-1.484	-5.003	80.34	98.88
44	M3	Y	-5.003	-7.51	98.88	117.42
45	M3	Y	-7.51	-5.067	117.42	135.96
46	M3	Y	-5.067	-.22	135.96	154.5
47	M12	Y	-.622	-.622	1.287	3.767
48	M13	Y	-1.338	-4.796	0	14.2
49	M13	Y	-4.796	-7.732	14.2	28.4
50	M13	Y	-7.732	-7.673	28.4	42.6
51	M13	Y	-7.673	-4.783	42.6	56.8
52	M13	Y	-4.783	-1.538	56.8	71
53	M14	Y	-.626	-.626	.23	2.714
54	M62	Y	-.526	-.526	0	3
55	M4	Y	.096	-.289	0	2
56	M4	Y	-.289	-1.059	2	4
57	M5	Y	-1.733	-3.868	0	8.52
58	M5	Y	-3.868	-5.376	8.52	17.04
59	M5	Y	-5.376	-3.49	17.04	25.56
60	M5	Y	-3.49	-.636	25.56	34.08
61	M5	Y	-.636	-.107	34.08	42.6
62	M9	Y	-.105	-.677	28.4	36.92
63	M9	Y	-.677	-3.539	36.92	45.44
64	M9	Y	-3.539	-5.362	45.44	53.96
65	M9	Y	-5.362	-3.839	53.96	62.48
66	M9	Y	-3.839	-1.73	62.48	71
67	M10	Y	-1.461	-.43	0	1.333
68	M10	Y	-.43	.086	1.333	2.667
69	M10	Y	.086	.086	2.667	4
70	M8	Y	.099	.099	0	1.333
71	M8	Y	.099	-.496	1.333	2.667
72	M8	Y	-.496	-1.685	2.667	4
73	M9	Y	-1.738	-3.832	0	8.52
74	M9	Y	-3.832	-5.343	8.52	17.04
75	M9	Y	-5.343	-3.497	17.04	25.56
76	M9	Y	-3.497	-.645	25.56	34.08
77	M9	Y	-.645	-.105	34.08	42.6
78	M13	Y	-.102	-.627	28.4	36.92
79	M13	Y	-.627	-3.563	36.92	45.44

Member Distributed Loads (BLC 14 : BLC 1 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
80	M13	Y	-3.563	-5.415	45.44	53.96
81	M13	Y	-5.415	-3.832	53.96	62.48
82	M13	Y	-3.832	-1.786	62.48	71
83	M14	Y	-.932	-.254	0	2
84	M14	Y	-.254	.085	2	4
85	M5	Y	-.105	-.677	28.4	36.92
86	M5	Y	-.677	-3.539	36.92	45.44
87	M5	Y	-3.539	-5.361	45.44	53.96
88	M5	Y	-5.361	-3.839	53.96	62.48
89	M5	Y	-3.839	-1.73	62.48	71
90	M6	Y	-1.461	-.43	0	1.333
91	M6	Y	-.43	.086	1.333	2.667
92	M6	Y	.086	.086	2.667	4
93	M12	Y	.096	-.289	0	2
94	M12	Y	-.289	-1.059	2	4
95	M13	Y	-1.733	-3.868	0	8.52
96	M13	Y	-3.868	-5.376	8.52	17.04
97	M13	Y	-5.376	-3.49	17.04	25.56
98	M13	Y	-3.49	-.636	25.56	34.08
99	M13	Y	-.636	-.107	34.08	42.6

Member Distributed Loads (BLC 15 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
1	M1	Y	-.722	-4.864	61.8	80.34
2	M1	Y	-4.864	-16.4	80.34	98.88
3	M1	Y	-16.4	-24.616	98.88	117.42
4	M1	Y	-24.616	-16.609	117.42	135.96
5	M1	Y	-16.609	-.722	135.96	154.5
6	M3	Y	-.725	-16.581	0	18.54
7	M3	Y	-16.581	-24.258	18.54	37.08
8	M3	Y	-24.258	-16.28	37.08	55.62
9	M3	Y	-16.28	-5.056	55.62	74.16
10	M3	Y	-5.056	-.725	74.16	92.7
11	M4	Y	-2.039	-2.039	1.287	3.767
12	M5	Y	-4.386	-15.72	0	14.2
13	M5	Y	-15.72	-25.346	14.2	28.4
14	M5	Y	-25.346	-25.151	28.4	42.6
15	M5	Y	-25.151	-15.678	42.6	56.8
16	M5	Y	-15.678	-5.041	56.8	71
17	M6	Y	-2.054	-2.054	.23	2.714
18	M35	Y	-1.723	-1.723	0	3
19	M1	Y	-.725	-16.578	0	18.54
20	M1	Y	-16.578	-24.258	18.54	37.08
21	M1	Y	-24.258	-16.28	37.08	55.62
22	M1	Y	-16.28	-5.056	55.62	74.16
23	M1	Y	-5.056	-.725	74.16	92.7
24	M2	Y	-.722	-4.864	61.8	80.34
25	M2	Y	-4.864	-16.4	80.34	98.88
26	M2	Y	-16.4	-24.617	98.88	117.42
27	M2	Y	-24.617	-16.612	117.42	135.96
28	M2	Y	-16.612	-.722	135.96	154.5
29	M8	Y	-2.039	-2.039	1.287	3.767
30	M9	Y	-4.386	-15.72	0	14.2
31	M9	Y	-15.72	-25.346	14.2	28.4
32	M9	Y	-25.346	-25.151	28.4	42.6
33	M9	Y	-25.151	-15.678	42.6	56.8

Member Distributed Loads (BLC 15 : BLC 2 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
34	M9	Y	-15.678	-5.041	56.8	71
35	M10	Y	-2.054	-2.054	.23	2.714
36	M47	Y	-1.723	-1.723	0	3
37	M2	Y	-.725	-16.58	0	18.54
38	M2	Y	-16.58	-24.258	18.54	37.08
39	M2	Y	-24.258	-16.28	37.08	55.62
40	M2	Y	-16.28	-5.056	55.62	74.16
41	M2	Y	-5.056	-.725	74.16	92.7
42	M3	Y	-.722	-4.864	61.8	80.34
43	M3	Y	-4.864	-16.4	80.34	98.88
44	M3	Y	-16.4	-24.617	98.88	117.42
45	M3	Y	-24.617	-16.61	117.42	135.96
46	M3	Y	-16.61	-.722	135.96	154.5
47	M12	Y	-2.039	-2.039	1.287	3.767
48	M13	Y	-4.386	-15.72	0	14.2
49	M13	Y	-15.72	-25.346	14.2	28.4
50	M13	Y	-25.346	-25.151	28.4	42.6
51	M13	Y	-25.151	-15.678	42.6	56.8
52	M13	Y	-15.678	-5.041	56.8	71
53	M14	Y	-2.054	-2.054	.23	2.714
54	M62	Y	-1.723	-1.723	0	3
55	M4	Y	.315	-.946	0	2
56	M4	Y	-.946	-3.47	2	4
57	M5	Y	-5.681	-12.681	0	8.52
58	M5	Y	-12.681	-17.623	8.52	17.04
59	M5	Y	-17.623	-11.441	17.04	25.56
60	M5	Y	-11.441	-2.084	25.56	34.08
61	M5	Y	-2.084	-.35	34.08	42.6
62	M9	Y	-.346	-2.218	28.4	36.92
63	M9	Y	-2.218	-11.601	36.92	45.44
64	M9	Y	-11.601	-17.576	45.44	53.96
65	M9	Y	-17.576	-12.583	53.96	62.48
66	M9	Y	-12.583	-5.67	62.48	71
67	M10	Y	-4.788	-1.408	0	1.333
68	M10	Y	-1.408	.282	1.333	2.667
69	M10	Y	.282	.282	2.667	4
70	M8	Y	.325	.325	0	1.333
71	M8	Y	.325	-1.624	1.333	2.667
72	M8	Y	-1.624	-5.523	2.667	4
73	M9	Y	-5.698	-12.56	0	8.52
74	M9	Y	-12.56	-17.515	8.52	17.04
75	M9	Y	-17.515	-11.464	17.04	25.56
76	M9	Y	-11.464	-2.115	25.56	34.08
77	M9	Y	-2.115	-.343	34.08	42.6
78	M13	Y	-.335	-2.055	28.4	36.92
79	M13	Y	-2.055	-11.681	36.92	45.44
80	M13	Y	-11.681	-17.75	45.44	53.96
81	M13	Y	-17.75	-12.562	53.96	62.48
82	M13	Y	-12.562	-5.855	62.48	71
83	M14	Y	-3.056	-.833	0	2
84	M14	Y	-.833	.278	2	4
85	M5	Y	-.346	-2.22	28.4	36.92
86	M5	Y	-2.22	-11.601	36.92	45.44
87	M5	Y	-11.601	-17.573	45.44	53.96
88	M5	Y	-17.573	-12.583	53.96	62.48
89	M5	Y	-12.583	-5.67	62.48	71
90	M6	Y	-4.788	-1.408	0	1.333

Member Distributed Loads (BLC 15 : BLC 2 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,%]
91	M6	Y	-1.408	.282	1.333	2.667
92	M6	Y	.282	.282	2.667	4
93	M12	Y	.315	-.946	0	2
94	M12	Y	-.946	-3.47	2	4
95	M13	Y	-5.681	-12.681	0	8.52
96	M13	Y	-12.681	-17.623	8.52	17.04
97	M13	Y	-17.623	-11.441	17.04	25.56
98	M13	Y	-11.441	-2.084	25.56	34.08
99	M13	Y	-2.084	-.35	34.08	42.6

Member Point Loads (BLC 13 : Lv)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	M1	Y	-250	0
2	M2	Y	-250	0
3	M3	Y	-250	0
4	M5	Y	-250	0
5	M9	Y	-250	0
6	M13	Y	-250	0
7	M1	Y	-250	%100
8	M2	Y	-250	%100
9	M3	Y	-250	%100
10	M5	Y	-250	%100
11	M9	Y	-250	%100
12	M13	Y	-250	%100
13	M7	Y	-250	%100
14	M11	Y	-250	%100
15	M15	Y	-250	%100
16	M25	Y	-250	%50
17	M26	Y	-250	%50
18	M27	Y	-250	%50

Member Area Loads (BLC 1 : DL)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N33	N45	N14	N6	Y	Two Way	-5
2	N36	N39A	N5	N10A	Y	Two Way	-5
3	N39	N42	N9	N15	Y	Two Way	-5
4	N22	N14A	N172A	N171B	Y	Two Way	-5
5	N29	N21	N175A	N174A	Y	Two Way	-5
6	N15A	N28	N179A	N178A	Y	Two Way	-5

Member Area Loads (BLC 2 : DLi)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N33	N45	N14	N6	Y	Two Way	-16.39
2	N36	N39A	N5	N10A	Y	Two Way	-16.39
3	N39	N42	N9	N15	Y	Two Way	-16.39
4	N22	N14A	N172A	N171B	Y	Two Way	-16.39
5	N29	N21	N175A	N174A	Y	Two Way	-16.39
6	N15A	N28	N179A	N178A	Y	Two Way	-16.39

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(...
1	DL	None		-1		30			6	
2	DLi	None				30		27	6	9
3	WLX	None				30		27		9
4	WLZ	None				30		27		9
5	WLXi	None				30		27		9
6	WLZi	None				30		27		9
7	WLXm	None				30		27		9
8	WLZm	None				30		27		9
9	EhX	None								
10	EhZ	None								
11	Ev	None								
12	Lm	None				6				
13	Lv	None					18			
14	BLC 1 Transient Area Loads	None						99		
15	BLC 2 Transient Area Loads	None						99		

