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

June 15, 2020

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

RE: **Notice of Exempt Modification for T-Mobile:**
876321 - T-Mobile Site ID: CTNH107A
150 North Main Street, Branford, CT 06450
Latitude: 41° 17′ 19.00″/ Longitude: -72° 48′ 49.90″

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) total antennas at the 121-foot mount on the existing 147-foot monopole tower, located at 150 North Main Street, Branford, CT. The structure is owned by Crown Castle and the property is owned by Premier Realty Holdings LLC. T-Mobile now intends to replace three (3) existing antennas with three (3) new 600/700 MHz antennas on a replacement mount. Additional mount modification details as shown on the enclosed mount analysis.

Planned Modifications:
Tower:

Remove and Replace:

(3) ANDREW LNX-6515DS-A1M (**REMOVE)** – (3) RFS-APXVAARR24_43U-NA20 Antenna 600/700 MHz **(REPLACE)**
(3) 1-5/8" coax **(REMOVE)** – (3) 1 – 5/8" 6x12 HCS Hybrid Fiber Trunk **(REPLACE)**
(3) 11 - B12 RRUs **(REMOVE) -** (3) 4449 B12/B71 RRUs **(REPLACE)**

Existing to Remain:

(3) AIR21 KRC118023-1_B2P_B4A Antenna 2100 MHz
(3) AIR21 KRC118023-1_B2A_B4P Antenna 1900/2100 MHz

Ground:

Existing RBS 6201 Cabinet to be removed and replaced with new RBS 6131.
Internal upgrades to existing cabinet.
Upgrade existing breakers.

This facility was approved by the Town of Brandord Planning and Zoning Commission on September 18, 1997. The approval was given with conditions which this exempt modification comply with.

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.J\. § 16-50j- 72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to James B. Cosgrove, First Selectman for the Town of Branford, Harry Smith, Town Planner, as well as the property owner and Crown Castle is the tower owner.

1. The proposed modifications will not result in an increase in the height of the existing tower.
2. The proposed modifications will not require the extension of the site boundary.
3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

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

Sincerely,

Anne Marie Zsamba
Site Acquisition Specialist
3 Corporate Park Drive, Suite 101 Clifton Park, NY 12065
201-236-9224
annemarie.zsamba@crowncastle.com

Attachments

cc:

James Cosgrove, First Selectman (*via email only to jcosgrove@branford-ct.gov*)
Branford Town Hall
1019 Main Street, P.O. Box 150, Branford, CT 06405
(203) 488-8394

Harry Smith, Town Planner (*via email only to p-z@branford-ct.gov*)
Branford Town Hall
1019 Main Street, P.O. Box 150,
Branford, CT 06405
(203) 488-8394

Premier Realty Holdings LLC
155 North Main St (*via email only to nancyanderson3@comcast.net*)
Branford, CT 06405
(303) 359-5537

From:	Zsamba, Anne Marie
To:	jcosgrove@branford-ct.gov
Subject:	Notice of Exempt Modification - 150 North Main Street, Branford - TMobile
Date:	Monday, June 15, 2020 10:48:00 AM
Attachments:	T-Mobile -CTNH107A - 876321 Exempt Modification App CT Siting Council Town of Branford notice.pdf

Dear First Selectman Cosgrove:

Attached please find T-Mobile's exempt modification application that is being submitted to the Connecticut Siting Council, today June 15, 2020.

In light of the present circumstances with Covid-19, The Council has advised that electronic notification of this filing is acceptable. If you could kindly confirm receipt. Thank you.

Best,
Anne Marie Zsamba

ANNE MARIE ZSAMBA
Site Acquisition Specialist
T: (201) 236-9224
M: (518) 350-3639
F: (724) 416-6112

CROWN CASTLE
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065
CrownCastle.com

From:	Zsamba, Anne Marie
To:	nancyanderson3@comcast.net
Subject:	Notice of Exempt Modification - 150 North Main Street, Branford - TMobile
Date:	Monday, June 15, 2020 10:48:00 AM
Attachments:	T-Mobile -CTNH107A - 876321 Exempt Modification App CT Siting Council Town of Branford notice.pdf

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Dear Premier Realty Holdings LLC:

Attached please find T-Mobile's exempt modification application that is being submitted to the Connecticut Siting Council, today June 15, 2020.

In light of the present circumstances with Covid-19, The Council has advised that electronic notification of this filing is acceptable. If you could kindly confirm receipt. Thank you.

Best,
Anne Marie Zsamba

ANNE MARIE ZSAMBA
Site Acquisition Specialist
T: (201) 236-9224
M: (518) 350-3639
F: (724) 416-6112

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3 Corporate Park Drive, Suite 101
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From:	Zsamba, Anne Marie
To:	p-z@branford-ct.gov
Subject:	Notice of Exempt Modification - 150 North Main Street, Branford - TMobile
Date:	Monday, June 15, 2020 10:48:00 AM
Attachments:	T-Mobile -CTNH107A - 876321 Exempt Modification App CT Siting Council Town of Branford notice.pdf

Dear Town Planner Smith:

Attached please find T-Mobile's exempt modification application that is being submitted to the Connecticut Siting Council, today June 15, 2020.

In light of the present circumstances with Covid-19, The Council has advised that electronic notification of this filing is acceptable. If you could kindly confirm receipt. Thank you.

Best,
Anne Marie Zsamba

ANNE MARIE ZSAMBA
Site Acquisition Specialist
T: (201) 236-9224
M: (518) 350-3639
F: (724) 416-6112

CROWN CASTLE
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065
CrownCastle.com

Exhibit A

Original Facility Approval

4704

PLANNING AND ZONING COMMISSION
TOWN OF BRANFORD TOWN HALL DRIVE P.O. BOX 150
Branford, Connecticut 06405 488-1255

NOTICE OF DECISION

recorded 9/29/97

September 22, 1997

Sprint PCS
% Attorney John Knuff
Harris Beach & Wilcox, L.L.P
147 North Broad Street
Milford, Connecticut 06460

SUBJECT: Special Exception LOCATION: 150 North Main Street

APPLICATION # 97-6.5 OWNER OF RECORD: Irene Maculaitis

Dear Sir:

At a meeting of the Branford Planning & Zoning Commission held on Thursday, September 18, 1997, the Commission voted to:

X Approve your above subject application with the conditions noted below.

Very truly yours,

Shirley Rasmussen
Shirley Rasmussen
Town Planner

NOTE: This Special Exception shall become effective only after it is filed on the Land Records in the office of the Town Clerk.

1. Prior to issuance of a building permit, revise plan to show the following:

   a. Revise width of eastern-most curb cut to 30 feet (Sect. 25.10a) by creating new landscaped island extending 15 feet back from streetline (Sect. 25.8.2) with new sidewalk (Sect. 31.5.3(b)).

   b. Relocate proposed utility pole so that it is not in the access drive.

2. Provide for co-location of communications equipment to be operated by the Town of Branford Sewage Treatment Plant.

3. Change plantings around tower yard to 6' to 7' dark American Arborvitae and rearrange to screen parking area from street.

(OVER)

4. All users of the telecommunications facility must demonstrate compliance with current FCC regulations for electromagnetic frequency emissions and any future changes in these standards.

5. The owner of the telecommunication facility shall provide for and encourage co-location of other antennae on the facility.

NOTE: Special Exception shall become null and void in the event the applicant fails to obtain a building permit within one (1) year of date of approval.
(Per Section 31.7 of the Branford Zoning Regulations)

CC: Scott M. Thomae
Sprint PCS
Irene Maculaitis

RECEIVED FOR RECORD Sept. 29 1997
at 2 h 03 m P M, AND RECORDED BY
GEORGETTE A. LASKE
BRANFORD TOWN CLERK

SITE PLAN AND SPECIAL EXCEPTION

APPLICATION FOR CERTIFICATE OF ZONING COMPLIANCE
TOWN OF BRANFORD

ADDRESS OF SUBJECT PROPERTY 150 N. MAIN Street Branford, CT 06405

ASSESSOR'S MAP D-6 BLOCK 13 LOT 13 ZONE: IG-1

APPLICANT'S NAME Sprint PCS

TELEPHONE (203) 237-1737 ext.17

ADDRESS 300 RESEARCH Parkway 3rd fl. Meriden, CT 06450

Briefly describe the building, structure or use for which Zoning Compliance Application is made:

The erection of a monopole telecommunications facility and placement of the associated equipment cabinets on property located at 150 N. MAIN Street within the IG-1/ Industrial District.

PLEASE SUBMIT THE FOLLOWING WITH YOUR COMPLETED APPLICATION:

1. $125.00 (which includes $100.00 application fee, $15.00 Zoning Compliance fee, and $10.00 State surcharge)

2. Application materials described in Sect. 31.4 of the Branford Zoning Regulations including:
   - (1) Statement of Use
   - (2) Site Plan Map
   - (3) Erosion Control Plan
   - (4) Tabulation of Standards
   - (5) Staging Plan
   - (6) Building Plans
   - (7) Traffic Report
   - (8) Drainage Report
   - (9) Flood Requirements
   - (10) Agency Reports

3. Sufficient information to determine compliance with special standards listed on attached sheet.

4. Copy of any variance or Wetlands Commission approval pertinent to this application.

5. Additional information which may be necessary to determine compliance, as specified by the Branford Planning & Zoning Commission.

RECEIVED
JUN 11 1997
BRANFORD PLANNING & ZONING COMMISSION

The undersigned states that information submitted with this application is correct and acknowledges that any approval based on erroneous or incomplete information shall be null and void.

SIGNATURE OF APPLICANT [signature] DATE 6/10/97

SIGNATURE OF OWNER [signature] as agent DATE 6/11/97

Exhibit B

Property Card

Town of Branford
Property Listing Report

Parcel ID	D06/E06/001/001.1	Account	005520

Property Information

Owner	PREMIER REALTY HOLDINGS LLC
Address	148-160 NO MAIN ST
Mailing Address	150 NORTH MAIN ST BRANFORD , CT 06405
Land Use	- AUTO S S&S MDL96
Land Class	C

Census Tract	
Neighborhood	500
Zoning	IG-1
Acreage	2.05
Utilities	Public Water,Public Sewer
Lot Setting/ Desc	/ Level

Photo

PARCEL VALUATIONS (Assessed value = 70% of Appraised Value)

	Appraised	Assessed
Buildings	61400	43000
Outbuildings	77800	54400
Improvements	142500	99700
Extras	3300	2300
Land	1007000	704900
Total	1149500	804600
Previous		

Construction Details

Year Built	1965
Stories	1
Building Style	Car Dealrshp
Building Use	Ind/Comm
Building Condition	03
Total Rooms	
Bedrooms	
Full Bathrooms	
Half Bathrooms	
Bath Style	
Kitchen Style	
Roof Style	Flat
Roof Cover	Metal/Tin

EXTERIOR WALLS:

Primary	MASONRY
Secondary	Pre-finsh Metl

INTERIOR WALLS:

Primary	Minim/Masonry
Secondary	Drywall

FLOORS:

Primary	Concr-Finished
Secondary	Carpet

HEATING/AC:

Heating Type	Forced Air-Duc
Heating Fuel	Oil
AC Type	None

BUILDING AREA:

Effective Building Area	
Gross Building Area	23192
Total Living Area	13144

SALES HISTORY:

Sale Date	7/6/2004
Sale Price	
Book/ Page	0877/0469

Report Created On 6/9/2020

Town of Branford, Connecticut - Assessment Parcel Map

Parcel: D06-E06-001-001-1   Address: 148-160 NO MAIN ST

Approximate Scale: 1 inch : 100 feet

Grand List Date October 2019

Exhibit C

Construction Drawings

T-Mobile

T-MOBILE SITE NAME:

NH107/GLOBAL/CHERRY HILL

T-MOBILE SITE NUMBER:

CTNH107A

CROWN BU: 876321 / APP#: 479853

67D02C OUTDOOR CONFIGURATION

150 NORTH MAIN STREET
BRANFORD, CT 06405

EXISTING 147'-0" MONOPOLE

B+T GRP

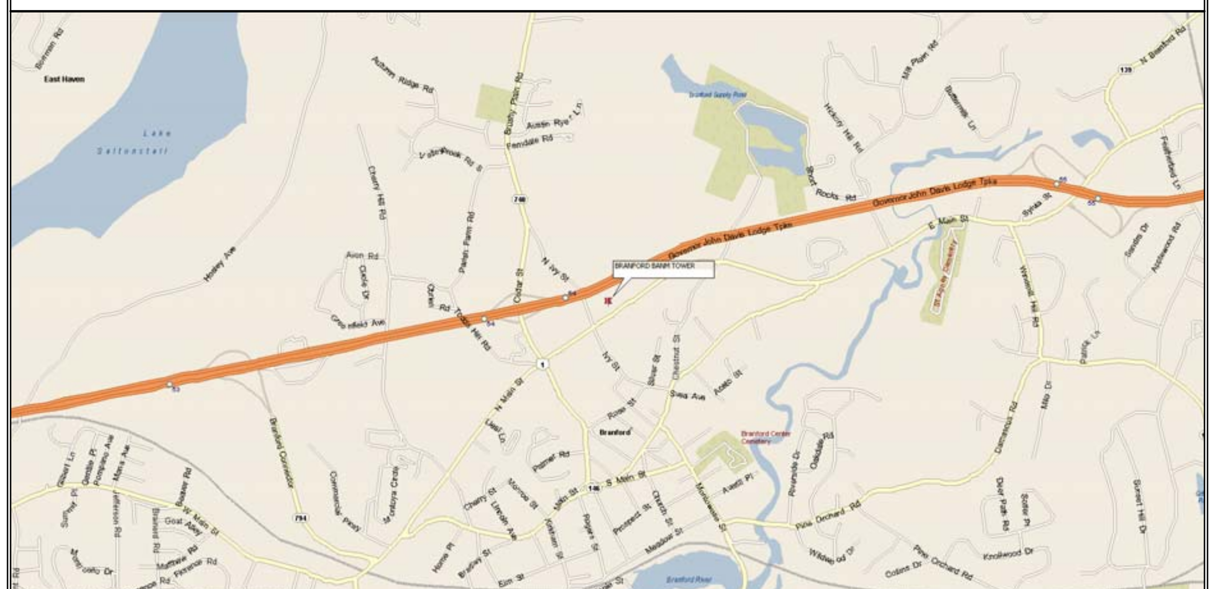
CROWN CASTLE

T-Mobile

PROJECT SUMMARY

SITE TYPE:	EXISTING EQUIPMENT UPGRADE
SITE ADDRESS:	150 NORTH MAIN STREET BRANFORD, CT 06405
JURISDICTION:	NEW HAVEN
NAD83	
LATITUDE: LONGITUDE:	41.28850801° N 72.81380060° W
TOWER OWNER:	CROWN CASTLE 3200 HORIZON DRIVE, SUITE 150 KING OF PRUSSIA, PA 19406 JASON SMITH (610) 635-3225
CUSTOMER/APPLICANT:	T-MOBILE 4 SYLVAN WAY PARSIPPANY, NJ 07054 (973) 397-4800
OCCUPANCY TYPE:	UNMANNED
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION

LOCATION MAP



NO SCALE

DRAWING INDEX

SHEET #	SHEET DESCRIPTION	REV. #
T-1	TITLE SHEET	1
A-1	OVERALL SITE PLAN	1
A-2	ANTENNA/CABLE SCHEDULE AND AZIMUTH PLANS	1
A-3	TOWER ELEVATION	1
A-4	ANTENNA AND RRU DETAILS	1
E-1	PANEL SCEHDULE AND ONE-LINE DIAGRAM	1

CTNH107A
BU #: 876321
NH107/GLOBAL/CHERRY HILL
150 NORTH MAIN STREET
BRANFORD, CT 06405
EXISTING 147'-0" MONOPOLE

PROJECT NO:	136457.001.01
CHECKED BY:	FWP

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
0	7/16/19	JDP	CONSTRUCTION
1	6/2/20	FWP	CONSTRUCTION

CONTACT INFORMATION

A&E FIRM: B+T GROUP
1717 S. BOULDER, STE. 300
TULSA, OK 74119
CONTACT: MIKE OAKES
PHONE: (918) 587-4630

ELECTRIC PROVIDER: UNITED ILLUMINATING CO.
(203) 499-2000

TELCO PROVIDER: COMCAST PHONE
(800) 934-6489

DRIVING DIRECTIONS

DEPART BRADLEY INTERNATIONAL AIRPORT ON TERMINAL RD. ROAD NAME CHANGES TO BRADLEY FIELD CONNECTOR. ROAD NAME CHANGES TO CT-20. TAKE RAMP ONTO I-91. TAKE RAMP ONTO I-95. AT EXIT 54, TURN RIGHT ONTO RAMP. TURN RIGHT ONTO CT-740. TURN LEFT ONTO US-1. TURN LEFT ONTO PARKING LOT. ARRIVE AT BRANFORD BANM TOWER.

A/E DOCUMENT REVIEW STATUS

TITLE	SIGNATURE	DATE
T-MOBILE PROP:		
T-MOBILE R.F. MGR.:		
T-MOBILE NetOps:		
T-MOBILE CONST. MGR.:		
INTERCONNECT:		
T-MOBILE SITE DEV. MGR.:		
PROPERTY OWNER:		
PLANNING:		

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR MODIFICATIONS.

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/21

STATE OF CONNECTICUT
31627
LICENSED PROFESSIONAL ENGINEER
6/2/20

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

CODE COMPLIANCE

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

CODE TYPE	CODE
BUILDING/DWELLING	IBC 2018 BUILDING CODE OF CONNECTICUT
STRUCTURAL	IBC 2018 BUILDING CODE OF CONNECTICUT
MECHANICAL	IBC 2018 MECHANICAL CODE OF CONNECTICUT
ELECTRICAL	NEC 2017

PROJECT DESCRIPTION

THE PROPOSED PROJECT INCLUDES:

- REMOVE (3) EXISTING ANTENNAS AT 125'-0".
- REMOVE (1) RBS 3106 CABINET.
- REMOVE (1) DUS41 AND (6)RUS01 B4.
- REMOVE (3) COAX CABLES.
- INSTALL (3) NEW ANTENNAS AT 125'-0".
- INSTALL (3) NEW RRUS AT 125'-0".
- INSTALL (3) NEW 6x12 HCS CABLES.
- INSTALL (1) NEW RBS 6131 EQUIPMENT CABINET.
- INSTALL (2) BB 6630 AND (6) RU22 IN NEW RBS 6131.
- RELOCATE (1) DUG20 AND (2) DUW30 TO NEW RBS 6131.
- REPLACE EXISTING MOUNTS PER MOUNT REPLACEMENT REPORT BY CLS ENGINEERING DATED 5/28/19.

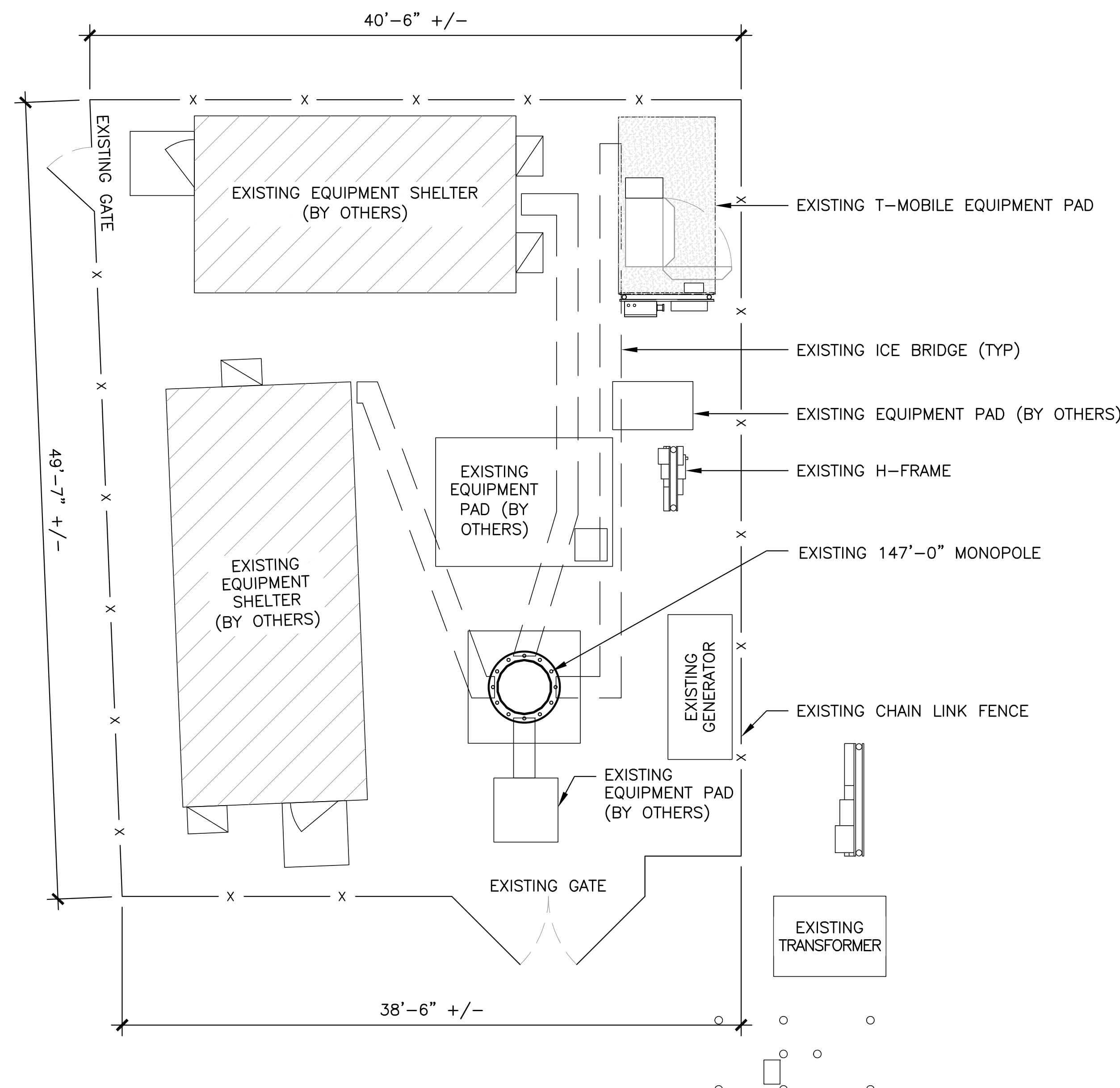
DO NOT SCALE DRAWINGS

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

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

811

SHEET NUMBER:	REVISION:
T-1	1



1 OVERALL SITE PLAN

SCALE: 0' 4' 8' 16' 32'

N

GENERAL NOTES:

1. SUBJECT PROPERTY IS KNOWN AS BLOCK TBD LOT TBD AS SHOWN ON THE BRANFORD TOWNSHIP TAX MAP AND IS SITUATED AT 150 NORTH MAIN STREET, BRANFORD, CT 06405.
2. APPLICANT: T-MOBILE
   A DELAWARE LIMITED LIABILITY COMPANY
   4 SYLVAN WAY
   PARSIPPANY, NEW JERSEY 07054
   (973) 397-4800

   TOWER OWNER: CROWN CASTLE INTERNATIONAL

- THE APPLICANT IS TO UPDATE THEIR NETWORK BY INSTALLING SIX (6) NEW PANEL ANTENNAS, THREE (3) RRUS, AND THREE (3) ADDITIONAL CABLES MOUNTED ON AN EXISTING MONOPOLE.

3. THIS FACILITY SHALL BE VISITED ON THE AVERAGE OF ONCE A MONTH FOR MAINTENANCE AND SHALL BE MONITORED FROM A REMOTE FACILITY.
4. THE EXISTING SITE IS LOCATED AT LATITUDE OF 41.28850801° N± AND LONGITUDE OF 72.81380060° W±. THE HORIZONTAL DATUM ARE IN TERMS OF NORTH AMERICAN DATUM OF 1983 (NAD 83).
5. 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 INDICATED "ISSUED FOR CONSTRUCTION"
6. 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.
7. 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.
8. 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.
9. THE CONSTRUCTION CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ALL CONSTRUCTION MEANS AND METHODS. THE CONSTRUCTION CONTRACTOR IS ALSO RESPONSIBLE FOR ALL JOB SITE SAFETY.
10. SITE INFORMATION SHOWN TAKEN FROM CROWN CASTLE SITE PLANS AND FROM CROWN CASTLE INSPECTION PHOTOS.
11. NO GUARANTEE IS MADE NOR SHOULD BE ASSUMED AS TO THE COMPLETENESS OR ACCURACY OF THE HORIZONTAL OR VERTICAL LOCATIONS. ALL PARTIES UTILIZING THIS INFORMATION SHALL FIELD VERIFY THE ACCURACY AND COMPLETENESS OF THE INFORMATION SHOWN PRIOR TO CONSTRUCTION ACTIVITIES.
12. ALL IMPROVEMENTS SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE TOWNSHIP ENGINEER WHO WILL BE GIVEN PROPER NOTIFICATION PRIOR TO THE START OF ANY CONSTRUCTION.

B+T GRP

CROWN CASTLE

T-Mobile

CTNH107A
BU #: 876321
NH107/GLOBAL/CHERRY HILL
150 NORTH MAIN STREET
BRANFORD, CT 06405
EXISTING 147'-0" MONOPOLE

PROJECT NO:	136457.001.01
CHECKED BY:	FWP

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
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1	6/2/20	FWP	CONSTRUCTION

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/21

STATE OF CONNECTICUT
31627
LICENSED
PROFESSIONAL ENGINEER
6/2/20

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

SHEET NUMBER:	REVISION:
A-1	1

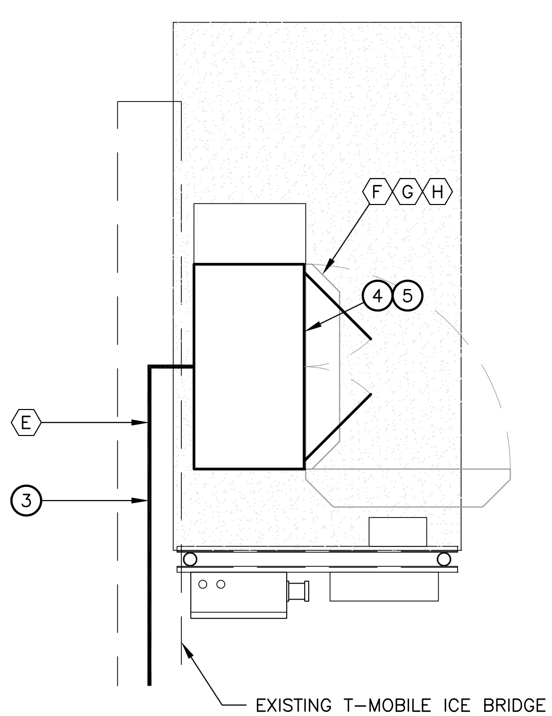
136457_876321_Branford BANM Tower.dwg – Sheet:A-1 – User: fperkins – Jun 02, 2020 – 8:49am

LEGEND

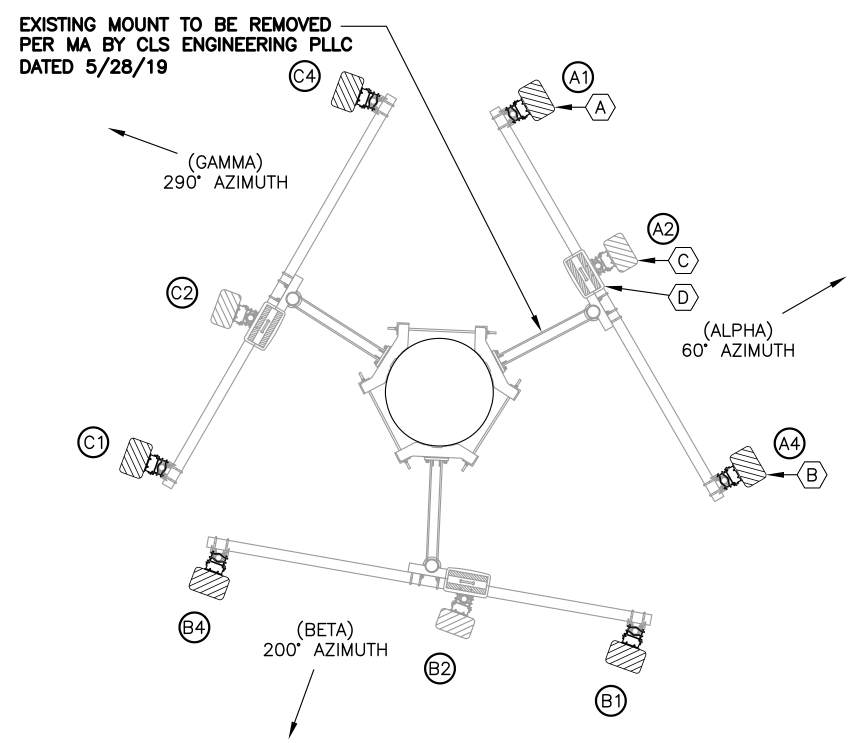
EXISTING/DEMOLITION NOTES		INSTALLATION NOTES	
A	EXISTING ERICSSON AIR21 KRC118023-1B2A_B4P ANTENNA TO REMAIN (TOTAL OF 3)	1	INSTALL RFS APXVAARR24_43-U-NA20 (8 FT) ANTENNAS ON NEW MOUNT. (TYP. OF 1 PER SECTOR, TOTAL OF 3)
B	EXISTING ERICSSON AIR21 KRC118023-1B2P_B4A ANTENNA TO REMAIN (TOTAL OF 3)	2	INSTALL RADIO 4449 B12/B71 (TYP. OF 1 PER SECTOR, TOTAL OF 3)
C	EXISTING ANDREW LNX6515DS-A1M ANTENNA TO BE REMOVED (TOTAL OF 3)	3	INSTALL (3) 6x12 HCS FIBER. RUN FROM EQUIPMENT TO ANTENNAS FOLLOWING EXISTING ROUTING
D	EXISTING RRUS11 B12 RADIO TO BE REMOVED (TOTAL OF 3)	4	INSTALL NEW RBS 6131 MU AC
E	EXISTING 1 5/8" COAX TO BE REMOVED (TOTAL OF 3)	5	INSTALL (2) NEW BB 6630 BASEBANDS IN NEW RBS 6131 CABINET
F	EXISTING RBS 3106 CABINET TO BE REMOVED (TOTAL OF 1)	6	INSTALL (6) NEW RU22 RADIOS IN NEW RBS 6131 CABINET
G	EXISTING DUW30 TO BE RELOCATED TO NEW RBS 6131 CABINET (TOTAL OF 2)		
H	EXISTING DUG20 TO BE RELOCATED TO NEW RBS 6131 CABINET (TOTAL OF 1)		

