

July 5, 2016

Melanie A. Bachman
Acting Executive Director
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 12 Orchard Drive, Ledyard, 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 Connecticut Siting Council (“Council”) to approve the shared use by Cellco of an existing telecommunications tower on a 142.84 acre parcel at 12 Orchard Drive in Ledyard, Connecticut (the “Property”). The existing 150-foot tower is owned by SBA Communications Corporation (“SBA”). The Property is owned by Brixmore GA Turnpike Plaza LLC. Cellco identifies this site as its “Ledyard North Facility”.

Cellco requests that the Council find that the proposed shared use of the SBA 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 Ledyard’s Mayor, Michael Finkelstein, SBA, the owner of the tower and Brixmore GA Turnpike Plaza LLC, the owner of the Property. Because the tower site may be within 2,500 feet of the Ledyard/Preston town line, a copy of this filing is also being sent to Robert Congdon, First Selectman of the Town of Preston.

Background

On February 27, 2007, the Council approved an application by Optasite, Inc. and Omni-Point Communications Inc. (now T-Mobile) to construct a 150-foot tower on the Property

14357176-v1

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(Docket No. 322). In 2008, the Docket No. 322 certificate was transferred to SBA. T-Mobile currently maintains antennas at the 147-foot level on the SBA tower. Equipment associated with T-Mobile's antennas is located near the base of the tower within a fenced compound.

Cellco is licensed by the Federal Communications Commission ("FCC") to provide wireless services throughout the State of Connecticut. Cellco and SBA have agreed to the proposed shared use of the Orchard Road tower pursuant to mutually acceptable terms and conditions. Likewise, SBA and Cellco have agreed to the proposed installation of equipment on the ground within the existing tower compound. SBA has authorized Cellco to apply for all necessary permits and approvals that may be required to share the existing tower. (See Owner's authorization letters included in Attachment 1).

Cellco proposes to install nine (9) antennas and nine (9) remote radio heads (RRHs) behind its antennas, at a height of 127 feet above ground level. Cellco will also install three (3) equipment cabinets and a diesel fueled (15 kW) back-up generator on a 12' x 26' concrete pad and metal frame canopy structure within the existing fenced compound. Included in Attachment 2 are Cellco's project plans showing the location of all proposed site improvements. Attachment 3 contains specifications for Cellco's proposed antennas, RRHs and backup generator.

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

A. Technical Feasibility. The existing SBA tower is structurally capable of supporting Cellco's proposed improvements. The proposed shared use of this tower is, therefore, technically feasible. A Feasibility Structural Analysis Report ("Structural Report") prepared for this project confirms that the tower, with certain structural modifications can support Cellco's proposed loading. A copy of the Structural Report is included in Attachment 4.

B. Legal Feasibility. Under C.G.S. § 16-50aa, the Council has been authorized to issue orders approving the shared use of an existing tower such as the SBA 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

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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 SBA tower would have a minimal environmental effect, for the following reasons:

1. The proposed installation of nine (9) antennas and nine (9) remote radio heads at the 127-foot level on the existing 150-foot tower would have an insignificant incremental visual impact on the area around the existing tower. Cellco's equipment cabinets and generator would be installed within an expanded facility compound in an area previously developed. Cellco's shared use of this tower would therefore, not cause any significant change or alteration in the physical or environmental characteristics of the existing site.
2. There are no fans, motors or other mechanical devices included as a part of the equipment cabinets. Cellco anticipates therefore that the proposed installation will comply with State and/or local noise standards. Noise associated with Cellco's emergency back-up generator is exempt from State and local noise standards.
3. Operation of Cellco's antennas at this site would not exceed the RF emissions standards adopted by the Federal Communications Commission ("FCC"). Included in Attachment 5 of this filing is a cumulative worst case General Power Density table that demonstrates that the facility, with T-Mobile's existing and Cellco's proposed antennas, will operate well within the FCC RF emissions 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 SBA facility other than periodic (monthly) maintenance visits to the cell site.

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The proposed shared use of the SBA 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 SBA 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 full array of nine (9) antennas, nine (9) remote radio heads and all related equipment. Cellco is not aware of any public safety concerns relative to the proposed sharing of the existing SBA 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 Ledyard.

Conclusion

For the reasons discussed above, the proposed shared use of the existing SBA tower at 12 Orchard Road 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:

Michael Finkelstein, Mayor, Town of Ledyard
Robert M. Congdon, First Selectman, Town of Preston
SBA Communications Corporation
Tim Parks

ATTACHMENT 1



SBA Communications Corporation
8051 Congress Avenue
Boca Raton, FL 33487-1307

T + 561.995.7670
F + 561.995.7626

sbasite.com

LETTER OF AUTHORIZATION

SBA Site ID: CT13076-A, Ledyard

Property Located at: 12 Orchard Drive, Ledyard, CT, 06335

THE CITY/COUNTY OF: Ledyard / New London/Ledyard

APPLICATION FOR ZONING/USE/BUILDING PERMIT

This letter authorizes Verizon Wireless and its authorized agents to file for all necessary zoning, planning and building permits (local, state and federal) for the purposes of installing, operating and maintaining a telecommunications facility on the existing tower on the property referenced above on behalf of Richard H. & Diane Y. Holmberg.

All approval conditions that may be granted to Verizon Wireless in connection with above referenced facility relating to this specific application are the sole responsibility of Verizon Wireless.

SBA Towers IV, LLC

Jason Silberstein

Executive VP, Site Leasing

Date: 7/01/2016

ATTACHMENT 2

verizon

WIRELESS COMMUNICATIONS FACILITY

SITE NAME: LEDYARD NORTH CT

SBA SITE #CT13076
HOLMBERG ORCHARDS
12 ORCHARD LANE
GALES FERRY, CT 06335
TOWN OF LEDYARD

MONOPOLE CO-LOCATION

PROJECT DESCRIPTION
– INSTALLATION OF OUTDOOR EQUIPMENT CABINETS AND A DIESEL FUELED GENERATOR LOCATED ON A NEW 26'x12' CONCRETE PAD WITHIN AN EXISTING FENCED COMPOUND AT GRADE – INSTALLATION OF (9) PANEL ANTENNAS AND ASSOCIATED DEVICES ON AN EXISTING MONOPOLE – INSTALLATION OF CABLING FROM EQUIP. CABINETS TO ANTENNAS – ELECTRICAL, TELEPHONE & GROUNDING CONNECTIONS TO EXISTING UTILITIES



PROJECT SUMMARY	
SITE NAME:	LEDYARD NORTH CT
SITE ADDRESS:	HOLMBERG ORCHARDS 12 ORCHARD LANE GALES FERRY, CT 06335 TOWN OF LEDYARD
PROPERTY OWNER:	RICHARD H. & DIANE Y. HOLMBERG 4 ORCHARD LANE GALES FERRY, CT 06339
TOWER OWNER:	SBA SITE # CT13076
TOWER COORDINATES:	41° 28' 05.80" N 72° 03' 16.10" W
APPLICANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 99 EAST RIVER DR., 9TH FL. EAST HARTFORD, CT 06108
VERIZON WIRELESS CONTACTS:	JOHN TIERNEY - CONSTRUCTION (860) 999-1179 JIM SMITH - SITE ACQUISITION (860) 608-0028
LEGAL/REGULATORY COUNSEL:	KENNETH C. BALDWIN, ESQ. ROBINSON & COLE, LLP (860) 275-8345

DRAWING SCHEDULE	
SHEET NO.	SHEET DESCRIPTION
T-1	TITLE SHEET
C-1	COMPOUND PLAN, NORTH ELEVATION & ANTENNA PLAN
C-2	2,500 FT. RADIUS MAP, ABUTTERS MAP & PROPERTY OWNER LIST

verizon

WIRELESS COMMUNICATIONS FACILITY

99 EAST RIVER DRIVE
EAST HARTFORD, CT 06108

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	06.17.16	REVIEW
1	06.24.16	CSC FILING

DRAWN BY:	CHECKED BY:
AS	DW

SITE NAME:

LEDYARD NORTH CT

PROJECT DESCRIPTION:

NEW BUILD MACRO

PROJECT INFORMATION:

