



1 Cityplace Dr, Suite 490
Creve Coeur, MO 63141

Phone: (314) 513-0147
www.crowncastle.com

August 13, 2021

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

RE: **Notice of Exempt Modification for T-Mobile**
Crown Site ID# 822779; T-Mobile Site ID# CT11240B
1875 Noble Ave Bridgeport, CT 06610
Latitude: 41.210353 / Longitude: -73.181183

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 107-foot and 115-foot mounts on the existing 120-foot Flagpole Tower located at 1875 Noble Ave in Bridgeport. The property is owned by The Connecticut Zoological Society and the Tower by Crown Castle. T-Mobile now intends to replace three (3) existing antennas. This modification/proposal includes hardware that is both 4G(LTE) and 5G capable through remote software configuration and either or both services may be turned on or off at various times.

Planned Modifications:

Tower:

Remove and Replace:

(3) Andrew – DBXNH-6565B-A2M Antennas (**REMOVE**) – (3) Commscope FW-65C-R3 Antennas (**REPLACE**)

Ground:

Remove and Replace:

(3) B12 RRUs (**REMOVE**) – (3) 4449 B85/B71 RRU (**REPLACE**)

Install New:

(2) BB6630 in Existing Cabinet

Remove:

(2) DUS 41 from Existing Cabinet
(1) XMU Multiplexer

The facility was approved by the City of Bridgeport by way of a Site Plan Review on March 27th, 2000.



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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 Joseph P. Ganim, Mayor for the City of Bridgeport and Bruce A. Nelson, Building Official for the City of Bridgeport. A copy will also be sent to 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).

Sincerely,

Colin Robinson

Colin Robinson
Project Manager
NETWORK BUILDING + CONSULTING
100 Apollo Drive Suite 303
Chelmsford, MA 01824
crobinson@nbcllc.com
(360) 561-3311

The Foundation for a Wireless World.

CrownCastle.com



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Creve Coeur, MO 63141

Phone: (314) 513-0147
www.crowncastle.com

cc:

Joseph P. Ganim, Mayor (*Via FedEx*)
City of Bridgeport
Margaret E. Morton Government Center
999 Broad Street
Bridgeport, CT 06604
203-576-7201

Bruce A. Nelson (*Via FedEx*)
Building Official
Building Department
45 Lyon Terrace, Room 222
Bridgeport, CT 06604
203-576-7226

Connecticut Zoological Society (*Via FedEx*)
1875 Noble Ave
C/O Beardsley Zoo
Bridgeport, CT 06610-1646
(203) 332-4246

Colin Robinson

From: TrackingUpdates@fedex.com
Sent: Friday, August 13, 2021 9:54 AM
To: Colin Robinson
Subject: FedEx Shipment 774523551011: Your package has been delivered



Hi. Your package was
delivered Fri, 08/13/2021 at
9:53am.



Delivered to 999 BROAD ST, BRIDGEPORT, CT 06604
Received by H.GASTER

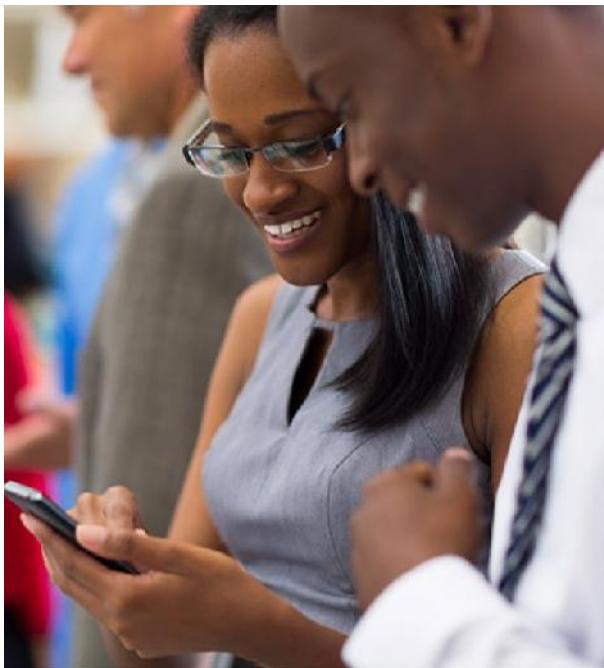
OBTAI N PROOF OF DELIVERY

TRACKING NUMBER [774523551011](#)

FROM NB+C
100 Apollo Dr.
Suite 303
CHELMSFORD, MA, US, 01824

TO City of Bridgeport
Joseph P. Ganim

999 Broad Street	
Margaret E. Morton Government Cente	
BRIDGEPORT, CT, US, 06604	
REFERENCE	100788 822779 Bridgeport CT
SHIPPER REFERENCE	100788 822779 Bridgeport CT
SHIP DATE	Thu 8/12/2021 06:12 PM
DELIVERED TO	Receptionist/Front Desk
PACKAGING TYPE	FedEx Envelope
ORIGIN	CHELMSFORD, MA, US, 01824
DESTINATION	BRIDGEPORT, CT, US, 06604
SPECIAL HANDLING	Deliver Weekday
NUMBER OF PIECES	1
TOTAL SHIPMENT WEIGHT	1.00 LB
SERVICE TYPE	FedEx Priority Overnight



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Colin Robinson

From: TrackingUpdates@fedex.com
Sent: Friday, August 13, 2021 9:46 AM
To: Colin Robinson
Subject: FedEx Shipment 774523609076: Your package has been delivered



Hi. Your package was
delivered Fri, 08/13/2021 at
9:42am.



Delivered to 45 LYON TER, BRIDGEPORT, CT 06604
Received by M.MCDOWELL

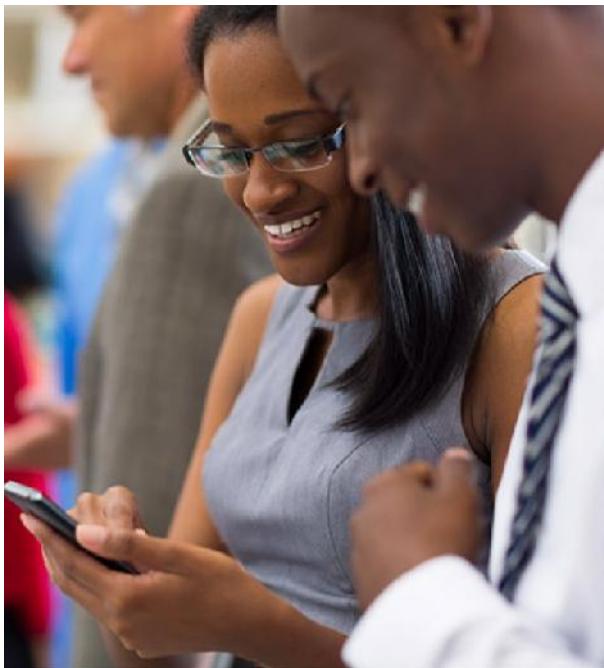
OBTAI N PROOF OF DELIVERY

TRACKING NUMBER [774523609076](#)

FROM NB+C
100 Apollo Dr.
Suite 303
CHELMSFORD, MA, US, 01824

TO Building Department
Bruce A. Nelson

	45 Lyon Terrace
	Room 222
	BRIDGEPORT, CT, US, 06604
REFERENCE	100788 822779 Bridgeport CT
SHIPPER REFERENCE	100788 822779 Bridgeport CT
SHIP DATE	Thu 8/12/2021 06:12 PM
DELIVERED TO	Mailroom
PACKAGING TYPE	FedEx Envelope
ORIGIN	CHELMSFORD, MA, US, 01824
DESTINATION	BRIDGEPORT, CT, US, 06604
SPECIAL HANDLING	Deliver Weekday
NUMBER OF PIECES	1
TOTAL SHIPMENT WEIGHT	1.00 LB
SERVICE TYPE	FedEx Priority Overnight



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Colin Robinson

From: TrackingUpdates@fedex.com
Sent: Friday, August 13, 2021 10:11 AM
To: Colin Robinson
Subject: FedEx Shipment 774523640110: Your package has been delivered



Hi. Your package was
delivered Fri, 08/13/2021 at
10:09am.



Delivered to 1875 NOBLE AVE, BRIDGEPORT, CT 06610
Received by S.SUSAN

OBTAI PROOF OF DELIVERY

TRACKING NUMBER [774523640110](#)

FROM NB+C
100 Apollo Dr.
Suite 303
CHELMSFORD, MA, US, 01824

TO Connecticut Zoological Society
1875 Noble Ave
C/O Beardsley Zoo
BRIDGEPORT, CT, US, 06610

REFERENCE 100788 822779 Bridgeport CT

SHIPPER REFERENCE 100788 822779 Bridgeport CT

SHIP DATE Thu 8/12/2021 06:12 PM

DELIVERED TO Receptionist/Front Desk

PACKAGING TYPE FedEx Envelope

ORIGIN CHELMSFORD, MA, US, 01824

DESTINATION BRIDGEPORT, CT, US, 06610

SPECIAL HANDLING Deliver Weekday

NUMBER OF PIECES 1

TOTAL SHIPMENT WEIGHT 1.00 LB

SERVICE TYPE FedEx Priority Overnight



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Exhibit A

Original Facility Approval

ZONING DEPARTMENT
DEVELOPMENT ADMINISTRATION
City of Bridgeport



DATE: March 31, 2000

OUR FILE: # 2K-07

Attorney J. Brendan Sharkey
100 Filley Street
Bloomfield, CT 06002

RE: Site Plan Review
1875 Noble Avenue
Bridgeport, CT

Dear Attorney Sharkey:

At its meeting held on Monday, March 27, 2000, the Planning & Zoning Commission voted to approve conditionally the application submitted by you which sought a Site Plan Review under Sec. 14-2 of the Bridgeport Zoning Regulations to permit the installation of a 120' high flagpole which will house telecommunications antennas & associated equipment within the Beardsley Zoo pavilion in a ZOOLOGICAL PARK ZONE.

The Commission stipulated the following conditions for its approval:

1. Stockade fencing not less than 6' high shall be installed to encompass & enclose the proposed equipment area.
2. No equipment shall exceed the height of the fencing required in condition No. 1 above.
3. Arborvitae trees no less than 6' high shall be planted at 6' intervals around the perimeter of the equipment enclosure area.
4. All required fencing & landscape trees are to be maintained at all times.
5. A "Removal Bond" as determined by the City Attorney's Office shall be filed with the Bridgeport Zoning Department prior to the Certification Of An Application For Zoning Compliance.

The Commission assigned the following reason for its action:

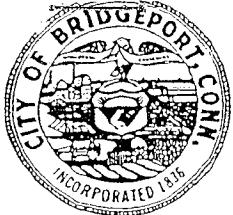
1. As to the Site Plan Review, the project, as approved, complies with the standards of Sec. 14-2-5 of the Bridgeport Zoning Regulations.

Very truly yours,



William A. Shaw, Clerk
Planning & Zoning Commission

WAS:map



APPLICATION FOR CERTIFICATE OF ZONING COMPLIANCE

ZONING COMMISSION
CITY OF BRIDGEPORT, CONN.CT11-240A
CITY HALL
45 Lyon Terrace
Room No. 206
Bridgeport, Conn.

Applicant Omnipoint Communications, Inc. Date 5/17/00 19.....
1875 ^{water or Tenant Only} Noble ^{45 Lyon Terrace}
Address of Work 45 Lyon Terrace East main Street
on the corner of Noble ^{East main Street} side of the above street about feet
North, South, East, West Beardsley Zoo Street Lot No. 9-9A-9B-9C
North, South, East, West
Block No. 3000 as shown on Tax Assessor's Maps. C.A.M. Area NO Wetlands NO
Yes - No
Dimension of Lot: Entire city block
Size of Proposed Building or Addition No. Stories
Wood Frame Brick Veneer Masonry
Other Work (Describe in Detail) Installation of telecommunication antennas and associated equipment. (flagpole)
Proposed Use of Above (Describe in Detail) Telecommunication antenna for cell phones, as approved by Z.B.P. 1/14/00 P.Z. approval 3/27/00
Presently Existing Use 200 Zone ZP

Previous use and date discontinued (if applicable)
..... Is pre-existing right claimed Yes ^{Yes} _{No}Signature J. Brendan Sharkey Print Same J. Brendan Sharkey, Esq.
If signed by agent state capacity (attorney, builder, etc.) Attorney for Omnipoint Communications
(The Applicant)Mailing Address 100 Filley Street, Bloomfield, CT 06002 Phone No. 860/692-7100

INSTRUCTIONS

Fill Out This Application In Ink or Type

A detailed plot plan must be submitted with this application showing the proposed or existing lot and building dimensions and the location of all buildings in relation to the street line, side lot lines and rear lot line. NOTE: The occupancy and use of land, buildings and structures prior to the issuance of a Certificate of Zoning Compliance is prohibited. This is not the said certificate. Fees, payable at the time of making application, are not returnable and, are in an amount established by the Zoning Commission.

Fee received 100 Date 5/17/00 19..... By mr.d.

PLAN AND APPLICATION

C.A.M. APPROVAL

FINAL INSPECTION

APPROVED FOR ZONING COMPLIANCE ONLY
ZONING DEPARTMENT
CITY OF BRIDGEPORT, CONN.
DATE: <u>10/6/00</u>

Certificate Issued Date 19.....

Exhibit B

Property Card

BU #: 822779

Tax Parcel ID # (Real Property):

BRID-003000-000009A (ALT APN 44643)

Aerial Photo of Parcel from County GIS Database:

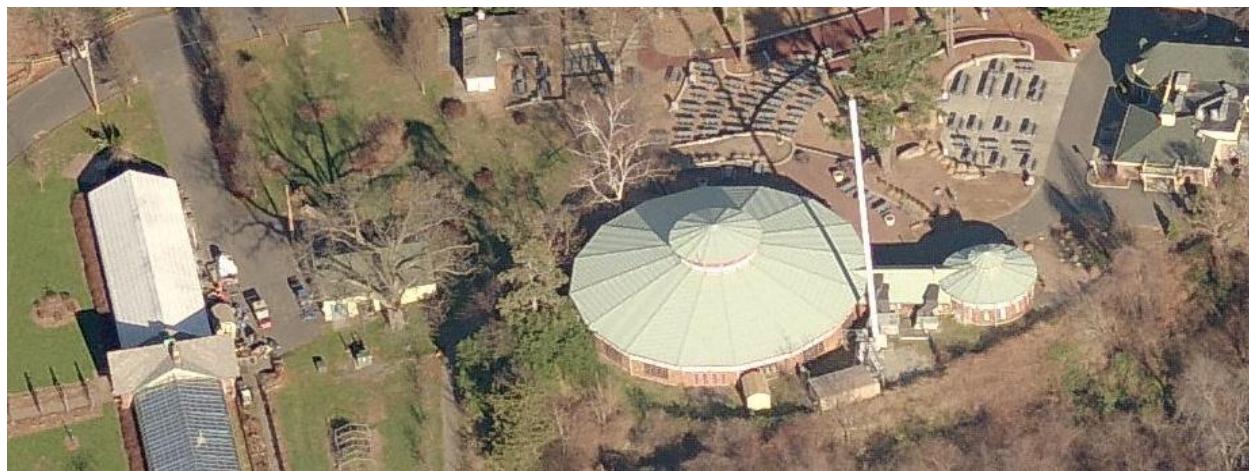
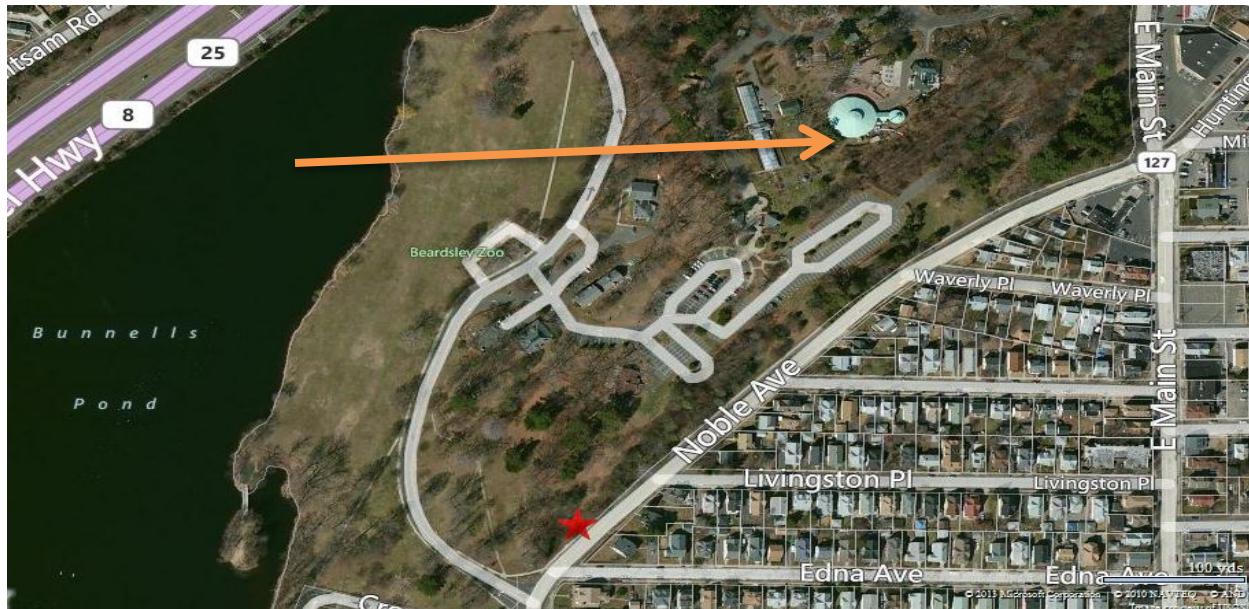
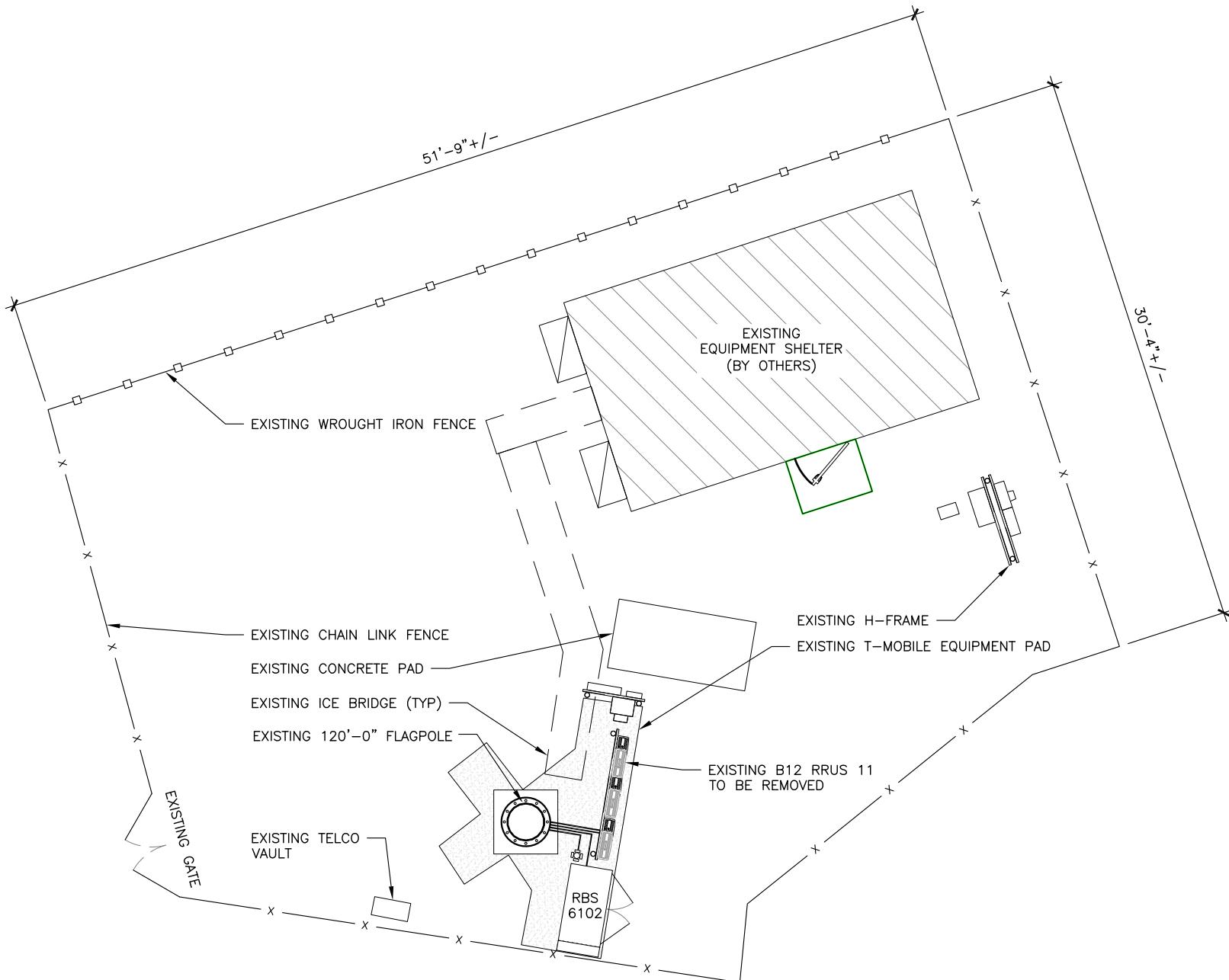


