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

July 10, 2019

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

RE: **Notice of Exempt Modification for T-Mobile:**
876370 - T-Mobile Site ID: CTNH032H
41 Beckwith Road, Montville, CT 06370
Latitude: 41° 26′ 7.66″ / Longitude: -72° 13′ 15.07″

Dear Ms. Bachman:

T-Mobile currently maintains 6 total antennas at the 175-foot mount on the existing 180-foot Monopole Tower, located at 41 Beckwith Road, Montville, CT. The tower is owned by Crown Castle and the property is owned by the Bond Family Trust, Gladys Bond as Trustee. T-Mobile now intends to replace three (3) existing antennas with three (3) new 600/700 MHz antennas. T-Mobile also intends to replace (3) existing remote radios and add (3) hybrid lines. T-Mobile also intends to install (1) microwave dish with the associated install of (1) fiber line and (2) power cables. An upgrade in the cabinet breaker from 80A to 100A is proposed, as well as, an internal upgrade to the existing cabinet on the ground.

Planned Modifications:
Tower:

Remove: NONE

Remove and Replace:
(3) LNX 6513DS-A1M Antenna **(REMOVE)** - (3) RFS-APXVAARR18_43-U-NA20 Antenna 600/700 MHz **(REPLACE)**

(3) RRUS11 B12 **(REMOVE) –** (3) Radio 4449 B71+B12 **(REPLACE)**

Install New:
(1) IBR1300 Dish
(1) ¼" Fiber Line
(2) ¼" Power Cables
(3) 1 5/8" Hybrid Fiber Line

Existing to Remain:
(1) 1 5/8" Coax

(3) APX16SWV-16DWV-S-E-A20 Antenna 1900/2100 MHz
(3) RRUS11 B2
(3) RRUS11 B4

Ground:

Upgrade: Internal upgrade to existing ground cabinet. Upgrade cabinet breaker from 80A to 100A.

The facility was approved by the Town of Montville Planning and Zoning Commission on May 9, 2000. This approval is included as Exhibit A. Please note this is the document the Town has on file for their approval.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Ronald K. McDaniel, Mayor, Town of Montville, Marcia A. Vlaun, Town Planner, Crown Castle, the tower owner, and The Bond Family Trust, the property owner.

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

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

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

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

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

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

Sincerely,

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

Attachments

cc:

Mr. Ronald K. McDaniel, Mayor
Town of Montville
Town Hall – 2nd Floor
310 Norwich-New London Tpke.
Uncasville, CT 06382
860.848.6778

Ms. Marcia A. Vlaun, Town Planner
Town of Montville
Town Hall – Room 101
310 Norwich-New London Tpke.
Uncasville, CT 06382
860.848.6779

Bond Family Trust, Property
Owner C/O Steve Bond
41 Beckwith Road
Oakdale, CT 06370

Crown Castle, Tower Owner

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

SHIP DATE: 24JUN19
ACTWGT: 4.00 LB
CAD: 104924194/INET4100

BILL SENDER

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

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

565J1/D210/23AD

J191019010701uv

FedEx Express

TUE - 25 JUN 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **7755 4925 4902**

EB BDLA

06051
BDL
CT-US

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
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Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

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Exhibit A

Original Facility Approval

e. mailed
May 10, '00
MC

L E G A L N O T I C E

The Montville Planning and Zoning Commission at its meeting held on, May 9, 2000, took the following action:

Sprint PCS/Bond: An application for a special permit for telecommunucations tower located on the property located at 41 Beckwith Road, Montville, Ct. Shown on Assessor's Map 12, Lot 1. GRANTED with CONDITIONS.

Maps and documentation concerning the above applications are on file in the office of the Town Planner and Town Clerk, Town Hall Annex and Town Hall, respectively, Montville, Ct.

Dated at Montville, Ct. this 10th day of May, 2000.

MONTVILLE PLANNING AND ZONING COMMISSION

Gregory Majewski, Chairman

PUBLISH IN THE NEW LONDON DAY MAY ~~11~~ 12, 2000

PLEASE REFERENCE PURCHASE ORDER 6100 I 1 ON INVOICE.

Note must be 48 hours in advance - per Judy @ the Day.

TEL: 848-8549
FAX: 848-2354

TOWN OF MONTVILLE
PLANNING & ZONING COMMISSION

310 NORWICH-NEW LONDON TPKE.
UNCASVILLE, CONNECTICUT 06382-2599

CERTIFICATE OF NOTICE OF DECISION

APPROVAL: APPROVED W/CONDITIONS

LOCATION/DESCRIPTION: 41 BECKWITH ROAD

NATURE OF PROJECT: TELECOMMUNICATIONS TOWER

APPLICABLE ZONING REGULATION: REGULATION

OWNER OF RECORD: SPRINT PCS/BOND

PLANNING DIRECTOR

CLERICAL ASSISTANT

REMARKS:

Received for Record SEP 0 6 2000
At 11 h 58 m A. M. and recorded by
Town Clerk

3147

Received for Record SEP 06 2000
at 11:58 o'clock AM noon
and recorded in MONTVILLE Land Records
Vol. 342, page 291, by
Brian Gilmore
TOWN CLERK

AFTER RECORDING, PLEASE RETURN TO:
Thomas J. Regan, Esquire
Brown Rudnick Freed & Gesmer
185 Asylum Street, 38th Floor
Hartford, CT 06103-3402

Exhibit B

Property Card

Property Card: **41 BECKWITH RD**

Town of Montville, CT

Parcel Information

Location:	41 BECKWITH RD	Property Use:	Residential	Primary Use:	Residential
Unique ID:	B0046400	Map Block Lot:	012-001-000	Acres:	226
		Zone:	WRP	Volume / Page:	0606/0806
		Sale Date:	06/29/2015	Sale Price:	$0

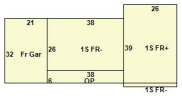
Value Information

	Appraised Value	Assessed Value
Land	802030	307670
Buildings	172740	120920
Detached Outbuildings	185590	129910
Total	1160360	558500

Owner's Information

Owner's Data
BOND GLADYS J TRUSTEE 41 BECKWITH RD OAKDALE, CT 06370

Building 1



Category:	Residential	Siding:	Aluminum Siding	Total Rooms:	6
Stories:	1.00	Fuel:	Oil	Beds/Units:	3
GLA:	2054	Heating:	Forced Hot Air	Baths:	2
Year Built:	1963	Fireplace:	2		
Class:	C+	Cooling Percent:	None	Half Baths:	1
Use:	Single Family	Floors:	Hardwood	Basement Garage:	0
Construction Style:	Split Level	Roof Material:	Asphalt	Finished Basement:	700


Day Rd
Salem Tpke
Holmes Rd
Birch Ter
Maiville Dr
85
Beckwith Rd
Bogue Brook
Reservior
Daisy Hill Dr
876370
Hartford New London Tpke
Chesterfield Rd
Chesterfield
Deer Run
85
0.5 km

Exhibit C

Construction Drawings

T-MOBILE SITE NAME:

CTNH032H

T-MOBILE SITE NUMBER:

CTNH032H

CROWN BU: 876370 / APP#: 479850

67D07C CONFIGURATION

41 BECKWITH ROAD
MONTVILLE, CT 06370

EXISTING 180'-0" MONOPOLE

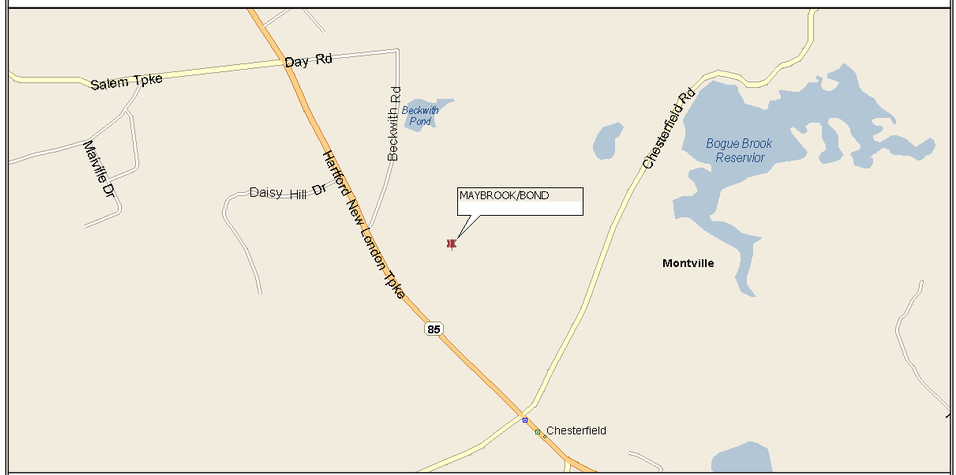
PROJECT SUMMARY

SITE TYPE:	EXISTING EQUIPMENT UPGRADE
SITE ADDRESS:	41 BECKWITH ROAD MONTVILLE, CT 06370
JURISDICTION:	NEW LONDON COUNTY

NAD83

LATITUDE:	41.435460° N
LONGITUDE:	72.220850° 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	ENLARGED SITE PLAN	1
A-3	TOWER ELEVATION AND ANTENNA ORIENTATION	1
A-4	ANTENNA, RRH AND TMA SCHEDULE	1
E-1	PANEL SCHEDULE AND ONE-LINE DIAGRAM	1

CONTACT INFORMATION

A&E FIRM:	B+T GROUP 1717 S. BOULDER, STE. 300 TULSA, OK 74119	ELECTRIC PROVIDER:	N/A
CONTACT:	STEVE THORNHILL	TELCO PROVIDER:	N/A
PHONE:	(918) 587-4630		

DRIVING DIRECTIONS

FROM WINDSOR LOCKS, CT, DEPART FROM BRADLEY INTERNATIONAL AIRPORT ON TERMINAL RD UNTIL IT CHANGES TO CT-20/BRADLEY FIELD CONNECTOR. TAKE RAMP RIGHT ONTO I-91/RICHARD P HORAN MEMORIAL HWY. AT EXIT 30, TAKE RAMP RIGHT ONTO I-84/US-44. AT EXIT 55, TAKE RAMP RIGHT ONTO CT-2/VETERANS OF FOREIGN WARS MEMORIAL HWY. AT EXIT 19, KEEP RIGHT ONTO RAMP FOR CT-11. AT EXIT 4, TAKE RAMP RIGHT TO CT-82/E HADDAM RD. TURN LEFT ONTO CT-82/E HADDAM RD. TURN RIGHT ONTO CT-85/NEW LONDON RD. TURN LEFT ONTO BECKWITH RD. ARRIVE AT MAYBROOK/BOND.

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.

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	2018 CT SBC
STRUCTURAL	2018 CT SBC
MECHANICAL	2018 CT SBC
ELECTRICAL	2018 CT SBC

PROJECT DESCRIPTION

THE PROPOSED PROJECT INCLUDES:

- REMOVE (3) EXISTING ANTENNAS AT 175'-0"
- REMOVE (3) EXISTING RRHS AT 175'-0"
- REMOVE (1) DUS41
- INSTALL (3) NEW ANTENNAS AT 175'-0"
- INSTALL (3) NEW RRHS AT 175'-0"
- INSTALL (1) NEW MW ANTENNA AT 175'-0"
- INSTALL (3) NEW 1 5/8" HYBRID CABLES FOR NEW ANTENNAS
- INSTALL (2) NEW 1/4" POWER CABLES FOR NEW MW ANTENNA
- INSTALL (1) NEW 1/4" FIBER OPTIC CABLE FOR NEW MW ANTENNA
- INSTALL (2) NEW BB 6630s
- UPGRADE CABINET BREAKER FROM 80A TO 100A

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

B+T GRP

CROWN CASTLE

T-Mobile

CTNH032H
BU #: 876370

CTNH032H

41 BECKWITH ROAD
MONTVILLE, CT 06370

EXISTING 180'-0" MONOPOLE

PROJECT NO:	G0135737.001.01
CHECKED BY:	RMC

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
A	05/17/19	DAC	PRELIMINARY REVIEW
0	6/10/19	JJD	CONSTRUCTION
1	6/28/19	JJD	CONSTRUCTION

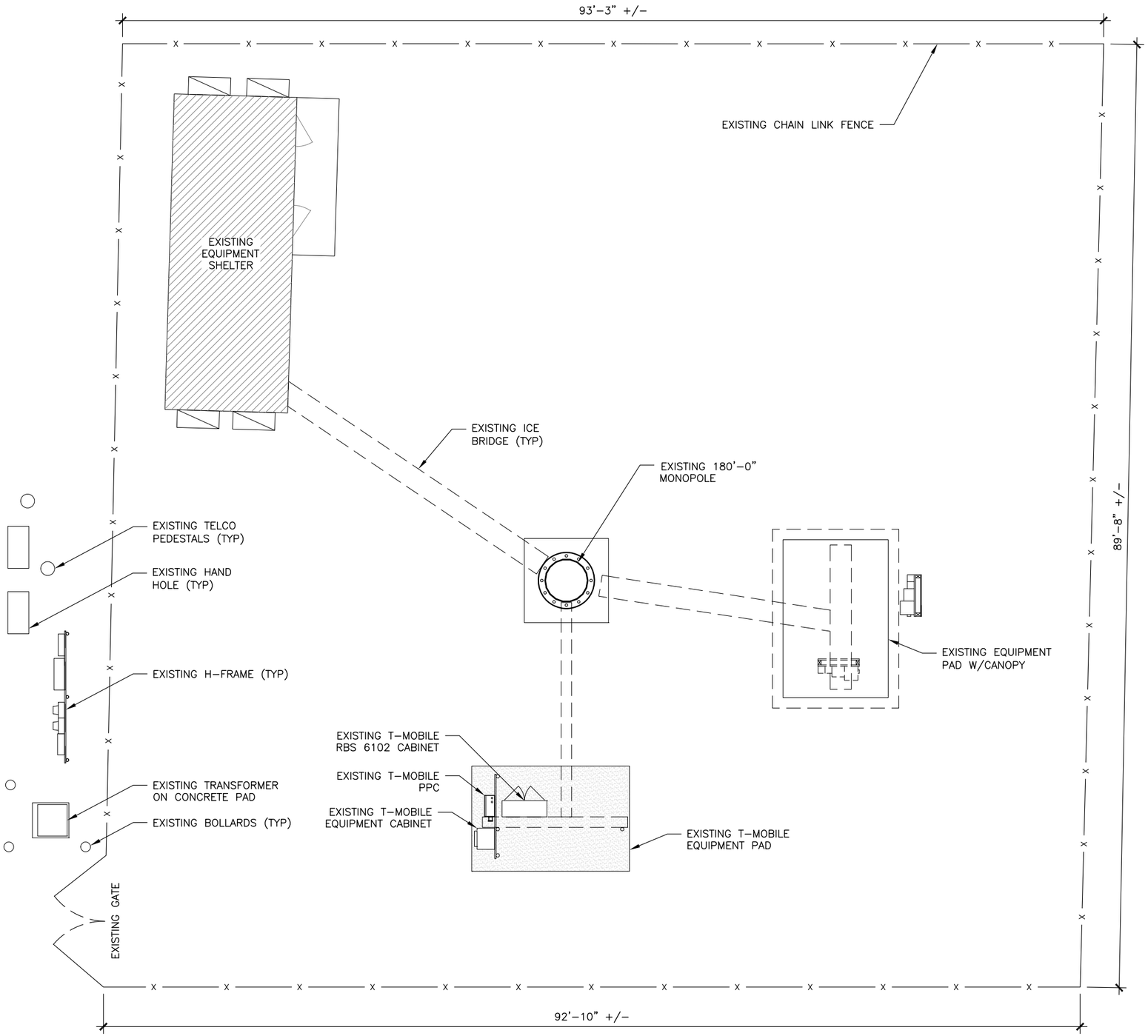
B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/20

STATE OF CONNECTICUT
31627
LICENSED PROFESSIONAL ENGINEER
6/28/19

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

SHEET NUMBER: T-1

REVISION: 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 MONTVILLE TOWNSHIP TAX MAP AND IS SITUATED AT 41 BECKWITH ROAD, MONTVILLE, CT 06370.

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 THREE (3) PANEL ANTENNAS, THREE (3) RRUS, ONE (1) MW ANTENNA, THREE (3) 1/4" CABLES, AND AN ADDITIONAL THREE (3) HCS 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 41.435460° N± AND LONGITUDE OF 72.220850° 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

CTNH032H
BU #: 876370

CTNH032H
41 BECKWITH ROAD
MONTVILLE, CT 06370

EXISTING 180'-0" MONOPOLE

PROJECT NO:	G0135737.001.01
CHECKED BY:	RMC

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Expires 2/10/20

STATE OF CONNECTICUT
31627
LICENSED PROFESSIONAL ENGINEER
6/28/19

SHEET NUMBER: A-1

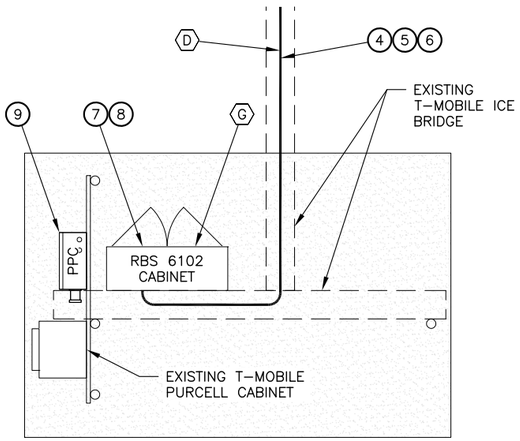
REVISION: 1

LEGEND

EXISTING/DEMOLITION NOTES		INSTALLATION NOTES	
A	EXISTING RFS – APX16DWV–16DWV–S–E–A20 ANTENNA TO REMAIN (TOTAL OF 3)	1	INSTALL RFS APXVAARR18_43–U–NA20 (6 FT) ANTENNAS ON EXISTING MOUNT PROVIDE NEW 2 7/8" OD SCH 40 PIPE MAST (LENGTH TO BE VIF) (TYP OF 1 PER SECTOR, TOTAL OF 3)
B	EXISTING RRUS11 B2 RRU TO REMAIN (TOTAL OF 3)	2	INSTALL RADIO 4449 B71+B12 (TYP OF 1 PER SECTOR, TOTAL OF 3)
C	EXISTING RRUS11 B4 RRU TO REMAIN (TOTAL OF 3)	3	INSTALL FASTBACK NETWORKS IBR 1300_CCIV2 (10.24 IN) MICROWAVE ANTENNA ON EXISTING MOUNT PROVIDE NEW 2 7/8" OD SCH 40 PIPE MAST (LENGTH TO BE VIF) (ALPHA SECTOR, TOTAL OF 1)
D	EXISTING 1 5/8" HYBRID FIBER TRUNK TO REMAIN (TOTAL OF 1)	4	INSTALL (3) 1 5/8" HYBRID FIBER TRUNK FROM EQUIPMENT TO ANTENNAS FOLLOWING EXISTING ROUTING
E	EXISTING COMMSCOPE – LNX–6513DS–A1M ANTENNA TO BE REMOVED (TOTAL OF 3)	5	INSTALL (2) 1/4" POWER CABLES FROM EXISTING EQUIPMENT TO MW ANTENNA FOLLOWING EXISTING ROUTING
F	EXISTING RRUS11 B12 TO BE REMOVED (TOTAL OF 3)	6	INSTALL (1) 1/4" FIBER CABLE FROM EXISTING EQUIPMENT TO MW ANTENNA FOLLOWING EXISTING ROUTING
G	EXISTING DUS41 TO BE REMOVED (TOTAL OF 1)	7	INSTALL (1) BB 6630 (L2100/L700/L600) IN RBS 6102 CABINET
		8	INSTALL (1) BB 6630 (FUTURE 5G) IN RBS 6102 CABINET
		9	UPGRADE CABINET BREAKER FROM 80A TO 100A

