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and New York

July 27, 2023

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

Re: **Request of Cellco Partnership d/b/a Verizon Wireless for an Order to Approve the Shared Use of an Existing Tower at 169 Hampden Road, Stafford, Connecticut**

Dear Attorney Bachman:

Pursuant to Connecticut General Statutes ("C.G.S.") §16-50aa, as amended, Cellco Partnership d/b/a Verizon Wireless ("Cellco") hereby requests an order from the Siting Council ("Council") to approve the shared use of an existing telecommunications tower located on a 43.38-acre parcel at 169 Hampden Road in Stafford (the "Property"). The Property is owned by Karen, Phillip and Michael Vivenzio. The tower is owned by Everest Infrastructure Partners ("Everest"). Cellco identifies this site as its "Stafford 4 Facility". The existing 180-foot guyed lattice tower was approved by the Town of Stafford. Cellco's real estate representatives did reach out to the Town Planning and Zoning and Building Departments to obtain a copy of the original tower approval. Town staff could not, however, locate the original tower approval.

Cellco requests that the Council find that the proposed shared use of the existing tower satisfies the criteria of C.G.S § 16-50aa and issue an order approving this request. A copy of this filing is being sent to Stafford's First Selectman, Sal P. Titus and Jennifer Roy, Zoning Officer.

Background

Cellco is licensed by the Federal Communications Commission ("FCC") to provide wireless services throughout the State of Connecticut. Cellco and Everest have agreed to the proposed shared use of the existing telecommunications facility at the Property pursuant to mutually acceptable terms and conditions and Everest has authorized Cellco to apply for all

necessary permits and approvals that may be required to share the existing tower. (*See* Attachment 1).

Cellco proposes to install nine (9) antennas and nine (9) remote radio heads ("RRHs") on an antenna platform at a height of 152'-8" feet above ground level ("AGL"). Cellco's radio equipment will be installed within a secure equipment room in the existing shelter near the base of the tower. Cellco will also install a 50-kW diesel-fueled generator on a concrete pad near the equipment shelter. Included in Attachment 2 are Cellco's project plans showing the location of Cellco's proposed site improvements. Attachment 3 contains specifications for Cellco's proposed antennas, RRHs and backup generator.

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

A. Technical Feasibility. The existing tower is structurally capable of supporting Cellco's antennas, RRHs, antenna platform and related equipment. The proposed shared use of this tower is, therefore, technically feasible. A Structural Analysis ("SA") dated February 22, 2023, prepared by Christina Hodges, P.E. confirms that the tower can support Cellco's proposed antennas and related equipment. Likewise, an Antenna Mount Analysis ("MA"), dated February 6, 2023, confirms that the proposed antenna and RRH mounting system can support Cellco's proposed shared use. Copies of the SA and MA are included in Attachment 4.

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

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

1. The proposed installation of nine (9) antennas and nine (9) RRHs on an

antenna platform at a height of 152'-8" feet AGL on the existing 180-foot tower would have an insignificant incremental visual impact on the area around the Property. As mentioned above, all of Cellco's equipment will be located inside the existing shelter near the base of the tower. Cellco's shared use of the existing tower would, therefore, not cause any significant change or alteration in the physical or environmental characteristics of the existing facility or the Property.

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

3. Operation of Cellco's antennas at this site would not exceed the RF emissions standards adopted by the Federal Communications Commission ("FCC"). Included in Attachment 5 of this filing is a Calculated Radio Frequency Emissions Report that demonstrates that the facility following Cellco's shared use will operate well within the FCC's safety standards.

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

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

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

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

A Certificate of Mailing verifying that a copy of this filing was sent to the municipal officials, the Property owner, and Everest, the tower owner is included in Attachment 6.

Conclusion

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

Thank you for your consideration of this matter.

Very truly yours,

Kenneth C. Baldwin

Enclosures
Copy to:
Sal P. Titus, First Selectman
Jennifer Roy, Zoning Official
Karen, Phillip and Michael Vivenzio, Property Owner
Everest Infrastructure Partners, Tower Owner
Tim Parks, Verizon Wireless

ATTACHMENT 1

EVEREST

Everest Infrastructure Partners
Two Allegheny Center
Nova Tower 2, Suite 1002
Pittsburgh, PA 15212

LETTER OF AUTHORIZATION

I, Michael Ashley Culbert, on behalf of EIP Communications I, LLC, owner representative of the telecommunications tower located at 169 Hamden Road, Stafford Springs, Tolland County, Connecticut, as evidenced by the Recorded Easement Agreement, bk. 704, pg. 164-175, dated October 29, 2021; hereby authorize Cellco Partnership d/b/a Verizon Wireless ("VZW"), through its designated agents, to apply for all necessary municipal, state, federal and other permits necessary to accommodate the installation of VZW's antennas and ancillary equipment on the subject tower and base station equipment on the ground on our leasehold property.

EIP Communications I, LLC

By: Michael Ashley Culbert

Michael Ashley Culbert
Vice President of Leasing & Collocation

Date: July 10, 2023

EIP ID: 596025 / Stafford 1 CDT
Lease ID: 596025-VZW-00

ATTACHMENT 2

verizon

SITE NAME: STAFFORD 4 CT
SITE ID: 617359998
169 HAMPDEN ROAD
STAFFORD, CT 06076

GENERAL NOTES

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. 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.
5. 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 AND ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
6. 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.
7. 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.
8. 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.
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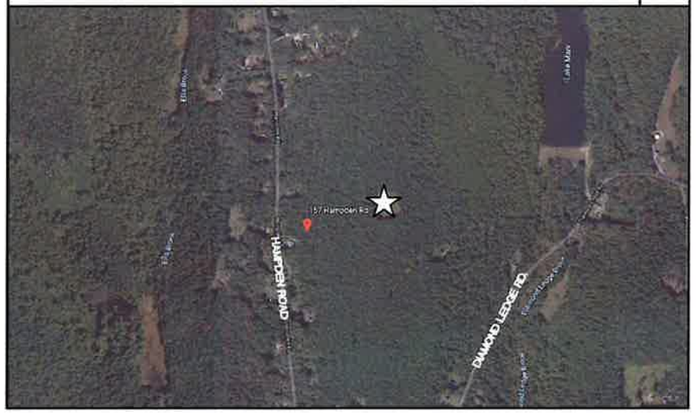
11. LOCATION OF EQUIPMENT AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS, SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
12. THE CONTRACTOR IS SOLELY RESPONSIBLE 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.
13. 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.
14. 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.
15. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
16. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
17. 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.
18. 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.
19. 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.
20. 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.
21. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUITS AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND CONFIRMED WITH THE PROJECT MANAGER AND OWNER PRIOR TO THE COMMENCEMENT OF ANY WORK
22. 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.
23. 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. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
24. CONTRACTOR SHALL COMPLY WITH THE OWNER'S ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.
25. THE COUNTY/CITY/TOWN MAY MAKE PERIODIC FIELD INSPECTIONS TO ENSURE COMPLIANCE WITH THE DESIGN PLANS, SPECIFICATIONS, AND CONTRACT DOCUMENTS.
26. THE COUNTY/CITY/TOWN MUST BE NOTIFIED (2) WORKING DAYS PRIOR TO CONCEALMENT/BURIAL OF ANY SYSTEM OR MATERIAL THAT WILL PREVENT THE DIRECT INSPECTION OF MATERIALS, METHODS OR WORKMANSHIP. EXAMPLES OF THESE PROCESSES ARE BACKFILLING A GROUND RING OR TOWER FOUNDATION, POURING TOWER FOUNDATIONS, BURYING GROUND RODS, PLATES OR GRIDS, ETC. THE CONTRACTOR MAY PROCEED WITH THE SCHEDULED PROCESS (2) WORKING DAYS AFTER PROVIDING NOTICE UNLESS NOTIFIED OTHERWISE BY THE COUNTY/CITY/TOWN.
27. PRIOR TO THE SUBMISSION OF BIDS, THE CONTRACTOR SHALL VISIT THE SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF ENGINEER ON RECORD, PRIOR TO THE COMMENCEMENT OF ANY WORK.

SITE LOCATION MAP — N.T.S.



VICINITY MAP — N.T.S.

SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH

SITE COORDINATES: LATITUDE: 41° 50' 56.49" N
LONGITUDE: 72° 21' 20.29" W
GROUND ELEVATION: ±1074' AMSL

NORTH

PROJECT SUMMARY

THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:

1. INSTALL (3) PROPOSED COMMSCOPE NHH-65B-R2B ANTENNAS
2. INSTALL (3) PROPOSED COMMSCOPE NHHSS-65B-R2BT4 ANTENNAS
3. INSTALL (3) PROPOSED SAMSUNG MT6407-77A ANTENNAS WITH INTEGRATED RADIO
4. INSTALL (3) PROPOSED SAMSUNG B2/B66A RRH ORAN (RF4439d-25A) RADIOS
5. INSTALL (3) PROPOSED SAMSUNG B5/B13 RRH ORAN (RF4440d-13A)
6. INSTALL (3) PROPOSED SAMSUNG CBRS RRH (RT4401-48A)
7. INSTALL (1) PROPOSED RAYCAP RVZDC-6627-PF-48 OVP BOX
8. INSTALL (3) SECTOR FRAME ANTENNA MOUNTS, TYP. (1) PER SECTOR
9. INSTALL (1) NEW EQUIPMENT CABINET WITHIN EXISTING EQUIPMENT ROOM
10. INSTALL NEW 50KW DIESEL FUELED BACK-UP GENERATOR ON A PROPOSED CONCRETE PAD AS SHOWN HEREIN.
11. REMOVE AND REPLACE EXISTING AIR CONDITIONING UNIT WITHIN THE EXISTING EQUIPMENT ROOM. SEE SHEET M-1 FOR ADDITIONAL DETAILS.
12. INSTALL NEW UTILITY METER
13. INSTALL ILC CABINET
14. INSTALL TELCO CABINET
15. INSTALL UNISTRUT FRAME TO ACCOMMODATE EQUIPMENT INSTALLATION

PROJECT INFORMATION

SITE NAME:	STAFFORD 4 CT
SITE ID:	617359998
SITE ADDRESS:	169 HAMPDEN ROAD STAFFORD, CT 06076
APPLICANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 20 ALEXANDER DRIVE WALLINGFORD, CT 06492
CONTACT PERSON:	MICHAEL HUMPHREYS (CONSTRUCTION MANAGER) VERIZON WIRELESS (860) 560-6410
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD ROAD BRANFORD, CT. 06405 CARLO F. CENTORE, PE (203) 488-0580 EXT. 122
SITE COORDINATES:	LATITUDE: 41° 50' 56.49" N LONGITUDE: 72° 21' 20.29" W GROUND ELEVATION: ±1074' AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHEET. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	2
N-1	SPECIFICATIONS, NOTES, AND ANT. SCHEDULE	2
C-1	COMPOUND, EQUIPMENT PLAN & ELEVATION	2
C-2	ANTENNA CONFIGURATION PLAN AND ELEVATION	2
C-3	TYPICAL EQUIPMENT DETAILS	2
C-4	TYPICAL EQUIPMENT DETAILS	2
C-5	CONDUIT PENETRATION DETAILS	2
M-1	MECHANICAL PLAN AND NOTES	2
E-1	ELETRICAL CONDUIT ROUTING AND RISER DIAGRAM	2
E-2	ELECTRICAL SCHEMATIC DIAGRAM	2
E-3	ELECTRICAL GROUNDING PLANS	2
E-4	TYPICAL ELECTRICAL DETAILS	2
E-5	TYPICAL ELECTRICAL DETAILS	2
E-6	ELECTRICAL SPECIFICATIONS	2

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	07/21/23	TDK	TJR	CONSTRUCTION DRAWINGS - REVISED PER CLIENT COMMENTS
1	07/11/23	BSP	TJR	CONSTRUCTION DRAWINGS - REVISED GENERATOR MODEL
0	06/12/23	BSP	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
A	05/19/23	DRA	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

verizon

CENTEK Engineering
Centered on Solutions
(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
SITE NAME: STAFFORD 4 CT
SITE ID: 16399206
169 HAMPDEN ROAD
STAFFORD CT, 06076

DATE: 05/19/23
SCALE: AS NOTED
JOB NO. 23010.09

TITLE SHEET

T-1

Sheet No. 1 of 14

NOTES AND SPECIFICATIONS:

DESIGN BASIS:

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

1. DESIGN CRITERIA:

- RISK CATEGORY II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED: 108 MPH (Vasd)
  (EXPOSURE B/ IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-16).

SITE NOTES

1. THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.
2. ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.
4. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
5. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

GENERAL NOTES

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20. 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.
21. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUITS AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND CONFIRMED WITH THE PROJECT MANAGER AND OWNER PRIOR TO THE COMMENCEMENT OF ANY WORK.
22. 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.
23. 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. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
24. CONTRACTOR SHALL COMPLY WITH THE OWNER'S ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.
25. THE COUNTY/CITY/TOWN MAY MAKE PERIODIC FIELD INSPECTIONS TO ENSURE COMPLIANCE WITH THE DESIGN PLANS, SPECIFICATIONS, AND CONTRACT DOCUMENTS.
26. THE COUNTY/CITY/TOWN MUST BE NOTIFIED (2) WORKING DAYS PRIOR TO CONCEALMENT/BURIAL OF ANY SYSTEM OR MATERIAL THAT WILL PREVENT THE DIRECT INSPECTION OF MATERIALS, METHODS OR WORKMANSHIP. EXAMPLES OF THESE PROCESSES ARE BACKFILLING A GROUND RING OR TOWER FOUNDATION, POURING TOWER FOUNDATIONS, BURYING GROUND RODS, PLATES OR GRIDS, ETC. THE CONTRACTOR MAY PROCEED WITH THE SCHEDULED PROCESS (2) WORKING DAYS AFTER PROVIDING NOTICE UNLESS NOTIFIED OTHERWISE BY THE COUNTY/CITY/TOWN.
27. PRIOR TO THE SUBMISSION OF BIDS, THE CONTRACTOR SHALL VISIT THE SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF ENGINEER ON RECORD, PRIOR TO THE COMMENCEMENT OF ANY WORK.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)
   A. STRUCTURAL STEEL (W SHAPES)----ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)----ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)----ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)----ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE----ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS----ASTM A325-N
   G. U-BOLTS----ASTM A36
   H. ANCHOR RODS----ASTM F 1554
   I. WELDING ELECTRODE----ASTM E 70XX
2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

ANTENNA/APPURTENANCE SCHEDULE

SECTOR	EXISTING/PROPOSED	ANTENNA (QTY)	SIZE (INCHES) (L x W x D)	ANTENNA ℄ HEIGHT	AZIMUTH	(E/P) RRU & OVP (QTY)	(QTY) PROPOSED HYBRID/COAX
A1	PROPOSED	COMMSCOPE: NHHSS-65B-R2BT4	72 x 11.9 x 7.1	152.8'	30°	(P) SAMSUNG B5/B13 RRH ORAN (RF4440d-13A) (1), (P) SAMSUNG B2/B66A RRH ORAN (RF4439d-25A) (1)	(2) 6x12 HYBRID CABLE
A2	PROPOSED	SAMSUNG: MT6407-77A (1)	35.1 x 16.1 x 5.5	152.8'	30°	(P) SAMSUNG CBRS RT4401-48A (1)	
A3							
A4	PROPOSED	COMMSCOPE: NHH-65B-R2B	72 x 11.9 x 7.0	152.8'	30°	(P) RAYCAP OVP 12 (1)	
B1	PROPOSED	COMMSCOPE: NHHSS-65B-R2BT4	72 x 11.9 x 7.1	152.8'	150°	(P) SAMSUNG B5/B13 RRH ORAN (RF4440d-13A) (1), (P) SAMSUNG B2/B66A RRH ORAN (RF4439d-25A) (1)	
B2	PROPOSED	SAMSUNG: MT6407-77A (1)	35.1 x 16.1 x 5.5	152.8'	150°	(P) SAMSUNG CBRS RT4401-48A (1)	
B3							
B4	PROPOSED	COMMSCOPE: NHH-65B-R2B	72 x 11.9 x 7.0	152.8'	150°	-	
C1	PROPOSED	COMMSCOPE: NHHSS-65B-R2BT4	72 x 11.9 x 7.1	152.8'	270°	(P) SAMSUNG B5/B13 RRH ORAN (RF4440d-13A) (1), (P) SAMSUNG B2/B66A RRH ORAN (RF4439d-25A) (1)	
C2	PROPOSED	SAMSUNG: MT6407-77A (1)	35.1 x 16.1 x 5.5	152.8'	270°	(P) SAMSUNG CBRS RT4401-48A (1)	
C3							
C4	PROPOSED	COMMSCOPE: NHH-65B-R2B	72 x 11.9 x 7.0	152.8'	270°	-	

NOTE:
ALL HYBRID/COAX LENGTHS TO BE MEASURED AND VERIFIED IN FIELD BEFORE ORDERING

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	07/27/23	TDK	TJR	CONSTRUCTION DRAWINGS - REVISED PER CLIENT COMMENTS
1	07/11/23	BSP	TJR	CONSTRUCTION DRAWINGS - REVISED GENERATOR MODEL
0	06/12/23	BSP	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
A	05/19/23	DRA	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CLIENT REVIEW

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STAFFORD CT, 06076

DATE: 05/19/23
SCALE: AS NOTED
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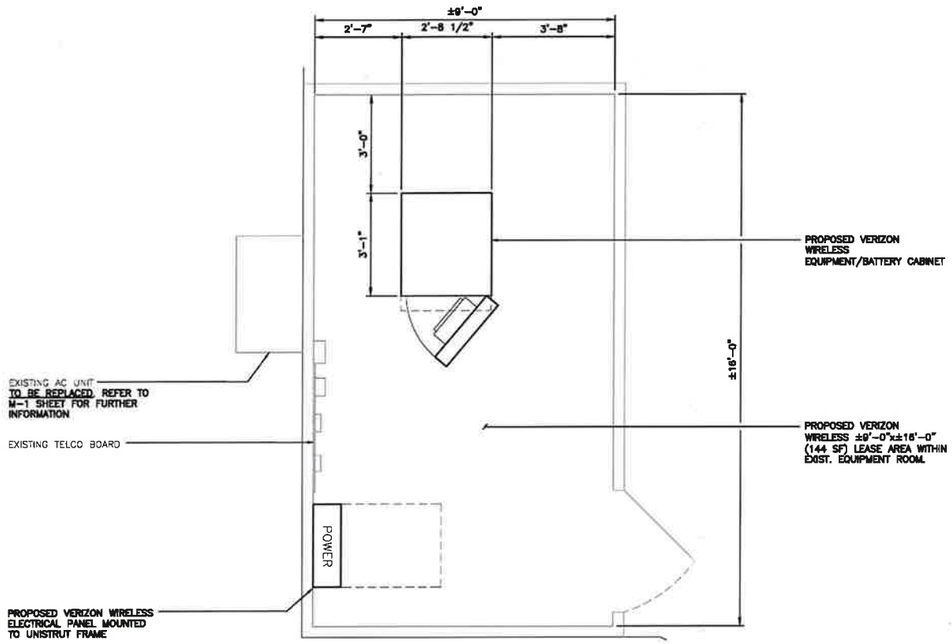
SPECIFICATIONS, NOTES AND ANT. SCHEDULE

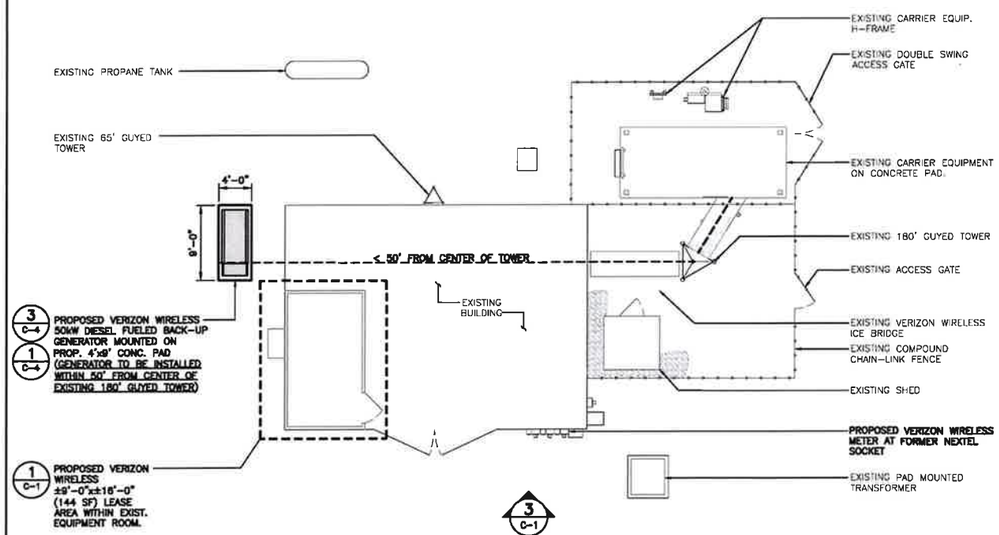
N-1

Sheet No. 2 of 14



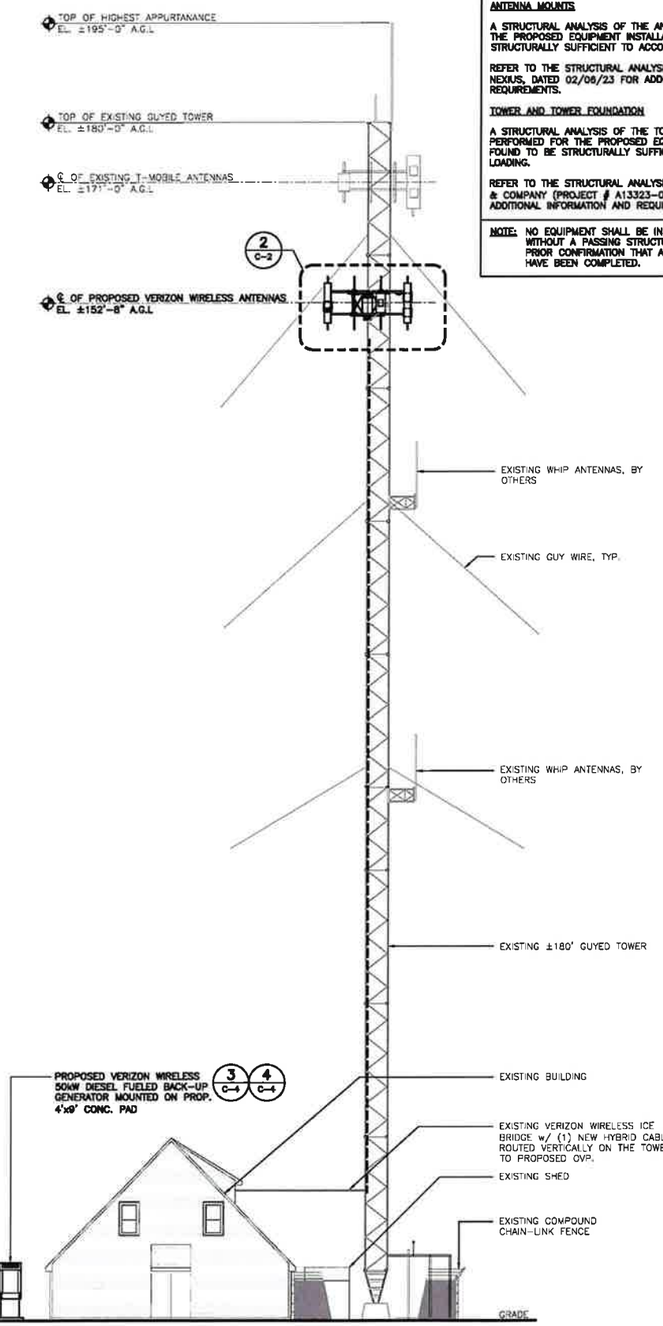
1 / C-1 **EQUIPMENT PLAN - PROPOSED CONDITIONS**
SCALE: 1/2" = 1'-0"

TRUE NORTH



2 / C-1 **COMPOUND PLAN - PROPOSED CONDITIONS**
SCALE: 1/8" = 1'-0"

TRUE NORTH



3 / C-1 **TOWER ELEVATION - PROPOSED CONDITIONS**
SCALE: 1" = 10'

STRUCTURAL COMPLIANCE

ANTENNA MOUNTS

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

REFER TO THE STRUCTURAL ANALYSIS & DESIGN REPORT PREPARED BY NEXUS, DATED 02/06/23 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

TOWER AND TOWER FOUNDATION

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

REFER TO THE STRUCTURAL ANALYSIS REPORT PREPARED BY PAUL J. FORD & COMPANY (PROJECT # A13323-0004.001.8700) DATED 02/22/23 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
A	05/18/23	DMA	TJR	CONSTRUCTION DRAWINGS -- ISSUED FOR CLIENT REVIEW
1	06/12/23	BSP	TJR	CONSTRUCTION DRAWINGS -- ISSUED FOR CONSTRUCTION
2	07/11/23	BSP	TJR	CONSTRUCTION DRAWINGS -- REVISED GENERATOR MODEL
3	07/25/23	TDK	TJR	CONSTRUCTION DRAWINGS -- REVISED PER CLIENT COMMENTS

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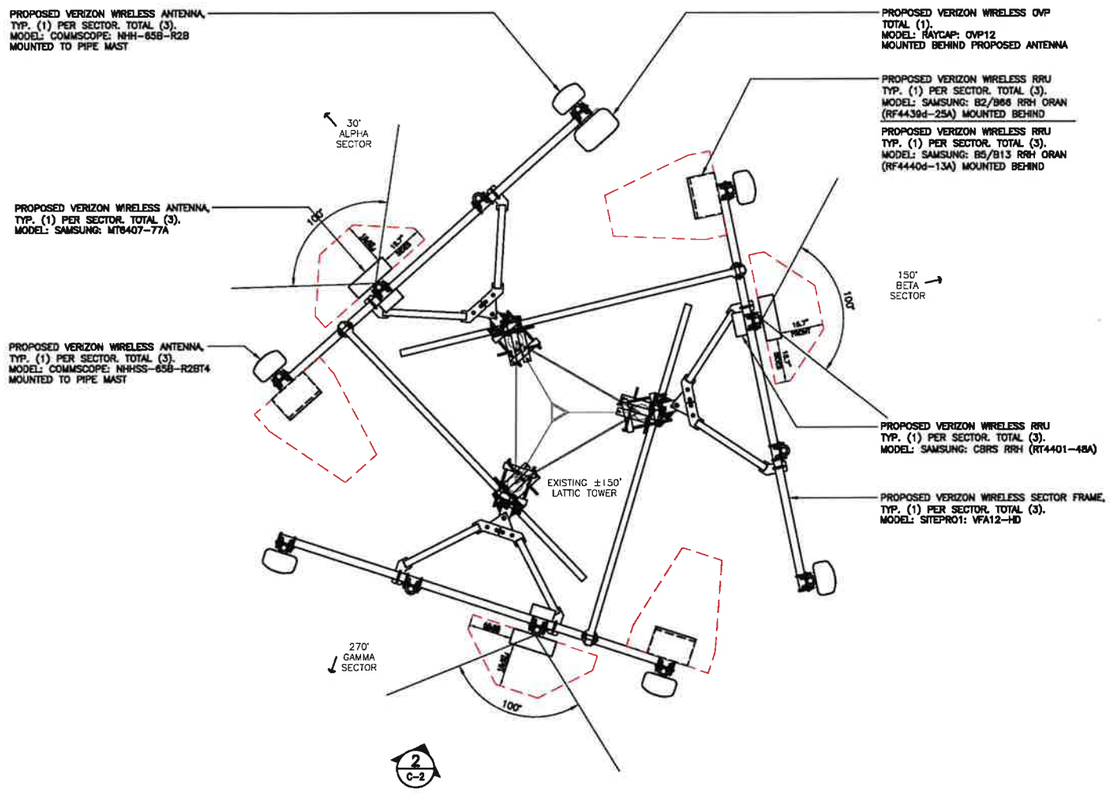
COMPOUND, EQUIPMENT PLAN & ELEVATION

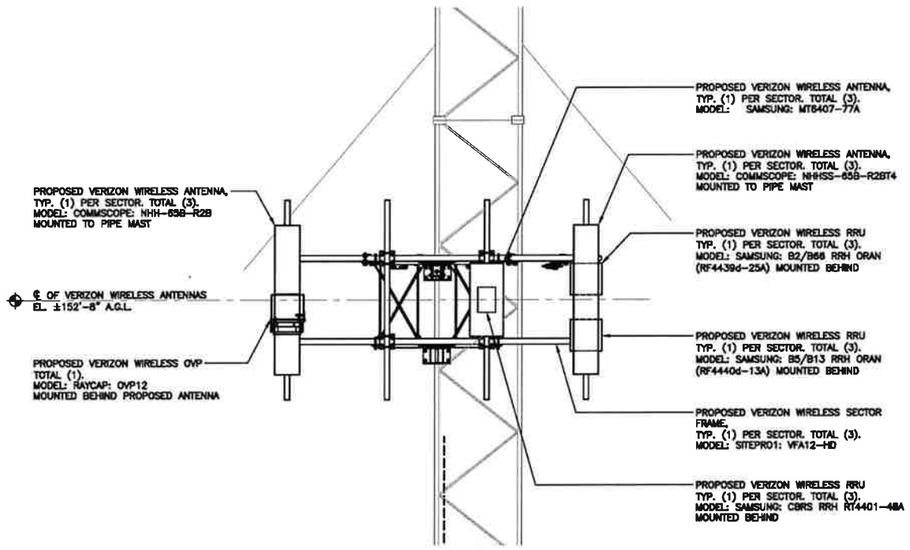
C-1

Sheet No. 3 of 14



1 C-2 **ANTENNA MOUNTING CONFIGURATION PLAN - PROPOSED**
SCALE: 1/2" = 1'-0"

TRUE NORTH



2 C-2 **ANTENNA ELEVATION - PROPOSED**
SCALE: 3/8" = 1'-0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	07/21/23	TDK	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
1	07/11/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED GENERATOR MODEL
0	06/12/23	BSP	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
A	05/19/23	DRA	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

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ANTENNA CONFIGURATION PLAN & ELEVATION

C-2

Sheet No. 4 of 14

ANTENNA FRONT

SECTOR ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: MT6407-77A	35.1"h x 16.1"W x 5.5"D (NOT TO EXCEED)	67 LBS. (NOT TO EXCEED)
CLEARANCES AND SERVICE AREA		
TOP: 31.5"	HORIZONTAL DISTANCE: (ANT. TO ANT.) 31.5"	
FRONT, SIDES & BOTTOM: 15.7"	VERTICAL DISTANCE: (ANT. TO ANT.) 63.0"	
NOTES: 1. THIS ANTENNA HAS ITS OWN BUILT-IN RRH.		

1 C-3 **PROPOSED ANTENNA DETAIL**
SCALE: NOT TO SCALE

FRONT VIEW

NHH-65B-R2B (BOTTOM VIEW)

ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT (WITH MOUNTING KIT)
MAKE: COMMSCOPE MODEL: NHH-65B-R2B	72.0"L x 11.9"W x 7.0"D	43.7 LBS.

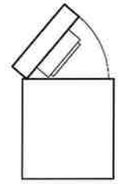
2 C-3 **PROPOSED ANTENNA DETAIL**
SCALE: NOT TO SCALE

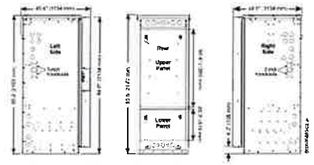
FRONT VIEW

BOTTOM

10-PORT SECTOR ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: NHHSS-65B-R2BT4	71.9"L x 11.8"W x 7.1"D	±51 LBS. (W/OUT MOUNT KIT)

3 C-2 **PROPOSED ANTENNA DETAIL**
SCALE: NOT TO SCALE





EQUIPMENT / BATTERY CABINET			
EQUIPMENT	DIMENSIONS	WT. (NO EQUIP/BATTERIES)	WT. (WITH EQUIP/BATTERIES)
MAKE: COMMSCOPE MODEL: RBA84-32	85.5"H x 45.4"W x 44.6"D	756 LBS. (MAX.)	3900 LBS. (MAX.)
NOTES: 1. CONTRACTOR TO CONFIRM CABINET MAKE/MODEL AND QUANTITY WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.			

4 C-3 **PROPOSED EQUIPMENT CABINET DETAIL**
SCALE: NOT TO SCALE

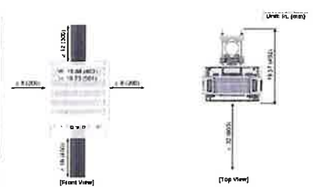
RRH - ISOMETRIC

RRH CLEARANCES

DUAL BAND RRU (REMOTE RADIO UNIT)			
EQUIPMENT	BANDS	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: RF4439d-25A	B2: PCS (1900 MHz) B66: AWS (2100 MHz)	15.0"H x 15.0"W x 10.0"D	74.7 LBS.
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.			

5 C-3 **DUAL-BAND AWS/PCS MACRO RADIO UNIT DETAIL**
SCALE: NOT TO SCALE

RRH - ISOMETRIC



RRH CLEARANCES

DUAL BAND RRU (REMOTE RADIO UNIT)			
EQUIPMENT	BANDS	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: RF4440d-13A	B5: 850 MHz B13: 700 MHz	15.0"H x 15.0"W x 9.0"D	70.3 LBS.
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.			

6 C-3 **DUAL-BAND 700/850 MHZ MACRO RADIO UNIT DETAIL**
SCALE: NOT TO SCALE

RRH ONLY

CBRS RRU (REMOTE RADIO UNIT)			
EQUIPMENT	BAND	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: CBRS RRH-RT4401-48A	CBRS	12.1"H x 8.5"W x 4.1"D	18.6 LBS.
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.			

7 C-3 **CBRS RRH DETAIL**
SCALE: NOT TO SCALE

OVP BOX		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: RAYCAP MODEL: RVZDC-6627-PF-48	19.18"H x 15.73"W x 10.25"D	26.9 LBS.
NOTES: 1. CONTRACTOR TO CONFIRM OVP BOX MAKE/MODEL AND QUANTITY WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING. 2. UNIT PROVIDES DC SURGE PROTECTION FOR 12 RRH UNITS.		

8 C-3 **PROPOSED OVER-VOLTAGE PROTECTION BOX**
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	07/21/23	TGK	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
1	07/11/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED GENERATOR MODEL
A	06/19/23	BSP	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
	05/19/23	DWA	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

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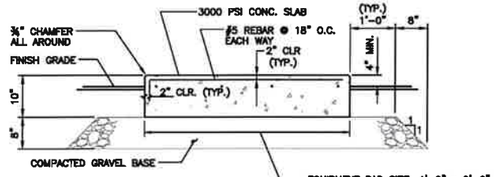
TYPICAL EQUIPMENT DETAILS

C-3

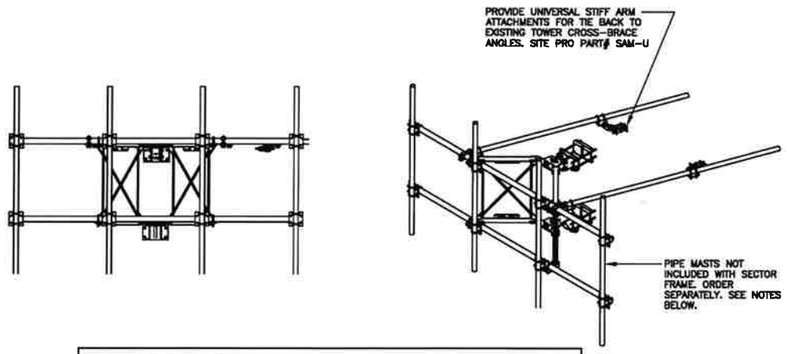
Sheet No. 5 of 14



NOTES:

1. TOP OF CONC. PAD TOLERANCE IS 1/4"±.
2. PROVIDE PVC SLEEVES FOR UTILITY CONDUIT PASSAGE THROUGH PAD OR CAST CONDUITS IN PLACE AS APPLICABLE. COORDINATE SLEEVE/CONDUIT LOCATIONS WITH CONSTRUCTION MANAGER.
3. REFER TO NOTES ON SHEET N-1 FOR ADDITIONAL REQUIREMENTS.
4. COORDINATE EQUIPMENT CABINET AND PROPANE TANK HOLD-DOWN HARDWARE WITH RESPECTIVE MANUFACTURERS.

1 C-4 **CONCRETE PAD DETAIL (TYP)**
SCALE: NOT TO SCALE

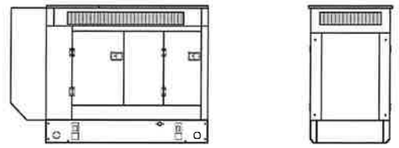


12 FT ANTENNA SECTOR MOUNTING FRAME			
EQUIPMENT	DESCRIPTION	QTY	WEIGHT
MAKE: SITE PRO MODEL: VFA12-HD	12 FT, HEAVY DUTY V-FRAME	3	735 LBS

NOTES:

1. GUYED AND SST MOUNTING RANGE: 1 1/2" TO 8 1/2" ROUND LEGS AND 3" TO 6" ANGLES.
2. PIPE MASTS ARE NOT INCLUDED IN SECTOR FRAME KIT. ORDER SEPARATELY (SITE M
3. PRO PART# P30120). WEIGHT LISTED ABOVE DOES NOT INCLUDE PIPE MASTS

2 C-4 **ANTENNA SECTOR FRAME DETAIL**
SCALE: NOT TO SCALE



SIDE VIEW

FRONT VIEW

DIESEL FUELED BACKUP POWER GENERATOR		
EQUIPMENT	FUEL TANK CAPACITY (GAL)	DIMENSIONS
MAKE: GENERAC MODEL: SD050	54 132 211 300	93"L x 38.0"W x 75.0"H 96"L x 38.0"W x 87.0"H 95"L x 38.0"W x 99.0"H 95"L x 38.0"W x 103.0"H

NOTES:

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

3 C-4 **BACK-UP GENERATOR DETAIL**
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	07/21/23	TDK	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
1	07/11/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED GENERATOR MODEL
A	06/13/23	BSP	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
	05/19/23	DRA	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

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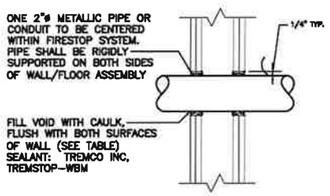
TYPICAL EQUIPMENT DETAILS

C-4

Sheet No. 6 of 14

PIPE OR CONDUIT	ANNULAR SPACE IN.	MIN. FILL MATERIAL THICKNESS	F RATING HR
PIPE	3/4"	1 1/4"	2
CONDUIT	3/4"	3/4"	1



UL SYSTEM NUMBER: WL1051
F RATING – 1 & 2 HR.

1 C-5 PIPE AND CONDUIT PENETRATION DETAIL IN GYPSUM WALLBOARD

SCALE: NOT TO SCALE

NOTES:

1. FLOOR OR WALL ASSEMBLY – MIN 2–1/2 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100–150 PCF) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS®. MAX DIAM OF OPENING IS 30–7/8 IN. SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.

   A. STEEL FLOOR UNIT/FLOOR ASSEMBLY (NOT SHOWN) – AS AN ALTERNATE TO ITEM 1, THE FLOOR ASSEMBLY MAY CONSIST OF A FLUTED STEEL FLOOR UNIT/ CONCRETE FLOOR ASSEMBLY. THE FLOOR ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL FLOOR CEILING DESIGN IN THE FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

   B. CONCRETE – MIN 2–1/2 IN. THICK REINFORCED LIGHTWEIGHT ON NORMAL WEIGHT (100–150 PCF) CONCRETE, AS MEASURED FROM THE TOP PLANE OF THE FLOOR UNITS.

   C. STEEL FLOOR AND FORM UNITS® – COMPOSITE OR NON–COMPOSITE 1–1/2 TO 3 IN. DEEP FLUTED GALV STEEL UNITS AS SPECIFIED IN THE INDIVIDUAL FLOOR–CEILING DESIGN. MAX DIAM OF OPENING IS 30–7/8 IN.

2. THROUGH–PENETRANT – ONE METALLIC PIPE OR CONDUIT TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. THE ANNULAR SPACE BETWEEN PIPE OR CONDUIT AND PERIPHERY OF OPENING SHALL BE MIN 0 IN. TO MAX 7/8 IN. PIPE OR CONDUIT TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES OR CONDUITS MAY BE USED:

   A. STEEL PIPE NOM 30 IN. DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.

   B. IRON PIPE NOM 30 IN. DIAM (OR SMALLER) CAST OR DUCTILE IRON PIPE.

   C. COPPER PIPE NOM 6 IN. DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.

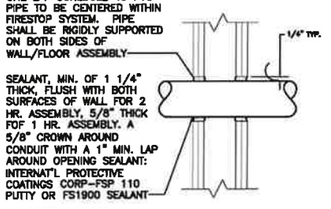
   D. COPPER TUBING NOM 6 IN. DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.

