Robinson+Cole

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Also admitted in Massachusetts

December 10, 2019

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 2 Tindall Avenue, Norwalk, Connecticut**

Dear Ms. Bachman:

Pursuant to Connecticut General Statutes ("C.G.S.") §16-50aa, as amended, Cellco Partnership d/b/a Verizon Wireless ("Cellco") hereby requests an order from the Siting Council ("Council") to approve the shared use of an existing telecommunications tower on a 4-acre parcel at 2 Tindall Avenue in Norwalk, Connecticut (the "Property"). The Property and tower are owned by Eversource Energy ("Eversource"). Cellco identifies this site as its "Norwalk 4 Facility".

The existing 150-foot lattice tower was approved by the Siting Council on June 11, 2015 in Petition No. 1156. (*See* Attachment 1). In Petition No. 1156, Eversource received Council approval to replace an existing 120-foot tower at the Property with a new 150-foot tower. The existing tower and an Eversource equipment shelter are located in the easterly portion of a paved vehicle and equipment storage yard, adjacent to an existing rail line.

Cellco requests that the Council find that the proposed shared use of the Eversource tower satisfies the criteria of C.G.S § 16-50aa and issue an order approving the proposed shared use. A copy of this filing is being sent to Norwalk's Mayor, Harry Rilling; Steven Kleppin, Norwalk's Planning Director; and Eversource, the owner of the Property and the tower.

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 Tindall Avenue tower pursuant to mutually acceptable terms and conditions. Likewise, Eversource and Cellco have agreed to the proposed installation of equipment on the ground within an existing fenced compound area. Eversource has authorized Cellco to apply for all necessary permits and approvals that may be required to share the existing tower. (*See* Owner's authorization letter included in Attachment 2).

Cellco proposes to install nine (9) antennas and six (6) remote radio heads ("RRHs") on the tower at a height of 110 feet above ground level ("AGL"). Cellco will install two (2) equipment cabinets on the ground in the southeast corner of the fenced compound. Emergency backup power for Cellco's equipment and antennas will be provided by an existing shared generator located within the site compound. Included in Attachment 3 are Cellco's project plans showing the location of all 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 Eversource tower is structurally capable of supporting Cellco's antennas, RRHs, antenna mounting frame and related equipment. The proposed shared use of this tower is, therefore, technically feasible. A Structural Analysis Report ("Structural Report") prepared for this project confirms that the tower can support all of Cellco's proposed tower loading. A copy of the Structural Analysis Report is included in Attachment 5.

B. Legal Feasibility. Under C.G.S. § 16-50aa, the Council has been authorized to issue orders approving the shared use of an existing tower such as the Eversource 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 Eversource tower would have minimal environmental effects, for the following reasons:

1. The proposed installation of nine (9) antennas and six (6) remote radio heads on an antenna mounting frame at a height of 110 feet AGL on the existing 150-foot tower would have an insignificant incremental visual impact on the area around the existing tower. As mentioned above, Cellco's equipment will be located within the existing fenced and paved compound area. Cellco's shared use of this tower facility would therefore, not cause any significant change or alteration in the physical or environmental characteristics of the existing site.

2. Noise associated with Cellco's proposed facility will comply with State and local noise standards. Noise associated with the existing shared backup generator is exempt from these same 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 cumulative worst-case General Power Density table that demonstrates that the 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 Eversource facility other than periodic maintenance visits to the cell site.

The proposed shared use of the Eversource 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 facility subject to mutually agreeable terms. The proposed tower sharing is, therefore, economically feasible.

E. **Public Safety Concerns.** As discussed above, the tower is 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 Eversource tower. In fact, the provision of new and improved wireless service through shared use of the existing tower is expected to enhance the safety and welfare of area residents and members of the general public traveling through the City of Norwalk.

Conclusion

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

For the reasons discussed above, the proposed shared use of the existing Eversource 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:
Harry Rilling, Mayor
Steven Kleppin, Planning Director
Christopher Gelinas, Eversource Energy
Greg Milano

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

June 15, 2015

John R. Morissette
Manager, Transmission Siting & Permitting
Eversource Energy
P.O. Box 270
Hartford, CT 06141-0270

RE: **PETITION NO. 1156 –** Eversource Energy petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the proposed replacement of an existing 120-foot tall telecommunications facility with a new 150-foot telecommunications facility located at property owned by Eversource Energy used as a service center and maintenance yard, 2 Tindall Avenue, Norwalk, Connecticut.

Dear Mr. Morissette:

At a public meeting held on June 11, 2015, 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:

- 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;

- 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 City of Norwalk;

- Unless otherwise approved by the Council, the existing tower shall be removed within 180 days of the installation and operation of the new lattice tower;

- The Council shall be notified in writing when the existing tower is removed and the new tower is operational;

- The final structural design drawings of the tower and foundation shall be submitted prior to construction;

- Any nonfunctioning antenna and associated antenna mounting equipment on this facility owned and operated by the Petitioner shall be removed within 60 days of the date the antenna ceased to function;

- 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;

- 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

- 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 April 23, 2015.

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

Very truly yours,

Robert Stein MAB

Robert Stein
Chairman

RS/MP/lm

Enclosure: Staff Report dated June 11, 2015

c: The Honorable Harry W. Rilling, Mayor, City of Norwalk
Michael Greene, Director of Planning and Zoning, City of Norwalk

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. 1156

Eversource

Tower Replacement

2 Tindall Avenue, Norwalk

Staff Report

June 11, 2015

On April 28, 2015, the Connecticut Siting Council (Council) received a petition (Petition) from The Connecticut Light and Power Company d/b/a Eversource Energy (Eversource) for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the proposed replacement of an existing telecommunications facility located in the City of Norwalk.

This Petition was field reviewed by Council member Dr. Barbara Bell and Michael Perrone of the Council staff on June 3, 2015. The following Eversource representatives also attended the field review: John Morissette, Project Manager, Transmission Siting; and Steven Florio, IT Telcom Engineer.; and Michael Libertine, Director of Siting & Permitting, All-Points Technology Corporation (representing Eversource).

Eversource currently owns and operates a 120-foot self-supporting lattice tower at 2 Tindall Avenue, Norwalk. This subject property is owned by Eversource and is currently used as a service center and maintenance yard. The existing tower (constructed in roughly the late 1960s) is currently used to operate two Eversource radio communications antennas.

Eversource is in the process of consolidating its service centers throughout the State of Connecticut, which requires the reconfiguration of its communications system. In Norwalk, this reconfiguration includes relocating five existing Eversource antennas currently located on the roof of the building at the NRG Norwalk Harbor Generating Station, a facility is that is now closed. These antennas are all currently located at 150-foot above ground level (agl). In addition, two Yankee Gas Service Company (i.e. part of Eversource Energy) antennas located at 9 Harbor Avenue, Norwalk would be relocated. Eversource's existing tower is not structurally cable of handling the new configuration. It is also not practical to reinforce the existing tower.

Thus, to accommodate this reconfiguration, Eversource seeks to remove the existing 120-foot self-supporting lattice tower and replace it with a new 150-foot self-supporting lattice tower approximately 325 feet to the east and on the same subject property. The proposed tower would be re-located to the eastern portion of the subject property to reduce the visual impact on the abutting property owned by the Clocktower Condominiums. The new location would also not disrupt the maintenance yard which can be quite active during a storm outage event. Furthermore, the existing tower has to remain until the new tower is installed and operational in order to maintain continuity of service.

Eversource would swap out its existing antennas and install new antennas and coaxial cables on the new tower to meet its needs for radio communications with field crews, paging services for local employees, and load management. Omni antennas would be installed at antenna centerline locations of 159-foot, 156-foot, 144-foot, 139-foot, 130-foot, 129-foot, 123-foot, and 121-foot levels of the tower to meet Eversource's

needs. The total height with appurtenances (or height to the top of the highest proposed antenna) would be 170 feet agl.

The proposed replacement tower would also serve as a microwave hub in the future to provide backhaul for a number of remote locations for Eversource. Accordingly, the preliminary microwave hub design is for a total of two six-foot diameter microwave dishes to be installed on the tower in the future. Eversource would file a Notice of Exempt Modification with the details of the microwave dish installation in the future.

To the north of the subject property is the State of Connecticut Metro-North Railroad (MNRR) right-of-way (ROW), and commercial properties are located on the opposite side of the tracks. The land use west of the subject property is commercial. Areas south and east of the subject property are residential.

The tower would be located within an irregular shaped compound in the northeast corner of the subject property adjacent to the MNRR ROW. In the unlikely event of a tower failure, the tower is designed to collapse upon itself and maintain the setback radius on the subject property and away from the abutting MNRR line.

The tower would be designed to accommodate up to four additional carriers. Eversource consulted with the City of Norwalk (City) regarding possible co-location of emergency services antennas on the proposed tower; however, the City does not plan to co-locate at this time. Eversource also offered space on the tower to MNRR. MNRR has not expressed an interest in co-locating at this time. The Council provided notice to the wireless telecommunications carriers to see if any are interested in co-locating at this time. On June 3, 2015, T-Mobile Northeast LLC indicated that it would not seek to co-locate on the facility in the foreseeable future. On June 4, 2015, Cellco Partnership d/b/a Verizon Wireless (Cellco) indicated that, while it does not have a lease in place with Eversource at this time, it is interested in co-locating on the tower. A preliminary analysis shows that the 110-foot level of the tower would be suitable for Cellco. No other wireless carriers have expressed an interest in co-locating at this time.

A Professional Engineer duly licensed in the State of Connecticut has certified that the proposed replacement tower would be structurally adequate to support the proposed loading. The maximum worst-case power density would be 19.5 percent of the applicable limit. This takes into account all of the proposed omni antennas.

The tower compound would have a seven-foot tall chain link fence without barbed wire. The chain link size would be the same or comparable to the existing fence on the subject property. Smaller anti-climb mesh and/or barbed wire would not be necessary for the tower compound because the subject property perimeter is already securely fenced. No new access would be necessary because the site is paved and has existing access already. Electric, telephone, and gas utilities would be trenched underground from the southern corner of the subject property to the fenced compound. The tower would have a 100-kW natural gas-fueled backup generator. The backup generator is sized to accommodate the needs of all future carriers as well as Eversource's needs. A natural gas-fueled generator is pipeline supplied, so it has virtually unlimited possible run time in an emergency.

The tower would be visible from about 91 acres within a two-mile radius. This is generally consistent with the existing site conditions associated with the existing tower. The majority of the views of the tower would occur from the areas within the immediate vicinity of the subject property, extending about 0.25 miles to the south and east and up to nearly 0.5 miles to the north and west. The new tower would be 30 feet taller than the existing tower and considerably more bulky, because it needs to support greater loading. The increase in the visual impact will be mitigated, however, by the commercial/industrial character of the area surrounding the tower site and the railroad ROW, especially along the approaches to the site from Main Street (north-south) and New Canaan Ave. (east-west).

No school or commercial child day care facilities are located within 250 feet of the subject property. The nearest school (Tracey Elementary School) is located at 20 Camp Street approximately 0.4 miles to the east. The nearest commercial child day care facility (Carousel Preschool Day Nursery) is located at 20 France Street, approximately 0.6 miles to the east. Neither of these locations would have views of the proposed facility. The only historic site on the National Register of Historic Places within a 0.5-mile radius is the Loth Joseph Company Building at 25 Grand Street. However, the new tower location would increase the distance from this property.

The site is paved and offers no significant wildlife habitat. The site is also just outside of the limits of the shaded area of the DEEP natural diversity database. The nearest Important Bird Area is Cove Island Park in Stamford, approximately six miles to the southwest. Further, the design of the tower would comply with the United States Fish and Wildlife Guidelines for Minimizing Impacts to Migratory Birds. The tower would not be lit or marked. No notice to the Federal Aviation administration would be required.

Notice was provided to the City of Norwalk and abutting property owners on or about the time of filing with the Council. No comments have been received.

Construction would begin as soon as possible and would be less than eight months in duration. Disassembly and removal of the existing tower would be completed as soon as practical following the completion of installation of all antenna systems on the replacement tower.

Staff recommends approval with the following conditions:

- 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;

- 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 City of Norwalk;

- Unless otherwise approved by the Council, the existing tower shall be removed within 180 days of the installation and operation of the new lattice tower;

- The Council shall be notified in writing when the existing tower is removed and the new tower is operational;

- The final structural design drawings of the tower and foundation shall be submitted prior to construction; and

- Any nonfunctioning antenna and associated antenna mounting equipment on this facility owned and operated by the Petitioner shall be removed within 60 days of the date the antenna ceased to function.

Existing Tower Location

Proposed Tower Location

Photo-simulation of Proposed Tower

PROPOSED

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
16	NEW CANAAN WAY	SOUTHEAST	+/- 0.11 MILE	YEAR ROUND

Site with Existing and Proposed Tower Locations

ATTACHMENT 2

EVERSOURCE ENERGY

107 Selden Street
Berlin, CT 06037

December 5, 2019

Site Permitting Authorization

Authorization is hereby given to **CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS (VERIZON)**, its employees and its duly authorized agents and independent contractors, to apply for any and all local municipal, state and federal licenses, permits and approvals, including but not limited to Connecticut Siting Council, building permits, zoning variances, zoning special exceptions, site plan and subdivision approvals, driveway, wetlands and terrain alteration permits, which are or may be necessary or required for **VERIZON** to construct, operate and maintain a wireless communications system (PCS System), and/or antenna site on the following property owned by The Connecticut Light & Power Company d/b/a Eversource Energy ("Eversource"):

2 TINDALL AVENUE
NORWALK, CT

The foregoing authorization is given subject to the following conditions:

1. This authorization shall be nonexclusive. Nothing herein shall prevent or restrict Eversource from authorizing any other person or entity to apply for any similar licenses, permits or approvals to construct, operate and maintain any other communication system or facility of any type on the property at any time.

2. This authorization shall not obligate Eversource to pay for or reimburse any costs or expenses or to provide any assistance of any kind in connection with any applications, or bind or obligate Eversource to agree or be responsible for any on-site or off-site improvements, development restrictions, impact fees or assessments, capital improvement charges, bonds or other security, or any other fee, assessment, charge or expense imposed or required as a condition of any license, permit or approval. **VERIZON** shall be solely and fully responsible for all fees, charges costs and expenses of any kind in connection with any applications. Eversource agrees to reasonably cooperate with **VERIZON** in signing such applications or other similar documents as may be required in order for **VERIZON** to apply for any license, permit or approval.

3. This authorization shall not be deemed or construed to grant or transfer to **VERIZON** any interest in the property, whatsoever, and shall not in any respect obligate or require Eversource to sell, lease or license the Property to **VERIZON** or otherwise allow **VERIZON** to use or occupy the property for any purpose, regardless of whether any licenses, permits and approvals applied for by **VERIZON** for the property are granted. Any and all applications filed by **VERIZON** for the property shall be at **VERIZON'S** sole risk and expense and without any enforceable expectation that the property will be made available for **VERIZON'S** use.

4. **VERIZON** shall be required to supply to Eversource, free of charge and contemporaneous with the filing of same, a complete copy of any and all applications, plans, reports and other public filings made by **VERIZON** with any local, municipal, state or federal governmental or regulatory officer, agency board, bureau, commission or other person or body for any licenses, permits or approvals for the property, and to keep Eversource fully informed on a regular basis of the status of **VERIZON'S** applications.

5. This authorization shall automatically expire three (3) months after the date of this letter, unless extended in writing by Eversource.

Christopher Gelinas
Senior Real Estate Specialist
Eversource Energy
Office: (860) 665-2008
Christopher.Gelinas@Eversource.com

ATTACHMENT 3

WIRELESS COMMUNICATIONS FACILITY

SITE NAME: NORWALK 4 CT

EVERSOURCE TOWER CO-LO
2 TINDALL AVE.
NORWALK, CT 06851

PROJECT DESCRIPTION

- INSTALLATION OF OUTDOOR EQUIPMENT CABINETS ON A NEW 20'X12' CONCRETE PAD ON GRADE WITH STEEL ROOF CANOPY ABOVE, LOCATED WITHIN AN EXISTING FENCED COMPOUND
- INSTALLATION OF (9) PANEL ANTENNAS AND ASSOCIATED DEVICES ON EXISTING TOWER
- INSTALLATION OF CABLING FROM EQUIP. CABINETS TO ANTENNAS
- ELECTRICAL, TELEPHONE & GROUNDING CONNECTIONS TO EXISTING UTILITIES INCLUDING CONNECTION TO THE ONSITE "SHARED" NATURAL GAS FUELED EMERGENCY GENERATOR

VICINITY MAP

NOT-TO-SCALE

PROJECT SUMMARY

SITE NAME:	NORWALK 4 CT
SITE ADDRESS:	2 TINDALL AVE. NORWALK, CT 06851
PROPERTY OWNER:	CONN. LIGHT & POWER CO. 107 SELDEN ST. BERLIN, CT 06037
PARCEL ID:	1-92-13
TOWER OWNER:	EVERSOURCE
TOWER COORDINATES:	41° 07' 31.10" N 73° 25' 17.61" W
GROUND ELEVATION:	57.0' AMSL
APPLICANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 20 ALEXANDER DR. WALLINGFORD, CT 06492
VERIZON WIRELESS CONTACTS:	NOVA CREVIER - CONSTRUCTION (860) 414-1144 GREG MILANO - SITE ACQUISITION (860) 707-9001

DRAWING SCHEDULE

SHEET NO.	SHEET DESCRIPTION
T-1	TITLE SHEET
C-1	2,500 FT. RADIUS MAP, ABUTTERS MAP & PROPERTY OWNER LIST
C-2	SITE LAYOUT & COMPOUND PLAN
C-3	SOUTH ELEVATION & ANTENNA PLAN

Cellco Partnership
d/b/a Verizon Wireless

verizon

WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Rd.
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	10.31.19	REVIEW