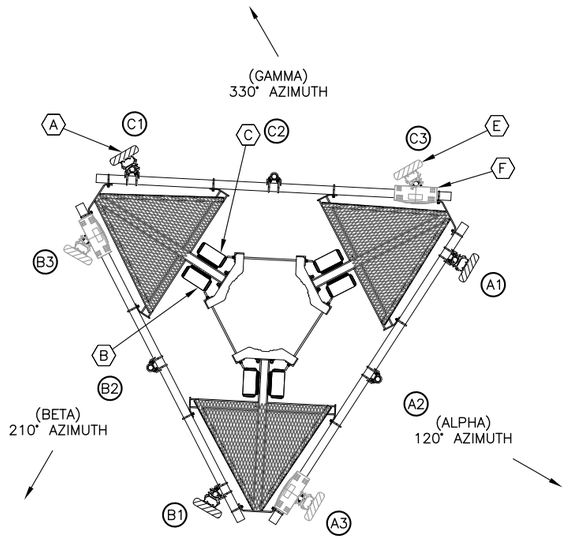
ANTENNA AND CABLE SCHEDULE

SECTOR	POSITION	EXISTING ANTENNAS	PROPOSED ANTENNA CONFIGURATION		E-TILT	M-TILT	ANTENNA CENTERLINE	TMA/RRH	CABLES	JUMPER TYPE	CABLE LENGTH
120° – ALPHA	A1	RFS APX16DWV–16DWV–S–E–A20	UMTS LTE	B2 B4	2°/2°	0°	175'–0"	0/2	(1) 1 5/8" HYBRID FIBER TRUNK	–	225'–0"
	A2	–	–	–	–	–		–	–	–	–
	A3	**RFS APXVAARR18_43–U–NA20**	**LTE**	**B71 + B12**	**2°**	**0°**		**0/1**	**(1) 1 5/8" HYBRID FIBER TRUNK**	**(1) FIBER (4) COAX**	**225'–0"**
210° – BETA	B1	RFS APX16DWV–16DWV–S–E–A20	UMTS LTE	B2 B4	2°/2°	0°	175'–0"	0/2	SHARED FIBER	–	–
	B2	–	–	–	–	–		–	–	–	–
	B3	**RFS APXVAARR18_43–U–NA20**	**LTE**	**B71 + B12**	**2°**	**0°**		**0/1**	**(1) 1 5/8" HYBRID FIBER TRUNK**	**(1) FIBER (4) COAX**	**225'–0"**
330° – GAMMA	C1	RFS APX16DWV–16DWV–S–E–A20	UMTS LTE	B2 B4	2°/2°	0°	175'–0"	0/2	SHARED FIBER	–	–
	C2	**RFS APXVAARR18_43–U–NA20**	**LTE**	**B71 + B12**	**2°**	**0°**		**0/1**	**(1) 1 5/8" HYBRID FIBER TRUNK**	–	**225'–0"**
25° – GAMMA	**C3**	**FASTBACK NETWORKS IBR 1300 CCIV2**	**–**	**–**	**–**	**–**		**–**	**(2) 1/4" POWER (1) 1/4" FIBER**	**–**	**225'–0"**



1 ENLARGED AREA PLAN

SCALE: 0' 1' 4' 8' 16'



2 EXISTING ANTENNA ORIENTATION

SCALE: 0' 1' 4' 8' 16'

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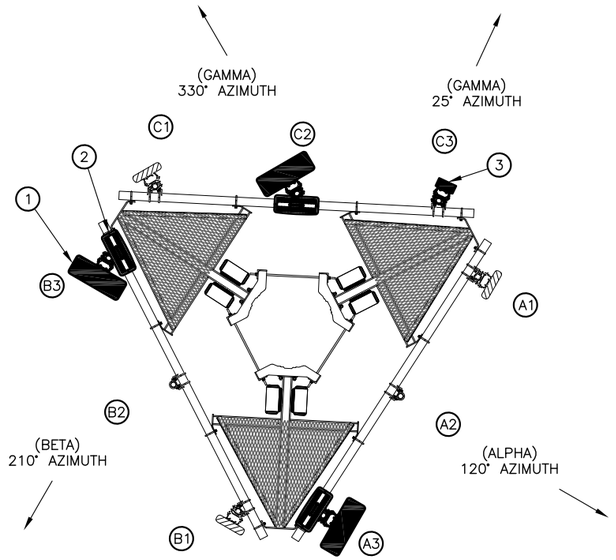


3 PROPOSED ANTENNA ORIENTATION

SCALE: 0' 1' 4' 8' 16'

N

B+T GRP

CROWN CASTLE

T···Mobile

CTNH032H
BU #: 876370

CTNH032H
41 BECKWITH ROAD
MONTVILLE, CT 06370

EXISTING 180'-0" MONOPOLE

PROJECT NO:	G0135737.001.01
CHECKED BY:	RMC

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
A	05/17/19	DAC	PRELIMINARY REVIEW
0	6/10/19	JJD	CONSTRUCTION
1	6/28/19	JJD	CONSTRUCTION

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/20

STATE OF CONNECTICUT · 31627 · LICENSED PROFESSIONAL ENGINEER

6/28/19

SHEET NUMBER:	REVISION:
A-2	1

LEGEND

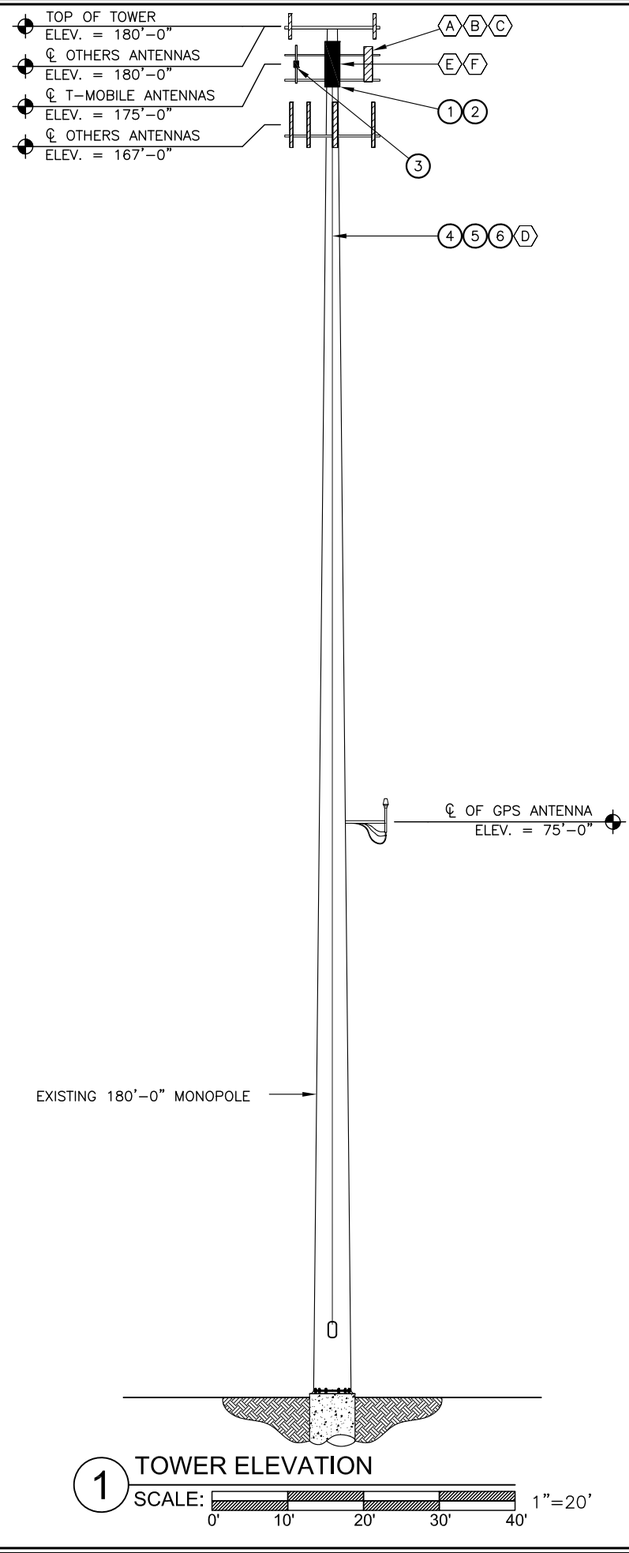
EXISTING/DEMOLITION NOTES		INSTALLATION NOTES	
A	EXISTING RFS – APX16DWV–16DWV–S–E–A20 ANTENNA TO REMAIN (TOTAL OF 3)	1	INSTALL RFS APXVAARR18_43–U–NA20 (6 FT) ANTENNAS ON EXISTING MOUNT PROVIDE NEW 2 7/8" OD SCH 40 PIPE MAST (LENGTH TO BE VIF) (TYP OF 1 PER SECTOR, TOTAL OF 3)
B	EXISTING RRUS11 B2 RRU TO REMAIN (TOTAL OF 3)	2	INSTALL RADIO 4449 B71+B12 (TYP OF 1 PER SECTOR, TOTAL OF 3)
C	EXISTING RRUS11 B4 RRU TO REMAIN (TOTAL OF 3)	3	INSTALL FASTBACK NETWORKS IBR 1300_CCIV2 (10.24 IN) MICROWAVE ANTENNA ON EXISTING MOUNT PROVIDE NEW 2 7/8" OD SCH 40 PIPE MAST (LENGTH TO BE VIF) (ALPHA SECTOR, TOTAL OF 1)
D	EXISTING 1 5/8" HYBRID FIBER TRUNK TO REMAIN (TOTAL OF 1)	4	INSTALL (3) 1 5/8" HYBRID FIBER TRUNK FROM EQUIPMENT TO ANTENNAS FOLLOWING EXISTING ROUTING
E	EXISTING COMMSCOPE – LNX–6513DS–A1M ANTENNA TO BE REMOVED (TOTAL OF 3)	5	INSTALL (2) 1/4" POWER CABLES FROM EXISTING EQUIPMENT TO MW ANTENNA FOLLOWING EXISTING ROUTING
F	EXISTING RRUS11 B12 TO BE REMOVED (TOTAL OF 3)	6	INSTALL (1) 1/4" FIBER CABLE FROM EXISTING EQUIPMENT TO MW ANTENNA FOLLOWING EXISTING ROUTING
G	GROUND EQUIPMENT NOT SHOWN FOR CLARITY	7	GROUND EQUIPMENT NOT SHOWN FOR CLARITY
		8	GROUND EQUIPMENT NOT SHOWN FOR CLARITY

STRUCTURAL ANALYSIS NOTE:

REFER TO STRUCTURAL ANALYSIS OR STRUCTURAL LETTER FOR APPROVAL OF ADDITIONAL NEW APPURTENANCES.

LEGEND:

- **NEW**
- EXISTING
- FUTURE



1 TOWER ELEVATION

SCALE: 0' 10' 20' 30' 40' 1"=20'

B+T GRP

CROWN CASTLE

T···Mobile

CTNH032H
BU #: 876370

CTNH032H

41 BECKWITH ROAD
MONTVILLE, CT 06370

EXISTING 180'-0" MONOPOLE

PROJECT NO:	G0135737.001.01
CHECKED BY:	RMC

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
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31627
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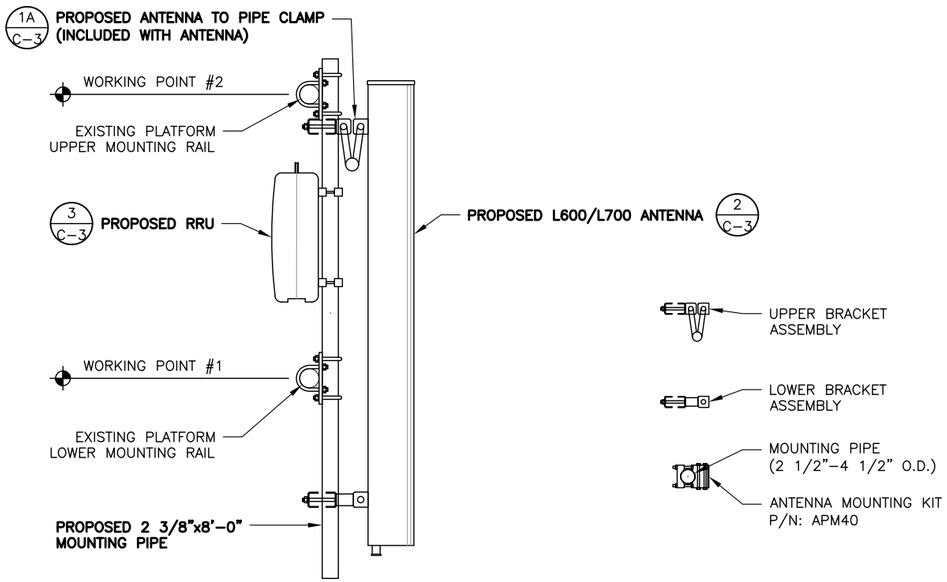
6/28/19

SHEET NUMBER:	REVISION:
A-3	1

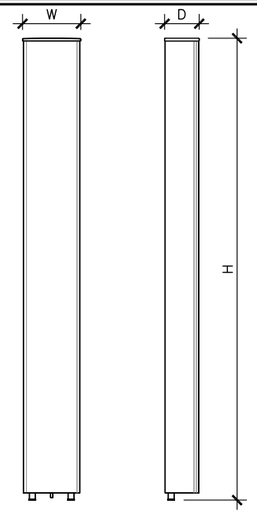


1 PROPOSED L600/L700 ANTENNA & RRU MOUNTING DETAIL

SCALE: N.T.S.

1A ANTENNA MOUNTING BRACKET

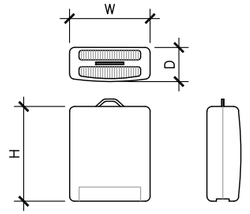
SCALE: N.T.S.



ANTENNA SPECS	
MANUFACTURER	RFS
MODEL #	APXVAARR18_43-U-NA20
WIDTH	24.0"
DEPTH	8.5"
HEIGHT	72"
WEIGHT	106.0 LBS

2 L600/L700 ANTENNA DETAIL

SCALE: N.T.S.

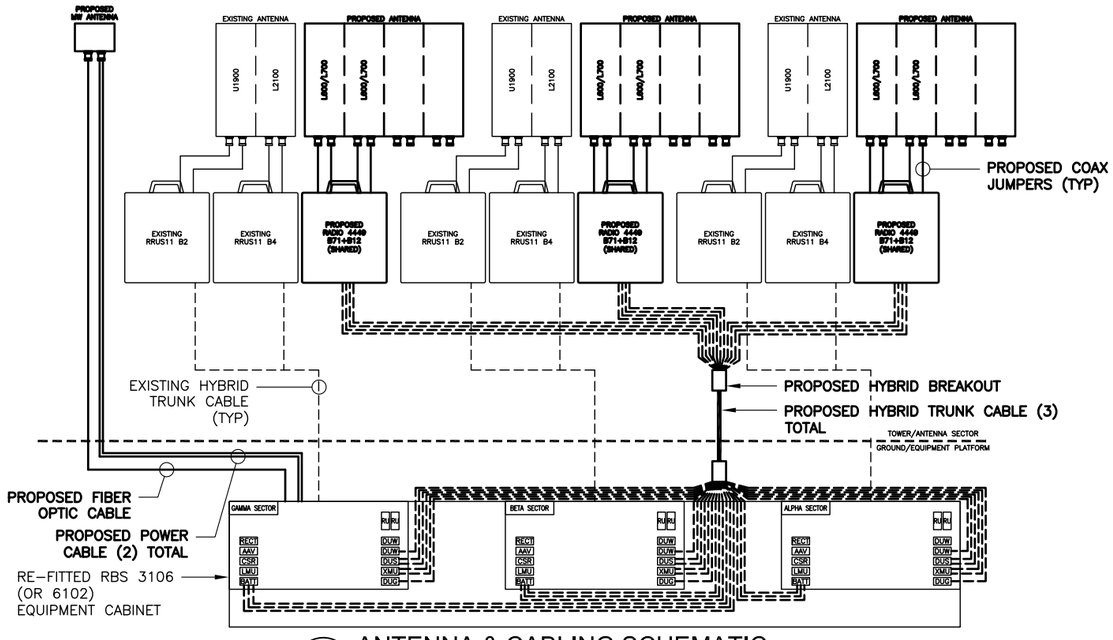


RRU SPECIFICATIONS	
MANUFACTURER	ERICSSON
MODEL #	4449
WIDTH	13.2"
DEPTH	10.4"
HEIGHT	14.9"
WEIGHT	74 LBS

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 C-3 FOR EXACT ANTENNA POSITIONING.



4 ANTENNA & CABLING SCHEMATIC

SCALE: N.T.S.

B+T GRP

CROWN CASTLE

T-Mobile

CTNH032H
BU #: 876370

CTNH032H

41 BECKWITH ROAD
MONTVILLE, CT 06370

EXISTING 180'-0" MONOPOLE

PROJECT NO:	G0135737.001.01
CHECKED BY:	RMC

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31627
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6/28/19

SHEET NUMBER:	REVISION:
A-4	1

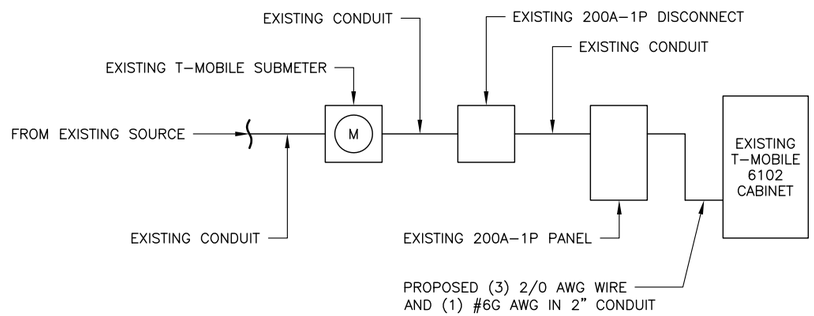
FINAL PANEL SCHEDULE								
LOAD	POLES	AMPS	BUS L1	BUS L2	BUS L3	AMPS	POLES	LOAD
TVSS	2	60A	1		2	20A	1	PANEL GFCI
			3		4	20A	1	AAV GFCI
RBS 6102	2	**100A**	5		6	15A	1	AAV OUTLET
			7		8	20A	1	LIGHT

RATED VOLTAGE: ■120/240 ☐_____. 3 PHASE, 4 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 225 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			

EXISTING 80A BREAKER PANEL TO BE REPLACED W/ NEW 100A BREAKER PANEL. SQUARE D P/N: QO342MQ225RB (OR APPROVED EQUAL)
REPLACE EXISTING WIRES FOR EXISTING 6102 CABINET WITH (3) 2/0 AWG THWN (COPPER) AND (1) #6G AWG. MINIMUM CONDUIT SIZE TO BE 2"
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.

B+T GRP

CROWN CASTLE

T-Mobile

CTNH032H
BU #: 876370

CTNH032H
41 BECKWITH ROAD
MONTVILLE, CT 06370

EXISTING 180'-0" MONOPOLE

PROJECT NO:	G0135737.001.01
CHECKED BY:	RMC

ISSUED FOR:

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B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/20

STATE OF CONNECTICUT
31627
LICENSED PROFESSIONAL ENGINEER
6/28/19

SHEET NUMBER:	REVISION:
E-1	1

Exhibit D

Structural Analysis Report

Pier Structural Engineering Corp.
55 Northfield Drive E, Suite 198
Waterloo, ON N2K 3T6
Tel: 519-885-3806
Fax: 519-884-3806
www.p-sec.ca

May 8, 2019

Amanda D Brown, Tower Structural Analyst
Crown Castle
3530 Toringdon Way
Charlotte, NC 28277

Subject:	**Structural Analysis Report**	
Carrier Designation:	Carrier Co-Locate:	**T-Mobile**
	Carrier Site Number:	**CTNH032H**
	Carrier Site Name:	**CTNH032H**
Crown Castle Designation:	Crown Castle BU Number:	**876370**
	Crown Castle Site Name:	**MAYBROOK / BOND**
	Crown Castle JDE Job Number:	**559333**
	Crown Castle WO Number:	**1731541**
	Crown Castle Order Number:	**479850 Rev. 0**
Engineering Firm Designation:	P-SEC Project Number:	**19986**
Site Data:	**41 Beckwith Rd., MONTVILLE, New London County, CT** **Latitude *41° 26' 7.66"*, Longitude *-72° 13' 15.07"*** **180-ft Monopole Tower**	

Dear Amanda D Brown,

Pier Structural Engineering Corp. (P-SEC) is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 1378174, in accordance with order 479850, revision 0.

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

LC7: Proposed Equipment Configuration **Sufficient Capacity - 82.3%**

This analysis utilizes an ultimate 3-second gust wind speed of 135 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

We at P-SEC appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Joseph Andre, E.I.T.