   E. CONDUIT NOM 6 IN. DIAM (OR SMALLER) STEEL CONDUIT.

   F. CONDUIT NOM 4 IN. DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING (EMT).

3. FILL, VOID OR CAVITY MATERIAL* – SEALANT – MIN 1/2 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH TOP SURFACE OF FLOOR OR WITH BOTH SURFACES OF WALL. AT THE POINT CONTACT LOCATION BETWEEN PIPE AND CONCRETE, A MIN 1/4 IN. DIAM BEAD OF FILL MATERIAL SHALL BE APPLIED AT THE CONCRETE/PIPE INTERFACE ON THE TOP SURFACE OF FLOOR AND ON BOTH SURFACES OF WALL.

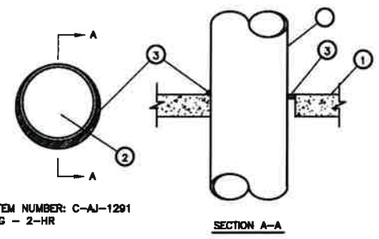
MAX. DIA. OF THROUGH PENETRANT	NOMINAL ANNULAR SPACE IN.	FILL MATERIAL TYPE
1"	1/2"	FSP 1100 PUTTY
2"	1"	FS 1900 SEALANT



UL SYSTEM NUMBER: WL2038
F RATING – 1 & 2 HR.

2 C-5 PVC CONDUIT PENETRATION DETAIL IN GYPSUM WALLBOARD

SCALE: NOT TO SCALE

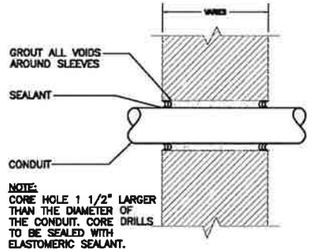


SECTION A–A

UL SYSTEM NUMBER: C–AJ–1291
F RATING – 2–HR

3 C-5 METAL PIPE THROUGH CONCRETE FLOOR/ WALL OR BLOCK WALL

SCALE: NOT TO SCALE



NOTE:
CORE HOLE 1 1/2" LARGER THAN THE DIAMETER OF THE CONDUIT. CORE DRILLS TO BE SEALED WITH ELASTOMERIC SEALANT.

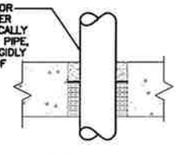
4 C-5 PIPE AND CONDUIT PENETRATION DETAIL IN NON-RATED PARTITION

SCALE: NOT TO SCALE

FLOOR OR WALL	MIN. WALL THICK.	MAX. PIPE DIA.	MIN. ANNULAR SPACE	MAX. ANNULAR SPACE	MIN. FILL MAT. THICK.	MIN. FORM. MAT. THICK.	F RATING
F	3 3/4"	1 1/2"	3/8"	2 1/8"	1"	2 3/4"	2
F	3 3/4"	6"	3/8"	3/4"	1"	2 3/4"	2
F	3 3/4"	6"	3/8"	1"	2"	1 3/4"	2
F	4 1/2"	1 1/2"	3/8"	2 1/8"	1"	3 1/2"	3
F	4 1/2"	6"	3/8"	3/4"	1"	3 1/2"	3
F	4 1/2"	6"	3/8"	1"	2"	2 1/2"	3
W	5 1/2"	1 1/2"	3/8"	2 1/8"	1"	3 1/2"	3
W	5 1/2"	6"	3/8"	3/4"	1"	3 1/2"	3
W	6 1/2"	1 1/2"	3/8"	2 1/8"	2"	2 1/2"	3
W	6 1/2"	6"	3/8"	1"	2"	2 1/2"	3

THROUGH PENETRANTS
ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL.

FORMING MATERIAL SHALL BE A MIN. OF 1 1/2" THICK OF MIN. 4.0 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED IN OPENING, USG INTERIORS–TYPE SAF



THICKNESS OF SEALANT APPLIED FLUSH W/THE TOP SURFACE OF BOTH SIDES OF FLOOR/WALL (SEE TABLE), USG INTERIORS–TYPE SS

UL SYSTEM NUMBER: CAJ1020

F RATING – 3 HR.

5 C-5 PIPE AND CONDUIT PENETRATION DETAIL IN CONCRETE OR MASONRY

SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	07/21/23	TSK	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
1	07/11/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED GENERATOR MODEL
A	06/12/23	BSP	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
A	05/19/23	DRA	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

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CONDUIT PENETRATION DETAILS

C-5

Sheet No. 7 of 14

MECHANICAL DEMOLITION NOTES

1. REMOVE EXISTING AIR CONDITIONING UNIT, ALL ASSOCIATED WIRING AND CONTROLS.
2. EXISTING WALL-MOUNTED EXHAUST FAN TO REMAIN. CONTRACTOR SHALL CLEAN, INSPECT, TEST OPERATION AND REPORT ANY SYSTEM DEFICIENCIES TO OWNER AND ENGINEER.

GENERAL NOTES:

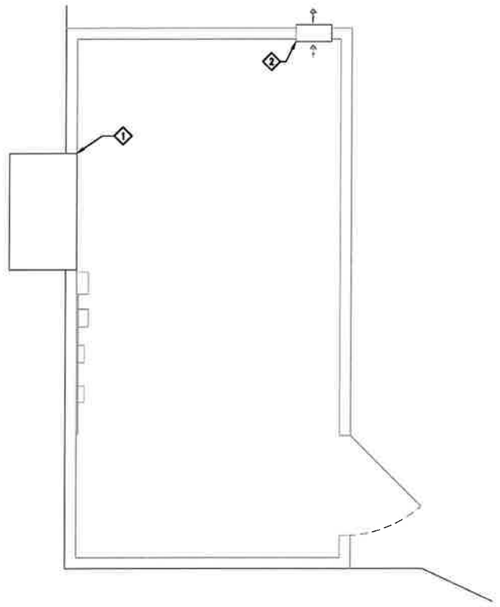
1. COORDINATE DEMOLITION WORK WITH ALL OTHER TRADES. REFER TO OTHER TRADE'S DRAWINGS FOR ADDITIONAL INFORMATION.

MECHANICAL WORK NOTES

1. LOCATION OF NEW AIR CONDITIONING UNIT AC-1 INSTALLED IN PLACE OF PREVIOUSLY DEMOLISHED AIR CONDITIONING UNIT. REPAIR AND PATCH WALL AS REQUIRED.
2. PROVIDE NEW ELECTRONIC THERMOSTAT AND INTERLOCK WITH AC-1 AS INDICATED.

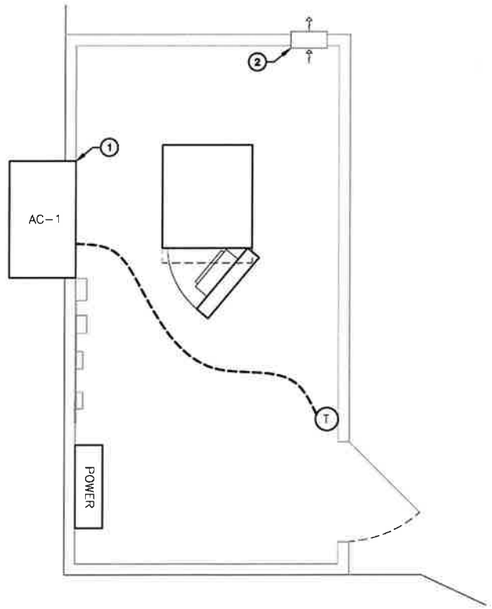
GENERAL NOTES:

1. COORDINATE NEW WORK WITH ALL OTHER TRADES. REFER TO OTHER TRADE'S DRAWINGS FOR ADDITIONAL INFORMATION.



1 / M-1 MECHANICAL PLAN - EXISTING CONDITIONS
SCALE: 1/2" = 1'-0"

TRUE NORTH



2 / M-1 MECHANICAL PLAN - PROPOSED CONDITIONS
SCALE: 1/2" = 1'-0"

TRUE NORTH

AIR CONDITIONING UNIT SCHEDULE

UNIT NO.	LOCATION	TYPE	FAN		ELECTRICAL DATA			COOLING CAPACITY	HEATING CAPACITY	SIMILAR TO	EMERGENCY POWER	NOTES
			CFM	EXT SP	VOLTS	AMPS	PHASE	TOTAL MBH	TOTAL KW			
AC-1	SEE PLANS	WALL-PACK	1700	0.4	208/230	42	1	55.0	5.0	BARD W60 SERIES	YES	ALL

NOTES:
1. PROVIDE WITH ECONOMIZER.
2. PROVIDE WITH MOTORIZED FRESH AIR DAMPER.
3. PROVIDE WITH ELECTRONIC THERMOSTAT.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	07/21/23	TDK	TJR	CONSTRUCTION DRAWINGS - REVISED PER CLIENT COMMENTS
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	05/19/23	DRA	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CLIENT REVIEW

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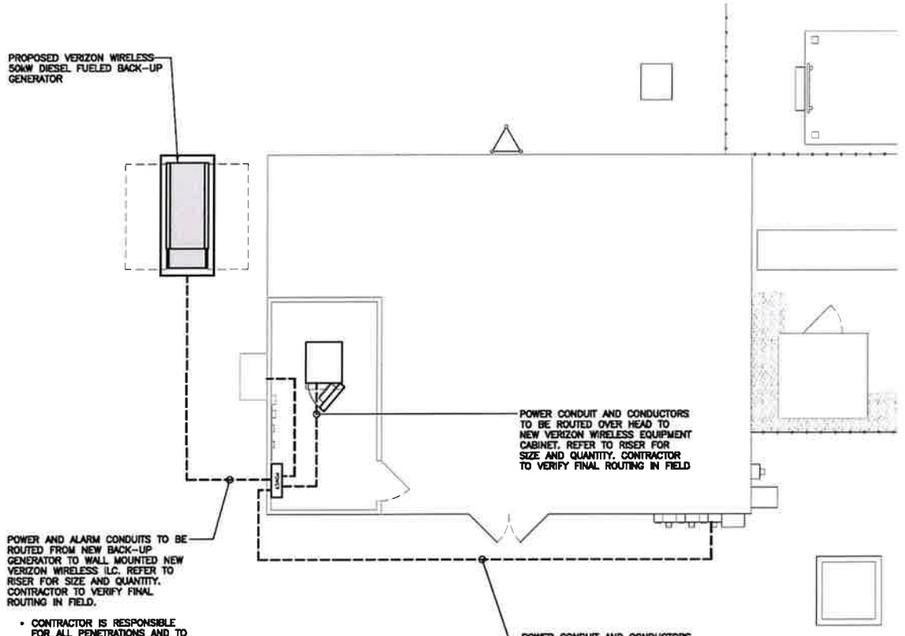
MECHANICAL PLAN AND NOTES

M-1

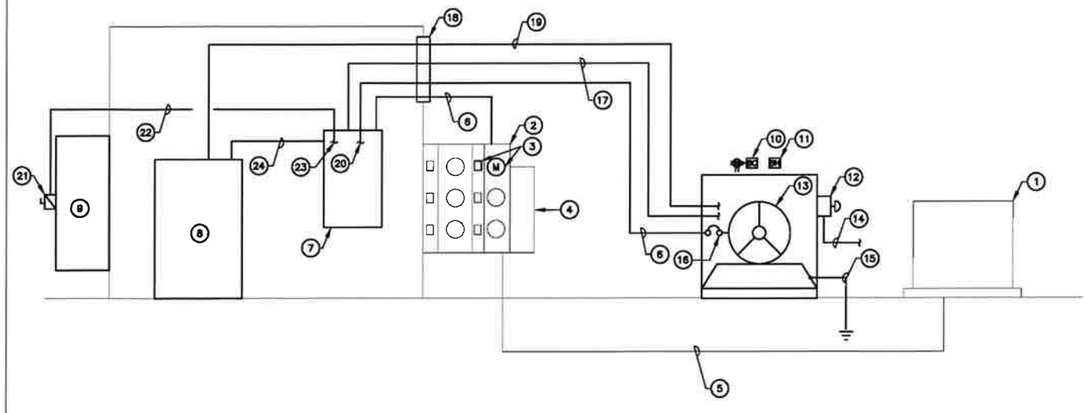
Sheet No. 8 of 14



1 E-1 **ELECTRICAL CONDUIT ROUTING PLAN**
SCALE: NOT TO SCALE

RISER NOTES

1. EXISTING PAD MOUNTED TRANSFORMER TO REMAIN.
2. EXISTING MUTLI-GANG METER CENTER TO REMAIN.
3. EXISTING NEXTEL UTILITY METER AND CIRCUIT BREAKER TO BE REMOVED AND REPLACED WITH NEW 200A, 240V RATED UTILITY METER WITH 200A/2P CIRCUIT BREAKER. ALL EQUIPMENT MUST BE UTILITY APPROVED.
4. EXISTING MULTIGANG METER CENTER MAIN DEVICE TO REMAIN.
5. EXISTING CONDUITS AND CONDUCTORS TO REMAIN.
6. (3) 3/0 AWG, (1) #6 AWG GROUND. 2" CONDUIT
7. NEW 200A, 240V, 1Φ, ILC CABINET
8. VERIZON WIRELESS EQUIPMENT CABINET
9. NEW HVAC UNIT
10. GENERATOR BATTERY CHARGER AND CONVENIENCE GFCI OUTLET WIRED TO NEW ILC. OUTLET TO BE MOUNTED IN WEATHERPROOF ENCLOSURE.
11. GENERATOR BLOCK HEATER WIRED TO ILC CABINET
12. REMOTE GENERATOR SHUT OFF SWITCH IN BREAK GLASS ENCLOSURE MOUNTED TO EXTERIOR OF GENERATOR ENCLOSURE PER 2019 NFPA 110 5.6.5.6.1.
13. EMERGENCY BACK-UP GENERATOR
14. 3/4" CONDUIT AND CONDUCTORS REQUIRED FOR PROPER OPERATION OF EMERGENCY GENERATOR SHUT OFF SWITCH.
15. GENERATOR GROUNDING PER NEC AND MANUFACTURER'S REQUIREMENTS. BOND TO EXISTING GROUNDING SYSTEM. (MINIMUM OF (1) #2 AWG GROUND)
16. GENERATOR OUTPUT CIRCUIT BREAKER.
17. 1" CONDUIT FOR GENERATOR CONTROL AND SIGNAL WIRING. CONTRACTOR TO VERIFY ROUTING IN FIELD.
18. WALL PENETRATION. COORDINATE WITH CIVIL AND STRUCTURAL DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR ENSURING ALL PENETRATIONS ARE FIREPROOF AND FIRE RATING OF WALLS IS MAINTAINED.
19. 1" CONDUIT FOR CABINET ALARM.
20. EXTEND GENERATOR POWER OUTPUT CONDUCTORS TO EMERGENCY LUGS IN ILC CABINET.
21. 60A, 240V, HEAVY DUTY, NEMA-3R, SINGLE PHASE, FUSED DISCONNECT SWITCH WITH (2) 60A FUSES.
22. (2) #4 AWG, (1) #10 AWG GROUND. 1" CONDUIT.
23. NEW 60A/2P CIRCUIT BREAKER.
24. POWER CONDUIT AND CONDUCTORS FOR CABINETS COORDINATE WITH MANUFACTURER AND CONSTRUCTION MANAGER.



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2	07/21/23	TDK	T.J.R.	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
1	07/11/23	BSP	T.J.R.	CONSTRUCTION DRAWINGS – REVISED GENERATOR MODEL
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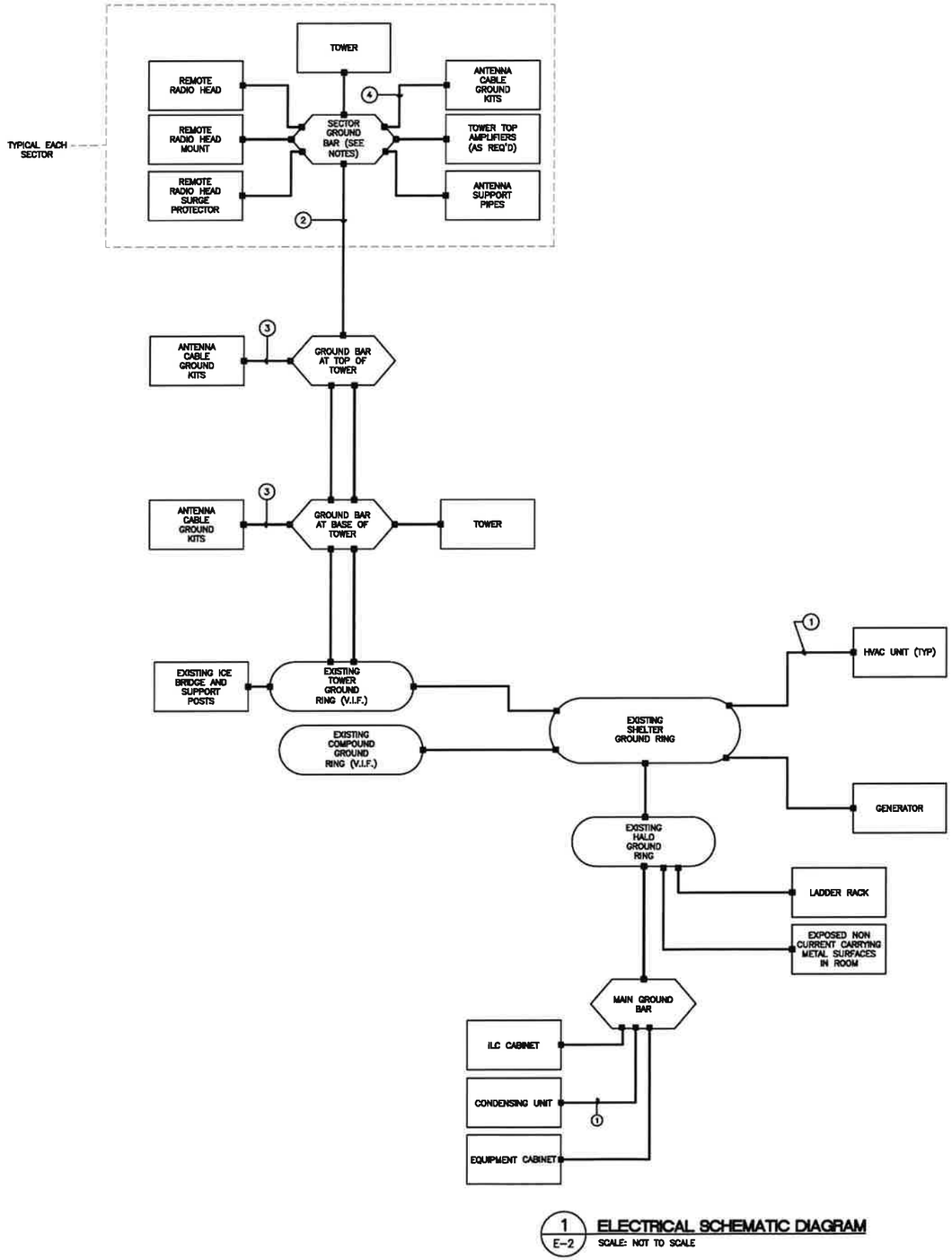
ELETRICAL CONDUIT ROUTING AND RISER DIAGRAM

E-1

Sheet No. 9 of 14



1 E-2 **ELECTRICAL SCHEMATIC DIAGRAM**

SCALE: NOT TO SCALE

GROUNDING SCHEMATIC NOTES

1. #2 AWG GREEN INSULATED
2. GROUND RING, #2 AWG BCW
3. #2/0 GREEN INSULATED

GENERAL NOTES:

1. ALL SURGE SUPPRESSION EQUIPMENT SHALL BE BONDED TO GROUND PER MANUFACTURER'S SPECIFICATIONS
2. UNLESS OTHERWISE NOTED OR REQUIRED BY CODE, GROUND CONDUCTORS SHOWN SHALL BE #2 AWG (SOLID TINNED BCW – EXTERIOR; STRANDED GREEN INSULATED – INTERIOR).
3. BOND CABLE TRAY AND ICE BRIDGE SECTIONS TOGETHER WITH #6 AWG STRANDED GREEN INSULATED JUMPERS.
4. ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.
5. BOND ALL EQUIPMENT CABINETS AND BATTERY CABINETS TO GROUND PER MANUFACTURER'S SPECIFICATIONS.
6. ALL BONDS TO TOWER SHALL BE MADE IN STRICT ACCORDANCE WITH SPECIFICATIONS OF TOWER MANUFACTURER OR STRUCTURAL ENGINEER.
7. REFER TO GROUNDING PLAN FOR LOCATION OF GROUNDING DEVICES.
8. REFER TO ALL ELECTRICAL AND GROUNDING DETAILS.
9. COORDINATE ALL TOWER MOUNTED EQUIPMENT WITH OWNER.
10. ALL TOWER MOUNTED AMPLIFIERS AND ASSOCIATED EQUIPMENT SHALL BE BONDED TO THE SECTOR GROUND BAR PER MANUFACTURER'S SPECIFICATIONS.
11. ALL GROUNDING SHALL BE IN ACCORDANCE WITH NEC AND OWNER'S REQUIREMENTS.
12. ALL EXPOSED METAL OBJECTS IN SHELTER SHALL BE BONDED TO THE HALO GROUND WITHIN THAT ROOM.
13. BOND GENERATOR TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS
14. COORDINATE WITH TOWER OWNER BEFORE INSTALLING ANY GROUNDING ELEMENTS ON TOWER OR BONDING TO EXISTING TOWER GROUND RING.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	07/21/23	TMK	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
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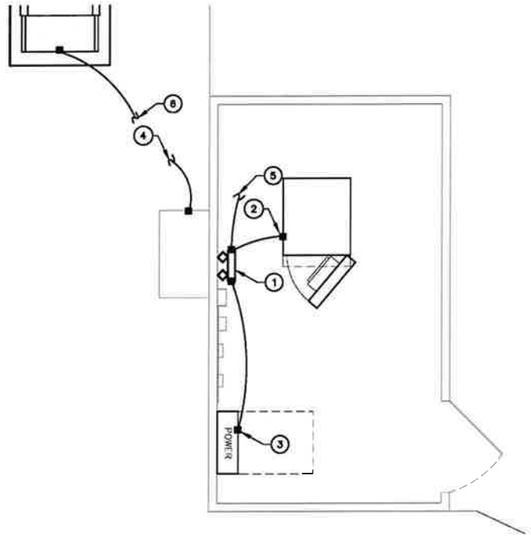
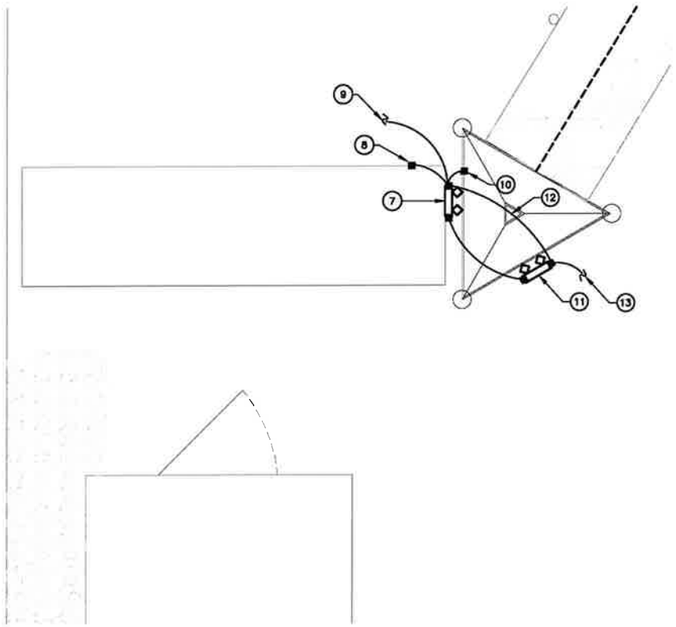
ELECTRICAL SCHEMATIC DIAGRAM

E-2

Sheet No. 10 of 14



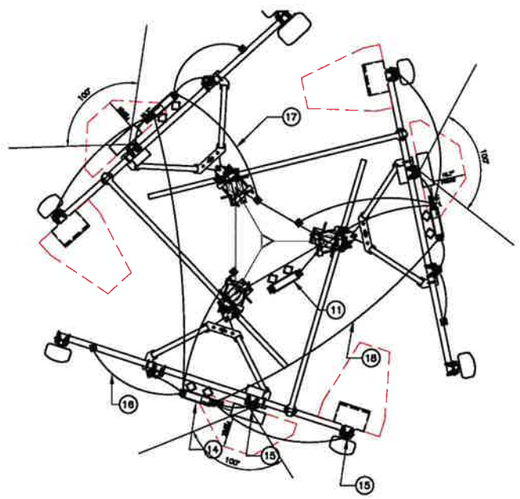
1 E-3 **EQUIPMENT GROUNDING PLAN**
SCALE: NOT TO SCALE



2 E-3 **TOWER GROUNDING PLAN**
SCALE: NOT TO SCALE

GROUNDING PLAN NOTES:

1. MAIN GROUND BAR TYP.
2. BOND EQUIPMENT CABINET TO MAIN GROUND BAR NEC AND MANUFACTUTER REQUIREMENTS.
3. BOND ILC CABINET TO MAIN GROUND BAR PER NEC AND MANUFACTUTER REQUIREMENTS.
4. CONNECT HVAC UNIT TO EXISTING SHELTER GROUND RING TYP.
5. BOND TO EXISTING HALO GROUND RING TYP.
6. BOND GENERATOR TO EXISTING SHELTER GROUND RING TYP.
7. LOWER TOWER MOUNTED GROUND BAR.
8. BOND LOWER TOWER MOUNTED GROUND BAR TO EXISTING ICE-BRIDGE POST.
9. BOND LOWER TOWER MOUNTED GROUND BAR TO TOWER GROUND RING TYP. 2 LEADS.
10. BOND LOWER TOWER MOUNTED GROUND BAR TO TOWER STEEL.
11. UPPER TOWER MOUNTED GROUND BAR.
12. BOND UPPER TOWER MOUNTED GROUND BAR TO LOWER TOWER MOUNTED GROUND BAR. TYP. 2 PLACES
13. CONNECT UPPER TOWER MOUNTED GROUND BAR TO SECTOR GROUND BAR TYP.
14. SECTOR GROUND BAR TYP.
15. BOND ANTENNA AND RRU MOUNTING PIPES TO SECTOR GROUND BAR.
16. BOND SECTOR GROUND BAR TO ANTENNA FRAME STEEL TYP.
17. BOND SECTOR GROUND BAR TO TOWER STEEL.
18. ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.



3 E-3 **ANTENNA GROUNDING PLAN**
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	07/21/23	TDK	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
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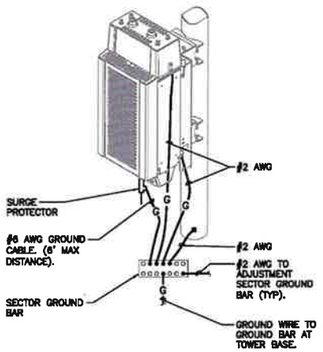
ELECTRICAL GROUNDING PLANS

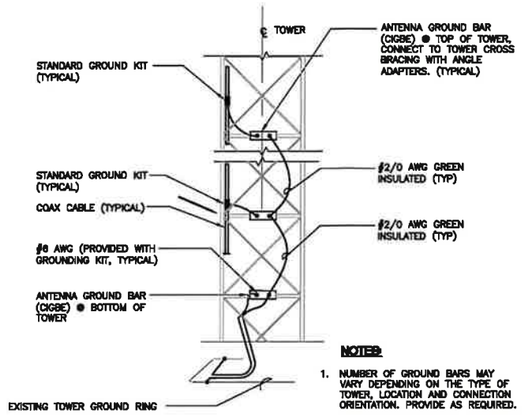
E-3

Sheet No. 11 of 14

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

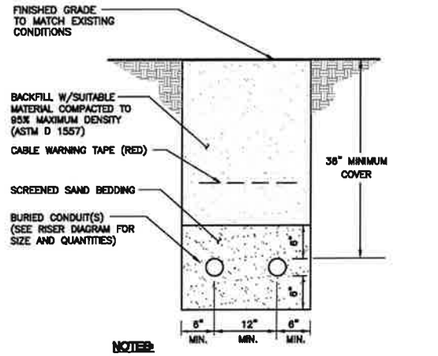


1 / E-4 **RRH POLE MOUNT GROUNDING**
SCALE: NOT TO SCALE



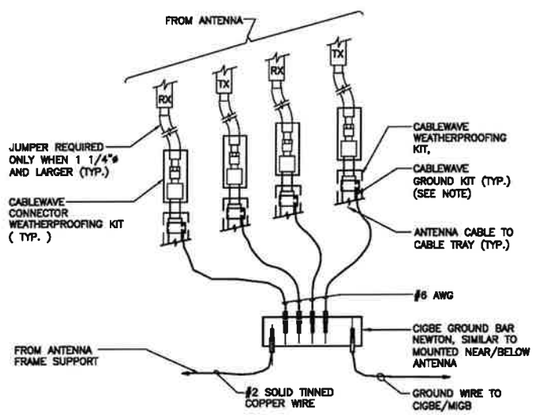
NOTES:
1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER, LOCATION AND CONNECTION ORIENTATION. PROVIDE AS REQUIRED.

2 / E-4 **ANTENNA CABLE GROUNDING - LATTICE TOWER**
SCALE: NOT TO SCALE



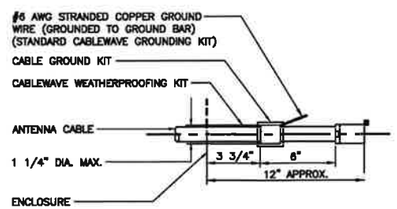
NOTES:
1. THE CLEAN FILL SHALL PASS THROUGH A 3/8" MESH SCREEN AND SHALL NOT CONTAIN SHARP STONES. OTHER BACKFILL SHALL NOT CONTAIN ASHES, CINDERS, SHELLS, FROZEN MATERIAL, LOOSE DEBRIS OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION.
2. WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.
3. WHERE SHALLOW BEDROCK IS ENCOUNTERED BETWEEN UTILITY SOURCE AND SERVICE EQUIPMENT, COORDINATE WITH UTILITY COMPANY FOR BURIAL DEPTH REQUIREMENTS.
4. COORDINATE WITH ELECTRICAL ENGINEER WHERE SHALLOW BEDROCK IS ENCOUNTERED BETWEEN SERVICE EQUIPMENT AND EQUIPMENT SHELTER.

3 / E-4 **TYPICAL ELECTRICAL TRENCH DETAIL**
SCALE: NOT TO SCALE



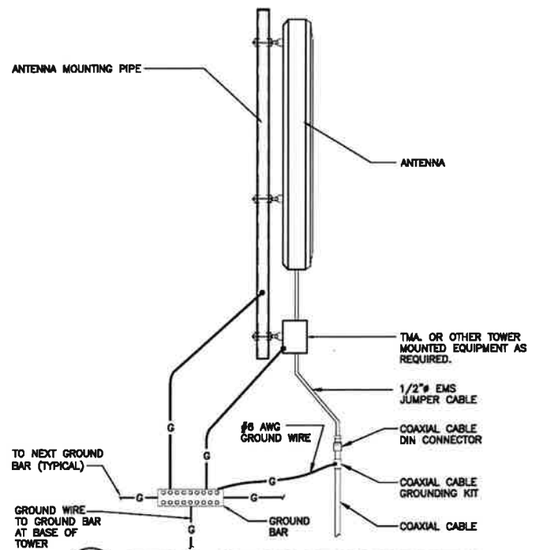
NOTES:
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE

4 / E-4 **CONNECTION OF GROUND WIRES TO GROUND BAR**
SCALE: NOT TO SCALE



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

5 / E-4 **ANTENNA CABLE GROUNDING DETAIL**
SCALE: NOT TO SCALE



6 / E-4 **TYPICAL ANTENNA GROUNDING DETAIL**
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
A	05/19/23	DRA	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW
1	06/12/23	BSP	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
2	07/11/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED GENERATOR MODEL
3	07/21/23	TDK	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS

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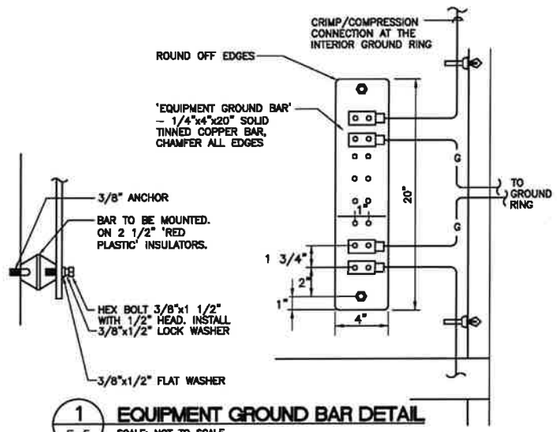
STAFFORD CT, 06076

DATE: 05/19/23
SCALE: AS NOTED
JOB NO. 23010.09

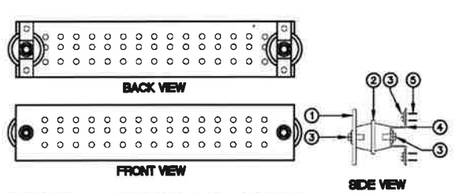
TYPICAL ELECTRICAL DETAILS

E-4

Sheet No. 12 of 14



1 E-5 **EQUIPMENT GROUND BAR DETAIL**
SCALE: NOT TO SCALE

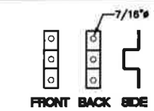


TYPICAL GROUND BAR ASSEMBLY
SCALE: 1/8"= 1'-0"

TYPICAL GROUND BAR - DIMENSIONS
SCALE: 1/8"= 1'-0"

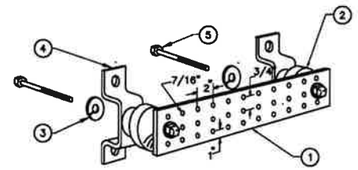
NOTES

1. HIGH CONDUCTIVITY TINNED COPPER BAR 1'-8"Lx4"Wx1/4"D.
2. RED COLORED STANDOFF INSULATOR PLASTIC #1872-1A.
3. STAINLESS STEEL TRUSS SPANNER MACHINE SCREWS, SPLIT LOCKWASHER AND FLAT WASHER.
4. 1"Wx1/8"T STAINLESS STEEL TYPE 304 BRACKET.
5. STAINLESS STEEL TYPE 304 HARDWARE – 3/8"ø EXPANSION BOLT FOR CONCRETE.



BRACKET FOR GROUND BAR-DIMENSIONS
SCALE: 1/8"= 1'-0"

2 E-5 **MASTER/EQUIPMENT GROUND BAR DETAILS**
SCALE: 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-8056.
5. 5/8-11 x 1" STAINLESS STEEL TRUSS SPANNER MACHINE SCREWS.

3 E-5 **GROUND BAR DETAIL**
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	07/21/23	TDK	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
1	07/11/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED GENERATOR MODEL
0	06/12/23	BSP	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
A	05/19/23	DRA	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

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SCALE: AS NOTED
JOB NO. 23010.09

TYPICAL ELECTRICAL DETAILS

E-5

Sheet No. 13 of 14

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. INSTALL 200A, 240/120V, 1P, 3 WIRE ELECTRIC SERVICE WITH REVENUE METER AND 200A MAIN CIRCUIT BREAKER FOR OWNER AND ASSOCIATED DISTRIBUTION EQUIPMENT. (AS REQUIRED BY UTILITY CO.)
2. NEW SITE TELEPHONE SERVICE AS SPECIFIED BY TELEPHONE COMPANY.
3. GENERATOR
4. FEEDERS AND BRANCH CIRCUIT WIRING TO PANELS, RECEPTACLES, EQUIPMENT, ETC. AS INDICATED OR NOTED ON PLANS.
5. CELLULAR GROUNDING SYSTEMS, CONSISTING OF ANTENNA GROUNDING, GROUND BARS, ETC.
6. FIELD MEASURE EXISTING ELECTRICAL SERVICES TO CONFIRM AVAILABLE EXISTING POWER.
7. COORDINATE ALL WORK SHOWN, ON THESE PLANS WITH LOCAL UTILITY COMPANIES.

B. LOCAL UTILITY COMPANIES SHALL PROVIDE THE FOLLOWING:

1. TELEPHONE CABLES.

C. CONTRACTOR SHALL CONFER WITH LOCAL UTILITY COMPANIES TO ASCERTAIN THE LIMITS OF THEIR WORK AND SHALL INCLUDE IN BID ANY CHARGES OR FEES MADE BY THE UTILITY COMPANIES FOR THEIR PORTION OF THE WORK AND SHALL PROVIDE AND INSTALL ALL ITEMS REQUIRED, BUT NOT PROVIDED BY UTILITY COMPANY.

D. CONTRACTOR SHALL COORDINATE WITH TELEPHONE UTILITY COMPANY FOR LOCATION OF TELEPHONE SERVICE AND TO DETERMINE ANY REQUIRED EQUIPMENT TO BE INSTALLED BY CONTRACTOR.

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. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH LOCAL TELEPHONE COMPANY THAT MAY BE REQUIRED FOR THE INSTALLATION OF TELEPHONE SERVICE TO THE PROPOSED CELLULAR SITE.

F. 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.

G. 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.

H. 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.

I. 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.

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

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

L. 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.

M. PROVIDE TEMPORARY POWER AND LIGHTING IN WORK AREAS AS REQUIRED.

N. SHOP DRAWINGS:

1. CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF SHOP DRAWINGS ON ALL EQUIPMENT AND MATERIALS PROPOSED FOR USE ON THIS PROJECT, GIVING ALL DETAILS, WHICH INCLUDE DIMENSIONS, CAPACITIES, ETC.
2. CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF ALL TEST REPORTS CALLED FOR IN THE SPECIFICATIONS AND DRAWINGS.

O. 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 16111

1.01. CONDUIT

A. MINIMUM CONDUIT SIZE FOR BRANCH CIRCUITS, LOW VOLTAGE CONTROL AND ALARM CIRCUITS SHALL BE 3/4". CONDUITS SHALL BE PROPERLY FASTENED AS REQUIRED BY THE N.E.C.

B. THE INTERIOR OF RACEWAYS/ ENCLOSURES INSTALLED UNDERGROUND SHALL BE CONSIDERED TO BE WET LOCATION, INSULATED CONDUCTORS SHALL BE LISTED FOR USE IN WET LOCATIONS. PROVIDE WEATHERPROOF CONSTRUCTION IN WET LOCATIONS.

C. CONDUIT INSTALLED UNDERGROUND SHALL BE INSTALLED TO MEET MINIMUM COVER REQUIREMENTS OF TABLE 300.5.

D. PROVIDE RIGID GALVANIZED STEEL CONDUIT (RMC) FOR THE FIRST 10 FOOT SECTION WHEN LEAVING A BUILDING OR SECTIONS PASSING THROUGH FLOOR SLABS

E. ONLY LISTED PVC CONDUIT AND FITTINGS ARE PERMITTED FOR THE INSTALLATION OF ELECTRICAL CONDUCTORS, SUITABLE FOR UNDERGROUND APPLICATIONS.