Load Combinations

	Description	S...	P...	S...	B...	Fa...	BLC	Factor	B...	Factor	BLC	Fa...	B...	Fa...	B...	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.4DL	Y...	Y		1	1.4																		
2	1.2DL+1.0WL (0)	Y...	Y		1	1.2	3	1	4															
3	1.2DL+1.0WL (30)	Y...	Y		1	1.2	3	.866	4	.5														
4	1.2DL+1.0WL (60)	Y...	Y		1	1.2	3	.5	4	.866														
5	1.2DL+1.0WL (90)	Y...	Y		1	1.2	3		4	1														
6	1.2DL+1.0WL (120)	Y...	Y		1	1.2	3	.866	4	-.5														
7	1.2DL+1.0WL (150)	Y...	Y		1	1.2	3	.5	4	-.866														
8	1.2DL+1.0WL (180)	Y...	Y		1	1.2	3	-1	4															
9	1.2DL+1.0WL (210)	Y...	Y		1	1.2	3	-.866	4	-.5														
10	1.2DL+1.0WL (240)	Y...	Y		1	1.2	3	-.5	4	-.866														
11	1.2DL+1.0WL (270)	Y...	Y		1	1.2	3		4	-1														
12	1.2DL+1.0WL (300)	Y...	Y		1	1.2	3	.866	4	-.5														
13	1.2DL+1.0WL (330)	Y...	Y		1	1.2	3	.5	4	-.866														
14																								
15	1.2DL+1.0DLi+1.0WLi (0)	Y...	Y		1	1.2	2	1	5	1	6													
16	1.2DL+1.0DLi+1.0WLi (30)	Y...	Y		1	1.2	2	1	5	.866	6	.5												
17	1.2DL+1.0DLi+1.0WLi (60)	Y...	Y		1	1.2	2	1	5	.5	6	.866												
18	1.2DL+1.0DLi+1.0WLi (90)	Y...	Y		1	1.2	2	1	5		6	1												
19	1.2DL+1.0DLi+1.0WLi (120)	Y...	Y		1	1.2	2	1	5	.866	6	-.5												
20	1.2DL+1.0DLi+1.0WLi (150)	Y...	Y		1	1.2	2	1	5	.5	6	-.8...												
21	1.2DL+1.0DLi+1.0WLi (180)	Y...	Y		1	1.2	2	1	5	-1	6													
22	1.2DL+1.0DLi+1.0WLi (210)	Y...	Y		1	1.2	2	1	5	-.866	6	-.5												
23	1.2DL+1.0DLi+1.0WLi (240)	Y...	Y		1	1.2	2	1	5	-.5	6	-.8...												
24	1.2DL+1.0DLi+1.0WLi (270)	Y...	Y		1	1.2	2	1	5		6	-1												
25	1.2DL+1.0DLi+1.0WLi (300)	Y...	Y		1	1.2	2	1	5	.866	6	-.5												
26	1.2DL+1.0DLi+1.0WLi (330)	Y...	Y		1	1.2	2	1	5	.5	6	-.8...												
27																								
28	1.2DL+1.5Lm+1.0WLm (0)	Y...	Y		1	1.2	12	1.5	7	1	8													
29	1.2DL+1.5Lm+1.0WLm (30)	Y...	Y		1	1.2	12	1.5	7	.866	8	.5												
30	1.2DL+1.5Lm+1.0WLm (60)	Y...	Y		1	1.2	12	1.5	7	.5	8	.866												
31	1.2DL+1.5Lm+1.0WLm (90)	Y...	Y		1	1.2	12	1.5	7		8	1												
32	1.2DL+1.5Lm+1.0WLm (120)	Y...	Y		1	1.2	12	1.5	7	.866	8	-.5												
33	1.2DL+1.5Lm+1.0WLm (150)	Y...	Y		1	1.2	12	1.5	7	.5	8	-.8...												
34	1.2DL+1.5Lm+1.0WLm (180)	Y...	Y		1	1.2	12	1.5	7	-1	8													
35	1.2DL+1.5Lm+1.0WLm (210)	Y...	Y		1	1.2	12	1.5	7	-.866	8	-.5												
36	1.2DL+1.5Lm+1.0WLm (240)	Y...	Y		1	1.2	12	1.5	7	-.5	8	-.8...												

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	BLC	Factor	B...	Factor	BLC	Fa...	B...	Fa...	B...	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
37	1.2DL+1.5Lm+1.0WLm (270)	Y...	Y		1	1.2	12	1.5	7		8	-1												
38	1.2DL+1.5Lm+1.0WLm (300)	Y...	Y		1	1.2	12	1.5	7	.866	8	-.5												
39	1.2DL+1.5Lm+1.0WLm (330)	Y...	Y		1	1.2	12	1.5	7	.5	8	-.8...												
40																								
41	1.2DL+1.0Ev+1.0Eh (0)	Y...	Y		1	1.2	11	1	9	1	10													
42	1.2DL+1.0Ev+1.0Eh (30)	Y...	Y		1	1.2	11	1	9	.866	10	.5												
43	1.2DL+1.0Ev+1.0Eh (60)	Y...	Y		1	1.2	11	1	9	.5	10	.866												
44	1.2DL+1.0Ev+1.0Eh (90)	Y...	Y		1	1.2	11	1	9		10	1												
45	1.2DL+1.0Ev+1.0Eh (120)	Y...	Y		1	1.2	11	1	9	.866	10	-.5												
46	1.2DL+1.0Ev+1.0Eh (150)	Y...	Y		1	1.2	11	1	9	.5	10	-.8...												
47	1.2DL+1.0Ev+1.0Eh (180)	Y...	Y		1	1.2	11	1	9	-1	10													
48	1.2DL+1.0Ev+1.0Eh (210)	Y...	Y		1	1.2	11	1	9	-.866	10	-.5												
49	1.2DL+1.0Ev+1.0Eh (240)	Y...	Y		1	1.2	11	1	9	-.5	10	-.8...												
50	1.2DL+1.0Ev+1.0Eh (270)	Y...	Y		1	1.2	11	1	9		10	-1												
51	1.2DL+1.0Ev+1.0Eh (300)	Y...	Y		1	1.2	11	1	9	.866	10	-.5												
52	1.2DL+1.0Ev+1.0Eh (330)	Y...	Y		1	1.2	11	1	9	.5	10	-.8...												
53																								
54	1.2DL+1.5Lv	Y...	Y		1	1.2	13	1.5																

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N16	max	4210.119	8	3345.706	24	-1097.1...	11	6468.364	24	2662.218	2	1541.722	2
2		min	-4209.826	2	-11.569	5	-8189.3...	54	-1963.1...	5	-2661.82	8	-1578.218	8
3	N23	max	139.959	9	3319.092	21	4189.072	10	1419.901	7	2257.829	10	1600.3	6
4		min	-7092.364	54	13.232	6	-2295.1...	4	-3329.6...	18	-2256.725	4	-5547.097	21
5	N30	max	7092.196	54	3341.027	16	4121.233	7	1440.501	10	2058.795	5	5611.638	16
6		min	-269.755	6	13.41	9	-2154.0...	5	-3260.9...	17	-2256.033	7	-1597.468	9
7	Totals:	max	6938.485	8	9578.783	21	7124.758	11						
8		min	-6938.484	2	2819.263	6	-7124.7...	5						

Envelope AISC 13th(360-05): LRFD Steel Code Checks

	Member	Shape	Code Check	Loc[in]	LC	Shear ...	Lo...	Dir	LC	phi*Pn...	phi*Pnt ...	phi*Mn...	phi*Mn z...	Cb	Eqn
1	M1	C5x6.7	.285	78.859	5	1.106	77....	z	7	4448.1...	63828	1603.7...	7009.788	1.557	H1-1b
2	M2	C5x6.7	.270	78.859	6	1.118	77....	z	8	4448.1...	63828	1603.7...	6959.74	1.546	H1-1b
3	M3	C5x6.7	.273	78.859	9	1.102	77....	z	4	4448.1...	63828	1603.7...	7066.375	1.57	H1-1b
4	M5	L4x4x4	.871	35.5	21	.067	35.5	z	21	38417....	62532	3137.5...	6148.47	1.315	H2-1
5	M7	HSS4x...	.438	0	23	.226	0	z	8	11847...	139518	16180.5	16180.5	2.668	H1-1b
6	M9	L4x4x4	.873	35.5	17	.067	35.5	z	16	38417....	62532	3137.5...	6148.709	1.315	H2-1
7	M11	HSS4x...	.432	0	18	.210	0	z	4	11847...	139518	16180.5	16180.5	2.687	H1-1b
8	M13	L4x4x4	.873	35.5	20	.067	35.5	z	24	38417....	62532	3137.5...	6148.62	1.315	H2-1
9	M15	HSS4x...	.437	0	17	.210	0	z	7	11847...	139518	16180.5	16180.5	2.667	H1-1b
10	M25	L3x3x4	.315	4.688	8	.250	14...	z	10	4948.0...	46656	1688.1...	2933.574	1.631	H2-1
11	M26	L3x3x4	.335	4.688	4	.263	7.8...	y	2	4948.0...	46656	1688.1...	2910.054	1.591	H2-1
12	M27	L3x3x4	.339	4.688	7	.259	14...	y	2	4948.0...	46656	1688.1...	2965.299	1.688	H2-1
13	M33	PIPE_2.0	.415	51	6	.080	51		2	20866....	32130	1871.6...	1871.625	2.176	H1-1b
14	M36	PIPE_2.0	.392	51	2	.080	51		5	20866....	32130	1871.6...	1871.625	2.18	H1-1b
15	M39	PIPE_2.0	.316	51	8	.084	51		6	20866....	32130	1871.6...	1871.625	2.112	H1-1b
16	M42	PIPE_2.0	.297	51	2	.085	51		4	20866....	32130	1871.6...	1871.625	2.09	H1-1b
17	M42A	PIPE_2.0	.340	21	8	.075	21		4	20866....	32130	1871.6...	1871.625	2.48	H1-1b
18	M45	PIPE_2.0	.441	51	9	.088	51		10	20866....	32130	1871.6...	1871.625	2.198	H1-1b
19	M48	PIPE_2.0	.422	51	10	.081	51		6	20866....	32130	1871.6...	1871.625	2.198	H1-1b
20	M51	PIPE_2.0	.341	51	3	.083	51		3	20866....	32130	1871.6...	1871.625	2.186	H1-1b
21	M54	PIPE_2.0	.323	51	10	.085	51		7	20866....	32130	1871.6...	1871.625	2.116	H1-1b
22	M57	PIPE_2.0	.370	21	4	.073	21		11	20866....	32130	1871.6...	1871.625	2.478	H1-1b

Envelope AISC 13th(360-05): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[in]	LC	Shear ...	Lo...	Dir	LC	phi*Pn...	phi*Pnt ...	phi*Mn...	phi*Mn z...	Cb	Eqn
23	M60	PIPE_2.0	.432	51	5	.087	51		7	20866....	32130	1871.6...	1871.625	2.192	H1-1b
24	M63	PIPE_2.0	.380	51	7	.078	51		8	20866....	32130	1871.6...	1871.625	2.166	H1-1b
25	M66	PIPE_2.0	.344	51	7	.084	51		11	20866....	32130	1871.6...	1871.625	2.138	H1-1b
26	M69	PIPE_2.0	.301	51	6	.083	51		8	20866....	32130	1871.6...	1871.625	2.121	H1-1b
27	M72	PIPE_2.0	.371	21	7	.079	21		8	20866....	32130	1871.6...	1871.625	2.479	H1-1b

