STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	
A PETITION OF CELLCO PARTNERSHIP	:	SUB-PETITION NO. 1133
D/B/A VERIZON WIRELESS FOR	:	1191 TERRYVILLE AVENUE
MODIFICATIONS TO AN EXISTING	:	BRISTOL, CT
WIRELESS TELECOMMUNICATIONS	:	
FACILITY AT 1191 TERRYVILLE AVENUE	:	
IN BRISTOL, CONNECTICUT	:	JANUARY 22, 2024

SUB-PETITION FOR DECLARATORY RULING:
ELIGIBLE FACILITIES REQUEST FOR MODIFICATIONS
THAT WILL NOT SUBSTANTIALLY CHANGE THE
PHYSICAL DIMENSIONS OF AN EXISTING BASE STATION

I. Introduction

Pursuant to Section 6409(a) of the Middle Class Tax Relief and Job Creation Act of 2012, codified at 47 U.S.C. § 1455(a) ("Section 6409(a)") and the October 21, 2014 Report and Order (FCC-14-153) issued by the Federal Communications Commission ("FCC") (the "FCC Order"), Cellco Partnership d/b/a Verizon Wireless ("Cellco") hereby petitions the Connecticut Siting Council (the "Council") for a declaratory ruling ("Sub-Petition") that the installation of replacement antennas and related telecommunications equipment at the existing wireless telecommunications base station at 1191 Terryville Avenue in Bristol, Connecticut (the "Property") constitutes an Eligible Facilities Request ("EFR") under the FCC Order. Cellco identifies this site as its "Bristol West Facility". The Property is a 65-acre parcel owned by Pequabuck Golf Club of Bristol (the "Property Owner").

II. Factual Background

The existing facility consists of a 120-foot flagpole tower within a fenced compound at the Property. Cellco is the only wireless carrier using this tower. Cellco's antennas are located at two antenna levels at the top of the tower inside an RF transparent screening shroud. The existing shroud is 25.5-inches in diameter. Equipment associated with the existing antennas is located on the ground

adjacent to the flagpole tower. The flagpole tower and Cellco's use of the flagpole tower was approved by the Council in January of 2007 (Docket No. 318). Included in Attachment 1 is a copy of the Docket No. 318 Decision and Order.

III. Cellco's Proposed Facility Modifications

Cellco is licensed to provide wireless telecommunications services in the 700 MHz, 800 MHz, 1900 MHz, 2100 MHz and 3600 MHz frequency ranges in Bristol and throughout the State of Connecticut. Cellco intends to remove all six (6) of its existing antennas and install three (3) model NHHSS-65B-R2BT4 antennas at the 117-foot level on the flagpole tower. To accommodate Cellco's new antennas, the existing antenna screening shroud will need to be replaced with a larger shroud, 36-inch in diameter. Cellco is not proposing any changes to its ground-mounted equipment.

Project Plans and Specifications for Cellco's new antennas at the Bristol West Facility are included in Attachment 2. According to the attached Structural Analysis Report ("SA") and Antenna Mount Analysis ("MA"), the existing tower, tower foundation and the existing mounting brackets can support Cellco's proposed antenna modifications. Copies of the SA and MA are included in Attachment 3.

IV. Discussion

A. The Proposed Modification Will Not Cause a Substantial Change to the Physical Dimensions of the Existing Base Station

Section 6409(a) provides, in relevant part, that "a State or local government may not deny, and shall approve, any eligible facilities request for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station." Pursuant to the FCC Order, the proposed modification does not substantially change the physical dimensions of the base station if the following criteria are satisfied.

1. *The proposed modified facility will not increase the height of the tower by more than ten (10) percent of the height.* Cellco's proposed antenna and antenna shroud modifications do not require an increase in the height of the existing flagpole tower.

2. *The proposed facility modification will not protrude from the edge of the structure more than six (6) feet.* Cellco's antennas will be located inside a 36-inch diameter antenna screening shroud. The new antennas will not, therefore, protrude more than six (6) feet from the face of the tower.

3. *The proposed facility does not involve installation of more than the standard number of new equipment cabinets for the technology involved, but not to exceed four cabinets.* No changes are proposed to Cellco's ground equipment as part of these facility modifications. All existing Cellco equipment is located inside an equipment shelter.

4. *The proposed facility does not entail any excavation or deployment outside the current site of the base station.* Cellco's proposed facility modifications will remain within the limits of the Property and the existing fenced compound.

5. *The proposed facility does not defeat the existing concealment elements of the base station.* The existing facility consists of a flagpole tower and related ground-mounted equipment. All antennas on the tower are currently located inside an antenna screening shroud that is 25.5-inch in diameter. To accommodate Cellco's new antennas, the diameter of the screening shroud will need to increase from 25.5 inches to 36 inches. Cellco's antennas will remain concealed within a screening shroud, consistent with the existing concealment elements and current Council approval.

6. *The proposed facility complies with conditions associated with the prior approval of construction or modification of the base station.* Cellco's proposed facility modifications are consistent with the Siting Council's Docket No. 318 Decision and Order.

B. FCC Compliance

Included in Attachment 4 are far field approximation tables for its proposed modified facility confirming that the Bristol West Facility will operate well within (3.3%) the FCC safety standards for radio frequency emissions.

C. Notice to the City, Property Owner and Abutting Landowners

On January 22, 2024, a copy of this Sub-Petition was sent to Bristol's Mayor, Jeffrey Caggiano; Robert Flanagan, City Planner; and the Property Owner. Copies of the letters sent to Mayor Caggiano, Robert Flanagan and Pequabuck Golf Club of Bristol are included in Attachment 5. A copy of this Sub-Petition was also sent to the owners of land that abuts the Property. A sample abutter's letter and the list of those abutting landowners who were sent notice and a copy of this filing is included in Attachment 6.

V. Conclusion

Based on the information provided above, Cellco respectfully submits that the proposed modification of the existing base station at the Property constitutes an "eligible facilities request" under Section 6409(a) and the FCC Order.

Respectfully submitted,

CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS

By _____

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597
(860) 275-8200
Its Attorneys

ATTACHMENT 1

DOCKET NO. 318 – Cellco Partnership d/b/a Verizon Wireless application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance and operation of a telecommunications facility at 1191 Terryville Avenue in Bristol, Connecticut.	}	Connecticut
	}	Siting
	}	Council

January 18, 2007

Decision and Order

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of a telecommunications facility including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application and therefore directs that a Certificate of Environmental Compatibility and Pubic Need, as provided by General Statutes § 16-50k, be issued to Cellco Partnership d/b/a Verizon Wireless for the construction, maintenance and operation of a wireless telecommunications facility to be located at 1191 Terryville Avenue in Bristol, Connecticut.

The facility shall be constructed, operated, and maintained substantially as specified in the Council's record in this matter, and subject to the following conditions:

1. The tower shall be designed as a flagpole and shall be constructed no taller than 120 feet above ground level to provide telecommunications services to both public and private entities.

2. The Certificate Holder shall prepare a Development and Management (D&M) Plan for this site in compliance with Sections 16-50j-75 through 16-50j-77 of the Regulations of Connecticut State Agencies. The D&M Plan shall be served on the City of Bristol and all parties and intervenors, as listed in the service list, and submitted to and approved by the Council prior to the commencement of facility construction and shall include:

   a) a final site plan(s) of site development to include specifications for the tower, tower foundation, antenna mountings, equipment building, access road, utility line, and landscaping; and

   b) construction plans for site clearing, water drainage, and erosion and sedimentation control consistent with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, as amended.

3. The Certificate Holder shall, prior to the commencement of operation, provide the Council worst-case modeling of electromagnetic radio frequency power density of all proposed entities' antennas at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin No. 65, August 1997. The Certificate Holder shall ensure a recalculated report of electromagnetic radio frequency power density is submitted to the Council in the event other carriers locate at this facility or if circumstances in operation cause a change in power density above the levels calculated and provided pursuant to this Decision and Order.

4. Upon the establishment of any new state or federal radio frequency standards applicable to frequencies of this facility, the facility granted herein shall be brought into compliance with such standards.

5. The Certificate Holder shall permit public or private entities to share space on the proposed tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.

6. The Certificate Holder shall provide reasonable space on the tower for no compensation for any City of Bristol public safety services (police, fire and medical services), provided such use can be accommodated and is compatible with the structural integrity of the tower.

7. If the facility authorized herein is not fully constructed and providing wireless services within eighteen months from the date of the mailing of the Council's Findings of Fact, Opinion, and Decision and Order (collectively called "Final Decision"), this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made. The time between the filing and resolution of any appeals of the Council's Final Decision shall not be counted in calculating this deadline.

8. If the facility ceases to provide wireless services for a period of one year, this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made.

9. The Certificate Holder shall remove any nonfunctioning antenna, and associated antenna mounting equipment, within 60 days of the date the antenna ceased to function.

10. Any request for extension of the time periods referred to in Conditions 7, 8, and 9 shall be filed with the Council not later than sixty days prior to the expiration date of this Certificate and shall be served on all parties and intervenors and the City of Bristol, as listed in the service list. Any proposed modifications to this Decision and Order shall likewise be so served.

11. In accordance with Section 16-50j-77 of the Regulations of Connecticut State Agencies, the Certificate Holder shall provide the Council with written notice two weeks prior to the commencement of construction activities. In addition, the Certificate Holder shall provide the Council with written notice of the completion of site construction and the commencement of site operation.

Pursuant to General Statutes § 16-50p, we hereby direct that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below, and notice of issuance shall be published in the Bristol Press.

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named or admitted to the proceeding in accordance with Section 16-50j-17 of the Regulations of Connecticut State Agencies.

The parties and intervenors in this proceeding are:

Status Granted	**Status Holder (name, address & phone number)**	**Representative (name, address & phone number)**
Applicant	Cellco Partnership d/b/a Verizon Wireless 99 East River Drive East Hartford, CT 06108	Sandy Carter Regulatory Manager Verizon Wireless 99 East River Drive East Hartford, CT 06108 Kenneth Baldwin, Esq. Robinson & Cole, LLP 280 Trumbull Street Hartford, CT 06103-3597 (860) 275-8200 (860) 275-8299 fax kbaldwin@rc.com

ATTACHMENT 2

verizon

BRISTOL W CT
1191 TERRYVILLE RD
BRISTOL, CT 06010

GENERAL NOTES AND SPECIFICATIONS

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2021 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2022 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "H" STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES, 2022 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE, AND LOCAL CODES.
2. SHOULD ANY FIELD CONDITIONS PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
3. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
4. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
5. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
6. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, AND ALL TRADES AS APPLICABLE PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
7. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN "AS-BUILT" SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
8. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING BUILDING'S/PROPERTY'S OPERATIONS, COORDINATE WORK WITH BUILDING/PROPERTY OWNER.
10. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
11. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
12. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
13. ANY AND ALL ERRORS, DISCREPANCIES, AND "MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE VERIZON WIRELESS CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
15. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
16. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
17. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
18. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB- CONTRACTORS FOR ANY CONDITION PER THE MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
19. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
20. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED PRIOR TO ANY EXCAVATION WORK. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
21. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
22. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
23. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
24. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.

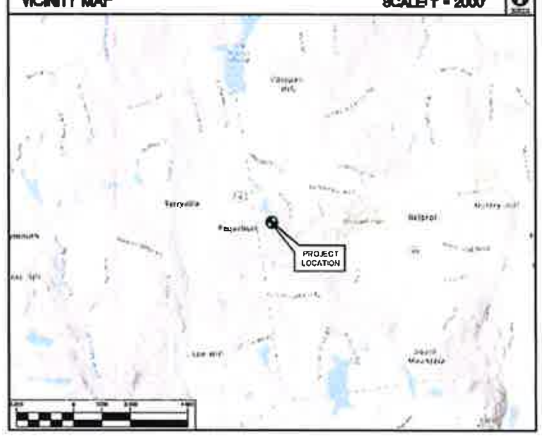
SITE DIRECTIONS

FROM: 20 ALEXANDER DRIVE, WALLINGFORD, CONNECTICUT
TO: 1191 TERRYVILLE RD, BRISTOL, CT 06010

1.	START OUT GOING NORTH ON ALEXANDER DR TOWARD BARNES INDUSTRIAL PARK RD.	0.18 MI
2.	TURN RIGHT ONTO BARNES INDUSTRIAL PARK RD.	0.11 MI
3.	TAKE THE 1ST LEFT ONTO CT-68.	0.35 MI
4.	TURN RIGHT ONTO RAMP.	0.17 MI
5.	TURN RIGHT ONTO N COLONY RD/US-5 N.	0.30 MI
6.	MERGE ONTO CT-15 N TOWARD HARTFORD.	3.88 MI
7.	MERGE ONTO I-691 W VIA EXIT 68W TOWARD MERIDEN/WATERBURY.	7.79 MI
8.	MERGE ONTO I-84 E VIA EXIT 2 TOWARD HARTFORD.	3.76 MI
9.	TAKE THE WEST ST/CT-229 EXIT, EXIT 31, TOWARD BRISTOL.	0.21 MI
10.	TURN LEFT ONTO WEST ST/CT-229. CONTINUE TO FOLLOW CT-229.	4.42 MI
11.	TURN LEFT ONTO RIVERSIDE AVE/CT-72.	0.23 MI
12.	STAY STRAIGHT TO GO ONTO MEMORIAL BLVD.	0.64 MI
13.	MEMORIAL BLVD BECOMES SCHOOL ST/CT-72.	0.36 MI
14.	TURN RIGHT ONTO WEST ST/CT-69.	0.71 MI
15.	TURN LEFT ONTO TERRYVILLE AVE/US-6 W.	2.15 MI
16.	1191 TERRYVILLE AVE, BRISTOL, CT 06010. 1191 TERRYVILLE AVE IS ON THE LEFT.	

VICINITY MAP

SCALE: 1" = 2000'



DESIGN BASIS:

GOVERNING CODE: 2021 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2022 CT STATE BUILDING CODE AND AMENDMENTS.

1. DESIGN CRITERIA:
   - RISK CATEGORY: II (BASED ON TABLE 1604.5 OF THE 2021 IBC)
   - NOMINAL DESIGN SPEED (TOWER): 93 MPH (Vasd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-16) PER 2021 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2022 CONNECTICUT STATE BUILDING CODE.
   - SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

PROJECT SUMMARY

1. THE PROPOSED UPGRADE SCOPE OF WORK AT THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY GENERALLY INCLUDES THE FOLLOWING:

A. AT THE EXISTING CONCEALMENT MONOPOLE MOUNTED ANTENNA SECTORS:
- REMOVE (3) EXISTING ANDREW DB844H-80658-VTM ANTENNAS.
- REMOVE (3) EXISTING AMTEL BXA-70063-6CF ANTENNAS.
- REMOVE ALL EXISTING NON 7/8" COAXIAL CABLES AND REPLACE THEM WITH 7/8" COAX CABLES. QUANTITIES TO BE VERIFIED IN FIELD.
- INSTALL (3) NEW COMMSCOPE NHH65-65B-R2B74 ANTENNAS.
- INSTALL (3) NEW COMMSCOPE CBC42B-DS-43 DIPLEXERS.
- REPLACE THE EXISTING (2) UPPER 10' TALL CANISTERS AND RELATED HARDWARE WITH MODIFIED/EXPANDED DIAMETER RADOMES.

B. AT THE EXISTING EQUIPMENT SHELTER (INTERIOR):
- RETAIN (3) EXISTING SAMSUNG B2/B66A RRUs.

B. AT THE EXISTING EQUIPMENT SHELTER (EXTERIOR):
- INSTALL (3) NEW COMMSCOPE CBC1923T-DS-43 DIPLEXERS.
- INSTALL (3) NEW SAMSUNG RT-8808-77A RRUs.
- INSTALL (3) NEW SAMSUNG RF4461d-13A RRUs.

PROJECT INFORMATION

SITE NAME:	BRISTOL W CT
SITE ADDRESS:	1191 TERRYVILLE RD BRISTOL, CT 06010
LESSEE/TENANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 20 ALEXANDER DRIVE, 2nd FLOOR WALLINGFORD, CT 06492
CONTACT PERSON:	WALTER CHARCZNSKI (CONSTRUCTION MANAGER) VERIZON WIRELESS (860) 308-1806
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT. 06405 (203) 488-0580
PROJECT COORDINATES:	LATITUDE: 41° 40' 27.4286"N LONGITUDE: 72° 58' 17.1312"W (COORDINATES REFERENCED FROM VERIZON WIRELESS RFDS DATED 07/28/2021)

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	1
B-1	RF BILL OF MATERIALS	1
C-1	COMPOUND PLAN AND ELEVATION	1
C-2	ANTENNA SECTOR CONFIGURATION DETAILS	1
C-3	RF AND APPURTENANCE MOUNTING DETAILS	1
E-1	ELECTRICAL DETAILS AND SPECIFICATIONS	1

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	12/14/23	TL	ORO	CONSTRUCTION DRAWINGS – REVISED PER RFDS
0	11/16/23	MFL	ORO	CONSTRUCTION DRAWINGS – REVISED RRU MODELS PER NEW RFDS
E	12/14/22	MFL	ORO	CONSTRUCTION DRAWINGS – REVISED BY REPORT REFERENCE
D	10/03/22	MFL	ORO	CONSTRUCTION DRAWINGS – REVISED FOR CLIENT COMMENTS
C	09/22/22	MFL	ORO	CONSTRUCTION DRAWINGS – REVISED FOR CLIENT COMMENTS
B	08/01/22	ORO	TL	CONSTRUCTION DRAWINGS – REVISED FOR CLIENT REVIEW
A	04/14/22	ABF	ORO	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

[illegible]

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

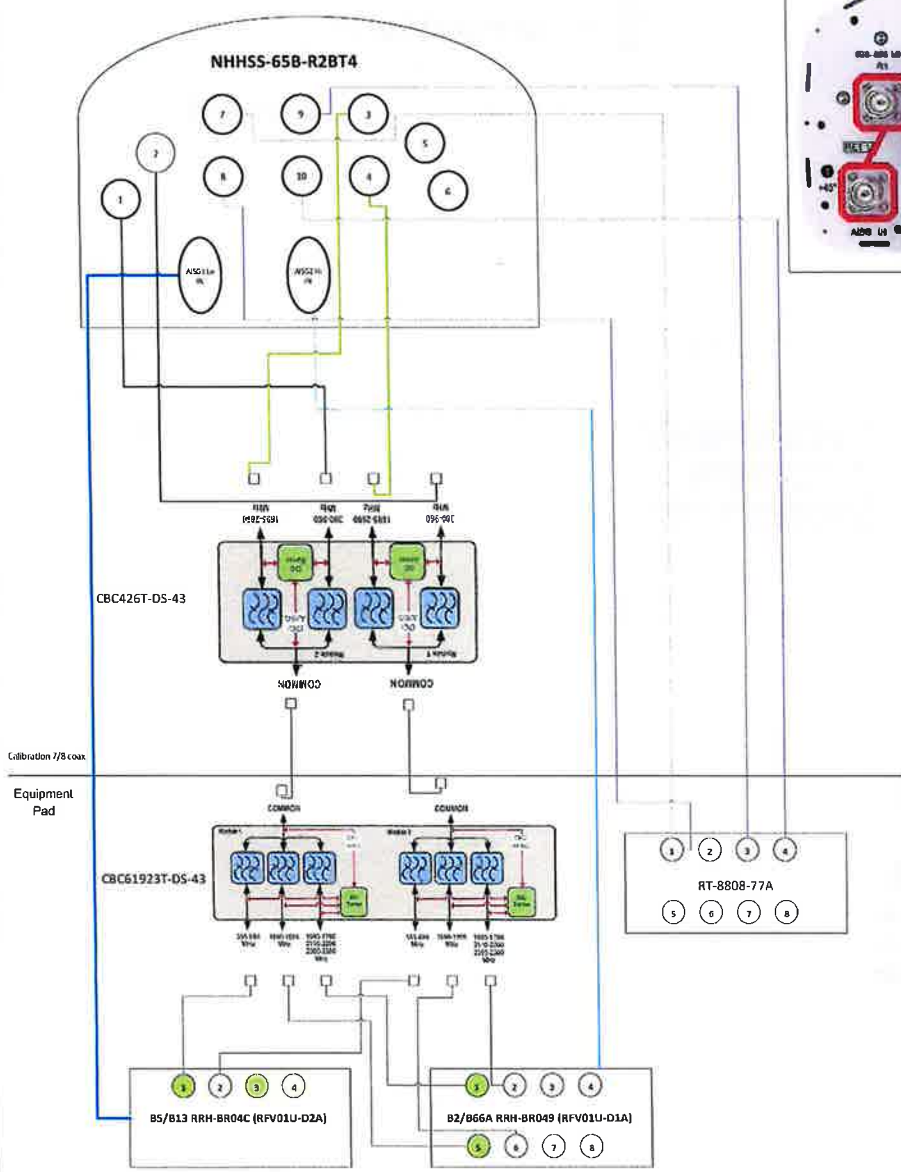
BRISTOL W CT
1191 TERRYVILLE RD
BRISTOL, CT 06010

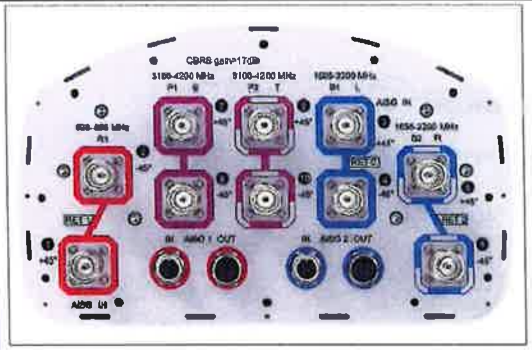
DATE:	04/14/22
SCALE:	AS NOTED
JOB NO.	22027.04

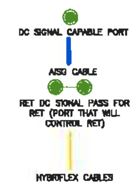
TITLE SHEET

T-1

Sheet No. 1 of 6







PLUMBING DIAGRAM COMMENTS:

A. DIAGRAM SHOWS CONFIGURATION AS VIEWED FROM BELOW ANTENNAS.

B. ANTENNAS WILL BE INSTALLED IN THAT ORDER FROM LEFT TO RIGHT AS VIEWED FROM BEHIND.

C. CAP AND WEATHERPROOF UNUSED ANTENNA PORTS.

D. ALL PLUMBING DIAGRAM COLORS ARE IRRELEVANT EXCEPT FOR AISG AND HYBRIFLEX CABLE. (FOR THE COAX COLORS, FOLLOW COAX COLORS GUIDE ABOVE)

NOTES:

1. INFORMATION SHOWN HEREIN IS FOR USE BY VERIZON WIRELESS EQUIPMENT OPERATIONS.
2. THIS B.O.M. DRAWING IS BASED ON FACILITY UPGRADE DESIGN DRAWINGS PREPARED BY CENTEK ENGINEERING (REV.1 DATED: 12/14/2023), & VERIZON WIRELESS RF ANTENNA EQUIPMENT RECOMMENDATION (DATED 12/05/2023).