CONDUIT SCHEDULE SECTION 16111

CONDUIT TYPE	NEC REFERENCE	APPLICATION	MIN. BURIAL DEPTH PER NEC TABLE 300.5 [2]
EMT	ARTICLE 358	INTERIOR CIRCUITING, EQUIPMENT ROOMS, SHELTERS	N/A
RMC, RIGID GALV. STEEL	ARTICLE 344, 300.5, 300.50	ALL INTERIOR/ EXTERIOR CIRCUITING, ALL UNDERGROUND INSTALLATIONS.	6 INCHES
PVC, SCHEDULE 40	ARTICLE 352, 300.5, 300.50	INTERIOR/ EXTERIOR CIRCUITING AND GROUNDING SYSTEMS, UNDERGROUND INSTALLATIONS, WHERE NOT SUBJECT TO PHYSICAL DAMAGE. [1]	18 INCHES
PVC, SCHEDULE 80	ARTICLE 352, 300.5, 300.50	INTERIOR/ EXTERIOR CIRCUITING AND GROUNDING SYSTEMS, UNDERGROUND INSTALLATIONS, WHERE SUBJECT TO PHYSICAL DAMAGE. [1]	18 INCHES
LIQUID TIGHT FLEX. METAL	ARTICLE 350	SHORT LENGTHS (MAX. 3FT.) WIRING TO VIBRATING EQUIPMENT IN WET LOCATIONS.	N/A
FLEX. METAL	ARTICLE 348	SHORT LENGTHS (MAX. 3FT.) WIRING TO VIBRATING EQUIPMENT IN WET LOCATIONS.	N/A

[1] PHYSICAL DAMAGE IS SUBJECT TO THE AUTHORITY HAVING JURISDICTION.
[2] UNDERGROUND CONDUIT INSTALLED UNDER ROADS, HIGHWAYS, DRIVEWAYS, PARKING LOTS SHALL HAVE MINIMUM DEPTH OF 24".
[3] WHERE SOLID ROCK PREVENTS COMPLIANCE WITH MINIMUM COVER DEPTHS, WIRING SHALL BE INSTALLED IN PERMITTED RACEWAY FOR DIRECT BURIAL. THE RACEWAY SHALL BE COVERED BY A MINIMUM OF 2" OF CONCRETE EXTENDING DOWN TO ROCK.

SECTION 16123

1.01. CONDUCTORS

A. ALL CONDUCTORS SHALL BE TYPE THWN (INT. APPLICATION) AND XHHW (EXT. APPLICATION), 75 DEGREE C, 600 VOLT INSULATION, SOFT ANNEALED STRANDED COPPER. #10 AWG AND SMALLER SHALL BE SPLICED USING ACCEPTABLE SOLDERLESS PRESSURE CONNECTORS. #8 AWG AND LARGER SHALL BE SPLICED USING COMPRESSION SPLIT-BOLT TYPE CONNECTORS. #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR FOR LINE VOLTAGE BRANCH CIRCUITS. REFER TO PANEL SCHEDULE FOR BRANCH CIRCUIT CONDUCTOR SIZE(S). CONDUCTORS SHALL BE COLOR CODED FOR CONSISTENT PHASE IDENTIFICATION:

	120/208/240V	277/480V
LINE	COLOR	COLOR
A	BLACK	BROWN
B	RED	ORANGE
C	BLUE	YELLOW
N	CONTINUOUS WHITE	GREY
G	CONTINUOUS GREEN	GREEN WITH YELLOW STRIPE

B. MINIMUM BENDING RADIUS FOR CONDUCTORS SHALL BE 12 TIMES THE LARGEST DIAMETER OF BRANCH CIRCUIT CONDUCTOR.

SECTION 16130

1.01. BOXES

A. FURNISH AND INSTALL OUTLET BOXES FOR ALL DEVICES, SWITCHES, RECEPTACLES, ETC.. BOXES TO BE ZINC COATED STEEL.

B. FURNISH AND INSTALL PULL BOXES IN MAIN FEEDERS RUNS WHERE REQUIRED. PULL BOXES SHALL BE GALVANIZED STEEL WITH SCREW REMOVABLE COVERS, SIZE AND QUANTITY AS REQUIRED. PROVIDE WEATHERPROOF CONSTRUCTION IN WET LOCATIONS.

SECTION 16140

1.01. WIRING DEVICES

A. THE FOLLOWING LIST IS PROVIDED TO CONVEY THE QUALITY AND RATING OF WIRING DEVICES WHICH ARE TO BE INSTALLED. A COMPLETE LIST OF ALL DEVICES MUST BE SUBMITTED BEFORE INSTALLATION FOR APPROVAL.

1. 15 MINUTE TIMER SWITCH - INTERMATIC #FF15M (INTERIOR LIGHTS)
2. DUPLEX RECEPTACLE - P&S #2095 (GFCI) SPECIFICATION GRADE
3. SINGLE POLE SWITCH - P&S #CS820AC2 (20A-120V HARD USE) SPECIFICATION GRADE
4. DUPLEX RECEPTACLE - P&S #5362 (20A-120V HARD USE) SPECIFICATION GRADE

B. PLATES - ALL PLATES USED SHALL BE CORROSION RESISTANT TYPE 304 STAINLESS STEEL. PLATES SHALL BE FROM SAME MANUFACTURER AS SWITCHES AND RECEPTACLES. PROVIDE WEATHERPROOF HOUSING FOR DEVICES LOCATED IN WET LOCATIONS.

C. OTHER MANUFACTURERS OF THE SWITCHES, RECEPTACLES AND PLATES MAY BE SUBMITTED FOR APPROVAL BY THE ENGINEER.

SECTION 16170

1.01. DISCONNECT SWITCHES

A. FUSIBLE AND NON-FUSIBLE, 600V, HEAVY DUTY DISCONNECT SWITCHES SHALL BE AS MANUFACTURED BY SQUARE "D". PROVIDE FUSES AS CALLED FOR ON THE CONTRACT DRAWINGS. AMPERE RATING SHALL BE CONSISTENT WITH LOAD BEING SERVED. DISCONNECT SWITCH COVER SHALL BE MECHANICALLY INTERLOCKED TO PREVENT COVER FROM OPENING WHEN THE SWITCH IS IN THE "ON" POSITION. EXTERIOR APPLICATIONS SHALL BE NEMA 3R CONSTRUCTION WITH PADLOCK FEATURE.

SECTION 16190

1.01. SEISMIC RESTRAINT

A. ALL DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH ZONE 2 SEISMIC REQUIREMENTS.

SECTION 16195

1.01. LABELING AND IDENTIFICATION NOMENCLATURE FOR ELECTRICAL EQUIPMENT

A. CONTRACTOR SHALL FURNISH AND INSTALL NON-METALLIC ENGRAVED BACK-LIT NAMEPLATES ON ALL PANELS AND MAJOR ITEMS OF ELECTRICAL EQUIPMENT.

B. LETTERS TO BE WHITE ON BLACK BACKGROUND WITH LETTERS 1-1/2 INCH HIGH WITH 1/4 INCH MARGIN.

C. IDENTIFICATION NOMENCLATURE SHALL BE IN ACCORDANCE WITH OWNER'S STANDARDS.

D. PROVIDE NAMEPLATE FOR PORTABLE ENGINE/GENERATOR CONNECTION SHOWING VOLTAGE KVA/KW RATING, # PHASE, AND # OF WIRES. PLATE TO BE PLASTIC ENGRAVED, RED WITH WHITE LETTERS.

E. ALL RECEPTACLES, SWITCHES, DISCONNECT SWITCHES, ETC. SHALL BE LABELED WITH THE CORRECT BRANCH CIRCUIT NUMBER SERVED BY MEANS OF PERMANENT PRESSED TYPE BLACK 1/4" TRANSFER LETTERING. (FOR EXAMPLE: "MDP-5", ETC.).

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. GROUNDING OF PANELBOARDS:

1. PANELBOARD SHALL BE GROUNDED BY TERMINATING THE PANELBOARD FEEDER'S EQUIPMENT GROUND CONDUCTOR TO THE EQUIPMENT GROUND BAR KIT(S) LUGGED TO THE CABINET. ENSURE THAT THE SURFACE BETWEEN THE KIT AND CABINET ARE BARE METAL TO BARE METAL. PRIME AND PAINT OVER TO PREVENT CORROSION.
2. CONDUIT(S) TERMINATING INTO THE PANELBOARD SHALL HAVE GROUNDING TYPE BUSHINGS. THE BUSHINGS SHALL BE BONDED TOGETHER WITH BARE #10 AWG COPPER CONDUCTOR WHICH IN TURN IS TERMINATED INTO THE PANELBOARD'S EQUIPMENT GROUND BAR KIT(S).

D. 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.
3. EACH FEEDER OR BRANCH CIRCUIT SHALL HAVE EQUIPMENT GROUND CONDUCTOR(S) INSTALLED IN THE SAME RACEWAY(S).

E. CELLULAR GROUNDING SYSTEM:

CONTRACTOR SHALL PROVIDE A CELLULAR GROUNDING SYSTEM WITH THE MAXIMUM AC RESISTANCE TO GROUND OF 10 OHM BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3-POINT GROUNDING TEST. (REFER TO SECTION 16960).

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

1. GROUND BARS
2. EXTERIOR GROUNDING (WHERE REQUIRED DUE TO MEASURED AC RESISTANCE GREATER THAN SPECIFIED).
3. ANTENNA GROUND CONNECTIONS AND PLATES.

F. CONTRACTOR, AFTER COMPLETION OF THE COMPLETE GROUNDING SYSTEM BUT PRIOR TO CONCEALMENT/BURIAL OF SAME, SHALL NOTIFY OWNER'S PROJECT ENGINEER WHO WILL HAVE A DESIGN ENGINEER VISIT SITE AND MAKE A VISUAL INSPECTION OF THE GROUNDING GRID AND CONNECTIONS OF THE SYSTEM.

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

SECTION 16470

1.01. DISTRIBUTION EQUIPMENT

A. REFER TO CONTRACT DRAWINGS FOR DETAILS AND SCHEDULES.

SECTION 16477

1.01. FUSES

A. FUSES SHALL BE NONRENEWABLE TYPE AS MANUFACTURED BY "BUSSMAN" OR APPROVED EQUAL. FUSES RATED TO 1/10 AMPERE UP TO 600 AMPERES SHALL BE EQUIVALENT TO BUSSMAN TYPE LPN-RK (250V) UL CLASS RK1, LOW PEAK, DUAL ELEMENT, TIME-DELAY FUSES. FUSES SHALL HAVE SEPARATE SHORT CIRCUIT AND OVERLOAD ELEMENTS AND HAVE AN INTERRUPTING RATING OF 200 KAIC. UPON COMPLETION OF WORK, PROVIDE ONE SPARE SET OF FUSES FOR EACH TYPE INSTALLED.

SECTION 16620
(SUPPLIED BY OWNER, INSTALLED BY CONTRACTOR)

1.01. GENERATOR SET

A. REFER TO CONTRACT DRAWINGS FOR DETAILS AND SCHEDULES.

SECTION 16960

1.01. TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

A. CONTRACTOR SHALL RETAIN THE SERVICES OF A LOCAL INDEPENDENT ELECTRICAL TESTING FIRM (WITH MINIMUM 5 YEARS COMMERCIAL EXPERIENCE IN THE ELECTRICAL TESTING INDUSTRY) AS SPECIFIED BY OWNER TO PERFORM:

TEST 1: THERMAL OVERLOAD AND MAGNETIC TRIP TEST, AND CABLE INSULATION TEST FOR ALL CIRCUIT BREAKERS RATED 100 AMPS OR GREATER.

TEST 2: RESISTANCE TO GROUND TEST ON THE CELLULAR GROUNDING SYSTEM.

THE TESTING FIRM SHALL INCLUDE THE FOLLOWING INFORMATION WITH THE REPORT:

1. TESTING PROCEDURE INCLUDING THE MAKE AND MODEL OF TEST EQUIPMENT.
2. CERTIFICATION OF TESTING EQUIPMENT CALIBRATION WITHIN SIX (6) MONTHS OF DATE OF TESTING. INCLUDE CERTIFICATION LAB ADDRESS AND TELEPHONE NUMBER.
3. GRAPHICAL DESCRIPTION OF TESTING METHOD ACTUALLY IMPLEMENTED.

B. THESE TESTS SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF OWNER'S CONSTRUCTION REPRESENTATIVE. TESTING DATA SHALL BE INITIALED AND DATED BY THE CONSTRUCTION REPRESENTATIVE AND INCLUDED WITH THE WRITTEN REPORT/ANALYSIS.

C. THE CONTRACTOR SHALL FORWARD SIX (6) COPIES OF THE INDEPENDENT ELECTRICAL TESTING FIRM'S REPORT/ANALYSIS TO ENGINEER A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO THE JOB TURNOVER.

D. CONTRACTOR TO PROVIDE A MINIMUM OF ONE (1) WEEK NOTICE TO OWNER AND ENGINEER FOR ALL TESTS REQUIRING WITNESSING.

SECTION 16961

1.01. TESTS BY CONTRACTOR

A. ALL TESTS AS REQUIRED UPON COMPLETION OF WORK, SHALL BE MADE BY THIS CONTRACTOR. THESE SHALL BE CONTINUITY AND INSULATION TESTS; TEST TO DETERMINE THE QUALITY OF MATERIALS, ETC. AND SHALL BE MADE IN ACCORDANCE WITH N.E.C. RECOMMENDATIONS. ALL FEEDERS AND BRANCH CIRCUIT WIRING (EXCEPT CLASS 2 SIGNAL CIRCUITS) MUST BE TESTED FREE FROM SHORT CIRCUIT AND GROUND FAULT CONDITIONS AT 500V IN A REASONABLY DRY AMBIENT OF APPROXIMATELY 70 DEGREES F.

B. CONTRACTOR SHALL PERFORM LOAD PHASE BALANCING TESTS. CIRCUITS SHALL BE SO CONNECTED TO THE PANELBOARDS SUCH THAT THE NEW LOAD IS DISTRIBUTED AS EQUALLY AS POSSIBLE BETWEEN EACH LOAD AND NEUTRAL. 10% SHALL BE CONSIDERED AS A REASONABLE AND ACCEPTABLE ALLOWANCE. BRANCH CIRCUITS SHALL BE BALANCED ON THEIR OWN PANELBOARDS; FEEDER LOADS SHALL IN TURN, BE BALANCED ON THE SERVICE EQUIPMENT. REASONABLE LOAD TEST SHALL BE ARRANGED TO VERIFY LOAD BALANCE IF REQUESTED BY THE ENGINEER.

C. ALL TESTS, UPON REQUEST, SHALL BE REPEATED IN THE PRESENCE OF OWNER'S REPRESENTATIVE. ALL TESTS SHALL BE DOCUMENTED AND TURNED OVER TO OWNER. OWNER SHALL HAVE THE AUTHORITY TO STOP ANY OF THE WORK NOT BEING PROPERLY INSTALLED. ALL SUCH DETECTED WORK SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL EXPENSE TO THE OWNER AND THE TESTS SHALL BE REPEATED.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
A	05/19/23	DWA	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CLIENT REVIEW
1	07/11/23	BSP	TJR	CONSTRUCTION DRAWINGS - REVISED GENERATOR MODEL
2	07/21/23	TDK	TJR	CONSTRUCTION DRAWINGS - REVISED PER CLIENT COMMENTS

PROFESSIONAL ENGINEER SEAL

verizon

CENTEK engineering
Centered on Solutions
(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

SITE NAME: STAFFORD 4 CT
SITE ID: 16999206
169 HAMPDEN ROAD
STAFFORD CT, 06076

DATE: 05/19/23
SCALE: AS NOTED
JOB NO. 23010.08

ELECTRICAL SPECIFICATIONS

E-6

Sheet No. 14 of 14

ATTACHMENT 3

NHH-65B-R2B

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

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

General Specifications

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

Remote Electrical Tilt (RET) Information

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

NHH-65B-R2B

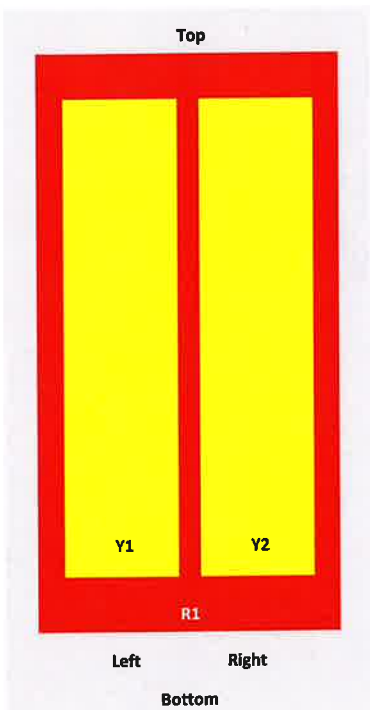
Protocol	3GPP/AISG 2.0 (Single RET)

Dimensions

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

Array Layout

NHH



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

View from the front of the antenna

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

Electrical Specifications

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

NHH-65B-R2B

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

Electrical Specifications

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

Electrical Specifications, BASTA

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

NHH-65B-R2B

CPR at Sector, dB	10	7	16	13	11	4

Mechanical Specifications

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

Packaging and Weights

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

Regulatory Compliance/Certifications

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

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

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

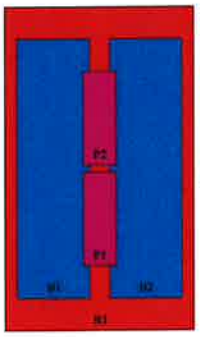
NHHSS-65B-R2BT4

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

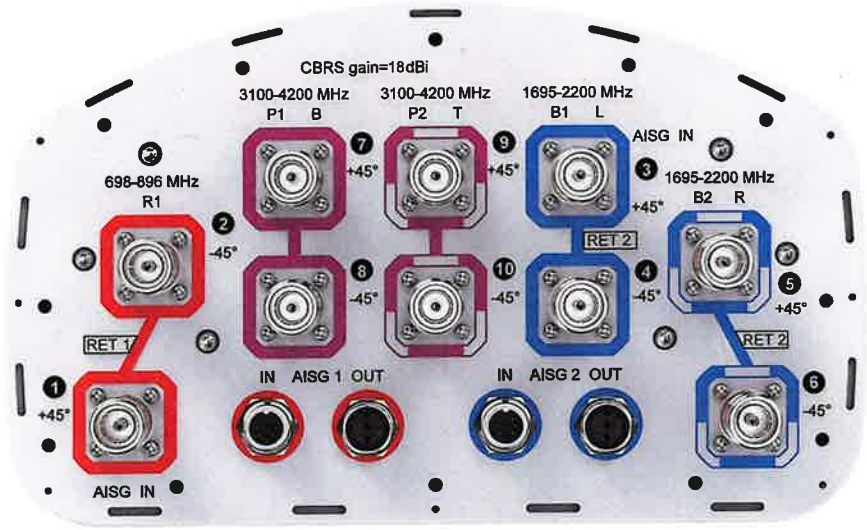


Array ID	Frequency (MHz)	RF Connector	RET (SRET)	AISG No.	AISG RET UID
B1	698-896	1 - 2	1	AISG1	CPxxxxxxxxxxxxxxR1
B4	1695-2200	3 - 4	2	AISG2	CPxxxxxxxxxxxxxxB1
B2	1695-2200	5 - 6			
P1	3100-4200	7 - 8	N/A	NA	N/A
P2	3100-4200	9 - 10			

(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

NHHSS-65B-R2BT4

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

SAMSUNG

SAMSUNG C-Band 64T64R Massive MIMO Radio

for High Capacity and Wide Coverage

Samsung C-Band 64T64R Massive MIMO Radio enables mobile operators to increase coverage range, boost data speeds and ultimately offer enriched 5G experiences to users in the U.S..

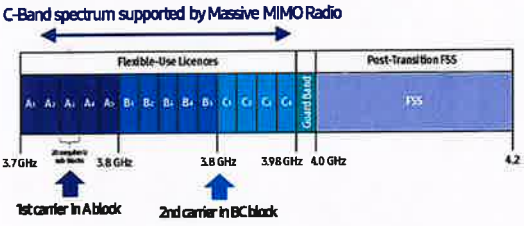
Model Code : MT6407-77A

Points of Differentiation

Wide Bandwidth

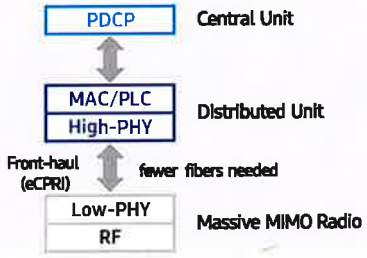
With capability to support up to 2 CC carrier configuration, Samsung C-Band massive MIMO Radio supports 200 MHz bandwidth in the C-Band spectrum.

Samsung C-Band massive MIMO Radio covers the entire C-Band 280 MHz spectrum, so it can meet the operator's needs in current A block and future B/C blocks



Future Proof Product

Samsung C-Band 64T64R Massive MIMO radio supports not only CPRI but also eCPRI as front-haul interface.
It enables operators can cut down on OPEX/CAPEX by reducing front-haul bandwidth through low layer split and using ethernet based higher efficient line.



Enhanced Performance

C-Band massive MIMO Radio creates sharp beams and extends networks' coverage on the critical mid-band spectrum using a large number of antenna elements and high output power to boost data speeds.

This helps operators reduce their CAPEX as they now need less products to cover the same area than before.

Furthermore, as C-Band massive MIMO Radio supports MU-MIMO(Multi-user MIMO) , it enables to increase user throughput by minimizing interference.

Well Matched Design

Samsung C-Band Massive MIMO radio utilizes 64 antennas, supports up to 280MHz bandwidth, and delivers a 200W output power. despite the above advanced performance, the Radio has a compact size of 50.9L and 79.4lbs. This makes it easy to install the Radio.

It is designed to look solid and compact, with a low profile appearance so that, when installed, harmonizes well with the surrounding environment..

Technical Specifications

Item	Specification
Tech	NR
Band	n77
Frequency Band	3700 - 3980 MHz
EIRP	78.5dBm (53.0 dBm+25.5 dBi)
IBW/OBW	280 MHz / 200 MHz
Installation	Pole/Wall
Size/ Weight	16.06 x 35.06 x 5.51 inch (50.86L)/ 79.4 lbs

SAMSUNG

About Samsung Electronics Co., Ltd.

Samsung inspires the world and shapes the future with transformative ideas and technologies. The company is redefining the worlds of TVs, smartphones, wearable devices, tablets, digital appliances, network systems, and memory, system LSI, foundry and LED solutions.

129 Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, Korea

SAMSUNG

AWS/PCS MACRO RADIO

DUAL-BAND AND HIGH POWER FOR MACRO COVERAGE

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

Model Code	RF4439d-25A

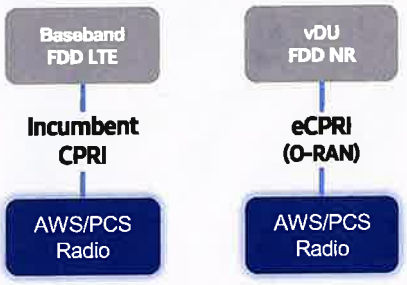
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

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



O-RAN Compliant

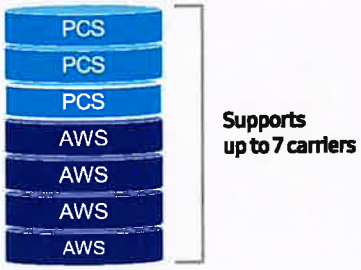
A standardized O-RAN radio can help in implementing cost-effective networks, which are capable of sending more data without compromising additional investments.

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

Optimum Spectrum Utilization

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

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



Brand New Features in a Compact Size

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

\+

- **2 FH connectivity**
- **O-RAN capability**
- **More carriers and spectrum**

Same as an incumbent radio volume

Technical Specifications

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

SAMSUNG

700/850MHZ MACRO RADIO

DUAL-BAND AND HIGH POWER FOR MACRO COVERAGE

Samsung's future proof dual-band radio is designed to help effectively increase the coverage areas in wireless networks. This 700/850MHz 4T4R dual-band radio has 4Tx/4Rx to 2Tx/2Rx RF chains options and a total output power of 320W, making it ideal for macro sites.

Model Code RF4440d-13A

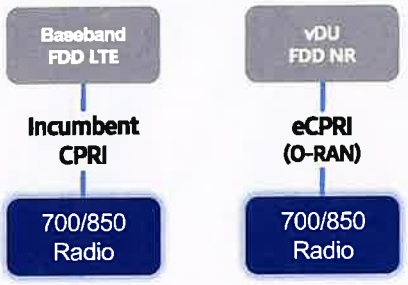
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

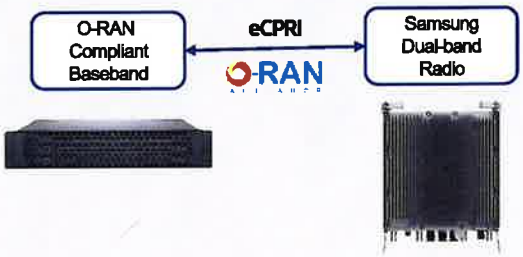
Samsung's 700/850MHz macro radio can support each incumbent CPRI interface as well as an advanced eCPRI interface. This feature provides installable options for both legacy LTE networks and added NR networks.



O-RAN Compliant

A standardized O-RAN radio can help when implementing cost-effective networks because it is capable of sending more data without compromising additional investments.

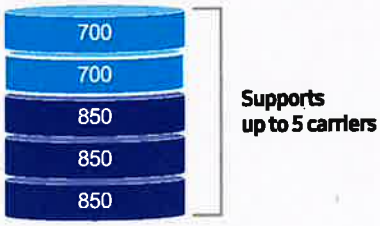
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



Optimum Spectrum Utilization

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

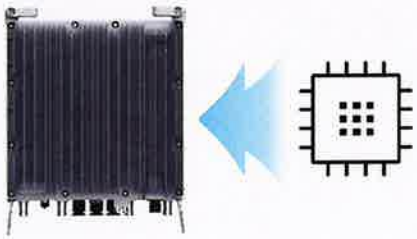
The new 700/850MHz dual-band radio can support up to 2 carriers in the B13 (700MHz) band and 3 carriers in the B5 (850MHz) band, respectively.



Secured Integrity

Access to sensitive data is allowed only to authorized software.

The Samsung radio's CPU can protect root of trust, which is credential information to verify SW integrity, and secure storage provides access control to sensitive data by using dedicated hardware (TPM).



Technical Specifications

Item	Specification
Tech	LTE / NR
Brand	B13(700MHz), B5(850MHz)
Frequency Band	DL: 746 – 756MHz, UL: 777 – 787MHz DL: 869 – 894MHz, UL: 824 – 849MHz
RF Power	(B13) 4 × 40W or 2 × 60W (B5) 4 × 40W or 2 × 60W
IBW/OBW	(B13) 10MHz / 10MHz (B5) 25MHz / 25MHz
Installation	Pole, Wall
Size/ Weight	14.96 x 14.96 x 9.05inch (33.2L) / 70.33 lb

Specifications

The table below outlines the main specifications of the RRH.

Table 1. Specifications

Item	RT4401-48A
Air Technology	LTE
Band	Band 48 (3.5 GHz)
Operating Frequency (MHz)	3550 to 3700
RF Chain	4TX/4RX
Input Power	-48 V DC (-38 to -57 V DC, 1 SKU), with clip-on AC-DC converter (Option)
Dimension (W × D × H) (mm)	8.55 in. (217.4) × 4.15 in. (105.5) × 13.91 in. (353.5) * RRH only 11.39 in. (289.4) × 5.45 in. (138.5) × 16.16 in. (410.5) * with Clip-on antenna, AC-DC power unit
Cooling	Natural convection
Unwanted Emission	3GPP 36.104 Category A
	[B48]: FCC 47 CFR 96.41 e)
Spectrum Analyzer	TX/RX Support
Antenna Type	Integrated (Clip-on) antenna (Option), External antenna (Option)
Operating Humidity	5 to 100 [%] (RH), condensing, not to exceed 30 g/m^3 absolute humidity
Altitude	-60 to 1,800 m
Earthquake	Telcordia Earthquake Risk Zone4 (Telcordia GR-63-CORE)
Vibration in Use Transportation Vibration	Office Vibration Transportation Vibration
Noise	Fanless (natural convection cooling)
Wind Resistance	Telcordia GR-487-CORE, Section 3.34
EMC	FCC Title 47, CFR Part 96
Safety	UL 60950-1 2nd ED

Item	RT4401-48A
	UL 62368-1 UL 60950-22
RF	FCC Title 47, CFR Part 96

The table below outlines the AC/DC power unit specifications of the RRH system.

SD050 | 4.5L | 50 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

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STANDARD FEATURES

ENGINE SYSTEM

- Oil Drain Extension
- Air Cleaner
- Fan Guard
- Stainless Steel Flexible Exhaust Connection
- Radiator Duct Adapter (Open Set Only)

Fuel System

- Fuel Lockoff Solenoid
- Secondary Fuel Filter

Cooling System

- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- Radiator Drain Extension

Electrical System

- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

ALTERNATOR SYSTEM

- UL2200 GENprotect™
- Class H Insulation Material
- 2/3 Pitch
- Skewed Stator
- Brushless Excitation
- Sealed Bearing
- Full Load Capacity Alternator
- Protective Thermal Switch

GENERATOR SET

- Genset Vibration Isolation
- Separation of Circuits - High/Low Voltage
- Separation of Circuits - Dual Breakers
- Standard Factory Testing
- 2 Year Limited Warranty (Standby Rated Units)
- 1 Year Limited Warranty (Prime Rated Units)

ENCLOSURE (If Selected)

- Rust-Proof Fasteners with Nylon Washers to Protect Finish
- High Performance Sound-Absorbing Material (Sound Attenuated Enclosures)
- Gasketed Doors
- Stamped Air-Intake Louvers
- Upward Facing Discharge Hoods (Radiator and Exhaust)
- Stainless Steel Lift Off Door Hinges
- Stainless Steel Lockable Handles
- RhinoCoat™ - Textured Polyester Powder Coat Paint

TANKS (If Selected)

- UL 142
- Double Wall
- Vents
- Sloped Top
- Sloped Bottom
- Factory Pressure Tested - 2 psi
- Rupture Basin Alarm
- Fuel Level
- Check Valve In Supply and Return Lines
- RhinoCoat™ - Textured Polyester Powder Coat Paint
- Stainless Steel Hardware

CONTROL SYSTEM

Digital H Control Panel- Dual 4x20 Display

Program Functions

- Programmable Crank Limiter
- 7-Day Programmable Exerciser
- Special Applications Programmable Logic Controller
- RS-232/485 Communications
- All Phase Sensing Digital Voltage Regulator
- 2-Wire Start Capability
- Date/Time Fault History (Event Log)
- Isochronous Governor Control
- Waterproof/Sealed Connectors
- Audible Alarms and Shutdowns
- Not in Auto (Flashing Light)
- Auto/Off/Manual Switch
- E-Stop (Red Mushroom-Type)
- NFPA110 Level I and II (Programmable)
- Customizable Alarms, Warnings, and Events
- Modbus® Protocol
- Predictive Maintenance Algorithm
- Sealed Boards
- Password Parameter Adjustment Protection
- Single Point Ground
- 16 Channel Remote Trending
- 0.2 msec High Speed Remote Trending
- Alarm Information Automatically Annunciated on the Display

Full System Status Display

- Power Output (kW)
- Power Factor
- kW Hours, Total, and Last Run
- Real/Reactive/Apparent Power
- All Phase AC Voltage
- All Phase Currents
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Speed
- Battery Voltage
- Frequency

Alarms and Warnings

- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Overspeed
- Battery Voltage
- Alarms and Warnings Time and Date Stamped
- Snap Shots of Key Operation Parameters During Alarms and Warnings
- Alarms and Warnings Spelled Out (No Alarm Codes)

SD050 | 4.5L | 50 kW

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CONFIGURABLE OPTIONS

ENGINE SYSTEM

- Oil Make-Up System
- Oil Heater
- Industrial Silencer
- Critical Silencer

FUEL SYSTEM

- Flexible Fuel Lines
- Primary Fuel Filter

COOLING SYSTEM

- 120 VAC Coolant Heater
- 208 VAC Coolant Heater
- 240 VAC Coolant Heater

ELECTRICAL SYSTEM

- Battery Box
- Battery Heater
- 10A UL Listed Float/Equalize Battery Charger

ALTERNATOR SYSTEM

- Main Line Circuit Breaker
- 2nd Circuit Breaker
- 3rd Circuit Breaker
- Alternator Upsizing
- Anti-Condensation Heater
- Tropical Coating
- Permanent Magnet Excitation

GENERATOR SET

- Weather Protected Enclosure
- Level 1 Sound Attenuated Enclosure
- Level 2 Sound Attenuated Enclosure
- IBC Seismic Certified/Seismic Rated Vibration Isolators
- Steel Enclosure
- Aluminum Enclosure
- Enclosure Light Kits

CONTROL SYSTEM

- NFPA 110 Level 1 Compliant 21-Light Remote Annunciator
- Remote Relay Assembly (8 or 16)
- Spare Inputs (x4) Outputs (x4)
- Oil Temperature Indication and Alarm
- Remote E-Stop (Break Glass-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Flush Mount)
- Remote Communication - Modem
- 10A Engine Run Relay
- Ground Fault Annunciator
- 100 dB Alarm Horn

WARRANTY (Standby Gensets Only)

- 2 Year Extended Limited Warranty
- 5 Year Limited Warranty
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

ENGINEERED OPTIONS

ENGINE SYSTEM

- Coolant Heater Ball Valves
- Fluid Containment Pan

CONTROL SYSTEM

- Battery Disconnect Switch

GENERATOR SET

- Special Testing
- Battery Box

ENCLOSURE

- Door Open Alarm
- Enclosure Heater
- Motorized Dampers

TANKS

- Overfill Protection Valve
- ULC S-601
- UL 2085 Tank
- Special Fuel Tanks
- External Vent Extensions
- Tank Risers
- 5 Gallon Spill Box
- Lockable Fuel Fill
- Pipe Flanges
- 90% High Fuel Alarm

SD050 | 4.5L | 50 kW

INDUSTRIAL DIESEL GENERATOR SET

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APPLICATION AND ENGINEERING DATA

ENGINE SPECIFICATIONS

General

Make	Iveco/FPT
EPA Emissions Compliance	Stationary Emergency
EPA Emissions Reference	See Emission Data Sheet
Cylinder #	4
Type	In-Line
Displacement - in^3 (L)	274 (4.5)
Bore - in (mm)	4.1 (105)
Stroke - in (mm)	5.2 (132)
Compression Ratio	17.5:1
Intake Air Method	Turbocharged
Cylinder Head Type	2-Valve
Piston Type	Aluminum
Crankshaft Type	Forged Steel

Engine Governing

Governor	Electronic Isochronous
Frequency Regulation (Steady State)	±0.25%

Lubrication System

Oil Pump Type	Gear
Oil Filter Type	Full-Flow Cartridge
Crankcase Capacity - qt (L)	14.4 (13.6)

Cooling System

Cooling System Type	Closed
Water Pump Type	Belt Driven Centrifugal
Fan Type	Pusher
Fan Speed - RPM	2,538
Fan Diameter - in (mm)	26 (660)

Fuel System

Fuel Type	Ultra Low Sulfur Diesel Fuel
Fuel Specifications	ASTM
Fuel Filtering (Microns)	5
Fuel Pump Type	Engine Driven Gear
Injector Type	Mechanical
Fuel Supply Line - in (mm)	0.25 (6.35) NPT
Fuel Return Line - in (mm)	0.25 (6.35) NPT

Engine Electrical System

System Voltage	12 VDC
Battery Charger Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	12 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	K0050124Y21
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5%
Telephone Interference Factor (TIF)	<50
Standard Excitation	Synchronous Brushless
Bearings	One, Pre-Lubed and Sealed
Coupling	Direct via Flexible Disc
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Digital
Number of Sensed Phases	3
Regulation Accuracy (Steady State)	±0.25%

SD050 | 4.5L | 50 kW

INDUSTRIAL DIESEL GENERATOR SET

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OPERATING DATA

POWER RATINGS

		Standby
Single-Phase 120/240 VAC @1.0pf	50 kW	Amps: 208
Three-Phase 120/208 VAC @0.8pf	50 kW	Amps: 174
Three-Phase 120/240 VAC @0.8pf	50 kW	Amps: 151
Three-Phase 277/480 VAC @0.8pf	50 kW	Amps: 75
Three-Phase 346/600 VAC @0.8pf	50 kW	Amps: 60

MOTOR STARTING CAPABILITIES (skVA)

skVA vs. Voltage Dip

277/480 VAC	30%	208/240 VAC	30%
K0050124Y21	98	K0050124Y21	75

FUEL CONSUMPTION RATES*

Fuel Pump Lift- ft (m)
3 (1)

Total Fuel Pump Flow (Combustion + Return) - gph (Lph)
13.6 (51.5)

Diesel - gph (Lph)

Percent Load	Standby
25%	1.15 (4.35)
50%	2.25 (8.52)
75%	3.21 (12.15)
100%	4.15 (15.75)

* Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

		Standby
Coolant Flow	gpm (Lpm)	32.7 (123.8)
Coolant System Capacity	gal (L)	4.5 (17.44)
Heat Rejection to Coolant	BTU/hr (kW)	121,000 (35.5)
Inlet Air	scfm (m^3/min)	6,360 (180)
Maximum Operating Radiator Air Temperature	°F (°C)	122 (50)
Maximum Ambient Temperature (Before Derate)		See Bulletin No. 0199270SSD
Maximum Radiator Backpressure	in H_2O (kPa)	0.5 (0.12)

COMBUSTION AIR REQUIREMENTS

	Standby	Prime
Flow at Rated Power scfm (m^3/min)	205 (5.80)	189 (5.35)

ENGINE

		Standby
Rated Engine Speed	RPM	1,800
Horsepower at Rated kW**	hp	80
Piston Speed	ft/min (m/min)	1,559 (475)
BMEP	psi (kPa)	128.5 (886)

EXHAUST

		Standby
Exhaust Flow (Rated Output)	scfm (m^3/min)	497 (14.1)
Max. Allowable Backpressure	inHg (kPa)	1.5 (5.1)
Exhaust Temp (Rated Output)	°F (°C)	850 (454)

** Refer to "Emissions Data Sheet" for maximum bHP for EPA and SCAQMD permitting purposes.

Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions.
Please contact a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with ISO3046, BS5514, ISO8528, and DIN6271 standards.
Standby - See Bulletin 10000018933
Prime - See Bulletin 10000018926

SD050 | 4.5L | 50 kW

INDUSTRIAL DIESEL GENERATOR SET

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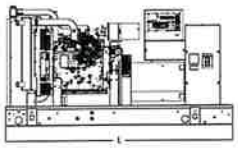
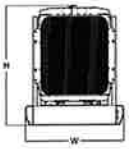
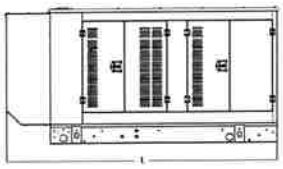
DIMENSIONS AND WEIGHTS*

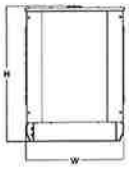




OPEN SET (Includes Exhaust Flex)

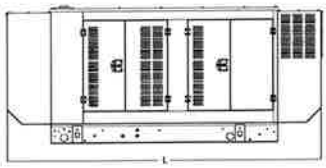
Run Time - Hours	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)
No Tank	-	76.0 (1,930) x 37.0 (940) x 53.0 (1,346)	1,996 (905)
13	54 (204)	76.0 (1,930) x 37.0 (940) x 66.0 (1,676)	2,476 (1,123)
32	132 (500)	76.0 (1,930) x 37.0 (940) x 78.0 (1,981)	2,706 (1,227)
51	211 (799)	76.0 (1,930) x 37.0 (940) x 90.0 (2,286)	2,915 (1,322)
72	300 (1,136)	93.0 (2,362) x 37.0 (940) x 94.0 (2,388)	2,978 (1,351)
122	510 (1,931)	117.0 (2,972) x 47.0 (1,194) x 96.0 (2,438)	3,361 (1,525)

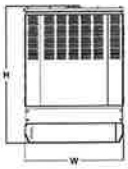




WEATHER PROTECTED ENCLOSURE

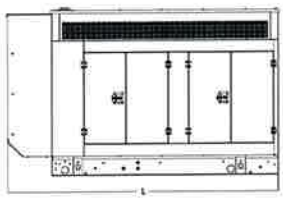
Run Time - Hours	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)
No Tank	-	95.0 (2,413) x 38.0 (965) x 50.0 (1,270)	2,298 (1,042)
13	54 (204)	95.0 (2,413) x 38.0 (965) x 63.0 (1,600)	2,778 (1,260)
32	132 (500)	95.0 (2,413) x 38.0 (965) x 75.0 (1,905)	3,008 (1,364)
51	211 (799)	95.0 (2,413) x 38.0 (965) x 87.0 (2,210)	3,217 (1,459)
72	300 (1,136)	95.0 (2,413) x 38.0 (965) x 91.0 (2,311)	3,280 (1,488)
122	510 (1,931)	117.0 (2,972) x 47.0 (1,194) x 93.0 (2,362)	3,663 (1,662)

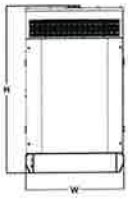




LEVEL 1 SOUND ENCLOSURE

Run Time - Hours	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)
No Tank	-	112.0 (2,845) x 38.0 (965) x 50.0 (1,270)	2,451 (1,112)
13	54 (204)	112.0 (2,845) x 38.0 (965) x 63.0 (1,600)	2,931 (1,329)
32	132 (500)	112.0 (2,845) x 38.0 (965) x 75.0 (1,905)	3,161 (1,434)
51	211 (799)	112.0 (2,845) x 38.0 (965) x 87.0 (2,210)	3,370 (1,529)
72	300 (1,136)	112.0 (2,845) x 38.0 (965) x 91.0 (2,311)	3,433 (1,557)
122	510 (1,931)	135.0 (3,429) x 47.0 (1,194) x 93.0 (2,362)	3,816 (1,731)





LEVEL 2 SOUND ENCLOSURE

Run Time - Hours	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)
No Tank	-	95.0 (2,413) x 38.0 (965) x 62.0 (1,575)	2,456 (1,114)
13	54 (204)	95.0 (2,413) x 38.0 (965) x 75.0 (1,905)	2,936 (1,332)
32	132 (500)	95.0 (2,413) x 38.0 (965) x 87.0 (2,210)	3,166 (1,436)
51	211 (799)	95.0 (2,413) x 38.0 (965) x 99.0 (2,515)	3,375 (1,531)
72	300 (1,136)	95.0 (2,413) x 38.0 (965) x 103.0 (2,616)	3,438 (1,559)
122	510 (1,931)	117.0 (2,972) x 47.0 (1,194) x 105.0 (2,667)	3,821 (1,733)

* All measurements are approximate and for estimation purposes only. Specification characteristics may change without notice. Please contact a Generac Power Systems Industrial Dealer for detailed installation drawings.