ANTENNA AND CABLE SCHEDULE

SECTOR	POSITION	PROPOSED ANTENNAS	PROPOSED ANTENNA CONFIGURATION		E-TILT	M-TILT	ANTENNA CENTERLINE	TMA/RRU	CABLES	JUMPER TYPE	CABLE LENGTH
60° – ALPHA	A1	ERICSSON AIR21 KRC118023-1_B2A_B4P	U1900 G1900 U2100	–	2°/2°	0°	125'-0"	1/0	(2) 1 5/8" COAX (1) 9X18 HCS FIBER	DC/FIBER & 1/2" COAX	171'-0"
	A2	**RFS APXVAARR24_43-U-NA20**	**L700 L600**	**B71 B12**	**2°**	**0°**		**0/1**	**(1) 6x12 HCS FIBER**	**DC/FIBER**	**171'-0"**
	A3	ERICSSON AIR21 KRC118023-1_B2P_B4A	L2100	–	2°	0°		0/0	(1) 6x12 HCS FIBER (SHARED)	DC/FIBER	171'-0"
200° – BETA	B1	ERICSSON AIR21 KRC118023-1_B2A_B4P	U1900 G1900 U2100	–	2°/2°	0°	125'-0"	1/0	(2) 1 5/8" COAX (1) 9X18 HCS FIBER (SHARED)	DC/FIBER & 1/2" COAX	171'-0"
	B2	**RFS APXVAARR24_43-U-NA20**	**L700 L600**	**B71 B12**	**2°**	**0°**		**0/1**	**(1) 6x12 HCS FIBER**	**DC/FIBER**	**171'-0"**
	B3	ERICSSON AIR21 KRC118023-1_B2P_B4A	L2100	–	2°	0°		0/0	(1) 6x12 HCS FIBER (SHARED)	DC/FIBER	171'-0"
290° – GAMMA	G1	ERICSSON AIR21 KRC118023-1_B2A_B4P	U1900 G1900 U2100	–	2°/2°	0°	125'-0"	1/0	(2) 1 5/8" COAX (1) 9X18 HCS FIBER (SHARED)	DC/FIBER & 1/2" COAX	171'-0"
	G2	**RFS APXVAARR24_43-U-NA20**	**L700 L600**	**B71 B12**	**2°**	**0°**		**0/1**	**(1) 6x12 HCS FIBER**	**DC/FIBER**	**171'-0"**
	G3	ERICSSON AIR21 KRC118023-1_B2P_B4A	L2100	–	2°	0°		0/0	(1) 6x12 HCS FIBER (SHARED)	DC/FIBER	171'-0"

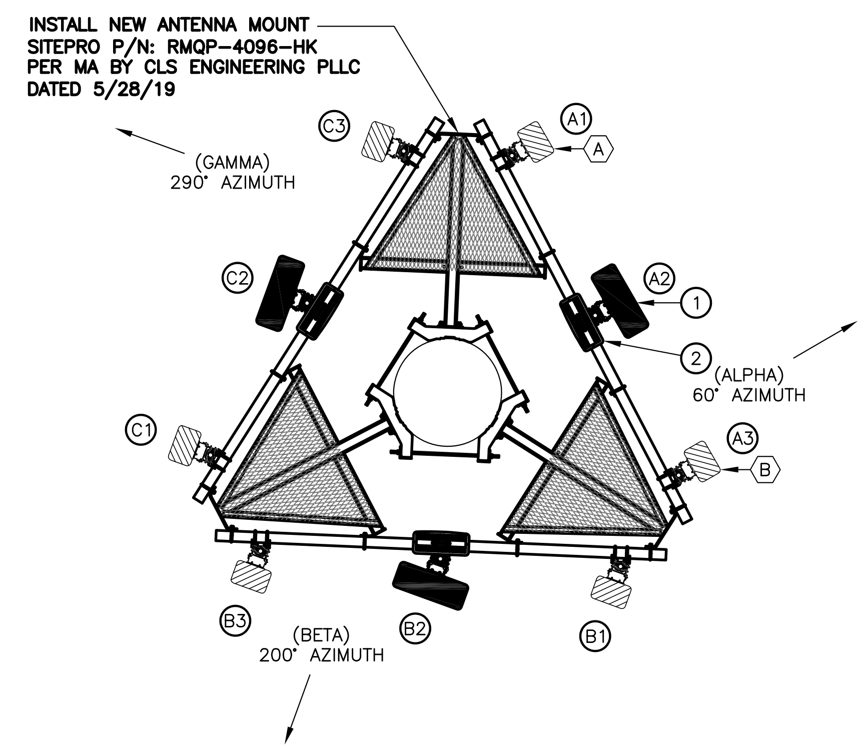


1 ENLARGED AREA PLAN
SCALE: 0' 1' 2' 4' 10'



2 EXISTING ANTENNA ORIENTATION
SCALE: 0' 1' 4' 8' 16'

N



3 PROPOSED ANTENNA ORIENTATION
SCALE: 0' 1' 4' 8' 16'

N

B+T GRP

CROWN CASTLE

T-Mobile

CTNH107A
BU #: 876321
NH107/GLOBAL/CHERRY HILL
150 NORTH MAIN STREET
BRANFORD, CT 06405
EXISTING 147'-0" MONOPOLE

PROJECT NO:	136457.001.01
CHECKED BY:	FWP

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
0	7/16/19	JDP	CONSTRUCTION
1	6/2/20	FWP	CONSTRUCTION

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PEC.0001564
Expires 2/10/21

STATE OF CONNECTICUT
31627
LICENSED PROFESSIONAL ENGINEER
6/2/20

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SHEET NUMBER:	REVISION:
A-2	1

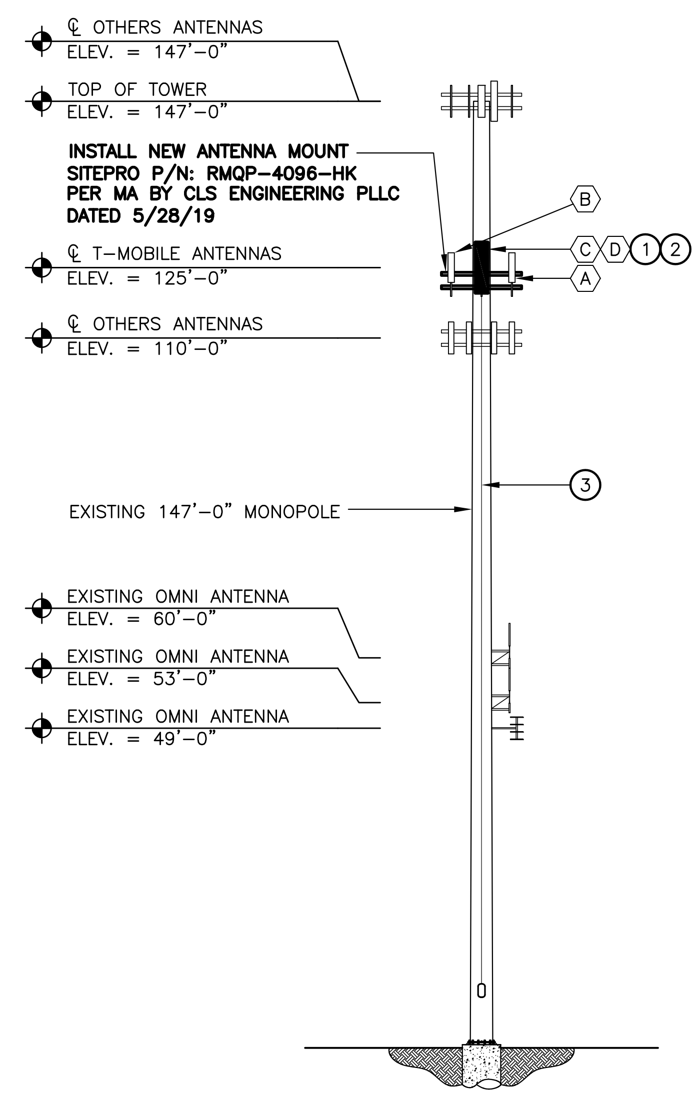
LEGEND			
EXISTING/DEMOLITION NOTES		**INSTALLATION NOTES**	
A	EXISTING ERICSSON AIR21 KRC18023-1_B2A_B4P ANTENNA TO REMAIN (TOTAL OF 3)	1	INSTALL RFS APXVAARR24_43-U-NA20 (8 FT) ANTENNAS ON NEW MOUNT. (TYP. OF 1 PER SECTOR, TOTAL OF 3)
B	EXISTING ERICSSON AIR21 KRC18023-1_B2P_B4A ANTENNA TO REMAIN (TOTAL OF 3)	2	INSTALL RADIO 4449 B12/B71 (TYP. OF 1 PER SECTOR, TOTAL OF 3)
C	EXISTING ANDREW LNX-6515DS-A1M ANTENNA TO BE REMOVED (TOTAL OF 3)	3	INSTALL (3) 6x12 HCS FIBER. RUN FROM EQUIPMENT TO ANTENNAS FOLLOWING EXISTING ROUTING
D	EXISTING RRUS11 B12 RADIO TO BE REMOVED (TOTAL OF 3)		

EXISTING TOWER IS SUFFICIENT PER STRUCTURAL ANALYSIS BY PAUL J. FORD AND COMPANY DATED 6/4/19.

EXISTING MOUNT IS INSUFFICIENT PER MOUNT ANALYSIS BY CLS ENGINEERING PLLC DATED 5/28/19.

LEGEND:

- **NEW**
- EXISTING
- FUTURE



1 TOWER ELEVATION

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

B+T GRP

CROWN CASTLE

T-Mobile

CTNH107A
BU #: 876321
NH107/GLOBAL/CHERRY HILL
150 NORTH MAIN STREET
BRANFORD, CT 06405
EXISTING 147'-0" MONOPOLE

PROJECT NO: 136457.001.01
CHECKED BY: FWP

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
0	7/16/19	JDP	CONSTRUCTION
1	6/2/20	FWP	CONSTRUCTION

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STATE OF CONNECTICUT
31627
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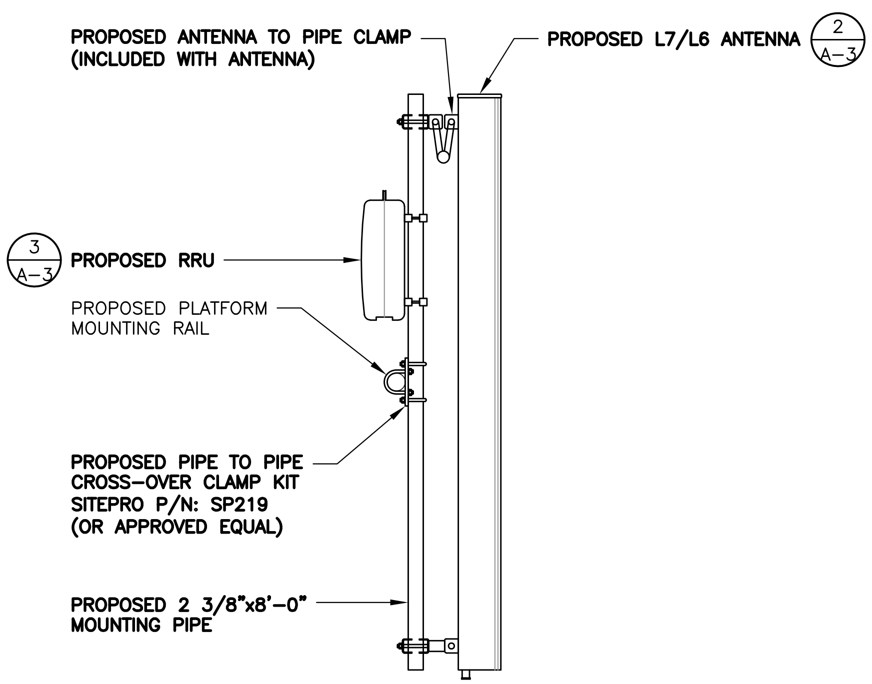
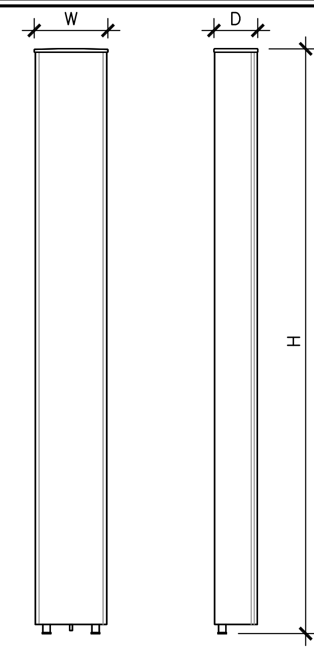
SHEET NUMBER: A-3
REVISION: 1

136457_876321_Branford BANM Tower.dwg — Sheet:A-3 — User: fperkins — Jun 02, 2020 — 8:49am



1 PROPOSED ANTENNA & RRU MOUNTING DETAIL

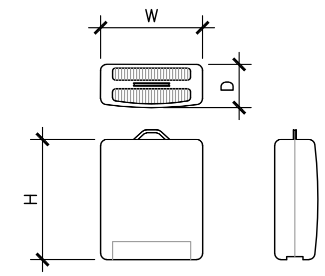
SCALE: N.T.S.



ANTENNA SPECS	
MANUFACTURER	RFS
MODEL #	APXVAARR24_43-U-NA20
WIDTH	24.0"
DEPTH	8.7"
HEIGHT	95.9"
WEIGHT	128.0 LBS

2 L1900 ANTENNA DETAIL

SCALE: N.T.S.

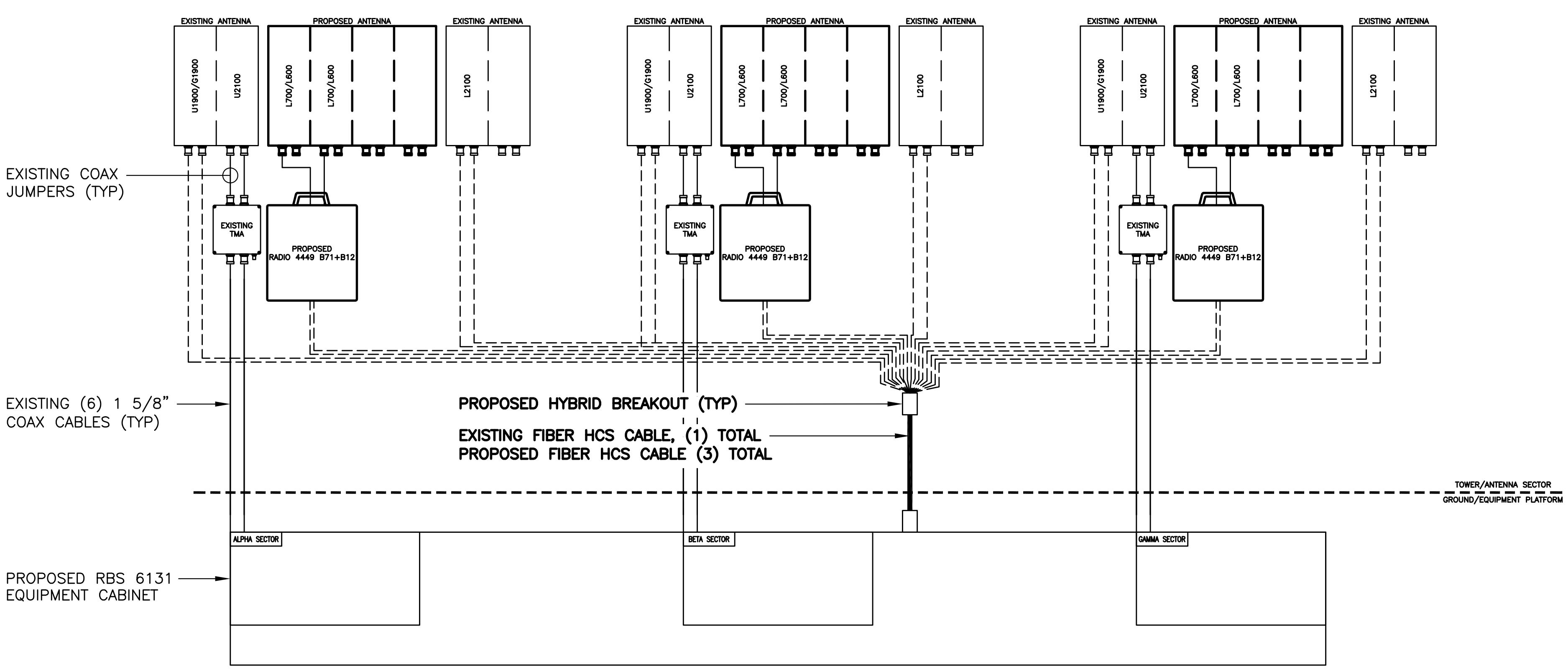


RRU SPECIFICATIONS	
MANUFACTURER	ERICSSON
MODEL #	4449
WIDTH	13.2"
DEPTH	10.4"
HEIGHT	14.9"
WEIGHT	74 LBS

3 REMOTE RADIO UNIT (RRU)

SCALE: N.T.S.

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-3 FOR EXACT ANTENNA POSITIONING.



4 ANTENNA & CABLING SCHEMATIC

SCALE: N.T.S.

B+T GRP

CROWN CASTLE

T-Mobile

CTNH107A
BU #: 876321

NH107/GLOBAL/CHERRY HILL

150 NORTH MAIN STREET
BRANFORD, CT 06405

EXISTING 147'-0" MONOPOLE

PROJECT NO:	136457.001.01
CHECKED BY:	FWP

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
0	7/16/19	JDP	CONSTRUCTION
1	6/2/20	FWP	CONSTRUCTION

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STATE OF CONNECTICUT PROFESSIONAL ENGINEER LICENSED 31627

6/2/20

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SHEET NUMBER:	REVISION:
A-4	1

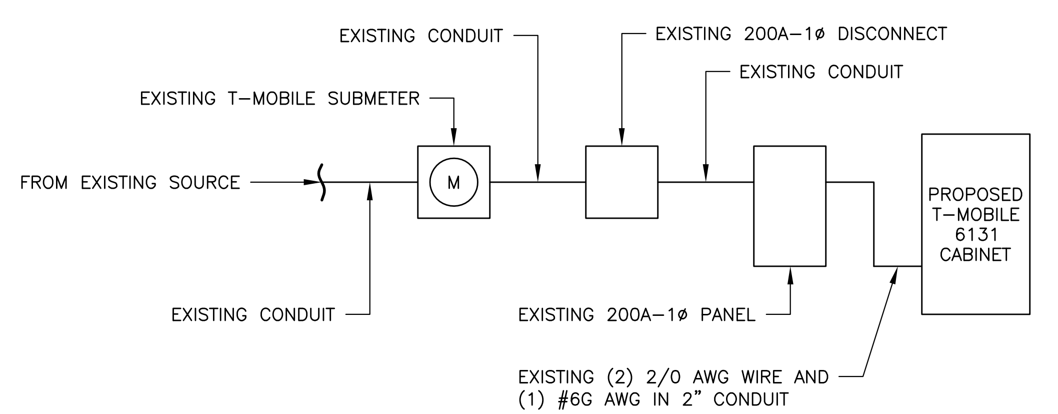
136457_876321_Branford BANM Tower.dwg — Sheet:A-4 — User: fperkins — Jun 02, 2020 — 8:49am

FINAL PANEL SCHEDULE							
LOAD	POLES	AMPS	BUS L1	BUS L2	AMPS	POLES	LOAD
S12000 OUTDOOR	2	50A	1	2	20A	1	PLUG
			3	4	100A	2	RBS 6131 MU AC
BTS (DARK)	2	40A	5	6			
			7	8			
LED LIGHT	1	15A	9	10			

RATED VOLTAGE: ■120/240 ☐______. 1 PHASE, 3 WIRE	BRANCH POLES: ☐12 ■24 ☐30 ☐42	APPROVED MF'RS
RATED AMPS: ☐100 ■225 ☐400 ☐______.	CABINET: ■SURFACE ☐FLUSH	NEMA ☐1 ■3R ☐4X
☐MAIN LUGS ONLY / MAIN 200 AMPS ■BREAKER ☐FUSED SWITCH	■HINGED DOOR	■KEYED DOOR LATCH
☐FUSED ■CIRCUIT BREAKER BRANCH DEVICES	☐__________ 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 DOCUMENTS AND PHOTOS

1 FINAL T-MOBILE PANEL DETAIL
SCALE: N.T.S.



2 ONE-LINE DIAGRAM
SCALE: N.T.S.

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CROWN CASTLE

T-Mobile

CTNH107A
BU #: 876321

NH107/GLOBAL/CHERRY HILL

150 NORTH MAIN STREET
BRANFORD, CT 06405

EXISTING 147'-0" MONOPOLE

PROJECT NO:	136457.001.01
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REV	DATE	DRWN	DESCRIPTION
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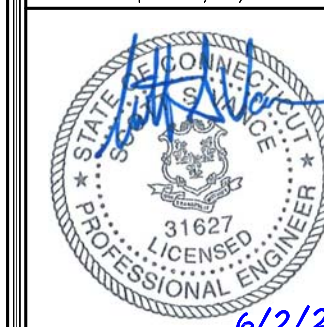
B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/21



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SHEET NUMBER:	REVISION:
E-1	1

Exhibit D

Structural Analysis Report

PAUL J. FORD
& COMPANY

Date: **August 22, 2019**

Darcy Tarr
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

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**	
	Carrier Site Number:	CTNH107A
	Carrier Site Name:	NH107/Global/Cherry Hill
Crown Castle Designation:	**Crown Castle BU Number:**	876321
	Crown Castle Site Name:	BRANFORD BANM TOWER
	Crown Castle JDE Job Number:	559323
	Crown Castle Work Order Number:	1783335
	Crown Castle Order Number:	479853 Rev. 0
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37519-2435.002.7805
Site Data:	**150 North Main Street, BRANFORD, New Haven County, CT** **Latitude *41° 17' 19"*, Longitude *-72° 48' 49.9"*** **147 Foot - Monopole Tower**	

Dear Darcy Tarr,

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:

LC5: Proposed Equipment Configuration **Sufficient Capacity – 89.6%**

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

Respectfully submitted by:

Udaykiran Yerra
Structural Designer
uyerra@pauljford.com

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22731
LICENSED
PROFESSIONAL ENGINEER

08/23/2019

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 147 ft Monopole tower designed by SUMMIT Manufacturing in March of 1999.

The tower has been modified multiple times to accommodate additional loading.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	130 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)
121.0	125.0	3	ericsson	RADIO 4449 B12/B71	10	1-5/8
		3	rfs celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
	121.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe		
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe		
		3	ericsson	KRY 112 144/1		
		1	Sitepro1	RMQP-4096-HK Platform		

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)
147.0	149.0	1	andrew	VHLP2-18	3 6	1-1/4 1/2
		2	dragonwave	A-ANT-23G-2-C		
	147.0	3	alcatel lucent	TD-RRH8x20-25		
		1	powerwave technologies	P40-16-XLPP-RR-A w/ Mount Pipe		
		9	rfs celwave	ACU-A20-N		
		2	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe		
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe		
		1	tower mounts	Platform Mount [LP 1201-1]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
145.0	146.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	--	--
		3	alcatel lucent	TME-800MHZ RRH		
	145.0	1	tower mounts	Side Arm Mount [SO 102-3]		
	143.0	3	alcatel lucent	TME-1900MHz RRH (65 MHz)		
110.0	112.0	9	andrew	SBNHH-1D65A w/ Mount Pipe	2 12 2 4	2" Cond 1-1/4 3/8 3/4
		3	ericsson	RRUS 32		
		3	ericsson	RRUS 32 B2		
		3	ericsson	RRUS 32 B66		
		6	powerwave technologies	7020.00		
		3	powerwave technologies	7770.00 w/ Mount Pipe		
		6	powerwave technologies	LGP2140X		
		2	raycap	DC6-48-60-18-8F		
	110.0	1	SitePro1	MT-195-14 (Hand Rail)		
		1	SitePro1	PRK-1245(Kickers)		
		1	tower mounts	Platform Mount [LP 1201-1]		
53.0	54.0	1	gps	GPS_A	1	1/2
	53.0	1	tower mounts	Side Arm Mount [SO 701-1]		
49.0	50.0	1	lucent	KS24019-L112A	1	1/2
	49.0	1	tower mounts	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, P.E., P.C., 10/08/96	2135657	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit/PJF, 29299-111, 03/15/99	1613620	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit/PJF, 29299-111, 03/15/99	1614568	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, A41709-0058, 05/08/2009	2431042	CCISITES
4-POST-MODIFICATION INSPECTION	PJF, 41709-0058, 06/15/09	2448190	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, A37512-1607, 09/04/2012	3316256	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 128359, 03/06/13	3890848	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Aero Solutions, 7/23/2013	4988798	CCISITES
4-POST-MODIFICATION INSPECTION	SGS, 130357, 12/9/13	4699667	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) The existing base plate grout was considered in this analysis. Grout must be maintained and inspected periodically and must be replaced if damaged or cracked. Refer to Crown Castle document ENG-PRC-10012, Base Plate Grout Repair.
5) Monopole was modified in conformance with the referenced modification drawings.
6) The shaft reinforcement and transition stiffeners from reference document #2431042 & document #3316256 has been found to be ineffective and therefore, has not been considered in this analysis.

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	147 - 99.5	Pole	TP30.313x22x0.25	1	-14.87	1342.23	60.2	Pass
L2	99.5 - 59	Pole	TP36.9x29.1567x0.3125	2	-22.73	2210.06	88.3	Pass
L3	59 - 29.25	Pole	TP41.481x35.4438x0.375	3	-30.79	2980.72	89.6	Pass
L4	29.25 - 0	Pole	TP45.85x39.8123x0.4375	4	-42.64	3929.66	89.4	Pass
							Summary	
						Pole (L3)	89.6	Pass
						Rating =	89.6	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	76.9	Pass
1	Base Plate	0	55.1	Pass
1	Base Foundation Steel	0	87.3	Pass
1	Base Foundation Soil Interaction	0	84.9	Pass

Structure Rating (max from all components) =	89.6%

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.

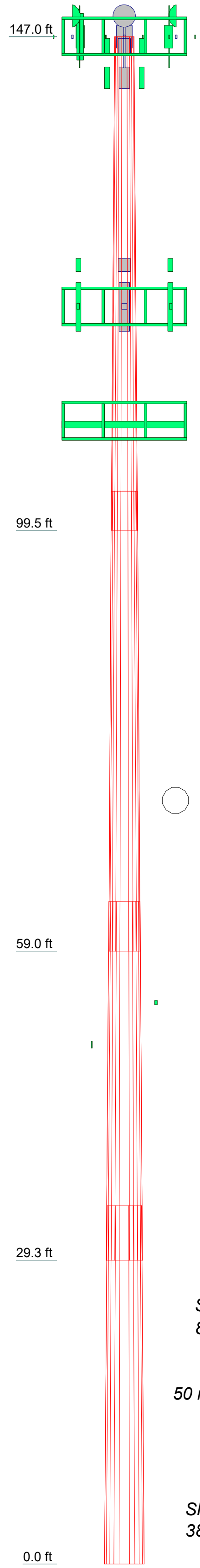
4.1) Recommendations

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	1	2	3	4
Length (ft)	47.5000	44.2500	34.5000	34.5000
Number of Sides	12	12	12	12
Thickness (in)	0.2500	0.3125	0.3750	0.4375
Socket Length (ft)	3.7500	4.7500	5.2500	
Top Dia (in)	22.0000	29.1567	35.4438	39.8123
Bot Dia (in)	30.3130	36.9000	41.4810	45.8500
Grade	A607-60		A607-65	
Weight (K) 20.7	3.4	5.0	5.4	7.0



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	A607-65	65 ksi	80 ksi

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.0000 ft
8. TIA-222H Annex S
9. TOWER RATING: 89.6%

ALL REACTIONS ARE FACTORED

AXIAL 72 K
SHEAR 8 K
MOMENT 822 kip-ft
TORQUE 0 kip-ft
50 mph WIND - 1.5000 in ICE

AXIAL 43 K
SHEAR 38 K
MOMENT 3719 kip-ft
TORQUE 1 kip-ft
REACTIONS - 130 mph WIND

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

Job: ***147' MP; Branford Banm Tower; Branford, CT***		
Project: ***PJF# 37519-2435.002.7805 (BU# 876321)***		
Client: CCI	Drawn by: Udaykiran Yerra	App'd:
Code: TIA-222-H	Date: 08/22/19	Scale: NTS
Path: G:\TOWER\375_Crown_Castle\2019\37519-2435_876321_BRANFORD BANM TOWER\37519-2435.002.7805_SA_1783335\37519-2435.002.7805.eri		Dwg No. E-1

Tower Input Data

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

1) Tower is located in New Haven County, Connecticut.
2) Tower base elevation above sea level: 57.0000 ft.
3) Basic wind speed of 130 mph.
4) Risk Category II.
5) Exposure Category C.
6) Simplified Topographic Factor Procedure for wind speed-up calculations is used.
7) Topographic Category: 1.
8) Crest Height: 0.0000 ft.
9) Nominal ice thickness of 1.5000 in.
10) Ice thickness is considered to increase with height.
11) Ice density of 56.00 pcf.
12) A wind speed of 50 mph is used in combination with ice.
13) Temperature drop of 50 °F.
14) Deflections calculated using a wind speed of 60 mph.
15) TIA-222H Annex S.
16) A non-linear (P-delta) analysis was used.
17) Pressures are calculated at each section.
18) Stress ratio used in pole design is 1.05.
19) Tower analysis based on target reliabilities in accordance with Annex S.
20) Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
21) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile

Include Bolts In Member Capacity

Leg Bolts Are At Top Of Section
Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
SR Members Have Cut Ends
SR Members Are Concentric

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
Use Clear Spans For KL/r
Retension Guys To Initial Tension
√ Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.