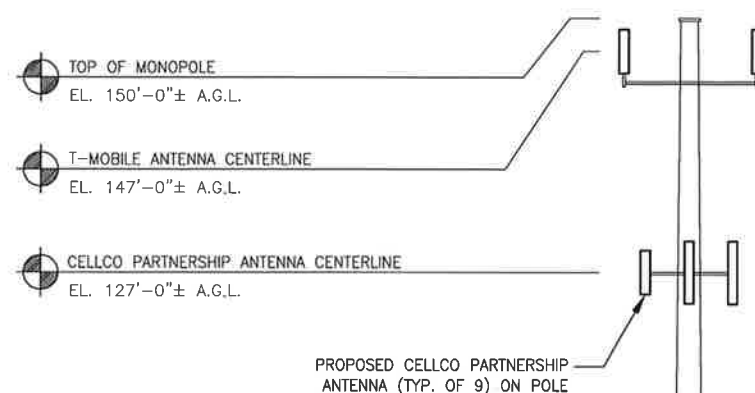
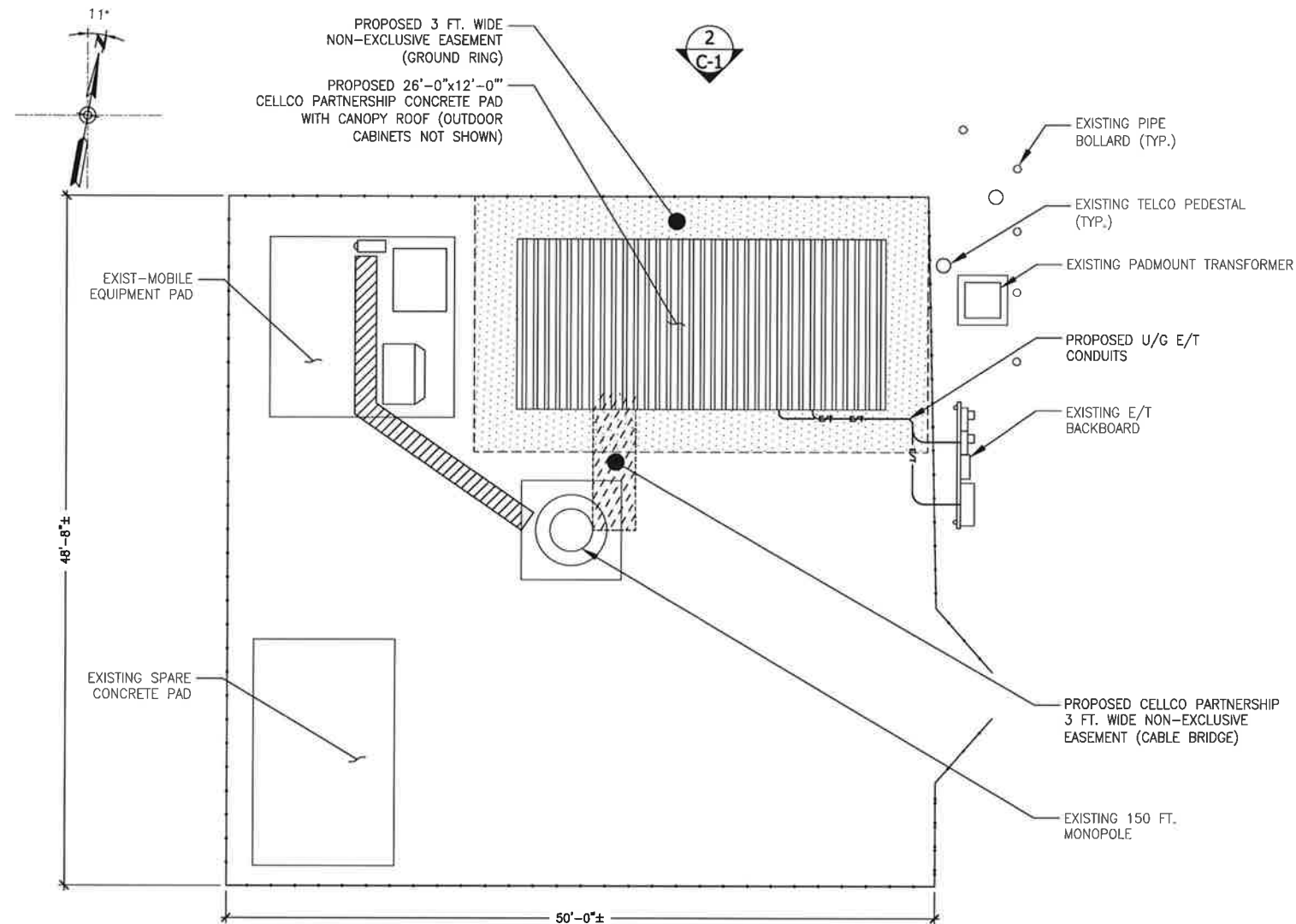
SBA SITE # CT13076
HOLMBERG ORCHARDS
12 ORCHARD LANE
GALES FERRY, CT 06335

DRAWING TITLE:

TITLE SHEET

SHEET NUMBER:

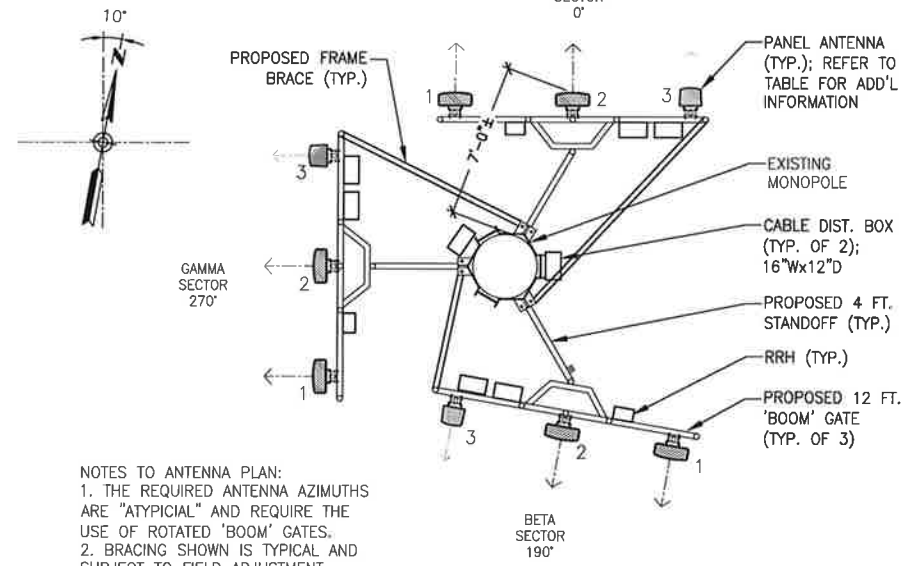
T-1



TOWER NOTES:
 1. EXISTING 150' TALL MONOPOLE TOWER.
 2. REFER TO STRUCTURAL ANALYSIS REPORT AS PREPARED BY TOWER ENGINEERING SOLUTIONS DATED 11/13/15.

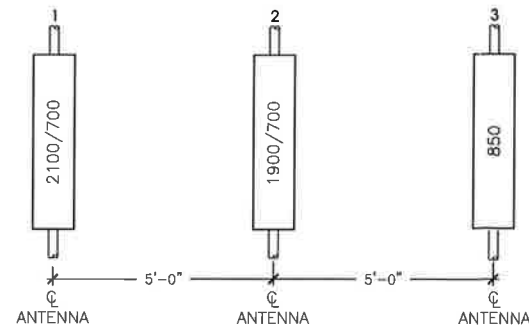
1 COMPOUND PLAN
 Scale: 3/16" = 1'-0"

ANTENNA SPECIFICATIONS (TYP. AT 3 SECTORS)				
POS.	ANTENNA BAND	MODEL #	SIZE	ACCESSORY EQUIPMENT
1	2100/700	SBNHH-1D45C	95.9"Hx18.0"Wx7.0"D; 79.6 LBS.	ALU RRH_2x60-AWS ALU B13 RRH2x60
2	1900/700	SBNHH-1D45C	95.9"Hx18.0"Wx7.0"D; 79.6 LBS.	ALU RRH_2x60-PCS
3	850	LNK-6514DS-A1M	72.7"Hx11.9"Wx7.1"D; 38.4 LBS.	

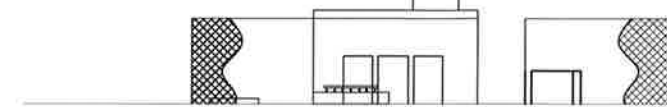


NOTES TO ANTENNA PLAN:
 1. THE REQUIRED ANTENNA AZIMUTHS ARE "ATYPICAL" AND REQUIRE THE USE OF ROTATED 'BOOM' GATES.
 2. BRACING SHOWN IS TYPICAL AND SUBJECT TO FIELD ADJUSTMENT.

3 ANTENNA PLAN @127 FT. A.G.L.
 Scale: 1/4" = 1'-0"



4 TYPICAL ANTENNA ELEVATION
 Scale: N.T.S.



2 NORTH ELEVATION
 Scale: 1" = 50'

verizon
 WIRELESS COMMUNICATIONS FACILITY
 99 EAST RIVER DRIVE
 EAST HARTFORD, CT 06108

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

SUBMISSIONS		
NO.	DATE	REVIEW
0	06.17.16	REVIEW
1	06.24.16	CSC FILING

DRAWN BY: AS
CHECKED BY: DW

SITE NAME:
 LEDYARD NORTH CT

PROJECT DESCRIPTION:
 NEW BUILD MACRO

PROJECT INFORMATION:
 SBA SITE # CT13076
 HOLMBERG ORCHARDS
 12 ORCHARD LANE
 GALES FERRY, CT 06335

DRAWING TITLE:
 COMPOUND PLAN,
 NORTH ELEVATION
 & ANTENNA PLAN

SHEET NUMBER:
 C-1



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

ABUTTERS LIST FROM PARCEL 24-1790-12			
S - B - L	OWNER NAME	OWNER MAILING ADDRESS	PROPERTY ADDRESS
* 24-1790-12	HOLMBERG RICHARD H + DIANE Y	4 ORCHARD DR, GALES FERRY, CT 06339	12 ORCHARD DR
24-1790-12R	I TOWN OF LEDYARD	741 COLONEL LEDYARD HWY, LEDYARD, CT 06339	12R ORCHARD DR
2-120-191	E NATURE CONSERVANCY OF CT INC	55 CHURCH ST FL 3, NEW HAVEN, CT 06510	191 AVERY HILL RD
13-120-160	ROCKETT MATTHEW J & SANDRA M	160 AVERY HILL RD, LEDYARD, CT 06339	160 AVERY HILL RD
25-120-156	HART DONALD J & PATRICIA L	156 AVERY HILL RD, LEDYARD, CT 06339	156 AVERY HILL RD
25-2515-4	JOHNSON DAVID W JR + MARIE V	4 TUCKERS RUN, LEDYARD, CT 06339	4 TUCKERS RUN
25-2515-8	DUNBAR NICK + LESLEY	8 TUCKERS RUN, LEDYARD, CT 06339	8 TUCKERS RUN
25-2515-10	PERDUE WILLIAM L + JOYCE A	10 TUCKERS RUN, LEDYARD, CT 06339	10 TUCKERS RUN
25-2515-12	WYNN PAUL R + MARIE B	12 TUCKERS RUN, LEDYARD, CT 06339	12 TUCKERS RUN
25-2515-14	LEVANTO DAVID M + BARBARA F	14 TUCKERS RUN, LEDYARD, CT 06339	14 TUCKERS RUN
25-2515-16	SAVINGS INSTITUTE BANK & TRUST CO (CNSR)	803 MAIN ST, WILLIMANTIC, CT 06226	16 TUCKERS RUN
25-2515-15A	I TOWN OF LEDYARD	741 COLONEL LEDYARD HWY, LEDYARD, CT 06339	15A TUCKERS RUN
25-2515-15	JAMES JESSE W + HEIDI	15 TUCKERS RUN, LEDYARD, CT 06339	15 TUCKERS RUN
25-2515-13	JAMES JESSE W + HEIDI L	15 TUCKERS RUN, LEDYARD, CT 06339	13 TUCKERS RUN
25-1670-20	HOOK BRIAN J	20 NAOMI DR, LEDYARD, CT 06339	20 NAOMI DR
25-1670-19	HOLDRIDGE JOSHUA + CRYSTAL	19 NAOMI DR, LEDYARD, CT 06339	19 NAOMI DR
25-2110-8	HARMAN PHYLLIS	8 ROSEMARIE CT, LEDYARD, CT 06339	8 ROSEMARIE CT
25-2110-7	JOHNSON EMILE T + LINDA S	7 ROSEMARIE COURT, LEDYARD, CT 06339	7 ROSEMARIE CT
25-200-40-A	I TOWN OF LEDYARD	741 COLONEL LEDYARD HWY, LEDYARD, CT 06339	40A BITTERSWEET DR
25-550-6	FERMIN SAGRARIO + FERNANDEZ CONCELSA	6 CORNELL CT, LEDYARD, CT 06339	6 CORNELL CT
25-550-8	HURLEY ROBERT P + MARY E	8 CORNELL CT, LEDYARD, CT 06339	8 CORNELL CT
25-550-10	JENKINS JOHN E + TINA M	5 CROSSLEY CT, NIANITIC, CT 06357	10 CORNELL CT
25-550-7	JARRETT ANDREW C + JESSICA E	33 UPSHUR RD, ANNAPOLIS, MD 21402	7 CORNELL CT
24-200-24-A	LINN THEODORE M + NANCY	24A BITTERSWEET DR, GALES FERRY, CT 06339	24A BITTERSWEET DR
24-200-6	MORTON JEAN M	6 BITTERSWEET DR, GALES FERRY, CT 06339	6 BITTERSWEET DR
24-2120-1978	BOSSARDET DONALD + KOWALSKI, KAREN L	1978 ROUTE 12, GALES FERRY, CT 06339	1978 ROUTE 12
24-1790-1980	HOLMBERG RICHARD H	4 ORCHARD DRIVE, GALES FERRY, CT 06339	1980 ROUTE 12
24-1790-4	HOLMBERG RICHARD H + DIANE Y	4 ORCHARD DRIVE, GALES FERRY, CT 06339	4 ORCHARD DR
24-1790-8	HOLMBERG RICHARD A + DIANE Y	4 ORCHARD DR, GALES FERRY, CT 06339	8 ORCHARD DR
24-1790-9	HOLMBERG RICHARD A + DIANE Y	4 ORCHARD DR, GALES FERRY, CT 06339	9 ORCHARD DR
24-1790-15	LOTRING NANCY E + ALFRED H TR	474 HARDWICKE RD, CITY OF HARDWICKE, NEW BRUNSWICK, CANADA E9AILG	15 ORCHARD DR
24-2120-2000	PROULX JAMES M + SCHIRDUAN VICTORIA	2000 ROUTE 12, GALES FERRY, CT 06339	2000 ROUTE 12
12-2120-2002	HOLMBERG ARTHUR	2002 ROUTE 12, GALES FERRY, CT 06339	2002 ROUTE 12