Generac Power Systems, Inc. | P.O.Box 8 | Waukesha, WI 53189
P: (262) 544-4811

Part No. 0191740SBY
Rev. D 04/04/19

ATTACHMENT 4

PAUL J. FORD & COMPANY

Report Date: February 22, 2023

Client: Everest Infrastructure Partners
Two Allegheny Center
Pittsburgh, PA 15212
Attn: Andy Dykstra
(412) 489-0348
andrew.dykstra@everestinfrastructure.com

Structure: Existing 180-ft Guyed Tower
FCC ASR #: 1267993
Site Name: Stafford 1 CDT
Site Reference #: 596025
Site Address: 169 Hampden Rd
City, County, State: Stafford Springs, Tolland County, CT
Latitude, Longitude: 41.999581°, -72.355646°

PJF Project: A13323-0004.001.8700

Paul J. Ford and Company is pleased to submit this "**Structural Analysis Report**" to determine the tower stress level.

Analysis Criteria:
This analysis utilizes an ultimate 3-second gust wind speed of 117 mph as required by the 2022 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Proposed Appurtenance Loads:
The structure was analyzed with the loading configuration shown in Table 1 of this report.

Summary of Analysis Results:
Existing Structure: Pass – 59..0%
Existing Foundation: Pass – 91.8%

We at Paul J. Ford and Company appreciate the opportunity of providing our continuing professional services to you and Everest Infrastructure Partners. If you have any questions or need further assistance on this or any other projects, please give us a call.

Respectfully Submitted by:
Paul J. Ford and Company

Christina Hedges, PE
Production Manager
chedges@pauljford.com

CRS

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 180 ft Guyed tower designed by Rohn in April 1995. Per site photos an additional guy cable was added at the 120' level. Cable size taken from previous analysis by Nudd.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	117 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Equipment Configuration

Status	Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Model	Mount	Number of Feed Lines	Feed Line Size (in)	Coax Location	Owner/ Tenant
Existing	179.0	187.0	1	16 ft x 2.5" omni whip	-	2	7/8	C	Unk
To be Removed	174.0	174.0	1	-	Generic 3.5' x 6' sidearm	-	-	-	Unk
	171.0	175.0	1	DB809DK-Y	Sector Mount [SM 803-3]	4	1 1/4	B	Unk
		171.0	3	1900 MHz 4x45W RRH					Sprint
			3	APXV9ERR18-C w/ Mount Pipe					
			3	TD-RRH8x20					
			3	DT465B-2XR w/ Mount Pipe					
Future			6	RRH 2x50-800 w/Notch Filter	Site Pro 1 VFA12-HD	3 1	1 5/8 1 1/4	B	T-Mobile
			3	AIR6449 B41 w/ Mount Pipe					
			3	RADIO 4460 B2/B25 B66_TMO					
			3	RADIO 4480 B71_TMO					
			3	APXVAALL24_43-U-NA20 w/ Mount Pipe					
Existing	163.0	167.0	1	PD201	5" x 2.375" Pipe Mount	1	7/8	C	Unk

Status	Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Model	Mount	Number of Feed Lines	Feed Line Size (in)	Coax Location	Owner/ Tenant
Proposed	**153.0**	**153.0**	**1**	**12 OVP**	**Site Pro 1 VFA12-HD**	**2**	**1 1/4**	**B**	**Verizon**
			3	**NHH-65B-R2B w/ Mount Pipe**					
			3	**NHHSS-65B-R2BT4 w/ Mount Pipe**					
			3	**B2/B66a RF4439D-25A**					
			3	**B5/B13 RF4440D-13A**					
			3	**CBRS RRHRT4401-48A**					
			3	**MT6407-77A w/ Mount Pipe**					
To be removed	150.0	150.0	-	-	Sector Mount [SM 803-3]	-	-	-	Unk
Existing	121.0	129.0	1	DB420	Generic 2' x 3' sidearm	1	7/8	C	Unk
Existing	77.0	81.0	1	PD201	5" x 2.375" Pipe Mount	1	1/2	C	Unk

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference
Tower Manufacturer Drawings	Rohn, 4/13/1995	B951658/D950801
Tower Inventory	Everest, 2/11/2023	
Previous Analysis	Nudd, 9/6/2021	121-23082

3.1) Analysis Method

tnxTower (version 8.1.1.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

Table 3 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	180 - 160	Leg	Pipe 2.375" x 0.218" (2 XS)	2	-12.19	62.91	19.4	Pass
T2	160 - 140	Leg	Pipe 2.375" x 0.218" (2 XS)	60	-17.31	62.91	27.5	Pass
T3	140 - 120	Leg	Pipe 2.375" x 0.218" (2 XS)	116	-19.16	62.91	30.5	Pass
T4	120 - 100	Leg	Pipe 2.375" x 0.218" (2 XS)	173	-23.94	62.91	38.0	Pass
T5	100 - 80	Leg	Pipe 2.875" x 0.276" (2.5 XS)	229	-32.53	101.36	32.1	Pass
T6	80 - 60	Leg	Pipe 2.875" x 0.276" (2.5 XS)	287	-32.54	79.98	40.7	Pass
T7	60 - 40	Leg	Pipe 2.875" x 0.203" (2.5 STD)	319	-35.57	61.33	58.0	Pass
T8	40 - 20	Leg	Pipe 2.875" x 0.203" (2.5 STD)	352	-36.24	61.33	59.0	Pass
T9	20 - 4.81771	Leg	Pipe 2.875" x 0.276" (2.5 XS)	385	-35.71	79.98	44.7	Pass
T10	4.81771 - 0	Leg	Pipe 2.875" x 0.276" (2.5 XS)	413	-36.45	77.52	47.0	Pass
T1	180 - 160	Diagonal	Pipe 1.5" x 0.058" (16 ga)	15	-1.68	6.52	25.7	Pass
T2	160 - 140	Diagonal	Pipe 1.5" x 0.058" (16 ga)	114	-1.36	6.52	20.9	Pass
T3	140 - 120	Diagonal	Pipe 1.5" x 0.058" (16 ga)	127	-1.21	6.52	18.6	Pass
T4	120 - 100	Diagonal	Pipe 1.5" x 0.058" (16 ga)	181	-0.74	6.52	11.4	Pass
T5	100 - 80	Diagonal	Pipe 1.5" x 0.058" (16 ga)	238	-1.95	6.52	29.9	Pass
T6	80 - 60	Diagonal	Pipe 1.5" x 0.058" (16 ga)	316	-1.58	6.52	24.2	Pass
T7	60 - 40	Diagonal	Pipe 1.5" x 0.058" (16 ga)	351	-0.97	6.52	14.9	Pass
T8	40 - 20	Diagonal	Pipe 1.5" x 0.058" (16 ga)	361	-0.59	6.52	9.0	Pass
T9	20 - 4.81771	Diagonal	Pipe 1.5" x 0.058" (16 ga)	397	-0.83	6.52	12.7 13.2 (b)	Pass
T10	4.81771 - 0	Horizontal	L 4 x 4 x 1/4	421	0.67	62.86	1.1	Pass
T1	180 - 160	Top Girt	Pipe 1.5" x 0.058" (16 ga)	4	0.04	9.93	0.4 0.7 (b)	Pass
T2	160 - 140	Top Girt	Pipe 1.5" x 0.058" (16 ga)	62	0.45	10.43	4.3 7.2 (b)	Pass
T3	140 - 120	Top Girt	Pipe 1.5" x 0.058" (16 ga)	118	-0.35	7.33	4.8 5.7 (b)	Pass
T4	120 - 100	Top Girt	Pipe 1.5" x 0.058" (16 ga)	176	2.40	10.43	23.0 38.6 (b)	Pass
T5	100 - 80	Top Girt	Pipe 1.5" x 0.058" (16 ga)	234	-0.56	7.40	7.6 9.1 (b)	Pass
T6	80 - 60	Top Girt	Pipe 1.5" x 0.058" (16 ga)	291	-0.57	7.40	7.7 12.1 (b)	Pass
T7	60 - 40	Top Girt	Pipe 1.5" x 0.058" (16 ga)	324	-0.62	7.40	8.4 10.0 (b)	Pass
T8	40 - 20	Top Girt	Pipe 1.5" x 0.058" (16 ga)	357	-0.63	7.40	8.5 10.1 (b)	Pass
T9	20 - 4.81771	Top Girt	Pipe 1.5" x 0.058" (16 ga)	390	-0.62	7.40	8.4 10.0 (b)	Pass
T10	4.81771 - 0	Top Girt	L 4 x 4 x 1/4	415	6.78	62.86	10.8	Pass
T1	180 - 160	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	9	0.39	10.43	3.8 6.3 (b)	Pass
T2	160 - 140	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	65	-0.30	7.33	4.1 4.8 (b)	Pass
T3	140 - 120	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	121	-0.35	7.33	4.8 7.4 (b)	Pass
T4	120 - 100	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	178	-0.42	7.33	5.7 6.7 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T5	100 - 80	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	237	-0.56	7.40	7.6 10.0 (b)	Pass
T6	80 - 60	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	294	-0.57	7.40	7.7 9.2 (b)	Pass
T7	60 - 40	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	327	-0.62	7.40	8.4 10.0 (b)	Pass
T8	40 - 20	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	360	-0.63	7.40	8.5 10.1 (b)	Pass
T9	20 - 4.81771	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	391	1.01	9.93	10.1 16.2 (b)	Pass
T10	4.81771 - 0	Bottom Girt	L 4 x 4 x 1/4	419	-0.25	67.37	2.8	Pass
T1	180 - 160	Guy A@162.523	3/4	432	14.39	36.73	39.2	Pass
T4	120 - 100	Guy A@119.385	1/2	435	6.29	16.95	37.1	Pass
T5	100 - 80	Guy A@82.5234	1/2	447	6.07	16.95	35.8	Pass
T1	180 - 160	Guy B@162.523	3/4	431	14.33	36.73	39.0	Pass
T4	120 - 100	Guy B@119.385	1/2	434	6.26	16.95	36.9	Pass
T5	100 - 80	Guy B@82.5234	1/2	443	6.02	16.95	35.5	Pass
T1	180 - 160	Guy C@162.523	3/4	427	14.50	36.73	39.5	Pass
T4	120 - 100	Guy C@119.385	1/2	433	6.29	16.95	37.1	Pass
T5	100 - 80	Guy C@82.5234	1/2	437	6.09	16.95	35.9	Pass
T1	180 - 160	Top Guy Pull-Off@162.523	2L 2 x 2 x 1/4 (3/8)	430	4.29	63.96	6.7 12.4 (b)	Pass
T5	100 - 80	Top Guy Pull-Off@82.5234	2L 2 x 2 x 1/4 (3/8)	441	2.89	51.56	5.6 8.4 (b)	Pass
T5	100 - 80	Torque Arm Top@82.5234	C10x15.3	449	2.08	152.75	26.8	Pass
							Summary	
						Leg (T8)	59.0	Pass
						Diagonal (T5)	29.9	Pass
						Horizontal (T10)	1.1	Pass
						Top Girt (T4)	38.6	Pass
						Bottom Girt (T9)	16.2	Pass
						Guy A (T1)	39.2	Pass
						Guy B (T1)	39.0	Pass
						Guy C (T1)	39.5	Pass
						Top Guy Pull-Off (T1)	12.4	Pass
						Torque Arm Top (T5)	26.8	Pass
						Bolt Checks	38.6	Pass
						RATING =	**59.0**	**Pass**

Table 4 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Base Foundation (Compared w/ Design Loads)	0	91.8	Pass
1,2	Guy Anchor Foundation Soil Interaction	0	50.0	Pass

Structure Rating (max from all components) =	91.8%

Notes:

- All structural ratings are per TIA-222-H Section 15.5

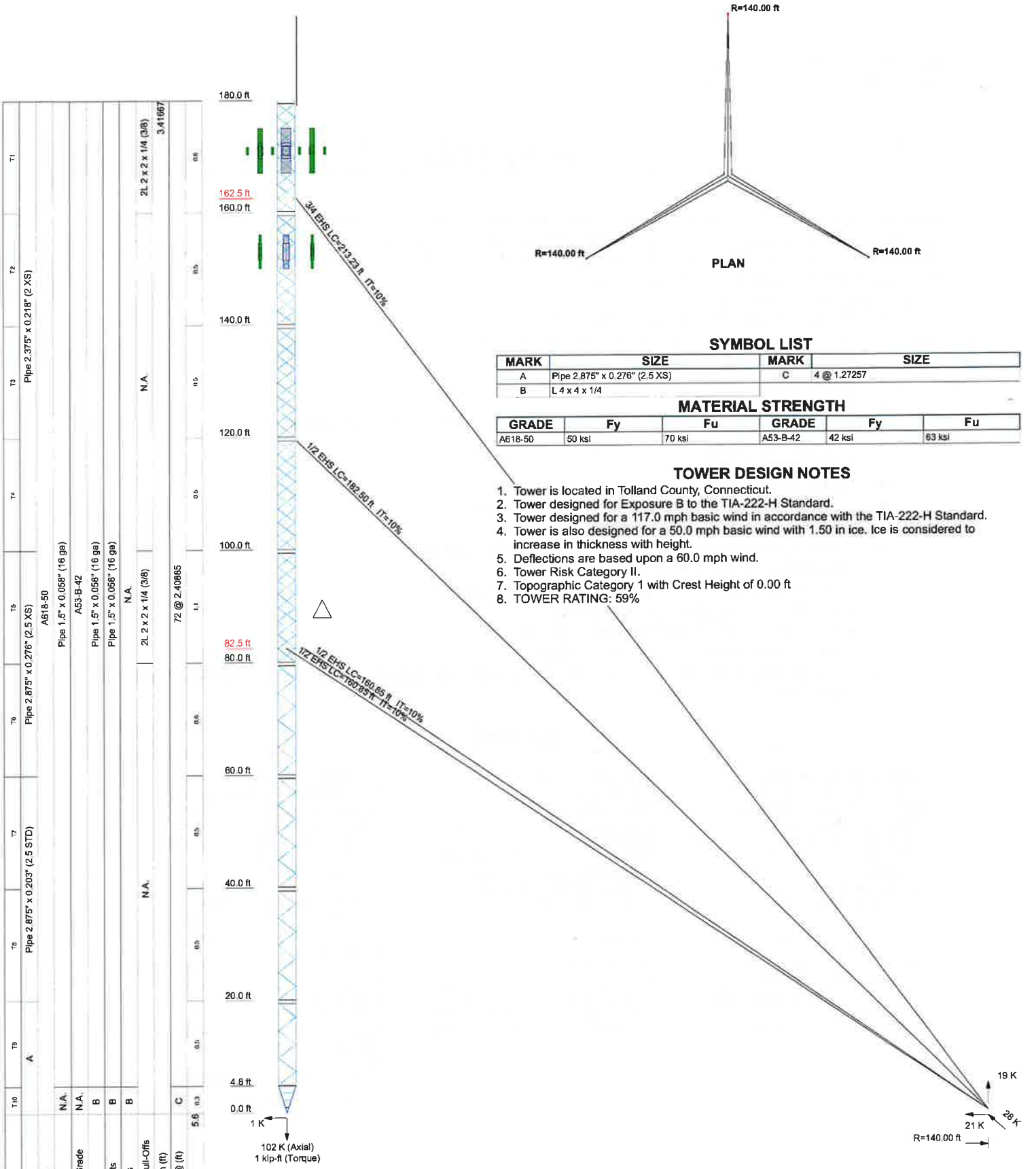
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Foundation capacity determined by comparing analysis reactions to original design reactions.

4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT



Section	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs		A	Pipe 2.875" x 0.203" (2.5 STD)		Pipe 2.875" x 0.276" (2.5 XS)			Pipe 2.375" x 0.218" (2 XS)		3.41667
Leg Grade						A618-50				
Diagonals	N.A.				Pipe 1.5" x 0.058" (16 ga)					
Diagonal Grade	N.A.					A53-B-42				
Top Girts		B				Pipe 1.5" x 0.058" (16 ga)				
Bottom Girts		B				Pipe 1.5" x 0.058" (16 ga)				
Horizontals	B					N.A.				
Top Guy Pull-Offs			N.A.			2L 2 x 2 x 1/4 (3/8)		N.A.		2L 2 x 2 x 1/4 (3/8)
Face Width (ft)										
# Panels @ (ft)						72 @ 2.40865				
Weight (K)	5.6	C	0.3	0.5	0.6	1.1	0.5	0.5	0.5	0.6

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pipe 2.875" x 0.276" (2.5 XS)	C	4 @ 1.27257
B	L 4 x 4 x 1/4		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A618-50	50 ksi	70 ksi	A53-B-42	42 ksi	63 ksi

TOWER DESIGN NOTES

1. Tower is located in Tolland County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 117.0 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50.0 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.0 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 59%

ALL REACTIONS ARE FACTORED

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

Job: Existing 180 ft Stafford Springs CT guyed towe			
Project: Stafford 1 CDT 596025 (PJF #13323-0004)			
Client: Everest	Drawn by: Chrissy Hedges	App'd:	
Code: TIA-222-H	Date: 02/22/23	Scale: NTS	
Path:		Dwg No. E-1	

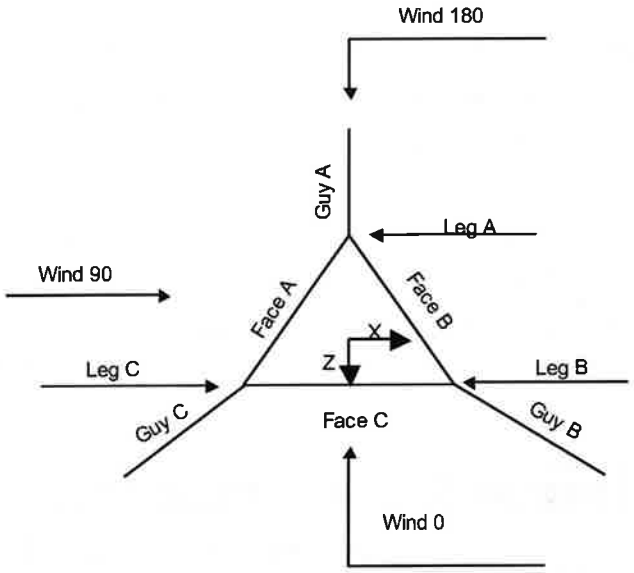
Tower Input Data

The main tower is a 3x guyed tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 3.42 ft at the top and tapered at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

- Tower is located in Tolland County, Connecticut.
- Tower base elevation above sea level: 1074.00 ft.
- Basic wind speed of 117.0 mph.
- Risk Category II.
- Exposure Category B.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.50 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50.0 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60.0 mph.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.05.
- Safety factor used in guy design is 0.9524.
- 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



Corner & Starmount Guyed Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.00-160.00	rohn #80	83PHX	3.42	1	20.00
T2-T4	160.00-100.00	rohn #80	83PHX	3.42	3	20.00
T5	100.00-80.00	rohn #80	84HX	3.42	1	20.00
T6	80.00-60.00	rohn #80	84H	3.42	1	20.00
T7-T8	60.00-20.00	rohn #80	84	3.42	2	20.00
T9	20.00-4.82	rohn #80	84HC	3.42	1	15.18
T10	4.82-0.00	rohn #80	84HTB	3.42	1	4.82

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180.00-160.00	2.41	CX Brace	No	No	7.38	1.38
T2-T4	160.00-100.00	2.41	CX Brace	No	No	7.38	1.38
T5	100.00-80.00	2.41	CX Brace	No	No	7.38	1.38
T6	80.00-60.00	2.41	K Brace Left	No	No	7.38	1.38
T7-T8	60.00-20.00	2.41	K Brace Left	No	No	7.38	1.38
T9	20.00-4.82	2.41	K Brace Left	No	No	7.38	1.38
T10	4.82-0.00	1.27	Diag Up	No	Yes	0.00	12.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-160.00	Pipe	Pipe 2.375" x 0.218" (2 XS)	A618-50 (50 ksi)	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)
T2-T4 160.00-100.00	Pipe	Pipe 2.375" x 0.218" (2 XS)	A618-50 (50 ksi)	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)
T5 100.00-80.00	Pipe	Pipe 2.875" x 0.276" (2.5 XS)	A618-50 (50 ksi)	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)
T6 80.00-60.00	Pipe	Pipe 2.875" x 0.276" (2.5 XS)	A618-50 (50 ksi)	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)
T7-T8 60.00-20.00	Pipe	Pipe 2.875" x 0.203" (2.5 STD)	A618-50 (50 ksi)	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)
T9 20.00-4.82	Pipe	Pipe 2.875" x 0.276" (2.5 XS)	A618-50 (50 ksi)	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)
T10 4.82-0.00	Pipe	Pipe 2.875" x 0.276" (2.5 XS)	A618-50 (50 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.00-160.00	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)
T2-T4 160.00-100.00	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)
T5 100.00-80.00	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)
T6 80.00-60.00	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)
T7-T8 60.00-20.00	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)
T9 20.00-4.82	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)	Pipe	Pipe 1.5" x 0.058" (16 ga)	A53-B-42 (42 ksi)
T10 4.82-0.00	Single Angle	L 4 x 4 x 1/4	A36 (36 ksi)	Single Angle	L 4 x 4 x 1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T10 4.82-0.00	None	Single Angle		A36 (36 ksi)	Single Angle	L 4 x 4 x 1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

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
T1 180.00-160.00	1.20	0.38	A36 (36 ksi)	1	1	1.05	41.00	41.00	36.00
T2-T4 160.00-	1.20	0.38	A36 (36 ksi)	1	1	1.05	41.00	41.00	36.00

Tower Elevation ft	Gusset Area (per face) ft²	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
100.00									
T5 100.00-80.00	1.20	0.38	A36 (36 ksi)	1	1	1.05	41.00	41.00	36.00
T6 80.00-60.00	0.73	0.38	A36 (36 ksi)	1	1	1.05	41.00	41.00	36.00
T7-T8 60.00-20.00	0.73	0.38	A36 (36 ksi)	1	1	1.05	41.00	41.00	36.00
T9 20.00-4.82	0.73	0.38	A36 (36 ksi)	1	1	1.05	41.00	41.00	36.00
T10 4.82-0.00	0.00	0.00	A36 (36 ksi)	1	1	1.05	41.00	41.00	36.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 180.00-160.00	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T2-T4 160.00-100.00	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T5 100.00-80.00	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T6 80.00-60.00	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T7-T8 60.00-20.00	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T9 20.00-4.82	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T10 4.82-0.00	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 180.00-160.00	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1
T2-T4 160.00-100.00	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1
T5 100.00-80.00	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1
T6 80.00-60.00	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1
T7-T8 60.00-20.00	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1
T9 20.00-4.82	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T10 4.82-0.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 180.00-160.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T2-T4 160.00-100.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T5 100.00-80.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T6 80.00-60.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T7-T8 60.00-20.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T9 20.00-4.82	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T10 4.82-0.00	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T1 180.00-160.00	0.00	3.50	0.00	3.50	0.00	0.00	0.00	0.00
T2-T4 160.00-100.00	0.00	3.50	0.00	3.50	0.00	0.00	0.00	0.00
T5 100.00-80.00	0.00	3.50	0.00	3.50	0.00	0.00	0.00	0.00
T6 80.00-60.00	0.00	3.50	0.00	3.50	0.00	0.00	0.00	0.00
T7-T8 60.00-20.00	0.00	3.50	0.00	3.50	0.00	0.00	0.00	0.00
T9 20.00-4.82	0.00	3.50	0.00	3.50	0.00	0.00	0.00	0.00
T10 4.82-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1 180.00-160.00	Flange	0.75 A325X	4	0.50 A325X	1	0.50 A325X	1	0.50 A325X	1	0.00 A325X	0	0.00 A325X	0	0.00 A325X	0
T2-T4 160.00-100.00	Flange	0.75 A325X	4	0.50 A325X	1	0.50 A325X	1	0.50 A325X	1	0.00 A325X	0	0.00 A325X	0	0.00 A325X	0
T5 100.00-80.00	Flange	0.75 A325X	4	0.50 A325X	1	0.50 A325X	1	0.50 A325X	1	0.00 A325X	0	0.00 A325X	0	0.00 A325X	0
T6 80.00-60.00	Flange	0.75 A325X	4	0.50 A325X	1	0.50 A325X	1	0.50 A325X	1	0.00 A325X	0	0.00 A325X	0	0.00 A325X	0
T7-T8 60.00-20.00	Flange	0.75 A325X	4	0.50 A325X	1	0.50 A325X	1	0.50 A325X	1	0.00 A325X	0	0.00 A325X	0	0.00 A325X	0
T9 20.00-4.82	Flange	0.75 A325X	4	0.50 A325X	1	0.50 A325X	1	0.50 A325X	1	0.00 A325X	0	0.00 A325X	0	0.00 A325X	0
T10 4.82-0.00	Flange	0.00 A325X	0	0.00 A325X	0	0.00 A325X	0	0.00 A325X	0	0.00 A325X	0	0.00 A325X	0	0.00 A325X	0

Guy Data

Guy Elevation ft	Guy Grade		Guy Size	Initial Tension K	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
162.523	EHS	A	3/4	5.83	10%	24000	1.16	213.08	140.00	0.000	0.00	100%
		B	3/4	5.83	10%	24000	1.16	213.08	140.00	0.000	0.00	100%
		C	3/4	5.83	10%	24000	1.16	213.08	140.00	0.000	0.00	100%
119.385	EHS	A	1/2	2.69	10%	23000	0.52	182.36	140.00	0.000	0.00	100%
		B	1/2	2.69	10%	23000	0.52	182.36	140.00	0.000	0.00	100%
		C	1/2	2.69	10%	23000	0.52	182.36	140.00	0.000	0.00	100%
82.5234	EHS	A	1/2	2.69	10%	23000	0.52	160.73	140.00	0.000	0.00	100%
		B	1/2	2.69	10%	23000	0.52	160.73	140.00	0.000	0.00	100%
		C	1/2	2.69	10%	23000	0.52	160.73	140.00	0.000	0.00	100%

Guy Data *(cont'd)*

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
162.523	Corner						
119.385	Corner						
82.5234	Torque Arm	6.83	0.000	Channel	A36 (36 ksi)	Channel	C10x15.3

Guy Data *(cont'd)*

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
162.52	A36 (36 ksi)	Solid Round			No	A36 (36 ksi)	Double Equal Angle	2L 2 x 2 x 1/4 (3/8)
119.39	A36 (36 ksi)	Solid Round				A36 (36 ksi)	Pipe	

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
82.52	A36 (36 ksi)	Solid Round			No	A36 (36 ksi)	Double Equal Angle	2L 2 x 2 x 1/4 (3/8)

Guy Data *(cont'd)*

Guy Elevation ft	Cable Weight A K	Cable Weight B K	Cable Weight C K	Cable Weight D K	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
162.523	0.25	0.25	0.25		4.43 3.6 sec/pulse	4.43 3.6 sec/pulse	4.43 3.6 sec/pulse	
119.385	0.09	0.09	0.09		3.16 3.1 sec/pulse	3.16 3.1 sec/pulse	3.16 3.1 sec/pulse	
82.5234	0.08	0.08	0.08		2.47 2.7 sec/pulse	2.47 2.7 sec/pulse	2.47 2.7 sec/pulse	

Guy Data *(cont'd)*

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm K_x	Torque Arm K_y	Pull Off K_x	Pull Off K_y	Diagonal K_x	Diagonal K_y
162.523	No	No			1	1	1	1
119.385	No	No			1	1	1	1
82.5234	No	No	1	1	1	1	1	1

Guy Data *(cont'd)*

Guy Elevation ft	Torque-Arm Bolt Size in	Torque-Arm Number	Torque-Arm Net Width Deduct in	Torque-Arm U	Pull Off Bolt Size in	Pull Off Number	Pull Off Net Width Deduct in	Pull Off U	Diagonal Bolt Size in	Diagonal Number	Diagonal Net Width Deduct in	Diagonal U
162.523	0.00 A325N	0	0.00	1	0.63 A325N	2	0.00	0.75	0.63 A325N	0	0.00	1
119.385	0.00 A325N	0	0.00	1	0.50 A325N	0	0.00	1	0.63 A325N	0	0.00	1
82.5234	0.00 A325N	0	0.00	1	0.63 A325N	2	0.00	0.75	0.63 A325N	0	0.00	1

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
162.523	A	81.26	27	5	1.64
	B	81.26	27	5	1.64
	C	81.26	27	5	1.64
119.385	A	59.69	24	4	1.59
	B	59.69	24	4	1.59

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
82.5234	C	59.69	24	4	1.59
	A	41.26	22	4	1.53
	B	41.26	22	4	1.53
	C	41.26	22	4	1.53

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF6-50A(1-1/4) (VZN)	B	No	No	Ar (CaAa)	153.00 - 5.00	0.00	-0.25	2	2	1.00 0.50	1.55		0.60
LDF7-50A(1-5/8") (new TMO)	B	No	No	Ar (CaAa)	171.00 - 5.00	0.00	0.25	3	3	1.00	1.98		0.82
LDF4P-50A(1/2) (UNK)	C	No	No	Ar (CaAa)	77.00 - 5.00	0.00	0.1	1	1	0.63	0.63		0.15
LDF5-50A(7/8) (UNK)	C	No	No	Ar (CaAa)	163.00 - 5.00	0.00	0.05	2	2	1.03	1.03		0.33
LDF5-50A(7/8) (UNK)	C	No	No	Ar (CaAa)	180.00 - 163.00	0.00	0.05	1	1	1.03	1.03		0.33
LDF6-50A(1-1/4) (1 TBR TMO)	C	No	No	Ar (CaAa)	171.00 - 5.00	0.00	0	1	1	1.00	1.55		0.60
LDF5-50A(7/8) (UNK)	C	No	No	Ar (CaAa)	121.00 - 5.00	0.00	-0.03	2	2	1.03	1.03		0.33
LDF5-50A(7/8) (UNK)	C	No	No	Ar (CaAa)	180.00 - 121.00	0.00	-0.03	1	1	1.03	1.03		0.33

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
16 ft x 2.5" omni whip	B	From Leg	0.50 0.00 8.00	0.000	179.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.00 5.63 7.28 10.62	4.00 5.63 7.28 10.62	0.03 0.06 0.10 0.21
** APXVAALL24_43-U-NA20_TIA w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	171.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	10.87 12.39 13.94 16.29	0.18 0.32 0.46 0.79
APXVAALL24_43-U-NA20_TIA w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	171.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	10.87 12.39 13.94 16.29	0.18 0.32 0.46 0.79
APXVAALL24_43-U-NA20_TIA w/ Mount Pipe	C	From Leg	4.00 0.00	0.000	171.00	No Ice 1/2"	20.48 21.23	10.87 12.39	0.18 0.32

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	21.99	13.94	0.46
						1" Ice	23.44	16.29	0.79
						2" Ice			
AIR6449 B41_TIA w/ Mount Pipe	A	From Leg	4.00	0.000	171.00	No Ice	5.89	3.28	0.12
			0.00			1/2"	6.26	3.74	0.17
			0.00			Ice	6.63	4.22	0.22
						1" Ice	7.41	5.21	0.35
						2" Ice			
AIR6449 B41_TIA w/ Mount Pipe	B	From Leg	4.00	0.000	171.00	No Ice	5.89	3.28	0.12
			0.00			1/2"	6.26	3.74	0.17
			0.00			Ice	6.63	4.22	0.22
						1" Ice	7.41	5.21	0.35
						2" Ice			
AIR6449 B41_TIA w/ Mount Pipe	C	From Leg	4.00	0.000	171.00	No Ice	5.89	3.28	0.12
			0.00			1/2"	6.26	3.74	0.17
			0.00			Ice	6.63	4.22	0.22
						1" Ice	7.41	5.21	0.35
						2" Ice			
RADIO 4460 B2/B25 B66_TMO	A	From Leg	4.00	0.000	171.00	No Ice	2.14	1.69	0.11
			0.00			1/2"	2.32	1.85	0.13
			0.00			Ice	2.51	2.02	0.16
						1" Ice	2.91	2.39	0.22
						2" Ice			
RADIO 4460 B2/B25 B66_TMO	B	From Leg	4.00	0.000	171.00	No Ice	2.14	1.69	0.11
			0.00			1/2"	2.32	1.85	0.13
			0.00			Ice	2.51	2.02	0.16
						1" Ice	2.91	2.39	0.22
						2" Ice			
RADIO 4460 B2/B25 B66_TMO	C	From Leg	4.00	0.000	171.00	No Ice	2.14	1.69	0.11
			0.00			1/2"	2.32	1.85	0.13
			0.00			Ice	2.51	2.02	0.16
						1" Ice	2.91	2.39	0.22
						2" Ice			
RADIO 4480 B71_TMO	A	From Leg	4.00	0.000	171.00	No Ice	2.85	1.38	0.09
			0.00			1/2"	3.06	1.54	0.11
			0.00			Ice	3.28	1.71	0.14
						1" Ice	3.74	2.07	0.20
						2" Ice			
RADIO 4480 B71_TMO	B	From Leg	4.00	0.000	171.00	No Ice	2.85	1.38	0.09
			0.00			1/2"	3.06	1.54	0.11
			0.00			Ice	3.28	1.71	0.14
						1" Ice	3.74	2.07	0.20
						2" Ice			
RADIO 4480 B71_TMO	C	From Leg	4.00	0.000	171.00	No Ice	2.85	1.38	0.09
			0.00			1/2"	3.06	1.54	0.11
			0.00			Ice	3.28	1.71	0.14
						1" Ice	3.74	2.07	0.20
						2" Ice			
(2) RRH 2x50-800 w/Notch Filter	A	From Leg	4.00	0.000	171.00	No Ice	1.73	1.33	0.07
			0.00			1/2"	1.90	1.48	0.09
			0.00			Ice	2.07	1.64	0.11
						1" Ice	2.44	1.97	0.16
						2" Ice			
(2) RRH 2x50-800 w/Notch Filter	B	From Leg	4.00	0.000	171.00	No Ice	1.73	1.33	0.07
			0.00			1/2"	1.90	1.48	0.09
			0.00			Ice	2.07	1.64	0.11
						1" Ice	2.44	1.97	0.16
						2" Ice			
(2) RRH 2x50-800 w/Notch Filter	C	From Leg	4.00	0.000	171.00	No Ice	1.73	1.33	0.07
			0.00			1/2"	1.90	1.48	0.09
			0.00			Ice	2.07	1.64	0.11
						1" Ice	2.44	1.97	0.16
						2" Ice			
Site Pro 1 VFA12-HD	A	From Leg	2.00	0.000	171.00	No Ice	13.20	9.20	0.66
			0.00			1/2"	19.50	14.60	0.80

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
			0.00				Ice	25.80	19.50	1.01
							1" Ice	38.40	30.80	1.24
							2" Ice			
Site Pro 1 VFA12-HD	B	From Leg	2.00	0.000		171.00	No Ice	13.20	9.20	0.66
			0.00				1/2"	19.50	14.60	0.80
			0.00				Ice	25.80	19.50	1.01
							1" Ice	38.40	30.80	1.24
							2" Ice			
Site Pro 1 VFA12-HD	C	From Leg	2.00	0.000		171.00	No Ice	13.20	9.20	0.66
			0.00				1/2"	19.50	14.60	0.80
			0.00				Ice	25.80	19.50	1.01
							1" Ice	38.40	30.80	1.24
							2" Ice			
***										
PD201	B	From Leg	4.00	0.000		163.00	No Ice	0.68	0.68	0.00
			0.00				1/2"	1.80	1.80	0.01
			4.00				Ice	2.92	2.92	0.02
							1" Ice	5.16	5.16	0.03
							2" Ice			
5" x 2.375" Pipe Mount	B	From Leg	2.00	0.000		163.00	No Ice	1.19	1.19	0.02
			0.00				1/2"	1.50	1.50	0.03
			0.00				Ice	1.81	1.81	0.04
							1" Ice	2.46	2.46	0.08
							2" Ice			
**										
NHH-65B-R2B_TIA w/ Mount Pipe	A	From Leg	4.00	0.000		153.00	No Ice	8.32	7.00	0.07
			0.00				1/2"	8.88	8.19	0.14
			0.00				Ice	9.40	9.08	0.21
							1" Ice	10.47	10.90	0.39
							2" Ice			
NHH-65B-R2B_TIA w/ Mount Pipe	B	From Leg	4.00	0.000		153.00	No Ice	8.32	7.00	0.07
			0.00				1/2"	8.88	8.19	0.14
			0.00				Ice	9.40	9.08	0.21
							1" Ice	10.47	10.90	0.39
							2" Ice			
NHH-65B-R2B_TIA w/ Mount Pipe	C	From Leg	4.00	0.000		153.00	No Ice	8.32	7.00	0.07
			0.00				1/2"	8.88	8.19	0.14
			0.00				Ice	9.40	9.08	0.21
							1" Ice	10.47	10.90	0.39
							2" Ice			
NHHSS-65B-R2BT4_TIA w/ Mount Pipe	A	From Leg	4.00	0.000		153.00	No Ice	8.29	7.02	0.08
			0.00				1/2"	8.84	8.20	0.14
			0.00				Ice	9.37	9.09	0.22
							1" Ice	10.44	10.92	0.40
							2" Ice			
NHHSS-65B-R2BT4_TIA w/ Mount Pipe	B	From Leg	4.00	0.000		153.00	No Ice	8.29	7.02	0.08
			0.00				1/2"	8.84	8.20	0.14
			0.00				Ice	9.37	9.09	0.22
							1" Ice	10.44	10.92	0.40
							2" Ice			
NHHSS-65B-R2BT4_TIA w/ Mount Pipe	C	From Leg	4.00	0.000		153.00	No Ice	8.29	7.02	0.08
			0.00				1/2"	8.84	8.20	0.14
			0.00				Ice	9.37	9.09	0.22
							1" Ice	10.44	10.92	0.40
							2" Ice			
MT6407-77A_TIA w/ Mount Pipe	A	From Leg	4.00	0.000		153.00	No Ice	4.91	2.68	0.10
			0.00				1/2"	5.26	3.14	0.14
			0.00				Ice	5.61	3.62	0.18
							1" Ice	6.36	4.63	0.29
							2" Ice			
MT6407-77A_TIA w/ Mount Pipe	B	From Leg	4.00	0.000		153.00	No Ice	4.91	2.68	0.10
			0.00				1/2"	5.26	3.14	0.14
			0.00				Ice	5.61	3.62	0.18
							1" Ice	6.36	4.63	0.29
							2" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
MT6407-77A_TIA w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.91 5.26 5.61 6.36	2.68 3.14 3.62 4.63	0.10 0.14 0.18 0.29
B2/B66a RF4439D-25A	A	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.33 2.52 2.71 3.13	1.56 1.72 1.89 2.26	0.07 0.10 0.12 0.18
B2/B66a RF4439D-25A	B	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.33 2.52 2.71 3.13	1.56 1.72 1.89 2.26	0.07 0.10 0.12 0.18
B2/B66a RF4439D-25A	C	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.33 2.52 2.71 3.13	1.56 1.72 1.89 2.26	0.07 0.10 0.12 0.18
B5/B13 RF4440D-13A	A	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.33 2.52 2.71 3.13	1.41 1.57 1.73 2.08	0.07 0.09 0.12 0.17
B5/B13 RF4440D-13A	B	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.33 2.52 2.71 3.13	1.41 1.57 1.73 2.08	0.07 0.09 0.12 0.17
B5/B13 RF4440D-13A	C	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.33 2.52 2.71 3.13	1.41 1.57 1.73 2.08	0.07 0.09 0.12 0.17
CBRS RRHRT4401- 48A	A	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.99 1.12 1.26 1.55	0.50 0.60 0.70 0.94	0.02 0.03 0.04 0.06
CBRS RRHRT4401- 48A	B	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.99 1.12 1.26 1.55	0.50 0.60 0.70 0.94	0.02 0.03 0.04 0.06
CBRS RRHRT4401- 48A	C	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.99 1.12 1.26 1.55	0.50 0.60 0.70 0.94	0.02 0.03 0.04 0.06
12 OVP (RCMDC-3315-PF-48)	A	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.36 3.60 3.84 4.34	2.19 2.39 2.61 3.05	0.03 0.06 0.09 0.17
Site Pro 1 VFA12-HD	A	From Leg	2.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	13.20 19.50 25.80 38.40	9.20 14.60 19.50 30.80	0.66 0.80 1.01 1.24
Site Pro 1 VFA12-HD	B	From Leg	2.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	13.20 19.50 25.80 38.40	9.20 14.60 19.50 30.80	0.66 0.80 1.01 1.24

