Robinson+Cole

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Also admitted in Massachusetts and New York

March 16, 2022

Via Electronic Mail

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 6-9 Campus Drive, Madison, Connecticut

Dear Ms. 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 facility located on a 54.72-acre parcel at 6-9 Campus Drive in Madison, Connecticut (the "Property"). The Property and the existing tower are owned by the Town of Madison ("Town"). Cellco identifies this site as its "Madison 6 Facility". The existing 150-foot lattice tower was approved by the Town in December of 1994. A copy of the Town's tower approval is included in <u>Attachment 1</u>.

Cellco requests that the Council find that the proposed shared use of the Town 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 Town's Chief Elected Official and Land Use Officer.

Background

Cellco is licensed by the Federal Communications Commission ("FCC") to provide wireless services throughout the State of Connecticut. Cellco and the Town have agreed to the proposed shared use of the existing Town tower pursuant to mutually acceptable terms and

Melanie A. Bachman, Esq. March 16, 2022 Page 2

conditions. Likewise, the Town and Cellco have agreed to the proposed installation of equipment on the ground within the fenced compound. The Town has authorized Cellco to apply for all necessary permits and approvals that may be required to share the existing facility. (*See* Attachment 2).

Cellco proposes to install twelve (12) antennas and six (6) remote radio heads ("RRHs") on the tower at a centerline height of 120 feet above ground level ("AGL"). Cellco will also install two equipment cabinets and a backup generator on the ground adjacent to the tower. Included in Attachment 3 are Cellco's project plans showing the location of Cellco's proposed site improvements. Attachment 4 contains specifications for Cellco's 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 structure satisfies these criteria.
- A. <u>Technical Feasibility</u>. The existing tower is structurally capable of supporting Cellco's antennas, RRHs, antenna mounting system and related equipment. The proposed shared use of this tower is, therefore, technically feasible. A Structural Analysis Report dated February 25, 2022, prepared by Centek Engineering, Inc. confirms that the tower structure can support Cellco's proposed modifications. A copy of the Structural Analysis Report is 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 structure, such as the existing Town 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, C.G.S. §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 tower modifications.
- **C.** Environmental Feasibility. The proposed shared use of the existing tower would have minimal environmental effects, for the following reasons:

Melanie A. Bachman, Esq. March 16, 2022 Page 3

- 1. The proposed installation of twelve (12) antennas and six (6) RRHs at a centerline 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. Cellco's equipment cabinets and generator will be located adjacent to the Town's existing equipment shelter and will require a small (4' x 24') expansion of the compound fence. No additional tree removal or site grading is needed to accommodate this small compound expansion. Cellco's shared use of the existing telecommunications facility would, therefore, not cause any significant change or alteration in the physical or environmental characteristics of the existing site.
- 2. Noise associated with Cellco's proposed facility will comply with 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 <u>Attachment 6</u> of this filing is a general power density table that demonstrates that the Cellco facility will operate well within the FCC's safety standards.
- 4. Under ordinary operating conditions, the proposed installation would not require the use of any water or sanitary facilities and would not generate air emissions or discharges to water bodies or sanitary facilities. After construction is complete the proposed installations would not generate any increased traffic to the facility other than periodic maintenance visits to the cell site.

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

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

<u>Public Safety Concerns.</u> As discussed above, the tower is capable of supporting Cellco's antennas, antenna mounting structures, RRHs and all related equipment. Cellco is not aware of any public safety concerns relative to the proposed sharing of the existing the tower facility. In fact, the provision of new and improved wireless service through shared use of the

Melanie A. Bachman, Esq. March 16, 2022 Page 4

existing tower is expected to enhance the safety and welfare of area residents and members of the general public traveling through the Town of Madison. A Certificate of Mailing verifying that this filing was sent to the municipal officials is included in <u>Attachment 7</u>.

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

Kunig mu

Enclosures Copy to:

Peggy Lyons, First Selectwoman Erin Mannix, Town Planner Tim Parks, Verizon Wireless

ATTACHMENT 1

TOWN OF MADISON 8 MEETINGHOUSE LANE MADISON, CT 06443

BUILDING PERMIT

DEPT. FILE COPY

VALIDATION

PERMIT TO CONSTRUCT radio towe (TYPE OF IMPROVEMENT)	r () STORY	(N	PROPOSED US	(STREET)	Madison NUMBER DWELLIN		ONTR'S LICENS
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REMARKS: IW Officer's Note: I	r) E					PERMIT \$ 1	26.00

ATTACHMENT 2

March 9, 2022

Andrew Candiello
Principal Engineer – RE/Regulatory
Cellco Partnership d/b/a Verizon Wireless
20 Alexander Drive
Wallingford, CT 02492

RE: Letter of Authorization – Cellco Partnership d/b/a Verizon Wireless
9 Campus Drive – Madison CT – Madison Police Department Wireless Facility

Dear Mr. Candiello:

The Town of Madison Connecticut Police/Fire Department through review and approval of the Madison Board Of Selectmen do hereby authorize Cellco Partnershi 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 and existing telecommunications facility at the above referenced address.

Sincerely,

Title

Pessy Lyms, Arst Selec

Date

ATTACHMENT 3

verizon

WIRELESS COMMUNICATIONS FACILITY UPGRADE

MADISON 6 CT 9 CAMPUS DRIVE MADISON CT 06443

GENERAL NOTES

- ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CONNECTICUT SUPPLEMENT. INCLUDING THE TIA/EIA-222 REVISION "G" STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES, 2017 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE, AND LOCAL CODES.
- SHOULD ANY FIELD CONDITIONS PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
- 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 REALTD PARTIES. THE SUBCONTRACTORS AND ALL REALTD PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
- 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.
- CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
- 6. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION. AND ALL TRADES AS APPLICABLE PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
- CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF SEVEN DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE ANALABLE. ALL OLD DRAWINGS SHALL BE SOON AS THEY ARE MADE ANALABLE. ALL OLD DRAWINGS SHALL BE SOON AS THEY ARE MADE ANALABLE. ALL OLD DRAWINGS SHALL BE CONTRACTOR SHALL FURNISH IN "S—GUILLT" SET OF DRAWINGS TO OWNER DIPON COMPLETION OF PROJECT.
- LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS
- THE CONTRACTOR IS SOLELY RESPONSELE TO DETERMINE CONSTRUCTION PROCEDURA MO SOLEDEC AND TO BESURE THE SAFETY OF EXCENDED AND TO SOLEDEC THE SAFETY OF EXCENDES STRUCTURES AND TIS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORNE, BRACKING, UNDEPRINNING, ETC. THAT MAY BE NECESSARY, MANTAIN EXISTING BUILDING'S/PROPERTY'S OPERATIONS, COORDINATE WORK WITH BUILDING/PROPERTY OWNER.
- 10. PRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE NO RECEIVED TO BE SUBSTANDARD IN ANY ORDINANCES. SHOULD BE NOT SHOULD SHOULD BE NOT S

- ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
- ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
- 13. ANY AND ALL ERRORS, DISCREPANCIES, AND "MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE VERIZON WIRELESS CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO "EXTRA" WILL BE ALLOWED FOR MISSED ITEMS.
- 14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON—SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
- 15. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL, DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
- 16. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
- 17. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURETENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- 18. ALL COUPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB— CONTRACTOR SON ALL APPLICABLE SUB— CONTRACTOR FOR ANY CONDITION PER THE MANUFACTURER'S RECOMMENDATION, CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANUSER.
- ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
- 20. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455, ALL UTILINES SHALL BE IDENTIFIED AND CLEARLY MARKED PRIOR TO ANY EXCAVATION WORK, CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.

SITE DIRECTIONS FROM: 20 ALEXANDER DRIVE WALLINGFORD, CONNECTICUT TO: 9 CAMPUS DRIVE MADISON, CT 06443 1. START OUT COING NORTH ON ALEXANDER DR TOWARD BARNES INDUSTRIAL RD. 2. TURN RIGHT ONTO BARNES INDUSTRIAL RD. 2. TURN RIGHT ONTO BARNES INDUSTRIAL RD. 4. TURN SLIGHT RECHT ONTO DAINA ROAD/CT-88. CONTINUE TO FOLLOW CT-68. 5. TURN RIGHT ONTO MAIN STREET/CT-17. 6. STAY STRANGT TO GO NOTH MAISON ROAD/CT-79. CONTINUE TO FOLLOW CT-79. 6. TURN LET ROUND-BOUT AND TAKE THE 2ND EXT ONTO DURINAM ROAD/CT-79. 6. TURN LET GOVEN ORSE FOR BOOK/CT-450. CONTINUE TO FOLLOW CT-450. 10. TURN RIGHT TO STAY ON CAMPUS DRIVE. 10. TURN RIGHT TO STAY ON CAMPUS DRIVE. 0.18 MI 0.11 MI 2.70 MI 4.25 MI 0.85 MI 8.16 MI 3.05 MI 2.70 MI 0.07 MI 0.05 MI



PROJECT SUMMARY

- THE PROPOSED ANTENNA INSTALLATION TO CONSIST OF A TOTAL OF (12) PANEL ANTENNAS MOUNTED ON THE EXISTING SELF-SUPPORTING LATTICE COMMUNICATIONS TOWER INCLUDING ASSOCIATED APPURTENANCES & CABLING
- THE PROPOSED GROUND WORK TO INCLUDE THE INSTALLATION OF A CONCRETE EQUIPMENT PAD WITH STEEL ICE BRIDGE CANOPY FOR RADIO EQUIPMENT AND A NATURAL GAS FUELED BACKUP POWER GENERATOR.
- POWER, TELCO AND NATURAL GAS UTILITIES SHALL BE ROUTED FROM EXISTING DEMARCS AS SHOWN HEREIN.

PROJECT INFORMATION

SITE ADDRESS 9 CAMPUS DRIVE MADISON, CT 06443

CELLCO PARTNERSHIP d.b.g. VERIZON WIRELESS 20 ALEXANDER DRIVE WALLINGFORD, CT 06492 LESSEE/TENANT

CONTACT PERSON

(860) 560-6410

CENTEK ENGINEERING, INC 63-2 NORTH BRANFORD BRANFORD, CT. 06405 (203) 488-0580

PROJECT COORDINATES:

LATITUDE: 41"-17"-47.5008"N LONGITUDE: 72"-34"-20.7984"W

COORDINATES BASED ON VERIZON WIRELESS RFDS, DATED FEBRUARY 2, 2022.

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d/b/a Verizon C

SCALE: AS NOTED JOB NO. 20083.14

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MADISON

NOTES AND SPECIFICATIONS

DESIGN BASIS:

GOVERNING CODE: 2015 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2018 CT STATE BUILDING CODE AND AMENDMENTS.

- 1. DESIGN CRITERIA:
- RISK CATEGORY: III (BASED ON TABLE 1604.5 OF THE 2015 IBC)
- NOMINAL DESIGN SPEED (TOWER): 108 MPH (Vosd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10) PER 2015 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2018 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

- DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE USBTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR RESULATIONS WITH NO INCREASE IN COSTS.
- 3. 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.
- 4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
- THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
- ALL DIMINISTONE, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES. SUPPORE, AND SUBSEMPACE, AND SUBSEMPACE AND SUBSEMPA
- AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN COMPLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
- THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE OF PROVIDING AND MANTANING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
- 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 SHORN, BRACING, LINDERPRINNING, ETC. THAT MAY BE RECESSARY, MAINTAIN EXISTING STE OPERATIONS, COMPONENT WORK WITH NORTHEAST UTILIZE.
- O. 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.
- 11. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

- 1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)
 - STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
 STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI)
 STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B,
- STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B,
- STRUCTURAL HSS (ROUND SHAPES)——

 = 42 KSI)
 PIPE——ASTM A53 (FY = 35 KSI)
 CONNECTION BOLTS——ASTM A325—N
 U—BOLTS——ASTM A36
 ANCHOR RODS——ASTM F 1554
 WELDING ELECTRODE——ASTM E 70XX
- CONTRACTOR TO REVEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL DRAWNESS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTION TO SECTION PROPILES, SEZES, CONNECTION ATTRACHER'S, REPROPERIOR, ANCHORAGE, SEZ AND THE OF RASTEMERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEXITIONS AND DETAILS.
- STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
- PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
- FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
- INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
- AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
- 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.
- ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
- 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.
- 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 DRAWNINGS.
- 13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
- 14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
- MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
- 16. FABRICATE BEAMS WITH MILL CAMBER UP.
- LEVEL AND PLUMB INDIMIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
- COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
- INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
- FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

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verizon VIIIZIIIU Supposition in the contract of the c (203) 488-0580 (203) 488-8587 Fox 63-2 North Branford R Branford, CT 06405

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MADISON Partnership

9 CAMPUS DRIVE MADISON, CT 06443

DATE: 02/28/22 SCALE: AS NOTED JOB NO. 20083.14

NOTES AND SPECIFICATIONS



PLUMBING DIAGRAM NOTES:

- PORTS 1 & 2 ARE FOR LOW BAND (698-896 MHz).
- PORTS 3. 4. 5 & 6 ARE FOR HIGH BAND (1695-2360 MHz).
- . SMART BIAS TEE (SBT) IS THROUGH ANTENNA PORTS 1 & 3 (1 FOR LOW BAND AND 3 FOR HIGH BAND).
- AISG CABLE IS ONLY NEEDED WHEN DRAWN IN THE DIAGRAM: ABOVE. IF IT IS NOT DRAWN THEN SBT IS ENOUGH TO CONTROL ALL RET MOTORS.
- NOT ALL SBT PORTS ARE NEEDED TO CONTROL RET. ONLY GREEN PORT CONNECTION TO GREEN PORT WILL CONTROL RET.

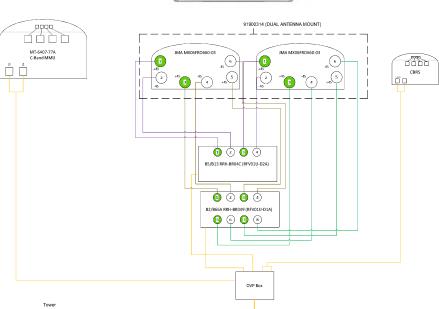


RET DC SIGNAL PASS FOR RET (PORT THAT WILL CONTROL RET)

PLUMBING DIAGRAM COMMENTS:

- DIAGRAMS SHOW ANTENNA PORT CONFIGURATIONS AS VIEWED FROM STANDING BEHIND THE ANTENNAS.
- B. ANTENNA POSITIONS ARE INDICATED AS VIEWED FROM IN FRONT OF ANTENNAS.
- C. CAP AND WEATHERPROOF UNUSED ANTENNA PORTS.
- D. ALL PLUMBING DIAGRAM COLORS ARE IRRELEVANT EXCEPT FOR AISG AND HYBRIFLEX CABLE. (FOR THE COAX COLORS, FOLLOW COAX COLORS GUIDE SHOWN HEREIN).





Equipment Pad

NOTES:

- . INFORMATION SHOWN HEREIN IS FOR USE BY VERIZON WIRELESS EQUIPMENT OPERATIONS.
- THIS B.O.M. DRAWING IS BASED OFF FACILITY UPGRADE DESIGN DRAWINGS PREPARED BY CENTEK ENDINEERING (REV. I DATED: 03.15.2022), & VERIZON WIRELESS RF ANTENNA EQUIPMENT RECOMMENDATION (DATED 02.02.2022).

BILL OF MATERIALS						
TECHNOLOGY	QUANTITY	ANTENNA				
LTE 700						
LTE 850	6					
LTE PCS 1900	ь .	JMA WIRELESS MODEL: MX06FR0660-03				
LTE AWS 2100						
CBRS	3	SAMSUNG MODEL: XXDWMM-12.5-65-BT-CBRS				
5G	3	SAMSUNG MODEL: MT6407-77A				

CABLES	QUANTITY	LENGTH (EA)	COMMENTS			
HYBRID CABLE	2	±175FT	6x12 LI			
RADIOS	QU	IANTITY	COMMENTS			
LTE 700						
LTE 850		3	SAMSUNG MODEL: B5/B13 RRH-BR04C			
LTE PCS 1900						
LTE AWS 2100		3	SAMSUNG MODEL: B2/B66A RRH-BR049			
5G		3	INTEGRATED INTO MT6407-77A ANTENNA			

DIPLEXERS	QUANTITY	COMMENTS
-	-	-
OVP BOXES	QUANTITY	COMMENTS

ANTENNA MOUNT	QUANTITY	COMMENTS
V_FRAMES	3	SITE DRO MODEL: VEA12-HD

NEER SEAL	100	A STATE OF THE PARTY OF THE PAR	San San	010	1	K		No.	1
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Partnership d/b/a Verizon Wireless MADISON 6 CT

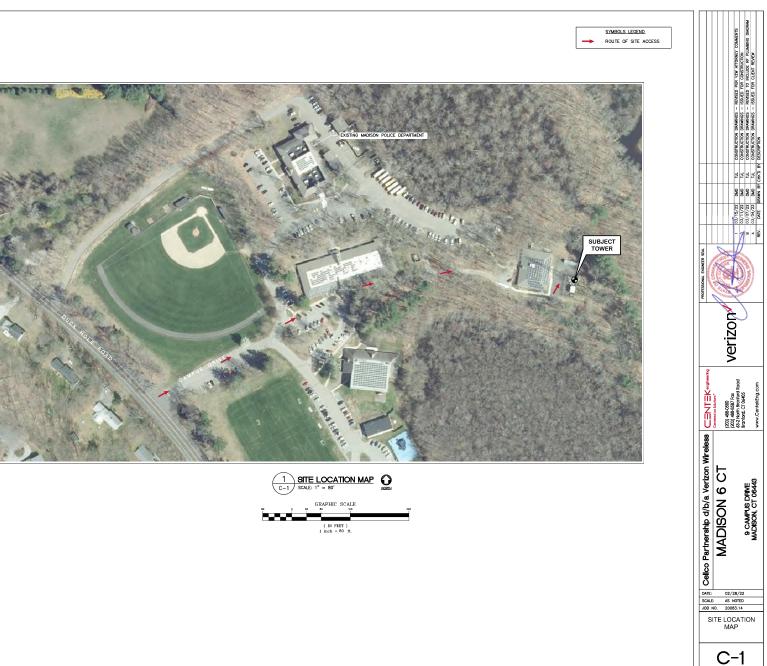
9 CAMPUS DRIVE MADISON, CT 06443

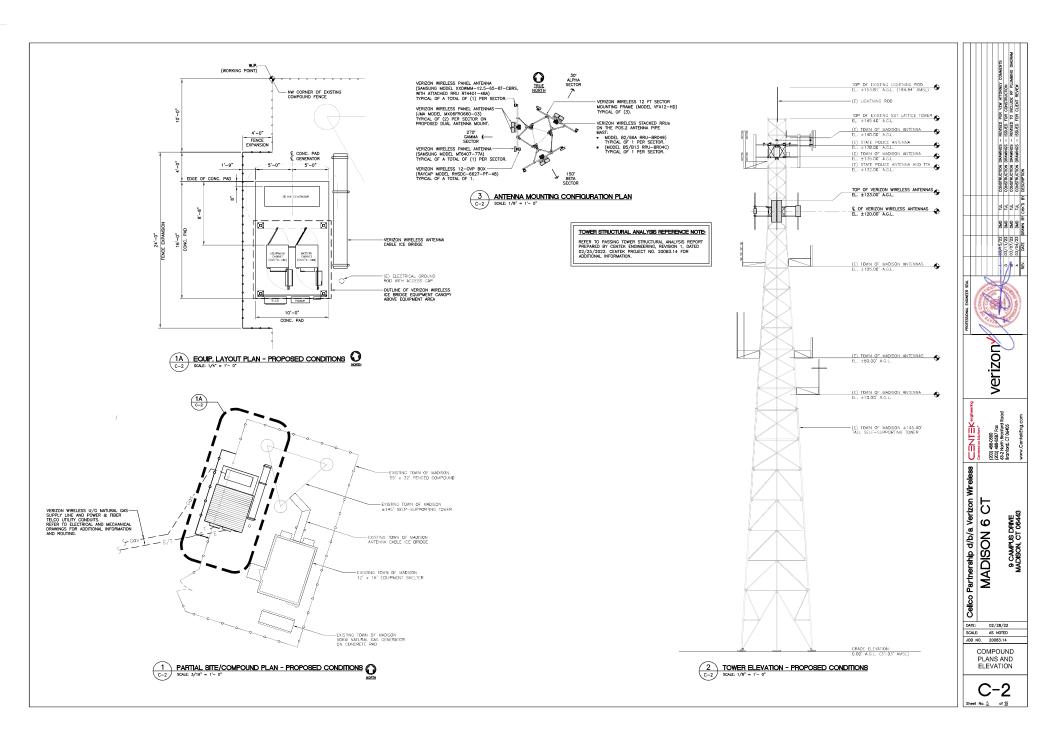
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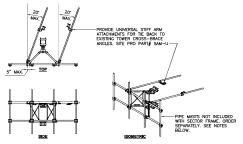
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RF BILL OF MATERIALS AND PLUMBING DIAGRAM







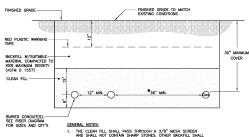


12 FT ANTENNA SECTOR MOUNTING FRAME									
EQUIPMENT	DESCRIPTION	QTY	WEIGHT						
MAKE: SITE PRO MODEL: VFA12-HD	12 FT, HEAVY DUTY V-FRAME	3	735 LBS						

1. GUYED AND SST MOUNTING RANGE: 1 1/2" TO 9 1/2" ROUND LEGS AND 3" TO 6" ANGLES.

PIPE MASTS ARE NOT INCLUDED IN SECTOR FRAME KIT. ORDER SEPARATELY (SITE PRO PART# P30120). WEIGHT LISTED ABOVE DOES NOT INCLUDE PIPE MASTS

1 SECTOR FRAME MOUNT DETAIL



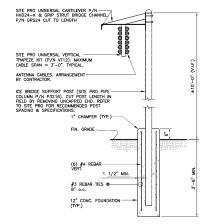
THE CLEAN FILL SHALL PASS THROUGH A 3/8" MESH SCREEN AND SHALL NOT CONTAIN SHARP STONES. OTHER BACKFILL SHALL NOT CONTAIN ASHES, CHOOPER, SHELLS, FROZEN MATERIAL, LOOSE DEBRIS OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION.

WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.

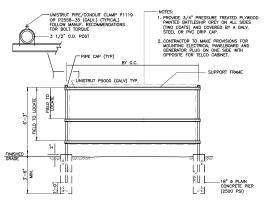
* NATURAL CAS NOTES:

1. DPUC REGULATIONS PROHIBIT INSTALLATION OF CAS MAINS IN THE SAME TRENCH AS OTHER UTILITIES. CAS SERVICES MAY BE INSTALLED IN THE SAME TRENCH AS OTHER UTILITIES EXCEPT FOR SEWER LINES.

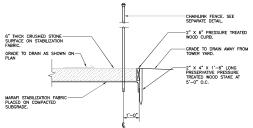
4 TYPICAL UTILITY TRENCH DETAIL C-3 NOT TO SCALE



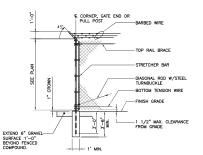
2 ANTENNA CABLE ICE BRIDGE DETAIL



UTILITY SUPPORT FRAME (TYP) C-3 NOT TO SCALE



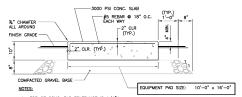
COMPOUND SURFACING DETAIL (C-3) NOT TO SCALE



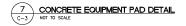
WOVEN WIRE FENCE NOTES:

- GATE POST, CORNER, TERMINAL OR PULL POST 2 1 SCHEDULE 40 PIPE FOR GATE WIDTHS UP THRU 6 FEET OR 12 FEET FOR DOUBLE SWING GATE PER ASTM-F1083.
- 3. GATE FRAME: 1 2" SCHEDULE 40 PIPE PER ASTM-F1083.
- 4. TOP RAIL & BRACE RAIL: 1 2 s SCHEDULE 40 PIPE PER ASTM-F1083.
- 5. FABRIC: 12 GA. CORE WIRE SIZE 1 $\mbox{$\frac{1}{4}$}$ MESH, CONFORMING TO ASTM-A392.
- 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. LOCAL ORDINANCE OF BARBED WIRE REQUIREMENTS SHALL BE COMPLIED WITH IF APPLICABLE. 10. HEIGHT = $\pm 8'-0"$ (MATCH EXISTING).





- 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.
- COORDINATE EQUIPMENT CABINET AND PROPANE TANK HOLD-DOWN HARDWARE WITH RESPECTIVE MANUFACTURERS.

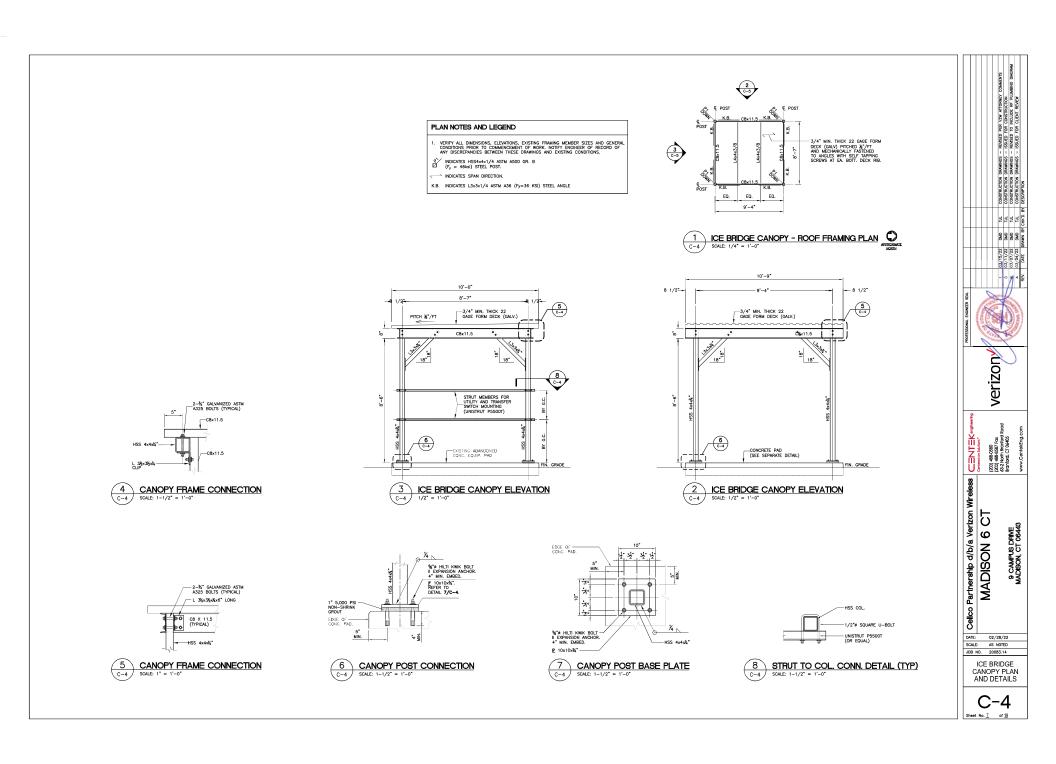




9 CAMPUS DRIVE MADISON, CT 06443 MADISON

DATE: 02/28/22 SCALE: AS NOTED JOB NO. 20083.14 MISCELLANEOUS DETAILS



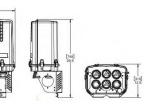




ANTENNA FRONT

EQUIPMENT	DIMENSI	ONS	WEIGHT
MAKE: SAMSUNG MODEL: MT6407-77A		35.1"h x 16.1"W x 5.5"D 87 (NOT TO EXCEED) (NOT TO	
CLEARANCES AND SERVICE A	REA		
TOP:	31.5"	HORIZONTAL DIST (ANT. TO ANT.)	ANCE: 31.5"
FRONT, SIDES & BOTTOM:	15.7"	VERTICAL DISTANO (ANT. TO ANT.)	CE: 63.0"

(1 C-5) SECTOR ANTENNA DETAIL



12 - OVP BOX					
	EQUIPMENT	DIMENSIONS	WEIGHT		
MAKE: MODEL:	RAYCAP RHSDC-6627-PF-48	29.5"H x 16.5"W x 12.6"D	32.0 LBS.		
NOTES:					

CONTRACTOR TO CONFIRM OVP BOX MAKE/MODEL AND QUANTITY WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING. UNIT PROVIDES DC SURGE PROTECTION FOR 12 RRH UNITS.

4 PROPOSED OVER-VOLTAGE PROTECTION BOX







CBRS CLIP-ON ANTENNA			CBRS RRU (REMOTE RADIO UNIT)					
EQUIPMENT		DIMENSIONS	WEIGHT	EQUIPM	ENT	BAND	DIMENSIONS	WEIGHT
MAKE: SANSU MODEL: XXDWN	NG MM-12.5-65-8T	12.3"H x 8.7"W x 1.4"D	2.9 LBS.	MAKE: MODEL:	SAMSUNG CBRS RRH-RT4401-48A	CBRS	12.1"H x 8.5"W x 4.1"D	18.6 LBS.
NOTES:	NOTES:							

2 COMBINED RRH/CLIP-ON ANTENNA DETAIL

NOT TO SCALE



RRH ISOMETRIC	RRH CLEARANCES				
	ADIO UNIT)				
EQUIPMENT	BANDS	DIMENSIONS	WEIGHT		
MAKE: SAMSUNG MODEL: B2/B66A RRH-BR049 (RFV01U-D1A)	B2: PCS (1900 MHz) B66: AWS (2100 MHz)	15.0"H x 15.0"W x 10.0"D	84.4 LBS.		
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH VERIZON WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.					

