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Also admitted in Massachusetts
and New York

May 8, 2024

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

Re: **Request of Cellco Partnership d/b/a Verizon Wireless for an Order to Approve the Shared Use of an Existing Tower at 575 Pleasant Valley Road, South Windsor, Connecticut**

Dear Attorney Bachman:

Pursuant to Connecticut General Statutes ("C.G.S.") §16-50aa, as amended, Cellco Partnership d/b/a Verizon Wireless ("Cellco") hereby requests an order from the Siting Council ("Council") to approve the shared use of an existing telecommunications tower located on a 23.93-acre parcel at 575 Pleasant Valley Road in South Windsor (the "Property"). The tower and Property are owned by the Town of South Windsor. Cellco identifies this site as its "South Windsor 4 Facility". The existing tower was approved by the Town of South Windsor ("Town") in March of 2021. A copy of the Town's tower approval is included in Attachment 1.

Cellco requests that the Council find that the proposed shared use of the existing tower satisfies the criteria of C.G.S § 16-50aa and issue an order approving this request. A copy of this filing is being sent to South Windsor's Town Manager, Michael Maniscalco and Director of Planning, Michele M. Lipe.

Background

Cellco is licensed by the Federal Communications Commission ("FCC") to provide wireless services throughout the State of Connecticut. Cellco and the Town have agreed to the proposed shared use of the existing tower pursuant to mutually acceptable terms and conditions. Likewise, the Town and Cellco have agreed to the proposed installation of equipment on the ground near the base of the tower. The Town has authorized Cellco to apply for all necessary permits and approvals that may be required to share the existing tower. (*See* Attachment 2).

Cellco proposes to install nine (9) antennas and nine (9) remote radio heads ("RRHs") on an antenna platform at a centerline height of 130 feet above ground level ("AGL")[1]. Cellco will also install equipment and battery cabinets and a diesel-fueled backup generator on a concrete pad on the ground near the base of the tower. Included in Attachment 3 are Cellco's project plans showing the location of Cellco's proposed site improvements. Attachment 4 contains specifications for Cellco's proposed antennas, RRHs and backup generator.

C.G.S. § 16-50aa(c)(1) provides that, upon written request for approval of a proposed shared use, "if the council finds that the proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns, the council shall issue an order approving such shared use."[2] Cellco respectfully submits that the shared use of the tower satisfies these criteria.

A. Technical Feasibility. The existing tower is structurally capable of supporting Cellco's antennas, RRHs, antenna platform and related equipment. The proposed shared use of this tower is, therefore, technically feasible. A Structural Analysis ("SA") dated March 14, 2024, prepared by Centek Engineering, confirms that the tower can support Cellco's proposed antennas and related equipment. Likewise, an Antenna Mount Analysis ("MA") dated April 2, 2024, also confirms that the proposed antenna and RRH mounting system can support Cellco's proposed shared use. Copies of the SA and MA are included in Attachment 5.

B. Legal Feasibility. Under C.G.S. § 16-50aa, the Council has been authorized to issue orders approving the shared use of an existing tower, such as the existing tower. This authority complements the Council's prior-existing authority under C.G.S. § 16-50p to issue orders approving the construction of new towers that are subject to the Council's jurisdiction. In addition, § 16-50x(a) directs the Council to "give such consideration to other state laws and municipal regulations as it shall deem appropriate" in ruling on requests for the shared use of existing tower facilities. Under the statutory authority vested in the Council, an order by the Council approving the requested shared use would permit the Applicant to obtain a building permit for the proposed installations.

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[1] On May 11, 2023, the Council approved a request by Dish Wireless LLC to share the existing tower and install antennas at the 130-foot level on the tower (TS-DISH-132-230413). As confirmed in the Town's authorization letter to Cellco (Attachment 2), Dish does not currently have a signed lease allowing them to share the Town's tower and will no longer be moving forward with its installation. Cellco and the Town have an executed lease allowing for the filing of this Application.

[2] Consistent with footnote no. 1 and the Town's authorization letter (Attachment 2), the SA does not include antennas and related equipment previously proposed by Dish Wireless LLC.

C. **Environmental Feasibility**. The proposed shared use of the existing tower would have minimal environmental effects, for the following reasons:

1. The proposed installation of nine (9) antennas and nine (9) RRHs on an antenna platform at a height of 130 feet AGL on the existing 174-foot tower would have an insignificant incremental visual impact on the area around the Property. As mentioned above, all of Cellco's equipment will be located within the fenced facility compound near the base of the tower. Cellco's shared use of the existing tower would, therefore, not cause any significant change or alteration in the physical or environmental characteristics of the existing facility.

2. Noise associated with Cellco's proposed facility will comply with State and local noise standards. Noise associated with the backup generator is exempt from state and local noise standards.

3. Operation of Cellco's antennas at this site would not exceed the RF emissions standards adopted by the Federal Communications Commission ("FCC"). Included in Attachment 6 of this filing is a Calculated Radio Frequency Emissions Report that demonstrates that the modified facility will operate well within the FCC's safety standards.

4. Under ordinary operating conditions, the proposed installation would not require the use of any water or sanitary facilities and would not generate air emissions or discharges to water bodies or sanitary facilities. After construction is complete the proposed installations would not generate any increased traffic to the facility other than periodic maintenance visits to the cell site.

The proposed shared use of the existing tower would, therefore, have a minimal environmental effect, and is environmentally feasible.

D. **Economic Feasibility**. As previously mentioned, Cellco has entered into an agreement with the Town for the shared use of the existing tower subject to mutually agreeable terms. The proposed tower sharing is, therefore, economically feasible.

E. **Public Safety Concerns**. As discussed above, the tower and antenna mounts are structurally capable of supporting Cellco's antennas, antenna mounting frame, RRHs and all related equipment. Cellco is not aware of any public safety concerns relative to the proposed sharing of the existing tower. In fact, the provision of new and improved wireless service through Cellco's shared use of the existing tower would enhance the safety and welfare of area residents and members of the general public traveling through the Town of South Windsor.

A Certificate of Mailing verifying that a copy of this filing was sent to the municipal officials is included in Attachment 7.

Conclusion

For the reasons discussed above, the proposed shared use of the existing tower at the Property satisfies the criteria stated in C.G.S. § 16-50aa and advances the General Assembly's and the Council's goal of preventing the unnecessary proliferation of towers in Connecticut. The Applicant, therefore, respectfully requests that the Council issue an order approving the proposed shared use.

Thank you for your consideration of this matter.

Very truly yours,

Kenneth C. Baldwin

Enclosures
Copy to:
Michael Maniscalco, Town Manager
Michele M. Lipe, AICP, Director of Planning
Tim Parks, Verizon Wireless

ATTACHMENT 1

Town of South Windsor
1540 SULLIVAN AVENUE • SOUTH WINDSOR, CT 06074
TELEPHONE (860) 644-2511

HAND DELIVERED

March 17, 2021

Town of South Windsor
Walter Summers, Fire Marshal
1540 Sullivan Avenue
South Windsor, CT 06074

Dear Mr. Summers:

Re: Appl. 21-07P, Town of South Windsor Radio Communications Tower Special Exception Site Plan of Development, 555 and 575 Pleasant Valley Road

We are pleased to advise you that the Planning & Zoning Commission voted on March 9, 2021 to approve with modifications the above referenced application for a Special Exception Site Plan of Development.

This approval is for special exception to Section 7.18 and site plan of development for the construction of a 175 foot monopole radio communications tower, on property located at 555 and 575 Pleasant Valley Road, A-20 and I zone, as shown on plans prepared by CHA, Project No. 065446, dated January 25, 2021 as revised. This approval is subject to the following modifications:

1. Prior to commencement of any site work, a meeting must be held with Town Staff.
2. No building permit will be issued until the final mylars have been filed in the Town Clerk's office.
3. This application is subject to the conditions of approval of the Inland Wetlands Agency/Conservation Commission.
4. An as-built plan is required prior to issuance of a Certificate of Occupancy per Section 9.1.3 of the Zoning Regulations.
5. All plans used in the field by the developer must bear the stamp and authorized signature of the Town of South Windsor.
6. The building street number must be included on the final plan.
7. Pavement markings must be maintained in good condition throughout the site drives and parking areas.
8. All free standing signs and/or building signs require the issuance of a sign permit before they are erected.
9. A new deed combining the properties shall be filed.

Black and white transparent mylars of Sheets # 2 and 3 with the above modifications, together with three print copies of the entire set of plans with live signatures and raised seals must be submitted to this Commission to be stamped and signed. The letters of approval of this Commission as well as the Inland Wetlands Agency/Conservation Commission must be reproduced on the mylars.

After the mylars have been signed by the Commission, they will be returned to you for filing in the Office of the Town Clerk. After filing these plans, a copy of the receipt must be submitted to the Planning Department.

The attached Special Exception form must be completed and filed in the Town Clerk's office. The Special Exception will take effect upon filing.

Sincerely,

Bart Pacekonis

Bart Pacekonis, Chairman
PLANNING & ZONING COMMISSION

BP/llz

cc: Town Engineer
Chief Building Official
Assessor
Superintendent of Pollution Control
Fire Marshal

Town of South Windsor Building Department

Building Permit: BLDP-21-781

APPLICANT
NAME: Cindy Morton
EMAIL ADDRESS: cmorton@easterncomm.com
ADDRESS: 103R Old Windsor Road
Bloomfield , CT 06002

LOCATION
ADDRESS: 575 PLEASANT VALLEY RD
South Windsor CT6074
OWNER: SOUTH WINDSOR TOWN OF 45
PLEASANT VALLEY ROAD
SOUTH WINDSOR CT 6074

DESCRIPTION OF WORK:
Develop access road and 100' x 100' tower compound. Construct tower foundation and ground ring. Erect 175' monopole and (2) antenna platforms. Construct slab in grade for equipment shelter, LP tank and generator. Place and set up pre-fab equipment shelter. Install town antenna system

October 25, 2021

BUILDING OFFICIAL DATE SIGNED

*****ALL WORK TO BE DONE IN ACCORDANCE WITH THE APPLICATION AND PLANS APPROVED BY THE BUILDING DEPARTMENT*****
*****PERMIT ONLY VALID IF SIGNED BY BUILDING OFFICIAL*****

ATTACHMENT 2

06074

Michael Maniscalco, MPA
Town Manager

May 1, 2024

Tim Parks
Network Real Estate
Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492

Re: **Application of Cellco Partnership d/b/a Verizon Wireless For The Installation of Telecommunications Facility at 575 Pleasant Valley Road, South Windsor, Connecticut**

Dear Mr. Parks:

We, the Town of South Windsor, as the owner of the property at 575 Pleasant Valley Road in South Windsor, Connecticut, hereby authorize Cellco Partnership d/b/a Verizon Wireless and/or it's agent(s) to apply for and obtain all necessary permits and approvals from all applicable State and local agencies for the installation of a wireless telecommunications facility at 575 Pleasant Valley Road, South Windsor, CT.

Please note that the Town is aware that Dish Wireless LLC was previously authorized to apply to the CT Siting Council for approval of a wireless installation on this tower and install antennas at the 130' level. The Town of South Windsor does not currently have a lease agreement in place with Dish Wireless LLC for shared use of the tower, therefore, making the 130-foot level on the tower available for Verizon's use.

Sincerely,

Michael Maniscalco
Town Manager

ATTACHMENT 3

verizon

WIRELESS COMMUNICATIONS FACILITY

SOUTH WINDSOR 4 CT

575 PLEASANT VALLEY ROAD

SOUTH WINDSOR, CT 06074

PROJECT SUMMARY

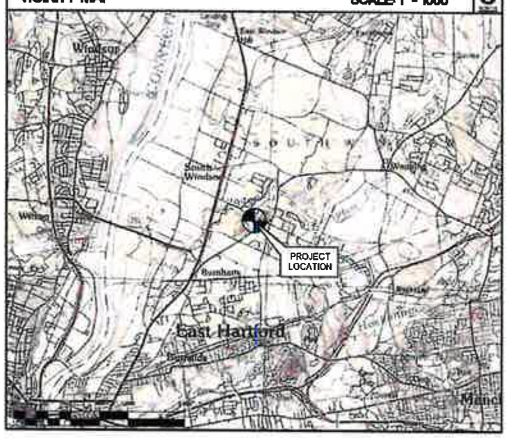
1. THE PROPOSED WIRELESS COMMUNICATIONS EQUIPMENT WILL BE INSTALLED WITHIN AN EXISTING 100' x 100' FENCED COMMUNICATIONS COMPOUND WITH AN EXISTING 175' TALL MONOPOLE TOWER LOCATED CENTRALLY WITHIN THE FENCED COMMUNICATIONS COMPOUND.
2. THE PROPOSED COMPOUND GROUND WORK TO INCLUDE THE INSTALLATION OF A PROPOSED 20' X 12' CONCRETE EQUIPMENT PAD, EQUIPMENT CABINETS, DIESEL GENERATOR, STEEL ICE-CANOPY, AND ANTENNA ICE BRIDGE ALL WITHIN THE EXISTING FENCED COMMUNICATIONS COMPOUND.
3. THE PROPOSED VERIZON WIRELESS ANTENNA INSTALLATION TO CONSIST OF A TOTAL OF (9) PANEL ANTENNAS MOUNTED ON THE EXISTING COMMUNICATIONS TOWER INCLUDING ASSOCIATED APPURTENANCES & CABLING.
4. POWER AND TELCO UTILITIES SHALL BE ROUTED FROM EXISTING DEMARCS LOCATED WITHIN THE COMMUNICATIONS FACILITY.

PROJECT INFORMATION

SITE NAME:	SOUTH WINDSOR 4 CT
SITE ADDRESS:	575 PLEASANT VALLEY ROAD SOUTH WINDSOR, CT 06074
PROPERTY OWNER:	TOWN OF SOUTH WINDSOR 1540 SULLIVAN AVENUE SOUTH WINDSOR, CT 06074
LESSEE/TENANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 20 ALEXANDER DRIVE WALLINGFORD, CT 06492
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT. 06405 (203) 488-0580
PROJECT COORDINATES:	LATITUDE: 41°-48'-48.63" N LONGITUDE: 72°-35'-02.61" W GROUND ELEVATION: ±70.45' A.M.S.L. SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM FAA 2C SURVEY PREPARED BY CENTEK ENGINEERING, DATED 03.27.24

VICINITY MAP

SCALE: 1" = 1000'



SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	C
Z-1	SITE LOCATION MAP	C
Z-2	TOWER ELEVATION & COMPOUND PLAN	C
Z-3	ANTENNA PLANS AND EQUIPMENT DETAILS	C
Z-4	TYPICAL EQUIPMENT DETAILS	C
Z-5	TYPICAL EQUIPMENT DETAILS	C

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
C	04/22/24	BMP	LJR	ZONING DRAWINGS - REVISED PER CLIENT COMMENTS
B	04/12/24	BMP	LJR	ZONING DRAWINGS - REVISED PER CLIENT COMMENTS
A	04/05/24	BMP	LJR	ZONING DRAWINGS - ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

verizon

CENTEK engineering
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

Cellco Partnership d/b/a Verizon Wireless

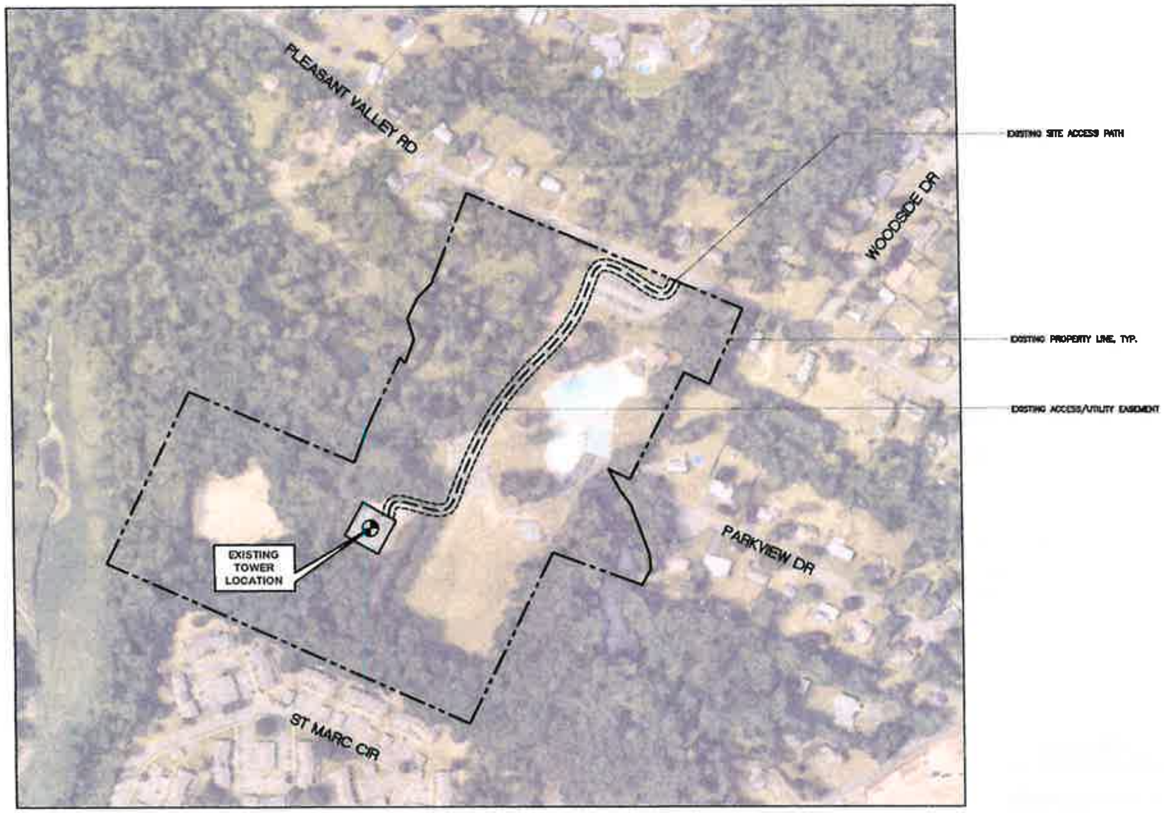
SOUTH WINDSOR 4 CT

575 PLEASANT VALLEY ROAD
SOUTH WINDSOR, CT 06074

DATE: 04/05/24
SCALE: AS NOTED
JOB NO. 24018.01

TITLE SHEET

T-1



SITE LOCATION MAP (1, Z-1)
SCALE: 1" = 150'

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
C	04/22/24	ESP	TJR	ZONING DRAWINGS – REVISED PER CLIENT COMMENTS
B	04/12/24	ESP	TJR	ZONING DRAWINGS – REVISED PER CLIENT COMMENTS
A	04/05/24	DSP	TJR	ZONING DRAWINGS – ISSUED FOR CLIENT REVIEW

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Cellco Partnership d/b/a Verizon Wireless

SOUTH WINDSOR 4 CT

576 PLEASANT VALLEY ROAD
SOUTH WINDSOR, CT 06074

DATE:	04/05/24
SCALE:	AS NOTED
JOB NO.	24015.01

SITE LOCATION MAP

Z-1

Sheet No. 2 of 6

STRUCTURAL COMPLIANCE

ANTENNA MOUNTS

A STRUCTURAL ANALYSIS OF THE ANTENNA MOUNTS WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING.

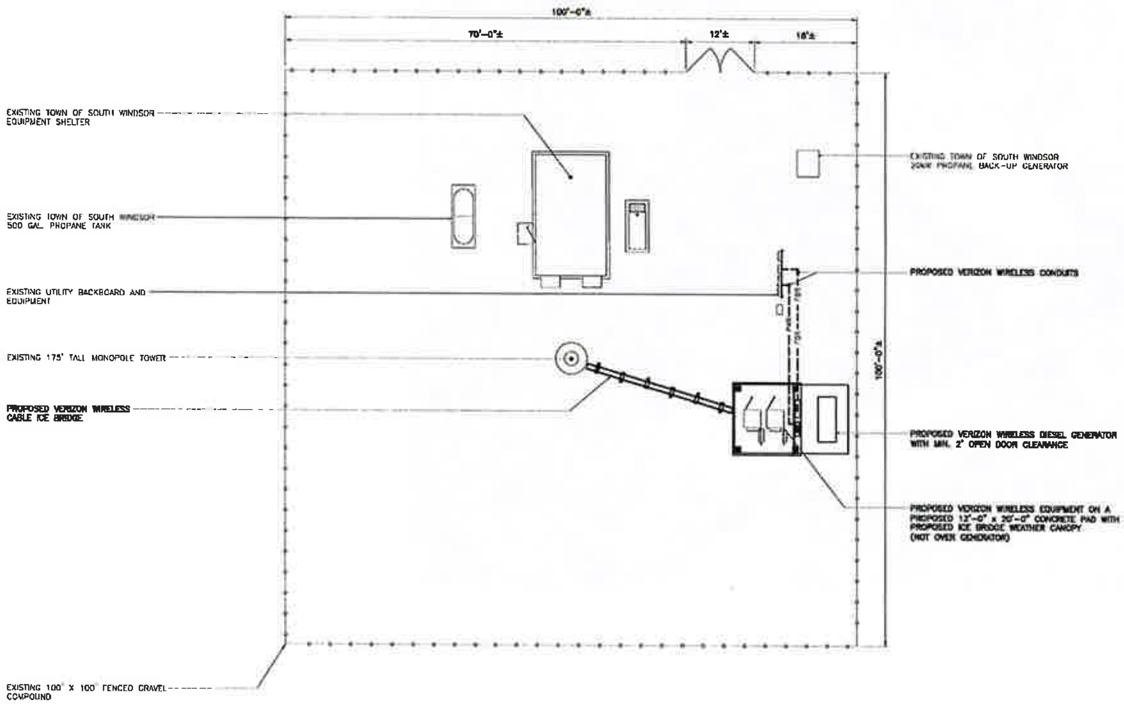
REFER TO THE ANTENNA MOUNT ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 24018.01) DATED 04/02/24 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

TOWER AND TOWER FOUNDATION

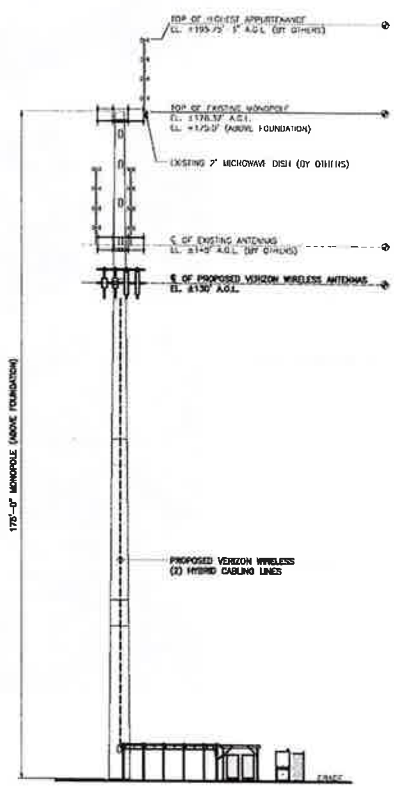
A STRUCTURAL ANALYSIS OF THE TOWER AND TOWER FOUNDATION WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING.

REFER TO THE STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 24018.01) DATED 04/14/24 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

NOTE: NO EQUIPMENT SHALL BE INSTALLED ON THE HOSTING STRUCTURE WITHOUT A PASSING STRUCTURAL ANALYSIS REPORT AND CONTRACTOR PRIOR CONFIRMATION THAT ANY AND ALL REQUISITE MODIFICATIONS HAVE BEEN COMPLETED.



1 / Z-2 COMPOUND PLAN
SCALE: 1" = 10'
GRAPHIC SCALE
(IN FEET)



2 / Z-2 MONOPOLE TOWER ELEVATION
SCALE: 1" = 15'
GRAPHIC SCALE
(IN FEET)

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
C	04/22/24	ESP	LJR	ZONING DRAWINGS – REVISED FOR CLIENT COMMENTS
[illegible]	04/12/24	ESP	LJR	ZONING DRAWINGS – REVISED FOR CLIENT COMMENTS
A	04/05/24	ESP	LJR	ZONING DRAWINGS – ISSUED FOR CLIENT REVIEW

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Cellco Partnership d/b/a Verizon Wireless

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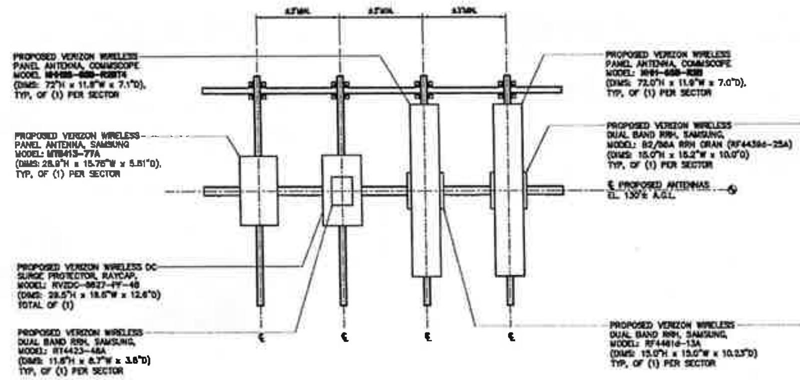
575 PLEASANT VALLEY ROAD
SOUTH WINDSOR, CT 06074

DATE:	04/05/24
SCALE:	AS NOTED
JOB NO.	24018.01

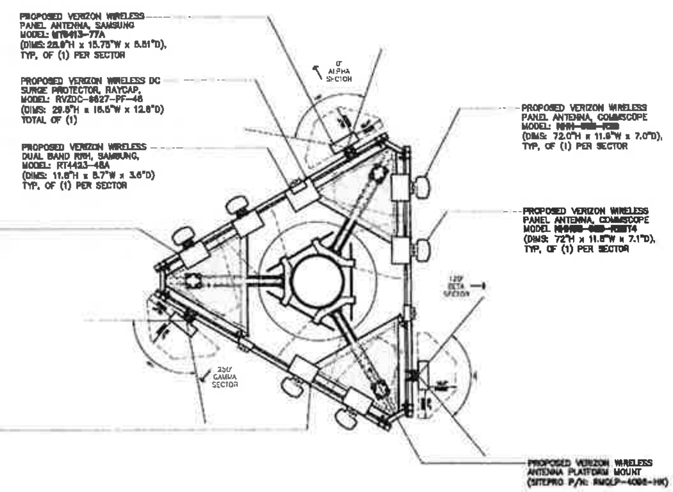
TOWER ELEVATION & COMPOUND PLAN

Z-2

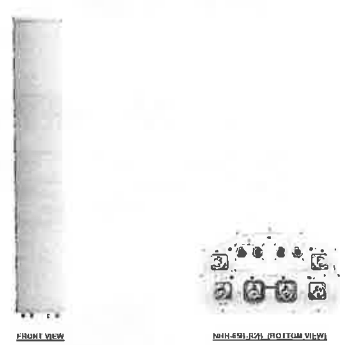
Sheet No. 3 of 8



1 Z-3 **ANTENNA MOUNTING CONFIG. DETAILS**
SCALE: 1/2" = 1' - 0"



2 Z-3 **ANTENNA MOUNTING CONFIG. DETAIL PLAN**
SCALE: 3/8" = 1' - 0"



ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: NHH-65B-R2B	72"H x 11.9"W x 7.0"D	43.7 LBS.

NOTES:
1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND CONFIRM FINAL EQUIPMENT MAKE/MODEL AND QUANTITY SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

3 Z-3 **PROPOSED ANTENNA DETAIL**
SCALE: NOT TO SCALE

ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: NHHSS-65B-R2BT4	72"H x 11.8"W x 7.1"D	60.63 LBS.

NOTES:
1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND CONFIRM FINAL EQUIPMENT MAKE/MODEL AND QUANTITY SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

4 Z-3 **PROPOSED ANTENNA DETAIL**
SCALE: NOT TO SCALE

ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: MT6413-77A	28.90"H x 15.75"W x 5.51"D	57.3 LBS.

NOTES:
1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND CONFIRM FINAL EQUIPMENT MAKE/MODEL AND QUANTITY SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.
2. ANTENNA HAS ITS OWN BUILT-IN RRU.

5 Z-3 **PROPOSED ANTENNA DETAIL**
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
C	04/22/24	SBP	TJR	ZONING DRAWINGS – REVISED PER CLIENT COMMENTS
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Cellco Partnership d/b/a Verizon Wireless

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575 PLEASANT VALLEY ROAD SOUTH WINDSOR, CT 06074

DATE:	04/05/24
SCALE:	AS NOTED
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ANTENNA PLANS AND EQUIPMENT DETAILS

Z-3

Sheet No. 4 of 11

RF4439d-25A

REMOTE RADIO UNIT (RRU)		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: RF4439d-25A	14.96"H x 14.96"W x 10.04"D	74.7 LBS.

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND CONFIRM FINAL EQUIPMENT MAKE/MODEL AND QUANTITY SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

1 / Z-4 PROPOSED REMOTE RADIO UNIT DETAIL
SCALE: NOT TO SCALE

RT4423-48 ONLY

RT4423-48 WITH CLIP-ON ANTENNA

REMOTE RADIO UNIT (RRU)		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: RT4423-48(A/B)	11.8"H x 8.7"W x 3.8"D	16.43 LBS.

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND CONFIRM FINAL EQUIPMENT MAKE/MODEL AND QUANTITY SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.
2. RT4423-48A IS FOR DC
RT4423-48B IS FOR AC (AC AND DC TYPE HAVE SAME SIZE AND WEIGHT)
3. DIMENSIONS AND WEIGHT SHOWN ARE FOR THE RRU ONLY.

2 / Z-4 PROPOSED REMOTE RADIO UNIT DETAIL
SCALE: NOT TO SCALE

RF4461d-13A

REMOTE RADIO UNIT (RRU)		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: RF4461d-13A	14.96"H x 14.96"W x 10.23"D	79.1 LBS.

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND CONFIRM FINAL EQUIPMENT MAKE/MODEL AND QUANTITY SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

3 / Z-4 PROPOSED REMOTE RADIO UNIT DETAIL
SCALE: NOT TO SCALE

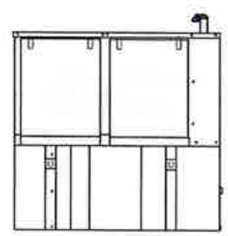
RVZDC-6627-PF-48

OVER VOLTAGE PROTECTION BOX		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: RAYCAP MODEL: RVZDC-6627-PF-48	29.5"H x 16.5"W x 12.6"D	32 LBS.

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND CONFIRM FINAL EQUIPMENT MAKE/MODEL AND QUANTITY SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.
2. PROVIDES DC SURGE PROTECTION FOR 12 REMOTE RADIO UNITS.

4 / Z-4 PROPOSED OVP BOX DETAIL
SCALE: NOT TO SCALE



SIDE VIEW

FRONT VIEW

BACKUP POWER GENERATOR						
EQUIPMENT	POWER GENERATED	FUEL	MODEL NUMBER	FUEL TANK SIZE (GAL)	DIMENSIONS	WEIGHT
MAKE: KOHLER MODEL: 50REOZJE	50 KW, AC	DIESEL	GM 117250-SA8	283	91.3"L x 41.2"W x 92.3"H	3785 LBS.

NOTES:

CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION AND ALL OPTIONAL FEATURES WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

5 / Z-4 BACK-UP POWER GENERATOR
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
A	04/05/24	BBP	LJR	ZONING DRAWINGS - ISSUED FOR CLIENT REVIEW
B	04/12/24	BBP	LJR	ZONING DRAWINGS - REVISED PER CLIENT COMMENTS
C	04/22/24	BBP	LJR	ZONING DRAWINGS - REVISED PER CLIENT COMMENTS

PROFESSIONAL ENGINEER SEAL

verizon

CENTEK engineering
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(203) 488-8587 Fax
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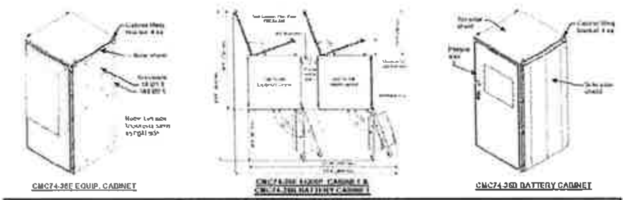
Cellco Partnership d/b/a Verizon Wireless
SOUTH WINDSOR 4 CT
575 PLEASANT VALLEY ROAD
SOUTH WINDSOR, CT 06074

DATE: 04/05/24
SCALE: AS NOTED
JOB NO. 24018.01

TYPICAL EQUIPMENT DETAILS

Z-4

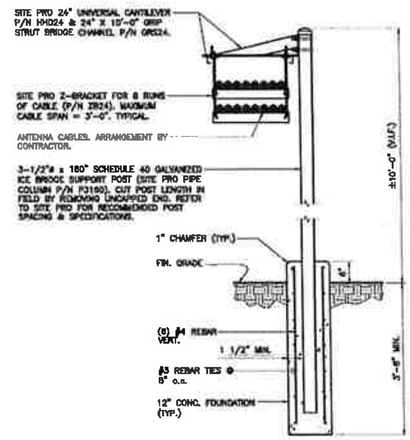
Sheet No. 6 of 8



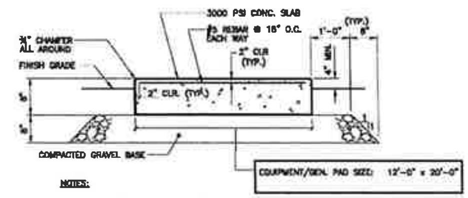
EQUIPMENT / BATTERY CABINET & BATTERY CABINET					
CABINET TYPE	MAKE/MODEL	SUB-MODEL/ OPTIONS	DIMENSIONS	WT. (EMPTY MAX. WT. W/OUT PUMPS)	WT. (WITH EQUIP/BATTERIES)
EQUIP. CABINET	MAKE: COMMSCOPE MODEL: CMC74-38E	760250058/ 4KW DC AIR CONDITIONER	74.8"H x 38.4"W x 37.2"D	525 LBS. (MAX.)	VARIES
BATTERY CABINET	MAKE: COMMSCOPE MODEL: CMC74-38B	760250540/ 1 KW HVAC DOOR, 800 W HEATER, 8 BATTERY STRINGS	74.8"H x 38.4"W x 37.2"D	1,060 LBS. (MAX.)	1,237 LBS. (MAX.)

NOTES:
1. CONTRACTOR TO CONFIRM CABINET MAKE/MODEL/SUBMODEL AND ALL OPTIONAL FEATURES AND QUANTITIES WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

1 / Z-5 EQUIPMENT CABINET / BATTERY CABINET
SCALE: NOT TO SCALE

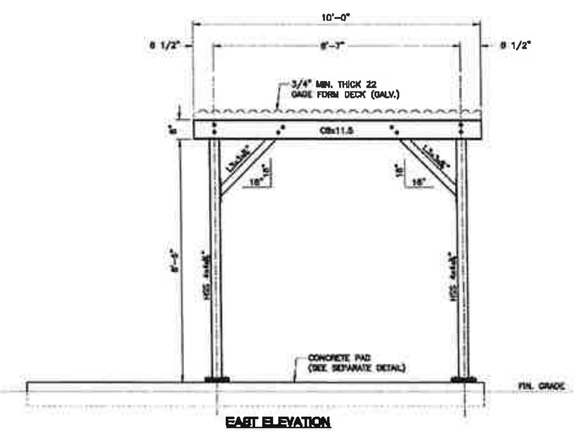


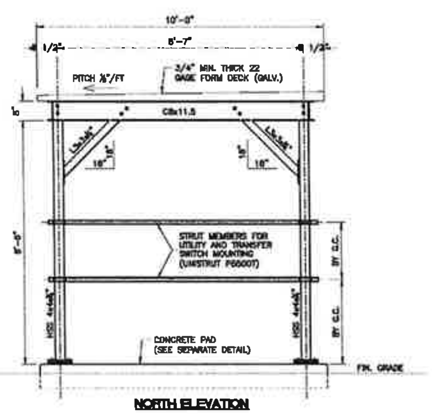
2 / Z-5 ANTENNA CABLE ICE BRIDGE DETAIL
SCALE: NOT TO SCALE



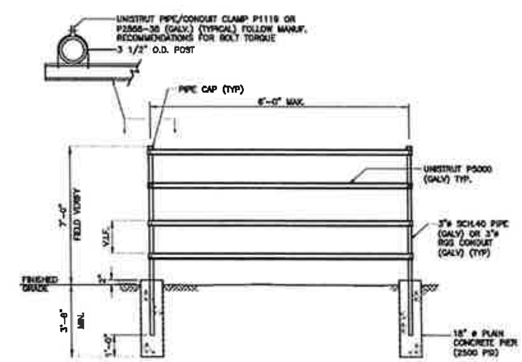
NOTES:
1. TOP OF SLAB TOLERANCE IS 1/4"±.
2. PROVIDE PVC SLEEVES FOR UTILITY CONDUIT PASSAGE THROUGH PAD OR CAST CONDUITS IN PLACE AS APPLICABLE. COORDINATE SLEEVE/CONDUIT LOCATIONS WITH CONSTRUCTION MANAGER.
3. COORDINATE EQUIPMENT HOLD-DOWN HARDWARE WITH RESPECTIVE MANUFACTURERS.