Exhibit C

Construction Drawings



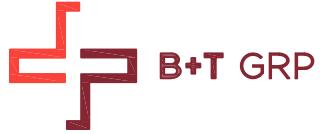
1 OVERALL SITE PLAN

SCALE: 0' 1' 4' 8' 20'



GENERAL NOTES:

1. SUBJECT PROPERTY IS SITUATED AT 1875 NOBLE AVE, BRIDGEPORT, CT 06610.
2. APPLICANT: T-MOBILE
A DELAWARE LIMITED LIABILITY COMPANY
4 SYLVAN WAY
PARSIPPANY, NEW JERSEY 07054
(973) 397-4800
3. TOWER OWNER: CROWN CASTLE INTERNATIONAL
4. THE APPLICANT IS TO UPDATE THEIR NETWORK BY INSTALLING THREE (3) NEW PANEL ANTENNAS MOUNTED ON AN EXISTING FLAGPOLE.
5. THIS FACILITY SHALL BE VISITED ON THE AVERAGE OF ONCE A MONTH FOR MAINTENANCE AND SHALL BE MONITORED FROM A REMOTE FACILITY.
6. THE EXISTING SITE IS LOCATED AT LATITUDE OF 41.210353° N± AND LONGITUDE OF 73.181183° W±. THE HORIZONTAL DATUM ARE IN TERMS OF NORTH AMERICAN DATUM OF 1983 (NAD 83).
7. THIS SET OF PLANS HAS BEEN PREPARED FOR THE PURPOSES OF MUNICIPAL AND AGENCY REVIEW AND APPROVAL. THIS SET OF PLANS SHALL NOT BE UTILIZED AS CONSTRUCTION DOCUMENTS UNTIL ALL CONDITIONS OF APPROVAL HAVE BEEN SATISFIED AND EACH OF THE DRAWINGS HAVE BEEN REVISED TO INDICATE "ISSUED FOR CONSTRUCTION"
8. ALL MATERIALS, WORKMANSHIP, AND CONSTRUCTION FOR THE SITE IMPROVEMENTS SHOWN HEREON SHALL BE IN ACCORDANCE WITH:
 - 6.A. CURRENT PREVAILING MUNICIPAL AND/OR COUNTY SPECIFICATIONS, STANDARDS, AND REQUIREMENTS.
 - 6.B. CURRENT PREVAILING UTILITY COMPANY AUTHORITY SPECIFICATIONS, STANDARDS AND REQUIREMENTS.
9. THE CONTRACTOR SHALL NOTIFY B+T GROUP, P.A. IMMEDIATELY IF ANY FIELD CONDITIONS ENCOUNTERED DIFFER FROM THOSE REPRESENTED HEREON, AND/OR IF SUCH CONDITIONS WOULD OR COULD RENDER THE DESIGNS SHOWN HEREON INAPPROPRIATE AND/OR INEFFECTIVE.
10. THE CONTRACTOR IS RESPONSIBLE TO PROTECT, REPAIR AND/OR REPLACE ANY DAMAGED STRUCTURES, UTILITIES OR LANDSCAPED AREA WHICH MAY BE DISTURBED DURING THE CONSTRUCTION OF THIS FACILITY.
11. THE CONSTRUCTION CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ALL CONSTRUCTION MEANS AND METHODS. THE CONSTRUCTION CONTRACTOR IS ALSO RESPONSIBLE FOR ALL JOB SITE SAFETY.
12. SITE INFORMATION SHOWN TAKEN FROM CROWN SITE PLANS AND FROM CROWN INSPECTION PHOTOS.



T...Mobile

BRIDGEPORT-RT 8
1875 NOBLE AVE
BRIDGEPORT, CT 06610
EXISTING 120'-0" FLAGPOLE
CT11240B
BU #: 822779

PROJECT NO:	137139.001.01																								
CHECKED BY:	CV																								
ISSUED FOR:																									
<table border="1"> <thead> <tr> <th>REV</th> <th>DATE</th> <th>DRWN</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>11/30/20</td> <td>JTS</td> <td>CONSTRUCTION</td> </tr> <tr> <td>2</td> <td>2/10/21</td> <td>JJD</td> <td>CONSTRUCTION</td> </tr> <tr> <td>3</td> <td>6/4/21</td> <td>GEH</td> <td>CONSTRUCTION</td> </tr> <tr> <td>4</td> <td>7/27/21</td> <td>KT</td> <td>CONSTRUCTION</td> </tr> <tr> <td>5</td> <td>8/10/21</td> <td>CV</td> <td>CONSTRUCTION</td> </tr> </tbody> </table>		REV	DATE	DRWN	DESCRIPTION	1	11/30/20	JTS	CONSTRUCTION	2	2/10/21	JJD	CONSTRUCTION	3	6/4/21	GEH	CONSTRUCTION	4	7/27/21	KT	CONSTRUCTION	5	8/10/21	CV	CONSTRUCTION
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5	8/10/21	CV	CONSTRUCTION																						

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/22



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OF A LICENSED PROFESSIONAL ENGINEER,
TO ALTER THIS DOCUMENT.

SHEET NUMBER: A-1
REVISION: 5



T...Mobile

BRIDGEPORT-RT 8
1875 NOBLE AVE
BRIDGEPORT, CT 06610
EXISTING 120'-0" FLAGPOLE
CT11240B
BU #: 822779

PROJECT NO: 137139.001.01
CHECKED BY: CV
ISSUED FOR:
REV DATE DRWN DESCRIPTION
1 11/30/20 JTS CONSTRUCTION
2 2/10/21 JJD CONSTRUCTION
3 6/4/21 GEH CONSTRUCTION
4 7/27/21 KT CONSTRUCTION
5 8/10/21 CV CONSTRUCTION

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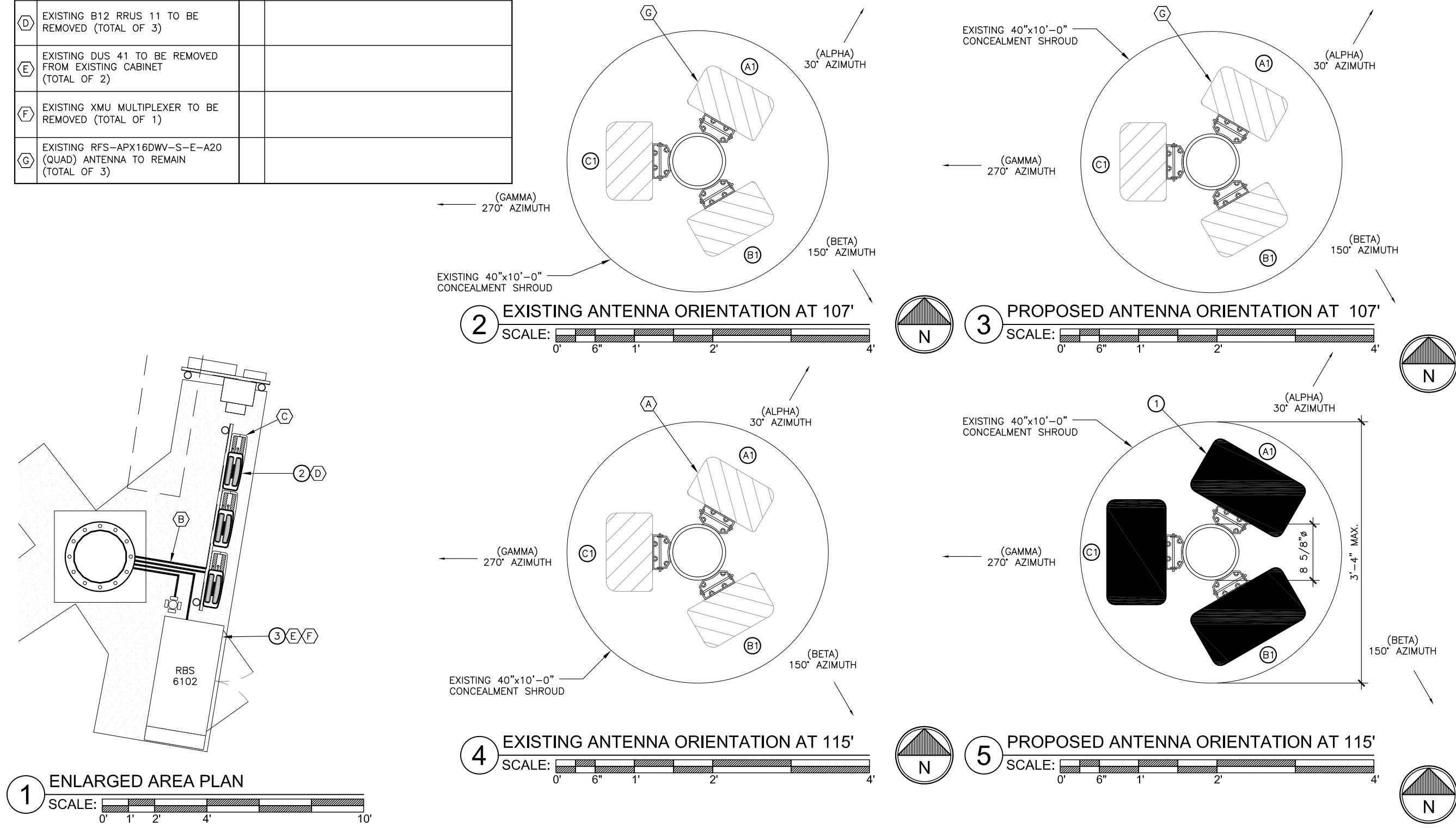
8/10/21
SHEET NUMBER: A-2
REVISION: 5

LEGEND

EXISTING/DEMOLITION NOTES		INSTALLATION NOTES	
A	EXISTING ANDREW DBXNH-6565B-A2M ANTENNA TO BE REMOVED (TOTAL OF 3)	①	INSTALL COMMSCOPE - FVV-65C-R3 ANTENNAS ON EXISTING MOUNT. PROVIDE NEW 2 7/8" OD SCH.40 PIPE MAST (LENGTH TO BE V.I.F) (TYP. OF 1 PER SECTOR, TOTAL OF 3)
B	EXISTING 7/8" COAX CABLES TO REMAIN (TOTAL OF 24)	②	INSTALL RADIO 4449 B85/B71 AT GROUND (TOTAL OF 3)
C	EXISTING B2 RRUS 11 TO REMAIN (TOTAL OF 3)	③	INSTALL BB6630 IN EXISTING CABINET (TOTAL OF 2)
D	EXISTING B12 RRUS 11 TO BE REMOVED (TOTAL OF 3)		
E	EXISTING DUS 41 TO BE REMOVED FROM EXISTING CABINET (TOTAL OF 2)		
F	EXISTING XMU MULTIPLEXER TO BE REMOVED (TOTAL OF 1)		
G	EXISTING RFS-APX16DWV-S-E-A20 (QUAD) ANTENNA TO REMAIN (TOTAL OF 3)		

ANTENNA AND CABLE SCHEDULE

SECTOR	POSITION	EXISTING ANTENNAS	PROPOSED ANTENNA CONFIGURATION	E-TILT	M-TILT	ANTENNA CENTERLINE	TMA/RRU	CABLES	JUMPER TYPE	CABLE LENGTH	
30° - ALPHA	A1	ANDREW - DBXNH-6565B-A2M (QUAD)	LTE	B71 B85 B2	0°	0°	115'-0"	0/2	(4) 7/8" COAX	-	120'-0"
150° - BETA	B1	ANDREW - DBXNH-6565B-A2M (QUAD)	LTE	B71 B85 B2	0°	0°	115'-0"	0/2	(4) 7/8" COAX	-	120'-0"
270° - GAMMA	C1	ANDREW - DBXNH-6565B-A2M (QUAD)	LTE	B71 B85 B2	0°	0°	115'-0"	0/2	(4) 7/8" COAX	-	120'-0"

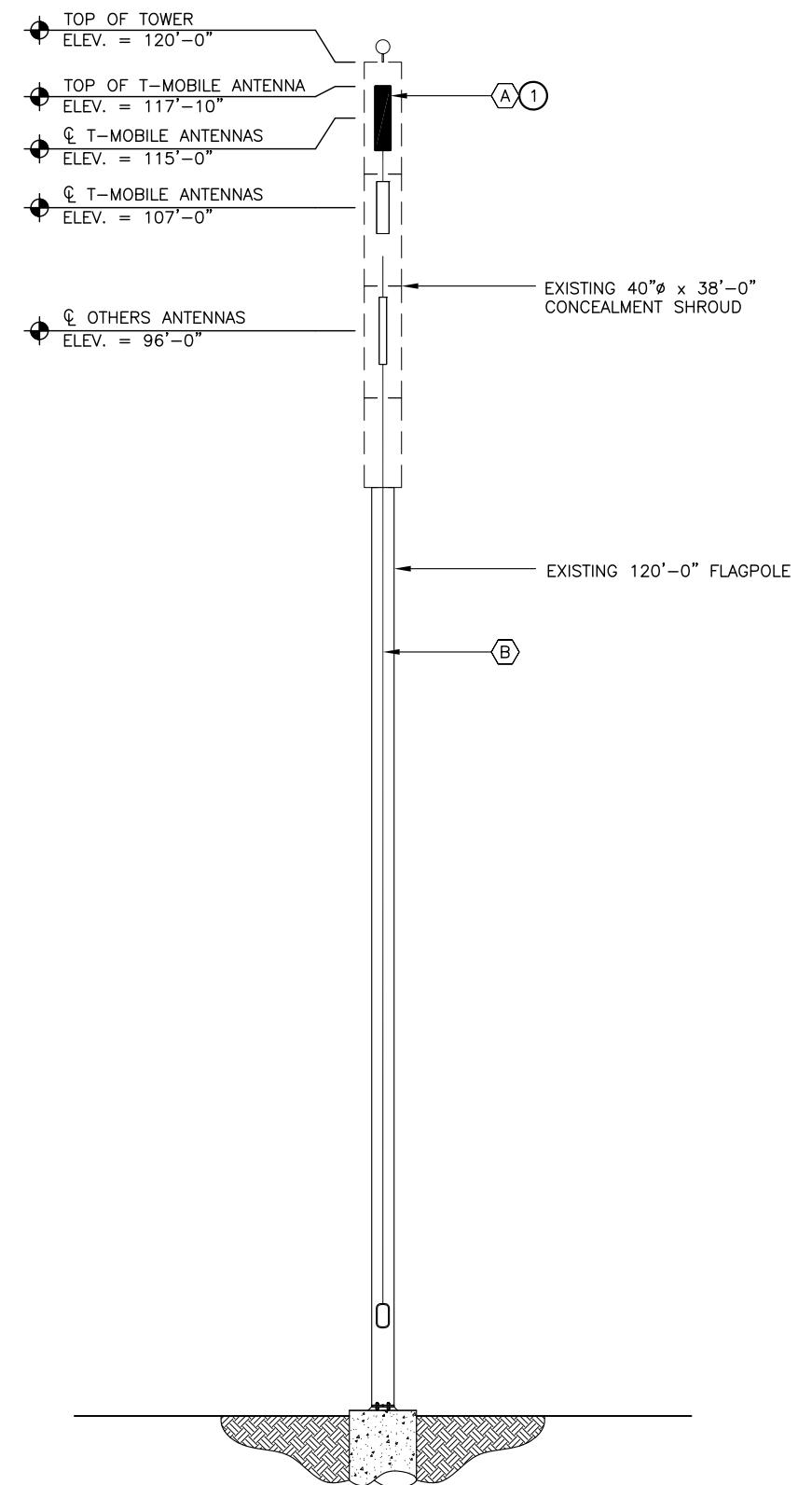


LEGEND	
EXISTING/DEMOLITION NOTES	INSTALLATION NOTES
(A) EXISTING ANDREW DBXNH-6565B-A2M ANTENNA TO BE REMOVED (TOTAL OF 3)	(1) INSTALL COMMSCOPE - FVV-65C-R3 ANTENNAS ON EXISTING MOUNT. PROVIDE NEW 2 7/8" OD SCH.40 PIPE MAST (LENGTH TO BE V.I.F) (TYP. OF 1 PER SECTOR, TOTAL OF 3)
(B) EXISTING 7/8" COAX CABLES TO REMAIN (TOTAL OF 24)	

EXISTING TOWER IS SUFFICIENT PER STRUCTURAL ANALYSIS
BY PAUL J FORD & COMPANY DATED 5/18/19.