BILL OF MATERIALS		
TECHNOLOGY	QUANTITY	ANTENNA
LTE 700	6	COMMSCOPE MODEL: NHHSS-65B-R2BT4
LTE 850		
LTE PCS 1900		
LTE AWS 2100		

CABLES	QUANTITY	LENGTH EA	COMMENTS
COAX CABLE	18 (VIF)	±128 FT EA	7/8" COAX CABLES

RADIOS	QUANTITY	COMMENTS
5G	3	SAMSUNG MODEL: RT-8808-77A
5G	3	SAMSUNG MODEL: RF4461d-13A

DIPLEXERS	QUANTITY	COMMENTS
DIPLEXER	3	COMMSCOPE MODEL: CBC426-DS-43
DIPLEXER	3	COMMSCOPE MODEL: CBC1923T-DS-43

OVP BOXES	QUANTITY	COMMENTS
-	-	-

ANTENNA MOUNT	QUANTITY	COMMENTS
-	-	-

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	12/14/23	TL	GMD	CONSTRUCTION DRAWINGS - REVISED PER RFDS
0	11/16/23	MFL	GMD	CONSTRUCTION DRAWINGS - REVISED RRU MODELS PER NEW RFDS
E	11/14/23	MFL	GMD	CONSTRUCTION DRAWINGS - REVISED SA REPORT REFERENCE
D	10/07/22	MFL	GMD	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT COMMENTS
C	08/30/22	MFL	GMD	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT COMMENTS
B	08/10/22	GMD	TL	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT REVIEW
A	04/14/22	MP	GMD	CONSTRUCTION DRAWINGS - ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

[illegible]

verizon

CENTEK engineering

(203) 488-0580
(203) 488-8587 Fax
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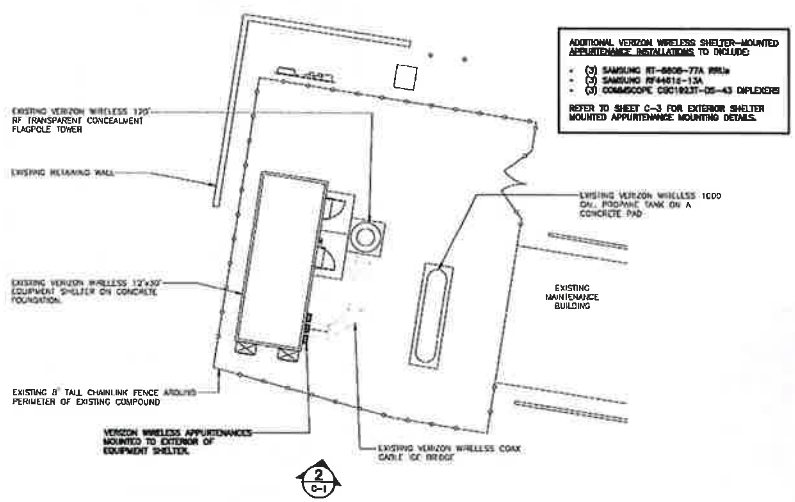
SCALE: AS NOTED
JOB NO. 22027.04

RF BILL OF MATERIALS

B-1

Sheet No. 2 of 8

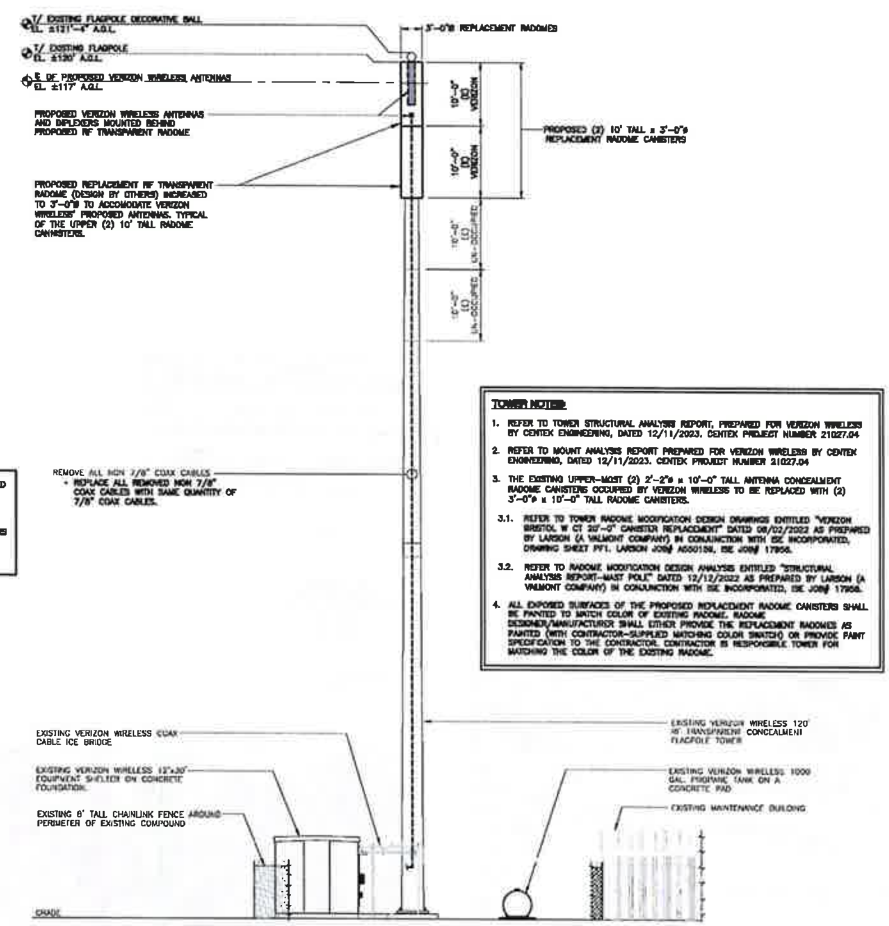


ADDITIONAL VERIZON WIRELESS SHELTER-MOUNTED APPURTENANCE INSTALLATIONS TO INCLUDE:

- (3) SAMSUNG RT-8808-77A RRUs
- (3) SAMSUNG RF4461d-13A
- (3) COMMSCOPE CBC1923T-DS-43 DIPLEXERS

REFER TO SHEET C-3 FOR EXTERIOR SHELTER MOUNTED APPURTENANCE MOUNTING DETAILS.

1 / C-1 **COMPOUND/PARTIAL SITE PLAN**
SCALE: 1" = 10'- 0"



TOWER NOTES:

1. REFER TO TOWER STRUCTURAL ANALYSIS REPORT, PREPARED FOR VERIZON WIRELESS BY CENTEK ENGINEERING, DATED 12/11/2023. CENTEK PROJECT NUMBER 21027.04
2. REFER TO MOUNT ANALYSIS REPORT PREPARED FOR VERIZON WIRELESS BY CENTEK ENGINEERING, DATED 12/11/2023. CENTEK PROJECT NUMBER 21027.04
3. THE EXISTING UPPER-MOST (2) 2'-2"Ø x 10'-0" TALL ANTENNA CONCEALMENT RADOME CANISTERS OCCUPIED BY VERIZON WIRELESS TO BE REPLACED WITH (2) 3'-0"Ø x 10'-0" TALL RADOME CANISTERS.
   - 3.1. REFER TO TOWER RADOME MODIFICATION DESIGN DRAWINGS ENTITLED "VERIZON BRISTOL W CT 20'-0" CANISTER REPLACEMENT" DATED 08/02/2022 AS PREPARED BY LARSON (A VALMONT COMPANY) IN CONJUNCTION WITH ISE INCORPORATED, DRAWING SHEET PF1. LARSON JOB# A550158, ISE JOB# 17956.
   - 3.2. REFER TO RADOME MODIFICATION DESIGN ANALYSIS ENTITLED "STRUCTURAL ANALYSIS REPORT-MAST POLE" DATED 12/12/2022 AS PREPARED BY LARSON (A VALMONT COMPANY) IN CONJUNCTION WITH ISE INCORPORATED, ISE JOB# 17956.
4. ALL EXPOSED SURFACES OF THE PROPOSED REPLACEMENT RADOME CANISTERS SHALL BE PAINTED TO MATCH COLOR OF EXISTING RADOME. RADOME DESIGNER/MANUFACTURER SHALL EITHER PROVIDE THE REPLACEMENT RADOMES AS PAINTED (WITH CONTRACTOR-SUPPLIED MATCHING COLOR SWATCH) OR PROVIDE PAINT SPECIFICATION TO THE CONTRACTOR. CONTRACTOR IS RESPONSIBLE TOWER FOR MATCHING THE COLOR OF THE EXISTING RADOME.

2 / C-1 **EAST ELEVATION - PROPOSED**
SCALE: 1/8" = 1'-0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	12/14/23	LA	GRD	CONSTRUCTION DRAWINGS - REVISED PER RFDS
0	11/10/23	LM	GRD	CONSTRUCTION DRAWINGS - REVISED RRU MODELS PER NEW RFDS
E	12/14/22	LM	GRD	CONSTRUCTION DRAWINGS - REVISED SA REPORT REFERENCE
D	10/25/22	LM	GRD	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT COMMENTS
C	08/23/22	LM	GRD	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT COMMENTS
B	08/01/22	GRD	LA	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT REVIEW
A	04/14/22	ESP	GRD	CONSTRUCTION DRAWINGS - ISSUED FOR CLIENT REVIEW

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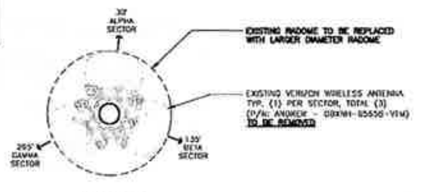
SCALE:	AS NOTED
JOB NO.	21027.04

COMPOUND PLAN AND ELEVATION

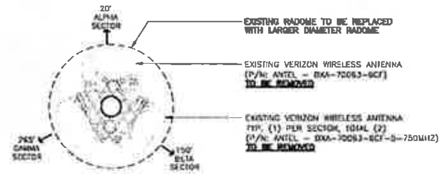
C-1

Sheet No. 3 of 8

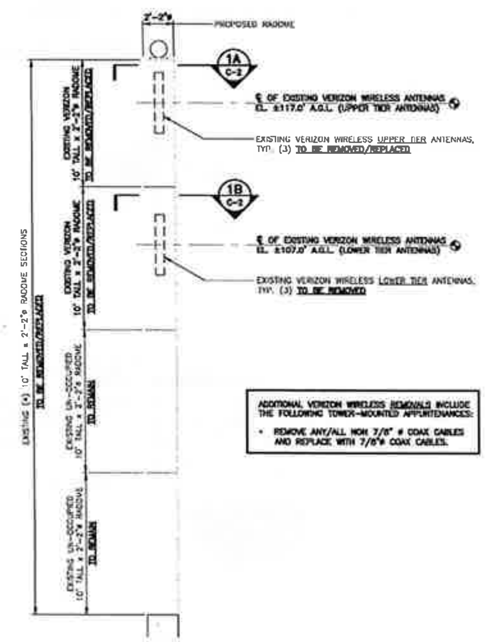
EXISTING ANTENNA CONFIGURATIONS



1A C-2 EXISTING SECTOR CONFIGURATION PLAN
SCALE: 1/2" = 1'-0"



1B C-2 EXISTING SECTOR CONFIGURATION PLAN
SCALE: 1/2" = 1'-0"



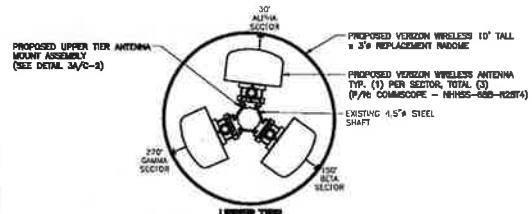
ADDITIONAL VERIZON WIRELESS REMOVALS INCLUDE THE FOLLOWING TOWER-MOUNTED APPURTENANCES:

- REMOVE ANY/ALL NON 7/8" ø COAX CABLES AND REPLACE WITH 7/8"ø COAX CABLES.

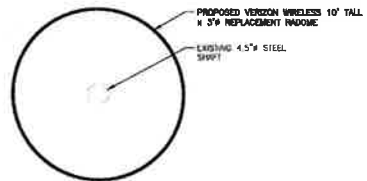
EXISTING CONDITIONS

1 C-2 PARTIAL CONCEALMENT TOWER ELEVATION
SCALE: 1/4" = 1'- 0"

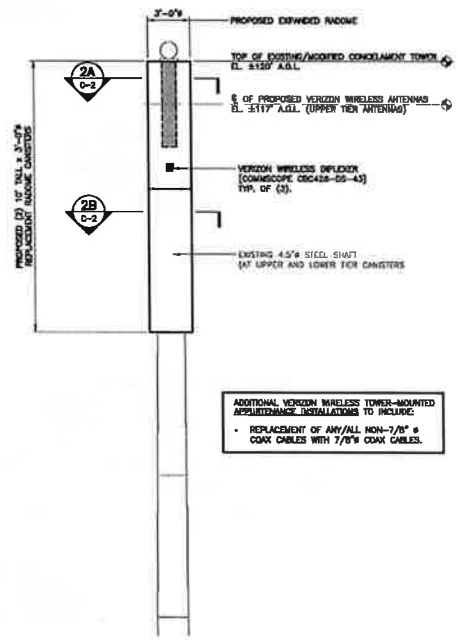
PROPOSED ANTENNA CONFIGURATIONS



2A C-2 PROPOSED ANTENNA SECTOR CONFIGURATION PLAN
SCALE: 1/2" = 1'-0"



2B C-2 PROPOSED APPURTENANCE CONFIGURATION PLAN
SCALE: 1/2" = 1'-0"

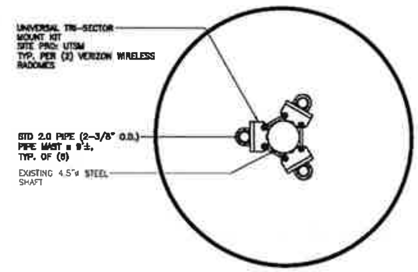


ADDITIONAL VERIZON WIRELESS TOWER-MOUNTED APPURTENANCE INSTALLATIONS TO INCLUDE:

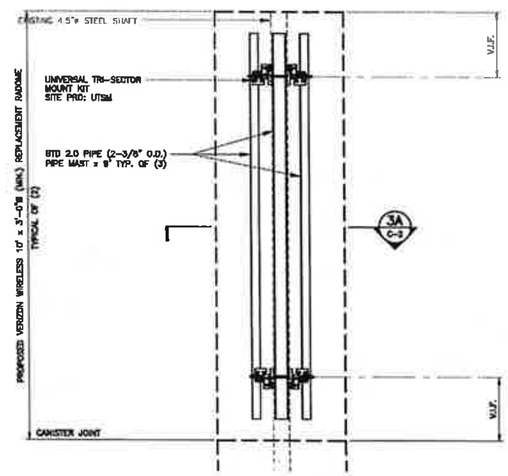
- REPLACEMENT OF ANY/ALL NON-7/8" ø COAX CABLES WITH 7/8"ø COAX CABLES.

PROPOSED CONDITIONS

2 C-2 PARTIAL CONCEALMENT TOWER ELEVATION
SCALE: 1/4" = 1'- 0"



3A C-2 UPPER TIER ANTENNA MOUNT ASSEMBLY SECTION
SCALE: 3/4" = 1'-0"



3 C-2 TYP. REPLACEMENT RADOME CANISTER ELEVATION
SCALE: 1/2" = 1'- 0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	12/14/23	TJL	GRD	CONSTRUCTION DRAWINGS - REVISED PER RFDS
0	11/18/23	LJN	GRD	CONSTRUCTION DRAWINGS - REVISED MNT MODELS PER NEW RFDS
E	12/14/22	LJN	GRD	CONSTRUCTION DRAWINGS - REVISED SA REPORT REFERENCE
D	10/27/22	LJN	GRD	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT COMMENTS
C	08/22/22	LJN	GRD	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT COMMENTS
B	08/01/22	GRD	TJL	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT REVIEW
A	04/14/22	BBP	GRD	CONSTRUCTION DRAWINGS - ISSUED FOR CLIENT REVIEW

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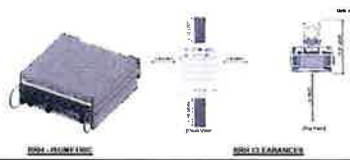
ANTENNA SECTOR CONFIGURATION DETAILS

C-2

Sheet No. 4 of 9

10-PORT SECTOR ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: NHHSS-65B-R2BT4	71.9"L x 11.8"W x 7.1"D	50.9 LBS. (W/OUT MOUNT KIT)

1 / C-3 SECTOR ANTENNA DETAIL
NOT TO SCALE

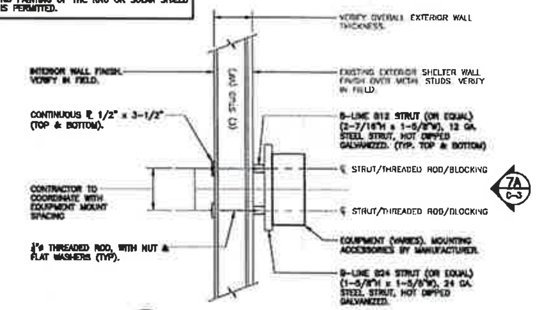


C BAND 8T8R 320W RRU (REMOTE RADIO UNIT)			
EQUIPMENT	BANDS	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: RT-8808-77A	N77: 3700 MHz	15.0"H x 15.0"W x 6.6"D	58.5 LBS.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

2 / C-3 C-BAND 8T8R 320W RADIO UNIT DETAIL
NOT TO SCALE

NOTES:
1. PROVIDE END CAPS TO ALL STRUT MEMBERS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS PERMITTED.



7 / C-3 TYP. SUPPORT FRAME SECTION
SCALE: 1" = 1'- 0"

DIPLEXER			
EQUIPMENT	DESCRIPTION	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: CBC426-DS-43	DIPLEXER, 555-894/PCS/AWS+WCS	5.864"H x 4.764"W x 2.224"D	4.55 LB (W/MOUNTING HARDWARE)

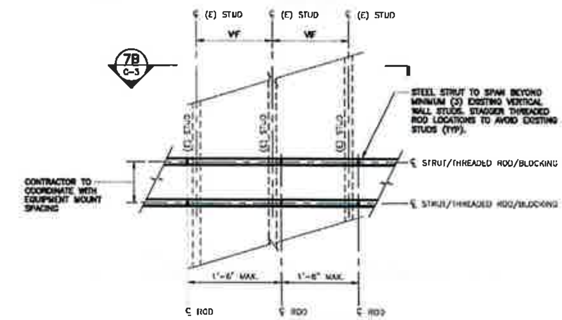
NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

3 / C-3 DIPLEXER DETAIL
NOT TO SCALE

DIPLEXER			
EQUIPMENT	DESCRIPTION	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: CBC1923T-DS-43	TWIN DIPLEXER, 555-894/PCS/AWS+WCS	6.649"H x 5.512"W x 3.978"D	8.46 LB (W/MOUNTING HARDWARE)

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

4 / C-3 DIPLEXER DETAIL
NOT TO SCALE

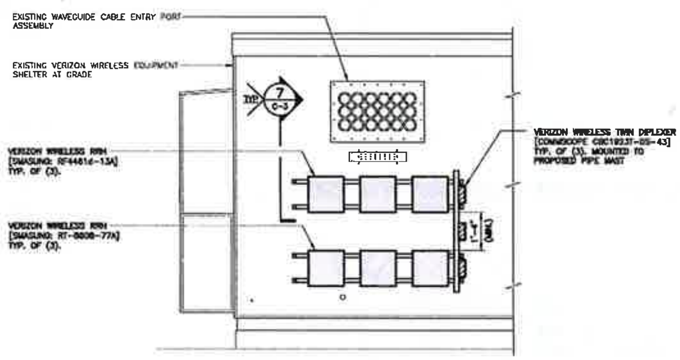


7A / C-3 TYP. SUPPORT FRAME ELEVATION
SCALE: 1" = 1'- 0"

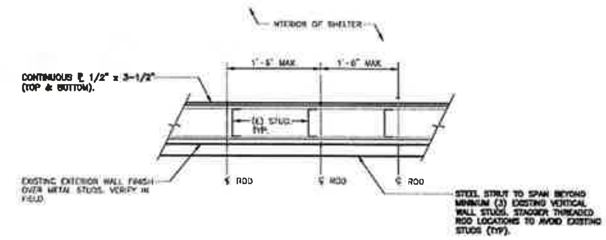
REMOTE RADIO UNIT (RRU)		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: RF4461d-13A	14.96"H x 14.96"W x 10.23"D	78.1 LBS.

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.

5 / C-3 PROPOSED REMOTE RADIO UNIT DETAIL
SCALE: NOT TO SCALE



6 / C-3 EQUIPMET MOUNTING ELEVATION
SCALE: 1/2" = 1'- 0"



7B / C-3 TYP. SUPPORT FRAME SECTION
SCALE: 1" = 1'- 0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
3	12/14/22	TJL	GRD	CONSTRUCTION DRAWINGS - REVISED PER RFDS
2	11/16/22	LM	GRD	CONSTRUCTION DRAWINGS - REVISED RRU MODELS PER NEW RFDS
1	11/14/22	LM	GRD	CONSTRUCTION DRAWINGS - REVISED SA REPORT REFERENCE
0	10/12/22	LM	GRD	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT COMMENTS
C	08/23/22	LM	GRD	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT COMMENTS
B	08/10/22	GRD	TJL	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT REVIEW
A	04/14/22	SEP	GRD	CONSTRUCTION DRAWINGS - ISSUED FOR CLIENT REVIEW

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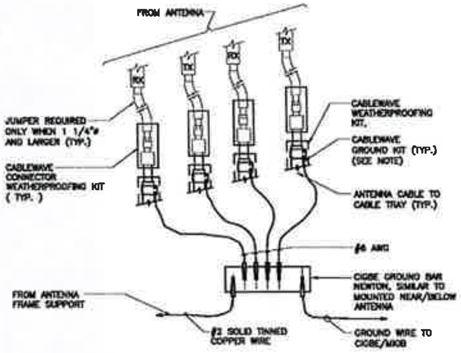
RF AND APPURTENANCE MOUNTING DETAILS

C-3

Sheet No. 5 of 9

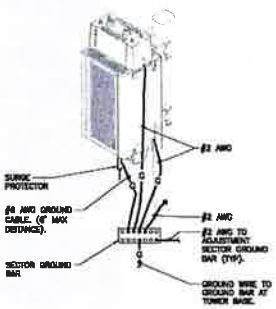


NOTES:

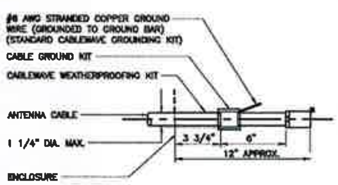
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE

1 / E-1 CONNECTION OF GROUND WIRES TO GROUND BAR
NOT TO SCALE

EACH RRH CABINET SHALL BE GROUNDED IN THE FOLLOWING MANNER:
1. AT TOP OF THE CABINET
2. AT RIGHT SIDE OF THE CABINET.



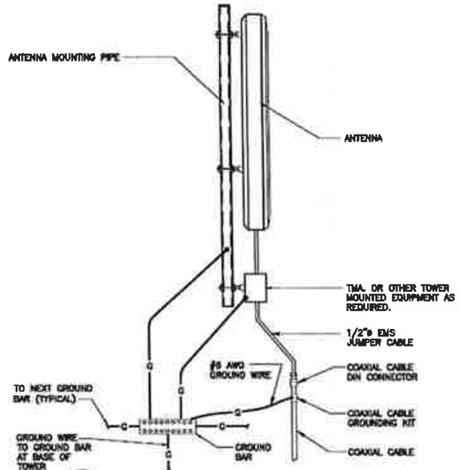
2 / E-1 RRH POLE MOUNT GROUNDING
NOT TO SCALE



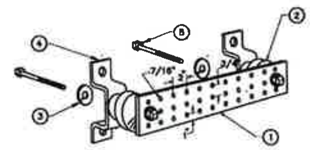
NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

3 / E-1 ANTENNA CABLE GROUNDING DETAIL
NOT TO SCALE



4 / E-1 TYPICAL ANTENNA GROUNDING DETAIL
NOT TO SCALE



NOTES

1. TINNED COPPER GROUND BAR, 1/4" x 4" x 20", NEWTON INSTRUMENT CO. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION.
2. INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061-4.
3. 5/8" LOCK WASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8.
4. WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A-6056.
5. 5/8-11 x 1" STAINLESS STEEL TRUSS SPANNER MACHINE SCREWS.

