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Also admitted in Massachusetts
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July 11, 2024

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

Re: **Request of Cellco Partnership d/b/a Verizon Wireless for an Order to Approve the Shared Use of an Existing Tower at 250 Olcott Street, Manchester, Connecticut**

Dear Attorney Bachman:

Pursuant to Connecticut General Statutes ("C.G.S.") §16-50aa, as amended, Cellco Partnership d/b/a Verizon Wireless ("Cellco") hereby requests an order from the Siting Council ("Council") to approve the shared use of an existing telecommunications tower located on a 30.4-acre parcel at 250 Olcott Street in Manchester (the "Property"). The tower and Property are owned by Eversource Energy ("Eversource"). Cellco identifies this site as its "Manchester 7 Facility". The existing tower was approved by the Council in June of 2018 (Petition No. 1346). A copy of Eversource's 2018 tower approval is included in Attachment 1.

Cellco requests that the Council find that the proposed shared use of the existing tower satisfies the criteria of C.G.S § 16-50aa and issue an order approving this request. A copy of this filing is being sent to Manchester's Town Manager, Steven Stephanou and Director of Planning and Economic Development, Gary Anderson.

Background

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

Cellco proposes to install nine (9) antennas and nine (9) remote radio heads ("RRHs") on an antenna mounting structure at a centerline height of 115 feet above ground level ("AGL")[1]. Cellco will also install equipment and battery cabinets on a concrete pad on the ground near the base of the tower. Included in Attachment 3 are Cellco's project plans showing the location of Cellco's proposed site improvements. Attachment 4 contains specifications for Cellco's proposed antennas and RRHs.

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

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

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

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

1. The proposed installation of nine (9) antennas and nine (9) RRHs on an antenna platform at a height of 115 feet AGL on the existing 180-foot tower would have an insignificant incremental visual impact on the area

[1] On March 16, 2023, DISH Wireless LLC was approved by the Council to install its antennas at the 115-foot level on the Eversource tower. However, as referenced in the Eversource authorization letter (Attachment 2), Eversource does not currently have a lease agreement in place with DISH, making the 115-foot level available for use by Cellco.

around the Property. As mentioned above, all of Cellco's equipment will be located within the fenced facility compound near the base of the tower. Cellco's shared use of the existing tower would, therefore, not cause any significant change or alteration in the physical or environmental characteristics of the existing facility.

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

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

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

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

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

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

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

Conclusion

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

Thank you for your consideration of this matter.

Very truly yours,

Kenneth C. Baldwin

Enclosures
Copy to:
Steven Stephanou, Town Manager
Gary Anderson, AICP, Director of Planning and Economic Development
Eversource Energy, Property Owner
Tim Parks, Verizon Wireless

ATTACHMENT 1

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

July 20, 2018

Kathleen M. Shanley
Manager-Transmission Siting
Eversource Energy
P.O. Box 270
Hartford, CT 06141-0270

RE: **PETITION NO. 1346** - The Connecticut Light and Power Company d/b/a Eversource Energy petition for a declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the proposed replacement and relocation of an existing telecommunications facility and an existing relay and control enclosure located at Manchester Substation, 250 Olcott Street, Manchester, Connecticut, and related substation improvements.

Dear Ms. Shanley:

At a public meeting held on July 19, 2018, the Connecticut Siting Council (Council) considered and ruled that the above-referenced proposal would not have a substantial adverse environmental effect, and pursuant to Connecticut General Statutes § 16-50k, would not require a Certificate of Environmental Compatibility and Public Need, with the following conditions:

1. Approval of any minor project changes be delegated to Council staff;

2. Unless otherwise approved by the Council, if the facility authorized herein is not fully constructed within three years from the date of the mailing of the Council's decision, this decision shall be void, and the facility owner/operator shall dismantle the facility and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made. The time between the filing and resolution of any appeals of the Council's decision shall not be counted in calculating this deadline. Authority to monitor and modify this schedule, as necessary, is delegated to the Executive Director. The facility owner/operator shall provide written notice to the Executive Director of any schedule changes as soon as is practicable;

3. Any request for extension of the time period to fully construct the facility shall be filed with the Council not later than 60 days prior to the expiration date of this decision and shall be served on all parties and intervenors, if applicable, and the Town of Manchester;

4. Unless otherwise approved by the Council, the existing tower shall be removed within 180 days of the installation of the new self-supporting lattice tower;

5. The Council shall be notified in writing within 45 days of when the existing tower is removed and the new self-supporting lattice tower is operational unless a written request for an extension is submitted to the Council within that timeframe;

6. Within 45 days after completion of construction of the control enclosure, the Council shall be notified in writing that construction has been completed;

7. The facility owner/operator shall remit timely payments associated with annual assessments and invoices submitted by the Council for expenses attributable to the facility under Conn. Gen. Stat. §16-50v;

8. This Declaratory Ruling may be transferred, provided the facility owner/operator/transferor is current with payments to the Council for annual assessments and invoices under Conn. Gen. Stat. §16-50v and the transferee provides written confirmation that the transferee agrees to comply with the terms, limitations and conditions contained in the Declaratory Ruling, including timely payments to the Council for annual assessments and invoices under Conn. Gen. Stat. §16-50v; and

9. If the facility owner/operator is a wholly owned subsidiary of a corporation or other entity and is sold/transferred to another corporation or other entity, the Council shall be notified of such sale and/or transfer and of any change in contact information for the individual or representative responsible for management and operations of the facility within 30 days of the sale and/or transfer.

This decision is under the exclusive jurisdiction of the Council and is not applicable to any other modification or construction. All work is to be implemented as specified in the petition dated June 1, 2018 and additional information received on June 7, 2018, July 9, 2018 and July 10, 2018.

Enclosed for your information is a copy of the staff report on this project.

Sincerely,

Robert Stein

Robert Stein
Chairman

RS/MP/lm

Enclosure: Staff Report dated July 19, 2018

c: The Honorable Jay Moran, Mayor, Town of Manchester
Scott A. Shanley, General Manager, Town of Manchester
James Davis, Zoning Enforcement Officer, Town of Manchester

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

Petition No. 1346
Eversource
Manchester Substation, Manchester, Connecticut
Staff Report
July 19, 2018

Introduction

On June 1, 2018, The Connecticut Light and Power Company d/b/a Eversource Energy (Eversource) submitted a petition to the Connecticut Siting Council (Council) for a declaratory ruling pursuant to Connecticut General Statutes (CGS) §4-176 and §16-50k for the proposed replacement and relocation of an existing telecommunications facility and an existing relay and control enclosure and related substation improvements at Manchester Substation, 250 Olcott Street, Manchester, Connecticut.

Council member Daniel P. Lynch, Jr. and Council staff member Michael Perrone conducted a field review of the proposed project on June 19, 2018. Paul Melzen, Substation Engineer, Eversource; Steven Florio, Construction Manager, Eversource; Ryan Ericson, Telecom Engineer, Eversource; Matthew LeClair, Substation Engineer, Eversource; Shodan Patel, Project Manager, Eversource; Susan Bellion, Project Siting Specialist, Eversource; Ian Cole, Environmental, Eversource; and Kyle Shiel, Senior Planner, Town of Manchester Planning Department also attended the field review.

Eversource met with the Town of Manchester officials in February 2018. Notice of the Petition was provided to the Town of Manchester and abutting property owners on or about May 30, 2018. To date, the Council has not received any comments regarding the Petition filing.

The Council issued interrogatories to Eversource on June 22, 2018 and July 2, 2018. Eversource submitted responses to Council interrogatories on July 9, 2018 and July 10, 2018, respectively.

On June 21, 2018, pursuant to CGS §4-176(e) of the Uniform Administrative Procedure Act (UAPA), which requires an administrative agency to take action on a petition within 60 days of receipt, the Council voted to set the date by which to render a decision on the above-referenced petition by November 28, 2018. November 28, 2018, is the statutorily-mandated 180-day decision deadline for this petition under CGS §4-176(i).

Proposed Project

Manchester Substation is located on a 30.4-acre parcel surrounded by a mix of municipal, commercial and industrial facilities including the Town of Manchester Landfill, Transfer Station, and Sewage Treatment Plant located north of the subject property and residential areas located to the east and southwest. The nearest residence is located off of Olcott Street West, approximately 540 feet southwest of the proposed replacement tower compound.

Eversource would remove an existing communications tower and existing 345-kV relay and control enclosure from the center of the substation and replace them with a new communications tower and new 115-kV/345-kV relay and control enclosure to the west of the current positions. The proposed replacement tower would be located outside of the substation fence line, and the replacement enclosure would be located within an expanded area of the substation.

The replacement tower and replacement control enclosure project is being proposed to allow for future upgrades and newer telecommunications technologies to be installed at the site. It would provide future capacity for Eversource, municipal and emergency communications and commercial wireless service providers. The control enclosure portion of the project is identified in Eversource's 2018 Forecast of Loads and Resources dated March 1, 2018 and in the June 2018 ISO-New England Regional System Plan Asset Condition Update as the proposed "Manchester Control House Expansion" with an estimated in-service date of 2019.

Tower Replacement

The existing tower is an approximately 200-foot self-supporting lattice tower located inside the fenced substation. It is 30 feet wide at the base, and it tapers to 8-feet 6-inches wide at the top. The existing tower contains antennas of multiple entities including, but not limited to, Eversource, Hartford Ops/Meter & Service, Talcott Microwave, DSCADA, EDACS/Voice Radio, Bolton Microwave, Sprint[1], Yankee Gas, and Hartford Underground.

The proposed replacement tower would be a 180-foot self-supporting lattice tower. It would be 23 feet wide at the base and tapering to 5-feet wide at the top. It would be located approximately 435 feet to the west of the existing tower location (and outside of the fenced substation). The proposed (and future) antenna inventory is listed below.

Antenna Type[1]	Antenna Make/Model or Capacity[2]	Antenna Center Line Elevation (ft. AGL)	Comments	Frequency (MHz)
14-ft. Omni	(1) Kreco CO-41-AN	±187.0	Hartford Ops / Meter & Service	RX: 49.02
19.2-ft. Dual Omni w/TTA	(1) dbSpectra DS9A09F36D-N (1) Bird 430-94C-09168-M-110_48	±189.4	DSCADA	TX: 936.95 & 938.95 RX: 897.95 & 899.95
23.3-ft. Dual Omni	(1) Sinclair SC351D-HF2LDF(D00-G6)	±187.3	EDACS / Voice Radio	TX: 451.675 RX: 456.675
8' Dish w/ Radome	(1) RFS PADX8-W59AC	±175.0	Bolton Microwave	TX: 6093.45 RX: 6345.49
8' Dish w/ Radome	(1) RFS PADX8-W59AC	±175.0	Talcott Microwave	TX: 6004.50 RX: 6256.54
8' Dish w/ Radome	(1) RFS PADX8-W59AC	±175.0	Future Eversource	NA - Future Dish
8' Dish w/ Radome	(1) RFS PADX8-W59AC	±164.0	Future Eversource	NA - Future Dish
23.3-ft. Dual Omni	(1) Sinclair SC351D-HF2LDF(D00-G6)	±156.4	Future Eversource	NA - Future Antenna
10-ft Dipole	(1) Sinclair SD212-SF2P2SNF(D00)	±163.0	Yankee Gas	TX & RX: 173.39625
15.75-ft Dipole	(1) Comprod 531-70HD*8	±158.1	Hartford Underground	TX & RX: 47.90
Wireless Carrier	(12) Panel Antennas (8'x1'), (12) RRHs, (3) MDB	±135.0	Future Carrier	TBD
Wireless Carrier	(12) Panel Antennas (8'x1'), (12) RRHs, (3) MDB	±125.0	Future Carrier	TBD
Wireless Carrier	(12) Panel Antennas (8'x1'), (12) RRHs, (3) MDB	±115.0	Future Carrier	TBD
Wireless Carrier	(12) Panel Antennas (8'x1'), (12) RRHs, (3) MDB	±105.0	Future Carrier	TBD

[1] Sprint PCS is the only commercial wireless telecommunications carrier on the existing tower. The relocation of Sprint onto the replacement tower would require a separate filing with the Council for review and approval. Thus, it is not yet known which height Sprint would co-locate at on the replacement tower in the future.

The total height with appurtenances would be approximately 199 feet, i.e. the tops of the 19.2-foot and 23.3-foot omni antennas would reach a maximum height of approximately 199 feet.

A Professional Engineer duly licensed in the State of Connecticut has certified that the proposed replacement tower is structurally adequate to support the proposed (and future) loading as identified above. Specifically, the proposed replacement tower is designed support all existing entities and a total of four future wireless carriers (i.e. Sprint plus three other carriers).

Once the replacement tower is constructed and operational, the existing tower would be removed.

The proposed replacement tower radius would remain within the boundaries of the subject property.

An existing fenced laydown area located to the west of the substation (but still on the subject property) would be removed to accommodate the proposed approximately 69-foot 9-inch by 94-foot 4-inch tower compound. The proposed compound fence would be eight feet tall anti-climb mesh fence with three strands of barbed wire on top that would add approximately one foot of additional height. Eversource would install a 10-foot by 20-foot equipment shelter inside the proposed tower compound.

A new electrical power supply for the proposed replacement tower would be trenched underground from an existing Eversource utility pole (#3343), located approximately 217 feet to the west on Olcott Road to a new electrical service panel located just outside of the proposed compound. For backup power, Eversource's proposed 20-kW propane-fueled generator would be located on a 4-foot by 6-foot concrete pad within the proposed tower compound. Eversource's generator is sized for its needs only. Eversource's proposed 1,000-gallon propane tank would be located within the tower compound and would provide approximately five days of run time at 100-percent load.

Substation Modifications/Expansion

The proposed substation modifications would require the removal of the existing 11-foot by 16-foot control enclosure from the interior of the substation and the removal of approximately 400 feet of existing substation security fencing from the western side of the substation. These modifications would allow for an approximately 21,470 square foot expansion of the substation to the west to accommodate the new 150-foot by 32-foot replacement control enclosure.

New water and sewer lines would be run to the new control enclosure. The existing water and sewer lines that currently supply the 345-kV control enclosure would be removed from the substation and capped at a location just inside the substation fence line.

Additional substation modifications would include the replacement of three existing 115-kV oil-filled circuit breakers with new gas-insulated circuit breakers and the installation of two new station service transformers to feed the replacement enclosure.

The base of the substation expansion area would match the existing ground surface with gravel, and the final fence design of the proposed substation expansion area would match the fence design of the existing substation.

Environmental Effects and Mitigation Measures

The substation expansion area for the new control enclosure and new tower compound would require minimal grading. However, the proposed project would require soil removal for the new tower foundation excavation and fill to remediate below grade facilities and foundations. Approximately 460 cubic yards of material would be removed for the construction of the tower and compound. Approximately 5,200 cubic yards of material would be removed for the construction of the new control enclosure, below-grade facilities and the new security fence. The removal of the obsolete 345-kV control enclosure and existing below-grade facilities would require approximately 3,500 cubic yards of fill.

If the quality of the excavated material is acceptable, it would be reused on site. If soil cannot be reused on-site, it would be field sampled for characterization and disposed of at a pre-approved soil disposal facility in accordance with Eversource polices and state and federal regulations.

Approximately 12 conifers greater than six inches diameter and several small deciduous saplings would be removed for the expansion of the substation and replacement control enclosure. No additional tree removal is anticipated for construction, but if needed, areas to the north and south of the proposed substation modifications would be cleared and re-graded to allow for additional work/laydown areas. Specifically, a small scrub/shrub habitat block exists in the southwest corner of the site. This habitat block totals approximately 4.1 acres. If needed, a portion of this habitat block would be cleared and converted to additional work zone and gravel laydown areas to provide additional space for work zones. Due to the relatively small size of this area and the minor clearing proposed, the removal of portions of scrub/shrub habitat block would not be expected to result in a significant negative impact on any dependent wildlife populations.

The foundation design for the proposed station service transformers do not include measures for insulating oil containment because the oil volumes are not significant and do not trigger such requirement under 40 Code of Federal Regulations (CFR) 112. However, in accordance with Federal Spill Prevention Containment & Countermeasure (SPCC) rules under 40 CFR 112, there would be above-ground oil volume triggers that require spill plans and either engineered secondary containment or a strong response plan. Eversource notes that all of its substations are covered under a SPCC Multi Plan, which includes a strong contingency in the event of oil release.

The proposed replacement 115-kV circuit breakers would be gas-insulated using sulfur hexafluoride (SF_6); therefore, oil containment measures are not required.

The project would be located in an upland area and would not be expected to have a significant adverse impact on wetland resources or watercourses because such project area would be limited to areas within or immediately west of the substation footprint. Such wetland/watercourse resources are located east of the substation. An inspection to field delineate wetlands was conducted on February 14, 2018. One wetland area, consisting of a contributing unnamed intermittent watercourse and backwater wetlands/floodplains to the South Fork Hockanum River is located approximately 160 feet north of the existing control enclosure and approximately 356 feet east of the proposed substation fence expansion.

The proposed project is located within the Federal Emergency Management Agency (FEMA) unshaded Zone X, an area outside of the 100-year and 500-year flood zones.

The proposed project is not located with a Connecticut Department of Energy and Environmental Protection (DEEP) Aquifer Protection Area.

Eversource developed and submitted a Stormwater Pollution Control Plan (SWPCP) to DEEP to register under a *General Permit for the Discharge of Stormwater and Remediation Wastewaters from Construction Activities.*

Eversource would conform to its Best Management Practices Manual for Massachusetts and Connecticut, *2002 Connecticut Guidelines for Soil Erosion and Sediment Control,* and the *2004 Connecticut Stormwater Manual,* as applicable. No soil remediation would be required for this proposed project.

The proposed project is located about 0.4 mile outside of the shaded area of the DEEP Natural Diversity Database (NDDB) Map. Because such distance is greater than 0.25 mile, no consultation with DEEP regarding the NDDB is required.

Connecticut is within the range of the northern long-eared bat (NLEB), a federally-listed Threatened species and state-listed Endangered species. There are no known NLEB hibernacula within 0.25 mile of the project or known maternity roost trees within 150 feet of the proposed project area. The existing white pines slated for removal, originally planted as landscape evergreens, do not provide optimal NLEB roosting habitat. Thus, the proposed project is not likely to adversely affect the NLEB.

The proposed replacement tower would not be located near an Important Bird Area (IBA), as designated by the National Audubon Society. The nearest IBA to the proposed replacement tower site is Meshomasic State Forest Block in Manchester, located approximately 2.6 miles to the southeast. The proposed replacement tower would not be expected to adversely impact this IBA because of the distance.

The proposed replacement tower would comply with the United States Fish and Wildlife Service guidelines for minimizing the potential for telecommunications towers to impact bird species.

By letter dated March 26, 2018, the State Historic Preservation Office (SHPO) notes that the area possesses a low potential to contain intact archaeological resources[2]. SHPO also indicated that no historic properties would be affected by the proposed project.

The final fence design of the proposed substation expansion area would be visually consistent with the existing fence design of the substation. While the proposed replacement tower would be located closer to the nearest residence versus the existing tower, it would be 20 feet shorter than the existing tower, and it would be narrower in width.

Construction-related noise is exempt per DEEP noise regulations. Post-construction noise levels would not increase beyond the property boundaries. Therefore, noise emissions would be consistent with present day levels.

Aviation Safety

According to Eversource's TOWAIR analysis, notification to the Federal Aviation Administration is not required.

Magnetic Fields and Radio Frequency Power Density

Magnetic field levels at the property boundaries would not be materially affected by the proposed substation expansion.

The proposed replacement telecommunications facility would have a cumulative worst-case power density of 3.29 percent of the applicable limit using a -10 dB off-beam adjustment.

[2] SHPO incorrectly refers to the replacement tower height as 280 feet.

Construction Schedule

Eversource intends to begin construction in August 2018 and complete construction and restoration by the end of 2020. Removal of the existing tower and existing enclosure would be completed following the installation of the replacement facilities. In general, work hours would be from 7 AM to 7 PM Monday through Saturday. Eversource would submit a request to the Council in advance of the need for any non-standard work hours.

Staff Recommendations

Staff recommends the following:

1. Approval of any minor project changes be delegated to Council staff.

Proposed Site Plan

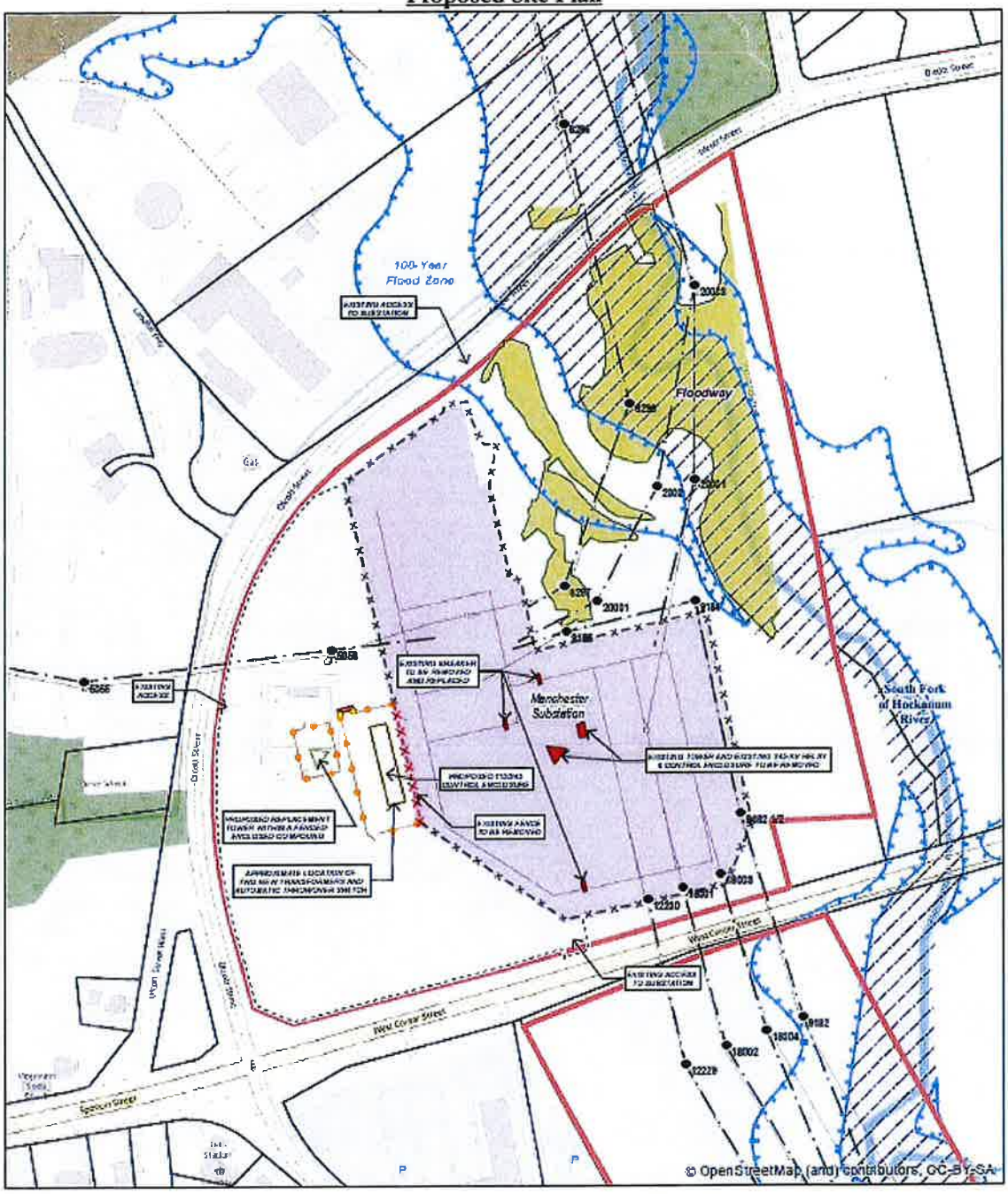
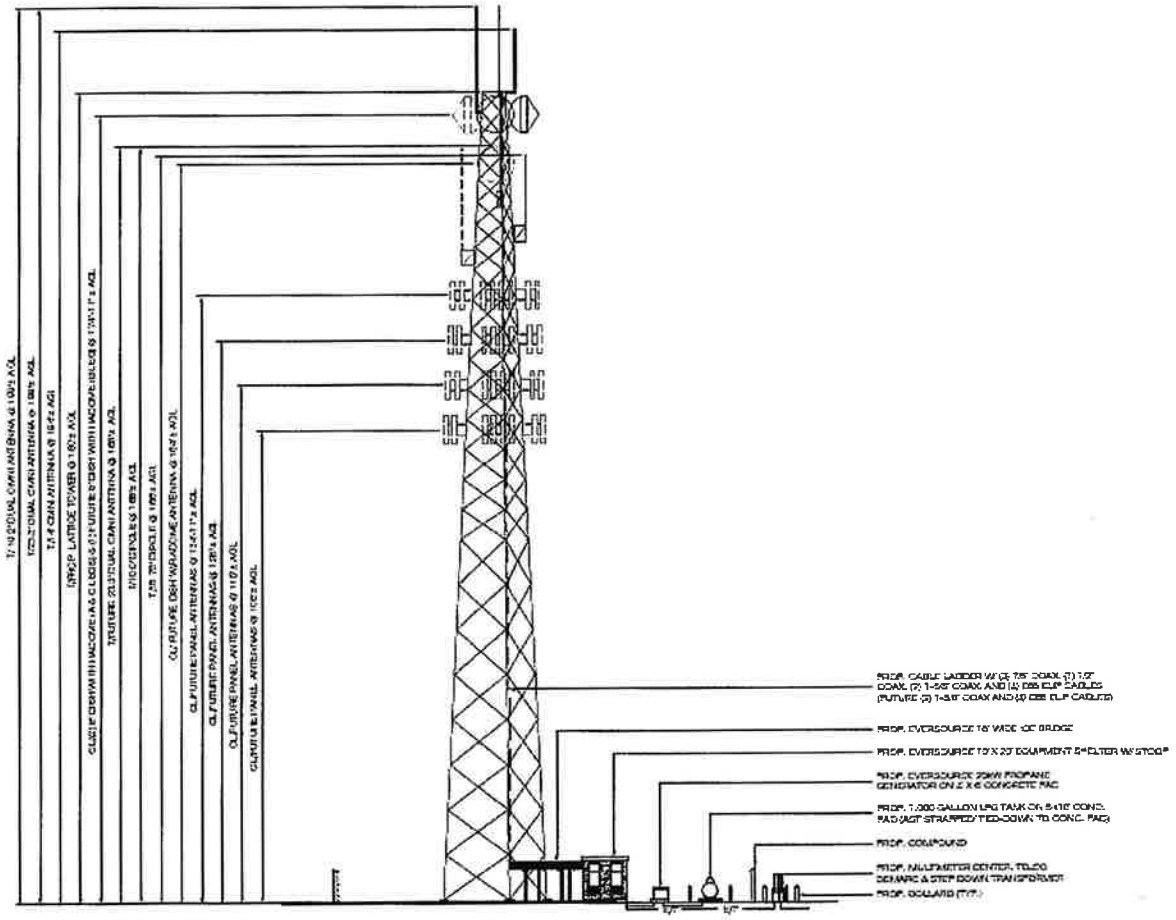


Figure 2
Site Schematic Map
Manchester 3A Substation Expansion and Replacement Communications Facility Project
250 Olcott Street
Manchester, Connecticut

EVERSOURCE ENERGY

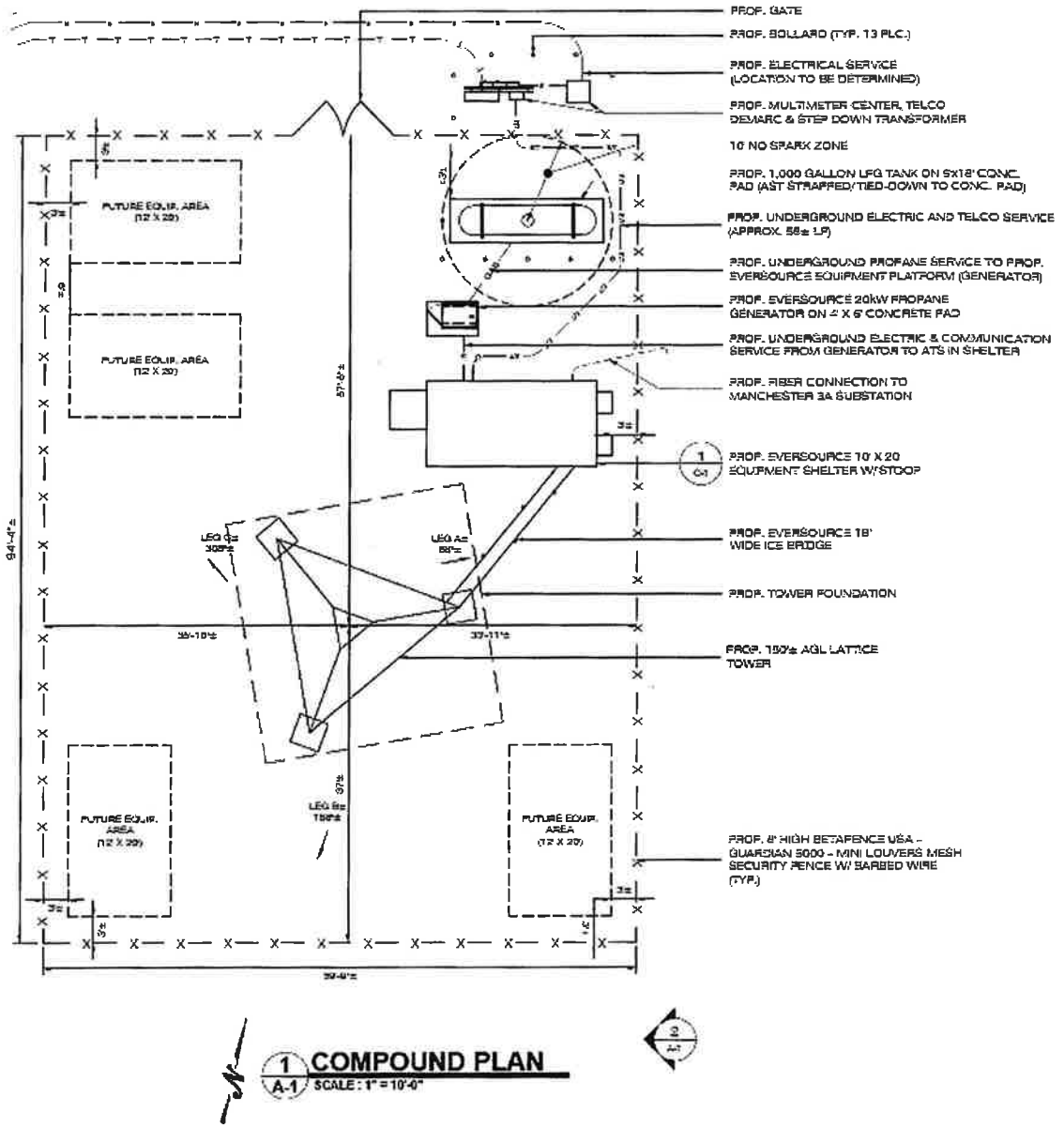
ALL POINTS

Proposed Replacement Tower



2 EAST ELEVATION
A-1 SCALE: 1" = 16'-0"

Proposed Tower Compound



ATTACHMENT 2

Steven Florio
Telecom Engineering
Construction Manager

107 Selden St
Berlin, CT 06037
Office: (860) 728-5611
Steven Florio@Eversource.com

June 27,2024

Ms. Amy White (Smartlink)
Agent for Cellco Partnership d/b/a Verizon Wireless
180 Washington Valley Road
Bedminster, New Jersey 07921

RE: Letter of Authorization

Project: Verizon Wireless Site Ref. Manchester 7 CT
250 Alcott Street
Manchester, CT. 06040
Owner: Eversource Energy

Dear Ms. White,

Eversource Energy, owner of the tower facility located at the address identified above, do hereby authorize Verizon Wireless, and/ or it's agent to use this authorization letter for the sole purpose of filing and consummating any land-use or building permit application(s) as may be required by the applicable permitting authorities for the Licensee's telecommunication's installation.

Please note: Eversource is aware that Dish Wireless LLC was previously authorized to apply to the CT Siting Council for approval of a wireless installation on this tower and install antennas at the 115' level. Eversource does not currently have a lease agreement in place with Dish Wireless LLC for shared use of the tower, therefore, making the 115' level on the tower available for Verizon's use.

Sincerely,
Steven Florio
Steven J. Florio
Eversource Energy

REF: All Points Technology Corp.
CD's Dated 06/04/2024.
Structural Analysis Dated 06/04/2024, Mount Analysis Dated 06/04/2024.

