Robinson+Cole

KENNETH C. BALDWIN

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

Also admitted in Massachusetts
and New York

November 6, 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 1249 Hartford Pike, Killingly, 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 2.46-acre parcel at 1249 Hartford Pike in Killingly (the "Property"). The Property and tower are owned by Quinebaug Valley Emergency Communications Inc. ("QVEC"). Cellco identifies this site as its "Killingly East Facility". The existing 150-foot lattice tower was approved by the Town of Killingly. A copy of the Town approval is included in Attachment 1.

Cellco requests that the Council find that the proposed shared use of the existing tower satisfies the criteria of C.G.S § 16-50aa and issue an order approving this request. A copy of this filing is being sent to Killingly' s Town Manager, Mary Calorio, Ann-Marie Aubrey, Director of Planning and Development and QVEC.

Background

Cellco is licensed by the Federal Communications Commission ("FCC") to provide wireless services throughout the State of Connecticut. Cellco and QVEC have agreed to the proposed shared use of the existing telecommunications facility at the Property pursuant to mutually acceptable terms and conditions and QVEC has authorized Cellco to apply for all necessary permits and approvals that may be required to share the existing tower. (*See* Attachment 2).

27701816-v1

Cellco proposes to install nine (9) antennas and six (6) remote radio heads ("RRHs") on three sector antenna frame mounting system at a centerline height of 120 feet above ground level ("AGL"). Cellco's radio equipment will be installed on the ground near the base of the tower within a 15' x 47' fenced compound expansion. Cellco will also install a 50-kW propane-fueled generator and 500-gallon propane tank on a concrete pad near Cellco's equipment cabinets. Included in Attachment 3 is a set of project plans showing the location of Cellco's proposed site improvements. Attachment 4 contains specifications for Cellco's proposed antennas, RRHs and backup generator.

C.G.S. § 16-50aa(c)(1) provides that, upon written request for approval of a proposed shared use, "if the council finds that the proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns, the council shall issue an order approving such shared use." 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 mounts and related equipment. The proposed shared use of this tower is, therefore, technically feasible. A Structural Analysis ("SA") (Rev. 3) dated August 17, 2023, prepared by Centek Engineering confirms that the tower can support Cellco's proposed antennas and related equipment. Likewise, an Antenna Mount Analysis ("MA"), (Rev. 2) dated August 18, 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 5.

B. Legal Feasibility. Under C.G.S. § 16-50aa, the Council has been authorized to issue orders approving the shared use of an existing tower, such as the existing Hartford Pike 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 six (6) RRHs on an antenna mounting structure at a height of 120 feet AGL on the existing 150-foot lattice 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 on the ground near the base of the tower within an extended fenced compound. The small expansion of the existing compound will not require any regrading or the Property of tree removal. Cellco's shared use of the existing facility 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 6 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 QVEC 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 Hartford Pike 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 Killingly.

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A Certificate of Mailing verifying that a copy of this filing was sent to the municipal officials, and QVEC, the tower and Property owner is included in Attachment 7.

Conclusion

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

Thank you for your consideration of this matter.

Very truly yours,

Kenneth C. Baldwin

Enclosures
Copy to:
Mary Calorio, Town Manager
Ann-Marie Aubrey, Director of Planning and Development
Quinebaug Valley Emergency Communication, Inc.
Tim Parks, Verizon Wireless

ATTACHMENT 1

TOWN OF KILLINGLY

PLANNING & DEVELOPMENT OFFICE
172 Main Street, P.O. Box 6000, Danielson, CT 06239
Tel: 860-779-5311 Fax: 860-779-5381

November 18, 2009 CERTIFIED MAIL

Quinebaug Valley Emergency Communications, Inc
Attn: Jeff Otto
55 Westcott Road
Danielson, CT 06239

Dear Mr. Otto:

At its November 16, 2009 regular meeting, the Killingly Planning & Zoning Commission approved your Special Permit Application #09-965 of Quinebaug Valley Emergency Communications, Inc. for Section 410.2.2g - Public Service Corporation; 1249 Hartford Pike (Our Lady of Peace Church Corp. lot 46 & St. James Roman Catholic Church lot 47 owners); 1.98+/- acres proposed; Low Density Zone.

Other than finalizing items as discussed and agreed to during the public hearing (lighting, landscaping), there were no conditions of approval.

The decision legal notice was published in the Norwich Bulletin on November 19, 2009. The 15-day appeal period commenced on that date. The approval does not become official until a recording sheet is filed with the Town Clerk. The recording sheet can be filed at the completion of the 15-day appeal period which expires at 4:30 PM on December 4, 2009. If you wish, upon receipt of a $53.00 check this office will file the recording sheet for you. Please provide our office with mylars for signing so that you may file them within 90 days of the end of the appeal period. If you wish, upon receipt of a check for $10.00 per mylar sheet, this office will file the plans for you. Once required filings are completed, please contact Zoning Enforcement Officer Roger Gandolf for a zoning permit.

If you have any questions regarding this matter, please contact me at 860-779-5311, 8:30 AM to 4:30 PM, Monday through Friday, excluding holidays. Voice mail is available after normal business hours.

Respectfully,

Linda E. Walden

Linda E. Walden
Director of Planning & Development

ATTACHMENT 2

QV 911

Quinebaug Valley
Emergency
Communications, Inc.

1249 Hartford Pike
East Killingly, CT 06243
860.774.7555

June 14, 2023

Andrew Candiello
Principal Engineer-RE/Regulatory
Cellco Partnership d/b/a Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492

Re: Letter of Authorization - Cellco Partnership d/b/a Verizon Wireless
Quinebaug Valley Emergency Communication, Inc with site address of 1249 Hartford Pike, Killingly, CT 06243

Dear Mr. Candiello:

I, Charles Kelleher, hereby authorize Cellco Partnership d/b/a Verizon Wireless and/or its authorized agents, to file for all necessary permit and approval applications for the installation of antennas and related equipment at an existing telecommunications facility in Killingly, CT.

Sincerely,

Charles R Kelleher

Charles Kelleher
Director

ATTACHMENT 3

verizon

SITE NAME: KILLINGLY EAST CT

SITE ID: 617359992

1249 HARTFORD PIKE

KILLINGY, CT 06243

PROJECT SUMMARY

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

1. INSTALL (6) PROPOSED COMMSCOPE JAHH–65B–R3B ANTENNAS
2. INSTALL (3) PROPOSED SAMSUNG MT6413–77A ANTENNAS WITH INTEGRATED RADIO
3. INSTALL (3) PROPOSED COMMSCOPE CBC78T–DS–43–2X DIPLEXER
4. INSTALL (3) PROPOSED SAMSUNG RF4439d–25A RADIOS
5. INSTALL (3) PROPOSED SAMSUNG RF4461d–13A RADIOS
6. INSTALL (3) SECTOR FRAME ANTENNA MOUNTS, TYP. (1) PER SECTOR
7. INSTALL (1) PROPOSED OVP 12
8. INSTALL (2) PROPOSED 6x12 HYBRID CABLES
9. INSTALL CABLE ICE–BRIDGE
10. INSTALL NEW EQUIPMENT PAD, STEEL EQUIPMENT CANOPY AND ASSOCIATED CABINETS
11. INSTALL NEW 50KW PROPANE FUELED BACK–UP GENERATOR ON EQUIPMENT PAD.
12. INSTALL A 500 GALLON ABOVE–GROUND PROPANE TANK ON A CONCRETE PAD.
13. INSTALL NEW SMART METER (PDSG)
14. INSTALL ILC CABINET
15. INSTALL TELCO CABINET
16. INSTALL UNISTRUT FRAME TO ACCOMMODATE EQUIPMENT INSTALLATION
17. PORTION OF EXISTING FENCE TO BE REMOVED AND NEW FENCE TO BE INSTALLED AS SHOWN HEREIN. CONTRACTOR TO VERIFY FINAL LENGTH AND RUN IN FIELD PRIOR TO CONSTRUCTION.

GENERAL NOTES

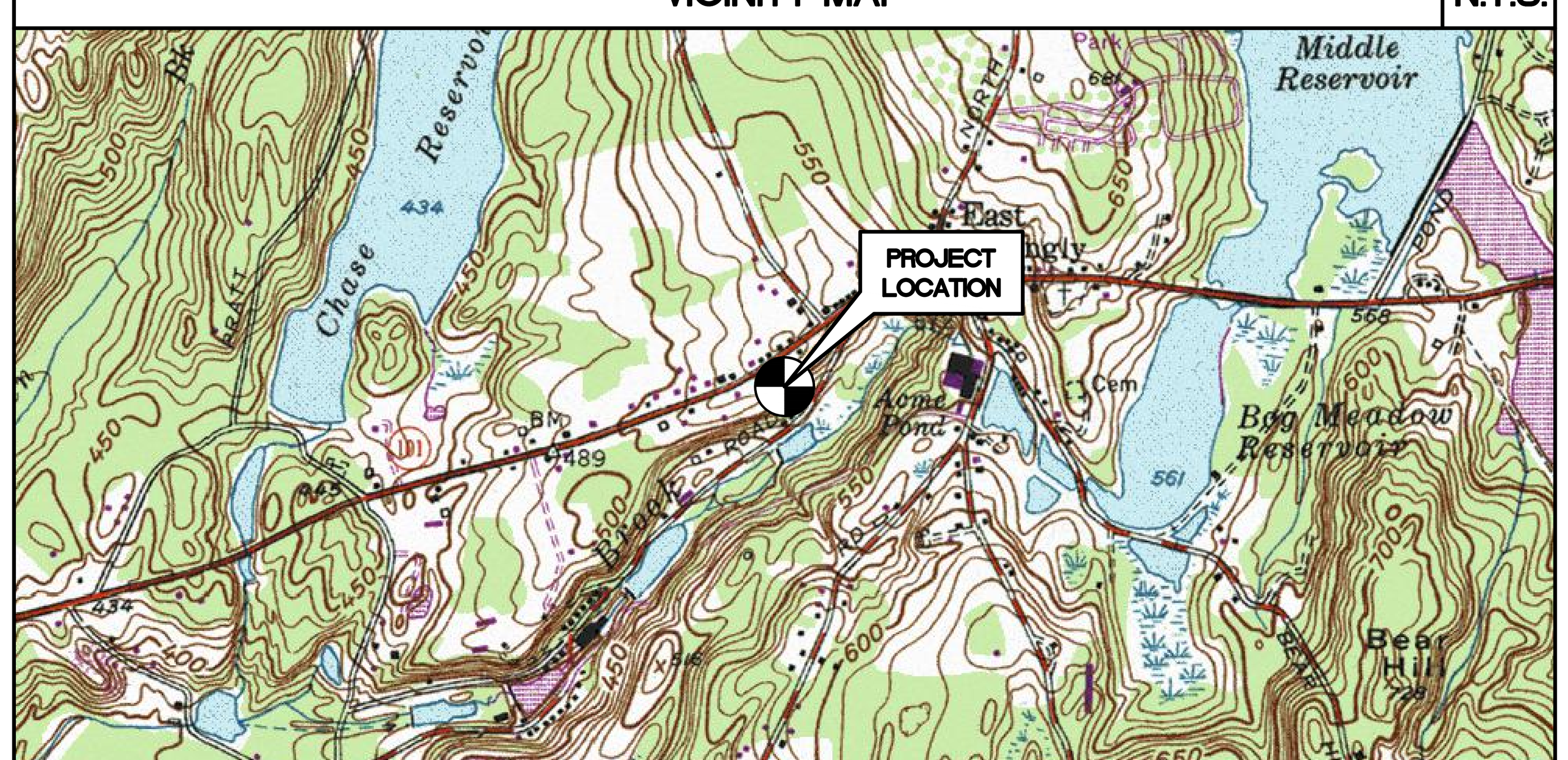
1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2021 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2022 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA–222 REVISION "H" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2022 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND 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.
9. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL, AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
10. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS–BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
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 FAA 2C SURVEY PREPARED BY "CME ASSOCIATES INC.", DATED 04/08/11.

SITE COORDINATES: LATITUDE: 41° 50' 43.428" N
LONGITUDE: 71° 49' 41.382" W
GROUND ELEVATION: ±502' AMSL

NORTH

PROJECT INFORMATION

SITE NAME:	KILLINGLY EAST CT
SITE ID:	617359992
SITE ADDRESS:	1249 HARTFORD PIKE KILLINGLY, CT 06243
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' 43.428" N LONGITUDE: 71° 49' 41.382" W GROUND ELEVATION: ±502' AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM FAA 2C SURVEY PREPARED BY "CME ASSOCIATES INC.", DATED 04/08/11.

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4	10/09/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
3	08/23/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER UPDATED RFDS
2	08/02/23	DMD	TJR	CONSTRUCTION DRAWINGS – REVISED FOR LEGAL COMMENTS
1	06/28/23	DMD	TJR	CONSTRUCTION DRAWINGS – REVISED FOR CONSTRUCTION (PROPANE ADD)
0	06/22/23	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
B	04/05/23	RTS	TJR	CONSTRUCTION DRAWINGS – REVISED STRUCTURAL NOTE REFERENCE
A	02/17/23	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT · CARLO F. CENTORE · No. 16694 · LICENSED · PROFESSIONAL ENGINEER

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: KILLINGLY EAST CT
SITE ID: 617359992
1249 HARTFORD PIKE
KILLINGLY CT, 06243

DATE: 02/17/23
SCALE: AS NOTED
JOB NO. 22017.12

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).

SPECIAL INSPECTIONS

1. SPECIAL INSPECTIONS ARE TO BE PROVIDED BY AN APPROVED AGENCY HIRED BY VERIZON WIRELESS. REFER TO THE STATEMENT OF SPECIAL INSPECTIONS PREPARED BY CENTEK ENGINEERING, INC. DATED 06/28/2023.

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

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.
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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.

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)	(E/P) DIPLEXER (QTY)	(E/P) CABLES (QTY)
A1	PROPOSED	COMMSCOPE: JAHH–65B–R3B (1)	77 x 17.7 x 13.9	120'	0°	(P) SAMSUNG RF4461d–13A RRH (1), (P) SAMSUNG RF4439d–25A RRH (1)	(P) CBC78T–DS–43–2X (1)	(P) 6x12 HYBRID CABLES (2)
A2	PROPOSED	COMMSCOPE: JAHH–65B–R3B (1)	77 x 17.7 x 13.9	120'	0°	–		
A3	PROPOSED	SAMSUNG: MT6413–77A (1)	28.9 x 15.7 x 5.5	120'	0°	(P) SAMSUNG CBRS MT6413–77A (1)		
A4	PROPOSED	–	–	120'	–	(P) OVP 12 (1)		
B1	PROPOSED	COMMSCOPE: JAHH–65B–R3B (1)	77 x 17.7 x 13.9	120'	180°	(P) SAMSUNG RF4461d–13A RRH (1), (P) SAMSUNG RF4439d–25A RRH (1)	(P) CBC78T–DS–43–2X (1)	
B2	PROPOSED	COMMSCOPE: JAHH–65B–R3B (1)	77 x 17.7 x 13.9	120'	180°	–		
B3	PROPOSED	SAMSUNG: MT6413–77A (1)	28.9 x 15.7 x 5.5	120'	180°	(P) SAMSUNG CBRS MT6413–77A (1)		
B4	–	–	–	120'	–	–		
C1	PROPOSED	COMMSCOPE: JAHH–65B–R3B (1)	77 x 17.7 x 13.9	120'	270°	(P) SAMSUNG RF4461d–13A RRH (1), (P) SAMSUNG RF4439d–25A RRH (1)	(P) CBC78T–DS–43–2X (1)	
C2	PROPOSED	COMMSCOPE: JAHH–65B–R3B (1)	77 x 17.7 x 13.9	120'	270°	–		
C3	PROPOSED	SAMSUNG: MT6413–77A (1)	28.9 x 15.7 x 5.5	120'	270°	(P) SAMSUNG CBRS MT6413–77A (1)		
C4	–	–	–	120'	–	–		

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
4	10/09/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
3	08/23/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER UPDATED RFDS
2	08/02/23	DMD	TJR	CONSTRUCTION DRAWINGS – REVISED FOR LEGAL COMMENTS
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0	06/22/23	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
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A	02/17/23	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

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(203) 488-8587 Fax
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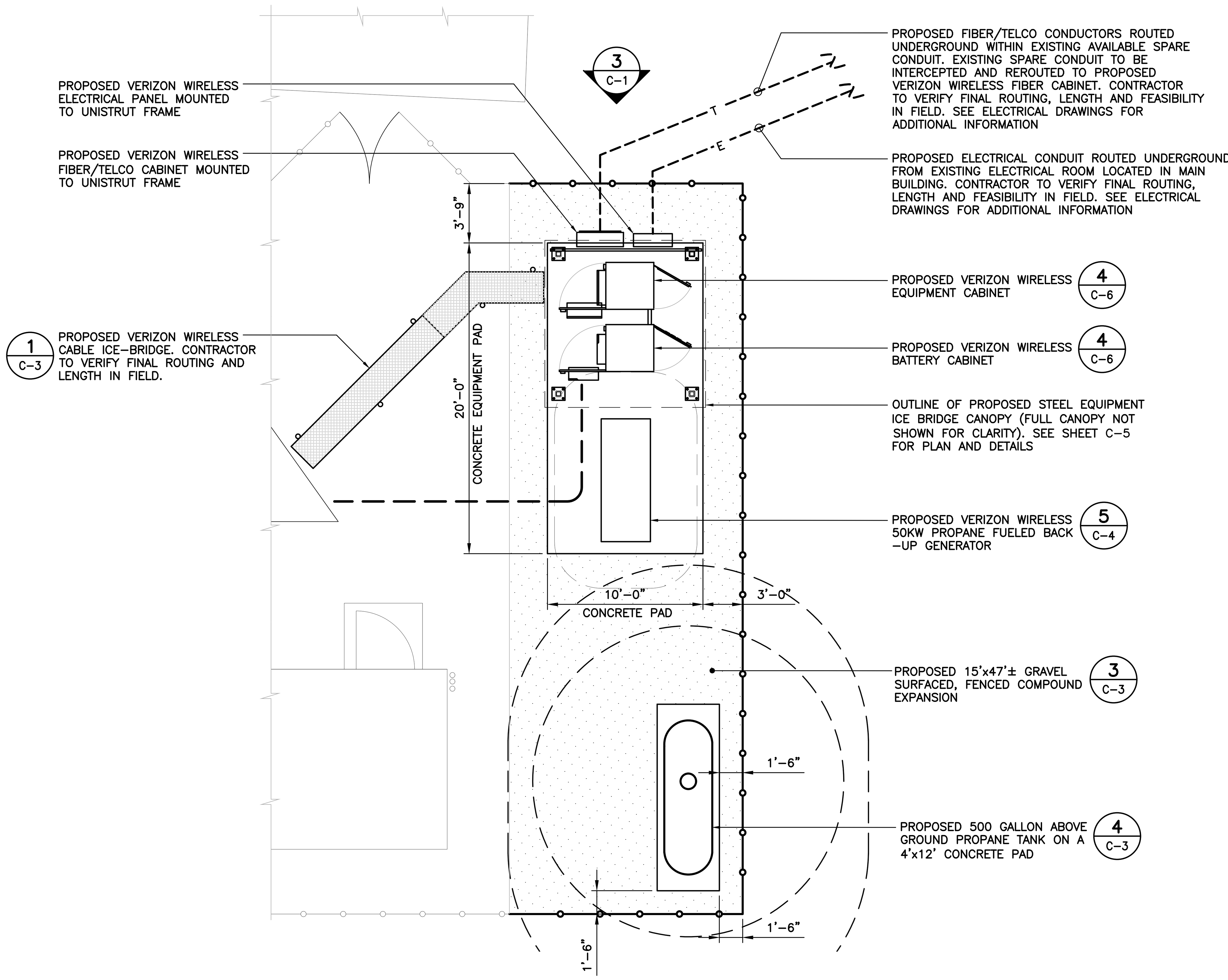
1249 HARTFORD PIKE
KILLINGLY CT, 06243

DATE: 02/17/23
SCALE: AS NOTED
JOB NO. 22017.12

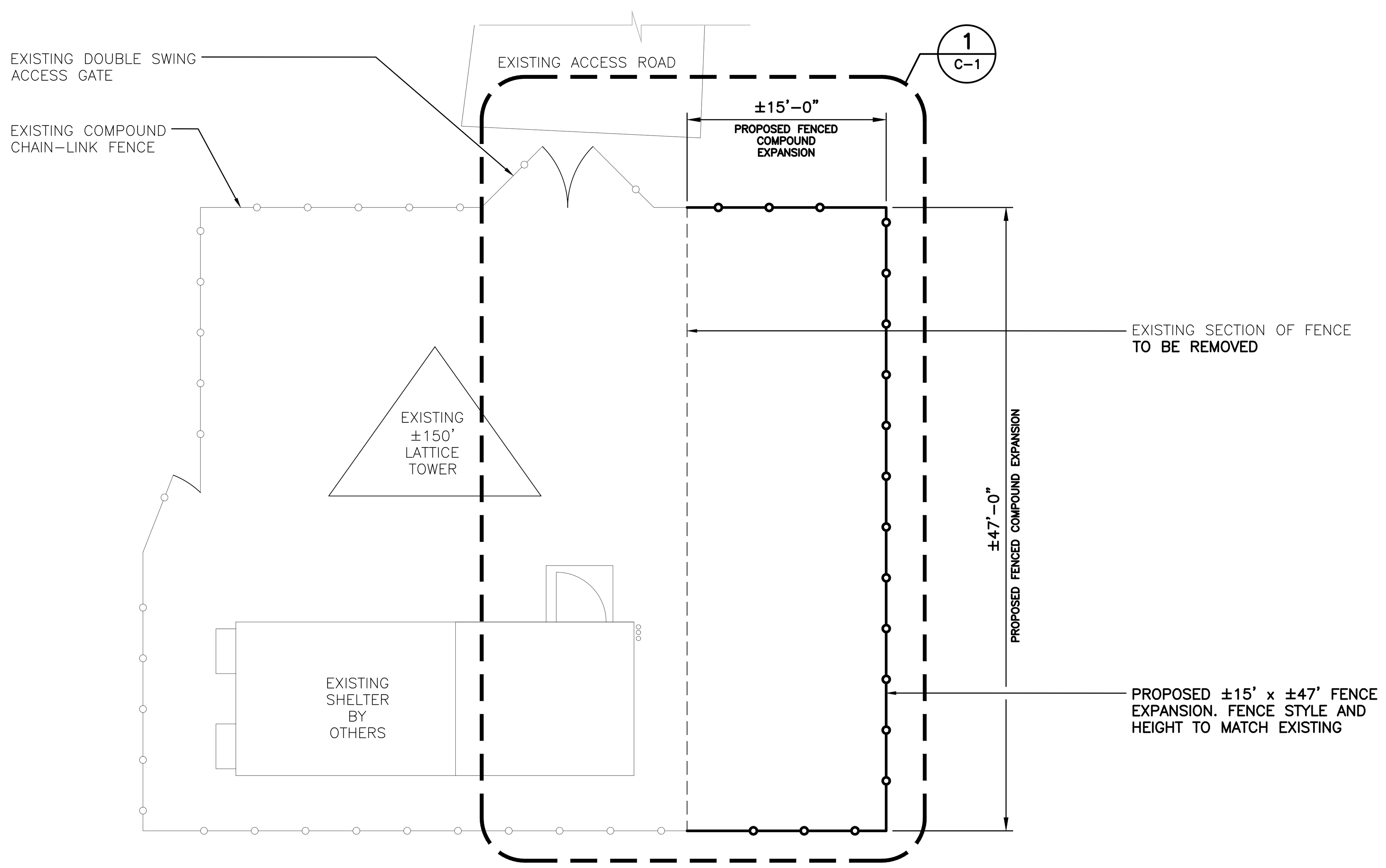
SPECIFICATIONS, NOTES AND ANT. SCHEDULE

N–1



1 C-1 EQUIPMENT PLAN - PROPOSED CONDITIONS

SCALE: 3/16" = 1'-0"



2 C-1 COMPOUND PLAN - PROPOSED CONDITIONS

SCALE: 1/8" = 1'-0"

STRUCTURAL COMPLIANCE

ANTENNA MOUNTS

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

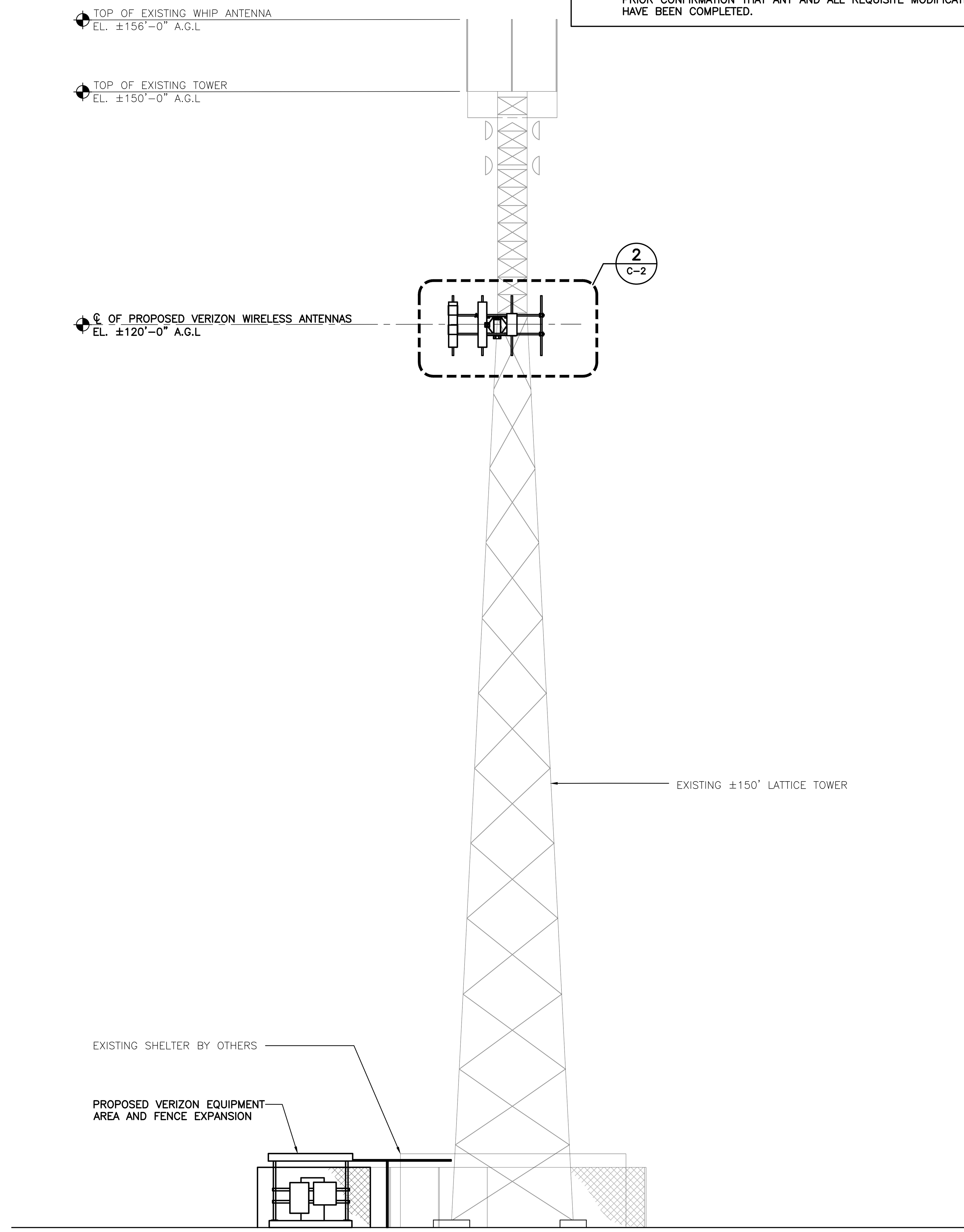
REFER TO THE ANTENNA MOUNT ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 22017.12) DATED 08/18/23 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

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 CENTEK ENGINEERING (PROJECT # 22017.12) DATED 08/17/23 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.



3 C-1 TOWER ELEVATION - PROPOSED CONDITIONS

SCALE: 1" = 10'

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
4	10/09/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
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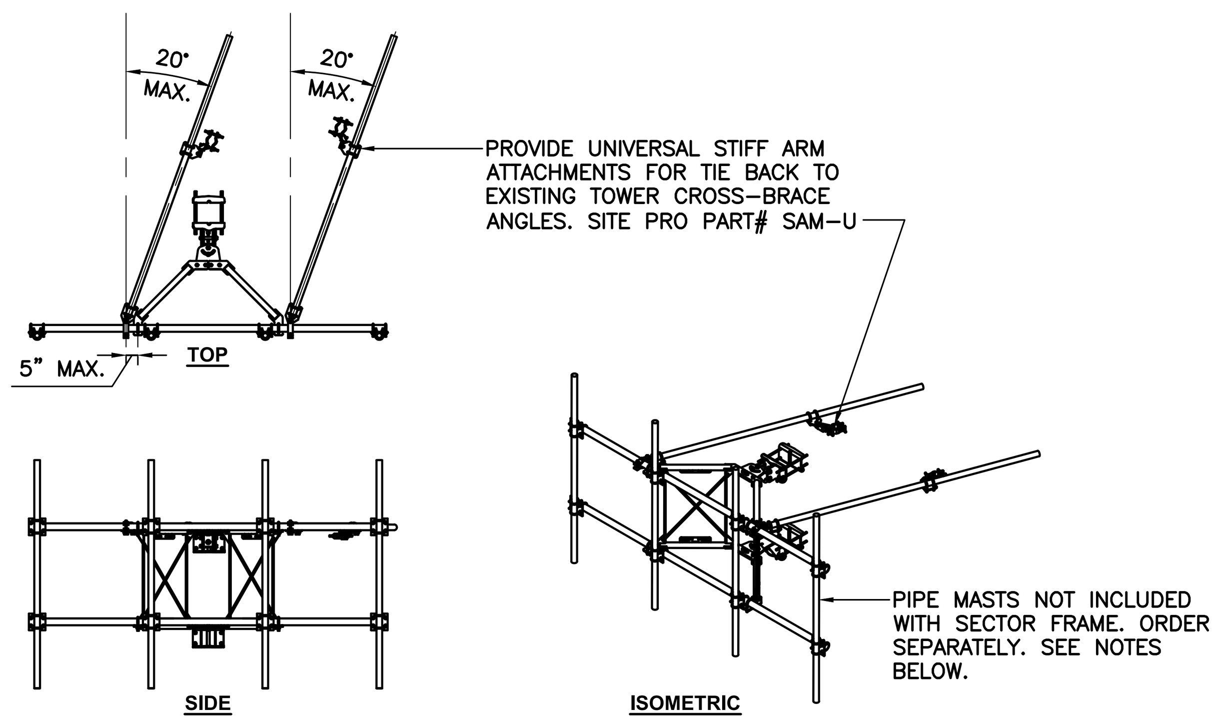
SCALE: AS NOTED
JOB NO. 22017.12

COMPOUND, EQUIPMENT PLAN & ELEVATION

C-1

Sheet No. 3 of 14



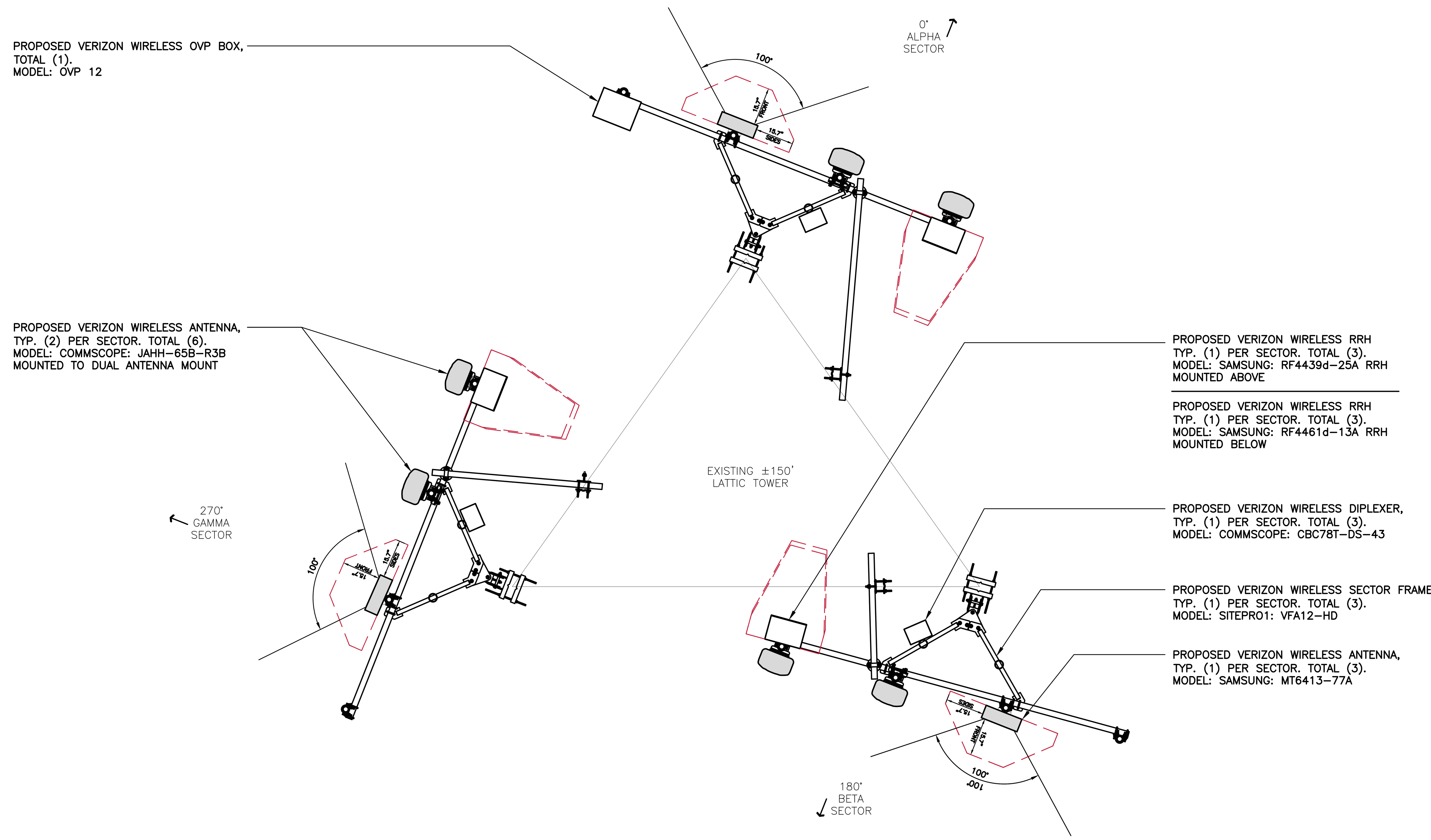
12 FT ANTENNA SECTOR MOUNTING FRAME			
EQUIPMENT	DESCRIPTION	QTY	WEIGHT
MAKE: SITE PRO MODEL: VFA12–HD	12 FT, HEAVY DUTY V–FRAME	3	735 LBS

NOTES:

1. GUYED AND SST MOUNTING RANGE: 1 1/2" TO 9 1/2" ROUND LEGS AND 3" TO 6" ANGLES.
2. PIPE MASTS ARE NOT INCLUDED IN SECTOR FRAME KIT. ORDER SEPARATELY (SITE PRO PART# P30120). WEIGHT LISTED ABOVE DOES NOT INCLUDE PIPE MASTS

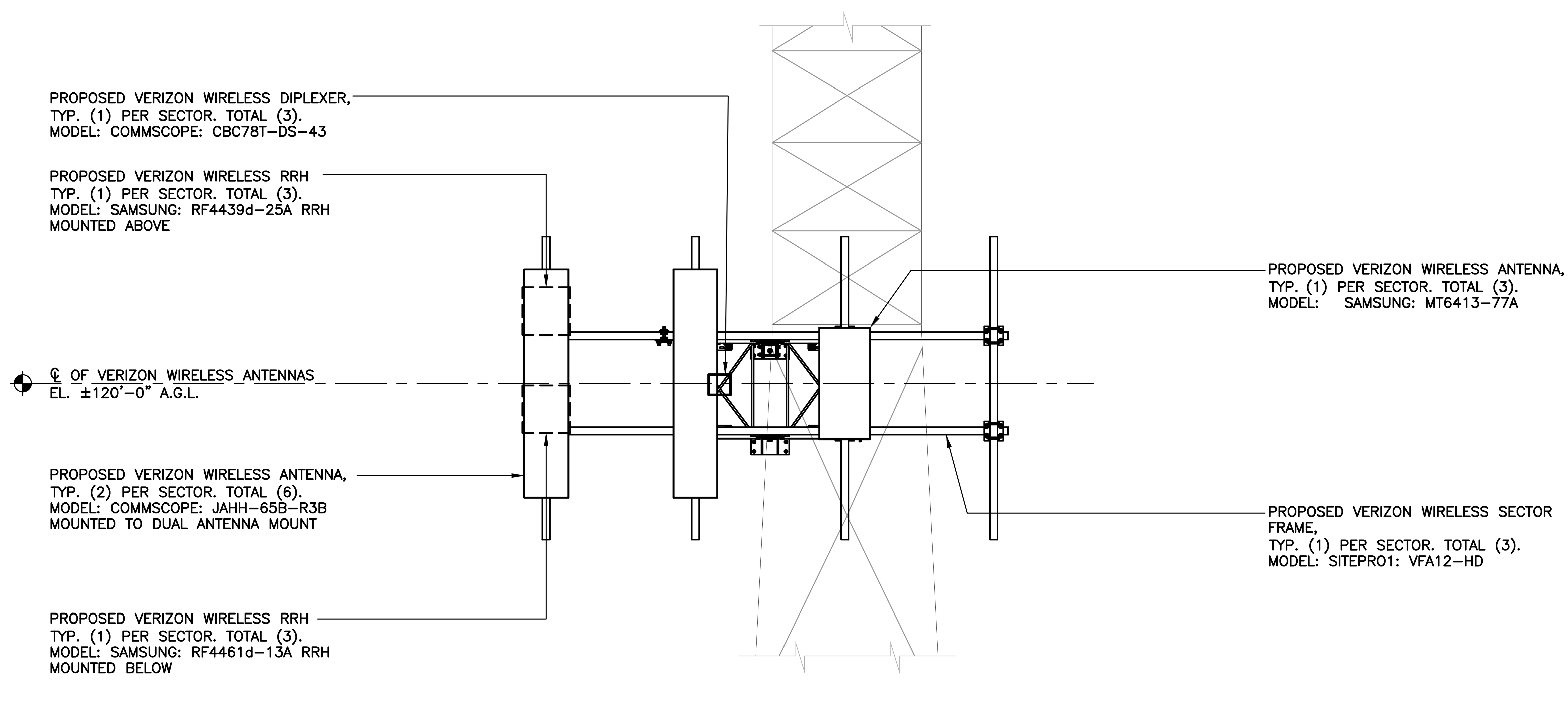
3 / C–2 **SECTOR FRAME MOUNT DETAIL**

SCALE: 3/16" = 1'–0"



1 / C–2 **ANTENNA MOUNTING CONFIGURATION PLAN – PROPOSED**

SCALE: 3/8" = 1'–0"



2 / C–2 **ANTENNA ELEVATION – PROPOSED**

SCALE: 3/8" = 1'–0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
4	10/09/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
3	08/23/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER UPDATED RFDS
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SCALE: AS NOTED
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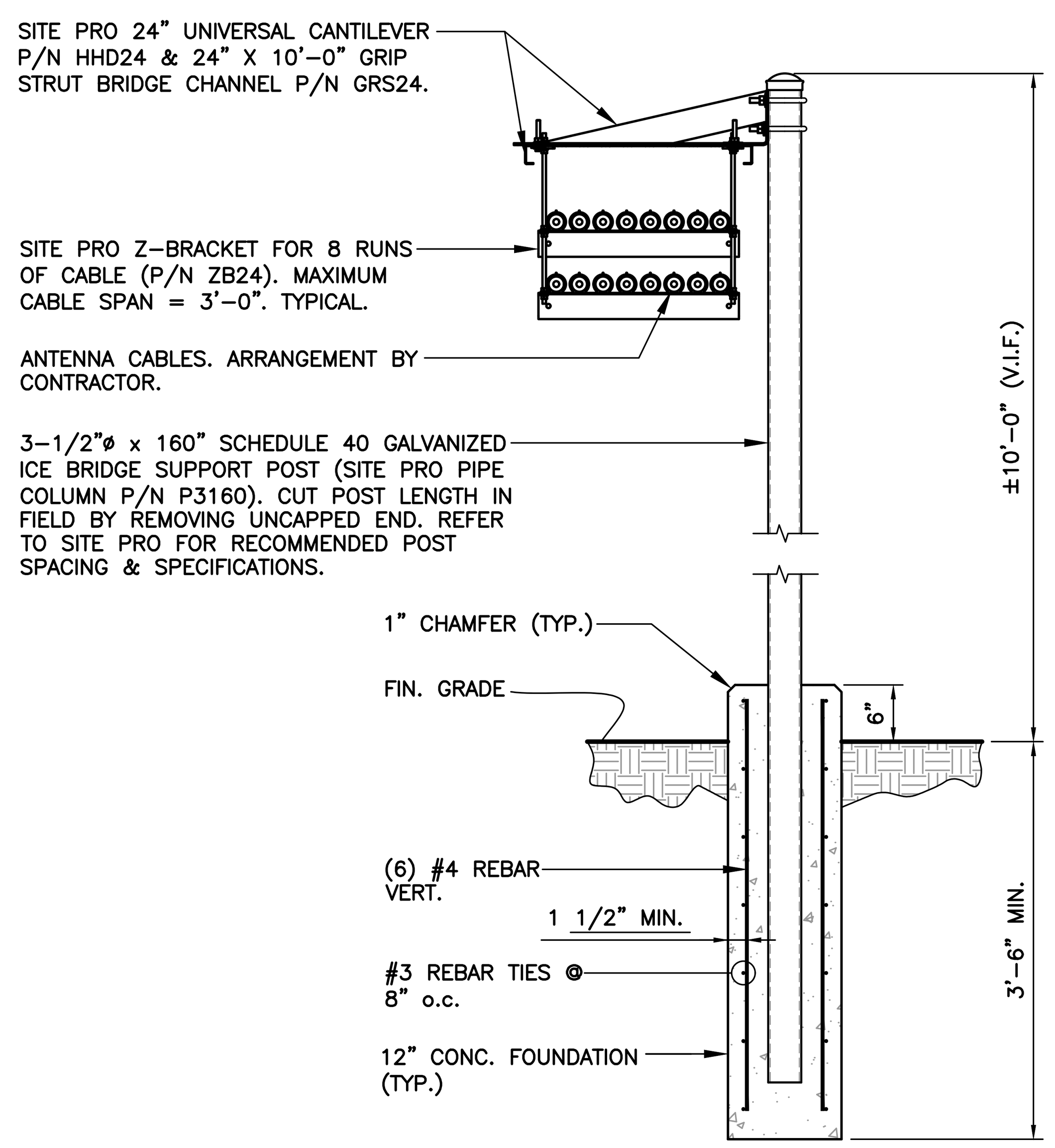
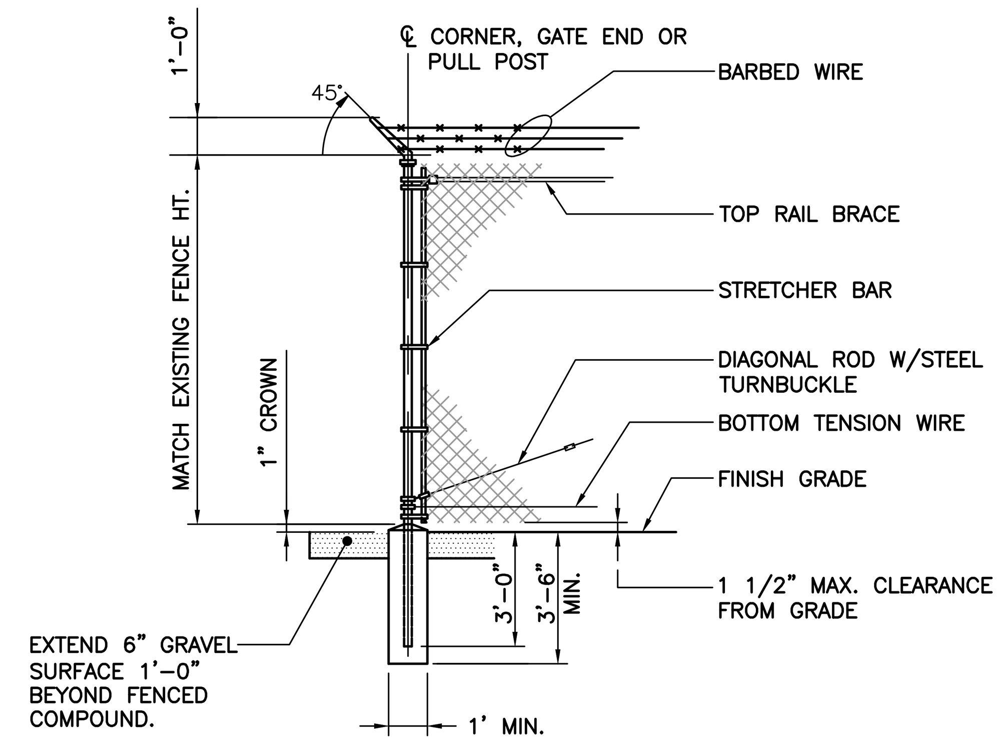
ANTENNA CONFIGURATION PLAN, ELEVATION AND DETAIL

C–2

Sheet No. 4 of 14



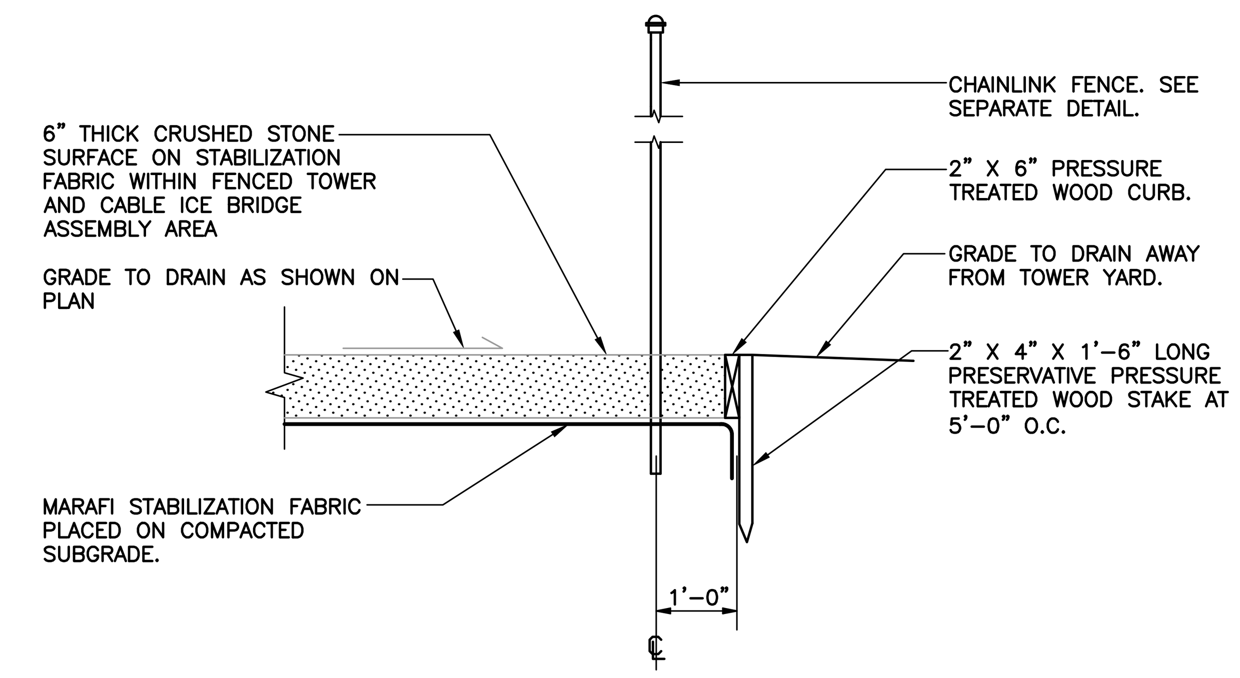
1 ANTENNA CABLE ICE BRIDGE DETAIL
C-3
SCALE: NOT TO SCALE



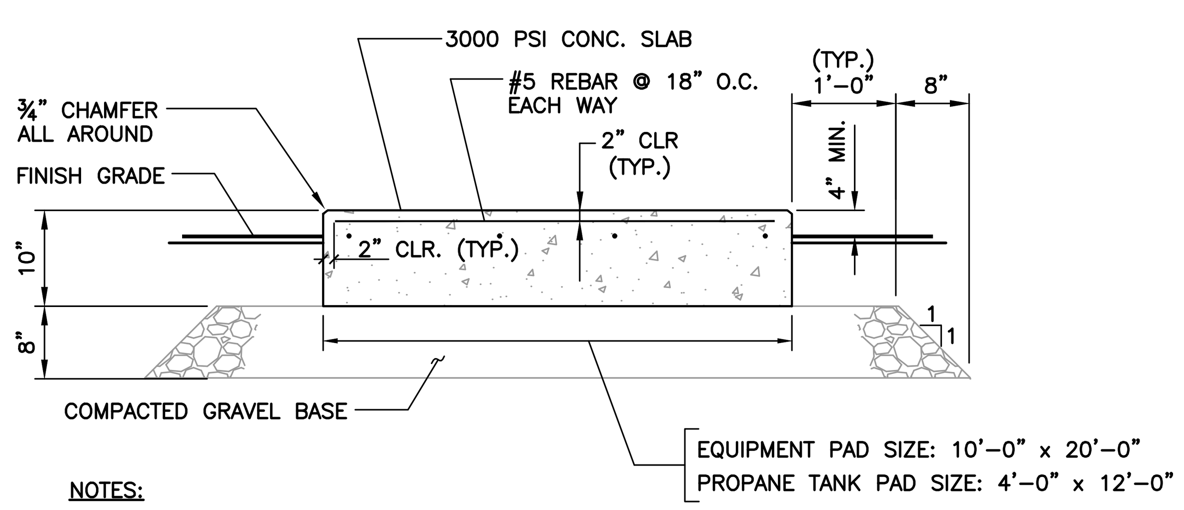
WOVEN WIRE FENCE NOTES:

1. GATE POST, CORNER, TERMINAL OR PULL POST 2 ½"ø SCHEDULE 40 PIPE FOR GATE WIDTHS UP THRU 6 FEET OR 12 FEET FOR DOUBLE SWING GATE PER ASTM-F1083.
2. LINE POST: 2"ø SCHEDULE 40 PIPE PER ASTM-F1083.
3. GATE FRAME: 1 ½"ø SCHEDULE 40 PIPE PER ASTM-F1083.
4. TOP RAIL & BRACE RAIL: 1 ½"ø SCHEDULE 40 PIPE PER ASTM-F1083.
5. FABRIC: 12 GA. CORE WIRE SIZE 1 ¾" MESH, CONFORMING TO ASTM-A392.
6. TIE WIRE: MINIMUM 11 GA. GALVANIZED STEEL AT POSTS AND RAILS. A SINGLE WRAP OF FABRIC TIE AND TENSION WIRE BY HOG RINGS SPACED 24" INTERVALS.
7. TENSION WIRE: 7 GA. GALVANIZED STEEL.
8. GATE LATCH: DROP DOWN LOCKABLE FORK LATCH AND LOCK, KEYED TO OWNER'S REQUIREMENTS.
9. HEIGHT = MATCH EXISTING.