3 / Z-5 CONCRETE EQUIPMENT/TANK PAD DETAIL
SCALE: NOT TO SCALE





4 / Z-5 EQUIPMENT ICE BRIDGE CANOPY ELEVATIONS
SCALE: NOT TO SCALE



5 / Z-5 UTILITY BACKBOARD FRAME CONSTRUCTION DETAIL (TYP)
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	04/05/24	SBP	LJB	ZONING DRAWINGS – ISSUED FOR CLIENT REVIEW
A	04/11/24	SBP	LJB	ZONING DRAWINGS – REVISED PER CLIENT COMMENTS
B	04/22/24	SBP	LJB	ZONING DRAWINGS – REVISED PER CLIENT COMMENTS

PROFESSIONAL ENGINEER SEAL

verizon

CENTEK engineering
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

Cellco Partnership d/b/a Verizon Wireless
SOUTH WINDSOR 4 CT
575 PLEASANT VALLEY ROAD
SOUTH WINDSOR, CT 06074

DATE: 04/05/24
SCALE: AS NOTED
JOB NO. 24018.01

TYPICAL EQUIPMENT DETAILS

Z-5
Sheet No. 5 of 5

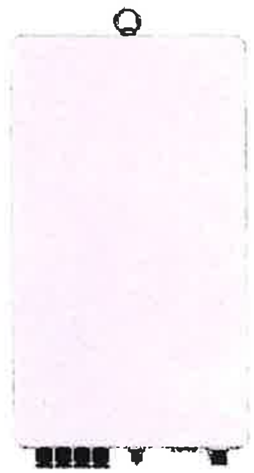
ATTACHMENT 4

C-band 64T64R

SAMSUNG

Gen 2

Gen 2 : Higher conducted power radio with reduced size/volume/weight vs Gen 1 and also SOC embedded for flexibility to support new features



※ Preliminary Design: External appearance and mechanical design can be subject to change

Gen 2. 64T64R C-band MMU Dimensions	
Size (WxHxD)	**400 x 734 x 140 mm (15.75 x 28.90 x 5.51 inch)**
Weight	**26kg (57.3 lb)**

Item	Gen 2 64T64R (MT6413-77A)
Air Technology	NR n77/TDD
Frequency	3700 – 3980 MHz
IBW	200 MHz
OBW	200 MHz
Carrier Bandwidth	20(HW ready)/40/60/80/100 MHz
# of Carriers	2 carriers
Layer	DL : 16L, UL : 16RX (8L)
RF Chain	64T64R
Antenna Configuration	4V16H with 192 AE
EIRP	80.5 dBm @320W (55 dBm + 25.5 dBi)
Conductive Power	320W
Spectrum Analyzer	TX/RX support
RX Sensitivity	Typical -97.8dBm @(1Rx, 18.36MHz with 30kHz,51RBs)
Modulation	DL 256QAM support, (DL 1024QAM with 1~2dB power back-off)
Function Split	DL/UL option 7-2x
Input Power	-48 VDC (-38 VDC to -57 VDC)
Power Consumption	1,287W (100% load, room temp.)
Size (WHD)	**400 x 734 x 140 mm (15.75 x 28.90 x 5.51 inch)**
Volume	**41.1L**
Weight	**26kg (57.3 lb)**
Operating Temperature	-40°C - 55°C (w/o solar load)
Cooling	Natural convection
Unwanted Emission	3GPP 38.104 FCC 47 CFR 27.53 : < -13dBm/MHz < -40 dBm/MHz @ above 4 GHz <-50 dBm /MHz @ 4,040 ~ 4,050 MHz, <-60 dBm /MHz @ above 4,050 MHz
Optic Interface	15km, 4 ports (25Gbps x 4), SFP28, single mode, Bi-di (Option: Duplex)
Mounting Options	Pole, wall
NB-IoT	Not support
External Alarm	4RX
Fronthaul Interface	eCPRI

NHH-65B-R2B

6-port sector antenna, 2x 698–896 and 4x 1695–2360 MHz, 65° HPBW, 2x RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package
- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- Separate RS-485 RET input/output for low and high band
- One RET for low band and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO

General Specifications

Antenna Type	Sector
Band	Multiband
Color	Light gray
Grounding Type	RF connector body grounded to reflector and mounting bracket
Performance Note	Outdoor usage | Wind loading figures are validated by wind tunnel measurements described in white paper WP-112534-EN
Radome Material	Fiberglass, UV resistant
Radiator Material	Low loss circuit board
Reflector Material	Aluminum
RF Connector Interface	4.3-10 Female
RF Connector Location	Bottom
RF Connector Quantity, high band	4
RF Connector Quantity, low band	2
RF Connector Quantity, total	6

Remote Electrical Tilt (RET) Information

RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	2 female | 2 male
Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 3
Internal RET	High band (1) | Low band (1)
Power Consumption, idle state, maximum	2 W
Power Consumption, normal conditions, maximum	13 W

NHH-65B-R2B

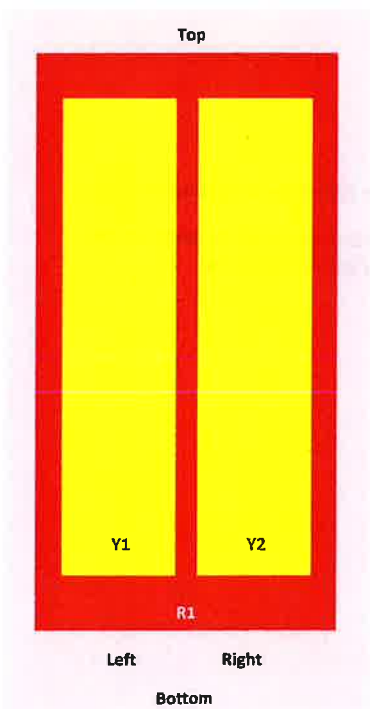
Protocol	3GPP/AISG 2.0 (Single RET)

Dimensions

Width	301 mm | 11.85 in
Depth	180 mm | 7.087 in
Length	1828 mm | 71.969 in
Net Weight, without mounting kit	19.8 kg | 43.651 lb

Array Layout

NHH



Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-896	1-2	1	ANxxxxxxxxxxxxxxxxx1
Y1	1695-2360	3-4	2	ANxxxxxxxxxxxxxxxxx2
Y2	1695-2360	5-6		

View from the front of the antenna

(Sizes of colored boxes are not true depictions of array sizes)

Electrical Specifications

Impedance	50 ohm
Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz

NHH-65B-R2B

Polarization	±45°
Total Input Power, maximum	900 W @ 50 °C

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain, dBi	14.9	15	17.7	17.9	18.4	18.7
Beamwidth, Horizontal, degrees	65	60	71	69	64	57
Beamwidth, Vertical, degrees	12.4	11.2	5.7	5.2	4.9	4.6
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS (First Lobe), dB	13	14	18	18	19	18
Front-to-Back Ratio at 180°, dB	30	29	31	30	29	31
Isolation, Cross Polarization, dB	25	25	25	25	25	25
Isolation, Inter-band, dB	30	30	30	30	30	30
VSWR | Return loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port at 50°C, maximum, watts	300	300	300	300	300	300

Electrical Specifications, BASTA

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain by all Beam Tilts, average, dBi	14.5	14.5	17.3	17.7	18.1	18.5
Gain by all Beam Tilts Tolerance, dB	±0.6	±1.1	±0.4	±0.4	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.4 7 ° | 14.6 14 ° | 14.3	0 ° | 14.7 7 ° | 14.7 14 ° | 14.1	0 ° | 17.2 4 ° | 17.3 7 ° | 17.3	0 ° | 17.6 4 ° | 17.7 7 ° | 17.7	0 ° | 18.0 4 ° | 18.2 7 ° | 18.1	0 ° | 18.3 4 ° | 18.5 7 ° | 18.6
Beamwidth, Horizontal Tolerance, degrees	±2	±2.1	±3	±4.1	±6.5	±2.9
Beamwidth, Vertical Tolerance, degrees	±0.7	±0.7	±0.3	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, dB	13	14	16	16	17	15
Front-to-Back Total Power at 180° ± 30°, dB	23	22	27	27	25	25
CPR at Boresight, dB	22	21	23	23	22	19

COMMSCOPE®

NHH-65B-R2B

CPR at Sector, dB	10	7	16	13	11	4

Mechanical Specifications

Effective Projective Area (EPA), frontal	0.26 m² | 2.799 ft²
Effective Projective Area (EPA), lateral	0.22 m² | 2.368 ft²
Wind Loading @ Velocity, frontal	278.0 N @ 150 km/h (62.5 lbf @ 150 km/h)
Wind Loading @ Velocity, lateral	230.0 N @ 150 km/h (51.7 lbf @ 150 km/h)
Wind Loading @ Velocity, maximum	537.0 N @ 150 km/h (120.7 lbf @ 150 km/h)
Wind Loading @ Velocity, rear	282.0 N @ 150 km/h (63.4 lbf @ 150 km/h)
Wind Speed, maximum	241 km/h | 149.75 mph

Packaging and Weights

Width, packed	409 mm | 16.102 in
Depth, packed	299 mm | 11.772 in
Length, packed	1952 mm | 76.85 in
Weight, gross	32.3 kg | 71.209 lb

Regulatory Compliance/Certifications

Agency	**Classification**
CHINA-ROHS	Below maximum concentration value
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
ROHS	Compliant

Included Products

BSAMNT-3 – Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note Severe environmental conditions may degrade optimum performance

COMMSCOPE®

NHHSS-65B-R2BT4

10-port sector antenna, 2x 698–896, 4x 1695–2200 and 4x 3100-4200 MHz, 65° HPBW, 2x RETs and 2x SBTs. Both high bands share the same electrical tilt.

- Perfect antenna to add 3.5GHz CBRS to macro sites
- Low band and mid band performance mirrors the performance of existing NHH hex port antennas
- Interleaved dipole technology providing for attractive, low wind load mechanical package
- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- One LB RET and one HB RET. Both high bands are controlled by one RET to ensure same tilt level for 4x MIMO

General Specifications

Antenna Type	Sector
Band	Multiband
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Performance Note	Outdoor usage
Radome Material	Fiberglass, UV resistant
Radiator Material	Low loss circuit board
Reflector Material	Aluminum
RF Connector Interface	4.3-10 Female
RF Connector Location	Bottom
RF Connector Quantity, high band	4
RF Connector Quantity, mid band	4
RF Connector Quantity, low band	2
RF Connector Quantity, total	10

Remote Electrical Tilt (RET) Information

RET Hardware	CommRET v2
RET Interface	4x 8 pin connector as per IEC 60130-9 Daisy chain in: Male / Daisy chain out: Female Pin3: RS485A(AISG_B), Pin5: RS485B(AISG_A), Pin6: DC 10~30V, Pin7: DC_ Return

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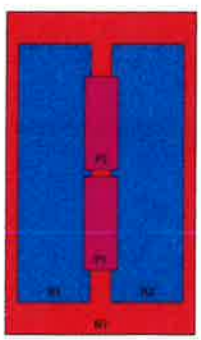
NHHSS-65B-R2BT4

RET Interface, quantity	2 female | 2 male
Input Voltage	10–30 Vdc
Internal RET	High band (1) | Low band (1)
Power Consumption, active state, maximum	10 W
Power Consumption, idle state, maximum	2 W
Protocol	3GPP/AISG 2.0 (Single RET)

Dimensions

Width	301 mm | 11.85 in
Depth	181 mm | 7.126 in
Length	1828 mm | 71.969 in
Net Weight, without mounting kit	23.1 kg | 50.927 lb

Array Layout



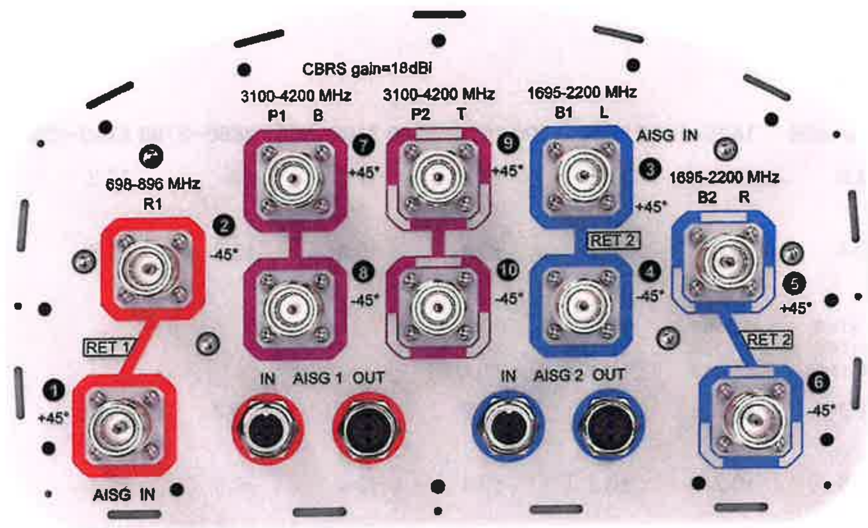
Array ID	Frequency (MHz)	RF Connector	RET (SRET)	AISG No.	AISG RET UID
[illegible]	698-896	1 - 2	1	AISG1	CPxxxxxxxxxxxxxxxxR1
[illegible]	1695-2200	3 - 4	2	AISG2	CPxxxxxxxxxxxxxxxxB1
[illegible]	1695-2200	5 - 6			
[illegible]	3100-4200	7 - 8	N/A	NA	N/A
[illegible]	3100-4200	9 - 10			

(Sizes of colored boxes are not true depictions of array sizes)

Port Configuration

COMMSCOPE®

NHHSS-65B-R2BT4



Electrical Specifications

Impedance	50 ohm
Operating Frequency Band	1695 – 2200 MHz | 3100 – 4200 MHz | 698 – 896 MHz
Polarization	±45°
Total Input Power, maximum	1,000 W @ 50 °C

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**3100–3550**	**3550–3700**	**3700–4200**
Gain, dBi	14.8	15.2	17.4	17.8	18	17.7	17.3	17.9
Beamwidth, Horizontal, degrees	65	62	66	61	64	54	64	60
Beamwidth, Vertical, degrees	13	11.6	5.5	5.2	4.9	5.7	5.3	4.9
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	4	4	4
USLS (First Lobe), dB	15	15	16	18	18	16	17	18
Front-to-Back Ratio at 180°, dB	26	29	31	28	27	30	33	29
Isolation, Cross Polarization, dB	25	25	25	25	25	25	25	25
Isolation, Inter-band, dB	25	25	25	25	25	28	28	28
VSWR | Return loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-140	-140	-140

Input Power per Port at 50°C, maximum, watts	300	300	300	300	300	100	100	100

Electrical Specifications, BASTA

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**3100–3550**	**3550–3700**	**3700–4200**
Gain by all Beam Tilts, average, dBi	14.6	14.8	17	17.5	17.7	17.3	17	17.2
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.4	±0.6	±0.3	±0.4	±0.6	±0.7	±0.8
Gain by Beam Tilt, average, dBi	0 ° | 14.6 7 ° | 14.6 14 ° | 14.4	0 ° | 15.0 7 ° | 14.9 14 ° | 14.5	0 ° | 16.9 3 ° | 17.0 7 ° | 16.8	0 ° | 17.4 3 ° | 17.5 7 ° | 17.4	0 ° | 17.5 3 ° | 17.8 7 ° | 17.6			
Beamwidth, Horizontal Tolerance, degrees	±1.7	±1.3	±7.2	±3.1	±6.2	±10	±6.7	±10.5
Beamwidth, Vertical Tolerance, degrees	±0.8	±0.8	±0.2	±0.2	±0.4	±0.4	±0.3	±0.4
USLS, beampeak to 20° above beampeak, dB	18	16	14	15	17	14		
Front-to-Back Total Power at 180° ± 30°, dB	22	25	25	25	24	26	25	24
CPR at Boresight, dB	24	17	16	21	19	15	17	14
CPR at Sector, dB	12	6	11	10	8	8	9	7

Mechanical Specifications

Wind Loading @ Velocity, frontal	278.0 N @ 150 km/h (62.5 lbf @ 150 km/h)
Wind Loading @ Velocity, lateral	230.0 N @ 150 km/h (51.7 lbf @ 150 km/h)
Wind Loading @ Velocity, maximum	537.0 N @ 150 km/h (120.7 lbf @ 150 km/h)
Wind Loading @ Velocity, rear	287.0 N @ 150 km/h (64.5 lbf @ 150 km/h)
Wind Speed, maximum	241 km/h | 149.75 mph

Packaging and Weights

Width, packed	1973 mm | 77.677 in
Depth, packed	441 mm | 17.362 in
Length, packed	337 mm | 13.268 in
Weight, gross	35.1 kg | 77.382 lb

Regulatory Compliance/Certifications

Agency	**Classification**
CHINA-ROHS	Above maximum concentration value

COMMSCOPE®

NHHSS-65B-R2BT4

ROHS | Compliant/Exempted

Included Products

BSAMNT-3	–	Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note Severe environmental conditions may degrade optimum performance

SAMSUNG

AWS/PCS MACRO RADIO

DUAL-BAND AND HIGH POWER FOR MACRO COVERAGE

Samsung's future proof dual-band radio is designed to help effectively increase the coverage areas in wireless networks. This AWS/PCS 4T4R dual-band radio has 4Tx/4Rx to 2Tx/2Rx RF chains options and a total output power of 320W, making it ideal for macro sites.

Model Code RF4439d-25A

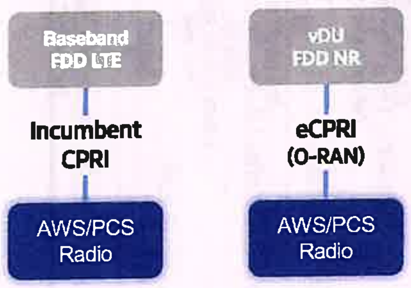
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

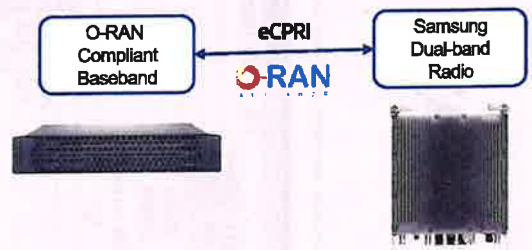
Samsung's AWS/PCS macro radio can support each incumbent CPRI interface as well as advanced eCPRI interfaces. This feature provides installable options for both legacy LTE networks and added NR networks.



O-RAN Compliant

A standardized O-RAN radio can help in implementing cost-effective networks, which are capable of sending more data without compromising additional investments.

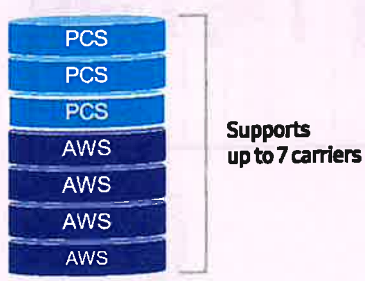
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



Optimum Spectrum Utilization

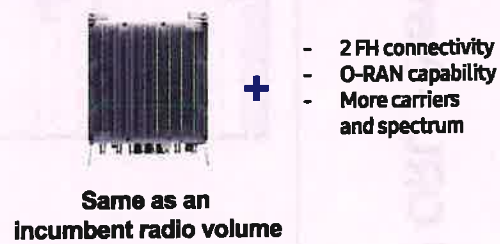
The number of required carriers varies according to site (region). Supporting many carriers is essential for using all frequencies that the operator has available.

The new AWS/PCS dual-band radio can support up to 3 carriers in the PCS (1.9GHz) band and 4 carriers in the AWS (2.1GHz) band, respectively.



Brand New Features in a Compact Size

Samsung's AWS/PCS macro radio offers several features, such as dual connectivity for baseband for both CDU and vDU, O-RAN capability, more carriers and an enlarged PCS spectrum, combined into an incumbent radio volume of 36.8L.



Technical Specifications

Item	Specification
Tech	LTE / NR
Brand	B25(PCS), B66(AWS)
Frequency Band	DL: 1930 – 1995MHz, UL: 1850 – 1915MHz DL: 2110 – 2200MHz, UL: 1710 – 1780MHz
RF Power	(B25) 4 × 40W or 2 × 60W (B66) 4 × 60W or 2 × 80W
IBW/OBW	(B25) 65MHz / 30MHz (B66) DL 90MHz, UL 70MHz / 60MHz
Installation	Pole, Wall
Size/ Weight	14.96 x 14.96 x 10.04inch (36.8L) / 74.7lb

700/850 4T4R Macro 320W ORU - New Filter (RF4461d-13A)

SAMSUNG

Specifications

Item	Specification	
Air Interface	LTE, NR(HW resource ready)	
Band	Band13 (700MHz)	Band5 (850MHz)
Frequency	DL: 746~756MHz UL: 777~787MHz	DL: 869~894MHz UL: 824~849MHz
IBW	10MHz	25MHz
OBW	10MHz	25MHz
Carrier Bandwidth	LTE/NR 5*/10MHz	LTE 5/10MHz NR 5/10/15/20MHz
# of carriers	2C*	3C
Total # of carriers	4C + B13 (SDL) 1C	
RF Chain	4T4R/2T4R/2T2R/1T2R 2T2R+2T2R bi-sector	
RF Output Power	Total : 320W 4 x 40W or 2 x 60W	4 x 40W or 2 x 60W
Spectrum Analyzer	TX/RX Support	
RX Sensitivity	Typ. -104.5dBm @1Rx (25RBs 5MHz)	
Modulation	256QAM support, (1024QAM with 1~2dB power back-off)	
Input Power	-48VDC (-38VDC to -57VDC)	
Power Consumption	1,165 Watt @ 100% RF load, room temperature	
Size (WHD)	380 x 380 x 260 mm (14.96 x 14.96 x 10.23 inch)	
Volume	37.5 L	
Weight (W/o Solar Shield & finger guard)	35.9 kg (79.1 lb)	
Operating Temperature	-40℃ (-40℉) ~ 55℃ (131℉) (Without solar load)	
Cooling	Natural convection	
Unwanted Emission	3GPP 36.104 FCC 47 CFR 27.53 c), f) -	3GPP 36.104 FCC 47 CFR 22.917 -69 dBm/100 kHz per path @ 396 ~901MHz
CPRI Cascade	Not supported	
Optic Interface	20km, 2 ports (9.8Gbps x 2), SFP+, single mode, Duplex (Option: Bi-di)	
RET & TMA Interface	AISG 3.0	
Bias-T	4 ports (2 ports per band)	
Mounting Options	Pole, wall	
NB-IoT	2GB+2IB or 4IB	2SA+2GB or 2GB+2IB or 4GB
PIM Cancellation	Support	
# of antenna port	4	
External Alarm	4	
Fronthaul Interface	Opt. 8 CPRI / Opt. 7-2x selectable (not simultaneous support)	
CPRI compression	Not Support	

* 5MHz supporting in B13(700MHz) depends on 3GPP std. and UE capability. External filters in interferer and victim sides for Mexican boarder to support 5MHz service need to be considered
** Finger guard is not needed.

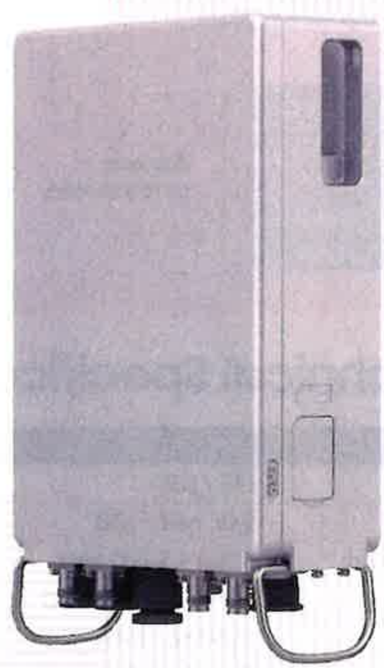
SAMSUNG

Samsung Micro Radio

CBRS(N48) 4T4R Micro Radio

Samsung's CBRS 4T4R Micro Radio provides mobile operators with a cost-effective solution to fill coverage gaps encountered when Macro Radios are in use.

Model Code	RT4423-48A(DC) RT4423-48B(AC)



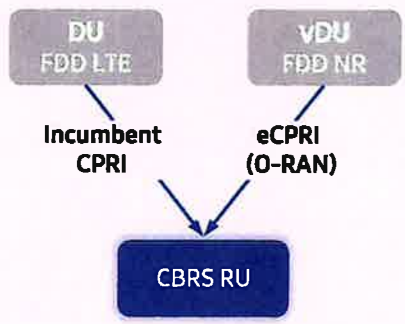
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Dual Personality

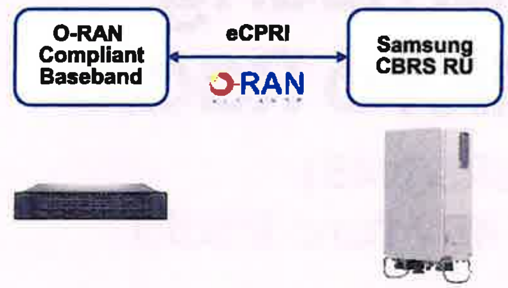
The new CBRS Radio supports existing CPRI and advanced eCPRI interfaces providing installation options for both legacy LTE and NR network equipment.



O-RAN Compliant

A standardized O-RAN radio supports implementing cost-effective networks capable of enhanced data throughput without compromising existing or new network investments.

Samsung O-RAN products ensure state-of-the-art O-RAN technology will accelerate efforts for creating solid O-RAN ecosystems.



High Capacity

The number of carriers required varies according to site(region). Supporting multiple carriers is essential to customers as they seek to utilize all frequencies available to them.

The new CBRS radio can support up to 5 carriers which is and increase of 3 carriers over the capacity of the previous CBRS product.

Compact and Easy Installation

New CBRS RU is compact in it's design with a volume of 6L and weighing only about 7kg.

This compact design allows for various installation options including, tower, rooftop, pole, wall and shroud.

A clip on antenna is available providing flexibility to installation requirements.

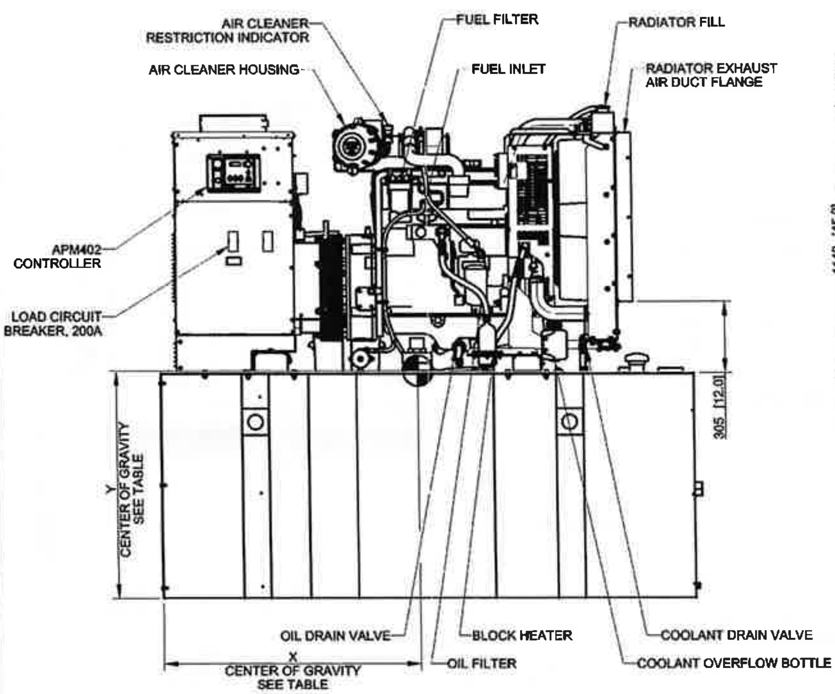
w/o Clip-on antenna

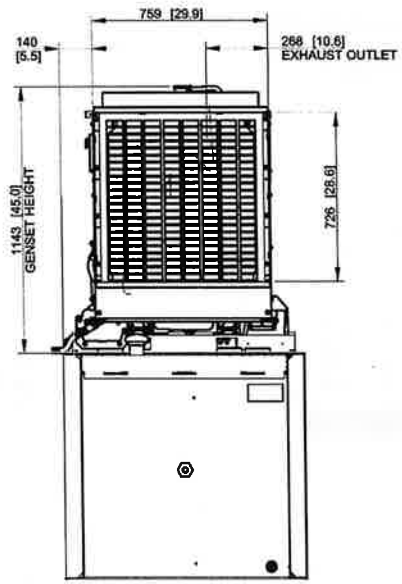
w/Clip-on antenna

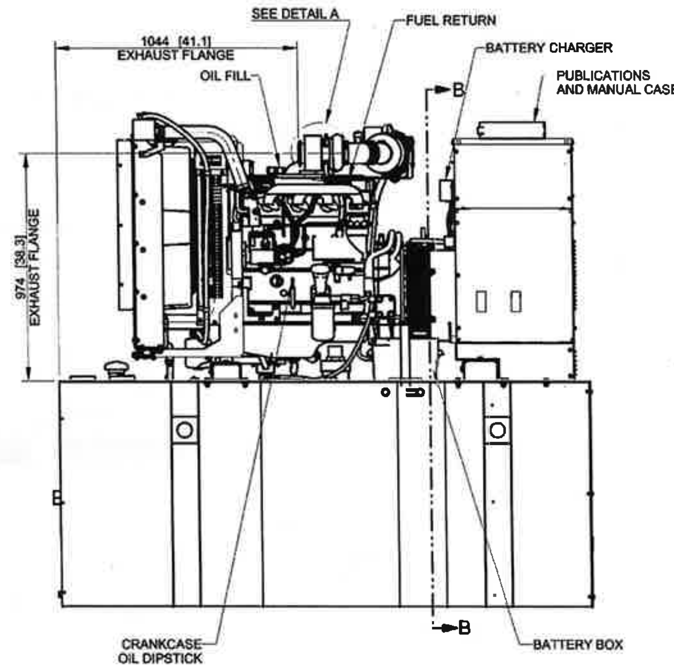
Technical Specifications

Item	Specification
Tech	LTE / NR
Band	B48, n48 / TDD
Frequency Band	3,550 – 3,700 MHz
RF Power	20 W (5 W x 4 Ports)
IBW/OBW	150MHz / 100MHz
Installation	Pole, Wall, Side by side (max 3 radio)
Size/ Weight	[Radio] w/o Clip-on antenna : 8.7 x 11.8 x 3.6 inch, 5.97L, 7kg w/ Clip-on antenna : 8.7 x 11.8 x 5.0 inch, 8.42L, 8.5kg *AC and DC type have same size and weight [Bracket Weight] Tilting & Swivel (EP97-02038A) : 2.51kg Fixed (EP97-02037A) : 1.31kg Side by side (EP97-02089A) : 8.0kg

MODEL	MODEL NUMBER	DESCRIPTION	CENTER OF GRAVITY X	CENTER OF GRAVITY Y	GENSET WEIGHT	ASSEMBLY WEIGHT
50REOZJE	GM117250-SA3	50REOZJE 12V 1PH RSS OPEN 283 GAL	1110 [43.8]	975 [38.5]	895 KG [1974 LBS]	1460 KG [3225 LBS]

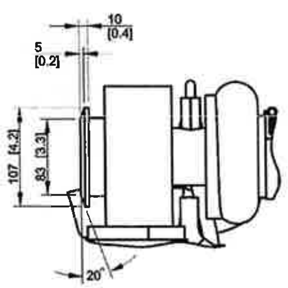




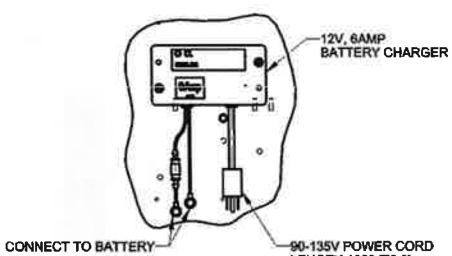


NOTES:

1. DIMENSIONS: MILLIMETERS [INCHES]
2. 6 AMP BATTERY CHARGER
3. 120 VAC ENGINE BLOCK HEATER WITH 60-80F THERMOSTAT
4. GENERATOR MUST BE GROUNDED
5. MUST ALLOW FREE FLOW OF DISCHARGE AIR AND EXHAUST
6. MUST ALLOW FREE FLOW OF INTAKE AIR
7. BASE TANK REQUIRES ALL STUB-UPS TO BE IN REAR TANK STUB-UP AREA
8. SEE TABLE FOR SUB-BASE FUEL TANK CAPACITY
9. TANK EQUIPPED WITH FIRE SAFETY VALVE ON FUEL SUPPLY LINE
10. IT IS THE RESPONSIBILITY OF THE INSTALLATION TECHNICIAN TO ENSURE THAT THE GENERATOR INSTALLATION COMPLIES WITH APPLICABLE CODES, STANDARDS, AND REGULATIONS
11. GENERATOR IS INSTALLED ON A UL-142 RATED DOUBLE WALL SUB-BASE FUEL TANK



DETAIL A
EXHAUST OUTLET
SCALE 0.200



SECTION B-B
BATTERY CHARGER
SCALE 0.150

50REOZJE OPEN UNIT
SHOWN W/ STANDARD TANK

REV	DATE	CHANGE NUMBER	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL ☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY
-	28SEP2021	CT214961	NEW DRAWING	ZJS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A

THIRD ANGLE PROJECTION

MAJOR ○ = 0
CRITICAL ◈ = 0
CHARACTERISTICS COMPLY WITH KPS-90022

DRAWN BY ZJS | DATE:
APPROVED BY WDG | 28SEP2021

DO NOT SCALE.
THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001.
REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.

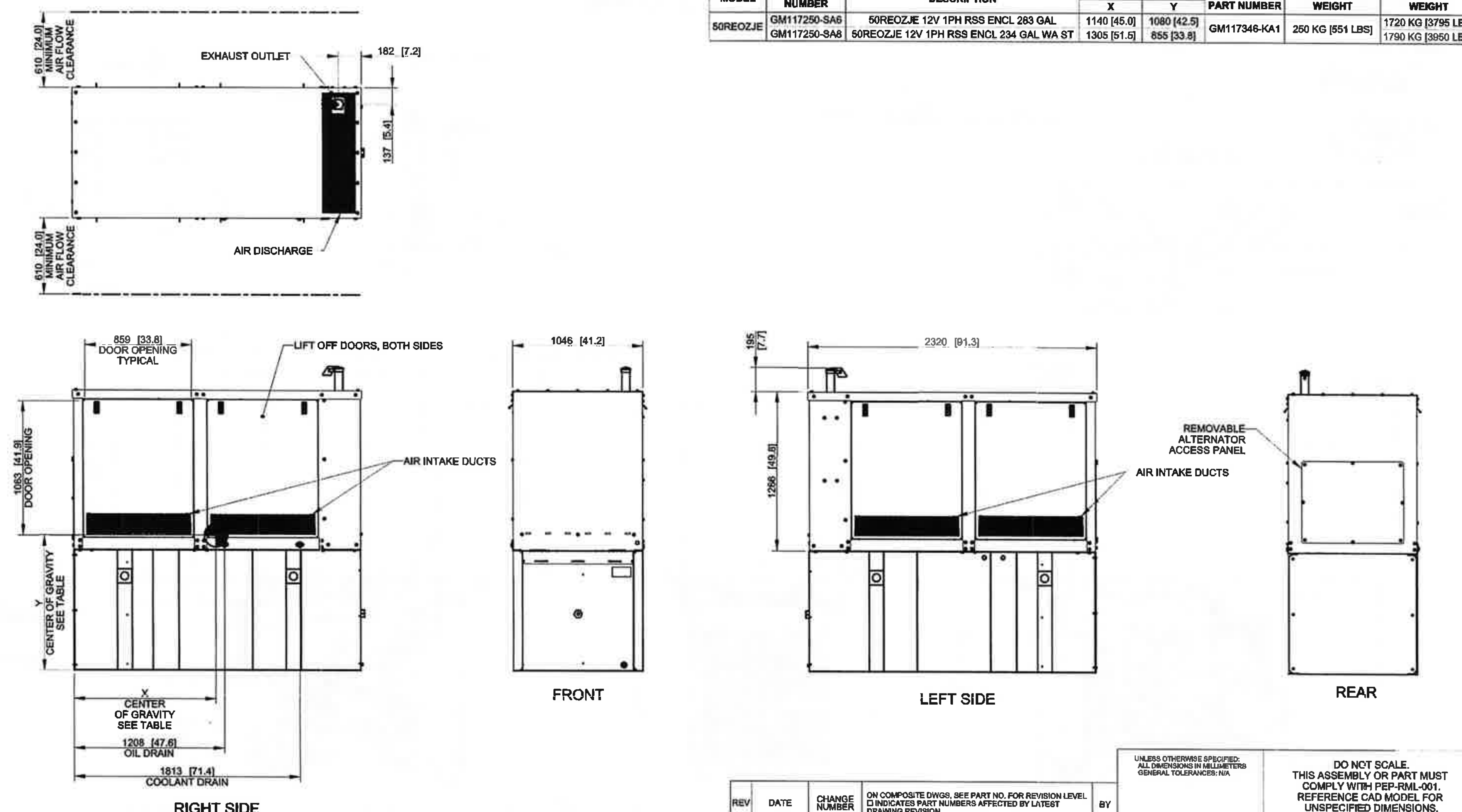
KOHLER.
KOHLER, WISCONSIN 53044

SCALE 0.050 | SHEET SIZE: B | SHEET 1 OF 4

TITLE: DIMENSION PRINT, 50REOZJE, VERIZON

DWG NO.: ADV-9797

MODEL	MODEL NUMBER	DESCRIPTION	CENTER OF GRAVITY X	CENTER OF GRAVITY Y	ENCLOSURE PART NUMBER	ENCLOSURE WEIGHT	ASSEMBLY WEIGHT
50REOZJE	GM117250-SA6	50REOZJE 12V 1PH RSS ENCL 283 GAL	1140 [45.0]	1080 [42.5]	GM117346-KA1	250 KG [551 LBS]	1720 KG [3795 LBS]
	GM117250-SA8	50REOZJE 12V 1PH RSS ENCL 234 GAL WA ST	1305 [51.5]	855 [33.8]			1790 KG [3950 LBS]



50REOZJE ENCLOSED UNIT
SHOWN W/ STANDARD TANK

REV	DATE	CHANGE NUMBER	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL ◻ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY
-	28SEP2021	CT214981	NEW DRAWING	ZJS

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES: N/A

THIRD ANGLE PROJECTION

MAJOR ○= 0
CRITICAL ◈= 0
CHARACTERISTICS COMPLY WITH KPS-30022

DRAWN BY ZJS
DATE:
APPROVED BY WDG 28SEP2021

DO NOT SCALE.
THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001.
REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.