Autocalc Torque Arm Areas

Add IBC .6D+W Combination
Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Treat Feed Line Bundles As Cylinder
Ignore KL/ry For 60 Deg. Angle Legs

Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feed Line Torque
Include Angle Block Shear Check
Use TIA-222-H Bracing Resist. Exemption
Use TIA-222-H Tension Splice Exemption

Poles

√ Include Shear-Torsion Interaction
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

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	147.0000-99.5000	47.5000	3.75	12	22.0000	30.3130	0.2500	1.0000	A607-60 (60 ksi)
L2	99.5000-59.0000	44.2500	4.75	12	29.1567	36.9000	0.3125	1.2500	A607-65 (65 ksi)
L3	59.0000-29.2500	34.5000	5.25	12	35.4438	41.4810	0.3750	1.5000	A607-65 (65 ksi)
L4	29.2500-0.0000	34.5000		12	39.8123	45.8500	0.4375	1.7500	A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.6879	17.5087	1057.2060	7.7865	11.3960	92.7699	2142.1860	8.6173	5.2260	20.904
	31.2941	24.2007	2791.7645	10.7626	15.7021	177.7952	5656.8718	11.9109	7.4539	29.816
L2	30.7544	29.0245	3082.2498	10.3262	15.1032	204.0796	6245.4738	14.2850	6.9765	22.325
	38.0915	36.8162	6290.5707	13.0983	19.1142	329.1046	12746.4018	18.1198	9.0517	28.965
L3	37.4224	42.3456	6647.1544	12.5546	18.3599	362.0477	13468.9370	20.8412	8.4939	22.651
	42.8120	49.6355	10705.0511	14.7159	21.4872	498.2069	21691.3357	24.4291	10.1119	26.965
L4	42.0136	55.4692	10976.7767	14.0962	20.6228	532.2649	22241.9255	27.3003	9.4972	21.708
	47.3131	63.9749	16840.1561	16.2577	23.7503	709.0502	34122.7218	31.4865	11.1153	25.406

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 147.0000-99.5000				1	1	1			
L2 99.5000-59.0000				1	1	1			
L3 59.0000-29.2500				1	1	1			
L4 29.2500-0.0000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
****										
7983A(ELLIPTICAL)	C	No	Surface Ar (CaAa)	147.0000 - 0.0000	6	2	0.192 0.225	0.5730		0.08
HB158-1-08U8-S8F18(1 5/8")	B	No	Surface Ar (CaAa)	121.0000 - 0.0000	1	1	-0.208 -0.158	1.9800		1.70
****										
LDF4-50A(1/2)	A	No	Surface Ar (CaAa)	53.0000 - 0.0000	1	1	0.242 0.258	0.6250		0.15
LDF4-50A(1/2)	A	No	Surface Ar (CaAa)	49.0000 - 0.0000	1	1	0.242 0.258	0.6250		0.15
***										
MP3-04 (L)	B	No	Surface Af (CaAa)	25.5000 - 0.0000	1	1	-0.267 -0.267	4.7800	12.7800	0.00

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
MP3-04 (L)	A	No	Surface Af (CaAa)	25.5000 - 0.0000	1	1	-0.267 -0.267	4.7800	12.7800	0.00
MP3-04 (L)	C	No	Surface Af (CaAa)	25.5000 - 0.0000	1	1	-0.267 -0.267	4.7800	12.7800	0.00
MP3-04 (L)	A	No	Surface Af (CaAa)	52.0000 - 32.0000	1	1	0.483 0.483	4.7800	12.7800	0.00
MP3-04 (L)	C	No	Surface Af (CaAa)	52.0000 - 32.0000	1	1	0.483 0.483	4.7800	12.7800	0.00
MP3-04 (L)	B	No	Surface Af (CaAa)	52.0000 - 32.0000	1	1	0.483 0.483	4.7800	12.7800	0.00
MP3-04 (L)	A	No	Surface Af (CaAa)	71.0000 - 61.0000	1	1	0.483 0.483	4.7800	12.7800	0.00
MP3-04 (L)	C	No	Surface Af (CaAa)	71.0000 - 61.0000	1	1	0.483 0.483	4.7800	12.7800	0.00
MP3-04 (L)	B	No	Surface Af (CaAa)	71.0000 - 61.0000	1	1	0.483 0.483	4.7800	12.7800	0.00
MP3-04 (L)	A	No	Surface Af (CaAa)	35.5000 - 0.0000	1	1	-0.017 -0.017	4.7800	12.7800	0.00
MP3-04 (L)	C	No	Surface Af (CaAa)	35.5000 - 0.0000	1	1	0.233 0.233	4.7800	12.7800	0.00
MP3-04 (L)	B	No	Surface Af (CaAa)	35.5000 - 0.0000	1	1	0.233 0.233	4.7800	12.7800	0.00
MP3-03 (L)	A	No	Surface Af (CaAa)	59.0000 - 49.0000	1	1	0.233 0.233	4.0600	11.2600	0.00
MP3-03 (L)	C	No	Surface Af (CaAa)	59.0000 - 49.0000	1	1	0.233 0.233	4.0600	11.2600	0.00
MP3-03 (L)	B	No	Surface Af (CaAa)	59.0000 - 49.0000	1	1	0.233 0.233	4.0600	11.2600	0.00

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight plf
HB114-1-0813U4-M5J(1-1/4)	C	No	No	Inside Pole	147.0000 - 0.0000	3	No Ice	0.0000	1.20
							1/2" Ice	0.0000	1.20
							1" Ice	0.0000	1.20
							2" Ice	0.0000	1.20
***									
LDF7-50A(1-5/8)	B	No	No	Inside Pole	119.0000 - 0.0000	6	No Ice	0.0000	0.82
							1/2" Ice	0.0000	0.82
							1" Ice	0.0000	0.82
							2" Ice	0.0000	0.82
HCS 6X12 4AWG(1-5/8)	B	No	No	Inside Pole	119.0000 - 0.0000	3	No Ice	0.0000	2.40
							1/2" Ice	0.0000	2.40
							1" Ice	0.0000	2.40
							2" Ice	0.0000	2.40
***									
LDF6-50A(1-1/4)	B	No	No	Inside Pole	110.0000 - 0.0000	12	No Ice	0.0000	0.60
							1/2" Ice	0.0000	0.60
							1" Ice	0.0000	0.60
							2" Ice	0.0000	0.60
FB-L98B-034-XXX(3/8)	B	No	No	Inside Pole	110.0000 - 0.0000	2	No Ice	0.0000	0.06
							1/2" Ice	0.0000	0.06
							1" Ice	0.0000	0.06
							2" Ice	0.0000	0.06
WR-VG86ST-BRD(3/4)	B	No	No	Inside Pole	110.0000 - 0.0000	4	No Ice	0.0000	0.58
							1/2" Ice	0.0000	0.58
							1" Ice	0.0000	0.58
							2" Ice	0.0000	0.58
2" (Nominal) Conduit	B	No	No	Inside Pole	110.0000 - 0.0000	2	No Ice	0.0000	0.72
							1/2" Ice	0.0000	0.72
							1" Ice	0.0000	0.72
							2" Ice	0.0000	0.72

Feed Line/Linear Appurtenances Section Areas

Tower Section	*Tower Elevation ft*	*Face*	*A_R ft²*	*A_F ft²*	*C_AA_A In Face ft²*	*C_AA_A Out Face ft²*	*Weight K*
L1	147.0000-99.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	4.257	0.000	0.39
		C	0.000	0.000	5.444	0.000	0.19
L2	99.5000-59.0000	A	0.000	0.000	7.806	0.000	0.00
		B	0.000	0.000	15.825	0.000	1.01
		C	0.000	0.000	12.447	0.000	0.17
L3	59.0000-29.2500	A	0.000	0.000	30.398	0.000	0.01
		B	0.000	0.000	33.570	0.000	0.74
		C	0.000	0.000	31.089	0.000	0.12
L4	29.2500-0.0000	A	0.000	0.000	47.274	0.000	0.01
		B	0.000	0.000	49.409	0.000	0.73
		C	0.000	0.000	46.970	0.000	0.12

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	*Tower Elevation ft*	*Face or Leg*	*Ice Thickness in*	*A_R ft²*	*A_F ft²*	*C_AA_A In Face ft²*	*C_AA_A Out Face ft²*	*Weight K*
L1	147.0000-99.5000	A	1.453	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	10.506	0.000	0.52
		C		0.000	0.000	24.063	0.000	0.46
L2	99.5000-59.0000	A	1.391	0.000	0.000	9.398	0.000	0.10
		B		0.000	0.000	29.189	0.000	1.36
		C		0.000	0.000	29.915	0.000	0.50
L3	59.0000-29.2500	A	1.312	0.000	0.000	51.632	0.000	0.50
		B		0.000	0.000	50.979	0.000	1.26
		C		0.000	0.000	51.419	0.000	0.63
L4	29.2500-0.0000	A	1.173	0.000	0.000	76.981	0.000	0.69
		B		0.000	0.000	71.444	0.000	1.38
		C		0.000	0.000	71.761	0.000	0.76

Feed Line Center of Pressure

Section	*Elevation ft*	*CP_X in*	*CP_Z in*	*CP_X Ice in*	*CP_Z Ice in*
L1	147.0000-99.5000	0.0701	0.1597	-0.2200	0.9028
L2	99.5000-59.0000	0.3608	-0.2586	0.2664	0.2131
L3	59.0000-29.2500	-0.2872	-0.0516	-0.6884	-0.4241
L4	29.2500-0.0000	-1.3788	0.8386	-1.7992	0.3432

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

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	6	7983A(ELLIPTICAL)	99.50 - 147.00	1.0000	1.0000
L1	10	HB158-1-08U8-S8F18(1 5/8")	99.50 - 121.00	1.0000	1.0000
L1	28	MP3-04 (L)	99.50 - 71.00	1.0000	1.0000
L1	29	MP3-04 (L)	99.50 - 71.00	1.0000	1.0000
L1	30	MP3-04 (L)	99.50 - 71.00	1.0000	1.0000
L2	6	7983A(ELLIPTICAL)	59.00 - 99.50	1.0000	1.0000
L2	10	HB158-1-08U8-S8F18(1 5/8")	59.00 - 99.50	1.0000	1.0000
L2	19	LDF4-50A(1/2)	59.00 - 53.00	1.0000	1.0000
L2	20	LDF4-50A(1/2)	59.00 - 49.00	1.0000	1.0000
L2	25	MP3-04 (L)	59.00 - 52.00	1.0000	1.0000
L2	26	MP3-04 (L)	59.00 - 52.00	1.0000	1.0000
L2	27	MP3-04 (L)	59.00 - 52.00	1.0000	1.0000
L2	31	MP3-04 (L)	59.00 - 35.50	1.0000	1.0000
L2	32	MP3-04 (L)	59.00 - 35.50	1.0000	1.0000
L2	33	MP3-04 (L)	59.00 - 35.50	1.0000	1.0000
L2	34	MP3-03 (L)	59.00 - 59.00	1.0000	1.0000
L2	35	MP3-03 (L)	59.00 - 59.00	1.0000	1.0000
L2	36	MP3-03 (L)	59.00 - 59.00	1.0000	1.0000
L3	6	7983A(ELLIPTICAL)	29.25 - 59.00	1.0000	1.0000
L3	10	HB158-1-08U8-S8F18(1 5/8")	29.25 - 59.00	1.0000	1.0000
L3	19	LDF4-50A(1/2)	29.25 - 53.00	1.0000	1.0000
L3	20	LDF4-50A(1/2)	29.25 - 49.00	1.0000	1.0000
L3	22	MP3-04 (L)	29.25 - 25.50	1.0000	1.0000
L3	23	MP3-04 (L)	29.25 - 25.50	1.0000	1.0000
L3	24	MP3-04 (L)	29.25 - 25.50	1.0000	1.0000
L3	31	MP3-04 (L)	29.25 - 35.50	1.0000	1.0000
L3	32	MP3-04 (L)	29.25 - 35.50	1.0000	1.0000
L3	33	MP3-04 (L)	29.25 - 35.50	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Top Hat 10" Diameter x 4' 6" Tall	C	None		0.00	147.0000	No Ice	2.1167	2.1167	0.20
						1/2" Ice	3.1744	3.1744	0.23
						1" Ice	3.4914	3.4914	0.27
						2" Ice	4.1531	4.1531	0.35
****									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.0000	0.00	147.0000	No Ice	4.6000	4.0100	0.10
			0.00			1/2" Ice	5.0500	4.4500	0.16
			0.00			1" Ice	5.5000	4.8900	0.23
						2" Ice	6.4400	5.8200	0.42
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.0000	0.00	147.0000	No Ice	4.6000	4.0100	0.10
			0.00			1/2" Ice	5.0500	4.4500	0.16
			0.00			1" Ice	5.5000	4.8900	0.23
						2" Ice	6.4400	5.8200	0.42
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.0000	0.00	147.0000	No Ice	4.0900	2.8600	0.08
			0.00			1/2" Ice	4.4800	3.2300	0.13
			0.00			1" Ice	4.8800	3.6100	0.19
						2" Ice	5.7100	4.4000	0.33
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.0000	0.00	147.0000	No Ice	4.0900	2.8600	0.08
			0.00			1/2" Ice	4.4800	3.2300	0.13
			0.00			1" Ice	4.8800	3.6100	0.19
						2" Ice	5.7100	4.4000	0.33
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.0000	0.00	147.0000	No Ice	4.0900	2.8600	0.08
			0.00			1/2" Ice	4.4800	3.2300	0.13
			0.00			1" Ice	4.8800	3.6100	0.19
						2" Ice	5.7100	4.4000	0.33
TD-RRH8x20-25	A	From Leg	4.0000	0.00	147.0000	No Ice	4.0455	1.5345	0.07
			0.00			1/2" Ice	4.2975	1.7142	0.10
			0.00			1" Ice	4.5570	1.9008	0.13
						2" Ice	5.0981	2.2951	0.20
TD-RRH8x20-25	B	From Leg	4.0000	0.00	147.0000	No Ice	4.0455	1.5345	0.07
			0.00			1/2" Ice	4.2975	1.7142	0.10
			0.00			1" Ice	4.5570	1.9008	0.13
						2" Ice	5.0981	2.2951	0.20
TD-RRH8x20-25	C	From Leg	4.0000	0.00	147.0000	No Ice	4.0455	1.5345	0.07
			0.00			1/2" Ice	4.2975	1.7142	0.10
			0.00			1" Ice	4.5570	1.9008	0.13
						2" Ice	5.0981	2.2951	0.20
(3) ACU-A20-N	A	From Leg	4.0000	0.00	147.0000	No Ice	0.0667	0.1167	0.00
			0.00			1/2" Ice	0.1037	0.1620	0.00
			0.00			1" Ice	0.1481	0.2148	0.00
						2" Ice	0.2593	0.3426	0.01
(3) ACU-A20-N	B	From Leg	4.0000	0.00	147.0000	No Ice	0.0667	0.1167	0.00
			0.00			1/2" Ice	0.1037	0.1620	0.00
			0.00			1" Ice	0.1481	0.2148	0.00
						2" Ice	0.2593	0.3426	0.01
(3) ACU-A20-N	C	From Leg	4.0000	0.00	147.0000	No Ice	0.0667	0.1167	0.00
			0.00			1/2" Ice	0.1037	0.1620	0.00
			0.00			1" Ice	0.1481	0.2148	0.00
						2" Ice	0.2593	0.3426	0.01
P40-16-XLPP-RR-A w/ Mount Pipe	C	From Leg	4.0000	0.00	147.0000	No Ice	8.2425	4.8250	0.07
			0.00			1/2"	8.7006	5.5706	0.14
			0.00			Ice	9.1551	6.2654	0.21
						1" Ice	10.0902	7.6723	0.37

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice			
(2) 6' x 2" Mount Pipe	A	From Leg	4.0000	0.00	147.0000	No Ice	1.4250	1.4250	0.02
			0.00			1/2"	1.9250	1.9250	0.03
			0.00			Ice	2.2939	2.2939	0.05
						1" Ice	3.0596	3.0596	0.09
						2" Ice			
(2) 6' x 2" Mount Pipe	B	From Leg	4.0000	0.00	147.0000	No Ice	1.4250	1.4250	0.02
			0.00			1/2"	1.9250	1.9250	0.03
			0.00			Ice	2.2939	2.2939	0.05
						1" Ice	3.0596	3.0596	0.09
						2" Ice			
(2) 6' x 2" Mount Pipe	C	From Leg	4.0000	0.00	147.0000	No Ice	1.4250	1.4250	0.02
			0.00			1/2"	1.9250	1.9250	0.03
			0.00			Ice	2.2939	2.2939	0.05
						1" Ice	3.0596	3.0596	0.09
						2" Ice			
Platform Mount [LP 1201-1]	B	None		0.00	147.0000	No Ice	18.3800	18.3800	2.10
						1/2"	22.1100	22.1100	2.65
						Ice	25.8700	25.8700	3.26
						1" Ice	33.4700	33.4700	4.66
						2" Ice			
****									
TME-1900MHz RRH (65 MHz)	A	From Leg	1.0000	0.00	145.0000	No Ice	2.3125	2.3750	0.06
			0.00			1/2"	2.5168	2.5809	0.08
			-2.00			Ice	2.7284	2.7943	0.11
						1" Ice	3.1740	3.2431	0.18
						2" Ice			
TME-1900MHz RRH (65 MHz)	B	From Leg	1.0000	0.00	145.0000	No Ice	2.3125	2.3750	0.06
			0.00			1/2"	2.5168	2.5809	0.08
			-2.00			Ice	2.7284	2.7943	0.11
						1" Ice	3.1740	3.2431	0.18
						2" Ice			
TME-1900MHz RRH (65 MHz)	C	From Leg	1.0000	0.00	145.0000	No Ice	2.3125	2.3750	0.06
			0.00			1/2"	2.5168	2.5809	0.08
			-2.00			Ice	2.7284	2.7943	0.11
						1" Ice	3.1740	3.2431	0.18
						2" Ice			
800 EXTERNAL NOTCH FILTER	A	From Leg	1.0000	0.00	145.0000	No Ice	0.6601	0.3211	0.01
			0.00			1/2"	0.7627	0.3983	0.02
			1.00			Ice	0.8727	0.4830	0.02
						1" Ice	1.1149	0.6744	0.04
						2" Ice			
TME-800MHZ RRH	A	From Leg	1.0000	0.00	145.0000	No Ice	2.1342	1.7730	0.05
			0.00			1/2"	2.3195	1.9461	0.07
			1.00			Ice	2.5123	2.1267	0.10
						1" Ice	2.9201	2.5100	0.16
						2" Ice			
800 EXTERNAL NOTCH FILTER	B	From Leg	1.0000	0.00	145.0000	No Ice	0.6601	0.3211	0.01
			0.00			1/2"	0.7627	0.3983	0.02
			1.00			Ice	0.8727	0.4830	0.02
						1" Ice	1.1149	0.6744	0.04
						2" Ice			
TME-800MHZ RRH	B	From Leg	1.0000	0.00	145.0000	No Ice	2.1342	1.7730	0.05
			0.00			1/2"	2.3195	1.9461	0.07
			1.00			Ice	2.5123	2.1267	0.10
						1" Ice	2.9201	2.5100	0.16
						2" Ice			
800 EXTERNAL NOTCH FILTER	C	From Leg	1.0000	0.00	145.0000	No Ice	0.6601	0.3211	0.01
			0.00			1/2"	0.7627	0.3983	0.02
			1.00			Ice	0.8727	0.4830	0.02
						1" Ice	1.1149	0.6744	0.04
						2" Ice			
TME-800MHZ RRH	C	From Leg	1.0000	0.00	145.0000	No Ice	2.1342	1.7730	0.05
			0.00			1/2"	2.3195	1.9461	0.07
			1.00			Ice	2.5123	2.1267	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice 2" Ice	2.9201	2.5100	0.16
Side Arm Mount [SO 102-3]	B	None		0.00	145.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.6000 4.1800 4.7500 5.9000	3.6000 4.1800 4.7500 5.9000	0.07 0.11 0.14 0.20
****									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	6.3292 6.7751 7.2137 8.1168	5.6424 6.4259 7.1313 8.5907	0.11 0.17 0.23 0.38
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	6.3292 6.7751 7.2137 8.1168	5.6424 6.4259 7.1313 8.5907	0.11 0.17 0.23 0.38
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	6.3292 6.7751 7.2137 8.1168	5.6424 6.4259 7.1313 8.5907	0.11 0.17 0.23 0.38
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	6.3186 6.7646 7.2032 8.1062	5.6334 6.4160 7.1208 8.5791	0.11 0.17 0.23 0.38
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	6.3186 6.7646 7.2032 8.1062	5.6334 6.4160 7.1208 8.5791	0.11 0.17 0.23 0.38
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	6.3186 6.7646 7.2032 8.1062	5.6334 6.4160 7.1208 8.5791	0.11 0.17 0.23 0.38
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	4.0000 0.00 4.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	14.6900 15.4600 16.2300 17.8200	6.8700 7.5500 8.2500 9.6700	0.19 0.31 0.46 0.79
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Leg	4.0000 0.00 4.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	14.6900 15.4600 16.2300 17.8200	6.8700 7.5500 8.2500 9.6700	0.19 0.31 0.46 0.79
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Leg	4.0000 0.00 4.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	14.6900 15.4600 16.2300 17.8200	6.8700 7.5500 8.2500 9.6700	0.19 0.31 0.46 0.79
KRY 112 144/1	A	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.3500 0.4259 0.5093 0.6981	0.1750 0.2343 0.3009 0.4565	0.01 0.01 0.02 0.03
KRY 112 144/1	B	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.3500 0.4259 0.5093 0.6981	0.1750 0.2343 0.3009 0.4565	0.01 0.01 0.02 0.03
KRY 112 144/1	C	From Leg	4.0000 0.00	0.00	121.0000	No Ice 1/2"	0.3500 0.4259	0.1750 0.2343	0.01 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice 1" Ice 2" Ice	0.5093 0.6981	0.3009 0.4565	0.02 0.03
RADIO 4449 B12/B71	A	From Leg	4.0000 0.00 4.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.6500 1.8104 1.9781 2.3359	1.1625 1.3012 1.4473 1.7618	0.07 0.09 0.11 0.16
RADIO 4449 B12/B71	B	From Leg	4.0000 0.00 4.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.6500 1.8104 1.9781 2.3359	1.1625 1.3012 1.4473 1.7618	0.07 0.09 0.11 0.16
RADIO 4449 B12/B71	C	From Leg	4.0000 0.00 4.00	0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.6500 1.8104 1.9781 2.3359	1.1625 1.3012 1.4473 1.7618	0.07 0.09 0.11 0.16
Platform Mount [LP 301-1_KCKR]	C	None		0.00	121.0000	No Ice 1/2" Ice 1" Ice 2" Ice	35.0300 44.4600 53.7200 72.2900	35.0300 44.4600 53.7200 72.2900	1.86 2.52 3.33 5.42
*****									
7770.00 w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	5.7460 6.1791 6.6067 7.4880	4.2543 5.0137 5.7109 7.1553	0.06 0.10 0.16 0.29
7770.00 w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	5.7460 6.1791 6.6067 7.4880	4.2543 5.0137 5.7109 7.1553	0.06 0.10 0.16 0.29
7770.00 w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	5.7460 6.1791 6.6067 7.4880	4.2543 5.0137 5.7109 7.1553	0.06 0.10 0.16 0.29
(3) SBNHH-1D65A w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.0400 3.3400 3.6500 4.3100	2.4500 2.7500 3.0500 3.6800	0.05 0.10 0.16 0.31
(3) SBNHH-1D65A w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.0400 3.3400 3.6500 4.3100	2.4500 2.7500 3.0500 3.6800	0.05 0.10 0.16 0.31
(3) SBNHH-1D65A w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.0400 3.3400 3.6500 4.3100	2.4500 2.7500 3.0500 3.6800	0.05 0.10 0.16 0.31
(2) LGP2140X	A	From Leg	4.0000 0.00 2.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.0800 1.2137 1.3548 1.6593	0.3580 0.4536 0.5563 0.7825	0.01 0.02 0.03 0.05
(2) LGP2140X	B	From Leg	4.0000 0.00 2.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.0800 1.2137 1.3548 1.6593	0.3580 0.4536 0.5563 0.7825	0.01 0.02 0.03 0.05
(2) LGP2140X	C	From Leg	4.0000	0.00	110.0000	No Ice	1.0800	0.3580	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2"	1.2137	0.4536	0.02
			2.00			Ice	1.3548	0.5563	0.03
						1" Ice	1.6593	0.7825	0.05
						2" Ice			
(2) 7020.00	A	From Leg	4.0000	0.00	110.0000	No Ice	0.1021	0.1750	0.00
			0.00			1/2"	0.1469	0.2393	0.01
			2.00			Ice	0.1991	0.3109	0.01
						1" Ice	0.3258	0.4765	0.02
						2" Ice			
(2) 7020.00	B	From Leg	4.0000	0.00	110.0000	No Ice	0.1021	0.1750	0.00
			0.00			1/2"	0.1469	0.2393	0.01
			2.00			Ice	0.1991	0.3109	0.01
						1" Ice	0.3258	0.4765	0.02
						2" Ice			
(2) 7020.00	C	From Leg	4.0000	0.00	110.0000	No Ice	0.1021	0.1750	0.00
			0.00			1/2"	0.1469	0.2393	0.01
			2.00			Ice	0.1991	0.3109	0.01
						1" Ice	0.3258	0.4765	0.02
						2" Ice			
RRUS 32 B2	A	From Leg	4.0000	0.00	110.0000	No Ice	2.7427	1.6681	0.05
			0.00			1/2"	2.9647	1.8552	0.07
			2.00			Ice	3.1941	2.0493	0.10
						1" Ice	3.6753	2.4585	0.16
						2" Ice			
RRUS 32 B2	B	From Leg	4.0000	0.00	110.0000	No Ice	2.7427	1.6681	0.05
			0.00			1/2"	2.9647	1.8552	0.07
			2.00			Ice	3.1941	2.0493	0.10
						1" Ice	3.6753	2.4585	0.16
						2" Ice			
RRUS 32 B2	C	From Leg	4.0000	0.00	110.0000	No Ice	2.7427	1.6681	0.05
			0.00			1/2"	2.9647	1.8552	0.07
			2.00			Ice	3.1941	2.0493	0.10
						1" Ice	3.6753	2.4585	0.16
						2" Ice			
RRUS 32 B66	A	From Leg	4.0000	0.00	110.0000	No Ice	2.7427	1.6681	0.05
			0.00			1/2"	2.9647	1.8552	0.07
			2.00			Ice	3.1941	2.0493	0.10
						1" Ice	3.6753	2.4585	0.16
						2" Ice			
RRUS 32 B66	B	From Leg	4.0000	0.00	110.0000	No Ice	2.7427	1.6681	0.05
			0.00			1/2"	2.9647	1.8552	0.07
			2.00			Ice	3.1941	2.0493	0.10
						1" Ice	3.6753	2.4585	0.16
						2" Ice			
RRUS 32 B66	C	From Leg	4.0000	0.00	110.0000	No Ice	2.7427	1.6681	0.05
			0.00			1/2"	2.9647	1.8552	0.07
			2.00			Ice	3.1941	2.0493	0.10
						1" Ice	3.6753	2.4585	0.16
						2" Ice			
RRUS 32	A	From Leg	4.0000	0.00	110.0000	No Ice	2.8571	1.7766	0.06
			0.00			1/2"	3.0830	1.9677	0.08
			2.00			Ice	3.3163	2.1658	0.10
						1" Ice	3.8052	2.5829	0.16
						2" Ice			
RRUS 32	B	From Leg	4.0000	0.00	110.0000	No Ice	2.8571	1.7766	0.06
			0.00			1/2"	3.0830	1.9677	0.08
			2.00			Ice	3.3163	2.1658	0.10
						1" Ice	3.8052	2.5829	0.16
						2" Ice			
RRUS 32	C	From Leg	4.0000	0.00	110.0000	No Ice	2.8571	1.7766	0.06
			0.00			1/2"	3.0830	1.9677	0.08
			2.00			Ice	3.3163	2.1658	0.10
						1" Ice	3.8052	2.5829	0.16
						2" Ice			
DC6-48-60-18-8F	B	From Leg	4.0000	0.00	110.0000	No Ice	1.2117	1.2117	0.03

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *K*
			0.00 2.00			1/2" Ice 1" Ice 2" Ice	1.8924 2.1051 2.5703	1.8924 2.1051 2.5703	0.05 0.08 0.14
DC6-48-60-18-8F	A	From Leg	4.0000 0.00 2.00	0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.2117 1.8924 2.1051 2.5703	1.2117 1.8924 2.1051 2.5703	0.03 0.05 0.08 0.14
Platform Mount [LP 1201-1]	B	None		0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	18.3800 22.1100 25.8700 33.4700	18.3800 22.1100 25.8700 33.4700	2.10 2.65 3.26 4.66
PRK-1245(Kickers)	B	None		0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	11.8400 16.9600 22.0800 32.3200	11.8400 16.9600 22.0800 32.3200	0.28 0.30 0.32 0.36
MT-195-14 (Hand Rail)	B	None		0.00	110.0000	No Ice 1/2" Ice 1" Ice 2" Ice	6.0000 8.5000 11.0000 16.0000	6.0000 8.5000 11.0000 16.0000	0.26 0.34 0.42 0.59
****									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	1.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.7900 4.3800 4.9900 6.2500	3.1600 3.7500 4.3500 5.5900	0.05 0.09 0.15 0.28
APXV18-206517S-C w/ Mount Pipe	B	From Leg	1.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.7900 4.3800 4.9900 6.2500	3.1600 3.7500 4.3500 5.5900	0.05 0.09 0.15 0.28
APXV18-206517S-C w/ Mount Pipe	C	From Leg	1.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.7900 4.3800 4.9900 6.2500	3.1600 3.7500 4.3500 5.5900	0.05 0.09 0.15 0.28
Pipe Mount [PM 601-3]	C	None		0.00	100.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.1700 3.7900 4.4200 5.7600	3.1700 3.7900 4.4200 5.7600	0.20 0.23 0.28 0.40
****									
GPS_A	B	From Leg	2.0000 0.00 1.00	0.00	53.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.2550 0.3205 0.3934 0.5614	0.2550 0.3205 0.3934 0.5614	0.00 0.00 0.01 0.02
Side Arm Mount [SO 701-1]	B	None		0.00	53.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.8500 1.1400 1.4300 2.0100	1.6700 2.3400 3.0100 4.3500	0.07 0.08 0.09 0.12
****									
KS24019-L112A	C	From Leg	2.0000 0.00 1.00	0.00	49.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.1407 0.1979 0.2621 0.4148	0.1407 0.1979 0.2621 0.4148	0.01 0.01 0.01 0.02
Side Arm Mount [SO 701-1]	C	None		0.00	49.0000	No Ice 1/2" Ice	0.8500 1.1400 1.4300	1.6700 2.3400 3.0100	0.07 0.08 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	2.0100	4.3500	0.12
						2" Ice			
****									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
A-ANT-23G-2-C	A	Paraboloid w/o Radome	From Leg	4.0000 0.00 2.00	0.00		147.0000	2.1750	No Ice 1/2" Ice 1" Ice 2" Ice	3.7200 4.0100 4.3000 4.8800	0.01 0.02 0.03 0.04
A-ANT-23G-2-C	B	Paraboloid w/o Radome	From Leg	4.0000 0.00 2.00	0.00		147.0000	2.1750	No Ice 1/2" Ice 1" Ice 2" Ice	3.7200 4.0100 4.3000 4.8800	0.01 0.02 0.03 0.04
VHLP2-18	C	Paraboloid w/o Radome	From Leg	4.0000 0.00 2.00	-60.00		147.0000	2.1750	No Ice 1/2" Ice 1" Ice 2" Ice	3.7200 4.0100 4.3000 4.8800	0.03 0.05 0.07 0.11