ATTACHMENT 3

verizon

WIRELESS SERVICES FACILITY

MANCHESTER 7 CT
250 OLCOTT STREET
MANCHESTER, CT 06040

DRAWING INDEX

T-1 TITLE SHEET

SP-1 SITE PLAN

C-1 COMPOUND PLAN & WEST ELEVATION

C-2 EQUIPMENT AREA PLAN & DETAILS

C-3 EQUIPMENT DETAILS

S-1 STRUCTURAL PLANS & DETAILS

E-1 ELECTRICAL PLAN, SCHEDULES & NOTES

E-2 SCHEMATIC ONE-LINE RISER DIAGRAM, DETAILS & NOTES

E-3 EQUIPMENT GROUNDING PLANS & NOTES

E-4 GROUNDING DETAILS

B-1 RF BILL OF MATERIALS & EQUIPMENT SPECIFICATIONS

N-1 NOTES & SPECIFICATIONS

SITE DIRECTIONS

START: 20 ALEXANDER DRIVE
WALLINGFORD, CONNECTICUT 06492

END: 250 OLCOTT STREET
MANCHESTER, CT 06040

1.	TURN RIGHT ONTO ALEXANDER DRIVE	30 FT
2.	TURN RIGHT ONTO BARNES INDUSTRIAL PARK RD S	0.3 MI
3.	TURN RIGHT ONTO BARNES RD	600 FT
4.	TURN LEFT TO MERGE ONTO I-91N, TOWARD HARTFORD	1.8 MI
5.	TAKE EXIT 29 ON THE LEFT ONTO US-5N/RT.15N	2.1 MI
6.	TAKE EXIT 59 TO MERGE ONTO I-384 E TOWARD PROVIDENCE	4.0 MI
7.	TAKE EXIT 1 ON TO SPENCER ST	0.8 MI
8.	TURN LEFT ONTO SPENCE ST TOWARD PARK & RIDE, MANCHESTER	0.6 MI
9.	TURN LEFT (DESTINATION ON THE LEFT)	1.0 MI

LOCATION MAP

SITE INFORMATION

VZ SITE NAME	MANCHESTER 7 CT
VZ MDG LOCATION CODE	5000953787
VZ FUZE I.D.	17225579
VZ FSLC	143600
LOCATION	250 OLCOTT STREET MANCHESTER, CT 06040
PROJECT SCOPE	INSTALLATION CONSISTS OF (6) PANEL ANTENNAS, (3) SAMSUNG MT6413-77A ANTENNAS w/ INTEGRATED RRHs, (6) DUAL BAND ORAN REMOTE RADIO HEADS (RRHs), (3) ODRS ORAN RRHs, (1) 12OVP & (3) NEW SECTOR FRAMES MOUNTED TO AN EXIST. 180'± AGL SELF SUPPORT LATTICE TOWER IN ADDITION TO BASE EQUIP. & BATTERY CABINETS, GFS UNIT w/ ICE CANOPY LOCATED AT GRADE WITHIN EXIST. FENCED COMPOUND
PARCEL ID	33-4300 0250
EVERSOURCE SITE ID	108221
LATITUDE	41° 46' 11.7847" N (41.7699402 N)
LONGITUDE	-72° 33' 32.7226" W (-72.5590897 W)
GROUND ELEVATION	112.0± AMSL
PROPERTY OWNER	CONNECTICUT LIGHT & POWER CO PO BOX 270 HARTFORD, CT 06141
TOWER OWNER	EVERSOURCE PO BOX 270 HARTFORD, CT 06151-0000
APPLICANT	CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS 20 ALEXANDER DRIVE WALLINGFORD, CT 06492
LEGAL/REGULATORY COUNSEL	ROBINSON & COLE, LLP KENNETH C. BALDWIN, ESQ. 280 TRUMBULL STREET HARTFORD, CT 06103
ENGINEER CONTACT	ALL-POINTS TECHNOLOGY CORPORATION, P.C. 567 VAUXHALL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385 860 663-1697

COORDINATES & GROUND ELEVATION INDICATED HEREIN WERE ESTABLISHED FROM A FAA 1-A SURVEY CERTIFICATION, AS PREPARED BY MARTIN SURVEYING ASSOCIATES, LLC., DATED JUNE 4, 2024

Cellco Partnership d/b/a
verizon

ALL-POINTS TECHNOLOGY CORPORATION

CONSTRUCTION DOCUMENTS

NO	DATE	REVISION
0	05/24/24	FOR REVIEW: JRM
1	06/04/24	FOR FILING: JRM
2		
3		
4		
5		
6		

STATE OF CONNECTICUT
MICHAEL TRODDEN
33313
LICENSED
PROFESSIONAL ENGINEER

DESIGN PROFESSIONALS OF RECORD

PROF: MICHAEL S. TRODDEN P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHALL STREET EXT. SUITE 311 WATERFORD, CT 06385

OWNER: CONNECTICUT LIGHT & POWER CO
ADDRESS: PO BOX 270 HARTFORD, CT 06141

MANCHESTER 7 CT

SITE ADDRESS: 250 OLCOTT STREET MANCHESTER, CT 06040

APT FILING NUMBER: CT141CT141_145600

DRAWN BY: ELZ/JW

DATE: 06/04/24 CHECKED BY: JRM

VZW MDG: 5000953787

VZW FSLC: 143600

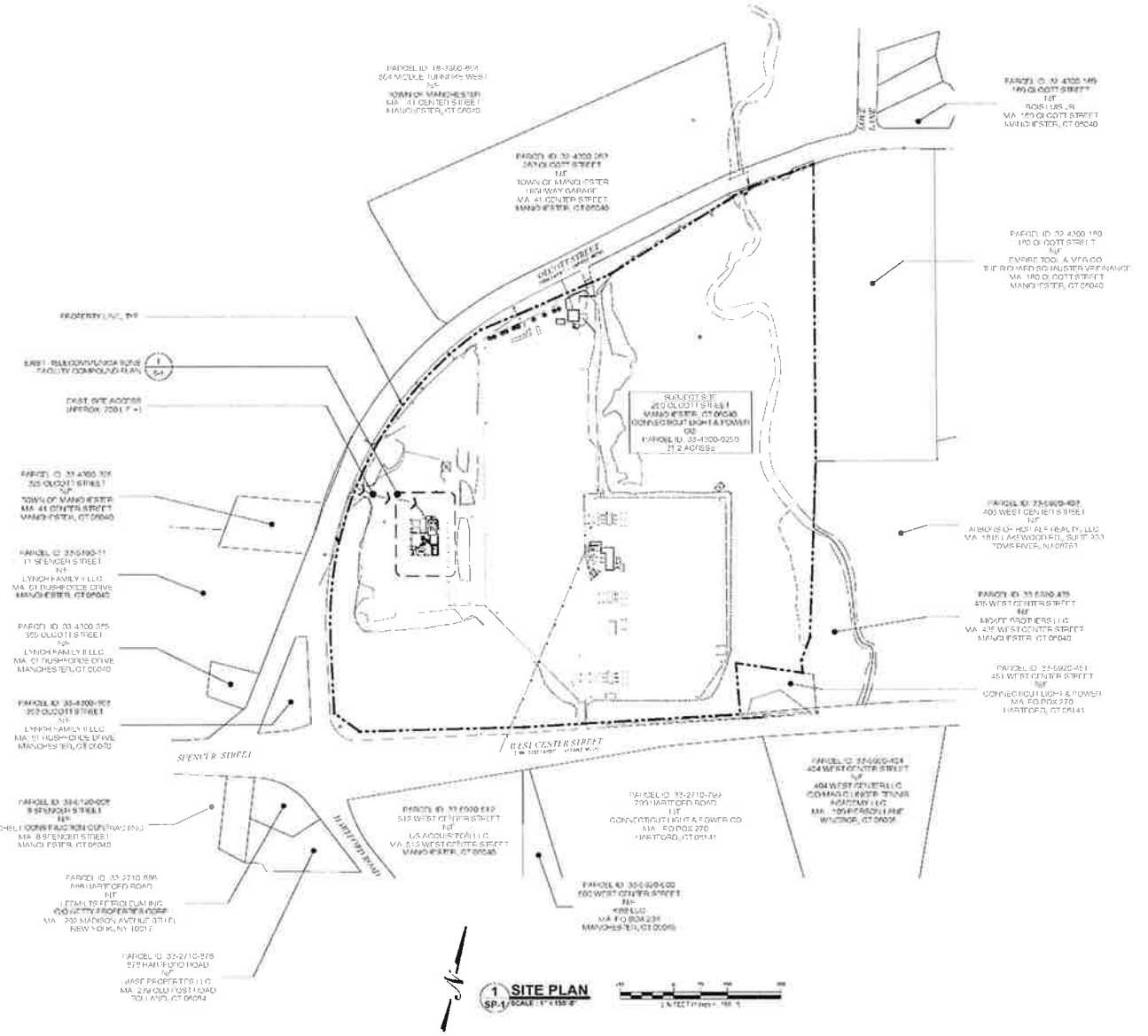
VZ FUZE ID: 17225579

SHEET TITLE:

TITLE SHEET

SHEET NUMBER:

T-1



SITE PLAN REFERENCE:

1. TOWN OF MANCHESTER, CT PUBLIC GIS VIEWER 3.0 GIS MAPPING, CITY OF MANCHESTER, 250 OLCOTT STREET, MANCHESTER, CT 06040 SITE PARCEL ID: 32-4200-0250
2. CONSTRUCTION DRAWING SET PREPARED FOR CUTSHEET SITE PLAN PREPARED BY ALL-POINTS TECHNOLOGY CORPORATION, P.C. MANCHESTER, CT DATED 02/14/24
3. CONSTRUCTION DRAWINGS SET PREPARED FOR ATTACHMENTS PREPARED BY ALL-POINTS TECHNOLOGY CORPORATION, P.C. MANCHESTER, CT DATED 05/15/24
4. BASE MAPPING SUPPLEMENTED W/ FIELD MEASUREMENTS OBTAINED BY ALL-POINTS TECHNOLOGY CORPORATION, P.C. ON 02/12/24

ABBREVIATION LIST:

AGL – ABOVE GROUND LEVEL
AMSL – ABOVE MEAN SEA LEVEL
AFL – ABOVE FINISH LEVEL
AWS – ADVANCED WIRELESS SERVICE
OVP – OVER VOLTAGE PROTECTION
RRH – REMOTE RADIO HEAD

Cellco Partnership d/b/a

verizon

ALL-POINTS TECHNOLOGY CORPORATION

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STATE OF CONNECTICUT
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COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
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WATERFORD, CT 06385

OWNER: CONNECTICUT LIGHT & POWER CO.
ADDRESS: PO BOX 270
HARTFORD, CT 06141

MANCHESTER 7 CT

SITE ADDRESS: 250 OLCOTT STREET
MANCHESTER, CT 06040

APT FILING NUMBER: CT14CT141_14560

	DRAWN BY: ELZ/JM
DATE: 05/24/24	CHECKED BY: JRM
VZW MDG: 5000953797	
VZW PSLC: 143808	
VZ FUZE ID: 17225579	

SHEET TITLE:

SITE PLAN

SHEET NUMBER:

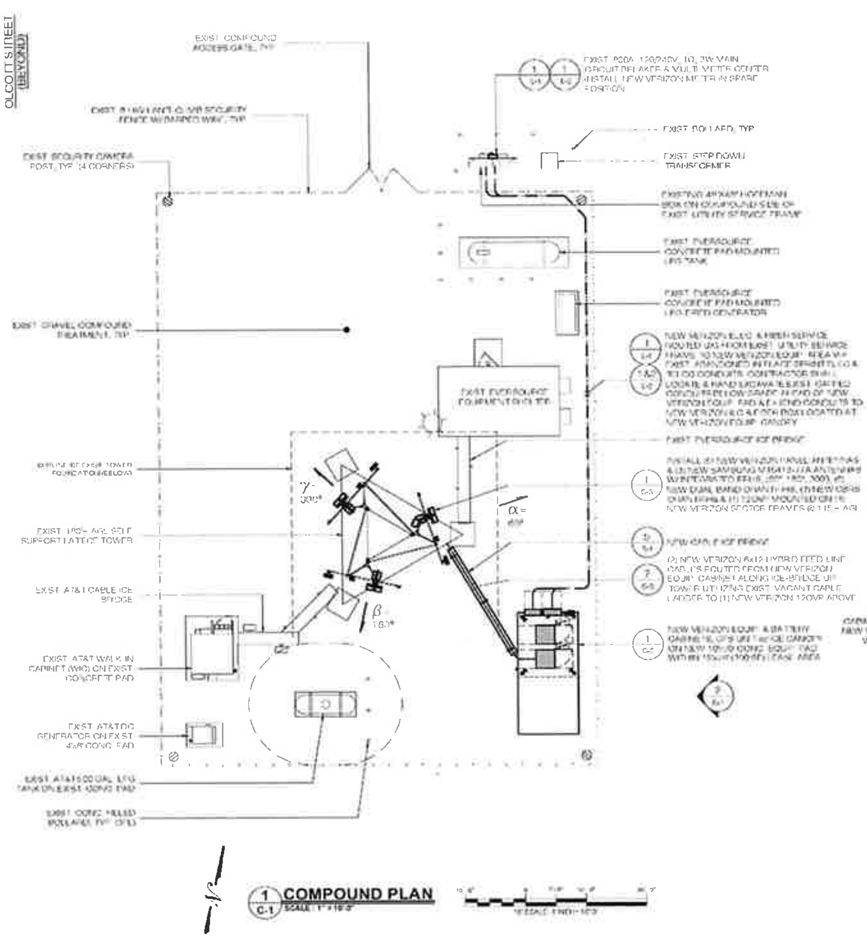
SP-1

EXCAVATION & TRENCHING NOTES

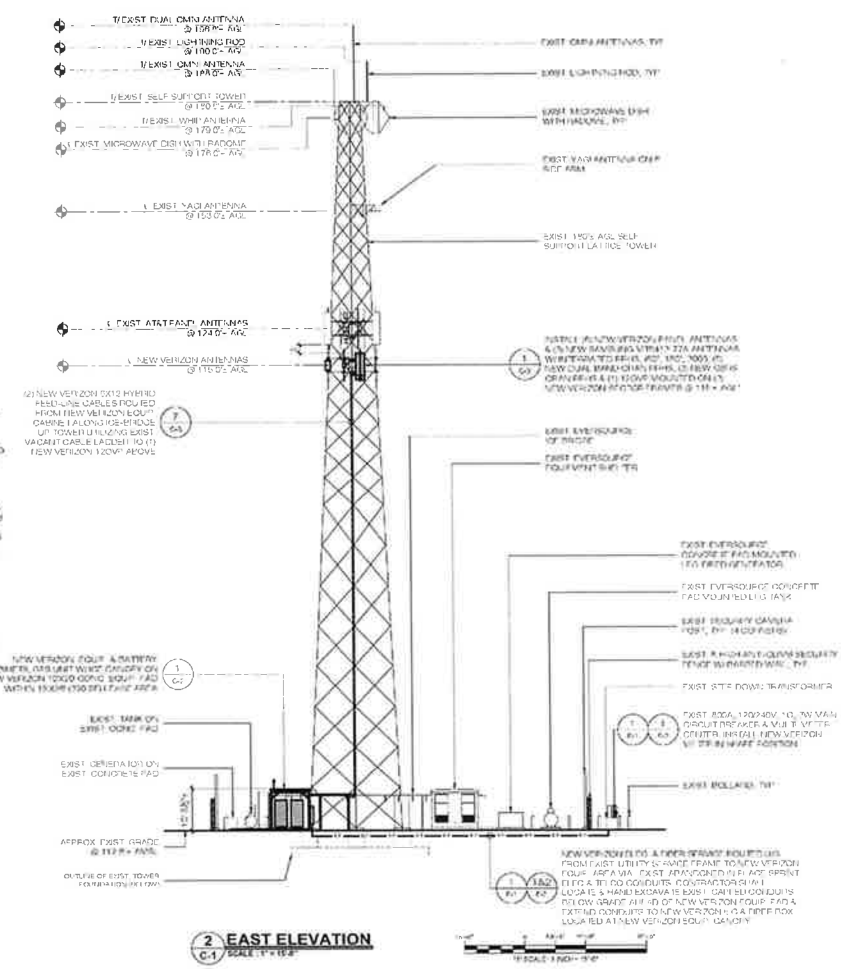
1. CONTRACTOR SHALL ENGAGE THE SERVICES OF AN UNDERGROUND UTILITY LOCATING COMPANY TO LOCATE ALL UNDERGROUND UTILITIES, GROUNDING & EQUIPMENT IN THE TRENCHING AREA TO AVOID ANY DAMAGE
2. HAND EXCAVATE WITHIN 5' OF EXIST. UNDERGROUND UTILITIES (V.I.F.) MAINTAIN 18" MIN CLEARANCE
3. CONTRACTOR TO COORDINATE TRENCHING OPERATIONS w/ OWNER AND/OR MANAGEMENT COMPANY SO AS TO MINIMIZE DISRUPTIONS TO THE EXIST. PROPERTY OPERATIONS

TOWER ANALYSIS NOTE
REFER TO STRUCTURAL ANALYSIS REPORT PREPARED BY ALL-POINTS TECHNOLOGY CORPORATION, P.C. MARKED REV 1, DATED 05/24/24 AVAILABLE UNDER SEPARATE COVER

MOUNT ANALYSIS NOTE
REFER TO MOUNT ANALYSIS REPORT PREPARED BY ALL-POINTS TECHNOLOGY CORPORATION, P.C. MARKED REV 1, DATED 05/09/24 AVAILABLE UNDER SEPARATE COVER



1 COMPOUND PLAN
C-1 SCALE: 1" = 10'-0"



2 EAST ELEVATION
C-1 SCALE: 1" = 15'-0"

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verizon

ALL-POINTS TECHNOLOGY CORPORATION

CONSTRUCTION DOCUMENTS

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5		
6		

STATE OF CONNECTICUT MICHAEL TRODDEN 33313 LICENSED PROFESSIONAL ENGINEER

DESIGN PROFESSIONALS OF RECORD
PROF: MICHAEL S. TRODDEN P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHALL STREET EXT. SUITE 311 WATERFORD, CT 06385

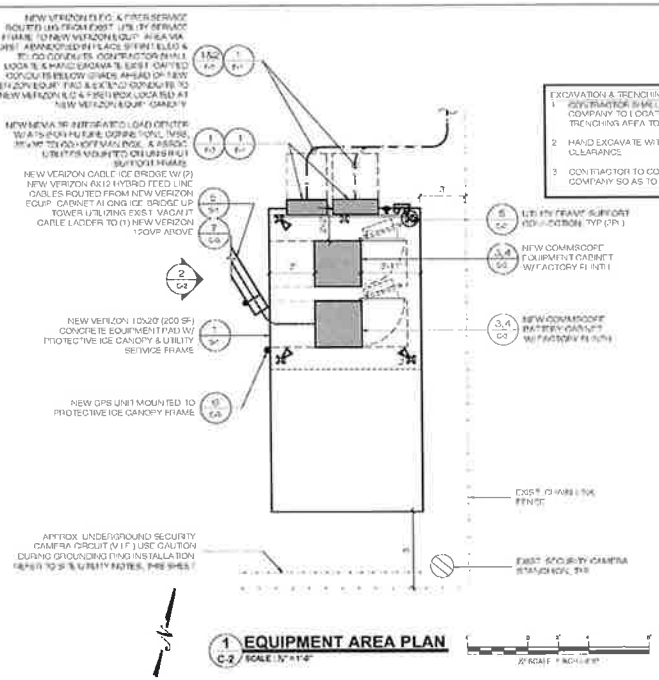
OWNER: CONNECTICUT LIGHT & POWER CO.
ADDRESS: PO BOX 270 HARTFORD, CT 06141

MANCHESTER 7 CT
SITE ADDRESS: 250 OLCOTT STREET MANCHESTER, CT 06040

APT FILING NUMBER: CT141CT141_14560
DRAWN BY: ELZ/JM
DATE: 05/24/24
CHECKED BY: JRM
VZW MDG: 5000053797
VZW PSLC: 143808
VZ FUZE ID: 17223579

SHEET TITLE:
COMPOUND PLAN & WEST ELEVATION

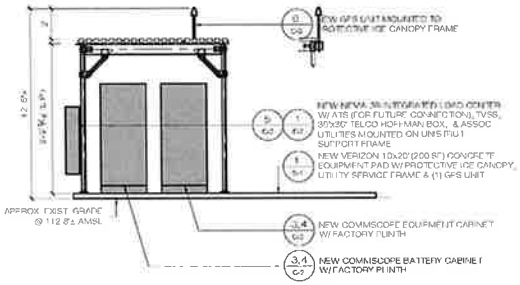
SHEET NUMBER:
C-1



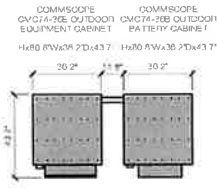
EXCAVATION & TRENCHING NOTES

1. CONTRACTOR SHALL ENGAGE THE SERVICES OF AN UNDERGROUND UTILITY LOCATING COMPANY TO LOCATE ALL UNDERGROUND UTILITIES, GROUNDING & EQUIPMENT IN THE TRENCHING AREA TO AVOID ANY DAMAGE.
2. HAND EXCAVATE WITHIN 5'OF EXIST. UNDERGROUND UTILITIES (V.I.F.) MAINTAIN 18" MIN. CLEARANCE.
3. CONTRACTOR TO COORDINATE TRENCHING OPERATIONS W/ OWNER AND/OR MANAGEMENT COMPANY SO AS TO MINIMIZE DISRUPTIONS TO THE EXIST. PROPERTY OPERATIONS

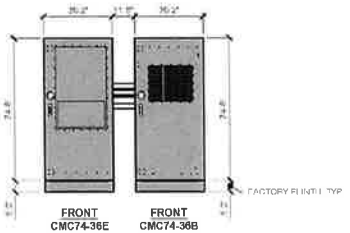
1 EQUIPMENT AREA PLAN
C-2 / SCALE: 1/4" = 1'-0"



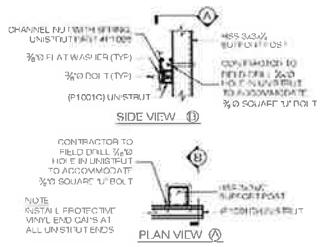
2 EQUIPMENT AREA ELEVATION
C-2 / SCALE: 1/4" = 1'-0"



3 OUTDOOR CABINET CMC74-36E & CMC74-36B PLAN VIEW
C-2 / SCALE: 1/4" = 1'-0"



4 OUTDOOR CABINET CMC74-36E & CMC74-36B ELEVATION VIEW
C-2 / SCALE: 1/4" = 1'-0"



5 SERVICE FRAME CONN. DETAIL
C-2 / SCALE: 1½" = 1'-0"

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verizon

ALL-POINTS TECHNOLOGY CORPORATION

CONSTRUCTION DOCUMENTS

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STATE OF CONNECTICUT · MICHAEL S. TRODDEN · 33313 · LICENSED PROFESSIONAL ENGINEER

DESIGN PROFESSIONALS OF RECORD

PROF: MICHAEL S. TRODDEN P.E.
COMP: ALL POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHALL STREET EXT. SUITE 311 WATERFORD, CT 06385
OWNER: CONNECTICUT LIGHT & POWER CO.
ADDRESS: PO BOX 270 HARTFORD, CT 06141

MANCHESTER 7 CT

SITE ADDRESS: 250 OLCOTT STREET MANCHESTER, CT 06040

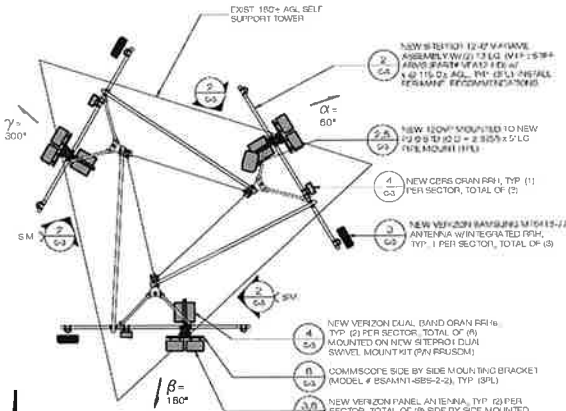
APT FILING NUMBER: CT141CT141_1466

DRAWN BY: ELZ/JM
DATE: 05/24/24
CHECKED BY: JRM

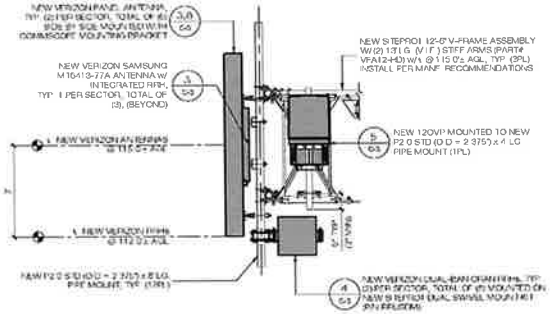
VZW MDG: 5000953797
VZW PSLC: 141808
VZ FUZE ID: 17235579

SHEET TITLE:
EQUIPMENT AREA PLAN & DETAILS

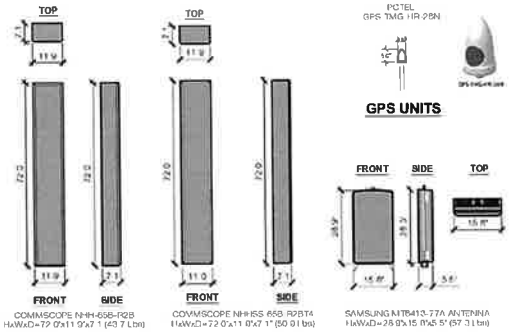
SHEET NUMBER:
C-2



1 ANTENNA MOUNT PLAN
C-3 SCALE: 1/2" = 1'-0"

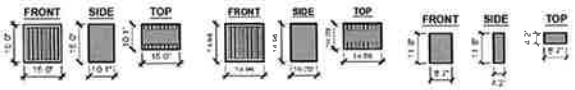


2 ANTENNA/RRH MOUNT DETAIL
C-3 SCALE: 1/2" = 1'-0"

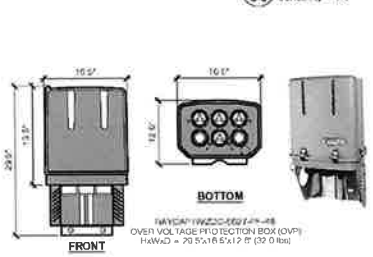


3 ANTENNA DETAILS
C-3 SCALE: 1/2" = 1'-0"

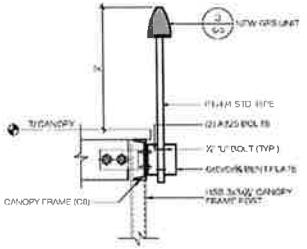
GPS UNITS



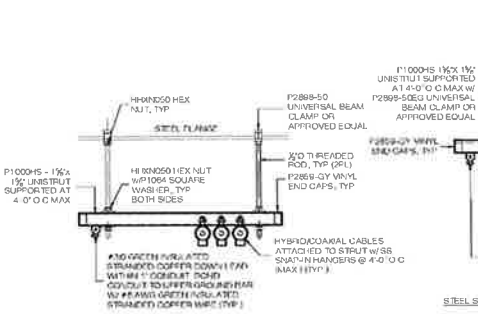
4 RRH EQUIPMENT
C-3 SCALE: 1/2" = 1'-0"



5 OVER VOLTAGE PROTECTION BOX (12 OVP)
C-3 SCALE: 1" = 1'-0"

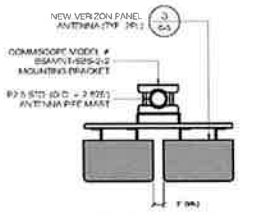


6 GPS MOUNT
C-3 SCALE: N.T.S.



NOTES
1. ALL EXTERIOR METAL COMPONENTS OF UNISTRUT SYSTEM SHALL BE HOT DIP GALVANIZED (HG)
2. CONTRACTOR SHALL COORDINATE INSTALLATION OF TRAPEZE SYSTEM w/ EXIST. DUCTWORK, PIPING, ETC. PROVIDE ALL BRIDGING, BRACING, FRAMING, ETC. AS REQUIRED
3. APPLY CONTINUOS BEAD OF SILICONE SEALANT COMPATIBLE W/ SURFACE AT ALL EXTERIOR PENETRATIONS FOR WATER TIGHTNESS
4. HYBRID COAXIAL JUMPER CABLE BEND RADIUS NOT TO EXCEED CABLE MANUFACTURER'S SPECIFICATIONS

7 CABLE SUPPORT DETAILS
C-3 SCALE: 1½" = 1'-0"



8 DUAL-MOUNT BRACKET DETAIL
C-3 SCALE: 3/4" = 1'-0"

Cellco Partnership d/b/a
verizon
[illegible]
WALLINGFORD, CT 06492

ALL-POINTS TECHNOLOGY CORPORATION
[illegible]

CONSTRUCTION DOCUMENTS

NO	DATE	REVISION
0	05/24/24	FOR REVIEW: JRM
1	08/08/24	FOR FILING: JRM
2		
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STATE OF CONNECTICUT
MICHAEL TRODDEN
33313
LICENSED PROFESSIONAL ENGINEER

DESIGN PROFESSIONALS OF RECORD

PROF: MICHAEL S. TRODDEN P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHALL STREET EXT, SUITE 311 WATERFORD, CT 06385

OWNER: CONNECTICUT LIGHT & POWER CO.
ADDRESS: PO BOX 270 HARTFORD, CT 06141

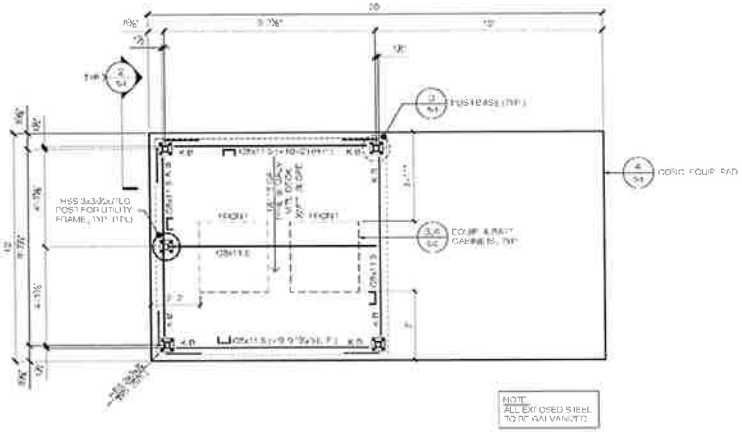
MANCHESTER 7 CT

SITE ADDRESS: 250 OLCOTT STREET MANCHESTER, CT 06040

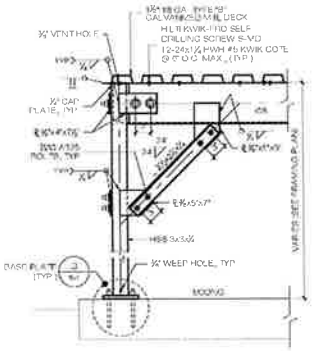
AP1 FILING NUMBER:	CT141CT141_145B
	DRAWN BY: ELZ/JM
DATE: 05/24/24	CHECKED BY: JRM
VZW MDG:	5800953787
VZW FSLC:	143808
VZ FUZE ID:	17235579

SHEET TITLE:
EQUIPMENT DETAILS

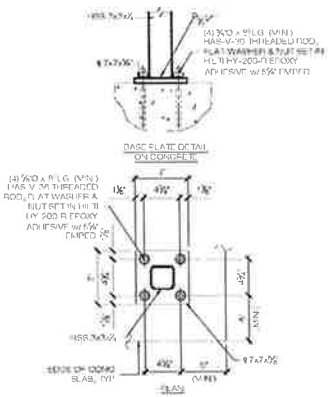
SHEET NUMBER:
C-3



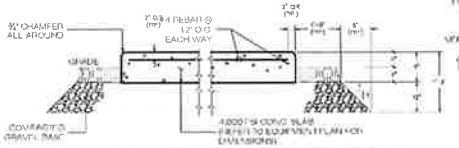
1 CANOPY FRAMING PLAN
S-1 SCALE: 3/8" = 1'-0"



2 CANOPY SUPPORT
S-1 SCALE: 1" = 1'-0"

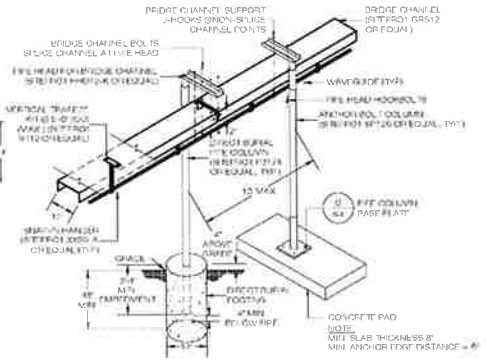


3 POST BASE DETAIL
S-1 SCALE: 1½" = 1'-0"

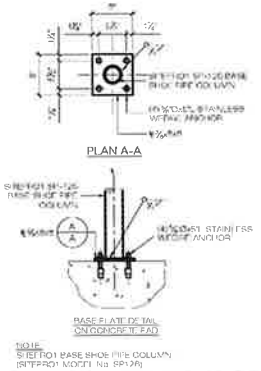


NOTES:
1. CONTRACTOR SHALL COORDINATE ALL SLAB DIMENSIONS, CONDUIT STUB UP LOCATIONS & TIE DOWN REQUIREMENTS W/ EQUIPMENT MANUFACTURER
2. CONCRETE SLAB DESIGN BASED ON A MINIMUM ALLOWABLE SOIL BEARING PRESSURE OF 1000 PSF
3. TOPS OF CONDUITS FOUND ON PLAN SHALL BE WITHIN 0.25" (+/-) FROM TOP OF ELEVATION AS SHOWN BY THE CUSTOMER
4. CONCRETE COMPRESSIVE STRENGTH SHALL BE MIN. 4000 PSI @ 28 DAYS. REFER TO CONCRETE NOTES ON SHEET E-1 FOR MORE INFORMATION
5. REFER TO NOTES ON SHEET E-1 FOR GROUNDING REQUIREMENTS

4 TYPICAL CONCRETE PAD DETAIL
S-1 SCALE: N.T.S.



5 CABLE BRIDGE & COAX HANGER DETAIL
S-1 SCALE: N.T.S.



6 SITEPRO1 PIPE BASE SHOE
S-1 SCALE: N.T.S.

Cellco Partnership d/b/a
verizon

ALL-POINTS TECHNOLOGY CORPORATION

CONSTRUCTION DOCUMENTS

NO	DATE	REVISION
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STATE OF CONNECTICUT MICHAEL TRODDEN 33313 LICENSED PROFESSIONAL ENGINEER

DESIGN PROFESSIONALS OF RECORD

PROF: MICHAEL S. TRODDEN P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHALL STREET EXT. SUITE 311 WATERFORD, CT 06385

OWNER: CONNECTICUT LIGHT & POWER CO.
ADDRESS: PO BOX 270 HARTFORD, CT 06141

MANCHESTER 7 CT

SITE ADDRESS: 250 OLCOTT STREET MANCHESTER, CT 06040

APT FILING NUMBER: CT1410T141_14560

	DRAWN BY: EL/ZJM
DATE: 05/24/24	CHECKED BY: JRM
VZW MDG: 5000053987	
VZW PM.C: 143808	
VZ FUZE ID: 17225570	

SHEET TITLE:

STRUCTURAL PLANS & DETAILS

SHEET NUMBER:

S-1

ELECTRICAL SYMBOL & ABBREVIATION LIST

SYMBOL	DESCRIPTION	ABBREV	DESCRIPTION
	FUSED DISCONNECT SWITCH (VOLTAGE AS REQUIRED)	AFF	ABOVE FINISHED FLOOR
	ELECTRICAL CONDUIT & CABLES	AFG	ABOVE FINISHED GRADE
	TELCOT PER CONDUIT & DRAG LINE	ACR	ANTENNA GROUND BAR
	GROUND CONDUIT & WIRE	AWG	AMERICAN WIRE GAGE
	DUPLEX RECEPTACLE WITH PANEL OR CIRCUIT INDICATED (MOUNTED 42" AFF)	BCW	BARE COPPER WIRE
	ELECTRO METER AND BASE COORDINATE WITH UTILITY COMPANY	C	CONDUIT
T	TRANSFORMER	DP	DISTRIBUTION PANEL
	NON-FUSED DISCONNECT SWITCH (VOLTAGE AS REQUIRED)	ECB	ENCLOSED CIRCUIT BREAKER
GB	GROUND BAR	EGB	EQUIPMENT GROUND BAR
	SPECIAL PURPOSE OUTLET	FACP	FIRE ALARM CONTROL PANEL
	GROUND ROD	GFCI	GND FAULT CIRCUIT INTERRUPTER
	GROUND CONNECTION	GRD	GALVANIZED ROD CONDUIT
IG	INTEGRATED LOAD CENTER W/ MAIN BREAKER	KWH	KILO WATT HOUR
ST	12 HR. TIMER SWITCH MOUNTED AT AFG	LFMC	LIQUID TIGHT FLEXIBLE METAL CONDUIT
GFCI/P	DUPLEX RECEPTACLE WITH GFCI AND WEATHERPROOF COVER, WHILE IN USE	MGB	MASTER GROUND BAR
GB	GROUND BAR	MTS	MANUAL TRANSFER SWITCH
A/D/A	LIGHT FIXTURE	NC	NON-RATED
		N O	NORMALLY OPEN
		RGS	RIGID STEEL CONDUIT
		SA	SURGE ARRESTOR
		T	TWIST-LOCK
		UNO	UNLESS NOTED OTHERWISE
		WP	WEATHERPROOF

LIGHTING FIXTURE SCHEDULE

TYPE	MANUFACTURER CATALOG#/MODEL No	GENERAL DESCRIPTION	LAMP	MOUNTING	NOTES
A	TBD LIGHTING INC LED MODEL # RELED18YD	BULLET FLOOD 18W	LED (HYDRA)	SURFACE	1,2
"	"	"	"	"	

NOTES:
1. ALUMINUM ROUND WEATHERPROOF BOX WOMASTER CARR MODEL # 7210471
2. ALUMINUM WEATHERPROOF COVER WOMASTER CARR MODEL # 7210413

EQUIPMENT LEGEND

DESIGNATION	DESCRIPTION
IG	INTEGRATED LOAD CENTER (ILC) - 200A 2P, 120/240VAC, 1 PH, 3W, W/ 200A SERVICE DISCONNECT SWITCH, AUTOMATIC TRANSFER SWITCH (FOR FUTURE CONNECTION) AND DOUBLE TVSS (OVERVOLTAGE PROTECTION AND GENERATOR) NEMA 3R ENCLOSURE MIN. TWO YEAR MANF. WARRANTY. FURNISH BOLT-ON CIRCUIT BREAKERS - TOTAL 42 POLES, 25KAIC
ST	1 20A @ 125V, 12 HOUR TIMER SWITCH - MCMASTER-CARR MODEL # 7201KKW 2 DOUBLE GANG WEATHERPROOF OUTLET BOX - MCMASTER-CARR MODEL # 7219K22 3 DOUBLE GANG WEATHERPROOF COVER - INTERMATIC MODEL # WP1230C

SUE UTILITY NOTE:
1. CONTRACTOR SHALL ENGAGE THE SERVICES OF AN UNDERGROUND UTILITY LOCATING COMPANY TO LOCATE ALL UNDERGROUND EQUIPMENT IN THE TRENCHING AREA TO AVOID ANY DAMAGE.
2. HAND EXCAVATE WITHIN 5'-0" OF EXIST. UNDERGROUND UTILITIES (NTE) MAINTAIN 18" MIN. CLEARANCE.
3. CONTRACTOR TO COORDINATE TRENCHING OPERATIONS w/ OWNER AND/OR MANAGEMENT COMPANY SO AS TO MINIMIZE DISRUPTIONS TO THE EXIST. PROPERTY OPERATIONS. RESTORE ALL DISTURBED GRADE TO PRE-CONSTRUCTION CONDITIONS & STANDARDS.