APPENDIX D

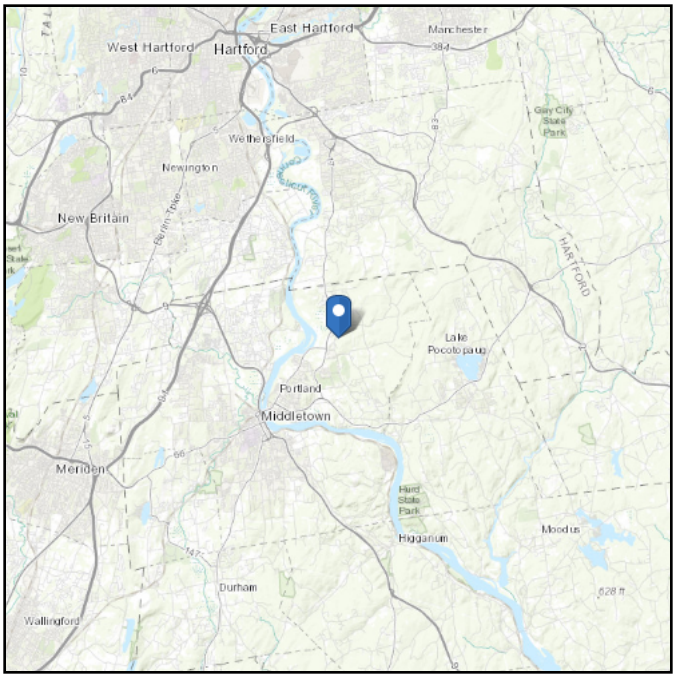
ADDITIONAL CALCULATIONS

Municipality	Ultimate Wind Speed, V_{ult}	Nominal Wind Speed, V_{asd}	Seismic Design Category[1]		Ground Snow Load, *Pg* (psf)
			Site (Soil) Class A-D	Site (Soil) Class E	
Orange	125	97	B	B	30
Oxford	125	97	B	B	30
Plainfield	135	105	B	B	35
Plainville	125	97	B	B	35
Plymouth	120	93	B	B	35
Pomfret	130	101	B	B	40
Portland	130	101	B	B	30
Preston	135	105	B	B	30
Prospect	125	97	B	B	30
Putnam	130	101	B	B	40
Redding	120	93	B	C	30
Ridgefield	120	93	B	C	30
Rocky Hill	125	97	B	B	30
Roxbury	120	93	B	B	35
Salem	135	105	B	B	30
Salisbury	115	89	B	B	40
Scotland	130	101	B	B	30
Seymour	125	97	B	B	30
Sharon	115	89	B	B	40
Shelton	125	97	B	C	30
Sherman	115	89	B	C	35
Simsbury	120	93	B	B	35
Somers	125	97	B	B	35
Southbury	125	97	B	B	35
Southington	120	93	B	B	30
South Windsor	125	97	B	B	30
Sprague	130	101	B	B	30
Stafford	125	97	B	B	35
Stamford	120	93	B	C	30
Sterling	135	105	B	B	35
Stonington[2]	140	108	B	B	30
Stratford	125	97	B	C	30
Suffield	120	93	B	B	35
Thomaston	120	93	B	B	35
Thompson	130	101	B	B	40
Tolland	125	97	B	B	35
Torrington	120	93	B	B	40
Trumbull	125	97	B	C	30
Union	125	97	B	B	40
Vernon	125	97	B	B	30
Voluntown	135	105	B	B	30
Wallingford	125	97	B	B	30
Warren	115	89	B	B	40
Washington	120	93	B	B	35
Waterbury	125	97	B	B	35
Waterford[2]	135	105	B	B	30
Watertown	120	93	B	B	35

ASCE 7 Hazards Report

Address:
74 Goodrich Ln
Portland, Connecticut
06480

Standard:	ASCE/SEI 7-10	**Elevation:**	229.32 ft (NAVD 88)
Risk Category:	II	**Latitude:**	41.60745
Soil Class:	D - Stiff Soil	**Longitude:**	-72.595443



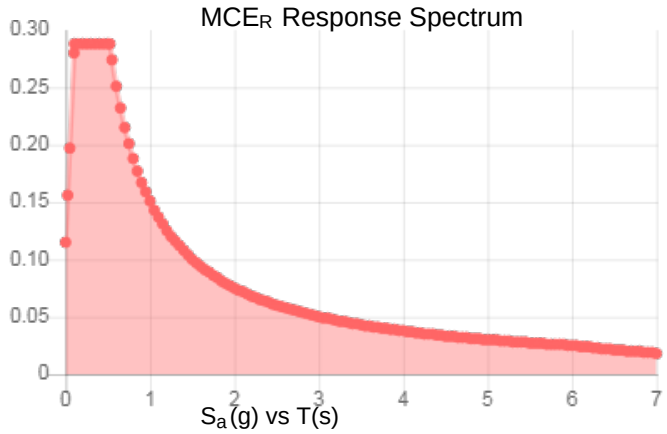
Seismic

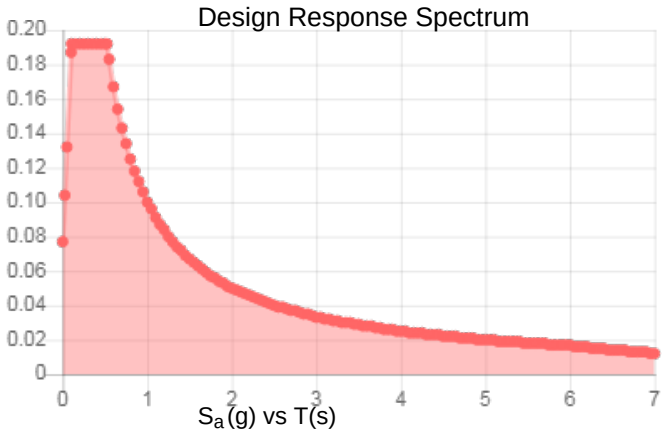
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.18	S_{DS} :	0.192
S_1 :	0.063	S_{D1} :	0.1
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.091
S_{MS} :	0.288	PGA_M :	0.146
S_{M1} :	0.151	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Tue Jan 15 2019

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	15 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Tue Jan 15 2019

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Date: **December 27, 2018**

Charles McGruirt
Crown Castle
3 Corporate Dr., St 101
Clifton Park, NY 12065

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structural@infinigy.com

Subject:	**Mount Analysis Report**	
Carrier Designation:	**AT&T Update**	
	Carrier Site Number:	10035087
	Carrier Site Name:	CTL01094
Crown Castle Designation:	**Crown Castle BU Number:**	876346
	Crown Castle Site Name:	Union
	Crown Castle JDE Job Number:	548520
	Crown Castle Order Number:	471505 Rev. 0
Engineering Firm Designation:	**Infinigy Report Designation:**	600-003
Site Data:	**23 Holland Road, Stafford Springs, CT, 06076** **Latitude 42°01'45.94" Longitude -72°08'23.54"**	
Structure Information:	**Tower Height & Type:**	**150 ft Monopole**
	Mount Elevation:	**137 ft**
	Mount Type:	**13.5 ft Platform**

Dear Charles McGruirt,

Infinigy is pleased to submit this **"Mount Analysis Report"** to determine the structural integrity of AT&T's antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

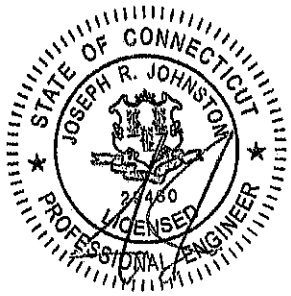
The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

Platform **Sufficient**

The analysis has been performed in accordance with the 2015 International Building Code/ 2018 Connecticut Building Code and TIA-222-H Standard based upon an ultimate 3-second gust wind speed of 125 mph. Exposure Category C with Risk Category II used in this analysis.

Mount analysis prepared by: Ishan Patel, E.I.T
Respectfully Submitted by:

Joe Johnston, P.E.
VP Structural Engineering



12/27/2018

TABLE OF CONTENTS

1) INTRODUCTION

This mount is a existing 13.5 ft Platform mapped on 04/10/2015. This mount is installed at the 137 ft elevation on 3 sectors of the 150 ft monopole.

2) ANALYSIS CRITERIA

Building Code:	2015 IBC
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	125 mph
Exposure Category:	C
Ice Thickness:	1.7 in
Wind Speed with Ice:	50 mph
Man Live Load at End-Points:	250 lb

Table 1 - Proposed Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Mount type
137.0	137.0	3	CCI HPA65R-BU4A	Platform
		3	Kathrein 80010964	
		2	P/Wave 7770	
		3	Ericsson RRUS 4449 B5/B12	
		3	Ericsson RRUS 8843 B2/B66A	
		4	P/Wave LGP21401	
		2	Raycap DC6-48-60-18-8F	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Crown Application	AT&T	471505, Rev. 0	CCI Sites
TIA Inspecion	--	4/10/2015	CCI Sites

3.1) Analysis Method

RISA-3D (Version 17.0.2), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

3.2) Assumptions

1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and the referenced drawings.
3) 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.
4) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM A53 (GR 35)
Pipe	ASTM A53 (GR 35)
Connection Bolts	ASTM A325

This analysis may be affected if any assumptions are not valid or have been made in error. Infinigy should be notified to determine the effect on the structural integrity of the antenna mounting system.

4) ANALYSIS RESULTS

Table 3 - Mount Component Stresses vs. Capacity (Platform, Alpha Sector)

Notes	Component	Centerline (ft)	% Capacity	Pass / Fail
1,2	Horizontal	137.0	24.2%	Pass
	Mount Pipe		63.7%	
	Stand-off		38.2%	
	Bolts		14.1%	

Structure Rating (max from all components) =	63.7%

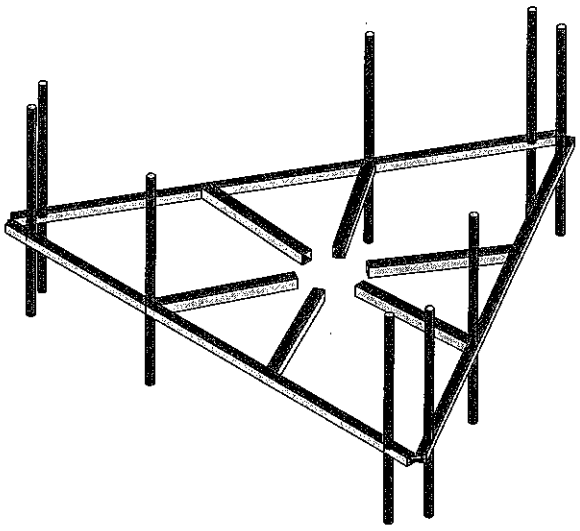
Notes:
1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
2) All sectors are typical

4.1) Recommendations

The Sector Frame Mount has sufficient capacity to support the proposed loading. No modifications are required at this time.

APPENDIX A

WIRE FRAME AND RENDERED MODELS



Envelope Only Solution

Infinigy Engineering	876346	Existing Configuration
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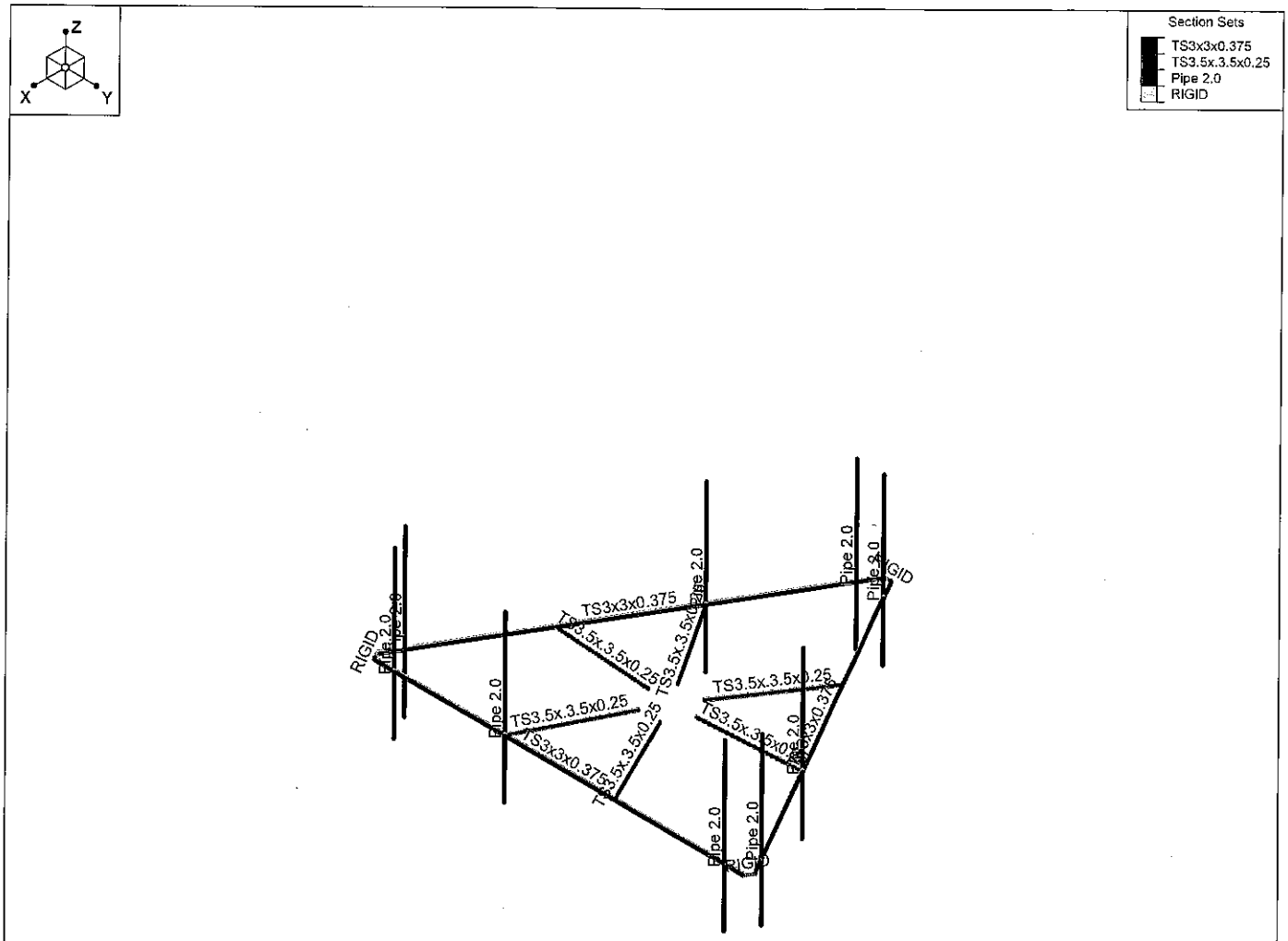

