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

July 17, 2019

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

RE: **Notice of Exempt Modification for T-Mobile:**
806366 - T-Mobile Site ID: CT11251A
73 North Main Street, Marlborough, CT 06447
Latitude: 41° 37′ 47.30″/ Longitude: -72° 27′ 59.40″

Dear Ms. Bachman:

T-Mobile currently maintains 6 total antennas at the 100-foot mount on the existing 155-foot Monopole Tower, located at 73 North Main Street, Marlborough, CT. The tower is owned by Crown Castle and the property is owned by Advantage Properties LLC. T-Mobile now intends to replace three (3) existing antennas with three (3) new 600/700 MHz antennas at the 100-foot mount.

Planned Modifications:
Tower:

Remove and Replace:
(3) LNX 6515DS-A1M Antenna **(REMOVE)** - (3) RFS-APXVAARR24_43-U-NA20 Antenna 600/700 MHz **(REPLACE)**

(3) TMA 1A-PCS **(REMOVE) –** (3) TMA 1B-AWS **(REPLACE)**

Install New:
(1) 1 5/8" Hybrid Fiber Line
(3) Radio 4449 B12/B71

Existing to Remain:
(12) 1 ¼" Coax
(3) TMA 1A-PCS
(3) EMS-RR90-17XXDP Antenna (Dormant)

Ground:
Internal upgrade to existing ground cabinet.

The facility was approved by the Connecticut Siting Council in Docket No. 169 on October 25, 1995. This approval included the following conditions: The tower shall be constructed as a monopole, no taller than necessary to provide the proposed communication service, sufficient to accommodate the antennas of Springwich Cellular Limited Partnership and the Town of Marlborough, and not to exceed the total height of 160 feet above ground level (AGL). T-Mobile's proposed modifications will comply with these 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.C.S.A. § 16-50j-73, a copy of this letter is being sent to Amy Traversa, First Selectman for the Town of Marlborough, The Town of Marlborough Planning Commision, Crown Castle as the tower owner, and Advantage Properties LLC, the 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, T-Mobile 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: Anne Marie Zsamba.

Sincerely,

Anne Marie Zsamba
Real Estate Specialist
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065
(201) 236-9224
AnneMarie.Zsamba@crowncastle.com

Attachments

cc:

Amy J. Traversa, First Selectman
Town of Marlborough
26 North Main Street
Marlborough, CT 06447
860-295-6204

Town of Marlborough Planning Commission
Town of Marlborough
26 North Main Street
Marlborough, CT 06447
860-295-6200

Advantage Properties LLC
C/O Kevin MacGranor
219 South Road
Marlborough, CT 06447

Crown Castle, Tower Owner

ORIGIN ID:GFLA (518) 373-3523
ANNE MARIE ZSAMBA
CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065
UNITED STATES US

SHIP DATE: 13JUL19
ACTWGT: 2.00 LB
CAD: 104924194/INET4100

BILL SENDER

TO **ADVANTAGE PROPERTIES LLC**

C/O KEVIN MACGRANOR
219 SOUTH ROAD
MARLBOROUGH CT 06447
(201) 236-9224
REF: 1734.7680
INV:
PO:
DEPT:

565J2/A6F9/23AD

J191019010701uv

FedEx Express

MON - 15 JUL 12:00P
PRIORITY OVERNIGHT

TRK# 0201 **7757 3207 1623**

XE SKKA

06447
BDL
CT-US

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Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

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ORIGIN ID:GFLA (518) 373-3523
ANNE MARIE ZSAMBA
CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065
UNITED STATES US

SHIP DATE: 13JUL19
ACTWGT: 2.00 LB
CAD: 104924194/INET4100

BILL SENDER

TO **AMY J. TRAVERSA, FIRST SELECTMAN**
TOWN OF MARLBOROUGH
26 NORTH MAIN STREET

MARLBOROUGH CT 06447
(860) 295-6204
REF: 1734.7680
INV:
PO:
DEPT:

565J2/A6F9/23AD

J191019010701uv

FedEx Express

MON - 15 JUL 12:00P
PRIORITY OVERNIGHT

TRK# 0201 **7757 3204 8886**

XE SKKA

06447
BDL
CT-US

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ORIGIN ID:GFLA (518) 373-3523
ANNE MARIE ZSAMBA
CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065
UNITED STATES US

SHIP DATE: 13JUL19
ACTWGT: 4.00 LB
CAD: 104924194/INET4100

BILL SENDER

TO **MELANIE BACHMAN**
CONNECTICUT SITING COUNCIL
10 FRANKLIN SQUARE

NEW BRITAIN CT 06051
(860) 827-2951
INV:
PO:
REF: 1765.6680
DEPT:

565J2/A6F9/23AD

J191019010701uv

FedEx Express

MON - 15 JUL 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **7757 3203 7250**

XE BDLA

06051
BDL
CT-US

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Exhibit A

Original Facility Approval

Filing Guides
Meetings & Minutes
Public Participation
Audio Link to New Britain Hearing Rooms
Programs & Services
Telecommunications Database
Publications
Other Resources
Statutes & Regulations
Electric Transmission Upgrade Projects
Frequently Asked Questions

Melanie Bachman,
Executive Director

DOCKET NO. 169 - An application of Bell Atlantic NYNEX Mobile, for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a telecommunications tower and associated equipment located within a 56+/- acre parcel at 56 East Hampton Road, in Marlborough, Connecticut. The proposed alternatives are located within a 21.7+/- acre parcel at North Main Street and within a 2.5+/- acre parcel at 9-11 South Main Street, in Marlborough, Connecticut.

Connecticut Siting Council

October 25, 1995

DECISION AND ORDER

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of a cellular telecommunications tower and equipment building at the proposed first alternate site in Marlborough, Connecticut, including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by General Statutes § 16-50k, be issued to Bell Atlantic NYNEX Mobile, Inc. (BANM) for the construction, operation, and maintenance of a cellular telecommunications tower, associated equipment, and building at the proposed first alternate site, located within a 21.7+/- acre parcel at North Main Street, Marlborough, Connecticut. We find the effects on scenic resources and adjacent land uses of the prime site and second alternate site to be significant, and therefore deny certification of these sites.

The facility shall be constructed, operated, and maintained as a monopole substantially as specified in the Council's record in this matter, and subject to the following conditions:

1. The tower shall be constructed as a monopole, no taller than necessary to provide the proposed communications service, sufficient to accommodate the antennas of Springwich Cellular Limited Partnership and the Town of Marlborough, and not to exceed a total height of 160 feet above ground level (AGL).

2. The Certificate Holder shall prepare a Development and Management (D&M) Plan for this site in compliance with Sections 16-50j-75 through 16-50j-77 of the Regulations of Connecticut State Agencies. The D&M Plan shall be submitted to and approved by the Council prior to the commencement of facility construction and shall include placement of utilities underground, relocation of the tower within the leased parcel to provide the maximum practicable buffer of the tower from adjacent land owners; plans for the tower foundation; specifications for the placement of all antennas to be attached to this tower; plans for the equipment building and security fence; plans for the access road and utility line installation from North Main Street; plans for site clearing and tree trimming; and plans for water drainage and erosion and sedimentation controls consistent with the Connecticut Guidelines for Soil Erosion and Sediment Control, as amended.

3. Upon the establishment of any new State or federal radio frequency standards applicable to frequencies of this facility, the facility granted herein shall be brought into compliance with such standards.

4. The Certificate Holder shall provide the Council a recalculated report of electromagnetic radio frequency power density if and when circumstances in operation cause a change in power density above the levels originally calculated and provided in the application.

5. The Certificate Holder shall permit public or private entities to share space on the proposed tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.

6. If the facility does not initially provide, or permanently ceases to provide cellular services following completion of construction, this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapplication for any continued or new use shall be made to the Council before any such use is made.

7. Unless otherwise approved by the Council, this Decision and Order shall be void if all construction authorized herein is not completed within three years of the effective date of this Decision and Order or within three years after all appeals to this Decision and Order have been resolved.

8. The Certificate Holder shall notify the Council upon completion of construction and provide the final cost to construct the facility.

Pursuant to General Statutes § 16-50p, we hereby direct that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below, and notice of issuance shall be published in The Hartford Courant, and the Middletown Press.

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named or admitted to the proceeding in accordance with Section 16-50j-17 of the Regulations of Connecticut State Agencies.

The parties and intervenors to this proceeding are:

APPLICANT	**ITS REPRESENTATIVE**
Bell Atlantic NYNEX Mobile, Inc.	Brian C. S. Freeman, Esq. Kenneth C. Baldwin, Esq. Robinson & Cole One Commercial Plaza Hartford, CT 06103-3597 David S. Malko General Manager - Engineering Sandy M. Ranciato Regulatory Services Bell Atlantic NYNEX Mobile, Inc. 20 Alexander Drive Wallingford, CT 06492
INTERVENOR	**ITS REPRESENTATIVE**
Springwich Cellular Limited Partnership	Peter J. Tyrrell, Esq. Springwich Cellular Limited Partnership 227 Church Street New Haven, CT 06510
PARTY	**ITS REPRESENTATIVE**
Town of Marlborough	William S. Fish, Jr. Tyler, Cooper & Alcorn CityPlace, 35th Floor Hartford, CT 06103-3488
PARTY	**ITS REPRESENTATIVE**
Neighbors Endorsing an Appropriate Tower (NEAT)	Barry S. Zitser Perakos, Kindl & Zitser 207 Main Street Hartford, CT 06106

Content Last Modified on 8/9/2002 11:28:31 AM

Exhibit B

Property Card

Property Location: 73 NO MAIN ST | **MAP ID:** 6/ 26/ 65T/ / | **Bldg Name:** | **State Use:** 200

Vision ID: 100287 | **Account #** 2014T | **Bldg #:** 1 of 1 | **Sec #:** 1 of 1 | **Card** 1 of 1 | **Print Date:** 05/07/2019 10:27

CURRENT OWNER	TOPO.	UTILITIES	STRT./ROAD	LOCATION
ADVANTAGE PROPERTIES LLC	2 Above Street		1 Paved	
C/O CROWN ATLANTIC CO				
PMB 353				
4017 WASHINGTON RD				
MCMURRAY, PA 15317				
Additional Owners:				

SUPPLEMENTAL DATA

Other ID: 2014T	EXEMPT CO
Census	Lake Area
Dev. Lot	Photo Retake
Dev. Map	CB Letter
GIS ID: 6/26/65T	ASSOC PID#

CURRENT ASSESSMENT

Description	Code	Appraised Value	Assessed Value
Comm Land	2-1	121,900	85,330
Comm Bldg	2-2	80,600	56,420
Comm OB	2-5	663,000	464,100
	Total	865,500	605,850

6079
MARLBOROUGH, CT

VISION

RECORD OF OWNERSHIP

	BK-VOL/PAGE	SALE DATE	q/u	v/i	SALE PRICE	V.C.
ADVANTAGE PROPERTIES LLC	252/ 911	05/06/2019	U	I		29
VILLAGE PROPERTIES LLC	127/ 9	02/03/1999	U	I		29

PREVIOUS ASSESSMENTS (HISTORY)

Yr.	Code	Assessed Value	Yr.	Code	Assessed Value	Yr.	Code	Assessed Value
2015	2-1	85,330	2014	2-1	90,300	2014	2-1	90,300
2015	2-2	56,420	2014	2-2	25,270	2014	2-2	25,270
2015	2-5	578,620	2014	2-5	463,260	2014	2-5	463,260
	Total:	720,370		Total:	578,830		Total:	578,830

EXEMPTIONS

Year	Type	Description	Amount
		Total:	

OTHER ASSESSMENTS

Code	Description	Number	Amount	Comm. Int.

This signature acknowledges a visit by a Data Collector or Assessor

APPRAISED VALUE SUMMARY

Appraised Bldg. Value (Card)	80,600
Appraised XF (B) Value (Bldg)	0
Appraised OB (L) Value (Bldg)	663,000
Appraised Land Value (Bldg)	121,900
Special Land Value	0
Total Appraised Parcel Value	865,500
Valuation Method:	C
Adjustment:	0
Net Total Appraised Parcel Value	865,500

ASSESSING NEIGHBORHOOD

NBHD/ SUB	NBHD Name	Street Index Name	Tracing	Batch
0001/A				

NOTES

CELL TOWER LOCATED BEHIND MARLBORO BARN
CELLULAR TOWER; GATED
500 FT LF FALL DOWN ZONE = 5.74 AC
1.84 COMMERCIAL SITE
3.9 COMMERCIAL EXCESS

CELL TOWER VALUE = $2083/MONTH-5% VAC-
15% EXPENSES = $20,184 CAPPED AT 10% =
$201,880 PER SITE X 5 SITES = $1,009,400
2017 UPDATE-TERMINATION/EXPIRATION OFONE
CARRIER/SPRINT/NEXTEL

BUILDING PERMIT RECORD

Permit ID	Issue Date	Type	Description	Amount	Insp. Date	% Comp.	Date Comp.	Comments
18-318	10/16/2018	BP		20,000		0		REMOVE AND REPLAC
17-035	03/09/2017	BP		7,500		0		REPLACE 3 RRUS TO E
15-101	05/12/2015	CM	Commercial	0	07/27/2015	100		ANTENNA UPGRADE
1128	12/27/2012	CM	Commercial	0	07/27/2015	100		GROUND MOUNTED C
500	12/13/2011	CM	Commercial	0	07/27/2015	100		CHANGE SEVEN (7) AN

VISIT/ CHANGE HISTORY

Date	Type	IS	ID	Cd.	Purpose/Result
07/27/2015			LM	99	Vacant Land

LAND LINE VALUATION SECTION

B #	Use Code	Use Description	Zone	D	Front	Depth	Units	Unit Price	I. Factor	S.A.	Acre Disc	C. Factor	ST. Idx	Adj.	Notes- Adj	Special Pricing	S Adj Fact	Adj. Unit Price	Land Value
1	200	Commercial	R	A	181		1.84 AC	76,000.00	0.6150	C	1.0000	1.00	D	1.10			1.00		94,600
1	200	Commercial	R				3.90 AC	7,000.00	1.0000	0	1.0000	1.00		0.00			1.00		27,300

Total Card Land Units: 5.74 AC | Parcel Total Land Area: 5.74 AC | Total Land Value: 121,900

Property Location: 73 NO MAIN ST | **MAP ID:** 6/ 26/ 65T/ / | **Bldg Name:** | **State Use:** 200

Vision ID: 100287 | **Account #** 2014T | **Bldg #:** 1 of 1 | **Sec #:** 1 of 1 | **Card** 1 of 1 | **Print Date:** 05/07/2019 10:27

CONSTRUCTION DETAIL

Element	Cd.	Ch.	Description
Style	91		Support Shed
Model	94		Commercial
Grade	03		Average
Stories	1		
Occupancy	1		
Exterior Wall A	24		Reinforc Concr
Exterior Wall B			
Roof Structure	01		Flat
Roof Cover	04		T&G/Rubber
Interior Wall A	01		Minimum
Interior Wall B			
Interior Floor A	03		Concrete
Interior Floor B			
Heating Fuel	01		Coal or Wood
Heating Type	01		None
AC Type	03		Central
Bldg Use	200		Commercial
Heat/AC	02		HEAT/AC SPLIT
Frame Type	04		Reinforced Cnc
Baths/Plumbing	00		None
Ceiling/Walls	00		None
Rooms/Prtns	01		Light
Wall Height	8		
% Comn Wall			

CONSTRUCTION DETAIL (CONTINUED)

Element	Cd.	Ch.	Description

MIXED USE

Code	Description	Percentage
200	Commercial	100

COST/MARKET VALUATION

Adj. Base Rate:	110.32
Replace Cost	92,669
AYB	2000
Dep Code	A
Remodel Rating	
Year Remodeled	
Dep %	13
Functional Obslnc	
External Obslnc	
Cost Trend Factor	1
Condition	
% Complete	
Overall % Cond	87
Apprais Val	80,600
Dep % Ovr	0
Dep Ovr Comment	
Misc Imp Ovr	0
Misc Imp Ovr Comment	
Cost to Cure Ovr	0
Cost to Cure Ovr Comment	

OB-OUTBUILDING & YARD ITEMS(L) / XF-BUILDING EXTRA FEATURES(B)

Code	Description	Sub	Sub Descript	L/B	Units	Unit Price	Yr	Gde	Dp Rt	Cnd	%Cnd	Apr Value
SHD1	Shed	FR	Frame	L	360	20.00	1999			5	60	4,300
FN4	Fence 8'			L	322	20.00	2000			5	60	3,900
PAT1	Patio	CR	Concrete	L	192	3.50	2000				60	400
CELL	Cell Tower			L	4	163,600.00	2011		0		100	654,400

BUILDING SUB-AREA SUMMARY SECTION

Code	Description	Living Area	Gross Area	Eff. Area	Unit Cost	Undeprec. Value
BAS	First Floor	840	840	840		92,669
	Ttl. Gross Liv/Lease Area:	840	840	840		92,669

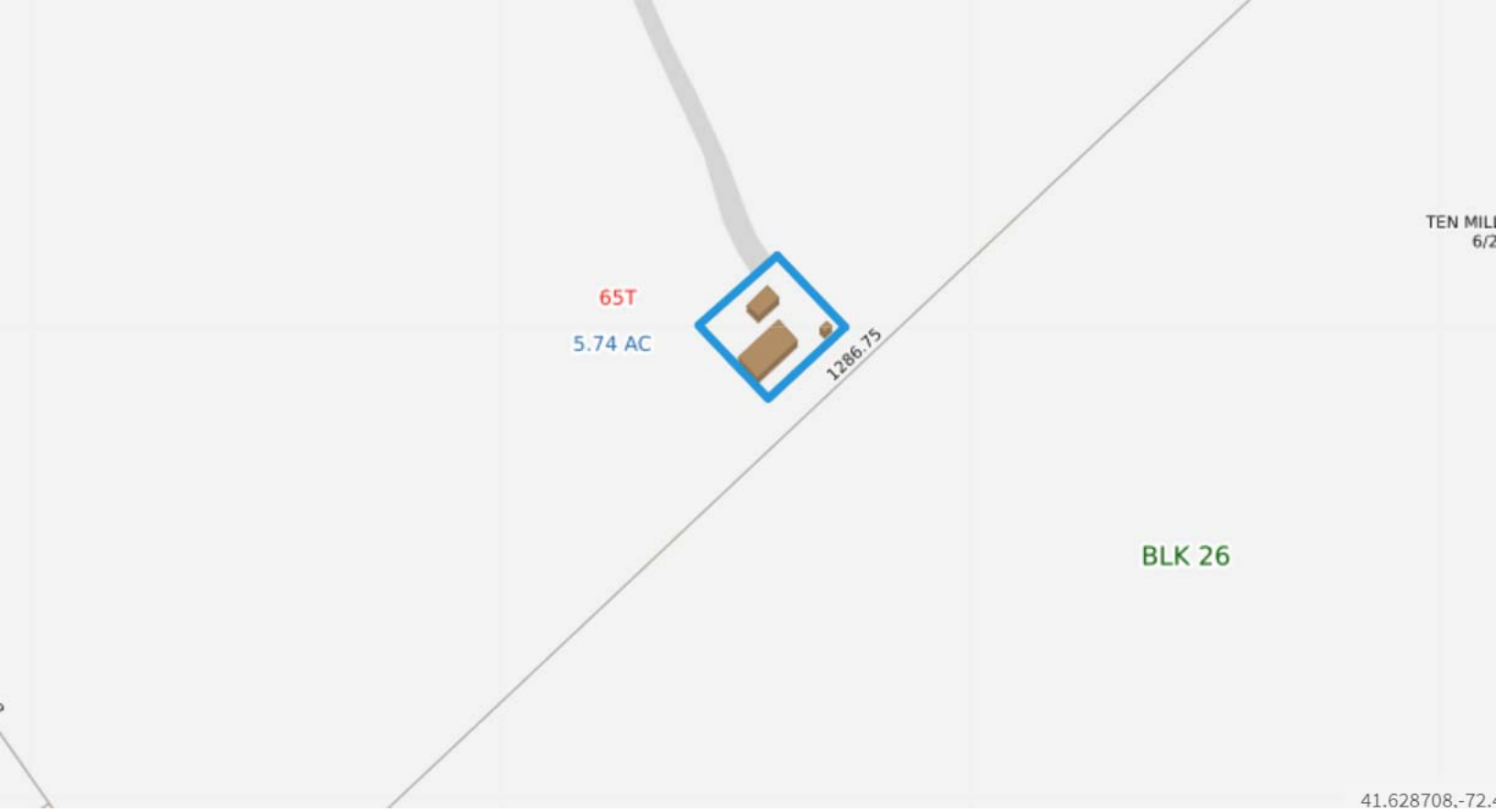

65T
5.74 AC
1286.75
BLK 26
TEN MILE
6/2
41.628708,-72.4

Exhibit C

Construction Drawings

T · · Mobile · · ·

T-MOBILE SITE NUMBER: CT11251A
T-MOBILE SITE NAME: EAST HAMPTON-2_1
T-MOBILE PROJECT: L600

BUSINESS UNIT #: 806366
SITE ADDRESS: 73 NORTH MAIN ST MARLBOROUGH, CT 06447
COUNTY: HARTFORD
SITE TYPE: MONOPOLE
TOWER HEIGHT: 155'-6"

SITE INFORMATION

CROWN CASTLE USA INC. SITE NAME:	HRT 107(C) 943204
SITE ADDRESS:	73 NORTH MAIN ST MARLBOROUGH, CT 06447
COUNTY:	HARTFORD
MAP/PARCEL #:	002222728
AREA OF CONSTRUCTION:	EXISTING
LATITUDE:	41°37'47.30"
LONGITUDE:	-72°27'59.40"
LAT/LONG TYPE:	NAD83
GROUND ELEVATION:	581'-0"
CURRENT ZONING:	TOWN OF MARLBOROUGH
JURISDICTION:	CT-CONNECTICUT SITING COUNCIL
OCCUPANCY CLASSIFICATION:	U
TYPE OF CONSTRUCTION:	IIB
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION
PROPERTY OWNER:	PYNE, JAMES E 73 NORTH MAIN ST MARLBOROUGH, CT 06447
TOWER OWNER:	CROWN CASTLE 2000 CORPORATE DRIVE CANONSBURG, PA 15317
CARRIER/APPLICANT:	T-MOBILE 12920 SE 38TH STREET BELLEVUE, WA 98006
ELECTRIC PROVIDER:	CONNECTICUT LIGHT & POWER CO 800-286-2000
TELCO PROVIDER:	ATT 866-620-6900

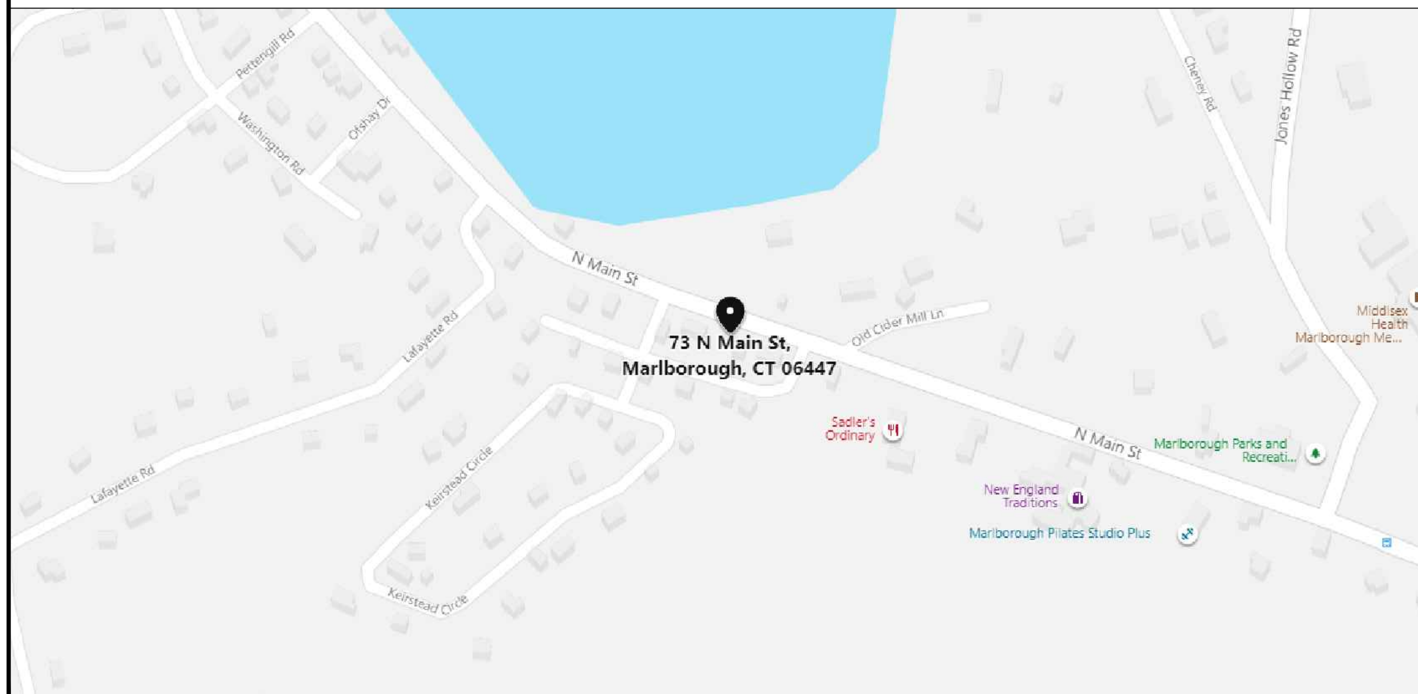
DRAWING INDEX

SHEET #	SHEET DESCRIPTION
T-1	TITLE SHEET
T-2	GENERAL NOTES
C-1.1	SITE PLAN
C-1.2	EXISTING & FINAL EQUIPMENT PLANS
C-2	FINAL ELEVATION & ANTENNA PLANS
C-3	EQUIPMENT DETAILS & COAX COLOR CODING
C-4	EQUIPMENT SPECS
G-1	TYPICAL FINAL GROUNDING SCHEMATIC
G-2	GROUNDING DETAILS
E-1	ONE LINE DIAGRAM

ALL DRAWINGS CONTAINED HEREIN ARE FORMATTED FOR 11X17. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

CALL CONNECTICUT ONE CALL
(800) 922-4455
CALL 3 WORKING DAYS
BEFORE YOU DIG!

LOCATION MAP



NO SCALE

PROJECT TEAM

A&E FIRM:	KIMLEY-HORN AND ASSOCIATES, INC. COA #: PEC.0000738 4807 ROCKSIDE RD, SUITE 430 INDEPENDENCE, OH 44131 KEVIN.CLEMENTS@KIMLEY-HORN.COM
CROWN CASTLE USA INC. DISTRICT CONTACTS:	3 CORPORATE PARK DRIVE, SUITE 101 CLIFTON PARK, NY 12065
	CATHERINE COVINGTON - PROJECT MANAGER CATHERINE.COVINGTON@CROWNCASTLE.COM
	ALLISON SQUIRES - A&E SPECIALIST 518-653-2598 ALLISON.SQUIRES.CONTRACTOR@CROWNCASTLE.COM

PROJECT DESCRIPTION

THE PURPOSE OF THIS PROJECT IS TO ENHANCE BROADBAND CONNECTIVITY AND CAPACITY TO THE EXISTING ELIGIBLE WIRELESS FACILITY.

TOWER SCOPE OF WORK:
- REMOVE (3) ANTENNAS
- REMOVE (3) TMAS
- INSTALL (3) ANTENNAS
- INSTALL (3) RADIO 4449 B71+B12
- INSTALL (3) TMAS
- INSTALL (1) ERICSSON 6X12 HCS

GROUND SCOPE OF WORK:
- REMOVE (1) DUS41
- REMOVE (6) RUS01 B12
- INSTALL (6) RUS01 B4
- INSTALL (2) BB 6630

APPLICABLE CODES/REFERENCE DOCUMENTS

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES:

CODE TYPE	CODE
BUILDING	2018 CT STATE BUILDING CODE (2015 IBC)
MECHANICAL	2015 IMC
ELECTRICAL	2017 NEC

REFERENCE DOCUMENTS:

STRUCTURAL ANALYSIS:	BY OTHERS
DATED:	
MOUNT ANALYSIS:	BY OTHERS
DATED:	
RFDS REVISION:	2.1
DATED:	03/29/19
ORDER ID:	----
REVISION:	0

NOTE:
PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE CROWN NOC AT (800) 788-7011 & CROWN CONSTRUCTION MANAGER.

T · · Mobile · · ·
12920 SE 38TH STREET
BELLEVUE, WA 98006

CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

Kimley»Horn
COA #PEC.0000738
421 FAYETTEVILLE ST, SUITE 600
RALEIGH, NC 27601

T-MOBILE SITE NUMBER:
CT11251A

BU #: **806366**
HRT 107(C) 943204

73 NORTH MAIN ST
MARLBOROUGH, CT 06447

EXISTING 155'-6" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	05/31/19	JW	ISSUED FOR PERMITTING	MCK
0	07/15/19	JW	ISSUED FOR CONSTRUCTION	MCK

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SHEET NUMBER:	REVISION:
T-1	0

CROWN CASTLE USA INC. SITE ACTIVITY REQUIREMENTS:

1. NOTICE TO PROCEED– NO WORK SHALL COMMENCE PRIOR TO CROWN CASTLE USA INC. WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE CROWN CASTLE USA INC. NOC AT 800–788–7011 & THE CROWN CASTLE USA INC. CONSTRUCTION MANAGER.
2. "LOOK UP" – CROWN CASTLE USA INC. SAFETY CLIMB REQUIREMENT:
THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR CROWN CASTLE USA INC. POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.
3. PRIOR TO THE START OF CONSTRUCTION, ALL REQUIRED JURISDICTIONAL PERMITS SHALL BE OBTAINED. THIS INCLUDES, BUT IS NOT LIMITED TO, BUILDING, ELECTRICAL, MECHANICAL, FIRE, FLOOD ZONE, ENVIRONMENTAL, AND ZONING. AFTER ONSITE ACTIVITIES AND CONSTRUCTION ARE COMPLETED, ALL REQUIRED PERMITS SHALL BE SATISFIED AND CLOSED OUT ACCORDING TO LOCAL JURISDICTIONAL REQUIREMENTS.
4. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN, AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) AND CROWN CASTLE USA INC. STANDARD CED–STD–10253, INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION, TO CERTIFY THE SUPPORTING STRUCTURE(S) IN ACCORDANCE WITH ANSI/TIA–322 (LATEST EDITION).
5. ALL SITE WORK TO COMPLY WITH QAS–STD–10068 "INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON CROWN CASTLE USA INC. TOWER SITE" AND LATEST VERSION OF ANSI/TIA–1019–A–2012 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS."
6. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY CROWN CASTLE USA INC. PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
9. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
10. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION E) CONSTRUCTION SAFETY PROCEDURES.
11. ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND PROJECT SPECIFICATIONS, LATEST APPROVED REVISION.
12. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH AT THE COMPLETION OF THE WORK. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
13. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, TOWER OWNER, CROWN CASTLE USA INC., AND/OR LOCAL UTILITIES.
14. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE REQUIRED BY LOCAL JURISDICTION AND SIGNAGE REQUIRED ON INDIVIDUAL PIECES OF EQUIPMENT, ROOMS, AND SHELTERS.
15. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.
16. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
17. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE CONSTRUCTION DRAWINGS AND/OR PROJECT SPECIFICATIONS.
18. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
19. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
20. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
21. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.
22. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
CONTRACTOR: GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION
CARRIER: T–MOBILE
TOWER OWNER: CROWN CASTLE USA INC.
2. THESE DRAWINGS HAVE BEEN PREPARED USING STANDARDS OF PROFESSIONAL CARE AND COMPLETENESS NORMALLY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY REPUTABLE ENGINEERS IN THIS OR SIMILAR LOCALITIES. IT IS ASSUMED THAT THE WORK DEPICTED WILL BE PERFORMED BY AN EXPERIENCED CONTRACTOR AND/OR WORKPEOPLE WHO HAVE A WORKING KNOWLEDGE OF THE APPLICABLE CODE STANDARDS AND REQUIREMENTS AND OF INDUSTRY ACCEPTED STANDARD GOOD PRACTICE. AS NOT EVERY CONDITION OR ELEMENT IS (OR CAN BE) EXPLICITLY SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL USE INDUSTRY ACCEPTED STANDARD GOOD PRACTICE FOR MISCELLANEOUS WORK NOT EXPLICITLY SHOWN.
3. THESE DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE MEANS OR METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR PROTECTION OF LIFE AND PROPERTY DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, FORMWORK, SHORING, ETC. SITE VISITS BY THE ENGINEER OR HIS REPRESENTATIVE WILL NOT INCLUDE INSPECTION OF THESE ITEMS AND IS FOR STRUCTURAL OBSERVATION OF THE FINISHED STRUCTURE ONLY.
4. NOTES AND DETAILS IN THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT, AND/OR AS PROVIDED FOR IN THE CONTRACT DOCUMENTS. WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL NOTES, AND SPECIFICATIONS, THE GREATER, MORE STRICT REQUIREMENTS, SHALL GOVERN. IF FURTHER CLARIFICATION IS REQUIRED CONTACT THE ENGINEER OF RECORD.
5. SUBSTANTIAL EFFORT HAS BEEN MADE TO PROVIDE ACCURATE DIMENSIONS AND MEASUREMENTS ON THE DRAWINGS TO ASSIST IN THE FABRICATION AND/OR PLACEMENT OF CONSTRUCTION ELEMENTS BUT IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE DIMENSIONS, MEASUREMENTS, AND/OR CLEARANCES SHOWN IN THE CONSTRUCTION DRAWINGS PRIOR TO FABRICATION OR CUTTING OF ANY NEW OR EXISTING CONSTRUCTION ELEMENTS. IF IT IS DETERMINED THAT THERE ARE DISCREPANCIES AND/OR CONFLICTS WITH THE CONSTRUCTION DRAWINGS THE ENGINEER OF RECORD IS TO BE NOTIFIED AS SOON AS POSSIBLE.
6. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CROWN CASTLE.
7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
8. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
9. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
10. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CARRIER AND CROWN CASTLE PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
11. CONTRACTOR IS TO PERFORM A SITE INVESTIGATION AND IS TO DETERMINE THE BEST ROUTING OF ALL CONDUITS FOR POWER, AND TELCO AND FOR GROUNDING CABLES AS SHOWN IN THE POWER, TELCO, AND GROUNDING PLAN DRAWINGS.
12. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF CROWN CASTLE USA INC.
13. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
14. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST–IN–PLACE CONCRETE.
2. UNLESS NOTED OTHERWISE, SOIL BEARING PRESSURE USED FOR DESIGN OF SLABS AND FOUNDATIONS IS ASSUMED TO BE 1000 psf.
3. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 3000 psi AT 28 DAYS, UNLESS NOTED OTHERWISE. NO MORE THAN 90 MINUTES SHALL ELAPSE FROM BATCH TIME TO TIME OF PLACEMENT UNLESS APPROVED BY THE ENGINEER OF RECORD. TEMPERATURE OF CONCRETE SHALL NOT EXCEED 90°f AT TIME OF PLACEMENT.
4. CONCRETE EXPOSED TO FREEZE–THAW CYCLES SHALL CONTAIN AIR ENTRAINING ADMIXTURES. AMOUNT OF AIR ENTRAINMENT TO BE BASED ON SIZE OF AGGREGATE AND F3 CLASS EXPOSURE (VERY SEVERE). CEMENT USED TO BE TYPE II PORTLAND CEMENT WITH A MAXIMUM WATER–TO–CEMENT RATIO (W/C) OF 0.45.
5. ALL STEEL REINFORCING SHALL CONFORM TO ASTM A615. ALL WELDED WIRE FABRIC (WWF) SHALL CONFORM TO ASTM A185. ALL SPLICES SHALL BE CLASS "B" TENSION SPLICES, UNLESS NOTED OTHERWISE. ALL HOOKS SHALL BE STANDARD 90 DEGREE HOOKS, UNLESS NOTED OTHERWISE. YIELD STRENGTH (Fy) OF STANDARD DEFORMED BARS ARE AS FOLLOWS:
#4 BARS AND SMALLER . . . . 40 ksi
#5 BARS AND LARGER . . . . 60 ksi
6. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:
CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH . . . . 3"
CONCRETE EXPOSED TO EARTH OR WEATHER:
#6 BARS AND LARGER . . . . 2"
#5 BARS AND SMALLER . . . . 1–1/2"
CONCRETE NOT EXPOSED TO EARTH OR WEATHER:
SLAB AND WALLS . . . . 3/4"
BEAMS AND COLUMNS . . . . 1–1/2"
7. A TOOLED EDGE OR A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNLESS NOTED OTHERWISE, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.
2. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.
3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.
4. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.
4.1. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.
4.2. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 20,000 AIC MINIMUM. VERYIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PRE THE GOVERNING JURISDICTION.
5. EACH END OF EVERY POWER PHASE CONDUCTOR, GROUNDING CONDUCTOR, AND TELCO CONDUCTOR OR CABLE SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.
6. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH LAMICOID TAGS SHOWING THEIR RATED VOLTAGE, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (i.e. PANEL BOARD AND CIRCUIT ID'S).
7. PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.
8. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
9. ALL POWER AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE COPPER CONDUCTOR (#14 OR LARGER) WITH TYPE THHW, THWN, THWN–2, XHHW, XHHW–2, THW, THW–2, RHW, OR RHW–2 INSULATION UNLESS OTHERWISE SPECIFIED.
10. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE COPPER CONDUCTOR (#6 OR LARGER) WITH TYPE THHW, THWN, THWN–2, XHHW, XHHW–2, THW, THW–2, RHW, OR RHW–2 INSULATION UNLESS OTHERWISE SPECIFIED.
11. POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI–CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.
12. POWER AND CONTROL WIRING FOR USE IN CABLE TRAY SHALL BE MULTI–CONDUCTOR, TYPE TC CABLE (#14 OR LARGER), WITH TYPE THHW, THWN, THWN–2, XHHW, XHHW–2, THW, THW–2, RHW, OR RHW–2 INSULATION UNLESS OTHERWISE SPECIFIED.
13. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP–STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION NOT LESS THAN 75° C (90° C IF AVAILABLE).
14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.
15. ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (IMC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
16. ELECTRICAL METALLIC TUBING (EMT) OR METAL–CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
17. SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.
18. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
19. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SET SCREW FITTINGS ARE NOT ACCEPTABLE.
20. CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND THE NEC.
21. WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREMOLD SPECMATE WIREWAY).
22. SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).
23. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON–PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES (i.e. POWDER–ACTUATED) FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.
24. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY–COATED SHEET STEEL. SHALL MEET OR EXCEED UL 50 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND NEMA 3R (OR BETTER) FOR EXTERIOR LOCATIONS.
25. METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY–COATED OR NON–CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
26. NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2 (NEWEST REVISION) AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
27. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CARRIER AND/OR CROWN CASTLE USA INC. BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
28. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.
29. INSTALL LAMICOID LABEL ON THE METER CENTER TO SHOW "T–MOBILE".
30. ALL EMPTY/SPARE CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE PULL CORD INSTALLED.

CONDUCTOR COLOR CODE		
SYSTEM	CONDUCTOR	COLOR
120/240V, 1Ø	A PHASE	BLACK
	B PHASE	RED
	NEUTRAL	WHITE
	GROUND	GREEN
120/208V, 3Ø	A PHASE	BLACK
	B PHASE	RED
	C PHASE	BLUE
	NEUTRAL	WHITE
	GROUND	GREEN
277/480V, 3Ø	A PHASE	BROWN
	B PHASE	ORANGE OR PURPLE
	C PHASE	YELLOW
	NEUTRAL	GREY
	GROUND	GREEN
DC VOLTAGE	POS (+)	RED**
	NEG (–)	BLACK**

* SEE NEC 210.5(C)(1) AND (2)
** POLARITY MARKED AT TERMINATION

GREENFIELD GROUNDING NOTES:

1. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION AND AC POWER GES'S) SHALL BE BONDED TOGETHER AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
2. THE CONTRACTOR SHALL PERFORM IEEE FALL–OF–POTENTAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS, THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT AND PROVIDE TESTING RESULTS.
4. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
5. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
6. EACH CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 STRANDED COPPER OR LARGER FOR INDOOR BTS; #2 BARE SOLID TINNED COPPER FOR OUTDOOR BTS.
7. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED BACK TO BACK CONNECTIONS ON OPPOSITE SIDE OF THE GROUND BUS ARE PERMITTED.
8. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING SHALL BE #2 SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.
11. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
12. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.
13. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
14. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.
15. APPROVED ANTIOXIDANT COATINGS (i.e. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
16. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
17. MISCELLANEOUS ELECTRICAL AND NON–ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
18. BOND ALL METALLIC OBJECTS WITHIN 6 ft OF MAIN GROUND RING WITH (1) #2 BARE SOLID TINNED COPPER GROUND CONDUCTOR.
19. GROUND CONDUCTORS USED FOR THE FACILITY GROUNDING AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON–METALLIC MATERIAL SUCH AS PVC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (i.e., NONMETALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
20. ALL GROUNDS THAT TRANSITION FROM BELOW GRADE TO ABOVE GRADE MUST BE #2 BARE SOLID TINNED COPPER IN 3/4" NON–METALLIC, FLEXIBLE CONDUIT FROM 24" BELOW GRADE TO WITHIN 3" TO 6" OF CAD–WELD TERMINATION POINT. THE EXPOSED END OF THE CONDUIT MUST BE SEALED WITH SILICONE CAULK. (ADD TRANSITIONING GROUND STANDARD DETAIL AS WELL).
21. BUILDINGS WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY).

ABBREVIATIONS:

ANT	ANTENNA
(E)	EXISTING
FIF	FACILITY INTERFACE FRAME
GEN	GENERATOR
GPS	GLOBAL POSITIONING SYSTEM
GSM	GLOBAL SYSTEM FOR MOBILE
LTE	LONG TERM EVOLUTION
MGB	MASTER GROUND BAR
MW	MICROWAVE
(N)	NEW
NEC	NATIONAL ELECTRIC CODE
(P)	PROPOSED
PP	POWER PLANT
QTY	QUANTITY
RECT	RECTIFIER
RBS	RADIO BASE STATION
RET	REMOTE ELECTRIC TILT
RFDS	RADIO FREQUENCY DATA SHEET
RRH	REMOTE RADIO HEAD
RRU	REMOTE RADIO UNIT
SIAD	SMART INTEGRATED DEVICE
TMA	TOWER MOUNTED AMPLIFIER
TYP	TYPICAL
UMTS	UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM
W.P.	WORK POINT

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CROWN CASTLE
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CLIFTON PARK, NY 12065

Kimley»Horn
COA #PEC.0000738
421 FAYETTEVILLE ST, SUITE 600
RALEIGH, NC 27601

T-MOBILE SITE NUMBER:
CT11251A

BU #: **806366**
HRT 107(C) 943204

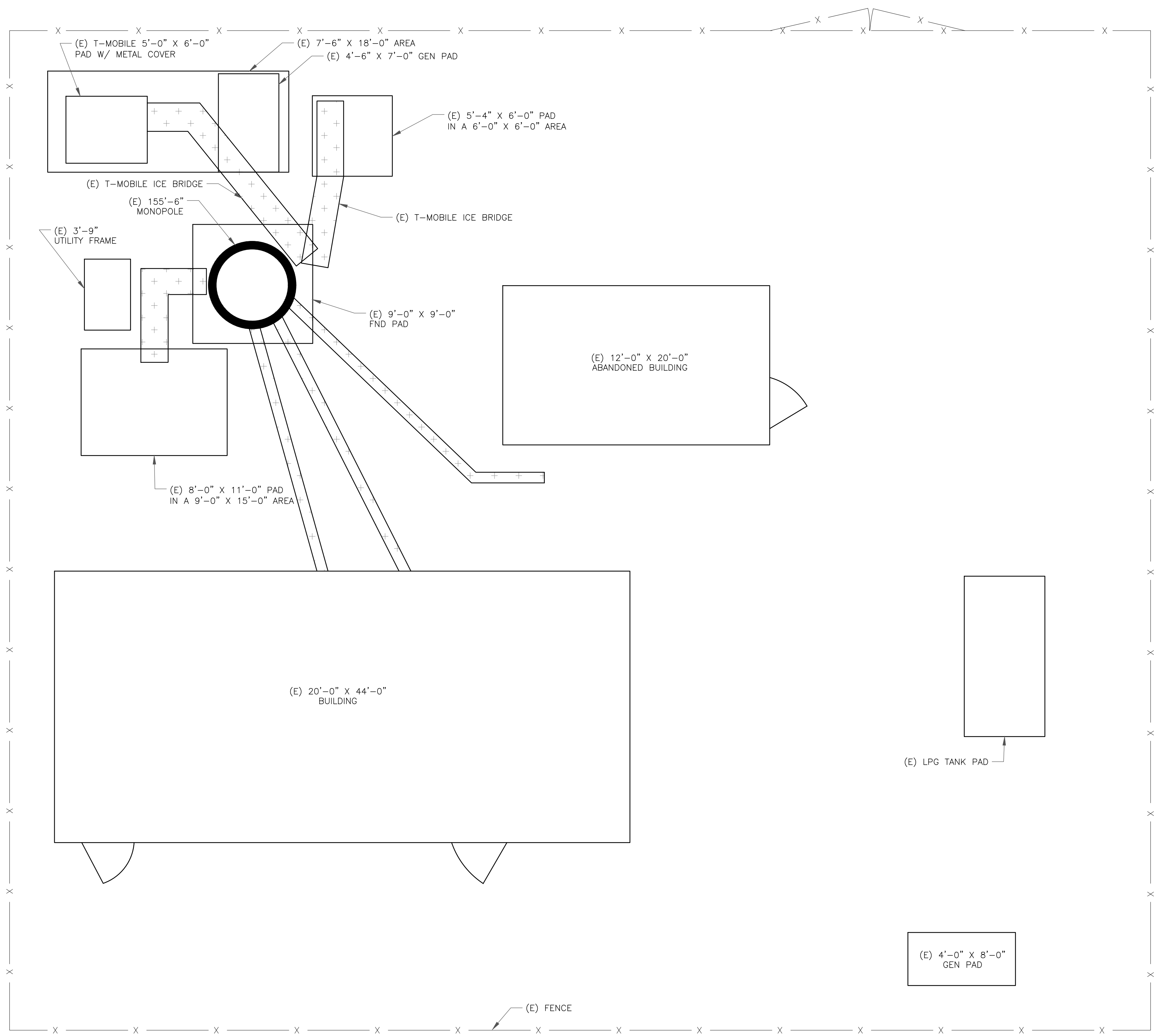
73 NORTH MAIN ST
MARLBOROUGH, CT 06447

EXISTING 155'-6" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	05/31/19	JW	ISSUED FOR PERMITTING	MCK
0	07/15/19	JW	ISSUED FOR CONSTRUCTION	MCK

SHEET NUMBER: T-2
REVISION: 0



1 SITE PLAN
SCALE: 4' 2' 0 4' 3/16"=1'-0" (FULL SIZE) 3/32"=1'-0" (11x17)

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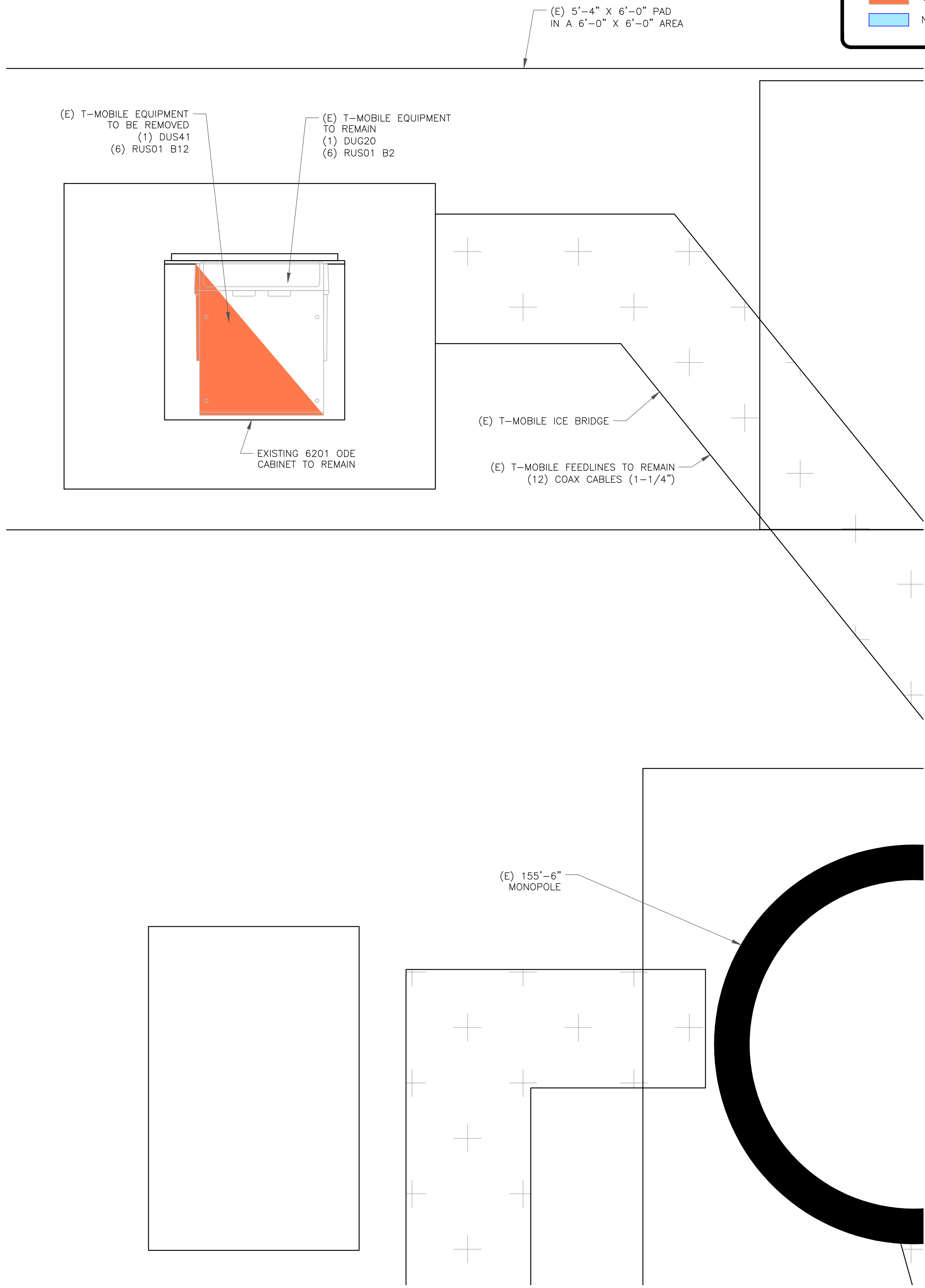
STATE OF CONNECTICUT PROFESSIONAL ENGINEER LICENSED 29510
7-15-19

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

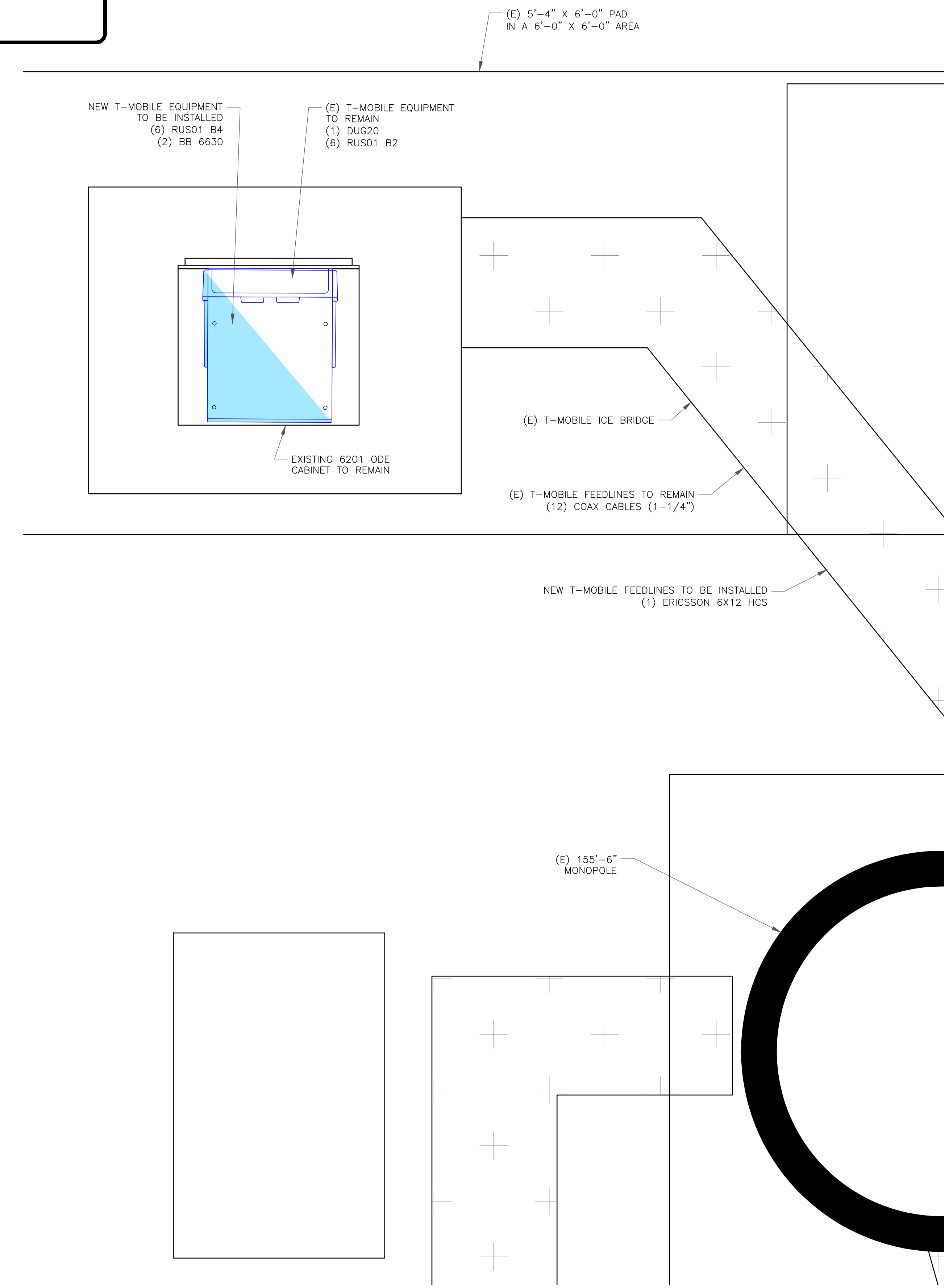
SHEET NUMBER: C-1.1
REVISION: 0

EQUIPMENT LEGEND:

- EXISTING
- TO BE RELOCATED/REMOVED
- NEW



1 EXISTING EQUIPMENT PLAN
SCALE: 1/4"=1'-0" (FULL SIZE) 1/8"=1'-0" (11x17)



2 FINAL EQUIPMENT PLAN
SCALE: 1/4"=1'-0" (FULL SIZE) 1/8"=1'-0" (11x17)

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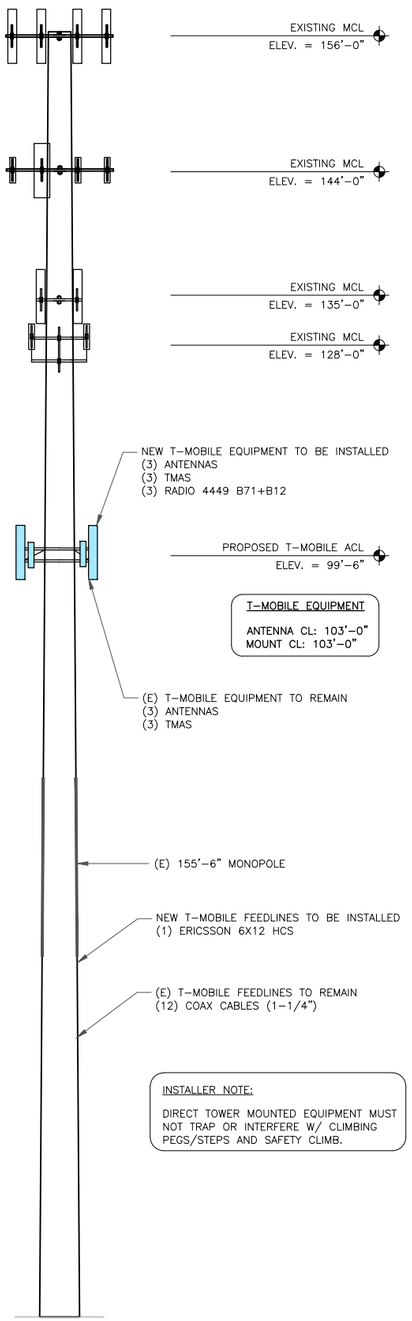
SHEET NUMBER: **C-1.2**
REVISION: **0**



INSTALLER NOTE:

DIRECT TOWER MOUNTED EQUIPMENT MUST NOT TRAP OR INTERFERE W/ CLIMBING PEGS/STEPS AND SAFETY CLIMB.

1 FINAL ELEVATION
SCALE: NOT TO SCALE

EQUIPMENT LEGEND:

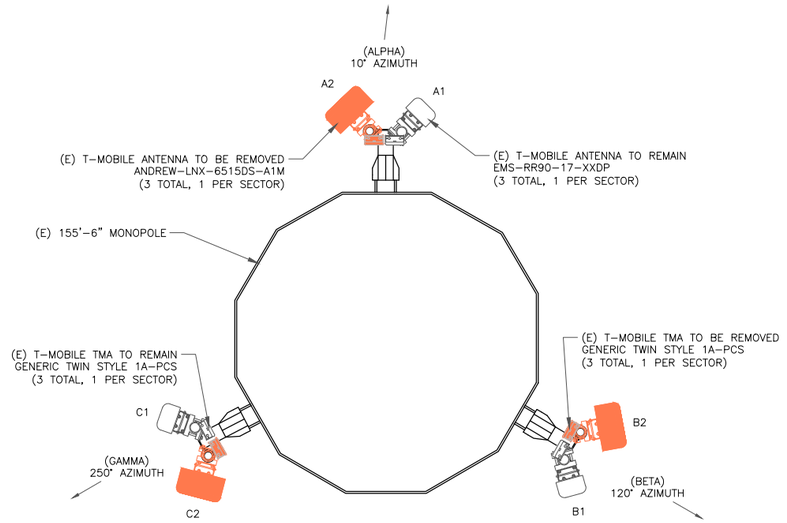
- EXISTING
- TO BE RELOCATED/REMOVED
- NEW

MOUNT ANALYSIS NOTES:

1. THE DESIGN DEPICTED IN THESE DRAWINGS IS VALID WHEN ACCOMPANIED BY A CORRESPONDING PASSING MOUNT ANALYSIS.
2. CONSTRUCTION MANAGER / GENERAL CONTRACTOR SHALL REVIEW THE MOUNT ANALYSIS FOR ANY CONDITIONS PRIOR TO INSTALLATION.
3. ANY REQUIRED MOUNT MODIFICATION DESIGN OR MOUNT REPLACEMENT SHALL BE APPROVED BY EOR.

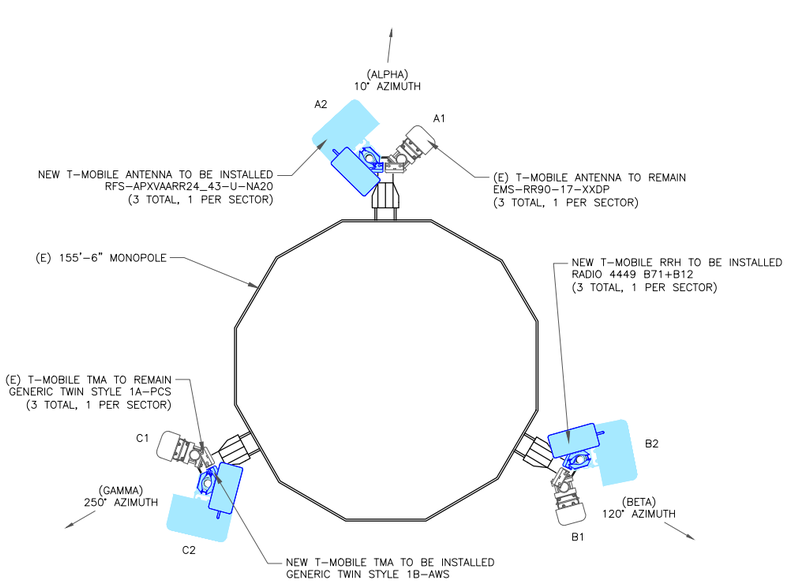
"LOOK UP" – CROWN CASTLE USA INC.
SAFETY CLIMB REQUIREMENT:

THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR CROWN CASTLE USA INC. POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.



2 EXISTING ANTENNA PLAN
SCALE: NOT TO SCALE

N



3 FINAL ANTENNA PLAN
SCALE: NOT TO SCALE

N

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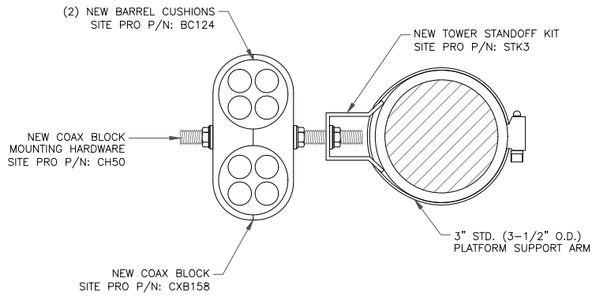
SHEET NUMBER: C-2

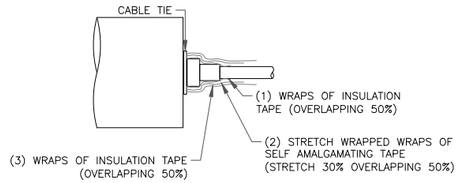
REVISION: 0



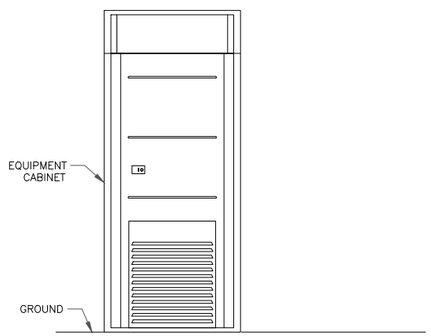
1 RF JUMPER DETAIL
SCALE: NOT TO SCALE

INSTALLER NOTE:

JUMPERS TO BE TORQUED TO 221.27 IN/LBS



2 RF JUMPER CONNECTION
SCALE: NOT TO SCALE

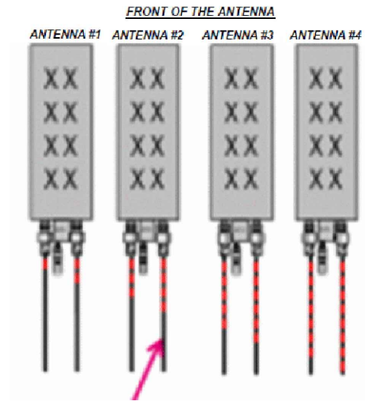


3 GROUND EQUIPMENT ELEVATION
SCALE: NOT TO SCALE

Coax Color Coding

- Antennas will be labeled (back of antenna view) Right to left 1 - X ports
- Coax/Jumper lines will be identified by sector color and by number of bands around the coax/jumper

SECTOR A	RED
SECTOR B	GREEN
SECTOR C	BLUE
SECTOR D	YELLOW
SECTOR E	WHITE
SECTOR F	PURPLE
LMU	BROWN + SECTOR COLOR BANDS (1 & 2)
FIBER ID	GRAY
UNUSED COAX	PINK
MICROWAVE	ORANGE
DWE T-1'S + GPS DOWNLINK CABLE	ID W/LABEL MAKER

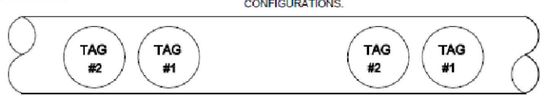


COLOR CODING NOTES:

color	GSM
color	UMTS 1900
color	UMTS AWS
color	LTE
color	FIBER CABLE

METALLIC TAG NOTES:

1. TWO METALLIC TAGS SHALL BE ATTACHED AT EACH END OF EVERY CABLE LONGER THAN (3) THREE FEET
2. CABLE LESS THAN (3) THREE FEET WILL HAVE TWO METALLIC TAGS ATTACHED AT THE CENTER OF THE CABLE.
3. TAGS WILL BE FASTENED WITH STAINLESS STEEL ZIP TIES APPROPRIATE FOR CABLE DIAMETER.
4. STANDARDIZED METALLIC TAG KIT WILL BE ASSEMBLED WITH TAGS ALREADY ENGRAVED TO ACCOMMODATE ALL CONFIGURATIONS.



ANTENNA AND COAXIAL CABLE SCHEDULE

1. ALL ANTENNAS SHALL BE FURNISHED WITH DOWNTILT BRACKETS. CONTRACTOR SHALL COORDINATE REQUIRED MECHANICAL DOWNTILT FOR EACH ANTENNA WITH RF ENGINEER. ANTENNA DOWNTILT SHALL BE SET AND VERIFIED BY A SMART LEVEL.
2. CONTRACTOR SHALL INSTALL COLOR CODE RINGS ON EACH OF THE HYBRID CABLES AND JUMPER CABLES WITH UV RESISTANT TAPE. ALL CABLE SHALL BE MARKED AT TOP AND BOTTOM WITH 2" COLOR TAPE OR STENCIL TAG. COLOR TAPE MAY BE OBTAINED FROM GRAYBAR ELECTRONICS.

4 COAX COLOR CODING
SCALE: NOT TO SCALE

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RALEIGH, NC 27601

T-MOBILE SITE NUMBER:
CT11251A

BU #: **806366**
HRT 107(C) 943204

73 NORTH MAIN ST
MARLBOROUGH, CT 06447

EXISTING 155'-6" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
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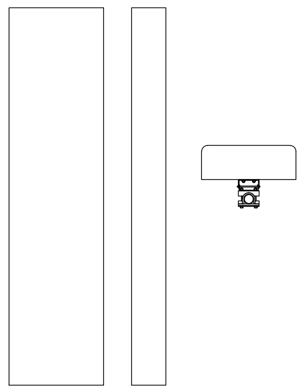
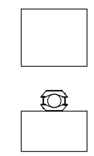
SHEET NUMBER: C-3

REVISION: 0



RFS – APXVAARR24_43–U–NA20
WEIGHT: 128 LBS.
SIZE (HxWxD): 95.9x24x8.7 IN.