5 / E-1 GROUND BAR DETAIL
NOT TO SCALE

ELECTRICAL SPECIFICATIONS

SECTION 16010

1.01. SCOPE OF WORK

A. WORK SHALL INCLUDE ALL LABOR, EQUIPMENT AND SERVICES REQUIRED TO COMPLETE (MAKE READY FOR OPERATION) ALL THE ELECTRICAL WORK INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:

1. CELLULAR GROUNDING SYSTEMS CONSISTING OF ANTENNA GROUNDING, GROUND BARS, ETC.

1.02. GENERAL REQUIREMENTS

A. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE MADE IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS WHICH MAY APPLY AND NOTHING IN THE DRAWINGS OR SPECIFICATIONS SHALL BE INTERPRETED AS AN INFRINGEMENT OF SUCH CODES OR REGULATIONS.

B. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR THE COMPLETE INSTALLATION AND COORDINATION OF THE ENTIRE ELECTRICAL SERVICE. ALL ACTIVITIES TO BE COORDINATED THROUGH OWNERS REPRESENTATIVE, DESIGN ENGINEER AND OTHER AUTHORITIES HAVING JURISDICTION OF TRADES.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES THAT MAY BE REQUIRED FOR THE ELECTRICAL WORK AND FOR SCHEDULING OF ALL INSPECTIONS THAT MAY BE REQUIRED BY THE LOCAL AUTHORITY.

D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE BUILDING OWNER FOR NEW AND/OR DEMOLITION WORK INVOLVED.

E. NO MATERIAL OTHER THAN THAT CONTAINED IN THE "LATEST LIST OF ELECTRICAL FITTINGS" APPROVED BY THE UNDERWRITERS' LABORATORIES, SHALL BE USED IN ANY PART OF THE WORK. ALL MATERIAL FOR WHICH LABEL SERVICE HAS BEEN ESTABLISHED SHALL BEAR THE U.L. LABEL.

F. THE CONTRACTOR SHALL GUARANTEE ALL NEW WORK FOR A PERIOD OF ONE YEAR FROM THE ACCEPTANCE DATE BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING WARRANTIES FROM ALL EQUIPMENT MANUFACTURERS FOR SUBMISSION TO THE OWNER.

G. DRAWINGS INDICATE GENERAL ARRANGEMENT OF WORK INCLUDED IN CONTRACT. CONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE MODIFICATIONS TO THE LAYOUT OF THE WORK TO PREVENT CONFLICT WITH WORK OF OTHER TRADES AND FOR THE PROPER INSTALLATION OF WORK. CHECK ALL DRAWINGS AND VISIT JOB SITE TO VERIFY SPACE AND TYPE OF EXISTING CONDITIONS IN WHICH WORK WILL BE DONE, PRIOR TO SUBMITTAL OF BID.

H. THE ELECTRICAL CONTRACTOR SHALL SUPPLY THREE (3) COMPLETE SETS OF APPROVED DRAWINGS, ENGINEERING DATA SHEETS, MAINTENANCE AND OPERATING INSTRUCTION MANUALS FOR ALL SYSTEMS AND THEIR RESPECTIVE EQUIPMENT. THESE MANUALS SHALL BE INSERTED IN VINYL COVERED 3-RING BINDERS AND TURNED OVER TO OWNER'S REPRESENTATIVE ONE (1) WEEK PRIOR TO FINAL PUNCH LIST.

I. ALL WORK SHALL BE INSTALLED IN A NEAT AND WORKMAN LIKE MANNER AND WILL BE SUBJECT TO THE APPROVAL OF THE OWNER'S REPRESENTATIVE.

J. ALL EQUIPMENT AND MATERIALS TO BE INSTALLED SHALL BE NEW, UNLESS OTHERWISE NOTED.

K. BEFORE FINAL PAYMENT, THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF PRINTS (AS-BUILTS), LEGIBLY MARKED IN RED PENCIL TO SHOW ALL CHANGES FROM THE ORIGINAL PLANS.

L. ENTIRE ELECTRICAL INSTALLATION SHALL BE IN ACCORDANCE WITH OWNER'S SPECIFICATIONS, AND REQUIREMENTS OF ALL LOCAL AUTHORITIES HAVING JURISDICTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH APPROPRIATE INDIVIDUALS TO OBTAIN ALL SUCH SPECIFICATIONS AND REQUIREMENTS. NOTHING CONTAINED IN, OR OMITTED FROM, THESE DOCUMENTS SHALL RELIEVE CONTRACTOR FROM THIS OBLIGATION.

SECTION 16450

1.01. GROUNDING

A. ALL NON-CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUIT SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONNECTED TO PROVIDE AN INDEPENDENT RETURN PATH TO THE EQUIPMENT GROUNDING SOURCES.

B. GROUNDING SYSTEM WILL BE IN ACCORDANCE WITH THE LATEST ACCEPTABLE EDITION OF THE NATIONAL ELECTRICAL CODE AND REQUIREMENTS PER LOCAL INSPECTOR HAVING JURISDICTION.

C. EQUIPMENT GROUNDING CONDUCTOR:

1. EACH EQUIPMENT GROUND CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH THE N.E.C. ARTICLE 250-122.
2. THE MINIMUM SIZE OF EQUIPMENT GROUND CONDUCTOR SHALL BE #12 AWG COPPER.

D. CELLULAR GROUNDING SYSTEM:

PROVIDE THE CELLULAR GROUNDING SYSTEM AS SPECIFIED ON DRAWINGS, INCLUDING, BUT NOT LIMITED TO:

1. GROUND BARS
2. ANTENNA GROUND CONNECTIONS AND PLATES.

E. ALL EQUIPMENT SHALL BE BONDED TO GROUND AS REQUIRED BY N.E.C., MFG. SPECIFICATIONS, AND OWNER'S SPECIFICATIONS.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	12/1?/23	TL	GRD	CONSTRUCTION DRAWINGS - REVISED PER RFDS
0	11/14/23	LM	GRD	CONSTRUCTION DRAWINGS - REVISED RRU MODELS PER NEW RFDS
E	[illegible]	LM	GRD	CONSTRUCTION DRAWINGS - REVISED PER SA REPORT REFERENCE
D	[illegible]	LM	GRD	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT COMMENTS
C	[illegible]	LM	GRD	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT COMMENTS
B	08/10/22	GRD	TL	CONSTRUCTION DRAWINGS - REVISED FOR CLIENT REVIEW
A	06/14/22	[illegible]	GRD	CONSTRUCTION DRAWINGS - ISSUED FOR CLIENT REVIEW

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JOB NO. 22027.04

ELECTRICAL DETAILS AND SPECIFICATIONS

E-1

Sheet No. [illegible] of [illegible]

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

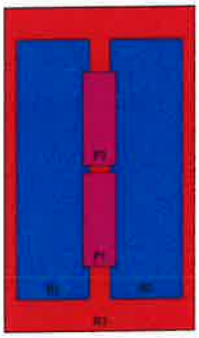
NHHSS-65B-R2BT4

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

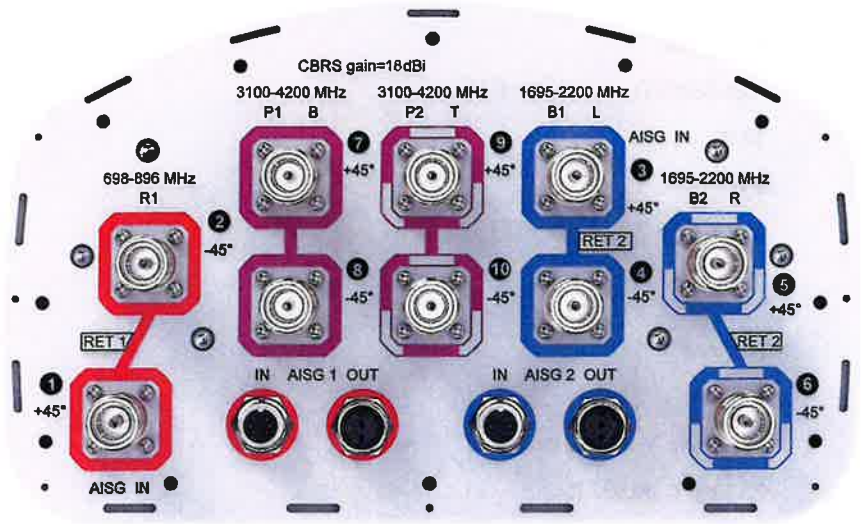


Array ID	Frequency (MHz)	RF Connector	RET (SHET)	AISG No.	AISG RET UID
	698-896	1 - 2	1	AISG1	CPxxxxxxxxxxxxxxR1
	1695-2200	3 - 4	2	AISG2	CPxxxxxxxxxxxxxxB1
	1695-2200	5 - 6			
	3100-4200	7 - 8	N/A	NA	N/A
	3100-4200	9 - 10			

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

Port Configuration

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

COMMSCOPE®

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

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

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

120-ft Existing Flagpole

Proposed Verizon
Antenna Upgrade

Site Ref: Bristol West

1191 Terryville Road
Bristol, CT

Centek Project No. 22027.04

~~Date: August 31, 2022~~
Rev 2: December 11, 2023

Max Stress Ratio = 75%

Prepared for:

Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492

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

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by Verizon Wireless on the existing RF transparent pole (tower) located in in Bristol, CT.

The host tower is a 80-ft tall, two-section, eighteen sided, tapered pole with four (4) 10-ft RF transparent concealment sections (total height 120-ft), originally designed and manufactured by manufactured by Engineered Endeavors Inc.; job no; 14720, dated February 2, 2007. The tower geometry, structure member sizes and foundation system information were obtained from the aforementioned EEI design documents.

Antenna and appurtenance information were obtained from a Verizon RF data sheet.

The tower is made up of two (2) tapered vertical steel section conforming to A572-65 and four (4) 10-ft tall RF transparent concealment sections. The concealment sections are flange connected to each other and to the top of the pole section. The diameter of the pole (flat-flat) is 25.5-in at the top and 37.00-in at the base.

Antenna and Appurtenance Summary

- VERIZON WIRELESS (Existing to Remain):
  Cables: Eighteen (18) 7/8" ∅ coax cables running on the inside of the existing tower.

- **VERIZON WIRELESS (Existing to Remove):**
  Antennas: Three (3) Andrew DBXNH-6565B-VTM panel antennas mounted within the existing RF transparent concealment pole section with a RAD center elevation of 117-ft above grade level.

- **VERIZON WIRELESS (Existing to Remove):**
  Antennas: Three (3) Antel BXA-70063-6CF mounted within the existing RF transparent concealment pole section with a RAD center elevation of 107-ft above grade level.

- **VERIZON WIRELESS (Proposed):**
  Antennas: Three (3) Commscope NHHSS-65B-R2BT0 panel antennas and three (3) Commscope CBC426-DS-43 diplexers within the proposed RF transparent concealment pole section with a RAD center elevation of 117-ft above grade level.

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.
- 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.

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; 120 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]*

[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.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L2)	1.00'-49.58'	37%	**PASS**

Foundation and Anchors

The existing foundation consists of a 6-ft square x 5-ft long reinforced concrete pier on a 12.0-ft square x 3.0-ft thick reinforce concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the original geotechnical EEI design documents. The base of the tower is connected to the foundation by means of (4) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 7-ft into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	9 kips
	Compression	14 kips
	Moment	516 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-H Section 9.4 FS[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Pad and Pier	OTM[2]	1.0	1.87	**PASS**

Note 1: FS denotes Factor of Safety.
Note 2: OTM denotes Overturning Moment.

- 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	Combined Axial and Shear	56.0%	**PASS**
Base Plate	Bending	74.5%	**PASS**

Conclusion

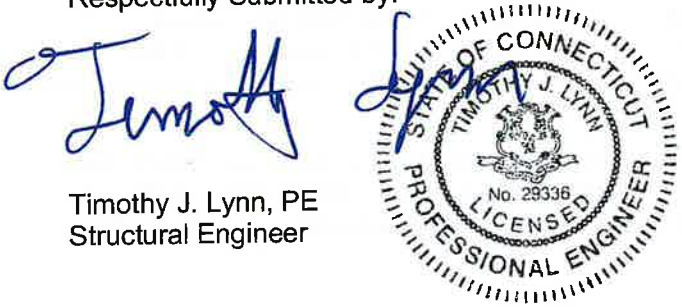
This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

- Replacement of the top two (2) 10-ft concealment canisters with 10-ft x 36" diameter canisters (designed by others) is required to accommodate the proposed antennas.

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:

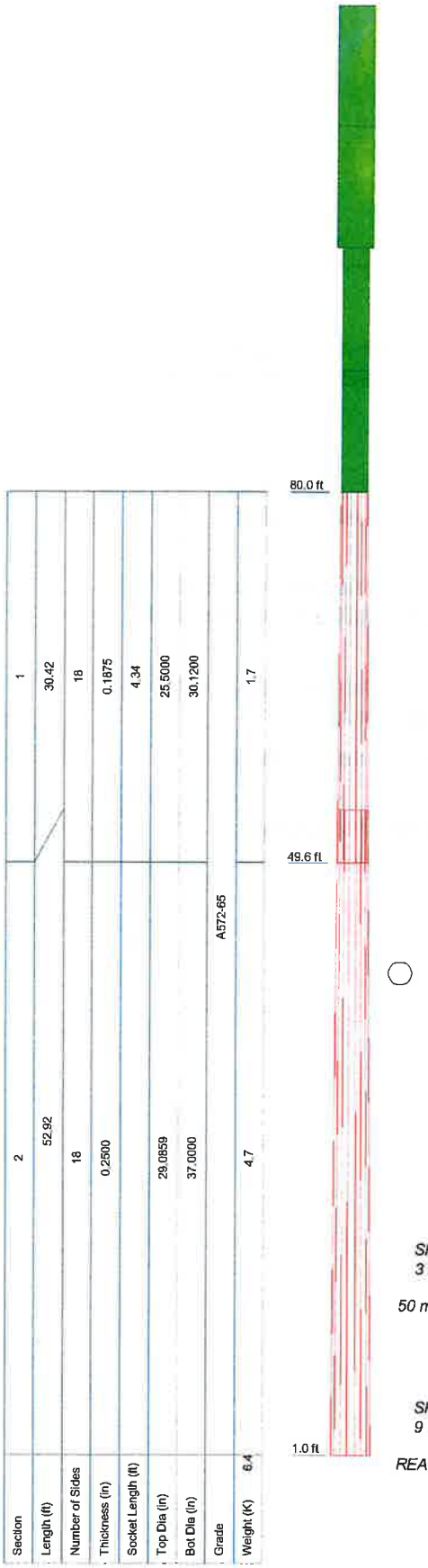
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or 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/ASCE10 & 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.

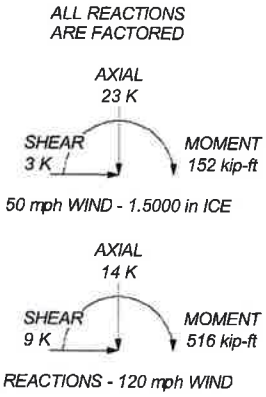
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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.





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
NHHSS-65B-R2B (Verizon Proposed)	117	Pipe 4XX x 10-ft	115
NHHSS-65B-R2B (Verizon Proposed)	117	36-in Dia x 10 Canister (Proposed)	105
NHHSS-65B-R2B (Verizon Proposed)	117	Solid Round 4.5" x 10-ft	105
CBC426T-DS-43 (Verizon Proposed)	117	26-in Dia x 10 Canister	95
CBC426T-DS-43 (Verizon Proposed)	117	Solid Round 6" x 10-ft	95
CBC426T-DS-43 (Verizon Proposed)	117	Solid Round 7" x 10-ft	85
36-in Dia x 10 Canister (Porposed)	115	26-in Dia x 10 Canister	85

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 120 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 II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 37%

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

Job: **22027.04 - Bristol West**			
Project: ***120-ft Flagpole - Bristol, CT***			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA-222-H	Date: 10/13/22	Scale: NTS	
Path:		Dwg No. E-1	

tnxTower	Job	Page
	22027.04 - Bristol West	1 of 19
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Project 120-ft Flagpole - Bristol, CT	Date 09:44:07 10/13/22
	Client Verizon Wireless	Designed by TJL

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: 1.00 ft.
Basic wind speed of 120 mph.
Risk Category II.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.5000 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		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification		Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks		Consider Feed Line Torque
	Always Use Max Kz		Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-H Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-H Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

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

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	80.00-49.58	30.42	4.34	18	25.5000	30.1200	0.1875	0.7500	A572-65 (65 ksi)
L2	49.58-1.00	52.92		18	29.0859	37.0000	0.2500	1.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	25.8645	15.0641	1219.4128	8.9859	12.9540	94.1341	2440.4302	7.5335	4.1580	22.176
	30.5557	17.8136	2016.3904	10.6260	15.3010	131.7820	4035.4340	8.9085	4.9711	26.513
L2	30.1551	22.8813	2403.7177	10.2367	14.7756	162.6813	4810.5983	11.4428	4.6791	18.716
	37.5322	29.1611	4975.7255	13.0463	18.7960	264.7226	9957.9981	14.5833	6.0720	24.288

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 80.00 49.58				1	1	1			
L2 49.58-1.00				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 plf
7/8 (Verizon)	C	No	Yes	Inside Pole	80.00 - 1.00	18	No Ice	0.00	0.54
							1/2" Ice	0.00	0.54
							1" Ice	0.00	0.54
							2" Ice	0.00	0.54

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	80.00-49.58	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.30
L2	49.58-1.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.47

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	80.00-49.58	A	1.604	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.30
L2	49.58-1.00	A	1.462	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.47

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
36-in Dia x 10 Canister (Porposed)	C	None			0.0000	115.00	No Ice	15.56	15.56	0.30
							1/2" Ice	22.30	22.30	0.56
							1" Ice	23.04	23.04	0.83
							2" Ice	24.57	24.57	1.39
36-in Dia x 10 Canister (Proposed)	C	None			0.0000	105.00	No Ice	15.56	15.56	0.30
							1/2" Ice	22.30	22.30	0.56
							1" Ice	23.04	23.04	0.83
							2" Ice	24.57	24.57	1.39
26-in Dia x 10 Canister	C	None			0.0000	95.00	No Ice	11.85	11.85	0.25
							1/2" Ice	16.88	16.88	0.43
							1" Ice	17.58	17.58	0.62
							2" Ice	19.02	19.02	1.03
26-in Dia x 10 Canister	C	None			0.0000	85.00	No Ice	11.85	11.85	0.25
							1/2" Ice	16.88	16.88	0.43
							1" Ice	17.58	17.58	0.62
							2" Ice	19.02	19.02	1.03
Pipe 4XX x 10-ft	C	None			0.0000	115.00	No Ice	0.00	0.00	0.28
							1/2" Ice	0.00	0.00	0.31
							1" Ice	0.00	0.00	0.35
							2" Ice	0.00	0.00	0.44
Soild Round 4.5" x 10-ft	C	None			0.0000	105.00	No Ice	0.00	0.00	0.55
							1/2" Ice	0.00	0.00	0.58
							1" Ice	0.00	0.00	0.62
							2" Ice	0.00	0.00	0.72
Soild Round 6" x 10-ft	C	None			0.0000	95.00	No Ice	0.00	0.00	0.98
							1/2" Ice	0.00	0.00	1.02
							1" Ice	0.00	0.00	1.06
							2" Ice	0.00	0.00	1.18
Soild Round 7" x 10-ft	C	None			0.0000	85.00	No Ice	0.00	0.00	1.35
							1/2" Ice	0.00	0.00	1.40
							1" Ice	0.00	0.00	1.45
							2" Ice	0.00	0.00	1.58
NHHSS-65B-R2B (Verizon Proposed)	A	None			0.0000	117.00	No Ice	0.00	0.00	0.05
							1/2" Ice	0.00	0.00	0.10
							1" Ice	0.00	0.00	0.16
							2" Ice	0.00	0.00	0.29

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
NHHSS-65B-R2B (Verizon Proposed)	B	None		0.0000	117.00	No Ice	0.00	0.00	0.05
						1/2" Ice	0.00	0.00	0.10
						1" Ice	0.00	0.00	0.16
						2" Ice	0.00	0.00	0.29
NHHSS-65B-R2B (Verizon Proposed)	C	None		0.0000	117.00	No Ice	0.00	0.00	0.05
						1/2" Ice	0.00	0.00	0.10
						1" Ice	0.00	0.00	0.16
						2" Ice	0.00	0.00	0.29
CBC426T-DS-43 (Verizon Proposed)	A	None		0.0000	117.00	No Ice	0.00	0.00	0.01
						1/2" Ice	0.00	0.00	0.01
						1" Ice	0.00	0.00	0.02
						2" Ice	0.00	0.00	0.03
CBC426T-DS-43 (Verizon Proposed)	B	None		0.0000	117.00	No Ice	0.00	0.00	0.01
						1/2" Ice	0.00	0.00	0.01
						1" Ice	0.00	0.00	0.02
						2" Ice	0.00	0.00	0.03
CBC426T-DS-43 (Verizon Proposed)	C	None		0.0000	117.00	No Ice	0.00	0.00	0.01
						1/2" Ice	0.00	0.00	0.01
						1" Ice	0.00	0.00	0.02
						2" Ice	0.00	0.00	0.03

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 80.00-49.58	64.56	1.154	40	71.513	A	0.000	71.513	71.513	100.00	0.000	0.000
					B	0.000	71.513		100.00	0.000	0.000
					C	0.000	71.513		100.00	0.000	0.000
L2 49.58-1.00	25.56	0.95	33	137.010	A	0.000	137.010	137.010	100.00	0.000	0.000
					B	0.000	137.010		100.00	0.000	0.000
					C	0.000	137.010		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G 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 80.00-49.58	64.56	1.154	7	1.6041	79.645	A	0.000	79.645	79.645	100.00	0.000	0.000
						B	0.000	79.645		100.00	0.000	0.000
						C	0.000	79.645		100.00	0.000	0.000

Section Elevation	z	K_Z	q_z	t_Z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	in	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
L2 49.58-1.00	25.56	0.95	6	1.4622	149.998	A	0.000	149.998	149.998	100.00	0.000	0.000
						B	0.000	149.998		100.00	0.000	0.000
						C	0.000	149.998		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.100$

Section Elevation	z	K_Z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
L1 80.00-49.58	64.56	1.154	9	71.513	A	0.000	71.513	71.513	100.00	0.000	0.000
					B	0.000	71.513		100.00	0.000	0.000
					C	0.000	71.513		100.00	0.000	0.000
L2 49.58-1.00	25.56	0.95	7	137.010	A	0.000	137.010	137.010	100.00	0.000	0.000
					B	0.000	137.010		100.00	0.000	0.000
					C	0.000	137.010		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K				psf			ft^2	K	plf	
L1 80.00-49.58	0.30	1.70	A	1	0.73	40	1	1	71.513	2.32	76.17	C
			B	1	0.73		1	1	71.513			
			C	1	0.73		1	1	71.513			
L2 49.58-1.00	0.47	4.69	A	1	0.73	33	1	1	137.010	3.60	74.08	C
			B	1	0.73		1	1	137.010			
			C	1	0.73		1	1	137.010			
Sum Weight:	0.77	6.39						OTM	235.65 kip-ft	5.92		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K				psf			ft^2	K	plf	
L1 80.00-49.58	0.30	1.70	A	1	0.73	40	1	1	71.513	2.32	76.17	C
			B	1	0.73		1	1	71.513			
			C	1	0.73		1	1	71.513			
L2 49.58-1.00	0.47	4.69	A	1	0.73	33	1	1	137.010	3.60	74.08	C
			B	1	0.73		1	1	137.010			
			C	1	0.73		1	1	137.010			
Sum Weight:	0.77	6.39						OTM	235.65	5.92		