LEGEND:

- NEW
- EXISTING
- [-] FUTURE



1 TOWER ELEVATION
SCALE: 0' 15' 30' 45' 60' 1"=30'



T...Mobile

BRIDGEPORT-RT 8
CT11240B
BU #: 822779
1875 NOBLE AVE
BRIDGEPORT, CT 06610
EXISTING 120'-0" FLAGPOLE

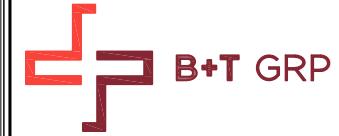
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SHEET NUMBER: A-3 REVISION: 5



T...Mobile

BRIDGEPORT-RT 8
1875 NOBLE AVE
BRIDGEPORT, CT 06610
EXISTING 120'-0" FLAGPOLE

PROPOSED L7/L6/N6 ANTENNA MOUNTING DETAIL

1 SCALE: 3/8" = 1'-0"

NOTES:

1. TAG ALL EXISTING AND PROPOSED CABLES/JUMPERS PER T-MOBILE SPECIFICATIONS.
2. SEE RF SCHEDULE FOR CABLE AND JUMPER LENGTHS.
3. REFER TO ANTENNA ORIENTATION ON SHEET A-2 FOR EXACT ANTENNA POSITIONING.



ANTENNA SPECS

MANUFACTURER	COMMSCOPE
MODEL #	FV-65C-R3
WIDTH	11.85"
DEPTH	7.13"
HEIGHT	96.50"
WEIGHT	53.79 LBS

L7/L6/N6 ANTENNA DETAIL

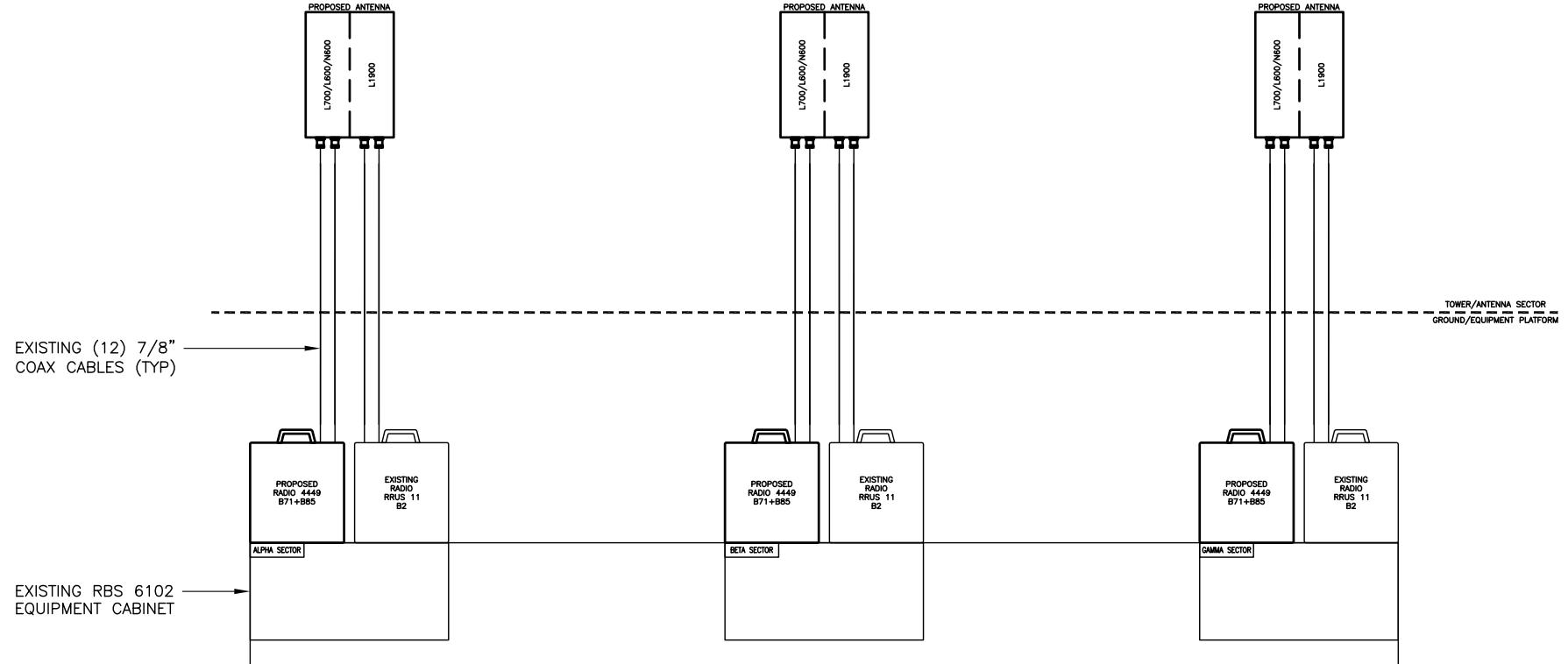
2 SCALE: 3/8" = 1'-0"

RRU SPECIFICATIONS

MANUFACTURER	ERICSSON
MODEL #	4449
WIDTH	13.2"
DEPTH	10.4"
HEIGHT	14.9"
WEIGHT	74 LBS

REMOTE RADIO UNIT (RRU)

3 SCALE: 3/8" = 1'-0"



ANTENNA & CABLING SCHEMATIC

4 SCALE: N.T.S.

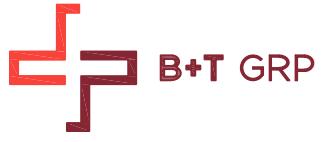
PROJECT NO:	137139.001.01
CHECKED BY:	CV
ISSUED FOR:	
REV	DATE
1	11/30/20
2	2/10/21
3	6/4/21
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OF A LICENSED PROFESSIONAL ENGINEER,
TO ALTER THIS DOCUMENT.

SHEET NUMBER: A-4 REVISION: 5



T...Mobile

BRIDGEPORT-RT 8
CT11240B
BU #: 822779
1875 NOBLE AVE
BRIDGEPORT, CT 06610
EXISTING 120'-0" FLAGPOLE

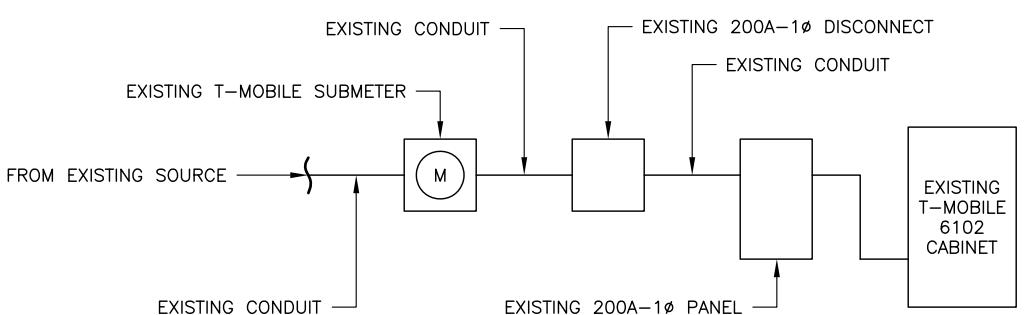
FINAL PANEL SCHEDULE									
LOAD	POLES	AMPS	BUS		AMPS	POLES	LOAD		
			L1	L2					
			3	4	20A	1			FIBER
FLOOD LIGHTS	1	20A	5	6	20A	1			EQUIPMENT
RBS 6102	2	100A	7	8	50A	2			UMTS 3106
			9	10					

RATED VOLTAGE: 120/240 1 PHASE, 3 WIRE
RATED AMPS: 100 200 400
 MAIN LUGS ONLY MAIN 200 AMPS BREAKER FUSED SWITCH
 FUSED CIRCUIT BREAKER
BRANCH POLES: 12 20 30 42
CABINET: SURFACE FLUSH
NEMA 1 3R 4X
 HINGED DOOR KEYED DOOR LATCH
TO BE GFCI BREAKERS
FULL NEUTRAL BUS GROUND BAR
ALL BREAKERS MUST BE RATED TO INTERRUPT A SHORT CIRCUIT ISC OF 10,000 AMPS SYMMETRICAL

FINAL PANEL DESIGN AND CALCULATIONS FOR WIRE SIZE WERE BASED OFF OF EXISTING PHOTOS

1 FINAL T-MOBILE PANEL DETAIL

SCALE: N.T.S.



2 ONE-LINE DIAGRAM

SCALE: N.T.S.

PROJECT NO:	137139.001.01
CHECKED BY:	CV
ISSUED FOR:	
REV	DATE
1	11/30/20
2	2/10/21
3	6/4/21
4	7/27/21
5	8/10/21
DESCRIPTION	
JTS	CONSTRUCTION
JJD	CONSTRUCTION
GEH	CONSTRUCTION
KT	CONSTRUCTION
CV	CONSTRUCTION

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/22



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TO ALTER THIS DOCUMENT.

SHEET NUMBER: E-1
REVISION: 5

Exhibit D

Structural Analysis Report

Date: May 18, 2021

Paul J. Ford and Company
250 E. Broad St., Ste 600
Columbus, OH 43215
614-221-6679

Subject:	Structural Analysis Report	
Carrier Designation:	T-Mobile Co-Locate	
	Site Number:	CT11240B
	Site Name:	Bridgeport/ Rt 8
Crown Castle Designation:	BU Number:	822779
	Site Name:	Bridgeport/ Rt 8
	JDE Job Number:	559228
	Work Order Number:	1967728
	Order Number:	479820 Rev. 6
Engineering Firm Designation:	Paul J. Ford and Company Project Number: 37521-0593.002.7805	
Site Data:	1875 Noble Avenue, Bridgeport, Fairfield County, CT Latitude 41° 12' 37.271", Longitude -73° 10' 52.259" 120 Foot - Monopole Tower	

Paul J. Ford and Company is pleased to submit this “**Structural Analysis Report**” to determine the structural integrity of the above-mentioned tower.

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

LC7: Proposed Equipment Configuration

Sufficient Capacity (84.7%)

This analysis utilizes an ultimate 3-second gust wind speed of 125 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:

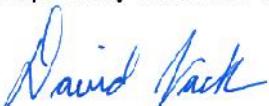

David Jack, PE
Project Engineer
djack@pauljford.com



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tnxTower Output

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1) INTRODUCTION

This tower is a 120 ft Monopole tower designed by PIROD MANUFACTURES INC..

The tower has been modified per reinforcement drawings prepared by PJF in 2015. Reinforcement consist of concealment replacement.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	125 mph
Exposure Category:	C
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)
115.0	115.0	3	commscope	FVV-65C-R3	12	7/8
105.0	107.0	3	rfs celwave	APX16DWV-16DWV-S-E-A20	12	7/8

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)
115.0	115.0	1	miscl	36"Ø × 10' Concealment Shroud	—	--
105.0	105.0	1	miscl	36"Ø × 10' Concealment Shroud	—	--
95.0	96.0	1	box enclosures and assembly	BEN-92P	6	1-1/4
		3	commscope	DHHTT65B-3XR	2	3/8
		3	nokia	FWHR	4	17/64
		3	rfs celwave	FD9R6004/1C-3L	1	1/8
	95.0	1	miscl	36"Ø × 10' Concealment Shroud	1	7/8
86.0	86.0	1	miscl	36"Ø × 8' Concealment Shroud	—	--

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Reference	Source
4-GEOTECHNICAL REPORTS	3584592	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	3914232	CCISITES
4-TOWER MANUFACTURER DRAWINGS	3584593	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	6175820	CCISITES
4-POST-MODIFICATION INSPECTION	6261360	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.9.0), 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. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 standard.

3.2) Assumptions

- 1) Tower and structures were maintained in accordance with the TIA-222 Standard.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 3) The structure was modified in conformance with the referenced modification drawings as shown in the referenced post modification inspection.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P _{allow} (K)	% Capacity	Pass / Fail	
L1	120 - 110	Pole	P10.75x0.349	1	-0.78	452.62	8.0	Pass	
L2	110 - 100	Pole	P10.75x0.349	2	-1.77	452.62	22.6	Pass	
L3	100 - 90	Pole	P10.75x0.349	3	-2.99	452.62	43.6	Pass	
L4	90 - 82	Pole	P10.75x0.349	4	-3.83	452.62	64.5	Pass	
L5	82 - 60	Pole	P24x0.375	5	-7.04	1104.67	26.9	Pass	
L6	60 - 30	Pole	P24x0.375	6	-10.91	1104.67	53.1	Pass	
L7	30 - 0	Pole	P24x0.375	7	-14.94	1104.67	84.7	Pass	
							Summary		
							Pole (L7)	84.7	Pass
							Rating =	84.7	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Flange Bolts	110	6.8	Pass
1	Flange Plate	110	3.2	Pass
1	Flange Bolts	100	19.3	Pass
1	Flange Plate	100	8.9	Pass
1	Flange Bolts	90	37.3	Pass
1	Flange Plate	90	17.1	Pass
1	Flange Bolts	82	39.1	Pass
1	Flange Plate	82	57.7	Pass
1	Flange Bolts	60	32.0	Pass
1	Flange Plate	60	46.2	Pass
1	Flange Bolts	30	42.3	Pass
1	Flange Plate	30	46.2	Pass
1	Anchor Rods	0	11.8	Pass
1	Base Plate	0	25.2	Pass
1	Base Foundation (Structure)	0	18.6	Pass
1	Base Foundation (Soil Interaction)	0	18.1	Pass
1	Base Foundation (Micropiles)	0	62.3	Pass

Structure Rating (max from all components) =

84.7%

Notes:

- All structural ratings are per TIA-222-H Section 15.5
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
- 2) Connection analyzed via finite element analysis. See Appendix C for details.