1 RFS–APXVAARR24_43–U–NA20
SCALE: NOT TO SCALE



ERICSSON – 4449 B71 + B12
WEIGHT: 74 LBS.
SIZE (HxWxD): 13.1x14.9x9.2 IN.

2 RADIO 4449 B71+B12
SCALE: NOT TO SCALE

3 NOT USED
SCALE: NOT TO SCALE

4 NOT USED
SCALE: NOT TO SCALE

5 NOT USED
SCALE: NOT TO SCALE

6 NOT USED
SCALE: NOT TO SCALE

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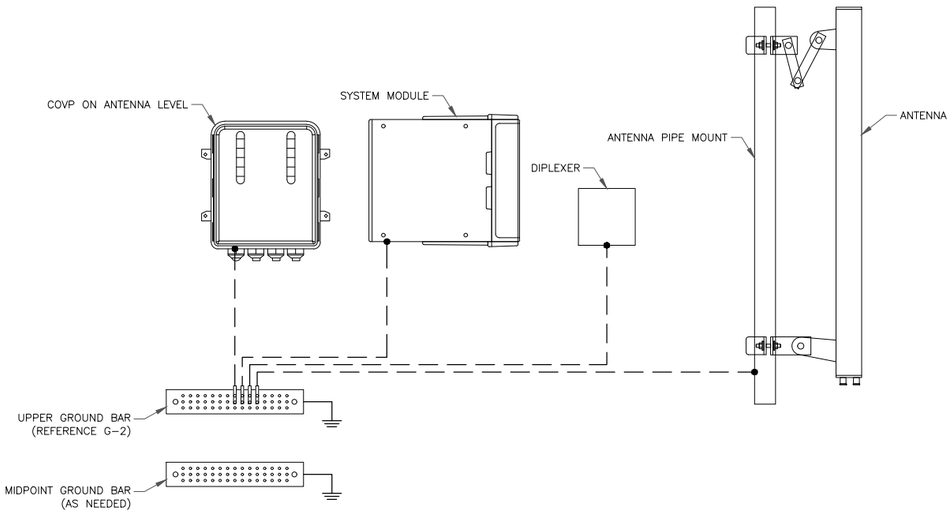
STATE OF CONNECTICUT
29510
LICENSED PROFESSIONAL ENGINEER
7-15-19

SHEET NUMBER: C-4

REVISION: 0



1 TYPICAL FINAL GROUNDING SCHEMATIC
SCALE: NOT TO SCALE

GROUNDING PLAN LEGEND:

- #6 STRANDED COPPER WITH GREEN INSULATION GROUND WIRE
- #2 STRANDED COPPER WITH GREEN INSULATION GROUND WIRE
- #2 BARE, SOLID, TINNED COPPER GROUND WIRE
- EXOTHERMIC WELD
- MECHANICAL CONNECTION
- COPPER GROUND ROD
- GROUND ROD W/ TEST WELL

NOTE:

SEE FINAL EQUIPMENT PLAN FOR PROPOSED EQUIPMENT REQUIRING GROUNDING. CONTRACTOR TO VERIFY EXISTING EQUIPMENT GROUNDING IN FIELD. CONTRACTOR TO VERIFY IN FIELD AND INSTALL ANY MISSING T-MOBILE GROUND BARS ON SITE.

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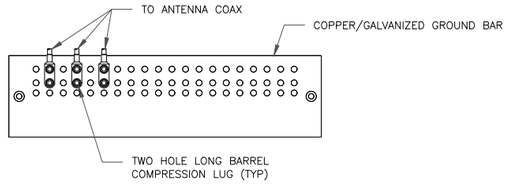
STATE OF CONNECTICUT
BRIAN S. BROWER
29510
LICENSED
PROFESSIONAL ENGINEER
7-15-19

SHEET NUMBER: G-1

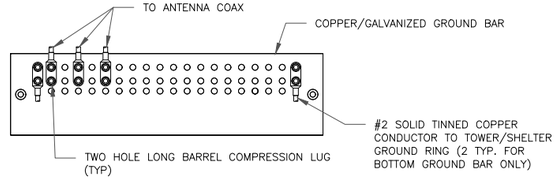
REVISION: 0



NOTES:

1. DOUBLING UP "OR STACKING" OF CONNECTIONS IS NOT PERMITTED.
2. EXTERIOR ANTIOXIDANT JOINT COMPOUND TO BE USED ON ALL EXTERIOR CONNECTIONS.
3. GROUND BAR SHALL NOT BE ISOLATED FROM TOWER. MOUNT DIRECTLY TO TOWER STEEL.

1 ANTENNA GROUND BAR DETAIL
SCALE: NOT TO SCALE

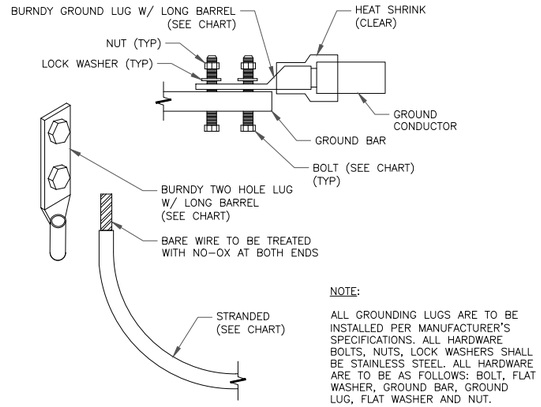


NOTES:

1. EXTERIOR ANTIOXIDANT JOINT COMPOUND TO BE USED ON ALL EXTERIOR CONNECTIONS.
2. GROUND BAR SHALL NOT BE ISOLATED FROM TOWER. MOUNT DIRECTLY TO TOWER STEEL (TOWER ONLY).
3. GROUND BAR SHALL BE ISOLATED FROM BUILDING OR SHELTER.

2 TOWER/SHELTER GROUND BAR DETAIL
SCALE: NOT TO SCALE

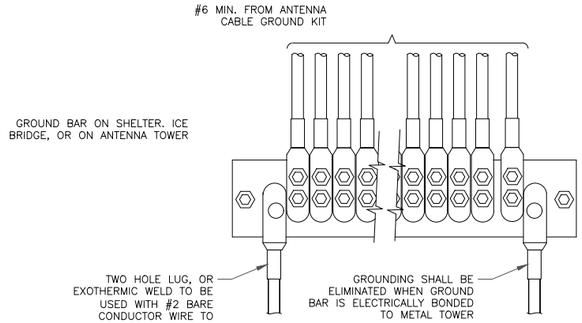
WIRE SIZE	BURNDY LUG	BOLT SIZE
#6 GREEN INSULATED	YA6C-2TC38	3/8" - 16 NC SS 2 BOLT
#2 SOLID TINNED	YA3C-2TC38	3/8" - 16 NC SS 2 BOLT
#2 STRANDED	YA2C-2TC38	3/8" - 16 NC SS 2 BOLT
#2/0 STRANDED	YA26-2TC38	3/8" - 16 NC SS 2 BOLT
#4/0 STRANDED	YA28-2N	1/2" - 16 NC SS 2 BOLT



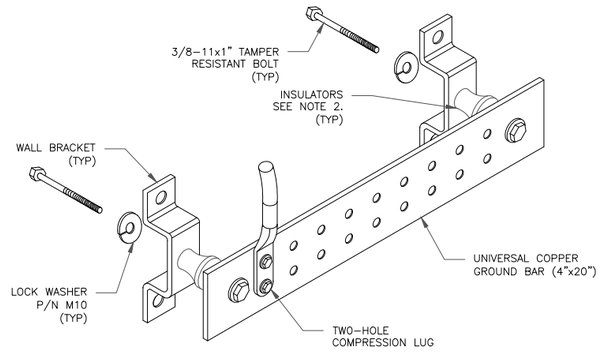
NOTE:

ALL GROUNDING LUGS ARE TO BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. ALL HARDWARE BOLTS, NUTS, LOCK WASHERS SHALL BE STAINLESS STEEL. ALL HARDWARE ARE TO BE AS FOLLOWS: BOLT, FLAT WASHER, GROUND BAR, GROUND LUG, FLAT WASHER AND NUT.

3 MECHANICAL LUG CONNECTION
SCALE: NOT TO SCALE



4 GROUNDWIRE INSTALLATION
SCALE: NOT TO SCALE

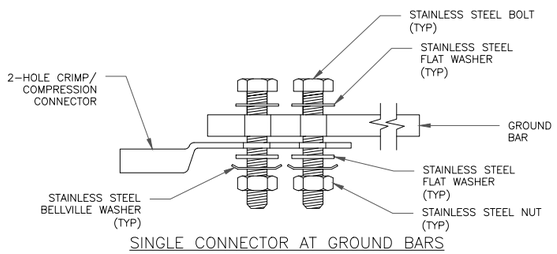


NOTES:

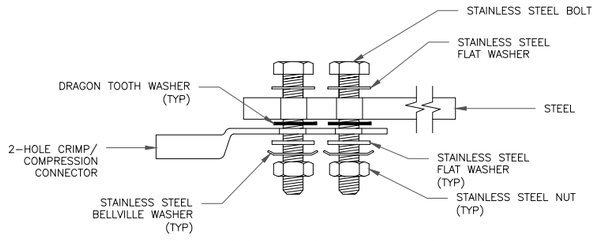
1. DOWN LEAD (HOME RUN) CONDUCTORS ARE NOT TO BE INSTALLED ON CROWN CASTLE USA INC. TOWER, PER THE GROUNDING DOWN CONDUCTOR POLICY QAS-STD-10091. NO MODIFICATION OR DRILLING TO TOWER STEEL IS ALLOWED IN ANY FORM OR FASHION, CAD-WELDING ON THE TOWER AND/OR IN THE AIR ARE NOT PERMITTED.

2. OMIT INSULATOR WHEN MOUNTING TO TOWER STEEL OR PLATFORM STEEL USE INSULATORS WHEN ATTACHING TO BUILDING OR SHELTERS.

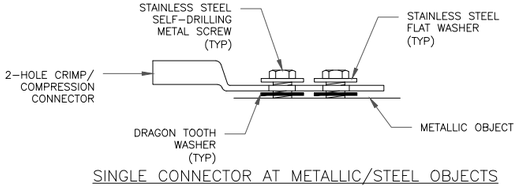
5 GROUND BAR DETAIL
SCALE: NOT TO SCALE



SINGLE CONNECTOR AT GROUND BARS

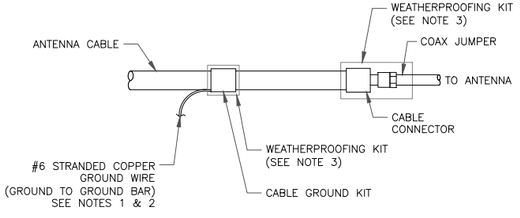


SINGLE CONNECTOR AT STEEL OBJECTS



SINGLE CONNECTOR AT METALLIC/STEEL OBJECTS

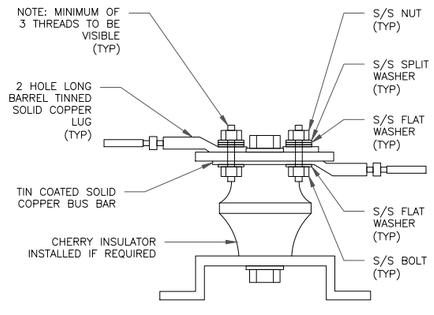
9 HARDWARE DETAIL FOR EXTERIOR CONNECTIONS
SCALE: NOT TO SCALE



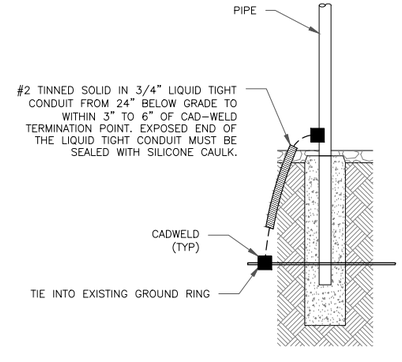
NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
2. GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
3. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT, COLD SHRINK SHALL NOT BE USED.

6 CABLE GROUND KIT CONNECTION
SCALE: NOT TO SCALE



7 LUG DETAIL
SCALE: NOT TO SCALE



8 TRANSITIONING GROUND DETAIL
SCALE: NOT TO SCALE

T-Mobile
12920 SE 38TH STREET
BELLEVUE, WA 98006

CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

Kimley»Horn
COA #PEC.0000738
421 FAYETTEVILLE ST, SUITE 600
RALEIGH, NC 27601

T-MOBILE SITE NUMBER:
CT11251A

BU #: **806366**
HRT 107(C) 943204

73 NORTH MAIN ST
MARLBOROUGH, CT 06447

EXISTING 155'-6" MONOPOLE

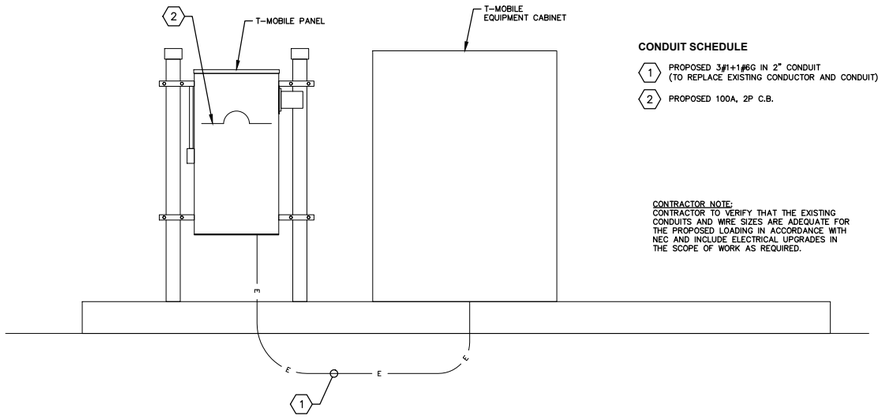
ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	05/31/19	JW	ISSUED FOR PERMITTING	MCK
0	07/15/19	JW	ISSUED FOR CONSTRUCTION	MCK

STATE OF CONNECTICUT
BRIAN E. BRUNER
29510
LICENSED
PROFESSIONAL ENGINEER
7-15-19

SHEET NUMBER: G-2

REVISION: 0



CONDUIT SCHEDULE

1. PROPOSED 3#1+1#6G IN 2" CONDUIT (TO REPLACE EXISTING CONDUCTOR AND CONDUIT)
2. PROPOSED 100A, 2P C.B.

CONTRACTOR NOTE:
CONTRACTOR TO VERIFY THAT THE EXISTING CONDUITS AND WIRE SIZES ARE ADEQUATE FOR THE PROPOSED LOADING IN ACCORDANCE WITH NEC AND INCLUDE ELECTRICAL UPGRADES IN THE SCOPE OF WORK AS REQUIRED.

1 ONE LINE DIAGRAM
SCALE: NOT TO SCALE

2 DETAIL NOT USED
SCALE: NOT TO SCALE

3 DETAIL NOT USED
SCALE: NOT TO SCALE

4 DETAIL NOT USED
SCALE: NOT TO SCALE

T-Mobile
12920 SE 38TH STREET
BELLEVUE, WA 98006

CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

Kimley»Horn
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CT11251A

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HRT 107(C) 943204

73 NORTH MAIN ST
MARLBOROUGH, CT 06447

EXISTING 155'-6" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
0	05/31/19	JW	ISSUED FOR PERMITTING	MCK

FOR REFERENCE ONLY

SHEET NUMBER: E-1

REVISION: 0

Exhibit D

Structural Analysis Report

Date: **May 6, 2019**

Heather Simeone
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

FDH Infrastructure Services, LLC
6521 Meridian Drive, Suite 107
Raleigh, North Carolina 27616
919.755.1012

Subject:	**Structural Analysis Report**	
Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11251A
	Carrier Site Name:	East Hampton-2_1
Crown Castle Designation:	**Crown Castle BU Number:**	806366
	Crown Castle Site Name:	HRT 107(C) 943204
	Crown Castle JDE Job Number:	559173
	Crown Castle Work Order Number:	1729888
	Crown Castle Order Number:	479823 Rev. 2
Engineering Firm Designation:	**FDH-IS Project Number:**	19BKFC1400 R.1
Site Data:	**73 North Main Street, MARLBOROUGH, Hartford County, CT** **Latitude *41° 37' 47.3"*, Longitude *-72° 27' 59.4"*** **155.5 Foot - Monopole Tower**	

Dear Heather Simeone,

FDH Infrastructure Services, LLC 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 **Tower Rating: 55.6%**

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.

Respectfully submitted by:

Eric Sjoerdsma
Project Engineer I

Reviewed by:

Dennis D. Abel, PE
Chief Engineer
CT PE License No. 23247

STATE OF CONNECTICUT
DENNIS D. ABEL
No. 23247
LICENSED
PROFESSIONAL ENGINEER
05-06-2019

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 155.5 ft Monopole tower designed by Fort Worth Tower, Inc.

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)
100.0	100.0	1	crown mounts	Side Arm Mount [SO 701-3]	1 12	1-5/8 1-1/4
		3	ems wireless	RV90-17-00DP		
		3	ericsson	KRY 112 144/1		
		3	ericsson	KRY 112 489/2		
		3	ericsson	RADIO 4449 B12/B71		
		3	rfs celwave	APXVAARR24_43-U-NA20		

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)
156.0	159.0	3	alcatel lucent	B13 RRH 4x30	17	1-5/8
		6	andrew	SBNHH-1D65B		
		3	commscope	LNX-6514DS-A1M		
		2	commscope	LNX-6514DS-AIM		
		1	commscope	LNX-8513DS-VTM		
		3	decibel	DB809K-Y		
		2	raycap	RRFDC-3315-PF-48		
	156.0	1	crown mounts	Platform Mount [LP 1002-1]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
144.0	144.0	1	crown mounts	Platform Mount [LP 1002-1]	12 4 2 1	1-1/4 3/4 3/8 Conduit
		3	ericsson	RRUS 12		
		3	ericsson	RRUS 32		
		3	ericsson	RRUS 4449 B5/B12		
		3	kathrein	80010965		
		3	kmw comm	AM-X-CD-16-65-00T-RET		
		3	powerwave tech	1001940		
		3	powerwave tech	7770.00		
		6	powerwave tech	LGP 17201		
		6	powerwave tech	LGP21903		
		2	raycap	DC6-48-60-18-8F		
135.0	135.0	3	kathrein	742 213	6	1-1/4
128.0	130.0	3	alcatel lucent	PCS 1900MHZ 4X45W-65MHZ	3 1	1-1/4 7/8
		6	alcatel lucent	RRH2X50-800		
		3	alcatel lucent	TD-RRH8X20-25		
		3	commscope	NNVV-65B-R4		
		3	rfs celwave	APXVTM14-ALU-I20		
	129.0	1	crown mounts	T-Arm Mount [TA 602-3]		
	127.0	1	crown mounts	T-Arm Mount [TA 602-3]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-TOWER MANUFACTURER DRAWINGS	Fort Worth Tower, Inc.	823126	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Fort Worth Tower, Inc.	823125	CCISITES
4-GEOTECHNICAL REPORTS	FDH Engineering, Inc.	2208816	CCISITES

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 and maintained in accordance with the manufacturer's specifications.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. FDH Infrastructure Services, LLC 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[2]	Pass / Fail
L1	155.5 - 110	Pole	TP64.606x58.6x0.375	1	-28.92	4083.22	14.7	Pass
L2	110 - 72.5	Pole	TP68.805x62.8x0.4375	2	-48.46	5456.99	27.7	Pass
L3	72.5 - 36	Pole	TP72.748x66.8082x0.5	3	-70.30	6956.40	36.4	Pass
L4	36 - 0	Pole	TP76.5x70.56x0.5	4	-98.89	7106.06	54.5	Pass
							Summary	
						Pole (L4)	54.5	Pass
						Rating =	**54.5**	**Pass**

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Anchor Rods	0	55.6	Pass
1,2	Base Plate	0	24.2	Pass
1,2	Base Foundation	0	33.7	Pass
1,2	Base Foundation Soil Interaction	0	31.0	Pass

Structure Rating (max from all components) =	55.6%[2]

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.

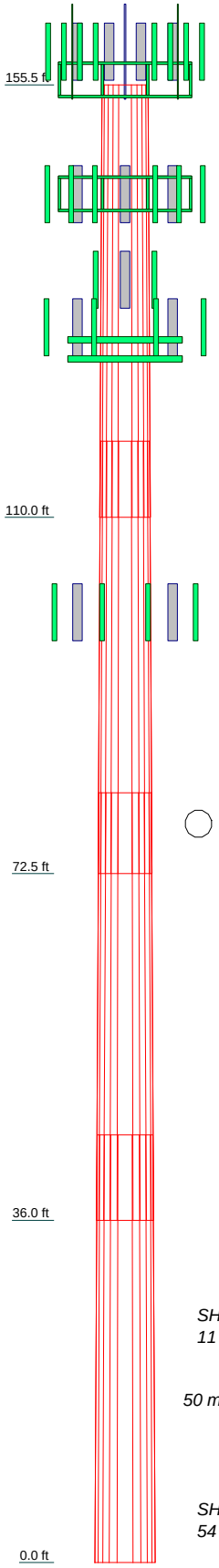
4.1) Recommendations

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	45.50	12	0.3750	8.00	58.6000	64.6060	A572-65	11.4
2	45.50	12	0.4375	8.50	62.8000	68.8050		14.3
3	45.00	12	0.5000	9.00	66.8082	72.7480		17.1
4	45.00	12	0.5000		70.5600	76.5000		18.0
								60.8



ALL REACTIONS ARE FACTORED

AXIAL 141 K

SHEAR 11 K *MOMENT 1229 kip-ft*

TORQUE 0 kip-ft
50 mph WIND - 1.5000 in ICE

AXIAL 99 K

SHEAR 54 K *MOMENT 5847 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 Hartford 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 0.00 ft
8. TIA-222-H Annex S
9. TOWER RATING: 54.5%

FDH INFRASTRUCTURE SERVICES
ENGINEERING INNOVATION

FDH Infrastructure Services, LLC
6521 Meridian Drive, Suite 107
Raleigh, North Carolina 27616
Phone: 919.755.1012
FAX: 919.755.1012

Job: ***806366 HRT 107(C) 943204***			
Project: ***19BKFC1400 R.1***			
Client: Crown Castle	Drawn by: Eric Sjoerdsma	App'd:	
Code: TIA-222-H	Date: 05/06/19	Scale: NTS	
Path:		Dwg No. E-1	

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 Hartford County, Connecticut.
Tower base elevation above sea level: 577.55 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: 0.00 ft.
Nominal ice thickness of 1.5000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °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	155.50-110.00	45.50	8.00	12	58.6000	64.6060	0.3750	1.5000	A572-65 (65 ksi)
L2	110.00-72.50	45.50	8.50	12	62.8000	68.8050	0.4375	1.7500	A572-65 (65 ksi)
L3	72.50-36.00	45.00	9.00	12	66.8082	72.7480	0.5000	2.0000	A572-65 (65 ksi)
L4	36.00-0.00	45.00		12	70.5600	76.5000	0.5000	2.0000	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	60.5349	70.3067	30422.9680	20.8446	30.3548	1002.2457	61645.1813	34.6028	14.6998	39.199
	66.7528	77.5589	40842.0131	22.9947	33.4659	1220.4065	82756.9913	38.1721	16.3094	43.492
L2	65.9541	87.8532	43610.4361	22.3258	32.5304	1340.6056	88366.5670	43.2387	15.6579	35.789
	71.0778	96.3127	57460.4440	24.4756	35.6410	1612.2011	116430.4378	47.4022	17.2672	39.468
L3	70.1501	106.7562	59911.9268	23.7383	34.6066	1731.2263	121397.8066	52.5421	16.5646	33.129
	75.1379	116.3193	77497.7893	25.8648	37.6835	2056.5463	157031.5318	57.2488	18.1565	36.313
L4	74.1026	112.7967	70668.0184	25.0815	36.5501	1933.4563	143192.5643	55.5151	17.5701	35.14
	79.0222	122.3600	90209.5680	27.2080	39.6270	2276.4673	182789.0418	60.2219	19.1620	38.324

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 155.50-110.00				1	1	1			
L2 110.00-72.50				1	1	1			
L3 72.50-36.00				1	1	1			
L4 36.00-0.00				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 plf
Safety Line 3/8 ***	C	No	Surface Ar (CaAa)	155.50 - 8.00	1	1	0.000 0.000	0.3750		0.22

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 plf
***									
HB158-1-08U8-S8J 18(1-5/8)	A	No	No	Inside Pole	155.50 - 8.00	2	No Ice	0.00	1.30
							1/2" Ice	0.00	1.30
							1" Ice	0.00	1.30
							2" Ice	0.00	1.30
561(1-5/8")	A	No	No	Inside Pole	155.50 - 8.00	12	No Ice	0.00	1.35
							1/2" Ice	0.00	1.35
							1" Ice	0.00	1.35
							2" Ice	0.00	1.35
LDF7-50A(1-5/8")	B	No	No	Inside Pole	155.50 - 8.00	3	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
***									
UCF114-50JA(1 1/4")	C	No	No	Inside Pole	144.00 - 8.00	12	No Ice	0.00	0.55
							1/2" Ice	0.00	0.55
							1" Ice	0.00	0.55
							2" Ice	0.00	0.55
FB-L98B-002-75000 (3/8")	C	No	No	Inside Pole	144.00 - 8.00	1	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
							2" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	No	Inside Pole	144.00 - 8.00	2	No Ice	0.00	0.58
							1/2" Ice	0.00	0.58
							1" Ice	0.00	0.58
							2" Ice	0.00	0.58
2" Conduit	C	No	No	Inside Pole	144.00 - 8.00	1	No Ice	0.00	2.40
							1/2" Ice	0.00	2.40
							1" Ice	0.00	2.40
							2" Ice	0.00	2.40
FB-L98B-034-XXX(3/8)	C	No	No	Inside Pole	144.00 - 0.00	1	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
							2" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	No	Inside Pole	144.00 - 0.00	2	No Ice	0.00	0.58
							1/2" Ice	0.00	0.58
							1" Ice	0.00	0.58
							2" Ice	0.00	0.58
***									
AVA6-50(1-1/4")	C	No	No	Inside Pole	135.00 - 8.00	6	No Ice	0.00	0.45
							1/2" Ice	0.00	0.45
							1" Ice	0.00	0.45
							2" Ice	0.00	0.45
***									
HB114-08U3M12-X XXF(7/8)	B	No	No	Inside Pole	128.00 - 8.00	1	No Ice	0.00	0.68
							1/2" Ice	0.00	0.68
							1" Ice	0.00	0.68
							2" Ice	0.00	0.68
HB114-1-08U4-M5 F(1-1/4)	B	No	No	Inside Pole	128.00 - 8.00	3	No Ice	0.00	1.30
							1/2" Ice	0.00	1.30
							1" Ice	0.00	1.30
							2" Ice	0.00	1.30
***									
LDF6-50A(1-1/4")	C	No	No	Inside Pole	100.00 - 8.00	6	No Ice	0.00	0.66

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
							1/2" Ice	0.00	0.66
							1" Ice	0.00	0.66
							2" Ice	0.00	0.66
AVA6-50(1-1/4")	C	No	No	Inside Pole	100.00 - 8.00	6	No Ice	0.00	0.45
							1/2" Ice	0.00	0.45
							1" Ice	0.00	0.45
							2" Ice	0.00	0.45
HCS 6X12 4AWG(1-5/8")	C	No	No	Inside Pole	100.00 - 8.00	1	No Ice	0.00	2.40
							1/2" Ice	0.00	2.40
							1" Ice	0.00	2.40
							2" Ice	0.00	2.40
***									

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	155.50-110.00	A	0.000	0.000	0.000	0.000	0.86
		B	0.000	0.000	0.000	0.000	0.19
		C	0.000	0.000	1.706	0.000	0.47
L2	110.00-72.50	A	0.000	0.000	0.000	0.000	0.70
		B	0.000	0.000	0.000	0.000	0.26
		C	0.000	0.000	1.406	0.000	0.79
L3	72.50-36.00	A	0.000	0.000	0.000	0.000	0.69
		B	0.000	0.000	0.000	0.000	0.26
		C	0.000	0.000	1.369	0.000	0.86
L4	36.00-0.00	A	0.000	0.000	0.000	0.000	0.53
		B	0.000	0.000	0.000	0.000	0.20
		C	0.000	0.000	1.050	0.000	0.67

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	155.50-110.00	A	1.465	0.000	0.000	0.000	0.000	0.86
		B		0.000	0.000	0.000	0.000	0.19
		C		0.000	0.000	15.041	0.000	0.62
L2	110.00-72.50	A	1.412	0.000	0.000	0.000	0.000	0.70
		B		0.000	0.000	0.000	0.000	0.26
		C		0.000	0.000	12.396	0.000	0.91
L3	72.50-36.00	A	1.341	0.000	0.000	0.000	0.000	0.69
		B		0.000	0.000	0.000	0.000	0.26
		C		0.000	0.000	11.673	0.000	0.97
L4	36.00-0.00	A	1.199	0.000	0.000	0.000	0.000	0.53
		B		0.000	0.000	0.000	0.000	0.20
		C		0.000	0.000	8.557	0.000	0.74

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	155.50-110.00	0.0000	0.2289	0.0000	1.4659
L2	110.00-72.50	0.0000	0.2290	0.0000	1.4749
L3	72.50-36.00	0.0000	0.2291	0.0000	1.4374
L4	36.00-0.00	0.0000	0.1771	0.0000	1.0771

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	1	Safety Line 3/8	110.00 - 155.50	1.0000	1.0000
L2	1	Safety Line 3/8	72.50 - 110.00	1.0000	1.0000
L3	1	Safety Line 3/8	36.00 - 72.50	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
156									
DB809K-Y	A	From Leg	4.00 0.00 3.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.85 4.03 5.21 7.17	2.85 4.03 5.21 7.17	0.03 0.05 0.08 0.16
DB809K-Y	B	From Leg	4.00 0.00 3.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.85 4.03 5.21 7.17	2.85 4.03 5.21 7.17	0.03 0.05 0.08 0.16
DB809K-Y	C	From Leg	4.00 0.00 3.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.85 4.03 5.21 7.17	2.85 4.03 5.21 7.17	0.03 0.05 0.08 0.16
Pipe Mount	A	From Leg	4.00 0.00 0.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.20 1.50 1.81 2.47	1.20 1.50 1.81 2.47	0.02 0.03 0.04 0.08
Pipe Mount	B	From Leg	4.00	0.0000	156.00	No Ice	1.20	1.20	0.02

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
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
						2" Ice	2.47	2.47	0.08
Pipe Mount	C	From Leg	4.00	0.0000	156.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
						2" Ice	2.47	2.47	0.08
156									
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00	0.0000	156.00	No Ice	4.09	3.30	0.07
			0.00			1/2" Ice	4.49	3.68	0.13
			3.00			1" Ice	4.89	4.07	0.20
						2" Ice	5.72	4.87	0.39
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00	0.0000	156.00	No Ice	4.09	3.30	0.07
			0.00			1/2" Ice	4.49	3.68	0.13
			3.00			1" Ice	4.89	4.07	0.20
						2" Ice	5.72	4.87	0.39
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00	0.0000	156.00	No Ice	4.09	3.30	0.07
			0.00			1/2" Ice	4.49	3.68	0.13
			3.00			1" Ice	4.89	4.07	0.20
						2" Ice	5.72	4.87	0.39
LNX-8513DS-VTM w/ Mount Pipe	C	From Leg	4.00	0.0000	156.00	No Ice	8.41	7.08	0.06
			0.00			1/2" Ice	8.97	8.27	0.13
			3.00			1" Ice	9.50	9.18	0.21
						2" Ice	10.59	11.02	0.39
LNX-6514DS-A1M w/ Mount Pipe	C	From Leg	4.00	0.0000	156.00	No Ice	8.41	7.08	0.06
			0.00			1/2" Ice	8.97	8.27	0.13
			3.00			1" Ice	9.50	9.18	0.21
						2" Ice	10.59	11.02	0.39
LNX-6514DS-AIM w/ Mount Pipe	A	From Leg	4.00	0.0000	156.00	No Ice	8.41	7.08	0.06
			0.00			1/2" Ice	8.97	8.27	0.13
			3.00			1" Ice	9.50	9.18	0.21
						2" Ice	10.59	11.02	0.39
LNX-6514DS-A1M w/ Mount Pipe	A	From Leg	4.00	0.0000	156.00	No Ice	8.41	7.08	0.06
			0.00			1/2" Ice	8.97	8.27	0.13
			3.00			1" Ice	9.50	9.18	0.21
						2" Ice	10.59	11.02	0.39
LNX-6514DS-AIM w/ Mount Pipe	B	From Leg	4.00	0.0000	156.00	No Ice	8.41	7.08	0.06
			0.00			1/2" Ice	8.97	8.27	0.13
			3.00			1" Ice	9.50	9.18	0.21
						2" Ice	10.59	11.02	0.39
LNX-6514DS-A1M w/ Mount Pipe	B	From Leg	4.00	0.0000	156.00	No Ice	8.41	7.08	0.06
			0.00			1/2" Ice	8.97	8.27	0.13
			3.00			1" Ice	9.50	9.18	0.21
						2" Ice	10.59	11.02	0.39
B13 RRH 4x30	A	From Leg	4.00	0.0000	156.00	No Ice	2.06	1.32	0.06
			0.00			1/2" Ice	2.24	1.48	0.07
			3.00			1" Ice	2.43	1.64	0.09
						2" Ice	2.84	2.00	0.14
B13 RRH 4x30	B	From Leg	4.00	0.0000	156.00	No Ice	2.06	1.32	0.06
			0.00			1/2" Ice	2.24	1.48	0.07
			3.00			1" Ice	2.43	1.64	0.09
						2" Ice	2.84	2.00	0.14
B13 RRH 4x30	C	From Leg	4.00	0.0000	156.00	No Ice	2.06	1.32	0.06
			0.00			1/2" Ice	2.24	1.48	0.07
			3.00			1" Ice	2.43	1.64	0.09
						2" Ice	2.84	2.00	0.14
(2) RRFDC-3315-PF-48	C	From Leg	0.50	0.0000	156.00	No Ice	3.02	1.96	0.03