Respectfully submitted by:

STATE OF CONNECTICUT
SHAWN HOFFMEYER
No. 31228
LICENSED PROFESSIONAL ENGINEER

05/08/19

Shawn Hoffmeyer, P.E., P.Eng.
CT PE# 31228

tnxTower Report - version 8.0.5.0

Pier Structural Engineering Corp.
55 Northfield Drive E, Suite 198
Waterloo, ON N2K 3T6
Tel: 519-885-3806
Fax: 519-884-3806
www.p-sec.ca

May 8, 2019

Amanda D Brown, Tower Structural Analyst
Crown Castle
3530 Toringdon Way
Charlotte, NC 28277

Subject:	**Structural Analysis Report**	
Carrier Designation:	Carrier Co-Locate:	**T-Mobile**
	Carrier Site Number:	**CTNH032H**
	Carrier Site Name:	**CTNH032H**
Crown Castle Designation:	Crown Castle BU Number:	**876370**
	Crown Castle Site Name:	**MAYBROOK / BOND**
	Crown Castle JDE Job Number:	**559333**
	Crown Castle WO Number:	**1731541**
	Crown Castle Order Number:	**479850 Rev. 0**
Engineering Firm Designation:	P-SEC Project Number:	**19986**
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Structural analysis prepared by: Joseph Andre, E.I.T.

Respectfully submitted by:

Shawn Hoffmeyer, P.E., P.Eng.
CT PE# 31228

tnxTower Report - version 8.0.5.0

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 180-ft Monopole tower originally designed by ENGINEERED ENDEAVORS, INC. in September of 2000 for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The following design parameters have been used in our analysis:

Design Standard:		TIA-222-H Standard
County/State:		New London County, CT
Wind Speeds:	*CASE 1*	135 mph (3-second gust)
	CASE 2	50 mph (3-second gust) with 1.5" radial solid ice
	CASE 3	60 mph (3-second gust) for serviceability
Exposure Category:		B
Topographic Category:		1
Risk Category:		II

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elev. (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
175	175	1	fastback	IBR 1300_CCIV2	4 3	1-5/8 1/4
		3	rfs celwave	APX16DWV-16DWV-S-E-A20		
		3	rfs celwave	APXVAARR18_43-U-NA20		
		3	ericsson	RADIO 4449 B12/B71		
		3	ericsson	RRUS 11 B2		
		3	ericsson	RRUS 11 B4		
		1	--	Miscellaneous [NA 509-3]		
		1	--	Platform Mount [LP 301-1]		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elev. (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
180	180	3	commscope	NNVV-65B-R4	4	1-1/4
		3	rfs celwave	APXVTM14-ALU-I20		
		3	alcatel lucent	PCS 1900MHZ 4X45W-65MHZ		
		6	alcatel lucent	RRH2X50-800		
		3	alcatel lucent	TD-RRH8X20-25		
		1	--	Platform Mount [RMQP-496]		
167	167	6	antel	LPA-80080/4CF	12	1-5/8
		6	commscope	JAHH-65B-R3B		
		3	alcatel lucent	B13 RRH 4X30		
		3	alcatel lucent	B66A RRH4X45-4R		
		3	nokia	AIRSCALE RRH 4T4R B5 160W		
		3	nokia	B25 RRH4X30 (UHFA)		
		2	raycap	RC3DC-3315-PF-48		
		1	--	Side Arm Mount [SO 201-3]		
		1	--	SFS-V-L		
		1	--	T-Arm Mount [TA 602-3]		
75	76	1	lucent	KS24019-L112A	1	1/2
	75	1	--	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	CSA, Proj. No. 2000.905 dated 3/16/2000	1533478	CCISITES
4-TOWER/FOUNDATION MANUFACTURER DRAWINGS	EEI, Proj. No. 7776 dated 9/7/2000	1532099	CCISITES
APPLICATION	T-Mobile, Revision #0 dated 4/22/2019	479850	CCISITES

3.1) Analysis Method/

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

3.2) Assumptions

1) Tower and structures were built and maintained in accordance with the manufacturer's specifications.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
3) P-SEC did not analyze antenna supporting mounts as part of this analysis report and assumed they are structurally sufficient. It is the carrier's responsibility to ensure structural compliance of their existing and/or proposed antenna supporting mounts.
4) All equipment model numbers, quantities, and centerline elevations are as provided in the CCI CAD package dated 4/25/2019.

This analysis may be affected if any assumptions are not valid or have been made in error. P-SEC 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	180 - 133	Pole	TP27.51x15.5x0.25	1	-12.58	1278.86	82.3	Pass
L2	133 - 87.3333	Pole	TP38.56x25.9879x0.375	2	-21.72	2693.05	66.0	Pass
L3	87.3333 - 42.6667	Pole	TP49.1x36.46x0.4375	3	-34.97	4006.98	59.9	Pass
L4	42.6667 - 0	Pole	TP59x46.5397x0.4375	4	-53.79	4995.16	63.6	Pass
							Summary	
						Pole (L1)	82.3	Pass
						Rating =	82.3	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
2	Anchor Rods	--	63.1	Pass
2	Base Plate	--	79.9	Pass
2	Base Foundation (Compared w/ Design Loads)	--	70.4	Pass

Structure Rating (max from all components) =	82.3%

Notes: 1) See full member breakdown and section capacities in Appendix A.
2) See additional documentation in Appendix C for supporting calculations.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the proposed loading configuration.

No modifications are required at this time.

Should you have any questions, please call us anytime at 519-885-3806.

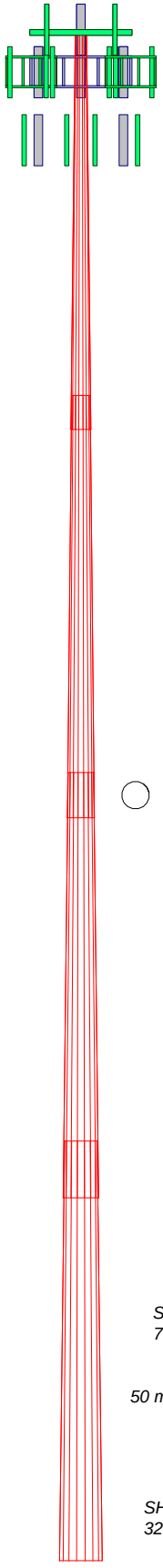
encl.
BU876370_479850 SA Report_20190508.doc

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4
Length (ft)	47'	49'8-1/32"	50'	49'3-31/32"
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.3750	0.4375	0.4375
Socket Length (ft)	4'	5'3-31/32"	6'8-1/32"	
Top Dia (in)	15.5000	25.9879	36.4600	46.5397
Bot Dia (in)	27.5100	38.5600	49.1000	59.0000
Grade	A572-65			
Weight (K)	2.7	6.4	10.0	12.2

Total Weight (K) 31.3



MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 135 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'
8. TIA-222-H Annex S
9. ----------
10. E - Existing, R/MLA - Reserved, P - Proposed
11. Proposed loading at 175ft elevation
12. Reserved loading at 180ft and 167ft elevations
13. TOWER RATING: 82.3%

ALL REACTIONS ARE FACTORED

AXIAL 78 K

SHEAR 7 K — *MOMENT 977 kip-ft*

TORQUE 1 kip-ft
50 mph WIND - 1.5000 in ICE

AXIAL 54 K

SHEAR 32 K — *MOMENT 4309 kip-ft*

TORQUE 3 kip-ft
REACTIONS - 135 mph WIND

Pier Structural Engineering Corp.
168 Lexington Court
Waterloo, Ontario
Phone: 519-885-3806
FAX: 519-884-3806

Job: ***PSEC 19986 (for T-Mobile)***
Project: ***876370 - Maybrook/Bond***
Client: CROWN CASTLE | Drawn by: JA | App'd:
Code: TIA-222-H | Date: 05/08/19 | Scale: NTS
Path: H:\PROJECTS\JOB 19000 - 19999\19900 - 19999\19986 - CCI - 876370 - MAYBROOK_BOND\876370_LC7_20190508.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:

Tower is located in New London County, Connecticut.
Tower base elevation above sea level: 257'.
Basic wind speed of 135 mph.
Risk Category II.
Exposure Category B.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0'.
Nominal ice thickness of 1.5000 in.
Ice thickness is considered to increase with height.
Ice density of 56.00 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
TIA-222-H Annex S.
- .
E - Existing, R/MLA - Reserved, P - Proposed.
Proposed loading at 175ft elevation.
Reserved loading at 180ft and 167ft elevations.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.05.
Tower analysis based on target reliabilities in accordance with Annex S.
Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
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
L1	180'-133'	47'	4'	18	15.5000	27.5100	0.2500	1.0000	A572-65 (65 ksi)
L2	133'-87'3-31/32"	49'8-1/32"	5'3-31/32"	18	25.9879	38.5600	0.3750	1.5000	A572-65 (65 ksi)
L3	87'3-31/32"-42'8 -1/32"	50'	6'8-1/32"	18	36.4600	49.1000	0.4375	1.7500	A572-65 (65 ksi)
L4	42'8-1/32"-0'	49'3-31/32"		18	46.5397	59.0000	0.4375	1.7500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	15.7005	12.1009	355.5445	5.4138	7.8740	45.1542	711.5567	6.0516	2.2880	9.152
	27.8958	21.6308	2030.7756	9.6773	13.9751	145.3141	4064.2233	10.8175	4.4018	17.607
L2	27.3591	30.4857	2526.6815	9.0926	13.2018	191.3886	5056.6876	15.2458	3.9139	10.437
	39.0970	45.4497	8372.4782	13.5557	19.5885	427.4185	16755.9731	22.7292	6.1266	16.337
L3	38.3240	50.0217	8200.5503	12.7880	18.5217	442.7545	16411.8912	25.0156	5.6470	12.907
	49.7900	67.5740	20216.4865	17.2752	24.9428	810.5139	40459.5744	33.7934	7.8716	17.992
L4	48.8999	64.0186	17190.4140	16.3663	23.6421	727.1088	34403.4477	32.0154	7.4210	16.962
	59.8427	81.3214	35235.5662	20.7897	29.9720	1175.6161	70517.4963	40.6684	9.6140	21.975

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 180'-133'				1	1	1			
L2 133'-87'3-31/32"				1	1	1			
L3 87'3-31/32"-42'8-1/32"				1	1	1			
L4 42'8-1/32"-0'				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight klf
****										
Safety Line 3/8 (Climb to Top)	A	No	Surface Ar (CaAa)	180' - 0'	1	1	-0.500 -0.450	0.3750		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 ft^2/ft	Weight klf
HB114-1-0813U4-M5J(1-1/4) (Carrier 180' R)	B	No	No	Inside Pole	180' - 0'	3	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00
HB114-13U3M12-XXXF(1-1/4) (Carrier 180' R)	B	No	No	Inside Pole	180' - 0'	1	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00
***									
OSP6U(1/4) (Carrier 175' P)	B	No	No	Inside Pole	175' - 0'	3	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00
HCS 6X12 4AWG(1-5/8) (Carrier 175' P)	B	No	No	Inside Pole	175' - 0'	3	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00
MLE HYBRID 9POWER/18FIBER RL 2(1-5/8) (Carrier 175' E)	B	No	No	Inside Pole	175' - 0'	1	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00
***									
HB158-1-08U8-S8J18(1-5/8) (Carrier 167' R)	A	No	No	Inside Pole	167' - 0'	2	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00
LCF158-50J(1-5/8) (Carrier 167' E)	A	No	No	Inside Pole	167' - 0'	10	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00
***									
LDF4-50A(1/2) (Carrier 75' E)	A	No	No	Inside Pole	75' - 0'	1	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00
***									

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
NNVV-65B-R4 w/ Mount Pipe (Carrier 180' R)	A	From Leg	4.00 0' 0'	0.000	180'	No Ice	12.51	7.41	0.10
						1/2" Ice	13.11	8.60	0.19
						1" Ice	13.67	9.50	0.29
						2" Ice	14.82	11.33	0.52
NNVV-65B-R4 w/ Mount Pipe (Carrier 180' R)	B	From Leg	4.00 0' 0'	0.000	180'	No Ice	12.51	7.41	0.10
						1/2" Ice	13.11	8.60	0.19
						1" Ice	13.67	9.50	0.29
						2" Ice	14.82	11.33	0.52

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
NNVV-65B-R4 w/ Mount Pipe (Carrier 180' R)	C	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	12.51 13.11 13.67 14.82	7.41 8.60 9.50 11.33	0.10 0.19 0.29 0.52
APXVTM14-ALU-I20 w/ Mount Pipe (Carrier 180' R)	A	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	6.58 7.03 7.47 8.38	4.96 5.75 6.47 7.94	0.08 0.13 0.19 0.34
APXVTM14-ALU-I20 w/ Mount Pipe (Carrier 180' R)	B	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	6.58 7.03 7.47 8.38	4.96 5.75 6.47 7.94	0.08 0.13 0.19 0.34
APXVTM14-ALU-I20 w/ Mount Pipe (Carrier 180' R)	C	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	6.58 7.03 7.47 8.38	4.96 5.75 6.47 7.94	0.08 0.13 0.19 0.34
TD-RRH8X20-25 (Carrier 180' R)	A	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
TD-RRH8X20-25 (Carrier 180' R)	B	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
TD-RRH8X20-25 (Carrier 180' R)	C	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
(2) RRH2X50-800 (Carrier 180' R)	A	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	1.70 1.86 2.03 2.40	1.28 1.43 1.58 1.91	0.05 0.07 0.09 0.14
(2) RRH2X50-800 (Carrier 180' R)	B	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	1.70 1.86 2.03 2.40	1.28 1.43 1.58 1.91	0.05 0.07 0.09 0.14
(2) RRH2X50-800 (Carrier 180' R)	C	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	1.70 1.86 2.03 2.40	1.28 1.43 1.58 1.91	0.05 0.07 0.09 0.14
PCS 1900MHZ 4X45W-65MHZ (Carrier 180' R)	A	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.09	0.06 0.08 0.11 0.17
PCS 1900MHZ 4X45W-65MHZ (Carrier 180' R)	B	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.09	0.06 0.08 0.11 0.17
PCS 1900MHZ 4X45W-65MHZ (Carrier 180' R)	C	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.09	0.06 0.08 0.11 0.17
(2) 8'x2" Antenna Mount Pipe (Carrier 180' R)	A	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
(2) 8'x2" Antenna Mount Pipe	B	From Leg	4.00	0.000	180'	No Ice	1.90	1.90	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
(Carrier 180' R)			0' 0'			1/2" Ice 1" Ice 2" Ice	2.73 3.40 4.40	2.73 3.40 4.40	0.04 0.06 0.12
(2) 8'x2" Antenna Mount Pipe (Carrier 180' R)	C	From Leg	4.00 0' 0'	0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
Platform Mount [RMQP-496] (Carrier 180' R)	C	None		0.000	180'	No Ice 1/2" Ice 1" Ice 2" Ice	14.66 18.87 23.08 31.50	14.66 18.87 23.08 31.50	1.25 1.48 1.71 2.18
***									
APXVAARR18_43-U-NA20 (Carrier 175' P)	A	From Leg	4.00 0' 0'	0.000	175'	No Ice 1/2" Ice 1" Ice 2" Ice	14.67 15.18 15.71 16.78	6.16 6.62 7.09 8.03	0.11 0.19 0.28 0.49
APXVAARR18_43-U-NA20 (Carrier 175' P)	B	From Leg	4.00 0' 0'	0.000	175'	No Ice 1/2" Ice 1" Ice 2" Ice	14.67 15.18 15.71 16.78	6.16 6.62 7.09 8.03	0.11 0.19 0.28 0.49
APXVAARR18_43-U-NA20 (Carrier 175' P)	C	From Leg	4.00 0' 0'	0.000	175'	No Ice 1/2" Ice 1" Ice 2" Ice	14.67 15.18 15.71 16.78	6.16 6.62 7.09 8.03	0.11 0.19 0.28 0.49
RADIO 4449 B12/B71 (Carrier 175' P)	A	From Leg	4.00 0' 0'	0.000	175'	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	0.07 0.09 0.11 0.16
RADIO 4449 B12/B71 (Carrier 175' P)	B	From Leg	4.00 0' 0'	0.000	175'	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	0.07 0.09 0.11 0.16
RADIO 4449 B12/B71 (Carrier 175' P)	C	From Leg	4.00 0' 0'	0.000	175'	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	0.07 0.09 0.11 0.16
IBR 1300_CCIV2 (Carrier 175' P)	C	From Leg	4.00 0' 0'	0.000	175'	No Ice 1/2" Ice 1" Ice 2" Ice	0.67 0.78 0.89 1.13	0.31 0.38 0.47 0.67	0.01 0.01 0.02 0.04
APX16DWV-16DWV-S-E-A 20 (Carrier 175' E)	A	From Leg	4.00 0' 0'	0.000	175'	No Ice 1/2" Ice 1" Ice 2" Ice	6.59 6.96 7.34 8.13	2.15 2.49 2.84 3.55	0.04 0.07 0.11 0.20
APX16DWV-16DWV-S-E-A 20 (Carrier 175' E)	B	From Leg	4.00 0' 0'	0.000	175'	No Ice 1/2" Ice 1" Ice 2" Ice	6.59 6.96 7.34 8.13	2.15 2.49 2.84 3.55	0.04 0.07 0.11 0.20
APX16DWV-16DWV-S-E-A 20 (Carrier 175' E)	C	From Leg	4.00 0' 0'	0.000	175'	No Ice 1/2" Ice 1" Ice 2" Ice	6.59 6.96 7.34 8.13	2.15 2.49 2.84 3.55	0.04 0.07 0.11 0.20
(2) RRUS 11 B4 (Carrier 175' E)	A	From Leg	4.00 0' 0'	0.000	175'	No Ice 1/2" Ice 1" Ice 2" Ice	2.83 3.04 3.26 3.71	1.18 1.33 1.48 1.83	0.05 0.07 0.10 0.15
RRUS 11 B4	B	From Leg	4.00	0.000	175'	No Ice	2.83	1.18	0.05

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
(Carrier 175' E)			0' 0'			1/2" Ice	3.04	1.33	0.07
						1" Ice	3.26	1.48	0.10
						2" Ice	3.71	1.83	0.15
RRUS 11 B2	B	From Leg	4.00	0.000	175'	No Ice	2.83	1.18	0.05
(Carrier 175' E)			0' 0'			1/2" Ice	3.04	1.33	0.07
						1" Ice	3.26	1.48	0.10
						2" Ice	3.71	1.83	0.15
(2) RRUS 11 B2	C	From Leg	4.00	0.000	175'	No Ice	2.83	1.18	0.05
(Carrier 175' E)			0' 0'			1/2" Ice	3.04	1.33	0.07
						1" Ice	3.26	1.48	0.10
						2" Ice	3.71	1.83	0.15
Platform Mount [LP 301-1]	C	None		0.000	175'	No Ice	30.10	30.10	1.59
(Carrier 175' E)						1/2" Ice	40.80	40.80	2.03
						1" Ice	51.50	51.50	2.47
						2" Ice	72.90	72.90	3.35
Miscellaneous [NA 509-3]	C	None		0.000	175'	No Ice	11.84	11.84	0.28
(Carrier 175' E)						1/2" Ice	16.96	16.96	0.30
						1" Ice	22.08	22.08	0.32
						2" Ice	32.32	32.32	0.36
***									
(2) JAHH-65B-R3B w/ Mount Pipe	A	From Leg	4.00	0.000	167'	No Ice	9.35	7.65	0.09
(Carrier 167' R)			0' 0'			1/2" Ice	9.92	8.83	0.17
						1" Ice	10.46	9.73	0.25
						2" Ice	11.55	11.56	0.45
(2) JAHH-65B-R3B w/ Mount Pipe	B	From Leg	4.00	0.000	167'	No Ice	9.35	7.65	0.09
(Carrier 167' R)			0' 0'			1/2" Ice	9.92	8.83	0.17
						1" Ice	10.46	9.73	0.25
						2" Ice	11.55	11.56	0.45
(2) JAHH-65B-R3B w/ Mount Pipe	C	From Leg	4.00	0.000	167'	No Ice	9.35	7.65	0.09
(Carrier 167' R)			0' 0'			1/2" Ice	9.92	8.83	0.17
						1" Ice	10.46	9.73	0.25
						2" Ice	11.55	11.56	0.45
(2) B25 RRH4X30 (UHFA)	A	From Leg	4.00	0.000	167'	No Ice	2.11	1.29	0.05
(Carrier 167' R)			0' 0'			1/2" Ice	2.30	1.45	0.07
						1" Ice	2.50	1.61	0.09
						2" Ice	2.91	1.96	0.14
B25 RRH4X30 (UHFA)	B	From Leg	4.00	0.000	167'	No Ice	2.11	1.29	0.05
(Carrier 167' R)			0' 0'			1/2" Ice	2.30	1.45	0.07
						1" Ice	2.50	1.61	0.09
						2" Ice	2.91	1.96	0.14
AIRSCALE RRH 4T4R B5 160W	B	From Leg	4.00	0.000	167'	No Ice	1.29	0.72	0.04
(Carrier 167' R)			0' 0'			1/2" Ice	1.43	0.83	0.05
						1" Ice	1.58	0.96	0.06
						2" Ice	1.90	1.22	0.09
(2) AIRSCALE RRH 4T4R B5 160W	C	From Leg	4.00	0.000	167'	No Ice	1.29	0.72	0.04
(Carrier 167' R)			0' 0'			1/2" Ice	1.43	0.83	0.05
						1" Ice	1.58	0.96	0.06
						2" Ice	1.90	1.22	0.09
(2) RC3DC-3315-PF-48	A	From Leg	4.00	0.000	167'	No Ice	3.79	2.51	0.03
(Carrier 167' R)			0' 0'			1/2" Ice	4.04	2.72	0.06
						1" Ice	4.30	2.94	0.10
						2" Ice	4.84	3.41	0.18
(3) B13 RRH 4X30	A	From Leg	4.00	0.000	167'	No Ice	2.06	1.32	0.06
(Carrier 167' R)			0' 0'			1/2" Ice	2.24	1.48	0.07
						1" Ice	2.43	1.64	0.09
						2" Ice	2.84	2.00	0.14
(3) B66A RRH4X45-4R	A	From Leg	4.00	0.000	167'	No Ice	2.54	1.61	0.06