2 WOVEN WIRE FENCE DETAIL
C-3
SCALE: NOT TO SCALE



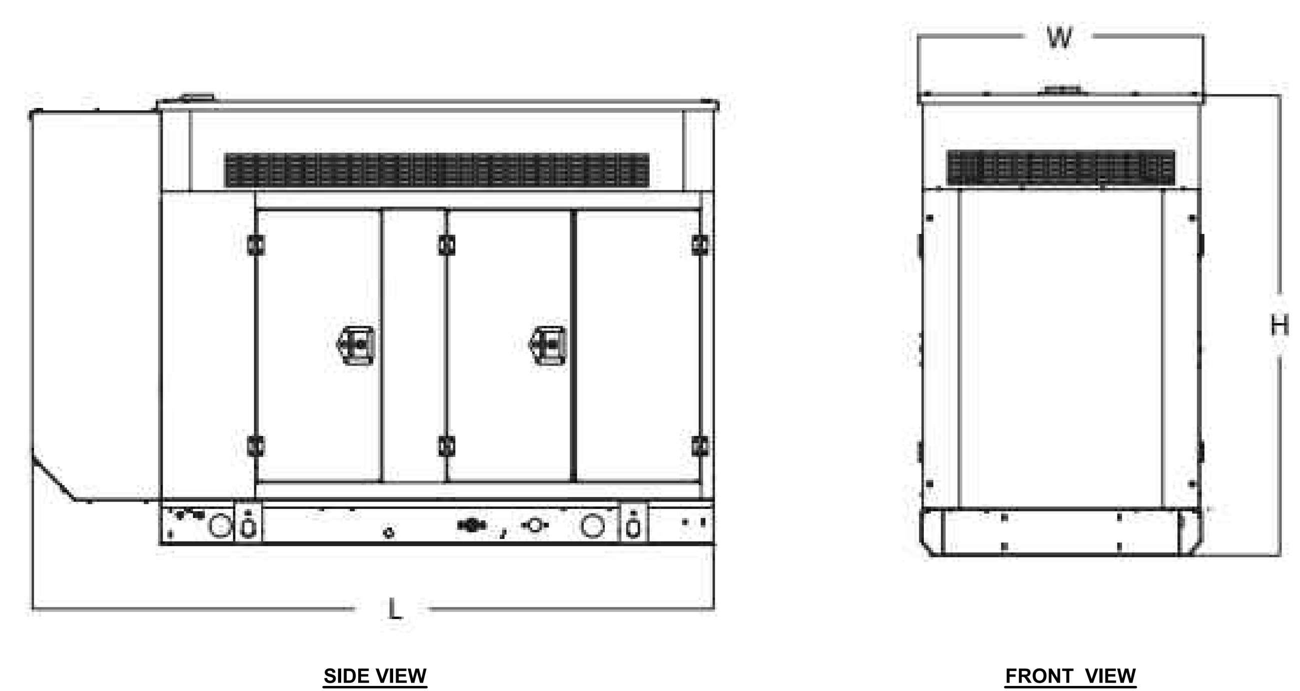
3 COMPOUND SURFACING DETAIL
C-3
SCALE: NOT TO SCALE



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.

4 CONCRETE PAD DETAIL (TYP)
C-3
SCALE: NOT TO SCALE



BACKUP POWER GENERATOR

EQUIPMENT	POWER GENERATED	FUEL	ENCLOSURE	DIMENSIONS
MAKE: GENERAC MODEL: SG050	50 KW, AC	NAT. GAS/ PROPANE	LEVEL 2 SOUND ATTENUATED	94.8"L x 37.4"W x 69.1"H

NOTES:

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

5 BACKUP POWER GENERATOR DETAIL
C-3
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
4	10/09/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
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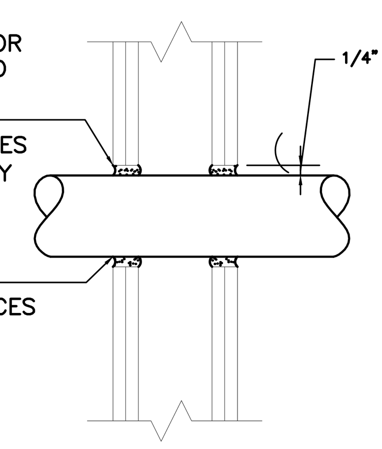
SITE AND MISCELLANEOUS DETAILS

C-3

Sheet No. 5 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

ONE 2"ø METALLIC PIPE OR CONDUIT TO BE CENTERED WITHIN FIRESTOP SYSTEM. PIPE SHALL BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL/FLOOR ASSEMBLY



FILL VOID WITH CAULK, FLUSH WITH BOTH SURFACES OF WALL (SEE TABLE) SEALANT: TREMCO INC, TREMSTOP-WBM

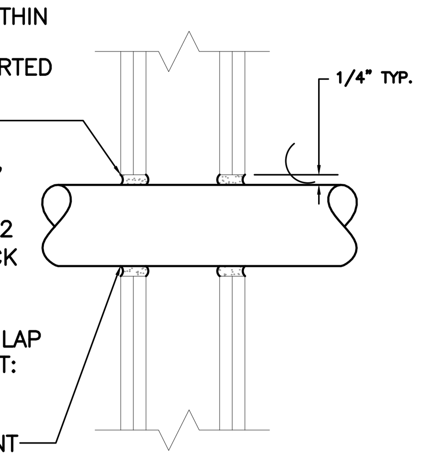
UL SYSTEM NUMBER: WL1051
F RATING – 1 & 2 HR.

1 C-4 PIPE AND CONDUIT PENETRATION DETAIL IN GYPSUM WALLBOARD

SCALE: NOT TO SCALE

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

ONE 2"ø SCHEDULE 40 PVC PIPE TO BE CENTERED WITHIN FIRESTOP SYSTEM. PIPE SHALL BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL/FLOOR ASSEMBLY



SEALANT, MIN. OF 1 1/4" THICK, FLUSH WITH BOTH SURFACES OF WALL FOR 2 HR. ASSEMBLY, 5/8" THICK FOF 1 HR. ASSEMBLY. A 5/8" CROWN AROUND CONDUIT WITH A 1" MIN. LAP AROUND OPENING SEALANT: INTERNAT'L PROTECTIVE COATINGS CORP–FSP 110 PUTTY OR FS1900 SEALANT

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

2 C-4 PVC 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.

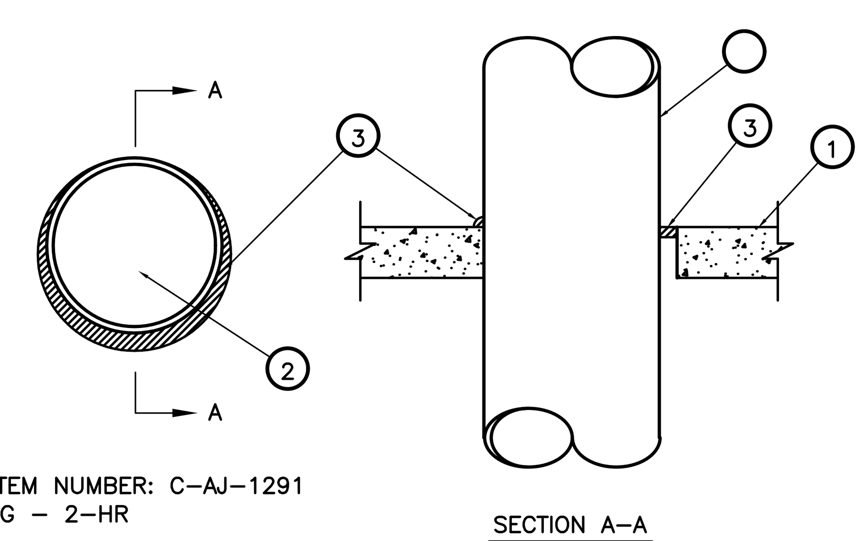
   C. COPPER PIPE NOM 6 IN. DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.

   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.



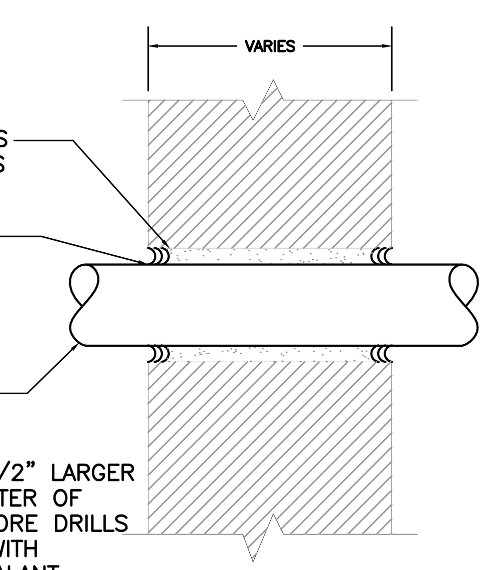
UL SYSTEM NUMBER: C-AJ-1291
F RATING – 2-HR

3 C-4 METAL PIPE THROUGH CONCRETE FLOOR/ WALL OR BLOCK WALL

SCALE: NOT TO SCALE

GROUT ALL VOIDS AROUND SLEEVES

SEALANT



CONDUIT

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

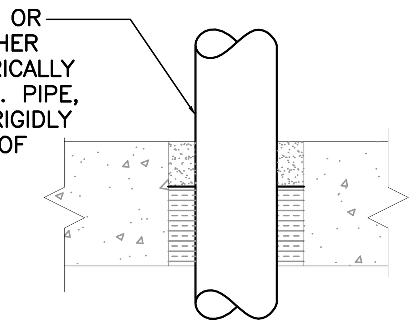
4 C-4 PIPE AND CONDUIT PENETRATION DETAIL IN NON-RATED PARTITION

SCALE: NOT TO SCALE

FLOOR OR WALL	MIN. 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-4 PIPE AND CONDUIT PENETRATION DETAIL IN CONCRETE OR MASONRY

SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
4	10/09/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
3	08/23/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER UPDATED RFDS
2	08/02/23	DMD	TJR	CONSTRUCTION DRAWINGS – REVISED FOR LEGAL COMMENTS
1	06/28/23	DMD	TJR	CONSTRUCTION DRAWINGS – REVISED FOR CONSTRUCTION (PROPANE ADD)
0	06/22/23	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
B	04/05/23	RTS	TJR	CONSTRUCTION DRAWINGS – REVISED STRUCTURAL NOTE REFERENCE
A	02/17/23	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

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KILLINGLY CT, 06243

DATE: 02/17/23
SCALE: AS NOTED
JOB NO. 22017.12

TYPICAL CONDUIT PENETRATION DETAILS

C-4

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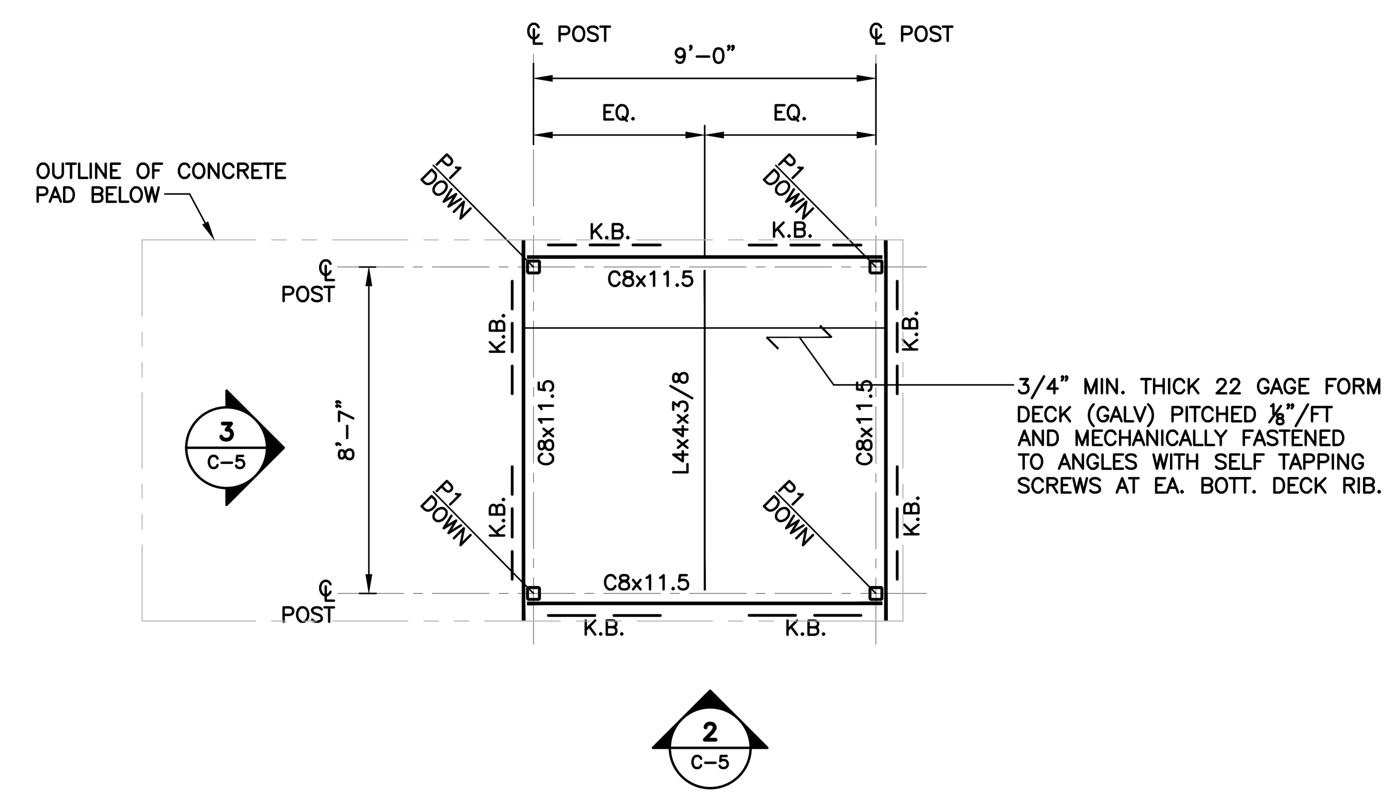
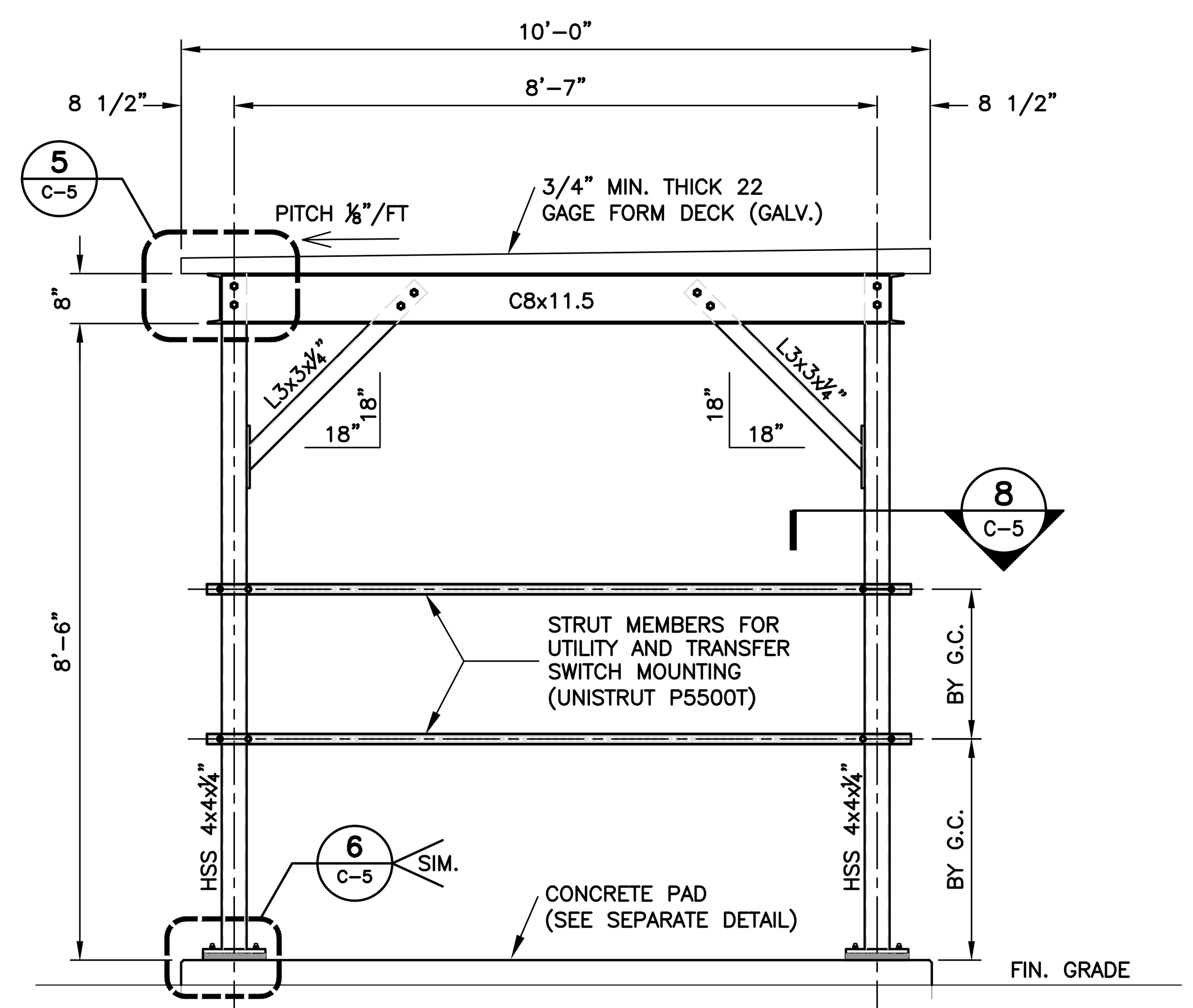
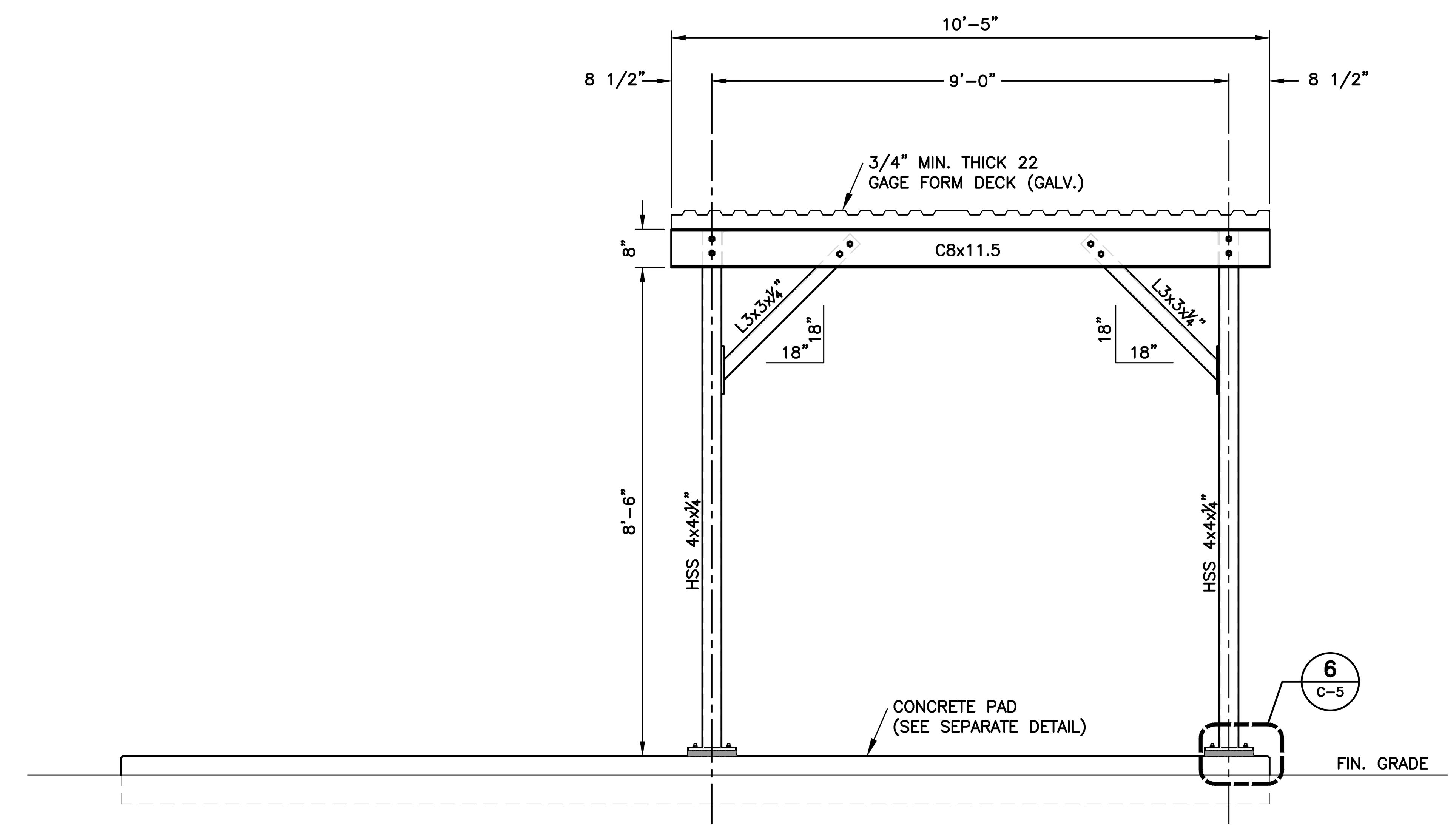
PLAN NOTES AND LEGEND	
1.	VERIFY ALL DIMENSIONS, ELEVATIONS, EXISTING FRAMING MEMBER SIZES AND GENERAL CONDITIONS PRIOR TO COMMENCEMENT OF WORK. NOTIFY ENGINEER OF RECORD OF ANY DISCREPANCIES BETWEEN THESE DRAWINGS AND EXISTING CONDITIONS.
P1	INDICATES HSS4x4x1/4 ASTM A500 GR. B (F_y = 46ksi) STEEL POST.
⟵	INDICATES SPAN DIRECTION.
K.B.	INDICATES L3x3x1/4 ASTM A36 (Fy=36 KSI) STEEL ANGLE



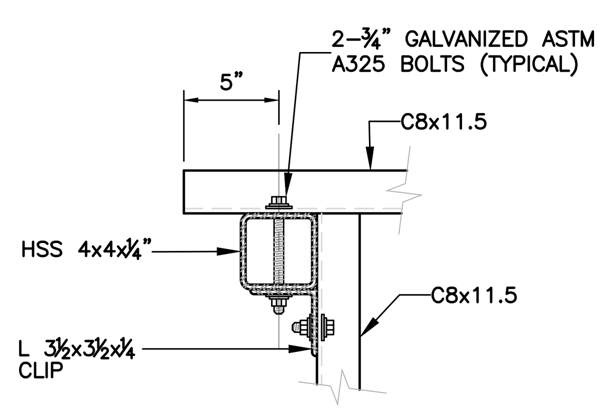
1 C-5 **ICE BRIDGE CANOPY - ROOF FRAMING PLAN**
SCALE: 1/4" = 1'-0"
APPROXIMATE NORTH



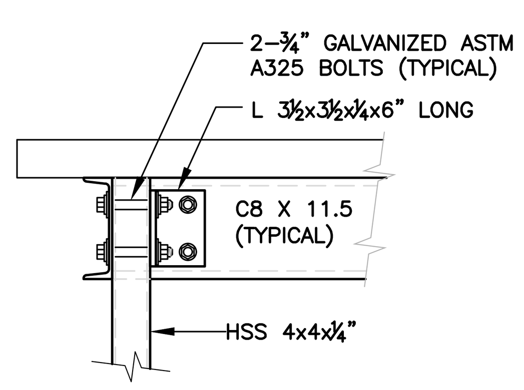
3 C-5 **ICE BRIDGE CANOPY ELEVATION**
1/2" = 1'-0"



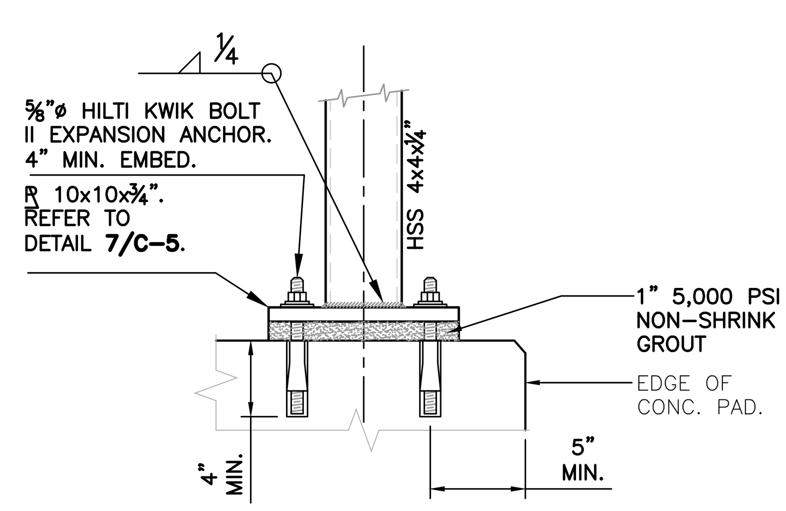
2 C-5 **ICE BRIDGE CANOPY ELEVATION**
SCALE: 1/2" = 1'-0"



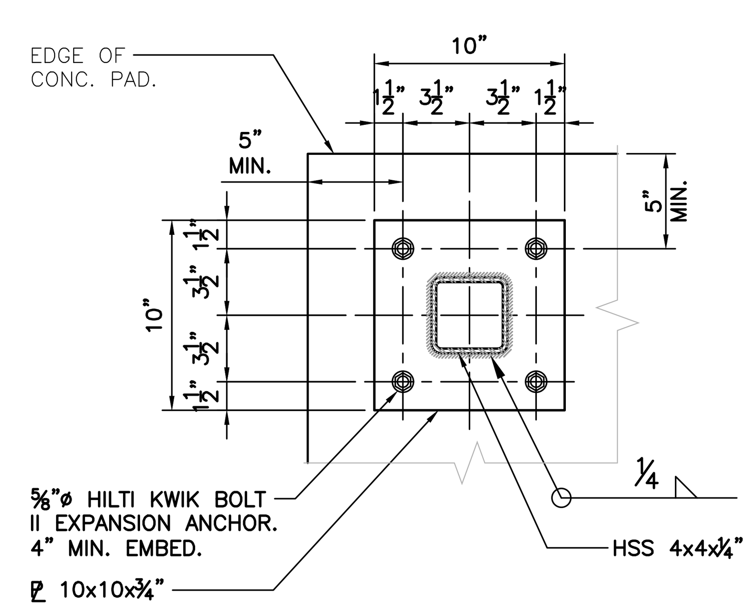
4 C-5 **CANOPY FRAME CONNECTION**
SCALE: 1-1/2" = 1'-0"



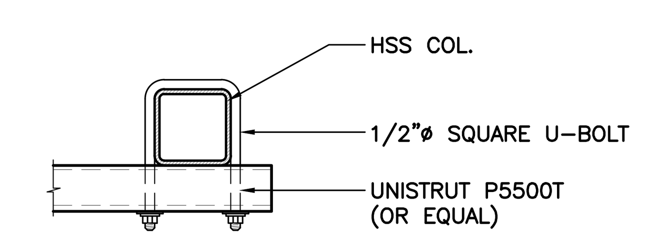
5 C-5 **CANOPY FRAME CONNECTION**
SCALE: 1" = 1'-0"



6 C-5 **CANOPY POST CONNECTION**
SCALE: 1-1/2" = 1'-0"



7 C-5 **CANOPY POST BASE PLATE**
SCALE: 1-1/2" = 1'-0"



8 C-5 **STRUT TO COL. CONN. DETAIL (TYP)**
SCALE: 1-1/2" = 1'-0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
4	10/09/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
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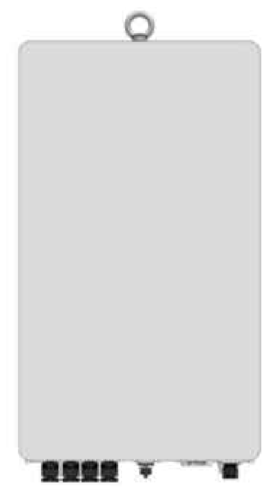
EQUIPMENT ICE BRIDGE CANOPY PLAN AND DETAILS

C-5

Sheet No. 7 of 14

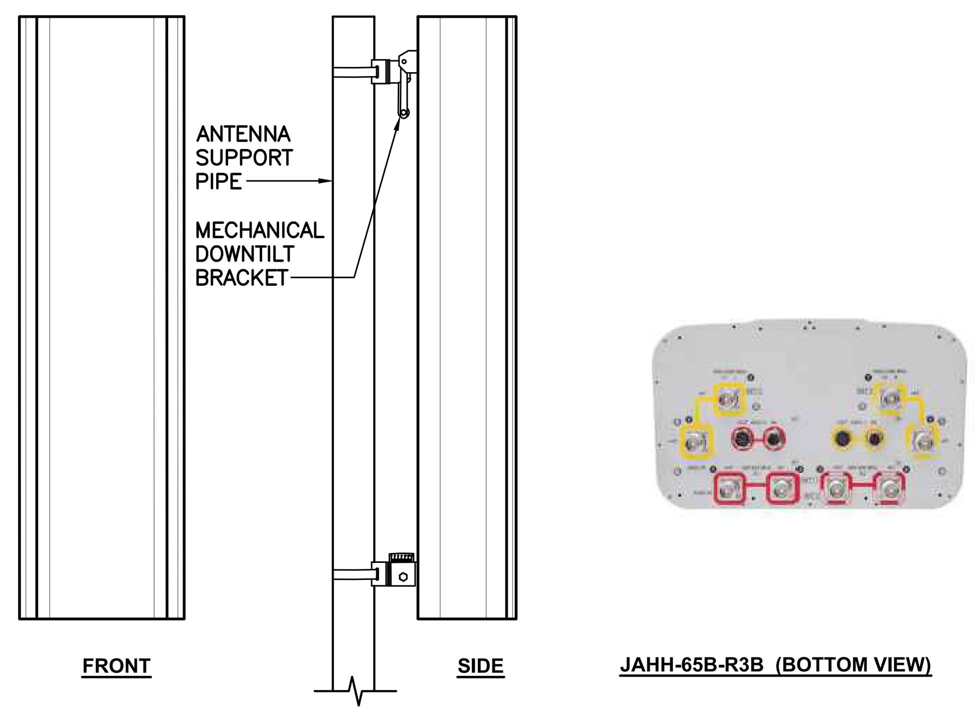


ANTENNA FRONT

SECTOR ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: MT6413–77A	28.9"H x 15.75"W x 5.51"D	57.3 LBS.

NOTES:
1. THIS ANTENNA HAS ITS OWN BUILT–IN RRH.

1 / C–6 **PROPOSED ANTENNA DETAIL**
SCALE: NOT TO SCALE



ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT (WITH MOUNTING KIT)
MAKE: COMMSCOPE MODEL: JAHH–65B–R3B	77.0"L x 17.7"W x 13.9"D	93 LBS.

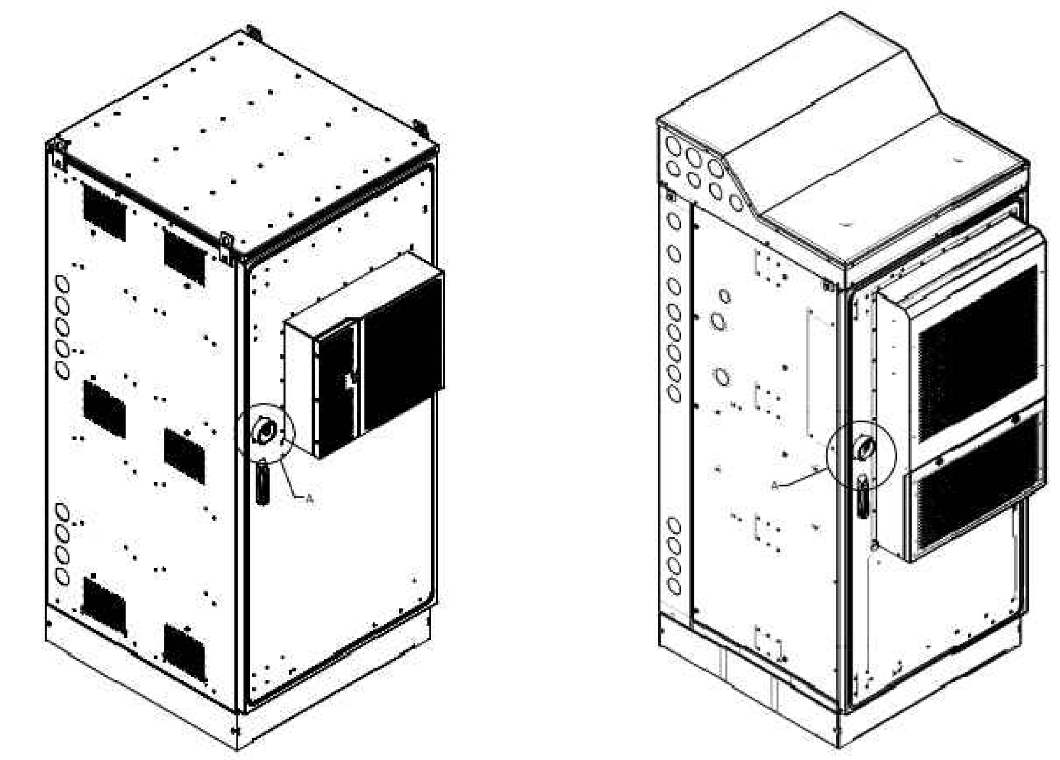
NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

2 / C–6 **PROPOSED ANTENNA DETAIL**
SCALE: NOT TO SCALE

OVP BOX		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: RAYCAP MODEL: DB–C1–12C–24AB–0Z	29.5"H x 16.5"W x 12.6"D	32 LBS.

NOTES:
1. CONTRACTOR TO CONFIRM OVP BOX MAKE/MODEL AND QUANTITY WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

3 / C–6 **PROPOSED OVER-VOLTAGE PROTECTION BOX**
NOT TO SCALE



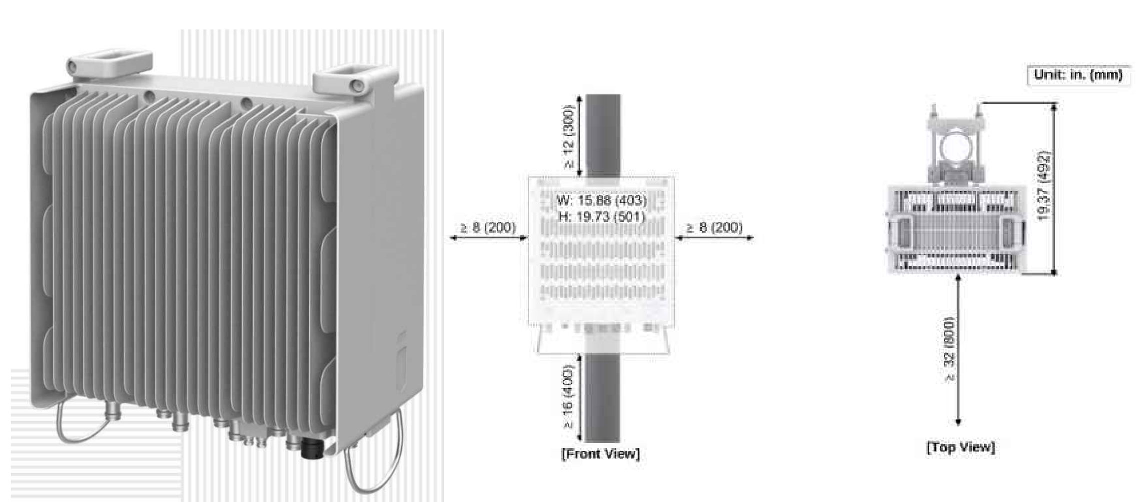
CMC74-36B (BATTERY)

CMC74-36E (EQUIPMENT)

SIDE-BY-SIDE ANTENNA MOUNTING KIT		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: CMC74–36E	80"H x 36"W x 43"D	455 LBS.
MAKE: COMMSCOPE MODEL: CMC74–36B	80"H x 36"W x 43"D	846 LBS.

NOTES:
1. CONTRACTOR TO CONFIRM CABINET MAKE/MODEL AND QUANTITY WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

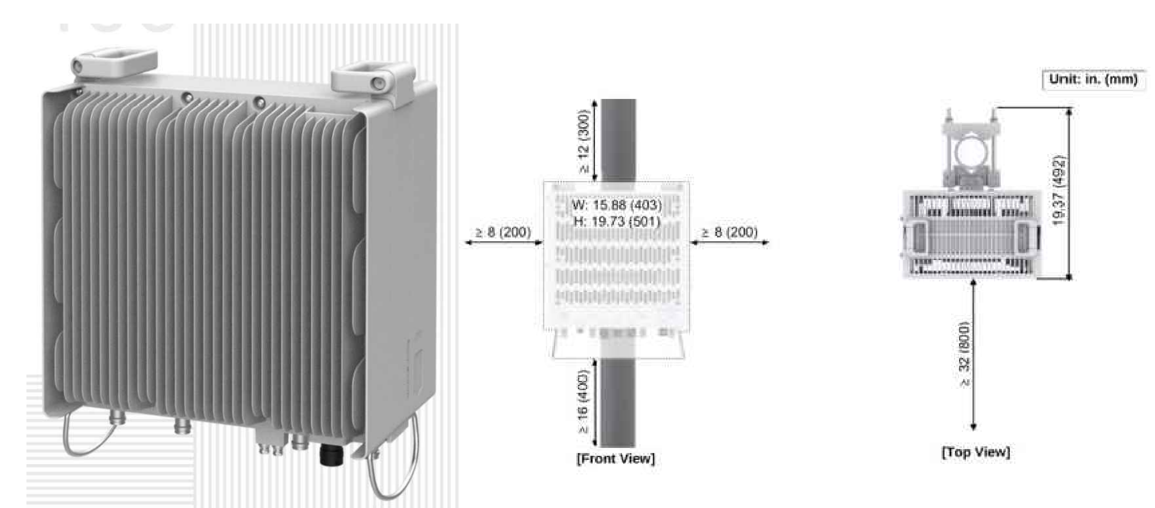
4 / C–6 **PROPOSED EQUIPMENT CABINET DETAIL**
SCALE: NOT TO SCALE



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–6 **DUAL-BAND AWS/PCS MACRO RADIO UNIT DETAIL**
SCALE: NOT TO SCALE



DUAL BAND RRU (REMOTE RADIO UNIT)			
EQUIPMENT	BANDS	DIMENSIONS	WEIGHT
MAKE: SAMSUNG MODEL: RF4461d–13A	B5: 850 MHz B13: 700 MHz	15.0"H x 15.0"W x 10.23"D	79.1 LBS.

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

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

ISOMETRIC

DIPLEXER		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: CBC78T–DS–43	6.3"H x 6.9"W x 4.7"D	–

NOTES:
1. CONTRACTOR TO CONFIRM OVP BOX MAKE/MODEL AND QUANTITY WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

7 / C–6 **PROPOSED DIPLEXER DETAIL**
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
4	10/09/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
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SCALE: AS NOTED
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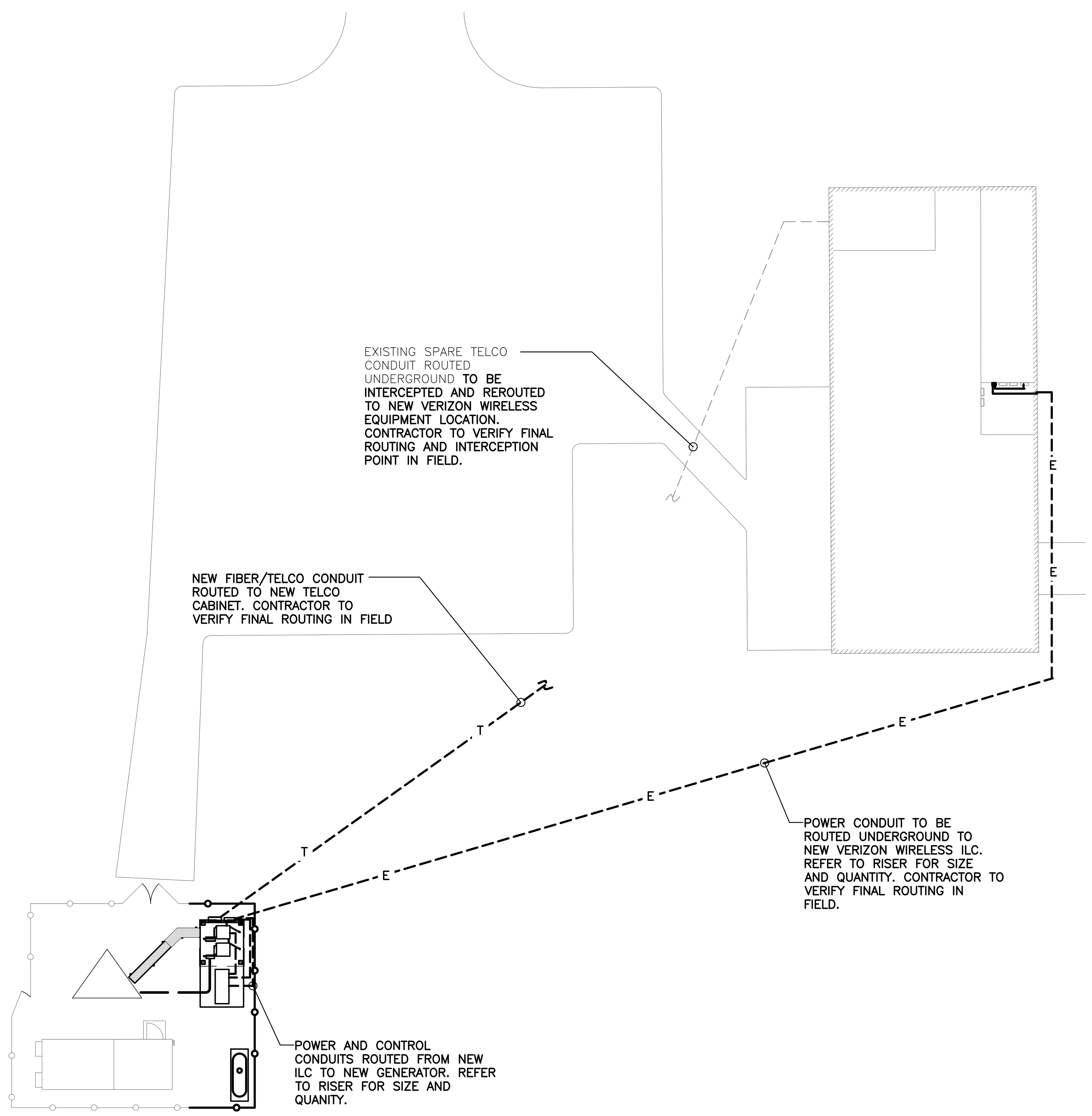
RF DETAILS

C-6

Sheet No. 8 of 14



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

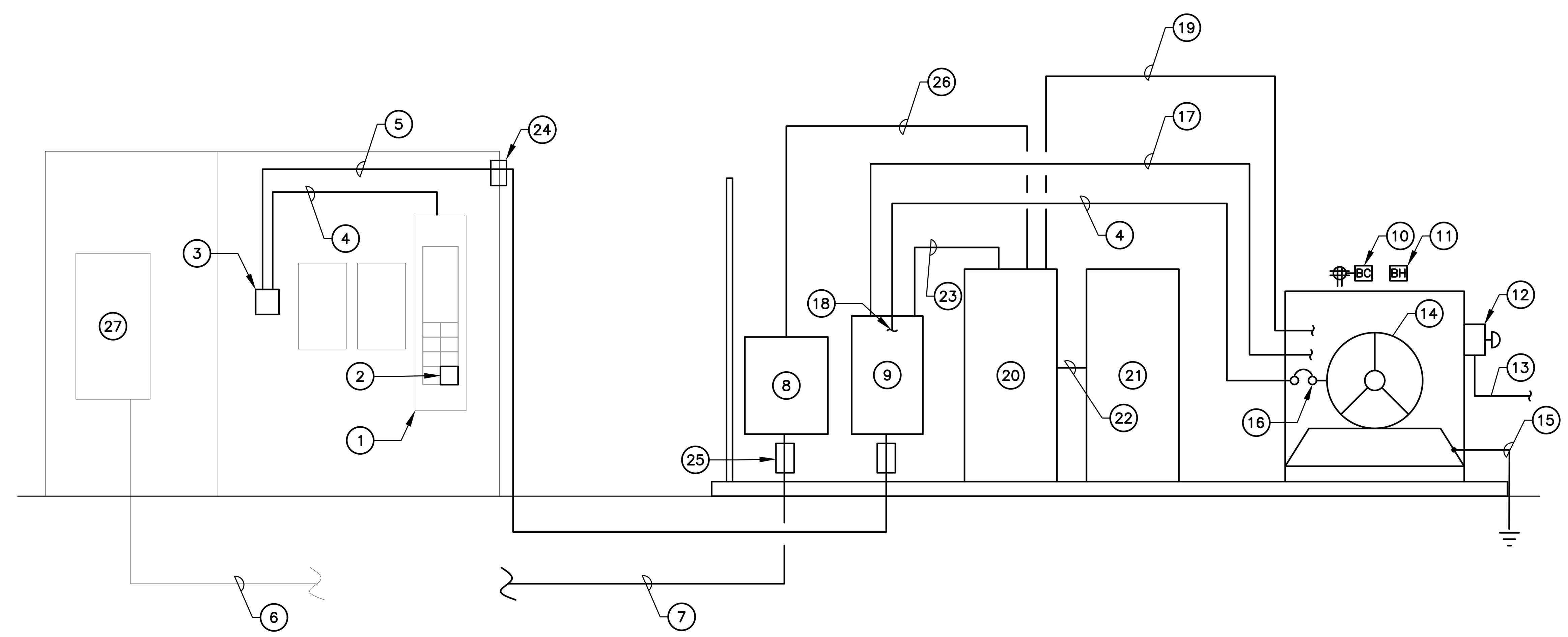
SMART METER		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: POWER DESIGN AND SUPPLY GROUP (PDSG)	–	–

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

3 / E-1 **SMART METER DETAIL (PDSG)**
SCALE: NOT TO SCALE

RISER NOTES

1. EXISTING DISTRIBUTION PANEL TO REMAIN.
2. NEW 200A, 208V, 3P, 3ø, CIRCUIT BREAKER
3. NEW 200A, 208V, 3ø, PDSG SMART METER
4. (4) 3/0 AWG, (1) #6 AWG GROUND. 2" CONDUIT
5. (4) 4/0 AWG, (1) #4 AWG GROUND. 3" CONDUIT.
6. EXISTING SPARE TELCO CONDUIT TO REMAIN. CONDUIT TO BE INTERCEPTED AND REROUTED TO VERIZON WIRELESS EQUIPMENT LOCATION. CONTRACTOR TO VERIFY FINAL ROUTING AND INTERCEPTION POINT IN FIELD.
7. NEW 4" TELCO CONDUIT ROUTED FROM INTERCEPTION OF EXISTING CONDUIT TO NEW EQUIPMENT LOCATION. CONTRACTOR TO VERIFY FINAL ROUTING AND INTERCEPTION POINT IN FIELD.
8. 3 X 3 X 1 HOFFMAN BOX
9. NEW 200A, 208V, 3ø, ILC CABINET
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. 3/4" CONDUIT AND CONDUCTORS REQUIRED FOR PROPER OPERATION OF EMERGENCY GENERATOR SHUT OFF SWITCH.
14. 50KW EMERGENCY BACK-UP GENERATOR
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. CONDUIT TO BE ROUTED ABOVE GROUND. CONTRACTOR TO VERIFY ROUTING IN FIELD.
18. EXTEND GENERATOR POWER OUTPUT CONDUCTORS TO EMERGENCY LUGS IN ILC CABINET.
19. 1" CONDUIT FOR CABINET ALARM.
20. VERIZON WIRELESS EQUIPMENT CABINET
21. VERIZON WIRELESS BATTERY CABINET
22. DC CONDUIT AND CONDUCTORS FOR BATTERY CABINET CONNECTION PER MANUFACTURERS SPECIFICATIONS.
23. POWER CONDUIT AND CONDUCTORS FOR CABINETS COORDINATE WITH MANUFACTURER AND CONSTRUCTION MANAGER.
24. FLOOR/WALL PENETRATION. COORDINATE WITH CIVIL AND STRUCTURAL DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR ENSURING ALL PENETRATIONS ARE FIREPROOF AND FIRE RATING OF WALLS AND FLOORS IS MAINTAINED.
25. EXPANSION COUPLING
26. CONDUITS AND CONDUCTORS FOR TELCO CONNECTION TO EQUIPMENT CABINETS AS REQUIRED BY MANUFACTURER AND CONSTRUCTION MANAGER FOR PROPER OPERATION OF EQUIPMENT.
27. EXISTING TELCO DEMARC



2 / E-1 **ELECTRICAL RISER DIAGRAM**
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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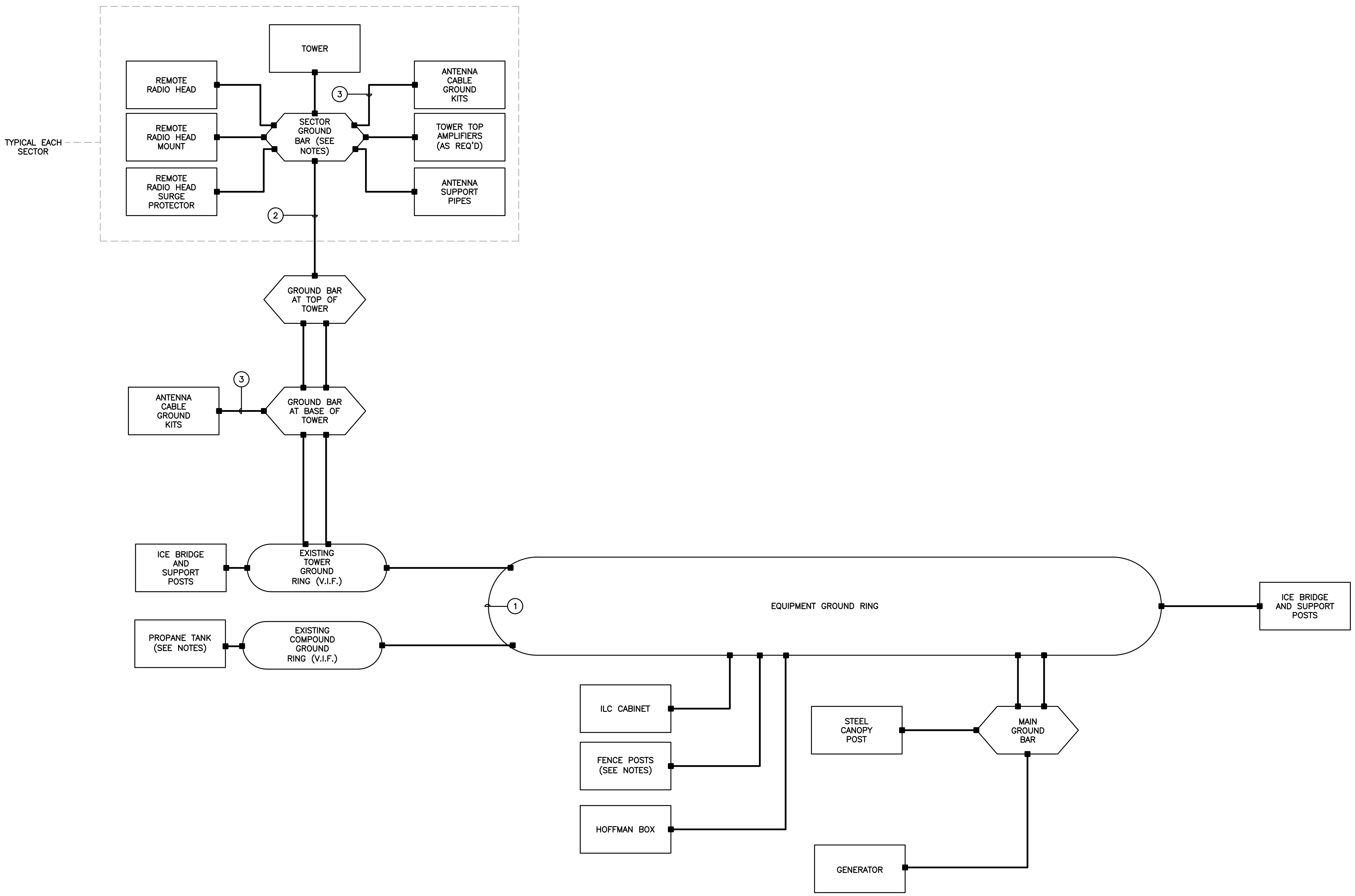
DATE: 02/17/23
SCALE: AS NOTED
JOB NO. 22017.12

ELECTRICAL CONDUIT ROUTING AND RISER DIAGRAM

E-1



1
E–2
ELECTRICAL SCHEMATIC DIAGRAM
SCALE: NOT TO SCALE

GROUNDING SCHEMATIC NOTES

(1) GROUND RING, #2 AWG BCW
(2) #2/0 GREEN INSULATED
(3) #6 AWG

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 FENCE POSTS WITHIN 6' OF EQUIPMENT SHELTER SHALL BE BONDED TO GROUND RING.
12. ALL GROUNDING SHALL BE IN ACCORDANCE WITH NEC AND OWNER'S REQUIREMENTS.
13. BOND GENERATOR TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
14. BOND PROPANE TANK TO GROUND RING PER NEC AND MANUFACTURERS SPECIFICATIONS. COORDINATE WITH TANK MANUFACTURER FOR REQUIREMENTS PRIOR TO INSTALLATION.
15. COORDINATE WITH TOWER OWNER BEFORE INSTALLING ANY GROUNDING ELEMENTS ON TOWER OR BONDING TO EXISTING TOWER GROUND RING.