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
			0.00			1/2" Ice	3.24	2.15	0.06
			3.00			1" Ice	3.47	2.35	0.09
						2" Ice	3.94	2.76	0.16
Platform Mount [LP 1002-1]	C	None		0.0000	156.00	No Ice	77.10	77.10	4.05
						1/2" Ice	93.30	93.30	5.27
						1" Ice	109.50	109.50	6.48
						2" Ice	141.90	141.90	8.91
144									
80010965 w/ Mount Pipe	A	From Leg	4.00	0.0000	144.00	No Ice	13.81	7.16	0.13
			0.00			1/2" Ice	14.35	7.96	0.22
			0.00			1" Ice	14.89	8.77	0.32
						2" Ice	15.99	10.44	0.55
80010965 w/ Mount Pipe	B	From Leg	4.00	0.0000	144.00	No Ice	13.81	7.16	0.13
			0.00			1/2" Ice	14.35	7.96	0.22
			0.00			1" Ice	14.89	8.77	0.32
						2" Ice	15.99	10.44	0.55
80010965 w/ Mount Pipe	C	From Leg	4.00	0.0000	144.00	No Ice	13.81	7.16	0.13
			0.00			1/2" Ice	14.35	7.96	0.22
			0.00			1" Ice	14.89	8.77	0.32
						2" Ice	15.99	10.44	0.55
7770.00 w/ Mount Pipe	A	From Leg	4.00	0.0000	144.00	No Ice	5.75	4.25	0.06
			0.00			1/2" Ice	6.18	5.01	0.10
			0.00			1" Ice	6.61	5.71	0.16
						2" Ice	7.49	7.16	0.29
7770.00 w/ Mount Pipe	B	From Leg	4.00	0.0000	144.00	No Ice	5.75	4.25	0.06
			0.00			1/2" Ice	6.18	5.01	0.10
			0.00			1" Ice	6.61	5.71	0.16
						2" Ice	7.49	7.16	0.29
7770.00 w/ Mount Pipe	C	From Leg	4.00	0.0000	144.00	No Ice	5.75	4.25	0.06
			0.00			1/2" Ice	6.18	5.01	0.10
			0.00			1" Ice	6.61	5.71	0.16
						2" Ice	7.49	7.16	0.29
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	0.0000	144.00	No Ice	8.26	6.30	0.07
			0.00			1/2" Ice	8.82	7.48	0.14
			0.00			1" Ice	9.35	8.37	0.21
						2" Ice	10.42	10.18	0.38
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.0000	144.00	No Ice	8.26	6.30	0.07
			0.00			1/2" Ice	8.82	7.48	0.14
			0.00			1" Ice	9.35	8.37	0.21
						2" Ice	10.42	10.18	0.38
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00	0.0000	144.00	No Ice	8.26	6.30	0.07
			0.00			1/2" Ice	8.82	7.48	0.14
			0.00			1" Ice	9.35	8.37	0.21
						2" Ice	10.42	10.18	0.38
(2) RRUS 4449 B5/B12	C	From Leg	4.00	0.0000	144.00	No Ice	1.97	1.41	0.07
			0.00			1/2" Ice	2.14	1.56	0.09
			0.00			1" Ice	2.33	1.73	0.11
						2" Ice	2.72	2.07	0.16
RRUS 4449 B5/B12	A	From Leg	4.00	0.0000	144.00	No Ice	1.97	1.41	0.07
			0.00			1/2" Ice	2.14	1.56	0.09
			0.00			1" Ice	2.33	1.73	0.11
						2" Ice	2.72	2.07	0.16
RRUS 32	A	From Leg	4.00	0.0000	144.00	No Ice	2.74	1.67	0.05
			0.00			1/2" Ice	2.96	1.86	0.07
			0.00			1" Ice	3.19	2.05	0.10
						2" Ice	3.68	2.46	0.16
(2) RRUS 32	B	From Leg	4.00	0.0000	144.00	No Ice	2.74	1.67	0.05

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
			0.00			1/2" Ice	2.96	1.86	0.07
			0.00			1" Ice	3.19	2.05	0.10
						2" Ice	3.68	2.46	0.16
DC6-48-60-18-8F	B	From Leg	0.50	0.0000	144.00	No Ice	1.21	1.21	0.03
			0.00			1/2" Ice	1.89	1.89	0.05
			0.00			1" Ice	2.11	2.11	0.08
						2" Ice	2.57	2.57	0.14
(2) LGP 17201	A	From Leg	4.00	0.0000	144.00	No Ice	1.67	0.47	0.03
			0.00			1/2" Ice	1.83	0.57	0.04
			0.00			1" Ice	2.00	0.68	0.06
						2" Ice	2.36	0.91	0.09
(2) LGP 17201	B	From Leg	4.00	0.0000	144.00	No Ice	1.67	0.47	0.03
			0.00			1/2" Ice	1.83	0.57	0.04
			0.00			1" Ice	2.00	0.68	0.06
						2" Ice	2.36	0.91	0.09
(2) LGP 17201	C	From Leg	4.00	0.0000	144.00	No Ice	1.67	0.47	0.03
			0.00			1/2" Ice	1.83	0.57	0.04
			0.00			1" Ice	2.00	0.68	0.06
						2" Ice	2.36	0.91	0.09
(2) LGP21903	A	From Leg	4.00	0.0000	144.00	No Ice	0.23	0.16	0.01
			0.00			1/2" Ice	0.29	0.21	0.01
			0.00			1" Ice	0.36	0.28	0.02
						2" Ice	0.53	0.42	0.03
(2) LGP21903	B	From Leg	4.00	0.0000	144.00	No Ice	0.23	0.16	0.01
			0.00			1/2" Ice	0.29	0.21	0.01
			0.00			1" Ice	0.36	0.28	0.02
						2" Ice	0.53	0.42	0.03
(2) LGP21903	C	From Leg	4.00	0.0000	144.00	No Ice	0.23	0.16	0.01
			0.00			1/2" Ice	0.29	0.21	0.01
			0.00			1" Ice	0.36	0.28	0.02
						2" Ice	0.53	0.42	0.03
(3) RRUS 12	A	From Leg	4.00	0.0000	144.00	No Ice	3.15	1.29	0.06
			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
						2" Ice	4.07	1.95	0.17
DC6-48-60-18-8F	A	From Leg	0.50	0.0000	144.00	No Ice	1.21	1.21	0.03
			0.00			1/2" Ice	1.89	1.89	0.05
			0.00			1" Ice	2.11	2.11	0.08
						2" Ice	2.57	2.57	0.14
1001940	A	From Leg	4.00	0.0000	144.00	No Ice	0.18	0.08	0.00
			0.00			1/2" Ice	0.23	0.13	0.00
			0.00			1" Ice	0.30	0.18	0.01
						2" Ice	0.44	0.30	0.01
(2) 1001940	A	From Leg	4.00	0.0000	144.00	No Ice	0.18	0.08	0.00
			0.00			1/2" Ice	0.23	0.13	0.00
			0.00			1" Ice	0.30	0.18	0.01
						2" Ice	0.44	0.30	0.01
(2) Pipe Mount	A	From Leg	4.00	0.0000	144.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
						2" Ice	2.47	2.47	0.08
(2) Pipe Mount	B	From Leg	4.00	0.0000	144.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
						2" Ice	2.47	2.47	0.08
(2) Pipe Mount	C	From Leg	4.00	0.0000	144.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03

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
			0.00			1" Ice	1.81	1.81	0.04
						2" Ice	2.47	2.47	0.08
Platform Mount [LP 1002-1]	C	None		0.0000	144.00	No Ice	77.10	77.10	4.05
						1/2" Ice	93.30	93.30	5.27
						1" Ice	109.50	109.50	6.48
						2" Ice	141.90	141.90	8.91
135									
742 213 w/ Mount Pipe	A	From Leg	1.00	0.0000	135.00	No Ice	3.54	2.98	0.05
			0.00			1/2" Ice	4.13	3.57	0.09
			0.00			1" Ice	4.74	4.17	0.14
						2" Ice	6.01	5.42	0.27
742 213 w/ Mount Pipe	B	From Leg	1.00	0.0000	135.00	No Ice	3.54	2.98	0.05
			0.00			1/2" Ice	4.13	3.57	0.09
			0.00			1" Ice	4.74	4.17	0.14
						2" Ice	6.01	5.42	0.27
742 213 w/ Mount Pipe	C	From Leg	1.00	0.0000	135.00	No Ice	3.54	2.98	0.05
			0.00			1/2" Ice	4.13	3.57	0.09
			0.00			1" Ice	4.74	4.17	0.14
						2" Ice	6.01	5.42	0.27
128									
NNVV-65B-R4 w/ Mount Pipe	A	From Leg	4.00	0.0000	128.00	No Ice	12.56	7.76	0.12
			0.00			1/2" Ice	13.14	8.80	0.21
			2.00			1" Ice	13.70	9.69	0.32
						2" Ice	14.85	11.52	0.55
NNVV-65B-R4 w/ Mount Pipe	B	From Leg	4.00	0.0000	128.00	No Ice	12.56	7.76	0.12
			0.00			1/2" Ice	13.14	8.80	0.21
			2.00			1" Ice	13.70	9.69	0.32
						2" Ice	14.85	11.52	0.55
NNVV-65B-R4 w/ Mount Pipe	C	From Leg	4.00	0.0000	128.00	No Ice	12.56	7.76	0.12
			0.00			1/2" Ice	13.14	8.80	0.21
			2.00			1" Ice	13.70	9.69	0.32
						2" Ice	14.85	11.52	0.55
APXVTM14-ALU-I20 w/ Mount Pipe	A	From Leg	4.00	0.0000	128.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			2.00			1" Ice	7.47	6.47	0.19
						2" Ice	8.38	7.94	0.34
APXVTM14-ALU-I20 w/ Mount Pipe	B	From Leg	4.00	0.0000	128.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			2.00			1" Ice	7.47	6.47	0.19
						2" Ice	8.38	7.94	0.34
APXVTM14-ALU-I20 w/ Mount Pipe	C	From Leg	4.00	0.0000	128.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			2.00			1" Ice	7.47	6.47	0.19
						2" Ice	8.38	7.94	0.34
(4) RRH2X50-800	C	From Leg	4.00	0.0000	128.00	No Ice	2.13	1.79	0.05
			0.00			1/2" Ice	2.32	1.96	0.07
			2.00			1" Ice	2.51	2.14	0.10
						2" Ice	2.92	2.53	0.15
RRH2X50-800	A	From Leg	4.00	0.0000	128.00	No Ice	2.13	1.79	0.05
			0.00			1/2" Ice	2.32	1.96	0.07
			2.00			1" Ice	2.51	2.14	0.10
						2" Ice	2.92	2.53	0.15
RRH2X50-800	B	From Leg	4.00	0.0000	128.00	No Ice	2.13	1.79	0.05
			0.00			1/2" Ice	2.32	1.96	0.07
			2.00			1" Ice	2.51	2.14	0.10
						2" Ice	2.92	2.53	0.15
(3) TD-RRH8X20-25	A	From Leg	4.00	0.0000	128.00	No Ice	3.70	1.29	0.07

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
			0.00			1/2" Ice	3.95	1.46	0.09
			2.00			1" Ice	4.20	1.64	0.12
						2" Ice	4.72	2.02	0.18
(3) PCS 1900MHZ 4X45W-65MHZ	B	From Leg	4.00	0.0000	128.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			2.00			1" Ice	2.74	2.65	0.11
						2" Ice	3.19	3.09	0.17
Pipe Mount	A	From Leg	4.00	0.0000	128.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
						2" Ice	2.47	2.47	0.08
Pipe Mount	B	From Leg	4.00	0.0000	128.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
						2" Ice	2.47	2.47	0.08
Pipe Mount	C	From Leg	4.00	0.0000	128.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
						2" Ice	2.47	2.47	0.08
T-Arm Mount [TA 602-3]	C	None		0.0000	129.00	No Ice	11.59	11.59	0.77
						1/2" Ice	15.44	15.44	0.99
						1" Ice	19.29	19.29	1.21
						2" Ice	26.99	26.99	1.64
T-Arm Mount [TA 602-3]	C	None		0.0000	127.00	No Ice	11.59	11.59	0.77
						1/2" Ice	15.44	15.44	0.99
						1" Ice	19.29	19.29	1.21
						2" Ice	26.99	26.99	1.64
100									
RV90-17-00DP w/ Mount Pipe	A	From Leg	3.00	0.0000	100.00	No Ice	4.59	3.32	0.04
			0.00			1/2" Ice	5.02	4.09	0.08
			0.00			1" Ice	5.44	4.78	0.12
						2" Ice	6.30	6.23	0.23
RV90-17-00DP w/ Mount Pipe	B	From Leg	3.00	0.0000	100.00	No Ice	4.59	3.32	0.04
			0.00			1/2" Ice	5.02	4.09	0.08
			0.00			1" Ice	5.44	4.78	0.12
						2" Ice	6.30	6.23	0.23
RV90-17-00DP w/ Mount Pipe	C	From Leg	3.00	0.0000	100.00	No Ice	4.59	3.32	0.04
			0.00			1/2" Ice	5.02	4.09	0.08
			0.00			1" Ice	5.44	4.78	0.12
						2" Ice	6.30	6.23	0.23
KRY 112 489/2	A	From Leg	3.00	0.0000	100.00	No Ice	0.56	0.37	0.02
			0.00			1/2" Ice	0.66	0.45	0.02
			0.00			1" Ice	0.76	0.54	0.03
						2" Ice	1.00	0.75	0.05
KRY 112 489/2	B	From Leg	3.00	0.0000	100.00	No Ice	0.56	0.37	0.02
			0.00			1/2" Ice	0.66	0.45	0.02
			0.00			1" Ice	0.76	0.54	0.03
						2" Ice	1.00	0.75	0.05
KRY 112 489/2	C	From Leg	3.00	0.0000	100.00	No Ice	0.56	0.37	0.02
			0.00			1/2" Ice	0.66	0.45	0.02
			0.00			1" Ice	0.76	0.54	0.03
						2" Ice	1.00	0.75	0.05
APXVAARR24_43-U-NA20 w/ Mount Pipe	.0From	From Leg	3.00	0.0000	100.00	No Ice	20.48	11.02	0.16
			0.00			1/2" Ice	21.23	12.55	0.30
			0.00			1" Ice	21.99	14.10	0.44
						2" Ice	23.44	16.45	0.78
APXVAARR24_43-U-NA20	B	From Leg	3.00	0.0000	100.00	No Ice	20.48	11.02	0.16

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
w/ Mount Pipe			0.00			1/2" Ice	21.23	12.55	0.30
			0.00			1" Ice	21.99	14.10	0.44
						2" Ice	23.44	16.45	0.78
APXVAARR24_43-U-NA20	C	From Leg	3.00	0.0000	100.00	No Ice	20.48	11.02	0.16
w/ Mount Pipe			0.00			1/2" Ice	21.23	12.55	0.30
			0.00			1" Ice	21.99	14.10	0.44
						2" Ice	23.44	16.45	0.78
(2) RADIO 4449 B12/B71	A	From Leg	3.00	0.0000	100.00	No Ice	1.65	1.30	0.08
			0.00			1/2" Ice	1.81	1.44	0.09
			0.00			1" Ice	1.98	1.60	0.11
						2" Ice	2.34	1.92	0.16
RADIO 4449 B12/B71	B	From Leg	3.00	0.0000	100.00	No Ice	1.65	1.30	0.08
			0.00			1/2" Ice	1.81	1.44	0.09
			0.00			1" Ice	1.98	1.60	0.11
						2" Ice	2.34	1.92	0.16
KRY 112 144/1	A	From Leg	3.00	0.0000	100.00	No Ice	0.35	0.16	0.01
			0.00			1/2" Ice	0.43	0.22	0.01
			0.00			1" Ice	0.51	0.28	0.02
						2" Ice	0.70	0.44	0.03
KRY 112 144/1	B	From Leg	3.00	0.0000	100.00	No Ice	0.35	0.16	0.01
			0.00			1/2" Ice	0.43	0.22	0.01
			0.00			1" Ice	0.51	0.28	0.02
						2" Ice	0.70	0.44	0.03
KRY 112 144/1	C	From Leg	3.00	0.0000	100.00	No Ice	0.35	0.16	0.01
			0.00			1/2" Ice	0.43	0.22	0.01
			0.00			1" Ice	0.51	0.28	0.02
						2" Ice	0.70	0.44	0.03
Side Arm Mount [SO 701-3]	C	None		0.0000	100.00	No Ice	2.83	2.83	0.20
						1/2" Ice	3.92	3.92	0.24
						1" Ice	5.01	5.01	0.28
						2" Ice	7.19	7.19	0.36
***									

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	132.66	1.071	41	241.316	A	0.000	241.316	241.316	100.00	0.000	0.000
155.50-110.00					B	0.000	241.316		100.00	0.000	0.000
					C	0.000	241.316		100.00	1.706	0.000
L2	91.29	0.963	37	214.112	A	0.000	214.112	214.112	100.00	0.000	0.000
110.00-72.50					B	0.000	214.112		100.00	0.000	0.000
					C	0.000	214.112		100.00	1.406	0.000
L3 72.50-36.00	54.48	0.831	32	220.959	A	0.000	220.959	220.959	100.00	0.000	0.000
					B	0.000	220.959		100.00	0.000	0.000
					C	0.000	220.959		100.00	1.369	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L4 36.00-0.00	17.81	0.7	27	229.687	A	0.000	229.687	229.687	100.00	0.000	0.000
					B	0.000	229.687		100.00	0.000	0.000
					C	0.000	229.687		100.00	1.050	0.000

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	132.66	1.071	6	1.4653	252.428	A	0.000	252.428	252.428	100.00	0.000	0.000
155.50-110.00						B	0.000	252.428		100.00	0.000	0.000
						C	0.000	252.428		100.00	15.041	0.000
L2 110.00-72.50	91.29	0.963	5	1.4116	223.271	A	0.000	223.271	223.271	100.00	0.000	0.000
						B	0.000	223.271		100.00	0.000	0.000
						C	0.000	223.271		100.00	12.396	0.000
L3 72.50-36.00	54.48	0.831	5	1.3406	229.546	A	0.000	229.546	229.546	100.00	0.000	0.000
						B	0.000	229.546		100.00	0.000	0.000
						C	0.000	229.546		100.00	11.673	0.000
L4 36.00-0.00	17.81	0.7	4	1.1987	237.731	A	0.000	237.731	237.731	100.00	0.000	0.000
						B	0.000	237.731		100.00	0.000	0.000
						C	0.000	237.731		100.00	8.557	0.000

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	132.66	1.071	8	241.316	A	0.000	241.316	241.316	100.00	0.000	0.000
155.50-110.00					B	0.000	241.316		100.00	0.000	0.000
					C	0.000	241.316		100.00	1.706	0.000
L2	91.29	0.963	7	214.112	A	0.000	214.112	214.112	100.00	0.000	0.000
110.00-72.50					B	0.000	214.112		100.00	0.000	0.000
					C	0.000	214.112		100.00	1.406	0.000
L3 72.50-36.00	54.48	0.831	6	220.959	A	0.000	220.959	220.959	100.00	0.000	0.000
					B	0.000	220.959		100.00	0.000	0.000
					C	0.000	220.959		100.00	1.369	0.000
L4 36.00-0.00	17.81	0.7	5	229.687	A	0.000	229.687	229.687	100.00	0.000	0.000
					B	0.000	229.687		100.00	0.000	0.000
					C	0.000	229.687		100.00	1.050	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	1.52	11.45	A	1	0.95	41	1	1	241.316	10.32	226.74	C
155.50-110.00			B	1	0.95		1	1	241.316			
			C	1	0.95		1	1	241.316			
L2	1.76	14.26	A	1	0.95	37	1	1	214.112	8.22	219.24	C
110.00-72.50			B	1	0.95		1	1	214.112			
			C	1	0.95		1	1	214.112			
L3	1.80	17.08	A	1	0.95	32	1	1	220.959	7.30	199.92	C
72.50-36.00			B	1	0.95		1	1	220.959			
			C	1	0.95		1	1	220.959			
L4 36.00-0.00	1.39	18.00	A	1	0.95	27	1	1	229.687	6.42	178.46	C
			B	1	0.95		1	1	229.687			
			C	1	0.95		1	1	229.687			
Sum Weight:	6.46	60.79						OTM	2631.13 kip-ft	32.26		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	1.52	11.45	A	1	0.95	41	1	1	241.316	10.32	226.74	C
155.50-110.00			B	1	0.95		1	1	241.316			
			C	1	0.95		1	1	241.316			
L2	1.76	14.26	A	1	0.95	37	1	1	214.112	8.22	219.24	C
110.00-72.50			B	1	0.95		1	1	214.112			
			C	1	0.95		1	1	214.112			
L3	1.80	17.08	A	1	0.95	32	1	1	220.959	7.30	199.92	C
72.50-36.00			B	1	0.95		1	1	220.959			
			C	1	0.95		1	1	220.959			
L4 36.00-0.00	1.39	18.00	A	1	0.95	27	1	1	229.687	6.42	178.46	C
			B	1	0.95		1	1	229.687			
			C	1	0.95		1	1	229.687			
Sum Weight:	6.46	60.79						OTM	2631.13 kip-ft	32.26		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	1.52	11.45	A	1	0.95	41	1	1	241.316	10.32	226.74	C
155.50-110.00			B	1	0.95		1	1	241.316			
			C	1	0.95		1	1	241.316			
L2	1.76	14.26	A	1	0.95	37	1	1	214.112	8.22	219.24	C
110.00-72.50			B	1	0.95		1	1	214.112			
			C	1	0.95		1	1	214.112			
L3	1.80	17.08	A	1	0.95	32	1	1	220.959	7.30	199.92	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
72.50-36.00			B	1	0.95		1	1	220.959			
			C	1	0.95		1	1	220.959			
L4 36.00-0.00	1.39	18.00	A	1	0.95	27	1	1	229.687	6.42	178.46	C
			B	1	0.95		1	1	229.687			
			C	1	0.95		1	1	229.687			
Sum Weight:	6.46	60.79						OTM	2631.13 kip-ft	32.26		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	1.67	16.71	A	1	1.2	6	1	1	252.428	2.02	44.32	C
155.50-110.00			B	1	1.2		1	1	252.428			
			C	1	1.2		1	1	252.428			
L2	1.88	18.75	A	1	1.2	5	1	1	223.271	1.60	42.72	C
110.00-72.50			B	1	1.2		1	1	223.271			
			C	1	1.2		1	1	223.271			
L3	1.91	21.47	A	1	1.2	5	1	1	229.546	1.42	38.81	C
72.50-36.00			B	1	1.2		1	1	229.546			
			C	1	1.2		1	1	229.546			
L4 36.00-0.00	1.47	22.07	A	1	1.2	4	1	1	237.731	1.24	34.51	C
			B	1	1.2		1	1	237.731			
			C	1	1.2		1	1	237.731			
Sum Weight:	6.93	79.01						OTM	513.06 kip-ft	6.28		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	1.67	16.71	A	1	1.2	6	1	1	252.428	2.02	44.32	C
155.50-110.00			B	1	1.2		1	1	252.428			
			C	1	1.2		1	1	252.428			
L2	1.88	18.75	A	1	1.2	5	1	1	223.271	1.60	42.72	C
110.00-72.50			B	1	1.2		1	1	223.271			
			C	1	1.2		1	1	223.271			
L3	1.91	21.47	A	1	1.2	5	1	1	229.546	1.42	38.81	C
72.50-36.00			B	1	1.2		1	1	229.546			
			C	1	1.2		1	1	229.546			
L4 36.00-0.00	1.47	22.07	A	1	1.2	4	1	1	237.731	1.24	34.51	C
			B	1	1.2		1	1	237.731			
			C	1	1.2		1	1	237.731			
Sum Weight:	6.93	79.01						OTM	513.06 kip-ft	6.28		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	1.67	16.71	A	1	1.2	6	1	1	252.428	2.02	44.32	C
155.50-110.00			B	1	1.2		1	1	252.428			
			C	1	1.2		1	1	252.428			
L2	1.88	18.75	A	1	1.2	5	1	1	223.271	1.60	42.72	C
110.00-72.50			B	1	1.2		1	1	223.271			
			C	1	1.2		1	1	223.271			
L3	1.91	21.47	A	1	1.2	5	1	1	229.546	1.42	38.81	C
72.50-36.00			B	1	1.2		1	1	229.546			
			C	1	1.2		1	1	229.546			
L4 36.00-0.00	1.47	22.07	A	1	1.2	4	1	1	237.731	1.24	34.51	C
			B	1	1.2		1	1	237.731			
			C	1	1.2		1	1	237.731			
Sum Weight:	6.93	79.01						OTM	513.06 kip-ft	6.28		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	1.52	11.45	A	1	0.95	8	1	1	241.316	2.07	45.49	C
155.50-110.00			B	1	0.95		1	1	241.316			
			C	1	0.95		1	1	241.316			
L2	1.76	14.26	A	1	0.95	7	1	1	214.112	1.65	43.99	C
110.00-72.50			B	1	0.95		1	1	214.112			
			C	1	0.95		1	1	214.112			
L3	1.80	17.08	A	1	0.95	6	1	1	220.959	1.46	40.11	C
72.50-36.00			B	1	0.95		1	1	220.959			
			C	1	0.95		1	1	220.959			
L4 36.00-0.00	1.39	18.00	A	1	0.95	5	1	1	229.687	1.29	35.80	C
			B	1	0.95		1	1	229.687			
			C	1	0.95		1	1	229.687			
Sum Weight:	6.46	60.79						OTM	527.87 kip-ft	6.47		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	1.52	11.45	A	1	0.95	8	1	1	241.316	2.07	45.49	C
155.50-110.00			B	1	0.95		1	1	241.316			
			C	1	0.95		1	1	241.316			
L2	1.76	14.26	A	1	0.95	7	1	1	214.112	1.65	43.99	C
110.00-72.50			B	1	0.95		1	1	214.112			
			C	1	0.95		1	1	214.112			
L3	1.80	17.08	A	1	0.95	6	1	1	220.959	1.46	40.11	C
72.50-36.00			B	1	0.95		1	1	220.959			
			C	1	0.95		1	1	220.959			
L4 36.00-0.00	1.39	18.00	A	1	0.95	5	1	1	229.687	1.29	35.80	C
			B	1	0.95		1	1	229.687			
			C	1	0.95		1	1	229.687			
Sum Weight:	6.46	60.79						OTM	527.87 kip-ft	6.47		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	1.52	11.45	A	1	0.95	8	1	1	241.316	2.07	45.49	C
155.50-110.00			B	1	0.95		1	1	241.316			
			C	1	0.95		1	1	241.316			
L2	1.76	14.26	A	1	0.95	7	1	1	214.112	1.65	43.99	C
110.00-72.50			B	1	0.95		1	1	214.112			
			C	1	0.95		1	1	214.112			
L3	1.80	17.08	A	1	0.95	6	1	1	220.959	1.46	40.11	C
72.50-36.00			B	1	0.95		1	1	220.959			
			C	1	0.95		1	1	220.959			
L4 36.00-0.00	1.39	18.00	A	1	0.95	5	1	1	229.687	1.29	35.80	C
			B	1	0.95		1	1	229.687			
			C	1	0.95		1	1	229.687			
Sum Weight:	6.46	60.79						OTM	527.87 kip-ft	6.47		

Discrete Appurtenance Pressures - No Ice $G_H = 1.100$

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft²	C_AA_C Side ft²
DB809K-Y	0.0000	0.03	0.00	-6.44	159.00	1.128	43	2.85	2.85
DB809K-Y	120.0000	0.03	5.58	3.22	159.00	1.128	43	2.85	2.85
DB809K-Y	240.0000	0.03	-5.58	3.22	159.00	1.128	43	2.85	2.85
Pipe Mount	0.0000	0.02	0.00	-6.44	156.00	1.122	43	1.20	1.20
Pipe Mount	120.0000	0.02	5.58	3.22	156.00	1.122	43	1.20	1.20
Pipe Mount	240.0000	0.02	-5.58	3.22	156.00	1.122	43	1.20	1.20
SBNHH-1D65B w/ Mount Pipe	0.0000	0.13	0.00	-6.44	159.00	1.128	43	8.18	6.60

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
SBNHH-1D65B w/ Mount Pipe	120.0000	0.13	5.58	3.22	159.00	1.128	43	8.18	6.60
SBNHH-1D65B w/ Mount Pipe	240.0000	0.13	-5.58	3.22	159.00	1.128	43	8.18	6.60
LNX-8513DS-VTM w/ Mount Pipe	240.0000	0.06	-5.58	3.22	159.00	1.128	43	8.41	7.08
LNX-6514DS-A1M w/ Mount Pipe	240.0000	0.06	-5.58	3.22	159.00	1.128	43	8.41	7.08
LNX-6514DS-AIM w/ Mount Pipe	0.0000	0.06	0.00	-6.44	159.00	1.128	43	8.41	7.08
LNX-6514DS-A1M w/ Mount Pipe	0.0000	0.06	0.00	-6.44	159.00	1.128	43	8.41	7.08
LNX-6514DS-AIM w/ Mount Pipe	120.0000	0.06	5.58	3.22	159.00	1.128	43	8.41	7.08
LNX-6514DS-A1M w/ Mount Pipe	120.0000	0.06	5.58	3.22	159.00	1.128	43	8.41	7.08
B13 RRH 4x30	0.0000	0.06	0.00	-6.44	159.00	1.128	43	2.06	1.32
B13 RRH 4x30	120.0000	0.06	5.58	3.22	159.00	1.128	43	2.06	1.32
B13 RRH 4x30	240.0000	0.06	-5.58	3.22	159.00	1.128	43	2.06	1.32
RRFDC-3315-PF-48	240.0000	0.06	-2.55	1.47	159.00	1.128	43	6.05	3.93
Platform Mount [LP 1002-1]	0.0000	4.05	0.00	0.00	156.00	1.122	43	77.10	77.10
80010965 w/ Mount Pipe	0.0000	0.13	0.00	-6.50	144.00	1.097	42	13.81	7.16
80010965 w/ Mount Pipe	120.0000	0.13	5.63	3.25	144.00	1.097	42	13.81	7.16
80010965 w/ Mount Pipe	240.0000	0.13	-5.63	3.25	144.00	1.097	42	13.81	7.16
7770.00 w/ Mount Pipe	0.0000	0.06	0.00	-6.50	144.00	1.097	42	5.75	4.25
7770.00 w/ Mount Pipe	120.0000	0.06	5.63	3.25	144.00	1.097	42	5.75	4.25
7770.00 w/ Mount Pipe	240.0000	0.06	-5.63	3.25	144.00	1.097	42	5.75	4.25
AM-X-CD-16-65-00T-RET w/ Mount Pipe	0.0000	0.07	0.00	-6.50	144.00	1.097	42	8.26	6.30
AM-X-CD-16-65-00T-RET w/ Mount Pipe	120.0000	0.07	5.63	3.25	144.00	1.097	42	8.26	6.30
AM-X-CD-16-65-00T-RET w/ Mount Pipe	240.0000	0.07	-5.63	3.25	144.00	1.097	42	8.26	6.30
RRUS 4449 B5/B12	240.0000	0.14	-5.63	3.25	144.00	1.097	42	3.94	2.82
RRUS 4449 B5/B12	0.0000	0.07	0.00	-6.50	144.00	1.097	42	1.97	1.41
RRUS 32	0.0000	0.05	0.00	-6.50	144.00	1.097	42	2.74	1.67
RRUS 32	120.0000	0.10	5.63	3.25	144.00	1.097	42	5.49	3.34
DC6-48-60-18-8F	120.0000	0.03	2.60	1.50	144.00	1.097	42	1.21	1.21
LGP 17201	0.0000	0.06	0.00	-6.50	144.00	1.097	42	3.34	0.93
LGP 17201	120.0000	0.06	5.63	3.25	144.00	1.097	42	3.34	0.93
LGP 17201	240.0000	0.06	-5.63	3.25	144.00	1.097	42	3.34	0.93
LGP21903	0.0000	0.02	0.00	-6.50	144.00	1.097	42	0.46	0.32
LGP21903	120.0000	0.02	5.63	3.25	144.00	1.097	42	0.46	0.32
LGP21903	240.0000	0.02	-5.63	3.25	144.00	1.097	42	0.46	0.32
RRUS 12	0.0000	0.18	0.00	-6.50	144.00	1.097	42	9.44	3.86
DC6-48-60-18-8F	0.0000	0.03	0.00	-3.00	144.00	1.097	42	1.21	1.21
1001940	0.0000	0.00	0.00	-6.50	144.00	1.097	42	0.18	0.08
1001940	0.0000	0.00	0.00	-6.50	144.00	1.097	42	0.35	0.17
Pipe Mount	0.0000	0.04	0.00	-6.50	144.00	1.097	42	2.40	2.40
Pipe Mount	120.0000	0.04	5.63	3.25	144.00	1.097	42	2.40	2.40
Pipe Mount	240.0000	0.04	-5.63	3.25	144.00	1.097	42	2.40	2.40
Platform Mount [LP 1002-1]	0.0000	4.05	0.00	0.00	144.00	1.097	42	77.10	77.10
742 213 w/ Mount Pipe	0.0000	0.05	0.00	-3.55	135.00	1.077	41	3.54	2.98
742 213 w/ Mount Pipe	120.0000	0.05	3.08	1.78	135.00	1.077	41	3.54	2.98
742 213 w/ Mount Pipe	240.0000	0.05	-3.08	1.78	135.00	1.077	41	3.54	2.98
NNVV-65B-R4 w/ Mount Pipe	0.0000	0.12	0.00	-6.59	130.00	1.065	41	12.56	7.76
NNVV-65B-R4 w/ Mount Pipe	120.0000	0.12	5.71	3.30	130.00	1.065	41	12.56	7.76