PANEL SCHEDULE

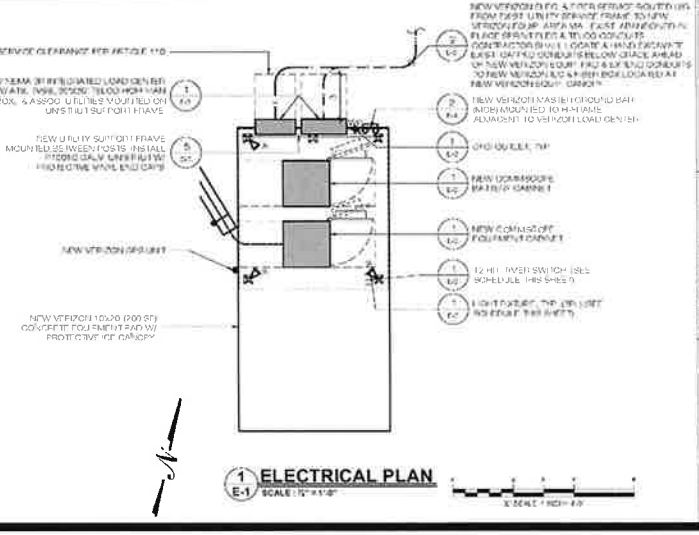
PANEL NAME/LOCATION: EQ VERIZON EQUIPMENT AREA
MAIN: 200A, 1P MCB
VOLTAGE/PHASE: 120/240V, 1Ø, 3W W/ INTEGRATED LOAD CENTER (ILC)
PANEL RATING: 200A, 240 VAC
MOUNTING: SURFACE
MANUFACTURER: ARGO OR EQUIV.
BREAKER TYPE: PLUG ON
MCB RATING: 42KAIC

CKT NO	LOAD DESCRIPTION	BRK (AMPS)	#	CONDUCTOR LOAD (AMPS)	A (KVA)	B (KVA)	CONDUCTOR LOAD (AMPS)	#	BRK (AMPS)	LOAD DESCRIPTION	CKT NO
1	RECTIFIER #1	70	2	5.83	2.5		5.83	2	70	RECTIFIER #2	2
3				5.83		3.5	5.83				4
5	RECTIFIER # 2	70	2	5.83	2.0		5.83	2	70	RECTIFIER #3	6
7				5.83		2.5	5.83				8
9	RECTIFIER #3	70	2	5.83	2.5		5.83	2	70	RECTIFIER #3	10
11				5.83		2.5	5.83				12
13	RECTIFIER # 4	70	2	5.83	2.5		5.83	2	70	RECTIFIER #3	14
15				5.83		2.5	5.83				16
17	QUADRUPLEX RECEPTACLE	20	1	0.36	0.54		0.18	1	20	GFCI EQUIPMENT CABINET	18
19	GFCI CONTROLLED EQUIP. CANOPY	20	1	0.18		0.36	0.18	1	20	GFCI TELCO BOX	20
21						0.12	0.12	1	15	CANOPY LIGHTING	22
23					0.01		0.01	2	50	TVSS	24
25						0.01	0.01				26
27											28
29											30
31											32
33											34
35	SPARE	-	-					-	-	SPARE	36
37	SPARE									SPARE	38
39	SPARE									SPARE	40
41	SPARE	-	-					-	-	SPARE	42

A	B	TOTAL	
11.8	11.2	23.0	TOTAL PANEL LOAD (KVA)
		24.0	TOTAL RATED CAPACITY (KW)
		19.0	TOTAL DERATED RATED CAPACITY (KW)
		95.8	PANEL AMPS (A)

NOTES
1. DOOR DIRECTORY TO BE COMPLETED WITH RESPECT TO THE ACTUAL CIRCUIT DESCRIPTION
2. BRANCH OCP AND CONDUCTOR SIZE AND QUANTITY BASED ON SPECIFIED EQUIPMENT CONFIRM FINAL REQUIREMENTS PRIOR TO INSTALLATION.
3. BRANCH CONDUCTOR SPECIFIED SHALL BE TYPE THWN-2 CU W/ 75 DEG. C RATED COPPER U N O

STANDARD ACCESSORIES
- CIRCUIT USED ONLY
- COPPER EQUIPMENT GROUND KIT
- INSULATED COPPER BOLT STRUCTURAL BAR
- BOLT-ON BRANCH CIRCUIT BREAKERS
- DIRECTORY FRAME WITH CLASSIFIED TYPE LAMINATED ENGRAVED PACKLIST NAMEPLATE
- FRONT DOOR (DOOR IN DOOR CONSTRUCTION) NEMA 3R



1 E-1 ELECTRICAL PLAN
SCALE: 1/2" = 1'-0"

1/2" SCALE = 1'-0"

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STATE OF CONNECTICUT
MICHAEL TRODDEN
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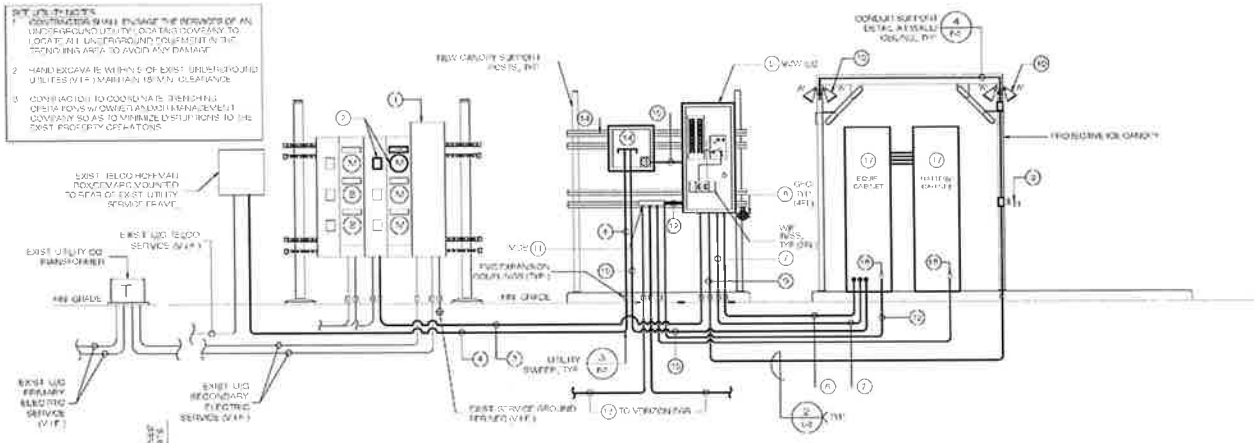
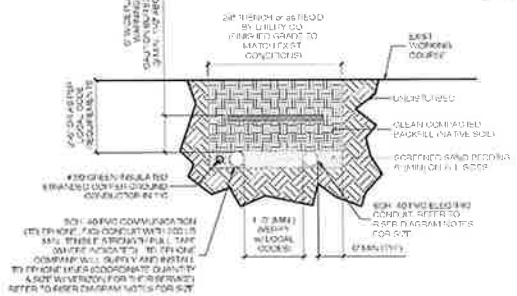
VZW MDG: 08009537897
VZW PSLC: 143808
VZ FUZE ID: 17225579

SHEET TITLE:
ELECTRICAL PLAN SCHEDULES & NOTES

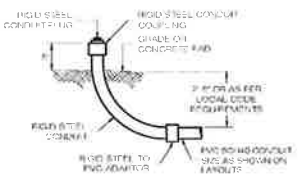
SHEET NUMBER:
E-1



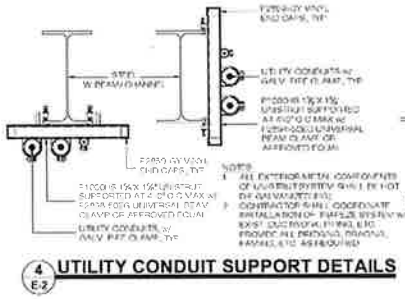
1 SCHEMATIC ONE-LINE RISER DIAGRAM
E-2 SCALE : N.T.S.



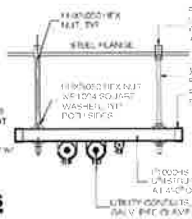
2 UTILITY TRENCH DETAIL
E-2 SCALE : N.T.S.



3 UTILITY SWEEP
E-2 SCALE : N.T.S.



NOTE:
1. ALL EXTERIOR METAL COMPONENTS OF UTILITY ENTRY SHALL BE HOT DIP GALVANIZED.
2. CONTRACTOR SHALL COORDINATE INSTALLATION OF CONDUITS, SYSTEM W/ EXIST. UTILITY PROVIDERS. FIELD VERIFY ALL PATHING, PHASING, PAYMENTS, ETC AS REQUIRED



4 UTILITY CONDUIT SUPPORT DETAILS
E-2

STRUCTAGHMENT NOTES

A. EXIST. CMU WALL (HOLLOW & GROUT FILLED)
FASTEN TO CMU W/ 3/8" SS HILTI HUS-P 5 1/4" SS WEDGE ANCHORS (MIN. 2 PER UNISTRUT)
- MIN. EMBED: 3 1/2"
- MIN. SPACING: 3"
- MIN. EDGE DISTANCE: 1 1/2"

B. CONCRETE WALL/CEILING
USE STRUT ANCHORED TO WALL/CEILING W/ 3/8" DIA. SS HILTI KWIK BOLT TZ2 STRUT WITH P1000S FOR 6" STRUT
- MIN. EMBED: 3"
- MIN. SPACING: 6"
- MIN. EDGE DISTANCE: 4"

C. BRICK MASONRY WALL/CEILING
USE STRUT ANCHORED TO WALL W/ 3/8" DIA SS HILTI "HEATED BOLT" WITH P1000T FOR 6" STRUT (MIN. 3 PER BRACKET) W/ BOX ANCHOR METHOD
- MIN. EMBED: 3"
- MIN. SPACING: 10" (VERT. & HORIZ.)
- MIN. EDGE DISTANCE: 10"

D. WOOD STUD CEILING
USE STRUT ANCHORED TO (2) OF EXIST. WOOD JOIST @ 6" O.C. MAX W/ 5/16" DIA. (6" LG. CARRIAGE) CONNECTOR SCREWS WITH 4" WASHERS (MODEL NO. SDR0112), TYP. 2 PER STRUT

1. USE STAINLESS STEEL ANCHORS INTO CONCRETE
2. USE CARBON STEEL ANCHORS INTO BRICK OR MASONRY
3. INSTALL ALL ANCHORS PER MANUFACTURERS RECOMMENDATIONS

ELECTRICAL ONE-LINE RISER KEY NOTES:

1. EXIST. (N) 120/240V, 3Ø, 800A, (E) 200A/2-POLE MAIN CIRCUIT BREAKER, 4-(E) NO. 3/0, 1-(E) NO. 4/0 GND IN 2" C. EXIST. UTILITY METER TO REMAIN. (E) 120/240V, 1Ø, 200A SWITCH TO BE REMOVED. PROVIDE BYPASS SOCKET READY.
2. NEW 120/240V, 1Ø, 3W KWH MMEUB, PV, FASS METER SOCKET ELECTRIC FOR EQUAL W/ 200A, 2P TENANT CIRCUIT BREAKER COORDINATE INSTALLATION AND ACTIVATION OF METER WITH UTILITY COMPANY. REFER TO SE-1 FOR LOCATION. VERIFY LOCATION OF METER WITH UTILITY COMPANY AND LOCAL ELECTRICAL INSPECTOR. METER SOCKET SHALL BE OF EARLY LATCH TO START OF RAINT SERV OF CUTS-AIDE, 200A, 120/240V, 1Ø, 3W.
3. (3#3/0 & 1#1/0 G TO 3/4" C) 4/0 AWG, 2-POLE 200A, 120/240V, 1Ø, 3W NORMAL POWER SERVICE FROM LOAD SIDE OF VERIZON METER SOCKET TO NORMAL TERMINAL OF VERIZON'S UTILITY EXIST. ABANDONED SPRINT 200 AMP METER. CONTRACTOR SHALL LOCATE & HAND EXCAVATE EXIST. CAPPED CONDUIT BELOW GRADE AHEAD OF NEW VERIZON EQUIP. PAD & EXTEND CONDUIT TO NEW VERIZON EQUIP. CANOPY. PROVIDE UNDERGROUND PULL BOXES AND EXPANSION COUPLINGS AS REQUIRED.
4. NEW VERIZON 24 FIBER (SINGLE MODE FIBER SERVICE ROUTED FROM TELCO MAIN TO NEW HOFFMAN BOX AND FIBER TERMINATION PANEL. (E) THE LOCATED AT VERIZON EQUIPMENT AREA UTILIZE EXIST. ABANDONED SPRINT 200 AMP METER SOCKET W/ 2" CONDUIT. CONTRACTOR SHALL LOCATE & HAND EXCAVATE EXIST. CAPPED TELCO CONDUIT OR CONDUIT BANK AHEAD OF NEW VERIZON EQUIP. PAD & EXTEND CONDUIT TO NEW VERIZON FIBER BOX LOCATED AT NEW VERIZON EQUIP. CANOPY. PROVIDE UNDERGROUND PULL BOXES AND EXPANSION COUPLINGS AS REQUIRED. FINAL TERMINATION BY OTHERS. CONTRACTOR TO INSTALL CONDUIT WITH LOCAL UTILITY COVERAGE AND AUTHORITY HAVING JURISDICTION (AHJ).
5. NEW VERIZON 120/240V, 1 PH, 3W, NEMA 3R INTEGRATED LOAD CENTER W/ 200A 2P MAIN CIRCUIT BREAKER (MCB), AUTOMATIC TRANSFER SWITCH AND GOLD CLASS. REFER TO E-1 FOR SPECIFICATIONS. CONTRACTOR SHALL PROVIDE TYPE WRITTEN DIRECTORY WITH CIRCUIT BREAKER NUMBERING AND PROVIDE ONE COPY FOR VERIZON CONSTRUCTION MANAGER AND ANOTHER SECOND COPY TO BUILDING. PROVIDE LABEL ON FRONT OF PANEL WITH BLACK LETTERS ON WHITE BACKGROUND MARKED "VERIZON". MOUNT VERIZON LOAD CENTER IN THEIR EQUIPMENT SUITE ON TOP OF 1" UNISTRUT P1001C GALV. UNISTRUT AND INSTALL PROTECTIVE VINYL END CAPS.
6. (1#) #6 AWG (1) #6 GND IN 3/4" C. TO FEED NEW EQUIPMENT CABINET. (E) STATE 2 (1) WIRING PER MANUFACTURERS SPECIFICATIONS.
7. (2) #12 AWG (1) #12 G IN 3/4" C. TO FEED NEW EQUIPMENT CABINET 2 SMART 120V GFCI OUTLET.
8. (2) #12 AWG (1) #12 G IN 3/4" C. TO FEED NEW 20A/1P/2P CIRCUIT BREAKER IN NEW VERIZON METER SOCKET LOCATED AT VERIZON CANOPY FOR INSTALL APPROX. 40' A.F.G. REFER TO EQUIPMENT LAYOUT ON DRAWING E-1 FOR SPECIFICATIONS AND SEE P FOR LOCATION.
9. (2) #12 AWG (1) #12 G IN 3/4" C. TO FEED NEW 20A/1P/2P CIRCUIT BREAKER IN NEW VERIZON METER SOCKET LOCATED AT VERIZON CANOPY FOR INSTALL APPROX. 40' A.F.G. REFER TO EQUIPMENT LAYOUT ON DRAWING E-1 FOR SPECIFICATIONS AND SEE P FOR LOCATION.
10. NEW SERVICE ENTRANCE GROUND EXIT FIXTURE TO J-BOX. REFER TO LIGHTING FIXTURE SCHEDULE ON DRAWING E-1 FOR SPECIFICATIONS AND SEE P FOR LOCATION. WIRE SWITCH TO CONTROL ALL LIGHTS SIMULTANEOUSLY (TYP.)
11. MASTER GROUND BAR (MGB). REFER TO E-2 FOR LOCATION AND E-4 FOR DETAILS.
12. PROVIDE #6 AWG GREEN INSULATED STRANDED COPPER WIRE IN 1"C AND GROUND VERIZON LOAD CENTER TO MAIN GROUND BAR (MGB). REFER TO DRAWING E-1 FOR LOCATION AND GROUNDING NOTES.
13. PROVIDE #2/0 AWG GREEN INSULATED STRANDED COPPER WIRE IN 2"C TO BEST ON SITE GROUND BONDING VAULT WITH #6 AWG GREEN INSULATED STRANDED COPPER WIRE AT BOTH ENDS. REFER TO E-1 FOR LOCATION.
14. 3'-6" x 1'-6" x 1'-0" (1) OUTDOOR J-BOX WITH HINGED COVER, LOCKABLE CLASP, 3/4" MARINE GRADE PLYWOOD BACKBOARD PAINTED WHITE BLACK PVC FILM MOUNT AT MAXIMUM 6'-0" A.F.F. MOUNTED PVC CE AND (1) OUTLET BOX LOCATED INSIDE OF (1) OF EACH HINGED COVERED MOUNT HOH VAN BOX (E) PATTERN EQUIPMENT CANOPY POSTS (4") 120/2 GALV. GRIP NUT AND INSTALL PROTECTIVE VINYL END CAPS.
15. (1) 3/4" TELCO SERVICE ROUTED WITHIN 2" HOH VAN TELCO HOH VAN BOX TO EQUIPMENT CABINET FINAL TERMINATION BY OTHERS. PROVIDE JUNCTION BOXES WHERE REQUIRED.
16. (2) #12 & (1) #12G IN 3/4"C TO FEED NEW 20A/2P/2P GFCI OUTLET IN EVA (2) OPEN NEMA 4X ENCLOSURE LOCATED WITHIN VERIZON HOFFMAN BOX. INSTALL APPROX. 4'-6" A.F.G. REFER TO E-1 FOR LOCATION.
17. VERIZON WIRELESS EQUIPMENT & BATTERY CABINETS. COORDINATE INSTALLATION WITH VERIZON CONSTRUCTION MANAGER.
18. BOND EQUIPMENT & BATTERY CABINET TO MAIN GROUND BAR (MGB) PER EQUIPMENT CABINET MANUFACTURER'S SPECIFICATIONS. MIN. #2 AWG GREEN INSULATED STRANDED COPPER WIRE. FOR ALL OTHER (1) INTERNAL GROUNDING IN VAULT AS PER NEC & TELCO.

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STATE OF CONNECTICUT
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VZW PSLC: 143808
VZ FUZE ID: 17225579

SHEET TITLE:
SCHEMATIC ONE-LINE RISER DIAGRAM, DETAILS & NOTES

SHEET NUMBER:
E-2

TYPICAL GROUNDING NOTES

1. GROUND RING NOTES (NFPA 70, NEC) AND MANUFACTURERS SPECIFICATIONS
2. #3/0 GREEN INSULATED STRANDED COPPER DOWN LEAD BETWEEN UPPER EQUIPMENT GROUND BAR AND LOWER EQUIPMENT GROUND BAR (EGB) AT BASE OF STRUCTURE. ROUTE GROUND ALONGSIDE HYBRID CABLES. COORDINATE W/ VERIZON CONSTRUCTION MANAGER AND OWNER.
3. BOND VERIZON MASTER & LOWER EQUIPMENT GROUND BARS (MGB/EGB) TO NEW EXTERIOR GROUND RING (EGR) W/ #3/0 AWG GREEN INSULATED STRANDED COPPER WIRE (EGR) IN 1" I.D. PVC TYP. (2) REFER TO E-4 FOR DETAILS
4. #3/0 GREEN INSULATED STRANDED COPPER DOWN LEAD WITHIN TOWER BETWEEN ANTENNA SECTOR GROUND BAR & UPPER EQUIPMENT GROUND BAR (EGB) (TYP.2) REFER TO E-4 FOR DETAILS
5. #2 AWG SOLID TINNED BARE COPPER WIRE (STRG) EXTERNAL GROUND RING (EGR) AT PERIMETER OF EQUIP. AREA & BETWEEN GROUND RODS LOCATED MIN. 30" BELOW GRADE OR 6" BELOW FROST LINE, TYP.
6. BOND CANOPY POSTS, STEEL SERVICE FRAME POSTS & STEEL DUNNAGE FRAME (WHERE APPLICABLE) TO VERIZON EXTERIOR GROUND RING (EGR) W/ #2 AWG SOLID TINNED BARE COPPER WIRE (STRG) IN 1" I.D. PVC.
7. BOND VERIZON INTEGRATED LOAD CENTER & TELCO HOFFMAN BOX TO EQUIPMENT GROUND BAR (EGB) W/ #6 AWG GREEN INSULATED STRANDED COPPER WIRE.
8. BOND VERIZON WIRELESS EQUIPMENT & BATTERY CABINETS TO VERIZON MASTER GROUND BAR (MGB) WITH #2 AWG GREEN INSULATED STRANDED COPPER WIRE PER MANUFACTURERS SPECIFICATIONS.
9. BOND HYBRID COAXIAL CABLES TO ANTENNA SECTOR GROUND BARS & EQUIPMENT GROUND BAR (EGB) AT CANOPY W/ #6 AWG GREEN INSULATED STRANDED COPPER WIRE.
10. GROUND RODS, QUAD DIP EXPERS & CMP TO ANTENNA GROUND BAR W/ #6 AWG GRCH INSULATED STRANDED COPPER WIRE PER MANUFACTURERS RECOMMENDATIONS.
11. BOND ANTENNA MOUNTING PIPE, ANTENNA MOUNTING BRACKETS & FRAMES TO ANTENNA GROUND BAR W/ #2 AWG GREEN INSULATED COPPER WIRE.
12. BOND GPS ANTENNA MOUNTING MAST (AS APPLICABLE) TO MASTER GROUND BAR W/ #2 AWG GREEN INSULATED COPPER WIRE.
13. BOND ALL ICE-BRIDGE POSTS TO EXTERNAL GROUND RING (EGR) WITH #2 SOLID TINNED WIRE.

GROUNDING GENERAL NOTES:

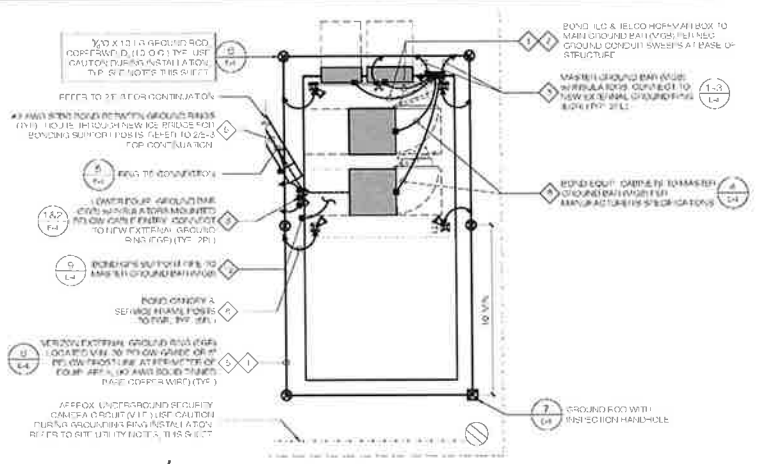
1. ALL SURGE SUPPRESSION DEVICES (WHERE APPLICABLE) SHALL BE BONDED TO EQUIPMENT GROUND BAR (EGB) PER MANUFACTURERS SPECIFICATIONS.
2. ALL IN-GROUND RINGS, RADIALS, AND BONDING CONDUCTORS SHALL BE #2 AWG SOLID BARE TINNED COPPER (STRG) MIN. AT LEAST 30 IN. DEEP OR MIN. BELOW FROST LINE WHICHEVER IS GREATER.
3. **ALL GROUND RINGS SHALL BE MIN 2'-1" FROM FOUNDATION BEING ENCIRCLED.**
4. COMBINE IN-GROUND RINGS, RADIALS, AND BONDING CONDUCTORS WITH SINGLE CONDUCTOR FOR ALL PORTIONS PARALLEL 2 FT APART OR CLOSER.
5. UNLESS NOTED OTHERWISE, ALL ABOVE GROUND CONDUCTORS SHALL BE MIN #6 AWG INSULATED STRANDED COPPER.
6. CONDUCTORS BONDING ABOVE GROUND CONNECTIONS TO IN GROUND CONNECTIONS SHALL BE MIN #2 AWG SOLID UNLESS NOTED OTHERWISE AND SHALL BE ROUTED IN LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT FOR ALL PORTIONS ABOVE GROUND.
7. **REFER TO GROUNDING NOTES & SPECIFICATIONS ON SHEET E-1 FOR MORE INFORMATION.**

GROUNDING LEGEND

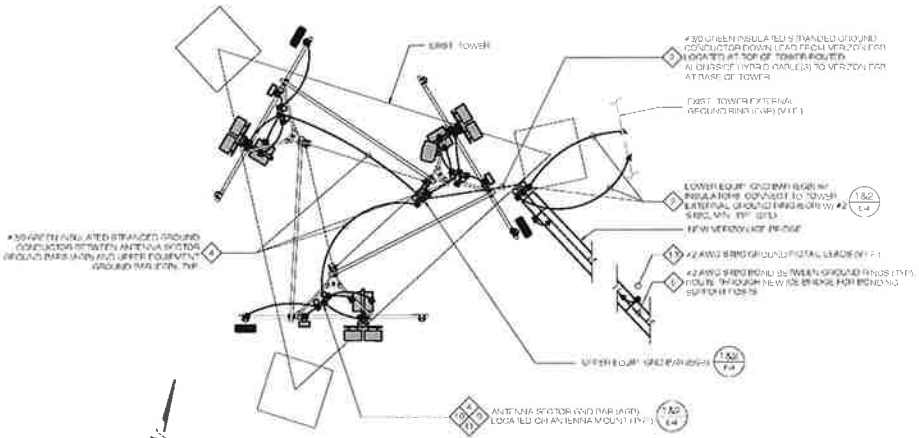
SYMBOL	DESCRIPTION
▶	EXOTHERMIC WELD
■	MECHANICAL CONNECTION
⊗	GROUND ROD
——	GROUND CONDUCTOR
—⊠—	GROUND ROD W/ INSPECTION HAND HOLE

SITE UTILITY NOTES:

1. CONTRACTOR SHALL ENGAGE THE SERVICES OF AN UNDERGROUND UTILITY LOCATING COMPANY TO LOCATE ALL UNDERGROUND EQUIPMENT IN THE WORK AREA TO AVOID ANY DAMAGE.
2. HAND EXCAVATE WITHIN 5' OF EXIST. UNDERGROUND UTILITIES (V.I.F.) MAINTAIN 12" MIN. CLEARANCE.
3. CONTRACTOR TO COORDINATE TRENCHING OPERATIONS W/ OWNER AND/OR MANAGEMENT COMPANY SO AS TO MINIMIZE DISRUPTIONS TO THE EXIST. PROPERTY OPERATIONS.



1 EQUIPMENT GROUNDING PLAN
E-3 SCALE: N.T.S.



2 ANTENNA GROUNDING PLAN
E-3 SCALE: N.T.S.

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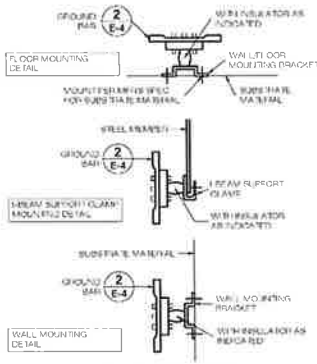
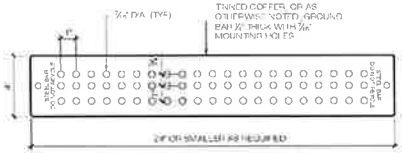
VZW PSLC: 143808
VZ FUZE ID: 17221579

SHEET TITLE:
EQUIPMENT GROUNDING PLANS & NOTES

SHEET NUMBER:
E-3

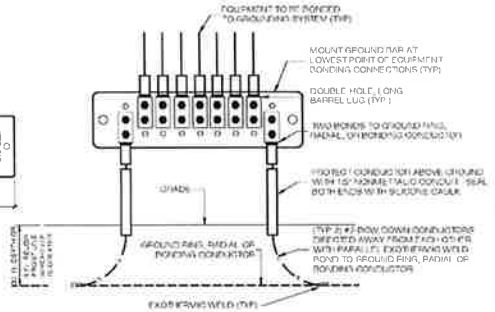


1 GROUND BAR MOUNTING DETAILS
E-4 SCALE : NTS

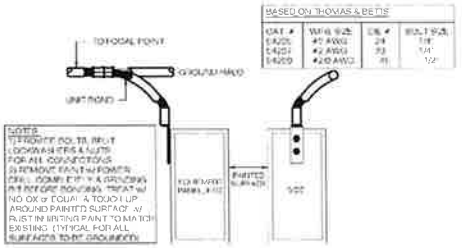


2 GROUND BARS
E-4 SCALE : NTS

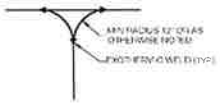
NOTES:
1. PID EXOTHERMIC WELDS TO GROUND BAR ATTACH CONDUCTORS WITH (2) HOLE COPPER COMPRESSION TERMINATORS AND ALL STAINLESS STEEL HARDWARE.
2. DOUBLE UP CONNECTIONS ON BACKSIDE OF GROUND BAR ONLY AS NECESSARY.
3. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
4. ALL STAINLESS STEEL MOUNTING HARDWARE.



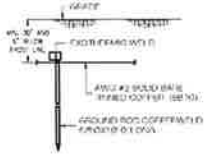
3 GROUND BAR CONNECTION DETAIL
E-4 SCALE : NTS



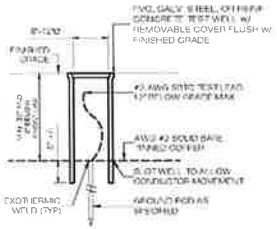
4 (2) HOLE LUG BONDS
E-4 SCALE : N.T.S



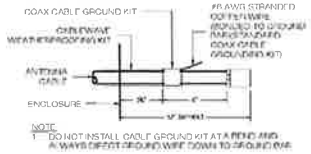
5 TIE CONNECTION DETAIL
E-4 SCALE : NTS



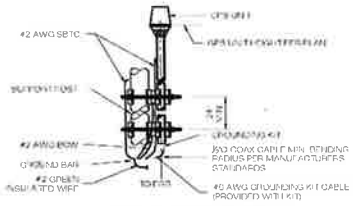
6 GROUND ROD DETAIL
E-4 SCALE : N.T.S



7 TEST WELL DETAIL
E-4 SCALE : NTS



ANTENNA CABLE GROUNDING DETAIL
E-4 SCALE : N.T.S.



GPS ANTENNA MOUNTING BRACKET

9 GPS AND MOUNTING BRACKET GROUNDING DETAIL
E-4 SCALE : N.T.S

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verizon

ALL-POINTS TECHNOLOGY CORPORATION

CONSTRUCTION DOCUMENTS

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0	05/24/24	FOR REVIEW JRM
1	06/04/24	FOR FILING JRM
2		
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STATE OF CONNECTICUT MICHAEL TRODDEN 33313 LICENSED PROFESSIONAL ENGINEER

DESIGN PROFESSIONALS OF RECORD

PROF: MICHAEL S. TRODDEN P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHALL STREET EXT. SUITE 311 WATERFORD, CT 06385
OWNER: CONNECTICUT LIGHT & POWER CO.
ADDRESS: PO BOX 270 HARTFORD, CT 06141

MANCHESTER 7 CT

SITE ADDRESS: 250 OLCOTT STREET MANCHESTER, CT 06040

APT FILING NUMBER: CT141CT141_14550

DRAWN BY: ELZ/JM
DATE: 05/24/24
CHECKED BY: JRM

VZW MDG: 5000053797
VZW PSLC: 143808
VZ FUZE ID: 17225579

SHEET TITLE:

GROUNDING DETAILS

SHEET NUMBER:

E-4

EQUIPMENT DATA

EQUIPMENT SPECIFICATIONS

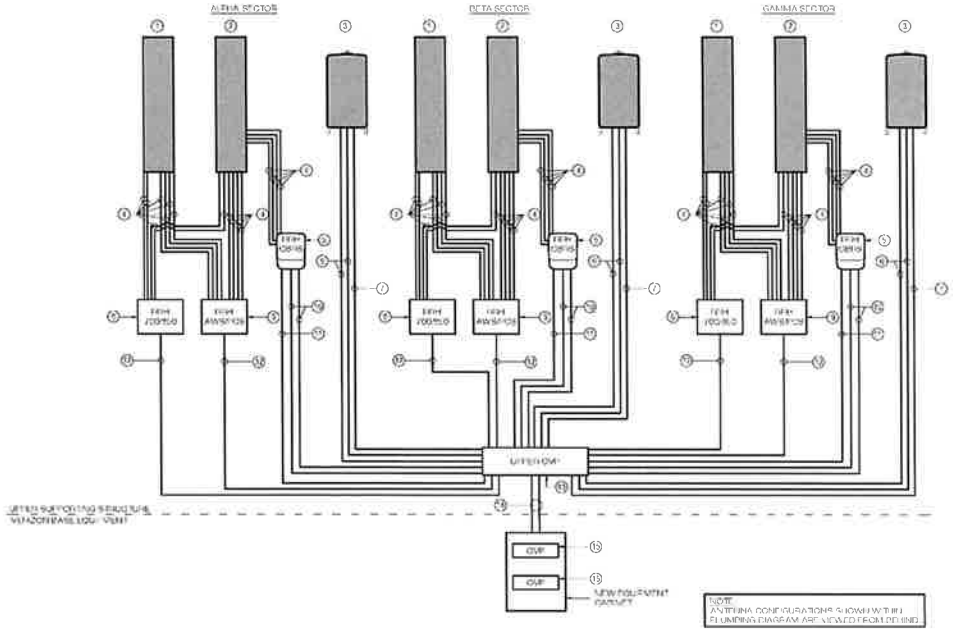
SECTOR	ANTENNA MAKE/MODEL	QTY	AZIMUTH	EQUIPMENT STATUS	HEIGHT (IN)	WIDTH (IN)	DEPTH (IN)	WEIGHT (LBS)
ALPHA	JOMS/GTV0021/00 COMMSCOPE NHH-65B-R2B	1	60°	NEW	72.0	11.9	7.1	49.1 #
	JOMS/GTV0021/00 COMMSCOPE NHH-65B-R2B/34	1	60°	NEW	72.0	11.9	7.1	50.9#
	SAMSUNG MT6413-77A	1	60°	NEW	28.9	15.8	6.5	57.3 #
BETA	JOMS/GTV0021/00 COMMSCOPE NHH-65B-R2B	1	180°	NEW	72.0	11.9	7.1	49.1#
	JOMS/GTV0021/00 COMMSCOPE NHH-65B-R2B/34	1	180°	NEW	72.0	11.9	7.1	50.9#
	SAMSUNG MT6413-77A	1	180°	NEW	28.9	15.8	6.5	57.3 #
GAMMA	JOMS/GTV0021/00 COMMSCOPE NHH-65B-R2B	1	300°	NEW	72.0	11.9	7.1	49.1#
	JOMS/GTV0021/00 COMMSCOPE NHH-65B-R2B/34	1	300°	NEW	72.0	11.9	7.1	50.9#
	SAMSUNG MT6413-77A	1	300°	NEW	28.9	15.8	6.5	57.3 #
	APPURTENANCE MAKE/MODEL							
	SAMSUNG B2/B66A DUAL RRH (RF4439d-25A)	3	-	NEW	15.0	13.0	10.1	71.2
	SAMSUNG B5/B13 QUAD RRH (RF4439d-13A)	3	-	NEW	14.96	14.96	10.23	79.1
	SAMSUNG B29 RT4401-48A RRH	3	-	NEW	11.8	8.1	9.2	79.4
	HYBRIFLEX ZOCC-052278-M	1		NEW	29.5	16.5	12.6	50.0

(1) WEIGHT WITHOUT MOUNTING BRACKET
(2) EQUIPMENT DATA BASED ON LATEST VERIZON RFDS
(3) EQUIPMENT CONFIGURATION AS VIEWED FROM BEHIND

BILL OF MATERIALS

	EQUIPMENT DESCRIPTION	QUANTITY	LENGTH	COMMENTS
1	JOMS/GTV0021/00	3		COMMSCOPE NHH-65B-R2B
2	JOMS/GTV0021/00	3		COMMSCOPE NHH-65B-R2B/34
3	LSA ANTENNA w/INTEGRATED RET	3		SAMSUNG MT6413-77A
4	1/2 JUMPER CABLE	48	15 FT	ROUTED FROM RRHS TO ANTENNAS
5	ODRS RFH	3		SAMSUNG ODRS RT4401-48A
6	ANTENNA LINK CABLES	6	15 V	ROUTE FROM UTTER-DVP TO LSA ANTENNA
7	ANTENNA POWER CABLES	3	15 V	PROPRIETARY POWER CABLE FROM EXIST DVP TO LSA ANTENNA
8	B5/B13 DUAL BAND RRH	3		SAMSUNG B5/B13 RRH (RF4461d-13A)
9	PSRWS DUAL BAND RRH	3		SAMSUNG B2/B66A RRH (RF4439d-25A)
10	DC9 CABLES	6	25 FT	ROUTE FROM UTTER-DVP TO RRH
11	10 AWG x3 DC POWER CABLE	3	25 FT	PROPRIETARY POWER CABLE FROM UTTER-DVP TO RRH
12	RRH CABLES	9	15M	PROPRIETARY POWER & FIBER CABLES
13	UTTER DVP	1		RNDC0-C02U-H-45
14	HYBRID CABLE	2	150± FT	6x12 LOW INDUCTANCE (LI) HYBRID FEED LINE CABLE ROUTED FROM LOWER DVP(s) TO UTTER DVP
15	LOWER DVP	2		(6) DVP(s) ARE MOUNTED IN NEW EQUIPMENT CABINET