DRAWN BY:	CHECKED BY:
AS	DW

SITE NAME:
NORWALK 4 CT

PROJECT DESCRIPTION:
NEW BUILD MACRO

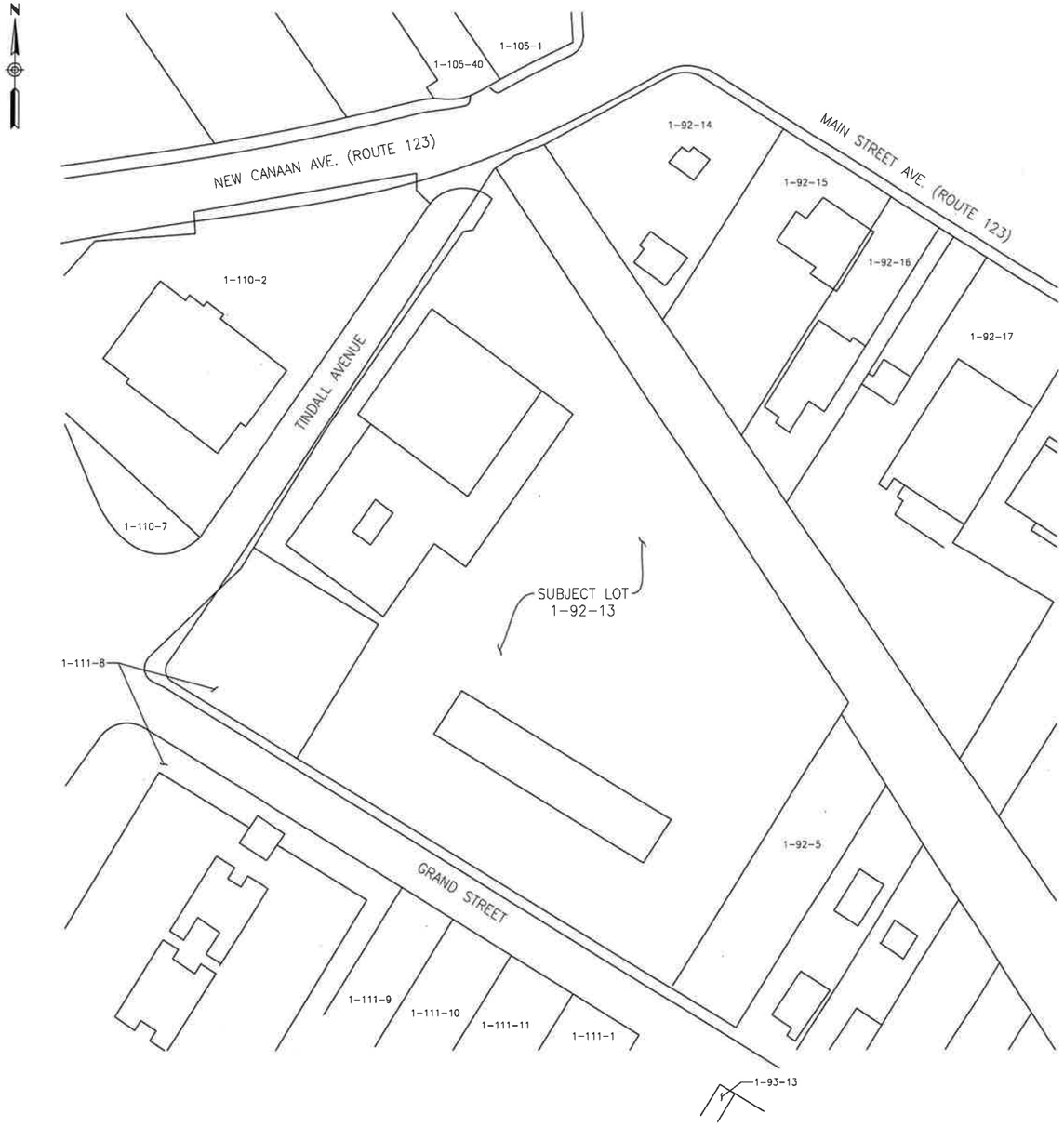
PROJECT INFORMATION:
EVERSOURCE TOWER
2 TINDALL AVE.
NORWALK , CT 06851

DRAWING TITLE:
TITLE SHEET

SHEET NUMBER:
T-1

1 C-1 **2,500 FT. RADIUS MAP**
Scale: N.T.S

ABUTTERS LIST FROM PARCEL 1-92-13			
PARCEL ID	OWNER NAME	OWNER MAILING ADDRESS	PROPERTY ADDRESS
1-92-14	ONE HUNDRED NINETY ONE MAIN STREET LLC	225 MAIN ST, NORWALK, CT 06851	191 MAIN ST
1-92-15	VONA CARLO & VONA RICHARD A & VONA CARLO JR TRUSTEES	135 RICHARDS AVE, NORWALK, CT 06854	189 MAIN ST
1-92-16	185 MAIN STREET LLC	185 MAIN ST, NORWALK, CT 06851	185 MAIN ST
1-92-17	FRIEDMAN DREW	39 IMPERIAL AVE, WESTPORT, CT 06880	181 MAIN ST
1-92-5	CONN LIGHT & POWER CO	107 SELDEN ST, BERLIN, CT 06037	12 GRAND ST
1-93-13	MIGLIACCIO FREDERICK	272 EAST AVE, NORWALK, CT 06855	9 GRAND ST
1-111-1	DOMALEWSKI JOSEPHINE (100% L.U.) & DOMALEWSKI RONALD J	2 WARREN ST, NORWALK, CT 06851	2 WARREN ST
1-111-11	ZULLO MARK J & CHRISTINA L	15 GRAND ST, NORWALK, CT 06851	15 GRAND ST
1-111-10	GOICO LUIS S & PATRICIA A	17 GRAND ST, NORWALK, CT 06851	17 GRAND ST
1-111-9	CHOWDHURLY BADRUL	19 GRAND ST, NORWALK, CT 06851	19 GRAND ST
1-111-8	CLOCKTOWER CLOSE ASSOCIATES LLC C/O SEABOARD PROPERTY MGMT	1 ATLANTIC ST, STAMFORD, CT 06901	25 GRAND ST
1-110-7	GRAND LLC	25 NEW CANAAN AVE, NORWALK, CT 06851	TINDALL AVE
1-110-2	CNM LLC c/o CHRIS CONDORS	23 FIRST ST, NORWALK, CT 06855	10 TINDALL AVE
1-105-40	WATTS JOHN W	8 TULIP TREE LN, NORWALK, CT 06851	4 NEW CANAAN AVE
1-105-1	NORWALK DONUTS INC	196 EAST AVE, NORWALK, CT 06855	195 MAIN ST



NOTES TO ABUTTERS MAP & OWNERS LIST:
1. ALL INFORMATION TAKEN FROM THE CITY OF NORWALK ONLINE "GIS" DATABASE, OCT 2019.

2 C-1 **ABUTTERS MAP**
Scale: 1" = 50'

Cellco Partnership
d/b/a Verizon Wireless
verizon
WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Rd.
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	10.31.19	REVIEW

DRAWN BY:	CHECKED BY:
AS	DW

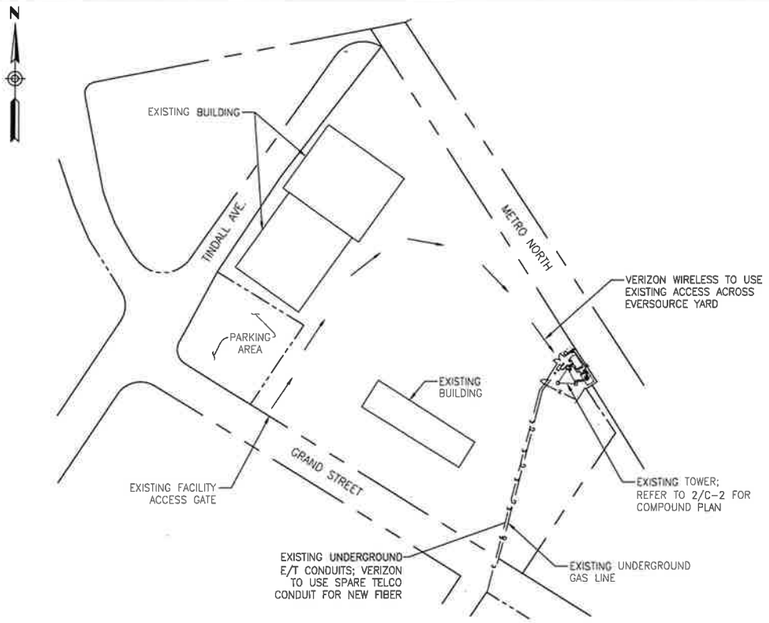
SITE NAME:
NORWALK 4 CT

PROJECT DESCRIPTION:
NEW BUILD MACRO

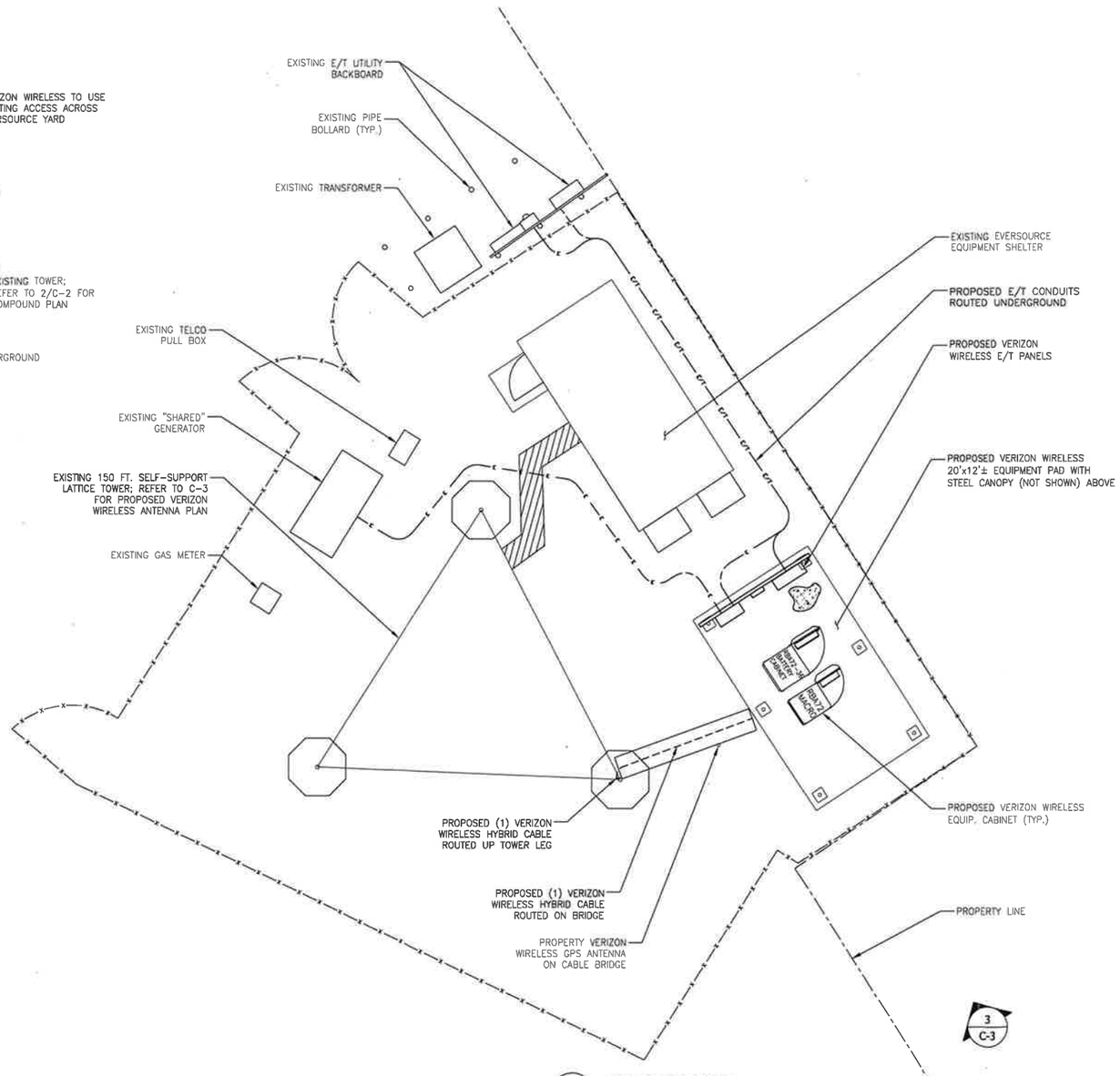
PROJECT INFORMATION:
EVERSOURCE TOWER
2 TINDALL AVE.
NORWALK , CT 06851

DRAWING TITLE:
2,500 FT. RADIUS MAP,
ABUTTERS MAP &
PROPERTY OWNER LIST

SHEET NUMBER:
C-1



1 C-2 **SITE LAYOUT**
Scale: 1" = 50'



2 C-2 **COMPOUND PLAN**
Scale: 1/8" = 1'-0"

Cellco Partnership
d/b/a Verizon Wireless

verizon

WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Rd.
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE

DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
0	10.31.19	REVIEW

DRAWN BY:	CHECKED BY:
AS	DW

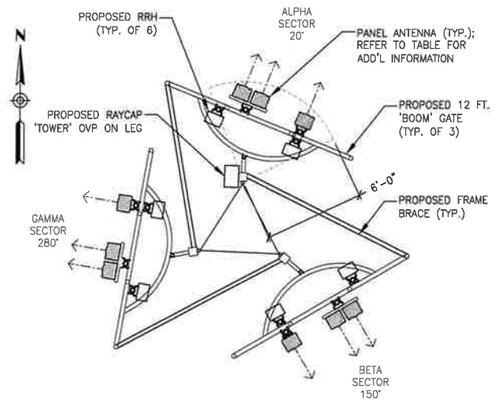
SITE NAME:
NORWALK 4 CT

PROJECT DESCRIPTION:
NEW BUILD MACRO

PROJECT INFORMATION:
EVERSOURCE TOWER
2 TINDALL AVE.
NORWALK , CT 06851

DRAWING TITLE:
SITE LAYOUT &
COMPOUND PLAN

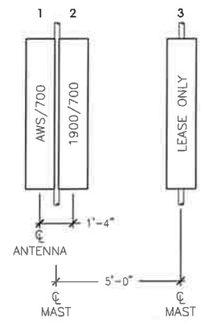
SHEET NUMBER:
C-2



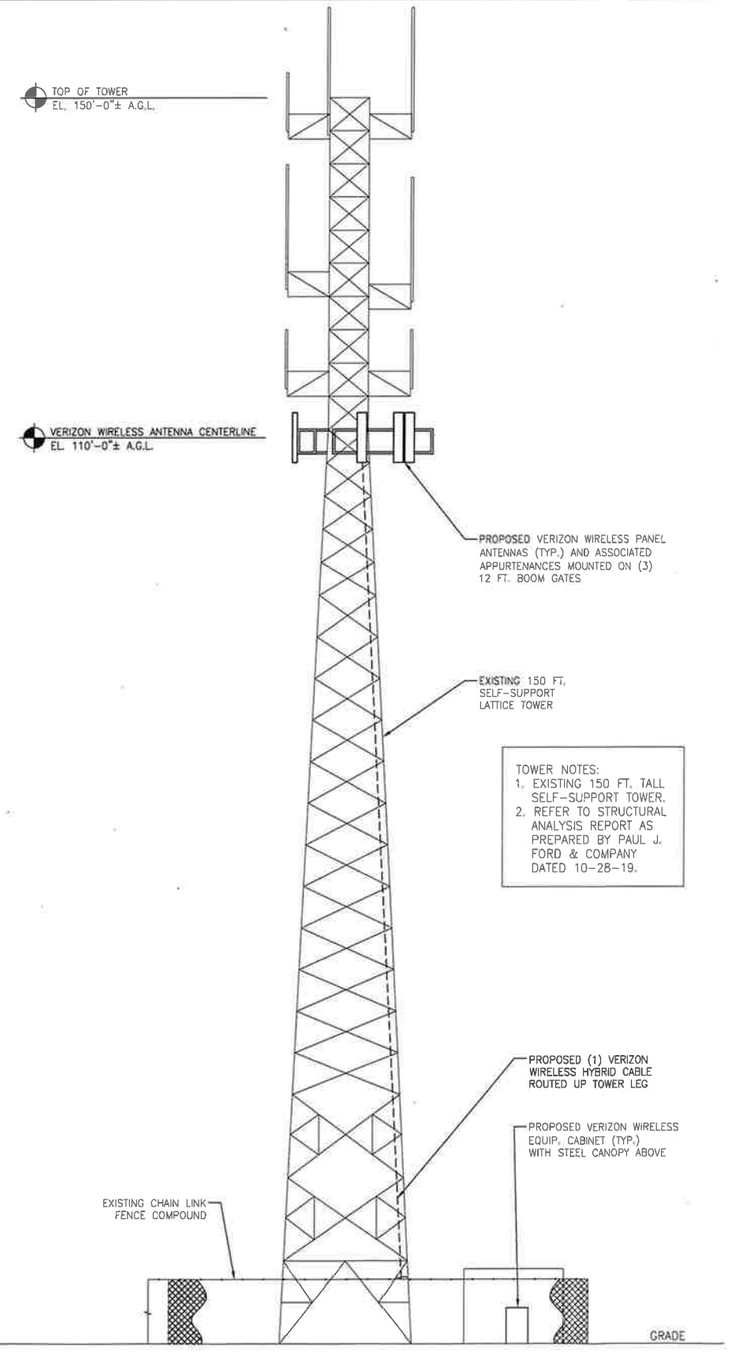
NOTES TO ANTENNA PLAN:
1. CONTACT MATT DAVID, D&D WELDING, INC., WILLIAMSON, NY FOR PURCHASING FRAME AND ALL REQ'D COMPONENTS, 315-589-4700.
2. BRACING SHOWN IS DIAGRAMMATIC ONLY; CONTRACTOR TO FIELD VERIFY BRACING FOR A STRUCTURALLY STABLE FRAME.
3. STRUCTURAL ANALYSIS IS BASED ON ANTENNA MOUNT & LOADING DEPICTED HEREIN; ANY CHANGES TO THESE ITEMS MAY INCUR ADDITIONAL ENGINEERING COSTS TO BE PAID FOR BY THE CONTRACTOR OR RESPONSIBLE PARTY.

1 / C-3 **ANTENNA PLAN @ 110 FT. A.G.L.**
Scale: 1/4" = 1'-0"

ANTENNA SPECIFICATIONS (TYP. AT 3 SECTORS)				
POS.	ANTENNA BAND	MODEL #	SIZE	ACCESSORY EQUIPMENT
1	2100/700	QS6656-5	72"Hx12.0"Wx9.6"D; 88.0 LBS.	B2/B66A RRH SBS MTG. BRACKET
2	1900/700	QS6656-5	72"HX12.0"WX9.6"D; 88.0 LBS.	B5/B13 RRH SBS MTG. BRACKET
3	LEASE ONLY	QS6656-5	72"HX12.0"WX9.6"D; 88.0 LBS.	



2 / C-3 **TYPICAL ANTENNA ELEVATION**
Scale: N.T.S.