NOTES TO ABUTTERS MAP & OWNERS LIST:
1. ALL INFORMATION TAKEN FROM TOWN OF LEDYARD ONLINE "GIS" DATABASE, JUNE 17, 2016.
2. ORCHARD "DRIVE" AND ORCHARD "LANE" ARE BOTH USED FOR THE SUBJECT PARCEL AND ROAD

* INDICATES SUBJECT PROPERTY



1
C-2 ABUTTERS MAP
Scale: 1"=400'

verizon
WIRELESS COMMUNICATIONS FACILITY

99 EAST RIVER DRIVE
EAST HARTFORD, CT 06108

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	06.17.16	REVIEW
1	06.24.16	CSC FILING

DRAWN BY:	CHECKED BY:
AS	DW

SITE NAME:

LEDYARD NORTH CT

PROJECT DESCRIPTION:

NEW BUILD MACRO

PROJECT INFORMATION:

**SBA SITE # CT13076
HOLMBERG ORCHARDS
12 ORCHARD LANE
GALES FERRY, CT 06335**

DRAWING TITLE:

**2,500 FT. RADIUS MAP,
ABUTTERS MAP &
PROPERTY OWNER LIST**

SHEET NUMBER:

C-2

ATTACHMENT 3



LINX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site collocations and tough zoning restrictions
- Excellent solution for site sharing and maximizing capacity
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.8	15.9
Beamwidth, Horizontal, degrees	65	64
Beamwidth, Vertical, degrees	12.4	11.2
Beam Tilt, degrees	0–10	0–10
USLS (First Lobe), dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	23	23
CPR at Sector, dB	12	10
Isolation, dB	30	30
VSWR Return Loss, dB	1.4 15.6	1.4 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896
Gain by all Beam Tilts, average, dBi	15.6	15.7
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.5
	0 ° 15.7	0 ° 15.9
Gain by Beam Tilt, average, dBi	5 ° 15.7	5 ° 15.8
	10 ° 15.3	10 ° 15.3
Beamwidth, Horizontal Tolerance, degrees	±0.9	±1.4
Beamwidth, Vertical Tolerance, degrees	±0.8	±0.6
USLS, beampeak to 20° above beampeak, dB	18	20
Front-to-Back Total Power at 180° ± 30°, dB	25	23
CPR at Boresight, dB	25	24
CPR at Sector, dB	15	12

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the [whitepaper Time to Raise the Bar on BSAs](#).

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® Teletilt®

Product Specifications

COMMScope®

LNx-6514DS-VTM

POWERED BY



Operating Frequency Band
Performance Note

698 – 896 MHz
Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241 km/h 150 mph

Dimensions

Depth	180.5 mm 7.1 in
Length	1851.0 mm 72.9 in
Width	301.0 mm 11.9 in
Net Weight	14.2 kg 31.3 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	LNx-6514DS-A1M
RET System	Teletilt®

Packed Dimensions

Depth	284.0 mm 11.2 in
Length	2163.0 mm 85.2 in
Width	411.0 mm 16.2 in
Shipping Weight	32.3 kg 71.2 lb

Regulatory Compliance/Certifications

Agency

RoHS 2011/65/EU
China RoHS SJ/T 11364-2006
ISO 9001:2008

Classification

Compliant by Exemption
Above Maximum Concentration Value (MCV)
Designed, manufactured and/or distributed under this quality management system



Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

LNK-6514DS-VTM

POWERED BY



DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance
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SBNHH-1D45C

Andrew® Tri-band Antenna, 698–896 and 2x 1695–2360 MHz, 45° horizontal beamwidth, internal RETs.

- Interleaved dipole technology providing for attractive, low wind load mechanical package
- Three internal RETs for independent tilt on all three bands

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	18.3	18.6	19.6	20.2	20.5	21.0
Beamwidth, Horizontal, degrees	47	43	44	43	42	39
Beamwidth, Vertical, degrees	8.9	8.2	5.8	5.3	5.1	4.5
Beam Tilt, degrees	0–10	0–10	0–8	0–8	0–8	0–8
USLS (First Lobe), dB	17	16	20	20	19	16
Front-to-Back Ratio at 180°, dB	30	31	33	35	35	36
CPR at Boresight, dB	25	19	20	24	17	17
CPR at 10 dB Horizontal Beamwidth, dB	11	16	10	10	10	10
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR Return Loss, dB	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	17.9	18.5	19.2	20.0	20.3	20.8
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.2	±0.5	±0.4	±0.4	±0.4
	0 ° 17.8	0 ° 18.4	0 ° 19.2	0 ° 20.0	0 ° 20.2	0 ° 20.8
Gain by Beam Tilt, average, dBi	5 ° 18.0	5 ° 18.6	4 ° 19.3	4 ° 20.0	4 ° 20.3	4 ° 20.9
	10 ° 17.9	10 ° 18.4	8 ° 19.0	8 ° 19.8	8 ° 20.1	8 ° 20.5
Beamwidth, Horizontal Tolerance, degrees	±1.6	±2.3	±1.8	±0.9	±1	±1.6
Beamwidth, Vertical Tolerance, degrees	±0.5	±0.3	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	16	16	16	16	17	16
Front-to-Back Total Power at 180° ± 30°, dB	24	25	29	31	32	33
CPR at Boresight, dB	25	22	22	26	21	19
CPR at 10 dB Horizontal Beamwidth, dB	14	18	13	11	11	12

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, [download the whitepaper Time to Raise the Bar on BSAs.](#)

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® multiband with internal RET
Band	Multiband
Brand	DualPol®
Operating Frequency Band	1695 – 2360 MHz 698 – 896 MHz
Performance Note	Outdoor usage

SBNHH-1D45C

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, frontal	1460.0 N @ 150 km/h 328.2 lbf @ 150 km/h
Wind Loading, lateral	325.0 N @ 150 km/h 73.1 lbf @ 150 km/h
Wind Loading, rear	1534.0 N @ 150 km/h 344.9 lbf @ 150 km/h
Wind Speed, maximum	241 km/h 150 mph

Dimensions

Depth	178.0 mm 7.0 in
Length	2437.0 mm 95.9 in
Width	457.0 mm 18.0 in
Net Weight, without mounting kit	36.1 kg 79.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal RET	High band (2) Low band (1)
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Interface	8-pin DIN Female 8-pin DIN Male
RET Interface, quantity	1 female 1 male

Packed Dimensions

Depth	311.0 mm 12.2 in
Length	2559.0 mm 100.7 in
Width	567.0 mm 22.3 in
Shipping Weight	55.8 kg 123.0 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

SBNHH-1D45C



Included Products

BSAMNT-1 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

BSAMNT-M — Middle Downtilt Mounting Kit for Long Antennas for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance
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ALCATEL-LUCENT B13 RRH4X30-4R

Alcatel-Lucent B13 Remote Radio Head 4x30-4R is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH4x30-4R allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B13 RRH4x30-4R product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity and up to 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH4x30-4R is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

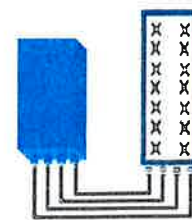


FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between
modes via SW w/o site
visit

TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield)
Volume in L	38 (with solar shield)
Weight in kg (lb) (w/o mounting HW)	26 (57.2) (with solar shield)
DC voltage range	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
DC power consumption	550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions	-40°C (-40°F) / +55°C (+131°F)
Wind load (@150km/h or 93mph)	IP65 Frontal: <200N / Lateral : <150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

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ALCATEL-LUCENT

WIRELESS PRODUCT DATASHEET

RRH2X60-1900A-4R FOR BAND 2/25

APPLICATIONS

The Alcatel-Lucent RRH2x60-1900A-4R is a high power, small form factor Remote Radio Head operating in the PCS 1900MHz frequency band for WCDMA and LTE technologies. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.



A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent RRH2x60-1900A-4R is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations,

administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-1900A-4R integrates all the latest technologies. This allows operators to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-1900A-4R is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

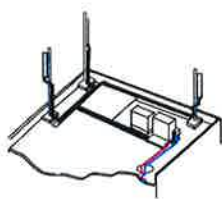
The Alcatel-Lucent RRH2x60-1900A-4R is a very cost-effective solution to deploy LTE MIMO.