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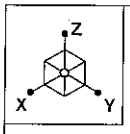

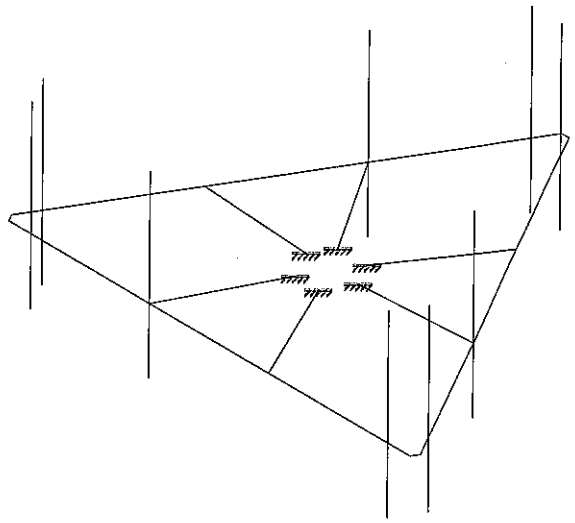

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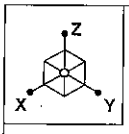

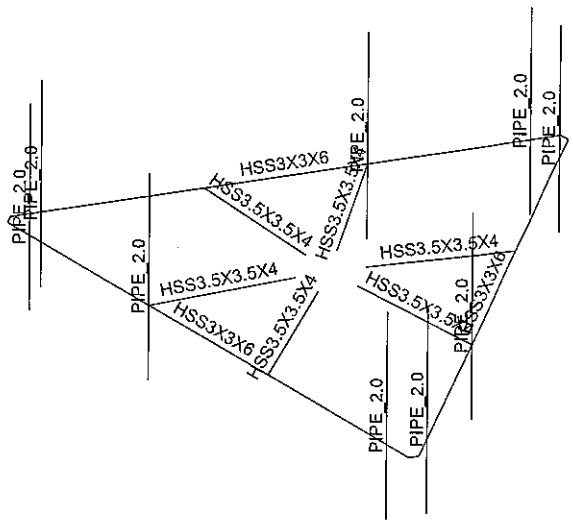

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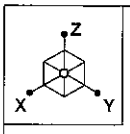

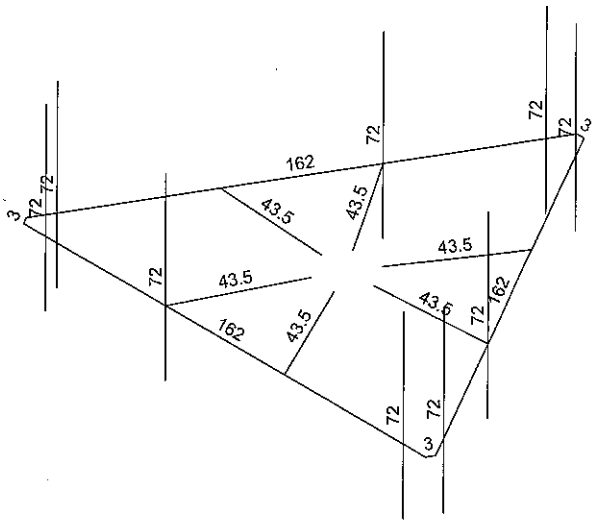

Member Length (in) Displayed
Envelope Only Solution

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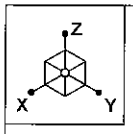

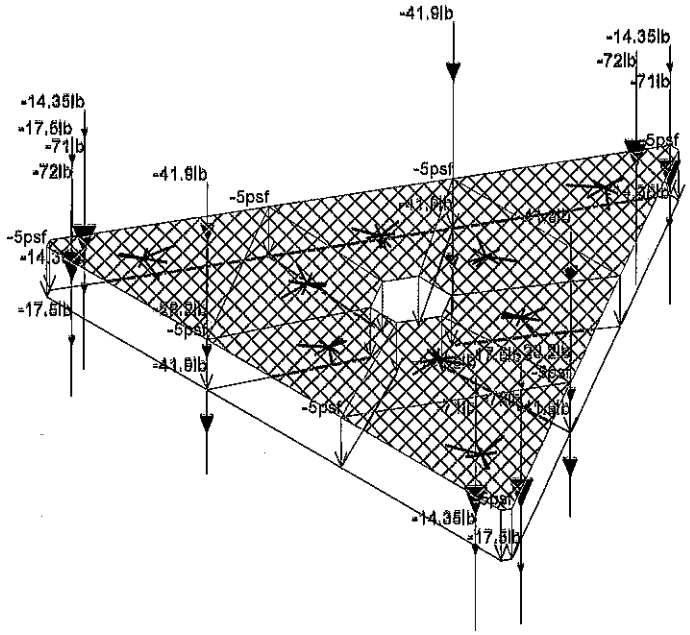

Loads: BLC 1, Self Weight
Envelope Only Solution

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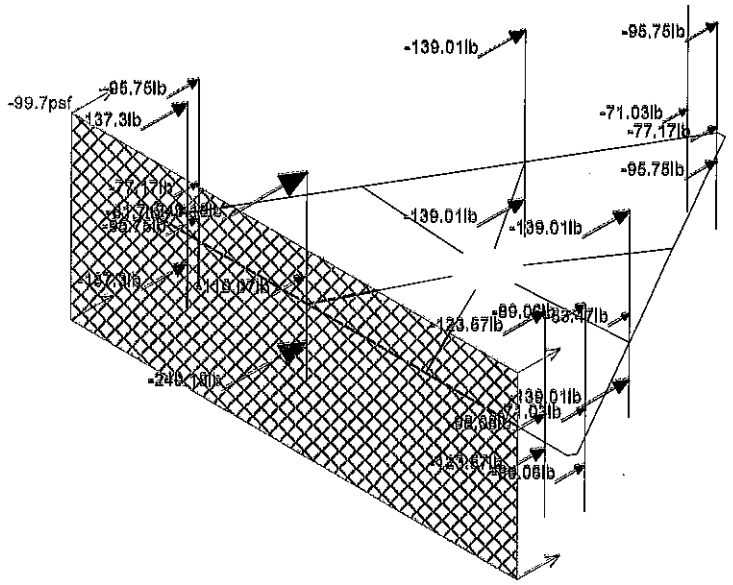

Loads: BLC 2, Wind Load AZI 000
Envelope Only Solution

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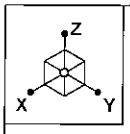

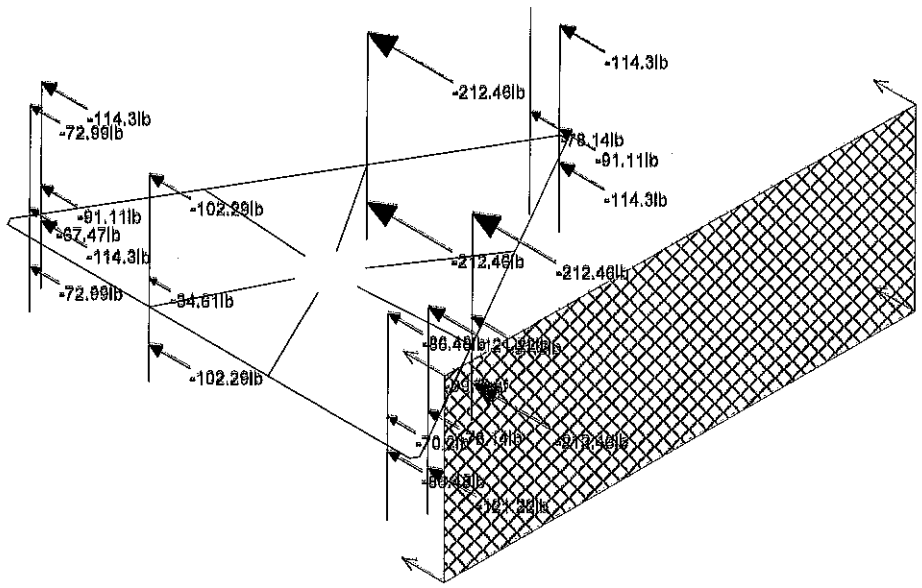

Loads: BLC 3, Wind Load AZI 090
Envelope Only Solution

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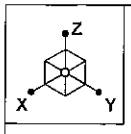

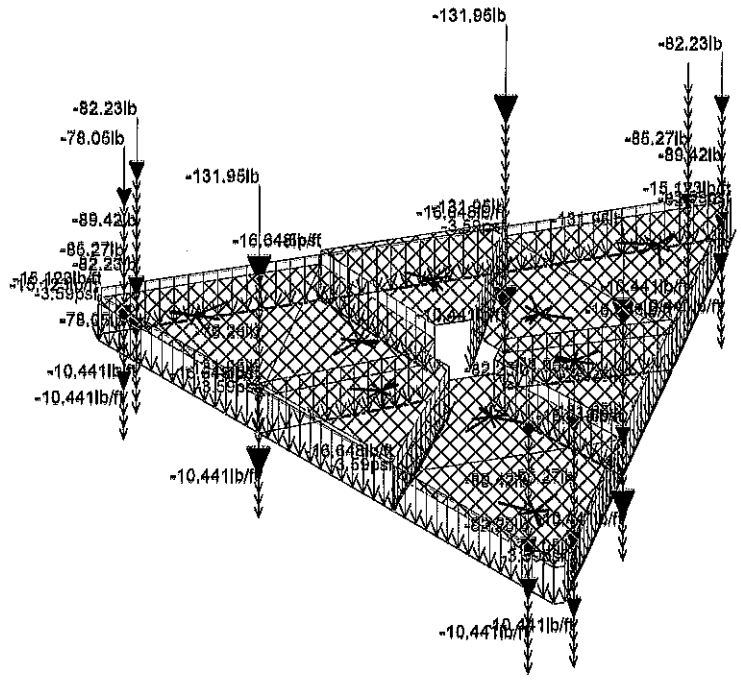

Loads: BLC 4, Ice Weight
Envelope Only Solution

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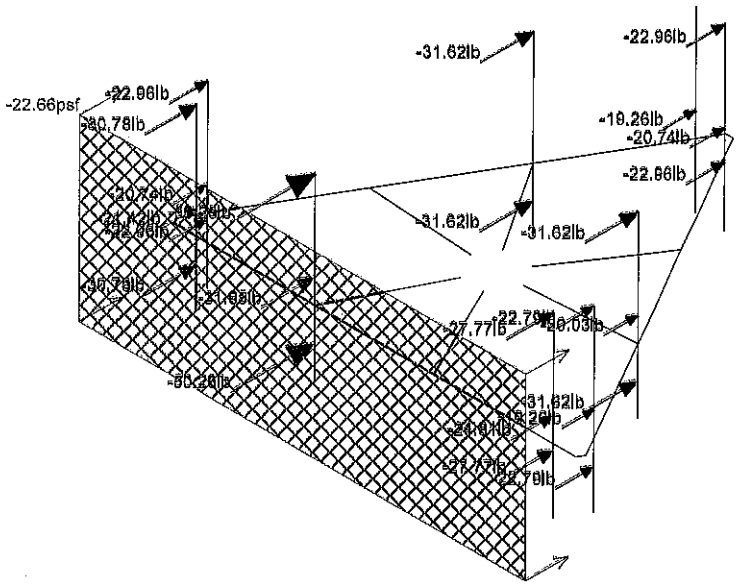