3 / C-3 **SOUTH ELEVATION**
Scale: 1/8" = 1'-0"

Cellco Partnership
d/b/a Verizon Wireless
verizon
WIRELESS COMMUNICATIONS FACILITY
20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

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DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.:	DATE:	SUBMISSIONS
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DRAWN BY:	CHECKED BY:
AS	DW

SITE NAME:
NORWALK 4 CT

PROJECT DESCRIPTION:
NEW BUILD MACRO

PROJECT INFORMATION:
EVERSOURCE TOWER
2 TINDALL AVE.
NORWALK , CT 06851

DRAWING TITLE:
SOUTH ELEVATION
& ANTENNA PLAN

SHEET NUMBER:
C-3

ATTACHMENT 4

Quintel®
New Dimensions in Wireless™

QS6656-5D

6ft 65° XXX MultiServ™ 6-Port Antenna

2x698-806MHz & 824-894MHz / 4x1695-2400MHz

MultiServ

- Provides 6 antenna Ports in a slim-line form factor
- Independent 700 & 850 Tilt for use with **dual band radios**
- Optimized Azimuth patterns for Min Inter-Sector Interference

- 700, 850, PCS, AWS & WCS bands in one antenna
- AISG & 3GPP compliant internal (RET) with Smart Bias T
- Industry leading Minimal Wind-Load design

The Quintel MultiServ™ Multiband 6 Port Antenna with patented QTilt™ technology uniquely delivers three independent services in a single slim-line antenna. This antenna allows for the use of **dual band radios** with 700 and 850 on a single pair of lowband ports while offering independent tilt between the 700 and 850 bands. This enables existing antenna network sites to be upgraded constraint free to add new services such as LTE for 700, 850, PCS, AWS and WCS bands with the replacement of one antenna. The QS6656-5D also provides 4x1695-2400MHz ports as two side-by-side (CLA-2X) arrays for connection to 2T4R/4T4R services.

Electrical Characteristics	2x Ports 1&2		4x Ports 3-6			
Operating Frequency (MHz)	698-806	824-894	1695-2400			
	698-806	824-894	1695-1780	1850-1990	2110-2180	2300-2400
Azimuth beamwidth[1]	67°	64°	67°	63°	60°	59°
Elevation beamwidth[1]	12.1°	10.6°	6.2°	5.9°	5.2°	4.8°
Gain[1] (dBi)	12.5	13.4	17	17.1	17.8	18.0
Polarization	±45°		2x ±45°			
Electrical down-tilt range	2°-10°	2°-10°	0° – 8°			
Upper SLL (20° > mainbeam)[1]	-17dB	-17dB	-16dB	-18dB	-17dB	-16dB
Front to Back Ratio(180°±10°)[1]	≥25dB	≥25dB	≥25dB	≥25dB	≥28dB	≥30dB
Port to Port isolation[1]	≥25dB	≥25dB	≥30dB	≥30dB	≥30dB	≥30dB
Return loss (VSWR)	14dB(1.5)	14dB(1.5)	14dB(1.5)	14dB(1.5)	14dB (1.5)	14dB(1.5)
X Polar Discrimination (at 0°)[1]	>16dB	>16dB	>19dB	>19dB	>19dB	>19dB
Max Power handling (per any port)	250 watts		250 watts			
PIM (3rd Order) (2x43dBm)	>153dBc		>153dBc			
X Band PIM (3rd Order) (2x43dBm)	>159dBc					

[1] *Typical Performance across frequency and Downtilt.*

Mechanical Characteristics	
Dimensions	L 72"(1828mm) x W 12"(304mm) x D 9.6"(245mm)
Weight (excl mounting brackets)	92.5lbs (42.0kg)
No. of Connectors	6x 4.3-10 DIN Female Long Neck
Max Wind Speed	150mph (67m/s)
Equivalent Flat Plate Area[2]	Front: 2.6ft² (0.24m²) Side: 5ft² (0.48m²)
Wind Load @160km/h (45m/s)[2]	Front: 284.7N (64 lbs), Side: 535.5N (120.4 lbs)
Operating Temperature	-40°C to +65°C

[2] *Derived from wind tunnel measurements*

Fully Integrated RET Characteristics	
AISG Standards	V1.1, V 2.0 and 3GPP
Factory Default	AISG 2.0
Surge immunity	IEC 61000-4-5:2005 4KV (AISG PIN)
Device Type	SRET Type 1
AISG Data rate	9.6 kbps
No of connectors	2in/2out.
Connector type	IEC 60130-9 (Ed 3.0)
MTBF	36,000 Operational moves

Quintel®
New Dimensions in Wireless™

QS6656-5D

6ft 65° XXX MultiServ™ 6-Port Antenna

2x698-806MHz & 824-894MHz / **4x1695-2400MHz**

MultiServ.

RET Configuration

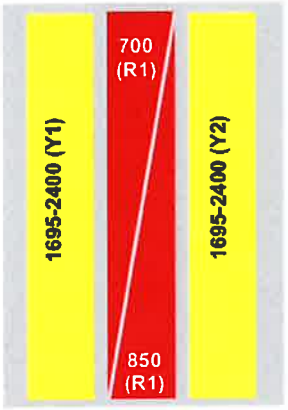
The Quintel MultiServ™ Multiband 6 Port Antenna has the following Array, RF Port and AISG I/O Configurations.

The 6-Port array topology consists of 3 radiating arrays:

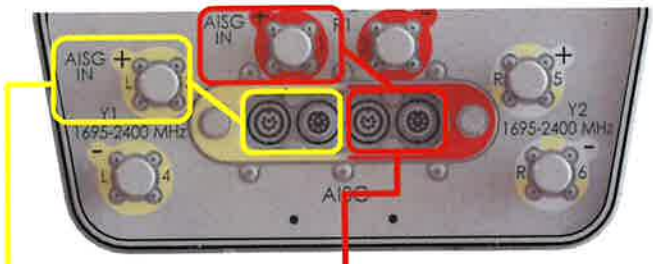
R1 – 698-806 & 824-894MHz
Y1 – 1695-2400MHz
Y2 – 1695-2400MHz

RF Connector Port Configuration

	Ports	Freq (MHz)
R1	1-2	698-806 & 824-894
Y1	3-4	1695-2400
Y2	5-6	1695-2400



The RET Devices can be communicated with either via the designated external AISG connector or RF Port as shown below.



AISG I/O Configuration

RET Device	Band	RF Ports
3	1695-2400	3-6

AISG I/O Configuration

RET Device	Band	RF Ports
1	698-806	1-2
2	824-894	1-2

Multiband Optimization

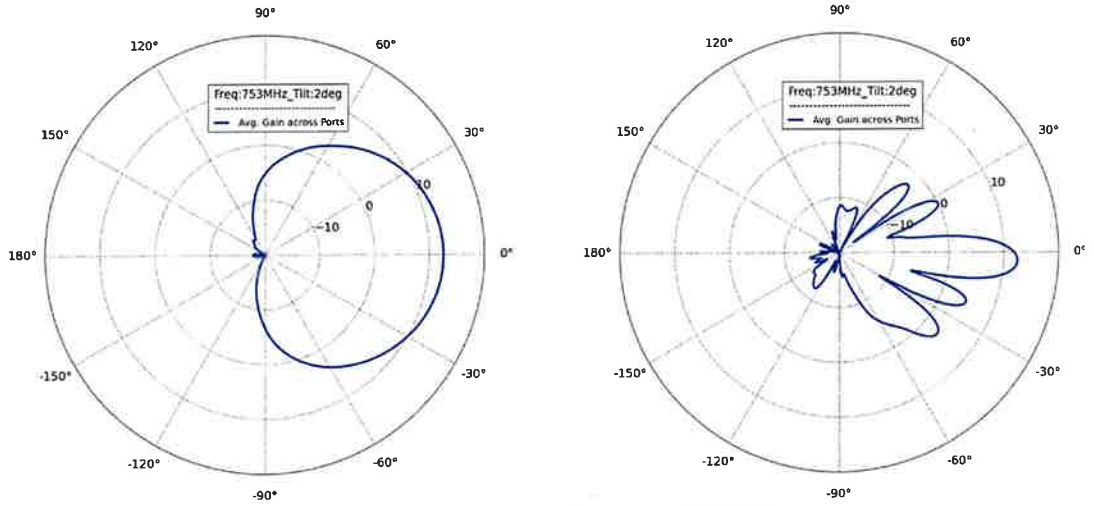
The Quintel MultiServ™ Multiband QSx656-5D series of 6 Port Antennas are the only antenna solutions for independently optimizing 700MHz and 850MHz services when dual-band, lowband radios are used at site. Independent tilting ensures that traffic in each band can be optimized for coverage, capacity, interference, contouring at 850MHz band, spectrum border area transitions, and for optimal carrier aggregation tuning in the future.

The tilt of each service is controlled independently via internal RET actuators compliant to AISG1.1, AISG2.0 and 3GPP protocols. The QS6656-5D provides a total of 3 independent tilts:

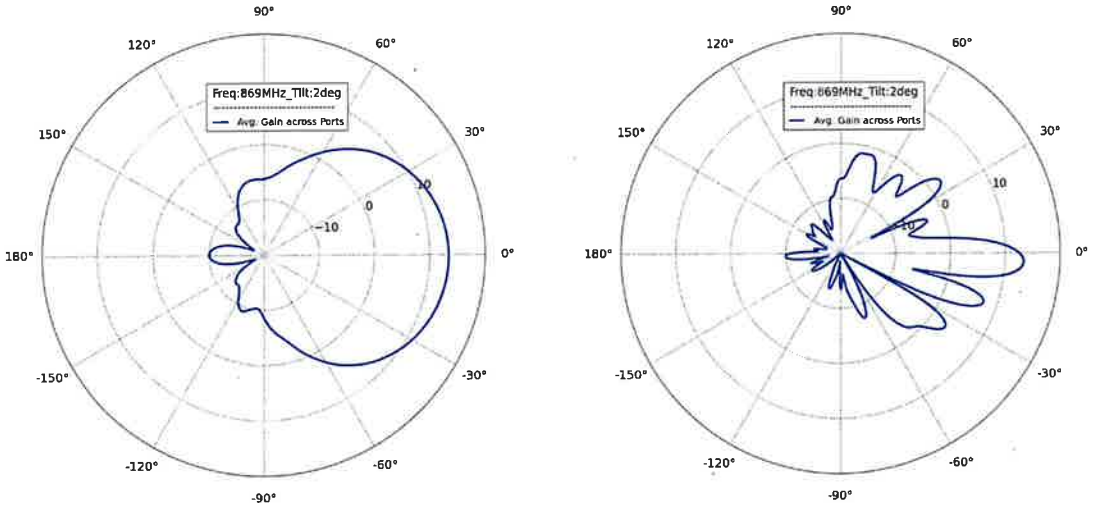
- 1x(698-806MHz)
- 1x(824-894MHz)
- 1x Left & Right Array (1695-2400MHz)

Design Optimization

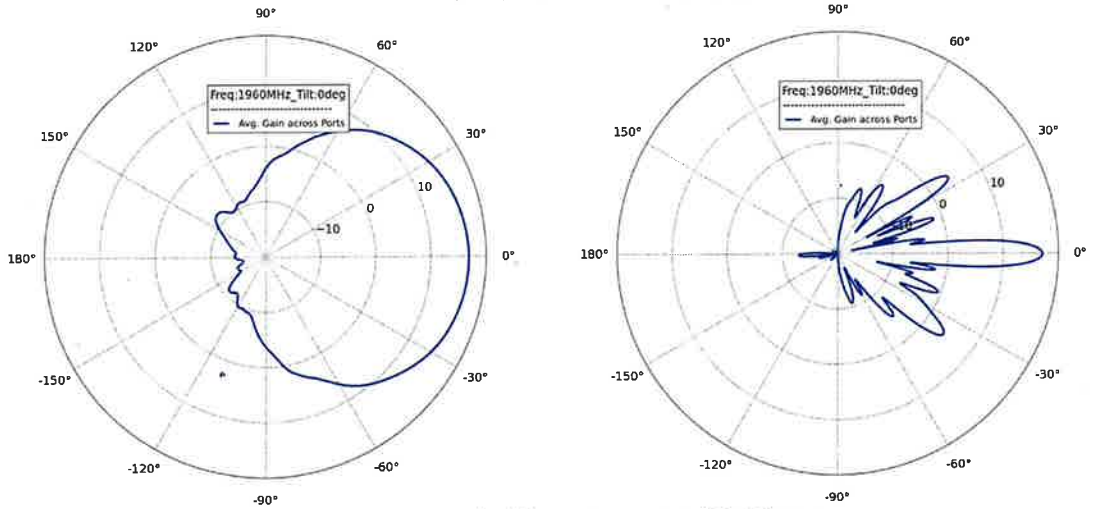
All Quintel antennas use the same mechanical mounting brackets thus making maintenance swaps easy and future proof. All Quintel Antennas also have Azimuth patterns optimized with network design and deployment in mind. The 3dB Azimuth beamwidth is ~65° as with most Antennas, but we have optimized how the pattern rolls-off and where the sidelobes emerge such that there is minimal Inter-Sector Interference when 3x sectors are deployed. For interference limited networks, we can deliver 25% more capacity.



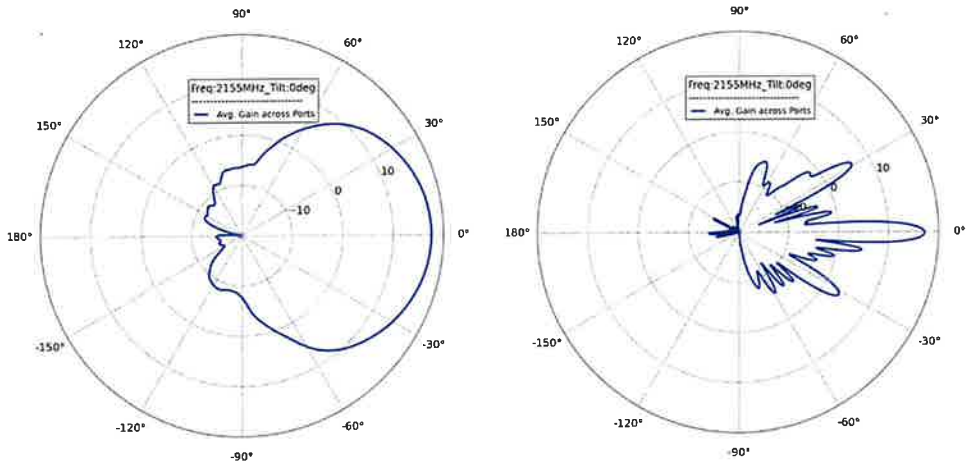
753MHz Azimuth (Left) and Elevation (Right) Patterns



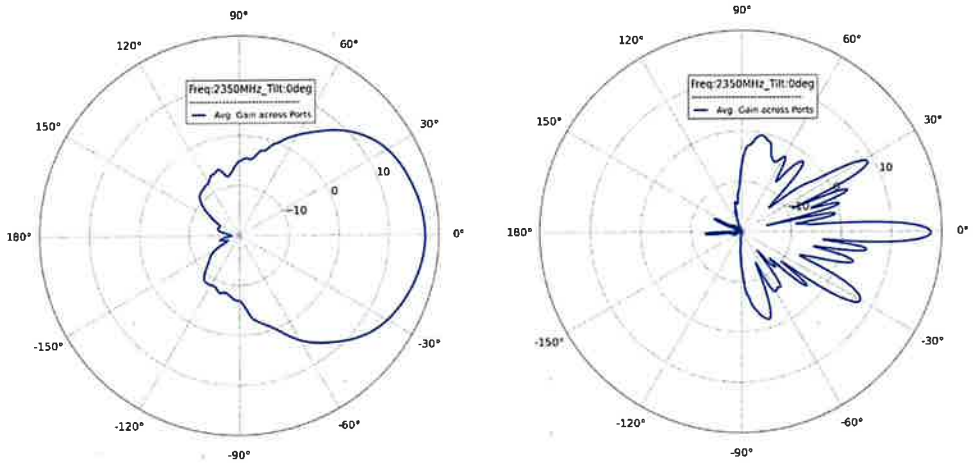
869MHz Azimuth (Left) and Elevation (Right) Patterns



1960MHz Azimuth (Left) and Elevation (Right) Patterns



2155MHz Azimuth (Left) and Elevation (Right) Patterns



2350MHz Azimuth (Left) and Elevation (Right) Patterns

Tel (Americas): +1 (585) 420-8720
info@quintelsolutions.com
www.quintelsolutions.com

SAMSUNG

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

RFV01U-D2A

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

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

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

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

Features and Benefits

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

Key Technical Specifications

Duplex Type: FDD
Operating Frequencies:
    B13: DL(746-756MHz)/UL(777-787MHz)
    B5: DL(869-894MHz)/UL(824-849MHz)
Instantaneous Bandwidth: 10MHz(B13) + 25MHz(B5)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 207mm (29.9L)
Weight: 31.9kg
Input Power: -48V DC
Operating Temp.: -40 - 55°(w/o solar load)
Cooling: Natural convection

SAMSUNG

Dual-Band Radio Unit
AWS/PCS (B66/B2)
RFV01U-D1A

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

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

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

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

Features and Benefits

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

Key Technical Specifications

Duplex Type: FDD
Operating Frequencies:
B66: DL(2,110-2,180MHz)/UL(1,710-1,780MHz)
B2: DL(1,930-1,990MHz)/UL(1,850-1,910MHz)
Instantaneous Bandwidth:
70MHz(B66) + 60MHz(B2)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 255mm (36.8L)
Weight: 38.3kg
Input Power: -48V DC
Operating Temp.: -40 - 55°(w/o solar load)
Cooling: Natural convection

ATTACHMENT 5

PAUL J. FORD & COMPANY

Report Date:	October 28, 2019
Client:	On Air Engineering, LLC 88 Foundry Pond Road Cold Spring, NY 10516 Attn: David Weinpahl, P.E. (201) 456-4624 dweinpahl@onaireng.com
Structure:	Existing 150-ft Self Support
Site Name:	Verizon - Norwalk 4 CT
Site Address:	2 Tindall Ave
City, County, State:	Norwalk, Fairfield County, CT
Latitude, Longitude:	41.125392, -73.421578
PJF Project:	A42919-0013.001.8700

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

Analysis Criteria:

Reference Standard:	2015 International Building Code with the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1.
Ultimate Wind Speed:	130 mph 3-second gust wind speed without ice
Nominal Wind Speed:	101 mph 3-second gust wind speed without ice
Ice Wind Speed:	50 mph 3-second gust wind speed with 0.75" ice
Service Wind Speed:	60 mph (Serviceability) without ice
IBC Site Criteria:	Risk Category III, Topographic Category 1, Exposure Category C

Proposed Appurtenance Loads:

The structure was analyzed with the addition of the proposed appurtenance loads shown in Table 1 combined with the existing and reserved loads shown in Table 2 of this report.