EASY INSTALLATION

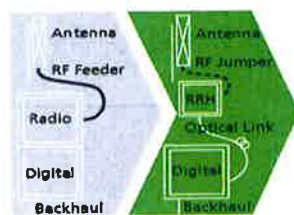
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-1900A-4R installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-1900A-4R is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

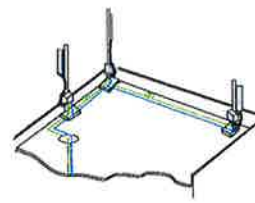
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-190A-4R is compact and weighs about 21 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-1900A-4R integrates two power amplifiers of 60W rating (at each antenna connector)
- RRH2x60-1900A-4R can operate WCDMA only, LTE only or a mix of WCDMA and LTE
- RRH2x60-1900A-4R offers the possibility for WCDMA (non MIMO) to operate the two radio chains independently (2 blocks of 20 MHz anywhere in the band)

- RRH2x60-1900A-4R is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO deployment and/or WCDMA and LTE simultaneous operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses

in RF cables and thus reducing power consumption by 50% compared to conventional solutions

- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights

- HxWxD : 500x285x208 mm (30l with solar shield)
- Weight : 21 kg (46 lbs) (with solar shield)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption: 460W typ. @2x60W (100%RF)

RF Characteristics

- Supported spectrum: DL 1930-1990 / UL 1850-1910
- Frequency band: 3GPP band 2/25
- Output power: 2x60W at antenna connectors
- Technology supported: W-CDMA and LTE
- Instantaneous bandwidth: 20 MHz (MIMO) or 2x20 MHz (non MIMO)
- Rx diversity: 2-way and 4-way uplink reception

- Typical sensitivity without Rx diversity: -124.8dBm for WCDMA and -105 dBm for LTE

Connectivity

- Two CPRI optical ports for daisy chaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 15km using SM fiber
- TMA/RETA: AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%

- Environmental Conditions: ETS300-019-1-4 class4.1E
- Ingress Protection: IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089
- Safety : IEC60950-1, EN 60825-1
- Regulatory: CE Mark-European Directive 2002/95/EC (RoHS), 2002/96/EC (WEEE), 1999/5/EC (R&TTE)
- Health : EN 50385

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B66A RRH 4X45 - PHYSICAL CHARACTERISTICS- TARGET 15.1



B4 RRH4x45-4R (AWS-Extension Band)	
Frequency Band	LR15.1 – B4 / LR16.1 B66 (AWS 1 and 3 only)
RF Output Power	2x90W/4x45W (SW configurable)
Operational range	2110-2180 MHz, DL/ 1710-1780 MHz UL
Instantaneous Bandwidth	70MHz
Configuration (HW readiness)	LTE: 2T2R, 2T4R, 4T4R
Carrier Bandwidths	5, 10, 15 and 20 MHz
Interfaces	2x CPRI Rate 7 Ports Antenna Connectors 4.3-10
AISG Support	AISG 2.0 for RET Internal Smart Bias T
Monitor Ports	NA (Spec An to replace ports)
Environmental	GR487 Compliance / GR3178 Compliance (with exceptions)
Mounting options	Pole/Wall
Connectors location	All bottom
External Alarms	4
Annual Return Rate (Target)	<2%
Operating Temperature	-40 C to +55 C (without solar load)

- Commercial Product Will include B66 support of AWS 1 and 3.
- Lower AWS 3 UL Not in 3GPP Band 66 Definition

Physical Dimensions – Not to Exceed		
W/O Solar Shield		With Solar Shield
Dimensions HxWxD	H = 26in W = 11.4in D = 5.9in (H=660mm) (W=290mm) (D=150mm)	H = 26.6in W = 12in D = 6.8in (H=675mm) (W=304mm) (D=173mm)
Volume	29l	35.5l
Weight		64lbs / 29kg

8220-603 series

Reliability through Simplicity



Founded in 1979 Polar Power specialized in solar photovoltaic systems, solar air conditioning and refrigeration. We developed and provided photovoltaic charging controls for telecommunications in the 1980s along with DC generators for the military. In 1994 we were first to provide DC generators with remote control and monitoring to the telecommunications industry.

Polar's success is based on engineering generators to meet the very specific needs of each application. Telecom site optimization is best met with the DC generator technology as the loads and batteries are DC. It makes no sense to install an AC generator and convert the output to DC. The AC generators are designed for a wide range of applications and they are not specifically produced for telecom applications so there are issues with reliability, space, and fuel efficiency.

Polar can save you considerable time and cost in permitting, installing, purchasing, and maintaining a backup generator. We reduce CAPEX and OPEX costs while improving backup reliability.

Intertek 4003706

Conforms to UL STD 2200

Certified to CSA STD C22.2 No. 100

Fuel tank is UL 142 Listed

Meets EPA Emission Regulations
CA/MA Emissions Compliant

2 year standard warranty, extended 5-10 year warranty available

Available Models:

- **8220-603-D-10** Diesel 10 kW, -48 VDC
- **8220-603-D-15** Diesel 15 kW -48 VDC



The concepts and features behind Polar's backup generator for telecommunications include:

SMALL FOOTPRINT. Polar's DC generator is considerably smaller in size than an AC generator. You can now backup sites that could not accommodate an AC generator. Smaller also means less cost for space leasing.

LONG RESERVE. 48 to 72 hour reserve. Polar's DC generator can provide long reserve times because of very low fuel consumption. This generator should be the first choice for sites exposed to natural disasters requiring backup for weeks or months at a time (fuel consumption 1.02 gallon per hour).

LOW ACOUSTIC NOISE. <66 dBA @ 7 meters, and low vibration so as not to disturb the local residents or building landlords. Quieter than other generators with lower noise ratings.

LIGHTWEIGHT. Up to 1/3 the weight of a comparable AC generator. Facilitates roof top installations.

CORROSION RESISTANT. All-aluminum enclosure with stainless hardware for low maintenance, and long service life.

RODENT RESISTANT. Small animals can quickly destroy a generator set by gnawing on wires, fuel lines, radiator hoses, etc. Cooling air inlets and outlets have perforated aluminum screens to keep small rodents and large insects out. Stainless steel wire braid is placed over fuel and radiator lines for increased reliability and safety.

SUPERCAPACITOR STARTER. Failure to start is the number one problem plaguing generator reliability. Polar's unique design has replaced the starting battery with a Super Capacitor. Capacitors are more reliable and last longer than batteries (10-15 year life).

LONG LIFE. Controls and wire harnesses are designed to exceed a 20 year life. Higher grade, longer life electrical wire (UL 3173), weather tight connectors, gold plated connector pins on signal circuits. Controls and wire harness are easily replaceable.

ADVANCED MONITORING. Remote diagnostics, control, and monitoring. Ethernet and RS232 standard, with optional SNMP.

SIMPLICITY. Transfer switch, rectifier, and starting battery are not required.

COMPARING THE COST OF AC vs DC

	AC	DC
Transfer switch required	Yes	No
Permitting costs	\$\$	\$
Shipping to site and installation cost	\$\$	\$
Site preparation/reinforcing structures	\$\$\$	\$
Ethernet/RS232 remote control and monitoring	Extra	Standard

8220 ALTERNATOR FEATURES

- No mechanical adjustments
- Very lightweight
- High quality electrical output
- Voltage and current regulation
- Up to 94% efficiency
- Class 220° C insulation
- Anodized type III process for aluminum parts
- Nickel plating for steel parts
- Stator is varnished

8220 ALTERNATOR SPECIFICATIONS

Type	Permanent Magnets, NdFeB
Weight (lb/kg)	46.5/21
Regulation Type	Variable engine speed
Stator	3 phase/32 poles
Overcurrent Protection (A)	10 kW - 250 15 kW - 350
Disconnect Means	Pull fuse block, sized for each generator kW
Voltage Range (VDC)	44 to 62
Alternator Exhaust Flow (cfm/cmm)	130 to 180 / 3.68 to 5.1
MTBF (hr)	100,000+

ENCLOSURE

Model	88-25-0603
Type	Weather Protective
Materials	Marine Grade Aluminum
Door Hardware	Three Point with Padlock Hasp, and Removable Side Panels
Mounting	Secure Mounting Tabs

WEIGHTS AND DIMENSIONS

	10 kW	15 kW
Dry Weight (lb/kg)	1106/502	1248/566
Dimensions (LxWxH) (in/cm)	32 x 50 x 72 / 81.3 x 127 x 183	

PERMITTING IS FACILITATED

- Small engine horsepower
- Small 54 gallon diesel fuel tank meets UL 142
- DC generator is fully isolated from the utility grid
- No transfer switch
- Low acoustic noise
- Incorporates all requirements made by local Fire Marshals

STARTER SUPERCAPACITOR SPECIFICATIONS

Model	20-16-0001
Storage Rating (Farads)	500
Voltage (VDC)	13-14.4
Weight (lb/kg)	12.1/5.5
Operating Temperature (°C/°F)	-40 to 65 / -40 to 149
Service Life (year)	10 to 15

CHARGER SPECIFICATIONS

Model	00-10-0015
Input Voltage (VDC)	28.8 to 60
Output Voltage (VDC)	14 to 14.4
Recharge time from 0 VDC (min)	10
Recharge time from 8 VDC (min)	2
Weight (lb/kg)	2.2/1

SOUND EMISSIONS

Contact us for current sound data.