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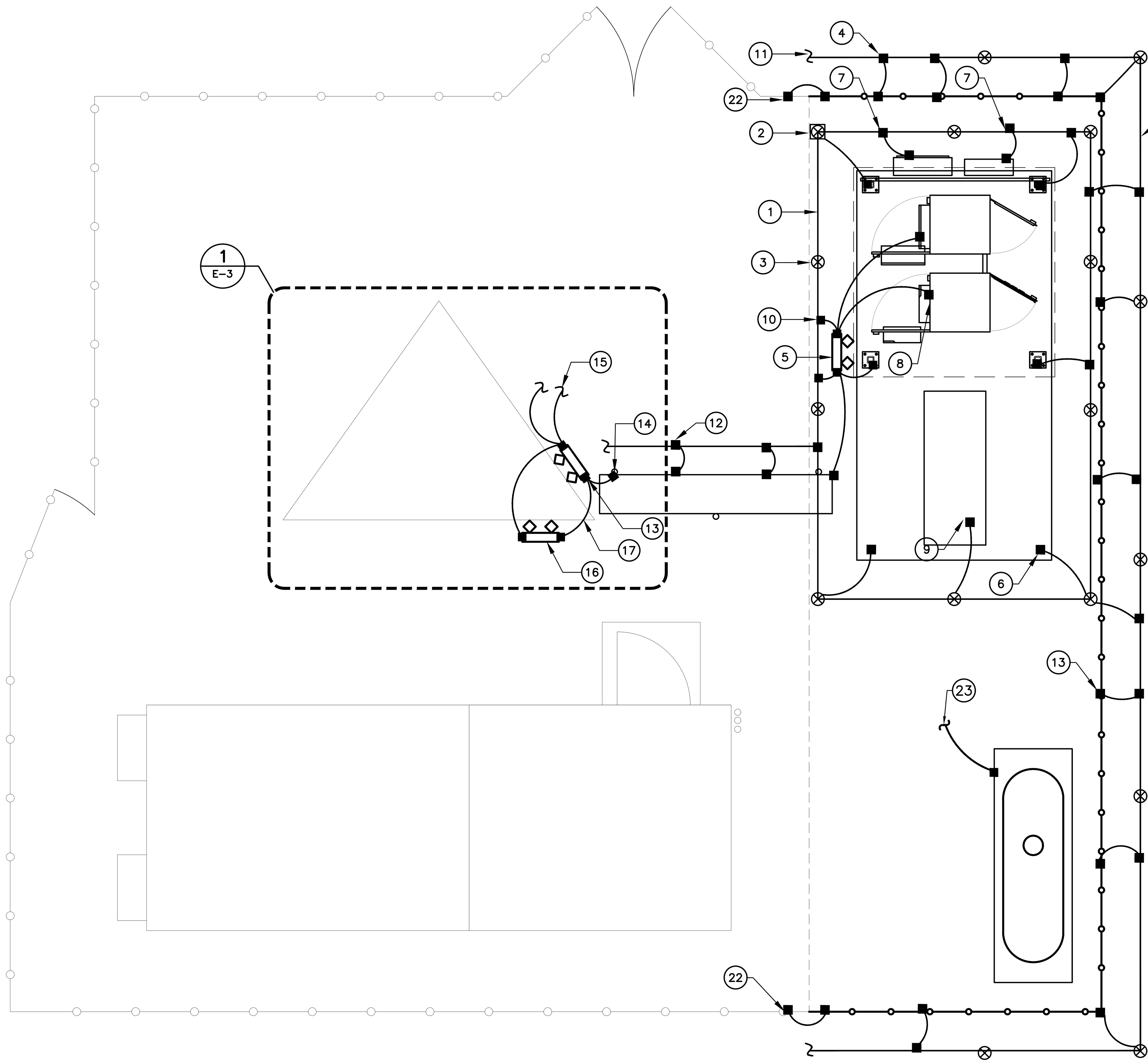
ELECTRICAL SCHEMATIC DIAGRAM

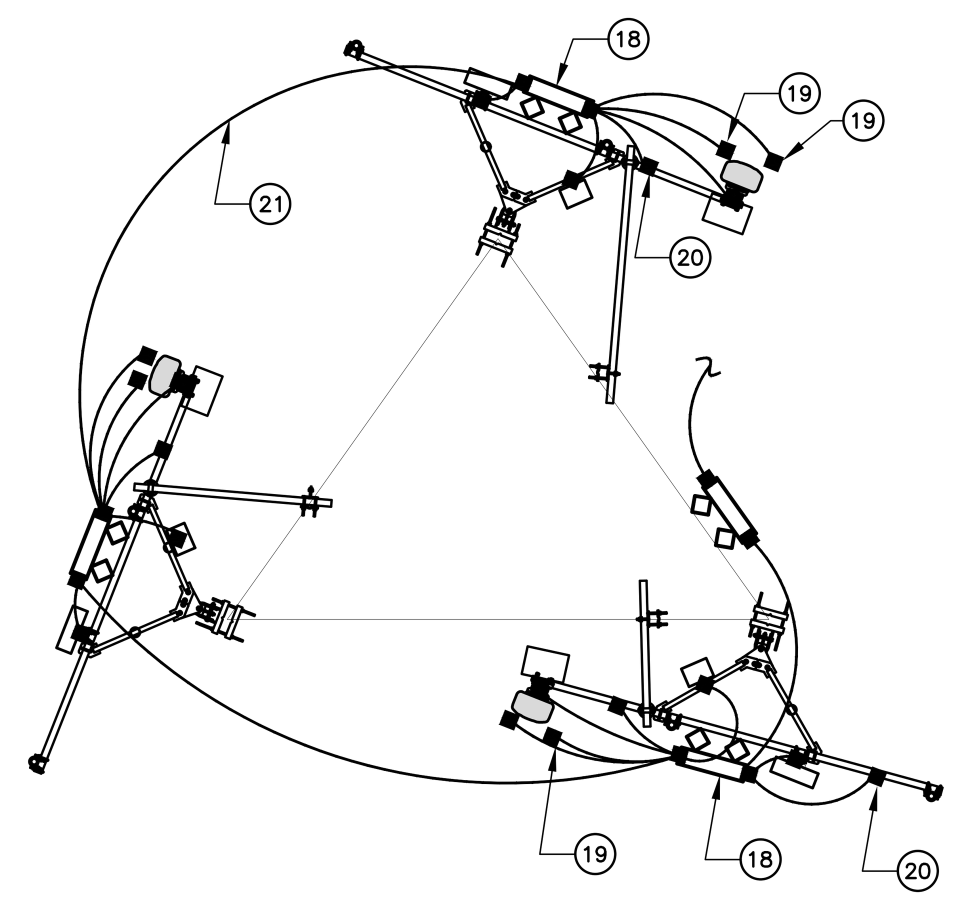
E–2

GROUNDING PLAN NOTES:

1. #2 SOLID TINNED BCW GROUND RING (INSTALL AS SHOWN ALONG COMPOUND PERIMETER, AND COMPLETELY ENCIRCLING THE EQUIPMENT PAD).
2. GROUNDING ROD WITH ACCESS (TYP.) SEE DETAILS.
3. GROUNDING ROD (TYP.) SEE DETAILS.
4. CONNECT FENCE TO COMPOUND GROUNDING RING.
5. MAIN GROUND BAR TYP.
6. BOND CANOPY POST TO GROUND RING TYP. EACH CORNER.
7. BOND CABINETS TO GROUND RING PER NEC AND MANUFACTUTER REQUIREMENTS.
8. BOND EQUIPMENT CABINETS TO GROUND BAR PER NEC AND MANUFACTURER REQUIREMNENTS.
9. BOND GENERATOR PER NEC AND MANUFACTURER REQUIREMENTS.
10. BOND GROUND BAR TO GROUND RING TYP. 2 PLACES.
11. CONNECT SECTION OF COMPOUND GROUND RING TO EXISTING COMPOUND GROUND. CONTRACTOR TO VERIFY FINAL LOCATION IN FIELD.
12. ICE BRIDGE POST AND COVER. BOND EACH SECTION AND SUPPORT TO GROUND RING SEE DETAILS.
13. LOWER TOWER MOUNTED GROUND BAR.
14. BOND GROUND BAR TO ICE–BRIDGE
15. BOND GROUND BAR TO TOWER GROUND RING TYP.
16. UPPER TOWER MOUNTED GROUND BAR.
17. BOND UPPER TOWER MOUNTED GROUND BAR TO LOWER TOWER MOUNTED GROUND BAR. TYP. 2 PLACES
18. SECTOR GROUND BAR TYP.
19. BOND ANTENNA MOUNTING PIPES TO SECTOR GROUND BAR.
20. BOND SECTOR GROUND BAR TO ANTENNA FRAME STEEL TYP.
21. ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.
22. BOND NEW FENCE SECTION TO EXISTING FENCE. TYP.
23. BOND PROPANE TANK TO GROUND RING PER NEC AND MANUFACTURERS SPECIFICATIONS.



1 / E-3 **COMPOUND GROUNDING PLAN**
SCALE: NOT TO SCALE



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

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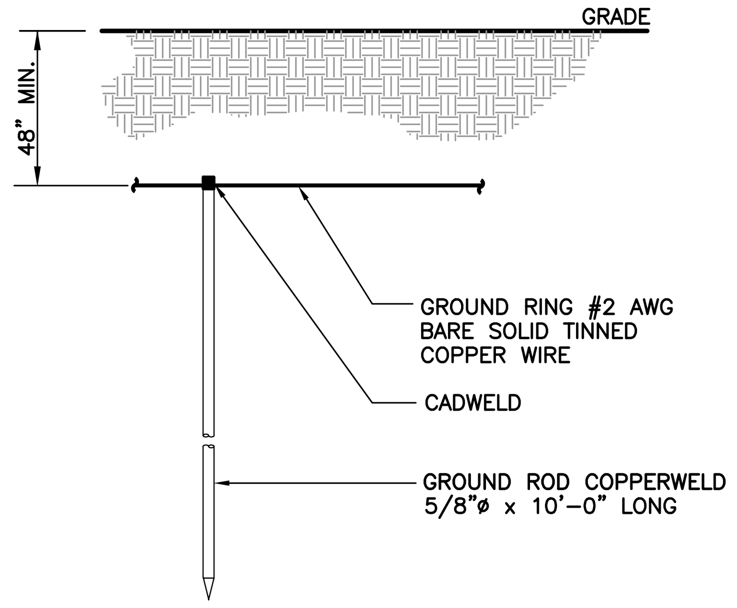
ELECTRICAL GROUNDING PLANS

E-3

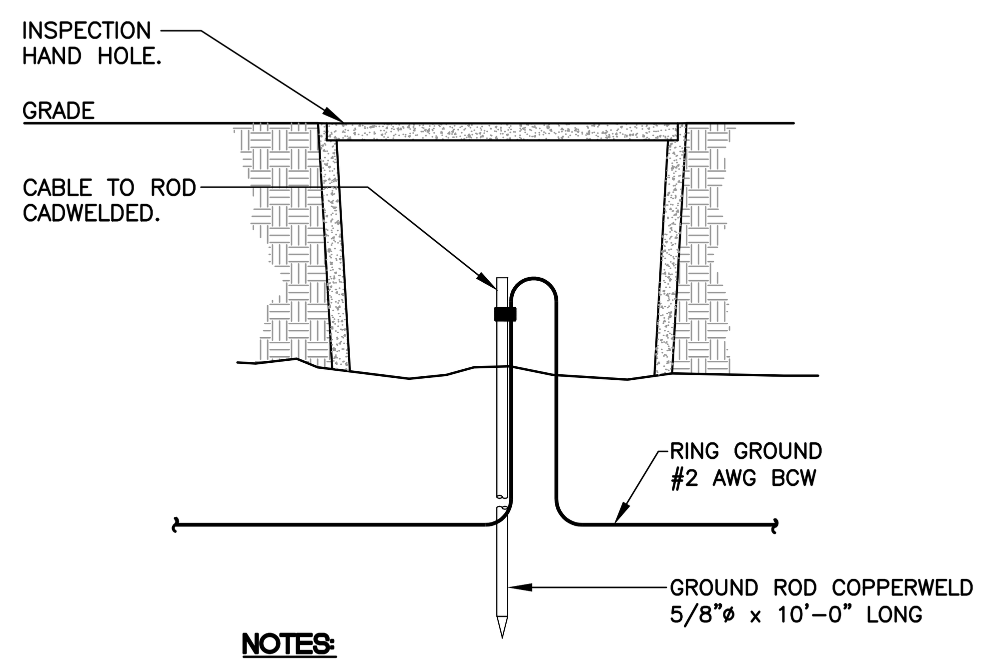
Sheet No. 11 of 14



NOTES:

1. USE GROUND PLATE DETAIL IF 10 FT. GROUND ROD DEPTH CANNOT BE ACHIEVED DUE TO LEDGE CONDITION OR IF EXISTING TOWER FOUNDATION IS ENCOUNTERED.

1 (E-4) GROUND ROD DETAIL
SCALE: NOT TO SCALE

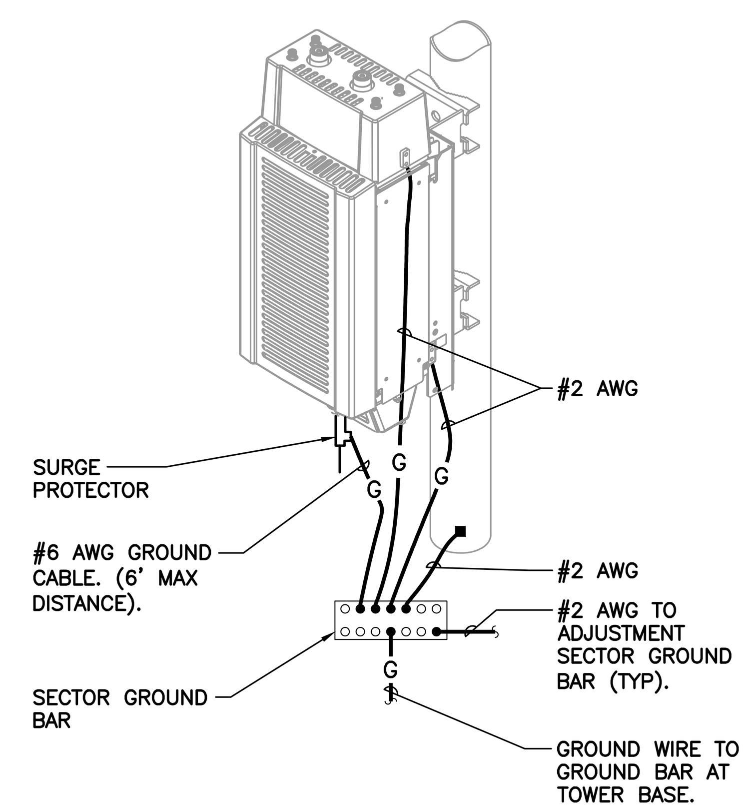


NOTES:

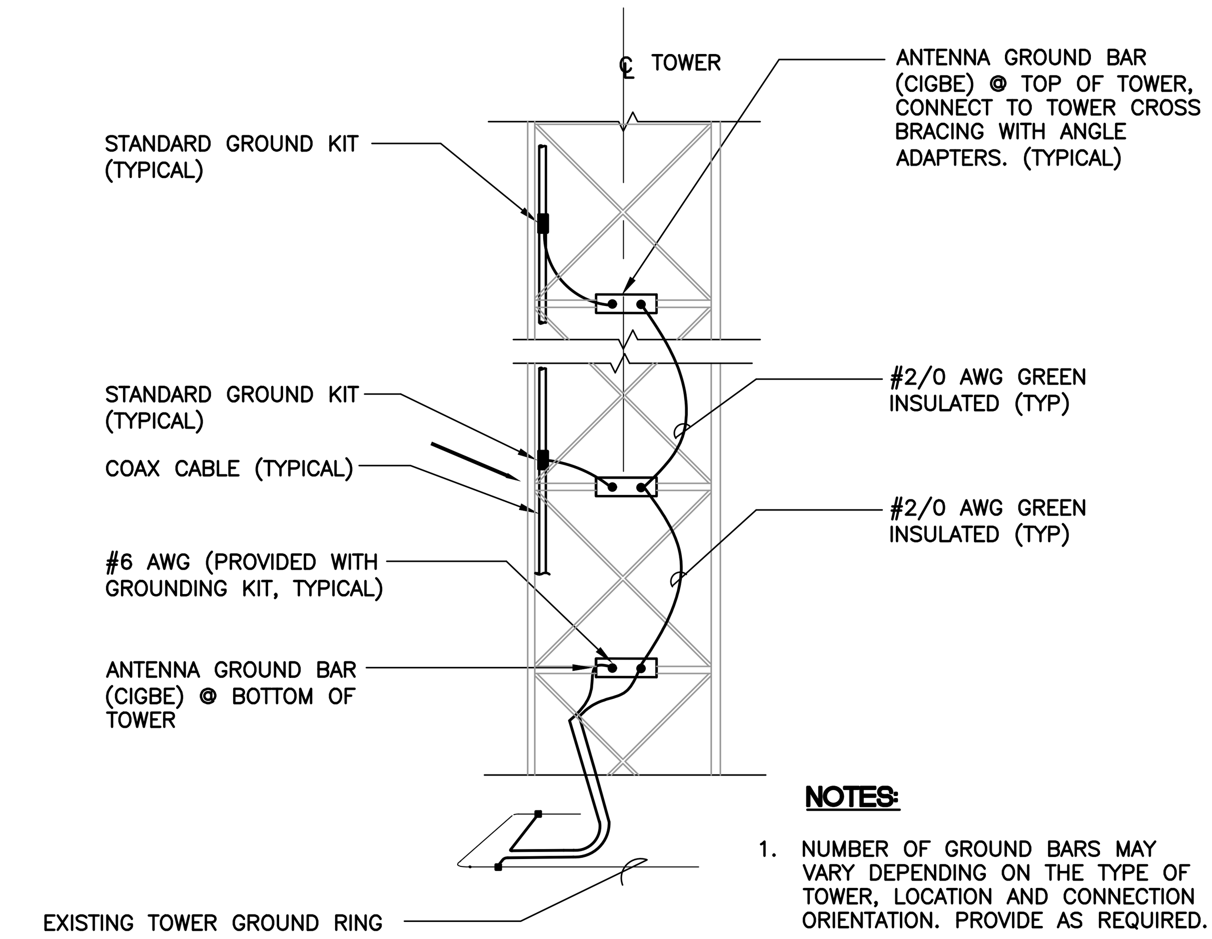
1. INSPECTION HAND HOLE MAY BE CONCRETE OR PVC AND SHALL BE A MINIMUM OF 12" DIA x 18" DEEP.

2 (E-4) GROUND ROD WITH ACCESS DETAIL
SCALE: NOT TO SCALE

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



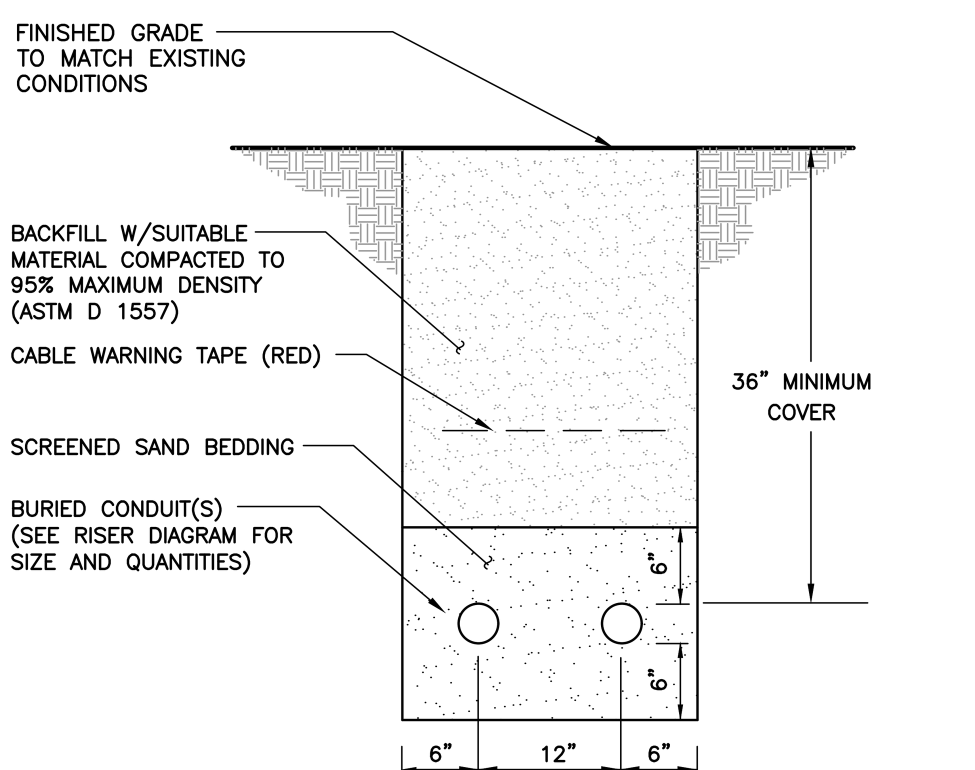
3 (E-4) RRH POLE MOUNT GROUNDING
SCALE: NOT TO SCALE



NOTES:

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

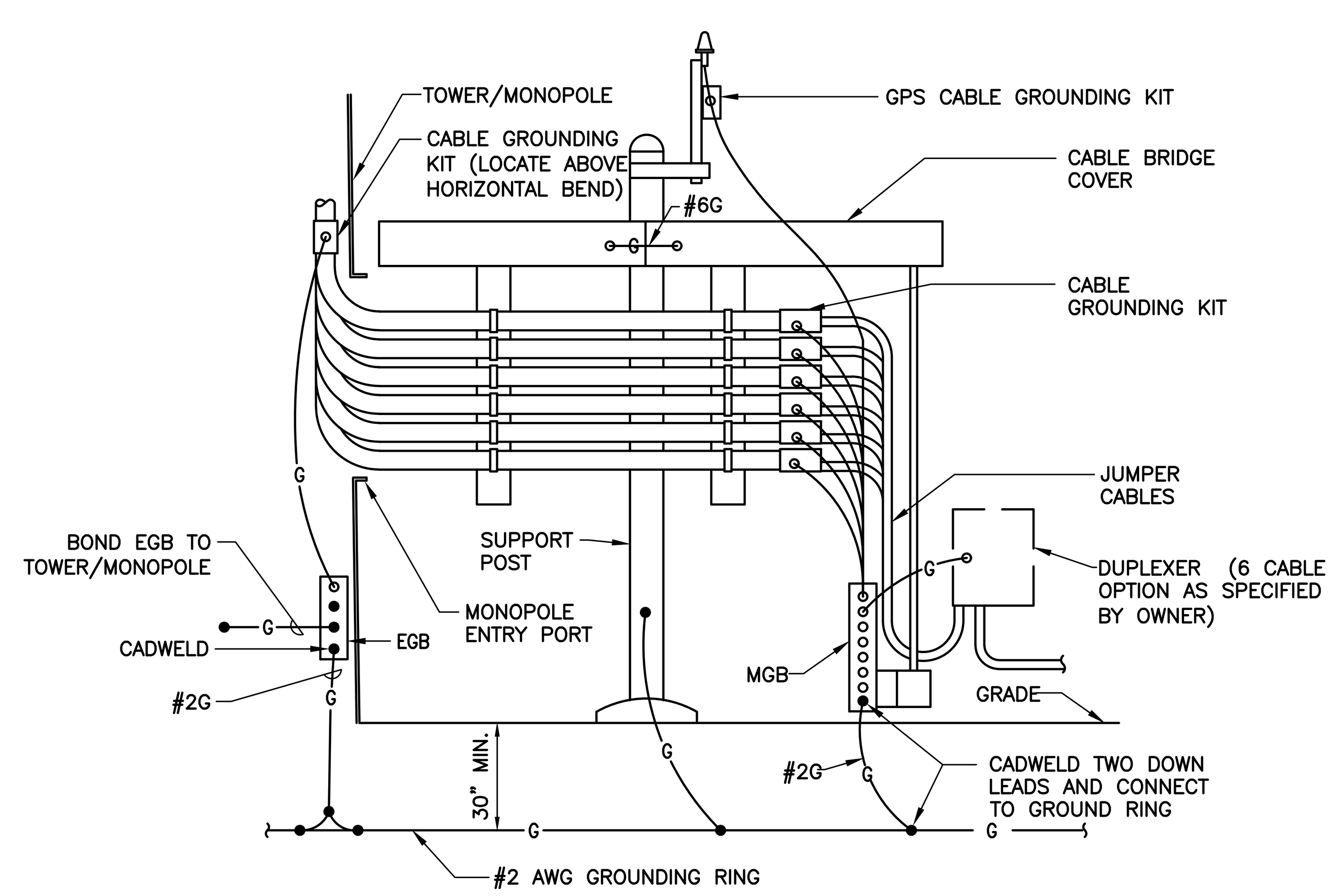
4 (E-4) ANTENNA CABLE GROUNDING - LATTICE TOWER
SCALE: NOT TO SCALE



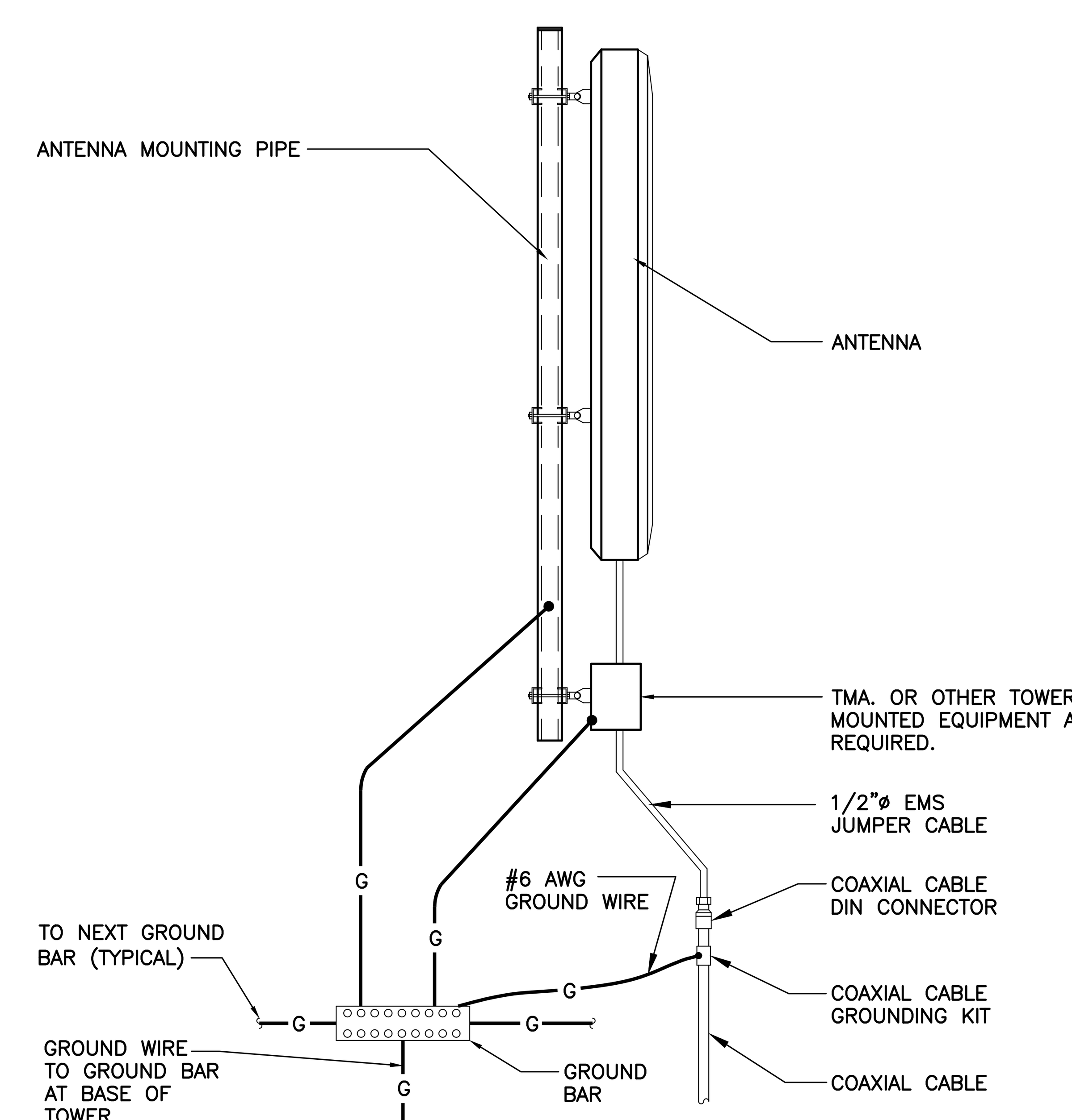
NOTES:

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.

5 (E-4) TYPICAL ELECTRICAL TRENCH DETAIL
SCALE: NOT TO SCALE



6 (E-4) CABLE BRIDGE GROUNDING DIAGRAM
SCALE: NOT TO SCALE



7 (E-4) TYPICAL ANTENNA GROUNDING DETAIL
SCALE: NOT TO SCALE

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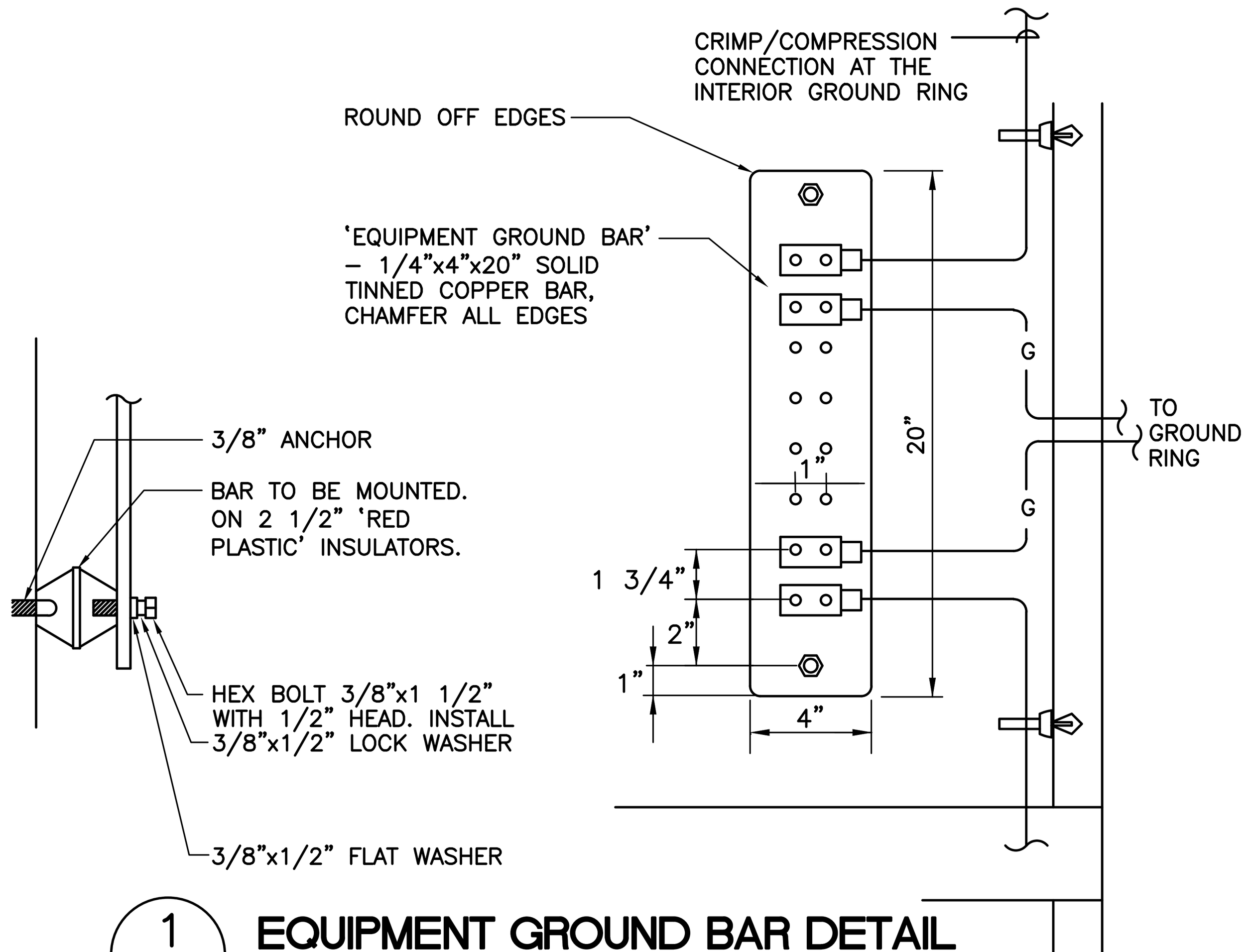
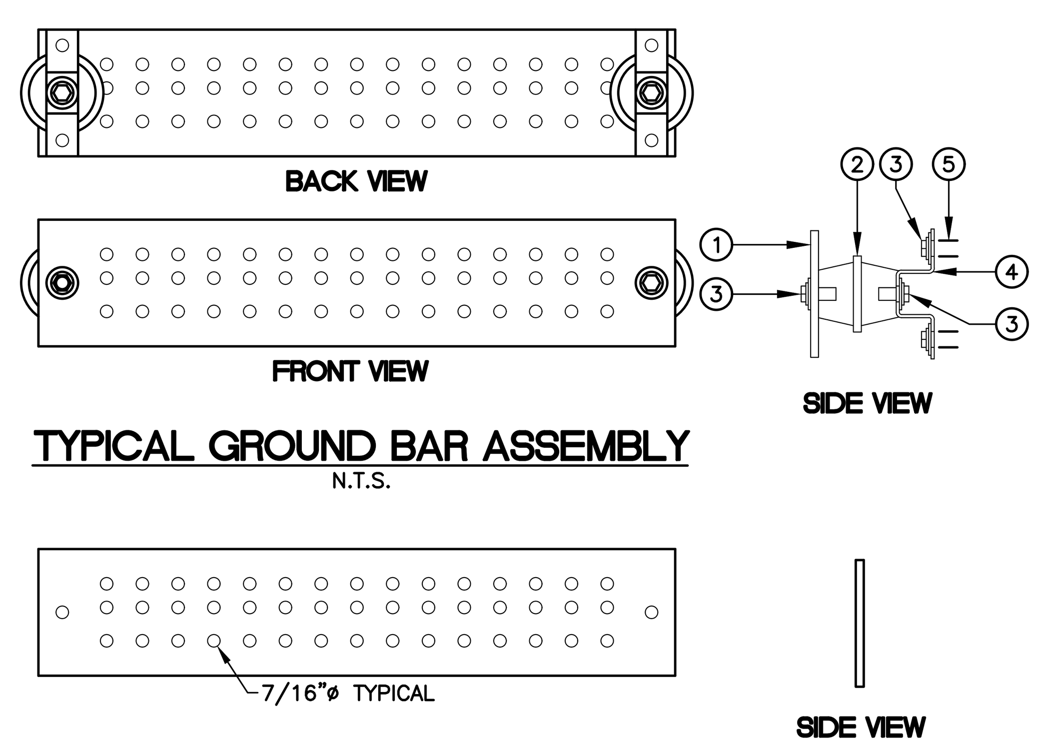
TYPICAL ELECTRICAL DETAILS

E-4



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

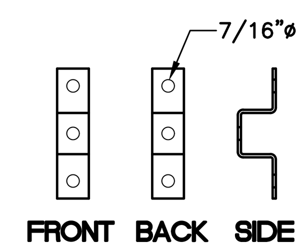


TYPICAL GROUND BAR ASSEMBLY
N.T.S.

TYPICAL GROUND BAR – DIMENSIONS
N.T.S.

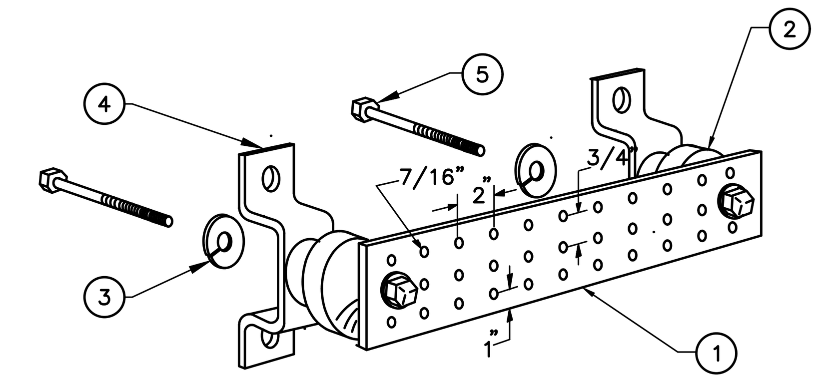
NOTES

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
N.T.S.

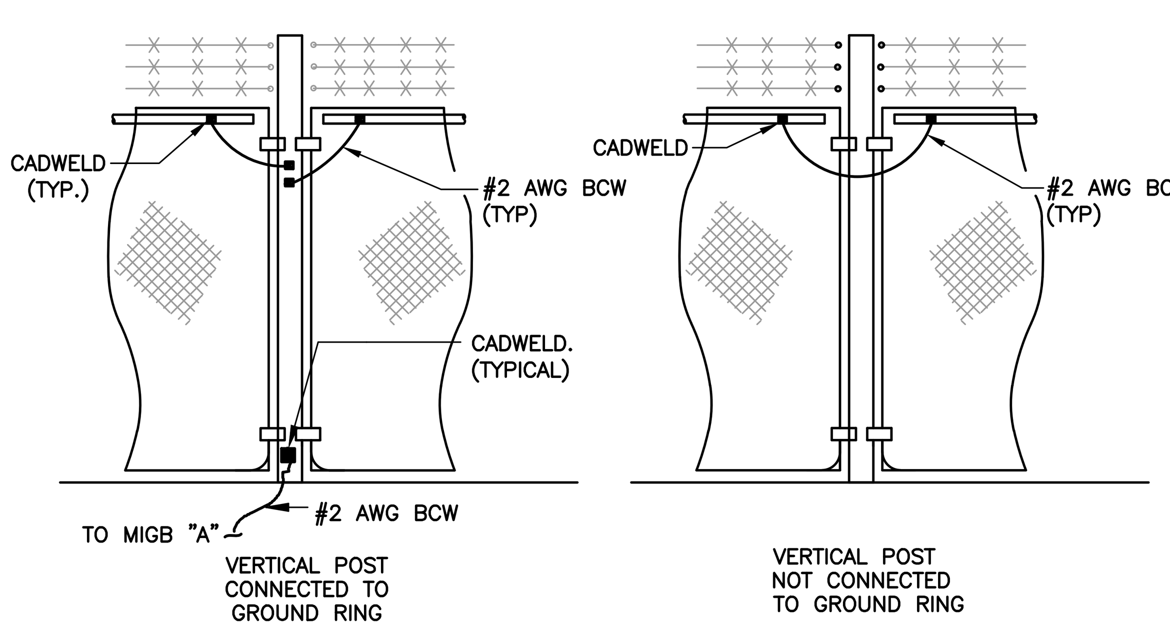
2 MASTER/EQUIPMENT GROUND BAR DETAILS
E-5
SCALE: NOT TO SCALE



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–6056.
5. 5/8–11 x 1" STAINLESS STEEL TRUSS SPANNER MACHINE SCREWS.

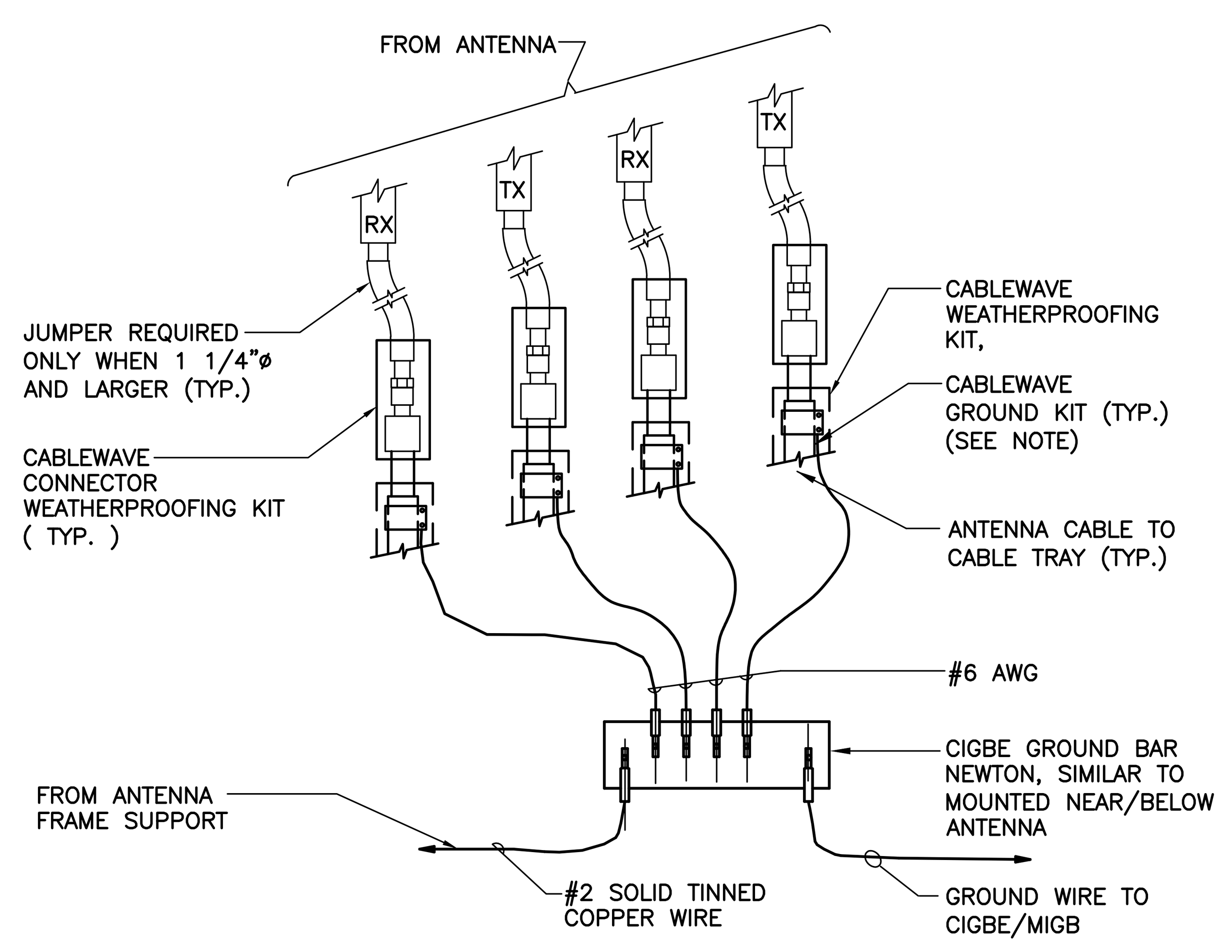
3 GROUND BAR DETAIL
E-5
SCALE: NOT TO SCALE



NOTES:

1. VERTICAL POSTS SHALL BE BONDED TO THE RING AT EACH CORNER AND AT EACH GATE POST. AS A MINIMUM ONE VERTICAL POST SHALL BE BONDED TO THE GROUND RING IN EVERY 100 FOOT STRAIGHT RUN OF FENCE.
2. HORIZONTAL POLES SHALL BE BONDED TO EACH OTHER.
3. BOND EACH HORIZONTAL POLE / BRACE TO EACH OTHER AND TO EACH VERTICAL POST THAT IS BONDED TO THE EXTERIOR GROUND RING.