Loads: BLC 5, Wind + Ice Load AZI 000
Envelope Only Solution

Infinigy Engineering	876346	Existing Configuration
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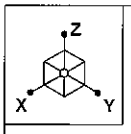
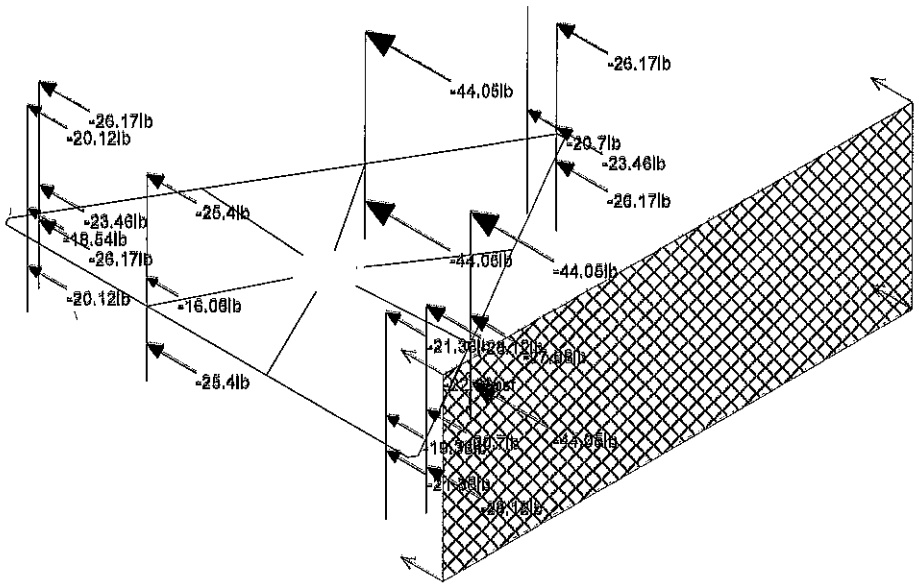
600-003		AT03XC031.r3d





Loads: BLC 6, Wind + Ice Load AZI 090
Envelope Only Solution

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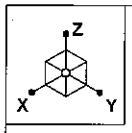
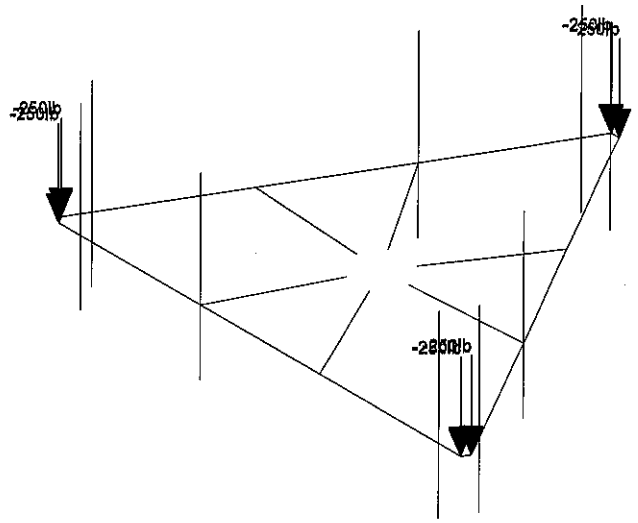




Loads: BLC 7, Service Live 1
Envelope Only Solution

Infinigy Engineering	876346	Existing Configuration
IP		Dec 27, 2018 at 1:32 PM
600-003		AT03XC031.r3d

APPENDIX B

SOFTWARE INPUT CALCULATIONS

Site Name:	876346
Client:	CCI
Carrier:	AT&T
Engineer:	IP
Date:	12/27/2018

INFINIGY
FROM ZERO TO INFINIGY
the solutions are endless

INFINIGY WIND LOAD CALCULATOR 3.0.2

Site Information Inputs:

Adopted Building Code:	2015 IBC
Structure Load Standard:	TIA-222-H
Antenna Load Standard:	TIA-222-H
Structure Risk Category:	II
Structure Type:	Mount + Platform
Number of Sectors:	3
Structure Shape 1:	Flat

Rooftop Inputs:

Rooftop Wind Speed-Up?: No

Wind Loading Inputs:

Design Wind Velocity:	125	mph (ultimate 3-second gust)
Wind Centerline 1 (z_1):	137.0	ft
Side Face Angle (θ):	60	degrees
Exposure Category:	C	
Topographic Category:	1	

Wind with No Ice		
q_z (psf)	Gh	F_{ST} (psf)
49.85	1.00	**99.70**

Wind with Ice		
q_z (psf)	Gh	F_{ST} (psf)
7.98	1.00	**22.66**

Ice Loading Inputs:

Is Ice Loading Needed?:	Yes	
Ice Wind Velocity:	50	mph (ultimate 3-second gust)
Base Ice Thickness:	1.70	in

Input Appurtenance Information and Load Placements:

Appurtenance Name	Elevation (ft)	Total Quantity	Ka	Front Shape	Side Shape	q_z (psf)	EPA (ft^2)	Fz (lbs)	Fx (lbs)	Fz(60) (lbs)	Fx(30) (lbs)
CCI HPA65R-BU4A	137.0	3	1.00	Flat	Flat	49.85	4.96	247.14	172.96	191.51	228.60
Kathrein 80010964	137.0	3	1.00	Flat	Flat	49.85	10.00	498.36	204.59	278.03	424.92
P/Wave 7770	137.0	2	1.00	Flat	Flat	49.85	5.51	274.60	145.97	178.13	242.44
Ericsson RRUS 4449 B5/B12	137.0	3	1.00	Flat	Flat	49.85	1.97	98.08	70.20	77.17	91.11
Ericsson RRUS 8843 B2/B66A	137.0	3	1.00	Flat	Flat	49.85	1.64	81.70	67.47	71.03	78.14
P/Wave LGP21401	137.0	4	1.00	Flat	Flat	49.85	1.10	55.03	17.30	26.74	45.60
Raycap DC6-48-60-18-8F	137.0	2	1.00	Round	Round	49.85	1.21	60.40	60.40	60.40	60.40

APPENDIX C

SOFTWARE ANALYSIS OUTPUT

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N51	N50A			TS3x3x0.375	Beam	Tube	A500 Gr.46	Typical
2	M2	N47	N48A			TS3x3x0.375	Beam	Tube	A500 Gr.46	Typical
3	M3	N54A	N53A			TS3x3x0.375	Beam	Tube	A500 Gr.46	Typical
4	M4	N11	N14			TS3.5x3.5x0.25	Beam	Tube	A500 Gr.46	Typical
5	M5	N8	N15			TS3.5x3.5x0.25	Beam	Tube	A500 Gr.46	Typical
6	M6	N10	N16			TS3.5x3.5x0.25	Beam	Tube	A500 Gr.46	Typical
7	M7	N7	N17			TS3.5x3.5x0.25	Beam	Tube	A500 Gr.46	Typical
8	M8	N12	N18			TS3.5x3.5x0.25	Beam	Tube	A500 Gr.46	Typical
9	M9	N9	N19			TS3.5x3.5x0.25	Beam	Tube	A500 Gr.46	Typical
10	MP3	N54	N50			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
11	MP2	N52	N48			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
12	MP1	N53	N49			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
13	MP6	N31	N28			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
14	MP5	N29	N26			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
15	MP4	N30	N27			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
16	MP9	N38	N35			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
17	MP8	N36	N33			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
18	MP7	N37	N34			Pipe 2.0	Beam	Pipe	A53 Gr.B	Typical
19	M19	N47	N54A			RIGID	None	None	RIGID	Typical
20	M20	N51	N53A			RIGID	None	None	RIGID	Typical
21	M21	N50A	N48A			RIGID	None	None	RIGID	Typical

Material Takeoff

	Material	Size	Pieces	Length[in]	Weight[LB]
1	General				
2	RIGID		3	9	0
3	Total General		3	9	0
4					
5	Hot Rolled Steel				
6	A500 Gr.46	HSS3.5X3.5X4	6	261	215.4
7	A500 Gr.46	HSS3X3X6	3	486	467.2
8	A53 Gr.B	PIPE_2.0	9	648	187.4
9	Total HR Steel		18	1395	870

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(...
1	Self Weight	DL		-1			24		6	
2	Wind Load AZI 000	WLZ					24		1	
3	Wind Load AZI 090	WLX					24		1	
4	Ice Weight	OL1					24	18	6	
5	Wind + Ice Load AZI 000	OL2					24		1	
6	Wind + Ice Load AZI 090	OL3					24		1	
7	Service Live 1	LL				6				
8	BLC 1 Transient Area Loads	None						54		
9	BLC 2 Transient Area Loads	None						21		
10	BLC 3 Transient Area Loads	None						19		
11	BLC 4 Transient Area Loads	None						54		
12	BLC 5 Transient Area Loads	None						21		
13	BLC 6 Transient Area Loads	None						19		

Load Combinations

	Description	Solve	PDelta	S...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Fa...
1	1.4D	Yes	Y		DL	1.4						
2	1.2D + 1W AZI 000	Yes	Y		DL	1.2	WLZ	1				
3	1.2D + 1W AZI 030	Yes	Y		DL	1.2	WLZ	.866	WLX	.5		
4	1.2D + 1W AZI 060	Yes	Y		DL	1.2	WLZ	.5	WLX	.866		
5	1.2D + 1W AZI 090	Yes	Y		DL	1.2			WLX	1		
6	1.2D + 1W AZI 120	Yes	Y		DL	1.2	WLZ	-.5	WLX	.866		
7	1.2D + 1W AZI 150	Yes	Y		DL	1.2	WLZ	-.866	WLX	.5		
8	1.2D + 1W AZI 180	Yes	Y		DL	1.2	WLZ	-1				
9	1.2D + 1W AZI 210	Yes	Y		DL	1.2	WLZ	-.866	WLX	-.5		
10	1.2D + 1W AZI 240	Yes	Y		DL	1.2	WLZ	-.5	WLX	-.866		
11	1.2D + 1W AZI 270	Yes	Y		DL	1.2			WLX	-1		
12	1.2D + 1W AZI 300	Yes	Y		DL	1.2	WLZ	.5	WLX	-.866		
13	1.2D + 1W AZI 330	Yes	Y		DL	1.2	WLZ	.866	WLX	-.5		
14	0.9D + 1W AZI 000	Yes	Y		DL	.9	WLZ	1				
15	0.9D + 1W AZI 030	Yes	Y		DL	.9	WLZ	.866	WLX	.5		
16	0.9D + 1W AZI 060	Yes	Y		DL	.9	WLZ	.5	WLX	.866		
17	0.9D + 1W AZI 090	Yes	Y		DL	.9			WLX	1		
18	0.9D + 1W AZI 120	Yes	Y		DL	.9	WLZ	-.5	WLX	.866		
19	0.9D + 1W AZI 150	Yes	Y		DL	.9	WLZ	-.866	WLX	.5		
20	0.9D + 1W AZI 180	Yes	Y		DL	.9	WLZ	-1				
21	0.9D + 1W AZI 210	Yes	Y		DL	.9	WLZ	-.866	WLX	-.5		
22	0.9D + 1W AZI 240	Yes	Y		DL	.9	WLZ	-.5	WLX	-.866		
23	0.9D + 1W AZI 270	Yes	Y		DL	.9			WLX	-1		
24	0.9D + 1W AZI 300	Yes	Y		DL	.9	WLZ	.5	WLX	-.866		
25	0.9D + 1W AZI 330	Yes	Y		DL	.9	WLZ	.866	WLX	-.5		
26	1.2D + 1.0Dl	Yes	Y		DL	1.2	OL1	1				
27	1.2D + 1.0Dl + 1.0Wl AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	1		
28	1.2D + 1.0Dl + 1.0Wl AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	.866	OL3	.5
29	1.2D + 1.0Dl + 1.0Wl AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	.5	OL3	.866
30	1.2D + 1.0Dl + 1.0Wl AZI ...	Yes	Y		DL	1.2	OL1	1			OL3	1
31	1.2D + 1.0Dl + 1.0Wl AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	-.5	OL3	.866
32	1.2D + 1.0Dl + 1.0Wl AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	-.866	OL3	.5
33	1.2D + 1.0Dl + 1.0Wl AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	-1		
34	1.2D + 1.0Dl + 1.0Wl AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	-.866	OL3	-.5
35	1.2D + 1.0Dl + 1.0Wl AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	-.5	OL3	-.8...
36	1.2D + 1.0Dl + 1.0Wl AZI ...	Yes	Y		DL	1.2	OL1	1			OL3	-1
37	1.2D + 1.0Dl + 1.0Wl AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	.5	OL3	-.8...
38	1.2D + 1.0Dl + 1.0Wl AZI ...	Yes	Y		DL	1.2	OL1	1	OL2	.866	OL3	-.5
39	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	.058		
40	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	.05	WLX	.029
41	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	.029	WLX	.05
42	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5			WLX	.058
43	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	-.029	WLX	.05
44	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	-.05	WLX	.029
45	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	-.058		
46	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	-.05	WLX	-.0...
47	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	-.029	WLX	-.05
48	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5			WLX	-.0...
49	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	.029	WLX	-.05
50	1.2D + 1.5L + 1.0WL (30 ...	Yes	Y		DL	1.2	LL	1.5	WLZ	.05	WLX	-.0...