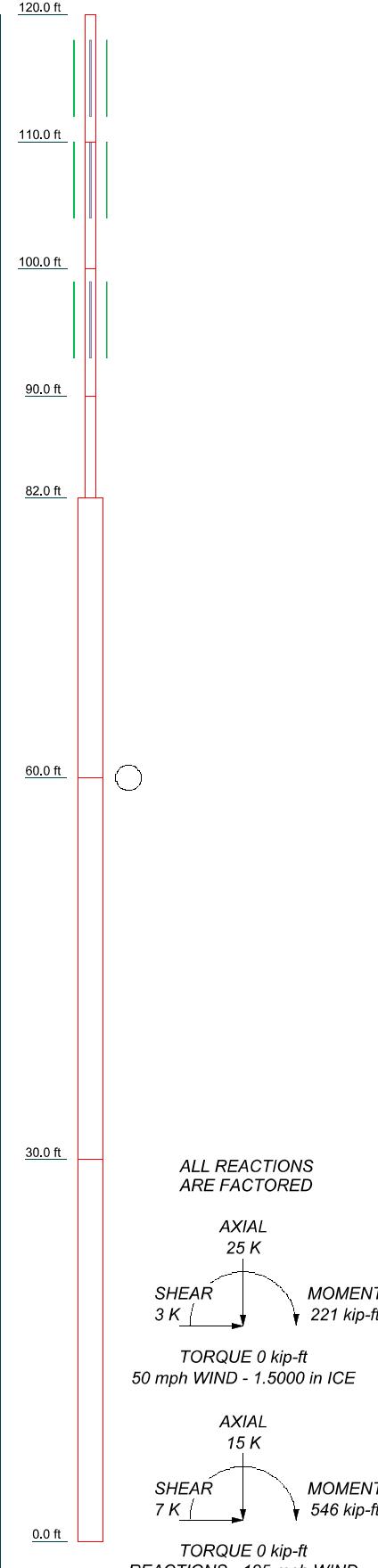
4.1) Recommendations

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	7	6	5	4	3	2	1
Size	P24x0.375	P24x0.375	P24x0.375	P10.75x0.349	P10.75x0.349	P10.75x0.349	P10.75x0.349
Length (ft)	30.0000	30.0000	22.0000	8.0000	10.0000	10.0000	10.0000
Grade							
Weight (K)	9.2	2.8	2.8	2.1	0.3	0.4	0.4



MATERIAL STRENGTH		TOWER DESIGN NOTES	
GRADE	Fy	Fu	GRADE
A500-42	42 ksi	58 ksi	A53-B-42
	P10.75x0.349	P10.75x0.349	42 ksi
	P10.75x0.349	P10.75x0.349	63 ksi

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 125 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 0.0000 ft
8. TIA-222-H Annex S
9. TOWER RATING: 84.7%

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 Fairfield County, Connecticut.
- Tower base elevation above sea level: 123.1500 ft.
- Basic wind speed of 125 mph.
- Risk Category II.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.0000 ft.
- Nominal ice thickness of 1.5000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56.00 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.
- 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	Retention 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.
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Use TIA-222-H Tension Splice
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Exemption
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Poles
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	✓ Include Shear-Torsion Interaction
SR Members Are Concentric	Ignore KL/ry For 60 Deg. Angle Legs	Always Use Sub-Critical Flow
		Use Top Mounted Sockets
		Pole Without Linear Attachments
		Pole With Shroud Or No
		Appurtenances
		Outside and Inside Corner Radii Are Known

Pole Section Geometry

Section	Elevation	Section Length	Pole Size	Pole Grade	Socket Length ft
L1	120.0000-110.0000	10.0000	P10.75x0.349	A500-42 (42 ksi)	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L2	110.0000- 100.0000	10.0000	P10.75x0.349	A500-42 (42 ksi)	
L3	100.0000- 90.0000	10.0000	P10.75x0.349	A500-42 (42 ksi)	
L4	90.0000-82.0000	8.0000	P10.75x0.349	A500-42 (42 ksi)	
L5	82.0000-60.0000	22.0000	P24x0.375	A53-B-42 (42 ksi)	
L6	60.0000-30.0000	30.0000	P24x0.375	A53-B-42 (42 ksi)	
L7	30.0000-0.0000	30.0000	P24x0.375	A53-B-42 (42 ksi)	

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _r	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 120.0000- 110.0000				1	0	1			
L2 110.0000- 100.0000				1	0	1			
L3 100.0000- 90.0000				1	0	1			
L4 90.0000- 82.0000				1	0	1			
L5 82.0000- 60.0000				1	1	1			
L6 60.0000- 30.0000				1	1	1			
L7 30.0000- 0.0000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Componen t Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf
AVA5-50(7/8)	C	No	No	Inside Pole	115.0000 - 0.0000	12	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000
*** AVA5-50(7/8)	C	No	No	Inside Pole	105.0000 - 0.0000	12	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000
*** LDF6-50A(1-1/4)	C	No	No	Inside Pole	95.0000 - 0.0000	6	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000
9833(3/8)	C	No	No	Inside Pole	95.0000 - 0.0000	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000
7919A(17/64)	C	No	No	Inside Pole	95.0000 - 0.0000	4	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000
004U8X- 32125E2G(1/8)	C	No	No	Inside Pole	95.0000 - 0.0000	1	No Ice 1/2" Ice	0.0000 0.0000

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C_{AA}	Weight
							ft ² /ft	plf
TYPE SOOW 12/9(7/8)	C	No	No	Inside Pole	95.0000 - 0.0000	1	1" Ice	0.0000
							2" Ice	0.0000
							No Ice	0.0000
							1/2" Ice	0.0000
							1" Ice	0.0000
							2" Ice	0.0000

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight
							K
L1	120.0000-	A	0.000	0.000	0.000	0.000	0.00
	110.0000	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.02
L2	110.0000-	A	0.000	0.000	0.000	0.000	0.00
	100.0000	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.05
L3	100.0000-	A	0.000	0.000	0.000	0.000	0.00
	90.0000	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.09
L4	90.0000-82.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.09
L5	82.0000-60.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.25
L6	60.0000-30.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.35
L7	30.0000-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.35

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} In Face ft ²	C_{AA} Out Face ft ²	Weight
								K
L1	120.0000-	A	1.699	0.000	0.000	0.000	0.000	0.00
	110.0000	B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.02
L2	110.0000-	A	1.684	0.000	0.000	0.000	0.000	0.00
	100.0000	B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.05
L3	100.0000-	A	1.667	0.000	0.000	0.000	0.000	0.00
	90.0000	B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.09
L4	90.0000-82.0000	A	1.651	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.09
L5	82.0000-60.0000	A	1.619	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.25
L6	60.0000-30.0000	A	1.547	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.35
L7	30.0000-0.0000	A	1.386	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg C	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
				0.000	0.000	0.000	0.000	0.35

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
L1	120.0000-110.0000	0.0000	0.0000	0.0000	0.0000
L2	110.0000-100.0000	0.0000	0.0000	0.0000	0.0000
L3	100.0000-90.0000	0.0000	0.0000	0.0000	0.0000
L4	90.0000-82.0000	0.0000	0.0000	0.0000	0.0000
L5	82.0000-60.0000	0.0000	0.0000	0.0000	0.0000
L6	60.0000-30.0000	0.0000	0.0000	0.0000	0.0000
L7	30.0000-0.0000	0.0000	0.0000	0.0000	0.0000

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

User Defined Loads

Description	Elevation ft	Offset From Centroid ft	Azimuth Angle °	Weight K	F_x K	F_z K	Wind Force K	C_{AA} ft ²
Flag	120.0000	0.00	0.00	No Ice 0.03	0.00	0.00	0.51	9.2836
				Ice 0.79	0.00	0.00	0.08	9.6353
				Service 0.03	0.00	0.00	0.12	10.3758

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lat Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C_{AA} Front	C_{AA} Side	Weight K	

FVV-65C-R3	A	From Leg	1.0000 0.00 0.00	0.00	115.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.05 0.12 0.19 0.36
FVV-65C-R3	B	From Leg	1.0000 0.00 0.00	0.00	115.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.05 0.12 0.19 0.36	
FVV-65C-R3	C	From Leg	1.0000 0.00 0.00	0.00	115.0000	No Ice 1/2" Ice 1" Ice	0.0000 0.0000 0.0000 0.0000	0.05 0.12 0.19 0.36	

Description	Face or Leg	Offset Type	Offsets: Horz Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C _A A _A		C _A A _A Side	Weight K
						Front	ft ²		
2" Ice									

APX16DWV-16DWV-S-E-A20	A	From Leg	1.0000 0.00 2.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.04 0.07 0.11 0.20
APX16DWV-16DWV-S-E-A20	B	From Leg	1.0000 0.00 2.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.04 0.07 0.11 0.20
APX16DWV-16DWV-S-E-A20	C	From Leg	1.0000 0.00 2.00	0.00	105.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.04 0.07 0.11 0.20

DHHTT65B-3XR	A	From Leg	1.0000 0.00 1.00	0.00	95.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.05 0.10 0.15 0.28
DHHTT65B-3XR	B	From Leg	1.0000 0.00 1.00	0.00	95.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.05 0.10 0.15 0.28
DHHTT65B-3XR	C	From Leg	1.0000 0.00 1.00	0.00	95.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.05 0.10 0.15 0.28
FD9R6004/1C-3L	A	From Leg	1.0000 0.00 1.00	0.00	95.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.00 0.00 0.01 0.02
FD9R6004/1C-3L	B	From Leg	1.0000 0.00 1.00	0.00	95.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.00 0.00 0.01 0.02
FD9R6004/1C-3L	C	From Leg	1.0000 0.00 1.00	0.00	95.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.00 0.00 0.01 0.02
FWHR	A	From Leg	1.0000 0.00 1.00	0.00	95.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.03 0.04 0.05 0.08
FWHR	B	From Leg	1.0000 0.00 1.00	0.00	95.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.03 0.04 0.05 0.08
FWHR	C	From Leg	1.0000 0.00 1.00	0.00	95.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.03 0.04 0.05 0.08
BEN-92P	C	From Leg	1.0000 0.00	0.00	95.0000	No Ice 1/2"	0.0000 0.0000	0.0000 0.0000	0.00 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C _{AA} Front	C _{AA} Side	Weight K
			1.00					

Canister Load1	C	None		0.00	120.0000	No Ice 1/2" Ice 1" Ice 2" Ice	6.7500 16.9583 17.4167 18.3333 18.3333	0.09 0.21 0.32 0.56
Canister Load2	C	None		0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	13.5000 33.9167 34.8333 36.6667 36.6667	0.31 0.54 0.77 1.24
Canister Load3	C	None		0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice	13.5000 33.9167 34.8333 36.6667 36.6667	0.31 0.54 0.77 1.24
Canister Load4	C	None		0.00	90.0000	No Ice 1/2" Ice 1" Ice 2" Ice	12.1500 30.5250 31.3500 33.0000 33.0000	0.30 0.50 0.70 1.13
Canister Load5	C	None		0.00	82.0000	No Ice 1/2" Ice 1" Ice 2" Ice	5.4000 13.5667 13.9333 14.6667 14.6667	0.39 0.48 0.57 0.76
Truck Ball	C	None		0.00	120.7500	No Ice 1/2" Ice 1" Ice 2" Ice	0.8836 1.3783 1.5272 1.8479 1.8479	0.05 0.07 0.09 0.13

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L1 120.0000- 110.0000	115.0000	1.303	49.30 9	8.958	A	0.000	0.000	0.000	0.00	0.000	0.000
					B	0.000	0.000		0.00	0.000	0.000
					C	0.000	0.000		0.00	0.000	0.000
L2 110.0000- 100.0000	105.0000	1.279	48.37 4	8.958	A	0.000	0.000	0.000	0.00	0.000	0.000
					B	0.000	0.000		0.00	0.000	0.000
					C	0.000	0.000		0.00	0.000	0.000
L3 100.0000- 90.0000	95.0000	1.252	47.36 5	8.958	A	0.000	0.000	0.000	0.00	0.000	0.000
					B	0.000	0.000		0.00	0.000	0.000
					C	0.000	0.000		0.00	0.000	0.000
L4 90.0000- 82.0000	86.0000	1.226	46.38 3	7.167	A	0.000	0.000	0.000	0.00	0.000	0.000
					B	0.000	0.000		0.00	0.000	0.000
					C	0.000	0.000		0.00	0.000	0.000
L5 82.0000- 60.0000	71.0000	1.178	42.32 1	44.000	A	0.000	44.000	44.000	100.00	0.000	0.000
					B	0.000	44.000		100.00	0.000	0.000
					C	0.000	44.000		100.00	0.000	0.000

Section Elevation	z	K _z	q _z	A _G	F _{a c e}	A _F	A _R	A _{leg}	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
L6 60.0000-30.0000	45.0000	1.07	38.447	60.000	A B C	0.000 0.000 0.000	60.000 60.000 60.000	60.000	100.00	0.000	0.000
L7 30.0000-0.0000	15.0000	0.85	30.549	60.000	A B C	0.000 0.000 0.000	60.000 60.000 60.000	60.000	100.00	0.000	0.000

Tower Pressure - With Ice

G_H = 1.100

Section Elevation	z	K _z	q _z	t _z	A _G	F _{a c e}	A _F	A _R	A _{leg}	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
ft	ft		psf	in	ft ²		ft ²	ft ²	ft ²			
L1 120.0000-110.0000	115.0000	1.303	7.889	1.6995	11.791	A B C	0.000 0.000 0.000	0.000 0.000 0.000	0.000	0.00	0.000	0.000
L2 110.0000-100.0000	105.0000	1.279	7.740	1.6841	11.765	A B C	0.000 0.000 0.000	0.000 0.000 0.000	0.000	0.00	0.000	0.000
L3 100.0000-90.0000	95.0000	1.252	7.578	1.6673	11.737	A B C	0.000 0.000 0.000	0.000 0.000 0.000	0.000	0.00	0.000	0.000
L4 90.0000-82.0000	86.0000	1.226	7.421	1.6508	9.368	A B C	0.000 0.000 0.000	0.000 0.000 0.000	0.000	0.00	0.000	0.000
L5 82.0000-60.0000	71.0000	1.178	6.771	1.6194	49.938	A B C	0.000 0.000 0.000	49.938 49.938 49.938	49.938	100.00	0.000	0.000
L6 60.0000-30.0000	45.0000	1.07	6.152	1.5473	67.736	A B C	0.000 0.000 0.000	67.736 67.736 67.736	67.736	100.00	0.000	0.000
L7 30.0000-0.0000	15.0000	0.85	4.888	1.3863	66.931	A B C	0.000 0.000 0.000	66.931 66.931 66.931	66.931	100.00	0.000	0.000

Tower Pressure - Service

G_H = 1.100

Section Elevation	z	K _z	q _z	A _G	F _{a c e}	A _F	A _R	A _{leg}	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
L1 120.0000-110.0000	115.0000	1.303	10.165	8.958	A B C	0.000 0.000 0.000	0.000 0.000 0.000	0.000	0.00	0.000	0.000
L2 110.0000-100.0000	105.0000	1.279	9.972	8.958	A B C	0.000 0.000 0.000	0.000 0.000 0.000	0.000	0.00	0.000	0.000
L3 100.0000-90.0000	95.0000	1.252	9.764	8.958	A B C	0.000 0.000 0.000	0.000 0.000 0.000	0.000	0.00	0.000	0.000
L4 90.0000-82.0000	86.0000	1.226	9.562	7.167	A B C	0.000 0.000 0.000	0.000 0.000 0.000	0.000	0.00	0.000	0.000
L5 82.0000-60.0000	71.0000	1.178	8.724	44.000	A B C	0.000 0.000 0.000	44.000 44.000 44.000	44.000	100.00	0.000	0.000

Section Elevation	z	Kz	qz	AG	Fa ce	AF	AR	Aleg	Leg %	CAA In Face ft ²	CAA Out Face ft ²
	ft	ft	psf	ft ²		ft ²	ft ²	ft ²			
L6 60.0000-30.0000	45.0000	1.07	7.926	60.000	A	0.000	60.000	60.000	100.00	0.000	0.000
					B	0.000	60.000		100.00	0.000	0.000
					C	0.000	60.000		100.00	0.000	0.000
L7 30.0000-0.0000	15.0000	0.85	6.297	60.000	A	0.000	60.000	60.000	100.00	0.000	0.000
					B	0.000	60.000		100.00	0.000	0.000
					C	0.000	60.000		100.00	0.000	0.000

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 110	Pole	Max Tension	20	0.00	-0.00	0.00
			Max. Compression	26	-3.15	0.00	-0.00
			Max. Mx	20	-0.78	9.77	-0.00
			Max. My	14	-0.78	0.00	-9.77
			Max. Vy	20	-1.00	9.77	-0.00
			Max. Vx	14	1.00	0.00	-9.77
			Max. Torque	32		0.00	
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-5.64	0.00	-0.00
			Max. Mx	20	-1.77	27.68	-0.00
L2	110 - 100	Pole	Max. My	14	-1.77	0.00	-27.68
			Max. Vy	20	-1.82	27.68	-0.00
			Max. Vx	14	1.82	0.00	-27.68
			Max. Torque	12		0.00	
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-8.68	0.04	-0.02
			Max. Mx	20	-2.99	53.51	-0.00
			Max. My	14	-2.99	0.00	-53.51
			Max. Vy	20	-2.60	50.91	-0.00
			Max. Vx	14	2.60	0.00	-50.91
L3	100 - 90	Pole	Max. Torque	38		0.00	
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-10.41	0.04	-0.02
			Max. Mx	20	-3.83	79.43	-0.00
			Max. My	14	-3.83	0.00	-79.43
			Max. Vy	20	-3.25	56.76	-0.00
			Max. Vx	14	3.25	0.00	-56.76
			Max. Torque	38		0.00	
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-15.10	0.04	-0.02
L4	90 - 82	Pole	Max. Mx	20	-7.04	171.56	-0.00
			Max. My	14	-7.04	0.00	-171.56
			Max. Vy	20	-4.86	171.56	-0.00
			Max. Vx	14	4.86	0.00	-171.56
			Max. Torque	38		0.00	
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-20.37	0.04	-0.02
			Max. Mx	20	-10.91	340.57	-0.00
			Max. My	14	-10.91	0.00	-340.57
			Max. Vy	20	-6.38	340.57	-0.00
L5	82 - 60	Pole	Max. Vx	14	6.38	0.00	-340.57
			Max. Torque	38		0.00	
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-25.49	0.04	-0.02
			Max. Mx	20	-14.94	545.37	-0.00
			Max. My	14	-14.94	0.00	-545.36
			Max. Vy	20	-7.22	545.37	-0.00
			Max. Vx	14	7.22	0.00	-545.36
			Max. Torque	38		0.00	
			Max Tension	1	0.00	0.00	0.00
L6	60 - 30	Pole	Max. Compression	26	-25.49	0.04	-0.02
			Max. Mx	20	-10.91	340.57	-0.00
			Max. My	14	-10.91	0.00	-340.57
			Max. Vy	20	-6.38	340.57	-0.00
			Max. Vx	14	6.38	0.00	-340.57
			Max. Torque	38		0.00	
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-20.37	0.04	-0.02
			Max. Mx	20	-10.91	340.57	-0.00
			Max. My	14	-10.91	0.00	-340.57
L7	30 - 0	Pole	Max. Vy	20	-6.38	340.57	-0.00
			Max. Vx	14	6.38	0.00	-340.57
			Max. Torque	38		0.00	
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-25.49	0.04	-0.02
			Max. Mx	20	-14.94	545.37	-0.00
			Max. My	14	-14.94	0.00	-545.36
			Max. Vy	20	-7.22	545.37	-0.00
			Max. Vx	14	7.22	0.00	-545.36
			Max. Torque	38		0.00	

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	25.49	0.00	-0.00
	Max. H _x	21	11.21	7.21	0.00
	Max. H _z	3	11.21	-0.00	7.21
	Max. M _x	2	545.36	-0.00	7.21
	Max. M _z	8	545.36	-7.21	0.00
	Max. Torsion	38	0.00	1.34	2.32
	Min. Vert	21	11.21	7.21	0.00
	Min. H _x	9	11.21	-7.21	0.00
	Min. H _z	15	11.21	-0.00	-7.21
	Max. Torque	38			