ENGINE SPECIFICATIONS: 10 KW DIESEL

Engine Model	Isuzu 3CA1 or Yanmar 3TNV74
Cylinders	3 In-line
Displacement (L)	0.993
Bore (in./mm)	2.91/74
Stroke (in./mm)	3.03/77
Intake Air System	Naturally Aspirated
Engine HP	18
Emissions Compliance	EPA and CARB Certified
Variable RPM	2300 to 2600

ENGINE SPECIFICATIONS: 15 KW DIESEL

Engine Model	Yanmar 3TNV88
Cylinders	3 In-line
Displacement (L)	1.642
Bore (in./mm)	3.4/88
Stroke (in./mm)	3.5/90
Intake Air System	Naturally Aspirated
Engine HP	24
Emissions Compliance	EPA and CARB Certified
Variable RPM	1500 to 1850

ENVIRONMENTAL

Operating Temperature (°C/°F)	-40 to 72 / -40 to 162
Operating Humidity %	100
Cold Start Aids	Glow Plugs

ENGINE FUEL CONSUMPTION

	Output (kW)	gal/hr	L/hr
3CA1/3TNV74	4	0.35	1.32
	5	0.44	1.66
	6	0.53	2
	7	0.615	2.33
	8	0.7	2.65
	9	0.79	2.99
	10	0.88	3.33
3TNV88	15	1.02	3.86

POWER ADJUSTMENT FOR AMBIENT CONDITIONS

Temperature Deration	1% derate for every 5.6 °C (10 °F) above 25 °C (77 °F)
Altitude Deration	3% derate for every 300 m (1000 ft) above 91 m (300 ft)

ENGINE LUBRICATION SYSTEM

Oil Filter Type	Full flow spin-on canister
Oil Capacity	2.8 L - 3CA1/3TNV74 6.7 L - 3TNV88
Oil Pressure Switch	Yes
Oil Pressure Transducer	Optional

ENGINE COOLING SYSTEM

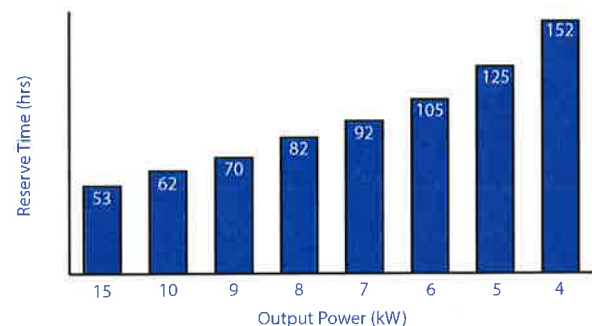
Type	Pressurized Aluminum Radiator
Water Pump	Belt-driven, Pre-lubed, self-sealing
Fan Type	Electric Fans
Airflow CFM or M³/hr	1300 or 2200
Fan Mode	Pusher
Temperature Switch	Yes

DIESEL FUEL SYSTEM

Type	Diesel
Fuel Pump Type	Electrical
Injector Type	Mechanical
Fuel Filtering	Paper element

FUEL TANK SPECIFICATIONS

UL Rated Capacity (gal/L)	54/204
Run Time	see table below
Tank Alarms	Yes
Visual Gages	Yes
Catch Basin (gal/L)	5/19
Listings	UL 142 (double wall)



ENGINE COOLING

	10 kW	15 kW
System coolant capacity (gal/L)	2.2/8.3	
Maximum operation air temperature on radiator (°C/°F)	50/122	57/135
Maximum ambient temperature (°C/°F)	60/140	60/140

COMBUSTION REQUIREMENTS

	10 kW	15 kW
Flow at rated power (cfm/cmm)	47/1.34	68/1.92

EXHAUST

	10 kW	15 kW
Exhaust flow at rated output (cfm/cmm)	90/2.55	135/3.82
Exhaust temperature at rated output (°C/°F)	480/900	

CONTROLLER FEATURES

Controller Type.....	Supra Model 250
4-Line Plain Text LCD Display.....	Simple user interface for ease of operation
Engine Run Hours Indication.....	Standard
Programmable Start Delay.....	Standard
Run/Alarm/Maintenance Logs.....	Standard
Engine Start Sequence.....	Cyclic cranking: 5 sec on, 45 sec rest (3 attempts maximum)
Starter Supercapacitor Charger.....	Standard
Automatic Voltage Regulation with Over and Under Voltage Protection.....	Standard
Automatic Low Oil Pressure/High Oil Temperature Shutdown.....	Standard
Overcrank/Overspeed.....	Standard
Automatic High Engine Temperature Shutdown.....	Standard
Field Upgradeable Firmware.....	Standard
Glow Plug Delay	Automatic With Temperature
Engine Start Delay.....	Adjustable, Set at 60 sec
Return to Utility Delay.....	Adjustable, Set at 60 sec
Engine Cool-down.....	Adjustable, Set at 60 sec
Exerciser.....	Programmable, weekly/bi-weekly

WARNING ALARMS

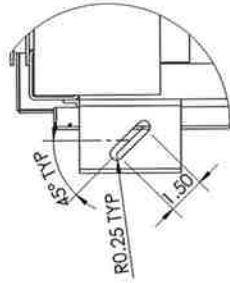
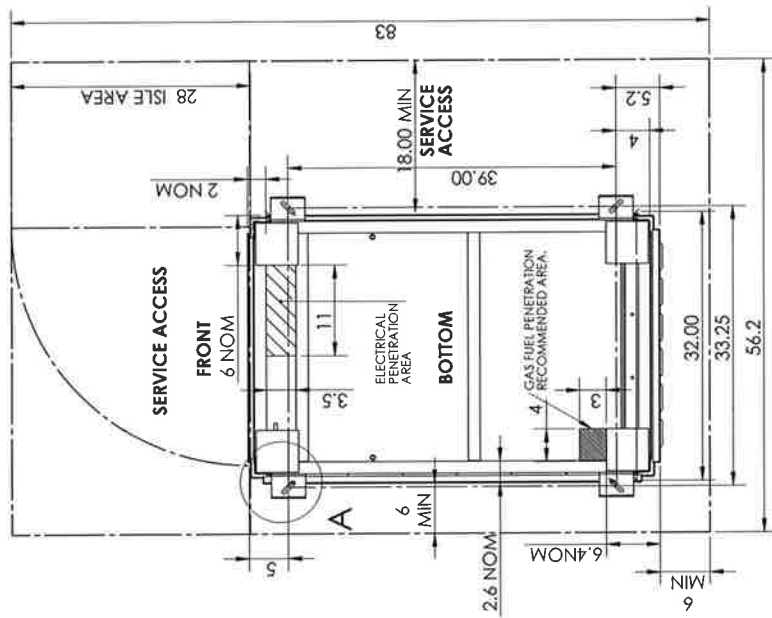
Low Diesel Fuel Level.....	Standard
Diesel Fuel Tank Rapture Basin.....	Standard
Low/High Supercapacitor Voltage.....	Standard
High Water Temperature.....	Standard
Low Oil Pressure.....	Standard

CONTACT CLOSURE FOR REMOTE INDICATION (PN 84-12-0640)

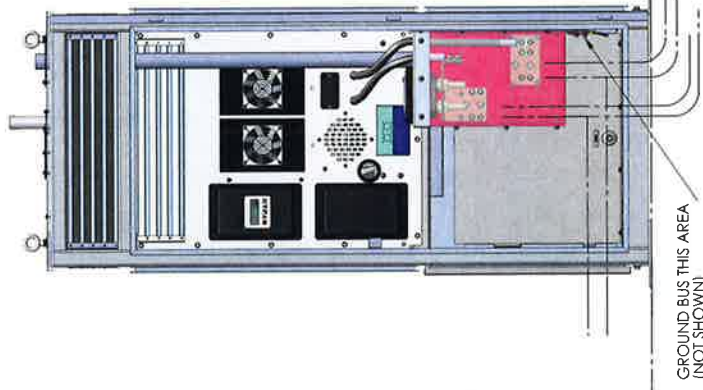
Shutdown Alarm.....	Optional
Warning Alarm.....	Optional
Engine Run.....	Optional
Low Diesel Fuel Level.....	Optional
Diesel Fuel Leak.....	Optional
E-Stop Depressed.....	Optional
Fuel Level Over 90%.....	Optional



INSTALLATION FOOTPRINT, BOTTOM VIEW



DETAIL A
SCALE 1 : 4



FRONT DOOR
REMOVED
FOR CLARITY

GROUND BUS THIS AREA
(NOT SHOWN)

POLAR POWER INC.
249 E GARDENA AVE, GARDENA, CA 90248
TITLE: ALUMINUM VERTICAL ENCLOSURE, 72 IN
SIZE DWG. NO. REV
B 88-25-0603 A-1
SCALE: 1/24 WEIGHT: SHEET 2 OF 4

UNLESS OTHERWISE SPECIFIED:	DO NOT SCALE DRAWING
DRAWINGS ARE IN INCHES	DATE
TOLERANCES ARE	APPROVALS
FRACTIONS DECIMALS	DRAWN
1/32" 0.03125"	CHECKED
1/16" 0.0625"	ENG APPR.
1/8" 0.125"	MFG APPR.
1/4" 0.25"	D.A.
1/2" 0.5"	
3/4" 0.75"	
1" 1.0"	
1 1/4" 1.5"	
1 1/2" 1.75"	
1 3/4" 2.0"	
2" 2.0"	
2 1/4" 2.5"	
2 1/2" 2.75"	
2 3/4" 3.0"	
3" 3.0"	
3 1/4" 3.5"	
3 1/2" 3.75"	
3 3/4" 4.0"	
4" 4.0"	
4 1/4" 4.5"	
4 1/2" 4.75"	
4 3/4" 5.0"	
5" 5.0"	
5 1/4" 5.5"	
5 1/2" 5.75"	
5 3/4" 6.0"	
6" 6.0"	
6 1/4" 6.5"	
6 1/2" 6.75"	
6 3/4" 7.0"	
7" 7.0"	
7 1/4" 7.5"	
7 1/2" 7.75"	
7 3/4" 8.0"	
8" 8.0"	
8 1/4" 8.5"	
8 1/2" 8.75"	
8 3/4" 9.0"	
9" 9.0"	
9 1/4" 9.5"	
9 1/2" 9.75"	
9 3/4" 10.0"	
10" 10.0"	
10 1/4" 10.5"	
10 1/2" 10.75"	
10 3/4" 11.0"	
11" 11.0"	
11 1/4" 11.5"	
11 1/2" 11.75"	
11 3/4" 12.0"	
12" 12.0"	
12 1/4" 12.5"	
12 1/2" 12.75"	
12 3/4" 13.0"	
13" 13.0"	
13 1/4" 13.5"	
13 1/2" 13.75"	
13 3/4" 14.0"	
14" 14.0"	
14 1/4" 14.5"	
14 1/2" 14.75"	
14 3/4" 15.0"	
15" 15.0"	
15 1/4" 15.5"	
15 1/2" 15.75"	
15 3/4" 16.0"	
16" 16.0"	
16 1/4" 16.5"	
16 1/2" 16.75"	
16 3/4" 17.0"	
17" 17.0"	
17 1/4" 17.5"	
17 1/2" 17.75"	
17 3/4" 18.0"	
18" 18.0"	
18 1/4" 18.5"	
18 1/2" 18.75"	
18 3/4" 19.0"	
19" 19.0"	
19 1/4" 19.5"	
19 1/2" 19.75"	
19 3/4" 20.0"	
20" 20.0"	
20 1/4" 20.5"	
20 1/2" 20.75"	
20 3/4" 21.0"	
21" 21.0"	
21 1/4" 21.5"	
21 1/2" 21.75"	
21 3/4" 22.0"	
22" 22.0"	
22 1/4" 22.5"	
22 1/2" 22.75"	
22 3/4" 23.0"	
23" 23.0"	
23 1/4" 23.5"	
23 1/2" 23.75"	
23 3/4" 24.0"	
24" 24.0"	
24 1/4" 24.5"	
24 1/2" 24.75"	
24 3/4" 25.0"	
25" 25.0"	
25 1/4" 25.5"	
25 1/2" 25.75"	
25 3/4" 26.0"	
26" 26.0"	
26 1/4" 26.5"	
26 1/2" 26.75"	
26 3/4" 27.0"	
27" 27.0"	
27 1/4" 27.5"	
27 1/2" 27.75"	
27 3/4" 28.0"	
28" 28.0"	
28 1/4" 28.5"	
28 1/2" 28.75"	
28 3/4" 29.0"	
29" 29.0"	
29 1/4" 29.5"	
29 1/2" 29.75"	
29 3/4" 30.0"	
30" 30.0"	
30 1/4" 30.5"	
30 1/2" 30.75"	
30 3/4" 31.0"	
31" 31.0"	
31 1/4" 31.5"	
31 1/2" 31.75"	
31 3/4" 32.0"	
32" 32.0"	
32 1/4" 32.5"	
32 1/2" 32.75"	
32 3/4" 33.0"	
33" 33.0"	
33 1/4" 33.5"	
33 1/2" 33.75"	
33 3/4" 34.0"	
34" 3	