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2 kip-ft	F K	w plf	Ctrl. Face

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.30	1.70	A	1	0.73	40	1	1	71.513	2.32	76.17	C
80.00-49.58			B	1	0.73		1	1	71.513			
			C	1	0.73		1	1	71.513			
L2 49.58-1.00	0.47	4.69	A	1	0.73	33	1	1	137.010	3.60	74.08	C
			B	1	0.73		1	1	137.010			
			C	1	0.73		1	1	137.010			
Sum Weight:	0.77	6.39						OTM	235.65 kip-ft	5.92		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.30	1.70	A	1	0.73	40	1	1	71.513	2.32	76.17	C
80.00-49.58			B	1	0.73		1	1	71.513			
			C	1	0.73		1	1	71.513			
L2 49.58-1.00	0.47	4.69	A	1	0.73	33	1	1	137.010	3.60	74.08	C
			B	1	0.73		1	1	137.010			
			C	1	0.73		1	1	137.010			
Sum Weight:	0.77	6.39						OTM	235.65 kip-ft	5.92		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.30	3.47	A	1	1.2	7	1	1	79.645	0.74	24.21	C
80.00-49.58			B	1	1.2		1	1	79.645			
			C	1	1.2		1	1	79.645			
L2 49.58-1.00	0.47	7.74	A	1	1.2	6	1	1	148.849	1.12	22.97	C
			B	1	1.2		1	1	148.849			
			C	1	1.2		1	1	148.849			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
Sum Weight:	0.77	11.21						OTM	74.21 kip-ft	1.85		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.30	3.47	A	1	1.2	7	1	1	79.645	0.74	24.21	C
80.00-49.58			B	1	1.2		1	1	79.645			
			C	1	1.2		1	1	79.645			
L2 49.58-1.00	0.47	7.74	A	1	1.2	6	1	1	148.849	1.12	22.97	C
			B	1	1.2		1	1	148.849			
			C	1	1.2		1	1	148.849			
Sum Weight:	0.77	11.21						OTM	74.21 kip-ft	1.85		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.30	3.47	A	1	1.2	7	1	1	79.645	0.74	24.21	C
80.00-49.58			B	1	1.2		1	1	79.645			
			C	1	1.2		1	1	79.645			
L2 49.58-1.00	0.47	7.74	A	1	1.2	6	1	1	148.849	1.12	22.97	C
			B	1	1.2		1	1	148.849			
			C	1	1.2		1	1	148.849			
Sum Weight:	0.77	11.21						OTM	74.21 kip-ft	1.85		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.30	3.47	A	1	1.2	7	1	1	79.645	0.74	24.21	C
80.00-49.58			B	1	1.2		1	1	79.645			
			C	1	1.2		1	1	79.645			
L2 49.58-1.00	0.47	7.74	A	1	1.2	6	1	1	148.849	1.12	22.97	C
			B	1	1.2		1	1	148.849			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
Sum Weight:	0.77	11.21	C	1	1.2		1	1 OTM	148.849 74.21 kip-ft	1.85		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 80.00-49.58	0.30	1.70	A B C	1 1 1	0.73 0.73 0.73	9	1 1 1	1 1 1	71.513 71.513 71.513	0.52	17.04	C
L2 49.58-1.00	0.47	4.69	A B C	1 1 1	0.73 0.73 0.73	7	1 1 1	1 1 1	137.010 137.010 137.010	0.81	16.57	C
Sum Weight:	0.77	6.39						OTM	52.71 kip-ft	1.32		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 80.00-49.58	0.30	1.70	A B C	1 1 1	0.73 0.73 0.73	9	1 1 1	1 1 1	71.513 71.513 71.513	0.52	17.04	C
L2 49.58-1.00	0.47	4.69	A B C	1 1 1	0.73 0.73 0.73	7	1 1 1	1 1 1	137.010 137.010 137.010	0.81	16.57	C
Sum Weight:	0.77	6.39						OTM	52.71 kip-ft	1.32		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 80.00-49.58	0.30	1.70	A B C	1 1 1	0.73 0.73 0.73	9	1 1 1	1 1 1	71.513 71.513 71.513	0.52	17.04	C
L2 49.58-1.00	0.47	4.69	A	1	0.73	7	1	1	137.010	0.81	16.57	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			B	1	0.73		1	1	137.010			
			C	1	0.73		1	1	137.010			
Sum Weight:	0.77	6.39						OTM	52.71 kip-ft	1.32		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.30	1.70	A	1	0.73	9	1	1	71.513	0.52	17.04	C
80.00-49.58			B	1	0.73		1	1	71.513			
			C	1	0.73		1	1	71.513			
L2 49.58-1.00	0.47	4.69	A	1	0.73	7	1	1	137.010	0.81	16.57	C
			B	1	0.73		1	1	137.010			
			C	1	0.73		1	1	137.010			
Sum Weight:	0.77	6.39						OTM	52.71 kip-ft	1.32		

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	6.39					
Bracing Weight	0.00			0.00	0.00	
Total Member Self-Weight	6.39			0.00	0.00	
Total Weight	11.59					
Wind 0 deg - No Ice		0.00	-8.59	-505.02	0.00	0.00
Wind 30 deg - No Ice		4.30	-7.44	-437.36	-252.51	0.00
Wind 45 deg - No Ice		6.08	-6.08	-357.10	-357.10	0.00
Wind 60 deg - No Ice		7.44	-4.30	-252.51	-437.36	0.00
Wind 90 deg - No Ice		8.59	0.00	0.00	-505.02	0.00
Wind 120 deg - No Ice		7.44	4.30	252.51	-437.36	0.00
Wind 135 deg - No Ice		6.08	6.08	357.10	-357.10	0.00
Wind 150 deg - No Ice		4.30	7.44	437.36	-252.51	0.00
Wind 180 deg - No Ice		0.00	8.59	505.02	0.00	0.00
Wind 210 deg - No Ice		-4.30	7.44	437.36	252.51	0.00
Wind 225 deg - No Ice		-6.08	6.08	357.10	357.10	0.00
Wind 240 deg - No Ice		-7.44	4.30	252.51	437.36	0.00
Wind 270 deg - No Ice		-8.59	0.00	0.00	505.02	0.00
Wind 300 deg - No Ice		-7.44	-4.30	-252.51	437.36	0.00
Wind 315 deg - No Ice		-6.08	-6.08	-357.10	357.10	0.00
Wind 330 deg - No Ice		-4.30	-7.44	-437.36	252.51	0.00
Member Ice	4.83					
Total Weight Ice	20.78			0.00	0.00	
Wind 0 deg - Ice		0.00	-2.58	-146.91	0.00	0.00

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 30 deg - Ice		1.29	-2.23	-127.23	-73.46	0.00
Wind 45 deg - Ice		1.82	-1.82	-103.88	-103.88	0.00
Wind 60 deg - Ice		2.23	-1.29	-73.46	-127.23	0.00
Wind 90 deg - Ice		2.58	0.00	0.00	-146.91	0.00
Wind 120 deg - Ice		2.23	1.29	73.46	-127.23	0.00
Wind 135 deg - Ice		1.82	1.82	103.88	-103.88	0.00
Wind 150 deg - Ice		1.29	2.23	127.23	-73.46	0.00
Wind 180 deg - Ice		0.00	2.58	146.91	0.00	0.00
Wind 210 deg - Ice		-1.29	2.23	127.23	73.46	0.00
Wind 225 deg - Ice		-1.82	1.82	103.88	103.88	0.00
Wind 240 deg - Ice		-2.23	1.29	73.46	127.23	0.00
Wind 270 deg - Ice		-2.58	0.00	0.00	146.91	0.00
Wind 300 deg - Ice		-2.23	-1.29	-73.46	127.23	0.00
Wind 315 deg - Ice		-1.82	-1.82	-103.88	103.88	0.00
Wind 330 deg - Ice		-1.29	-2.23	-127.23	73.46	0.00
Total Weight	11.59			0.00	0.00	
Wind 0 deg - Service		0.00	-1.92	-112.97	0.00	0.00
Wind 30 deg - Service		0.96	-1.66	-97.83	-56.48	0.00
Wind 45 deg - Service		1.36	-1.36	-79.88	-79.88	0.00
Wind 60 deg - Service		1.66	-0.96	-56.48	-97.83	0.00
Wind 90 deg - Service		1.92	0.00	0.00	-112.97	0.00
Wind 120 deg - Service		1.66	0.96	56.48	-97.83	0.00
Wind 135 deg - Service		1.36	1.36	79.88	-79.88	0.00
Wind 150 deg - Service		0.96	1.66	97.83	-56.48	0.00
Wind 180 deg - Service		0.00	1.92	112.97	0.00	0.00
Wind 210 deg - Service		-0.96	1.66	97.83	56.48	0.00
Wind 225 deg - Service		-1.36	1.36	79.88	79.88	0.00
Wind 240 deg - Service		-1.66	0.96	56.48	97.83	0.00
Wind 270 deg - Service		-1.92	0.00	0.00	112.97	0.00
Wind 300 deg - Service		-1.66	-0.96	-56.48	97.83	0.00
Wind 315 deg - Service		-1.36	-1.36	-79.88	79.88	0.00
Wind 330 deg - Service		-0.96	-1.66	-97.83	56.48	0.00

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

Comb. No.	Description
20	1.2 Dead+1.0 Wind 210 deg - No Ice
21	0.9 Dead+1.0 Wind 210 deg - No Ice
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	80 - 49.58	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-13.24	0.00	0.00
			Max. Mx	10	-7.25	-157.44	0.00
			Max. My	2	-7.25	0.00	157.44
			Max. Vy	10	4.82	-157.44	0.00
			Max. Vx	2	-4.82	0.00	157.44

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L2	49.58 - 1	Pole	Max. Torque	8			0.00
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-23.38	0.00	0.00
			Max. Mx	10	-13.91	-515.62	0.00
			Max. My	2	-13.91	0.00	515.62
			Max. Vy	10	8.60	-515.62	0.00
			Max. Vx	2	-8.60	0.00	515.62
			Max. Torque	8			0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	35	23.38	0.00	2.58
	Max. H_x	27	10.43	8.59	0.00
	Max. H_z	2	13.91	0.00	8.59
	Max. M_x	2	515.62	0.00	8.59
	Max. M_z	10	515.62	-8.59	0.00
	Max. Torsion	8	0.00	-7.44	4.30
	Min. Vert	7	10.43	-6.08	6.08
	Min. H_x	10	13.91	-8.59	0.00
	Min. H_z	18	13.91	0.00	-8.59
	Min. M_x	18	-515.62	0.00	-8.59
	Min. M_z	26	-515.62	8.59	0.00
	Min. Torsion	12	-0.00	-7.44	-4.30

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	11.59	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	13.91	0.00	-8.59	-515.62	0.00	0.00
0.9 Dead+1.0 Wind 0 deg - No Ice	10.43	0.00	-8.59	-512.90	0.00	0.00
1.2 Dead+1.0 Wind 30 deg - No Ice	13.91	4.30	-7.44	-446.54	-257.81	0.00
0.9 Dead+1.0 Wind 30 deg - No Ice	10.43	4.30	-7.44	-444.19	-256.45	0.00
1.2 Dead+1.0 Wind 45 deg - No Ice	13.91	6.08	-6.08	-364.60	-364.60	0.00
0.9 Dead+1.0 Wind 45 deg - No Ice	10.43	6.08	-6.08	-362.68	-362.68	0.00
1.2 Dead+1.0 Wind 60 deg - No Ice	13.91	7.44	-4.30	-257.81	-446.54	-0.00
0.9 Dead+1.0 Wind 60 deg - No Ice	10.43	7.44	-4.30	-256.45	-444.19	-0.00
1.2 Dead+1.0 Wind 90 deg - No Ice	13.91	8.59	0.00	0.00	-515.62	0.00
0.9 Dead+1.0 Wind 90 deg - No Ice	10.43	8.59	0.00	0.00	-512.90	0.00

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 120 deg - No Ice	13.91	7.44	4.30	257.81	-446.54	0.00
0.9 Dead+1.0 Wind 120 deg - No Ice	10.43	7.44	4.30	256.45	-444.19	0.00
1.2 Dead+1.0 Wind 135 deg - No Ice	13.91	6.08	6.08	364.60	-364.60	0.00
0.9 Dead+1.0 Wind 135 deg - No Ice	10.43	6.08	6.08	362.68	-362.68	0.00
1.2 Dead+1.0 Wind 150 deg - No Ice	13.91	4.30	7.44	446.54	-257.81	-0.00
0.9 Dead+1.0 Wind 150 deg - No Ice	10.43	4.30	7.44	444.19	-256.45	-0.00
1.2 Dead+1.0 Wind 180 deg - No Ice	13.91	0.00	8.59	515.62	0.00	0.00
0.9 Dead+1.0 Wind 180 deg - No Ice	10.43	0.00	8.59	512.90	0.00	0.00
1.2 Dead+1.0 Wind 210 deg - No Ice	13.91	-4.30	7.44	446.54	257.81	0.00
0.9 Dead+1.0 Wind 210 deg - No Ice	10.43	-4.30	7.44	444.19	256.45	0.00
1.2 Dead+1.0 Wind 225 deg - No Ice	13.91	-6.08	6.08	364.60	364.60	0.00
0.9 Dead+1.0 Wind 225 deg - No Ice	10.43	-6.08	6.08	362.68	362.68	0.00
1.2 Dead+1.0 Wind 240 deg - No Ice	13.91	-7.44	4.30	257.81	446.54	-0.00
0.9 Dead+1.0 Wind 240 deg - No Ice	10.43	-7.44	4.30	256.45	444.19	-0.00
1.2 Dead+1.0 Wind 270 deg - No Ice	13.91	-8.59	0.00	0.00	515.62	0.00
0.9 Dead+1.0 Wind 270 deg - No Ice	10.43	-8.59	0.00	0.00	512.90	0.00
1.2 Dead+1.0 Wind 300 deg - No Ice	13.91	-7.44	-4.30	-257.81	446.54	0.00
0.9 Dead+1.0 Wind 300 deg - No Ice	10.43	-7.44	-4.30	-256.45	444.19	0.00
1.2 Dead+1.0 Wind 315 deg - No Ice	13.91	-6.08	-6.08	-364.60	364.60	0.00
0.9 Dead+1.0 Wind 315 deg - No Ice	10.43	-6.08	-6.08	-362.68	362.68	0.00
1.2 Dead+1.0 Wind 330 deg - No Ice	13.91	-4.30	-7.44	-446.54	257.81	-0.00
0.9 Dead+1.0 Wind 330 deg - No Ice	10.43	-4.30	-7.44	-444.19	256.45	-0.00
1.2 Dead+1.0 Ice+1.0 Temp	23.38	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	23.38	0.00	-2.58	-152.45	0.00	0.00
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	23.38	1.29	-2.23	-132.02	-76.22	0.00
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	23.38	1.82	-1.82	-107.80	-107.80	0.00
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	23.38	2.23	-1.29	-76.22	-132.02	-0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	23.38	2.58	0.00	0.00	-152.45	0.00
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	23.38	2.23	1.29	76.22	-132.02	0.00
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	23.38	1.82	1.82	107.80	-107.80	0.00
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	23.38	1.29	2.23	132.02	-76.22	-0.00

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 180 deg+1.0 Ice+1.0 Temp	23.38	0.00	2.58	152.45	0.00	0.00
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	23.38	-1.29	2.23	132.02	76.22	0.00
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	23.38	-1.82	1.82	107.80	107.80	0.00
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	23.38	-2.23	1.29	76.22	132.02	-0.00
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	23.38	-2.58	0.00	0.00	152.45	0.00
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	23.38	-2.23	-1.29	-76.22	132.02	0.00
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	23.38	-1.82	-1.82	-107.80	107.80	0.00
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	23.38	-1.29	-2.23	-132.02	76.22	-0.00
Dead+Wind 0 deg - Service	11.59	0.00	-1.92	-114.94	0.00	0.00
Dead+Wind 30 deg - Service	11.59	0.96	-1.66	-99.54	-57.47	0.00
Dead+Wind 45 deg - Service	11.59	1.36	-1.36	-81.28	-81.28	0.00
Dead+Wind 60 deg - Service	11.59	1.66	-0.96	-57.47	-99.54	0.00
Dead+Wind 90 deg - Service	11.59	1.92	0.00	0.00	-114.94	0.00
Dead+Wind 120 deg - Service	11.59	1.66	0.96	57.47	-99.54	0.00
Dead+Wind 135 deg - Service	11.59	1.36	1.36	81.28	-81.28	0.00
Dead+Wind 150 deg - Service	11.59	0.96	1.66	99.54	-57.47	0.00
Dead+Wind 180 deg - Service	11.59	0.00	1.92	114.94	0.00	0.00
Dead+Wind 210 deg - Service	11.59	-0.96	1.66	99.54	57.47	0.00
Dead+Wind 225 deg - Service	11.59	-1.36	1.36	81.28	81.28	0.00
Dead+Wind 240 deg - Service	11.59	-1.66	0.96	57.47	99.54	0.00
Dead+Wind 270 deg - Service	11.59	-1.92	0.00	0.00	114.94	0.00
Dead+Wind 300 deg - Service	11.59	-1.66	-0.96	-57.47	99.54	0.00
Dead+Wind 315 deg - Service	11.59	-1.36	-1.36	-81.28	81.28	0.00
Dead+Wind 330 deg - Service	11.59	-0.96	-1.66	-99.54	57.47	0.00

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-11.59	0.00	0.00	11.59	0.00	0.000%
2	0.00	-13.91	-8.59	0.00	13.91	8.59	0.000%
3	0.00	-10.43	-8.59	0.00	10.43	8.59	0.000%
4	4.30	-13.91	-7.44	-4.30	13.91	7.44	0.000%
5	4.30	-10.43	-7.44	-4.30	10.43	7.44	0.000%
6	6.08	-13.91	-6.08	-6.08	13.91	6.08	0.000%
7	6.08	-10.43	-6.08	-6.08	10.43	6.08	0.000%
8	7.44	-13.91	-4.30	-7.44	13.91	4.30	0.000%
9	7.44	-10.43	-4.30	-7.44	10.43	4.30	0.000%
10	8.59	-13.91	0.00	-8.59	13.91	0.00	0.000%
11	8.59	-10.43	0.00	-8.59	10.43	0.00	0.000%
12	7.44	-13.91	4.30	-7.44	13.91	-4.30	0.000%
13	7.44	-10.43	4.30	-7.44	10.43	-4.30	0.000%
14	6.08	-13.91	6.08	-6.08	13.91	-6.08	0.000%
15	6.08	-10.43	6.08	-6.08	10.43	-6.08	0.000%
16	4.30	-13.91	7.44	-4.30	13.91	-7.44	0.000%
17	4.30	-10.43	7.44	-4.30	10.43	-7.44	0.000%
18	0.00	-13.91	8.59	0.00	13.91	-8.59	0.000%
19	0.00	-10.43	8.59	0.00	10.43	-8.59	0.000%
20	-4.30	-13.91	7.44	4.30	13.91	-7.44	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
21	-4.30	-10.43	7.44	4.30	10.43	-7.44	0.000%
22	-6.08	-13.91	6.08	6.08	13.91	-6.08	0.000%
23	-6.08	-10.43	6.08	6.08	10.43	-6.08	0.000%
24	-7.44	-13.91	4.30	7.44	13.91	-4.30	0.000%
25	-7.44	-10.43	4.30	7.44	10.43	-4.30	0.000%
26	-8.59	-13.91	0.00	8.59	13.91	0.00	0.000%
27	-8.59	-10.43	0.00	8.59	10.43	0.00	0.000%
28	-7.44	-13.91	-4.30	7.44	13.91	4.30	0.000%
29	-7.44	-10.43	-4.30	7.44	10.43	4.30	0.000%
30	-6.08	-13.91	-6.08	6.08	13.91	6.08	0.000%
31	-6.08	-10.43	-6.08	6.08	10.43	6.08	0.000%
32	-4.30	-13.91	-7.44	4.30	13.91	7.44	0.000%
33	-4.30	-10.43	-7.44	4.30	10.43	7.44	0.000%
34	0.00	-23.38	0.00	0.00	23.38	0.00	0.000%
35	0.00	-23.38	-2.58	0.00	23.38	2.58	0.000%
36	1.29	-23.38	-2.23	-1.29	23.38	2.23	0.000%
37	1.82	-23.38	-1.82	-1.82	23.38	1.82	0.000%
38	2.23	-23.38	-1.29	-2.23	23.38	1.29	0.000%
39	2.58	-23.38	0.00	-2.58	23.38	0.00	0.000%
40	2.23	-23.38	1.29	-2.23	23.38	-1.29	0.000%
41	1.82	-23.38	1.82	-1.82	23.38	-1.82	0.000%
42	1.29	-23.38	2.23	-1.29	23.38	-2.23	0.000%
43	0.00	-23.38	2.58	0.00	23.38	-2.58	0.000%
44	-1.29	-23.38	2.23	1.29	23.38	-2.23	0.000%
45	-1.82	-23.38	1.82	1.82	23.38	-1.82	0.000%
46	-2.23	-23.38	1.29	2.23	23.38	-1.29	0.000%
47	-2.58	-23.38	0.00	2.58	23.38	0.00	0.000%
48	-2.23	-23.38	-1.29	2.23	23.38	1.29	0.000%
49	-1.82	-23.38	-1.82	1.82	23.38	1.82	0.000%
50	-1.29	-23.38	-2.23	1.29	23.38	2.23	0.000%
51	0.00	-11.59	-1.92	0.00	11.59	1.92	0.000%
52	0.96	-11.59	-1.66	-0.96	11.59	1.66	0.000%
53	1.36	-11.59	-1.36	-1.36	11.59	1.36	0.000%
54	1.66	-11.59	-0.96	-1.66	11.59	0.96	0.000%
55	1.92	-11.59	0.00	-1.92	11.59	0.00	0.000%
56	1.66	-11.59	0.96	-1.66	11.59	-0.96	0.000%
57	1.36	-11.59	1.36	-1.36	11.59	-1.36	0.000%
58	0.96	-11.59	1.66	-0.96	11.59	-1.66	0.000%
59	0.00	-11.59	1.92	0.00	11.59	-1.92	0.000%
60	-0.96	-11.59	1.66	0.96	11.59	-1.66	0.000%
61	-1.36	-11.59	1.36	1.36	11.59	-1.36	0.000%
62	-1.66	-11.59	0.96	1.66	11.59	-0.96	0.000%
63	-1.92	-11.59	0.00	1.92	11.59	0.00	0.000%
64	-1.66	-11.59	-0.96	1.66	11.59	0.96	0.000%
65	-1.36	-11.59	-1.36	1.36	11.59	1.36	0.000%
66	-0.96	-11.59	-1.66	0.96	11.59	1.66	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00002221
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00070036
5	Yes	4	0.00000001	0.00046677