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
(Carrier 167' R)			0' 0'			1/2" Ice 1" Ice 2" Ice	2.75 2.97 3.43	1.79 1.98 2.37	0.08 0.10 0.16
(2) LPA-80080/4CF w/ Mount Pipe (Carrier 167' E)	A	From Leg	4.00 0' 0'	0.000	167'	No Ice 1/2" Ice 1" Ice 2" Ice	2.86 3.22 3.59 4.34	6.57 7.19 7.84 9.17	0.03 0.08 0.13 0.25
(2) LPA-80080/4CF w/ Mount Pipe (Carrier 167' E)	B	From Leg	4.00 0' 0'	0.000	167'	No Ice 1/2" Ice 1" Ice 2" Ice	2.86 3.22 3.59 4.34	6.57 7.19 7.84 9.17	0.03 0.08 0.13 0.25
(2) LPA-80080/4CF w/ Mount Pipe (Carrier 167' E)	C	From Leg	4.00 0' 0'	0.000	167'	No Ice 1/2" Ice 1" Ice 2" Ice	2.86 3.22 3.59 4.34	6.57 7.19 7.84 9.17	0.03 0.08 0.13 0.25
3.5' Hor 2.5x2.5 Angle (Carrier 167' E)	A	From Leg	2.00 4' 0'	0.000	167'	No Ice 1/2" Ice 1" Ice 2" Ice	0.88 1.13 1.38 1.92	0.05 0.08 0.12 0.22	0.04 0.05 0.06 0.10
3.5' Hor 2.5x2.5 Angle (Carrier 167' E)	A	From Leg	2.00 -4' 0'	0.000	167'	No Ice 1/2" Ice 1" Ice 2" Ice	0.88 1.13 1.38 1.92	0.05 0.08 0.12 0.22	0.04 0.05 0.06 0.10
3.5' Hor 2.5x2.5 Angle (Carrier 167' E)	B	From Leg	2.00 4' 0'	0.000	167'	No Ice 1/2" Ice 1" Ice 2" Ice	0.88 1.13 1.38 1.92	0.05 0.08 0.12 0.22	0.04 0.05 0.06 0.10
3.5' Hor 2.5x2.5 Angle (Carrier 167' E)	B	From Leg	2.00 -4' 0'	0.000	167'	No Ice 1/2" Ice 1" Ice 2" Ice	0.88 1.13 1.38 1.92	0.05 0.08 0.12 0.22	0.04 0.05 0.06 0.10
3.5' Hor 2.5x2.5 Angle (Carrier 167' E)	C	From Leg	2.00 4' 0'	0.000	167'	No Ice 1/2" Ice 1" Ice 2" Ice	0.88 1.13 1.38 1.92	0.05 0.08 0.12 0.22	0.04 0.05 0.06 0.10
3.5' Hor 2.5x2.5 Angle (Carrier 167' E)	C	From Leg	2.00 -4' 0'	0.000	167'	No Ice 1/2" Ice 1" Ice 2" Ice	0.88 1.13 1.38 1.92	0.05 0.08 0.12 0.22	0.04 0.05 0.06 0.10
Side Arm Mount [SO 201-3] (Carrier 167' E)	C	From Leg	4.00 0' 0'	0.000	167'	No Ice 1/2" Ice 1" Ice 2" Ice	5.71 7.91 10.11 14.51	5.71 7.91 10.11 14.51	0.29 0.35 0.41 0.54
T-Arm Mount [TA 602-3] (Carrier 167' E)	C	From Leg	4.00 0' 0'	0.000	167'	No Ice 1/2" Ice 1" Ice 2" Ice	11.59 15.44 19.29 26.99	11.59 15.44 19.29 26.99	0.77 0.99 1.21 1.64
SFS-V-L (Carrier 167' E)	C	None		0.000	167'	No Ice 1/2" Ice 1" Ice 2" Ice	13.50 0.00 0.00 0.00	13.50 0.00 0.00 0.00	0.94 0.00 0.00 0.00
***									
KS24019-L112A (Carrier 75' E)	A	From Leg	3.00 0' 1'	0.000	75'	No Ice 1/2" Ice 1" Ice 2" Ice	0.14 0.20 0.26 0.41	0.14 0.20 0.26 0.41	0.01 0.01 0.01 0.02
Side Arm Mount [SO 701-1]	A	None		0.000	75'	No Ice	0.85	1.67	0.07

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
(Carrier 75' E)						1/2" Ice	1.14	2.34	0.08
						1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
****									

Load Combinations

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

Comb. No.	Description
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 Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	36	77.55	7.16	-0.00
	Max. H_x	20	53.81	32.16	-0.00
	Max. H_z	2	53.81	-0.00	32.49
	Max. M_x	2	4308.23	-0.00	32.49
	Max. M_z	8	4245.57	-32.16	0.00
	Max. Torsion	5	3.00	-16.08	28.14
	Min. Vert	19	40.36	27.86	-16.25
	Min. H_x	8	53.81	-32.16	0.00
	Min. H_z	14	53.81	0.00	-32.49
	Min. M_x	14	-4309.37	0.00	-32.49
	Min. M_z	20	-4257.40	32.16	-0.00
	Min. Torsion	17	-2.99	16.08	-28.14

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	44.84	-0.00	0.00	0.47	4.90	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	53.81	0.00	-32.49	-4308.23	5.54	-2.74
0.9 Dead+1.0 Wind 0 deg - No Ice	40.36	0.00	-32.49	-4243.55	3.91	-2.78
1.2 Dead+1.0 Wind 30 deg - No Ice	53.81	16.08	-28.14	-3731.27	-2120.02	-2.97
0.9 Dead+1.0 Wind 30 deg - No Ice	40.36	16.08	-28.14	-3675.26	-2089.70	-3.00
1.2 Dead+1.0 Wind 60 deg - No Ice	53.81	27.86	-16.25	-2154.33	-3676.11	-2.40
0.9 Dead+1.0 Wind 60 deg - No Ice	40.36	27.86	-16.25	-2122.06	-3622.38	-2.41
1.2 Dead+1.0 Wind 90 deg - No Ice	53.81	32.16	-0.00	0.20	-4245.57	-1.18
0.9 Dead+1.0 Wind 90 deg - No Ice	40.36	32.16	-0.00	0.04	-4183.28	-1.18
1.2 Dead+1.0 Wind 120 deg - No Ice	53.81	27.85	16.24	2154.83	-3675.66	0.36
0.9 Dead+1.0 Wind 120 deg - No Ice	40.36	27.85	16.24	2122.23	-3621.95	0.38
1.2 Dead+1.0 Wind 150 deg - No Ice	53.81	16.08	28.14	3732.02	-2119.26	1.79
0.9 Dead+1.0 Wind 150 deg - No Ice	40.36	16.08	28.14	3675.69	-2088.96	1.82
1.2 Dead+1.0 Wind 180 deg -	53.81	-0.00	32.49	4309.37	6.37	2.74

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
No Ice						
0.9 Dead+1.0 Wind 180 deg - No Ice	40.36	-0.00	32.49	4244.37	4.72	2.77
1.2 Dead+1.0 Wind 210 deg - No Ice	53.81	-16.08	28.14	3732.39	2131.87	2.95
0.9 Dead+1.0 Wind 210 deg - No Ice	40.36	-16.08	28.14	3676.07	2098.28	2.99
1.2 Dead+1.0 Wind 240 deg - No Ice	53.81	-27.86	16.25	2155.51	3687.92	2.38
0.9 Dead+1.0 Wind 240 deg - No Ice	40.36	-27.86	16.25	2122.91	3630.94	2.40
1.2 Dead+1.0 Wind 270 deg - No Ice	53.81	-32.16	0.00	1.04	4257.40	1.18
0.9 Dead+1.0 Wind 270 deg - No Ice	40.36	-32.16	0.00	0.86	4191.86	1.18
1.2 Dead+1.0 Wind 300 deg - No Ice	53.81	-27.85	-16.24	-2153.57	3687.55	-0.34
0.9 Dead+1.0 Wind 300 deg - No Ice	40.36	-27.85	-16.24	-2121.32	3630.57	-0.36
1.2 Dead+1.0 Wind 330 deg - No Ice	53.81	-16.08	-28.14	-3730.82	2131.20	-1.78
0.9 Dead+1.0 Wind 330 deg - No Ice	40.36	-16.08	-28.14	-3674.83	2097.61	-1.81
1.2 Dead+1.0 Ice+1.0 Temp	77.55	-0.00	-0.00	-1.15	12.06	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	77.55	0.00	-7.21	-973.15	12.08	-0.79
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	77.55	3.58	-6.24	-842.98	-469.31	-0.71
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	77.55	6.20	-3.60	-487.24	-821.69	-0.43
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	77.55	7.16	-0.00	-1.25	-950.64	-0.04
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	77.55	6.20	3.60	484.76	-821.60	0.36
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	77.55	3.58	6.24	840.57	-469.15	0.67
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	77.55	-0.00	7.21	970.83	12.27	0.79
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	77.55	-3.58	6.24	840.66	493.67	0.71
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	77.55	-6.20	3.60	484.92	846.05	0.43
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	77.55	-7.16	0.00	-1.06	974.99	0.04
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	77.55	-6.20	-3.60	-487.07	845.95	-0.36
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	77.55	-3.58	-6.24	-842.88	493.50	-0.66
Dead+Wind 0 deg - Service	44.84	0.00	-6.04	-795.54	4.91	-0.53
Dead+Wind 30 deg - Service	44.84	2.99	-5.23	-688.93	-387.76	-0.57
Dead+Wind 60 deg - Service	44.84	5.18	-3.02	-397.60	-675.20	-0.46
Dead+Wind 90 deg - Service	44.84	5.98	-0.00	0.41	-780.38	-0.23
Dead+Wind 120 deg - Service	44.84	5.18	3.02	398.43	-675.12	0.07
Dead+Wind 150 deg - Service	44.84	2.99	5.23	689.82	-387.63	0.35
Dead+Wind 180 deg - Service	44.84	-0.00	6.04	796.50	5.06	0.53
Dead+Wind 210 deg - Service	44.84	-2.99	5.23	689.90	397.74	0.57
Dead+Wind 240 deg - Service	44.84	-5.18	3.02	398.56	685.17	0.46
Dead+Wind 270 deg - Service	44.84	-5.98	0.00	0.56	790.35	0.23
Dead+Wind 300 deg - Service	44.84	-5.18	-3.02	-397.46	685.10	-0.07
Dead+Wind 330 deg - Service	44.84	-2.99	-5.23	-688.85	397.60	-0.35

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 133	30.795	46	1.889	0.008
L2	137 - 87.3333	15.847	46	1.281	0.003
L3	92.6667 - 42.6667	6.579	46	0.715	0.001
L4	49.3333 - 0	1.782	46	0.337	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180'	NNVV-65B-R4 w/ Mount Pipe	46	30.795	1.889	0.008	23758
175'	APXVAARR18_43-U-NA20	46	28.904	1.817	0.008	23758
167'	(2) JAHH-65B-R3B w/ Mount Pipe	46	25.911	1.703	0.007	9137
75'	KS24019-L112A	46	4.197	0.542	0.001	6410

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 133	165.378	14	10.060	0.044
L2	137 - 87.3333	85.574	14	6.910	0.016
L3	92.6667 - 42.6667	35.596	14	3.868	0.006
L4	49.3333 - 0	9.644	14	1.827	0.002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180'	NNVV-65B-R4 w/ Mount Pipe	14	165.378	10.060	0.045	4767
175'	APXVAARR18_43-U-NA20	14	155.301	9.694	0.041	4767
167'	(2) JAHH-65B-R3B w/ Mount Pipe	14	139.341	9.109	0.035	1831
75'	KS24019-L112A	14	22.699	2.934	0.004	1187

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	180 - 133 (1)	TP27.51x15.5x0.25	47'	0'	0.0	20.8198	-12.58	1217.96	0.010
L2	133 - 87.3333 (2)	TP38.56x25.9879x0.375	49'8-1/32"	0'	0.0	43.8428	-21.72	2564.81	0.008
L3	87.3333 - 42.6667 (3)	TP49.1x36.46x0.4375	50'	0'	0.0	65.2337	-34.97	3816.17	0.009
L4	42.6667 - 0 (4)	TP59x46.5397x0.4375	49'3-31/32"	0'	0.0	81.3214	-53.79	4757.30	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	180 - 133 (1)	TP27.51x15.5x0.25	690.66	812.52	0.850	0.00	812.52	0.000
L2	133 - 87.3333 (2)	TP38.56x25.9879x0.375	1668.94	2442.03	0.683	0.00	2442.03	0.000
L3	87.3333 - 42.6667 (3)	TP49.1x36.46x0.4375	2806.03	4530.67	0.619	0.00	4530.67	0.000
L4	42.6667 - 0 (4)	TP59x46.5397x0.4375	4309.37	6570.46	0.656	0.00	6570.46	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	180 - 133 (1)	TP27.51x15.5x0.25	20.07	365.39	0.055	2.98	839.58	0.004
L2	133 - 87.3333 (2)	TP38.56x25.9879x0.375	24.07	769.44	0.031	2.75	2482.08	0.001
L3	87.3333 - 42.6667 (3)	TP49.1x36.46x0.4375	28.33	1144.85	0.025	2.74	4709.94	0.001
L4	42.6667 - 0 (4)	TP59x46.5397x0.4375	32.53	1427.19	0.023	2.74	7319.50	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	180 - 133 (1)	0.010	0.850	0.000	0.055	0.004	0.864	1.050	4.8.2
L2	133 - 87.3333	0.008	0.683	0.000	0.031	0.001	0.693	1.050	4.8.2

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L3	(2) 87.3333 - 42.6667 (3)	0.009	0.619	0.000	0.025	0.001	0.629	1.050	4.8.2
L4	42.6667 - 0 (4)	0.011	0.656	0.000	0.023	0.000	0.668	1.050	4.8.2

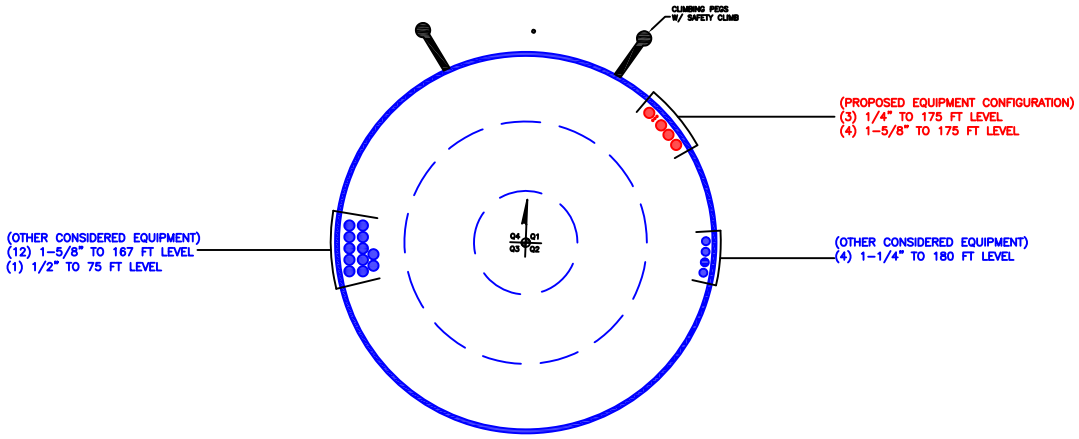
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	180 - 133	Pole	TP27.51x15.5x0.25	1	-12.58	1278.86	82.3	Pass
L2	133 - 87.3333	Pole	TP38.56x25.9879x0.375	2	-21.72	2693.05	66.0	Pass
L3	87.3333 - 42.6667	Pole	TP49.1x36.46x0.4375	3	-34.97	4006.98	59.9	Pass
L4	42.6667 - 0	Pole	TP59x46.5397x0.4375	4	-53.79	4995.16	63.6	Pass
							Summary	
						Pole (L1)	82.3	Pass
						RATING =	**82.3**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

TX LINE LAYOUT



Clients

CROWN CASTLE

Professional Stamp

Revisions

No.	Description	Date
A	ISSUED FOR REVIEW	5.8.19

Engineering Firm

P-SEC
ph: 519-885-3806
fx: 519-886-0076
www.p-sec.ca
PIER STRUCTURAL ENGINEERING CORP
55 NORTHFIELD DR. E, SUITE 198
WATERLOO, ON N2K 3T6

PSEC Job No.