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. M_x	14	-545.36	-0.00	-7.21
	Min. M_z	20	-545.37	7.21	0.00
	Min. Torsion	32	-0.00	-1.34	-2.32

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overspinning Moment, M_x kip-ft	Overspinning Moment, M_z kip-ft	Torque kip-ft
Dead Only	12.45	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	14.95	0.00	-7.21	-545.36	0.00	-0.00
0.9 Dead+1.0 Wind 0 deg - No Ice	11.21	0.00	-7.21	-536.79	0.00	-0.00
1.2 Dead+1.0 Wind 30 deg - No Ice	14.95	3.60	-6.24	-472.49	-272.79	-0.00
0.9 Dead+1.0 Wind 30 deg - No Ice	11.21	3.60	-6.24	-465.05	-268.49	-0.00
1.2 Dead+1.0 Wind 60 deg - No Ice	14.95	6.24	-3.60	-272.79	-472.49	-0.00
0.9 Dead+1.0 Wind 60 deg - No Ice	11.21	6.24	-3.60	-268.49	-465.04	-0.00
1.2 Dead+1.0 Wind 90 deg - No Ice	14.95	7.21	-0.00	0.00	-545.36	0.00
0.9 Dead+1.0 Wind 90 deg - No Ice	11.21	7.21	-0.00	0.00	-536.79	0.00
1.2 Dead+1.0 Wind 120 deg - No Ice	14.95	6.24	3.60	272.80	-472.49	0.00
0.9 Dead+1.0 Wind 120 deg - No Ice	11.21	6.24	3.60	268.50	-465.04	0.00
1.2 Dead+1.0 Wind 150 deg - No Ice	14.95	3.60	6.24	472.49	-272.79	0.00
0.9 Dead+1.0 Wind 150 deg - No Ice	11.21	3.60	6.24	465.05	-268.49	0.00
1.2 Dead+1.0 Wind 180 deg - No Ice	14.95	0.00	7.21	545.36	0.00	0.00
0.9 Dead+1.0 Wind 180 deg - No Ice	11.21	0.00	7.21	536.79	0.00	0.00
1.2 Dead+1.0 Wind 210 deg - No Ice	14.95	-3.60	6.24	472.49	272.80	0.00
0.9 Dead+1.0 Wind 210 deg - No Ice	11.21	-3.60	6.24	465.05	268.50	0.00
1.2 Dead+1.0 Wind 240 deg - No Ice	14.95	-6.24	3.60	272.80	472.50	-0.00
0.9 Dead+1.0 Wind 240 deg - No Ice	11.21	-6.24	3.60	268.50	465.05	-0.00
1.2 Dead+1.0 Wind 270 deg - No Ice	14.95	-7.21	-0.00	0.00	545.37	-0.00
0.9 Dead+1.0 Wind 270 deg - No Ice	11.21	-7.21	-0.00	0.00	536.79	-0.00
1.2 Dead+1.0 Wind 300 deg - No Ice	14.95	-6.24	-3.60	-272.79	472.50	-0.00
0.9 Dead+1.0 Wind 300 deg - No Ice	11.21	-6.24	-3.60	-268.49	465.05	-0.00
1.2 Dead+1.0 Wind 330 deg - No Ice	14.95	-3.60	-6.24	-472.49	272.80	-0.00
0.9 Dead+1.0 Wind 330 deg - No Ice	11.21	-3.60	-6.24	-465.05	268.50	-0.00
1.2 Dead+1.0 Ice+1.0 Temp 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	25.49	-0.00	0.00	0.02	0.04	0.00
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	25.49	0.00	-2.68	-220.73	0.05	-0.00
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	25.49	1.34	-2.32	-191.15	-110.33	-0.00

Load Combination	Vertical	Shear _x	Shear _z	Overshooting Moment, M _x	Overshooting Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	25.49	2.68	-0.00	0.03	-220.71	0.00
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	25.49	2.32	1.34	110.41	-191.13	0.00
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	25.49	1.34	2.32	191.21	-110.33	0.00
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	25.49	0.00	2.68	220.79	0.05	0.00
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	25.49	-1.34	2.32	191.21	110.43	0.00
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	25.49	-2.32	1.34	110.41	191.23	-0.00
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	25.49	-2.68	-0.00	0.03	220.81	-0.00
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	25.49	-2.32	-1.34	-110.35	191.23	-0.00
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	25.49	-1.34	-2.32	-191.15	110.43	-0.00
Dead+Wind 0 deg - Service	12.45	0.00	-1.50	-112.93	0.00	-0.00
Dead+Wind 30 deg - Service	12.45	0.75	-1.30	-97.80	-56.46	-0.00
Dead+Wind 60 deg - Service	12.45	1.30	-0.75	-56.46	-97.80	-0.00
Dead+Wind 90 deg - Service	12.45	1.50	-0.00	0.00	-112.93	0.00
Dead+Wind 120 deg - Service	12.45	1.30	0.75	56.47	-97.80	0.00
Dead+Wind 150 deg - Service	12.45	0.75	1.30	97.80	-56.46	0.00
Dead+Wind 180 deg - Service	12.45	0.00	1.50	112.93	0.00	0.00
Dead+Wind 210 deg - Service	12.45	-0.75	1.30	97.80	56.47	0.00
Dead+Wind 240 deg - Service	12.45	-1.30	0.75	56.47	97.80	-0.00
Dead+Wind 270 deg - Service	12.45	-1.50	-0.00	0.00	112.93	-0.00
Dead+Wind 300 deg - Service	12.45	-1.30	-0.75	-56.46	97.80	-0.00
Dead+Wind 330 deg - Service	12.45	-0.75	-1.30	-97.80	56.47	-0.00

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-12.45	0.00	0.00	12.45	0.00	0.000%
2	0.00	-14.95	-7.21	-0.00	14.95	7.21	0.016%
3	0.00	-11.21	-7.21	-0.00	11.21	7.21	0.018%
4	3.60	-14.95	-6.24	-3.60	14.95	6.24	0.002%
5	3.60	-11.21	-6.24	-3.60	11.21	6.24	0.002%
6	6.24	-14.95	-3.60	-6.24	14.95	3.60	0.002%
7	6.24	-11.21	-3.60	-6.24	11.21	3.60	0.002%
8	7.21	-14.95	0.00	-7.21	14.95	0.00	0.016%
9	7.21	-11.21	0.00	-7.21	11.21	0.00	0.018%
10	6.24	-14.95	3.60	-6.24	14.95	-3.60	0.002%
11	6.24	-11.21	3.60	-6.24	11.21	-3.60	0.002%
12	3.60	-14.95	6.24	-3.60	14.95	-6.24	0.002%
13	3.60	-11.21	6.24	-3.60	11.21	-6.24	0.002%
14	0.00	-14.95	7.21	-0.00	14.95	-7.21	0.016%
15	0.00	-11.21	7.21	-0.00	11.21	-7.21	0.018%
16	-3.60	-14.95	6.24	3.60	14.95	-6.24	0.002%
17	-3.60	-11.21	6.24	3.60	11.21	-6.24	0.002%
18	-6.24	-14.95	3.60	6.24	14.95	-3.60	0.002%
19	-6.24	-11.21	3.60	6.24	11.21	-3.60	0.002%
20	-7.21	-14.95	0.00	7.21	14.95	0.00	0.016%
21	-7.21	-11.21	0.00	7.21	11.21	0.00	0.018%
22	-6.24	-14.95	-3.60	6.24	14.95	3.60	0.002%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
23	-6.24	-11.21	-3.60	6.24	11.21	3.60	0.002%
24	-3.60	-14.95	-6.24	3.60	14.95	6.24	0.002%
25	-3.60	-11.21	-6.24	3.60	11.21	6.24	0.002%
26	0.00	-25.49	0.00	0.00	25.49	-0.00	0.000%
27	0.00	-25.49	-2.68	-0.00	25.49	2.68	0.004%
28	1.34	-25.49	-2.32	-1.34	25.49	2.32	0.004%
29	2.32	-25.49	-1.34	-2.32	25.49	1.34	0.004%
30	2.68	-25.49	0.00	-2.68	25.49	0.00	0.004%
31	2.32	-25.49	1.34	-2.32	25.49	-1.34	0.004%
32	1.34	-25.49	2.32	-1.34	25.49	-2.32	0.004%
33	0.00	-25.49	2.68	-0.00	25.49	-2.68	0.004%
34	-1.34	-25.49	2.32	1.34	25.49	-2.32	0.004%
35	-2.32	-25.49	1.34	2.32	25.49	-1.34	0.004%
36	-2.68	-25.49	0.00	2.68	25.49	0.00	0.004%
37	-2.32	-25.49	-1.34	2.32	25.49	1.34	0.004%
38	-1.34	-25.49	-2.32	1.34	25.49	2.32	0.004%
39	0.00	-12.45	-1.50	-0.00	12.45	1.50	0.005%
40	0.75	-12.45	-1.30	-0.75	12.45	1.30	0.005%
41	1.30	-12.45	-0.75	-1.30	12.45	0.75	0.005%
42	1.50	-12.45	0.00	-1.50	12.45	0.00	0.005%
43	1.30	-12.45	0.75	-1.30	12.45	-0.75	0.005%
44	0.75	-12.45	1.30	-0.75	12.45	-1.30	0.005%
45	0.00	-12.45	1.50	-0.00	12.45	-1.50	0.005%
46	-0.75	-12.45	1.30	0.75	12.45	-1.30	0.005%
47	-1.30	-12.45	0.75	1.30	12.45	-0.75	0.005%
48	-1.50	-12.45	0.00	1.50	12.45	0.00	0.005%
49	-1.30	-12.45	-0.75	1.30	12.45	0.75	0.005%
50	-0.75	-12.45	-1.30	0.75	12.45	1.30	0.005%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	27	0.00012552	0.00007464
3	Yes	26	0.00011388	0.00008325
4	Yes	34	0.00000001	0.00013356
5	Yes	33	0.00000001	0.00013841
6	Yes	34	0.00000001	0.00013357
7	Yes	33	0.00000001	0.00013841
8	Yes	27	0.00012552	0.00007464
9	Yes	26	0.00011388	0.00008325
10	Yes	34	0.00000001	0.00013357
11	Yes	33	0.00000001	0.00013841
12	Yes	34	0.00000001	0.00013357
13	Yes	33	0.00000001	0.00013841
14	Yes	27	0.00012552	0.00007464
15	Yes	26	0.00011388	0.00008325
16	Yes	34	0.00000001	0.00013358
17	Yes	33	0.00000001	0.00013842
18	Yes	34	0.00000001	0.00013358
19	Yes	33	0.00000001	0.00013842
20	Yes	27	0.00012552	0.00007464
21	Yes	26	0.00011388	0.00008325
22	Yes	34	0.00000001	0.00013357
23	Yes	33	0.00000001	0.00013841
24	Yes	34	0.00000001	0.00013358
25	Yes	33	0.00000001	0.00013842
26	Yes	6	0.00000001	0.00000001
27	Yes	32	0.00014293	0.00003907
28	Yes	32	0.00014269	0.00007466
29	Yes	32	0.00014269	0.00007467
30	Yes	32	0.00014292	0.00003906
31	Yes	32	0.00014269	0.00007475
32	Yes	32	0.00014269	0.00007471

33	Yes	32	0.00014293	0.00003909
34	Yes	32	0.00014270	0.00007484
35	Yes	32	0.00014270	0.00007483
36	Yes	32	0.00014294	0.00003910
37	Yes	32	0.00014270	0.00007475
38	Yes	32	0.00014269	0.00007480
39	Yes	26	0.00013419	0.00002275
40	Yes	26	0.00013411	0.00001881
41	Yes	26	0.00013411	0.00001881
42	Yes	26	0.00013419	0.00002275
43	Yes	26	0.00013411	0.00001881
44	Yes	26	0.00013411	0.00001881
45	Yes	26	0.00013419	0.00002275
46	Yes	26	0.00013411	0.00001881
47	Yes	26	0.00013411	0.00001881
48	Yes	26	0.00013419	0.00002275
49	Yes	26	0.00013411	0.00001881
50	Yes	26	0.00013411	0.00001881

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 110	16.09	48	1.17	0.00
L2	110 - 100	13.65	48	1.15	0.00
L3	100 - 90	11.30	48	1.08	0.00
L4	90 - 82	9.19	48	0.92	0.00
L5	82 - 60	7.81	48	0.71	0.00
L6	60 - 30	4.68	48	0.63	0.00
L7	30 - 0	1.36	47	0.40	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.7500	Truck Ball	48	16.09	1.17	0.00	27108
120.0000	Canister Load1	48	16.09	1.17	0.00	27108
115.0000	FVV-65C-R3	48	14.86	1.17	0.00	27108
110.0000	Canister Load2	48	13.65	1.15	0.00	13262
105.0000	APX16DWV-16DWV-S-E-A20	48	12.45	1.12	0.00	8304
100.0000	Canister Load3	48	11.30	1.08	0.00	5472
95.0000	DHHTT65B-3XR	48	10.20	1.02	0.00	3249
90.0000	Canister Load4	48	9.19	0.92	0.00	2517
82.0000	Canister Load5	48	7.81	0.71	0.00	4891

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 110	77.30	20	5.61	0.00
L2	110 - 100	65.64	20	5.52	0.00
L3	100 - 90	54.41	20	5.17	0.00
L4	90 - 82	44.29	18	4.42	0.00
L5	82 - 60	37.66	18	3.44	0.00
L6	60 - 30	22.60	18	3.05	0.00
L7	30 - 0	6.56	18	1.94	0.00

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
				°	°

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.7500	Truck Ball	20	77.30	5.61	0.00	6005
120.0000	Canister Load1	20	77.30	5.61	0.00	6005
115.0000	FVV-65C-R3	20	71.44	5.58	0.00	6005
110.0000	Canister Load2	20	65.64	5.52	0.00	2928
105.0000	APX16DWV-16DWV-S-E-A20	20	59.94	5.38	0.00	1817
100.0000	Canister Load3	20	54.41	5.17	0.00	1187
95.0000	DHHTT65B-3XR	20	49.13	4.88	0.00	698
90.0000	Canister Load4	18	44.29	4.42	0.00	537
82.0000	Canister Load5	18	37.66	3.44	0.00	1036

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	120 - 110 (1)	P10.75x0.349	10.000 0	0.0000	0.0	11.403 8	-0.78	431.06	0.002
L2	110 - 100 (2)	P10.75x0.349	10.000 0	0.0000	0.0	11.403 8	-1.77	431.06	0.004
L3	100 - 90 (3)	P10.75x0.349	10.000 0	0.0000	0.0	11.403 8	-2.99	431.06	0.007
L4	90 - 82 (4)	P10.75x0.349	8.0000	0.0000	0.0	11.403 8	-3.83	431.06	0.009
L5	82 - 60 (5)	P24x0.375	22.000 0	0.0000	0.0	27.832 5	-7.04	1052.07	0.007
L6	60 - 30 (6)	P24x0.375	30.000 0	0.0000	0.0	27.832 5	-10.91	1052.07	0.010
L7	30 - 0 (7)	P24x0.375	30.000 0	0.0000	0.0	27.832 5	-14.94	1052.07	0.014

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	120 - 110 (1)	P10.75x0.349	9.77	118.97	0.082	0.00	118.97	0.000
L2	110 - 100 (2)	P10.75x0.349	27.69	118.97	0.233	0.00	118.97	0.000
L3	100 - 90 (3)	P10.75x0.349	53.54	118.97	0.450	0.00	118.97	0.000
L4	90 - 82 (4)	P10.75x0.349	79.47	118.97	0.668	0.00	118.97	0.000
L5	82 - 60 (5)	P24x0.375	171.64	623.72	0.275	0.00	623.72	0.000
L6	60 - 30 (6)	P24x0.375	340.73	623.72	0.546	0.00	623.72	0.000
L7	30 - 0 (7)	P24x0.375	545.59	623.72	0.875	0.00	623.72	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
			V_u			T_u		
L1	120 - 110 (1)	P10.75x0.349	1.01	129.32	0.008	0.00	118.26	0.000
L2	110 - 100 (2)	P10.75x0.349	1.82	129.32	0.014	0.00	118.26	0.000
L3	100 - 90 (3)	P10.75x0.349	2.60	129.32	0.020	0.00	118.26	0.000
L4	90 - 82 (4)	P10.75x0.349	3.23	129.32	0.025	0.00	118.26	0.000
L5	82 - 60 (5)	P24x0.375	4.86	315.62	0.015	0.00	655.57	0.000
L6	60 - 30 (6)	P24x0.375	6.38	315.62	0.020	0.00	655.57	0.000
L7	30 - 0 (7)	P24x0.375	7.22	315.62	0.023	0.00	655.57	0.000