6	Yes	4	0.00000001	0.00080521
7	Yes	4	0.00000001	0.00053584
8	Yes	4	0.00000001	0.00070036
9	Yes	4	0.00000001	0.00046677
10	Yes	4	0.00000001	0.00002221
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00070036
13	Yes	4	0.00000001	0.00046677
14	Yes	4	0.00000001	0.00080521
15	Yes	4	0.00000001	0.00053584
16	Yes	4	0.00000001	0.00070036
17	Yes	4	0.00000001	0.00046677
18	Yes	4	0.00000001	0.00002221
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00070036
21	Yes	4	0.00000001	0.00046677
22	Yes	4	0.00000001	0.00080521
23	Yes	4	0.00000001	0.00053584
24	Yes	4	0.00000001	0.00070036
25	Yes	4	0.00000001	0.00046677
26	Yes	4	0.00000001	0.00002221
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00070036
29	Yes	4	0.00000001	0.00046677
30	Yes	4	0.00000001	0.00080521
31	Yes	4	0.00000001	0.00053584
32	Yes	4	0.00000001	0.00070036
33	Yes	4	0.00000001	0.00046677
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00046650
36	Yes	4	0.00000001	0.00049597
37	Yes	4	0.00000001	0.00050541
38	Yes	4	0.00000001	0.00049597
39	Yes	4	0.00000001	0.00046650
40	Yes	4	0.00000001	0.00049597
41	Yes	4	0.00000001	0.00050541
42	Yes	4	0.00000001	0.00049597
43	Yes	4	0.00000001	0.00046650
44	Yes	4	0.00000001	0.00049597
45	Yes	4	0.00000001	0.00050541
46	Yes	4	0.00000001	0.00049597
47	Yes	4	0.00000001	0.00046650
48	Yes	4	0.00000001	0.00049597
49	Yes	4	0.00000001	0.00050541
50	Yes	4	0.00000001	0.00049597
51	Yes	4	0.00000001	0.00000001
52	Yes	4	0.00000001	0.00000001
53	Yes	4	0.00000001	0.00000001
54	Yes	4	0.00000001	0.00000001
55	Yes	4	0.00000001	0.00000001
56	Yes	4	0.00000001	0.00000001
57	Yes	4	0.00000001	0.00000001
58	Yes	4	0.00000001	0.00000001
59	Yes	4	0.00000001	0.00000001
60	Yes	4	0.00000001	0.00000001
61	Yes	4	0.00000001	0.00000001
62	Yes	4	0.00000001	0.00000001
63	Yes	4	0.00000001	0.00000001
64	Yes	4	0.00000001	0.00000001
65	Yes	4	0.00000001	0.00000001
66	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	80 - 49.58	3.603	55	0.3925	0.0000
L2	53.92 - 1	1.730	55	0.2833	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
117.00	NHHSS-65B-R2B	55	3.603	0.3925	0.0000	42150
115.00	36-in Dia x 10 Canister	55	3.603	0.3925	0.0000	42150
105.00	36-in Dia x 10 Canister	55	3.603	0.3925	0.0000	42150
95.00	26-in Dia x 10 Canister	55	3.603	0.3925	0.0000	42150
85.00	26-in Dia x 10 Canister	55	3.603	0.3925	0.0000	42150

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	80 - 49.58	16.174	2	1.7616	0.0000
L2	53.92 - 1	7.768	2	1.2722	0.0000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
117.00	NHHSS-65B-R2B	2	16.174	1.7616	0.0000	9400
115.00	36-in Dia x 10 Canister	2	16.174	1.7616	0.0000	9400
105.00	36-in Dia x 10 Canister	2	16.174	1.7616	0.0000	9400
95.00	26-in Dia x 10 Canister	2	16.174	1.7616	0.0000	9400
85.00	26-in Dia x 10 Canister	2	16.174	1.7616	0.0000	9400

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	80 - 49.58 (1)	TP30.12x25.5x0.1875	30.42	0.00	0.0	17.4213	-7.25	1019.15	0.007
L2	49.58 - 1 (2)	TP37x29.0859x0.25	52.92	0.00	0.0	29.1611	-13.91	1705.93	0.008

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	80 - 49.58 (1)	TP30.12x25.5x0.1875	157.44	660.78	0.238	0.00	660.78	0.000
L2	49.58 - 1 (2)	TP37x29.0859x0.25	515.62	1425.51	0.362	0.00	1425.51	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	80 - 49.58 (1)	TP30.12x25.5x0.1875	4.82	305.74	0.016	0.00	783.81	0.000
L2	49.58 - 1 (2)	TP37x29.0859x0.25	8.60	511.78	0.017	0.00	1647.09	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	80 - 49.58 (1)	0.007	0.238	0.000	0.016	0.000	0.246 ✔	1.000	4.8.2 ✔
L2	49.58 - 1 (2)	0.008	0.362	0.000	0.017	0.000	0.370 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	80 - 49.58	Pole	TP30.12x25.5x0.1875	1	-7.25	1019.15	24.6	Pass
L2	49.58 - 1	Pole	TP37x29.0859x0.25	2	-13.91	1705.93	37.0	Pass
							Summary	
						Pole (L2)	37.0	Pass
						RATING =	**37.0**	**Pass**

Program Version 8.1.1.0 - 6/3/2021 File:J:/Jobs/2202700.WI/04_Bristol W CT/05_Structural/Tower Analysis/Backup Documentation/Rev (1)/Calcs/ERI Files/120-ft Flagpole Bristol, CT.eri

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P: (203) 488-0580
F: (203) 488-8587

Subject:	Anchor Bolt and Baseplate Analysis
Location:	120-FT EEI RF Transparent Flagpole Bristol, CT
Rev. 1: 10/13/22	Prepared by: T.J.L. Checked by: C.F.C. Job No. 22027.04

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 516·ft·kips	(Input From tnxTower)
Shear Force =	Shear := 9·kips	(Input From tnxTower)
Axial Force =	Axial := 14·kips	(Input From tnxTower)

Anchor Bolt Data:

ASTMA615 Grade 75

Number of Anchor Bolts =	N := 4	(User Input)
Diameter of Bolt Circle =	D_{BC} := 45·in	(User Input)
Bolt "Column" Distance =	l := 3.0·in	(User Input)
Bolt Ultimate Strength =	F_u := 100·ksi	(User Input)
Bolt Yield Strength =	F_y := 75·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Anchor Bolts =	D := 2.25·in	(User Input)
Threads per Inch =	n := 4.5	(User Input)

Base Plate Data:

Plate Yield Strength =	F_{yf} := 60·ksi	(User Input)
Base Plate Thickness =	t_{TP} := 1.75·in	(User Input)
Base Plate Diameter =	D_{OD} := 51·in	(User Input)
Outer Pole Diameter =	D_T := 37·in	(User Input)
Pole Wall Thickness =	t_T := 0.25·in	(User Input)
Pole Design Yield Strength =	F_{yp} := 65·ksi	(User Input)
	η := 0.5	

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

	d_1 := 22.5in	(User Input)
	d_2 := 0in	(User Input)

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia = $I_p := d_1^2 \cdot 2 + d_2^2 \cdot 4 = 1.012 \times 10^3 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 2.033 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.508 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.826 \cdot in^3$

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_1}{I_p} - \frac{Axial}{N} = 134.1 \cdot kips$

Maximum Compressive Force = $C_{Max} := OM \cdot \frac{d_1}{I_p} + \frac{Axial}{N} = 141.1 \cdot kips$

Maximum Shear Force = $V_{Max} := \frac{Shear}{N} = 2.3 \cdot kips$

Design Tensile Strength = $\Phi R_{nt} := 0.8 \cdot F_u \cdot A_n = 259.815 \cdot k$

Bolt % of Capacity = $\frac{\left(C_{Max} + \frac{V_{Max}}{\eta}\right)}{\Phi R_{nt}} \cdot 100 = 56$

Condition1 = $Condition1 := if\left[\frac{\left(C_{Max} + \frac{V_{Max}}{\eta}\right)}{\Phi R_{nt}} \le 1.00, "OK", "Overstressed"\right]$

Condition1 = "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 = $D_e := D_T + w_1 = 37.25 \cdot in$

Effective Base Plate Outside Diameter = $D_{oe} := \begin{cases} D_{OD} & \text{if } D_{OD} \le (D_{BC} + 6 \cdot t_{TP}) \\ (D_{BC} + 6 \cdot t_{TP}) & \text{otherwise} \end{cases} = 51 \cdot in$

Half-Angle Between Radial Lines Extending from Pole Centerline Through Midpoints Between Adjacent Anchor Rods = $\theta_1 := \frac{\pi}{N} = 0.785$

Angle Defining Limiting Effective Base Plate Width Based on Plate Thickness = $\theta_2 := \operatorname{asin}\left(\frac{12 \cdot t_{TP}}{D_{BC}}\right) = 0.486$

Angle Defining Limiting Effective Base Plate Width Based on Distance Between Anchor Rod Bolt Circle and Effective Pole Outside Diameter = $\theta_3 := \operatorname{acos}\left(\frac{D_{BC} + D_e}{2 \cdot D_{BC}}\right) = 0.418$

Governing Angle Defining Effective Base Plate Width Resisting Bending = $\theta := \min(\theta_1, \theta_2, \theta_3) = 0.418$

Effective Moment Arm of Anchor Rod Force = $x := 0.5 \cdot (D_{BC} - D_e) = 3.875 \cdot in$

Effective Base Plate Width Resisting Bending from Transverse Bend Line = $B_{et} := D_{BC} \cdot \sin(\theta) = 18.268 \cdot in$

Effective Base Plate Width Resisting Bending from Radial Bend Lines = $B_{er} := (D_{oe} - D_e) \cdot \sin(\theta) = 5.582 \cdot in$

Total Effective Base Plate Width Resisting Bending = $B_{eff} := B_{et} + B_{er} = 23.85 \cdot in$

Required Base Plate Thickness = $t_{TP.Req} := \sqrt{\frac{4 \cdot C_{Max} \cdot x}{\phi_b \cdot F_{yf} \cdot B_{eff}}} = 1.303 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 74.5 \cdot \%$

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

Condition2 = "Ok"

Required Base Plate Thickness = $t_{TP.Req} := \frac{\phi_b \cdot t_T \cdot F_{yp}}{\phi_v \cdot 0.6 \cdot F_{yf}} = 0.406 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 23.2 \cdot \%$

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

Condition3 = "Ok"

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P:(203) 488-0580
F:(203) 488-8587

Subject:

Location:

Rev. 1: 10/13/22

FOUNDATION ANALYSIS

120-ft EEI RF Transparent Flagpole
Bristol, CT

Prepared by: T.J.L Checked by: C.F.C.
Job no. 22027.04

Standard Monopole Foundation:

Input Data:

Tower Data			
Overturning Moment =	$OM := 516 \cdot ft \cdot kips$	(User Input)	
Shear Force =	$Shear := 9 \cdot kip$	(User Input)	
Axial Force =	$Axial := 14 \cdot kip$	(User Input)	
Tower Height =	$H_t := 120 \cdot ft$	(User Input)	
Footing Data:			
Overall Depth of Footing =	$D_f := 7 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 5 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 1 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 6 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 3 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 12 \cdot ft$	(User Input)	
Anchor Bolt Data:			
Length of Anchor Bolts=	$L_{st} := 96 \cdot in$	(User Input)	
Projection of Anchor Bolts Above Pier =	$A_{BP} := 12.0 \cdot in$	(User Input)	
Anchor Bolt Diameter =	$d_{anchor} := 2.25 \cdot in$	(User Input)	
Base Plate Bolt Circle =	$MP := 45 \cdot in$	(User Input)	
Material Properties:			
Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment 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 =	$\Phi_s := 30 \cdot deg$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_u := 12000 \cdot psf$	(User Input)	
Allowable Soil Bearing Capacity =	$q_a := \frac{q_u}{2} = 6000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 100 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(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)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.00 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 36$	(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 =	$d_{Tie} := 0.5 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 8$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.00 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 10$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.00 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 10$	(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 =

$$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.785 \cdot in^2$$

Pad Top Reinforcement Bar Area =

$$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.785 \cdot in^2$$

Pad Bottom Reinforcement Bar Area =

$$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.785 \cdot in^2$$

Coefficient of Lateral Soil Pressure =

$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$$

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P: (203) 488-0580
F: (203) 488-8587

Subject: FOUNDATION ANALYSIS

Location: 120-ft EEI RF Transparent Flagpole
Bristol, CT

Rev. 1: 10/13/22

Prepared by: T.J.L Checked by: C.F.C.
Job no. 22027.04

Stability of Footing:

Adjusted Concrete Unit Weight =

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

Adjusted Soil Unit Weight =

$\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 100 \cdot pcf$

Passive Pressure =

$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.2 \cdot ksf$

$P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.2 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.1 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.65 \cdot ksf$

$T_p := \text{if}[n < (D_f - T_f), T_f, (D_f - n)] = 3$

$A_p := W_f \cdot T_p = 36$

Ultimate Shear =

$S_u := P_{ave} \cdot A_p = 59.4 \cdot kip$

Weight of Concrete Pad =

$WT_c := \left[\left(W_f^2 \cdot T_f\right) + d_p^2 L_p\right] \cdot \gamma_c = 91.8 \cdot kip$

Weight of Soil Above Footing =

$WT_{s1} := \left[\left(W_f^2 - d_p^2\right) \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 43.2 \cdot kip$

Weight of Soil Wedge at Back Face =

$WT_{s2} := \left(\frac{D_f^2 \cdot \tan(\Phi_s)}{2} \cdot W_f\right) \cdot \gamma_s = 16.974 \cdot kip$

Weight of Soil Wedge at back face Corners =

$WT_{s3} := 2 \cdot \left[(D_f)^3 \cdot \frac{\tan(\Phi_s)}{3}\right] \cdot \gamma_s = 13.202 \cdot kips$

Total Weight =

$WT_{tot} := WT_c + WT_{s1} + Axial = 149 \cdot kip$

Resisting Weight =

$WT_R := 0.9 \cdot WT_c + 0.75 \cdot WT_{s1} + 0.75 \cdot Axial = 125.52 \cdot kip$

Resisting Moment =

$M_r := (WT_R) \cdot \frac{W_f}{2} + 0.75 \cdot S_u \cdot \frac{T_f}{3} + 0.75 \cdot \left[(WT_{s2} + WT_{s3}) \cdot \left(W_f + \frac{D_f \cdot \tan(\Phi_s)}{3}\right)\right] = 1100 \cdot kip \cdot ft$

Overturning Moment =

$M_{ot} := OM + Shear \cdot (L_p + T_f) = 588 \cdot kip \cdot ft$

Factor of Safety Actual =

$FS := \frac{M_r}{M_{ot}} = 1.87$

Factor of Safety Required =

$FS_{req} := 1$

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

OverTurning_Moment_Check = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier =

$$S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 126.45 \cdot kips$$

Shear_Check := if(S_p > Shear, "Okay", "No Good")

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat =

$$A_{mat} := W_f^{\,2} = 144$$

Section Modulus of Mat =

$$S := \frac{W_f^{\,3}}{6} = 288 \cdot ft^3$$

Maximum Pressure in Mat =

$$P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 3.076 \cdot ksf$$

Max_Pressure_Check := if(P_max < .75·q_u, "Okay", "No Good")

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat =

$$P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -1.007 \cdot ksf$$

Min_Pressure_Check := if[(P_min ≥ 0)·(P_min < .75·q_u), "Okay", "No Good"]

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution =

$$X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} + \frac{1}{3} = 3.014$$

Distance to Kern =

$$X_k := \frac{W_f}{6} = 2$$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity =

$$e := \frac{M_{ot}}{WT_{tot}} = 3.946$$

Adjusted Soil Pressure =

$$P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \left(\frac{W_f}{2} - e\right)} = 4.031 \cdot ksf$$

$$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 4.031 \cdot ksf$$

Pressure_Check := if(q_adj < .75·q_u, "Okay", "No Good")

Pressure_Check = "Okay"

Concrete Bearing Capacity:

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

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 8.998 \times 10^3 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if(P_b > Axial, "Okay", "No Good")$

Bearing_Check = "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)

$d := T_f - Cvr_{pad} - d_{bbot} = 2.667$

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

$d_2 := d_1 - d$

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

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

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

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

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

Beam_Shear_Check = "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 = $b_o := \left(d_p + d\right) \cdot \pi = 27.2$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot \left(d_p + d\right)^2}{4} = 59$

Area Outside of Perimeter = $A_{out} := A_{mat} - A_{bo} = 85$

Guess Value = $v_u := 1ksf$ (From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{WT_{tot}}{\pi \cdot v_u}$

$v_u := \text{Find}(v_u) = 2.1 \cdot ksf$

$V_u := v_u \cdot d \cdot W_f = 65.7 \cdot kips$

Required Shear Strength = $V_{req} := V_u = 65.7 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 2248.2 \cdot kip$ (ACI-2008 11.11.2.1)

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

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

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

$q_b := q_{adj} - d_1 \cdot Slope = 2.068 \cdot ksf$

Maximum Bending at Face of Pier = $M_n := \frac{1}{\phi_m} \cdot \left[(q_{adj} - q_b) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f = 202.6 \cdot kip \cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000 \right)}{1000} \right] \cdot 0.5 \right] & \text{otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$R_n := \frac{M_n}{W_f \cdot d^2} = 16.5 \cdot psi$

$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_n}{0.85 \cdot f_c}} \right) = 0.0003$

$\rho_{min} := \rho = 0.00028$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases}$$ (ACI-2008 7.12.2.1)

Check Bottom Bars:

$$As := \begin{cases} \rho_{min} \cdot W_f \cdot d & \text{if } \rho_{min} > \frac{\rho_{sh}}{2} \\ \rho_{sh} \cdot W_f \cdot \frac{d}{2} & \text{otherwise} \end{cases} = 4.147 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 7.9 \cdot in^2$$

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

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := \rho_{sh} \cdot \left(W_f \cdot \frac{d}{2}\right) = 4.1 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 7.9 \cdot in^2$$

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

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 14.22 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 3 \cdot in$$

Transverse Reinforcement Index =

$$k_{tr} := 0$$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 23.7 \cdot in$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot in$$ (ACI-2008 12.2.1)

$$L_{dbtCheck} := if(L_{dbt} \geq L_{dbmin}, "Use L.dbt", "Use L.dbmin")$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - Cvr_{pad} = 33 \cdot in$$

$$Lpad\_Check := if(L_{Pad} > L_{dbt}, "Okay", "No Good")$$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Bar Spacing In Pier =

$$B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 5.283 \cdot in$$

Diameter of Reinforcement Cage =

$$Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 66 \cdot in$$

Maximum Moment in Pier =

$$M_p := \left[OM + Shear \cdot \left(L_p + \frac{A_{BP}}{2} \right) \right] = 6786 \cdot in \cdot kips$$

Pier Check evaluated from outside program and results are listed below;

$$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu} \right) := \left(d_p \cdot 12 \;\; NB_{pier} \;\; BS_{pier} \;\; \frac{Axial \cdot 1.333}{kips} \;\; \frac{M_p}{in \cdot kips} \right)$$

$$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu} \right) = (72 \;\; 36 \;\; 8 \;\; 18.7 \;\; 6786)$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho \right) := (0 \;\; 0 \;\; 0 \;\; 0)$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho \right) := \phi P'_n\left(D, N, n, P_u, M_{xu} \right)^T$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho \right) = (130.6 \;\; 47499 \;\; -60 \;\; 0)$$

$$Axial\_Load\_Check := if\left(\phi P_n \geq P_u, "Okay", "No\ Good" \right)$$

Axial_Load_Check = "Okay"

$$Bending\_Check := if\left(\phi M_{xn} \geq M_{xu}, "Okay", "No\ Good" \right)$$

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 57 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 33 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 2.642 \cdot in$

Transverse Reinforcement = $k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 26.93 \cdot in$

Minimum Development Length = $L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 13.282 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right)$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 18.974 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 18 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 18.974 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

verizon
fuze | RFDS

NORTHEAST > North East > New England > New England West > BRISTOL W CT

RF Submit by: Brauer, Mark - mark.brauer2@verizonwireless.com - 12/5/2023, 6:56:03 AM

EE Submit by: , - -

Project Details

FUZE Project ID: 16244074
Project Name: 5G L-Sub6 - Carrier Add
Project Alt Name: BRISTOL W CT - MKT 64 - MODIFICATION
Project Type: Modification
Modification Type: RF
Designed Sector Carrier 4G: 18
Designed Sector Carrier 5G: 3
Additional Sector Carrier 4G: N/A
Additional Sector Carrier 5G: N/A
FP Solution Type & Tech Type: MODIFICATION;5G_L-Sub6
Carrier Aggregation: false
MPT Id:
eCIP-0: false
Suffix:

Location Information

Site ID: 323493
E-NodeB ID: 0649402,064062
MDG Location ID: 5000104018
PSLC: 468212
Switch Name: Wallingford 1
Tower Owner:
Tower Type: Monopole
Site Type: MACRO
Site Sub Type: TRADITIONAL
Street Address: 1191 Terryville Road
City: Bristol
State: CT
Zip Code: 06010
County: Hartford
Latitude: 41.674286 / 41° 40' 27.4296" N
Longitude: -72.988092 / 72° 59' 17.1312" W

RFDS Project Scope: C Band add
8T C band RRH in 4tx mode only no calibration port connection
legacy LTE in 2x mode only
Remove any coax that is not 7/8 and replace with 7/8 to make room. Any additional un used Verizon coax can be removed.
1 antenna per sector in upper 117' section, remove any antennas in lower 107' section (keep leased for future expansion)
Place diplexers and RRHs outside of shelter on wall by coax port.
update 03/28/2022 - update RRH location to shelter
Update 09/20/2023 - update for latest RRHs and spectrum
Update 12/05/2023 - RRH location to shelter again and added plumbing diagram

Antenna Summary

Added

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
LTE	LTE 5G	LTE	LTE	5G	COMMSCOPE	NHHSS-65B-R2BT4	117	120	150(B) 270(C) 30(A)		false	PHYSICAL	3	000000001900055945

Removed

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
		LTE	LTE		ANDREW	DBXNH-6565B-VTM	117	120	30(01) 135(02) 265(03)		false	PHYSICAL	3	
LTE	LTE 5G				AMPHENOL	BXA-70063-6CF	107	110	20(01) 150(02) 265(03) 20(0172) 150(0173) 265(0174)		false	PHYSICAL	3	

Retained

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID

No data available.