19986

Site Name

876370
MAYBROOK/BOND

Site Design

Sheet Title

TX LINES

Drawn by	Sheet
JA	A-1
Checked by	
Approved By	

APPENDIX C

ADDITIONAL CALCULATIONS

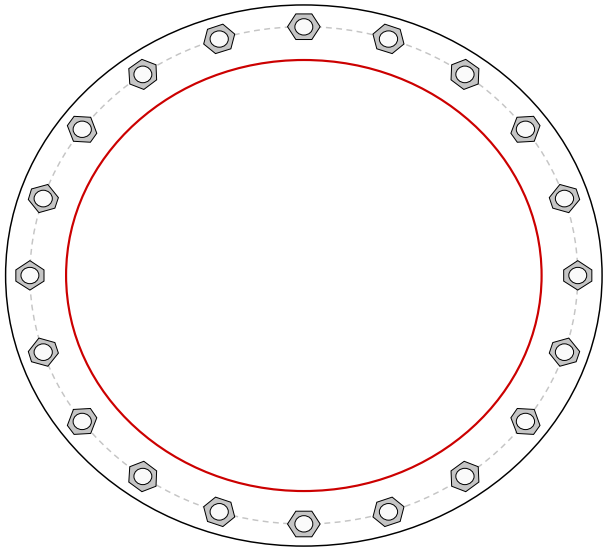
Monopole Base Plate Connection

Site Info	
BU #	876370
Site Name	MAYBROOK/BOND
Order #	479850

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	2.5

Applied Loads	
Moment (kip-ft)	4309.00
Axial Force (kips)	54.00
Shear Force (kips)	32.00

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(20) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 68" BC

Base Plate Data

74" OD x 2" Plate (A871 Gr 60; Fy=60 ksi, Fu=75 ksi)

Stiffener Data

N/A

Pole Data

59" x 0.4375" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

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

Pu_c = 154.71	ϕPn_c = 243.75	**Stress Rating**
Vu = 1.6	ϕVn = 73.13	**63.1%**
Mu = 2.6	ϕMn = 94.7	**Pass**

Base Plate Summary

Max Stress (ksi):	45.3	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**79.9%**	**Pass**

PROJECT No:	19986	ENG:	JA
PROJECT NAME:	876370 - MAYBROOK/BOND CROWN CASTLE	CHK:	SH
DATE:	May 8, 2019	PAGE:	1 of 1

FOUNDATION COMAPRISON CALCULATIONS

a) Governing Standards Used

Tower Type	MONOPOLE
Current Standard	TIA-222-H
Original Standard	TIA-222-F

b) Foundation Loads from "Current Analysis"

	Factored		
i) MOMENT (OTM)	4309.0	k-ft	(INPUT values from TNX Tower results)
ii) AXIAL	54.0	kips	
iii) SHEAR	32.0	kips	

c) Foundation Capacity from "Original Design"

	Allowable		
i) MOMENT (OTM)	4315.6	k-ft	(INPUT values from EEI Proj. No. 7776)
ii) AXIAL	39.9	kips	
iii) SHEAR	33.3	kips	

d) Foundation Capacity Increase

	Factored		
i) MOMENT (OTM)	5826.1	k-ft	(multiply by 1.35 per Rev G/H Clause 15.5.1)
ii) AXIAL	53.9	kips	
iii) SHEAR	45.0	kips	

e) Foundation Capacities

i) MOMENT (OTM)	4309 k-ft / 5826.06 k-ft	[70.4%]
ii) AXIAL	54 kips / 53.865 kips	[95.5%]
iii) SHEAR	32 kips / 44.955 kips	[67.8%]

f) OVERALL FOUNDATION CAPACITY

** Note: Axial and Shear capacities are negligeble, the overturning moment governs calculations.*

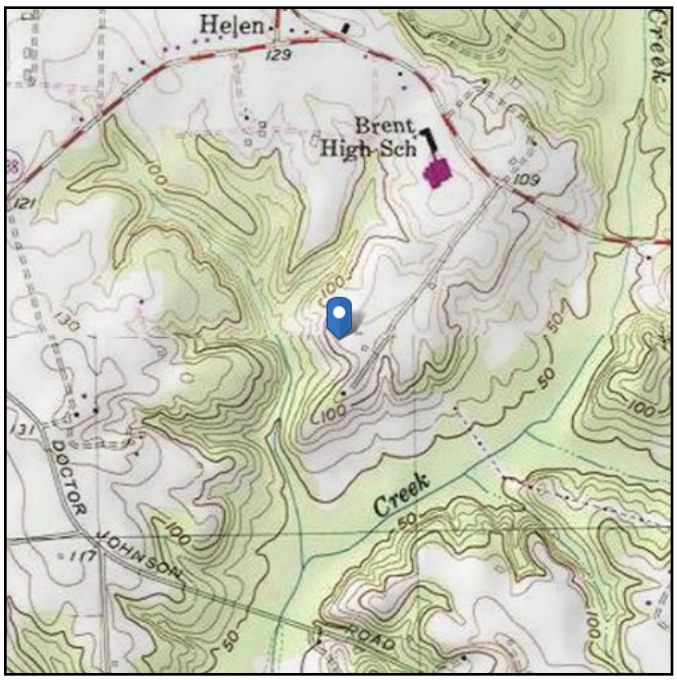
FOUNDATION CAPACITY	**70.4%**

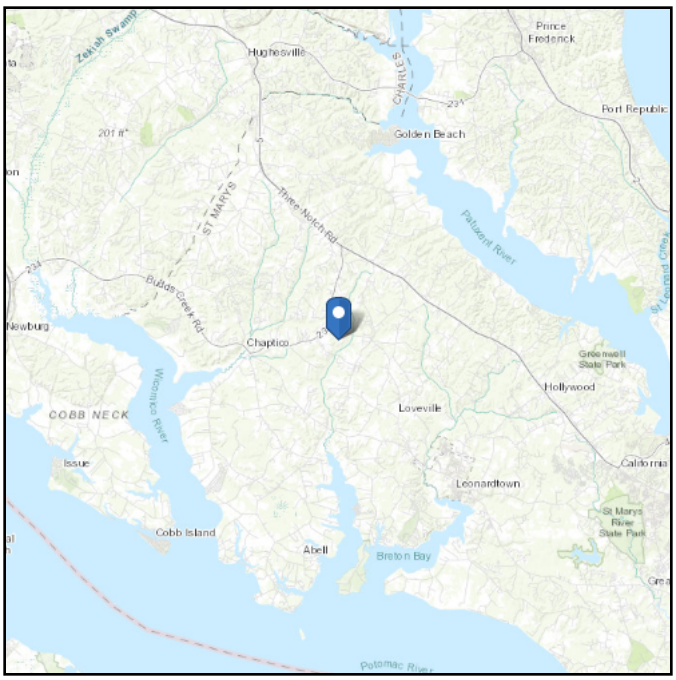
ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 115.02 ft (NAVD 88)
Latitude: 38.374931
Longitude: -76.719547





Wind

Results:

Wind Speed:	115 Vmph
10-year MRI	76 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	96 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: Wed May 08 2019

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

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2.

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

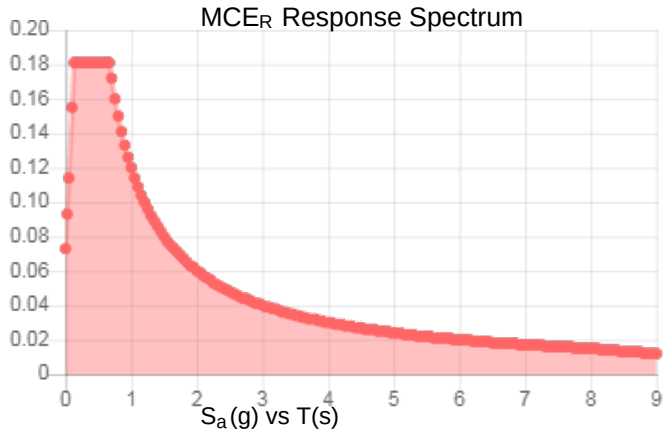
Seismic

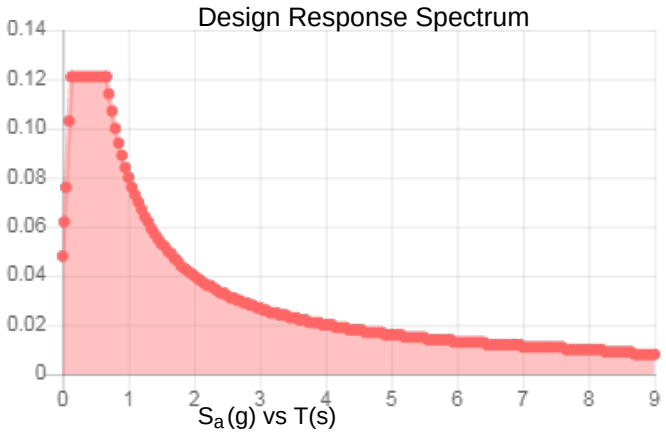
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.113	S_{DS} :	0.121
S_1 :	0.05	S_{D1} :	0.08
F_a :	1.6	T_L :	8
F_v :	2.4	PGA :	0.053
S_{MS} :	0.181	PGA_M :	0.085
S_{M1} :	0.12	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Wed May 08 2019

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

Ice

Results:

Ice Thickness:	0.50 in.
Concurrent Temperature:	15 F
Gust Speed:	40 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Wed May 08 2019

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

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

876370 – MAYBROOK / BOND
Exposure B, Topographic Category 1

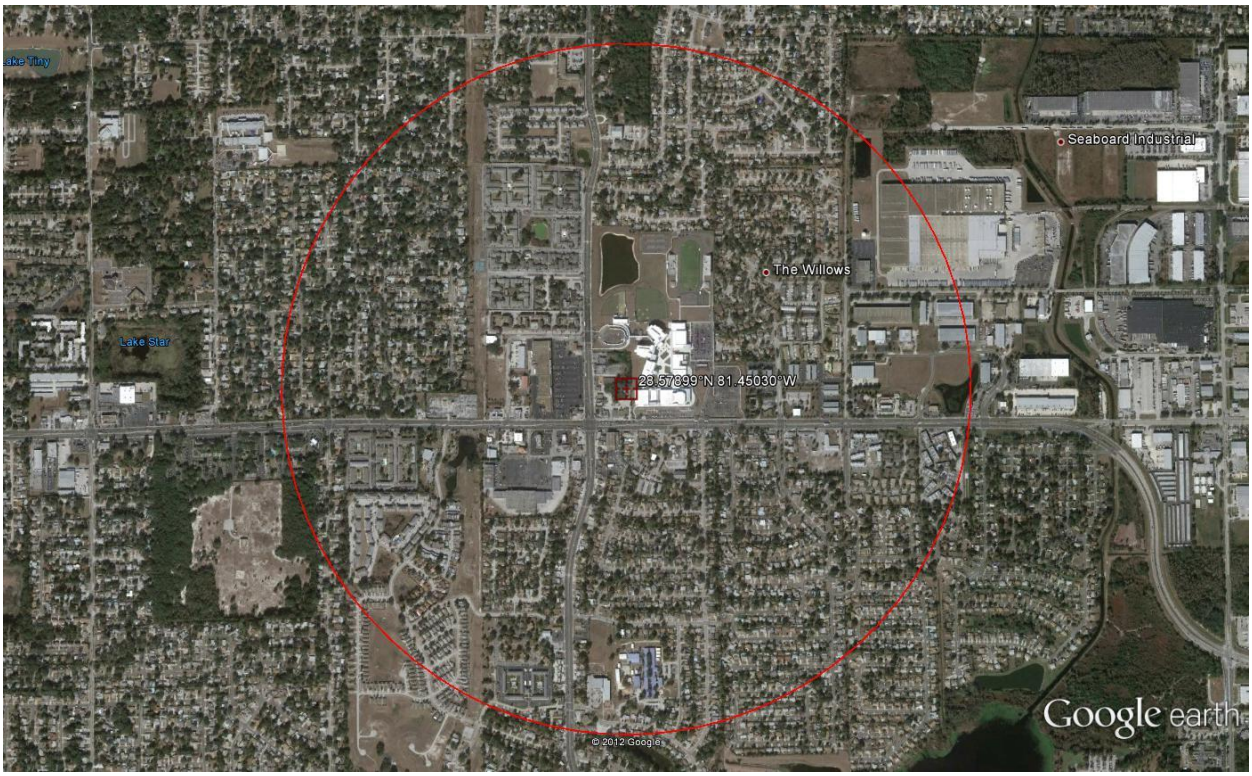


Exhibit E

Mount Analysis

PAUL J. FORD & COMPANY

Date: April 29, 2019

Kevin Morrow
Crown Castle
3530 Toringdon Way
Charlotte, NC 28277

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

Subject:	**Mount Analysis Report**	
Carrier Designation:	***T-Mobile* Equipment Change-out**	
	Carrier Site Number:	CTNH032H
	Carrier Site Name:	CTNH032H
Crown Castle Designation:	**Crown Castle BU Number:**	876370
	Crown Castle Site Name:	Maybrook / Bond
	Crown Castle JDE Job Number:	559333
	Crown Castle Purchase Order Number:	1370332
	Crown Castle Order Number:	479850 Rev. 0
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	A37519-1590.002.7190
Site Data:	**41 Beckwith Rd, Montville, New London County, CT** **Latitude 41.435461°, Longitude -72.220853°**	
Structure Information:	**Tower Height & Type:**	**180 Foot Monopole**
	Mount Elevation:	**175 Foot**
	Mount Type:	**(1) 12.5 Foot Platform**

Dear Kevin Morrow,

Paul J Ford and Company is pleased to submit this "Mount Analysis Report" to determine the structural integrity of the T-Mobile antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point is not part of this document.

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

12.5' Platform	**SUFFICIENT**

This analysis utilizes an ultimate 3-second gust wind speed of 135 mph as required by the 2018 Connecticut State Building Code and Appendix N. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Respectfully submitted by:

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

D.S.

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

MAY 01 2019

TABLE OF CONTENTS

1) INTRODUCTION

The existing mount under consideration is (1) 12.5' Platform mount mapped by RKS on 04/07/2019.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	135 mph
Exposure Category:	B
Topographic Factor at Base:	1
Topographic Factor at Mount:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Live Loading Wind Speed:	30 mph
Man Live Load at Mid/End-Points:	250 lb
Man Live Load at Mount Pipes:	500 lb

Table 1 - Proposed Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
175	175	1	FASTBACK NETWORKS	IBR 1300_CCIV2	(1) 12.5' Platform
		3	RFS CELWAVE	APX16DWV-16DWV-S-E-A20	
		3	RFS CELWAVE	APXVAARR18_43-U-NA20	
		3	ERICSSON	RRUS 11 B2	
		3	ERICSSON	RRUS 11 B4	
		3	ERICSSON	RADIO 4449 B12/B71	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Mount Mapping	876370 Dated: 04/10/2019	8353054	CCISites
Order	ID: 479850 Rev. 0 Dated: 04/22/2019	-	CCISites

3.1) Analysis Method

RISA-3D (version 15.0.4), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases.

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

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

Table 3- Mount Component Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Face Horizontals	175	20.3	Pass
1	Bracing Members		23.3	Pass
1	Support Rails		46.6	Pass
1	Grating Support Members		19.4	Pass
1	Standoff Members		23.4	Pass
1	Kick-Brace		9.7	Pass
1	Corner Plates		73.1	Pass
1	Mount Pipes		86.5	Pass
1	Mount to Tower Connection		22.8	Pass

Mount Rating (max from all components) =	**86.5%**

Notes:
1) See additional documentation in “Appendix C – Software Analysis Output” for calculations supporting the % capacity consumed.

4.1) Recommendations

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

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

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

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

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

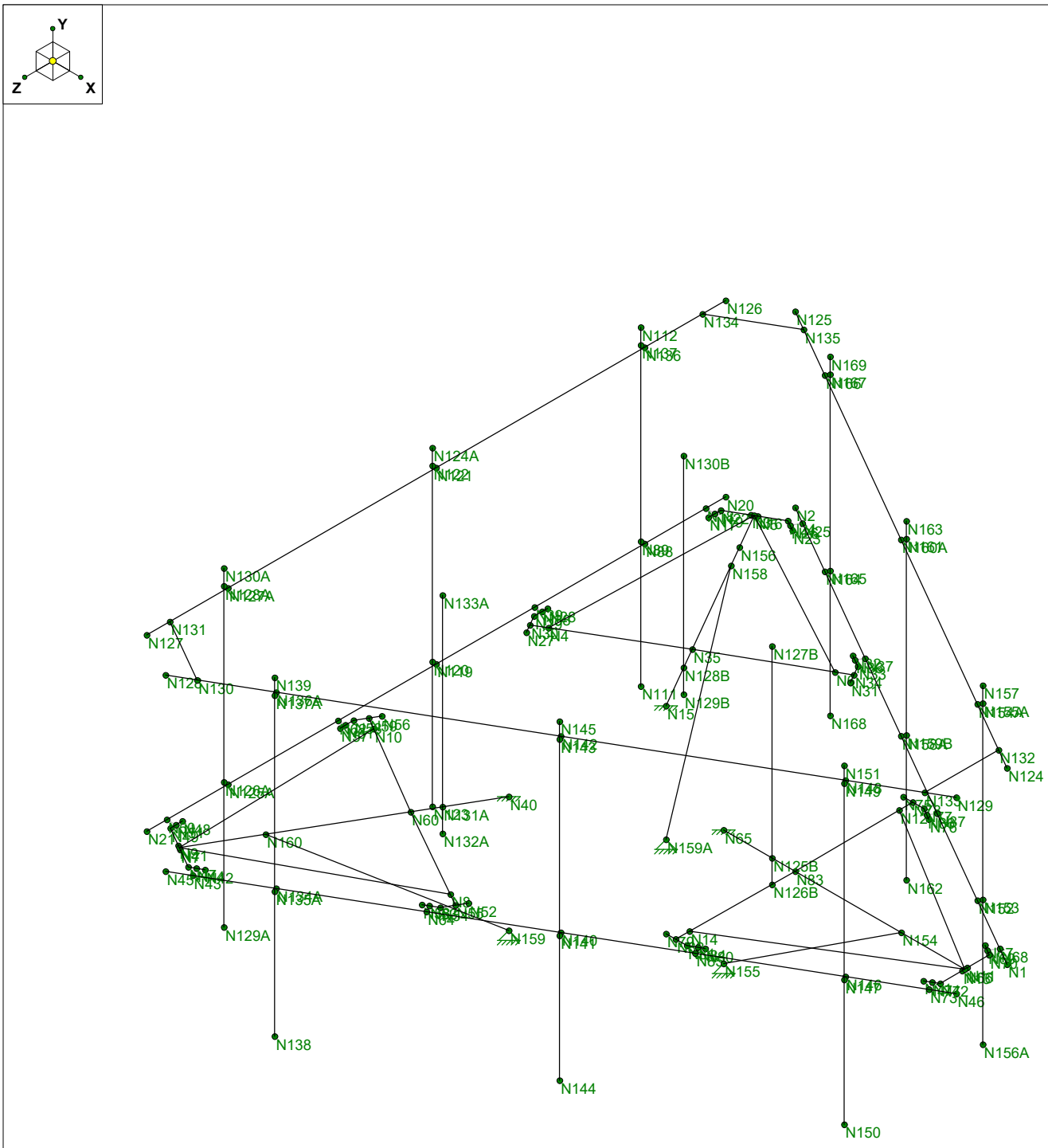
4) The standard of care for all Professional Engineering Services performed or furnished by Paul J. Ford and Company under this project will be the skill and care used by members of the Consultant's profession practicing under similar circumstances at the same time and in the same locality.

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

****

APPENDIX A

WIRE FRAME AND RENDERED MODELS



Envelope Only Solution

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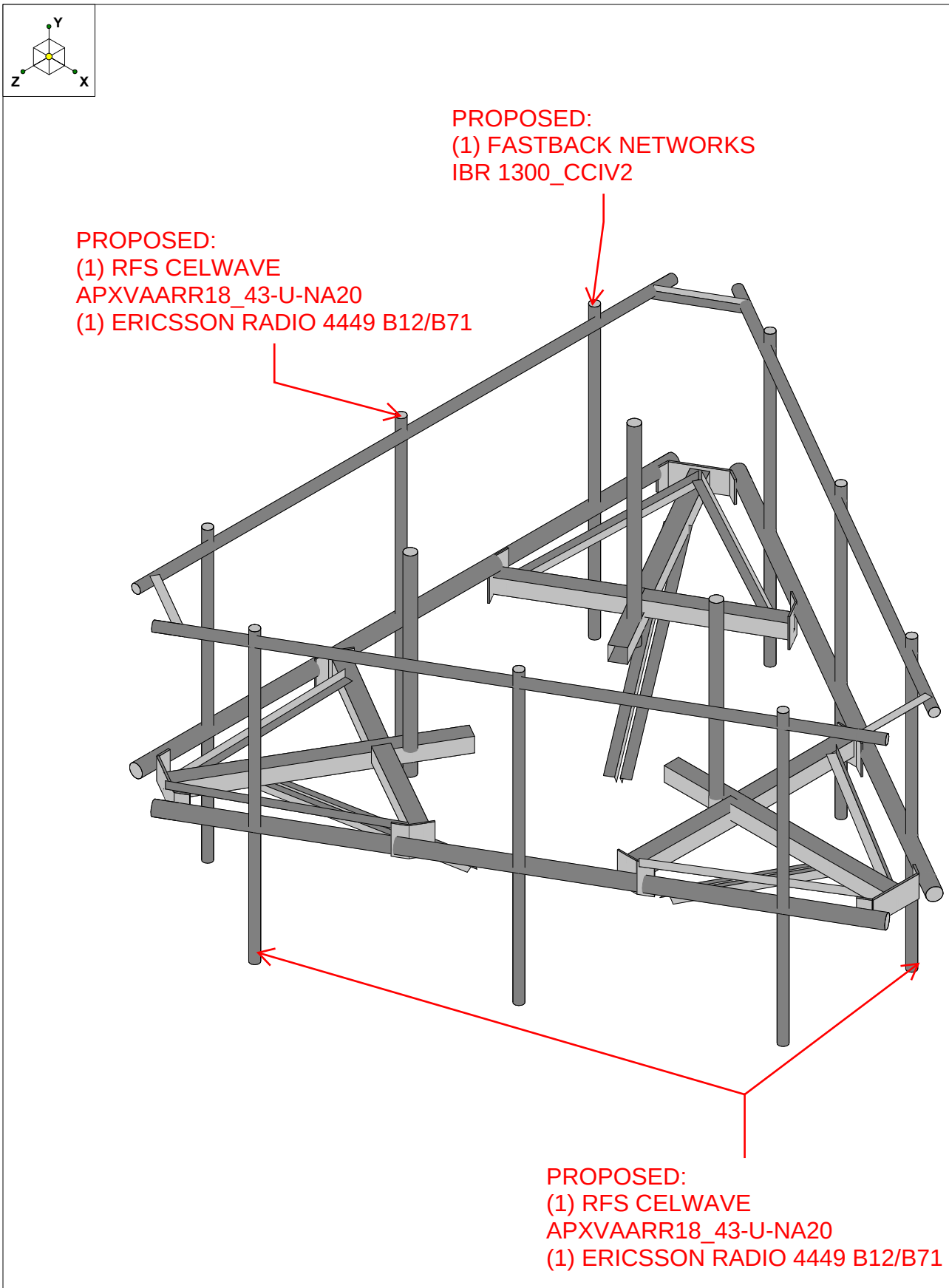