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N14	max	1094.508	25	1225.905	6	1086.21	31	112.117	24	458.558	14	1520.828	5
2		min	-1208.78	7	-897.936	24	96.016	24	-2161.902	31	-3510.755	33	-1046.395	23
3	N16	max	703.276	3	1596.564	5	1085.293	35	4041.025	36	304.469	14	1317.546	21
4		min	-587.249	21	-1158.625	23	109.996	16	-393.893	17	-397.688	8	-1586.585	3
5	N15	max	648.57	3	1153.802	4	953.525	34	1865.406	35	618.501	15	1554.954	4
6		min	-534.345	21	-832.296	22	-93.94	15	-216.99	16	-3085.299	34	-1080.99	22
7	N19	max	589.515	24	1108.726	6	930.927	30	429.946	23	206.962	15	1334.524	25
8		min	-720.176	6	-703.673	24	-49.432	23	-3497.323	30	-312.83	9	-1623.935	7
9	N18	max	1269.351	2	674.066	5	855.775	27	337.975	22	2742.895	28	1411.86	25
10		min	-1172.33	20	-493.385	23	35.947	20	-1612.57	29	-219.718	21	-1618.696	7
11	N17	max	1069.237	14	361.043	5	793.853	38	1533.548	37	2508.356	38	1311.549	21
12		min	-1150.945	8	-205.658	23	-67.962	19	-396.329	18	-335.443	19	-1493.589	3
13	Totals:	max	4936.281	2	5745.222	5	5459.922	31						
14		min	-4936.281	20	-3918.263	23	1071.167	24						

Envelope AISC 13th(360-05): LRFD Steel Code Checks

	Member	Shape	Code Check	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	phi*Pnc ...	phi*Pnt [...	phi*Mn y...	phi*Mn z...	Cb	Eqn
1	MP2	PIPE_2.0	.637	26.25	8	.045	26.25		8	20866.7...	32130	1871.625	1871.625	2...	H1-1b
2	MP5	PIPE_2.0	.569	26.25	5	.041	26.25		5	20866.7...	32130	1871.625	1871.625	1...	H1-1b
3	MP8	PIPE_2.0	.528	26.25	5	.032	26.25		5	20866.7...	32130	1871.625	1871.625	1...	H1-1b
4	MP3	PIPE_2.0	.397	26.25	8	.031	26.25		8	20866.7...	32130	1871.625	1871.625	2...	H1-1b
5	M4	HSS3.5X3....	.382	43.5	31	.078	43.5	y	29	111937....	120474	12075	12075	1...	H1-1b
6	MP6	PIPE_2.0	.378	26.25	5	.030	26.25		5	20866.7...	32130	1871.625	1871.625	1...	H1-1b
7	MP1	PIPE_2.0	.376	26.25	8	.031	26.25		8	20866.7...	32130	1871.625	1871.625	2...	H1-1b
8	MP7	PIPE_2.0	.370	26.25	5	.031	26.25		5	20866.7...	32130	1871.625	1871.625	2...	H1-1b
9	MP4	PIPE_2.0	.369	26.25	5	.031	26.25		5	20866.7...	32130	1871.625	1871.625	2...	H1-1b
10	M6	HSS3.5X3....	.352	43.5	27	.082	43.5	y	33	111937....	120474	12075	12075	1...	H1-1b
11	M9	HSS3.5X3....	.327	43.5	31	.073	43.5	y	32	111937....	120474	12075	12075	1...	H1-1b
12	M5	HSS3.5X3....	.316	43.5	31	.064	43.5	y	37	111937....	120474	12075	12075	1...	H1-1b
13	M8	HSS3.5X3....	.280	43.5	31	.059	43.5	y	49	111937....	120474	12075	12075	1...	H1-1b
14	M7	HSS3.5X3....	.275	43.5	27	.057	43.5	y	41	111937....	120474	12075	12075	1...	H1-1b
15	M3	HSS3X3X6	.242	55.687	31	.044	55.687	z	4	32536.8...	140346	11212.5	11212.5	1...	H1-1b
16	M2	HSS3X3X6	.222	106.312	29	.052	0	z	3	32536.8...	140346	11212.5	11212.5	1...	H1-1b
17	M1	HSS3X3X6	.203	106.312	40	.045	0	z	5	32536.8...	140346	11212.5	11212.5	1...	H1-1b
18	MP9	PIPE_2.0	.129	26.25	5	.018	26.25		5	20866.7...	32130	1871.625	1871.625	2...	H1-1b

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	TS3x3x0.375	HSS3X3X6	Beam	Tube	A500 Gr.46	Typical	3.39	3.78	3.78	6.64
2	TS3.5x3.5x0.25	HSS3.5X3.5X4	Beam	Tube	A500 Gr.46	Typical	2.91	5.04	5.04	8.35
3	Pipe 2.0	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25

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]
1	N13						
2	N14	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N18	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N19	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N15	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N16	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
7	N17	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
8	N1						

Joint Boundary Conditions (Continued)

	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]
9	N5						
10	N3						
11	N47						
12	N48A						
13	N50A						
14	N51						
15	N53A						
16	N54A						

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
1	M1						Yes	Default			None
2	M2						Yes	Default			None
3	M3						Yes	Default			None
4	M4						Yes				None
5	M5						Yes				None
6	M6						Yes				None
7	M7						Yes				None
8	M8						Yes				None
9	M9						Yes				None
10	MP3						Yes				None
11	MP2						Yes				None
12	MP1						Yes				None
13	MP6						Yes				None
14	MP5						Yes				None
15	MP4						Yes				None
16	MP9						Yes				None
17	MP8						Yes				None
18	MP7						Yes				None
19	M19						Yes	** NA **			None
20	M20						Yes	** NA **			None
21	M21						Yes	** NA **			None

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E...	Density[lb/f...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	490	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	490	50	1.1	65	1.1
3	A992	29000	11154	.3	.65	490	50	1.1	65	1.1
4	A500 Gr.42	29000	11154	.3	.65	490	42	1.4	58	1.3
5	A500 Gr.46	29000	11154	.3	.65	490	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	490	35	1.5	60	1.2

Joint Loads and Enforced Displacements (BLC 7 : Service Live 1)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2...
1	N54A	L	Z	-250
2	N47	L	Z	-250
3	N48A	L	Z	-250
4	N50A	L	Z	-250
5	N53A	L	Z	-250
6	N51	L	Z	-250

Member Point Loads (BLC 1 : Self Weight)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	Z	-14.35	24
2	MP2	Z	-41.9	13
3	MP3	Z	-17.5	16
4	MP1	Z	-71	36
5	MP3	Z	-72	36
6	MP2	Z	-28.2	36
7	MP1	Z	-14.35	72
8	MP2	Z	-41.9	72
9	MP3	Z	-17.5	72
10	MP4	Z	-14.35	24
11	MP5	Z	-41.9	13
12	MP6	Z	-17.5	16
13	MP4	Z	-71	36
14	MP6	Z	-72	36
15	MP5	Z	-28.2	36
16	MP4	Z	-14.35	72
17	MP5	Z	-41.9	72
18	MP6	Z	-17.5	72
19	MP7	Z	-14.35	24
20	MP8	Z	-41.9	13
21	MP7	Z	-71	36
22	MP9	Z	-72	36
23	MP7	Z	-14.35	72
24	MP8	Z	-41.9	72

Member Point Loads (BLC 2 : Wind Load AZI 000)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	X	-123.57	24
2	MP2	X	-249.18	13
3	MP3	X	-137.3	16
4	MP1	X	-98.08	36
5	MP3	X	-81.7	36
6	MP2	X	-110.07	36
7	MP1	X	-123.57	72
8	MP2	X	-249.18	72
9	MP3	X	-137.3	72
10	MP4	X	-95.75	24
11	MP5	X	-139.01	13
12	MP6	X	-89.06	16
13	MP4	X	-77.17	36
14	MP6	X	-71.03	36
15	MP5	X	-53.47	36
16	MP4	X	-95.75	72
17	MP5	X	-139.01	72
18	MP6	X	-89.06	72
19	MP7	X	-95.75	24
20	MP8	X	-139.01	13
21	MP7	X	-77.17	36
22	MP9	X	-71.03	36
23	MP7	X	-95.75	72
24	MP8	X	-139.01	72

Member Point Loads (BLC 3 : Wind Load AZI 090)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	Y	-86.48	24

Member Point Loads (BLC 3 : Wind Load AZI 090) (Continued)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
2	MP2	Y	-102.29	13
3	MP3	Y	-72.99	16
4	MP1	Y	-70.2	36
5	MP3	Y	-67.47	36
6	MP2	Y	-34.61	36
7	MP1	Y	-86.48	72
8	MP2	Y	-102.29	72
9	MP3	Y	-72.99	72
10	MP4	Y	-114.3	24
11	MP5	Y	-212.46	13
12	MP6	Y	-121.22	16
13	MP4	Y	-91.11	36
14	MP6	Y	-78.14	36
15	MP5	Y	-91.2	36
16	MP4	Y	-114.3	72
17	MP5	Y	-212.46	72
18	MP6	Y	-121.22	72
19	MP7	Y	-114.3	24
20	MP8	Y	-212.46	13
21	MP7	Y	-91.11	36
22	MP9	Y	-78.14	36
23	MP7	Y	-114.3	72
24	MP8	Y	-212.46	72

Member Point Loads (BLC 4 : Ice Weight)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	Z	-82.23	24
2	MP2	Z	-131.95	13
3	MP3	Z	-78.05	16
4	MP1	Z	-89.42	36
5	MP3	Z	-85.27	36
6	MP2	Z	-79.25	36
7	MP1	Z	-82.23	72
8	MP2	Z	-131.95	72
9	MP3	Z	-78.05	72
10	MP4	Z	-82.23	24
11	MP5	Z	-131.95	13
12	MP6	Z	-78.05	16
13	MP4	Z	-89.42	36
14	MP6	Z	-85.27	36
15	MP5	Z	-79.25	36
16	MP4	Z	-82.23	72
17	MP5	Z	-131.95	72
18	MP6	Z	-78.05	72
19	MP7	Z	-82.23	24
20	MP8	Z	-131.95	13
21	MP7	Z	-89.42	36
22	MP9	Z	-85.27	36
23	MP7	Z	-82.23	72
24	MP8	Z	-131.95	72

Member Point Loads (BLC 5 : Wind + Ice Load AZI 000)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	X	-27.77	24
2	MP2	X	-50.26	13
3	MP3	X	-30.78	16