Pole Interaction Design Data

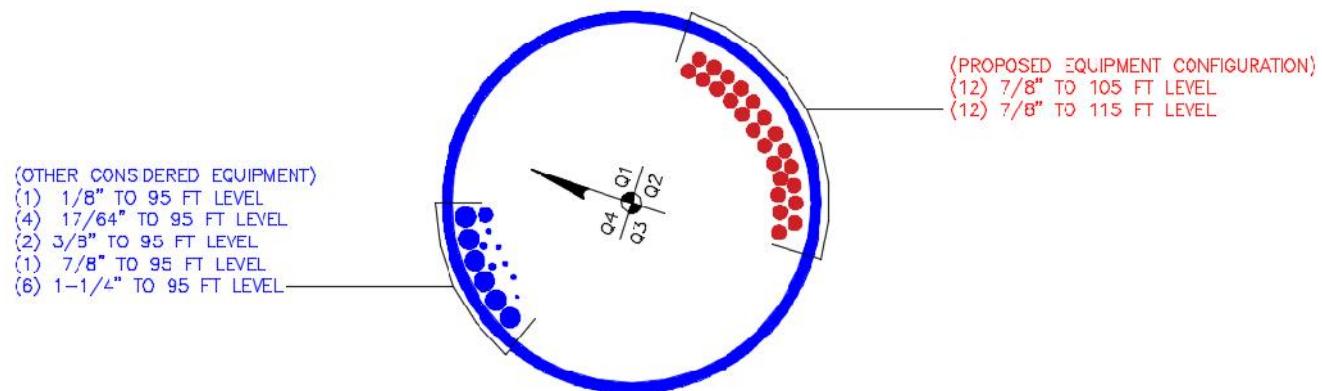
Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$\frac{P_u}{\phi P_n}$	$\frac{M_{nx}}{\phi M_{nx}}$	$\frac{M_{ny}}{\phi M_{ny}}$	$\frac{V_u}{\phi V_n}$	$\frac{T_u}{\phi T_n}$			
L1	120 - 110 (1)	0.002	0.082	0.000	0.008	0.000	0.084	1.050	4.8.2 ✓
L2	110 - 100 (2)	0.004	0.233	0.000	0.014	0.000	0.237	1.050	4.8.2 ✓
L3	100 - 90 (3)	0.007	0.450	0.000	0.020	0.000	0.457	1.050	4.8.2 ✓
L4	90 - 82 (4)	0.009	0.668	0.000	0.025	0.000	0.677	1.050	4.8.2 ✓
L5	82 - 60 (5)	0.007	0.275	0.000	0.015	0.000	0.282	1.050	4.8.2 ✓
L6	60 - 30 (6)	0.010	0.546	0.000	0.020	0.000	0.557	1.050	4.8.2 ✓
L7	30 - 0 (7)	0.014	0.875	0.000	0.023	0.000	0.889	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	120 - 110	Pole	P10.75x0.349	1	-0.78	452.62	8.0	Pass
L2	110 - 100	Pole	P10.75x0.349	2	-1.77	452.62	22.6	Pass
L3	100 - 90	Pole	P10.75x0.349	3	-2.99	452.62	43.6	Pass
L4	90 - 82	Pole	P10.75x0.349	4	-3.83	452.62	64.5	Pass
L5	82 - 60	Pole	P24x0.375	5	-7.04	1104.67	26.9	Pass
L6	60 - 30	Pole	P24x0.375	6	-10.91	1104.67	53.1	Pass
L7	30 - 0	Pole	P24x0.375	7	-14.94	1104.67	84.7	Pass
Summary								
Pole (L7)							84.7	Pass
RATING =							84.7	Pass

APPENDIX B

BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

CCI Flagpole Tool



Site Data

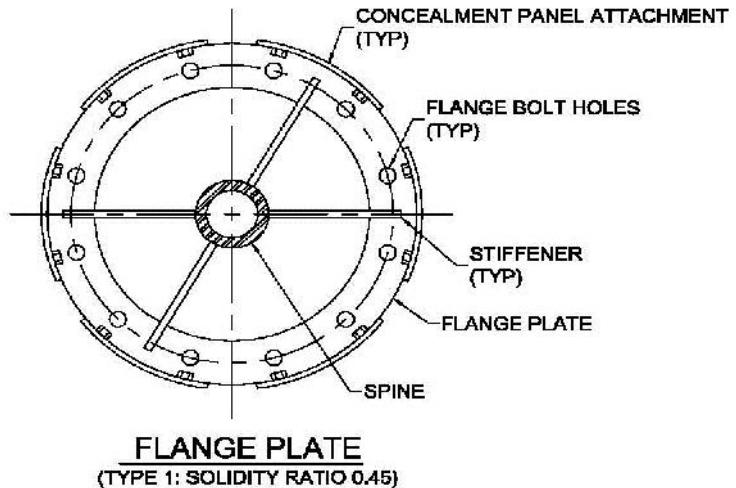
BU#:	822779
Site Name:	Bridgeport RT 8
Order #:	479820 Rev 6

Code

Code:	TIA-222-H
Ice Thickness:	1.5 in
Windspeed (V):	125 mph
Ice Wind Speed (V):	50 mph
Exposure Category:	C
Topographic Feature:	N/A
Risk Category:	II

Tower Information

Total Tower Height:	120 ft
Base Tower Height:	82 ft
Total Canister Length:	38 ft
Number of Canister Assembly Sections:	4



Canister Section Number *:	Canister Assembly Length (ft):	Canister Assembly Diameter (in):	Number of Sides Canister Section	Plate Type:	Mating Flange Plate Thickness (in)**:	Mating Flange Plate Diameter (in):	Solidity Ratio	Plate Weight (Kip):	Canister Weight (Kip)	Vent Length (ft)
1	10	36	Round	1	2.00	17.75	0.45	0.126	0.188	0-0
2	10	36	Round	1	2.00	17.75	0.45	0.126	0.188	0-0
3	10	36	Round	1	2.00	17.75	0.45	0.126	0.188	0-0
4	8	36	Round	1	2.50	25	0.45	0.313	0.151	0-0

Sections are numbered from the top of the tower down

** Mating Flange Plate Thickness at the bottom of canister section

Flag on Tower:	Yes
Flag Width:	20 ft
Flag Height:	12 ft
Flag Elevation(z):	120 ft

Truck Ball on Tower:	Yes
Diameter of Ball:	18 in

Geometry : Base Tower + Spine			
37521-0593.002.7805.eri (last saved 05/18 2:40 pm)			

Height Above Base (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Bend Radius (in)	Pole Material	Delete
120	10		0	10.75	10.75	0.349	n/a	A500-42	[x]
110	10		0	10.75	10.75	0.349	n/a	A500-42	[x]
100	10		0	10.75	10.75	0.349	n/a	A500-42	[x]
90	8		0	10.75	10.75	0.349	n/a	A500-42	[x]

82	22		0	24	24	0.375	n/a	A53-B-42
60	30		0	24	24	0.375	n/a	A53-B-42
30	30		0	24	24	0.375	n/a	A53-B-42

[x]
[x]
[x]

Discrete Loads: Truck Ball	Apply $C_a A_A$ at Elevation(z) (ft)	$C_a A_A$	Weight No Ice (Kip)	Weight 1/2" Ice (Kip)				
	120.75	0.884	1.378	1.527	1.848	2.581	0.05	0.067

Discrete Loads : $C_F A_F$ for Canister Assembly

Canister Loading	Apply $C_F A_F$ at Elevation(z) (ft)	$C_F A_F$	Canister Assembly Weight No Ice (Kip)	Canister Assembly Weight 1/2" Ice (Kip)				
Canister Load 1	120	6.750	16.958	17.417	18.333	20.167	0.094	0.206
Canister Load 2	110	13.500	33.917	34.833	36.667	40.333	0.315	0.538
Canister Load 3	100	13.500	33.917	34.833	36.667	40.333	0.315	0.538
Canister Load 4	90	12.150	30.525	31.350	33.000	36.300	0.296	0.497
Canister Load 5	82	5.400	13.567	13.933	14.667	16.133	0.389	0.478

User Forces: Flag Force Calculation Per ANSI/NAAMM FP 1001-07

Wind _{FORCE} =	0.508 Kip
Weight=	0.025 Kip
Wind _{FORCE, ICE} =	0.084 Kip
Weight _{ICE} =	0.790 Kip
W _{FORCE, SERVICE WIND} =	0.117 Kip
Weight=	0.025 Kip

←Flag force should be included at the top of the flag attachment elevation. If the attachment of the flag to the halyard distributes forces equally to the pole, apply flag forces accordingly in tnx file.

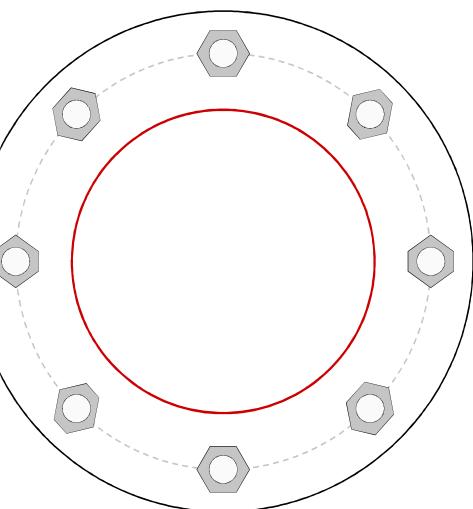
Deflection Check Required: Yes [Import Deflection Results](#)

3% Spine Deflection Check

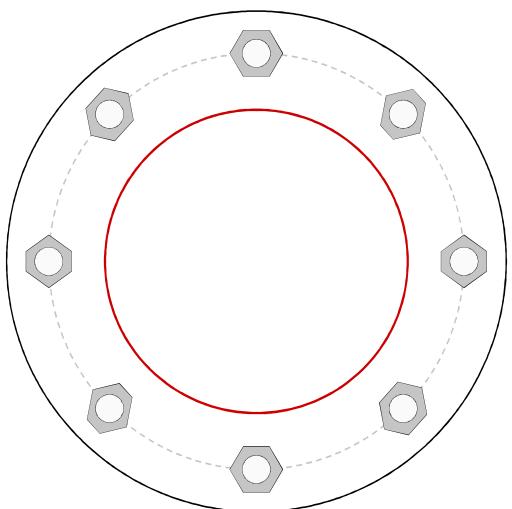
allowable (3%) Horizontal Spine Deflection (inches)	Actual Deflection ***(inches)	Sufficient/ Insufficient
13.680	8.284	Sufficient

relative deflection under service level wind speed

Top Plate - External



Bottom Plate - External



Connection Properties

Bolt Data

(8) 1" \varnothing bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 14.75" BC

Plate (A36; Fy=36 ksi, Fu=58 ksi)

ata

round pole (A500-42; Fy=42 ksi, Fu=58 ksi)

Bottom Plate Data

17.75" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Stiffener Data

N/A

Bottom Pole Data

10.75" x 0.349" round pole (A500-42; Fy=42 ksi, Fu=58 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	3.87
Allowable (kips)	54.54
Stress Rating:	6.8% Pass

city

: 1.07 (Flexural)

ss (ksi): 32.40

3.2% Pass

ress Rating: **1.4%** Pass

Bottom Plate Capacity

Max Stress (ksi):	1.07	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	3.2%	Pass
Tension Side Stress Rating:	1.4%	Pass

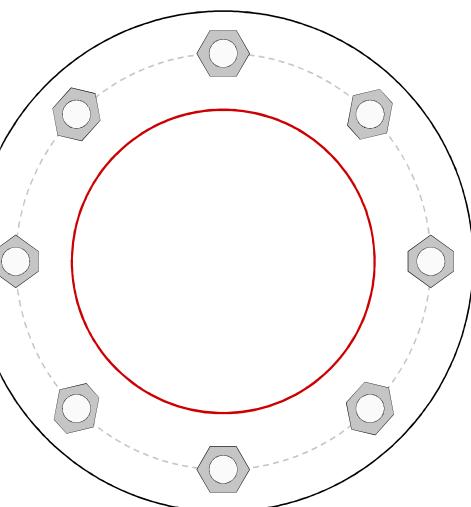
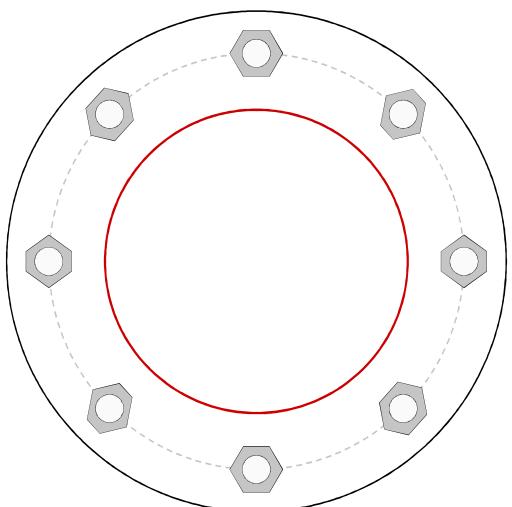
Top Plate - External**Bottom Plate - External****Connection Properties****Bolt Data**(8) 1" \varnothing bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 14.75" BC

Plate (A36; Fy=36 ksi, Fu=58 ksi)

ata

round pole (A500-42; Fy=42 ksi, Fu=58 ksi)

Bottom Plate Data

17.75" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Stiffener Data

N/A

Bottom Pole Data

10.75" x 0.349" round pole (A500-42; Fy=42 ksi, Fu=58 ksi)

Analysis Results**Bolt Capacity**

Max Load (kips)	11.02
Allowable (kips)	54.54
Stress Rating:	19.3% Pass

city

: 3.02 (Flexural)

s (ksi): 32.40

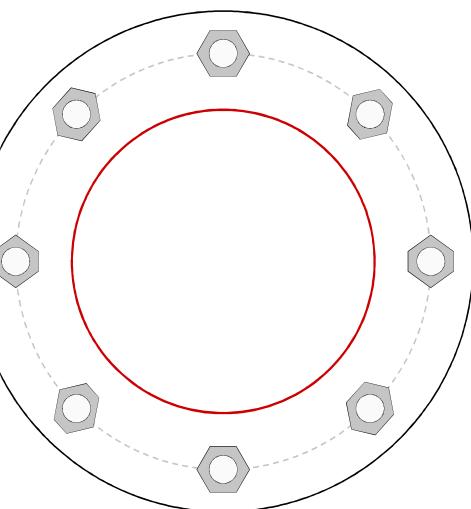
8.9% Passress Rating: **4.1%** Pass**Bottom Plate Capacity**

Max Stress (ksi): 3.02 (Flexural)

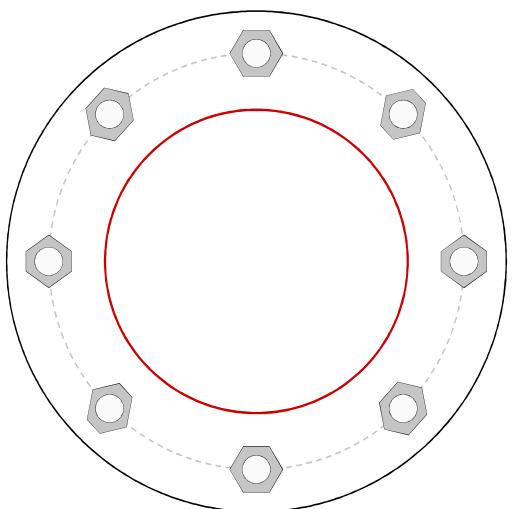
Allowable Stress (ksi): 32.40

Stress Rating: **8.9%** PassTension Side Stress Rating: **4.1%** Pass

Top Plate - External



Bottom Plate - External



Connection Properties

Bolt Data

(8) 1" \varnothing bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 14.75" BC

Plate (A36; Fy=36 ksi, Fu=58 ksi)

ata

round pole (A500-42; Fy=42 ksi, Fu=58 ksi)

Bottom Plate Data

17.75" OD x 2" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Stiffener Data

N/A

Bottom Pole Data

10.75" x 0.349" round pole (A500-42; Fy=42 ksi, Fu=58 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	21.37
Allowable (kips)	54.54
Stress Rating:	37.3% Pass

city

: 5.83 (Flexural)

ss (ksi): 32.40

17.1% Pass

ress Rating: 7.9% Pass

Bottom Plate Capacity

Max Stress (ksi):	5.83	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	17.1%	Pass
Tension Side Stress Rating:	7.9%	Pass

Job Number:	37521-0593.002.7805
Engineer:	DMJ
Date:	5/19/2021
Site Name:	Bridgeport/ Rt 8
Site Number:	822779
WO Number:	1967728
Order Number:	479820 Rev 6

EEI FLANGE CONCEALMENT CALCULATIONS (82' EI.)