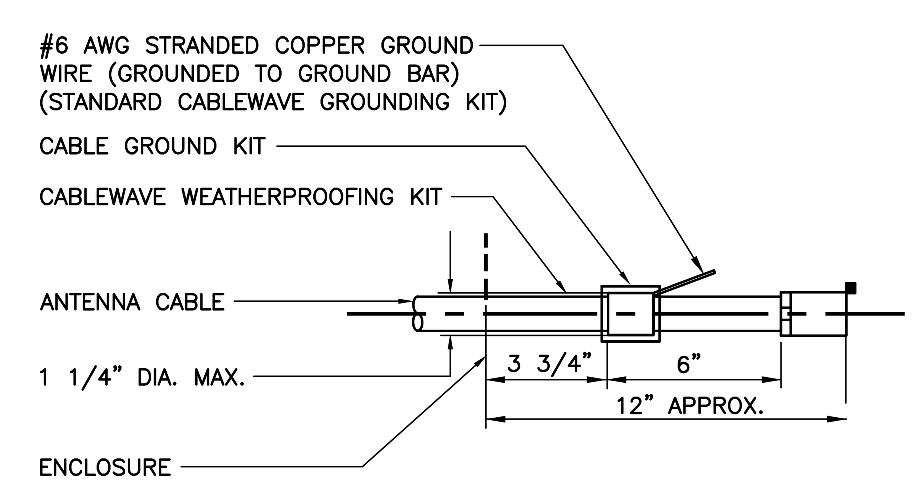
4 GROUND-STD. DETAIL FENCE GROUNDING
E-5
SCALE: NOT TO SCALE



NOTES:

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

5 CONNECTION OF GROUND WIRES TO GROUND BAR
E-5
SCALE: NOT TO SCALE



NOTES:

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

6 ANTENNA CABLE GROUNDING DETAIL
E-5
SCALE: NOT TO SCALE

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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, 208V, 3P, 4 WIRE ELECTRIC SERVICE WITH SMART SUB-METER AND 200A MAIN CIRCUIT BREAKER FOR OWNER AND ASSOCIATED DISTRIBUTION EQUIPMENT.
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) [2,3]
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 #CSB20AC2 (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
4	10/09/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
3	08/23/23	BSP	TJR	CONSTRUCTION DRAWINGS – REVISED PER UPDATED RFDS
2	08/02/23	DMD	TJR	CONSTRUCTION DRAWINGS – REVISED FOR LEGAL COMMENTS
1	06/28/23	DMD	TJR	CONSTRUCTION DRAWINGS – REVISED FOR CONSTRUCTION (PROPANE ADD)
0	06/22/23	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
B	04/05/23	RTS	TJR	CONSTRUCTION DRAWINGS – REVISED STRUCTURAL NOTE REFERENCE
A	02/17/23	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

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

Cellco Partnership d/b/a Verizon Wireless
SITE NAME: KILLINGLY EAST CT
SITE ID: 617359992
1249 HARTFORD PIKE
KILLINGLY CT, 06243

DATE: 02/17/23
SCALE: AS NOTED
JOB NO. 22017.12

ELECTRICAL SPECIFICATIONS

E-6

ATTACHMENT 4

JAHH-65B-R3B

8-port sector antenna, 2x 698–787, 2x 824-894 and 4x 1695–2360 MHz, 65° HPBW, 3x RET and low bands have diplexers. Internal SBT's on first LB(Port 1) and first HB(Port 5).

- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- One RET for 700MHz, one RET for 850MHz, and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO
- Internal filter on low band and interleaved dipole technology providing for attractive, low wind load mechanical package
- Separate RS-485 RET input/output for low and high band

General Specifications

Antenna Type	Sector
Band	Multiband
Color	Light gray
Effective Projective Area (EPA), frontal	0.28 m^2 | 3.014 ft^2
Effective Projective Area (EPA), lateral	0.24 m^2 | 2.583 ft^2
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	Aluminum | 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	4
RF Connector Quantity, total	8

Remote Electrical Tilt (RET) Information, General

RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	2 female | 2 male

Dimensions

Width	350 mm | 13.78 in

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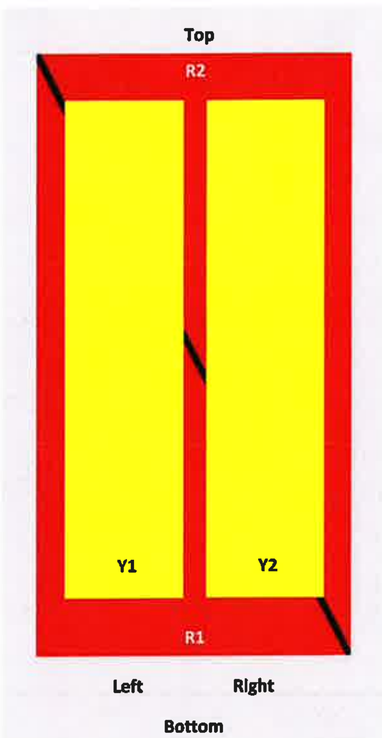
JAHH-65B-R3B

Length 1828 mm | 71.969 in

Depth 208 mm | 8.189 in

Array Layout

JAHH-65A-R3B JAHH-65B-R3B JAHH-65C-R3B



Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-798	1-2	1	ANxxxxxxxxxxxxxxxxx1
R2	824-894	3-4	2	ANxxxxxxxxxxxxxxxxx2
Y1	1695-2360	5-6	3	ANxxxxxxxxxxxxxxxxx3
Y2	1695-2360	7-8		

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 – 787 MHz | 824 – 894 MHz

Polarization ±45°

Remote Electrical Tilt (RET) Information, Electrical

Protocol 3GPP/AISG 2.0 (Single RET)

Power Consumption, idle state, maximum 2 W

JAHH-65B-R3B

Power Consumption, normal conditions, maximum	13 W
Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 5
Internal RET	High band (1) | Low band (2)

Electrical Specifications

Frequency Band, MHz	**698–787**	**824–894**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain, dBi	14.5	15.8	18	18.4	18.5	18.8
Beamwidth, Horizontal, degrees	67	65	63	63	65	68
Beamwidth, Vertical, degrees	12.4	10.5	5.7	5.2	4.9	4.4
Beam Tilt, degrees	2–14	2–14	0–10	0–10	0–10	0–10
USLS (First Lobe), dB	18	18	20	20	21	23
Front-to-Back Ratio at 180°, dB	32	34	31	35	36	38
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	200	200	300	300	300	250

Electrical Specifications, BASTA

Frequency Band, MHz	**698–787**	**824–894**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain by all Beam Tilts, average, dBi	14.3	14.9	17.6	18.1	18.2	18.5
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.5	±0.6	±0.4	±0.5	±0.6
Gain by Beam Tilt, average, dBi	2 ° | 14.3 8 ° | 14.3 14 ° | 14.3	2 ° | 15.0 8 ° | 14.9 14 ° | 15.4	0 ° | 17.2 5 ° | 17.6 10 ° | 17.6	0 ° | 17.6 5 ° | 18.2 10 ° | 18.2	0 ° | 17.7 5 ° | 18.3 10 ° | 18.3	0 ° | 17.9 5 ° | 18.7 10 ° | 18.7
Beamwidth, Horizontal Tolerance, degrees	±1.2	±1.4	±4	±2.4	±2.9	±2.7
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.5	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	18	17	17	18	19	18
Front-to-Back Total Power at 180° ± 30°, dB	25	24	26	29	27	29
CPR at Boresight, dB	22	23	20	21	21	24

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JAHH-65B-R3B

CPR at Sector, dB	11	12	11	11	11	8

Mechanical Specifications

Wind Loading at Velocity, frontal	301.0 N @ 150 km/h | 67.7 lbf @ 150 km/h
Wind Loading at Velocity, lateral	254.0 N @ 150 km/h | 57.1 lbf @ 150 km/h
Wind Loading at Velocity, maximum	143.4 lbf @ 150 km/h | 638.0 N @ 150 km/h
Wind Speed, maximum	241 km/h | 149.75 mph

Packaging and Weights

Width, packed	456 mm | 17.953 in
Depth, packed	357 mm | 14.055 in
Length, packed	1975 mm | 77.756 in
Net Weight, without mounting kit	29.2 kg | 64.375 lb
Weight, gross	42.5 kg | 93.696 lb

Regulatory Compliance/Certifications

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

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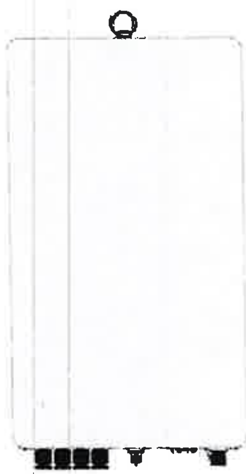
C-band 64T64R

SAMSUNG

Gen 2

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



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

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

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

SAMSUNG

AWS/PCS MACRO RADIO

DUAL-BAND AND HIGH POWER FOR MACRO COVERAGE

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

Model Code	RF4439d-25A

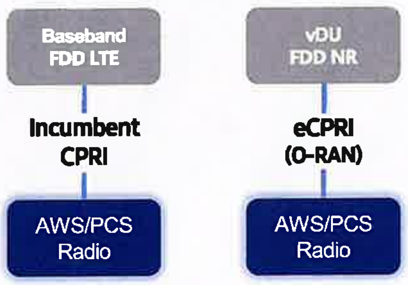
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

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



O-RAN Compliant

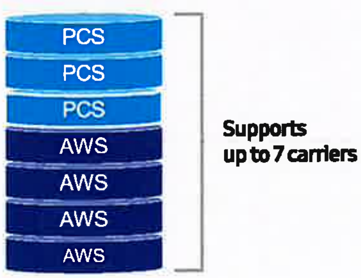
A standardized O-RAN radio can help in implementing cost-effective networks, which are capable of sending more data without compromising additional investments.

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

Optimum Spectrum Utilization

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

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



Brand New Features in a Compact Size

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

Technical Specifications

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

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

SAMSUNG

Specifications

Item	Specification	
Air Interface	LTE, NR(HW resource ready)	
Band	Band13 (700MHz)	Band5 (850MHz)
Frequency	DL: 746~756MHz UL: 777~787MHz	DL: 869~894MHz UL: 824~849MHz
IBW	10MHz	25MHz
OBW	10MHz	25MHz
Carrier Bandwidth	LTE/NR 5*/10MHz	LTE 5/10MHz NR 5/10/15/20MHz
# of carriers	2C*	3C
Total # of carriers	4C + B13 (SDL) 1C	
RF Chain	4T4R/2T4R/2T2R/1T2R 2T2R+2T2R bi-sector	
RF Output Power	Total : 320W 4 x 40W or 2 x 60W	4 x 40W or 2 x 60W
Spectrum Analyzer	TX/RX Support	
RX Sensitivity	Typ. -104.5dBm @1Rx (25RBs 5MHz)	
Modulation	256QAM support, (1024QAM with 1~2dB power back-off)	
Input Power	-48VDC (-38VDC to -57VDC)	
Power Consumption	1,165 Watt @ 100% RF load, room temperature	
Size (WHD)	380 x 380 x 260 mm (14.96 x 14.96 x 10.23 inch)	
Volume	37.5 L	
Weight (W/o Solar Shield & finger guard)	35.9 kg (79.1 lb)	
Operating Temperature	-40℃ (-40℉) ~ 55℃ (131℉) (Without solar load)	
Cooling	Natural convection	
Unwanted Emission	3GPP 36.104 FCC 47 CFR 27.53 c), f) -	3GPP 36.104 FCC 47 CFR 22.917 -69 dBm/100 kHz per path @ 896 ~901MHz
CPRI Cascade	Not supported	
Optic Interface	20km, 2 ports (9.8Gbps x 2), SFP+, single mode, Duplex (Option: Bi-di)	
RET & TMA Interface	AISG 3.0	
Bias-T	4 ports (2 ports per band)	
Mounting Options	Pole, wall	
NB-IoT	2GB+2IB or 4IB	2SA+2GB or 2GB+2IB or 4GB
PIM Cancellation	Support	
# of antenna port	4	
External Alarm	4	
Fronthaul Interface	Opt. 8 CPRI / Opt. 7-2x selectable (not simultaneous support)	
CPRI compression	Not Support	

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

SG050NA | 4.5L | 50 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary

GENERAC | INDUSTRIAL POWER

Standby Power Rating
50 kW, 63 kVA, 60 Hz

Demand Response Rating
50 kW, 63 kVA, 60 Hz

Prime Power Rating
45 kW, 56 kVA, 60 Hz

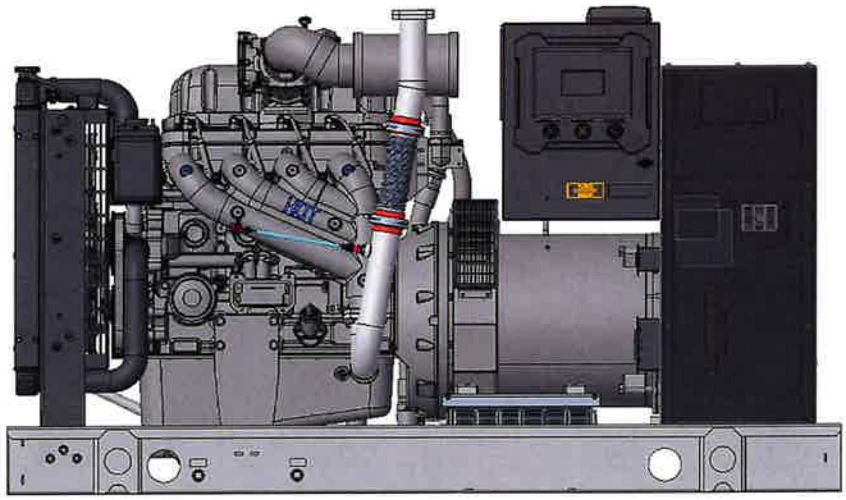


Image used for illustration purposes only

Codes and Standards

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

UL2200, UL6200, UL1236, UL489

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

Generac ensures superior quality by designing and manufacturing most of its generator components, such as alternators, enclosures, control systems and communications software. Generac also makes its own spark-ignited engines, and you'll find them on every Generac gaseous-fueled generator. We engineer and manufacture them from the block up — all at our facilities throughout Wisconsin. Applying natural gas and LP-fueled engines to generators requires advanced engineering expertise to ensure reliability, durability and necessary performance. By designing specifically for these dry, hotter-burning fuels, the engines last longer and require less maintenance. Building our own engines also means we control every step of the supply chain and delivery process, so you benefit from single-source responsibility.

Plus, Generac Industrial Power's distribution network provides all parts and service so you don't have to deal with third-party suppliers. It all leads to a positive owner experience and higher confidence level. Generac spark-ignited engines give you more options in commercial and industrial generator applications as well as extended run time from utility-supplied natural gas.

SG050NA | 4.5L | 50 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary

STANDARD FEATURES

ENGINE SYSTEM

- Oil Drain Extension
- Air Cleaner
- Fan Guard
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Critical Silencer
- Oil Temperature Sender with Alarm
- Air Filter Restriction Indicator

Fuel System

- Fuel Line - NPT Connection
- Primary and Secondary Fuel Shutoff

Cooling System

- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- 50/50 Ethylene Glycol Antifreeze
- 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

GENERATOR SET

- Internal Genset Vibration Isolation
- Separation of Circuits - High/Low Voltage
- Separation of Circuits - Multiple Breakers
- Wrapped Exhaust Piping
- 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

CONTROL SYSTEM

Power Zone Pro® Controller

- NFPA 110 Level 1 Compliant
- Engine Protective Functions
- Alternator Protective Functions
- Digital Engine Governor Control
- Digital Voltage Regulator
- Multiple Programmable Inputs and Outputs
- Remote Display Capability
- Remote Communication via Modbus® RTU, Modbus TCP/IP, and Ethernet 10/100
- Alarm and Event Logging with Real Time Stamping
- Expandable Analog and Digital Inputs and Outputs
- Remote Wireless Software Update Capable
- Wi-Fi, Bluetooth, BMS, and Remote Telemetry
- Built-In Programmable Logic Eliminates the Need for External Controllers Under Most Conditions
- Programmable I/O Channel Properties
- Built-In Diagnostics

Alarms and Warnings

- High/Low Oil Pressure
- High/Low Coolant Level
- High/Low Coolant Temperature
- Sender/Sensor Failure
- High/Low Oil Temperature
- Over Total kW
- Over/Under Speed
- Over/Under Voltage
- Over/Under Frequency
- Over Current
- High/Low Battery Voltage
- Battery Charger Current
- Phase to Phase and Phase to Neutral Short Circuits (I^2T Algorithm)

4.3 Inch Color Touch Screen Display

- Resistive Color Touch Screen
- Easily Identifiable Icons
- Multi-Lingual
- On Screen Editable Parameters
- Key Function Monitoring
- Three Phase Voltage, Amperage, kW, kVA, and kVAr
- Selectable Line to Line or Line to Neutral Measurements
- Frequency
- Engine Speed
- Engine Coolant Temperature
- Engine Oil Pressure
- Engine Oil Temperature
- Battery Voltage
- Hourmeter
- Warning and Alarm Indication
- Diagnostics
- Maintenance Events/Information

SG050NA | 4.5L | 50 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary

GENERAC | INDUSTRIAL POWER

CONFIGURABLE OPTIONS

ENGINE SYSTEM

- Heater with Shutoff Valves
- Fluid Containment Pan
- Engine Coolant Heater
- Oil Heater
- Level 1 Fan and Belt Guards (Enclosed Units Only)
- Radiator Duct Adapter (Open Set Only)

ELECTRICAL SYSTEM

- 10A UL Listed Battery Charger
- Battery Warmer

ALTERNATOR SYSTEM

- Alternator Upsizing
- Anti-Condensation Heater
- Tropical Coating

CIRCUIT BREAKER OPTIONS

- Main Line Circuit Breaker
- 2nd Main Line Circuit Breaker
- 3rd Main Line Circuit Breaker
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

GENERATOR SET

- Demand Response Rating
- Extended Factory Testing (3-Phase Only)
- 8 Position Load Center

ENCLOSURE

- Weather Protected Enclosure
- Level 1 Sound Attenuated
- Level 2 Sound Attenuated
- Level 2 Sound Attenuated with Motorized Dampers
- Steel Enclosure
- Aluminum Enclosure
- Up to 200 MPH Wind Load Rating (Contact Factory for Availability)
- AC/DC Enclosure Lighting Kit
- Enclosure Heaters

CONTROL SYSTEM

- NFPA 110 Compliant 21-Light Remote Annunciator
- Remote Relay Assembly (8 or 16)
- Remote E-Stop (Break Glass-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Flush Mount)
- 10A Run Relay
- Ground Fault Indication and Protection Functions
- 120V GFCI and 240V Outlets
- 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

CONTROL SYSTEM

- Spare Inputs (x4) / Outputs (x4)
- Battery Disconnect Switch

GENERATOR SET

- Special Testing
- Battery Box

SG050NA | 4.5L | 50 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary

GENERAC INDUSTRIAL POWER

APPLICATION AND ENGINEERING DATA

ENGINE SPECIFICATIONS

General

Make	Generac
Cylinder #	4
Type	In-Line
Displacement - in^3 (L)	275.0 (4.5)
Bore - in (mm)	4.5 (114.0)
Stroke - in (mm)	4.25 (107.95)
Compression Ratio	9.94:1
Intake Air Method	Naturally Aspirated
Number of Main Bearings	5
Connecting Rods	Forged Steel, Fractured Split, Bushingless
Cylinder Head	Cast Iron
Cylinder Liners	Cast Iron
Ignition	Coil Near Plug Solid State Inductive
Piston Type	Cast Aluminum Flat Top
Crankshaft Type	Forged Steel
Lifter Type	Hydraulic
Intake Valve Material	Stainless Steel
Exhaust Valve Material	Stainless Steel
Hardened Valve Seats	High Steel Iron Alloy

Engine Governing

Governor	Electronic
Frequency Regulation (Steady State)	±0.25%

Lubrication System

Oil Pump Type	Gear Driving
Oil Filter Type	Full-Flow Spin-On Cartridge
Crankcase Capacity - qt (L)	21 (20)

Cooling System

Cooling System Type	Pressurized Closed
Fan Type	Pusher
Fan Speed - RPM	2,100
Fan Diameter - in (mm)	20 (508)

Fuel System

Fuel Type	Natural Gas, Propane
Fuel Injection	Electronic
Fuel Shut Off	Dual
NG Operating Fuel Pressure - in H_2O (kPa)	5 - 14 (1.2 - 3.5)
LP Operating Fuel Pressure - in H_2O (kPa)	7 - 14 (1.7 - 3.5)

Engine Electrical System

System Voltage	12 VDC
Battery Charger Alternator	35 A
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% (3-Phase)
Telephone Interference Factor (TIF)	<50

Standard Excitation	Synchronous Brushless
Bearings	Sealed Ball
Coupling	Direct via Flexible Disc
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Full Digital
Number of Sensed Phases	All
Regulation Accuracy (Steady State)	±0.25%

GENERAC | INDUSTRIAL POWER

OPERATING DATA

POWER RATINGS

		Natural Gas				LP Vapor			
		Standby/Demand Response		Prime		Standby/Demand Response		Prime	
Alternator	Voltage	Power	Amps	Power	Amps	Power	Amps	Power	Amps
A0050044N21	Single-Phase 120/240 VAC @1.0pf	48 kW/48 kVA	200	45 kW/45 kVA	188	50 kW/50 kVA	208	45 kW/45 kVA	188
A0060044N21	Single-Phase 120/240 VAC @1.0pf	50 kW/50 kVA	208	45 kW/45 kVA	188	50 kW/50 kVA	208	45 kW/45 kVA	188
K0050124Y21	Three-Phase 120/208 VAC @0.8pf	48 kW/60 kVA	167	45 kW/56 kVA	156	50 kW/63 kVA	174	45 kW/56 kVA	156
K0060124Y21	Three-Phase 120/208 VAC @0.8pf	50 kW/63 kVA	174	45 kW/56 kVA	156	50 kW/63 kVA	174	45 kW/56 kVA	156
K0050124Y21	Three-Phase 120/240 VAC @0.8pf	48 kW/60 kVA	144	45 kW/56 kVA	135	50 kW/63 kVA	150	45 kW/56 kVA	135
K0060124Y21	Three-Phase 120/240 VAC @0.8pf	50 kW/63 kVA	150	45 kW/56 kVA	135	50 kW/63 kVA	150	45 kW/56 kVA	135
K0050124Y21	Three-Phase 277/480 VAC @0.8pf	50 kW/63 kVA	75	45 kW/56 kVA	68	50 kW/63 kVA	75	45 kW/56 kVA	68
K0060124Y21	Three-Phase 277/480 VAC @0.8pf	50 kW/63 kVA	75	45 kW/56 kVA	68	50 kW/63 kVA	75	45 kW/56 kVA	68

MOTOR STARTING CAPABILITIES (skVA)

skVA vs. Voltage Dip

277/480 VAC	30%	208/240 VAC	30%
K0050124Y21	98	K0050124Y21	75
K0060124Y21	124	K0060124Y21	95

SG050NA | 4.5L | 50 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary

GENERAC INDUSTRIAL POWER

OPERATING DATA

FUEL CONSUMPTION RATES*

Natural Gas – scfh (m^3/hr)

Percent Load	Standby
25%	204 (5.8)
50%	343 (9.7)
75%	456 (12.9)
100%	621 (17.6)

Propane Vapor – scfh (m^3/hr)

Percent Load	Standby
25%	102.6 (2.9)
50%	175.9 (5.0)
75%	237.5 (6.7)
100%	293.2 (8.3)

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

COOLING

		Standby
Air Flow (Fan Air Flow Across Radiator)	scfm (m^3/min)	2,470 (69.9)
Coolant Flow	gpm (Lpm)	38 (142.7)
Coolant System Capacity	gal (L)	3 (11.4)
Max. Operating Ambient Temperature	°F (°C)	122 (50)
Maximum Operating Ambient Temperature (Before Derate)	See Bulletin No. 0199270SSD	
Maximum Radiator Backpressure	in H_2O (kPa)	0.5 (0.12)

COMBUSTION AIR REQUIREMENTS

	Standby
Flow at Rated Power scfm (m^3/min)	115 (3.3)

ENGINE

		Standby
Rated Engine Speed	RPM	1,800
Horsepower at Rated kW**	hp	76
Piston Speed	ft/min (m/min)	1,275 (389)
BMEP	psi (kPa)	124 (855)

EXHAUST

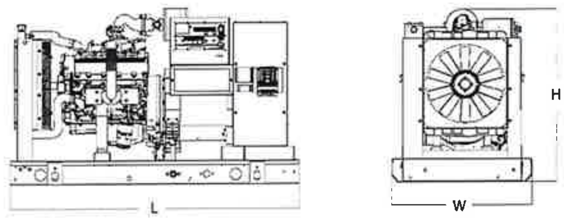
		Standby
Exhaust Flow (Rated Output)	scfm (m^3/min)	332 (9.4)
Maximum Exhaust Backpressure	inHg (kPa)	0.75 (2.54)
Exhaust Temp (Rated Output - Post Silencer)	°F (°C)	1,100 (593)

** 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 0187500SSB
Prime - See Bulletin 0187510SSB

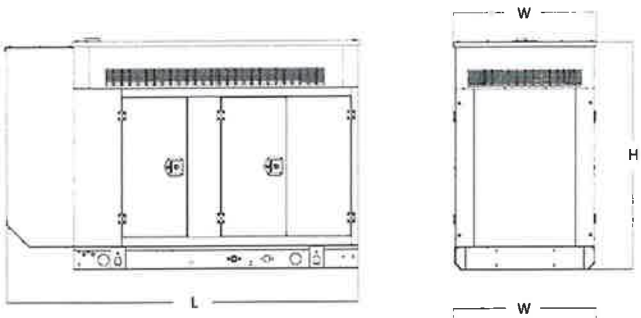
GENERAC® INDUSTRIAL POWER

DIMENSIONS AND WEIGHTS*



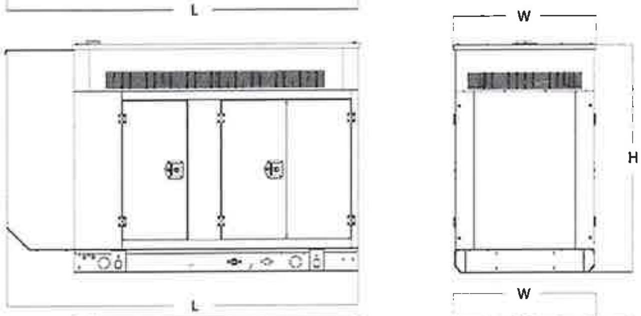
OPEN SET (Includes Exhaust Flex)

L x W x H - in (mm)	76.0 (1,930) x 37.4 (950) x 46.3 (1,176)
Weight - lbs (kg)	2,256 (1,023)



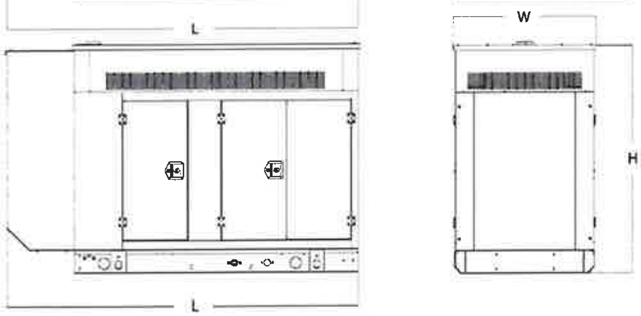
WEATHER PROTECTED ENCLOSURE

L x W x H - in (mm)	94.8 (2,407) x 37.4 (950) x 69.1 (1,755)
Weight - lbs (kg)	Steel: 2,697 (1,223) Aluminum: 1,754 (795)



LEVEL 1 SOUND ATTENUATED ENCLOSURE

L x W x H - in (mm)	94.8 (2,407) x 37.4 (950) x 69.1 (1,755)
Weight - lbs (kg)	Steel: 2,776 (1,259) Aluminum: 2,508 (1,138)



LEVEL 2 SOUND ATTENUATED ENCLOSURE

L x W x H - in (mm)	94.8 (2,407) x 37.4 (950) x 69.1 (1,755)
Weight - lbs (kg)	Steel: 2,928 (1,328) Aluminum: 2,574 (1,168)

* All measurements are approximate and for estimation purposes only.

YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Please contact a Generac Power Systems Industrial Dealer for detailed installation drawings.

SPEC SHEET

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

Part No. A0000310340
Rev. 1 07/15/19

ATTACHMENT 5

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

150' Existing Lattice Tower

Proposed Verizon Wireless
Antenna Installation

Site Ref: Killingly East

1249 Hartford Pike
Killingly, CT

Centek Project No. 22017.12

~~Date: February 7, 2023~~
Rev 3: August 17, 2023

Max Stress Ratio = 88%

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

Prepared for:

Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-∆ structural analysis of the antenna installation proposed by Verizon on the existing lattice tower located in Killingly, Connecticut.

The host tower is a 150-ft, three legged, lattice tower originally designed and manufactured by Valmont eng. file no. A-150712 dated 5/18/2011. The tower geometry, structure member sizes and foundation information were taken from the aforementioned design documents.

Antenna and appurtenance inventory was taken from the aforementioned design documents, a tower inventory provided by the tower owner, photo documentation (from grade) taken by Centek personnel on February 2, 2023 and an RF data sheet.

The tower consists of eight (8) vertical sections consisting of solid round pipe legs conforming to ASTM A572 Gr. 50 and lateral bracing consisting of steel angles conforming to ASTM A36 and soild round pipe conforming to ASTM A572 Gr. 50. The vertical tower sections are connected by bolted flange plates/sleeves with the diagonal and horizontal bracing to pipe legs consisting of bolted/welded connections. The width of the tower face is 4-ft 0-in at the top and 16-ft at the bottom.

Antenna and Appurtenance Summary

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

- UNKNOWN (EXISTING):
  <u>Antennas:</u> Two (2) DB438 yagi antennas, three (3) PD201 omni antennas, two (2) DB411 dipole antennas, one (1) DB222 dipole antenna, three (3) PD1142 omni antennas and two (2) 3-ft microwave dishes mounted on (1) 6-arm halo mount with an elevation of ±150-ft above grade level.
  <u>Coax Cable:</u> Five (5) 7/8” ∅ and eight (8) 1/2” ∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report
- UNKNOWN (EXISTING):
  <u>Antennas:</u> Three (3) DB438 yagi antennas mounted on (3) 3-ft side arm mounts with an elevation of ±135-ft above grade level.
  <u>Coax Cable:</u> Three (3) 1/2” ∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report
- UNKNOWN (EXISTING):
  <u>Antennas:</u> Three (3) DB438 yagi antennas and one (1) ground plain antenna mounted on (3) 3-ft side arm mounts with an elevation of ±130-ft above grade level.
  <u>Coax Cable:</u> Four (4) 1/2” ∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report
- UNKNOWN (EXISTING):
  <u>Antennas:</u> One (1) DB438 yagi antenna mounted on (1) 3-ft side arm mount with an elevation of ±125-ft above grade level.
  <u>Coax Cable:</u> One (1) 1/2” ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report

- UNKNOWN (EXISTING):
  Antennas: One (1) 6-ft yagi antenna and one (1) DB222 dipole antenna mounted on (2) 3-ft side arm mounts and one (1) DB-225 antenna leg mounted with an elevation of ±120-ft above grade level.
  Coax Cable: Three (3) 1/2" ∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report
- UNKNOWN (EXISTING):
  Antennas: One (1) DB-225 antenna leg mounted with an elevation of ±110-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ cables running on a leg/face of the existing tower as specified in Section 3 of this report
- UNKNOWN (EXISTING):
  Antennas: One (1) PD201 omni antenna mounted on (1) 3-ft side arm mount with an elevation of ±85-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report
- **VERIZON (PROPOSED):**
  Antennas: Six (6) Commscope JAHH-65B-R3B panel antennas, three (3) Samsung MT6413-77A panel antennas, three (3) Samsung RF4439d-25A (B2/B66A) RRHs, three (3) Samsung RF4461d-13A (B5/B13) RRHs, three (3) CBC78T-DS-43 diplexers and one (1) OVP box mounted on (3) 12-ft V-Frames (SitePro VFA-12-HD) with a RAD center elevation of ±120-ft above grade level.
  Coax Cable: One (1) 1-5/8" ∅ fiber cable running on a leg/face of the existing tower as specified in Section 3 of this report

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables should be routed as specified in section 3 of this report.

Analysis

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

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

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

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-H, gravity loads of the tower structure and its components, and the application of 1.00" radial ice on the tower structure and its components.

Load Cases:	Load Case 1; 135 mph (Ultimate) wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix P of the 2022 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 1.00" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-H]*

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

Tower Capacity

Calculated stresses were found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (%of capacity)	Result
Leg (T7)	20-0”-40’-0”	76.6%	**PASS**
Diagonal (T7)	20’-0”-40’-0”	87.7%	**PASS**

Foundation and Anchors

The existing foundation consists of a three (3) 3.5-ft ∅ x 3.5-ft long reinforced concrete piers concentrically bearing on a 24-ft square x 1-ft 6-in thick reinforced concrete mat. The sub grade conditions used in the foundation analysis were derived from the aforementioned design documents. The base of the tower is connected to the foundation by means of (6) 1.0”∅, ASTM F1554-105 anchor bolts per leg embedded 4-ft 3-in into the concrete foundation structure.

- The tower reactions developed from the governing Load Case were used in the verification of the foundation and anchor bolts:

Load Effect	Proposed Tower Reactions
Leg Shear	22 kips
Leg Compression	218 kips
Leg Tension	199 kips
Base Moment	2,904 ft-kips
Base Shear	33 kips

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

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	56.7%	**PASS**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-H Required FS(1)	Proposed Loading (FS)(1)	Result
Reinforced Concrete Pad and Piers	Overturning	1.0	1.17	**PASS**

Note 1: FS denotes Factor of Safety

Conclusion

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

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

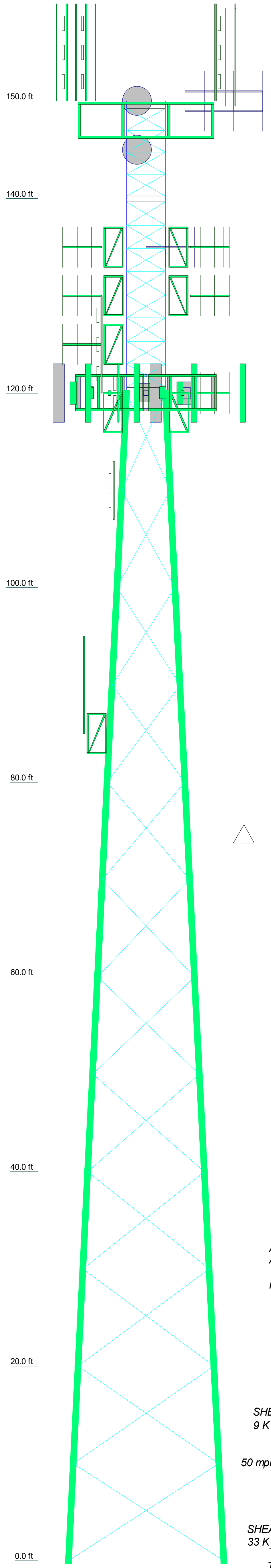
tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Bottom Girts	Horizontals	# Panels @ (ft)	Weight (K)
T1	SR 1 1/2	A572-50	SR 5/8	A572-50	SR 7/8	SR 7/8	SR 3/4	4 @ 2.26042	0.4
T2	SR 1 3/4	A572-50	SR 3/4	A572-50	SR 7/8	SR 7/8	SR 3/4	8 @ 2.38021	0.9
T3	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	A572-50	L2 1/2x2 1/2x3/16	A36	N.A.	N.A.	N.A.	12 @ 10	1.7
T4	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	A572-50	L2 1/2x2 1/2x3/16	A36	N.A.	N.A.	N.A.	12 @ 10	1.8
T5	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	A500M-58	L2 1/2x2 1/2x3/16	A36	N.A.	N.A.	N.A.	12 @ 10	2.2
T6	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	A500M-58	L2 1/2x2 1/2x3/16	A36	N.A.	N.A.	N.A.	12 @ 10	2.2
T7	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	A500M-58	L2 1/2x2 1/2x3/16	A36	N.A.	N.A.	N.A.	12 @ 10	2.3
T8	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	A500M-58	L3x3x3/16	A36	N.A.	N.A.	N.A.	12 @ 10	2.8

Face Width (ft): 4, 6, 8, 10, 12, 14, 16

Weight (K): 14.3



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DB438	150	RF4461d-13A (Verizon - Proposed)	120
DB438	150	CBC78T-DS-43 (Verizon - Proposed)	120
PD201-1	150	CBC78T-DS-43 (Verizon - Proposed)	120
PD201-1	150	CBC78T-DS-43 (Verizon - Proposed)	120
DB411-A	150	RC2DC-3315-PF-48 (Verizon - Proposed)	120
PD1142-1	150	RF4461d-13A (Verizon - Proposed)	120
DB222	150	SitePro VFA12-HD (Verizon - Proposed)	120
PD201-1	150	SitePro VFA12-HD (Verizon - Proposed)	120
DB411-A	150	SitePro VFA12-HD (Verizon - Proposed)	120
PD1142-1	150	(2) JAHH-65B-R3B (Verizon - Proposed)	120
PD1142-1 (Future)	150	MT6413-77A (Verizon - Proposed)	120
3-ft Dish	150	(2) JAHH-65B-R3B (Verizon - Proposed)	120
6-Arm Halo Mount	148	MT6413-77A (Verizon - Proposed)	120
3-ft Dish	145	(2) JAHH-65B-R3B (Verizon - Proposed)	120
DB438	135	MT6413-77A (Verizon - Proposed)	120
3' Side Mount Standoff	135	6' Yagi	120
DB438	135	DB222	120
3' Side Mount Standoff	135	RF4439d-25A (B2/B66A RRH) (Verizon - Proposed)	120
DB438	135	DB225-A (Future)	120
3' Side Mount Standoff	135	RF4439d-25A (B2/B66A RRH) (Verizon - Proposed)	120
DB438	130	RF4461d-13A (Verizon - Proposed)	120
DB438	130	3' Side Mount Standoff	118
3' Side Mount Standoff	130	3' Side Mount Standoff	118
Ground Plane	130	DB225-A (Future)	110
3' Side Mount Standoff	130	PD201-1	85
DB438	130	3' Side Mount Standoff	85
3' Side Mount Standoff	130		
DB438	125		
3' Side Mount Standoff	125		
RF4439d-25A (B2/B66A RRH) (Verizon - Proposed)	120		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A500M-58	58 ksi	70 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-H Standard.
2. Tower designed for a 135 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 87.7%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 218 K
SHEAR: 22 K

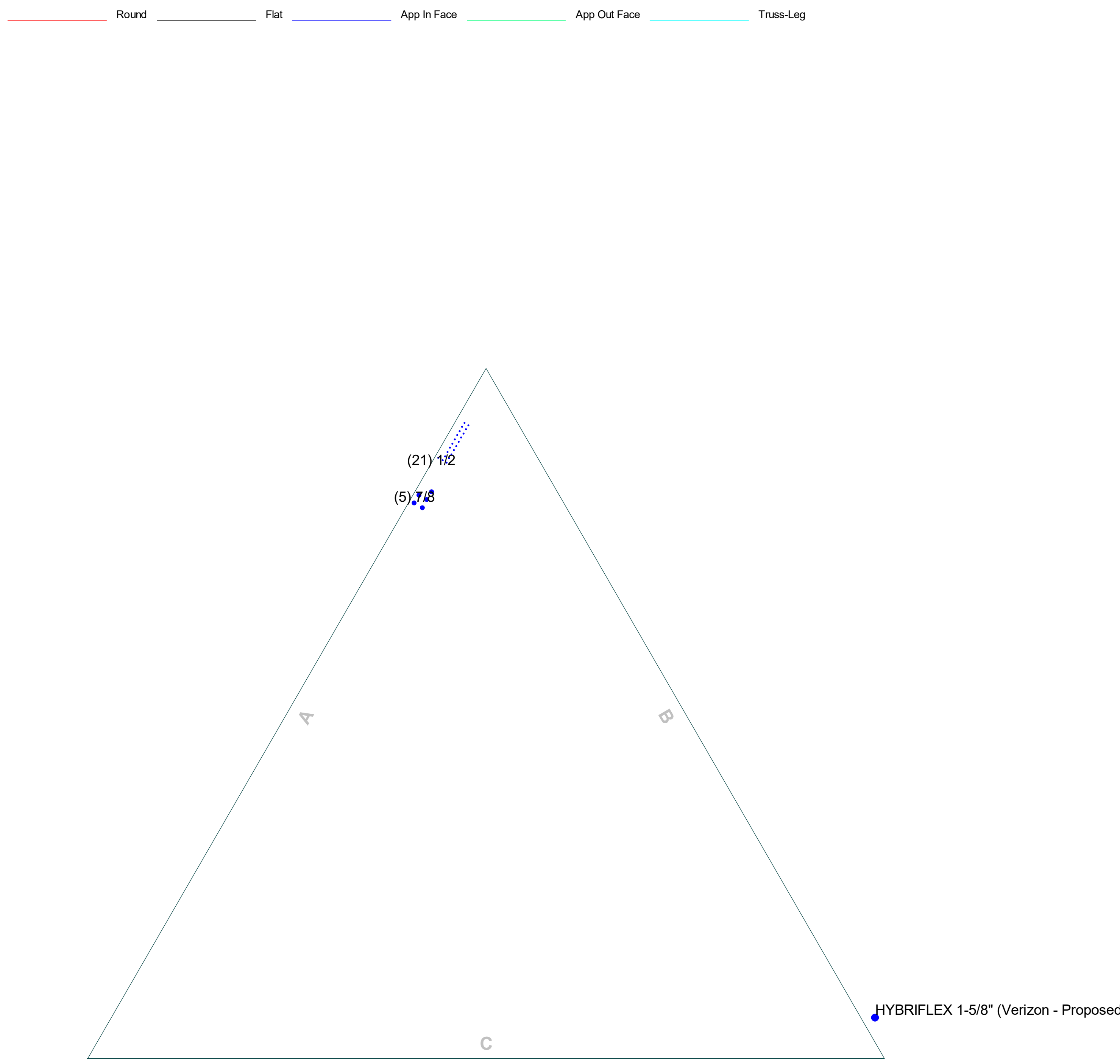
UPLIFT: -199 K
SHEAR: 20 K

AXIAL 58 K
SHEAR 9 K
MOMENT 817 kip-ft
TORQUE 3 kip-ft
50 mph WIND - 1.0000 in ICE

AXIAL 26 K
SHEAR 33 K
MOMENT 2904 kip-ft
TORQUE 19 kip-ft
REACTIONS - 135 mph WIND

Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: **22017.02 - Killingly East**	
	Project: **150' Lattice Tower - 1249 Hartford Pike, Killingly, CT**	
	Client: Verizon	Drawn by: TJL / App'd:
	Code: TIA-222-H	Date: 08/17/23 / Scale: NTS
	Path: J:\Jobs\2201700.WI\12_Killingly East CT\05_Structural\Tower\Backup Documentation\Rev (0)\Tnx\150-ft Valmont Lattice Tower.eri	Dwg No. E-1

Feed Line Plan



Centek Engineering Inc.	Job: 22017.02 - Killingly East		
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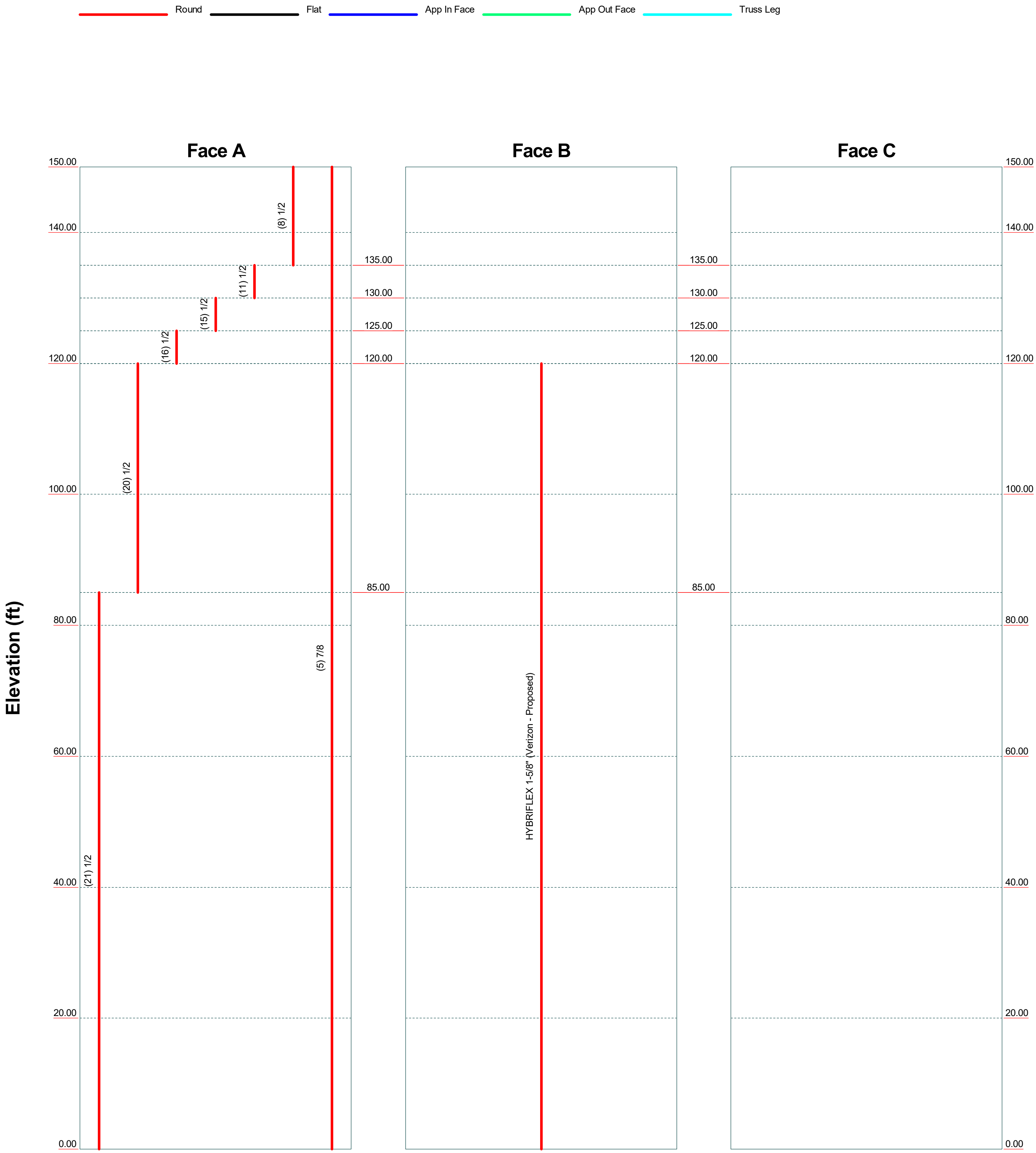
Feed Line Distribution Chart
0' - 150'



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	Path: J:\Jobs\2201700.WI\12_Killingly East CT\05_Structural\Tower\Backup Documentation\Rev (3)\Tnx\150-ft Valmont Lattice Tower.eri		Dwg No. E-7

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 150.00 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 4.00 ft at the top and 16.00 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

- Tower base elevation above sea level: 0.00 ft.
- Basic wind speed of 135 mph.
- Risk Category III.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.0000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