NOTES:
1. INFORMATION SHOWN HEREON IS FOR USE BY VERIZON EQUIPMENT OPERATIONS
2. INFORMATION IS BASED ON LATEST VERIZON RFDS
3. (*) DENOTES EQUIPMENT DESIGNATED TO BE EMERGENCY WHERE APPLICABLE
4. INSTALL ALARM BOARDS AT ALL DVP(s) WHERE REQUIRED. COORDINATE W/ VERIZON EQUIPMENT ENGINEERING
5. INSTALL DC CONVERTER(S) LOCATED AT BASE DVP(s) WHERE REQUIRED. COORDINATE W/ VERIZON EQUIPMENT ENGINEERING AS NECESSARY
6. COORDINATE ANTENNA CABLING REQUIREMENTS WITH VERIZON ENGINEERING
7. CONTRACTOR SHALL INSTALL NEW SIDE-BY-SIDE & DUAL-MOUNT BRACKETS TO ACCOMMODATE EQUIPMENT AS NOTED. PRIOR TO ORDERING ANY EQUIPMENT, CONTRACTOR SHALL VERIFY THAT EXISTING MOUNTS ARE COMPATIBLE WITH NEW EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF RECORD IMMEDIATELY IF EXISTING MOUNTS ARE NOT COMPATIBLE WITH NEW EQUIPMENT. CONTRACTOR SHALL VERIFY MINIMUM PIPE MAST DIAMETER REQUIRED TO INSTALL NEW MOUNT BRACKETS. CONTRACTOR SHALL NOTIFY ENGINEER OF RECORD IF EXISTING PIPE MAST DIAMETER DOES NOT MEET MINIMUM REQUIREMENTS. CONTRACTOR SHALL PROVIDE PRICING FOR PIPE MAST REPLACEMENT TO SUPPORT THE NEW MOUNT BRACKETS



NOTE:
ANTENNA CONFIGURATIONS SHOWN IN BILL/PLUMBING DIAGRAM ARE VIEWED FROM BEHIND

1 PLUMBING DIAGRAM
B-1 SCALE: N.T.S.

Cellco Partnership d/b/a
verizon
72 ALEXANDER DRIVE
WALLINGFORD, CT 06492

ALL-POINTS TECHNOLOGY CORPORATION

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2	05/24/24	FOR REVIEW: JEM
1	05/04/24	FOR FILING: JEM
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STATE OF CONNECTICUT
MICHAEL TRODDEN
33313
LICENSED
PROFESSIONAL ENGINEER

DESIGN PROFESSIONALS OF RECORD

PROF: MICHAEL S. TRODDEN P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
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SITE ADDRESS: 250 OLCOTT STREET MANCHESTER, CT 06040

APT FILING NUMBER: CT1410T141_14500

DRAWN BY: EL,ZJM
DATE: 05/2024
CHECKED BY: JEM

VZW MDG: 50009 53787
VZW P&LC: 143808
VZ FUZE ID: 17225579

SHEET TITLE:
RF BILL OF MATERIALS & EQUIPMENT SPECIFICATIONS

SHEET NUMBER:
B-1

Cellco Partnership d/b/a

verizon

ALL-POINTS TECHNOLOGY CORPORATION

CONSTRUCTION DOCUMENTS

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0	05/24/24	FOR REVIEW JRM
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2		
3		
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6		

STATE OF CONNECTICUT
MICHAEL TRODDEN
33313
LICENSED
PROFESSIONAL ENGINEER

DESIGN PROFESSIONALS OF RECORD

PROF: MICHAEL S. TRODDEN P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHALL STREET EXT. SUITE 311 WATERFORD, CT 06385

OWNER: CONNECTICUT LIGHT & POWER CO.
ADDRESS: PO BOX 270 HARTFORD, CT 06141

MANCHESTER 7 CT

SITE ADDRESS: 250 OLCOTT STREET MANCHESTER, CT 06040

APT FILING NUMBER: CT14CT141_14560

	DRAWN BY: ELJ/N
DATE: 05/24/24	CHECKED BY: JRM
VZW MDG: 5000953787	
VZW PSLC: 143808	
VZ FUZE ID: 17225570	

SHEET TITLE:

NOTES & SPECIFICATIONS

SHEET NUMBER:

N-1

ATTACHMENT 4

C-band 64T64R

SAMSUNG

Gen 2

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

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

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

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

NHH-65B-R2B

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

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

General Specifications

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

Remote Electrical Tilt (RET) Information

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

NHH-65B-R2B

Protocol	3GPP/AISG 2.0 (Single RET)

Dimensions

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

Array Layout

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

View from the front of the antenna

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

Electrical Specifications

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

NHH-65B-R2B

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

Electrical Specifications

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

Electrical Specifications, BASTA

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

NHH-65B-R2B

CPR at Sector, dB	10	7	16	13	11	4

Mechanical Specifications

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

Packaging and Weights

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

Regulatory Compliance/Certifications

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

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

NHHSS-65B-R2BT4

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

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

General Specifications

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

Remote Electrical Tilt (RET) Information

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

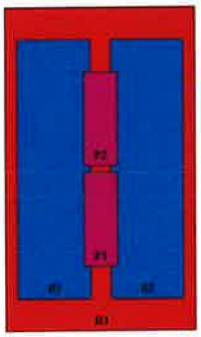
NHHSS-65B-R2BT4

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

Dimensions

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

Array Layout

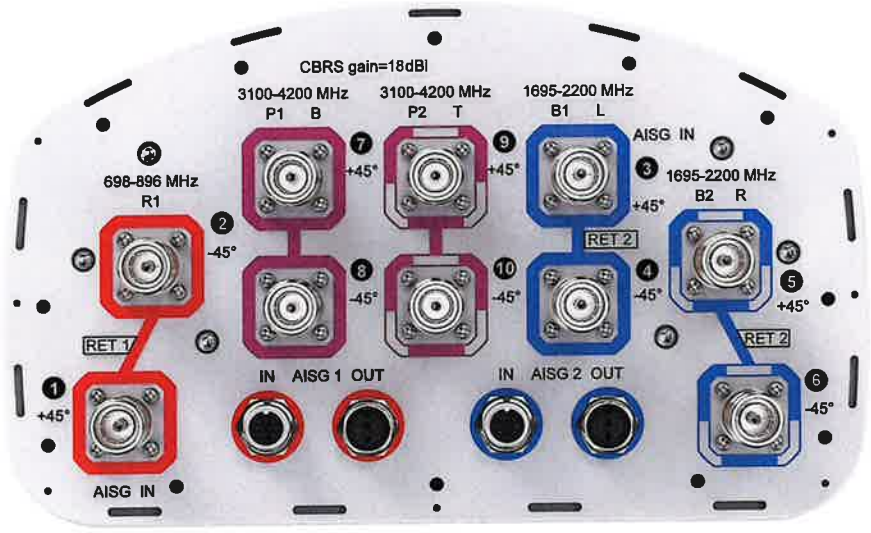


Array ID	Frequency (MHz)	RF Connector	RET (SRET)	AISG No.	AISG RET UID
R1	698-896	1 - 2	1	AISG1	CPxxxxxxxxxxxxxxR1
B1	1695-2200	3 - 4	2	AISG2	CPxxxxxxxxxxxxxxB1
B2	1695-2200	5 - 6			
P1	3100-4200	7 - 8	N/A	NA	N/A
P2	3100-4200	9 - 10			

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

Port Configuration

NHHSS-65B-R2BT4



Electrical Specifications

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

Electrical Specifications

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

NHHSS-65B-R2BT4

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

Electrical Specifications, BASTA

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

Mechanical Specifications

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

Packaging and Weights

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

Regulatory Compliance/Certifications

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

NHHSS-65B-R2BT4

ROHS	Compliant/Exempted

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

SAMSUNG

AWS/PCS MACRO RADIO

DUAL-BAND AND HIGH POWER FOR MACRO COVERAGE

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

Model Code	RF4439d-25A

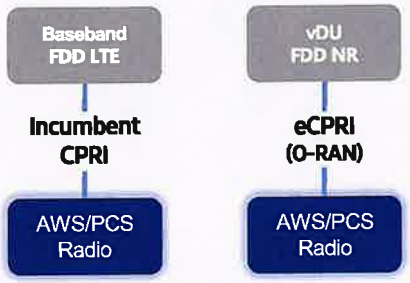
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

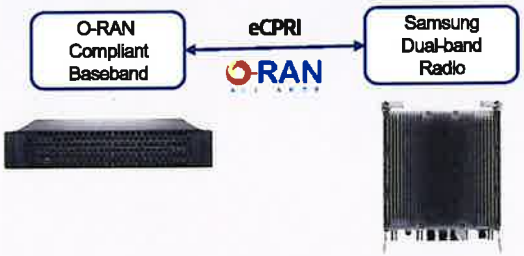
Samsung's AWS/PCS macro radio can support each incumbent CPRI interface as well as advanced eCPRI interfaces. This feature provides installable options for both legacy LTE networks and added NR networks.



O-RAN Compliant

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

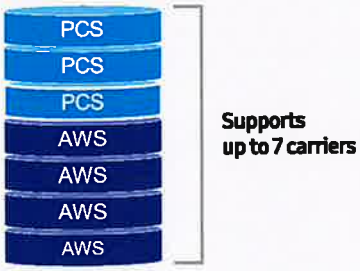
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



Optimum Spectrum Utilization

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

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



Brand New Features in a Compact Size

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

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

Same as an Incumbent radio volume

Technical Specifications

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

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

SAMSUNG

Specifications

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

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

SAMSUNG

Samsung Micro Radio

CBRS(N48) 4T4R Micro Radio

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

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

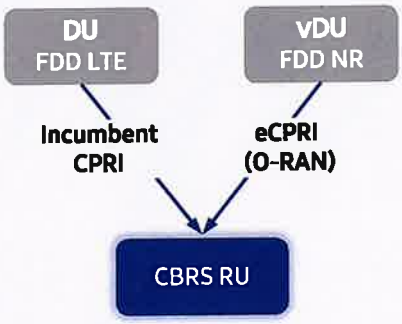
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Dual Personality

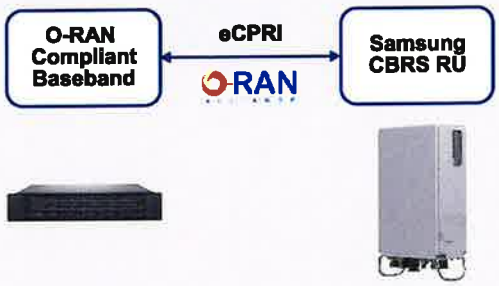
The new CBRS Radio supports existing CPRI and advanced eCPRI interfaces providing installation options for both legacy LTE and NR network equipment.



O-RAN Compliant

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

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



High Capacity

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

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

Compact and Easy Installation

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

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

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

w/o Clip-on antenna

w/Clip-on antenna

Technical Specifications

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

ATTACHMENT 5

ALL-POINTS
TECHNOLOGY CORPORATION

STRUCTURAL ANALYSIS REPORT
FOR PROPOSED WIRELESS EQUIPMENT INSTALLATION
EXISTING 180'± SELF-SUPPORT TOWER
MANCHESTER, CONNECTICUT

Prepared for
Verizon Wireless

verizon

Verizon Wireless Site Ref:
Manchester 7 CT

Site Address: 250 Olcott Street, Manchester, CT 06040
FUZE ID: 17225579
PSLC: 143808
MDG Location ID: 5000953787
Project Type: New Site Build

APT Filing No. CT141_14560

~~Rev. 0 ~ May 24, 2024~~
Rev. 1 ~ June 4, 2024

ALL-POINTS TECHNOLOGY CORPORATION, P.C.
567 VAUXHALL STREET EXTENSION · SUITE 311 · WATERFORD, CT 06385 · PHONE 860-663-1697

STRUCTURAL ANALYSIS REPORT
180'± SELF-SUPPORT TOWER
MANCHESTER, CONNECTICUT
prepared for
Verizon Wireless

EXECUTIVE SUMMARY:

All-Points Technology Corporation, P.C. (APT) performed a structural analysis of the subject 180'± self-support lattice tower structure to support a proposed Verizon Wireless equipment installation.

The proposed Verizon antenna and appurtenance installation consists of six (6) panel antennas, three (3) LSub6 antennas with integrated remote radio heads (RRHs), six (6) dual-band RRHs, three (3) CBRS RRHs, and one (1) 12OVP. Equipment shall be installed on three (3) new sector mounts, and be fed by two (2) new 6x12 Low-Inductance (LI) hybrid feed-line cables. Reference can be made to the inventory table on the following page for additional information.

In coordination with Eversource, it was decided that APT should include the reserve wireless communication carrier's equipment that was part of the original tower design. Additionally, APT incorporated a Service Wind Speed of 101-mph to evaluate the twist and sway based on Eversource's SUB 090 requirements and per TIA-222-H Annex D.

The results of this analysis indicate that the subject tower structure **meets** the requirements of the 2021 International Building Code (IBC), as amended by the 2022 Connecticut State Building Code, and the ANSI/TIA-222-H standard with the existing, proposed, and reserved equipment loading.

The steel component structure usage is summarized in the table below:

Component/Member	Usage (%)
Diagonal (0'-20')	62% [1]

Notes:

1. Member connection controls.
2. Usage values noted in table above <100% are deemed adequate.

INTRODUCTION:

A structural analysis was performed on the above-mentioned communications tower by APT for Verizon Wireless. The subject tower is located at 250 Olcott Street, in Manchester, Connecticut.

The following information was utilized in the preparation of this analysis:

- RFDS detailing Verizon's proposed equipment changes, latest version.
- Mount Design and Analysis Report, prepared by APT (Project No. CT141_14560) marked Rev 1 dated 06/04/24.
- Construction Drawings, prepared by APT (Project No. CT141_14560) marked Rev 1 dated 06/04/24.

- Structural Analysis Report, prepared by APT (Project No. CT411870), marked Rev, 3, dated 12/06/22.
- Structural Analysis Report, prepared by APT (Project No. CT1931643), marked Rev. 2, dated 06/15/22.
- Tower Mapping Report, prepared by APT (Project No. CT1931640), dated 10/20/20.
- Field observations conducted by APT on numerous occasions, including most recently 10/15/20. APT climbed the structure in its entirety and recorded information regarding physical and dimensional properties of the structure and its appurtenances.

The subject host structure is a 180'± galvanized steel self-support lattice tower, designed and manufactured by Sabre Industries. The analysis was conducted using the following inventory (proposed equipment shown in **bold**; reserved/future equipment shown in *italic*). Should the equipment/dimensions listed differ from actual field conditions, APT should be contacted to review the discrepancies.

Carrier	Antenna and Appurtenance Make/Model	Elevation [5,6]	Status [4]	Mount Type	Coax/Feed -Line
N/A	Lightning Rod	179'±	ETR	18' x 2-3/8" pipe	N/A
Eversource	Kreco CO-41AN omnidirectional whip	178'±	ETR	Leg	7/8"
Eversource	4' x 2" omnidirectional whip (SO9627), Bird Technologies 430-946-09168-T TTA, db Spectra DS9A09F36D-N omnidirectional whip,	177'±	ETR	6' sidearm Leg Leg	1-5/8" 1/2" (2) 1-5/8"
	Sinclair SC351D-HF2LDF		*R*	Leg	*7/8"*
Eversource	(2) 8' dish w/ radome (PAD8X)	176'±	ETR	(2) 8' x 4-1/2" pipe	(2) EW63
Eversource	*8' dish w/ radome*	164'±	*R*	*8' x 4-1/2" pipe*	*(2) EW65*
Eversource	*Sinclair SD212-SF2P2SNF 2-bay dipole, Comprod 531-7071D dipole,*	158'±	*R*	*Sidearm below*	*(2) 7/8"*
Eversource	*Sinclair SC351D-HP2LDF omnidirectional whip*	156'±	*R*	*Sidearm below*	7/8"
Eversource	3' yagi	153'±	ETR	8' x 4-1/2" pipe, 6' sidearm	7/8"
AT&T	*(3) cci TPA65R-BU8DA-K antennas, (3) cci HPA-65R-BU8A antennas, (3) cci DMP65R-BU8DA-K antennas, (3) 4478 RRHs, (3) RRUS-E2 RRHs, (3) 4415 RRHs, (3) 4449 RRHs, (3) 8843 RRHs, (2) "squid" D-boxes*	124'±	*R*	*(3) 12' sector mounts (SitePro1 VFA12-WLL-30120*	*(5) DC power, (2) fiber*
Verizon	**(3) Commscope NHH-65B-R2B antennas [6], (3) Commscope NHHSS-65B-R2B antennas [6], (3) Samsung MT6413-77A antennas w/ integrated RRHs, (3) Samsung CBRS RT4423-48A ORAN RRHs, (1) Raycap RVZDC-6627-PF-48 12OVP**	**115'±**	**P**	**Three (3) SITEPRO1 12'-6" Heavy Duty V-Frame Assembly (P/N VFA-12-HD) w/ two (2) tie-back arms, twelve (12) P2.0 STD x 8'-0"L antenna mounting pipes, and one (1) P2.0 STD x 5'-0"L OVP mounting pipe**	**(2) 6x12 LI hybrid**
	(3) Samsung B2/B66A RF4439d-25A ORAN RRHs, (3) Samsung B5/B13 RF4461d-13A ORAN RRHs	**112'±**	**P**		
Reserved	*(12) 8' x 1' x 6" antennas, (12) Ericsson RRUS 11 RRHs, (3) Raycap RCMDC-3315-PF-48 OVPs*	105'±	*R*	*(3) 14' sector mounts*	*(21) 1-5/8"*

Notes:

3. Panel antennas and MW dish antennas listed at centerline elevations. Omni-whip/dipole antennas listed at base elevation.
4. Elevations are measured above ground level (AGL).
5. ETR = Existing to Remain; ERL= Existing to be Relocated *R*= Reserved/Future; **P** = Proposed.
6. Proposed antennas to utilize Dual Mount Antenna Brackets (Commscope P/N BSAMNT-SBS-2-2)

RIGOROUS STRUCTURAL ANALYSIS:

Methodology:

This analysis has been prepared in accordance with the ANSI/TIA-222-H standard entitled "Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures," the American Institute of Steel Construction (AISC) Manual of Steel Construction, and the 2021 International Building Code (IBC), as amended by the 2022 Connecticut State Building Code, utilizing the following criteria:

- Load Case 1: 130 mph (3-second gust), 0" ice
- Load Case 2: 50 mph (3-second gust) w/ 1.5" ice thickness
- Load Case 3: 101 mph (3-second gust) (Service Load)
- Risk Category III
- Exposure Category C
- Topographic Category 1

ANALYSIS RESULTS:

Analysis of the tower was conducted in accordance with the criteria outlined herein with the aforementioned equipment loading. The following table summarizes the results of the analysis based on stresses of individual tower sections:

Elevation	Legs	Bracing
160'-180'	23%	37%
140'-160'	40%	43%
120'-140'	23%	42%
100'-120'	38%	57% [7]
80'-100'	54%	60% [7]
60'-80'	42%	55% [7]
40'-60'	51%	57% [7]
20'-40'	60%	59% [7]
0'-20'	52%	62% [7]

Notes:
7. Member connection controls.
8. Usage values noted in table above <100% are deemed adequate

Bracing, Splice and Anchor Bolts:

Bracing, splice, and anchor bolts were evaluated under the proposed loading. All bolts were found to be adequately sized to support the proposed loads.

Foundation:

Evaluation of the existing base foundation, anchor bolts, and base plate was limited to a comparison of the base reactions calculated under the proposed loading against the design reactions indicated within original design documents, prepared by Sabre Industries. Reactions imposed by the proposed installation are less than the published design reactions, indicating that the base foundation is adequately sized.

Factored base reactions imposed with the aforementioned equipment loading were calculated to be as follows:

Load Effect	Original Design	Calculated Reactions [3]	Result
Leg Compression	572 kip	355.7 k	PASS
Leg Uplift	505 kip	311.3 k	PASS
Leg Shear	65.4 kip	41.6 k	PASS
Moment	10,887 ft-kip	6,654.8 ft-k	PASS

Deflection:

Combined twist and sway was evaluated per Northeast Utilities Substation Standard SUB 090, Section 7, utilizing the service wind speed, as outlined in the criteria above. Results are summarized as follows:

Load Case	Tilt	Twist	Combined Max.[9]	Eversource Allowable
Service Wind - 101-mph	0.3457°	0.0927°	0.3579°	0.500°

Notes:
9. Twist and sway was evaluated at the highest dish elevation at 176'.

APT also evaluated the allowable twist and sway based on the provisions included within TIA-222-H Annex D. Results are summarized as follows:

Dish Model	Allowable Radio Frequency	Dish Diameter (ft)	Dish Frequency	TIA-222-H - Allowable
8' dish w/ radome (PAD8X)	3 dB	8-ft	5.925-6.875 GHz	0.5636°-0.6540°

CONCLUSIONS AND RECOMMENDATIONS:

In conclusion, the results of this analysis indicates that the subject tower structure **meets** the requirements of the 2021 International Building Code (IBC), as amended by the 2022 Connecticut State Building Code and the ANSI/TIA-222-H standard with the existing, proposed, and reserved equipment loading.

Sincerely,
All-Points Technology

Domenic Aversa, PE
Senior Structural Engineer

LIMITATIONS:

This report is based on the following:

1. Tower/structure is properly installed and maintained.
2. All members and components are in a non-deteriorated condition.
3. All required members are in place.
4. All bolts are in place and are properly tightened.
5. Tower/structure is in plumb condition.
6. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
7. Material grades as follows:
   Legs: ASTM A500 Gr. 50
   Bracing: ASTM A572 Gr. 50

All-Points Technology Corporation, P.C. (APT) is not responsible for any modifications completed prior to or hereafter which APT is not or was not directly involved. Modifications include but are not limited to:

1. Replacing or reinforcing bracing members.
2. Reinforcing members in any manner.
3. Installing antenna mounts or waveguide cables.
4. Adding or relocating antennas.
5. Extending tower/structure.

APT hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon the information contained and set forth herein. If you are aware of any information which is contrary to that which is contained herein, or you are aware of any defects arising from the original design, material, fabrication and erection deficiencies, you should disregard this report and immediately contact APT. APT disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

Appendix A

Design Criteria

Municipality	Basic Design Wind Speeds, V (mph)				Allowable Stress Design Wind Speeds, V_{asd} (mph)				Ground Snow Load p_g (psf)	MCE Ground Accelerations		Wind-Borne Debris Region[1]		Hurricane-Prone Region
	Risk Cat. I	Risk Cat. II	Risk Cat. III	Risk Cat. IV	Risk Cat. I	Risk Cat. II	Risk Cat. III	Risk Cat. IV		S_S (g)	S_1 (g)	Risk Cat. III Occup. I-2	Risk Cat. IV	
Hampton	115	125	130	135	89	97	101	105	35	0.184	0.054			Yes
Hartford	110	120	130	135	85	93	101	105	30	0.189	0.055			Yes
Hartland	110	115	125	130	85	89	97	101	35	0.167	0.054			
Harwinton	110	120	125	130	85	93	97	101	35	0.177	0.054			Yes
Hebron	115	125	130	135	89	97	101	105	30	0.200	0.055			Yes
Kent	105	115	125	130	81	89	97	101	40	0.184	0.054			
Killingly	115	125	135	140	89	97	105	108	35	0.186	0.055			Yes
Killingworth	115	125	135	140	89	97	105	108	30	0.210	0.055			Yes
Lebanon	115	125	135	135	89	97	105	105	30	0.196	0.055			Yes
Ledyard	120	130	140	140	93	101	108	108	30	0.190	0.053			Yes
Lisbon	115	125	135	140	89	97	105	108	30	0.190	0.054			Yes
Litchfield	110	115	125	130	85	89	97	101	35	0.178	0.054			
Lyme	115	125	135	140	89	97	105	108	30	0.207	0.054			Yes
Madison	115	125	135	140	89	97	105	108	30	0.206	0.054	Type B	Type B	Yes
Manchester	110	120	130	135	85	93	101	105	30	0.190	0.055			Yes
Mansfield	110	120	130	135	85	93	101	105	35	0.186	0.055			Yes
Marlborough	110	125	130	135	85	97	101	105	30	0.205	0.056			Yes
Meriden	110	120	130	135	85	93	101	105	30	0.203	0.055			Yes
Middlebury	110	120	130	130	85	93	101	101	35	0.194	0.054			Yes
Middlefield	110	120	130	135	85	93	101	105	30	0.209	0.055			Yes
Middletown	110	120	130	135	85	93	101	105	30	0.209	0.056			Yes
Milford	110	120	130	135	85	93	101	105	30	0.202	0.053	Type B	Type B	Yes
Monroe	110	120	130	135	85	93	101	105	30	0.208	0.055			Yes
Montville	120	125	135	140	93	97	105	108	30	0.198	0.054			Yes
Morris	110	115	125	130	85	89	97	101	35	0.182	0.054			
Naugatuck	110	120	130	135	85	93	101	105	30	0.197	0.054			Yes
New Britain	110	120	130	135	85	93	101	105	30	0.195	0.055			Yes
New Canaan	110	120	130	135	85	93	101	105	30	0.252	0.058			Yes
New Fairfield	110	115	125	130	85	89	97	101	30	0.219	0.056			
New Hartford	110	115	125	130	85	89	97	101	35	0.172	0.054			
New Haven	110	125	130	135	85	97	101	105	30	0.201	0.054	Type B	Type B	Yes
New London	120	130	140	140	93	101	108	108	30	0.191	0.053	Type B	Type A	Yes

ASCE Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: III
Soil Class: undefined

Latitude: 41.769935
Longitude: -72.559088
Elevation: 112.8551439164826 ft (NAVD 88)

Wind

Results:

Wind Speed	128 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	98 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1C and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Fri May 24 2024

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (annual exceedance probability = 0.000588, MRI = 1,700 years).

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

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AMERICAN SOCIETY OF CIVIL ENGINEERS

Ice

Results:

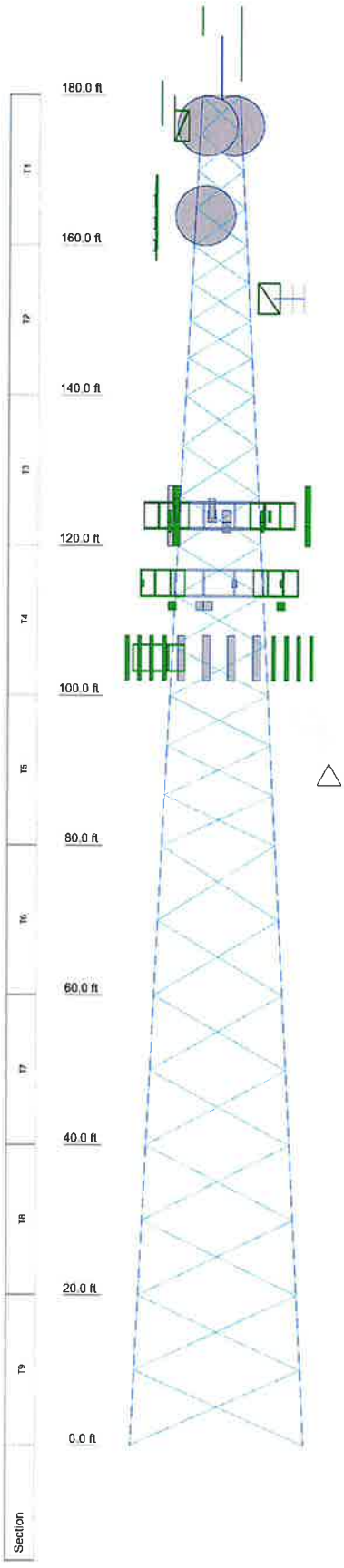
Ice Thickness:	1.50 in.
Concurrent Temperature:	5 F
Gust Speed	50 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Fri May 24 2024

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

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

Appendix B

Tower Schematic



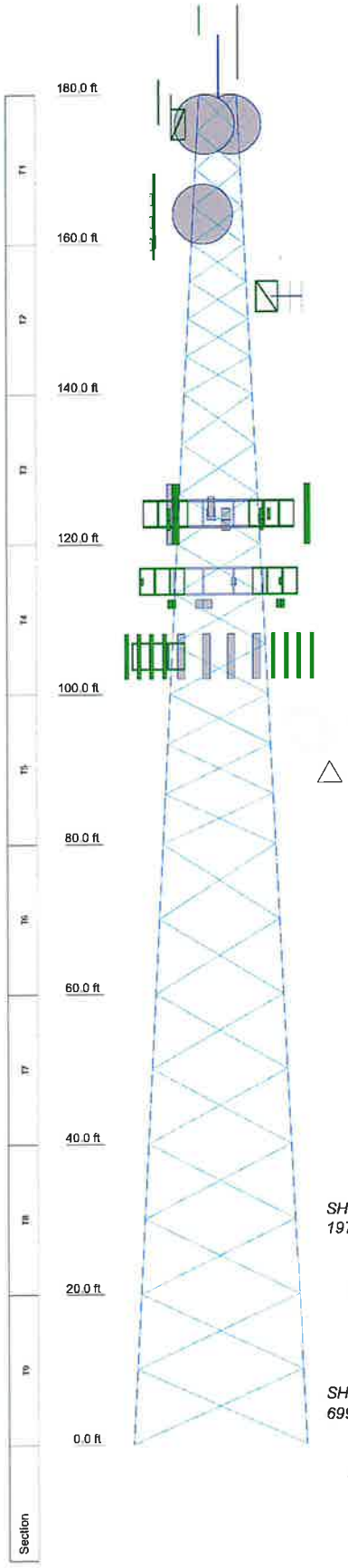
DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION
Generic Lightning Rod 4' copper	180
Sinclair SC351D-HF2LDF (Reserved)	180 - 156
18'x2 3/8" Pipe Mount	179
Kreco CO-41AN	178
6' sidearm	177
db Spectra DS9A09F36D-N	177
Bird Technologies 430-496-09168 TTA	177
Sinclair SC351D-HF2LDF (Reserved)	177
4' x 2" omni whip	177
8'x4 1/2" Pipe Mount	176
8'x4 1/2" Pipe Mount	176
8' dish with radome	176
8' dish with radome	176
Comprod 531-7071D (Reserved)	170.83 - 158
SD212 2-bay dipole (Reserved)	168 - 158
8'x4 1/2" Pipe Mount	164
8' dish with radome	164
8'x4 1/2" Pipe Mount	153
3' Yagi	153
6' sidearm	153
HPA-65R-BU8A (ATI)	124
HPA-65R-BU8A (ATI)	124
HPA-65R-BU8A (ATI)	124
DMP65R-BU8DA-K (ATI)	124
DMP65R-BU8DA-K (ATI)	124
DMP65R-BU8DA-K (ATI)	124
Radio 4478 (ATI)	124
Radio 4478 (ATI)	124
Radio 4478 (ATI)	124
Ericsson RRUS-E2 (ATI)	124
Ericsson RRUS-E2 (ATI)	124
Ericsson RRUS-E2 (ATI)	124
Radio 4415 (ATI)	124
Radio 4415 (ATI)	124
Radio 4415 (ATI)	124
Radio 4449 (ATI)	124
Radio 4449 (ATI)	124
Radio 4449 (ATI)	124
Radio 8843 (ATI)	124
Radio 8843 (ATI)	124
Radio 8843 (ATI)	124
DC9-48-60-24-8C-EV (ATI)	124
DC9-48-60-24-8C-EV (ATI)	124
VFA12-WLL-30120 (ATI)	124
VFA12-WLL-30120 (ATI)	124
VFA12-WLL-30120 (ATI)	124
(4) 8'x2" Pipe Mount (ATI)	124
(4) 8'x2" Pipe Mount (ATI)	124
(4) 8'x2" Pipe Mount (ATI)	124
TPA65R-BU8DA-K (ATI)	124
TPA65R-BU8DA-K (ATI)	124
TPA65R-BU8DA-K (ATI)	124

TYPE	ELEVATION
NHHSS-65B-R2BT4 (Verizon)	115
NHHSS-65B-R2BT4 (Verizon)	115
NHHSS-65B-R2BT4 (Verizon)	115
Samsung MT6413-77A antennas w/ integrated RRHs (Verizon)	115
Samsung MT6413-77A antennas w/ integrated RRHs (Verizon)	115
Samsung MT6413-77A antennas w/ integrated RRHs (Verizon)	115
RT4423-48A (Verizon)	115
RT4423-48A (Verizon)	115
RT4423-48A (Verizon)	115
Commscope RCMDC-6627-PF-48 (12 OVP) (Verizon)	115
VFA12-HD (Verizon)	115
VFA12-HD (Verizon)	115
VFA12-HD (Verizon)	115
(4) 8'x2" Pipe Mount (Verizon)	115
(4) 8'x2" Pipe Mount (Verizon)	115
(4) 8'x2" Pipe Mount (Verizon)	115
(4) 5' x 2" pipe mount (Verizon)	115
NHH-65B-R2B (Verizon)	115
NHH-65B-R2B (Verizon)	115
NHH-65B-R2B (Verizon)	115
Samsung B2/B66A ORAN RRH (RF4439d-25A) (Verizon)	112
Samsung B5/B13 RRH (RF4461d-13A) (Verizon)	112
Samsung B5/B13 RRH (RF4461d-13A) (Verizon)	112
Samsung B5/B13 RRH (RF4461d-13A) (Verizon)	112
Samsung B2/B66A ORAN RRH (RF4439d-25A) (Verizon)	112
Samsung B2/B66A ORAN RRH (RF4439d-25A) (Verizon)	112
(4) Ericsson RRUS-11 (Reserve)	105
(4) Ericsson RRUS-11 (Reserve)	105
(4) Ericsson RRUS-11 (Reserve)	105
Raycap RDC-3315-PF-48 J-box (Reserve)	105
Raycap RDC-3315-PF-48 J-box (Reserve)	105
Raycap RDC-3315-PF-48 J-box (Reserve)	105
14' sector mount (Reserve)	105
14' sector mount (Reserve)	105
14' sector mount (Reserve)	105
(4) 8' x 1' x 6" panel (Reserve)	105
(4) 8' x 1' x 6" panel (Reserve)	105
(4) 8' x 1' x 6" panel (Reserve)	105

All-Points Technology Corporation, P.C.
567 Vauxhall Street Ext. Suite 311
Waterford, CT 06385
Phone: (860) 663-1697
FAX:

Job: **180' Self-Support Tower**		
Project: ***CT141_14560; Manchester 7***		
Client: Verizon Wireless	Drawn by: DJA	App'd:
Code: TIA-222-H	Date: 06/04/24	Scale: NTS
Path:		Dwg No. E-1



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-H Standard.
2. Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 101 mph wind.
5. Tower Risk Category III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 62.2%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 355713 lb
SHEAR: 41583 lb

UPLIFT: -311297 lb
SHEAR: 38338 lb

AXIAL 167488 lb
SHEAR 19765 lb *MOMENT 2119462 lb-ft*
TORQUE 32373 lb-ft
50 mph WIND - 1.5000 in ICE

AXIAL 64998 lb
SHEAR 69901 lb *MOMENT 6654802 lb-ft*
TORQUE 69397 lb-ft
REACTIONS - 130 mph WIND

All-Points Technology Corporation, P.C.
567 Vauxhall Street Ext. Suite 311
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Phone: (860) 663-1697
FAX:

Job: *180' Self-Support Tower*		
Project: *CT141_14560; Manchester 7*		
Client: Verizon Wireless	Drawn by: DJA	App'd:
Code: TIA-222-H	Date: 06/04/24	Scale: NTS
Path:		Dwg No. E-1

Appendix C

Calculations

tnxTower	Job	Page
	180' Self-Support Tower	1 of 11
All-Points Technology Corporation, P.C. 567 Vauxhall Street Ext. Suite 311 Waterford, CT 06385 Phone: (860) 663-1697 FAX:	**Project** CT141_14560; Manchester 7	**Date** 13:03:55 06/04/24
	Client Verizon Wireless	**Designed by** DJA

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 5.00 ft at the top and 23.00 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower base elevation above sea level: 113.00 ft.
Basic wind speed of 130 mph.
Risk Category III.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.5000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 101 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.

