CROWN CASTLE

1 Cityplace Dr, Suite 490

Creve Coeur, MO 63141

Phone: (314) 513-0147

www.crowncastle.com

April 29, 2021

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

RE: **Notice of Exempt Modification for T-Mobile**
Crown Site ID# 876369; T-Mobile Site ID# CTNH558A
64 Hungerford Lane Harwinton, CT 06791
Latitude: 41.75726000/ Longitude: -73.05260000

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 180-foot mount on the existing 178-foot Monopole Tower located at 64 Hungerford Lane in Harwinton. The property is owned by Red Wolf Broadcasting Corporation and the Tower by Crown Castle. T-Mobile now intends to replace six (6) existing antennas and add three (3) antennas. This modification/proposal includes hardware that is both 4G(LTE) and 5G capable through remote software configuration and either or both services may be turned on or off at various times.

Planned Modifications:
Tower:

Remove and Replace:
(3) RFS – APXVTM14-C-120 Antennas **(REMOVE) –** (3) RFS-APX16DWV-16-DWV-S-E-A20 Antennas **(REPLACE)**

(3) RFS – APXVSPP18C-A20 Antennas **(REMOVE) -** (3) RFS APXVAALL24_43-U-NA20 Antennas **(REPLACE)**

(3) Sprint RRUs Radios **(REMOVE)** – (3) Ericsson 4449 B71+B85 Radios **(REPLACE)**

(3) Sprint RRUs Radios **(REMOVE)** – (3) Ericsson 4415 B66A Radios **(REPLACE)**

(1) Sprint Antenna Platform **(REMOVE)** – (1) T-Mobile Antenna Platform **(REPLACE)**

(3) Hybrid Cables (1 5/8”) **(REMOVE)** – (3) Hybrid Cables (1 5/8”) **(REPLACE)**

Install New:
(3) Ericsson-AIR6449 B41 Antennas
(3) Ericsson 4424 B25 Radios

(1) Hybrid Cables (1 5/8")

Remove:
(9) Sprint TMAs
(1) RRH Mount

Ground:

Remove and Replace:
(1) MMBS Cabinet **(REMOVE)** – (1) 6160 Equipment Cabinet **(REPLACE)**
(1) BBU Cabinet **(REMOVE)** – (1) B160 Battery Cabinet **(REPLACE)**

Install New:
(1) PSU 4813 Booster in 6160 Cabinet
(3) BB6630 in 6160 Cabinet
(1) BB6648 in 6160 Cabinet
(1) IXRE Router in 6160 Cabinet

The facility was approved by the Town of Harwinton Building Official by way of a Building Permit on May 29th, 2001.

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 Michael R. Criss, First Selectman of the Town of Harwinton, Jeffrey Neumann, Building Official for the Town of Harwinton and Polly Redmond, Land Use Coordinator for the Town of Harwinton. A copy will also be sent to the property owner.

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

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

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

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

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

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

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For the foregoing reasons, T-Mobile respectfully submits that the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. §16-50j-72(b)(2).

Sincerely,

Colin Robinson

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

cc:

Michael R. Criss, First Selectman *(via email only to mcriss@harwinton.us)*
Town of Harwinton
100 Bentley Drive
Harwinton CT, 06791
(860) 485-9051

Jeffrey Neumann, Building Official *(via email only to building@harwinton.us)* and
Polly Redmond, Land Use Coordinator *(via email only to landuse@harwinton.us)*
Town of Harwinton
100 Bentley Drive
Harwinton CT, 06791
(860) 485-2784

Red Wolf Broadcasting Corporation *(via FedEx)*
758 Colonel Ledyard Highway
Ledyard, CT 06339
(860) 464-1065

Colin Robinson

From: Colin Robinson
Sent: Thursday, April 29, 2021 3:07 PM
To: mcriss@harwinton.us
Cc: Colin Robinson
Subject: CSC Exempt Modification Application 64 Hungerford Ln Harwinton CT 876369
Attachments: CSC Exempt Modification Application 64 Hungerford Ln Harwinton CT 876369 04292021.pdf

Good Afternoon First Selectman Criss,

Please see the attached application to the Connecticut Siting Council regarding antenna work on the existing cell tower located at 64 Hungerford Ln Harwinton, CT.

Should you have any questions/comments/concerns regarding this application, please do not hesitate to contact me.

Thank you,

Colin

Colin Robinson
Project Manager
NETWORK BUILDING + CONSULTING
100 Apollo Drive | Suite 303 | Chelmsford, MA | 01824
M 360.561.3311

Colin Robinson

From: Colin Robinson
Sent: Thursday, April 29, 2021 3:06 PM
To: building@harwinton.us
Cc: Colin Robinson
Subject: CSC Exempt Modification Application 64 Hungerford Ln Harwinton CT 876369
Attachments: CSC Exempt Modification Application 64 Hungerford Ln Harwinton CT 876369 04292021.pdf

Good Afternoon Mr. Neumann,

Please see the attached application to the Connecticut Siting Council regarding antenna work on the existing cell tower located at 64 Hungerford Ln Harwinton, CT.

Should you have any questions/comments/concerns regarding this application, please do not hesitate to contact me.

Thank you,

Colin

Colin Robinson
Project Manager
NETWORK BUILDING + CONSULTING
100 Apollo Drive | Suite 303 | Chelmsford, MA | 01824
M 360.561.3311

Colin Robinson

From: Colin Robinson
Sent: Thursday, April 29, 2021 3:06 PM
To: landuse@harwinton.us
Cc: Colin Robinson
Subject: CSC Exempt Modification Application 64 Hungerford Ln Harwinton CT 876369
Attachments: CSC Exempt Modification Application 64 Hungerford Ln Harwinton CT 876369 04292021.pdf

Good Afternoon Ms. Redmond,

Please see the attached application to the Connecticut Siting Council regarding antenna work on the existing cell tower located at 64 Hungerford Ln Harwinton, CT.

Should you have any questions/comments/concerns regarding this application, please do not hesitate to contact me.

Thank you,

Colin

Colin Robinson
Project Manager
NETWORK BUILDING + CONSULTING
100 Apollo Drive | Suite 303 | Chelmsford, MA | 01824
M 360.561.3311

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.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

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.

Exhibit A

Original Facility Approval

Building Permit

09

TOWN OF HARWINTON

MINIMUM FEE: $.

DATE: 5/29/01

TYPE OF INSTALLATION

ELECTRICAL SERVICE-NEW OR CHANGE		WATER HEATER	
ELECTRICAL INSTALLATION		ROOFING	
ELECTRICAL-SWIMMING POOL		RE-ROOFING:	
PLUMBING INSTALLATION		HOW MANY LAYERS?	
HEATING INSTALLATION		SIDING	
AIR CONDITIONING		OTHER	
OIL BURNER-GAS BURNER			
WOODBURNING STOVE			
CHIMNEY INSTALLATION		Steve Flynn 485-	

NAME OF CONTRACTOR Baron Wireless Corporation

ADDRESS OF CONTRACTOR 24 Corporate Circle Albany NY 12203

LICENSE # 007-00-019 EXPIRATION DATE _____ TELE. # 518-456-8114

REQUEST PERMISSION TO PERFORM _____

AT: LOT # 21A-21-B STREET ADDRESS Hungerford Lane

ESTIMATED COST $272,000.00

REMARKS: _____

OWNER Tower owner: Sprint Spectrum LP

ADDRESS One International Blvd. 3rd Floor Mahwah NJ 07495

VALUATION OF WORK $272,000.00

FEE $4 per $1000.00

PERMIT # 4587

Frank Kyfak 4

BUILDING OFFICIAL

PAID DATE 5-29-01

10-15-2001

BUILDING INSPECTION DIVISION HARWINTON, CONN.

CERTIFICATE OF OCCUPANCY

Sprint Spectrum L P

This is to certify that the ~~new house~~ at Tele Communication Tower Lot as constructed under Permit No conforms substantially to the requirements of the State Building Code and is hereby approved for occupancy as indicated below. At the date and time this Certificate is issued the house is owned by

Approved for occupancy: Sprint Spectrum L.P

Towers ok

Basement

•

First Floor

•

Second Floor

•

Use Group:
Type of Construction:

Frank Kyle

This certificate is VOID unless signed by the Building Official

Exhibit B

Property Card

qPublic.net™ Town of Harwinton, CT

Summary

ParcelId	341
Account Number	595
Location Address	64 HUNGERFORD LA
Map-Block-Lot	D5 /02 /0032
Use Class/Description	2-1 COMM LAND
Assessing Neighborhood	0001A
Census Tract	2984
Acreage	40.28
Utilities	

Owner

RED WOLF BROADCASTING CORPORATION
758 COLONEL LEDYARD HIGHWAY
LEDYARD, CT 06339

Current Appraised Value

		2019	2018	2017
+	Building Value	$76,360	$76,360	$35,280
+	XF Value	$0	$0	$0
+	OB Value	$2,950	$2,950	$3,950
+	Land Value	$3,139,960	$3,139,960	$367,850
+	Special Land Value			
+	Total Appraised Value	$3,219,270	$3,219,270	$407,080
+	Net Appraised Value	$3,219,270	$3,219,270	$407,080
+	Current Assessment	$293,590	$293,590	$284,960

Assessment History

		2018	2017	2016	2015
+	Building Value	$53,450	$24,700	$24,700	$24,700
+	OB/Misc	$2,060	$2,760	$2,760	$2,760
+	Land	$238,080	$257,500	$257,500	$257,500
+	Total Assessment	$293,590	$284,960	$284,960	$284,960

Land

Use	Class	Zoning	Area	Value
2-1 COMM LAND	C	CR2	1 AC	$74,330
5-2V EX COMM V	C		10.97 AC	$78,980
3-1 IND LAND	I		1 BL	$180,000
6-2 FOREST LD	R		28.31 AC	$2,806,650

Commercial Building

Building #	1
Style	Office Bldg
Actual Year Built	1964
Effective Year Built	1965
Gross Area	1230
Stories	1
Grade	Below Average
Exterior Wall	Brick/Masonry
Interior Wall	Drywall/Sheet
Wall Height	8
Units	1
Roof Cover	Asph/F Gls/Cmp
Roof Structure	Gable/Hip
Floor Type	Quarry Tile
Heat Type	Oil
Heat Fuel	Forced Air-Duc
AC Type	HEAT/AC PKGS
Sprinkler	03

Construction	MASONRY
Plumbing	AVERAGE
Comm Walls	0

Building Sub Areas

Code	Description	Living Area	Gross Area	Effective Area
BAS		1200	1200	1200
FEP	Enclosed Porch	0	30	20
	Totals	1200	1230	1220

Out Buildings\Extra Features

Description	Sub Description	Area	Year Built	Value
SHED FRAME AVE		360S.F.	2004	$2,790
PATIO GOOD		36S.F.	2000	$160

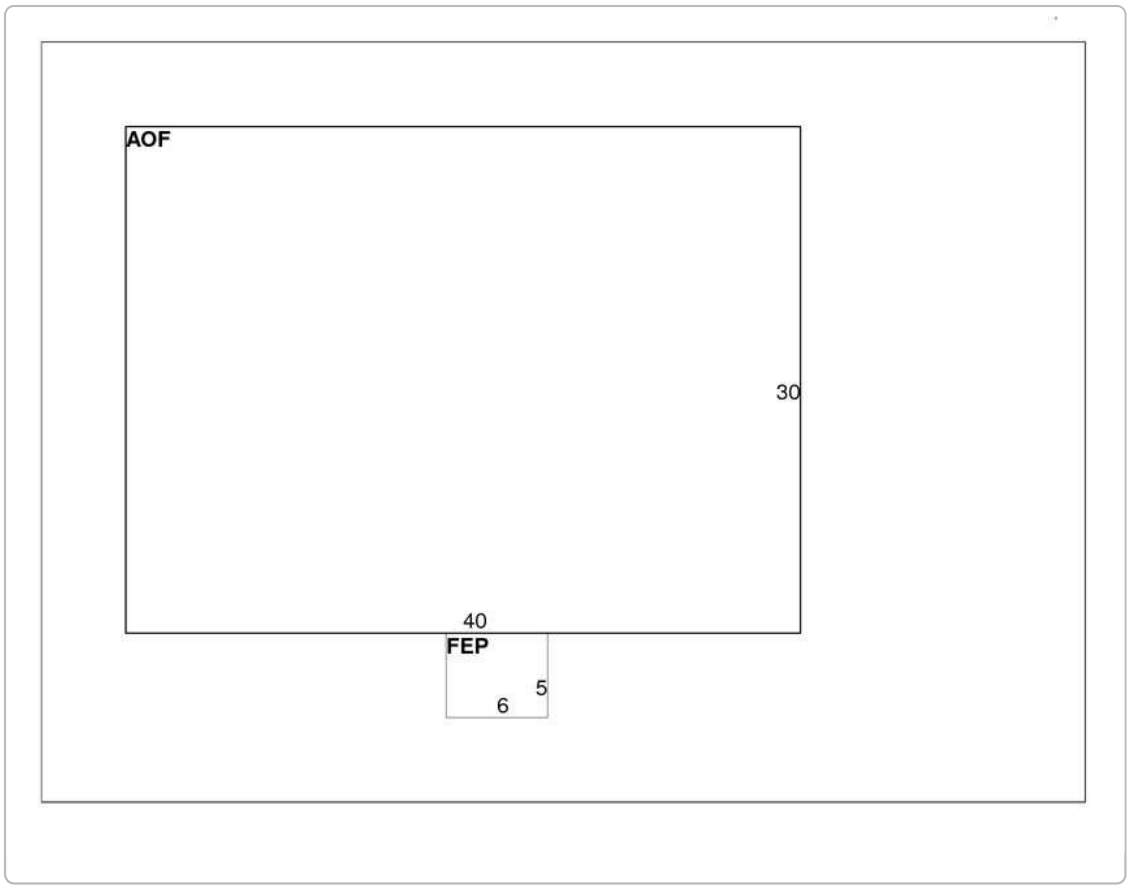
Sales History

Sales Date	Type of Document	Grantee	Vacant/Improved	Book/Page	Amount
04-04-2018		RED WOLF BROADCASTING CORPORATION	Improved	0256/0776	$407,080
07-09-2014		CONNOISSEUR MEDIA OF CONNECTICUT LLC	Improved	0243/1029	$407,080
07-23-1997		BUCKLEY BROADCASTING CORP OF CT	Improved	0145/0372	$0
01-09-1997		USA	Improved	0145/0216	$0
07-24-1985		CONSUMER SERVICE RADIO INC	Improved	0101/0665	$0

Permit Information

Permit ID	Issue Date	Type	Description	Amount	Inspection Date	% Complete	Date Complete	Comments
17126B	09-11-2017		3 ANTENNAS	$20,000		100		
	11-30-2015		CERTIFCATE OF APPROV	$0		0		
9417	10-24-2014		MODIFICATIONS	$20,000		0		
8721	11-29-2012		CELL TOWER MODIFICAT	$25,000		0		
8703	11-21-2012		ANTENNAS	$12,000		0		
8619	10-02-2012		REPLACE 6 ANTENNAS O	$10,000		0		
CO	04-17-2006		CO ISSUED	$0		0		
6239	01-17-2006			$50,000		0		PREFAB CONCRETE SHELTER

Sketch



Photos

No data available for the following modules: Building Data.

Last Data Upload: 4/26/2021, 8:21:54 PM

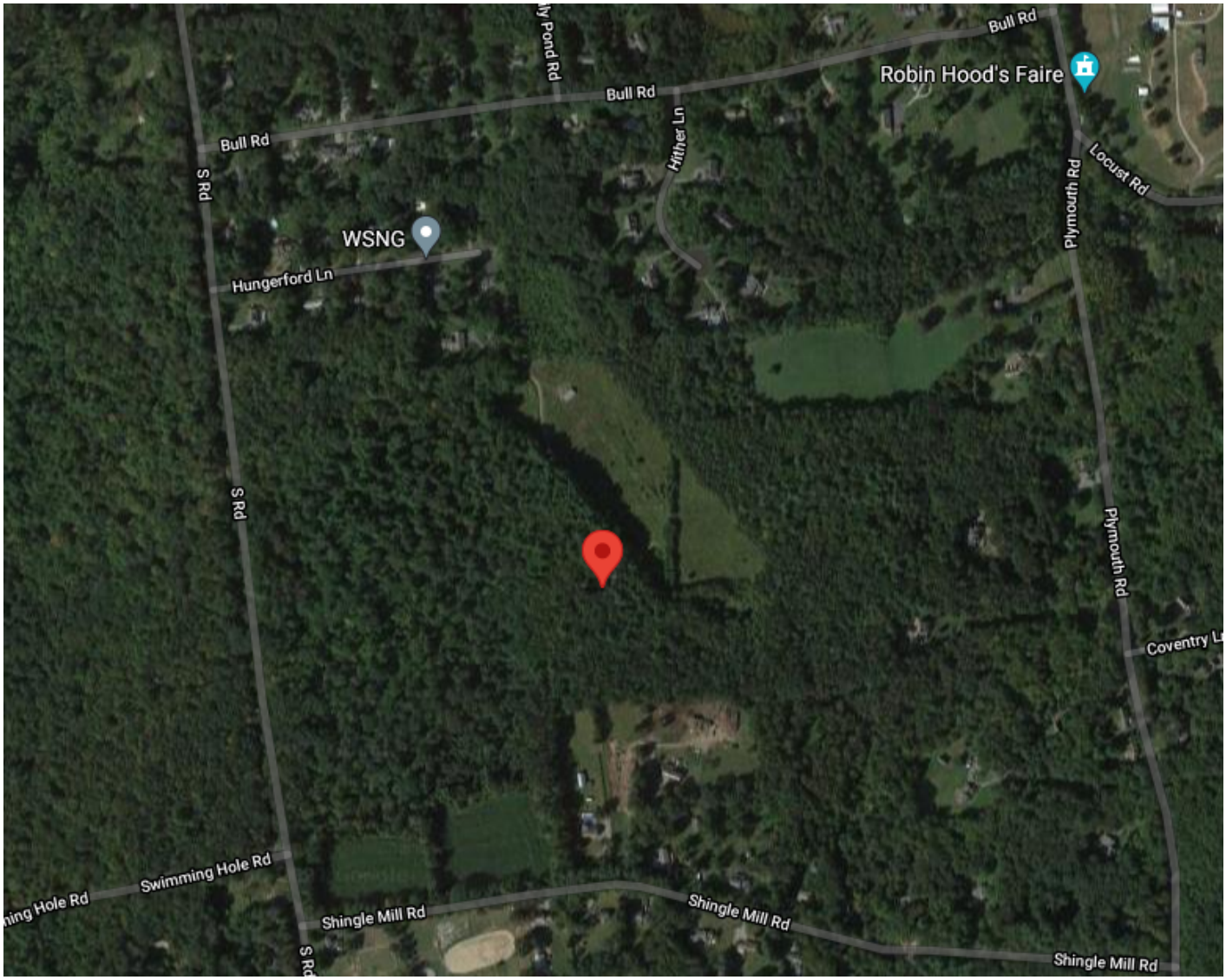

Bull Rd
Bull Rd
Bull Rd
Robin Hood's Faire
Hither Ln
Locust Rd
Plymouth Rd
WSNG
Hungerford Ln
S Rd
S Rd
Plymouth Rd
Swimming Hole Rd
Shingle Mill Rd
Shingle Mill Rd
Shingle Mill Rd

Exhibit C

Construction Drawings

T-Mobile

T-MOBILE SITE NUMBER: CTNH558A
T-MOBILE SITE NAME: CTNH558A
SITE TYPE: MONOPOLE
TOWER HEIGHT: 178'-0"

BUSINESS UNIT #: 876369
SITE ADDRESS: 64 HUNGERFORD LANE HARWINTON, CT 06791
COUNTY: LITCHFIELD
JURISDICTION: TOWN OF HARWINTON

T-MOBILE SPRINT RETAIN SITE CONFIGURATION: 67D5998C_1xAIR+1QP (GSM ONLY)

SITE INFORMATION

CROWN CASTLE USA INC. SITE NAME:	HARWINTON / BUCKLEY BROADCASTI
SITE ADDRESS:	64 HUNGERFORD LANE HARWINTON, CT 06791
COUNTY:	LITCHFIELD
MAP/PARCEL #:	D5/02/0032
AREA OF CONSTRUCTION:	EXISTING
LATITUDE:	41.75726000° (41° 45' 26.15")
LONGITUDE:	-73.05260000° (-73° 3' 9.20")
LAT/LONG TYPE:	NAD83
GROUND ELEVATION:	857.0 FT
CURRENT ZONING:	2-1 COMM LAND
JURISDICTION:	TOWN OF HARWINTON
OCCUPANCY CLASSIFICATION:	U
TYPE OF CONSTRUCTION:	IIB
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION
PROPERTY OWNER:	CROWN CASTEL USA 2000 CORPORATE DRIVE CANONSBURG, PA
TOWER OWNER:	CROWN CASTLE 2000 CORPORATE DRIVE CANONSBURG, PA 15317
CARRIER/APPLICANT:	T-MOBILE 35 GRIFFIN ROAD BLOOMFIELD, CT 06002
ELECTRIC PROVIDER:	CONNECTICUT LIGHT AND POWER (800) 286-2000
TELCO PROVIDER:	TBD --

PROJECT TEAM

A&E FIRM:	INFINIGY 1033 WATERVLIET SHAKER RD. ALBANY, NY 12205
CROWN CASTLE USA INC. DISTRICT CONTACTS:	1500 CORPORATE DRIVE CANONSBURG, PA 15317
	TRICIA PELON - PROJECT MANAGER (518) 373-3507
	JASON D'AMICO - CONSTRUCTION MANAGER (860) 209-0104

DRAWING INDEX

SHEET #	SHEET DESCRIPTION
T-1	TITLE SHEET
T-2	GENERAL NOTES
C-1	SITE PLAN & ENLARGED SITE PLAN
C-2	FINAL ELEVATION & ANTENNA PLANS
C-3	ANTENNA & CABLE SCHEDULE
C-4	PLUMBING DIAGRAM
C-5	EQUIPMENT SPECS
C-6	EQUIPMENT SPECS
E-1	AC PANEL SCHEDULES & ONE LINE DIAGRAM
G-1	ANTENNA GROUNDING DIAGRAM
G-2	GROUNDING DETAILS

ALL DRAWINGS CONTAINED HEREIN ARE FORMATTED FOR ANSI-D. 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.

PROJECT DESCRIPTION

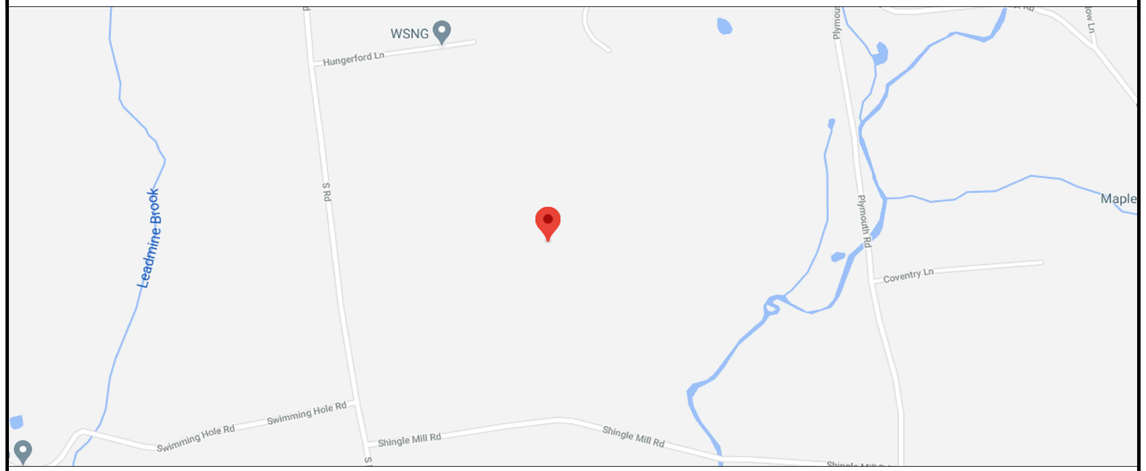
THE PURPOSE OF THIS PROJECT IS TO ENHANCE BROADBAND CONNECTIVITY AND CAPACITY TO THE EXISTING ELIGIBLE WIRELESS FACILITY.

TOWER SCOPE OF WORK:
- REMOVE (6) ANTENNAS
- REMOVE (9) TMAS
- REMOVE (6) RRHs
- REMOVE (1) RRH MOUNT
- REMOVE (3) HYBRID CABLES
- INSTALL (9) ANTENNAS
- INSTALL (9) RRHs
- INSTALL (4) HYBRID CABLES
- REMOVE (1) PLATFORM
- INSTALL (1) PLATFORM

GROUND SCOPE OF WORK:
- REMOVE (1) MMBS EQUIPMENT CABINET
- REMOVE (1) BBU EQUIPMENT CABINET
- INSTALL (1) 6160 & (1) B160 BATTERY CABINETS
- INSTALL (1) PSU4813 BOOSTER IN (P) CABINET
- INSTALL (3) BB6630 IN (P) CABINET
- INSTALL (1) BB6648 IN (P) CABINET
- INSTALL (1) IXRE ROUTER IN (P) CABINET

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

LOCATION MAP



NO SCALE

APPLICABLE CODES/REFERENCE DOCUMENTS

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

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

REFERENCE DOCUMENTS:

STRUCTURAL ANALYSIS: DATED:	BY OTHERS
MOUNT ANALYSIS: DATED:	GPD ENGINEERING 03/11/2021
RFDS REVISION: DATED:	1 01/15/2021
ORDER ID: REVISION:	538773 0

CALL CONNECTICUT ONE CALL (800) 922-4455 CBYD.COM CALL 2 WORKING DAYS BEFORE YOU DIG!

APPROVALS

APPROVAL	SIGNATURE	DATE
PROPERTY OWNER OR REP.		
LAND USE PLANNER		
T-MOBILE		
OPERATIONS		
RF		
NETWORK		
BACKHAUL		
CONSTRUCTION MANAGER		

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

T-Mobile
35 GRIFFIN ROAD
BLOOMFIELD, CT 06002

CROWN CASTLE
1500 CORPORATE DRIVE
CANONSBURG, PA 15317

INFINIGY
FROM ZERO TO INFINIGY
the solutions are endless
1033 Watervliet Shaker Rd | Albany, NY 12205
Phone: 518-690-0790 | Fax: 518-690-0793
www.infinigy.com

T-MOBILE SITE NUMBER:
CTNH558A

BU #: **876369**
HARWINTON / BUCKLEY BROADCASTI

64 HUNGERFORD LANE
HARWINTON, CT 06791

EXISTING 178'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	03/23/2021	RCD	PRELIMINARY	SS
0	04/22/2021	BMM	FINAL	SS

STATE OF CONNECTICUT
SHUHEI SAKAMOTO
34916
LICENSED PROFESSIONAL ENGINEER
4/22/21

SHEET NUMBER: T-1
REVISION: 0

CROWN CASTLE USA INC. SITE ACTIVITY REQUIREMENTS:

1. NOTICE TO PROCEED– NO WORK SHALL COMMENCE PRIOR TO CROWN CASTLE USA INC. WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE CROWN CASTLE USA INC. NOC AT 800–788–7011 & THE CROWN CASTLE USA INC. CONSTRUCTION MANAGER.
2. "LOOK UP" – CROWN CASTLE USA INC. SAFETY CLIMB REQUIREMENT:
   THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR CROWN CASTLE USA INC. POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.
3. PRIOR TO THE START OF CONSTRUCTION, ALL REQUIRED JURISDICTIONAL PERMITS SHALL BE OBTAINED. THIS INCLUDES, BUT IS NOT LIMITED TO, BUILDING, ELECTRICAL, MECHANICAL, FIRE, FLOOD ZONE, ENVIRONMENTAL, AND ZONING. AFTER ONSITE ACTIVITIES AND CONSTRUCTION ARE COMPLETED, ALL REQUIRED PERMITS SHALL BE SATISFIED AND CLOSED OUT ACCORDING TO LOCAL JURISDICTIONAL REQUIREMENTS.
4. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN, AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) AND CROWN CASTLE USA INC. STANDARD CED–STD–10253, INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION, TO CERTIFY THE SUPPORTING STRUCTURE(S) IN ACCORDANCE WITH ANSI/TIA–322 (LATEST EDITION).
5. ALL SITE WORK TO COMPLY WITH QAS–STD–10068 "INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON CROWN CASTLE USA INC. TOWER SITE," CED–STD–10294 "STANDARD FOR INSTALLATION OF MOUNTS AND APPURTENANCES," AND LATEST VERSION OF ANSI/TIA–1019–A–2012 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS."
6. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY CROWN CASTLE USA INC. PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
9. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
10. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION E) CONSTRUCTION SAFETY PROCEDURES.
11. ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND PROJECT SPECIFICATIONS, LATEST APPROVED REVISION.
12. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH AT THE COMPLETION OF THE WORK. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
13. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, TOWER OWNER, CROWN CASTLE USA INC., AND/OR LOCAL UTILITIES.
14. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE REQUIRED BY LOCAL JURISDICTION AND SIGNAGE REQUIRED ON INDIVIDUAL PIECES OF EQUIPMENT, ROOMS, AND SHELTERS.
15. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.
16. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
17. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE CONSTRUCTION DRAWINGS AND/OR PROJECT SPECIFICATIONS.
18. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
19. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
20. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
21. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.
22. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

GENERAL NOTES:

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

CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:

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

GREENFIELD GROUNDING NOTES:

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

ELECTRICAL INSTALLATION NOTES:

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

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

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

APWA UNIFORM COLOR CODE:

WHITE	PROPOSED EXCAVATION
PINK	TEMPORARY SURVEY MARKINGS
RED	ELECTRIC POWER LINES, CABLES, CONDUIT, AND LIGHTING CABLES
YELLOW	GAS, OIL, STEAM, PETROLEUM, OR GASEOUS MATERIALS
ORANGE	COMMUNICATION, ALARM OR SIGNAL LINES, CABLES, OR CONDUIT AND TRAFFIC LOOPS
BLUE	POTABLE WATER
PURPLE	RECLAIMED WATER, IRRIGATION, AND SLURRY LINES
GREEN	SEWERS AND DRAIN LINES

ABBREVIATIONS:

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

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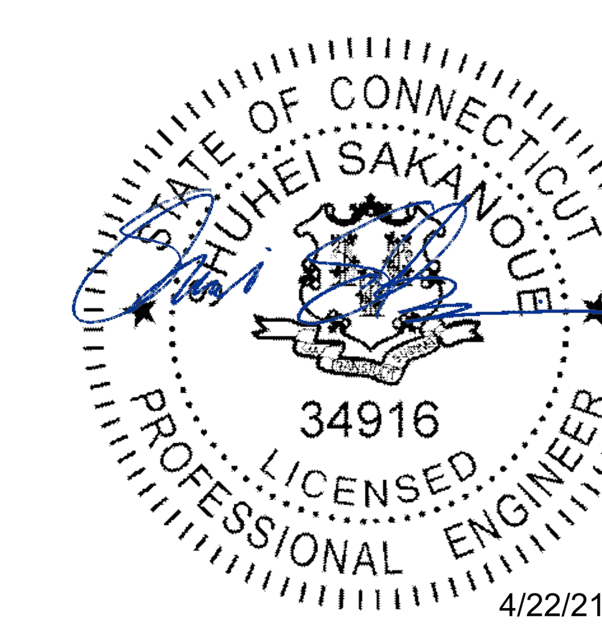
BU #: **876369**
HARWINTON / BUCKLEY BROADCASTI

64 HUNGERFORD LANE
HARWINTON, CT 06791

EXISTING 178'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	03/23/2021	RCD	PRELIMINARY	SS
0	04/22/2021	BMM	FINAL	SS

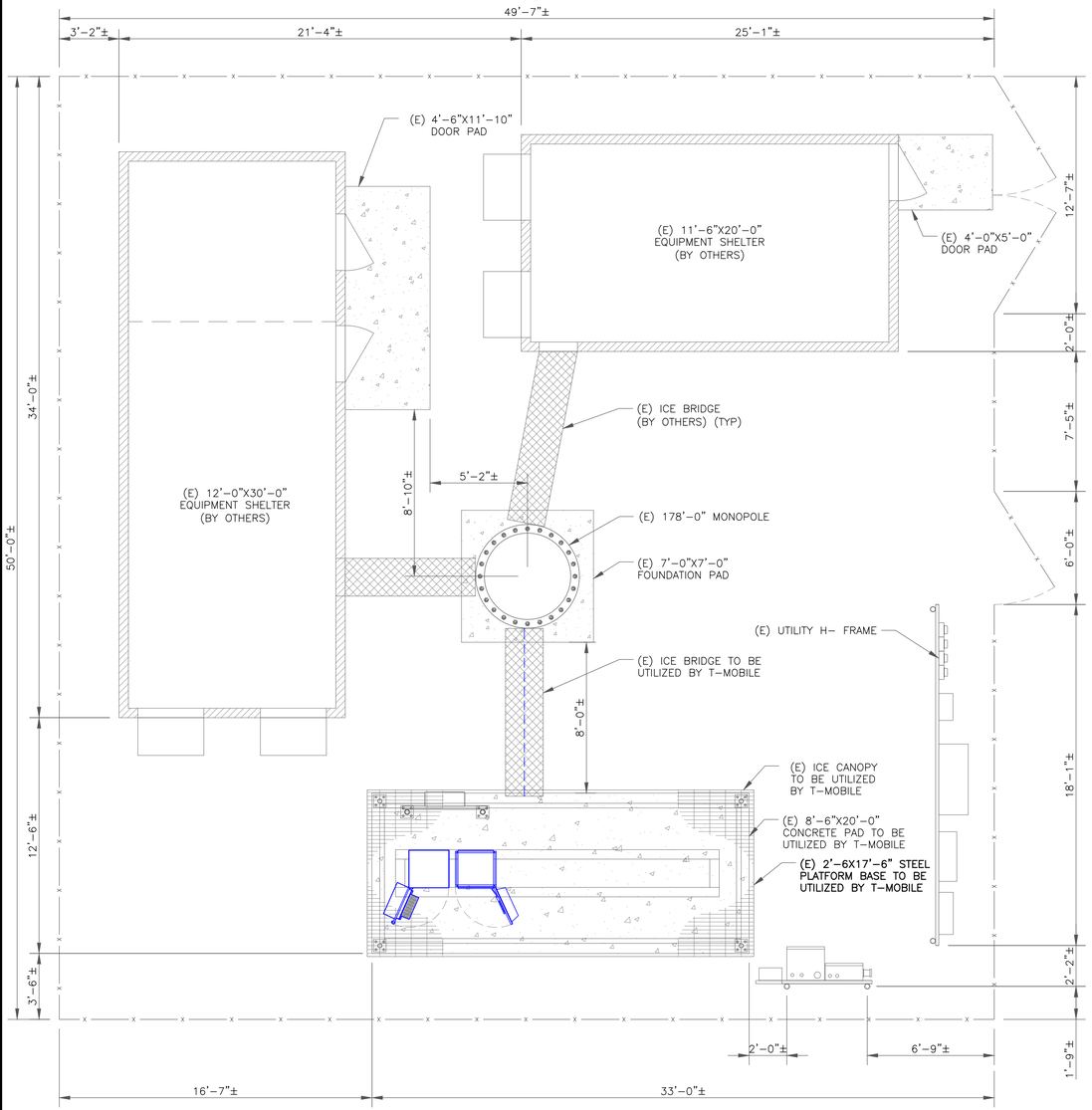


4/22/21

SHEET NUMBER: **T-2**
REVISION: **0**

NOTE:

1. PLANS BASED ON SITE PLAN PROVIDED BY TOWER OWNER AND SITE VISIT PERFORMED BY INFINIGY. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND LOCATION/ORIENTATION OF EXISTING T-MOBILE EQUIPMENT.