KOHLER
KOHLER, WISCONSIN 53044

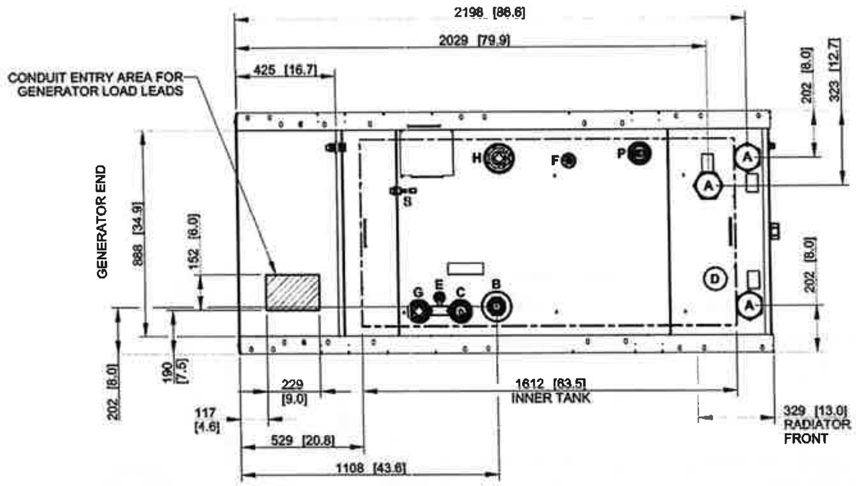
SCALE: 0.035 | SHEET SIZE: B | SHEET 2 OF 4

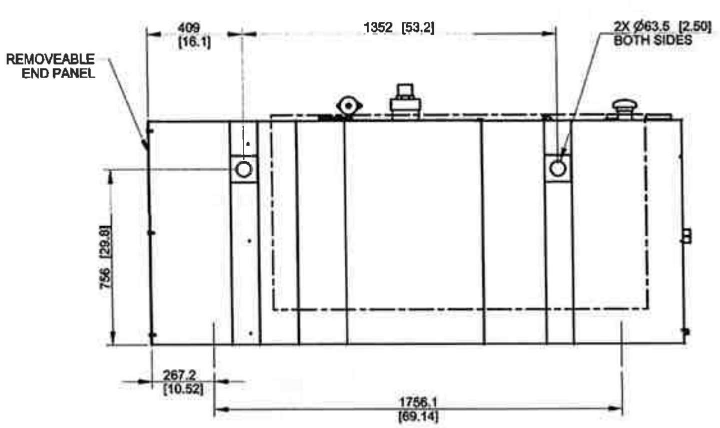
TITLE:
DIMENSION PRINT, 50REOZJE, VERIZON

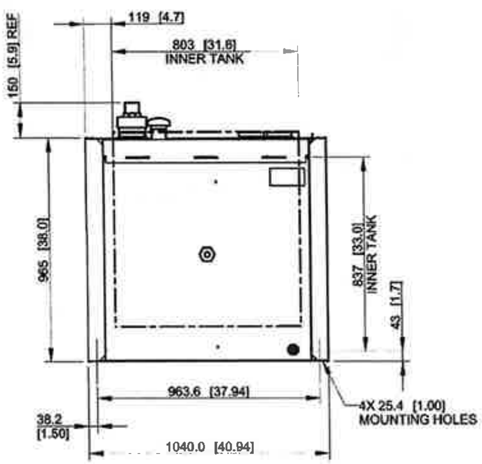
DWG NO.: ADV-9797

MODEL	MODEL NUMBER	TANK PART NUMBER	TANK CAPACITY	FITTING "B"	FITTING "H"
TANK SPECIFICATIONS					
50REOZJE	GM117250-SA3	GM92858-MA7	1073 L [283 GAL]	4" NPT FUEL FILL FITTING WITH 95% OVERFILL PREVENTION VALVE	4"NPT FITTING BUSHED DOWN TO 2" NPT (PIPE PLUGGED)
	GM117250-SA6	GM92858-MA8		2" NPT WATER TIGHT FUEL FILL FITTING WITH LOCKABLE CAP & 2" RISER	NA

TANK FITTINGS:
A. 3" NPT EMERGENCY VENT FITTING PER NFPA 30 WITH VENT CAPS.
B. SEE TABLE
C. 2" NPT FOR FUEL LEVEL SENDING UNIT WITH MECHANICAL INDICATOR NEEDLE.
D. 2" NPT NORMAL VENT FITTING WITH MJSHROOM VENT CAP AND 5" RISER.
E. 1/2" NPT FITTING FOR REMOVABLE ENGINE SUPPLY DIP TUBE (3/8" NPT FEMALE WITH CHECK & FIRE SAFETY VALVES AND LOCKOUT COVER).
F. 3/4" NPT FITTING FOR REMOVABLE FUEL RETURN DIP TUBE (3/8" NPT FEMALE).
G. 2" NPT ADDITIONAL FITTING FOR OPTIONAL ACCESSORY
H. SEE TABLE
M. 1/2" NPT BASIN DRAIN
N. 1/2" NPT FOR FUEL IN BASIN SWITCH.
P. 2" NPT FOR HIGH FUEL LEVEL SWITCH AT 90% FULL.
S. 1/2" NPT FITTING FOR ENGINE FLUID CONTAINMENT BASIN FLOAT SWITCH







50REOZJE STANDARD TANK

REV	DATE	CHANGE NUMBER	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL ☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY
-	28SEP2021	CT214961	NEW DRAWING	ZJS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A

THIRD ANGLE PROJECTION

MAJOR ○ = 0
CRITICAL ◍ = 0
CHARACTERISTICS COMPLY WITH KPS-80022

DRAWN BY ZJS
APPROVED BY WDG
DATE: 28SEP2021

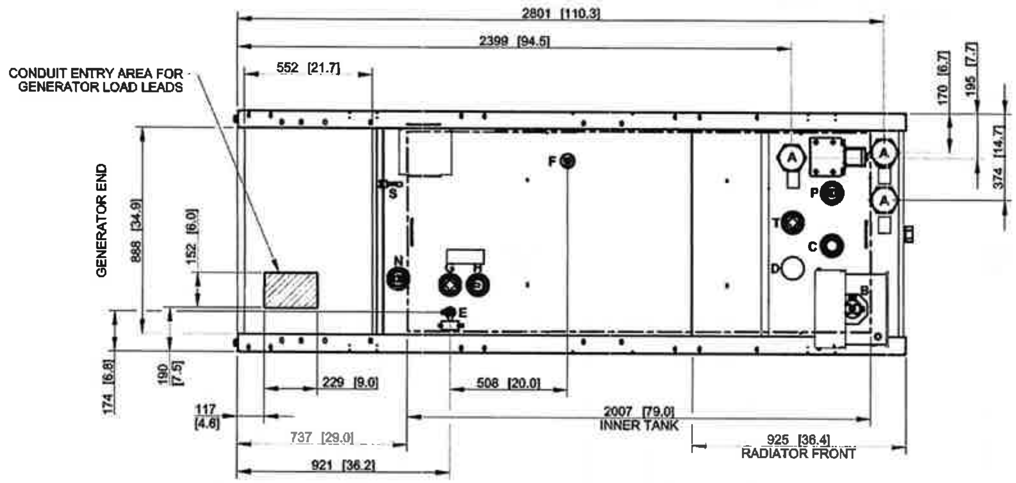
DO NOT SCALE.
THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001.
REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.

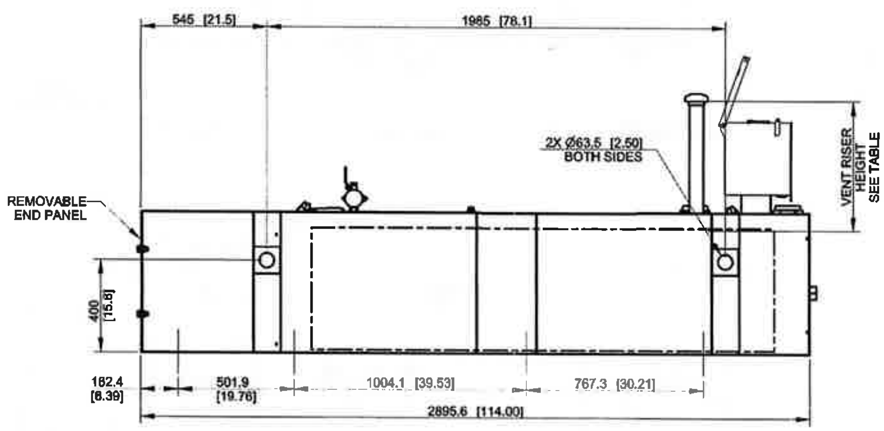
KOHLER.
KOHLER, WISCONSIN 53044

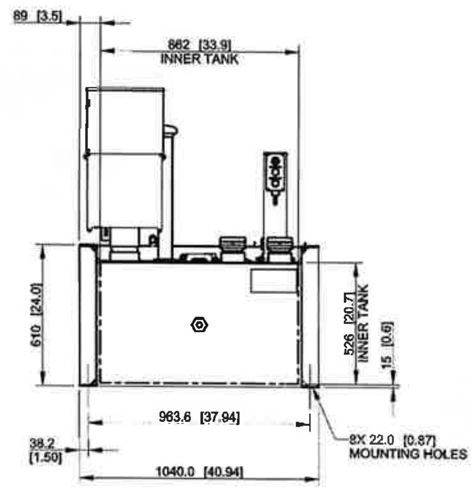
SCALE: 0.050 | SHEET SIZE: B | SHEET 3 OF 4

TITLE
DIMENSION PRINT, 50REOZJE, VERIZON

DWG NO.: **ADV-9797**







TANK SPECIFICATIONS

MODEL	MODEL NUMBER	TANK PART NUMBER	CAPACITY	VENT RISER HEIGHT	FITTING "T"
50REOZJE	GM117250-SA9	GM92858-MA9	886 L [234 GAL]	559 [22.0]	2" NPT FITTING FOR OPTIONAL ACCESSORY
	GM117250-SA8	GM92858-MA10		3505 [138.0]	2" NPT NORMAL VENT FITTING WITH MUSHROOM VENT CAP AND 138" RISER

TANK FITTINGS:
A. 3" NPT EMERGENCY VENT FITTING PER NFPA 30 WITH VENT CAPS.
B. 4" NPT FUEL FILL FITTING WITH A 5 GAL SPILL BOX WITH 95% OVERFILL PREVENTION VALVE & FILL PIPE.
C. 2" NPT FUEL LEVEL GAUGE FITTING WITH DIRECT READING MECHANICAL GAUGE.
D. 2" NPT NORMAL VENT FITTING WITH MUSHROOM VENT CAP, SEE TABLE FOR RISER HEIGHT.
E. 1/2" NPT FITTING FOR REMOVABLE FUEL SUPPLY DIP TUBE (3/8" NPT WITH CHECK VALVE, FIRE SAFETY VALVE, & LOCKOUT COVER).
F. 3/4" NPT FITTING FOR REMOVABLE ENGINE RETURN DIP TUBE (3/8" NPT FEMALE).
G. 2" NPT ADDITIONAL FITTING FOR OPTIONAL ACCESSORY
H. 2" NPT FOR FUEL LEVEL GAUGE W/ SENDER
N. 2" NPT FOR FUEL IN BASIN SWITCH.
P. 2" NPT FOR HIGH FUEL LEVEL SWITCH AT 90% FULL.
S. 1/2" NPT FITTING FOR ENGINE FLUID CONTAINMENT BASIN FLOAT SWITCH.
T. SEE TABLE

50REOZJE STATE TANK

REV	DATE	CHANGE NUMBER	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL ☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY
-	28SEP2021	CT214981	NEW DRAWING	ZJS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A

THIRD ANGLE PROJECTION

MAJOR ○ = 0
CRITICAL ◈ = 0
CHARACTERISTICS COMPLY WITH RPS-80022

DRAWN BY ZJS DATE:
APPROVED BY WDG 28SEP2021

DO NOT SCALE.
THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001.
REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.

KOHLER.
KOHLER, WISCONSIN 53044

SCALE 0.050 | SHEET SIZE: B | SHEET 4 OF 4

TITLE
DIMENSION PRINT, 50REOZJE, VERIZON

DWG NO.: ADV-9797

ATTACHMENT 5

CENTEK engineering

Centered on Solutions™

Structural Analysis Report

175-ft Valmont Monopole

Proposed Verizon
Equipment Installation

Site Ref: South Windsor 4

575 Pleasant Valley Road
South Windsor, CT

CENTEK Project No. 24018.01

~~Date: March 6, 2024~~
Rev 2: April 14, 2024

Max Stress Ratio = 62%

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Prepared for:
Verizon Wireless
20 Alexander Drive, 2nd Floor.
Wallingford, CT 06492

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the equipment installation proposed by Verizon on the existing monopole (tower) located in South Windsor, Connecticut.

The host tower is a 175-ft tall, four-section, eighteen-sided, tapered monopole, originally designed and manufactured by Valmont; no. 511112 dated July 13, 2021. The tower geometry and structure member sizes were obtained from the aforementioned documents.

Antenna and appurtenance information were obtained from the aforementioned tower design documents and a Verizon RF data sheet.

The tower is made up of four (4) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole is 29.0-in at the top and 66-in at the base.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- TOWN (EXISTING):
  Appurtenances: One (1) BA8080-67-DIN dipole antenna and one (1) SIAE ANT-18GHZ-24-SP microwave dish mounted on a platform w/ handrail with an elevation of 174-ft above grade.
  Coax Cables: One (1) 1-1/4" and one (1) 1/2" diameter cables running on the inside of the existing tower.
- TOWN (EXISTING):
  Appurtenances: Two (2) BA8080-67-DIN dipole antennas mounted on a platform w/ handrail with an elevation of 140-ft above grade.
  Coax Cables: Two (2) 7/8" diameter coax cable running on the inside of the existing tower.
- **VERIZON (PROPOSED):**
  Antennas: Three (3) Samsung MT6413-77A panel antennas, three (3) Commscope NHH-65B-R2B panel antennas, three (3) Commscope NHHSS-65B-R2BT4 panel antennas, three (3) 4439d-25A (B2/B66A) remote radio heads, three (3) 4461d-13A remote radio heads, three (3) 4423-48A remote radio heads and one (1) OVP box mounted on a platform (SitePro p/n RMQLP-4096-HK) with a RAD center elevation of 130-ft above grade.
  Coax Cables: Two (2) Hybrid cables running on the inside of the existing tower.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables to be installed as indicated in this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower, and the model assumes that the tower members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (3-second gust) with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-H entitled "Structural Standard for Antenna Support Structures and Antennas", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix P of the CSBC[1] and the wind speed data available in the TIA-222-H Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-H, gravity loads of the tower structure and its components, and the application of 1.50" radial ice on the tower structure and its components.

Load Cases:	Load Case 1; 130 mph (Ultimate) wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix P of the 2022 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 1.50" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-H]*
	Load Case 3; 60 mph wind speed used for deflection calculation.	

1 The 2021 International Building Code as amended by the 2022 Connecticut State Building Code (CSBC).

Tower Capacity

- Calculated stresses were found to be within allowable limits. This tower was found to be at **53.7%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L4)	1'-40.17'	53.7%	**PASS**

Foundation and Anchors

The existing foundation consists of a 7.5' ∅ x 5.5' long reinforced concrete pier on a 2.5' thick x 28.5-ft square reinforced concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned design documents. The base of the tower is connected to the foundation by means of (26) 1.75"∅, ASTM A615-75 anchor bolts embedded into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	39 kips
	Compression	54 kips
	Moment	4149 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Pier and Footing	Overturning Moment	38%	**PASS**
	Bearing Pressure	58%	**PASS**

- The anchor bolts and base plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	56.6%	**PASS**
Base Plate	Bending	61.9%	**PASS**

Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by Verizon. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE16 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

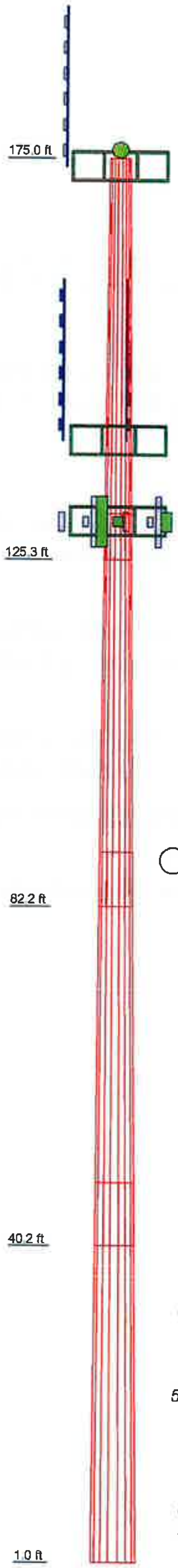
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

TnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, TnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

TnxTower Features:

- TnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-H standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- TnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	49.670	18	0.250	5.670	29.000	40.100	A572-65	4.6
2	48.750	18	0.313	6.750	38.333	49.227	A572-65	7.2
3	48.830	18	0.375	7.830	47.093	58.005	A572-65	10.3
4	47.000	18	0.438		55.505	66.009	A572-65	13.4
								35.5



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
SIAE ANT-18GHZ-24-SP (Town)	176	NHHSS-65B-R2BT4 (VERIZON)	130
SitePro RMQLP-496-HK (Town)	174	B2/B66A (RF4439d-25A) (VERIZON)	130
BA8080-67-DIN (Town)	174	B2/B66A (RF4439d-25A) (VERIZON)	130
BA8080-67-DIN (Town)	140	B2/B66A (RF4439d-25A) (VERIZON)	130
SitePro RMQLP-496-HK (Town)	140	RF4461d-13A (VERIZON)	130
BA8080-67-DIN (Town)	140	RF4461d-13A (VERIZON)	130
MT6413-77A (VERIZON)	130	RF4461d-13A (VERIZON)	130
MT6413-77A (VERIZON)	130	RF4423-48A (VERIZON)	130
NHH-65B-R2B (VERIZON)	130	RF4423-48A (VERIZON)	130
NHH-65B-R2B (VERIZON)	130	RF4423-48A (VERIZON)	130
NHH-65B-R2B (VERIZON)	130	RDIDC-9181-PF-48 (VERIZON)	130
NHHSS-65B-R2BT4 (VERIZON)	130	SitePro RMQLP-496-HK (VERIZON)	130
NHHSS-65B-R2BT4 (VERIZON)	130	MT6413-77A (VERIZON)	130

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-H Standard.
2. Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category III.
6. Topographic Category 1 with Crest Height of 0.000 ft
7. TOWER RATING: 53.7%

ALL REACTIONS ARE FACTORED

AXIAL 86 K
SHEAR 10 K
MOMENT 1148 kip-ft
TORQUE 3 kip-ft
50 mph WIND - 1.500 in ICE

AXIAL 54 K
SHEAR 39 K
MOMENT 4149 kip-ft
TORQUE 9 kip-ft
REACTIONS - 130 mph WIND

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: **24018.01 - South Windsor 4**		
Project: **175' Valmont Monopole - 575 Pleasent Valley Road, South Windsor,CT**		
Client: Verizon	Drawn by: TJL	App'd:
Code: TIA-222-H	Date: 04/30/24	Scale: NTS
Path:		Dwg No. E-1

Tower Input Data

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

- Tower base elevation above sea level: 1.000 ft.
- Basic wind speed of 130 mph.
- Risk Category III.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.000 ft.
- Nominal ice thickness of 1.500 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
SR Members Have Cut Ends
SR Members Are Concentric
Distribute Leg Loads As Uniform

Assume Legs Pinned
√ Assume Rigid Index Plate
Use Clear Spans For Wind Area
Use Clear Spans For KL/r
Retension Guys To Initial Tension
√ Bypass Mast Stability Checks
Use Azimuth Dish Coefficients
√ Project Wind Area of Appurtenances
Alternative Appurt. EPA Calculation
Autocalc Torque Arm Areas
Add IBC .6D+W Combination
√ Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Treat Feed Line Bundles As Cylinder
Ignore KL/ry For 60 Deg. Angle Legs
Use ASCE 10 X-Brace Ly Rules

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

Poles

√ Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets
Pole Without Linear Attachments
Pole With Shroud Or No Appurtenances
Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	175.000-125.33 0	49.670	5.670	18	29.000	40.100	0.250	1.000	A572-65 (65 ksi)
L2	125.330-82.250	48.750	6.750	18	38.333	49.227	0.313	1.252	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
L3	82.250-40.170	48.830	7.830	18	47.093	58.005	0.375	1.500	A572-65 (65 ksi)
L4	40.170-1.000	47.000		18	55.505	66.009	0.438	1.752	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	29.409	22.813	2382.308	10.206	14.732	161.710	4767.751	11.409	4.664	18.656
	40.680	31.621	6344.090	14.147	20.371	311.431	12696.528	15.813	6.618	26.47
L2	40.163	37.771	6897.973	13.497	19.473	354.231	13805.023	18.889	6.196	19.795
	49.938	48.594	14689.136	17.365	25.007	587.390	29397.599	24.302	8.113	25.921
L3	49.293	55.606	15332.890	16.585	23.923	640.922	30685.955	27.808	7.628	20.342
	58.842	68.594	28782.185	20.459	29.467	976.773	57602.242	34.304	9.549	25.464
L4	58.071	76.555	29329.166	19.549	28.197	1040.163	58696.924	38.285	8.998	20.543
	66.959	91.157	49516.046	23.278	33.532	1476.664	99097.246	45.587	10.847	24.764

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 175.000-125.330				1	1	1			
L2 125.330-82.250				1	1	1			
L3 82.250-40.170				1	1	1			
L4 40.170-1.000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
1 1/4 (Town)	A	No	Yes	Inside Pole	175.000 - 1.000	1	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
7/8 (Town)	A	No	Yes	Inside Pole	140.000 - 1.000	2	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
							2" Ice	0.000	0.001
HYBRIFLEX 1-5/8" (Verizon)	A	No	Yes	Inside Pole	130.000 - 1.000	2	No Ice	0.000	0.002
							1/2" Ice	0.000	0.002
							1" Ice	0.000	0.002
							2" Ice	0.000	0.002

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight klf
1/2 (Town)	A	No	Yes	Inside Pole	175.000 - 1.000	1	No Ice	0.000	0.000
							1/2" Ice	0.000	0.000
							1" Ice	0.000	0.000
							2" Ice	0.000	0.000

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	175.000-125.330	A	0.000	0.000	0.000	0.000	0.079
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000
L2	125.330-82.250	A	0.000	0.000	0.000	0.000	0.249
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000
L3	82.250-40.170	A	0.000	0.000	0.000	0.000	0.244
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000
L4	40.170-1.000	A	0.000	0.000	0.000	0.000	0.227
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	175.000-125.330	A	2.006	0.000	0.000	0.000	0.000	0.079
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.000
L2	125.330-82.250	A	1.933	0.000	0.000	0.000	0.000	0.249
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.000
L3	82.250-40.170	A	1.834	0.000	0.000	0.000	0.000	0.244
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.000
L4	40.170-1.000	A	1.647	0.000	0.000	0.000	0.000	0.227
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.000

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
BA8080-67-DIN	A	From Face	3.000	0.000	174.000	No Ice	10.000	10.000	0.038
(Town)			-6.000			1/2" Ice	20.827	20.827	0.169
			10.000			1" Ice	22.034	22.034	0.314
						2" Ice	24.475	24.475	0.644
SitePro RMQLP-496-HK	C	None		0.000	174.000	No Ice	39.200	39.200	2.500
(Town)						1/2" Ice	48.200	48.200	2.900
						1" Ice	56.700	56.700	3.500
						2" Ice	75.200	75.200	4.100
BA8080-67-DIN	A	From Face	3.000	0.000	140.000	No Ice	10.000	10.000	0.038
(Town)			-6.000			1/2" Ice	20.827	20.827	0.169
			10.000			1" Ice	22.034	22.034	0.314
						2" Ice	24.475	24.475	0.644
BA8080-67-DIN	B	From Face	3.000	0.000	140.000	No Ice	10.000	10.000	0.038
(Town)			-6.000			1/2" Ice	20.827	20.827	0.169
			10.000			1" Ice	22.034	22.034	0.314
						2" Ice	24.475	24.475	0.644
SitePro RMQLP-496-HK	C	None		0.000	140.000	No Ice	39.200	39.200	2.500
(Town)						1/2" Ice	48.200	48.200	2.900
						1" Ice	56.700	56.700	3.500
						2" Ice	75.200	75.200	4.100
MT6413-77A	A	From Face	3.000	0.000	130.000	No Ice	3.793	1.462	0.060
(VERIZON)			-6.000			1/2" Ice	4.045	1.651	0.084
			0.000			1" Ice	4.304	1.847	0.112
						2" Ice	4.845	2.259	0.179
MT6413-77A	B	From Face	3.000	0.000	130.000	No Ice	3.793	1.462	0.060
(VERIZON)			-6.000			1/2" Ice	4.045	1.651	0.084
			0.000			1" Ice	4.304	1.847	0.112
						2" Ice	4.845	2.259	0.179
MT6413-77A	C	From Face	3.000	0.000	130.000	No Ice	3.793	1.462	0.060
(VERIZON)			-6.000			1/2" Ice	4.045	1.651	0.084
			0.000			1" Ice	4.304	1.847	0.112
						2" Ice	4.845	2.259	0.179
NHH-65B-R2B	A	From Face	3.000	0.000	130.000	No Ice	11.187	8.687	0.071
(VERIZON)			2.000			1/2" Ice	11.691	9.169	0.150
			0.000			1" Ice	12.202	9.658	0.236
						2" Ice	13.245	10.658	0.430
NHH-65B-R2B	B	From Face	3.000	0.000	130.000	No Ice	11.187	8.687	0.071
(VERIZON)			2.000			1/2" Ice	11.691	9.169	0.150
			0.000			1" Ice	12.202	9.658	0.236
						2" Ice	13.245	10.658	0.430
NHH-65B-R2B	C	From Face	3.000	0.000	130.000	No Ice	11.187	8.687	0.071
(VERIZON)			2.000			1/2" Ice	11.691	9.169	0.150
			0.000			1" Ice	12.202	9.658	0.236
						2" Ice	13.245	10.658	0.430
NHHSS-65B-R2BT4	A	From Face	3.000	0.000	130.000	No Ice	8.011	5.333	0.051
(VERIZON)			6.000			1/2" Ice	8.466	5.785	0.101
			0.000			1" Ice	8.928	6.245	0.157
						2" Ice	9.873	7.187	0.287
NHHSS-65B-R2BT4	B	From Face	3.000	0.000	130.000	No Ice	8.011	5.333	0.051
(VERIZON)			6.000			1/2" Ice	8.466	5.785	0.101
			0.000			1" Ice	8.928	6.245	0.157
						2" Ice	9.873	7.187	0.287
NHHSS-65B-R2BT4	C	From Face	3.000	0.000	130.000	No Ice	8.011	5.333	0.051
(VERIZON)			6.000			1/2" Ice	8.466	5.785	0.101
			0.000			1" Ice	8.928	6.245	0.157
						2" Ice	9.873	7.187	0.287
B2/B66A (RF4439d-25A)	A	From Face	3.000	0.000	130.000	No Ice	3.003	2.675	0.097

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
(VERIZON)			0.000			1/2" Ice	3.569	3.318	0.131
			0.000			1" Ice	4.039	3.837	0.170
						2" Ice	5.023	4.924	0.264
B2/B66A (RF4439d-25A)	B	From Face	3.000	0.000	130.000	No Ice	3.003	2.675	0.097
(VERIZON)			0.000			1/2" Ice	3.569	3.318	0.131
			0.000			1" Ice	4.039	3.837	0.170
						2" Ice	5.023	4.924	0.264
B2/B66A (RF4439d-25A)	C	From Face	3.000	0.000	130.000	No Ice	3.003	2.675	0.097
(VERIZON)			0.000			1/2" Ice	3.569	3.318	0.131
			0.000			1" Ice	4.039	3.837	0.170
						2" Ice	5.023	4.924	0.264
RF4461d-13A	A	From Face	3.000	0.000	130.000	No Ice	1.865	1.275	0.080
(VERIZON)			0.000			1/2" Ice	2.035	1.419	0.099
			0.000			1" Ice	2.212	1.570	0.120
						2" Ice	2.589	1.894	0.172
RF4461d-13A	B	From Face	3.000	0.000	130.000	No Ice	1.865	1.275	0.080
(VERIZON)			0.000			1/2" Ice	2.035	1.419	0.099
			0.000			1" Ice	2.212	1.570	0.120
						2" Ice	2.589	1.894	0.172
RF4461d-13A	C	From Face	3.000	0.000	130.000	No Ice	1.865	1.275	0.080
(VERIZON)			0.000			1/2" Ice	2.035	1.419	0.099
			0.000			1" Ice	2.212	1.570	0.120
						2" Ice	2.589	1.894	0.172
RF4423-48A	A	From Face	3.000	0.000	130.000	No Ice	0.856	0.492	0.019
(VERIZON)			0.000			1/2" Ice	0.973	0.589	0.027
			0.000			1" Ice	1.098	0.693	0.036
						2" Ice	1.370	0.924	0.061
RF4423-48A	B	From Face	3.000	0.000	130.000	No Ice	0.856	0.492	0.019
(VERIZON)			0.000			1/2" Ice	0.973	0.589	0.027
			0.000			1" Ice	1.098	0.693	0.036
						2" Ice	1.370	0.924	0.061
RF4423-48A	C	From Face	3.000	0.000	130.000	No Ice	0.856	0.492	0.019
(VERIZON)			0.000			1/2" Ice	0.973	0.589	0.027
			0.000			1" Ice	1.098	0.693	0.036
						2" Ice	1.370	0.924	0.061
RDIDC-9181-PF-48	A	From Face	3.000	0.000	130.000	No Ice	1.867	1.067	0.022
(VERIZON)			0.000			1/2" Ice	2.037	1.204	0.038
			0.000			1" Ice	2.215	1.348	0.057
						2" Ice	2.593	1.659	0.104
SitePro RMQLP-496-HK	C	None		0.000	130.000	No Ice	39.200	39.200	2.500
(VERIZON)						1/2" Ice	48.200	48.200	2.900
						1" Ice	56.700	56.700	3.500
						2" Ice	75.200	75.200	4.100

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
SIAE ANT-18GHZ-24-SP (Town)	C	Paraboloid w/o Radome	From Face	3.000 0.000 0.000	Worst		176.000	2.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.142 3.409 3.676 4.211	0.025 0.042 0.060 0.095