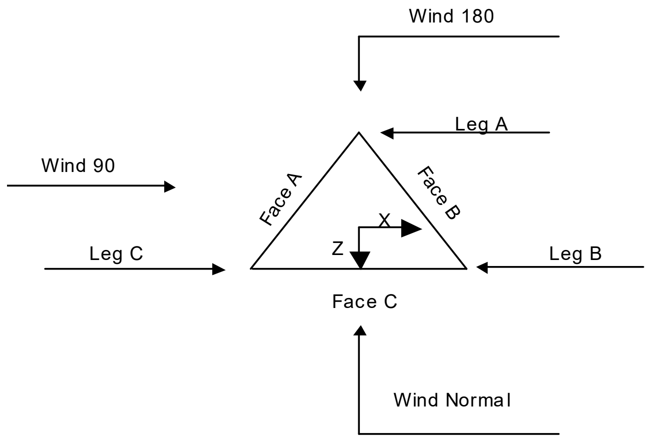
Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
√ Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
Secondary Horizontal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

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

Use ASCE 10 X-Brace Ly Rules
√ Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
√ SR Leg Bolts Resist Compression
√ All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feed Line Torque
Include Angle Block Shear Check
Use TIA-222-H Bracing Resist. Exemption
Use TIA-222-H Tension Splice Exemption

Poles

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



Triangular Tower

Tower Section Geometry

Tower Section	*Tower Elevation* *ft*	*Assembly Database*	*Description*	*Section Width* *ft*	*Number of Sections*	*Section Length* *ft*
T1	150.00-140.00			4.00	1	10.00
T2	140.00-120.00			4.00	1	20.00
T3	120.00-100.00			4.00	1	20.00
T4	100.00-80.00			6.00	1	20.00
T5	80.00-60.00			8.00	1	20.00
T6	60.00-40.00			10.00	1	20.00
T7	40.00-20.00			12.00	1	20.00
T8	20.00-0.00			14.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	*Tower Elevation* *ft*	*Diagonal Spacing* *ft*	*Bracing Type*	*Has K Brace End Panels*	*Has Horizontals*	*Top Girt Offset* *in*	*Bottom Girt Offset* *in*
T1	150.00-140.00	2.26	X Brace	No	Steps	9.0000	2.5000
T2	140.00-120.00	2.38	X Brace	No	Steps	4.5000	7.0000
T3	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T4	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T5	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T6	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T7	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T8	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 150.00-140.00	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round	5/8	A572-50 (50 ksi)
T2 140.00-120.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T3 120.00-100.00	Truss Leg	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 100.00-80.00	Truss Leg	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 80.00-60.00	Truss Leg	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	A500M-58 (58 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 60.00-40.00	Truss Leg	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	A500M-58 (58 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 40.00-20.00	Truss Leg	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	A500M-58 (58 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T8 20.00-0.00	Truss Leg	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	A500M-58 (58 ksi)	Single Angle	L3x3x3/16	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 150.00-140.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 140.00-120.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 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
T1 150.00-140.00	None	Single Angle		A36 (36 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 140.00-120.00	None	Solid Round		A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 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 150.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	30.0000	36.0000
T2 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

			K Factors[1]							
Tower Elevation *ft*	*Calc K Single Angles*	*Calc K Solid Rounds*	*Legs*	*X Brace Diags* *X* *Y*	*K Brace Diags* *X* *Y*	*Single Diags* *X* *Y*	*Girts* *X* *Y*	*Horiz.* *X* *Y*	*Sec. Horiz.* *X* *Y*	*Inner Brace* *X* *Y*
T1 150.00-140.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 140.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 120.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 20.00-0.00	Yes	Yes	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)*

Truss-Leg K Factors

Tower Elevation ft	Truss-Legs Used As Leg Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals
T3 120.00-100.00	1	1	1	1	0.5	0.85
T4 100.00-80.00	1	1	1	1	0.5	0.85
T5 80.00-60.00	1	1	1	1	0.5	0.85
T6 60.00-40.00	1	1	1	1	0.5	0.85
T7 40.00-20.00	1	1	1	1	0.5	0.85
T8 20.00-0.00	1	1	1	1	0.5	0.85

Tower Section Geometry *(cont'd)*

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
T1 150.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T2 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

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 150.00-140.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 140.00-120.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 120.00-100.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 100.00-80.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 80.00-60.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 60.00-40.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 40.00-20.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 20.00-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Leg Connection Type*	*Leg*		*Diagonal*		*Top Girt*		*Bottom Girt*		*Mid Girt*		*Long Horizontal*		*Short Horizontal*	
		Bolt Size in	*No.*	*Bolt Size in*	*No.*	*Bolt Size in*	*No.*	*Bolt Size in*	*No.*	*Bolt Size in*	*No.*	*Bolt Size in*	*No.*	*Bolt Size in*	*No.*
T1 150.00-140.00	Sleeve DS	0.6250 A325N	4	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 140.00-120.00	Flange	1.0000 A325N	6	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 120.00-100.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 100.00-80.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 80.00-60.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 60.00-40.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 40.00-20.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 20.00-0.00	Flange	1.0000 F1554-105	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	0

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*
HYBRIFLEX 1-5/8" (Verizon - Proposed)	B	No	No	Ar (CaAa)	120.00 - 0.00	2.0000	0.45	1	1	1.9800	1.9800		1.90
1/2	A	No	No	Ar (CaAa)	85.00 - 0.00	-3.0000	0.4	21	10	0.5800	0.5800		0.25
1/2	A	No	No	Ar (CaAa)	120.00 - 85.00	-3.0000	0.4	20	10	0.5800	0.5800		0.25
1/2	A	No	No	Ar (CaAa)	125.00 - 120.00	-3.0000	0.4	16	8	0.5800	0.5800		0.25
1/2	A	No	No	Ar (CaAa)	130.00 - 125.00	-3.0000	0.4	15	8	0.5800	0.5800		0.25
1/2	A	No	No	Ar (CaAa)	135.00 - 130.00	-3.0000	0.4	11	6	0.5800	0.5800		0.25
1/2	A	No	No	Ar (CaAa)	150.00 - 135.00	-3.0000	0.4	8	4	0.5800	0.5800		0.25
7/8	A	No	No	Ar (CaAa)	150.00 - 0.00	-3.0000	0.32	5	3	1.1100	1.1100		0.54

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T1	150.00-140.00	A	0.000	0.000	10.190	0.000	0.05
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	140.00-120.00	A	0.000	0.000	25.600	0.000	0.12
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T3	120.00-100.00	A	0.000	0.000	34.300	0.000	0.15
		B	0.000	0.000	3.960	0.000	0.04
		C	0.000	0.000	0.000	0.000	0.00
T4	100.00-80.00	A	0.000	0.000	34.590	0.000	0.16
		B	0.000	0.000	3.960	0.000	0.04
		C	0.000	0.000	0.000	0.000	0.00
T5	80.00-60.00	A	0.000	0.000	35.460	0.000	0.16
		B	0.000	0.000	3.960	0.000	0.04
		C	0.000	0.000	0.000	0.000	0.00
T6	60.00-40.00	A	0.000	0.000	35.460	0.000	0.16
		B	0.000	0.000	3.960	0.000	0.04
		C	0.000	0.000	0.000	0.000	0.00
T7	40.00-20.00	A	0.000	0.000	35.460	0.000	0.16
		B	0.000	0.000	3.960	0.000	0.04
		C	0.000	0.000	0.000	0.000	0.00
T8	20.00-0.00	A	0.000	0.000	35.460	0.000	0.16
		B	0.000	0.000	3.960	0.000	0.04
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T1	150.00-140.00	A	1.333	0.000	0.000	22.768	0.000	0.28
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	140.00-120.00	A	1.319	0.000	0.000	51.789	0.000	0.67
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T3	120.00-100.00	A	1.297	0.000	0.000	60.897	0.000	0.83
		B		0.000	0.000	9.149	0.000	0.14
		C		0.000	0.000	0.000	0.000	0.00
T4	100.00-80.00	A	1.271	0.000	0.000	60.799	0.000	0.82
		B		0.000	0.000	9.045	0.000	0.14
		C		0.000	0.000	0.000	0.000	0.00
T5	80.00-60.00	A	1.240	0.000	0.000	61.107	0.000	0.83
		B		0.000	0.000	8.919	0.000	0.14
		C		0.000	0.000	0.000	0.000	0.00
T6	60.00-40.00	A	1.199	0.000	0.000	60.555	0.000	0.81
		B		0.000	0.000	8.755	0.000	0.13
		C		0.000	0.000	0.000	0.000	0.00
T7	40.00-20.00	A	1.139	0.000	0.000	59.751	0.000	0.78
		B		0.000	0.000	8.516	0.000	0.12
		C		0.000	0.000	0.000	0.000	0.00
T8	20.00-0.00	A	1.021	0.000	0.000	58.159	0.000	0.73
		B		0.000	0.000	8.042	0.000	0.11
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	150.00-140.00	-0.4945	-8.2672	-0.3834	-6.2449
T2	140.00-120.00	-0.4312	-9.1117	-0.3730	-6.9708
T3	120.00-100.00	0.5631	-7.0687	0.4337	-3.6688
T4	100.00-80.00	0.4430	-9.3916	0.5779	-7.0027
T5	80.00-60.00	0.2803	-11.4610	0.5789	-9.9852
T6	60.00-40.00	0.2140	-13.3138	0.5683	-12.1162
T7	40.00-20.00	0.1551	-15.0058	0.5230	-13.7221
T8	20.00-0.00	0.0944	-15.3885	0.4207	-14.6880

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	7	1/2	140.00 - 150.00	0.6000	0.5629
T1	8	7/8	140.00 - 150.00	0.6000	0.5629
T2	4	1/2	120.00 - 125.00	0.6000	0.5746
T2	5	1/2	125.00 - 130.00	0.6000	0.5746
T2	6	1/2	130.00 - 135.00	0.6000	0.5746
T2	7	1/2	135.00 - 140.00	0.6000	0.5746
T2	8	7/8	120.00 - 140.00	0.6000	0.5746
T3	1	HYBRIFLEX 1-5/8"	100.00 - 120.00	0.6000	0.3452
T3	3	1/2	100.00 - 120.00	0.6000	0.3452
T3	8	7/8	100.00 - 120.00	0.6000	0.3452
T4	1	HYBRIFLEX 1-5/8"	80.00 - 100.00	0.6000	0.4891
T4	2	1/2	80.00 - 85.00	0.6000	0.4891
T4	3	1/2	85.00 - 100.00	0.6000	0.4891
T4	8	7/8	80.00 - 100.00	0.6000	0.4891
T5	1	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.5750
T5	2	1/2	60.00 - 80.00	0.6000	0.5750
T5	8	7/8	60.00 - 80.00	0.6000	0.5750
T6	1	HYBRIFLEX 1-5/8"	40.00 - 60.00	0.6000	0.6000
T6	2	1/2	40.00 - 60.00	0.6000	0.6000
T6	8	7/8	40.00 - 60.00	0.6000	0.6000
T7	1	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.6000
T7	2	1/2	20.00 - 40.00	0.6000	0.6000
T7	8	7/8	20.00 - 40.00	0.6000	0.6000
T8	1	HYBRIFLEX 1-5/8"	0.00 - 20.00	0.6000	0.6000
T8	2	1/2	0.00 - 20.00	0.6000	0.6000
T8	8	7/8	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
SitePro VFA12-HD	A	From Leg	2.00	0.0000	120.00	No Ice	21.00	21.00	0.75
(Verizon - Proposed)			0.00			1/2" Ice	25.00	25.00	0.90
			0.00			1" Ice	29.00	29.00	1.05
SitePro VFA12-HD	B	From Leg	2.00	0.0000	120.00	No Ice	21.00	21.00	0.75
(Verizon - Proposed)			0.00			1/2" Ice	25.00	25.00	0.90
			0.00			1" Ice	29.00	29.00	1.05
SitePro VFA12-HD	C	From Leg	2.00	0.0000	120.00	No Ice	21.00	21.00	0.75
(Verizon - Proposed)			0.00			1/2" Ice	25.00	25.00	0.90
			0.00			1" Ice	29.00	29.00	1.05
(2) JAHH-65B-R3B	A	From Leg	4.00	0.0000	120.00	No Ice	9.11	5.98	0.06
(Verizon - Proposed)			-4.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
MT6413-77A	A	From Leg	4.00	0.0000	120.00	No Ice	3.79	1.46	0.06
(Verizon - Proposed)			4.00			1/2" Ice	4.04	1.65	0.08
			0.00			1" Ice	4.30	1.85	0.11
(2) JAHH-65B-R3B	B	From Leg	4.00	0.0000	120.00	No Ice	9.11	5.98	0.06
(Verizon - Proposed)			-4.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
MT6413-77A	B	From Leg	4.00	0.0000	120.00	No Ice	3.79	1.46	0.06
(Verizon - Proposed)			4.00			1/2" Ice	4.04	1.65	0.08
			0.00			1" Ice	4.30	1.85	0.11
(2) JAHH-65B-R3B	C	From Leg	4.00	0.0000	120.00	No Ice	9.11	5.98	0.06
(Verizon - Proposed)			-4.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
MT6413-77A	C	From Leg	4.00	0.0000	120.00	No Ice	3.79	1.46	0.06
(Verizon - Proposed)			4.00			1/2" Ice	4.04	1.65	0.08
			0.00			1" Ice	4.30	1.85	0.11
RF4439d-25A (B2/B66A	A	From Leg	2.00	0.0000	120.00	No Ice	1.88	1.25	0.08
RRH)			4.00			1/2" Ice	2.05	1.39	0.09
(Verizon - Proposed)			0.00			1" Ice	2.22	1.54	0.11
RF4439d-25A (B2/B66A	B	From Leg	2.00	0.0000	120.00	No Ice	1.88	1.25	0.08
RRH)			4.00			1/2" Ice	2.05	1.39	0.09
(Verizon - Proposed)			0.00			1" Ice	2.22	1.54	0.11
RF4439d-25A (B2/B66A	C	From Leg	2.00	0.0000	120.00	No Ice	1.88	1.25	0.08
RRH)			4.00			1/2" Ice	2.05	1.39	0.09
(Verizon - Proposed)			0.00			1" Ice	2.22	1.54	0.11
RF4461d-13A	A	From Leg	2.00	0.0000	120.00	No Ice	1.87	1.28	0.08
(Verizon - Proposed)			4.00			1/2" Ice	2.03	1.42	0.10
			0.00			1" Ice	2.21	1.57	0.12
RF4461d-13A	B	From Leg	2.00	0.0000	120.00	No Ice	1.87	1.28	0.08
(Verizon - Proposed)			4.00			1/2" Ice	2.03	1.42	0.10
			0.00			1" Ice	2.21	1.57	0.12
RF4461d-13A	C	From Leg	2.00	0.0000	120.00	No Ice	1.87	1.28	0.08
(Verizon - Proposed)			4.00			1/2" Ice	2.03	1.42	0.10
			0.00			1" Ice	2.21	1.57	0.12
CBC78T-DS-43	A	From Leg	2.00	0.0000	120.00	No Ice	0.37	0.26	0.01
(Verizon - Proposed)			0.00			1/2" Ice	0.45	0.32	0.02
			0.00			1" Ice	0.53	0.40	0.02
CBC78T-DS-43	B	From Leg	2.00	0.0000	120.00	No Ice	0.37	0.26	0.01
(Verizon - Proposed)			0.00			1/2" Ice	0.45	0.32	0.02

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			1" Ice	0.53	0.40	0.02
CBC78T-DS-43	C	From Leg	2.00	0.0000	120.00	No Ice	0.37	0.26	0.01
(Verizon - Proposed)			0.00			1/2" Ice	0.45	0.32	0.02
			0.00			1" Ice	0.53	0.40	0.02
RC2DC-3315-PF-48	A	From Leg	2.00	0.0000	120.00	No Ice	3.01	1.96	0.03
(Verizon - Proposed)			0.00			1/2" Ice	3.23	2.15	0.05
			0.00			1" Ice	3.46	2.35	0.08
6-Arm Halo Mount	C	None		0.0000	148.00	No Ice	45.75	45.75	2.00
						1/2" Ice	66.00	66.00	3.00
						1" Ice	86.25	86.25	4.00
DB438	A	From Leg	6.00	0.0000	150.00	No Ice	1.80	1.80	0.03
			4.00			1/2" Ice	3.00	3.00	0.05
			1.00			1" Ice	4.20	4.20	0.07
DB438	A	From Leg	6.00	0.0000	150.00	No Ice	1.80	1.80	0.03
			4.00			1/2" Ice	3.00	3.00	0.05
			-1.00			1" Ice	4.20	4.20	0.07
PD201-1	B	From Leg	6.00	0.0000	150.00	No Ice	0.63	0.63	0.00
			-4.00			1/2" Ice	1.54	1.54	0.01
			4.50			1" Ice	2.47	2.47	0.02
PD201-1	B	From Leg	6.00	0.0000	150.00	No Ice	0.63	0.63	0.00
			-2.00			1/2" Ice	1.54	1.54	0.01
			4.50			1" Ice	2.47	2.47	0.02
DB411-A	B	From Leg	6.00	0.0000	150.00	No Ice	1.50	1.50	0.03
			0.00			1/2" Ice	2.70	2.70	0.03
			5.00			1" Ice	3.90	3.90	0.04
PD1142-1	C	From Leg	6.00	0.0000	150.00	No Ice	1.32	1.32	0.01
			-4.00			1/2" Ice	3.21	3.21	0.02
			5.00			1" Ice	5.12	5.12	0.05
DB222	C	From Leg	6.00	0.0000	150.00	No Ice	1.60	1.60	0.02
			-2.00			1/2" Ice	2.88	2.88	0.02
			5.00			1" Ice	4.16	4.16	0.03
PD201-1	C	From Leg	6.00	0.0000	150.00	No Ice	0.63	0.63	0.00
			0.00			1/2" Ice	1.54	1.54	0.01
			5.00			1" Ice	2.47	2.47	0.02
DB411-A	C	From Leg	6.00	0.0000	150.00	No Ice	1.50	1.50	0.03
			2.00			1/2" Ice	2.70	2.70	0.03
			5.00			1" Ice	3.90	3.90	0.04
PD1142-1	C	From Leg	6.00	0.0000	150.00	No Ice	1.32	1.32	0.01
			4.00			1/2" Ice	3.21	3.21	0.02
			5.00			1" Ice	5.12	5.12	0.05
DB438	A	From Leg	3.00	0.0000	135.00	No Ice	1.80	1.80	0.03
			0.00			1/2" Ice	3.00	3.00	0.05
			0.00			1" Ice	4.20	4.20	0.07
3' Side Mount Standoff	A	From Leg	1.50	0.0000	135.00	No Ice	2.00	2.00	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00			1" Ice	4.74	4.74	0.06
DB438	B	From Leg	3.00	0.0000	135.00	No Ice	1.80	1.80	0.03
			0.00			1/2" Ice	3.00	3.00	0.05
			0.00			1" Ice	4.20	4.20	0.07
3' Side Mount Standoff	B	From Leg	1.50	0.0000	135.00	No Ice	2.00	2.00	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00			1" Ice	4.74	4.74	0.06
DB438	C	From Leg	3.00	0.0000	135.00	No Ice	1.80	1.80	0.03
			0.00			1/2" Ice	3.00	3.00	0.05
			0.00			1" Ice	4.20	4.20	0.07
3' Side Mount Standoff	C	From Leg	1.50	0.0000	135.00	No Ice	2.00	2.00	0.04
			0.00			1/2" Ice	3.69	3.69	0.05

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		C_AA_A *Front* *ft²*	C_AA_A *Side* *ft²*	*Weight* *K*
			0.00			1" Ice	4.74	4.74	0.06
DB438	B	From Leg	3.00	0.0000	130.00	No Ice	1.80	1.80	0.03
			0.00			1/2" Ice	3.00	3.00	0.05
			0.00			1" Ice	4.20	4.20	0.07
DB438	B	From Leg	3.00	0.0000	130.00	No Ice	1.80	1.80	0.03
			0.00			1/2" Ice	3.00	3.00	0.05
			0.00			1" Ice	4.20	4.20	0.07
3' Side Mount Standoff	B	From Leg	1.50	0.0000	130.00	No Ice	2.00	2.00	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00			1" Ice	4.74	4.74	0.06
Ground Plane	C	From Leg	3.00	0.0000	130.00	No Ice	5.00	5.00	0.05
			0.00			1/2" Ice	9.00	9.00	0.07
			0.00			1" Ice	13.00	13.00	0.10
3' Side Mount Standoff	C	From Leg	1.50	0.0000	130.00	No Ice	2.00	2.00	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00			1" Ice	4.74	4.74	0.06
DB438	C	From Leg	3.00	0.0000	130.00	No Ice	1.80	1.80	0.03
			0.00			1/2" Ice	3.00	3.00	0.05
			0.00			1" Ice	4.20	4.20	0.07
3' Side Mount Standoff	C	From Leg	1.50	0.0000	130.00	No Ice	2.00	2.00	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00			1" Ice	4.74	4.74	0.06
DB438	C	From Leg	3.00	0.0000	125.00	No Ice	1.80	1.80	0.03
			0.00			1/2" Ice	3.00	3.00	0.05
			0.00			1" Ice	4.20	4.20	0.07
3' Side Mount Standoff	C	From Leg	1.50	0.0000	125.00	No Ice	2.00	2.00	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00			1" Ice	4.74	4.74	0.06
6' Yagi	B	From Leg	3.00	0.0000	120.00	No Ice	5.00	5.00	0.04
			0.00			1/2" Ice	6.50	6.50	0.06
			0.00			1" Ice	8.00	8.00	0.08
3' Side Mount Standoff	B	From Leg	1.50	0.0000	118.00	No Ice	2.00	2.00	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00			1" Ice	4.74	4.74	0.06
DB222	C	From Leg	3.00	0.0000	120.00	No Ice	1.60	1.60	0.02
			0.00			1/2" Ice	2.88	2.88	0.02
			5.00			1" Ice	4.16	4.16	0.03
3' Side Mount Standoff	C	From Leg	1.50	0.0000	118.00	No Ice	2.00	2.00	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00			1" Ice	4.74	4.74	0.06
PD201-1	C	From Leg	3.00	0.0000	85.00	No Ice	0.63	0.63	0.00
			0.00			1/2" Ice	1.54	1.54	0.01
			5.00			1" Ice	2.47	2.47	0.02
3' Side Mount Standoff	C	From Leg	1.50	0.0000	85.00	No Ice	2.00	2.00	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00			1" Ice	4.74	4.74	0.06
PD1142-1	B	From Leg	6.00	0.0000	150.00	No Ice	1.32	1.32	0.01
(Future)			-4.00			1/2" Ice	3.21	3.21	0.02
			5.00			1" Ice	5.12	5.12	0.05
DB225-A	C	From Leg	1.00	0.0000	120.00	No Ice	3.21	3.21	0.04
(Future)			0.00			1/2" Ice	5.78	5.78	0.05
			0.00			1" Ice	8.35	8.35	0.06
DB225-A	C	From Leg	1.00	0.0000	110.00	No Ice	3.21	3.21	0.04
(Future)			0.00			1/2" Ice	5.78	5.78	0.05
			0.00			1" Ice	8.35	8.35	0.06

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
3-ft Dish	A	Paraboloid w/o Radome	From Leg	6.00 -1.00 0.00	0.0000		150.00	3.00	No Ice 1/2" Ice 1" Ice	7.07 7.47 7.86	0.06 0.10 0.14
3-ft Dish	A	Paraboloid w/o Radome	From Leg	6.00 -1.00 0.00	0.0000		145.00	3.00	No Ice 1/2" Ice 1" Ice	7.07 7.47 7.86	0.06 0.10 0.14

Truss-Leg Properties

Section Designation	Area in^2	Area Ice in^2	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in^2
#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	2175.9279	5831.9416	0.44	0.66	7.5553	20.2498	3.6816
#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	2175.9279	5813.6103	0.44	0.64	7.5553	20.1861	3.6816
#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	2303.0530	5863.1655	0.55	0.63	7.9967	20.3582	5.3014
#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	2303.0530	5833.9850	0.55	0.60	7.9967	20.2569	5.3014
#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	2303.0530	5791.5187	0.55	0.55	7.9967	20.1094	5.3014
#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	2421.2670	5779.2166	0.68	0.44	8.4072	20.0667	7.2158

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 150.00-140.00	145.00	1.369	54	41.250	A	0.000	4.920	2.500	50.82	10.190	0.000
					B	0.000	4.920		50.82	0.000	0.000
					C	0.000	5.646		44.28	0.000	0.000
T2 140.00-120.00	130.00	1.337	53	82.917	A	0.000	10.880	5.833	53.61	25.600	0.000
					B	0.000	10.880		53.61	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	12.567		46.42	0.000	0.000
T3 120.00-100.00	110.00	1.291	51	122.111	A	7.450	25.226	25.226	77.20	34.300	0.000
					B	7.450	25.226		77.20	3.960	0.000
					C	7.450	25.226		77.20	0.000	0.000
T4 100.00-80.00	90.00	1.238	49	162.111	A	8.723	25.226	25.226	74.31	34.590	0.000
					B	8.723	25.226		74.31	3.960	0.000
					C	8.723	25.226		74.31	0.000	0.000
T5 80.00-60.00	70.00	1.174	47	202.528	A	9.970	26.700	26.700	72.81	35.460	0.000
					B	9.970	26.700		72.81	3.960	0.000
					C	9.970	26.700		72.81	0.000	0.000
T6 60.00-40.00	50.00	1.094	43	242.528	A	11.267	26.700	26.700	70.33	35.460	0.000
					B	11.267	26.700		70.33	3.960	0.000
					C	11.267	26.700		70.33	0.000	0.000
T7 40.00-20.00	30.00	0.982	39	282.528	A	12.620	26.700	26.700	67.90	35.460	0.000
					B	12.620	26.700		67.90	3.960	0.000
					C	12.620	26.700		67.90	0.000	0.000
T8 20.00-0.00	10.00	0.85	34	322.945	A	16.830	28.071	28.071	62.52	35.460	0.000
					B	16.830	28.071		62.52	3.960	0.000
					C	16.830	28.071		62.52	0.000	0.000

Tower Pressure - With Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 150.00-140.00	145.00	1.369	7	1.3335	43.472	A	0.000	19.001	6.945	36.55	22.768	0.000
						B	0.000	19.001		36.55	0.000	0.000
						C	0.000	22.311		31.13	0.000	0.000
T2 140.00-120.00	130.00	1.337	7	1.3190	87.313	A	0.000	37.143	14.627	39.38	51.789	0.000
						B	0.000	37.143		39.38	0.000	0.000
						C	0.000	44.760		32.68	0.000	0.000
T3 120.00-100.00	110.00	1.291	7	1.2971	126.440	A	7.450	75.343	67.612	81.66	60.897	0.000
						B	7.450	75.343		81.66	9.149	0.000
						C	7.450	75.343		81.66	0.000	0.000
T4 100.00-80.00	90.00	1.238	7	1.2714	166.354	A	8.723	76.271	67.399	79.30	60.799	0.000
						B	8.723	76.271		79.30	9.045	0.000
						C	8.723	76.271		79.30	0.000	0.000
T5 80.00-60.00	70.00	1.174	6	1.2398	206.666	A	9.970	77.863	67.974	77.39	61.107	0.000
						B	9.970	77.863		77.39	8.919	0.000
						C	9.970	77.863		77.39	0.000	0.000
T6 60.00-40.00	50.00	1.094	6	1.1988	246.529	A	11.267	78.440	67.635	75.40	60.555	0.000
						B	11.267	78.440		75.40	8.755	0.000
						C	11.267	78.440		75.40	0.000	0.000
T7 40.00-20.00	30.00	0.982	5	1.1391	286.330	A	12.620	78.643	67.143	73.57	59.751	0.000
						B	12.620	78.643		73.57	8.516	0.000
						C	12.620	78.643		73.57	0.000	0.000
T8 20.00-0.00	10.00	0.85	5	1.0206	326.351	A	16.830	78.451	67.000	70.32	58.159	0.000
						B	16.830	78.451		70.32	8.042	0.000
						C	16.830	78.451		70.32	0.000	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 150.00-140.00	145.00	1.369	11	41.250	A	0.000	4.920	2.500	50.82	10.190	0.000
					B	0.000	4.920		50.82	0.000	0.000
					C	0.000	5.646		44.28	0.000	0.000
T2 140.00-120.00	130.00	1.337	10	82.917	A	0.000	10.880	5.833	53.61	25.600	0.000
					B	0.000	10.880		53.61	0.000	0.000
					C	0.000	12.567		46.42	0.000	0.000
T3 120.00-100.00	110.00	1.291	10	122.111	A	7.450	25.226	25.226	77.20	34.300	0.000
					B	7.450	25.226		77.20	3.960	0.000
					C	7.450	25.226		77.20	0.000	0.000
T4 100.00-80.00	90.00	1.238	10	162.111	A	8.723	25.226	25.226	74.31	34.590	0.000
					B	8.723	25.226		74.31	3.960	0.000
					C	8.723	25.226		74.31	0.000	0.000
T5 80.00-60.00	70.00	1.174	9	202.528	A	9.970	26.700	26.700	72.81	35.460	0.000
					B	9.970	26.700		72.81	3.960	0.000
					C	9.970	26.700		72.81	0.000	0.000
T6 60.00-40.00	50.00	1.094	9	242.528	A	11.267	26.700	26.700	70.33	35.460	0.000
					B	11.267	26.700		70.33	3.960	0.000
					C	11.267	26.700		70.33	0.000	0.000
T7 40.00-20.00	30.00	0.982	8	282.528	A	12.620	26.700	26.700	67.90	35.460	0.000
					B	12.620	26.700		67.90	3.960	0.000
					C	12.620	26.700		67.90	0.000	0.000
T8 20.00-0.00	10.00	0.85	7	322.945	A	16.830	28.071	28.071	62.52	35.460	0.000
					B	16.830	28.071		62.52	3.960	0.000
					C	16.830	28.071		62.52	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 150.00-140.00	0.05	0.36	A	0.119	2.888	54	1	1	2.780	0.70	69.81	C
			B	0.119	2.888		1	1	2.780			
			C	0.137	2.82		1	1	3.198			
T2 140.00-120.00	0.12	0.92	A	0.131	2.842	53	1	1	6.157	1.58	79.10	C
			B	0.131	2.842		1	1	6.157			
			C	0.152	2.766		1	1	7.134			
T3 120.00-100.00	0.19	1.75	A	0.268	2.386	51	1	1	22.322	3.32	165.86	C
			B	0.268	2.386		1	1	22.322			
			C	0.268	2.386		1	1	22.322			
T4 100.00-80.00	0.19	1.78	A	0.209	2.565	49	1	1	23.258	3.45	172.71	C
			B	0.209	2.565		1	1	23.258			
			C	0.209	2.565		1	1	23.258			
T5 80.00-60.00	0.20	2.16	A	0.181	2.66	47	1	1	25.227	3.59	179.61	C
			B	0.181	2.66		1	1	25.227			
			C	0.181	2.66		1	1	25.227			
T6 60.00-40.00	0.20	2.21	A	0.157	2.748	43	1	1	26.439	3.55	177.52	C
			B	0.157	2.748		1	1	26.439			
			C	0.157	2.748		1	1	26.439			
T7 40.00-20.00	0.20	2.27	A	0.139	2.812	39	1	1	27.746	3.37	168.31	C
			B	0.139	2.812		1	1	27.746			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.139	2.812		1	1	27.746			
T8 20.00-0.00	0.20	2.84	A	0.139	2.812	34	1	1	32.732	3.32	165.76	C
			B	0.139	2.812		1	1	32.732			
			C	0.139	2.812		1	1	32.732			
Sum Weight:	1.34	14.28						OTM	1545.80 kip-ft	22.88		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 150.00-140.00	0.05	0.36	A	0.119	2.888	54	0.825	1	2.780	0.70	69.81	C
			B	0.119	2.888		0.825	1	2.780			
			C	0.137	2.82		0.825	1	3.198			
T2 140.00-120.00	0.12	0.92	A	0.131	2.842	53	0.825	1	6.157	1.58	79.10	C
			B	0.131	2.842		0.825	1	6.157			
			C	0.152	2.766		0.825	1	7.134			
T3 120.00-100.00	0.19	1.75	A	0.268	2.386	51	0.825	1	21.018	3.18	159.09	C
			B	0.268	2.386		0.825	1	21.018			
			C	0.268	2.386		0.825	1	21.018			
T4 100.00-80.00	0.19	1.78	A	0.209	2.565	49	0.825	1	21.731	3.29	164.54	C
			B	0.209	2.565		0.825	1	21.731			
			C	0.209	2.565		0.825	1	21.731			
T5 80.00-60.00	0.20	2.16	A	0.181	2.66	47	0.825	1	23.482	3.41	170.43	C
			B	0.181	2.66		0.825	1	23.482			
			C	0.181	2.66		0.825	1	23.482			
T6 60.00-40.00	0.20	2.21	A	0.157	2.748	43	0.825	1	24.467	3.35	167.53	C
			B	0.157	2.748		0.825	1	24.467			
			C	0.157	2.748		0.825	1	24.467			
T7 40.00-20.00	0.20	2.27	A	0.139	2.812	39	0.825	1	25.538	3.16	158.03	C
			B	0.139	2.812		0.825	1	25.538			
			C	0.139	2.812		0.825	1	25.538			
T8 20.00-0.00	0.20	2.84	A	0.139	2.812	34	0.825	1	29.787	3.08	153.89	C
			B	0.139	2.812		0.825	1	29.787			
			C	0.139	2.812		0.825	1	29.787			
Sum Weight:	1.34	14.28						OTM	1484.81 kip-ft	21.75		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 150.00-140.00	0.05	0.36	A	0.119	2.888	54	0.8	1	2.780	0.70	69.81	C
			B	0.119	2.888		0.8	1	2.780			
			C	0.137	2.82		0.8	1	3.198			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T2 140.00-120.00	0.12	0.92	A	0.131	2.842	53	0.8	1	6.157	1.58	79.10	C
			B	0.131	2.842		0.8	1	6.157			
			C	0.152	2.766		0.8	1	7.134			
T3 120.00-100.00	0.19	1.75	A	0.268	2.386	51	0.8	1	20.832	3.16	158.12	C
			B	0.268	2.386		0.8	1	20.832			
			C	0.268	2.386		0.8	1	20.832			
T4 100.00-80.00	0.19	1.78	A	0.209	2.565	49	0.8	1	21.513	3.27	163.38	C
			B	0.209	2.565		0.8	1	21.513			
			C	0.209	2.565		0.8	1	21.513			
T5 80.00-60.00	0.20	2.16	A	0.181	2.66	47	0.8	1	23.233	3.38	169.12	C
			B	0.181	2.66		0.8	1	23.233			
			C	0.181	2.66		0.8	1	23.233			
T6 60.00-40.00	0.20	2.21	A	0.157	2.748	43	0.8	1	24.185	3.32	166.10	C
			B	0.157	2.748		0.8	1	24.185			
			C	0.157	2.748		0.8	1	24.185			
T7 40.00-20.00	0.20	2.27	A	0.139	2.812	39	0.8	1	25.222	3.13	156.57	C
			B	0.139	2.812		0.8	1	25.222			
			C	0.139	2.812		0.8	1	25.222			
T8 20.00-0.00	0.20	2.84	A	0.139	2.812	34	0.8	1	29.366	3.04	152.20	C
			B	0.139	2.812		0.8	1	29.366			
			C	0.139	2.812		0.8	1	29.366			
Sum Weight:	1.34	14.28						OTM	1476.10 kip-ft	21.59		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 150.00-140.00	0.05	0.36	A	0.119	2.888	54	0.85	1	2.780	0.70	69.81	C
			B	0.119	2.888		0.85	1	2.780			
			C	0.137	2.82		0.85	1	3.198			
T2 140.00-120.00	0.12	0.92	A	0.131	2.842	53	0.85	1	6.157	1.58	79.10	C
			B	0.131	2.842		0.85	1	6.157			
			C	0.152	2.766		0.85	1	7.134			
T3 120.00-100.00	0.19	1.75	A	0.268	2.386	51	0.85	1	21.204	3.20	160.06	C
			B	0.268	2.386		0.85	1	21.204			
			C	0.268	2.386		0.85	1	21.204			
T4 100.00-80.00	0.19	1.78	A	0.209	2.565	49	0.85	1	21.949	3.31	165.71	C
			B	0.209	2.565		0.85	1	21.949			
			C	0.209	2.565		0.85	1	21.949			
T5 80.00-60.00	0.20	2.16	A	0.181	2.66	47	0.85	1	23.732	3.43	171.74	C
			B	0.181	2.66		0.85	1	23.732			
			C	0.181	2.66		0.85	1	23.732			
T6 60.00-40.00	0.20	2.21	A	0.157	2.748	43	0.85	1	24.749	3.38	168.96	C
			B	0.157	2.748		0.85	1	24.749			
			C	0.157	2.748		0.85	1	24.749			
T7 40.00-20.00	0.20	2.27	A	0.139	2.812	39	0.85	1	25.853	3.19	159.50	C
			B	0.139	2.812		0.85	1	25.853			
			C	0.139	2.812		0.85	1	25.853			
T8 20.00-0.00	0.20	2.84	A	0.139	2.812	34	0.85	1	30.208	3.11	155.59	C
			B	0.139	2.812		0.85	1	30.208			
			C	0.139	2.812		0.85	1	30.208			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
Sum Weight:	1.34	14.28						OTM	1493.52 kip-ft	21.91		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 150.00-140.00	0.28	0.98	A	0.437	1.995	7	1	1	12.408	0.27	26.52	C
			B	0.437	1.995		1	1	12.408			
			C	0.513	1.883		1	1	15.444			
T2 140.00-120.00	0.67	2.14	A	0.425	2.016	7	1	1	24.054	0.54	27.25	C
			B	0.425	2.016		1	1	24.054			
			C	0.513	1.884		1	1	30.970			
T3 120.00-100.00	0.97	4.75	A	0.655	1.78	7	1	1	66.194	0.85	42.40	C
			B	0.655	1.78		1	1	66.194			
			C	0.655	1.78		1	1	66.194			
T4 100.00-80.00	0.96	4.79	A	0.511	1.886	7	1	1	61.422	0.86	42.93	C
			B	0.511	1.886		1	1	61.422			
			C	0.511	1.886		1	1	61.422			
T5 80.00-60.00	0.96	5.21	A	0.425	2.017	6	1	1	60.380	0.88	43.98	C
			B	0.425	2.017		1	1	60.380			
			C	0.425	2.017		1	1	60.380			
T6 60.00-40.00	0.94	5.23	A	0.364	2.14	6	1	1	60.007	0.86	42.99	C
			B	0.364	2.14		1	1	60.007			
			C	0.364	2.14		1	1	60.007			
T7 40.00-20.00	0.91	5.19	A	0.319	2.247	5	1	1	60.197	0.80	40.02	C
			B	0.319	2.247		1	1	60.197			
			C	0.319	2.247		1	1	60.197			
T8 20.00-0.00	0.84	5.59	A	0.292	2.318	5	1	1	63.623	0.74	36.78	C
			B	0.292	2.318		1	1	63.623			
			C	0.292	2.318		1	1	63.623			
Sum Weight:	6.53	33.90						OTM	415.78 kip-ft	5.79		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 150.00-140.00	0.28	0.98	A	0.437	1.995	7	0.825	1	12.408	0.27	26.52	C
			B	0.437	1.995		0.825	1	12.408			
			C	0.513	1.883		0.825	1	15.444			
T2 140.00-120.00	0.67	2.14	A	0.425	2.016	7	0.825	1	24.054	0.54	27.25	C
			B	0.425	2.016		0.825	1	24.054			
			C	0.513	1.884		0.825	1	30.970			
T3	0.97	4.75	A	0.655	1.78	7	0.825	1	64.890	0.83	41.71	C

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
120.00-100.00			B	0.655	1.78		0.825	1	64.890			
			C	0.655	1.78		0.825	1	64.890			
T4	0.96	4.79	A	0.511	1.886	7	0.825	1	59.896	0.84	42.11	C
100.00-80.00			B	0.511	1.886		0.825	1	59.896			
			C	0.511	1.886		0.825	1	59.896			
T5	0.96	5.21	A	0.425	2.017	6	0.825	1	58.635	0.86	43.03	C
80.00-60.00			B	0.425	2.017		0.825	1	58.635			
			C	0.425	2.017		0.825	1	58.635			
T6	0.94	5.23	A	0.364	2.14	6	0.825	1	58.035	0.84	41.92	C
60.00-40.00			B	0.364	2.14		0.825	1	58.035			
			C	0.364	2.14		0.825	1	58.035			
T7	0.91	5.19	A	0.319	2.247	5	0.825	1	57.989	0.78	38.90	C
40.00-20.00			B	0.319	2.247		0.825	1	57.989			
			C	0.319	2.247		0.825	1	57.989			
T8 20.00-0.00	0.84	5.59	A	0.292	2.318	5	0.825	1	60.678	0.71	35.44	C
			B	0.292	2.318		0.825	1	60.678			
			C	0.292	2.318		0.825	1	60.678			
Sum Weight:	6.53	33.90						OTM	409.43 kip-ft	5.67		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
T1	0.28	0.98	A	0.437	1.995	7	0.8	1	12.408	0.27	26.52	C
150.00-140.00			B	0.437	1.995		0.8	1	12.408			
			C	0.513	1.883		0.8	1	15.444			
T2	0.67	2.14	A	0.425	2.016	7	0.8	1	24.054	0.54	27.25	C
140.00-120.00			B	0.425	2.016		0.8	1	24.054			
			C	0.513	1.884		0.8	1	30.970			
T3	0.97	4.75	A	0.655	1.78	7	0.8	1	64.704	0.83	41.61	C
120.00-100.00			B	0.655	1.78		0.8	1	64.704			
			C	0.655	1.78		0.8	1	64.704			
T4	0.96	4.79	A	0.511	1.886	7	0.8	1	59.678	0.84	41.99	C
100.00-80.00			B	0.511	1.886		0.8	1	59.678			
			C	0.511	1.886		0.8	1	59.678			
T5	0.96	5.21	A	0.425	2.017	6	0.8	1	58.386	0.86	42.89	C
80.00-60.00			B	0.425	2.017		0.8	1	58.386			
			C	0.425	2.017		0.8	1	58.386			
T6	0.94	5.23	A	0.364	2.14	6	0.8	1	57.753	0.84	41.77	C
60.00-40.00			B	0.364	2.14		0.8	1	57.753			
			C	0.364	2.14		0.8	1	57.753			
T7	0.91	5.19	A	0.319	2.247	5	0.8	1	57.673	0.77	38.74	C
40.00-20.00			B	0.319	2.247		0.8	1	57.673			
			C	0.319	2.247		0.8	1	57.673			
T8 20.00-0.00	0.84	5.59	A	0.292	2.318	5	0.8	1	60.257	0.71	35.25	C
			B	0.292	2.318		0.8	1	60.257			
			C	0.292	2.318		0.8	1	60.257			
Sum Weight:	6.53	33.90						OTM	408.52 kip-ft	5.66		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 150.00-140.00	0.28	0.98	A	0.437	1.995	7	0.85	1	12.408	0.27	26.52	C
			B	0.437	1.995		0.85	1	12.408			
			C	0.513	1.883		0.85	1	15.444			
T2 140.00-120.00	0.67	2.14	A	0.425	2.016	7	0.85	1	24.054	0.54	27.25	C
			B	0.425	2.016		0.85	1	24.054			
			C	0.513	1.884		0.85	1	30.970			
T3 120.00-100.00	0.97	4.75	A	0.655	1.78	7	0.85	1	65.076	0.84	41.80	C
			B	0.655	1.78		0.85	1	65.076			
			C	0.655	1.78		0.85	1	65.076			
T4 100.00-80.00	0.96	4.79	A	0.511	1.886	7	0.85	1	60.114	0.84	42.23	C
			B	0.511	1.886		0.85	1	60.114			
			C	0.511	1.886		0.85	1	60.114			
T5 80.00-60.00	0.96	5.21	A	0.425	2.017	6	0.85	1	58.884	0.86	43.16	C
			B	0.425	2.017		0.85	1	58.884			
			C	0.425	2.017		0.85	1	58.884			
T6 60.00-40.00	0.94	5.23	A	0.364	2.14	6	0.85	1	58.317	0.84	42.07	C
			B	0.364	2.14		0.85	1	58.317			
			C	0.364	2.14		0.85	1	58.317			
T7 40.00-20.00	0.91	5.19	A	0.319	2.247	5	0.85	1	58.304	0.78	39.06	C
			B	0.319	2.247		0.85	1	58.304			
			C	0.319	2.247		0.85	1	58.304			
T8 20.00-0.00	0.84	5.59	A	0.292	2.318	5	0.85	1	61.098	0.71	35.63	C
			B	0.292	2.318		0.85	1	61.098			
			C	0.292	2.318		0.85	1	61.098			
Sum Weight:	6.53	33.90						OTM	410.33 kip-ft	5.69		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 150.00-140.00	0.05	0.36	A	0.119	2.888	11	1	1	2.780	0.14	13.79	C
			B	0.119	2.888		1	1	2.780			
			C	0.137	2.82		1	1	3.198			
T2 140.00-120.00	0.12	0.92	A	0.131	2.842	10	1	1	6.157	0.31	15.63	C
			B	0.131	2.842		1	1	6.157			
			C	0.152	2.766		1	1	7.134			
T3 120.00-100.00	0.19	1.75	A	0.268	2.386	10	1	1	22.322	0.66	32.76	C
			B	0.268	2.386		1	1	22.322			
			C	0.268	2.386		1	1	22.322			
T4 100.00-80.00	0.19	1.78	A	0.209	2.565	10	1	1	23.258	0.68	34.12	C
			B	0.209	2.565		1	1	23.258			
			C	0.209	2.565		1	1	23.258			
T5 80.00-60.00	0.20	2.16	A	0.181	2.66	9	1	1	25.227	0.71	35.48	C
			B	0.181	2.66		1	1	25.227			
			C	0.181	2.66		1	1	25.227			
T6	0.20	2.21	A	0.157	2.748	9	1	1	26.439	0.70	35.07	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
60.00-40.00			B	0.157	2.748		1	1	26.439			
			C	0.157	2.748		1	1	26.439			
T7	0.20	2.27	A	0.139	2.812	8	1	1	27.746	0.66	33.25	C
40.00-20.00			B	0.139	2.812		1	1	27.746			
			C	0.139	2.812		1	1	27.746			
T8 20.00-0.00	0.20	2.84	A	0.139	2.812	7	1	1	32.732	0.65	32.74	C
			B	0.139	2.812		1	1	32.732			
			C	0.139	2.812		1	1	32.732			
Sum Weight:	1.34	14.28						OTM	305.34 kip-ft	4.52		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.05	0.36	A	0.119	2.888	11	0.825	1	2.780	0.14	13.79	C
150.00-140.00			B	0.119	2.888		0.825	1	2.780			
			C	0.137	2.82		0.825	1	3.198			
T2	0.12	0.92	A	0.131	2.842	10	0.825	1	6.157	0.31	15.63	C
140.00-120.00			B	0.131	2.842		0.825	1	6.157			
			C	0.152	2.766		0.825	1	7.134			
T3	0.19	1.75	A	0.268	2.386	10	0.825	1	21.018	0.63	31.43	C
120.00-100.00			B	0.268	2.386		0.825	1	21.018			
			C	0.268	2.386		0.825	1	21.018			
T4	0.19	1.78	A	0.209	2.565	10	0.825	1	21.731	0.65	32.50	C
100.00-80.00			B	0.209	2.565		0.825	1	21.731			
			C	0.209	2.565		0.825	1	21.731			
T5	0.20	2.16	A	0.181	2.66	9	0.825	1	23.482	0.67	33.66	C
80.00-60.00			B	0.181	2.66		0.825	1	23.482			
			C	0.181	2.66		0.825	1	23.482			
T6	0.20	2.21	A	0.157	2.748	9	0.825	1	24.467	0.66	33.09	C
60.00-40.00			B	0.157	2.748		0.825	1	24.467			
			C	0.157	2.748		0.825	1	24.467			
T7	0.20	2.27	A	0.139	2.812	8	0.825	1	25.538	0.62	31.22	C
40.00-20.00			B	0.139	2.812		0.825	1	25.538			
			C	0.139	2.812		0.825	1	25.538			
T8 20.00-0.00	0.20	2.84	A	0.139	2.812	7	0.825	1	29.787	0.61	30.40	C
			B	0.139	2.812		0.825	1	29.787			
			C	0.139	2.812		0.825	1	29.787			
Sum Weight:	1.34	14.28						OTM	293.30 kip-ft	4.30		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 150.00-140.00	0.05	0.36	A	0.119	2.888	11	0.8	1	2.780	0.14	13.79	C
			B	0.119	2.888		0.8	1	2.780			
			C	0.137	2.82		0.8	1	3.198			
T2 140.00-120.00	0.12	0.92	A	0.131	2.842	10	0.8	1	6.157	0.31	15.63	C
			B	0.131	2.842		0.8	1	6.157			
			C	0.152	2.766		0.8	1	7.134			
T3 120.00-100.00	0.19	1.75	A	0.268	2.386	10	0.8	1	20.832	0.62	31.23	C
			B	0.268	2.386		0.8	1	20.832			
			C	0.268	2.386		0.8	1	20.832			
T4 100.00-80.00	0.19	1.78	A	0.209	2.565	10	0.8	1	21.513	0.65	32.27	C
			B	0.209	2.565		0.8	1	21.513			
			C	0.209	2.565		0.8	1	21.513			
T5 80.00-60.00	0.20	2.16	A	0.181	2.66	9	0.8	1	23.233	0.67	33.41	C
			B	0.181	2.66		0.8	1	23.233			
			C	0.181	2.66		0.8	1	23.233			
T6 60.00-40.00	0.20	2.21	A	0.157	2.748	9	0.8	1	24.185	0.66	32.81	C
			B	0.157	2.748		0.8	1	24.185			
			C	0.157	2.748		0.8	1	24.185			
T7 40.00-20.00	0.20	2.27	A	0.139	2.812	8	0.8	1	25.222	0.62	30.93	C
			B	0.139	2.812		0.8	1	25.222			
			C	0.139	2.812		0.8	1	25.222			
T8 20.00-0.00	0.20	2.84	A	0.139	2.812	7	0.8	1	29.366	0.60	30.06	C
			B	0.139	2.812		0.8	1	29.366			
			C	0.139	2.812		0.8	1	29.366			
Sum Weight:	1.34	14.28						OTM	291.58 kip-ft	4.26		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 150.00-140.00	0.05	0.36	A	0.119	2.888	11	0.85	1	2.780	0.14	13.79	C
			B	0.119	2.888		0.85	1	2.780			
			C	0.137	2.82		0.85	1	3.198			
T2 140.00-120.00	0.12	0.92	A	0.131	2.842	10	0.85	1	6.157	0.31	15.63	C
			B	0.131	2.842		0.85	1	6.157			
			C	0.152	2.766		0.85	1	7.134			
T3 120.00-100.00	0.19	1.75	A	0.268	2.386	10	0.85	1	21.204	0.63	31.62	C
			B	0.268	2.386		0.85	1	21.204			
			C	0.268	2.386		0.85	1	21.204			
T4 100.00-80.00	0.19	1.78	A	0.209	2.565	10	0.85	1	21.949	0.65	32.73	C
			B	0.209	2.565		0.85	1	21.949			
			C	0.209	2.565		0.85	1	21.949			
T5 80.00-60.00	0.20	2.16	A	0.181	2.66	9	0.85	1	23.732	0.68	33.92	C
			B	0.181	2.66		0.85	1	23.732			
			C	0.181	2.66		0.85	1	23.732			
T6 60.00-40.00	0.20	2.21	A	0.157	2.748	9	0.85	1	24.749	0.67	33.37	C
			B	0.157	2.748		0.85	1	24.749			
			C	0.157	2.748		0.85	1	24.749			
T7 40.00-20.00	0.20	2.27	A	0.139	2.812	8	0.85	1	25.853	0.63	31.51	C
			B	0.139	2.812		0.85	1	25.853			
			C	0.139	2.812		0.85	1	25.853			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T8 20.00-0.00	0.20	2.84	A	0.139	2.812	7	0.85	1	30.208	0.61	30.73	C
			B	0.139	2.812		0.85	1	30.208			
			C	0.139	2.812		0.85	1	30.208			
Sum Weight:	1.34	14.28						OTM	295.02 kip-ft	4.33		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	10.36					
Bracing Weight	3.92					
Total Member Self-Weight	14.28			-4.01	0.18	
Total Weight	22.03			-4.01	0.18	
Wind 0 deg - No Ice		0.00	-33.08	-2886.06	0.18	-2.56
Wind 30 deg - No Ice		15.95	-27.72	-2441.16	-1399.27	-13.00
Wind 45 deg - No Ice		22.38	-22.45	-1977.15	-1963.57	-16.50
Wind 60 deg - No Ice		27.21	-15.85	-1403.40	-2387.45	-18.79
Wind 90 deg - No Ice		31.62	-0.01	-5.14	-2756.47	-19.21
Wind 120 deg - No Ice		28.05	17.20	1535.42	-2409.99	-13.92
Wind 135 deg - No Ice		22.47	23.53	2086.77	-1934.85	-9.83
Wind 150 deg - No Ice		15.60	28.11	2491.51	-1348.67	-5.65
Wind 180 deg - No Ice		0.00	31.98	2836.54	0.18	2.88
Wind 210 deg - No Ice		-15.60	28.11	2491.51	1349.04	10.92
Wind 225 deg - No Ice		-22.12	23.18	2076.07	1924.52	14.61
Wind 240 deg - No Ice		-28.05	17.20	1535.42	2410.35	17.95
Wind 270 deg - No Ice		-31.47	-0.01	-5.14	2737.13	19.20
Wind 300 deg - No Ice		-27.08	-15.78	-1393.54	2370.74	16.32
Wind 315 deg - No Ice		-22.28	-22.35	-1963.21	1950.00	13.17
Wind 330 deg - No Ice		-15.88	-27.60	-2424.09	1389.78	8.75
Member Ice	19.62					
Total Weight Ice	53.88			-21.42	0.08	
Wind 0 deg - Ice		0.00	-8.55	-804.92	0.08	-1.09
Wind 30 deg - Ice		4.21	-7.30	-693.14	-386.57	-2.62
Wind 45 deg - Ice		5.93	-5.94	-567.59	-544.65	-3.06
Wind 60 deg - Ice		7.24	-4.20	-408.48	-664.76	-3.27
Wind 90 deg - Ice		8.37	-0.00	-21.59	-766.67	-2.99
Wind 120 deg - Ice		7.26	4.35	381.16	-657.53	-1.83
Wind 135 deg - Ice		5.88	6.04	535.48	-532.70	-1.05
Wind 150 deg - Ice		4.12	7.31	651.69	-374.30	-0.29
Wind 180 deg - Ice		0.00	8.38	750.34	0.08	1.14
Wind 210 deg - Ice		-4.12	7.31	651.69	374.47	2.30
Wind 225 deg - Ice		-5.89	6.05	541.32	538.71	2.76
Wind 240 deg - Ice		-7.26	4.35	381.16	657.69	3.14
Wind 270 deg - Ice		-8.29	-0.00	-21.59	754.93	2.99
Wind 300 deg - Ice		-7.16	-4.16	-402.53	654.61	2.20
Wind 315 deg - Ice		-5.87	-5.88	-559.17	536.40	1.56
Wind 330 deg - Ice		-4.16	-7.23	-682.83	380.78	0.77
Total Weight	22.03			-4.01	0.18	
Wind 0 deg - Service		0.00	-6.53	-569.22	0.86	-0.51
Wind 30 deg - Service		3.15	-5.48	-481.33	-275.58	-2.57
Wind 45 deg - Service		4.42	-4.43	-389.68	-387.04	-3.26