	NEXT ASSY	USED ON	APPLICATION
01-6789-0000	01-6789-0000	01-6789-0000	01-6789-0000

EXAMPLE:

PROPRIETARY AND CONFIDENTIAL

THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF
POLAR POWER, INC. IT IS TO BE KEPT IN STRICTLY CONFIDENTIAL AND WITHOUT
THE WRITTEN PERMISSION OF POLAR POWER, INC. IS PROHIBITED

DATE _____
BY _____

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ATTACHMENT 4



Tower Engineering Solutions

Phone (972) 483-0607, Fax (972) 975-9615
8445 Freeport Parkway, Suite 375, Irving, Texas 75063

Structural Analysis Report

Existing 150 ft. Monopole

Customer Name: SBA Communications Corp

Customer Site Number: CT13076-A-03

Customer Site Name: Ledyard

Carrier Name: Verizon

Carrier Site ID / Name: 395819

Site Location: 12 Orchard Drive

Ledyard, Connecticut

New London County

Latitude: 41.468277

Longitude: -72.054472

Analysis Result:

Max Structural Usage: 67.2% [Pass]

Max Foundation Usage: 63.0% [Pass]

Report Prepared By : Delu Zhou



Introduction

The purpose of this report is to summarize the analysis results on the 150 ft. Monopole to support the proposed antennas and transmission lines in addition to those currently installed. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

Sources of Information

Tower Drawings	Radian Communication Services, File # 060-3664, Drawing # A070132, dated 03-15-2007
Foundation Drawing	Radian Communication Services, File # 060-3664, Drawing # A070146, dated 03-26-2007
Geotechnical Report	Gemini Geotechnical Associates, Inc. Geotechnical Report, dated 03-22-2007
Modification Drawings	N/A

Analysis Criteria

The analysis was performed in accordance with the requirements and stipulations of the ANSI/TIA/EIA 222-F. In accordance with this standard, the structure was analyzed using **TESPoles**, a proprietary analysis software. The program considers the structure as an elastic 3-D model with second-order effects and temperature effects incorporated in the analysis. The analysis was performed using multiple wind directions.

Basic Wind Speed Used in the Analysis:	85.0 mph (fastest mile)
Basic Wind Speed with Ice:	74 mph (fastest mile) with 1/2" radial ice concurrent
Operational Wind Speed:	50 mph + 0" Radial ice
Standard/Codes:	ANSI/TIA/EIA 222-F / 2005 Connecticut State Building Code

Existing Antennas, Mounts and Transmission Lines

The table below summarizes the antennas, mounts and transmission lines that were considered in the analysis as existing on the tower.

Items	Elevation (ft.)	Qty.	Antenna Descriptions	Mount Type & Qty.	Transmission Lines	Owner
1	147.0	3	Ericsson AIR 21 B2A B4P	(1) Low Profile Platform	(12) 1 5/8" (1) 1 5/8" Fiber	T-Mobile
2		3	Ericsson AIR 21 B4A B2P			
3		3	Ericsson KRY 112 144/1 TMA			
4	137.0	6	Kathrein 742 351	(3) T-Arms	(12) 1 5/8"	Metro PCS*

*Metro PCS is removed from 137' but Lease is still active.

Proposed Carrier's Final Configuration of Antennas, Mounts and Transmission Lines

Information pertaining to the proposed carrier's final configuration of antennas and transmission lines was provided by SBA Communications Corp. The proposed antennas and lines are listed below.

Items	Elevation (ft.)	Qty.	Antenna Descriptions	Mount Type & Qty.	Transmission Lines	Owner
5	127.0	6	SBNHH-1D45C - Panel	(1) Platform w/ Handrails	(2) 1 5/8" Hybrid	Verizon
6		3	LNK-6514DS-AIM - Panel			
7		3	ALU B13 RRH4X30-4R - RRH			
8		3	ALU RRH2X60-PCS - RRH			
9		3	ALU RRH2x90-AWS - RRH			
10		2	RFS DB-T1-6Z-8AB-0Z - ODU			

All transmission lines are considered running inside of the pole shafts.

Analysis Results

The results of the structural analysis, performed for the wind and ice loading and antenna equipment as defined above, are summarized as the following:

	Pole shafts	Anchor Bolts	Base Plate
Max. Usage:	43.6%	48.2%	67.2%
Pass/Fail	Pass	Pass	Pass

Foundations

	Moment (Kip-Ft)	Shear (Kips)	Axial (Kips)
Analysis Reactions	2565.6	25.0	47.9

The foundation has been investigated using the supplied documents and soils report and was found adequate. Therefore, no modification to the foundation will be required.

Operational Condition (Rigidity):

Maximum twist and sway of the microwave dishes under the operational wind speed as specified in the Analysis Criteria are listed in the table below:

Elevation (ft.)	Dish	Carrier	Twist (deg.)	Sway (deg.)
127.0	LNK-6514DS-AIM - Panel	Verizon	0.000	0.702
127.0	SBNHH-1D45C - Panel	Verizon	0.000	0.702

It is recommended that the carriers review the twist and sway values of the microwave dishes.

Conclusions

Based on the analysis results, the existing structure and its foundation were found to be adequate to safely support the existing and proposed equipment and meet the minimum requirements per the ANSI/TIA/EIA 222-F Standard under the design basic wind speed as specified in the Analysis Criteria.

Standard Conditions

1. This analysis was performed based on the information supplied to **(TES) Tower Engineering Solutions, LLC**. Verification of the information provided was not included in the Scope of Work for **TES**. The accuracy of the analysis is dependent on the accuracy of the information provided.
2. The analysis is based on the presumption that the tower members and components along with any existing reinforcement items have been correctly and properly designed, manufactured, installed and maintained.
3. All the existing structural members were assumed to be in good condition with no physical damage or deterioration associated with corrosion.
4. An initial tension of 10% of the break strength on all the existing guy wires was assumed in all the structural analyses of guyed towers unless different values were provided by the client. **TES** cannot take responsibility for the deviations in the analysis results because of differences in the initial tension forces of the existing guy wires.
5. Secondary component or connection secondary components, welds and bolts are assumed to be able to carry their intended original design loads. **TES** cannot take responsibility for verification of the adequacy on the connections, bolts and welds present in the structure.
6. The analyses will be performed based on the codes as specified by the client or based on the best knowledge of the engineering staff of **TES**. In the absence of information to the contrary, all work will be performed in accordance with the latest relevant revision of ANSI/TIA-222. If wind speed or/and ice loads are different from the minimum values recommended by the EIA/TIA-222 standard or other codes, **TES** should be notified in writing and the applicable minimum values provided by the client.
7. The configuration of the existing mounts, antennas, coax and other appurtenances were supplied by the customer for the current structural analysis. **TES** has not visited the tower site to verify the adequacy of the information provided. If there is any discrepancy found in the report regarding the existing conditions, **TES** should be notified immediately to evaluate the effect of the discrepancy on the analysis results.
8. The client will assume responsibility for rework associated with the differences in initially provided information, including tower and foundation information, existing and/or proposed equipment and transmission lines.
9. If a feasibility analysis was performed, final acceptance of changed conditions shall be based upon a rigorous structural analysis.

Usage Diagram - Max Stress 43.6% at 0.0ft

Structure: CT13076-A-SBA
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69

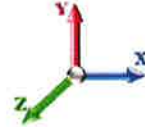
11/13/2015



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Dead Load Factor: 1.00
Wind Load Factor: 1.00