5 DUAL-BAND AWS/PCS RADIO UNIT DETAIL
NOT TO SCALE





ELEVATION - ISOMETRIC

BOTTOM

8-PORT SECTOR ANTENNA				
EQUIPMENT	DIMENSIONS	WEIGHT		
MAKE: JMA MODEL: MX06FR0660-03	71.3°L × 15.4°W × 10.7°D	60.0 LBS. (W/OUT MOUNT KIT)		

3 SECTOR ANTENNA DETAIL

C-5 NOT TO SCALE



RRH ISOMETRIC		RRH CLEARANCES				
	DUAL BAND RRU (REMOTE R	ADIO UNIT)				
EQUIPMENT	BANDS	DIMENSIONS	WEIGHT			
MAKE: SAMSUNG MODEL: B5/B13 RRH-BR04C (RFV01U-D2A)	B5: 850 MHz B13: 700 MHz	15.0"H x 15.0"W x 8.1"D	70.3 LBS.			
NOTES:						

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

ODUAL-BAND 700/850 MHZ RADIO UNIT DETAIL

NOT TO SCALE



DUAL ANTENNA MOUNTING KIT					
EQUIPMENT	DESCRIPTION				
MOUNT MAKE: JMA MODEL: 919003314	SIDE-BY-SIDE MOUNTING KIT, ACCOMMODATES (2) COMPATABLE ANTENNAS				
	2 BRACKETS REQUIRED FOR 4'-6' ANTENNAS				
	3 BRACKETS REQUIRED FOR 6'-8' ANTENNAS				

7 DUAL ANTENNA MOUNT DETAIL
C-5 NOT TO SCALE

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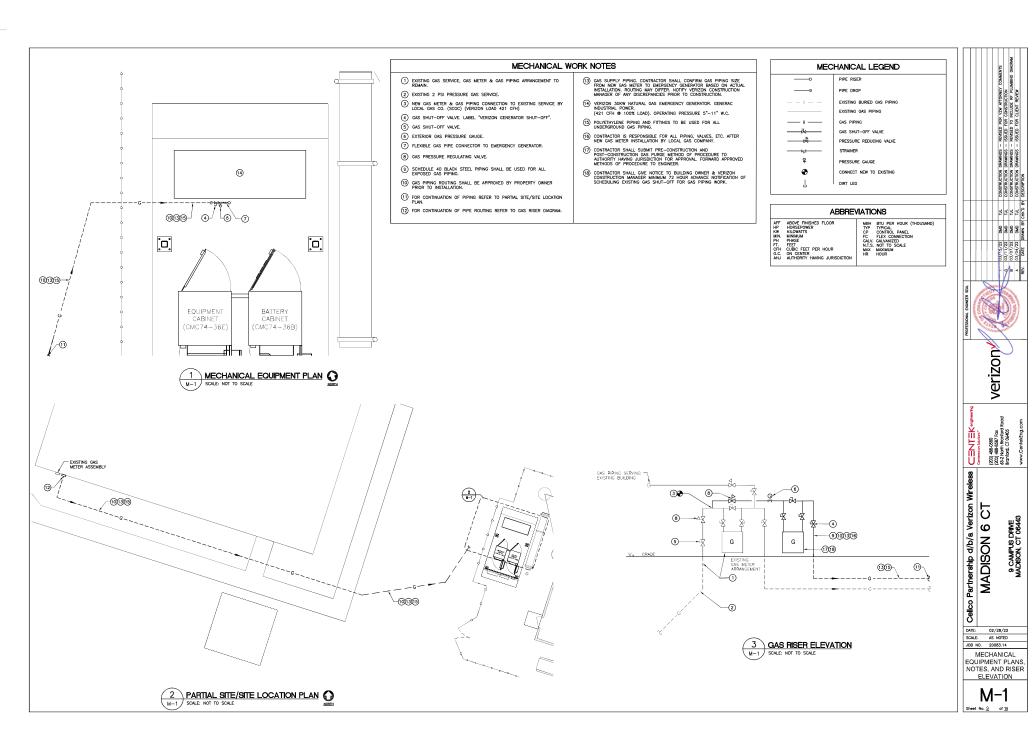
Partnership d/b/a Verizon Wireless MADISON 6 CT 9 CAMPUS DRIVE MADISON, CT 06443

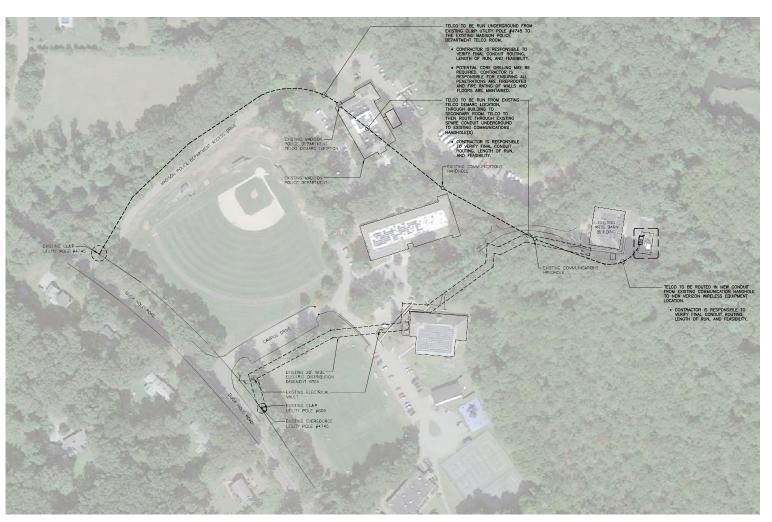
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Cellco DATE: 02/28/22 SCALE: AS NOTED JOB NO. 20083.14

RF DETAILS



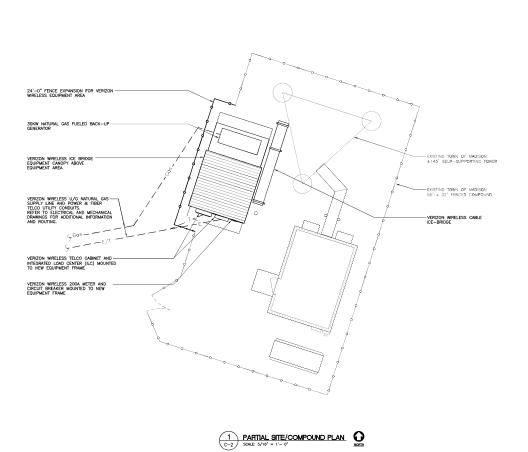




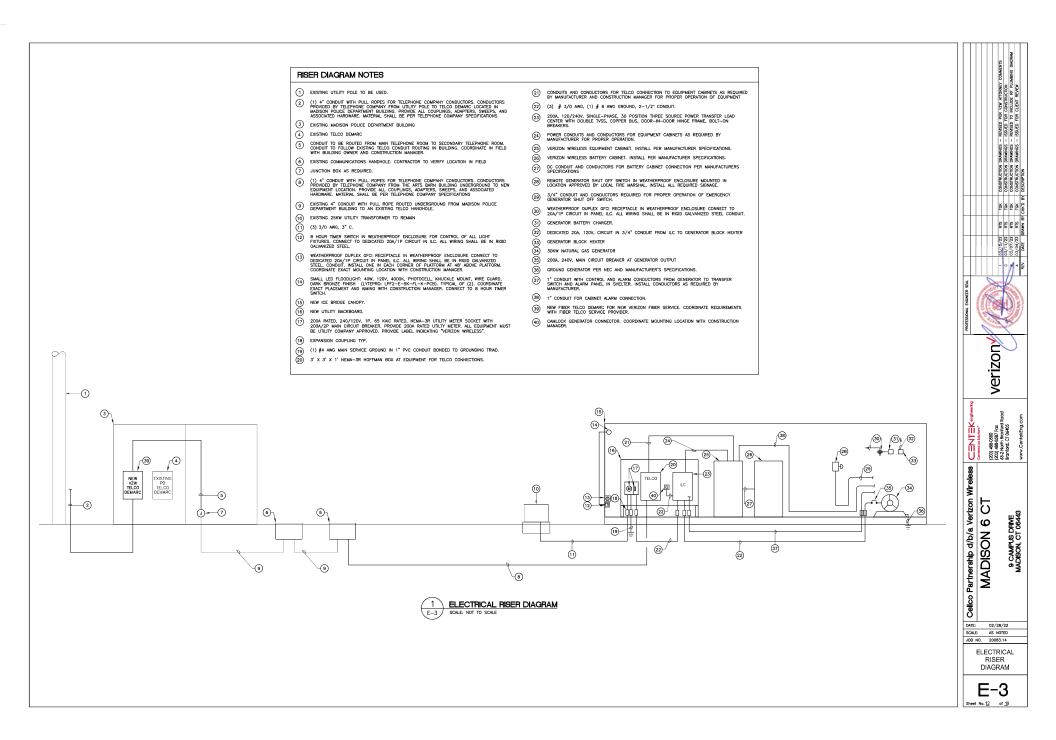


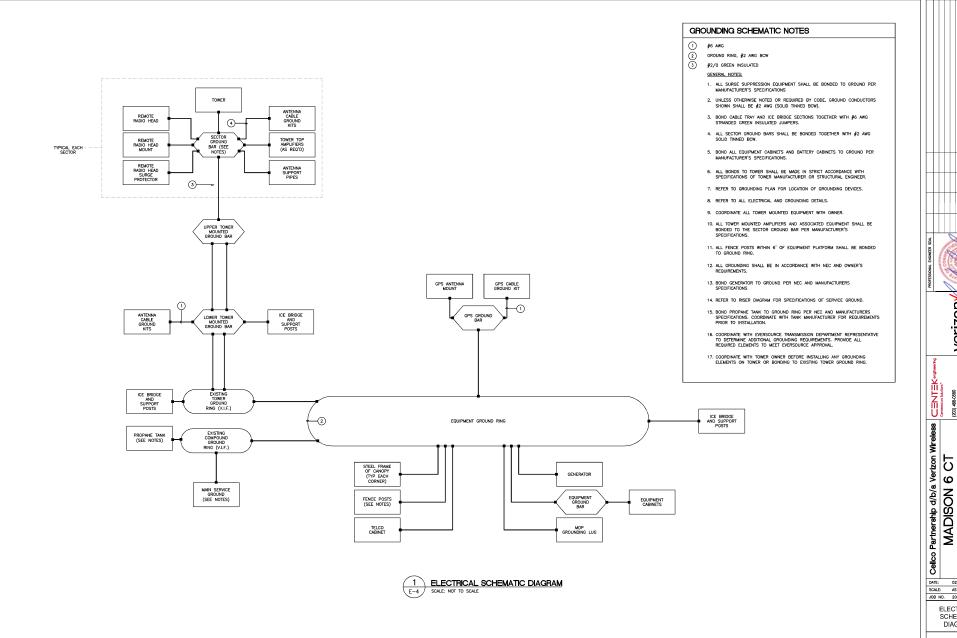


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DESCRIPTION PROMINGS - ISSUED FOR CLIBHT REVEW TGK TGK TGK TGK TGK TGK TGK TGK 03/15/22 RTS 03/11/22 RTS 03/07/22 RTS 03/04/22 RTS DATE DRAWN BY verizon CENTEK en (203) 488-0580 (203) 488-6587 Fax 63-2 North Branford R. Branford, CT 06405 Celico Partnership d/b/a Verizon Wireless
MADISON 6 CT 9 CAMPUS DRIVE MADISON, CT 06443 DATE: 02/28/22 SCALE: AS NOTED JOB NO. 20083.14 PARTIAL SITE/ COMPOUND PLAN



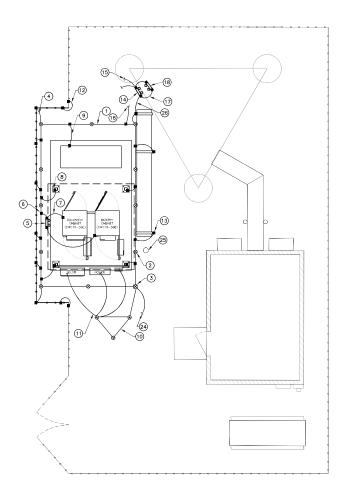


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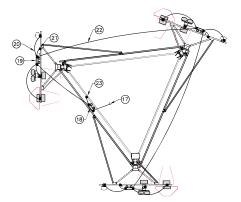
9 CAMPUS DRIVE MADISON, CT 06443

DATE: 02/28/22 SCALE: AS NOTED 02/28/22 JOB NO. 20083.14

> ELECTRICAL SCHEMATIC DIAGRAM







2 ELECTRICAL GROUNDING PLAN - ANTENNA SECTORS INDE

GROUNDING PLAN NOTES

- 1) #2 SOLID TINNED BCW GROUND RING (2'-0" IF POSSIBLE FROM OUTSIDE EDGE OF EQUIPMENT AREA) (TYP.).
- GROUNDING ROD (TYP.) PER DETAIL.
 GROUNDING ROD WITH ACCESS (TYP.) PER DETAIL.
- CONNECT FENCE TO EQUIPMENT GROUNDING RING PER FENCE DETAILS (TYP.)
- 5 EQUIPMENT GROUND BAR.
 6 BOND GROUND BAR TO GROUND RING TYP
- BOND EQUIPMENT CABINET(S) TO GROUND RING TYP. PER MANUFACTURERS SPECIFICATIONS
- BOND EQUIPMENT CANOPY TO GROUND RING TYPICAL EACH POST
- BOND GENERATOR TO GROUND RING PER MANUFACTURER REQUIREMENTS.
- (10) GROUNDING TRIAD. BOND TO GROUND RING.
 (11) MAIN SERVICE GROUNDING ELECTRODE CONDUCTOR.
- BOND NEW SECTION OF FENCE TO EXISTING SECTION OF FENCE TYP.
- (13) ICE BRIDGE POST AND COVER. BOND EACH SECTION AND SUPPORT TO GROUND RING
- (4) LOWER TOWER MOUNTED GROUND BAR.
- BOND GROUND BAR TO EXISTING TOWER GROUND RING TYP. 2 PLACES. CONTRACTOR TO VERIFY LOCATION IN FIELD
- $\ensuremath{\fbox{16}}$ Bond equipment ground ring to existing tower ground ring with \$\#2\$ awg BCW
- BOND UPPER TOWER MOUNTED GROUND BAR TO LOWER TOWER MOUNTED GROUND BAR (2 GROUND LEADS)
- (18) UPPER TOWER MOUNTED GROUND BAR (19) SECTOR GROUND BAR TYP.
- 20 BOND ANTENNA MOUNTING PIPES TO SECTOR GROUND BAR. (TYPICAL)
- 2) BOND SECTOR GROUND TO SECTOR FRAME STEEL TYP.
- 22) ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.
- 23) BOND UPPER TOWER MOUNTED GROUND BAR TO TOWER STEEL
- BOND EQUIPMENT GROUND RING TO EXISTING COMPOUND GROUND RING.
- 25) EXISTING GROUND ROD WITH ACCESS TO REMAIN
- (26) BOND LOWER TOWER MOUNTED GROUND BAR TO ICE-BRIDGE POST

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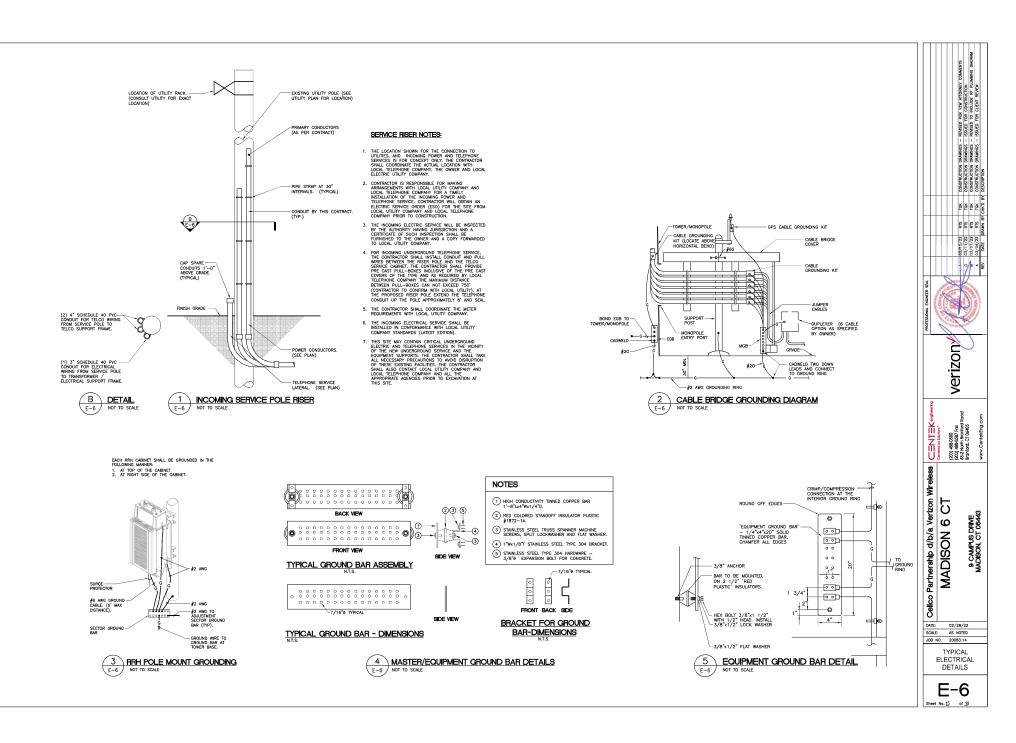
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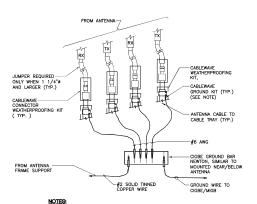
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Partnership d/b/a Verizon Wir MADISON 6 CT

DATE: 02/28/22 SCALE: AS NOTED JOB NO. 20083.14

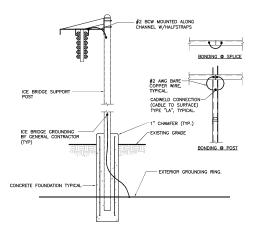
ELECTRICAL GROUNDING PLANS



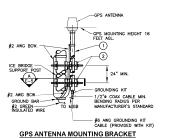


 DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE

1 CONNECTION OF GROUND WIRES TO GROUND BAR NOT TO SCALE



2 ICE BRIDGE BONDING DETAIL



BILL OF MATERIALS				
ITEM	DESCRIPTION	QUANTITY		
1	2-1/2"ø SCH. 40 x 8'-0" LG. MAX SS OR GALV. PIPE	1		
2	UNIVERSAL CLAMP SET.	2		



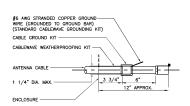
NOTES

- THE ELEVATION AND LOCATION OF THE GPS ANTENNA SHALL BE IN ACCORDANCE WITH THE FINAL RF REPORT.
- IN ACCORDANCE WITH tHE FINAL TO NEUTVIL.

 2 THE GPS ANTENNA MOINT IS DESCRIBED TO FASTEN TO A
 STANDARD 2-1/2' DIMMETER, SCHEDULE 40, GALVANIZED STEEL
 OR STANLESS STEEL PIPE. THE PIPE MISH THE TE HEREAGED
 AT THE ANTENNA MOUNT END. THE PIPE SHALL BE CUT TO THE
 REQUIRED LIGHTING MINIMAN OF 24 INCHESS SINKS A FANNO OR
 PERPENDICULAR CUT. A HACK SAW SHALL NOT BE USED. THE
 CUT PIPE EN SHALL BE DESIRERED AND SWOOTH IN ORDER TO
 SEA, AGAINST THE REOFRENE GASKET ATTACHED TO THE
 ANTENNA MOUNT.

3 GPS GROUNDING/MOUNTING BRACKET DETAIL

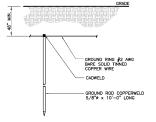
NOT TO SCALE



NOTES:

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

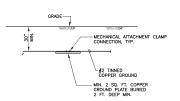
4 ANTENNA CABLE GROUNDING DETAIL



NOTES

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

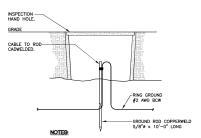




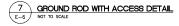
NOTES:

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





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



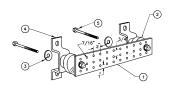
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					PER VZW ATTORNEY	FOR CONSTRUCTION	TO INCLUDE RF PLU	FOR CLIENT REVEW	

MADISON 6 CT
9 CAMPUS DRIVE
MADISON, CT 06443

DATE: 02/28/22
SCALE: AS NOTED
JOB NO. 20083.14

TYPICAL ELECTRICAL DETAILS

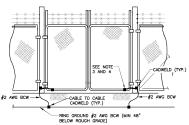
E-7



NOTES

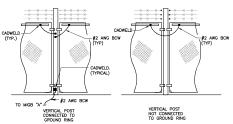
- TINNED COPPER GROUND BAR, 1/4" x 4" x 20", NEWTON INSTRUMENT CO. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION.
- INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061-4.
- 5/8" LOCK WASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8.
- WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A-6056.
- 5/8-11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





NOTES:

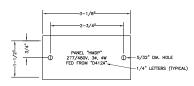
- THE #2 AWG, BCW, FROM THE RING GROUND SHALL BE CADWELDED TO THE POST, ABOVE GRADE.
- BOND EACH HORIZONTAL POLE/BRACE TO EACH OTHER AND TO EACH VERTICAL POLE BONDED TO THE EXTERIOR GROUND RING.
- GATE JUMPER SHALL BE #4/O AWG WELDING CABLE OR FLEXIBLE COPPER BRAID BURNDY TYPE B WITH SLEEVES ON EACH END DESIGNED FOR EXOTHERMIC WELDING.
- GATE JUMPER SHALL BE INSTALLED SO THAT IT WILL NOT BE SUBJECTED TO DAMAGING STRAIN WHEN GATE IS FULLY OPEN IN EITHER DIRECTION.
- 2 FENCE GATE GROUNDING
 E-8 NOT TO SCALE



NOTES

- 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.
- BOND EACH HORIZONTAL POLE / BRACE TO EACH OTHER AND TO EACH VERTICAL POST THAT IS BONDED TO THE EXTERIOR GROUND RING.

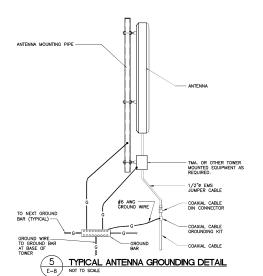
GROUND-STD. DETAIL FENCE GROUNDING NOT TO SCALE

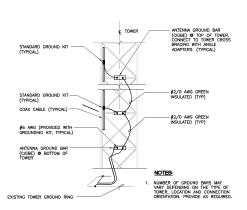


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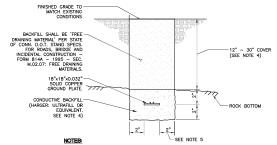
- REFER TO SPECIFICATIONS FOR ADDITIONAL NAMEPLATE REQUIREMENTS.
- NAMEPLATE TO BE 1/16" WHITE PLASTIC WITH BLACK CENTER LAMINATION. FACE TO BE WHITE, ENGRAVED LETTERS TO BE BLACK.
- SECURE NAMEPLATE TO SURFACES WITH (2) FLAT HEAD BRASS SCREWS.

4 DETAIL OF TYPICAL NAMEPLATE NOT TO SCALE









BACKFILLING.

BACKFILLING.

- MAINTAIN MIN. 2'-0" LINEAR CLEARANCE BETWEEN BACKFILL AND THE FOLLOWING: FOUNDATION, UNDERGROUND PIPING/CONDUIT, UNDERGROUND SERVICES. IN THE CLEARANCE AREAS, USE EARTH BACKFILL INSTEAD.
- 3. EXERCISE HANDLING AND USE PRECAUTION OF BACKFILL MATERIAL PER MFR'S REQUIREMENTS.
- FOR LOCATIONS WHERE ROCK BOTTOM DEPTH IS LESS THAN 12" CONDUCTIVE CONCRETE SHALL BE USED INSTEAD OF CONDUCTIVE BACKFILL.
- 5. PROVIDE MIN 2" CLEARANCE ON ALL SIDES OF GROUND PLATE.

GROUND PLATE TRENCH/BACKFILL DETAIL (SHALLOW TOPSOIL)

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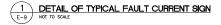
> TYPICAL ELECTRICAL DETAILS

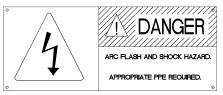
E-8



NOTES:

- REFER TO SPECIFICATIONS FOR FOR ADDITIONAL NAMEPLATE REQUIREMENTS.
- PROVIDE WARNING LABEL ON ALL SERVICE EQUIPMENT IN ACCORDANCE WITH CURRENT NEC REQUIREMENTS.
- PROVIDE FAULT SHORT CIRCUIT AND COORDINATION STUDY TO ENSURE COMPLIANCE WITH NEC REQUIREMENTS.

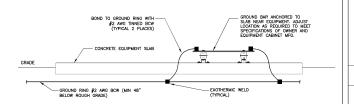




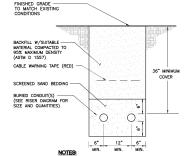
NOTES

- REFER TO SPECIFICATIONS FOR FOR ADDITIONAL NAMEPLATE REQUIREMENTS.
- PROVIDE WARNING LABEL ON ALL SWITCHBOARDS, DISTRIBUTION PANELS, PANELBOARDS IN ACCORDANCE WITH NEC REQUIREMENTS.

DETAIL OF TYPICAL FLASH PROTECTION WARNING SIGN E-9 NOT TO SCALE

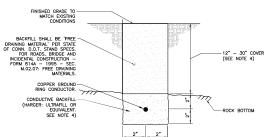


3 GROUNDING AND BONDING AT CONCRETE SLAB



- 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 MARENIA, LOOSE DEBRIS OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION.
- WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.
- WHERE SHALLOW BEDROCK IS ENCOUNTERED BETWEEN UTILITY SOURCE AND SERVICE EQUIPMENT, COORDINATE WITH UTILITY COMPANY FOR BURIAL DEPTH REQUIREMENTS.
- COORDINATE WITH ELECTRICAL ENGINEER WHERE SHALLOW BEDROCK IS ENCOUNTERED BETWEEN SERVICE EQUIPMENT AND EQUIPMENT SHELTER.

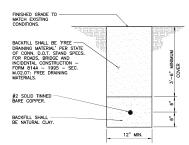
TYPICAL ELECTRICAL TRENCH DETAIL E-9 / NOT TO SCALE



ENGINEER SHALL INSPECT PLACEMENT OF EGR CONDUCTOR PRIOR TO BACKFILLING.

- MAINTAIN MIN. 2'-O" LINEAR CLEARANCE BETWEEN BACKFILL AND THE FOLLOWING: FOUNDATION, UNDERGROUND PIPING/CONDUIT, UNDERGROUND SERVICES. IN THE CLEARANCE AREAS, USE EARTH BACKFILL INSTEAD.
- EXERCISE HANDLING AND USE PRECAUTION OF BACKFILL MATERIAL PER MFR'S REQUIREMENTS.
- FOR LOCATIONS WHERE ROCK BOTTOM DEPTH IS LESS THAN 12" CONDUCTIVE CONCRETE SHALL BE USED INSTEAD OF CONDUCTIVE BACKFILL.

EGR TRENCH/BACKFILL DETAIL (SHALLOW TOPSOIL)



NOTES:

- ENGINEER SHALL INSPECT PLACEMENT OF EGR CONDUCTOR PRIOR TO BACKFILLING.
- MAINTAIN MIN. 2'-0" LINEAR CLEARANCE BETWEEN NATURAL CLAY BACKFILL AND THE FOLLOWING: FOUNDATION, UNDERGROUND PIPING/CONDUIT, UNDERGROUND SERVICES, IN THE CLEARANCE AREAS, USE EARTH BACKFILL INSTEAD.
- EXERCISE HANDLING AND USE PRECAUTION OF BACKFILL MATERIAL PER MFR'S REQUIREMENTS.



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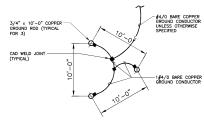
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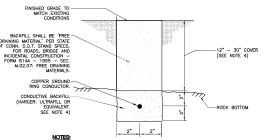
> **TYPICAL** ELECTRICAL DETAILS

E-9



GROUND TRIAD DETAIL

NOT TO SCALE



ELECTRICAL SPECIFICATIONS

- A. WORK SHALL INCLUDE ALL LABOR, EQUIPMENT AND SERVICES REQUIRED TO COMPLETE (MAKE READY FOR OPERATION) ALL THE ELECTRICAL WORK INCLUDING, BUT NOT LIMITED
- INSTALL 200A, 240/120V, 1P, 3 WIRE ELECTRIC SERVICE WITH REVENUE METER AND 200A MAIN CIRCUIT BREAKER FOR OWNER AND ASSOCIATED DISTRIBUTION EQUIPMENT (AS REQUIRED BY UTILITY CO.)
- 2. NEW SITE TELEPHONE SERVICE AS SPECIFIED BY TELEPHONE COMPANY
- 3. GENERATOR/TRANSFER SWITCH.
- FEEDERS AND BRANCH CIRCUIT WIRING TO PANELS, RECEPTACLES, EQUIPMENT, LIGHTING FIXTURES, ETC. AS INDICATED OR NOTED ON PLANS.
- 5. CELLULAR SITE ALARMS, ASSOCIATED WIRING AND DEVICES.
- CELLULAR GROUNDING SYSTEMS, CONSISTING OF ANTENNA GROUNDING, INTERIOR GROUNDING RING, GROUND BARS, ETC.
- 7. FURNISH AND INSTALL 3/4" PLYWOOD BACKBOARD OF SIZE INDICATED ON DRAWINGS FOR MOUNTING OF POWER/SERVICE EQUIPMENT AND TELEPHONE/ALARM EQUIPMENT. BACKBOARDS SHALL BE PAINTED WITH TWO (2) COATS OF SEMI-GLOSS GRAY FIRE RETARDANT PAINT.
- FIELD MEASURE EXISTING ELECTRICAL SERVICES TO CONFIRM AVAILABLE EXISTING POWER.
- 9. COORDINATE ALL WORK SHOWN, ON THESE PLANS WITH LOCAL UTILITY COMPANIES.
- B. LOCAL UTILITY COMPANIES SHALL PROVIDE THE FOLLOWING:
- TELEPHONE CABLES.
- 2. SHUTDOWN OF SERVICE (COORDINATE WITH OWNER).
- 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 POPTION OF THE WORK AND SHALL PROVIDE AND INSTALL ALL ITEMS REQUIRED, BUT NOT PROVIDED BY UTILITY COMPANY.
- ELECTRICAL CONTRACTOR SHALL COORDINATE ELECTRICAL INSTALLATION WITH ELECTRIC UTILITY CO., PRIOR TO INSTALLATION.
- E. 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 COORDINATION OF THE ENTIRE ELECTRICAL 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.
- H. DRAWINGS INICIATE GENERAL ARRANGEMENT OF MORE NACLUEED IN CONTRACTS.
 CONTRACTORS SHALL WITHOUT PERM CHARGE. MAY MORPOSTONIS OF THE MOVIL OF
 THE MORE TO PROCENT COMPLICE WITH WORK OF OTHER TRADES AND FOR THE PROPER
 INSTALLATION OF WORK. CHECK ALL DRAWINGS AND WST DOB SITE OF 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 DRAWNOS, ENGINEERING DATA SHEETS, MAINTENANCE AND OPERATING INSTRUCTION MANUALS FOR ALL STSTEMS AND THEIR RESPECTIVE SCUMPMENT, HESSE MANUALS SHALL BE INSERTED IN WINL COVERED 3-RING BINDERS AND TRANSED OVER TO OWNER'S REPRESENTATIVE ONE (1) WEST PROOF TO FIAM, 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
- 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.
- 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 CONTINEOUS RESPONSIBILITY TO CORDINATE WITH APPROPRIATE MONIMOUALS TO OBTAIN ALL SUCH SPECIFICATIONS AND REQUIREMENTS. MOTHING CONTAINED IN, OR OMITTED FROM, THESE DOCUMENTS SHALL RELIEVE CONTRICTOR FROM THIS GOBLICATION.

- 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 RETURNICE	APPLICATION	MIN. BURIAL DEPTH (PER NEC TABLE 300.5) 25				
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 INTERGRIUND CONDUCT INSTALLED LINEER ROADS, HIGHWAYS, DRIVEWAYS, PARKING LOTS, SHALL HAVE MINIMUM DEPTH OF 24*. ³ WHERE SOLID ROCK PREVENTS COMPLIANCE WITH MINIMUM COVER DEPTHS, VIRING SHALL BE INSTALLED IN PERMITTED RACEVAY FOR DIRECT BURIAL. THE RACEVAY SHALL BE COVERED BY A MINIMUM OF 2' OF CONCRETE EXTENDING DOWN TO ROCK.

SECTION 16114

- A. CABLE TRAY SHALL BE SOLID SIDE BAR, 18" WIDE (NEWTON INSTRUMENT COMPANY, INC.). TRAY SHALL BE INSTALLED AS SHOWN ON CONTRACT DOCUMENTS.
- B. CROSSWISE RUNS SHALL BE COORDINATED WITH THE SPECIFIC EQUIPMENT THE TRAY SHALL SERVE.
- C. ALL PROTRUDING CABLE TRAY SUPPORT RODS SHALL BE FILED SMOOTH WITH NO SHARP EDGES. ALL SUPPORT RODS SHALL BE CAD-PLATED FOR RUST RESISTANCE AND A MINIMUM 1/2* DIAMETER.

SECTION 16123

A LL CORDUCTIONS SHALL BE TIPE THAN (INT. APPLICATION) AND SHAME (SOT. APPLICATION), 75
DEGREE C, GO VOLT INSULATION, 50FT AMHABLED STRANGED CORPER, 81 ANN AND SAMALER
SHALL BE SPUCED USING ACCEPTABLE SOLDERLESS PRESSURE CONNECTIONS, 86 ANN AND LANGES
SHALL BE SEVENUED USING COMPRESSION SPIT—BOTT TIPE CONNECTIONS, 912 ANN SHALL BE TIPE
BRANCH CRICIAT CONDUCTION STEELS, CONDUCTIONS SHALL BE COLOR CODED FOR CONSISTENT
PHASE IDENTIFICATION.

	120/208/240V	277/480V
LINE	COLOR	COLOR
A	BLACK	BROWN
В	RED	ORANGE
С	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

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

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.
- 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 MID NON-FUSIBLE 607, HEAVY DUTY DISCONNECT SWITCHES SHALL BE AS MANUFACTURED BY SOUNCE OF PROME FUSES AS CALLED FOR ON THE CONTRACT DAMINOS, MANUES, MANUES,

SECTION 16190

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

SECTION 16195

- LABELING AND IDENTIFICATION NOMENCLATURE FOR ELECTRICAL EQUIPMENT
- 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
- 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: "MOP-5", ETC.).
- F. PROVIDE A NAMEPLATE AT THE SERVICE EQUIPMENT INDICATING THE TYPE AND LOCATION OF THE ON SITE GENERATOR.