Summary of Analysis Results:

Existing Structure:	Pass – 95.4%
Existing Foundation:	Pass – 46.0%

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

Respectfully Submitted by:
Paul J. Ford and Company

Kurt J. Swarts, P.E.
Project Manager
kswarts@pauljford.com

JPJ

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER

10/29/2019

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 150 ft Self Support tower designed by Rohn in July 2014. The tower was originally designed fpr a wind speed of 110 mph per TIA-222-G.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-G
Risk Category:	III
Wind Speed:	101 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	0.75 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
110.0	110.0	9	quintel technology	QS6656-5_TIA w/ Mount Pipe	1	1-5/8 Hybrid	-
		1	rfs celwave	DB-C1-12C-24AB-0Z			
		3	samsung	B2/B66A RRH-BR049			
		3	samsung	B5/B13 RRH-BR04C			
		3	Armor Tower Engineering	12-Ft Arch Antenna Frame			

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
149.0	159.0	1	dbspectra	DS9A09F36D-N	4	1-5/8	1
		1	telewave	ANT150F6			
	156.6	1	rfs celwave	1151-3			
	149.0	3	tower mounts	Rohn 6' Side-Arm(1)			
141.0	143.5	1	telewave	ANT150F2	2	1-5/8	1
	143.2	1	telewave	ANT220F2			
	141.0	2	tower mounts	Rohn 6' Side-Arm(1)			
135.0	135.0	1	rfs celwave	PAL6-59	1	E65	1
		1	tower mounts	6'x2" Pipe Mount			
132.0	138.0	1	kreco	CO-36A	1	1-5/8	1
	132.0	1	tower mounts	Rohn 6' Side-Arm(1)			
124.0	126.5	1	telewave	ANT150F2	1	1-5/8	1
	124.0	1	tower mounts	Rohn 6' Side-Arm(1)			
123.0	129.0	1	kreco	CO-36A	1	1-5/8	1
	123.0	1	tower mounts	Rohn 6' Side-Arm(1)			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
120.0	120.0	1	rfs celwave	PAL6-59	1	E65	1
		1	tower mounts	6'x2" Pipe Mount			
118.0	124.0	1	kreco	CO-36A	2	1-5/8	1
	120.2	1	telewave	ANT220F2			
	118.0	2	tower mounts	Rohn 6' Side-Arm(1)			
100.0	100.0	9	alcatel lucent	RRH2X40-AWS	3 2	1-5/8 1-5/8 Fiber	1
		6	antel	BXA-171063-12CF-EDIN-X w/ Mount Pipe			
		6	antel	BXA-70063-6CF-EDIN-0 w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		3	tower mounts	Pirod 12' T-Frame Sector Mount (1)			
90.0	90.0	3	alcatel lucent	FD-RRH-2x50-800	3 3	1-5/8 1-5/8 Fiber	1
		3	rfs celwave	APXVSPP18-C_TIA w/ Mount Pipe			
		3	tower mounts	Pirod 12' T-Frame Sector Mount (1)			
80.0	80.0	6	ericsson	AIR 21	6 2	1-5/8 1-5/8 Fiber	1
		3	ericsson	KRY 112 144/1			
		3	tower mounts	Pirod 12' T-Frame Sector Mount (1)			

Notes:
1) Reserved Equipment

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks
Tower Manufacturer Drawings	Rohn: 210856-01-D1:7/9/2014
Foundation Design Drawings	Rohn: 210856-01-F1:7/14/2014
Geotechnical Report	Doctor Clarence Welti Geotechnical Engineering: 4/21/2014
Structural Analysis Report	Centek Engineering: 15043.000: 5/11/2015

3.1) Analysis Method

tnxTower (version 8.0.5.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	150 - 130	Leg	2 1/4" solid	3	-18.27	105.06	17.4	Pass
		Diagonal	L1 1/2x1 1/2x3/16	10	-3.70	8.10	45.7 46.5 (b)	Pass
		Top Girt	L 1.5 x 1.5 x 3/16	4	-0.22	3.49	6.3	Pass
T2	130 - 110	Leg	2 1/2" solid	39	-64.68	143.51	45.1	Pass
		Diagonal	L1 3/4x1 3/4x3/16	42	-7.47	12.85	58.1	Pass
T3	110 - 94	Leg	2 3/4" solid	70	-107.77	186.92	57.7	Pass
		Diagonal	L 2 x 2 x 3/16	79	-7.40	13.08	56.6 83.9 (b)	Pass
		Top Girt	L 2 x 2 x 3/16	73	-1.24	8.61	14.3	Pass
T4	94 - 90	Leg	2 3/4" solid	100	-118.32	243.04	48.7	Pass
		Diagonal	L 2 x 2 x 3/16	106	-7.03	11.97	58.8 78.8 (b)	Pass
		Secondary Horizontal	L 2 x 2 x 1/4	111	-2.05	21.33	9.6 16.5 (b)	Pass
T5	90 - 80	Leg	3 1/4" solid	112	-144.83	250.21	57.9	Pass
		Diagonal	L2 1/2x2 1/2x3/16	118	-7.81	17.03	45.9 90.5 (b)	Pass
T6	80 - 70	Leg	3 1/4" solid	127	-172.74	335.61	51.5	Pass
		Diagonal	L2 1/2x2 1/2x3/16	133	-8.23	14.29	57.6 95.4 (b)	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	136	-3.00	19.60	15.3 24.1 (b)	Pass
T7	70 - 55	Leg	3 3/4" solid	148	-211.35	368.00	57.4	Pass
		Diagonal	L 2 1/2x 2 1/2x 1/4	154	-7.84	14.50	54.1 70.8 (b)	Pass
T8	55 - 50	Leg	3 3/4" solid	169	-223.21	459.35	48.6	Pass
		Diagonal	L 2 1/2x 2 1/2x 1/4	174	-7.93	13.38	59.3 68.9 (b)	Pass
		Secondary Horizontal	L 2 1/2x 2 1/2x 1/4	180	-3.87	17.23	22.5 31.2 (b)	Pass
T9	50 - 30	Leg	4 1/4" solid	181	-268.98	505.21	53.2	Pass
		Diagonal	L 3 x 3 x 3/16	189	-7.94	13.50	58.8 91.9 (b)	Pass
T10	30 - 10	Leg	4 1/2" solid	208	-306.70	580.89	52.8	Pass
		Diagonal	L3 1/2x3 /12x1/4	216	-10.22	37.63	27.1 41.1 (b)	Pass
T11	10 - 0	Leg	4 1/2" solid	223	-318.13	580.89	54.8	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
		Diagonal	L3 1/2x3 /12x1/4	244	-13.55	20.29	66.8	Pass
		Horizontal	L3 1/2x3 /12x1/4	240	-8.27	24.31	34.0	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x1/4	245	-5.52	31.12	17.7	Pass
		Redund Diag 1 Bracing	L 2 1/2x 2 1/2x 1/4	246	-4.52	13.60	33.2	Pass
		Inner Bracing	L 3 x 3 x 1/4	249	-0.01	14.35	0.3	Pass
							Summary	
						Leg (T5)	57.9	Pass
						Diagonal (T6)	95.4	Pass
						Horizontal (T11)	34.0	Pass
						Secondary Horizontal (T8)	31.2	Pass
						Top Girt (T3)	14.3	Pass
						Redund Horz 1 Bracing (T11)	17.7	Pass
						Redund Diag 1 Bracing (T11)	33.2	Pass
						Inner Bracing (T11)	0.3	Pass
						Bolt Checks	95.4	Pass
						Rating =	95.4	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Anchor Rods	0	41.0	Pass
1	Base Foundation	0	30.8	Pass
1	Base Foundation Soil Interaction	0	46.0	Pass

Structure Rating (max from all components) =	95.4%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Anchor rod analysis assumes that the grout does not exist between the base plate and the top of concrete, and the maximum distance from top of concrete to the bottom of the levelling nut is less than 3 inches.

The results of the tilt and twist values for a 60 mph 3-second gust service wind speed per the TIA-222-G Standard are given below:

Table 6 - Microwave Dish Tilt (Sway) Results for 60 mph Rev G Service

Dish Elevation ft	Dish	Dish Diameter ft	Dish Frequency GHz	Analysis Results Tilt at Service Wind deg	Analysis Results Twist at Service Wind deg
135.0	PAL6-59	6	-	2.374	0.1736
120.0	PAL6-59	6	-	1.833	0.1586

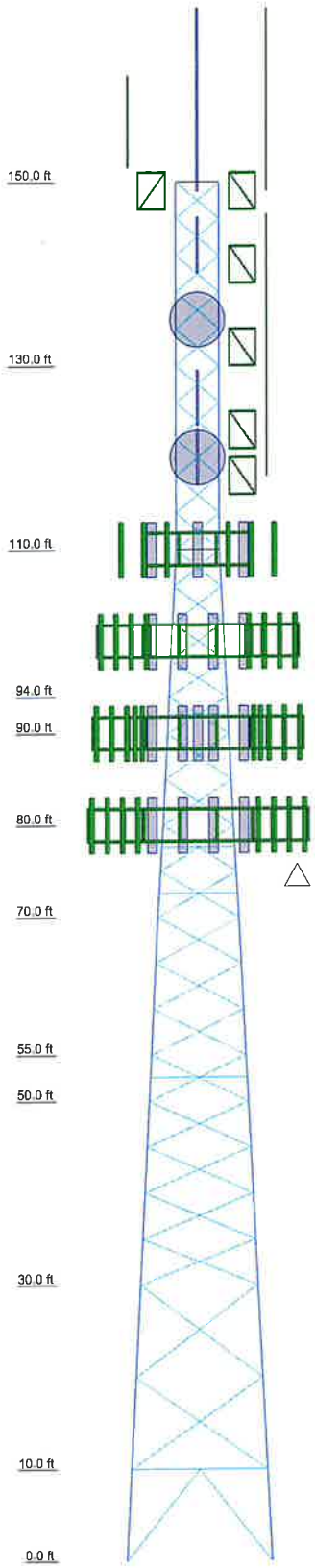
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs		SR 4 1/2" solid	SR 4 1/4" solid		SR 3 3/4" solid	SR 3 1/4" solid			SR 2 3/4" solid	SR 2 1/2" solid	SR 2 1/4" solid
Leg Grade						A572-50					
Diagonals		L3 1/2x3 /12x1/4	L 3 x 3 x 3/16		L 2 1/2x 2 1/2x 1/4	L2 1/2x2 1/2x3/16			L 2 x 2 x 3/16	L3 1/4x1 3/4x3/16	L 1 1/2x1 1/2x3/16
Diagonal Grade						A572-50					
Top Girts			N.A.				N.A.		L 2 x 2 x 3/16	N.A.	L 1.5 x 1.5 x 3/16
Horizontals	A					C	N.A.	B			
Sec. Horizontals		N.A.		D	N.A.				N.A.		
Red. Horizontals	E						N.A.				
Red. Diagonals	D						N.A.				
Inner Bracing	L 3 x 3 x 1/4						N.A.				
Face Width (ft)	15.8667	12.8224	10.7928	10.2855	8.76329	7.74852	6.7337	6.32784	4.7042		
# Panels @ (ft)		3 @ 10	12 @ 5						15 @ 4		
Weight (K)	21.55	4.4	4.0	1.0	2.5	1.4	1.2	0.4	1.4	1.4	1.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
ANT150F6	149	(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	100
DS9A09F36D-N	149	(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	100
1151-3	149	(3) RRH2X40-AWS	100
Rohn 6' Side-Arm(1)	149	(3) RRH2X40-AWS	100
Rohn 6' Side-Arm(1)	149	(3) RRH2X40-AWS	100
Rohn 6' Side-Arm(1)	149	DB-T1-6Z-8AB-0Z	100
ANT220F2	141	Pirod 12' T-Frame Sector Mount (1)	100
ANT150F2	141	Pirod 12' T-Frame Sector Mount (1)	100
Rohn 6' Side-Arm(1)	141	Pirod 12' T-Frame Sector Mount (1)	100
Rohn 6' Side-Arm(1)	141	(2) BXA-70063-6CF-EDIN-0 w/ Mount Pipe	100
6'x2" Pipe Mount	135	(2) BXA-70063-6CF-EDIN-0 w/ Mount Pipe	100
PAL6-59	135	APXVSPP18-C_TIA w/ Mount Pipe	90
Rohn 6' Side-Arm(1)	132	FD-RRH-2x50-800	90
CO-36A	132	FD-RRH-2x50-800	90
Rohn 6' Side-Arm(1)	124	FD-RRH-2x50-800	90
ANT150F2	124	Pirod 12' T-Frame Sector Mount (1)	90
Rohn 6' Side-Arm(1)	123	Pirod 12' T-Frame Sector Mount (1)	90
CO-36A	123	Pirod 12' T-Frame Sector Mount (1)	90
6'x2" Pipe Mount	120	APXVSPP18-C_TIA w/ Mount Pipe	90
PAL6-59	120	APXVSPP18-C_TIA w/ Mount Pipe	90
Rohn 6' Side-Arm(1)	118	(2) AIR 21	80
Rohn 6' Side-Arm(1)	118	KRY 112 144/1	80
ANT220F2	118	KRY 112 144/1	80
CO-36A	118	KRY 112 144/1	80
(3) QS6656-5_TIA w/ Mount Pipe	110	Pirod 12' T-Frame Sector Mount (1)	80
B2/B66A RRH-BR049	110	Pirod 12' T-Frame Sector Mount (1)	80
B2/B66A RRH-BR049	110	Pirod 12' T-Frame Sector Mount (1)	80
B2/B66A RRH-BR049	110	(2) AIR 21	80
B5/B13 RRH-BR04C	110	(2) AIR 21	80
B5/B13 RRH-BR04C	110	Secondarty Members 30'-20'	25
B5/B13 RRH-BR04C	110	Secondarty Members 30'-20'	25
DB-C1-12C-24AB-0Z	110	Secondarty Members 30'-20'	25
(3) Armor Tower Engineering 12-Ft Arch Frame	110	Secondarty Members 20'-10'	15
(3) QS6656-5_TIA w/ Mount Pipe	110	Secondarty Members 20'-10'	15
(3) QS6656-5_TIA w/ Mount Pipe	110	Secondarty Members 20'-10'	15
(2) BXA-70063-6CF-EDIN-0 w/ Mount Pipe	100		
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	100		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L3 1/2x3 /12x1/4	D	L 2 1/2x 2 1/2x 1/4
B	L 2 x 2 x 1/4	E	L2 1/2x2 1/2x1/4
C	L2 1/2x2 1/2x3/16		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

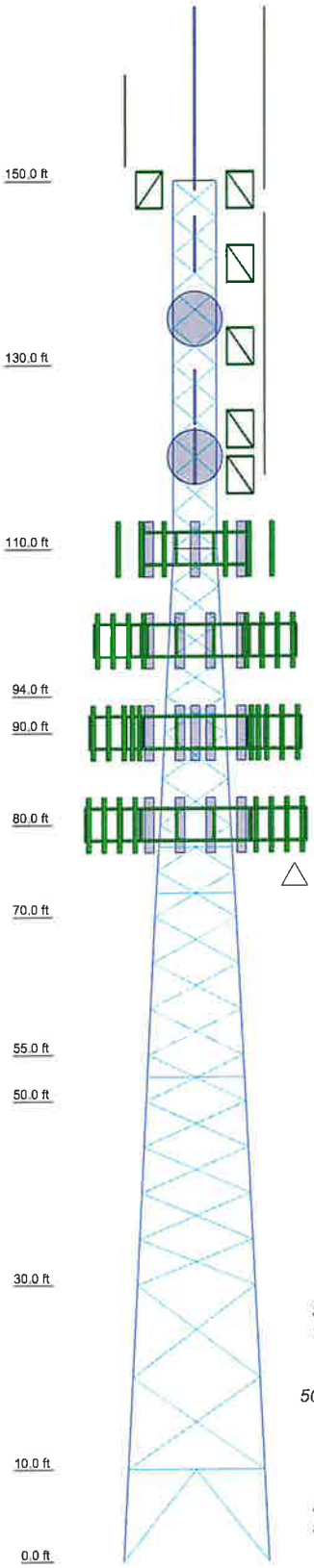
1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 130 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category III.
7. Topographic Category 1 with Crest Height of 0.00 ft

PJFLogo

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

Job: *150-Ft Self-Support Tower: Norwalk 4: Norwalk, C*		
Project: *42919-0013.001.8700*		
Client: On-Air Engineering	Drawn by: Kurt Swarts	App'd:
Code: TIA-222-G	Date: 10/28/19	Scale: NTS
Path: G:\TOWER\429_On Air Engineering\2019\42919.0013 - Norwalk 4 CT\1\[42919.0013.001.8700.eri]		Dwg No. E-1

Section	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs		SR 4 1/2" solid	SR 4 1/4" solid		SR 3 3/4" solid	SR 3 1/4" solid			SR 2 3/4" solid	SR 2 1/2" solid	SR 2 1/4" solid
Leg Grade						A572-50					
Diagonals	L3 1/2x3 /12x1/4		L 3 x 3 x 3/16		L 2 1/2x 2 1/2x 1/4	L2 1/2x2 1/2x3/16			L 2 x 2 x 3/16	L 1 3/4x1 3/4x3/16	L1 1/2x1 1/2x3/16
Diagonal Grade						A572-50					
Top Girts			N.A.			N.A.			L 2 x 2 x 3/16	N.A.	L 1.5 x 1.5 x 3/16
Horizontals	A										
Sec. Horizontals		N.A.		D	N.A.	C	N.A.	B		N.A.	
Red. Horizontals	E					N.A.					
Red. Diagonals	D					N.A.					
Inner Bracing	L 3 x 3 x 1/4					N.A.					
Face Width (ft)	15.8667	12.8224		10.7928	10.2855	8.76329	7.74852	6.73378	4.32784		4.7042
# Panels @ (ft)		3 @ 10			12 @ 5				15 @ 4		
Weight (K)	21.5	44	40	10	25	14	12	6.4	14	14	12



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L3 1/2x3 /12x1/4	D	L 2 1/2x 2 1/2x 1/4
B	L 2 x 2 x 1/4	E	L2 1/2x2 1/2x1/4
C	L2 1/2x2 1/2x3/16		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 130 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category III.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 95.4%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 337 K
SHEAR: 33 K

UPLIFT: -299 K
SHEAR: 30 K

AXIAL 109 K
SHEAR 14 K
MOMENT 1185 kip-ft

TORQUE 6 kip-ft
50 mph WIND - 0.7500 in ICE

AXIAL 45 K
SHEAR 55 K
MOMENT 4445 kip-ft

TORQUE 29 kip-ft
REACTIONS - 130 mph WIND

PJFLogo
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Columbus, OH 43215
Phone: 614-221-6679
FAX:

Job: **150-Ft Self-Support Tower: Norwalk 4: Norwalk, C**			
Project: **42919-0013.001.8700**			
Client: On-Air Engineering	Drawn by: Kurt Swarts	App'd:	
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Path: G:\TOWER\429 On Air Engineering\2019\42919.0013 - Norwalk 4 CT\TNX\42919.0013.001.8700.eri		Dwg No. E-1	