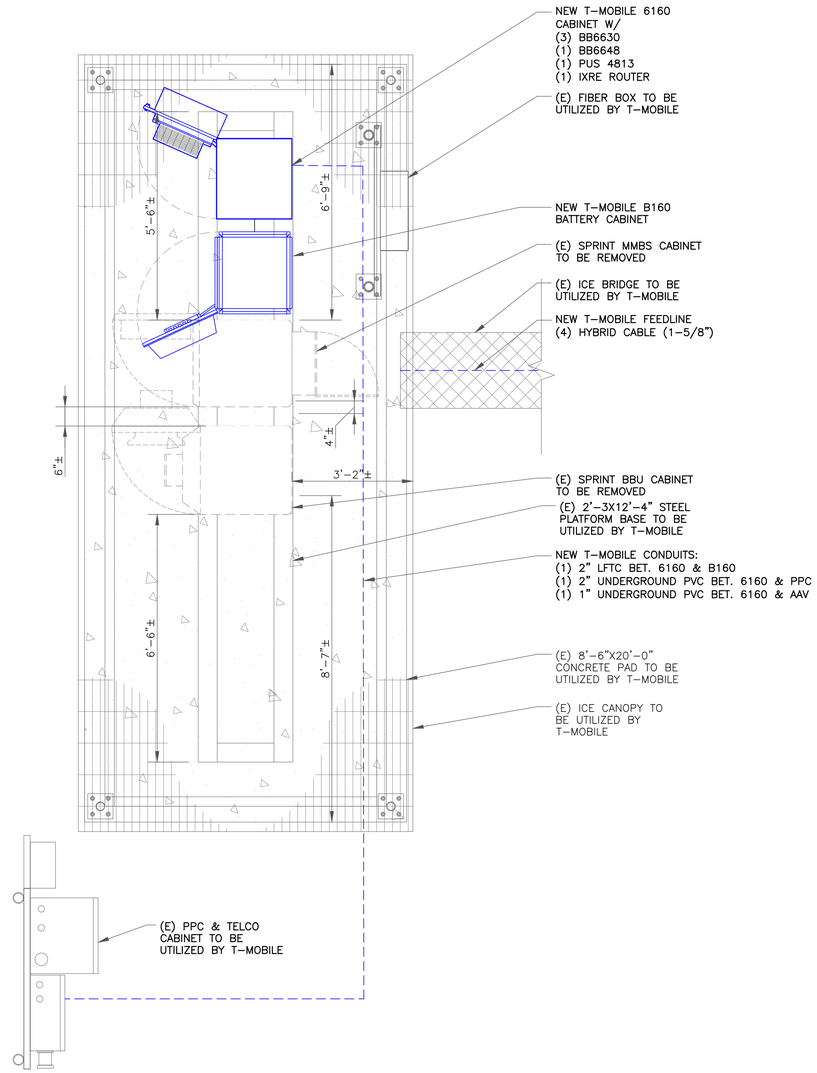


1 SITE PLAN
SCALE: 2' 1' 0 2' 1/2"=1'-0" (FULL SIZE) 1/4"=1'-0" (11x17)

N

NOTES:

THE POWER DESIGN FOR ANY AC ELECTRICAL POWER CHANGES IS TO BE PERFORMED BY OTHERS AND IS SHOWN HERE FOR REFERENCE PURPOSES ONLY. T-MOBILE IS SOLELY RESPONSIBLE FOR THE ELECTRICAL POWER DESIGN.



2 ENLARGED SITE PLAN
SCALE: 1' 6" 0 1' 1"=1'-0" (FULL SIZE) 1/2"=1'-0" (11x17)

N

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T-MOBILE SITE NUMBER:
CTNH558A

BU #: **876369**
HARWINTON / BUCKLEY BROADCASTI

64 HUNGERFORD LANE
HARWINTON, CT 06791

EXISTING 178'-0" MONOPOLE

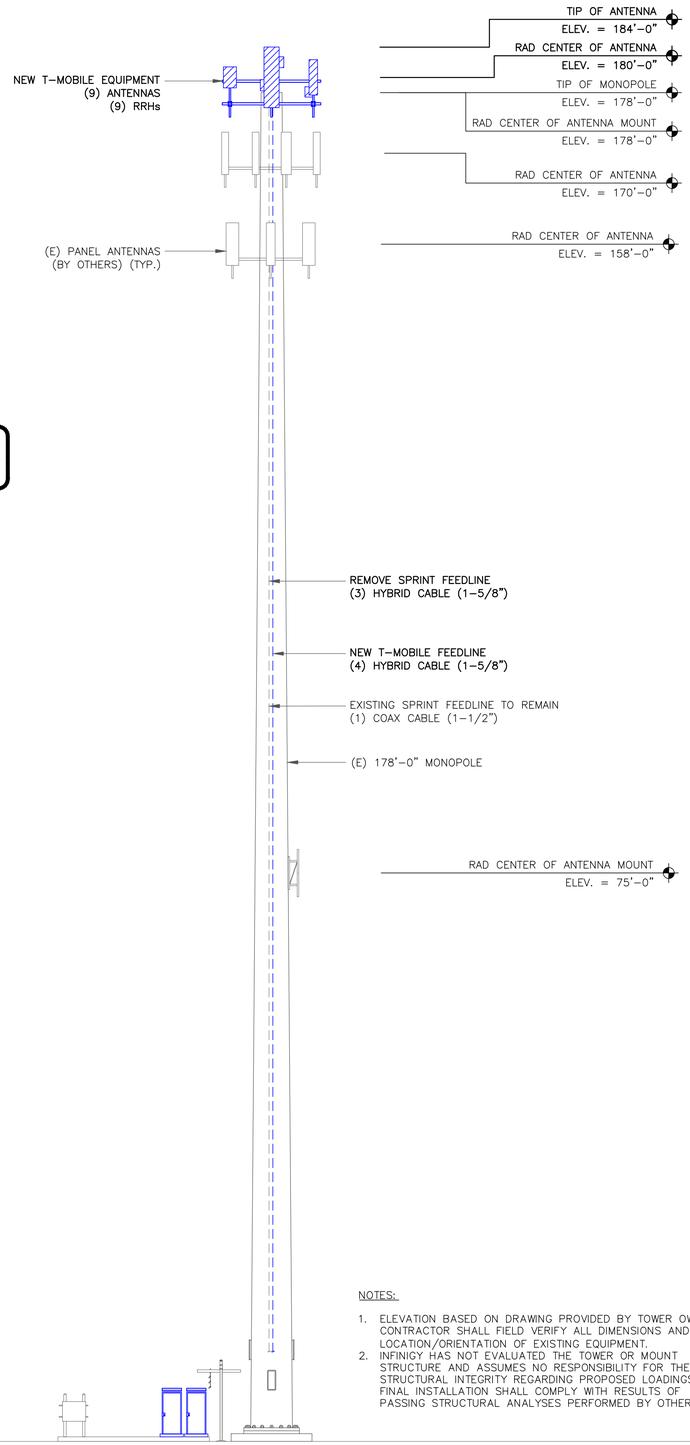
ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	03/23/2021	RCD	PRELIMINARY	SS
0	04/22/2021	BMM	FINAL	SS

STATE OF CONNECTICUT
SAYHEI SAKANOUE
34916
LICENSED PROFESSIONAL ENGINEER
4/22/21

SHEET NUMBER: C-1

REVISION: 0



T-MOBILE EQUIPMENT

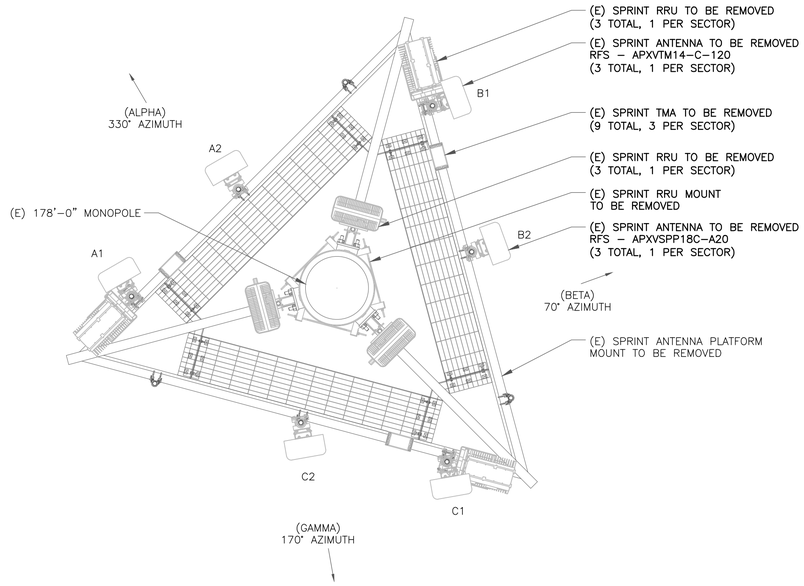
ANTENNA CL: 180'-0"
MOUNT CL: 178'-0"
ANTENNA CL: 76'-0"
MOUNT CL: 75'-0"

ANY AND ALL TOWER MOUNTED EQUIPMENT MUST NOT TRAP OR INTERFERE W/ EXISTING SAFETY CLIMB

NOTES:

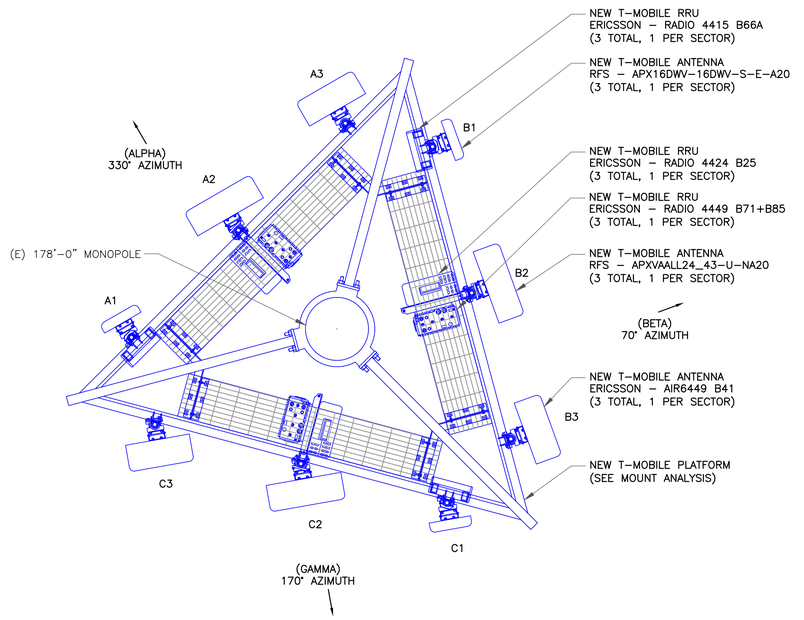
1. ELEVATION BASED ON DRAWING PROVIDED BY TOWER OWNER. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND LOCATION/ORIENTATION OF EXISTING EQUIPMENT.
2. INFINIGY HAS NOT EVALUATED THE TOWER OR MOUNT STRUCTURE AND ASSUMES NO RESPONSIBILITY FOR THEIR STRUCTURAL INTEGRITY REGARDING PROPOSED LOADINGS. FINAL INSTALLATION SHALL COMPLY WITH RESULTS OF PASSING STRUCTURAL ANALYSES PERFORMED BY OTHERS.

1 FINAL ELEVATION
SCALE: NOT TO SCALE



2 EXISTING ANTENNA LAYOUT
SCALE: NOT TO SCALE

N



3 FINAL ANTENNA LAYOUT
SCALE: NOT TO SCALE

N

NOTE:
A STRUCTURAL EVALUATION OF THE T-MOBILE ANTENNA MOUNTS HAS BEEN PERFORMED BY GPD ENGINEERING. REFER TO ANTENNA MOUNT STRUCTURAL ANALYSIS DATED TBD PRIOR TO CONSTRUCTION.

INFINIGY HAS NOT EVALUATED THE TOWER FOR THIS SITE AND ASSUMES NO RESPONSIBILITY FOR ITS STRUCTURAL INTEGRITY. CONTRACTOR TO COORDINATE LOADING WITH RF ENGINEER. REFER TO STRUCTURAL ANALYSIS PERFORMED BY OTHERS PRIOR TO CONSTRUCTION.

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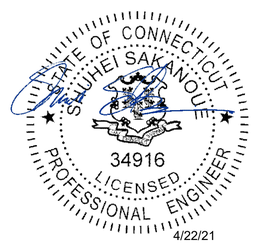


SHEET NUMBER: C-2

REVISION: 0

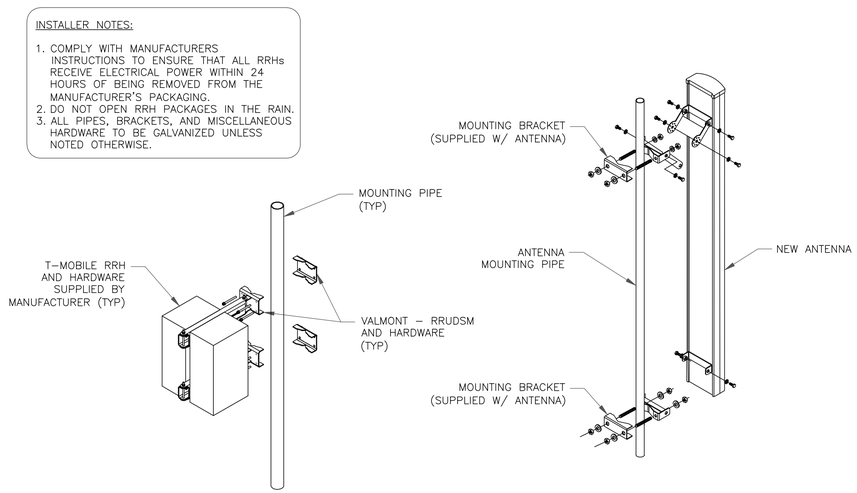
ANTENNA SCHEDULE

SECTOR	POS.	TECHNOLOGY	RAD CENTER	AZIMUTH	ANTENNA MANUFACTURER	ANTENNA MODEL	MECH. TILT	ELECT. TILT	TOWER MOUNTED EQUIPMENT	FEEDLINE TYPE
ALPHA	A1	L2100	180'-0"	330°	RFS	APX16DWV-16DWV-S-E-A20	0°	0°	(1) ERICSSON - RRUS 4415 B66A	(1) 6X24 HCS HYBRID (SHARED)
ALPHA	A2	L700, L600, N600, L1900, G1900	180'-0"	330°	RFS	APXVAALL24_43-U-NA20	0°	0°	(1) ERICSSON - RRUS 4449 B71+B85 (1) ERICSSON - RRUS 4424 B25	(2) 6X24 HCS HYBRID (SHARED)
ALPHA	A3	L2500, N2500	180'-0"	330°	ERICSSON	AIR6449 B41	0°	0°	--	(1) 6X24 HCS HYBRID (SHARED)
BETA	B1	L2100	180'-0"	70°	RFS	APX16DWV-16DWV-S-E-A20	0°	0°	(1) ERICSSON - RRUS 4415 B66A	(1) 6X24 HCS HYBRID (SHARED)
BETA	B2	L700, L600, N600, L1900, G1900	180'-0"	70°	RFS	APXVAALL24_43-U-NA20	0°	0°	(1) ERICSSON - RRUS 4449 B71+B85 (1) ERICSSON - RRUS 4424 B25	(2) 6X24 HCS HYBRID (SHARED)
BETA	B3	L2500, N2500	180'-0"	70°	ERICSSON	AIR6449 B41	0°	0°	--	(1) 6X24 HCS HYBRID (SHARED)
GAMMA	C1	L2100	180'-0"	170°	RFS	APX16DWV-16DWV-S-E-A20	0°	0°	(1) ERICSSON - RRUS 4415 B66A	(1) 6X24 HCS HYBRID (SHARED)
GAMMA	C2	L700, L600, N600, L1900, G1900	180'-0"	170°	RFS	APXVAALL24_43-U-NA20	0°	0°	(1) ERICSSON - RRUS 4449 B71+B85 (1) ERICSSON - RRUS 4424 B25	(2) 6X24 HCS HYBRID (SHARED)
GAMMA	C3	L2500, N2500	180'-0"	170°	ERICSSON	AIR6449 B41	0°	0°	--	(1) 6X24 HCS HYBRID (SHARED)

1 ANTENNA AND CABLE SCHEDULE
SCALE: NOT TO SCALE

INSTALLER NOTES:

1. COMPLY WITH MANUFACTURERS INSTRUCTIONS TO ENSURE THAT ALL RRHs RECEIVE ELECTRICAL POWER WITHIN 24 HOURS OF BEING REMOVED FROM THE MANUFACTURER'S PACKAGING.
2. DO NOT OPEN RRH PACKAGES IN THE RAIN.
3. ALL PIPES, BRACKETS, AND MISCELLANEOUS HARDWARE TO BE GALVANIZED UNLESS NOTED OTHERWISE.



2 ANTENNA WITH RRHs MOUNTING DETAIL
SCALE: NOT TO SCALE

NOTE:

1. CONTRACTOR SHALL INSTALL 3RD DUAL RRH MOUNT TO ACCOMMODATE ALL RRH BRACKETS HOLES IF NECESSARY.

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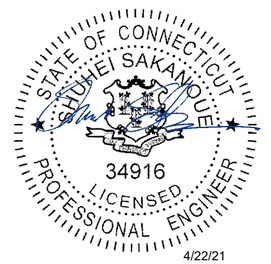
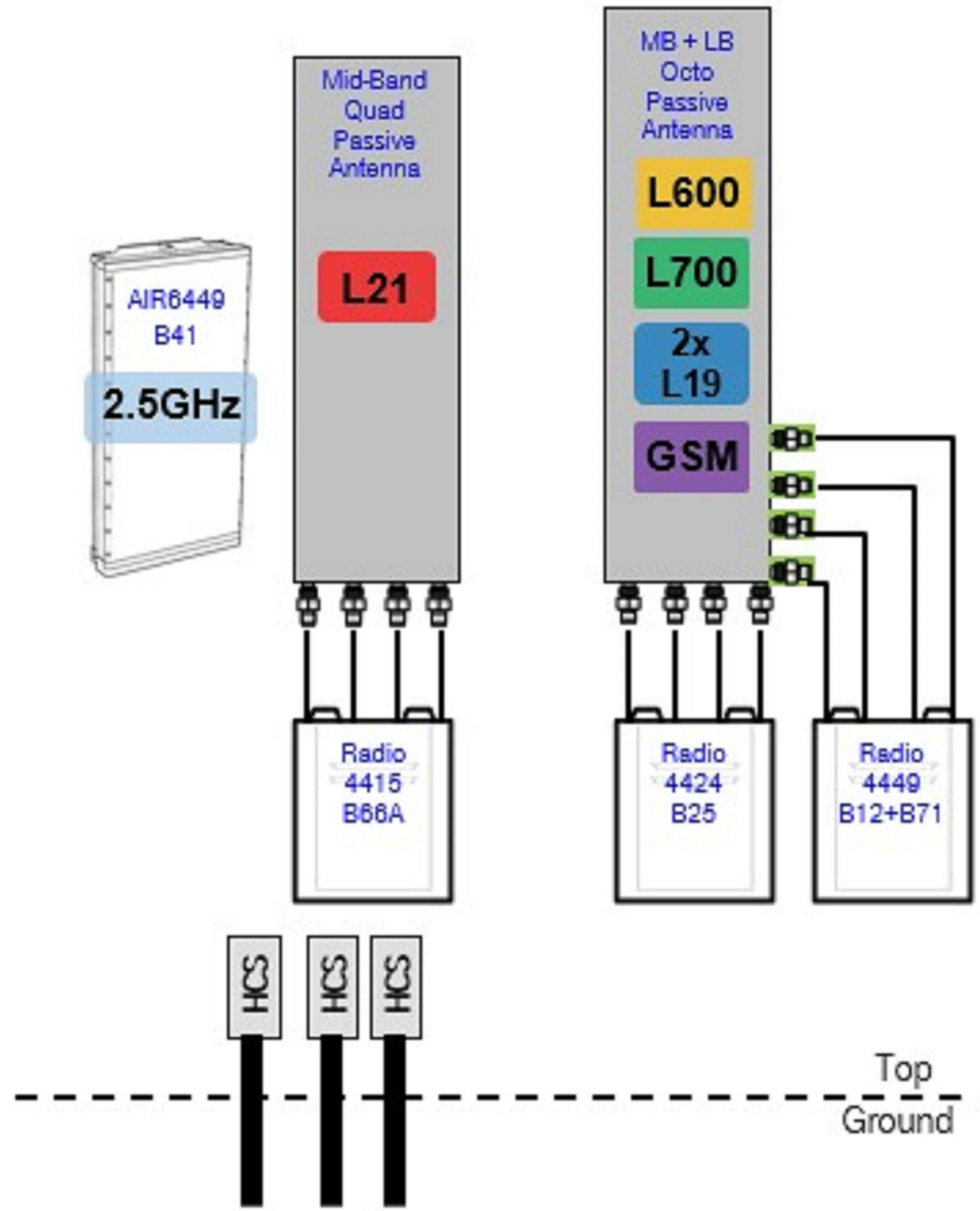


SHEET NUMBER: C-3

REVISION: 0



1 PLUMBING DIAGRAM
SCALE: NOT TO SCALE

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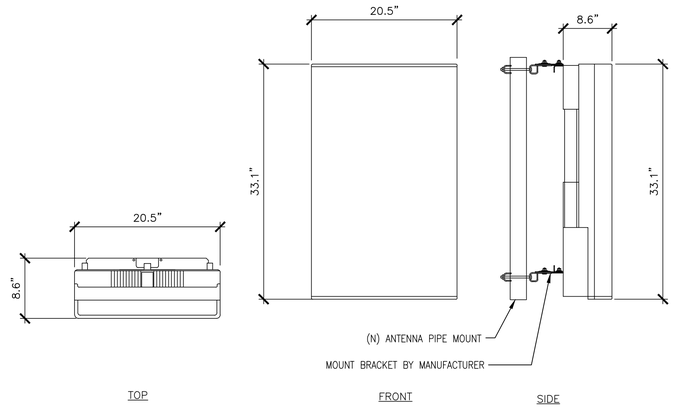
PROFESSIONAL ENGINEER
4/22/21

SHEET NUMBER: C-4

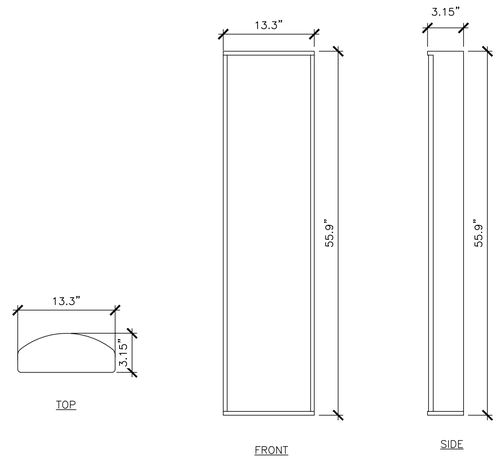
REVISION: 0

MANUFACTURER: ERICSSON
MODEL: AIR6449 B41
WEIGHT: 104 LBS (W/ MOUNT BRACKET 113)
DIMENSIONS: 33.1"H. X 20.5"W. X 8.6"D.
FREQUENCY: REFER TO RF DATA SHEET

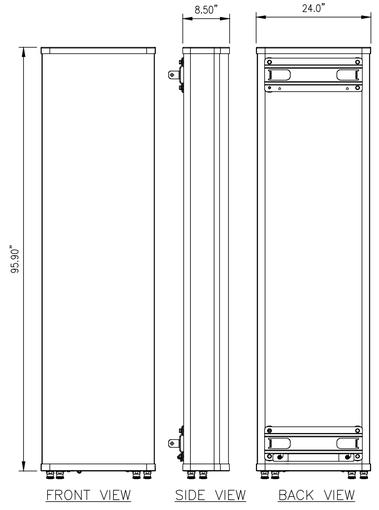


1 (N) AIR6449 B41 ANTENNA SPEC
SCALE: NOT TO SCALE

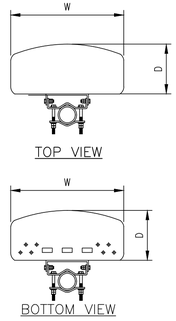
MANUFACTURER: RFS
MODEL: APX16DWV-16DWV-S-E-A20
WEIGHT: 40.7 LBS
DIMENSIONS: 55.9"H. X 13.3"W. X 3.15"D.
FREQUENCY: REFER TO RF DATA SHEET



2 (N) APX16DWV-16DWV-S-E-A20 ANTENNA SPEC
SCALE: NOT TO SCALE



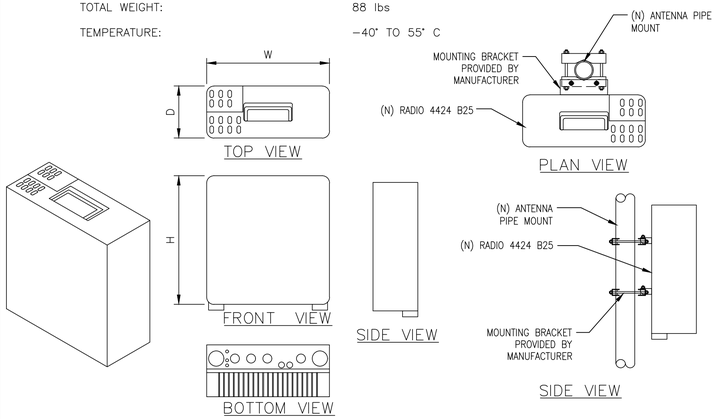
700MHz RFS ANTENNAS	
MODEL	WEIGHT (lb)
(8') APXVAALL24_43-UNA20	149.90
WEIGHT W/ MOUNTING BRACKET (lb):	154