SECTION 16450

- A. ALL NON-CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUI 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:
 - 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. FRIME AND PAINT OVER TO PREVENT CORROSION.
- 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 FOUIPMENT GROUND BAR KIT(S).
- 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.
- EACH FEEDER OR BRANCH CIRCUIT SHALL HAVE EQUIPMENT GROUND CONDUCTOR(S) INSTALLED IN THE SAME RACEWAY(S).

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:

- GROUND BARS
 INTERIOR GROUND RING
 SETERIOR GROUNDING (WHERE REQUIRED DUE TO MEASURED AC RESISTANCE GREATER
- THAN SPECIFIED).

 4. ANTENNA GROUND CONNECTIONS AND PLATES.
- F. CONTRACTOR, AFTER COMPLETION OF THE COMPLETE GROUNDING SYSTEM BUT PRIOR TO CONCEALMENT/BURBL, OF SAME, SHALL NOTIFY OWNER'S PROJECT ENGINEER WHO WILL HAVE A DESION ENGINEER VIST 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.

- 1.01. DISTRIBUTION EQUIPMENT
- A. REFER TO CONTRACT DRAWINGS FOR DETAILS AND SCHEDULES.

SECTION 16477

- 1.01. FUSES
- A TUSES SHALL BE NONERBENNES TYPE AS MANUFACTURED BY "BUSSAIM" OR APPROVED EDUAL PRESS ANTO TO 1/10 MAPPER UP 10 SOM MAPPERS SHALL BE SOUNDEST TO BUSSAIM TYPE [JPA-IRK (2507) IL. CLASS RKI, LOW FPAK, DUAL ELEMENT, THE-DELAY FUSES, FUSES SHALL HAVE SPARATE SHORT CROUT AND OVERLOOD ELEMENTS AND HAVE AN INTERRUPTING RATING OF 200 KAC. UPON COMPLETION OF WORK, PROVIDE ONE SPARE STO FUSES FOR EACH TYPE INSTALL OF

SECTION 16620

(SUPPLIED BY OWNER, INSTALLED BY CONTRACTOR)

A. REFER TO CONTRACT DRAWINGS FOR DETAILS AND SCHEDULES.

SECTION 16960

1.01. TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

- CONTRACTOR SHALL RETAIN THE SERVICES OF A LOCAL INDEPENDENT ELECTRICAL TESTING FIRM (WITH MINIMUM OF 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:
- 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 REQUISED UPON COMPETION OF WORK, SHALL BE MADE OF THE COMPRIGHT, THESE SHALL BE CONTINUED AND RISALITION TESTS TO DETERMINE THE COMPRISH OF THE COMPRISHON ALL FEEDERS AND BRANCH CIRCUIT WINNING (EXCEPT CLASS 2 SORAL CIRCUITS) MUST BE TESTED FREE FROM SHOPT CIRCUIT AND GROUND FAULT CONDITIONS AT 5000 IN A RESCONDARY DRY AMBIENT OF APPROXIMATELY TO DECREES F.
- B. CONTRICTOR SHALL PERFORM LIAD, PHASE BALANCIN, TESTS, CRELITS SHALL BE SO CONNECTED TO THE PARELBANGOS SUCH THAT THE NIVE DOLD IS DISTRIBUTED AS EQUALLY AS POSSIBLE BETWEEN EACH LOAD AND NEUTRAL. IDAS SHALL BE CONSIDERED AS A RESONALE, AND ACCEPTURE ALLOPANCE, BRANCH CINCLITS SHALL BE GALANCE SERVICE EQUIPMENT, RESONABLE LOAD TEST SHALL BE ARRANGED TO VERRIY LOAD SERVICE EQUIPMENT, RESONABLE LOAD TEST SHALL BE ARRANGED TO VERRIY LOAD SHALL BE ARRANGED TO VERRIY LOAD.
- 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 PROPINISTALED. ALL SUCH DETECTED WORK SHALL BE REPARED OR REPLACED AT NO ADDITIONAL DEPOSES TO THE OWNER AND THE TESTS SHALL BE REPEATED.

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ELECTRICAL SPECIFICATIONS



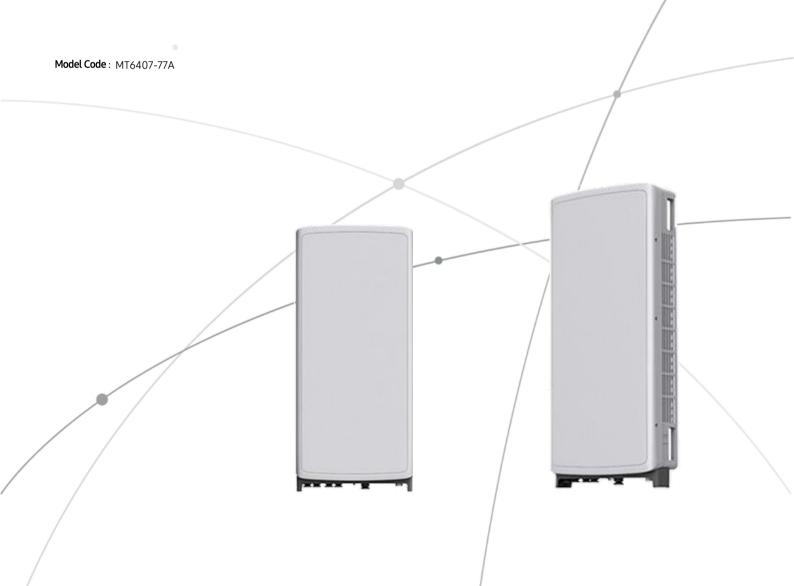
ATTACHMENT 4

SAMSUNG

SAMSUNG C-Band 64T64R Massive MIMO Radio

for High Capacity and Wide Coverage

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



Points of Differentiation

Wide Bandwidth

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

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

C-Band spectrum supported by Massive MIMO Radio



Enhanced Performance

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

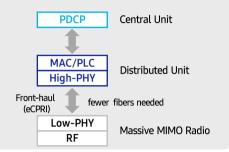
This helps operators reduce their CAPEX as they now need less products to cover the same area than before.

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



Future Proof Product

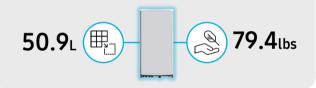
Samsung C-Band 64T64R Massive MIMO radio supports not only CPRI but also eCPRI as front-haul interface. It enables operators can cut down on OPEX/CAPEX by reducing front-haul bandwidth through low layer split and using ethernet based higher efficient line.



Well Matched Design

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

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





Technical Specifications

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



About Samsung Electronics Co., Ltd.

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

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

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MX06FRO660-03

NWAV™ X-Pol Hex-Port Antenna

X-Pol Hex-Port 6 ft 60° Fast Roll Off antenna with independent tilt on 700 & 850 MHz:

2 ports 698-798, 824-894 MHz and 4 ports 1695-2180 MHz

- Fast Roll Off (FRO™) azimuth beam pattern improves Intra- and Inter-cell SINR
- Compatible with dual band 700/850 MHz radios with independent low band EDT without external diplexers
- Fully integrated (iRETs) with independent RET control for low and high bands for ease of network optimization
- SON-Ready array spacing supports beamforming capabilities
- Suitable for LTE/CDMA/PCS/UMTS/GSM air interface technologies
- Integrated Smart Bias-Ts reduce leasing costs

Fast Roll-Off antennas increase data throughput without compromising coverage

The horizontal beam produced by Fast Roll-Off (FRO) technology increases the Signal to Interference & Noise Ratio (SINR) by eliminating overlap between sectors .

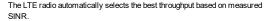
Non-FRO antenna

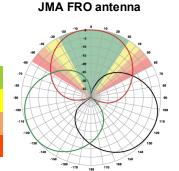
Large traditional antenna pattern overlap creates harmful interference.

JMA's FRO antenna pattern minimizes overlap, thereby minimizing interference.

0
-10 _0 10
-20 20
-30
40
10
-50 50
45
40
40
70
The state of the s
-80 80
The state of the s
-90 90
100
-100
-110
-120
-130
140
-150

LTE throughput	SINR	Speed (bps/Hz)	Speed increase	CQI
Excellent	>18	>4.5	333+%	8-10
Good	15-18	3.3-4.5	277%	6-7
Fair	10-15	2-3.3	160%	4-6
Poor	<10	<2	0%	1-3







Electrical specification (minimum/maximum)	Ports 1, 2		Ports 3, 4, 5, 6		
Frequency bands, MHz	698-798	824-894	1695-1880	1850-1990	1920-2180
Polarization	± 45° ± 45°				
Average gain over all tilts, dBi	14.4	14.0	17.6	18.0	18.2
Horizontal beamwidth (HBW), degrees	60.5	53.0	55.0	55.0	55.5
Front-to-back ratio, co-polar power @180°± 30°, dB	>24	>24.0	>25.0	>25.0	>25.0
X-Pol discrimination (CPR) at boresight, dB	>15.0	>14.2	>18	>18	>15
Sector power ratio, percent	<3.5	<3.0	<3.7	<3.8	<3.6
Vertical beamwidth (VBW), degrees ¹	13.1	11.8	6.0	5.5	5.5
Electrical downtilt (EDT) range, degrees	2-14	2-14	0-9		
First upper side lobe (USLS) suppression, dB ¹	≤-15.0	≤-16.5	≤-16.0	≤-16.0	≤-16.0
Cross-polar isolation, port-to-port, dB ¹	25	25	25	25	25
Max VSWR / return loss, dB	1.5:1 / -14.0 1.5:1 / -14.0				
Max passive intermodulation (PIM), 2x20W carrier, dBc	-153		-153		
Max input power per any port, watts	300		250		
Total composite power all ports, watts	1500				

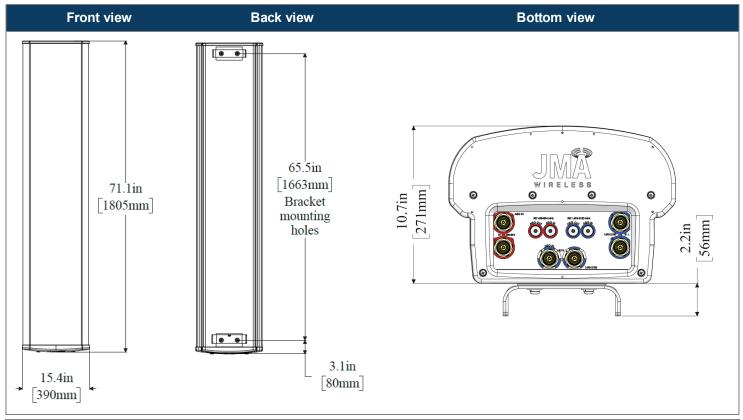
¹ Typical value over frequency and tilt



MX06FRO660-03

NWAV™ X-Pol Hex-Port Antenna

Mechanical specifications		
Dimensions height/width/depth, inches (mm)	71.3/ 15.4/ 10.7 (1811/ 392/ 273)	
Shipping dimensions length/width/height, inches (mm)	82/ 20/ 15 (2083/ 508/ 381)	
No. of RF input ports, connector type, and location	6 x 4.3-10 female, bottom	
RF connector torque	96 lbf·in (10.85 N·m or 8 lbf·ft)	
Net antenna weight, lb (kg)	60 (27.0)	
Shipping weight, lb (kg)	90 (41.0)	
Antenna mounting and downtilt kit included with antenna	91900318	
Net weight of the mounting and downtilt kit, lb (kg)	18 (8.18)	
Range of mechanical up/down tilt	-2° to 14°	
Rated wind survival speed, mph (km/h)	150 (241)	
Frontal, lateral, and rear wind loading @ 150 km/h, lbf (N)	154 (685), 73 (325), 158 (703)	
Equivalent flat plate @ 100 mph and Cd=2, sq ft	2.6	



Ordering information			
Antenna model	Description		
MX06FRO660-03 6F X-Pol HEX FRO 60° independent tilt 700/850 RET, 4.3-10 & SBT			
Optional accessories			
AISG cables	M/F cables for AISG connections		
PCU-1000 RET controller	Stand-alone controller for RET control and configurations		



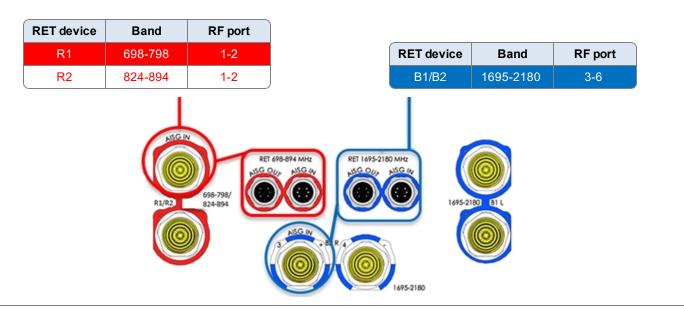
MX06FRO660-03

NWAV™ X-Pol Hex-Port Antenna

Remote electrical tilt (RET 1000) information		
RET location	Integrated into antenna	
RET interface connector type	8-pin AISG connector per IEC 60130-9	
RET connector torque	Min 0.5 N⋅m to max 1.0 N⋅m (hand pressure & finger tight)	
RET interface connector quantity	2 pairs of AISG male/female connectors	
RET interface connector location	Bottom of the antenna	
Total no. of internal RETs (low bands)	2	
Total no. of internal RETs (high bands)	1	
RET input operating voltage, vdc	10-30	
RET max power consumption, idle state, W	≤ 2.0	
RET max power consumption, normal operating conditions, W	≤ 13.0	
RET communication protocol	AISG 2.0 / 3GPP	

RET and RF connector topology

Each RET device can be controlled either via the designated external AISG connector or RF port as shown below:

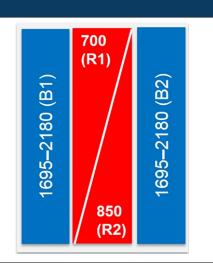


Array topology

3 sets of radiating arrays

R1/R2: 698-894 MHz B1: 1695-2180 MHz B2: 1695-2180 MHz

Band	RF port
1695-2180	3-4
698-894	1-2
1695-2180	5-6



SAMSUNG

Dual-Band Radio Unit 700/850MHz (B13/B5)

RFV01U-D2A

Samsung's RFV01U-D2A is a compact remote Radio Unit (RU) designed for deployments that require flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.



The RFV01U-D2A RU targets dual-band support across Band 13 (700MHz) and Band 5 (850MHz), making it an ideal product for broad coverage footprints across multiple common low-end, long-range frequencies.

The RU handles all Radio Frequency (RF) processing in a single, compact unit, and is designed to interface via CPRI with Samsung's CDU baseband offerings, in both distributed-and central-RAN configurations.

In addition to its minimal footprint and ease of installation, the RU is also designed to reduce cost of ownership through its integrated spectrum analyzer, which allows for remote RF monitoring, greatly reducing the need for on-site maintenance visits.

Features and Benefits

- Dual-band support for broad frequency coverage
- Minimal footprint reduces site costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability
- Convection cooled, silent operation

Key Technical Specifications

Duplex Type: FDD Operating Frequencies:

B13: DL(746-756MHz)/UL(777-787MHz) B5: DL(869-894MHz)/UL(824-849MHz) Instantaneous Bandwidth: 10MHz(B13) + 25MHz(B5)

RF Chain: 4T4R/2T4R/2T2R Output Power: Total 320W DU-RU Interface: CPRI (10Gbps) Dimensions: 380 x 380 x 207mm (29.9L)

Weight: 31.9kg Input Power: -48V DC

Operating Temp.: -40 - 55°(w/o solar load)

Cooling: Natural convection

SAMSUNG

Dual-Band Radio Unit AWS/PCS (B66/B2)

RFV01U-D1A

Samsung's RFV01U-D1A is a compact remote Radio Unit (RU) designed for deployments that require flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.



The RFV01U-D1A RU targets dual-band support across Band 66 (AWS) and Band 2 (PCS), making it an ideal product for broad coverage footprints across multiple common mid-range frequencies.

The RU handles all Radio Frequency (RF) processing in a single, compact unit, and is designed to interface via CPRI with Samsung's CDU baseband offerings, in both distributed-and central-RAN configurations.

In addition to its minimal footprint and ease of installation, the RU is also designed to reduce cost of ownership through its integrated spectrum analyzer, which allows for remote RF monitoring, greatly reducing the need for on-site maintenance visits.

Features and Benefits

- Dual-band support for broad frequency coverage
- Minimal footprint reduces site costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability
- Convection cooled, silent operation
- Built-in Broadcast Auxiliary Services (BAS) filter ensures compliant AWS operation without impacting footprint

Key Technical Specifications

Duplex Type: FDD Operating Frequencies:

B66: DL(2,110-2,180MHz)/UL(1,710-1,780MHz) B2: DL(1,930-1,990MHz)/UL(1,850-1,910MHz)

Instantaneous Bandwidth:

70MHz(B66) + 60MHz(B2)

RF Chain: 4T4R/2T4R/2T2R Output Power: Total 320W DU-RU Interface: CPRI (10Gbps)

Dimensions: 380 x 380 x 255mm (36.8L)

Weight: 38.3kg

Input Power: -48V DC

Operating Temp.: -40 - 55°(w/o solar load)

Cooling: Natural convection

[CBRS] Clip-on Antenna Specifications

VzW accepted IP45 in FLD, but IP55 is Samsung Spec.

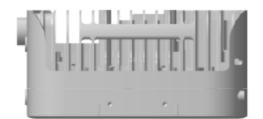


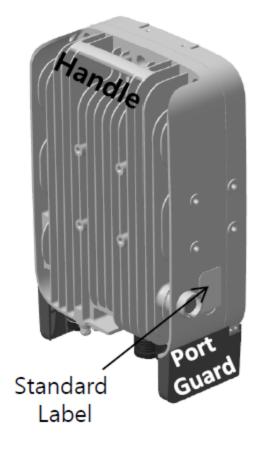
Items	Clip-on Antenna, BASTA**	
Antenna Gain	12.5 ± 0.5 dBi (Max 13 dBi)	
Horizontal BW (-3dB)	65° ± 5°	
Vertical BW (-3dB)	17° ±3°	
Electrical Tilt	8° (fixed) $\pm 2^{\circ}$	
Front-to-Back Ratio	> 25 dB	
Port-to-Port Tracking	< 3 dB	
VSWR	< 1.5	
Isolation	> 25 dB	
Ingress Protection	IP55	
Size	220(W)×313(H)×34.3(D) mm (*) (8.7 x 12.3 x 1.4 inch.)	
Weight	< 2.0 kg [Typ. 1.3 kg]	
It is required that the radio should be weatherproofed properly with JMA WPS Boot with external antenna or with Weatherproof Boot for clip-on antennas.		

Antenna includes integrated cable with connector * Design is subject to minor change

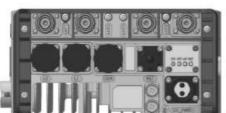
^{**} Ant. spec. follows NGMN recommendations on Base Station Antenna Standards (BASTA). For example, 'mean ± tolerance of 86.6%' is applied to double-sided specification of statistical RF parameters.

[CBRS RRH] Spec.









Current Size: 216 x 307 x 105.5 mm (6.99L) (8.5 x 12.1 x 4.1 inch., excluding Port Guard)

Design is subject to minor change

Item	Specification	
Band	Band 48 (3.5 GHz)	
Frequency	3550~3700 MHz	
IBW	150 MHz	
OBW	80 MHz	
# of Carriers	5/10/15/20 MHz x 4 carriers	
RF Chain	4TX / 4RX	
RF Output Power	4 path x 5 W (Total: 20 W = 43 dBm)	
& EIRP	(EIRP: 47 dBm / 10 MHz)	
RX Sensitivity	Typical: -101.5 dBm @ 1 Rx (3GPP 36.104, Wide Area)	
Modulation	256-QAM support (1024-QAM with 1~2dB power back-off)	
	-48 VDC (-38 to -57 VDC, 1 SKU),	
Input Power	with clip-on AC-DC converter (Option)	
Power Consumption	About 160 Watt @ 100% RF load, typical conditions	
Volume	Under 7L (w/o Antenna), Under 9.6L (with antenna)	
Weight	Under 8.0 kg (18.64 lb) (w/o Antenna), Under 10.5 Kg (with ant.)	
Operating Temperature	-40°C (-40°F) ~ 55°C (131°F) (W/o solar load)	
Cooling	Natural convection	
Universal Engineers	3GPP 36.104 Category A	
Unwanted Emission	[B48] : FCC 47 CFR 96.41 e)	
Optic Interface	20km, 2 ports (9.8Gbps x 2), SFP, single mode, duplex or Bi-Di	
CPRI Cascade	Not supported	
# of Antenna Port	4	
External Alarm (UDA)	4	
RET	AISG 2.2	
TMA & built-in Bias-T I//F and PIM cancellation	Not supported	
	Pole, wall, tower, back to back, side by side (for external ant),	
Mounting Options	3 RRH with Clip-on Antenna on the pole	
Antonna Tyna	Integrated (Clip-on) antenna (Option),	
Antenna Type	External antenna (Option)	
NB-IoT	Not Supported (HW Resource reserved	
NBIOI	for 1 Guard Band NB-IoT per LTE carrier)	
Spectrum Analyzer	TX/RX Support	
External Alarm (UDA)	4	
5G NR	Support with S/W upgrade	
XRAN	Support with S/W upgrade	



208-600 V

Model: 30CCL

Gas



EPA-Certified for Stationary Emergency Applications

Ratings Range

 60 Hz

 Standby:
 kW
 30

 kVA
 30–38



The Kohler® Advantage

High Quality Power

Kohler generators provide advanced voltage and frequency regulation along with ultra-low levels of harmonic distortion for excellent generator power quality to protect your valuable electronics.

• Extraordinary Reliability

Kohler is known for extraordinary reliability and performance and backs that up with a premium five-year or 2000 hour limited warranty.

All-Aluminum Sound Enclosure
 Durable aluminum sound-attenuating enclosure.

Generator Set Ratings

				Natura 130°C Standby	Rise	LP (130°C Standby	Rise
Alternator	Voltage	Ph	Hz	kW/kVA	Amps	kW/kVA	Amps
	120/208	3	60	30/38	106	30/38	106
	127/220	3	60	30/38	100	30/38	100
	120/240	3	60	30/38	92	30/38	92
4D0.0	120/240	1	60	30/30	125	30/30	125
4D8.3	139/240	3	60	30/38	92	30/38	92
	220/380	3	60	30/38	58	30/38	58
	277/480	3	60	30/38	46	30/38	46
	347/600	3	60	30/38	37	30/38	37
	120/208	3	60	30/38	106	30/38	106
	127/220	3	60	30/38	100	30/38	100
	120/240	3	60	30/38	92	30/38	92
4P7BX	120/240	1	60	30/30	125	30/30	125
	139/240	3	60	30/38	92	30/38	92
	220/380	3	60	30/38	58	30/38	58
	277/480	3	60	30/38	46	30/38	46
4E8.3	120/240	1	60	30/30	125	30/30	125
4Q7BX	120/240	1	60	30/30	125	30/30	125

Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The generator set accepts rated load in one step.
- A five-year/2000 hour limited warranty covers all generator set systems and components. A five-year extended comprehensive limited warranty is also available.
- Engine Features
 - Powerful and reliable 2.2 L turbocharged liquidcooled engine
 - Electronic engine management system.
 - Simple field conversion between natural gas and LPG fuels while maintaining emission certification.
- Innovative Cooling System
 - Electronically controlled fan speeds minimize generator set sound signature.
- Alternator features:
 - Kohler's wound field excitation system with its unique PowerBoost™ design delivers great voltage response and short-circuit capability.
 - The unique Fast-Response® X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM)-excited alternator.
 - The brushless, rotating-field alternator has broadrange reconnectability.
- Kohler designed controller for one-source system integration and remote communication. See Controller on page 3.
- Certifications
 - The generator set engine is certified by the Environmental Protection Agency (EPA) to conform to the New Source Performance Standard (NSPS) for stationary spark-ignited emissions.
 - UL 2200/cUL listing is available.
 - The generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
 - CSA certification is available.
 - Accepted by the Massachusetts Board of Registration of Plumbers and Gas Fitters.
- Approved for stationary standby applications in locations served by a reliable utility source.

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor. Standby Ratings: The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. Obtain technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Alternator Specifications

-		
Specifications		Alternator
Manufacturer		Kohler
Exciter type		Brushless, Wound-Field
Leads: quantity	, type	
4D		12, Reconnectable
4E		4, 110-120/220-240 V
4PX		12, Reconnectable
4QX		4, 110-120/220-240 V
Voltage regulate	or	Solid State, Volts/Hz
Insulation:		NEMA MG1
Material		Class H
Temperatur	e rise	130°C, Standby
Bearing: quanti	ty, type	1, Sealed
Coupling		Flexible Disc
Amortisseur wir	ndings	Full
Voltage regulati	ion, no-load to full-load	Controller Dependent
One-step load a	acceptance	100% of Rating
Unbalanced load capability		100% of Rated Standby
		Current
Peak motor sta	•	(35% dip for voltages below)
480 V	4D8.3 (12 lead)	120
240 V	4E8.3 (4 lead)	74
480 V	4P7BX (12 lead)	180
240 V	4Q7BX (4 lead)	113

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Windings are vacuum-impregnated with epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.

Application Data

Engine

Engine Specifications	
Manufacturer	Kohler
Engine: model, type	KG2204T, 2.2 L, 4-Cycle
	Turbocharged
Cylinder arrangement	In-line 4
Displacement, L (cu. in.)	2.2 (134.25)
Bore and stroke, mm (in.)	91 x 86 (3.5 x 3.4)
Compression ratio	10.5:1
Piston speed, m/min. (ft./min.)	340 (1016)
Main bearings: quantity, type	5, plain alloy steel
Rated rpm	1800
Max power at rated RPM, kW (HP)	
LPG	47.8 (64.1)
Natural Gas	47.6 (63.9)
Cylinder head material	Cast Iron
Piston type and material	High Silicon Aluminum
Crankshaft material	Nodular Iron
Valve (exhaust) material	Forged Steel
Governor type	Electronic
Frequency regulation, no-load to full-load	Isochronous
Frequency regulation, steady state	±1.0%
Frequency	Fixed
Air cleaner type, all models	Dry

Engine Electrical

Engine Electrical System	
Ignition system	Electronic
Battery charging alternator:	
Ground (negative/positive)	Negative
Volts (DC)	14
Ampere rating	90
Starter motor rated voltage (DC)	12
Battery, recommended cold cranking amps (CCA):	
Qty., rating for -18°C (0°F)	One, 630
Battery voltage (DC)	12
Battery group size	24

Exhaust

Exhaust System	
Exhaust manifold type	Dry
Exhaust temperature at rated kW, dry exhaust, °C (°F)	610 (1130)
Maximum allowable back pressure, kPa (in. Hg)	7.5 (2.2)

Fuel

Fuel System		
Final times		
Fuel type	Natural G	as or LPG
Fuel supply line inlet	1 N	PTF
Natural gas fuel supply pressure, kPa		
(in. H ₂ O)	1.24-2.	74 (5-11)
LPG vapor withdrawal fuel supply		
pressure, kPa (in. H ₂ O)	1.24-2.	74 (5-11)
Fuel Composition Limits *	Nat. Gas	LP Gas
Methane, % by volume	90 min.	_
Ethane, % by volume	4.0 max.	
Propane, % by volume	1.0 max.	85 min.
Propene, % by volume	0.1 max.	5.0 max.
C ₄ and higher, % by volume	0.3 max.	2.5 max.
Sulfur, ppm mass	25 ו	max.
Lower heating value, MJ/m ³ (Btu/ft ³), min.		
Methane, % by volume Ethane, % by volume Propane, % by volume	90 min. 4.0 max. 1.0 max.	85 min.

* Fuels with other compositions may be acceptable. If your fuel is outside the listed specifications, contact your local distributor for further analysis and advice.

Application Data

Lubrication

Lubricating System	
Туре	Full Pressure
Oil pan capacity, L (qt.) §	4.2 (4.4)
Oil added during oil change (on	
average), L (qt.) §	3.3 (3.5)
Oil pan capacity with filter, L (qt.) §	8.5 (9.0)
Oil filter: quantity, type §	1, Cartridge

§ Kohler recommends the use of Kohler Genuine oil and filters.

Cooling

Radiator System	
Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	2.65 (0.7)
Radiator system capacity, including	
engine, L (gal.)	13.2 (3.5)
Engine jacket water flow, Lpm (gpm)	62 (16.4)
Heat rejected to cooling water at rated	
kW, dry exhaust, kW (Btu/min.)	22.5 (1280)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	qty. 3 @ 406 (16)
Fan power requirements (powered by	
engine battery charging alternator)	12 VDC, 18 amps each

Operation Requirements

Air Requirements	
Radiator-cooled cooling air,	
m ³ /min. (scfm)‡	51 (1800)
Combustion air, m ³ /min. (cfm)	1.6 (57)
Air over engine m ³ /min. (cfm)	25 (883)
† Air density = $1.20 \text{ kg/m}^3 (0.075 \text{ lbm/ft}^3)$	

Fuel Consumption ‡		
Natural Gas, m ³ /hr. (cf	fh) at % load	Standby Ratings
100%		11.9 (421)
75%		10.0 (355)
50%		8.2 (289)
25%		6.3 (223)
0%		4.5 (158)
LP Gas, m ³ /hr. (cfh) at	% load	Standby Ratings
100%		4.6 (164)
75%		3.7 (131)
50%		2.8 (99)
25%		1.9 (66)
0%		1.0 (34)
‡ Nominal fuel rating:	Natural gas, 37	7 MJ/m ³ (1000 Btu/ft. ³)

LP vapor, 93 MJ/m³ (2500 Btu/ft.³)

LP vapor conversion factors:

 $8.58 \text{ ft.}^3 = 1 \text{ lb.}$ $0.535 \text{ m}^3 = 1 \text{ kg.}$ $36.39 \text{ ft.}^3 = 1 \text{ gal.}$

Controller



APM402 Controller

Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.

- Digital display and menu control provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or serial configuration
- Controller supports Modbus® protocol
- Integrated hybrid voltage regulator with ±0.5% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-161 for additional controller features and accessories.

Modbus® is a registered trademark of Schneider Electric.

Sound Enclosure

- Durable aluminum, sound-attenuating enclosure with quiet operation of 57 dB(A) log average @ 7 m (23 ft.) at no load.
- Internally mounted silencer.
- Fade-, scratch, and corrosion-resistant Kohler® Power Armor™ automotive-grade textured finish.
- Acoustic insulation that meets UL 94 HF1 flammability classification and repels moisture absorption.



KOHLER CO., Kohler, Wisconsin 53044 USA Phone 920-457-4441, Fax 920-459-1646 For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444 KOHLERPower.com

Standard Features

- Alternator Protection
- Aluminum Sound Enclosure with Enclosed Silencer
- Battery Rack and Cables
- Flexible Fuel Line
- Gas Fuel System (includes fuel mixer, electronic secondary gas regulator, gas solenoid valve, and flexible fuel line between the engine and the skid-mounted fuel system components)
- Integral Vibration Isolation
- Local Emergency Stop Switch
- Low Fuel Pressure Switch (with NFPA fuel module)
- Operation and Installation Literature

☐ Battery Charger, 10 Amp w/Alarms

Temperature Compensation for 10 Amp Battery Charger

Battery Heater

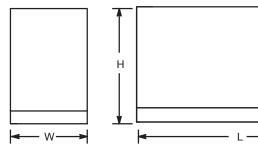
	standard 5- rear Limited Warranty
Αν	ailable Options
	Approvals and Listings CSA Certified UL 2200 Listing
00000000	Controller 15-Relay Dry Contact Board Communication Products Input/Output Module (2 inputs, 5 outputs) Lockable Emergency Stop (lockout/tagout) Low Fuel Pressure Warning Switch Manual Key Switch Manual Speed Adjust Remote Annunciator Panel Remote Emergency Stop Run Relay
	Enclosure Accessories Enclosure Doors for 291 kph (181 mph) Wind load
	Starting Aids* Block Heater, 110-120 V Block Heater, 220-240 V
- * (t	Oil Pan Heater* Oil Pan Heater, 110-120 V Oil Pan Heater, 190-240 V One block heater or oil pan heater is required for ambient emperatures below 0°C (32°F). At temperatures below -18°C (0°F) installation of both heaters is required.
	Electrical System Alternator Strip Heater Battery Battery Charger, 6 Amp

	Miscellaneous Certified Test Report Engine Fluids Added Maintenance Kit (filters, spark plugs, oil) Rated Power Factor Testing
	Literature General Maintenance NFPA 110 Overhaul Production
	Warranty Optional Extended 5-Year/2000 Hour Comprehensive Limited Warranty
	Other Options
5	
4	
7	
5	

Dimensions and Weights

Overall Size, L x W x H, mm (in.): Weight, with engine fluids, kg (lb.):

2280 x 830 x 1182 (89.8 x 32.7 x 46.5) 635 (1432)



NOTE: This drawing is provided for reference only and should not be used for planning. Contact your local distributor for more detailed information.