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
NNVV-65B-R4 w/ Mount Pipe	240.0000	0.12	-5.71	3.30	130.00	1.065	41	12.56	7.76
APXVTM14-ALU-I20 w/ Mount Pipe	0.0000	0.08	0.00	-6.59	130.00	1.065	41	6.58	4.96
APXVTM14-ALU-I20 w/ Mount Pipe	120.0000	0.08	5.71	3.30	130.00	1.065	41	6.58	4.96
APXVTM14-ALU-I20 w/ Mount Pipe	240.0000	0.08	-5.71	3.30	130.00	1.065	41	6.58	4.96
RRH2X50-800	240.0000	0.20	-5.71	3.30	130.00	1.065	41	8.54	7.16
RRH2X50-800	0.0000	0.05	0.00	-6.59	130.00	1.065	41	2.13	1.79
RRH2X50-800	120.0000	0.05	5.71	3.30	130.00	1.065	41	2.13	1.79
TD-RRH8X20-25	0.0000	0.21	0.00	-6.59	130.00	1.065	41	11.11	3.88
PCS 1900MHZ 4X45W-65MHZ	120.0000	0.18	5.71	3.30	130.00	1.065	41	6.97	6.71
Pipe Mount	0.0000	0.02	0.00	-6.59	128.00	1.060	41	1.20	1.20
Pipe Mount	120.0000	0.02	5.71	3.30	128.00	1.060	41	1.20	1.20
Pipe Mount	240.0000	0.02	-5.71	3.30	128.00	1.060	41	1.20	1.20
T-Arm Mount [TA 602-3]	0.0000	0.77	0.00	0.00	129.00	1.063	41	11.59	11.59
T-Arm Mount [TA 602-3]	0.0000	0.77	0.00	0.00	127.00	1.058	40	11.59	11.59
RV90-17-00DP w/ Mount Pipe	0.0000	0.04	0.00	-5.72	100.00	0.988	38	4.59	3.32
RV90-17-00DP w/ Mount Pipe	120.0000	0.04	4.95	2.86	100.00	0.988	38	4.59	3.32
RV90-17-00DP w/ Mount Pipe	240.0000	0.04	-4.95	2.86	100.00	0.988	38	4.59	3.32
KRY 112 489/2	0.0000	0.02	0.00	-5.72	100.00	0.988	38	0.56	0.37
KRY 112 489/2	120.0000	0.02	4.95	2.86	100.00	0.988	38	0.56	0.37
KRY 112 489/2	240.0000	0.02	-4.95	2.86	100.00	0.988	38	0.56	0.37
APXVAARR24_43-U-NA20 w/ Mount Pipe	0.0000	0.16	0.00	-5.72	100.00	0.988	38	20.48	11.02
APXVAARR24_43-U-NA20 w/ Mount Pipe	120.0000	0.16	4.95	2.86	100.00	0.988	38	20.48	11.02
APXVAARR24_43-U-NA20 w/ Mount Pipe	240.0000	0.16	-4.95	2.86	100.00	0.988	38	20.48	11.02
RADIO 4449 B12/B71	0.0000	0.16	0.00	-5.72	100.00	0.988	38	3.30	2.60
RADIO 4449 B12/B71	120.0000	0.08	4.95	2.86	100.00	0.988	38	1.65	1.30
KRY 112 144/1	0.0000	0.01	0.00	-5.72	100.00	0.988	38	0.35	0.16
KRY 112 144/1	120.0000	0.01	4.95	2.86	100.00	0.988	38	0.35	0.16
KRY 112 144/1	240.0000	0.01	-4.95	2.86	100.00	0.988	38	0.35	0.16
Side Arm Mount [SO 701-3]	0.0000	0.20	0.00	0.00	100.00	0.988	38	2.83	2.83
	Sum Weight:	15.17							

Discrete Appurtenance Pressures - With Ice $G_H = 1.100$

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
DB809K-Y	0.0000	0.12	0.00	-6.44	159.00	1.128	6	6.18	6.18	1.4921
DB809K-Y	120.0000	0.12	5.58	3.22	159.00	1.128	6	6.18	6.18	1.4921
DB809K-Y	240.0000	0.12	-5.58	3.22	159.00	1.128	6	6.18	6.18	1.4921
Pipe Mount	0.0000	0.06	0.00	-6.44	156.00	1.122	6	2.13	2.13	1.4893
Pipe Mount	120.0000	0.06	5.58	3.22	156.00	1.122	6	2.13	2.13	1.4893
Pipe Mount	240.0000	0.06	-5.58	3.22	156.00	1.122	6	2.13	2.13	1.4893
SBNHH-1D65B w/	0.0000	0.59	0.00	-6.44	159.00	1.128	6	10.60	8.93	1.4921

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
Mount Pipe										
SBNHH-1D65B w/ Mount Pipe	120.0000	0.59	5.58	3.22	159.00	1.128	6	10.60	8.93	1.4921
SBNHH-1D65B w/ Mount Pipe	240.0000	0.59	-5.58	3.22	159.00	1.128	6	10.60	8.93	1.4921
LNX-8513DS-VTM w/ Mount Pipe	240.0000	0.30	-5.58	3.22	159.00	1.128	6	10.04	10.09	1.4921
LNX-6514DS-A1M w/ Mount Pipe	240.0000	0.30	-5.58	3.22	159.00	1.128	6	10.04	10.09	1.4921
LNX-6514DS-AIM w/ Mount Pipe	0.0000	0.30	0.00	-6.44	159.00	1.128	6	10.04	10.09	1.4921
LNX-6514DS-A1M w/ Mount Pipe	0.0000	0.30	0.00	-6.44	159.00	1.128	6	10.04	10.09	1.4921
LNX-6514DS-AIM w/ Mount Pipe	120.0000	0.30	5.58	3.22	159.00	1.128	6	10.04	10.09	1.4921
LNX-6514DS-A1M w/ Mount Pipe	120.0000	0.30	5.58	3.22	159.00	1.128	6	10.04	10.09	1.4921
B13 RRH 4x30	0.0000	0.12	0.00	-6.44	159.00	1.128	6	2.63	1.81	1.4921
B13 RRH 4x30	120.0000	0.12	5.58	3.22	159.00	1.128	6	2.63	1.81	1.4921
B13 RRH 4x30	240.0000	0.12	-5.58	3.22	159.00	1.128	6	2.63	1.81	1.4921
RRFDC-3315-PF-48	240.0000	0.24	-2.55	1.47	159.00	1.128	6	7.41	5.10	1.4921
Platform Mount [LP 1002-1]	0.0000	7.67	0.00	0.00	156.00	1.122	6	125.35	125.35	1.4893
80010965 w/ Mount Pipe	0.0000	0.43	0.00	-6.50	144.00	1.097	6	15.41	9.57	1.4774
80010965 w/ Mount Pipe	120.0000	0.43	5.63	3.25	144.00	1.097	6	15.41	9.57	1.4774
80010965 w/ Mount Pipe	240.0000	0.43	-5.63	3.25	144.00	1.097	6	15.41	9.57	1.4774
7770.00 w/ Mount Pipe	0.0000	0.22	0.00	-6.50	144.00	1.097	6	7.03	6.40	1.4774
7770.00 w/ Mount Pipe	120.0000	0.22	5.63	3.25	144.00	1.097	6	7.03	6.40	1.4774
7770.00 w/ Mount Pipe	240.0000	0.22	-5.63	3.25	144.00	1.097	6	7.03	6.40	1.4774
AM-X-CD-16-65-00T-RET w/ Mount Pipe	0.0000	0.29	0.00	-6.50	144.00	1.097	6	9.86	9.23	1.4774
AM-X-CD-16-65-00T-RET w/ Mount Pipe	120.0000	0.29	5.63	3.25	144.00	1.097	6	9.86	9.23	1.4774
AM-X-CD-16-65-00T-RET w/ Mount Pipe	240.0000	0.29	-5.63	3.25	144.00	1.097	6	9.86	9.23	1.4774
RRUS 4449 B5/B12	240.0000	0.27	-5.63	3.25	144.00	1.097	6	5.03	3.79	1.4774
RRUS 4449 B5/B12	0.0000	0.14	0.00	-6.50	144.00	1.097	6	2.51	1.89	1.4774
RRUS 32	0.0000	0.13	0.00	-6.50	144.00	1.097	6	3.42	2.24	1.4774
RRUS 32	120.0000	0.25	5.63	3.25	144.00	1.097	6	6.85	4.49	1.4774
DC6-48-60-18-8F	120.0000	0.11	2.60	1.50	144.00	1.097	6	2.33	2.33	1.4774
LGP 17201	0.0000	0.14	0.00	-6.50	144.00	1.097	6	4.34	1.58	1.4774
LGP 17201	120.0000	0.14	5.63	3.25	144.00	1.097	6	4.34	1.58	1.4774
LGP 17201	240.0000	0.14	-5.63	3.25	144.00	1.097	6	4.34	1.58	1.4774
LGP21903	0.0000	0.04	0.00	-6.50	144.00	1.097	6	0.89	0.69	1.4774
LGP21903	120.0000	0.04	5.63	3.25	144.00	1.097	6	0.89	0.69	1.4774
LGP21903	240.0000	0.04	-5.63	3.25	144.00	1.097	6	0.89	0.69	1.4774
RRUS 12	0.0000	0.41	0.00	-6.50	144.00	1.097	6	11.46	5.31	1.4774
DC6-48-60-18-8F	0.0000	0.11	0.00	-3.00	144.00	1.097	6	2.33	2.33	1.4774
1001940	0.0000	0.01	0.00	-6.50	144.00	1.097	6	0.37	0.24	1.4774
1001940	0.0000	0.02	0.00	-6.50	144.00	1.097	6	0.73	0.48	1.4774
Pipe Mount	0.0000	0.12	0.00	-6.50	144.00	1.097	6	4.25	4.25	1.4774
Pipe Mount	120.0000	0.12	5.63	3.25	144.00	1.097	6	4.25	4.25	1.4774
Pipe Mount	240.0000	0.12	-5.63	3.25	144.00	1.097	6	4.25	4.25	1.4774
Platform Mount [LP 1002-1]	0.0000	7.64	0.00	0.00	144.00	1.097	6	124.97	124.97	1.4774
742 213 w/ Mount Pipe	0.0000	0.20	0.00	-3.55	135.00	1.077	6	5.33	4.75	1.4679
742 213 w/ Mount Pipe	120.0000	0.20	3.08	1.78	135.00	1.077	6	5.33	4.75	1.4679
742 213 w/ Mount Pipe	240.0000	0.20	-3.08	1.78	135.00	1.077	6	5.33	4.75	1.4679
NNVV-65B-R4 w/ Mount Pipe	0.0000	0.42	0.00	-6.59	130.00	1.065	6	14.23	10.54	1.4624
NNVV-65B-R4 w/	120.0000	0.42	5.71	3.30	130.00	1.065	6	14.23	10.54	1.4624

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
Mount Pipe										
NNVV-65B-R4 w/ Mount Pipe	240.0000	0.42	-5.71	3.30	130.00	1.065	6	14.23	10.54	1.4624
APXVTM14-ALU-I20 w/ Mount Pipe	0.0000	0.26	0.00	-6.59	130.00	1.065	6	7.89	7.15	1.4624
APXVTM14-ALU-I20 w/ Mount Pipe	120.0000	0.26	5.71	3.30	130.00	1.065	6	7.89	7.15	1.4624
APXVTM14-ALU-I20 w/ Mount Pipe	240.0000	0.26	-5.71	3.30	130.00	1.065	6	7.89	7.15	1.4624
RRH2X50-800	240.0000	0.49	-5.71	3.30	130.00	1.065	6	10.80	9.29	1.4624
RRH2X50-800	0.0000	0.12	0.00	-6.59	130.00	1.065	6	2.70	2.32	1.4624
RRH2X50-800	120.0000	0.12	5.71	3.30	130.00	1.065	6	2.70	2.32	1.4624
TD-RRH8X20-25	0.0000	0.44	0.00	-6.59	130.00	1.065	6	13.31	5.45	1.4624
PCS 1900MHZ 4X45W-65MHZ	120.0000	0.42	5.71	3.30	130.00	1.065	6	8.84	8.57	1.4624
Pipe Mount	0.0000	0.06	0.00	-6.59	128.00	1.060	6	2.11	2.11	1.4601
Pipe Mount	120.0000	0.06	5.71	3.30	128.00	1.060	6	2.11	2.11	1.4601
Pipe Mount	240.0000	0.06	-5.71	3.30	128.00	1.060	6	2.11	2.11	1.4601
T-Arm Mount [TA 602-3]	0.0000	1.41	0.00	0.00	129.00	1.063	6	22.84	22.84	1.4612
T-Arm Mount [TA 602-3]	0.0000	1.40	0.00	0.00	127.00	1.058	6	22.82	22.82	1.4589
RV90-17-00DP w/ Mount Pipe	0.0000	0.17	0.00	-5.72	100.00	0.988	6	5.80	5.40	1.4245
RV90-17-00DP w/ Mount Pipe	120.0000	0.17	4.95	2.86	100.00	0.988	6	5.80	5.40	1.4245
RV90-17-00DP w/ Mount Pipe	240.0000	0.17	-4.95	2.86	100.00	0.988	6	5.80	5.40	1.4245
KRY 112 489/2	0.0000	0.04	0.00	-5.72	100.00	0.988	6	0.86	0.63	1.4245
KRY 112 489/2	120.0000	0.04	4.95	2.86	100.00	0.988	6	0.86	0.63	1.4245
KRY 112 489/2	240.0000	0.04	-4.95	2.86	100.00	0.988	6	0.86	0.63	1.4245
APXVAARR24_43-U-NA20 w/ Mount Pipe	0.0000	0.58	0.00	-5.72	100.00	0.988	6	22.61	15.10	1.4245
APXVAARR24_43-U-NA20 w/ Mount Pipe	120.0000	0.58	4.95	2.86	100.00	0.988	6	22.61	15.10	1.4245
APXVAARR24_43-U-NA20 w/ Mount Pipe	240.0000	0.58	-4.95	2.86	100.00	0.988	6	22.61	15.10	1.4245
RADIO 4449 B12/B71	0.0000	0.27	0.00	-5.72	100.00	0.988	6	4.26	3.47	1.4245
RADIO 4449 B12/B71	120.0000	0.13	4.95	2.86	100.00	0.988	6	2.13	1.74	1.4245
KRY 112 144/1	0.0000	0.02	0.00	-5.72	100.00	0.988	6	0.59	0.35	1.4245
KRY 112 144/1	120.0000	0.02	4.95	2.86	100.00	0.988	6	0.59	0.35	1.4245
KRY 112 144/1	240.0000	0.02	-4.95	2.86	100.00	0.988	6	0.59	0.35	1.4245
Side Arm Mount [SO 701-3]	0.0000	0.31	0.00	0.00	100.00	0.988	6	5.94	5.94	1.4245
	Sum Weight:	35.56								

Discrete Appurtenance Pressures - Service $G_H = 1.100$

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
DB809K-Y	0.0000	0.03	0.00	-6.44	159.00	1.128	9	2.85	2.85
DB809K-Y	120.0000	0.03	5.58	3.22	159.00	1.128	9	2.85	2.85
DB809K-Y	240.0000	0.03	-5.58	3.22	159.00	1.128	9	2.85	2.85
Pipe Mount	0.0000	0.02	0.00	-6.44	156.00	1.122	9	1.20	1.20
Pipe Mount	120.0000	0.02	5.58	3.22	156.00	1.122	9	1.20	1.20
Pipe Mount	240.0000	0.02	-5.58	3.22	156.00	1.122	9	1.20	1.20

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
SBNHH-1D65B w/ Mount Pipe	0.0000	0.13	0.00	-6.44	159.00	1.128	9	8.18	6.60
SBNHH-1D65B w/ Mount Pipe	120.0000	0.13	5.58	3.22	159.00	1.128	9	8.18	6.60
SBNHH-1D65B w/ Mount Pipe	240.0000	0.13	-5.58	3.22	159.00	1.128	9	8.18	6.60
LNX-8513DS-VTM w/ Mount Pipe	240.0000	0.06	-5.58	3.22	159.00	1.128	9	8.41	7.08
LNX-6514DS-A1M w/ Mount Pipe	240.0000	0.06	-5.58	3.22	159.00	1.128	9	8.41	7.08
LNX-6514DS-AIM w/ Mount Pipe	0.0000	0.06	0.00	-6.44	159.00	1.128	9	8.41	7.08
LNX-6514DS-A1M w/ Mount Pipe	0.0000	0.06	0.00	-6.44	159.00	1.128	9	8.41	7.08
LNX-6514DS-AIM w/ Mount Pipe	120.0000	0.06	5.58	3.22	159.00	1.128	9	8.41	7.08
LNX-6514DS-A1M w/ Mount Pipe	120.0000	0.06	5.58	3.22	159.00	1.128	9	8.41	7.08
B13 RRH 4x30	0.0000	0.06	0.00	-6.44	159.00	1.128	9	2.06	1.32
B13 RRH 4x30	120.0000	0.06	5.58	3.22	159.00	1.128	9	2.06	1.32
B13 RRH 4x30	240.0000	0.06	-5.58	3.22	159.00	1.128	9	2.06	1.32
RRFDC-3315-PF-48	240.0000	0.06	-2.55	1.47	159.00	1.128	9	6.05	3.93
Platform Mount [LP 1002-1]	0.0000	4.05	0.00	0.00	156.00	1.122	9	77.10	77.10
80010965 w/ Mount Pipe	0.0000	0.13	0.00	-6.50	144.00	1.097	8	13.81	7.16
80010965 w/ Mount Pipe	120.0000	0.13	5.63	3.25	144.00	1.097	8	13.81	7.16
80010965 w/ Mount Pipe	240.0000	0.13	-5.63	3.25	144.00	1.097	8	13.81	7.16
7770.00 w/ Mount Pipe	0.0000	0.06	0.00	-6.50	144.00	1.097	8	5.75	4.25
7770.00 w/ Mount Pipe	120.0000	0.06	5.63	3.25	144.00	1.097	8	5.75	4.25
7770.00 w/ Mount Pipe	240.0000	0.06	-5.63	3.25	144.00	1.097	8	5.75	4.25
AM-X-CD-16-65-00T-RET w/ Mount Pipe	0.0000	0.07	0.00	-6.50	144.00	1.097	8	8.26	6.30
AM-X-CD-16-65-00T-RET w/ Mount Pipe	120.0000	0.07	5.63	3.25	144.00	1.097	8	8.26	6.30
AM-X-CD-16-65-00T-RET w/ Mount Pipe	240.0000	0.07	-5.63	3.25	144.00	1.097	8	8.26	6.30
RRUS 4449 B5/B12	240.0000	0.14	-5.63	3.25	144.00	1.097	8	3.94	2.82
RRUS 4449 B5/B12	0.0000	0.07	0.00	-6.50	144.00	1.097	8	1.97	1.41
RRUS 32	0.0000	0.05	0.00	-6.50	144.00	1.097	8	2.74	1.67
RRUS 32	120.0000	0.10	5.63	3.25	144.00	1.097	8	5.49	3.34
DC6-48-60-18-8F	120.0000	0.03	2.60	1.50	144.00	1.097	8	1.21	1.21
LGP 17201	0.0000	0.06	0.00	-6.50	144.00	1.097	8	3.34	0.93
LGP 17201	120.0000	0.06	5.63	3.25	144.00	1.097	8	3.34	0.93
LGP 17201	240.0000	0.06	-5.63	3.25	144.00	1.097	8	3.34	0.93
LGP21903	0.0000	0.02	0.00	-6.50	144.00	1.097	8	0.46	0.32
LGP21903	120.0000	0.02	5.63	3.25	144.00	1.097	8	0.46	0.32
LGP21903	240.0000	0.02	-5.63	3.25	144.00	1.097	8	0.46	0.32
RRUS 12	0.0000	0.18	0.00	-6.50	144.00	1.097	8	9.44	3.86
DC6-48-60-18-8F	0.0000	0.03	0.00	-3.00	144.00	1.097	8	1.21	1.21
1001940	0.0000	0.00	0.00	-6.50	144.00	1.097	8	0.18	0.08
1001940	0.0000	0.00	0.00	-6.50	144.00	1.097	8	0.35	0.17
Pipe Mount	0.0000	0.04	0.00	-6.50	144.00	1.097	8	2.40	2.40
Pipe Mount	120.0000	0.04	5.63	3.25	144.00	1.097	8	2.40	2.40
Pipe Mount	240.0000	0.04	-5.63	3.25	144.00	1.097	8	2.40	2.40
Platform Mount [LP 1002-1]	0.0000	4.05	0.00	0.00	144.00	1.097	8	77.10	77.10
742 213 w/ Mount Pipe	0.0000	0.05	0.00	-3.55	135.00	1.077	8	3.54	2.98
742 213 w/ Mount Pipe	120.0000	0.05	3.08	1.78	135.00	1.077	8	3.54	2.98
742 213 w/ Mount Pipe	240.0000	0.05	-3.08	1.78	135.00	1.077	8	3.54	2.98
NNVV-65B-R4 w/ Mount Pipe	0.0000	0.12	0.00	-6.59	130.00	1.065	8	12.56	7.76

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
NNVV-65B-R4 w/ Mount Pipe	120.0000	0.12	5.71	3.30	130.00	1.065	8	12.56	7.76
NNVV-65B-R4 w/ Mount Pipe	240.0000	0.12	-5.71	3.30	130.00	1.065	8	12.56	7.76
APXVTM14-ALU-I20 w/ Mount Pipe	0.0000	0.08	0.00	-6.59	130.00	1.065	8	6.58	4.96
APXVTM14-ALU-I20 w/ Mount Pipe	120.0000	0.08	5.71	3.30	130.00	1.065	8	6.58	4.96
APXVTM14-ALU-I20 w/ Mount Pipe	240.0000	0.08	-5.71	3.30	130.00	1.065	8	6.58	4.96
RRH2X50-800	240.0000	0.20	-5.71	3.30	130.00	1.065	8	8.54	7.16
RRH2X50-800	0.0000	0.05	0.00	-6.59	130.00	1.065	8	2.13	1.79
RRH2X50-800	120.0000	0.05	5.71	3.30	130.00	1.065	8	2.13	1.79
TD-RRH8X20-25	0.0000	0.21	0.00	-6.59	130.00	1.065	8	11.11	3.88
PCS 1900MHZ 4X45W-65MHZ	120.0000	0.18	5.71	3.30	130.00	1.065	8	6.97	6.71
Pipe Mount	0.0000	0.02	0.00	-6.59	128.00	1.060	8	1.20	1.20
Pipe Mount	120.0000	0.02	5.71	3.30	128.00	1.060	8	1.20	1.20
Pipe Mount	240.0000	0.02	-5.71	3.30	128.00	1.060	8	1.20	1.20
T-Arm Mount [TA 602-3]	0.0000	0.77	0.00	0.00	129.00	1.063	8	11.59	11.59
T-Arm Mount [TA 602-3]	0.0000	0.77	0.00	0.00	127.00	1.058	8	11.59	11.59
RV90-17-00DP w/ Mount Pipe	0.0000	0.04	0.00	-5.72	100.00	0.988	8	4.59	3.32
RV90-17-00DP w/ Mount Pipe	120.0000	0.04	4.95	2.86	100.00	0.988	8	4.59	3.32
RV90-17-00DP w/ Mount Pipe	240.0000	0.04	-4.95	2.86	100.00	0.988	8	4.59	3.32
KRY 112 489/2	0.0000	0.02	0.00	-5.72	100.00	0.988	8	0.56	0.37
KRY 112 489/2	120.0000	0.02	4.95	2.86	100.00	0.988	8	0.56	0.37
KRY 112 489/2	240.0000	0.02	-4.95	2.86	100.00	0.988	8	0.56	0.37
APXVAARR24_43-U-NA20 w/ Mount Pipe	0.0000	0.16	0.00	-5.72	100.00	0.988	8	20.48	11.02
APXVAARR24_43-U-NA20 w/ Mount Pipe	120.0000	0.16	4.95	2.86	100.00	0.988	8	20.48	11.02
APXVAARR24_43-U-NA20 w/ Mount Pipe	240.0000	0.16	-4.95	2.86	100.00	0.988	8	20.48	11.02
RADIO 4449 B12/B71	0.0000	0.16	0.00	-5.72	100.00	0.988	8	3.30	2.60
RADIO 4449 B12/B71	120.0000	0.08	4.95	2.86	100.00	0.988	8	1.65	1.30
KRY 112 144/1	0.0000	0.01	0.00	-5.72	100.00	0.988	8	0.35	0.16
KRY 112 144/1	120.0000	0.01	4.95	2.86	100.00	0.988	8	0.35	0.16
KRY 112 144/1	240.0000	0.01	-4.95	2.86	100.00	0.988	8	0.35	0.16
Side Arm Mount [SO 701-3]	0.0000	0.20	0.00	0.00	100.00	0.988	8	2.83	2.83
	Sum Weight:	15.17							

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	60.79					
Bracing Weight	0.00					
Total Member Self-Weight	60.79			-2.06	-0.27	
Total Weight	82.42			-2.06	-0.27	

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 0 deg - No Ice		0.04	-54.04	-5715.19	-6.05	0.23
Wind 30 deg - No Ice		26.85	-46.82	-4952.67	-2835.04	-0.09
Wind 60 deg - No Ice		46.47	-27.05	-2863.63	-4904.45	-0.38
Wind 90 deg - No Ice		53.64	-0.04	-7.84	-5659.78	-0.57
Wind 120 deg - No Ice		46.43	26.99	2849.50	-4898.66	-0.61
Wind 150 deg - No Ice		26.79	46.78	4942.77	-2825.01	-0.48
Wind 180 deg - No Ice		-0.04	54.04	5711.07	5.52	-0.23
Wind 210 deg - No Ice		-26.85	46.82	4948.55	2834.50	0.09
Wind 240 deg - No Ice		-46.47	27.05	2859.52	4903.91	0.38
Wind 270 deg - No Ice		-53.64	0.04	3.73	5659.25	0.57
Wind 300 deg - No Ice		-46.43	-26.99	-2853.61	4898.12	0.61
Wind 330 deg - No Ice		-26.79	-46.78	-4946.88	2824.48	0.48
Member Ice	18.22					
Total Weight Ice	121.49			-2.76	-0.49	
Wind 0 deg - Ice		0.01	-11.00	-1186.54	-1.42	0.05
Wind 30 deg - Ice		5.47	-9.53	-1028.41	-588.81	-0.04
Wind 60 deg - Ice		9.47	-5.50	-595.46	-1018.55	-0.11
Wind 90 deg - Ice		10.93	-0.01	-3.70	-1175.51	-0.16
Wind 120 deg - Ice		9.46	5.49	588.32	-1017.62	-0.16
Wind 150 deg - Ice		5.46	9.52	1021.95	-587.19	-0.12
Wind 180 deg - Ice		-0.01	11.00	1181.02	0.45	-0.05
Wind 210 deg - Ice		-5.47	9.53	1022.89	587.84	0.04
Wind 240 deg - Ice		-9.47	5.50	589.94	1017.58	0.11
Wind 270 deg - Ice		-10.93	0.01	-1.83	1174.54	0.16
Wind 300 deg - Ice		-9.46	-5.49	-593.85	1016.65	0.16
Wind 330 deg - Ice		-5.46	-9.52	-1027.48	586.22	0.12
Total Weight	82.42			-2.06	-0.27	
Wind 0 deg - Service		0.01	-10.84	-1148.35	-1.43	0.05
Wind 30 deg - Service		5.39	-9.39	-995.37	-569.00	-0.02
Wind 60 deg - Service		9.32	-5.43	-576.26	-984.17	-0.08
Wind 90 deg - Service		10.76	-0.01	-3.31	-1135.71	-0.12
Wind 120 deg - Service		9.32	5.42	569.95	-983.01	-0.12
Wind 150 deg - Service		5.37	9.39	989.91	-566.99	-0.10
Wind 180 deg - Service		-0.01	10.84	1144.05	0.89	-0.05
Wind 210 deg - Service		-5.39	9.39	991.07	568.46	0.02
Wind 240 deg - Service		-9.32	5.43	571.96	983.64	0.08
Wind 270 deg - Service		-10.76	0.01	-0.99	1135.18	0.12
Wind 300 deg - Service		-9.32	-5.42	-574.25	982.48	0.12
Wind 330 deg - Service		-5.37	-9.39	-994.21	566.45	0.10

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

Comb. No.	Description
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	155.5 - 110	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-52.44	0.20	2.97
			Max. Mx	20	-28.94	725.15	0.19
			Max. My	2	-28.92	-1.40	732.94
			Max. Vy	8	28.43	-724.85	3.30
			Max. Vx	2	-28.82	-1.40	732.94
			Max. Torque	18			-0.76
L2	110 - 72.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-79.55	-0.54	3.88
			Max. Mx	8	-48.47	-1979.48	5.55
			Max. My	2	-48.46	-3.31	2002.92
			Max. Vy	8	39.15	-1979.48	5.55
			Max. Vx	2	-39.56	-3.31	2002.92
			Max. Torque	10			0.62
L3	72.5 - 36	Pole	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	26	-106.68	-0.54	3.53
			Max. Mx	8	-70.31	-3525.82	6.85
			Max. My	2	-70.30	-4.62	3564.19
			Max. Vy	8	46.49	-3525.82	6.85
			Max. Vx	2	-46.90	-4.62	3564.19
			Max. Torque	10			0.62
L4	36 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-141.00	-0.54	3.17
			Max. Mx	8	-98.89	-5789.77	8.45
			Max. My	2	-98.89	-6.24	5846.62
			Max. Vy	8	53.86	-5789.77	8.45
			Max. Vx	2	-54.26	-6.24	5846.62
			Max. Torque	10			0.62

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	141.00	0.00	0.00
	Max. H_x	20	98.90	53.83	-0.04
	Max. H_z	2	98.90	-0.04	54.23
	Max. M_x	2	5846.62	-0.04	54.23
	Max. M_z	8	5789.77	-53.83	0.04
	Max. Torsion	10	0.62	-46.60	-27.09
	Min. Vert	11	74.18	-46.60	-27.09
	Min. H_x	8	98.90	-53.83	0.04
	Min. H_z	14	98.90	0.04	-54.23
	Min. M_x	14	-5841.54	0.04	-54.23
	Min. M_z	20	-5789.12	53.83	-0.04
	Min. Torsion	22	-0.61	46.60	27.09

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
Dead Only	82.42	0.00	0.00	-2.06	-0.27	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	98.90	0.04	-54.23	-5846.62	-6.24	0.23
0.9 Dead+1.0 Wind 0 deg - No Ice	74.18	0.04	-54.23	-5819.00	-6.12	0.23
1.2 Dead+1.0 Wind 30 deg - No Ice	98.90	26.94	-46.98	-5066.62	-2900.16	-0.09
0.9 Dead+1.0 Wind 30 deg - No Ice	74.18	26.94	-46.98	-5042.60	-2886.70	-0.09
1.2 Dead+1.0 Wind 60 deg - No Ice	98.90	46.63	-27.15	-2929.71	-5017.09	-0.39
0.9 Dead+1.0 Wind 60 deg - No Ice	74.18	46.63	-27.15	-2915.54	-4993.86	-0.39
1.2 Dead+1.0 Wind 90 deg - No Ice	98.90	53.83	-0.04	-8.45	-5789.77	-0.58
0.9 Dead+1.0 Wind 90 deg - No	74.18	53.83	-0.04	-7.77	-5762.98	-0.58