3 (N) APXVAALL24_43-UNA20 ANTENNA SPEC
SCALE: NOT TO SCALE

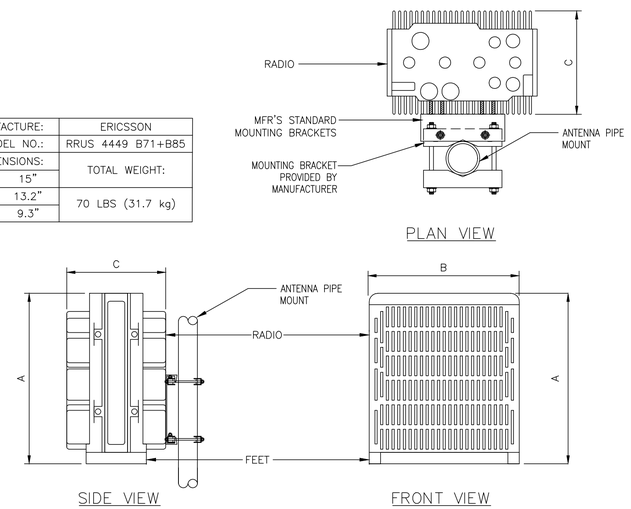
ERICSSON RADIO-4424 B25

DIMENSIONS, WxDxH:	13.5"x9.6"x16.5"
MAX OUTPUT POWER:	4x80W (2x(2x80W))
TOTAL WEIGHT:	88 lbs
TEMPERATURE:	-40° TO 55° C



4 (N) RADIO 4424 B25 SPEC
SCALE: NOT TO SCALE

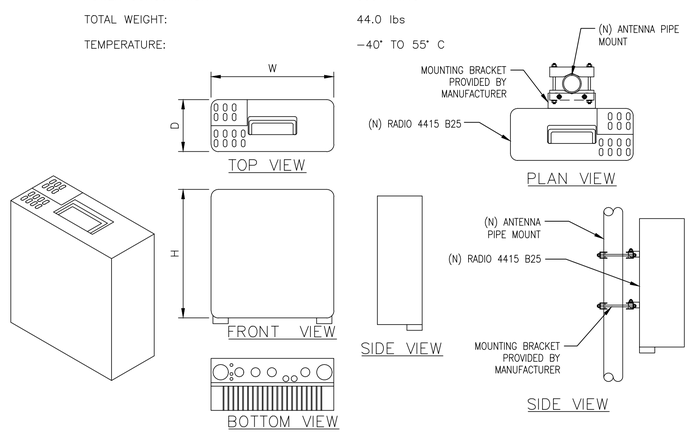
MANUFACTURE:	ERICSSON
MODEL NO.:	RRUS 4449 B71+B85
DIMENSIONS:	TOTAL WEIGHT:
A 15"	
B 13.2"	70 LBS (31.7 kg)
C 9.3"	



5 (N) RADIO 4449 B71+B885 SPEC
SCALE: NOT TO SCALE

ERICSSON RADIO-4415 B25

DIMENSIONS, WxDxH:	13.19"x5.39"x14.96"
POWER CONSUMPTION:	660 WATTS
TOTAL WEIGHT:	44.0 lbs
TEMPERATURE:	-40° TO 55° C



6 (N) RADIO 4415 B25 SPEC
SCALE: NOT TO SCALE

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EXISTING 178'-0" MONOPOLE

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STATE OF CONNECTICUT
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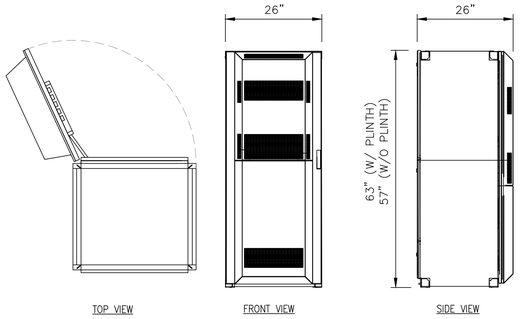
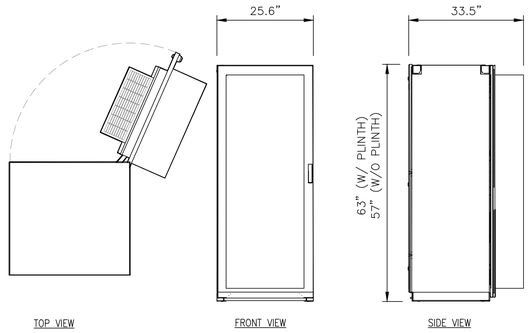
LICENSED PROFESSIONAL ENGINEER
4/22/21

SHEET NUMBER:	REVISION:
C-5	0



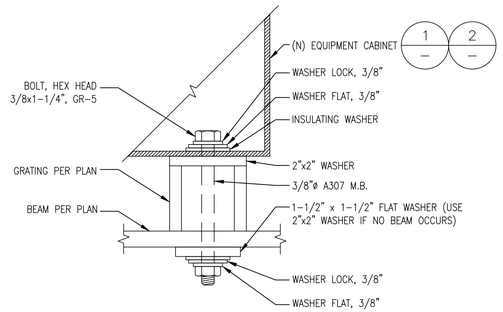
ERICSSON MODEL NO.:	B160
RACK SPACE:	19U
DIMENSIONS, HxWxD:	63"x26"x26" (W/ 6" PLINTH)
CABINET WEIGHT, EMPTY:	485 LBS
MAXIMUM WEIGHT:	2100± LBS

1 (N) B160 CABINET DETAIL
SCALE: NOT TO SCALE

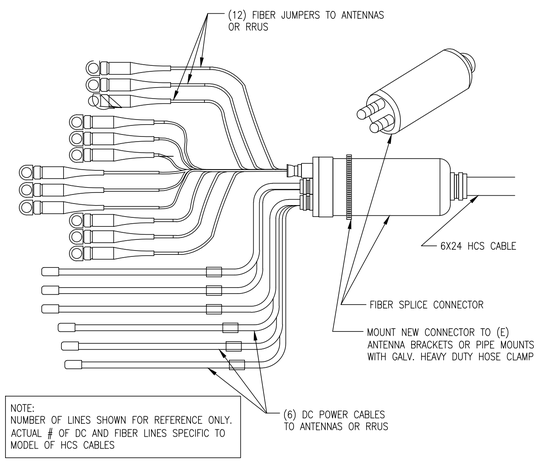


ERICSSON MODEL NO.:	6160
RACK SPACE:	19U
DIMENSIONS, HxWxD:	63"x25.6"x25.6" (W/ 6" PLINTH)
CABINET WEIGHT, EMPTY:	410 LBS
MAXIMUM WEIGHT:	770± LBS

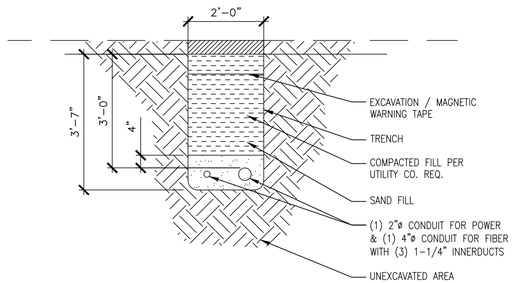
2 (N) 6160 CABINET DETAIL
SCALE: NOT TO SCALE



3 (N) EQUIPMENT CABINET MOUNTING DETAIL
SCALE: NOT TO SCALE



4 (N) 6X24 HCS CABLE DETAIL
SCALE: NOT TO SCALE



5 (N) CONDUIT TRENCH DETAIL
SCALE: NOT TO SCALE

6 NOT USED
SCALE: NOT TO SCALE

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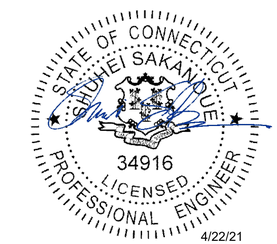


SHEET NUMBER: C-6
REVISION: 0

T-MOBILE PANEL SCHEDULE

MAIN: 200A MAIN BREAKER | **VOTAGE/PHASE:** 120/240V, 1-PHASE, 3-WIRE | **SHORT CIRCUIT CURRENT RATING:** --

MOUNTING: INSIDE PPC ENCLOSURE | **ENCLOSURE:** NEMA 3R | **SURGE PROTECTION DEVICE:** YES

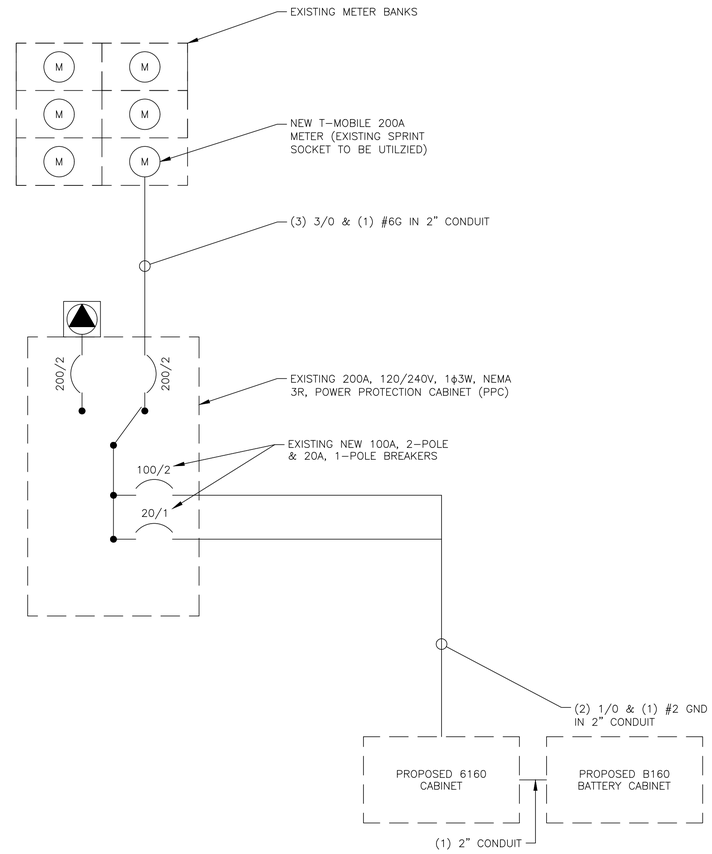
DESCRIPTION	LOAD (VA)	C or NC	C/B	CIR No.	PHASE LOADS (VA) A	PHASE LOADS (VA) B	CIR No.	C/B	C or NC	LOAD (VA)	DESCRIPTION
6160**	**7000**	**C**	**100**	**1**	7000		7	60	NC	0	(NOT CONNECTED)
	7000	**C**		**2**		7000	8		NC	0	
outside lights	**200**	**NC**	**20**	**3**	200		9		NC	0	Blank
6160 GFI**	180	NC	20	4		180	10		NC	0	Blank
NID Outlet	180	NC	15	5	1260		11	15	NC	1080	Not Labeled
Telco Fan (OFF)	0	NC	10	6		0	12			**0**	BLANK
				BASE LOAD (VA) =	8640	7180					
				25% OF CONTINUOUS LOAD (VA) =	2115	1795					
				TOTAL LOAD (VA) =	10755	8975					
				TOTAL LOAD (A) =	89.6	74.8					

C = CONTINUOUS LOAD; NC = NON-CONTINUOUS LOAD
*INDICATES NEW LOAD. ALL OTHER LOADS ARE EXISTING.
NEW BREAKER TO BE SAME TYPE AND HAVE SAME AIC RATING AS EXISTING. CUSTOMER HAS NOT PROVIDED LOADS FOR EQUIPMENT CABINETS THEREFORE THE CABINET LOADS SHOWN ARE ESTIMATED

1 AC PANEL SCHEDULE
SCALE: NOT TO SCALE

NOTES:

1. ALL NEW CONDUCTORS TO BE INSTALLED SHALL BE COPPER. ALL CONDUCTORS SHALL BE THHW, THWN, THWN–2, XHHW, OR XHHW–2 UNLESS NOTED OTHERWISE.
2. CONTRACTOR IS TO FIELD VERIFY ALL EXISTING ITEMS SHOWN ON THE ELECTRICAL ONE–LINE DIAGRAM AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES.
3. ALL GROUNDING AND BONDING PER THE NEC.



2 ONE LINE DIAGRAM
SCALE: NOT TO SCALE

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BU #: **876369**
HARWINTON / BUCKLEY BROADCASTI

64 HUNGERFORD LANE
HARWINTON, CT 06791

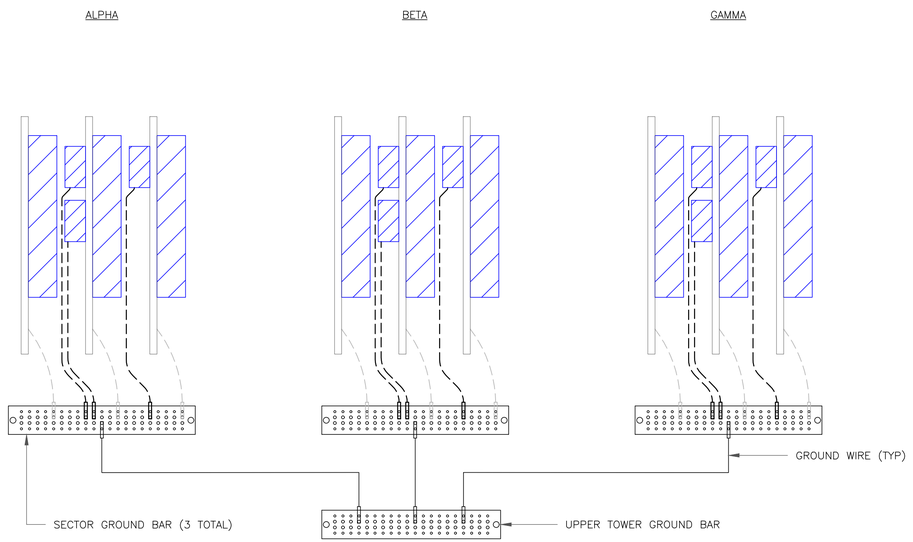
EXISTING 178'-0" MONOPOLE

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	DES./QA
A	03/23/2021	RCD	PRELIMINARY	SS
0	04/22/2021	BMM	FINAL	SS

STATE OF CONNECTICUT
CHUHEI SAKAMOTO
34916
LICENSED PROFESSIONAL ENGINEER
4/22/21

SHEET NUMBER: E-1 | **REVISION:** 0



NOTE:

ALL NEW GROUNDS TO BE #6 STRANDED COPPER WITH GREEN INSULATION UNLESS NOTED OTHERWISE.

1 ANTENNA GROUNDING DIAGRAM
SCALE: NOT TO SCALE

T-Mobile
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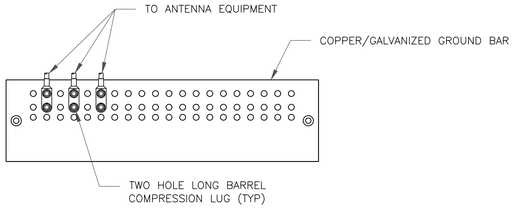
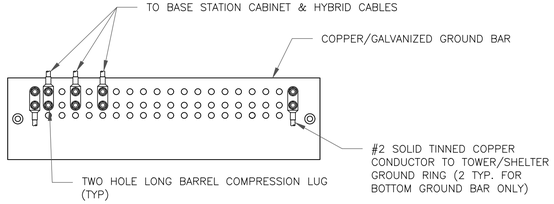


NOTES:

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

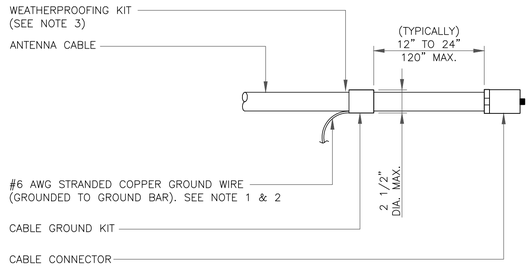
1 ANTENNA SECTOR GROUND BAR DETAIL
SCALE: NOT TO SCALE



NOTES:

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

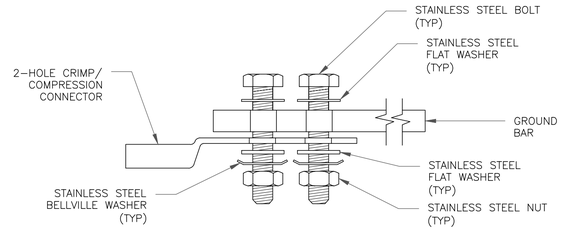
2 TOWER/SHELTER GROUND BAR DETAIL
SCALE: NOT TO SCALE



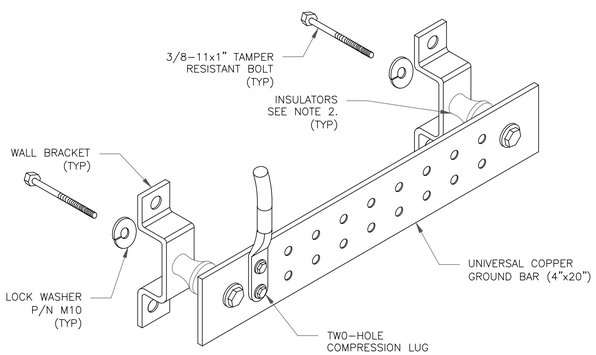
NOTES:

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

3 CABLE GROUND KIT CONNECTION
SCALE: NOT TO SCALE



4 HARDWARE DETAIL FOR EXTERIOR CONNECTIONS
SCALE: NOT TO SCALE



NOTES:

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

5 GROUND BAR DETAIL
SCALE: NOT TO SCALE

6 NOT USED
SCALE: NOT TO SCALE

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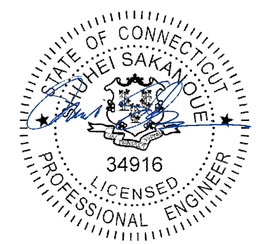


4/22/21

SHEET NUMBER: G-2

REVISION: 0

Exhibit D

Structural Analysis Report

Date: **March 16, 2021**

Black & Veatch Corp.
6800 W. 115th St., Suite 2292
Overland Park, KS 66211
(913) 458-6909

Subject:	**Structural Analysis Report**	
Carrier Designation:		
	Site Number:	CTNH558A
	Site Name:	CTNH558A
Crown Castle Designation:	**BU Number:**	876369
	Site Name:	HARWINTON / BUCKLEY BROADCASTI
	JDE Job Number:	628849
	Work Order Number:	1918906
	Order Number:	538773 Rev. 1
Engineering Firm Designation:	**Black & Veatch Corp. Project Number:**	406642
Site Data:	**64 Hungerford Lane, Harwinton, Litchfield County, CT** **Latitude *41° 45' 26.15"*, Longitude *-73° 3' 9.2"*** **178 Foot - Monopole Tower**	

Black & Veatch Corp. is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above-mentioned tower.

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

LC5: Proposed Equipment Configuration **Sufficient Capacity - 74.5%**

This analysis utilizes an ultimate 3-second gust wind speed of 120 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Thanyaporn Yakhasem / Kanchanaporn Rattanachan

Respectfully submitted by:

Joshua J. Riley, P.E.
Professional Engineer

03/16/2021

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 178 ft Monopole tower designed by Engineered Endeavors, Inc.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	120 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	1.500 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
178.0	180.0	3	ericsson	AIR6449 B41_T-MOBILE w/ Mount Pipe	4	1-5/8
		3	ericsson	RADIO 4415 B66A_CCIV3		
		3	ericsson	RADIO 4424 B25_TMO		
		3	ericsson	RADIO 4449 B71 B85A_T-MOBILE		
		3	rfs celwave	APX16DWV-16DWV-S-E-A20 w/ Mount Pipe		
		3	rfs celwave	APXVAALL24_43-U-NA20_TMO w/ Mount Pipe		
	178.0	1	site pro 1	RMQP-496-HK + PRK-1245 + HRK12 12.5' Platform with Handrails and Kickers		
75.0	76.0	1	lucent	KS24019-L112A	1	1/2

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
168.0	170.0	3	antel	BXA-171085-12BF-2 w/ Mount Pipe	12	1-5/8
		3	antel	BXA-70063-6CF-2 w/ Mount Pipe		
		6	antel	LPA-80080/6CF w/ Mount Pipe		
		6	rfs celwave	FD9R6004/2C-3L		
	168.0	1	cci tower mounts (v2.1)	Platform Mount [16' LP 403-1]		
156.0	158.0	1	cci antennas	HPA65R-BU6A w/ Mount Pipe		
		2	commscope	SBNHH-1D65A w/ Mount Pipe		
		3	ericsson	RRUS 4449 B5/B12		
		3	ericsson	RRUS 8843 B2/B66A		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		3	kathrein	80010964 w/ Mount Pipe	12 2 2 2 1	1-5/8 3/4 7/16 3/8 2''conduit
		3	powerwave technologies	7770.00 w/ Mount Pipe		
		6	powerwave technologies	LGP21401		
		1	raycap	DC6-48-60-18-8C-EV		
		1	raycap	DC6-48-60-18-8F		
	156.0	1	cci tower mounts (v2.1)	Platform Mount [LP 303-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Reference	Source
4-GEOTECHNICAL REPORTS	1532983	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	2150286	CCISITES
4-TOWER MANUFACTURER DRAWINGS	2150280	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.7.5), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 standard.

3.2) Assumptions

1) Tower and structures were maintained in accordance with the TIA-222 Standard.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Black & Veatch Corp. should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary) (Monopole Tower)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	178 - 129.87	Pole	TP29.64x19.5x0.25	1	-13.30	1388.85	60.7	Pass
L2	129.87 - 84.83	Pole	TP38.5x28.2446x0.375	2	-22.70	2706.23	57.1	Pass
L3	84.83 - 41.2833	Pole	TP46.8x36.6403x0.4375	3	-35.66	3840.78	56.8	Pass
L4	41.2833 - 0	Pole	TP54.5x44.5913x0.5	4	-55.03	5264.00	54.0	Pass
							Summary	
						Pole (L1)	60.7	Pass
						Rating =	60.7	Pass

Table 5 - Tower Component Stresses vs. Capacity (Monopole Tower) - LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	52.3	Pass
	Base Plate		61.1	Pass
1	Base Foundation	0	74.5	Pass
	Base Foundation Soil Interaction		66.6	Pass

Structure Rating (max from all components) =	74.5%

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

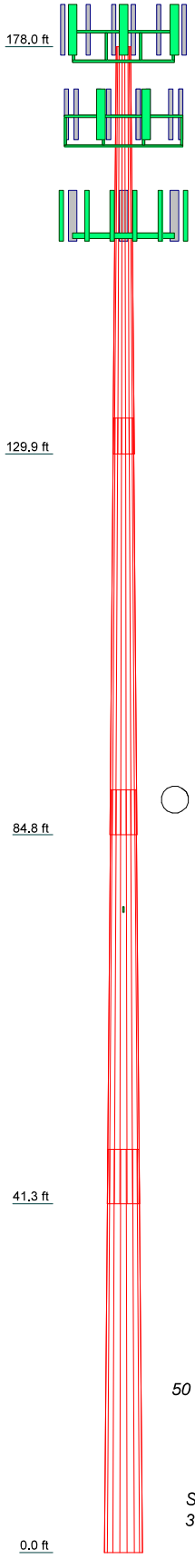
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	48.13	18	0.2500	4.25	19.5000	29.6400	A572-65	3.2
2	49.29	18	0.3750	5.33	28.2446	38.5000		6.6
3	48.88	18	0.4375	6.42	36.6403	46.8000		9.5
4	47.70	18	0.5000		44.5913	54.5000		12.6
								31.9



ALL REACTIONS ARE FACTORED

AXIAL 81 K

SHEAR 8 K

MOMENT 1086 kip-ft

TORQUE 2 kip-ft
50 mph WIND - 1.5000 in ICE

AXIAL 55 K

SHEAR 30 K

MOMENT 3798 kip-ft

TORQUE 9 kip-ft
REACTIONS - 120 mph WIND

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Litchfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 120 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 60.7%

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6800 W. 115th St., Suite 2292
Overland Park, KS 66211
Phone: (913) 458-6909
FAX:

Job:	*HARWINTON / BUCKLEY BROADCASTI (BU# 876369*		
Project:	*406642 (876369.1918906)*		
Client: Crown Castle	Drawn by: Kanchanaporn Rattanachan	App'd:	
Code: TIA-222-H	Date: 03/16/21	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

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

1) Tower is located in Litchfield County, Connecticut.
2) Tower base elevation above sea level: 841.00 ft.
3) Basic wind speed of 120 mph.
4) Risk Category II.
5) Exposure Category C.
6) Simplified Topographic Factor Procedure for wind speed-up calculations is used.
7) Topographic Category: 1.
8) Crest Height: 0.00 ft.
9) Nominal ice thickness of 1.5000 in.
10) Ice thickness is considered to increase with height.
11) Ice density of 56 pcf.
12) A wind speed of 50 mph is used in combination with ice.
13) Temperature drop of 50 °F.
14) Deflections calculated using a wind speed of 60 mph.
15) A non-linear (P-delta) analysis was used.
16) Pressures are calculated at each section.
17) Stress ratio used in pole design is 1.05.
18) Tower analysis based on target reliabilities in accordance with Annex S.
19) Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
20) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	178.00-129.87	48.13	4.25	18	19.5000	29.6400	0.2500	1.0000	A572-65 (65 ksi)

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
L2	129.87-84.83	49.29	5.33	18	28.2446	38.5000	0.3750	1.5000	A572-65 (65 ksi)
L3	84.83-41.28	48.88	6.42	18	36.6403	46.8000	0.4375	1.7500	A572-65 (65 ksi)
L4	41.28-0.00	47.70		18	44.5913	54.5000	0.5000	2.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	19.7623	15.2749	715.1161	6.8338	9.9060	72.1902	1431.1733	7.6389	2.9920	11.968
	30.0587	23.3210	2544.9728	10.4335	15.0571	169.0212	5093.2943	11.6627	4.7766	19.107
L2	29.5204	33.1718	3255.1307	9.8937	14.3483	226.8658	6514.5446	16.5891	4.3111	11.496
	39.0361	45.3783	8333.0732	13.5344	19.5580	426.0698	16677.1113	22.6935	6.1160	16.309
L3	38.2637	50.2722	8324.3516	12.8520	18.6133	447.2261	16659.6565	25.1409	5.6787	12.98
	47.4545	64.3801	17483.2823	16.4587	23.7744	735.3827	34989.5695	32.1962	7.4668	17.067
L4	46.5556	69.9729	17185.9266	15.6524	22.6524	758.6809	34394.4670	34.9931	6.9681	13.936
	55.2636	85.6980	31571.5320	19.1700	27.6860	1140.3428	63184.6066	42.8571	8.7120	17.424

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 178.00-129.87				1	1	1			
L2 129.87-84.83				1	1	1			
L3 84.83-41.28				1	1	1			
L4 41.28-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8 ***	B	No	Surface Ar (CaAa)	178.00 - 10.00	1	1	-0.400 -0.390	0.3750		0.22
LDF4-50A(1/2) ***	C	No	Surface Ar (CaAa)	75.00 - 8.00	1	1	0.170 0.183	0.6250		0.15

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight plf

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
***									
HB158-21U6S24-xxM_TMO(1-5/8)	C	No	No	Inside Pole	178.00 - 0.00	4	No Ice	0.00	2.50
							1/2" Ice	0.00	2.50
							1" Ice	0.00	2.50
							2" Ice	0.00	2.50
***									
LDF7-50A(1-5/8)	C	No	No	Inside Pole	168.00 - 0.00	12	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
***									
2" innerduct conduit	C	No	No	Inside Pole	156.00 - 0.00	1	No Ice	0.00	0.20
							1/2" Ice	0.00	0.20
							1" Ice	0.00	0.20
							2" Ice	0.00	0.20
LDF7-50A(1-5/8)	C	No	No	Inside Pole	156.00 - 0.00	12	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
FB-L98B-002-75000(3/8)	C	No	No	Inside Pole	156.00 - 0.00	2	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
							2" Ice	0.00	0.06
WR-VG122ST-BRDA(7/16)	C	No	No	Inside Pole	156.00 - 0.00	2	No Ice	0.00	0.14
							1/2" Ice	0.00	0.14
							1" Ice	0.00	0.14
							2" Ice	0.00	0.14
WR-VG86ST-BRD(3/4)	C	No	No	Inside Pole	156.00 - 0.00	2	No Ice	0.00	0.58
							1/2" Ice	0.00	0.58
							1" Ice	0.00	0.58
							2" Ice	0.00	0.58
***									

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	178.00-129.87	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	1.805	0.000	0.01
		C	0.000	0.000	0.000	0.000	1.16
L2	129.87-84.83	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	1.689	0.000	0.01
		C	0.000	0.000	0.000	0.000	1.42
L3	84.83-41.28	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	1.633	0.000	0.01
		C	0.000	0.000	2.107	0.000	1.37
L4	41.28-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	1.173	0.000	0.01
		C	0.000	0.000	2.080	0.000	1.30

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	178.00-129.87	A	1.486	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	16.108	0.000	0.17
		C		0.000	0.000	0.000	0.000	1.16
L2	129.87-84.83	A	1.434	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	15.074	0.000	0.16
		C		0.000	0.000	0.000	0.000	1.42
L3	84.83-41.28	A	1.359	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	14.118	0.000	0.15
		C		0.000	0.000	11.774	0.000	1.50
L4	41.28-0.00	A	1.218	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	9.679	0.000	0.10
		C		0.000	0.000	11.130	0.000	1.41

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	178.00-129.87	0.0657	-0.2939	0.2916	-1.3045
L2	129.87-84.83	0.0659	-0.2947	0.3082	-1.3789
L3	84.83-41.28	-0.0778	0.0782	-0.1237	-0.2350
L4	41.28-0.00	-0.0950	0.1536	-0.2001	0.1057

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

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	1	Safety Line 3/8	129.87 - 178.00	1.0000	1.0000
L2	1	Safety Line 3/8	84.83 - 129.87	1.0000	1.0000
L3	1	Safety Line 3/8	41.28 - 84.83	1.0000	1.0000
L3	15	LDF4-50A(1/2)	41.28 - 75.00	1.0000	1.0000
L4	1	Safety Line 3/8	10.00 - 41.28	1.0000	1.0000
L4	15	LDF4-50A(1/2)	8.00 - 41.28	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Site Pro 1 RMQP-496-HK + PRK-1245 + HRK12 12.5' Platform with Handrails and Kickers	C	None		0.0000	178.00	No Ice	23.14	21.40	1.95
						1/2" Ice	28.17	26.44	2.34
						1" Ice	33.23	31.60	2.85
							43.26	41.56	3.50

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice			
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	A	From Face	4.00 -6.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.29 6.86 7.45 8.68	2.76 3.27 3.79 4.90	0.06 0.11 0.16 0.29
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	B	From Face	4.00 -6.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.29 6.86 7.45 8.68	2.76 3.27 3.79 4.90	0.06 0.11 0.16 0.29
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	C	From Face	4.00 -6.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.29 6.86 7.45 8.68	2.76 3.27 3.79 4.90	0.06 0.11 0.16 0.29
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	A	From Face	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.69 15.46 16.23 17.82	6.87 7.55 8.25 9.67	0.18 0.31 0.45 0.78
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	B	From Face	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.69 15.46 16.23 17.82	6.87 7.55 8.25 9.67	0.18 0.31 0.45 0.78
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	C	From Face	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.69 15.46 16.23 17.82	6.87 7.55 8.25 9.67	0.18 0.31 0.45 0.78
AIR6449 B41_T-MOBILE w/ Mount Pipe	A	From Face	4.00 6.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.87 6.23 6.61 7.38	3.27 3.73 4.20 5.20	0.13 0.18 0.23 0.36
AIR6449 B41_T-MOBILE w/ Mount Pipe	B	From Face	4.00 6.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.87 6.23 6.61 7.38	3.27 3.73 4.20 5.20	0.13 0.18 0.23 0.36
AIR6449 B41_T-MOBILE w/ Mount Pipe	C	From Face	4.00 6.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.87 6.23 6.61 7.38	3.27 3.73 4.20 5.20	0.13 0.18 0.23 0.36
RADIO 4415 B66A_CCIV3	A	From Face	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.32	0.68 0.79 0.91 1.18	0.05 0.06 0.07 0.11
RADIO 4415 B66A_CCIV3	B	From Face	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.32	0.68 0.79 0.91 1.18	0.05 0.06 0.07 0.11
RADIO 4415 B66A_CCIV3	C	From Face	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.32	0.68 0.79 0.91 1.18	0.05 0.06 0.07 0.11
RADIO 4449 B71 B85A_T-MOBILE	A	From Face	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice	1.97 2.15 2.33 2.72	1.59 1.75 1.92 2.28	0.07 0.09 0.12 0.17