DISTRIBUTED BY:		

ATTACHMENT 5



Centered on Solutions™

Structural Analysis Report

150' Existing Lattice Tower

Proposed Verizon Wireless Antenna Installation

Site Ref: Madison 6

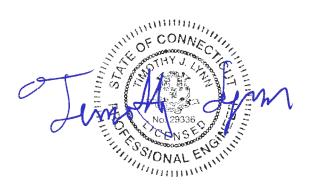
9 Campus Drive Madison, CT

CENTEK Project No. 20083.14

Date: May 13, 2021

Rev 1: February 25, 2022

Max Stress Ratio 83%



Prepared for:

Verizon Wireless 20 Alexander Drive Wallingford, CT 06492

Structural Analysis - 150-ft Lattice Tower Verizon Antenna Installation – Madison 6 Madison, CT Rev 1 ~ February 25, 2022

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- INTRODUCTION
- ANTENNA AND APPURTENANCE SUMMARY
- PRIMARY ASSUMPTIONS USED IN THE ANALYSIS
- ANALYSIS
- TOWER LOADING
- TOWER CAPACITY
- FOUNDATION AND ANCHORS
- CONCLUSION

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Structural Analysis - 150-ft Lattice Tower Verizon Antenna Installation – Madison 6 Madison, CT Rev 1 ~ February 25, 2022

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 Madison, Connecticut.

The host tower is a 150-ft, three legged, lattice tower originally designed and manufactured by Valmont Eng. File No. 319430 dated 1/13/2017. 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, visual verification from grade conducted by Centek personnel on 12/15/2020 and a Verizon RF data sheet.

The tower consists of eight (8) vertical sections consisting of pipe legs conforming to ASTM A572 Gr. 50 and steel angle lateral bracing conforming to ASTM A36. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 5-ft 0-in at the top and 17-ft at the bottom.

Antenna and Appurtenance Summary

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

- Town of Madison (Existing):
 <u>Antennas</u>: One (1) Sinclair SC323-HF2LDF omni-directional antenna mounted on a
 6-ft sidearm with an elevation of 140-ft above the existing tower base.
 <u>Coax Cables</u>: One (1) 7/8" diameter cable running on a face of the tower.
- CT State Police (Existing):
 <u>Antennas</u>: One (1) Sinclair SE414 antenna mounted on a 6-ft sidearm with an elevation of 138-ft above the existing tower base.

 <u>Coax Cables</u>: One (1) 1-5/8" diameter cable running on a face of the tower
- Town of Madison (Existing):
 Antennas: One (1) RFI BA40-41 dipole antenna mounted on a 6-ft sidearm with an elevation of 135-ft above the existing tower base.

 Coax Cables: One (1) 7/8" diameter cable running on a face of the tower.
- CT State Police (Existing):
 Antennas: Two (2) Sinclair SE4192 antennas and one (1) TTA mounted on a 12-ft V-Frame with an elevation of 132-ft above the existing tower base.
 Coax Cables: One (1) 1-5/8" and three (3) 1/2" diameter cables running on a face of the tower
- Town of Madison (Existing):
 <u>Antennas</u>: One (1) RFI CSA40-67 dipole antenna mounted on a 6-ft sidearm with an elevation of 105-ft above the existing tower base.
 <u>Coax Cables</u>: One (1) 7/8" diameter cable running on a face of the tower.
- Town of Madison (Existing):
 Antennas: One (1) Sinclair SC323-HF2LDF omni-directional antenna mounted on a 6-ft sidearm with an elevation of 105-ft above the existing tower base.
 Coax Cables: One (1) 7/8" diameter cable running on a face of the tower.

Structural Analysis - 150-ft Lattice Tower Verizon Antenna Installation – Madison 6 Madison, CT Rev 1 ~ February 25, 2022

- Town of Madison (Existing):
 <u>Antennas</u>: Two (2) Sinclair SC381-HF3LDF omni-directional antennas mounted on two (2) 6-ft sidearms with an elevation of 80-ft above the existing tower base.
 Coax Cables: Two (2) 7/8" diameter cables running on a face of the tower.
- Town of Madison (Existing):
 <u>Antennas</u>: Two (2) RFI COL54-160 omni-directional antennas mounted on two (2) 6-ft sidearms with an elevation of 80-ft above the existing tower base.
 Coax Cables: Two (2) 7/8" diameter cables running on a face of the tower.
- Town of Madison (Existing):
 <u>Antennas</u>: One (1) Sinclair SG101-SFXSNM ground plane antenna mounted on a 6 ft sidearm with an elevation of 70-ft above the existing tower base.
 <u>Coax Cables</u>: One (1) 7/8" diameter cable running on a face of the tower.
- VERIZON (Proposed): <u>Antennas</u>: Six (6) JMA MX06FRO660 panel antennas, three (3) Samsung CBRS panel antennas/RRHs, three (3) Samsung MT6407-77A (AKA VZS01) panel antennas, three (3) B2/B66A remote radio heads, three (3) B5/B13 remote radio heads and one (1) OVP box mounted on three (3) V-Frames (SitePro VFA12-HD) with a RAD center elevation of 120-ft above the existing tower base. <u>Coax Cables:</u> Two (2) hybrid cables running on a face of the tower.

Structural Analysis - 150-ft Lattice Tower Verizon Antenna Installation – Madison 6 Madison, CT Rev 1 ~ February 25, 2022

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.

Structural Analysis - 150-ft Lattice Tower Verizon Antenna Installation – Madison 6 Madison, CT Rev 1 ~ February 25, 2022

<u>Analysis</u>

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-G-2005 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 N of the CSBC¹ and the wind speed data available in the TIA-222-G-2005 Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-G-2005, gravity loads of the tower structure and its components, and the application of 0.75" radial ice on the tower structure and its components.

Basic Wind	Madison; v = 108 mph (Vasd - Risk	[Appendix N of the 2018 CT
Speed:	Category III)	Building Code]

Load Cases: Load Case 1; 108 mph wind speed w/ no ice plus gravity load – used in

w/ no ice plus gravity load – used i calculation of tower stresses and rotation.

Load Case 2; 50 mph wind speed w/

0.75" radial ice plus gravity load – used in calculation of tower stresses.

[Annex B of TIA-222-G-2005]

[Appendix N of the 2018 CT

Building Code1

¹ The 2015 International Building Code as amended by the 2018 Connecticut State Building Code (CSBC).

Structural Analysis - 150-ft Lattice Tower Verizon Antenna Installation – Madison 6 Madison, CT Rev 1 ~ February 25, 2022

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Design flexural strength was determined based on section 4.7 and Table 4-8 of the TIA-222-G.

Calculated stresses were found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T5)	60'-0"-80'-0"	78.4%	PASS
Diagonal (T3)	100'-0"-120'-0"	83.2%	PASS

Foundation and Anchors

The existing foundation consists of a three (3) 3.5-ft \emptyset x 5.5-ft long reinforced concrete piers concentrically bearing on a 25-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 (8) 1.25" \emptyset , F1554 Grade 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	25 kips
Leg Compression	224 kips
Leg Tension	198 kips
Base Moment	3173 ft-kips
Base Shear	37 kips

The anchor bolts were found to be within allowable limits.

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	36.9%	PASS

Structural Analysis - 150-ft Lattice Tower Verizon Antenna Installation – Madison 6 Madison, CT Rev 1 ~ February 25, 2022

The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-G Section 9.4 FS ⁽¹⁾	Proposed Loading (FS) ⁽¹⁾	Result
Reinforced Concrete Pad and Piers	Overturning	1.0	1.43	PASS

Note 1: FS denotes Factor of Safety

<u>Conclusion</u>

This analysis shows that the subject tower <u>is adequate</u> 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

Structural Analysis - 150-ft Lattice Tower Verizon Antenna Installation – Madison 6 Madison, CT Rev 1 ~ February 25, 2022

<u>Standard Conditions for Furnishing of</u> <u>Professional Engineering Services on</u> 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 uncorroded 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.

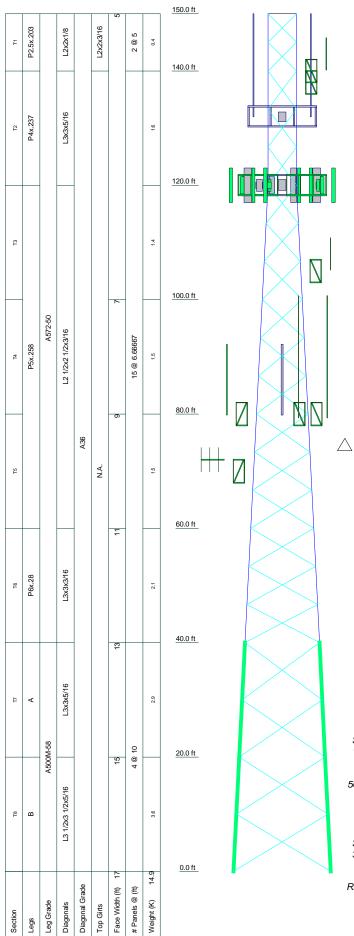
Structural Analysis - 150-ft Lattice Tower Verizon Antenna Installation – Madison 6 Madison, CT Rev 1 ~ February 25, 2022

<u>GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM</u>

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 selfsupporting 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.



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
SC323-HF2LDF (Town of Madison)	140	CBRS Antenna/RRH (Verizon)	120
Rohn 6' Side-Arm(1) (Town of Madison)	140	SitePro VFA12-HD (Verizon)	120
SE-414 (CT State Police)	138	SitePro VFA12-HD (Verizon)	120
Rohn 6' Side-Arm(1) (CT State Police)	138	SitePro VFA12-HD (Verizon)	120
BA40-41 (Town of Madison)	135	MX06FRO660 (Verizon)	120
Rohn 6' Side-Arm(1) (Town of Madison)	135	MX06FRO660 (Verizon)	120
SE4192 (CT State Police)	132	MX06FRO660 (Verizon)	120
SE4192 (CT State Police)	132	VZS01 (Verizon)	120
Tower Top Amplifier (CT State Police)	132	CBRS Antenna/RRH (Verizon)	120
12' V-Frame (CT State Police)	132	CSA40-67 (Town of Madison)	105
MX06FRO660 (Verizon)	120	Rohn 6' Side-Arm(1) (Town of Madison)	105
MX06FRO660 (Verizon)	120	SC323-HF2LDF (Town of Madison)	105
VZS01 (Verizon)	120	Rohn 6' Side-Arm(1) (Town of Madison)	105
CBRS Antenna/RRH (Verizon)	120	COL54-160 (Town of Madison)	80
MX06FRO660 (Verizon)	120	Rohn 6' Side-Arm(1) (Town of Madison)	80
B2/B66A RRH (Verizon)	120	SC381HF3LDF (Town of Madison)	80
B2/B66A RRH (Verizon)	120	Rohn 6' Side-Arm(1) (Town of Madison)	80
B2/B66A RRH (Verizon)	120	COL54-160 (Town of Madison)	80
B5/B13 RRH (Verizon)	120	Rohn 6' Side-Arm(1) (Town of Madison)	80
B5/B13 RRH (Verizon)	120	SC381HF3LDF (Town of Madison)	80
B5/B13 RRH (Verizon)	120	Rohn 6' Side-Arm(1) (Town of Madison)	80
RC2DC-3315-PF-48 (Verizon)	120	SG101-SFXSNM (CT State Police)	70
VZS01 (Verizon)	120	Rohn 6' Side-Arm(1) (CT State Police)	70

SYMBOL LIST

MARK	SIZE	MARK	SIZE
Α	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	В	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)

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-G Standard.
- Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
- Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
- 4. Deflections are based upon a 60 mph wind.
- 5. Tower Structure Class III.
- 6. Topographic Category 1 with Crest Height of 0.00 ft 7. TOWER RATING: 83.2%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:

DOWN: 224 K SHEAR: 25 K

UPLIFT: -198 K SHEAR: 22 K

AXIAL 82 K MOMENT SHEAR 10 K 887 kip-ft

TORQUE 8 kip-ft 50 mph WIND - 0.7500 in ICE

AXIAL 26 K MOMENT SHEAR 3173 kip-ft

TORQUE 23 kip-ft REACTIONS - 101 mph WIND

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

^{ob:} 20083.14 - Madison 6				
Project: 150' Lattice To	wer - Madison, C1	7		
	Drawn by: TJL	App'd:		
Code: TIA-222-G	Date: 02/25/22	Scale: NTS		
Path:	•	Dwg No. F-		

Feed Line Plan

App Out Face

Truss-Leg

App In Face

__ Flat ____

Round _

White the factor of the police C

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Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

² 20083.14 - Madison 6					
oject: 150' Lattice Tow					
^{ient:} Verizon	Drawn by: TJL	App'd:			
ode: TIA-222-G	Date: 05/13/21	Scale: NTS			
ath:		Dwg No			

Round ______ Flat _____ App In Face _____ App Out Face _____ Truss Leg

Face C Face A Face B 150.00 150.00 140.00 140.00 138.00 138.00 135.00 135.00 (2) 7/8 (Town of Madison) 120.00 120.00 120.00 120.00 105.00 105.00 100.00 100.00 (4) 7/8 (Town of Madison) (8) 7/8 (Town of Madison) 80.00 (2) 1 5/8 (CT State Police) (3) 1/2 (CT State Police) 70.00 (2) HYBRIFLEX 1-5/8" (Verizon) 60.00 (9) 7/8 (Town of Madison) 40.00 20.00 0.00

Elevation (ft)

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^{ob:} 20083.14 - Madison 6						
Project: 150' Lattice Tower	- Madison, CT					
	Drawn by: TJL	App'd:				
Code: TIA-222-G		Scale: NTS				
Path: J. Uobsi 2008 300, WM 14 Madison 6 CT/04 Structural/Bad	up Documentation/ERI Files/150-ft Valmont Lattice Tower en	Dwg No. E-				

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Project		Date
	150' Lattice Tower - Madison, CT	12:16:24 02/25/22
Client		Designed by
	Verizon	TJL

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 5.00 ft at the top and 17.00 ft at the base.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

Basic wind speed of 101 mph.

Structure Class III.

Exposure Category C.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 0.7500 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

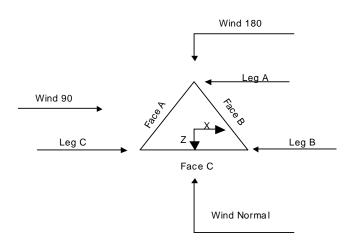
- Use ASCE 10 X-Brace Ly Rules
- √ Calculate Redundant Bracing Forces Ignore Redundant Members in FEA
- √ SR Leg Bolts Resist Compression
- √ All Leg Panels Have Same Allowable Offset Girt At Foundation
- ✓ Consider Feed Line Torque Include Angle Block Shear Check
 Use TIA-222-G Bracing Resist. Exemption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

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	150' Lattice Tower - Madison, CT	12:16:24 02/25/22
Client	Verizon	Designed by TJL



Triangular Tower

Tower	Section	Geometry

Tower	Tower	Assembly	Description	Section	Number	Section
Section	Elevation	Database		Width	of	Length
					Sections	
	ft			ft		ft
T1	150.00-140.00			5.00	1	10.00
T2	140.00-120.00			5.00	1	20.00
T3	120.00-100.00			5.00	1	20.00
T4	100.00-80.00			7.00	1	20.00
T5	80.00-60.00			9.00	1	20.00
T6	60.00-40.00			11.00	1	20.00
T7	40.00-20.00			13.00	1	20.00
T8	20.00-0.00			15.00	1	20.00

Tower	Tower	Diagonal	Bracing	Has	Has	Top Girt	Bottom Girt
Section	Elevation	Spacing	Type	K Brace	Horizontals	Offset	Offset
				End			
	ft	ft		Panels		in	in
T1	150.00-140.00	5.00	X Brace	No	Yes	0.0000	0.0000
T2	140.00-120.00	6.67	X Brace	No	No	0.0000	0.0000
T3	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000
T4	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T5	80.00-60.00	6.67	X Brace	No	No	0.0000	0.0000
T6	60.00-40.00	6.67	X Brace	No	No	0.0000	0.0000
T7	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000

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Job		Page
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Project		Date
	150' Lattice Tower - Madison, CT	12:16:24 02/25/22
Client	Verizon	Designed by TJL

Tower	Tower	Diagonal	Bracing	Has	Has	Top Girt	Bottom Girt
Section	Elevation	Spacing	Type	K Brace	Horizontals	Offset	Offset
				End			
	ft	ft		Panels		in	in
Т8	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower	Section	Geometry	/ ((cont'd))
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Tower	Leg	Leg	Leg	Diagonal	Diagonal	Diagonal
Elevation	Type	Size	Grade	Type	Size	Grade
ft						
T1 150.00-140.00	Pipe	P2.5x.203	A572-50	Single Angle	L2x2x1/8	A36
			(50 ksi)			(36 ksi)
T2 140.00-120.00	Pipe	P4x.237	A572-50	Single Angle	L3x3x5/16	A36
			(50 ksi)			(36 ksi)
T3 120.00-100.00	Pipe	P5x.258	A572-50	Single Angle	L2 1/2x2 1/2x3/16	A36
	_		(50 ksi)			(36 ksi)
T4 100.00-80.00	Pipe	P5x.258	A572-50	Single Angle	L2 1/2x2 1/2x3/16	A36
	_		(50 ksi)			(36 ksi)
T5 80.00-60.00	Pipe	P5x.258	A572-50	Single Angle	L2 1/2x2 1/2x3/16	A36
	_		(50 ksi)			(36 ksi)
T6 60.00-40.00	Pipe	P6x.28	A572-50	Single Angle	L3x3x3/16	A36
	_		(50 ksi)			(36 ksi)
T7 40.00-20.00	Truss Leg	#12ZG - 1.50" - 1.00" conn.	A500M-58	Single Angle	L3x3x5/16	A36
	_	(Pirod 207629)	(58 ksi)	-		(36 ksi)
T8 20.00-0.00	Truss Leg	#12ZG - 1.75" - 1.00" conn.	A500M-58	Single Angle	L3 1/2x3 1/2x5/16	A36
	_	(Pirod 195557)	(58 ksi)			(36 ksi)

Tower Section	Geometry	(cont'd)
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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	Single Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower	Gusset	Gusset	Gusset Grade	Adjust. Factor	Adjust.	Weight Mult.	Double Angle	Double Angle	Double Angle
Elevation	Area	Thickness		A_f	Factor		Stitch Bolt	Stitch Bolt	Stitch Bolt
	(per face)				A_r		Spacing	Spacing	Spacing
							Diagonals	Horizontals	Redundants
ft	ft^2	in					in	in	in
T1	0.00	0.0000	A36	1	1	1	30.0000	30.0000	36.0000
150.00-140.00			(36 ksi)						
T2	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
140.00-120.00			(36 ksi)						
T3	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
120.00-100.00			(36 ksi)						
T4	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
100.00-80.00			(36 ksi)						

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Tower	Gusset	Gusset	Gusset Grade	Adjust. Factor	Adjust.	Weight Mult.	Double Angle	Double Angle	Double Angle
Elevation	Area	Thickness		A_f	Factor		Stitch Bolt	Stitch Bolt	Stitch Bolt
	(per face)				A_r		Spacing	Spacing	Spacing
							Diagonals	Horizontals	Redundants
ft	ft ²	in					in	in	in
T5 80.00-60.00	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
			(36 ksi)						
T6 60.00-40.00	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
			(36 ksi)						
T7 40.00-20.00	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
			(36 ksi)						
T8 20.00-0.00	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
			(36 ksi)						

Tower Section Geometry (cont'd)

						K Fac	ctors ¹			
Tower Elevation	Calc K Single	Calc K Solid	Legs	X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
C	Angles	Rounds		X	X	X	X	X	X	X
ft				Y	Y	Y	Y	Y	Y	Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
150.00-140.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
Т6	Yes	Yes	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00	1 00	100	1	1	1	1	1	1	1	1
T8 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1
10 20.00-0.00	103	103	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.

			Truss-Leg	K Factors					
	Trus	s-Legs Used As Leg Me	mbers	Truss-Legs Used As Inner Members					
Tower	Leg	X	Z	Leg	X	Z			
Elevation	Panels	Brace	Brace	Panels	Brace	Brace			
ft		Diagonals	Diagonals		Diagonals	Diagonals			
T7	1	1	1	1	0.5	0.85			
40.00-20.00									
Γ8 20.00-0.00	1	1	1	1	0.5	0.85			

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Tower Section Geometry (cont'd)

Tower Elevation	Leg		Diagon	al	Top Gi	rt	Bottom	Girt	Mid	Girt	Long Hor	rizontal	Short Ho	rizontal
ft	Net Width	U	Net Width	U	Net Width	U	Net	U	Net	U	Net	U	Net	
	Deduct	Ü	Deduct	Ü	Deduct	Ü	Width	Ü	Width	Ü	Width	Ü	Width	Ü
	in		in		in		Deduct		Deduct		Deduct		Deduct	
							in		in		in		in	
T1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
150.00-140.00														
T2	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
140.00-120.00														
Т3	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
120.00-100.00														
T4	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
100.00-80.00														
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	Redund	ant	Redund	lant	Redund	lant	Redun	dant	Redundan	t Vertical	Redundo	ınt Hip	Redundo	ınt Hip
Elevation	Horizoi	ıtal	Diago	nal	Sub-Diag	gonal	Sub-Hor	izontal					Diago	onal
ft														
	Net Width	U	Net Width	U	Net Width	U	Net	U	Net	U	Net	U	Net	U
	Deduct		Deduct		Deduct		Width		Width		Width		Width	
	in		in		in		Deduct		Deduct		Deduct		Deduct	
							in		in		in		in	
T1	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
150.00-140.00														
T2	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
140.00-120.00														
T3	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
120.00-100.00														
T4	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
100.00-80.00														
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	Leg	Leg		Diagon	al	Top G	irt	Bottom (Girt	Mid Gi	irt	Long Hori	zontal	Short Hori	zontal
Elevation	Connection														
ft	Type														
		Bolt Size	No.	Bolt Size	No.	Bolt Size	No.	Bolt Size	No.						
		in		in		in		in		in		in		in	
T1	Flange	0.7500	4	0.7500	1	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0
150.00-140.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2	Flange	0.7500	6	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
140.00-120.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3	Flange	0.7500	8	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
120.00-100.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

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Tower	Leg	Leg		Diagor	ıal	Top G	irt	Bottom	Girt	Mid Gi	irt	Long Hori	zontal	Short Hort	izontal
Elevation ft	Connection Type														
ft	Туре	Bolt Size	No.	Bolt Size	No.	Bolt Size	No.	Bolt Size	No.						
		in		in		in		in		in		in		in	
T4	Flange	0.7500	8	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
100.00-80.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 80.00-60.00	Flange	0.7500	8	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T6 60.00-40.00	Flange	1.0000	6	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T7 40.00-20.00	Flange	1.0000	6	1.0000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T8 20.00-0.00	Flange	1.2500	6	1.0000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		F1554-105		A325N		A325N		A325N		A325X		A325N		A325X	

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or	Allow Shield	Exclude From	Component Type		Face Offset	Lateral Offset	#	# Per		Width or Diameter	Perimeter	Weight
	Leg		Torque		ft	in	(Frac FW)		Row	in	in	in	plf
			Calculation										
HYBRIFLEX	C	No	No	Ar (CaAa)	120.00 -	2.0000	0.47	2	1	1.9800	1.9800		1.90
1-5/8''					0.00								
(Verizon)													
7/8	C	No	No	Ar (CaAa)	70.00 - 0.00	0.0000	0.42	9	5	1.1100	1.1100		0.54
(Town of													
Madison)													
7/8	C	No	No	Ar (CaAa)	80.00 -	0.0000	0.42	8	4	1.1100	1.1100		0.54
(Town of					70.00								
Madison)													
7/8	C	No	No	Ar (CaAa)	105.00 -	0.0000	0.42	4	4	1.1100	1.1100		0.54
(Town of					80.00								
Madison)													
7/8	C	No	No	Ar (CaAa)	135.00 -	0.0000	0.42	2	2	1.1100	1.1100		0.54
(Town of					105.00								
Madison)													
1 5/8	C	No	No	Ar (CaAa)	138.00 -	0.0000	0.38	2	1	1.9800	1.9800		1.04
(CT State				` ,	0.00								
Police)													
1/2	C	No	No	Ar (CaAa)	138.00 -	6.0000	0.42	3	3	0.5800	0.5800		0.25
(CT State	_	2.70	0	(34114)	0.00	2.2000		-		2.2000	2.2000		0
Police)					2.00								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation	Face	A_R	A_F	C _A A _A In Face	C _A A _A Out Face	Weight
	ft		ft^2	ft^2	ft^2	ft^2	K
T1	150.00-140.00	A	0.000	0.000	0.000	0.000	0.00
		В	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	0.000	0.000	0.00
		В	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	13.590	0.000	0.07

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Tower	Tower	Face	A_R	A_F	$C_A A_A$	$C_A A_A$	Weight
Section	Elevation				In Face	Out Face	
	ft		ft^2	ft^2	ft ²	ft^2	K
T3	120.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		В	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	24.870	0.000	0.16
T4	100.00-80.00	A	0.000	0.000	0.000	0.000	0.00
		В	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	28.200	0.000	0.18
T5	80.00-60.00	A	0.000	0.000	0.000	0.000	0.00
		В	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	38.190	0.000	0.22
T6	60.00-40.00	A	0.000	0.000	0.000	0.000	0.00
		В	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	39.300	0.000	0.23
T7	40.00-20.00	A	0.000	0.000	0.000	0.000	0.00
		В	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	39.300	0.000	0.23
T8	20.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		В	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	39.300	0.000	0.23

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower	Tower	Face	Ice	A_R	A_F	$C_A A_A$	$C_A A_A$	Weight
Section	Elevation	or	Thickness			In Face	Out Face	
	ft	Leg	in	ft^2	ft ²	ft^2	ft^2	K
T1	150.00-140.00	A	2.174	0.000	0.000	0.000	0.000	0.00
		В		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	2.151	0.000	0.000	0.000	0.000	0.00
		В		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	64.145	0.000	0.86
T3	120.00-100.00	A	2.115	0.000	0.000	0.000	0.000	0.00
		В		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	106.643	0.000	1.52
T4	100.00-80.00	A	2.073	0.000	0.000	0.000	0.000	0.00
		В		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	112.770	0.000	1.62
T5	80.00-60.00	A	2.021	0.000	0.000	0.000	0.000	0.00
		В		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	116.369	0.000	1.83
T6	60.00-40.00	A	1.955	0.000	0.000	0.000	0.000	0.00
		В		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	116.945	0.000	1.80
T7	40.00-20.00	A	1.857	0.000	0.000	0.000	0.000	0.00
		В		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	114.281	0.000	1.71
T8	20.00-0.00	A	1.664	0.000	0.000	0.000	0.000	0.00
		В		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	109.007	0.000	1.52

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X	CP_Z
				Ice	Ice
	ft	in	in	in	in

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Section	Elevation	CP_X	CP_Z	CP_X	CP_Z
				Ice	Ice
	ft	in	in	in	in
T1	150.00-140.00	0.0000	0.0000	0.0000	0.0000
T2	140.00-120.00	-3.4870	3.2249	-6.8057	5.9814
T3	120.00-100.00	-7.1753	6.0964	-12.4625	10.2033
T4	100.00-80.00	-9.4438	7.7060	-16.7597	13.1761
T5	80.00-60.00	-13.5105	10.7912	-20.0334	15.5512
T6	60.00-40.00	-13.9270	11.0754	-21.6020	16.6011
T7	40.00-20.00	-15.0838	11.6645	-21.4148	16.0851
T8	20.00-0.00	-15.1685	11.7469	-22.4540	16.8263

Shielding Factor Ka

Tower	Feed Line	Description	Feed Line	K_a	K_a
Section	Record No.		Segment Elev.	No Ice	Ice
T2	5	7/8	120.00 -	0.6000	0.4988
			135.00		
T2	6	1 5/8	120.00 -	0.6000	0.4988
			138.00		
T2	7	1/2	120.00 -	0.6000	0.4988
			138.00		
Т3	1	HYBRIFLEX 1-5/8"	100.00 -	0.6000	0.5557
			120.00		
Т3	4	7/8	100.00 -	0.6000	0.5557
			105.00		
Т3	5	7/8	105.00 -	0.6000	0.5557
			120.00		
Т3	6	1 5/8	100.00 -	0.6000	0.5557
			120.00		
Т3	7	1/2	100.00 -	0.6000	0.5557
			120.00		
T4	1	HYBRIFLEX 1-5/8"	80.00 - 100.00	0.6000	
T4	4	7/8	80.00 - 100.00	0.6000	0.6000
T4	6	1 5/8	80.00 - 100.00	0.6000	0.6000
T4	7	1/2	80.00 - 100.00	0.6000	0.6000
T5	1	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	
T5	2	7/8	60.00 - 70.00	0.6000	0.6000
T5	3	7/8	70.00 - 80.00	0.6000	0.6000
T5	6	1 5/8	60.00 - 80.00	0.6000	0.6000
T5	7	1/2	60.00 - 80.00	0.6000	0.6000
T6	1	HYBRIFLEX 1-5/8"	40.00 - 60.00	0.6000	0.6000
T6	2	7/8	40.00 - 60.00	0.6000	0.6000
T6	6	1 5/8	40.00 - 60.00	0.6000	0.6000
T6	7	1/2	40.00 - 60.00	0.6000	0.6000
T7	1	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.6000
T7	2	7/8	20.00 - 40.00	0.6000	0.6000
T7	6	1 5/8	20.00 - 40.00	0.6000	
T7	7	1/2	20.00 - 40.00	0.6000	0.6000
T8	1	HYBRIFLEX 1-5/8"	0.00 - 20.00	0.6000	0.6000
Т8	2	7/8	0.00 - 20.00	0.6000	0.6000
Т8	6	1 5/8	0.00 - 20.00	0.6000	0.6000
Т8	7	1/2	0.00 - 20.00	0.6000	0.6000

Centek Engineering Inc. 63-2 North Branford Rd.