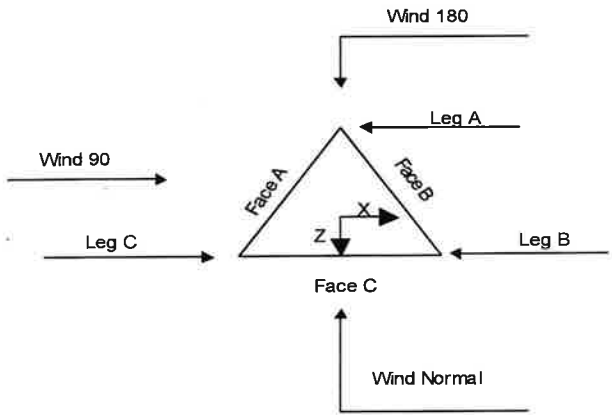
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 150.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 4.70 ft at the top and 15.87 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1) Tower is located in Fairfield County, Connecticut.
2) ASCE 7-10 Wind Data is used.
3) Basic wind speed of 130 mph.
4) Risk Category III.
5) Exposure Category C.
6) Topographic Category 1.
7) Crest Height 0.00 ft.
8) Nominal ice thickness of 0.7500 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56 pcf.
11) A wind speed of 50 mph is used in combination with ice.
12) Deflections calculated using a wind speed of 60 mph.
13) A non-linear (P-delta) analysis was used.
14) Pressures are calculated at each section.
15) Stress ratio used in tower member design is 1.
16) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	150.00-130.00			4.70	1	20.00
T2	130.00-110.00			4.70	1	20.00
T3	110.00-94.00			4.70	1	16.00
T4	94.00-90.00			6.33	1	4.00
T5	90.00-80.00			6.73	1	10.00
T6	80.00-70.00			7.75	1	10.00
T7	70.00-55.00			8.76	1	15.00
T8	55.00-50.00			10.29	1	5.00
T9	50.00-30.00			10.79	1	20.00
T10	30.00-10.00			12.82	1	20.00
T11	10.00-0.00			14.85	1	10.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	150.00-130.00	4.00	X Brace	No	No	0.0000	0.0000
T2	130.00-110.00	4.00	X Brace	No	No	0.0000	0.0000
T3	110.00-94.00	4.00	X Brace	No	No	0.0000	0.0000
T4	94.00-90.00	4.00	X Brace	No	Yes	0.0000	0.0000
T5	90.00-80.00	5.00	X Brace	No	No	0.0000	0.0000
T6	80.00-70.00	5.00	X Brace	No	Yes	0.0000	0.0000
T7	70.00-55.00	5.00	X Brace	No	No	0.0000	0.0000
T8	55.00-50.00	5.00	X Brace	No	Yes	0.0000	0.0000
T9	50.00-30.00	5.00	X Brace	No	No	0.0000	0.0000
T10	30.00-10.00	10.00	X Brace	No	No	0.0000	0.0000
T11	10.00-0.00	10.00	K1 Down	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 150.00-130.00	Solid Round	2 1/4" solid	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x3/16	A572-50 (50 ksi)
T2 130.00-110.00	Solid Round	2 1/2" solid	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A572-50 (50 ksi)
T3 110.00-94.00	Solid Round	2 3/4" solid	A572-50 (50 ksi)	Single Angle	L 2 x 2 x 3/16	A572-50 (50 ksi)
T4 94.00-90.00	Solid Round	2 3/4" solid	A572-50 (50 ksi)	Single Angle	L 2 x 2 x 3/16	A572-50 (50 ksi)
T5 90.00-80.00	Solid Round	3 1/4" solid	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A572-50 (50 ksi)
T6 80.00-70.00	Solid Round	3 1/4" solid	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A572-50 (50 ksi)
T7 70.00-55.00	Solid Round	3 3/4" solid	A572-50 (50 ksi)	Single Angle	L 2 1/2x 2 1/2x 1/4	A572-50 (50 ksi)
T8 55.00-50.00	Solid Round	3 3/4" solid	A572-50 (50 ksi)	Single Angle	L 2 1/2x 2 1/2x 1/4	A572-50 (50 ksi)
T9 50.00-30.00	Solid Round	4 1/4" solid	A572-50 (50 ksi)	Single Angle	L 3 x 3 x 3/16	A572-50 (50 ksi)
T10 30.00-10.00	Solid Round	4 1/2" solid	A572-50 (50 ksi)	Single Angle	L3 1/2x3 /12x1/4	A572-50 (50 ksi)
T11 10.00-0.00	Solid Round	4 1/2" solid	A572-50 (50 ksi)	Single Angle	L3 1/2x3 /12x1/4	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 150.00-130.00	Single Angle	L 1.5 x 1.5 x 3/16	A572-50 (50 ksi)	Single Angle		A36 (36 ksi)
T3 110.00-94.00	Single Angle	L 2 x 2 x 3/16	A572-50 (50 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T11 10.00-0.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3 1/2x3 /12x1/4	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T4 94.00-90.00	Single Angle	L 2 x 2 x 1/4	A572-50	Single Angle		A572-50

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T6 80.00-70.00	Single Angle	L2 1/2x2 1/2x3/16	(50 ksi) A572-50 (50 ksi)	Single Angle		(50 ksi) A572-50 (50 ksi)
T8 55.00-50.00	Single Angle	L 2 1/2x 2 1/2x 1/4	(50 ksi) A572-50 (50 ksi)	Single Angle		(50 ksi) A572-50 (50 ksi)
T11 10.00-0.00	Solid Round		(50 ksi) A572-50 (50 ksi)	Single Angle	L 3 x 3 x 1/4	(50 ksi) A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T11 10.00-0.00	A572-50 (50 ksi)	Horizontal (1)	Single Angle	L2 1/2x2 1/2x1/4	1
		Diagonal (1)	Single Angle	L 2 1/2x 2 1/2x 1/4	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 150.00-130.00	0.00	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 130.00-110.00	0.00	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 110.00-94.00	0.00	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 94.00-90.00	0.00	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 90.00-80.00	0.00	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 80.00-70.00	0.00	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 70.00-55.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 55.00-50.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T9 50.00-30.00	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T10 30.00-10.00	0.00	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T11 10.00-0.00	0.00	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 150.00-130.00	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T2 130.00-110.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T3 110.00-94.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T4 94.00-90.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	0.5	1
T5 90.00-80.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T6 80.00-70.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	0.5	1
T7 70.00-55.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T8 55.00-50.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	0.5	1
T9 50.00-30.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T10 30.00-10.00	No	No	0.5	0.5	1	1	1	1	1	1
				1	1	1	1	1	1	1
T11 10.00-0.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 150.00-130.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 130.00-110.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 110.00-94.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 94.00-90.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 90.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 80.00-70.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 70.00-55.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 55.00-50.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 50.00-30.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 30.00-10.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T11 10.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 150.00-130.00	Flange	0.8750 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 130.00-110.00	Flange	1.0000 A325N	5	0.6250 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 110.00-94.00	Flange	1.0000 A325N	5	0.6250 A325N	1	0.6250 A325N	1	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 94.00-90.00	Flange	0.0000 A325N	0	0.6250 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1
T5 90.00-80.00	Flange	1.0000 A325N	7	0.6250 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 80.00-70.00	Flange	0.0000 A325N	0	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1
T7 70.00-55.00	Flange	1.5000 A325N	5	0.7500 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 55.00-50.00	Flange	0.0000 A325N	0	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	0	0.6250 A325N	1
T9 50.00-30.00	Flange	1.5000 A325N	5	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 30.00-10.00	Flange	1.5000 A325N	5	0.6250 A325N	2	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11 10.00-0.00	Flange	1.5000 F1554-105	7	0.6250 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	2	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1.5" flat Cable Ladder Rail	B	No	No	Af (CaAa)	150.00 - 0.00	0.0000	-0.4	2	2	30.0000 1.5000	1.5000		1.80
LDF7-50A (1 5/8" foam)	B	No	No	Ar (CaAa)	149.00 - 141.00	0.0000	-0.4	4	4	1.0000 0.5000	1.9800		0.92
LDF7-50A (1 5/8" foam)	B	No	No	Ar (CaAa)	141.00 - 132.00	0.0000	-0.4	6	6	1.0000 0.5000	1.9800		0.92
EP65(ELLIPTICAL)	B	No	No	Ar (CaAa)	135.00 - 0.00	0.0000	-0.34	1	1	2.0000	2.0000		0.67
LDF7-50A (1 5/8" foam)	B	No	No	Ar (CaAa)	132.00 - 124.00	0.0000	-0.4	7	6	1.0000 0.5000	1.9800		0.92
LDF7-50A (1 5/8" foam)	B	No	No	Ar (CaAa)	124.00 - 123.00	0.0000	-0.4	8	6	1.0000 0.5000	1.9800		0.92
LDF7-50A (1 5/8" foam)	B	No	No	Ar (CaAa)	123.00 - 118.00	0.0000	-0.4	9	6	1.0000 0.5000	1.9800		0.92
EP65(ELLIPTICAL)	B	No	No	Ar (CaAa)	120.00 - 0.00	0.0000	-0.32	1	1	2.0000	2.0000		0.67
LDF7-50A (1 5/8" foam) ****	B	No	No	Ar (CaAa)	118.00 - 0.00	0.0000	-0.4	11	6	1.0000 0.5000	1.9800		0.92
1.5" flat Cable Ladder Rail	B	No	No	Af (CaAa)	110.00 - 0.00	0.0000	0.4	2	2	30.0000 1.5000	1.5000		1.80
HB158-1-08U8-S8F18(1 5/8") ****	B	No	No	Ar (CaAa)	110.00 - 0.00	0.0000	0.4	1	1	1.0000 0.5000	1.9800		1.70
1.5" flat Cable Ladder Rail	C	No	No	Af (CaAa)	100.00 - 0.00	0.0000	-0.4	2	2	30.0000 1.5000	1.5000		1.80
LDF7-50A (1 5/8" foam)	C	No	No	Ar (CaAa)	100.00 - 0.00	0.0000	-0.4	5	3	1.0000 0.5000	1.9800		0.92

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" flat Cable Ladder Rail	C	No	No	Af (CaAa)	90.00 - 0.00	0.0000	0.4	2	2	30.0000 1.5000	1.5000		1.80
LDF7-50A (1 5/8" foam)	C	No	No	Ar (CaAa)	90.00 - 0.00	0.0000	0.4	6	3	1.0000 0.5000	1.9800		0.92
***													
1.5" flat Cable Ladder Rail	A	No	No	Af (CaAa)	80.00 - 0.00	0.0000	-0.4	2	2	30.0000 1.5000	1.5000		1.80
LDF7-50A (1 5/8" foam)	A	No	No	Ar (CaAa)	80.00 - 0.00	0.0000	-0.4	8	4	1.0000 0.5000	1.9800		0.92

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	150.00-130.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	30.800	0.000	0.17
		C	0.000	0.000	0.000	0.000	0.00
T2	130.00-110.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	52.234	0.000	0.26
		C	0.000	0.000	0.000	0.000	0.00
T3	110.00-94.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	60.416	0.000	0.33
		C	0.000	0.000	8.940	0.000	0.05
T4	94.00-90.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	15.104	0.000	0.08
		C	0.000	0.000	5.960	0.000	0.03
T5	90.00-80.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	37.760	0.000	0.20
		C	0.000	0.000	31.780	0.000	0.17
T6	80.00-70.00	A	0.000	0.000	20.840	0.000	0.11
		B	0.000	0.000	37.760	0.000	0.20
		C	0.000	0.000	31.780	0.000	0.17
T7	70.00-55.00	A	0.000	0.000	31.260	0.000	0.16
		B	0.000	0.000	56.640	0.000	0.31
		C	0.000	0.000	47.670	0.000	0.26
T8	55.00-50.00	A	0.000	0.000	10.420	0.000	0.05
		B	0.000	0.000	18.880	0.000	0.10
		C	0.000	0.000	15.890	0.000	0.09
T9	50.00-30.00	A	0.000	0.000	41.680	0.000	0.22
		B	0.000	0.000	75.520	0.000	0.41
		C	0.000	0.000	63.560	0.000	0.35
T10	30.00-10.00	A	0.000	0.000	41.680	0.000	0.22
		B	0.000	0.000	75.520	0.000	0.41
		C	0.000	0.000	63.560	0.000	0.35
T11	10.00-0.00	A	0.000	0.000	20.840	0.000	0.11
		B	0.000	0.000	37.760	0.000	0.20
		C	0.000	0.000	31.780	0.000	0.17

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	150.00-130.00	A	1.733	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	71.136	0.000	1.11
		C		0.000	0.000	0.000	0.000	0.00
T2	130.00-110.00	A	1.707	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		B		0.000	0.000	94.312	0.000	1.60
		C		0.000	0.000	0.000	0.000	0.00
T3	110.00-94.00	A	1.679	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	106.574	0.000	1.85
		C		0.000	0.000	17.335	0.000	0.28
T4	94.00-90.00	A	1.662	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	26.525	0.000	0.46
		C		0.000	0.000	11.505	0.000	0.18
T5	90.00-80.00	A	1.649	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	66.086	0.000	1.14
		C		0.000	0.000	57.329	0.000	0.95
T6	80.00-70.00	A	1.628	0.000	0.000	31.689	0.000	0.57
		B		0.000	0.000	65.733	0.000	1.12
		C		0.000	0.000	57.022	0.000	0.94
T7	70.00-55.00	A	1.599	0.000	0.000	47.208	0.000	0.84
		B		0.000	0.000	97.839	0.000	1.66
		C		0.000	0.000	84.874	0.000	1.38
T8	55.00-50.00	A	1.571	0.000	0.000	15.634	0.000	0.28
		B		0.000	0.000	32.375	0.000	0.54
		C		0.000	0.000	28.085	0.000	0.45
T9	50.00-30.00	A	1.529	0.000	0.000	61.913	0.000	1.08
		B		0.000	0.000	128.047	0.000	2.12
		C		0.000	0.000	111.078	0.000	1.77
T10	30.00-10.00	A	1.427	0.000	0.000	60.401	0.000	1.03
		B		0.000	0.000	124.521	0.000	1.99
		C		0.000	0.000	108.017	0.000	1.66
T11	10.00-0.00	A	1.242	0.000	0.000	28.838	0.000	0.46
		B		0.000	0.000	59.083	0.000	0.88
		C		0.000	0.000	51.249	0.000	0.74

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	150.00-130.00	1.0930	-10.5203	1.0560	-9.7670
T2	130.00-110.00	1.6412	-13.1295	1.6209	-11.6737
T3	110.00-94.00	6.7492	-9.9969	7.4289	-7.9294
T4	94.00-90.00	9.0946	-8.4688	9.2125	-6.0053
T5	90.00-80.00	3.8876	-6.7052	5.1274	-4.4088
T6	80.00-70.00	-1.0262	-3.0429	-0.2190	-1.3304
T7	70.00-55.00	-1.2631	-3.6592	-0.2952	-1.6345
T8	55.00-50.00	-1.2072	-3.5029	-0.3089	-1.6166
T9	50.00-30.00	-1.3839	-3.9621	-0.3843	-1.8889
T10	30.00-10.00	-1.7448	-4.8992	-0.5455	-2.4283
T11	10.00-0.00	-1.6336	-4.6130	-0.6291	-2.5292

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	1.5" flat Cable Ladder Rail	130.00 - 150.00	0.6000	0.5507
T1	2	LDF7-50A (1 5/8" foam)	141.00 - 149.00	0.6000	0.5507
T1	3	LDF7-50A (1 5/8" foam)	132.00 - 141.00	0.6000	0.5507
T1	4	EP65(ELLIPTICAL)	130.00 -	0.6000	0.5507