Added: 3 Retained: 0

Equipment Summary

Added

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
RRU	Shelter	LTE	LTE 5G				SAMSUNG ELECTRONIC AMERICA INC	SFG-ARR57201VZ			PHYSICAL	3	1900473027
RRU	Shelter					5G	SAMSUNG ELECTRONIC AMERICA INC	SFG-ARR11T01VZ			PHYSICAL	3	1900068425
Diplexer	Tower						COMMSCOPE	CBC426-DS-43			PHYSICAL	3	000000001900084
Diplexer	Shelter						COMMSCOPE	CBC1923T-DS-43			PHYSICAL	3	000000001900084
Coaxial Cables	Tower						N/A	7/8" Coax			PHYSICAL	18	

Removed

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
RRU	Tower	LTE	LTE 5G				SAMSUNG ELECTRONIC AMERICA INC	SLS-BR04C4ECEX			PHYSICAL	6	1900068503
Coaxial Cables	Tower						N/A	remove if not 7/8"			PHYSICAL	18	

Retained

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
RRU	Tower			LTE	LTE		SAMSUNG ELECTRONIC AMERICA INC	SLS-BR0497EAEX			PHYSICAL	3	1900167303

Service Info

700 MHz LTE

	0000			5GLS		
Sector	**01**	**02**	**03**	**01**	**02**	**03**
Azimuth	20	150	265	30	150	270
Cell / ENode B ID	064062	064062	064062	064062	064062	064062
Antenna Model	BXA-70063-6CF	BXA-70063-6CF	BXA-70063-6CF	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4
Antenna Make	AMPHENOL	AMPHENOL	AMPHENOL	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	107	107	107	117	117	117
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	5	5	2	5	5	2
Tip Height	110	110	110	120	120	120
Regulatory Power	139.88	139.88	139.88	57.62	57.62	57.62
DLEARFCN	5230	5230	5230	5230	5230	5230
Channel Bandwidth(MHz)	10	10	10	10	10	10
Total ERP (W)	1258.93	1258.93	1258.93	518.56	518.56	518.56
TMA Make						
TMA Model						
RRU Make	Samsung	Samsung	Samsung	Samsung	Samsung	Samsung
RRU Model	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx, Rx Lines	2,2	2,2	2,2	2,2	2,2	2,2
Position				1	1	1
Transmitter Id	1958922	1958933	1958935	7841337	7841340	7841342
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

850 MHz LTE

	0000			5GLS		
Sector	**01**	**02**	**03**	**01**	**02**	**03**
Azimuth	20	150	265	30	150	270
Cell / ENode B ID	064062	064062	064062	064062	064062	064062
Antenna Model	BXA-70063-6CF	BXA-70063-6CF	BXA-70063-6CF	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4
Antenna Make	AMPHENOL	AMPHENOL	AMPHENOL	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	107	107	107	117	117	117
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	5	5	2	5	5	2
Tip Height	110	110	110	120	120	120
Regulatory Power	184.84	184.84	184.84	129.3	129.3	129.3
DLEARFCN	2450	2450	2450	2450	2450	2450
Channel Bandwidth(MHz)	10	10	10	10	10	10
Total ERP (W)	831.76	831.76	831.76	581.84	581.84	581.84
TMA Make						
TMA Model						
RRU Make	Samsung	Samsung	Samsung	Samsung	Samsung	Samsung
RRU Model	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx, Rx Lines	2,2	2,2	2,2	2,2	2,2	2,2
Position				1	1	1
Transmitter Id	1956153	1956154	1957016	11965729	11965730	11965731
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

850 MHz 5GNR

		0000			5GLS	
Sector	**0172**	**0173**	**0174**	**0172**	**0173**	**0174**
Azimuth	20	150	265	30	150	270
Cell / ENode B ID	0649402	0649402	0649402	0649402	0649402	0649402
Antenna Model	BXA-70063-6CF	BXA-70063-6CF	BXA-70063-6CF	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4
Antenna Make	AMPHENOL	AMPHENOL	AMPHENOL	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	107	107	107	117	117	117
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	5	5	2	5	5	2
Tip Height	110	110	110	120	120	120
Regulatory Power	184.84	184.84	184.84	129.3	129.3	129.3
DLEARFCN	2450	2450	2450	2450	2450	2450
Channel Bandwidth(MHz)	10	10	10	10	10	10
Total ERP (W)	831.76	831.76	831.76	581.84	581.84	581.84
TMA Make						
TMA Model						
RRU Make	Samsung	Samsung	Samsung	Samsung	Samsung	Samsung
RRU Model	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx, Rx Lines	2,2	2,2	2,2	2,2	2,2	2,2
Position				1	1	1
Transmitter Id	1956153	1956154	1957016	11965729	11965730	11965731
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

1900 MHz LTE

		0000			5GLS	
Sector	**01**	**02**	**03**	**01**	**02**	**03**
Azimuth	30	135	265	30	150	270
Cell / ENode B ID	064062	064062	064062	064062	064062	064062
Antenna Model	DBXNH-6565B-VTM	DBXNH-6565B-VTM	DBXNH-6565B-VTM	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4
Antenna Make	ANDREW	ANDREW	ANDREW	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	117	117	117	117	117	117
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	2	2	2	5	5	0
Tip Height	120	120	120	120	120	120
Regulatory Power	240.3	240.3	240.3	188.61	188.61	188.61
DLEARFCN	1050	1050	1050	1050	1050	1050
Channel Bandwidth(MHz)	10	10	10	10	10	10
Total ERP (W)	1318.26	1318.26	1318.26	1034.67	1034.67	1034.67
TMA Make						
TMA Model						
RRU Make	Samsung	Samsung	Samsung	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)
Number of Tx, Rx Lines	2,2	2,2	2,2	2,2	2,2	2,2
Position				1	1	1
Transmitter Id	4407243	4407244	4407245	10666762	10666763	10666764
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

2100 MHz LTE

	0000			5GLS		
Sector	**01**	**02**	**03**	**01**	**02**	**03**
Azimuth	30	135	265	30	150	270
Cell / ENode B ID	064062	064062	064062	064062	064062	064062
Antenna Model	DBXNH-6565B-VTM	DBXNH-6565B-VTM	DBXNH-6565B-VTM	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4
Antenna Make	ANDREW	ANDREW	ANDREW	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	117	117	117	117	117	117
Mechanical Down-Tilt(Deg.)	0	0	0	0	0	0
Electrical Down-Tilt	2	2	2	5	5	0
Tip Height	120	120	120	120	120	120
Regulatory Power	96.77	96.77	96.77	105.81	105.81	105.81
DLEARFCN	2050	2050	2050	2050	2050	2050
Channel Bandwidth(MHz)	20	20	20	20	20	20
Total ERP (W)	1061.7	1061.7	1061.7	1160.91	1160.91	1160.91
TMA Make						
TMA Model						
RRU Make	Samsung	Samsung	Samsung	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)	B2/B66A RRH-BR049 (RFV01U-D1A)
Number of Tx, Rx Lines	2,2	2,2	2,2	2,2	2,2	2,2
Position				1	1	1
Transmitter Id	1958932	1958934	1958936	10666867	10666868	10666869
Source	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API	ATOLL_API

nL-Sub6

				5GLS		
Sector				**0172**	**0173**	**0174**
Azimuth				30	150	270
Cell / ENode B ID				0649402	0649402	0649402
Antenna Model				NHHSS-65B-R2BT4	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4
Antenna Make				COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)				117	117	117
Mechanical Down-Tilt(Deg.)				0	0	0
Electrical Down-Tilt				4	4	4
Tip Height				120	120	120
Regulatory Power				90.99	90.99	90.99
DLEARFCN				650006, 655324	650006, 655324	650006, 655324
Channel Bandwidth(MHz)				100,60	60,100	100,60
Total ERP (W)				4215.02	4215.02	4215.02
TMA Make						
TMA Model						
RRU Make				Samsung	Samsung	Samsung
RRU Model				RT-8808-77A	RT-8808-77A	RT-8808-77A
Number of Tx, Rx Lines				2,2	2,2	2,2
Position				1	1	1
Transmitter Id				7841403	7841404	7841405
Source				ATOLL_API	ATOLL_API	ATOLL_API

Service Comments

Callsigns Per Antenna

Sector	Antenna Make	Antenna Model	Ant CL Height AGL	Tip Height	Azimuth (TN)	Elec Tilt	Mech Tilt	Gain	Beam Width	Regulatory Power	Callsigns								
											700	850	1900	2100	28 GHz	31 GHz	39 GHz	CBRS	LSub6
0173	COMMSCOPE	NHHSS-65B-R2BT4	117	120	150	5	0	12.85	62	129.3 - PSD		KNKA404							
0174	COMMSCOPE	NHHSS-65B-R2BT4	117	120	270	4	0	14.65	65	90.99									WRNE581 WRNE582 WRNE583 WRNE584 WRNE585
02	COMMSCOPE	NHHSS-65B-R2BT4	117	120	150	5	0	15.25	63	188.61			KNLH251 WPOJ730						
02	COMMSCOPE	NHHSS-65B-R2BT4	117	120	150	5	0	15.75	65	105.81				WQGA906 WQGB276					
01	COMMSCOPE	NHHSS-65B-R2BT4	117	120	30	5	0	15.75	65	105.81				WQGA906 WQGB276					
01	COMMSCOPE	NHHSS-65B-R2BT4	117	120	30	5	0	12.35	65	57.62	WQJQ689								
0172	COMMSCOPE	NHHSS-65B-R2BT4	117	120	30	4	0	14.65	65	90.99									WRNE581 WRNE582 WRNE583 WRNE584 WRNE585
03	COMMSCOPE	NHHSS-65B-R2BT4	117	120	270	2	0	12.35	65	57.62	WQJQ689								
01	COMMSCOPE	NHHSS-65B-R2BT4	117	120	30	5	0	15.25	63	188.61			KNLH251 WPOJ730						
02	COMMSCOPE	NHHSS-65B-R2BT4	117	120	150	5	0	12.85	62	129.3 - PSD		KNKA404							
0174	COMMSCOPE	NHHSS-65B-R2BT4	117	120	270	2	0	12.85	62	129.3 - PSD		KNKA404							
01	COMMSCOPE	NHHSS-65B-R2BT4	117	120	30	5	0	12.85	62	129.3 - PSD		KNKA404							
0172	COMMSCOPE	NHHSS-65B-R2BT4	117	120	30	4	0	14.65	65	90.99									WRNE585 WRNE586 WRNE587 WRNE588
02	COMMSCOPE	NHHSS-65B-R2BT4	117	120	150	5	0	12.35	65	57.62	WQJQ689								
03	COMMSCOPE	NHHSS-65B-R2BT4	117	120	270	2	0	12.85	62	129.3 - PSD		KNKA404							
03	COMMSCOPE	NHHSS-65B-R2BT4	117	120	270	0	0	15.55	67	105.81				WQGA906 WQGB276					
0174	COMMSCOPE	NHHSS-65B-R2BT4	117	120	270	4	0	14.65	65	90.99									WRNE585 WRNE586 WRNE587 WRNE588
03	COMMSCOPE	NHHSS-65B-R2BT4	117	120	270	0	0	15.05	62	188.61			KNLH251 WPOJ730						
0172	COMMSCOPE	NHHSS-65B-R2BT4	117	120	30	5	0	12.85	62	129.3 - PSD		KNKA404							

0173	COMMSCOPE	NHHSS-65B-R2BT4	117	120	150	4	0	14.65	65	90.99	WRNE581 WRNE582 WRNE583 WRNE584 WRNE585
0173	COMMSCOPE	NHHSS-65B-R2BT4	117	120	150	4	0	14.65	65	90.99	WRNE585 WRNE586 WRNE587 WRNE588

Callsigns

Callsign	Market	Radio Code	Market Number	Block	State	County	Licensee Name	Wholly Owned	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs /Sq MI	Status	Action	Approved for Insvc
WRLD514	D09003 - Hartford, CT	PL	D09003	0	9003	Hartford	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000-3650.000	.000-.000	.000-.000	.000-.000		501	1223.64	Active		Yes
WRHD610	New York, NY	UU	PEA001	M10	9003	Hartford	Cellco Partnership	Yes	100.000	38500.000-38600.000	.000-.000	.000-.000	.000-.000		0	1223.64	Active		Yes
WRHD615	New York, NY	UU	PEA001	M6	9003	Hartford	Cellco Partnership	Yes	100.000	38100.000-38200.000	.000-.000	.000-.000	.000-.000		0	1223.64	Active		Yes
WRNE582	New York, NY	PM	PEA001	A2	9003	Hartford	Cellco Partnership	Yes	20.000	3720.000-3740.000	.000-.000	.000-.000	.000-.000	90.99	1640	1223.64	Active	added	Yes
WRNE588	New York, NY	PM	PEA001	B3	9003	Hartford	Cellco Partnership	Yes	20.000	3840.000-3860.000	.000-.000	.000-.000	.000-.000	90.99	1640	1223.64	Active	added	Yes
WQGA906	New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-	AW	BEA010	B	9003	Hartford	Cellco Partnership	Yes	20.000	1720.000-1730.000	2120.000-2130.000	.000-.000	.000-.000	105.81	1640	1223.64	Active	added	Yes
WQJQ689	Northeast	WU	REA001	C	9003	Hartford	Cellco Partnership	Yes	22.000	746.000-757.000	776.000-787.000	.000-.000	.000-.000	57.62	1000	1223.64	Active	added	Yes
KNKA404	Hartford-New Britain-Bristol, CT	CL	CMA032	A	9003	Hartford	Cellco Partnership	Yes	25.000	824.000-835.000	869.000-880.000	845.000-846.500	890.000-891.500	129.3 - PSD	400	1223.64	Active	added	Yes
WQGB276	Hartford-New Britain-Bristol, CT	AW	CMA032	A	9003	Hartford	Cellco Partnership	Yes	20.000	1710.000-1720.000	2110.000-2120.000	.000-.000	.000-.000	105.81	1640	1223.64	Active	added	Yes
WRNE586	New York, NY	PM	PEA001	B1	9003	Hartford	Cellco Partnership	Yes	20.000	3800.000-3820.000	.000-.000	.000-.000	.000-.000	90.99	1640	1223.64	Active	added	Yes
WRNE585	New York, NY	PM	PEA001	A5	9003	Hartford	Cellco Partnership	Yes	20.000	3780.000-3800.000	.000-.000	.000-.000	.000-.000	90.99	1640	1223.64	Active	added	Yes
WRHD618	New York, NY	UU	PEA001	M9	9003	Hartford	Cellco Partnership	Yes	100.000	38400.000-38500.000	.000-.000	.000-.000	.000-.000		0	1223.64	Active		Yes
WRNE581	New York, NY	PM	PEA001	A1	9003	Hartford	Cellco Partnership	Yes	20.000	3700.000-3720.000	.000-.000	.000-.000	.000-.000	90.99	1640	1223.64	Active	added	Yes
WRNE584	New York, NY	PM	PEA001	A4	9003	Hartford	Cellco Partnership	Yes	20.000	3760.000-3780.000	.000-.000	.000-.000	.000-.000	90.99	1640	1223.64	Active	added	Yes
WRHD614	New York, NY	UU	PEA001	M5	9003	Hartford	Cellco Partnership	Yes	100.000	38000.000-38100.000	.000-.000	.000-.000	.000-.000		0	1223.64	Active		Yes
KNLH251	Hartford, CT	CW	BTA184	F	9003	Hartford	Cellco Partnership	Yes	10.000	1890.000-1895.000	1970.000-1975.000	.000-.000	.000-.000	188.61	1640	1223.64	Active	added	Yes
WRLD513	D09003 - Hartford, CT	PL	D09003	0	9003	Hartford	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000-3650.000	.000-.000	.000-.000	.000-.000		501	1223.64	Active		Yes
WRBA709	Hartford, CT	UU	BTA184	L2	9003	Hartford	Cellco Partnership	Yes	325.000	27925.000-28050.000	28150.000-28350.000	.000-.000	.000-.000		0	1223.64	Active		Yes
WRHD613	New York, NY	UU	PEA001	M4	9003	Hartford	Cellco Partnership	Yes	100.000	37900.000-38000.000	.000-.000	.000-.000	.000-.000		0	1223.64	Active		Yes
WRHD619	New York, NY	UU	PEA001	N1	9003	Hartford	Cellco Partnership	Yes	100.000	38600.000-38700.000	.000-.000	.000-.000	.000-.000		0	1223.64	Active		Yes

WRHD612	New York, NY	UU	PEA001	M3	9003	Hartford	Cellco Partnership	Yes	100.000	37800.000-37900.000	.000-.000	.000-.000	.000-.000		0	1223.64	Active		Yes
WRLD515	D09003 - Hartford, CT	PL	D09003	0	9003	Hartford	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000-3650.000	.000-.000	.000-.000	.000-.000		501	1223.64	Active		Yes
WRHD617	New York, NY	UU	PEA001	M8	9003	Hartford	Cellco Partnership	Yes	100.000	38300.000-38400.000	.000-.000	.000-.000	.000-.000		0	1223.64	Active		Yes
WPOJ730	*Hartford, CT*	*CW*	*BTA184*	*C*	*9003*	*Hartford*	*Cellco Partnership*	*Yes*	*10.000*	*1895.000-1900.000*	*1975.000-1980.000*	*.000-.000*	*.000-.000*	*188.61*	*1640*	*1223.64*	*Active*	*added*	*Yes*
WRNE583	*New York, NY*	*PM*	*PEA001*	*A3*	*9003*	*Hartford*	*Cellco Partnership*	*Yes*	*20.000*	*3740.000-3760.000*	*.000-.000*	*.000-.000*	*.000-.000*	*90.99*	*1640*	*1223.64*	*Active*	*added*	*Yes*
WRHD616	New York, NY	UU	PEA001	M7	9003	Hartford	Cellco Partnership	Yes	100.000	38200.000-38300.000	.000-.000	.000-.000	.000-.000		0	1223.64	Active		Yes
WRHD611	New York, NY	UU	PEA001	M2	9003	Hartford	Cellco Partnership	Yes	100.000	37700.000-37800.000	.000-.000	.000-.000	.000-.000		0	1223.64	Active		Yes
WRNE587	*New York, NY*	*PM*	*PEA001*	*B2*	*9003*	*Hartford*	*Cellco Partnership*	*Yes*	*20.000*	*3820.000-3840.000*	*.000-.000*	*.000-.000*	*.000-.000*	*90.99*	*1640*	*1223.64*	*Active*	*added*	*Yes*
WRHD609	New York, NY	UU	PEA001	M1	9003	Hartford	Cellco Partnership	Yes	100.000	37600.000-37700.000	.000-.000	.000-.000	.000-.000		0	1223.64	Active		Yes
WRBA708	Hartford, CT	UU	BTA184	L1	9003	Hartford	Cellco Partnership	Yes	325.000	27500.000-27600.000	27700.000-27925.000	.000-.000	.000-.000		0	1223.64	Active		Yes

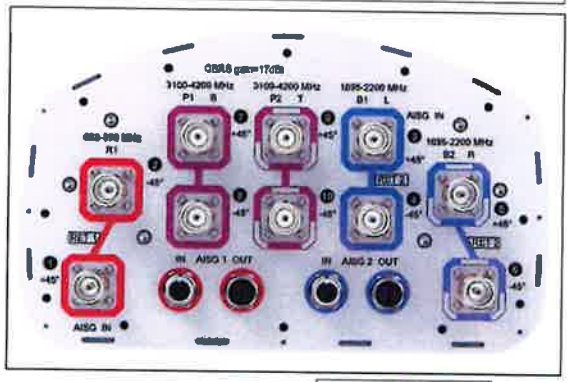
Comments:

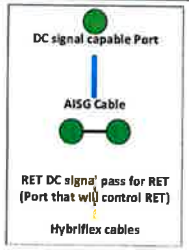
Diagram shows configuration as viewed from below antennas.

Antennas will be installed in that order from left to right as viewed from behind.

Cap and weatherproof unused antenna ports.

All plumbing diagram colors are irrelevant except for AISG & Hybriflex cable. (For the coax colors follow Coax Colors guide above)





CENTEK engineering

Centered on Solutions℠

Analysis Report

Antenna Mount Analysis

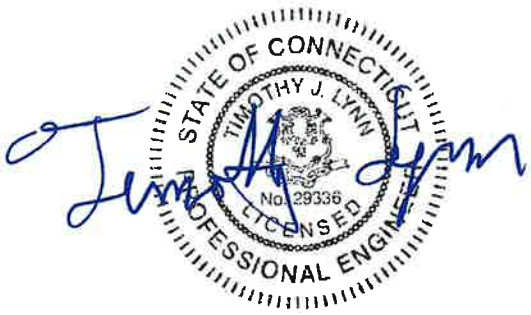
Verizon Site #: Bristol West

1191 Terryville Road
Bristol, CT

Centek Project No. 22027.04

~~Date: August 31, 2022~~
Rev 2: December 11, 2023

Max Stress Ratio = 53%



Prepared for:

Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492

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

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CENTEK engineering

Centered on Solutions℠

December 11, 2023

Mrs. Danielle Sabourin
Airosmith Development
318 West Avenue
Saratoga Springs, NY 12866

Re: Structural Letter ~ Antenna Mount
Verizon – Site Ref: Bristol West
1191 Terryville Road
Bristol, CT 06010

Centek Project No. 22027.04

Dear Mrs. Sabourin,

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 proposed mount, consisting of three (3) pipe masts to support the proposed/existing 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:**
  Pipe Masts: Three (3) Commscope NHHSS-65B-R2BT4 panel antennas and three (3) Commscope CBC426-DS-43 diplexers mounted on three (3) pipe masts within the concealment flagpole with a RAD center elevation of 117 ft +/- AGL.

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

A structural analysis of tower and foundation needs to be completed prior to any work.