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice			
RADIO 4449 B71 B85A_T-MOBILE	B	From Face	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.15 2.33 2.72	1.59 1.75 1.92 2.28	0.07 0.09 0.12 0.17
RADIO 4449 B71 B85A_T-MOBILE	C	From Face	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.15 2.33 2.72	1.59 1.75 1.92 2.28	0.07 0.09 0.12 0.17
RADIO 4424 B25_TMO	A	From Face	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.05 2.23 2.42 2.81	1.61 1.77 1.94 2.30	0.09 0.11 0.13 0.19
RADIO 4424 B25_TMO	B	From Face	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.05 2.23 2.42 2.81	1.61 1.77 1.94 2.30	0.09 0.11 0.13 0.19
RADIO 4424 B25_TMO	C	From Face	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.05 2.23 2.42 2.81	1.61 1.77 1.94 2.30	0.09 0.11 0.13 0.19
*** ***									
Platform Mount [16' LP 403-1]	C	None		0.0000	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.20 24.86 29.59 39.22	20.20 24.86 29.59 39.22	1.60 2.03 2.53 3.77
(2) LPA-80080/6CF w/ Mount Pipe	A	From Face	4.00 0.00 2.00	0.0000	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.56 5.11 5.61 6.65	10.26 11.43 12.31 14.13	0.05 0.11 0.19 0.36
(2) LPA-80080/6CF w/ Mount Pipe	B	From Face	4.00 0.00 2.00	0.0000	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.56 5.11 5.61 6.65	10.26 11.43 12.31 14.13	0.05 0.11 0.19 0.36
(2) LPA-80080/6CF w/ Mount Pipe	B	From Face	4.00 0.00 2.00	0.0000	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.56 5.11 5.61 6.65	10.26 11.43 12.31 14.13	0.05 0.11 0.19 0.36
BXA-70063-6CF-2 w/ Mount Pipe	A	From Face	4.00 -2.67 2.00	0.0000	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	7.81 8.36 8.87 9.93	5.40 6.55 7.41 9.18	0.04 0.10 0.17 0.33
BXA-70063-6CF-2 w/ Mount Pipe	B	From Face	4.00 -2.67 2.00	0.0000	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	7.81 8.36 8.87 9.93	5.40 6.55 7.41 9.18	0.04 0.10 0.17 0.33
BXA-70063-6CF-2 w/ Mount Pipe	C	From Face	4.00 -2.67 2.00	0.0000	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	7.81 8.36 8.87 9.93	5.40 6.55 7.41 9.18	0.04 0.10 0.17 0.33
BXA-171085-12BF-2 w/ Mount Pipe	A	From Face	4.00 2.67	0.0000	168.00	No Ice 1/2"	4.97 5.52	5.23 6.39	0.04 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.00			Ice	6.04	7.26	0.14
						1" Ice	7.09	9.05	0.27
						2" Ice			
BXA-171085-12BF-2 w/ Mount Pipe	B	From Face	4.00 2.67 2.00	0.0000	168.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice	4.97 5.52 6.04 7.09	5.23 6.39 7.26 9.05	0.04 0.09 0.14 0.27
BXA-171085-12BF-2 w/ Mount Pipe	C	From Face	4.00 2.67 2.00	0.0000	168.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice	4.97 5.52 6.04 7.09	5.23 6.39 7.26 9.05	0.04 0.09 0.14 0.27
(2) FD9R6004/2C-3L	A	From Face	4.00 0.00 2.00	0.0000	168.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice	0.31 0.39 0.47 0.65	0.08 0.12 0.17 0.29	0.00 0.01 0.01 0.02
(2) FD9R6004/2C-3L	B	From Face	4.00 0.00 2.00	0.0000	168.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice	0.31 0.39 0.47 0.65	0.08 0.12 0.17 0.29	0.00 0.01 0.01 0.02
(2) FD9R6004/2C-3L	C	From Face	4.00 0.00 2.00	0.0000	168.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice	0.31 0.39 0.47 0.65	0.08 0.12 0.17 0.29	0.00 0.01 0.01 0.02
***									
Platform Mount [LP 303-1_HR-1]	C	None		0.0000	156.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice	17.09 21.47 25.72 33.96	17.09 21.47 25.72 33.96	1.50 1.88 2.35 3.52
6'x2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	156.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6'x2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	156.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6'x2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	156.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
7770.00 w/ Mount Pipe	A	From Leg	4.00 -6.00 2.00	0.0000	156.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.10 0.16 0.29
7770.00 w/ Mount Pipe	B	From Leg	4.00 6.00 2.00	0.0000	156.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.10 0.16 0.29
7770.00 w/ Mount Pipe	C	From Leg	4.00 6.00 2.00	0.0000	156.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.10 0.16 0.29
HPA65R-BU6A w/ Mount	A	From Leg	4.00	0.0000	156.00	No Ice	8.09	7.19	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
Pipe			0.00 2.00			1/2" Ice 1" Ice 2" Ice	8.64 9.16 10.22	8.36 9.24 11.05	0.14 0.21 0.39
SBNHH-1D65A w/ Mount Pipe	B	From Leg	4.00 -6.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.04 3.34 3.65 4.31	2.45 2.75 3.05 3.68	0.05 0.10 0.16 0.31
SBNHH-1D65A w/ Mount Pipe	C	From Leg	4.00 -6.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.04 3.34 3.65 4.31	2.45 2.75 3.05 3.68	0.05 0.10 0.16 0.31
80010964 w/ Mount Pipe	A	From Leg	4.00 6.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.61 9.18 9.77 10.98	4.10 4.59 5.10 6.16	0.12 0.19 0.26 0.45
80010964 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.61 9.18 9.77 10.98	4.10 4.59 5.10 6.16	0.12 0.19 0.26 0.45
80010964 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.61 9.18 9.77 10.98	4.10 4.59 5.10 6.16	0.12 0.19 0.26 0.45
(2) LGP21401	A	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.35 0.44 0.54 0.77	0.01 0.02 0.03 0.05
(2) LGP21401	B	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.35 0.44 0.54 0.77	0.01 0.02 0.03 0.05
(2) LGP21401	C	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.35 0.44 0.54 0.77	0.01 0.02 0.03 0.05
RRUS 4449 B5/B12	A	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	B	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	C	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 8843 B2/B66A	A	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.32	1.35 1.50 1.65 1.99	0.07 0.09 0.11 0.16
RRUS 8843 B2/B66A	B	From Leg	4.00	0.0000	156.00	No Ice	1.64	1.35	0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00				1/2" Ice	1.80	1.50	0.09
			2.00				1" Ice	1.97	1.65	0.11
							2" Ice	2.32	1.99	0.16
RRUS 8843 B2/B66A	C	From Leg	4.00		0.0000	156.00	No Ice	1.64	1.35	0.07
			0.00				1/2" Ice	1.80	1.50	0.09
			2.00				1" Ice	1.97	1.65	0.11
							2" Ice	2.32	1.99	0.16
DC6-48-60-18-8C-EV	A	From Leg	1.00		0.0000	156.00	No Ice	2.74	2.74	0.03
			0.00				1/2" Ice	2.96	2.96	0.05
			2.00				1" Ice	3.20	3.20	0.08
							2" Ice	3.68	3.68	0.15
DC6-48-60-18-8F	C	From Leg	1.00		0.0000	156.00	No Ice	0.92	0.92	0.02
			0.00				1/2" Ice	1.46	1.46	0.04
			2.00				1" Ice	1.64	1.64	0.06
							2" Ice	2.04	2.04	0.11
***										
4'x2" Horizontal Mount Pipe	C	From Face	0.00		0.0000	75.00	No Ice	0.87	0.01	0.01
			0.00				1/2" Ice	1.11	0.04	0.02
			0.00				1" Ice	1.36	0.07	0.03
							2" Ice	1.90	0.13	0.06
KS24019-L112A	C	From Face	4.00		0.0000	75.00	No Ice	0.14	0.14	0.01
			0.00				1/2" Ice	0.20	0.20	0.01
			1.00				1" Ice	0.26	0.26	0.01
							2" Ice	0.41	0.41	0.02
***										

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice

Comb. No.	Description
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	178 - 129.87	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-29.58	-3.79	5.37
			Max. Mx	8	-13.45	-558.58	-7.35
			Max. My	2	-13.30	7.29	585.71
			Max. Vy	8	16.92	-558.58	-7.35
			Max. Vx	2	-17.68	7.29	585.71
			Max. Torque	11			8.67
L2	129.87 - 84.83	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-41.64	-4.29	5.88
			Max. Mx	8	-22.79	-1391.57	-16.98
			Max. My	2	-22.70	17.05	1452.34
			Max. Vy	8	21.01	-1391.57	-16.98
			Max. Vx	2	-21.77	17.05	1452.34
			Max. Torque	11			8.64
L3	84.83 - 41.2833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-57.75	-4.64	5.82
			Max. Mx	8	-35.71	-2372.00	-26.40
			Max. My	2	-35.66	26.44	2465.88
			Max. Vy	8	25.09	-2372.00	-26.40
			Max. Vx	2	-25.87	26.44	2465.88
			Max. Torque	11			8.60
L4	41.2833 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-80.78	-4.85	5.67
			Max. Mx	8	-55.03	-3667.10	-36.66
			Max. My	2	-55.03	36.67	3797.66
			Max. Vy	8	28.95	-3667.10	-36.66
			Max. Vx	2	-29.70	36.67	3797.66
			Max. Torque	11			8.54

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	80.78	0.04	8.32
	Max. H_x	20	55.05	28.92	0.21
	Max. H_z	2	55.05	0.21	29.67
	Max. M_x	2	3797.66	0.21	29.67
	Max. M_z	8	3667.10	-28.92	-0.21
	Max. Torsion	11	8.54	-25.15	-15.01
	Min. Vert	11	41.29	-25.15	-15.01
	Min. H_x	8	55.05	-28.92	-0.21
	Min. H_z	14	55.05	-0.21	-29.67
	Min. M_x	14	-3795.50	-0.21	-29.67
	Min. M_z	20	-3665.14	28.92	0.21
	Min. Torsion	23	-8.44	25.15	15.01

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	45.88	0.00	0.00	-0.84	-0.77	-0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	55.05	-0.21	-29.67	-3797.66	36.67	3.44
0.9 Dead+1.0 Wind 0 deg - No Ice	41.29	-0.21	-29.67	-3741.59	36.29	3.45
1.2 Dead+1.0 Wind 30 deg - No Ice	55.05	14.28	-25.59	-3270.51	-1801.33	-0.89
0.9 Dead+1.0 Wind 30 deg - No Ice	41.29	14.28	-25.59	-3222.21	-1774.79	-0.89
1.2 Dead+1.0 Wind 60 deg - No Ice	55.05	24.94	-14.65	-1867.08	-3157.18	-5.03
0.9 Dead+1.0 Wind 60 deg - No Ice	41.29	24.94	-14.65	-1839.44	-3110.75	-5.04
1.2 Dead+1.0 Wind 90 deg - No Ice	55.05	28.92	0.21	36.66	-3667.10	-7.84
0.9 Dead+1.0 Wind 90 deg - No Ice	41.29	28.92	0.21	36.29	-3613.18	-7.85
1.2 Dead+1.0 Wind 120 deg - No Ice	55.05	25.15	15.01	1930.08	-3194.36	-8.52
0.9 Dead+1.0 Wind 120 deg - No Ice	41.29	25.15	15.01	1901.89	-3147.36	-8.54
1.2 Dead+1.0 Wind 150 deg - No Ice	55.05	14.64	25.80	3305.72	-1866.15	-6.88
0.9 Dead+1.0 Wind 150 deg - No Ice	41.29	14.64	25.80	3257.37	-1838.57	-6.90
1.2 Dead+1.0 Wind 180 deg - No Ice	55.05	0.21	29.67	3795.50	-38.51	-3.39
0.9 Dead+1.0 Wind 180 deg - No Ice	41.29	0.21	29.67	3740.02	-37.63	-3.40
1.2 Dead+1.0 Wind 210 deg - No Ice	55.05	-14.28	25.59	3268.38	1799.33	0.99
0.9 Dead+1.0 Wind 210 deg - No Ice	41.29	-14.28	25.59	3220.65	1773.34	0.99
1.2 Dead+1.0 Wind 240 deg - No Ice	55.05	-24.94	14.65	1865.08	3155.12	5.08
0.9 Dead+1.0 Wind 240 deg - No Ice	41.29	-24.94	14.65	1837.98	3109.25	5.09
1.2 Dead+1.0 Wind 270 deg - No Ice	55.05	-28.92	-0.21	-38.54	3665.14	7.79
0.9 Dead+1.0 Wind 270 deg - No Ice	41.29	-28.92	-0.21	-37.65	3611.75	7.81
1.2 Dead+1.0 Wind 300 deg - No Ice	55.05	-25.15	-15.01	-1931.97	3192.56	8.42
0.9 Dead+1.0 Wind 300 deg	41.29	-25.15	-15.01	-1903.27	3146.04	8.44

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
- No Ice 1.2 Dead+1.0 Wind 330 deg	55.05	-14.64	-25.80	-3307.75	1864.41	6.83
- No Ice 0.9 Dead+1.0 Wind 330 deg	41.29	-14.64	-25.80	-3258.85	1837.30	6.85
- No Ice 1.2 Dead+1.0 Ice+1.0 Temp	80.78	0.00	-0.00	-5.67	-4.85	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	80.78	-0.04	-8.32	-1086.13	3.30	0.73
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	80.78	4.05	-7.18	-937.31	-523.94	-0.14
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	80.78	7.05	-4.12	-538.84	-912.12	-0.98
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	80.78	8.17	0.04	2.47	-1057.18	-1.55
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	80.78	7.09	4.20	541.55	-920.35	-1.71
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	80.78	4.12	7.22	933.97	-538.21	-1.40
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	80.78	0.04	8.32	1074.55	-13.19	-0.72
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	80.78	-4.05	7.18	925.73	514.03	0.15
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	80.78	-7.05	4.12	527.27	902.21	0.98
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	80.78	-8.17	-0.04	-14.03	1047.28	1.55
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	80.78	-7.09	-4.20	-553.12	910.46	1.70
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	80.78	-4.12	-7.22	-945.55	528.33	1.40
Dead+Wind 0 deg - Service	45.88	-0.05	-6.99	-887.88	7.96	0.82
Dead+Wind 30 deg - Service	45.88	3.36	-6.02	-764.66	-421.41	-0.22
Dead+Wind 60 deg - Service	45.88	5.87	-3.45	-436.79	-738.08	-1.21
Dead+Wind 90 deg - Service	45.88	6.81	0.05	7.88	-857.19	-1.88
Dead+Wind 120 deg - Service	45.88	5.92	3.53	450.20	-746.84	-2.04
Dead+Wind 150 deg - Service	45.88	3.45	6.07	771.64	-436.60	-1.65
Dead+Wind 180 deg - Service	45.88	0.05	6.99	886.08	-9.59	-0.82
Dead+Wind 210 deg - Service	45.88	-3.36	6.02	762.86	419.77	0.23
Dead+Wind 240 deg - Service	45.88	-5.87	3.45	435.00	736.44	1.21
Dead+Wind 270 deg - Service	45.88	-6.81	-0.05	-9.67	855.56	1.87
Dead+Wind 300 deg - Service	45.88	-5.92	-3.53	-451.99	745.22	2.03
Dead+Wind 330 deg - Service	45.88	-3.45	-6.07	-773.43	434.97	1.65

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-45.88	0.00	0.00	45.88	0.00	0.000%
2	-0.21	-55.05	-29.67	0.21	55.05	29.67	0.000%
3	-0.21	-41.29	-29.67	0.21	41.29	29.67	0.000%
4	14.28	-55.05	-25.59	-14.28	55.05	25.59	0.000%
5	14.28	-41.29	-25.59	-14.28	41.29	25.59	0.000%
6	24.94	-55.05	-14.65	-24.94	55.05	14.65	0.000%
7	24.94	-41.29	-14.65	-24.94	41.29	14.65	0.000%
8	28.92	-55.05	0.21	-28.92	55.05	-0.21	0.000%
9	28.92	-41.29	0.21	-28.92	41.29	-0.21	0.000%
10	25.15	-55.05	15.01	-25.15	55.05	-15.01	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
11	25.15	-41.29	15.01	-25.15	41.29	-15.01	0.000%
12	14.64	-55.05	25.80	-14.64	55.05	-25.80	0.000%
13	14.64	-41.29	25.80	-14.64	41.29	-25.80	0.000%
14	0.21	-55.05	29.67	-0.21	55.05	-29.67	0.000%
15	0.21	-41.29	29.67	-0.21	41.29	-29.67	0.000%
16	-14.28	-55.05	25.59	14.28	55.05	-25.59	0.000%
17	-14.28	-41.29	25.59	14.28	41.29	-25.59	0.000%
18	-24.94	-55.05	14.65	24.94	55.05	-14.65	0.000%
19	-24.94	-41.29	14.65	24.94	41.29	-14.65	0.000%
20	-28.92	-55.05	-0.21	28.92	55.05	0.21	0.000%
21	-28.92	-41.29	-0.21	28.92	41.29	0.21	0.000%
22	-25.15	-55.05	-15.01	25.15	55.05	15.01	0.000%
23	-25.15	-41.29	-15.01	25.15	41.29	15.01	0.000%
24	-14.64	-55.05	-25.80	14.64	55.05	25.80	0.000%
25	-14.64	-41.29	-25.80	14.64	41.29	25.80	0.000%
26	0.00	-80.78	0.00	-0.00	80.78	0.00	0.000%
27	-0.04	-80.78	-8.32	0.04	80.78	8.32	0.000%
28	4.05	-80.78	-7.18	-4.05	80.78	7.18	0.000%
29	7.05	-80.78	-4.12	-7.05	80.78	4.12	0.000%
30	8.17	-80.78	0.04	-8.17	80.78	-0.04	0.000%
31	7.09	-80.78	4.20	-7.09	80.78	-4.20	0.000%
32	4.12	-80.78	7.22	-4.12	80.78	-7.22	0.000%
33	0.04	-80.78	8.32	-0.04	80.78	-8.32	0.000%
34	-4.05	-80.78	7.18	4.05	80.78	-7.18	0.000%
35	-7.05	-80.78	4.12	7.05	80.78	-4.12	0.000%
36	-8.17	-80.78	-0.04	8.17	80.78	0.04	0.000%
37	-7.09	-80.78	-4.20	7.09	80.78	4.20	0.000%
38	-4.12	-80.78	-7.22	4.12	80.78	7.22	0.000%
39	-0.05	-45.88	-6.99	0.05	45.88	6.99	0.000%
40	3.36	-45.88	-6.02	-3.36	45.88	6.02	0.000%
41	5.87	-45.88	-3.45	-5.87	45.88	3.45	0.000%
42	6.81	-45.88	0.05	-6.81	45.88	-0.05	0.000%
43	5.92	-45.88	3.53	-5.92	45.88	-3.53	0.000%
44	3.45	-45.88	6.07	-3.45	45.88	-6.07	0.000%
45	0.05	-45.88	6.99	-0.05	45.88	-6.99	0.000%
46	-3.36	-45.88	6.02	3.36	45.88	-6.02	0.000%
47	-5.87	-45.88	3.45	5.87	45.88	-3.45	0.000%
48	-6.81	-45.88	-0.05	6.81	45.88	0.05	0.000%
49	-5.92	-45.88	-3.53	5.92	45.88	3.53	0.000%
50	-3.45	-45.88	-6.07	3.45	45.88	6.07	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00018034
3	Yes	5	0.00000001	0.00008731
4	Yes	6	0.00000001	0.00019316
5	Yes	6	0.00000001	0.00006154
6	Yes	6	0.00000001	0.00021029
7	Yes	6	0.00000001	0.00006825
8	Yes	5	0.00000001	0.00050704
9	Yes	5	0.00000001	0.00024580
10	Yes	6	0.00000001	0.00018447
11	Yes	6	0.00000001	0.00005767
12	Yes	6	0.00000001	0.00022901
13	Yes	6	0.00000001	0.00007368
14	Yes	5	0.00000001	0.00035041
15	Yes	5	0.00000001	0.00016502
16	Yes	6	0.00000001	0.00019864
17	Yes	6	0.00000001	0.00006368
18	Yes	6	0.00000001	0.00018097
19	Yes	6	0.00000001	0.00005748
20	Yes	5	0.00000001	0.00066915

21	Yes	5	0.00000001	0.00032068
22	Yes	6	0.00000001	0.00023055
23	Yes	6	0.00000001	0.00007469
24	Yes	6	0.00000001	0.00018601
25	Yes	6	0.00000001	0.00005789
26	Yes	4	0.00000001	0.00010023
27	Yes	5	0.00000001	0.00078867
28	Yes	6	0.00000001	0.00015803
29	Yes	6	0.00000001	0.00016076
30	Yes	5	0.00000001	0.00077901
31	Yes	6	0.00000001	0.00015362
32	Yes	6	0.00000001	0.00016452
33	Yes	5	0.00000001	0.00076940
34	Yes	6	0.00000001	0.00015015
35	Yes	6	0.00000001	0.00014609
36	Yes	5	0.00000001	0.00076702
37	Yes	6	0.00000001	0.00016534
38	Yes	6	0.00000001	0.00015606
39	Yes	4	0.00000001	0.00025014
40	Yes	4	0.00000001	0.00066242
41	Yes	4	0.00000001	0.00088327
42	Yes	4	0.00000001	0.00051923
43	Yes	4	0.00000001	0.00070213
44	Yes	5	0.00000001	0.00006755
45	Yes	4	0.00000001	0.00028103
46	Yes	4	0.00000001	0.00071125
47	Yes	4	0.00000001	0.00059362
48	Yes	4	0.00000001	0.00054881
49	Yes	5	0.00000001	0.00007051
50	Yes	4	0.00000001	0.00064988

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	178 - 129.87	32.718	39	1.8012	0.0256
L2	134.12 - 84.83	17.615	39	1.3603	0.0102
L3	90.1633 - 41.2833	7.459	39	0.8228	0.0040
L4	47.7 - 0	2.004	39	0.3880	0.0014

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	Site Pro 1 RMQP-496-HK + PRK-1245 + HRK12 12.5' Platform with Handrails and Kickers	39	32.718	1.8012	0.0258	31650
168.00	Platform Mount [16' LP 403-1]	39	29.045	1.7073	0.0218	15825
156.00	Platform Mount [LP 303-1_HR-1]	39	24.744	1.5916	0.0172	7192
75.00	4'x2'' Horizontal Mount Pipe	39	5.047	0.6536	0.0029	5413

Maximum Tower Deflections - Design Wind

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

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	178 - 129.87	139.810	2	7.6973	0.1063
L2	134.12 - 84.83	75.374	2	5.8242	0.0419
L3	90.1633 - 41.2833	31.932	2	3.5243	0.0163
L4	47.7 - 0	8.577	2	1.6610	0.0058

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	Site Pro 1 RMQP-496-HK + PRK-1245 + HRK12 12.5' Platform with Handrails and Kickers	2	139.810	7.6973	0.1095	7653
168.00	Platform Mount [16' LP 403-1]	2	124.147	7.2992	0.0925	3825
156.00	Platform Mount [LP 303-1_HR-1]	2	105.804	6.8082	0.0731	1735
75.00	4'x2" Horizontal Mount Pipe	2	21.605	2.7992	0.0121	1268

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	178 - 129.87 (1)	TP29.64x19.5x0.25	48.13	0.00	0.0	22.6105	-13.30	1322.71	0.010
L2	129.87 - 84.83 (2)	TP38.5x28.2446x0.375	49.29	0.00	0.0	44.0575	-22.70	2577.36	0.009
L3	84.83 - 41.2833 (3)	TP46.8x36.6403x0.4375	48.88	0.00	0.0	62.5281	-35.66	3657.89	0.010
L4	41.2833 - 0 (4)	TP54.5x44.5913x0.5	47.70	0.00	0.0	85.6980	-55.03	5013.33	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	178 - 129.87 (1)	TP29.64x19.5x0.25	585.75	936.75	0.625	0.00	936.75	0.000
L2	129.87 - 84.83 (2)	TP38.5x28.2446x0.375	1452.44	2463.13	0.590	0.00	2463.13	0.000
L3	84.83 - 41.2833 (3)	TP46.8x36.6403x0.4375	2466.03	4208.93	0.586	0.00	4208.93	0.000
L4	41.2833 - 0 (4)	TP54.5x44.5913x0.5	3797.83	6831.09	0.556	0.00	6831.09	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	178 - 129.87 (1)	TP29.64x19.5x0.25	17.69	396.81	0.045	3.47	990.22	0.004
L2	129.87 - 84.83 (2)	TP38.5x28.2446x0.375	21.77	773.21	0.028	3.45	2506.45	0.001
L3	84.83 - 41.2833 (3)	TP46.8x36.6403x0.4375	25.87	1097.37	0.024	3.44	4327.36	0.001
L4	41.2833 - 0 (4)	TP54.5x44.5913x0.5	29.70	1504.00	0.020	3.44	7112.49	0.000

Pole Interaction Design Data

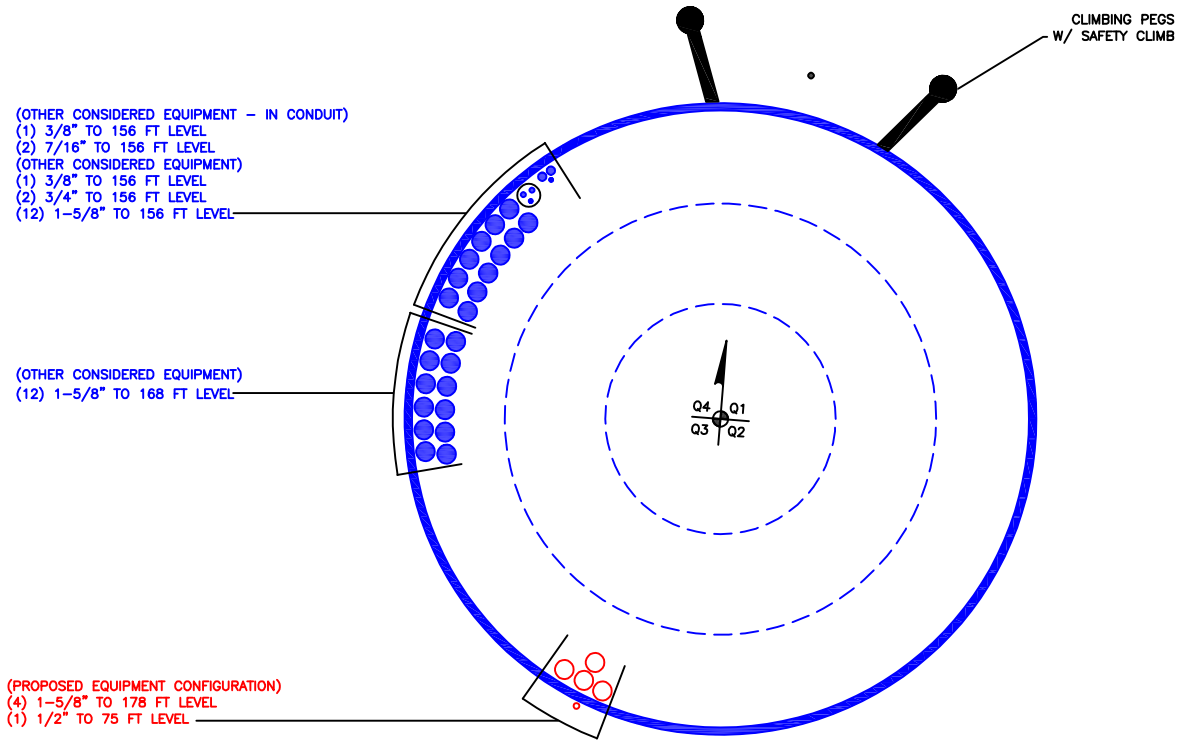
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	178 - 129.87 (1)	0.010	0.625	0.000	0.045	0.004	0.638	1.050	4.8.2
L2	129.87 - 84.83 (2)	0.009	0.590	0.000	0.028	0.001	0.599	1.050	4.8.2
L3	84.83 - 41.2833 (3)	0.010	0.586	0.000	0.024	0.001	0.596	1.050	4.8.2
L4	41.2833 - 0 (4)	0.011	0.556	0.000	0.020	0.000	0.567	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	178 - 129.87	Pole	TP29.64x19.5x0.25	1	-13.30	1388.85	60.7	Pass
L2	129.87 - 84.83	Pole	TP38.5x28.2446x0.375	2	-22.70	2706.23	57.1	Pass
L3	84.83 - 41.2833	Pole	TP46.8x36.6403x0.4375	3	-35.66	3840.78	56.8	Pass
L4	41.2833 - 0	Pole	TP54.5x44.5913x0.5	4	-55.03	5264.00	54.0	Pass
							Summary	
						Pole (L1)	60.7	Pass
						RATING =	**60.7**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


CLIMBING PEGS
W/ SAFETY CLIMB
(OTHER CONSIDERED EQUIPMENT – IN CONDUIT)
(1) 3/8" TO 156 FT LEVEL
(2) 7/16" TO 156 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(1) 3/8" TO 156 FT LEVEL
(2) 3/4" TO 156 FT LEVEL
(12) 1-5/8" TO 156 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(12) 1-5/8" TO 168 FT LEVEL
Q4
Q1
Q3
Q2
(PROPOSED EQUIPMENT CONFIGURATION)
(4) 1-5/8" TO 178 FT LEVEL
(1) 1/2" TO 75 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

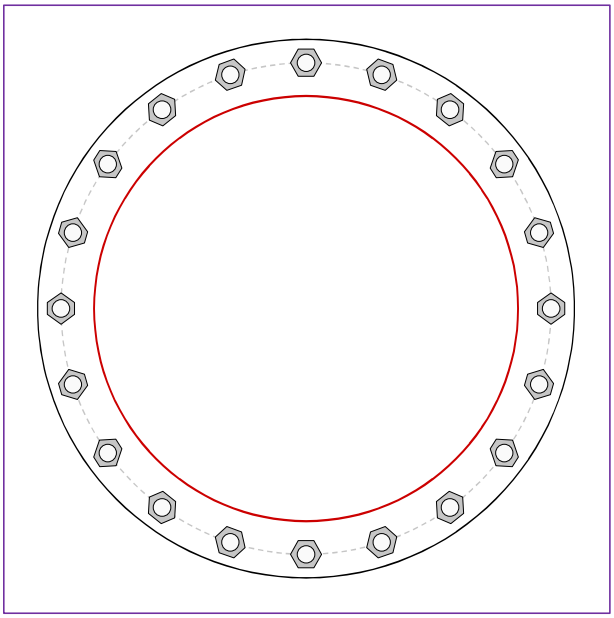
Monopole Base Plate Connection

Site Info	
BU #	876369
Site Name	NTON / BUCKLEY BROA
Order #	538773 Rev. 1

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	1.0625

Applied Loads	
Moment (kip-ft)	3797.84
Axial Force (kips)	55.03
Shear Force (kips)	29.70

**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 63" BC

Base Plate Data

69" OD x 2.25" Plate (A871 Gr. 60; Fy=60 ksi, Fu=75 ksi)

Stiffener Data

N/A

Pole Data

54.5" x 0.5" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

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

Pu_c = 147.36	ϕPn_c = 268.39	**Stress Rating**
Vu = 1.49	ϕVn = 120.77	**52.3%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	34.65	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**61.1%**	**Pass**

Pier and Pad Foundation

BU # :	876369
Site Name:	HARWINTON / BU
App. Number:	538773 Rev. 1

TIA-222 Revision:	H
Tower Type:	Monopole

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

Superstructure Analysis Reactions

Compression, P_{comp}:	55.05	kips
Base Shear, Vu_comp:	29.67	kips
Moment, M_u:	3797.84	ft-kips
Tower Height, **H**:	178	ft
BP Dist. Above Fdn, bp_{dist}:	5.5	in

Pier Properties

Pier Shape:	Square	
Pier Diameter, **dpier**:	7	ft
Ext. Above Grade, **E**:	1	ft
Pier Rebar Size, **Sc**:	8	
Pier Rebar Quantity, **mc**:	46	
Pier Tie/Spiral Size, **St**:	4	
Pier Tie/Spiral Quantity, **mt**:	5	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties

Depth, **D**:	6.5	ft
Pad Width, W_1:	28	ft
Pad Thickness, **T**:	3	ft
Pad Rebar Size (Top dir.2), Sp_{top2}:	8	
Pad Rebar Quantity (Top dir. 2), mp_{top2}:	15	
Pad Rebar Size (Bottom dir. 2), Sp_2:	8	
Pad Rebar Quantity (Bottom dir. 2), mp_2:	34	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties

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

Soil Properties

Total Soil Unit Weight, γ:	125	pcf
Ultimate Gross Bearing, Qult:	8.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, φ:	38	degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:	0.6	
Neglected Depth, **N**:	4.00	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	2	ft

<--Toggle between Gross and Net

Foundation Analysis Checks

	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	316.01	29.67	**8.9%**	**Pass**
Bearing Pressure (ksf)	6.00	1.67	**27.8%**	**Pass**
*Overturning (kip*ft)*	6058.82	4033.96	**66.6%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	5906.85	3931.36	**63.4%**	**Pass**
Pier Compression (kip)	31187.52	89.24	**0.3%**	**Pass**
*Pad Flexure (kip*ft)*	3722.15	1652.38	**42.3%**	**Pass**
Pad Shear - 1-way (kips)	1004.09	224.31	**21.3%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.190	0.038	**19.2%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	3015.04	2358.81	**74.5%**	**Pass**

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

Soil Rating*:	**66.6%**
Structural Rating*:	**74.5%**

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 840.53 ft (NAVD 88)
Latitude: 41.757264
Longitude: -73.052556

Wind

Results:

Wind Speed:	118 Vmph	120 mph per municipality specific structural parameters
10-year MRI	76 Vmph	
25-year MRI	85 Vmph	
50-year MRI	90 Vmph	
100-year MRI	97 Vmph	

Data Accessed: Mon Mar 15 2021

Date Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, and Section 26.5.2, incorporating errata of March 12, 2014

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.