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APPENDIX B

SOFTWARE INPUT CALCULATION

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

Project # 37519-1590
By AMS

Date: 04/29/19

Analysis 30 degrees

v1.0, Effective 04/03/2018

Mount Loading per TIA-222-H

Structure Information

Mount Type =	3 Sectors	
Mount Elev, z =	175	ft
Ground Elev, z_s =	257	ft
Wind Speed =	135	mph
Ice Wind Speed =	50	mph
Ice Thickness =	1.5	in
Exposure Cat =	B	
Structure Class =	II	
Topographic Cat =	1	
Crest Height =	0	ft

Velocity Pressure Coefficients

z_g =	1200	ft	
a =	7.00		
K_{zmin} =	0.70		
K_z =	1.16		Calculated Value
Ke =	0.99		Ground Elevation Factor
K_z =	1.16		Velocity Press Coef (Section 2.6.5.2)
K_{zt} =	1.00		Topographic Factor (Section 2.6.6.4)
Gh =	1.00		Gust Effect Factor (Section 2.6.7)
K_d =	0.95		Wind Dir Probability Factor (Table 2-2)
K_a =	0.90		Shielding factor (Section 16.6)
q_z=	45.83	psf	Velocity Pressure (Section 2.6.9.6)

Ice Loading

Ii =	1.00		Ice Importance Factor (Table 2-3)
Iwi =	1.00		Wind Ice Importance Factor (Table 2-3)
q_z=	7.05	psf	Ice Velocity Pressure (Section 2.6.9.6)
K_{iz} =	1.18		Ice Escalation Factor (Section 2.6.8)
T_{iz} =	1.77	in	Factored Ice Thickness (Section 2.6.8)
h =	1.00	in	Bar Grating Height
W_i =	12.94	psf	Grating Ice Weight

Wind Pressures

Pressure =	45.828	psf
Ice Pressure =	7.050	psf

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

Face	Label	Top Elev (in)	Bot Elev (in)	Length, in	Face	Label	Top Elev (in)	Bot Elev (in)	Length, in	Face	Label	Top Elev (in)	Bot Elev (in)	Length, in	Face	Label	Top Elev (in)	Bot Elev (in)
A	A1	77.0	33	80.5	B	B1	77.0	33	80.5	C	C1	77.0	33	80.5	D			
A	A3	80.0	28	80.5	B	B3	80.0	28	80.5	C	C2	80.0	28	80.5	D			
A (2)	A3	55.0	55	80.5	B (2)	B3	55.0	55	80.5	C (2)	C2	55.0	55	80.5	D			
A	A4	46.0	46	53.5	B	B4	46.0	46	53.5	C	C3	58.0	52	80.5	D			
A					B					C	C4	46	46	53.5	D			
A					B					C					D			
A					B					C					D			
A					B					C					D			
A					B					C					D			
A					B					C					D			

Antennas

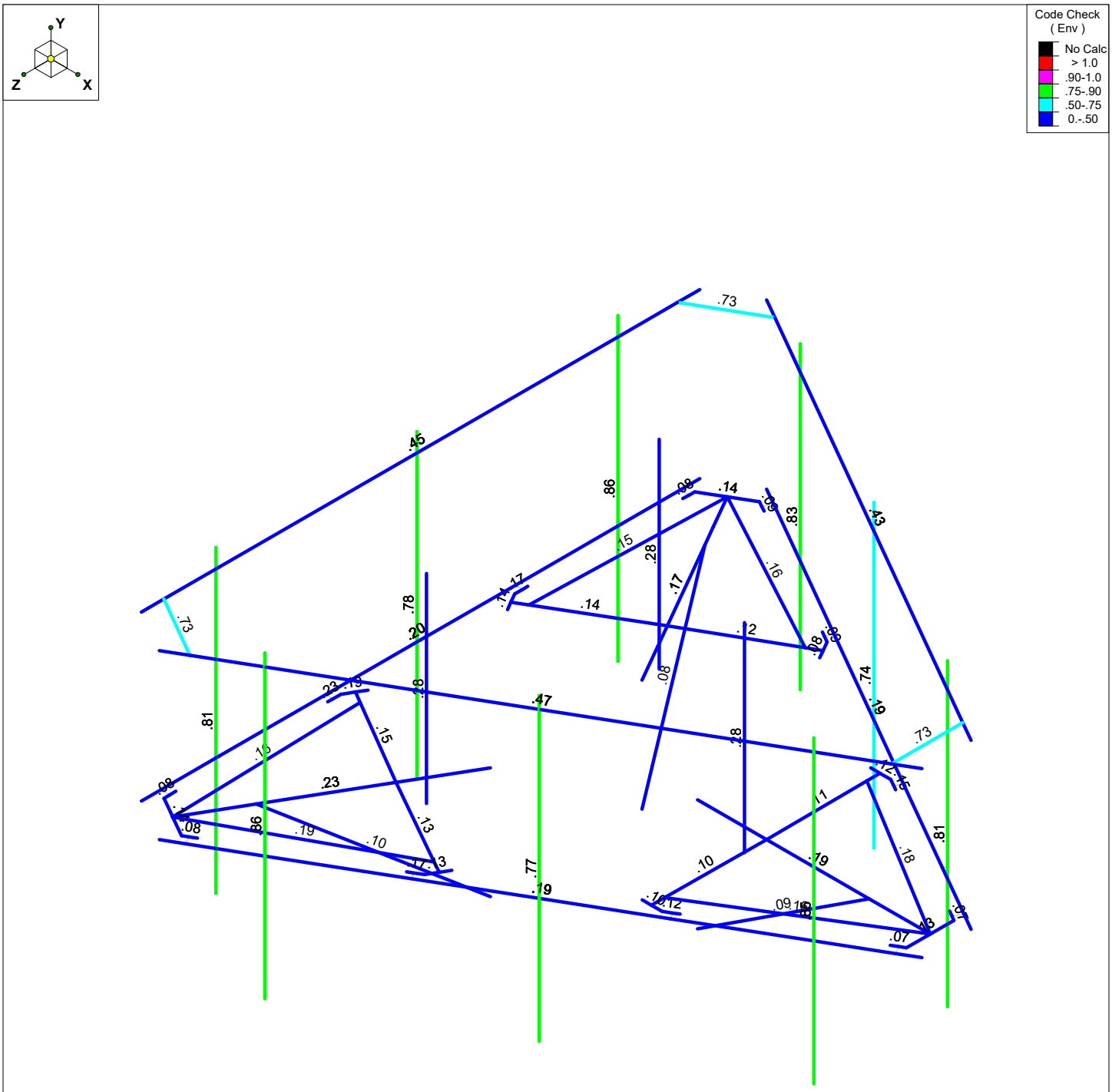
Item	Manufacturer	Antenna	Height (in)	Width (in)	Depth (in)	Flat or Round	Weight (lbs)	Antenna Attachment Locations					
								Label	Label	Label	Label	Label	Label
1	FASTBACK NETWORKS	IBR 1300_CCIV2	10.24	7.87	3.54	Flat	8.2	C3					
2	RFS CELWAVE	APX16DWV-16DWV-S-E-A20	55.9	13.3	3.15	Flat	40.7	A1	B1	C1			
3	RFS CELWAVE	APXVAARR18_43-U-NA20	72	24	8.5	Flat	106	A3	B3	C2			
4	ERICSSON	RRUS 11 B2	20	17	7	Flat	50.7	A4	B4	C4			
5	ERICSSON	RRUS 11 B4	20	17	7	Flat	50.7	A4	B4	C4			
6	ERICSSON	RADIO 4449 B12/B71	15	13.2	9.3	Flat	74	A3(2)	B3(2)	C2(2)			
7													
8													
9													
10													
11													
12													
13													
14													
15													

Dishes

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

APPENDIX C

SOFTWARE ANALYSIS OUTPUT



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

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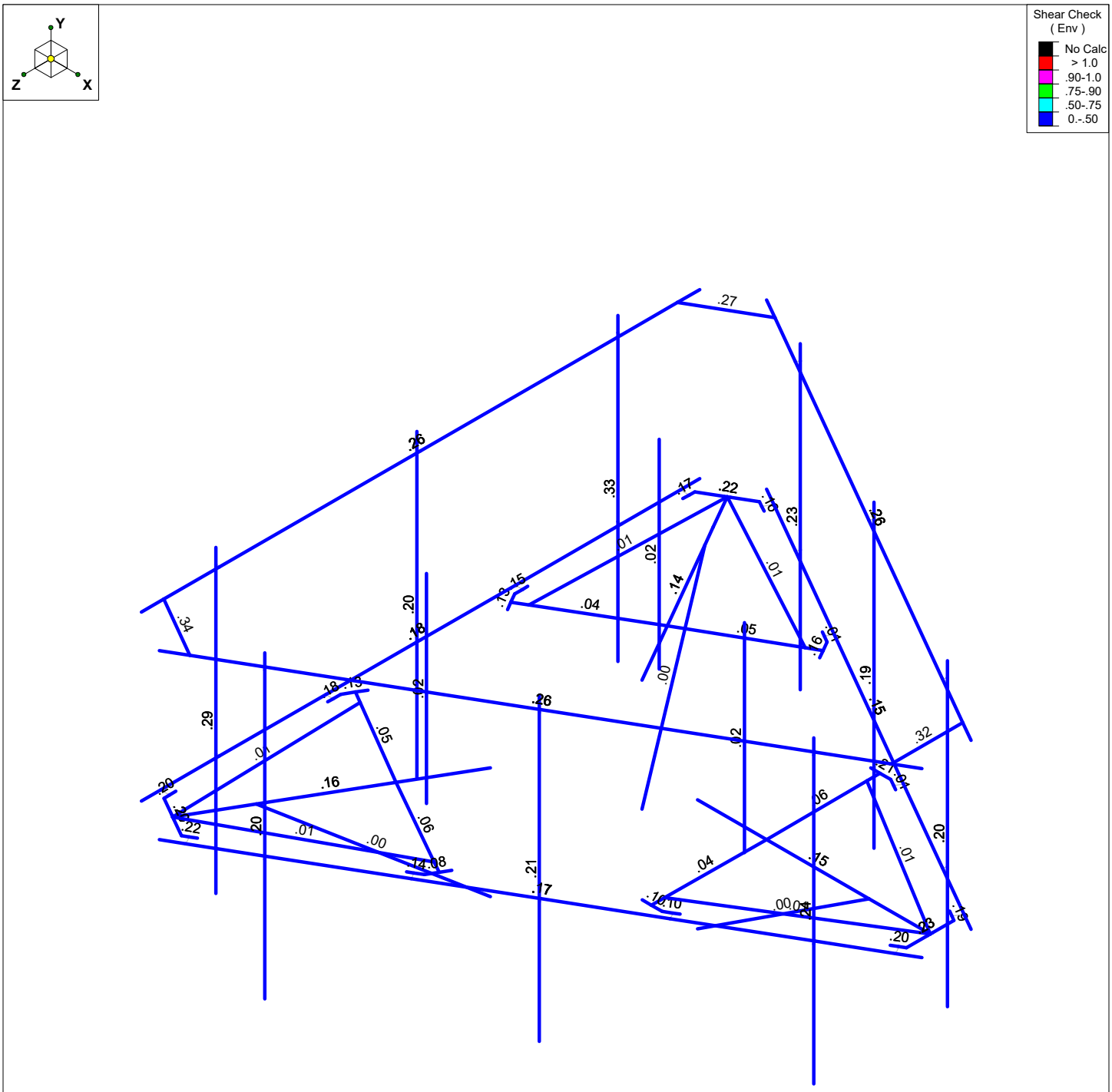

Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

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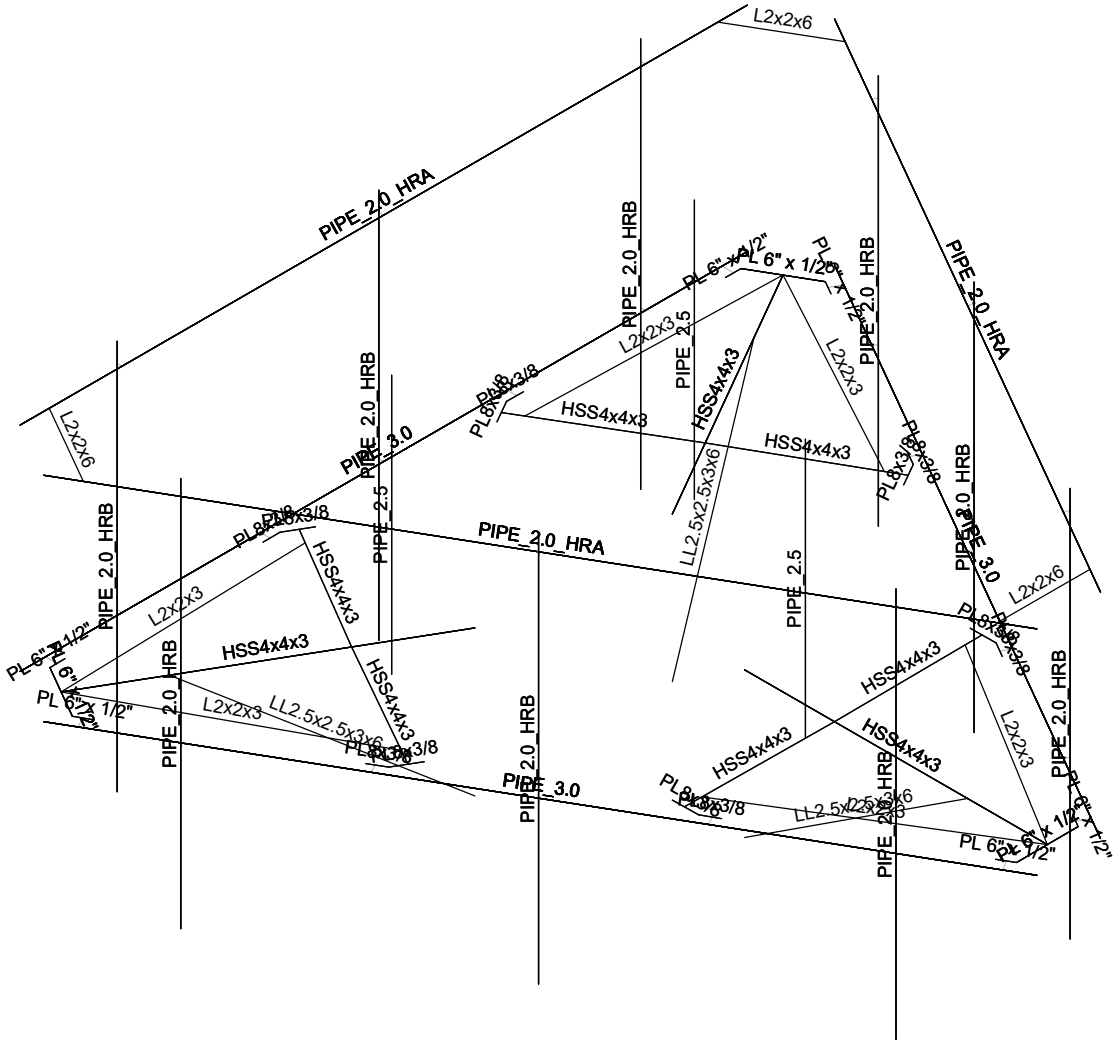

Envelope Only Solution

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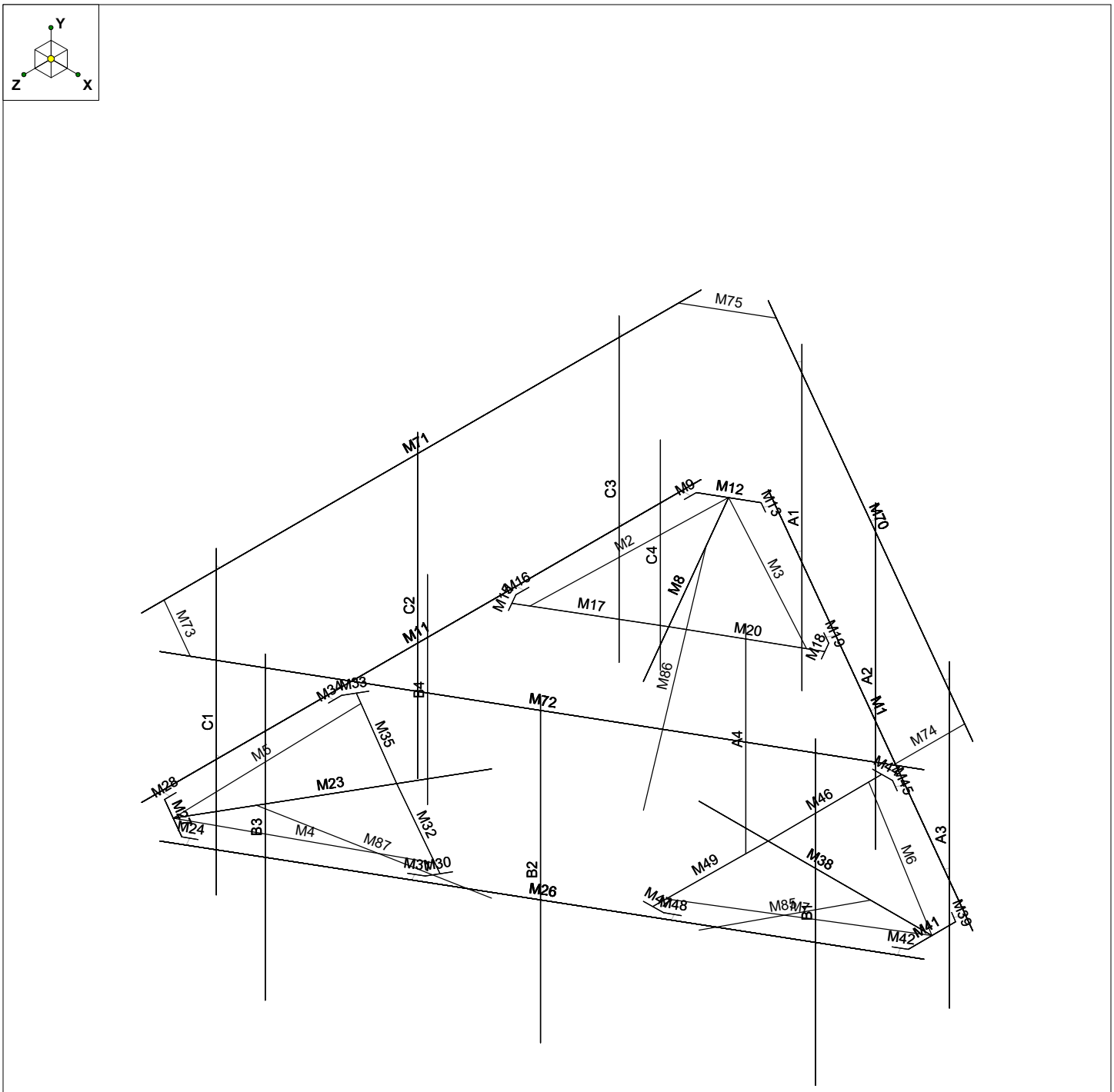