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
Ice						
1.2 Dead+1.0 Wind 120 deg - No Ice	98.90	46.60	27.09	2914.39	-5011.18	-0.62
0.9 Dead+1.0 Wind 120 deg - No Ice	74.18	46.60	27.09	2901.58	-4987.98	-0.61
1.2 Dead+1.0 Wind 150 deg - No Ice	98.90	26.88	46.95	5055.63	-2889.93	-0.48
0.9 Dead+1.0 Wind 150 deg - No Ice	74.18	26.88	46.95	5032.94	-2876.52	-0.48
1.2 Dead+1.0 Wind 180 deg - No Ice	98.90	-0.04	54.23	5841.54	5.58	-0.22
0.9 Dead+1.0 Wind 180 deg - No Ice	74.18	-0.04	54.23	5815.22	5.63	-0.22
1.2 Dead+1.0 Wind 210 deg - No Ice	98.90	-26.94	46.98	5061.54	2899.51	0.10
0.9 Dead+1.0 Wind 210 deg - No Ice	74.18	-26.94	46.98	5038.82	2886.21	0.10
1.2 Dead+1.0 Wind 240 deg - No Ice	98.90	-46.63	27.15	2924.62	5016.43	0.39
0.9 Dead+1.0 Wind 240 deg - No Ice	74.18	-46.63	27.15	2911.76	4993.37	0.39
1.2 Dead+1.0 Wind 270 deg - No Ice	98.90	-53.83	0.04	3.37	5789.12	0.58
0.9 Dead+1.0 Wind 270 deg - No Ice	74.18	-53.83	0.04	3.99	5762.50	0.58
1.2 Dead+1.0 Wind 300 deg - No Ice	98.90	-46.60	-27.09	-2919.47	5010.52	0.61
0.9 Dead+1.0 Wind 300 deg - No Ice	74.18	-46.60	-27.09	-2905.36	4987.49	0.61
1.2 Dead+1.0 Wind 330 deg - No Ice	98.90	-26.88	-46.95	-5060.72	2889.27	0.48
0.9 Dead+1.0 Wind 330 deg - No Ice	74.18	-26.88	-46.95	-5036.72	2876.03	0.48
1.2 Dead+1.0 Ice+1.0 Temp	141.00	0.00	0.00	-3.17	-0.54	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	141.00	0.01	-11.04	-1228.56	-1.53	0.05
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	141.00	5.49	-9.56	-1064.90	-609.49	-0.04
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	141.00	9.50	-5.52	-616.79	-1054.29	-0.11
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	141.00	10.97	-0.01	-4.31	-1216.74	-0.16
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	141.00	9.50	5.51	608.42	-1053.32	-0.16
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	141.00	5.48	9.56	1057.23	-607.81	-0.12
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	141.00	-0.01	11.04	1221.86	0.40	-0.05
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	141.00	-5.49	9.56	1058.20	608.36	0.04
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	141.00	-9.50	5.52	610.09	1053.16	0.11
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	141.00	-10.97	0.01	-2.38	1215.62	0.16
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	141.00	-9.50	-5.51	-615.12	1052.20	0.16
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	141.00	-5.48	-9.56	-1063.93	606.69	0.12
Dead+Wind 0 deg - Service	82.42	0.01	-10.88	-1171.10	-1.45	0.05
Dead+Wind 30 deg - Service	82.42	5.41	-9.43	-1015.08	-580.33	-0.02
Dead+Wind 60 deg - Service	82.42	9.36	-5.45	-587.63	-1003.78	-0.08

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+Wind 90 deg - Service	82.42	10.80	-0.01	-3.29	-1158.34	-0.12
Dead+Wind 120 deg - Service	82.42	9.35	5.43	581.37	-1002.59	-0.12
Dead+Wind 150 deg - Service	82.42	5.39	9.42	1009.68	-578.28	-0.10
Dead+Wind 180 deg - Service	82.42	-0.01	10.88	1166.89	0.91	-0.04
Dead+Wind 210 deg - Service	82.42	-5.41	9.43	1010.86	579.78	0.02
Dead+Wind 240 deg - Service	82.42	-9.36	5.45	583.41	1003.23	0.08
Dead+Wind 270 deg - Service	82.42	-10.80	0.01	-0.93	1157.79	0.12
Dead+Wind 300 deg - Service	82.42	-9.35	-5.43	-585.58	1002.05	0.12
Dead+Wind 330 deg - Service	82.42	-5.39	-9.42	-1013.90	577.74	0.10

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-82.42	0.00	0.00	82.42	0.00	0.000%
2	0.04	-98.90	-54.23	-0.04	98.90	54.23	0.000%
3	0.04	-74.18	-54.23	-0.04	74.18	54.23	0.000%
4	26.94	-98.90	-46.98	-26.94	98.90	46.98	0.000%
5	26.94	-74.18	-46.98	-26.94	74.18	46.98	0.000%
6	46.63	-98.90	-27.15	-46.63	98.90	27.15	0.000%
7	46.63	-74.18	-27.15	-46.63	74.18	27.15	0.000%
8	53.83	-98.90	-0.04	-53.83	98.90	0.04	0.000%
9	53.83	-74.18	-0.04	-53.83	74.18	0.04	0.000%
10	46.60	-98.90	27.09	-46.60	98.90	-27.09	0.000%
11	46.60	-74.18	27.09	-46.60	74.18	-27.09	0.000%
12	26.88	-98.90	46.95	-26.88	98.90	-46.95	0.000%
13	26.88	-74.18	46.95	-26.88	74.18	-46.95	0.000%
14	-0.04	-98.90	54.23	0.04	98.90	-54.23	0.000%
15	-0.04	-74.18	54.23	0.04	74.18	-54.23	0.000%
16	-26.94	-98.90	46.98	26.94	98.90	-46.98	0.000%
17	-26.94	-74.18	46.98	26.94	74.18	-46.98	0.000%
18	-46.63	-98.90	27.15	46.63	98.90	-27.15	0.000%
19	-46.63	-74.18	27.15	46.63	74.18	-27.15	0.000%
20	-53.83	-98.90	0.04	53.83	98.90	-0.04	0.000%
21	-53.83	-74.18	0.04	53.83	74.18	-0.04	0.000%
22	-46.60	-98.90	-27.09	46.60	98.90	27.09	0.000%
23	-46.60	-74.18	-27.09	46.60	74.18	27.09	0.000%
24	-26.88	-98.90	-46.95	26.88	98.90	46.95	0.000%
25	-26.88	-74.18	-46.95	26.88	74.18	46.95	0.000%
26	0.00	-141.00	0.00	0.00	141.00	0.00	0.000%
27	0.01	-141.00	-11.04	-0.01	141.00	11.04	0.000%
28	5.49	-141.00	-9.56	-5.49	141.00	9.56	0.000%
29	9.50	-141.00	-5.52	-9.50	141.00	5.52	0.000%
30	10.97	-141.00	-0.01	-10.97	141.00	0.01	0.000%
31	9.50	-141.00	5.51	-9.50	141.00	-5.51	0.000%
32	5.48	-141.00	9.56	-5.48	141.00	-9.56	0.000%
33	-0.01	-141.00	11.04	0.01	141.00	-11.04	0.000%
34	-5.49	-141.00	9.56	5.49	141.00	-9.56	0.000%
35	-9.50	-141.00	5.52	9.50	141.00	-5.52	0.000%
36	-10.97	-141.00	0.01	10.97	141.00	-0.01	0.000%
37	-9.50	-141.00	-5.51	9.50	141.00	5.51	0.000%
38	-5.48	-141.00	-9.56	5.48	141.00	9.56	0.000%
39	0.01	-82.42	-10.88	-0.01	82.42	10.88	0.000%
40	5.41	-82.42	-9.43	-5.41	82.42	9.43	0.000%
41	9.36	-82.42	-5.45	-9.36	82.42	5.45	0.000%
42	10.80	-82.42	-0.01	-10.80	82.42	0.01	0.000%
43	9.35	-82.42	5.43	-9.35	82.42	-5.43	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
44	5.39	-82.42	9.42	-5.39	82.42	-9.42	0.000%
45	-0.01	-82.42	10.88	0.01	82.42	-10.88	0.000%
46	-5.41	-82.42	9.43	5.41	82.42	-9.43	0.000%
47	-9.36	-82.42	5.45	9.36	82.42	-5.45	0.000%
48	-10.80	-82.42	0.01	10.80	82.42	-0.01	0.000%
49	-9.35	-82.42	-5.43	9.35	82.42	5.43	0.000%
50	-5.39	-82.42	-9.42	5.39	82.42	9.42	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	0.00007656
3	Yes	4	0.00000001	0.00003885
4	Yes	4	0.00000001	0.00079659
5	Yes	4	0.00000001	0.00052113
6	Yes	4	0.00000001	0.00080247
7	Yes	4	0.00000001	0.00052548
8	Yes	4	0.00000001	0.00007871
9	Yes	4	0.00000001	0.00004094
10	Yes	4	0.00000001	0.00077921
11	Yes	4	0.00000001	0.00051027
12	Yes	4	0.00000001	0.00079790
13	Yes	4	0.00000001	0.00052277
14	Yes	4	0.00000001	0.00007611
15	Yes	4	0.00000001	0.00003850
16	Yes	4	0.00000001	0.00079774
17	Yes	4	0.00000001	0.00052242
18	Yes	4	0.00000001	0.00078723
19	Yes	4	0.00000001	0.00051558
20	Yes	4	0.00000001	0.00007764
21	Yes	4	0.00000001	0.00004003
22	Yes	4	0.00000001	0.00079981
23	Yes	4	0.00000001	0.00052398
24	Yes	4	0.00000001	0.00078570
25	Yes	4	0.00000001	0.00051396
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00072959
28	Yes	4	0.00000001	0.00074057
29	Yes	4	0.00000001	0.00073677
30	Yes	4	0.00000001	0.00072070
31	Yes	4	0.00000001	0.00073121
32	Yes	4	0.00000001	0.00073257
33	Yes	4	0.00000001	0.00072199
34	Yes	4	0.00000001	0.00073329
35	Yes	4	0.00000001	0.00073164
36	Yes	4	0.00000001	0.00071976
37	Yes	4	0.00000001	0.00073469
38	Yes	4	0.00000001	0.00073880
39	Yes	4	0.00000001	0.00001294
40	Yes	4	0.00000001	0.00001767
41	Yes	4	0.00000001	0.00001775
42	Yes	4	0.00000001	0.00001280
43	Yes	4	0.00000001	0.00001733
44	Yes	4	0.00000001	0.00001762

45	Yes	4	0.00000001	0.00001286
46	Yes	4	0.00000001	0.00001759
47	Yes	4	0.00000001	0.00001742
48	Yes	4	0.00000001	0.00001279
49	Yes	4	0.00000001	0.00001772
50	Yes	4	0.00000001	0.00001752

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155.5 - 110	6.122	39	0.2820	0.0001
L2	118 - 72.5	3.951	39	0.2642	0.0001
L3	81 - 36	2.068	39	0.2116	0.0000
L4	45 - 0	0.718	39	0.1352	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
156.00	DB809K-Y	39	6.122	0.2820	0.0001	442271
144.00	80010965 w/ Mount Pipe	39	5.443	0.2788	0.0001	192292
135.00	742 213 w/ Mount Pipe	39	4.917	0.2754	0.0001	107871
129.00	T-Arm Mount [TA 602-3]	39	4.571	0.2723	0.0001	83447
128.00	NNVV-65B-R4 w/ Mount Pipe	39	4.514	0.2717	0.0001	80413
127.00	T-Arm Mount [TA 602-3]	39	4.456	0.2711	0.0001	77591
100.00	RV90-17-00DP w/ Mount Pipe	39	2.990	0.2427	0.0001	46217

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155.5 - 110	30.545	2	1.4062	0.0004
L2	118 - 72.5	19.717	2	1.3179	0.0003
L3	81 - 36	10.323	2	1.0561	0.0002
L4	45 - 0	3.583	2	0.6753	0.0001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
156.00	DB809K-Y	2	30.545	1.4062	0.0004	89275
144.00	80010965 w/ Mount Pipe	2	27.159	1.3905	0.0004	38815

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
135.00	742 213 w/ Mount Pipe	2	24.535	1.3736	0.0003	21774
129.00	T-Arm Mount [TA 602-3]	2	22.810	1.3582	0.0003	16843
128.00	NNVV-65B-R4 w/ Mount Pipe	2	22.524	1.3553	0.0003	16231
127.00	T-Arm Mount [TA 602-3]	2	22.240	1.3522	0.0003	15661
100.00	RV90-17-00DP w/ Mount Pipe	2	14.925	1.2109	0.0003	9301

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	155.5 - 153.526	TP64.606x58.6x0.375	45.50	0.00	0.0	70.6213	-6.68	3832.44	0.002
	153.526 - 151.553					70.9359	-7.32	3836.54	0.002
	151.553 - 149.579					71.2504	-7.96	3840.54	0.002
	149.579 - 147.605					71.5650	-8.60	3844.41	0.002
	147.605 - 145.632					71.8796	-9.25	3848.18	0.002
	145.632 - 143.658					72.1942	-16.68	3851.82	0.004
	143.658 - 141.684					72.5088	-17.33	3855.36	0.004
	141.684 - 139.711					72.8234	-17.98	3858.77	0.005
	139.711 - 137.737					73.1380	-18.64	3862.08	0.005
	137.737 - 135.763					73.4525	-19.30	3865.26	0.005
	135.763 - 133.789					73.7671	-20.13	3868.34	0.005
	133.789 - 131.816					74.0817	-20.79	3871.29	0.005
	131.816 - 129.842					74.3963	-21.46	3874.14	0.006
	129.842 - 127.868					74.7109	-24.60	3876.86	0.006
	127.868 - 125.895					75.0255	-26.19	3879.48	0.007
	125.895 - 123.921					75.3401	-26.87	3881.97	0.007
	123.921 - 121.947					75.6546	-27.55	3884.36	0.007
	121.947 - 119.974					75.9692	-28.23	3886.62	0.007
	119.974 - 118					76.2838	-28.92	3888.78	0.007
	118 - 110					77.5589	-16.16	3896.32	0.004
L2	118 - 110	TP68.805x62.8x0.4375	45.50	0.00	0.0	89.3406	-18.45	5106.94	0.004
	110 - 108.389					89.6401	-35.29	5112.60	0.007
	108.389 -					89.9397	-35.97	5118.18	0.007

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
	106.778								
	106.778 - 105.167					90.2392	-36.65	5123.69	0.007
	105.167 - 103.556					90.5387	-37.34	5129.12	0.007
	103.556 - 101.944					90.8383	-38.02	5134.48	0.007
	101.944 - 100.333					91.1378	-38.71	5139.76	0.008
	100.333 - 98.7222					91.4374	-40.70	5144.96	0.008
	98.7222 - 97.1111					91.7369	-41.39	5150.09	0.008
	97.1111 - 95.5					92.0365	-42.09	5155.14	0.008
	95.5 - 93.8889					92.3360	-42.79	5160.11	0.008
	93.8889 - 92.2778					92.6356	-43.49	5165.00	0.008
	92.2778 - 90.6667					92.9351	-44.19	5169.82	0.009
	90.6667 - 89.0556					93.2346	-44.89	5174.57	0.009
	89.0556 - 87.4444					93.5342	-45.60	5179.23	0.009
	87.4444 - 85.8333					93.8337	-46.31	5183.82	0.009
	85.8333 - 84.2222					94.1333	-47.03	5188.33	0.009
	84.2222 - 82.6111					94.4328	-47.74	5192.77	0.009
	82.6111 - 81					94.7324	-48.46	5197.13	0.009
	81 - 72.5					96.3127	-26.43	5218.86	0.005
L3	81 - 72.5	TP72.748x66.8082x0.5	45.00	0.00	0.0	108.5630	-29.54	6350.91	0.005
	72.5 - 70.9722					108.8870	-56.76	6369.90	0.009
	70.9722 - 69.4444					109.2120	-57.54	6388.90	0.009
	69.4444 - 67.9167					109.5370	-58.32	6407.89	0.009
	67.9167 - 66.3889					109.8610	-59.10	6426.88	0.009
	66.3889 - 64.8611					110.1860	-59.88	6445.88	0.009
	64.8611 - 63.3333					110.5110	-60.67	6464.87	0.009
	63.3333 - 61.8056					110.8350	-61.46	6483.86	0.009
	61.8056 - 60.2778					111.1600	-62.25	6502.86	0.010
	60.2778 - 58.75					111.4850	-63.04	6521.85	0.010
	58.75 - 57.2222					111.8090	-63.84	6540.84	0.010
	57.2222 - 55.6944					112.1340	-64.64	6559.84	0.010
	55.6944 - 54.1667					112.4590	-65.44	6578.83	0.010
	54.1667 - 52.6389					112.7830	-66.25	6590.96	0.010
	52.6389 -					113.108	-67.05	6597.93	0.010

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
	51.1111					0			
	51.1111 - 49.5833					113.433 0	-67.86	6604.84	0.010
	49.5833 - 48.0556					113.757 0	-68.67	6611.67	0.010
	48.0556 - 46.5278					114.082 0	-69.49	6618.44	0.010
	46.5278 - 45					114.407 0	-70.30	6625.14	0.011
	45 - 36					116.319 0	-40.04	6663.19	0.006
L4	45 - 36	TP76.5x70.56x0.5	45.00	0.00	0.0	114.709 0	-39.23	6631.32	0.006
	36 - 34.1053					115.112 0	-80.28	6639.45	0.012
	34.1053 - 32.2105					115.515 0	-81.28	6647.47	0.012
	32.2105 - 30.3158					115.917 0	-82.29	6655.39	0.012
	30.3158 - 28.4211					116.320 0	-83.30	6663.20	0.013
	28.4211 - 26.5263					116.723 0	-84.31	6670.91	0.013
	26.5263 - 24.6316					117.125 0	-85.33	6678.51	0.013
	24.6316 - 22.7368					117.528 0	-86.35	6686.01	0.013
	22.7368 - 20.8421					117.931 0	-87.37	6693.40	0.013
	20.8421 - 18.9474					118.333 0	-88.40	6700.68	0.013
	18.9474 - 17.0526					118.736 0	-89.43	6707.86	0.013
	17.0526 - 15.1579					119.139 0	-90.47	6714.93	0.013
	15.1579 - 13.2632					119.541 0	-91.51	6721.89	0.014
	13.2632 - 11.3684					119.944 0	-92.55	6728.75	0.014
	11.3684 - 9.47368					120.347 0	-93.60	6735.50	0.014
	9.47368 - 7.57895					120.749 0	-94.65	6742.15	0.014
	7.57895 - 5.68421					121.152 0	-95.70	6748.69	0.014
	5.68421 - 3.78947					121.555 0	-96.76	6755.13	0.014
	3.78947 - 1.89474					121.957 0	-97.82	6761.46	0.014
	1.89474 - 0					122.360 0	-98.89	6767.68	0.015

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	155.5 - 153.526	TP64.606x58.6x0.375	33.32	4573.23	0.007	0.00	4573.23	0.000
	153.526 - 151.553		50.77	4598.65	0.011	0.00	4598.65	0.000
	151.553 - 149.579		69.11	4623.98	0.015	0.00	4623.98	0.000
	149.579 - 147.605		88.37	4649.22	0.019	0.00	4649.22	0.000
	147.605 - 145.632		108.53	4674.35	0.023	0.00	4674.35	0.000
	145.632 - 143.658		132.55	4699.38	0.028	0.00	4699.38	0.000
	143.658 - 141.684		169.02	4724.32	0.036	0.00	4724.32	0.000
	141.684 - 139.711		206.40	4749.15	0.043	0.00	4749.15	0.000
	139.711 - 137.737		244.69	4773.88	0.051	0.00	4773.88	0.000
	137.737 - 135.763		283.88	4798.49	0.059	0.00	4798.49	0.000
	135.763 - 133.789		324.65	4823.00	0.067	0.00	4823.00	0.000
	133.789 - 131.816		366.75	4847.39	0.076	0.00	4847.39	0.000
	131.816 - 129.842		409.76	4871.68	0.084	0.00	4871.68	0.000
	129.842 - 127.868		460.52	4895.85	0.094	0.00	4895.85	0.000
	127.868 - 125.895		512.72	4919.90	0.104	0.00	4919.90	0.000
	125.895 - 123.921		566.41	4943.83	0.115	0.00	4943.83	0.000
	123.921 - 121.947		621.01	4967.65	0.125	0.00	4967.65	0.000
	121.947 - 119.974		676.52	4991.34	0.136	0.00	4991.34	0.000
	119.974 - 118		732.94	5014.91	0.146	0.00	5014.91	0.000
	118 - 110		458.24	5109.13	0.090	0.00	5109.13	0.000
L2	118 - 110	TP68.805x62.8x0.4375	513.04	6604.87	0.078	0.00	6604.87	0.000
	110 - 108.389		1021.14	6634.52	0.154	0.00	6634.52	0.000
	108.389 - 106.778		1071.59	6664.11	0.161	0.00	6664.11	0.000
	106.778 - 105.167		1122.63	6693.65	0.168	0.00	6693.65	0.000
	105.167 - 103.556		1174.24	6723.14	0.175	0.00	6723.14	0.000
	103.556 - 101.944		1226.45	6752.57	0.182	0.00	6752.57	0.000
	101.944 - 100.333		1279.23	6781.96	0.189	0.00	6781.96	0.000
	100.333 - 98.7222		1336.42	6811.29	0.196	0.00	6811.29	0.000
	98.7222 - 97.1111		1394.13	6840.56	0.204	0.00	6840.56	0.000
	97.1111 - 95.5		1452.43	6869.77	0.211	0.00	6869.77	0.000
	95.5 - 93.8889		1511.31	6898.92	0.219	0.00	6898.92	0.000
	93.8889 - 92.2778		1570.76	6928.02	0.227	0.00	6928.02	0.000
	92.2778 - 90.6667		1630.78	6957.06	0.234	0.00	6957.06	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 $\frac{M_{uy}}{\phi M_{ny}}$
	90.6667 - 89.0556		1691.38	6986.03	0.242	0.00	6986.03	0.000
	89.0556 - 87.4444		1752.55	7014.95	0.250	0.00	7014.95	0.000
	87.4444 - 85.8333		1814.29	7043.79	0.258	0.00	7043.79	0.000
	85.8333 - 84.2222		1876.60	7072.58	0.265	0.00	7072.58	0.000
	84.2222 - 82.6111		1939.48	7101.30	0.273	0.00	7101.30	0.000
	82.6111 - 81		2002.93	7129.95	0.281	0.00	7129.95	0.000
	81 - 72.5		1120.59	7279.98	0.154	0.00	7279.98	0.000
L3	81 - 72.5	TP72.748x66.8082x0.5	1226.86	8925.58	0.137	0.00	8925.58	0.000
	72.5 - 70.9722		2411.10	8963.33	0.269	0.00	8963.33	0.000
	70.9722 - 69.4444		2475.22	9001.00	0.275	0.00	9001.00	0.000
	69.4444 - 67.9167		2539.83	9038.67	0.281	0.00	9038.67	0.000
	67.9167 - 66.3889		2604.91	9076.33	0.287	0.00	9076.33	0.000
	66.3889 - 64.8611		2670.46	9113.92	0.293	0.00	9113.92	0.000
	64.8611 - 63.3333		2736.47	9151.50	0.299	0.00	9151.50	0.000
	63.3333 - 61.8056		2802.95	9189.08	0.305	0.00	9189.08	0.000
	61.8056 - 60.2778		2869.90	9226.58	0.311	0.00	9226.58	0.000
	60.2778 - 58.75		2937.30	9264.08	0.317	0.00	9264.08	0.000
	58.75 - 57.2222		3005.17	9301.50	0.323	0.00	9301.50	0.000
	57.2222 - 55.6944		3073.48	9338.92	0.329	0.00	9338.92	0.000
	55.6944 - 54.1667		3142.25	9376.25	0.335	0.00	9376.25	0.000
	54.1667 - 52.6389		3211.47	9413.58	0.341	0.00	9413.58	0.000
	52.6389 - 51.1111		3281.13	9450.83	0.347	0.00	9450.83	0.000
	51.1111 - 49.5833		3351.23	9488.08	0.353	0.00	9488.08	0.000
	49.5833 - 48.0556		3421.78	9525.25	0.359	0.00	9525.25	0.000
	48.0556 - 46.5278		3492.78	9562.42	0.365	0.00	9562.42	0.000
	46.5278 - 45		3564.19	9599.50	0.371	0.00	9599.50	0.000
	45 - 36		2039.83	9817.17	0.208	0.00	9817.17	0.000
L4	45 - 36	TP76.5x70.56x0.5	1954.38	9634.08	0.203	0.00	9634.08	0.000
	36 - 34.1053		4086.67	9680.00	0.422	0.00	9680.00	0.000
	34.1053 - 32.2105		4179.70	9725.83	0.430	0.00	9725.83	0.000
	32.2105 - 30.3158		4273.29	9771.58	0.437	0.00	9771.58	0.000
	30.3158 - 28.4211		4367.44	9817.25	0.445	0.00	9817.25	0.000
	28.4211 - 26.5263		4462.16	9862.92	0.452	0.00	9862.92	0.000
	26.5263 - 24.6316		4557.43	9908.42	0.460	0.00	9908.42	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 $\frac{M_{uy}}{\phi M_{ny}}$
	24.6316 - 22.7368		4653.27	9953.92	0.467	0.00	9953.92	0.000
	22.7368 - 20.8421		4749.67	9999.25	0.475	0.00	9999.25	0.000
	20.8421 - 18.9474		4846.62	10044.58	0.483	0.00	10044.58	0.000
	18.9474 - 17.0526		4944.13	10089.75	0.490	0.00	10089.75	0.000
	17.0526 - 15.1579		5042.19	10134.92	0.498	0.00	10134.92	0.000
	15.1579 - 13.2632		5140.82	10179.92	0.505	0.00	10179.92	0.000
	13.2632 - 11.3684		5239.99	10224.83	0.512	0.00	10224.83	0.000
	11.3684 - 9.47368		5339.72	10269.67	0.520	0.00	10269.67	0.000
	9.47368 - 7.57895		5440.00	10314.50	0.527	0.00	10314.50	0.000
	7.57895 - 5.68421		5540.83	10359.08	0.535	0.00	10359.08	0.000
	5.68421 - 3.78947		5642.22	10403.67	0.542	0.00	10403.67	0.000
	3.78947 - 1.89474		5744.15	10448.17	0.550	0.00	10448.17	0.000
	1.89474 - 0		5846.62	10492.50	0.557	0.00	10492.50	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	155.5 - 153.526	TP64.606x58.6x0.375	8.61	1239.40	0.007	0.00	6376.18	0.000
	153.526 - 151.553		9.07	1244.92	0.007	0.00	6433.12	0.000
	151.553 - 149.579		9.53	1250.45	0.008	0.00	6490.30	0.000
	149.579 - 147.605		9.99	1255.97	0.008	0.00	6547.74	0.000
	147.605 - 145.632		10.45	1261.49	0.008	0.00	6605.43	0.000
	145.632 - 143.658		18.25	1267.01	0.014	0.59	6663.37	0.000
	143.658 - 141.684		18.71	1272.53	0.015	0.59	6721.57	0.000
	141.684 - 139.711		19.17	1278.05	0.015	0.59	6780.02	0.000
	139.711 - 137.737		19.63	1283.57	0.015	0.59	6838.73	0.000
	137.737 - 135.763		20.09	1289.09	0.016	0.59	6897.68	0.000
	135.763 - 133.789		21.10	1294.61	0.016	0.59	6956.90	0.000
	133.789 - 131.816		21.56	1300.13	0.017	0.59	7016.36	0.000
	131.816 -		22.03	1305.66	0.017	0.59	7076.07	0.000

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 $\frac{T_u}{\phi T_n}$
	129.842							
	129.842 - 127.868		25.91	1311.18	0.020	0.59	7136.04	0.000
	127.868 - 125.895		26.97	1316.70	0.020	0.01	7196.27	0.000
	125.895 - 123.921		27.44	1322.22	0.021	0.01	7256.74	0.000
	123.921 - 121.947		27.90	1327.74	0.021	0.01	7317.47	0.000
	121.947 - 119.974		28.36	1333.26	0.021	0.01	7378.45	0.000
	119.974 - 118		28.82	1338.78	0.022	0.01	7439.68	0.000
	118 - 110		14.99	1361.16	0.011	0.01	7690.48	0.000
L2	118 - 110	TP68.805x62.8x0.4375	15.79	1567.93	0.010	0.01	8746.58	0.000
	110 - 108.389		31.14	1573.18	0.020	0.01	8805.33	0.000
	108.389 - 106.778		31.50	1578.44	0.020	0.01	8864.33	0.000
	106.778 - 105.167		31.86	1583.70	0.020	0.01	8923.50	0.000
	105.167 - 103.556		32.23	1588.95	0.020	0.01	8982.83	0.000
	103.556 - 101.944		32.59	1594.21	0.020	0.01	9042.33	0.000
	101.944 - 100.333		32.95	1599.47	0.021	0.01	9102.08	0.000
	100.333 - 98.7222		35.65	1599.47	0.022	0.23	9162.00	0.000
	98.7222 - 97.1111		36.01	1609.98	0.022	0.23	9222.17	0.000
	97.1111 - 95.5		36.37	1615.24	0.023	0.23	9282.42	0.000
	95.5 - 93.8889		36.73	1620.50	0.023	0.23	9343.00	0.000
	93.8889 - 92.2778		37.08	1625.75	0.023	0.23	9403.67	0.000
	92.2778 - 90.6667		37.44	1631.01	0.023	0.23	9464.58	0.000
	90.6667 - 89.0556		37.80	1636.27	0.023	0.23	9525.75	0.000
	89.0556 - 87.4444		38.15	1641.52	0.023	0.23	9587.00	0.000
	87.4444 - 85.8333		38.51	1646.78	0.023	0.23	9648.50	0.000
	85.8333 - 84.2222		38.86	1652.04	0.024	0.23	9710.25	0.000
	84.2222 - 82.6111		39.21	1657.30	0.024	0.23	9772.08	0.000
	82.6111 - 81		39.56	1662.55	0.024	0.23	9834.25	0.000
	81 - 72.5		20.30	1690.29	0.012	0.11	10165.08	0.000
L3	81 - 72.5	TP72.748x66.8082x0.5	21.23	1905.27	0.011	0.12	11300.83	0.000
	72.5 - 70.9722		41.83	1910.97	0.022	0.23	11368.58	0.000
	70.9722 - 69.4444		42.14	1916.67	0.022	0.23	11436.42	0.000
	69.4444 - 67.9167		42.45	1922.37	0.022	0.23	11504.50	0.000
	67.9167 - 66.3889		42.76	1928.06	0.022	0.23	11572.83	0.000
	66.3889 - 64.8611		43.07	1933.76	0.022	0.23	11641.33	0.000
	64.8611 - 63.3333		43.37	1939.46	0.022	0.23	11710.08	0.000
	63.3333 -		43.68	1945.16	0.022	0.23	11779.00	0.000

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 $\frac{T_u}{\phi T_n}$
	61.8056							
	61.8056 - 60.2778		43.98	1950.86	0.023	0.23	11848.08	0.000
	60.2778 - 58.75		44.28	1956.55	0.023	0.23	11917.42	0.000
	58.75 - 57.2222		44.58	1962.25	0.023	0.23	11986.92	0.000
	57.2222 - 55.6944		44.88	1967.95	0.023	0.23	12056.58	0.000
	55.6944 - 54.1667		45.17	1973.65	0.023	0.23	12126.50	0.000
	54.1667 - 52.6389		45.46	1979.35	0.023	0.23	12196.67	0.000
	52.6389 - 51.1111		45.76	1985.04	0.023	0.23	12267.00	0.000
	51.1111 - 49.5833		46.05	1990.74	0.023	0.23	12337.50	0.000
	49.5833 - 48.0556		46.33	1996.44	0.023	0.23	12408.25	0.000
	48.0556 - 46.5278		46.62	2002.14	0.023	0.23	12479.17	0.000
	46.5278 - 45		46.90	2007.84	0.023	0.23	12550.25	0.000
	45 - 36		25.29	2041.40	0.012	0.12	12973.42	0.000
L4	45 - 36	TP76.5x70.56x0.5	23.41	2013.15	0.012	0.11	12616.75	0.000
	36 - 34.1053		48.97	2020.22	0.024	0.23	12705.50	0.000
	34.1053 - 32.2105		49.27	2027.28	0.024	0.23	12794.58	0.000
	32.2105 - 30.3158		49.57	2034.35	0.024	0.23	12883.92	0.000
	30.3158 - 28.4211		49.86	2041.42	0.024	0.23	12973.58	0.000
	28.4211 - 26.5263		50.16	2048.48	0.024	0.23	13063.58	0.000
	26.5263 - 24.6316		50.46	2055.55	0.025	0.23	13153.83	0.000
	24.6316 - 22.7368		50.75	2062.62	0.025	0.23	13244.42	0.000
	22.7368 - 20.8421		51.05	2069.68	0.025	0.23	13335.33	0.000
	20.8421 - 18.9474		51.34	2076.75	0.025	0.23	13426.58	0.000
	18.9474 - 17.0526		51.64	2083.82	0.025	0.23	13518.08	0.000
	17.0526 - 15.1579		51.93	2090.88	0.025	0.23	13609.92	0.000
	15.1579 - 13.2632		52.22	2097.95	0.025	0.23	13702.08	0.000
	13.2632 - 11.3684		52.52	2105.02	0.025	0.23	13794.58	0.000
	11.3684 - 9.47368		52.81	2112.08	0.025	0.23	13887.33	0.000
	9.47368 - 7.57895		53.10	2119.15	0.025	0.23	13980.42	0.000
	7.57895 - 5.68421		53.39	2126.22	0.025	0.23	14073.83	0.000
	5.68421 - 3.78947		53.68	2133.28	0.025	0.23	14167.50	0.000
	3.78947 - 1.89474		53.97	2140.35	0.025	0.23	14261.58	0.000
	1.89474 - 0		54.26	2147.42	0.025	0.23	14355.92	0.000