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

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 60 deg - Service		5.37	-3.13	-276.34	-470.77	-3.71
Wind 90 deg - Service		6.25	-0.00	-0.14	-543.67	-3.80
Wind 120 deg - Service		5.54	3.40	304.16	-475.23	-2.75
Wind 135 deg - Service		4.44	4.65	413.07	-381.37	-1.94
Wind 150 deg - Service		3.08	5.55	493.02	-265.58	-1.12
Wind 180 deg - Service		0.00	6.32	561.18	0.86	0.57
Wind 210 deg - Service		-3.08	5.55	493.02	267.30	2.16
Wind 225 deg - Service		-4.37	4.58	410.96	380.97	2.89
Wind 240 deg - Service		-5.54	3.40	304.16	476.94	3.55
Wind 270 deg - Service		-6.22	-0.00	-0.14	541.49	3.79
Wind 300 deg - Service		-5.35	-3.12	-274.40	469.12	3.22
Wind 315 deg - Service		-4.40	-4.41	-386.92	386.00	2.60
Wind 330 deg - Service		-3.14	-5.45	-477.96	275.34	1.73

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 45 deg - No Ice
7	0.9 Dead+1.0 Wind 45 deg - No Ice
8	1.2 Dead+1.0 Wind 60 deg - No Ice
9	0.9 Dead+1.0 Wind 60 deg - No Ice
10	1.2 Dead+1.0 Wind 90 deg - No Ice
11	0.9 Dead+1.0 Wind 90 deg - No Ice
12	1.2 Dead+1.0 Wind 120 deg - No Ice
13	0.9 Dead+1.0 Wind 120 deg - No Ice
14	1.2 Dead+1.0 Wind 135 deg - No Ice
15	0.9 Dead+1.0 Wind 135 deg - No Ice
16	1.2 Dead+1.0 Wind 150 deg - No Ice
17	0.9 Dead+1.0 Wind 150 deg - No Ice
18	1.2 Dead+1.0 Wind 180 deg - No Ice
19	0.9 Dead+1.0 Wind 180 deg - No Ice
20	1.2 Dead+1.0 Wind 210 deg - No Ice
21	0.9 Dead+1.0 Wind 210 deg - No Ice
22	1.2 Dead+1.0 Wind 225 deg - No Ice
23	0.9 Dead+1.0 Wind 225 deg - No Ice
24	1.2 Dead+1.0 Wind 240 deg - No Ice
25	0.9 Dead+1.0 Wind 240 deg - No Ice
26	1.2 Dead+1.0 Wind 270 deg - No Ice
27	0.9 Dead+1.0 Wind 270 deg - No Ice
28	1.2 Dead+1.0 Wind 300 deg - No Ice
29	0.9 Dead+1.0 Wind 300 deg - No Ice
30	1.2 Dead+1.0 Wind 315 deg - No Ice
31	0.9 Dead+1.0 Wind 315 deg - No Ice
32	1.2 Dead+1.0 Wind 330 deg - No Ice
33	0.9 Dead+1.0 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp

Comb. No.	*Description*
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Axial K*	*Major Axis Moment kip-ft*	*Minor Axis Moment kip-ft*
T1	150 - 140	Leg	Max Tension	19	9.65	-0.03	0.36
			Max. Compression	2	-11.57	0.00	-0.01
			Max. Mx	8	-0.97	-0.33	0.13
			Max. My	18	9.32	-0.03	0.36
			Max. Vy	8	1.46	0.01	-0.00
			Max. Vx	18	1.68	-0.00	0.01
		Diagonal	Max Tension	4	2.25	0.00	0.00
			Max. Compression	4	-2.28	0.00	0.00
			Max. Mx	36	0.63	-0.00	-0.00
			Max. My	6	-2.19	-0.00	-0.00
			Max. Vy	36	0.01	-0.00	-0.00
			Max. Vx	6	0.00	-0.00	-0.00
		Horizontal	Max Tension	2	0.13	0.00	0.00
			Max. Compression	3	-0.08	0.00	0.00
			Max. Mx	34	0.08	0.01	0.00
			Max. My	8	0.07	0.00	-0.00
			Max. Vy	34	-0.01	0.00	0.00
			Max. Vx	8	0.00	0.00	0.00
		Top Girt	Max Tension	2	0.33	0.00	0.00
			Max. Compression	19	-0.37	0.00	0.00
			Max. Mx	46	0.08	0.01	0.00
			Max. My	4	0.03	0.00	0.00
			Max. Vy	46	-0.01	0.00	0.00
			Max. Vx	4	-0.00	0.00	0.00
		Bottom Girt	Max Tension	18	0.82	0.00	0.00

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Axial K*	*Major Axis Moment kip-ft*	*Minor Axis Moment kip-ft*
			Max. Compression	24	-0.76	0.00	0.00
			Max. Mx	46	-0.23	0.01	0.00
			Max. My	4	0.07	0.00	0.00
			Max. Vy	34	-0.01	0.00	0.00
			Max. Vx	4	-0.00	0.00	0.00
T2	140 - 120	Leg	Max Tension	19	43.33	-0.05	0.42
			Max. Compression	2	-44.78	-0.16	1.81
			Max. Mx	12	-43.61	-1.52	-0.91
			Max. My	2	-44.78	-0.16	1.81
			Max. Vy	12	3.27	-1.52	-0.91
			Max. Vx	2	-3.85	-0.16	1.81
		Diagonal	Max Tension	4	3.63	0.00	0.00
			Max. Compression	4	-3.62	0.00	0.00
			Max. Mx	35	1.00	-0.00	-0.00
			Max. My	4	-3.21	-0.00	-0.00
			Max. Vy	35	0.01	-0.00	-0.00
			Max. Vx	4	0.00	-0.00	-0.00
		Horizontal	Max Tension	18	0.84	0.00	0.00
			Max. Compression	3	-0.68	0.00	0.00
			Max. Mx	34	0.14	0.01	0.00
			Max. My	8	-0.18	0.00	-0.00
			Max. Vy	34	-0.01	0.00	0.00
			Max. Vx	8	0.00	0.00	0.00
		Top Girt	Max Tension	24	0.80	0.00	0.00
			Max. Compression	8	-0.74	0.00	0.00
			Max. Mx	46	0.27	0.01	0.00
			Max. My	4	-0.06	0.00	0.00
			Max. Vy	34	-0.01	0.00	0.00
			Max. Vx	4	-0.00	0.00	0.00
		Bottom Girt	Max Tension	18	0.44	0.00	0.00
			Max. Compression	3	-0.35	0.00	0.00
			Max. Mx	34	0.07	0.01	0.00
			Max. My	4	-0.00	0.00	0.00
			Max. Vy	34	-0.01	0.00	0.00
			Max. Vx	4	-0.00	0.00	0.00
T3	120 - 100	Leg	Max Tension	19	71.05	-3.78	-0.02
			Max. Compression	2	-75.81	4.51	0.03
			Max. Mx	2	-75.81	4.51	0.03
			Max. My	20	-6.85	0.03	6.10
			Max. Vy	18	0.37	-3.85	-0.03
			Max. Vx	10	-0.72	-0.21	5.69
		Diagonal	Max Tension	7	7.35	0.06	0.01
			Max. Compression	2	-7.73	0.00	0.00
			Max. Mx	24	4.78	0.08	-0.00
			Max. My	4	-7.48	-0.04	0.05
			Max. Vy	35	-0.02	0.05	0.01
			Max. Vx	4	-0.01	0.00	0.00
T4	100 - 80	Leg	Max Tension	19	101.96	-4.20	-0.03
			Max. Compression	2	-108.52	4.19	0.03
			Max. Mx	2	-93.09	4.51	0.03
			Max. My	16	-9.17	0.13	-4.75
			Max. Vy	24	0.20	4.44	-0.35
			Max. Vx	10	-0.31	-0.06	4.55
		Diagonal	Max Tension	4	5.89	0.00	0.00
			Max. Compression	4	-6.28	0.00	0.00
			Max. Mx	2	3.74	0.08	0.00
			Max. My	6	-6.04	-0.04	0.01
			Max. Vy	37	0.03	0.05	-0.01
			Max. Vx	41	0.00	0.00	0.00
T5	80 - 60	Leg	Max Tension	19	128.21	-4.45	-0.01
			Max. Compression	2	-137.43	4.04	0.00

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Axial K*	*Major Axis Moment kip-ft*	*Minor Axis Moment kip-ft*
			Max. Mx	2	-124.06	4.47	0.00
			Max. My	16	-10.88	0.12	-4.36
			Max. Vy	25	0.20	4.40	-0.27
			Max. Vx	10	-0.27	-0.03	4.25
		Diagonal	Max Tension	4	5.59	0.00	0.00
			Max. Compression	4	-5.83	0.00	0.00
			Max. Mx	2	4.17	0.06	0.00
			Max. My	6	-5.52	-0.01	0.01
			Max. Vy	38	0.04	0.06	-0.01
			Max. Vx	35	0.00	0.00	0.00
T6	60 - 40	Leg	Max Tension	19	151.72	-4.14	-0.00
			Max. Compression	2	-163.70	4.19	-0.00
			Max. Mx	2	-163.70	4.19	-0.00
			Max. My	16	-11.17	0.12	-4.36
			Max. Vy	18	0.16	-4.16	-0.00
			Max. Vx	10	0.23	-0.03	4.25
		Diagonal	Max Tension	4	5.60	0.00	0.00
			Max. Compression	4	-5.90	0.00	0.00
			Max. Mx	38	1.16	0.07	-0.01
			Max. My	46	-0.07	0.07	-0.01
			Max. Vy	38	0.04	0.07	-0.01
			Max. Vx	46	-0.00	0.00	0.00
T7	40 - 20	Leg	Max Tension	19	173.29	-3.79	0.00
			Max. Compression	2	-188.13	4.60	0.01
			Max. Mx	2	-188.13	4.60	0.01
			Max. My	20	-12.46	0.02	4.46
			Max. Vy	43	0.36	-3.28	-0.01
			Max. Vx	10	0.29	-0.09	4.35
		Diagonal	Max Tension	7	5.84	0.00	0.00
			Max. Compression	4	-6.14	0.00	0.00
			Max. Mx	38	1.57	0.08	-0.01
			Max. My	38	-1.28	0.05	0.01
			Max. Vy	38	0.05	0.08	-0.01
			Max. Vx	46	-0.00	0.00	0.00
T8	20 - 0	Leg	Max Tension	19	193.24	-3.95	0.00
			Max. Compression	2	-211.44	-0.00	-0.00
			Max. Mx	35	-71.79	4.70	-0.00
			Max. My	20	-13.73	-0.10	6.39
			Max. Vy	43	-0.64	-3.28	-0.01
			Max. Vx	10	0.79	-0.20	6.22
		Diagonal	Max Tension	7	6.95	0.00	0.00
			Max. Compression	24	-7.41	0.00	0.00
			Max. Mx	38	-0.09	0.11	0.02
			Max. My	46	-1.24	0.11	-0.02
			Max. Vy	38	0.05	0.11	0.02
			Max. Vx	46	0.00	0.00	0.00

Maximum Reactions

Location	*Condition*	*Gov. Load Comb.*	*Vertical K*	*Horizontal, X K*	*Horizontal, Z K*
Leg C	Max. Vert	24	216.09	18.37	-11.27
	Max. H_x	24	216.09	18.37	-11.27
	Max. H_z	9	-194.14	-16.67	10.41
	Min. Vert	9	-194.14	-16.67	10.41
	Min. H_x	9	-194.14	-16.67	10.41

Location	*Condition*	*Gov. Load Comb.*	*Vertical K*	*Horizontal, X K*	*Horizontal, Z K*
	Min. H_z	24	216.09	18.37	-11.27
Leg B	Max. Vert	12	216.06	-18.44	-11.15
	Max. H_x	29	-192.73	16.63	10.28
	Max. H_z	29	-192.73	16.63	10.28
	Min. Vert	29	-192.73	16.63	10.28
	Min. H_x	12	216.06	-18.44	-11.15
	Min. H_z	12	216.06	-18.44	-11.15
Leg A	Max. Vert	2	218.41	-0.09	21.69
	Max. H_x	27	6.95	1.65	0.51
	Max. H_z	2	218.41	-0.09	21.69
	Min. Vert	19	-199.08	0.11	-20.00
	Min. H_x	11	6.95	-1.64	0.51
	Min. H_z	19	-199.08	0.11	-20.00

Tower Mast Reaction Summary

Load Combination	*Vertical K*	*$Shear_x$ K*	*$Shear_z$ K*	*Overturning Moment, M_x kip-ft*	*Overturning Moment, M_z kip-ft*	*Torque kip-ft*
Dead Only	22.03	0.00	0.00	-3.94	0.18	-0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	26.44	-0.00	-33.08	-2904.31	0.25	-2.57
0.9 Dead+1.0 Wind 0 deg - No Ice	19.83	-0.00	-33.08	-2898.67	0.19	-2.57
1.2 Dead+1.0 Wind 30 deg - No Ice	26.44	15.95	-27.72	-2456.81	-1407.73	-13.00
0.9 Dead+1.0 Wind 30 deg - No Ice	19.83	15.95	-27.72	-2451.83	-1405.62	-12.99
1.2 Dead+1.0 Wind 45 deg - No Ice	26.44	22.38	-22.45	-1989.98	-1975.47	-16.51
0.9 Dead+1.0 Wind 45 deg - No Ice	19.83	22.38	-22.45	-1985.73	-1972.48	-16.50
1.2 Dead+1.0 Wind 60 deg - No Ice	26.44	27.21	-15.85	-1412.79	-2401.93	-18.83
0.9 Dead+1.0 Wind 60 deg - No Ice	19.83	27.21	-15.85	-1409.41	-2398.29	-18.82
1.2 Dead+1.0 Wind 90 deg - No Ice	26.44	31.62	-0.01	-5.98	-2773.14	-19.28
0.9 Dead+1.0 Wind 90 deg - No Ice	19.83	31.62	-0.01	-4.78	-2768.96	-19.27
1.2 Dead+1.0 Wind 120 deg - No Ice	26.44	28.05	17.20	1544.24	-2424.41	-13.95
0.9 Dead+1.0 Wind 120 deg - No Ice	19.83	28.05	17.20	1543.00	-2420.80	-13.94
1.2 Dead+1.0 Wind 135 deg - No Ice	26.44	22.47	23.53	2098.95	-1946.41	-9.83
0.9 Dead+1.0 Wind 135 deg - No Ice	19.83	22.47	23.53	2096.86	-1943.52	-9.83
1.2 Dead+1.0 Wind 150 deg - No Ice	26.44	15.60	28.11	2506.16	-1356.72	-5.63
0.9 Dead+1.0 Wind 150 deg - No Ice	19.83	15.60	28.11	2503.44	-1354.72	-5.63
1.2 Dead+1.0 Wind 180 deg - No Ice	26.44	0.00	31.98	2853.31	0.25	2.90
0.9 Dead+1.0 Wind 180 deg - No Ice	19.83	0.00	31.98	2850.06	0.19	2.89
1.2 Dead+1.0 Wind 210 deg -	26.44	-15.60	28.11	2506.15	1357.22	10.92

Load Combination	Vertical K	Shear$_x$ K	Shear$_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
No Ice						
0.9 Dead+1.0 Wind 210 deg - No Ice	19.83	-15.60	28.11	2503.43	1355.10	10.92
1.2 Dead+1.0 Wind 225 deg - No Ice	26.44	-22.12	23.18	2088.23	1936.21	14.62
0.9 Dead+1.0 Wind 225 deg - No Ice	19.83	-22.12	23.18	2086.14	1933.20	14.61
1.2 Dead+1.0 Wind 240 deg - No Ice	26.44	-28.05	17.20	1544.22	2424.89	17.99
0.9 Dead+1.0 Wind 240 deg - No Ice	19.83	-28.05	17.20	1542.98	2421.16	17.98
1.2 Dead+1.0 Wind 270 deg - No Ice	26.44	-31.47	-0.01	-5.98	2753.74	19.26
0.9 Dead+1.0 Wind 270 deg - No Ice	19.83	-31.47	-0.01	-4.77	2749.48	19.25
1.2 Dead+1.0 Wind 300 deg - No Ice	26.44	-27.08	-15.78	-1402.84	2385.20	16.35
0.9 Dead+1.0 Wind 300 deg - No Ice	19.83	-27.08	-15.78	-1399.48	2381.48	16.34
1.2 Dead+1.0 Wind 315 deg - No Ice	26.44	-22.28	-22.35	-1975.92	1961.90	13.17
0.9 Dead+1.0 Wind 315 deg - No Ice	19.83	-22.28	-22.35	-1971.69	1958.82	13.17
1.2 Dead+1.0 Wind 330 deg - No Ice	26.44	-15.88	-27.60	-2439.59	1398.29	8.73
0.9 Dead+1.0 Wind 330 deg - No Ice	19.83	-15.88	-27.60	-2434.65	1396.07	8.73
1.2 Dead+1.0 Ice+1.0 Temp	58.28	0.00	0.00	-22.13	0.14	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	58.28	0.00	-8.55	-816.61	0.14	-1.09
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	58.28	4.21	-7.30	-703.30	-391.86	-2.65
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	58.28	5.93	-5.94	-576.00	-552.13	-3.09
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	58.28	7.24	-4.20	-414.71	-673.89	-3.32
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	58.28	8.37	-0.00	-22.46	-777.18	-3.04
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	58.28	7.26	4.35	385.93	-666.46	-1.87
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	58.28	5.88	6.04	542.37	-539.92	-1.08
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	58.28	4.12	7.31	660.18	-379.36	-0.31
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	58.28	-0.00	8.38	760.20	0.15	1.14
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	58.28	-4.12	7.31	660.18	379.66	2.33
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	58.28	-5.89	6.05	548.33	546.19	2.80
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	58.28	-7.26	4.35	385.93	666.76	3.19
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	58.28	-8.29	-0.00	-22.46	765.37	3.04
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	58.28	-7.16	-4.16	-408.66	663.70	2.24
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	58.28	-5.87	-5.88	-567.45	543.86	1.60
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	58.28	-4.16	-7.23	-692.82	386.10	0.79
Dead+Wind 0 deg - Service	22.03	0.00	-6.53	-576.16	0.19	-0.51

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 30 deg - Service	22.03	3.15	-5.48	-487.84	-277.66	-2.58
Dead+Wind 45 deg - Service	22.03	4.42	-4.43	-395.71	-389.69	-3.26
Dead+Wind 60 deg - Service	22.03	5.37	-3.13	-281.81	-473.85	-3.72
Dead+Wind 90 deg - Service	22.03	6.25	-0.00	-4.19	-547.10	-3.80
Dead+Wind 120 deg - Service	22.03	5.54	3.40	301.71	-478.29	-2.75
Dead+Wind 135 deg - Service	22.03	4.44	4.65	411.17	-383.96	-1.95
Dead+Wind 150 deg - Service	22.03	3.08	5.55	491.53	-267.59	-1.12
Dead+Wind 180 deg - Service	22.03	0.00	6.32	560.04	0.19	0.57
Dead+Wind 210 deg - Service	22.03	-3.08	5.55	491.53	267.98	2.16
Dead+Wind 225 deg - Service	22.03	-4.37	4.58	409.06	382.23	2.89
Dead+Wind 240 deg - Service	22.03	-5.54	3.40	301.71	478.67	3.55
Dead+Wind 270 deg - Service	22.03	-6.22	-0.00	-4.19	543.56	3.80
Dead+Wind 300 deg - Service	22.03	-5.35	-3.12	-279.85	470.84	3.23
Dead+Wind 315 deg - Service	22.03	-4.40	-4.41	-392.94	387.30	2.60
Dead+Wind 330 deg - Service	22.03	-3.14	-5.45	-484.45	276.08	1.73

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-22.03	0.00	0.00	22.03	0.00	0.000%
2	0.00	-26.44	-33.08	0.00	26.44	33.08	0.000%
3	0.00	-19.83	-33.08	0.00	19.83	33.08	0.000%
4	15.95	-26.44	-27.72	-15.95	26.44	27.72	0.000%
5	15.95	-19.83	-27.72	-15.95	19.83	27.72	0.000%
6	22.38	-26.44	-22.45	-22.38	26.44	22.45	0.000%
7	22.38	-19.83	-22.45	-22.38	19.83	22.45	0.000%
8	27.21	-26.44	-15.85	-27.21	26.44	15.85	0.000%
9	27.21	-19.83	-15.85	-27.21	19.83	15.85	0.000%
10	31.62	-26.44	-0.01	-31.62	26.44	0.01	0.000%
11	31.62	-19.83	-0.01	-31.62	19.83	0.01	0.000%
12	28.05	-26.44	17.20	-28.05	26.44	-17.20	0.000%
13	28.05	-19.83	17.20	-28.05	19.83	-17.20	0.000%
14	22.47	-26.44	23.53	-22.47	26.44	-23.53	0.000%
15	22.47	-19.83	23.53	-22.47	19.83	-23.53	0.000%
16	15.60	-26.44	28.11	-15.60	26.44	-28.11	0.000%
17	15.60	-19.83	28.11	-15.60	19.83	-28.11	0.000%
18	0.00	-26.44	31.98	-0.00	26.44	-31.98	0.000%
19	0.00	-19.83	31.98	-0.00	19.83	-31.98	0.000%
20	-15.60	-26.44	28.11	15.60	26.44	-28.11	0.000%
21	-15.60	-19.83	28.11	15.60	19.83	-28.11	0.000%
22	-22.12	-26.44	23.18	22.12	26.44	-23.18	0.000%
23	-22.12	-19.83	23.18	22.12	19.83	-23.18	0.000%
24	-28.05	-26.44	17.20	28.05	26.44	-17.20	0.000%
25	-28.05	-19.83	17.20	28.05	19.83	-17.20	0.000%
26	-31.47	-26.44	-0.01	31.47	26.44	0.01	0.000%
27	-31.47	-19.83	-0.01	31.47	19.83	0.01	0.000%
28	-27.08	-26.44	-15.78	27.08	26.44	15.78	0.000%
29	-27.08	-19.83	-15.78	27.08	19.83	15.78	0.000%
30	-22.28	-26.44	-22.35	22.28	26.44	22.35	0.000%
31	-22.28	-19.83	-22.35	22.28	19.83	22.35	0.000%
32	-15.88	-26.44	-27.60	15.88	26.44	27.60	0.000%
33	-15.88	-19.83	-27.60	15.88	19.83	27.60	0.000%
34	0.00	-58.28	0.00	0.00	58.28	-0.00	0.000%
35	0.00	-58.28	-8.55	-0.00	58.28	8.55	0.000%
36	4.21	-58.28	-7.30	-4.21	58.28	7.30	0.000%
37	5.93	-58.28	-5.94	-5.93	58.28	5.94	0.000%

	Sum of Applied Forces			*Sum of Reactions*			
Load Comb.	*PX K*	*PY K*	*PZ K*	*PX K*	*PY K*	*PZ K*	*% Error*
38	7.24	-58.28	-4.20	-7.24	58.28	4.20	0.000%
39	8.37	-58.28	-0.00	-8.37	58.28	0.00	0.000%
40	7.26	-58.28	4.35	-7.26	58.28	-4.35	0.000%
41	5.88	-58.28	6.04	-5.88	58.28	-6.04	0.000%
42	4.12	-58.28	7.31	-4.12	58.28	-7.31	0.000%
43	0.00	-58.28	8.38	0.00	58.28	-8.38	0.000%
44	-4.12	-58.28	7.31	4.12	58.28	-7.31	0.000%
45	-5.89	-58.28	6.05	5.89	58.28	-6.05	0.000%
46	-7.26	-58.28	4.35	7.26	58.28	-4.35	0.000%
47	-8.29	-58.28	-0.00	8.29	58.28	0.00	0.000%
48	-7.16	-58.28	-4.16	7.16	58.28	4.16	0.000%
49	-5.87	-58.28	-5.88	5.87	58.28	5.88	0.000%
50	-4.16	-58.28	-7.23	4.16	58.28	7.23	0.000%
51	0.00	-22.03	-6.53	0.00	22.03	6.53	0.000%
52	3.15	-22.03	-5.48	-3.15	22.03	5.48	0.000%
53	4.42	-22.03	-4.43	-4.42	22.03	4.43	0.000%
54	5.37	-22.03	-3.13	-5.37	22.03	3.13	0.000%
55	6.25	-22.03	-0.00	-6.25	22.03	0.00	0.000%
56	5.54	-22.03	3.40	-5.54	22.03	-3.40	0.000%
57	4.44	-22.03	4.65	-4.44	22.03	-4.65	0.000%
58	3.08	-22.03	5.55	-3.08	22.03	-5.55	0.000%
59	0.00	-22.03	6.32	0.00	22.03	-6.32	0.000%
60	-3.08	-22.03	5.55	3.08	22.03	-5.55	0.000%
61	-4.37	-22.03	4.58	4.37	22.03	-4.58	0.000%
62	-5.54	-22.03	3.40	5.54	22.03	-3.40	0.000%
63	-6.22	-22.03	-0.00	6.22	22.03	0.00	0.000%
64	-5.35	-22.03	-3.12	5.35	22.03	3.12	0.000%
65	-4.40	-22.03	-4.41	4.40	22.03	4.41	0.000%
66	-3.14	-22.03	-5.45	3.14	22.03	5.45	0.000%

Non-Linear Convergence Results

Load Combination	*Converged?*	*Number of Cycles*	*Displacement Tolerance*	*Force Tolerance*
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000144
3	Yes	4	0.00000001	0.00000129
4	Yes	4	0.00000001	0.00000220
5	Yes	4	0.00000001	0.00000185
6	Yes	4	0.00000001	0.00000159
7	Yes	4	0.00000001	0.00000120
8	Yes	4	0.00000001	0.00000153
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000273
11	Yes	4	0.00000001	0.00000238
12	Yes	4	0.00000001	0.00000135
13	Yes	4	0.00000001	0.00000124
14	Yes	4	0.00000001	0.00000213
15	Yes	4	0.00000001	0.00000197
16	Yes	4	0.00000001	0.00000253
17	Yes	4	0.00000001	0.00000227
18	Yes	4	0.00000001	0.00000139
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000213
21	Yes	4	0.00000001	0.00000183
22	Yes	4	0.00000001	0.00000178

23	Yes	4	0.00000001	0.00000157
24	Yes	4	0.00000001	0.00000141
25	Yes	4	0.00000001	0.00000123
26	Yes	4	0.00000001	0.00000266
27	Yes	4	0.00000001	0.00000231
28	Yes	4	0.00000001	0.00000128
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000165
31	Yes	4	0.00000001	0.00000123
32	Yes	4	0.00000001	0.00000223
33	Yes	4	0.00000001	0.00000190
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000989
36	Yes	4	0.00000001	0.00001035
37	Yes	4	0.00000001	0.00001067
38	Yes	4	0.00000001	0.00001110
39	Yes	4	0.00000001	0.00001034
40	Yes	4	0.00000001	0.00000978
41	Yes	4	0.00000001	0.00000994
42	Yes	4	0.00000001	0.00001028
43	Yes	4	0.00000001	0.00001115
44	Yes	4	0.00000001	0.00001029
45	Yes	4	0.00000001	0.00001000
46	Yes	4	0.00000001	0.00000982
47	Yes	4	0.00000001	0.00001032
48	Yes	4	0.00000001	0.00001109
49	Yes	4	0.00000001	0.00001063
50	Yes	4	0.00000001	0.00001032
51	Yes	4	0.00000001	0.00000001
52	Yes	4	0.00000001	0.00000001
53	Yes	4	0.00000001	0.00000001
54	Yes	4	0.00000001	0.00000001
55	Yes	4	0.00000001	0.00000001
56	Yes	4	0.00000001	0.00000001
57	Yes	4	0.00000001	0.00000001
58	Yes	4	0.00000001	0.00000001
59	Yes	4	0.00000001	0.00000001
60	Yes	4	0.00000001	0.00000001
61	Yes	4	0.00000001	0.00000001
62	Yes	4	0.00000001	0.00000001
63	Yes	4	0.00000001	0.00000001
64	Yes	4	0.00000001	0.00000001
65	Yes	4	0.00000001	0.00000001
66	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* *°*	*Twist* *°*
T1	150 - 140	4.193	51	0.2631	0.0811
T2	140 - 120	3.632	51	0.2574	0.0595
T3	120 - 100	2.590	51	0.2202	0.0352
T4	100 - 80	1.724	51	0.1772	0.0215
T5	80 - 60	1.069	51	0.1274	0.0152
T6	60 - 40	0.591	51	0.0926	0.0105
T7	40 - 20	0.258	51	0.0581	0.0065
T8	20 - 0	0.067	51	0.0242	0.0029

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	3-ft Dish	51	4.193	0.2631	0.0811	101459
148.00	6-Arm Halo Mount	51	4.080	0.2624	0.0765	101459
145.00	3-ft Dish	51	3.911	0.2611	0.0697	101459
135.00	DB438	51	3.359	0.2508	0.0513	40897
130.00	DB438	51	3.094	0.2417	0.0449	34257
125.00	DB438	51	2.837	0.2311	0.0397	29473
120.00	SitePro VFA12-HD	51	2.590	0.2202	0.0352	25739
118.00	3' Side Mount Standoff	51	2.494	0.2160	0.0335	24915
110.00	DB225-A	51	2.132	0.1993	0.0272	23074
85.00	PD201-1	51	1.214	0.1391	0.0164	25361

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	150 - 140	21.174	18	1.3272	0.4110
T2	140 - 120	18.331	18	1.3053	0.3016
T3	120 - 100	13.056	2	1.1190	0.1786
T4	100 - 80	8.695	2	0.8955	0.1089
T5	80 - 60	5.389	2	0.6422	0.0769
T6	60 - 40	2.982	2	0.4665	0.0531
T7	40 - 20	1.302	2	0.2926	0.0328
T8	20 - 0	0.338	2	0.1220	0.0146

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	3-ft Dish	18	21.174	1.3272	0.4110	21447
148.00	6-Arm Halo Mount	18	20.602	1.3252	0.3876	21447
145.00	3-ft Dish	18	19.746	1.3209	0.3534	21447
135.00	DB438	18	16.942	1.2734	0.2601	8308
130.00	DB438	2	15.592	1.2282	0.2276	6778
125.00	DB438	2	14.299	1.1750	0.2013	5716
120.00	SitePro VFA12-HD	2	13.056	1.1190	0.1786	5015
118.00	3' Side Mount Standoff	2	12.575	1.0970	0.1699	4863
110.00	DB225-A	2	10.746	1.0106	0.1376	4509
85.00	PD201-1	2	6.123	0.7008	0.0833	4967

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	150	Leg	A325N	0.6250	4	2.89	27.61	0.105 ✔	1	Bolt DS
T2	140	Leg	A325N	1.0000	6	7.22	54.52	0.132 ✔	1	Bolt Tension
T3	120	Leg	A325N	1.0000	6	11.84	54.52	0.217 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	7.35	12.72	0.577 ✔	1	Member Bearing
T4	100	Leg	A325N	1.0000	6	16.99	54.52	0.312 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	5.89	12.72	0.463 ✔	1	Member Bearing
T5	80	Leg	A325N	1.0000	6	21.37	54.52	0.392 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	5.59	12.72	0.440 ✔	1	Member Bearing
T6	60	Leg	A325N	1.0000	6	25.29	54.52	0.464 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	5.60	12.72	0.440 ✔	1	Member Bearing
T7	40	Leg	A325N	1.0000	6	28.88	54.52	0.530 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	5.84	12.72	0.459 ✔	1	Member Bearing
T8	20	Leg	F1554-10 5	1.0000	6	32.21	56.79	0.567 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	6.95	12.72	0.546 ✔	1	Member Bearing

Compression Checks

Leg 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	150 - 140	1 1/2	10.00	2.26	72.3 K=1.00	1.7672	-11.57	54.24	0.213 [1] ✔
T2	140 - 120	1 3/4	20.00	2.38	65.3 K=1.00	2.4053	-44.78	79.26	0.565 [1] ✔
T3	120 - 100	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	20.03	10.02	45.0 K=1.00	3.6816	-75.81	142.87	0.531 [1] ✔
T4	100 - 80	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	20.03	10.02	45.0 K=1.00	3.6816	-108.52	142.87	0.760 [1] ✔
T5	80 - 60	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	20.03	10.02	37.5 K=1.00	5.3014	-137.43	245.62	0.560 [1] ✔
T6	60 - 40	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	20.03	10.02	37.5 K=1.00	5.3014	-163.70	245.62	0.666 [1] ✔
T7	40 - 20	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	20.03	10.02	37.5 K=1.00	5.3014	-188.13	245.62	0.766 [1] ✔
T8	20 - 0	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	20.03	10.02	31.9 K=1.00	7.2158	-211.44	345.60	0.612 [1] ✔

[1] P_u / ϕP_n controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T3	120 - 100	0.5	1.48	141.6	165.67	0.1963	0.72	2.49	0.288 ✔
T4	100 - 80	0.5	1.48	141.6	165.67	0.1963	0.31	2.49	0.124 ✔
T5	80 - 60	0.5	1.46	140.4	276.74	0.1963	0.27	2.53	0.108 ✔
T6	60 - 40	0.5	1.46	140.4	276.74	0.1963	0.23	2.53	0.091 ✔
T7	40 - 20	0.5	1.46	140.4	276.74	0.1963	0.36	2.53	0.142 ✔
T8	20 - 0	0.5	1.44	138.4	376.67	0.1963	0.79	2.62	0.301 ✔

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	150 - 140	5/8	4.59	2.23	153.8 K=0.90	0.3068	-2.28	2.93	0.777 [1] ✔
T2	140 - 120	3/4	4.65	2.24	129.2 K=0.90	0.4418	-3.62	5.98	0.605 [1] ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	10.97	4.89	118.9 K=1.00	0.9020	-7.73	18.03	0.429 [1] ✔
T4	100 - 80	L2 1/2x2 1/2x3/16	12.50	5.67	137.4 K=1.00	0.9020	-6.08	13.67	0.445 [1] ✔
T5	80 - 60	L2 1/2x2 1/2x3/16	13.80	6.37	154.4 K=1.00	0.9020	-5.78	10.83	0.534 [1] ✔
T6	60 - 40	L2 1/2x2 1/2x3/16	15.24	7.12	172.7 K=1.00	0.9020	-5.90	8.66	0.682 [1] ✔
T7	40 - 20	L2 1/2x2 1/2x3/16	16.80	7.92	192.1 K=1.00	0.9020	-6.14	7.00	0.877 [1] ✔
T8	20 - 0	L3x3x3/16	18.45	8.76	176.4 K=1.00	1.0900	-7.41	10.03	0.739 [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 $\frac{P_u}{\phi P_n}$
T1	150 - 140	3/4	4.00	3.88	173.6	0.4418	-0.19	3.31	0.057 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
					K=0.70				✓
T2	140 - 120	3/4	4.00	3.85	172.7 K=0.70	0.4418	-0.76	3.35	0.226 [1] ✓

[1] P_u / ϕP_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	150 - 140	7/8	4.00	3.88	148.8 K=0.70	0.6013	-0.37	6.14	0.061 [1] ✓
T2	140 - 120	7/8	4.00	3.85	148.0 K=0.70	0.6013	-0.78	6.20	0.125 [1] ✓

[1] P_u / ϕP_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	150 - 140	7/8	4.00	3.88	148.8 K=0.70	0.6013	-0.76	6.14	0.124 [1] ✓
T2	140 - 120	7/8	4.00	3.85	148.0 K=0.70	0.6013	-0.78	6.20	0.125 [1] ✓

[1] P_u / ϕP_n controls

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	150 - 140	1 1/2	10.00	2.26	72.3	1.2339	9.65	60.15	0.160 [1 #] ✓
T2	140 - 120	1 3/4	20.00	2.38	65.3	2.4053	43.33	108.24	0.400 [1] ✓
T3	120 - 100	#12ZG - 1.25" - 1.00" conn.	20.03	10.02	45.0	3.6816	71.06	165.67	0.429 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
		(Pirod 207628)							✔
T4	100 - 80	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	20.03	10.02	45.0	3.6816	101.96	165.67	0.615 [1] ✔
T5	80 - 60	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	20.03	10.02	37.5	5.3014	128.21	276.74	0.463 [1] ✔
T6	60 - 40	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	20.03	10.02	37.5	5.3014	151.72	276.74	0.548 [1] ✔
T7	40 - 20	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	20.03	10.02	37.5	5.3014	173.29	276.74	0.626 [1] ✔
T8	20 - 0	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	20.03	10.02	31.9	7.2158	193.24	376.67	0.513 [1] ✔

[1] P_u / ϕP_n controls
[#] Based on net area of leg in section below

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T3	120 - 100	0.5	1.48	141.6	165.67	0.1963	0.72	2.49	0.288 ✔
T4	100 - 80	0.5	1.48	141.6	165.67	0.1963	0.31	2.49	0.124 ✔
T5	80 - 60	0.5	1.46	140.4	276.74	0.1963	0.27	2.53	0.108 ✔
T6	60 - 40	0.5	1.46	140.4	276.74	0.1963	0.23	2.53	0.091 ✔
T7	40 - 20	0.5	1.46	140.4	276.74	0.1963	0.36	2.53	0.142 ✔
T8	20 - 0	0.5	1.44	138.4	376.67	0.1963	0.79	2.62	0.301 ✔

Diagonal 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	150 - 140	5/8	4.59	2.23	170.9	0.3068	2.25	13.81	0.163 [1] ✔
T2	140 - 120	3/4	4.65	2.24	143.5	0.4418	3.63	19.88	0.182 [1] ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	10.97	4.89	78.0	0.9020	7.35	29.22	0.251 [1] ✔
T4	100 - 80	L2 1/2x2 1/2x3/16	11.93	5.42	86.2	0.9020	5.89	29.22	0.202 [1] ✔
T5	80 - 60	L2 1/2x2 1/2x3/16	13.13	6.06	96.0	0.9020	5.59	29.22	0.191 [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	60 - 40	L2 1/2x2 1/2x3/16	15.24	7.12	112.4	0.9020	5.60	29.22	0.192 [1] ✔
T7	40 - 20	L2 1/2x2 1/2x3/16	16.80	7.92	124.8	0.9020	5.84	29.22	0.200 [1] ✔
T8	20 - 0	L3x3x3/16	18.45	8.76	114.1	1.0900	6.95	35.32	0.197 [1] ✔

[1] P_u / ϕP_n controls

Horizontal 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	150 - 140	3/4	4.00	3.88	248.0	0.4418	0.19	19.88	0.009 [1] ✔
T2	140 - 120	3/4	4.00	3.85	246.7	0.4418	0.84	19.88	0.042 [1] ✔

[1] P_u / ϕP_n controls

Top Girt 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	150 - 140	7/8	4.00	3.88	212.6	0.6013	0.33	27.06	0.012 [1] ✔
T2	140 - 120	7/8	4.00	3.85	211.4	0.6013	0.80	27.06	0.029 [1] ✔

[1] P_u / ϕP_n controls

Bottom Girt 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	150 - 140	7/8	4.00	3.88	212.6	0.6013	0.82	27.06	0.030 [1] ✔
T2	140 - 120	7/8	4.00	3.85	211.4	0.6013	0.78	27.06	0.029 [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 / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
T1	150 - 140	Leg	1 1/2	3	-11.57	54.24	21.3	Pass
T2	140 - 120	Leg	1 3/4	39	-44.78	79.26	56.5	Pass
T3	120 - 100	Leg	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	103	-75.81	142.87	53.1	Pass
T4	100 - 80	Leg	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	118	-108.52	142.87	76.0	Pass
T5	80 - 60	Leg	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	133	-137.43	245.62	56.0	Pass
T6	60 - 40	Leg	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	148	-163.70	245.62	66.6	Pass
T7	40 - 20	Leg	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	163	-188.13	245.62	76.6	Pass
T8	20 - 0	Leg	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	178	-211.44	345.60	61.2	Pass
T1	150 - 140	Diagonal	5/8	14	-2.28	2.93	77.7	Pass
T2	140 - 120	Diagonal	3/4	50	-3.62	5.98	60.5	Pass
T3	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	114	-7.73	18.03	42.9 57.7 (b)	Pass
T4	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	123	-6.08	13.67	44.5 46.3 (b)	Pass
T5	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	138	-5.78	10.83	53.4	Pass
T6	60 - 40	Diagonal	L2 1/2x2 1/2x3/16	153	-5.90	8.66	68.2	Pass
T7	40 - 20	Diagonal	L2 1/2x2 1/2x3/16	168	-6.14	7.00	87.7	Pass
T8	20 - 0	Diagonal	L3x3x3/16	184	-7.41	10.03	73.9	Pass
T1	150 - 140	Horizontal	3/4	23	-0.19	3.31	5.7	Pass
T2	140 - 120	Horizontal	3/4	59	-0.76	3.35	22.6	Pass
T1	150 - 140	Top Girt	7/8	4	-0.37	6.14	6.1	Pass
T2	140 - 120	Top Girt	7/8	41	-0.78	6.20	12.5	Pass
T1	150 - 140	Bottom Girt	7/8	8	-0.76	6.14	12.4	Pass
T2	140 - 120	Bottom Girt	7/8	44	-0.78	6.20	12.5	Pass
							Summary	
						Leg (T7)	76.6	Pass
						Diagonal (T7)	87.7	Pass
						Horizontal (T2)	22.6	Pass
						Top Girt (T2)	12.5	Pass
						Bottom Girt (T2)	12.5	Pass
						Bolt Checks	57.7	Pass
						RATING =	**87.7**	**Pass**

Pier and Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 2904 \cdot ft \cdot kips$	(User Input from tnxTower)
Shear Force =	$S_t := 33 \cdot kip$	(User Input from tnxTower)
Axial Force =	$WT_t := 26 \cdot kip$	(User Input from tnxTower)
Max Compression Force =	$C_t := 218 \cdot kip$	(User Input from tnxTower)
Max Uplift Force =	$U_t := 199 \cdot kip$	(User Input from tnxTower)
Tower Height =	$H_t := 150 \cdot ft$	(User Input)
Tower Width =	$W_t := 16 \cdot ft$	(User Input)
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 1$	(User Input)

Footing Data:

Overall Depth of Footing =	$D_f := 4.5 \cdot ft$	(User Input)
Length of Pier =	$L_p := 3.5 \cdot ft$	(User Input)
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)
Diameter of Pier =	$d_p := 3.5 \cdot ft$	(User Input)
Thickness of Footing =	$T_f := 1.5 \cdot ft$	(User Input)
Width of Footing =	$W_f := 24.0 \cdot ft$	(User Input)

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 12000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 120 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 6$	(User Input)	
Bar Diameter =	$d_{bpier} := 0.75 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 16$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 0.5 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 8$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.0 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 34$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.000 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 34$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.442 \cdot in^2$$

Pad Top Reinforcement Bar Area = $$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.785 \cdot in^2$$

Pad Bottom Reinforcement Bar Area = $$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.785 \cdot in^2$$

Coefficient of Lateral Soil Pressure = $$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$$

Load Factor = $LF := 1$

Stability of Footing:

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

Adjusted Soil Unit Weight = $\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{soil} - 62.4\text{pcf}, \gamma_{soil}) = 120 \cdot \text{pcf}$

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.08 \cdot \text{ksf}$

$P_{top} := \text{if}\left[n < (D_f - T_f), P_{pt}, P_{pn}\right] = 1.08 \cdot \text{ksf}$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.62 \cdot \text{ksf}$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.35 \cdot \text{ksf}$$