63-2 North Branjora Ka. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587

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Client	Verizon	Designed by TJL

Discrete Tower Loads

Description	Face or	Offset Type	Offsets: Horz	Azimuth Adjustment	Placement		C _A A _A Front	C _A A _A Side	Weigh
	Leg	Туре	Lateral	Айзинені			Troni	Sitte	
			Vert	0	C		ft ²	ft ²	v
			ft ft		ft		Jτ	Jτ	K
			ft						
SitePro VFA12-HD	A	From Leg	2.00	0.0000	120.00	No Ice	21.00	21.00	0.75
(Verizon)			0.00			1/2" Ice	25.00	25.00	0.90
	_	_	0.00			1" Ice	29.00	29.00	1.05
SitePro VFA12-HD	В	From Leg	2.00	0.0000	120.00	No Ice	21.00	21.00	0.75
(Verizon)			0.00			1/2" Ice 1" Ice	25.00 29.00	25.00 29.00	0.90 1.05
SitePro VFA12-HD	C	From Leg	2.00	0.0000	120.00	No Ice	21.00	21.00	0.75
(Verizon)	C	Trom Leg	0.00	0.0000	120.00	1/2" Ice	25.00	25.00	0.90
(v chizon)			0.00			1" Ice	29.00	29.00	1.05
MX06FRO660	A	From Leg	4.00	0.0000	120.00	No Ice	9.87	7.34	0.06
(Verizon)			-6.00			1/2" Ice	10.34	7.78	0.13
			0.00			1" Ice	10.82	8.24	0.20
VZS01	A	From Leg	4.00	0.0000	120.00	No Ice	4.71	1.84	0.00
(Verizon)			-2.00			1/2" Ice	5.00	2.06	0.03
CDDC 4 DDH			0.00	0.0000	120.00	1" Ice	5.29	2.29	0.06
CBRS Antenna/RRH	Α	From Leg	4.00	0.0000	120.00	No Ice	1.72	1.17	0.03
(Verizon)			2.00 0.00			1/2" Ice 1" Ice	1.93 2.14	1.44	0.05
MX06FRO660	A	From Leg	4.00	0.0000	120.00	No Ice	9.87	1.71 7.34	0.07
(Verizon)	А	110III Leg	6.00	0.0000	120.00	1/2" Ice	10.34	7.78	0.00
(VCIIZOII)			0.00			1" Ice	10.82	8.24	0.20
MX06FRO660	В	From Leg	4.00	0.0000	120.00	No Ice	9.87	7.34	0.06
(Verizon)			-6.00			1/2" Ice	10.34	7.78	0.13
,			0.00			1" Ice	10.82	8.24	0.20
VZS01	В	From Leg	4.00	0.0000	120.00	No Ice	4.71	1.84	0.00
(Verizon)			-2.00			1/2" Ice	5.00	2.06	0.03
	_	_	0.00			1" Ice	5.29	2.29	0.06
CBRS Antenna/RRH	В	From Leg	4.00	0.0000	120.00	No Ice	1.72	1.17	0.03
(Verizon)			2.00			1/2" Ice	1.93	1.44	0.05
MX06FRO660	В	From Leg	0.00 4.00	0.0000	120.00	1" Ice No Ice	2.14 9.87	1.71 7.34	0.07
(Verizon)	ь	110III Leg	6.00	0.0000	120.00	1/2" Ice	10.34	7.78	0.00
(VCIIZOII)			0.00			1" Ice	10.82	8.24	0.20
MX06FRO660	C	From Leg	4.00	0.0000	120.00	No Ice	9.87	7.34	0.06
(Verizon)			-6.00			1/2" Ice	10.34	7.78	0.13
,			0.00			1" Ice	10.82	8.24	0.20
VZS01	C	From Leg	4.00	0.0000	120.00	No Ice	4.71	1.84	0.00
(Verizon)			2.00			1/2" Ice	5.00	2.06	0.03
			0.00			1" Ice	5.29	2.29	0.06
CBRS Antenna/RRH	C	From Leg	4.00	0.0000	120.00	No Ice	1.72	1.17	0.03
(Verizon)			-2.00			1/2" Ice	1.93	1.44	0.05
MX06FRO660	C	From Leg	0.00 4.00	0.0000	120.00	1" Ice No Ice	2.14 9.87	1.71 7.34	0.07 0.06
(Verizon)	C	110III Leg	6.00	0.0000	120.00	1/2" Ice	10.34	7.78	0.00
(v Clizoli)			0.00			1" Ice	10.34	8.24	0.13
B2/B66A RRH	A	From Leg	2.00	0.0000	120.00	No Ice	2.54	1.61	0.06
(Verizon)			-4.00			1/2" Ice	2.75	1.79	0.08
,			0.00			1" Ice	2.97	1.98	0.10
B2/B66A RRH	В	From Leg	2.00	0.0000	120.00	No Ice	2.54	1.61	0.06
(Verizon)			-4.00			1/2" Ice	2.75	1.79	0.08
Da/Daza			0.00		100	1" Ice	2.97	1.98	0.10
B2/B66A RRH	C	From Leg	2.00	0.0000	120.00	No Ice	2.54	1.61	0.06

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(Verizon) B5/B13 RRH (Verizon) B5/B13 RRH (Verizon) B5/B13 RRH (Verizon) RC2DC-3315-PF-48 (Verizon)	Leg A B	From Leg	Lateral Vert ft ft ft -4.00 0.00	٥	ft		ft ²	2	
B5/B13 RRH (Verizon) B5/B13 RRH (Verizon) B5/B13 RRH (Verizon) RC2DC-3315-PF-48		From Leg	ft ft -4.00	0	ft		£2		
B5/B13 RRH (Verizon) B5/B13 RRH (Verizon) B5/B13 RRH (Verizon) RC2DC-3315-PF-48		From Leg	-4.00				Jι	ft ²	K
B5/B13 RRH (Verizon) B5/B13 RRH (Verizon) B5/B13 RRH (Verizon) RC2DC-3315-PF-48		From Leg							
(Verizon) B5/B13 RRH (Verizon) B5/B13 RRH (Verizon) RC2DC-3315-PF-48		From Leg	0.00			1/2" Ice	2.75	1.79	0.08
(Verizon) B5/B13 RRH (Verizon) B5/B13 RRH (Verizon) RC2DC-3315-PF-48		From Leg		0.0000	120.00	1" Ice	2.97	1.98	0.10
B5/B13 RRH (Verizon) B5/B13 RRH (Verizon) RC2DC-3315-PF-48	В		2.00	0.0000	120.00	No Ice	1.87	1.02	0.07
(Verizon) B5/B13 RRH (Verizon) RC2DC-3315-PF-48	В		-4.00 0.00			1/2" Ice 1" Ice	2.03 2.21	1.15 1.29	0.09
(Verizon) B5/B13 RRH (Verizon) RC2DC-3315-PF-48		From Leg	2.00	0.0000	120.00	No Ice	1.87	1.02	0.07
B5/B13 RRH (Verizon) RC2DC-3315-PF-48	-	Trom Leg	-4.00	0.0000	120.00	1/2" Ice	2.03	1.15	0.09
(Verizon) RC2DC-3315-PF-48			0.00			1" Ice	2.21	1.29	0.11
RC2DC-3315-PF-48	C	From Leg	2.00	0.0000	120.00	No Ice	1.87	1.02	0.07
			-4.00			1/2" Ice	2.03	1.15	0.09
			0.00			1" Ice	2.21	1.29	0.11
(Verizon)	Α	From Leg	2.00	0.0000	120.00	No Ice	3.01	1.96	0.03
			0.00			1/2" Ice	3.23	2.15	0.05
BA40-41	Δ.	From Log	0.00 6.00	0.0000	135.00	1" Ice No Ice	3.46 4.48	2.35 4.48	0.08
(Town of Madison)	A	From Leg	0.00	0.0000	155.00	1/2" Ice	4.48 7.66	4.48 7.66	0.03
(Town of Madison)			1.00			1" Ice	10.84	10.84	0.05
Rohn 6' Side-Arm(1)	A	From Leg	3.00	0.0000	135.00	No Ice	6.00	6.00	0.14
(Town of Madison)			0.00			1/2" Ice	8.50	8.50	0.21
,			0.00			1" Ice	11.00	11.00	0.28
SC323-HF2LDF	В	From Leg	6.00	0.0000	140.00	No Ice	1.13	1.13	0.01
(Town of Madison)			0.00			1/2" Ice	1.66	1.66	0.02
			3.00			1" Ice	2.01	2.01	0.03
Rohn 6' Side-Arm(1)	В	From Leg	3.00	0.0000	140.00	No Ice	6.00	6.00	0.14
(Town of Madison)			0.00			1/2" Ice	8.50	8.50	0.21
CSA40-67	A	From Leg	0.00 6.00	0.0000	105.00	1" Ice No Ice	11.00 15.00	11.00 15.00	0.28
(Town of Madison)	А	110III Leg	0.00	0.0000	105.00	1/2" Ice	26.00	26.00	0.03
(Town of Madison)			3.00			1" Ice	37.00	37.00	0.23
Rohn 6' Side-Arm(1)	Α	From Leg	3.00	0.0000	105.00	No Ice	6.00	6.00	0.14
(Town of Madison)		C	0.00			1/2" Ice	8.50	8.50	0.21
			0.00			1" Ice	11.00	11.00	0.28
SC323-HF2LDF	В	From Leg	6.00	0.0000	105.00	No Ice	1.13	1.13	0.01
(Town of Madison)			0.00			1/2" Ice	1.66	1.66	0.02
D 1 (10'1 A (1)	ъ	г т	3.00	0.0000	105.00	1" Ice	2.01	2.01	0.03
Rohn 6' Side-Arm(1) (Town of Madison)	В	From Leg	3.00 0.00	0.0000	105.00	No Ice 1/2" Ice	6.00 8.50	6.00 8.50	0.14
(Town of Madison)			0.00			1" Ice	11.00	11.00	0.28
SC381HF3LDF	A	From Leg	6.00	0.0000	80.00	No Ice	3.99	3.99	0.05
(Town of Madison)		205	0.00			1/2" Ice	6.84	6.84	0.09
,			6.00			1" Ice	7.86	7.86	0.13
Rohn 6' Side-Arm(1)	A	From Leg	3.00	0.0000	80.00	No Ice	6.00	6.00	0.14
(Town of Madison)			0.00			1/2" Ice	8.50	8.50	0.21
0.000444F04 D.F	-		0.00	0.0000	00.00	1" Ice	11.00	11.00	0.28
SC381HF3LDF	C	From Leg	6.00	0.0000	80.00	No Ice	3.99	3.99	0.05
(Town of Madison)			0.00			1/2" Ice 1" Ice	6.84	6.84	0.09
Rohn 6' Side-Arm(1)	С	From Leg	6.00 3.00	0.0000	80.00	No Ice	7.86 6.00	7.86 6.00	0.13 0.14
(Town of Madison)	C	110III Leg	0.00	0.0000	0U.UU	1/2" Ice	8.50	8.50	0.12
(10wii oi Mauisoii)			0.00			1" Ice	11.00	11.00	0.28
COL54-160	В	From Leg	1.00	0.0000	80.00	No Ice	6.40	6.40	0.05
(Town of Madison)		- 3	-5.00			1/2" Ice	8.57	8.57	0.09
,			10.00			1" Ice	10.75	10.75	0.15
Rohn 6' Side-Arm(1)	В	From Leg	0.00	0.0000	80.00	No Ice	6.00	6.00	0.14
(Town of Madison)			-3.00			1/2" Ice	8.50	8.50	0.21
COL54-160	В	From Leg	0.00 1.00	0.0000	80.00	1" Ice No Ice	11.00 6.40	11.00 6.40	0.28 0.05

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Client	Verizon	Designed by TJL

Description	Face or Leg	Offset Type	Offsets: Horz Lateral	Azimuth Adjustment	Placement		C _A A _A Front	C _A A _A Side	Weigh
			Vert	0			c.2	c.2	**
			ft	Ŭ	ft		ft^2	ft^2	K
			ft ft						
(Town of Madison)			5.00			1/2" Ice	8.57	8.57	0.09
(10.00			1" Ice	10.75	10.75	0.15
Rohn 6' Side-Arm(1)	В	From Leg	0.00	0.0000	80.00	No Ice	6.00	6.00	0.14
(Town of Madison)			3.00			1/2" Ice	8.50	8.50	0.21
(0.00			1" Ice	11.00	11.00	0.28
SG101-SFXSNM	C	From Leg	6.00	0.0000	70.00	No Ice	6.50	6.50	0.05
(CT State Police)		C	0.00			1/2" Ice	9.00	9.00	0.08
(2.00			1" Ice	11.50	11.50	0.11
Rohn 6' Side-Arm(1)	C	From Leg	3.00	0.0000	70.00	No Ice	6.00	6.00	0.14
(CT State Police)			0.00			1/2" Ice	8.50	8.50	0.21
(0.00			1" Ice	11.00	11.00	0.28
SE-414	В	From Leg	6.00	0.0000	138.00	No Ice	4.80	4.80	0.02
(CT State Police)		Č	0.00			1/2" Ice	5.70	5.70	0.03
,			2.00			1" Ice	6.60	6.60	0.03
Rohn 6' Side-Arm(1)	В	From Leg	3.00	0.0000	138.00	No Ice	6.00	6.00	0.14
(CT State Police)		C	0.00			1/2" Ice	8.50	8.50	0.21
,			0.00			1" Ice	11.00	11.00	0.28
SE4192	A	From Leg	6.00	0.0000	132.00	No Ice	8.70	25.50	0.06
(CT State Police)		C	-5.00			1/2" Ice	10.73	26.96	0.14
,			9.00			1" Ice	12.78	28.25	0.25
SE4192	A	From Leg	6.00	0.0000	132.00	No Ice	8.70	25.50	0.06
(CT State Police)		C	5.00			1/2" Ice	10.73	26.96	0.14
			9.00			1" Ice	12.78	28.25	0.25
Tower Top Amplifier	A	From Leg	6.00	0.0000	132.00	No Ice	2.67	1.03	0.04
(CT State Police)		Č	0.00			1/2" Ice	2.87	1.17	0.06
. ,			0.00			1" Ice	3.08	1.32	0.08
12' V-Frame	A	From Leg	3.00	0.0000	132.00	No Ice	9.22	12.97	0.30
(CT State Police)		Č	0.00			1/2" Ice	9.22	12.97	0.40
			0.00			1" Ice	9.22	12.97	0.50

Truss-Leg Properties

Section Designation	Area	Area Ice	Self Weight	Ice Weight	Equiv. Diameter	Equiv. Diameter Ice	Leg Area
	in^2	in^2	K	K	in	in	in^2
#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	2303.0530	6302.3435	0.55	1.32	7.9967	21.8831	5.3014
#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	2421.2670	6236.8943	0.68	1.02	8.4072	21.6559	7.2158

Tower Pressures - No Ice

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	Verizon	TJL

Section	z	K_Z	q_z	A_G	F	A_F	A_R	A_{leg}	Leg	$C_A A_A$	$C_A A_A$
Elevation					а				%	In	Out
					С					Face	Face
ft	ft		psf	ft^2	e	ft ²	ft ²	ft^2		ft^2	ft^2
T1	145.00	1.369	35	52.396	A	5.282	4.792	4.792	47.57	0.000	0.000
150.00-140.00					В	5.282	4.792		47.57	0.000	0.000
					C	5.282	4.792		47.57	0.000	0.000
T2	130.00	1.337	34	107.500	Α	11.563	15.000	15.000	56.47	0.000	0.000
140.00-120.00					В	11.563	15.000		56.47	0.000	0.000
					C	11.563	15.000		56.47	13.590	0.000
T3	110.00	1.291	33	129.283	Α	10.355	18.574	18.574	64.21	0.000	0.000
120.00-100.00					В	10.355	18.574		64.21	0.000	0.000
					C	10.355	18.574		64.21	24.870	0.000
T4	90.00	1.238	32	169.283	Α	12.271	18.574	18.574	60.22	0.000	0.000
100.00-80.00					В	12.271	18.574		60.22	0.000	0.000
					C	12.271	18.574		60.22	28.200	0.000
T5 80.00-60.00	70.00	1.174	30	209.283	Α	14.333	18.574	18.574	56.44	0.000	0.000
					В	14.333	18.574		56.44	0.000	0.000
					C	14.333	18.574		56.44	38.190	0.000
T6 60.00-40.00	50.00	1.094	28	251.055	Α	19.649	22.120	22.120	52.96	0.000	0.000
					В	19.649	22.120		52.96	0.000	0.000
					C	19.649	22.120		52.96	39.300	0.000
T7 40.00-20.00	30.00	0.982	25	302.528	Α	15.980	26.700	26.700	62.56	0.000	0.000
					В	15.980	26.700		62.56	0.000	0.000
					C	15.980	26.700		62.56	39.300	0.000
T8 20.00-0.00	10.00	0.85	22	342.945	Α	20.641	28.071	28.071	57.63	0.000	0.000
					В	20.641	28.071		57.63	0.000	0.000
					C	20.641	28.071		57.63	39.300	0.000

Tower Pressure - With Ice

 $G_H = 0.850$

Section	Z	K_Z	q_z	t_Z	A_G	F	A_F	A_R	A_{leg}	Leg	$C_A A_A$	$C_A A_A$
Elevation			_			a			_	%	In	Out
						c					Face	Face
ft	ft		psf	in	ft^2	e	ft^2	ft^2	ft ²		ft^2	ft^2
T1	145.00	1.369	7	2.1741	56.019	A	5.282	23.522	12.039	41.80	0.000	0.000
150.00-140.00						В	5.282	23.522		41.80	0.000	0.000
						C	5.282	23.522		41.80	0.000	0.000
T2	130.00	1.337	7	2.1505	114.668	A	11.563	45.914	29.337	51.04	0.000	0.000
140.00-120.00						В	11.563	45.914		51.04	0.000	0.000
						C	11.563	45.914		51.04	64.145	0.000
T3	110.00	1.291	7	2.1149	136.342	Α	10.355	50.216	32.697	53.98	0.000	0.000
120.00-100.00						В	10.355	50.216		53.98	0.000	0.000
						C	10.355	50.216		53.98	106.643	0.000
T4 100.00-80.00	90.00	1.238	7	2.0729	176.201	Α	12.271	52.765	32.416	49.84	0.000	0.000
						В	12.271	52.765		49.84	0.000	0.000
						C	12.271	52.765		49.84	112.770	0.000
T5 80.00-60.00	70.00	1.174	6	2.0214	216.030	Α	14.333	55.251	32.073	46.09	0.000	0.000
						В	14.333	55.251		46.09	0.000	0.000
						C	14.333	55.251		46.09	116.369	0.000
T6 60.00-40.00	50.00	1.094	6	1.9546	257.579	Α	19.649	60.776	35.172	43.73	0.000	0.000
						В	19.649	60.776		43.73	0.000	0.000
						C	19.649	60.776		43.73		0.000
T7 40.00-20.00	30.00	0.982	5	1.8572	308.727	Α	15.980	92.851	73.065	67.14	0.000	0.000
						В	15.980	92.851		67.14	0.000	0.000
						C	15.980	92.851		67.14	114.281	0.000
T8 20.00-0.00	10.00	0.85	5	1.6640	348.499	A	20.641	91.933	72.306	64.23	0.000	0.000
						В	20.641	91.933		64.23	0.000	0.000

Centek Engineering Inc. 63-2 North Branford Rd.

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	Verizon	TJL

Section Elevation	z	K_Z	q_z	t_Z	A_G	F a	A_F	A_R	A_{leg}	Leg %	$C_A A_A$ In	C_AA_A Out
ft	ft		psf	in	ft²	c e	ft^2	ft^2	ft^2		Face ft²	Face ft²
						С	20.641	91.933		64.23	109.007	0.000

Tower Pressure - Service

 $G_H=0.850$

Section	z	K_Z	q_z	A_G	F	A_F	A_R	A_{leg}	Leg	$C_A A_A$	$C_A A_A$
Elevation					а				%	In	Out
					С					Face	Face
ft	ft		psf	ft^2	e	ft ²	ft^2	ft^2		ft^2	ft^2
T1	145.00	1.369	11	52.396	Α	5.282	4.792	4.792	47.57	0.000	0.000
150.00-140.00					В	5.282	4.792		47.57	0.000	0.000
					C	5.282	4.792		47.57	0.000	0.000
T2	130.00	1.337	10	107.500	Α	11.563	15.000	15.000	56.47	0.000	0.000
140.00-120.00					В	11.563	15.000		56.47	0.000	0.000
					C	11.563	15.000		56.47	13.590	0.000
T3	110.00	1.291	10	129.283	Α	10.355	18.574	18.574	64.21	0.000	0.000
120.00-100.00					В	10.355	18.574		64.21	0.000	0.000
					C	10.355	18.574		64.21	24.870	0.000
T4	90.00	1.238	10	169.283	Α	12.271	18.574	18.574	60.22	0.000	0.000
100.00-80.00					В	12.271	18.574		60.22	0.000	0.000
					C	12.271	18.574		60.22	28.200	0.000
T5 80.00-60.00	70.00	1.174	9	209.283	Α	14.333	18.574	18.574	56.44	0.000	0.000
					В	14.333	18.574		56.44	0.000	0.000
					C	14.333	18.574		56.44	38.190	0.000
T6 60.00-40.00	50.00	1.094	9	251.055	Α	19.649	22.120	22.120	52.96	0.000	0.000
					В	19.649	22.120		52.96	0.000	0.000
					C	19.649	22.120		52.96	39.300	0.000
T7 40.00-20.00	30.00	0.982	8	302.528	Α	15.980	26.700	26.700	62.56	0.000	0.000
					В	15.980	26.700		62.56	0.000	0.000
					C	15.980	26.700		62.56	39.300	0.000
T8 20.00-0.00	10.00	0.85	7	342.945	A	20.641	28.071	28.071	57.63	0.000	0.000
					В	20.641	28.071		57.63	0.000	0.000
					C	20.641	28.071		57.63	39.300	0.000

Tower Forces - No Ice - Wind Normal To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			с			psf						
ft	K	K	e						ft ²	K	plf	
T1	0.00	0.35	Α	0.192	2.622	35	1	1	8.028	0.63	62.51	C
150.00-140.00			В	0.192	2.622		1	1	8.028			
			C	0.192	2.622		1	1	8.028			
T2	0.07	1.56	Α	0.247	2.446	34	1	1	19.553	1.62	81.24	C
140.00-120.00			В	0.247	2.446		1	1	19.553			
			C	0.247	2.446		1	1	19.553			
T3	0.16	1.38	Α	0.224	2.519	33	1	1	19.374	1.79	89.26	C
120.00-100.00			В	0.224	2.519		1	1	19.374			
			C	0.224	2.519		1	1	19.374			
T4	0.18	1.46	Α	0.182	2.657	32	1	1	21.006	1.95	97.66	C
100.00-80.00			В	0.182	2.657		1	1	21.006			

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Client	Verizon	Designed by
	VEHZOH	TJL

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			c			psf			_			
ft	K	K	e						ft^2	K	plf	
			C	0.182	2.657		1	1	21.006			
T5	0.22	1.54	Α	0.157	2.745	30	1	1	22.991	2.19	109.57	C
80.00-60.00			В	0.157	2.745		1	1	22.991			
			C	0.157	2.745		1	1	22.991			
T6	0.23	2.06	Α	0.166	2.712	28	1	1	29.243	2.44	122.09	C
60.00-40.00			В	0.166	2.712		1	1	29.243			
			C	0.166	2.712		1	1	29.243			
T7	0.23	2.91	Α	0.141	2.805	25	1	1	31.111	2.36	118.11	C
40.00-20.00			В	0.141	2.805		1	1	31.111			
			C	0.141	2.805		1	1	31.111			
T8 20.00-0.00	0.23	3.65	Α	0.142	2.801	22	1	1	36.551	2.32	116.16	C
			В	0.142	2.801		1	1	36.551			
			C	0.142	2.801		1	1	36.551			
Sum Weight:	1.32	14.90						OTM	1043.61	15.31		
									kip-ft			

Tower Forces - No Ice - Wind 45 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	a			_						Face
			c			psf						
ft	K	K	e						ft^2	K	plf	
T1	0.00	0.35	A	0.192	2.622	35	0.825	1	7.104	0.55	55.31	С
150.00-140.00			В	0.192	2.622		0.825	1	7.104			
			C	0.192	2.622		0.825	1	7.104			
T2	0.07	1.56	Α	0.247	2.446	34	0.825	1	17.529	1.48	74.05	C
140.00-120.00			В	0.247	2.446		0.825	1	17.529			
			C	0.247	2.446		0.825	1	17.529			
T3	0.16	1.38	A	0.224	2.519	33	0.825	1	17.562	1.66	82.87	C
120.00-100.00			В	0.224	2.519		0.825	1	17.562			
			C	0.224	2.519		0.825	1	17.562			
T4	0.18	1.46	Α	0.182	2.657	32	0.825	1	18.859	1.80	90.00	C
100.00-80.00			В	0.182	2.657		0.825	1	18.859			
			C	0.182	2.657		0.825	1	18.859			
T5	0.22	1.54	A	0.157	2.745	30	0.825	1	20.483	2.02	100.80	C
80.00-60.00			В	0.157	2.745		0.825	1	20.483			
			C	0.157	2.745		0.825	1	20.483			
T6	0.23	2.06	Α	0.166	2.712	28	0.825	1	25.804	2.22	111.03	C
60.00-40.00			В	0.166	2.712		0.825	1	25.804			
			C	0.166	2.712		0.825	1	25.804			
T7	0.23	2.91	Α	0.141	2.805	25	0.825	1	28.314	2.20	109.75	C
40.00-20.00			В	0.141	2.805		0.825	1	28.314			
			C	0.141	2.805		0.825	1	28.314			
T8 20.00-0.00	0.23	3.65	Α	0.142	2.801	22	0.825	1	32.939	2.14	106.82	C
			В	0.142	2.801		0.825	1	32.939			
			C	0.142	2.801		0.825	1	32.939			
Sum Weight:	1.32	14.90						OTM	956.42	14.06		
Ŭ									kip-ft			

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Client		Designed by
	Verizon	TJL

Tower Forces - No Ice - Wind 60 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	a									Face
			С			psf						
ft	K	K	e						ft^2	K	plf	
T1	0.00	0.35	Α	0.192	2.622	35	0.8	1	6.972	0.54	54.28	С
150.00-140.00			В	0.192	2.622		0.8	1	6.972			
			C	0.192	2.622		0.8	1	6.972			
T2	0.07	1.56	Α	0.247	2.446	34	0.8	1	17.240	1.46	73.03	C
140.00-120.00			В	0.247	2.446		0.8	1	17.240			
			C	0.247	2.446		0.8	1	17.240			
T3	0.16	1.38	Α	0.224	2.519	33	0.8	1	17.303	1.64	81.95	C
120.00-100.00			В	0.224	2.519		0.8	1	17.303			
			C	0.224	2.519		0.8	1	17.303			
T4	0.18	1.46	A	0.182	2.657	32	0.8	1	18.552	1.78	88.91	C
100.00-80.00			В	0.182	2.657		0.8	1	18.552			
			C	0.182	2.657		0.8	1	18.552			
T5	0.22	1.54	A	0.157	2.745	30	0.8	1	20.125	1.99	99.55	C
80.00-60.00			В	0.157	2.745		0.8	1	20.125			
			C	0.157	2.745		0.8	1	20.125			
T6	0.23	2.06	Α	0.166	2.712	28	0.8	1	25.313	2.19	109.45	C
60.00-40.00			В	0.166	2.712		0.8	1	25.313			
			C	0.166	2.712		0.8	1	25.313			
T7	0.23	2.91	A	0.141	2.805	25	0.8	1	27.915	2.17	108.56	C
40.00-20.00			В	0.141	2.805		0.8	1	27.915			
			C	0.141	2.805		0.8	1	27.915			
T8 20.00-0.00	0.23	3.65	Α	0.142	2.801	22	0.8	1	32.423	2.11	105.49	C
			В	0.142	2.801		0.8	1	32.423			
			C	0.142	2.801		0.8	1	32.423			
Sum Weight:	1.32	14.90						OTM	943.96	13.88		
									kip-ft			

Tower Forces - No Ice - Wind 90 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			С			psf			2			
ft	K	K	e						ft^2	K	plf	
T1	0.00	0.35	Α	0.192	2.622	35	0.85	1	7.236	0.56	56.34	C
150.00-140.00			В	0.192	2.622		0.85	1	7.236			
			C	0.192	2.622		0.85	1	7.236			
T2	0.07	1.56	Α	0.247	2.446	34	0.85	1	17.818	1.50	75.08	C
140.00-120.00			В	0.247	2.446		0.85	1	17.818			
			C	0.247	2.446		0.85	1	17.818			
T3	0.16	1.38	Α	0.224	2.519	33	0.85	1	17.821	1.68	83.78	C
120.00-100.00			В	0.224	2.519		0.85	1	17.821			
			C	0.224	2.519		0.85	1	17.821			
T4	0.18	1.46	Α	0.182	2.657	32	0.85	1	19.165	1.82	91.10	C
100.00-80.00			В	0.182	2.657		0.85	1	19.165			
			C	0.182	2.657		0.85	1	19.165			
T5	0.22	1.54	Α	0.157	2.745	30	0.85	1	20.841	2.04	102.06	C
80.00-60.00			В	0.157	2.745		0.85	1	20.841			
			C	0.157	2.745		0.85	1	20.841			
T6	0.23	2.06	Α	0.166	2.712	28	0.85	1	26.295	2.25	112.61	C
60.00-40.00			В	0.166	2.712		0.85	1	26.295			
			C	0.166	2.712		0.85	1	26.295			

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Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			c			psf						
ft	K	K	e						ft^2	K	plf	
T7	0.23	2.91	Α	0.141	2.805	25	0.85	1	28.714	2.22	110.94	C
40.00-20.00			В	0.141	2.805		0.85	1	28.714			
			C	0.141	2.805		0.85	1	28.714			
T8 20.00-0.00	0.23	3.65	Α	0.142	2.801	22	0.85	1	33.455	2.16	108.16	C
			В	0.142	2.801		0.85	1	33.455			
			C	0.142	2.801		0.85	1	33.455			
Sum Weight:	1.32	14.90						OTM	968.87	14.24		
									kip-ft			

Tower Forces - With Ice - Wind Normal To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	a			_						Face
			c			psf						
ft	K	K	e						ft^2	K	plf	
T1	0.00	2.08	Α	0.514	1.882	7	1	1	21.576	0.26	25.70	C
150.00-140.00			В	0.514	1.882		1	1	21.576			
			C	0.514	1.882		1	1	21.576			
T2	0.86	5.12	Α	0.501	1.898	7	1	1	43.044	0.70	35.16	C
140.00-120.00			В	0.501	1.898		1	1	43.044			
			C	0.501	1.898		1	1	43.044			
T3	1.52	4.93	Α	0.444	1.983	7	1	1	43.321	0.87	43.34	C
120.00-100.00			В	0.444	1.983		1	1	43.321			
			C	0.444	1.983		1	1	43.321			
T4	1.62	5.28	A	0.369	2.128	7	1	1	45.165	0.94	46.88	C
100.00-80.00			В	0.369	2.128		1	1	45.165			
			C	0.369	2.128		1	1	45.165			
T5	1.83	5.64	A	0.322	2.239	6	1	1	47.821	0.96	48.01	C
80.00-60.00			В	0.322	2.239		1	1	47.821			
			C	0.322	2.239		1	1	47.821			
T6	1.80	6.95	A	0.312	2.264	6	1	1	56.286	1.00	49.97	C
60.00-40.00			В	0.312	2.264		1	1	56.286			
			C	0.312	2.264		1	1	56.286			
T7	1.71	9.75	A	0.353	2.166	5	1	1	73.269	1.03	51.61	C
40.00-20.00			В	0.353	2.166		1	1	73.269			
			C	0.353	2.166		1	1	73.269			
T8 20.00-0.00	1.52	9.75	Α	0.323	2.237	5	1	1	76.392	0.93	46.43	C
			В	0.323	2.237		1	1	76.392			
			C	0.323	2.237		1	1	76.392			
Sum Weight:	10.86	49.49						OTM	465.85	6.68		
									kip-ft			

Tower Forces - With Ice - Wind 45 To Face

Section	Add	Self	F	е	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			c			psf			_			
ft	K	K	e						ft^2	K	plf	
T1	0.00	2.08	Α	0.514	1.882	7	0.825	1	20.652	0.25	24.60	C

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Client	Mari'aa	Designed by
	Verizon	TJL

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			С			psf						
ft	K	K	e						ft^2	K	plf	
150.00-140.00			В	0.514	1.882		0.825	1	20.652			
			C	0.514	1.882		0.825	1	20.652			
T2	0.86	5.12	Α	0.501	1.898	7	0.825	1	41.021	0.68	33.97	C
140.00-120.00			В	0.501	1.898		0.825	1	41.021			
			C	0.501	1.898		0.825	1	41.021			
Т3	1.52	4.93	Α	0.444	1.983	7	0.825	1	41.509	0.85	42.27	C
120.00-100.00			В	0.444	1.983		0.825	1	41.509			
			C	0.444	1.983		0.825	1	41.509			
T4	1.62	5.28	Α	0.369	2.128	7	0.825	1	43.018	0.91	45.57	C
100.00-80.00			В	0.369	2.128		0.825	1	43.018			
			C	0.369	2.128		0.825	1	43.018			
T5	1.83	5.64	Α	0.322	2.239	6	0.825	1	45.312	0.93	46.49	C
80.00-60.00			В	0.322	2.239		0.825	1	45.312			
			C	0.322	2.239		0.825	1	45.312			
Т6	1.80	6.95	Α	0.312	2.264	6	0.825	1	52.848	0.96	48.00	C
60.00-40.00			В	0.312	2.264		0.825	1	52.848			
			C	0.312	2.264		0.825	1	52.848			
T7	1.71	9.75	Α	0.353	2.166	5	0.825	1	70.473	1.00	50.23	C
40.00-20.00			В	0.353	2.166		0.825	1	70.473			
			C	0.353	2.166		0.825	1	70.473			
T8 20.00-0.00	1.52	9.75	Α	0.323	2.237	5	0.825	1	72.779	0.90	44.84	C
			В	0.323	2.237		0.825	1	72.779			
			C	0.323	2.237		0.825	1	72.779			
Sum Weight:	10.86	49.49						OTM	451.21	6.47		
									kip-ft			