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 147.0000-99.5000	122.2279	1.32	51.38	106.839	A	0.000	106.839	106.839	100.00	0.000	0.000
					B	0.000	106.839		100.00	4.257	0.000
					C	0.000	106.839		100.00	5.444	0.000
L2 99.5000-59.0000	78.8041	1.204	46.80	116.177	A	0.000	116.177	116.177	100.00	7.806	0.000
					B	0.000	116.177		100.00	15.825	0.000
					C	0.000	116.177		100.00	12.447	0.000
L3 59.0000-29.2500	43.7930	1.064	41.45	99.457	A	0.000	99.457	99.457	100.00	30.398	0.000
					B	0.000	99.457		100.00	33.570	0.000
					C	0.000	99.457		100.00	31.089	0.000
L4 29.2500-0.0000	14.3368	0.85	33.12	108.867	A	0.000	108.867	108.867	100.00	47.274	0.000
					B	0.000	108.867		100.00	49.409	0.000
					C	0.000	108.867		100.00	46.970	0.000

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.0000-99.5000	122.2279	1.32	7.60	1.4534	118.345	A	0.000	118.345	118.345	100.00	0.000	0.000
						B	0.000	118.345		100.00	10.506	0.000
						C	0.000	118.345		100.00	24.063	0.000
L2 99.5000-59.0000	78.8041	1.204	6.92	1.3910	125.988	A	0.000	125.988	125.988	100.00	9.398	0.000
						B	0.000	125.988		100.00	29.189	0.000
						C	0.000	125.988		100.00	29.915	0.000
L3 59.0000-29.2500	43.7930	1.064	6.13	1.3116	106.354	A	0.000	106.354	106.354	100.00	51.632	0.000
						B	0.000	106.354		100.00	50.979	0.000
						C	0.000	106.354		100.00	51.419	0.000
L4 29.2500-0.0000	14.3368	0.85	4.90	1.1730	115.261	A	0.000	115.261	115.261	100.00	76.981	0.000
						B	0.000	115.261		100.00	71.444	0.000
						C	0.000	115.261		100.00	71.761	0.000

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.0000-99.5000	122.2279	1.32	10.31	106.839	A	0.000	106.839	106.839	100.00	0.000	0.000
					B	0.000	106.839		100.00	4.257	0.000
					C	0.000	106.839		100.00	5.444	0.000
L2 99.5000-59.0000	78.8041	1.204	9.39	116.177	A	0.000	116.177	116.177	100.00	7.806	0.000
					B	0.000	116.177		100.00	15.825	0.000
					C	0.000	116.177		100.00	12.447	0.000
L3 59.0000-29.2500	43.7930	1.064	8.32	99.457	A	0.000	99.457	99.457	100.00	30.398	0.000
					B	0.000	99.457		100.00	33.570	0.000
					C	0.000	99.457		100.00	31.089	0.000
L4 29.2500-0.0000	14.3368	0.85	6.64	108.867	A	0.000	108.867	108.867	100.00	47.274	0.000
					B	0.000	108.867		100.00	49.409	0.000
					C	0.000	108.867		100.00	46.970	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

Comb. No.	Description
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	147 - 99.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-34.63	-0.62	0.04
			Max. Mx	20	-14.96	515.27	5.30
			Max. My	2	-14.88	10.21	529.02
			Max. Vy	20	-22.44	515.27	5.30
			Max. Vx	2	-22.75	10.21	529.02
			Max. Torque	5			1.68
L2	99.5 - 59	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-45.86	-1.01	-0.09
			Max. Mx	20	-22.79	1534.65	9.87
			Max. My	2	-22.73	19.47	1560.66
			Max. Vy	20	-28.49	1534.65	9.87
			Max. Vx	2	-28.79	19.47	1560.66
			Max. Torque	5			1.53
L3	59 - 29.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-56.83	-1.13	-0.17
			Max. Mx	8	-30.82	-2427.93	7.55
			Max. My	2	-30.79	26.13	2472.70
			Max. Vy	8	33.31	-2427.93	7.55
			Max. Vx	2	-33.63	26.13	2472.70
			Max. Torque	5			1.52
L4	29.25 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-72.34	-1.08	-0.31
			Max. Mx	8	-42.64	-3664.93	9.77
			Max. My	2	-42.64	33.66	3719.31
			Max. Vy	8	38.18	-3664.93	9.77
			Max. Vx	2	-38.44	33.66	3719.31
			Max. Torque	5			1.49

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	72.34	-0.00	-0.00
	Max. H_x	21	32.01	36.96	0.10
	Max. H_z	3	32.01	0.21	38.40
	Max. M_x	2	3719.31	0.21	38.40
	Max. M_z	8	3664.93	-38.14	0.06
	Max. Torsion	5	1.48	-18.52	32.30
	Min. Vert	15	32.01	0.04	-37.16
	Min. H_x	9	32.01	-38.14	0.06
	Min. H_z	15	32.01	0.04	-37.16
	Min. M_x	14	-3652.67	0.04	-37.16
	Min. M_z	20	-3623.09	36.96	0.10
	Min. Torsion	11	-0.56	-33.02	-19.35

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	35.56	0.00	-0.00	-0.15	-0.40	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	42.68	-0.21	-38.40	-3719.31	33.66	-1.21
0.9 Dead+1.0 Wind 0 deg - No Ice	32.01	-0.21	-38.40	-3669.60	33.23	-1.21
1.2 Dead+1.0 Wind 30 deg - No Ice	42.68	18.52	-32.30	-3165.33	-1807.15	-1.48
0.9 Dead+1.0 Wind 30 deg - No Ice	32.01	18.52	-32.30	-3122.68	-1782.75	-1.48
1.2 Dead+1.0 Wind 60 deg - No Ice	42.68	31.97	-18.79	-1859.54	-3130.11	-1.46
0.9 Dead+1.0 Wind 60 deg - No Ice	32.01	31.97	-18.79	-1834.34	-3087.93	-1.46
1.2 Dead+1.0 Wind 90 deg - No Ice	42.68	38.14	-0.06	-9.77	-3664.93	0.30
0.9 Dead+1.0 Wind 90 deg - No Ice	32.01	38.14	-0.06	-9.56	-3616.19	0.30
1.2 Dead+1.0 Wind 120 deg - No Ice	42.68	33.02	19.35	1881.22	-3179.17	0.56
0.9 Dead+1.0 Wind 120 deg - No Ice	32.01	33.02	19.35	1856.06	-3136.70	0.56
1.2 Dead+1.0 Wind 150 deg - No Ice	42.68	18.38	32.19	3166.79	-1796.66	0.54
0.9 Dead+1.0 Wind 150 deg - No Ice	32.01	18.38	32.19	3124.17	-1772.42	0.54
1.2 Dead+1.0 Wind 180 deg - No Ice	42.68	-0.04	37.16	3652.67	4.91	0.34
0.9 Dead+1.0 Wind 180 deg - No Ice	32.01	-0.04	37.16	3603.69	4.96	0.34
1.2 Dead+1.0 Wind 210 deg - No Ice	42.68	-18.98	33.11	3209.03	1830.58	-0.14
0.9 Dead+1.0 Wind 210 deg - No Ice	32.01	-18.98	33.11	3166.19	1806.33	-0.13
1.2 Dead+1.0 Wind 240 deg - No Ice	42.68	-33.17	19.19	1857.84	3206.03	0.06
0.9 Dead+1.0 Wind 240 deg - No Ice	32.01	-33.17	19.19	1833.05	3163.33	0.06
1.2 Dead+1.0 Wind 270 deg - No Ice	42.68	-36.96	-0.10	-16.92	3623.09	0.29
0.9 Dead+1.0 Wind 270 deg - No Ice	32.01	-36.96	-0.10	-16.59	3574.68	0.28
1.2 Dead+1.0 Wind 300 deg - No Ice	42.68	-32.25	-18.91	-1867.47	3153.61	-0.93
0.9 Dead+1.0 Wind 300 deg - No Ice	32.01	-32.25	-18.91	-1842.19	3111.40	-0.94
1.2 Dead+1.0 Wind 330 deg - No Ice	42.68	-19.22	-33.31	-3217.24	1854.88	-0.91

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
0.9 Dead+1.0 Wind 330 deg - No Ice	32.01	-19.22	-33.31	-3174.23	1830.25	-0.92
1.2 Dead+1.0 Ice+1.0 Temp	72.34	0.00	0.00	0.31	-1.08	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	72.34	-0.04	-7.64	-822.46	6.29	-0.21
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	72.34	3.79	-6.61	-709.37	-405.93	-0.26
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	72.34	6.55	-3.84	-415.16	-703.21	-0.26
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	72.34	7.58	-0.01	-0.63	-812.18	0.05
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	72.34	6.56	3.84	416.13	-704.04	0.09
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	72.34	3.77	6.60	711.38	-405.50	0.09
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	72.34	-0.00	7.62	820.16	-1.13	0.06
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	72.34	-3.77	6.59	710.10	403.22	-0.02
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	72.34	-6.59	3.81	410.62	707.08	0.01
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	72.34	-7.58	-0.02	-3.83	811.77	0.05
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	72.34	-6.57	-3.85	-417.05	704.23	-0.18
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	72.34	-3.82	-6.62	-711.75	409.46	-0.17
Dead+Wind 0 deg - Service	35.56	-0.04	-7.70	-741.48	6.38	-0.24
Dead+Wind 30 deg - Service	35.56	3.72	-6.48	-630.96	-360.48	-0.30
Dead+Wind 60 deg - Service	35.56	6.41	-3.77	-370.71	-624.14	-0.29
Dead+Wind 90 deg - Service	35.56	7.65	-0.01	-2.06	-730.84	0.06
Dead+Wind 120 deg - Service	35.56	6.62	3.88	374.82	-633.96	0.10
Dead+Wind 150 deg - Service	35.56	3.69	6.46	631.00	-358.39	0.10
Dead+Wind 180 deg - Service	35.56	-0.01	7.46	727.95	0.65	0.07
Dead+Wind 210 deg - Service	35.56	-3.81	6.64	639.47	364.53	-0.02
Dead+Wind 240 deg - Service	35.56	-6.65	3.85	370.17	638.68	0.01
Dead+Wind 270 deg - Service	35.56	-7.41	-0.02	-3.49	721.81	0.05
Dead+Wind 300 deg - Service	35.56	-6.47	-3.79	-372.30	628.20	-0.20
Dead+Wind 330 deg - Service	35.56	-3.86	-6.68	-641.36	369.38	-0.19

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-35.56	0.00	-0.00	35.56	0.00	0.000%
2	-0.21	-42.68	-38.40	0.21	42.68	38.40	0.003%
3	-0.21	-32.01	-38.40	0.21	32.01	38.40	0.002%
4	18.52	-42.68	-32.30	-18.52	42.68	32.30	0.000%
5	18.52	-32.01	-32.30	-18.52	32.01	32.30	0.000%
6	31.97	-42.68	-18.79	-31.97	42.68	18.79	0.000%
7	31.97	-32.01	-18.79	-31.97	32.01	18.79	0.000%
8	38.15	-42.68	-0.06	-38.14	42.68	0.06	0.007%
9	38.15	-32.01	-0.06	-38.14	32.01	0.06	0.005%
10	33.02	-42.68	19.35	-33.02	42.68	-19.35	0.000%
11	33.02	-32.01	19.35	-33.02	32.01	-19.35	0.000%
12	18.38	-42.68	32.19	-18.38	42.68	-32.19	0.000%
13	18.38	-32.01	32.19	-18.38	32.01	-32.19	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
14	-0.04	-42.68	37.17	0.04	42.68	-37.16	0.007%
15	-0.04	-32.01	37.17	0.04	32.01	-37.16	0.005%
16	-18.98	-42.68	33.11	18.98	42.68	-33.11	0.000%
17	-18.98	-32.01	33.11	18.98	32.01	-33.11	0.000%
18	-33.17	-42.68	19.19	33.17	42.68	-19.19	0.000%
19	-33.17	-32.01	19.19	33.17	32.01	-19.19	0.000%
20	-36.96	-42.68	-0.10	36.96	42.68	0.10	0.007%
21	-36.96	-32.01	-0.10	36.96	32.01	0.10	0.005%
22	-32.25	-42.68	-18.91	32.25	42.68	18.91	0.000%
23	-32.25	-32.01	-18.91	32.25	32.01	18.91	0.000%
24	-19.22	-42.68	-33.31	19.22	42.68	33.31	0.000%
25	-19.22	-32.01	-33.31	19.22	32.01	33.31	0.000%
26	0.00	-72.34	0.00	-0.00	72.34	-0.00	0.000%
27	-0.04	-72.34	-7.64	0.04	72.34	7.64	0.001%
28	3.79	-72.34	-6.62	-3.79	72.34	6.61	0.001%
29	6.55	-72.34	-3.84	-6.55	72.34	3.84	0.001%
30	7.58	-72.34	-0.01	-7.58	72.34	0.01	0.001%
31	6.56	-72.34	3.85	-6.56	72.34	-3.84	0.001%
32	3.78	-72.34	6.60	-3.77	72.34	-6.60	0.001%
33	-0.00	-72.34	7.62	0.00	72.34	-7.62	0.001%
34	-3.77	-72.34	6.59	3.77	72.34	-6.59	0.001%
35	-6.59	-72.34	3.81	6.59	72.34	-3.81	0.001%
36	-7.58	-72.34	-0.02	7.58	72.34	0.02	0.001%
37	-6.57	-72.34	-3.85	6.57	72.34	3.85	0.001%
38	-3.82	-72.34	-6.63	3.82	72.34	6.62	0.001%
39	-0.04	-35.56	-7.70	0.04	35.56	7.70	0.002%
40	3.72	-35.56	-6.48	-3.72	35.56	6.48	0.002%
41	6.41	-35.56	-3.77	-6.41	35.56	3.77	0.002%
42	7.65	-35.56	-0.01	-7.65	35.56	0.01	0.002%
43	6.62	-35.56	3.88	-6.62	35.56	-3.88	0.002%
44	3.69	-35.56	6.46	-3.69	35.56	-6.46	0.002%
45	-0.01	-35.56	7.46	0.01	35.56	-7.46	0.002%
46	-3.81	-35.56	6.64	3.81	35.56	-6.64	0.002%
47	-6.65	-35.56	3.85	6.65	35.56	-3.85	0.002%
48	-7.42	-35.56	-0.02	7.41	35.56	0.02	0.002%
49	-6.47	-35.56	-3.79	6.47	35.56	3.79	0.002%
50	-3.86	-35.56	-6.68	3.86	35.56	6.68	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00003487	0.00010404
3	Yes	15	0.00002186	0.00007748
4	Yes	18	0.00000001	0.00012914
5	Yes	18	0.00000001	0.00008542
6	Yes	18	0.00000001	0.00013581
7	Yes	18	0.00000001	0.00008997
8	Yes	14	0.00008553	0.00010041
9	Yes	14	0.00005510	0.00008143
10	Yes	18	0.00000001	0.00013477
11	Yes	18	0.00000001	0.00008900
12	Yes	18	0.00000001	0.00012994
13	Yes	18	0.00000001	0.00008602
14	Yes	14	0.00008535	0.00011208
15	Yes	14	0.00005497	0.00009027
16	Yes	18	0.00000001	0.00013174
17	Yes	18	0.00000001	0.00008702
18	Yes	18	0.00000001	0.00013402
19	Yes	18	0.00000001	0.00008846
20	Yes	14	0.00008554	0.00012696
21	Yes	14	0.00005510	0.00010018
22	Yes	18	0.00000001	0.00013392
23	Yes	18	0.00000001	0.00008851

24	Yes	18	0.00000001	0.00013567
25	Yes	18	0.00000001	0.00008958
26	Yes	6	0.00000001	0.00000001
27	Yes	16	0.00000001	0.00007528
28	Yes	16	0.00000001	0.00009248
29	Yes	16	0.00000001	0.00009371
30	Yes	16	0.00000001	0.00007402
31	Yes	16	0.00000001	0.00009369
32	Yes	16	0.00000001	0.00009295
33	Yes	16	0.00000001	0.00007495
34	Yes	16	0.00000001	0.00009236
35	Yes	16	0.00000001	0.00009302
36	Yes	16	0.00000001	0.00007396
37	Yes	16	0.00000001	0.00009343
38	Yes	16	0.00000001	0.00009373
39	Yes	14	0.00000001	0.00002984
40	Yes	14	0.00000001	0.00003282
41	Yes	14	0.00000001	0.00004153
42	Yes	14	0.00000001	0.00002850
43	Yes	14	0.00000001	0.00003903
44	Yes	14	0.00000001	0.00003517
45	Yes	14	0.00000001	0.00002884
46	Yes	14	0.00000001	0.00003707
47	Yes	14	0.00000001	0.00003753
48	Yes	14	0.00000001	0.00002851
49	Yes	14	0.00000001	0.00003488
50	Yes	14	0.00000001	0.00004111

Maximum Tower Deflections - Service Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* *°*	*Twist* *°*
L1	147 - 99.5	27.10	39	1.51	0.00
L2	103.25 - 59	13.97	39	1.27	0.00
L3	63.75 - 29.25	5.27	39	0.78	0.00
L4	34.5 - 0	1.56	39	0.41	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* *°*	*Twist* *°*	*Radius of Curvature* *ft*
149.0000	A-ANT-23G-2-C	39	27.10	1.51	0.00	46983
147.0000	Top Hat 10" Diameter x 4' 6" Tall	39	27.10	1.51	0.00	46983
145.0000	TME-1900MHz RRH (65 MHz)	39	26.47	1.51	0.00	46983
121.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	39	19.02	1.40	0.00	9034
110.0000	7770.00 w/ Mount Pipe	39	15.82	1.33	0.00	6348
100.0000	APXV18-206517S-C w/ Mount Pipe	39	13.11	1.24	0.00	5274
53.0000	GPS_A	39	3.62	0.64	0.00	4119
49.0000	KS24019-L112A	39	3.08	0.59	0.00	4028

Maximum Tower Deflections - Design Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* *°*	*Twist* *°*
L1	147 - 99.5	135.92	2	7.61	0.01

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L2	103.25 - 59	70.09	2	6.40	0.00
L3	63.75 - 29.25	26.47	2	3.91	0.00
L4	34.5 - 0	7.83	2	2.04	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149.0000	A-ANT-23G-2-C	2	135.92	7.61	0.02	9647
147.0000	Top Hat 10" Diameter x 4' 6" Tall	2	135.92	7.61	0.02	9647
145.0000	TME-1900MHz RRH (65 MHz)	2	132.75	7.57	0.02	9647
121.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	2	95.43	7.06	0.01	1850
110.0000	7770.00 w/ Mount Pipe	2	79.39	6.69	0.01	1297
100.0000	APXV18-206517S-C w/ Mount Pipe	2	65.79	6.24	0.01	1074
53.0000	GPS_A	2	18.15	3.20	0.00	825
49.0000	KS24019-L112A	2	15.47	2.94	0.00	806

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	147 - 99.5 (1)	TP30.313x22x0.25	47.500 0	0.0000	0.0	23.672 4	-14.88	1278.31	0.012
L2	99.5 - 59 (2)	TP36.9x29.1567x0.3125	44.250 0	0.0000	0.0	35.979 8	-22.73	2104.82	0.011
L3	59 - 29.25 (3)	TP41.481x35.4438x0.375	34.500 0	0.0000	0.0	48.526 2	-30.79	2838.78	0.011
L4	29.25 - 0 (4)	TP45.85x39.8123x0.4375	34.500 0	0.0000	0.0	63.974 9	-42.64	3742.53	0.011

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	147 - 99.5 (1)	TP30.313x22x0.25	529.12	857.29	0.617	0.00	857.29	0.000
L2	99.5 - 59 (2)	TP36.9x29.1567x0.3125	1560.78	1707.36	0.914	0.00	1707.36	0.000
L3	59 - 29.25 (3)	TP41.481x35.4438x0.375	2472.84	2662.28	0.929	0.00	2662.28	0.000
L4	29.25 - 0 (4)	TP45.85x39.8123x0.4375	3719.47	4017.32	0.926	0.00	4017.32	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	147 - 99.5 (1)	TP30.313x22x0.25	22.75	383.49	0.059	1.24	991.98	0.001
L2	99.5 - 59 (2)	TP36.9x29.1567x0.3125	28.80	631.45	0.046	1.23	1986.04	0.001
L3	59 - 29.25 (3)	TP41.481x35.4438x0.375	33.63	851.63	0.039	1.21	3010.53	0.000
L4	29.25 - 0 (4)	TP45.85x39.8123x0.4375	38.44	1122.76	0.034	1.21	4484.99	0.000

Pole Interaction Design Data

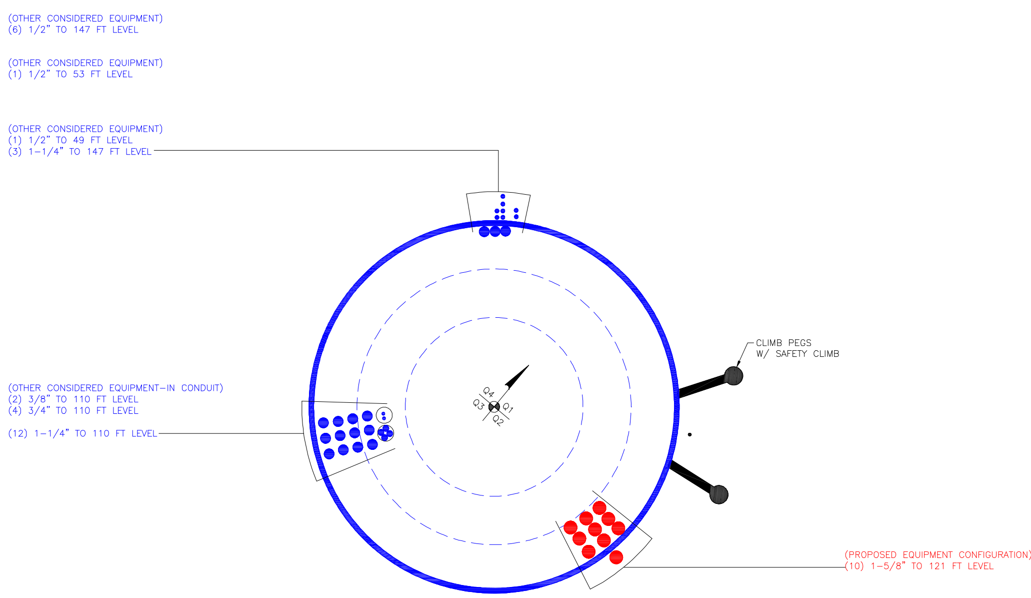
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	147 - 99.5 (1)	0.012	0.617	0.000	0.059	0.001	0.633	1.050	4.8.2
L2	99.5 - 59 (2)	0.011	0.914	0.000	0.046	0.001	0.927	1.050	4.8.2
L3	59 - 29.25 (3)	0.011	0.929	0.000	0.039	0.000	0.941	1.050	4.8.2
L4	29.25 - 0 (4)	0.011	0.926	0.000	0.034	0.000	0.938	1.050	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
L1	147 - 99.5	Pole	TP30.313x22x0.25	1	-14.88	1342.23	60.2	Pass
L2	99.5 - 59	Pole	TP36.9x29.1567x0.3125	2	-22.73	2210.06	88.3	Pass
L3	59 - 29.25	Pole	TP41.481x35.4438x0.375	3	-30.79	2980.72	89.6	Pass
L4	29.25 - 0	Pole	TP45.85x39.8123x0.4375	4	-42.64	3929.66	89.4	Pass
							Summary	
						Pole (L3)	89.6	Pass
						RATING =	**89.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(OTHER CONSIDERED EQUIPMENT)
(6) 1/2" TO 147 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 53 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 49 FT LEVEL
(3) 1-1/4" TO 147 FT LEVEL
CLIMB PEGS
W/ SAFETY CLIMB
(OTHER CONSIDERED EQUIPMENT-IN CONDUIT)
(2) 3/8" TO 110 FT LEVEL
(4) 3/4" TO 110 FT LEVEL
(12) 1-1/4" TO 110 FT LEVEL
Q4
Q3
Q1
Q2
(PROPOSED EQUIPMENT CONFIGURATION)
(10) 1-5/8" TO 121 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

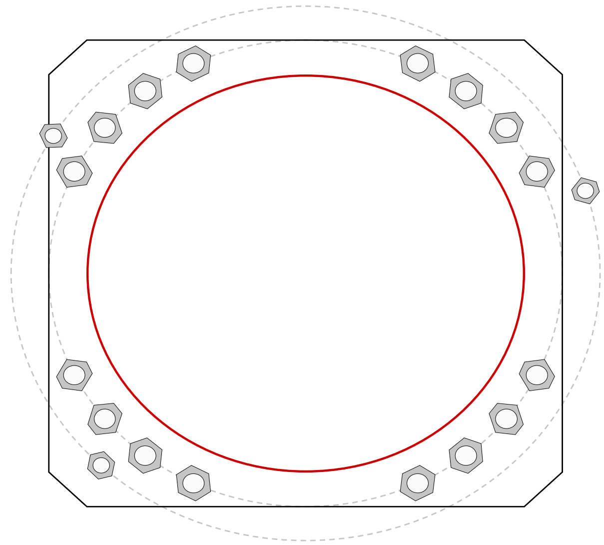
Monopole Base Plate Connection

Site Info	
BU #	
Site Name	
Order #	

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

Applied Loads	
Moment (kip-ft)	3719.43
Axial Force (kips)	42.64
Shear Force (kips)	38.44

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

GROUP 1: (16) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 54" BC
Anchor Spacing: 6 in
GROUP 2: (3) 1-3/4" ø bolts (A193 Gr. B7 N; Fy=105 ksi, Fu=125 ksi) on 61.85" BC
pos. (deg): 18, 149, 226

Base Plate Data

54" OD x 3.5" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Stiffener Data

N/A

Pole Data

45.85" x 0.4375" 12-sided pole (A607-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

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

GROUP 1:

Pu_c = 196.49	ϕPn_c = 243.75	**Stress Rating**
Vu = 2.4	ϕVn = 73.13	**76.9%**
Mu = n/a	ϕMn = n/a	Pass

GROUP 2:

Pu_c = 119.79	ϕPn_c = 199.5	**Stress Rating**
Vu = 0	ϕVn = 59.85	**57.2%**
Mu = n/a	ϕMn = n/a	Pass

Base Plate Summary

Max Stress (ksi):	26.05	(Flexural)
Allowable Stress (ksi):	45	
Stress Rating:	**55.1%**	Pass

Pier and Pad Foundation

BU # :	876321
Site Name:	
App. Number:	

TIA-222 Revision:	H
Tower Type:	Monopole

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

Superstructure Analysis Reactions		
Compression, P_{comp}:	43	kips
Base Shear, Vu_comp:	38	kips
Moment, M_u:	3719	ft-kips
Tower Height, **H**:	147	ft
BP Dist. Above Fdn, bp_{dist}:	2.5	in

Foundation Analysis Checks	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	346.43	38.00	**10.4%**	**Pass**
Bearing Pressure (ksf)	6.00	4.16	**69.3%**	**Pass**
*Overturning (kip*ft)*	4904.30	4163.92	**84.9%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	4076.63	4042.00	**94.4%**	**Pass**
Pier Compression (kip)	23390.64	105.13	**0.4%**	**Pass**
*Pad Flexure (kip*ft)*	4322.10	2187.06	**48.2%**	**Pass**
Pad Shear - 1-way (kips)	624.22	358.92	**54.8%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.164	0.000	**0.0%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	6631.37	2425.20	**34.8%**	**Pass**

Pier Properties		
Pier Shape:	Square	
Pier Diameter, **dpier**:	7	ft
Ext. Above Grade, **E**:	0.5	ft
Pier Rebar Size, **Sc**:	11	
Pier Rebar Quantity, **mc**:	16	
Pier Tie/Spiral Size, **St**:	5	
Pier Tie/Spiral Quantity, **mt**:	12	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

*Rating per TIA-222-H Section 15.5

Soil Rating*:	**84.9%**
Structural Rating*:	*

*See SP Column for steel calculations

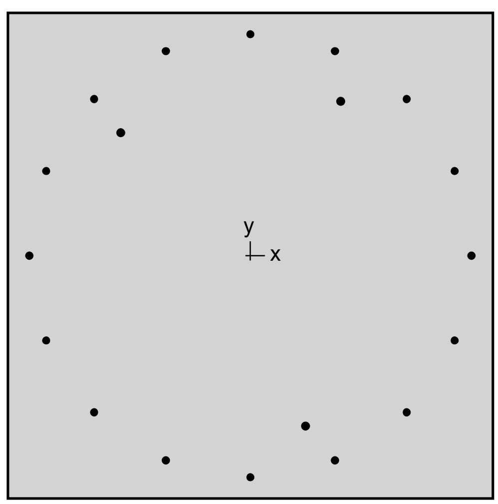
Pad Properties		
Depth, **D**:	11	ft
Pad Width, **W**:	20.5	ft
Pad Thickness, **T**:	3	ft
Pad Rebar Size (Bottom), **Sp**:	11	
Pad Rebar Quantity (Bottom), **mp**:	21	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties		
Rebar Grade, **Fy**:	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, Qult:	8.000	ksf	<--Toggle between Gross and Net
Cohesion, **Cu**:	0.000	ksf	
Friction Angle, φ:	35	degrees	
SPT Blow Count, N_{blows}:	34		
Base Friction, μ:			
Neglected Depth, **N**:	3.50	ft	
Foundation Bearing on Rock?	No		
Groundwater Depth, **gw**:	4.5	ft	

Version 3.2.0

spColumn v6.00
Computer program for the Strength Design of Reinforced Concrete Sections



Contents

List of Figures

1. General Information

File Name	g:\tower\375_crown_...\foundation steel check.col
Project	37519-2435.001.7805
Column	BU 876321
Engineer	GP
Code	ACI 318-14
Bar Set	ASTM A615
Units	English
Run Option	Investigation
Run Axis	X - axis
Slenderness	Not Considered
Column Type	Architectural

2. Material Properties

2.1. Concrete

Type	Standard	
f'_c	3	ksi
E_c	3122.02	ksi
f_c	2.55	ksi
ε_u	0.003	in/in
β_1	0.85	

2.2. Steel

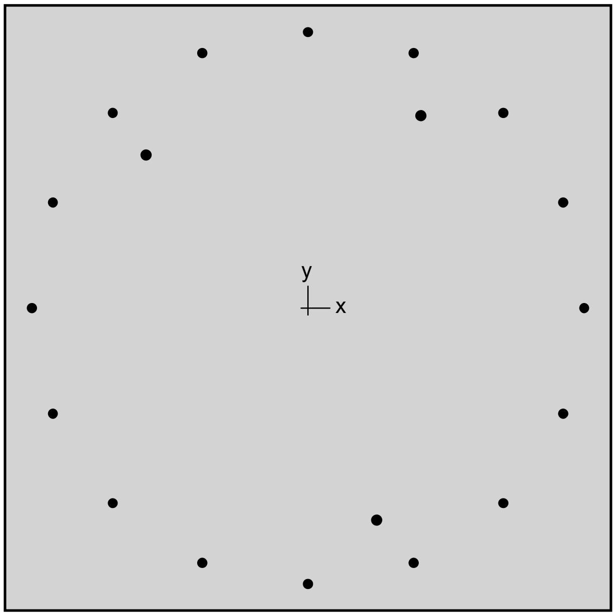
Type	Standard	
f_y	60	ksi
E_s	29000	ksi
ε_{yt}	0.00206897	in/in

3. Section

3.1. Shape and Properties

Type	Rectangular	
Width	84	in
Depth	84	in
A_g	7056	in^2
I_x	4.14893e+006	in^4
I_y	4.14893e+006	in^4
r_x	24.2487	in
r_y	24.2487	in
X_o	0	in
Y_o	0	in

3.2. Section Figure



Rectangular 84 x 84 in 0.43% reinf.