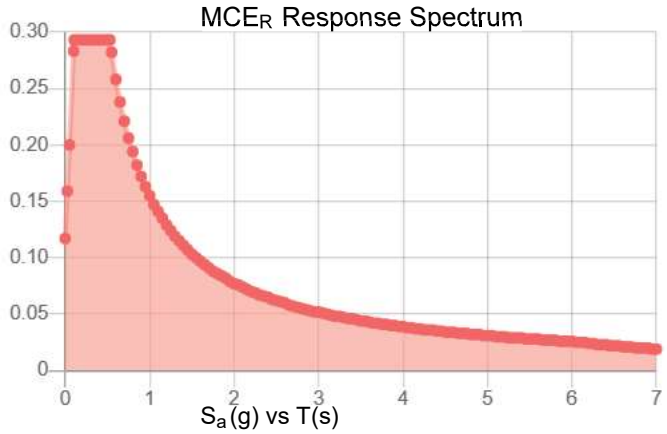
Seismic

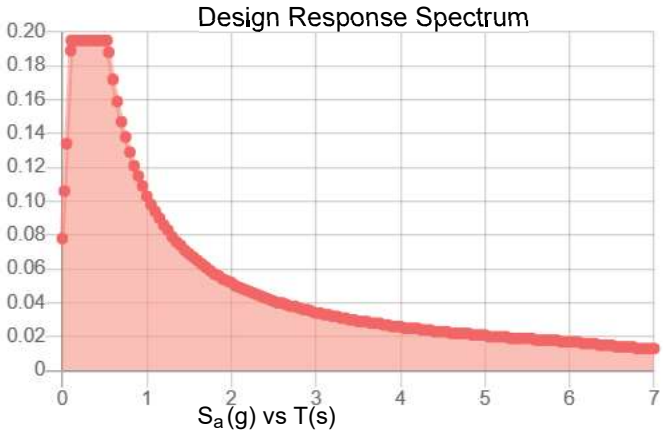
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.183	S_{DS} :	0.195
S_1 :	0.065	S_{D1} :	0.103
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.093
S_{MS} :	0.293	PGA_M :	0.148
S_{M1} :	0.155	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Mon Mar 15 2021

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:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Mon Mar 15 2021

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

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

Exhibit E

Mount Analysis

Date: **March 11, 2021**

Darcy Tarr
Crown Castle
6325 Ardrey Kell Road, Suite 600
Charlotte, NC 28277
(704) 405-6589

GPD Engineering and Architecture
Professional Corporation
520 South Main Street, Suite 2531
Akron, Ohio 44311
(216) 927-8663
CrownMA@gpdgroup.com

Subject:	**Mount Replacement Analysis Report**	
Carrier Designation:	***Sprint PCS* Loading Modification**	
	Carrier Site Number:	CTNH558A
	Carrier Site Name:	CTNH558A
Crown Castle Designation:	**Crown Castle BU Number:**	876369
	Crown Castle Site Name:	HARWINTON / BUCKLEY BROADCASTI
	Crown Castle JDE Job Number:	628849
	Crown Castle Order Number:	538773 Rev. 1
Engineering Firm Designation:	**GPD Report Designation:**	2021777.876369.02
Site Data:	**64 Hungerford Lane, Harwinton, Litchfield County, CT 06791** **Latitude 41° 45' 26.15" Longitude -73° 3' 9.20"**	
Structure Information:	**Tower Height & Type:**	**178.0 ft Monopole Tower**
	Mount Elevation:	**178.0 ft**
	Mount Type:	**12.5 ft Platform Mount**

Dear Darcy Tarr,

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

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

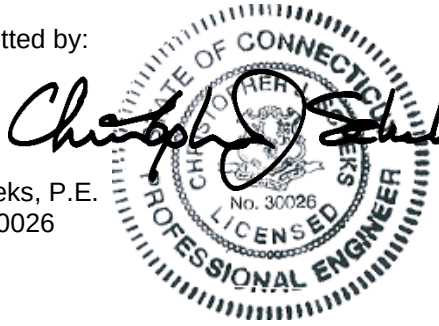
Platform Mount **Sufficient Capacity – 40.9%***

***See Section 4.1 of this report for the loading and strucrural modifications required in order for the mount to support the loading listed in Table 1.**

This analysis utilizes an ultimate 3-second gust wind speed of 120 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Mount analysis prepared by: Matt Steward

Respectfully Submitted by:



Christopher J. Scheks, P.E. 3/11/2021
Connecticut #: 0030026

TABLE OF CONTENTS

1) INTRODUCTION

This is a Proposed 12.5' Platform Mount designed by Site Pro 1 (Part #: RMQP-496-HK, dated 7/14/2014).

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	120 mph
Exposure Category:	C
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 Details
178.0	180.0	3	Ericsson	AIR6449 B41_T-MOBILE	12.5 ft. Platform Mount
		3	RFS/Celwave	APX16DWV-16DWV-S-E-A20	
		3	RFS/Celwave	APXVAALL24_43-U-NA20_TMO	
		3	Ericsson	RADIO 4415 B66A_CCIV3	
		3	Ericsson	RADIO 4424 B25_TMO	
		3	Ericsson	RADIO 4449 B71 B85A_T-MOBILE	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
CCI Application	Crown Order Number 538773 Rev. 1	-	CCI
Mount Design	Site Pro 1 Part #: RMQP-496-HK, dated 7/14/2014	-	Site Pro 1
RF Data Sheet	Sprint Retain RFDS #: CTNH558A, dated 1/15/2021	-	CCI

3.1) Analysis Method

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

A tool internally developed by GPD, using Microsoft Excel, was used to calculate wind loading on all appurtenances, dishes, and mount members for various load cases. Selected output from the analysis is included in Appendix B.

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

3.2) Assumptions

1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and the referenced drawings.
3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
4) This analysis assumes all information reference in Table 2 is current and correct.
5) Steel grades have been assumed as follows, unless noted otherwise:

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

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

4) ANALYSIS RESULTS

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

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1,3	Standoff Arm	M46	178.0	16.9	Pass
	Cross Arm	M47		15.7	Pass
	Grating Angle	M49		39.7	Pass
	Toe Rail	M61		11.0	Pass
	Connection Plate (End)	M96		24.5	Pass
	Connection Plate (Mid)	M55		27.6	Pass
	Pipe Mount	C3		40.9	Pass
	Support Rail	M73		27.8	Pass
	Support Rail Corner	M90		38.9	Pass
	Platform Reinforcement Kicker	M92A		9.4	Pass
	Reinforcement Connection Plate	M91A		8.1	Pass
2,3	Mount to Tower Connection	-		9.5	Pass
	Tieback to Tower Connection	-		6.5	Pass

Structure Rating (max from all components) =	**40.9%[3]**

Notes:
1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
2) See additional documentation in "Appendix D - Additional Calculations" for calculations supporting the % capacity consumed.
3) Ratings per TIA-222-H section 15.5.

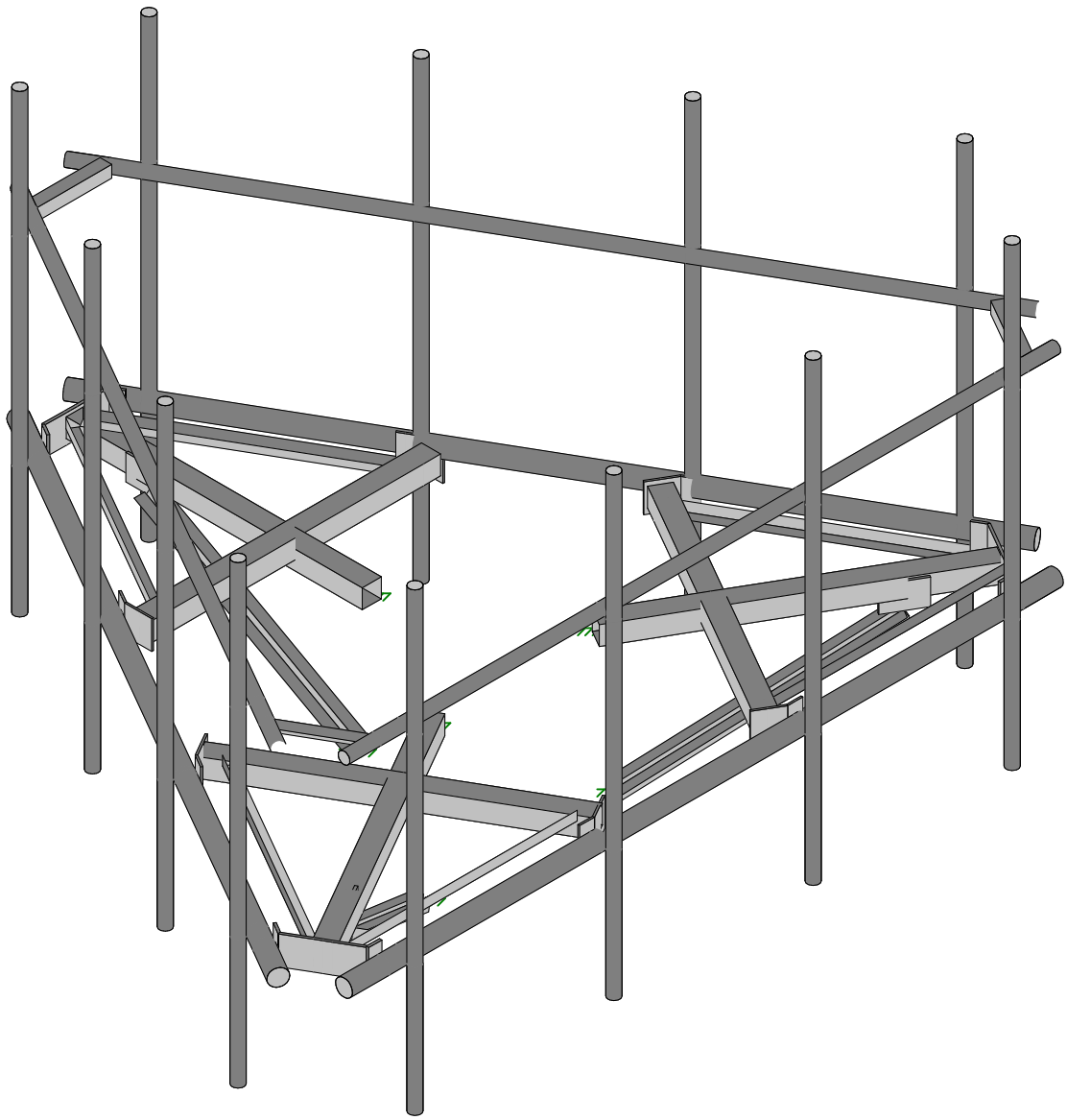
4.1) Recommendations

The mount has sufficient capacity to carry the proposed loading configuration. In order for the results of the analysis to be considered valid, the mount listed below shall be installed to support the proposed loading configuration.

Site Pro 1 RMQP-496-HK

APPENDIX A

WIRE FRAME AND RENDERED MODELS



Envelope Only Solution

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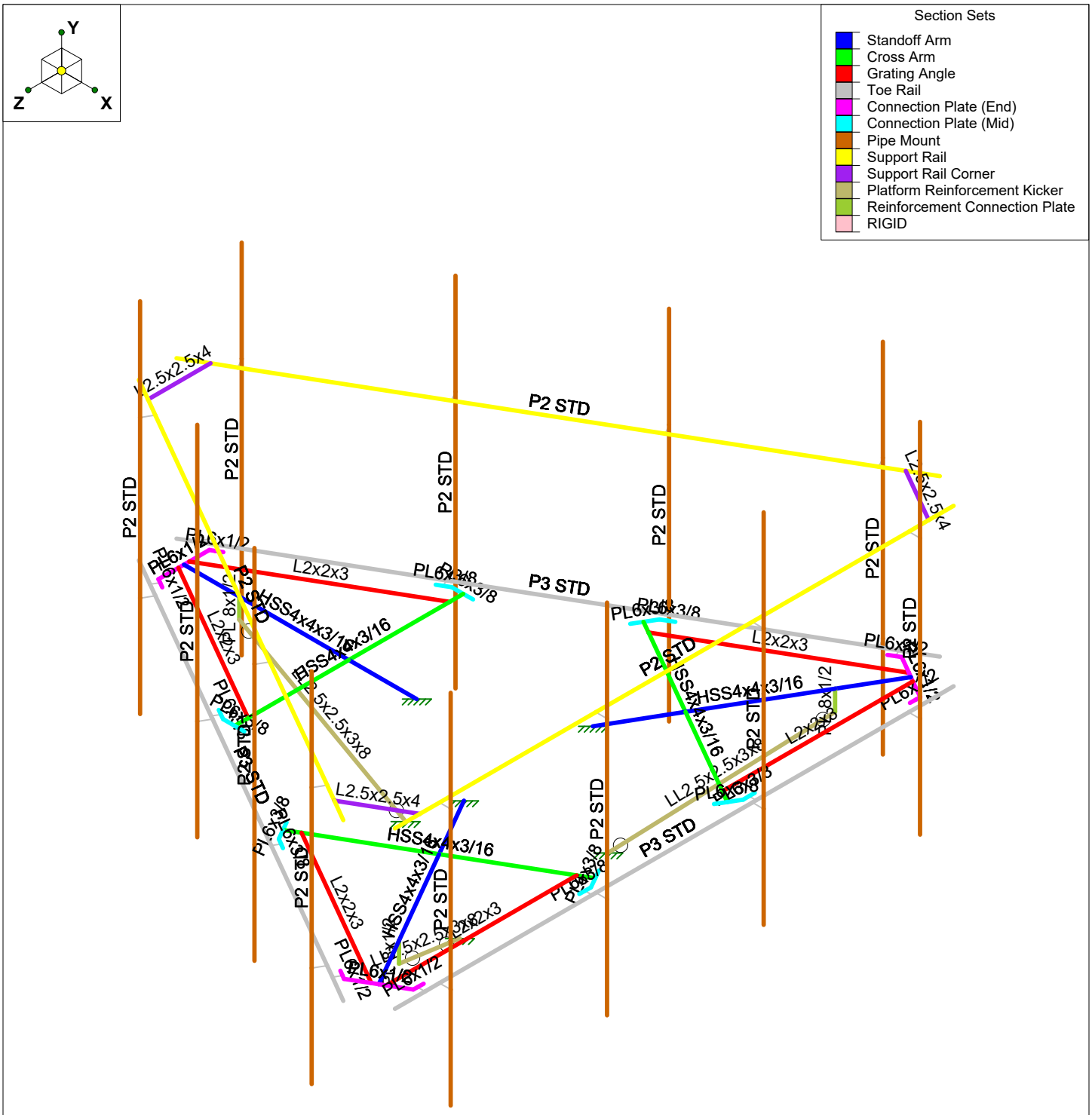

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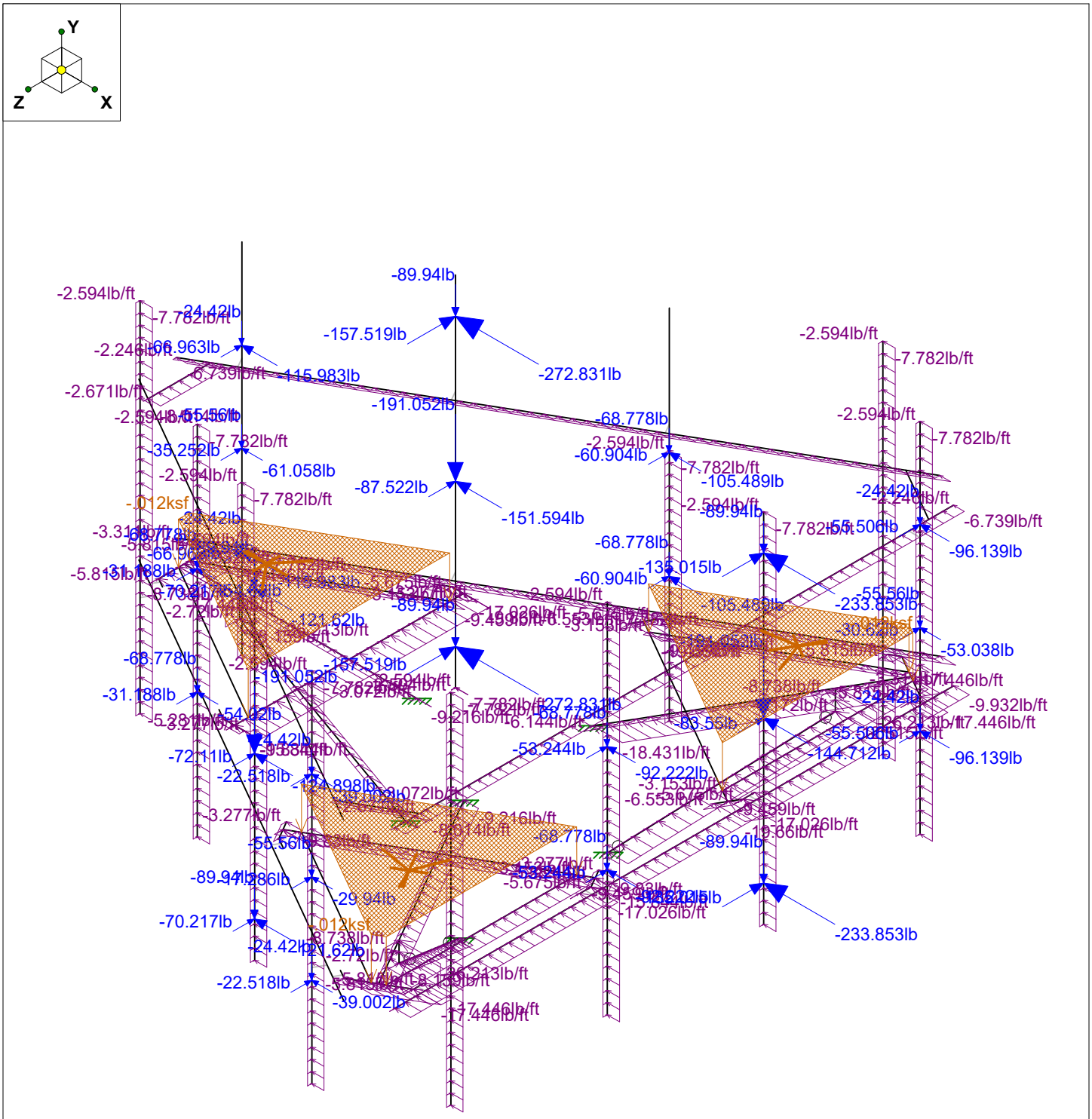

Loads: LC 16, 1.2 Dead + 1.0 Wind @ 210° - No Ice
Envelope Only Solution

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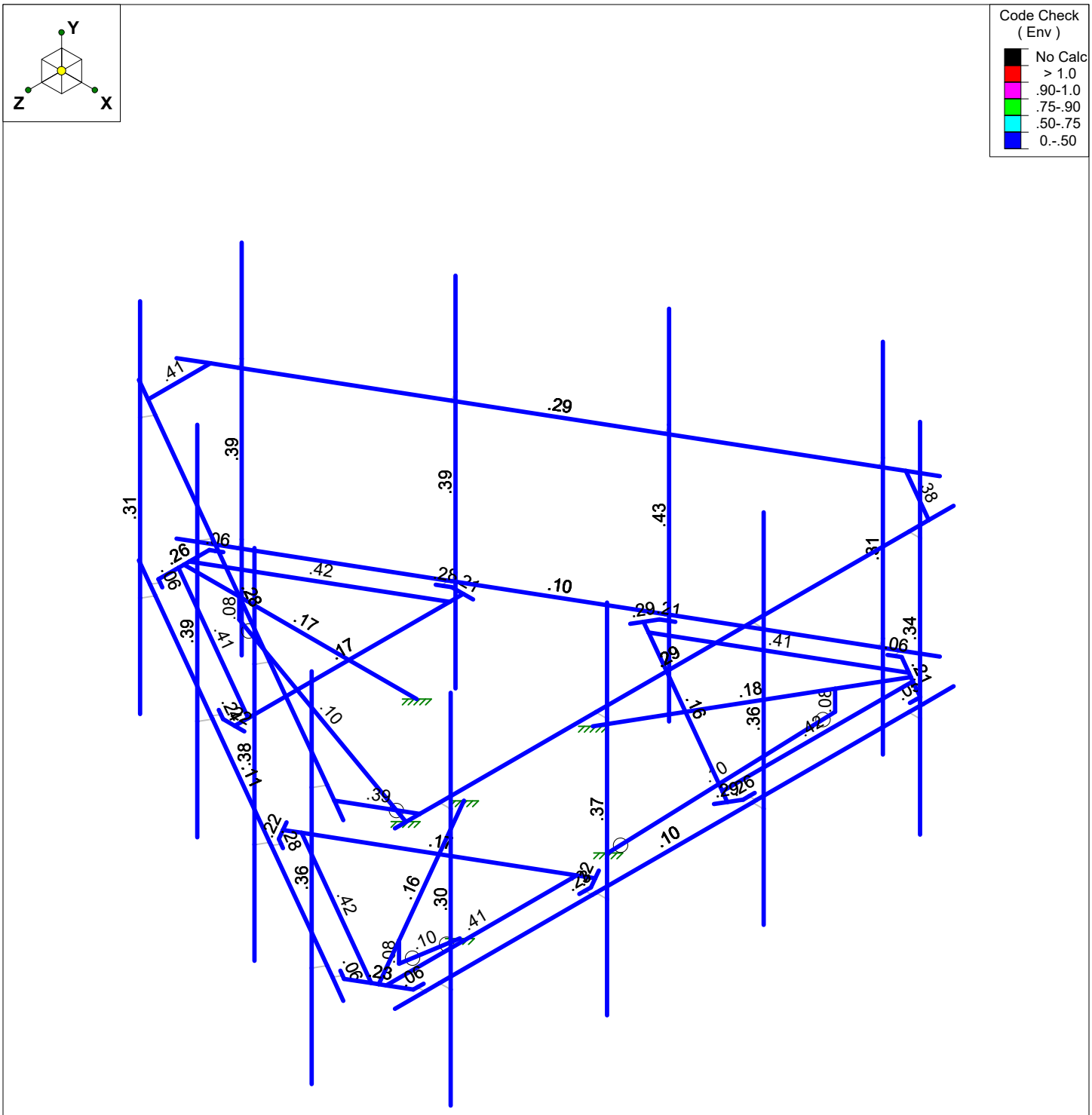

Member Code Checks Displayed (Enveloped)
Envelope Only Solution

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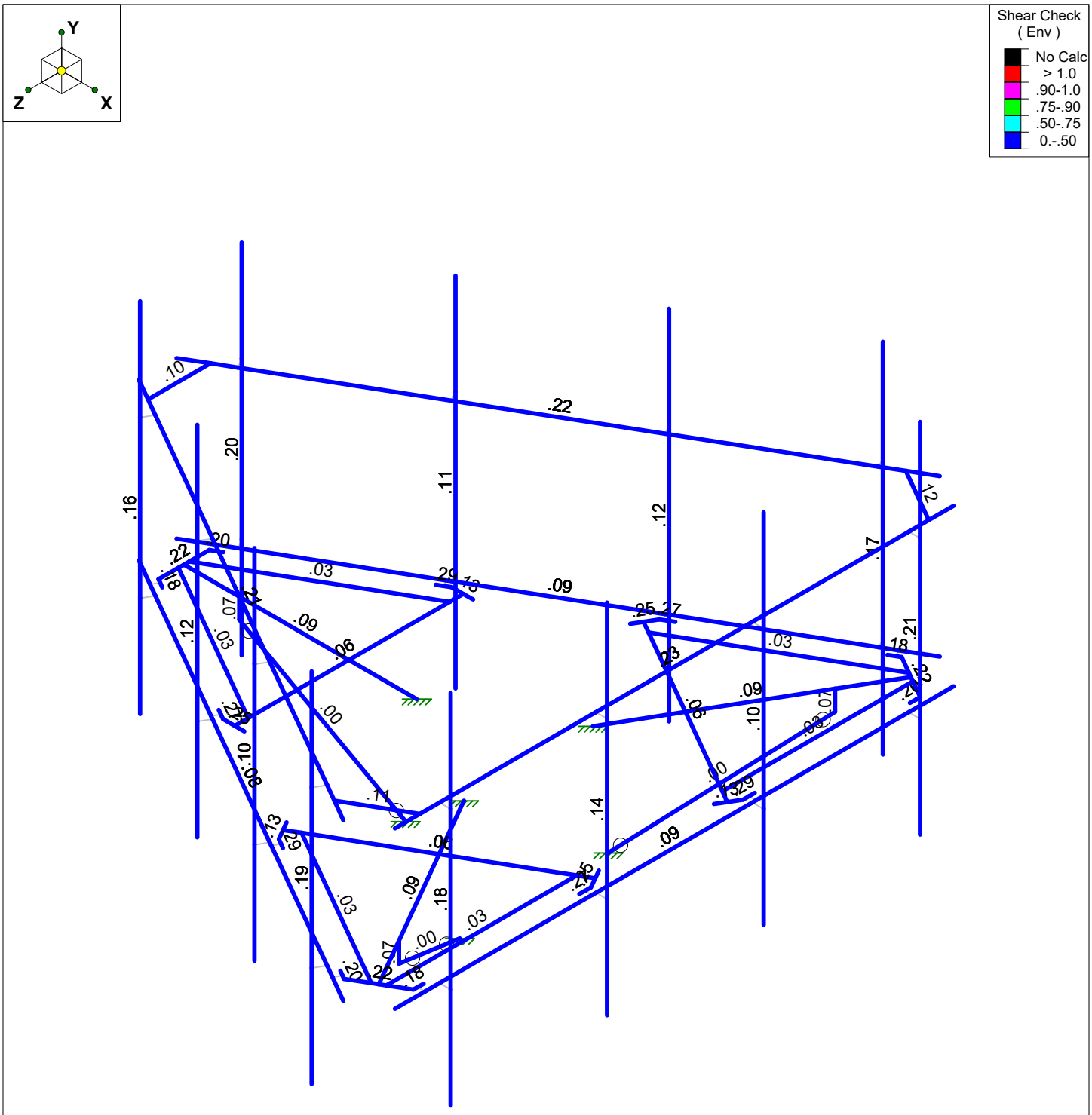

Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

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APPENDIX B

SOFTWARE INPUT CALCULATIONS

TIA-222-H: Mount Analysis Wind Loading
876369 - HARWINTON / BUCKLEY BROADCASTI
2021777.876369.02

Structure Information		
Structure Type:	Monopole	
Structure Height:	178	ft
z (Mount Centerline) =	178	ft
Gh (Mount Gust Effect Factor) =	1.00	
Risk Category:	II	

Code Specifications		
TIA/EIA Code:	H	
Ultimate Wind Speed (No Ice) =	120	mph (3-s gust)
Ultimate Wind Speed (With Ice) =	50	mph (3-s gust)
Ice Thickness	1.5	in
Exposure Category	C	
Tower Base Elevation (AMSL)	841	ft

Topographic Inputs	
Topographic Feature:	N/A

Section Sets										No Ice	Ice Output	
Mount Components	Member Type	Length (in)	Side (Longest seeing wind) (in)	Other Side (in)	Calculated Dc, for ice weight (in)	Dc, for ice weight (in)	Area Type (Round or Flat)	K_a	User's Wind Multiplier	Normal Wind Force (lb/ft)*	Normal Ice Wind Force (lb/ft)*	Ice Weight (lb/ft)*
Standoff Arm	Square/Rect.	62.500	4	4		5.66	Flat	0.90	1.00	27.31	6.12	16.12
Cross Arm	Square/Rect.	61.000	4	4		5.66	Flat	0.90	1.00	27.10	6.09	16.12
Grating Angle	Angle	52.000	2	2		2.83	Flat	0.90	1.00	16.18	4.20	9.99
Toe Rail	Pipe	150.000	3.5	3.5		3.50	Round	0.90	1.00	16.99	5.53	11.44
Connection Plate (End)	Square/Rect.	19.000	6	0.5		6.02	Flat	0.90	1.00	29.84	6.80	16.91
Connection Plate (Mid)	Square/Rect.	8.500	6	0.375		6.01	Flat	0.90	1.00	29.13	6.80	16.89
Pipe Mount	Pipe	96.000	2.375	2.375		2.38	Round	0.90	1.00	11.53	4.18	9.00
Support Rail	Pipe	150.000	2.375	2.375		2.38	Round	0.90	1.00	11.53	4.99	9.00
Support Rail Corner	Angle	15.000	2.5	2.5		3.54	Flat	0.90	1.00	13.71	3.85	11.52
Platform Reinforcement Kicker	Other	50.000	2.5	5.5	5.5	5.50	Flat	0.90	1.00	18.54	4.60	15.78
Reinforcement Connection Plate	Square/Rect.	4.000	8	0.5		8.02	Flat	0.90	1.00	38.83	8.49	21.24

*All forces are unfactored.