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 175.000-125.330	149.049	1.377	0.057	145.055	A	0.000	145.055	145.055	100.00	0.000	0.000
					B	0.000	145.055		100.00	0.000	0.000
					C	0.000	145.055		100.00	0.000	0.000
L2 125.330-82.250	103.247	1.274	0.052	161.731	A	0.000	161.731	161.731	100.00	0.000	0.000
					B	0.000	161.731		100.00	0.000	0.000
					C	0.000	161.731		100.00	0.000	0.000
L3 82.250-40.170	60.975	1.14	0.047	189.597	A	0.000	189.597	189.597	100.00	0.000	0.000
					B	0.000	189.597		100.00	0.000	0.000
					C	0.000	189.597		100.00	0.000	0.000
L4 40.170-1.000	20.837	0.91	0.038	204.060	A	0.000	204.060	204.060	100.00	0.000	0.000
					B	0.000	204.060		100.00	0.000	0.000
					C	0.000	204.060		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 175.000-125.330	149.049	1.377	0.008	2.006	161.659	A	0.000	161.659	161.659	100.00	0.000	0.000
						B	0.000	161.659		100.00	0.000	0.000
						C	0.000	161.659		100.00	0.000	0.000
L2 125.330-82.250	103.247	1.274	0.008	1.933	176.132	A	0.000	176.132	176.132	100.00	0.000	0.000
						B	0.000	176.132		100.00	0.000	0.000
						C	0.000	176.132		100.00	0.000	0.000
L3 82.250-40.170	60.975	1.14	0.007	1.834	203.157	A	0.000	203.157	203.157	100.00	0.000	0.000
						B	0.000	203.157		100.00	0.000	0.000
						C	0.000	203.157		100.00	0.000	0.000
L4 40.170-1.000	20.837	0.91	0.006	1.647	216.034	A	0.000	216.034	216.034	100.00	0.000	0.000
						B	0.000	216.034		100.00	0.000	0.000
						C	0.000	216.034		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 175.000-125.330	149.049	1.377	0.011	145.055	A	0.000	145.055	145.055	100.00	0.000	0.000
					B	0.000	145.055		100.00	0.000	0.000
					C	0.000	145.055		100.00	0.000	0.000
L2 125.330-82.250	103.247	1.274	0.010	161.731	A	0.000	161.731	161.731	100.00	0.000	0.000
					B	0.000	161.731		100.00	0.000	0.000
					C	0.000	161.731		100.00	0.000	0.000
L3 82.250-40.170	60.975	1.14	0.009	189.597	A	0.000	189.597	189.597	100.00	0.000	0.000
					B	0.000	189.597		100.00	0.000	0.000
					C	0.000	189.597		100.00	0.000	0.000
L4 40.170-1.000	20.837	0.91	0.007	204.060	A	0.000	204.060	204.060	100.00	0.000	0.000
					B	0.000	204.060		100.00	0.000	0.000
					C	0.000	204.060		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 175.000-125.330	0.079	4.600	A	1	0.73	0.057	1	1	145.055	6.584	0.133	C
			B	1	0.73		1	1	145.055			
			C	1	0.73		1	1	145.055			
L2 125.330-82.250	0.249	7.163	A	1	0.73	0.052	1	1	161.731	6.792	0.158	C
			B	1	0.73		1	1	161.731			
			C	1	0.73		1	1	161.731			
L3 82.250-40.170	0.244	10.318	A	1	0.73	0.047	1	1	189.597	7.109	0.169	C
			B	1	0.73		1	1	189.597			
			C	1	0.73		1	1	189.597			
L4 40.170-1.000	0.227	13.411	A	1	0.73	0.038	1	1	204.060	6.160	0.157	C
			B	1	0.73		1	1	204.060			
			C	1	0.73		1	1	204.060			
Sum Weight:	0.799	35.493						OTM	2217.789 kip-ft	26.645		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 175.000-125.330	0.079	4.600	A	1	0.73	0.057	1	1	145.055	6.584	0.133	C
			B	1	0.73		1	1	145.055			
			C	1	0.73		1	1	145.055			
L2 125.330-82.250	0.249	7.163	A	1	0.73	0.052	1	1	161.731	6.792	0.158	C
			B	1	0.73		1	1	161.731			
			C	1	0.73		1	1	161.731			
L3 82.250-40.170	0.244	10.318	A	1	0.73	0.047	1	1	189.597	7.109	0.169	C
			B	1	0.73		1	1	189.597			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
			C	1	0.73		1	1	189.597			
L4 40.170-1.000	0.227	13.411	A	1	0.73	0.038	1	1	204.060	6.160	0.157	C
			B	1	0.73		1	1	204.060			
			C	1	0.73		1	1	204.060			
Sum Weight:	0.799	35.493						OTM	2217.789 kip-ft	26.645		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 175.000-125.330	0.079	4.600	A	1	0.73	0.057	1	1	145.055	6.584	0.133	C
			B	1	0.73		1	1	145.055			
			C	1	0.73		1	1	145.055			
L2 125.330-82.250	0.249	7.163	A	1	0.73	0.052	1	1	161.731	6.792	0.158	C
			B	1	0.73		1	1	161.731			
			C	1	0.73		1	1	161.731			
L3 82.250-40.170	0.244	10.318	A	1	0.73	0.047	1	1	189.597	7.109	0.169	C
			B	1	0.73		1	1	189.597			
			C	1	0.73		1	1	189.597			
L4 40.170-1.000	0.227	13.411	A	1	0.73	0.038	1	1	204.060	6.160	0.157	C
			B	1	0.73		1	1	204.060			
			C	1	0.73		1	1	204.060			
Sum Weight:	0.799	35.493						OTM	2217.789 kip-ft	26.645		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 175.000-125.330	0.079	4.600	A	1	0.73	0.057	1	1	145.055	6.584	0.133	C
			B	1	0.73		1	1	145.055			
			C	1	0.73		1	1	145.055			
L2 125.330-82.250	0.249	7.163	A	1	0.73	0.052	1	1	161.731	6.792	0.158	C
			B	1	0.73		1	1	161.731			
			C	1	0.73		1	1	161.731			
L3 82.250-40.170	0.244	10.318	A	1	0.73	0.047	1	1	189.597	7.109	0.169	C
			B	1	0.73		1	1	189.597			
			C	1	0.73		1	1	189.597			
L4 40.170-1.000	0.227	13.411	A	1	0.73	0.038	1	1	204.060	6.160	0.157	C
			B	1	0.73		1	1	204.060			
			C	1	0.73		1	1	204.060			
Sum Weight:	0.799	35.493						OTM	2217.789 kip-ft	26.645		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 175.000-125.330	0.079	9.095	A	1	1.2	0.008	1	1	161.659	1.784	0.036	C
			B	1	1.2		1	1	161.659			
			C	1	1.2		1	1	161.659			
L2 125.330-82.250	0.249	11.928	A	1	1.2	0.008	1	1	175.613	1.793	0.042	C
			B	1	1.2		1	1	175.613			
			C	1	1.2		1	1	175.613			
L3 82.250-40.170	0.244	15.571	A	1	1.2	0.007	1	1	202.461	1.846	0.044	C
			B	1	1.2		1	1	202.461			
			C	1	1.2		1	1	202.461			
L4 40.170-1.000	0.227	18.452	A	1	1.2	0.006	1	1	214.815	1.577	0.040	C
			B	1	1.2		1	1	214.815			
			C	1	1.2		1	1	214.815			
Sum Weight:	0.799	55.047						OTM	589.531 kip-ft	7.001		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 175.000-125.330	0.079	9.095	A	1	1.2	0.008	1	1	161.659	1.784	0.036	C
			B	1	1.2		1	1	161.659			
			C	1	1.2		1	1	161.659			
L2 125.330-82.250	0.249	11.928	A	1	1.2	0.008	1	1	175.613	1.793	0.042	C
			B	1	1.2		1	1	175.613			
			C	1	1.2		1	1	175.613			
L3 82.250-40.170	0.244	15.571	A	1	1.2	0.007	1	1	202.461	1.846	0.044	C
			B	1	1.2		1	1	202.461			
			C	1	1.2		1	1	202.461			
L4 40.170-1.000	0.227	18.452	A	1	1.2	0.006	1	1	214.815	1.577	0.040	C
			B	1	1.2		1	1	214.815			
			C	1	1.2		1	1	214.815			
Sum Weight:	0.799	55.047						OTM	589.531 kip-ft	7.001		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.079	9.095	A	1	1.2	0.008	1	1	161.659	1.784	0.036	C
175.000-125.3			B	1	1.2		1	1	161.659			
30			C	1	1.2		1	1	161.659			
L2	0.249	11.928	A	1	1.2	0.008	1	1	175.613	1.793	0.042	C
125.330-82.25			B	1	1.2		1	1	175.613			
0			C	1	1.2		1	1	175.613			
L3	0.244	15.571	A	1	1.2	0.007	1	1	202.461	1.846	0.044	C
82.250-40.170			B	1	1.2		1	1	202.461			
			C	1	1.2		1	1	202.461			
L4	0.227	18.452	A	1	1.2	0.006	1	1	214.815	1.577	0.040	C
40.170-1.000			B	1	1.2		1	1	214.815			
			C	1	1.2		1	1	214.815			
Sum Weight:	0.799	55.047						OTM	589.531 kip-ft	7.001		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.079	9.095	A	1	1.2	0.008	1	1	161.659	1.784	0.036	C
175.000-125.3			B	1	1.2		1	1	161.659			
30			C	1	1.2		1	1	161.659			
L2	0.249	11.928	A	1	1.2	0.008	1	1	175.613	1.793	0.042	C
125.330-82.25			B	1	1.2		1	1	175.613			
0			C	1	1.2		1	1	175.613			
L3	0.244	15.571	A	1	1.2	0.007	1	1	202.461	1.846	0.044	C
82.250-40.170			B	1	1.2		1	1	202.461			
			C	1	1.2		1	1	202.461			
L4	0.227	18.452	A	1	1.2	0.006	1	1	214.815	1.577	0.040	C
40.170-1.000			B	1	1.2		1	1	214.815			
			C	1	1.2		1	1	214.815			
Sum Weight:	0.799	55.047						OTM	589.531 kip-ft	7.001		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.079	4.600	A	1	0.73	0.011	1	1	145.055	1.255	0.025	C
175.000-125.3			B	1	0.73		1	1	145.055			
30			C	1	0.73		1	1	145.055			
L2	0.249	7.163	A	1	0.73	0.010	1	1	161.731	1.294	0.030	C
125.330-82.25			B	1	0.73		1	1	161.731			
0			C	1	0.73		1	1	161.731			
L3	0.244	10.318	A	1	0.73	0.009	1	1	189.597	1.355	0.032	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
82.250-40.170			B	1	0.73		1	1	189.597			
			C	1	0.73		1	1	189.597			
L4	0.227	13.411	A	1	0.73	0.007	1	1	204.060	1.174	0.030	C
40.170-1.000			B	1	0.73		1	1	204.060			
			C	1	0.73		1	1	204.060			
Sum Weight:	0.799	35.493						OTM	422.699 kip-ft	5.078		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 175.000-125.330	0.079	4.600	A	1	0.73	0.011	1	1	145.055	1.255	0.025	C
			B	1	0.73		1	1	145.055			
			C	1	0.73		1	1	145.055			
L2 125.330-82.250	0.249	7.163	A	1	0.73	0.010	1	1	161.731	1.294	0.030	C
			B	1	0.73		1	1	161.731			
			C	1	0.73		1	1	161.731			
L3 82.250-40.170	0.244	10.318	A	1	0.73	0.009	1	1	189.597	1.355	0.032	C
			B	1	0.73		1	1	189.597			
			C	1	0.73		1	1	189.597			
L4 40.170-1.000	0.227	13.411	A	1	0.73	0.007	1	1	204.060	1.174	0.030	C
			B	1	0.73		1	1	204.060			
			C	1	0.73		1	1	204.060			
Sum Weight:	0.799	35.493						OTM	422.699 kip-ft	5.078		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 175.000-125.330	0.079	4.600	A	1	0.73	0.011	1	1	145.055	1.255	0.025	C
			B	1	0.73		1	1	145.055			
			C	1	0.73		1	1	145.055			
L2 125.330-82.250	0.249	7.163	A	1	0.73	0.010	1	1	161.731	1.294	0.030	C
			B	1	0.73		1	1	161.731			
			C	1	0.73		1	1	161.731			
L3 82.250-40.170	0.244	10.318	A	1	0.73	0.009	1	1	189.597	1.355	0.032	C
			B	1	0.73		1	1	189.597			
			C	1	0.73		1	1	189.597			
L4 40.170-1.000	0.227	13.411	A	1	0.73	0.007	1	1	204.060	1.174	0.030	C
			B	1	0.73		1	1	204.060			
			C	1	0.73		1	1	204.060			
Sum Weight:	0.799	35.493						OTM	422.699 kip-ft	5.078		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 175.000-125.330	0.079	4.600	A	1	0.73	0.011	1	1	145.055	1.255	0.025	C
			B	1	0.73		1	1	145.055			
			C	1	0.73		1	1	145.055			
L2 125.330-82.250	0.249	7.163	A	1	0.73	0.010	1	1	161.731	1.294	0.030	C
			B	1	0.73		1	1	161.731			
			C	1	0.73		1	1	161.731			
L3 82.250-40.170	0.244	10.318	A	1	0.73	0.009	1	1	189.597	1.355	0.032	C
			B	1	0.73		1	1	189.597			
			C	1	0.73		1	1	189.597			
L4 40.170-1.000	0.227	13.411	A	1	0.73	0.007	1	1	204.060	1.174	0.030	C
			B	1	0.73		1	1	204.060			
			C	1	0.73		1	1	204.060			
Sum Weight:	0.799	35.493						OTM	422.699 kip-ft	5.078		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	35.493					
Bracing Weight	0.000					
Total Member Self-Weight	35.493			-0.001	0.569	
Total Weight	45.087			-0.001	0.569	
Wind 0 deg - No Ice		0.000	-39.175	-4044.752	0.569	-8.570
Wind 30 deg - No Ice		19.583	-33.918	-3501.777	-2021.183	-5.449
Wind 45 deg - No Ice		27.696	-27.696	-2859.426	-2858.856	-4.296
Wind 60 deg - No Ice		33.927	-19.588	-2022.376	-3502.288	-3.502
Wind 90 deg - No Ice		39.195	0.000	-0.001	-4046.678	-1.062
Wind 120 deg - No Ice		33.952	19.602	2024.247	-3505.531	4.297
Wind 135 deg - No Ice		27.720	27.720	2862.481	-2861.913	7.096
Wind 150 deg - No Ice		19.597	33.944	3505.018	-2023.055	8.949
Wind 180 deg - No Ice		0.000	39.175	4044.750	0.569	8.570
Wind 210 deg - No Ice		-19.583	33.918	3501.776	2022.320	5.449
Wind 225 deg - No Ice		-27.696	27.696	2859.424	2859.994	4.296
Wind 240 deg - No Ice		-33.927	19.588	2022.375	3503.426	3.502
Wind 270 deg - No Ice		-39.195	0.000	-0.001	4047.816	1.062
Wind 300 deg - No Ice		-33.952	-19.602	-2024.248	3506.669	-4.297
Wind 315 deg - No Ice		-27.720	-27.720	-2862.483	2863.051	-7.096
Wind 330 deg - No Ice		-19.597	-33.944	-3505.020	2024.193	-8.949
Member Ice	19.554					
Total Weight Ice	74.448			-0.755	8.716	
Wind 0 deg - Ice		0.000	-10.366	-1087.847	8.716	-3.015
Wind 30 deg - Ice		5.182	-8.976	-942.018	-534.723	-2.376
Wind 45 deg - Ice		7.329	-7.329	-769.334	-759.863	-1.959

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 60 deg - Ice		8.978	-5.183	-544.301	-932.733	-1.505
Wind 90 deg - Ice		10.370	0.000	-0.755	-1078.806	-0.285
Wind 120 deg - Ice		8.982	5.186	543.113	-933.292	1.416
Wind 135 deg - Ice		7.333	7.333	768.350	-760.390	2.217
Wind 150 deg - Ice		5.185	8.980	941.067	-535.045	2.792
Wind 180 deg - Ice		0.000	10.366	1086.337	8.716	3.015
Wind 210 deg - Ice		-5.182	8.976	940.508	552.154	2.376
Wind 225 deg - Ice		-7.329	7.329	767.824	777.294	1.959
Wind 240 deg - Ice		-8.978	5.183	542.791	950.165	1.505
Wind 270 deg - Ice		-10.370	0.000	-0.755	1096.238	0.285
Wind 300 deg - Ice		-8.982	-5.186	-544.623	950.724	-1.416
Wind 315 deg - Ice		-7.333	-7.333	-769.860	777.821	-2.217
Wind 330 deg - Ice		-5.185	-8.980	-942.577	552.477	-2.792
Total Weight	45.087			-0.001	0.569	
Wind 0 deg - Service		0.000	-7.467	-770.909	0.569	-1.633
Wind 30 deg - Service		3.732	-6.465	-667.421	-384.766	-1.038
Wind 45 deg - Service		5.279	-5.279	-544.992	-544.423	-0.819
Wind 60 deg - Service		6.466	-3.733	-385.455	-667.058	-0.667
Wind 90 deg - Service		7.470	0.000	-0.001	-770.815	-0.202
Wind 120 deg - Service		6.471	3.736	385.810	-667.676	0.819
Wind 135 deg - Service		5.283	5.283	545.574	-545.005	1.353
Wind 150 deg - Service		3.735	6.469	668.038	-385.123	1.706
Wind 180 deg - Service		0.000	7.467	770.908	0.569	1.633
Wind 210 deg - Service		-3.732	6.465	667.420	385.904	1.038
Wind 225 deg - Service		-5.279	5.279	544.991	545.561	0.819
Wind 240 deg - Service		-6.466	3.733	385.454	668.195	0.667
Wind 270 deg - Service		-7.470	0.000	-0.001	771.953	0.202
Wind 300 deg - Service		-6.471	-3.736	-385.812	668.813	-0.819
Wind 315 deg - Service		-5.283	-5.283	-545.575	546.143	-1.353
Wind 330 deg - Service		-3.735	-6.469	-668.039	386.261	-1.706

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 45 deg - No Ice
7	0.9 Dead+1.0 Wind 45 deg - No Ice
8	1.2 Dead+1.0 Wind 60 deg - No Ice
9	0.9 Dead+1.0 Wind 60 deg - No Ice
10	1.2 Dead+1.0 Wind 90 deg - No Ice
11	0.9 Dead+1.0 Wind 90 deg - No Ice
12	1.2 Dead+1.0 Wind 120 deg - No Ice
13	0.9 Dead+1.0 Wind 120 deg - No Ice
14	1.2 Dead+1.0 Wind 135 deg - No Ice
15	0.9 Dead+1.0 Wind 135 deg - No Ice
16	1.2 Dead+1.0 Wind 150 deg - No Ice
17	0.9 Dead+1.0 Wind 150 deg - No Ice
18	1.2 Dead+1.0 Wind 180 deg - No Ice
19	0.9 Dead+1.0 Wind 180 deg - No Ice
20	1.2 Dead+1.0 Wind 210 deg - No Ice
21	0.9 Dead+1.0 Wind 210 deg - No Ice

Comb. No.	Description
22	1.2 Dead+1.0 Wind 225 deg - No Ice
23	0.9 Dead+1.0 Wind 225 deg - No Ice
24	1.2 Dead+1.0 Wind 240 deg - No Ice
25	0.9 Dead+1.0 Wind 240 deg - No Ice
26	1.2 Dead+1.0 Wind 270 deg - No Ice
27	0.9 Dead+1.0 Wind 270 deg - No Ice
28	1.2 Dead+1.0 Wind 300 deg - No Ice
29	0.9 Dead+1.0 Wind 300 deg - No Ice
30	1.2 Dead+1.0 Wind 315 deg - No Ice
31	0.9 Dead+1.0 Wind 315 deg - No Ice
32	1.2 Dead+1.0 Wind 330 deg - No Ice
33	0.9 Dead+1.0 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	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	175 - 125.33	Pole	Max Tension	39	0.000	0.000	0.000
			Max. Compression	34	-20.165	8.608	0.508
			Max. Mx	26	-10.383	338.811	-0.015
			Max. My	18	-10.384	0.301	-338.281
			Max. Vy	26	-13.448	338.811	-0.015
			Max. Vx	18	13.447	0.301	-338.281
			Max. Torque	3			8.052
L2	125.33 - 82.25	Pole	Max Tension	1	0.000	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	34	-42.647	9.375	0.784
			Max. Mx	26	-22.803	1270.113	-0.013
			Max. My	2	-22.804	0.589	1268.590
			Max. Vy	26	-25.620	1270.113	-0.013
			Max. Vx	2	-25.600	0.589	1268.590
			Max. Torque	17			-8.932
L3	82.25 - 40.17	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-60.338	9.480	0.793
			Max. Mx	26	-34.929	2459.343	-0.002
			Max. My	2	-34.930	0.680	2456.999
			Max. Vy	26	-32.331	2459.343	-0.002
			Max. Vx	2	-32.311	0.680	2456.999
			Max. Torque	17			-8.923
L4	40.17 - 1	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-85.943	9.480	0.793
			Max. Mx	26	-54.087	4148.229	-0.011
			Max. My	2	-54.087	0.687	4144.960
			Max. Vy	26	-39.218	4148.229	-0.011
			Max. Vx	2	-39.199	0.687	4144.960
			Max. Torque	17			-8.916

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	47	85.943	10.370	0.000
	Max. H_x	26	54.104	39.195	-0.009
	Max. H_z	3	40.578	0.000	39.175
	Max. M_x	2	4144.960	0.000	39.175
	Max. M_z	10	4146.799	-39.195	-0.009
	Max. Torsion	33	8.913	19.597	33.944
	Min. Vert	7	40.578	-27.696	27.696
	Min. H_x	10	54.104	-39.195	-0.009
	Min. H_z	19	40.578	0.000	-39.175
	Min. M_x	18	-4144.960	0.000	-39.175
	Min. M_z	26	-4148.229	39.195	-0.009
	Min. Torsion	17	-8.913	-19.597	-33.944

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	45.087	0.000	0.002	0.001	0.569	0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	54.104	0.000	-39.175	-4144.960	0.686	-8.535
0.9 Dead+1.0 Wind 0 deg - No Ice	40.578	-0.000	-39.175	-4118.845	0.508	-8.536
1.2 Dead+1.0 Wind 30 deg - No Ice	54.104	19.583	-33.918	-3588.524	-2071.141	-5.426
0.9 Dead+1.0 Wind 30 deg - No Ice	40.578	19.583	-33.918	-3565.919	-2058.270	-5.427

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
1.2 Dead+1.0 Wind 45 deg - No Ice	54.104	27.696	-27.696	-2930.257	-2929.562	-4.279
0.9 Dead+1.0 Wind 45 deg - No Ice	40.578	27.696	-27.696	-2911.799	-2911.284	-4.280
1.2 Dead+1.0 Wind 60 deg - No Ice	54.104	33.927	-19.588	-2072.470	-3588.931	-3.489
0.9 Dead+1.0 Wind 60 deg - No Ice	40.578	33.927	-19.588	-2059.416	-3566.500	-3.489
1.2 Dead+1.0 Wind 90 deg - No Ice	54.104	39.195	0.009	0.012	-4146.799	-1.061
0.9 Dead+1.0 Wind 90 deg - No Ice	40.578	39.195	0.006	0.008	-4120.857	-1.060
1.2 Dead+1.0 Wind 120 deg - No Ice	54.104	33.952	19.602	2074.385	-3592.255	4.277
0.9 Dead+1.0 Wind 120 deg - No Ice	40.578	33.952	19.602	2061.319	-3569.802	4.278
1.2 Dead+1.0 Wind 135 deg - No Ice	54.104	27.720	27.720	2933.382	-2932.702	7.066
0.9 Dead+1.0 Wind 135 deg - No Ice	40.578	27.720	27.720	2914.905	-2914.401	7.067
1.2 Dead+1.0 Wind 150 deg - No Ice	54.104	19.597	33.944	3591.840	-2073.070	8.912
0.9 Dead+1.0 Wind 150 deg - No Ice	40.578	19.597	33.944	3569.214	-2060.183	8.913
1.2 Dead+1.0 Wind 180 deg - No Ice	54.104	0.000	39.175	4144.960	0.686	8.534
0.9 Dead+1.0 Wind 180 deg - No Ice	40.578	-0.000	39.175	4118.845	0.508	8.536
1.2 Dead+1.0 Wind 210 deg - No Ice	54.104	-19.583	33.918	3588.542	2072.540	5.426
0.9 Dead+1.0 Wind 210 deg - No Ice	40.578	-19.583	33.918	3565.932	2059.306	5.427
1.2 Dead+1.0 Wind 225 deg - No Ice	54.104	-27.696	27.696	2930.277	2930.972	4.279
0.9 Dead+1.0 Wind 225 deg - No Ice	40.578	-27.696	27.696	2911.813	2912.329	4.280
1.2 Dead+1.0 Wind 240 deg - No Ice	54.104	-33.927	19.588	2072.489	3590.350	3.489
0.9 Dead+1.0 Wind 240 deg - No Ice	40.578	-33.927	19.588	2059.430	3567.551	3.489
1.2 Dead+1.0 Wind 270 deg - No Ice	54.104	-39.195	0.009	0.012	4148.229	1.061
0.9 Dead+1.0 Wind 270 deg - No Ice	40.578	-39.195	0.006	0.008	4121.915	1.060
1.2 Dead+1.0 Wind 300 deg - No Ice	54.104	-33.952	-19.602	-2074.411	3593.670	-4.277
0.9 Dead+1.0 Wind 300 deg - No Ice	40.578	-33.952	-19.602	-2061.339	3570.850	-4.278
1.2 Dead+1.0 Wind 315 deg - No Ice	54.104	-27.720	-27.720	-2933.416	2934.097	-7.066
0.9 Dead+1.0 Wind 315 deg - No Ice	40.578	-27.720	-27.720	-2914.931	2915.435	-7.067
1.2 Dead+1.0 Wind 330 deg - No Ice	54.104	-19.597	-33.944	-3591.870	2074.447	-8.912
0.9 Dead+1.0 Wind 330 deg - No Ice	40.578	-19.597	-33.944	-3569.237	2061.204	-8.913
1.2 Dead+1.0 Ice+1.0 Temp	85.943	-0.000	-0.000	-0.793	9.480	0.001
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	85.943	-0.000	-10.366	-1138.272	9.660	-3.003
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	85.943	5.182	-8.976	-985.684	-558.957	-2.380

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
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	85.943	7.329	-7.329	-804.998	-794.529	-1.970
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	85.943	8.978	-5.183	-569.539	-975.409	-1.523
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	85.943	10.370	0.000	-0.808	-1128.249	-0.311
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	85.943	8.982	5.186	568.259	-975.994	1.388
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	85.943	7.333	7.333	803.932	-795.081	2.190
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	85.943	5.185	8.980	984.652	-559.296	2.770
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	85.943	-0.000	10.366	1136.655	9.660	3.005
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	85.943	-5.182	8.976	984.070	578.281	2.381
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	85.943	-7.329	7.329	803.385	813.854	1.971
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	85.943	-8.978	5.183	567.925	994.735	1.524
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	85.943	-10.370	0.000	-0.808	1147.578	0.313
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	85.943	-8.982	-5.186	-569.880	995.320	-1.387
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	85.943	-7.333	-7.333	-805.554	814.405	-2.189
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	85.943	-5.185	-8.980	-986.272	578.618	-2.768
Dead+Wind 0 deg - Service	45.087	0.000	-7.467	-787.024	0.592	-1.633
Dead+Wind 30 deg - Service	45.087	3.732	-6.465	-681.372	-392.798	-1.038
Dead+Wind 45 deg - Service	45.087	5.279	-5.279	-556.384	-555.792	-0.819
Dead+Wind 60 deg - Service	45.087	6.466	-3.733	-393.512	-680.990	-0.667
Dead+Wind 90 deg - Service	45.087	7.470	-0.000	-0.000	-786.917	-0.203
Dead+Wind 120 deg - Service	45.087	6.471	3.736	393.876	-681.621	0.819
Dead+Wind 135 deg - Service	45.087	5.283	5.283	556.979	-556.387	1.352
Dead+Wind 150 deg - Service	45.087	3.735	6.469	682.003	-393.163	1.705
Dead+Wind 180 deg - Service	45.087	0.000	7.467	787.024	0.592	1.633
Dead+Wind 210 deg - Service	45.087	-3.732	6.465	681.373	393.983	1.038
Dead+Wind 225 deg - Service	45.087	-5.279	5.279	556.384	556.977	0.819
Dead+Wind 240 deg - Service	45.087	-6.466	3.733	393.512	682.175	0.667
Dead+Wind 270 deg - Service	45.087	-7.470	-0.000	-0.000	788.103	0.203
Dead+Wind 300 deg - Service	45.087	-6.471	-3.736	-393.877	682.807	-0.819
Dead+Wind 315 deg - Service	45.087	-5.283	-5.283	-556.980	557.572	-1.352
Dead+Wind 330 deg - Service	45.087	-3.735	-6.469	-682.004	394.347	-1.705

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	0.000	-45.087	0.000	0.000	45.087	-0.002	0.004%
2	0.000	-54.104	-39.175	0.000	54.104	39.175	0.000%
3	0.000	-40.578	-39.175	0.000	40.578	39.175	0.000%
4	19.583	-54.104	-33.918	-19.583	54.104	33.918	0.000%
5	19.583	-40.578	-33.918	-19.583	40.578	33.918	0.000%
6	27.696	-54.104	-27.696	-27.696	54.104	27.696	0.000%
7	27.696	-40.578	-27.696	-27.696	40.578	27.696	0.000%
8	33.927	-54.104	-19.588	-33.927	54.104	19.588	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
9	33.927	-40.578	-19.588	-33.927	40.578	19.588	0.000%
10	39.195	-54.104	0.000	-39.195	54.104	-0.009	0.013%
11	39.195	-40.578	0.000	-39.195	40.578	-0.006	0.011%
12	33.952	-54.104	19.602	-33.952	54.104	-19.602	0.000%
13	33.952	-40.578	19.602	-33.952	40.578	-19.602	0.000%
14	27.720	-54.104	27.720	-27.720	54.104	-27.720	0.000%
15	27.720	-40.578	27.720	-27.720	40.578	-27.720	0.000%
16	19.597	-54.104	33.944	-19.597	54.104	-33.944	0.000%
17	19.597	-40.578	33.944	-19.597	40.578	-33.944	0.000%
18	0.000	-54.104	39.175	0.000	54.104	-39.175	0.000%
19	0.000	-40.578	39.175	0.000	40.578	-39.175	0.000%
20	-19.583	-54.104	33.918	19.583	54.104	-33.918	0.000%
21	-19.583	-40.578	33.918	19.583	40.578	-33.918	0.000%
22	-27.696	-54.104	27.696	27.696	54.104	-27.696	0.000%
23	-27.696	-40.578	27.696	27.696	40.578	-27.696	0.000%
24	-33.927	-54.104	19.588	33.927	54.104	-19.588	0.000%
25	-33.927	-40.578	19.588	33.927	40.578	-19.588	0.000%
26	-39.195	-54.104	0.000	39.195	54.104	-0.009	0.013%
27	-39.195	-40.578	0.000	39.195	40.578	-0.006	0.011%
28	-33.952	-54.104	-19.602	33.952	54.104	19.602	0.000%
29	-33.952	-40.578	-19.602	33.952	40.578	19.602	0.000%
30	-27.720	-54.104	-27.720	27.720	54.104	27.720	0.000%
31	-27.720	-40.578	-27.720	27.720	40.578	27.720	0.000%
32	-19.597	-54.104	-33.944	19.597	54.104	33.944	0.000%
33	-19.597	-40.578	-33.944	19.597	40.578	33.944	0.000%
34	0.000	-85.943	0.000	0.000	85.943	0.000	0.000%
35	0.000	-85.943	-10.366	0.000	85.943	10.366	0.000%
36	5.182	-85.943	-8.976	-5.182	85.943	8.976	0.000%
37	7.329	-85.943	-7.329	-7.329	85.943	7.329	0.000%
38	8.978	-85.943	-5.183	-8.978	85.943	5.183	0.000%
39	10.370	-85.943	0.000	-10.370	85.943	0.000	0.000%
40	8.982	-85.943	5.186	-8.982	85.943	-5.186	0.000%
41	7.333	-85.943	7.333	-7.333	85.943	-7.333	0.000%
42	5.185	-85.943	8.980	-5.185	85.943	-8.980	0.000%
43	0.000	-85.943	10.366	0.000	85.943	-10.366	0.000%
44	-5.182	-85.943	8.976	5.182	85.943	-8.976	0.000%
45	-7.329	-85.943	7.329	7.329	85.943	-7.329	0.000%
46	-8.978	-85.943	5.183	8.978	85.943	-5.183	0.000%
47	-10.370	-85.943	0.000	10.370	85.943	0.000	0.000%
48	-8.982	-85.943	-5.186	8.982	85.943	5.186	0.000%
49	-7.333	-85.943	-7.333	7.333	85.943	7.333	0.000%
50	-5.185	-85.943	-8.980	5.185	85.943	8.980	0.000%
51	0.000	-45.087	-7.467	0.000	45.087	7.467	0.000%
52	3.732	-45.087	-6.465	-3.732	45.087	6.465	0.000%
53	5.279	-45.087	-5.279	-5.279	45.087	5.279	0.000%
54	6.466	-45.087	-3.733	-6.466	45.087	3.733	0.000%
55	7.470	-45.087	0.000	-7.470	45.087	0.000	0.000%
56	6.471	-45.087	3.736	-6.471	45.087	-3.736	0.000%
57	5.283	-45.087	5.283	-5.283	45.087	-5.283	0.000%
58	3.735	-45.087	6.469	-3.735	45.087	-6.469	0.000%
59	0.000	-45.087	7.467	0.000	45.087	-7.467	0.000%
60	-3.732	-45.087	6.465	3.732	45.087	-6.465	0.000%
61	-5.279	-45.087	5.279	5.279	45.087	-5.279	0.000%
62	-6.466	-45.087	3.733	6.466	45.087	-3.733	0.000%
63	-7.470	-45.087	0.000	7.470	45.087	0.000	0.000%
64	-6.471	-45.087	-3.736	6.471	45.087	3.736	0.000%
65	-5.283	-45.087	-5.283	5.283	45.087	5.283	0.000%
66	-3.735	-45.087	-6.469	3.735	45.087	6.469	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00010227
2	Yes	5	0.00000001	0.00003723
3	Yes	4	0.00000001	0.00075114
4	Yes	5	0.00000001	0.00009294
5	Yes	5	0.00000001	0.00004240
6	Yes	5	0.00000001	0.00011797
7	Yes	5	0.00000001	0.00005382
8	Yes	5	0.00000001	0.00011060
9	Yes	5	0.00000001	0.00005093
10	Yes	4	0.00000001	0.00016939
11	Yes	4	0.00000001	0.00010665
12	Yes	5	0.00000001	0.00011439
13	Yes	5	0.00000001	0.00005277
14	Yes	5	0.00000001	0.00012147
15	Yes	5	0.00000001	0.00005559
16	Yes	5	0.00000001	0.00009033
17	Yes	5	0.00000001	0.00004124
18	Yes	5	0.00000001	0.00003723
19	Yes	4	0.00000001	0.00075115
20	Yes	5	0.00000001	0.00011677
21	Yes	5	0.00000001	0.00005393
22	Yes	5	0.00000001	0.00011814
23	Yes	5	0.00000001	0.00005388
24	Yes	5	0.00000001	0.00009622
25	Yes	5	0.00000001	0.00004392
26	Yes	4	0.00000001	0.00016950
27	Yes	4	0.00000001	0.00010670
28	Yes	5	0.00000001	0.00009468
29	Yes	5	0.00000001	0.00004318
30	Yes	5	0.00000001	0.00012163
31	Yes	5	0.00000001	0.00005564
32	Yes	5	0.00000001	0.00012790
33	Yes	5	0.00000001	0.00005937
34	Yes	4	0.00000001	0.00002968
35	Yes	5	0.00000001	0.00008383
36	Yes	5	0.00000001	0.00008884
37	Yes	5	0.00000001	0.00009151
38	Yes	5	0.00000001	0.00008916
39	Yes	5	0.00000001	0.00008033
40	Yes	5	0.00000001	0.00008911
41	Yes	5	0.00000001	0.00009166
42	Yes	5	0.00000001	0.00008900
43	Yes	5	0.00000001	0.00008366
44	Yes	5	0.00000001	0.00009282
45	Yes	5	0.00000001	0.00009441
46	Yes	5	0.00000001	0.00009123
47	Yes	5	0.00000001	0.00008346
48	Yes	5	0.00000001	0.00009147
49	Yes	5	0.00000001	0.00009491
50	Yes	5	0.00000001	0.00009362
51	Yes	4	0.00000001	0.00005038
52	Yes	4	0.00000001	0.00003853
53	Yes	4	0.00000001	0.00004754
54	Yes	4	0.00000001	0.00004629
55	Yes	4	0.00000001	0.00009865
56	Yes	4	0.00000001	0.00005181
57	Yes	4	0.00000001	0.00005819

58	Yes	4	0.00000001	0.00005099
59	Yes	4	0.00000001	0.00005039
60	Yes	4	0.00000001	0.00005550
61	Yes	4	0.00000001	0.00004779
62	Yes	4	0.00000001	0.00003474
63	Yes	4	0.00000001	0.00009881
64	Yes	4	0.00000001	0.00003720
65	Yes	4	0.00000001	0.00005843
66	Yes	4	0.00000001	0.00007224

Maximum Tower Deflections - Service Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* °	*Twist* °
L1	175 - 125.33	13.254	63	0.619	0.009
L2	131 - 82.25	7.784	64	0.547	0.004
L3	89 - 40.17	3.595	64	0.381	0.002
L4	48 - 1	1.041	64	0.198	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* °	*Twist* °	*Radius of Curvature* *ft*
176.000	SIAE ANT-18GHZ-24-SP	63	13.254	0.619	0.009	165409
174.000	BA8080-67-DIN	63	13.125	0.618	0.009	165409
140.000	BA8080-67-DIN	64	8.842	0.569	0.005	23629
130.000	MT6413-77A	64	7.669	0.544	0.004	18713

Maximum Tower Deflections - Design Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* °	*Twist* °
L1	175 - 125.33	69.758	26	3.255	0.047
L2	131 - 82.25	40.982	28	2.881	0.023
L3	89 - 40.17	18.934	28	2.010	0.010
L4	48 - 1	5.482	28	1.040	0.004

Critical Deflections and Radius of Curvature - Design Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* °	*Twist* °	*Radius of Curvature* *ft*
176.000	SIAE ANT-18GHZ-24-SP	26	69.758	3.255	0.047	31747
174.000	BA8080-67-DIN	26	69.080	3.249	0.047	31747

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.000	BA8080-67-DIN	28	46.553	2.998	0.027	4532
130.000	MT6413-77A	28	40.379	2.867	0.023	3587

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in²	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	175 - 125.33 (1)	TP40.1x29x0.25	49.670	0.000	0.0	30.615	-10.384	1791.010	0.006
L2	125.33 - 82.25 (2)	TP49.227x38.333x0.313	48.750	0.000	0.0	47.096	-22.802	2755.110	0.008
L3	82.25 - 40.17 (3)	TP58.005x47.093x0.375	48.830	0.000	0.0	66.511	-34.929	3890.920	0.009
L4	40.17 - 1 (4)	TP66.009x55.505x0.438	47.000	0.000	0.0	91.157	-54.087	5332.690	0.010

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	175 - 125.33 (1)	TP40.1x29x0.25	338.757	1538.525	0.220	0.000	1538.525	0.000
L2	125.33 - 82.25 (2)	TP49.227x38.333x0.313	1270.433	2932.192	0.433	0.000	2932.192	0.000
L3	82.25 - 40.17 (3)	TP58.005x47.093x0.375	2460.067	4915.567	0.500	0.000	4915.567	0.000
L4	40.17 - 1 (4)	TP66.009x55.505x0.438	4149.417	7889.692	0.526	0.000	7889.692	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	175 - 125.33 (1)	TP40.1x29x0.25	13.447	537.303	0.025	3.508	1815.492	0.002
L2	125.33 - 82.25 (2)	TP49.227x38.333x0.313	25.630	826.533	0.031	4.282	3431.408	0.001
L3	82.25 - 40.17 (3)	TP58.005x47.093x0.375	32.341	1167.280	0.028	4.279	5712.325	0.001
L4	40.17 - 1 (4)	TP66.009x55.505x0.438	39.228	1599.810	0.025	4.277	9186.667	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	175 - 125.33 (1)	0.006	0.220	0.000	0.025	0.002	0.227 ✔	1.000	✔
L2	125.33 - 82.25 (2)	0.008	0.433	0.000	0.031	0.001	0.443 ✔	1.000	✔
L3	82.25 - 40.17 (3)	0.009	0.500	0.000	0.028	0.001	0.510 ✔	1.000	✔
L4	40.17 - 1 (4)	0.010	0.526	0.000	0.025	0.000	0.537 ✔	1.000	✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
L1	175 - 125.33	Pole	TP40.1x29x0.25	1	-10.384	1791.010	22.7	Pass
L2	125.33 - 82.25	Pole	TP49.227x38.333x0.313	2	-22.802	2755.110	44.3	Pass
L3	82.25 - 40.17	Pole	TP58.005x47.093x0.375	3	-34.929	3890.920	51.0	Pass
L4	40.17 - 1	Pole	TP66.009x55.505x0.438	4	-54.087	5332.690	53.7	Pass
							Summary	
						Pole (L4)	53.7	Pass
						RATING =	**53.7**	**Pass**

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$M_u := 4149 \cdot ft \cdot kip$	(Input From tnxTower)
Shear Force =	$Shear := 39 \cdot kip$	(Input From tnxTower)
Axial Force =	$R_u := 54 \cdot kip$	(Input From tnxTower)

Anchor Bolt Data:

ASTM A615 Grade 75

Number of Anchor Bolts =	$N := 26$	(User Input)
Diameter of Bolt Circle =	$D_{BC} := 72.75 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 1.75 \cdot in$	(User Input)
Threads per Inch =	$n := 5$	(User Input)
Top of Concrete to Bot Leveling Nut =	$l_{ar} := 2 \cdot in$	(User Input)
Anchor Rod Force Correction Factor =	$n_c := 1$	Table 2-1 Addendum 3

Base Plate Data:

ASTM A572 Grade 60

Plate Yield Strength =	$F_{yf} := 50 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{TP} := 2.5 \cdot in$	(User Input)
Base Plate Diameter =	$D_{OD} := 78.32 \cdot in$	(User Input)
Outer Pole Diameter =	$D_T := 66.01 \cdot in$	(User Input)
Pole Wall Thickness =	$t_T := 0.438 \cdot in$	(User Input)
Pole Design Yield Strength =	$F_{yp} := 65 \cdot ksi$	(User Input)

Anchor Bolt Analysis:

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 2.405\ in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 1.899\ in^2$

Tensile Root Diameter = $d_{rt} := D - \frac{0.9743 \cdot in}{n} = 1.555\ in$

Plastic Section Modulus = $Z := \frac{d_{rt}^{\ 3}}{6} = 0.627\ in^3$

Maximum Anchor Rod Force = $P_{ut} := \frac{n_c \cdot \pi \cdot M_u}{N \cdot D_{BC}} - \frac{R_u}{N} = 80.6\ kip$

Maximum Anchor Rod Force = $P_{uc} := \frac{n_c \cdot \pi \cdot M_u}{N \cdot D_{BC}} + \frac{R_u}{N} = 84.8\ kip$

Maximum Shear Force = $V_u := \frac{Shear}{N} = 1.5\ kip$

$\Phi_t := 0.75 \qquad \Phi_v := 0.75 \qquad \Phi_c := 1.0$

Design Tensile Strength = $\Phi R_{nt} := \Phi_t \cdot F_u \cdot A_n = 142.459\ kip$