Figure 1: Column section

4. Reinforcement

4.1. Bar Set: ASTM A615

Bar	Diameter	Area	Bar	Diameter	Area	Bar	Diameter	Area
	in	in^2		in	in^2		in	in^2
#3	0.38	0.11	#4	0.50	0.20	#5	0.63	0.31
#6	0.75	0.44	#7	0.88	0.60	#8	1.00	0.79
#9	1.13	1.00	#10	1.27	1.27	#11	1.41	1.56
#14	1.69	2.25	#18	2.26	4.00			

4.2. Confinement and Factors

Confinement type	Tied
For #10 bars or less	#3 ties
For larger bars	#4 ties
Capacity Reduction Factors	
Axial compression, (a)	0.8
Tension controlled ϕ, (b)	0.9
Compression controlled ϕ, (c)	0.65

4.3. Arrangement

Pattern	Irregular
Bar layout	---
Cover to	---
Clear cover	---
Bars	---

Total steel area, A_s	30.66 in²
Rho	0.43 %
Minimum clear spacing	5.95 in

(Note: Rho < 0.50%)

4.4. Bars Provided

Area	X	Y	Area	X	Y	Area	X	Y
in²	in	in	in²	in	in	in²	in	in
1.56	0.0	38.3	1.56	14.7	35.4	1.56	27.1	27.1
1.56	35.4	14.7	1.56	38.3	0.0	1.56	35.4	-14.7
1.56	27.1	-27.1	1.56	14.7	-35.4	1.56	0.0	-38.3
1.56	-14.7	-35.4	1.56	-27.1	-27.1	1.56	-35.4	-14.7
1.56	-38.3	0.0	1.56	-35.4	14.7	1.56	-27.1	27.1
1.56	-14.7	35.4	1.90	9.5	-29.4	1.90	15.7	26.7
1.90	-22.5	21.3						

5. Factored Loads and Moments with Corresponding Capacities

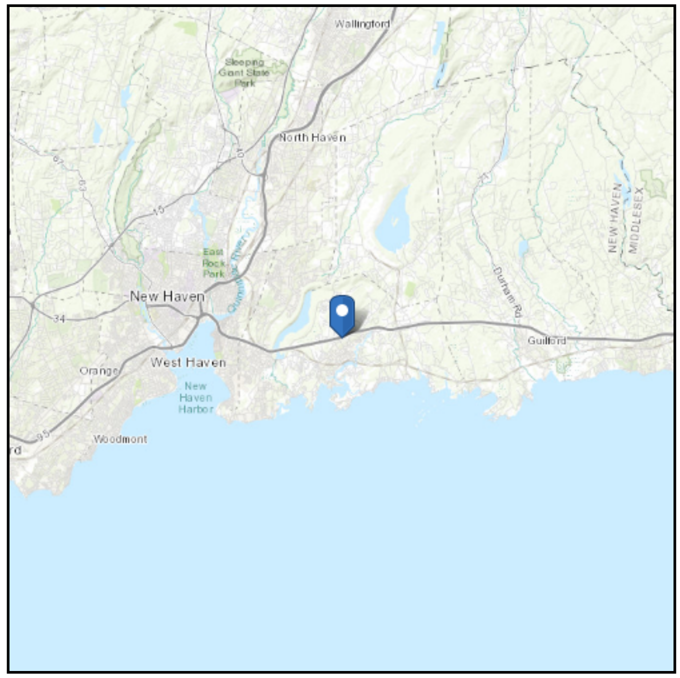
No	P_u	M_{ux}	ϕM_{nx}	$\phi M_n/M_u$	NA Depth	d_t Depth	ε_t	ϕ
	kip	k-ft	k-ft		in	in		
1	-91.37	4163.62	4771.41	1.146	12.53	80.29	0.01622	0.900

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 57.7 ft (NAVD 88)
Latitude: 41.288611
Longitude: -72.813861



Wind

Results:

Wind Speed:	127 Vmph
10-year MRI	78 Vmph
25-year MRI	88 Vmph
50-year MRI	95 Vmph
100-year MRI	103 Vmph

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

Date Accessed: Mon Jun 03 2019

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

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

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

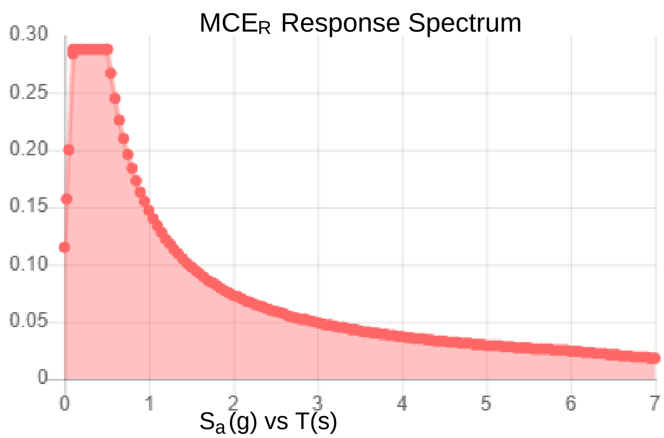
Seismic

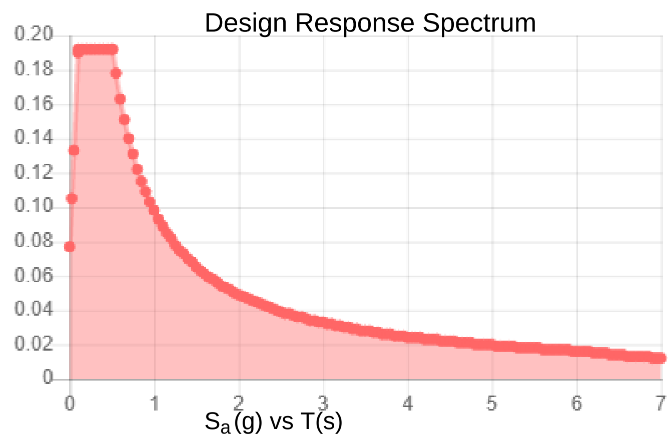
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.18	S_{DS} :	0.192
S_1 :	0.061	S_{D1} :	0.098
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.093
S_{MS} :	0.288	PGA_M :	0.149
S_{M1} :	0.147	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Mon Jun 03 2019

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

Ice

Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	15 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Mon Jun 03 2019

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

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

Exhibit E

Mount Analysis

Date: May 28, 2019

CLS Engineering PLLC
319 Chapanoke Road, Suite 118
Raleigh, NC 27603
(405) 348-5460
Engineering@clsengineeringpllc.com

Kevin Morrow
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(704) 405-6619

Subject:	**Mount Replacement Report**	
Carrier Designation:	**T-Mobile Equipment Change-Out**	
	Carrier Site Number:	CTNH107A
	Carrier Site Name:	NH107/Global/Cherry Hill
Crown Castle Designation:	**Crown Castle BU Number:**	876321
	Crown Castle Site Name:	Branford Banm Tower
	Crown Castle JDE Job Number:	559323
	Crown Castle Order Number:	479853 Rev. 0
Engineering Firm Designation:	**CLS Engineering PLLC Project #:**	42284-CTNH107A-02-MR
Site Data:	**150 North Main Street, Branford, CT 06405, New Haven County**	
	Latitude: 41° 17' 19.00" Longitude: -72° 48' 49.90"	
Structure Information:	**Tower Height & Type:**	147 ft Monopole
	Mount Elevation:	121 ft
	Mount Width & Type:	12.5 ft Site Pro 1 RMQP-4096-HK

Dear Kevin Morrow,

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

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

Site Pro 1 RMQP-4096-HK	**Sufficient***

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

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

Mount analysis prepared by: Michelle Lin

Respectfully Submitted by:

Tyler M. Barker, P.E.
Director of Engineering

STATE OF CONNECTICUT
TYLER M BARKER
No. 32402
LICENSED
PROFESSIONAL ENGINEER

Tyler M. Barker
CLS Engineering, PLLC
Director of Engineering
PE # 32402 Exp. 1/31/2020
COA # PEC.001833 Exp. 8/14/2019

Digitally signed by Tyler Barker
DN: c=US, o=Telamon Corporation, ou=A01427E0000016A4525ADF800001D17, cn=Tyler Barker
Date: 2019.05.28 17:53:44 -04'00'

TABLE OF CONTENTS

1. INTRODUCTION

The proposed equipment is to be mounted to the existing Site Pro 1 RMQP-4096-HK. This proposed mounting configuration was analyzed using RISA-3D, a commercially available finite element analysis software package. A selection of input and output from our analysis is attached to the end of this report.

2. ANALYSIS CRITERIA

STANDARD	2015 IBC / 2018 Connecticut State Building Code / TIA-222-H
BASIC WIND SPEED	130 mph, V_{ult} (3-Second Gust)
BASIC WIND SPEED W/ ICE	50 mph (3-Second Gust) w/ 1.5" Radial Ice (Escalating)
EXPOSURE CATEGORY	C
MAX. TOPOGRAPHIC FACTOR,	1.00
RISK CATEGORY	II
MAINTENANCE LIVE LOAD	L_M: 500 lb

Table 1 - Final Equipment Configuration

ELEVATION (ft)		ANTENNAS	
MOUNT	RAD.	#	NAME
121.0	121.0	3	RFS Celwave APXVAARR24_43-U-NA20
		3	Ericsson AIR 21 B2A/B4P
		3	Ericsson AIR 21 B4A/B2P
		3	Ericsson RADIO 4449 B12/B71
		3	Ericsson KRY 112 144/1

3. ANALYSIS PROCEDURE

Table 2 - Documents Provided

STRUCTURAL DATA	Assembly Drawings by Site Pro 1, Part No. RMQP-4096-HK, Rev. A, dated July 14, 2014
PREVIOUS ANALYSES	Mount Analysis by CLS Group, Project No. 42284-CTNH107A-01-MA, dated April 29, 2019 Tower SA by Tower Engineering Professionals, Project #25579.155918, dated January 31, 2018
LOADING DATA	Crown Castle Order ID #479853 Rev. 0, dated April 22, 2019

3.1. Analysis Method

RISA-3D, a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases. This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 Tower Mount Analysis (Revision B).

4. ANALYSIS RESULTS

Table 3 - Mount Component Stresses vs. Capacity

COMPONENT	PEAK USAGE	RESULT
Connection Plate	84%	Pass
Support Rail	43%	Pass
Mount Pipes	36%	Pass
Collar Reactions	30%	Pass
Connections	18%	Pass
Platform Base	11%	Pass

Structure Rating (max from all components) =	84%

Notes:

1) **See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.**

4.1 Conclusion and Recommendations

According to our structural analysis, the mounts have been found to **PASS PENDING REPLACEMENT**. The mounting configuration considered in this analysis will be capable of supporting the referenced loading pursuant to referenced standards once the following scope is executed:

- **Replace existing T-Arms with (1) proposed Site Pro 1 RMQP-4096-HK platform mount.**
- **All mount pipes are to be installed equidistant from each other as shown in the following sketches.**
- **Install existing and proposed antennas such that they are centered vertically on the platform base. Install existing and proposed RRUS and TMAs behind antennas.**

See “Appendix E: Installation Sketches and Mount Assembly Drawings” for additional details.

5. ASSUMPTIONS AND CONDITIONS

This analysis is inclusive of the antenna supporting frames/mounts and all recorded connections that will support the equipment listed in this report. It considers only the theoretical capacity of structural components and it is not a condition assessment. The validity of the analysis may be dependent on the accuracy of structural information supplied by others. The client is responsible for verifying this information. If any provided information is revised after completion of this analysis, CLS Engineering PLLC should be notified immediately to revise results.

This analysis assumes the following:

1. The tower or other superstructure and mounts (if existing) were properly constructed as per the original design and have been properly maintained in accordance with applicable code standards.
2. Member sizes and strengths are accurate as supplied or are assumed as stated in the calculations.
3. In the absence of sufficient design information, all welds and connections are assumed to develop at least the capacity of the connected member, unless otherwise stated in this analysis.
4. All prior structural modifications, if any, are assumed to be correctly installed and fully effective.
5. The loading configuration is complete and accurate as supplied and/or as modeled in the previous analysis. All appurtenances are assumed to be properly installed and supported as per manufacturer requirements.
6. Some conservative assumptions may be used regarding appurtenances and their projected areas based on careful interpretation of data supplied, previous experience and standard industry practice.

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of the report. All opinions and conclusions contained herein are subject to revision based upon receipt of new or updated information. All services are provided exercising a level of care and diligence equivalent to the standard of our profession. No warranty or guarantee, either expressed or implied, is offered. All services are confidential in nature and this report will not be released to any other party without the client’s consent. The use of this analysis is limited to the expressed purpose for which it was commissioned and it may not be reused, copied or disseminated for any other purpose without consent from CLS Engineering PLLC.

All services were performed, results obtained and recommendations made in accordance with generally accepted engineering principles and practices. CLS Engineering PLLC is not responsible for the conclusions, opinions or recommendations made by others based on the information supplied in this analysis.

It is not possible to have the fully detailed information necessary to perform a complete and thorough analysis of every structural sub-component of an existing structure. The structural analysis by CLS Engineering PLLC verifies the adequacy of the primary members of the structure. CLS Engineering PLLC provides a limited scope of service in that we cannot verify the adequacy of every weld, bolt, gusset, etc.

APPENDIX A

SOFTWARE INPUT CALCULATIONS

Wind & Ice Loading

Nominal Mount Elevation (AGL), z_{mount}	121 ft	K_a	0.90
Nominal Rad Elevation (AGL), z_{rad}	121 ft	K_d	0.95
TIA Standard	H	K_z	1.32
Basic Wind Speed, V_{ult} (bare)	130 mph	K_{zt}	1.00
Basic Wind Speed, V (ice)	50 mph	Ks	1.00
Design Ice Thickness, t_i	1 1/2 in	t_{iz}	1.71 in
Exposure Category	C	G_h	1.00
Risk Category	II	q_z (bare)	54.0 psf
Seismic Response Coeff., C_s	-	q_z (ice)	8.0 psf

Live Loading

At Mount Pipes, L_M	500 lb
Joint Labels Considered	M1
	M2
	M3
	M4

Member Distributed Loading

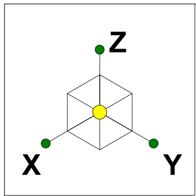
Section Set Label	Shape Label	F_A (lb/ft) Bare	F_A (lb/ft) Ice	Ice Wt. (lb/ft)
PRK-1245	L2.5x2.5x3	20.26	2.68	9.96
Offset Tube	HSS4X4X4	32.42	2.82	14.19
Offset End Plate	0.5 x 6 Plate	48.63	6.79	12.20
Offset Side Plate	0.38 X 6 Plate	48.63	6.78	12.04
Platform Horzontal Pipe	PIPE_3.0	17.02	4.98	10.87
Grating Angle	L2x2x3	16.21	2.64	8.64
HRKAngle	L2.5x2.5x4	20.26	2.68	9.96
HRK12-U	PIPE_2.0	11.55	4.17	8.52
HRKPlate	0.38 X 6 Plate	48.63	6.78	12.04
Mount Pipe	PIPE_2.5	13.98	4.53	9.56

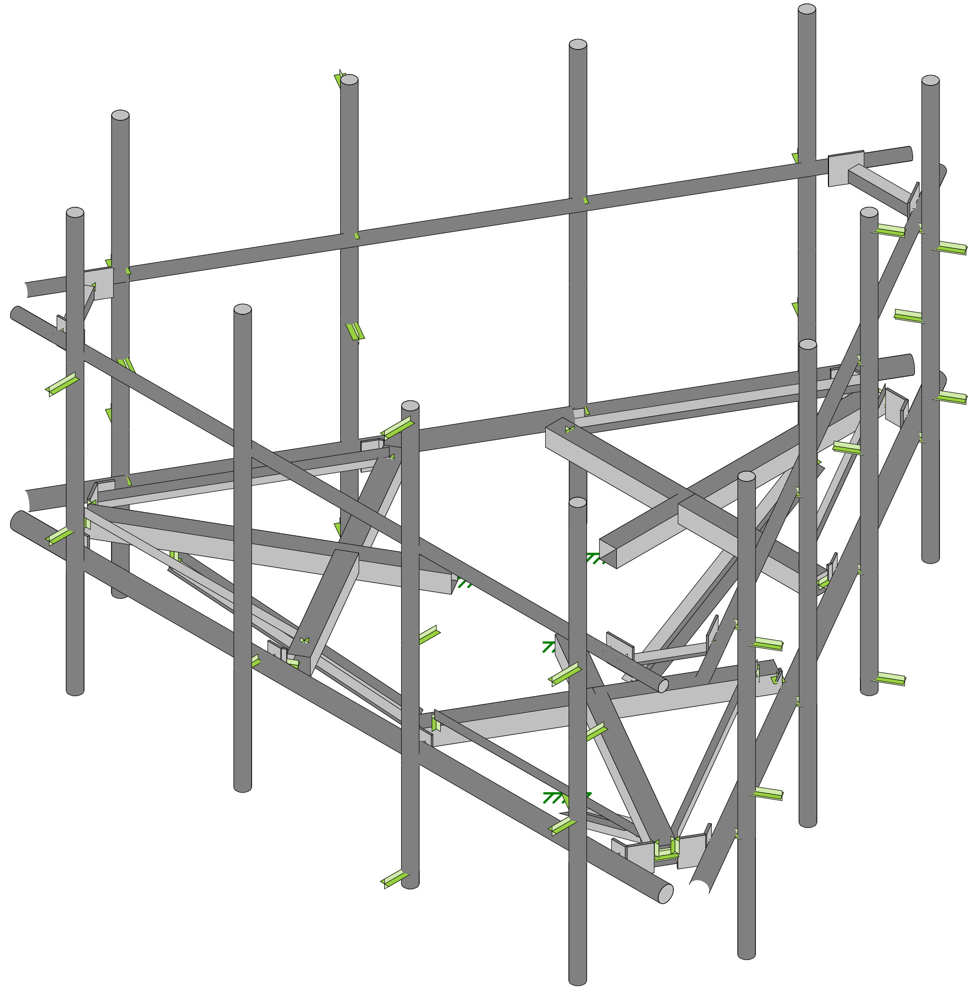
Appurtenances

Appurtenance Model	Status	Azimuth Offset (°, ↻)	Rad Elev. Override (ft)	Swap Width & Depth	Area Factor		Qty. per Azimuth			Total Qty. Override	0° Joints		120° Joints		240° Joints		Height (in)	Width (in)	Depth (in)	Weight (Bare) (lb)	Shape	Weight of Ice (lb)	EPA_A (Bare) (ft²)		EPA_A (Ice) (ft²)		F_A (Bare) (lb)		F_A (Ice) (lb)	
					Front	Side	0°	120°	240°		1	2	1	2	1	2							N	T	N	T	N	T	N	T
AIR 21 B2A/B4P				☐			1	1	1		a1_t	a1_b	b1_t	b1_b	g1_t	g1_b	55	12	7.9	83	Flat	140.07	5.92	4.22	7.86	6.05	288.12	205.19	56.57	43.54
AIR 21 B4A/B2P				☐			1	1	1		a4_t	a4_b	b4_t	b4_b	g4_t	g4_b	55	12	7.9	83	Flat	140.07	5.92	4.22	7.86	6.05	288.12	205.19	56.57	43.54
APXVAARR24_43-U-NA20				☐			1	1	1		a2_t	a2_b	b2_t	b2_b	g2_t	g2_b	95.9	24	8.7	128	Flat	384.65	20.24	8.89	23.63	12.03	984.45	432.27	170.03	86.56
KRY 112 144/1				☐	0.5		1	1	1		a1_r1		b1_r1		g1_r1		7	6	3	11	Flat	10.85	0.18	0.18	0.41	0.56	8.51	8.51	2.94	4.01
RADIO 4449 B12/B71				☐	0.5		1	1	1		a2_r1		b2_r1		g2_r1		15	13.2	10.4	75	Flat	58.77	0.83	1.30	1.28	2.12	40.12	63.22	9.17	15.25

APPENDIX B

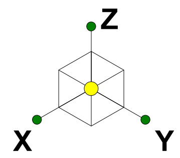
WIRE FRAME AND RENDERED MODELS

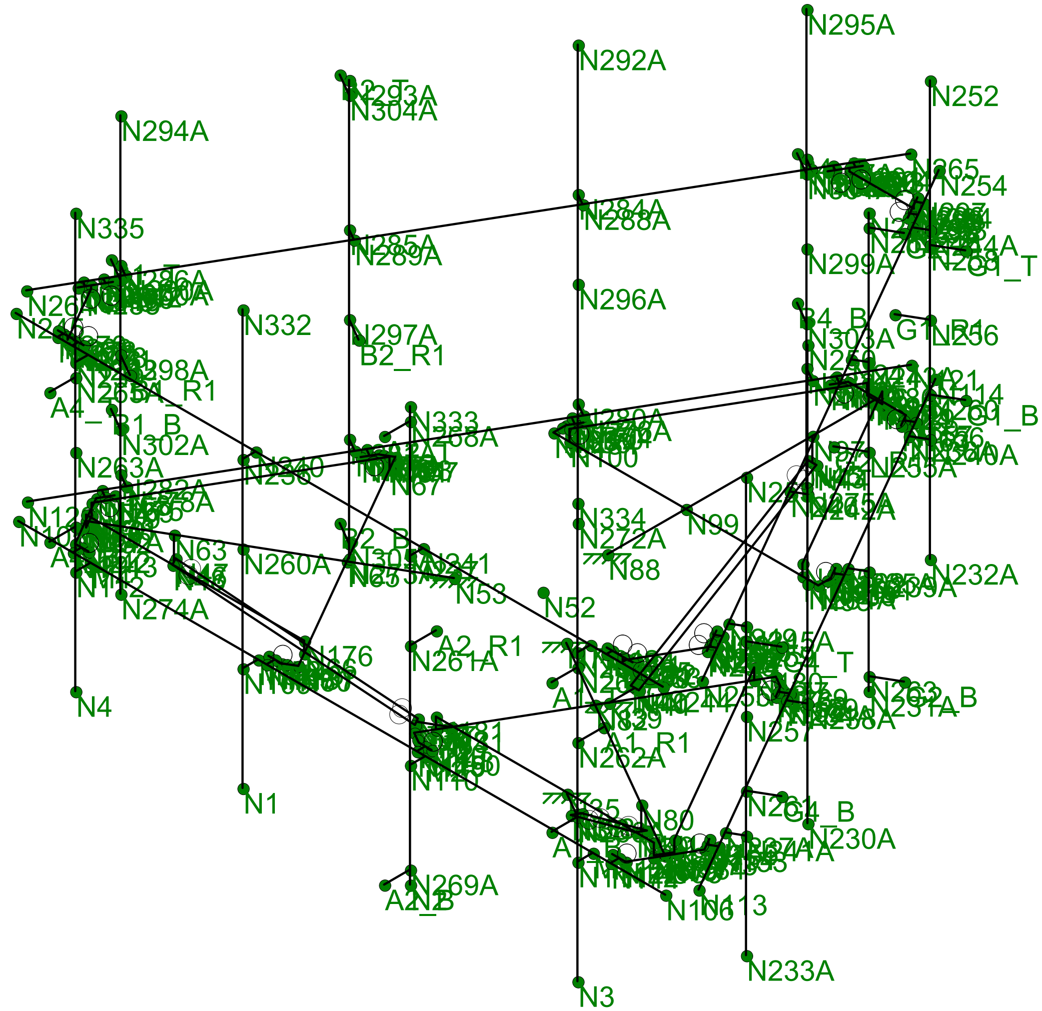




Envelope Only Solution

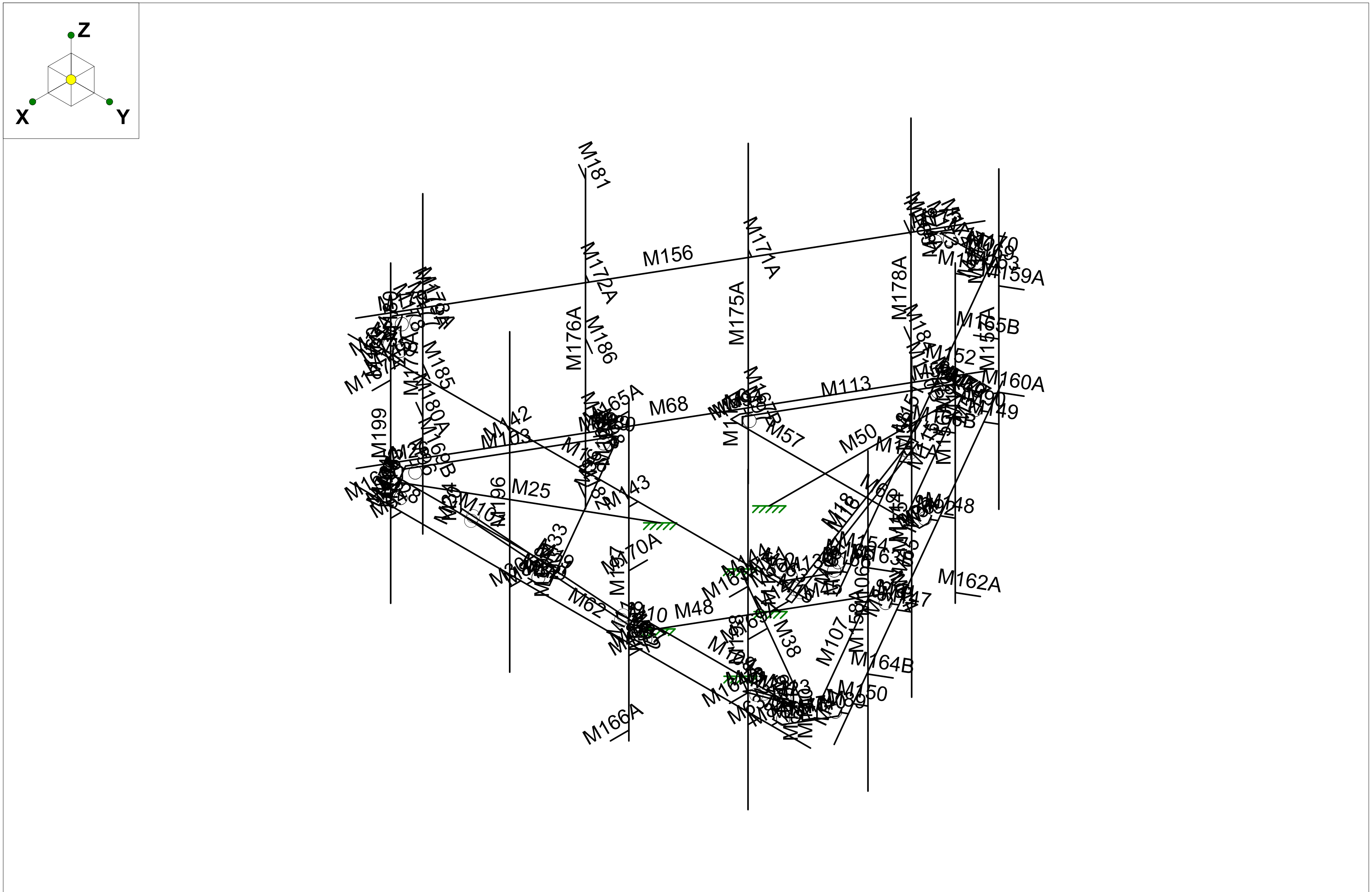
CLS	42284-CTNH107A-NH107/Global/Cherry Hill Rendered	SK - 1
ML		May 27, 2019 at 6:28 PM
42284-CTNH107A-02-MR		42284-CTNH107A-02-MR.r3d