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	*Face or Leg*	*Allow Shield*	*Exclude From Torque Calculation*	*Component Type*	*Placement ft*	*Face Offset in*	*Lateral Offset (Frac FW)*	*#*	*# Per Row*	*Clear Spacing in*	*Width or Diameter in*	*Perimeter in*	*Weight plf*
1 5/8	B	No	No	Ar (CaAa)	177.00 - 5.00	0.0000	0.42	2	2	0.5000	1.9800		1.04
1 5/8	B	No	No	Ar (CaAa)	177.00 - 5.00	0.0000	0.38	1	1	0.5000	1.9800		1.04
1/2	B	No	No	Ar (CaAa)	177.00 - 5.00	0.0000	0.35	1	1	0.5800	0.5800		0.25
7/8	B	No	No	Ar (CaAa)	153.00 - 5.00	0.0000	0.37	1	1	1.1100	1.1100		0.54
7/8	B	No	No	Ar (CaAa)	178.00 - 5.00	0.0000	0.44	1	1	1.1100	1.1100		0.54
EW63	B	No	No	Ar (CaAa)	176.00 - 5.00	0.0000	0.4	2	2	1.5742	1.5742		0.51
E65	B	No	No	Ar (CaAa)	164.00 - 5.00	0.0000	0.46	2	2	1.5742	1.5742		0.51
7/8	B	No	No	Ar (CaAa)	177.00 - 5.00	0.0000	0.49	1	1	1.1100	1.1100		0.54
7/8	B	No	No	Ar (CaAa)	158.00 - 5.00	0.0000	0.33	2	2	1.1100	1.1100		0.54
7/8	B	No	No	Ar (CaAa)	156.00 - 5.00	0.0000	0.48	1	1	1.1100	1.1100		0.54
CommScope	C	No	No	Ar (CaAa)	124.00 -	0.0000	-0.4	5	5	0.8200	0.8200		0.62

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
PWRT-608-S power (AT&T)					5.00								
CommScope RFFT-48SM-0 01-75M fiber (AT&T)	C	No	No	Ar (CaAa)	124.00 - 5.00	0.0000	-0.4	2	2	0.4000	0.4000		0.06
6x12 LI hybrid (Verizon)	C	No	No	Ar (CaAa)	115.00 - 5.00	0.0000	-0.4	2	2	0.5000	1.9800		1.04
1 5/8 (Reserve)	B	No	No	Ar (CaAa)	105.00 - 5.00	0.0000	-0.4	21	7	0.5000	1.9800		1.04
Feedline Ladder (Af)	B	No	No	Af (CaAa)	180.00 - 5.00	0.0000	0.4	1	1	3.0000	2.0000		8.40
Feedline Ladder (Af)	C	No	No	Af (CaAa)	135.00 - 5.00	0.0000	-0.4	1	1	3.0000	2.0000		8.40
Feedline Ladder (Af)	A	No	No	Af (CaAa)	124.00 - 5.00	0.0000	-0.4	1	1	3.0000	2.0000		8.40
Feedline Ladder (Af)	C	No	No	Af (CaAa)	105.00 - 5.00	0.0000	-0.4	1	1	3.0000	2.0000		8.40

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#		C_AA_A ft^2/ft	Weight plf
3/8" safety cable	C	No	No	CaAa (In Face)	180.00 - 5.00	4.0000	0	1	No Ice	0.04	0.22
									1/2" Ice	0.14	0.83
									1" Ice	0.24	1.98
									2" Ice	0.44	6.10
Climbing Ladder	C	No	No	CaAa (In Face)	180.00 - 5.00	0.0000	0	1	No Ice	0.29	7.90
									1/2" Ice	0.55	10.60
									1" Ice	0.81	13.30
									2" Ice	1.33	18.70

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Generic Lightning Rod 4' copper	C	From Leg	0.00 0.00 10.00	0.0000	180.00	No Ice	0.50	0.50	0.00
						1/2" Ice	1.00	1.00	0.00
						1" Ice	1.50	1.50	0.00
						2" Ice	2.50	2.50	0.00
18'x2 3/8" Pipe Mount	C	From Leg	0.00	0.0000	179.00	No Ice	4.75	4.75	100.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00			1/2" Ice	6.78	6.78	135.41
			9.00			1" Ice	8.82	8.82	183.44
						2" Ice	12.96	12.96	317.94
Kreco CO-41AN	A	From Leg	0.50	0.0000	178.00	No Ice	2.03	2.03	14.00
			0.00			1/2" Ice	3.34	3.34	30.52
			5.00			1" Ice	4.66	4.66	55.18
						2" Ice	7.35	7.35	129.59
4' x 2" omni whip	C	From Leg	6.00	0.0000	177.00	No Ice	0.79	0.79	20.00
			0.00			1/2" Ice	1.03	1.03	26.34
			2.00			1" Ice	1.28	1.28	35.48
						2" Ice	1.81	1.81	62.76
6' sidearm	C	From Leg	3.00	0.0000	177.00	No Ice	4.17	2.09	75.00
			0.00			1/2" Ice	6.17	3.09	125.00
			0.00			1" Ice	8.17	4.09	200.00
						2" Ice	12.17	6.09	275.00
db Spectra DS9A09F36D-N	B	From Leg	0.00	0.0000	177.00	No Ice	5.76	5.76	55.00
			0.00			1/2" Ice	7.71	7.71	96.46
			10.00			1" Ice	9.68	9.68	150.10
						2" Ice	13.67	13.67	294.56
Bird Technologies 430-496-09168 TTA	A	From Leg	0.00	0.0000	177.00	No Ice	2.67	1.18	25.00
			0.00			1/2" Ice	2.87	1.33	44.96
			0.00			1" Ice	3.08	1.48	67.91
						2" Ice	3.53	1.83	123.52
8'x4 1/2" Pipe Mount	A	From Leg	0.00	0.0000	176.00	No Ice	2.33	2.33	86.30
			0.00			1/2" Ice	3.84	3.84	111.50
			0.00			1" Ice	4.33	4.33	142.21
						2" Ice	5.35	5.35	220.72
8'x4 1/2" Pipe Mount	B	From Leg	0.00	0.0000	176.00	No Ice	2.33	2.33	86.30
			0.00			1/2" Ice	3.84	3.84	111.50
			0.00			1" Ice	4.33	4.33	142.21
						2" Ice	5.35	5.35	220.72
Sinclair SC351D-HF2LDF (Reserved)	C	From Leg	0.00	0.0000	177.00	No Ice	7.03	7.03	95.00
			0.00			1/2" Ice	14.05	14.05	174.31
			12.00			1" Ice	16.45	16.45	268.54
						2" Ice	21.30	21.30	502.35
8'x4 1/2" Pipe Mount	A	From Leg	0.00	0.0000	164.00	No Ice	2.35	2.35	86.30
			0.00			1/2" Ice	3.84	3.84	111.50
			0.00			1" Ice	4.33	4.33	142.21
						2" Ice	5.35	5.35	220.72
Sinclair SC351D-HF2LDF (Reserved)	B	From Leg	6.00	0.0000	180.00 - 156.00	No Ice	7.07	7.07	95.00
			0.00			1/2" Ice	14.05	14.05	174.31
			0.00			1" Ice	16.45	16.45	268.54
						2" Ice	21.30	21.30	502.35
SD212 2-bay dipole (Reserved)	C	From Leg	6.00	0.0000	168.00 - 158.00	No Ice	3.04	3.04	30.00
			0.00			1/2" Ice	4.54	4.54	54.95
			0.00			1" Ice	5.30	5.30	86.52
						2" Ice	6.53	6.53	170.12
Comprod 531-7071D (Reserved)	C	From Leg	6.00	0.0000	170.83 - 158.00	No Ice	3.80	3.80	40.00
			0.00			1/2" Ice	5.40	5.40	68.29
			0.00			1" Ice	7.02	7.02	106.61
						2" Ice	10.31	10.31	213.90
3' Yagi	B	From Face	6.00	0.0000	153.00	No Ice	2.08	2.08	30.95
			0.00			1/2" Ice	3.79	3.79	52.87
			0.00			1" Ice	5.52	5.52	85.27
						2" Ice	9.05	9.05	183.57
8'x4 1/2" Pipe Mount	B	From Leg	6.00	0.0000	153.00	No Ice	2.37	2.37	86.30
			0.00			1/2" Ice	3.84	3.84	111.50

tnxTower	Job: 180' Self-Support Tower	Page: 4 of 11
All-Points Technology Corporation, P.C. 567 Vauxhall Street Ext. Suite 311 Waterford, CT 06385 Phone: (860) 663-1697 FAX:	Project: CT141_14560; Manchester 7	Date: 13:03:55 06/04/24
	Client: Verizon Wireless	Designed by: DJA

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00			1" Ice	4.33	4.33	142.21
						2" Ice	5.35	5.35	220.72
6' sidearm	B	From Leg	3.00	0.0000	153.00	No Ice	4.17	2.09	75.00
			0.00			1/2" Ice	6.17	3.09	125.00
			0.00			1" Ice	8.17	4.09	200.00
						2" Ice	12.17	6.09	275.00
TPA65R-BU8DA-K (AT&T)	A	From Leg	4.00	0.0000	124.00	No Ice	17.87	8.12	87.10
			-6.00			1/2" Ice	18.50	8.72	184.68
			0.00			1" Ice	19.14	9.32	290.53
						2" Ice	20.44	10.54	527.76
TPA65R-BU8DA-K (AT&T)	B	From Leg	4.00	0.0000	124.00	No Ice	17.87	8.12	87.10
			-6.00			1/2" Ice	18.50	8.72	184.68
			0.00			1" Ice	19.14	9.32	290.53
						2" Ice	20.44	10.54	527.76
TPA65R-BU8DA-K (AT&T)	C	From Leg	4.00	0.0000	124.00	No Ice	17.87	8.12	87.10
			-6.00			1/2" Ice	18.50	8.72	184.68
			0.00			1" Ice	19.14	9.32	290.53
						2" Ice	20.44	10.54	527.76
HPA-65R-BU8A (AT&T)	A	From Leg	4.00	0.0000	124.00	No Ice	11.23	7.89	58.00
			-1.50			1/2" Ice	11.85	8.48	123.99
			0.00			1" Ice	12.47	9.08	197.64
						2" Ice	13.72	10.30	368.67
HPA-65R-BU8A (AT&T)	B	From Leg	4.00	0.0000	124.00	No Ice	11.23	7.89	58.00
			-1.50			1/2" Ice	11.85	8.48	123.99
			0.00			1" Ice	12.47	9.08	197.64
						2" Ice	13.72	10.30	368.67
HPA-65R-BU8A (AT&T)	C	From Leg	4.00	0.0000	124.00	No Ice	11.23	7.89	58.00
			-1.50			1/2" Ice	11.85	8.48	123.99
			0.00			1" Ice	12.47	9.08	197.64
						2" Ice	13.72	10.30	368.67
DMP65R-BU8DA-K (AT&T)	A	From Leg	4.00	0.0000	124.00	No Ice	17.87	8.12	103.00
			6.00			1/2" Ice	18.50	8.72	200.58
			0.00			1" Ice	19.14	9.32	306.43
						2" Ice	20.44	10.54	543.66
DMP65R-BU8DA-K (AT&T)	B	From Leg	4.00	0.0000	124.00	No Ice	17.87	8.12	103.00
			6.00			1/2" Ice	18.50	8.72	200.58
			0.00			1" Ice	19.14	9.32	306.43
						2" Ice	20.44	10.54	543.66
DMP65R-BU8DA-K (AT&T)	C	From Leg	4.00	0.0000	124.00	No Ice	17.87	8.12	103.00
			6.00			1/2" Ice	18.50	8.72	200.58
			0.00			1" Ice	19.14	9.32	306.43
						2" Ice	20.44	10.54	543.66
Radio 4478 (AT&T)	A	From Leg	1.00	0.0000	124.00	No Ice	2.04	1.18	75.00
			-1.00			1/2" Ice	2.22	1.32	92.22
			0.00			1" Ice	2.40	1.48	112.18
						2" Ice	2.80	1.81	161.13
Radio 4478 (AT&T)	B	From Leg	1.00	0.0000	124.00	No Ice	2.04	1.18	75.00
			-1.00			1/2" Ice	2.22	1.32	92.22
			0.00			1" Ice	2.40	1.48	112.18
						2" Ice	2.80	1.81	161.13
Radio 4478 (AT&T)	C	From Leg	1.00	0.0000	124.00	No Ice	2.04	1.18	75.00
			-1.00			1/2" Ice	2.22	1.32	92.22
			0.00			1" Ice	2.40	1.48	112.18
						2" Ice	2.80	1.81	161.13
Ericsson RRUS-E2 (AT&T)	A	From Leg	2.00	0.0000	124.00	No Ice	3.15	1.29	60.00
			-2.00			1/2" Ice	3.36	1.44	83.22
			0.00			1" Ice	3.59	1.60	109.64

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
						2" Ice	3.99	1.89	152.88
Ericsson RRUS-E2 (AT&T)	B	From Leg	2.00 -2.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.15 3.36 3.59 3.99	1.29 1.44 1.60 1.89	60.00 83.22 109.64 152.88
Ericsson RRUS-E2 (AT&T)	C	From Leg	2.00 -2.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.15 3.36 3.59 3.99	1.29 1.44 1.60 1.89	60.00 83.22 109.64 152.88
Radio 4415 (AT&T)	A	From Leg	1.00 1.00 -1.50	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.84 2.01 2.19 2.57	0.82 0.94 1.07 1.37	46.00 60.07 76.66 118.17
Radio 4415 (AT&T)	B	From Leg	1.00 1.00 -1.50	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.84 2.01 2.19 2.57	0.82 0.94 1.07 1.37	46.00 60.07 76.66 118.17
Radio 4415 (AT&T)	C	From Leg	1.00 1.00 -1.50	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.84 2.01 2.19 2.57	0.82 0.94 1.07 1.37	46.00 60.07 76.66 118.17
Radio 4449 (AT&T)	A	From Leg	1.00 1.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	71.00 89.51 110.84 162.74
Radio 4449 (AT&T)	B	From Leg	1.00 1.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	71.00 89.51 110.84 162.74
Radio 4449 (AT&T)	C	From Leg	1.00 1.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	71.00 89.51 110.84 162.74
Radio 8843 (AT&T)	A	From Leg	2.00 2.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.96 2.28	1.36 1.51 1.66 1.96	71.87 89.45 109.74 142.19
Radio 8843 (AT&T)	B	From Leg	2.00 2.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.96 2.28	1.36 1.51 1.66 1.96	71.87 89.45 109.74 142.19
Radio 8843 (AT&T)	C	From Leg	2.00 2.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.96 2.28	1.36 1.51 1.66 1.96	71.87 89.45 109.74 142.19
DC9-48-60-24-8C-EV (AT&T)	A	From Leg	1.00 -1.00 1.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.14 1.79 2.00 2.45	1.14 1.79 2.00 2.45	28.70 49.08 72.26 127.60
DC9-48-60-24-8C-EV (AT&T)	C	From Leg	1.00 -1.00 1.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.14 1.79 2.00 2.45	1.14 1.79 2.00 2.45	28.70 49.08 72.26 127.60
VFA12-WLL-30120 (AT&T)	A	From Leg	2.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	13.20 19.50 25.80 38.40	9.20 14.60 19.50 30.80	658.00 804.00 1015.00 1242.00

tnxTower	Job: 180' Self-Support Tower	Page: 6 of 11
All-Points Technology Corporation, P.C. 567 Vauxhall Street Ext. Suite 311 Waterford, CT 06385 Phone: (860) 663-1697 FAX:	Project: CT141_14560; Manchester 7	Date: 13:03:55 06/04/24
	Client: Verizon Wireless	Designed by: DJA

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
VFA12-WLL-30120 (AT&T)	B	From Leg	2.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	13.20 19.50 25.80 38.40	9.20 14.60 19.50 30.80	658.00 804.00 1015.00 1242.00
VFA12-WLL-30120 (AT&T)	C	From Leg	2.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	13.20 19.50 25.80 38.40	9.20 14.60 19.50 30.80	658.00 804.00 1015.00 1242.00
(4) 8'x2" Pipe Mount (AT&T)	A	From Leg	3.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	29.20 43.54 63.16 118.86
(4) 8'x2" Pipe Mount (AT&T)	B	From Leg	3.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	29.20 43.54 63.16 118.86
(4) 8'x2" Pipe Mount (AT&T)	C	From Leg	3.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	29.20 43.54 63.16 118.86
NHH-65B-R2B (Verizon)	A	From Leg	4.00 -2.50 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.08 8.53 9.00 9.95	5.34 5.79 6.26 7.20	69.20 119.25 175.40 306.75
NHH-65B-R2B (Verizon)	B	From Leg	4.00 -2.50 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.08 8.53 9.00 9.95	5.34 5.79 6.26 7.20	69.20 119.25 175.40 306.75
NHH-65B-R2B (Verizon)	C	From Leg	4.00 -2.50 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.08 8.53 9.00 9.95	5.34 5.79 6.26 7.20	69.20 119.25 175.40 306.75
NHHSS-65B-R2BT4 (Verizon)	A	From Leg	4.00 -1.50 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.05 8.50 8.97 9.91	5.35 5.81 6.27 7.21	50.93 100.90 156.97 288.14
NHHSS-65B-R2BT4 (Verizon)	B	From Leg	4.00 -1.50 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.05 8.50 8.97 9.91	5.35 5.81 6.27 7.21	50.93 100.90 156.97 288.14
NHHSS-65B-R2BT4 (Verizon)	C	From Leg	4.00 -1.50 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.05 8.50 8.97 9.91	5.35 5.81 6.27 7.21	50.93 100.90 156.97 288.14
Samsung MT6413-77A antennas w/ integrated RRHs (Verizon)	A	From Leg	4.00 6.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.79 4.04 4.30 4.84	0.73 0.85 0.97 1.25	57.30 81.68 109.51 176.28
Samsung MT6413-77A antennas w/ integrated RRHs (Verizon)	B	From Leg	4.00 6.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.79 4.04 4.30 4.84	0.73 0.85 0.97 1.25	57.30 81.68 109.51 176.28
Samsung MT6413-77A antennas w/ integrated RRHs (Verizon)	C	From Leg	4.00 6.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.79 4.04 4.30 4.84	0.73 0.85 0.97 1.25	57.30 81.68 109.51 176.28
Samsung B2/B66A ORAN	A	From Leg	1.50	90.0000	112.00	No Ice	1.87	1.25	74.70

tnxTower	Job: 180' Self-Support Tower	Page: 7 of 11
All-Points Technology Corporation, P.C. 567 Vauxhall Street Ext. Suite 311 Waterford, CT 06385 Phone: (860) 663-1697 FAX:	Project: CT141_14560; Manchester 7	Date: 13:03:55 06/04/24
	Client: Verizon Wireless	Designed by: DJA

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
RRH (RF4439d-25A) (Verizon)			-2.50 0.00			1/2" Ice 1" Ice 2" Ice	2.03 2.21 2.59	1.39 1.54 1.87	93.02 114.12 165.45
Samsung B2/B66A ORAN RRH (RF4439d-25A) (Verizon)	B	From Leg	1.50 -2.50 0.00	90.0000	112.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.87 2.03 2.21 2.59	1.25 1.39 1.54 1.87	74.70 93.02 114.12 165.45
Samsung B2/B66A ORAN RRH (RF4439d-25A) (Verizon)	C	From Leg	1.50 -2.50 0.00	90.0000	112.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.87 2.03 2.21 2.59	1.25 1.39 1.54 1.87	74.70 93.02 114.12 165.45
Samsung B5/B13 RRH (RF4461d-13A) (Verizon)	A	From Leg	1.50 -1.50 0.00	90.0000	112.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.87 2.03 2.21 2.59	1.28 1.42 1.57 1.89	79.10 97.61 118.91 170.68
Samsung B5/B13 RRH (RF4461d-13A) (Verizon)	B	From Leg	1.50 -1.50 0.00	90.0000	112.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.87 2.03 2.21 2.59	1.28 1.42 1.57 1.89	79.10 97.61 118.91 170.68
Samsung B5/B13 RRH (RF4461d-13A) (Verizon)	C	From Leg	1.50 -1.50 0.00	90.0000	112.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.87 2.03 2.21 2.59	1.28 1.42 1.57 1.89	79.10 97.61 118.91 170.68
RT4423-48A (Verizon)	A	From Leg	4.00 2.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.86 0.97 1.10 1.37	0.42 0.51 0.61 0.83	18.70 25.65 34.40 58.05
RT4423-48A (Verizon)	B	From Leg	4.00 2.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.86 0.97 1.10 1.37	0.42 0.51 0.61 0.83	18.70 25.65 34.40 58.05
RT4423-48A (Verizon)	C	From Leg	4.00 2.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.86 0.97 1.10 1.37	0.42 0.51 0.61 0.83	18.70 25.65 34.40 58.05
Commscope RCMDC-6627-PF-48 (12 OVP) (Verizon)	A	From Leg	1.50 1.50 0.00	45.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.12 6.44 6.76 7.43	5.25 5.55 5.85 6.49	50.00 108.92 172.82 316.39
VFA12-HD (Verizon)	A	From Leg	2.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	13.20 19.50 25.80 38.40	9.20 14.60 19.50 30.80	658.00 804.00 1015.00 1242.00
VFA12-HD (Verizon)	B	From Leg	2.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	13.20 19.50 25.80 38.40	9.20 14.60 19.50 30.80	658.00 804.00 1015.00 1242.00
VFA12-HD (Verizon)	C	From Leg	2.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	13.20 19.50 25.80 38.40	9.20 14.60 19.50 30.80	658.00 804.00 1015.00 1242.00
(4) 8'x2" Pipe Mount (Verizon)	A	From Leg	3.50 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	29.20 43.54 63.16 118.86
(4) 8'x2" Pipe Mount (Verizon)	B	From Leg	3.50 0.00	0.0000	115.00	No Ice 1/2" Ice	1.90 2.73	1.90 2.73	29.20 43.54

tnxTower	Job: 180' Self-Support Tower	Page: 8 of 11
All-Points Technology Corporation, P.C. 567 Vauxhall Street Ext. Suite 311 Waterford, CT 06385 Phone: (860) 663-1697 FAX:	Project: CT141_14560; Manchester 7	Date: 13:03:55 06/04/24
	Client: Verizon Wireless	Designed by: DJA

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00			1" Ice	3.40	3.40	63.16
						2" Ice	4.40	4.40	118.86
(4) 8'x2" Pipe Mount (Verizon)	C	From Leg	3.50 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	29.20 43.54 63.16 118.86
(4) 5' x 2" pipe mount (Verizon)	C	From Leg	3.50 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.19 1.50 1.81 2.46	1.19 1.50 1.81 2.46	18.27 27.36 39.89 75.93
(4) 8' x 1' x 6" panel (Reserve)	A	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.47 12.08 12.71 13.95	6.80 7.38 7.98 9.18	65.00 127.06 196.70 359.52
(4) 8' x 1' x 6" panel (Reserve)	B	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.47 12.08 12.71 13.95	6.80 7.38 7.98 9.18	65.00 127.06 196.70 359.52
(4) 8' x 1' x 6" panel (Reserve)	C	From Leg	4.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.47 12.08 12.71 13.95	6.80 7.38 7.98 9.18	65.00 127.06 196.70 359.52
(4) Ericsson RRUS-11 (Reserve)	A	From Leg	3.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.79 3.00 3.21 3.66	1.02 1.16 1.30 1.62	55.00 75.86 99.77 157.47
(4) Ericsson RRUS-11 (Reserve)	B	From Leg	3.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.79 3.00 3.21 3.66	1.02 1.16 1.30 1.62	55.00 75.86 99.77 157.47
(4) Ericsson RRUS-11 (Reserve)	C	From Leg	3.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.79 3.00 3.21 3.66	1.02 1.16 1.30 1.62	55.00 75.86 99.77 157.47
Raycap RDC-3315-PF-48 J-box (Reserve)	A	From Leg	3.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.51 2.71 2.91 3.35	1.64 1.81 1.98 2.35	30.00 52.86 78.84 140.93
Raycap RDC-3315-PF-48 J-box (Reserve)	B	From Leg	3.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.51 2.71 2.91 3.35	1.64 1.81 1.98 2.35	30.00 52.86 78.84 140.93
Raycap RDC-3315-PF-48 J-box (Reserve)	C	From Leg	3.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.51 2.71 2.91 3.35	1.64 1.81 1.98 2.35	30.00 52.86 78.84 140.93
14' sector mount (Reserve)	A	From Leg	2.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	10.80 12.38 13.88 20.40	5.40 6.19 6.94 10.20	475.00 700.00 950.00 1375.00
14' sector mount (Reserve)	B	From Leg	2.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice 2" Ice	10.80 12.38 13.88 20.40	5.40 6.19 6.94 10.20	475.00 700.00 950.00 1375.00
14' sector mount (Reserve)	C	From Leg	2.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	10.80 12.38 13.88	5.40 6.19 6.94	475.00 700.00 950.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
						2" Ice	20.40	10.20	1375.00

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
8' dish with radome	A	Paraboloid w/Radome	From Face	0.50 0.00 0.00	0.0000		176.00	8.00	No Ice 1/2" Ice 1" Ice 2" Ice	50.27 51.32 52.37 54.48	450.00 713.43 976.86 1503.72
8' dish with radome	B	Paraboloid w/Radome	From Face	0.50 0.00 0.00	0.0000		176.00	8.00	No Ice 1/2" Ice 1" Ice 2" Ice	50.27 51.32 52.37 54.48	450.00 713.43 976.86 1503.72
8' dish with radome	A	Paraboloid w/Radome	From Face	0.50 0.00 0.00	0.0000		164.00	8.00	No Ice 1/2" Ice 1" Ice 2" Ice	50.27 51.32 52.37 54.48	450.00 713.43 976.86 1503.72

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	7.318	55	0.3481	0.0968
T2	160 - 140	5.843	55	0.3263	0.0776
T3	140 - 120	4.530	56	0.2726	0.0652
T4	120 - 100	3.407	56	0.2439	0.0561
T5	100 - 80	2.396	56	0.2059	0.0438
T6	80 - 60	1.544	56	0.1563	0.0288
T7	60 - 40	0.904	62	0.1198	0.0199
T8	40 - 20	0.435	62	0.0792	0.0127
T9	20 - 0	0.136	62	0.0357	0.0062

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	Generic Lightning Rod 4' copper	55	7.318	0.3481	0.0968	105362
179.00	18'x2 3/8" Pipe Mount	55	7.243	0.3475	0.0957	105362
178.00	Kreco CO-41AN	55	7.168	0.3469	0.0947	105362
177.00	4' x 2" omni whip	55	7.093	0.3463	0.0937	105362
176.00	8' dish with radome	55	7.017	0.3457	0.0927	105362

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
174.00	Sinclair SC351D-HF2LDF	55	6.868	0.3444	0.0906	87802
170.83	Comprod 531-7071D	55	6.631	0.3419	0.0874	57449
168.00	Sinclair SC351D-HF2LDF	55	6.422	0.3390	0.0847	43901
164.42	Comprod 531-7071D	55	6.160	0.3343	0.0814	33805
164.00	8' dish with radome	55	6.130	0.3336	0.0810	32937
163.00	SD212 2-bay dipole	55	6.057	0.3320	0.0801	31072
162.00	Sinclair SC351D-HF2LDF	55	5.986	0.3302	0.0793	29520
158.00	SD212 2-bay dipole	55	5.703	0.3217	0.0761	26167
156.00	Sinclair SC351D-HF2LDF	55	5.564	0.3167	0.0746	25467
153.00	3' Yagi	55	5.359	0.3084	0.0725	24551
124.00	TPA65R-BU8DA-K	56	3.621	0.2489	0.0580	45963
115.00	NHH-65B-R2B	56	3.144	0.2364	0.0535	49759
112.00	Samsung B2/B66A ORAN RRH (RF4439d-25A)	56	2.989	0.2312	0.0518	43656
105.00	(4) 8' x 1' x 6" panel	56	2.637	0.2173	0.0473	33943

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	12.037	10	0.5734	0.1604
T2	160 - 140	9.607	10	0.5372	0.1287
T3	140 - 120	7.443	12	0.4483	0.1080
T4	120 - 100	5.597	12	0.4010	0.0930
T5	100 - 80	3.935	12	0.3382	0.0725
T6	80 - 60	2.537	12	0.2567	0.0477
T7	60 - 40	1.490	24	0.1967	0.0329
T8	40 - 20	0.716	24	0.1300	0.0210
T9	20 - 0	0.224	24	0.0586	0.0103

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	Generic Lightning Rod 4' copper	10	12.037	0.5734	0.1604	63634
179.00	18'x2 3/8" Pipe Mount	10	11.913	0.5725	0.1587	63634
178.00	Kreco CO-41AN	10	11.789	0.5715	0.1570	63634
177.00	4' x 2" omni whip	10	11.665	0.5705	0.1553	63634
176.00	8' dish with radome	10	11.542	0.5695	0.1536	63634
174.00	Sinclair SC351D-HF2LDF	10	11.295	0.5673	0.1502	53028
170.83	Comprod 531-7071D	10	10.905	0.5630	0.1449	34697
168.00	Sinclair SC351D-HF2LDF	10	10.560	0.5583	0.1404	26514
164.42	Comprod 531-7071D	10	10.128	0.5505	0.1349	20416
164.00	8' dish with radome	10	10.079	0.5494	0.1343	19892
163.00	SD212 2-bay dipole	10	9.960	0.5467	0.1328	18766
162.00	Sinclair SC351D-HF2LDF	10	9.842	0.5437	0.1314	17827
158.00	SD212 2-bay dipole	10	9.376	0.5296	0.1261	15793
156.00	Sinclair SC351D-HF2LDF	10	9.147	0.5212	0.1236	15354
153.00	3' Yagi	10	8.810	0.5075	0.1202	14812
124.00	TPA65R-BU8DA-K	12	5.949	0.4092	0.0962	27850
115.00	NHH-65B-R2B	12	5.165	0.3886	0.0887	30188
112.00	Samsung B2/B66A ORAN RRH	12	4.910	0.3801	0.0858	26484

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.00	(RF4439d-25A) (4) 8' x 1' x 6" panel	12	4.332	0.3570	0.0784	20590

Section Capacity Table

Section No.	Elevation ft	Component Type	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	180 - 160	Leg	1	-17138.80	74430.70	23.0	Pass
		Diagonal	9	-3443.14	9319.74	36.9	Pass
		Top Girt	6	-359.83	7444.69	4.8	Pass
						6.4 (b)	
T2	160 - 140	Leg	32	-43898.90	110613.00	39.7	Pass
		Diagonal	35	-4049.85	9383.56	43.2	Pass
T3	140 - 120	Leg	59	-71012.90	309502.00	22.9	Pass
		Diagonal	62	-6598.71	15596.10	42.3	Pass
T4	120 - 100	Leg	80	-116393.00	309502.00	37.6	Pass
		Diagonal	83	-11476.80	25800.80	44.5	Pass
						57.0 (b)	
T5	100 - 80	Leg	101	-167464.00	309502.00	54.1	Pass
		Diagonal	104	-11954.00	20200.00	59.2	Pass
						60.3 (b)	
T6	80 - 60	Leg	122	-211677.00	505555.00	41.9	Pass
		Diagonal	126	-13574.70	27240.70	49.8	Pass
						54.6 (b)	
T7	60 - 40	Leg	137	-257947.00	505555.00	51.0	Pass
		Diagonal	141	-14050.70	26828.50	52.4	Pass
						56.5 (b)	
T8	40 - 20	Leg	152	-302326.00	505555.00	59.8	Pass
		Diagonal	156	-14600.60	28560.90	51.1	Pass
						58.8 (b)	
T9	20 - 0	Leg	167	-344945.00	668659.00	51.6	Pass
		Diagonal	172	-15454.70	41818.20	37.0	Pass
						62.2 (b)	
						Summary	
					Leg (T8)	59.8	Pass
					Diagonal (T9)	62.2	Pass
					Top Girt (T1)	6.4	Pass
					Bolt Checks	62.2	Pass
					RATING =	**62.2**	**Pass**

ALL-POINTS TECHNOLOGY CORPORATION

MOUNT DESIGN AND ANALYSIS REPORT
MANCHESTER, CONNECTICUT

verizon

Prepared for
Verizon Wireless

Verizon Wireless Site Ref:
Manchester 7 CT

Site Address: 250 Olcott Street, Manchester, CT 06040
FUZE ID: 17225579
PSLC: 143808
MDG Location ID: 5000953787
Project Type: New Site Build

APT Filing No. CT141_14560

~~Rev. 0 ~ May 24, 2024~~
Rev. 1 ~ June 4, 2024

ALL-POINTS TECHNOLOGY CORPORATION, P.C.
567 VAUXHALL STREET EXTENSION · SUITE 311 · WATERFORD, CT 06385 · PHONE 860-663-1697

MOUNT DESIGN AND ANALYSIS REPORT
180'± SELF SUPPORT TOWER
MANCHESTER, CONNECTICUT
prepared for
Verizon Wireless

EXECUTIVE SUMMARY:

All-Points Technology Corporation, P.C. (APT) performed a mount design and analysis for a proposed Verizon wireless equipment installation on an existing 180'± AGL host tower structure.

Details of the proposed antenna and appurtenance configuration are included within the table on the following page.

Our mount design and analysis indicate that the proposed Verizon mount assembly **meets** the requirements of the 2021 International Building Code (IBC), as amended by the 2022 Connecticut State Building Code, and the ANSI/TIA-222-H standard with Verizon's proposed equipment installation.

The mount assembly component usage is summarized in the table below:

Component/Member	Usage (%)
Connection (bolt)	14%
Mount Member	37%

Notes:

1. Usage values noted in table above <100% are deemed adequate.

INTRODUCTION:

A mount design and analysis was performed on the above-mentioned communications tower structure by APT for Verizon Wireless. The tower is located at 250 Olcott Street in Manchester, Connecticut.

The following information was utilized in the preparation of this analysis:

- RFDS detailing Verizon's proposed equipment changes, latest version.
- Construction Drawings prepared by APT (APT Project No. CT141_14560), marked Rev 1, dated June 4, 2024.
- Tower Structural Analysis Report prepared by APT (APT Project No. CT141_14560), marked Rev 1, dated June 4, 2024.
- Field Mapping and images from APT's site visit conducted on 03/12/24.
- Assembly Drawings for the 12'-6" Heavy Duty V-Frame Assembly with two stiff arms (P/N: VFA12-HD) prepared by Site Pro1, Inc., dated January 25, 2017.

The existing host structure consists of a 180'± self-support tower. The mount design and analysis was conducted utilizing the following antenna inventory (proposed equipment shown in **bold** text). Should the equipment/dimensions listed below differ from the actual field conditions, APT should be contacted to review the discrepancies.

Carrier	Antenna and Appurtenance Make/Model	Elevation	Status	Mount Type
Verizon	**(3) Commscope NHH-65B-R2B antennas [3], (3) Commscope NHHSS-65B-R2B antennas [3], (3) Samsung MT6413-77A antennas w/ integrated RRHs, (3) Samsung B2/B66A RF4439d-25A ORAN RRHs, (3) Samsung B5/B13 RF4461d-13A ORAN RRHs, (3) Samsung CBRS RT4423-48A ORAN RRHs, (1) Raycap RVZDC-6627-PF-48 12OVP**	**115'±**	**P**	**Three (3) SITEPRO1 12'-6" Heavy Duty V-Frame Assembly (P/N VFA-12-HD) w/ two (2) tie-back arms, twelve (12) P2.0 STD x 8'-0"L antenna mounting pipes, and one (1) P2.0 STD x 5'-0"L OVP mounting pipe**

Notes:

2. ETR = Existing to Remain; ERL= Existing to be Relocated; **P** = Proposed; F = Future; *R*= Reserved.
3. Proposed antennas to utilize Dual Mount Antenna Brackets (Commscope P/N BSAMNT-SBS-2-2)

STRUCTURAL ANALYSIS:

Mount Design and Analysis Criteria:

The mount analysis has been prepared in accordance with the ANSI/TIA-222-H standard entitled "Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures"; American Institute of Steel Construction (AISC) Manual of Steel Construction, and the 2021 International Building Code (IBC), as amended by the 2022 Connecticut State Building Code utilizing the following criteria:

- 130 mph 3-second gust) wind speed
- 50mph (3-second gust) wind speed w/ 1.50" ice thickness
- 30mph (3-second gust) Maintenance wind speed.
- Risk Category: III
- Exposure Category: C
- Topographic Category 1
- Maintenance Live Load, L_v = 250 lbs / L_m = 500 lbs

ANALYSIS RESULTS:

Antenna Mount

The design and analysis of the antenna mount assembly was conducted in accordance with the criteria outlined herein with the aforementioned proposed equipment loading. The following table summarizes the results of the analysis:

Component/Member	Usage (%)
Connection (bolt)	14%
Mount Member	37%

CONCLUSION:

In conclusion, our mount design and analysis indicate that the proposed Verizon mount assembly **meets** the requirements of the 2021 International Building Code (IBC), as amended by the 2022 Connecticut State Building Code, and the ANSI/TIA-222-H standard with Verizon's proposed equipment installation.

Sincerely,
All-Points Technology Corp. P.C.

Michael S. Trodden, P.E.
Senior Structural Engineer

Prepared by,
All-Points Technology Corp, P.C.

Jeremy P. Vassell
Project Structural Engineer

LIMITATIONS:

This report is based on the following:

1. Tower/structure is properly installed and maintained.
2. With the exception of the anchor bolts, all members are in a non-deteriorated condition.
3. All required members are in place.
4. All bolts are in place and are properly tightened.
5. Tower/structure is in plumb condition.
6. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
7. Mount Assembly material yield stress values as follows:
   Pipes: ASTM A53 Gr. B (35 KSI)
   Misc. Steel: ASTM A36 (36 KSI)

All-Points Technology Corporation, P.C. (APT) is not responsible for any modifications completed prior to or hereafter which APT is not or was not directly involved. Modifications include but are not limited to:

1. Replacing or reinforcing bracing members.
2. Reinforcing members in any manner.
3. Installing antenna mounts.
4. Extending tower/structure.