Design Compression Strength = $\Phi R_{nc} := \Phi_c \cdot F_y \cdot A_n = 142.459\ kip$

Design Shear Rupture Strength = $\Phi R_{nv} := \Phi_v \cdot 0.5 \cdot F_u \cdot A_g = 90.198\ kip$

Design Shear Yield Strength = $\Phi R_{nvc} := \Phi_c \cdot 0.6 \cdot F_y \cdot \frac{A_n}{2} = 42.738\ kip$

Bolt % of Capacity = $\left(\left(\frac{P_{ut}}{\Phi R_{nt}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv}}\right)^2\right) = 32.1\%$ $\qquad \frac{P_{ut}}{\Phi R_{nt}} = 0.566$

Condition1 = $Condition1 := \text{if}\left(\left(\frac{P_{ut}}{\Phi R_{nt}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv}}\right)^2 \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

$Condition1 = \text{"OK"}$

Bolt % of Capacity = $\left(\left(\frac{P_{uc}}{\Phi R_{nc}}\right)^2 + \left(\frac{V_u}{\Phi R_{nvc}}\right)^2\right) = 35.5\%$

Condition2 = $Condition2 := \text{if}\left(\left(\frac{P_{uc}}{\Phi R_{nc}}\right)^2 + \left(\frac{V_u}{\Phi R_{nvc}}\right)^2 \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

$Condition2 = \text{"OK"}$

Base Plate Analysis:

Strength Resistance Factor for Yielding due to Bending = $\phi_b := 0.9$

Strength Resistance Factor for Yielding due to Shear = $\phi_v := 1.0$

Outside Fillet Horizontal Leg Dimension = $w_1 := 0.25 \cdot in$

Effective Pole Outside Diameter = $D_e := D_T + w_1 = 66.26\ in$

Effective Base Plate Outside Diameter = $D_{oe} := \begin{cases} D_{OD} & \text{if } D_{OD} \le (D_{BC} + 6 \cdot t_{TP}) \\ (D_{BC} + 6 \cdot t_{TP}) & \text{else} \end{cases} = 78.32\ in$

Half-Angle Between Radial Lines Extending from Pole Centerline Through Midpoints Between Adjacent Anchor Rods = $\theta_1 := \frac{\pi}{N} = 0.121$

Angle Defining Limiting Effective Base Plate Width Based on Plate Thickness = $\theta_2 := \operatorname{asin}\left(\frac{12 \cdot t_{TP}}{D_{BC}}\right) = 0.425$

Angle Defining Limiting Effective Base Plate Width Based on Distance Between Anchor Rod Bolt Circle and Effective Pole Outside Diameter = $\theta_3 := \operatorname{acos}\left(\frac{D_{BC} + D_e}{2 \cdot D_{BC}}\right) = 0.3$

Governing Angle Defining Effective Base Plate Width Resisting Bending = $\theta := min(\theta_1, \theta_2, \theta_3) = 0.121$

Effective Moment Arm of Anchor Rod Force = $x := 0.5 \cdot (D_{BC} - D_e) = 3.245\ in$

Effective Base Plate Width Resisting Bending from Transverse Bend Line = $B_{et} := D_{BC} \cdot \sin(\theta) = 8.769\ in$

Effective Base Plate Width Resisting Bending from Radial Bend Lines = $B_{er} := (D_{oe} - D_e) \cdot \sin(\theta) = 1.454\ in$

Total Effective Base Plate Width Resisting Bending = $B_{eff} := B_{et} + B_{er} = 10.223\ in$

Required Base Plate Thickness = $t_{TP.Req} := \sqrt{\frac{4 \cdot P_{uc} \cdot x}{\phi_b \cdot F_{yf} \cdot B_{eff}}} = 1.547\ in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 61.9\%$

Condition2 = $Condition3 := \text{if}\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, \text{“Ok”}, \text{“Overstressed”}\right)$

$Condition3 = \text{“Ok”}$

Required Base Plate Thickness = $t_{TP.Req} := \frac{\phi_b \cdot t_T \cdot F_{yp}}{\phi_v \cdot 0.6 \cdot F_{yf}} = 0.854\ in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 34.2\%$

Condition2 = $Condition4 := \text{if}\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, \text{“Ok”}, \text{“Overstressed”}\right)$

$Condition4 = \text{“Ok”}$

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Subject: Foundation Analysis

Location: 175-ft Valmont Monopole
Plainville, CT

Rev. 2: 04/17/24

Prepared by: C.M.T. Checked by: T.J.L.
Job no. 24018.01

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 4149 \cdot ft \cdot kip$	(User Input)
Shear Force =	$Shear := 39 \cdot kip$	(User Input)
Axial Force =	$Axial := 54 \cdot kip$	(User Input)
Tower Height =	$H_t := 175 \cdot ft$	(User Input)

Footing Data:

Overall Depth of Footing =	$D_f := 7.5 \cdot ft$	(User Input)
Length of Pier =	$L_p := 5.5 \cdot ft$	(User Input)
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)
Diameter of Pier =	$d_p := 7.5 \cdot ft$	(User Input)
Thickness of Footing =	$T_f := 2.5 \cdot ft$	(User Input)
Width of Footing =	$W_f := 28.5 \cdot ft$	(User Input)

Anchor Bolt Data:

Length of Anchor Bolts =	$L_{st} := 72 \cdot in$	(User Input)
Projection of Anchor Bolts Above Pier =	$A_{BP} := 9.5 \cdot in$	(User Input)
Anchor Bolt Diameter =	$d_{anchor} := 1.75 \cdot in$	(User Input)
Base Plate Bolt Circle =	$MP := 72.75 \cdot in$	(User Input)

Material Properties:

Concrete Compressive Strength =	$f_c := 4500 \cdot psi$	(User Input)	
Steel Reinforcement Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 32 \cdot deg$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_u := 5000 \cdot psf$	(User Input)	
Allowable Soil Bearing Capacity =	$q_a := \frac{q_u}{2} = 2500\ psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 125 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Buoyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0.5 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 10$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.27 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 32$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 0.5625 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 5$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 0.625 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 49$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 9$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.128 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 46$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 1.267\ in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.307\ in^2$

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.999\ in^2$

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.255$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := \text{if}\,(Bouyancy = 1\,, \gamma_{conc} - 62.4 \cdot \mathbf{pcf}\,, \gamma_{conc}) = 150\ \mathbf{pcf}$

Adjusted Soil Unit Weight = $\gamma_s := \text{if}\,(Bouyancy = 1\,, \gamma_{soil} - 62.4 \cdot \mathbf{pcf}\,, \gamma_{soil}) = 125\ \mathbf{pcf}$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0.203\ ksf$

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 2.034\ ksf$$

$$P_{top} := \text{if}\,(n < (D_f - T_f)\,, P_{pt}\,, P_{pn}) = 2.034\ ksf$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 3.051\ ksf$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 2.543\ ksf$$

$$T_p := \text{if}\,(n < (D_f - T_f)\,, T_f\,, (D_f - n)) = 2.5\ \mathbf{ft}$$

$$A_p := W_f \cdot T_p = 71.25\ \mathbf{ft}^2$$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 181.164\ kip$

Weight of Concrete Pad = $WT_c := \left(\left(W_f^{\,2} \cdot T_f\right) + d_p^{\,2} \cdot L_p\right) \cdot \gamma_c = 351\ \mathbf{kip}$

Weight of Soil Above Footing = $WT_{s1} := \left(\left(W_f^{\,2} - d_p^{\,2}\right) \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right) \cdot \gamma_s = 425.25\ \mathbf{kip}$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left(\frac{D_f^{\,2} \cdot \tan(\Phi_s)}{2} \cdot W_f\right) \cdot \gamma_s = 62.609\ kip$

Weight of Soil Wedge at back face Corners = $WT_{s3} := 2 \cdot \left((D_f)^3 \cdot \frac{\tan(\Phi_s)}{3}\right) \cdot \gamma_s = 21.968\ \mathbf{kip}$

Total Weight = $WT_{tot} := WT_c + WT_{s1} + Axial = 830.25\ \mathbf{kip}$

Resisting Weight = $WT_R := 0.9 \cdot WT_c + 0.75 \cdot WT_{s1} + 0.75 \cdot Axial = 675.338\ kip$

Resisting Moment = $M_r := (WT_R) \cdot \frac{W_f}{2} + 0.75 \cdot S_u \cdot \frac{T_f}{3} + 0.75 \cdot \left((WT_{s2} + WT_{s3}) \cdot \left(W_f + \frac{D_f \cdot \tan(\Phi_s)}{3}\right)\right) = 11644\ kip \cdot ft$

Overturning Moment = $M_{ot} := OM + Shear \cdot (L_p + T_f) = 4461\ \mathbf{kip} \cdot \mathbf{ft}$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.61$

Factor of Safety Required = $FS_{req} := 1$

$OverTurning\_Moment\_Check := \text{if}\,(FS \geq FS_{req}\,, \text{"Okay"}\,, \text{"No Good"})$

$OverTurning\_Moment\_Check = \text{"Okay"}$

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 554.776\ kip$

$Shear\_Check := \text{if}\left(S_p > Shear, \text{"Okay"}, \text{"No Good"}\right)$

$Shear\_Check = \text{"Okay"}$

Bearing Pressure Caused by Footing:

Area of the Mat = $A_{mat} := W_f^2 = 812.25\ ft^2$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 3858.19\ ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 2.178\ ksf$

$Max\_Pressure\_Check := \text{if}\left(P_{max} < .75 \cdot q_u, \text{"Okay"}, \text{"No Good"}\right)$

$Max\_Pressure\_Check = \text{"Okay"}$

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.134\ ksf$

$Min\_Pressure\_Check := \text{if}\left(\left(P_{min} \geq 0\right) \cdot \left(P_{min} < .75 \cdot q_u\right), \text{"Okay"}, \text{"No Good"}\right)$

$Min\_Pressure\_Check = \text{"No Good"}$

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 8.949\ ft$

Distance to Kern = $X_k := \frac{W_f}{6} = 4.75\ ft$

Eccentricity = $e := \frac{M_{ot}}{WT_{tot}} = 5.373\ ft$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 2.188\ ksf$

$q_{adj} := \text{if}\left(P_{min} < 0, P_a, P_{max}\right) = 2.188\ ksf$

$Pressure\_Check := \text{if}\left(q_{adj} < .75 \cdot q_u, \text{"Okay"}, \text{"No Good"}\right)$

$Pressure\_Check = \text{"Okay"}$

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^{\ 2}}{4} = \left(1.582 \cdot 10^4\right) \, kip$ (ACI-2008 10.14)

$Bearing\_Check := \text{if}\left(P_b > Axial, \text{"Okay"}, \text{"No Good"}\right)$

$Bearing\_Check = \text{"Okay"}$

Shear Strength of Concrete:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 2.156 \, ft$

$$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$$

$$d_2 := d_1 - d$$

$$L := \left(\frac{W_f}{2} - e\right) \cdot 3$$

$$Slope := \text{if}\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$$

$$V_{req} := \left(\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right) \cdot W_f \cdot d_1$$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := \text{if}\left(V_{req} < V_{Avail}, \text{"Okay"}, \text{"No Good"}\right)$

$Beam\_Shear\_Check = \text{"Okay"}$

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := \left(d_p + d\right) \cdot \pi = 30.3 \, ft$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot \left(d_p + d\right)^2}{4} = 73.2 \, ft^2$

Area Outside of Perimeter = $A_{out} := A_{mat} - A_{bo} = 739 \, ft^2$

$v_u := \frac{WT_{tot}}{\pi \cdot (d^2 + d_p \cdot d)} = 12.7\ ksf$ (From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

$V_u := v_u \cdot d \cdot W_f = 780\ kip$

Required Shear Strength = $V_{req} := V_u = 780\ kip$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 2148\ kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := \text{if}\ (V_{req} < V_{Avail}, \text{"Okay"}, \text{"No Good"})$

$Punching\_Shear\_Check = \text{"Okay"}$

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

$q_b := q_{adj} - d_1 \cdot Slope = 1.325\ ksf$

Maximum Bending at Face of Pier = $M_n := \frac{1}{\phi_m} \cdot \left((q_{adj} - q_b) \cdot \frac{d_1^{\ 2}}{3} + q_b \cdot \frac{d_1^{\ 2}}{2} \right) \cdot W_f = 3317.2\ kip \cdot ft$

$\beta := \begin{cases} \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi & 0.85 \\ \text{also if } f_c > 8000 \cdot psi & 0.65 \\ \text{else} & \left(\left(0.85 - \left(\frac{\left(\frac{f_c}{psi} - 4000 \right)}{1000} \right) \cdot 0.5 \right) \right) \end{cases} = 0.6$ (ACI-200810.2.7.3)

$R_n := \frac{M_n}{W_f \cdot d^2} = 173.9\ psi$

$\rho := \frac{0.85 \cdot f_c}{f_y} \cdot \left(1 - \sqrt{1 - \frac{2 \cdot R_n}{0.85 \cdot f_c}} \right) = 0.003$

$\rho_{min} := \rho = 0.00297$

Required Reinforcement for Temperature and Shrinkage:

$\rho_{sh} :=$ if $f_y \geq 60000 \cdot psi$
  .0018
else
  .0020

(ACI -2008 7.12.2.1)

Check Bottom Bars:

$As :=$ if $\rho_{min} > \frac{\rho_{sh}}{2}$
  $\rho_{min} \cdot W_f \cdot d$
else
  $\rho_{sh} \cdot W_f \cdot \frac{d}{2}$

$= 26.254\ in^2$

$As_{prov.bot} := A_{bbot} \cdot NB_{bot} = 46\ in^2$

$Pad\_Reinforcement\_Bot :=$ if $(As_{prov.bot} > As$, "Okay", "No Good")

$Pad\_Reinforcement\_Bot =$ "Okay"

Check Temp Shrinkage Reinforcement:

$As := \rho_{sh} \cdot (W_f \cdot T_f) = 18.5\ in^2$

$As_{prov.top} := A_{btop} \cdot NB_{top} = 15\ in^2$

$As_{prov.tot} := As_{prov.bot} + As_{prov.top} = 61\ in^2$

$Pad\_Reinforcement\_Temp :=$ if $(As_{prov.tot} > As$, "Okay", "No Good")

$Pad\_Reinforcement\_Temp =$ "Okay"

verizon

NPP RFDS

NORTHEAST > North East > New England > Windsor-3 > SOUTH WINDSOR 4 CT

Brauer, Mark - mark.brauer2@verizonwireless.com - 20240307_153358

Project Details		Location Information	
Carrier Aggregation	N	Site Id	617416761
Ecip	N	Search Ring#	
Project Name	SOUTH WINDSOR 4 CT	E-NodeB ID#	null
Project Alt Name	SOUTH WINDSOR 4 CT - MKT 68 - MCR	PSLC#	0
Project Id	17130359	Switch Name	Windsor-3
Designed Sector Carrier 4G	15	Tower Type	
Designed Sector Carrier 5G	6	Site Type	MACRO
Additional Sector Carrier 4G	0	Street Address	575 Pleasant Valley Road
Additional Sector Carrier 5G	0	City	South Windsor
Suffix		State	CT
FP Solution Type & Tech Type	MCR;4G_700;5G_850;4G_850;4G_AWS;4G_CBRS;5G_L-Sub6;4G_PCS	Zip Code	06074
		County	Hartford
		Latitude	41.813612/ 41° 48' 49.003"
		Longitude	-72.600687/ 72° 36' 2.473"

Project Scope

New build SOUTH WINDSOR 4 CT
Update - 03/07/2024 - height change from 120' to 130' as dish is not moving forward per RE.

Antenna Summary

Added Antenna

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Center line	Tip Height	Azimuth	Install Type	Quantit
					5G	Samsung	MT6413-77A	130	131.2	0(A),120(B),25 0(C)	PHYSICAL	3
LTE	5G,LTE	LTE				COMMSCOPE	NHH-65B-R2B	130	133	0(A),120(B),25 0(C),0(73)	PHYSICAL	3
			LTE	LTE		COMMSCOPE	NHHSS-65B-R2BT4	130	133	0(A),120(B),25 0(C)	PHYSICAL	3

Removed Antenna

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Center line	Tip Height	Azimuth	Install Type	Quantit

Retained Antenna

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Center line	Tip Height	Azimuth	Install Type	Quantit

Added: 9	Removed: 0	Retained: 0

Non Antenna Summary

Added Non Antenna

Equipment Type	Location	700	850	1900	AWS	CBRS	Make	Model	Install Type	Quantity
OVP	Tower							12 OVP	PHYSICAL	1
Hybrid Cable	Tower						TBD	6 X 12	PHYSICAL	2
RRU	Tower			LTE	LTE		Samsung	B2/B66A RRH ORAN (RF4439d-25A)	PHYSICAL	3
RRU	Tower	LTE	5G,LTE				Samsung	RF4461d-13A	PHYSICAL	3
RRU	Tower					LTE	Samsung	RT4423-48A	PHYSICAL	3

Removed Non Antenna

Equipment Type	Location	700	850	1900	AWS	CBRS	Make	Model	Install Type	Quantity

Retained Non Antenna

Equipment Type	Location	700	850	1900	AWS	CBRS	Make	Model	Install Type	Quantity

Added: 12	Removed: 0	Retained: 0

Services

700 LTE	0002 (8881368)		
Sector	01	02	03
Azimuth	0	120	250
Cell/Enodeb-Id	068511	068511	068511
Antenna Model	NHH-65B-R2B	NHH-65B-R2B	NHH-65B-R2B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	130	130	130
DLEARFCN	5230	5230	5230
Mech Down-tilt	0	0	0
Elect Down-tilt	0	0	0
Tip Height	133	133	133
Regulatory Power	111.11 (W/MHz) ERP	111.11 (W/MHz) ERP	111.11 (W/MHz) ERP
Transmitter Max Power	47.8 dBm	47.8 dBm	47.8 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx,Rx	2 , 4	2 , 4	2 , 4
Operational Port Count	0	0	0
Position	3,4	3,4	3,4
Transmitter Id	20856386	20856390	20856394
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10	10	10
Ant. Dimensions H x W x D(inch)	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1
Weight(lb)	43.7	43.7	43.7

Services

850 LTE	0002 (8881368)		
Sector	01	02	03
Azimuth	0	120	250
Cell/Enodeb-Id	068511	068511	068511
Antenna Model	NHH-65B-R2B	NHH-65B-R2B	NHH-65B-R2B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	130	130	130
DLEARFCN	2450	2450	2450
Mech Down-tilt	0	0	0
Elect Down-tilt	0	0	0
Tip Height	133	133	133
Regulatory Power	240.32 (W/MHz) ERPSD	240.32 (W/MHz) ERPSD	240.32 (W/MHz) ERPSD
Transmitter Max Power	47.8 dBm	47.8 dBm	47.8 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx,Rx	2 , 4	2 , 4	2 , 4
Operational Port Count	0	0	0
Position	3,4	3,4	3,4
Transmitter Id	20856389	20856393	20856397
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10	10	10
Ant. Dimensions H x W x D(inch)	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1
Weight(lb)	43.7	43.7	43.7

Services

850 NR	0002 (8881368)		
Sector	0073	0074	0075
Azimuth	0	120	250
Cell/Enodeb-Id	0689511	0689511	0689511
Antenna Model	NHH-65B-R2B	NHH-65B-R2B	NHH-65B-R2B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	130	130	130
DLEARFCN	2450	2450	2450
Mech Down-tilt	0	0	0
Elect Down-tilt	0	0	0
Tip Height	133	133	133
Regulatory Power	240.32 (W/MHz) ERPSD	240.32 (W/MHz) ERPSD	240.32 (W/MHz) ERPSD
Transmitter Max Power	47.8 dBm	47.8 dBm	47.8 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx,Rx	2 , 4	2 , 4	2 , 4
Operational Port Count	0	0	0
Position	3,4	3,4	3,4
Transmitter Id	20856389	20856393	20856397
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10	10	10
Ant. Dimensions H x W x D(inch)	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1
Weight(lb)	43.7	43.7	43.7

Services

1900 LTE	0002 (8881368)		
Sector	01	02	03
Azimuth	0	120	250
Cell/Enodeb-Id	068511	068511	068511
Antenna Model	NHH-65B-R2B	NHH-65B-R2B	NHH-65B-R2B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	130	130	130
DLEARFCN	1050	1050	1050
Mech Down-tilt	0	0	0
Elect Down-tilt	0	0	0
Tip Height	133	133	133
Regulatory Power	385.26 (W/MHz) EIRP	182.29 (W/MHz) EIRP	182.29 (W/MHz) EIRP
Transmitter Max Power	47.8 dBm	47.8 dBm	47.8 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx,Rx	2 , 4	2 , 4	2 , 4
Operational Port Count	0	0	0
Position	4	4	4
Transmitter Id	20856387	20856391	20856395
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10	10	10
Ant. Dimensions H x W x D(inch)	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1
Weight(lb)	43.7	43.7	43.7

Services

AWS LTE	0002 (8881368)		
Sector	01	02	03
Azimuth	0	120	250
Cell/Enodeb-Id	068511	068511	068511
Antenna Model	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	130	130	130
DLEARFCN	2050	2050	2050
Mech Down-tilt	0	0	0
Elect Down-tilt	0	0	0
Tip Height	133	133	133
Regulatory Power	210.25 (W/MHz) EIRP	210.25 (W/MHz) EIRP	210.25 (W/MHz) EIRP
Transmitter Max Power	47.8 dBm	47.8 dBm	47.8 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx,Rx	2 , 4	2 , 4	2 , 4
Operational Port Count	0	0	0
Position	3	3	3
Transmitter Id	20856388	20856392	20856396
Source	VZNPP	VZNPP	VZNPP
Bandwidth	20	20	20
Ant. Dimensions H x W x D(inch)	72.0 x 11.8 x 7.1	72.0 x 11.8 x 7.1	72.0 x 11.8 x 7.1
Weight(lb)	50.9	50.9	50.9

Services

CBRS LTE	0002 (8881368)		
Sector	19	20	21
Azimuth	0	120	250
Cell/Enodeb-Id	068511	068511	068511
Antenna Model	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	130	130	130
DLEARFCN	55790, 55941	55790, 55941	55790, 55941
Mech Down-tilt	0	0	0
Elect Down-tilt	4	4	4
Tip Height	133	133	133
Regulatory Power	16.89 (W/MHz) EIRPSD, 16.89 (W/MHz) EIRPSD	16.89 (W/MHz) EIRPSD, 16.89 (W/MHz) EIRPSD	16.89 (W/MHz) EIRPSD, 16.89 (W/MHz) EIRPSD
Transmitter Max Power	34.01 dBm	34.01 dBm	34.01 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RT4423-48A	RT4423-48A	RT4423-48A
Number of Tx,Rx	4 , 4	4 , 4	4 , 4
Operational Port Count	0	0	0
Position	3	3	3
Transmitter Id	20856398	20856399	20856400
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10, 20	10, 20	10, 20
Ant. Dimensions H x W x D(inch)	72.0 x 11.8 x 7.1	72.0 x 11.8 x 7.1	72.0 x 11.8 x 7.1
Weight(lb)	50.9	50.9	50.9

Services

CBAND NR	0002 (8881368)		
Sector	0073	0074	0075
Azimuth	0	120	250
Cell/Enodeb-Id	0689552	0689552	0689552
Antenna Model	MT6413-77A	MT6413-77A	MT6413-77A
Antenna Make	Samsung	Samsung	Samsung
Centerline	130	130	130
DLEARFCN	650006, 655324	650006, 655324	650006, 655324
Mech Down-tilt	0	0	0
Elect Down-tilt	1	1	1
Tip Height	131.2	131.2	131.2
Regulatory Power	1170.73 (W/MHz) EIRP, 1549.91 (W/MHz) EIRP	1170.73 (W/MHz) EIRP, 1549.91 (W/MHz) EIRP	1170.73 (W/MHz) EIRP, 1549.91 (W/MHz) EIRP
Transmitter Max Power	54.49 dBm	54.49 dBm	54.49 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	MT6413-77A	MT6413-77A	MT6413-77A
Number of Tx,Rx	2 , 2	2 , 2	2 , 2
Operational Port Count	64	64	64
Position	2	2	2
Transmitter Id	20856401	20856402	20856403
Source	VZNPP	VZNPP	VZNPP
Bandwidth	100, 60	100, 60	100, 60
Ant. Dimensions H x W x D(inch)	29.53 x 15.75 x 5.51	29.53 x 15.75 x 5.51	29.53 x 15.75 x 5.51
Weight(lb)	55.1	55.1	55.1

Callsigns Per Antenna

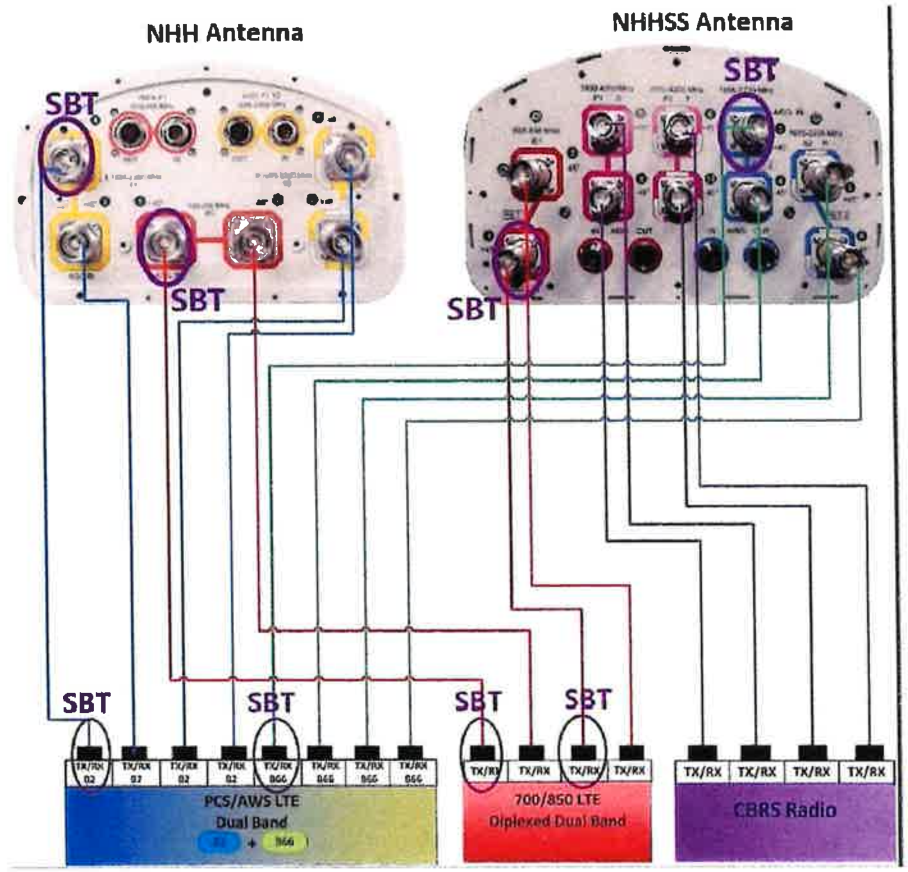
Sector	Make	Model	Ant CL Height AG	Ant Tip Height	Azimuth	Elect Down-tilt	Mech Down-tilt	Gain	Bandwidth	Regulatory Power	700	850	1900	2100	28 GHz	31 GHz	39 GHz	LSub-6	CBRS
01	COMMSCOPE	NHH-65B-R2	130	133	0	0	0	12.25	66	111.11	WQJQ689								
02	COMMSCOPE	NHH-65B-R2	130	133	120	0	0	12.25	66	111.11	WQJQ689								
03	COMMSCOPE	NHH-65B-R2	130	133	250	0	0	12.25	66	111.11	WQJQ689								
0073	COMMSCOPE	NHH-65B-R2	130	133	0	0	0	12.74	59	240.32		KNKA404							
0074	COMMSCOPE	NHH-65B-R2	130	133	120	0	0	12.74	59	240.32		KNKA404							
0075	COMMSCOPE	NHH-65B-R2	130	133	250	0	0	12.74	59	240.32		KNKA404							
01	COMMSCOPE	NHH-65B-R2	130	133	0	0	0	12.74	59	240.32		KNKA404							
02	COMMSCOPE	NHH-65B-R2	130	133	120	0	0	12.74	59	240.32		KNKA404							
03	COMMSCOPE	NHH-65B-R2	130	133	250	0	0	12.74	59	240.32		KNKA404							
01	COMMSCOPE	NHH-65B-R2	130	133	0	0	0	15.4	68	385.26			KNLH251,WPOJ730						
02	COMMSCOPE	NHH-65B-R2	130	133	120	0	0	12.25	66	182.29			KNLH251,WPOJ730						
03	COMMSCOPE	NHH-65B-R2	130	133	250	0	0	12.25	66	182.29			KNLH251,WPOJ730						
01	COMMSCOPE	NHHSS-65B-R2BT4	130	133	0	0	0	15.79	62	210.25				WQGA906,WQGB276					
02	COMMSCOPE	NHHSS-65B-R2BT4	130	133	120	0	0	15.79	62	210.25				WQGA906,WQGB276					
03	COMMSCOPE	NHHSS-65B-R2BT4	130	133	250	0	0	15.79	62	210.25				WQGA906,WQGB276					
0073	Samsung	MT6413-77A	130	131.2	0	1	0	23.15	105	1170.73								WRNE581,WRNE582,WRNE583,WRNE584,WRNE585	
0074	Samsung	MT6413-77A	130	131.2	120	1	0	23.15	105	1170.73								WRNE581,WRNE582,WRNE583,WRNE584,WRNE585	
0075	Samsung	MT6413-77A	130	131.2	250	1	0	23.15	105	1170.73								WRNE581,WRNE582,WRNE583,WRNE584,WRNE585	
0073	Samsung	MT6413-77A	130	131.2	0	1	0	23.15	105	1549.91								WRNE585,WRNE586,WRNE587,WRNE58	
0074	Samsung	MT6413-77A	130	131.2	120	1	0	23.15	105	1549.91								WRNE585,WRNE586 WRNE587,WRNE58	
0075	Samsung	MT6413-77A	130	131.2	250	1	0	23.15	105	1549.91								WRNE585,WRNE586 WRNE587,WRNE58	
19	COMMSCOPE	NHHSS-65B-R2BT4	130	133	0	4	0	14.61	64	16.89									CBRS_CALLSIGN,WRLD513,WRLD514,WRLD515
19	COMMSCOPE	NHHSS-65B-R2BT4	130	133	0	4	0	14.61	64	16.89									CBRS_CALLSIGN,WRLD513,WRLD514,WRLD515

20	COMMSCOPE	NHHSS-65B-R2BT4	130	133	120	4	0	14.61	64	16.89									CBRS_CALLSIGN,WRLD513,WRLD514,WRLD515
20	COMMSCOPE	NHHSS-65B-R2BT4	130	133	120	4	0	14.61	64	16.89									CBRS_CALLSIGN,WRLD513,WRLD514,WRLD515
21	COMMSCOPE	NHHSS-65B-R2BT4	130	133	250	4	0	14.61	64	16.89									CBRS_CALLSIGN,WRLD513,WRLD514,WRLD515
21	COMMSCOPE	NHHSS-65B-R2BT4	130	133	250	4	0	14.61	64	16.89									CBRS_CALLSIGN,WRLD513,WRLD514,WRLD515

Callsigns

Callsign	Market	Radio Code	Market #	Block	State	County	License Name	Wholly Owner	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs/Sq. mi	Status	Action	Approve for Insvc
WQJQ689	Northeast	WU	REA001	C	CT	9003	Cellco Partnership	Yes	22.000	746.000 - 757.000/. 000 - .000	776.000 - 787.000/. 000 - .000	746.000 - 757.000/. 000 - .000	776.000 - 787.000/. 000 - .000	111.11	1000	1223.64	proposed	added	1
KNKA404	Hartford-New Britain-Bristol, CT	CL	CMA032	A	CT	9003	Cellco Partnership	Yes	25.000	824.000 - 835.000/845.000 - 846.500	869.000 - 880.000/890.000 - 891.500	824.000 - 835.000/845.000 - 846.500	869.000 - 880.000/890.000 - 891.500	240.32	400	1223.64	proposed	added	1
WPOJ730	Hartford, CT	CW	BTA184	C	CT	9003	Cellco Partnership	Yes	10.000	1895.000 1900.000/ .000 - .000	1975.000 1980.000/ .000 - .000	1895.000 1900.000/ .000 - .000	1975.000 1980.000/ .000 - .000	385.26	1640	1223.64	proposed	added	1
KNLH251	Hartford, CT	CW	BTA184	F	CT	9003	Cellco Partnership	Yes	10.000	1890.000 1895.000/ .000 - .000	1970.000 1975.000/ .000 - .000	1890.000 1895.000/ .000 - .000	1970.000 1975.000/ .000 - .000	385.26	1640	1223.64	proposed	added	1
CBRS_CALLSIGN	UNLICENSE	3.5 GHz	UNLICENSE	UNLICENSE	CT	UNLICENSE	UNLICENSE	UNLICENSE	UNLICENSE	UNLICENSED - UNLICENSED/UNLICENSED - UNLICENSE	UNLICENSED - UNLICENSED/UNLICENSED - UNLICENSE	- / -	- / -	16.89		1223.64	proposed	added	
WRLD514	D09003 - Hartford, CT	PL	D09003	0	CT	9003	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000 3650.000/ .000 - .000	.000 - .000/.000 - .000	3550.000 3650.000/ .000 - .000	.000 - .000/.000 - .000	16.89	501	1223.64	proposed	added	1
WRLD515	D09003 - Hartford, CT	PL	D09003	0	CT	9003	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000 3650.000/ .000 - .000	.000 - .000/.000 - .000	3550.000 3650.000/ .000 - .000	.000 - .000/.000 - .000	16.89	501	1223.64	proposed	added	1
WRLD513	D09003 - Hartford, CT	PL	D09003	0	CT	9003	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000 3650.000/ .000 - .000	.000 - .000/.000 - .000	3550.000 3650.000/ .000 - .000	.000 - .000/.000 - .000	16.89	501	1223.64	proposed	added	1
WQGB276	Hartford-New Britain-Bristol, CT	AW	CMA032	A	CT	9003	Cellco Partnership	Yes	20.000	1710.000 1720.000/ .000 - .000	2110.000 2120.000/ .000 - .000	1710.000 1720.000/ .000 - .000	2110.000 2120.000/ .000 - .000	210.25	1640	1223.64	proposed	added	1
WRNE581	New York, NY	PM	PEA001	A1	CT	9003	Cellco Partnership	Yes	20.000	3700.000 3720.000/ .000 - .000	.000 - .000/.000 - .000	3700.000 3720.000/ .000 - .000	.000 - .000/.000 - .000	1170.73	1640	1223.64	proposed	added	1
WRNE582	New York, NY	PM	PEA001	A2	CT	9003	Cellco Partnership	Yes	20.000	3720.000 3740.000/ .000 - .000	.000 - .000/.000 - .000	3720.000 3740.000/ .000 - .000	.000 - .000/.000 - .000	1170.73	1640	1223.64	proposed	added	1

WRNE583	New York, NY	PM	PEA001	A3	CT	9003	Cellco Partnership	Yes	20.000	3740.000 3760.000/ .000 - .000	.000 - .000/.000 - .000	3740.000 3760.000/ .000 - .000	.000 - .000/.000 - .000	1170.73	1640	1223.64	proposed	added	1
WRNE584	New York, NY	PM	PEA001	A4	CT	9003	Cellco Partnership	Yes	20.000	3760.000 3780.000/ .000 - .000	.000 - .000/.000 - .000	3760.000 3780.000/ .000 - .000	.000 - .000/.000 - .000	1170.73	1640	1223.64	proposed	added	1
WRNE585	New York, NY	PM	PEA001	A5	CT	9003	Cellco Partnership	Yes	20.000	3780.000 3800.000/ .000 - .000	.000 - .000/.000 - .000	3780.000 3800.000/ .000 - .000	.000 - .000/.000 - .000	1549.91	1640	1223.64	proposed	added	1
WQGA906	New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-	AW	BEA010	B	CT	9003	Cellco Partnership	Yes	20.000	1720.000 1730.000/ .000 - .000	2120.000 2130.000/ .000 - .000	1720.000 1730.000/ .000 - .000	2120.000 2130.000/ .000 - .000	210.25	1640	1223.64	proposed	added	1
WRNE586	New York, NY	PM	PEA001	B1	CT	9003	Cellco Partnership	Yes	20.000	3800.000 3820.000/ .000 - .000	.000 - .000/.000 - .000	3800.000 3820.000/ .000 - .000	.000 - .000/.000 - .000	1549.91	1640	1223.64	proposed	added	1
WRNE587	New York, NY	PM	PEA001	B2	CT	9003	Cellco Partnership	Yes	20.000	3820.000 3840.000/ .000 - .000	.000 - .000/.000 - .000	3820.000 3840.000/ .000 - .000	.000 - .000/.000 - .000	1549.91	1640	1223.64	proposed	added	1
WRNE588	New York, NY	PM	PEA001	B3	CT	9003	Cellco Partnership	Yes	20.000	3840.000 3860.000/ .000 - .000	.000 - .000/.000 - .000	3840.000 3860.000/ .000 - .000	.000 - .000/.000 - .000	1549.91	1640	1223.64	proposed	added	1


NHH Antenna
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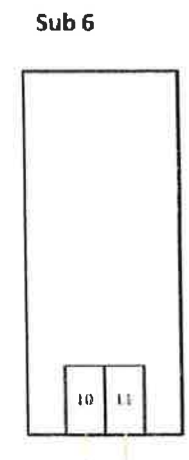
PCS/AWS LTE
Dual Band
700/850 LTE
Diplexed Dual Band
CBRS Radio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Analysis Report

Antenna Mount Analysis

Proposed Verizon Antenna Upgrade

Site Ref: South Windsor 4

575 Pleasant Valley Road
South Windsor, CT

CENTEK Project No. 24018.01

Date: April 2, 2024

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Prepared for:

Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492

CENTEK engineering

Centered on Solutions℠

April 2, 2024

Ms. Amy White
Smartlink
85 Rangeway Road
Billerica, MA 01862

Re: Structural Letter ~ Antenna Mount
Verizon – Site Ref: South Windsor 4
575 Pleasant Valley Road
South Windsor, CT

Centek Project No. 24018.01

Dear Ms. White,

Centek Engineering, Inc. has reviewed the Verizon antenna upgrade at the above referenced site. The purpose of the review is to determine the structural adequacy of the **existing mount, consisting of one (1) platform mount (SitePro P/N RMQLP-4096-HK)** to support the proposed equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2021 International Building Code as modified by the 2022 Connecticut State Building Code (CTBC) including ASCE 7-16 and ANSI/TIA-222-H *Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures"*.