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Site Pro 1 VFA12-HD	C	From Leg	2.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice 2" Ice	13.20 19.50 25.80 38.40	9.20 14.60 19.50 30.80	0.66 0.80 1.01 1.24
***									
3' x 2.375" Pipe Mount	B	From Leg	1.50 0.00 0.00	0.000	138.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.58 0.77 0.97 1.39	0.58 0.77 0.97 1.39	0.03 0.03 0.04 0.06
DB420	B	From Leg	3.00 0.00 8.00	0.000	121.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.33 5.99 8.66 13.99	3.33 5.99 8.66 13.99	0.03 0.04 0.05 0.07
Generic 2' x 3' sidearm	B	From Leg	1.50 0.00 0.00	0.000	121.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.50 2.50 3.50 5.50	3.00 4.00 5.00 7.00	0.19 0.28 0.36 0.54
***									
PD201	B	From Leg	4.00 0.00 4.00	0.000	77.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.68 1.80 2.92 5.16	0.68 1.80 2.92 5.16	0.00 0.01 0.02 0.03
5" x 2.375" Pipe Mount	B	From Leg	2.00 0.00 0.00	0.000	77.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.19 1.50 1.81 2.46	1.19 1.50 1.81 2.46	0.02 0.03 0.04 0.08
***									

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice+1.0 Guy
3	1.2D+1.0W (pattern 1) 0 deg - No Ice+1.0 Guy
4	1.2D+1.0W (pattern 2) 0 deg - No Ice+1.0 Guy
5	1.2D+1.0W (pattern 3) 0 deg - No Ice+1.0 Guy
6	1.2D+1.0W (pattern 4) 0 deg - No Ice+1.0 Guy
7	1.2 Dead+1.0 Wind 30 deg - No Ice+1.0 Guy
8	1.2D+1.0W (pattern 1) 30 deg - No Ice+1.0 Guy
9	1.2D+1.0W (pattern 2) 30 deg - No Ice+1.0 Guy
10	1.2D+1.0W (pattern 3) 30 deg - No Ice+1.0 Guy
11	1.2D+1.0W (pattern 4) 30 deg - No Ice+1.0 Guy
12	1.2 Dead+1.0 Wind 60 deg - No Ice+1.0 Guy
13	1.2D+1.0W (pattern 1) 60 deg - No Ice+1.0 Guy
14	1.2D+1.0W (pattern 2) 60 deg - No Ice+1.0 Guy
15	1.2D+1.0W (pattern 3) 60 deg - No Ice+1.0 Guy
16	1.2D+1.0W (pattern 4) 60 deg - No Ice+1.0 Guy
17	1.2 Dead+1.0 Wind 90 deg - No Ice+1.0 Guy
18	1.2D+1.0W (pattern 1) 90 deg - No Ice+1.0 Guy
19	1.2D+1.0W (pattern 2) 90 deg - No Ice+1.0 Guy
20	1.2D+1.0W (pattern 3) 90 deg - No Ice+1.0 Guy
21	1.2D+1.0W (pattern 4) 90 deg - No Ice+1.0 Guy
22	1.2 Dead+1.0 Wind 120 deg - No Ice+1.0 Guy
23	1.2D+1.0W (pattern 1) 120 deg - No Ice+1.0 Guy
24	1.2D+1.0W (pattern 2) 120 deg - No Ice+1.0 Guy

Comb. No.	Description
25	1.2D+1.0W (pattern 3) 120 deg - No Ice+1.0 Guy
26	1.2D+1.0W (pattern 4) 120 deg - No Ice+1.0 Guy
27	1.2 Dead+1.0 Wind 150 deg - No Ice+1.0 Guy
28	1.2D+1.0W (pattern 1) 150 deg - No Ice+1.0 Guy
29	1.2D+1.0W (pattern 2) 150 deg - No Ice+1.0 Guy
30	1.2D+1.0W (pattern 3) 150 deg - No Ice+1.0 Guy
31	1.2D+1.0W (pattern 4) 150 deg - No Ice+1.0 Guy
32	1.2 Dead+1.0 Wind 180 deg - No Ice+1.0 Guy
33	1.2D+1.0W (pattern 1) 180 deg - No Ice+1.0 Guy
34	1.2D+1.0W (pattern 2) 180 deg - No Ice+1.0 Guy
35	1.2D+1.0W (pattern 3) 180 deg - No Ice+1.0 Guy
36	1.2D+1.0W (pattern 4) 180 deg - No Ice+1.0 Guy
37	1.2 Dead+1.0 Wind 210 deg - No Ice+1.0 Guy
38	1.2D+1.0W (pattern 1) 210 deg - No Ice+1.0 Guy
39	1.2D+1.0W (pattern 2) 210 deg - No Ice+1.0 Guy
40	1.2D+1.0W (pattern 3) 210 deg - No Ice+1.0 Guy
41	1.2D+1.0W (pattern 4) 210 deg - No Ice+1.0 Guy
42	1.2 Dead+1.0 Wind 240 deg - No Ice+1.0 Guy
43	1.2D+1.0W (pattern 1) 240 deg - No Ice+1.0 Guy
44	1.2D+1.0W (pattern 2) 240 deg - No Ice+1.0 Guy
45	1.2D+1.0W (pattern 3) 240 deg - No Ice+1.0 Guy
46	1.2D+1.0W (pattern 4) 240 deg - No Ice+1.0 Guy
47	1.2 Dead+1.0 Wind 270 deg - No Ice+1.0 Guy
48	1.2D+1.0W (pattern 1) 270 deg - No Ice+1.0 Guy
49	1.2D+1.0W (pattern 2) 270 deg - No Ice+1.0 Guy
50	1.2D+1.0W (pattern 3) 270 deg - No Ice+1.0 Guy
51	1.2D+1.0W (pattern 4) 270 deg - No Ice+1.0 Guy
52	1.2 Dead+1.0 Wind 300 deg - No Ice+1.0 Guy
53	1.2D+1.0W (pattern 1) 300 deg - No Ice+1.0 Guy
54	1.2D+1.0W (pattern 2) 300 deg - No Ice+1.0 Guy
55	1.2D+1.0W (pattern 3) 300 deg - No Ice+1.0 Guy
56	1.2D+1.0W (pattern 4) 300 deg - No Ice+1.0 Guy
57	1.2 Dead+1.0 Wind 330 deg - No Ice+1.0 Guy
58	1.2D+1.0W (pattern 1) 330 deg - No Ice+1.0 Guy
59	1.2D+1.0W (pattern 2) 330 deg - No Ice+1.0 Guy
60	1.2D+1.0W (pattern 3) 330 deg - No Ice+1.0 Guy
61	1.2D+1.0W (pattern 4) 330 deg - No Ice+1.0 Guy
62	1.2 Dead+1.0 Ice+1.0 Temp+Guy
63	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
64	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
65	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
66	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
67	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
68	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
69	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
70	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
71	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
72	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
73	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
74	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
75	Dead+Wind 0 deg - Service+Guy
76	Dead+Wind 30 deg - Service+Guy
77	Dead+Wind 60 deg - Service+Guy
78	Dead+Wind 90 deg - Service+Guy
79	Dead+Wind 120 deg - Service+Guy
80	Dead+Wind 150 deg - Service+Guy
81	Dead+Wind 180 deg - Service+Guy
82	Dead+Wind 210 deg - Service+Guy
83	Dead+Wind 240 deg - Service+Guy
84	Dead+Wind 270 deg - Service+Guy
85	Dead+Wind 300 deg - Service+Guy
86	Dead+Wind 330 deg - Service+Guy

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	1.13	77	0.048	0.131
T2	160 - 140	0.90	77	0.037	0.126
T3	140 - 120	0.72	77	0.043	0.115
T4	120 - 100	0.49	77	0.038	0.099
T5	100 - 80	0.34	77	0.020	0.069
T6	80 - 60	0.28	77	0.002	0.041
T7	60 - 40	0.32	77	0.005	0.047
T8	40 - 20	0.31	82	0.012	0.044
T9	20 - 4.81771	0.20	83	0.034	0.034
T10	4.81771 - 0	0.04	83	0.041	0.022

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.00	16 ft x 2.5" omni whip	77	1.12	0.047	0.131	196628
171.00	APXVAALL24_43-U-NA20_TIA w/ Mount Pipe	77	1.02	0.041	0.129	109238
163.00	PD201	77	0.93	0.037	0.127	58412
162.52	Guy	77	0.93	0.037	0.127	57306
153.00	NHH-65B-R2B_TIA w/ Mount Pipe	77	0.84	0.038	0.123	191863
138.00	3' x 2.375" Pipe Mount	77	0.70	0.043	0.114	53993
121.00	DB420	77	0.50	0.039	0.101	43114
119.39	Guy	77	0.49	0.038	0.099	40205
82.52	Guy	77	0.28	0.003	0.043	34087
77.00	PD201	77	0.28	0.001	0.040	40228

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	6.13	43	0.318	0.501
T2	160 - 140	4.68	43	0.273	0.480
T3	140 - 120	3.48	8	0.281	0.445
T4	120 - 100	2.26	38	0.223	0.388
T5	100 - 80	1.57	16	0.144	0.275
T6	80 - 60	1.28	16	0.073	0.172
T7	60 - 40	1.39	15	0.036	0.193
T8	40 - 20	1.36	15	0.056	0.178
T9	20 - 4.81771	0.84	15	0.146	0.134
T10	4.81771 - 0	0.18	15	0.176	0.083

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.00	16 ft x 2.5" omni whip	43	6.06	0.315	0.501	40618
171.00	APXVAALL24_43-U-NA20_TIA w/ Mount Pipe	43	5.46	0.292	0.493	22566
163.00	PD201	43	4.88	0.276	0.484	12020

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
162.52	Guy	43	4.85	0.275	0.484	11754
153.00	NHH-65B-R2B_TIA w/ Mount Pipe	43	4.23	0.275	0.470	15181
138.00	3' x 2.375" Pipe Mount	8	3.36	0.279	0.440	9267
121.00	DB420	38	2.32	0.227	0.392	6742
119.39	Guy	38	2.23	0.221	0.385	6438
82.52	Guy	16	1.29	0.081	0.178	8085
77.00	PD201	16	1.28	0.063	0.169	9471

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Leg	A325X	0.75	4	1.00	30.10	0.033 ✔	1	Bolt Tension
		Diagonal	A325X	0.50	1	1.47	5.92	0.249 ✔	1.05	Member Bearing
		Top Girt	A325X	0.50	1	0.04	5.92	0.007 ✔	1	Member Bearing
		Bottom Girt	A325X	0.50	1	0.39	5.92	0.066 ✔	1.05	Member Bearing
		Top Guy Pull-Off@162.523	A325N	0.63	2	2.15	16.45	0.130 ✔	1.05	Member Block Shear
T2	160	Leg	A325X	0.75	4	1.43	30.10	0.048 ✔	1.05	Bolt Tension
		Diagonal	A325X	0.50	1	1.18	5.92	0.199 ✔	1.05	Member Bearing
		Top Girt	A325X	0.50	1	0.45	5.92	0.076 ✔	1.05	Member Bearing
		Bottom Girt	A325X	0.50	1	0.30	5.92	0.051 ✔	1.05	Member Bearing
T3	140	Leg	A325X	0.75	4	1.70	30.10	0.056 ✔	1.05	Bolt Tension
		Diagonal	A325X	0.50	1	1.21	7.02	0.173 ✔	1.05	Member Bearing
		Top Girt	A325X	0.50	1	0.35	5.92	0.060 ✔	1.05	Member Bearing
		Bottom Girt	A325X	0.50	1	0.46	5.92	0.078 ✔	1.05	Member Bearing
T4	120	Leg	A325X	0.75	4	2.00	30.10	0.067 ✔	1.05	Bolt Tension
		Diagonal	A325X	0.50	1	0.74	7.02	0.106 ✔	1.05	Member Bearing
		Top Girt	A325X	0.50	1	2.40	5.92	0.405 ✔	1.05	Member Bearing
		Bottom Girt	A325X	0.50	1	0.42	5.92	0.070 ✔	1.05	Member Bearing
T5	100	Leg	A325X	0.75	4	2.71	30.10	0.090 ✔	1.05	Bolt Tension
		Diagonal	A325X	0.50	1	1.95	7.02	0.278 ✔	1.05	Member Bearing
		Top Girt	A325X	0.50	1	0.56	5.92	0.095 ✔	1.05	Member Bearing
		Bottom Girt	A325X	0.50	1	0.62	5.92	0.106 ✔	1.05	Member Bearing
		Top Guy Pull-Off@82.5234	A325N	0.63	2	1.45	16.45	0.088 ✔	1.05	Member Block Shear
T6	80	Leg	A325X	0.75	4	2.74	30.10	0.091 ✔	1.05	Bolt Tension
		Diagonal	A325X	0.50	1	1.49	5.92	0.251 ✔	1.05	Member Bearing
		Top Girt	A325X	0.50	1	0.75	5.92	0.128 ✔	1.05	Member Bearing

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Bottom Girt	A325X	0.50	1	0.57	5.92	0.096 ✔	1.05	Member Bearing
T7	60	Leg	A325X	0.75	4	2.98	30.10	0.099 ✔	1.05	Bolt Tension
		Diagonal	A325X	0.50	1	0.82	5.92	0.138 ✔	1.05	Member Bearing
		Top Girt	A325X	0.50	1	0.62	5.92	0.105 ✔	1.05	Member Bearing
		Bottom Girt	A325X	0.50	1	0.62	5.92	0.105 ✔	1.05	Member Bearing
T8	40	Leg	A325X	0.75	4	2.99	30.10	0.099 ✔	1.05	Bolt Tension
		Diagonal	A325X	0.50	1	0.59	7.02	0.084 ✔	1.05	Member Bearing
		Top Girt	A325X	0.50	1	0.63	5.92	0.106 ✔	1.05	Member Bearing
		Bottom Girt	A325X	0.50	1	0.63	5.92	0.106 ✔	1.05	Member Bearing
T9	20	Leg	A325X	0.75	4	2.80	30.10	0.093 ✔	1	Bolt Tension
		Diagonal	A325X	0.50	1	0.82	5.92	0.139 ✔	1.05	Member Bearing
		Top Girt	A325X	0.50	1	0.62	5.92	0.105 ✔	1.05	Member Bearing
		Bottom Girt	A325X	0.50	1	1.01	5.92	0.170 ✔	1	Member Bearing

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T_u K	Allowable ϕT_n K	Required S.F.	Actual S.F.
T1	162.52 (A) (432)	3/4 EHS	5.83	58.30	14.39	36.73	0.952	2.431 ✔
	162.52 (B) (431)	3/4 EHS	5.83	58.30	14.33	36.73	0.952	2.442 ✔
	162.52 (C) (427)	3/4 EHS	5.83	58.30	14.50	36.73	0.952	2.412 ✔
T4	119.39 (A) (435)	1/2 EHS	2.69	26.90	6.29	16.95	0.952	2.568 ✔
	119.39 (B) (434)	1/2 EHS	2.69	26.90	6.26	16.95	0.952	2.578 ✔
	119.39 (C) (433)	1/2 EHS	2.69	26.90	6.29	16.95	0.952	2.564 ✔
T5	82.52 (A) (447)	1/2 EHS	2.69	26.90	6.07	16.95	0.952	2.661 ✔
	82.52 (A) (448)	1/2 EHS	2.69	26.90	5.98	16.95	0.952	2.701 ✔
	82.52 (B) (443)	1/2 EHS	2.69	26.90	6.02	16.95	0.952	2.680 ✔
	82.52 (B) (444)	1/2 EHS	2.69	26.90	6.02	16.95	0.952	2.681 ✔
	82.52 (C) (436)	1/2 EHS	2.69	26.90	5.99	16.95	0.952	2.695 ✔
	82.52 (C) (437)	1/2 EHS	2.69	26.90	6.09	16.95	0.952	2.651 ✔

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	Mast Stability Index	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	Pipe 2.375" x 0.218" (2 XS)	20.00	2.41	37.7 K=1.00	1.48	1.00	-12.18	59.91	0.203 [1]
T2	160 - 140	Pipe 2.375" x 0.218" (2 XS)	20.00	2.41	37.7 K=1.00	1.48	1.00	-17.29	59.91	0.289 [1]
T3	140 - 120	Pipe 2.375" x 0.218" (2 XS)	20.00	2.41	37.7 K=1.00	1.48	1.00	-19.12	59.91	0.319 [1]
T4	120 - 100	Pipe 2.375" x 0.218" (2 XS)	20.00	2.41	37.7 K=1.00	1.48	1.00	-23.89	59.91	0.399 [1]
T5	100 - 80	Pipe 2.875" x 0.276" (2.5 XS)	20.00	0.11	1.5 K=1.00	2.25	0.95	-32.47	96.54	0.336 [1]
T6	80 - 60	Pipe 2.875" x 0.276" (2.5 XS)	20.00	2.41	62.6 K=2.00	2.25	1.00	-32.48	76.17	0.426 [1]
T7	60 - 40	Pipe 2.875" x 0.203" (2.5 STD)	20.00	2.41	61.0 K=2.00	1.70	1.00	-35.50	58.41	0.608 [1]
T8	40 - 20	Pipe 2.875" x 0.203" (2.5 STD)	20.00	2.41	61.0 K=2.00	1.70	1.00	-36.16	58.41	0.619 [1]
T9	20 - 4.81771	Pipe 2.875" x 0.276" (2.5 XS)	15.18	2.41	62.6 K=2.00	2.25	1.00	-35.63	76.17	0.468 [1]
T10	4.81771 - 0	Pipe 2.875" x 0.276" (2.5 XS)	5.21	1.38	17.9 K=1.00	2.25	0.78	-36.35	77.52	0.469 [1]

* DL controls
[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5 K=1.00	0.26	-1.67	6.21	0.270 [1]
T2	160 - 140	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5 K=1.00	0.26	-1.36	6.21	0.219 [1]
T3	140 - 120	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5 K=1.00	0.26	-1.21	6.21	0.195 [1]
T4	120 - 100	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5 K=1.00	0.26	-0.74	6.21	0.120 [1]
T5	100 - 80	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5 K=1.00	0.26	-1.95	6.21	0.313 [1]
T6	80 - 60	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5 K=1.00	0.26	-1.58	6.21	0.254 [1]
T7	60 - 40	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5 K=1.00	0.26	-0.97	6.21	0.156 [1]
T8	40 - 20	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5 K=1.00	0.26	-0.59	6.21	0.095 [1]
T9	20 - 4.81771	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5 K=1.00	0.26	-0.83	6.21	0.134 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T10	4.81771 - 0	L 4 x 4 x 1/4	2.51	2.27	34.3 K=1.00	1.94	-0.67	65.06	0.010 *1 ✔

* DL controls
[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7 K=1.00	0.26	-0.03	6.99	0.004 [1] ✔
T2	160 - 140	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7 K=1.00	0.26	-0.30	6.99	0.043 [1] ✔
T3	140 - 120	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7 K=1.00	0.26	-0.35	6.99	0.050 [1] ✔
T4	120 - 100	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7 K=1.00	0.26	-0.42	6.99	0.059 [1] ✔
T5	100 - 80	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7 K=1.00	0.26	-0.56	7.05	0.080 [1] ✔
T6	80 - 60	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7 K=1.00	0.26	-0.57	7.05	0.081 [1] ✔
T7	60 - 40	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7 K=1.00	0.26	-0.62	7.05	0.088 [1] ✔
T8	40 - 20	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7 K=1.00	0.26	-0.63	7.05	0.089 [1] ✔
T9	20 - 4.81771	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7 K=1.00	0.26	-0.62	7.05	0.088 [1] ✔
T10	4.81771 - 0	L 4 x 4 x 1/4	3.42	3.18	48.0 K=1.00	1.94	-0.67	62.76	0.011 *1 ✔

* DL controls
[1] $P_u / \phi P_n$ controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7 K=1.00	0.26	-0.21	6.99	0.030 *1 ✔
T2	160 - 140	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7 K=1.00	0.26	-0.30	6.99	0.043 [1] ✔
T3	140 - 120	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7 K=1.00	0.26	-0.35	6.99	0.050 [1] ✔
T4	120 - 100	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7 K=1.00	0.26	-0.42	6.99	0.059 [1] ✔
T5	100 - 80	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7	0.26	-0.56	7.05	0.080 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T6	80 - 60	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	K=1.00 74.7 K=1.00	0.26	-0.57	7.05	✔ 0.081 [1] ✔
T7	60 - 40	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7 K=1.00	0.26	-0.62	7.05	0.088 [1] ✔
T8	40 - 20	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7 K=1.00	0.26	-0.63	7.05	0.089 [1] ✔
T9	20 - 4.81771	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7 K=1.00	0.26	-0.62	7.05	0.088 [1] ✔
T10	4.81771 - 0	L 4 x 4 x 1/4	0.71	0.47	7.1 K=1.00	1.94	-0.24	67.37	0.004 *[1] ✔

* DL controls
[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T5	100 - 80	2L 2 x 2 x 1/4 (3/8) 2L 'a' > 18.36 in - 441	3.42	3.18	104.9 K=1.00	1.88	-1.79	43.61	0.041 [1]

[1] P_u / ϕP_n controls

Top Guy Pull-Off 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 $\frac{M_{uy}}{\phi M_{ny}}$
T5	100 - 80	2L 2 x 2 x 1/4 (3/8)	0	2	0.000	0	3	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T5	100 - 80	2L 2 x 2 x 1/4 (3/8)	0.041	0.000	0.000	0.041 [1] ✔	1.050	4.8.1 ✔

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T5	100 - 80 (438)	C10x15.3	3.42	3.30	55.5 K=1.00	4.49	-0.19	123.71	0.002
T5	100 - 80 (439)	C10x15.3	3.42	3.30	55.5 K=1.00	4.49	-0.11	123.71	0.001
T5	100 - 80 (445)	C10x15.3	3.42	3.30	55.5 K=1.00	4.49	-0.24	123.71	0.002
T5	100 - 80 (446)	C10x15.3	3.42	3.30	55.5 K=1.00	4.49	-0.49	123.71	0.004
T5	100 - 80 (449)	C10x15.3	3.42	3.30	55.5 K=1.00	4.49	-0.30	123.71	0.002
T5	100 - 80 (450)	C10x15.3	3.42	3.30	55.5 K=1.00	4.49	-0.44	123.71	0.004

Torque-Arm Top 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 $\frac{M_{uy}}{\phi M_{ny}}$
T5	100 - 80 (438)	C10x15.3	-8	42	0.188	0	5	0.000
T5	100 - 80 (439)	C10x15.3	-8	42	0.185	0	5	0.000
T5	100 - 80 (445)	C10x15.3	-8	42	0.185	0	5	0.000
T5	100 - 80 (446)	C10x15.3	-8	42	0.187	0	5	0.000
T5	100 - 80 (449)	C10x15.3	-8	42	0.185	0	5	0.000
T5	100 - 80 (450)	C10x15.3	-8	42	0.185	0	5	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T5	100 - 80 (438)	C10x15.3	0.002	0.188	0.000	0.189 ✔	1.050	4.8.1 ✔
T5	100 - 80 (439)	C10x15.3	0.001	0.185	0.000	0.186 ✔	1.050	4.8.1 ✔
T5	100 - 80 (445)	C10x15.3	0.002	0.185	0.000	0.186 ✔	1.050	4.8.1 ✔
T5	100 - 80 (446)	C10x15.3	0.004	0.187	0.000	0.189 ✔	1.050	4.8.1 ✔
T5	100 - 80 (449)	C10x15.3	0.002	0.185	0.000	0.186 ✔	1.050	4.8.1 ✔
T5	100 - 80 (450)	C10x15.3	0.004	0.185	0.000	0.186 ✔	1.050	4.8.1 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	Pipe 2.375" x 0.218" (2 XS)	20.00	2.41	37.7	1.48	7.58	66.48	0.114 [1] ✔

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 160	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5	0.26	1.47	9.93	0.148 [1] ✔
T2	160 - 140	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5	0.26	1.18	9.93	0.119 [1] ✔
T3	140 - 120	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5	0.26	0.83	9.93	0.084 [1] ✔
T4	120 - 100	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5	0.26	0.59	9.93	0.060 [1] ✔
T5	100 - 80	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5	0.26	0.84	9.93	0.084 [1] ✔
T6	80 - 60	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5	0.26	1.49	9.93	0.150 [1] ✔
T7	60 - 40	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5	0.26	0.82	9.93	0.082 [1] ✔
T8	40 - 20	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5	0.26	0.44	9.93	0.044 [1] ✔
T9	20 - 4.81771	Pipe 1.5" x 0.058" (16 ga)	3.72	3.72	87.5	0.26	0.82	9.93	0.083 [1] ✔

[1] $P_u / \phi P_n$ controls

Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T10	4.81771 - 0	L 4 x 4 x 1/4	2.51	2.27	21.8	1.94	0.67	62.86	0.011 *[1] ✔

* DL controls
[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 160	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7	0.26	0.04	9.93	0.004 *[1] ✔
T2	160 - 140	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7	0.26	0.45	9.93	0.045 [1] ✔
T3	140 - 120	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7	0.26	0.35	9.93	0.035 [1] ✔

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T4	120 - 100	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7	0.26	2.40	9.93	0.241 [1] ✔
T5	100 - 80	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7	0.26	0.56	9.93	0.057 [1] ✔
T6	80 - 60	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7	0.26	0.75	9.93	0.076 [1] ✔
T7	60 - 40	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7	0.26	0.62	9.93	0.062 [1] ✔
T8	40 - 20	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7	0.26	0.63	9.93	0.063 [1] ✔
T9	20 - 4.81771	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7	0.26	0.62	9.93	0.063 [1] ✔
T10	4.81771 - 0	L 4 x 4 x 1/4	3.42	3.18	30.5	1.94	6.76	62.86	0.108* [1] ✔

* DL controls
[1] $P_u / \phi P_n$ controls

Bottom Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 160	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7	0.26	0.39	9.93	0.040 [1] ✔
T2	160 - 140	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7	0.26	0.30	9.93	0.030 [1] ✔
T3	140 - 120	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7	0.26	0.46	9.93	0.046 [1] ✔
T4	120 - 100	Pipe 1.5" x 0.058" (16 ga)	3.42	3.22	75.7	0.26	0.42	9.93	0.042 [1] ✔
T5	100 - 80	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7	0.26	0.62	9.93	0.063 [1] ✔
T6	80 - 60	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7	0.26	0.57	9.93	0.057 [1] ✔
T7	60 - 40	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7	0.26	0.62	9.93	0.062 [1] ✔
T8	40 - 20	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7	0.26	0.63	9.93	0.063 [1] ✔
T9	20 - 4.81771	Pipe 1.5" x 0.058" (16 ga)	3.42	3.18	74.7	0.26	1.00	9.93	0.101* [1] ✔

* DL controls
[1] $P_u / \phi P_n$ controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 160	2L 2 x 2 x 1/4 (3/8) 2L 'a' > 18.60 in - 430	3.42	3.22	63.4	1.88	4.29	60.91	0.070 [1]
T5	100 - 80	2L 2 x 2 x 1/4 (3/8) 2L 'a' > 18.36 in - 441	3.42	3.18	62.6	1.13	2.89	49.10	0.059 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$

[1] $P_u / \phi P_n$ controls

Top Guy Pull-Off 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 $\frac{M_{uy}}{\phi M_{ny}}$
T1	180 - 160	2L 2 x 2 x 1/4 (3/8)	0	2	0.000	0	3	0.000
T5	100 - 80	2L 2 x 2 x 1/4 (3/8)	0	2	0.000	0	3	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	180 - 160	2L 2 x 2 x 1/4 (3/8)	0.070	0.000	0.000	0.070 [1] ✔	1.050	4.8.1 ✔
T5	100 - 80	2L 2 x 2 x 1/4 (3/8)	0.059	0.000	0.000	0.059 [1] ✔	1.050	4.8.1 ✔

[1] $P_u / \phi P_n$ controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T5	100 - 80 (438)	C10x15.3	3.42	3.30	55.5	4.49	1.74	145.48	0.012
T5	100 - 80 (439)	C10x15.3	3.42	3.30	55.5	4.49	1.75	145.48	0.012
T5	100 - 80 (445)	C10x15.3	3.42	3.30	55.5	4.49	2.07	145.48	0.014
T5	100 - 80 (446)	C10x15.3	3.42	3.30	55.5	4.49	1.98	145.48	0.014
T5	100 - 80 (449)	C10x15.3	3.42	3.30	55.5	4.49	2.08	145.48	0.014
T5	100 - 80 (450)	C10x15.3	3.42	3.30	55.5	4.49	1.97	145.48	0.014

Torque-Arm Top 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 $\frac{M_{uy}}{\phi M_{ny}}$
T5	100 - 80 (438)	C10x15.3	-12	42	0.275	0	5	0.000
T5	100 - 80 (439)	C10x15.3	-12	42	0.274	0	5	0.000
T5	100 - 80 (445)	C10x15.3	-12	42	0.274	0	5	0.000
T5	100 - 80 (446)	C10x15.3	-11	42	0.273	0	5	0.000
T5	100 - 80 (449)	C10x15.3	-12	42	0.274	0	5	0.000
T5	100 - 80 (450)	C10x15.3	-12	42	0.274	0	5	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T5	100 - 80 (438)	C10x15.3	0.012	0.275	0.000	0.281 ✔	1.050	4.8.1 ✔
T5	100 - 80 (439)	C10x15.3	0.012	0.274	0.000	0.280 ✔	1.050	4.8.1 ✔
T5	100 - 80 (445)	C10x15.3	0.014	0.274	0.000	0.281 ✔	1.050	4.8.1 ✔
T5	100 - 80 (446)	C10x15.3	0.014	0.273	0.000	0.280 ✔	1.050	4.8.1 ✔
T5	100 - 80 (449)	C10x15.3	0.014	0.274	0.000	0.282 ✔	1.050	4.8.1 ✔
T5	100 - 80 (450)	C10x15.3	0.014	0.274	0.000	0.281 ✔	1.050	4.8.1 ✔

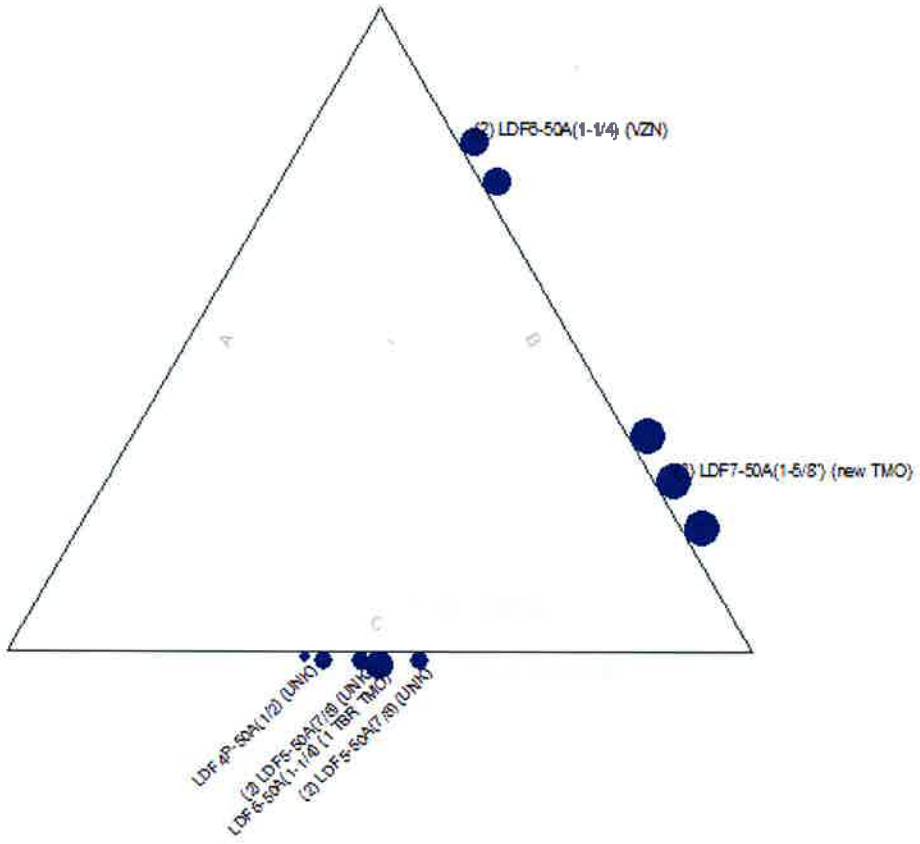
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	180 - 160	Leg	Pipe 2.375" x 0.218" (2 XS)	2	-12.19	62.91	19.4	Pass
T2	160 - 140	Leg	Pipe 2.375" x 0.218" (2 XS)	60	-17.31	62.91	27.5	Pass
T3	140 - 120	Leg	Pipe 2.375" x 0.218" (2 XS)	116	-19.16	62.91	30.5	Pass
T4	120 - 100	Leg	Pipe 2.375" x 0.218" (2 XS)	173	-23.94	62.91	38.0	Pass
T5	100 - 80	Leg	Pipe 2.875" x 0.276" (2.5 XS)	229	-32.53	101.36	32.1	Pass
T6	80 - 60	Leg	Pipe 2.875" x 0.276" (2.5 XS)	287	-32.54	79.98	40.7	Pass
T7	60 - 40	Leg	Pipe 2.875" x 0.203" (2.5 STD)	319	-35.57	61.33	58.0	Pass
T8	40 - 20	Leg	Pipe 2.875" x 0.203" (2.5 STD)	352	-36.24	61.33	59.0	Pass
T9	20 - 4.81771	Leg	Pipe 2.875" x 0.276" (2.5 XS)	385	-35.71	79.98	44.7	Pass
T10	4.81771 - 0	Leg	Pipe 2.875" x 0.276" (2.5 XS)	413	-36.45	77.52	47.0	Pass
T1	180 - 160	Diagonal	Pipe 1.5" x 0.058" (16 ga)	15	-1.68	6.52	25.7	Pass
T2	160 - 140	Diagonal	Pipe 1.5" x 0.058" (16 ga)	114	-1.36	6.52	20.9	Pass
T3	140 - 120	Diagonal	Pipe 1.5" x 0.058" (16 ga)	127	-1.21	6.52	18.6	Pass
T4	120 - 100	Diagonal	Pipe 1.5" x 0.058" (16 ga)	181	-0.74	6.52	11.4	Pass
T5	100 - 80	Diagonal	Pipe 1.5" x 0.058" (16 ga)	238	-1.95	6.52	29.9	Pass
T6	80 - 60	Diagonal	Pipe 1.5" x 0.058" (16 ga)	316	-1.58	6.52	24.2	Pass
T7	60 - 40	Diagonal	Pipe 1.5" x 0.058" (16 ga)	351	-0.97	6.52	14.9	Pass
T8	40 - 20	Diagonal	Pipe 1.5" x 0.058" (16 ga)	361	-0.59	6.52	9.0	Pass
T9	20 - 4.81771	Diagonal	Pipe 1.5" x 0.058" (16 ga)	397	-0.83	6.52	12.7 13.2 (b)	Pass
T10	4.81771 - 0	Horizontal	L 4 x 4 x 1/4	421	0.67	62.86	1.1	Pass
T1	180 - 160	Top Girt	Pipe 1.5" x 0.058" (16 ga)	4	0.04	9.93	0.4 0.7 (b)	Pass
T2	160 - 140	Top Girt	Pipe 1.5" x 0.058" (16 ga)	62	0.45	10.43	4.3 7.2 (b)	Pass
T3	140 - 120	Top Girt	Pipe 1.5" x 0.058" (16 ga)	118	-0.35	7.33	4.8 5.7 (b)	Pass
T4	120 - 100	Top Girt	Pipe 1.5" x 0.058" (16 ga)	176	2.40	10.43	23.0 38.6 (b)	Pass
T5	100 - 80	Top Girt	Pipe 1.5" x 0.058" (16 ga)	234	-0.56	7.40	7.6 9.1 (b)	Pass
T6	80 - 60	Top Girt	Pipe 1.5" x 0.058" (16 ga)	291	-0.57	7.40	7.7 12.1 (b)	Pass
T7	60 - 40	Top Girt	Pipe 1.5" x 0.058" (16 ga)	324	-0.62	7.40	8.4 10.0 (b)	Pass
T8	40 - 20	Top Girt	Pipe 1.5" x 0.058" (16 ga)	357	-0.63	7.40	8.5 10.1 (b)	Pass
T9	20 - 4.81771	Top Girt	Pipe 1.5" x 0.058" (16 ga)	390	-0.62	7.40	8.4 10.0 (b)	Pass
T10	4.81771 - 0	Top Girt	L 4 x 4 x 1/4	415	6.78	62.86	10.8	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	180 - 160	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	9	0.39	10.43	3.8 6.3 (b)	Pass
T2	160 - 140	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	65	-0.30	7.33	4.1 4.8 (b)	Pass
T3	140 - 120	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	121	-0.35	7.33	4.8 7.4 (b)	Pass
T4	120 - 100	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	178	-0.42	7.33	5.7 6.7 (b)	Pass
T5	100 - 80	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	237	-0.56	7.40	7.6 10.0 (b)	Pass
T6	80 - 60	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	294	-0.57	7.40	7.7 9.2 (b)	Pass
T7	60 - 40	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	327	-0.62	7.40	8.4 10.0 (b)	Pass
T8	40 - 20	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	360	-0.63	7.40	8.5 10.1 (b)	Pass
T9	20 - 4.81771	Bottom Girt	Pipe 1.5" x 0.058" (16 ga)	391	1.01	9.93	10.1 16.2 (b)	Pass
T10	4.81771 - 0	Bottom Girt	L 4 x 4 x 1/4	419	-0.25	67.37	2.8	Pass
T1	180 - 160	Guy A@162.523	3/4	432	14.39	36.73	39.2	Pass
T4	120 - 100	Guy A@119.385	1/2	435	6.29	16.95	37.1	Pass
T5	100 - 80	Guy A@82.5234	1/2	447	6.07	16.95	35.8	Pass
T1	180 - 160	Guy B@162.523	3/4	431	14.33	36.73	39.0	Pass
T4	120 - 100	Guy B@119.385	1/2	434	6.26	16.95	36.9	Pass
T5	100 - 80	Guy B@82.5234	1/2	443	6.02	16.95	35.5	Pass
T1	180 - 160	Guy C@162.523	3/4	427	14.50	36.73	39.5	Pass
T4	120 - 100	Guy C@119.385	1/2	433	6.29	16.95	37.1	Pass
T5	100 - 80	Guy C@82.5234	1/2	437	6.09	16.95	35.9	Pass
T1	180 - 160	Top Guy Pull-Off@162.523	2L 2 x 2 x 1/4 (3/8)	430	4.29	63.96	6.7 12.4 (b)	Pass
T5	100 - 80	Top Guy Pull-Off@82.5234	2L 2 x 2 x 1/4 (3/8)	441	2.89	51.56	5.6 8.4 (b)	Pass
T5	100 - 80	Torque Arm Top@82.5234	C10x15.3	449	2.08	152.75	26.8	Pass
							Summary	
						Leg (T8)	59.0	Pass
						Diagonal (T5)	29.9	Pass
						Horizontal (T10)	1.1	Pass
						Top Girt (T4)	38.6	Pass
						Bottom Girt (T9)	16.2	Pass
						Guy A (T1)	39.2	Pass
						Guy B (T1)	39.0	Pass
						Guy C (T1)	39.5	Pass
						Top Guy Pull-Off (T1)	12.4	Pass
						Torque Arm Top (T5)	26.8	Pass
						Bolt Checks	38.6	Pass
						RATING =	**59.0**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(2) LDF6-50A(1-1/4) (VZN)
(2) LDF7-50A(1-5/8") (new TMO)
LDF4P-50A(1/2) (UNK)
(2) LDF5-50A(7/8) (UNK)
LDF6-50A(1-1/4) (1 TBR TMO)
(2) LDF5-50A(7/8) (UNK)

APPENDIX C

ADDITIONAL CALCULATIONS

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

Job Number:	[illegible]
Engineer:	[illegible]
Date:	2/23/2023
Site Name:	[illegible]
Site Number:	590025
Client Project:	[illegible]
Client Project 1:	

Monopole and Tower Foundation Comparison Tool

(Version v1.5 - Effective Date 04/1/2020)

Structure Type:	Guy Tower (1 Anchor)
Current Analysis Code:	TIA-222-H
Original Design Code:	TIA-222-F
Manufacturer:	Rohn
Design Drawing Number:	8951658/D950801
Design Drawing Date:	4/13/1995

☑ Apply Capacity Normalization per Section 15.5
☐ Compare Base Shear
☑ Compare Base Axial Compression

Foundation Component	Base Reaction	Original Design (kips, kip-ft)	Adjusted Original Design	Current Analysis (kips, kip-ft)	Reactions Ratio	Result
Base	Axial Compression	78.40	105.84	102.00	91.78%	Sufficient
	Moment					
Guy Anchor	Uplift	26.80	36.18	19.00	50.01%	Sufficient
	Shear	32.40	43.74	21.00	45.72%	Sufficient

Notes: 1. Reaction Ratio Normalized per TIA 222-H Section 15.5.
2. The original tower design was completed in accordance with the TIA 222-F standard. Per section 15.5.2 of the TIA 222-H standard, the reactions from the original design shall be multiplied by 1.35 for comparison to the reactions from this analysis.