APT hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon the information contained and set forth herein. If you are aware of any information which is contrary to that which is contained herein, or you are aware of any defects arising from the original design, material, fabrication, and erection deficiencies, you should disregard this report and immediately contact APT. APT disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

Appendix A

Design Criteria

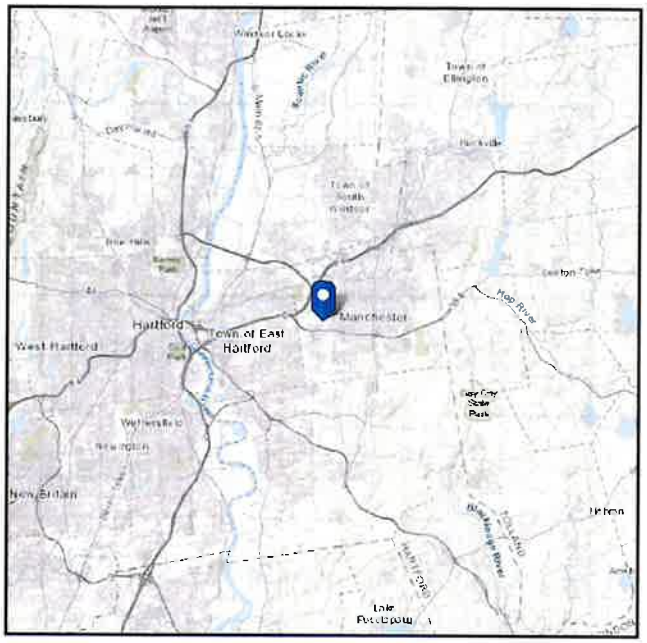
Municipality	Basic Design Wind Speeds, V (mph)				Allowable Stress Design Wind Speeds, V_{asd} (mph)				Ground Snow Load p_g (psf)	MCE Ground Accelerations		Wind-Borne Debris Region[1]		Hurricane-Prone Region
	Risk Cat. I	Risk Cat. II	Risk Cat. III	Risk Cat. IV	Risk Cat. I	Risk Cat. II	Risk Cat. III	Risk Cat. IV		S_S (g)	S_1 (g)	Risk Cat. III Occup. I-2	Risk Cat. IV	
Hampton	115	125	130	135	89	97	101	105	35	0.184	0.054			Yes
Hartford	110	120	130	135	85	93	101	105	30	0.189	0.055			Yes
Hartland	110	115	125	130	85	89	97	101	35	0.167	0.054			
Harwinton	110	120	125	130	85	93	97	101	35	0.177	0.054			Yes
Hebron	115	125	130	135	89	97	101	105	30	0.200	0.055			Yes
Kent	105	115	125	130	81	89	97	101	40	0.184	0.054			
Killingly	115	125	135	140	89	97	105	108	35	0.186	0.055			Yes
Killingworth	115	125	135	140	89	97	105	108	30	0.210	0.055			Yes
Lebanon	115	125	135	135	89	97	105	105	30	0.196	0.055			Yes
Ledyard	120	130	140	140	93	101	108	108	30	0.190	0.053			Yes
Lisbon	115	125	135	140	89	97	105	108	30	0.190	0.054			Yes
Litchfield	110	115	125	130	85	89	97	101	35	0.178	0.054			
Lyme	115	125	135	140	89	97	105	108	30	0.207	0.054			Yes
Madison	115	125	135	140	89	97	105	108	30	0.206	0.054	Type B	Type B	Yes
Manchester	110	120	130	135	85	93	101	105	30	0.190	0.055			Yes
Mansfield	110	120	130	135	85	93	101	105	35	0.186	0.055			Yes
Marlborough	110	125	130	135	85	97	101	105	30	0.205	0.056			Yes
Meriden	110	120	130	135	85	93	101	105	30	0.203	0.055			Yes
Middlebury	110	120	130	130	85	93	101	101	35	0.194	0.054			Yes
Middlefield	110	120	130	135	85	93	101	105	30	0.209	0.055			Yes
Middletown	110	120	130	135	85	93	101	105	30	0.209	0.056			Yes
Milford	110	120	130	135	85	93	101	105	30	0.202	0.053	Type B	Type B	Yes
Monroe	110	120	130	135	85	93	101	105	30	0.208	0.055			Yes
Montville	120	125	135	140	93	97	105	108	30	0.198	0.054			Yes
Morris	110	115	125	130	85	89	97	101	35	0.182	0.054			
Naugatuck	110	120	130	135	85	93	101	105	30	0.197	0.054			Yes
New Britain	110	120	130	135	85	93	101	105	30	0.195	0.055			Yes
New Canaan	110	120	130	135	85	93	101	105	30	0.252	0.058			Yes
New Fairfield	110	115	125	130	85	89	97	101	30	0.219	0.056			
New Hartford	110	115	125	130	85	89	97	101	35	0.172	0.054			
New Haven	110	125	130	135	85	97	101	105	30	0.201	0.054	Type B	Type B	Yes
New London	120	130	140	140	93	101	108	108	30	0.191	0.053	Type B	Type A	Yes

ASCE Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: III
Soil Class: undefined

Latitude: 41.769942
Longitude: -72.559106
Elevation: 112.92076221910733 ft (NAVD 88)



Wind

Results:

Wind Speed	128 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	98 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1C and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Thu Mar 21 2024

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (annual exceedance probability = 0.000588, MRI = 1,700 years).

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

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Ice

Results:

Ice Thickness:	1.50 in.
Concurrent Temperature:	5 F
Gust Speed	50 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Thu Mar 21 2024

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

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

Appendix B

Mount Analysis

ALL-POINTS TECHNOLOGY CORPORATION

Project ID: VT141_14560
Site Name: Manchester 7 CT
Date: 5/23/2024

(Based on ANSI/TIA-222-H)

Site Name:	Manchester 7 CT
Site Address:	250 Olcott Street Manchester, CT 06040
Site County:	Hartford

Design Criteria

Risk Category =	III		*Sect. 2.2 & Table 2-1*
Exposure Category =	C		*Section 2.6.5*
Ultimate Design Wind Speed, V =	130	mph	*2022 CSBC, Appendix P*
Design Wind Speed with Ice, V_i =	50	mph	*Fig. B-9*
Design Ice Thickness, t_i =	1.50	in	*Fig. B-9*
Importance Factor, I =	1.00		*Table 2-3*
Service Wind Speed, V_s =	30	mph	*Section 16.3*
Maintenance Load, L_m =	500.0	lbs	*Section 16.3*
Assembly Maintenance Load, L_v =	250.0	lbs	*Section 16.3*
Platform Maintenance Load, L_v =	250.0	lbs	*Section 12.4 (See note)*

Wind Pressure Analysis:

$q_z = 0.00256 K_z K_{zt} K_s K_e K_d V^2$ *Section 2.6.11.6*

K_z : **See Next Sheet**

	z_g =	900	*Table 2-4*
	α =	9.5	*Table 2-4*
	K_{zmin} =	0.85	*Table 2-4*
K_{zt} :	**K_{zt} =**	**1.00**	*Section 2.6.6*
K_s :	**K_s =**	**1.00**	*Section 2.6.7*
K_e :	**K_e =**	**1.00**	*Section 2.6.8*
K_d :	**K_d =**	**0.95**	*Section 16.6*

q_z' =	**41.10**	**psf**
q_{zi}' =	**6.08**	**psf**
q_{zm}' =	**2.19**	**psf**

$F = q_z G_h (EPA)_A = q_z G_h K_a [(EPA)_N \cos^2(\Theta) + (EPA)_T \sin^2(\Theta)]$ *Section 2.6.11.2*

G_h =	1.00	*Section 16.6*
K_a =	0.90	*Section 16.6*

ALL-POINTS TECHNOLOGY CORPORATION

Project ID: VT141_14560
Site Name: Manchester 7 CT
Date: 5/23/2024

(Based on ANSI/TIA-222-H)

Design Criteria: *(From Previous Sheet)*

$q_z' =$ 41.10 psf
$q_{zi}' =$ 6.08 psf
$t_i =$ 1.50 in
$q_{zm}' =$ 2.19 psf

$G_h =$ 1.00 *Section 16.6*
$K_a =$ 0.90 *Section 16.6*

$z_g =$ 900 *Table 2-4*
$\alpha =$ 9.5 *Table 2-4*
$K_{zmin} =$ 0.85 *Table 2-4*

$I =$ 1.00 *Table 2-3*
$K_{zt} =$ 1.00 *Section 2.6.6*

Description	Elev. z_z, ft	K_z	q_z, psf	Dimensions Height, in	Width, in	Depth, in	Wght., lbs	Flat Panel Front Coefficient Area, ft²	Aspect Ratio	Ca	C_aA_a	Flat Panel Side Coefficient Area, ft²	Aspect Ratio	Ca	C_aA_a	Front Wind Force, lbs	Side Wind Force, lbs	Weight, lbs
NHH-65B-R2B	115.0	1.303	53.57	72.0	11.9	7.1	77.4	5.92	6.073	1.36	8.05	3.542	10.155	1.51	5.331	389.0	258.0	77.4
MT6413-77A	115.0	1.303	53.57	28.9	15.8	5.5	57.3	3.16	1.835	1.20	3.79	1.106	5.245	1.32	1.462	183.0	71.0	57.3
NHHSS-65B-R2B	115.0	1.303	53.57	72.0	11.9	7.1	84.7	5.95	6.050	1.36	8.08	3.550	10.141	1.50	5.342	390.0	258.0	84.7305
B2/B66A RRH (RF4439d-25)	115.0	1.303	53.57	15.0	15.0	10.0	74.7	1.55	1.000	1.20	1.87	1.043	1.490	1.20	1.252	90.0	61.0	74.7
B5/B13 RRH (RF4461d-13A)	115.0	1.303	53.57	15.0	15.0	10.2	79.1	1.55	1.000	1.20	1.87	1.063	1.462	1.20	1.275	90.0	62.0	79.1
CBRS ORAN RRH (RT4423-48A)	115.0	1.303	53.57	11.8	8.7	4.2	18.7	0.71	1.356	1.20	0.86	0.344	2.810	1.21	0.418	42.0	21.0	18.7
RVZDC-6627-PF-48 (OVP12)	115.0	1.303	53.57	29.5	16.5	12.6	32.0	3.38	1.788	1.20	4.06	2.581	2.341	1.20	3.098	196.0	150.0	32.0

Description	z, ft	K_z	q_{zi}, psf	Dimensions with Ice Ice Thick., t_{iz}, in	Height, in	Dc, in	Ice Wght., lbs	Flat Panel Front Coefficient Area, ft²	Aspect Ratio	Ca	C_aA_a	Flat Panel Side Coefficient Area, ft²	Aspect Ratio	Ca	C_aA_a	Front Wind Force, lbs	Side Wind Force, lbs	Weight, lbs
NHH-65B-R2B	115.0	1.303	7.925	1.70	75.37	13.81	202.2	7.98	5.46	0.77	6.111	5.488	5.46	0.77	4.203	44.0	30.0	279.6
MT6413-77A	115.0	1.303	7.925	1.70	32.30	16.69	102.7	4.30	1.94	0.70	3.007	1.998	1.94	0.70	1.399	22.0	10.0	160.0
NHHSS-65B-R2B	115.0	1.303	7.925	1.70	75.40	13.86	202.9	8.01	5.44	0.77	6.131	5.497	5.44	0.77	4.207	44.0	31.0	287.7
B2/B66A RRH (RF4439d-25)	115.0	1.303	7.925	1.70	18.36	18.02	62.6	2.34	1.02	0.70	1.638	1.713	1.02	0.70	1.199	12.0	9.0	137.3
B5/B13 RRH (RF4461d-13A)	115.0	1.303	7.925	1.70	18.36	18.12	63.0	2.34	1.01	0.70	1.638	1.738	1.01	0.70	1.216	12.0	9.0	142.1
CBRS ORAN RRH (RT4423-48A)	115.0	1.303	7.925	1.70	15.20	9.66	29.9	1.28	1.57	0.70	0.894	0.802	1.57	0.70	0.561	7.0	5.0	48.6
RVZDC-6627-PF-48 (OVP12)	115.0	1.303	7.925	1.70	32.90	20.76	127.8	4.55	1.58	0.70	3.182	3.655	1.58	0.70	2.559	23.0	19.0	159.8

Description	Elev. z, ft	K_z	q_z, psf	Dimensions Height, in	Width, in	Depth, in	Wght.[1], lbs	Flat Panel Front Coefficient Area, ft²	Aspect Ratio	Ca	C_aA_a	Flat Panel Side Coefficient Area, ft²	Aspect Ratio	Ca	C_aA_a	Front Wind Force, lbs	Side Wind Force, lbs	Weight, lbs
NHH-65B-R2B	115.0	1.303	2.85	72.0	11.9	7.1	77.4	5.92	6.073	1.36	8.05	3.542	10.155	1.51	5.331	21.0	14.0	77.4
MT6413-77A	115.0	1.303	2.85	28.9	15.8	5.5	57.3	3.16	1.835	1.20	3.79	1.106	5.245	1.32	1.462	10.0	4.0	57.3
NHHSS-65B-R2B	115.0	1.303	2.85	72.0	11.9	7.1	84.7	5.95	6.050	1.36	8.08	3.550	10.141	1.50	5.342	21.0	14.0	84.7
B2/B66A RRH (RF4439d-25)	115.0	1.303	2.85	15.0	15.0	10.0	74.7	1.55	1.000	1.20	1.87	1.043	1.490	1.20	1.252	5.0	4.0	74.7
B5/B13 RRH (RF4461d-13A)	115.0	1.303	2.85	15.0	15.0	10.2	79.1	1.55	1.000	1.20	1.87	1.063	1.462	1.20	1.275	5.0	4.0	79.1
CBRS ORAN RRH (RT4423-48A)	115.0	1.303	2.85	11.8	8.7	4.2	18.7	0.71	1.356	1.20	0.86	0.344	2.810	1.21	0.418	3.0	2.0	18.7
RVZDC-6627-PF-48 (OVP12)	115.0	1.303	2.85	29.5	16.5	12.6	32.0	3.38	1.788	1.20	4.06	2.581	2.341	1.20	3.098	11.0	8.0	32.0

ALL-POINTS TECHNOLOGY CORPORATION

Project ID: VT141_14560
Site Name: Manchester 7 CT
Date: 5/23/2024

(Based on ANSI/TIA-222-H)

Design Criteria: *(From Previous Sheet)*

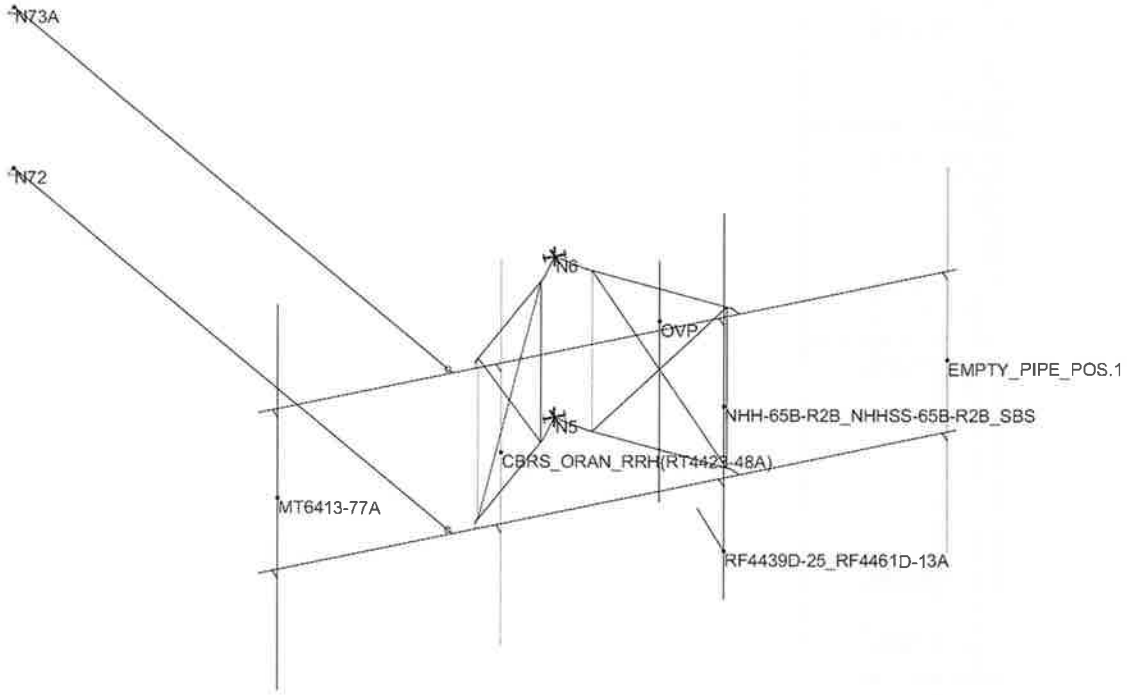
$q_z' =$ 41.10 psf
$q_h' =$ 6.08 psf
$t_i =$ 1.50 In
$q_{zm}' =$ 2.19 psf

$G_h =$ 1.00 *Section 16.6*
$K_a =$ 0.90 *Section 16.6*

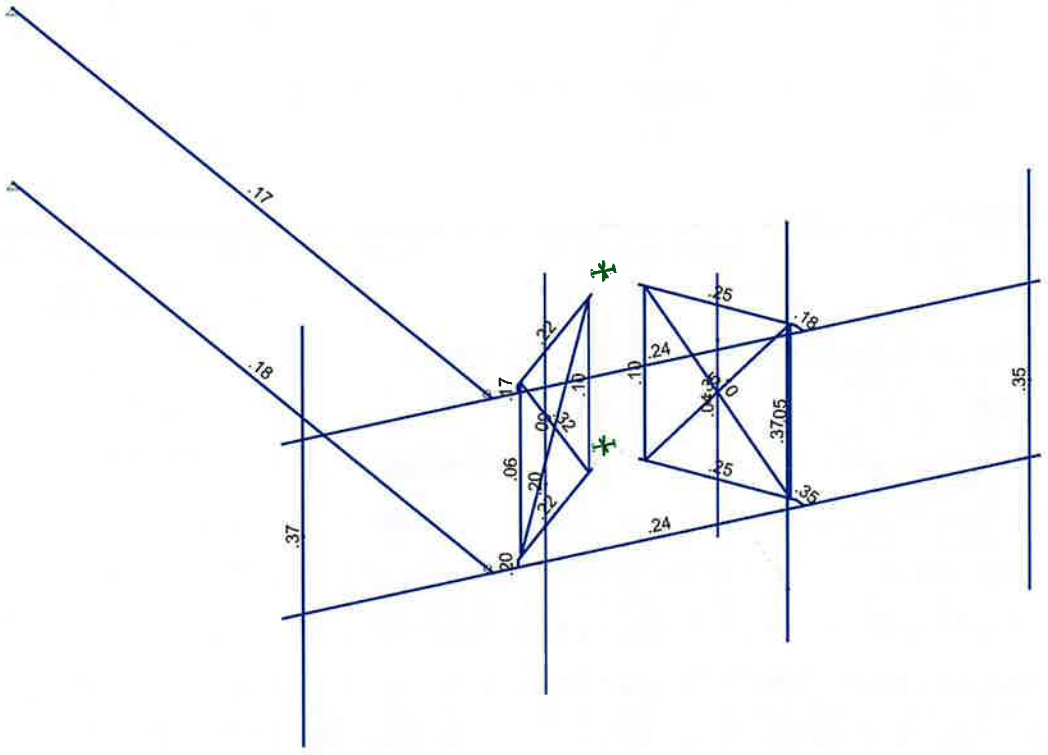
$z_g =$ 900 *Table 2-4*
$\alpha =$ 9.5 *Table 2-4*
$K_{zmin} =$ 0.85 *Table 2-4*

$I =$ 1.00 *Table 2-3*
$K_{it} =$ 1.00 *Section 2.6.6*

Description	Elev., z_z, ft	K_z	q_z, psf	Ice Thick., t_{di}, in	q_{zi}, psf	q_{zi}, psf	Dimensions: Width or Dia, in	Dimensions: Depth, in	Dimensions: Thickness, In	Dimensions: r_x	Weight, lbs/ft	Loading, No Ice: Flat or Round	Loading, No Ice: Ca	Loading, No Ice: Wind, lbs/ft	With Ice: Width or Dia, in	With Ice: Dc, In	With Ice: Weight, lbs/ft	With Ice: Ca	With Ice: Wind, lbs/ft	Maintenance: Ca	Maintenance: Wind, lbs/ft
2.0" STD	115.0	1.303	53.57	1.70	7.92	2.85	2.375	2.375	-	-	3.66	ROUND	1.20	11.45	5.77	2.38	8.46	1.20	4.12	1.20	0.61
2.5" STD	115.0	1.303	53.57	1.70	7.92	2.85	2.875	2.875	-	-	5.29	ROUND	1.20	13.86	6.27	2.88	9.50	1.20	4.47	1.20	0.74
1-1/4" STD	115.0	1.303	53.57	1.70	7.92	2.85	1.660	1.660	-	-	2.27	ROUND	1.20	8.00	5.06	1.66	6.98	1.20	3.61	1.20	0.43
3/4" Dia. Rod	115.0	1.303	53.57	1.70	7.92	2.85	0.750	0.750	-	-	1.04	ROUND	1.20	3.62	4.15	0.75	5.09	1.20	2.96	1.20	0.19



APT Engineering	SitePro1 VFA12-HD	
JV		
Manchester 7 CT	CONNECTION NODES & EQUIPMENT LOCATIONS	Machester 7 CT VFA12-HD.r3d



Member Code Checks Displayed (Enveloped)
Results for LC 1, 1.4DL

APT Engineering	SitePro1 VFA12-HD	
JV		
Manchester 7 CT	BENDING STRESSES	Machester 7 CT VFA12-HD.r3d

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Grav...	Joint	Point	Distrib...	Area(Memb...	Surfac...
1	DL	DL		-1.05		8				
2	WLX	WLX				7		21		
3	WLZ	WLZ				8		21		
4	DLi	OL1				8		21		
5	WLXi	WL+X				7		21		
6	WLZi	WL+Z				8		21		
7	Working Load	LL					2			
8	WLXw	WL-X				7		21		
9	WLZw	WL-Z				8		21		
10	LLm1	OL2					1			
11	LLm2	OL3					1			
12	LLm3	OL4					1			
13	LLm4	OL5					1			

Load Combinations

	Description	S...	PDelta S...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.4DL	Yes	Y	DL	1.4																
2																					
3	1.2DL + WLX	Yes	Y	DL	1.2	WLX	1														
4	1.2DL + 0.75WLX + 0.25WLZ	Yes	Y	DL	1.2	WLX	.75	WLZ	.25												
5	1.2DL + 0.25WLX + 0.75WLZ	Yes	Y	DL	1.2	WLX	.25	WLZ	.75												
6	1.2DL + WLZ	Yes	Y	DL	1.2	WLZ	1														
7	1.2DL + 0.25WL-X + 0.75WLZ	Yes	Y	DL	1.2	WLX	-.25	WLZ	.75												
8	1.2DL + 0.75WL-X + 0.25WLZ	Yes	Y	DL	1.2	WLX	-.75	WLZ	.25												
9	1.2DL + WL-X	Yes	Y	DL	1.2	WLX	-1														
10	1.2DL + 0.75WL-X + 0.25WL-Z	Yes	Y	DL	1.2	WLX	-.75	WLZ	-.25												
11	1.2DL + 0.25WL-X + 0.75WL-Z	Yes	Y	DL	1.2	WLX	-.25	WLZ	-.75												
12	1.2DL + WL-Z	Yes	Y	DL	1.2	WLZ	-1														
13	1.2DL + 0.25WLX + 0.75WL-Z	Yes	Y	DL	1.2	WLX	.25	WLZ	-.75												
14	1.2DL + 0.75WLX + 0.25WL-Z	Yes	Y	DL	1.2	WLX	.75	WLZ	-.25												
15																					
16	1.2DL + DLi + WLXi	Yes	Y	DL	1.2	OL1	1	W...	1												
17	1.2DL + DLi + 0.75WLXi + 0.25W...	Yes	Y	DL	1.2	OL1	1	W...	.75	W...	.25										
18	1.2DL + DLi + 0.25WLXi + 0.75W...	Yes	Y	DL	1.2	OL1	1	W...	.25	W...	.75										
19	1.2DL + DLi + WLZi	Yes	Y	DL	1.2	OL1	1	W...	1												
20	1.2DL + DLi + 0.25WL-Xi + 0.75...	Yes	Y	DL	1.2	OL1	1	W...	-.25	W...	.75										
21	1.2DL + DLi + 0.75WL-Xi + 0.25...	Yes	Y	DL	1.2	OL1	1	W...	-.75	W...	.25										
22	1.2DL + DLi + WL-Xi	Yes	Y	DL	1.2	OL1	1	W...	-1												
23	1.2DL + DLi + 0.75WL-Xi + 0.25...	Yes	Y	DL	1.2	OL1	1	W...	-.75	W...	-.25										
24	1.2DL + DLi + 0.25WL-Xi + 0.75...	Yes	Y	DL	1.2	OL1	1	W...	-.25	W...	-.75										
25	1.2DL + DLi + WL-Zi	Yes	Y	DL	1.2	OL1	1	W...	-1												
26	1.2DL + DLi + 0.25WLXi + 0.75W...	Yes	Y	DL	1.2	OL1	1	W...	.25	W...	-.75										
27	1.2DL + DLi + 0.75WLXi + 0.25W...	Yes	Y	DL	1.2	OL1	1	W...	.75	W...	-.25										
28																					
29	1.2DL + 1.5Lm(1) + WLXm	Yes	Y	DL	1.2	OL2	1.5	W...	1												
30	1.2DL + 1.5Lm(1) + 0.75WLXm + ...	Yes	Y	DL	1.2	OL2	1.5	W...	.75	W...	.25										
31	1.2DL + 1.5Lm(1) + 0.25WLXm + ...	Yes	Y	DL	1.2	OL2	1.5	W...	.25	W...	.75										
32	1.2DL + 1.5Lm(1) + WLZm	Yes	Y	DL	1.2	OL2	1.5	W...	1												
33	1.2DL + 1.5Lm(1) + 0.25WL-Xm ...	Yes	Y	DL	1.2	OL2	1.5	W...	-.25	W...	.75										
34	1.2DL + 1.5Lm(1) + 0.75WL-Xm ...	Yes	Y	DL	1.2	OL2	1.5	W...	-.75	W...	.25										
35	1.2DL + 1.5Lm(1) + WL-Xm	Yes	Y	DL	1.2	OL2	1.5	W...	-1												
36	1.2DL + 1.5Lm(1) + 0.75WL-Xm ...	Yes	Y	DL	1.2	OL2	1.5	W...	-.75	W...	-.25										
37	1.2DL + 1.5Lm(1) + 0.25WL-Xm ...	Yes	Y	DL	1.2	OL2	1.5	W...	-.25	W...	-.75										
38	1.2DL + 1.5Lm(1) + WL-Zm	Yes	Y	DL	1.2	OL2	1.5	W...	-1												

Load Combinations (Continued)

	Description	S...	PDelta	S...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
39	1.2DL + 1.5Lm(1) + 0.25WLXm + ...	Yes	Y		DL	1.2	OL2	1.5	W...	.25	W...	-.75												
40	1.2DL + 1.5Lm(1) + 0.75WLXm + ...	Yes	Y		DL	1.2	OL2	1.5	W...	.75	W...	-.25												
41																								
42	1.2DL + 1.5Lm(2) + WLXm	Yes	Y		DL	1.2	OL3	1.5	W...	1														
43	1.2DL + 1.5Lm(2) + 0.75WLXm + ...	Yes	Y		DL	1.2	OL3	1.5	W...	.75	W...	.25												
44	1.2DL + 1.5Lm(2) + 0.25WLXm + ...	Yes	Y		DL	1.2	OL3	1.5	W...	.25	W...	.75												
45	1.2DL + 1.5Lm(2) + WLZm	Yes	Y		DL	1.2	OL3	1.5	W...	1														
46	1.2DL + 1.5Lm(2) + 0.25WL-Xm ...	Yes	Y		DL	1.2	OL3	1.5	W...	-.25	W...	.75												
47	1.2DL + 1.5Lm(2) + 0.75WL-Xm ...	Yes	Y		DL	1.2	OL3	1.5	W...	-.75	W...	.25												
48	1.2DL + 1.5Lm(2) + WL-Xm	Yes	Y		DL	1.2	OL3	1.5	W...	-1														
49	1.2DL + 1.5Lm(2) + 0.75WL-Xm ...	Yes	Y		DL	1.2	OL3	1.5	W...	-.75	W...	-.25												
50	1.2DL + 1.5Lm(2) + 0.25WL-Xm ...	Yes	Y		DL	1.2	OL3	1.5	W...	-.25	W...	-.75												
51	1.2DL + 1.5Lm(2) + WL-Zm	Yes	Y		DL	1.2	OL3	1.5	W...	-1														
52	1.2DL + 1.5Lm(2) + 0.25WLXm + ...	Yes	Y		DL	1.2	OL3	1.5	W...	.25	W...	-.75												
53	1.2DL + 1.5Lm(2) + 0.75WLXm + ...	Yes	Y		DL	1.2	OL3	1.5	W...	.75	W...	-.25												
54																								
55	1.2DL + 1.5Lm(3) + WLXm	Yes	Y		DL	1.2	OL4	1.5	W...	1														
56	1.2DL + 1.5Lm(3) + 0.75WLXm + ...	Yes	Y		DL	1.2	OL4	1.5	W...	.75	W...	.25												
57	1.2DL + 1.5Lm(3) + 0.25WLXm + ...	Yes	Y		DL	1.2	OL4	1.5	W...	.25	W...	.75												
58	1.2DL + 1.5Lm(3) + WLZm	Yes	Y		DL	1.2	OL4	1.5	W...	1														
59	1.2DL + 1.5Lm(3) + 0.25WL-Xm ...	Yes	Y		DL	1.2	OL4	1.5	W...	-.25	W...	.75												
60	1.2DL + 1.5Lm(3) + 0.75WL-Xm ...	Yes	Y		DL	1.2	OL4	1.5	W...	-.75	W...	.25												
61	1.2DL + 1.5Lm(3) + WL-Xm	Yes	Y		DL	1.2	OL4	1.5	W...	-1														
62	1.2DL + 1.5Lm(3) + 0.75WL-Xm ...	Yes	Y		DL	1.2	OL4	1.5	W...	-.75	W...	-.25												
63	1.2DL + 1.5Lm(3) + 0.25WL-Xm ...	Yes	Y		DL	1.2	OL4	1.5	W...	-.25	W...	-.75												
64	1.2DL + 1.5Lm(3) + WL-Zm	Yes	Y		DL	1.2	OL4	1.5	W...	-1														
65	1.2DL + 1.5Lm(3) + 0.25WLXm + ...	Yes	Y		DL	1.2	OL4	1.5	W...	.25	W...	-.75												
66	1.2DL + 1.5Lm(3) + 0.75WLXm + ...	Yes	Y		DL	1.2	OL4	1.5	W...	.75	W...	-.25												
67																								
68	1.2DL + 1.5Lm(4) + WLXm	Yes	Y		DL	1.2	OL5	1.5	W...	1														
69	1.2DL + 1.5Lm(4) + 0.75WLXm + ...	Yes	Y		DL	1.2	OL5	1.5	W...	.75	W...	.25												
70	1.2DL + 1.5Lm(4) + 0.25WLXm + ...	Yes	Y		DL	1.2	OL5	1.5	W...	.25	W...	.75												
71	1.2DL + 1.5Lm(4) + WLZm	Yes	Y		DL	1.2	OL5	1.5	W...	1														
72	1.2DL + 1.5Lm(4) + 0.25WL-Xm ...	Yes	Y		DL	1.2	OL5	1.5	W...	-.25	W...	.75												
73	1.2DL + 1.5Lm(4) + 0.75WL-Xm ...	Yes	Y		DL	1.2	OL5	1.5	W...	-.75	W...	.25												
74	1.2DL + 1.5Lm(4) + WL-Xm	Yes	Y		DL	1.2	OL5	1.5	W...	-1														
75	1.2DL + 1.5Lm(4) + 0.75WL-Xm ...	Yes	Y		DL	1.2	OL5	1.5	W...	-.75	W...	-.25												
76	1.2DL + 1.5Lm(4) + 0.25WL-Xm ...	Yes	Y		DL	1.2	OL5	1.5	W...	-.25	W...	-.75												
77	1.2DL + 1.5Lm(4) + WL-Zm	Yes	Y		DL	1.2	OL5	1.5	W...	-1														
78	1.2DL + 1.5Lm(4) + 0.25WLXm + ...	Yes	Y		DL	1.2	OL5	1.5	W...	.25	W...	-.75												
79	1.2DL + 1.5Lm(4) + 0.75WLXm + ...	Yes	Y		DL	1.2	OL5	1.5	W...	.75	W...	-.25												
80																								
81	1.2DL + 1.5Lv	Yes	Y		DL	1.2	LL	1.5																

Joint Reactions (By Combination)

	LC	Joint Label	X [lb]	Y [lb]	Z [lb]	MX [lb-ft]	MY [lb-ft]	MZ [lb-ft]
1	1	N6	-73.44	609.18	-590.72	-366.38	0	0
2	1	N5	73.44	546.76	590.72	-330.72	0	0
3	1	N73A	-4.86	33.16	-18.23	0	0	0
4	1	N72	4.87	33.16	18.24	0	0	0
5	1	Totals:	0	1222.27	0			
6	1	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			
7	3	N6	394.44	597.93	-916.54	-358.23	0	0
8	3	N5	728.48	392.88	.48	-236.02	0	0
9	3	N73A	176.89	28.42	393.56	0	0	0

Joint Reactions (By Combination) (Continued)

	LC	Joint Label	X [lb]	Y [lb]	Z [lb]	MX [lb-ft]	MY [lb-ft]	MZ [lb-ft]
10	3	N72	211.28	28.42	522.5	0	0	0
11	3	Totals:	1511.09	1047.66	0			
12	3	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			
13	4	N6	281.45	519.57	-580.5	-314.82	0	0
14	4	N5	575.96	471.24	512.91	-279.45	0	0
15	4	N73A	130.25	28.42	290.89	0	0	0
16	4	N72	145.66	28.42	348.63	0	0	0
17	4	Totals:	1133.32	1047.66	571.93			
18	4	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			
19	5	N6	55.46	362.88	91.49	-228.03	0	0
20	5	N5	270.99	627.93	1537.91	-366.33	0	0
21	5	N73A	36.98	28.42	85.62	0	0	0
22	5	N72	14.34	28.43	.75	0	0	0
23	5	Totals:	377.77	1047.66	1715.77			
24	5	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			
25	6	N6	-57.54	284.55	427.44	-184.65	0	0
26	6	N5	118.55	706.26	2050.49	-409.77	0	0
27	6	N73A	-9.65	28.43	-16.97	0	0	0
28	6	N72	-51.36	28.43	-173.27	0	0	0
29	6	Totals:	0	1047.66	2287.7			
30	6	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			
31	7	N6	-173.27	325.01	296.46	-205.98	0	0
32	7	N5	-61.73	665.79	1790.82	-390.09	0	0
33	7	N73A	-53.53	28.43	-118.84	0	0	0
34	7	N72	-89.25	28.43	-252.68	0	0	0
35	7	Totals:	-377.77	1047.66	1715.77			
36	7	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			
37	8	N6	-404.69	405.93	34.68	-248.63	0	0
38	8	N5	-422.25	584.86	1271.6	-350.73	0	0
39	8	N73A	-141.33	28.43	-322.73	0	0	0
40	8	N72	-165.05	28.44	-411.62	0	0	0
41	8	Totals:	-1133.32	1047.66	571.92			
42	8	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			
43	9	N6	-520.38	446.39	-96.13	-269.95	0	0
44	9	N5	-602.5	544.4	1012.05	-331.05	0	0
45	9	N73A	-185.25	28.44	-424.76	0	0	0
46	9	N72	-202.97	28.44	-491.16	0	0	0
47	9	Totals:	-1511.09	1047.66	0			
48	9	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			
49	10	N6	-407.34	524.73	-431.99	-313.29	0	0
50	10	N5	-450.02	466.07	499.68	-287.56	0	0
51	10	N73A	-138.63	28.43	-322.26	0	0	0
52	10	N72	-137.32	28.43	-317.35	0	0	0
53	10	Totals:	-1133.32	1047.66	-571.93			
54	10	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			
55	11	N6	-181.26	681.43	-1103.79	-400.01	0	0
56	11	N5	-145.01	309.38	-524.91	-200.59	0	0
57	11	N73A	-45.4	28.43	-117.19	0	0	0
58	11	N72	-6.11	28.43	30.12	0	0	0
59	11	Totals:	-377.77	1047.66	-1715.77			
60	11	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			
61	12	N6	-68.23	759.8	-1439.74	-443.39	0	0
62	12	N5	7.54	231.01	-1037.13	-157.11	0	0
63	12	N73A	1.22	28.43	-14.61	0	0	0
64	12	N72	59.47	28.43	203.78	0	0	0
65	12	Totals:	0	1047.66	-2287.7			
66	12	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			

Joint Reactions (By Combination) (Continued)