The loads considered in this analysis consist of the following:

- **Verizon:**
  Platform: Three (3) Samsung MT6413-77A panel antennas, three (3) Commscope NHH-65B-R2B panel antennas, three (3) Commscope NHHSS-65B-R2BT4 panel antennas, three (3) Samsung 4439d-25A (B2/B66A) remote radio heads, three (3) Samsung 4461d-13A remote radio heads, three (3) Samsung 4423-48A remote radio heads, and one (1) OVP box mounted on a platform (SitePro P/N RMQLP-4096-HK) with a RAD center elevation of 130-ft above grade.

The antenna mount was analyzed per the requirements of the 2021 International Building Code as modified by the 2022 Connecticut State Building Code considering an Ultimate design wind speed of 120 mph for South Windsor as required in Appendix P of the 2022 Connecticut State Building Code.

Based on our review of the installation, it is our opinion that the **subject antenna mount has sufficient capacity** to support the aforementioned antenna configuration.

If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

STATE OF CONNECTICUT TIMOTHY J. LYNN No. 29336 LICENSED PROFESSIONAL ENGINEER

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE16 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

Development of Design Heights, Exposure Coefficients, and Velocity Pressures Per TIA-222-H

Wind Speeds

Basic Wind Speed	$V := 120$	mph	(User Input - 2022 CSBC Appendix P)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input per Annex B of TIA-222-H)
Basic Wind Speed Mount	$V_m := 30$	mph	(User Input - TIA-222-H Section 16.3)

Input

Structure Type =	$Structure\_Type := Pole$		(User Input)
Structure Category =	$SC := II$		(User Input)
Exposure Category =	$Exp := C$		(User Input)
Structure Height =	$h := 175$	ft	(User Input)
Height to Center of Antennas =	$z_{ant} := 130$	ft	(User Input)
Radial Ice Thickness =	$t_i := 1.5$	in	(User Input per Annex B of TIA-222-H)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topographic Factor =	$K_{zt} := 1.0$		(User Input)
Shielding Factor for Appurtenances =	$K_a := 1.0$		(User Input)
Ground Elevation Factor =	$K_e = 0.996$		(User Input)
Gust Response Factor =	$G_H := 1.35$		(User Input - Section 2.6.9.4 of TIA-222-H)

Output

Wind Direction Probability Factor =

$$K_d := \begin{cases} 0.95 & \text{if } Structure\_Type = Pole \\ 0.85 & \text{if } Structure\_Type = Lattice \end{cases} = 0.95$$

(Per Table 2-2 of TIA-222-H)

Importance Factors =

$$I_{ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.15 & \text{if } SC = 3 \\ 1.25 & \text{if } SC = 4 \end{cases} = 1$$

(Per Table 2-3 of TIA-222-H)

$$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.147$$

$$t_{iz} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.72$$

Velocity Pressure Coefficient Antennas =

$$Kz_{ant} := 2.01 \cdot \left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.337$$

Velocity Pressure w/o Ice Antennas =

$$qz_{ant} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V^2 = 46.634$$

Velocity Pressure with Ice Antennas =

$$qz_{ice.ant} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_i^2 = 8.096$$

Velocity Pressure Service =

$$qz_m := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_m^2 = 2.915$$

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Branford, CT 06405 F: (203) 488-8587

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Commscope NHH-65B-R2B		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 72$	in	(User Input)
Appurtenance Width =	$W_{app} := 11.85$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 7.1$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 43.65$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 6.1$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.36$		

Wind Load (without Ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 5.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 507$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 3.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 304$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 8$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 119$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 5.5$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 82$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 5.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 32$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 3.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 19$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 6058$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 6102$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 198$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 198$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Commscope NHHSS-65B-R2BT4		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 72$	in	(User Input)
Appurtenance Width =	$W_{app} := 11.85$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 7.1$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 51$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 6.1$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.36$		

Wind Load (without Ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 5.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 507$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 3.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 304$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 8$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 119$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 5.5$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 82$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 5.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 32$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 3.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 19$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 6058$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 6102$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 198$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 198$	lbs

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Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Samsung MT6413-77A		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 28.9$	in	(User Input)
Appurtenance Width =	$W_{app} := 15.75$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 5.5$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 57.3$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.8$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.36$		

Wind Load (without Ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.2$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 270$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 94$	lbs

Wind Load (with Ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 4.3$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 64$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 2$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 30$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.2$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 17$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 6$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 2503$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 3046$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 99$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 99$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model = Samsung B2/B66A (RF4439d-25A)

Appurtenance Shape = Flat (User Input)

Appurtenance Height = $L_{app} := 15$ in (User Input)

Appurtenance Width = $W_{app} := 15$ in (User Input)

Appurtenance Thickness = $T_{app} := 10$ in (User Input)

Appurtenance Weight = $WT_{app} := 74.7$ lbs (User Input)

Number of Appurtenances = $N_{app} := 1$ (User Input)

Appurtenance Aspect Ratio = $Ar_{app} := \frac{L_{app}}{W_{app}} = 1.0$

Appurtenance Force Coefficient = $Ca_{app} = 1.36$

Wind Load (without ice)

Surface Area for One Appurtenance (Front) = $SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 134$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 89$ lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)= $SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 2.4$ sf

Total Appurtenance Wind Force w/ Ice = $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 35$ lbs

Surface Area for One Appurtenance w/ Ice (Side) = $SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 1.7$ sf

Total Appurtenance Wind Force w/ Ice = $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 26$ lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) = $SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 8$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 6$ lbs

Gravity Loads (ice only)

Volume of Each Appurtenance = $V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 2250$ cu in

Volume of Ice on Each Appurtenance = $V_{ice} := (L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 2321$ cu in

Weight of Ice on Each Appurtenance = $W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 75$ lbs

Weight of Ice on All Appurtenances = $W_{ICEapp} \cdot N_{app} = 75$ lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Samsung RF4461d-13A		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 15$	in	(User Input)
Appurtenance Width =	$W_{app} := 15$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 10$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 79.1$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.0$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.36$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 134$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 89$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 2.4$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 35$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 1.7$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 26$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 8$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 6$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 2250$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 2321$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 75$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 75$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Samsung RT4423-48A		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 11.8$	in	(User Input)
Appurtenance Width =	$W_{app} := 8.7$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 5$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 19$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.4$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.36$		

Wind Load (without Ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.7$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 61$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.4$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 35$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 1.3$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 19$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 0.9$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 13$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.7$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 4$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.4$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 2$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 513$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 1049$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 34$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 34$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	RAYCAP RHSDC-3315-PF-48		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 19.2$	in	(User Input)
Appurtenance Width =	$W_{app} := 15.73$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 10.25$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 32$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.2$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.36$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 2.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 179$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.4$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 117$	lbs

Wind Load (with ice)

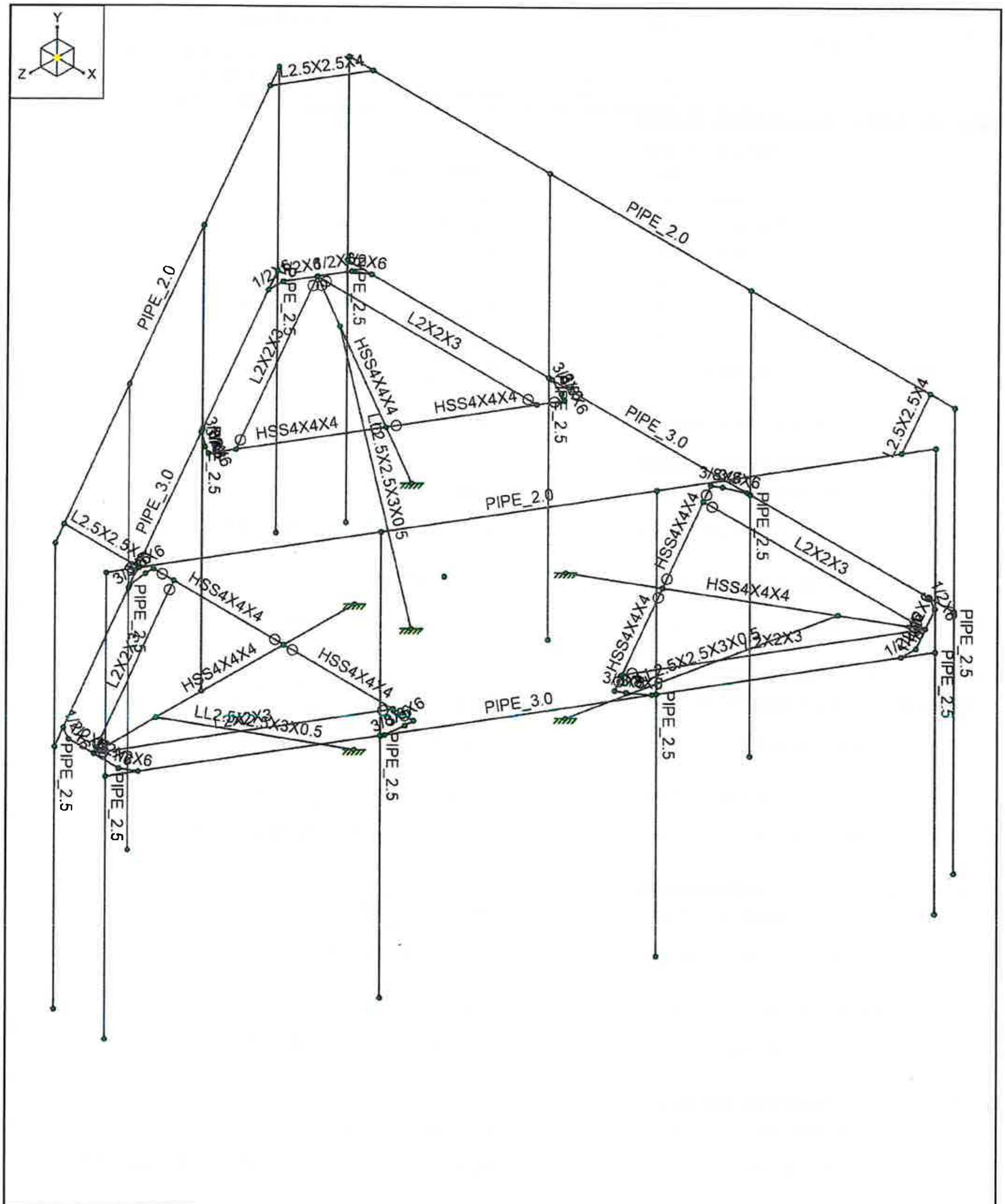
Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 3$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 45$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 2.2$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 32$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 2.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 11$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.4$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 7$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 3096$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 2847$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 92$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 92$	lbs



Envelope Only Solution

RISA	Centek Engineering	Antenna Platform Mount	SK-2
	CMT		Apr 02, 2024 at 09:51 AM
	24018.01	Members	Proposed Mount Check.r3d

Node Coordinates

	Label	X [in]	Y [in]	Z [in]	Detach From Diaphragm
1	NP12	50.859997	0	-48.64683	
2	NP11	2.859997	0	-48.64683	
3	NP10	-45.140003	0	-48.64683	
4	NP9	-93.140003	0	-48.64683	
5	NP8	-99.259957	0	-38.053611	
6	NP7	-75.259958	0	3.515608	
7	NP6	-51.259958	0	45.084827	
8	NP5	-27.259957	0	86.654047	
9	NP4	-15.019907	0	86.653819	
10	NP3	8.980093	0	45.084599	
11	NP2	32.980093	0	3.51538	
12	NP1	56.980093	0	-38.053839	
13	N79	-21.14	-4.75	0	
14	N57	-21.14	0	21.14	
15	N56	-39.429139	0	-10.577296	
16	N55	-2.850332	0	-10.577296	
17	N53	54.080415	0	-33.031449	
18	N51	32.580415	0	4.207644	
19	N50	9.375547	0	44.399654	
20	N48	-12.124453	0	81.638747	
21	N45	-30.155542	0	81.638746	
22	N43	-51.655542	0	44.399655	
23	N42	-74.860411	0	4.207644	
24	N40	-96.36041	0	-33.031448	
25	N37	-87.344866	0	-48.64683	
26	N35	-44.344866	0	-48.64683	
27	N34	2.06487	0	-48.64683	
28	N32	45.06487	0	-48.64683	
29	N30	-54.112835	0	-19.050015	
30	N29	-41.035465	0	-41.700677	
31	N28	-67.190166	0	3.600592	
32	N27	-93.350574	0	-41.690794	
33	N26	-90.344866	0	-46.89683	
34	N25	-96.344866	0	-36.504525	
35	N24	-38.612815	0	-45.89683	
36	N23	-69.612815	0	7.796745	
37	N22	-40.344866	0	-46.89683	
38	N21	-71.344866	0	6.796745	
39	N20	11.830838	0	-19.053474	
40	N19	24.91017	0	3.600593	
41	N18	-1.244531	0	-41.700677	
42	N17	51.062889	0	-41.704109	
43	N16	54.06487	0	-36.504525	
44	N15	48.06487	0	-46.89683	
45	N14	27.332819	0	7.796745	
46	N13	-3.667181	0	-45.89683	
47	N12	29.06487	0	6.796745	
48	N11	-1.93513	0	-46.89683	
49	N10	-21.14	0	38.060553	
50	N9	-47.294698	0	38.060553	
51	N8	5.014703	0	38.060553	
52	N7	-21.14	0	83.361823	
53	N6	-27.139998	0	83.361823	
54	N5	-15.139998	0	83.361823	
55	N4	-52.139998	0	38.060553	

Node Coordinates (Continued)

	Label	X [in]	Y [in]	Z [in]	Detach From Diaphragm
56	N3	9.860002	0	38.060553	
57	N2	-52.139998	0	40.060553	
58	N1	9.860002	0	40.060553	
59	N144	-21.14	-30	21.14	
60	N145	-39.429139	-30	-10.577296	
61	N146	-2.850332	-30	-10.577296	
62	N147	-21.14	0	68.361823	
63	N148	-80.358309	0	-34.194057	
64	N149	38.072508	0	-34.204109	
65	N150	50.859997	42	-48.64683	
66	N151	2.859997	42	-48.64683	
67	N152	-45.140003	42	-48.64683	
68	N153	-93.140003	42	-48.64683	
69	N154	-99.259957	42	-38.053611	
70	N155	-75.259957	42	3.515608	
71	N156	-51.259958	42	45.084828	
72	N157	-27.259957	42	86.654047	
73	N158	-15.019907	42	86.653819	
74	N159	8.980094	42	45.084599	
75	N160	32.980094	42	3.51538	
76	N161	56.980093	42	-38.053839	
77	N162	54.080415	42	-33.031448	
78	N163	-12.124453	42	81.638747	
79	N164	-30.155543	42	81.638747	
80	N165	-96.36041	42	-33.031448	
81	N166	-87.344866	42	-48.64683	
82	N167	45.06487	42	-48.64683	
83	N95	50.859997	-54	-48.64683	
84	N96	2.859997	-54	-48.64683	
85	N97	-45.140003	-54	-48.64683	
86	N98	-93.140003	-54	-48.64683	
87	N99	-99.259958	-54	-38.053611	
88	N100	-75.259958	-54	3.515608	
89	N101	-51.259958	-54	45.084827	
90	N102	-27.259958	-54	86.654047	
91	N103	-15.019907	-54	86.653819	
92	N104	8.980093	-54	45.084599	
93	N105	32.980093	-54	3.51538	
94	N106	56.980093	-54	-38.053839	

Node Boundary Conditions

	Node 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	N56	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N10						
3	N55	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N57	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N144	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N145	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
7	N146	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e5°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	58	1.2
3	A992	29000	11154	0.3	0.65	0.49	50	1.1	58	1.2
4	A500 Gr.42	29000	11154	0.3	0.65	0.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	0.3	0.65	0.49	46	1.2	58	1.1
6	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.5	58	1.2
7	Q235	29000	11154	0.3	0.65	0.49	34	1.5	58	1.2
8	J429-Gr5	29000	11154	0.3	0.65	0.49	92	1.5	120	1.2
9	A500 Gr.B RECT	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(in, %)]
1	M66	Y	-0.044	%50
2	M74	Y	-0.044	%50
3	M70	Y	-0.044	%50
4	M65	Y	-0.051	%50
5	M73	Y	-0.051	%50
6	M69	Y	-0.051	%50
7	M64	Y	-0.058	%50
8	M72	Y	-0.058	%50
9	M68	Y	-0.058	%50
10	M66	Y	-0.075	%25
11	M74	Y	-0.075	%25
12	M70	Y	-0.075	%25
13	M65	Y	-0.079	%25
14	M73	Y	-0.079	%25
15	M69	Y	-0.079	%25
16	M64	Y	-0.019	%25
17	M72	Y	-0.019	%25
18	M68	Y	-0.019	%25
19	M63	Y	-0.032	%50

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(in, %)]
1	M66	Y	-0.198	%50
2	M74	Y	-0.198	%50
3	M70	Y	-0.198	%50
4	M65	Y	-0.198	%50
5	M73	Y	-0.198	%50
6	M69	Y	-0.198	%50
7	M64	Y	-0.099	%50
8	M72	Y	-0.099	%50
9	M68	Y	-0.099	%50
10	M66	Y	-0.075	%25
11	M74	Y	-0.075	%25
12	M70	Y	-0.075	%25
13	M65	Y	-0.075	%25
14	M73	Y	-0.075	%25
15	M69	Y	-0.075	%25
16	M64	Y	-0.034	%25
17	M72	Y	-0.034	%25
18	M68	Y	-0.034	%25

Member Point Loads (BLC 3 : Ice Load) (Continued)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(in, %)]
19	M63	Y	-0.092	%50

Member Point Loads (BLC 6 : Wind X Ice)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(in, %)]
1	M66	X	0.082	%50
2	M74	X	0.082	%50
3	M70	X	0.082	%50
4	M65	X	0.082	%50
5	M73	X	0.082	%50
6	M69	X	0.082	%50
7	M64	X	0.03	%50
8	M72	X	0.03	%50
9	M68	X	0.03	%50
10	M66	X	0.026	%25
11	M74	X	0.026	%25
12	M70	X	0.026	%25
13	M65	X	0.026	%25
14	M73	X	0.026	%25
15	M69	X	0.026	%25
16	M64	X	0.013	%25
17	M72	X	0.013	%25
18	M68	X	0.013	%25
19	M63	X	0.032	%50

Member Point Loads (BLC 7 : Wind X)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(in, %)]
1	M66	X	0.304	%50
2	M74	X	0.304	%50
3	M70	X	0.304	%50
4	M65	X	0.304	%50
5	M73	X	0.304	%50
6	M69	X	0.304	%50
7	M64	X	0.094	%50
8	M72	X	0.094	%50
9	M68	X	0.094	%50
10	M66	X	0.089	%25
11	M74	X	0.089	%25
12	M70	X	0.089	%25
13	M65	X	0.089	%25
14	M73	X	0.089	%25
15	M69	X	0.089	%25
16	M64	X	0.035	%25
17	M72	X	0.035	%25
18	M68	X	0.035	%25
19	M63	X	0.117	%50

Member Point Loads (BLC 9 : Wind Z Ice)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(in, %)]
1	M66	Z	0.119	%50
2	M74	Z	0.119	%50
3	M70	Z	0.119	%50
4	M65	Z	0.119	%50

Member Point Loads (BLC 9 : Wind Z Ice) (Continued)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(in, %)]
5	M73	Z	0.119	%50
6	M69	Z	0.119	%50
7	M64	Z	0.064	%50
8	M72	Z	0.064	%50
9	M68	Z	0.064	%50
10	M66	Z	0.035	%25
11	M74	Z	0.035	%25
12	M70	Z	0.035	%25
13	M65	Z	0.035	%25
14	M73	Z	0.035	%25
15	M69	Z	0.035	%25
16	M64	Z	0.019	%25
17	M72	Z	0.019	%25
18	M68	Z	0.019	%25
19	M63	Z	0.045	%50

Member Point Loads (BLC 10 : Wind Z)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(in, %)]
1	M66	Z	0.507	%50
2	M74	Z	0.507	%50
3	M70	Z	0.507	%50
4	M65	Z	0.507	%50
5	M73	Z	0.507	%50
6	M69	Z	0.507	%50
7	M64	Z	0.27	%50
8	M72	Z	0.27	%50
9	M68	Z	0.27	%50
10	M66	Z	0.134	%25
11	M74	Z	0.134	%25
12	M70	Z	0.134	%25
13	M65	Z	0.134	%25
14	M73	Z	0.134	%25
15	M69	Z	0.134	%25
16	M64	Z	0.061	%25
17	M72	Z	0.061	%25
18	M68	Z	0.061	%25
19	M63	Z	0.179	%50

Member Distributed Loads (BLC 6 : Wind X Ice)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/in]	End Magnitude [k/ft, F, ksf, k-ft/in]	Start Location [(in, %)]	End Location [(in, %)]
1	M41	X	-0.003	-0.003	0	%100
2	M40	X	-0.003	-0.003	0	%100
3	M42	X	-0.003	-0.003	0	%100
4	M154	X	-0.002	-0.002	0	%100
5	M155	X	-0.002	-0.002	0	%100
6	M156	X	-0.002	-0.002	0	%100
7	M66	X	-0.002	-0.002	0	12
8	M70	X	-0.002	-0.002	0	12
9	M74	X	-0.002	-0.002	0	12
10	M66	X	-0.002	-0.002	84	96
11	M70	X	-0.002	-0.002	84	96
12	M74	X	-0.002	-0.002	84	96
13	M65	X	-0.002	-0.002	0	12

Member Distributed Loads (BLC 6 : Wind X Ice) (Continued)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/in]	End Magnitude [k/ft, F, ksf, k-ft/in]	Start Location [(in, %)]	End Location [(in, %)]
14	M69	X	-0.002	-0.002	0	12
15	M73	X	-0.002	-0.002	0	12
16	M65	X	-0.002	-0.002	84	96
17	M69	X	-0.002	-0.002	84	96
18	M73	X	-0.002	-0.002	84	96
19	M68	X	-0.002	-0.002	0	33
20	M72	X	-0.002	-0.002	0	33
21	M64	X	-0.002	-0.002	0	33
22	M68	X	-0.002	-0.002	63	96
23	M72	X	-0.002	-0.002	63	96
24	M64	X	-0.002	-0.002	63	96
25	M63	X	-0.002	-0.002	0	38
26	M63	X	-0.002	-0.002	58	96
27	M67	X	-0.002	-0.002	0	%100
28	M71	X	-0.002	-0.002	0	%100
29	M139	X	-0.002	-0.002	0	%100
30	M140	X	-0.002	-0.002	0	%100
31	M141	X	-0.002	-0.002	0	%100

Member Distributed Loads (BLC 7 : Wind X)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/in]	End Magnitude [k/ft, F, ksf, k-ft/in]	Start Location [(in, %)]	End Location [(in, %)]
1	M41	X	-0.014	-0.014	0	%100
2	M40	X	-0.014	-0.014	0	%100
3	M42	X	-0.014	-0.014	0	%100
4	M154	X	-0.01	-0.01	0	%100
5	M155	X	-0.01	-0.01	0	%100
6	M156	X	-0.01	-0.01	0	%100
7	M66	X	-0.012	-0.012	0	12
8	M70	X	-0.012	-0.012	0	12
9	M74	X	-0.012	-0.012	0	12
10	M66	X	-0.012	-0.012	84	96
11	M70	X	-0.012	-0.012	84	96
12	M74	X	-0.012	-0.012	84	96
13	M65	X	-0.012	-0.012	0	12
14	M69	X	-0.012	-0.012	0	12
15	M73	X	-0.012	-0.012	0	12
16	M65	X	-0.012	-0.012	84	96
17	M69	X	-0.012	-0.012	84	96
18	M73	X	-0.012	-0.012	84	96
19	M68	X	-0.012	-0.012	0	33
20	M72	X	-0.012	-0.012	0	33
21	M64	X	-0.012	-0.012	0	33
22	M68	X	-0.012	-0.012	63	96
23	M72	X	-0.012	-0.012	63	96
24	M64	X	-0.012	-0.012	63	96
25	M63	X	-0.012	-0.012	0	38
26	M63	X	-0.012	-0.012	58	96
27	M67	X	-0.012	-0.012	0	%100
28	M71	X	-0.012	-0.012	0	%100
29	M139	X	-0.012	-0.012	0	%100
30	M140	X	-0.012	-0.012	0	%100
31	M141	X	-0.012	-0.012	0	%100

Member Distributed Loads (BLC 9 : Wind Z Ice)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/in]	End Magnitude [k/ft, F, ksf, k-ft/in]	Start Location [(in, %)]	End Location [(in, %)]
1	M41	Z	-0.003	-0.003	0	%100
2	M40	Z	-0.003	-0.003	0	%100
3	M42	Z	-0.003	-0.003	0	%100
4	M154	Z	-0.002	-0.002	0	%100
5	M155	Z	-0.002	-0.002	0	%100
6	M156	Z	-0.002	-0.002	0	%100
7	M66	Z	-0.002	-0.002	0	12
8	M70	Z	-0.002	-0.002	0	12
9	M74	Z	-0.002	-0.002	0	12
10	M66	Z	-0.002	-0.002	84	96
11	M70	Z	-0.002	-0.002	84	96
12	M74	Z	-0.002	-0.002	84	96
13	M65	Z	-0.002	-0.002	0	12
14	M69	Z	-0.002	-0.002	0	12
15	M73	Z	-0.002	-0.002	0	12
16	M65	Z	-0.002	-0.002	84	96
17	M69	Z	-0.002	-0.002	84	96
18	M73	Z	-0.002	-0.002	84	96
19	M68	Z	-0.002	-0.002	63	96
20	M72	Z	-0.002	-0.002	63	96
21	M64	Z	-0.002	-0.002	63	96
22	M68	Z	-0.002	-0.002	0	33
23	M72	Z	-0.002	-0.002	0	33
24	M64	Z	-0.002	-0.002	0	33
25	M63	Z	-0.002	-0.002	58	96
26	M63	Z	-0.002	-0.002	0	38
27	M67	Z	-0.002	-0.002	0	%100
28	M71	Z	-0.002	-0.002	0	%100
29	M139	X	-0.002	-0.002	0	%100
30	M140	X	-0.002	-0.002	0	%100
31	M141	X	-0.002	-0.002	0	%100

Member Distributed Loads (BLC 10 : Wind Z)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/in]	End Magnitude [k/ft, F, ksf, k-ft/in]	Start Location [(in, %)]	End Location [(in, %)]
1	M41	Z	-0.014	-0.014	0	%100
2	M40	Z	-0.014	-0.014	0	%100
3	M42	Z	-0.014	-0.014	0	%100
4	M154	Z	-0.01	-0.01	0	%100
5	M155	Z	-0.01	-0.01	0	%100
6	M156	Z	-0.01	-0.01	0	%100
7	M66	Z	-0.012	-0.012	0	12
8	M70	Z	-0.012	-0.012	0	12
9	M74	Z	-0.012	-0.012	0	12
10	M66	Z	-0.012	-0.012	84	96
11	M70	Z	-0.012	-0.012	84	96
12	M74	Z	-0.012	-0.012	84	96
13	M65	Z	-0.012	-0.012	0	12
14	M69	Z	-0.012	-0.012	0	12
15	M73	Z	-0.012	-0.012	0	12
16	M65	Z	-0.012	-0.012	84	96
17	M69	Z	-0.012	-0.012	84	96
18	M73	Z	-0.012	-0.012	84	96
19	M68	Z	-0.012	-0.012	0	33
20	M72	Z	-0.012	-0.012	0	33

Member Distributed Loads (BLC 10 : Wind Z) (Continued)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/in]	End Magnitude [k/ft, F, ksf, k-ft/in]	Start Location [(in, %)]	End Location [(in, %)]
21	M64	Z	-0.012	-0.012	0	33
22	M68	Z	-0.012	-0.012	63	96
23	M72	Z	-0.012	-0.012	63	96
24	M64	Z	-0.012	-0.012	63	96
25	M63	Z	-0.012	-0.012	58	96
26	M63	Z	-0.012	-0.012	0	38
27	M67	Z	-0.012	-0.012	0	%100
28	M71	Z	-0.012	-0.012	0	%100
29	M139	Z	-0.012	-0.012	0	%100
30	M140	Z	-0.012	-0.012	0	%100
31	M141	Z	-0.012	-0.012	0	%100

Basic Load Cases

	BLC Description	Category	Y Gravity	Point	Distributed
1	Self Weight	DL	-1		
2	Dead Load	DL		19	
3	Ice Load	DL		19	
4	Lm Maintainence Load	DL			
5	Lv Maintainence Load	DL			
6	Wind X Ice	WLX		19	31
7	Wind X	WLX		19	31
8	Wm Wind X	WLX			
9	Wind Z Ice	WLZ		19	31
10	Wind Z	WLZ		19	31
11	Wm Wind Z	WLZ			

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	1.4D	Yes	Y	1	1.4	2	1.4				
2	1.2D + 1.5Lv	Yes	Y	1	1.2	2	1.2	5	1.5		
3	1.2D + 1.0W (X-direction)	Yes	Y	1	1.2	2	1.2	7	1		
4	1.2D + 1.0Di + 1.0Wi (X-direction)	Yes	Y	1	1.2	2	1.2	3	1	6	1
5	1.2D + 1.5Lm +1.0Wm (X-direction)	Yes	Y	1	1.2	2	1.2	4	1.5	8	1
6	1.2D + 1.0W (Z-direction)	Yes	Y	1	1.2	2	1.2	10	1		
7	1.2D + 1.0Di + 1.0Wi (Z-direction)	Yes	Y	1	1.2	2	1.2	3	1	9	1
8	1.2D +1.5Lm + 1.0Wm (Z-direction)	Yes	Y	1	1.2	2	1.2	4	1.5		

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
0	N56	max	2.639	7	-0.212	8	1.517	4	-0.087	6	0.011	1	0.49	7
1		min	1.083	6	-0.448	4	-0.027	6	-0.202	4	-0.602	6	0.236	2
2	N55	max	-1.302	6	-0.169	3	1.65	4	-0.114	3	0.435	6	-0.205	3
3		min	-3.002	4	-0.45	7	0.333	6	-0.321	7	0.011	2	-0.418	7
4	N57	max	0.208	6	-0.153	6	-1.732	3	0.558	4	0.282	6	-0.017	6
5		min	-0.276	3	-0.496	4	-3.922	7	0.216	6	-0.408	3	-0.073	3
6	N144	max	0.007	6	2.309	4	3.742	4	0.082	4	0.027	6	0.038	3
7		min	-0.016	4	1.082	6	1.768	6	0.038	2	-0.059	3	-0.017	6
8	N145	max	-1.689	8	2.14	4	-0.981	8	-0.021	8	-0.007	8	0.055	4
9		min	-2.992	4	1.214	2	-1.755	7	-0.059	7	-0.058	6	0.011	6
10	N146	max	3.023	7	2.145	7	-0.892	3	-0.014	8	0.031	6	-0.019	6
11		min	1.56	3	1.102	3	-1.728	7	-0.034	7	-0.018	4	-0.071	4
12	Totals:	max	0.028	7	5.175	4	0	3						

Envelope Node Reactions (Continued)

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
13		min	-1.22	3	3.046	6	-3.376	6						

Envelope Node Displacements

	Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
0	NP12	max	0.003	6	-0.021	8	0.008	6	2.35e-4	7	-2.56e-5	8	1.025e-3	7
1		min	-0.002	3	-0.037	7	-0.001	3	-1.69e-4	3	-1.068e-4	6	5.155e-4	3
2	NP11	max	0.003	6	-0.063	3	0.003	6	-9.952e-5	8	-2.804e-5	8	9.603e-4	7
3		min	-0.002	3	-0.117	7	-0.003	3	-9.437e-4	6	-1.149e-4	6	4.952e-4	3
4	NP10	max	0.002	6	-0.066	3	0.004	6	-7.434e-5	3	1.495e-4	3	-3.542e-4	3
5		min	-0.002	3	-0.128	7	-0.004	3	-1.316e-3	6	1.277e-5	2	-8.294e-4	7
6	NP9	max	0.003	6	-0.023	8	0.014	6	-1.469e-5	3	6.353e-4	6	-3.925e-4	3
7		min	-0.002	3	-0.043	7	0	2	-1.061e-3	6	4.341e-5	2	-1.106e-3	7
8	NP8	max	0	8	-0.018	6	0.008	3	7.994e-4	4	6.966e-5	3	-2.887e-4	3
9		min	-0.002	6	-0.036	4	-0.001	1	3.853e-4	6	-2.733e-5	1	-8.132e-4	7
10	NP7	max	0	3	-0.067	8	0.008	3	9.693e-4	4	9.85e-5	6	2.164e-4	3
11		min	-0.002	7	-0.118	4	0	2	1.783e-4	6	-3.88e-5	4	-6.2e-4	6
12	NP6	max	0.005	3	-0.07	8	0.006	3	-5.033e-5	3	1.541e-4	3	1.13e-3	3
13		min	-0.002	7	-0.129	4	0.001	2	-6.339e-4	6	-9.909e-5	6	-2.804e-5	6
14	NP5	max	0.017	3	-0.021	6	0.012	6	-2.1e-4	3	5.727e-4	3	1.002e-3	3
15		min	-0.01	6	-0.046	4	-0.001	3	-1.007e-3	6	-4.857e-4	6	1.68e-4	6
16	NP4	max	0.016	3	-0.019	3	0.007	6	-5.272e-4	8	4.727e-4	3	1.88e-4	3
17		min	-0.006	6	-0.041	7	0	2	-9.459e-4	4	-4.382e-5	7	-3.587e-4	7
18	NP3	max	0.002	4	-0.063	6	0.008	6	-3.798e-4	8	1.254e-4	3	1.968e-4	3
19		min	-0.004	6	-0.119	4	-0.007	3	-7.367e-4	4	-1.594e-4	6	-6.053e-4	7
20	NP2	max	0.005	6	-0.065	6	0.014	6	8.151e-4	4	1.647e-5	1	7.519e-4	3
21		min	0.001	2	-0.128	4	-0.006	3	2.147e-6	6	-5.918e-5	3	9.655e-5	2
22	NP1	max	0.007	3	-0.019	3	0.01	6	1.094e-3	4	5.602e-5	7	8.796e-4	3
23		min	-0.001	6	-0.042	7	-0.004	3	1.441e-4	6	-2.782e-4	3	2.362e-4	2
24	N79	max	0	8	0	8	0	8	0	8	0	8	0	8
25		min	0	1	0	1	0	1	0	1	0	1	0	1
26	N57	max	0	3	0	4	0	7	0	6	0	3	0	3
27		min	0	6	0	6	0	3	0	4	0	6	0	6
28	N56	max	0	6	0	4	0	6	0	4	0	6	0	8
29		min	0	7	0	2	0	4	0	6	0	1	0	7
30	N55	max	0	4	0	7	0	6	0	7	0	8	0	7
31		min	0	6	0	3	0	4	0	3	0	6	0	3
32	N53	max	0.006	3	-0.024	3	0.01	6	1.496e-3	4	6.594e-5	7	9.545e-4	3
33		min	-0.002	6	-0.05	7	-0.005	3	4.525e-4	6	-2.124e-4	3	3.492e-4	2
34	N51	max	0.005	6	-0.065	6	0.014	6	7.737e-4	4	1.47e-5	1	7.231e-4	3
35		min	0.001	2	-0.129	4	-0.006	3	-5.838e-6	6	-6.282e-5	3	8.183e-5	2
36	N50	max	0.002	4	-0.063	6	0.008	6	-3.627e-4	8	1.175e-4	3	1.992e-4	3
37		min	-0.004	6	-0.12	4	-0.007	3	-7.083e-4	4	-1.681e-4	6	-6.008e-4	7
38	N48	max	0.013	3	-0.023	3	0.007	6	-7.24e-4	8	4.513e-4	3	7.764e-5	3
39		min	-0.006	6	-0.047	7	0	3	-1.294e-3	4	-4.426e-5	7	-5.223e-4	7
40	N45	max	0.014	3	-0.027	6	0.01	6	-3.985e-4	3	4.925e-4	3	1.088e-3	4
41		min	-0.008	6	-0.053	4	0	2	-1.28e-3	7	-4.341e-4	6	2.728e-4	6
42	N43	max	0.005	3	-0.071	8	0.006	3	-3.417e-5	3	1.563e-4	3	1.111e-3	3
43		min	-0.002	7	-0.13	4	0.001	2	-5.956e-4	6	-8.793e-5	6	-4.09e-5	6
44	N42	max	0	3	-0.067	8	0.008	3	9.528e-4	4	1.054e-4	6	2.292e-4	3
45		min	-0.002	7	-0.119	4	0	2	1.706e-4	6	-3.647e-5	4	-6.02e-4	6
46	N40	max	0	4	-0.023	6	0.008	3	1.103e-3	4	7.178e-5	3	-3.799e-4	3
47		min	-0.002	6	-0.043	4	-0.001	1	5.667e-4	6	-2.562e-5	1	-1.041e-3	7
48	N37	max	0.003	6	-0.027	3	0.01	6	-2.979e-5	3	4.992e-4	6	-6.946e-4	3
49		min	-0.002	3	-0.05	7	0	1	-1.013e-3	6	3.958e-5	2	-1.55e-3	7
50	N35	max	0.002	6	-0.066	3	0.004	6	-7.941e-5	3	1.378e-4	3	-3.395e-4	3