Appurtenances							Shielding			No Ice		Ice Output	
Appurtenance Model	Loading Elevation (ft)	Height (in)	Front Width (in)	Side Depth (in)	Wt (lbs)	Type for Area	Front Shielding (%)	Side Shielding (%)	K_a and/or block shielding	Normal Wind Force (lbs)*	Wt (lbs) (no ice)*	Normal Wind Force (lbs) (w/ ice)*	Wt (lbs) (only ice)*
(3) AIR6449 B41_T-MOBILE	180	33.11	20.51	8.54	114.63	Flat	0%	0%	0.90	247.82	114.63	50.54	157.89
(3) APX16DWV-16DWV-S-E-A20	180	55.9	13.3	3.15	40.7	CFD	0%	0%	0.90	274.14	40.70	64.14	143.46
(3) APXVAALL24_43-U-NA20_TMO	180	95.9	24	8.5	149.9	CFD	0%	0%	0.90	642.42	149.90	132.67	439.05
(3) RADIO 4415 B66A_CCIV3	180	14.9	13.2	5.4	46.3	Flat	0%	0%	0.90	71.77	46.30	16.62	55.31
(3) RADIO 4424 B25_TMO	180	17.1	14.4	11.3	86	Flat	0%	0%	0.90	89.86	86.00	20.21	88.35
(3) RADIO 4449 B71 B85A_T-MOBILE	180	17.91	13.2	10.63	73.21	Flat	0%	0%	0.90	86.27	73.21	19.53	83.88

*All forces are unfactored.

APPENDIX C

SOFTWARE ANALYSIS OUTPUT

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E..Density[k/ft...	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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Standoff Arm	HSS4x4x3/16	None	None	A500 Gr.B Rect	Typical	2.859	6.944	6.944	10.39
2	Cross Arm	HSS4x4x3/16	None	None	A500 Gr.B Rect	Typical	2.859	6.944	6.944	10.39
3	Grating Angle	L2x2x3	None	None	A36 Gr.36	Typical	.722	.271	.271	.009
4	Toe Rail	P3 STD	None	None	A53 Gr.B	Typical	2.228	3.017	3.017	6.034
5	Connection Plate (End)	PL6x1/2	None	None	A36 Gr.36	Typical	3	.063	9	.237
6	Connection Plate (Mid)	PL6x3/8	None	None	A36 Gr.36	Typical	2.25	.026	6.75	.101
7	Pipe Mount	P2 STD	None	None	A53 Gr.B	Typical	1.075	.666	.666	1.331
8	Support Rail	P2 STD	None	None	A53 Gr.B	Typical	1.075	.666	.666	1.331
9	Support Rail Corner	L2.5x2.5x4	None	None	A36 Gr.36	Typical	1.19	.692	.692	.026
10	Platform Reinforcement ...	LL2.5x2.5x3x8	None	None	A36 Gr.36	Typical	1.805	2.703	1.093	.02
11	Reinforcement Connecti...	PL 8x1/2	None	None	A36 Gr.36	Typical	4	.083	21.333	.32

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M46	SA	N88			Standoff Arm	None	None	A500 Gr.B...	Typical
2	M47	N89	N90			Cross Arm	None	None	A500 Gr.B...	Typical
3	M48	N92	N93			Grating Angle	None	None	A36 Gr.36	Typical
4	M49	N94	N95		270	Grating Angle	None	None	A36 Gr.36	Typical
5	M50	N96	N97			Connection Pl...	None	None	A36 Gr.36	Typical
6	M51	N97	N98			Connection Pl...	None	None	A36 Gr.36	Typical
7	M52	N98	N99			Connection Pl...	None	None	A36 Gr.36	Typical
8	M53	N100	N101			Connection Pl...	None	None	A36 Gr.36	Typical
9	M54	N101	N102			Connection Pl...	None	None	A36 Gr.36	Typical
10	M55	N103	N104			Connection Pl...	None	None	A36 Gr.36	Typical
11	M56	N104	N105			Connection Pl...	None	None	A36 Gr.36	Typical
12	M57	N106	N107			RIGID	None	None	RIGID	Typical
13	M58	N108	N109			RIGID	None	None	RIGID	Typical
14	M59	N110	N111			RIGID	None	None	RIGID	Typical
15	M60	N112	N113			RIGID	None	None	RIGID	Typical
16	M16	N29	N30			Toe Rail	None	None	A53 Gr.B	Typical
17	M46A	SB	N93A			Standoff Arm	None	None	A500 Gr.B...	Typical
18	M47A	N94A	N95A			Cross Arm	None	None	A500 Gr.B...	Typical
19	M48A	N97A	N98A			Grating Angle	None	None	A36 Gr.36	Typical
20	M49A	N99A	N100A		270	Grating Angle	None	None	A36 Gr.36	Typical
21	M50A	N101A	N102A			Connection Pl...	None	None	A36 Gr.36	Typical
22	M51A	N102A	N103A			Connection Pl...	None	None	A36 Gr.36	Typical
23	M52A	N103A	N104A			Connection Pl...	None	None	A36 Gr.36	Typical
24	M53A	N105A	N106A			Connection Pl...	None	None	A36 Gr.36	Typical
25	M54A	N106A	N107A			Connection Pl...	None	None	A36 Gr.36	Typical
26	M55A	N108A	N109A			Connection Pl...	None	None	A36 Gr.36	Typical
27	M56A	N109A	N110A			Connection Pl...	None	None	A36 Gr.36	Typical
28	M57A	N111A	N112A			RIGID	None	None	RIGID	Typical
29	M58A	N113A	N114			RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
30	M59A	N115	N116			RIGID	None	None	RIGID	Typical
31	M60A	N117	N118			RIGID	None	None	RIGID	Typical
32	M61	N119	N120			Toe Rail	None	None	A53 Gr.B	Typical
33	M91	SC	N183			Standoff Arm	None	None	A500 Gr.B...	Typical
34	M92	N184	N185			Cross Arm	None	None	A500 Gr.B...	Typical
35	M93	N187	N188			Grating Angle	None	None	A36 Gr.36	Typical
36	M94	N189	N190		270	Grating Angle	None	None	A36 Gr.36	Typical
37	M95	N191	N192			Connection Pl...	None	None	A36 Gr.36	Typical
38	M96	N192	N193			Connection Pl...	None	None	A36 Gr.36	Typical
39	M97	N193	N194			Connection Pl...	None	None	A36 Gr.36	Typical
40	M98	N195	N196			Connection Pl...	None	None	A36 Gr.36	Typical
41	M99	N196	N197			Connection Pl...	None	None	A36 Gr.36	Typical
42	M100	N198	N199			Connection Pl...	None	None	A36 Gr.36	Typical
43	M101	N199	N200			Connection Pl...	None	None	A36 Gr.36	Typical
44	M102	N201	N202			RIGID	None	None	RIGID	Typical
45	M103	N203	N204			RIGID	None	None	RIGID	Typical
46	M104	N205	N206			RIGID	None	None	RIGID	Typical
47	M105	N207	N208			RIGID	None	None	RIGID	Typical
48	M106	N209	N210			Toe Rail	None	None	A53 Gr.B	Typical
49	M49B	N89A	N90A			RIGID	None	None	RIGID	Typical
50	M50B	N91A	N92A			RIGID	None	None	RIGID	Typical
51	M51B	N93B	N94B			RIGID	None	None	RIGID	Typical
52	M52B	N95B	N96B			RIGID	None	None	RIGID	Typical
53	A1	N97B	N101B			Pipe Mount	None	None	A53 Gr.B	Typical
54	A2	N98B	N102B			Pipe Mount	None	None	A53 Gr.B	Typical
55	A3	N99B	N103B			Pipe Mount	None	None	A53 Gr.B	Typical
56	A4	N100B	N104B			Pipe Mount	None	None	A53 Gr.B	Typical
57	M57B	N105B	N106B			RIGID	None	None	RIGID	Typical
58	M58B	N107B	N108B			RIGID	None	None	RIGID	Typical
59	M59B	N109B	N110B			RIGID	None	None	RIGID	Typical
60	M60B	N111B	N112B			RIGID	None	None	RIGID	Typical
61	B1	N113B	N117A			Pipe Mount	None	None	A53 Gr.B	Typical
62	B2	N114A	N118A			Pipe Mount	None	None	A53 Gr.B	Typical
63	B3	N115A	N119A			Pipe Mount	None	None	A53 Gr.B	Typical
64	B4	N116A	N120A			Pipe Mount	None	None	A53 Gr.B	Typical
65	M65	N121	N122			RIGID	None	None	RIGID	Typical
66	M66	N123	N124			RIGID	None	None	RIGID	Typical
67	M67	N125	N126			RIGID	None	None	RIGID	Typical
68	M68	N127	N128			RIGID	None	None	RIGID	Typical
69	C1	N129	N133			Pipe Mount	None	None	A53 Gr.B	Typical
70	C2	N130	N134			Pipe Mount	None	None	A53 Gr.B	Typical
71	C3	N131	N135			Pipe Mount	None	None	A53 Gr.B	Typical
72	C4	N132	N136			Pipe Mount	None	None	A53 Gr.B	Typical
73	M73	N137	N138			Support Rail	None	None	A53 Gr.B	Typical
74	M74	N139	N140			RIGID	None	None	RIGID	Typical
75	M75	N141	N142			RIGID	None	None	RIGID	Typical
76	M76	N143	N144			RIGID	None	None	RIGID	Typical
77	M77	N145	N146			RIGID	None	None	RIGID	Typical
78	M78	N147	N148		180	Support Rail C...	None	None	A36 Gr.36	Typical
79	M79	N149	N150			Support Rail	None	None	A53 Gr.B	Typical
80	M80	N151	N152			RIGID	None	None	RIGID	Typical
81	M81	N153	N154			RIGID	None	None	RIGID	Typical
82	M82	N155	N156			RIGID	None	None	RIGID	Typical
83	M83	N157	N158			RIGID	None	None	RIGID	Typical
84	M84	N159	N160		180	Support Rail C...	None	None	A36 Gr.36	Typical
85	M85	N161	N162			Support Rail	None	None	A53 Gr.B	Typical
86	M86	N163	N164			RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
87	M87	N165	N166			RIGID	None	None	RIGID	Typical
88	M88	N167	N168			RIGID	None	None	RIGID	Typical
89	M89	N169	N170			RIGID	None	None	RIGID	Typical
90	M90	N171	N172		180	Support Rail C...	None	None	A36 Gr.36	Typical
91	M91A	N173	N174			Reinforcement...	None	None	A36 Gr.36	Typical
92	M92A	N174	RC			Platform Reinf...	None	None	A36 Gr.36	Typical
93	M93A	N177	N178		120	Reinforcement...	None	None	A36 Gr.36	Typical
94	M94A	N178	RA			Platform Reinf...	None	None	A36 Gr.36	Typical
95	M95A	N181	N182		240	Reinforcement...	None	None	A36 Gr.36	Typical
96	M96A	N182	RB			Platform Reinf...	None	None	A36 Gr.36	Typical

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	SA	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	SB	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	SC	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	RC	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	RA	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	RB	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

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 Dead	Yes	Y		1	1.4	0		0		0		0		0		0		0					
2	1.2 Dead + 1.0 Wind @ 0° - ..	Yes	Y		1	1.2	2	1	0		0		0		0		0		0					
3	0.9 Dead + 1.0 Wind @ 0° - ..	Yes	Y		1	.9	2	1	0		0		0		0		0		0					
4	1.2 Dead + 1.0 Wind @ 30° ..	Yes	Y		1	1.2	3	1	0		0		0		0		0		0					
5	0.9 Dead + 1.0 Wind @ 30° ..	Yes	Y		1	.9	3	1	0		0		0		0		0		0					
6	1.2 Dead + 1.0 Wind @ 60° ..	Yes	Y		1	1.2	4	1	0		0		0		0		0		0					
7	0.9 Dead + 1.0 Wind @ 60° ..	Yes	Y		1	.9	4	1	0		0		0		0		0		0					
8	1.2 Dead + 1.0 Wind @ 90° ..	Yes	Y		1	1.2	5	1	0		0		0		0		0		0					
9	0.9 Dead + 1.0 Wind @ 90° ..	Yes	Y		1	.9	5	1	0		0		0		0		0		0					
10	1.2 Dead + 1.0 Wind @ 120...	Yes	Y		1	1.2	6	1	0		0		0		0		0		0					
11	0.9 Dead + 1.0 Wind @ 120...	Yes	Y		1	.9	6	1	0		0		0		0		0		0					
12	1.2 Dead + 1.0 Wind @ 150...	Yes	Y		1	1.2	7	1	0		0		0		0		0		0					
13	0.9 Dead + 1.0 Wind @ 150...	Yes	Y		1	.9	7	1	0		0		0		0		0		0					
14	1.2 Dead + 1.0 Wind @ 180...	Yes	Y		1	1.2	8	1	0		0		0		0		0		0					
15	0.9 Dead + 1.0 Wind @ 180...	Yes	Y		1	.9	8	1	0		0		0		0		0		0					
16	1.2 Dead + 1.0 Wind @ 210...	Yes	Y		1	1.2	9	1	0		0		0		0		0		0					
17	0.9 Dead + 1.0 Wind @ 210...	Yes	Y		1	.9	9	1	0		0		0		0		0		0					
18	1.2 Dead + 1.0 Wind @ 240...	Yes	Y		1	1.2	10	1	0		0		0		0		0		0					
19	0.9 Dead + 1.0 Wind @ 240...	Yes	Y		1	.9	10	1	0		0		0		0		0		0					
20	1.2 Dead + 1.0 Wind @ 270...	Yes	Y		1	1.2	11	1	0		0		0		0		0		0					
21	0.9 Dead + 1.0 Wind @ 270...	Yes	Y		1	.9	11	1	0		0		0		0		0		0					
22	1.2 Dead + 1.0 Wind @ 300...	Yes	Y		1	1.2	12	1	0		0		0		0		0		0					
23	0.9 Dead + 1.0 Wind @ 300...	Yes	Y		1	.9	12	1	0		0		0		0		0		0					
24	1.2 Dead + 1.0 Wind @ 330...	Yes	Y		1	1.2	13	1	0		0		0		0		0		0					
25	0.9 Dead + 1.0 Wind @ 330...	Yes	Y		1	.9	13	1	0		0		0		0		0		0					
26	1.2 Dead + 1.0 Ice Wind @ ...	Yes	Y		1	1.2	15	1	14	1		1	0		0		0		0					
27	1.2 Dead + 1.0 Ice Wind @ ...	Yes	Y		1	1.2	16	1	14	1		1	0		0		0		0					
28	1.2 Dead + 1.0 Ice Wind @ ...	Yes	Y		1	1.2	17	1	14	1		1	0		0		0		0					
29	1.2 Dead + 1.0 Ice Wind @ ...	Yes	Y		1	1.2	18	1	14	1		1	0		0		0		0					
30	1.2 Dead + 1.0 Ice Wind @ ...	Yes	Y		1	1.2	19	1	14	1		1	0		0		0		0					
31	1.2 Dead + 1.0 Ice Wind @ ...	Yes	Y		1	1.2	20	1	14	1		1	0		0		0		0					
32	1.2 Dead + 1.0 Ice Wind @ ...	Yes	Y		1	1.2	21	1	14	1		1	0		0		0		0					

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...
33	1.2 Dead + 1.0 Ice Wind @ ...	Yes	Y		1	1.2	22	1	14	1		1	0		0		0		0					
34	1.2 Dead + 1.0 Ice Wind @ ...	Yes	Y		1	1.2	23	1	14	1		1	0		0		0		0					
35	1.2 Dead + 1.0 Ice Wind @ ...	Yes	Y		1	1.2	24	1	14	1		1	0		0		0		0					
36	1.2 Dead + 1.0 Ice Wind @ ...	Yes	Y		1	1.2	25	1	14	1		1	0		0		0		0					
37	1.2 Dead + 1.0 Ice Wind @ ...	Yes	Y		1	1.2	26	1	14	1		1	0		0		0		0					
38	1.2 Dead + 1.5 Live_M - A1 ...	Yes	Y		1	1.2	27	1.5	2	.063	0		0		0		0		0					
39	1.2 Dead + 1.5 Live_M - A1 ...	Yes	Y		1	1.2	27	1.5	3	.063	0		0		0		0		0					
40	1.2 Dead + 1.5 Live_M - A1 ...	Yes	Y		1	1.2	27	1.5	4	.063	0		0		0		0		0					
41	1.2 Dead + 1.5 Live_M - A1 ...	Yes	Y		1	1.2	27	1.5	5	.063	0		0		0		0		0					
42	1.2 Dead + 1.5 Live_M - A1 ...	Yes	Y		1	1.2	27	1.5	6	.063	0		0		0		0		0					
43	1.2 Dead + 1.5 Live_M - A1 ...	Yes	Y		1	1.2	27	1.5	7	.063	0		0		0		0		0					
44	1.2 Dead + 1.5 Live_M - A1 ...	Yes	Y		1	1.2	27	1.5	8	.063	0		0		0		0		0					
45	1.2 Dead + 1.5 Live_M - A1 ...	Yes	Y		1	1.2	27	1.5	9	.063	0		0		0		0		0					
46	1.2 Dead + 1.5 Live_M - A1 ...	Yes	Y		1	1.2	27	1.5	10	.063	0		0		0		0		0					
47	1.2 Dead + 1.5 Live_M - A1 ...	Yes	Y		1	1.2	27	1.5	11	.063	0		0		0		0		0					
48	1.2 Dead + 1.5 Live_M - A1 ...	Yes	Y		1	1.2	27	1.5	12	.063	0		0		0		0		0					
49	1.2 Dead + 1.5 Live_M - A1 ...	Yes	Y		1	1.2	27	1.5	13	.063	0		0		0		0		0					
50	1.2 Dead + 1.5 Live_M - A2 ...	Yes	Y		1	1.2	28	1.5	2	.063	0		0		0		0		0					
51	1.2 Dead + 1.5 Live_M - A2 ...	Yes	Y		1	1.2	28	1.5	3	.063	0		0		0		0		0					
52	1.2 Dead + 1.5 Live_M - A2 ...	Yes	Y		1	1.2	28	1.5	4	.063	0		0		0		0		0					
53	1.2 Dead + 1.5 Live_M - A2 ...	Yes	Y		1	1.2	28	1.5	5	.063	0		0		0		0		0					
54	1.2 Dead + 1.5 Live_M - A2 ...	Yes	Y		1	1.2	28	1.5	6	.063	0		0		0		0		0					
55	1.2 Dead + 1.5 Live_M - A2 ...	Yes	Y		1	1.2	28	1.5	7	.063	0		0		0		0		0					
56	1.2 Dead + 1.5 Live_M - A2 ...	Yes	Y		1	1.2	28	1.5	8	.063	0		0		0		0		0					
57	1.2 Dead + 1.5 Live_M - A2 ...	Yes	Y		1	1.2	28	1.5	9	.063	0		0		0		0		0					
58	1.2 Dead + 1.5 Live_M - A2 ...	Yes	Y		1	1.2	28	1.5	10	.063	0		0		0		0		0					
59	1.2 Dead + 1.5 Live_M - A2 ...	Yes	Y		1	1.2	28	1.5	11	.063	0		0		0		0		0					
60	1.2 Dead + 1.5 Live_M - A2 ...	Yes	Y		1	1.2	28	1.5	12	.063	0		0		0		0		0					
61	1.2 Dead + 1.5 Live_M - A2 ...	Yes	Y		1	1.2	28	1.5	13	.063	0		0		0		0		0					
62	1.2 Dead + 1.5 Live_M - A3 ...	Yes	Y		1	1.2	29	1.5	2	.063	0		0		0		0		0					
63	1.2 Dead + 1.5 Live_M - A3 ...	Yes	Y		1	1.2	29	1.5	3	.063	0		0		0		0		0					
64	1.2 Dead + 1.5 Live_M - A3 ...	Yes	Y		1	1.2	29	1.5	4	.063	0		0		0		0		0					
65	1.2 Dead + 1.5 Live_M - A3 ...	Yes	Y		1	1.2	29	1.5	5	.063	0		0		0		0		0					
66	1.2 Dead + 1.5 Live_M - A3 ...	Yes	Y		1	1.2	29	1.5	6	.063	0		0		0		0		0					
67	1.2 Dead + 1.5 Live_M - A3 ...	Yes	Y		1	1.2	29	1.5	7	.063	0		0		0		0		0					
68	1.2 Dead + 1.5 Live_M - A3 ...	Yes	Y		1	1.2	29	1.5	8	.063	0		0		0		0		0					
69	1.2 Dead + 1.5 Live_M - A3 ...	Yes	Y		1	1.2	29	1.5	9	.063	0		0		0		0		0					
70	1.2 Dead + 1.5 Live_M - A3 ...	Yes	Y		1	1.2	29	1.5	10	.063	0		0		0		0		0					
71	1.2 Dead + 1.5 Live_M - A3 ...	Yes	Y		1	1.2	29	1.5	11	.063	0		0		0		0		0					
72	1.2 Dead + 1.5 Live_M - A3 ...	Yes	Y		1	1.2	29	1.5	12	.063	0		0		0		0		0					
73	1.2 Dead + 1.5 Live_M - A3 ...	Yes	Y		1	1.2	29	1.5	13	.063	0		0		0		0		0					
74	1.2 Dead + 1.5 Live_M - A4 ...	Yes	Y		1	1.2	30	1.5	2	.063	0		0		0		0		0					
75	1.2 Dead + 1.5 Live_M - A4 ...	Yes	Y		1	1.2	30	1.5	3	.063	0		0		0		0		0					
76	1.2 Dead + 1.5 Live_M - A4 ...	Yes	Y		1	1.2	30	1.5	4	.063	0		0		0		0		0					
77	1.2 Dead + 1.5 Live_M - A4 ...	Yes	Y		1	1.2	30	1.5	5	.063	0		0		0		0		0					
78	1.2 Dead + 1.5 Live_M - A4 ...	Yes	Y		1	1.2	30	1.5	6	.063	0		0		0		0		0					
79	1.2 Dead + 1.5 Live_M - A4 ...	Yes	Y		1	1.2	30	1.5	7	.063	0		0		0		0		0					
80	1.2 Dead + 1.5 Live_M - A4 ...	Yes	Y		1	1.2	30	1.5	8	.063	0		0		0		0		0					
81	1.2 Dead + 1.5 Live_M - A4 ...	Yes	Y		1	1.2	30	1.5	9	.063	0		0		0		0		0					
82	1.2 Dead + 1.5 Live_M - A4 ...	Yes	Y		1	1.2	30	1.5	10	.063	0		0		0		0		0					
83	1.2 Dead + 1.5 Live_M - A4 ...	Yes	Y		1	1.2	30	1.5	11	.063	0		0		0		0		0					
84	1.2 Dead + 1.5 Live_M - A4 ...	Yes	Y		1	1.2	30	1.5	12	.063	0		0		0		0		0					
85	1.2 Dead + 1.5 Live_M - A4 ...	Yes	Y		1	1.2	30	1.5	13	.063	0		0		0		0		0					
86	1.2 Dead + 1.5 Live_M - B1 ...	Yes	Y		1	1.2	31	1.5	2	.063	0		0		0		0		0					
87	1.2 Dead + 1.5 Live_M - B1 ...	Yes	Y		1	1.2	31	1.5	3	.063	0		0		0		0		0					
88	1.2 Dead + 1.5 Live_M - B1 ...	Yes	Y		1	1.2	31	1.5	4	.063	0		0		0		0		0					
89	1.2 Dead + 1.5 Live_M - B1 ...	Yes	Y		1	1.2	31	1.5	5	.063	0		0		0		0		0					

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...
90	1.2 Dead + 1.5 Live_M - B1 ..	Yes	Y		1	1.2	31	1.5	6	.063	0		0		0		0		0					
91	1.2 Dead + 1.5 Live_M - B1 ..	Yes	Y		1	1.2	31	1.5	7	.063	0		0		0		0		0					
92	1.2 Dead + 1.5 Live_M - B1 ..	Yes	Y		1	1.2	31	1.5	8	.063	0		0		0		0		0					
93	1.2 Dead + 1.5 Live_M - B1 ..	Yes	Y		1	1.2	31	1.5	9	.063	0		0		0		0		0					
94	1.2 Dead + 1.5 Live_M - B1 ..	Yes	Y		1	1.2	31	1.5	10	.063	0		0		0		0		0					
95	1.2 Dead + 1.5 Live_M - B1 ..	Yes	Y		1	1.2	31	1.5	11	.063	0		0		0		0		0					
96	1.2 Dead + 1.5 Live_M - B1 ..	Yes	Y		1	1.2	31	1.5	12	.063	0		0		0		0		0					
97	1.2 Dead + 1.5 Live_M - B1 ..	Yes	Y		1	1.2	31	1.5	13	.063	0		0		0		0		0					
98	1.2 Dead + 1.5 Live_M - B2 ..	Yes	Y		1	1.2	32	1.5	2	.063	0		0		0		0		0					
99	1.2 Dead + 1.5 Live_M - B2 ..	Yes	Y		1	1.2	32	1.5	3	.063	0		0		0		0		0					
100	1.2 Dead + 1.5 Live_M - B2 ..	Yes	Y		1	1.2	32	1.5	4	.063	0		0		0		0		0					
101	1.2 Dead + 1.5 Live_M - B2 ..	Yes	Y		1	1.2	32	1.5	5	.063	0		0		0		0		0					
102	1.2 Dead + 1.5 Live_M - B2 ..	Yes	Y		1	1.2	32	1.5	6	.063	0		0		0		0		0					
103	1.2 Dead + 1.5 Live_M - B2 ..	Yes	Y		1	1.2	32	1.5	7	.063	0		0		0		0		0					
104	1.2 Dead + 1.5 Live_M - B2 ..	Yes	Y		1	1.2	32	1.5	8	.063	0		0		0		0		0					
105	1.2 Dead + 1.5 Live_M - B2 ..	Yes	Y		1	1.2	32	1.5	9	.063	0		0		0		0		0					
106	1.2 Dead + 1.5 Live_M - B2 ..	Yes	Y		1	1.2	32	1.5	10	.063	0		0		0		0		0					
107	1.2 Dead + 1.5 Live_M - B2 ..	Yes	Y		1	1.2	32	1.5	11	.063	0		0		0		0		0					
108	1.2 Dead + 1.5 Live_M - B2 ..	Yes	Y		1	1.2	32	1.5	12	.063	0		0		0		0		0					
109	1.2 Dead + 1.5 Live_M - B2 ..	Yes	Y		1	1.2	32	1.5	13	.063	0		0		0		0		0					
110	1.2 Dead + 1.5 Live_M - B3 ..	Yes	Y		1	1.2	33	1.5	2	.063	0		0		0		0		0					
111	1.2 Dead + 1.5 Live_M - B3 ..	Yes	Y		1	1.2	33	1.5	3	.063	0		0		0		0		0					
112	1.2 Dead + 1.5 Live_M - B3 ..	Yes	Y		1	1.2	33	1.5	4	.063	0		0		0		0		0					
113	1.2 Dead + 1.5 Live_M - B3 ..	Yes	Y		1	1.2	33	1.5	5	.063	0		0		0		0		0					
114	1.2 Dead + 1.5 Live_M - B3 ..	Yes	Y		1	1.2	33	1.5	6	.063	0		0		0		0		0					
115	1.2 Dead + 1.5 Live_M - B3 ..	Yes	Y		1	1.2	33	1.5	7	.063	0		0		0		0		0					
116	1.2 Dead + 1.5 Live_M - B3 ..	Yes	Y		1	1.2	33	1.5	8	.063	0		0		0		0		0					
117	1.2 Dead + 1.5 Live_M - B3 ..	Yes	Y		1	1.2	33	1.5	9	.063	0		0		0		0		0					
118	1.2 Dead + 1.5 Live_M - B3 ..	Yes	Y		1	1.2	33	1.5	10	.063	0		0		0		0		0					
119	1.2 Dead + 1.5 Live_M - B3 ..	Yes	Y		1	1.2	33	1.5	11	.063	0		0		0		0		0					
120	1.2 Dead + 1.5 Live_M - B3 ..	Yes	Y		1	1.2	33	1.5	12	.063	0		0		0		0		0					
121	1.2 Dead + 1.5 Live_M - B3 ..	Yes	Y		1	1.2	33	1.5	13	.063	0		0		0		0		0					
122	1.2 Dead + 1.5 Live_M - B4 ..	Yes	Y		1	1.2	34	1.5	2	.063	0		0		0		0		0					
123	1.2 Dead + 1.5 Live_M - B4 ..	Yes	Y		1	1.2	34	1.5	3	.063	0		0		0		0		0					
124	1.2 Dead + 1.5 Live_M - B4 ..	Yes	Y		1	1.2	34	1.5	4	.063	0		0		0		0		0					
125	1.2 Dead + 1.5 Live_M - B4 ..	Yes	Y		1	1.2	34	1.5	5	.063	0		0		0		0		0					
126	1.2 Dead + 1.5 Live_M - B4 ..	Yes	Y		1	1.2	34	1.5	6	.063	0		0		0		0		0					
127	1.2 Dead + 1.5 Live_M - B4 ..	Yes	Y		1	1.2	34	1.5	7	.063	0		0		0		0		0					
128	1.2 Dead + 1.5 Live_M - B4 ..	Yes	Y		1	1.2	34	1.5	8	.063	0		0		0		0		0					
129	1.2 Dead + 1.5 Live_M - B4 ..	Yes	Y		1	1.2	34	1.5	9	.063	0		0		0		0		0					
130	1.2 Dead + 1.5 Live_M - B4 ..	Yes	Y		1	1.2	34	1.5	10	.063	0		0		0		0		0					
131	1.2 Dead + 1.5 Live_M - B4 ..	Yes	Y		1	1.2	34	1.5	11	.063	0		0		0		0		0					
132	1.2 Dead + 1.5 Live_M - B4 ..	Yes	Y		1	1.2	34	1.5	12	.063	0		0		0		0		0					
133	1.2 Dead + 1.5 Live_M - B4 ..	Yes	Y		1	1.2	34	1.5	13	.063	0		0		0		0		0					
134	1.2 Dead + 1.5 Live_M - C1 ..	Yes	Y		1	1.2	35	1.5	2	.063	0		0		0		0		0					
135	1.2 Dead + 1.5 Live_M - C1 ..	Yes	Y		1	1.2	35	1.5	3	.063	0		0		0		0		0					
136	1.2 Dead + 1.5 Live_M - C1 ..	Yes	Y		1	1.2	35	1.5	4	.063	0		0		0		0		0					
137	1.2 Dead + 1.5 Live_M - C1 ..	Yes	Y		1	1.2	35	1.5	5	.063	0		0		0		0		0					
138	1.2 Dead + 1.5 Live_M - C1 ..	Yes	Y		1	1.2	35	1.5	6	.063	0		0		0		0		0					
139	1.2 Dead + 1.5 Live_M - C1 ..	Yes	Y		1	1.2	35	1.5	7	.063	0		0		0		0		0					
140	1.2 Dead + 1.5 Live_M - C1 ..	Yes	Y		1	1.2	35	1.5	8	.063	0		0		0		0		0					
141	1.2 Dead + 1.5 Live_M - C1 ..	Yes	Y		1	1.2	35	1.5	9	.063	0		0		0		0		0					
142	1.2 Dead + 1.5 Live_M - C1 ..	Yes	Y		1	1.2	35	1.5	10	.063	0		0		0		0		0					
143	1.2 Dead + 1.5 Live_M - C1 ..	Yes	Y		1	1.2	35	1.5	11	.063	0		0		0		0		0					
144	1.2 Dead + 1.5 Live_M - C1 ..	Yes	Y		1	1.2	35	1.5	12	.063	0		0		0		0		0					
145	1.2 Dead + 1.5 Live_M - C1 ..	Yes	Y		1	1.2	35	1.5	13	.063	0		0		0		0		0					
146	1.2 Dead + 1.5 Live_M - C2 ..	Yes	Y		1	1.2	36	1.5	2	.063	0		0		0		0		0					