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. 28336
LICENSED
PROFESSIONAL ENGINEER

CENTEK Engineering, Inc.
Structural Analysis – Mount Analysis
Verizon Site Ref. ~ Bristol West
Bristol, CT
Rev 2 ~ December 11, 2023

Section 2 - Calculations

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P: (203) 488-0580
F: (203) 488-8587

Subject:	TIA-222-H Loads
Location:	Bristol, CT
Rev. 1: 10/13/22	Prepared by: T.J.L. Checked by: C.F.C. Job No. 22027.04

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

Wind Speeds

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

Input

Structure Type =	Structure_Type := Flexible		(User Input)
Structure Category =	SC := II		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	$h := 120$	ft	(User Input)
Height to Center of Antennas =	$z_{ant} := 117$	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)
Topograpic Factor =	$K_{zt} := 1.0$		(User Input)
Shielding Factor for Appurtenances =	$K_a := 1.0$		(User Input)
Rooftop Wind Speed-up Factor =	$K_s := 1.0$		(User Input)
Ground Elevation Factor =	$K_e = 0.996$		(User Input)
Gust Response Factor =	$G_H = 1.35$		(User Input)

Output

Wind Direction Probability Factor = $K_d := 0.95$ (Per Table 2-2 of TIA-222-H)

Importance Factors = (Per Table 2-3 of TIA-222-H)

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

$$I_{Seismic} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.25 & \text{if } SC = 3 \\ 1.50 & \text{if } SC = 4 \end{cases} = 1$$

$$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.135 \qquad t_{iz} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.702$$

Velocity Pressure Coefficient Antennas = $Kz_{ant} := 2.01\left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.308$

Velocity Pressure w/o Ice Antennas = $qz_{ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V^2 = 45.611$

Velocity Pressure with Ice Antennas = $qz_{ice.ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_i^2 = 7.919$

Velocity Pressure with Ice Antennas = $qz_m := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_m^2 = 2.851$

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Commscope NHHSS-65B-R2BT0		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height=	$L_{app} := 71.9$	in	(User Input)
Appurtenance Width =	$W_{app} := 11.8$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 7.1$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 55$	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 =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 493$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 3.5$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 297$	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 =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 116$	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 =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 80$	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 =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 31$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 3.5$	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 =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 6024$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 6004$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 195$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 195$	lbs

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P: (203) 488-0580
F: (203) 488-8587

Subject:	TIA-222-H Loads
Location:	Bristol, CT
Rev. 1: 10/13/22	Prepared by: T.J.L. Checked by: C.F.C. Job No. 22027.04

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Commscope CBC426-DS-43		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 5.984$	in	(User Input)
Appurtenance Width =	$W_{app} := 4.764$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 2.224$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 5$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.3$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without Ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.2$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 15$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 7$	lbs

Wind Load (with Ice)

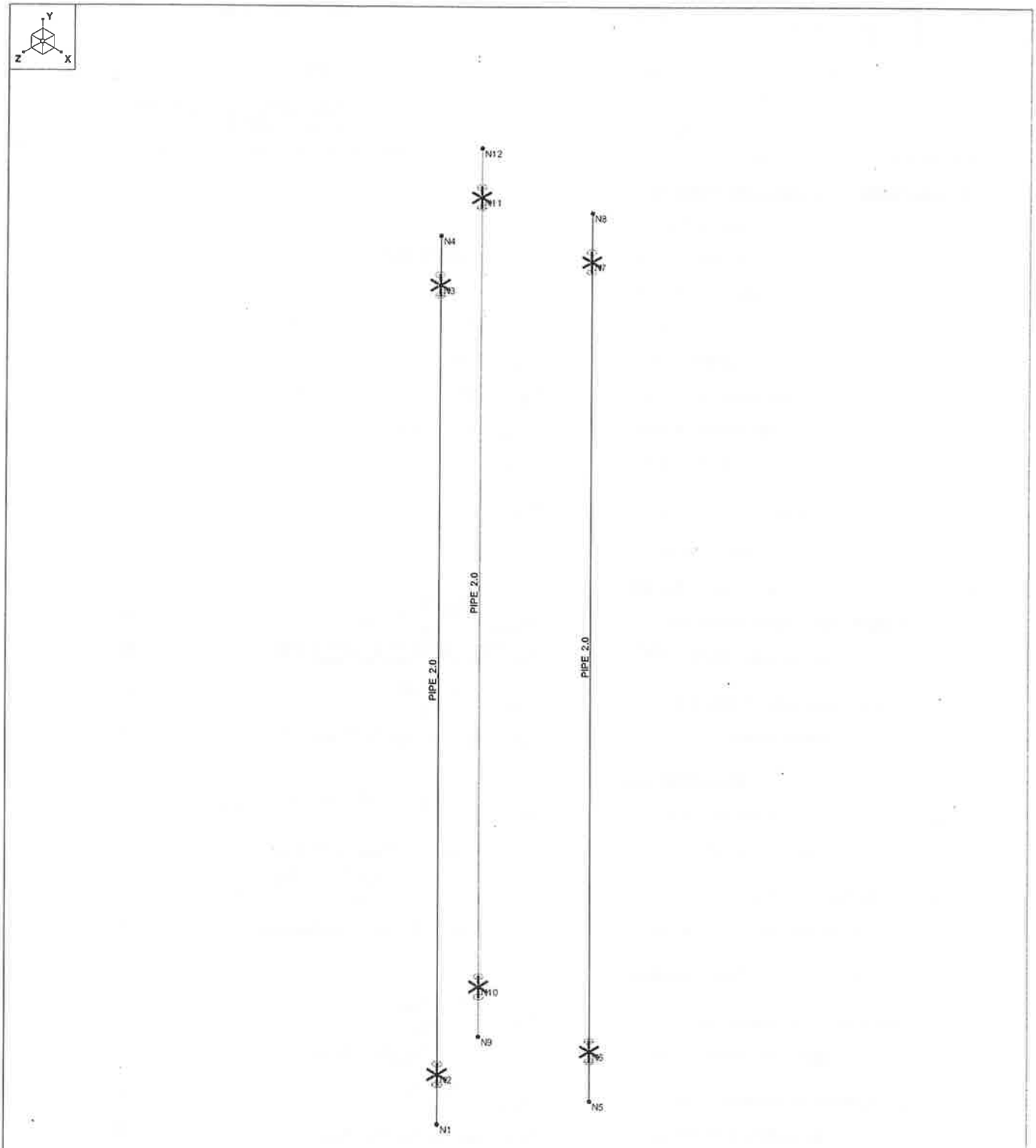
Surface Area for One Appurtenance w/ Ice (Front) =	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 0.5$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 7$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 0.4$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 5$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.2$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 1$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 0$	lbs

Gravity Loads (Ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 63$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 368$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot ld = 12$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 12$	lbs



Centek		
TJL	Bristol West	Oct 13, 2022 at 10:32 AM
22027.04	Member Framing	Mount.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI S100-10: ASD
Wood Code	AWC NDS-12: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	ACI 530-11: ASD
Aluminum Code	AA ADM1-10: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

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

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	1
Cd X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	150.001
Footing Concrete f'c (ksi)	4
Footing Concrete Ec (ksi)	3644
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	2
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	(P) Antenna Mast Pipe...	PIPE_2.0	Column	Wide Flange	A53 Grade B	Typical	1.02	.627	.627	1.25

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	(P) Antenna Mast P...	9			Lbyy						Lateral
2	M2	(P) Antenna Mast P...	9			Lbyy						Lateral
3	M3	(P) Antenna Mast P...	9			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
1	M1	N1	N4			(P) Antenna Mast Pipe_2...	Column	Wide Flan...	A53 Grade B	Typical
2	M2	N5	N8			(P) Antenna Mast Pipe_2...	Column	Wide Flan...	A53 Grade B	Typical
3	M3	N9	N12			(P) Antenna Mast Pipe_2...	Column	Wide Flan...	A53 Grade B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	.75	0	
2	N2	0	.5	.75	0	
3	N3	0	8.5	.75	0	
4	N4	0	9	.75	0	
5	N5	0.649519	0	-.375	0	
6	N6	0.649519	.5	-.375	0	
7	N7	0.649519	8.5	-.375	0	
8	N8	0.649519	9	-.375	0	
9	N9	-0.649519	0	-.375	0	
10	N10	-0.649519	.5	-.375	0	
11	N11	-0.649519	8.5	-.375	0	
12	N12	-0.649519	9	-.375	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N2	Reaction	Reaction	Reaction		Reaction	
2	N3	Reaction	Reaction	Reaction		Reaction	
3	N6	Reaction	Reaction	Reaction		Reaction	
4	N7	Reaction	Reaction	Reaction		Reaction	
5	N10	Reaction	Reaction	Reaction		Reaction	
6	N11	Reaction	Reaction	Reaction		Reaction	

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.055	%50
2	M2	Y	-.055	%50
3	M3	Y	-.055	%50

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.195	%50
2	M2	Y	-.195	%50
3	M3	Y	-.195	%50

Member Point Loads (BLC 4 : Lm Maintenance Load (500lb))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.5	%50
2	M2	Y	-.5	%50
3	M3	Y	-.5	%50

Member Point Loads (BLC 6 : Wind with Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.116	%50
2	M2	X	.116	%50
3	M3	X	.116	%50

Member Point Loads (BLC 7 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.493	%50
2	M2	X	.493	%50
3	M3	X	.493	%50

Member Point Loads (BLC 8 : Wm Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.031	%50
2	M2	X	.031	%50
3	M3	X	.031	%50

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Z	.116	%50
2	M2	Z	.116	%50
3	M3	Z	.116	%50

Member Point Loads (BLC 10 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Z	.493	%50
2	M2	Z	.493	%50
3	M3	Z	.493	%50

Member Point Loads (BLC 11 : Wm Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Z	.031	%50
2	M2	Z	.031	%50
3	M3	Z	.031	%50

Member Distributed Loads

Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft,..	End Location[ft,...
No Data to Print ...					

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	None		-1						
2	Dead Load	None					3			
3	Ice Load	None					3			
4	Lm Maintenance Load (500lb)	None					3			
5	Lv Maintenance Load (250lb)	None								
6	Wind with Ice X	None					3			
7	Wind X	None					3			
8	Wm Wind X	None					3			
9	Wind with Ice Z	None					3			
10	Wind Z	None					3			
11	Wm Wind Z	None					3			

Load Combinations

	Description	So...	P...	S...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
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-dir...	Yes	Y		1	1.2	2	1.2	7	1														
4	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	6	1												
5	1.2D +1.5Lm+ 1.0...	Yes	Y		1	1.2	2	1.2	4	1.5	8	1												
6	1.2D + 1.0W (Z-dir...	Yes	Y		1	1.2	2	1.2	10	1														
7	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	9	1												
8	1.2D +1.5Lm+ 1.0...	Yes	Y		1	1.2	2	1.2	4	1.5	11	1												

Envelope Joint Reactions

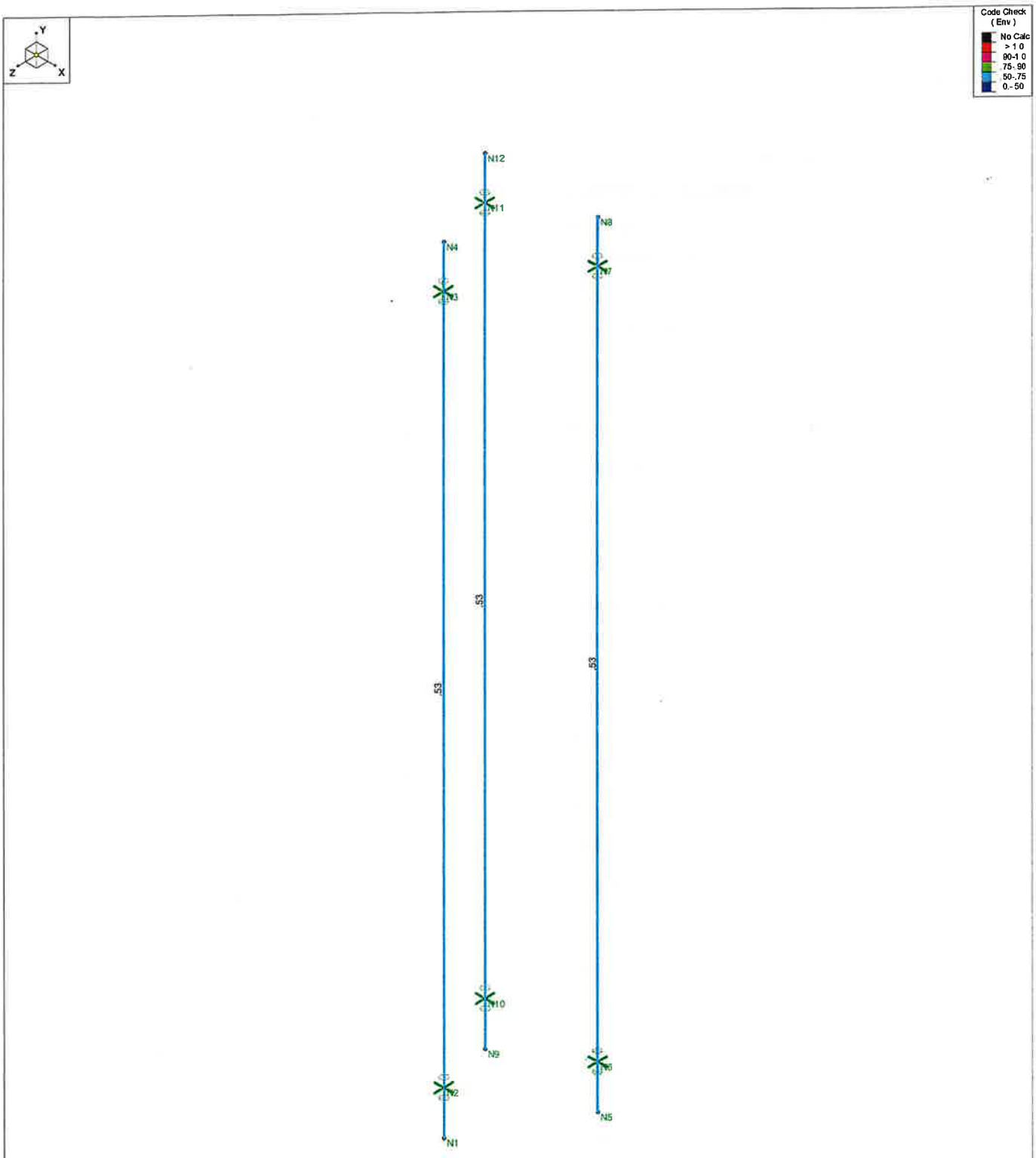
	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N2	max	0	8	.427	8	0	5	0	8	0	8	0	8
2		min	-.247	3	.052	2	-.247	6	0	1	0	1	0	1
3	N3	max	0	8	.427	8	0	5	0	8	0	8	0	8
4		min	-.246	3	.052	2	-.246	6	0	1	0	1	0	1
5	N6	max	0	8	.427	8	0	5	0	8	0	8	0	8
6		min	-.247	3	.052	2	-.247	6	0	1	0	1	0	1
7	N7	max	0	8	.427	8	0	5	0	8	0	8	0	8
8		min	-.246	3	.052	2	-.246	6	0	1	0	1	0	1
9	N10	max	0	8	.427	8	0	5	0	8	0	8	0	8
10		min	-.247	3	.052	2	-.247	6	0	1	0	1	0	1
11	N11	max	0	8	.427	8	0	5	0	8	0	8	0	8
12		min	-.246	3	.052	2	-.246	6	0	1	0	1	0	1
13	Totals:	max	0	8	2.56	8	0	5						
14		min	-1.479	3	.31	2	-1.479	6						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
1	N1	max	0	8	0	8	0	5	1.952e-02	6	0	8	0	8
2		min	-.117	3	0	1	-.117	6	0	1	0	1	-1.952e-02	3
3	N2	max	0	8	0	8	0	8	1.952e-02	6	0	8	0	8
4		min	0	1	0	1	0	1	0	1	0	1	-1.952e-02	3
5	N3	max	0	8	0	8	0	8	0	5	0	8	1.952e-02	3
6		min	0	1	0	1	0	1	-1.952e-02	6	0	1	0	1
7	N4	max	0	8	0	8	0	5	0	5	0	8	1.952e-02	3
8		min	-.117	3	0	1	-.117	6	-1.952e-02	6	0	1	0	1
9	N5	max	0	8	0	8	0	5	1.952e-02	6	0	8	0	8
10		min	-.117	3	0	1	-.117	6	0	1	0	1	-1.952e-02	3
11	N6	max	0	8	0	8	0	8	1.952e-02	6	0	8	0	8
12		min	0	1	0	1	0	1	0	1	0	1	-1.952e-02	3
13	N7	max	0	8	0	8	0	8	0	5	0	8	1.952e-02	3
14		min	0	1	0	1	0	1	-1.952e-02	6	0	1	0	1
15	N8	max	0	8	0	8	0	5	0	5	0	8	1.952e-02	3
16		min	-.117	3	0	1	-.117	6	-1.952e-02	6	0	1	0	1
17	N9	max	0	8	0	8	0	5	1.952e-02	6	0	8	0	8
18		min	-.117	3	0	1	-.117	6	0	1	0	1	-1.952e-02	3
19	N10	max	0	8	0	8	0	8	1.952e-02	6	0	8	0	8
20		min	0	1	0	1	0	1	0	1	0	1	-1.952e-02	3
21	N11	max	0	8	0	8	0	8	0	5	0	8	1.952e-02	3
22		min	0	1	0	1	0	1	-1.952e-02	6	0	1	0	1
23	N12	max	0	8	0	8	0	5	0	5	0	8	1.952e-02	3
24		min	-.117	3	0	1	-.117	6	-1.952e-02	6	0	1	0	1

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

	Memb...	Shape	Code Check	L...	LC	Sh...L...	Dir	...phi*P...	phi*Pn...	phi*Mn y-y [k-ft]	phi*...Cb	Eqn
1	M1	PIPE 2.0	.527	4.5	6	.026 .5..	6	12.144	32.13	1.872	1.872 1	H1..
2	M2	PIPE 2.0	.527	4.5	6	.026 .5..	6	12.144	32.13	1.872	1.872 1	H1..
3	M3	PIPE 2.0	.527	4.5	6	.026 .5..	6	12.144	32.13	1.872	1.872 1	H1..



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek	Bristol West	
TJL		Oct 13, 2022 at 10:32 AM
22027.04	Unity Check	Mount.r3d

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P:(203) 488-0580
F:(203) 488-8587

Subject:	Connection to Host Building
Location:	Bristol, CT
Rev. 1: 10/13/22	Prepared by: T.J.L. Checked by: C.F.C. Job No. 22027.04

Antenna Mast Connection:

Anchor Data:

A307 Threaded Rod =

Number of Anchor Bolts = $N := 2$ (User Input)

Diameter of Bolts = $D := 0.5in$ (User Input)

Bolt Spacing Horz = $Sp_H := 0in$ (User Input)

Bolt Spacing Vertical = $Sp_V := 0in$ (User Input)

Design Tension = $T_n := 8.82 \cdot kips$ (User Input)

Design Shear = $V_n := 5.29 \cdot kips$ (User Input)

Design Reactions:

Shear X = $Shear_x := 0.25 \cdot kips$ (User Input)

Shear Y = $Shear_y := 0.43 \cdot kips$ (User Input)

Shear Z = $Shear_z := 0.25 \cdot kips$ (User Input)

Moment X = $Mx := 0 \cdot ft \cdot kips$ (User Input)

Moment Y = $My := 0 \cdot ft \cdot kips$ (User Input)

Moment Z = $Mz := 0 \cdot ft \cdot kips$ (User Input)

Anchor Check:

Max Tension Force = $$T_{Max} := \frac{Shear_x}{N} + \frac{My}{Sp_H \cdot \frac{N}{2}} + \frac{Mz}{Sp_V \cdot \frac{N}{2}} = 125lb$$

Max Shear Force = $$V_{Max} := \frac{Shear_y + Shear_z}{N} + \frac{Mx}{Sp_H \cdot \frac{N}{2}} = 340lb$$

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

% of Capacity = $$\max\left[\frac{T_{Max}}{T_n}, \frac{V_{Max}}{V_n}, \left(\frac{\frac{T_{Max}}{T_n} + \frac{V_{Max}}{V_n}}{1.0}\right)\right] = 7.8 \cdot \%$$

ATTACHMENT 4

Location	BRISTOL W CT				
Date	1/11/2024				
Band	C-Band	AWS	PCS	850	700
Operating Frequency (MHz)	3,700	2,145	1,970	869	746
General Population MPE (mW/cm^2)	1	1	1	0.57933333	0.49733333
ERP Per Transmitter (Watts)	4,216	1,161	1,035	582	519
Number of Transmitters	4	4	4	4	4
Antenna Centerline (CL) (feet)	117	117	117	117	117
Total ERP (Watts)	16,864	4,644	4,140	2,328	2,076
Total ERP (dBm)	72	67	66	64	63
Maximum % of General Population Limit	8.5%				

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Section 1.1310 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

MHz = Megahertz
mW/cm^2 = milliwatts per square centimeter
ERP = Effective Radiated Power

Absolute worst case maximum values used, including the following assumptions:
1. closest accessible point is distance from antenna to base of pole;
2. continuous transmission from all available channels at full power for indefinite time period;
3. calculation takes into account a point of interest of 2m or 6.56ft

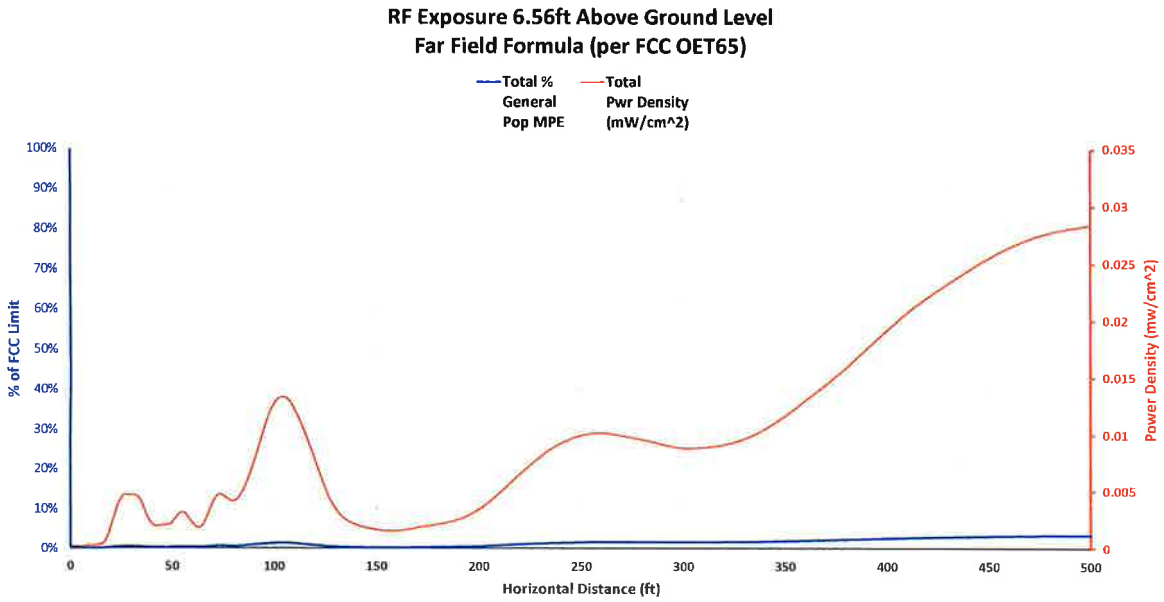
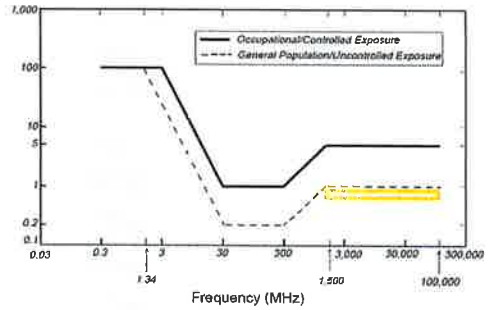
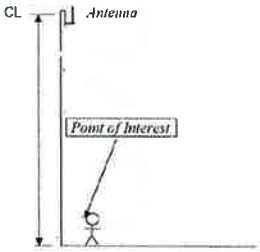


Figure 1. FCC Limits for Maximum Permissible Exposure (MPE)
Plane-wave Equivalent Power Density





Angle Below Horizon	Power Density (mW/cm^2) C-Band	AWS	PCS	850	700 MHz	Percent of Fraction in Respective MPE									Distance	Total Pwr Density (mW/cm^2)	Total % General Pop MPE
90	2.86122E-05	5.977E-06	7.35515E-06	4.97249E-05	3.60428E-05	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	0	0.000127712	0.02%
89	4.04123E-05	5.08681E-06	1.0152E-05	4.74828E-05	3.68791E-05	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	1.029848831	0.000140013	0.02%
88	5.08628E-05	5.32515E-06	1.19245E-05	4.53339E-05	3.77283E-05	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	2.0603254	0.000151175	0.02%
87	5.08407E-05	7.5187E-06	1.36852E-05	4.42827E-05	3.94892E-05	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	3.092058978	0.000155816	0.02%
86	4.22616E-05	1.03724E-05	1.60689E-05	4.42556E-05	4.22876E-05	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	4.125681905	0.000155246	0.02%
85	3.35432E-05	1.24605E-05	1.97535E-05	4.52508E-05	4.52763E-05	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	5.161831148	0.000156284	0.02%
84	3.42913E-05	1.33388E-05	2.42786E-05	4.52071E-05	4.73643E-05	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	6.201149881	0.00016448	0.02%
83	6.23285E-05	1.36339E-05	2.9835E-05	4.51554E-05	4.84121E-05	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	7.244289093	0.000199365	0.03%
82	9.64074E-05	1.42575E-05	3.5822E-05	4.4069E-05	4.83478E-05	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	8.291909247	0.000238904	0.03%
81	9.85039E-05	1.56094E-05	4.30024E-05	4.30007E-05	4.82748E-05	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	9.344681979	0.000248391	0.03%
80	7.12385E-05	1.70862E-05	5.16125E-05	4.29277E-05	5.16395E-05	0.00%	0.00%	0.01%	0.00%	0.00%	0.01%	0.01%	0.00%	0.01%	10.40329186	0.000234504	0.03%
79	4.48635E-05	1.78577E-05	6.48535E-05	4.48659E-05	6.05564E-05	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.00%	0.01%	11.46843824	0.000232997	0.03%
78	2.95793E-05	1.78205E-05	7.96209E-05	4.79744E-05	7.78492E-05	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.00%	0.02%	12.54083714	0.000252844	0.04%
77	1.86207E-05	1.62154E-05	9.55069E-05	5.37053E-05	0.000102391	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.00%	0.02%	13.62122328	0.000286439	0.04%
76	2.28515E-05	1.34538E-05	0.000111932	6.01086E-05	0.000134642	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.00%	0.03%	14.71035217	0.000342988	0.05%
75	7.04276E-05	1.04154E-05	0.000125251	6.57302E-05	0.000169048	0.00%	0.00%	0.01%	0.00%	0.00%	0.01%	0.01%	0.00%	0.03%	15.80900235	0.000440872	0.07%
74	0.000222064	8.44131E-06	0.000140126	7.18622E-05	0.000198036	0.00%	0.00%	0.02%	0.00%	0.00%	0.01%	0.01%	0.00%	0.04%	16.91797776	0.00064053	0.09%
73	0.000543398	1.0117E-05	0.000156732	7.6761E-05	0.000226665	0.00%	0.00%	0.05%	0.00%	0.00%	0.02%	0.01%	0.00%	0.05%	18.03811021	0.001013673	0.13%