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

1) Paul J. Ford and Company has not made a field inspection to verify the tower member sizes or the antenna/coax loading. If the existing conditions are not as represented on these drawings, we should be contacted immediately to evaluate the significance of the deviation.

2) No allowance was made for any damaged, missing, or rusted members. The analysis of this tower assumes that no physical deterioration has occurred in any of the structural components of the tower and that all the tower members have the same load carrying capacity as the day the tower was erected.

3) It is not possible to have all the detailed information to perform a thorough analysis of every structural sub-component of an existing tower. The structural analysis by Paul J. Ford and Company verifies the adequacy of the main structural members of the tower. Paul J. Ford and Company provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc.

4) The structural integrity of the existing tower foundation can only be verified if exact foundation sizes and soil conditions are known. Paul J. Ford and Company will not accept any responsibility for the adequacy of the existing foundations unless the foundation sizes and a soils report are provided.

5) This tower has been analyzed according to the minimum design wind loads recommended by the Telecommunications Industry Association Standard ANSI/TIA-222-H. If the owner or local or state agencies require a higher design wind load, Paul J. Ford and Company should be made aware of this requirement.

6) The enclosed sketches are a schematic representation of the tower that we have analyzed. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions and for the proper fit and clearance in the field.

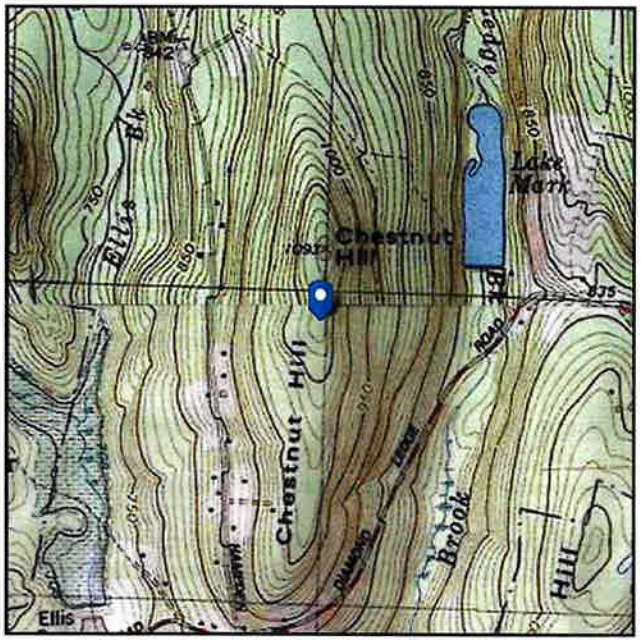
7) Miscellaneous items such as antenna mounts etc. have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

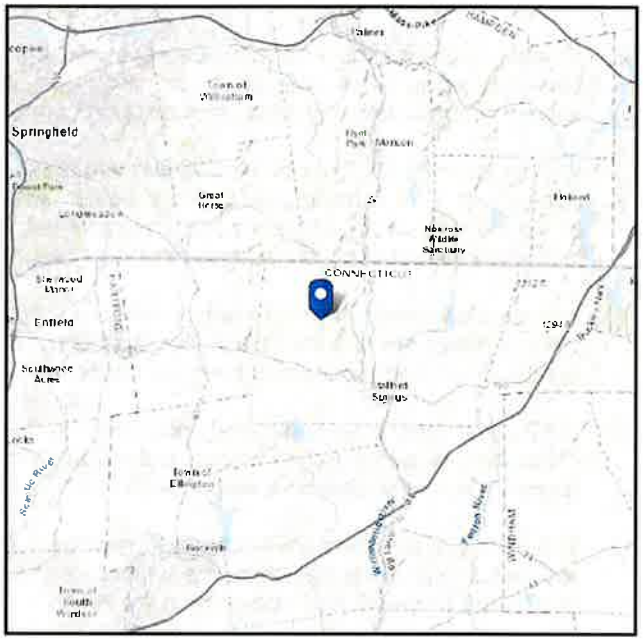
ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Latitude: 41.999581
Longitude: -72.355646
Elevation: 1074.84 ft (NAVD 88)





Wind

Results:

Wind Speed	117 Vmph
10-year MRI	75 Vmph
25-year MRI	83 Vmph
50-year MRI	90 Vmph
100-year MRI	97 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Tue Feb 14 2023

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

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Seismic

D - Default (see Section 11.4.3)

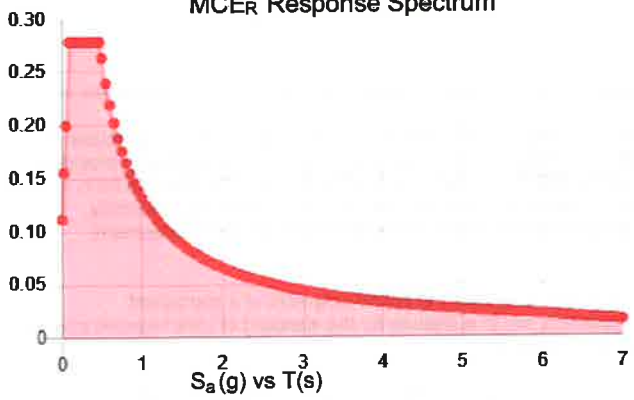
Site Soil Class:

Results:

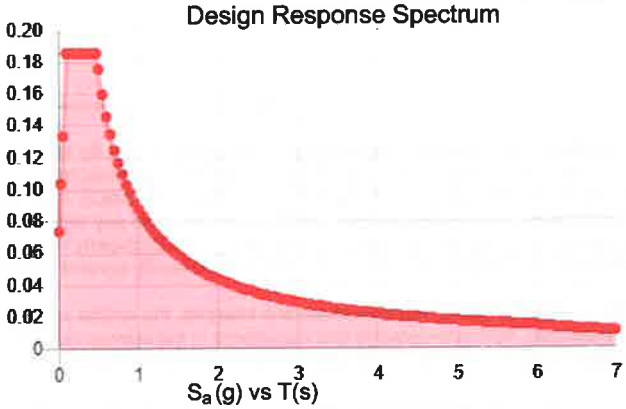
S_S :	0.174	S_{D1} :	0.088
S_1 :	0.055	T_L :	6
F_a :	1.6	PGA :	0.092
F_v :	2.4	PGA_M :	0.147
S_{MS} :	0.279	F_{PGA} :	1.6
S_{M1} :	0.132	I_e :	1
S_{DS} :	0.186	C_v :	0.7

Seismic Design Category: B

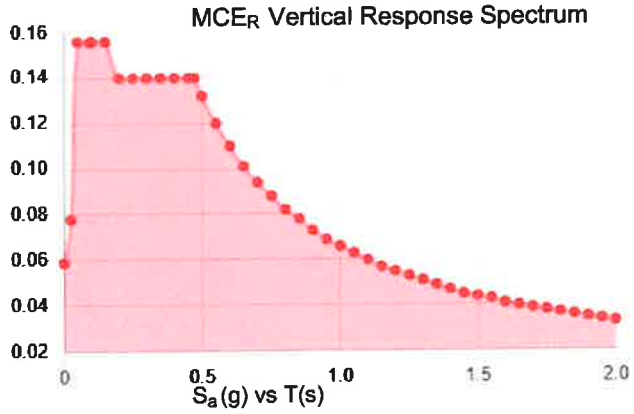
MCE_R Response Spectrum



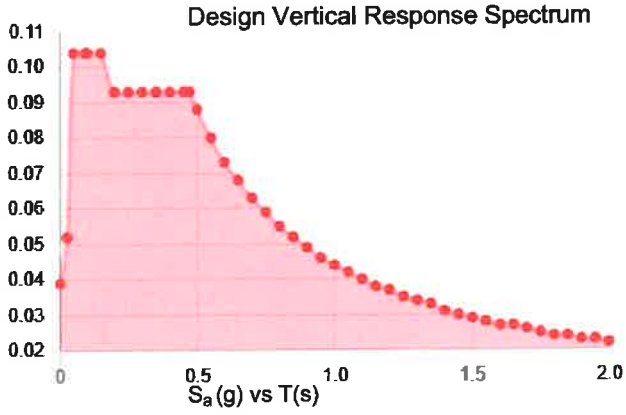
Design Response Spectrum



MCE_R Vertical Response Spectrum



Design Vertical Response Spectrum



Data Accessed: **Tue Feb 14 2023**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	1.50 in.
Concurrent Temperature:	5 F
Gust Speed	50 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Tue Feb 14 2023

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

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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Structural Analysis & Design Report

Property Owner	N/A
Structural Type	180 ft Guyed Tower
Site Address	169 Hampden Rd, Stafford, CT 06076
Site ID	16999206
Site Name	STAFFORD 4 CT
Latitude	41.999581
Longitude	-72.355636

Client	**Verizon Wireless** *900 Chelmsford Street* *Tower 2 Floor 5* *Lowell, MA 01851*
Site Type	MACRO
Site ID	617359998
Site Name	STAFFORD 4 CT
Location Code	780563
Structural Type	**Proposed Site Pro 1, P/N: VFA12-HD**

Prepared by	Nexius Solutions, Inc. *2595 North Dallas Parkway Suite 300* *Frisco, TX 75034*
Job/Task Number	STAFFORD 4 CT/16999206
Email	structurals@nexius.com
Phone	972-581-9888
Rev	0
Date	02/06/2023
Result	**Pass (53%)**

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Dear Sir / Madam:

Nexius Solutions is pleased to submit this **Report** to determine the structural integrity of the equipment platform.

Referenced documents used for this analysis are listed in the section DOCUMENTS & REFERENCES. This analysis has been performed in compliance with the:

- *2022 Connecticut Building Code, (2022 IBC w/ State Amendments)*
- *ANSI/TIA-222-H w/ Addendums, Structural Standard for Antenna Supporting Structures and Antennas and Small Wind Turbine Support Structures*

Detailed design parameters are listed in Table 1. Analysis loading is detailed in Table 2.

Based on our analysis we have determined the following result:

Proposed Sector Mounts Site Pro 1 **Adequate (53%)**
P/N: VFA12-HD

Nexius Solutions appreciates the opportunity of providing continued engineering services. Should you have any questions, comments or require additional information, please do not hesitate to contact us.

Sincerely,

Analysis Prepared by:
Salman Al Jurdi, E.I.T

Analysis Reviewed by:
Jiazhu Hu, P.E.
Engineering Manager
License #: 31530

Digitally signed by Jiazhu Hu, Ph.D., P.E.
DN: cn=Jiazhu Hu, Ph.D., P.E., o=Nexius, ou=Engineering, email=Jiazhu.Hu@Nexius.com, c=US
Date: 2023.02.06 11:56:32 -05'00'

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DOCUMENTS & REFERENCES

- LE Drawings, Location Code: 780563, Verizon Site Name: STAFFORD 4 CT, by Nexius, dated 02/6/2023.
- Site Visit Photos and Notes, Location Code: 780563, Verizon Site Name: STAFFORD 4 CT, by Nexius, dated 12/12/2022.
- RFDS, Location Code: 780563, Verizon Site Name: STAFFORD 4 CT, by Verizon, dated 12/5/2022.

DESIGN STANDARDS & PARAMETERS

TABLE 1 STANDARDS & DESIGN PARAMETERS

Codes and Standards	
Building Code	Connecticut State Building Code (2022 IBC w/ State Amendments)
TIA Standard	ANSI/TIA-222-H w/ Addendums
Wind Parameters	
Ultimate Wind Speed	117 mph
Nominal Wind Speed with Ice	50 mph
Radial Ice Thickness	1.5 in
Exposure Category	C
Structure Class	II
Topographic Category	1
Seismic Design Parameters*	
S_S	0.174
S_1	0.055

RESULTS & RECOMMENDATIONS

Based on our analysis, it is determined that the **proposed mounts (Site Pro 1, P/N: VFA12-HD)** *to* be **ADEQUATE** to support the proposed loading.

*See construction drawings for proposed mounts.

If the site conditions are different or do not meet requirements, the analysis result would not be valid and Nexius should be notified for re-evaluation.

LOADING

TABLE 2 – PROPOSED ANTENNA INFORMATION

Sector	Mount Elev. ft	Ant. Ctr. Elev. ft	Qty	Description	Mount Type	Status
All Sectors	152.8	152.8	3	NHH-65B-R2B	Proposed Site Pro 1, P/N: VFA12-HD	Proposed
			3	NHHSS-65B-R2BT4		
			3	MT6407-77A		
			3	B2/B66A RRH ORAN (RF4439d-25A)		
			3	B5/B13 RRH ORAN (RF4440d-13A)		
			1	12 OVP		
			3	CBRS RRH - RT4401-48A		

ANALYSIS

Risa 3D (Version 17), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for required loading cases. Selected output from the analysis is included in APPENDICES.

ASSUMPTIONS

1) The existing building structure matches the drawings provided by the building owner and has no damage which may reduce the structural capacity of the building.

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

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Standard Conditions for Providing Structural Consulting Services on Existing Structures

1. Mounting hardware is analyzed to the best of our ability using all information that is provided or can be obtained during fieldwork (if authorized by client). If the existing conditions are not as we have represented in this analysis, we should be contacted to evaluate the significance of the deviation and revise the assessment accordingly.
2. The structural analysis has been performed assuming that the hardware is in "like new" condition. No allowance was made for excessive corrosion, damaged or missing structural members, loose bolts, misaligned parts, or any reduction in strength due to the age or fatigue of the product.
3. The structural analysis provided is an assessment of the primary load carrying capacity of the hardware. We provided a limited scope of service. In some cases, we cannot verify the capacity of every weld, plate, connection detail, etc. In some cases, structural fabrication details are unknown at the time of our analysis, and the detailed field measurement of some of the required details may not be possible. In instances where we cannot perform connection capacity calculations, it is assumed that the existing manufactured connections develop the full capacity of the primary members being connected.
4. We cannot be held responsible for mounting hardware that is installed improperly or hardware that is loose or has a tendency of working loose over the lifetime of the mounting hardware. Our analysis has been performed assuming fully tightened connections, and proper installation and symmetry of the mounting hardware per manufacturer's instructions.
5. The structural analysis has been performed using information currently provided by the client and potentially field verified. We have been provided with a mounting arrangement for all telecommunications equipment, including antennas RRH's, TMA's, RRU's, diplexers, surge protection devices, etc. Our analysis has been based upon a particular mounting arrangement. We are not responsible for deviations in the mounting arrangements that may occur over time. If deviations in equipment type or mounting arrangements are proposed, then we should be contacted to revise the recommendations of this structural report.
6. We cannot be held responsible for temporary and unbalanced loads on mounting hardware. Our analysis is based on a particular mounting arrangement or as-build field condition. We are not responsible for the methods and means of how the mounting arrangement is accomplished by the contractor. These methods and means may include rigging of equipment or hardware to lift and locate, temporary hanging of equipment in locations other than the final arrangement, movement and tie off of tower riggers, personnel, and their equipment, etc.
7. Steel grade and strength is unknown and cannot be field tested. We cannot be held responsible for equipment manufactured from inferior steel or bolts. Our analysis assumes that standard structural grade steel has been used by the equipment manufacturer for all assembled parts of the mounting apparatus. Acceptable steels and connection components are specified by the American Institute of Steel Construction. It is assumed all welded connections are performed in the shop under the latest American
8. Welding Society Code. No field welds are permitted or assumed for the existing pre-manufactured equipment. In case no accurate info available, following material assumptions were used:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM 500 (GR B-46)
HSS (Round)	ASTM 500 (GR B-42)
Pipe	ASTM A53 (GR 35)
Connection Bolts	ASTM A325
U-Bolts	SAE 429 Gr.2

Appendix #1: Loading Parameters and Calculations

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Latitude: 41.999581
Longitude: -72.355636
Elevation: 1074.84 ft (NAVD 88)

Wind

Results:

Wind Speed	117 Vmph
10-year MRI	75 Vmph
25-year MRI	83 Vmph
50-year MRI	90 Vmph
100-year MRI	97 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Fri Feb 03 2023

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

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Seismic

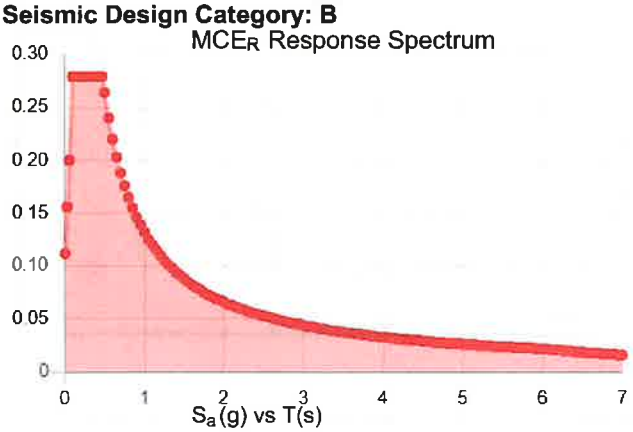
D - Default (see Section 11.4.3)

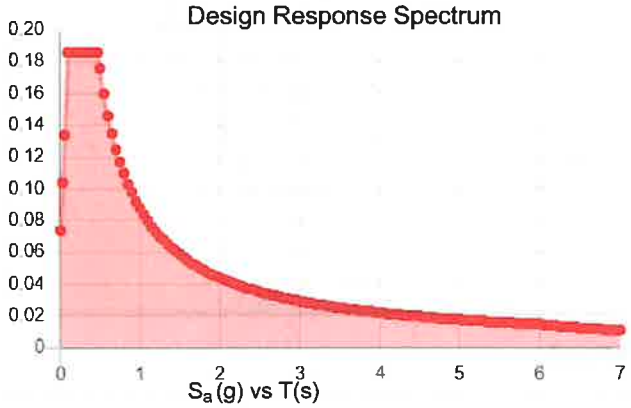
Site Soil Class:

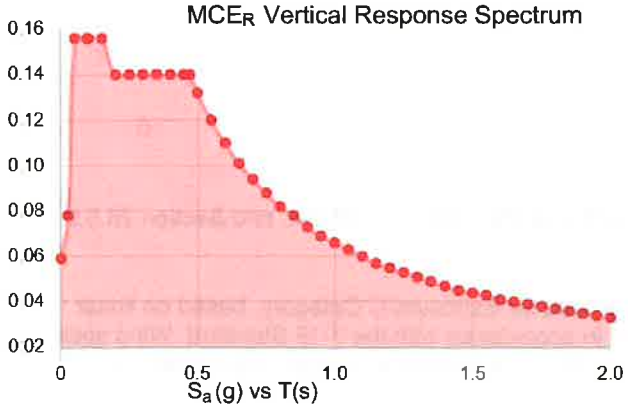
Results:

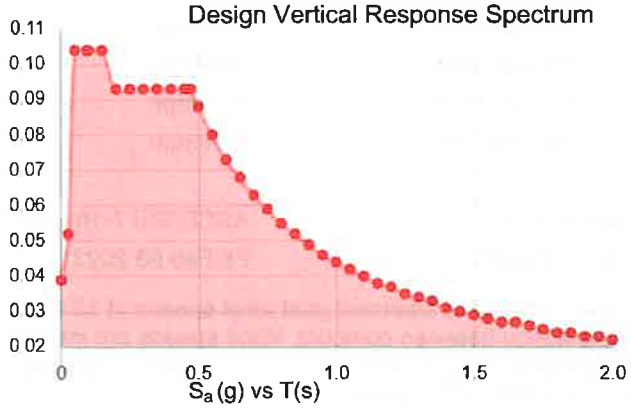
S_S :	0.174	S_{D1} :	0.088
S_1 :	0.055	T_L :	6
F_a :	1.6	PGA :	0.092
F_v :	2.4	PGA_M :	0.147
S_{MS} :	0.279	F_{PGA} :	1.6
S_{M1} :	0.132	I_e :	1
S_{DS} :	0.186	C_v :	0.7

Seismic Design Category: B









Data Accessed: **Fri Feb 03 2023**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

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Ice

Results:

Ice Thickness:	1.50 in.
Concurrent Temperature:	5 F
Gust Speed	50 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Fri Feb 03 2023

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

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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Mount Analysis Loading Calculations

Site Name	STAFFORD 4 CT		
Site ID	617359998		
Job Number	16999206	Mount Existing?	Proposed
TIA-222 Code Rev.	H	Risk Category	II

Legend
Input
Calculated
Notes

Basic Parameters		
Mount Height	152.8	ft
Exposure Category	C	(B,C, or D)
Ultimate Wind Speed	117	mph
Ice Wind Speed	50	mph
Design Ice Thickness, t_i	1.5	in
Maintenance Wind Speed	30	mph
Run Earthquake Analysis?	Yes	
Ground Elevation	1074.84	ft, ASCE Hazard Tool
S_1	0.055	USGS
S_{DS}	0.186	2.7.5
Vertical Seismic Loads, E_v	0.037	2.7.6
Seismic Response Coefficient, C_s	0.093	2.7.7.1.1
C_s Min	0.030	2.7.7.1.1

Wind Parameters					
Gust Effect Factor, G_h	1.000	2.6.9	K_t	1.000	2.6.7
K_z	1.384	2.6.5.2	K_e	0.962	2.6.8
K_{zt}	1.000	2.6.6	K_s	0.900	16.6
K_d	0.950	Table 2-2	*Note for Rooftop Structures greater than 50', unobstructed for 90 deg and protruding 50' above surrounding buildings Ks must be calculated.		
q_z	40.004	psf, 2.6.11.6			
C/D	137.632	Table 2-9			
t_{iz}	1.748	in, 2.6.10			
q_{iz}	7.306	psf, 2.6.9.6	I, Ice	1.000	Table 2-3
C/D_{iz}	58.817	Table 2-9	I, EQ	1.000	Table 2-3
$q_{Maintenance}$	2.726	psf, 2.6.9.6			
$C/D_{Maintenance}$	35.290	Table 2-9			
Ice Dead, Grating	0.016318828	ksf			

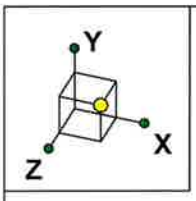
Mounting Pipes (Orientation Drawn Top-Down)

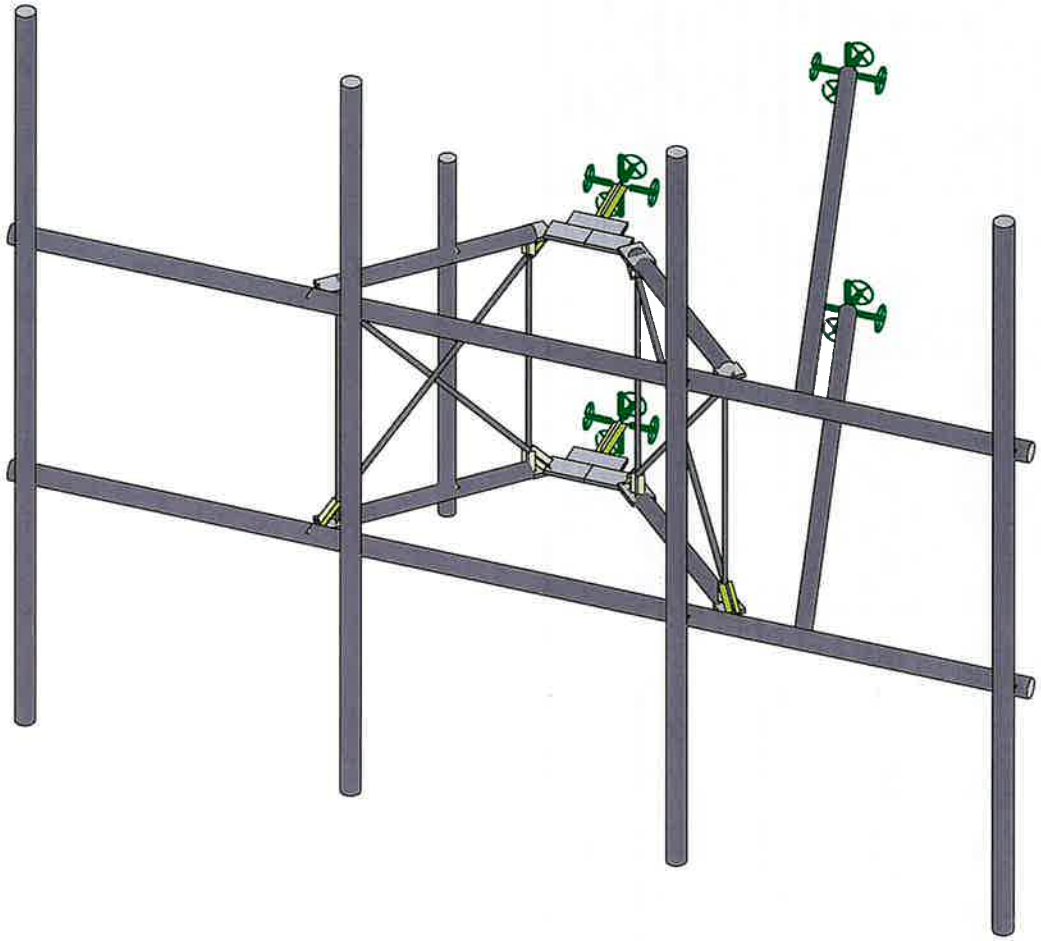
Risa 3D Label	Elevation (ft)	Length (in)	Diameter (in)
M44	152.8	120	2.38
M50	152.8	120	2.38
M47	152.8	120	2.38
M5	152.8	120	2.38
M70	152.8	63	2.38

Appurtenances

Model	Type	Height (in)	Width (in)	Depth (in)	Weight (lbs)
COMMSCOPE NHH-65B-R2B	Antenna	72	11.9	7.1	43.7
SAMSUNG MT6407-77A ANTENNA w/ RRH	Antenna	35.12	16.06	5.51	87.1
SAMSUNG RF4440d-13A	RRU, TMA, Etc.	14.96	14.96	9.05	70.33
SAMSUNG RF4439d-25A	RRU, TMA, Etc.	14.96	14.96	10.04	74.7
12 OVP Box	RRU, TMA, Etc.	28.3	15	10	32
CBRS RRH - RT4401-48A	RRU, TMA, Etc.	14	9	4	23
NHHSS-65B-R2BT4	Antenna	72	11	7	50

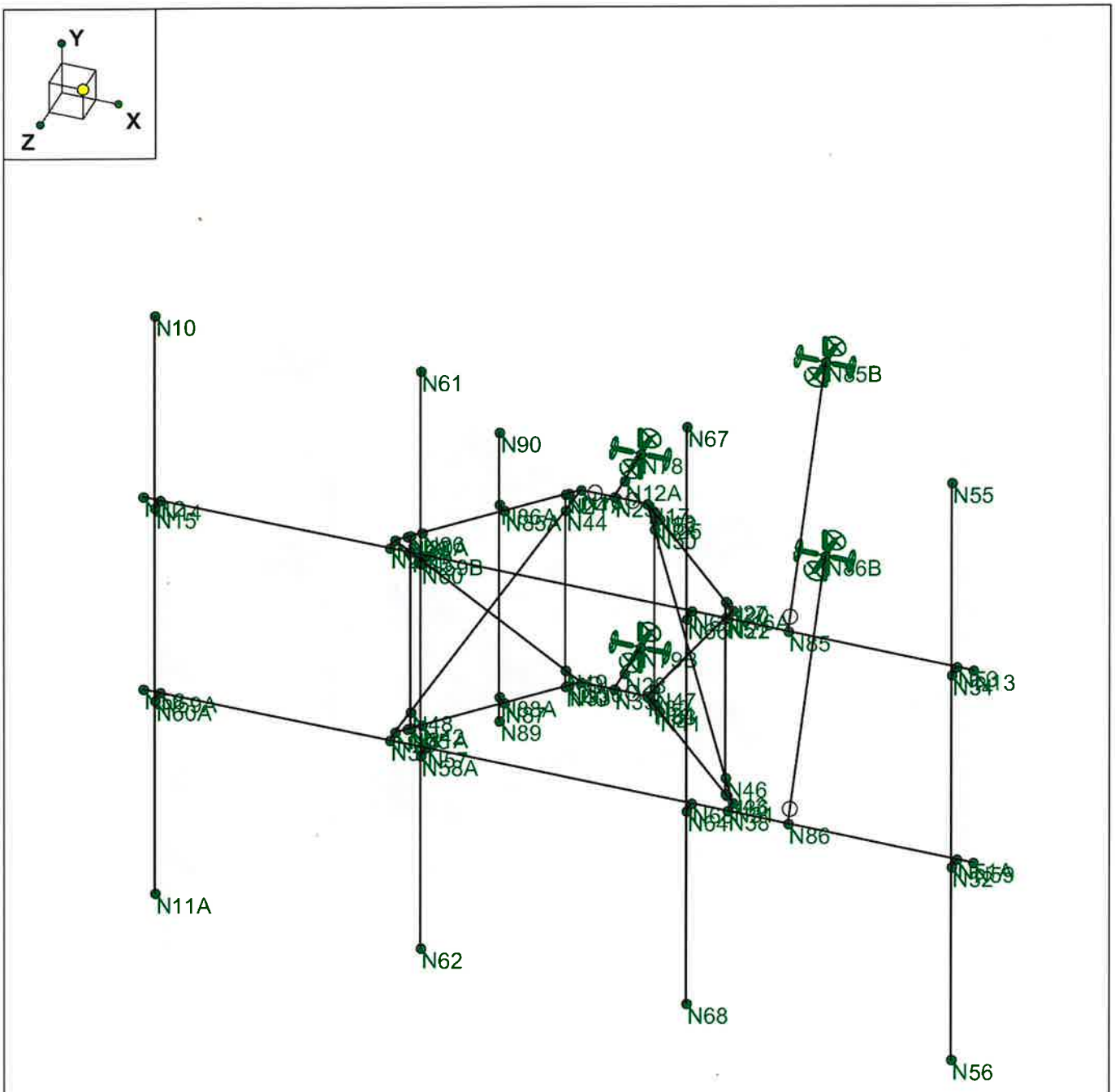
Pipe Mount	Antenna	Quantity	Orientation (deg)	Front Exposed (%)	Side Exposed (%)	Type	Height (in)	Width (in)	Depth (in)	Weight (lbs)	Front C_AA_A (ft^2)	Side C_AA_A (ft^2)	Front F_A (kips)	Side F_A (kips)	Top %	Bottom %
M44	SAMSUNG MT6407-77A ANTENNA w/ RRH	1	0	100.0%	100.0%	Antenna	35.120	16.060	5.510	87.100	4.700	1.844	0.193	0.076	25.0%	55.0%
M44																
M44																
M44																
M44																
M44																
M50	NHHSS-65B-R2BT4	1	0	100.0%	100.0%	Antenna	72.000	11.000	7.000	50.000	7.589	5.283	0.311	0.216	10.0%	71.0%
M50	SAMSUNG RF4440d-13A	1	90	100.0%	100.0%	RRU, TMA, Etc.	14.960	14.960	9.050	70.330	1.865	1.128	0.046	0.076	25.0%	25.0%
M50	CBRS RRH - RT4401-48A	1	90	100.0%	100.0%	RRU, TMA, Etc.	14.000	9.000	4.000	23.000	1.050	0.484	0.020	0.043	50.0%	50.0%
M50																
M50																
M50																
M47	COMMSCOPE NHH-65B-R2B	1	0	100.0%	100.0%	Antenna	72.000	11.900	7.100	43.700	8.079	5.342	0.331	0.219	10.0%	71.0%
M47	SAMSUNG RF4439d-25A	1	90	100.0%	100.0%	RRU, TMA, Etc.	14.960	14.960	10.040	74.700	1.865	1.252	0.051	0.076	25.0%	25.0%
M47																
M47																
M47																
M47																
M5																
M5																
M5																
M5																
M5																
M5																
M70	12 OVP Box	1	0	100.0%	100.0%	RRU, TMA, Etc.	28.300	15.000	10.000	32.000	3.538	2.387	0.145	0.098	50.0%	50.0%
M70																
M70																
M70																
M70																
M70																





Envelope Only Solution

Nexius	STAFFORD 4 CT - MKT 68	RENDERING
SJ		Feb 6, 2023 at 2:38 PM
16999206		STAFFORD 4 CT.r3d



Envelope Only Solution

Nexius	STAFFORD 4 CT - MKT 68	NODES
SJ		Feb 6, 2023 at 2:37 PM
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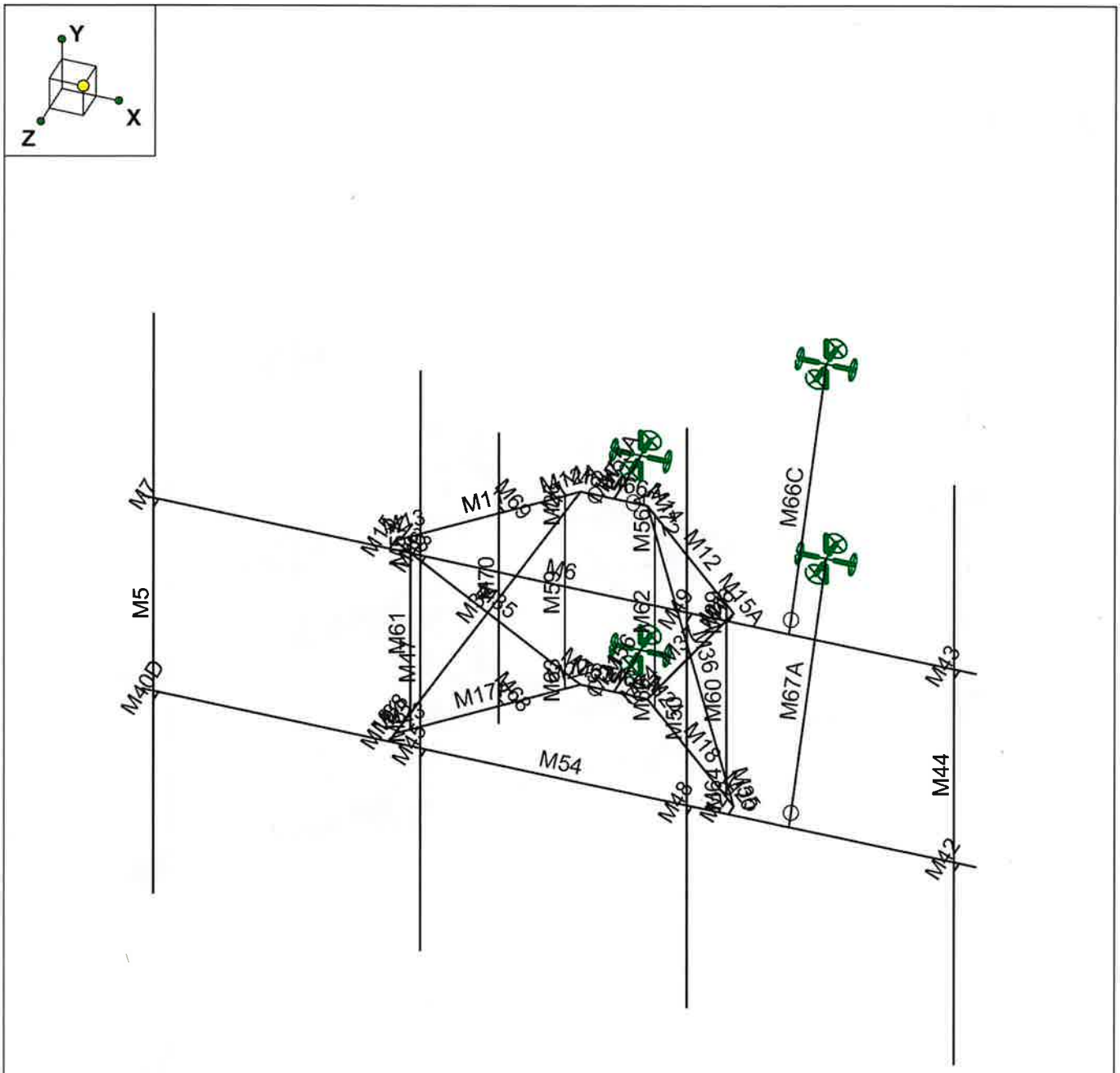

Envelope Only Solution

Nexius	STAFFORD 4 CT - MKT 68	LABELS
SJ		Feb 6, 2023 at 2:38 PM
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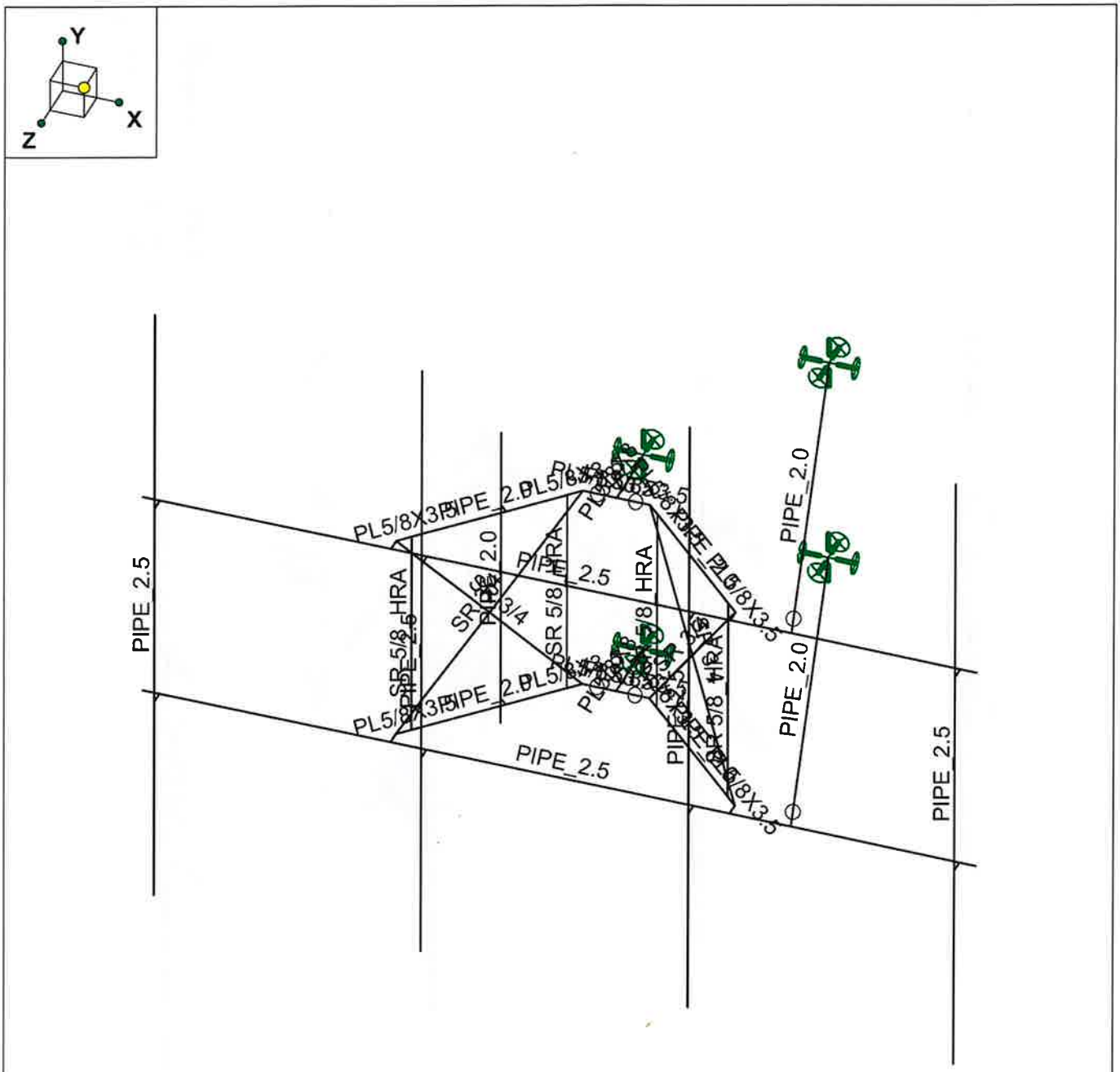