Envelope Only Solution

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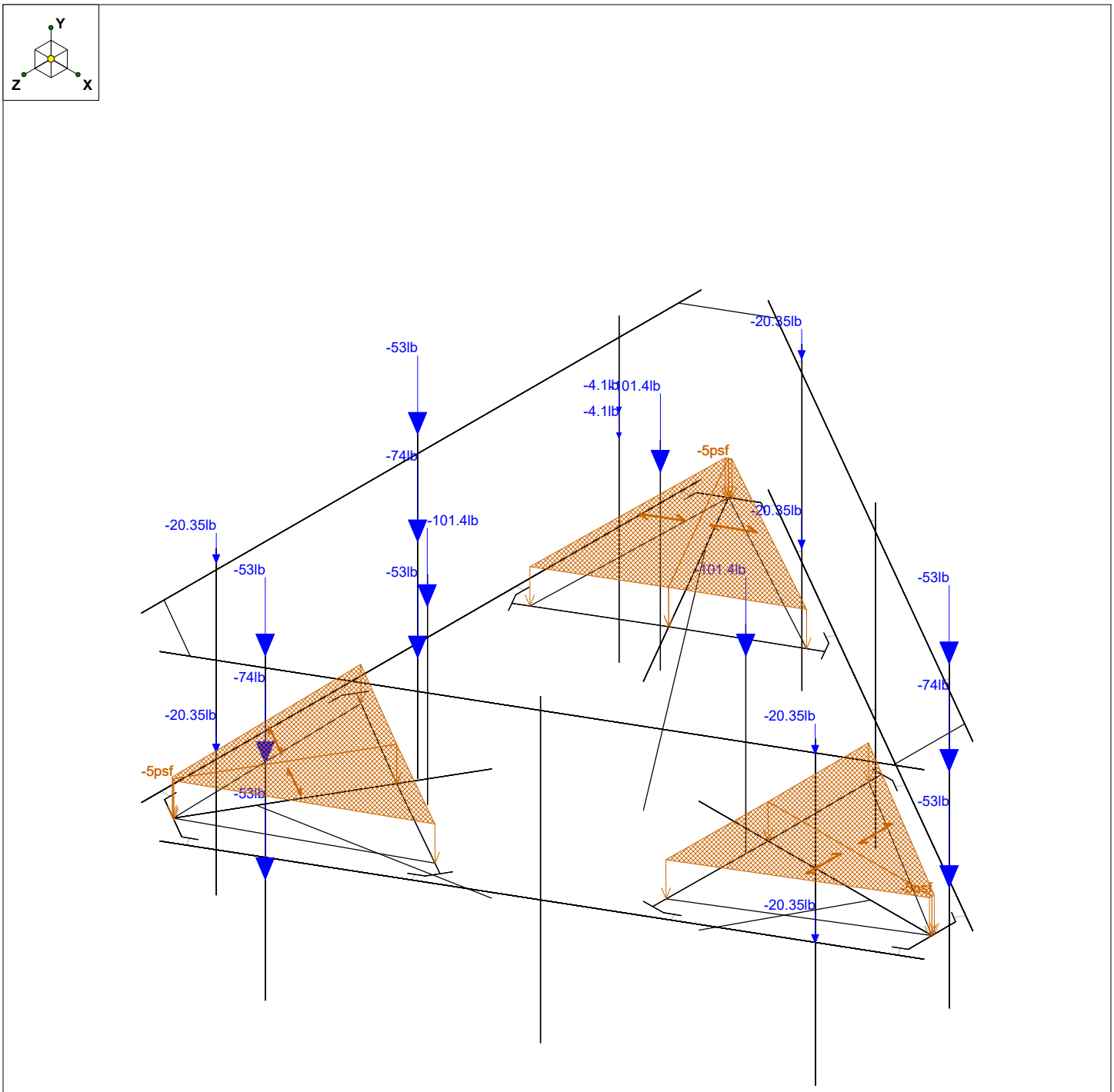

Loads: BLC 1, Dead
Envelope Only Solution

Paul J. Ford and Company	876370 - Maybrook/Bond	SK - 7
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(Global) Model Settings

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

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

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

(Global) Model Settings, Continued

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

Hot Rolled Steel Properties

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

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(de...	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N2			PIPE_3.0	None	None	A53 Gr.B	Typical
2	M2	N16	N4		270	L2x2x3	None	None	A36 Gr.36	Typical
3	M3	N16	N6			L2x2x3	None	None	A36 Gr.36	Typical
4	M4	N41	N8		270	L2x2x3	None	None	A36 Gr.36	Typical
5	M5	N41	N10			L2x2x3	None	None	A36 Gr.36	Typical
6	M6	N66	N12		270	L2x2x3	None	None	A36 Gr.36	Typical
7	M7	N66	N14			L2x2x3	None	None	A36 Gr.36	Typical
8	M8	N15	N16			HSS4x4x3	None	None	A500 Gr....	Typical
9	M9	N17	N22			PL 6" x 1/2"	None	None	A36 Gr.36	Typical
10	M10	N18	N19			RIGID	None	None	RIGID	Typical
11	M11	N20	N21			PIPE_3.0	None	None	A53 Gr.B	Typical
12	M12	N24	N22			PL 6" x 1/2"	None	None	A36 Gr.36	Typical
13	M13	N23	N24			PL 6" x 1/2"	None	None	A36 Gr.36	Typical
14	M14	N25	N26			RIGID	None	None	RIGID	Typical
15	M15	N29	N27			PL8x3/8	None	None	A36 Gr.36	Typical
16	M16	N28	N29			PL8x3/8	None	None	A36 Gr.36	Typical
17	M17	N30	N35			HSS4x4x3	None	None	A500 Gr....	Typical
18	M18	N33	N31			PL8x3/8	None	None	A36 Gr.36	Typical
19	M19	N32	N33			PL8x3/8	None	None	A36 Gr.36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(de...	Section/Shape	Type	Design List	Material	Design Rules
20	M20	N34	N35			HSS4x4x3	None	None	A500 Gr....	Typical
21	M21	N36	N37			RIGID	None	None	RIGID	Typical
22	M22	N39	N38			RIGID	None	None	RIGID	Typical
23	M23	N40	N41			HSS4x4x3	None	None	A500 Gr....	Typical
24	M24	N42	N47			PL 6" x 1/2"	None	None	A36 Gr.36	Typical
25	M25	N43	N44			RIGID	None	None	RIGID	Typical
26	M26	N45	N46			PIPE_3.0	None	None	A53 Gr.B	Typical
27	M27	N49	N47			PL 6" x 1/2"	None	None	A36 Gr.36	Typical
28	M28	N48	N49			PL 6" x 1/2"	None	None	A36 Gr.36	Typical
29	M29	N50	N51			RIGID	None	None	RIGID	Typical
30	M30	N54	N52			PL8x3/8	None	None	A36 Gr.36	Typical
31	M31	N53	N54			PL8x3/8	None	None	A36 Gr.36	Typical
32	M32	N55	N60			HSS4x4x3	None	None	A500 Gr....	Typical
33	M33	N58	N56			PL8x3/8	None	None	A36 Gr.36	Typical
34	M34	N57	N58			PL8x3/8	None	None	A36 Gr.36	Typical
35	M35	N59	N60			HSS4x4x3	None	None	A500 Gr....	Typical
36	M36	N62	N61			RIGID	None	None	RIGID	Typical
37	M37	N64	N63			RIGID	None	None	RIGID	Typical
38	M38	N65	N66			HSS4x4x3	None	None	A500 Gr....	Typical
39	M39	N67	N70			PL 6" x 1/2"	None	None	A36 Gr.36	Typical
40	M40	N68	N69			RIGID	None	None	RIGID	Typical
41	M41	N72	N70			PL 6" x 1/2"	None	None	A36 Gr.36	Typical
42	M42	N71	N72			PL 6" x 1/2"	None	None	A36 Gr.36	Typical
43	M43	N73	N74			RIGID	None	None	RIGID	Typical
44	M44	N77	N75			PL8x3/8	None	None	A36 Gr.36	Typical
45	M45	N76	N77			PL8x3/8	None	None	A36 Gr.36	Typical
46	M46	N78	N83			HSS4x4x3	None	None	A500 Gr....	Typical
47	M47	N81	N79			PL8x3/8	None	None	A36 Gr.36	Typical
48	M48	N80	N81			PL8x3/8	None	None	A36 Gr.36	Typical
49	M49	N82	N83			HSS4x4x3	None	None	A500 Gr....	Typical
50	M50	N85	N84			RIGID	None	None	RIGID	Typical
51	M51	N86	N87			RIGID	None	None	RIGID	Typical
52	M52	N89	N88			RIGID	None	None	RIGID	Typical
53	M70	N124	N125			PIPE_2.0_HRA	None	None	A53 Gr.B	Typical
54	M71	N126	N127			PIPE_2.0_HRA	None	None	A53 Gr.B	Typical
55	M72	N128	N129			PIPE_2.0_HRA	None	None	A53 Gr.B	Typical
56	M73	N131	N130		90	L2x2x6	None	None	A36 Gr.36	Typical
57	M74	N133	N132		90	L2x2x6	None	None	A36 Gr.36	Typical
58	M75	N135	N134		90	L2x2x6	None	None	A36 Gr.36	Typical
59	M76	N137	N136			RIGID	None	None	RIGID	Typical
60	M85	N155	N154			LL2.5x2.5x3x6	None	None	A36 Gr.36	Typical
61	M86	N159A	N158			LL2.5x2.5x3x6	None	None	A36 Gr.36	Typical
62	M87	N159	N160			LL2.5x2.5x3x6	None	None	A36 Gr.36	Typical
63	C3	N111	N112			PIPE_2.0_HRB	None	None	A53 Gr.B	Typical
64	M67	N120	N119			RIGID	None	None	RIGID	Typical
65	M68	N122	N121			RIGID	None	None	RIGID	Typical
66	C2	N123	N124A			PIPE_2.0_HRB	None	None	A53 Gr.B	Typical
67	M70A	N126A	N125A			RIGID	None	None	RIGID	Typical
68	M71A	N128A	N127A			RIGID	None	None	RIGID	Typical
69	C1	N129A	N130A			PIPE_2.0_HRB	None	None	A53 Gr.B	Typical
70	A4	N126B	N127B			PIPE_2.5	None	None	A53 Gr.B	Typical
71	C4	N129B	N130B			PIPE_2.5	None	None	A53 Gr.B	Typical
72	B4	N132A	N133A			PIPE_2.5	None	None	A53 Gr.B	Typical
73	M73A	N135A	N134A			RIGID	None	None	RIGID	Typical
74	M74A	N137A	N136A			RIGID	None	None	RIGID	Typical
75	B3	N138	N139			PIPE_2.0_HRB	None	None	A53 Gr.B	Typical
76	M76A	N141	N140			RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(de...	Section/Shape	Type	Design List	Material	Design Rules
77	M77	N143	N142			RIGID	None	None	RIGID	Typical
78	B2	N144	N145			PIPE_2.0_HRB	None	None	A53 Gr.B	Typical
79	M79	N147	N146			RIGID	None	None	RIGID	Typical
80	M80	N149	N148			RIGID	None	None	RIGID	Typical
81	B1	N150	N151			PIPE_2.0_HRB	None	None	A53 Gr.B	Typical
82	M82	N153	N152			RIGID	None	None	RIGID	Typical
83	M83	N155A	N154A			RIGID	None	None	RIGID	Typical
84	A3	N156A	N157			PIPE_2.0_HRB	None	None	A53 Gr.B	Typical
85	M85A	N159B	N158A			RIGID	None	None	RIGID	Typical
86	M86A	N161	N160A			RIGID	None	None	RIGID	Typical
87	A2	N162	N163			PIPE_2.0_HRB	None	None	A53 Gr.B	Typical
88	M88	N165	N164			RIGID	None	None	RIGID	Typical
89	M89	N167	N166			RIGID	None	None	RIGID	Typical
90	A1	N168	N169			PIPE_2.0_HRB	None	None	A53 Gr.B	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Analysis ...	Inactive	Seismic Design ...
1	M1						Yes			None
2	M2	BenPIN	BenPIN				Yes			None
3	M3	BenPIN	BenPIN				Yes			None
4	M4	BenPIN	BenPIN				Yes			None
5	M5	BenPIN	BenPIN				Yes			None
6	M6	BenPIN	BenPIN				Yes			None
7	M7	BenPIN	BenPIN				Yes			None
8	M8						Yes			None
9	M9						Yes			None
10	M10	OOOOOX					Yes			None
11	M11						Yes			None
12	M12						Yes			None
13	M13						Yes			None
14	M14	OOOOOX					Yes			None
15	M15						Yes			None
16	M16						Yes			None
17	M17						Yes			None
18	M18						Yes			None
19	M19						Yes			None
20	M20						Yes			None
21	M21	OOOOOX					Yes			None
22	M22	OOOOOX					Yes			None
23	M23						Yes			None
24	M24						Yes			None
25	M25	OOOOOX					Yes			None
26	M26						Yes			None
27	M27						Yes			None
28	M28						Yes			None
29	M29	OOOOOX					Yes			None
30	M30						Yes			None
31	M31						Yes			None
32	M32						Yes			None
33	M33						Yes			None
34	M34						Yes			None
35	M35						Yes			None
36	M36	OOOOOX					Yes			None
37	M37	OOOOOX					Yes			None
38	M38						Yes			None

Member Advanced Data (Continued)

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Analysis ...	Inactive	Seismic Design ...
39	M39						Yes			None
40	M40	OOOOOX					Yes			None
41	M41						Yes			None
42	M42						Yes			None
43	M43	OOOOOX					Yes			None
44	M44						Yes			None
45	M45						Yes			None
46	M46						Yes			None
47	M47						Yes			None
48	M48						Yes			None
49	M49						Yes			None
50	M50	OOOOOX					Yes			None
51	M51	OOOOOX					Yes			None
52	M52						Yes			None
53	M70						Yes			None
54	M71						Yes			None
55	M72						Yes			None
56	M73	OOOOOX	OOOOOX				Yes			None
57	M74	OOOOOX	OOOOOX				Yes			None
58	M75	OOOOOX	OOOOOX				Yes			None
59	M76		OOOXOX				Yes			None
60	M85		BenPIN				Yes			None
61	M86		BenPIN				Yes			None
62	M87		BenPIN				Yes			None
63	C3						Yes			None
64	M67						Yes			None
65	M68		OOOXOX				Yes			None
66	C2						Yes			None
67	M70A						Yes			None
68	M71A		OOOXOX				Yes			None
69	C1						Yes			None
70	A4						Yes			None
71	C4						Yes			None
72	B4						Yes			None
73	M73A						Yes			None
74	M74A		OOOXOX				Yes			None
75	B3						Yes			None
76	M76A						Yes			None
77	M77		OOOXOX				Yes			None
78	B2						Yes			None
79	M79						Yes			None
80	M80		OOOXOX				Yes			None
81	B1						Yes			None
82	M82						Yes			None
83	M83		OOOXOX				Yes			None
84	A3						Yes			None
85	M85A						Yes			None
86	M86A		OOOXOX				Yes			None
87	A2						Yes			None
88	M88						Yes			None
89	M89		OOOXOX				Yes			None
90	A1						Yes			None

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	PIPE_3.0	150			Lbyy						Lateral
2	M2	L2x2x3	51.837			Lbyy						Lateral
3	M3	L2x2x3	51.837			Lbyy						Lateral
4	M4	L2x2x3	51.837			Lbyy						Lateral
5	M5	L2x2x3	51.837			Lbyy						Lateral
6	M6	L2x2x3	51.837			Lbyy						Lateral
7	M7	L2x2x3	51.837			Lbyy						Lateral
8	M8	HSS4x4x3	62.486			Lbyy						Lateral
9	M9	PL 6" x 1/2"	3.184			Lbyy						Lateral
10	M11	PIPE_3.0	150			Lbyy						Lateral
11	M12	PL 6" x 1/2"	12.707			Lbyy						Lateral
12	M13	PL 6" x 1/2"	3.184			Lbyy						Lateral
13	M15	PL8x3/8	5.363			Lbyy						Lateral
14	M16	PL8x3/8	3.499			Lbyy						Lateral
15	M17	HSS4x4x3	30.71			Lbyy						Lateral
16	M18	PL8x3/8	5.363			Lbyy						Lateral
17	M19	PL8x3/8	3.499			Lbyy						Lateral
18	M20	HSS4x4x3	30.71			Lbyy						Lateral
19	M23	HSS4x4x3	62.486			Lbyy						Lateral
20	M24	PL 6" x 1/2"	3.184			Lbyy						Lateral
21	M26	PIPE_3.0	150			Lbyy						Lateral
22	M27	PL 6" x 1/2"	12.707			Lbyy						Lateral
23	M28	PL 6" x 1/2"	3.184			Lbyy						Lateral
24	M30	PL8x3/8	5.363			Lbyy						Lateral
25	M31	PL8x3/8	3.499			Lbyy						Lateral
26	M32	HSS4x4x3	30.71			Lbyy						Lateral
27	M33	PL8x3/8	5.363			Lbyy						Lateral
28	M34	PL8x3/8	3.499			Lbyy						Lateral
29	M35	HSS4x4x3	30.71			Lbyy						Lateral
30	M38	HSS4x4x3	62.486			Lbyy						Lateral
31	M39	PL 6" x 1/2"	3.184			Lbyy						Lateral
32	M41	PL 6" x 1/2"	12.707			Lbyy						Lateral
33	M42	PL 6" x 1/2"	3.184			Lbyy						Lateral
34	M44	PL8x3/8	5.363			Lbyy						Lateral
35	M45	PL8x3/8	3.499			Lbyy						Lateral
36	M46	HSS4x4x3	30.71			Lbyy						Lateral
37	M47	PL8x3/8	5.363			Lbyy						Lateral
38	M48	PL8x3/8	3.499			Lbyy						Lateral
39	M49	HSS4x4x3	30.71			Lbyy						Lateral
40	M70	PIPE_2.0_...	150			Lbyy						Lateral
41	M71	PIPE_2.0_...	150			Lbyy						Lateral
42	M72	PIPE_2.0_...	150			Lbyy						Lateral
43	M73	L2x2x6	19.173									Lateral
44	M74	L2x2x6	19.173									Lateral
45	M75	L2x2x6	19.173									Lateral
46	M85	LL2.5x2.5x3...	54.978									Lateral
47	M86	LL2.5x2.5x3...	54.978									Lateral
48	M87	LL2.5x2.5x3...	54.978									Lateral
49	C3	PIPE_2.0_...	80.5									Lateral
50	C2	PIPE_2.0_...	80.5									Lateral
51	C1	PIPE_2.0_...	80.5									Lateral
52	A4	PIPE_2.5	53.5									Lateral
53	C4	PIPE_2.5	53.5									Lateral
54	B4	PIPE_2.5	53.5									Lateral
55	B3	PIPE_2.0_...	80.5									Lateral
56	B2	PIPE_2.0_...	80.5									Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
57	B1	PIPE_2.0_...	80.5									Lateral
58	A3	PIPE_2.0_...	80.5									Lateral
59	A2	PIPE_2.0_...	80.5									Lateral
60	A1	PIPE_2.0_...	80.5									Lateral

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Dead	None		-1.1			26		6	
2	Live	None								
3	Wind 0	None					52	120		
4	Wind 30	None					52	120		
5	Wind 60	None					52	120		
6	Wind 90	None					52	120		
7	Wind 120	None					52	120		
8	Wind 150	None					52	120		
9	Ice Load	None					26	60	6	
10	Ice 0	None					52	120		
11	Ice 30	None					52	120		
12	Ice 60	None					52	120		
13	Ice 90	None					52	120		
14	Ice 120	None					52	120		
15	Ice 150	None					52	120		
16	Lm	None				1				
17	Lv	None				1				
18	BLC 1 Transient Area...	None						15		
19	BLC 9 Transient Area...	None						15		

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.4 D	Yes	Y		1	1.4																		
2	1.2 D + 1.6 L	Yes	Y		1	1.2	2	1.6																
3	1.2 D + 1.0 Wo @ 0	Yes	Y		1	1.2	3	1																
4	1.2 D + 1.0 Wo @ 30	Yes	Y		1	1.2	4	1																
5	1.2 D + 1.0 Wo @ 60	Yes	Y		1	1.2	5	1																
6	1.2 D + 1.0 Wo @ 90	Yes	Y		1	1.2	6	1																
7	1.2 D + 1.0 Wo @ 120	Yes	Y		1	1.2	7	1																
8	1.2 D + 1.0 Wo @ 150	Yes	Y		1	1.2	8	1																
9	1.2 D + 1.0 Wo @ 180	Yes	Y		1	1.2	3	-1																
10	1.2 D + 1.0 Wo @ 210	Yes	Y		1	1.2	4	-1																
11	1.2 D + 1.0 Wo @ 240	Yes	Y		1	1.2	5	-1																
12	1.2 D + 1.0 Wo @ 270	Yes	Y		1	1.2	6	-1																
13	1.2 D + 1.0 Wo @ 300	Yes	Y		1	1.2	7	-1																
14	1.2 D + 1.0 Wo @ 330	Yes	Y		1	1.2	8	-1																
15	1.2 D + 1.0 Di + 1.0 Wi @ 0	Yes	Y		1	1.2	9	1	10	1														
16	1.2 D + 1.0 Di + 1.0 Wi @ 30	Yes	Y		1	1.2	9	1	11	1														
17	1.2 D + 1.0 Di + 1.0 Wi @ 60	Yes	Y		1	1.2	9	1	12	1														
18	1.2 D + 1.0 Di + 1.0 Wi @ 90	Yes	Y		1	1.2	9	1	13	1														
19	1.2 D + 1.0 Di + 1.0 Wi @ 1...	Yes	Y		1	1.2	9	1	14	1														
20	1.2 D + 1.0 Di + 1.0 Wi @ 1...	Yes	Y		1	1.2	9	1	15	1														
21	1.2 D + 1.0 Di + 1.0 Wi @ 1...	Yes	Y		1	1.2	9	1	10	-1														
22	1.2 D + 1.0 Di + 1.0 Wi @ 2...	Yes	Y		1	1.2	9	1	11	-1														
23	1.2 D + 1.0 Di + 1.0 Wi @ 2...	Yes	Y		1	1.2	9	1	12	-1														
24	1.2 D + 1.0 Di + 1.0 Wi @ 2...	Yes	Y		1	1.2	9	1	13	-1														
25	1.2 D + 1.0 Di + 1.0 Wi @ 3...	Yes	Y		1	1.2	9	1	14	-1														