72	0.001031952	1.75223E-05	0.000175267	8.01091E-05	0.0002477	0.00%	0.00%	0.10%	0.00%	0.00%	0.02%	0.01%	0.00%	0.05%	19.17026208	0.00155255	0.19%
71	0.001667629	3.10478E-05	0.000191487	8.35837E-05	0.000264464	0.00%	0.00%	0.17%	0.00%	0.00%	0.02%	0.01%	0.00%	0.05%	20.31532918	0.002238211	0.26%
70	0.002346576	5.2525E-05	0.000199744	8.71881E-05	0.000269589	0.00%	0.00%	0.23%	0.00%	0.01%	0.02%	0.02%	0.00%	0.05%	21.47424382	0.002955622	0.33%
69	0.002942127	8.10202E-05	0.000203564	9.09251E-05	0.00026849	0.00%	0.00%	0.29%	0.00%	0.01%	0.02%	0.02%	0.00%	0.05%	22.64797807	0.003586127	0.39%
68	0.003441724	0.000113948	0.000198069	9.47978E-05	0.000261242	0.00%	0.00%	0.34%	0.00%	0.01%	0.02%	0.02%	0.00%	0.05%	23.83754732	0.004109781	0.44%
67	0.003756421	0.000153005	0.00019267	9.8809E-05	0.000248337	0.00%	0.00%	0.38%	0.00%	0.02%	0.02%	0.02%	0.00%	0.05%	25.04401416	0.004449242	0.48%
66	0.004005453	0.000183056	0.000187366	9.83273E-05	0.000236003	0.00%	0.00%	0.40%	0.00%	0.02%	0.02%	0.02%	0.00%	0.05%	26.26849243	0.004710206	0.50%
65	0.003984772	0.000209091	0.000186399	9.3417E-05	0.000219114	0.00%	0.00%	0.40%	0.00%	0.02%	0.02%	0.02%	0.00%	0.04%	27.51215183	0.004692793	0.50%
64	0.003963004	0.000222821	0.000189699	9.50708E-05	0.000203372	0.00%	0.00%	0.40%	0.00%	0.02%	0.02%	0.02%	0.00%	0.04%	28.77622273	0.004673967	0.49%
63	0.003940119	0.000216492	0.000192996	0.00013808	0.000184406	0.00%	0.00%	0.39%	0.00%	0.02%	0.02%	0.02%	0.00%	0.04%	30.06200152	0.004673821	0.50%
62	0.003916084	0.000191771	0.000200859	0.000215216	0.000167155	0.00%	0.00%	0.39%	0.00%	0.02%	0.02%	0.04%	0.00%	0.03%	31.37085647	0.004691085	0.50%
61	0.003715747	0.000154874	0.000218819	0.000309078	0.000141356	0.00%	0.00%	0.37%	0.00%	0.02%	0.02%	0.05%	0.00%	0.03%	32.70423404	0.004539874	0.49%
60	0.003444172	0.000108897	0.0002383	0.000414102	0.000114117	0.00%	0.00%	0.34%	0.00%	0.01%	0.02%	0.07%	0.00%	0.02%	34.06366588	0.004319589	0.47%
59	0.002910456	6.07985E-05	0.000253513	0.000529643	8.59464E-05	0.00%	0.00%	0.29%	0.00%	0.01%	0.03%	0.09%	0.00%	0.02%	35.45077652	0.003840357	0.43%
58	0.002191123	2.45809E-05	0.000257458	0.00064668	5.90111E-05	0.00%	0.00%	0.22%	0.00%	0.00%	0.03%	0.11%	0.00%	0.01%	36.86729176	0.003178853	0.37%
57	0.001503812	6.26795E-06	0.000249594	0.00075373	3.95786E-05	0.00%	0.00%	0.15%	0.00%	0.00%	0.02%	0.13%	0.00%	0.01%	38.315048	0.002552983	0.31%
56	0.001031651	1.00801E-05	0.000225721	0.000858134	3.26437E-05	0.00%	0.00%	0.10%	0.00%	0.00%	0.02%	0.15%	0.00%	0.01%	39.79600249	0.00215823	0.28%
55	0.000775665	4.89334E-05	0.000186086	0.000932602	3.63029E-05	0.00%	0.00%	0.08%	0.00%	0.00%	0.02%	0.16%	0.00%	0.01%	41.31224475	0.00197959	0.27%
54	0.00068487	0.000116289	0.000136662	0.000967454	4.22547E-05	0.00%	0.00%	0.07%	0.00%	0.01%	0.01%	0.17%	0.00%	0.01%	42.86600915	0.001947529	0.27%
53	0.000662708	0.000209534	7.96824E-05	0.000980268	7.27092E-05	0.00%	0.00%	0.07%	0.00%	0.02%	0.01%	0.17%	0.00%	0.01%	44.45968896	0.002004902	0.28%
52	0.000640923	0.000313861	2.38147E-05	0.000948044	0.000140305	0.00%	0.00%	0.06%	0.00%	0.03%	0.00%	0.16%	0.00%	0.03%	46.09585196	0.002066949	0.29%
51	0.000564997	0.000399924	8.35768E-06	0.000875122	0.000235675	0.00%	0.00%	0.06%	0.00%	0.04%	0.00%	0.15%	0.00%	0.05%	47.77725796	0.002084075	0.30%
50	0.000584828	0.0004539	4.86483E-05	0.000788952	0.00035261	0.00%	0.00%	0.06%	0.00%	0.05%	0.00%	0.14%	0.00%	0.07%	49.50687824	0.002228939	0.32%
49	0.000835099	0.000469537	0.000123532	0.000694641	0.000480845	0.00%	0.00%	0.08%	0.00%	0.05%	0.01%	0.12%	0.00%	0.10%	51.28791753	0.002603654	0.36%
48	0.001164554	0.000442681	0.00023238	0.000570403	0.000625787	0.00%	0.00%	0.12%	0.00%	0.04%	0.02%	0.10%	0.00%	0.13%	53.12383861	0.003035805	0.41%
47	0.001259723	0.00038037	0.00033909	0.00044699	0.000759525	0.00%	0.00%	0.13%	0.00%	0.04%	0.03%	0.08%	0.00%	0.15%	55.01839008	0.003185698	0.43%
46	0.000986431	0.000304788	0.000401889	0.000334264	0.000921156	0.00%	0.00%	0.10%	0.00%	0.03%	0.04%	0.06%	0.00%	0.19%	56.97563771	0.002948528	0.41%
45	0.000509934	0.000222559	0.000405092	0.000244082	0.001041791	0.00%	0.00%	0.05%	0.00%	0.02%	0.04%	0.04%	0.00%	0.21%	59	0.002423459	0.37%
44	0.000104857	0.00015154	0.000363609	0.000182229	0.001177232	0.00%	0.00%	0.01%	0.00%	0.02%	0.04%	0.03%	0.00%	0.24%	61.09628851	0.001979468	0.33%
43	2.30828E-05	9.62099E-05	0.000304318	0.000132834	0.001269272	0.00%	0.00%	0.00%	0.00%	0.01%	0.03%	0.02%	0.00%	0.26%	63.26975389	0.001825717	0.32%
42	0.000452445	5.56542E-05	0.000243	0.000146416	0.001336081	0.00%	0.00%	0.05%	0.00%	0.01%	0.02%	0.03%	0.00%	0.27%	65.52613837	0.002233597	0.37%
41	0.00134092	2.73738E-05	0.000189427	0.000307203	0.001372997	0.00%	0.00%	0.13%	0.00%	0.00%	0.02%	0.05%	0.00%	0.28%	67.87173603	0.003237922	0.48%
40	0.002181569	8.48595E-06	0.000165504	0.000523349	0.001377322	0.00%	0.00%	0.22%	0.00%	0.00%	0.02%	0.09%	0.00%	0.28%	70.31346196	0.00425623	0.60%
39	0.00245263	6.6003E-06	0.000186068	0.00077563	0.001317949	0.00%	0.00%	0.25%	0.00%	0.00%	0.02%	0.13%	0.00%	0.27%	72.85893224	0.004738877	0.66%
38	0.001995068	9.33016E-06	0.000275421	0.00104708	0.001230905	0.00%	0.00%	0.20%	0.00%	0.00%	0.03%	0.18%	0.00%	0.25%	75.5165563	0.004557804	0.66%
37	0.001287384	4.89373E-05	0.000436263	0.001287451	0.001121954	0.00%	0.00%	0.13%	0.00%	0.00%	0.04%	0.22%	0.00%	0.23%	78.29564448	0.004181989	0.63%
36	0.001020571	0.000109339	0.000674346	0.00147525	0.000975236	0.00%	0.00%	0.10%	0.00%	0.01%	0.07%	0.25%	0.00%	0.20%	81.20653331	0.004254742	0.63%
35	0.00140384	0.000153904	0.000971309	0.001611907	0.00082715	0.00%	0.00%	0.14%	0.00%	0.02%	0.10%	0.28%	0.00%	0.17%	84.2607324	0.004968111	0.70%
34	0.002541462	0.000146223	0.0013339	0.00164099	0.000668883	0.00%	0.00%	0.25%	0.00%	0.01%	0.13%	0.28%	0.00%	0.13%	87.47109714	0.006331458	0.82%
33	0.004286354	8.55105E-05	0.001667738	0.001592614	0.000527661	0.00%	0.00%	0.43%	0.00%	0.01%	0.17%	0.27%	0.00%	0.11%	90.85203287	0.008159877	0.98%
32	0.00658072	1.77094E-05	0.001854869	0.001473316	0.000425148	0.00%	0.00%	0.66%	0.00%	0.00%	0.19%	0.25%	0.00%	0.09%	94.41973721	0.010351761	1.19%
31	0.008781657	5.53998E-05	0.001834916	0.001269401	0.000334074	0.00%	0.00%	0.88%	0.00%	0.01%	0.18%	0.22%	0.00%	0.07%	98.19248946	0.012275449	1.35%
30	0.010184228	0.000172926	0.001541586	0.001042199	0.000287207	0.00%	0.00%	1.02%	0.00%	0.02%	0.15%	0.18%	0.00%	0.06%	102.1909976	0.013228146	1.43%
29	0.010746137	0.000269888	0.001074712	0.000796663	0.000270097	0.00%	0.00%	1.07%	0.00%	0.03%	0.11%	0.14%	0.00%	0.05%	106.4388176	0.013157497	1.40%
28	0.010080116	0.000241767	0.000697437	0.000566876	0.0002778	0.00%	0.00%	1.01%	0.00%	0.02%	0.07%	0.10%	0.00%	0.06%	110.9628615	0.011863997	1.26%
27	0.008403795	0.000136272	0.000555284	0.000384147	0.000284933	0.00%	0.00%	0.84%	0.00%	0.01%	0.06%	0.07%	0.00%	0.06%	115.7940198	0.009764431	1.03%
26	0.005810052	0.000163724	0.000622615	0.000247858	0.000278257	0.00%	0.00%	0.58%	0.00%	0.02%	0.06%	0.04%	0.00%	0.06%	120.9679267	0.007122506	0.76%
25	0.002968015	0.000270644	0.000817534	0.0001708	0.000258662	0.00%	0.00%	0.30%	0.00%	0.03%	0.08%	0.03%	0.00%	0.05%	126.5259083	0.004485654	0.49%
24	0.001021428	0.000548453	0.000910432	0.000151088	0.000223601	0.00%	0.00%	0.10%	0.00%	0.05%	0.09%	0.03%	0.00%	0.04%	132.5161697	0.002855001	0.32%
23	0.0001715	0.000820721	0.000783978	0.000152857	0.000197029	0.00%	0.00%	0.02%	0.00%	0.08%	0.08%	0.03%	0.00%	0.04%	138.9952896	0.002126085	0.24%
22	2.02991E-06	0.000826816	0.000572159	0.00016125	0.000189559	0.00%	0.00%	0.00%	0.00%	0.08%	0.06%	0.03%	0.00%	0.04%	146.0301244	0.001751814	0.21%
21	0.000169305	0.000547774	0.000415632	0.000177293	0.000228526	0.00%	0.00%	0.02%	0.00%	0.05%	0.04%	0.03%	0.00%	0.05%	153.7002548	0.001538531	0.19%
20	0.000521963	0.000193897	0.000286866	0.000203078	0.000345069	0.00%	0.00%	0.05%	0.00%	0.02%	0.03%	0.04%	0.00%	0.07%	162.1011677	0.001550873	0.20%
19	0.000748441	0.000113263	0.000179555	0.000259525	0.000568099	0.00%	0.00%	0.07%	0.00%	0.01%	0.02%	0.04%	0.00%	0.11%	171.3484418	0.001868883	0.26%
18	0.000534514	0.000203185	8.87154E-05	0.000414936	0.00092945	0.00%	0.00%	0.05%	0.00%	0.02%	0.01%	0.07%	0.00%	0.19%	181.5833287	0.0021708	0.34%
17	0.000140845	0.000396891	7.921E-05	0.000722375	0.001409311	0.00%	0.00%	0.01%	0.00%	0.04%	0.01%	0.12%	0.00%	0.28%	192.9803045	0.002748632	0.47%
16	0.000136818	0.000685608	0.000188879	0.001191699	0.001978841	0.00%	0.00%	0.01%	0.00%	0.07%	0.02%	0.21%	0.00%	0.40%	205.7574522	0.004181844	0.70%
15	0.000616242	0.001070737	0.00046751	0.001777353	0.002630377	0.00%	0.00%	0.06%	0.00%	0.11%	0.05%	0.31%	0.00%	0.53%	220.1909976	0.006562218	1.05%
14	0.001119594	0.001409264	0.000739776	0.002449532	0.003230929	0.00%	0.00%	0.11%	0.00%	0.14%	0.07%	0.42%	0.00%	0.65%	236.6360751	0.008949095	1.40%
13	0.001105266	0.001423634	0.000597439	0.003115223	0.003834719	0.00%	0.00%	0.11%	0.00%	0.14%	0.07%	0.54%	0.00%	0.77%	255.5570766	0.010176282	1.63%
12	0.000527504	0.000916553	0.000317882	0.003734638	0.004192691	0.00%	0.00%	0.05%	0.00%	0.09%	0.03%	0.64%	0.00%	0.84%	277.5731765	0.009689268	1.66%
11	7.84168E-06	0.000242293	4.30972E-05	0.004115584	0.00441241	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.71%	0.00%	0.89%	303.5286869	0.008821227	1.63%
10	0.000739316	0.000169341	0.000397072	0.004353639	0.004356089	0.00%	0.00%	0.07%	0.00%	0.02%	0.04%	0.75%	0.00%	0.88%	334.6056274	0.010015457	1.76%
9	0.00366385	0.001185412	0.001599475	0.004206879	0.004113433	0.00%	0.00%	0.37%	0.00%	0.12%	0.16%	0.73%	0.00%	0.83%	372.5113394	0.014769049	2.20%
8	0.008465321	0.002934777	0.003145453	0.003869598	0.003613351	0.00%	0.00%	0.85%	0.00%	0.29%	0.31%	0.67%	0.00%	0.73%	419.8068136	0.022028499	2.85%
7	0.012794753	0.004435714	0.004237129	0.003288927	0.003001226	0.00%	0.00%	1.28%	0.00%	0.44%	0.42%	0.57%	0.00%	0.60%	480.5164393	0.027757748	3.32%
6	0.014382944	0.004653497	0.004148466	0.002557821	0.002280944	0.00%	0.00%	1.44%	0.00%	0.47%	0.41%	0.44%	0.00%	0.46%	561.3475028	0.028023672	3.22%
5	0.012402517	0.003576362	0.003188229	0.001792801	0.001598735	0.00%	0.00%	1.24%	0.00%	0.36%	0.32%	0.31%	0.00%	0.32%	674.3730859	0.022558645	2.55%
4	0.008375487	0.001963097	0.001832525	0.00112988	0.001007574	0.00%	0.00%	0.84%	0.00%	0.20%	0.18%	0.20%	0.00%	0.20%	843.7393091	0.014308562	1.61%
3	0.004127931	0.000751042	0.000751229	0.000583116	0.000532107	0.00%	0.00%	0.41%	0.00%	0.08%	0.08%	0.10%	0.00%	0.11%	1125.787065	0.006745424	0.77%
2	0.001334B	0.000160453	0.00019745	0.000231974	0.000216612	0.00%	0.00%	0.13%	0.00%	0.02%	0.02%	0.04%	0.00%	0.04%	1689.538944	0.002141289	0.25%
1	0.000206291	1.13347E-05	2.11115E-05	4.94883E-05	4.72875E-05	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	3380.107736	0.000335513	0.04%

ATTACHMENT 5

Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts and New York

January 22, 2024

Via Certificate of Mailing

Jeffery Caggiano, Mayor
City of Bristol
111 North Main Street
Bristol, CT 06010

Re: **Proposed Modifications to an Existing Telecommunications Facility at 1191 Terryville Road in Bristol, Connecticut**

Dear Mr. Caggiano:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to modify its existing wireless telecommunications facility at 1191 Terryville Road in Bristol, Connecticut (the "Property"). Cellco intends to replace its existing antennas with new antennas at the same level in the existing flagpole tower. In order to accommodate Cellco's new antennas, the antenna screening shroud around the antennas will increase from 25.5 inches in diameter to 36 inches diameter. Equipment associated with Cellco's antennas will not change as part of these facility modifications.

As presented in the Sub-Petition, the proposed facility modifications constitute an eligible facility request pursuant to Section 6409(a) of the Federal Middle Class Tax Relief and Job Creation act of 2012 (47 U.S.C. § 1455(a)) and the October 21, 2014 Order of the Federal Communications Commission (FCC-14-153). A copy of the full Sub-Petition is attached for your review. Landowners whose property abuts the Property were also sent notice of this filing along with a copy of the Sub-Petition.

Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the attached Sub-Petition.

Please contact me if you have any questions regarding this proposal.

Sincerely,

Kenneth C. Baldwin

Attachment
28659898-v1

Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts and New York

January 22, 2024

Via Certificate of Mailing

Robert Flanagan, City Planner
City of Bristol
111 North Main Street
Bristol, CT 06010

Re: **Proposed Modifications to an Existing Telecommunications Facility at 1191 Terryville Road in Bristol, Connecticut**

Dear Mr. Flanagan:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to modify its existing wireless telecommunications facility at 1191 Terryville Road in Bristol, Connecticut (the "Property"). Cellco intends to replace its existing antennas with new antennas at the same level in the existing flagpole tower. In order to accommodate Cellco's new antennas, the antenna screening shroud around the antennas will increase from 25.5 inches in diameter to 36 inches diameter. Equipment associated with Cellco's antennas will not change as part of these facility modifications.

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Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the attached Sub-Petition.

Please contact me if you have any questions regarding this proposal.

Sincerely,

Kenneth C. Baldwin

Attachment
28660053-v1

Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts
and New York

January 22, 2024

Via Certificate of Mailing

Pequabuck Golf Club of Bristol
P.O. Box 218
Pequabuck, CT 06781

Re: **Proposed Modifications to an Existing Telecommunications Facility at 1191 Terryville Road in Bristol, Connecticut**

Dear Sir or Madam:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to modify its existing wireless telecommunications facility at 1191 Terryville Road in Bristol, Connecticut (the "Property"). Cellco intends to replace its existing antennas with new antennas at the same level in the existing flagpole tower. In order to accommodate Cellco's new antennas, the antenna screening shroud around the antennas will increase from 25.5 inches in diameter to 36 inches diameter. Equipment associated with Cellco's antennas will not change as part of these facility modifications.

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Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the attached Sub-Petition.

Please contact me if you have any questions regarding this proposal.

Sincerely,

Kenneth C. Baldwin

Attachment

28659815-v1

ATTACHMENT 6

Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts and New York

January 22, 2024

Via Certificate of Mailing

«Name_and_Address»

Re: **Proposed Modifications to a Telecommunications Facility at 1191 Terryville Avenue, Bristol, Connecticut**

Dear «Salutation»:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to modify its existing wireless telecommunications facility at 1191 Terryville Road in Bristol, Connecticut (the "Property"). Cellco intends to replace its existing antennas with new antennas at the same level in the flagpole tower. In order to accommodate Cellco's new antennas, the antenna screening shroud around the antennas will need to increase from 25.5 inches in diameter to 36 inches diameter. Equipment associated with Cellco's antennas will not change as part of these facility modifications.

As presented in the Sub-Petition, the proposed facility modifications constitute an eligible facility request pursuant to Section 6409(a) of the Federal Middle Class Tax Relief and Job Creation act of 2012 (47 U.S.C. § 1455(a)) and the October 21, 2014 Order of the Federal Communications Commission (FCC-14-153). You are receiving a copy of the full Sub-Petition because you are listed as an abutter to the Property.

Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the attached Sub-Petition.

Robinson+Cole

If you have any questions regarding the Sub-Petition, the Council's process for reviewing the Sub-Petition or the details of the filing itself, please feel free to contact me at the number listed above. You may also contact me or the Council directly at 860-827-2935.

Sincerely,

Kenneth C. Baldwin

Attachment

CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS

ADJACENT PROPERTY OWNERS

1191 TERRYVILLE AVENUE
BRISTOL, CONNECTICUT

	Parcel ID	Property Owner & Mailing Address	Property Address
1.	67/26	Tom's Used Auto Parts LLC c/o Thomas Cristofaro 39 Greer Road Burlington, CT 06013	578 Terryville Road
2.	67/28-1	City of Bristol Water Department 111 North Main Street Bristol, CT 06010	251 Clark Avenue
3.	67/27-1	City of Bristol 111 North Main Street Bristol, CT 06010	Clark Avenue
4.	67/28	City of Bristol Water Department 111 North Main Street Bristol, CT 06010	1080 Terryville Avenue
5.	67/29-1	City of Bristol 111 North Main Street Bristol, CT 06010	Clark Avenue
6.	51/100/1	Pequabuck Golf Club of Bristol Inc. P.O. Box 218 Pequabuck, CT 06781	50 School Street
7.	51/100/2	Limaris Ortiz 46 School Street Terryville, CT 06786	46 School Street
8.	51/100/3	Christina Wilkus and Daniel McGrail 42 School Street Terryville, CT 06786	42 School Street

	Parcel ID	**Property Owner & Mailing Address**	**Property Address**
9.	51/100/4	Wendy H. Wood 38 School Street Pequabuck, CT 06781	38 School Street
10.	51/100/5	Fred Taddei 34 School Street Terryville, CT 06786	34 School Street
11.	51/100/10	PS LLC P.O. Box 1 Terryville, CT 06786	16 School Street
12.	51/100/21A	Pequabuck Golf Club of Bristol Inc. P.O. Box 218 Pequabuck, CT 06781	56 School Street

CERTIFICATION OF SERVICE

I hereby certify that a copy of the foregoing letter was sent by certified mail, return receipt requested, to each of the parties on the attached list of abutting landowners.

January 22, 2024
Date

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, Connecticut 06103
Attorneys for CELLCO PARTNERSHIP
d/b/a VERIZON WIRELESS