Envelope Only Solution

Nexius	STAFFORD 4 CT - MKT 68	SHAPES
SJ		Feb 6, 2023 at 2:38 PM
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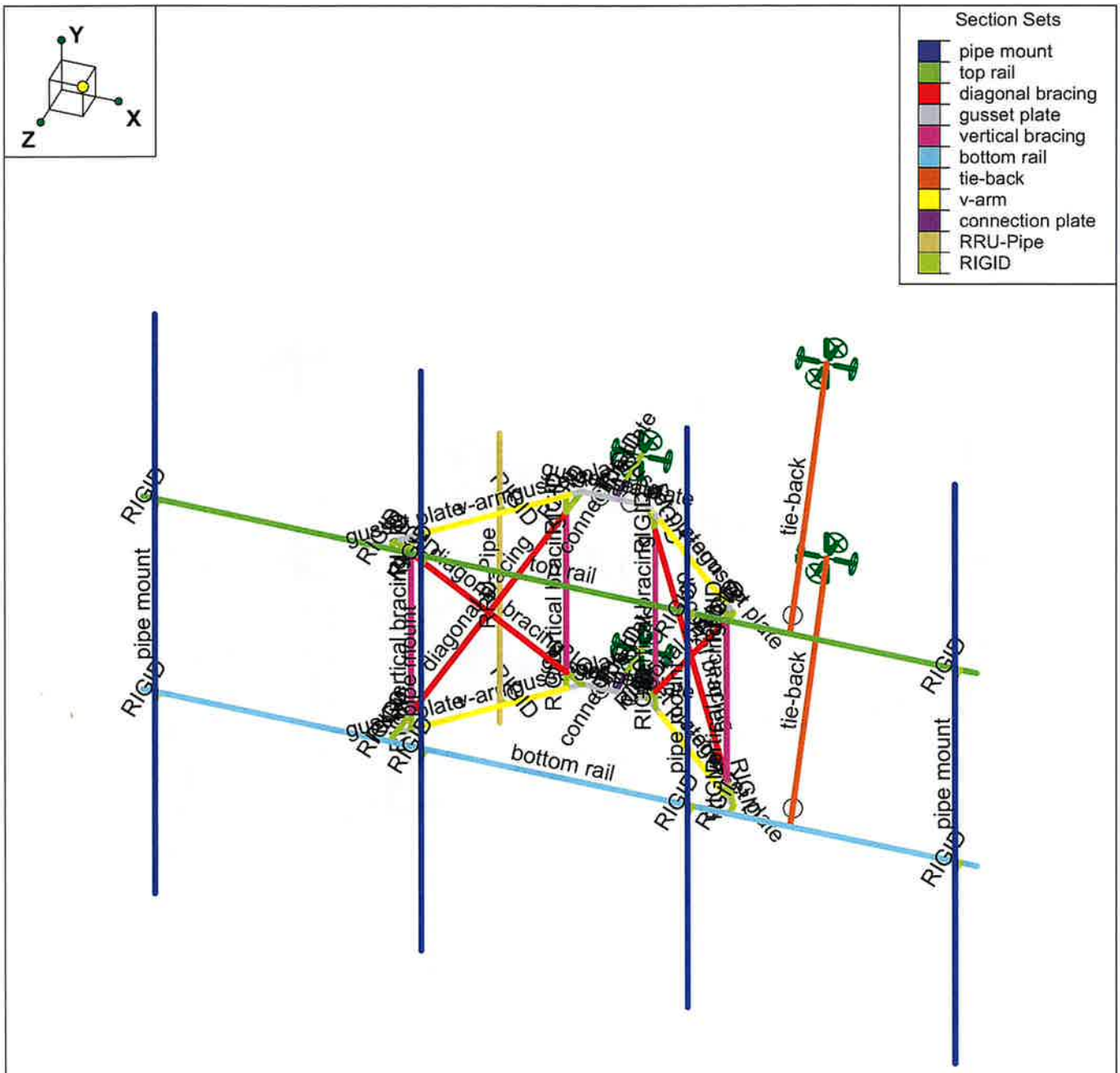

Envelope Only Solution

Nexius	STAFFORD 4 CT - MKT 68	SECTION SETS
SJ		Feb 6, 2023 at 2:38 PM
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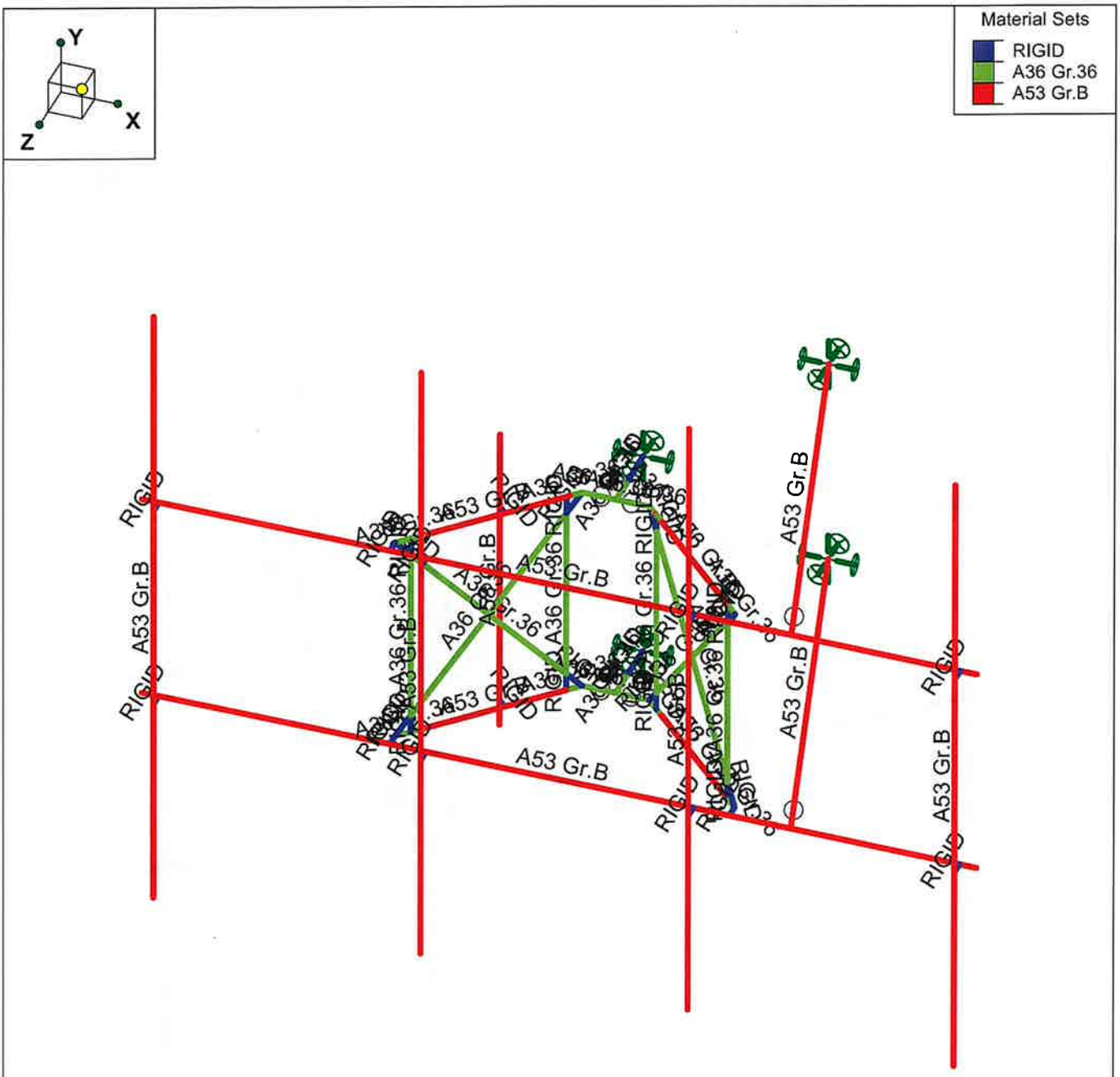

Envelope Only Solution

Nexius	STAFFORD 4 CT - MKT 68	MATERIAL SETS
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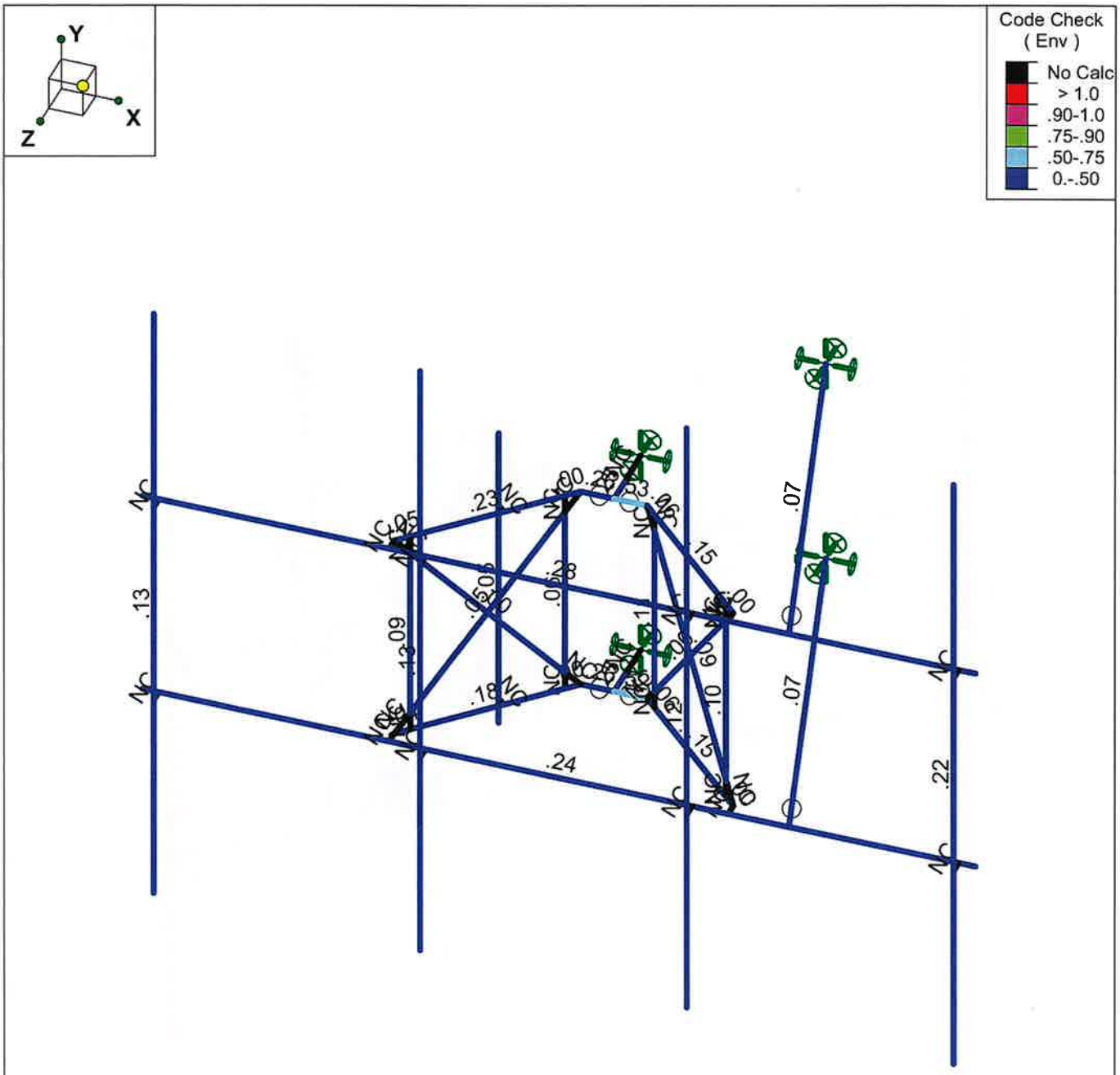
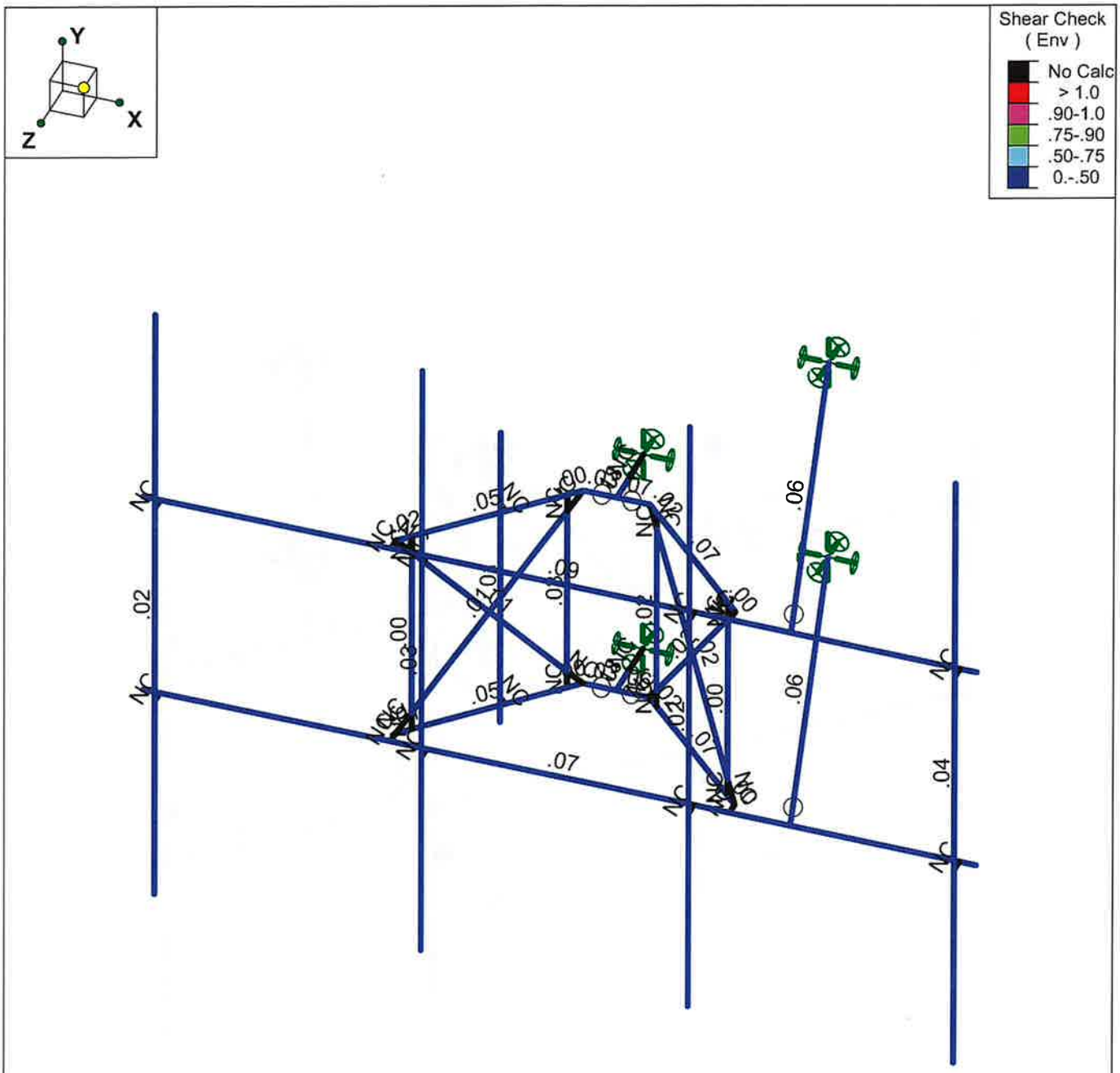


Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Nexius	STAFFORD 4 CT - MKT 68	BENDING CHECK
SJ		Feb 6, 2023 at 2:39 PM
16999206		STAFFORD 4 CT.r3d



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Nexius	STAFFORD 4 CT - MKT 68	SHEAR CHECK
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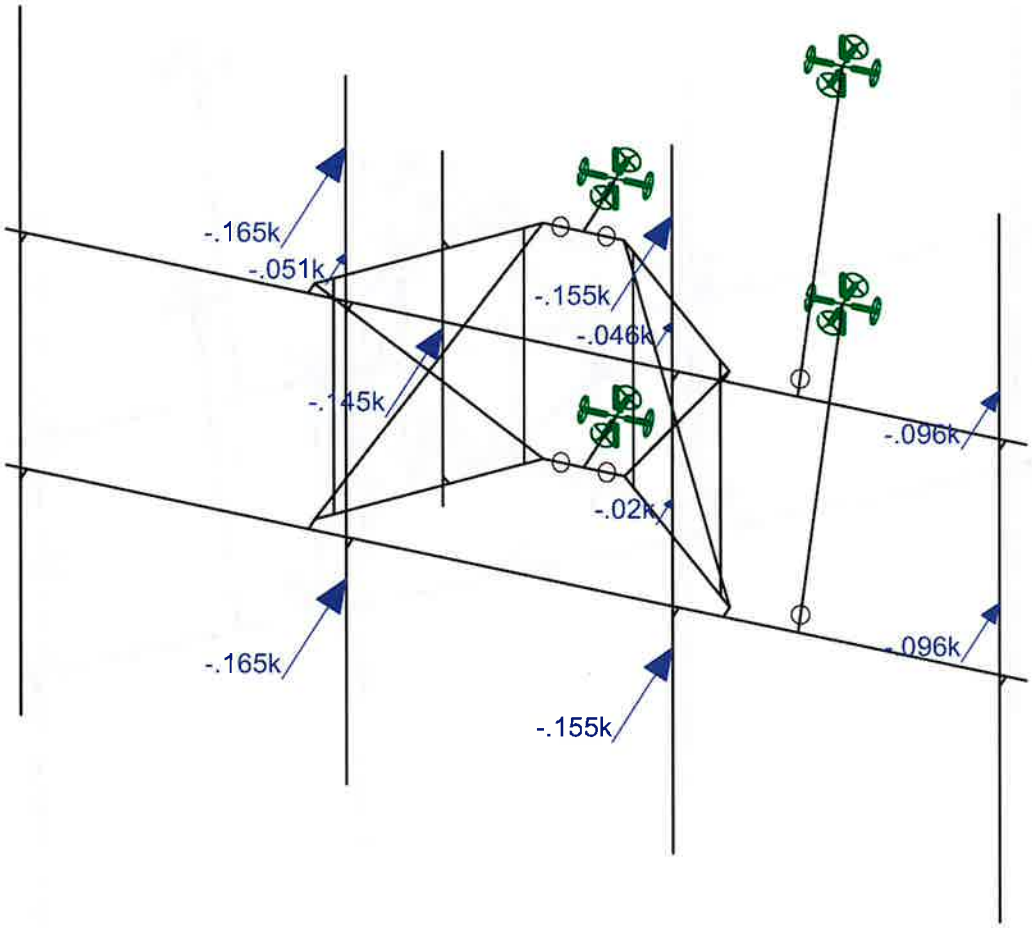
16999206		STAFFORD 4 CT.r3d



Loads: BLC 3, Full Wind Antenna (0 Deg)
Envelope Only Solution

Nexius	STAFFORD 4 CT - MKT 68	FRONT WIND
SJ		Feb 6, 2023 at 2:39 PM
16999206		STAFFORD 4 CT.r3d

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1...	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3
8	HR8	29000	11154	.3	.65	.49	36	1.5	58	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	pipe mount	PIPE_2.5	Column	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
2	top rail	PIPE_2.5	Beam	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
3	diagonal bracing	SR 3/4	Column	BAR	A36 Gr.36	Typical	.442	.016	.016	.031
4	gusset plate	PL5/8X3.5	Beam	RECT	A36 Gr.36	Typical	2.188	.071	2.233	.253
5	vertical bracing	SR 5/8 HRA	Column	BAR	A36 Gr.36	Typical	.307	.007	.007	.015
6	bottom rail	PIPE_2.5	Beam	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
7	tie-back	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
8	v-arm	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
9	connection plate	PL5/8X8	Beam	RECT	A36 Gr.36	Typical	5	.163	26.667	.619
10	RRU-Pipe	PIPE_2.0	Column	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25

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	N12A						
2	N28						
3	N78	Reaction	Reaction	Reaction	Reaction		Reaction
4	N79B	Reaction	Reaction	Reaction	Reaction		Reaction
5	N85B	Reaction	Reaction	Reaction	Reaction		Reaction
6	N86B	Reaction	Reaction	Reaction	Reaction		Reaction

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
1	M54	bottom rail	12.5	5.083	5.083	5.083	5.083	5.083				Lateral
2	M6	top rail	12.5	5.083	5.083	5.083	5.083	5.083				Lateral
3	M5	pipe mount	10	3.33	3.33	3.33	3.33	3.33				Lateral
4	M11	v-arm	2.5			Lbyy						Lateral
5	M12	v-arm	2.5			Lbyy						Lateral
6	M17	connection ...	.417									Lateral
7	M12A	gusset plate	.243			Lbyy						Lateral
8	M13	gusset plate	.417			Lbyy						Lateral
9	M14	gusset plate	.417			Lbyy						Lateral
10	M15A	gusset plate	.243			Lbyy						Lateral
11	M17A	v-arm	2.5			Lbyy						Lateral
12	M18	v-arm	2.5			Lbyy						Lateral
13	M21	connection ...	.417									Lateral
14	M22	gusset plate	.243			Lbyy						Lateral
15	M23	gusset plate	.417			Lbyy						Lateral
16	M24	gusset plate	.417			Lbyy						Lateral
17	M25	gusset plate	.243			Lbyy						Lateral
18	M34	diagonal bra...	3.667	3.33	3.33	3.33	3.33	3.33	.7	.7		Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
19	M35	diagonal bra..	3.667	3.33	3.33	3.33	3.33	3.33	.7	.7		Lateral
20	M36	diagonal bra..	3.667	3.33	3.33	3.33	3.33	3.33	.7	.7		Lateral
21	M37	diagonal bra..	3.667	3.33	3.33	3.33	3.33	3.33	.7	.7		Lateral
22	M44	pipe mount	10	3.33	3.33	3.33	3.33	3.33				Lateral
23	M47	pipe mount	10	3.33	3.33	3.33	3.33	3.33				Lateral
24	M50	pipe mount	10	3.33	3.33	3.33	3.33	3.33				Lateral
25	M59	vertical brac..	2.771			Lbyy			.7	.7		Lateral
26	M60	vertical brac..	2.771			Lbyy			.7	.7		Lateral
27	M61	vertical brac..	2.771			Lbyy			.7	.7		Lateral
28	M62	vertical brac..	2.771			Lbyy			.7	.7		Lateral
29	M65A	gusset plate	.5			Lbyy						Lateral
30	M66A	gusset plate	.5			Lbyy						Lateral
31	M63A	gusset plate	.5			Lbyy						Lateral
32	M64A	gusset plate	.5			Lbyy						Lateral
33	M66C	tie-back	6.582			Lbyy						Lateral
34	M67A	tie-back	6.582			Lbyy						Lateral
35	M70	RRU-Pipe	5									Lateral

Joint Loads and Enforced Displacements (BLC 42 : Man 1 (500 lbs))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft...
1	N51A	L	Y	0
2	N51A	L	Y	-.5

Joint Loads and Enforced Displacements (BLC 43 : Man 2 (500 lbs))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft...
1	N51A	L	Y	0
2	N63	L	Y	-.5

Joint Loads and Enforced Displacements (BLC 44 : Man 3 (500 lbs))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft...
1	N63	L	Y	0
2	N57	L	Y	-.5

Joint Loads and Enforced Displacements (BLC 45 : Man 4 (250 lbs))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft...
1	N63	L	Y	0
2	N59	L	Y	-.25

Joint Loads and Enforced Displacements (BLC 46 : Man 5 (250 lbs))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft...
1	N57	L	Y	0
2	N58	L	Y	-.25

Joint Loads and Enforced Displacements (BLC 47 : Man 6 (250 lbs))

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft...
1	N59	L	Y	0

Member Point Loads (BLC 1 : Dead)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Y	-.044	%25
2	M50	Y	-.025	%10

Member Point Loads (BLC 1 : Dead) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
3	M50	Y	-.07	%25
4	M50	Y	-.023	%50
5	M47	Y	-.022	%10
6	M47	Y	-.075	%25
7	M70	Y	-.032	%50
8	M44	Y	-.044	%55
9	M50	Y	-.025	%71
10	M47	Y	-.022	%71

Member Point Loads (BLC 2 : Ice Dead)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Y	-.059	%25
2	M50	Y	-.096	%10
3	M50	Y	-.052	%25
4	M50	Y	-.029	%50
5	M47	Y	-.101	%10
6	M47	Y	-.053	%25
7	M70	Y	-.101	%50
8	M44	Y	-.059	%55
9	M50	Y	-.096	%71
10	M47	Y	-.101	%71

Member Point Loads (BLC 3 : Full Wind Antenna (0 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	-.096	%25
2	M50	Z	-.155	%10
3	M50	Z	-.046	%25
4	M50	Z	-.02	%50
5	M47	Z	-.165	%10
6	M47	Z	-.051	%25
7	M70	Z	-.145	%50
8	M44	Z	-.096	%55
9	M50	Z	-.155	%71
10	M47	Z	-.165	%71

Member Point Loads (BLC 4 : Full Wind Antenna (30 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	-.071	%25
2	M50	Z	-.124	%10
3	M50	Z	-.047	%25
4	M50	Z	-.022	%50
5	M47	Z	-.131	%10
6	M47	Z	-.05	%25
7	M70	Z	-.115	%50
8	M44	Z	-.071	%55
9	M50	Z	-.124	%71
10	M47	Z	-.131	%71
11	M44	X	.041	%25
12	M50	X	.072	%10
13	M50	X	.027	%25
14	M50	X	.013	%50
15	M47	X	.076	%10
16	M47	X	.029	%25
17	M70	X	.067	%50
18	M44	X	.041	%55

Member Point Loads (BLC 4 : Full Wind Antenna (30 Deg)) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
19	M50	X	.072	%71
20	M47	X	.076	%71

Member Point Loads (BLC 5 : Full Wind Antenna (60 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	-.026	%25
2	M50	Z	-.06	%10
3	M50	Z	-.034	%25
4	M50	Z	-.019	%50
5	M47	Z	-.062	%10
6	M47	Z	-.035	%25
7	M70	Z	-.055	%50
8	M44	Z	-.026	%55
9	M50	Z	-.06	%71
10	M47	Z	-.062	%71
11	M44	X	.045	%25
12	M50	X	.104	%10
13	M50	X	.06	%25
14	M50	X	.032	%50
15	M47	X	.107	%10
16	M47	X	.061	%25
17	M70	X	.095	%50
18	M44	X	.045	%55
19	M50	X	.104	%71
20	M47	X	.107	%71

Member Point Loads (BLC 6 : Full Wind Antenna (90 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	0	%25
2	M50	Z	0	%10
3	M50	Z	0	%25
4	M50	Z	0	%50
5	M47	Z	0	%10
6	M47	Z	0	%25
7	M70	Z	0	%50
8	M44	Z	0	%55
9	M50	Z	0	%71
10	M47	Z	0	%71
11	M44	X	.038	%25
12	M50	X	.108	%10
13	M50	X	.076	%25
14	M50	X	.043	%50
15	M47	X	.109	%10
16	M47	X	.076	%25
17	M70	X	.098	%50
18	M44	X	.038	%55
19	M50	X	.108	%71
20	M47	X	.109	%71

Member Point Loads (BLC 7 : Full Wind Antenna (120 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	.026	%25
2	M50	Z	.06	%10
3	M50	Z	.034	%25
4	M50	Z	.019	%50

Member Point Loads (BLC 7 : Full Wind Antenna (120 Deg)) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
5	M47	Z	.062	%10
6	M47	Z	.035	%25
7	M70	Z	.055	%50
8	M44	Z	.026	%55
9	M50	Z	.06	%71
10	M47	Z	.062	%71
11	M44	X	.045	%25
12	M50	X	.104	%10
13	M50	X	.06	%25
14	M50	X	.032	%50
15	M47	X	.107	%10
16	M47	X	.061	%25
17	M70	X	.095	%50
18	M44	X	.045	%55
19	M50	X	.104	%71
20	M47	X	.107	%71

Member Point Loads (BLC 8 : Full Wind Antenna (150 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	.071	%25
2	M50	Z	.124	%10
3	M50	Z	.047	%25
4	M50	Z	.022	%50
5	M47	Z	.131	%10
6	M47	Z	.05	%25
7	M70	Z	.115	%50
8	M44	Z	.071	%55
9	M50	Z	.124	%71
10	M47	Z	.131	%71
11	M44	X	.041	%25
12	M50	X	.072	%10
13	M50	X	.027	%25
14	M50	X	.013	%50
15	M47	X	.076	%10
16	M47	X	.029	%25
17	M70	X	.067	%50
18	M44	X	.041	%55
19	M50	X	.072	%71
20	M47	X	.076	%71

Member Point Loads (BLC 15 : Ice Wind Antenna (0 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	-.024	%25
2	M50	Z	-.038	%10
3	M50	Z	-.015	%25
4	M50	Z	-.008	%50
5	M47	Z	-.04	%10
6	M47	Z	-.016	%25
7	M70	Z	-.037	%50
8	M44	Z	-.024	%55
9	M50	Z	-.038	%71
10	M47	Z	-.04	%71

Member Point Loads (BLC 16 : Ice Wind Antenna (30 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]

Member Point Loads (BLC 16 : Ice Wind Antenna (30 Deg)) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	-.018	%25
2	M50	Z	-.031	%10
3	M50	Z	-.014	%25
4	M50	Z	-.008	%50
5	M47	Z	-.032	%10
6	M47	Z	-.015	%25
7	M70	Z	-.03	%50
8	M44	Z	-.018	%55
9	M50	Z	-.031	%71
10	M47	Z	-.032	%71
11	M44	X	.01	%25
12	M50	X	.018	%10
13	M50	X	.008	%25
14	M50	X	.005	%50
15	M47	X	.018	%10
16	M47	X	.009	%25
17	M70	X	.017	%50
18	M44	X	.01	%55
19	M50	X	.018	%71
20	M47	X	.018	%71

Member Point Loads (BLC 17 : Ice Wind Antenna (60 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	-.007	%25
2	M50	Z	-.016	%10
3	M50	Z	-.01	%25
4	M50	Z	-.006	%50
5	M47	Z	-.016	%10
6	M47	Z	-.01	%25
7	M70	Z	-.015	%50
8	M44	Z	-.007	%55
9	M50	Z	-.016	%71
10	M47	Z	-.016	%71
11	M44	X	.013	%25
12	M50	X	.027	%10
13	M50	X	.017	%25
14	M50	X	.011	%50
15	M47	X	.028	%10
16	M47	X	.017	%25
17	M70	X	.025	%50
18	M44	X	.013	%55
19	M50	X	.027	%71
20	M47	X	.028	%71

Member Point Loads (BLC 18 : Ice Wind Antenna (90 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	0	%25
2	M50	Z	0	%10
3	M50	Z	0	%25
4	M50	Z	0	%50
5	M47	Z	0	%10
6	M47	Z	0	%25
7	M70	Z	0	%50
8	M44	Z	0	%55
9	M50	Z	0	%71
10	M47	Z	0	%71

Member Point Loads (BLC 18 : Ice Wind Antenna (90 Deg)) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
11	M44	X	.012	%25
12	M50	X	.029	%10
13	M50	X	.021	%25
14	M50	X	.014	%50
15	M47	X	.029	%10
16	M47	X	.021	%25
17	M70	X	.027	%50
18	M44	X	.012	%55
19	M50	X	.029	%71
20	M47	X	.029	%71

Member Point Loads (BLC 19 : Ice Wind Antenna (120 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	.007	%25
2	M50	Z	.016	%10
3	M50	Z	.01	%25
4	M50	Z	.006	%50
5	M47	Z	.016	%10
6	M47	Z	.01	%25
7	M70	Z	.015	%50
8	M44	Z	.007	%55
9	M50	Z	.016	%71
10	M47	Z	.016	%71
11	M44	X	.013	%25
12	M50	X	.027	%10
13	M50	X	.017	%25
14	M50	X	.011	%50
15	M47	X	.028	%10
16	M47	X	.017	%25
17	M70	X	.025	%50
18	M44	X	.013	%55
19	M50	X	.027	%71
20	M47	X	.028	%71

Member Point Loads (BLC 20 : Ice Wind Antenna (150 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	.018	%25
2	M50	Z	.016	%10
3	M50	Z	.01	%25
4	M50	Z	.006	%50
5	M47	Z	.016	%10
6	M47	Z	.01	%25
7	M70	Z	.015	%50
8	M44	Z	.018	%55
9	M50	Z	.016	%71
10	M47	Z	.016	%71
11	M44	X	.01	%25
12	M50	X	.027	%10
13	M50	X	.017	%25
14	M50	X	.011	%50
15	M47	X	.028	%10
16	M47	X	.017	%25
17	M70	X	.025	%50
18	M44	X	.01	%55
19	M50	X	.027	%71
20	M47	X	.028	%71

Member Point Loads (BLC 27 : Seismic Antenna (0 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Z	-.008	%40
2	M50	Z	-.005	%40.5
3	M50	Z	-.007	%25
4	M50	Z	-.002	%50
5	M47	Z	-.004	%40.5
6	M47	Z	-.007	%25
7	M70	Z	-.003	%50

Member Point Loads (BLC 28 : Seismic Antenna (90 Deg))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	X	.008	%40
2	M50	X	.005	%40.5
3	M50	X	.007	%25
4	M50	X	.002	%50
5	M47	X	.004	%40.5
6	M47	X	.007	%25
7	M70	X	.003	%50

Member Point Loads (BLC 41 : Seismic Vertical Antennas)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M44	Y	-.017	%40
2	M50	Y	-.01	%40.5
3	M50	Y	-.014	%25
4	M50	Y	-.005	%50
5	M47	Y	-.009	%40.5
6	M47	Y	-.015	%25
7	M70	Y	-.006	%50

Member Point Loads (BLC 47 : Man 6 (250 lbs))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M54	Y	-.25	%50

Member Area Loads

Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[ksf]
No Data to Print ...						