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...	B...	Fa...
26	1.2 D + 1.0 Di + 1.0 Wi @ 3...	Yes	Y		1	1.2	9	1	15	-1																
27	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	3	.049	16	1.5																
28	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	4	.049	16	1.5																
29	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	5	.049	16	1.5																
30	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	6	.049	16	1.5																
31	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	7	.049	16	1.5																
32	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	8	.049	16	1.5																
33	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	3	-.049	16	1.5																
34	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	4	-.049	16	1.5																
35	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	5	-.049	16	1.5																
36	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	6	-.049	16	1.5																
37	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	7	-.049	16	1.5																
38	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	8	-.049	16	1.5																
39	1.2 D + 1.5 Lv	Yes	Y		1	1.2	17	1.5																		

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N40	max	2905.941	12	1059.577	16	3169.89	4	-.169	27	2.509	13	-.082	11
2		min	-2034.403	6	-57.425	10	-4720.184	10	-.749	24	-2.519	7	-.726	17
3	N65	max	3646.014	12	829.229	23	1665.348	3	.616	31	1.925	9	.749	21
4		min	-5338.453	6	-214.435	5	-1662.326	9	-.102	13	-1.933	3	.067	3
5	N15	max	2593.525	14	1160.225	20	4533.135	14	.772	21	1.533	5	-.159	5
6		min	-2010.925	8	-72.206	14	-3530.421	8	.065	3	-1.541	11	-.758	23
7	N155	max	3339.057	18	2238.507	18	46.352	14	0	1	0	1	0	1
8		min	-896.88	12	-591.235	12	-46.44	10	0	1	0	1	0	1
9	N159	max	351.209	4	2308.722	22	2985.173	22	0	1	0	1	0	1
10		min	-1723.544	22	-464.666	4	-608.49	4	0	1	0	1	0	1
11	N159A	max	588.052	8	1780.004	14	1018.172	8	0	1	0	1	0	1
12		min	-1333.327	14	-772.942	8	-2310.156	14	0	1	0	1	0	1
13	Totals:	max	6260.242	12	8059.196	19	5925.477	3						
14		min	-6260.223	6	2947.039	13	-5925.483	9						

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

	Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	phi*Pnc ...	phi*Pnt [...	phi*Mn y...	phi*Mn z...	Cb	Eqn
1	B3	PIPE_2.0_...	.865	32.703	6	.204	32.703		10	18731.88	32130	1.872	1.872	1....	H1-1b
2	C3	PIPE_2.0_...	.858	32.703	14	.327	76.307		13	18731.88	32130	1.872	1.872	1....	H1-1b
3	B1	PIPE_2.0_...	.854	32.703	6	.241	32.703		7	18731.88	32130	1.872	1.872	1....	H1-1b
4	A1	PIPE_2.0_...	.831	32.703	14	.229	32.703		3	18731.88	32130	1.872	1.872	1....	H1-1b
5	C1	PIPE_2.0_...	.814	32.703	8	.290	32.703		11	18731.88	32130	1.872	1.872	1....	H1-1b
6	A3	PIPE_2.0_...	.806	32.703	6	.200	32.703		5	18731.88	32130	1.872	1.872	1....	H1-1b
7	C2	PIPE_2.0_...	.780	32.703	14	.201	32.703		14	18731.88	32130	1.872	1.872	1....	H1-1b
8	B2	PIPE_2.0_...	.773	32.703	6	.211	32.703		6	18731.88	32130	1.872	1.872	1....	H1-1b
9	A2	PIPE_2.0_...	.737	32.703	14	.194	32.703		14	18731.88	32130	1.872	1.872	1....	H1-1b
10	M74	L2x2x6	.731	19.173	13	.317	0	z	3	38981.5...	44388	.925	2.142	1....	H2-1
11	M75	L2x2x6	.729	0	7	.274	19.173	z	5	38981.5...	44388	.925	2.142	1....	H2-1
12	M73	L2x2x6	.726	0	3	.340	0	z	7	38981.5...	44388	.925	2.142	1....	H2-1
13	M72	PIPE_2.0_...	.466	20.312	7	.260	6.25		5	6295.422	32130	1.872	1.872	2....	H1-1b
14	M71	PIPE_2.0_...	.448	75	13	.260	143.75		3	6295.422	32130	1.872	1.872	2....	H1-1b
15	M70	PIPE_2.0_...	.431	20.313	3	.261	129....		13	6295.422	32130	1.872	1.872	2....	H1-1b
16	C4	PIPE_2.5	.284	6.13	13	.021	6.13		13	43101.6...	50715	3.596	3.596	1....	H1-1b
17	B4	PIPE_2.5	.284	6.13	9	.021	6.13		9	43101.6...	50715	3.596	3.596	1....	H1-1b
18	A4	PIPE_2.5	.284	6.13	5	.021	6.13		5	43101.6...	50715	3.596	3.596	1....	H1-1b
19	M23	HSS4x4x3	.234	0	13	.161	13.018	z	7	95770.0...	106812	12.662	12.662	2....	H1-1b
20	M34	PL8x3/8	.233	1.422	13	.177	3.499	y	19	79622.5...	97200	.759	16.2	1....	H1-1b

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

	Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	phi*Pnc ...	phi*Pnt [...	phi*Mn y...	phi*Mn z...	Cb	Eqn
21	M11	PIPE_3.0	.203	75	14	.178	75		13	28250.5...	65205	5.749	5.749	1....	H1-1b
22	M26	PIPE_3.0	.194	21.875	3	.167	100		6	28250.5...	65205	5.749	5.749	1....	H1-1b
23	M38	HSS4x4x3	.194	0	9	.151	13.018	z	9	95770.0...	106812	12.662	12.662	2....	H1-1b
24	M4	L2x2x3	.194	25.918	9	.010	51.837	z	19	9185.35	23392.8	.558	1.087	1....	H2-1
25	M33	PL8x3/8	.190	2.849	13	.126	2.849	y	25	74706.1...	97200	.759	16.2	1....	H1-1b
26	M1	PIPE_3.0	.186	21.875	11	.153	128....		14	28250.5...	65205	5.749	5.749	1....	H1-1b
27	M6	L2x2x3	.182	25.918	4	.008	51.837	z	20	9185.35	23392.8	.558	1.086	1....	H2-1
28	M8	HSS4x4x3	.167	0	11	.139	13.018	z	5	95770.0...	106812	12.662	12.662	2....	H1-1b
29	M31	PL8x3/8	.166	1.422	7	.143	3.499	y	25	79622.5...	97200	.759	16.2	1....	H1-1b
30	M16	PL8x3/8	.165	1.422	11	.152	3.499	y	17	79622.5...	97200	.759	16.2	1....	H1-1b
31	M5	L2x2x3	.164	25.918	11	.012	51.837	y	25	9185.35	23392.8	.558	1.087	1....	H2-1
32	M7	L2x2x3	.162	25.918	8	.011	51.837	y	21	9185.35	23392.8	.558	1.086	1....	H2-1
33	M3	L2x2x3	.162	25.918	3	.010	51.837	y	18	9185.35	23392.8	.558	1.087	1....	H2-1
34	M35	HSS4x4x3	.154	30.71	23	.049	30.71	y	19	104033....	106812	12.662	12.662	1....	H1-1b
35	M2	L2x2x3	.152	25.918	13	.011	51.837	z	23	9185.35	23392.8	.558	1.087	1....	H2-1
36	M45	PL8x3/8	.145	1.422	3	.011	3.499	y	21	79622.5...	97200	.759	16.2	1....	H1-1b
37	M12	PL 6" x 1/2"	.145	6.354	14	.216	6.354	y	5	64843.0...	97200	1.012	12.15	1....	H1-1b
38	M27	PL 6" x 1/2"	.141	6.354	10	.195	6.354	y	13	64843.0...	97200	1.012	12.15	1....	H1-1b
39	M15	PL8x3/8	.138	2.849	11	.126	2.849	y	24	74706.1...	97200	.759	16.2	2....	H1-1b
40	M17	HSS4x4x3	.136	30.71	19	.044	3.519	z	7	104033....	106812	12.662	12.662	1....	H1-1b
41	M41	PL 6" x 1/2"	.135	6.354	6	.232	6.354	y	4	64843.0...	97200	1.012	12.15	1....	H1-1b
42	M30	PL8x3/8	.133	2.849	7	.082	2.849	y	14	74706.1...	97200	.759	16.2	1....	H1-1b
43	M32	HSS4x4x3	.125	30.71	21	.057	3.519	z	3	104033....	106812	12.662	12.662	1....	H1-1b
44	M44	PL8x3/8	.120	2.849	3	.214	2.849	y	10	74706.1...	97200	.759	16.2	1....	H1-1b
45	M20	HSS4x4x3	.118	30.71	22	.047	3.519	z	9	104033....	106812	12.662	12.662	1....	H1-1b
46	M48	PL8x3/8	.116	1.422	9	.099	3.499	y	16	79622.5...	97200	.759	16.2	1....	H1-1b
47	M46	HSS4x4x3	.106	30.71	22	.060	3.519	z	10	104033....	106812	12.662	12.662	1....	H1-1b
48	M49	HSS4x4x3	.100	30.71	19	.040	3.519	z	13	104033....	106812	12.662	12.662	1....	H1-1b
49	M87	LL2.5x2.5x...	.097	0	22	.003	0	y	23	42680.9...	58320	4.643	2.55	1	H1-1b*
50	M47	PL8x3/8	.095	2.849	13	.097	2.849	y	9	74706.1...	97200	.759	16.2	1....	H1-1b
51	M19	PL8x3/8	.095	1.422	5	.012	3.499	y	23	79622.5...	97200	.759	16.2	1....	H1-1b
52	M85	LL2.5x2.5x...	.094	0	18	.003	54.978	y	17	42680.9...	58320	4.643	2.55	1	H1-1b*
53	M13	PL 6" x 1/2"	.090	3.184	8	.161	3.184	y	13	94760.1...	97200	1.012	12.15	2....	H1-1b
54	M9	PL 6" x 1/2"	.085	3.184	8	.174	3.184	y	4	94760.1...	97200	1.012	12.15	2....	H1-1b
55	M18	PL8x3/8	.083	2.849	5	.156	0	y	4	74706.1...	97200	.759	16.2	1....	H1-1b
56	M28	PL 6" x 1/2"	.080	3.184	4	.204	3.184	y	8	94760.1...	97200	1.012	12.15	3....	H1-1b
57	M24	PL 6" x 1/2"	.076	3.184	4	.223	3.184	y	12	94760.1...	97200	1.012	12.15	3....	H1-1b
58	M86	LL2.5x2.5x...	.076	54.978	14	.003	54.978	y	25	42680.9...	58320	4.643	2.55	1	H1-1b*
59	M39	PL 6" x 1/2"	.075	3.184	6	.195	3.184	y	31	94760.1...	97200	1.012	12.15	2....	H1-1b
60	M42	PL 6" x 1/2"	.073	3.184	12	.195	3.184	y	4	94760.1...	97200	1.012	12.15	3....	H1-1b

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

Project # 37519-1590
By AMS
Date: 04/29/19
v0.1, Effective 07/10/18

MOUNT TO TOWER CONNECTION CHECKS

REACTIONS

Px=	1.665	Kip
Py=	0.829	Kip
(Axial)Pz=	5.338	Kip
Mx=	8.983	Kip-in
My=	23.194	Kip-in
(Torque)Mz=	7.389	Kip-in

Number of Bolts	=	4	
Plate Size	b=	8	in
	d=	8	in
Edge distance for Bolts	=	1	in
Bolt group centroid y-coordinate, Yc		4	in
Bolt group centroid x-coordinate, Xc		4	in
Load eccentricity in x-direction, ex		0	in
Load eccentricity in y-direction, ey		0	in
Total Moment including load eccentricity ΣMx=		8.983	Kips-in
Total Moment including load eccentricity ΣMy=		23.194	Kips-in
Total Moment including load eccentricity ΣMz=		7.389	Kips-in

WELD CHECKS

Standoff Member Type		Square
Width	=	4 in
Depth (only for square members)	=	4 in
Weld Size	=	0.3750
Total Forces in X direction	=	0.381 kips
Total Forces in Y direction	=	0.277 kips
Total Forces in Z direction	=	1.84 kips
Resultant	=	1.90 kips
Φ*Fw (Kip/in)/16" weld	=	1.392
Capacity used		22.76%

BOLT CHECKS

Tension Reaction	4.02	kip
Shear Reaction	0.89	kip
Bolt Type	A325N	
Bolt Diameter	0.625	in
Tensile Strength	20.7	kips
Shear Strength	12.4	kips
Reduced Tensile Strength	-	kips
Tensile Capacity Used	19.4%	
Shear Capacity Used	7.2%	

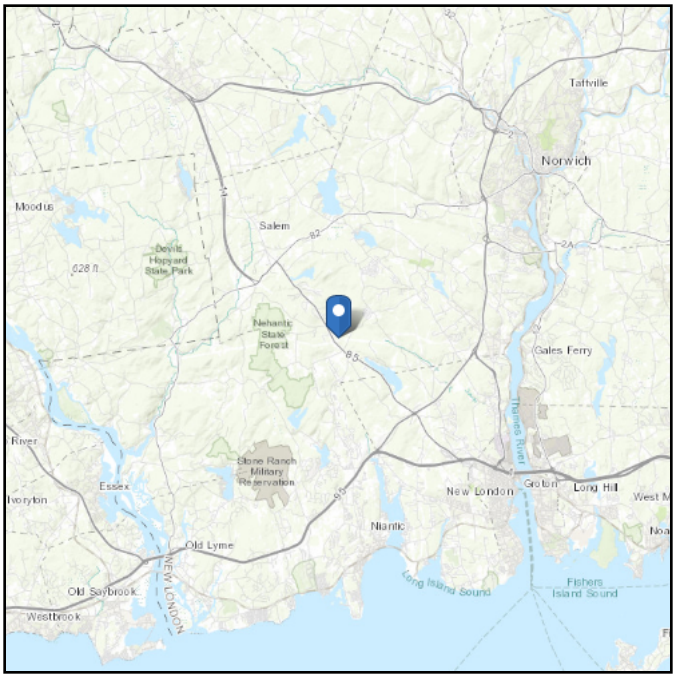
Note: Tension reduction not required if tension or shear capacity < 30%

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 256.7 ft (NAVD 88)
Latitude: 41.435461
Longitude: -72.220853



Wind

Results:

Wind Speed:	132 Vmph ← City requires a 135 mph ultimate wind speed
10-year MRI	79 Vmph
25-year MRI	89 Vmph
50-year MRI	98 Vmph
100-year MRI	107 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 Apr 29 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.

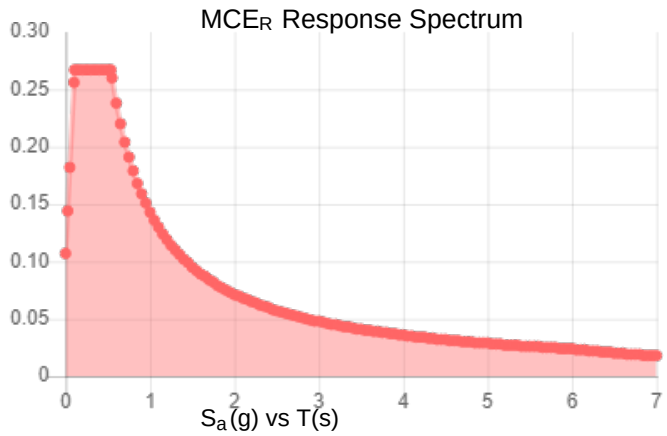
Seismic

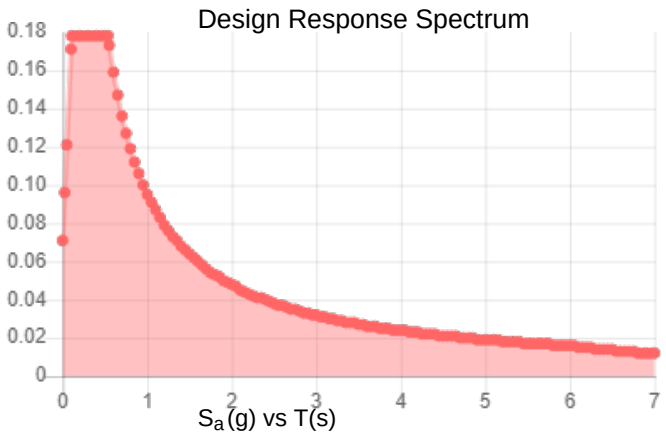
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.167	S_{DS} :	0.178
S_1 :	0.06	S_{D1} :	0.095
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.084
S_{MS} :	0.267	PGA_M :	0.134
S_{M1} :	0.143	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Mon Apr 29 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 Apr 29 2019

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

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

Exhibit F

Power Density/RF Emissions Report

Transcom Engineering, Inc.

Wireless Network Design and Deployment

Radio Frequency Emissions Analysis Report

T-MOBILE Existing Facility

Site ID: CTNH032H

Crown Castle Oakdale
41 Beckwith Road
Oakdale, CT 06370

June 27, 2019

Transcom Engineering Project Number: 737001-0023

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**6.64 %**

June 27, 2019

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

Emissions Analysis for Site: **CTNH032H – Crown Castle Oakdale**

Transcom Engineering, Inc ("Transcom") was directed to analyze the proposed upgrades to the T-MOBILE facility located at **41 Beckwith Road, Oakdale, 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 **41 Beckwith Road, Oakdale, 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
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	RFS APX16DWV-16DWV-S-E-ACU	175
A	2	RFS APXVAARR18_43-C-NA20	175
B	1	RFS APX16DWV-16DWV-S-E-ACU	175
B	2	RFS APXVAARR18_43-C-NA20	175
C	1	RFS APX16DWV-16DWV-S-E-ACU	175
C	2	RFS APXVAARR18_43-C-NA20	175

Table 2: Antenna Data

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

RESULTS

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

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	RFS APX16DWV-16DWV-S-E-ACU	1900 MHz (PCS) / 2100 MHz (AWS)	15.9 / 15.9	3	160	6,224.72	0.79
Antenna A2	RFS APXVAARR18_43-C-NA20	600 MHz / 700 MHz	12.95 / 13.55	4	120	2,447.88	0.72
						Sector A Composite MPE%	**1.51**
Antenna B1	RFS APX16DWV-16DWV-S-E-ACU	1900 MHz (PCS) / 2100 MHz (AWS)	15.9 / 15.9	3	160	6,224.72	0.79
Antenna B2	RFS APXVAARR18_43-C-NA20	600 MHz / 700 MHz	12.95 / 13.55	4	120	2,447.88	0.72
						Sector B Composite MPE%	**1.51**
Antenna C1	RFS APX16DWV-16DWV-S-E-ACU	1900 MHz (PCS) / 2100 MHz (AWS)	15.9 / 15.9	3	160	6,224.72	0.79
Antenna C2	RFS APXVAARR18_43-C-NA20	600 MHz / 700 MHz	12.95 / 13.55	4	120	2,447.88	0.72
						Sector C Composite MPE%	**1.51**

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	**1.51 %**
Verizon Wireless	3.24 %
Sprint	1.89 %
Site Total MPE %:	**6.64 %**

Table 4: All Carrier MPE Contributions

T-MOBILE Sector A Total:	1.51 %
T-MOBILE Sector B Total:	1.51 %
T-MOBILE Sector C Total:	1.51 %
Site Total:	6.64 %

Table 5: Site MPE Summary

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

T-MOBILE _ Frequency Band / Technology Max Power Values (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile 1900 MHz (PCS) UMTS	1	1,556.18	175	1.96	1900 MHz (PCS)	1000	0.20%
T-Mobile 2100 MHz (AWS) LTE	2	2,334.27	175	5.88	2100 MHz (AWS)	1000	0.59%
T-Mobile 600 MHz LTE / 5G NR	2	771.01	175	1.94	600 MHz	400	0.48%
T-Mobile 700 MHz LTE	2	452.93	175	1.14	700 MHz	467	0.24%
						Total:	**1.51%**

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:	1.51 %
Sector B:	1.51 %
Sector C:	1.51 %
T-MOBILE Maximum Total (per sector):	1.51 %
Site Total:	6.64 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **6.64 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

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