Member Point Loads (BLC 5 : Wind + Ice Load AZI 000) (Continued)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
4	MP1	X	-24.81	36
5	MP3	X	-21.42	36
6	MP2	X	-31.95	36
7	MP1	X	-27.77	72
8	MP2	X	-50.26	72
9	MP3	X	-30.78	72
10	MP4	X	-22.96	24
11	MP5	X	-31.62	13
12	MP6	X	-22.79	16
13	MP4	X	-20.74	36
14	MP6	X	-19.26	36
15	MP5	X	-20.03	36
16	MP4	X	-22.96	72
17	MP5	X	-31.62	72
18	MP6	X	-22.79	72
19	MP7	X	-22.96	24
20	MP8	X	-31.62	13
21	MP7	X	-20.74	36
22	MP9	X	-19.26	36
23	MP7	X	-22.96	72
24	MP8	X	-31.62	72

Member Point Loads (BLC 6 : Wind + Ice Load AZI 090)

	Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
1	MP1	Y	-21.36	24
2	MP2	Y	-25.4	13
3	MP3	Y	-20.12	16
4	MP1	Y	-19.38	36
5	MP3	Y	-18.54	36
6	MP2	Y	-16.06	36
7	MP1	Y	-21.36	72
8	MP2	Y	-25.4	72
9	MP3	Y	-20.12	72
10	MP4	Y	-26.17	24
11	MP5	Y	-44.05	13
12	MP6	Y	-28.12	16
13	MP4	Y	-23.46	36
14	MP6	Y	-20.7	36
15	MP5	Y	-27.98	36
16	MP4	Y	-26.17	72
17	MP5	Y	-44.05	72
18	MP6	Y	-28.12	72
19	MP7	Y	-26.17	24
20	MP8	Y	-44.05	13
21	MP7	Y	-23.46	36
22	MP9	Y	-20.7	36
23	MP7	Y	-26.17	72
24	MP8	Y	-44.05	72

Member Distributed Loads (BLC 4 : Ice Weight)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M1	Z	-15.123	-15.123	0	%100
2	M2	Z	-15.123	-15.123	0	%100
3	M3	Z	-15.123	-15.123	0	%100
4	M4	Z	-16.648	-16.648	0	%100

Member Distributed Loads (BLC 4 : Ice Weight) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
5	M5	Z	-16.648	-16.648	0	%100
6	M6	Z	-16.648	-16.648	0	%100
7	M7	Z	-16.648	-16.648	0	%100
8	M8	Z	-16.648	-16.648	0	%100
9	M9	Z	-16.648	-16.648	0	%100
10	MP3	Z	-10.441	-10.441	0	%100
11	MP2	Z	-10.441	-10.441	0	%100
12	MP1	Z	-10.441	-10.441	0	%100
13	MP6	Z	-10.441	-10.441	0	%100
14	MP5	Z	-10.441	-10.441	0	%100
15	MP4	Z	-10.441	-10.441	0	%100
16	MP9	Z	-10.441	-10.441	0	%100
17	MP8	Z	-10.441	-10.441	0	%100
18	MP7	Z	-10.441	-10.441	0	%100

Member Distributed Loads (BLC 8 : BLC 1 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M2	Z	-.174	-3.947	0	12.96
2	M2	Z	-3.947	-7.384	12.96	25.92
3	M2	Z	-7.384	-8.696	25.92	38.88
4	M2	Z	-8.696	-4.386	38.88	51.84
5	M2	Z	-4.386	-.174	51.84	64.8
6	M3	Z	-1.308	-4.13	0	12.96
7	M3	Z	-4.13	-7.656	12.96	25.92
8	M3	Z	-7.656	-8.764	25.92	38.88
9	M3	Z	-8.764	-3.949	38.88	51.84
10	M3	Z	-3.949	-.141	51.84	64.8
11	M19	Z	-.785	-.785	0	3
12	M4	Z	-4.41	-7.346	0	10.875
13	M4	Z	-7.346	-7.935	10.875	21.75
14	M4	Z	-7.935	-5.624	21.75	32.625
15	M4	Z	-5.624	-2.76	32.625	43.5
16	M9	Z	-10.086	-7.396	4.35	17.4
17	M9	Z	-7.396	-5.872	17.4	30.45
18	M9	Z	-5.872	-5.515	30.45	43.5
19	M1	Z	-.174	-4.386	97.2	110.16
20	M1	Z	-4.386	-8.696	110.16	123.12
21	M1	Z	-8.696	-7.384	123.12	136.08
22	M1	Z	-7.384	-3.947	136.08	149.04
23	M1	Z	-3.947	-.174	149.04	162
24	M2	Z	-.141	-3.949	97.2	110.16
25	M2	Z	-3.949	-8.764	110.16	123.12
26	M2	Z	-8.764	-7.656	123.12	136.08
27	M2	Z	-7.656	-4.13	136.08	149.04
28	M2	Z	-4.13	-1.308	149.04	162
29	M21	Z	-.785	-.785	0	3
30	M5	Z	-4.41	-7.346	0	10.875
31	M5	Z	-7.346	-7.935	10.875	21.75
32	M5	Z	-7.935	-5.624	21.75	32.625
33	M5	Z	-5.624	-2.76	32.625	43.5
34	M6	Z	-10.086	-7.396	4.35	17.4
35	M6	Z	-7.396	-5.872	17.4	30.45
36	M6	Z	-5.872	-5.515	30.45	43.5
37	M1	Z	-.174	-3.947	0	12.96
38	M1	Z	-3.947	-7.384	12.96	25.92
39	M1	Z	-7.384	-8.696	25.92	38.88

Member Distributed Loads (BLC 8 : BLC 1 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
40	M1	Z	-8.696	-4.386	38.88	51.84
41	M1	Z	-4.386	-.174	51.84	64.8
42	M3	Z	-.141	-3.949	97.2	110.16
43	M3	Z	-3.949	-8.764	110.16	123.12
44	M3	Z	-8.764	-7.656	123.12	136.08
45	M3	Z	-7.656	-4.13	136.08	149.04
46	M3	Z	-4.13	-1.308	149.04	162
47	M20	Z	-.785	-.785	0	3
48	M7	Z	-10.086	-7.396	4.35	17.4
49	M7	Z	-7.396	-5.872	17.4	30.45
50	M7	Z	-5.872	-5.515	30.45	43.5
51	M8	Z	-4.41	-7.346	0	10.875
52	M8	Z	-7.346	-7.935	10.875	21.75
53	M8	Z	-7.935	-5.624	21.75	32.625
54	M8	Z	-5.624	-2.76	32.625	43.5

Member Distributed Loads (BLC 9 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M1	X	-12.463	-12.463	0	162
2	M2	X	-24.925	-24.925	0	162
3	M3	X	-12.462	-12.462	0	162
4	M4	X	-12.898	-12.898	0	43.5
5	M5	X	-12.898	-12.898	0	43.5
6	M6	X	-29.02	-29.02	0	43.5
7	M7	X	-16.122	-16.122	0	43.5
8	M8	X	-16.122	-16.122	0	43.5
9	M9	X	-29.02	-29.02	0	43.5
10	MP3	X	-19.732	-19.732	0	72
11	MP2	X	-19.732	-19.732	0	72
12	MP1	X	-19.732	-19.732	0	72
13	MP6	X	-19.732	-19.732	0	72
14	MP5	X	-19.732	-19.732	0	72
15	MP4	X	-19.732	-19.732	0	72
16	MP9	X	-19.732	-19.732	0	72
17	MP8	X	-19.732	-19.732	0	72
18	MP7	X	-19.732	-19.732	0	72
19	M19	X	0	0	0	3
20	M20	X	0	0	0	3
21	M21	X	0	0	0	3

Member Distributed Loads (BLC 10 : BLC 3 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M1	Y	-21.586	-21.586	0	162
2	M3	Y	-21.586	-21.586	0	162
3	M4	Y	-26.062	-26.062	0	43.5
4	M5	Y	-26.062	-26.062	0	43.5
5	M6	Y	-1.862	-1.862	0	43.5
6	M7	Y	-24.201	-24.201	0	43.5
7	M8	Y	-24.201	-24.201	0	43.5
8	M9	Y	-1.862	-1.862	0	43.5
9	MP3	Y	-19.732	-19.732	0	72
10	MP2	Y	-19.732	-19.732	0	72
11	MP1	Y	-19.732	-19.732	0	72
12	MP6	Y	-19.732	-19.732	0	72
13	MP5	Y	-19.732	-19.732	0	72
14	MP4	Y	-19.732	-19.732	0	72

Member Distributed Loads (BLC 10 : BLC 3 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
15	MP9	Y	-19.732	-19.732	0	72
16	MP8	Y	-19.732	-19.732	0	72
17	MP7	Y	-19.732	-19.732	0	72
18	M19	Y	0	0	0	3
19	M21	Y	0	0	0	3

Member Distributed Loads (BLC 11 : BLC 4 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M2	Z	-.125	-2.834	0	12.96
2	M2	Z	-2.834	-5.302	12.96	25.92
3	M2	Z	-5.302	-6.244	25.92	38.88
4	M2	Z	-6.244	-3.149	38.88	51.84
5	M2	Z	-3.149	-.125	51.84	64.8
6	M3	Z	-.939	-2.965	0	12.96
7	M3	Z	-2.965	-5.497	12.96	25.92
8	M3	Z	-5.497	-6.292	25.92	38.88
9	M3	Z	-6.292	-2.835	38.88	51.84
10	M3	Z	-2.835	-.101	51.84	64.8
11	M19	Z	-.564	-.564	0	3
12	M4	Z	-3.167	-5.274	0	10.875
13	M4	Z	-5.274	-5.697	10.875	21.75
14	M4	Z	-5.697	-4.038	21.75	32.625
15	M4	Z	-4.038	-1.982	32.625	43.5
16	M9	Z	-7.242	-5.31	4.35	17.4
17	M9	Z	-5.31	-4.216	17.4	30.45
18	M9	Z	-4.216	-3.96	30.45	43.5
19	M1	Z	-.125	-3.149	97.2	110.16
20	M1	Z	-3.149	-6.244	110.16	123.12
21	M1	Z	-6.244	-5.302	123.12	136.08
22	M1	Z	-5.302	-2.834	136.08	149.04
23	M1	Z	-2.834	-.125	149.04	162
24	M2	Z	-.101	-2.835	97.2	110.16
25	M2	Z	-2.835	-6.292	110.16	123.12
26	M2	Z	-6.292	-5.497	123.12	136.08
27	M2	Z	-5.497	-2.965	136.08	149.04
28	M2	Z	-2.965	-.939	149.04	162
29	M21	Z	-.564	-.564	0	3
30	M5	Z	-3.167	-5.274	0	10.875
31	M5	Z	-5.274	-5.697	10.875	21.75
32	M5	Z	-5.697	-4.038	21.75	32.625
33	M5	Z	-4.038	-1.982	32.625	43.5
34	M6	Z	-7.242	-5.31	4.35	17.4
35	M6	Z	-5.31	-4.216	17.4	30.45
36	M6	Z	-4.216	-3.96	30.45	43.5
37	M1	Z	-.125	-2.834	0	12.96
38	M1	Z	-2.834	-5.302	12.96	25.92
39	M1	Z	-5.302	-6.244	25.92	38.88
40	M1	Z	-6.244	-3.149	38.88	51.84
41	M1	Z	-3.149	-.125	51.84	64.8
42	M3	Z	-.101	-2.835	97.2	110.16
43	M3	Z	-2.835	-6.292	110.16	123.12
44	M3	Z	-6.292	-5.497	123.12	136.08
45	M3	Z	-5.497	-2.965	136.08	149.04
46	M3	Z	-2.965	-.939	149.04	162
47	M20	Z	-.564	-.564	0	3
48	M7	Z	-7.242	-5.31	4.35	17.4

Member Distributed Loads (BLC 11 : BLC 4 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
49	M7	Z	-5.31	-4.216	17.4	30.45
50	M7	Z	-4.216	-3.96	30.45	43.5
51	M8	Z	-3.167	-5.274	0	10.875
52	M8	Z	-5.274	-5.697	10.875	21.75
53	M8	Z	-5.697	-4.038	21.75	32.625
54	M8	Z	-4.038	-1.982	32.625	43.5