	LC	Joint Label	X [lb]	Y [lb]	Z [lb]	MX [lb-ft]	MY [lb-ft]	MZ [lb-ft]
67	13	N6	47.42	719.33	-1309.02	-422.1	0	0
68	13	N5	187.76	271.48	-777.79	-176.83	0	0
69	13	N73A	45.16	28.43	87.51	0	0	0
70	13	N72	97.44	28.43	283.52	0	0	0
71	13	Totals:	377.77	1047.66	-1715.77			
72	13	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			
73	14	N6	278.75	638.4	-1047.42	-379.52	0	0
74	14	N5	548.23	352.41	-258.98	-216.29	0	0
75	14	N73A	132.99	28.42	291.6	0	0	0
76	14	N72	173.34	28.42	442.88	0	0	0
77	14	Totals:	1133.32	1047.66	-571.92			
78	14	COG (in):	X: -1.43	Y: -22.31	Z: 20.3			
79	16	N6	-3.66	1401.28	-1511.97	-859.2	0	0
80	16	N5	331.9	1269	1254.94	-781.08	0	0
81	16	N73A	51.99	83.41	97.88	0	0	0
82	16	N72	68.33	83.41	159.15	0	0	0
83	16	Totals:	448.56	2837.1	0			
84	16	COG (in):	X: -2.08	Y: -20.04	Z: 19.86			
85	17	N6	-41.16	1382.39	-1421.04	-850.36	0	0
86	17	N5	288.89	1287.89	1369.99	-789.94	0	0
87	17	N73A	37.48	83.41	69.49	0	0	0
88	17	N72	51.21	83.41	120.92	0	0	0
89	17	Totals:	336.42	2837.1	139.36			
90	17	COG (in):	X: -2.08	Y: -20.04	Z: 19.86			
91	18	N6	-116.17	1344.6	-1239.19	-832.7	0	0
92	18	N5	202.88	1325.67	1600.09	-807.67	0	0
93	18	N73A	8.48	83.42	12.71	0	0	0
94	18	N72	16.95	83.41	44.46	0	0	0
95	18	Totals:	112.14	2837.1	418.07			
96	18	COG (in):	X: -2.08	Y: -20.04	Z: 19.86			
97	19	N6	-153.67	1325.71	-1148.27	-823.87	0	0
98	19	N5	159.87	1344.56	1715.14	-816.54	0	0
99	19	N73A	-6.02	83.42	-15.67	0	0	0
100	19	N72	-.18	83.42	6.23	0	0	0
101	19	Totals:	0	2837.1	557.43			
102	19	COG (in):	X: -2.08	Y: -20.04	Z: 19.86			
103	20	N6	-191	1334.18	-1178.36	-826.14	0	0
104	20	N5	113.59	1336.09	1667.76	-814.41	0	0
105	20	N73A	-20.67	83.42	-48.05	0	0	0
106	20	N72	-14.06	83.42	-23.27	0	0	0
107	20	Totals:	-112.14	2837.1	418.07			
108	20	COG (in):	X: -2.08	Y: -20.04	Z: 19.86			
109	21	N6	-265.66	1351.12	-1238.54	-830.68	0	0
110	21	N5	21.03	1319.14	1573	-810.15	0	0
111	21	N73A	-49.97	83.42	-112.83	0	0	0
112	21	N72	-41.82	83.42	-82.28	0	0	0
113	21	Totals:	-336.42	2837.1	139.36			
114	21	COG (in):	X: -2.08	Y: -20.04	Z: 19.86			
115	22	N6	-302.99	1359.6	-1268.62	-832.95	0	0
116	22	N5	-25.25	1310.67	1525.62	-808.02	0	0
117	22	N73A	-64.62	83.42	-145.22	0	0	0
118	22	N72	-55.7	83.42	-111.79	0	0	0
119	22	Totals:	-448.56	2837.1	0			
120	22	COG (in):	X: -2.08	Y: -20.04	Z: 19.86			
121	23	N6	-265.49	1378.49	-1359.53	-841.78	0	0
122	23	N5	17.76	1291.78	1410.58	-799.16	0	0
123	23	N73A	-50.12	83.42	-116.84	0	0	0

Joint Reactions (By Combination) (Continued)

	LC	Joint Label	X [lb]	Y [lb]	Z [lb]	MX [lb-ft]	MY [lb-ft]	MZ [lb-ft]
124	23	N72	-38.57	83.42	-73.57	0	0	0
125	23	Totals:	-336.42	2837.1	-139.36			
126	23	COG (in):	X: -2.08	Y: -20.04	Z: 19.86			
127	24	N6	-190.48	1416.27	-1541.37	-859.45	0	0
128	24	N5	103.77	1254	1180.49	-781.42	0	0
129	24	N73A	-21.11	83.42	-60.07	0	0	0
130	24	N72	-4.32	83.42	2.87	0	0	0
131	24	Totals:	-112.14	2837.1	-418.07			
132	24	COG (in):	X: -2.08	Y: -20.04	Z: 19.86			
133	25	N6	-152.97	1435.17	-1632.29	-868.28	0	0
134	25	N5	146.78	1235.1	1065.45	-772.56	0	0
135	25	N73A	-6.61	83.42	-31.69	0	0	0
136	25	N72	12.8	83.41	41.09	0	0	0
137	25	Totals:	0	2837.1	-557.43			
138	25	COG (in):	X: -2.08	Y: -20.04	Z: 19.86			
139	26	N6	-115.64	1426.7	-1602.21	-866.01	0	0
140	26	N5	193.06	1243.58	1112.82	-774.69	0	0
141	26	N73A	8.04	83.42	.71	0	0	0
142	26	N72	26.69	83.41	70.61	0	0	0
143	26	Totals:	112.14	2837.1	-418.07			
144	26	COG (in):	X: -2.08	Y: -20.04	Z: 19.86			
145	27	N6	-40.99	1409.75	-1542.05	-861.47	0	0
146	27	N5	285.62	1260.53	1207.56	-778.95	0	0
147	27	N73A	37.34	83.41	65.49	0	0	0
148	27	N72	54.45	83.41	129.64	0	0	0
149	27	Totals:	336.42	2837.1	-139.36			
150	27	COG (in):	X: -2.08	Y: -20.04	Z: 19.86			
151	29	N6	-1262.99	902.83	-585.02	-519.09	0	0
152	29	N5	1325.22	837.97	534.44	-486.98	0	0
153	29	N73A	-118.67	28.36	-459.35	0	0	0
154	29	N72	139.92	28.49	509.94	0	0	0
155	29	Totals:	83.47	1797.66	0			
156	29	COG (in):	X: 29.21	Y: -19.26	Z: 26.18			
157	30	N6	-1269.27	898.49	-566.9	-516.68	0	0
158	30	N5	1316.79	842.31	563.02	-489.37	0	0
159	30	N73A	-121.2	28.36	-464.9	0	0	0
160	30	N72	136.28	28.49	500.23	0	0	0
161	30	Totals:	62.61	1797.66	31.45			
162	30	COG (in):	X: 29.21	Y: -19.26	Z: 26.18			
163	31	N6	-1281.83	889.81	-530.64	-511.87	0	0
164	31	N5	1299.93	850.99	620.19	-494.15	0	0
165	31	N73A	-126.25	28.36	-476	0	0	0
166	31	N72	129.02	28.49	480.81	0	0	0
167	31	Totals:	20.87	1797.66	94.35			
168	31	COG (in):	X: 29.21	Y: -19.26	Z: 26.18			
169	32	N6	-1288.12	885.47	-512.51	-509.46	0	0
170	32	N5	1291.5	855.33	648.77	-496.55	0	0
171	32	N73A	-128.77	28.36	-481.55	0	0	0
172	32	N72	125.39	28.49	471.1	0	0	0
173	32	Totals:	0	1797.66	125.8			
174	32	COG (in):	X: 29.21	Y: -19.26	Z: 26.18			
175	33	N6	-1294.48	887.71	-519.29	-510.62	0	0
176	33	N5	1281.5	853.1	634.19	-495.45	0	0
177	33	N73A	-131.21	28.36	-487.33	0	0	0
178	33	N72	123.33	28.49	466.78	0	0	0
179	33	Totals:	-20.87	1797.66	94.35			
180	33	COG (in):	X: 29.21	Y: -19.26	Z: 26.18			

Joint Reactions (By Combination) (Continued)

	LC	Joint Label	X [lb]	Y [lb]	Z [lb]	MX [lb-ft]	MY [lb-ft]	MZ [lb-ft]
181	34	N6	-1307.21	892.17	-532.83	-512.94	0	0
182	34	N5	1261.5	848.64	605.04	-493.25	0	0
183	34	N73A	-136.11	28.36	-498.88	0	0	0
184	34	N72	119.22	28.49	458.13	0	0	0
185	34	Totals:	-62.61	1797.66	31.45			
186	34	COG (in):	X: 29.21	Y: -19.26	Z: 26.18			
187	35	N6	-1313.58	894.4	-539.61	-514.1	0	0
188	35	N5	1251.49	846.41	590.46	-492.15	0	0
189	35	N73A	-138.55	28.36	-504.66	0	0	0
190	35	N72	117.16	28.49	453.81	0	0	0
191	35	Totals:	-83.47	1797.66	0			
192	35	COG (in):	X: 29.21	Y: -19.26	Z: 26.18			
193	36	N6	-1307.29	898.74	-557.74	-516.51	0	0
194	36	N5	1259.93	842.07	561.88	-489.75	0	0
195	36	N73A	-136.03	28.36	-499.11	0	0	0
196	36	N72	120.79	28.49	463.52	0	0	0
197	36	Totals:	-62.61	1797.66	-31.45			
198	36	COG (in):	X: 29.21	Y: -19.26	Z: 26.18			
199	37	N6	-1294.73	907.42	-593.99	-521.32	0	0
200	37	N5	1276.79	833.39	504.71	-484.97	0	0
201	37	N73A	-130.98	28.36	-488.01	0	0	0
202	37	N72	128.05	28.49	482.94	0	0	0
203	37	Totals:	-20.87	1797.66	-94.35			
204	37	COG (in):	X: 29.21	Y: -19.26	Z: 26.18			
205	38	N6	-1288.45	911.76	-612.12	-523.73	0	0
206	38	N5	1285.22	829.05	476.13	-482.58	0	0
207	38	N73A	-128.45	28.36	-482.46	0	0	0
208	38	N72	131.69	28.49	492.65	0	0	0
209	38	Totals:	0	1797.66	-125.8			
210	38	COG (in):	X: 29.21	Y: -19.26	Z: 26.18			
211	39	N6	-1282.08	909.53	-605.35	-522.57	0	0
212	39	N5	1295.22	831.28	490.71	-483.68	0	0
213	39	N73A	-126.01	28.36	-476.69	0	0	0
214	39	N72	133.74	28.49	496.97	0	0	0
215	39	Totals:	20.87	1797.66	-94.35			
216	39	COG (in):	X: 29.21	Y: -19.26	Z: 26.18			
217	40	N6	-1269.35	905.06	-591.8	-520.25	0	0
218	40	N5	1315.22	835.74	519.86	-485.88	0	0
219	40	N73A	-121.12	28.36	-465.13	0	0	0
220	40	N72	137.86	28.49	505.62	0	0	0
221	40	Totals:	62.61	1797.66	-31.45			
222	40	COG (in):	X: 29.21	Y: -19.26	Z: 26.18			
223	42	N6	-473.92	901.85	-990.3	-536.8	0	0
224	42	N5	536.08	838.96	939.59	-501.77	0	0
225	42	N73A	-7.9	28.42	-44.22	0	0	0
226	42	N72	29.22	28.43	94.93	0	0	0
227	42	Totals:	83.47	1797.66	0			
228	42	COG (in):	X: 9.18	Y: -19.26	Z: 26.18			
229	43	N6	-480.22	897.51	-972.18	-534.4	0	0
230	43	N5	527.66	843.3	968.18	-504.17	0	0
231	43	N73A	-10.43	28.42	-49.76	0	0	0
232	43	N72	25.58	28.43	85.22	0	0	0
233	43	Totals:	62.61	1797.66	31.45			
234	43	COG (in):	X: 9.18	Y: -19.26	Z: 26.18			
235	44	N6	-492.8	888.83	-935.93	-529.59	0	0
236	44	N5	510.83	851.98	1025.35	-508.97	0	0
237	44	N73A	-15.47	28.42	-60.86	0	0	0

Joint Reactions (By Combination) (Continued)

	LC	Joint Label	X [lb]	Y [lb]	Z [lb]	MX [lb-ft]	MY [lb-ft]	MZ [lb-ft]
238	44	N72	18.32	28.43	65.79	0	0	0
239	44	Totals:	20.87	1797.66	94.35			
240	44	COG (in):	X: 9.18	Y: -19.26	Z: 26.18			
241	45	N6	-499.1	884.49	-917.81	-527.19	0	0
242	45	N5	502.41	856.31	1053.94	-511.36	0	0
243	45	N73A	-17.99	28.42	-66.4	0	0	0
244	45	N72	14.68	28.43	56.08	0	0	0
245	45	Totals:	0	1797.66	125.8			
246	45	COG (in):	X: 9.18	Y: -19.26	Z: 26.18			
247	46	N6	-505.47	886.73	-924.57	-528.35	0	0
248	46	N5	492.41	854.08	1039.35	-510.27	0	0
249	46	N73A	-20.44	28.42	-72.19	0	0	0
250	46	N72	12.63	28.43	51.76	0	0	0
251	46	Totals:	-20.87	1797.66	94.35			
252	46	COG (in):	X: 9.18	Y: -19.26	Z: 26.18			
253	47	N6	-518.2	891.19	-938.11	-530.68	0	0
254	47	N5	472.42	849.62	1010.19	-508.09	0	0
255	47	N73A	-25.33	28.42	-83.75	0	0	0
256	47	N72	8.51	28.43	43.12	0	0	0
257	47	Totals:	-62.61	1797.66	31.45			
258	47	COG (in):	X: 9.18	Y: -19.26	Z: 26.18			
259	48	N6	-524.57	893.43	-944.87	-531.85	0	0
260	48	N5	462.42	847.39	995.6	-507	0	0
261	48	N73A	-27.78	28.42	-89.53	0	0	0
262	48	N72	6.46	28.43	38.8	0	0	0
263	48	Totals:	-83.47	1797.66	0			
264	48	COG (in):	X: 9.18	Y: -19.26	Z: 26.18			
265	49	N6	-518.28	897.76	-963	-534.25	0	0
266	49	N5	470.84	843.05	967.02	-504.6	0	0
267	49	N73A	-25.26	28.42	-83.99	0	0	0
268	49	N72	10.09	28.43	48.52	0	0	0
269	49	Totals:	-62.61	1797.66	-31.45			
270	49	COG (in):	X: 9.18	Y: -19.26	Z: 26.18			
271	50	N6	-505.69	906.44	-999.24	-539.06	0	0
272	50	N5	487.67	834.37	909.85	-499.8	0	0
273	50	N73A	-20.21	28.42	-72.9	0	0	0
274	50	N72	17.36	28.43	67.94	0	0	0
275	50	Totals:	-20.87	1797.66	-94.35			
276	50	COG (in):	X: 9.18	Y: -19.26	Z: 26.18			
277	51	N6	-499.4	910.78	-1017.37	-541.46	0	0
278	51	N5	496.09	830.03	881.26	-497.4	0	0
279	51	N73A	-17.69	28.42	-67.35	0	0	0
280	51	N72	20.99	28.43	77.65	0	0	0
281	51	Totals:	0	1797.66	-125.8			
282	51	COG (in):	X: 9.18	Y: -19.26	Z: 26.18			
283	52	N6	-493.03	908.54	-1010.6	-540.3	0	0
284	52	N5	506.09	832.26	895.84	-498.49	0	0
285	52	N73A	-15.24	28.42	-61.57	0	0	0
286	52	N72	23.05	28.43	81.97	0	0	0
287	52	Totals:	20.87	1797.66	-94.35			
288	52	COG (in):	X: 9.18	Y: -19.26	Z: 26.18			
289	53	N6	-480.29	904.08	-997.07	-537.97	0	0
290	53	N5	526.08	836.73	925.01	-500.68	0	0
291	53	N73A	-10.35	28.42	-50	0	0	0
292	53	N72	27.16	28.43	90.61	0	0	0
293	53	Totals:	62.61	1797.66	-31.45			
294	53	COG (in):	X: 9.18	Y: -19.26	Z: 26.18			

Joint Reactions (By Combination) (Continued)

	LC	Joint Label	X [lb]	Y [lb]	Z [lb]	MX [lb-ft]	MY [lb-ft]	MZ [lb-ft]
295	55	N6	402.02	901.52	-1084.54	-529.99	0	0
296	55	N5	-339.87	839.29	1033.81	-494.52	0	0
297	55	N73A	16.1	28.42	45.75	0	0	0
298	55	N72	5.22	28.43	4.98	0	0	0
299	55	Totals:	83.47	1797.66	0			
300	55	COG (in):	X: -10.85	Y: -19.26	Z: 26.18			
301	56	N6	395.71	897.18	-1066.43	-527.59	0	0
302	56	N5	-348.27	843.63	1062.41	-496.93	0	0
303	56	N73A	13.58	28.42	40.22	0	0	0
304	56	N72	1.58	28.43	-4.75	0	0	0
305	56	Totals:	62.61	1797.66	31.45			
306	56	COG (in):	X: -10.85	Y: -19.26	Z: 26.18			
307	57	N6	383.09	888.51	-1030.21	-522.79	0	0
308	57	N5	-365.07	852.3	1119.62	-501.75	0	0
309	57	N73A	8.54	28.42	29.15	0	0	0
310	57	N72	-5.69	28.43	-24.2	0	0	0
311	57	Totals:	20.87	1797.66	94.35			
312	57	COG (in):	X: -10.85	Y: -19.26	Z: 26.18			
313	58	N6	376.78	884.17	-1012.1	-520.39	0	0
314	58	N5	-373.48	856.64	1148.22	-504.16	0	0
315	58	N73A	6.02	28.42	23.62	0	0	0
316	58	N72	-9.33	28.43	-33.93	0	0	0
317	58	Totals:	0	1797.66	125.8			
318	58	COG (in):	X: -10.85	Y: -19.26	Z: 26.18			
319	59	N6	370.42	886.41	-1018.86	-521.57	0	0
320	59	N5	-383.47	854.4	1133.63	-503.08	0	0
321	59	N73A	3.57	28.42	17.82	0	0	0
322	59	N72	-11.38	28.43	-38.24	0	0	0
323	59	Totals:	-20.87	1797.66	94.35			
324	59	COG (in):	X: -10.85	Y: -19.26	Z: 26.18			
325	60	N6	357.68	890.88	-1032.37	-523.93	0	0
326	60	N5	-403.47	849.93	1104.44	-500.94	0	0
327	60	N73A	-1.32	28.43	6.24	0	0	0
328	60	N72	-15.49	28.43	-46.86	0	0	0
329	60	Totals:	-62.61	1797.66	31.45			
330	60	COG (in):	X: -10.85	Y: -19.26	Z: 26.18			
331	61	N6	351.31	893.11	-1039.13	-525.11	0	0
332	61	N5	-413.46	847.69	1089.84	-499.87	0	0
333	61	N73A	-3.77	28.43	.45	0	0	0
334	61	N72	-17.54	28.43	-51.16	0	0	0
335	61	Totals:	-83.47	1797.66	0			
336	61	COG (in):	X: -10.85	Y: -19.26	Z: 26.18			
337	62	N6	357.62	897.45	-1057.23	-527.51	0	0
338	62	N5	-405.06	843.35	1061.24	-497.46	0	0
339	62	N73A	-1.26	28.43	5.98	0	0	0
340	62	N72	-13.91	28.43	-41.44	0	0	0
341	62	Totals:	-62.61	1797.66	-31.45			
342	62	COG (in):	X: -10.85	Y: -19.26	Z: 26.18			
343	63	N6	370.24	906.13	-1093.45	-532.31	0	0
344	63	N5	-388.26	834.68	1004.03	-492.64	0	0
345	63	N73A	3.78	28.42	17.05	0	0	0
346	63	N72	-6.63	28.43	-21.99	0	0	0
347	63	Totals:	-20.87	1797.66	-94.35			
348	63	COG (in):	X: -10.85	Y: -19.26	Z: 26.18			
349	64	N6	376.54	910.46	-1111.56	-534.71	0	0
350	64	N5	-379.85	830.35	975.43	-490.23	0	0
351	64	N73A	6.3	28.42	22.58	0	0	0

Joint Reactions (By Combination) (Continued)

	LC	Joint Label	X [lb]	Y [lb]	Z [lb]	MX [lb-ft]	MY [lb-ft]	MZ [lb-ft]
352	64	N72	-2.99	28.43	-12.26	0	0	0
353	64	Totals:	0	1797.66	-125.8			
354	64	COG (in):	X: -10.85	Y: -19.26	Z: 26.18			
355	65	N6	382.91	908.23	-1104.8	-533.53	0	0
356	65	N5	-369.86	832.58	990.03	-491.3	0	0
357	65	N73A	8.75	28.42	28.37	0	0	0
358	65	N72	-.94	28.43	-7.95	0	0	0
359	65	Totals:	20.87	1797.66	-94.35			
360	65	COG (in):	X: -10.85	Y: -19.26	Z: 26.18			
361	66	N6	395.65	903.76	-1091.29	-531.17	0	0
362	66	N5	-349.86	837.05	1019.22	-493.45	0	0
363	66	N73A	13.65	28.42	39.96	0	0	0
364	66	N72	3.17	28.43	.67	0	0	0
365	66	Totals:	62.61	1797.66	-31.45			
366	66	COG (in):	X: -10.85	Y: -19.26	Z: 26.18			
367	68	N6	1190.39	902.2	-1516.4	-506.47	0	0
368	68	N5	-1128.2	838.62	1465.62	-473.21	0	0
369	68	N73A	127.71	28.27	464.19	0	0	0
370	68	N72	-106.42	28.56	-413.41	0	0	0
371	68	Totals:	83.47	1797.66	0			
372	68	COG (in):	X: -30.87	Y: -19.26	Z: 26.18			
373	69	N6	1184.08	897.87	-1498.3	-504.07	0	0
374	69	N5	-1136.6	842.95	1494.23	-475.63	0	0
375	69	N73A	125.19	28.27	458.67	0	0	0
376	69	N72	-110.06	28.57	-423.15	0	0	0
377	69	Totals:	62.61	1797.66	31.45			
378	69	COG (in):	X: -30.87	Y: -19.26	Z: 26.18			
379	70	N6	1171.46	889.19	-1462.11	-499.27	0	0
380	70	N5	-1153.41	851.62	1551.46	-480.46	0	0
381	70	N73A	120.16	28.28	447.62	0	0	0
382	70	N72	-117.34	28.57	-442.63	0	0	0
383	70	Totals:	20.87	1797.66	94.35			
384	70	COG (in):	X: -30.87	Y: -19.26	Z: 26.18			
385	71	N6	1165.15	884.85	-1444.01	-496.87	0	0
386	71	N5	-1161.81	855.96	1580.08	-482.87	0	0
387	71	N73A	117.65	28.28	442.1	0	0	0
388	71	N72	-120.99	28.58	-452.37	0	0	0
389	71	Totals:	0	1797.66	125.8			
390	71	COG (in):	X: -30.87	Y: -19.26	Z: 26.18			
391	72	N6	1158.78	887.09	-1450.77	-498.06	0	0
392	72	N5	-1171.81	853.72	1565.49	-481.81	0	0
393	72	N73A	115.2	28.28	436.31	0	0	0
394	72	N72	-123.04	28.58	-456.68	0	0	0
395	72	Totals:	-20.87	1797.66	94.35			
396	72	COG (in):	X: -30.87	Y: -19.26	Z: 26.18			
397	73	N6	1146.06	891.56	-1464.28	-500.44	0	0
398	73	N5	-1191.82	849.24	1536.3	-479.68	0	0
399	73	N73A	110.3	28.28	424.73	0	0	0
400	73	N72	-127.15	28.58	-465.3	0	0	0
401	73	Totals:	-62.61	1797.66	31.45			
402	73	COG (in):	X: -30.87	Y: -19.26	Z: 26.18			
403	74	N6	1139.7	893.79	-1471.04	-501.63	0	0
404	74	N5	-1201.82	847	1521.71	-478.62	0	0
405	74	N73A	107.85	28.29	418.94	0	0	0
406	74	N72	-129.2	28.58	-469.61	0	0	0
407	74	Totals:	-83.47	1797.66	0			
408	74	COG (in):	X: -30.87	Y: -19.26	Z: 26.18			

Joint Reactions (By Combination) (Continued)

	LC	Joint Label	X [lb]	Y [lb]	Z [lb]	MX [lb-ft]	MY [lb-ft]	MZ [lb-ft]
409	75	N6	1146.01	898.13	-1489.14	-504.03	0	0
410	75	N5	-1193.42	842.66	1493.09	-476.2	0	0
411	75	N73A	110.37	28.28	424.47	0	0	0
412	75	N72	-125.56	28.58	-459.87	0	0	0
413	75	Totals:	-62.61	1797.66	-31.45			
414	75	COG (in):	X: -30.87	Y: -19.26	Z: 26.18			
415	76	N6	1158.63	906.81	-1525.33	-508.82	0	0
416	76	N5	-1176.62	834	1435.86	-471.37	0	0
417	76	N73A	115.4	28.28	435.51	0	0	0
418	76	N72	-118.28	28.57	-440.39	0	0	0
419	76	Totals:	-20.87	1797.66	-94.35			
420	76	COG (in):	X: -30.87	Y: -19.26	Z: 26.18			
421	77	N6	1164.94	911.15	-1543.43	-511.22	0	0
422	77	N5	-1168.22	829.66	1407.25	-468.96	0	0
423	77	N73A	117.91	28.28	441.03	0	0	0
424	77	N72	-114.64	28.57	-430.66	0	0	0
425	77	Totals:	0	1797.66	-125.8			
426	77	COG (in):	X: -30.87	Y: -19.26	Z: 26.18			
427	78	N6	1171.3	908.91	-1536.67	-510.03	0	0
428	78	N5	-1158.21	831.9	1421.84	-470.02	0	0
429	78	N73A	120.36	28.28	446.82	0	0	0
430	78	N72	-112.58	28.57	-426.34	0	0	0
431	78	Totals:	20.87	1797.66	-94.35			
432	78	COG (in):	X: -30.87	Y: -19.26	Z: 26.18			
433	79	N6	1184.02	904.44	-1523.15	-507.66	0	0
434	79	N5	-1138.21	836.38	1451.02	-472.15	0	0
435	79	N73A	125.26	28.27	458.4	0	0	0
436	79	N72	-108.47	28.56	-417.72	0	0	0
437	79	Totals:	62.61	1797.66	-31.45			
438	79	COG (in):	X: -30.87	Y: -19.26	Z: 26.18			
439	81	N6	-63.12	890.78	-980.14	-508.07	0	0
440	81	N5	63.12	850.03	980.14	-485.36	0	0
441	81	N73A	-3.91	28.43	-14.66	0	0	0
442	81	N72	3.91	28.42	14.66	0	0	0
443	81	Totals:	0	1797.66	0			
444	81	COG (in):	X: -.83	Y: -10.92	Z: 25			

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N6	max	1190.39	68	1435.17	25	427.44	6	-184.65	6	0	1	0	1
2		min	-1313.58	35	284.55	6	-1632.29	25	-868.28	25	0	1	0	1
3	N5	max	1325.22	29	1344.56	19	2050.49	6	-157.11	12	0	1	0	1
4		min	-1201.82	74	231.01	12	-1037.13	12	-816.54	19	0	1	0	1
5	N73A	max	176.89	3	83.42	22	464.19	68	0	1	0	1	0	1
6		min	-185.25	9	28.27	68	-504.66	35	0	1	0	1	0	1
7	N72	max	211.28	3	83.42	22	522.5	3	0	1	0	1	0	1
8		min	-202.97	9	28.42	4	-491.16	9	0	1	0	1	0	1
9	Totals:	max	1511.09	3	2837.1	16	2287.7	6						
10		min	-1511.09	9	1047.66	13	-2287.7	12						

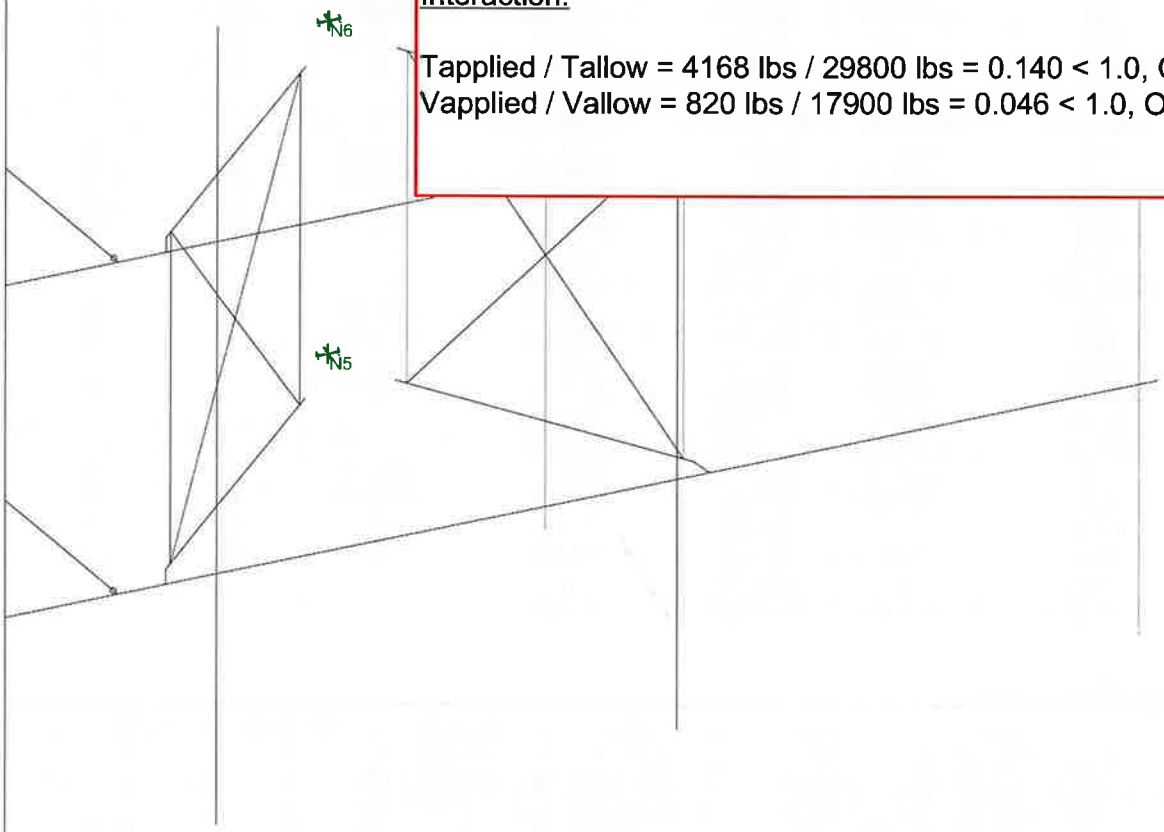
Connection consists of (2) 3/4" A325 Bolts:
Tallow = 29800 lbs
Vallow = 17900 lbs

Max Reactions: N6 LC25
Fx = 152.97 lbs
Fy = 0 (in compression)
Fz = 1632.29lbs
M = 868.28 lbs-ft

Tapplied = 868.28lbs-ft / [2.5" (1'/12")] = 4168 lbs / bolt
Vapplied = [(152.97^2)+(1632.29^2)]^(1/2) = 1640 / 2 bolts
= 820 lbs / bolt

<u>Interaction:</u>

Tapplied / Tallow = 4168 lbs / 29800 lbs = 0.140 < 1.0, OK
Vapplied / Vallow = 820 lbs / 17900 lbs = 0.046 < 1.0, OK



APT Engineering		
JV	SitePro1 VFA12-HD	
Manchester 7 CT	CONNECTION CHECK	Machester 7 CT VFA12-HD.r3d

Appendix C

REFERENCES

verizon
NPP RFDS

NORTHEAST > North East > New England > Windsor-3 > MANCHESTER 7 CT

Brauer, Mark - mark.brauer2@verizonwireless.com - 20240319_143808

Project Details		Location Information	
Carrier Aggregation	N	Site Id	617436640
Ecip	N	Search Ring#	
Project Name	MANCHESTER 7 CT	E-NodeB ID#	null
Project Alt Name	MANCHESTER 7 CT - MKT 68 - MCR	PSLC#	0
Project Id	17225579	Switch Name	Windsor-3
Designed Sector Carrier 4G	15	Tower Type	
Designed Sector Carrier 5G	6	Site Type	MACRO
Additional Sector Carrier 4G	0	Street Address	250 Olcott Street
Additional Sector Carrier 5G	0	City	Manchester
Suffix		State	CT
FP Solution Type & Tech Type	MCR;4G_700;5G_850;4G_850;4G_AWS;4G_CBRS;5G_L-Sub6;4G_PCS	Zip Code	06040
		County	Hartford
		Latitude	41.76994/ 41° 46' 11.784"
		Longitude	-72.55909/ 72° 33' 32.724"

Project Scope

New build macro - preliminary, azimuth and height will depend on drawings.
Update 03/19/2024 - update OVP and hybrid

Antenna Summary

Added Antenna

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Center line	Tip Height	Azimuth	Install Type	Quantit
					5G	Samsung	MT6413-77A	115	116.2	60(A),180(B),300(C)	PHYSICAL	3
LTE	5G,LTE	LTE				COMMSCOPE	NHH-65B-R2B	115	118	60(A),180(B),300(C)	PHYSICAL	3
			LTE	LTE		COMMSCOPE	NHHSS-65B-R2BT4	115	118	60(A),180(B),300(C)	PHYSICAL	3

Removed Antenna

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

Retained Antenna

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

Added: 9	Removed: 0	Retained: 0

Non Antenna Summary

Added Non Antenna

Equipment Type	Location	700	850	1900	AWS	CBRS	Make	Model	Install Type	Quantity
OVP	Tower							12 OVP Box	PHYSICAL	1
Hybrid Cable	Tower						N/A	6x12 Hybriflex LI	PHYSICAL	2
RRU	Tower			LTE	LTE		Samsung	B2/B66A RRH ORAN (RF4439d-25A)	PHYSICAL	3
RRU	Tower	LTE	5G,LTE				Samsung	RF4461d-13A	PHYSICAL	3
RRU	Tower					LTE	Samsung	RT4423-48A	PHYSICAL	3

Removed Non Antenna

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

Retained Non Antenna

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

Added: 12	Removed: 0	Retained: 0

Services		
700 LTE		**0002 (8919168)**

Sector	01	02	03
Azimuth	60	180	300
Cell/Enodeb-Id	068971	068971	068971
Antenna Model	NHH-65B-R2B	NHH-65B-R2B	NHH-65B-R2B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	115	115	115
DLEARFCN	5230	5230	5230
Mech Down-tilt	0	0	0
Elect Down-tilt	4	4	4
Tip Height	118	118	118
Regulatory Power	73.41 (W/MHz) ERP	73.41 (W/MHz) ERP	73.41 (W/MHz) ERP
Transmitter Max Power	46.0 dBm	46.0 dBm	46.0 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx,Rx	4 , 4	4 , 4	4 , 4
Operational Port Count	0	0	0
Position	1,4	1,4	1,4
Transmitter Id	21138253	21138260	21138256
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10	10	10
Ant. Dimensions H x W x D(inch)	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1
Weight(lb)	43.7	43.7	43.7

Services		
850 LTE		**0002 (8919168)**

Sector	01	02	03
Azimuth	60	180	300
Cell/Enodeb-Id	068971	068971	068971
Antenna Model	NHH-65B-R2B	NHH-65B-R2B	NHH-65B-R2B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	115	115	115
DLEARFCN	2450	2450	2450
Mech Down-tilt	0	0	0
Elect Down-tilt	4	4	4
Tip Height	118	118	118
Regulatory Power	317.55 (W/MHz) ERPSD	317.55 (W/MHz) ERPSD	317.55 (W/MHz) ERPSD
Transmitter Max Power	46.0 dBm	46.0 dBm	46.0 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx,Rx	4 , 4	4 , 4	4 , 4
Operational Port Count	0	0	0
Position	1,4	1,4	1,4
Transmitter Id	21138250	21138251	21138252
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10	10	10
Ant. Dimensions H x W x D(inch)	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1
Weight(lb)	43.7	43.7	43.7

Services		
850 NR		**0002 (8919168)**

Sector	0202	0203	0204
Azimuth	60	180	300
Cell/Enodeb-Id	0689551	0689551	0689551
Antenna Model	NHH-65B-R2B	NHH-65B-R2B	NHH-65B-R2B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	115	115	115
DLEARFCN	2450	2450	2450
Mech Down-tilt	0	0	0
Elect Down-tilt	4	4	4
Tip Height	118	118	118
Regulatory Power	317.55 (W/MHz) ERPSD	317.55 (W/MHz) ERPSD	317.55 (W/MHz) ERPSD
Transmitter Max Power	46.0 dBm	46.0 dBm	46.0 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RF4461d-13A	RF4461d-13A	RF4461d-13A
Number of Tx,Rx	4 , 4	4 , 4	4 , 4
Operational Port Count	0	0	0
Position	1,4	1,4	1,4
Transmitter Id	21138250	21138251	21138252
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10	10	10
Ant. Dimensions H x W x D(inch)	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1
Weight(lb)	43.7	43.7	43.7

Services		
1900 LTE		0002 (8919168)