Tower Forces - With Ice - Wind 60 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	a			_						Face
			С			psf						
ft	K	K	e						ft^2	K	plf	
T1	0.00	2.08	Α	0.514	1.882	7	0.8	1	20.520	0.24	24.44	С
150.00-140.00			В	0.514	1.882		0.8	1	20.520			
			C	0.514	1.882		0.8	1	20.520			
T2	0.86	5.12	Α	0.501	1.898	7	0.8	1	40.732	0.68	33.80	C
140.00-120.00			В	0.501	1.898		0.8	1	40.732			
			C	0.501	1.898		0.8	1	40.732			
T3	1.52	4.93	Α	0.444	1.983	7	0.8	1	41.250	0.84	42.11	C
120.00-100.00			В	0.444	1.983		0.8	1	41.250			
			C	0.444	1.983		0.8	1	41.250			
T4	1.62	5.28	Α	0.369	2.128	7	0.8	1	42.711	0.91	45.38	C
100.00-80.00			В	0.369	2.128		0.8	1	42.711			
			C	0.369	2.128		0.8	1	42.711			
T5	1.83	5.64	Α	0.322	2.239	6	0.8	1	44.954	0.93	46.27	C
80.00-60.00			В	0.322	2.239		0.8	1	44.954			
			C	0.322	2.239		0.8	1	44.954			
T6	1.80	6.95	Α	0.312	2.264	6	0.8	1	52.356	0.95	47.72	C
60.00-40.00			В	0.312	2.264		0.8	1	52.356			
			C	0.312	2.264		0.8	1	52.356			
T7	1.71	9.75	Α	0.353	2.166	5	0.8	1	70.073	1.00	50.04	C
40.00-20.00			В	0.353	2.166		0.8	1	70.073			
			C	0.353	2.166		0.8	1	70.073			
T8 20.00-0.00	1.52	9.75	Α	0.323	2.237	5	0.8	1	72.263	0.89	44.61	C

Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405

Phone: (203) 488-0580 FAX: (203) 488-8587

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	150' Lattice Tower - Madison, CT	12:16:24 02/25/22
Client	Verizon	Designed by

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			С			psf						
ft	K	K	e						ft^2	K	plf	
			В	0.323	2.237		0.8	1	72.263			
			C	0.323	2.237		0.8	1	72.263			
Sum Weight:	10.86	49.49						OTM	449.11	6.44		
									kip-ft			

Tower Forces - With Ice - Wind 90 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			С			psf						
ft	K	K	e						ft^2	K	plf	
T1	0.00	2.08	Α	0.514	1.882	7	0.85	1	20.784	0.25	24.76	C
150.00-140.00			В	0.514	1.882		0.85	1	20.784			
			C	0.514	1.882		0.85	1	20.784			
T2	0.86	5.12	Α	0.501	1.898	7	0.85	1	41.310	0.68	34.14	C
140.00-120.00			В	0.501	1.898		0.85	1	41.310			
			C	0.501	1.898		0.85	1	41.310			
T3	1.52	4.93	Α	0.444	1.983	7	0.85	1	41.768	0.85	42.42	C
120.00-100.00			В	0.444	1.983		0.85	1	41.768			
			C	0.444	1.983		0.85	1	41.768			
T4	1.62	5.28	Α	0.369	2.128	7	0.85	1	43.324	0.92	45.75	C
100.00-80.00			В	0.369	2.128		0.85	1	43.324			
			C	0.369	2.128		0.85	1	43.324			
T5	1.83	5.64	Α	0.322	2.239	6	0.85	1	45.671	0.93	46.71	C
80.00-60.00			В	0.322	2.239		0.85	1	45.671			
			C	0.322	2.239		0.85	1	45.671			
T6	1.80	6.95	Α	0.312	2.264	6	0.85	1	53.339	0.97	48.28	C
60.00-40.00			В	0.312	2.264		0.85	1	53.339			
			C	0.312	2.264		0.85	1	53.339			
T7	1.71	9.75	Α	0.353	2.166	5	0.85	1	70.872	1.01	50.43	C
40.00-20.00			В	0.353	2.166		0.85	1	70.872			
			C	0.353	2.166		0.85	1	70.872			
T8 20.00-0.00	1.52	9.75	Α	0.323	2.237	5	0.85	1	73.295	0.90	45.07	C
			В	0.323	2.237		0.85	1	73.295			
			C	0.323	2.237		0.85	1	73.295			
Sum Weight:	10.86	49.49						OTM	453.30	6.50		
									kip-ft			

Tower Forces - Service - Wind Normal To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			c			psf						
ft	K	K	e						ft^2	K	plf	
T1	0.00	0.35	Α	0.192	2.622	11	1	1	8.028	0.19	19.18	C
150.00-140.00			В	0.192	2.622		1	1	8.028			
			C	0.192	2.622		1	1	8.028			
T2	0.07	1.56	Α	0.247	2.446	10	1	1	20.327	0.52	25.77	C
140.00-120.00			В	0.247	2.446		1	1	20.327			

Centek Engineering Inc. 63-2 North Branford Rd.

Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587

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Client	Vorince	Designed by
	Verizon	TJL

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	a			_						Face
	-		С			psf						
ft	K	K	e						ft^2	K	plf	
			C	0.247	2.446		1	1	20.327			
T3	0.16	1.38	Α	0.224	2.519	10	1	1	21.110	0.59	29.27	C
120.00-100.00			В	0.224	2.519		1	1	21.110			
			C	0.224	2.519		1	1	21.110			
T4	0.18	1.46	Α	0.182	2.657	10	1	1	22.887	0.64	32.03	C
100.00-80.00			В	0.182	2.657		1	1	22.887			
			C	0.182	2.657		1	1	22.887			
T5	0.22	1.54	Α	0.157	2.745	9	1	1	24.889	0.71	35.66	C
80.00-60.00			В	0.157	2.745		1	1	24.889			
			C	0.157	2.745		1	1	24.889			
T6	0.23	2.06	Α	0.166	2.712	9	1	1	31.985	0.80	40.18	C
60.00-40.00			В	0.166	2.712		1	1	31.985			
			C	0.166	2.712		1	1	31.985			
T7	0.23	2.91	Α	0.141	2.805	8	1	1	31.111	0.72	36.24	C
40.00-20.00			В	0.141	2.805		1	1	31.111			
			C	0.141	2.805		1	1	31.111			
T8 20.00-0.00	0.23	3.65	Α	0.142	2.801	7	1	1	36.551	0.71	35.65	C
			В	0.142	2.801		1	1	36.551			
			C	0.142	2.801		1	1	36.551			
Sum Weight:	1.32	14.90						OTM	335.85	4.89		
									kip-ft			

Tower Forces - Service - Wind 45 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	a									Face
			С			psf						
ft	K	K	e						ft^2	K	plf	
T1	0.00	0.35	Α	0.192	2.622	11	0.825	1	7.104	0.17	16.97	C
150.00-140.00			В	0.192	2.622		0.825	1	7.104			
			C	0.192	2.622		0.825	1	7.104			
T2	0.07	1.56	Α	0.247	2.446	10	0.825	1	18.303	0.47	23.57	C
140.00-120.00			В	0.247	2.446		0.825	1	18.303			
			C	0.247	2.446		0.825	1	18.303			
T3	0.16	1.38	Α	0.224	2.519	10	0.825	1	19.298	0.55	27.31	C
120.00-100.00			В	0.224	2.519		0.825	1	19.298			
			C	0.224	2.519		0.825	1	19.298			
T4	0.18	1.46	Α	0.182	2.657	10	0.825	1	20.740	0.59	29.68	C
100.00-80.00			В	0.182	2.657		0.825	1	20.740			
			C	0.182	2.657		0.825	1	20.740			
T5	0.22	1.54	Α	0.157	2.745	9	0.825	1	22.380	0.66	32.97	C
80.00-60.00			В	0.157	2.745		0.825	1	22.380			
			C	0.157	2.745		0.825	1	22.380			
T6	0.23	2.06	Α	0.166	2.712	9	0.825	1	28.546	0.74	36.78	C
60.00-40.00			В	0.166	2.712		0.825	1	28.546			
			C	0.166	2.712		0.825	1	28.546			
T7	0.23	2.91	Α	0.141	2.805	8	0.825	1	28.314	0.67	33.68	C
40.00-20.00			В	0.141	2.805		0.825	1	28.314			
			C	0.141	2.805		0.825	1	28.314			
T8 20.00-0.00	0.23	3.65	Α	0.142	2.801	7	0.825	1	32.939	0.66	32.78	C
			В	0.142	2.801		0.825	1	32.939			
			C	0.142	2.801		0.825	1	32.939			
Sum Weight:	1.32	14.90						OTM	309.10	4.51		
									kip-ft			

Centek Engineering Inc. 63-2 North Branford Rd.

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150' Lattice Tower - Madison, CT	12:16:24 02/25/22
Client Verizon	Designed by TJL

Tower Forces - Service - Wind 60 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а			_						Face
			С			psf						
ft	K	K	e						ft^2	K	plf	
T1	0.00	0.35	Α	0.192	2.622	11	0.8	1	6.972	0.17	16.66	C
150.00-140.00			В	0.192	2.622		0.8	1	6.972			
			C	0.192	2.622		0.8	1	6.972			
T2	0.07	1.56	Α	0.247	2.446	10	0.8	1	18.014	0.47	23.25	C
140.00-120.00			В	0.247	2.446		0.8	1	18.014			
			C	0.247	2.446		0.8	1	18.014			
T3	0.16	1.38	Α	0.224	2.519	10	0.8	1	19.039	0.54	27.03	C
120.00-100.00			В	0.224	2.519		0.8	1	19.039			
			C	0.224	2.519		0.8	1	19.039			
T4	0.18	1.46	Α	0.182	2.657	10	0.8	1	20.433	0.59	29.34	C
100.00-80.00			В	0.182	2.657		0.8	1	20.433			
			C	0.182	2.657		0.8	1	20.433			
T5	0.22	1.54	Α	0.157	2.745	9	0.8	1	22.022	0.65	32.59	C
80.00-60.00			В	0.157	2.745		0.8	1	22.022			
			C	0.157	2.745		0.8	1	22.022			
T6	0.23	2.06	Α	0.166	2.712	9	0.8	1	28.055	0.73	36.29	C
60.00-40.00			В	0.166	2.712		0.8	1	28.055			
			C	0.166	2.712		0.8	1	28.055			
T7	0.23	2.91	Α	0.141	2.805	8	0.8	1	27.915	0.67	33.31	C
40.00-20.00			В	0.141	2.805		0.8	1	27.915			
			C	0.141	2.805		0.8	1	27.915			
T8 20.00-0.00	0.23	3.65	Α	0.142	2.801	7	0.8	1	32.423	0.65	32.37	C
			В	0.142	2.801		0.8	1	32.423			
			C	0.142	2.801		0.8	1	32.423			
Sum Weight:	1.32	14.90						OTM	305.27	4.45		
									kip-ft			

Tower Forces - Service - Wind 90 To Face

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			С			psf						
ft	K	K	e						ft^2	K	plf	
T1	0.00	0.35	A	0.192	2.622	11	0.85	1	7.236	0.17	17.29	C
150.00-140.00			В	0.192	2.622		0.85	1	7.236			
			C	0.192	2.622		0.85	1	7.236			
T2	0.07	1.56	Α	0.247	2.446	10	0.85	1	18.593	0.48	23.88	C
140.00-120.00			В	0.247	2.446		0.85	1	18.593			
			C	0.247	2.446		0.85	1	18.593			
T3	0.16	1.38	Α	0.224	2.519	10	0.85	1	19.557	0.55	27.59	C
120.00-100.00			В	0.224	2.519		0.85	1	19.557			
			C	0.224	2.519		0.85	1	19.557			
T4	0.18	1.46	Α	0.182	2.657	10	0.85	1	21.047	0.60	30.01	C
100.00-80.00			В	0.182	2.657		0.85	1	21.047			
			C	0.182	2.657		0.85	1	21.047			
T5	0.22	1.54	Α	0.157	2.745	9	0.85	1	22.739	0.67	33.35	C

Centek Engineering Inc. 63-2 North Branford Rd.

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Project		Date
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Client		Designed by
	Verizon	TJL

Section	Add	Self	F	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl.
Elevation	Weight	Weight	а									Face
			С			psf			_			
ft	K	K	e						ft^2	K	plf	
80.00-60.00			В	0.157	2.745		0.85	1	22.739			
			C	0.157	2.745		0.85	1	22.739			
T6	0.23	2.06	Α	0.166	2.712	9	0.85	1	29.037	0.75	37.26	C
60.00-40.00			В	0.166	2.712		0.85	1	29.037			
			C	0.166	2.712		0.85	1	29.037			
T7	0.23	2.91	Α	0.141	2.805	8	0.85	1	28.714	0.68	34.05	C
40.00-20.00			В	0.141	2.805		0.85	1	28.714			
			C	0.141	2.805		0.85	1	28.714			
T8 20.00-0.00	0.23	3.65	Α	0.142	2.801	7	0.85	1	33.455	0.66	33.19	C
			В	0.142	2.801		0.85	1	33.455			
			C	0.142	2.801		0.85	1	33.455			
Sum Weight:	1.32	14.90						OTM	312.92	4.56		
									kip-ft			

Force Totals

Load	Vertical	Sum of	Sum of	Sum of	Sum of	Sum of Torques
Case	Forces	Forces	Forces	Overturning	Overturning	
		X	Z	Moments, M_x	Moments, M_z	
	K	K	K	kip-ft	kip-ft	kip-ft
Leg Weight	8.30					
Bracing Weight	6.60					
Total Member Self-Weight	14.90			1.12	4.94	
Total Weight	21.59			1.12	4.94	
Wind 0 deg - No Ice		0.00	-22.45	-1860.78	4.94	-11.78
Wind 30 deg - No Ice		11.20	-18.52	-1546.61	-961.19	-14.34
Wind 45 deg - No Ice		15.72	-14.99	-1253.79	-1352.57	-14.19
Wind 60 deg - No Ice		19.10	-10.51	-880.01	-1646.88	-13.07
Wind 90 deg - No Ice		22.41	0.00	1.12	-1927.33	-8.29
Wind 120 deg - No Ice		20.33	11.22	932.07	-1733.17	-1.29
Wind 135 deg - No Ice		16.22	15.50	1291.26	-1387.80	2.47
Wind 150 deg - No Ice		11.20	18.52	1548.85	-961.19	6.05
Wind 180 deg - No Ice		0.00	21.02	1763.37	4.94	11.78
Wind 210 deg - No Ice		-11.20	18.52	1548.85	971.08	14.34
Wind 225 deg - No Ice		-15.72	14.99	1256.03	1362.46	14.19
Wind 240 deg - No Ice		-20.33	11.22	932.07	1743.06	13.07
Wind 270 deg - No Ice		-22.41	0.00	1.12	1937.22	8.29
Wind 300 deg - No Ice		-19.10	-10.51	-880.01	1656.77	1.29
Wind 315 deg - No Ice		-15.72	-14.99	-1253.79	1362.46	-2.47
Wind 330 deg - No Ice		-11.20	-18.52	-1546.61	971.08	-6.05
Member Ice	34.59					
Total Weight Ice	77.29			18.65	43.01	
Wind 0 deg - Ice		0.00	-9.76	-791.06	43.01	-7.60
Wind 30 deg - Ice		4.88	-8.30	-671.71	-368.12	-6.87
Wind 45 deg - Ice		6.88	-6.75	-543.54	-536.94	-5.78
Wind 60 deg - Ice		8.40	-4.76	-377.84	-665.46	-4.30
Wind 90 deg - Ice		9.76	0.00	18.65	-779.25	-0.57
Wind 120 deg - Ice		8.61	4.88	423.51	-679.96	3.30
Wind 135 deg - Ice		6.96	6.84	586.77	-542.85	4.97
Wind 150 deg - Ice		4.88	8.30		-368.12	6.30
Wind 180 deg - Ice		0.00	9.52	811.63	43.01	7.60
Wind 210 deg - Ice		-4.88	8.30	709.01	454.14	6.87
Wind 225 deg - Ice		-6.88	6.75		622.96	5.78
Wind 240 deg - Ice		-8.61	4.88	423.51	765.98	4.30

Centek Engineering Inc. 63-2 North Branford Rd.

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Project		Date
	150' Lattice Tower - Madison, CT	12:16:24 02/25/22
Client	Marina in	Designed by
	Verizon	TJL

Load	Vertical	Sum of	Sum of	Sum of	Sum of	Sum of Torques
Case	Forces	Forces	Forces	Overturning	Overturning	
		X	Z	Moments, M_x	Moments, M_z	
	K	K	K	kip-ft	kip-ft	kip-ft
Wind 270 deg - Ice		-9.76	0.00	18.65	865.27	0.57
Wind 300 deg - Ice		-8.40	-4.76	-377.84	751.49	-3.30
Wind 315 deg - Ice		-6.88	-6.75	-543.54	622.96	-4.97
Wind 330 deg - Ice		-4.88	-8.30	-671.71	454.14	-6.30
Total Weight	21.59			1.12	4.94	
Wind 0 deg - Service		0.00	-7.11	-592.64	-1.32	-3.74
Wind 30 deg - Service		3.55	-5.87	-493.85	-306.71	-4.55
Wind 45 deg - Service		4.98	-4.75	-401.16	-430.50	-4.49
Wind 60 deg - Service		6.05	-3.33	-282.76	-523.64	-4.13
Wind 90 deg - Service		7.09	0.00	-3.47	-612.09	-2.62
Wind 120 deg - Service		6.43	3.55	291.12	-550.13	-0.40
Wind 135 deg - Service		5.13	4.91	405.03	-441.31	0.79
Wind 150 deg - Service		3.55	5.87	486.91	-306.71	1.93
Wind 180 deg - Service		0.00	6.67	555.13	-1.32	3.74
Wind 210 deg - Service		-3.55	5.87	486.91	304.06	4.55
Wind 225 deg - Service		-4.98	4.75	394.22	427.86	4.49
Wind 240 deg - Service		-6.43	3.55	291.12	547.48	4.13
Wind 270 deg - Service		-7.09	0.00	-3.47	609.45	2.62
Wind 300 deg - Service		-6.05	-3.33	-282.76	521.00	0.40
Wind 315 deg - Service		-4.98	-4.75	-401.16	427.86	-0.79
Wind 330 deg - Service		-3.55	-5.87	-493.85	304.06	-1.93

Load Combinations

Comb.	Description
No.	
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 45 deg - No Ice
7	0.9 Dead+1.6 Wind 45 deg - No Ice
8	1.2 Dead+1.6 Wind 60 deg - No Ice
9	0.9 Dead+1.6 Wind 60 deg - No Ice
10	1.2 Dead+1.6 Wind 90 deg - No Ice
11	0.9 Dead+1.6 Wind 90 deg - No Ice
12	1.2 Dead+1.6 Wind 120 deg - No Ice
13	0.9 Dead+1.6 Wind 120 deg - No Ice
14	1.2 Dead+1.6 Wind 135 deg - No Ice
15	0.9 Dead+1.6 Wind 135 deg - No Ice
16	1.2 Dead+1.6 Wind 150 deg - No Ice
17	0.9 Dead+1.6 Wind 150 deg - No Ice
18	1.2 Dead+1.6 Wind 180 deg - No Ice
19	0.9 Dead+1.6 Wind 180 deg - No Ice
20	1.2 Dead+1.6 Wind 210 deg - No Ice
21	0.9 Dead+1.6 Wind 210 deg - No Ice
22	1.2 Dead+1.6 Wind 225 deg - No Ice
23	0.9 Dead+1.6 Wind 225 deg - No Ice
24	1.2 Dead+1.6 Wind 240 deg - No Ice
25	0.9 Dead+1.6 Wind 240 deg - No Ice
26	1.2 Dead+1.6 Wind 270 deg - No Ice
27	0.9 Dead+1.6 Wind 270 deg - No Ice
28	1.2 Dead+1.6 Wind 300 deg - No Ice
29	0.9 Dead+1.6 Wind 300 deg - No Ice
30	1.2 Dead+1.6 Wind 315 deg - No Ice

Centek Engineering Inc. 63-2 North Branford Rd.

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

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Project		Date
	150' Lattice Tower - Madison, CT	12:16:24 02/25/22
Client	Mada a	Designed by
	Verizon	TJL

Comb.	Description
No.	· · · · · · · · · · · · · · · · · · ·
31	0.9 Dead+1.6 Wind 315 deg - No Ice
32	1.2 Dead+1.6 Wind 330 deg - No Ice
33	0.9 Dead+1.6 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57 50	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 65	Dead+Wind 300 deg - Service
66	Dead+Wind 315 deg - Service
00	Dead+Wind 330 deg - Service

Maximum Member Forces

Section	Elevation	Component	Condition	Gov.	Axial	Major Axis	Minor Axi
No.	ft	Туре	Load			Moment	Moment
				Comb.	K	kip-ft	kip-ft
T1	150 - 140	Leg	Max Tension	9	0.70	-0.02	0.06
			Max. Compression	12	-0.94	-0.06	0.06
			Max. Mx	9	-0.48	-0.15	0.27
			Max. My	6	-0.35	-0.15	0.28
			Max. Vy	24	-0.06	0.14	-0.27
			Max. Vx	4	-0.10	-0.14	0.27
		Diagonal	Max Tension	24	0.47	0.00	0.00
			Max. Compression	8	-0.46	0.00	0.00
			Max. Mx	39	0.04	0.02	-0.00
			Max. My	10	-0.27	0.00	-0.00
			Max. Vy	38	-0.02	0.02	0.00
			Max. Vx	10	-0.00	0.00	0.00
		Top Girt	Max Tension	8	0.13	0.00	0.00
		-	Max. Compression	12	-0.14	0.00	0.00
			Max. Mx	34	-0.01	-0.05	0.00
			Max. My	10	-0.02	0.00	0.00
			Max. Vy	34	-0.04	0.00	0.00

Centek Engineering Inc. 63-2 North Branford Rd.

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Project		Date
	150' Lattice Tower - Madison, CT	12:16:24 02/25/22
Client	Marina in	Designed by
	Verizon	TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load	Axial	Major Axis Moment	Minor Axis Moment
	v	~ 4		Comb.	K	kip-ft	kip-ft
			Max. Vx	10	-0.00	0.00	0.00
T2	140 - 120	Leg	Max Tension	9	21.38	0.08	0.49
			Max. Compression	12	-23.36	-0.33	-0.02
			Max. Mx	26	-0.78	-2.75	0.01
			Max. My	27	6.67	0.07	-1.60
			Max. Vy	26	3.24	1.56	0.01
			Max. Vx	10	-2.19	-0.05	-1.33
		Diagonal	Max Tension	28	8.41	0.00	0.00
			Max. Compression	12	-8.77	0.00	0.00
			Max. Mx	10	6.31	0.11	0.04
			Max. My	10	-0.91	0.08	0.10
			Max. Vy	36	-0.05	0.08	0.01
TD2	100 100	Ŧ	Max. Vx	10	-0.02	0.08	0.10
T3	120 - 100	Leg	Max Tension	9 12	57.95	-0.54	0.10
			Max. Compression Max. Mx	24	-65.03 51.80	0.53 0.74	0.11 -0.16
				10	-51.80 -3.60	-0.04	0.16
			Max. My Max. Vy	24	0.41	0.74	-0.16
			Max. Vx	26	-0.79	0.02	-0.16
		Diagonal	Max Tension	29	8.95	0.02	0.00
		Diagonai	Max. Compression	12	-9.31	0.00	0.00
			Max. Mx	35	1.19	0.05	0.00
			Max. My	12	-9.29	-0.02	0.07
			Max. Vy	38	0.04	0.04	0.01
			Max. Vx	12	-0.02	0.00	0.00
T4	100 - 80	Leg	Max Tension	9	89.34	-0.50	-0.02
		8	Max. Compression	12	-99.10	0.51	-0.04
			Max. Mx	28	68.36	-0.55	-0.13
			Max. My	10	-4.16	-0.02	0.94
			Max. Vy	8	-0.08	-0.54	0.11
			Max. Vx	32	0.16	0.01	0.64
		Diagonal	Max Tension	12	7.42	0.00	0.00
		-	Max. Compression	12	-7.54	0.00	0.00
			Max. Mx	35	1.09	0.06	0.01
			Max. My	26	-5.78	0.01	-0.03
			Max. Vy	48	0.05	0.06	-0.01
			Max. Vx	26	0.01	0.00	0.00
T5	80 - 60	Leg	Max Tension	29	119.29	-0.59	0.20
			Max. Compression	24	-132.75	0.72	-0.01
			Max. Mx	24	-132.75	0.72	-0.01
			Max. My	32	-9.86	0.01	0.84
			Max. Vy	28	-0.64	-0.50	0.04
		D' 1	Max. Vx	20	0.78	-0.03	0.31
		Diagonal	Max Tension	30	6.68	0.00	0.00
			Max. Compression	14	-6.96	0.00	0.00
			Max. Mx Max. My	48 28	0.96 -6.28	0.08 -0.00	-0.01 -0.02
			Max. Vy	48	0.06	0.08	-0.02
			Max. Vx	28	0.00	0.00	0.00
T6	60 - 40	Leg	Max Tension	29	146.60	-0.62	0.05
10	00 - 40	Leg	Max. Compression	24	-163.52	2.04	-0.07
			Max. Mx	12	-163.14	2.04	-0.02
			Max. My	26	-5.89	0.03	-2.07
			Max. Vy	13	-0.29	2.03	-0.02
			Max. Vx	32	-0.38	0.09	1.89
		Diagonal	Max Tension	6	6.52	0.00	0.00
			Max. Compression	22	-6.67	0.00	0.00
			Max. Mx	48	1.33	0.12	0.01
			Max. My	6	-6.33	0.00	0.02
			Max. Vy	48	0.08	0.12	0.01
			Max. Vx	38	-0.00	0.00	0.00

Centek Engineering Inc. 63-2 North Branford Rd.

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Client	Verizon	Designed by
	Venzon	TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axi Moment kip-ft
T7	40 - 20	Leg	Max Tension	29	168.30	-3.58	0.30
-,	.0 20	208	Max. Compression	24	-188.68	4.64	-0.01
			Max. Mx	24	-188.68	4.64	-0.01
			Max. My	26	-6.65	-0.19	-5.78
			Max. Vy	38	0.52	-4.02	0.01
			Max. Vx	32	0.60	-0.06	5.56
		Diagonal	Max Tension	4	7.50	0.00	0.00
			Max. Compression	20	-7.81	0.00	0.00
			Max. Mx	46	2.62	0.18	0.02
			Max. My	44	-2.56	0.13	-0.03
			Max. Vy	48	0.10	0.18	-0.02
			Max. Vx	37	-0.01	0.00	0.00
T8	20 - 0	Leg	Max Tension	29	190.80	-3.67	0.30
		C	Max. Compression	24	-215.64	-0.00	0.00
			Max. Mx	46	-77.86	5.31	0.05
			Max. My	26	-7.91	-0.26	-7.17
			Max. Vy	38	-0.81	-4.02	0.01
			Max. Vx	32	0.87	-0.14	6.87
		Diagonal	Max Tension	7	8.53	0.00	0.00
		•	Max. Compression	24	-9.25	0.00	0.00
			Max. Mx	48	-0.46	0.26	0.03
			Max. My	43	-3.25	0.20	-0.03
			Max. Vy	48	0.12	0.26	0.03
			Max. Vx	43	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov.	Vertical	Horizontal, X	Horizontal, Z
		Load	K	K	K
		Comb.			
Leg C	Max. Vert	24	224.04	20.97	-12.99
-	Max. H _x	24	224.04	20.97	-12.99
	Max. H _z	9	-197.16	-18.57	11.61
	Min. Vert	9	-197.16	-18.57	11.61
	Min. H _x	9	-197.16	-18.57	11.61
	Min. H _z	24	224.04	20.97	-12.99
Leg B	Max. Vert	12	223.34	-21.28	-12.42
	Max. H _x	29	-197.69	18.90	11.06
	Max. H _z	29	-197.69	18.90	11.06
	Min. Vert	29	-197.69	18.90	11.06
	Min. H _x	12	223.34	-21.28	-12.42
	Min. H _z	12	223.34	-21.28	-12.42
Leg A	Max. Vert	2	211.67	-0.64	23.73
	Max. H _x	25	-95.05	1.47	-10.91
	Max. H _z	2	211.67	-0.64	23.73
	Min. Vert	19	-185.66	0.64	-20.98
	Min. H _x	9	102.44	-1.36	11.34
	Min. H _z	19	-185.66	0.64	-20.98

Tower Mast Reaction Summary

Centek Engineering Inc. 63-2 North Branford Rd.