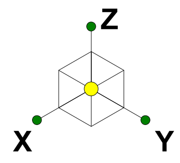


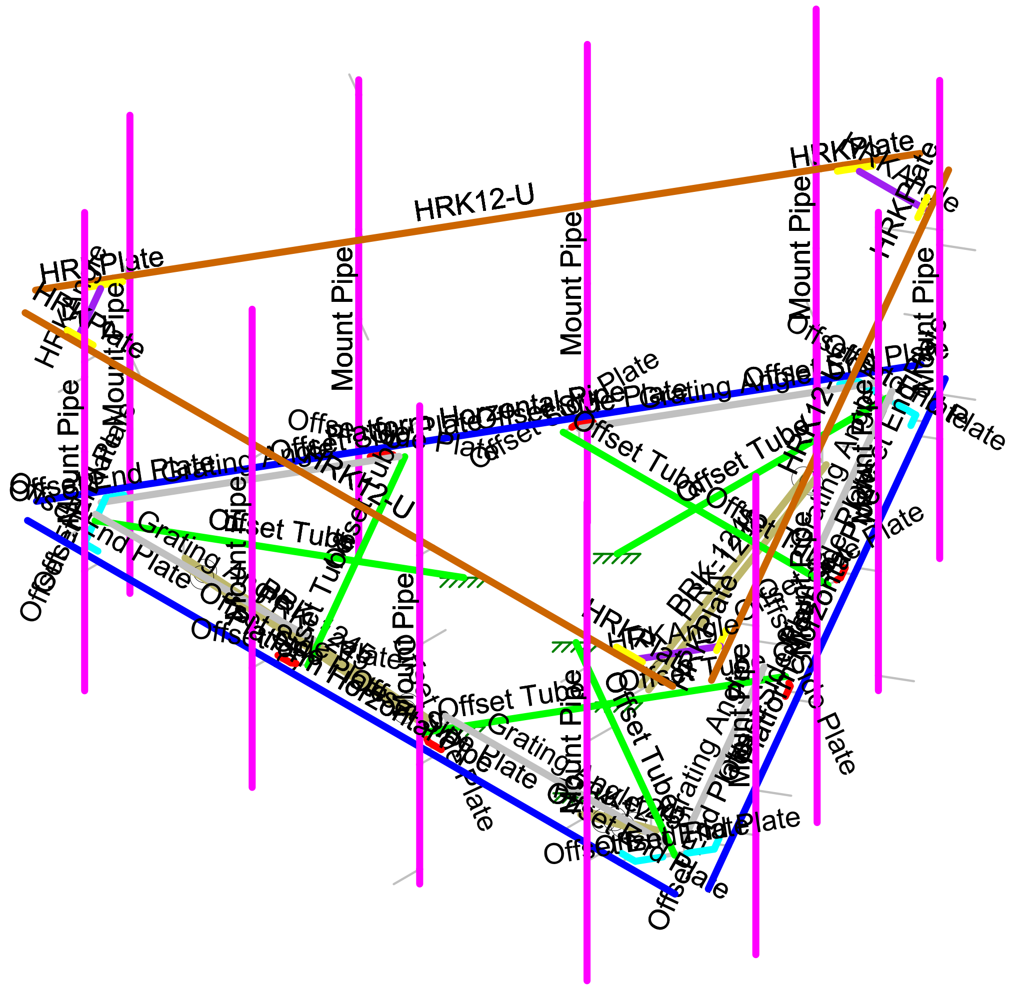
Envelope Only Solution

CLS	42284-CTNH107A-NH107/Global/Cherry Hill Joint Labels	SK - 2
ML		May 27, 2019 at 6:29 PM
42284-CTNH107A-02-MR		42284-CTNH107A-02-MR.r3d



CLS		SK - 3
ML	42284-CTNH107A-NH107/Global/Cherry Hill	May 27, 2019 at 6:30 PM
42284-CTNH107A-02-MR	Member Labels	42284-CTNH107A-02-MR.r3d



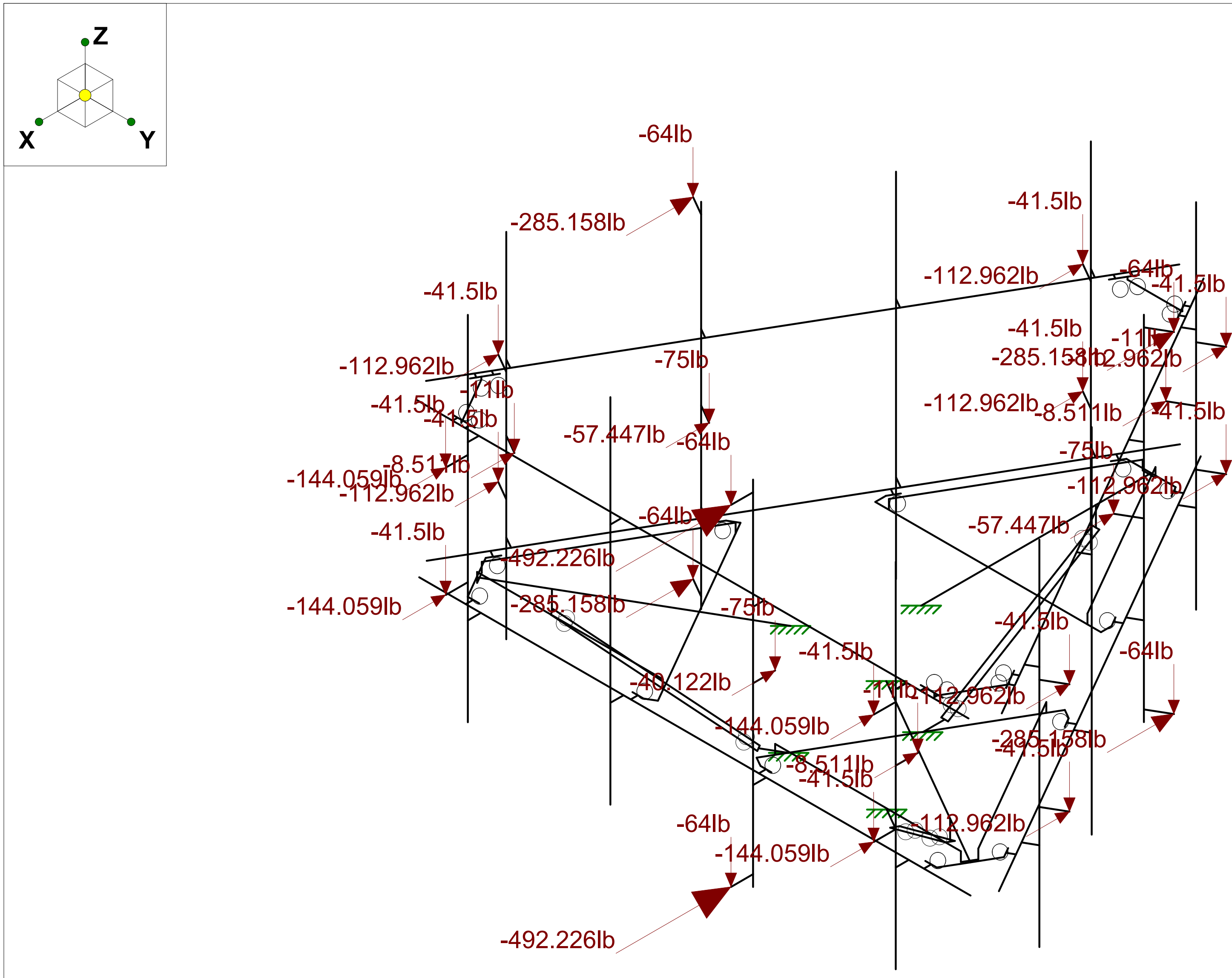


Section Sets

- Platform Horzontal Pipe
- Offset Tube
- Offset Side Plate
- Grating Angle
- Mount Pipe
- Offset End Plate
- HRK12-U
- HRKPlate
- HRKAngle
- PRK-1245
- RIGID

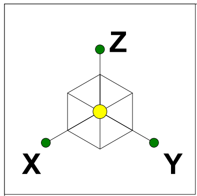
Envelope Only Solution

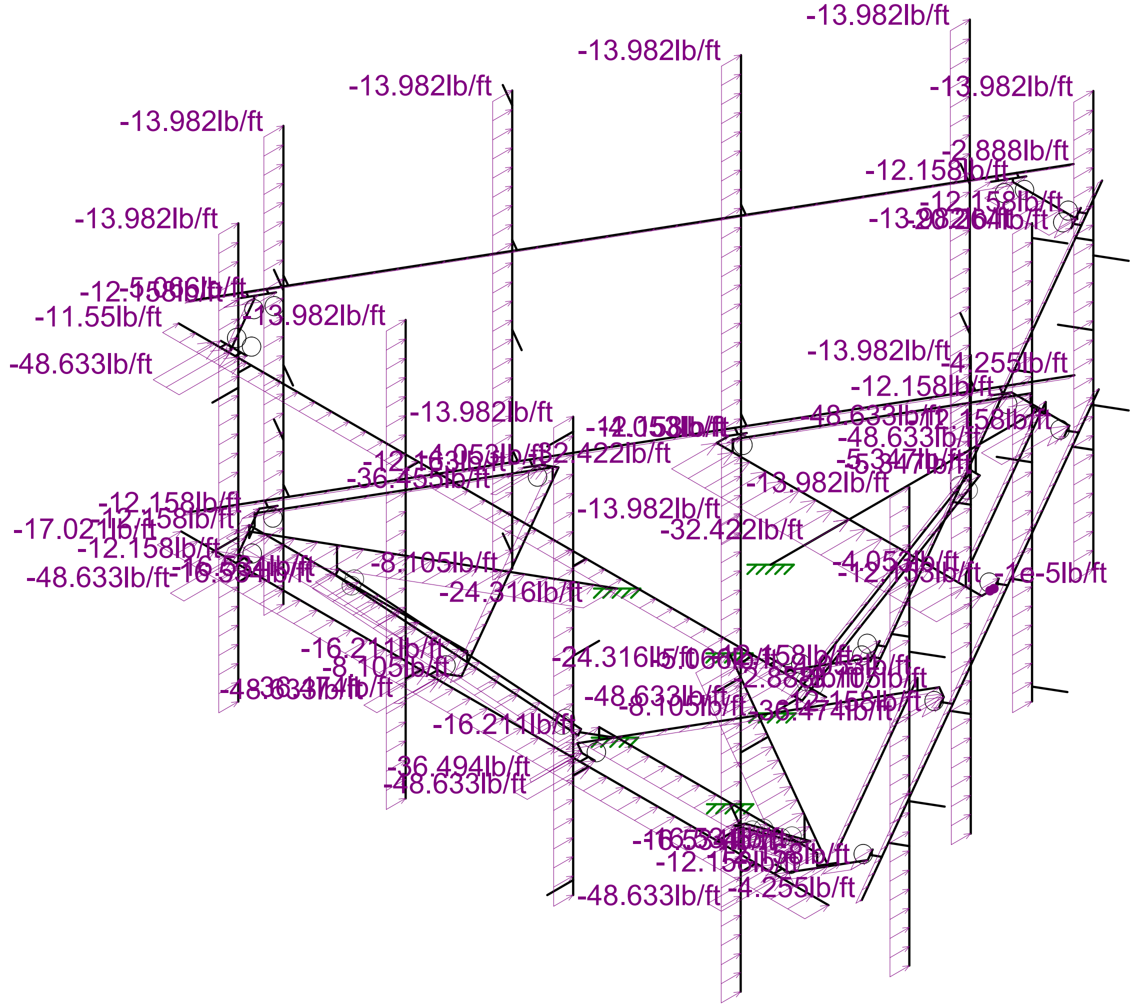
CLS	42284-CTNH107A-NH107/Global/Cherry Hill Section Sets	SK - 4
ML		May 27, 2019 at 6:31 PM
42284-CTNH107A-02-MR		42284-CTNH107A-02-MR.r3d



Loads: LC 1, DISPLAY (1.0D + 1.0W_0°)
Envelope Only Solution

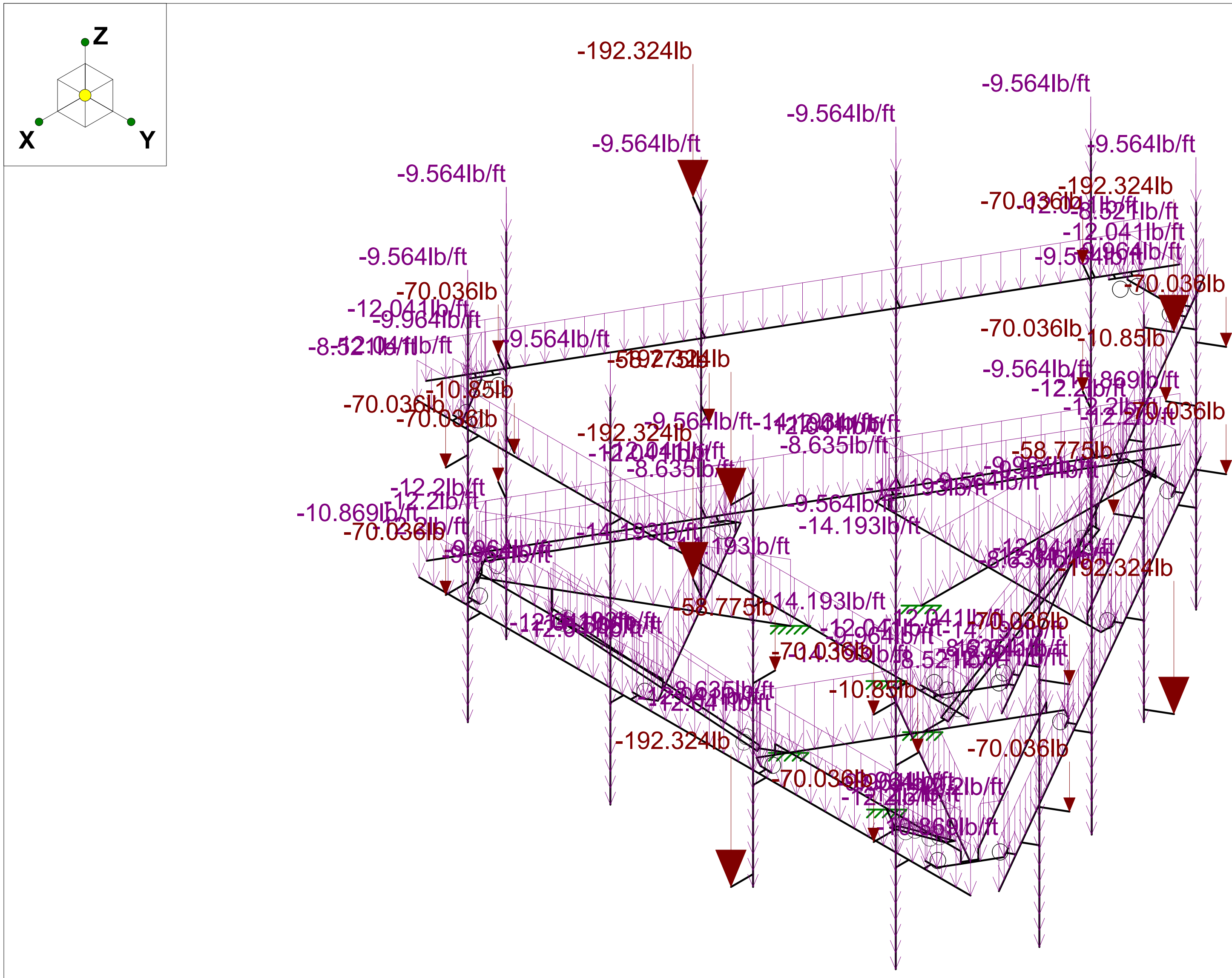
CLS	42284-CTNH107A-NH107/Global/Cherry Hill	SK - 5
ML		May 27, 2019 at 6:31 PM
42284-CTNH107A-02-MR	Joint Loads – Dead and Normal Wind	42284-CTNH107A-02-MR.r3d





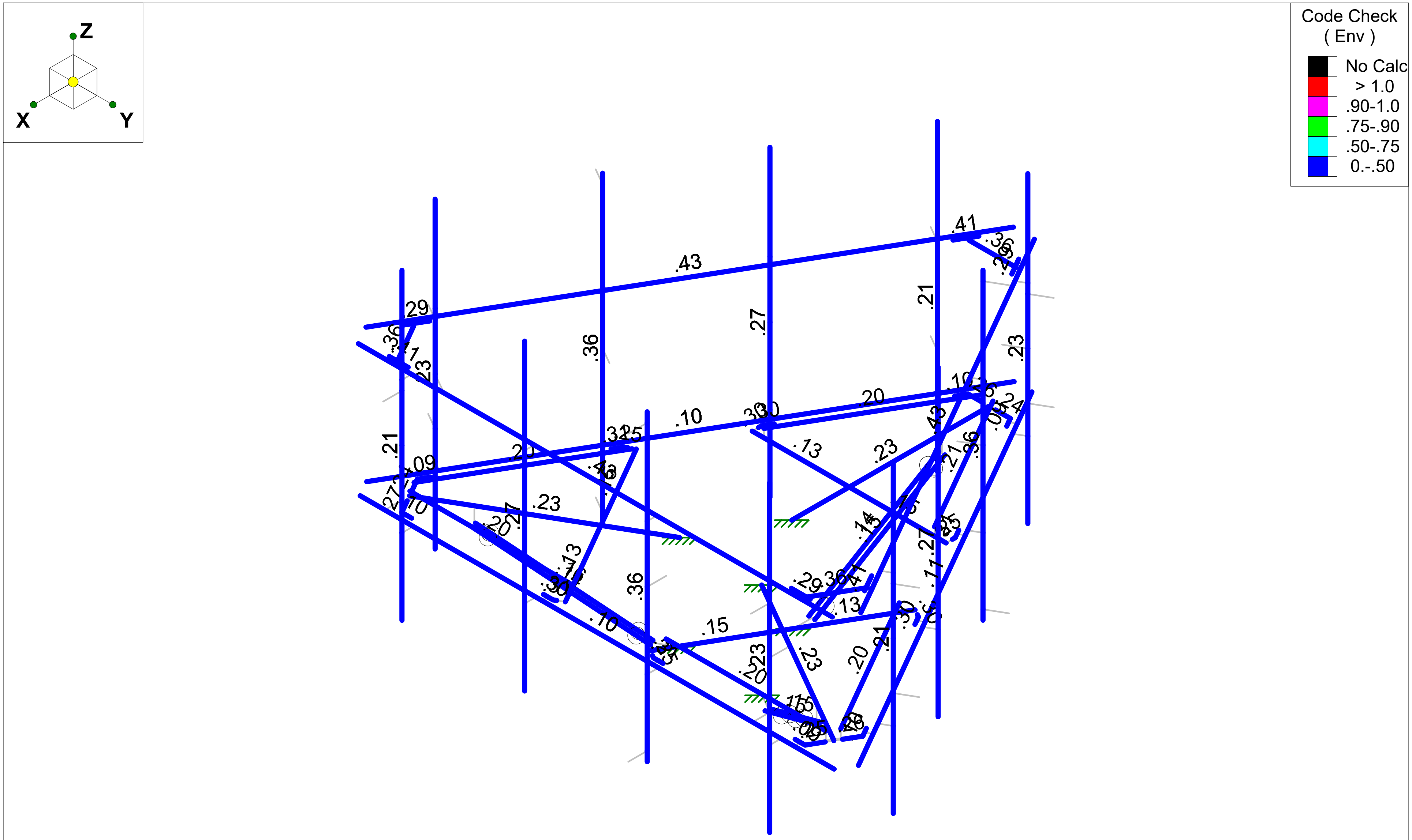
Loads: BLC 4, Structure Wind 0°
Envelope Only Solution

CLS		SK - 6
ML	42284-CTNH107A-NH107/Global/Cherry Hill	May 27, 2019 at 6:32 PM
42284-CTNH107A-02-MR	Distributed Load – Normal Wind	42284-CTNH107A-02-MR.r3d



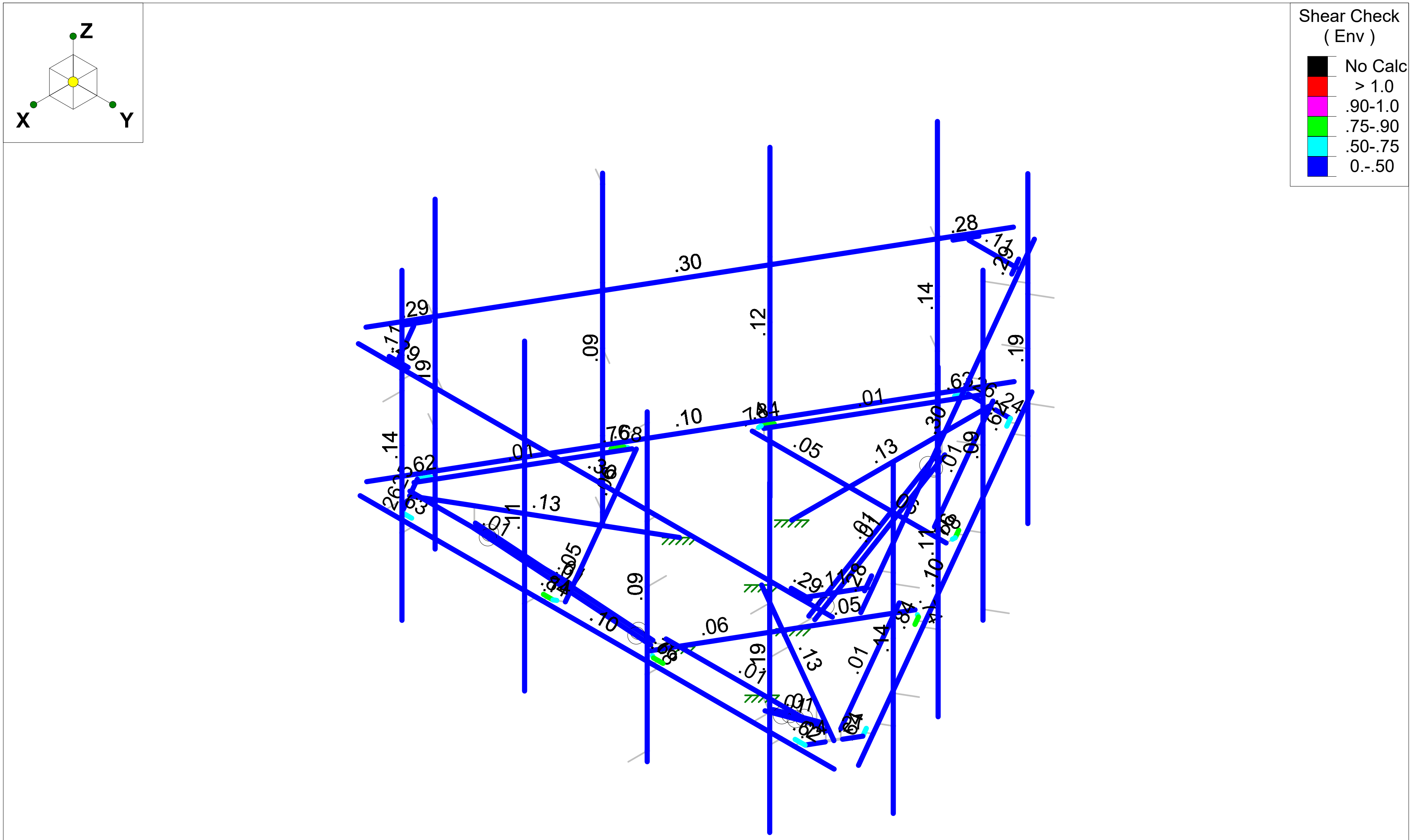
Loads: BLC 2, Ice Dead
Envelope Only Solution

CLS	42284-CTNH107A-NH107/Global/Cherry Hill Ice Dead Loads	SK - 7
ML		May 27, 2019 at 6:33 PM
42284-CTNH107A-02-MR		42284-CTNH107A-02-MR.r3d



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

CLS		SK - 8
ML	42284-CTNH107A-NH107/Global/Cherry Hill	May 27, 2019 at 6:33 PM
42284-CTNH107A-02-MR	Envelope Member Unity Check Results – Bending	42284-CTNH107A-02-MR.r3d



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

CLS		SK - 9
ML	42284-CTNH107A-NH107/Global/Cherry Hill	May 27, 2019 at 6:34 PM
42284-CTNH107A-02-MR	Envelope Member Check Results – Shear	42284-CTNH107A-02-MR.r3d

APPENDIX C

SOFTWARE ANALYSIS OUTPUT

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribu...	Area(M...	Surface...
1	Dead	DL			-1	24				
2	Ice Dead	RL				24		72		
4	Structure Wind 0°	None						70		
5	Structure Wind 30°	None						115		
6	Structure Wind 45°	None						144		
7	Structure Wind 60°	None						140		
8	Structure Wind 90°	None						58		
9	Structure Wind 120°	None						140		
10	Structure Wind 135°	None						144		
11	Structure Wind 150°	None						115		
12	Structure Wind w/ Ice 0°	None						70		
13	Structure Wind w/ Ice 30°	None						118		
14	Structure Wind w/ Ice 45°	None						144		
15	Structure Wind w/ Ice 60°	None						140		
16	Structure Wind w/ Ice 90°	None						59		
17	Structure Wind w/ Ice 120°	None						140		
18	Structure Wind w/ Ice 135°	None						144		
19	Structure Wind w/ Ice 150°	None						118		
20	Antenna Wind 0°	None				24				
21	Antenna Wind 30°	None				48				
22	Antenna Wind 45°	None				48				
23	Antenna Wind 60°	None				48				
24	Antenna Wind 90°	None				24				
25	Antenna Wind 120°	None				48				
26	Antenna Wind 135°	None				48				
27	Antenna Wind 150°	None				48				
28	Antenna Wind w/ Ice 0°	None				24				
29	Antenna Wind w/ Ice 30°	None				48				
30	Antenna Wind w/ Ice 45°	None				48				
31	Antenna Wind w/ Ice 60°	None				48				
32	Antenna Wind w/ Ice 90°	None				24				
33	Antenna Wind w/ Ice 120°	None				48				
34	Antenna Wind w/ Ice 135°	None				48				
35	Antenna Wind w/ Ice 150°	None				48				
39	Maintenance Live 500 (1)	OL1				1				
40	Maintenance Live 500 (2)	OL2				1				
41	Maintenance Live 500 (3)	OL3				1				
42	Maintenance Live 500 (4)	OL4				1				

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	DISPLAY (1.0D + 1.0W_0°)	Yes	Y		DL	1	20	1																
2	1.4D	Yes	Y		DL	1.4																		
3	1.2D + 1.0W_0°	Yes	Y		DL	1.2	4	1	20	1														
4	1.2D + 1.0W_30°	Yes	Y		DL	1.2	5	1	21	1														
5	1.2D + 1.0W_45°	Yes	Y		DL	1.2	6	1	22	1														
6	1.2D + 1.0W_60°	Yes	Y		DL	1.2	7	1	23	1														
7	1.2D + 1.0W_90°	Yes	Y		DL	1.2	8	1	24	1														
8	1.2D + 1.0W_120°	Yes	Y		DL	1.2	9	1	25	1														
9	1.2D + 1.0W_135°	Yes	Y		DL	1.2	10	1	26	1														
10	1.2D + 1.0W_150°	Yes	Y		DL	1.2	11	1	27	1														
11	1.2D + 1.0W_180°	Yes	Y		DL	1.2	4	-1	20	-1														
12	1.2D + 1.0W_210°	Yes	Y		DL	1.2	5	-1	21	-1														
13	1.2D + 1.0W_225°	Yes	Y		DL	1.2	6	-1	22	-1														