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...
147	1.2 Dead + 1.5 Live_M - C2 ...	Yes	Y		1	1.2	36	1.5	3	.063	0		0		0		0		0					
148	1.2 Dead + 1.5 Live_M - C2 ...	Yes	Y		1	1.2	36	1.5	4	.063	0		0		0		0		0					
149	1.2 Dead + 1.5 Live_M - C2 ...	Yes	Y		1	1.2	36	1.5	5	.063	0		0		0		0		0					
150	1.2 Dead + 1.5 Live_M - C2 ...	Yes	Y		1	1.2	36	1.5	6	.063	0		0		0		0		0					
151	1.2 Dead + 1.5 Live_M - C2 ...	Yes	Y		1	1.2	36	1.5	7	.063	0		0		0		0		0					
152	1.2 Dead + 1.5 Live_M - C2 ...	Yes	Y		1	1.2	36	1.5	8	.063	0		0		0		0		0					
153	1.2 Dead + 1.5 Live_M - C2 ...	Yes	Y		1	1.2	36	1.5	9	.063	0		0		0		0		0					
154	1.2 Dead + 1.5 Live_M - C2 ...	Yes	Y		1	1.2	36	1.5	10	.063	0		0		0		0		0					
155	1.2 Dead + 1.5 Live_M - C2 ...	Yes	Y		1	1.2	36	1.5	11	.063	0		0		0		0		0					
156	1.2 Dead + 1.5 Live_M - C2 ...	Yes	Y		1	1.2	36	1.5	12	.063	0		0		0		0		0					
157	1.2 Dead + 1.5 Live_M - C2 ...	Yes	Y		1	1.2	36	1.5	13	.063	0		0		0		0		0					
158	1.2 Dead + 1.5 Live_M - C3 ...	Yes	Y		1	1.2	37	1.5	2	.063	0		0		0		0		0					
159	1.2 Dead + 1.5 Live_M - C3 ...	Yes	Y		1	1.2	37	1.5	3	.063	0		0		0		0		0					
160	1.2 Dead + 1.5 Live_M - C3 ...	Yes	Y		1	1.2	37	1.5	4	.063	0		0		0		0		0					
161	1.2 Dead + 1.5 Live_M - C3 ...	Yes	Y		1	1.2	37	1.5	5	.063	0		0		0		0		0					
162	1.2 Dead + 1.5 Live_M - C3 ...	Yes	Y		1	1.2	37	1.5	6	.063	0		0		0		0		0					
163	1.2 Dead + 1.5 Live_M - C3 ...	Yes	Y		1	1.2	37	1.5	7	.063	0		0		0		0		0					
164	1.2 Dead + 1.5 Live_M - C3 ...	Yes	Y		1	1.2	37	1.5	8	.063	0		0		0		0		0					
165	1.2 Dead + 1.5 Live_M - C3 ...	Yes	Y		1	1.2	37	1.5	9	.063	0		0		0		0		0					
166	1.2 Dead + 1.5 Live_M - C3 ...	Yes	Y		1	1.2	37	1.5	10	.063	0		0		0		0		0					
167	1.2 Dead + 1.5 Live_M - C3 ...	Yes	Y		1	1.2	37	1.5	11	.063	0		0		0		0		0					
168	1.2 Dead + 1.5 Live_M - C3 ...	Yes	Y		1	1.2	37	1.5	12	.063	0		0		0		0		0					
169	1.2 Dead + 1.5 Live_M - C3 ...	Yes	Y		1	1.2	37	1.5	13	.063	0		0		0		0		0					
170	1.2 Dead + 1.5 Live_M - C4 ...	Yes	Y		1	1.2	38	1.5	2	.063	0		0		0		0		0					
171	1.2 Dead + 1.5 Live_M - C4 ...	Yes	Y		1	1.2	38	1.5	3	.063	0		0		0		0		0					
172	1.2 Dead + 1.5 Live_M - C4 ...	Yes	Y		1	1.2	38	1.5	4	.063	0		0		0		0		0					
173	1.2 Dead + 1.5 Live_M - C4 ...	Yes	Y		1	1.2	38	1.5	5	.063	0		0		0		0		0					
174	1.2 Dead + 1.5 Live_M - C4 ...	Yes	Y		1	1.2	38	1.5	6	.063	0		0		0		0		0					
175	1.2 Dead + 1.5 Live_M - C4 ...	Yes	Y		1	1.2	38	1.5	7	.063	0		0		0		0		0					
176	1.2 Dead + 1.5 Live_M - C4 ...	Yes	Y		1	1.2	38	1.5	8	.063	0		0		0		0		0					
177	1.2 Dead + 1.5 Live_M - C4 ...	Yes	Y		1	1.2	38	1.5	9	.063	0		0		0		0		0					
178	1.2 Dead + 1.5 Live_M - C4 ...	Yes	Y		1	1.2	38	1.5	10	.063	0		0		0		0		0					
179	1.2 Dead + 1.5 Live_M - C4 ...	Yes	Y		1	1.2	38	1.5	11	.063	0		0		0		0		0					
180	1.2 Dead + 1.5 Live_M - C4 ...	Yes	Y		1	1.2	38	1.5	12	.063	0		0		0		0		0					
181	1.2 Dead + 1.5 Live_M - C4 ...	Yes	Y		1	1.2	38	1.5	13	.063	0		0		0		0		0					
182	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	39	1.5	0		0		0		0		0		0					
183	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	40	1.5	0		0		0		0		0		0					
184	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	41	1.5	0		0		0		0		0		0					
185	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	42	1.5	0		0		0		0		0		0					
186	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	43	1.5	0		0		0		0		0		0					
187	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	44	1.5	0		0		0		0		0		0					
188	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	45	1.5	0		0		0		0		0		0					
189	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	46	1.5	0		0		0		0		0		0					
190	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	47	1.5	0		0		0		0		0		0					
191	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	48	1.5	0		0		0		0		0		0					
192	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	49	1.5	0		0		0		0		0		0					
193	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	50	1.5	0		0		0		0		0		0					
194	1.2 Dead + 1.5 Live_V - M1...	Yes	Y		1	1.2	51	1.5	0		0		0		0		0		0					
195	1.2 Dead + 1.5 Live_V - M1...	Yes	Y		1	1.2	52	1.5	0		0		0		0		0		0					
196	1.2 Dead + 1.5 Live_V - M1...	Yes	Y		1	1.2	53	1.5	0		0		0		0		0		0					
197	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	54	1.5	0		0		0		0		0		0					
198	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	55	1.5	0		0		0		0		0		0					
199	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	56	1.5	0		0		0		0		0		0					
200	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	57	1.5	0		0		0		0		0		0					
201	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	58	1.5	0		0		0		0		0		0					
202	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	59	1.5	0		0		0		0		0		0					
203	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	60	1.5	0		0		0		0		0		0					

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...
204	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	61	1.5	0		0		0		0		0		0					
205	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	62	1.5	0		0		0		0		0		0					
206	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	63	1.5	0		0		0		0		0		0					
207	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	64	1.5	0		0		0		0		0		0					
208	1.2 Dead + 1.5 Live_V - M4...	Yes	Y		1	1.2	65	1.5	0		0		0		0		0		0					
209	1.2 Dead + 1.5 Live_V - M6...	Yes	Y		1	1.2	66	1.5	0		0		0		0		0		0					
210	1.2 Dead + 1.5 Live_V - M6...	Yes	Y		1	1.2	67	1.5	0		0		0		0		0		0					
211	1.2 Dead + 1.5 Live_V - M6...	Yes	Y		1	1.2	68	1.5	0		0		0		0		0		0					
212	1.2 Dead + 1.5 Live_V - M9...	Yes	Y		1	1.2	69	1.5	0		0		0		0		0		0					
213	1.2 Dead + 1.5 Live_V - M9...	Yes	Y		1	1.2	70	1.5	0		0		0		0		0		0					
214	1.2 Dead + 1.5 Live_V - M9...	Yes	Y		1	1.2	71	1.5	0		0		0		0		0		0					
215	1.2 Dead + 1.5 Live_V - M9...	Yes	Y		1	1.2	72	1.5	0		0		0		0		0		0					
216	1.2 Dead + 1.5 Live_V - M9...	Yes	Y		1	1.2	73	1.5	0		0		0		0		0		0					
217	1.2 Dead + 1.5 Live_V - M9...	Yes	Y		1	1.2	74	1.5	0		0		0		0		0		0					
218	1.2 Dead + 1.5 Live_V - M9...	Yes	Y		1	1.2	75	1.5	0		0		0		0		0		0					
219	1.2 Dead + 1.5 Live_V - M9...	Yes	Y		1	1.2	76	1.5	0		0		0		0		0		0					
220	1.2 Dead + 1.5 Live_V - M9...	Yes	Y		1	1.2	77	1.5	0		0		0		0		0		0					
221	1.2 Dead + 1.5 Live_V - M9...	Yes	Y		1	1.2	78	1.5	0		0		0		0		0		0					
222	1.2 Dead + 1.5 Live_V - M9...	Yes	Y		1	1.2	79	1.5	0		0		0		0		0		0					
223	1.2 Dead + 1.5 Live_V - M9...	Yes	Y		1	1.2	80	1.5	0		0		0		0		0		0					
224	1.2 Dead + 1.5 Live_V - M1...	Yes	Y		1	1.2	81	1.5	0		0		0		0		0		0					
225	1.2 Dead + 1.5 Live_V - M1...	Yes	Y		1	1.2	82	1.5	0		0		0		0		0		0					
226	1.2 Dead + 1.5 Live_V - M1...	Yes	Y		1	1.2	83	1.5	0		0		0		0		0		0					

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Dead	DL		-1			30		3	
2	No Ice Wind 0 deg	None					30	57		
3	No Ice Wind 30 deg	None					60	98		
4	No Ice Wind 60 deg	None					60	114		
5	No Ice Wind 90 deg	None					30	49		
6	No Ice Wind 120 deg	None					60	114		
7	No Ice Wind 150 deg	None					60	98		
8	No Ice Wind 180 deg	None					30	57		
9	No Ice Wind 210 deg	None					60	98		
10	No Ice Wind 240 deg	None					60	114		
11	No Ice Wind 270 deg	None					30	49		
12	No Ice Wind 300 deg	None					60	114		
13	No Ice Wind 330 deg	None					60	98		
14	Ice Weight	None					30	60	3	
15	Ice Wind 0 deg	None					30	57		
16	Ice Wind 30 deg	None					60	98		
17	Ice Wind 60 deg	None					60	114		
18	Ice Wind 90 deg	None					30	49		
19	Ice Wind 120 deg	None					60	114		
20	Ice Wind 150 deg	None					60	98		
21	Ice Wind 180 deg	None					30	57		
22	Ice Wind 210 deg	None					60	98		
23	Ice Wind 240 deg	None					60	114		
24	Ice Wind 270 deg	None					30	49		
25	Ice Wind 300 deg	None					60	114		
26	Ice Wind 330 deg	None					60	98		
27	Live Load - A1	None					1			
28	Live Load - A2	None					1			
29	Live Load - A3	None					1			

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
30	Live Load - A4	None					1			
31	Live Load - B1	None					1			
32	Live Load - B2	None					1			
33	Live Load - B3	None					1			
34	Live Load - B4	None					1			
35	Live Load - C1	None					1			
36	Live Load - C2	None					1			
37	Live Load - C3	None					1			
38	Live Load - C4	None					1			
39	Live Load - M46 (Start)	None					1			
40	Live Load - M46 (Mid...	None					1			
41	Live Load - M46 (End)	None					1			
42	Live Load - M47 (Start)	None					1			
43	Live Load - M47 (Mid...	None					1			
44	Live Load - M47 (End)	None					1			
45	Live Load - M48 (Start)	None					1			
46	Live Load - M48 (Mid...	None					1			
47	Live Load - M48 (End)	None					1			
48	Live Load - M49 (Start)	None					1			
49	Live Load - M49 (Mid...	None					1			
50	Live Load - M49 (End)	None					1			
51	Live Load - M16 (Start)	None					1			
52	Live Load - M16 (Mid...	None					1			
53	Live Load - M16 (End)	None					1			
54	Live Load - M46A (St...	None					1			
55	Live Load - M46A (Mi...	None					1			
56	Live Load - M46A (E...	None					1			
57	Live Load - M47A (St...	None					1			
58	Live Load - M47A (Mi...	None					1			
59	Live Load - M47A (E...	None					1			
60	Live Load - M48A (St...	None					1			
61	Live Load - M48A (Mi...	None					1			
62	Live Load - M48A (E...	None					1			
63	Live Load - M49A (St...	None					1			
64	Live Load - M49A (Mi...	None					1			
65	Live Load - M49A (E...	None					1			
66	Live Load - M61 (Start)	None					1			
67	Live Load - M61 (Mid...	None					1			
68	Live Load - M61 (End)	None					1			
69	Live Load - M91 (Start)	None					1			
70	Live Load - M91 (Mid...	None					1			
71	Live Load - M91 (End)	None					1			
72	Live Load - M92 (Start)	None					1			
73	Live Load - M92 (Mid...	None					1			
74	Live Load - M92 (End)	None					1			
75	Live Load - M93 (Start)	None					1			
76	Live Load - M93 (Mid...	None					1			
77	Live Load - M93 (End)	None					1			
78	Live Load - M94 (Start)	None					1			
79	Live Load - M94 (Mid...	None					1			
80	Live Load - M94 (End)	None					1			
81	Live Load - M106 (St...	None					1			
82	Live Load - M106 (Mi...	None					1			
83	Live Load - M106 (En...	None					1			
84	BLC 1 Transient Area...	None						51		
85	BLC 14 Transient Are...	None						51		

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	SA	max	1832.211	15	1452.436	31	3842.959	22	1.412	33	1.613	4	1.187	27
2		min	-2870.055	2	410.602	25	-2042.856	11	.274	5	-1.599	17	.061	15
3	SB	max	1288.489	19	1452.451	34	2472.554	19	-.336	23	1.136	12	.967	73
4		min	-2332.766	6	412.202	7	-4265.801	6	-1.699	30	-1.123	25	-.049	103
5	SC	max	5165.185	14	1451.814	28	1043.478	21	.683	154	1.37	20	-.459	3
6		min	-3089.447	3	412.561	19	-1048.105	8	-.489	112	-1.357	9	-1.77	32
7	RC	max	421.589	3	2065.602	32	34.839	21	0	141	0	123	0	226
8		min	-3653.227	32	-230.361	3	-34.825	9	0	123	0	141	0	1
9	RA	max	1805.646	36	2041.931	36	187.009	11	0	175	0	175	0	49
10		min	-111.197	11	-115.629	11	-3127.378	36	0	49	0	49	0	175
11	RB	max	1824.25	28	2061.246	28	3157.12	28	0	83	0	83	0	83
12		min	-178.185	19	-189.748	19	-303.42	19	0	89	0	89	0	89
13	Totals:	max	5766.049	15	9941.518	31	5105.465	21						
14		min	-5766.051	2	2836.085	25	-5105.466	9						

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Member	Shape	Code Check	Loc[...	LC	Shear...	Loc[...	Dir	LC	phi*Pnc...	phi*Pnt...	phi*Mn ...	phi*Mn ...	Cb	Eqn
1	M46	HSS4x4x3...	.177	0	2	.089	0	y	51	106237...	118378...	14.115	14.115	3...	H1-1b
2	M47	HSS4x4x3...	.165	30.6...	35	.059	30.6...	y	27	106648...	118378...	14.115	14.115	1...	H1-1b
3	M48	L2x2x3	.411	25.5...	1...	.031	51.1...	y	1...	15920....	23392.8	.558	1.169	1...	H2-1
4	M49	L2x2x3	.417	25.5...	1...	.030	0	z	1...	15920....	23392.8	.558	1.166	1...	H2-1
5	M50	PL6x1/2	.058	1.642	24	.180	2.765	y	1...	95340....	97200	1.012	12.15	2...	H1-1b
6	M51	PL6x1/2	.211	6.81	24	.222	6.81	y	1...	60829....	97200	1.012	12.15	1...	H1-1b
7	M52	PL6x1/2	.052	1.123	22	.205	0	y	49	95340....	97200	1.012	12.15	3...	H1-1b
8	M53	PL6x3/8	.287	2.627	14	.250	2.627	y	29	62895....	72900	.57	9.113	1...	H1-1b
9	M54	PL6x3/8	.209	1.595	8	.267	0	y	36	69770.62	72900	.57	9.113	1...	H1-1b
10	M55	PL6x3/8	.290	2.627	4	.130	2.627	y	33	62895....	72900	.57	9.113	1...	H1-1b
11	M56	PL6x3/8	.264	1.595	12	.288	0	y	36	69770.62	72900	.57	9.113	1...	H1-1b
12	M16	P3 STD	.104	96.8...	6	.093	96.8...		4	29986.1	70196....	6.124	6.124	3...	H1-1b
13	M46A	HSS4x4x3...	.161	0	31	.088	0	y	1...	106237...	118378...	14.115	14.115	2...	H1-1b
14	M47A	HSS4x4x3...	.165	30.6...	29	.059	30.6...	y	30	106648...	118378...	14.115	14.115	1...	H1-1b
15	M48A	L2x2x3	.411	25.5...	2...	.031	51.1...	y	2...	15920....	23392.8	.558	1.169	1...	H2-1
16	M49A	L2x2x3	.417	25.5...	2...	.030	0	z	2...	15920....	23392.8	.558	1.166	1...	H2-1
17	M50A	PL6x1/2	.060	1.642	6	.180	2.765	y	75	95340....	97200	1.012	12.15	2...	H1-1b
18	M51A	PL6x1/2	.235	6.81	6	.222	6.81	y	2...	60829....	97200	1.012	12.15	1...	H1-1b
19	M52A	PL6x1/2	.058	1.123	6	.205	0	y	89	95340....	97200	1.012	12.15	3...	H1-1b
20	M53A	PL6x3/8	.218	2.627	22	.251	2.627	y	33	62895....	72900	.57	9.113	1...	H1-1b
21	M54A	PL6x3/8	.225	1.595	16	.267	0	y	28	69770.62	72900	.57	9.113	1...	H1-1b
22	M55A	PL6x3/8	.225	2.627	12	.128	2.627	y	36	62895....	72900	.57	9.113	1...	H1-1b
23	M56A	PL6x3/8	.276	1.595	20	.289	0	y	28	69770.62	72900	.57	9.113	1...	H1-1b
24	M61	P3 STD	.115	96.8...	14	.082	96.8...		12	29986.1	70196....	6.124	6.124	3...	H1-1b
25	M91	HSS4x4x3...	.166	0	35	.088	0	y	1...	106237...	118378...	14.115	14.115	2...	H1-1b
26	M92	HSS4x4x3...	.165	30.6...	33	.059	30.6...	y	34	106648...	118378...	14.115	14.115	1...	H1-1b
27	M93	L2x2x3	.411	25.5...	2...	.031	51.1...	y	2...	15920....	23392.8	.558	1.169	1...	H2-1
28	M94	L2x2x3	.417	25.5...	2...	.030	0	z	2...	15920....	23392.8	.558	1.166	1...	H2-1
29	M95	PL6x1/2	.061	1.642	14	.180	2.765	y	1...	95340....	97200	1.012	12.15	2...	H1-1b
30	M96	PL6x1/2	.257	6.81	14	.222	6.81	y	2...	60829....	97200	1.012	12.15	1...	H1-1b
31	M97	PL6x1/2	.064	1.123	3	.205	0	y	1...	95340....	97200	1.012	12.15	2...	H1-1b
32	M98	PL6x3/8	.224	2.627	6	.251	2.627	y	37	62895....	72900	.57	9.113	1...	H1-1b
33	M99	PL6x3/8	.235	1.595	2	.268	0	y	32	69770.62	72900	.57	9.113	1...	H1-1b
34	M100	PL6x3/8	.209	2.627	20	.129	2.627	y	28	62895....	72900	.57	9.113	1...	H1-1b
35	M101	PL6x3/8	.281	1.595	2	.289	0	y	32	69770.62	72900	.57	9.113	2...	H1-1b
36	M106	P3 STD	.103	54.6...	1...	.088	53.1...		16	29986.1	70196....	6.124	6.124	2...	H1-1b
37	A1	P2 STD	.337	69	22	.211	69		2	15808....	33847....	1.997	1.997	3...	H1-1b

Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[...	LC	Shear...	Loc[...	Dir	LC	phi*Pnc...	phi*Pnt...	phi*Mn ...	phi*Mn ...	Cb	Eqn
38	A2	P2 STD	.362	69	18	.103	69		24	15808....	33847....	1.997	1.997	2...	H1-1b
39	A3	P2 STD	.375	69	8	.140	69		4	15808....	33847....	1.997	1.997	3...	H1-1b
40	A4	P2 STD	.303	69	6	.180	27		2	15808....	33847....	1.997	1.997	3...	H1-1b
41	B1	P2 STD	.356	69	6	.191	27		8	15808....	33847....	1.997	1.997	3...	H1-1b
42	B2	P2 STD	.381	69	4	.104	69		6	15808....	33847....	1.997	1.997	3...	H1-1b
43	B3	P2 STD	.394	69	16	.122	69		10	15808....	33847....	1.997	1.997	4...	H1-1b
44	B4	P2 STD	.306	69	14	.161	69		20	15808....	33847....	1.997	1.997	4...	H1-1b
45	C1	P2 STD	.388	69	14	.197	27		16	15808....	33847....	1.997	1.997	4...	H1-1b
46	C2	P2 STD	.392	69	12	.113	48		14	15808....	33847....	1.997	1.997	2...	H1-1b
47	C3	P2 STD	.429	69	2	.118	69		18	15808....	33847....	1.997	1.997	4...	H1-1b
48	C4	P2 STD	.310	69	24	.171	69		4	15808....	33847....	1.997	1.997	4...	H1-1b
49	M73	P2 STD	.292	53.1...	2	.229	12.5		2	6684.464	33847....	1.997	1.997	3...	H1-1b
50	M78	L2.5x2.5x4	.379	0	24	.120	0	y	16	36167....	38556	1.114	2.537	1...	H2-1
51	M79	P2 STD	.282	53.1...	8	.213	12.5		8	6684.464	33847....	1.997	1.997	3...	H1-1b
52	M84	L2.5x2.5x4	.393	0	8	.106	0	y	24	36167....	38556	1.114	2.537	1...	H2-1
53	M85	P2 STD	.292	53.1...	16	.220	12.5		16	6684.464	33847....	1.997	1.997	3...	H1-1b
54	M90	L2.5x2.5x4	.408	0	16	.102	0	y	6	36167....	38556	1.114	2.537	1...	H2-1
55	M91A	PL 8x1/2	.085	0	32	.071	0	y	32	120475...	129600	1.35	21.6	1...	H1-1b
56	M92A	LL2.5x2.5x...	.099	50.9...	32	.005	0	y	33	42543....	58482	4.246	2.614	1	H1-1b*
57	M93A	PL 8x1/2	.084	0	35	.070	0	y	36	120475...	129600	1.35	21.6	1...	H1-1b
58	M94A	LL2.5x2.5x...	.098	50.9...	36	.005	50.9...	y	37	42543....	58482	4.246	2.614	1...	H1-1b*
59	M95A	PL 8x1/2	.084	0	28	.071	0	y	28	120475...	129600	1.35	21.6	1...	H1-1b
60	M96A	LL2.5x2.5x...	.098	50.9...	28	.005	50.9...	y	29	42543....	58482	4.246	2.614	1...	H1-1b*

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Member	Shape	Code Check Actual	Code Check Allowable	Ratio (Act./Allow.)	Loc[in]	LC	Shear Check	Shear Check Allowable	Ratio (Act./Allow.)	Loc[in]	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-y [k-ft]	phi*Mn z-z [k-ft]	Cb	Eqn
1	M46	HSS4x4x3/16	0.177	1.05	0.169*	0	2	0.089	1.05	0.085*	0	106237.62	118378.13	14.115	14.115	3.576	H1-1b
2	M47	HSS4x4x3/16	0.165	1.05	0.157*	30.69	35	0.059	1.05	0.056*	30.69	106648.52	118378.13	14.115	14.115	1.329	H1-1b
3	M48	L2x2x3	0.411	1.05	0.391*	25.58	189	0.031	1.05	0.03*	51.17	15920.319	23392.8	0.558	1.169	1.757	H2-1
4	M49	L2x2x3	0.417	1.05	0.397*	25.58	192	0.03	1.05	0.029*	0	15920.319	23392.8	0.558	1.166	1.728	H2-1
5	M50	PL6x1/2	0.058	1.05	0.055*	1.642	24	0.18	1.05	0.171*	2.765	95340.363	97200	1.012	12.15	2.739	H1-1b
6	M51	PL6x1/2	0.211	1.05	0.201*	6.81	24	0.222	1.05	0.211*	6.81	60829.391	97200	1.012	12.15	1.378	H1-1b
7	M52	PL6x1/2	0.052	1.05	0.05*	1.123	22	0.205	1.05	0.195*	0	95340.363	97200	1.012	12.15	3.576	H1-1b
8	M53	PL6x3/8	0.287	1.05	0.273*	2.627	14	0.25	1.05	0.238*	2.627	62895.756	72900	0.57	9.113	1.572	H1-1b
9	M54	PL6x3/8	0.209	1.05	0.199*	1.595	8	0.267	1.05	0.254*	0	69770.62	72900	0.57	9.113	1.426	H1-1b
10	M55	PL6x3/8	0.29	1.05	0.276*	2.627	4	0.13	1.05	0.124*	2.627	62895.756	72900	0.57	9.113	1.439	H1-1b
11	M56	PL6x3/8	0.264	1.05	0.251*	1.595	12	0.288	1.05	0.274*	0	69770.62	72900	0.57	9.113	1.712	H1-1b
12	M16	P3 STD	0.104	1.05	0.099*	96.88	6	0.093	1.05	0.089*	96.88	29986.1	70196.802	6.124	6.124	3.131	H1-1b
13	M46A	HSS4x4x3/16	0.161	1.05	0.153*	0	31	0.088	1.05	0.084*	0	106237.62	118378.13	14.115	14.115	2.923	H1-1b
14	M47A	HSS4x4x3/16	0.165	1.05	0.157*	30.69	29	0.059	1.05	0.056*	30.69	106648.52	118378.13	14.115	14.115	1.328	H1-1b
15	M48A	L2x2x3	0.411	1.05	0.391*	25.58	204	0.031	1.05	0.03*	51.17	15920.319	23392.8	0.558	1.169	1.757	H2-1
16	M49A	L2x2x3	0.417	1.05	0.397*	25.58	207	0.03	1.05	0.029*	0	15920.319	23392.8	0.558	1.166	1.728	H2-1
17	M50A	PL6x1/2	0.06	1.05	0.057*	1.642	6	0.18	1.05	0.171*	2.765	95340.363	97200	1.012	12.15	2.94	H1-1b
18	M51A	PL6x1/2	0.235	1.05	0.224*	6.81	6	0.222	1.05	0.211*	6.81	60829.391	97200	1.012	12.15	1.32	H1-1b
19	M52A	PL6x1/2	0.058	1.05	0.055*	1.123	6	0.205	1.05	0.195*	0	95340.363	97200	1.012	12.15	3.815	H1-1b
20	M53A	PL6x3/8	0.218	1.05	0.208*	2.627	22	0.251	1.05	0.239*	2.627	62895.756	72900	0.57	9.113	1.562	H1-1b
21	M54A	PL6x3/8	0.225	1.05	0.214*	1.595	16	0.267	1.05	0.254*	0	69770.62	72900	0.57	9.113	1.417	H1-1b
22	M55A	PL6x3/8	0.225	1.05	0.214*	2.627	12	0.128	1.05	0.122*	2.627	62895.756	72900	0.57	9.113	1.447	H1-1b
23	M56A	PL6x3/8	0.276	1.05	0.263*	1.595	20	0.289	1.05	0.275*	0	69770.62	72900	0.57	9.113	1.794	H1-1b
24	M61	P3 STD	0.115	1.05	0.11*	96.88	14	0.082	1.05	0.078*	96.88	29986.1	70196.802	6.124	6.124	3.234	H1-1b
25	M91	HSS4x4x3/16	0.166	1.05	0.158*	0	35	0.088	1.05	0.084*	0	106237.62	118378.13	14.115	14.115	2.933	H1-1b
26	M92	HSS4x4x3/16	0.165	1.05	0.157*	30.69	33	0.059	1.05	0.056*	30.69	106648.52	118378.13	14.115	14.115	1.328	H1-1b
27	M93	L2x2x3	0.411	1.05	0.391*	25.58	219	0.031	1.05	0.03*	51.17	15920.319	23392.8	0.558	1.169	1.757	H2-1
28	M94	L2x2x3	0.417	1.05	0.397*	25.58	222	0.03	1.05	0.029*	0	15920.319	23392.8	0.558	1.166	1.728	H2-1
29	M95	PL6x1/2	0.061	1.05	0.058*	1.642	14	0.18	1.05	0.171*	2.765	95340.363	97200	1.012	12.15	2.948	H1-1b
30	M96	PL6x1/2	0.257	1.05	0.245*	6.81	14	0.222	1.05	0.211*	6.81	60829.391	97200	1.012	12.15	1.317	H1-1b
31	M97	PL6x1/2	0.064	1.05	0.061*	1.123	3	0.205	1.05	0.195*	0	95340.363	97200	1.012	12.15	2.471	H1-1b
32	M98	PL6x3/8	0.224	1.05	0.213*	2.627	6	0.251	1.05	0.239*	2.627	62895.756	72900	0.57	9.113	1.563	H1-1b
33	M99	PL6x3/8	0.235	1.05	0.224*	1.595	2	0.268	1.05	0.255*	0	69770.62	72900	0.57	9.113	1.427	H1-1b
34	M100	PL6x3/8	0.209	1.05	0.199*	2.627	20	0.129	1.05	0.123*	2.627	62895.756	72900	0.57	9.113	1.45	H1-1b
35	M101	PL6x3/8	0.281	1.05	0.268*	1.595	2	0.289	1.05	0.275*	0	69770.62	72900	0.57	9.113	2.955	H1-1b
36	M106	P3 STD	0.103	1.05	0.098*	54.69	157	0.088	1.05	0.084*	53.13	29986.1	70196.802	6.124	6.124	2.33	H1-1b
37	A1	P2 STD	0.337	1.05	0.321*	69	22	0.211	1.05	0.201*	69	15808.485	33847.742	1.997	1.997	3.301	H1-1b
38	A2	P2 STD	0.362	1.05	0.345*	69	18	0.103	1.05	0.098*	69	15808.485	33847.742	1.997	1.997	2.243	H1-1b
39	A3	P2 STD	0.375	1.05	0.357*	69	8	0.14	1.05	0.133*	69	15808.485	33847.742	1.997	1.997	3.461	H1-1b
40	A4	P2 STD	0.303	1.05	0.289*	69	6	0.18	1.05	0.171*	27	15808.485	33847.742	1.997	1.997	3.331	H1-1b
41	B1	P2 STD	0.356	1.05	0.339*	69	6	0.191	1.05	0.182*	27	15808.485	33847.742	1.997	1.997	3.99	H1-1b
42	B2	P2 STD	0.381	1.05	0.363*	69	4	0.104	1.05	0.099*	69	15808.485	33847.742	1.997	1.997	3.154	H1-1b
43	B3	P2 STD	0.394	1.05	0.375*	69	16	0.122	1.05	0.116*	69	15808.485	33847.742	1.997	1.997	4.636	H1-1b
44	B4	P2 STD	0.306	1.05	0.291*	69	14	0.161	1.05	0.153*	69	15808.485	33847.742	1.997	1.997	4.193	H1-1b
45	C1	P2 STD	0.388	1.05	0.37*	69	14	0.197	1.05	0.188*	27	15808.485	33847.742	1.997	1.997	4.375	H1-1b
46	C2	P2 STD	0.392	1.05	0.373*	69	12	0.113	1.05	0.108*	48	15808.485	33847.742	1.997	1.997	2.635	H1-1b
47	C3	P2 STD	0.429	1.05	0.409*	69	2	0.118	1.05	0.112*	69	15808.485	33847.742	1.997	1.997	4.54	H1-1b
48	C4	P2 STD	0.31	1.05	0.295*	69	24	0.171	1.05	0.163*	69	15808.485	33847.742	1.997	1.997	4.463	H1-1b
49	M73	P2 STD	0.292	1.05	0.278*	53.13	2	0.229	1.05	0.218*	12.5	6684.464	33847.742	1.997	1.997	3.763	H1-1b
50	M78	L2.5x2.5x4	0.379	1.05	0.361*	0	24	0.12	1.05	0.114*	0	36167.335	38556	1.114	2.537	1.802	H2-1
51	M79	P2 STD	0.282	1.05	0.269*	53.13	8	0.213	1.05	0.203*	12.5	6684.464	33847.742	1.997	1.997	3.734	H1-1b
52	M84	L2.5x2.5x4	0.393	1.05	0.374*	0	8	0.106	1.05	0.101*	0	36167.335	38556	1.114	2.537	1.749	H2-1
53	M85	P2 STD	0.292	1.05	0.278*	53.13	16	0.22	1.05	0.21*	12.5	6684.464	33847.742	1.997	1.997	3.687	H1-1b
54	M90	L2.5x2.5x4	0.408	1.05	0.389*	0	16	0.102	1.05	0.097*	0	36167.335	38556	1.114	2.537	1.683	H2-1
55	M91A	PL 8x1/2	0.085	1.05	0.081*	0	32	0.071	1.05	0.068*	0	120475.67	129600	1.35	21.6	1.667	H1-1b
56	M92A	LL2.5x2.5x3x8	0.099	1.05	0.094*	50.97	32	0.005	1.05	0.005*	0	42543.862	58482	4.246	2.614	1	H1-1b*
57	M93A	PL 8x1/2	0.084	1.05	0.08*	0	35	0.07	1.05	0.067*	0	120475.67	129600	1.35	21.6	1.667	H1-1b
58	M94A	LL2.5x2.5x3x8	0.098	1.05	0.093*	50.97	36	0.005	1.05	0.005*	50.97	42543.862	58482	4.246	2.614	1.136	H1-1b*
59	M95A	PL 8x1/2	0.084	1.05	0.08*	0	28	0.071	1.05	0.068*	0	120475.67	129600	1.35	21.6	1.667	H1-1b
60	M96A	LL2.5x2.5x3x8	0.098	1.05	0.093*	50.97	28	0.005	1.05	0.005*	50.97	42543.862	58482	4.246	2.614	1.136	H1-1b*