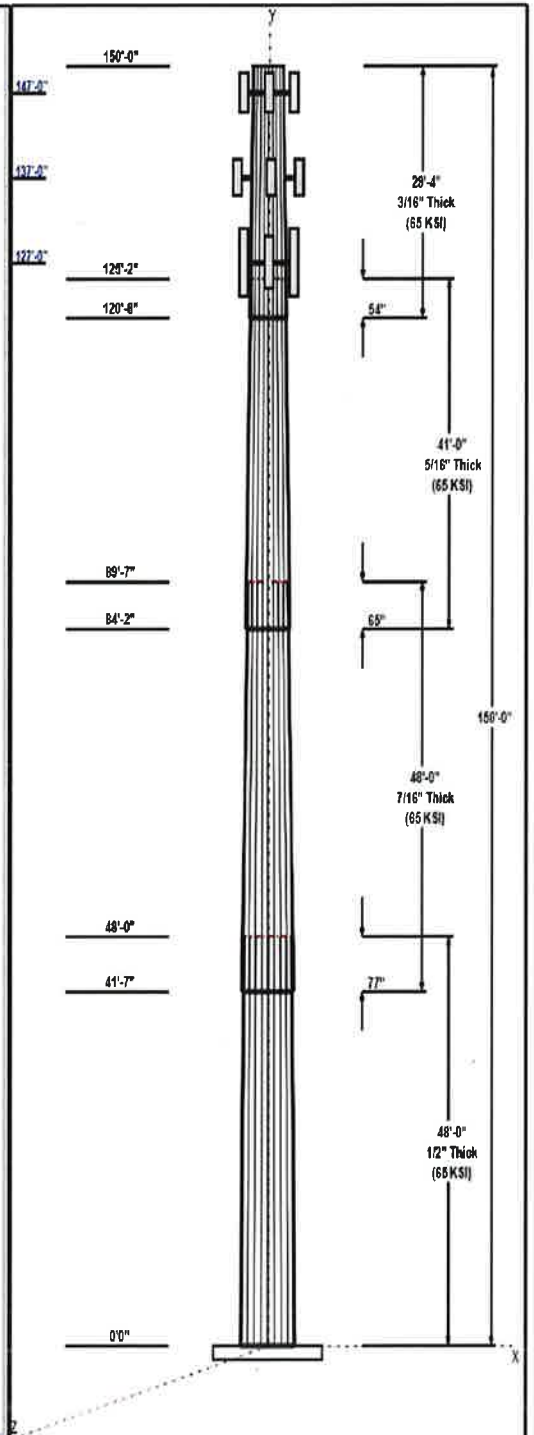
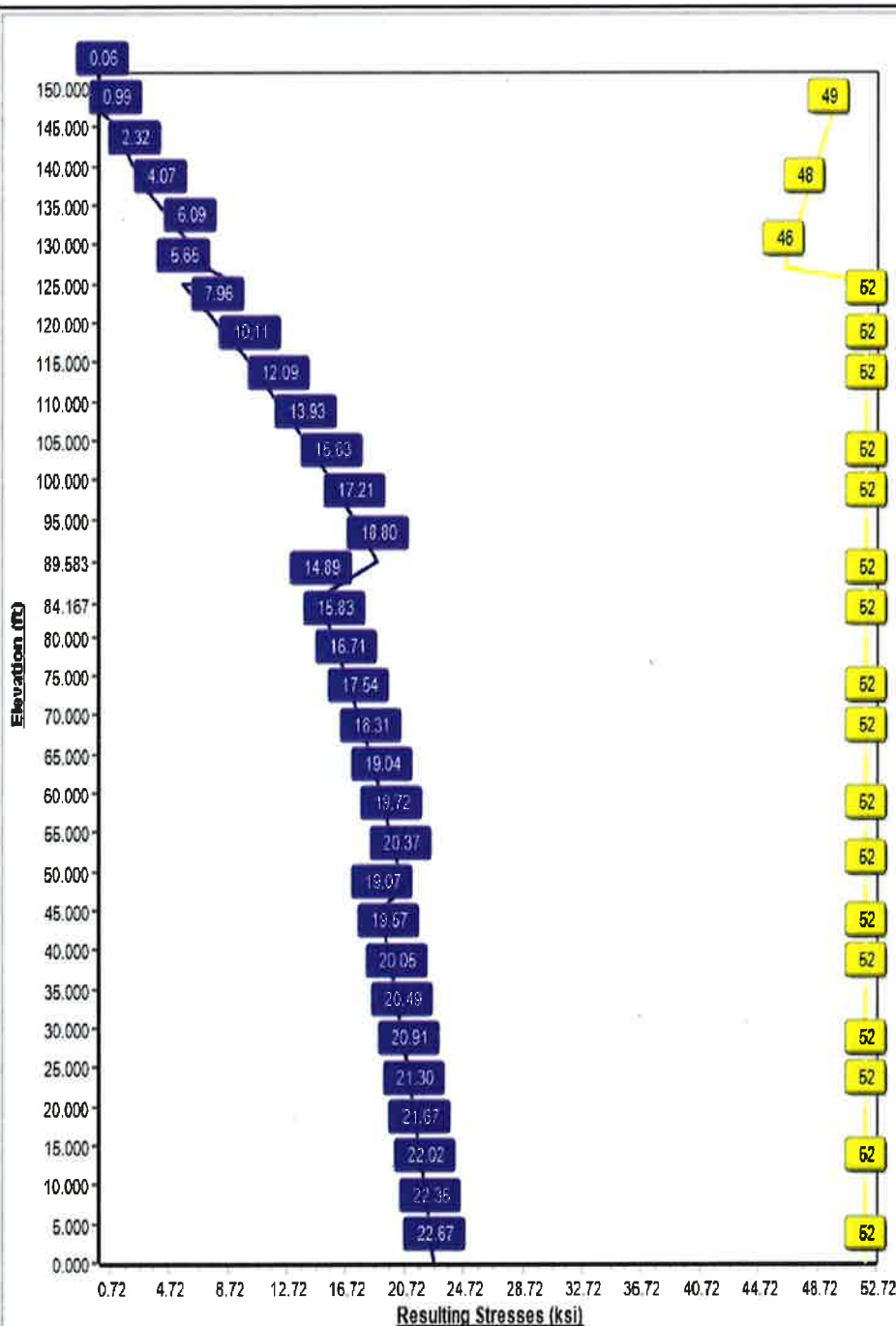
Load Case : 85 mph Wind with 0 in Ice



Iterations: 21

52 Allowable Stress
23 Resulting Stress

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Structure: CT13076-A-SBA

Type: Tapered
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.00 (ft)

Base Shape: 18 Sided
Taper: 0.21250

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Shaft Properties

Seq	Length (ft)	Top (in)	Bottom (in)	Thick (in)	Joint Type	Taper	Grade (ksi)
1	48.00	49.80	60.00	0.500		0.21250	65
2	48.00	41.84	52.04	0.438	Slip	0.21250	65
3	41.00	34.90	43.61	0.313	Slip	0.21250	65
4	29.33	30.00	36.23	0.188	Slip	0.21250	65

Discrete Appurtenances

Attach Elev (ft)	Force Elev (ft)	Qty	Description	Carrier
150.00	152.50	1	Lightning Rod	
147.00	147.00	3	Ericsson AIR 21 B2A B4P	T-Mobile
147.00	147.00	3	Ericsson AIR 21 B4A B2P	T-Mobile
147.00	147.00	3	Ericsson KRY 112 144/1	T-Mobile
147.00	147.00	1	Low Profile Platform	T-Mobile
137.00	137.00	6	Kathrein 742 351	Metro PCS
137.00	137.00	3	T-Arms	Metro PCS
127.00	127.00	3	B13 RRH4X30-4R	Verizon
127.00	127.00	3	LNx-6514DS-AIM	Verizon
127.00	127.00	1	Platform w/ Handrails	Verizon
127.00	127.00	2	RFS DB-T1-6Z-8AB-0Z	Verizon
127.00	127.00	3	RRH2X60-PCS	Verizon
127.00	127.00	3	RRH2x90-AWS	Verizon
127.00	127.00	6	SBNHH-1D45C	Verizon

Linear Appurtenances

Elev From (ft)	Elev To (ft)	Placement	Description	Carrier
0.00	150.00	Outside	Safety Cable	
0.00	150.00	Outside	Step bolts (ladder)	
0.00	147.00	Inside	1 5/8" Coax	T-Mobile
0.00	147.00	Inside	1 5/8" Fiber	T-Mobile
0.00	137.00	Inside	1 5/8" Coax	Metro PCS
0.00	137.00	Inside	3/8"	Metro PCS
0.00	127.00	Inside	1 5/8" Hybrid	Verizon

Anchor Bolts

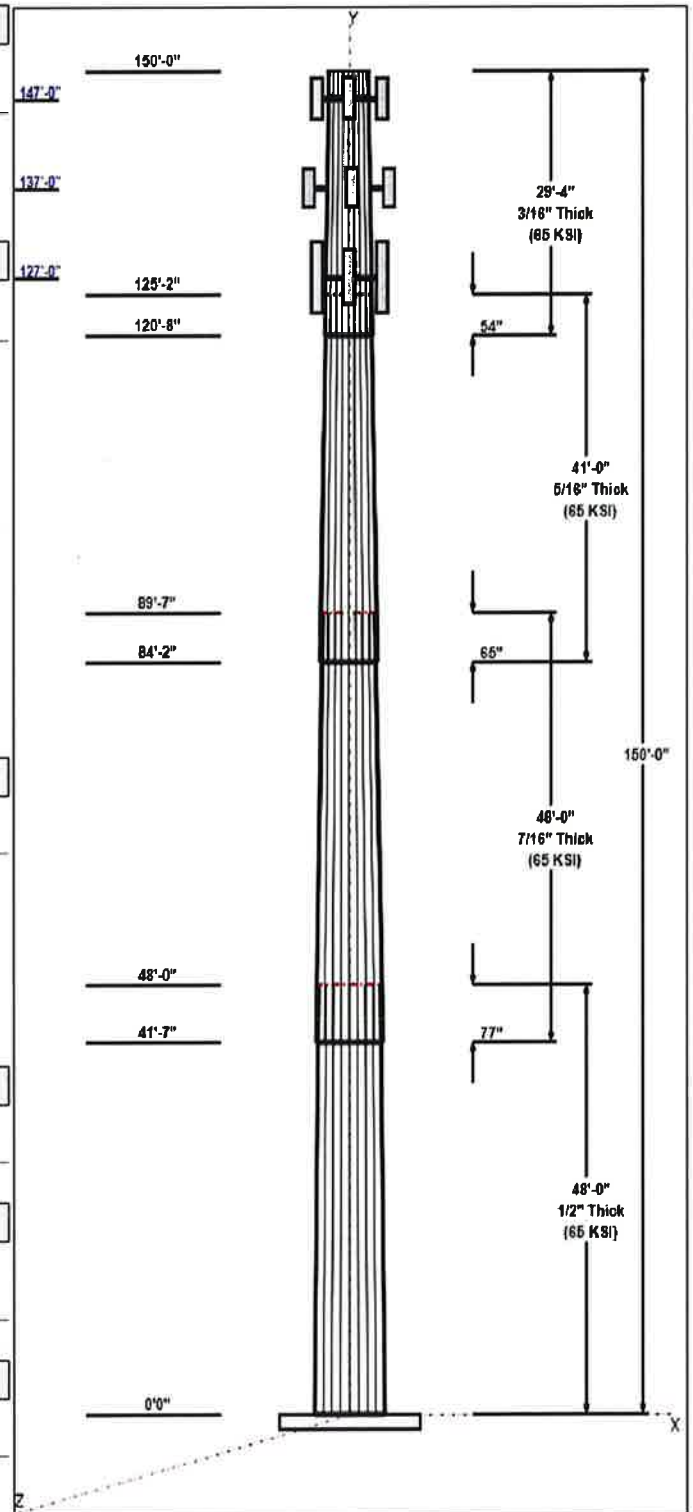
Qty	Specifications	Grade (ksi)	Arrangement
34	1.5" F1554 105	105.0	Radial