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
14	1.2D + 1.0W_240°	Yes	Y		DL	1.2	7	-1	23	-1														
15	1.2D + 1.0W_270°	Yes	Y		DL	1.2	8	-1	24	-1														
16	1.2D + 1.0W_300°	Yes	Y		DL	1.2	9	-1	25	-1														
17	1.2D + 1.0W_315°	Yes	Y		DL	1.2	10	-1	26	-1														
18	1.2D + 1.0W_330°	Yes	Y		DL	1.2	11	-1	27	-1														
19	1.2D + 1.0Di + 1.0Wi_0°	Yes	Y		DL	1.2	12	1	28	1	RL	1												
20	1.2D + 1.0Di + 1.0Wi_30°	Yes	Y		DL	1.2	13	1	29	1	RL	1												
21	1.2D + 1.0Di + 1.0Wi_45°	Yes	Y		DL	1.2	14	1	30	1	RL	1												
22	1.2D + 1.0Di + 1.0Wi_60°	Yes	Y		DL	1.2	15	1	31	1	RL	1												
23	1.2D + 1.0Di + 1.0Wi_90°	Yes	Y		DL	1.2	16	1	32	1	RL	1												
24	1.2D + 1.0Di + 1.0Wi_120°	Yes	Y		DL	1.2	17	1	33	1	RL	1												
25	1.2D + 1.0Di + 1.0Wi_135°	Yes	Y		DL	1.2	18	1	34	1	RL	1												
26	1.2D + 1.0Di + 1.0Wi_150°	Yes	Y		DL	1.2	19	1	35	1	RL	1												
27	1.2D + 1.0Di + 1.0Wi_180°	Yes	Y		DL	1.2	12	-1	28	-1	RL	1												
28	1.2D + 1.0Di + 1.0Wi_210°	Yes	Y		DL	1.2	13	-1	29	-1	RL	1												
29	1.2D + 1.0Di + 1.0Wi_225°	Yes	Y		DL	1.2	14	-1	30	-1	RL	1												
30	1.2D + 1.0Di + 1.0Wi_240°	Yes	Y		DL	1.2	15	-1	31	-1	RL	1												
31	1.2D + 1.0Di + 1.0Wi_270°	Yes	Y		DL	1.2	16	-1	32	-1	RL	1												
32	1.2D + 1.0Di + 1.0Wi_300°	Yes	Y		DL	1.2	17	-1	33	-1	RL	1												
33	1.2D + 1.0Di + 1.0Wi_315°	Yes	Y		DL	1.2	18	-1	34	-1	RL	1												
34	1.2D + 1.0Di + 1.0Wi_330°	Yes	Y		DL	1.2	19	-1	35	-1	RL	1												
35	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	4	.056	20	.056	O...	1.5												
36	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	5	.056	21	.056	O...	1.5												
37	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	6	.056	22	.056	O...	1.5												
38	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	7	.056	23	.056	O...	1.5												
39	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	8	.056	24	.056	O...	1.5												
40	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	9	.056	25	.056	O...	1.5												
41	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	10	.056	26	.056	O...	1.5												
42	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	11	.056	27	.056	O...	1.5												
43	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	4	-.056	20	-.056	O...	1.5												
44	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	5	-.056	21	-.056	O...	1.5												
45	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	6	-.056	22	-.056	O...	1.5												
46	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	7	-.056	23	-.056	O...	1.5												
47	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	8	-.056	24	-.056	O...	1.5												
48	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	9	-.056	25	-.056	O...	1.5												
49	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	10	-.056	26	-.056	O...	1.5												
50	1.2D + 1.5Lm_1 + 1.0Wm...	Yes	Y		DL	1.2	11	-.056	27	-.056	O...	1.5												
51	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	4	.056	20	.056	O...	1.5												
52	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	5	.056	21	.056	O...	1.5												
53	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	6	.056	22	.056	O...	1.5												
54	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	7	.056	23	.056	O...	1.5												
55	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	8	.056	24	.056	O...	1.5												
56	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	9	.056	25	.056	O...	1.5												
57	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	10	.056	26	.056	O...	1.5												
58	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	11	.056	27	.056	O...	1.5												
59	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	4	-.056	20	-.056	O...	1.5												
60	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	5	-.056	21	-.056	O...	1.5												
61	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	6	-.056	22	-.056	O...	1.5												
62	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	7	-.056	23	-.056	O...	1.5												
63	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	8	-.056	24	-.056	O...	1.5												
64	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	9	-.056	25	-.056	O...	1.5												
65	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	10	-.056	26	-.056	O...	1.5												
66	1.2D + 1.5Lm_2 + 1.0Wm...	Yes	Y		DL	1.2	11	-.056	27	-.056	O...	1.5												
67	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	4	.056	20	.056	O...	1.5												
68	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	5	.056	21	.056	O...	1.5												
69	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	6	.056	22	.056	O...	1.5												
70	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	7	.056	23	.056	O...	1.5												

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
71	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	8	.056	24	.056	O...	1.5												
72	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	9	.056	25	.056	O...	1.5												
73	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	10	.056	26	.056	O...	1.5												
74	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	11	.056	27	.056	O...	1.5												
75	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	4	-.056	20	-.056	O...	1.5												
76	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	5	-.056	21	-.056	O...	1.5												
77	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	6	-.056	22	-.056	O...	1.5												
78	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	7	-.056	23	-.056	O...	1.5												
79	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	8	-.056	24	-.056	O...	1.5												
80	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	9	-.056	25	-.056	O...	1.5												
81	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	10	-.056	26	-.056	O...	1.5												
82	1.2D + 1.5Lm_3 + 1.0Wm...	Yes	Y		DL	1.2	11	-.056	27	-.056	O...	1.5												
83	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	4	.056	20	.056	O...	1.5												
84	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	5	.056	21	.056	O...	1.5												
85	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	6	.056	22	.056	O...	1.5												
86	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	7	.056	23	.056	O...	1.5												
87	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	8	.056	24	.056	O...	1.5												
88	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	9	.056	25	.056	O...	1.5												
89	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	10	.056	26	.056	O...	1.5												
90	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	11	.056	27	.056	O...	1.5												
91	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	4	-.056	20	-.056	O...	1.5												
92	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	5	-.056	21	-.056	O...	1.5												
93	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	6	-.056	22	-.056	O...	1.5												
94	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	7	-.056	23	-.056	O...	1.5												
95	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	8	-.056	24	-.056	O...	1.5												
96	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	9	-.056	25	-.056	O...	1.5												
97	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	10	-.056	26	-.056	O...	1.5												
98	1.2D + 1.5Lm_4 + 1.0Wm...	Yes	Y		DL	1.2	11	-.056	27	-.056	O...	1.5												

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Platform Horzontal Pi...	PIPE_3.0	Beam	Pipe	A53 Gr.B	Typical	2.07	2.85	2.85	5.69
2	Offset Tube	HSS4X4X4	Beam	SquareTube	A36 Gr.36	Typical	3.37	7.8	7.8	12.8
3	Offset Side Plate	0.38 X 6 Plate	Beam	RECT	A36 Gr.36	Typical	2.28	.027	6.84	.105
4	Grating Angle	L2x2x3	Beam	Single Angle	A36 Gr.36	Typical	.722	.271	.271	.009
5	Mount Pipe	PIPE_2.5	Beam	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
6	Offset End Plate	0.5 x 6 Plate	Beam	RECT	A36 Gr.36	Typical	3	.063	9	.237
7	HRK12-U	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
8	HRKPlate	0.38 X 6 Plate	Beam	RECT	A36 Gr.36	Typical	2.28	.027	6.84	.105
9	HRKAngle	L2.5x2.5x4	Beam	Single Angle	A36 Gr.36	Typical	1.19	.692	.692	.026
10	PRK-1245	L2.5x2.5x3	Beam	Single Angle	A36 Gr.36	Typical	.901	.535	.535	.011

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torq...	Kyy	Kzz	Cb	Function
1	M16	PRK-1245	47.94			Lbyy						Lateral
2	M18	PRK-1245	47.94			Lbyy						Lateral
3	M19	PRK-1245	47.94			Lbyy						Lateral
4	M21	PRK-1245	47.94			Lbyy						Lateral
5	M22	PRK-1245	47.94			Lbyy						Lateral
6	M24	PRK-1245	47.94			Lbyy						Lateral
7	M25	Offset Tube	62.507									Lateral
8	M26	Offset End ...	3.122			Lbyy						Lateral
9	M27	Offset End ...	4.688			Lbyy						Lateral
10	M28	Offset End ...	3.122			Lbyy						Lateral
11	M29	Offset Side ...	.875			Lbyy						Lateral
12	M31	Offset Side ...	3			Lbyy						Lateral
13	M32	Offset Side ...	.875			Lbyy						Lateral
14	M33	Offset Tube	30.688			Lbyy						Lateral
15	M36	Offset Tube	30.687			Lbyy						Lateral
16	M38	Offset Tube	62.507									Lateral
17	M39	Offset End ...	3.122			Lbyy						Lateral
18	M40	Offset End ...	4.688			Lbyy						Lateral
19	M41	Offset End ...	3.122			Lbyy						Lateral
20	M42	Offset Side ...	.875			Lbyy						Lateral
21	M44	Offset Side ...	.875			Lbyy						Lateral
22	M45	Offset Tube	30.688			Lbyy						Lateral
23	M48	Offset Tube	30.687			Lbyy						Lateral
24	M50	Offset Tube	62.507									Lateral
25	M51	Offset End ...	3.122			Lbyy						Lateral
26	M52	Offset End ...	4.688			Lbyy						Lateral
27	M53	Offset End ...	3.122			Lbyy						Lateral
28	M54	Offset Side ...	.875			Lbyy						Lateral
29	M56	Offset Side ...	.875			Lbyy						Lateral
30	M57	Offset Tube	30.688			Lbyy						Lateral
31	M60	Offset Tube	30.687			Lbyy						Lateral
32	M62	Platform Ho...	150			Lbyy						Lateral
33	M65	Platform Ho...	150			Lbyy						Lateral
34	M68	Platform Ho...	150			Lbyy						Lateral
35	M71	Offset End ...	4.688			Lbyy						Lateral
36	M73	Offset End ...	4.688			Lbyy						Lateral
37	M75	Offset End ...	4.688			Lbyy						Lateral
38	M87	Offset Side ...	3			Lbyy						Lateral
39	M88	Offset Side ...	3			Lbyy						Lateral
40	M93	Offset Side ...	3			Lbyy						Lateral
41	M94	Offset Side ...	3			Lbyy						Lateral
42	M99	Offset Side ...	3			Lbyy						Lateral
43	M101	Grating Angle	50.542			Lbyy						Lateral
44	M103	Grating Angle	50.542			Lbyy						Lateral
45	M107	Grating Angle	50.542			Lbyy						Lateral
46	M109	Grating Angle	50.542			Lbyy						Lateral
47	M113	Grating Angle	50.542			Lbyy						Lateral
48	M115	Grating Angle	50.542			Lbyy						Lateral
49	M139	HRKAngle	14.902			Lbyy						Lateral
50	M140	HRKAngle	14.902			Lbyy						Lateral
51	M141	HRKAngle	14.902			Lbyy						Lateral
52	M146	HRK12-U	150			Lbyy						Lateral
53	M151	HRK12-U	150			Lbyy						Lateral
54	M156	HRK12-U	150			Lbyy						Lateral
55	M159	HRKPlate	6			Lbyy						Lateral
56	M163	HRKPlate	6			Lbyy						Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torq...	Kyy	Kzz	Cb	Function
57	M167	HRKPlate	6			Lbyy						Lateral
58	M171	HRKPlate	6			Lbyy						Lateral
59	M175	HRKPlate	6			Lbyy						Lateral
60	M179	HRKPlate	6			Lbyy						Lateral
61	M196	Mount Pipe	96			Lbyy						Lateral
62	M197	Mount Pipe	96			Lbyy						Lateral
63	M198	Mount Pipe	96			Lbyy						Lateral
64	M199	Mount Pipe	96			Lbyy						Lateral
65	M155	Mount Pipe	96			Lbyy						Lateral
66	M156A	Mount Pipe	96			Lbyy						Lateral
67	M157A	Mount Pipe	96			Lbyy						Lateral
68	M158A	Mount Pipe	96			Lbyy						Lateral
69	M175A	Mount Pipe	96			Lbyy						Lateral
70	M176A	Mount Pipe	96			Lbyy						Lateral
71	M177A	Mount Pipe	96			Lbyy						Lateral
72	M178A	Mount Pipe	96			Lbyy						Lateral

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N53	max	1763.059	6	5225.061	14	889.813	20	-62.517	10	470.225	17	2436.388	18
2		min	-2828.854	14	-3389.274	6	299.188	12	-1096.711	34	-790.09	73	-2431.551	10
3	N31	max	1705.997	30	683.875	6	2099.251	30	202.968	6	119.256	6	158.025	18
4		min	-394.738	6	-2954.403	30	-470.806	6	-912.381	30	-518.961	30	-150.866	10
5	N71	max	2213.146	3	3221.531	16	889.813	31	915.617	19	315.459	4	2436.244	12
6		min	-3270.504	11	-5062.431	8	295.718	1	-65.093	11	-908.075	60	-2431.4	4
7	N88	max	5939.584	3	1885.091	15	889.862	25	746.264	7	1096.341	27	2436.429	7
8		min	-3816.84	11	-1882.351	7	265.101	1	-608.92	15	275.38	1	-2431.588	15
9	N35	max	1705.595	24	2954.646	24	2099.257	24	905.626	24	116.156	16	158.018	12
10		min	-394.898	16	-683.815	16	-470.823	16	-204.767	16	-530.668	24	-150.86	4
11	N39	max	789.702	11	79.857	15	2099.269	19	71.553	7	1049.635	19	158.027	7
12		min	-3411.617	19	-79.843	7	-470.853	11	-67.146	15	-235.427	11	-150.868	15
13	Totals:	max	6930.14	3	6930.007	15	8062.388	19						
14		min	-6930.146	11	-6930.01	7	2644.218	1						

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

	Member	Shape	Code Che...	Loc...	LC	Shear Che...	Loc...	...	...	phi*Pn...	phi*Pn...	phi*Mn y-y [lb-ft]	phi*M...	...	Eqn
1	M31	0.38 X 6 Plate	.300	1.5	5	.843	3	y	11	71019...	73872	584.82	9234	...	H1-1b
2	M94	0.38 X 6 Plate	.299	1.5	10	.843	3	y	16	71019...	73872	584.82	9234	...	H1-1b
3	M88	0.38 X 6 Plate	.299	1.5	15	.843	3	y	6	71019...	73872	584.82	9234	...	H1-1b
4	M87	0.38 X 6 Plate	.311	1.5	18	.764	3	y	11	71020...	73872	584.82	9234	...	H1-1b
5	M99	0.38 X 6 Plate	.311	1.5	7	.764	3	y	16	71020...	73872	584.82	9234	...	H1-1b
6	M93	0.38 X 6 Plate	.311	1.5	12	.764	3	y	6	71020...	73872	584.82	9234	...	H1-1b
7	M32	0.38 X 6 Plate	.310	.875	5	.745	.875	y	3	73624...	73872	584.82	9234	...	H1-1b
8	M56	0.38 X 6 Plate	.296	.875	10	.745	.875	y	8	73624...	73872	584.82	9234	...	H1-1b
9	M44	0.38 X 6 Plate	.296	.875	15	.745	.875	y	14	73624...	73872	584.82	9234	...	H1-1b
10	M42	0.38 X 6 Plate	.251	.875	12	.679	.875	y	3	73624...	73872	584.82	9234	...	H1-1b
11	M29	0.38 X 6 Plate	.251	.875	18	.679	.875	y	8	73624...	73872	584.82	9234	...	H1-1b
12	M54	0.38 X 6 Plate	.251	.875	7	.679	.875	y	14	73624...	73872	584.82	9234	...	H1-1b
13	M41	0.5 x 6 Plate	.095	1.479	8	.641	0	y	5	94834...	97200	1012.5	12150	...	H1-1b
14	M28	0.5 x 6 Plate	.095	1.479	14	.628	0	y	11	94834...	97200	1012.5	12150	...	H1-1b
15	M53	0.5 x 6 Plate	.095	1.479	3	.628	0	y	16	94834...	97200	1012.5	12150	...	H1-1b
16	M39	0.5 x 6 Plate	.091	1.479	8	.622	0	y	11	94834...	97200	1012.5	12150	...	H1-1b
17	M26	0.5 x 6 Plate	.091	1.479	14	.622	0	y	16	94834...	97200	1012.5	12150	...	H1-1b
18	M51	0.5 x 6 Plate	.091	1.479	3	.622	0	y	6	94834...	97200	1012.5	12150	...	H1-1b

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

	Member	Shape	Code Che...	Loc...	LC	Shear Che...	Loc...	...	...	phi*Pn...	phi*Pn...	phi*Mn y-y [lb-ft]	phi*M...	...	Eqn
19	M146	PIPE_2.0	.431	94....	11	.299	11....		17	6295....	32130	1871.625	1871....	...	H3-6
20	M151	PIPE_2.0	.431	94....	6	.296	11....		11	6295....	32130	1871.625	1871....	...	H3-6
21	M156	PIPE_2.0	.431	94....	16	.296	11....		6	6295....	32130	1871.625	1871....	...	H3-6
22	M179	0.38 X 6 Plate	.294	2.368	11	.294	2.211	y	10	63107...	73872	584.82	9234	...	H1-1b
23	M171	0.38 X 6 Plate	.294	2.368	16	.294	2.211	y	15	63107...	73872	584.82	9234	...	H1-1b
24	M163	0.38 X 6 Plate	.294	2.368	6	.294	2.211	y	4	63107...	73872	584.82	9234	...	H1-1b
25	M159	0.38 X 6 Plate	.414	2.368	16	.290	2.211	y	17	63107...	73872	584.82	9234	...	H1-1b
26	M175	0.38 X 6 Plate	.414	2.368	6	.280	2.211	y	7	63107...	73872	584.82	9234	...	H1-1b
27	M167	0.38 X 6 Plate	.414	2.368	11	.280	2.211	y	12	63107...	73872	584.82	9234	...	H1-1b
28	M40	0.5 x 6 Plate	.264	4.688	8	.268	4.688	y	5	91950...	97200	1012.5	12150	...	H1-1b
29	M27	0.5 x 6 Plate	.273	4.688	13	.264	4.688	y	10	91950...	97200	1012.5	12150	...	H1-1b
30	M52	0.5 x 6 Plate	.264	4.688	3	.264	4.688	y	15	91950...	97200	1012.5	12150	...	H1-1b
31	M73	0.5 x 6 Plate	.242	0	14	.247	0	y	9	91950...	97200	1012.5	12150	...	H1-1b
32	M75	0.5 x 6 Plate	.250	0	9	.241	0	y	4	91950...	97200	1012.5	12150	...	H1-1b
33	M71	0.5 x 6 Plate	.242	0	3	.241	0	y	15	91950...	97200	1012.5	12150	...	H1-1b
34	M198	PIPE_2.5	.228	70....	7	.189	30....		11	30038...	50715	3596.25	3596.25	...	H1-1b
35	M177A	PIPE_2.5	.229	70....	13	.189	30....		16	30038...	50715	3596.25	3596.25	...	H1-1b
36	M157A	PIPE_2.5	.228	70....	18	.189	30....		6	30038...	50715	3596.25	3596.25	...	H1-1b
37	M199	PIPE_2.5	.209	70....	15	.144	30....		11	30038...	50715	3596.25	3596.25	...	H1-1b
38	M178A	PIPE_2.5	.209	70....	4	.144	30....		16	30038...	50715	3596.25	3596.25	...	H1-1b
39	M158A	PIPE_2.5	.209	70....	10	.144	30....		6	30038...	50715	3596.25	3596.25	...	H1-1b
40	M25	HSS4X4X4	.231	0	18	.133	0	z	18	99903...	109188	12663	12663	...	H1-1b
41	M50	HSS4X4X4	.231	0	7	.133	0	z	7	99903...	109188	12663	12663	...	H1-1b
42	M38	HSS4X4X4	.231	0	12	.133	0	z	12	99903...	109188	12663	12663	...	H1-1b
43	M175A	PIPE_2.5	.270	70....	6	.116	70....		17	30038...	50715	3596.25	3596.25	...	H1-1b
44	M196	PIPE_2.5	.270	70....	16	.112	70....		11	30038...	50715	3596.25	3596.25	...	H1-1b
45	M155	PIPE_2.5	.270	70....	11	.112	70....		6	30038...	50715	3596.25	3596.25	...	H1-1b
46	M141	L2.5x2.5x4	.357	14....	16	.107	14....	y	17	36663.9	38556	1113.554	2537....	...	H2-1
47	M140	L2.5x2.5x4	.362	14....	5	.105	0	y	7	36663.9	38556	1113.554	2537....	...	H2-1
48	M139	L2.5x2.5x4	.357	14....	11	.105	0	y	12	36663.9	38556	1113.554	2537....	...	H2-1
49	M62	PIPE_3.0	.104	59....	15	.102	134...		11	28250...	65205	5748.75	5748.75	...	H1-1b
50	M68	PIPE_3.0	.104	59....	4	.102	134...		16	28250...	65205	5748.75	5748.75	...	H1-1b
51	M65	PIPE_3.0	.105	59....	9	.102	134...		6	28250...	65205	5748.75	5748.75	...	H1-1b
52	M197	PIPE_2.5	.357	70....	3	.090	48		9	30038...	50715	3596.25	3596.25	...	H1-1b
53	M176A	PIPE_2.5	.357	70....	8	.087	48		14	30038...	50715	3596.25	3596.25	...	H1-1b
54	M156A	PIPE_2.5	.357	70....	14	.087	48		3	30038...	50715	3596.25	3596.25	...	H1-1b
55	M60	HSS4X4X4	.152	0	4	.063	27....	z	5	10687...	109188	12663	12663	...	H1-1b
56	M48	HSS4X4X4	.152	0	10	.062	27....	z	10	10687...	109188	12663	12663	...	H1-1b
57	M36	HSS4X4X4	.152	0	15	.062	27....	z	15	10687...	109188	12663	12663	...	H1-1b
58	M33	HSS4X4X4	.129	30....	29	.053	3.23	z	12	10687...	109188	12663	12663	...	H1-1b
59	M57	HSS4X4X4	.128	30....	34	.053	3.23	z	18	10687...	109188	12663	12663	...	H1-1b
60	M45	HSS4X4X4	.128	30....	23	.053	3.23	z	7	10687...	109188	12663	12663	...	H1-1b
61	M101	L2x2x3	.196	50....	14	.010	50....	y	33	9618....	23392.8	557.717	1232....	...	H2-1
62	M113	L2x2x3	.196	50....	3	.010	50....	y	23	9618....	23392.8	557.717	1232....	...	H2-1
63	M107	L2x2x3	.196	50....	8	.010	50....	y	28	9618....	23392.8	557.717	1232....	...	H2-1
64	M103	L2x2x3	.204	0	15	.009	50....	y	9	9618....	23392.8	557.717	1192....	...	H2-1
65	M115	L2x2x3	.207	0	5	.009	50....	z	31	9618....	23392.8	557.717	1217....	...	H2-1
66	M109	L2x2x3	.204	0	10	.009	50....	z	20	9618....	23392.8	557.717	1192....	...	H2-1
67	M19	L2.5x2.5x3	.155	23.97	17	.008	0	z	18	17206...	29192.4	872.574	1753....	...	H2-1
68	M21	L2.5x2.5x3	.140	23.97	27	.008	0	y	18	17206...	29192.4	872.574	1753....	...	H2-1
69	M22	L2.5x2.5x3	.153	23.97	27	.008	0	z	12	17206...	29192.4	872.574	1753....	...	H2-1
70	M24	L2.5x2.5x3	.146	23.97	5	.008	0	y	12	17206...	29192.4	872.574	1753....	...	H2-1
71	M16	L2.5x2.5x3	.153	23.97	22	.008	47.94	z	7	17206...	29192.4	872.574	1753....	...	H2-1
72	M18	L2.5x2.5x3	.140	23.97	32	.008	47.94	y	7	17206...	29192.4	872.574	1753....	...	H2-1

APPENDIX D

ADDITIONAL CALCULATIONS

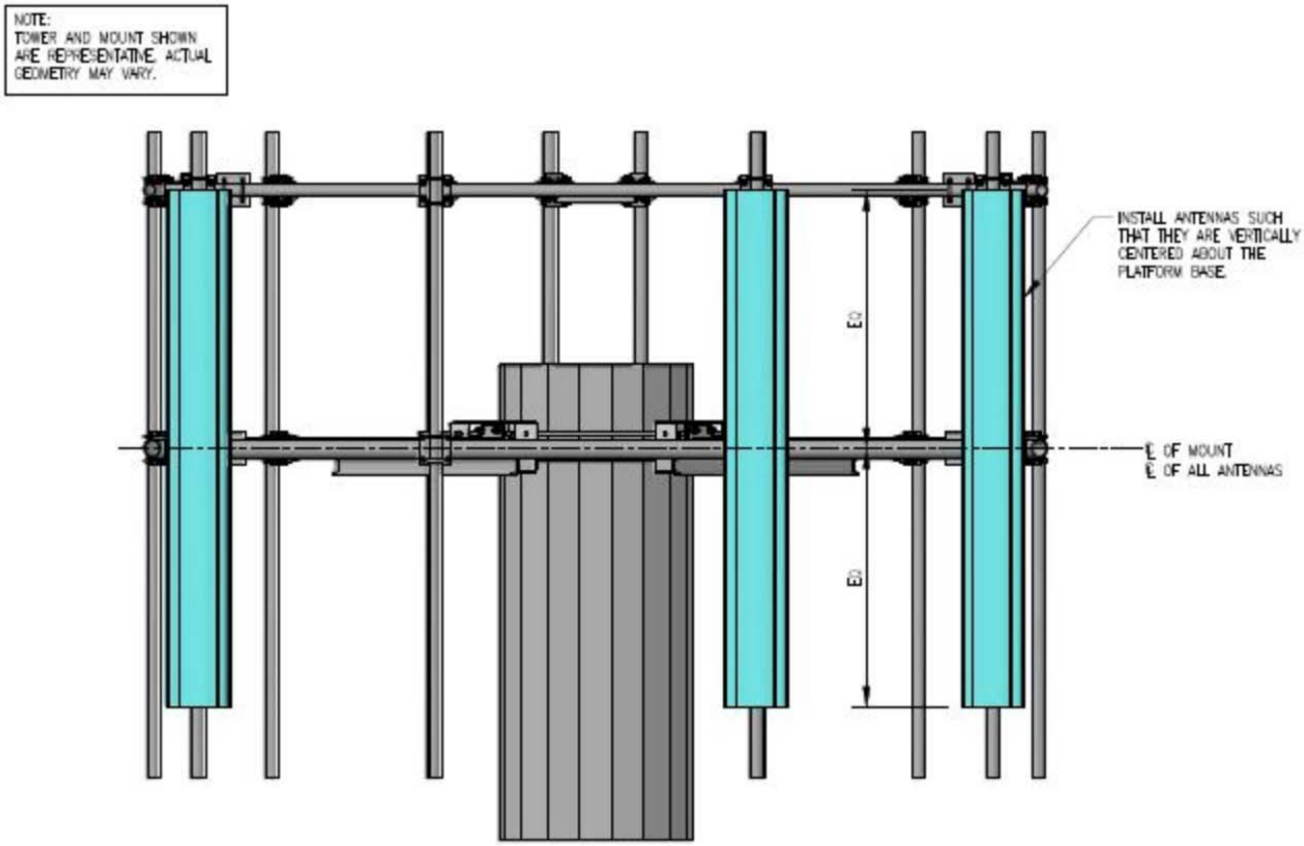
CLS Group
Bolt Strength Check
AISC 14th Edition (360-10)

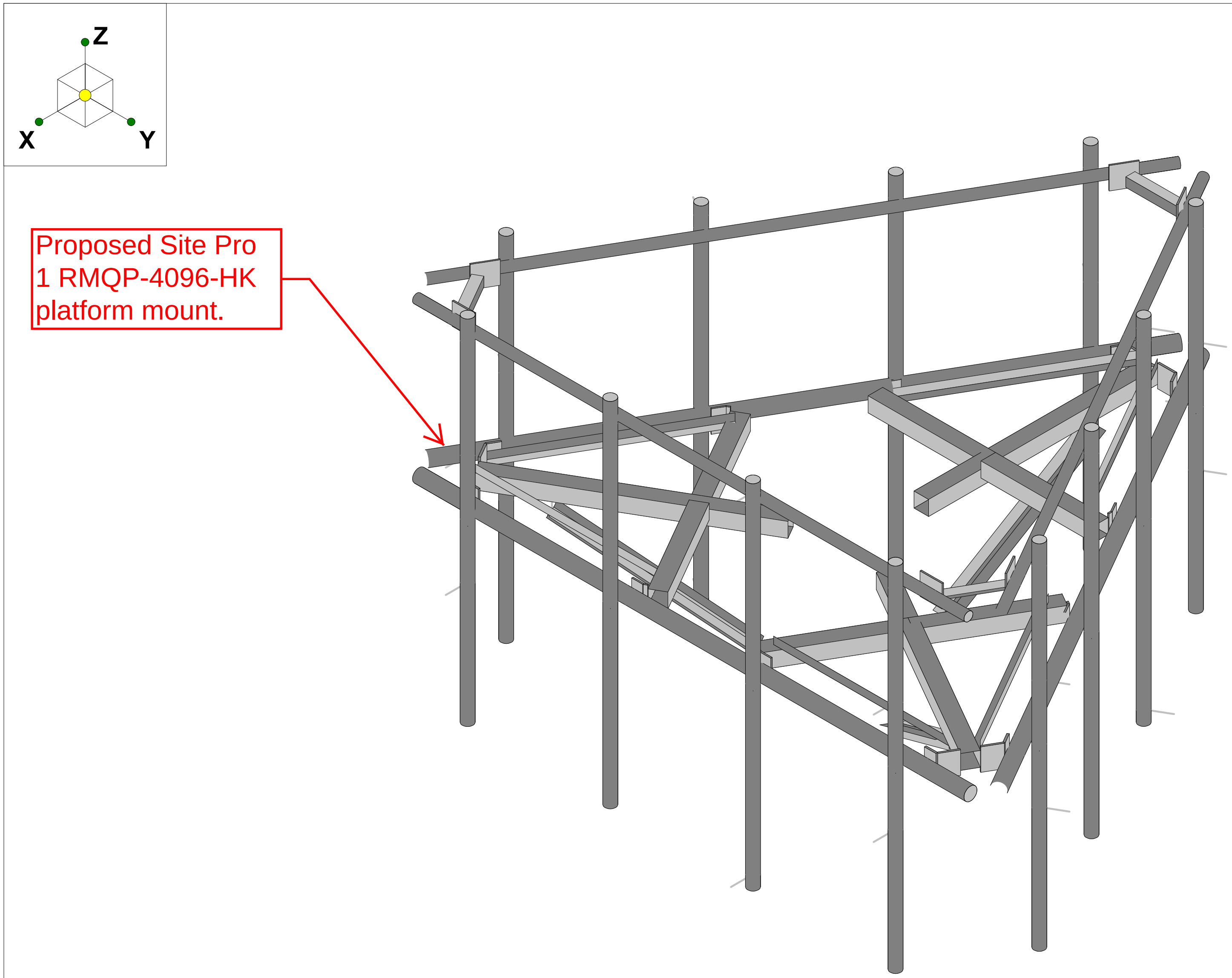
Member/Node Number	Load Comb.	Tensile Load, T_u (kips)	Shear Load, V_u (kips)	Bolt Diameter (in)	Number of Bolts	Shear Planes per Bolt	Bolt Tensile Strength, F_{nt} (ksi)	Bolt Shear Strength, F_{nv} (ksi)	Connected Member Thickness (in)	Connected Member Edge Clear Distance (in)	Connected Member Ultimate Strength, F_u (ksi)	Bolt Tensile Usage	Bolt Shear Usage	Member Bearing Usage
M63	Env.	1.150	0.400	0.5	1	1	43.5	26.1	0.375	0.71875	58	**18%**	**10%**	**3%**
M49	Env.	1.160	0.180	0.5	1	1	43.5	26.1	0.375	0.71875	58	**18%**	**5%**	**1%**