(Version v2.6 - Effective Date 04/2/2020)

General

Apply Capacity Normalization Per Section 15.5

Flange Elevation:	82.00	ft
Code Revision:	TIA-222-H	
Threads Excluded From Shear Plane:	No	
Consider Seismic Loads:	No	

Flange Connection Reactions

Moment:	79.47	kip-ft
Shear:	3.23	kip
Axial:	3.83	kip

Member Component Definitions

Spine Information

Use Design Thickness

Type:	Round HSS	
Specification:	HSS 10.750X0.375	
	Overrides	
Grade (F _y):	46	ksi
Ultimate Strength (F _u):	62	ksi
Outside Diameter:	10.750	in
Thickness:	0.375	in

Ring Plate Information

Thickness:	2.50	in
Inside Diameter:	18.00	in
Outside Diameter:	25.00	in
Grade (F _y):	36	ksi

Stiffener Information

Layout:	Radially Symmetric	
Quantity:	4	
Width:	6.75	in
Height:	13.50	in
Thickness:	0.75	in
Upper Toe Height:	2.00	in
Lower Tow Height:	2.00	in
Grade (F _y):	36	ksi
Horizontal Fillet Weld Size:	3/8	in
Vertical Fillet Weld Size:	3/8	in
Electrode:	E80	

Weld Lengths

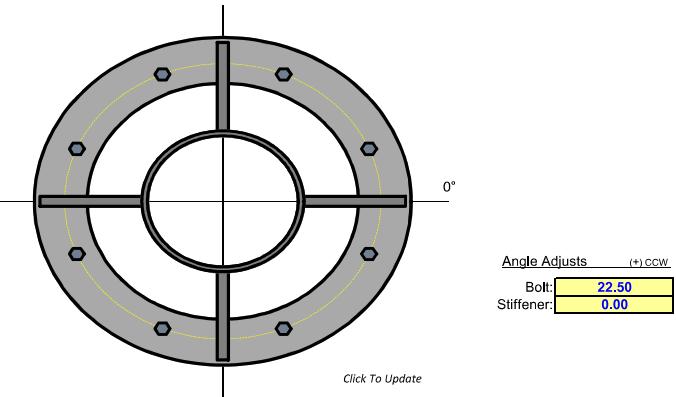
(Max: 7.75") (Max: 13.50")

* If left blank, max used

Bolt Information

Bolt Specification:	A325	
Quantity:	8	
Diameter:	1	in
Bolt Circle:	21.000	in

Layout



Flange Connection Capacity Results

57.7% Pass

Spine Wall Tearout / Punching Shear Check

21.0% Pass

Applied Load: 45.75 kip
Capacity: 207.54 kip

Stiffeners Bending-Shear Check

31.2% Pass

Bending: Applied Load: 71.49 kip-in
Capacity: 555.53 kip-in

Shear: Applied Load: 45.75 kip
Capacity: 139.47 kip

Ring Plate Combined Bending-Shear Check

51.2% Pass

Bending: Applied Load: 92.35 kip-in
Capacity: 177.19 kip-in

Shear: Applied Load: 22.40 kip
Capacity: 170.10 kip

Bolt Combined Tension-Shear Check

39.1% Pass

Tension: Applied Load: 22.40 kip
Capacity: 54.54 kip

Shear: Applied Load: 0.40 kip
Capacity: 35.33 kip

Welds Check

57.7% Pass

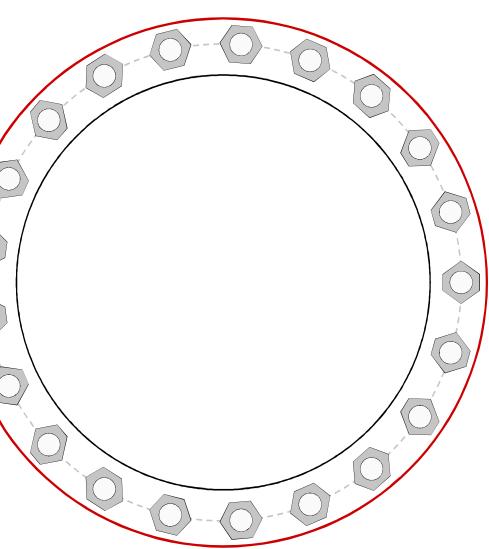
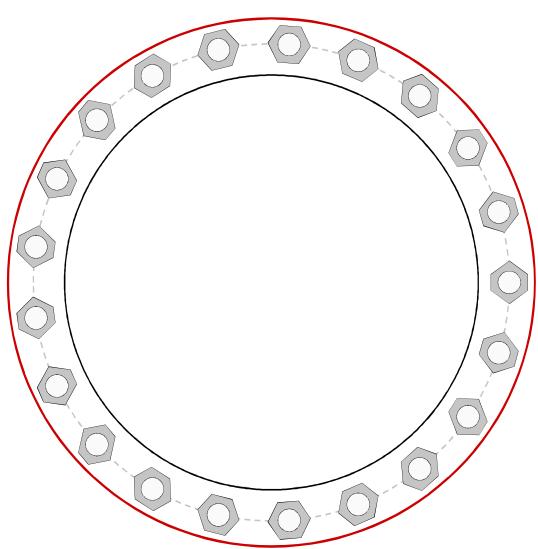
Stiffener To Ring Plate: Applied Stress: 21.80 ksi
Capacity: 36.00 ksi

Stiffener To Spine: Applied Load: 45.75 kip
Capacity: 188.91 kip

Welds Check Controls

Notes: 1. Results have been normalized by dividing by 1.05, max capacity is 100%.
2. The spine nominal wall thickness has been used for calculation.

tnxSource: G:\TOWER\375_Crown_Castle\2021

Top Plate - Internal**Bottom Plate - Internal****Connection Properties****Bolt Data**(21) 1" \varnothing bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 21" BC

5" Plate (A36; Fy=36 ksi, Fu=58 ksi)

ata

ound pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Plate Data

18.25" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Stiffener Data

N/A

Bottom Pole Data

24" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results**Bolt Capacity**

Max Load (kips)	18.33
Allowable (kips)	54.54
Stress Rating:	32.0% Pass

city

: 15.73 (Flexural)

s (ksi): 32.40

46.2% Passress Rating: **9.1%** Pass**Bottom Plate Capacity**

Max Stress (ksi): 15.73 (Flexural)

Allowable Stress (ksi): 32.40

Stress Rating: **46.2%** PassTension Side Stress Rating: **9.1%** Pass

Project Number:	37521-0593.002.7805
Engineer:	DMJ
Date:	5/18/2021
Site Name:	Bridgeport/ Rt 8
BU Number:	822779
WO Number:	1967728
Order Number:	479820 Rev 6

Bolted Flange Jump Analysis

(Version v3.3 - Effective Date 2/23/2021)

Settings

Code:	TIA-222-H
Analysis Elevation:	30.00
Deformation At Bolt Hole Is A Design Consideration:	Yes
Bolt Tension Method:	Case II

Generations Considered: 1

Load To Gen
93.47 kip

Override

Generation 1: Analysis

Pole Definition

Upper Section	
Number Of Sides:	Round
Diameter:	24.00
Thickness:	0.3750
Yield Strength (F_y):	42
Ultimate Strength (F_u):	60

Lower Section	
Round	in (Flat to Flat)
24.00	in
0.3750	in
42	ksi
60	ksi

Applied Moment:	340.73	kip-ft
Applied Axial:	10.91	kip
Applied Shear:	6.38	kip

Source: G:\TOWER\375_Crown_Castle\2021

Flange Plate Definitions

Upper Flange	
Flange Connection Type:	Lap
Bolt Groups:	1
Diameter:	1
Thickness:	1.25
Upward Offset:	0.00

Lower Flange	
Lap	in
1	in
1.25	in
0.00	in

Bolt Group 1	
Bolt Quantity:	16
Bolt Diameter:	1.00
Bolt Circle:	21.00
Start Angle:	0.00

Stiffeners Present: No

Moment To Group:	172.24 kip-ft
Axial To Group:	5.58 kip
Shear To Group:	6.38 kip

Jump Plate Definition

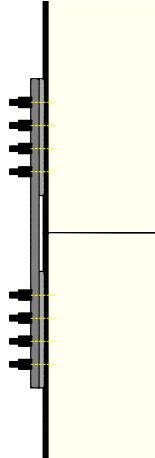
Generation 1

General:	Reference Document: 6175820
	Connected Reinforcement Present: No

Graphed Generation: 1

Member:	Crown Standard: CFP-040075
	Clear Distance (From Lower Pole Face): 0.50 in
	Bar Circle (Diameter): 25.75 in
	Top Elevation Increase: 2.00 in
	Bottom Elevation Decrease: 2.00 in
	Minimum Unbraced Length: 12.00 in
	Actual Unbraced Length: 16.00 in
	Single Bar Capacity Override: kip
	Calculated Single Bar Capacity: 123.75 kip

Location:	Member 1 (Degree): 0
	Member 2 (Degree): 70
	Member 3 (Degree): 180
	Member 4 (Degree): 250
	Member 5 (Degree):
	Member 6 (Degree):
	Quantity: 4



Project Number:	37521-0593.002.7805
Engineer:	DMU
Date:	5/18/2021
Site Name:	Bridgeport/ Rt 8
BU Number:	822779
WO Number:	1967728
Order Number:	479820 Rev 6

Bolted Flange Jump Analysis

(Version v3.3 - Effective Date 2/23/2021)

Reinforcement Definition Generation 1

None Present

Connection Definition Generation 1

Blind Bolts:	Bolt Type:	Approved Blind Bolt
	Bolt Diameter:	0.7874 in
	Shear Sleeve Diameter:	1.1410 in
	Single Bolt Shear Capacity:	37.00 kip
	Single Bolt Tensile Capacity:	33.00 kip
	Max Available Grip Length:	8.31 in

Top Layout:	Bolt Quantity:	4
	Termination Spacing:	3.00 in
	End Spacing:	3.00 in
	Hole Diameter:	1.1875 in
	Eccentricity:	0.875 in

Bottom Layout:	Bolt Quantity:	4
	Termination Spacing:	3.00 in
	End Spacing:	3.00 in
	Hole Diameter:	1.1875 in
	Eccentricity:	0.875 in

Summary Capacity Results Generation 1

Jump Plate	71.93%	71.9% Pass
Applied Axial Load:	93.47 kip	
Available Axial Strength:	123.75 kip	
Upper Connection	60.15%	60.1% Pass
Lower Connection	60.15%	60.1% Pass

Generation 1 Jump Plate Controls

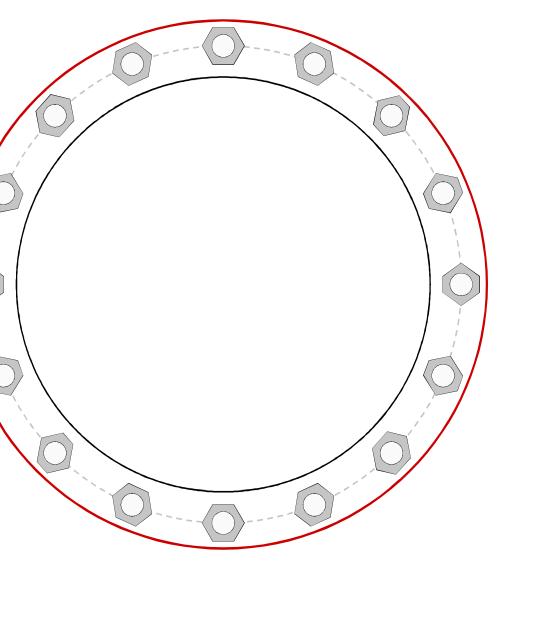
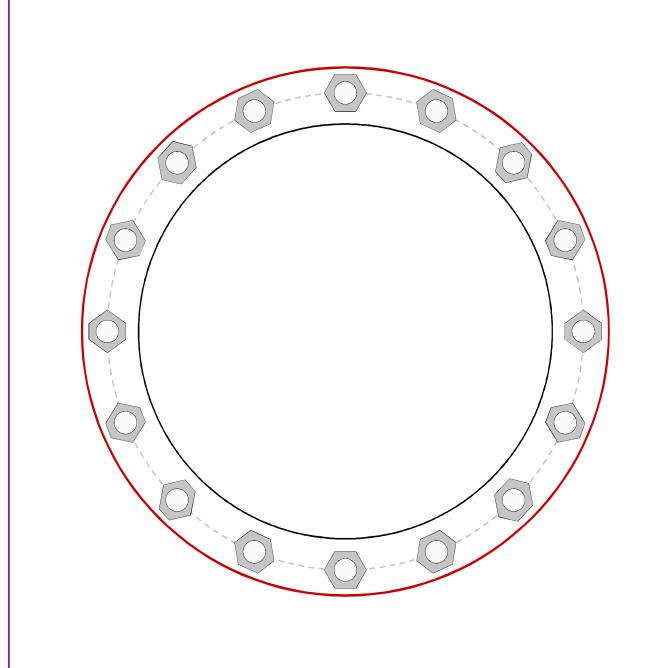
71.9% Pass

Grip Length Check

Sufficient

Notes

1. Allowable capacity is 100% (with values normalized by dividing by 1.05).
2. Bolt hole deformation was a design consideration.
3. AISC shear reduction factor used to discount for connection length.
4. Applied tension based on AISC Case II methodology.
5. TIA methodology used for bearing calculations.

Top Plate - Internal**Bottom Plate - Internal****Connection Properties****Bolt Data**(16) 1" \varnothing bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 21" BC

5" Plate (A36; Fy=36 ksi, Fu=58 ksi)

ata

ound pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Plate Data

18.25" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Stiffener Data

N/A

Bottom Pole Data

24" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results**Bolt Capacity**

Max Load (kips)	24.24
Allowable (kips)	54.54
Stress Rating:	42.3% Pass

city

: 15.73 (Flexural)

s (ksi): 32.40

46.2% Passress Rating: **8.8%** Pass**Bottom Plate Capacity**

Max Stress (ksi): 15.73 (Flexural)

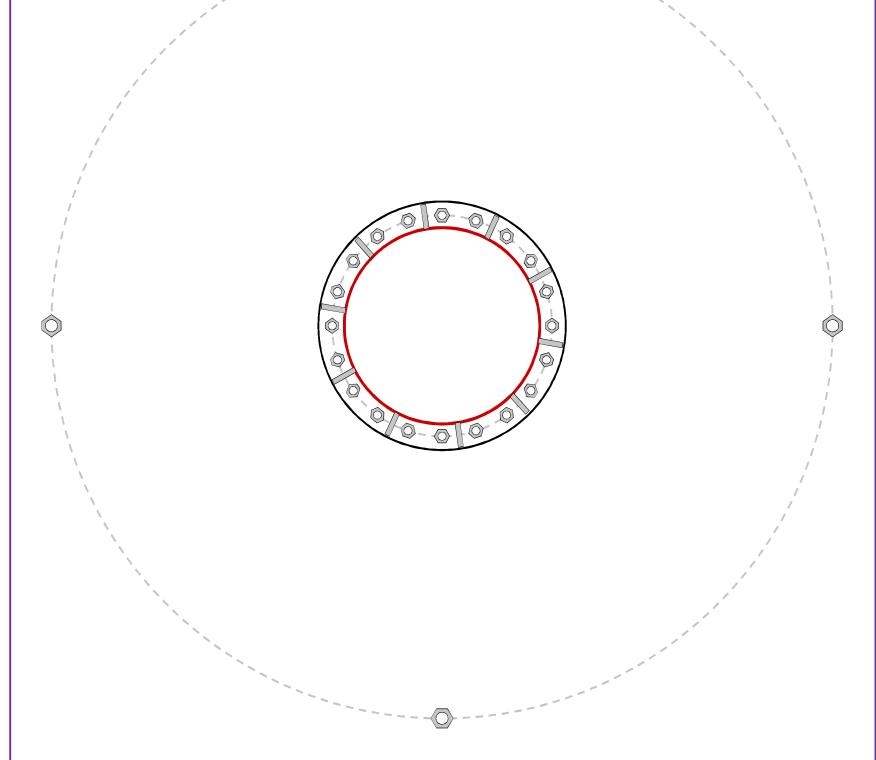
Allowable Stress (ksi): 32.40

Stress Rating: **46.2%** PassTension Side Stress Rating: **8.8%** Pass

siderations	
22 Revision	H
Considered:	See Custom Sheet
I_{ar} (in)	See Custom Sheet

s	
ment (kip-ft)	545.59
Force (kips)	14.94
Force (kips)	7.22

ction 15.5 Applied



Connection Properties

Data

20) 1" ϕ bolts (A687 N; Fy=105 ksi, Fu=125 ksi) on 27" BC
4) 1-1/2" ϕ bolts (Titan 40/16 N; Fy=84.8 ksi, Fu=84.8 ksi) on 96" BC

ata

1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

a

W x 0.625" T, Notch: 0.5"

6 ksi ; weld: Fy= 70 ksi

0.25" groove, 45° dbl bevel, 0.3125" fillet

0.3125" fillet

round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Anchor Rod Summary

GROUP 1:	(units of kip)		
$P_{u_c} = 7.83$	$\phi P_{n_c} = 74.22$	$\phi V_{n} = 33.4$	$\phi M_{n} = 15.75$
$V_{u} = 0.36$			
$M_{u} = 0.29$			

GROUP 2:

GROUP 2:	(units of kip)		
$P_{u_t} = 58.22$	$\phi P_{n_t} = 89.04$	$\phi V_{n} = 44.52$	$\phi M_{n} = n/a$
$V_{u} = 0$			
$M_{u} = n/a$			

Base Plate Summary

Max Stress (ksi):	5.03	(Flexural (b
Allowable Stress (ksi):	32.4	
Stress Rating:	14.8%	

Stiffener Summary

Horizontal Weld:	25.2%
Vertical Weld:	13.7%
Plate Flexure+Shear:	7.6%
Plate Tension+Shear:	13.3%
Plate Compression:	21.7%

Pole Summary

Punching Shear:	6.9%
-----------------	------

A687	27	0.5	1.25	N-Included	No	
A687	27	0.5	1.25	N-Included	No	
A687	27	0.5	1.25	N-Included	No	
A687	27	0.5	1.25	N-Included	No	
A687	27	0.5	1.25	N-Included	No	
Titan 40/16	96	0.5	0	N-Included	1.4	No
Titan 40/16	96	0.5	0	N-Included	1.4	No
Titan 40/16	96	0.5	0	N-Included	1.4	No
Titan 40/16	96	0.5	0	N-Included	1.4	No

Height (in)	Thickness (in)	H. Notch (in)	V. Notch (in)	Grade (ksi)	Weld Type	Groove Depth (in)	Gr
5	0.625	0.5	0.5	36	Both	0.25	
5	0.625	0.5	0.5	36	Both	0.25	
5	0.625	0.5	0.5	36	Both	0.25	
5	0.625	0.5	0.5	36	Both	0.25	
5	0.625	0.5	0.5	36	Both	0.25	
5	0.625	0.5	0.5	36	Both	0.25	
5	0.625	0.5	0.5	36	Both	0.25	
5	0.625	0.5	0.5	36	Both	0.25	
5	0.625	0.5	0.5	36	Both	0.25	

Pier and Pad Foundation

BU #:	822779
Site Name:	Bridgeport/Rt 8
App. Number:	479820 Rev 6



TIA-222 Revision:	H
Tower Type:	Monopole

Top & Bot. Pad Rein. Different?:	<input type="checkbox"/>
Block Foundation?:	<input type="checkbox"/>
Rectangular Pad?:	<input type="checkbox"/>

Superstructure Analysis Reactions

Compression, P_{comp} :	15	kips
Base Shear, V_u_{comp} :	7	kips
Moment, M_u :	99.1	ft-kips
Tower Height, H :	120	ft
BP Dist. Above Fdn, bp_{dist} :	2.25	in

Pier Properties

Pier Shape:	Circular	
Pier Diameter, d_{pier} :	3.5	ft
Ext. Above Grade, E :	0.5	ft
Pier Rebar Size, Sc :	7	
Pier Rebar Quantity, mc :	14	
Pier Tie/Spiral Size, St :	4	
Pier Tie/Spiral Quantity, mt :	6	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	3	in