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	5	LDF7-50A (1 5/8" foam)	135.00 - 130.00	0.6000	0.5507
T2	1	1.5" flat Cable Ladder Rail	132.00 - 110.00	0.6000	0.5547
T2	4	EP65(ELLIPTICAL)	130.00 - 110.00	0.6000	0.5547
T2	5	LDF7-50A (1 5/8" foam)	130.00 - 124.00	0.6000	0.5547
T2	6	LDF7-50A (1 5/8" foam)	130.00 - 123.00	0.6000	0.5547
T2	7	LDF7-50A (1 5/8" foam)	124.00 - 118.00	0.6000	0.5547
T2	8	EP65(ELLIPTICAL)	123.00 - 110.00	0.6000	0.5547
T2	9	LDF7-50A (1 5/8" foam)	120.00 - 110.00	0.6000	0.5547
T3	1	1.5" flat Cable Ladder Rail	118.00 - 94.00	0.6000	0.5563
T3	4	EP65(ELLIPTICAL)	110.00 - 94.00	0.6000	0.5563
T3	8	EP65(ELLIPTICAL)	110.00 - 94.00	0.6000	0.5563
T3	9	LDF7-50A (1 5/8" foam)	110.00 - 94.00	0.6000	0.5563
T3	11	1.5" flat Cable Ladder Rail	110.00 - 94.00	0.6000	0.5563
T3	12	HB158-1-08U8-S8F18(1 5/8")	110.00 - 94.00	0.6000	0.5563
T3	14	1.5" flat Cable Ladder Rail	110.00 - 94.00	0.6000	0.5563
T3	15	LDF7-50A (1 5/8" foam)	100.00 - 94.00	0.6000	0.5563
T4	1	1.5" flat Cable Ladder Rail	100.00 - 90.00	0.6000	0.5117
T4	4	EP65(ELLIPTICAL)	94.00 - 90.00	0.6000	0.5117
T4	8	EP65(ELLIPTICAL)	94.00 - 90.00	0.6000	0.5117
T4	9	LDF7-50A (1 5/8" foam)	94.00 - 90.00	0.6000	0.5117
T4	11	1.5" flat Cable Ladder Rail	94.00 - 90.00	0.6000	0.5117
T4	12	HB158-1-08U8-S8F18(1 5/8")	94.00 - 90.00	0.6000	0.5117
T4	14	1.5" flat Cable Ladder Rail	94.00 - 90.00	0.6000	0.5117
T4	15	LDF7-50A (1 5/8" foam)	94.00 - 90.00	0.6000	0.5117
T5	1	1.5" flat Cable Ladder Rail	94.00 - 80.00	0.6000	0.6000
T5	4	EP65(ELLIPTICAL)	90.00 - 80.00	0.6000	0.6000
T5	8	EP65(ELLIPTICAL)	90.00 - 80.00	0.6000	0.6000
T5	9	LDF7-50A (1 5/8" foam)	90.00 - 80.00	0.6000	0.6000
T5	11	1.5" flat Cable Ladder Rail	90.00 - 80.00	0.6000	0.6000
T5	12	HB158-1-08U8-S8F18(1 5/8")	90.00 - 80.00	0.6000	0.6000
T5	14	1.5" flat Cable Ladder Rail	90.00 - 80.00	0.6000	0.6000
T5	15	LDF7-50A (1 5/8" foam)	90.00 - 80.00	0.6000	0.6000
T5	17	1.5" flat Cable Ladder Rail	90.00 - 80.00	0.6000	0.6000
T5	18	LDF7-50A (1 5/8" foam)	90.00 - 80.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T6	1	1.5" flat Cable Ladder Rail	70.00 - 80.00	0.6000	0.5761
T6	4	EP65(ELLIPTICAL)	70.00 - 80.00	0.6000	0.5761
T6	8	EP65(ELLIPTICAL)	70.00 - 80.00	0.6000	0.5761
T6	9	LDF7-50A (1 5/8" foam)	70.00 - 80.00	0.6000	0.5761
T6	11	1.5" flat Cable Ladder Rail	70.00 - 80.00	0.6000	0.5761
T6	12	HB158-1-08U8-S8F18(1 5/8")	70.00 - 80.00	0.6000	0.5761
T6	14	1.5" flat Cable Ladder Rail	70.00 - 80.00	0.6000	0.5761
T6	15	LDF7-50A (1 5/8" foam)	70.00 - 80.00	0.6000	0.5761
T6	17	1.5" flat Cable Ladder Rail	70.00 - 80.00	0.6000	0.5761
T6	18	LDF7-50A (1 5/8" foam)	70.00 - 80.00	0.6000	0.5761
T6	20	1.5" flat Cable Ladder Rail	70.00 - 80.00	0.6000	0.5761
T6	21	LDF7-50A (1 5/8" foam)	70.00 - 80.00	0.6000	0.5761
T7	1	1.5" flat Cable Ladder Rail	55.00 - 70.00	0.6000	0.6000
T7	4	EP65(ELLIPTICAL)	55.00 - 70.00	0.6000	0.6000
T7	8	EP65(ELLIPTICAL)	55.00 - 70.00	0.6000	0.6000
T7	9	LDF7-50A (1 5/8" foam)	55.00 - 70.00	0.6000	0.6000
T7	11	1.5" flat Cable Ladder Rail	55.00 - 70.00	0.6000	0.6000
T7	12	HB158-1-08U8-S8F18(1 5/8")	55.00 - 70.00	0.6000	0.6000
T7	14	1.5" flat Cable Ladder Rail	55.00 - 70.00	0.6000	0.6000
T7	15	LDF7-50A (1 5/8" foam)	55.00 - 70.00	0.6000	0.6000
T7	17	1.5" flat Cable Ladder Rail	55.00 - 70.00	0.6000	0.6000
T7	18	LDF7-50A (1 5/8" foam)	55.00 - 70.00	0.6000	0.6000
T7	20	1.5" flat Cable Ladder Rail	55.00 - 70.00	0.6000	0.6000
T7	21	LDF7-50A (1 5/8" foam)	55.00 - 70.00	0.6000	0.6000
T8	1	1.5" flat Cable Ladder Rail	50.00 - 55.00	0.6000	0.6000
T8	4	EP65(ELLIPTICAL)	50.00 - 55.00	0.6000	0.6000
T8	8	EP65(ELLIPTICAL)	50.00 - 55.00	0.6000	0.6000
T8	9	LDF7-50A (1 5/8" foam)	50.00 - 55.00	0.6000	0.6000
T8	11	1.5" flat Cable Ladder Rail	50.00 - 55.00	0.6000	0.6000
T8	12	HB158-1-08U8-S8F18(1 5/8")	50.00 - 55.00	0.6000	0.6000
T8	14	1.5" flat Cable Ladder Rail	50.00 - 55.00	0.6000	0.6000
T8	15	LDF7-50A (1 5/8" foam)	50.00 - 55.00	0.6000	0.6000
T8	17	1.5" flat Cable Ladder Rail	50.00 - 55.00	0.6000	0.6000
T8	18	LDF7-50A (1 5/8" foam)	50.00 - 55.00	0.6000	0.6000
T8	20	1.5" flat Cable Ladder Rail	50.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T8	21	LDF7-50A (1 5/8" foam)	55.00 50.00 - 55.00	0.6000	0.6000
T9	1	1.5" flat Cable Ladder Rail	30.00 - 50.00	0.6000	0.6000
T9	4	EP65(ELLIPTICAL)	30.00 - 50.00	0.6000	0.6000
T9	8	EP65(ELLIPTICAL)	30.00 - 50.00	0.6000	0.6000
T9	9	LDF7-50A (1 5/8" foam)	30.00 - 50.00	0.6000	0.6000
T9	11	1.5" flat Cable Ladder Rail	30.00 - 50.00	0.6000	0.6000
T9	12	HB158-1-08U8-S8F18(1 5/8")	30.00 - 50.00	0.6000	0.6000
T9	14	1.5" flat Cable Ladder Rail	30.00 - 50.00	0.6000	0.6000
T9	15	LDF7-50A (1 5/8" foam)	30.00 - 50.00	0.6000	0.6000
T9	17	1.5" flat Cable Ladder Rail	30.00 - 50.00	0.6000	0.6000
T9	18	LDF7-50A (1 5/8" foam)	30.00 - 50.00	0.6000	0.6000
T9	20	1.5" flat Cable Ladder Rail	30.00 - 50.00	0.6000	0.6000
T9	21	LDF7-50A (1 5/8" foam)	30.00 - 50.00	0.6000	0.6000
T10	1	1.5" flat Cable Ladder Rail	10.00 - 30.00	0.6000	0.6000
T10	4	EP65(ELLIPTICAL)	10.00 - 30.00	0.6000	0.6000
T10	8	EP65(ELLIPTICAL)	10.00 - 30.00	0.6000	0.6000
T10	9	LDF7-50A (1 5/8" foam)	10.00 - 30.00	0.6000	0.6000
T10	11	1.5" flat Cable Ladder Rail	10.00 - 30.00	0.6000	0.6000
T10	12	HB158-1-08U8-S8F18(1 5/8")	10.00 - 30.00	0.6000	0.6000
T10	14	1.5" flat Cable Ladder Rail	10.00 - 30.00	0.6000	0.6000
T10	15	LDF7-50A (1 5/8" foam)	10.00 - 30.00	0.6000	0.6000
T10	17	1.5" flat Cable Ladder Rail	10.00 - 30.00	0.6000	0.6000
T10	18	LDF7-50A (1 5/8" foam)	10.00 - 30.00	0.6000	0.6000
T10	20	1.5" flat Cable Ladder Rail	10.00 - 30.00	0.6000	0.6000
T10	21	LDF7-50A (1 5/8" foam)	10.00 - 30.00	0.6000	0.6000
T11	1	1.5" flat Cable Ladder Rail	0.00 - 10.00	0.6000	0.6000
T11	4	EP65(ELLIPTICAL)	0.00 - 10.00	0.6000	0.6000
T11	8	EP65(ELLIPTICAL)	0.00 - 10.00	0.6000	0.6000
T11	9	LDF7-50A (1 5/8" foam)	0.00 - 10.00	0.6000	0.6000
T11	11	1.5" flat Cable Ladder Rail	0.00 - 10.00	0.6000	0.6000
T11	12	HB158-1-08U8-S8F18(1 5/8")	0.00 - 10.00	0.6000	0.6000
T11	14	1.5" flat Cable Ladder Rail	0.00 - 10.00	0.6000	0.6000
T11	15	LDF7-50A (1 5/8" foam)	0.00 - 10.00	0.6000	0.6000
T11	17	1.5" flat Cable Ladder Rail	0.00 - 10.00	0.6000	0.6000
T11	18	LDF7-50A (1 5/8" foam)	0.00 - 10.00	0.6000	0.6000
T11	20	1.5" flat Cable Ladder Rail	0.00 - 10.00	0.6000	0.6000
T11	21	LDF7-50A (1 5/8" foam)	0.00 - 10.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
ANT150F6	A	From Leg	6.00	0.0000		149.00	No Ice	4.80	4.80	0.03
			0.00				1/2" Ice	6.83	6.83	0.07
			10.00				1" Ice	8.87	8.87	0.11
DS9A09F36D-N	B	From Leg	6.00	0.0000		149.00	No Ice	4.83	4.83	0.05
			0.00				1/2" Ice	7.71	7.71	0.09
			10.00				1" Ice	9.68	9.68	0.14
1151-3	C	From Leg	6.00	0.0000		149.00	No Ice	3.83	3.83	0.02
			0.00				1/2" Ice	5.73	5.73	0.05
			7.60				1" Ice	7.30	7.30	0.09
Rohn 6' Side-Arm(1)	A	From Leg	3.00	0.0000		149.00	No Ice	10.60	10.60	0.14
			0.00				1/2" Ice	15.40	15.40	0.21
			0.00				1" Ice	20.20	20.20	0.28
Rohn 6' Side-Arm(1)	B	From Leg	3.00	0.0000		149.00	No Ice	10.60	10.60	0.14
			0.00				1/2" Ice	15.40	15.40	0.21
			0.00				1" Ice	20.20	20.20	0.28
Rohn 6' Side-Arm(1)	C	From Leg	3.00	0.0000		149.00	No Ice	10.60	10.60	0.14
			0.00				1/2" Ice	15.40	15.40	0.21
			0.00				1" Ice	20.20	20.20	0.28
***										
ANT220F2	A	From Leg	6.00	0.0000		141.00	No Ice	0.96	0.96	0.01
			0.00				1/2" Ice	1.29	1.29	0.02
			2.20				1" Ice	1.56	1.56	0.03
ANT150F2	B	From Leg	6.00	0.0000		141.00	No Ice	1.20	1.20	0.01
			0.00				1/2" Ice	1.60	1.60	0.02
			2.50				1" Ice	1.91	1.91	0.04
Rohn 6' Side-Arm(1)	A	From Leg	3.00	0.0000		141.00	No Ice	10.60	10.60	0.14
			0.00				1/2" Ice	15.40	15.40	0.21
			0.00				1" Ice	20.20	20.20	0.28
Rohn 6' Side-Arm(1)	B	From Leg	3.00	0.0000		141.00	No Ice	10.60	10.60	0.14
			0.00				1/2" Ice	15.40	15.40	0.21
			0.00				1" Ice	20.20	20.20	0.28
****										
6'x2" Pipe Mount	A	From Leg	1.00	0.0000		135.00	No Ice	1.20	1.20	0.07
			0.00				1/2" Ice	1.80	1.80	0.08
			0.00				1" Ice	2.17	2.17	0.09
****										
CO-36A	B	From Leg	6.00	0.0000		132.00	No Ice	0.75	0.75	0.01
			0.00				1/2" Ice	1.96	1.96	0.02
			6.00				1" Ice	3.19	3.19	0.04
Rohn 6' Side-Arm(1)	B	From Leg	3.00	0.0000		132.00	No Ice	10.60	10.60	0.14
			0.00				1/2" Ice	15.40	15.40	0.21
			0.00				1" Ice	20.20	20.20	0.28
****										
ANT150F2	A	From Leg	6.00	0.0000		124.00	No Ice	1.21	1.21	0.01
			0.00				1/2" Ice	1.60	1.60	0.02
			2.50				1" Ice	1.91	1.91	0.04
Rohn 6' Side-Arm(1)	A	From Leg	3.00	0.0000		124.00	No Ice	10.60	10.60	0.14

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 0.00			1/2" Ice 1" Ice	15.40 20.20	15.40 20.20	0.21 0.28
****									
CO-36A	B	From Leg	6.00 0.00 6.00	0.0000	123.00	No Ice 1/2" Ice 1" Ice	0.75 1.96 3.19	0.75 1.96 3.19	0.01 0.02 0.04
Rohn 6' Side-Arm(1)	B	From Leg	3.00 0.00 0.00	0.0000	123.00	No Ice 1/2" Ice 1" Ice	10.60 15.40 20.20	10.60 15.40 20.20	0.14 0.21 0.28
****									
6'x2" Pipe Mount	A	From Leg	1.00 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice	1.20 1.80 2.17	1.20 1.80 2.17	0.07 0.08 0.09
****									
ANT220F2	A	From Leg	6.00 0.00 2.20	0.0000	118.00	No Ice 1/2" Ice 1" Ice	0.98 1.29 1.56	0.98 1.29 1.56	0.01 0.02 0.03
CO-36A	B	From Leg	6.00 0.00 6.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice	0.75 1.96 3.19	0.75 1.96 3.19	0.01 0.02 0.04
Rohn 6' Side-Arm(1)	A	From Leg	3.00 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice	10.60 15.40 20.20	10.60 15.40 20.20	0.14 0.21 0.28
Rohn 6' Side-Arm(1)	B	From Leg	3.00 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice 1" Ice	10.60 15.40 20.20	10.60 15.40 20.20	0.14 0.21 0.28
****									
(3) QS6656-5_TIA w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	8.37 8.93 9.46	8.46 9.66 10.55	0.09 0.17 0.25
(3) QS6656-5_TIA w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	8.37 8.93 9.46	8.46 9.66 10.55	0.09 0.17 0.25
(3) QS6656-5_TIA w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	8.37 8.93 9.46	8.46 9.66 10.55	0.09 0.17 0.25
B2/B66A RRH-BR049	A	From Leg	4.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B2/B66A RRH-BR049	B	From Leg	4.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B2/B66A RRH-BR049	C	From Leg	4.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B5/B13 RRH-BR04C	A	From Leg	4.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B5/B13 RRH-BR04C	B	From Leg	4.00 0.00	0.0000	110.00	No Ice 1/2"	1.88 2.05	1.01 1.14	0.07 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	2.22	1.28	0.11
						1" Ice			
B5/B13 RRH-BR04C	C	From Leg	4.00	0.0000	110.00	No Ice	1.88	1.01	0.07
			0.00			1/2"	2.05	1.14	0.09
			0.00			Ice	2.22	1.28	0.11
						1" Ice			
DB-C1-12C-24AB-0Z	A	From Leg	0.50	0.0000	110.00	No Ice	4.06	3.10	0.03
			0.00			1/2"	4.32	3.34	0.07
			0.00			Ice	4.58	3.58	0.11
						1" Ice			
(3) Armor Tower Engineering 12-Ft Arch Frame	A	None		0.0000	110.00	No Ice	24.41	24.41	0.93
						1/2"	31.39	31.39	1.36
						Ice	38.37	38.37	1.79
						1" Ice			
**** SM 802-3 (2) BXA-70063-6CF-EDIN-0 w/ Mount Pipe	A	From Leg	4.00	0.0000	100.00	No Ice	7.81	5.80	0.04
			0.00			1/2"	8.36	6.95	0.10
			0.00			Ice	8.87	7.82	0.17
						1" Ice			
(2) BXA-70063-6CF-EDIN-0 w/ Mount Pipe	B	From Leg	4.00	0.0000	100.00	No Ice	7.81	5.80	0.04
			0.00			1/2"	8.36	6.95	0.10
			0.00			Ice	8.87	7.82	0.17
						1" Ice			
(2) BXA-70063-6CF-EDIN-0 w/ Mount Pipe	C	From Leg	4.00	0.0000	100.00	No Ice	7.81	5.80	0.04
			0.00			1/2"	8.36	6.95	0.10
			0.00			Ice	8.87	7.82	0.17
						1" Ice			
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	A	From Leg	4.00	0.0000	100.00	No Ice	5.03	5.29	0.04
			0.00			1/2"	5.58	6.46	0.09
			0.00			Ice	6.10	7.35	0.14
						1" Ice			
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	B	From Leg	4.00	0.0000	100.00	No Ice	5.03	5.29	0.04
			0.00			1/2"	5.58	6.46	0.09
			0.00			Ice	6.10	7.35	0.14
						1" Ice			
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	C	From Leg	4.00	0.0000	100.00	No Ice	5.03	5.29	0.04
			0.00			1/2"	5.58	6.46	0.09
			0.00			Ice	6.10	7.35	0.14
						1" Ice			
(3) RRH2X40-AWS	A	From Leg	4.00	0.0000	100.00	No Ice	2.16	1.42	0.04
			0.00			1/2"	2.36	1.59	0.06
			0.00			Ice	2.57	1.77	0.08
						1" Ice			
(3) RRH2X40-AWS	B	From Leg	4.00	0.0000	100.00	No Ice	2.16	1.42	0.04
			0.00			1/2"	2.36	1.59	0.06
			0.00			Ice	2.57	1.77	0.08
						1" Ice			
(3) RRH2X40-AWS	C	From Leg	4.00	0.0000	100.00	No Ice	2.16	1.42	0.04
			0.00			1/2"	2.36	1.59	0.06
			0.00			Ice	2.57	1.77	0.08
						1" Ice			
DB-T1-6Z-8AB-0Z	A	From Leg	4.00	0.0000	100.00	No Ice	4.80	2.00	0.04
			0.00			1/2"	5.07	2.19	0.08
			0.00			Ice	5.35	2.39	0.12
						1" Ice			
Pirod 12' T-Frame Sector Mount (1)	A	From Leg	0.00	0.0000	100.00	No Ice	13.60	13.60	0.47
			0.00			1/2"	18.40	18.40	0.60
			0.00			Ice	23.20	23.20	0.73
						1" Ice			
Pirod 12' T-Frame Sector Mount (1)	B	None		0.0000	100.00	No Ice	13.60	13.60	0.47
						1/2"	18.40	18.40	0.60
						Ice	23.20	23.20	0.73
						1" Ice			
Pirod 12' T-Frame Sector Mount (1)	C	None		0.0000	100.00	No Ice	13.60	13.60	0.47
						1/2"	18.40	18.40	0.60

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						Ice	23.20	23.20	0.73
						1" Ice			
****									
APXVSPP18-C_TIA w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	7.47 8.66 9.56	0.08 0.15 0.23
APXVSPP18-C_TIA w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	7.47 8.66 9.56	0.08 0.15 0.23
APXVSPP18-C_TIA w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	7.47 8.66 9.56	0.08 0.15 0.23
FD-RRH-2x50-800	A	From Leg	4.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.36 1.52 1.68	3.01 3.22 3.45	0.05 0.08 0.10
FD-RRH-2x50-800	B	From Leg	4.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.36 1.52 1.68	3.01 3.22 3.45	0.05 0.08 0.10
FD-RRH-2x50-800	C	From Leg	4.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.36 1.52 1.68	3.01 3.22 3.45	0.05 0.08 0.10
Pirod 12' T-Frame Sector Mount (1)	A	From Leg	0.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	13.60 18.40 23.20	13.60 18.40 23.20	0.47 0.60 0.73
Pirod 12' T-Frame Sector Mount (1)	B	None		0.0000	90.00	No Ice 1/2" Ice 1" Ice	13.60 18.40 23.20	13.60 18.40 23.20	0.47 0.60 0.73
Pirod 12' T-Frame Sector Mount (1)	C	None		0.0000	90.00	No Ice 1/2" Ice 1" Ice	13.60 18.40 23.20	13.60 18.40 23.20	0.47 0.60 0.73
****									
(2) AIR 21	A	From Face	4.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice	6.05 6.42 6.80	4.36 4.70 5.06	0.09 0.13 0.18
(2) AIR 21	B	From Face	4.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice	6.05 6.42 6.80	4.36 4.70 5.06	0.09 0.13 0.18
(2) AIR 21	C	From Face	4.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice	6.05 6.42 6.80	4.36 4.70 5.06	0.09 0.13 0.18
KRY 112 144/1	A	From Face	4.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice	0.35 0.43 0.51	0.17 0.23 0.30	0.01 0.01 0.02
KRY 112 144/1	B	From Face	4.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice	0.35 0.43 0.51	0.17 0.23 0.30	0.01 0.01 0.02
KRY 112 144/1	C	From Face	4.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice	0.35 0.43 0.51	0.17 0.23 0.30	0.01 0.01 0.02
Pirod 12' T-Frame Sector	A	From Leg	0.00	0.0000	80.00	No Ice	13.60	13.60	0.47