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 $\frac{T_u}{\phi T_n}$

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	155.5 - 153.526	0.002	0.007	0.000	0.007	0.000	0.009	1.050	4.8.2
	153.526 - 151.553	0.002	0.011	0.000	0.007	0.000	0.013	1.050	4.8.2
	151.553 - 149.579	0.002	0.015	0.000	0.008	0.000	0.017	1.050	4.8.2
	149.579 - 147.605	0.002	0.019	0.000	0.008	0.000	0.021	1.050	4.8.2
	147.605 - 145.632	0.002	0.023	0.000	0.008	0.000	0.026	1.050	4.8.2
	145.632 - 143.658	0.004	0.028	0.000	0.014	0.000	0.033	1.050	4.8.2
	143.658 - 141.684	0.004	0.036	0.000	0.015	0.000	0.040	1.050	4.8.2
	141.684 - 139.711	0.005	0.043	0.000	0.015	0.000	0.048	1.050	4.8.2
	139.711 - 137.737	0.005	0.051	0.000	0.015	0.000	0.056	1.050	4.8.2
	137.737 - 135.763	0.005	0.059	0.000	0.016	0.000	0.064	1.050	4.8.2
	135.763 - 133.789	0.005	0.067	0.000	0.016	0.000	0.073	1.050	4.8.2
	133.789 - 131.816	0.005	0.076	0.000	0.017	0.000	0.081	1.050	4.8.2
	131.816 - 129.842	0.006	0.084	0.000	0.017	0.000	0.090	1.050	4.8.2
	129.842 - 127.868	0.006	0.094	0.000	0.020	0.000	0.101	1.050	4.8.2
	127.868 - 125.895	0.007	0.104	0.000	0.020	0.000	0.111	1.050	4.8.2
	125.895 - 123.921	0.007	0.115	0.000	0.021	0.000	0.122	1.050	4.8.2
	123.921 - 121.947	0.007	0.125	0.000	0.021	0.000	0.133	1.050	4.8.2
	121.947 - 119.974	0.007	0.136	0.000	0.021	0.000	0.143	1.050	4.8.2
	119.974 - 118	0.007	0.146	0.000	0.022	0.000	0.154	1.050	4.8.2
	118 - 110	0.004	0.090	0.000	0.011	0.000	0.094	1.050	4.8.2
L2	118 - 110	0.004	0.078	0.000	0.010	0.000	0.081	1.050	4.8.2
	110 - 108.389	0.007	0.154	0.000	0.020	0.000	0.161	1.050	4.8.2
	108.389 - 106.778	0.007	0.161	0.000	0.020	0.000	0.168	1.050	4.8.2
	106.778 - 105.167	0.007	0.168	0.000	0.020	0.000	0.175	1.050	4.8.2
	105.167 - 103.556	0.007	0.175	0.000	0.020	0.000	0.182	1.050	4.8.2
	103.556 - 101.944	0.007	0.182	0.000	0.020	0.000	0.189	1.050	4.8.2
	101.944 -	0.008	0.189	0.000	0.021	0.000	0.197	1.050	4.8.2

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
	100.333								
	100.333 - 98.7222	0.008	0.196	0.000	0.022	0.000	0.205	1.050	4.8.2
	98.7222 - 97.1111	0.008	0.204	0.000	0.022	0.000	0.212	1.050	4.8.2
	97.1111 - 95.5	0.008	0.211	0.000	0.023	0.000	0.220	1.050	4.8.2
	95.5 - 93.8889	0.008	0.219	0.000	0.023	0.000	0.228	1.050	4.8.2
	93.8889 - 92.2778	0.008	0.227	0.000	0.023	0.000	0.236	1.050	4.8.2
	92.2778 - 90.6667	0.009	0.234	0.000	0.023	0.000	0.243	1.050	4.8.2
	90.6667 - 89.0556	0.009	0.242	0.000	0.023	0.000	0.251	1.050	4.8.2
	89.0556 - 87.4444	0.009	0.250	0.000	0.023	0.000	0.259	1.050	4.8.2
	87.4444 - 85.8333	0.009	0.258	0.000	0.023	0.000	0.267	1.050	4.8.2
	85.8333 - 84.2222	0.009	0.265	0.000	0.024	0.000	0.275	1.050	4.8.2
	84.2222 - 82.6111	0.009	0.273	0.000	0.024	0.000	0.283	1.050	4.8.2
	82.6111 - 81	0.009	0.281	0.000	0.024	0.000	0.291	1.050	4.8.2
	81 - 72.5	0.005	0.154	0.000	0.012	0.000	0.159	1.050	4.8.2
L3	81 - 72.5	0.005	0.137	0.000	0.011	0.000	0.142	1.050	4.8.2
	72.5 - 70.9722	0.009	0.269	0.000	0.022	0.000	0.278	1.050	4.8.2
	70.9722 - 69.4444	0.009	0.275	0.000	0.022	0.000	0.284	1.050	4.8.2
	69.4444 - 67.9167	0.009	0.281	0.000	0.022	0.000	0.291	1.050	4.8.2
	67.9167 - 66.3889	0.009	0.287	0.000	0.022	0.000	0.297	1.050	4.8.2
	66.3889 - 64.8611	0.009	0.293	0.000	0.022	0.000	0.303	1.050	4.8.2
	64.8611 - 63.3333	0.009	0.299	0.000	0.022	0.000	0.309	1.050	4.8.2
	63.3333 - 61.8056	0.009	0.305	0.000	0.022	0.000	0.315	1.050	4.8.2
	61.8056 - 60.2778	0.010	0.311	0.000	0.023	0.000	0.321	1.050	4.8.2
	60.2778 - 58.75	0.010	0.317	0.000	0.023	0.000	0.327	1.050	4.8.2
	58.75 - 57.2222	0.010	0.323	0.000	0.023	0.000	0.333	1.050	4.8.2
	57.2222 - 55.6944	0.010	0.329	0.000	0.023	0.000	0.339	1.050	4.8.2
	55.6944 - 54.1667	0.010	0.335	0.000	0.023	0.000	0.346	1.050	4.8.2
	54.1667 - 52.6389	0.010	0.341	0.000	0.023	0.000	0.352	1.050	4.8.2
	52.6389 - 51.1111	0.010	0.347	0.000	0.023	0.000	0.358	1.050	4.8.2
	51.1111 - 49.5833	0.010	0.353	0.000	0.023	0.000	0.364	1.050	4.8.2
	49.5833 - 48.0556	0.010	0.359	0.000	0.023	0.000	0.370	1.050	4.8.2
	48.0556 - 46.5278	0.010	0.365	0.000	0.023	0.000	0.376	1.050	4.8.2
	46.5278 - 45	0.011	0.371	0.000	0.023	0.000	0.382	1.050	4.8.2
	45 - 36	0.006	0.208	0.000	0.012	0.000	0.214	1.050	4.8.2
L4	45 - 36	0.006	0.203	0.000	0.012	0.000	0.209	1.050	4.8.2

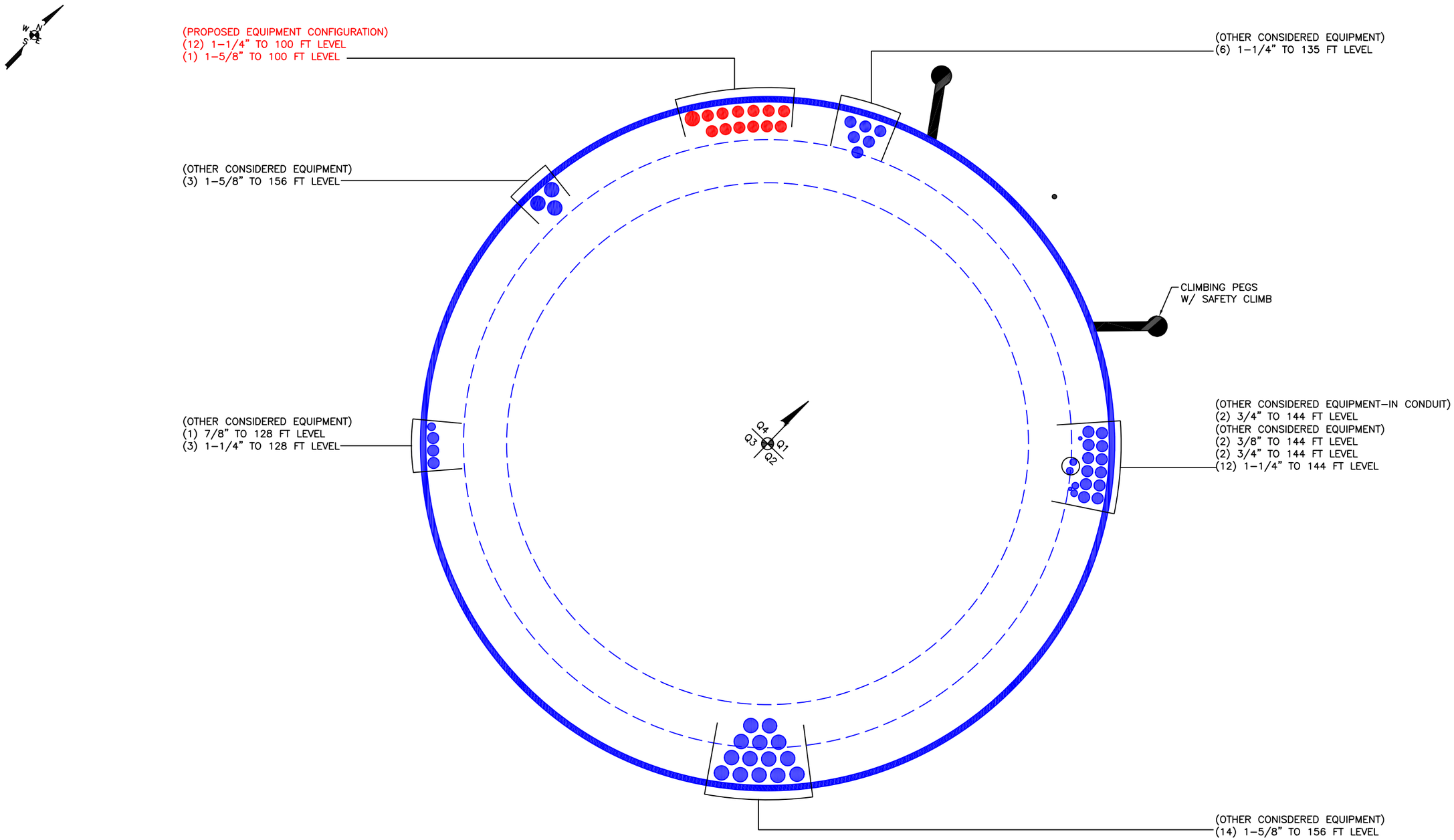
Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	36 - 34.1053	0.012	0.422	0.000	0.024	0.000	0.435	1.050	4.8.2
	34.1053 - 32.2105	0.012	0.430	0.000	0.024	0.000	0.443	1.050	4.8.2
	32.2105 - 30.3158	0.012	0.437	0.000	0.024	0.000	0.450	1.050	4.8.2
	30.3158 - 28.4211	0.013	0.445	0.000	0.024	0.000	0.458	1.050	4.8.2
	28.4211 - 26.5263	0.013	0.452	0.000	0.024	0.000	0.466	1.050	4.8.2
	26.5263 - 24.6316	0.013	0.460	0.000	0.025	0.000	0.473	1.050	4.8.2
	24.6316 - 22.7368	0.013	0.467	0.000	0.025	0.000	0.481	1.050	4.8.2
	22.7368 - 20.8421	0.013	0.475	0.000	0.025	0.000	0.489	1.050	4.8.2
	20.8421 - 18.9474	0.013	0.483	0.000	0.025	0.000	0.496	1.050	4.8.2
	18.9474 - 17.0526	0.013	0.490	0.000	0.025	0.000	0.504	1.050	4.8.2
	17.0526 - 15.1579	0.013	0.498	0.000	0.025	0.000	0.512	1.050	4.8.2
	15.1579 - 13.2632	0.014	0.505	0.000	0.025	0.000	0.519	1.050	4.8.2
	13.2632 - 11.3684	0.014	0.512	0.000	0.025	0.000	0.527	1.050	4.8.2
	11.3684 - 9.47368	0.014	0.520	0.000	0.025	0.000	0.534	1.050	4.8.2
	9.47368 - 7.57895	0.014	0.527	0.000	0.025	0.000	0.542	1.050	4.8.2
	7.57895 - 5.68421	0.014	0.535	0.000	0.025	0.000	0.550	1.050	4.8.2
	5.68421 - 3.78947	0.014	0.542	0.000	0.025	0.000	0.557	1.050	4.8.2
	3.78947 - 1.89474	0.014	0.550	0.000	0.025	0.000	0.565	1.050	4.8.2
	1.89474 - 0	0.015	0.557	0.000	0.025	0.000	0.572	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	155.5 - 110	Pole	TP64.606x58.6x0.375	1	-28.92	4083.22	14.7	Pass
L2	110 - 72.5	Pole	TP68.805x62.8x0.4375	2	-48.46	5456.99	27.7	Pass
L3	72.5 - 36	Pole	TP72.748x66.8082x0.5	3	-70.30	6956.40	36.4	Pass
L4	36 - 0	Pole	TP76.5x70.56x0.5	4	-98.89	7106.06	54.5	Pass
							Summary	
						Pole (L4)	54.5	Pass
						RATING =	**54.5**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 806366 TOWER ID: C_BASELEVEL

N.T.S.

PLOT DATE: 6/3/2016 FILE NAME: 806366_BASELEVEL.DWG

CROWN REGION ADDRESS

USA

09/01/17	UPDATED PER WORK ORDER 1347156	MDB
10/01/17	UPDATED PER WORK ORDER 1347448	AMT
02/03/17	UPDATED PER WORK ORDER 1372064	SLS
30/03/17	UPDATED PER WORK ORDER 1386649	ARR
06/11/17	UPDATED PER WORK ORDER 1479358 1479350	CJL
31/05/18	UPDATED PER WORK ORDER 1478242	CJL
17/10/18	UPDATED PER WORK ORDER 1582414	MS
04/01/19	UPDATED PER WORK ORDER 1642405	AT
22/04/19	UPDATED PER WORK ORDER 1678486	AE
	UPDATED PER WORK ORDER 1729887	

DRAWN BY: CDR
CHECKED BY: SL
DRAWING DATE: 01/04/05

SITE NUMBER:
SITE NAME:

SITE NAME

NNJ DENVILLE 942112

BUSINESS UNIT NUMBER

806366

SITE ADDRESS

NORTH MAIN STREET
MARLBOROUGH, CT 06447
HARTFORD COUNTY
USA

SHEET TITLE

BASE LEVEL DRAWING

SHEET NUMBER

A1-0

APPENDIX C

ADDITIONAL CALCULATIONS

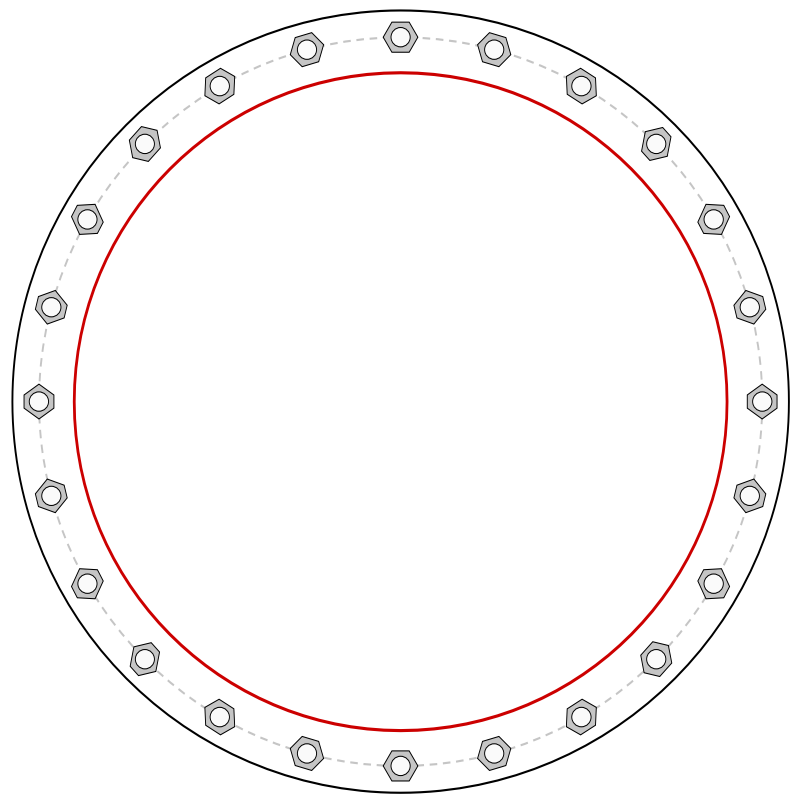
Monopole Base Plate Connection

Site Info	
BU #	806366
Site Name	HRT 107(C) 943204
Order #	479823 Rev.2

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	1.25

Applied Loads	
Moment (kip-ft)	5846.63
Axial Force (kips)	98.89
Shear Force (kips)	54.26

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(24) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 84.75" BC

Base Plate Data

91" OD x 3.25" Plate (A633 Grade E; Fy=60 ksi, Fu=80 ksi)

Stiffener Data

N/A

Pole Data

76.5" x 0.5" 12-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

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

Pu_c = 142.05	ϕPn_c = 243.75	**Stress Rating**
Vu = 2.26	ϕVn = 73.13	**55.6%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	13.73	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**24.2%**	**Pass**

Pier and Pad Foundation

BU # :	806366
Site Name:	HRT 107(C)
App. Number:	479823 Rev.2

TIA-222 Revision:	H
Tower Type:	Monopole

Top & Bot. Pad Rein. Different?:	☐
Block Foundation?:	☐

Superstructure Analysis Reactions

Compression, P_{comp}:	99	kips
Base Shear, Vu_comp:	54	kips
Moment, M_u:	5847	ft-kips
Tower Height, **H**:	155.5	ft
BP Dist. Above Fdn, bp_{dist}:	3.5	in

Pier Properties

Pier Shape:	Square	
Pier Diameter, **dpier**:	9	ft
Ext. Above Grade, **E**:	0.5	ft
Pier Rebar Size, **Sc**:	11	
Pier Rebar Quantity, **mc**:	59	
Pier Tie/Spiral Size, **St**:	5	
Pier Tie/Spiral Quantity, **mt**:	7	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties

Depth, **D**:	7.5	ft
Pad Width, **W**:	33.25	ft
Pad Thickness, **T**:	4.5	ft
Pad Rebar Size (Bottom), **Sp**:	11	
Pad Rebar Quantity (Bottom), **mp**:	25	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties

Rebar Grade, **Fy**:	60	ksi
Concrete Compressive Strength, **F'c**:	4	ksi
Dry Concrete Density, **δc**:	150	pcf

Soil Properties

Total Soil Unit Weight, **γ**:	130	pcf
Ultimate Net Bearing, Qnet:	21.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, **ϕ**:	40	degrees
SPT Blow Count, N_{blows}:		
Base Friction, **μ**:	0.4	
Neglected Depth, **N**:	4.50	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	n/a	ft

<--Toggle between Gross and Net

Foundation Analysis Checks

	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	611.50	54.00	**8.4%**	**Pass**
Bearing Pressure (ksf)	16.48	2.10	**12.1%**	**Pass**
*Overturning (kip*ft)*	18665.02	6294.75	**33.7%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	18536.38	6036.00	**31.0%**	**Pass**
Pier Compression (kip)	51554.88	150.03	**0.3%**	**Pass**
*Pad Flexure (kip*ft)*	8427.96	2148.58	**24.3%**	**Pass**
Pad Shear - 1-way (kips)	1850.42	235.60	**12.1%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.190	0.022	**11.1%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	11161.59	3621.60	**30.9%**	**Pass**

**Rating per TIA-222-H Section 15.5*

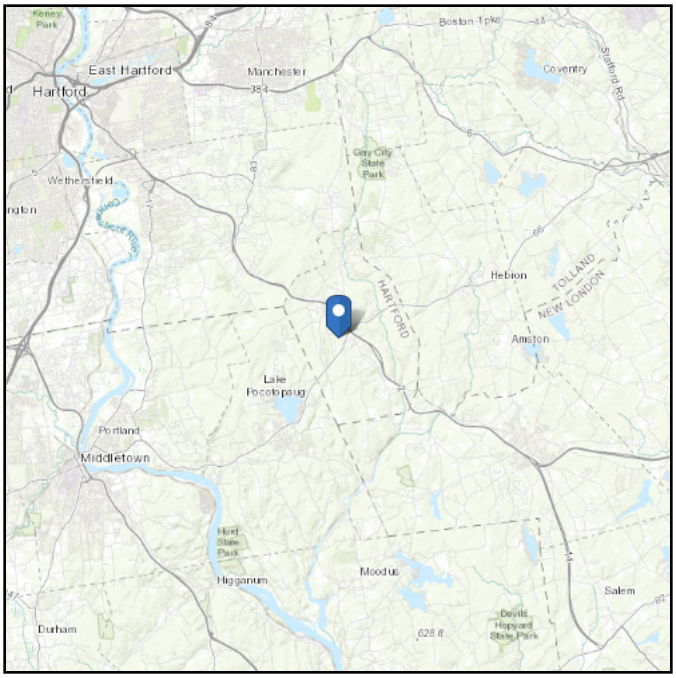
Soil Rating*:	**33.7%**
Structural Rating*:	**31.0%**

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 577.55 ft (NAVD 88)
Latitude: 41.629806
Longitude: -72.4665



Wind

Results:

Wind Speed:	126 Vmph	*130 mph per JDX
10-year MRI	78 Vmph	
25-year MRI	87 Vmph	
50-year MRI	95 Vmph	
100-year MRI	103 Vmph	

Data Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

Date Accessed: Tue Jan 08 2019

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

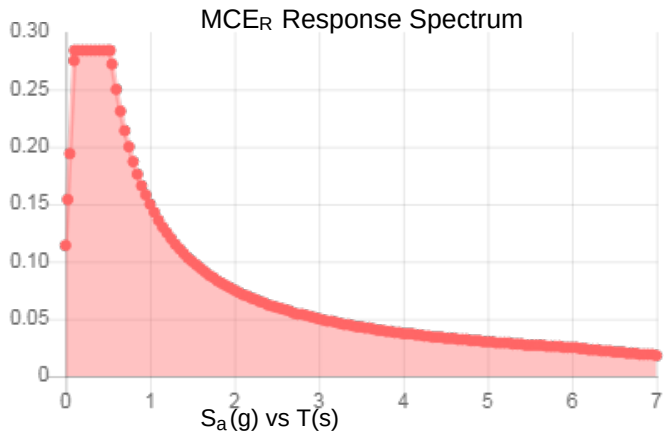
Seismic

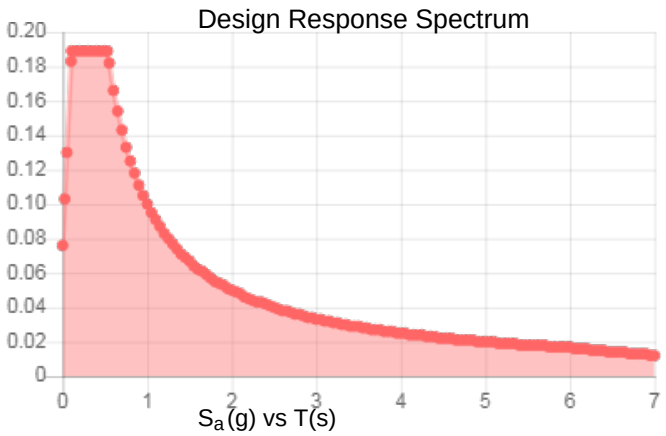
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.177	S_{DS} :	0.189
S_1 :	0.062	S_{D1} :	0.1
F_a :	1.6	T_L :	
F_v :	2.4	PGA :	0.09
S_{MS} :		PGA_M :	0.143
S_{M1} :		F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Tue Jan 08 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 08 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.

Exhibit E

Mount Analysis

PAUL J. FORD & COMPANY

Date: April 25, 2019

Kevin Morrow
Crown Castle
3530 Toringdon Way
Charlotte, NC 28277

Paul J Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
614.221.6679

Subject:	**Mount Analysis Report**	
Carrier Designation:	***T-Mobile* Equipment Change-out**	
	Carrier Site Number:	CT11251A
	Carrier Site Name:	East Hampton-2_1
Crown Castle Designation:	**Crown Castle BU Number:**	806366
	Crown Castle Site Name:	HRT 107(C) 943204
	Crown Castle JDE Job Number:	559173
	Crown Castle Purchase Order Number:	1370341
	Crown Castle Order Number:	479823 Rev. 2
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	A37519-1550.002.7190
Site Data:	**73 North Main St, Marlborough, Hartford County, CT** **Latitude 41.629806°, Longitude -72.4665°**	
Structure Information:	**Tower Height & Type:**	**155 Foot Monopole**
	Mount Elevation:	**100 Foot**
	Mount Type:	**(3) 2 Foot Standoff Mount**

Dear Kevin Morrow,

Paul J Ford and Company is pleased to submit this "Mount Analysis Report" to determine the structural integrity of the T-Mobile 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 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:

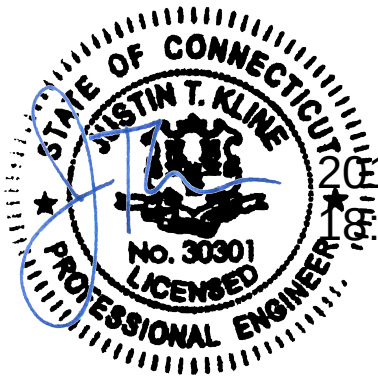
2' Standoff Mounts (typical) **SUFFICIENT**

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

Respectfully submitted by:

Angela Sage, E.I.
Structural Designer
asage@pauljford.com

AMD



2019.04.26 18:17:33-04'00'

TABLE OF CONTENTS

1) INTRODUCTION

The existing mounts under consideration are (3) 2' Standoff mounts mapped by RKS on 04/04/2019.

2) ANALYSIS CRITERIA

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

Table 1 - Proposed Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
100	100	3	EMS WIRELESS	RV90-17-00DP	(3) 2' Standoff Mounts
		3	RFS CELWAVE	APXVAARR24_43-U-NA20	
		3	ERICSSON	KRY 112 489/2	
		3	ERICSSON	RADIO 4449 B12/B71	
		3	ERICSSON	KRY 112 144/1	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Mount Mapping	806366 Dated: 04/11/2019	8352862	CCISites
Order	ID: 479823 Rev. 2 Dated: 04/17/2019	-	CCISites

3.1) Analysis Method

RISA-3D (version 15.0.4), a commercially available analysis software package, was used to create a three-dimensional model of the tower 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 C).

3.2) Assumptions

1) *The analysis of the existing tower or the effect of the mount attachment to the tower is not within the current scope of work.*
2) *The antenna mounting system was properly fabricated, installed and maintained in good condition, twist free and plumb in accordance with its original design and manufacturer's specifications and all bolts are tightened as specified by the manufacturer and AISC requirements.*
3) *The configuration of antennas, mounts, and other appurtenances are as specified in Table 1.*
4) *All member connections have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report. All U-Bolt connections have been properly tightened. This analysis will be required to be revised if the existing conditions in the field differ from those shown in the above referenced documents or assumed in this analysis. No allowance was made for any damaged, missing, or rusted members.*
5) *Steel grades are as follows, unless noted otherwise:*
   - *a) Channel, Solid Round, Angle, Plate, Unistrut* — *ASTM A36 (GR 36)*
   - *b) Pipe* — *ASTM A53 (GR 35)*
   - *c) HSS (Rectangular)* — *ASTM 500 (GR B-46)*
   - *d) HSS (Round)* — *ASTM 500 (GR B-42)*
   - *e) Threaded Rods* — *ASTM F1554 (GR 36)*
   - *f) Connection Bolts* — *ASTM A325*
   - *g) U-Bolts* — *SAE J429 (GR 2)*
6) *Proposed equipment is to be installed in the locations specified in Appendix A. Any changes to the proposed equipment locations will render this report invalid.*

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

4) ANALYSIS RESULTS

Table 3 - Mount Component Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1, 2	Face Horizontals	100	55.3	Pass
1, 2	Standoff Members		16.7	Pass
1, 2	Mount Pipes		90.7	Pass
1, 2	Mount to Tower Connection		27.8	Pass

Mount Rating (max from all components) =	90.7%

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 mount has sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

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

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

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

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

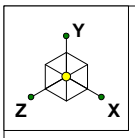
4) The standard of care for all Professional Engineering Services performed or furnished by Paul J. Ford and Company under this project will be the skill and care used by members of the Consultant's profession practicing under similar circumstances at the same time and in the same locality.

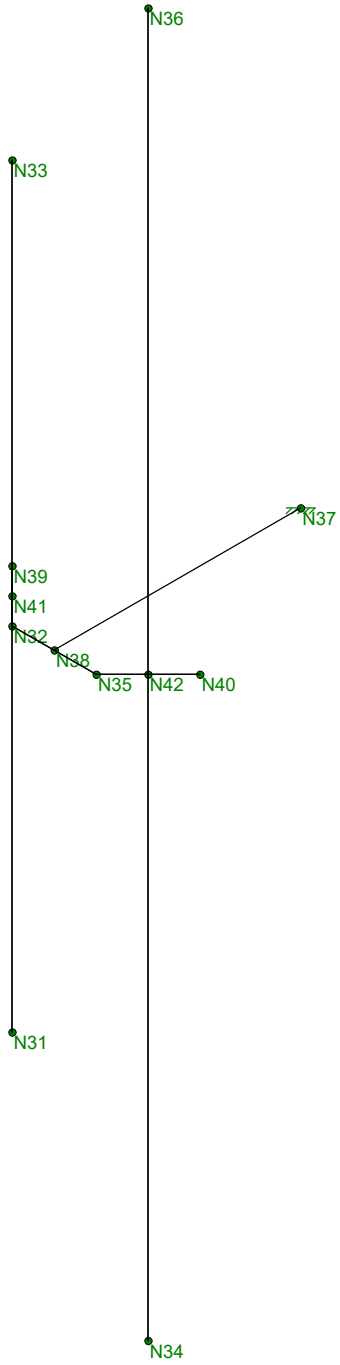
5) All Services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. Paul J. Ford and Company is not responsible for the conclusions, opinions and/or recommendations made by others based on the information supplied herein.