Sector	01	02	03
Azimuth	60	180	300
Cell/Enodeb-Id	068971	068971	068971
Antenna Model	NHH-65B-R2B	NHH-65B-R2B	NHH-65B-R2B
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	115	115	115
DLEARFCN	1050	1050	1050
Mech Down-tilt	0	0	0
Elect Down-tilt	2	2	2
Tip Height	118	118	118
Regulatory Power	254.54 (W/MHz) EIRP	254.54 (W/MHz) EIRP	254.54 (W/MHz) EIRP
Transmitter Max Power	46.0 dBm	46.0 dBm	46.0 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx,Rx	4 , 4	4 , 4	4 , 4
Operational Port Count	0	0	0
Position	1	1	1
Transmitter Id	21138254	21138261	21138257
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10	10	10
Ant. Dimensions H x W x D(inch)	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1	72.0 x 11.9 x 7.1
Weight(lb)	43.7	43.7	43.7

Services		
AWS LTE		**0002 (8919168)**

Sector	01	02	03
Azimuth	60	180	300
Cell/Enodeb-Id	068971	068971	068971
Antenna Model	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	115	115	115
DLEARFCN	2050	2050	2050
Mech Down-tilt	0	0	0
Elect Down-tilt	2	2	2
Tip Height	118	118	118
Regulatory Power	138.91 (W/MHz) EIRP	138.91 (W/MHz) EIRP	138.91 (W/MHz) EIRP
Transmitter Max Power	46.0 dBm	46.0 dBm	46.0 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx,Rx	4 , 4	4 , 4	4 , 4
Operational Port Count	0	0	0
Position	4	4	4
Transmitter Id	21138259	21138255	21138258
Source	VZNPP	VZNPP	VZNPP
Bandwidth	20	20	20
Ant. Dimensions H x W x D(inch)	72.0 x 11.8 x 7.1	72.0 x 11.8 x 7.1	72.0 x 11.8 x 7.1
Weight(lb)	50.9	50.9	50.9

Services		
CBRS LTE		**0002 (8919168)**

Sector	19	20	21
Azimuth	60	180	300
Cell/Enodeb-Id	068971	068971	068971
Antenna Model	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4	NHHSS-65B-R2BT4
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Centerline	115	115	115
DLEARFCN	55790, 55941	55790, 55941	55790, 55941
Mech Down-tilt	0	0	0
Elect Down-tilt	4	4	4
Tip Height	118	118	118
Regulatory Power	21.76 (W/MHz) EIRPSD, 21.76 (W/MHz) EIRPSD	21.76 (W/MHz) EIRPSD, 21.76 (W/MHz) EIRPSD	21.76 (W/MHz) EIRPSD, 21.76 (W/MHz) EIRPSD
Transmitter Max Power	35.11 dBm	35.11 dBm	35.11 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	RT4423-48A	RT4423-48A	RT4423-48A
Number of Tx,Rx	4 , 4	4 , 4	4 , 4
Operational Port Count	0	0	0
Position	4	4	4
Transmitter Id	21138265	21138266	21138267
Source	VZNPP	VZNPP	VZNPP
Bandwidth	10, 20	10, 20	10, 20
Ant. Dimensions H x W x D(inch)	72.0 x 11.8 x 7.1	72.0 x 11.8 x 7.1	72.0 x 11.8 x 7.1
Weight(lb)	50.9	50.9	50.9

Services		
CBAND NR		**0002 (8919168)**

Sector	0202	0203	0204
Azimuth	60	180	300
Cell/Enodeb-Id	0689551	0689551	0689551
Antenna Model	MT6413-77A	MT6413-77A	MT6413-77A
Antenna Make	Samsung	Samsung	Samsung
Centerline	115	115	115
DLEARFCN	650006, 655324	650006, 655324	650006, 655324
Mech Down-tilt	0	0	0
Elect Down-tilt	1	1	1
Tip Height	116.2	116.2	116.2
Regulatory Power	1170.73 (W/MHz) EIRP, 1622.95 (W/MHz) EIRP	1170.73 (W/MHz) EIRP, 1622.95 (W/MHz) EIRP	1170.73 (W/MHz) EIRP, 1622.95 (W/MHz) EIRP
Transmitter Max Power	54.58 dBm	54.58 dBm	54.58 dBm
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	MT6413-77A	MT6413-77A	MT6413-77A
Number of Tx,Rx	2 , 2	2 , 2	2 , 2
Operational Port Count	64	64	64
Position	2	2	2
Transmitter Id	21138262	21138263	21138264
Source	VZNPP	VZNPP	VZNPP
Bandwidth	100, 60	100, 60	100, 60
Ant. Dimensions H x W x D(inch)	29.53 x 15.75 x 5.51	29.53 x 15.75 x 5.51	29.53 x 15.75 x 5.51
Weight(lb)	55.1	55.1	55.1

Callsigns Per Antenna

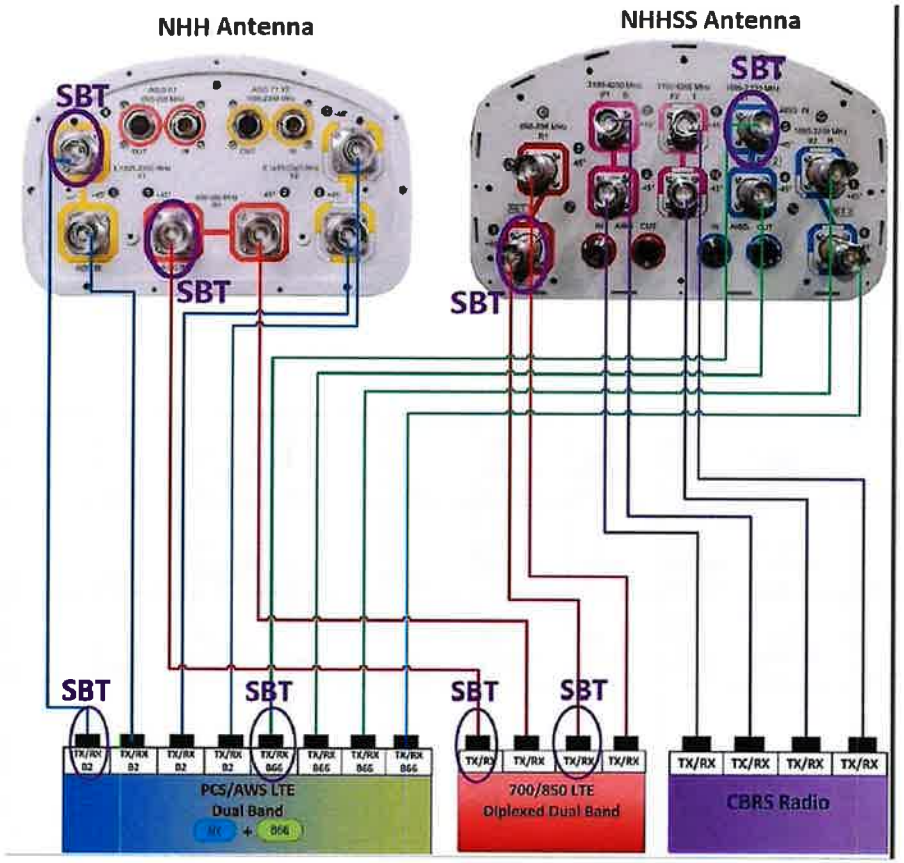
Sector	Make	Model	Ant CL Height AG	Ant Tip Height	Azimuth	Elect Down-tilt	Mech Down-tilt	Gain	Bandwidth	Regulatory Power	700	850	1900	2100	28 GHz	31 GHz	39 GHz	LSub-6	CBRS
01	COMMSCOPE	NHH-65B-R2	115	118	60	4	0	12.4	67	73.41	WQJQ689								
02	COMMSCOPE	NHH-65B-R2	115	118	180	4	0	12.4	67	73.41	WQJQ689								
03	COMMSCOPE	NHH-65B-R2	115	118	300	4	0	12.4	67	73.41	WQJQ689								
01	COMMSCOPE	NHH-65B-R2	115	118	60	4	0	12.62	60	317.55		KNKA404							
02	COMMSCOPE	NHH-65B-R2	115	118	180	4	0	12.62	60	317.55		KNKA404							
0202	COMMSCOPE	NHH-65B-R2	115	118	60	4	0	12.62	60	317.55		KNKA404							
0203	COMMSCOPE	NHH-65B-R2	115	118	180	4	0	12.62	60	317.55		KNKA404							
0204	COMMSCOPE	NHH-65B-R2	115	118	300	4	0	12.62	60	317.55		KNKA404							
03	COMMSCOPE	NHH-65B-R2	115	118	300	4	0	12.62	60	317.55		KNKA404							
01	COMMSCOPE	NHH-65B-R2	115	118	60	2	0	15.59	68	254.54			KNLH251,WPOJ730						
02	COMMSCOPE	NHH-65B-R2	115	118	180	2	0	15.59	68	254.54			KNLH251,WPOJ730						
03	COMMSCOPE	NHH-65B-R2	115	118	300	2	0	15.59	68	254.54			KNLH251,WPOJ730						
01	COMMSCOPE	NHHSS-65B-R2BT4	115	118	60	2	0	15.91	61	138.91				WQGA906,WQGB276					
02	COMMSCOPE	NHHSS-65B-R2BT4	115	118	180	2	0	15.91	61	138.91				WQGA906,WQGB276					
03	COMMSCOPE	NHHSS-65B-R2BT4	115	118	300	2	0	15.91	61	138.91				WQGA906,WQGB276					
0202	Samsung	MT6413-77A	115	116.2	60	1	0	23.15	105	1170.73								WRNE581,WRNE582,WRNE583,WRNE584,WRNE585	
0203	Samsung	MT6413-77A	115	116.2	180	1	0	23.15	105	1170.73								WRNE581,WRNE582,WRNE583,WRNE584,WRNE585	
0204	Samsung	MT6413-77A	115	116.2	300	1	0	23.15	105	1170.73								WRNE581,WRNE582,WRNE583,WRNE584,WRNE585	
0202	Samsung	MT6413-77A	115	116.2	60	1	0	23.15	105	1622.95								WRNE585,WRNE586,WRNE587,WRNE58	
0203	Samsung	MT6413-77A	115	116.2	180	1	0	23.15	105	1622.95								WRNE585,WRNE586,WRNE587,WRNE58	
0204	Samsung	MT6413-77A	115	116.2	300	1	0	23.15	105	1622.95								WRNE585,WRNE586,WRNE587,WRNE58	
19	COMMSCOPE	NHHSS-65B-R2BT4	115	118	60	4	0	14.61	64	21.76									
19	COMMSCOPE	NHHSS-65B-R2BT4	115	118	60	4	0	14.61	64	21.76									
20	COMMSCOPE	NHHSS-65B-R2BT4	115	118	180	4	0	14.61	64	21.76									
20	COMMSCOPE	NHHSS-65B-R2BT4	115	118	180	4	0	14.61	64	21.76									

21	COMMSCOPE	NHHSS-65B-R2BT4	115	118	300	4	0	14.61	64	21.76									
21	COMMSCOPE	NHHSS-65B-R2BT4	115	118	300	4	0	14.61	64	21.76									

CallSigns

Callsign	Market	Radio Code	Market #	Block	State	County	License Name	Wholly Owner	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs/Sq. mil	Status	Action	Approve for Insvc
WQJQ689	Northeast	WU	REA001	C	CT	9003	Cellco Partnership	Yes	22.000	746.000 - 757.000/.000 - .000	776.000 - 787.000/.000 - .000	746.000 - 757.000/.000 - .000	776.000 - 787.000/.000 - .000	73.41	1000	1223.64	proposed	added	1
KNKA404	Hartford-New Britain-Bristol, CT	CL	CMA032	A	CT	9003	Cellco Partnership	Yes	25.000	824.000 - 835.000/845.000 - 846.500	869.000 - 880.000/890.000 - 891.500	824.000 - 835.000/845.000 - 846.500	869.000 - 880.000/890.000 - 891.500	317.55	400	1223.64	proposed	added	1
WPOJ730	Hartford, CT	CW	BTA184	C	CT	9003	Cellco Partnership	Yes	10.000	1895.000 1900.000/.000 - .000	1975.000 1980.000/.000 - .000	1895.000 1900.000/.000 - .000	1975.000 1980.000/.000 - .000	254.54	1640	1223.64	proposed	added	1
KNLH251	Hartford, CT	CW	BTA184	F	CT	9003	Cellco Partnership	Yes	10.000	1890.000 1895.000/.000 - .000	1970.000 1975.000/.000 - .000	1890.000 1895.000/.000 - .000	1970.000 1975.000/.000 - .000	254.54	1640	1223.64	proposed	added	1
CBRS_CALL SIGN	UNLICENSE	3.5 GHz	UNLICENSE	UNLICENSE	CT	UNLICENSE	UNLICENSE	UNLICENSE	UNLICENSE	UNLICENSED - UNLICENSED/UNLICENSED - UNLICENSE	UNLICENSED - UNLICENSED/UNLICENSED - UNLICENSE	- / -	- / -	21.76		1223.64	proposed	added	
WRLD515	D09003 - Hartford, CT	PL	D09003	0	CT	9003	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000 3650.000/.000 - .000	.000 - .000/.000 - .000	3550.000 3650.000/.000 - .000	.000 - .000/.000 - .000	21.76	501	1223.64	proposed	added	1
WRLD513	D09003 - Hartford, CT	PL	D09003	0	CT	9003	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000 3650.000/.000 - .000	.000 - .000/.000 - .000	3550.000 3650.000/.000 - .000	.000 - .000/.000 - .000	21.76	501	1223.64	proposed	added	1
WRLD514	D09003 - Hartford, CT	PL	D09003	0	CT	9003	Verizon Wireless Network Procurement LP	Yes	100.000	3550.000 3650.000/.000 - .000	.000 - .000/.000 - .000	3550.000 3650.000/.000 - .000	.000 - .000/.000 - .000	21.76	501	1223.64	proposed	added	1
WQGB276	Hartford-New Britain-Bristol, CT	AW	CMA032	A	CT	9003	Cellco Partnership	Yes	20.000	1710.000 1720.000/.000 - .000	2110.000 2120.000/.000 - .000	1710.000 1720.000/.000 - .000	2110.000 2120.000/.000 - .000	138.91	1640	1223.64	proposed	added	1
WRNE581	New York, NY	PM	PEA001	A1	CT	9003	Cellco Partnership	Yes	20.000	3700.000 3720.000/.000 - .000	.000 - .000/.000 - .000	3700.000 3720.000/.000 - .000	.000 - .000/.000 - .000	1170.73	1640	1223.64	proposed	added	1
WRNE582	New York, NY	PM	PEA001	A2	CT	9003	Cellco Partnership	Yes	20.000	3720.000 3740.000/.000 - .000	.000 - .000/.000 - .000	3720.000 3740.000/.000 - .000	.000 - .000/.000 - .000	1170.73	1640	1223.64	proposed	added	1

WRNE583	New York, NY	PM	PEA001	A3	CT	9003	Cellco Partnersh ip	Yes	20.000	3740.000 3760.000/ .000 - .000	.000 - .000/.000 - .000	3740.000 3760.000/ .000 - .000	.000 - .000/.000 - .000	1170.73	1640	1223.64	proposed	added	1
WRNE584	New York, NY	PM	PEA001	A4	CT	9003	Cellco Partnersh ip	Yes	20.000	3760.000 3780.000/ .000 - .000	.000 - .000/.000 - .000	3760.000 3780.000/ .000 - .000	.000 - .000/.000 - .000	1170.73	1640	1223.64	proposed	added	1
WRNE585	New York, NY	PM	PEA001	A5	CT	9003	Cellco Partnersh ip	Yes	20.000	3780.000 3800.000/ .000 - .000	.000 - .000/.000 - .000	3780.000 3800.000/ .000 - .000	.000 - .000/.000 - .000	1622.95	1640	1223.64	proposed	added	1
WQGA906	New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-	AW	BEA010	B	CT	9003	Cellco Partnersh ip	Yes	20.000	1720.000 1730.000/ .000 - .000	2120.000 2130.000/ .000 - .000	1720.000 1730.000/ .000 - .000	2120.000 2130.000/ .000 - .000	138.91	1640	1223.64	proposed	added	1
WRNE586	New York, NY	PM	PEA001	B1	CT	9003	Cellco Partnersh ip	Yes	20.000	3800.000 3820.000/ .000 - .000	.000 - .000/.000 - .000	3800.000 3820.000/ .000 - .000	.000 - .000/.000 - .000	1622.95	1640	1223.64	proposed	added	1
WRNE587	New York, NY	PM	PEA001	B2	CT	9003	Cellco Partnersh ip	Yes	20.000	3820.000 3840.000/ .000 - .000	.000 - .000/.000 - .000	3820.000 3840.000/ .000 - .000	.000 - .000/.000 - .000	1622.95	1640	1223.64	proposed	added	1
WRNE588	New York, NY	PM	PEA001	B3	CT	9003	Cellco Partnersh ip	Yes	20.000	3840.000 3860.000/ .000 - .000	.000 - .000/.000 - .000	3840.000 3860.000/ .000 - .000	.000 - .000/.000 - .000	1622.95	1640	1223.64	proposed	added	1


NHH Antenna
NHHSS Antenna
SBT
SBT
SBT
SBT
SBT
SBT
SBT
SBT
TX/RX
PCS/AWS LTE
Dual Band
700/850 LTE
Diplexed Dual Band
CBRS Radio


Sub 6
10
11

ATTACHMENT 6

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Calculated Radio Frequency Emissions Report

Manchester 7

250 Olcott Street, Manchester, CT

June 28, 2024

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1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed installation of Verizon's antenna arrays mounted at 115' on an existing self-support tower located at 250 Olcott Street in Manchester, CT. The coordinates of the tower are 41° 46' 11.784" N, 72° 33' 32.724" W.

Verizon is proposing the following:

1) Install nine (9) multi-band antennas, three (3) per sector to support its commercial LTE and 5G network.

This report considers the planned antenna configuration for Verizon[1] as well as existing antenna configuration for AT&T[2] Eversource[3] and T-Mobile[4] to derive the resulting % MPE of its proposed installation.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

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

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

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

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

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

---

[1] As referenced to Verizon's Radio Frequency Design Sheet updated 3/19/2024.

[2] As referenced to AT&T's Connecticut Siting Council Sub-Petition for Declaratory Ruling – Olcott Street, Manchester, Connecticut, Dated 09/02/2022

[3] As referenced to 2024 Antenna Inventory – Manchester 7, provided by Eversource.

[4] As referenced to T-Mobile's Connecticut Siting Council Notice of Exempt Modification – 250 Olcott Street, Manchester, Connecticut, dated 12/17/2021.

3. RF Exposure Prediction Methods

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

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

Where:

EIRP = Effective Isotropic Radiated Power

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

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Off Beam Loss is determined by the selected antenna patterns

Ground reflection factor (GRF) of 1.6

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

4. Antenna Inventory

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

Operator	Sector / Azimuth	TX Freq (MHz)	Power at Antenna (Watts)	Ant Gain (dBi)	Power EIRP (Watts)	Antenna Model	Beam Width	Mech. Tilt	Length (ft)	Antenna Centerline Height (ft)
Verizon	Alpha / 60°	700	160	14.9	4944	NHH-65B-R2B	65	0	6	115
		850	160	15	5060		60			
		1900	160	17.9	9866		69			
		2100	240	18	15143	NHHSS-65B-R2BT4	64	0	6	115
		3500	20	17.3	1074		64			
		3700	320	25.5	113540	MT6413-77A	-	0	2.46	115
	Beta / 180°	700	160	14.9	4944	NHH-65B-R2B	65	0	6	115
		850	160	15	5060		60			
		1900	160	17.9	9866		69			
		2100	240	18	15143	NHHSS-65B-R2BT4	64	0	6	115
		3500	20	17.3	1074		64			
		3700	320	25.5	113540	MT6413-77A	-	0	2.46	115
	Gamma / 300°	700	160	14.9	4944	NHH-65B-R2B	65	0	6	115
		850	160	15	5060		60			
		1900	160	17.9	9866		69			
		2100	240	18	15143	NHHSS-65B-R2BT4	64	0	6	115
		3500	20	17.3	1074		64			
		3700	320	25.5	113540	MT6413-77A	-	0	2.46	115

Table 1: Proposed Antenna Inventory[5,6]

[5] Antenna heights are in referenced to Verizon's Radio Frequency Design Sheet updated 3/19/2024.

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

5. Calculation Results

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

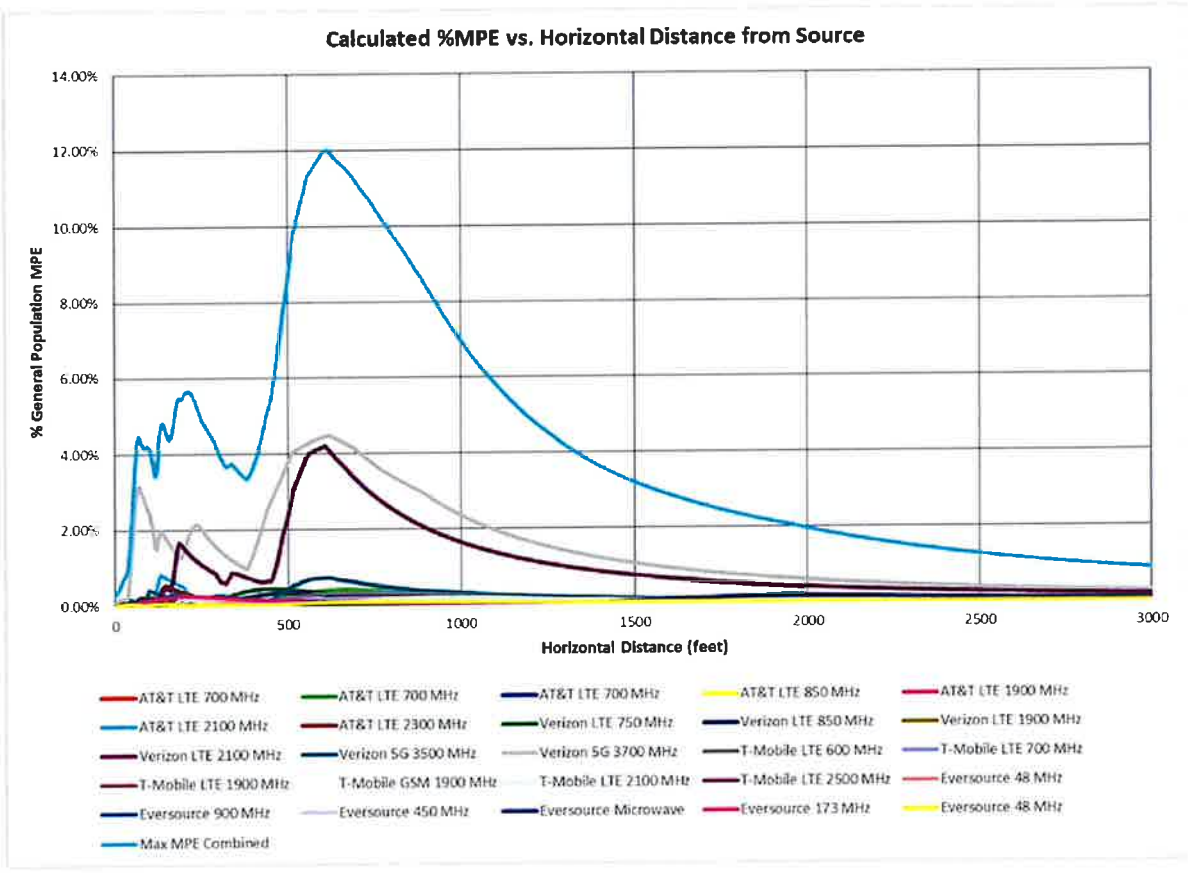

Figure 1: Graph of General Population % MPE vs. Distance

The highest percent of MPE (12.00% of the General Population limit) is calculated to occur at a horizontal distance of 607 feet from antennas. Please note that the percent of MPE calculations close to the site take into account off beam loss, which is determined from the vertical pattern of the antennas used. Therefore, RF power density levels may increase as the distance from the site increases. At distances of approximately 1500 feet and beyond, one would now be in the main beam of the antenna pattern and off beam loss is no longer considered. Beyond this point, RF levels become calculated solely on distance from the site and the percent of MPE decreases significantly as distance from the site increases.

Table 2 below lists percent of MPE values as well as the associated parameters that were included in the calculations. The highest percent of MPE value was calculated to occur at a horizontal distance of 607 feet from the site (reference Figure 1).

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

Carrier	Number of Transmitters	Power out of Base Station Per Transmitter (Watts)	Antenna Height (Feet)	Distance to the Base of Antennas (Feet)	Power Density (mW/cm^2)	Limit (mW/cm^2)	% MPE
AT&T LTE 1900 MHz	1	160.0	124.0	607	0.000800	1.000	0.08%
AT&T LTE 2100 MHz	1	240.0	124.0	607	0.000826	1.000	0.08%
AT&T LTE 2300 MHz	1	100.0	124.0	607	0.000643	1.000	0.06%
AT&T LTE 700 MHz	1	80.0	124.0	607	0.000740	0.467	0.16%
AT&T LTE 700 MHz	1	160.0	124.0	607	0.001809	0.467	0.39%
AT&T LTE 700 MHz	1	40.0	124.0	607	0.000484	0.467	0.10%
AT&T LTE 850 MHz	1	80.0	124.0	607	0.000772	0.567	0.14%
Eversource 173 MHz	1	100.0	158.0	607	0.000171	0.200	0.09%
Eversource 450 MHz	1	100.0	177.0	607	0.000076	0.300	0.03%
Eversource 48 MHz	1	100.0	187.0	607	0.000125	0.200	0.06%
Eversource 48 MHz	1	100.0	156.0	607	0.000138	0.200	0.07%
Eversource 900 MHz	1	100.0	177.0	607	0.000100	0.600	0.02%
Eversource Microwave	2	1.0	176.0	607	0.000004	1.000	0.00%
T-Mobile GSM 1900 MHz	1	120.0	135.0	607	0.000239	1.000	0.02%
T-Mobile LTE 1900 MHz	1	120.0	135.0	607	0.000239	1.000	0.02%
T-Mobile LTE 2100 MHz	1	120.0	135.0	607	0.000121	1.000	0.01%
T-Mobile LTE 2500 MHz	1	240.0	135.0	607	0.042041	1.000	4.20%
T-Mobile LTE 600 MHz	1	140.0	135.0	607	0.001199	0.400	0.30%
T-Mobile LTE 700 MHz	1	60.0	135.0	607	0.000783	0.467	0.17%
Verizon 5G 3500 MHz	1	160.0	115.0	607	0.004011	0.567	0.71%
Verizon 5G 3700 MHz	1	320.0	115.0	607	0.044460	1.000	4.45%
Verizon LTE 1900 MHz	1	160.0	115.0	607	0.001046	1.000	0.10%
Verizon LTE 2100 MHz	1	240.0	115.0	607	0.001374	1.000	0.14%
Verizon LTE 750 MHz	1	160.0	115.0	607	0.001598	0.500	0.32%
Verizon LTE 850 MHz	1	160.0	115.0	607	0.001600	0.567	0.28%
						Total	**12.00%**

Table 2: Maximum Percent of General Population Exposure Values[7,8, 9, 10]

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

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

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

[10] Reasonable assumptions for the frequency and power was used in the calculation for absolute worst case %MPE for Eversource.

6. Conclusion

The above analysis verifies that RF exposure levels from the site with Verizon's proposed antenna configuration will be well below the maximum permissible levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Using the conservative calculation methods and parameters detailed above, the maximum cumulative percent of MPE in consideration of all transmitters is calculated to be **12.00%** of the FCC limit (General Population/Uncontrolled). This maximum cumulative percent of MPE value is calculated to occur 607 feet away from the site.

7. Statement of Certification

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

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RF Engineer
C Squared Systems, LLC

June 27, 2024
Date

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

June 28, 2024
Date

Attachment A: References

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

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

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

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

(A) Limits for Occupational/Controlled Exposure[11]

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

(B) Limits for General Population/Uncontrolled Exposure[12]

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

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

Table 3: FCC Limits for Maximum Permissible Exposure

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

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

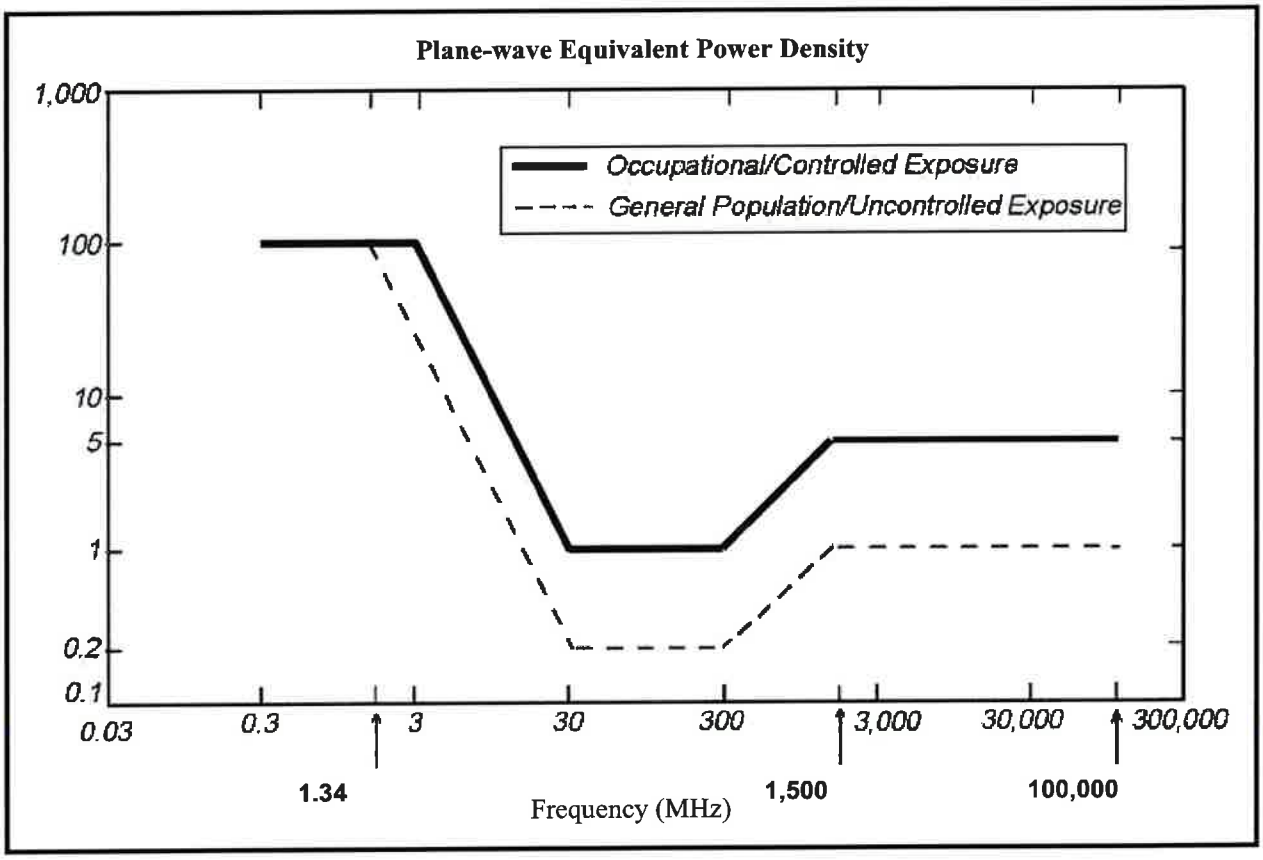
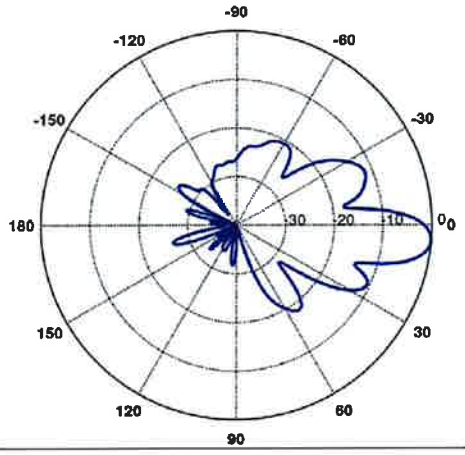


Figure 2: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Verizon Antenna Model Data Sheets and Electrical Patterns

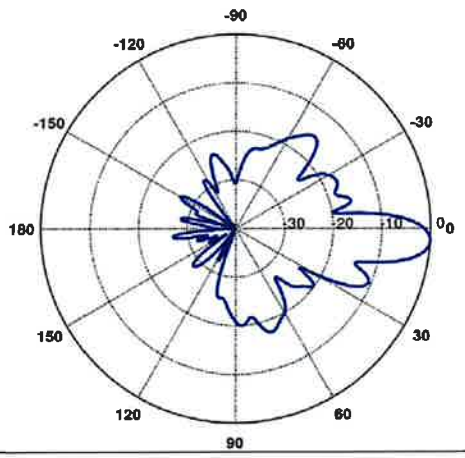
750 MHz

Manufacturer:	COMMSCOPE
Model #:	NHH-65B-R2B
Frequency Band:	698-806 MHz
Gain:	14.9 dBi
Vertical Beamwidth:	12.4°
Horizontal Beamwidth:	65°
Polarization:	±45°
Dimensions (L x W x D):	71.9" x 11.85" x 7.1"



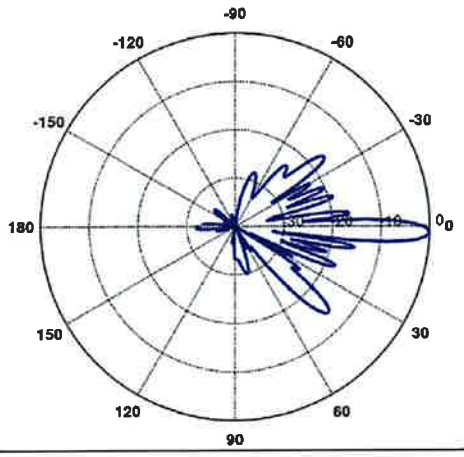
850 MHz

Manufacturer:	COMMSCOPE
Model #:	NHH-65B-R2B
Frequency Band:	806-896 MHz
Gain:	15 dBi
Vertical Beamwidth:	11.2°
Horizontal Beamwidth:	60°
Polarization:	±45°
Dimensions (L x W x D):	71.9" x 11.85" x 7.1"



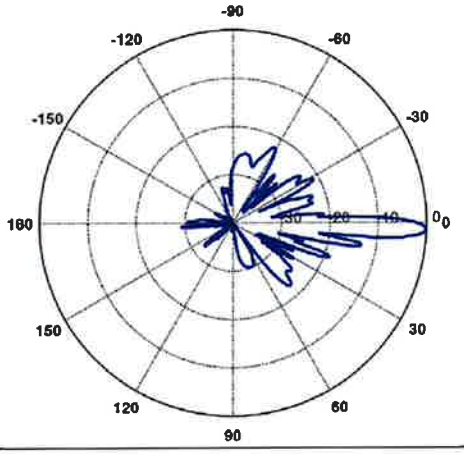
1900 MHz

Manufacturer:	COMMSCOPE
Model #:	NHH-65B-R2B
Frequency Band:	1850-1990 MHz
Gain:	17.9 dBi
Vertical Beamwidth:	5.2°
Horizontal Beamwidth:	69°
Polarization:	±45°
Dimensions (L x W x D):	71.96" x 11.85" x 7.08"



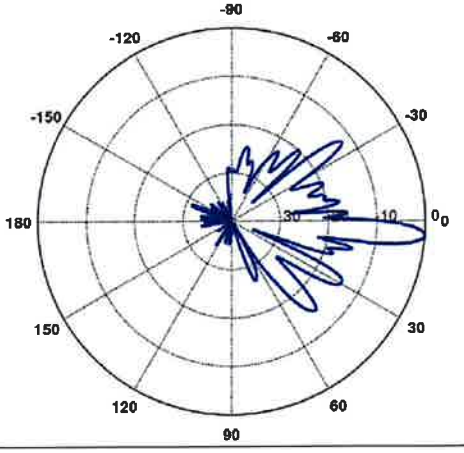
2100 MHz

Manufacturer:	COMMSCOPE
Model #:	NHHSS-65B-R2BT4
Frequency Band:	1920-2200 MHz
Gain:	18 dBi
Vertical Beamwidth:	4.9°
Horizontal Beamwidth:	64°
Polarization:	±45°
Dimensions (L x W x D):	71.96" x 11.85" x 7.12"



3500 MHz

Manufacturer:	COMMSCOPE
Model #:	NHHSS-65B-R2BT4
Frequency Band:	3550-3700 MHz
Gain:	17.3 dBi
Vertical Beamwidth:	5.3°
Horizontal Beamwidth:	64°
Polarization:	±45°
Dimensions (L x W x D):	71.96" x 11.85" x 7.12"



ATTACHMENT 7

Verizon/Manchester 7

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	27	27	JUL 11 2018 HOUSE STA quadient CORRECTION IMI $003.34
	Postmaster, per *(name of receiving employee)*		

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Steven Stephanou, Town Manager Town of Manchester 41 Center Street Manchester, CT 06040				
2.	Gary Anderson, AICP, Director of Planning and Economic Development Town of Manchester 494 Main Street Manchester, CT 06045				
3.	Eversource Energy Attn: Chris Gelinas 107 Seldon Street Berlin, CT 06037				
4.					
5.					
6.					

See Reverse for Instructions