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Project		Date
	150' Lattice Tower - Madison, CT	12:16:24 02/25/22
Client	Verizon	Designed by TJL

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only 1.2 Dead+1.6 Wind 0 deg - No	21.59 25.91	0.00 -0.00	0.00 -35.92	1.12 -2989.11	4.94 5.98	0.00 -18.85
Ice 0.9 Dead+1.6 Wind 0 deg - No	19.43	-0.00	-35.92	-2986.55	4.49	-18.85
Ice 1.2 Dead+1.6 Wind 30 deg - No	25.91	17.93	-29.62	-2484.55	-1545.93	-22.90
Ice 0.9 Dead+1.6 Wind 30 deg - No	19.43	17.93	-29.62	-2482.48	-1545.87	-22.89
Ice 1.2 Dead+1.6 Wind 45 deg - No Ice	25.91	25.15	-23.99	-2014.23	-2174.62	-22.65
0.9 Dead+1.6 Wind 45 deg - No Ice	19.43	25.15	-23.99	-2012.61	-2173.94	-22.64
1.2 Dead+1.6 Wind 60 deg - No Ice	25.91	30.56	-16.82	-1413.87	-2647.39	-20.87
0.9 Dead+1.6 Wind 60 deg - No Ice	19.43	30.56	-16.82	-1412.82	-2646.23	-20.86
1.2 Dead+1.6 Wind 90 deg - No Ice	25.91	35.85	-0.00	1.39	-3097.87	-13.30
0.9 Dead+1.6 Wind 90 deg - No Ice	19.43	35.85	-0.00	1.06	-3096.27	-13.30
1.2 Dead+1.6 Wind 120 deg - No Ice	25.91	32.53	17.96	1496.60	-2785.96	-2.16
0.9 Dead+1.6 Wind 120 deg - No Ice	19.43	32.53	17.96	1494.83	-2784.68	-2.16
1.2 Dead+1.6 Wind 135 deg - No Ice	25.91	25.96	24.79	2073.51	-2231.22	3.85
0.9 Dead+1.6 Wind 135 deg - No Ice	19.43	25.96	24.79	2071.18	-2230.49	3.86
1.2 Dead+1.6 Wind 150 deg - No Ice	25.91	17.93	29.62	2487.25	-1545.97	9.61
0.9 Dead+1.6 Wind 150 deg - No Ice	19.43	17.93	29.62	2484.51	-1545.91	9.62
1.2 Dead+1.6 Wind 180 deg - No Ice	25.91	0.00	33.64	2831.79	5.97	18.85
0.9 Dead+1.6 Wind 180 deg - No Ice	19.43	0.00	33.64	2828.72	4.49	18.85
1.2 Dead+1.6 Wind 210 deg - No Ice	25.91	-17.93	29.62	2487.19	1557.90	23.04
0.9 Dead+1.6 Wind 210 deg - No Ice	19.43	-17.93	29.62	2484.47	1554.87	23.03
1.2 Dead+1.6 Wind 225 deg - No Ice	25.91	-25.15	23.99	2016.89	2186.57	22.81
0.9 Dead+1.6 Wind 225 deg - No Ice	19.43	-25.15	23.99	2014.61	2182.91	22.80
1.2 Dead+1.6 Wind 240 deg - No Ice	25.91	-32.53	17.96	1496.54	2797.86	21.02
0.9 Dead+1.6 Wind 240 deg - No Ice	19.43	-32.53	17.96	1494.78	2793.61	21.00
1.2 Dead+1.6 Wind 270 deg - No Ice	25.91	-35.85	-0.00	1.37	3109.76	13.30
0.9 Dead+1.6 Wind 270 deg - No Ice	19.43	-35.85	-0.00	1.04	3105.18	13.30
1.2 Dead+1.6 Wind 300 deg - No Ice	25.91	-30.56	-16.82	-1413.85	2659.29	2.02
0.9 Dead+1.6 Wind 300 deg - No Ice	19.43	-30.56	-16.82	-1412.80	2655.16	2.01
1.2 Dead+1.6 Wind 315 deg - No Ice	25.91	-25.15	-23.99	-2014.20	2186.54	-4.02
0.9 Dead+1.6 Wind 315 deg - No Ice	19.43	-25.15	-23.99	-2012.58	2182.88	-4.02

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Project		Date
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Client	Verizon	Designed by TJL

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.6 Wind 330 deg -	25.91	-17.93	-29.62	-2484.53	1557.87	-9.75
No Ice						
0.9 Dead+1.6 Wind 330 deg -	19.43	-17.93	-29.62	-2482.45	1554.84	-9.76
No Ice						
1.2 Dead+1.0 Ice+1.0 Temp	81.60	0.00	-0.00	18.77	44.32	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0	81.60	0.00	-9.76	-800.74	44.39	-7.65
Ice+1.0 Temp						
1.2 Dead+1.0 Wind 30 deg+1.0	81.60	4.88	-8.30	-679.96	-371.79	-6.92
Ice+1.0 Temp						
1.2 Dead+1.0 Wind 45 deg+1.0	81.60	6.88	-6.75	-550.24	-542.68	-5.82
Ice+1.0 Temp						
1.2 Dead+1.0 Wind 60 deg+1.0	81.60	8.40	-4.76	-382.52	-672.80	-4.33
Ice+1.0 Temp						
1.2 Dead+1.0 Wind 90 deg+1.0	81.60	9.76	-0.00	18.78	-787.98	-0.58
Ice+1.0 Temp						
1.2 Dead+1.0 Wind 120	81.60	8.61	4.88	428.54	-687.46	3.32
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 135	81.60	6.96	6.84	593.78	-548.67	4.99
deg+1.0 Ice+1.0 Temp	01.60	4.00	0.20	515.50	271.00	. 22
1.2 Dead+1.0 Wind 150	81.60	4.88	8.30	717.52	-371.80	6.33
deg+1.0 Ice+1.0 Temp	01.60	0.00	0.50	021.20	44.00	
1.2 Dead+1.0 Wind 180	81.60	0.00	9.52	821.38	44.39	7.65
deg+1.0 Ice+1.0 Temp	01.60	4.00	0.20	717.51	160.57	6.02
1.2 Dead+1.0 Wind 210	81.60	-4.88	8.30	717.51	460.57	6.92
deg+1.0 Ice+1.0 Temp 1.2 Dead+1.0 Wind 225	81.60	-6.88	6.75	587.80	631.46	5.83
deg+1.0 Ice+1.0 Temp	81.00	-0.00	0.73	367.60	031.40	3.63
1.2 Dead+1.0 Wind 240	81.60	-8.61	4.88	428.54	776.22	4.34
deg+1.0 Ice+1.0 Temp	01.00	-0.01	4.00	420.54	770.22	7.57
1.2 Dead+1.0 Wind 270	81.60	-9.76	-0.00	18.78	876.75	0.59
deg+1.0 Ice+1.0 Temp	01.00	7.70	0.00	10.70	070.75	0.57
1.2 Dead+1.0 Wind 300	81.60	-8.40	-4.76	-382.52	761.58	-3.32
deg+1.0 Ice+1.0 Temp	01.00	0.10	1.70	302.32	701.50	3.32
1.2 Dead+1.0 Wind 315	81.60	-6.88	-6.75	-550.23	631.47	-5.00
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 330	81.60	-4.88	-8.30	-679.95	460.58	-6.34
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	21.59	0.00	-7.11	-589.96	4.95	-3.74
Dead+Wind 30 deg - Service	21.59	3.55	-5.87	-490.84	-301.44	-4.55
Dead+Wind 45 deg - Service	21.59	4.98	-4.75	-397.86	-425.63	-4.50
Dead+Wind 60 deg - Service	21.59	6.05	-3.33	-279.09	-519.09	-4.14
Dead+Wind 90 deg - Service	21.59	7.09	0.00	1.11	-607.83	-2.62
Dead+Wind 120 deg - Service	21.59	6.43	3.55	296.64	-545.66	-0.40
Dead+Wind 135 deg - Service	21.59	5.13	4.91	410.92	-436.49	0.79
Dead+Wind 150 deg - Service	21.59	3.55	5.87	493.06	-301.44	1.92
Dead+Wind 180 deg - Service	21.59	0.00	6.67	561.50	4.95	3.74
Dead+Wind 210 deg - Service	21.59	-3.55	5.87	493.05	311.34	4.56
Dead+Wind 225 deg - Service	21.59	-4.98	4.75	400.07	435.55	4.50
Dead+Wind 240 deg - Service	21.59	-6.43	3.55	296.64	555.57	4.14
Dead+Wind 270 deg - Service	21.59	-7.09	0.00	1.11	617.73	2.62
Dead+Wind 300 deg - Service	21.59	-6.05	-3.33	-279.09	528.99	0.40
Dead+Wind 315 deg - Service	21.59	-4.98	-4.75	-397.86	435.54	-0.79
Dead+Wind 330 deg - Service	21.59	-3.55	-5.87	-490.84	311.34	-1.93

Solution Summary

Centek Engineering Inc. 63-2 North Branford Rd.

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Client	Verizon	Designed by TJL

		m of Applied Forces	5		Sum of Reaction		
Load	PX	PY	PZ	PX	PY	PZ	% Error
Comb.	K	<u>K</u>	<u>K</u>	<u>K</u>	<u>K</u>	<u>K</u>	0.0000/
1	0.00	-21.59	0.00	0.00	21.59	0.00	0.000%
2	0.00	-25.91	-35.92	0.00	25.91	35.92	0.000%
3	0.00	-19.43	-35.92	0.00	19.43	35.92	0.000%
4	17.93	-25.91	-29.62	-17.93	25.91	29.62	0.000%
5	17.93	-19.43	-29.62	-17.93	19.43	29.62	0.000%
6	25.15	-25.91	-23.99	-25.15	25.91	23.99	0.000%
7	25.15	-19.43	-23.99	-25.15	19.43	23.99	0.000%
8	30.56	-25.91	-16.82	-30.56	25.91	16.82	0.000%
9	30.56	-19.43	-16.82	-30.56	19.43	16.82	0.000%
10	35.85	-25.91	0.00	-35.85	25.91	0.00	0.000%
11	35.85	-19.43	0.00	-35.85	19.43	0.00	0.000%
12	32.53	-25.91	17.96	-32.53	25.91	-17.96	0.000%
13	32.53	-19.43	17.96	-32.53	19.43	-17.96	0.000%
14	25.96	-25.91	24.79	-25.96	25.91	-24.79	0.000%
15	25.96	-19.43	24.79	-25.96	19.43	-24.79	0.000%
16	17.93	-25.91	29.62	-17.93	25.91	-29.62	0.000%
17	17.93	-19.43	29.62	-17.93	19.43	-29.62	0.000%
18	0.00	-25.91	33.64	-0.00	25.91	-33.64	0.000%
19	0.00	-19.43	33.64	-0.00	19.43	-33.64	0.000%
20	-17.93	-25.91	29.62	17.93	25.91	-29.62	0.000%
21	-17.93	-19.43	29.62	17.93	19.43	-29.62	0.000%
22	-25.15	-25.91	23.99	25.15	25.91	-23.99	0.000%
23	-25.15	-19.43	23.99	25.15	19.43	-23.99	0.000%
24	-32.53	-25.91	17.96	32.53	25.91	-17.96	0.000%
25	-32.53	-19.43	17.96	32.53	19.43	-17.96	0.000%
26	-35.85	-25.91	0.00	35.85	25.91	0.00	0.000%
27	-35.85	-19.43	0.00	35.85	19.43	0.00	0.000%
28	-30.56	-25.91	-16.82	30.56	25.91	16.82	0.000%
29	-30.56	-19.43	-16.82	30.56	19.43	16.82	0.000%
30	-25.15	-25.91	-23.99	25.15	25.91	23.99	0.000%
31	-25.15	-19.43	-23.99	25.15	19.43	23.99	0.000%
32	-17.93	-25.91	-29.62	17.93	25.91	29.62	0.000%
33	-17.93	-19.43	-29.62	17.93	19.43	29.62	0.000%
34	0.00	-81.60	0.00	-0.00	81.60	0.00	0.000%
35	0.00	-81.60	-9.76	-0.00	81.60	9.76	0.000%
36	4.88	-81.60	-8.30	-4.88	81.60	8.30	0.000%
37	6.88	-81.60	-6.75	-6.88	81.60	6.75	0.000%
38	8.40	-81.60	-4.76	-8.40	81.60	4.76	0.000%
39	9.76	-81.60	0.00	-9.76	81.60	0.00	0.000%
40	8.61	-81.60	4.88	-8.61	81.60	-4.88	0.000%
41	6.96	-81.60	6.84	-6.96	81.60	-6.84	0.000%
42	4.88	-81.60	8.30	-4.88	81.60	-8.30	0.000%
43	0.00	-81.60	9.52	-0.00	81.60	-9.52	0.000%
44	-4.88	-81.60	8.30	4.88	81.60	-8.30	0.000%
45	-6.88	-81.60	6.75	6.88	81.60	-6.75	0.000%
46	-8.61	-81.60	4.88	8.61	81.60	-4.88	0.000%
47	-9.76	-81.60	0.00	9.76	81.60	0.00	0.000%
48	-8.40	-81.60	-4.76	8.40	81.60	4.76	0.000%
49	-6.88	-81.60	-6.75	6.88	81.60	6.75	0.000%
50	-4.88	-81.60	-8.30	4.88	81.60	8.30	0.000%
51	0.00	-21.59	-7.11	0.00	21.59	7.11	0.000%
52	3.55	-21.59	-5.87	-3.55	21.59	5.87	0.000%
53	4.98	-21.59	-4.75	-4.98	21.59	4.75	0.000%
54	6.05	-21.59	-3.33	-6.05	21.59	3.33	0.000%
55	7.09	-21.59	0.00	-7.09	21.59	0.00	0.000%
56	6.43	-21.59	3.55	-6.43	21.59	-3.55	0.000%
57	5.13	-21.59	4.91	-5.13	21.59	-4.91	0.000%
58	3.55	-21.59	5.87	-3.55	21.59	-5.87	0.000%
59	0.00	-21.59	6.67	0.00	21.59	-5.67 -6.67	0.000%
	0.00						
60	-3.55	-21.59	5.87	3.55	21.59	-5.87	0.000%

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	Su	m of Applied Forces	5		Sum of Reaction	S	
Load	PX	PY	PZ	PX	PY	PZ	% Error
Comb.	K	K	K	K	K	K	
62	-6.43	-21.59	3.55	6.43	21.59	-3.55	0.000%
63	-7.09	-21.59	0.00	7.09	21.59	0.00	0.000%
64	-6.05	-21.59	-3.33	6.05	21.59	3.33	0.000%
65	-4.98	-21.59	-4.75	4.98	21.59	4.75	0.000%
66	-3.55	-21.59	-5.87	3.55	21.59	5.87	0.000%

Non-Linear Convergence Results

Load	Converged?	Number	Displacement	Force	
Combination		of Cycles	Tolerance	Tolerance	
1	Yes	4	0.00000001	0.00000001	
2	Yes	4	0.00000001	0.00000001	
3	Yes	4	0.00000001	0.00000001	
4	Yes	4	0.00000001	0.00000001	
5	Yes	4	0.00000001	0.00000001	
6	Yes	4	0.00000001	0.00000001	
7	Yes	4	0.00000001	0.00000001	
8	Yes	4	0.00000001	0.00000001	
9	Yes	4	0.00000001	0.00000001	
10	Yes	4	0.00000001	0.00000001	
11	Yes	4	0.00000001	0.00000001	
12	Yes	4	0.00000001	0.00000001	
13	Yes	4	0.00000001	0.00000001	
14	Yes	4	0.00000001	0.00000001	
15	Yes	4	0.00000001	0.00000001	
16	Yes	4	0.00000001	0.00000001	
17	Yes	4	0.00000001	0.00000001	
18	Yes	4	0.00000001	0.00000001	
19	Yes	4	0.00000001	0.00000001	
20	Yes	4	0.00000001	0.00000001	
21	Yes	4	0.00000001	0.00000001	
22	Yes	4	0.00000001	0.00000001	
23	Yes	4	0.00000001	0.00000001	
24	Yes	4	0.00000001	0.00000001	
25	Yes	4	0.00000001	0.00000001	
26	Yes	4	0.00000001	0.00000001	
27	Yes	4	0.00000001	0.00000001	
28	Yes	4	0.00000001	0.00000001	
29	Yes	4	0.00000001	0.00000001	
30	Yes	4	0.00000001	0.00000001	
31	Yes	4	0.00000001	0.00000001	
32	Yes	4	0.00000001	0.00000001	
33	Yes	4	0.00000001	0.00000001	
34	Yes	4	0.00000001	0.00000001	
35	Yes	4	0.00000001	0.00000543	
36	Yes	4	0.00000001	0.00000552	
37	Yes	4	0.00000001	0.00000561	
38	Yes	4	0.00000001	0.00000565	
39	Yes	4	0.00000001	0.00000555	
40	Yes	4	0.00000001	0.00000539	
41	Yes	4	0.00000001	0.00000536	
42	Yes	4	0.00000001	0.00000538	
43	Yes	4	0.00000001	0.00000544	
44	Yes	4	0.00000001	0.00000541	
45	Yes	4	0.00000001	0.00000539	
46	Yes	4	0.00000001	0.00000545	

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47	Yes	4	0.00000001	0.00000564
48	Yes	4	0.00000001	0.00000573
49	Yes	4	0.00000001	0.00000569
50	Yes	4	0.00000001	0.00000559
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	0.0000001	0.00000001
56	Yes	4	0.00000001	0.00000001
57	Yes	4	0.00000001	0.00000001
58	Yes	4	0.0000001	0.00000001
59	Yes	4	0.00000001	0.00000001
60	Yes	4	0.0000001	0.00000001
61	Yes	4	0.0000001	0.00000001
62	Yes	4	0.00000001	0.00000001
63	Yes	4	0.0000001	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	Elevation	Horz.	Gov.	Tilt	Twist
No.		Deflection	Load		
	ft	in	Comb.	0	0
T1	150 - 140	3.425	56	0.1878	0.1004
T2	140 - 120	3.036	56	0.1875	0.1002
T3	120 - 100	2.280	62	0.1755	0.0828
T4	100 - 80	1.580	62	0.1506	0.0434
T5	80 - 60	0.996	62	0.1194	0.0211
T6	60 - 40	0.548	62	0.0841	0.0103
T7	40 - 20	0.235	62	0.0550	0.0042
T8	20 - 0	0.059	62	0.0234	0.0017

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov.	Deflection	Tilt	Twist	Radius of
		Load				Curvature
ft		Comb.	in	0	0	ft
140.00	SC323-HF2LDF	56	3.036	0.1875	0.1002	404325
138.00	SE-414	56	2.958	0.1870	0.0997	308461
135.00	BA40-41	56	2.842	0.1860	0.0985	203977
132.00	SE4192	62	2.728	0.1846	0.0966	150767
120.00	SitePro VFA12-HD	62	2.280	0.1755	0.0828	73017
105.00	CSA40-67	62	1.747	0.1576	0.0528	40395
80.00	SC381HF3LDF	62	0.996	0.1194	0.0211	34086
70.00	SG101-SFXSNM	62	0.755	0.1014	0.0150	34673

Maximum Tower Deflections - Design Wind

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Section	Elevation	Horz.	Gov.	Tilt	Twist
No.		Deflection	Load		
	ft	in	Comb.	0	0
T1	150 - 140	17.530	12	0.9515	0.5222
T2	140 - 120	15.536	12	0.9501	0.5211
T3	120 - 100	11.625	24	0.8941	0.4301
T4	100 - 80	8.023	24	0.7714	0.2245
T5	80 - 60	5.041	24	0.6080	0.1083
T6	60 - 40	2.765	24	0.4257	0.0522
T7	40 - 20	1.187	24	0.2777	0.0215
T8	20 - 0	0.296	24	0.1179	0.0088

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load	Deflection	Tilt	Twist	Radius of Curvature
ft		Comb.	in	0	0	ft
140.00	SC323-HF2LDF	12	15.536	0.9501	0.5211	104089
138.00	SE-414	12	15.138	0.9481	0.5184	73203
135.00	BA40-41	12	14.543	0.9435	0.5120	46298
132.00	SE4192	24	13.951	0.9371	0.5026	33016
120.00	SitePro VFA12-HD	24	11.625	0.8941	0.4301	15156
105.00	CSA40-67	24	8.875	0.8069	0.2737	7979
80.00	SC381HF3LDF	24	5.041	0.6080	0.1083	6670
70.00	SG101-SFXSNM	24	3.814	0.5146	0.0762	6770

Bolt Design Data

Section	Elevation	Component	Bolt	Bolt Size	Number	Maximum	Allowable	Ratio	Allowable	Criteria
No.		Type	Grade		Of	Load	Load	Load	Ratio	
	ft			in	Bolts	per Bolt	per Bolt	Allowable		
						K	K			
T1	150	Leg	A325N	0.7500	4	0.17	29.82	0.006	1	Bolt Tension
		Diagonal	A325N	0.7500	1	0.47	7.18	0.066	1	Member Bearing
		Top Girt	A325N	0.7500	1	0.13	9.46	0.014	1	Member Bearing
T2	140	Leg	A325N	0.7500	6	3.56	29.82	0.119	1	Bolt Tension
		Diagonal	A325N	0.7500	1	8.77	17.89	0.490	1	Bolt Shear
T3	120	Leg	A325N	0.7500	8	7.24	29.82	0.243	1	Bolt Tension
		Diagonal	A325N	0.7500	1	8.95	10.77	0.832	1	Member Bearing
T4	100	Leg	A325N	0.7500	8	11.17	29.82	0.374	1	Bolt Tension
		Diagonal	A325N	0.7500	1	7.42	10.77	0.689	1	Member Bearing
T5	80	Leg	A325N	0.7500	8	14.91	29.82	0.500	1	Bolt Tension
		Diagonal	A325N	0.7500	1	6.68	10.77	0.620	1	Member Bearing
T6	60	Leg	A325N	1.0000	6	24.43	53.01	0.461	1	Bolt Tension
		Diagonal	A325N	0.7500	1	6.52	10.77	0.606	1	Member Bearing
T7	40	Leg	A325N	1.0000	6	28.05	53.01	0.529	1	Bolt Tension
		Diagonal	A325N	1.0000	1	7.50	16.86	0.445	1	Member Bearing
Т8	20	Leg	F1554-10	1.2500	6	31.80	86.29	0.369	1	Bolt Tension

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Section No.	Elevation	Component Type	Bolt Grade	Bolt Size	Number Of	Maximum Load	Allowable Load	Ratio Load	Allowable Ratio	Criteria
	ft			in	Bolts	per Bolt K	per Bolt K	Allowable		
		Diagonal	5 A325N	1.0000	1	8.53	16.86	0.506	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	$Ratio$ P_u
	ft		ft	ft		in^2	K	K	ϕP_n
T1	150 - 140	P2.5x.203	10.00	5.00	63.3 K=1.00	1.7040	-0.94	57.19	0.016 1
T2	140 - 120	P4x.237	20.00	6.67	53.0 K=1.00	3.1741	-23.36	116.32	0.201 1
Т3	120 - 100	P5x.258	20.03	6.68	42.7 K=1.00	4.2999	-65.03	169.37	0.384 1
T4	100 - 80	P5x.258	20.03	6.68	42.7 K=1.00	4.2999	-99.10	169.37	0.585 1
T5	80 - 60	P5x.258	20.03	6.68	42.7 K=1.00	4.2999	-132.75	169.37	0.784 ¹
Т6	60 - 40	P6x.28	20.03	6.68	35.7 K=1.00	5.5813	-163.52	228.83	0.715 1
T7	40 - 20	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	20.03	10.02	37.5 K=1.00	5.3014	-188.68	245.62	0.768 ¹
Т8	20 - 0	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	20.03	10.02	31.9 K=1.00	7.2158	-215.64	345.60	0.624 1

¹ P_u / ϕP_n controls

Truss-Leg Diagonal Data

Section	Elevation	Diagonal Size	L_d	Kl/r	ϕP_n	A_{\perp}	V_u	ϕV_n	Stress
No.	ft		ft		K	in^2	K	K	Ratio
T7	40 - 20	0.5	1.46	140.4	276.74	0.1963	0.60	2.53	0.239
									/
T8	20 - 0	0.5	1.44	138.4	376.67	0.1963	0.88	2.62	0.337
									✓

Diagonal Design Data (Compression)

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Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio P_u
	ft		ft	ft		in^2	K	K	ϕP_n
T1	150 - 140	L2x2x1/8	7.07	3.22	102.9 K=1.06	0.4844	-0.46	8.85	0.052 1
T2	140 - 120	L3x3x5/16	8.33	3.71	86.7 K=1.15	1.7800	-8.77	38.84	0.226 1
Т3	120 - 100	L2 1/2x2 1/2x3/16	8.54	4.06	103.9 K=1.05	0.9020	-9.31	16.56	0.562 1
T4	100 - 80	L2 1/2x2 1/2x3/16	10.94	5.24	127.0 K=1.00	0.9020	-6.58	12.50	0.526 1
T5	80 - 60	L2 1/2x2 1/2x3/16	12.58	6.07	147.1 K=1.00	0.9020	-6.56	9.42	0.697 ¹
T6	60 - 40	L3x3x3/16	14.32	6.89	138.7 K=1.00	1.0900	-6.34	12.80	0.495 1
Т7	40 - 20	L3x3x5/16	17.62	8.34	169.9 K=1.00	1.7800	-7.81	13.94	0.560 1
Т8	20 - 0	L3 1/2x3 1/2x5/16	19.30	9.19	159.8 K=1.00	2.0900	-9.25	18.49	0.500 1

¹ P_u / ϕP_n controls

	Top Girt Design Data (Compression)								
Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio P.,
	ft		ft	ft		in^2	K	K	ϕP_n
T1	150 - 140	L2x2x3/16	5.00	4.49	136.7 K=1.00	0.7150	-0.14	8.64	0.016 1

¹ P_u / ϕP_n controls

Tension Checks

			Leg Des	sign C	ata (Tensio	n)		
Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio P _u
	ft		ft	ft		in^2	K	K	ϕP_n
T1	150 - 140	P2.5x.203	10.00	5.00	63.3	1.7040	0.70	76.68	0.009 1
T2	140 - 120	P4x.237	20.00	6.67	53.0	3.1741	21.38	142.83	0.150 1
Т3	120 - 100	P5x.258	20.03	6.68	42.7	4.2999	57.95	193.49	0.300 1
T4	100 - 80	P5x.258	20.03	6.68	42.7	4.2999	89.34	193.49	0.462 1
T5	80 - 60	P5x.258	20.03	6.68	42.7	4.2999	119.29	193.49	0.616 1

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Section No.	Elevation	Size	L	L_u	Kl/r	Α	P_u	ϕP_n	Ratio P_u
	ft		ft	ft		in^2	K	K	ϕP_n
									~
T6	60 - 40	P6x.28	20.03	6.68	35.7	5.5813	146.60	251.16	0.584^{-1}
									/
T7	40 - 20	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	20.03	10.02	37.5	5.3014	168.30	276.74	0.608 1
Т8	20 - 0	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	20.03	10.02	31.9	7.2158	190.80	376.67	0.507 1

¹ P_u / ϕP_n controls

			Truss-	Leg D	iagon	al Data	1		
Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	$\phi P_n \ K$	A in ²	$V_u \ K$	$\phi V_n \ K$	Stress Ratio
Т7	40 - 20	0.5	1.46	140.4	276.74	0.1963	0.60	2.53	0.239
Т8	20 - 0	0.5	1.44	138.4	376.67	0.1963	0.88	2.62	0.337

Section No.	Elevation	Size	L	L_u	Kl/r	Α	P_u	ϕP_n	$Ratio$ P_u
	ft		ft	ft		in^2	K	K	ϕP_n
T1	150 - 140	L2x2x1/8	7.07	3.22	64.5	0.4844	0.47	15.69	0.030 1
T2	140 - 120	L3x3x5/16	8.33	3.71	50.2	1.7800	8.41	57.67	0.146 ¹
Т3	120 - 100	L2 1/2x2 1/2x3/16	8.54	4.06	64.9	0.9020	8.95	29.22	0.306 1
T4	100 - 80	L2 1/2x2 1/2x3/16	9.91	4.74	75.4	0.9020	7.42	29.22	0.254 1
T5	80 - 60	L2 1/2x2 1/2x3/16	11.47	5.52	87.4	0.9020	6.68	29.22	0.229 1
Т6	60 - 40	L3x3x3/16	13.73	6.60	86.2	1.0900	6.52	35.32	0.185 ¹
T7	40 - 20	L3x3x5/16	17.62	8.34	110.7	1.7800	7.50	57.67	0.130 ¹
T8	20 - 0	L3 1/2x3 1/2x5/16	19.30	9.19	104.0	2.0900	8.53	67.72	0.126 ¹

¹ P_u / ϕP_n controls

Centek Engineering Inc.

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Job		Page
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Project		Date
	150' Lattice Tower - Madison, CT	12:16:24 02/25/22
Client	Verizon	Designed by
		IJL

	Top Girt Design Data (Tension)										
Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio P _u		
	ft		ft	ft		in^2	K	K	ϕP_n		
T1	150 - 140	L2x2x3/16	5.00	4.49	92.6	0.7150	0.13	23.17	0.006 1		

¹ P_u / ϕP_n controls

Section Capacity Table

Section	Elevation	Component	Size	Critical	P	ϕP_{allow}	%	Pass
No.	ft	Type		Element	K	K	Capacity	Fail
T1	150 - 140	Leg	P2.5x.203	2	-0.94	57.19	1.6	Pass
T2	140 - 120	Leg	P4x.237	20	-23.36	116.32	20.1	Pass
T3	120 - 100	Leg	P5x.258	41	-65.03	169.37	38.4	Pass
T4	100 - 80	Leg	P5x.258	62	-99.10	169.37	58.5	Pass
T5	80 - 60	Leg	P5x.258	82	-132.75	169.37	78.4	Pass
T6	60 - 40	Leg	P6x.28	103	-163.52	228.83	71.5	Pass
Т7	40 - 20	Leg	#12ZG - 1.50" - 1.00" conn. (Pirod 207629)	124	-188.68	245.62	76.8	Pass
Т8	20 - 0	Leg	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	139	-215.64	345.60	62.4	Pass
T1	150 - 140	Diagonal	L2x2x1/8	11	-0.46	8.85	5.2 6.6 (b)	Pass
T2	140 - 120	Diagonal	L3x3x5/16	24	-8.77	38.84	22.6 49.0 (b)	Pass
Т3	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	57	-9.31	16.56	56.2 83.2 (b)	Pass
T4	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	66	-6.58	12.50	52.6 68.9 (b)	Pass
T5	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	90	-6.56	9.42	69.7	Pass
T6	60 - 40	Diagonal	L3x3x3/16	110	-6.34	12.80	49.5 60.6 (b)	Pass
T7	40 - 20	Diagonal	L3x3x5/16	132	-7.81	13.94	56.0	Pass
Т8	20 - 0	Diagonal	L3 1/2x3 1/2x5/16	147	-9.25	18.49	50.0 50.6 (b)	Pass
T1	150 - 140	Top Girt	L2x2x3/16	6	-0.14	8.64	1.6 Summary	Pass
						Leg (T5)	78.4	Pass
						Diagonal (T3)	83.2	Pass
						Top Girt (T1)	1.6	Pass
						Bolt Checks	83.2	Pass
						RATING =	83.2	Pass

 $Program\ Version\ 8.1.1.0-6/3/2021\ File: J: Jobs/2008300. WI/14_Madison\ 6\ CT/04_Structural/Tower\ Analysis/Backup\ Documentation/Rev\ (1)/ERI\ Files/150-ft\ Valmont\ Lattice\ Tower.eri$



Subject: FOUNDATION ANALYSIS

Location: Madison, CT

Prepared by: T.J.L. Checked by: C.F.C.