Envelope Node Displacements (Continued)

	Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
51		min	-0.002	3	-0.128	7	-0.004	3	-1.304e-3	6	1.121e-5	2	-7.819e-4	7
52	N34	max	0.003	6	-0.064	3	0.003	6	-1.055e-4	8	-2.697e-5	8	9.346e-4	7
53		min	-0.002	3	-0.118	7	-0.003	3	-9.481e-4	6	-1.117e-4	6	4.77e-4	3
54	N32	max	0.003	6	-0.025	8	0.008	6	2.627e-4	7	-2.383e-5	8	1.397e-3	7
55		min	-0.002	3	-0.043	7	-0.001	3	-2.087e-4	6	-9.554e-5	6	7.216e-4	3
56	N30	max	0	8	0.003	7	0.003	6	4.125e-5	3	1.823e-4	6	-7.757e-5	3
57		min	-0.002	6	0.001	2	0	1	-3.558e-5	6	-8.067e-6	1	-2.112e-4	7
58	N29	max	0	6	-0.057	3	0.004	6	-1.833e-3	3	7.365e-5	3	-1.177e-3	6
59		min	-0.004	3	-0.11	7	-0.001	4	-3.568e-3	7	-2.873e-4	6	-2.461e-3	4
60	N28	max	0.003	3	-0.059	8	0.004	6	3.784e-3	7	1.701e-4	3	1.603e-3	4
61		min	-0.001	7	-0.104	4	-0.001	1	2.118e-3	2	-1.752e-5	1	8.32e-4	6
62	N27	max	-0.001	8	-0.023	8	0.007	3	8.609e-4	4	2.962e-5	3	-1.116e-3	3
63		min	-0.005	3	-0.041	4	-0.001	1	4.206e-4	6	-4.709e-4	6	-2.355e-3	7
64	N26	max	0.002	6	-0.024	8	0.009	6	6.388e-4	4	-1.183e-4	8	-1.012e-3	3
65		min	-0.002	3	-0.045	7	0	1	2.611e-4	6	-1.137e-3	6	-2.169e-3	7
66	N25	max	0	8	-0.021	6	0.008	3	1.092e-3	4	5.383e-4	3	-1.226e-3	3
67		min	-0.003	6	-0.04	4	-0.001	1	5.62e-4	6	7.35e-5	2	-2.56e-3	7
68	N24	max	0.002	6	-0.068	3	0.005	6	-2.929e-4	3	-3.669e-4	8	-4.155e-4	3
69		min	-0.004	3	-0.131	7	-0.001	3	-9.554e-4	6	-1.041e-3	3	-8.934e-4	7
70	N23	max	0.003	3	-0.07	8	0.004	6	1.503e-3	4	1.26e-3	3	3.279e-4	3
71		min	-0.001	7	-0.123	4	-0.001	1	7.227e-4	6	2.318e-4	2	-1.29e-4	6
72	N22	max	0.002	6	-0.067	3	0.004	6	-2.901e-4	3	-3.234e-4	8	-4.204e-4	3
73		min	-0.003	3	-0.13	7	-0.002	3	-9.597e-4	6	-8.898e-4	3	-9.005e-4	7
74	N21	max	0.002	3	-0.069	8	0.005	3	1.512e-3	4	1.126e-3	3	3.245e-4	3
75		min	-0.002	7	-0.122	4	0	1	7.314e-4	6	2.023e-4	2	-1.442e-4	6
76	N20	max	0.001	6	0.003	7	0.002	6	1.75e-4	7	-7.814e-6	8	1.061e-4	7
77		min	0	2	0.001	3	0	1	3.429e-5	6	-1.612e-4	6	6.304e-5	2
78	N19	max	0.004	3	-0.057	6	0.004	6	3.983e-3	4	2.566e-4	3	-8.043e-4	3
79		min	-0.001	6	-0.111	4	-0.002	3	2.094e-3	6	-1.158e-4	6	-1.812e-3	7
80	N18	max	0.003	6	-0.055	3	0.001	6	-1.75e-3	3	2.976e-5	3	2.425e-3	7
81		min	0	3	-0.103	7	0	1	-3.251e-3	7	-3.465e-5	4	1.256e-3	6
82	N17	max	0.005	6	-0.022	3	0.007	6	1.532e-3	4	7.111e-4	3	1.864e-3	4
83		min	0	3	-0.042	7	-0.002	3	5.054e-4	6	-4.987e-4	6	1.062e-3	6
84	N16	max	0.005	3	-0.022	3	0.01	6	1.507e-3	4	7.909e-4	3	1.629e-3	4
85		min	-0.001	6	-0.044	7	-0.005	3	4.626e-4	6	-7.426e-4	6	9.066e-4	6
86	N15	max	0.004	6	-0.023	8	0.007	6	1.581e-3	7	3.23e-4	6	2.146e-3	7
87		min	-0.002	3	-0.04	7	-0.001	3	5.302e-4	3	7.383e-5	2	1.105e-3	3
88	N14	max	0.006	3	-0.068	6	0.004	6	1.198e-3	4	1.116e-3	3	2.063e-4	3
89		min	-0.002	6	-0.133	4	-0.002	3	4.122e-4	6	-2.772e-3	6	-1.499e-4	7
90	N13	max	0.003	6	-0.066	3	0.001	6	-4.811e-4	8	1.092e-3	3	1.158e-3	7
91		min	0	3	-0.122	7	0	4	-9.47e-4	7	-1.582e-4	6	5.713e-4	3
92	N12	max	0.005	3	-0.067	6	0.008	6	1.205e-3	4	9.332e-4	3	2.228e-4	3
93		min	0.001	2	-0.132	4	-0.004	3	4.188e-4	6	-2.504e-3	6	-1.394e-4	7
94	N11	max	0.003	6	-0.065	3	0.002	6	-4.762e-4	8	9.761e-4	3	1.172e-3	7
95		min	-0.001	3	-0.121	7	-0.001	4	-9.389e-4	7	-2.179e-4	6	5.773e-4	3
96	N10	max	0.002	3	0.003	4	0.001	7	-9.299e-5	6	1.917e-4	3	1.035e-4	3
97		min	-0.002	6	0.001	6	0	3	-1.836e-4	4	-1.214e-4	6	2.484e-5	6
98	N9	max	0.002	3	-0.061	8	0.006	3	-6.14e-5	3	2.236e-4	6	4.379e-3	4
99		min	-0.002	6	-0.112	7	0.001	2	-4.138e-4	7	1.098e-7	2	2.386e-3	2
100	N8	max	0.002	3	-0.056	6	0.007	6	-2.635e-4	8	2.116e-4	3	-2.167e-3	6
101		min	-0.002	6	-0.104	4	-0.006	3	-5.107e-4	4	-3.17e-4	6	-4.091e-3	4
102	N7	max	0.014	3	-0.023	6	0.002	6	-1.336e-3	8	2.611e-4	6	4.426e-4	3
103		min	-0.007	6	-0.045	7	0.001	3	-2.358e-3	4	-8.329e-5	4	9.077e-5	6
104	N6	max	0.014	3	-0.024	6	0.008	6	-1.28e-3	8	1.179e-3	6	5.158e-4	3
105		min	-0.007	6	-0.048	4	0	2	-2.206e-3	4	-2.199e-4	4	1.314e-4	6

Envelope Node Displacements (Continued)

	Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
106	N5	max	0.014	3	-0.022	3	0.006	6	-1.318e-3	6	1.291e-4	4	3.936e-4	3
107		min	-0.007	6	-0.044	7	0.001	2	-2.53e-3	4	-8.708e-4	6	4.76e-5	6
108	N4	max	0.002	3	-0.073	8	0.006	3	-5.48e-5	3	1.28e-3	6	1.119e-3	4
109		min	-0.002	6	-0.133	7	0.001	2	-4.643e-4	6	-4.431e-4	4	6.379e-4	2
110	N3	max	0.002	3	-0.066	6	0.008	6	-2.946e-4	8	3.675e-4	4	-5.301e-4	3
111		min	-0.002	6	-0.124	4	-0.007	3	-5.712e-4	4	-6.474e-4	6	-1.293e-3	7
112	N2	max	0.003	3	-0.072	8	0.006	3	-5.256e-5	3	1.034e-3	6	1.119e-3	4
113		min	-0.001	7	-0.132	4	0.001	2	-4.815e-4	6	-3.671e-4	4	6.379e-4	2
114	N1	max	0.002	3	-0.065	6	0.008	6	-3.037e-4	8	3.296e-4	4	-5.301e-4	3
115		min	-0.003	6	-0.123	4	-0.007	3	-5.891e-4	4	-5.424e-4	6	-1.293e-3	7
116	N144	max	0	4	0	6	0	6	0	8	0	3	0	6
117		min	0	6	0	4	0	4	0	4	0	6	0	3
118	N145	max	0	4	0	8	0	7	0	7	0	6	0	6
119		min	0	2	0	4	0	2	0	2	0	2	0	4
120	N146	max	0	3	0	3	0	7	0	7	0	4	0	4
121		min	0	7	0	7	0	3	0	2	0	6	0	6
122	N147	max	0.009	3	-0.006	3	0.002	7	1.583e-3	4	2.956e-4	3	2.888e-4	3
123		min	-0.005	6	-0.012	7	0.001	3	8.038e-4	6	-1.145e-4	6	6.933e-5	6
124	N148	max	-0.001	8	-0.006	6	0.005	6	-4.327e-4	3	1.591e-4	3	1.139e-3	4
125		min	-0.003	3	-0.01	4	-0.001	1	-1.e-3	7	-3.163e-8	1	5.814e-4	6
126	N149	max	0.004	6	-0.006	6	0.005	6	-3.199e-4	8	7.013e-5	3	-6.639e-4	3
127		min	0.001	3	-0.011	4	-0.001	3	-4.982e-4	7	-1.33e-4	6	-1.412e-3	7
128	N150	max	0.003	7	-0.021	8	0.009	7	2.642e-4	4	-9.862e-5	8	4.127e-4	3
129		min	-0.014	3	-0.037	7	-0.009	3	-3.114e-4	6	-7.148e-4	6	1.599e-4	2
130	N151	max	0.003	7	-0.063	3	-0.003	8	1.752e-5	4	6.378e-5	3	3.625e-4	4
131		min	-0.014	3	-0.117	7	-0.045	6	-1.173e-3	6	-4.804e-4	6	1.786e-4	6
132	N152	max	0.003	7	-0.066	3	-0.003	3	5.852e-5	3	2.883e-4	3	5.35e-5	3
133		min	-0.013	3	-0.127	7	-0.05	6	-1.312e-3	6	1.637e-5	2	-3.185e-4	7
134	N153	max	0.004	7	-0.023	8	0.011	3	5.075e-5	3	8.651e-4	6	1.309e-4	3
135		min	-0.013	3	-0.043	7	-0.016	6	-6.502e-4	6	1.155e-4	2	-3.365e-4	7
136	N154	max	0.012	6	-0.018	6	0.008	3	1.736e-4	3	3.299e-4	6	1.645e-4	3
137		min	-0.013	3	-0.037	4	-0.014	6	-3.59e-4	6	-3.353e-4	3	-4.824e-4	6
138	N155	max	0.019	6	-0.067	8	0.02	3	5.426e-4	3	-3.511e-5	6	7.545e-4	3
139		min	-0.034	3	-0.118	4	-0.018	6	-3.321e-4	6	-3.371e-4	3	-7.233e-4	6
140	N156	max	0.01	6	-0.07	8	0.022	3	3.19e-4	3	2.4e-4	3	1.114e-3	3
141		min	-0.037	3	-0.129	4	-0.013	6	-5.841e-4	6	-3.54e-4	6	-1.638e-4	6
142	N157	max	-0.001	8	-0.021	6	0.006	3	-4.292e-5	3	9.138e-4	3	6.763e-4	3
143		min	-0.01	3	-0.046	4	-0.004	6	-5.371e-4	6	-2.762e-4	6	-7.189e-5	6
144	N158	max	-0.002	8	-0.019	3	0	7	-1.914e-4	8	7.031e-4	3	5.976e-4	3
145		min	-0.011	3	-0.041	7	-0.006	3	-3.638e-4	6	-1.751e-4	7	-7.937e-6	6
146	N159	max	0.003	1	-0.063	6	0.006	7	-1.479e-4	8	1.989e-4	3	8.494e-4	3
147		min	-0.034	3	-0.119	4	-0.019	3	-6.043e-4	3	-1.897e-4	7	-1.375e-4	7
148	N160	max	0.007	7	-0.065	6	0.009	7	3.144e-4	4	2.77e-5	1	1.018e-3	3
149		min	-0.03	3	-0.128	4	-0.016	3	-3.653e-4	6	-2.654e-4	3	3.995e-5	2
150	N161	max	0.002	7	-0.019	3	0.007	7	2.918e-4	4	1.328e-4	1	6.768e-4	3
151		min	-0.016	3	-0.043	7	-0.008	3	-2.389e-4	6	-3.435e-4	6	1.055e-4	2
152	N162	max	0.003	7	-0.023	3	0.007	7	1.029e-3	4	1.605e-4	4	9.183e-4	3
153		min	-0.017	3	-0.047	7	-0.009	3	2.936e-4	6	-4.022e-4	6	3.928e-4	2
154	N163	max	-0.002	8	-0.021	3	0.001	7	-6.516e-4	8	7.706e-4	3	3.462e-4	3
155		min	-0.015	3	-0.045	7	-0.008	3	-1.178e-3	4	-1.876e-4	7	-1.51e-4	1
156	N164	max	-0.002	8	-0.025	6	0.009	3	-4.562e-4	3	9.867e-4	3	7.569e-4	3
157		min	-0.015	3	-0.051	4	-0.005	6	-1.11e-3	7	-2.283e-4	6	5.707e-5	6
158	N165	max	0.014	6	-0.02	6	0.009	3	7.343e-4	4	4.061e-4	6	-2.269e-4	3
159		min	-0.015	3	-0.041	4	-0.015	6	1.917e-4	6	-4.249e-4	3	-1.073e-3	7
160	N166	max	0.004	7	-0.025	3	0.01	3	8.439e-5	1	9.177e-4	6	-4.843e-4	3

Envelope Node Displacements (Continued)

	Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
161		min	-0.013	3	-0.048	7	-0.022	6	-5.682e-4	6	1.329e-4	2	-1.211e-3	7
162	N167	max	0.003	7	-0.023	8	0.007	7	5.028e-4	4	-1.067e-4	8	1.098e-3	7
163		min	-0.014	3	-0.041	7	-0.01	6	-1.868e-4	6	-8.579e-4	6	6.356e-4	2
164	N95	max	0.057	7	-0.021	8	0.009	3	4.661e-4	6	-2.56e-5	8	1.024e-3	7
165		min	0	3	-0.037	7	-0.014	7	-1.69e-4	3	-1.068e-4	6	-1.086e-4	3
166	N96	max	0.054	7	-0.063	3	0.036	6	-9.935e-5	8	-2.804e-5	8	9.571e-4	7
167		min	0.003	3	-0.117	7	0.004	2	-4.708e-4	6	-1.149e-4	6	-5.218e-5	3
168	N97	max	-0.025	8	-0.066	3	0.073	6	-7.422e-5	3	1.495e-4	3	-4.704e-4	8
169		min	-0.043	7	-0.128	7	0	3	-1.201e-3	6	1.277e-5	2	-8.253e-4	7
170	N98	max	-0.026	6	-0.023	8	0.07	6	-1.466e-5	3	6.353e-4	6	-5.341e-4	6
171		min	-0.058	7	-0.043	7	0.004	2	-9.457e-4	6	4.341e-5	2	-1.101e-3	7
172	N99	max	-0.021	8	-0.018	6	-0.022	3	1.009e-3	6	6.966e-5	3	-3.778e-4	8
173		min	-0.045	7	-0.036	4	-0.045	7	4.799e-4	2	-2.733e-5	1	-9.124e-4	3
174	N100	max	-0.009	3	-0.067	8	-0.022	6	9.66e-4	4	9.85e-5	6	-1.72e-4	8
175		min	-0.034	6	-0.118	4	-0.05	4	4.998e-4	2	-3.88e-5	4	-6.19e-4	6
176	N101	max	0.06	3	-0.07	8	0.037	6	-5.025e-5	3	1.541e-4	3	9.281e-4	3
177		min	0.001	6	-0.129	4	0.009	3	-5.931e-4	7	-9.909e-5	6	-2.8e-5	6
178	N102	max	0.065	3	-0.021	6	0.065	6	-2.097e-4	3	5.727e-4	3	8.31e-4	4
179		min	-0.001	6	-0.046	4	0.01	3	-9.157e-4	7	-4.857e-4	6	1.677e-4	6
180	N103	max	0.004	3	-0.019	3	0.052	4	-1.103e-4	6	4.727e-4	3	-1.942e-4	6
181		min	-0.022	7	-0.041	7	0.021	6	-9.433e-4	4	-4.382e-5	7	-3.695e-4	3
182	N104	max	-0.006	6	-0.063	6	0.04	4	-3.914e-5	6	1.254e-4	3	-2.347e-5	6
183		min	-0.033	7	-0.119	4	0.018	6	-7.342e-4	4	-1.594e-4	6	-6.4e-4	4
184	N105	max	0.038	3	-0.065	6	0.012	6	8.111e-4	4	1.647e-5	1	5.806e-4	6
185		min	0.007	2	-0.128	4	-0.043	4	8.429e-5	3	-5.918e-5	3	9.64e-5	2
186	N106	max	0.049	3	-0.019	3	0.001	6	1.089e-3	4	5.602e-5	7	6.781e-4	3
187		min	0.013	2	-0.042	7	-0.059	4	2.573e-4	6	-2.782e-4	3	2.359e-4	2

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

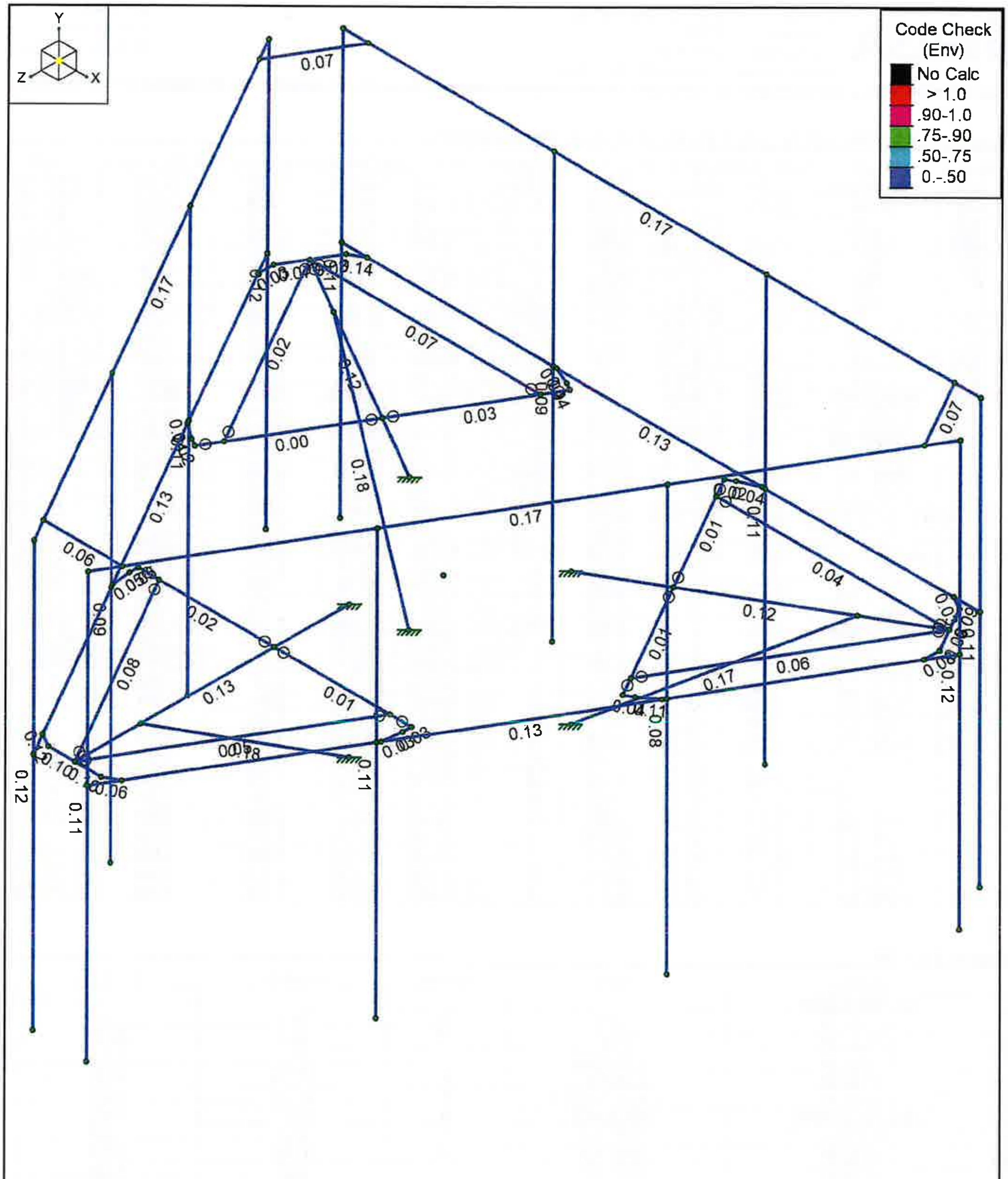
	Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-y [k-ft]	phi*Mn z-z [k-ft]	Cb	Eqn
0	M1	1/2X6	0.095	0	6	0.017	0	z	4	93.564	97.2	12.15	1.012	1.38	H1-1b
1	M2	1/2X6	0.097	0	6	0.021	0	z	4	93.564	97.2	12.15	1.012	1.512	H1-1b
2	M3	3/8X6	0.026	2	6	0.001	2	y	6	72.349	72.9	9.113	0.57	1.015	H1-1b
3	M4	3/8X6	0.028	4.366	4	0.037	4.366	y	4	70.31	72.9	9.113	0.57	1.028	H1-1b
4	M5	3/8X6	0.048	2	6	0.003	2	y	6	72.349	72.9	9.113	0.57	1.011	H1-1b
5	M6	3/8X6	0.05	4.366	6	0.035	4.366	y	6	70.31	72.9	9.113	0.57	1.029	H1-1b
6	M7	L2X2X3	0.085	26.155	6	0.009	52.309	y	7	15.646	23.393	0.558	1.062	1.136	H2-1
7	M8	L2X2X3	0.05	26.155	6	0.009	52.309	z	4	15.646	23.393	0.558	1.062	1.136	H2-1
8	M9	1/2X6	0.059	3.473	6	0.119	3.473	y	7	95.966	97.2	12.15	1.012	2.167	H1-1b
9	M10	1/2X6	0.118	3.473	6	0.104	3.473	y	4	95.966	97.2	12.15	1.012	2.153	H1-1b
10	M11	HSS4X4X4	0.13	14.907	4	0.051	14.907	y	4	133.041	139.518	16.181	16.181	1.719	H1-1b
11	M12	HSS4X4X4	0.012	5.167	6	0.019	4.844	z	6	137.881	139.518	16.181	16.181	1.123	H1-1b
12	M13	HSS4X4X4	0.022	25.833	6	0.032	31	z	6	137.881	139.518	16.181	16.181	1.123	H1-1b
13	M14	1/2X6	0.085	0	6	0.019	0	z	7	93.568	97.2	12.15	1.012	1.328	H1-1b
14	M15	1/2X6	0.084	0	6	0.025	0	z	7	93.559	97.2	12.15	1.012	1.585	H1-1b
15	M16	3/8X6	0.022	2	4	0.002	2	y	3	72.349	72.9	9.113	0.57	1.011	H1-1b
16	M17	3/8X6	0.045	4.366	3	0.036	4.366	y	4	70.31	72.9	9.113	0.57	1.078	H1-1b
17	M18	3/8X6	0.042	2	6	0.004	2	y	6	72.349	72.9	9.113	0.57	1.015	H1-1b
18	M19	3/8X6	0.106	4.366	6	0.039	4.366	y	3	70.31	72.9	9.113	0.57	1.038	H1-1b
19	M20	L2X2X3	0.056	26.156	3	0.008	52.311	y	4	15.646	23.393	0.558	1.062	1.136	H2-1
20	M21	L2X2X3	0.041	26.154	6	0.009	52.307	z	7	15.647	23.393	0.558	1.062	1.136	H2-1
21	M22	1/2X6	0.028	0	6	0.126	3.473	y	7	95.966	97.2	12.15	1.012	1.696	H1-1b
22	M23	1/2X6	0.085	3.473	3	0.083	3.473	y	7	95.966	97.2	12.15	1.012	1.92	H1-1b
23	M24	HSS4X4X4	0.121	14.915	7	0.048	14.915	y	7	133.034	139.518	16.181	16.181	1.723	H1-1b
24	M25	HSS4X4X4	0.013	5.166	6	0.014	4.843	z	7	137.882	139.518	16.181	16.181	1.122	H1-1b

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

	Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-y [k-ft]	phi*Mn z-z [k-ft]	Cb	Eqn
25	M26	HSS4X4X4	0.013	25.837	3	0.024	31.004	z	3	137.881	139.518	16.181	16.181	1.123	H1-1b
26	M27	1/2X6	0.073	0	3	0.019	0	z	4	93.577	97.2	12.15	1.012	1.337	H1-1b
27	M28	1/2X6	0.082	0	6	0.025	0	z	7	93.55	97.2	12.15	1.012	1.313	H1-1b
28	M29	3/8X6	0.025	2	4	0.002	2	y	3	72.349	72.9	9.113	0.57	1.012	H1-1b
29	M30	3/8X6	0.044	4.366	3	0.041	4.366	y	7	70.31	72.9	9.113	0.57	1.154	H1-1b
30	M31	3/8X6	0.039	2	6	0.003	2	y	6	72.349	72.9	9.113	0.57	1.025	H1-1b
31	M32	3/8X6	0.041	4.366	4	0.023	4.366	y	4	70.31	72.9	9.113	0.57	1.048	H1-1b
32	M33	L2X2X3	0.074	26.158	6	0.008	52.315	y	7	15.645	23.393	0.558	1.062	1.136	H2-1
33	M34	L2X2X3	0.02	26.152	4	0.009	52.304	z	7	15.648	23.393	0.558	1.062	1.136	H2-1
34	M35	1/2X6	0.03	0	3	0.126	3.473	y	7	95.966	97.2	12.15	1.012	1.771	H1-1b
35	M36	1/2X6	0.136	3.473	6	0.133	3.473	y	6	95.966	97.2	12.15	1.012	1.657	H1-1b
36	M37	HSS4X4X4	0.122	14.915	7	0.05	14.915	y	7	133.034	139.518	16.181	16.181	1.725	H1-1b
37	M38	HSS4X4X4	0.003	5.167	4	0.013	4.844	z	4	137.881	139.518	16.181	16.181	1.122	H1-1b
38	M39	HSS4X4X4	0.029	25.833	6	0.032	31	z	6	137.881	139.518	16.181	16.181	1.122	H1-1b
39	M40	PIPE 3.0	0.129	96	4	0.043	144		6	30.165	65.205	5.749	5.749	1	H1-1b
40	M41	PIPE 3.0	0.128	96	7	0.036	139.5		7	30.165	65.205	5.749	5.749	1	H1-1b
41	M42	PIPE 3.0	0.13	96	7	0.037	139.5		4	30.165	65.205	5.749	5.749	1	H1-1b
42	M139	LL2.5X2.5X3X0.5	0.183	55.946	4	0.005	55.946	y	4	42.397	58.472	4.246	2.174	1	H1-1b
43	M140	LL2.5X2.5X3X0.5	0.176	55.973	7	0.005	55.973	y	7	42.395	58.472	4.246	2.174	1	H1-1b
44	M141	LL2.5X2.5X3X0.5	0.167	55.972	7	0.005	55.972	y	7	42.395	58.472	4.246	2.174	1	H1-1b
45	M154	PIPE 2.0	0.17	96	7	0.042	0		7	6.831	32.13	1.872	1.872	1	H1-1b
46	M155	PIPE 2.0	0.169	96	4	0.047	0		4	6.831	32.13	1.872	1.872	1	H1-1b
47	M156	PIPE 2.0	0.166	96	4	0.048	0		4	6.831	32.13	1.872	1.872	1	H1-1b
48	M157	L2.5X2.5X4	0.059	0	7	0.006	18.031	z	3	35.818	38.556	1.114	2.537	1.111	H2-1
49	M158	L2.5X2.5X4	0.073	0	4	0.007	18.031	z	6	35.818	38.556	1.114	2.537	1.336	H2-1
50	M159	L2.5X2.5X4	0.071	0	7	0.006	0	y	3	35.818	38.556	1.114	2.537	1.399	H2-1
51	M63	PIPE 2.5	0.109	42	4	0.014	0		7	30.038	50.715	3.596	3.596	1	H1-1b
52	M64	PIPE 2.5	0.108	42	4	0.021	42		6	30.038	50.715	3.596	3.596	1	H1-1b
53	M65	PIPE 2.5	0.084	42	4	0.033	42		6	30.038	50.715	3.596	3.596	1	H1-1b
54	M66	PIPE 2.5	0.116	42	4	0.038	42		6	30.038	50.715	3.596	3.596	1	H1-1b
55	M67	PIPE 2.5	0.111	42	7	0.02	42		6	30.038	50.715	3.596	3.596	1	H1-1b
56	M68	PIPE 2.5	0.108	42	7	0.023	42		6	30.038	50.715	3.596	3.596	1	H1-1b
57	M69	PIPE 2.5	0.087	42	7	0.037	42		6	30.038	50.715	3.596	3.596	1	H1-1b
58	M70	PIPE 2.5	0.114	42	7	0.037	42		6	30.038	50.715	3.596	3.596	1	H1-1b
59	M71	PIPE 2.5	0.115	42	7	0.018	42		3	30.038	50.715	3.596	3.596	1	H1-1b
60	M72	PIPE 2.5	0.107	42	4	0.018	42		6	30.038	50.715	3.596	3.596	1	H1-1b
61	M73	PIPE 2.5	0.088	42	7	0.038	42		6	30.038	50.715	3.596	3.596	1	H1-1b
62	M74	PIPE 2.5	0.119	42	7	0.037	42		6	30.038	50.715	3.596	3.596	1	H1-1b

Material Take-Off

	Material	Size	Pieces	Length[in]	Weight[K]
0	Hot Rolled Steel				
1	A36 Gr.36	1/2X6	12	56.8	0.048
2	A36 Gr.36	3/8X6	12	38.2	0.024
3	A36 Gr.36	L2.5X2.5X4	3	54.1	0.018
4	A36 Gr.36	L2X2X3	6	313.9	0.064
5	A36 Gr.36	LL2.5X2.5X3X0.5	3	167.9	0.086
6	A500 Gr.B RECT	HSS4X4X4	9	372.7	0.383
7	A53 Gr.B	PIPE 2.0	3	432	0.125
8	A53 Gr.B	PIPE 2.5	12	1152	0.526
9	A53 Gr.B	PIPE 3.0	3	432	0.254
10	Total HR Steel		63	3019.6	1.529



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

RISA	Centek Engineering	Antenna Platform Mount	SK-3
	CMT		Apr 02, 2024 at 09:53 AM
	24018.01	Unity Check	Proposed Mount Check.r3d

Antenna Mount Connection:

Anchor Data:

A325-Bolt =

Number of Anchor Bolts = $N := 4$ (User Input)

Diameter of Bolts = $D := 0.625 \cdot in$ (User Input)

Bolt Spacing Horz = $Sp_H := 6 \cdot in$ (User Input)

Bolt Spacing Vertical = $Sp_V := 6 \cdot in$ (User Input)

Design Tension = $T_n := 20.7 \cdot kip$ (User Input)

Design Shear = $V_n := 12.4 \cdot kip$ (User Input)

Design Reactions:

Force X = $F_x := 3.023 \cdot kip$ (User Input)

Force Y = $F_y := 2.309 \cdot kip$ (User Input)

Force Z = $F_z := 3.922 \cdot kip$ (User Input)

Moment X = $Mx := 0.558 \cdot ft \cdot kip$ (User Input)

Moment Y = $My := 0.602 \cdot ft \cdot kip$ (User Input)

Moment Z = $Mz := 0.049 \cdot ft \cdot kip$ (User Input)

Anchor Check:

Max Tension Force = $T_{Max} := \frac{F_z}{N} + \frac{Mx}{Sp_V \cdot \frac{N}{2}} + \frac{My}{Sp_H \cdot \frac{N}{2}} = 2.14\ kip$

Max Shear Force = $V_{Max} := \frac{F_x + F_y}{N} + \frac{Mz}{Sp_V \cdot \frac{N}{2}} = 1.38\ kip$

Condition 1 = $Condition1 := \text{if}\left(\frac{T_{Max}}{T_n} + \frac{V_{Max}}{V_n} \le 1.0, \text{"OK"}, \text{"NG"}\right) = \text{"OK"}$

% of Capacity = $\max\left(\frac{T_{Max}}{T_n}, \frac{V_{Max}}{V_n}, \left(\frac{\frac{T_{Max}}{T_n} + \frac{V_{Max}}{V_n}}{1.0}\right)\right) = 21.5\%$

verizon NPP RFDS

NORTHEAST > North East > New England > Windsor-3 > SOUTH WINDSOR 4 CT

Brauer, Mark - mark.brauer2@verizonwireless.com - 20240307_153358

Project Details		Location Information	
Carrier Aggregation	N	Site Id	617416761
Ecip	N	Search Ring#	
Project Name	SOUTH WINDSOR 4 CT	E-NodeB ID#	null
Project Alt Name	SOUTH WINDSOR 4 CT - MKT 68 - MCR	PSLC#	0
Project Id	17130359	Switch Name	Windsor-3
Designed Sector Carrier 4G	15	Tower Type	
Designed Sector Carrier 5G	6	Site Type	MACRO
Additional Sector Carrier 4G	0	Street Address	575 Pleasant Valley Road
Additional Sector Carrier 5G	0	City	South Windsor
Suffix		State	CT
FP Solution Type & Tech Type	MCR;4G_700;5G_850;4G_850;4G_AWS;4G_CBRS;5G_L-Sub6;4G_PCS	Zip Code	06074
		County	Hartford
		Latitude	41.813612/ 41° 48' 49.003"
		Longitude	-72.600687/ 72° 36' 2.473"

Project Scope

New build SOUTH WINDSOR 4 CT
Update - 03/07/2024 - height change from 120' to 130' as dish is not moving forward per RE.