****

APPENDIX A

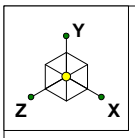
WIRE FRAME AND RENDERED MODELS

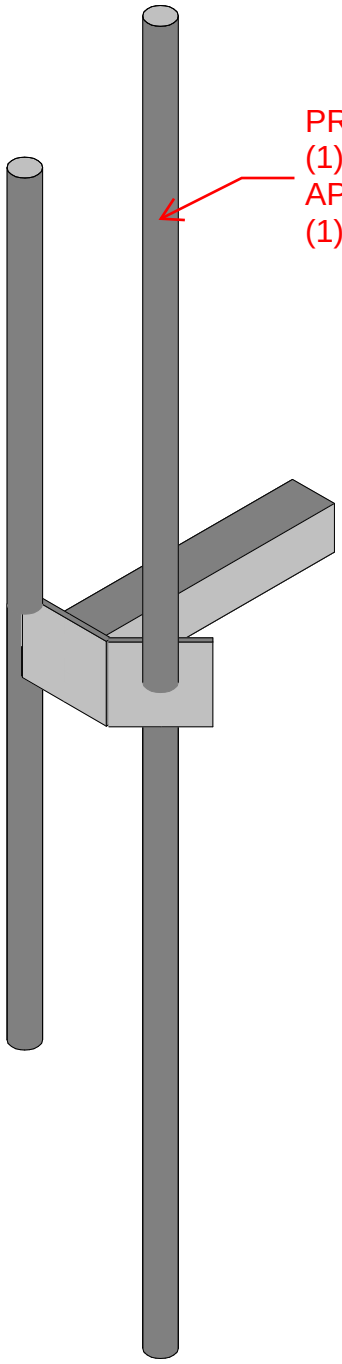




Envelope Only Solution

Paul J. Ford and Company	806366 - HRT 107(C) 943204	SK - 1
AMS		Apr 25, 2019 at 3:57 PM
37519-1550.002.7190		37519-1550_Wind Load.r3d





PROPOSED: (TYP)
(1) RFS CELWAVE
APXVAARR24_43-U-NA20
(1) ERICSSON RADIO 4449 B12/B71

Envelope Only Solution

Paul J. Ford and Company	806366 - HRT 107(C) 943204	SK - 2
AMS		Apr 25, 2019 at 3:57 PM
37519-1550.002.7190		37519-1550_Wind Load.r3d

APPENDIX B

SOFTWARE INPUT CALCULATION

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

Project # 37519-1550
By AMS

Date: 04/26/19

Analysis 30 degrees

v1.0, Effective 04/03/2018

Mount Loading per TIA-222-H

Structure Information

Mount Type =	1 Sector	
Mount Elev, z =	100	ft
Ground Elev, z_s =	578	ft
Wind Speed =	130	mph
Ice Wind Speed =	50	mph
Ice Thickness =	1.5	in
Exposure Cat =	B	
Structure Class =	II	
Topographic Cat =	1	
Crest Height =	0	ft

Velocity Pressure Coefficients

z_g =	1200	ft	
a =	7.00		
K_{zmin} =	0.70		
K_z =	0.99		Calculated Value
Ke =	0.98		Ground Elevation Factor
K_z =	0.99		Velocity Press Coef (Section 2.6.5.2)
K_{zt} =	1.00		Topographic Factor (Section 2.6.6.4)
Gh =	1.00		Gust Effect Factor (Section 2.6.7)
K_d =	0.95		Wind Dir Probability Factor (Table 2-2)
K_a =	0.90		Shielding factor (Section 16.6)
q_z=	35.80	psf	Velocity Pressure (Section 2.6.9.6)

Ice Loading

Ii =	1.00		Ice Importance Factor (Table 2-3)
Iwi =	1.00		Wind Ice Importance Factor (Table 2-3)
q_z=	6.01	psf	Ice Velocity Pressure (Section 2.6.9.6)
K_{iz} =	1.12		Ice Escalation Factor (Section 2.6.8)
T_{iz} =	1.68	in	Factored Ice Thickness (Section 2.6.8)
h =	0.00	in	Bar Grating Height
W_i =	7.82	psf	Grating Ice Weight

Wind Pressures

Pressure =	35.798	psf
Ice Pressure =	6.008	psf

Antenna Attachment Labels & Elevations (inches with Respect to Bottom of Member)

Face	Label	Top Elev (in)	Bot Elev (in)	Length, in	Face	Label	Top Elev (in)	Bot Elev (in)	Length, in	Face	Label	Top Elev (in)	Bot Elev (in)	Length, in	Face	Label	Top Elev (in)	Bot Elev (in)
A					B					C	C1	103.0	19	110.0	D			
A					B					C (2)	C1	67.0	67	110.0	D			
A					B					C	C2	64.0	20	72.0	D			
A					B					C (2)	C2	48.0	48	72.0	D			
A					B					C					D			
A					B					C					D			
A					B					C					D			
A					B					C					D			
A					B					C					D			
A					B					C					D			

Antennas

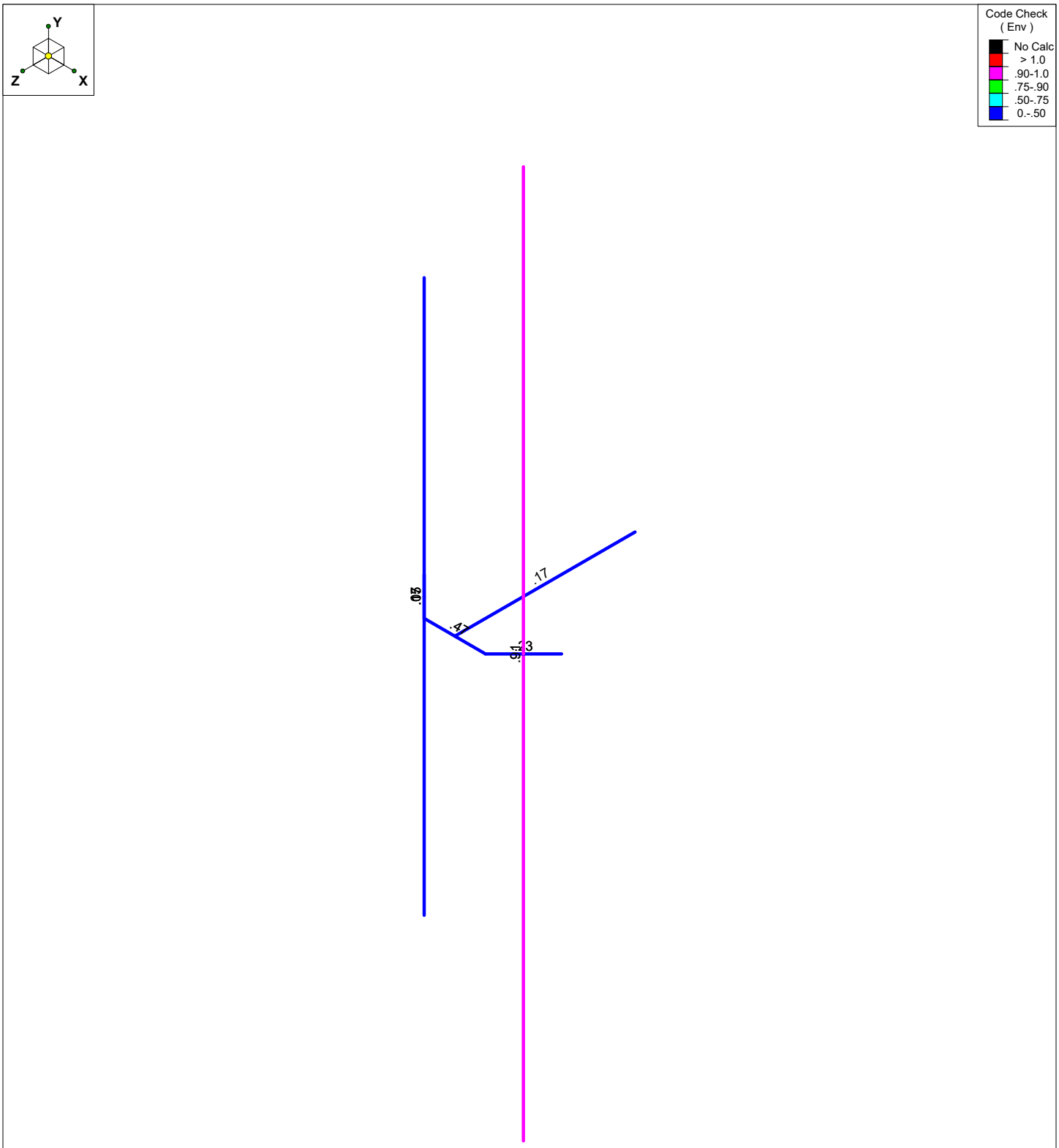
Item	Manufacturer	Antenna	Height (in)	Width (in)	Depth (in)	Flat or Round	Weight (lbs)	Antenna Attachment Locations					
								Label	Label	Label	Label	Label	Label
1	EMS WIRELESS	RV90-17-00DP	56	8	2.75	Flat	18	C2					
2	RFS CELWAVE	APXVAARR24_43-U-NA20	95.9	24	8.7	Flat	128	C1					
3	ERICSSON	KRY 112 489/2	11	6.1	3.94	Flat	15.4	C2(2)					
4	ERICSSON	RADIO 4449 B12/B71	15	13.2	9.3	Flat	74	C1(2)					
5	ERICSSON	KRY 112 144/1	7	6	3	Flat	11	C2(2)					
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													

Dishes

Item	Manufacturer	Microwave Dish	Dia (in)	Dish Type	Weight (lbs)	Dish Attachment Locations					
						Label	Label	Label	Label	Label	Label
1											
2											
3											
4											
5											

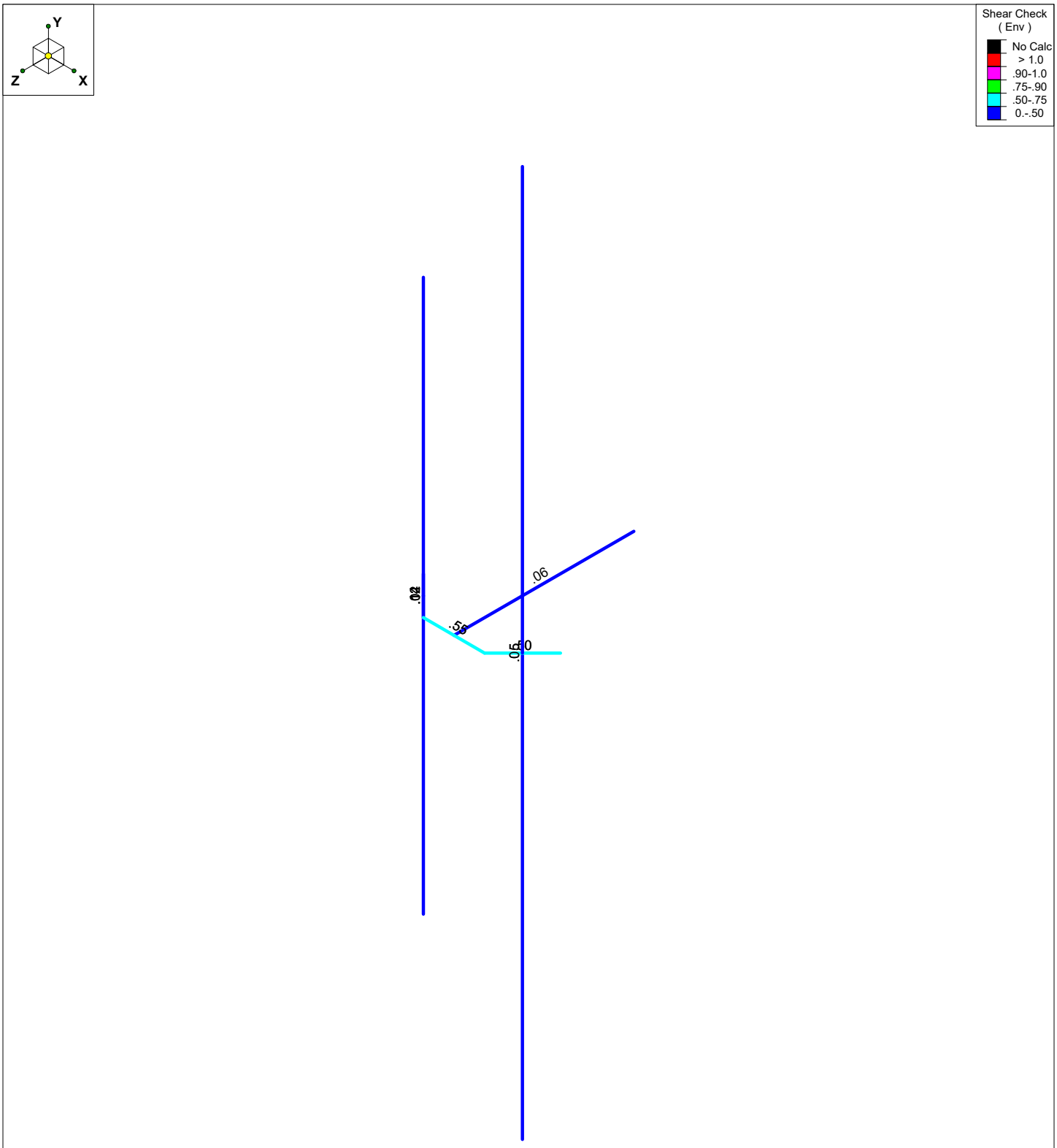
APPENDIX C

SOFTWARE ANALYSIS OUTPUT



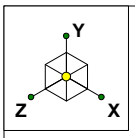
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

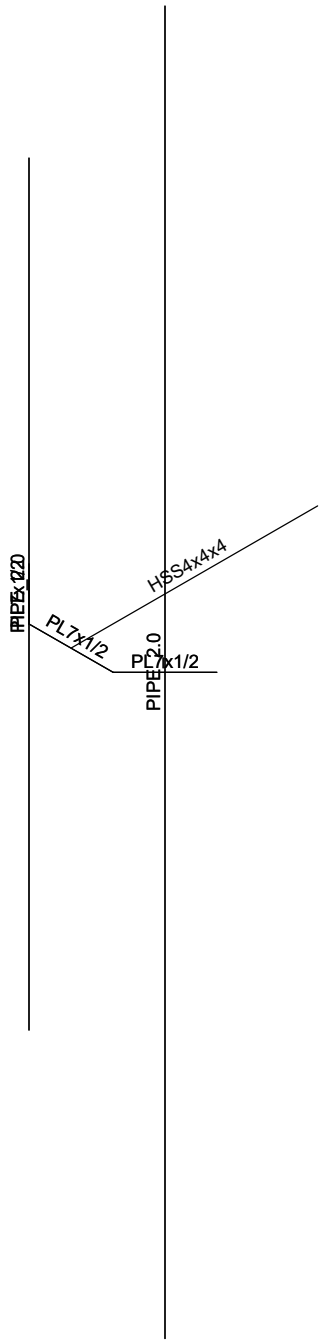
Paul J. Ford and Company	806366 - HRT 107(C) 943204	SK - 3
AMS		Apr 25, 2019 at 4:15 PM
37519-1550.002.7190		37519-1550_Wind Load.r3d



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

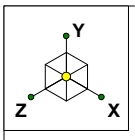
Paul J. Ford and Company	806366 - HRT 107(C) 943204	SK - 4
AMS		Apr 25, 2019 at 4:15 PM
37519-1550.002.7190		37519-1550_Wind Load.r3d

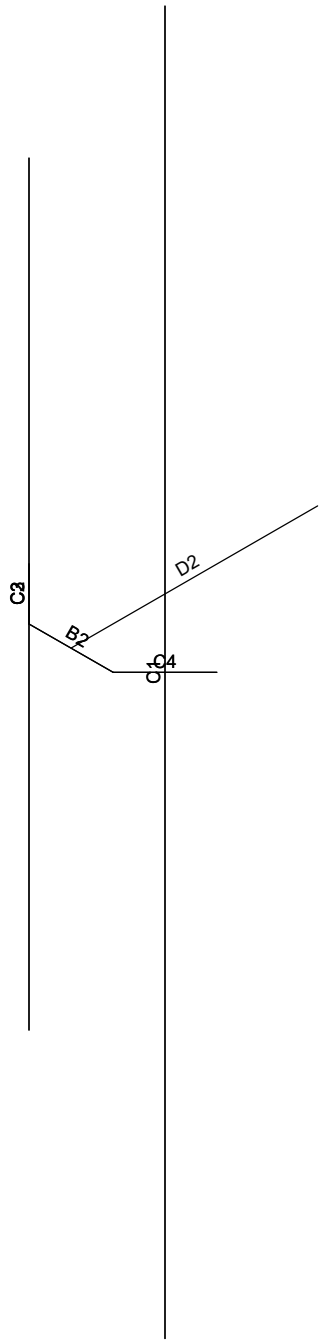




Envelope Only Solution

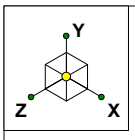
Paul J. Ford and Company	806366 - HRT 107(C) 943204	SK - 5
AMS		Apr 25, 2019 at 3:57 PM
37519-1550.002.7190		37519-1550_Wind Load.r3d

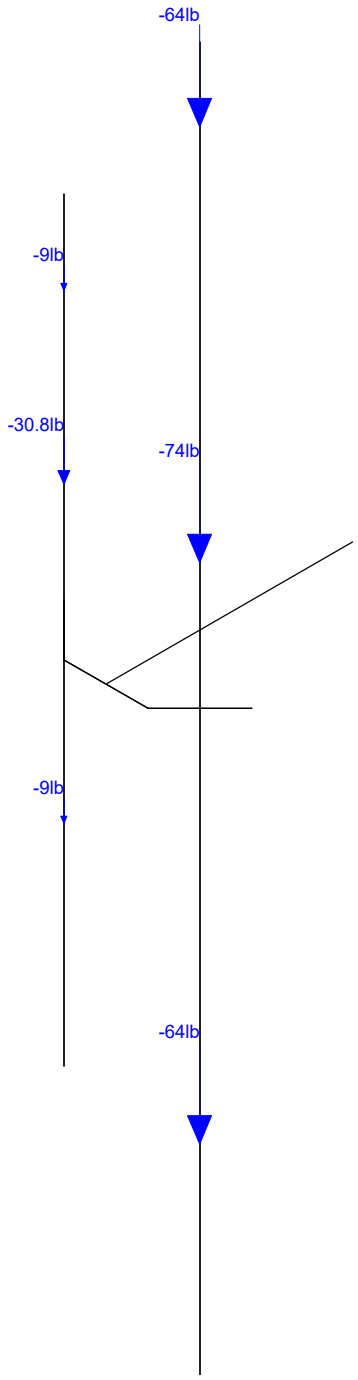




Envelope Only Solution

Paul J. Ford and Company	806366 - HRT 107(C) 943204	SK - 6
AMS		Apr 25, 2019 at 3:57 PM
37519-1550.002.7190		37519-1550_Wind Load.r3d





Loads: BLC 1, Dead
Envelope Only Solution

Paul J. Ford and Company	806366 - HRT 107(C) 943204	SK - 7
AMS		Apr 25, 2019 at 4:16 PM
37519-1550.002.7190		37519-1550_Wind Load.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	No
Max Iterations for Wall Stiffness	3
Gravity Acceleration (in/sec^2)	386.4
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

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

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	No
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	No
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	0

(Global) Model Settings, Continued

Seismic Code	None
Seismic Base Elevation (in)	Not Entered
Add Base Weight?	No
Ct X	0
Ct Z	0
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	1
R Z	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/f...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A53 Gr. B (35 ksi)	29000	11154	.3	.65	.49	35	1.5	60	1.2
2	A500 Gr. B (46ksi)	29000	11154	.3	.65	.49	46	1.5	58	1.2
3	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(de...	Section/Shape	Type	Design List	Material	Design Rules
1	C2	N31	N33			PIPE_2.0	None	None	A53 Gr. ...	Typical
2	C1	N34	N36			PIPE_2.0	None	None	A53 Gr. ...	Typical
3	B2	N32	N35			PL7x1/2	None	None	A36 Gr.36	Typical
4	D2	N37	N38			HSS4x4x4	None	None	A500 Gr. ...	Typical
5	C3	N39	N32			PL7x1/2	None	None	A36 Gr.36	Typical
6	C4	N40	N35			PL7x1/2	None	None	A36 Gr.36	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Analysis ...	Inactive	Seismic Design ...
1	C2						Yes			None
2	C1						Yes			None
3	B2						Yes			None
4	D2						Yes			None
5	C3						Yes			None
6	C4						Yes			None

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
1	C2	PIPE_2.0	72			Lbyy						Lateral
2	C1	PIPE_2.0	110			Lbyy						Lateral
3	B2	PL7x1/2	8			Lbyy						Lateral
4	D2	HSS4x4x4	23.5			Lbyy						Lateral
5	C3	PL7x1/2	7									Lateral
6	C4	PL7x1/2	7									Lateral

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Dead	None		-1.1			8			
2	Live	None								
3	Wind 0	None					16	12		
4	Wind 30	None					16	12		
5	Wind 60	None					16	12		

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
6	Wind 90	None					16	12		
7	Wind 120	None					16	12		
8	Wind 150	None					16	12		
9	Ice Load	None					8	6		
10	Ice 0	None					16	12		
11	Ice 30	None					16	12		
12	Ice 60	None					16	12		
13	Ice 90	None					16	12		
14	Ice 120	None					16	12		
15	Ice 150	None					16	12		

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.4 D	Yes	Y		1	1.4																		
2	1.2 D + 1.6 L	Yes	Y		1	1.2	2	1.6																
3	1.2 D + 1.0 Wo @ 0	Yes	Y		1	1.2	3	1																
4	1.2 D + 1.0 Wo @ 30	Yes	Y		1	1.2	4	1																
5	1.2 D + 1.0 Wo @ 60	Yes	Y		1	1.2	5	1																
6	1.2 D + 1.0 Wo @ 90	Yes	Y		1	1.2	6	1																
7	1.2 D + 1.0 Wo @ 120	Yes	Y		1	1.2	7	1																
8	1.2 D + 1.0 Wo @ 150	Yes	Y		1	1.2	8	1																
9	1.2 D + 1.0 Wo @ 180	Yes	Y		1	1.2	3	-1																
10	1.2 D + 1.0 Wo @ 210	Yes	Y		1	1.2	4	-1																
11	1.2 D + 1.0 Wo @ 240	Yes	Y		1	1.2	5	-1																
12	1.2 D + 1.0 Wo @ 270	Yes	Y		1	1.2	6	-1																
13	1.2 D + 1.0 Wo @ 300	Yes	Y		1	1.2	7	-1																
14	1.2 D + 1.0 Wo @ 330	Yes	Y		1	1.2	8	-1																
15	1.2 D + 1.0 Di + 1.0 Wi @ 0	Yes	Y		1	1.2	9	1	10	1														
16	1.2 D + 1.0 Di + 1.0 Wi @ 30	Yes	Y		1	1.2	9	1	11	1														
17	1.2 D + 1.0 Di + 1.0 Wi @ 60	Yes	Y		1	1.2	9	1	12	1														
18	1.2 D + 1.0 Di + 1.0 Wi @ 90	Yes	Y		1	1.2	9	1	13	1														
19	1.2 D + 1.0 Di + 1.0 Wi @ 1...	Yes	Y		1	1.2	9	1	14	1														
20	1.2 D + 1.0 Di + 1.0 Wi @ 1...	Yes	Y		1	1.2	9	1	15	1														
21	1.2 D + 1.0 Di + 1.0 Wi @ 1...	Yes	Y		1	1.2	9	1	10	-1														
22	1.2 D + 1.0 Di + 1.0 Wi @ 2...	Yes	Y		1	1.2	9	1	11	-1														
23	1.2 D + 1.0 Di + 1.0 Wi @ 2...	Yes	Y		1	1.2	9	1	12	-1														
24	1.2 D + 1.0 Di + 1.0 Wi @ 2...	Yes	Y		1	1.2	9	1	13	-1														
25	1.2 D + 1.0 Di + 1.0 Wi @ 3...	Yes	Y		1	1.2	9	1	14	-1														
26	1.2 D + 1.0 Di + 1.0 Wi @ 3...	Yes	Y		1	1.2	9	1	15	-1														
27	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	3	.053	16	1.5														
28	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	4	.053	16	1.5														
29	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	5	.053	16	1.5														
30	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	6	.053	16	1.5														
31	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	7	.053	16	1.5														
32	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	8	.053	16	1.5														
33	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	3	-.053	16	1.5														
34	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	4	-.053	16	1.5														
35	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	5	-.053	16	1.5														
36	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	6	-.053	16	1.5														
37	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	7	-.053	16	1.5														
38	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	8	-.053	16	1.5														
39	1.2 D + 1.5 Lv	Yes	Y		1	1.2	17	1.5																

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N37	max	895.321	11	1238.028	22	1152.527	3	-.18	3	1.69	11	.529	7
2		min	-895.321	5	428.911	4	-1152.527	9	-2.252	21	-1.691	5	-.315	11
3	Totals:	max	895.321	11	1238.028	22	1152.527	3						
4		min	-895.321	5	428.911	4	-1152.527	9						

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

	Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	phi*Pnc ...	phi*Pnt [...	phi*Mn y...	phi*Mn z...	Cb	Eqn
1	C1	PIPE 2.0	.907	55	14	.051	55		14	11706.3...	32130	1.872	1.872	1....	H1-1b
2	B2	PL7x1/2	.470	4	8	.553	4	y	3	96466.7...	113400	1.181	16.538	1....	H1-1b
3	C4	PL7x1/2	.232	7	14	.501	7	y	14	100193....	113400	1.181	16.538	1....	H1-1b
4	D2	HSS4x4x4	.167	0	11	.063	0	y	19	137296....	139518	16.181	16.181	1....	H1-1b
5	C2	PIPE 2.0	.148	36	4	.016	36		4	20866.7...	32130	1.872	1.872	1....	H1-1b
6	C3	PL7x1/2	.069	7	4	.139	7	y	4	100193....	113400	1.181	16.538	1....	H1-1b

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

Project # 37519-1550
By AMS
Date: 04/25/19
v0.1, Effective 07/10/18

MOUNT TO TOWER CONNECTION CHECKS

REACTIONS

Px=	0.895	Kip
Py=	1.238	Kip
(Axial)Pz=	1.153	Kip
Mx=	27.026	Kip-in
My=	20.291	Kip-in
(Torque)Mz=	6.344	Kip-in

Number of Bolts	=	4	
Plate Size	b=	10	in
	d=	12	in
Edge distance for Bolts	=	1.5	in
Bolt group centroid y-coordinate, Yc		6	in
Bolt group centroid x-coordinate, Xc		5	in
Load eccentricity in x-direction, ex		0	in
Load eccentricity in y-direction, ey		0	in
Total Moment including load eccentricity ΣMx=		27.026	Kips-in
Total Moment including load eccentricity ΣMy=		20.291	Kips-in
Total Moment including load eccentricity ΣMz=		6.344	Kips-in

WELD CHECKS

Standoff Member Type		Square	
Width	=	4	in
Depth (only for square members)	=	4	in
Weld Size	=	0.3750	
Total Forces in X direction =		0.261	kips
Total Forces in Y direction =		0.303	kips
Total Forces in Z direction =		2.29	kips
Resultant	=	2.32	kips
Φ*Fw (Kip/in)/16" weld =		1.392	
Capacity used		27.83%	

BOLT CHECKS

Tension Reaction	3.32	kip
Shear Reaction	0.65	kip
Bolt Type	A325N	
Bolt Diameter	0.625	in
Tensile Strength	20.7	kips
Shear Strength	12.4	kips
Reduced Tensile Strength	-	kips
Tensile Capacity Used	16.0%	
Shear Capacity Used	5.3%	

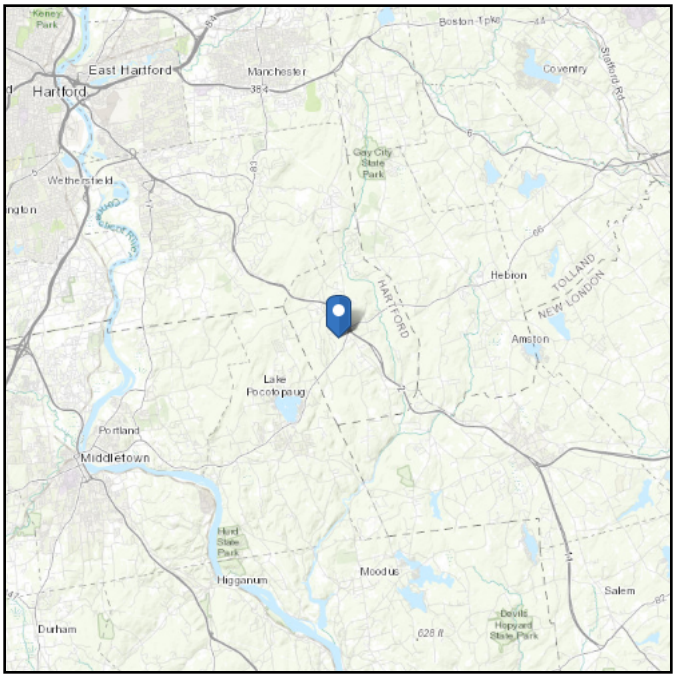
Note: Tension reduction not required if tension or shear capacity < 30%

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 577.55 ft (NAVD 88)
Latitude: 41.629806
Longitude: -72.4665



Wind

Results:

Wind Speed:	126 Vmph ← The city requires a 130 mph ultimate wind speed
10-year MRI	78 Vmph
25-year MRI	87 Vmph
50-year MRI	95 Vmph
100-year MRI	103 Vmph
Data Source:	ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014
Date Accessed:	Thu Apr 25 2019

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

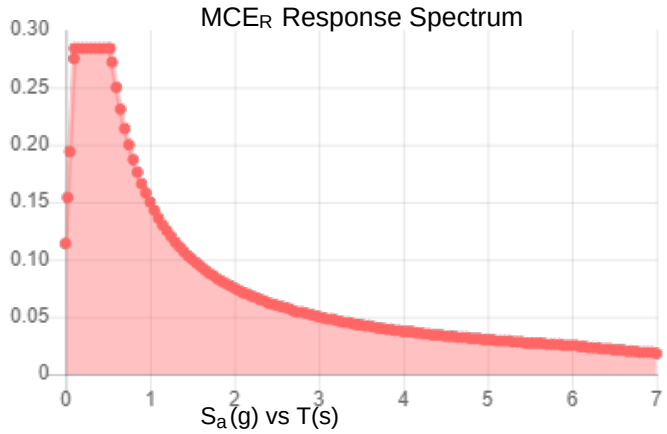
Seismic

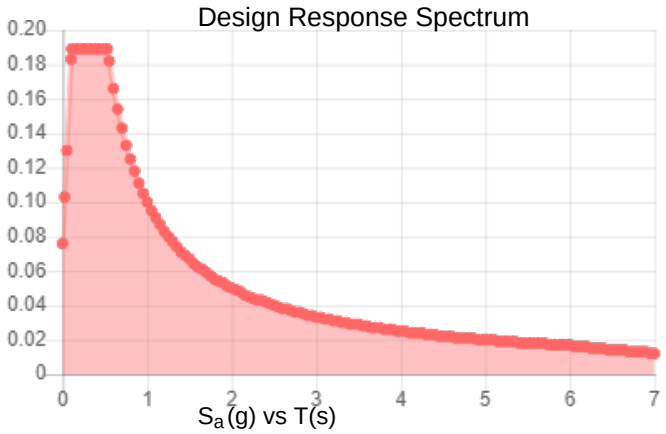
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.177	S_{DS} :	0.189
S_1 :	0.062	S_{D1} :	0.1
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.09
S_{MS} :	0.284	PGA_M :	0.143
S_{M1} :	0.15	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Thu Apr 25 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:	Thu Apr 25 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.

Exhibit F

Power Density/RF Emissions Report

Transcom Engineering, Inc.

Wireless Network Design and Deployment

Radio Frequency Emissions Analysis Report

T-MOBILE Existing Facility

Site ID: CT11251A

East Hampton-2_1
61-77 North Main St
Marlborough, CT 06424

May 17, 2019

Transcom Engineering Project Number: 737001-0016

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**32.74 %**

May 17, 2019

T-MOBILE
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 6009

Emissions Analysis for Site: **CT11251A – East Hampton-2_1**

Transcom Engineering, Inc ("Transcom") was directed to analyze the proposed upgrades to the T-MOBILE facility located at **61-77 North Main St, Marlborough, CT**, for the purpose of determining whether the emissions from the Proposed T-MOBILE Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general population may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 & 700 MHz bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were performed for the proposed upgrades to the T-MOBILE antenna facility located at **61-77 North Main St, Marlborough, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-MOBILE is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. All power values expressed and analyzed are maximum power levels expected to be used on all radios.

All emissions values for additional carriers were taken from the Connecticut Siting Council (CSC) active MPE database. Values in this database are provided by the individual carriers themselves

For each sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
LTE	1900 MHz (PCS)	4	60
GSM	1900 MHz (PCS)	1	30
LTE	2100 MHz (AWS)	2	60
LTE / 5G NR	600 MHz	2	30
LTE	700 MHz	2	60

Table 1: Channel Data Table

The following antennas listed in *Table 2* were used in the modeling for transmission in the 600, 700 MHz, 1900 MHz (PCS) and 2100 MHz (AWS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	RFS APXVAARR24_43-U-NA20	103
A	2	EMS RR90-17-XXDP (Dormant)	103
B	1	RFS APXVAARR24_43-U-NA20	103
B	2	EMS RR90-17-XXDP (Dormant)	103
C	1	RFS APXVAARR24_43-U-NA20	103
C	2	EMS RR90-17-XXDP (Dormant)	103

Table 2: Antenna Data

All calculations were done with respect to uncontrolled / general population threshold limits.

Cable losses were factored in the calculations for this site. Since all **1900 MHz (PCS) and 2100 MHz (AWS)** radios are ground mounted the following cable loss values were used. For each ground mounted **1900 MHz (PCS)** radio there was **1.65 dB** of cable loss calculated into the system gains / losses for this site. For each ground mounted **2100 MHz (AWS)** radio there was **1.74 dB** of cable loss calculated into the system gains / losses for this site. These values were calculated based upon the manufacturers specifications for **135 feet** of **1-1/4"** coax.

RESULTS

Per the calculations completed for the proposed T-MOBILE configurations *Table 3* shows resulting emissions power levels and percentages of the FCC's allowable general population limit.

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	RFS APXVAARR24_43-U-NA20	1900 MHz (PCS) / 2100 MHz (AWS) / 600 MHz / 700 MHz	15.65 / 16.35 / 12.95	11	415	10,309.80	5.22
Antenna A2	EMS RR90-17-XXDP	Dormant	N/A	0	0	0.00	0.00
						Sector A Composite MPE%	**5.22**
Antenna A1	RFS APXVAARR24_43-U-NA20	1900 MHz (PCS) / 2100 MHz (AWS) / 600 MHz / 700 MHz	15.65 / 16.35 / 12.95	11	415	10,309.80	5.22
Antenna A2	EMS RR90-17-XXDP	Dormant	N/A	0	0	0.00	0.00
						Sector B Composite MPE%	**5.22**
Antenna A1	RFS APXVAARR24_43-U-NA20	1900 MHz (PCS) / 2100 MHz (AWS) / 600 MHz / 700 MHz	15.65 / 16.35 / 12.95	11	415	10,309.80	5.22
Antenna A2	EMS RR90-17-XXDP	Dormant	N/A	0	0	0.00	0.00
						Sector C Composite MPE%	**5.22**

Table 3: T-MOBILE Emissions Levels

The Following table (*table 4*) shows all additional carriers on site and their MPE% as recorded in the CSC active MPE database for this facility along with the newly calculated maximum T-MOBILE MPE contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, all three sectors have the same configuration yielding the same results on all three sectors. *Table 5* below shows a summary for each T-MOBILE Sector as well as the composite MPE value for the site.

Site Composite MPE%	
Carrier	**MPE%**
T-MOBILE – Max Per Sector Value	**5.22 %**
AT&T	13.90 %
MetroPCS	0.41 %
Verizon Wireless	3.59 %
Town	6.03 %
Sprint	3.59 %
Site Total MPE %:	**32.74 %**

Table 4: All Carrier MPE Contributions

T-MOBILE Sector A Total:	5.22 %
T-MOBILE Sector B Total:	5.22 %
T-MOBILE Sector C Total:	5.22 %
Site Total:	32.74 %

Table 5: Site MPE Summary

FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. *Table 6* below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated T-MOBILE sector(s). For this site, all three sectors have the same configuration yielding the same results on all three sectors.

T-MOBILE _ Frequency Band / Technology Max Power Values (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile 1900 MHz (PCS) LTE	4	1,007.07	103	15.39	1900 MHz (PCS)	1000	1.54%
T-Mobile 1900 MHz (PCS) GSM	1	377.65	103	1.44	1900 MHz (PCS)	1000	0.14%
T-Mobile 2100 MHz (AWS) LTE	2	1,730.42	103	13.22	2100 MHz (AWS)	1000	1.32%
T-Mobile 600 MHz LTE / 5G NR	2	788.97	103	6.03	600 MHz	400	1.51%
T-Mobile 700 MHz LTE	2	432.54	103	3.31	700 MHz	467	0.71%
						Total:	**5.22%**

Table 6: T-MOBILE Maximum Sector MPE Power Values

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the T-MOBILE facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

T-MOBILE Sector	Power Density Value (%)
Sector A:	5.22 %
Sector B:	5.22 %
Sector C:	5.22 %
T-MOBILE Maximum Total (per sector):	5.22 %
Site Total:	32.74 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **32.74 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

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