*Rating per TIA-222-H, Section 15.5

APPENDIX D

ADDITIONAL CALCULATIONS

TIA-222-H CONNECTION CHECK
Mount to Tower Connection - Typ. All Sectors
2021777.876369.02

Bolt Information		
Bolt Diameter (d)	0.625	in
Net Tensile Area (An)	0.226	in^2
# of Bolts Total (n)	4	
Bolt Distance Up-Down	6	in
Bolt Distance Left-Right	6	in
Bolt Grade	A325N	
Bolt Tensile Strength (F_{ub})	120	ksi

Flange Information		
Height (h)	8	in
Width (w)	8	in
Thickness (t)	0.75	in
Steel Grade	A36	
Plate Yield Strength (Fy)	36	ksi
Support Arm Height	4	in
Support Arm Width	4	in

RISA 3D Reactions (Up-Down)		
Moment (M)	0.24	k-ft
Axial (T)	-2.59	kips
Shear (V)	4.51	kips

RISA 3D Reactions (Left -Right)		
Moment (M)	1.61	k-ft
Axial (T)	0.37	kips
Shear (V)	1.79	kips

Bolt Capacity (Up-Down)		
Nominal Tensile Strength (R_{nt})	27.120	kips
Nominal Shear Strength (R_{nv})	18.41	kips
Bolt Tensile Force (T_{ub})	-0.41	kips
Bolt Shear Force (V_{ub})	1.127	kips
$T_{ub}/\phi R_{nt}$	-0.01925	
$V_{ub}/\phi R_{nv}$	0.07771	
$(V_{ub}/\phi R_{nv})^2+(T_{ub}/\phi R_{nt})^2$	0.00673	
Bolt Capacity =	7.8%	OK

*Rating per TIA-222-H, Section 15.5

Bolt Capacity (Left-Right)		
Nominal Tensile Strength (R_{nt})	27.120	kips
Nominal Shear Strength (R_{nv})	18.41	kips
Bolt Tensile Force (T_{ub})	1.70	kips
Bolt Shear Force (V_{ub})	0.448	kips
$T_{ub}/\phi R_{nt}$	0.07982	
$V_{ub}/\phi R_{nv}$	0.03092	
$(V_{ub}/\phi R_{nv})^2+(T_{ub}/\phi R_{nt})^2$	0.00769	
Bolt Capacity =	8.0%	OK

*Rating per TIA-222-H, Section 15.5

Plate Capacity (Up-Down)		
Bolt Circle (D_{BC})	8.485	in
Effective Width (B_{eff})	7.48	in
Flexural Moment (M_u)	1.55	k-in
Flexural Strength ($\emptyset M_n$)	34.10	k-in
Plate Capacity=	4.3%	OK

*Rating per TIA-222-H, Section 15.5

Plate Capacity (Left-Right)		
Bolt Circle (D_{BC})	8.485	in
Effective Width (B_{eff})	7.48	in
Flexural Moment (M_u)	3.41	k-in
Flexural Strength ($\emptyset M_n$)	34.10	k-in
Plate Capacity=	9.5%	OK

*Rating per TIA-222-H, Section 15.5

TIA-222-H CONNECTION CHECK
Kicker to Tower Connection - Typ. All Sectors
2021777.876369.02

Bolt Information		
Bolt Diameter (d)	0.625	in
Net Tensile Area (An)	0.226	in^2
# of Bolts Total (n)	4	
Bolt Grade	A325N	
Bolt Tensile Strength (F_{ub})	120	ksi

RISA 3D Reactions		
Moment (M)	0.00	k-ft
Axial (T)	1.83	kips
Shear (V)	3.78	kips

Bolt Capacity		
Nominal Tensile Strength (R_{nt})	27.120	kips
Nominal Shear Strength (R_{nv})	18.41	kips
Bolt Tensile Force (T_{ub})	0.46	kips
Bolt Shear Force (V_{ub})	0.945	kips
$T_{ub}/\phi R_{nt}$	0.02139	
$V_{ub}/\phi R_{nv}$	0.06516	
$(V_{ub}/\phi R_{nv})^2+(T_{ub}/\phi R_{nt})^2$	0.00494	
Bolt Capacity =	6.5%	OK

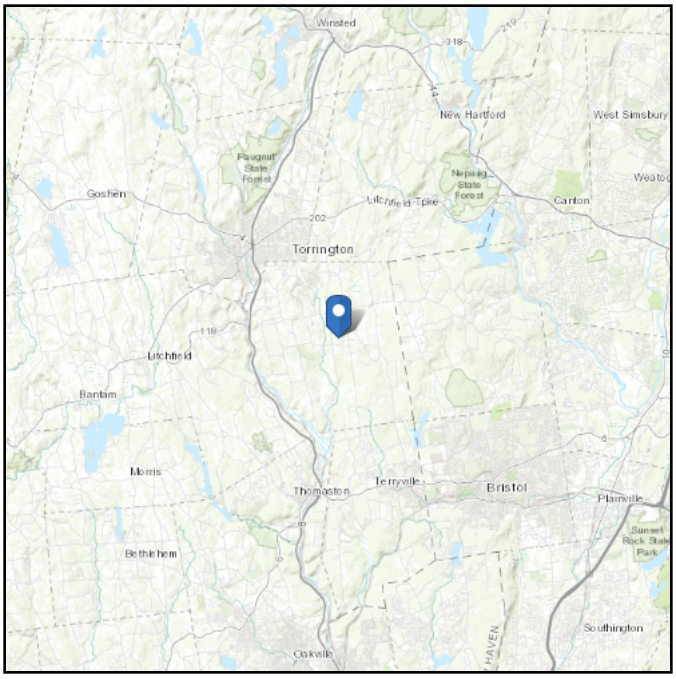
*Rating per TIA-222-H, Section 15.5

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 840.53 ft (NAVD 88)
Latitude: 41.757264
Longitude: -73.052556



Wind

Results:

Wind Speed:	~~118 Vmph~~	120 mph per jurisdiction requirement
10-year MRI	76 Vmph	
25-year MRI	85 Vmph	
50-year MRI	90 Vmph	
100-year MRI	97 Vmph	

Data Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, and Section 26.5.2, incorporating errata of March 12, 2014

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.

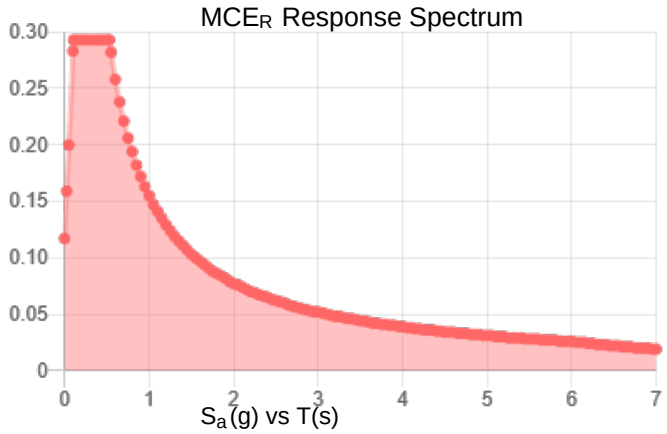
Seismic

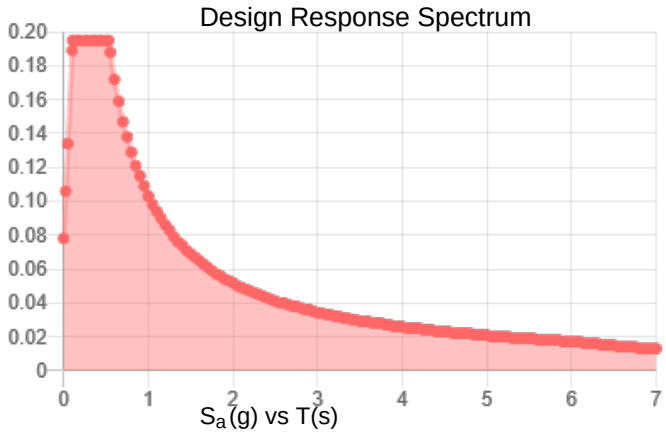
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.183	S_{DS} :	0.195
S_1 :	0.065	S_{D1} :	0.103
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.093
S_{MS} :	0.293	PGA_M :	0.148
S_{M1} :	0.155	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Wed Mar 10 2021

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:

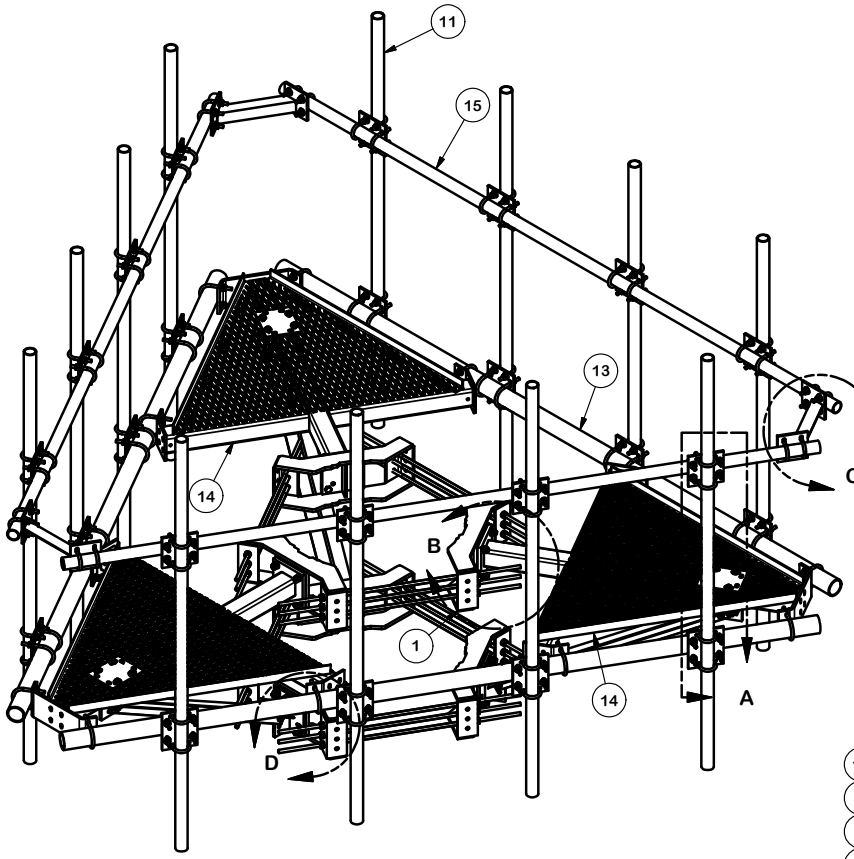
Ice Thickness:	0.75 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Wed Mar 10 2021

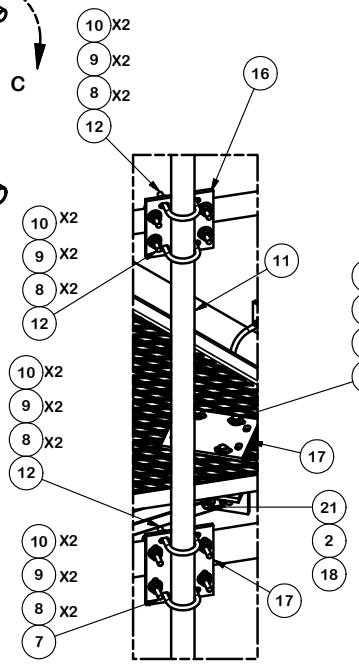
Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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.

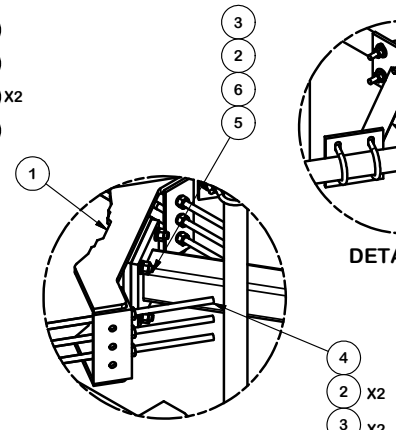
APPENDIX E

SUPPLEMENTAL DRAWINGS





DETAIL A



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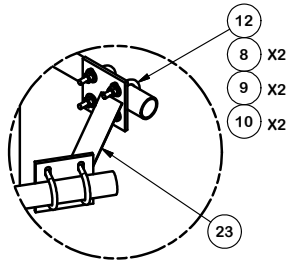

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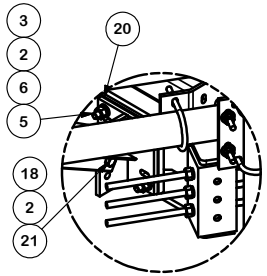


DETAIL D

PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	6	X-LWRM	RING MOUNT WELDMENT		68.16	408.95
2	66	G58LW	5/8" HDG LOCKWASHER		0.03	1.72
3	60	A58NUT	5/8" HDG A325 HEX NUT		0.13	7.78
4	18	G58R-24	5/8" x 24" THREADED ROD (HDG.)		0.55	9.88
4	18	G58R-48	5/8" x 48" THREADED ROD (HDG.)		0.55	9.88
5	24	A58234	5/8" x 2-3/4" HDG A325 HEX BOLT	2 3/4 in	0.36	8.53
6	24	A58FW	5/8" HDG A325 FLATWASHER		0.03	0.82
7	36	X-UB1306	1/2" X 3-5/8" X 6" X 3" U-BOLT (HDG.)		0.73	26.34
8	264	G12FW	1/2" HDG USS FLATWASHER		0.03	8.99
9	252	G12LW	1/2" HDG LOCKWASHER		0.01	3.50
10	252	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	18.03
11	12	P296	2-3/8" X 96" SCH. 40 GALVANIZED PIPE	96 in	30.76	369.08
12	84	X-UB1212	1/2" X 2-1/2" X 4-1/2" X 2" U-BOLT (HDG.)		0.73	61.46
13	3	P3150	3-1/2" X 150" SCH 40 GALVANIZED PIPE	150 in	94.80	284.40
14	3	X-SV196	LOW PROFILE PLATFORM CORNER		212.10	636.31
15	3	P2150	2-3/8" OD X 150" SCH 40 GALVANIZED PIPE	150 in	48.06	144.17
16	12	SCX2	CROSSOVER PLATE	7 in	4.80	57.56
17	15	SCX4	CROSSOVER PLATE	8 1/2 in	6.02	90.32
18	6	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	0.78
19	6	X-253993	PLATFORM REINFORCEMENT KIT ANGLE	52 25/32 in	14.33	85.99
20	6	X-253992	T-BRACKET FOR REINFORCEMENT KIT		13.55	81.27
21	6	G5802	5/8" x 2" HDG HEX BOLT GR5		0.27	1.62
22	12	G12065	1/2" x 6-1/2" HDG HEX BOLT GR5 FULL THREAD	6 1/2 in	0.41	4.91
23	3	X-AHCP	ANGLE HANDRAIL CORNER PLATE		12.92	38.76
					TOTAL WT. #	2448.72

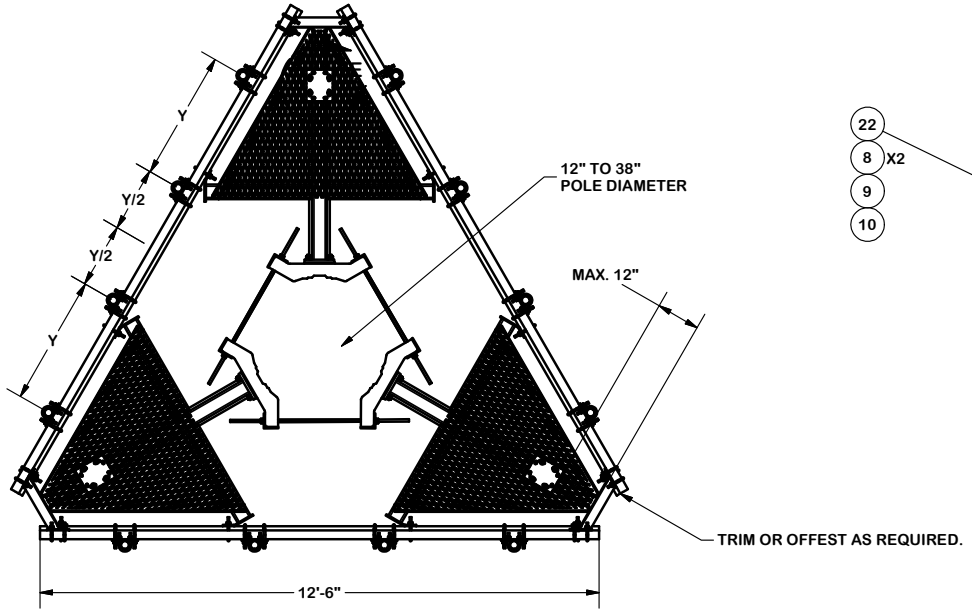
TOLERANCE NOTES

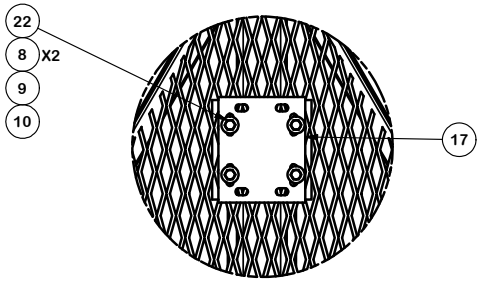
TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

DESCRIPTION
12' 6" LOW PROFILE PLATFORM
WITH TWELVE 2-3/8" ANTENNA MOUTING
PIPES, AND HANDRAIL

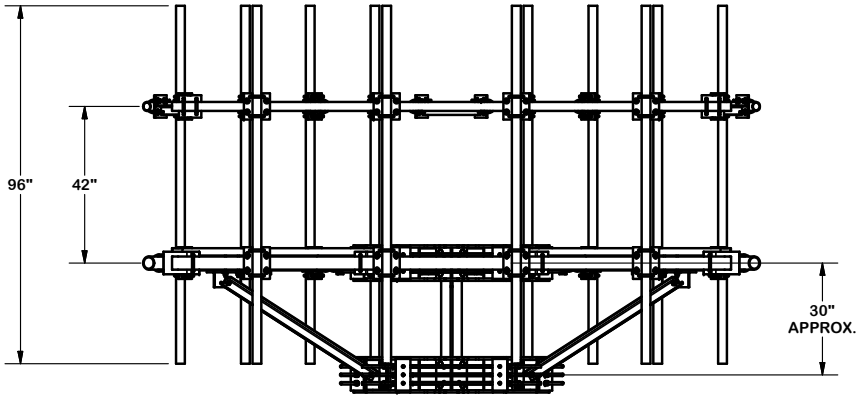
SITE PRO 1
A valmont COMPANY
Engineering Support Team: 1-888-753-7446
Locations:
New York, NY
Atlanta, GA
Los Angeles, CA
Plymouth, IN
Salem, OR
Dallas, TX

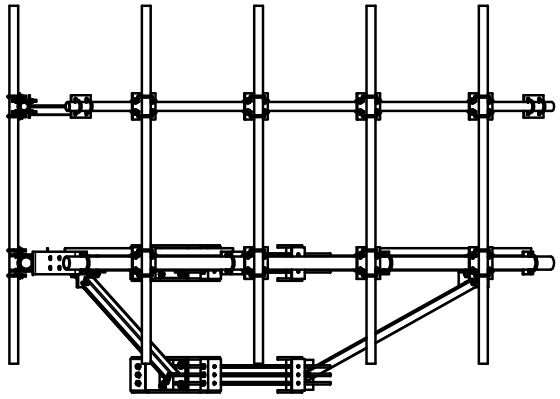
CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.	PAGE
4488	CEK 7/14/2014		RMQP-496-HK	1 OF 3
CLASS / SUB	DRAWING USAGE	CHECKED BY	DWG. NO.	
81 / 02	CUSTOMER	BMC 7/14/2014	RMQP-496-HK	





DETAIL E





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LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

DESCRIPTION
12' 6" LOW PROFILE PLATFORM
WITH TWELVE 2-3/8" ANTENNA MOUTING
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CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
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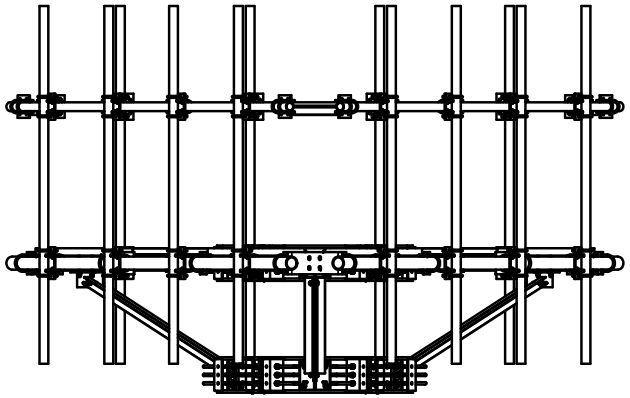
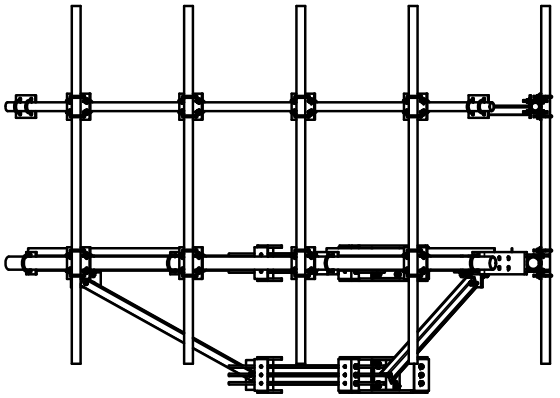
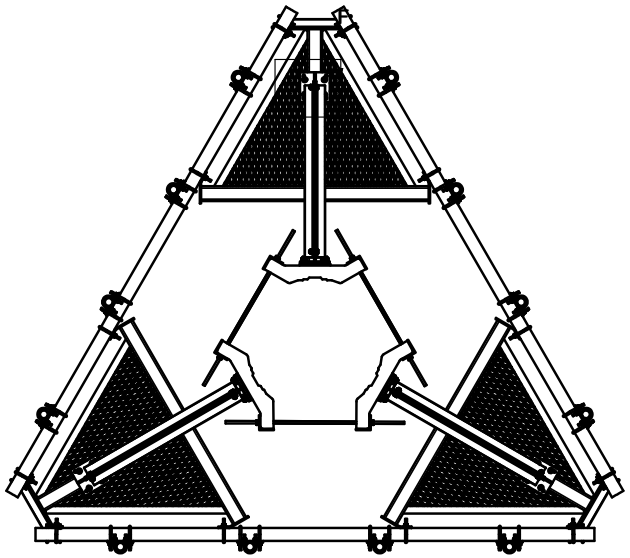
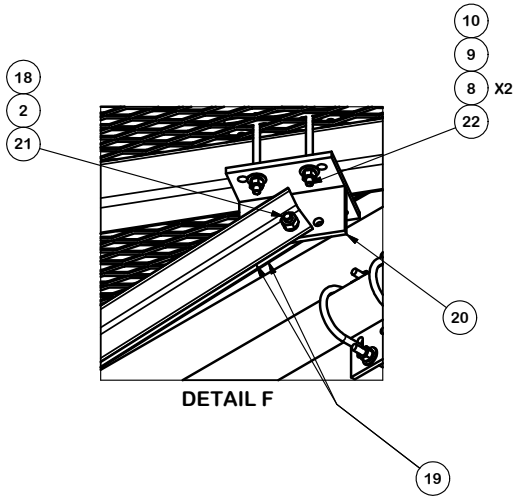
CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	02	CUSTOMER	BMC 7/14/2014	RMQP-496-HK









DETAIL F

TOLERANCE NOTES

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

DESCRIPTION
12' 6" LOW PROFILE PLATFORM
WITH TWELVE 2-3/8" ANTENNA MOUTING
PIPES, AND HANDRAIL

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

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
4488	CEK 7/14/2014		RMQP-496-HK

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	02	CUSTOMER	BMC 7/14/2014	RMQP-496-HK

Exhibit F

Power Density/RF Emissions Report

EBI Consulting

environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CTNH558A

64 Hungerford Lane
Harwinton, Connecticut 06791

April 21, 2021

EBI Project Number: 6221001884

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**11.12%**

21 B Street, Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

April 21, 2021

T-Mobile
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, Connecticut 06002

Emissions Analysis for Site: CTNH558A

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **64 Hungerford Lane** in **Harwinton, Connecticut** 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 ($\mu W/cm^2$). 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.

Public 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 MHz and 700 MHz frequency 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), 2100 MHz (AWS) and 11 GHz frequency 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 done for the proposed T-Mobile Wireless antenna facility located at 64 Hungerford Lane in Harwinton, Connecticut 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 manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, 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. For power density calculations, the broadcast footprint of the AIR6449 antenna has been considered. Due to the beamforming nature of this antenna, the actual beam locations vary depending on demand and are narrow in nature. Using the broadcast footprint accounts for the potential location of beams at any given time.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 1 NR channel (600 MHz Band) was considered for each sector of the proposed installation. This Channel has a transmit power of 80 Watts.

3) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 4 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

5) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

6) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

7) 1 LTE channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 120 Watts.

8) 1 NR channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 120 Watts.

9) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. 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. This is rarely the case, and if so, is never continuous.

10) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

11) The antennas used in this modeling are the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector A, the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector B, the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, 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.

12) The antenna mounting height centerline of the proposed antennas is 180 feet above ground level (AGL).

13) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20
Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	180 feet	Height (AGL):	180 feet	Height (AGL):	180 feet
Channel Count:	2	Channel Count:	2	Channel Count:	2
Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A1 MPE %:	**0.55%**	Antenna B1 MPE %:	**0.55%**	Antenna C1 MPE %:	**0.55%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVAALL24_43-U-NA20	Make / Model:	RFS APXVAALL24_43-U-NA20	Make / Model:	RFS APXVAALL24_43-U-NA20
Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz
Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd
Height (AGL):	180 feet	Height (AGL):	180 feet	Height (AGL):	180 feet
Channel Count:	11	Channel Count:	11	Channel Count:	11
Total TX Power (W):	440 Watts	Total TX Power (W):	440 Watts	Total TX Power (W):	440 Watts
ERP (W):	12,569.87	ERP (W):	12,569.87	ERP (W):	12,569.87
Antenna A2 MPE %:	**2.17%**	Antenna B2 MPE %:	**2.17%**	Antenna C2 MPE %:	**2.17%**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449
Frequency Bands:	2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz
Gain:	17.3 dBd / 17.3 dBd	Gain:	17.3 dBd / 17.3 dBd	Gain:	17.3 dBd / 17.3 dBd
Height (AGL):	180 feet	Height (AGL):	180 feet	Height (AGL):	180 feet
Channel Count:	2	Channel Count:	2	Channel Count:	2
Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts
ERP (W):	12,888.76	ERP (W):	12,888.76	ERP (W):	12,888.76
Antenna A3 MPE %:	**1.53%**	Antenna B3 MPE %:	**1.53%**	Antenna C3 MPE %:	**1.53%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	4.26%
Verizon	1.43%
Sprint	1.75%
AT&T	3.68%
Site Total MPE % :	11.12%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	4.26%
T-Mobile Sector B Total:	4.26%
T-Mobile Sector C Total:	4.26%
Site Total MPE % :	11.12%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile 2100 MHz LTE	2	2334.27	180.0	5.54	2100 MHz LTE	1000	0.55%
T-Mobile 600 MHz LTE	2	591.73	180.0	1.41	600 MHz LTE	400	0.35%
T-Mobile 600 MHz NR	1	1577.94	180.0	1.87	600 MHz NR	400	0.47%
T-Mobile 700 MHz LTE	2	695.22	180.0	1.65	700 MHz LTE	467	0.35%
T-Mobile 1900 MHz GSM	4	1052.26	180.0	5.00	1900 MHz GSM	1000	0.50%
T-Mobile 1900 MHz LTE	2	2104.51	180.0	5.00	1900 MHz LTE	1000	0.50%
T-Mobile 2500 MHz LTE	1	6444.38	180.0	7.65	2500 MHz LTE	1000	0.77%
T-Mobile 2500 MHz NR	1	6444.38	180.0	7.65	2500 MHz NR	1000	0.77%
						Total:	**4.26%**

• NOTE: Totals may vary by approximately 0.01% due to summation of remainders in calculations.

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:	4.26%
Sector B:	4.26%
Sector C:	4.26%
T-Mobile Maximum MPE % (Sector A):	4.26%
Site Total:	11.12%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **11.12%** 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.