Antenna Summary

Added Antenna

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Center line	Tip Height	Azimuth	Install Type	Quantit
					5G	Samsung	MT6413-77A	130	131.2	0(A),120(B),250(C)	PHYSICAL	3
LTE	5G,LTE	LTE				COMMSCOPE	NHH-65B-R2B	130	133	0(A),120(B),250(C),0(73)	PHYSICAL	3
			LTE	LTE		COMMSCOPE	NHHSS-65B-R2BT4	130	133	0(A),120(B),250(C)	PHYSICAL	3

Removed Antenna

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Center line	Tip Height	Azimuth	Install Type	Quantit

Retained Antenna

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Center line	Tip Height	Azimuth	Install Type	Quantit

Added: 9	Removed: 0	Retained: 0

Non Antenna Summary

Added Non Antenna

Equipment Type	Location	700	850	1900	AWS	CBRS	Make	Model	Install Type	Quantity
OVP	Tower							12 OVP	PHYSICAL	1
Hybrid Cable	Tower						TBD	6 X 12	PHYSICAL	2
RRU	Tower			LTE	LTE		Samsung	B2/B66A RRH ORAN (RF4439d-25A)	PHYSICAL	3
RRU	Tower	LTE	5G,LTE				Samsung	RF4461d-13A	PHYSICAL	3
RRU	Tower					LTE	Samsung	RT4423-48A	PHYSICAL	3

Removed Non Antenna

Equipment Type	Location	700	850	1900	AWS	CBRS	Make	Model	Install Type	Quantity

Retained Non Antenna

Equipment Type	Location	700	850	1900	AWS	CBRS	Make	Model	Install Type	Quantity

Added: 12	Removed: 0	Retained: 0

Services

700 LTE	0002 (8881368)		
Sector	01	02	03
Azimuth	0	120	250
Cell/Enodeb-Id	068511	068511	068511
Antenna Model	NHH-65B-R2B	NHH-65B-R2B	NHH-65B-R2B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	130	130	130
DLEARFCN	5230	5230	5230
Mech Down-tilt	0	0	0
Elect Down-tilt	0	0	0
Tip Height	133	133	133
Regulatory Power	111.11 (W/MHz) ERP	111.11 (W/MHz) ERP	111.11 (W/MHz) ERP
Transmitter Max Power	47.8 dBm	47.8 dBm	47.8 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx,Rx	2 , 4	2 , 4	2 , 4
Operational Port Count	0	0	0
Position	3,4	3,4	3,4
Transmitter Id	20856386	20856390	20856394
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10	10	10
Ant. Dimensions H x W x D(inch)	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1
Weight(lb)	43.7	43.7	43.7

Services

850 LTE	0002 (8881368)		
Sector	01	02	03
Azimuth	0	120	250
Cell/Enodeb-Id	068511	068511	068511
Antenna Model	NHH-65B-R2B	NHH-65B-R2B	NHH-65B-R2B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	130	130	130
DLEARFCN	2450	2450	2450
Mech Down-tilt	0	0	0
Elect Down-tilt	0	0	0
Tip Height	133	133	133
Regulatory Power	240.32 (W/MHz) ERPSD	240.32 (W/MHz) ERPSD	240.32 (W/MHz) ERPSD
Transmitter Max Power	47.8 dBm	47.8 dBm	47.8 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx,Rx	2 , 4	2 , 4	2 , 4
Operational Port Count	0	0	0
Position	3,4	3,4	3,4
Transmitter Id	20856389	20856393	20856397
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10	10	10
Ant. Dimensions H x W x D(inch)	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1
Weight(lb)	43.7	43.7	43.7

Services

850 NR	0002 (8881368)		
Sector	0073	0074	0075
Azimuth	0	120	250
Cell/Enodeb-Id	0689511	0689511	0689511
Antenna Model	NHH-65B-R2B	NHH-65B-R2B	NHH-65B-R2B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	130	130	130
DLEARFCN	2450	2450	2450
Mech Down-tilt	0	0	0
Elect Down-tilt	0	0	0
Tip Height	133	133	133
Regulatory Power	240.32 (W/MHz) ERPSD	240.32 (W/MHz) ERPSD	240.32 (W/MHz) ERPSD
Transmitter Max Power	47.8 dBm	47.8 dBm	47.8 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx,Rx	2 , 4	2 , 4	2 , 4
Operational Port Count	0	0	0
Position	3,4	3,4	3,4
Transmitter Id	20856389	20856393	20856397
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10	10	10
Ant. Dimensions H x W x D(inch)	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1
Weight(lb)	43.7	43.7	43.7

Services

1900 LTE		0002 (8881368)	
Sector	01	02	03
Azimuth	0	120	250
Cell/Enodeb-Id	068511	068511	068511
Antenna Model	NHH-65B-R2B	NHH-65B-R2B	NHH-65B-R2B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	130	130	130
DLEARFCN	1050	1050	1050
Mech Down-tilt	0	0	0
Elect Down-tilt	0	0	0
Tip Height	133	133	133
Regulatory Power	385.26 (W/MHz) EIRP	182.29 (W/MHz) EIRP	182.29 (W/MHz) EIRP
Transmitter Max Power	47.8 dBm	47.8 dBm	47.8 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx,Rx	2 , 4	2 , 4	2 , 4
Operational Port Count	0	0	0
Position	4	4	4
Transmitter Id	20856387	20856391	20856395
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10	10	10
Ant. Dimensions H x W x D(inch)	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1
Weight(lb)	43.7	43.7	43.7

Services

AWS LTE	0002 (8881368)		
Sector	01	02	03
Azimuth	0	120	250
Cell/Enodeb-Id	068511	068511	068511
Antenna Model	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	130	130	130
DLEARFCN	2050	2050	2050
Mech Down-tilt	0	0	0
Elect Down-tilt	0	0	0
Tip Height	133	133	133
Regulatory Power	210.25 (W/MHz) EIRP	210.25 (W/MHz) EIRP	210.25 (W/MHz) EIRP
Transmitter Max Power	47.8 dBm	47.8 dBm	47.8 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx,Rx	2 , 4	2 , 4	2 , 4
Operational Port Count	0	0	0
Position	3	3	3
Transmitter Id	20856388	20856392	20856396
Source	VZNPP	VZNPP	VZNPP
Bandwidth	20	20	20
Ant. Dimensions H x W x D(inch)	72.0 x 11.8 x 7.1	72.0 x 11.8 x 7.1	72.0 x 11.8 x 7.1
Weight(lb)	50.9	50.9	50.9

Services

CBRS LTE		0002 (8881368)	
Sector	19	20	21
Azimuth	0	120	250
Cell/Enodeb-Id	068511	068511	068511
Antenna Model	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	130	130	130
DLEARFCN	55790, 55941	55790, 55941	55790, 55941
Mech Down-tilt	0	0	0
Elect Down-tilt	4	4	4
Tip Height	133	133	133
Regulatory Power	16.89 (W/MHz) EIRPSD, 16.89 (W/MHz) EIRPSD	16.89 (W/MHz) EIRPSD, 16.89 (W/MHz) EIRPSD	16.89 (W/MHz) EIRPSD, 16.89 (W/MHz) EIRPSD
Transmitter Max Power	34.01 dBm	34.01 dBm	34.01 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RT4423-48A	RT4423-48A	RT4423-48A
Number of Tx,Rx	4 , 4	4 , 4	4 , 4
Operational Port Count	0	0	0
Position	3	3	3
Transmitter Id	20856398	20856399	20856400
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10, 20	10, 20	10, 20
Ant. Dimensions H x W x D(inch)	72.0 x 11.8 x 7.1	72.0 x 11.8 x 7.1	72.0 x 11.8 x 7.1
Weight(lb)	50.9	50.9	50.9

Services

CBAND NR	0002 (8881368)		
Sector	0073	0074	0075
Azimuth	0	120	250
Cell/Enodeb-Id	0689552	0689552	0689552
Antenna Model	MT6413-77A	MT6413-77A	MT6413-77A
Antenna Make	Samsung	Samsung	Samsung
Centerline	130	130	130
DLEARFCN	650006, 655324	650006, 655324	650006, 655324
Mech Down-tilt	0	0	0
Elect Down-tilt	1	1	1
Tip Height	131.2	131.2	131.2
Regulatory Power	1170.73 (W/MHz) EIRP, 1549.91 (W/MHz) EIRP	1170.73 (W/MHz) EIRP, 1549.91 (W/MHz) EIRP	1170.73 (W/MHz) EIRP, 1549.91 (W/MHz) EIRP
Transmitter Max Power	54.49 dBm	54.49 dBm	54.49 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	MT6413-77A	MT6413-77A	MT6413-77A
Number of Tx,Rx	2 , 2	2 , 2	2 , 2
Operational Port Count	64	64	64
Position	2	2	2
Transmitter Id	20856401	20856402	20856403
Source	VZNPP	VZNPP	VZNPP
Bandwidth	100, 60	100, 60	100, 60
Ant. Dimensions H x W x D(inch)	29.53 x 15.75 x 5.51	29.53 x 15.75 x 5.51	29.53 x 15.75 x 5.51
Weight(lb)	55.1	55.1	55.1

Callsigns Per Antenna

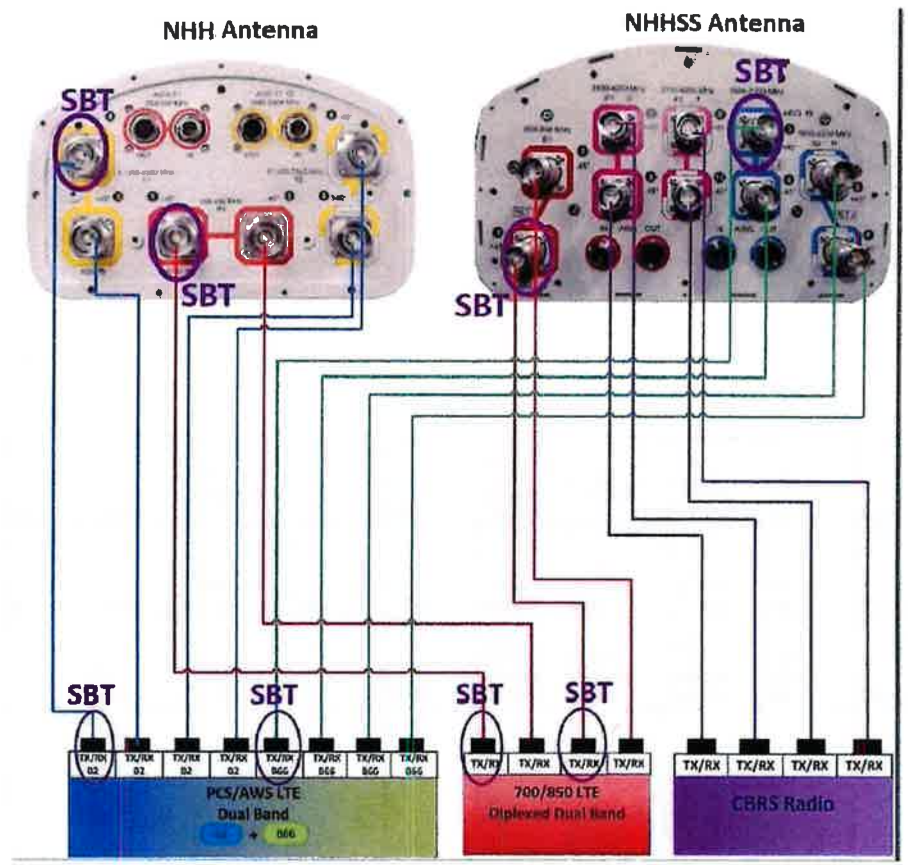
Sector	Make	Model	Ant CL Height AG	Ant Tip Height	Azimuth	Elect Down-tilt	Mech Down-tilt	Gain	Bandwidth	Regulatory Power	700	850	1900	2100	28 GHz	31 GHz	39 GHz	LSub-6	CBRS
01	COMMSCOPE	NHH-65B-R2	130	133	0	0	0	12.25	66	111.11	WQJQ689								
02	COMMSCOPE	NHH-65B-R2	130	133	120	0	0	12.25	66	111.11	WQJQ689								
03	COMMSCOPE	NHH-65B-R2	130	133	250	0	0	12.25	66	111.11	WQJQ689								
0073	COMMSCOPE	NHH-65B-R2	130	133	0	0	0	12.74	59	240.32		KNKA404							
0074	COMMSCOPE	NHH-65B-R2	130	133	120	0	0	12.74	59	240.32		KNKA404							
0075	COMMSCOPE	NHH-65B-R2	130	133	250	0	0	12.74	59	240.32		KNKA404							
01	COMMSCOPE	NHH-65B-R2	130	133	0	0	0	12.74	59	240.32		KNKA404							
02	COMMSCOPE	NHH-65B-R2	130	133	120	0	0	12.74	59	240.32		KNKA404							
03	COMMSCOPE	NHH-65B-R2	130	133	250	0	0	12.74	59	240.32		KNKA404							
01	COMMSCOPE	NHH-65B-R2	130	133	0	0	0	15.4	68	385.26			KNLH251,WPOJ730						
02	COMMSCOPE	NHH-65B-R2	130	133	120	0	0	12.25	66	182.29			KNLH251,WPOJ730						
03	COMMSCOPE	NHH-65B-R2	130	133	250	0	0	12.25	66	182.29			KNLH251,WPOJ730						
01	COMMSCOPE	NHHSS-65B-R2BT4	130	133	0	0	0	15.79	62	210.25				WQGA906,WQGB276					
02	COMMSCOPE	NHHSS-65B-R2BT4	130	133	120	0	0	15.79	62	210.25				WQGA906,WQGB276					
03	COMMSCOPE	NHHSS-65B-R2BT4	130	133	250	0	0	15.79	62	210.25				WQGA906,WQGB276					
0073	Samsung	MT6413-77A	130	131.2	0	1	0	23.15	105	1170.73								WRNE581,WRNE582,WRNE583,WRNE584,WRNE585	
0074	Samsung	MT6413-77A	130	131.2	120	1	0	23.15	105	1170.73								WRNE581,WRNE582,WRNE583,WRNE584,WRNE585	
0075	Samsung	MT6413-77A	130	131.2	250	1	0	23.15	105	1170.73								WRNE581,WRNE582,WRNE583,WRNE584,WRNE585	
0073	Samsung	MT6413-77A	130	131.2	0	1	0	23.15	105	1549.91								WRNE585,WRNE586,WRNE587,WRNE58	
0074	Samsung	MT6413-77A	130	131.2	120	1	0	23.15	105	1549.91								WRNE585,WRNE586,WRNE587,WRNE58	
0075	Samsung	MT6413-77A	130	131.2	250	1	0	23.15	105	1549.91								WRNE585,WRNE586,WRNE587,WRNE58	
19	COMMSCOPE	NHHSS-65B-R2BT4	130	133	0	4	0	14.61	64	16.89									CBRS_CALLSIGN,WRLD513,WRLD514,WRLD515
19	COMMSCOPE	NHHSS-65B-R2BT4	130	133	0	4	0	14.61	64	16.89									CBRS_CALLSIGN,WRLD513,WRLD514,WRLD515

20	COMMSCOPE	NHHSS-65B-R2BT4	130	133	120	4	0	14.61	64	16.89									CBRS_CALLSIGN,WRLD513,WRLD514,WRLD515
20	COMMSCOPE	NHHSS-65B-R2BT4	130	133	120	4	0	14.61	64	16.89									CBRS_CALLSIGN,WRLD513,WRLD514,WRLD515
21	COMMSCOPE	NHHSS-65B-R2BT4	130	133	250	4	0	14.61	64	16.89									CBRS_CALLSIGN,WRLD513,WRLD514,WRLD515
21	COMMSCOPE	NHHSS-65B-R2BT4	130	133	250	4	0	14.61	64	16.89									CBRS_CALLSIGN,WRLD513,WRLD514,WRLD515

Callsigns

Callsign	Market	Radio Code	Market #	Block	State	County	License Name	Wholly Owner	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs/Sq. mil	Status	Action	Approve for Inavc
WQJQ689	Northeast	WU	REA001	C	CT	9003	Cellco Partnership	Yes	22.000	746.000 - 757.000/.000 - .000	776.000 - 787.000/.000 - .000	746.000 - 757.000/.000 - .000	776.000 - 787.000/.000 - .000	111.11	1000	1223.64	proposed	added	1
KNKA404	Hartford-New Britain-Bristol, CT	CL	CMA032	A	CT	9003	Cellco Partnership	Yes	25.000	824.000 - 835.000/845.000 - 846.500	869.000 - 880.000/890.000 - 891.500	824.000 - 835.000/845.000 - 846.500	869.000 - 880.000/890.000 - 891.500	240.32	400	1223.64	proposed	added	1
WPOJ730	Hartford, CT	CW	BTA184	C	CT	9003	Cellco Partnership	Yes	10.000	1895.000 1900.000/.000 - .000	1975.000 1980.000/.000 - .000	1895.000 1900.000/.000 - .000	1975.000 1980.000/.000 - .000	385.26	1640	1223.64	proposed	added	1
KNLH251	Hartford, CT	CW	BTA184	F	CT	9003	Cellco Partnership	Yes	10.000	1890.000 1895.000/.000 - .000	1970.000 1975.000/.000 - .000	1890.000 1895.000/.000 - .000	1970.000 1975.000/.000 - .000	385.26	1640	1223.64	proposed	added	1
CBRS_CALL SIGN	UNLICENSE	3.5 GHz	UNLICENSE	UNLICENSE	CT	UNLICENSE	UNLICENSE	UNLICENSE	UNLICENSE	UNLICENSED - UNLICENSED/UNLICENSED - UNLICENSE	UNLICENSED - UNLICENSED/UNLICENSED - UNLICENSE	- / -	- / -	16.89		1223.64	proposed	added	
WRLD514	D09003 - Hartford, CT	PL	D09003	0	CT	9003	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000 3650.000/.000 - .000	.000 - .000/.000 - .000	3550.000 3650.000/.000 - .000	.000 - .000/.000 - .000	16.89	501	1223.64	proposed	added	1
WRLD515	D09003 - Hartford, CT	PL	D09003	0	CT	9003	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000 3650.000/.000 - .000	.000 - .000/.000 - .000	3550.000 3650.000/.000 - .000	.000 - .000/.000 - .000	16.89	501	1223.64	proposed	added	1
WRLD513	D09003 - Hartford, CT	PL	D09003	0	CT	9003	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000 3650.000/.000 - .000	.000 - .000/.000 - .000	3550.000 3650.000/.000 - .000	.000 - .000/.000 - .000	16.89	501	1223.64	proposed	added	1
WQGB276	Hartford-New Britain-Bristol, CT	AW	CMA032	A	CT	9003	Cellco Partnership	Yes	20.000	1710.000 1720.000/.000 - .000	2110.000 2120.000/.000 - .000	1710.000 1720.000/.000 - .000	2110.000 2120.000/.000 - .000	210.25	1640	1223.64	proposed	added	1
WRNE581	New York, NY	PM	PEA001	A1	CT	9003	Cellco Partnership	Yes	20.000	3700.000 3720.000/.000 - .000	.000 - .000/.000 - .000	3700.000 3720.000/.000 - .000	.000 - .000/.000 - .000	1170.73	1640	1223.64	proposed	added	1
WRNE582	New York, NY	PM	PEA001	A2	CT	9003	Cellco Partnership	Yes	20.000	3720.000 3740.000/.000 - .000	.000 - .000/.000 - .000	3720.000 3740.000/.000 - .000	.000 - .000/.000 - .000	1170.73	1640	1223.64	proposed	added	1

WRNE583	New York, NY	PM	PEA001	A3	CT	9003	Cellco Partnership	Yes	20.000	3740.000 3760.000/ .000 - .000	.000 - .000/.000 - .000	3740.000 3760.000/ .000 - .000	.000 - .000/.000 - .000	1170.73	1640	1223.64	proposed	added	1
WRNE584	New York, NY	PM	PEA001	A4	CT	9003	Cellco Partnership	Yes	20.000	3760.000 3780.000/ .000 - .000	.000 - .000/.000 - .000	3760.000 3780.000/ .000 - .000	.000 - .000/.000 - .000	1170.73	1640	1223.64	proposed	added	1
WRNE585	New York, NY	PM	PEA001	A5	CT	9003	Cellco Partnership	Yes	20.000	3780.000 3800.000/ .000 - .000	.000 - .000/.000 - .000	3780.000 3800.000/ .000 - .000	.000 - .000/.000 - .000	1549.91	1640	1223.64	proposed	added	1
WQGA906	New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-	AW	BEA010	B	CT	9003	Cellco Partnership	Yes	20.000	1720.000 1730.000/ .000 - .000	2120.000 2130.000/ .000 - .000	1720.000 1730.000/ .000 - .000	2120.000 2130.000/ .000 - .000	210.25	1640	1223.64	proposed	added	1
WRNE586	New York, NY	PM	PEA001	B1	CT	9003	Cellco Partnership	Yes	20.000	3800.000 3820.000/ .000 - .000	.000 - .000/.000 - .000	3800.000 3820.000/ .000 - .000	.000 - .000/.000 - .000	1549.91	1640	1223.64	proposed	added	1
WRNE587	New York, NY	PM	PEA001	B2	CT	9003	Cellco Partnership	Yes	20.000	3820.000 3840.000/ .000 - .000	.000 - .000/.000 - .000	3820.000 3840.000/ .000 - .000	.000 - .000/.000 - .000	1549.91	1640	1223.64	proposed	added	1
WRNE588	New York, NY	PM	PEA001	B3	CT	9003	Cellco Partnership	Yes	20.000	3840.000 3860.000/ .000 - .000	.000 - .000/.000 - .000	3840.000 3860.000/ .000 - .000	.000 - .000/.000 - .000	1549.91	1640	1223.64	proposed	added	1


NHH Antenna
NHHSS Antenna
SBT
SBT
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TX/RX 02
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TX/RX 02
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TX/RX 866
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PCS/AWS LTE
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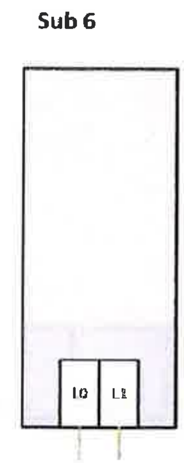
CBRS Radio


Sub 6

ATTACHMENT 6

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Calculated Radio Frequency Emissions Report

South Windsor 4

575 Pleasant Valley Road, South Windsor, CT

April 29, 2024

Table of Contents

List of Figures

List of Tables

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed installation of Verizon's antenna arrays mounted on a monopole located at 575 Pleasant Valley Road in South Windsor, CT. The coordinates of the building are 41° 48' 49.00" N, 72° 36' 02.47" W.

Verizon is proposing the following:

1) Install nine (9) multi-band antennas, three (4) per sector to support its commercial LTE and 5G network.

This report considers the planned antenna configuration for Verizon[1] to derive the resulting % MPE of its proposed installation.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment C of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment C contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

[1] As referenced to Verizon's Radio Frequency Design Sheet updated 3/7/2024.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{\text{GRF}^2 \times 1.64 \times \text{ERP}}{4\pi \times R^2}\right) \text{X Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Off Beam Loss is determined by the selected antenna patterns

Ground reflection factor (GRF) of 1.6

These calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not take into account actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the final installations.

4. Antenna Inventory

Table 1 below outlines Verizon's proposed antenna configuration for the site. The associated data sheets and antenna patterns for these specific antenna models are included in Attachments C.

Operator	Sector / Azimuth	TX Freq (MHz)	Power at Antenna (Watts)	Ant Gain (dBi)	Power EIRP (Watts)	Antenna Model	Beam Width	Mech Tilt	Length (ft)	Antenna Centerline Height (ft)
Verizon	Alpha / 0°	750	160	14.9	4944	NHH-65B-R2B	65	0	6	130
		850	160	15	5060		60			
		1900	160	17.9	9866		69			
		2100	240	18.0	15143	NHHSS-65B-R2BT4	64	0	6	130
		3500	4	17.7	236		54	0		
		3700	320	25.5	113540	MT6413-77A	-	0	3.42	130
	Beta 120°	750	160	14.9	4944	NHH-65B-R2B	65	0	6	130
		850	160	15	5060		60			
		1900	160	17.9	9866		69			
		2100	240	18.0	15143	NHHSS-65B-R2BT4	64	0	6	130
		3500	4	17.7	236		54	0		
		3700	320	25.5	113540	MT6413-77A	-	0	3.42	130
	Gamma 250°	750	160	14.9	4944	NHH-65B-R2B	65	0	6	130
		850	160	15	5060		60			
		1900	160	17.9	9866		69			
		2100	240	18.0	15143	NHHSS-65B-R2BT4	64	0	6	130
		3500	4	17.7	236		54	0		
		3700	320	25.5	113540	MT6413-77A	-	0	3.42	130

Table 1: Proposed Antenna Inventory[2,3]

[2] Antenna heights are in reference to Verizon's Radio Frequency Design Sheet updated 3/7/2024.

[3] Transmit power assumes 0 dB of cable loss.

5. Calculation Results

The calculated power density results are shown in Figure 1 below. For completeness, the calculations for this analysis range from 0 feet horizontal distance (directly below the antennas) to a value of 3,000 feet horizontal distance from the site. In addition to the other worst-case scenario considerations that were previously mentioned, the power density calculations to each horizontal distance point away from the antennas was completed using a local maximum off beam antenna gain (within ± 5 degrees of the true mathematical angle) to incorporate a realistic worst-case scenario.

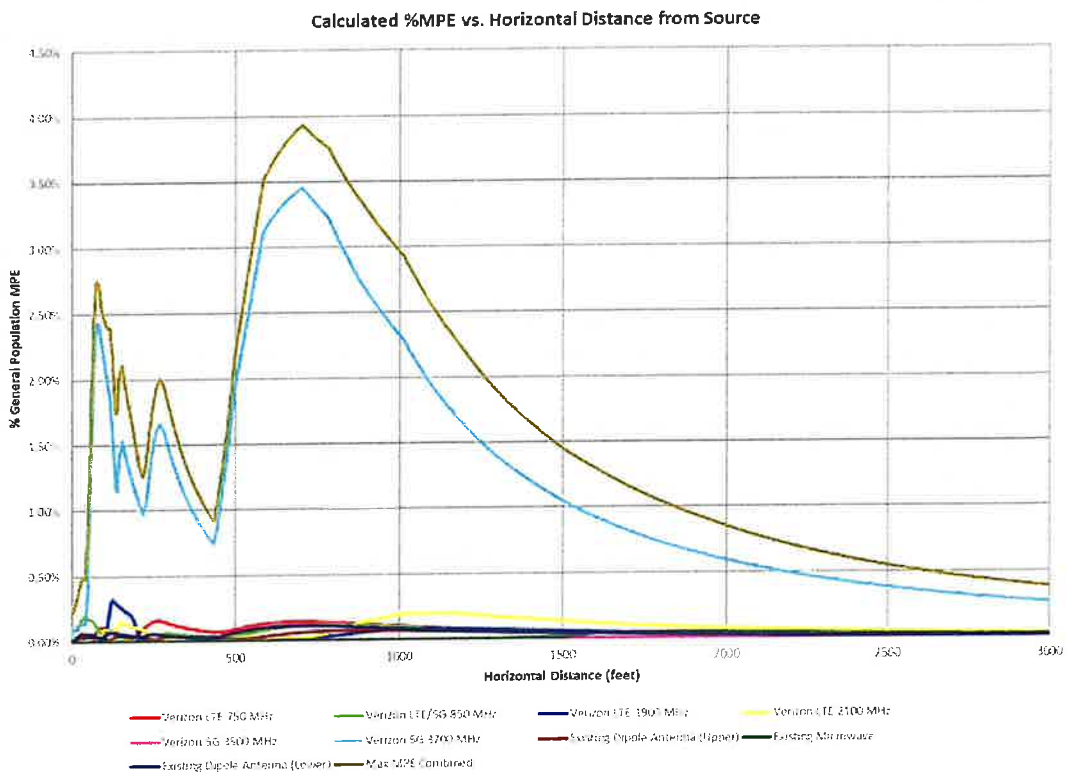


Figure 1: Graph of General Population % MPE vs. Distance

The highest percent of MPE (3.93% of the General Population limit) is calculated to occur at a horizontal distance of 703 feet from antennas. Please note that the percent of MPE calculations close to the site take into account off beam loss, which is determined from the vertical pattern of the antennas used. Therefore, RF power density levels may increase as the distance from the site increases. At distances of approximately 1500 feet and beyond, one would now be in the main beam of the antenna pattern and off beam loss is no longer considered. Beyond this point, RF levels become calculated solely on distance from the site and the percent of MPE decreases significantly as distance from the site increases.

Table 2 below lists percent of MPE values as well as the associated parameters that were included in the calculations. The highest percent of MPE value was calculated to occur at a horizontal distance of 703 feet from the site (reference Figure 1).

As stated in Section 3, all calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. In addition, a six foot height offset was considered in this analysis to account for average human height. As a result, the predicted signal levels are significantly higher than the actual signal levels will be from the final configuration. The results presented in Figure 1 and Table 2 assume level ground elevation from the base of the tower out to the horizontal distances calculated.

Carrier	Number of Transmitters	Power out of Base Station Per Transmitter (Watts)	Antenna Height (Feet)	Distance to the Base of Antennas (Feet)	Power Density (mW/cm^2)	Limit (mW/cm^2)	% MPE
Existing Dipole Antenna (Lower)	2	100.0	150.0	703	0.000343	0.300	0.11%
Existing Dipole Antenna (Upper)	2	100.0	184.0	703	0.000187	0.300	0.06%
Existing Microwave	1	1.0	175.0	703	0.000005	1.000	0.00%
Verizon 5G 3500 MHz	1	4.0	130.0	703	0.000058	1.000	0.01%
Verizon 5G 3700 MHz	1	320.0	130.0	703	0.034562	1.000	3.46%
Verizon LTE 1900 MHz	1	160.0	130.0	703	0.000076	1.000	0.01%
Verizon LTE 2100 MHz	1	240.0	130.0	703	0.000214	1.000	0.02%
Verizon LTE 750 MHz	1	160.0	130.0	703	0.000724	0.500	0.14%
Verizon LTE/5G 850 MHz	1	160.0	130.0	703	0.000652	0.567	0.12%
						Total	**3.93%**

Table 2: Maximum Percent of General Population Exposure Values[4,5,6]

[4] Frequencies listed are representative of the operating band and are not the specific operating frequency.

[5] The total % MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not reflect the total value listed in the table.

[6] In the case where antenna pattern data was unavailable from the manufacturer, generic antenna pattern was used based on the frequency, bandwidth and gain of the antenna.

6. Conclusion

The above analysis verifies that RF exposure levels from the site with Verizon's proposed antenna configuration will be well below the maximum permissible levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Using the conservative calculation methods and parameters detailed above, the maximum cumulative percent of MPE in consideration of all transmitters is calculated to be **3.93%** of the FCC limit (General Population/Uncontrolled). This maximum cumulative percent of MPE value is calculated to occur 703 feet away from the site.

7. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.

Reviewed/Approved By: Martin Lavin
Senior RF Engineer
C Squared Systems, LLC

April 29, 2024
Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

IEEE C95.1-2019, IEEE Standard Safety Levels With Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz IEEE-SA Standards Board

IEEE C95.3-2021, IEEE Recommended Practice for Measurements and Computations of Electric, Magnetic, and Electromagnetic Fields with Respect to Human Exposure to Such Fields, 0 Hz-300 GHz IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure[7]

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

(B) Limits for General Population/Uncontrolled Exposure[8]

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

f = frequency in MHz * Plane-wave equivalent power density

Table 3: FCC Limits for Maximum Permissible Exposure

[7] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

[8] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

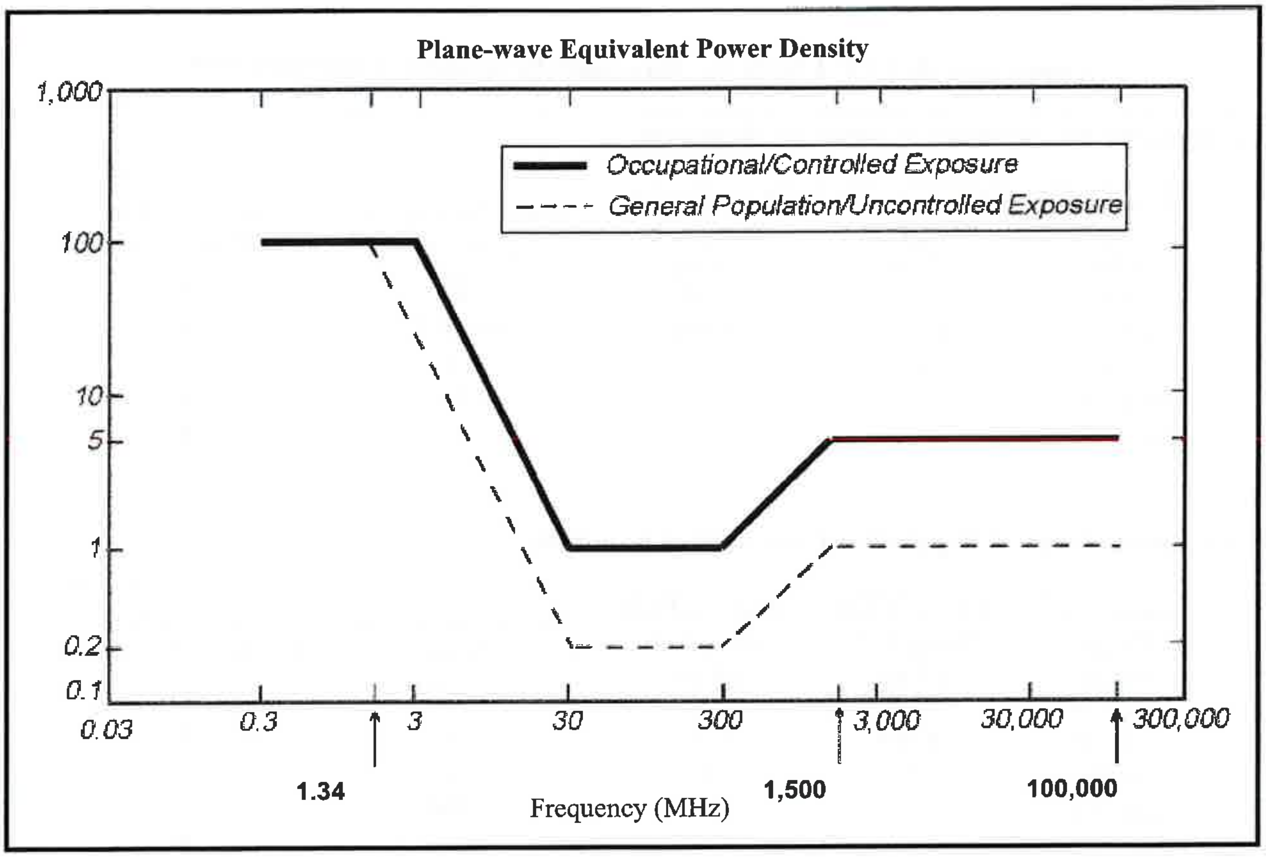
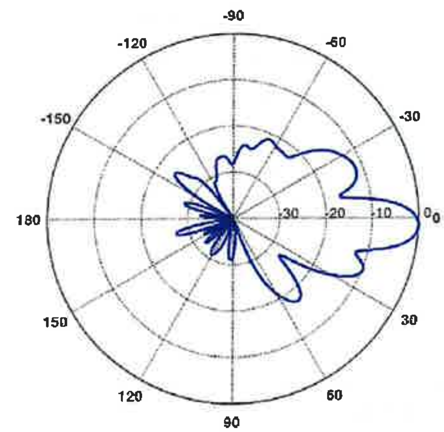


Figure 2: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Verizon Antenna Model Data Sheets and Electrical Patterns

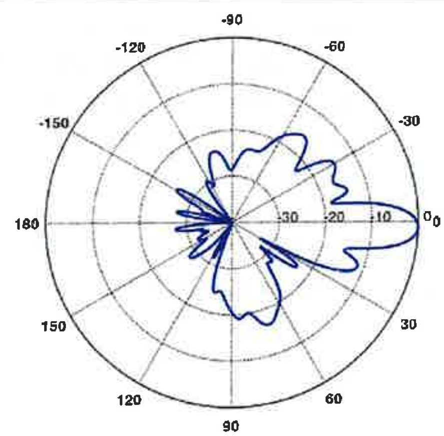
750 MHz

Manufacturer:	COMMSCOPE
Model #:	NHH-65B-R2B
Frequency Band:	698-787 MHz
Gain:	14.9 dBi
Vertical Beamwidth:	12.4°
Horizontal Beamwidth:	65°
Polarization:	±45°
Dimensions (L x W x D):	71.97" x 11. 85" x 7.09"



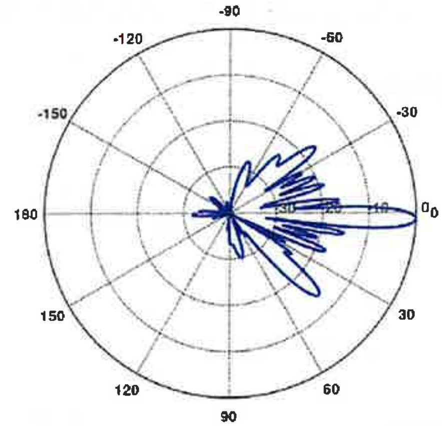
850 MHz

Manufacturer:	COMMSCOPE
Model #:	NHH-65B-R2B
Frequency Band:	824-894 MHz
Gain:	15.0 dBi
Vertical Beamwidth:	11.2°
Horizontal Beamwidth:	60°
Polarization:	±45°
Dimensions (L x W x D):	71.97" x 11. 85" x 7.09"



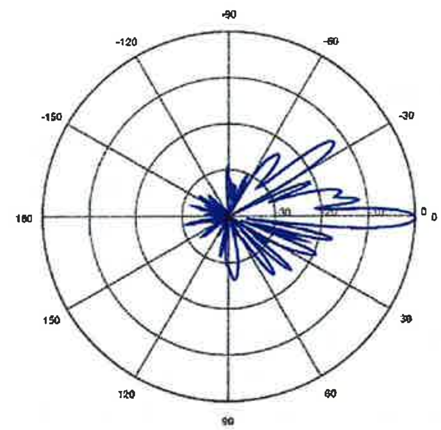
1900 MHz

Manufacturer:	COMMSCOPE
Model #:	NHH-65B-R2B
Frequency Band:	1850-1990 MHz
Gain:	17.7 dBi
Vertical Beamwidth:	5.7°
Horizontal Beamwidth:	71°
Polarization:	±45°
Dimensions (L x W x D):	71.97” x 11. 85” x 7.09“



2100 MHz

Manufacturer:	COMMSCOPE
Model #:	NHHSS-65B-R2BT4
Frequency Band:	1920-2200 MHz
Gain:	18.0 dBi
Vertical Beamwidth:	5.7°
Horizontal Beamwidth:	54°
Polarization:	±45°
Dimensions (L x W x D):	71.97” x 11. 85” x 7.13“



ATTACHMENT 7

Verizon/South Windsor 4

UNITED STATES POSTAL SERVICE ®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	2	2	quadient CORRECTION IMI $003.34 05/08/2024 ZIP 06101 043M32206619 US POSTAGE
	Postmaster, per *(name of receiving employee)*		

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Michael Maniscalco, Town Manager Town of South Windsor 1540 Sullivan Avenue South Windsor, CT 06074				
2.	Michele M. Lipe, AICP, Director of Planning Town of South Windsor 1540 Sullivan Avenue South Windsor, CT 06074				
3.					
4.					
5.					
6.					

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See Reverse for Instructions