APPENDIX E

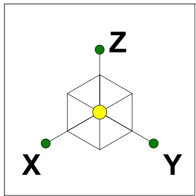
INSTALLATION SKETCHES AND MOUNT ASSEMBLY DRAWINGS

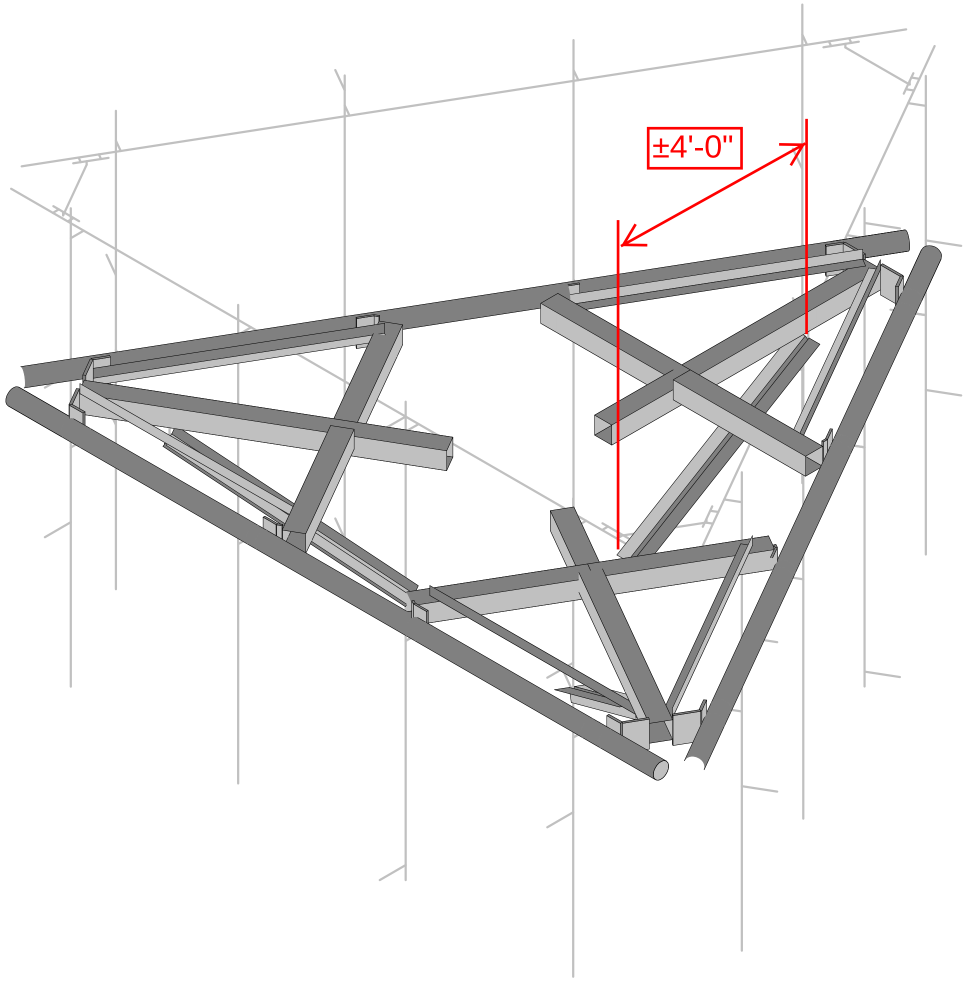
INSTALL ANTENNAS CENTERED ON THE PLATFORM BASE





CLS		MOD - 1
ML	42284-CTNH107A-NH107/Global/Cherry Hill	May 27, 2019 at 7:17 PM
42284-CTNH107A-02-MR	Proposed Mount - Rendered	42284-CTNH107A-02-MR.r3d





CLS	42284-CTNH107A-NH107/Global/Cherry Hill	MOD - 2
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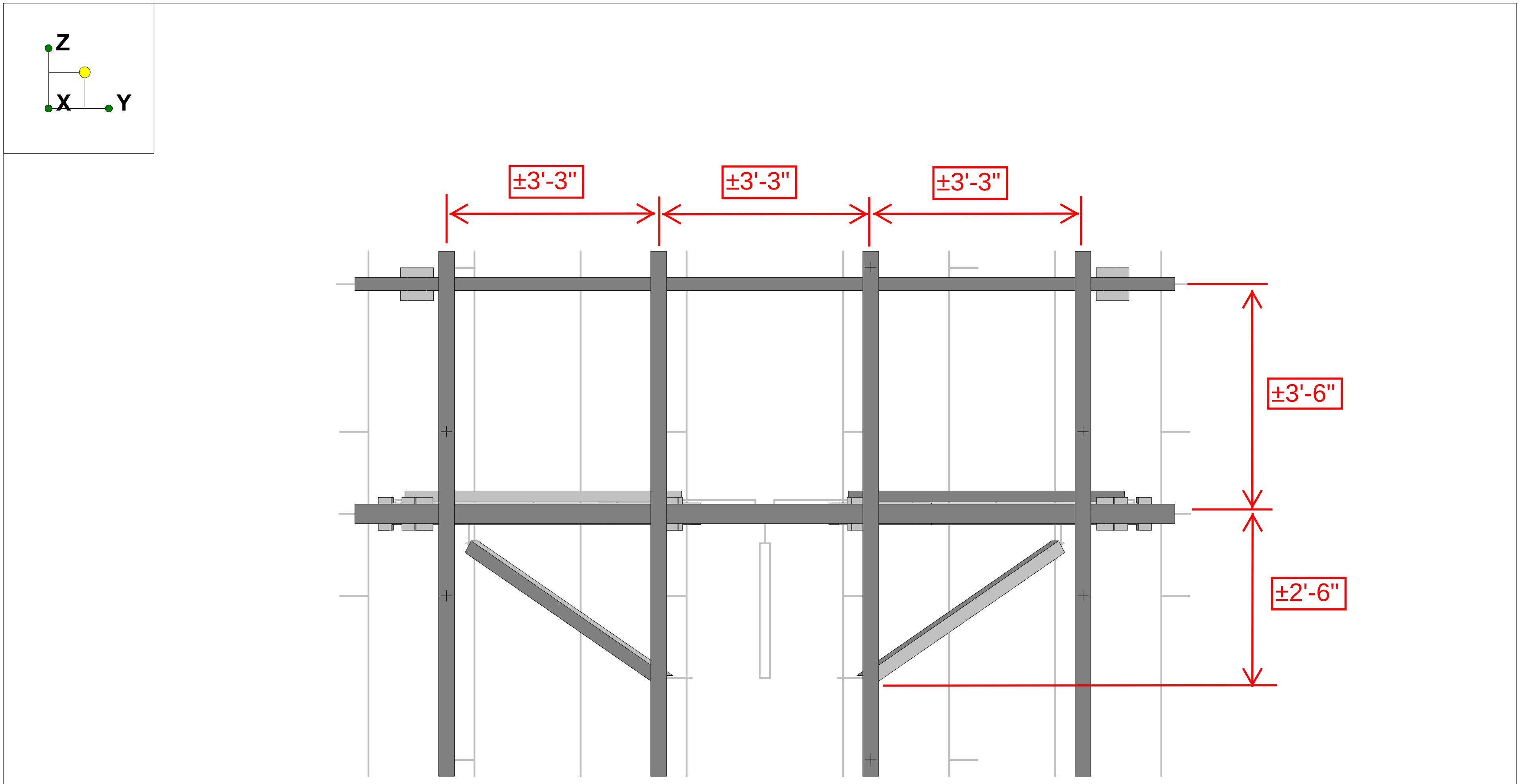

CLS	42284-CTNH107A-NH107/Global/Cherry Hill	MOD - 3
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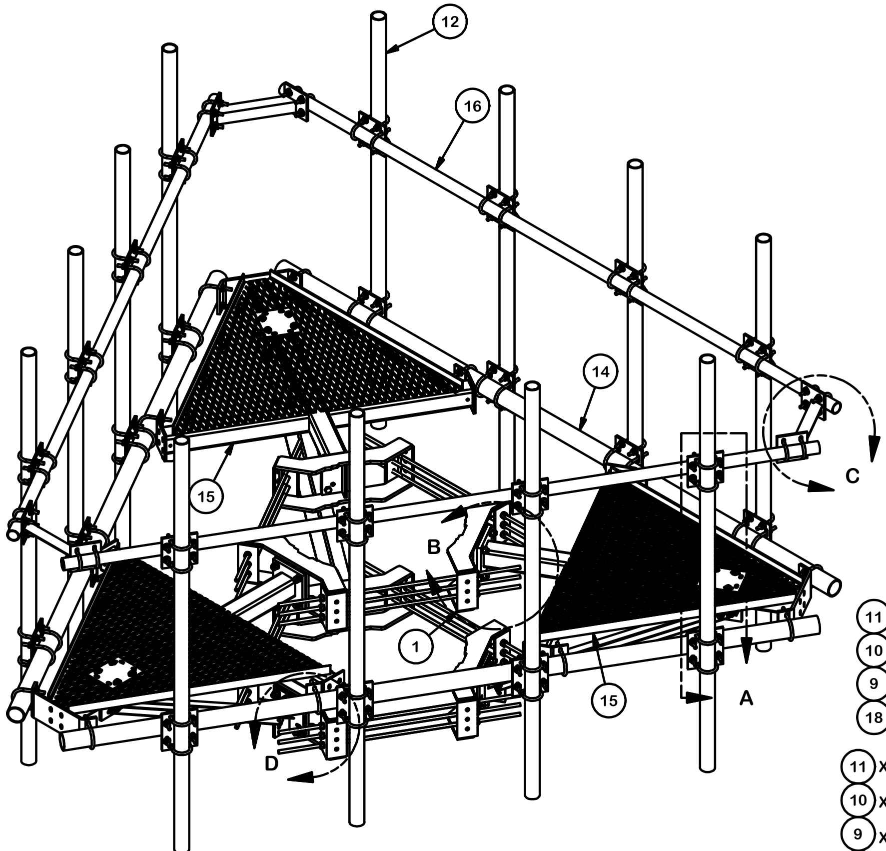
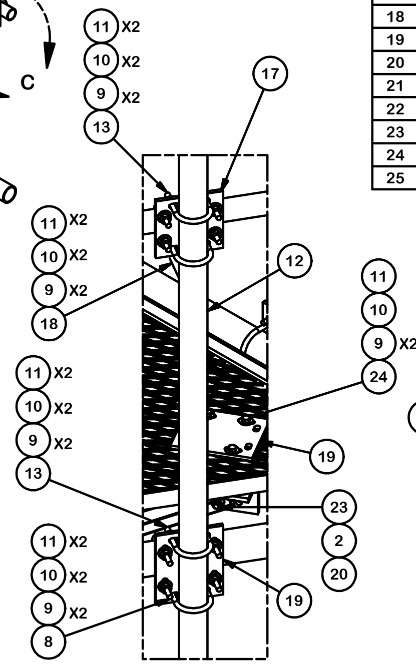
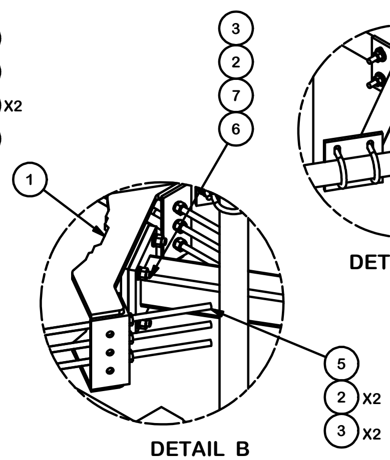


PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	6	X-LWRM	RING MOUNT WELDMENT		68.16	408.95
2	66	G58LW	5/8" HDG LOCKWASHER		0.03	1.72
3	60	A58NUT	5/8" HDG A325 HEX NUT		0.13	7.78
4	18	G58R-24	5/8" x 24" THREADED ROD (HDG.)		0.55	9.88
5	18	G58R-48	5/8" x 48" THREADED ROD (HDG.)		0.55	9.88
6	24	A58234	5/8" x 2-3/4" HDG A325 HEX BOLT	2 3/4 in	0.36	8.53
7	24	A58FW	5/8" HDG A325 FLATWASHER		0.03	0.82
8	36	X-UB1306	1/2" X 3-5/8" X 6" X 3" U-BOLT (HDG.)		0.73	26.34
9	264	G12FW	1/2" HDG USS FLATWASHER		0.03	8.99
10	252	G12LW	1/2" HDG LOCKWASHER		0.01	3.50
11	252	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	18.03
12	12	P3096	2-7/8" OD X 96" Sch 40 Galvanized Pipe		46.45	557.43
13	48	X-UB1300	1/2" X 3" X 5" X 2" U-BOLT (HDG.)		0.73	35.12
14	3	P3150	3-1/2" X 150" SCH 40 GALVANIZED PIPE	150 in	94.80	284.40
15	3	X-SV196	LOW PROFILE PLATFORM CORNER		212.10	636.31
16	3	P2150	2-3/8" OD X 150" SCH 40 GALVANIZED PIPE	150 in	48.06	144.17
17	12	SCX2	CROSSOVER PLATE	7 in	4.80	57.56
18	36	X-UB1212	1/2" X 2-1/2" X 4-1/2" X 2" U-BOLT (HDG.)		0.73	26.34
19	15	SCX4	CROSSOVER PLATE	8 1/2 in	6.02	90.32
20	6	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	0.78
21	6	X-253993	PLATFORM REINFORCEMENT KIT ANGLE	52 25/32 in	14.33	85.99
22	6	X-253992	T-BRACKET FOR REINFORCEMENT KIT		13.55	81.27
23	6	G5802	5/8" x 2" HDG HEX BOLT GR5		0.27	1.62
24	12	G12065	1/2" x 6-1/2" HDG HEX BOLT GR5 FULL THREAD	6 1/2 in	0.41	4.91
25	3	X-AHCP	ANGLE HANDRAIL CORNER PLATE		12.92	38.76
					TOTAL WT. #	2645.84



DETAIL A



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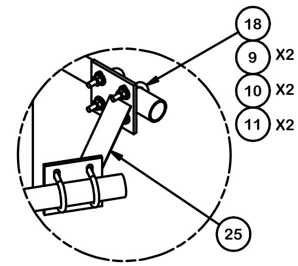

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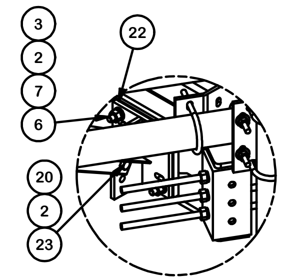


DETAIL D

REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
A	REPLACED HCP WITH X-AHCP	4488	CEK	7/14/2014

REVISION HISTORY

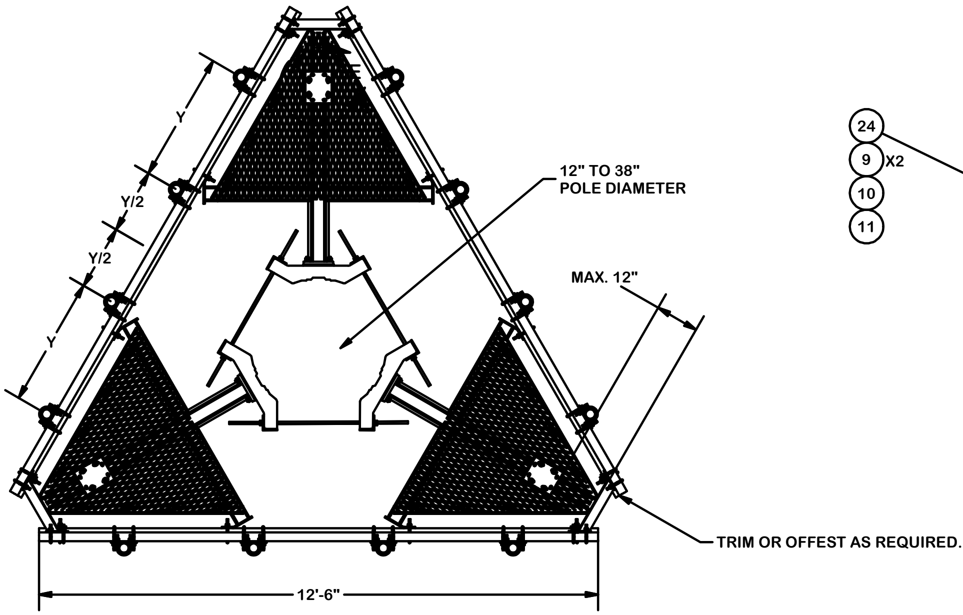
TOLERANCE NOTES

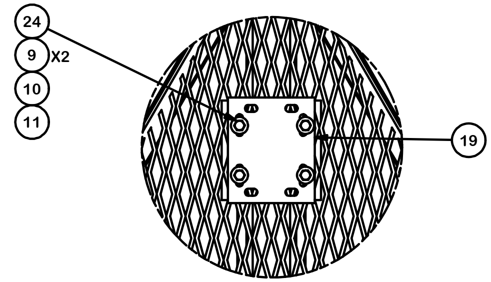
TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

DESCRIPTION
12' 6" LOW PROFILE PLATFORM
WITH TWELVE 2-7/8" ANTENNA MOUTING
PIPES, AND HANDRAIL

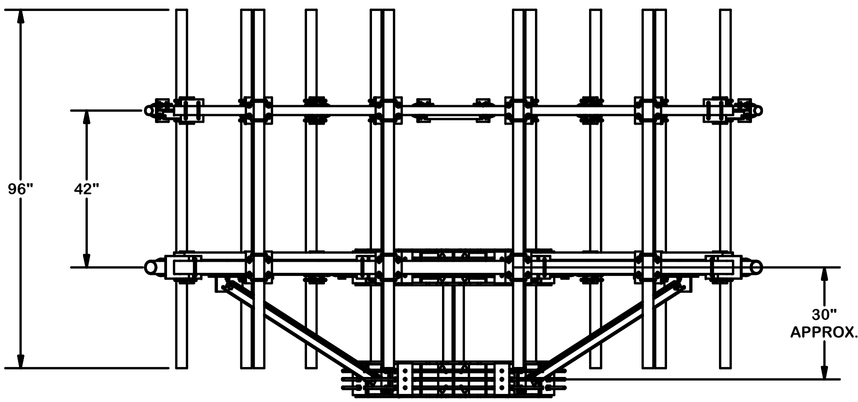
SITE PRO 1
A valmont COMPANY
Engineering Support Team:
1-888-753-7446
Locations:
New York, NY
Atlanta, GA
Los Angeles, CA
Plymouth, IN
Salem, OR
Dallas, TX

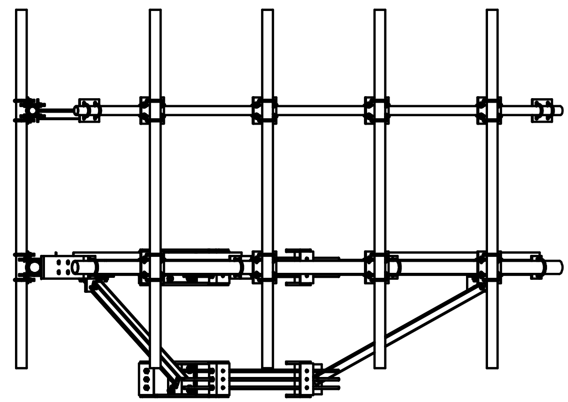
CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
4488	CEK 3/24/2014		RMQP-4096-HK
CLASS 81 / SUB 02	DRAWING USAGE: CUSTOMER	CHECKED BY: BMC 7/14/2014	DWG. NO. RMQP-4096-HK





DETAIL E





REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
A	REPLACED HCP WITH X-AHCP	4488	CEK	7/14/2014

REVISION HISTORY

TOLERANCE NOTES

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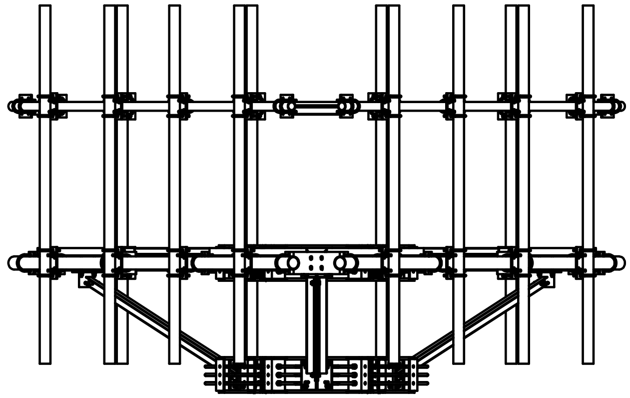
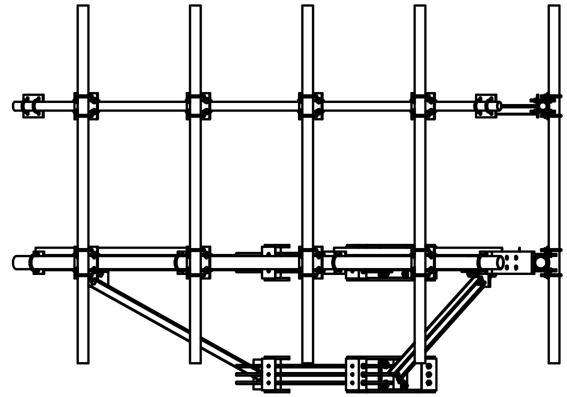
PIPES, AND HANDRAIL

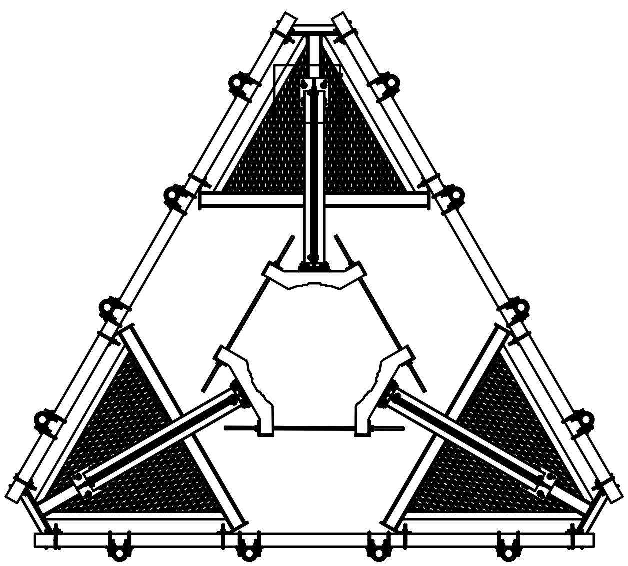
CPD NO.		DRAWN BY	ENG. APPROVAL
4488		CEK 3/24/2014	
CLASS	SUB	DRAWING USAGE	CHECKED BY
81	02	CUSTOMER	BMC 7/14/2014

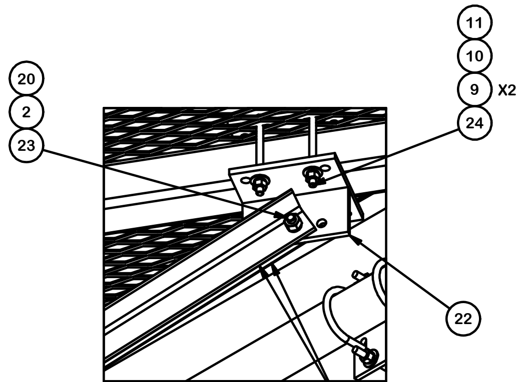
SITE PRO 1
A valmont COMPANY
Engineering Support Team: 1-888-753-7446
Locations:
New York, NY
Atlanta, GA
Los Angeles, CA
Plymouth, IN
Salem, OR
Dallas, TX

PART NO. RMQP-4096-HK
DWG. NO. RMQP-4096-HK









DETAIL F

A	REPLACED HCP WITH X-AHCP	4488	CEK	7/14/2014
REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE

REVISION HISTORY

TOLERANCE NOTES

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

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12' 6" LOW PROFILE PLATFORM
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CPD NO.		DRAWN BY	ENG. APPROVAL
4488		CEK 3/24/2014	
CLASS	SUB	DRAWING USAGE	CHECKED BY
81	02	CUSTOMER	BMC 7/14/2014

SITE PRO 1
A valmont COMPANY

Engineering
Support Team:
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Plymouth, IN
Salem, OR
Dallas, TX

PART NO. RMQP-4096-HK

DWG. NO. RMQP-4096-HK

Exhibit F

Power Density/RF Emissions Report

Transcom Engineering, Inc.
Wireless Network Design and Deployment

Radio Frequency Emissions Analysis Report

T-MOBILE Existing Facility

Site ID: CTNH107A

NH107/Global/Cherry Hill
150 North Main Street
Branford, CT 06405

August 13, 2019

Transcom Engineering Project Number: 737001-0043

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**11.70 %**

Transcom Engineering, Inc PO Box 1048 Sterling MA 01564

Transcom Engineering, Inc.

Wireless Network Design and Deployment

August 13, 2019

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

Emissions Analysis for Site: **CTNH107A – NH107/Global/Cherry Hill**

Transcom Engineering, Inc ("Transcom") was directed to analyze the proposed upgrades to the T-MOBILE facility located at **150 North Main Street, Branford, CT**, for the purpose of determining whether the emissions from the Proposed T-MOBILE Antenna Installation located on this property are within specified federal limits.

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

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were performed for the proposed upgrades to the T-MOBILE antenna facility located at **150 North Main Street, Branford, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-MOBILE is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

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

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

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
UMTS	1900 MHz (PCS)	1	40
GSM	1900 MHz (PCS)	1	15
UMTS	2100 MHz (AWS)	1	40
LTE	2100 MHz (AWS)	2	60
LTE / 5G NR	600 MHz	2	40
LTE	700 MHz	2	20

Table 1: Channel Data Table

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

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	Ericsson AIR21 B2A/B4P	121
A	2	Ericsson AIR21 B4A/B2P	121
A	3	RFS APXVAARR24_43-U-NA20	121
B	1	Ericsson AIR21 B2A/B4P	121
B	2	Ericsson AIR21 B4A/B2P	121
B	3	RFS APXVAARR24_43-U-NA20	121
C	1	Ericsson AIR21 B2A/B4P	121
C	2	Ericsson AIR21 B4A/B2P	121
C	3	RFS APXVAARR24_43-U-NA20	121

Table 2: Antenna Data

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

Cable losses were factored in the calculations for this site. Since all **2100 MHz (AWS) UMTS** radios are ground mounted the following cable loss values were used. For each ground mounted **2100 MHz (AWS) UMTS** radio there was 1.83 dB of cable loss calculated into the system gains / losses for this site. These values were calculated based upon the manufacturers specifications for **173 feet** of **1-5/8”** coax.

RESULTS

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

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	Ericsson AIR21 B2A/B4P	1900 MHz (PCS) / 2100 MHz (AWS)	15.9	3	95	3,160.83	0.86
Antenna A2	Ericsson AIR21 B4A/B2P	2100 MHz (AWS)	15.9	2	120	4,668.54	1.27
Antenna A3	RFS APXVAARR24_43-U-NA20	600 MHz / 700 MHz	12.95 / 13.35	4	120	2,443.03	1.57
						Sector A Composite MPE%	**3.70**
Antenna B1	Ericsson AIR21 B2A/B4P	1900 MHz (PCS) / 2100 MHz (AWS)	15.9	3	95	3,160.83	0.86
Antenna B2	Ericsson AIR21 B4A/B2P	2100 MHz (AWS)	15.9	2	120	4,668.54	1.27
Antenna B3	RFS APXVAARR24_43-U-NA20	600 MHz / 700 MHz	12.95 / 13.35	4	120	2,443.03	1.57
						Sector B Composite MPE%	**3.70**
Antenna C1	Ericsson AIR21 B2A/B4P	1900 MHz (PCS) / 2100 MHz (AWS)	15.9	3	95	3,160.83	0.86
Antenna C2	Ericsson AIR21 B4A/B2P	2100 MHz (AWS)	15.9	2	120	4,668.54	1.27
Antenna C3	RFS APXVAARR24_43-U-NA20	600 MHz / 700 MHz	12.95 / 13.35	4	120	2,443.03	1.57
						Sector C Composite MPE%	**3.70**

Table 3: T-MOBILE Emissions Levels

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

Site Composite MPE%	
Carrier	**MPE%**
T-MOBILE – Max Per Sector Value	**3.70 %**
AT&T / Cingular	6.48 %
MetroPCS	0.53 %
PageNet	0.11 %
Nextel	0.46 %
Clearwire	0.10 %
Sprint	0.32 %
Site Total MPE %:	**11.70 %**

Table 4: All Carrier MPE Contributions

T-MOBILE Sector A Total:	3.70 %
T-MOBILE Sector B Total:	3.70 %
T-MOBILE Sector C Total:	3.70 %
Site Total:	11.70 %

Table 5: Site MPE Summary

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

T-MOBILE _ Frequency Band / Technology Max Power Values (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (µW/cm²)	Frequency (MHz)	Allowable MPE (µW/cm²)	Calculated % MPE
T-Mobile 1900 MHz (PCS) UMTS	1	1,556.18	121	4.23	1900 MHz (PCS)	1000	0.42%
T-Mobile 1900 MHz (PCS) GSM	1	583.57	121	1.59	1900 MHz (PCS)	1000	0.16%
T-Mobile 2100 MHz (AWS) UMTS	1	1,021.08	121	2.78	2100 MHz (AWS)	1000	0.28%
T-Mobile 2100 MHz (AWS) LTE	2	2,334.27	121	12.69	2100 MHz (AWS)	1000	1.27%
T-Mobile 600 MHz LTE / 5G NR	2	788.97	121	4.29	600 MHz	400	1.07%
T-Mobile 700 MHz LTE	2	432.54	121	2.35	700 MHz	467	0.50%
						Total:	**3.70%**

Table 6: T-MOBILE Maximum Sector MPE Power Values

Summary

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

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

T-MOBILE Sector	Power Density Value (%)
Sector A:	3.70 %
Sector B:	3.70 %
Sector C:	3.70 %
T-MOBILE Maximum Total (per sector):	3.70 %
Site Total:	11.70 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **11.70 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
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Transcom Engineering, Inc
PO Box 1048
Sterling, MA 01564