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead	None		-1			10			
2	Ice Dead	None					10	67		
3	Full Wind Antenna (0 Deg)	None					10			
4	Full Wind Antenna (30 Deg)	None					20			
5	Full Wind Antenna (60 Deg)	None					20			
6	Full Wind Antenna (90 Deg)	None					20			
7	Full Wind Antenna (120 Deg)	None					20			
8	Full Wind Antenna (150 Deg)	None					20			
9	Full Wind Members (0 Deg)	None						74		
10	Full Wind Members (30 Deg)	None						74		
11	Full Wind Members (60 Deg)	None						74		
12	Full Wind Members (90 Deg)	None						74		
13	Full Wind Members (120 Deg)	None						74		
14	Full Wind Members (150 Deg)	None						74		

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
15	Ice Wind Antenna (0 Deg)	None					10			
16	Ice Wind Antenna (30 Deg)	None					20			
17	Ice Wind Antenna (60 Deg)	None					20			
18	Ice Wind Antenna (90 Deg)	None					20			
19	Ice Wind Antenna (120 Deg)	None					20			
20	Ice Wind Antenna (150 Deg)	None					20			
21	Ice Wind Members (0 Deg)	None						138		
22	Ice Wind Members (30 Deg)	None						138		
23	Ice Wind Members (60 Deg)	None						138		
24	Ice Wind Members (90 Deg)	None						138		
25	Ice Wind Members (120 Deg)	None						138		
26	Ice Wind Members (150 Deg)	None						138		
27	Seismic Antenna (0 Deg)	None					7			
28	Seismic Antenna (90 Deg)	None					7			
29	Seismic Members (0 Deg)	None		-.037	-.093					
30	Seismic Members (30 Deg)	None	.046	-.037	-.081					
31	Seismic Members (60 Deg)	None	.081	-.037	-.046					
32	Seismic Members (90 Deg)	None	.093	-.037	-5.697e-..					
33	Seismic Members (120 Deg)	None	.081	-.037	.046					
34	Seismic Members (150 Deg)	None	.046	-.037	.081					
35	Seismic Members (180 Deg)	None	1.139e-17	-.037	.093					
36	Seismic Members (210 Deg)	None	-.046	-.037	.081					
37	Seismic Members (240 Deg)	None	-.081	-.037	.046					
38	Seismic Members (270 Deg)	None	-.093	-.037	1.709e-17					
39	Seismic Members (300 Deg)	None	-.081	-.037	-.046					
40	Seismic Members (330 Deg)	None	-.046	-.037	-.081					
41	Seismic Vertical Antennas	None					7			
42	Man 1 (500 lbs)	None				2				
43	Man 2 (500 lbs)	None				2				
44	Man 3 (500 lbs)	None				2				
45	Man 4 (250 lbs)	None				2				
46	Man 5 (250 lbs)	None				2				
47	Man 6 (250 lbs)	None				1	1			

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	1.2D + 1.0W 0°	Yes	Y		1	1.2	3	1	9	1														
3	1.2D + 1.0W 30°	Yes	Y		1	1.2	4	1	10	1														
4	1.2D + 1.0W 60°	Yes	Y		1	1.2	5	1	11	1														
5	1.2D + 1.0W 90°	Yes	Y		1	1.2	6	1	12	1														
6	1.2D + 1.0W 120°	Yes	Y		1	1.2	7	1	13	1														
7	1.2D + 1.0W 150°	Yes	Y		1	1.2	8	1	14	1														
8	1.2D + 1.0W 180°	Yes	Y		1	1.2	3	-1	9	-1														
9	1.2D + 1.0W 210°	Yes	Y		1	1.2	4	-1	10	-1														
10	1.2D + 1.0W 240°	Yes	Y		1	1.2	5	-1	11	-1														
11	1.2D + 1.0W 270°	Yes	Y		1	1.2	6	-1	12	-1														
12	1.2D + 1.0W 300°	Yes	Y		1	1.2	7	-1	13	-1														
13	1.2D + 1.0W 330°	Yes	Y		1	1.2	8	-1	14	-1														
14	1.2D + 1.0Di + 1.0Wi 0°	Yes	Y		1	1.2	2	1	15	1	21	1												
15	1.2D + 1.0Di + 1.0Wi 3...	Yes	Y		1	1.2	2	1	16	1	22	1												
16	1.2D + 1.0Di + 1.0Wi 6...	Yes	Y		1	1.2	2	1	17	1	23	1												
17	1.2D + 1.0Di + 1.0Wi 9...	Yes	Y		1	1.2	2	1	18	1	24	1												
18	1.2D + 1.0Di + 1.0Wi 1...	Yes	Y		1	1.2	2	1	19	1	25	1												
19	1.2D + 1.0Di + 1.0Wi 1...	Yes	Y		1	1.2	2	1	20	1	26	1												

Load Combinations (Continued)

	Description	So..	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..
20	1.2D + 1.0Di + 1.0Wi 1..	Yes	Y		1	1.2	2	1	15	-1	21	-1														
21	1.2D + 1.0Di + 1.0Wi 2..	Yes	Y		1	1.2	2	1	16	-1	22	-1														
22	1.2D + 1.0Di + 1.0Wi 2..	Yes	Y		1	1.2	2	1	17	-1	23	-1														
23	1.2D + 1.0Di + 1.0Wi 2..	Yes	Y		1	1.2	2	1	18	-1	24	-1														
24	1.2D + 1.0Di + 1.0Wi 3..	Yes	Y		1	1.2	2	1	19	-1	25	-1														
25	1.2D + 1.0Di + 1.0Wi 3..	Yes	Y		1	1.2	2	1	20	-1	26	-1														
26	1.2D + 1.5Lm_1 + 1.0...	Yes	Y		1	1.2	3	.068	9	.068	42	1.5														
27	1.2D + 1.5Lm_1 + 1.0...	Yes	Y		1	1.2	4	.068	10	.068	42	1.5														
28	1.2D + 1.5Lm_1 + 1.0...	Yes	Y		1	1.2	5	.068	11	.068	42	1.5														
29	1.2D + 1.5Lm_1 + 1.0...	Yes	Y		1	1.2	6	.068	12	.068	42	1.5														
30	1.2D + 1.5Lm_1 + 1.0...	Yes	Y		1	1.2	7	.068	13	.068	42	1.5														
31	1.2D + 1.5Lm_1 + 1.0...	Yes	Y		1	1.2	8	.068	14	.068	42	1.5														
32	1.2D + 1.5Lm_1 + 1.0...	Yes	Y		1	1.2	3	-.068	9	-.068	42	1.5														
33	1.2D + 1.5Lm_1 + 1.0...	Yes	Y		1	1.2	4	-.068	10	-.068	42	1.5														
34	1.2D + 1.5Lm_1 + 1.0...	Yes	Y		1	1.2	5	-.068	11	-.068	42	1.5														
35	1.2D + 1.5Lm_1 + 1.0...	Yes	Y		1	1.2	6	-.068	12	-.068	42	1.5														
36	1.2D + 1.5Lm_1 + 1.0...	Yes	Y		1	1.2	7	-.068	13	-.068	42	1.5														
37	1.2D + 1.5Lm_1 + 1.0...	Yes	Y		1	1.2	8	-.068	14	-.068	42	1.5														
38	1.2D + 1.5Lm_2 + 1.0...	Yes	Y		1	1.2	3	.068	9	.068	43	1.5														
39	1.2D + 1.5Lm_2 + 1.0...	Yes	Y		1	1.2	4	.068	10	.068	43	1.5														
40	1.2D + 1.5Lm_2 + 1.0...	Yes	Y		1	1.2	5	.068	11	.068	43	1.5														
41	1.2D + 1.5Lm_2 + 1.0...	Yes	Y		1	1.2	6	.068	12	.068	43	1.5														
42	1.2D + 1.5Lm_2 + 1.0...	Yes	Y		1	1.2	7	.068	13	.068	43	1.5														
43	1.2D + 1.5Lm_2 + 1.0...	Yes	Y		1	1.2	8	.068	14	.068	43	1.5														
44	1.2D + 1.5Lm_2 + 1.0...	Yes	Y		1	1.2	3	-.068	9	-.068	43	1.5														
45	1.2D + 1.5Lm_2 + 1.0...	Yes	Y		1	1.2	4	-.068	10	-.068	43	1.5														
46	1.2D + 1.5Lm_2 + 1.0...	Yes	Y		1	1.2	5	-.068	11	-.068	43	1.5														
47	1.2D + 1.5Lm_2 + 1.0...	Yes	Y		1	1.2	6	-.068	12	-.068	43	1.5														
48	1.2D + 1.5Lm_2 + 1.0...	Yes	Y		1	1.2	7	-.068	13	-.068	43	1.5														
49	1.2D + 1.5Lm_2 + 1.0...	Yes	Y		1	1.2	8	-.068	14	-.068	43	1.5														
50	1.2D + 1.5Lm_3 + 1.0...	Yes	Y		1	1.2	3	.068	9	.068	44	1.5														
51	1.2D + 1.5Lm_3 + 1.0...	Yes	Y		1	1.2	4	.068	10	.068	44	1.5														
52	1.2D + 1.5Lm_3 + 1.0...	Yes	Y		1	1.2	5	.068	11	.068	44	1.5														
53	1.2D + 1.5Lm_3 + 1.0...	Yes	Y		1	1.2	6	.068	12	.068	44	1.5														
54	1.2D + 1.5Lm_3 + 1.0...	Yes	Y		1	1.2	7	.068	13	.068	44	1.5														
55	1.2D + 1.5Lm_3 + 1.0...	Yes	Y		1	1.2	8	.068	14	.068	44	1.5														
56	1.2D + 1.5Lm_3 + 1.0...	Yes	Y		1	1.2	3	-.068	9	-.068	44	1.5														
57	1.2D + 1.5Lm_3 + 1.0...	Yes	Y		1	1.2	4	-.068	10	-.068	44	1.5														
58	1.2D + 1.5Lm_3 + 1.0...	Yes	Y		1	1.2	5	-.068	11	-.068	44	1.5														
59	1.2D + 1.5Lm_3 + 1.0...	Yes	Y		1	1.2	6	-.068	12	-.068	44	1.5														
60	1.2D + 1.5Lm_3 + 1.0...	Yes	Y		1	1.2	7	-.068	13	-.068	44	1.5														
61	1.2D + 1.5Lm_3 + 1.0...	Yes	Y		1	1.2	8	-.068	14	-.068	44	1.5														
62	1.2D + 1.5Lv_1 0°	Yes	Y		1	1.2	45	1.5																		
63	1.2D + 1.5Lv_1 30°	Yes	Y		1	1.2	45	1.5																		
64	1.2D + 1.5Lv_1 60°	Yes	Y		1	1.2	45	1.5																		
65	1.2D + 1.5Lv_1 90°	Yes	Y		1	1.2	45	1.5																		
66	1.2D + 1.5Lv_1 120°	Yes	Y		1	1.2	45	1.5																		
67	1.2D + 1.5Lv_1 150°	Yes	Y		1	1.2	45	1.5																		
68	1.2D + 1.5Lv_1 180°	Yes	Y		1	1.2	45	1.5																		
69	1.2D + 1.5Lv_1 210°	Yes	Y		1	1.2	45	1.5																		
70	1.2D + 1.5Lv_1 240°	Yes	Y		1	1.2	45	1.5																		
71	1.2D + 1.5Lv_1 270°	Yes	Y		1	1.2	45	1.5																		
72	1.2D + 1.5Lv_1 300°	Yes	Y		1	1.2	45	1.5																		
73	1.2D + 1.5Lv_1 330°	Yes	Y		1	1.2	45	1.5																		
74	1.2D + 1.5Lv_2 0°	Yes	Y		1	1.2	46	1.5																		
75	1.2D + 1.5Lv_2 30°	Yes	Y		1	1.2	46	1.5																		
76	1.2D + 1.5Lv_2 60°	Yes	Y		1	1.2	46	1.5																		

Load Combinations (Continued)

	Description	So..	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..
77	1.2D + 1.5Lv_2_90°	Yes	Y		1	1.2	46	1.5																
78	1.2D + 1.5Lv_2_120°	Yes	Y		1	1.2	46	1.5																
79	1.2D + 1.5Lv_2_150°	Yes	Y		1	1.2	46	1.5																
80	1.2D + 1.5Lv_2_180°	Yes	Y		1	1.2	46	1.5																
81	1.2D + 1.5Lv_2_210°	Yes	Y		1	1.2	46	1.5																
82	1.2D + 1.5Lv_2_240°	Yes	Y		1	1.2	46	1.5																
83	1.2D + 1.5Lv_2_270°	Yes	Y		1	1.2	46	1.5																
84	1.2D + 1.5Lv_2_300°	Yes	Y		1	1.2	46	1.5																
85	1.2D + 1.5Lv_2_330°	Yes	Y		1	1.2	46	1.5																
86	1.2D + 1.5Lv_3_0°	Yes	Y		1	1.2	47	1.5																
87	1.2D + 1.5Lv_3_30°	Yes	Y		1	1.2	47	1.5																
88	1.2D + 1.5Lv_3_60°	Yes	Y		1	1.2	47	1.5																
89	1.2D + 1.5Lv_3_90°	Yes	Y		1	1.2	47	1.5																
90	1.2D + 1.5Lv_3_120°	Yes	Y		1	1.2	47	1.5																
91	1.2D + 1.5Lv_3_150°	Yes	Y		1	1.2	47	1.5																
92	1.2D + 1.5Lv_3_180°	Yes	Y		1	1.2	47	1.5																
93	1.2D + 1.5Lv_3_210°	Yes	Y		1	1.2	47	1.5																
94	1.2D + 1.5Lv_3_240°	Yes	Y		1	1.2	47	1.5																
95	1.2D + 1.5Lv_3_270°	Yes	Y		1	1.2	47	1.5																
96	1.2D + 1.5Lv_3_300°	Yes	Y		1	1.2	47	1.5																
97	1.2D + 1.5Lv_3_330°	Yes	Y		1	1.2	47	1.5																
98	1.2D + 1.0EV +1.0 EH ...	Yes	Y		1	1.2	27	1	28		29	1	41	1										
99	1.2D + 1.0EV +1.0 EH ...	Yes	Y		1	1.2	27	.866	28	.5	30	1	41	1										
100	1.2D + 1.0EV +1.0 EH ...	Yes	Y		1	1.2	27	.5	28	.866	31	1	41	1										
101	1.2D + 1.0EV +1.0 EH ...	Yes	Y		1	1.2	27		28	1	32	1	41	1										
102	1.2D + 1.0EV +1.0 EH ...	Yes	Y		1	1.2	27	-.5	28	.866	33	1	41	1										
103	1.2D + 1.0EV +1.0 EH ...	Yes	Y		1	1.2	27	-.866	28	.5	34	1	41	1										
104	1.2D + 1.0EV +1.0 EH ...	Yes	Y		1	1.2	27	-1	28		35	1	41	1										
105	1.2D + 1.0EV +1.0 EH ...	Yes	Y		1	1.2	27	-.866	28	-.5	36	1	41	1										
106	1.2D + 1.0EV +1.0 EH ...	Yes	Y		1	1.2	27	-.5	28	-.866	37	1	41	1										
107	1.2D + 1.0EV +1.0 EH ...	Yes	Y		1	1.2	27		28	-1	38	1	41	1										
108	1.2D + 1.0EV +1.0 EH ...	Yes	Y		1	1.2	27	.5	28	-.866	39	1	41	1										
109	1.2D + 1.0EV +1.0 EH ...	Yes	Y		1	1.2	27	.866	28	-.5	40	1	41	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	N78	max	1.142	11	1.157	17	.752	13	-.535	7	0	109	.212	30
2		min	-1.547	29	.512	11	-2.155	7	-1.209	14	0	1	-.061	74
3	N79B	max	1.506	35	1.148	23	1.917	25	-.554	6	0	109	.251	29
4		min	-.561	5	.513	6	-.25	6	-1.241	23	0	1	-.076	74
5	N85B	max	.294	5	.061	23	1.136	5	-.021	85	0	109	.118	28
6		min	-.275	11	.016	5	-1.078	11	-.098	17	0	1	.008	74
7	N86B	max	.2	5	.06	19	.807	5	-.021	85	0	109	.12	29
8		min	-.216	11	.017	74	-.869	11	-.097	17	0	1	.008	74
9	Totals:	max	1.562	11	2.407	17	1.865	2						
10		min	-1.562	5	1.102	11	-1.865	8						

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

	Member	Shape	Code C...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-...	phi*Mn z-...	Cb	Eqn
1	M54	PIPE_2.5	.239	8.854	36	.071	8.724		8	41.049	50.715	3.596	3.596	1	H1-1b
2	M6	PIPE_2.5	.282	8.854	6	.094	3.776		2	41.05	50.715	3.596	3.596	1	H1-1b
3	M5	PIPE_2.5	.126	6.667	85	.025	3.333		85	46.315	50.715	3.596	3.596	1	H1-1b
4	M11	PIPE_2.0	.227	.052	5	.054	.99		18	29.81	32.13	1.872	1.872	1....	H1-1b
5	M12	PIPE_2.0	.152	.234	29	.068	2.448		31	29.81	32.13	1.872	1.872	2....	H1-1b

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

	Member	Shape	Code C...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-...	phi*Mn z-...	Cb	Eqn
6	M17	PL5/8X8	.253	.417	17	.181	.417	y	29	155.571	162	2.109	27	1....	H1-1b
7	M12A	PL5/8X3.5	.000	.243	14	.000	0	z	25	69.904	70.875	.923	5.168	1	H1-1b
8	M13	PL5/8X3.5	.045	.247	11	.017	.247	y	7	68.066	70.875	.923	5.168	2....	H1-1b
9	M14	PL5/8X3.5	.058	.247	29	.025	.247	y	30	68.067	70.875	.923	5.168	2....	H1-1b
10	M15A	PL5/8X3.5	.000	.243	20	.000	0	z	25	69.904	70.875	.923	5.168	1	H1-1b
11	M17A	PIPE_2.0	.182	.052	35	.055	.99		24	29.81	32.13	1.872	1.872	2....	H1-1b
12	M18	PIPE_2.0	.152	.234	35	.068	2.448		29	29.81	32.13	1.872	1.872	2....	H1-1b
13	M21	PL5/8X8	.249	.417	23	.178	0	y	28	155.571	162	2.109	27	1....	H1-1b
14	M22	PL5/8X3.5	.000	.243	35	.000	.051	y	12	69.904	70.875	.923	5.168	2....	H1-1b
15	M23	PL5/8X3.5	.038	.247	12	.013	.247	y	12	68.066	70.875	.923	5.168	2....	H1-1b
16	M24	PL5/8X3.5	.057	.247	35	.025	.247	y	29	68.067	70.875	.923	5.168	2....	H1-1b
17	M25	PL5/8X3.5	.000	.051	35	.000	0	z	16	69.904	70.875	.923	5.168	2....	H1-1b
18	M34	SR 3/4	.054	0	58	.011	3.667		29	4.484	14.314	.179	.179	1	H1-1b*
19	M35	SR 3/4	.000	0	109	.011	0		35	4.484	14.314	.179	.179	1	H1-1a
20	M36	SR 3/4	.086	3.667	29	.019	3.667		5	4.484	14.314	.179	.179	1	H1-1b*
21	M37	SR 3/4	.000	0	109	.015	0		11	4.484	14.314	.179	.179	1	H1-1a
22	M44	PIPE_2.5	.219	6.667	34	.037	3.333		26	46.315	50.715	3.596	3.596	1	H1-1b
23	M47	PIPE_2.5	.133	3.333	8	.033	6.667		28	46.315	50.715	3.596	3.596	1	H1-1b
24	M50	PIPE_2.5	.124	3.333	8	.022	3.333		7	46.315	50.715	3.596	3.596	1	H1-1b
25	M59	SR 5/8_HRA	.056	0	23	.026	0		29	3.122	9.94	.104	.104	2....	H1-1b
26	M60	SR 5/8_HRA	.097	2.771	3	.004	0		28	3.122	9.94	.104	.104	2....	H1-1b*
27	M61	SR 5/8_HRA	.090	2.771	2	.002	0		2	3.122	9.94	.104	.104	2....	H1-1b*
28	M62	SR 5/8_HRA	.109	2.771	35	.023	0		29	3.122	9.94	.104	.104	2....	H1-1b
29	M65A	PL5/8X3.5	.263	.5	58	.029	.5	y	9	66.866	70.875	.923	5.168	1....	H1-1b
30	M66A	PL5/8X3.5	.530	0	29	.066	0	y	6	66.866	70.875	.923	5.168	1....	H1-1b
31	M63A	PL5/8X3.5	.257	.5	51	.027	.5	y	50	66.866	70.875	.923	5.168	1....	H1-1b
32	M64A	PL5/8X3.5	.524	0	35	.064	0	y	35	66.866	70.875	.923	5.168	1....	H1-1b
33	M66C	PIPE_2.0	.072	6.582	17	.059	6.582		28	19.112	32.13	1.872	1.872	2....	H1-1b
34	M67A	PIPE_2.0	.066	6.582	17	.060	6.582		29	19.112	32.13	1.872	1.872	2....	H1-1b
35	M70	PIPE_2.0	.048	2.5	8	.015	1.25		8	23.809	32.13	1.872	1.872	1....	H1-1b

		Shear X (k)		Vertical Y (k)		Shear Z (k)		MX (k-ft)		MY (k-ft)		MZ (k-ft)		Combined Shear (X +Y)+(Mz/Arm)	Axial Tension	Combined Tension (Tension)+|Mx/(HtPL/2)|
N78	max	1.142	11	1.157	17	0.752	13	-0.535	7	0	109	0.212	30	1.868	0.000	2.140
N78	min	-1.547	29	0.512	11	-2.155	7	-1.209	14	0	1	-0.061	74	1.560	2.155	6.991
N79B	max	1.506	35	1.148	23	1.917	25	-0.554	6	0	109	0.251	29	2.181	0.000	2.216
N79B	min	-0.561	5	0.513	6	-0.25	6	-1.241	23	0	1	-0.076	74	0.673	0.250	5.214

TIA-222-H **Section 4-9 - Connections**

Main Connection @ Leg Support

Qty.	4				
Bolt/Rod Dia.	0.625	in.	Fyb	Fub	
Bolt/Rod Grad	F1554-55		55	75	ksi
Thread(s)	N	N = Included / X = Excluded			
Horiz. Dist. Between Bolts	10.5	in.			
Leg Dia / Width	2	in.	Ecc=	4.25	in.

UNC	11	Bolt threads per inch
Ab	0.3068	in^2
An	0.2260	in^2

Front Support Member

Angle/Channel/Plate Ht.	6	in.			
Thickness	0.375	in.	Fyb	Fub	
Grade	A36		36	58	ksi
Edge Dist.	1.25	in. (Le)			
Slotted Hole	No	N = No / Y = Yes	Lc=	0.90625	in

Back Support Member

Back Member Type	Channel		Fyb	Fub	
Steel Grade	A36		36	58	ksi
Height	6	in.			
Width	2.16	in. (Note: Enter " 0 " for plate or flat bar)			
Thickness	0.375	in.			
Zy	1.5959	in.^3 (Plastic Modulus)	https://calcresource.com/cross-sections.html		

Strength Factors

Φv	0.75	Shear
Φt	0.75	Tension
Φb	0.80	Bearing
Φf	0.90	Flexure

Rb 1 Conn. length reduction factor (= to 1.00 for single bolt conn. or Lb < 16 in.) (Lb = dist. between bolts in same line of force)

ΦRnv	8.629	kips	Single Bolt/Rod **Shear** Strength		
ΦRnt	12.713	kips	Single Bolt/Rod **Tension** Strength	22.185	32.625
ΦRnb	22.185	kips	Single Bolt/Rod Member **Bearing** Strength (Front)	15.769	27.188
ΦRnb	22.185	kips	Single Bolt/Rod Member **Bearing** Strength (Back)		

Combined Shear & Tension - Section 4.9.6.4

		Shear		Tension	Unity Check	Result
N78	V/ΦRnv=	0.054	T/ΦRnt=	0.084	0.100	Pass
N78	V/ΦRnv=	0.045	T/ΦRnt=	0.275	0.279	Pass
N79B	V/ΦRnv=	0.063	T/ΦRnt=	0.087	0.108	Pass
N79B	V/ΦRnv=	0.020	T/ΦRnt=	0.205	0.206	Pass

Controlling

		Shear/Bearing		Tension	Unity Check	Result
N78	V/ΦRnv=	0.054	T/ΦRnt=	0.084	0.100	Pass
N78	V/ΦRnv=	0.045	T/ΦRnt=	0.275	0.279	Pass
N79B	V/ΦRnv=	0.063	T/ΦRnt=	0.087	0.108	Pass
N79B	V/ΦRnv=	0.020	T/ΦRnt=	0.205	0.206	Pass

Back Bracket

		Bending	Unity Check	Result
N78	M/ΦMn	0.088	0.088	Pass
N78	M/ΦMn	0.287	0.287	Pass
N79B	M/ΦMn	0.091	0.091	Pass
N79B	M/ΦMn	0.214	0.214	Pass

	Unity Check	Result
Controlling Unity Check	0.287	< 1.05 Pass

ATTACHMENT 5

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Calculated Radio Frequency Emissions Report

verizon

Stafford 4

169 Hampden Road, Stafford, CT 06076

July 26, 2023

Table of Contents

List of Figures

List of Tables

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed modification of Verizon's antenna arrays to be mounted at 152.8' AGL on an existing guyed tower located at 169 Hampden Road in Stafford, CT. The coordinates of the guyed tower are 41° 59' 58.49" N, 72° 21' 20.29" W.

Verizon is proposing the following:

1) Install nine (9) multi-band antennas, three (3) per sector to support its commercial LTE network.

This report considers the planned antenna configuration for Verizon[1] and the existing antennas for T-Mobile[2] to derive the resulting % MPE of its proposed installation.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

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

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

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

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

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

[1] As referenced to Verizon's Radio Frequency Design Sheet updated 12/05/2022.

[2] As referenced to EBI Consulting's Radio Frequency Emissions Analysis Report, Dated 10/18/2021

3. RF Exposure Prediction Methods

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

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

Where:

EIRP = Effective Isotropic Radiated Power

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

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Off Beam Loss is determined by the selected antenna patterns

Ground reflection factor (GRF) of 1.6

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

4. Antenna Inventory

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

Operator	Sector / Call Sign	TX Freq (MHz)	Power at Antenna (Watts)	Ant Gain (dBi)	Power EIRP (Watts)	Antenna Model	Beam Width	Mech. Tilt	Length (ft)	Antenna Centerline Height (ft)
Verizon	Alpha / 30°	700	160	14.9	4944	NHH-65B-R2B	65	0	5.99	152.8
		850	160	15	5060		60			
		1900	160	17.9	9866		69			
		2100	240	18.4	16604		64			
		3500	20	17.7	1178	NHHSS-65B-R2BT4	54	0	5.99	152.8
		3700	200	25.5	70963	MT6413-77A	105	0	2.92	152.8
	Beta / 150°	700	160	14.9	4944	NHH-65B-R2B	65	0	5.99	152.8
		850	160	15	5060		60			
		1900	160	17.9	9866		69			
		2100	240	18.4	16604		64			
		3500	20	17.7	1178	NHHSS-65B-R2BT4	54	0	5.99	152.8
		3700	200	25.5	70963	MT6413-77A	105	0	2.92	152.8
	Gamma / 270°	700	160	14.9	4944	NHH-65B-R2B	65	0	5.99	152.8
		850	160	15	5060		60			
		1900	160	17.9	9866		69			
		2100	240	18.4	16604		64			
		3500	20	17.7	1178	NHHSS-65B-R2BT4	54	0	5.99	152.8
		3700	200	25.5	70963	MT6413-77A	105	0	2.92	152.8

Table 1: Proposed Antenna Inventory[3][4]

[3] Antenna heights are in reference to Verizon's Radio Frequency Design Sheet updated 12/05/2022.

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

5. Calculation Results

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

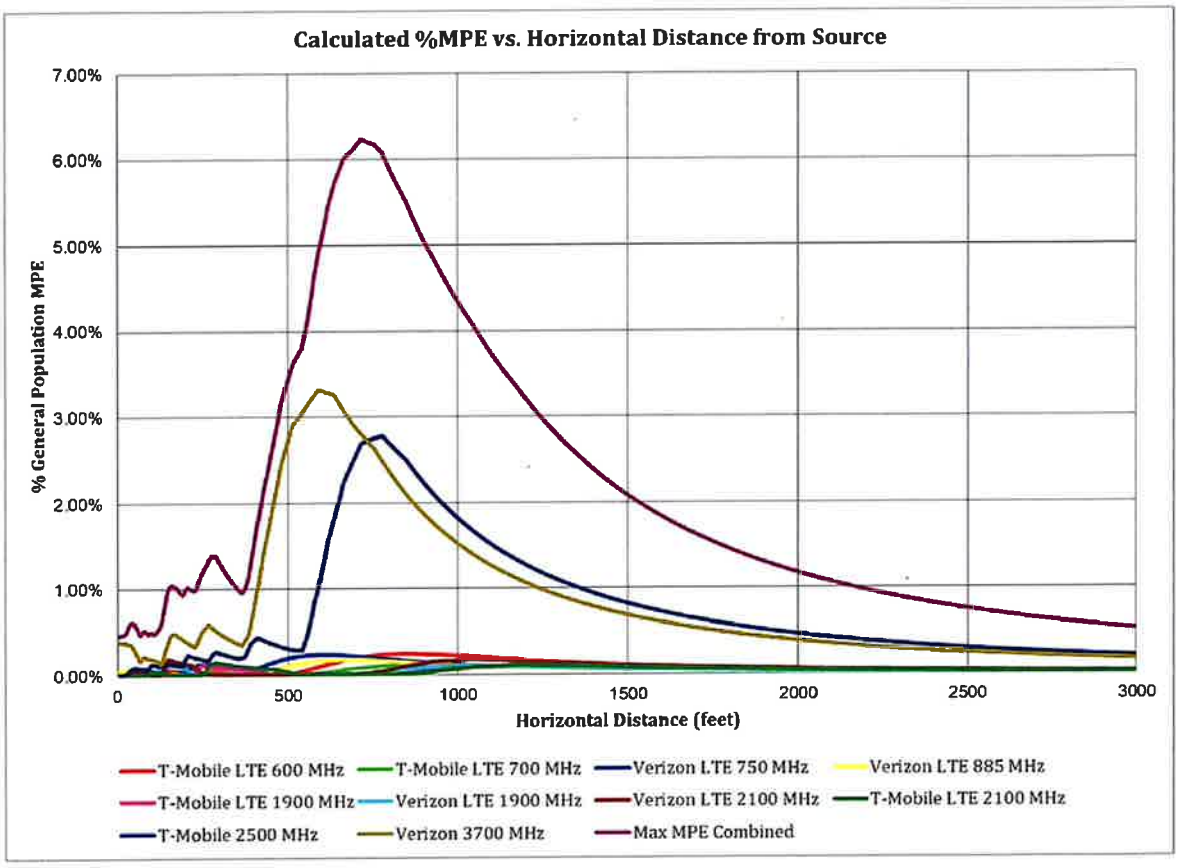

Figure 1: Graph of General Population % MPE vs. Distance

The highest percent of MPE (6.23% of the General Population limit) is calculated to occur at a horizontal distance of 715 feet from antennas. Please note that the percent of MPE calculations close to the site take into account off beam loss, which is determined from the vertical pattern of the antennas used. Therefore, RF power density levels may increase as the distance from the site increases. At distances of approximately 1500 feet and beyond, one would now be in the main beam of the antenna pattern and off beam loss is no longer considered. Beyond this point, RF levels become calculated solely on distance from the site and the percent of MPE decreases significantly as distance from the site increases.

Table 2 below lists percent of MPE values as well as the associated parameters that were included in the calculations. The highest percent of MPE value was calculated to occur at a horizontal distance of 715 feet from the site (reference Figure 1).

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

Carrier	Number of Transmitters	Power out of Base Station Per Transmitter (Watts)	Antenna Height (Feet)	Distance to the Base of Antennas (Feet)	Power Density (mW/cm^2)	Limit (mW/cm^2)	% MPE
T-Mobile 2500 MHz	1	240.0	171.0	715	0.026947	1.000	2.69%
T-Mobile LTE 1900 MHz	1	120.0	171.0	715	0.000053	1.000	0.01%
T-Mobile LTE 2100 MHz	1	120.0	171.0	715	0.000087	1.000	0.01%
T-Mobile LTE 600 MHz	1	140.0	171.0	715	0.000850	0.400	0.21%
T-Mobile LTE 700 MHz	1	60.0	171.0	715	0.000394	0.467	0.08%
Verizon 3700 MHz	1	200.0	152.8	715	0.028016	1.000	2.80%
Verizon LTE 1900 MHz	1	160.0	152.8	715	0.000141	1.000	0.01%
Verizon LTE 2100 MHz	1	240.0	152.8	715	0.000192	1.000	0.02%
Verizon LTE 750 MHz	1	160.0	152.8	715	0.001072	0.500	0.21%
Verizon LTE 885 MHz	1	160.0	152.8	715	0.001001	0.567	0.18%
						Total	**6.23%**

Table 2: Maximum Percent of General Population Exposure Values

6. Conclusion

The above analysis verifies that RF exposure levels from the site with Verizon's proposed antenna configuration will be well below the maximum permissible levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Using the conservative calculation methods and parameters detailed above, the maximum cumulative percent of MPE in consideration of all transmitters is calculated to be 6.23% of the FCC limit (General Population/Uncontrolled). This maximum cumulative percent of MPE value is calculated to occur 715 feet away from the site.

7. Statement of Certification

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

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July 24, 2023
Date

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

July 26, 2023
Date

Attachment A: References

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

IEEE C95.1-2005, IEEE Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz IEEE-SA Standards Board

IEEE C95.3-2002 (R2008), IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz IEEE-SA Standards Board

Verizon's Radio Frequency Design Sheet updated 10/21/2022

AT&T's filing, Connecticut Siting Council Notice of Exempt Modification – Antenna Add - 169 Hampton R (aka 1 Service Road) Stafford, CT, dated 9/23/2022

As referenced to Dish Wireless LLC's filing, Connecticut Siting Council Tower Share Application – 169 Hampton R , Stafford, CT, dated 11/19/2021

T-Mobile's filing, Connecticut Siting Council Notice of Exempt Modification – 169 Hampton R , Stafford, CT, dated 10/1/2020

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

(A) Limits for Occupational/Controlled Exposure[5]

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

(B) Limits for General Population/Uncontrolled Exposure[6]

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

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

Table 3: FCC Limits for Maximum Permissible Exposure

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

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

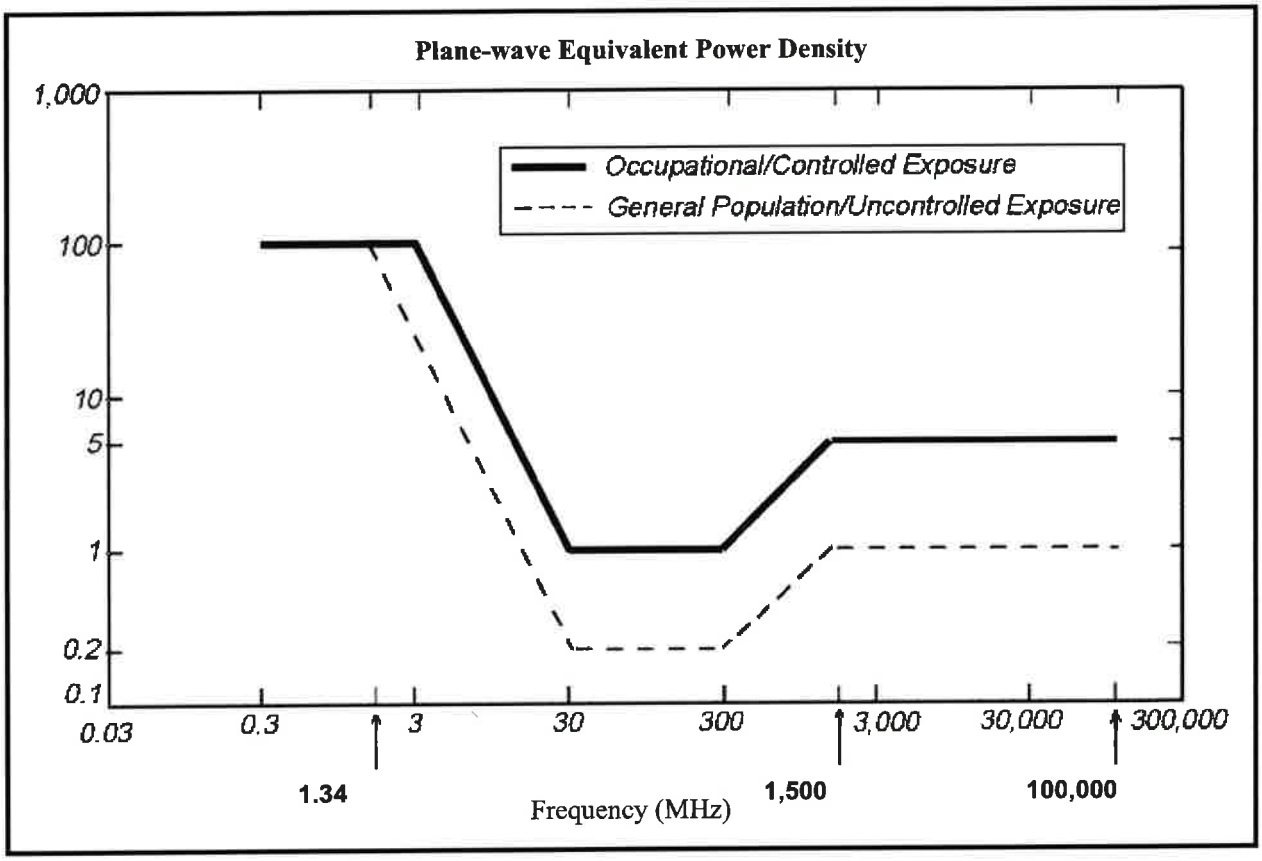
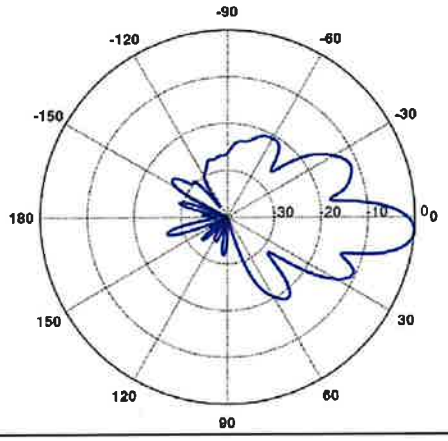


Figure 2: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Verizon Antenna Model Data Sheets and Electrical Patterns

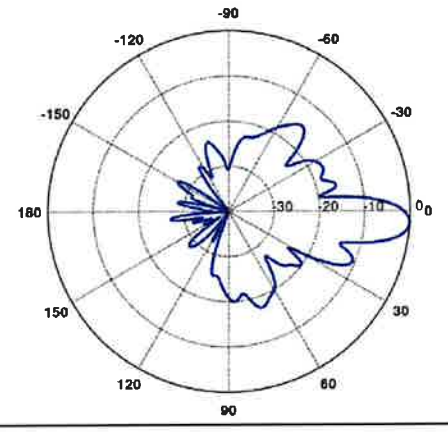
750 MHz

Manufacturer:	COMMSCOPE
Model #:	NHH-65B-R2B
Frequency Band:	698-806 MHz
Gain:	14.9 dBi
Vertical Beamwidth:	12.4°
Horizontal Beamwidth:	65.0°
Polarization:	±45°
Dimensions (L x W x D):	71.97" x 11.85" x 7.09"



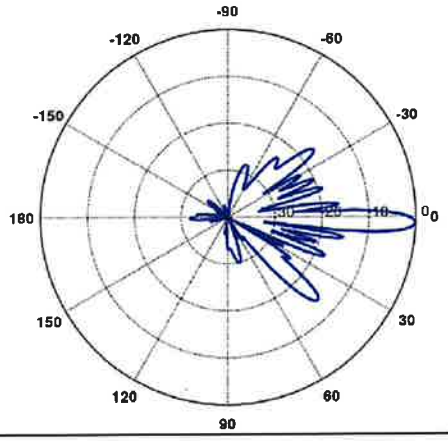
885 MHz

Manufacturer:	COMMSCOPE
Model #:	NHH-65B-R2B
Frequency Band:	806-896 MHz
Gain:	15.0 dBi
Vertical Beamwidth:	11.2°
Horizontal Beamwidth:	60°
Polarization:	±45°
Dimensions (L x W x D):	71.97" x 11.85" x 7.09"



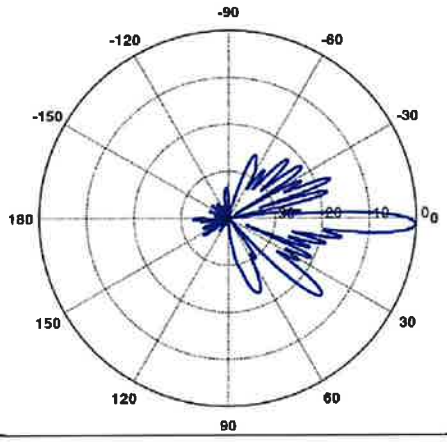
1900 MHz

Manufacturer:	COMMSCOPE
Model #:	NHH-65B-R2B
Frequency Band:	1850-1990 MHz
Gain:	17.9 dBi
Vertical Beamwidth:	5.2°
Horizontal Beamwidth:	69°
Polarization:	±45°
Dimensions (L x W x D):	71.97" x 11.85" x 7.09"



2100 MHz

Manufacturer:	COMMSCOPE
Model #:	NHH-65B-R2B
Frequency Band:	1920-2200 MHz
Gain:	18.4 dBi
Vertical Beamwidth:	4.9°
Horizontal Beamwidth:	64.0°
Polarization:	±45°
Dimensions (L x W x D):	71.97" x 11.85" x 7.09"



SD050 | 4.5L | 50 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

GENERAC | INDUSTRIAL POWER

Standby Power Rating
50 kW, 63 kVA, 60 Hz

Prime Power Rating*
45 kW, 56 kVA, 60 Hz

*EPA Certified Prime ratings are not available in the US or its Territories

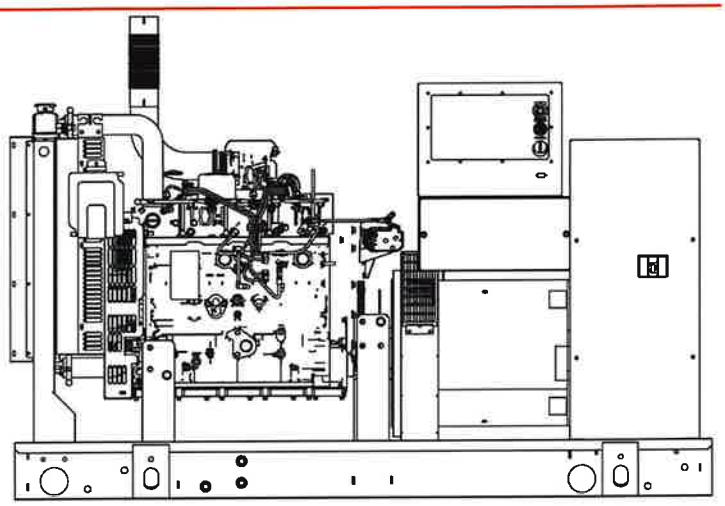


Image used for illustration purposes only

Codes and Standards

Not all codes and standards apply to all configurations. Contact factory for details.

- UL2200, UL508, UL489, UL142
- CSA C22.2
- BS5514 and DIN 6271
- SAE J1349
- NFPA 37, 70, 99, 110
- NEC700, 701, 702, 708
- ISO 3046, 7637, 8528, 9001
- NEMA ICS10, MG1, 250, ICS6, AB1
- ANSI C62.41
- IBC 2009, CBC 2010, IBC 2012, ASCE 7-05, ASCE 7-10, ICC-ES AC-156 (2012)

Powering Ahead

For over 50 years, Generac has provided innovative design and superior manufacturing.

Generac ensures superior quality by designing and manufacturing most of its generator components, including alternators, enclosures and base tanks, control systems and communications software.

Generac gensets utilize a wide variety of options, configurations and arrangements, allowing us to meet the standby power needs of practically every application.

Generac searched globally to ensure the most reliable engines power our generators. We choose only engines that have already been proven in heavy-duty industrial applications under adverse conditions.

Generac is committed to ensuring our customers' service support continues after their generator purchase.

ATTACHMENT 6

Verizon/Stafford 4

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

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Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	4	4	neopost 07/27/2023 US POSTAGE $003.55⁰ ZIP 06103 041L12203937
	Postmaster, per *(name of receiving employee)*		

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
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2.	Jennifer Roy, Zoning Official Town of Stafford - Warren Memorial Town Hall 1 Main Street Stafford Springs, CT 06076				
3.	Karen, Phillip and Michael Vivenzio 72 Tanglewood Drive East Longmeadow, MA 01025				
4.	Everest Infrastructures Partners Attn: Michael Ashley Culbert 2 Allgheny Center, Suite 703 - Nova Tower 2 Allegheny, PA 15212				
5.					
6.					

JUL 27 2023

PS Form **3665**, January 2017 (Page 1 of 1) PSN 7530-17-000-5549

See Reverse for Instructions