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount (1)			0.00	0.00			1/2" Ice	18.40	18.40	0.60
							1" Ice	23.20	23.20	0.73
Pirod 12' T-Frame Sector Mount (1)	B	None			0.0000	80.00	No Ice	13.60	13.60	0.47
							1/2" Ice	18.40	18.40	0.60
							1" Ice	23.20	23.20	0.73
Pirod 12' T-Frame Sector Mount (1)	C	None			0.0000	80.00	No Ice	13.60	13.60	0.47
							1/2" Ice	18.40	18.40	0.60
							1" Ice	23.20	23.20	0.73
****										
Secondarty Members 30'-20'	A	None			0.0000	25.00	No Ice	9.58	9.58	0.09
							1/2" Ice	14.03	14.03	0.13
							1" Ice	18.48	18.48	0.18
Secondarty Members 30'-20'	B	None			0.0000	25.00	No Ice	9.58	9.58	0.09
							1/2" Ice	14.03	14.03	0.13
							1" Ice	18.48	18.48	0.18
Secondarty Members 30'-20'	C	None			0.0000	25.00	No Ice	9.58	9.58	0.09
							1/2" Ice	14.03	14.03	0.13
							1" Ice	18.48	18.48	0.18
Secondarty Members 20'-10'	A	None			0.0000	15.00	No Ice	9.88	9.88	0.09
							1/2" Ice	14.46	14.46	0.14
							1" Ice	19.04	19.04	0.19
Secondarty Members 20'-10'	B	None			0.0000	15.00	No Ice	9.88	9.88	0.09
							1/2" Ice	14.46	14.46	0.14
							1" Ice	19.04	19.04	0.19
Secondarty Members 20'-10'	C	None			0.0000	15.00	No Ice	9.88	9.88	0.09
							1/2" Ice	14.46	14.46	0.14
							1" Ice	19.04	19.04	0.19

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
PAL6-59	A	Paraboloid w/o Radome	From Leg	1.00	0.00	0.0000		135.00	6.00	No Ice	28.27	0.19
										1/2" Ice	29.07	0.33
										1" Ice	29.86	0.48
****												
PAL6-59	A	Paraboloid w/o Radome	From Leg	1.00	0.00	0.0000		120.00	6.00	No Ice	28.27	0.19
										1/2" Ice	29.07	0.33
										1" Ice	29.86	0.48

Load Combinations

Comb. No.	Description

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

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	150 - 130	2.935	39	0.1772	0.1314
T2	130 - 110	2.190	39	0.1703	0.1192
T3	110 - 94	1.501	47	0.1424	0.0781
T4	94 - 90	1.064	47	0.1114	0.0475
T5	90 - 80	0.970	47	0.1031	0.0424
T6	80 - 70	0.759	47	0.0875	0.0330
T7	70 - 55	0.577	47	0.0712	0.0248
T8	55 - 50	0.362	47	0.0525	0.0171
T9	50 - 30	0.303	47	0.0462	0.0149
T10	30 - 10	0.114	47	0.0267	0.0063
T11	10 - 0	0.019	47	0.0088	0.0026

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149.00	ANT150F6	39	2.898	0.1771	0.1312	437064
141.00	ANT220F2	39	2.598	0.1759	0.1287	242813
135.00	PAL6-59	39	2.374	0.1736	0.1248	145688
132.00	CO-36A	39	2.264	0.1718	0.1218	119351
124.00	ANT150F2	39	1.973	0.1640	0.1091	58898
123.00	CO-36A	39	1.938	0.1627	0.1071	54587
120.00	PAL6-59	39	1.833	0.1586	0.1008	44758
118.00	ANT220F2	39	1.764	0.1556	0.0964	39962
110.00	(3) QS6656-5_TIA w/ Mount Pipe	47	1.501	0.1424	0.0781	28920
100.00	(2) BXA-70063-6CF-EDIN-0 w/ Mount Pipe	47	1.217	0.1237	0.0573	28403
90.00	APXVSPP18-C_TIA w/ Mount Pipe	47	0.970	0.1031	0.0424	32729
80.00	(2) AIR 21	47	0.759	0.0875	0.0330	39948
25.00	Secondarty Members 30'-20'	47	0.081	0.0223	0.0051	48781
15.00	Secondarty Members 20'-10'	47	0.034	0.0132	0.0035	54743

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	150 - 130	13.835	19	0.8213	0.6176
T2	130 - 110	10.379	19	0.7916	0.5604
T3	110 - 94	7.157	19	0.6671	0.3672
T4	94 - 90	5.053	18	0.5253	0.2234
T5	90 - 80	4.604	18	0.4868	0.1993
T6	80 - 70	3.594	18	0.4147	0.1552
T7	70 - 55	2.727	18	0.3389	0.1164
T8	55 - 50	1.708	18	0.2497	0.0804
T9	50 - 30	1.428	18	0.2195	0.0699
T10	30 - 10	0.537	18	0.1267	0.0297
T11	10 - 0	0.086	19	0.0415	0.0122

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149.00	ANT150F6	19	13.660	0.8210	0.6166	102675
141.00	ANT220F2	19	12.270	0.8159	0.6050	57042
135.00	PAL6-59	19	11.234	0.8064	0.5867	34225
132.00	CO-36A	19	10.720	0.7984	0.5724	28067
124.00	ANT150F2	19	9.368	0.7638	0.5129	13706
123.00	CO-36A	19	9.202	0.7582	0.5036	12642
120.00	PAL6-59	19	8.710	0.7400	0.4739	10252
118.00	ANT220F2	19	8.387	0.7267	0.4531	9045
110.00	(3) QS6656-5_TIA w/ Mount Pipe	19	7.157	0.6671	0.3672	6361
100.00	(2) BXA-70063-6CF-EDIN-0 w/ Mount Pipe	18	5.785	0.5821	0.2696	6154
90.00	APXVSPP18-C_TIA w/ Mount	18	4.604	0.4868	0.1993	6971

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
	Pipe					
80.00	(2) AIR 21	18	3.594	0.4147	0.1552	8632
25.00	Secondarty Members 30'-20'	18	0.382	0.1056	0.0240	10335
15.00	Secondarty Members 20'-10'	18	0.158	0.0627	0.0164	11497

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	150	Leg	A325N	0.8750	4	4.07	40.59	0.100 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	3.70	7.95	0.465 ✔	1	Bolt Shear
		Top Girt	A325N	0.5000	1	0.21	5.48	0.037 ✔	1	Member Bearing
T2	130	Leg	A325N	1.0000	5	12.44	53.01	0.235 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	2	3.66	11.70	0.313 ✔	1	Member Bearing
T3	110	Leg	A325N	1.0000	5	20.24	53.01	0.382 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	7.36	8.78	0.839 ✔	1	Member Bearing
		Top Girt	A325N	0.6250	1	1.05	9.51	0.110 ✔	1	Member Bearing
T4	94	Diagonal	A325N	0.6250	1	6.91	8.78	0.788 ✔	1	Member Bearing
		Secondary Horizontal	A325N	0.6250	1	2.05	12.43	0.165 ✔	1	Bolt Shear
T5	90	Leg	A325N	1.0000	7	19.21	53.01	0.362 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	7.94	8.78	0.905 ✔	1	Member Bearing
T6	80	Diagonal	A325N	0.6250	1	8.37	8.78	0.954 ✔	1	Member Bearing
		Secondary Horizontal	A325N	0.6250	1	3.00	12.43	0.241 ✔	1	Bolt Shear
T7	70	Leg	A325N	1.5000	5	38.60	119.28	0.324 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	7.94	11.21	0.708 ✔	1	Member Bearing
T8	55	Diagonal	A325N	0.7500	1	7.72	11.21	0.689 ✔	1	Member Bearing
		Secondary Horizontal	A325N	0.6250	1	3.87	12.43	0.312 ✔	1	Bolt Shear
T9	50	Leg	A325N	1.5000	5	48.53	119.28	0.407 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	7.73	8.41	0.919 ✔	1	Member Bearing
T10	30	Leg	A325N	1.5000	5	54.84	119.28	0.460 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	2	5.11	12.43	0.411 ✔	1	Bolt Shear
T11	10	Leg	F1554-105	1.5000	7	40.26	124.25	0.324 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	2	6.78	12.43	0.545 ✔	1	Bolt Shear
		Horizontal	A325N	0.6250	2	4.14	12.43	0.333 ✔	1	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	150 - 130	2 1/4" solid	20.00	4.00	85.3 K=1.00	3.9761	-18.27	105.06	0.174 [1] ✔
T2	130 - 110	2 1/2" solid	20.00	4.00	76.8 K=1.00	4.9087	-64.68	143.51	0.451 [1] ✔
T3	110 - 94	2 3/4" solid	16.03	4.01	69.9 K=1.00	5.9396	-107.77	186.92	0.577 [1] ✔
T4	94 - 90	2 3/4" solid	4.01	2.07	36.1 K=1.00	5.9396	-118.32	243.04	0.487 [1] ✔
T5	90 - 80	3 1/4" solid	10.02	5.01	74.0 K=1.00	8.2958	-144.83	250.21	0.579 [1] ✔
T6	80 - 70	3 1/4" solid	10.02	2.58	38.2 K=1.00	8.2958	-172.74	335.61	0.515 [1] ✔
T7	70 - 55	3 3/4" solid	15.03	5.01	64.1 K=1.00	11.044 7	-211.35	368.00	0.574 [1] ✔
T8	55 - 50	3 3/4" solid	5.01	2.56	32.8 K=1.00	11.044 7	-223.21	459.35	0.486 [1] ✔
T9	50 - 30	4 1/4" solid	20.03	5.01	56.6 K=1.00	14.186 3	-268.98	505.21	0.532 [1] ✔
T10	30 - 10	4 1/2" solid	20.03	10.02	53.4 K=0.50	15.904 3	-306.70	580.89	0.528 [1] ✔
T11	10 - 0	4 1/2" solid	10.02	5.01	53.4 K=1.00	15.904 3	-318.13	580.89	0.548 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	150 - 130	L1 1/2x1 1/2x3/16	6.17	2.96	121.3 K=1.00	0.5273	-3.70	8.10	0.457 [1] ✔
T2	130 - 110	L1 3/4x1 3/4x3/16	6.17	2.95	103.1 K=1.00	0.6211	-7.47	12.85	0.581 [1] ✔
T3	110 - 94	L 2 x 2 x 3/16	7.32	3.64	110.9 K=1.00	0.7150	-7.40	13.08	0.566 [1] ✔
T4	94 - 90	L 2 x 2 x 3/16	7.66	3.81	116.2 K=1.00	0.7150	-7.03	11.97	0.588 [1] ✔
T5	90 - 80	L2 1/2x2 1/2x3/16	9.01	4.50	109.0 K=1.00	0.9020	-7.81	17.03	0.459 [1] ✔
T6	80 - 70	L2 1/2x2 1/2x3/16	9.87	4.93	119.4 K=1.00	0.9020	-8.23	14.29	0.576 [1] ✔
T7	70 - 55	L 2 1/2x 2 1/2x 1/4	11.21	5.57	136.2 K=1.00	1.1900	-7.84	14.50	0.541 [1] ✔
T8	55 - 50	L 2 1/2x 2 1/2x 1/4	11.67	5.80	141.8 K=1.00	1.1900	-7.93	13.38	0.593 [1] ✔
T9	50 - 30	L 3 x 3 x 3/16	13.53	6.71	135.0 K=1.00	1.0898	-7.94	13.50	0.588 [1] ✔
T10	30 - 10	L3 1/2x3 /12x1/4	17.49	8.83	97.0 K=1.00	1.6875	-10.22	37.63	0.271 [1] ✔
T11	10 - 0	L3 1/2x3 /12x1/4	12.77	12.47	137.1 K=1.00	1.6875	-13.55	20.29	0.668 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T11	10 - 0	L3 1/2x3 /12x1/4	14.85	7.24	125.2 K=1.00	1.6875	-8.27	24.31	0.340 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T4	94 - 90	L 2 x 2 x 1/4	6.52	3.15	96.6 K=1.00	0.9380	-2.05	21.33	0.096 [1] ✔
T6	80 - 70	L2 1/2x2 1/2x3/16	8.50	4.12	99.8 K=1.00	0.9020	-3.00	19.60	0.153 [1] ✔
T8	55 - 50	L 2 1/2x 2 1/2x 1/4	10.53	5.11	124.9 K=1.00	1.1900	-3.87	17.23	0.225 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	150 - 130	L 1.5 x 1.5 x 3/16	4.70	4.52	184.8 K=1.00	0.5273	-0.22	3.49	0.063 [1] ✔
T3	110 - 94	L 2 x 2 x 3/16	4.70	4.50	136.9 K=1.00	0.7150	-1.24	8.61	0.143 [1] ✔

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T11	10 - 0	L2 1/2x2 1/2x1/4	3.71	3.53	86.2 K=1.00	1.1900	-5.52	31.12	0.177 [1] ✔

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T11	10 - 0	L 2 1/2x 2 1/2x 1/4	6.08	5.75	140.6 K=1.00	1.1900	-4.52	13.60	0.332 [1] ✔

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T11	10 - 0	L 3 x 3 x 1/4	7.43	7.43	150.4 K=1.00	1.4375	-0.01	14.35	0.001 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	150 - 130	2 1/4" solid	20.00	4.00	85.3	3.9761	16.29	178.92	0.091 [1] ✔
T2	130 - 110	2 1/2" solid	20.00	4.00	76.8	4.9087	62.18	220.89	0.281 [1] ✔
T3	110 - 94	2 3/4" solid	16.03	4.01	69.9	5.9396	101.19	267.28	0.379 [1] ✔
T4	94 - 90	2 3/4" solid	4.01	2.07	36.1	5.9396	111.16	267.28	0.416 [1] ✔
T5	90 - 80	3 1/4" solid	10.02	5.01	74.0	8.2958	134.48	373.31	0.360 [1] ✔
T6	80 - 70	3 1/4" solid	10.02	2.58	38.2	8.2958	158.52	373.31	0.425 [1] ✔
T7	70 - 55	3 3/4" solid	15.03	5.01	64.1	11.044 7	193.00	497.01	0.388 [1] ✔
T8	55 - 50	3 3/4" solid	5.01	2.56	32.8	11.044 7	203.35	497.01	0.409 [1] ✔
T9	50 - 30	4 1/4" solid	20.03	5.01	56.6	14.186 3	242.65	638.38	0.380 [1] ✔
T10	30 - 10	4 1/2" solid	20.03	10.02	106.8	15.904 3	274.22	715.69	0.383 [1] ✔
T11	10 - 0	4 1/2" solid	10.02	5.01	53.4	15.904 3	282.12	715.69	0.394 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	150 - 130	L1 1/2x1 1/2x3/16	6.17	2.96	77.9	0.3076	3.69	15.00	0.246 [1] ✔
T2	130 - 110	L1 3/4x1 3/4x3/16	6.17	2.95	65.9	0.3604	7.33	17.57	0.417 [1] ✔
T3	110 - 94	L 2 x 2 x 3/16	7.32	3.64	70.8	0.4308	7.36	21.00	0.351 [1] ✔
T4	94 - 90	L 2 x 2 x 3/16	7.66	3.81	74.2	0.4308	6.91	21.00	0.329 [1] ✔
T5	90 - 80	L2 1/2x2 1/2x3/16	8.59	4.29	66.2	0.5710	7.94	27.84	0.285 [1] ✔
T6	80 - 70	L2 1/2x2 1/2x3/16	9.44	4.71	72.7	0.5710	8.37	27.84	0.301 [1] ✔
T7	70 - 55	L 2 1/2x 2 1/2x 1/4	10.31	5.13	80.0	0.7284	7.94	35.51	0.224 [1] ✔
T8	55 - 50	L 2 1/2x 2 1/2x 1/4	11.67	5.80	90.6	0.7284	7.72	35.51	0.217 [1] ✔
T9	50 - 30	L 3 x 3 x 3/16	13.06	6.48	82.7	0.6943	7.73	33.85	0.228 [1] ✔
T10	30 - 10	L3 1/2x3 /12x1/4	17.49	8.83	97.0	1.1250	9.49	54.84	0.173 [1] ✔
T11	10 - 0	L3 1/2x3 /12x1/4	12.77	12.47	137.1	1.1250	13.18	54.84	0.240 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T11	10 - 0	L3 1/2x3 /12x1/4	14.85	7.24	79.6	1.1250	8.20	54.84	0.150 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T4	94 - 90	L 2 x 2 x 1/4	6.52	3.15	124.0	0.5629	2.05	27.44	0.075 [1] ✔
T6	80 - 70	L2 1/2x2 1/2x3/16	8.50	4.12	127.0	0.5710	3.00	27.84	0.108 [1] ✔
T8	55 - 50	L 2 1/2x 2 1/2x 1/4	10.53	5.11	159.6	0.7519	3.87	36.65	0.106 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	150 - 130	L 1.5 x 1.5 x 3/16	4.70	4.52	118.7	0.3076	0.21	15.00	0.014 [1] ✔
T3	110 - 94	L 2 x 2 x 3/16	4.70	4.50	87.4	0.4308	1.05	21.00	0.050 [1] ✔

[1] $P_u / \phi P_n$ controls

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T11	10 - 0	L2 1/2x2 1/2x1/4	3.71	3.53	55.0	1.1900	5.52	53.55	0.103 [1] ✔

[1] $P_u / \phi P_n$ controls

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T11	10 - 0	L 2 1/2x 2 1/2x 1/4	6.08	5.75	89.8	1.1900	4.52	53.55	0.084 [1] ✔

[1] $P_u / \phi P_n$ controls

Inner Bracing Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T11	10 - 0	L 3 x 3 x 1/4	7.43	7.43	95.8	1.4375	0.01	64.69	0.000 [1] ✔

[1] $P_u / \phi P_n$ controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	150 - 130	Leg	2 1/4" solid	3	-18.27	105.06	17.4	Pass
		Diagonal	L1 1/2x1 1/2x3/16	10	-3.70	8.10	45.7	Pass
							46.5 (b)	
		Top Girt	L 1.5 x 1.5 x 3/16	4	-0.22	3.49	6.3	Pass
T2	130 - 110	Leg	2 1/2" solid	39	-64.68	143.51	45.1	Pass
		Diagonal	L1 3/4x1 3/4x3/16	42	-7.47	12.85	58.1	Pass
T3	110 - 94	Leg	2 3/4" solid	70	-107.77	186.92	57.7	Pass