Pad Properties

Depth, D :	5	ft
Pad Width, W_1 :	12.5	ft
Pad Thickness, T :	1.75	ft
Pad Rebar Size (Bottom dir. 2), Sp_2 :	5	
Pad Rebar Quantity (Bottom dir. 2), mp_2 :	16	
Pad Clear Cover, cc_{pad} :	3	in

Material Properties

Rebar Grade, F_y :	60	ksi
Concrete Compressive Strength, F'_c :	3	ksi
Dry Concrete Density, δ_c :	150	pcf

Soil Properties

Total Soil Unit Weight, γ :	125	pcf
Ultimate Gross Bearing, Q_{ult} :	30,000	ksf
Cohesion, C_u :	0.000	ksf
Friction Angle, φ :	34	degrees
SPT Blow Count, N_{blows} :	21	
Base Friction, μ :		
Neglected Depth, N :	3.33	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	N/A	ft

<-- Toggle between Gross and Net

Foundation Analysis Checks

	Capacity	Demand	Rating*	Check
<i>Lateral (Sliding) (kips)</i>	62.23	7.00	10.7%	Pass
<i>Bearing Pressure (ksf)</i>	22.50	1.20	5.1%	Pass
<i>Overspinning (kip*ft)</i>	765.38	138.91	18.1%	Pass
<i>Pier Flexure (Comp.) (kip*ft)</i>	641.65	125.35	18.6%	Pass
<i>Pier Compression (kip)</i>	4592.74	21.49	0.4%	Pass
<i>Pad Flexure (kip*ft)</i>	372.15	54.66	14.0%	Pass
<i>Pad Shear - 1-way (kips)</i>	210.27	16.51	7.5%	Pass
<i>Pad Shear - 2-way (Comp) (ksi)</i>	0.164	0.014	8.0%	Pass
<i>Flexural 2-way (Comp) (kip*ft)</i>	511.25	75.21	14.0%	Pass

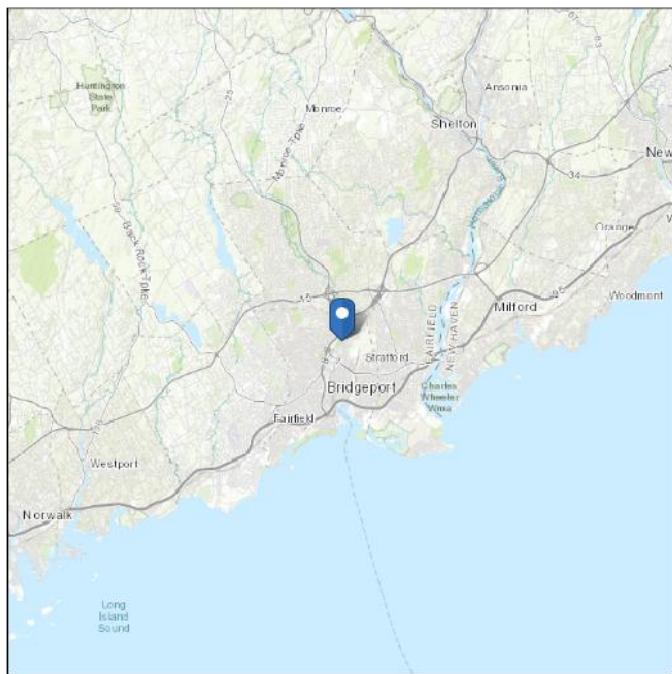
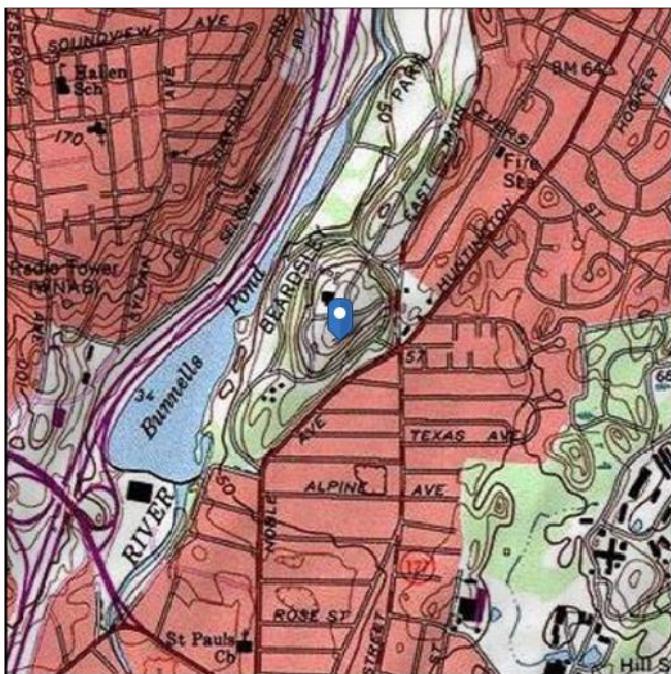
*Rating per TIA-222-H Section 15.5

Soil Rating*:	18.1%
Structural Rating*:	18.6%

Address:
No Address at This Location

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

Elevation: 123.15 ft (NAVD 88)
Latitude: 41.210353
Longitude: -73.181111



Wind

Results:

Wind Speed:	123 Vmph
10-year MRI	76 Vmph
25-year MRI	86 Vmph
50-year MRI	93 Vmph
100-year MRI	99 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 Jun 11 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.

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 Jun 11 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.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

Exhibit E

Power Density/RF Emissions Report



Non-Ionizing Radiation Report

Compiled For: Northeast Site Solutions on behalf of T-Mobile

Site Name: CT11240B

Site ID: CT11240B

1875 Noble Avenue, Bridgeport, CT 06610

Latitude: 41-12-37.271 N; Longitude: -73.-10-52.259 W

Structure Type: Monopole

Report Date: August 5, 2021

Report Written By: Tim Harris

Status: T-Mobile will be compliant with FCC rules on RF Exposure.

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General Population / Uncontrolled	11
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1. Executive Summary:

Northeast Site Solutions on behalf of T-Mobile has contracted Infinigy Solutions, LLC to determine whether the site CT11240B located at 1875 Noble Avenue in Bridgeport, CT Will Be Compliant with all Federal Communications Commission (FCC) rules and regulations for radio frequency (RF) exposure as indicated in **47CFR§1.1310**.

The report incorporates a theoretical RF field analysis in accordance with the FCC Rules and Regulations for all individuals classified as "Occupational or Controlled" and "General Public or Uncontrolled" (see Appendix A and B).

This document and the conclusions herein are based on information provided by Northeast Site Solutions on behalf of T-Mobile.

As a result of the analysis, **T-Mobile Will Be Compliant with FCC rules.**

T-Mobile, All Bands Cumulative Exposure %		
Uncontrolled / General Population	Exposure values at the site (mW/cm ²)	0.0188
	% Exposure	2.55 %
Controlled / Occupational	Exposure values at the site (mW/cm ²)	0.0188
	% Exposure	0.52 %

2. Site Summary:

Site Information	
Site Name: CT11240B	
Site Address: 1875 Noble Avenue, Bridgeport, CT 06610	
Site Type: Monopole	
Compliance Status	Will Be Compliant
Mitigation Required	No
Signage Required	Yes
Barriers Required	No
Access Locked	No
Area Controlled or Uncontrolled	Uncontrolled

3. Site Compliance

This report also incorporates overview of the site information:

- Antenna Inventory Table
- Calculation Tables showing exposure for each carrier transmit frequency
- Total exposure for all carriers existing and proposed at ground level considering the centerline of all antennas and horizontal distance from the tower.
- Maximum Effective Radiated Power Assumed as Worst Case for Calculations used in this study
- Calculations based on flat ground around base of the structure

4. Site Compliance Recommendations

Infinigy recommends the following upon the installation of antennas at the site:

Base of tower

Install an RF caution sign. Note: The recommendation for alerting signage is moot if there is an RF caution, or greater already installed.

5. Antenna Inventory Table

Ant ID	Sector	Azimuth	Operator	Antenna manufacturer	Antenna Model	Operating Frequency/Technology	Rad Ctr (Ft)	Az (Deg)	Total ERP Power (Watts)
1a	Alpha	30	T-Mobile	RFS	APX16DW-16DWS	2100 MHz UMTS	107	30	2154
1b	Alpha	30	T-Mobile	RFS	APX16DW-16DWS	1900 MHz GSM	107	30	3052
1c	Alpha	30	T-Mobile	RFS	APX16DW-16DWS	2100 MHz LTE	107	30	2154
1d	Alpha	30	T-Mobile	RFS	APX16DW-16DWS	1900 MHz UMTS	107	30	3052
2a	Alpha	30	T-Mobile	Commscope	FVV-65C-R3	700 MHz LTE	115	30	2256
2b	Alpha	30	T-Mobile	Commscope	FVV-65C-R3	600 MHz LTE	115	30	1128
2c	Alpha	30	T-Mobile	Commscope	FVV-65C-R3	600 MHz 5G	115	30	1128
2d	Alpha	30	T-Mobile	Commscope	FVV-65C-R3	1900 MHz LTE	115	30	3166
3a	Beta	150	T-Mobile	RFS	APX16DW-16DWS	2100 MHz UMTS	107	150	2154
3b	Beta	30	T-Mobile	RFS	APX16DW-16DWS	1900 MHz GSM	107	150	3052
3c	Beta	30	T-Mobile	RFS	APX16DW-16DWS	2100 MHz LTE	107	150	2154
3d	Beta	30	T-Mobile	RFS	APX16DW-16DWS	1900 MHz UMTS	107	150	3052
4a	Beta	30	T-Mobile	Commscope	FVV-65C-R3	700 MHz LTE	115	150	2256
4b	Beta	30	T-Mobile	Commscope	FVV-65C-R3	600 MHz LTE	115	150	1128
4c	Beta	30	T-Mobile	Commscope	FVV-65C-R3	600 MHz 5G	115	150	1128
4d	Beta	30	T-Mobile	Commscope	FVV-65C-R3	1900 MHz LTE	115	150	3166
5a	Gamma	30	T-Mobile	RFS	APX16DW-16DWS	2100 MHz UMTS	107	270	2154
5b	Gamma	30	T-Mobile	RFS	APX16DW-16DWS	1900 MHz GSM	107	270	3052
5c	Gamma	30	T-Mobile	RFS	APX16DW-16DWS	2100 MHz LTE	107	270	2154
5d	Gamma	30	T-Mobile	RFS	APX16DW-16DWS	1900 MHz UMTS	107	270	3052
6a	Gamma	30	T-Mobile	Commscope	FVV-65C-R3	700 MHz LTE	115	270	2256
6b	Gamma	30	T-Mobile	Commscope	FVV-65C-R3	600 MHz LTE	115	270	1128
6c	Gamma	30	T-Mobile	Commscope	FVV-65C-R3	600 MHz 5G	115	270	1128
6d	Gamma	30	T-Mobile	Commscope	FVV-65C-R3	1900 MHz LTE	115	270	3166

6. RF Guidelines

To ensure safety of company workers, the following points need to be taken into consideration and implemented at wireless sites in accordance with the Carriers policies:

- a) Worksite: Any employee at the site should avoid working directly in front of the antenna or in areas predicted to exceed general population exposure limits by 100%. Workers should insist that the transmitters be switched off during the work period.
- b) RF Safety Training and Awareness: All employees working in areas exceeding the general population limits should have a basic awareness of RF safety measures. Videos, classroom lectures and online courses are all appropriate training methods on these topics.
- c) Site Access: Restricting access to transmitting antenna locations is one of the most important elements of RF safety. This can be done with:
 - Locked doors/gates/ladder access
 - Alarmed doors
 - Restrictive barriers
- d) Three-foot Buffer: There is an inverse relationship between the strength of the field and the distance from the antenna. The RF field diminishes with distance from the antenna. Workers should maintain a three-foot distance from the antennas.
- e) Antennas: Workers should always assume that the antenna is transmitting and should never stop right in front of the antenna. If someone must pass by an antenna, he/she should move quickly, thus reducing RF exposure.

7. T-Mobile Exposure Analysis By Band and Technology

T-Mobile 600 MHz LTE		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	0.4
	Exposure values at the site (mW/cm ²)	0.0013
	% Exposure	0.33%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	2.0
	Exposure values at the site (mW/cm ²)	0.0013
	% Exposure	0.07%

T-Mobile 600 MHz 5G		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	0.4
	Exposure values at the site (mW/cm ²)	0.0013
	% Exposure	0.33%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	2.0
	Exposure values at the site (mW/cm ²)	0.0013
	% Exposure	0.07%

T-Mobile 700 MHz LTE		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	0.5
	Exposure values at the site (mW/cm ²)	0.0027
	% Exposure	0.53%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	2.3
	Exposure values at the site (mW/cm ²)	0.0027
	% Exposure	0.12%

T-Mobile 1900 MHz GSM		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	1.0
	Exposure values at the site (mW/cm ²)	0.0041
	% Exposure	0.41%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	5.0
	Exposure values at the site (mW/cm ²)	0.0041
	% Exposure	0.08%

T-Mobile 1900 MHz LTE		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	1.0
	Exposure values at the site (mW/cm ²)	0.0037
	% Exposure	0.37%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	5.0
	Exposure values at the site (mW/cm ²)	0.0037
	% Exposure	0.07%

T-Mobile 2100 MHz LTE		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	1.0
	Exposure values at the site (mW/cm ²)	0.0029
	% Exposure	0.29%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	5.0
	Exposure values at the site (mW/cm ²)	0.0029
	% Exposure	0.06%

T-Mobile 2100 MHz UMTS		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	1.0
	Exposure values at the site (mW/cm ²)	0.0029
	% Exposure	0.29%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	5.0
	Exposure values at the site (mW/cm ²)	0.0029
	% Exposure	0.06%

8. Appendix A: FCC Guidelines

FCC Policies

The Federal Communications Commission (FCC) in 1996 implemented regulations and policies for analysis of RF propagation to evaluate RF emissions. All the analysis and results of this report are compared with FCC's (Federal Communications Commission) rules to determine whether a site is compliant for Occupational/Controlled or General Public/Uncontrolled exposure. All the analysis of RF propagation is done in terms of a percentage. The limits primarily indicate the power density and are generally expressed in terms of milliwatts per centimeter square, mW/cm^2 .

FCC guidelines incorporate two separate tiers of exposure limits that are dependent on the scenario/ situation in which that exposure takes place or the status of the individuals who are subjected to that exposure. The decision as to which tier is applied to a scenario is based on the following definitions:

Occupational / Controlled

These limits apply in situations when someone is exposed to RF energy through his/her occupation, is fully aware of the harmful effects of the RF exposure and has an ability to exercise control over this exposure. Occupational / controlled exposure limits also apply when 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. limits for Occupational/Controlled exposure can be found on Table 1(A).

General Population / Uncontrolled

These limits apply to situations in which the general public may be exposed or in which persons who are exposed because of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure to RF. Therefore, members of the general public would always be considered under this category, for example, in the case of a telecommunications tower that exposes people in a nearby residential area. Exposure limits for General Population/Uncontrolled can be found on Table 1(B).

Table 1. LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)**(A) Limits for Occupational/Controlled Exposure**

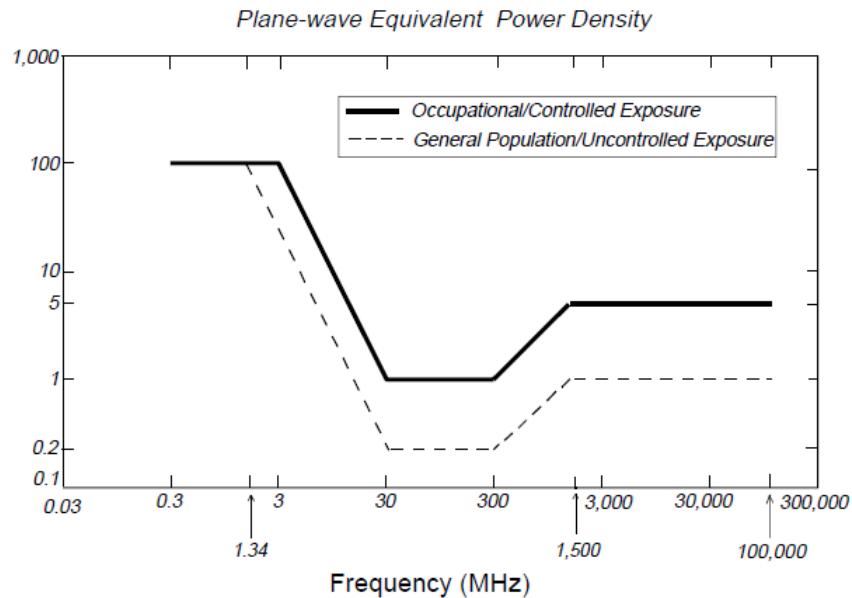
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz

*Plane-wave equivalent power density

Figure 1. FCC Limits for Maximum Permissible Exposure (MPE)

OSHA Statement:

The objective of the OSHA Act is to ensure the safety and health of the working men and women by enforcing certain standards. The act also assists and encourages the states in their efforts to ensure safe and healthy working conditions through means of research, information, education and training in the field of occupational safety and health and for other purposes.

According to OSHA Act section 5, important duties to be considered are:

(a) Each employer

- 1) Shall furnish to each of his employees' employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious harm to his employees
- 2) Shall comply with occupational safety and health standards promulgated under this act.

(b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.

9. Preparer Certification

I, Tim Harris, preparer of this report, certify that I am fully trained and aware of the rules and regulations of both the Federal Communications Commission and the Occupational Safety and Health Administration regarding Human Exposure to Radio Frequency Radiation. In addition, I have been trained in RF safety practices, rules, and regulations.

I certify that the information contained in this report is true and correct to the best of my knowledge.

Timothy A. Harris

Signature

8/5/2021

Date