Member Distributed Loads (BLC 12 : BLC 5 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M1	X	-2.833	-2.833	0	162
2	M2	X	-5.665	-5.665	0	162
3	M3	X	-2.832	-2.832	0	162
4	M4	X	-2.931	-2.931	0	43.5
5	M5	X	-2.931	-2.931	0	43.5
6	M6	X	-6.596	-6.596	0	43.5
7	M7	X	-3.664	-3.664	0	43.5
8	M8	X	-3.664	-3.664	0	43.5
9	M9	X	-6.596	-6.596	0	43.5
10	MP3	X	-4.485	-4.485	0	72
11	MP2	X	-4.485	-4.485	0	72
12	MP1	X	-4.485	-4.485	0	72
13	MP6	X	-4.485	-4.485	0	72
14	MP5	X	-4.485	-4.485	0	72
15	MP4	X	-4.485	-4.485	0	72
16	MP9	X	-4.485	-4.485	0	72
17	MP8	X	-4.485	-4.485	0	72
18	MP7	X	-4.485	-4.485	0	72
19	M19	X	0	0	0	3
20	M20	X	0	0	0	3
21	M21	X	0	0	0	3

Member Distributed Loads (BLC 13 : BLC 6 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft,F,psf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M1	Y	-4.906	-4.906	0	162
2	M3	Y	-4.906	-4.906	0	162
3	M4	Y	-5.924	-5.924	0	43.5
4	M5	Y	-5.924	-5.924	0	43.5
5	M6	Y	-.423	-.423	0	43.5
6	M7	Y	-5.5	-5.5	0	43.5
7	M8	Y	-5.5	-5.5	0	43.5
8	M9	Y	-.423	-.423	0	43.5
9	MP3	Y	-4.485	-4.485	0	72
10	MP2	Y	-4.485	-4.485	0	72
11	MP1	Y	-4.485	-4.485	0	72
12	MP6	Y	-4.485	-4.485	0	72
13	MP5	Y	-4.485	-4.485	0	72
14	MP4	Y	-4.485	-4.485	0	72
15	MP9	Y	-4.485	-4.485	0	72
16	MP8	Y	-4.485	-4.485	0	72
17	MP7	Y	-4.485	-4.485	0	72
18	M19	Y	0	0	0	3
19	M21	Y	0	0	0	3

APPENDIX D

ADDITIONAL CALCUATIONS

Date:	12/27/2018
Client	Crown Castle
Carrier	AT&T
Engineer:	IP
Site:	806376
Job #:	600-003

Code:	LRFD	
Axial:	1596.56	lbs
Shear:	1086.21	lbs

Bolt Capacity (1/2" A307 Bolt)				
	Ult Load / Bolt	Factored Load (ϕ=0.75)	# of Bolts	Factor Joint Capacity
Axial (lb)	8226.7	6170.0	2	12340
Shear(lb)	5133.3	3850.0	2	7700

Interaction Check	
$T/\phi T_n$	12.9%
$V/\phi Vn$	14.1%
≤1.0	3.7%
	OK

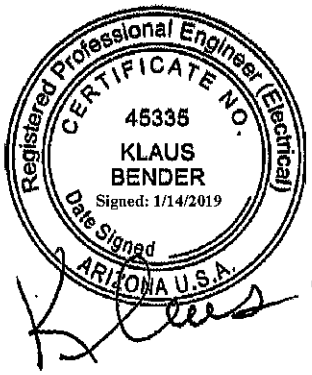
RF EMISSIONS COMPLIANCE REPORT

Crown Castle on behalf of AT&T Mobility, LLC

Crown Castle Site Name: UNION
Crown Castle Site ID: 876346
AT&T Mobility, LLC FA #: 10035087
23 Holland Road
Stafford Springs, CT
1/14/2019

Report Status:

AT&T Mobility, LLC Is Compliant



Klaus Bender
Registered Professional Engineer (Electrical)
Expires December 31, 2021

Prepared By:

Sitesafe, LLC

8618 Westwood Center Drive,
Suite 315

Vienna, VA 22182

Voice 703-276-1100
Fax 703-276-1169

Engineering Statement in Re:
Electromagnetic Energy Analysis
Crown Castle
Stafford Springs, CT

My signature on the cover of this document indicates:

That I am registered as a Professional Engineer in the jurisdiction indicated; and

That I have extensive professional experience in the wireless communications engineering industry; and

That I am an employee of Sitesafe, LLC in Vienna, Virginia; and

That I am thoroughly familiar with the Rules and Regulations of the Federal Communications Commission ("the FCC" and "the FCC Rules") both in general and specifically as they apply to the FCC's Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; and

That the technical information serving as the basis for this report was supplied by Crown Castle (See attached Site Summary and Carrier documents), and that AT&T Mobility, LLC's installations involve communications equipment, antennas and associated technical equipment at a location referred to as the "UNION" ("the site"); and

That AT&T Mobility, LLC proposes to operate at the site with transmit antennas listed in the carrier summary and with a maximum effective radiated power as specified by AT&T Mobility, LLC and shown on the worksheet, and that worst-case 100% duty cycle have been assumed; and

That this analysis has been performed with the assumption that the ground immediately surrounding the tower is primarily flat or falling; and

That at this time, the FCC requires that certain licensees address specific levels of radio-frequency energy to which workers or members of the public might possibly be exposed (at §1.1307(b) of the FCC Rules); and

That such consideration of possible exposure of humans to radio-frequency radiation must utilize the standards set by the FCC, which is the Federal Agency having jurisdiction over communications facilities; and

That the FCC rules define two tiers of permissible exposure guidelines: 1) "uncontrolled environments," defined as situations in which persons may not be aware of (the "general public"), or may not be able to control their exposure to a transmission facility; and (2) "controlled environments," which defines situations in which persons are aware of their potential for exposure (industry personnel); and

That this statement specifically addresses the uncontrolled environment (which is more conservative than the controlled environment) and the limit set forth in the FCC rules for licensees of AT&T Mobility, LLC's operating frequency as shown on the attached antenna worksheet; and

That when applying the uncontrolled environment standards, the predicted Maximum Power Density at two meters above ground level from the proposed AT&T Mobility, LLC operation is no more than 1.632% of the maximum in any accessible area on the ground and

That it is understood per FCC Guidelines and OET65 Appendix A, that regardless of the existent radio-frequency environment, only those licenses whose contributions exceed five percent of the exposure limit pertinent to their operation(s) bear any responsibility for bringing any non-compliant area(s) into compliance; and

That when applying the uncontrolled environment standards, the cumulative predicted energy density from the proposed operation is no more than 2.557% of the maximum in any accessible area up to two meters above the ground per OET-65; and

That the calculations provided in this report are based on data provided by the client and antenna pattern data supplied by the antenna manufacturer, in accordance with FCC guidelines listed in OET-65. Horizontal and vertical antenna patterns are combined for modeling purposes to accurately reflect the energy two meters above ground level where on-axis energy refers to maximum energy two meters above the ground along the azimuth of the antenna and where area energy refers to the maximum energy anywhere two meters above the ground regardless of the antenna azimuth, accounting for cumulative energy from multiple antennas for the carrier and frequency range indicated; and

That the Occupational Safety and Health Administration has policies in place which address worker safety in and around communications sites, thus individual companies will be responsible for their employees' training regarding Radio Frequency Safety.

In summary, it is stated here that the proposed operation at the site would not result in exposure of the Public to excessive levels of radio-frequency energy as defined in the FCC Rules and Regulations, specifically 47 CFR 1.1307 and that AT&T Mobility, LLC's proposed operation is completely compliant.

Finally, it is stated that access to the tower should be restricted to communication industry professionals, and approved contractor personnel trained in radio-frequency safety; and that the instant analysis addresses exposure levels at two meters above ground level and does not address exposure levels on the tower, or in the immediate proximity of the antennas.

Crown Castle
UNION
Site Summary

Carrier	Area Maximum Percentage MPE
AT&T Mobility, LLC	0.152 %
AT&T Mobility, LLC (Proposed)	0.361 %
AT&T Mobility, LLC (Proposed)	0.29 %
AT&T Mobility, LLC (Proposed)	0.294 %
AT&T Mobility, LLC (Proposed)	0.258 %
AT&T Mobility, LLC (Proposed)	0.277 %
MetroPCS (Decommissioned)	0 %
Sprint	0.335 %
Sprint	0.469 %
Sprint	0.12 %
Composite Site MPE:	2.557 %

AT&T Mobility, LLC
UNION
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	0.86205	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.15213	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Powerwave	7770	140	45	1094	0.533269	0.094106	0.833837	0.147148
Powerwave	7770	140	236	1094	0.533269	0.094106	0.833837	0.147148

AT&T Mobility, LLC (Proposed)
UNION
Carrier Summary

Frequency:	2300	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	3.61341	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.36134	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
CCI Antennas	HPA65R-BU4A	140	30	2985	2.917576	0.291758	3.602336	0.360234
CCI Antennas	HPA65R-BU4A	140	150	2985	2.903362	0.290336	3.602336	0.360234
CCI Antennas	HPA65R-BU4A	140	270	2985	2.917576	0.291758	3.602336	0.360234

AT&T Mobility, LLC (Proposed)
UNION
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	1.64537	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.29036	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
CCI Antennas	HPA65R-BU4A	140	30	1946	1.589316	0.280467	1.641637	0.289701
CCI Antennas	HPA65R-BU4A	140	150	1946	1.592546	0.281038	1.641637	0.289701
CCI Antennas	HPA65R-BU4A	140	270	1946	1.589316	0.280467	1.641637	0.289701

AT&T Mobility, LLC (Proposed)
UNION
Carrier Summary

Frequency:	2100	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	2.93634	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.29363	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	800-10964	140	30	5274	1.174128	0.117413	2.787822	0.278782
Kathrein-Scala	800-10964	140	150	5274	1.145787	0.114579	2.787822	0.278782
Kathrein-Scala	800-10964	140	270	5274	1.174128	0.117413	2.787822	0.278782

AT&T Mobility, LLC (Proposed)
UNION
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	2.58061	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.25806	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	800-10964	140	30	5154	1.131388	0.113139	2.449202	0.24492
Kathrein-Scala	800-10964	140	150	5154	1.132183	0.113218	2.449202	0.24492
Kathrein-Scala	800-10964	140	270	5154	1.131388	0.113139	2.449203	0.24492

AT&T Mobility, LLC (Proposed)
UNION
Carrier Summary

Frequency:	737	MHz
Maximum Permissible Exposure (MPE):	491.33	µW/cm^2
Maximum power density at ground level:	1.36152	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.27711	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	800-10964	140	30	2209	0.900364	0.183249	1.261375	0.256725
Kathrein-Scala	800-10964	140	150	2209	0.894363	0.182028	1.261375	0.256725
Kathrein-Scala	800-10964	140	270	2209	0.894362	0.182028	1.261375	0.256725

MetroPCS (Decommissioned)
UNION
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	0	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	80010504	130	30	0	0	0	0	0
Kathrein-Scala	80010504	130	150	0	0	0	0	0
Kathrein-Scala	80010504	130	270	0	0	0	0	0

Sprint
UNION
Carrier Summary

Frequency:	2500	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	3.34844	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.33484	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	APXVTM14-C-I20	150	30	6168	1.003626	0.100363	1.877372	0.187737
RFS	APXVTM14-C-I20	150	220	6168	1.003626	0.100363	1.877372	0.187737
RFS	APXVTM14-C-I20	150	240	6168	1.003242	0.100324	1.877372	0.187737

Sprint
UNION
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	4.69487	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.46949	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Commscope	NNVV-65B-R4	150	30	2781	1.03361	0.103361	1.321738	0.132174
Commscope	NNVV-65B-R4	150	30	2781	1.03361	0.103361	1.321738	0.132174
Commscope	NNVV-65B-R4	150	220	2781	1.03361	0.103361	1.321738	0.132174
Commscope	NNVV-65B-R4	150	220	2781	1.03361	0.103361	1.321738	0.132174
Commscope	NNVV-65B-R4	150	240	2781	1.030848	0.103085	1.321738	0.132174
Commscope	NNVV-65B-R4	150	240	2781	1.030848	0.103085	1.321738	0.132174

Sprint
UNION
Carrier Summary

Frequency:	862	MHz
Maximum Permissible Exposure (MPE):	574.67	µW/cm^2
Maximum power density at ground level:	0.6894	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.11996	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Commscope	NNVV-65B-R4	150	30	951	0.398376	0.069323	0.402603	0.070059
Commscope	NNVV-65B-R4	150	220	951	0.398376	0.069323	0.402603	0.070059
Commscope	NNVV-65B-R4	150	240	951	0.399138	0.069456	0.402603	0.070059