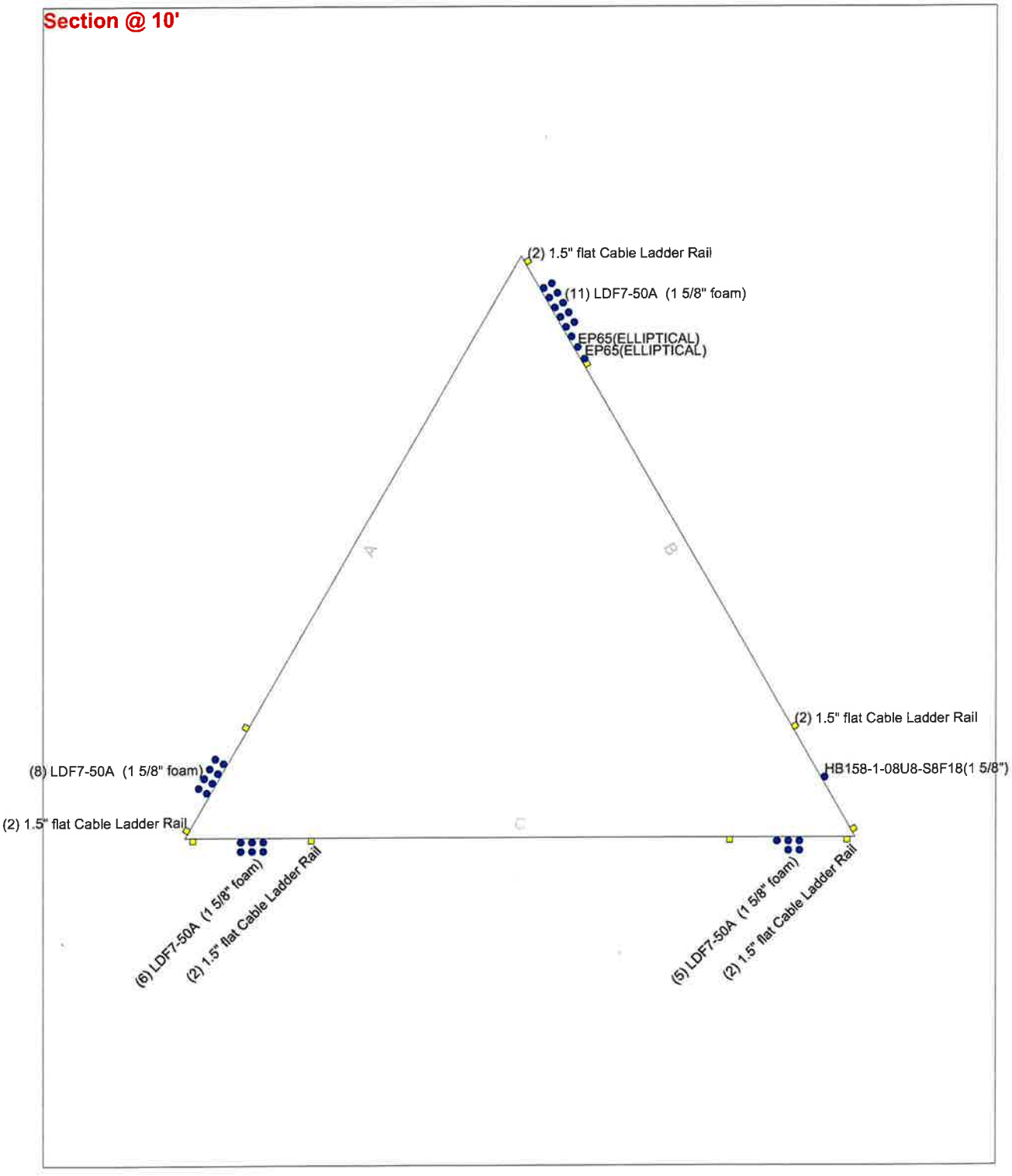
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
		Diagonal	L 2 x 2 x 3/16	79	-7.40	13.08	56.6 83.9 (b)	Pass
		Top Girt	L 2 x 2 x 3/16	73	-1.24	8.61	14.3	Pass
T4	94 - 90	Leg	2 3/4" solid	100	-118.32	243.04	48.7	Pass
		Diagonal	L 2 x 2 x 3/16	106	-7.03	11.97	58.8 78.8 (b)	Pass
		Secondary Horizontal	L 2 x 2 x 1/4	111	-2.05	21.33	9.6 16.5 (b)	Pass
T5	90 - 80	Leg	3 1/4" solid	112	-144.83	250.21	57.9	Pass
		Diagonal	L2 1/2x2 1/2x3/16	118	-7.81	17.03	45.9 90.5 (b)	Pass
T6	80 - 70	Leg	3 1/4" solid	127	-172.74	335.61	51.5	Pass
		Diagonal	L2 1/2x2 1/2x3/16	133	-8.23	14.29	57.6 95.4 (b)	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	136	-3.00	19.60	15.3 24.1 (b)	Pass
T7	70 - 55	Leg	3 3/4" solid	148	-211.35	368.00	57.4	Pass
		Diagonal	L 2 1/2x 2 1/2x 1/4	154	-7.84	14.50	54.1 70.8 (b)	Pass
T8	55 - 50	Leg	3 3/4" solid	169	-223.21	459.35	48.6	Pass
		Diagonal	L 2 1/2x 2 1/2x 1/4	174	-7.93	13.38	59.3 68.9 (b)	Pass
		Secondary Horizontal	L 2 1/2x 2 1/2x 1/4	180	-3.87	17.23	22.5 31.2 (b)	Pass
T9	50 - 30	Leg	4 1/4" solid	181	-268.98	505.21	53.2	Pass
		Diagonal	L 3 x 3 x 3/16	189	-7.94	13.50	58.8 91.9 (b)	Pass
T10	30 - 10	Leg	4 1/2" solid	208	-306.70	580.89	52.8	Pass
		Diagonal	L3 1/2x3 /12x1/4	216	-10.22	37.63	27.1 41.1 (b)	Pass
T11	10 - 0	Leg	4 1/2" solid	223	-318.13	580.89	54.8	Pass
		Diagonal	L3 1/2x3 /12x1/4	244	-13.55	20.29	66.8	Pass
		Horizontal	L3 1/2x3 /12x1/4	240	-8.27	24.31	34.0	Pass
		Redund Horz 1 Bracing	L2 1/2x2 1/2x1/4	245	-5.52	31.12	17.7	Pass
		Redund Diag 1 Bracing	L 2 1/2x 2 1/2x 1/4	246	-4.52	13.60	33.2	Pass
		Inner Bracing	L 3 x 3 x 1/4	249	-0.01	14.35	0.3	Pass
							Summary	
						Leg (T5)	57.9	Pass
						Diagonal (T6)	95.4	Pass
						Horizontal (T11)	34.0	Pass
						Secondary Horizontal (T8)	31.2	Pass
						Top Girt (T3)	14.3	Pass
						Redund Horz 1 Bracing (T11)	17.7	Pass
						Redund Diag 1 Bracing (T11)	33.2	Pass
						Inner Bracing (T11)	0.3	Pass
						Bolt Checks	95.4	Pass
						RATING =	**95.4**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

Feed Line Plan
10'

Round Flat App In Face App Out Face



PJFLogo

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

Job: *150-Ft Self-Support Tower: Norwalk 4: Norwalk, C*			
Project: *42919-0013.001.8700*			
Client: On-Air Engineering	Drawn by: Kurt Swarts	App'd:	
Code: TIA-222-G	Date: 10/28/19	Scale: NTS	
Path: G:\TOWER\429 On Air Engineering\2019\42919.0013 - Norwalk 4 CT\TNX\42919.0013.001.8700.eri		Dwg No. E-7	

APPENDIX C

ADDITIONAL CALCULATIONS

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

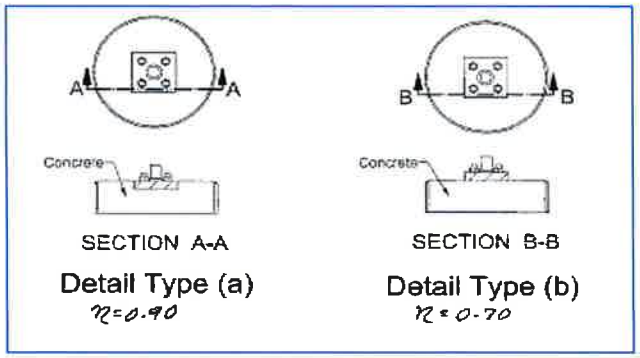
Self-Support Tower Anchor Rod Capacity - TIA-G

Loads

Compression :	337	kips	Tension :	299	kips	Code:	TIA-G
Comp. Shear :	33	kips	Ten.Shear :	30	kips	Maximum Ratio:	1.00

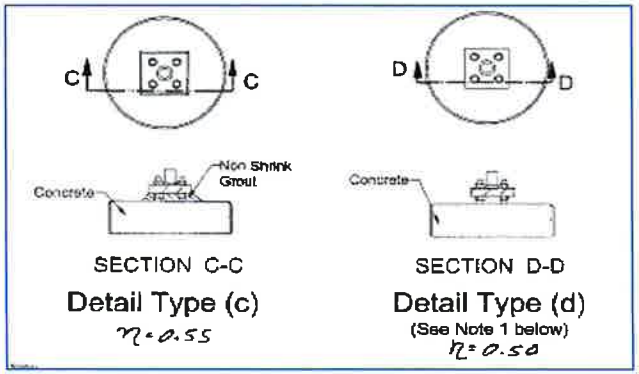
Existing Anchor Rods

Anchor Rod Condition (n) :	0.5				
Anchor Rod ø :	1 1/2	in	l_{ar} :	3	inches
Anchor Rod Quantity :	7		Comp. M_u :	64.35	k-in
Anchor Rod Grade :	F1554 Gr. 105				
F_y :	105	ksi	ϕ_v :	0.75	
F_u :	125	ksi	ϕ_f :	0.90	
Threads per Inch	6		$\phi_v R_{nv}$:	521.86	kips
Net Tensile Area	1.41	in^2	$\phi_f R_{nm}$:	248.68	k-in
ϕ_t :	0.80				
$\phi_t R_{nt}$:	983.67	kip			
Anchor Rod Ratio :	0.410				



SECTION A-A
Detail Type (a)
η=0.90

SECTION B-B
Detail Type (b)
η = 0.70

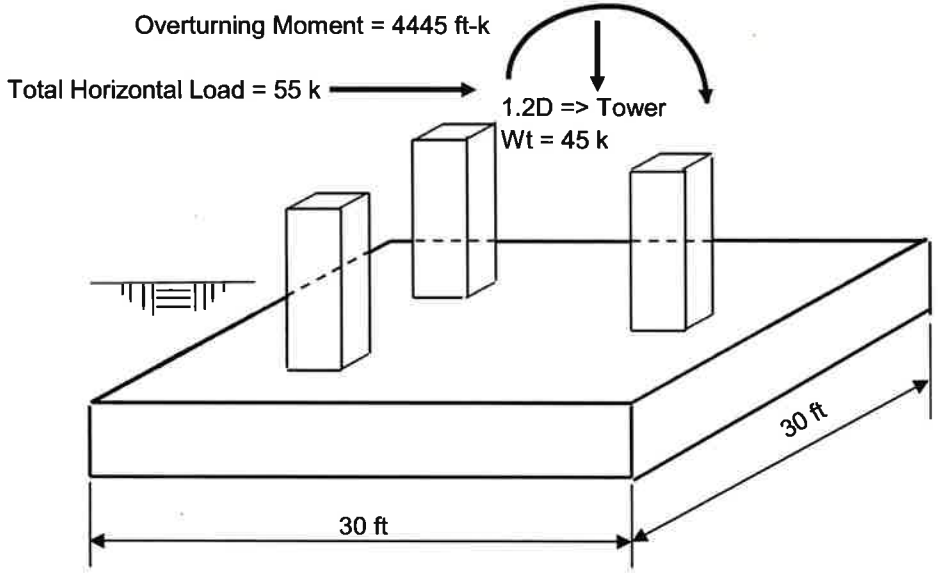


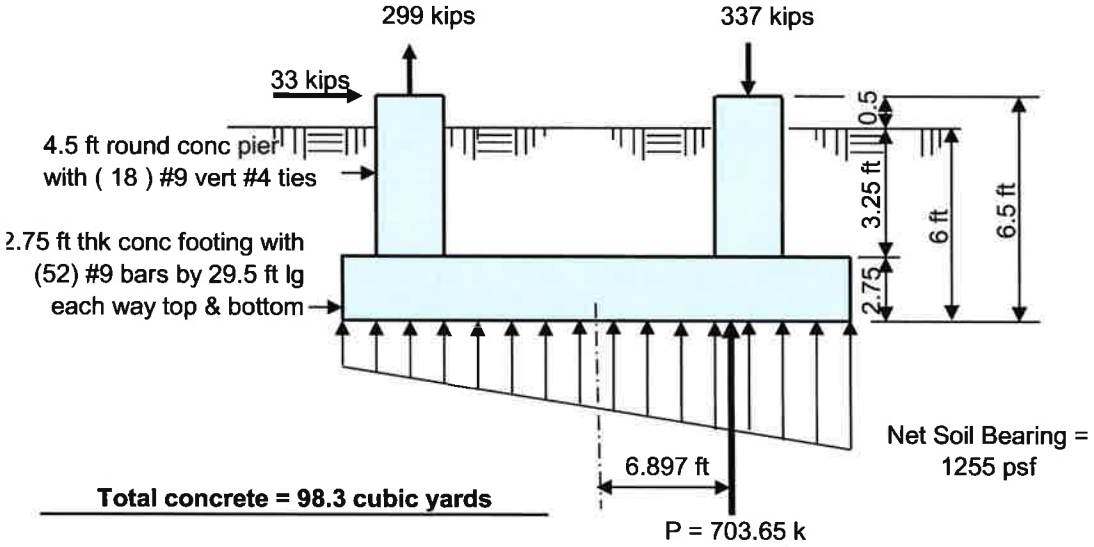
SECTION C-C
Detail Type (c)
η = 0.55

SECTION D-D
Detail Type (d)
(See Note 1 below)
η = 0.50

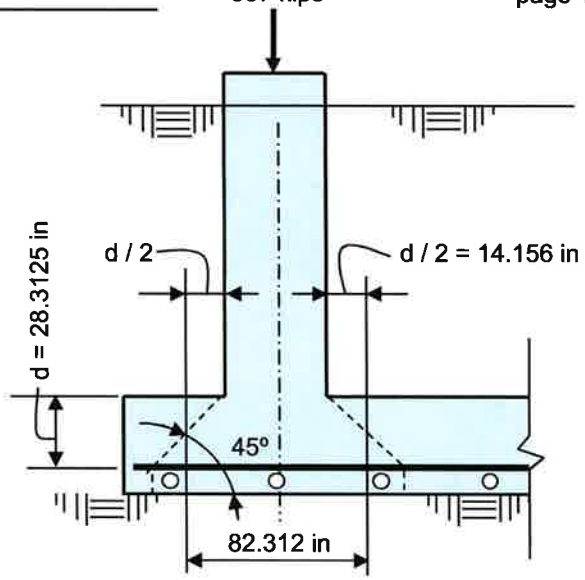
Combined Footing Foundation

Concrete strength F'c =	**4.5**	(ksi)
Rebar Strength Fy =	**60**	(ksi)
Soil Density =	**125**	(pcf)
Depth to Water Table =	**25**	(ft)
minimum cover over vert rebar =	**3**	inches





Total concrete = 98.3 cubic yards



Ftg Overturning Resistance = 10554.7 ft-kips
Total Overturning Moment = 4853.1 ft-kips
Required Overturning Safety Factor = 1
Overturning Safety Factor = 2.17
Ratio = 0.46 OK

Maximum Net Soil Bearing = 1.763 ksf
Ultimate Net Soil Bearing = 6 ksf
Soil Bearing Stress Ratio = 0.29 OK

Ult Punching Shear Capacity = 268 psi
Ult Punching Shear Force = 51 psi
Punching Shear Stress Ratio = 0.19 OK

Pad Bending Moment Capacity= 3523 ft-k
Pad Bending Moment = 616 ft-k
Bending Moment Stress Ratio = 0.18 OK

Pier Rebar Capacity = -972 kips
Pier Rebar Required = -299 kips
Pier Rebar Stress Ratio = 0.31 OK

Pad Bending Shear Capacity= 1026 ft-k
Pad Bending Shear = 132 ft-k
Bending Shear Stress Ratio = 0.13 OK

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

1) It is the responsibility of the client to ensure that the information provided to Paul J. Ford and Company is accurate and complete. Paul J. Ford and Company will rely on the accuracy and completeness of such information in performing or furnishing services under this project.

2) If the existing conditions are not as represented on the referenced drawings and/or documents, Paul J. Ford and Company should be contacted immediately to evaluate the significance of the deviation.

3) The structure has been analyzed according to the minimum design loads recommended by the Reference Standard. If additional design loads are required, Paul J. Ford and Company should be made aware of this prior to the start of the project.

4) The standard of care for all Professional Engineering Services performed or furnished by Paul J. Ford and Company under this project will be the skill and care used by members of the Consultant's profession practicing under similar circumstances at the same time and in the same locality.

5) All Services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. Paul J. Ford and Company is not responsible for the conclusions, opinions and/or recommendations made by others based on the information supplied herein.

ATTACHMENT 6

	General	Power	Density					
Site Name: Norwalk 4								
Tower Height: 150ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Eversource Energy	2	255	159	935.4	0.0078	0.6236	0.13%	
*Eversource Energy	1	120	156	451.4	0.0019	0.3009	0.06%	
*Eversource Energy	1	990	159	155.5	0.0152	0.2000	0.76%	
*Eversource Energy	1	150	144	220	0.0028	0.2000	0.14%	
*Eversource Energy	1	40	144	158	0.0008	0.2000	0.04%	
*Eversource Energy	1	250	139	37.7	0.0051	0.2000	0.25%	
*Eversource Energy	1	100	129	173	0.0024	0.2000	0.12%	
*Eversource Energy	1	250	130	48.3	0.0058	0.2000	0.29%	
*Eversource Energy	1	150	121	220	0.0041	0.2000	0.20%	
*Eversource Energy	1	100	123	47.8	0.0026	0.2000	0.13%	
VZW PCS	**4**	**5539**	**110**	**0.1646**	**1970**	**1.0000**	**16.46%**	
VZW Cellular	**0**	**0**	**110**	**0.0000**	**869**	**0.5793**	**0.00%**	
VZW Cellular	**4**	**1063**	**110**	**0.0316**	**880**	**0.5866**	**5.38%**	
VZW AWS	**4**	**6288.68**	**110**	**0.1869**	**2145**	**1.0000**	**18.69%**	
VZW 700	**4**	**2119.6**	**110**	**0.0630**	**746**	**0.4973**	**12.67%**	
								55.34%
* Source: Siting Council								

ATTACHMENT 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	3	3	neopost 12/10/2019 US POSTAGE $002.79 ZIP 06103 041L1220[illegible]
	Postmaster, per *(name of receiving employee)* YP		

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Harry Rilling, Mayor City of Norwalk 125 East Avenue Norwalk, CT 06851				
2.	Steven Kleppin, Planning Director City of Norwalk 125 East Avenue Norwalk, CT 06851				
3.	Christopher Gelinas, Senior Real Estate Specialist Eversource Energy 107 Selden Street Berlin, CT 06037				
4.					
5.					
6.					

OLD STATE HOUSE STATION 06103 DEC 10 2019 USPS

See Reverse for Instructions