Rev. 0: 5/13/21 Job No. 20083.14

Pier and Mat Foundation Analysis:

Input Data:

OM := 3173-ft-kips	(User Input from tnxTow	ver)
$S_t := 37 \cdot kip$	(User Input from tnxTow	ver)
$WT_t := 26 \cdot kip$	(User Input from tnxTow	ver)
$C_t := 224 \cdot kip$	(User Input from tnxTow	ver)
$U_{t} := 198 \cdot kip$	(User Input from tnxTow	ver)
$H_t := 150 \cdot ft$	(User Input)	
$W_t := 17 \cdot ft$	(User Input)	
Pos _t := 1	(User Input)	
$D_f := 6.5 \cdot ft$	(User Input)	
L _p := 5.5⋅ft	(User Input)	
L _{pag} := 0.5·ft	(User Input)	
$d_p := 3.5 \cdot ft$	(User Input)	
$T_f := 1.5 \cdot ft$	(User Input)	
$W_f := 25.0 \cdot ft$	(User Input)	
f _C := 4500·psi	(User Input)	
$f_y := 60000 \cdot psi$	(User Input)	
$\Phi_{\rm S} \coloneqq 30{\cdot}{\rm deg}$	(User Input)	
$\textbf{q}_{\textbf{S}} \coloneqq 4000 \cdotp \textbf{psf}$	(User Input)	
$\gamma_{\text{soil}} \coloneqq 100 \cdot \text{pcf}$	(User Input)	
$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Bouyancy := 0	(User Input)	(Yes=1 / No=0)
$n := 0 \cdot ft$	(User Input)	
$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Z := 2	(User Input)	(UBC-1997 Fig 23-2)
$\mu \coloneqq 0.45$	(User Input)	
	$S_t \coloneqq 37 \cdot \text{kip}$ $WT_t \coloneqq 26 \cdot \text{kip}$ $C_t \coloneqq 224 \cdot \text{kip}$ $U_t \coloneqq 198 \cdot \text{kip}$ $H_t \coloneqq 150 \cdot \text{ft}$ $W_t \coloneqq 17 \cdot \text{ft}$ $Pos_t \coloneqq 1$ $D_f \coloneqq 6.5 \cdot \text{ft}$ $L_p \coloneqq 5.5 \cdot \text{ft}$ $L_{pag} \coloneqq 0.5 \cdot \text{ft}$ $d_p \coloneqq 3.5 \cdot \text{ft}$ $T_f \coloneqq 1.5 \cdot \text{ft}$ $W_f \coloneqq 25.0 \cdot \text{ft}$ $f_c \coloneqq 4500 \cdot \text{psi}$ $f_y \coloneqq 60000 \cdot \text{psi}$ $f_y \coloneqq 60000 \cdot \text{psi}$ $\phi_s \coloneqq 30 \cdot \text{deg}$ $q_s \coloneqq 4000 \cdot \text{psf}$ $\gamma_{soil} \coloneqq 100 \cdot \text{pcf}$ $\gamma_{conc} \coloneqq 150 \cdot \text{pcf}$ $Bouyancy \coloneqq 0$ $n \coloneqq 0 \cdot \text{ft}$ $c \coloneqq 0 \cdot \text{ksf}$ $Z \coloneqq 2$	$S_t \coloneqq 37 \text{-kip} \qquad \text{(User Input from inxTow)} \\ WT_t \coloneqq 26 \text{-kip} \qquad \text{(User Input from inxTow)} \\ C_t \coloneqq 224 \text{-kip} \qquad \text{(User Input from inxTow)} \\ U_t \coloneqq 198 \text{-kip} \qquad \text{(User Input)} \\ W_t \coloneqq 150 \text{-ft} \qquad \text{(User Input)} \\ W_t \coloneqq 17 \text{-ft} \qquad \text{(User Input)} \\ Pos_t \coloneqq 1 \qquad \text{(User Input)} \\ L_p \coloneqq 5.5 \text{-ft} \qquad \text{(User Input)} \\ L_{pag} \coloneqq 0.5 \text{-ft} \qquad \text{(User Input)} \\ W_f \coloneqq 25.0 \text{-ft} \qquad \text{(User Input)} \\ W_f \coloneqq 25.0 \text{-ft} \qquad \text{(User Input)} \\ f_v \coloneqq 60000 \text{-psi} \qquad \text{(User Input)} \\ \phi_s \coloneqq 30 \text{-deg} \qquad \text{(User Input)} \\ \phi_s \coloneqq 30 \text{-deg} \qquad \text{(User Input)} \\ \phi_s \coloneqq 4000 \text{-psi} \qquad \text{(User Input)} \\ \phi_s \coloneqq 4000 \text{-psi} \qquad \text{(User Input)} \\ \phi_{conc} \coloneqq 150 \text{-pcf} \qquad \text{(User Input)} \\ \theta_{conc} \coloneqq 150 \text{-pcf} \qquad \text{(User Input)} \\ \theta_{conc} \coloneqq 150 \text{-pcf} \qquad \text{(User Input)} \\ \theta_{conc} \coloneqq 0 \text{-ft} \qquad \text{(User Input)} $



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Subject:

Rev. 0: 5/13/21

FOUNDATION ANALYSIS

Location: Madison, CT

Prepared by: T.J.L. Checked by: C.F.C. Job No. 20083.14

Pier Reinforcement:

<u>Pier Reinforcement:</u>			
Bar Size =	BS _{pier} := 7	(User Input)	
Bar Diameter =	d _{bpier} := 0.875⋅in	(User Input)	
Number of Bars =	NB _{pier} := 16	(User Input)	
Clear Cover of Reinforcement =	Cvr _{pier} := 3⋅in	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} \coloneqq 1.0$	(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 =	$\gamma_{pier} \coloneqq 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	d _{Tie} := 4⋅in	(User Input)	
Pad Reinforcement:			
Bar Size =	BS _{top} := 6	(User Input)	(Top of Pad)
Bar Diameter =	d _{btop} := 0.75⋅in	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} = 53$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} = 6$	(User Input)	(Bottom of Pad)
Bar Diameter =	d _{bbot} := 0.75⋅in	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} = 53$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	Cvr _{pad} := 3.0·in	(User Input)	
Reinforcement Location Factor =	$lpha_{ m pad}$:= 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 =	$\gamma_{pad} \coloneqq 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:	2
Pier Reinforcement Bar Area =	$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.601 \cdot in^2$
Pad Top Reinforcement Bar Area =	$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.442 \cdot in^2$
Pad Bottom Reinforcement Bar Area =	$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.442 \cdot in^2$
Coefficient of Lateral Soil Pressure =	$K_{p} \coloneqq \frac{1 + sin(\Phi_{s})}{1 - sin(\Phi_{s})} = 3$

Load Factor = LF := 1 Centered on Solutions www.centekeng.com Branford, CT 06405

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Stability of Footing:

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

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

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

> > $P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.5 \cdot ksf$

 $P_{top} := if n < (D_f - T_f), P_{pt}, P_{pn} = 1.5 \cdot ksf$

 $P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.95 \cdot ksf$

 $P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.725 \cdot ksf$

 $T_{n} := if \left[n < \left(D_{f} - T_{f} \right), T_{f}, \left(D_{f} - n \right) \right] = 1.5 \cdot ft$

 $A_n := W_f \cdot T_n = 37.5 \cdot ft^2$

 $S_u := P_{ave} \cdot A_p = 64.688 \cdot kip$ Ultimate Shear =

 $WT_{c} := \left| \left(W_{f}^{2} \cdot T_{f} \right) + (3) \cdot \left(\frac{d_{p}^{2} \cdot \pi}{4} L_{p} \right) \right| \cdot \gamma_{c} = 164.437 \cdot \text{kip}$ Weight of Concrete =

 $WT_{S1} := \left| W_f^2 - (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4} \right) \right| \cdot \left(\left| L_p - L_{pag} - n \right| \right) \right| \cdot \gamma_s = 298.07 \cdot \text{kip}$ Weight of Soil Above Footing =

> $X_{t1} \coloneqq \left\lceil \frac{\mathsf{W}_f}{2} - \frac{\left(\mathsf{W}_t \cdot \cos(30 \cdot \text{deg})\right)}{2} \right\rceil \qquad \qquad X_{t2} \coloneqq \frac{\mathsf{W}_f}{2} - \frac{\left(\mathsf{W}_t \cdot \cos(30 \cdot \text{deg})\right)}{3}$ Tower Offset = $X_t := if(Pos_t = 1, X_{t1}, X_{t2}) = 5.139$

> > $X_{\text{off1}} := \frac{W_f}{2} - \left[\frac{\left(W_f \cdot \cos(30 \cdot \text{deg})\right)}{3} + X_f \right] = 2.454$

 $X_{\text{off}} := if(Pos_t = 1, X_{\text{off1}}, X_{\text{off2}})$ $X_{\text{off}} = 2.454 \cdot \text{ft}$

 $WT_{tot} := 0.9WT_{c} + 0.75WT_{s1} = 371.5 \cdot kip$ Total Weight =

 $M_{f} := (WT_{tot}) \cdot \frac{W_{f}}{2} + 0.9WT_{t} \cdot \left(\frac{W_{f}}{2} - X_{off}\right) + 0.75 \cdot \left(S_{u} \cdot \frac{T_{p}}{3}\right) = 4904 \cdot \text{kip-ft}$ Resisting Moment =

> $M_{ot} := OM + S_t \cdot (L_D + T_f) = 3432 \cdot kip \cdot ft$ Overturning Moment =

 $FS := \frac{M_r}{M} = 1.43$ Factor of SafetyActual =

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

OverTurning_Moment_Check = "Okay"

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Shear Capacity in Pier:

Shear Resistance of Pier =

$$S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 231.883 \cdot kips$$

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

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Load =

$$\mathsf{Load}_{tot} \coloneqq \mathsf{WT}_c + \mathsf{WT}_{s1} + \mathsf{WT}_t = \mathsf{489} \cdot \mathsf{kip}$$

Area of the Mat =

$$A_{mat} := W_f^2 = 625$$

Section Modulus of Mat =

$$S := \frac{W_f^3}{6} = 2604.17 \cdot ft^3$$

Maximum Pressure in Mat =

$$P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 2.099 \cdot ksf$$

 $Max_Pressure_Check := if \Big(P_{max} < 0.75q_{s}, "Okay" \, , "No \ Good" \, \Big)$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat =

$$P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.536 \cdot ksf$$

 $\label{eq:min_Pressure_Check} \begin{aligned} \text{Min_Pressure_Check} \coloneqq \text{if} \bigg[\Big(P_{\mbox{min}} \geq 0 \Big) \cdot \Big(P_{\mbox{min}} < 0.75 q_{\mbox{\scriptsize S}} \Big), \\ \text{"Okay"} \ , \\ \text{"No Good"} \bigg] \end{aligned}$

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution =

$$X_p := \frac{\frac{P_{max}}{P_{max} - P_{min}} \cdot \frac{1}{3} = 6.638$$

Distance to Kern =

$$X_k := \frac{W_f}{6} = 4.167$$

 $X_k := \frac{W_f}{6} = 4.167$ Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity =

$$e := \frac{M_{ot}}{Load_{tot}} = 7.026$$

Adjusted Soil Pressure =

$$P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 2.38 \cdot ksf$$

$$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 2.38 \cdot ksf$$

Pressure_Check := if(qadi < 0.75qs, "Okay", "No Good")

Pressure_Check = "Okay"

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Concrete Bearing Capacity:

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Strength Reduction Factor =

 $\Phi_{\rm C} := 0.65$

(ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad =

 $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 3.445 \times 10^3 \cdot \text{kips}$

(ACI-2008 10.14)

 $\text{Bearing_Check} \coloneqq \text{if} \Big(\text{P}_b > \text{LF} \cdot \text{C}_t, \text{"Okay"} \,, \text{"No Good"} \Big)$

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)

 $\varphi_{\text{C}} \coloneqq 0.85$

(ACI 9.3.2.5)

$$d := T_f - Cvr_{pad} - d_{bbot} = 14.25 \cdot in$$

$$FL := LF \cdot \frac{C_t}{W_f^2} = 0.358 \cdot ksf$$

$$V_{req} := FL \cdot (X_t - .5 \cdot d_p - d) \cdot W_f = 19.724 \cdot kips$$

$$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 488 \cdot kip$$

(ACI-2008 11.2.1.1)

 $Beam_Shear_Check := if \Big(V_{\mbox{\footnotesize{req}}} < V_{\mbox{\footnotesize{Avail}}}, "\mbox{\footnotesize{Okay"}} \ , "\mbox{\footnotesize{No Good"}} \Big)$

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 =

$$b_0 := (d_0 + d) \cdot \pi = 14.7$$

Area Included Inside Perimeter =

$$A_{bo} := \frac{\pi \cdot \left(d_p + d\right)^2}{4} = 17.3$$

Required Shear Strength =

$$V_{req} := FL \cdot \left(W_f^2 - A_{bo}\right) = 218 \cdot kips$$

Available Shear Strength =

$$V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 574.3 \cdot kip$$

(ACI-2008 11.11.2.1)

 $Punching_Shear_Check := if \Big(V_{\mbox{req}} < V_{\mbox{Avail}}, "Okay" \ , "No \ Good" \ \Big)$

Punching_Shear_Check = "Okay"



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Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor =

$$\varphi_m \coloneqq .90$$

(ACI-2008 9.3.2.1)

Maximum Moment in Pad =

 $M_{max} := 430 \cdot kip \cdot ft$

(User Input)

Design Moment =

$$M_{\text{n}} \coloneqq \frac{\text{LF} \cdot \text{M}_{\text{max}}}{\Phi_{\text{m}}} = 477.778 \cdot \text{kips-ft}$$

$$\beta := \begin{bmatrix} 0.85 & \text{if} & 2500 \cdot psi \leq f_C \leq 4000 \cdot psi \\ 0.65 & \text{if} & f_C > 8000 \cdot psi \\ \hline \\ 0.85 - \boxed{ \left(\frac{f_C}{psi} - 4000 \right) \\ 1000} \cdot 0.5 \end{bmatrix} \text{ otherwise }$$

$$\textbf{b}_{eff} \coloneqq \textbf{W}_t {\cdot} \text{cos(30·deg)} \, + \, \textbf{d}_p = 218.669 {\cdot} \text{in}$$

$$A_s := \frac{M_n}{\left(f_{V} \cdot d\right)} = 6.706 \cdot in^2$$

$$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 0.681 \cdot in$$

$$A_S := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 6.87 \cdot in^2$$

$$\rho := \frac{A_S}{b_{\text{eff}} d} = 0.02646 \cdot \text{in}$$

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Required Reinforcement for Temperature and Shrinkage:

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

Check Bottom Bars:

$$\text{As} := \text{if} \left(\rho \geq \rho_{Sh}, A_S, \rho_{Sh} \cdot \frac{b_{eff}}{2} \cdot d \right) = 6.9 \cdot \text{in}^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 23.4 \cdot in^2$$

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

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$\text{As} := \text{if} \left(\rho \geq \rho_{Sh}, \text{A}_{S}, \rho_{Sh} \cdot \frac{\text{beff}}{2} \cdot \text{d} \right) = 6.9 \cdot \text{in}^2$$

$$\mathsf{As}_{prov} \coloneqq \mathsf{A}_{btop} \cdot \mathsf{NB}_{top} = 23.4 \cdot \mathsf{in}^2$$

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

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$\mathsf{B}_{sPad} \coloneqq \frac{\mathsf{W}_f - 2 \cdot \mathsf{Cvr}_{pad} - \mathsf{NB}_{bot} \cdot \mathsf{d}_{bbot}}{\mathsf{NB}_{bot} - 1} = 4.89 \cdot \mathsf{in}$$

Spacing or Cover Dimension =

$$c := if \left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2} \right) = 2.445 \cdot in$$

Transverse Reinforcement Index =

$$k_{tr} = 0$$

(ACI-2008 12.2.3)

$$L_{dbt} \coloneqq \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 15.4 \cdot in$$

 $L_{dbtCheck} \coloneqq \textit{if} \Big(L_{dbt} \geq L_{dbmin}, \texttt{"Use L.dbt"} \;, \texttt{"Use L.dbmin"} \, \Big) = \texttt{"Use L.dbt"}$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot in$$

(ACI-2008 12.2.1)

Available Length in Pad = $\frac{W_f}{L_{Pad}} = \frac{W_f}{L_{Pad}}$

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

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

Lpad_Check = "Okay"

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Steel Reinforcement in Pier:

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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)

$$A_{sprov} := NB_{pier} \cdot A_{bpier} = 9.62 \cdot in^2$$

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

Steel_Area_Check = "Okay"

Bar Spacing In Pier =

$$B_{\mbox{SPier}} \coloneqq \frac{\mbox{d}_{\mbox{p}} \cdot \pi}{\mbox{NB}_{\mbox{pier}}} - \mbox{d}_{\mbox{bpier}} = 7.372 \cdot \mbox{in}$$

Diameter of Reinforcement Cage =

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

Maximum Moment in Pier =

$$M_p := S_t \cdot (L_p) \cdot LF = 2442 \cdot in \cdot kips$$

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

$$(D \ N \ n \ P_u \ M_{XU}) = (42 \ 16 \ 7 \ 298.592 \ 2.442 \times 10^3)$$

$$\left(\boldsymbol{\varphi} \boldsymbol{P}_{n} \ \boldsymbol{\varphi} \boldsymbol{M}_{xn} \ \boldsymbol{f}_{sp} \ \boldsymbol{\rho} \right) \coloneqq \left(\boldsymbol{0} \ \boldsymbol{0} \ \boldsymbol{0} \ \boldsymbol{0} \right)$$

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

$$\left(\varphi P_{n} \ \varphi M_{\text{XN}} \ f_{\text{SP}} \ \rho \right) = \left(1.646 \times 10^{3} \ 1.346 \times 10^{4} \ -43.622 \ 6.929 \times 10^{-3} \right)$$

$$\label{eq:axial_Load_Check} \text{Axial_Load_Check} := \text{if} \Big(\varphi \textbf{P}_n \geq \textbf{P}_u, \text{"Okay"} \,, \text{"No Good"} \Big)$$

Axial_Load_Check = "Okay"

$$Bending_Check := if\Big(\varphi M_{XN} \geq M_{XU}, "Okay" , "No Good"\Big)$$

Bending_Check = "Okay"

Subject:

FOUNDATION ANALYSIS

Location:

Prepared by: T.J.L. Checked by: C.F.C.

Job No. 20083.14

Madison, CT

Rev. 0: 5/13/21

Development Length Pier Reinforcement:

Available Length in Foundation:

F: (203) 488-8587

$$L_{pier} := L_p - Cvr_{pier} = 63 \cdot in$$

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

<u>Tension:</u> (ACI-2008 12.2.3)

 $\text{Spacing or Cover Dimension} = \\ c := \text{if} \left(\text{Cvr}_{pier} < \frac{\text{B}_{sPier}}{2}, \text{Cvr}_{pier}, \frac{\text{B}_{sPier}}{2} \right) = 3 \text{ in}$

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

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 17.12 \cdot in$$

Minimum Development Length =

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

$$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 10.957 \cdot in \tag{ACI 12.2.1}$$

$$L_{db} := max(L_{dbt}, L_{dbmin}) = 17.12 \cdot in$$

$$\mathsf{L}_{tension_Check} \coloneqq \mathsf{if} \Big(\mathsf{L}_{pier} + \mathsf{L}_{pad} > \mathsf{L}_{dbt}, "\mathsf{Okay"} \,, "\mathsf{No} \,\, \mathsf{Good"} \Big)$$

Compression: (ACI-2008 12.32)

$$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot ps_i}} = 15.652 \cdot in$$

$$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 15.75 \cdot in$$

$$L_{dbc} := if(L_{dbc1} \ge L_{dbmin}, L_{dbc1}, L_{dbmin}) = 15.75 \cdot in$$

$$\label{eq:compression_Check} \textit{L}_{compression_Check} \coloneqq \textit{if} \Big(\textit{L}_{pier} + \textit{L}_{pad} > \textit{L}_{dbc}, \textit{"Okay"} \;, \textit{"No Good"} \Big)$$

L_{compression_Check} = "Okay"



NORTH EAST > North East > New England > New England West > MADISON 6 CT - NU Guyed Tower - B

Cheiban, Ziad - ziad.cheiban@verizonwireless.com - 2/2/2021 18:19:42

Project Details
Carrier Aggregation: false
MPT Id:
eCIP-0: false
Project Name: MADISON 6 CT - New Build
FUZE Project ID: 16426977
Designed Sector Carrier 4G: 18
Designed Sector Carrier 5G: N/A
Additional Sector Carrier 4G: N/A
Additional Sector Carrier 5G: N/A
SiteTraker Project Id:
FP Solution Type & Tech Type: MCR;4G_700,4G_850,4G_AWS,4G_PCS
Suffix: Rev0_2020-02-02

Location Information	
Site ID: 616918149	
E-NodeB ID:	
PSLC: 467391	
Switch Name:	
Tower Owner:	
Tower Type: Self Support (_attice Tower)
Site Type: MACRO	
Street Address: 9 Campus Driv	ve .
City: Madison	
State: CT	
Zip Code: 06443	
County: New Haven	
Latitude: 41.296528 / 43	L° 17' 47.5008" N
Longitude: -72.572444 / 7	'2° 34' 20.7984" W

RFDS Project Scope: New Build

Rev0_2020-02-02: Initial

Antenna Summary

Added	dded																	
700	850	1900	AWS	AWS3	28 GHz	31 GHz		CBRS	LAA	L-Sub Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity
LTE	LTE	LTE	LTE							JMA WIRELESS	MX06FR0660-03	120	123	30(0001) 30(01) 150(0002) 150(02) 270(0003) 270(03)	true	true	PHYSICAL	6
								LTE		SAMSUNG	XXDWMM-12.5-65-8T- CBRS Port1 3550 8DT	120	120.5	30(19) 150(20) 270(21)	false	true	PHYSICAL	3
										5G SAMSUNG	VZS01	120	121.5	30(0001) 150(0002) 270(0003)	false	false	PHYSICAL	3
Remove	ed																	
700	850	1900	AWS	AWS3	28 GHz			CBRS	LAA	L-Sub Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity
	No data avai							No data available.										
Retaine	d																	
700	850	1900	AWS	AWS3	28 GHz			CBRS	LAA	L-Sub Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity
											No data available.							

Added: 12 Removed: 0 Retained: 0

Equipment Summary

Added																	
Equipment Type	Location	700	850	1900	AWS	AWS3	28 GH;	31 GHz 39 GH:	CBRS	LAA	L-Sub(Make	Model	Cable Length	Cable Size	Install Type	Quantity
RRU	Tower			LTE	LTE							Samsung	B2/B66A RRH-BR049 (RFV01U-D1A)			PHYSICAL	3
RRU	Tower LTE LTE Samsung		B5/B13 RRH-BR04C (RFV01U-D2A)			PHYSICAL	3										
RRU	Tower								LTE			Samsung	CBRS RRH - RT4401- 48A			PHYSICAL	3
RRU	Tower											Samsung	VZS01			PHYSICAL	3
OVP Box	Tower												12-OVP			PHYSICAL	1
Hybrid Cable	Tower												LI 6x12			PHYSICAL	2
Removed																	
Equipment Type	Location	700	850	1900	AWS	AWS3	28 GH:	31 GHz 39 GH:	CBRS	LAA	L-Sub(Make	Model	Cable Length	Cable Size	Install Type	Quantity
No data available.																	
Retained																	
Equipment Type	Location	700	850	1900	AWS	AWS3	28 GHz	31 GHz 39 GH	CBRS	LAA	L-Sub(Make	Model	Cable Length	Cable Size	Install Type	Quantity
										No da	ata availab	ole.					

Service Info

Sub6		0006	
Sector	0001	0002	0003
Azimuth	30	150	270
Cell / ENode B ID	0064740	0064740	0064740
Antenna Model			
Antenna Model	MX06FRO660-03	MX06FRO660-03	MX06FRO660-03
Antenna Make	JMA WIRELESS	JMA WIRELESS	JMA WIRELESS
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	170.21	170.21	170.21
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	VZS01	VZS01	VZS01
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	9785697	9785699	9785700
Source	ATOLL_API	ATOLL_API	ATOLL_API
	ATOLE_NIT		ATOLL_ATT
: LTE Sector	24	0006	00
	01	02	03
Azimuth	30	150	270
Cell / ENode B ID	064740	064740	064740
Antenna Model	MX06FRO660-03	MX06FRO660-03	MX06FRO660-03
Antenna Make	JMA WIRELESS	JMA WIRELESS	JMA WIRELESS
Antenna Centerline(Ft)			
	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	4	4	4
Tip Height	123	123	123
Regulatory Power	68.48	68.48	68.48
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D
Number of Tx, Rx Lines	4,4	4,4	4,4
Position	•	,	,
Transmitter Id	9785623	9785624	9785625
Source	ATOLL_API	ATOLL_API	ATOLL_API
	ATOLE_AT		ATOLE_AT
: LTE Sector	04	0006	02
Azimuth	01	02	03
	30	150	270
Cell / ENode B ID	064740	064740	064740
Antenna Model	MX06FRO660-03	MX06FRO660-03	MX06FRO660-03
Antenna Make	JMA WIRELESS	JMA WIRELESS	JMA WIRELESS
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	4	4	4
Tip Height			
	123	123	123
Regulatory Power	273.92	273.92	273.92
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D2A)	B5/B13 RRH-BR04C (RFV01U-D
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
	9785644	9785645	9785646
I ransmitter id	- , , , , ,		2.000.0
Transmitter Id Source	ATOLL_API	ATOLL_API	ATOLL_API

0 MHz LTE		0006	
Sector	01	02	03
Azimuth	30	150	270
Cell / ENode B ID	064740	064740	064740
Antenna Model	MX06FRO660-03		MX06FRO660-03
Antenna wodei	MIXUUFROOU-US	MIX00FR0000-03	MV00LK0000-03
Antenna Make	JMA WIRELESS	JMA WIRELESS	JMA WIRELESS
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt		0	0
Tip Height	123	123	123
Regulatory Power	257.37	257.37	257.37
TMA Make	237.37	251.51	231.31
TMA Model		•	
RRU Make	Samsung	Samsung	Samsung
RRU Model		D1U-D1A) B2/B66A RRH-BR049 (RFV01U-D1A)	
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	9785654	9785655	9785656
Source	ATOLL_API	ATOLL_API	ATOLL_API
	ATOLL_AFT		ATOLL_ATT
E Sector		0006	00
	01	02	03
Azimuth	30	150	270
Cell / ENode B ID	064740	064740	064740
Antenna Model	MX06FRO660-03	MX06FRO660-03	MX06FRO660-03
Antenna Make	JMA WIRELESS	JMA WIRELESS	JMA WIRELESS
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	134.75	134.75	134.75
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model		D1U-D1A) B2/B66A RRH-BR049 (RFV01U-D1A)	
Number of Tx, Rx Lines	4,4	4,4	4,4
Position	7,7	7,7	7,7
Transmitter Id	0705651	0705652	9785653
	9785651	9785652	
Source	ATOLL_API	ATOLL_API	ATOLL_API
		0006	
Sector	19	20	21
Azimuth	30	150	270
Cell / ENode B ID	064740	064740	064740
Antenna Model	XXDWMM-12.5-65-87	T-C XXDWMM-12.5-65-8T-C	XXDWMM-12.5-65-8T-C
	BRS Port1 3550 8D		BRS Port1 3550 8DT
Antenna Make	SAMSUNG	SAMSUNG	SAMSUNG
Antenna Centerline(Ft)	120	120	120
Mechanical Down-Tilt(Deg.)			
		0	0
Electrical Down-Tilt	8	8	8
	120.5	120.5	120.5
Tip Height	151.91	151.91	151.91
Regulatory Power			
Regulatory Power TMA Make			
Regulatory Power			
Regulatory Power TMA Make TMA Model	Samsung	Samsung	Samsung
Regulatory Power TMA Make TMA Model RRU Make	Samsung CBRS RRH - RT4401-	Samsung 48A CBRS RRH - RT4401-48A	Samsung CBRS RRH - RT4401-48A
Regulatory Power TMA Make TMA Model RRU Make RRU Model	CBRS RRH - RT4401-4	48A CBRS RRH - RT4401-48A	CBRS RRH - RT4401-48A
Regulatory Power TMA Make TMA Model RRU Make RRU Model Number of Tx, Rx Lines			Samsung CBRS RRH - RT4401-48A 4,4
Regulatory Power TMA Make TMA Model RRU Make RRU Model Number of Tx, Rx Lines Position	CBRS RRH - RT4401-4 4,4	48A CBRS RRH - RT4401-48A 4,4	CBRS RRH - RT4401-48A 4,4
Regulatory Power TMA Make TMA Model RRU Make RRU Model Number of Tx, Rx Lines	CBRS RRH - RT4401-4	48A CBRS RRH - RT4401-48A	CBRS RRH - RT4401-48A

Proprietary and Confidential. Not for disclosure outside of Verizon.

Service Comments

Callsigns Per Antenna

Sector	Antenna Ma	Antenna Mo		Tip Height	Azimuth (TI		Mechanical	Gain	Beamwidth		Callsigns						
			Height AGL			Tilt	Tilt			Power	700	850	1900	2100	28 GHz	31 GHz	39 GHz
	No data available.																

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
WQJQ689	Northeast	WU	REA001	с	ст	New Haven	Cellco Partnership	Yes	22.000	746.000- 757.000	776.000- 787.000	.000000	.000000	68.48	1000	1426.75	Active	added	Yes
KNKA313	New Haven-West H aven-Waterbury - Meriden, CT	CL	СМА049	Α	ст	New Haven	Cellco Partnership	Yes	25.000	824.000- 835.000	869.000- 880.000	845.000- 846.500	890.000- 891.500	273.92	400	1426.75	Active	added	Yes
WQEM953	New Haven-Water - Meriden, CT	cw	BTA318	с	ст	New Haven	Cellco Partnership	Yes	10.000	1895.000- 1900.000	1975.000 1980.000	.000000	.000000	257.37	1640	1426.75	Active	added	Yes
KNLH262	New Haven-Water - Meriden, CT	cw	BTA318	F	ст	New Haven	Cellco Partnership	Yes	10.000	1890.000- 1895.000	1970.000 1975.000	.000000	.000000	257.37	1640	1426.75	Active	added	Yes
CBRS_CALL	UNLICENSE	3.5 GHz	UNLICENSE	UNLICENSE	СТ	New Haven	UNLICENSE	UNLICENSE	UNLICENSE	UNLICENSED-UNLICE	UNLICENSED-UNLICE	UNLICENSED-UNLICE	UNLICENSED-UNLICE	151.91		1426.75	Active	added	No
WQGB280	New Haven-West H aven-Waterbury - Meriden, CT	AW	CMA049	Α	ст	New Haven	Cellco Partnership	Yes	20.000	1710.000 1720.000	2110.000 2120.000	.000000	.000000	134.75	1640	1426.75	Active	added	Yes
WQGA906	New York-No. New Jer Long Island, NY-NJ- CT-PA- MA-	AW	BEA010	В	ст	New Haven	Cellco Partnership	Yes	20.000	1720.000 1730.000	2120.000- 2130.000	.000000	.000000	134.75	1640	1426.75	Active	added	Yes
WQCS396	New Haven-Water - Meriden, CT	CW	BTA318	С	ст	New Haven	Cellco Partnership	Yes	10.000	1905.000- 1910.000	1985.000- 1990.000	.000000	.000000		1640	1426.75	Active		Yes
WPOH945	New Haven-Water - Meriden, CT	LD	BTA318	Α	ст	New Haven	Cellco Partnership	Yes	300.000	29100.000-29250.000	31075.000-31225.000	.000000	.000000			1426.75	Active		No
WPLM399	New Haven-Water - Meriden, CT	LD	BTA318	В	ст	New Haven	Cellco Partnership	Yes	150.000	31000.000-31075.000	31225.000-31300.000	.000000	.000000			1426.75	Active		No

	New Haven-Water															
WRBA734	- Meriden, CT	UU	BTA318	L1	ст	New Haven	Cellco Partnership	Yes	325.000	27600.000-27925.000	.000000	.000000	.000000	1426.75	Active	Yes
WRBA735	New Haven-Water - Meriden, CT		BTA318	L2	ст	New Haven	Cellco Partnership	Yes	325.000	27925.000-27950.000	28050.000-28350.00	.000000	.000000	1426.75	Active	Yes
WRHD609	New York, NY	UU	PEA001	M1	СТ	New Haven	Straight Path um, LLC	Yes	100.000	37600.000-37700.000	.000000	.000000	.000000	1426.75	Active	Yes
WRHD610	New York, NY	UU	PEA001	M10	СТ	New Haven	Straight Path um, LLC	Yes	100.000	38500.000-38600.00	.000000	.000000	.000000	1426.75	Active	Yes
WRHD611	New York, NY	UU	PEA001	M2	СТ	New Haven	Straight Path um, LLC		100.000	37700.000-37800.000	.000000	.000000	.000000	1426.75	Active	Yes
WRHD612	New York, NY	UU	PEA001	МЗ	СТ	New Haven	Straight Path um, LLC	Voc	100.000	37800.000-37900.001	.000000	.000000	.000000	1426.75	Active	Yes
WRHD613	New York, NY	UU	PEA001	M4	СТ	New Haven	Straight Path um, LLC		100.000	37900.000-38000.001	.000000	.000000	.000000	1426.75	Active	Yes
WRHD614	New York, NY	UU	PEA001	M5	СТ	New Haven	Straight Path um, LLC	Yes	100.000	38000.000-38100.00	.000000	.000000	.000000	1426.75	Active	Yes
WRHD615	New York, NY	UU	PEA001	M6	СТ	New Haven	Straight Path um, LLC	Yes	100.000	38100.000-38200.000	.000000	.000000	.000000	1426.75	Active	Yes
WRHD616	New York, NY	UU	PEA001	M7	СТ	New Haven	Straight Path um, LLC	Yes	100.000	38200.000-38300.00	.000000	.000000	.000000	1426.75	Active	Yes
WRHD617	New York, NY	UU	PEA001	M8	ст	New Haven	Straight Path um, LLC	Yes	100.000	38300.000-38400.00	.000000	.000000	.000000	1426.75	Active	Yes
WRHD618	New York, NY	UU	PEA001	M9	ст	New Haven	Straight Path um, LLC	Yes	100.000	38400.000-38500.00	.000000	.000000	.000000	1426.75	Active	Yes
WRHD619	New York, NY	UU	PEA001	N1	ст	New Haven	Straight Path um, LLC	Yes	100.000	38600.000-38700.00	.000000	.000000	.000000	1426.75	Active	No

ATTACHMENT 6

Site Name: *MADISON 6 CT*Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissible Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)	(%)
VZW 700	751	4	616	2465	120	0.0062	0.5007	1.23%
VZW Cellular	874	4	616	2465	120	0.0062	0.5827	1.06%
VZW PCS	1975	4	1445	5779	120	0.0144	1.0000	1.44%
VZW AWS	2120	4	1621	6484	120	0.0162	1.0000	1.62%
VZW CBRS	3560.3	4	417	1667	120	0.0042	1.0000	0.42%
VZW CBAND	3730.08	2	21627	43254	120	0.1080	1.0000	10.80%

Total Percentage of Maximum Permissible Exposure

16.57%

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

Absolute worst case maximum values used.

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

^{**}Calculation includes a -10 dB Off Beam Antenna Pattern Adjustment pursuant to Attachments B and C of the Siting Council's November 10, 2015 Memorandum for Exempt Modification filings

ATTACHMENT 7

MADISON 6 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) 5 D - 1:4						
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	Postmaster, per (name of receiving employee)	neopost 03/16/2022 US POSTAGE \$002.99 ZIP 06103 041L12203337							
USPS® Tracking Number Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift				
1.	Peggy Lyons, First Selectwoman Town of Madison 8 Campus Drive Madison, CT 06443								
2.	Erin Mannix, Town Planner Town of Madison 8 Campus Drive Madison, CT 06443								
3.		OUD	STATE HOUSE						
4.			R 16 MM 8						
5.		- 000							
6.									