$T_p := \text{if}\left[n < (D_f - T_f), T_f, (D_f - n)\right] = 1.5 \cdot \text{ft}$

$A_p := W_f \cdot T_p = 36 \cdot \text{ft}^2$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 48.6 \cdot \text{kip}$

Weight of Concrete = $$WT_c := \left[\left(W_f^{\,2} \cdot T_f\right) + (3) \cdot \left(\frac{d_p^{\,2} \cdot \pi}{4} \cdot L_p\right)\right] \cdot \gamma_c = 144.753 \cdot \text{kip}$$

Weight of Soil Above Footing = $$WT_{s1} := \left[\left[W_f^{\,2} - (3) \cdot \left(\frac{d_p^{\,2} \cdot \pi}{4}\right)\right] \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 196.97 \cdot \text{kip}$$

Tower Offset = $$X_{t1} := \left[\frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot \text{deg}))}{2}\right] \qquad X_{t2} := \frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot \text{deg}))}{3}$$

$X_t := \text{if}(\text{Pos}_t = 1, X_{t1}, X_{t2}) = 5.072$

$$X_{off1} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot \text{deg}))}{3} + X_t\right] = 2.309 \qquad X_{off2} := 0$$

$X_{off} := \text{if}(\text{Pos}_t = 1, X_{off1}, X_{off2}) \qquad X_{off} = 2.309 \cdot \text{ft}$

Total Weight = $WT_{tot} := 0.9WT_c + 0.75WT_{s1} = 278 \cdot \text{kip}$

Resisting Moment = $$M_r := (WT_{tot}) \cdot \frac{W_f}{2} + 0.9WT_t \cdot \left(\frac{W_f}{2} - X_{off}\right) + 0.75\left(S_u \cdot \frac{T_p}{3}\right) = 3581 \cdot \text{kip} \cdot \text{ft}$$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 3069 \cdot \text{kip} \cdot \text{ft}$

Factor of Safety Actual = $$FS := \frac{M_r}{M_{ot}} = 1.17$$

Factor of Safety Required = $FS_{req} := 1$ OverTurning_Moment_Check := if($FS \geq FS_{req}$, "Okay", "No Good")

OverTurning_Moment_Check = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \dfrac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 173.702 \cdot kips$

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

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

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 368 \cdot kip$

Area of the Mat = $A_{mat} := W_f^{\,2} = 576$

Section Modulus of Mat = $S := \dfrac{W_f^{\,3}}{6} = 2304 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \dfrac{Load_{tot}}{A_{mat}} + \dfrac{M_{ot}}{S} = 1.97 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < 0.75 q_s, \text{"Okay"}, \text{"No Good"})$

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

Minimum Pressure in Mat = $P_{min} := \dfrac{Load_{tot}}{A_{mat}} - \dfrac{M_{ot}}{S} = -0.694 \cdot ksf$

$Min\_Pressure\_Check := if\left[(P_{min} \ge 0) \cdot (P_{min} < 0.75 q_s), \text{"Okay"}, \text{"No Good"}\right]$

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

Distance to Resultant of Pressure Distribution = $X_p := \dfrac{P_{max}}{\dfrac{P_{max} - P_{min}}{W_f}} \cdot \dfrac{1}{3} = 5.917$

Distance to Kern = $X_k := \dfrac{W_f}{6} = 4$

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

Eccentricity = $e := \dfrac{M_{ot}}{Load_{tot}} = 8.346$

Adjusted Soil Pressure = $P_a := \dfrac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\dfrac{W_f}{2} - e\right)} = 2.795 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 2.795 \cdot ksf$

$Pressure\_Check := if(q_{adj} < 0.75 q_s, \text{"Okay"}, \text{"No Good"})$

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

Concrete Bearing Capacity:

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

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 3.062 \times 10^3 \cdot kips$ (ACI-2008 10.14)

Bearing_Check := if(P_b > LF·C_t, "Okay", "No Good")

Bearing_Check = "Okay"

Shear Strength of Concrete:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 14 \cdot in$

$FL := LF \cdot \frac{C_t}{W_f^2} = 0.378 \cdot ksf$

$V_{req} := FL \cdot (X_t - .5 \cdot d_p - d) \cdot W_f = 19.576 \cdot kips$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 434 \cdot kip$ (ACI-2008 11.2.1.1)

Beam_Shear_Check := if(V_req < V_Avail, "Okay", "No Good")

Beam_Shear_Check = "Okay"

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

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 14.7$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 17.1$

Required Shear Strength = $V_{req} := FL \cdot (W_f^2 - A_{bo}) = 212 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 529.6 \cdot kip$ (ACI-2008 11.11.2.1)

Punching_Shear_Check := if(V_req < V_Avail, "Okay", "No Good")

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

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

Maximum Moment in Pad = $M_{max} := 630 \cdot kip \cdot ft$ (User Input)

Design Moment = $M_n := \frac{LF \cdot M_{max}}{\phi_m} = 700 \cdot kips \cdot ft$

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

(ACI-2008 10.2.7.3)

$$b_{eff} := W_t \cdot \cos(30 \cdot deg) + d_p = 208.277 \cdot in$$

$$A_s := \frac{M_n}{(f_y \cdot d)} = 10 \cdot in^2$$

$$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 0.847 \cdot in$$

$$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 10.312 \cdot in^2$$

$$\rho := \frac{A_s}{b_{eff} \cdot d} = 0.04244 \cdot in$$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases} = 0.0018$$ (ACI -2008 7.12.2.1)

Check Bottom Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 10.3 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 26.7 \cdot in^2$$

Pad_Reinforcement_Bot := if($As_{prov} > As$, "Okay", "No Good")

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 10.3 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 26.7 \cdot in^2$$

Pad_Reinforcement_Top := if($As_{prov} > As$, "Okay", "No Good")

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 7.52 \cdot in$$

Spacing or Cover Dimension =

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

Transverse Reinforcement Index =

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

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

Minimum Development Length =

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

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 45 \cdot in$$

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

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 1385.44 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 6.93 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 7.07 \cdot in^2$

Steel_Area_Check := if($A_{sprov} > A_{smin}$, "Okay" , "No Good")

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 7.497 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 36 \cdot in$

Maximum Moment in Pier = $M_p := S_t \cdot (L_p) \cdot LF = 1386 \cdot in \cdot kips$

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

$$\begin{pmatrix} D & N & n & P_u & M_{xu} \end{pmatrix} := \begin{pmatrix} d_p \cdot 12 & NB_{pier} & BS_{pier} & \frac{C_t \cdot 1.333}{kips} & \frac{M_p}{in \cdot kips} \end{pmatrix}$$

$$\begin{pmatrix} D & N & n & P_u & M_{xu} \end{pmatrix} = \begin{pmatrix} 42 & 16 & 6 & 290.594 & 1.386 \times 10^3 \end{pmatrix}$$

$$\begin{pmatrix} \phi P_n & \phi M_{xn} & f_{sp} & \rho \end{pmatrix} := \begin{pmatrix} 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} \phi P_n & \phi M_{xn} & f_{sp} & \rho \end{pmatrix} := \phi P'_n(D, N, n, P_u, M_{xu})^T$$

$$\begin{pmatrix} \phi P_n & \phi M_{xn} & f_{sp} & \rho \end{pmatrix} = \begin{pmatrix} 2.032 \times 10^3 & 9.693 \times 10^3 & -22.277 & 5.081 \times 10^{-3} \end{pmatrix}$$

Axial_Load_Check := if($\phi P_n \geq P_u$, "Okay" , "No Good")

Axial_Load_Check = "Okay"

Bending_Check := if($\phi M_{xn} \geq M_{xu}$, "Okay" , "No Good")

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$$L_{pier} := L_p - Cvr_{pier} = 39 \cdot in$$

$$L_{pad} := T_f - Cvr_{pad} = 15 \cdot in$$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

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

Transverse Reinforcement =

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

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 13.34 \cdot in$$

Minimum Development Length =

$$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 9.961 \cdot in$$ (ACI 12.2.1)

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

$$L_{db} := max(L_{dbt}, L_{dbmin}) = 13.341 \cdot in$$

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

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

Compression: (ACI-2008 12.3.2)

$$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 14.23 \cdot in$$

$$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot (d_{bpier} \cdot f_y) = 13.5 \cdot in$$

$$L_{dbc} := if(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}) = 14.23 \cdot in$$

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

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

verizon fuze | RFDS

NORTHEAST > North East > New England > New England West > **KILLINGLY EAST CT**

RF Submit by: Stevens, Wesley - wesley.stevens@verizonwireless.com - 3/27/2023, 10:55:38 AM

EE Submit by: , - -

Project Details

FUZE Project ID:	16999208
Project Name:	KILLINGLY EAST CT
Project Alt Name:	KILLINGLY EAST CT - MKT 64 - MCR
Project Type:	Initial Build
Modification Type:	
Designed Sector Carrier 4G:	17
Designed Sector Carrier 5G:	3
Additional Sector Carrier 4G:	N/A
Additional Sector Carrier 5G:	N/A
FP Solution Type & Tech Type:	MCR;4G_700,4G_850,4G_AWS,4G_PCS,5G_L-Sub6
Carrier Aggregation:	false
MPT Id:	
eCIP-0:	false
Suffix:	Rev2_20230809

Location Information

Site ID:	617359992
E-NodeB ID:	0649402,064247
MDG Location ID:	5000917380
PSLC:	780562
Switch Name:	
Tower Owner:	
Tower Type:	Self Support (Lattice Tower)
Site Type:	MACRO
Site Sub Type:	TRADITIONAL
Street Address:	1249 Hartford Pike
City:	Killingly
State:	CT
Zip Code:	06243
County:	Windham
Latitude:	41.845389 / 41° 50' 43.4004" N
Longitude:	-71.828167 / 71° 49' 41.4012" W

RFDS Project Scope:

New Build Macro
700/AWS/PCS/850/C-Band
side-by-side JAHH-65B antennas
64T C-Band MMUs
Need Diplexers for 700/850

Rev2_20230809: updated RRH models / C-Band MMU model
Rev1_20230327: updated RRH models to ORAN
Rev0_20221114: initial design

Antenna Summary

Added

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
				5G	Samsung	MT6413-77A	120	121.2	0(0001) 180(0002) 270(0003)		false	PHYSICAL	3	
LTE	LTE 5G	LTE	LTE		COMMSCOPE	JAHH-65B-R3B	120	123	0(0001) 0(01) 180(0002) 180(02) 270(0003) 270(03)		false	PHYSICAL	6	000000001900055848

Removed

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
No data available.														

Retained

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
No data available.														

Added: 9	Removed: 0	Retained: 0

Equipment Summary

Added

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
RRU	Tower			LTE	LTE		Samsung	B2/B66A RRH ORAN (RF4439d-25A)			PHYSICAL	3	
RRU	Tower					5G	Samsung	MT6413-77A			PHYSICAL	3	
RRU	Tower	LTE	LTE 5G				Samsung	RF4461d-13A			PHYSICAL	3	
Diplexer	Tower						Commscope	CBC78T-DS-43-2X			PHYSICAL	3	000000001900084
Mount	Tower						Commscope	BSAMNT-SBS-2-2			PHYSICAL	3	000000001900059

Removed

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID

No data available.

Retained

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID

No data available.

Service Info

700 MHz LTE

	CAND		
Sector	01	02	03
Azimuth	0	180	270
Cell / ENode B ID	064247	064247	064247
Antenna Model	JAHH-65B-R3B	JAHH-65B-R3B	JAHH-65B-R3B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	2	2
Tip Height	123	123	123
Regulatory Power	71.71	71.71	71.71
DLEARFCN	5230	5230	5230
Channel Bandwidth(MHz)	10	10	10
Total ERP (W)	645.36	645.36	645.36
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	15347835	15347836	15347837
Source	ATOLL_API	ATOLL_API	ATOLL_API

850 MHz LTE

	CAND		
Sector	01	02	03
Azimuth	0	180	270
Cell / ENode B ID	064247	064247	064247
Antenna Model	JAHH-65B-R3B	JAHH-65B-R3B	JAHH-65B-R3B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	8	8	8
Tip Height	123	123	123
Regulatory Power	246.95	246.95	246.95
DLEARFCN	2450	2450	2450
Channel Bandwidth(MHz)	10	10	10
Total ERP (W)	555.65	555.65	555.65
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	15347928	15347929	15347930
Source	ATOLL_API	ATOLL_API	ATOLL_API

850 MHz 5GNR

	CAND		
Sector	0001	0002	0003
Azimuth	0	180	270
Cell / ENode B ID	0649402	0649402	0649402
Antenna Model	JAHH-65B-R3B	JAHH-65B-R3B	JAHH-65B-R3B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	8	8	8
Tip Height	123	123	123
Regulatory Power	246.95	246.95	246.95
DLEARFCN	2450	2450	2450
Channel Bandwidth(MHz)	10	10	10
Total ERP (W)	555.65	555.65	555.65
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	15347928	15347929	15347930
Source	ATOLL_API	ATOLL_API	ATOLL_API

1900 MHz LTE

	CAND		
Sector	01	02	03
Azimuth	0	180	270
Cell / ENode B ID	064247	064247	064247
Antenna Model	JAHH-65B-R3B	JAHH-65B-R3B	JAHH-65B-R3B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	0	0	0
Tip Height	123	123	123
Regulatory Power	201.13	201.13	201.13
DLEARFCN	1075	1075	1075
Channel Bandwidth(MHz)	15	15	15
Total ERP (W)	1655.01	1655.01	1655.01
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	15347925	15347926	15347927
Source	ATOLL_API	ATOLL_API	ATOLL_API

2100 MHz LTE

	CAND		
Sector	01	02	03
Azimuth	0	180	270
Cell / ENode B ID	064247	064247	064247
Antenna Model	JAHH-65B-R3B	JAHH-65B-R3B	JAHH-65B-R3B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	0	0	0
Tip Height	123	123	123
Regulatory Power	152.24	152.24	152.24
DLEARFCN	2050	2050	2050
Channel Bandwidth(MHz)	20	20	20
Total ERP (W)	1670.32	1670.32	1670.32
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	15347922	15347923	15347924
Source	ATOLL_API	ATOLL_API	ATOLL_API

nL-Sub6

	CAND		
Sector	0001	0002	0003
Azimuth	0	180	270
Cell / ENode B ID	0649402	0649402	0649402
Antenna Model	MT6413-77A	MT6413-77A	MT6413-77A
Antenna Make	Samsung	Samsung	Samsung
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	1	1	1
Tip Height	121.2	121.2	121.2
Regulatory Power	942.16	942.16	942.16
DLEARFCN	648672, 655324	648672, 655324	648672, 655324
Channel Bandwidth(MHz)	60	60	60
Total ERP (W)	32734.07	32734.07	32734.07
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	MT6413-77A	MT6413-77A	MT6413-77A
Number of Tx, Rx Lines	2,2	2,2	2,2
Position			
Transmitter Id	15347931	15347932	15347933
Source	ATOLL_API	ATOLL_API	ATOLL_API

Service Comments

Callsigns Per Antenna

Sector	Antenna Make	Antenna Model	Ant CL Height AGL	Tip Height	Azimuth (TN)	Elec Tilt	Mech Tilt	Gain	Beam Width	Regulatory Power	Callsigns						
											700	850	1900	2100	28 GHz	31 GHz	39 GHz
0002	Samsung	MT6413-77A	120	121.2	180	1	0	23.15	105	942.16							
01	COMMSCOPE	JAHH-65B-R3B	120	123	0	0	0	15.678	63	201.13			KNLH263 WQDU931 WQEM954				
01	COMMSCOPE	JAHH-65B-R3B	120	123	0	2	0	12.258	67	71.71	WQJQ689						
02	COMMSCOPE	JAHH-65B-R3B	120	123	180	2	0	12.258	67	71.71	WQJQ689						
0001	Samsung	MT6413-77A	120	121.2	0	1	0	23.15	105	942.16							
0003	Samsung	MT6413-77A	120	121.2	270	1	0	23.15	105	942.16							
0002	COMMSCOPE	JAHH-65B-R3B	120	123	180	8	0	12.748	65	246.95 - PSD		KNKN862					
02	COMMSCOPE	JAHH-65B-R3B	120	123	180	0	0	15.678	63	201.13			KNLH263 WQDU931 WQEM954				
03	COMMSCOPE	JAHH-65B-R3B	120	123	270	8	0	12.748	65	246.95 - PSD		KNKN862					
0003	COMMSCOPE	JAHH-65B-R3B	120	123	270	8	0	12.748	65	246.95 - PSD		KNKN862					
0001	COMMSCOPE	JAHH-65B-R3B	120	123	0	8	0	12.748	65	246.95 - PSD		KNKN862					
03	COMMSCOPE	JAHH-65B-R3B	120	123	270	0	0	15.868	65	152.24				WQGA906 WQGD529			
0001	Samsung	MT6413-77A	120	121.2	0	1	0	23.15	105	942.16							
02	COMMSCOPE	JAHH-65B-R3B	120	123	180	0	0	15.868	65	152.24				WQGA906 WQGD529			
03	COMMSCOPE	JAHH-65B-R3B	120	123	270	2	0	12.258	67	71.71	WQJQ689						
0002	Samsung	MT6413-77A	120	121.2	180	1	0	23.15	105	942.16							
02	COMMSCOPE	JAHH-65B-R3B	120	123	180	8	0	12.748	65	246.95 - PSD		KNKN862					
01	COMMSCOPE	JAHH-65B-R3B	120	123	0	8	0	12.748	65	246.95 - PSD		KNKN862					
0003	Samsung	MT6413-77A	120	121.2	270	1	0	23.15	105	942.16							
03	COMMSCOPE	JAHH-65B-R3B	120	123	270	0	0	15.678	63	201.13			KNLH263 WQDU931 WQEM954				
01	COMMSCOPE	JAHH-65B-R3B	120	123	0	0	0	15.868	65	152.24				WQGA906 WQGD529			

Callsigns

Callsign	Market	Radio Code	Market Number	Block	State	County	Licensee Name	Wholly Owned	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs /Sq Mi	Status	Action	Approved for Insvc
KNLH263	*New London-Norwich, CT*	*CW*	*BTA319*	*F*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*10.000*	*1890.000-1895.000*	*1970.000-1975.000*	*.000-.000*	*.000-.000*	*201.13*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRNE588	*New York, NY*	*PM*	*PEA001*	*B3*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*3840.000-3860.000*	*.000-.000*	*.000-.000*	*.000-.000*	*942.16*	*1640*	*226.98*	*Active*	*added*	*Yes*
WQGD529	*Connecticut 2 - Windham*	*AW*	*CMA358*	*A*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*1710.000-1720.000*	*2110.000-2120.000*	*.000-.000*	*.000-.000*	*152.24*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRNE586	*New York, NY*	*PM*	*PEA001*	*B1*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*3800.000-3820.000*	*.000-.000*	*.000-.000*	*.000-.000*	*942.16*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRHD610	New York, NY	UU	PEA001	M10	9015	Windham	Cellco Partnership	Yes	100.000	38500.000-38600.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WRHD618	New York, NY	UU	PEA001	M9	9015	Windham	Cellco Partnership	Yes	100.000	38400.000-38500.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WQJQ689	*Northeast*	*WU*	*REA001*	*C*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*22.000*	*746.000-757.000*	*776.000-787.000*	*.000-.000*	*.000-.000*	*71.71*	*1000*	*226.98*	*Active*	*added*	*Yes*
WRHD611	New York, NY	UU	PEA001	M2	9015	Windham	Cellco Partnership	Yes	100.000	37700.000-37800.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WQDU931	*New London-Norwich, CT*	*CW*	*BTA319*	*C*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*10.000*	*1900.000-1905.000*	*1980.000-1985.000*	*.000-.000*	*.000-.000*	*201.13*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRNE585	New York, NY	PM	PEA001	A5	9015	Windham	Cellco Partnership	Yes	20.000	3780.000-3800.000	.000-.000	.000-.000	.000-.000		1640	226.98	Active		Yes
WRNE582	*New York, NY*	*PM*	*PEA001*	*A2*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*3720.000-3740.000*	*.000-.000*	*.000-.000*	*.000-.000*	*942.16*	*1640*	*226.98*	*Active*	*added*	*Yes*
WQGA906	*New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-*	*AW*	*BEA010*	*B*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*1720.000-1730.000*	*2120.000-2130.000*	*.000-.000*	*.000-.000*	*152.24*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRHD619	New York, NY	UU	PEA001	N1	9015	Windham	Cellco Partnership	Yes	100.000	38600.000-38700.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WRHD609	New York, NY	UU	PEA001	M1	9015	Windham	Cellco Partnership	Yes	100.000	37600.000-37700.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WRNE584	New York, NY	PM	PEA001	A4	9015	Windham	Cellco Partnership	Yes	20.000	3760.000-3780.000	.000-.000	.000-.000	.000-.000		1640	226.98	Active		Yes
WRNE587	*New York, NY*	*PM*	*PEA001*	*B2*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*3820.000-3840.000*	*.000-.000*	*.000-.000*	*.000-.000*	*942.16*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRHD616	New York, NY	UU	PEA001	M7	9015	Windham	Cellco Partnership	Yes	100.000	38200.000-38300.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WRNE583	*New York, NY*	*PM*	*PEA001*	*A3*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*3740.000-3760.000*	*.000-.000*	*.000-.000*	*.000-.000*	*942.16*	*1640*	*226.98*	*Active*	*added*	*Yes*
WREE837	C09015 - Windham, CT	UU	C09015	L1	9015	Windham	Cellco Partnership	Yes	425.000	27500.000-27925.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WQEM954	*New London-Norwich, CT*	*CW*	*BTA319*	*C*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*10.000*	*1895.000-1900.000*	*1975.000-1980.000*	*.000-.000*	*.000-.000*	*201.13*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRHD615	New York, NY	UU	PEA001	M6	9015	Windham	Cellco Partnership	Yes	100.000	38100.000-38200.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes

WRHD613	**New York, NY**	**UU**	**PEA001**	**M4**	**9015**	**Windham**	**Cellco Partnership**	**Yes**	**100.000**	**37900.000-38000.000**	**.000-.000**	**.000-.000**	**.000-.000**		**0**	**226.98**	**Active**		**Yes**
WRHD617	**New York, NY**	**UU**	**PEA001**	**M8**	**9015**	**Windham**	**Cellco Partnership**	**Yes**	**100.000**	**38300.000-38400.000**	**.000-.000**	**.000-.000**	**.000-.000**		**0**	**226.98**	**Active**		**Yes**
WRNE581	***New York, NY***	***PM***	***PEA001***	***A1***	***9015***	***Windham***	***Cellco Partnership***	***Yes***	***20.000***	***3700.000-3720.000***	***.000-.000***	***.000-.000***	***.000-.000***	***942.16***	***1640***	***226.98***	***Active***	***added***	***Yes***
KNKN862	***Connecticut 2 - Windham***	***CL***	***CMA358***	***A***	***9015***	***Windham***	***Cellco Partnership***	***Yes***	***25.000***	***824.000-835.000***	***869.000-880.000***	***845.000-846.500***	***890.000-891.500***	***246.95 - PSD***	***400***	***226.98***	***Active***	***added***	***Yes***
WRHD614	**New York, NY**	**UU**	**PEA001**	**M5**	**9015**	**Windham**	**Cellco Partnership**	**Yes**	**100.000**	**38000.000-38100.000**	**.000-.000**	**.000-.000**	**.000-.000**		**0**	**226.98**	**Active**		**Yes**
WREE838	**C09015 - Windham, CT**	**UU**	**C09015**	**L2**	**9015**	**Windham**	**Cellco Partnership**	**Yes**	**425.000**	**27925.000-28350.000**	**.000-.000**	**.000-.000**	**.000-.000**		**0**	**226.98**	**Active**		**Yes**
WRHD612	**New York, NY**	**UU**	**PEA001**	**M3**	**9015**	**Windham**	**Cellco Partnership**	**Yes**	**100.000**	**37800.000-37900.000**	**.000-.000**	**.000-.000**	**.000-.000**		**0**	**226.98**	**Active**		**Yes**

Centered on Solutions℠

Antenna Mount Analysis Report

Site Ref: Killingly East

1249 Hartford Pike
Killingly, CT

Centek Project No. 22017.12

~~Date: February 7, 2023~~
Rev 2: August 18, 2023

Max Stress Ratio = 85%

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

Prepared for:

Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492

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CENTEK engineering

Centered on Solutions℠

August 18, 2023

Mr. Paul Sagristano
Airosmith Development
21 Lyme Street
Old Lyme, CT

Re: Structural Letter ~ Antenna Mount
Verizon – Site Ref: Killingly East
1249 Hartford Pike
Killingly, CT

Centek Project No. 22017.12

Dear Mr. Sagristano,

Centek Engineering, Inc. has reviewed the Verizon antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the **proposed mount, consisting of three (3) V-frame sector mounts (SitePro P/N: VFA12-HD)** to support the proposed equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2021 International Building Code as modified by the 2022 Connecticut State Building Code (CTBC) including ASCE 7-16 and ANSI/TIA-222-H *Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures"*.

The loads considered in this analysis consist of the following:

- **Verizon:**
  V-Frames: Six (6) Commscope JAHH-65B-R3B panel antennas, three (3) Samsung MT6413-77A panel antennas, three (3) Samsung RF4439d-25A (B2/B66A) RRHs, three (3) Samsung RF4461d-13A RRHs, three (3) Commscope CBC78T-DS-43 diplexers and one (1) OVP Box mounted on three (3) V-Frames with a RAD center elevation of 120 ft +/- AGL.

The antenna mount was analyzed per the requirements of the 2021 International Building Code as modified by the 2022 Connecticut State Building Code considering a Ultimate design wind speed of 135 mph for Killingly as required in Appendix P of the 2022 Connecticut State Building Code.

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

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

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

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

Section 2 - Calculations

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

Wind Speeds

Basic Wind Speed	$V := 135$	mph	(User Input - CSBC 2022 Appendix P)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input - TIA-222-H Annex B)
Basic Wind Speed (Mount)	$V_m := 30$	mph	(User Input - TIA-222-H Section 16.3)

Input

Structure Type =	Structure_Type := Flexible		(User Input)
Structure Category =	SC := III		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	$h := 150$	ft	(User Input)
Height to Center of Antennas =	$z_{ant} := 120$	ft	(User Input)
Radial Ice Thickness =	$t_i := 1.0$	in	(User Input per Annex B of TIA-222-H)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1$		(User Input)
Shielding Factor for Appurtenances =	$K_a := 1.0$		(User Input)
Rooftop Wind Speed-up Factor =	$K_s := 1.0$		(User Input)
Ground Elevation Factor =	$K_e = 0.996$		(User Input)
Gust Response Factor =	$G_H = 1.35$		(User Input)

Output

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

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

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

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

$$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.138 \qquad t_{iz} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.308$$

Velocity Pressure Coefficient Antennas = $Kz_{ant} := 2.01\left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.315$

Velocity Pressure w/o Ice Antennas = $qz_{ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V^2 = 58.034$

Velocity Pressure with Ice Antennas = $qz_{ice.ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_i^2 = 7.961$

Velocity Pressure with Ice Antennas = $qz_m := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_m^2 = 2.866$

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Commscope JAHH-65B-R3B		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height=	$L_{app} := 71.969$	in	(User Input)
Appurtenance Width =	$W_{app} := 13.78$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 8.189$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 94$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 2$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 5.2$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.32$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 6.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 713$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 4.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 424$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 8.5$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 121$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 5.6$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 79$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 6.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 35$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 4.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 21$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 8121$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 5094$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 165$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 330$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Samsung MT6413-77A		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height=	$L_{app} := 28.9$	in	(User Input)
Appurtenance Width =	$W_{app} := 15.75$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 5.51$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 60$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.8$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.2$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 297$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 104$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 4$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 52$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 1.8$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 23$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.2$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 15$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 5$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 2508$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 2196$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 71$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 71$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model = Samsung RF4439-25A(B2/B66A)RRH

Appurtenance Shape = Flat (User Input)

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

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

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

Appurtenance Weight = $WT_{app} := 75$ lbs (User Input)

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

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

Appurtenance Force Coefficient = $Ca_{app} = 1.2$

Wind Load (without ice)

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

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 147$ lbs

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

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 98$ lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front) = $SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 2.2$ sf

Total Appurtenance Wind Force w/ Ice = $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 28$ lbs

Surface Area for One Appurtenance w/ Ice (Side) = $SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 1.5$ sf

Total Appurtenance Wind Force w/ Ice = $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 20$ lbs

Wind Load (Mount)

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

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 7$ lbs

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

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 5$ lbs

Gravity Loads (ice only)

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

Volume of Ice on Each Appurtenance = $V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 1666$ cu in

Weight of Ice on Each Appurtenance = $W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 54$ lbs

Weight of Ice on All Appurtenances = $W_{ICEapp} \cdot N_{app} = 54$ lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Samsung RF4461d-13ARRH		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height=	$L_{app} := 15$	in	(User Input)
Appurtenance Width =	$W_{app} := 15$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 10.23$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 80$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.0$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without ice)

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

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 147$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.1$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 100$ lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)= $SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 2.2$ sf

Total Appurtenance Wind Force w/ Ice = $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 28$ lbs

Surface Area for One Appurtenance w/ Ice (Side) = $SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 1.6$ sf

Total Appurtenance Wind Force w/ Ice = $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 20$ lbs

Wind Load (Mount)

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

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 7$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.1$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 5$ lbs

Gravity Loads (ice only)

Volume of Each Appurtenance = $V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 2302$ cu in

Volume of Ice on Each Appurtenance = $V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 1685$ cu in

Weight of Ice on Each Appurtenance = $W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 55$ lbs

Weight of Ice on All Appurtenances = $W_{ICEapp} \cdot N_{app} = 55$ lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	CBC78T-DS-43		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height=	$L_{app} := 6.378$	in	(User Input)
Appurtenance Width =	$W_{app} := 6.929$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 4.764$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 12$	lbs	(User Input)
Number of Appurtenances=	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 0.9$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.3$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 29$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.2$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 20$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 0.6$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 8$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 0.5$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 6$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.3$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 1$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.2$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 1$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 211$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 423$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 14$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 14$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model = OVP Box

Appurtenance Shape = Flat (User Input)

Appurtenance Height= $L_{app} := 29.5$ in (User Input)

Appurtenance Width = $W_{app} := 16.5$ in (User Input)

Appurtenance Thickness = $T_{app} := 12.6$ in (User Input)

Appurtenance Weight = $WT_{app} := 32$ lbs (User Input)

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

Appurtenance Aspect Ratio = $Ar_{app} := \frac{L_{app}}{W_{app}} = 1.8$

Appurtenance Force Coefficient = $Ca_{app} = 1.2$

Wind Load (without ice)

Surface Area for One Appurtenance (Front) = $SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.4$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 318$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 2.6$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 243$ lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)= $SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 4.3$ sf

Total Appurtenance Wind Force w/ Ice= $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 55$ lbs

Surface Area for One Appurtenance w/ Ice (Side) = $SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 3.4$ sf

Total Appurtenance Wind Force w/ Ice= $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 44$ lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) = $SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.4$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 16$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 2.6$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 12$ lbs

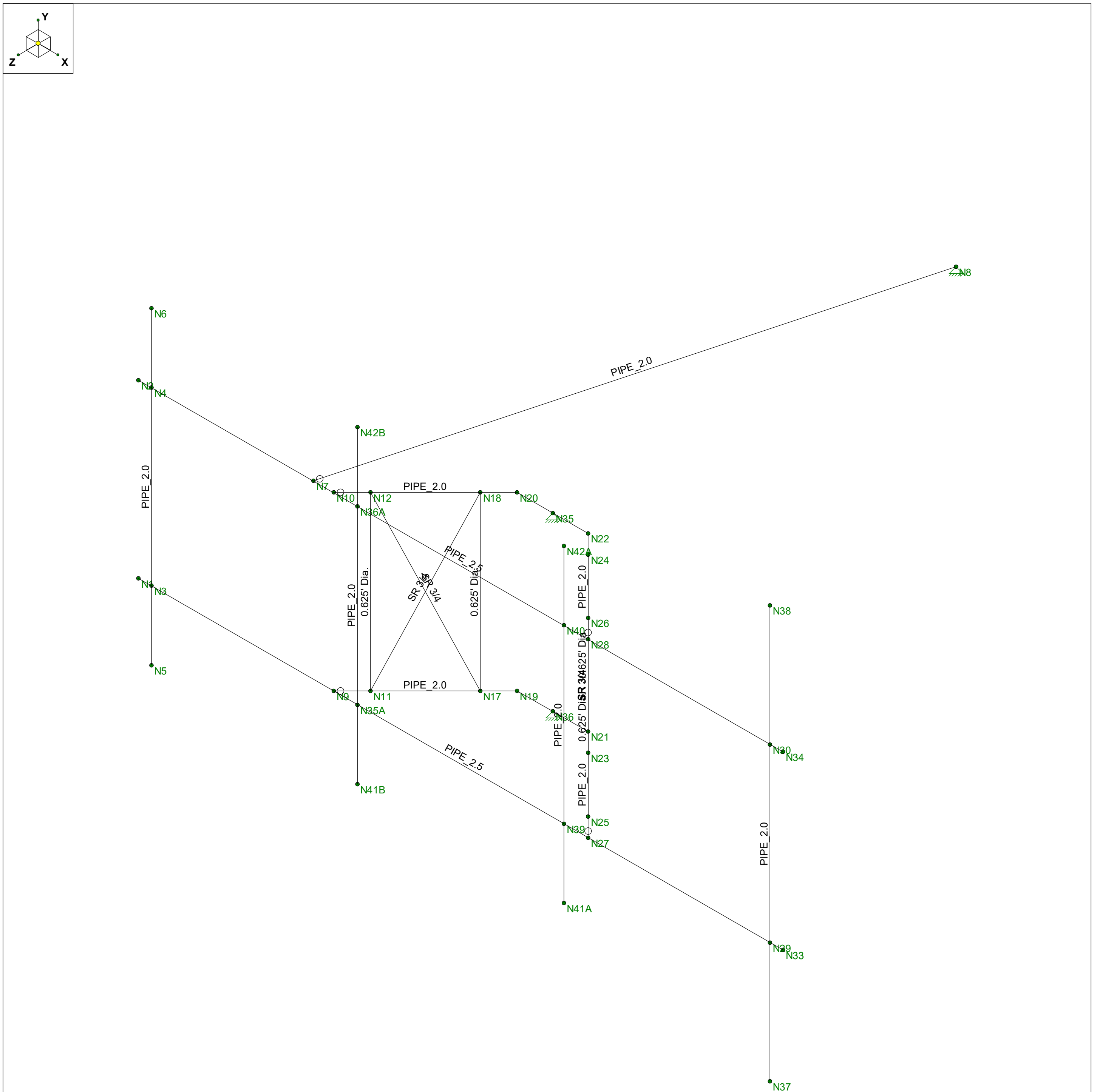
Gravity Loads (ice only)

Volume of Each Appurtenance = $V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 6133$ cu in

Volume of Ice on Each Appurtenance = $V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 3210$ cu in

Weight of Ice on Each Appurtenance = $W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 104$ lbs

Weight of Ice on All Appurtenances = $W_{ICEapp} \cdot N_{app} = 104$ lbs



Envelope Only Solution

Centek Engineering		
TJL	Killingly East	Aug 21, 2023 at 11:48 AM
22017.12	Member Framing	Mount.R3D

(Global) Model Settings

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

Hot Rolled Steel Code	AISC 15th(360-16): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 15th(360-16): LRFD
Cold Formed Steel Code	AISI S100-10: ASD
Wood Code	AWC NDS-12: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	ACI 530-11: ASD
Aluminum Code	AA ADM1-10: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

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

(Global) Model Settings, Continued

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

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Antenna Mast_2.0...	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
2	Horizontal_2.5 ST...	PIPE_2.5	Beam	Pipe	A53 Grade B	Typical	1.61	1.45	1.45	2.89
3	Outrigger_2.0 ST...	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Stabilizer_2.0 ST...	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
5	0.625" Dia. Bar	0.625' Dia.	Column	BAR	A36 Gr.36	Typical	.307	.007	.007	.015
6	0.75"Dia. Bar	SR 3/4	Column	BAR	A36 Gr.36	Typical	.442	.016	.016	.031

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	Horizontal_2.5 STD...	12.5	Segment		Lbyy						Lateral
2	M2	Horizontal_2.5 STD...	12.5	Segment		Lbyy						Lateral
3	M3	Stabilizer_2.0 STD ...	10.18			Lbyy						Lateral
4	M4	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
5	M5	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
6	M6	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
7	M7	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
8	M8	0.625" Dia. Bar	3.333									Lateral
9	M9	0.625" Dia. Bar	3.333									Lateral
10	M10	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
11	M11	0.625" Dia. Bar	3.333									Lateral
12	M12	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
13	M13	0.625" Dia. Bar	3.333									Lateral
14	M14	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
15	M15	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
16	PS.2	Antenna Mast_2.0 ...	6			Lbyy						Lateral
17	PS.1	Antenna Mast_2.0 ...	8			Lbyy						Lateral
18	M19	Antenna Mast_2.0 ...	6			Lbyy						Lateral
19	M21A	Antenna Mast_2.0 ...	6			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
1	M1	N2	N34			Horizontal_2.5 STD Pipe	Beam	Pipe	A53 Grade B	Typical
2	M2	N1	N33			Horizontal_2.5 STD Pipe	Beam	Pipe	A53 Grade B	Typical
3	M3	N7	N8			Stabilizer_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
4	M4	N10	N20			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
5	M5	N9	N19			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
6	M6	N28	N22			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
7	M7	N27	N21			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
8	M8	N12	N11			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
9	M9	N18	N17			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
10	M10	N12	N17			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
11	M11	N26	N25			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
12	M12	N18	N11			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
13	M13	N24	N23			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
14	M14	N26	N23			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
15	M15	N24	N25			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
16	PS.2	N5	N6			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical
17	PS.1	N37	N38			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
18	M19	N41A	N42A			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical
19	M20	N19	N21			RIGID	None	None	RIGID	Typical
20	M21	N20	N22			RIGID	None	None	RIGID	Typical
21	M21A	N41B	N42B			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0.	-0.	0	
2	N2	0	3.333334	-0.	0	
3	N3	.25	0.	-0.	0	
4	N4	.25	3.333334	-0.	0	
5	N5	.25	-1.333333	-0.	0	
6	N6	.25	4.666667	-0.	0	
7	N7	3.390625	3.333334	-0.	0	
8	N8	6.025403	3.333334	-9.833125	0	
9	N9	3.78125	0.	-0.	0	
10	N10	3.78125	3.333334	-0.	0	
11	N11	4.138628	0.	-0.357378	0	
12	N12	4.138628	3.333334	-0.357378	0	
13	N17	5.206335	0.	-1.425085	0	
14	N18	5.206335	3.333334	-1.425085	0	
15	N19	5.563713	0.	-1.782463	0	
16	N20	5.563713	3.333334	-1.782463	0	
17	N21	6.936287	0.	-1.782463	0	
18	N22	6.936287	3.333334	-1.782463	0	
19	N23	7.293665	0.	-1.425085	0	
20	N24	7.293665	3.333334	-1.425085	0	
21	N25	8.361372	0.	-0.357378	0	
22	N26	8.361372	3.333334	-0.357378	0	
23	N27	8.71875	0.	-0.	0	
24	N28	8.71875	3.333334	-0.	0	
25	N29	12.25	0.	-0.	0	
26	N30	12.25	3.333334	-0.	0	
27	N33	12.5	0.	-0.	0	
28	N34	12.5	3.333334	-0.	0	
29	N35	6.25	3.333334	-1.782463	0	
30	N36	6.25	0.	-1.782463	0	
31	N35A	4.25	0.	-0.	0	
32	N36A	4.25	3.333334	-0.	0	
33	N37	12.25	-2.333333	0	0	
34	N38	12.25	5.666667	0	0	
35	N39	8.25	0.	-0.	0	
36	N40	8.25	3.333334	-0.	0	
37	N41A	8.25	-1.333333	-0.	0	
38	N42A	8.25	4.666667	-0.	0	
39	N41B	4.25	-1.333333	-0.	0	
40	N42B	4.25	4.666667	-0.	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N8	Reaction	Reaction	Reaction			
2	N19						
3	N20						
4	N17						
5	N18						
6	N21						
7	N22						
8	N23						
9	N24						
10	N35	Reaction	Reaction	Reaction			
11	N36	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Y	-.094	1.5
2	PS.1	Y	-.094	6.5
3	PS.2	Y	-.03	2
4	PS.2	Y	-.03	4
5	PS.1	Y	-.075	3
6	PS.1	Y	-.08	5
7	PS.1	Y	-.012	1
8	M19	Y	-.032	%50

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Y	-.165	1.5
2	PS.1	Y	-.165	6.5
3	PS.2	Y	-.036	2
4	PS.2	Y	-.036	4
5	PS.1	Y	-.054	3
6	PS.1	Y	-.055	5
7	PS.1	Y	-.014	1
8	M19	Y	-.104	%50

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.04	1.5
2	PS.1	X	.04	6.5
3	PS.2	X	.012	2
4	PS.2	X	.012	4
5	PS.1	X	.02	3
6	PS.1	X	.02	5
7	PS.1	X	.008	1
8	M19	X	.044	%50

Member Point Loads (BLC 7 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.212	1.5

Member Point Loads (BLC 7 : Wind X) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
2	PS.1	X	.212	6.5
3	PS.2	X	.052	2
4	PS.2	X	.052	4
5	PS.1	X	.098	3
6	PS.1	X	.1	5
7	PS.1	X	.029	1
8	M19	X	.243	%50

Member Point Loads (BLC 8 : Wm Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.011	1.5
2	PS.1	X	.011	6.5
3	PS.2	X	.003	2
4	PS.2	X	.003	4
5	PS.1	X	.005	3
6	PS.1	X	.005	5
7	PS.1	X	.001	1
8	M19	X	.012	%50

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.121	1.5
2	PS.1	Z	.121	6.5
3	PS.2	Z	.026	2
4	PS.2	Z	.026	4
5	M19	Z	.055	%50

Member Point Loads (BLC 10 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.713	1.5
2	PS.1	Z	.713	6.5
3	PS.2	Z	.149	2
4	PS.2	Z	.149	4
5	M19	Z	.318	%50

Member Point Loads (BLC 11 : Wm Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.035	1.5
2	PS.1	Z	.035	6.5
3	PS.2	Z	.008	2
4	PS.2	Z	.008	4
5	M19	Z	.016	%50

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M3	X	.003	.003	0	0
2	M4	X	.003	.003	0	0
3	M5	X	.003	.003	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
4	M6	X	.003	.003	0	0
5	M7	X	.003	.003	0	0
6	M8	X	.003	.003	0	0
7	M9	X	.003	.003	0	0
8	M10	X	.003	.003	0	0
9	M11	X	.003	.003	0	0
10	M12	X	.003	.003	0	0
11	M13	X	.003	.003	0	0
12	M14	X	.003	.003	0	0
13	M15	X	.003	.003	0	0
14	PS.2	X	.003	.003	0	0
15	PS.1	X	.003	.003	0	0
16	M19	X	.003	.003	0	0
17	M20	X	.003	.003	0	0
18	M21	X	.003	.003	0	0
19	M21A	X	.003	.003	0	0

Member Distributed Loads (BLC 7 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M3	X	.018	.018	0	0
2	M4	X	.018	.018	0	0
3	M5	X	.018	.018	0	0
4	M6	X	.018	.018	0	0
5	M7	X	.018	.018	0	0
6	M8	X	.018	.018	0	0
7	M9	X	.018	.018	0	0
8	M10	X	.018	.018	0	0
9	M11	X	.018	.018	0	0
10	M12	X	.018	.018	0	0
11	M13	X	.018	.018	0	0
12	M14	X	.018	.018	0	0
13	M15	X	.018	.018	0	0
14	PS.2	X	.018	.018	0	0
15	PS.1	X	.018	.018	0	0
16	M19	X	.018	.018	0	0
17	M20	X	.018	.018	0	0
18	M21	X	.018	.018	0	0
19	M21A	X	.018	.018	0	0

Member Distributed Loads (BLC 8 : Wm Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M3	X	.003	.003	0	0
2	M4	X	.003	.003	0	0
3	M5	X	.003	.003	0	0
4	M6	X	.003	.003	0	0
5	M7	X	.003	.003	0	0
6	M8	X	.003	.003	0	0
7	M9	X	.003	.003	0	0
8	M10	X	.003	.003	0	0
9	M11	X	.003	.003	0	0
10	M12	X	.003	.003	0	0

Member Distributed Loads (BLC 8 : Wm Wind X) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
11	M13	X	.003	.003	0	0
12	M14	X	.003	.003	0	0
13	M15	X	.003	.003	0	0
14	PS.2	X	.003	.003	0	0
15	PS.1	X	.003	.003	0	0
16	M19	X	.003	.003	0	0
17	M20	X	.003	.003	0	0
18	M21	X	.003	.003	0	0
19	M21A	X	.003	.003	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.003	.003	0	0
2	M2	Z	.003	.003	0	0
3	M3	Z	.003	.003	0	0
4	M4	Z	.003	.003	0	0
5	M5	Z	.003	.003	0	0
6	M6	Z	.003	.003	0	0
7	M7	Z	.003	.003	0	0
8	M8	Z	.003	.003	0	0
9	M9	Z	.003	.003	0	0
10	M10	Z	.003	.003	0	0
11	M11	Z	.003	.003	0	0
12	M12	Z	.003	.003	0	0
13	M13	Z	.003	.003	0	0
14	M14	Z	.003	.003	0	0
15	M15	Z	.003	.003	0	0
16	PS.2	Z	.003	.003	0	0
17	M19	Z	.003	.003	0	0
18	M20	Z	.003	.003	0	0
19	M21	Z	.003	.003	0	0
20	M21A	Z	.003	.003	0	0

Member Distributed Loads (BLC 10 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.018	.018	0	0
2	M2	Z	.018	.018	0	0
3	M3	Z	.018	.018	0	0
4	M4	Z	.018	.018	0	0
5	M5	Z	.018	.018	0	0
6	M6	Z	.018	.018	0	0
7	M7	Z	.018	.018	0	0
8	M8	Z	.018	.018	0	0
9	M9	Z	.018	.018	0	0
10	M10	Z	.018	.018	0	0
11	M11	Z	.018	.018	0	0
12	M12	Z	.018	.018	0	0
13	M13	Z	.018	.018	0	0
14	M14	Z	.018	.018	0	0
15	M15	Z	.018	.018	0	0
16	PS.2	Z	.018	.018	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
17	M19	Z	.018	.018	0	0
18	M20	Z	.018	.018	0	0
19	M21	Z	.018	.018	0	0
20	M21A	Z	.018	.018	0	0

Member Distributed Loads (BLC 11 : Wm Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.003	.003	0	0
2	M2	Z	.003	.003	0	0
3	M3	Z	.003	.003	0	0
4	M4	Z	.003	.003	0	0
5	M5	Z	.003	.003	0	0
6	M6	Z	.003	.003	0	0
7	M7	Z	.003	.003	0	0
8	M8	Z	.003	.003	0	0
9	M9	Z	.003	.003	0	0
10	M10	Z	.003	.003	0	0
11	M11	Z	.003	.003	0	0
12	M12	Z	.003	.003	0	0
13	M13	Z	.003	.003	0	0
14	M14	Z	.003	.003	0	0
15	M15	Z	.003	.003	0	0
16	PS.2	Z	.003	.003	0	0
17	M19	Z	.003	.003	0	0
18	M20	Z	.003	.003	0	0
19	M21	Z	.003	.003	0	0
20	M21A	Z	.003	.003	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	None		-1						
2	Dead Load	None					8			
3	Ice Load	None					8			
4	Lm Maintenance Load (500lb)	None								
5	Lv Maintenance Load (250lb)	None								
6	Wind with Ice X	None					8	19		
7	Wind X	None					8	19		
8	Wm Wind X	None					8	19		
9	Wind with Ice Z	None					5	20		
10	Wind Z	None					5	20		
11	Wm Wind Z	None					5	20		

Load Combinations

	Description	So..	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac...
1	1.4D	Yes	Y		1	1.4	2	1.4												
2	1.2D +1.5Lv	Yes	Y		1	1.2	2	1.2	5	1.5										
3	1.2D + 1.0W (X-directi...	Yes	Y		1	1.2	2	1.2	7	1										
4	1.2D + 1.0Di + 1.0Wi (...	Yes	Y		1	1.2	2	1.2	3	1	6	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...
5	1.2D +1.5Lm+ 1.0Wm ...	Yes	Y		1	1.2	2	1.2	4	1.5	8	1												
6	1.2D + 1.0W (Z-directi...	Yes	Y		1	1.2	2	1.2	10	1														
7	1.2D + 1.0Di + 1.0Wi (...	Yes	Y		1	1.2	2	1.2	3	1	9	1												
8	1.2D +1.5Lm+ 1.0Wm ...	Yes	Y		1	1.2	2	1.2	4	1.5	11	1												

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	.288	3	.025	1	2.613	6	0	8	0	8	0	8
2		min	-.727	6	.021	3	-1.42	3	0	1	0	1	0	1
3	N35	max	.074	6	.796	7	.955	3	0	8	0	8	0	8
4		min	-2.201	3	.432	3	-5.045	6	0	1	0	1	0	1
5	N36	max	1.404	7	.772	4	.803	4	0	8	0	8	0	8
6		min	-.471	3	.347	6	-1.302	6	0	1	0	1	0	1
7	Totals:	max	0	8	1.566	7	0	3						
8		min	-2.384	3	.937	8	-3.734	6						

Envelope Joint Displacements

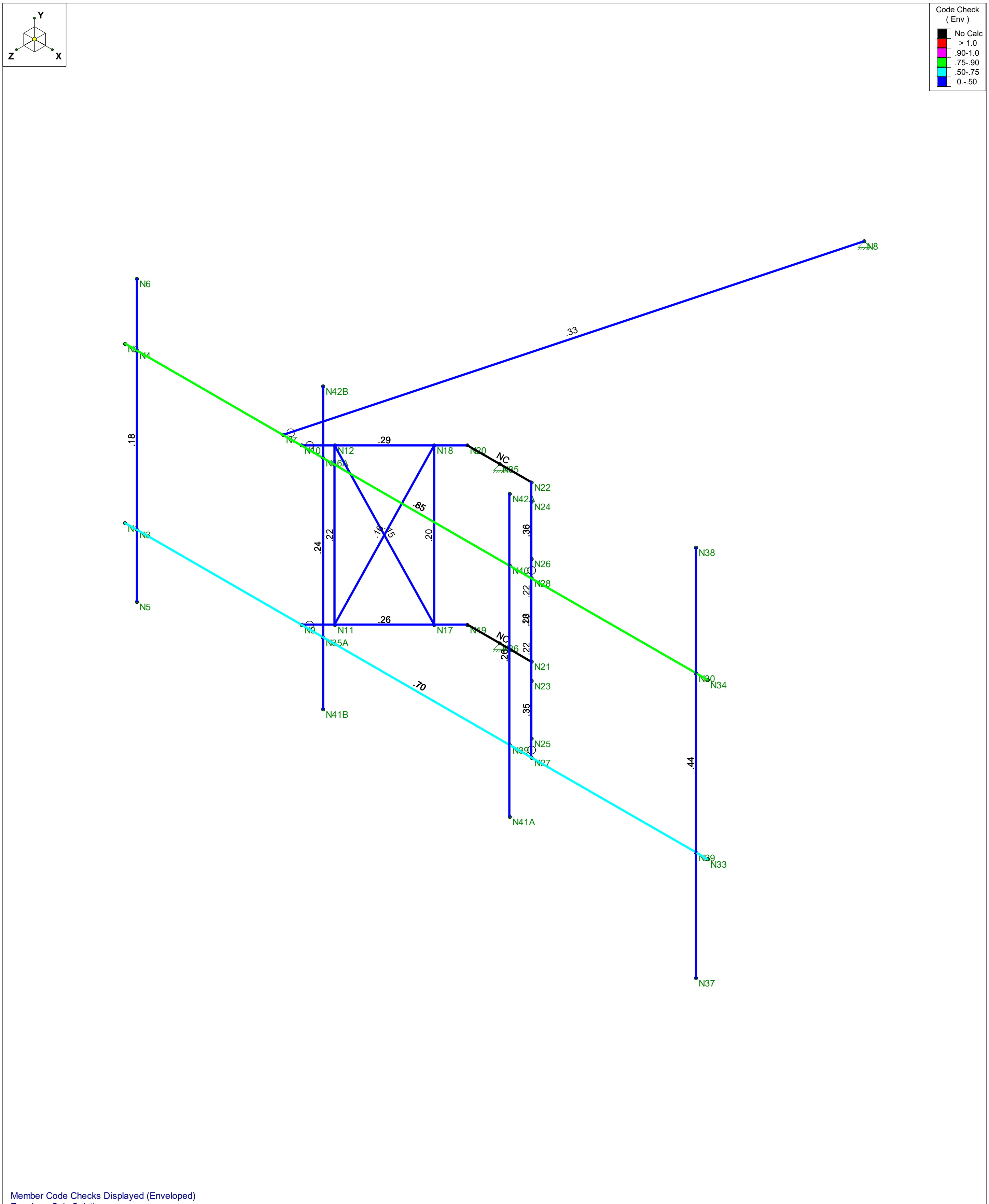
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
1	N1	max	.069	3	.111	6	.305	6	8.365e-03	6	1.699e-02	6	7.965e-04	3
2		min	-.243	6	-.012	3	-.064	4	-2.422e-03	3	-7.327e-04	4	-2.761e-03	6
3	N2	max	.045	3	.111	6	.664	6	6.902e-03	6	1.766e-02	6	9.903e-04	3
4		min	-.087	6	-.013	3	-.015	4	-2.532e-03	3	-6.301e-04	4	-2.796e-03	6
5	N3	max	.069	3	.103	6	.254	6	8.365e-03	6	1.699e-02	6	7.965e-04	3
6		min	-.243	6	-.01	3	-.062	4	-2.422e-03	3	-7.327e-04	4	-2.761e-03	6
7	N4	max	.045	3	.103	6	.611	6	6.902e-03	6	1.766e-02	6	9.902e-04	3
8		min	-.087	6	-.01	3	-.013	4	-2.532e-03	3	-6.301e-04	4	-2.797e-03	6
9	N5	max	.082	3	.103	6	.154	3	8.295e-03	6	1.699e-02	6	8.668e-04	3
10		min	-.287	6	-.01	3	-.091	7	-2.422e-03	3	-7.327e-04	4	-2.761e-03	6
11	N6	max	.039	4	.103	6	.722	6	6.972e-03	6	1.766e-02	6	9.198e-04	3
12		min	-.042	6	-.01	3	-.046	3	-2.532e-03	3	-6.301e-04	4	-2.797e-03	6
13	N7	max	.045	3	.064	7	.02	3	4.151e-03	6	1.611e-02	6	3.935e-04	3
14		min	-.087	6	.023	3	-.038	6	-1.24e-03	3	-1.532e-03	3	-1.286e-03	6
15	N8	max	0	8	0	8	0	8	2.082e-03	6	7.967e-03	3	1.097e-03	3
16		min	0	1	0	1	0	1	1.385e-03	3	8.402e-05	2	-1.84e-03	6
17	N9	max	.068	3	.06	7	.092	3	4.144e-03	6	6.834e-03	6	1.777e-04	3
18		min	-.243	6	.025	3	-.324	6	-8.644e-04	3	-9.333e-04	4	-1.353e-03	6
19	N10	max	.045	3	.059	7	.028	3	3.809e-03	6	1.469e-02	6	1.463e-04	3
20		min	-.087	6	.025	3	-.113	6	-1.08e-03	3	-1.398e-03	3	-1.289e-03	6
21	N11	max	.055	3	.064	7	.078	3	3.907e-03	6	3.203e-03	3	-4.625e-05	3
22		min	-.191	6	.024	3	-.273	6	-4.515e-04	3	-1.193e-02	6	-1.739e-03	6
23	N12	max	.029	3	.064	7	.013	3	3.509e-03	6	3.437e-03	3	2.423e-04	3
24		min	-.069	6	.024	3	-.096	6	-6.564e-04	3	-4.018e-03	6	-1.456e-03	6
25	N17	max	.013	3	.061	7	.037	3	2.019e-03	6	3.144e-03	3	-9.795e-04	3
26		min	-.045	6	.013	3	-.128	6	1.646e-04	3	-1.064e-02	6	-4.e-03	7
27	N18	max	-.002	3	.061	7	-.009	2	1.77e-03	6	4.59e-04	3	-7.656e-04	3
28		min	-.017	6	.013	3	-.048	6	1.774e-05	3	-3.809e-03	6	-3.963e-03	7
29	N19	max	0	8	.046	7	.024	3	7.072e-04	7	2.886e-03	3	-1.171e-03	3
30		min	0	1	.01	3	-.083	6	3.899e-04	3	-1.012e-02	6	-5.532e-03	7
31	N20	max	0	8	.046	7	-.007	2	7.031e-04	7	-8.208e-04	2	-1.184e-03	3

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
32		min	0	1	.01	3	-.032	6	4.283e-04	3	-3.94e-03	6	-5.528e-03	7
33	N21	max	0	8	-.01	3	.083	6	7.072e-04	7	2.886e-03	3	-1.171e-03	3
34		min	0	1	-.046	7	-.024	3	3.899e-04	3	-1.012e-02	6	-5.532e-03	7
35	N22	max	0	8	-.01	3	.032	6	7.031e-04	7	-8.208e-04	2	-1.184e-03	3
36		min	0	1	-.046	7	.007	2	4.283e-04	3	-3.94e-03	6	-5.528e-03	7
37	N23	max	.013	3	-.017	3	.129	6	1.7e-04	3	3.146e-03	3	-1.212e-03	3
38		min	-.045	6	-.068	7	-.037	3	-1.253e-03	6	-1.095e-02	6	-4.342e-03	7
39	N24	max	-.002	5	-.017	3	.051	6	4.436e-04	3	5.42e-04	3	-9.483e-04	3
40		min	-.017	6	-.068	7	.009	2	-1.203e-03	6	-4.247e-03	6	-4.333e-03	7
41	N25	max	.055	3	-.031	3	.278	6	2.332e-04	3	3.233e-03	3	-1.76e-03	3
42		min	-.193	6	-.078	7	-.078	3	-3.969e-03	6	-1.188e-02	6	-3.959e-03	7
43	N26	max	.03	3	-.031	3	.108	6	3.958e-04	3	3.613e-03	3	-9.556e-04	3
44		min	-.071	6	-.078	7	-.016	3	-3.267e-03	6	-4.324e-03	6	-3.834e-03	7
45	N27	max	.068	3	-.042	3	.329	6	1.089e-03	3	3.476e-03	3	-2.702e-03	3
46		min	-.244	6	-.087	7	-.092	3	-4.348e-03	6	-3.2e-02	6	-5.938e-03	7
47	N28	max	.046	3	-.038	3	.127	6	1.187e-03	3	2.518e-03	3	-2.035e-03	3
48		min	-.089	6	-.087	7	-.032	3	-1.892e-03	6	-2.826e-02	6	-5.964e-03	7
49	N29	max	.069	3	-.176	3	2.191	6	1.617e-03	3	2.958e-03	3	-1.146e-03	3
50		min	-.244	6	-.447	7	-.225	3	-1.078e-02	6	-4.974e-02	6	-6.725e-03	7
51	N30	max	.047	3	-.176	3	1.944	6	1.671e-03	3	2.974e-03	3	-2.617e-03	3
52		min	-.089	6	-.447	7	-.152	3	-1.294e-03	7	-4.997e-02	6	-6.726e-03	7
53	N33	max	.069	3	-.18	3	2.34	6	1.617e-03	3	2.958e-03	3	-1.146e-03	3
54		min	-.244	6	-.467	7	-.234	3	-1.078e-02	6	-4.974e-02	6	-6.725e-03	7
55	N34	max	.047	3	-.184	3	2.094	6	1.671e-03	3	2.974e-03	3	-2.617e-03	3
56		min	-.089	6	-.467	7	-.161	3	-1.294e-03	7	-4.997e-02	6	-6.726e-03	7
57	N35	max	0	8	0	8	0	8	7.031e-04	7	-8.208e-04	2	-1.184e-03	3
58		min	0	1	0	1	0	1	4.283e-04	3	-3.94e-03	6	-5.528e-03	7
59	N36	max	0	8	0	8	0	8	7.072e-04	7	2.886e-03	3	-1.171e-03	3
60		min	0	1	0	1	0	1	3.899e-04	3	-1.012e-02	6	-5.532e-03	7
61	N35A	max	.068	3	.053	4	.081	3	3.554e-03	6	4.109e-03	6	3.494e-06	3
62		min	-.243	6	.021	6	-.355	6	-7.854e-04	3	-9.683e-04	4	-1.475e-03	6
63	N36A	max	.045	3	.053	4	.034	3	3.425e-03	6	1.169e-02	6	-9.657e-05	3
64		min	-.087	6	.021	6	-.187	6	-9.525e-04	3	-7.073e-04	3	-1.432e-03	6
65	N37	max	.069	3	-.176	3	2.553	6	1.614e-03	3	2.958e-03	3	2.149e-04	3
66		min	-.402	6	-.447	7	-.27	3	-1.321e-02	6	-4.974e-02	6	-6.697e-03	7
67	N38	max	.208	4	-.176	3	2.007	6	2.5e-03	6	2.974e-03	3	-3.172e-03	2
68		min	.068	6	-.447	7	-.105	3	-9.37e-04	4	-4.997e-02	6	-6.752e-03	7
69	N39	max	.068	3	-.027	6	.162	6	1.002e-03	3	3.564e-03	3	-1.94e-03	3
70		min	-.244	6	-.059	4	-.072	3	-3.694e-03	6	-2.733e-02	6	-4.368e-03	7
71	N40	max	.046	3	-.027	6	-.003	2	1.065e-03	3	2.392e-03	3	-1.256e-03	3
72		min	-.089	6	-.059	4	-.018	3	-2.181e-03	6	-2.275e-02	6	-4.385e-03	7
73	N41A	max	.038	3	-.027	6	.222	6	1.002e-03	3	3.564e-03	3	-1.87e-03	3
74		min	-.292	6	-.059	4	-.088	3	-3.764e-03	6	-2.733e-02	6	-4.368e-03	7
75	N42A	max	.093	4	-.027	6	-.001	3	1.065e-03	3	2.392e-03	3	-1.326e-03	3
76		min	-.04	6	-.059	4	-.05	6	-2.11e-03	6	-2.275e-02	6	-4.385e-03	7
77	N41B	max	.069	3	.053	4	.094	3	3.484e-03	6	4.109e-03	6	7.389e-05	3
78		min	-.266	6	.021	6	-.411	6	-7.853e-04	3	-9.683e-04	4	-1.474e-03	6
79	N42B	max	.048	3	.053	4	.026	4	3.495e-03	6	1.169e-02	6	-1.67e-04	3
80		min	-.064	6	.021	6	-.131	6	-9.525e-04	3	-7.073e-04	3	-1.432e-03	6

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

	Mem...	Shape	Code Check	L...	LC	Sh...	Loc[ft]	Dir	...	phi*P...	phi*P...	phi*Mn y-y [k-ft]	phi*...	Cb	Eqn
1	M1	PIPE_2.5	.848	8...	6	.254	3.776		6	14.559	50.715	3.596	3.5...	2....	H1...
2	M2	PIPE_2.5	.702	8...	6	.178	8.724		6	14.559	50.715	3.596	3.5...	2....	H1...
3	PS.1	PIPE_2.0	.444	5...	4	.078	5.667		6	14.916	32.13	1.872	1.8...	4....	H1...
4	M6	PIPE_2.0	.360	2...	6	.114	.499		7	32.032	32.13	1.872	1.8...	1....	H1...
5	M7	PIPE_2.0	.346	2...	7	.132	.499		6	32.032	32.13	1.872	1.8...	1....	H1...
6	M3	PIPE_2.0	.334	4...	6	.009	10.18		3	9.492	32.13	1.872	1.8...	1....	H1...
7	M4	PIPE_2.0	.290	2...	3	.098	2.521		3	32.032	32.13	1.872	1.8...	1....	H1...
8	M5	PIPE_2.0	.263	2...	7	.085	2.521		4	32.032	32.13	1.872	1.8...	1....	H1...
9	M19	PIPE_2.0	.255	4...	6	.118	4.625		6	20.867	32.13	1.872	1.8...	1....	H1...
10	M21A	PIPE_2.0	.238	1...	6	.162	1.375		6	20.867	32.13	1.872	1.8...	1....	H1...
11	M8	0.625' Dia.	.217	3...	6	.042	3.333		6	1.058	9.94	.104	.104	2....	H1...
12	M11	0.625' Dia.	.216	0	6	.041	0		6	1.058	9.94	.104	.104	2....	H1...
13	M13	0.625' Dia.	.216	0	3	.037	0		6	1.058	9.94	.104	.104	2....	H1...
14	M14	SR 3/4	.200	3...	7	.034	0		6	6.954	14.314	.179	.179	1	H1...
15	M9	0.625' Dia.	.199	3...	6	.037	3.333		6	1.058	9.94	.104	.104	2....	H1...
16	M15	SR 3/4	.180	0	6	.035	0		6	6.954	14.314	.179	.179	1	H1...
17	PS.2	PIPE_2.0	.179	1...	6	.047	1.375		6	20.867	32.13	1.872	1.8...	1....	H1...
18	M12	SR 3/4	.155	0	3	.040	3.659		6	6.954	14.314	.179	.179	2....	H1...
19	M10	SR 3/4	.151	3...	6	.036	3.659		6	6.954	14.314	.179	.179	3....	H1...



Centek Engineering		SK - 1
TJL	Killingly East	Aug 21, 2023 at 11:47 AM
22017.12	Unity Check	Mount.R3D

Antenna Mount Connection:

Anchor Data:

A307 Threaded Rod =

Number of Anchor Bolts =	$N := 4$	(User Input)
Diameter of Bolts =	$D := 0.625in$	(User Input)
Design Tension =	$T_{design} := 10.4 \cdot kips$	(User Input)
Design Shear =	$V_{design} := 6.23 \cdot kips$	(User Input)

Design Reactions:

Fx =	$F_x := 2.2 \cdot kips$	(User Input)
Fy =	$F_y := 0.8 \cdot kips$	(User Input)
Fz =	$F_z := 5.1 \cdot kips$	(User Input)

Anchor Check:

Max Tension Force = $T_{Max} := \frac{F_z}{N} = 1275\,lb$

Max Shear Force = $V_{Max} := \frac{F_y}{N} + \frac{F_x}{N} = 750\,lb$

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

% of Capacity = $max\left[\frac{T_{Max}}{T_{design}}, \frac{V_{Max}}{V_{design}}, \left(\frac{\frac{T_{Max}}{T_{design}} + \frac{V_{Max}}{V_{design}}}{1.0}\right)\right] = 24.3 \cdot \%$

verizon fuze | RFDS

NORTHEAST > North East > New England > New England West > **KILLINGLY EAST CT**

RF Submit by: Stevens, Wesley - wesley.stevens@verizonwireless.com - 3/27/2023, 10:55:38 AM

EE Submit by: , - -

Project Details

FUZE Project ID:	16999208
Project Name:	KILLINGLY EAST CT
Project Alt Name:	KILLINGLY EAST CT - MKT 64 - MCR
Project Type:	Initial Build
Modification Type:	
Designed Sector Carrier 4G:	17
Designed Sector Carrier 5G:	3
Additional Sector Carrier 4G:	N/A
Additional Sector Carrier 5G:	N/A
FP Solution Type & Tech Type:	MCR;4G_700,4G_850,4G_AWS,4G_PCS,5G_L-Sub6
Carrier Aggregation:	false
MPT Id:	
eCIP-0:	false
Suffix:	Rev2_20230809

Location Information

Site ID:	617359992
E-NodeB ID:	0649402,064247
MDG Location ID:	5000917380
PSLC:	780562
Switch Name:	
Tower Owner:	
Tower Type:	Self Support (Lattice Tower)
Site Type:	MACRO
Site Sub Type:	TRADITIONAL
Street Address:	1249 Hartford Pike
City:	Killingly
State:	CT
Zip Code:	06243
County:	Windham
Latitude:	41.845389 / 41° 50' 43.4004" N
Longitude:	-71.828167 / 71° 49' 41.4012" W

RFDS Project Scope:

New Build Macro
700/AWS/PCS/850/C-Band
side-by-side JAHH-65B antennas
64T C-Band MMUs
Need Diplexers for 700/850

Rev2_20230809: updated RRH models / C-Band MMU model
Rev1_20230327: updated RRH models to ORAN
Rev0_20221114: initial design

Antenna Summary

Added

700	850	1900	AWS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
				5G	Samsung	MT6413-77A	120	121.2	0(0001) 180(0002) 270(0003)		false	PHYSICAL	3	
LTE	LTE 5G	LTE	LTE		COMMSCOPE	JAHH-65B-R3B	120	123	0(0001) 0(01) 180(0002) 180(02) 270(0003) 270(03)		false	PHYSICAL	6	000000001900055848

Removed

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

No data available.

Retained

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

No data available.

Added: 9 **Removed:** 0 **Retained:** 0

Equipment Summary

Added

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
RRU	Tower			LTE	LTE		Samsung	B2/B66A RRH ORAN (RF4439d-25A)			PHYSICAL	3	
RRU	Tower					5G	Samsung	MT6413-77A			PHYSICAL	3	
RRU	Tower	LTE	LTE 5G				Samsung	RF4461d-13A			PHYSICAL	3	
Diplexer	Tower						Commscope	CBC78T-DS-43-2X			PHYSICAL	3	000000001900084
Mount	Tower						Commscope	BSAMNT-SBS-2-2			PHYSICAL	3	000000001900059

Removed

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID

No data available.

Retained

Equipment Type	Location	700	850	1900	AWS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID

No data available.

Service Info

700 MHz LTE

	CAND		
Sector	01	02	03
Azimuth	0	180	270
Cell / ENode B ID	064247	064247	064247
Antenna Model	JAHH-65B-R3B	JAHH-65B-R3B	JAHH-65B-R3B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	2	2
Tip Height	123	123	123
Regulatory Power	71.71	71.71	71.71
DLEARFCN	5230	5230	5230
Channel Bandwidth(MHz)	10	10	10
Total ERP (W)	645.36	645.36	645.36
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	15347835	15347836	15347837
Source	ATOLL_API	ATOLL_API	ATOLL_API

850 MHz LTE

	CAND		
Sector	01	02	03
Azimuth	0	180	270
Cell / ENode B ID	064247	064247	064247
Antenna Model	JAHH-65B-R3B	JAHH-65B-R3B	JAHH-65B-R3B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	8	8	8
Tip Height	123	123	123
Regulatory Power	246.95	246.95	246.95
DLEARFCN	2450	2450	2450
Channel Bandwidth(MHz)	10	10	10
Total ERP (W)	555.65	555.65	555.65
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	15347928	15347929	15347930
Source	ATOLL_API	ATOLL_API	ATOLL_API

850 MHz 5GNR

Sector	CAND 0001	0002	0003
Azimuth	0	180	270
Cell / ENode B ID	0649402	0649402	0649402
Antenna Model	JAHH-65B-R3B	JAHH-65B-R3B	JAHH-65B-R3B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	8	8	8
Tip Height	123	123	123
Regulatory Power	246.95	246.95	246.95
DLEARFCN	2450	2450	2450
Channel Bandwidth(MHz)	10	10	10
Total ERP (W)	555.65	555.65	555.65
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	15347928	15347929	15347930
Source	ATOLL_API	ATOLL_API	ATOLL_API

1900 MHz LTE

Sector	CAND 01	02	03
Azimuth	0	180	270
Cell / ENode B ID	064247	064247	064247
Antenna Model	JAHH-65B-R3B	JAHH-65B-R3B	JAHH-65B-R3B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	0	0	0
Tip Height	123	123	123
Regulatory Power	201.13	201.13	201.13
DLEARFCN	1075	1075	1075
Channel Bandwidth(MHz)	15	15	15
Total ERP (W)	1655.01	1655.01	1655.01
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	15347925	15347926	15347927
Source	ATOLL_API	ATOLL_API	ATOLL_API

2100 MHz LTE

Sector	01	02	03
	CAND		
Azimuth	0	180	270
Cell / ENode B ID	064247	064247	064247
Antenna Model	JAHH-65B-R3B	JAHH-65B-R3B	JAHH-65B-R3B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	0	0	0
Tip Height	123	123	123
Regulatory Power	152.24	152.24	152.24
DLEARFCN	2050	2050	2050
Channel Bandwidth(MHz)	20	20	20
Total ERP (W)	1670.32	1670.32	1670.32
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	15347922	15347923	15347924
Source	ATOLL_API	ATOLL_API	ATOLL_API

nL-Sub6

Sector	0001	0002	0003
	CAND		
Azimuth	0	180	270
Cell / ENode B ID	0649402	0649402	0649402
Antenna Model	MT6413-77A	MT6413-77A	MT6413-77A
Antenna Make	Samsung	Samsung	Samsung
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	1	1	1
Tip Height	121.2	121.2	121.2
Regulatory Power	942.16	942.16	942.16
DLEARFCN	648672, 655324	648672, 655324	648672, 655324
Channel Bandwidth(MHz)	60	60	60
Total ERP (W)	32734.07	32734.07	32734.07
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	MT6413-77A	MT6413-77A	MT6413-77A
Number of Tx, Rx Lines	2,2	2,2	2,2
Position			
Transmitter Id	15347931	15347932	15347933
Source	ATOLL_API	ATOLL_API	ATOLL_API

Service Comments

Callsigns Per Antenna

Sector	Antenna Make	Antenna Model	Ant CL Height AGL	Tip Height	Azimuth (TN)	Elec Tilt	Mech Tilt	Gain	Beam Width	Regulatory Power	Callsigns						
											700	850	1900	2100	28 GHz	31 GHz	39 GHz
0002	Samsung	MT6413-77A	120	121.2	180	1	0	23.15	105	942.16							
01	COMMSCOPE	JAHH-65B-R3B	120	123	0	0	0	15.678	63	201.13			KNLH263 WQDU931 WQEM954				
01	COMMSCOPE	JAHH-65B-R3B	120	123	0	2	0	12.258	67	71.71	WQJQ689						
02	COMMSCOPE	JAHH-65B-R3B	120	123	180	2	0	12.258	67	71.71	WQJQ689						
0001	Samsung	MT6413-77A	120	121.2	0	1	0	23.15	105	942.16							
0003	Samsung	MT6413-77A	120	121.2	270	1	0	23.15	105	942.16							
0002	COMMSCOPE	JAHH-65B-R3B	120	123	180	8	0	12.748	65	246.95 - PSD		KNKN862					
02	COMMSCOPE	JAHH-65B-R3B	120	123	180	0	0	15.678	63	201.13			KNLH263 WQDU931 WQEM954				
03	COMMSCOPE	JAHH-65B-R3B	120	123	270	8	0	12.748	65	246.95 - PSD		KNKN862					
0003	COMMSCOPE	JAHH-65B-R3B	120	123	270	8	0	12.748	65	246.95 - PSD		KNKN862					
0001	COMMSCOPE	JAHH-65B-R3B	120	123	0	8	0	12.748	65	246.95 - PSD		KNKN862					
03	COMMSCOPE	JAHH-65B-R3B	120	123	270	0	0	15.868	65	152.24				WQGA906 WQGD529			
0001	Samsung	MT6413-77A	120	121.2	0	1	0	23.15	105	942.16							
02	COMMSCOPE	JAHH-65B-R3B	120	123	180	0	0	15.868	65	152.24				WQGA906 WQGD529			
03	COMMSCOPE	JAHH-65B-R3B	120	123	270	2	0	12.258	67	71.71	WQJQ689						
0002	Samsung	MT6413-77A	120	121.2	180	1	0	23.15	105	942.16							
02	COMMSCOPE	JAHH-65B-R3B	120	123	180	8	0	12.748	65	246.95 - PSD		KNKN862					
01	COMMSCOPE	JAHH-65B-R3B	120	123	0	8	0	12.748	65	246.95 - PSD		KNKN862					
0003	Samsung	MT6413-77A	120	121.2	270	1	0	23.15	105	942.16							
03	COMMSCOPE	JAHH-65B-R3B	120	123	270	0	0	15.678	63	201.13			KNLH263 WQDU931 WQEM954				
01	COMMSCOPE	JAHH-65B-R3B	120	123	0	0	0	15.868	65	152.24				WQGA906 WQGD529			

Callsigns

Callsign	Market	Radio Code	Market Number	Block	State	County	Licensee Name	Wholly Owned	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs /Sq Mi	Status	Action	Approved for Insvc
KNLH263	*New London-Norwich, CT*	*CW*	*BTA319*	*F*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*10.000*	*1890.000-1895.000*	*1970.000-1975.000*	*.000-.000*	*.000-.000*	*201.13*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRNE588	*New York, NY*	*PM*	*PEA001*	*B3*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*3840.000-3860.000*	*.000-.000*	*.000-.000*	*.000-.000*	*942.16*	*1640*	*226.98*	*Active*	*added*	*Yes*
WQGD529	*Connecticut 2 - Windham*	*AW*	*CMA358*	*A*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*1710.000-1720.000*	*2110.000-2120.000*	*.000-.000*	*.000-.000*	*152.24*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRNE586	*New York, NY*	*PM*	*PEA001*	*B1*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*3800.000-3820.000*	*.000-.000*	*.000-.000*	*.000-.000*	*942.16*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRHD610	New York, NY	UU	PEA001	M10	9015	Windham	Cellco Partnership	Yes	100.000	38500.000-38600.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WRHD618	New York, NY	UU	PEA001	M9	9015	Windham	Cellco Partnership	Yes	100.000	38400.000-38500.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WQJQ689	*Northeast*	*WU*	*REA001*	*C*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*22.000*	*746.000-757.000*	*776.000-787.000*	*.000-.000*	*.000-.000*	*71.71*	*1000*	*226.98*	*Active*	*added*	*Yes*
WRHD611	New York, NY	UU	PEA001	M2	9015	Windham	Cellco Partnership	Yes	100.000	37700.000-37800.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WQDU931	*New London-Norwich, CT*	*CW*	*BTA319*	*C*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*10.000*	*1900.000-1905.000*	*1980.000-1985.000*	*.000-.000*	*.000-.000*	*201.13*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRNE585	New York, NY	PM	PEA001	A5	9015	Windham	Cellco Partnership	Yes	20.000	3780.000-3800.000	.000-.000	.000-.000	.000-.000		1640	226.98	Active		Yes
WRNE582	*New York, NY*	*PM*	*PEA001*	*A2*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*3720.000-3740.000*	*.000-.000*	*.000-.000*	*.000-.000*	*942.16*	*1640*	*226.98*	*Active*	*added*	*Yes*
WQGA906	*New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-*	*AW*	*BEA010*	*B*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*1720.000-1730.000*	*2120.000-2130.000*	*.000-.000*	*.000-.000*	*152.24*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRHD619	New York, NY	UU	PEA001	N1	9015	Windham	Cellco Partnership	Yes	100.000	38600.000-38700.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WRHD609	New York, NY	UU	PEA001	M1	9015	Windham	Cellco Partnership	Yes	100.000	37600.000-37700.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WRNE584	New York, NY	PM	PEA001	A4	9015	Windham	Cellco Partnership	Yes	20.000	3760.000-3780.000	.000-.000	.000-.000	.000-.000		1640	226.98	Active		Yes
WRNE587	*New York, NY*	*PM*	*PEA001*	*B2*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*3820.000-3840.000*	*.000-.000*	*.000-.000*	*.000-.000*	*942.16*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRHD616	New York, NY	UU	PEA001	M7	9015	Windham	Cellco Partnership	Yes	100.000	38200.000-38300.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WRNE583	*New York, NY*	*PM*	*PEA001*	*A3*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*3740.000-3760.000*	*.000-.000*	*.000-.000*	*.000-.000*	*942.16*	*1640*	*226.98*	*Active*	*added*	*Yes*
WREE837	C09015 - Windham, CT	UU	C09015	L1	9015	Windham	Cellco Partnership	Yes	425.000	27500.000-27925.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WQEM954	*New London-Norwich, CT*	*CW*	*BTA319*	*C*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*10.000*	*1895.000-1900.000*	*1975.000-1980.000*	*.000-.000*	*.000-.000*	*201.13*	*1640*	*226.98*	*Active*	*added*	*Yes*
WRHD615	New York, NY	UU	PEA001	M6	9015	Windham	Cellco Partnership	Yes	100.000	38100.000-38200.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes

WRHD613	New York, NY	UU	PEA001	M4	9015	Windham	Cellco Partnership	Yes	100.000	37900.000-38000.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WRHD617	New York, NY	UU	PEA001	M8	9015	Windham	Cellco Partnership	Yes	100.000	38300.000-38400.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WRNE581	*New York, NY*	*PM*	*PEA001*	*A1*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*20.000*	*3700.000-3720.000*	*.000-.000*	*.000-.000*	*.000-.000*	*942.16*	*1640*	*226.98*	*Active*	*added*	*Yes*
KNKN862	*Connecticut 2 - Windham*	*CL*	*CMA358*	*A*	*9015*	*Windham*	*Cellco Partnership*	*Yes*	*25.000*	*824.000-835.000*	*869.000-880.000*	*845.000-846.500*	*890.000-891.500*	*246.95 - PSD*	*400*	*226.98*	*Active*	*added*	*Yes*
WRHD614	New York, NY	UU	PEA001	M5	9015	Windham	Cellco Partnership	Yes	100.000	38000.000-38100.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WREE838	C09015 - Windham, CT	UU	C09015	L2	9015	Windham	Cellco Partnership	Yes	425.000	27925.000-28350.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes
WRHD612	New York, NY	UU	PEA001	M3	9015	Windham	Cellco Partnership	Yes	100.000	37800.000-37900.000	.000-.000	.000-.000	.000-.000		0	226.98	Active		Yes

ATTACHMENT 6

C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
(603) 644-2800
support@csquaredsystems.com

Calculated Radio Frequency Emissions Report

Killingly East

1249 Killingly Pike, Killingly, CT 06243

November 2, 2023

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List of Tables

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed installation of Verizon's antenna arrays to be mounted at 120' AGL on an existing lattice tower located at 1249 Killingly Pike in Killingly, CT. The coordinates of the monopole tower are 41° 50' 43.40" N, 71° 49' 41.4" 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 unknown operator[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 04/10/2023.

[2] As referenced to Centek Engineering's Structural Analysis Report, Dated 05/16/2023

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 = $\sqrt{\left(H^2 + V^2\right)}$

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 / 0°	700	160	14.5	4509	JAHH-65B-R3B	67	0	5.99	120
		850	160	15.8	6083		65			
		1900	160	18.4	11069	JAHH-65B-R3B	63			
		2100	240	18.5	16991		65			
		3700	200	25.5	70963	MT6407	-	0	2.92	120
	Beta / 180°	700	160	14.5	4509	JAHH-65B-R3B	67	0	5.99	120
		850	160	15.8	6083		65			
		1900	160	18.4	11069	JAHH-65B-R3B	63			
		2100	240	18.5	16991		65			
		3700	200	25.5	70963	MT6407	-	0	2.92	120
	Gamma / 270°	700	160	14.5	4509	JAHH-65B-R3B	67	0	5.99	120
		850	160	15.8	6083		65			
		1900	160	18.4	11069	JAHH-65B-R3B	63			
		2100	240	18.5	16991		65			
		3700	200	25.5	70963	MT6407	-	0	2.92	120

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

[3] Antenna heights are in reference to Verizon's Radio Frequency Design Sheet updated 04/10/2023.

[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.

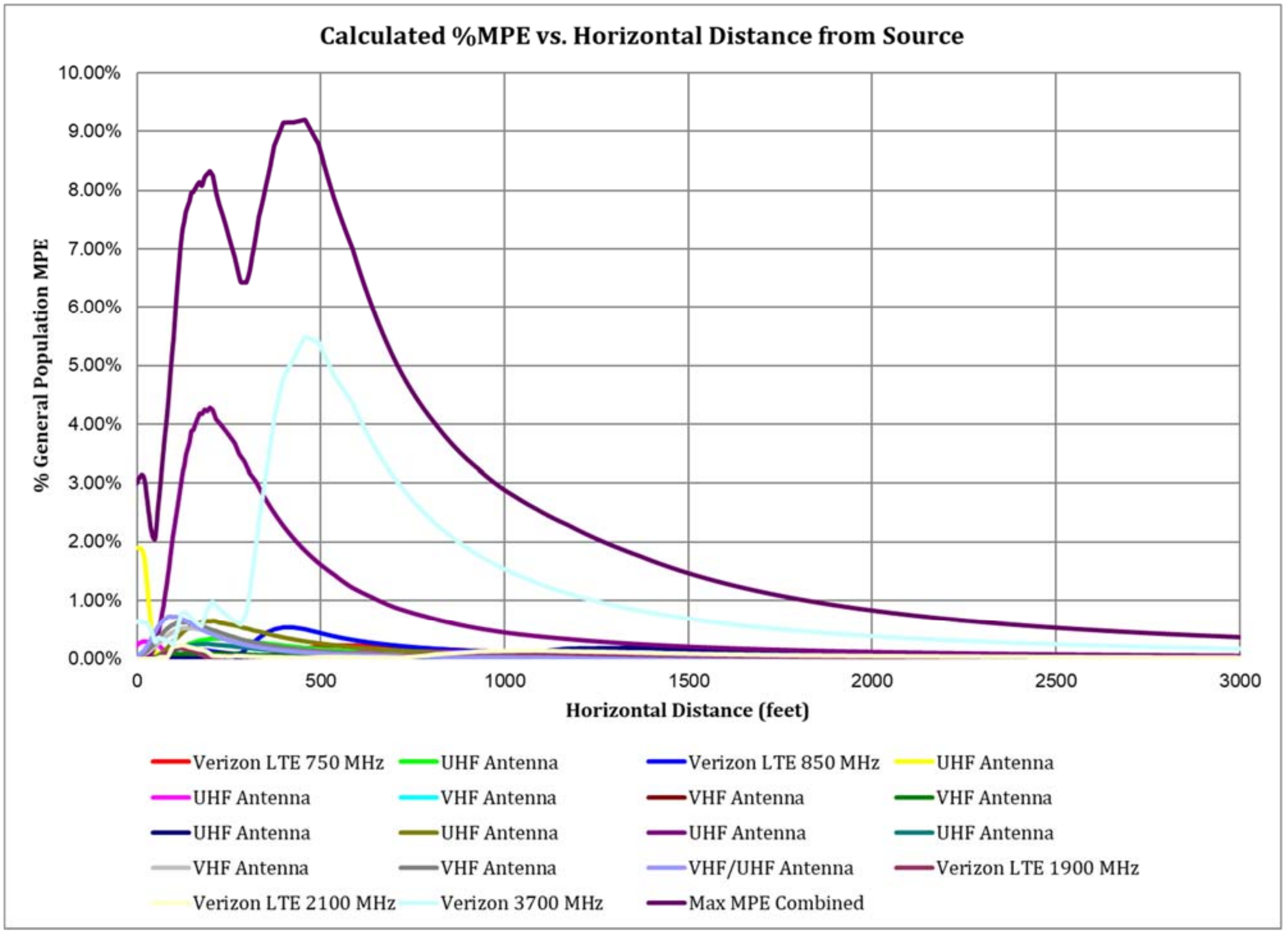


Figure 1: Graph of General Population % MPE vs. Distance

The highest percent of MPE (9.09% of the General Population limit) is calculated to occur at a horizontal distance of 457 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 457 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
UHF Antenna	2	35.0	150.0	457	0.000563	0.300	0.19%
UHF Antenna	3	35.0	150.0	457	0.000006	0.300	0.00%
UHF Antenna	2	100.0	150.0	457	0.000085	0.300	0.03%
UHF Antenna	2	7.4	150.0	457	0.000041	1.000	0.00%
UHF Antenna	3	35.0	135.0	457	0.000894	0.300	0.30%
UHF Antenna	3	35.0	130.0	457	0.005555	0.300	1.85%
UHF Antenna	1	35.0	125.0	457	0.000310	0.300	0.10%
Verizon 3700 MHz	1	200.0	120.0	457	0.054875	1.000	5.49%
Verizon LTE 1900 MHz	1	160.0	120.0	457	0.000205	1.000	0.02%
Verizon LTE 2100 MHz	1	240.0	120.0	457	0.000196	1.000	0.02%
Verizon LTE 750 MHz	1	160.0	120.0	457	0.000887	0.500	0.18%
Verizon LTE 850 MHz	1	160.0	120.0	457	0.002863	0.567	0.51%
VHF Antenna	1	30.0	150.0	457	0.000036	0.200	0.02%
VHF Antenna	1	100.0	150.0	457	0.000082	0.200	0.04%
VHF Antenna	1	100.0	150.0	457	0.000082	0.200	0.04%
VHF Antenna	1	100.0	120.0	457	0.000299	0.200	0.15%
VHF Antenna	1	100.0	110.0	457	0.000308	0.200	0.15%
VHF/UHF Antenna	1	100.0	85.0	457	0.000004	0.300	0.00%
						Total	**9.09%**

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 9.09% of the FCC limit (General Population/Uncontrolled). This maximum cumulative percent of MPE value is calculated to occur 457 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.

Report Prepared By: Ram Acharya
RF Engineer 1
C Squared Systems, LLC

November 1, 2023
Date

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

November 2, 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 - 1249 Killingly Pike (aka 1 Service Road) Killingly, CT, dated 9/23/2022

As referenced to Dish Wireless LLC's filing, Connecticut Siting Council Tower Share Application – 1249 Killingly Pike , Killingly, CT, dated 11/19/2021

T-Mobile's filing, Connecticut Siting Council Notice of Exempt Modification – 1249 Killingly Pike , Killingly, 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.

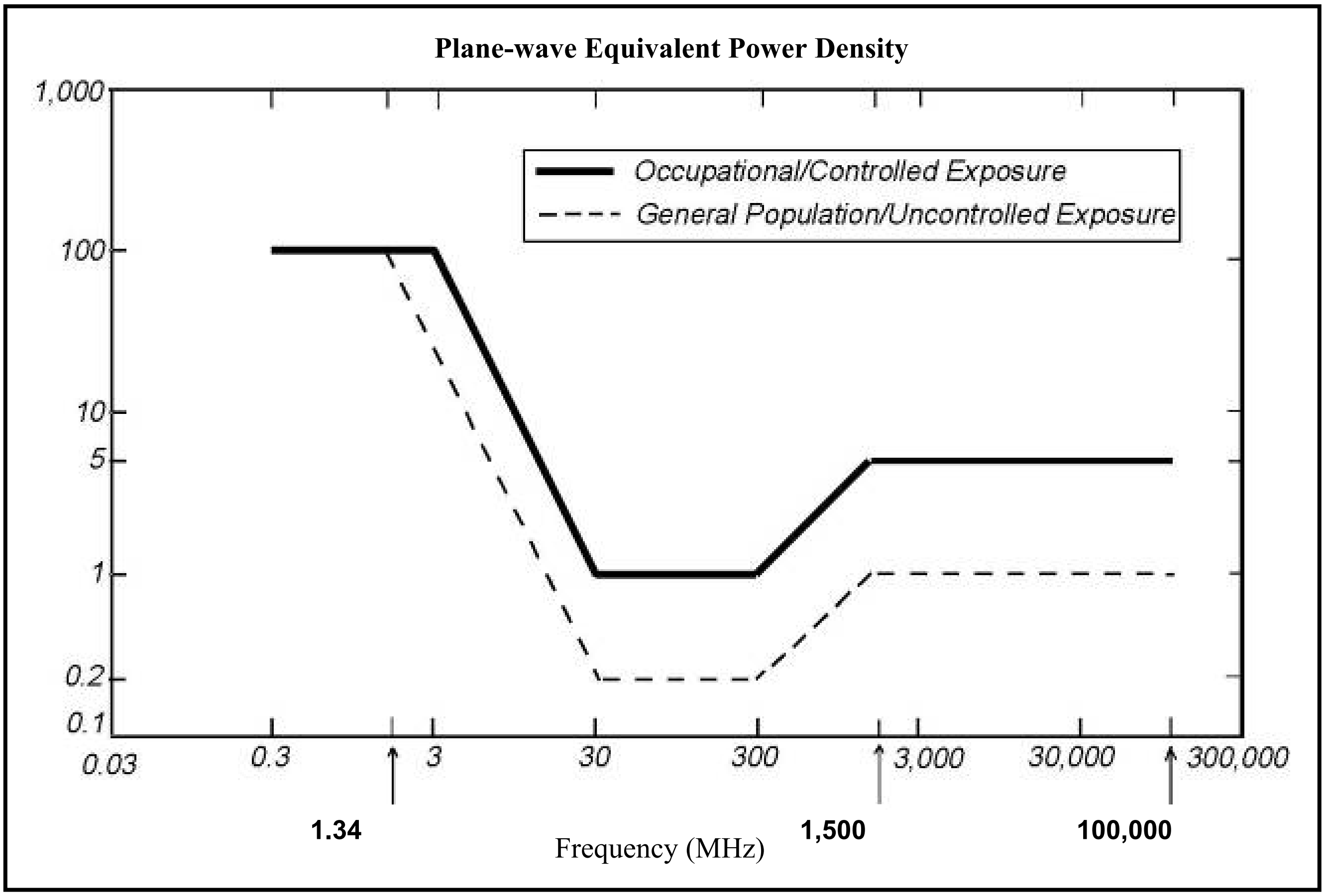
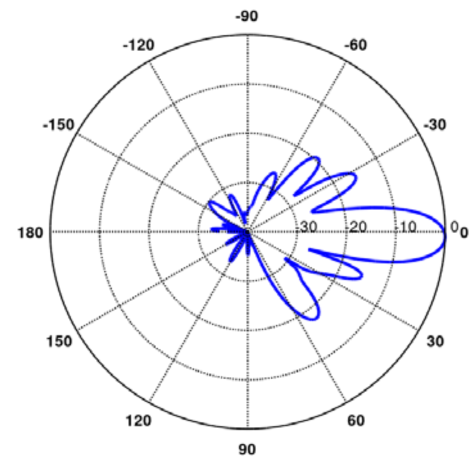


Figure 2: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Verizon Antenna Model Data Sheets and Electrical Patterns

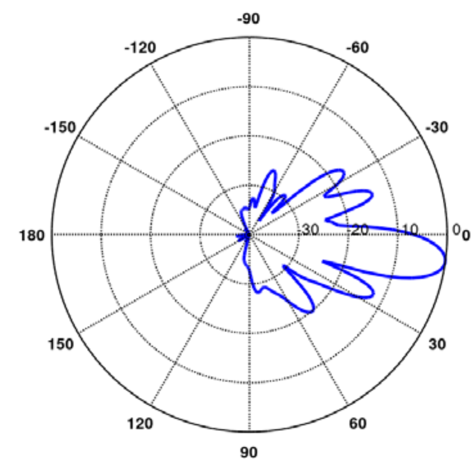
750 MHz

Manufacturer:	COMMSCOPE
Model #:	JAHH-65B-R3B
Frequency Band:	698-787 MHz
Gain:	14.5 dBi
Vertical Beamwidth:	12.4°
Horizontal Beamwidth:	67.0°
Polarization:	±45°
Dimensions (L x W x D):	71.97” x 8.2” x 13.78“



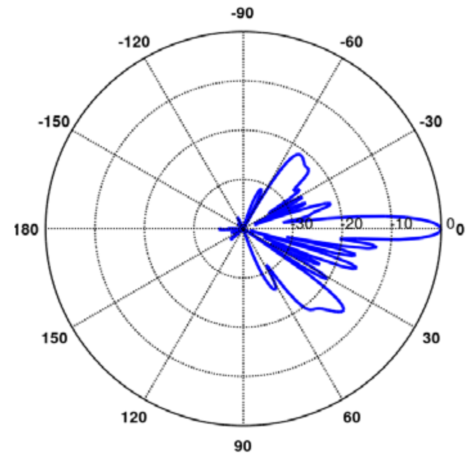
885 MHz

Manufacturer:	COMMSCOPE
Model #:	JAHH-65B-R3B
Frequency Band:	806-896 MHz
Gain:	15.8 dBi
Vertical Beamwidth:	10.5°
Horizontal Beamwidth:	65°
Polarization:	±45°
Dimensions (L x W x D):	71.97” x 8.2” x 13.78“



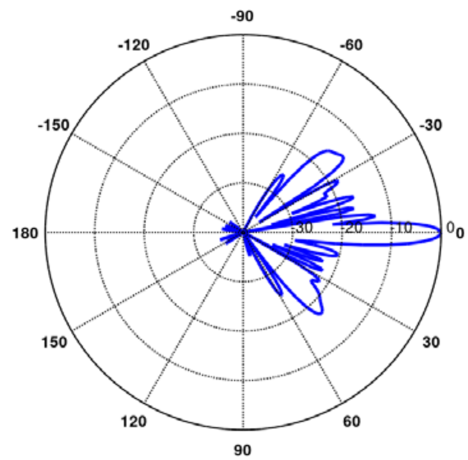
1900 MHz

Manufacturer:	COMMSCOPE
Model #:	JAHH-65B-R3B
Frequency Band:	1850-1990 MHz
Gain:	18.4 dBi
Vertical Beamwidth:	5.2°
Horizontal Beamwidth:	63°
Polarization:	±45°
Dimensions (L x W x D):	71.97” x 8.2” x 13.78“



2100 MHz

Manufacturer:	COMMSCOPE
Model #:	JAHH-65B-R3B
Frequency Band:	1920-2200 MHz
Gain:	18.5 dBi
Vertical Beamwidth:	4.9°
Horizontal Beamwidth:	65°
Polarization:	±45°
Dimensions (L x W x D):	71.97” x 8.2” x 13.78“



ATTACHMENT 7

UNITED STATES POSTAL SERVICE®

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Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	3	3	neopost 11/06/2023 US POSTAGE $003.19⁰ ZIP 06103 041L12203937 HARTFORD, CT 06103 OLD STATE HOUSE POST OFFICE NOV - 6 2023
	Postmaster, per *(name of receiving employee)*		

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1.	Mary Calorio, Town Manager Town of Killingly 172 Main Street Killingly, CT 06239				
2.	Ann-Marie Aubrey, Director of Planning and Development Town of Killingly 172 Main Street Killingly, CT 06239				
3.	Quinebaug Valley Emergency Communication, Inc. 1249 Hartford Pike Killingly, CT 06243				
4.					
5.					
6.					