Base Plate

Thickness (in)	Specifications (in)	Grade (ksi)	Geometry
1.7500	69.5	50.0	Round

Reactions

Load Case	Moment	Shear	Axial
85 mph Wind with 0" Ice	2565.6	25.0	41.7
73.61 mph Wind with 0.5" Ice	2156.6	20.5	47.9
50 mph Wind with 0" Ice	887.9	8.6	41.7



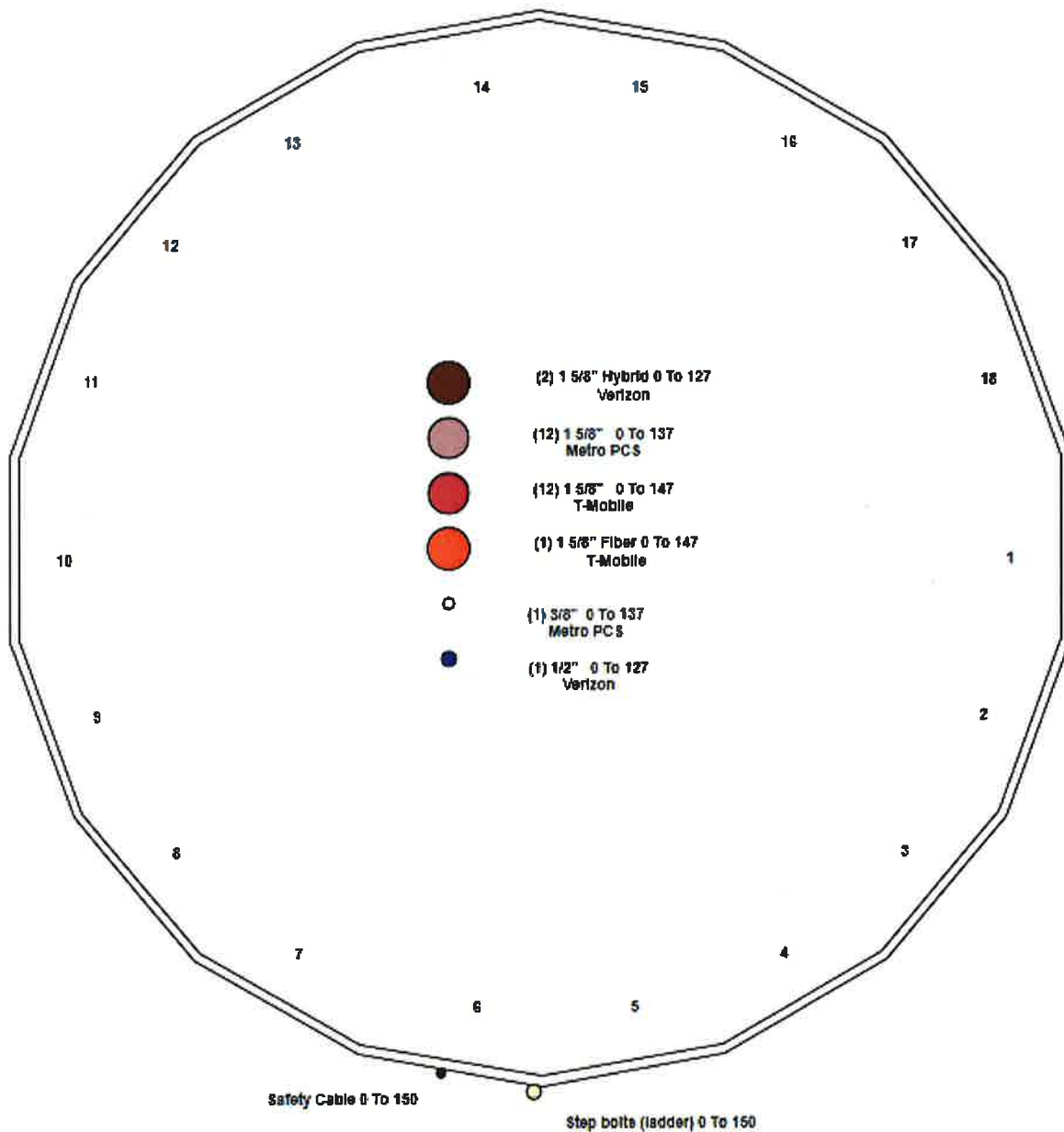
Structure: CT13076-A-SBA - Coax Line Placement

Type: Monopole
Site Name: Ledyard
Height: 150.00 (ft)

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Shaft Properties

Structure: CT13076-A-SBA
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

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Sec. No.	Shape	Length (ft)	Thick (in)	Fy (ksi)	Joint Type	Overlap (in)	Weight (lb)
1	18	48.000	0.5000	65		0.00	14,101
2	18	48.000	0.4375	65	Slip	77.00	10,546
3	18	41.000	0.3125	65	Slip	65.00	5,389
4	18	29.333	0.1875	65	Slip	54.00	1,956
Total Shaft Weight:							31,992

Bottom

Top

Sec. No.	Dia (in)	Elev (ft)	Area (sqin)	Ix (in^4)	W/t Ratio	D/t Ratio	Dia (in)	Elev (ft)	Area (sqin)	Ix (in^4)	W/t Ratio	D/t Ratio	Taper
1	60.00	0.00	94.42	42234.30	19.74	120	49.80	48.00	78.24	24024.5	16.15	99.6	0.212500
2	52.04	41.58	71.65	24104.48	19.56	118.9	41.84	89.58	57.49	12449.6	15.45	95.63	0.212500
3	43.61	84.17	42.95	10174.68	23.19	139.5	34.90	125.1	34.31	5185.97	18.28	111.6	0.212500
4	36.23	120.6	21.45	3521.36	32.66	193.2	30.00	150.0	17.74	1992.24	26.80	160.0	0.212500

Loading Summary

Structure: CT13076-A-SBA
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

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Discrete Appurtenances

No.	Elev (ft)	Description	Qty	No Ice			Ice			Hor. Ecc. (ft)	Vert Ecc (ft)
				Weight (lb)	CaAa (sf)	CaAa Factor	Weight (lb)	CaAa (sf)	CaAa Factor		
1	150.0	Lightning Rod	1	35.00	1.05	1.00	44.00	1.730	1.00	0.00	2.50
2	147.0	Ericsson AIR 21 B2A B4P	3	91.50	6.58	0.86	129.20	6.970	0.87	0.00	0.00
3	147.0	Ericsson AIR 21 B4A B2P	3	90.40	6.58	0.86	128.10	6.970	0.87	0.00	0.00
4	147.0	Ericsson KRY 112 144/1 TMA	3	11.00	0.41	0.70	14.10	0.550	0.71	0.00	0.00
5	147.0	Low Profile Platform	1	1500.00	22.00	1.00	1800.00	27.00	1.00	0.00	0.00
6	137.0	Kathrein 742 351	6	29.80	5.88	0.61	57.10	6.510	0.62	0.00	0.00
7	137.0	T-Arms	3	242.00	8.19	0.75	301.00	11.13	1.00	0.00	0.00
8	127.0	B13 RRH4X30-4R	3	57.20	2.52	0.88	72.50	2.710	0.89	0.00	0.00
9	127.0	LNx-6514DS-AIM	3	38.80	8.41	0.83	89.30	9.240	0.84	0.00	0.00
10	127.0	Platform w/ Handrails	1	1600.00	32.00	1.00	2200.00	40.00	1.00	0.00	0.00
11	127.0	RFS DB-T1-6Z-8AB-0Z	2	18.90	5.60	0.71	46.00	5.870	0.72	0.00	0.00
12	127.0	RRH2X60-PCS	3	55.00	2.57	0.89	70.90	2.760	0.90	0.00	0.00
13	127.0	RRH2x90-AWS	3	44.00	2.52	0.82	61.40	2.870	0.83	0.00	0.00
14	127.0	SBNHH-1D45C	6	49.60	11.39	0.84	111.20	11.86	0.85	0.00	0.00
Totals:			41	5,538.90			7,745.30				

Linear Appurtenances

Bottom Elev. (ft)	Top Elev. (ft)	Description	No Ice		Ice		Exposed
			Weight (lb/ft)	CaAa (sf/ft)	Weight (lb/ft)	CaAa (sf/ft)	
0.00	150.0	(1) Safety Cable	0.27	0.00	0.00	0.00	Outside
0.00	150.0	(1) Step bolts (ladder)	1.04	0.00	0.00	0.00	Outside
0.00	147.0	(12) 1 5/8" Coax	12.48	0.00	0.00	0.00	Inside
0.00	147.0	(1) 1 5/8" Fiber	1.10	0.00	0.00	0.00	Inside
0.00	137.0	(12) 1 5/8" Coax	12.48	0.00	0.00	0.00	Inside
0.00	137.0	(1) 3/8"	0.08	0.00	0.00	0.00	Inside
0.00	127.0	(2) 1 5/8" Hybrid	2.20	0.00	0.00	0.00	Inside
Totals:			4,193.33		0.00		

Shaft Section Properties

Structure: CT13076-A-SBA

Site Name: Ledyard

Height: 150.00 (ft)

Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F

Exposure: C

Gh: 1.69

Struct Class: II

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Increment Length: 5 (ft)

Elev (ft)	Description	Thick (in)	Dia (in)	Area (in^2)	Ix (in^4)	W/t Ratio	D/t Ratio	Fy (ksi)	Fb (ksi)	Weight (lb)
0.00		0.5000	60.000	94.423	42234.3	19.75	120.00	65	52	0.0
5.00		0.5000	58.938	92.737	40011.9	19.37	117.88	65	52	1592.2
10.00		0.5000	57.875	91.051	37868.9	19.00	115.75	65	52	1563.5
15.00		0.5000	56.813	89.365	35803.8	18.62	113.63	65	52	1534.8
20.00		0.5000	55.750	87.679	33815.1	18.25	111.50	65	52	1506.1
25.00		0.5000	54.688	85.992	31901.5	17.88	109.38	65	52	1477.4
30.00		0.5000	53.625	84.306	30061.5	17.50	107.25	65	52	1448.7
35.00		0.5000	52.563	82.620	28293.7	17.13	105.13	65	52	1420.0
40.00		0.5000	51.500	80.934	26596.5	16.75	103.00	65	52	1391.3
41.58	Bot - Section 2	0.5000	51.164	80.400	26073.6	16.63	102.33	65	52	434.6
45.00		0.5000	50.438	79.248	24968.6	16.38	100.88	65	52	1755.2
48.00	Top - Section 1	0.4375	50.675	69.759	22243.7	19.01	115.83	65	52	1520.5
50.00		0.4375	50.250	69.168	21683.9	18.84	114.86	65	52	472.7
55.00		0.4375	49.188	67.693	20325.7	18.41	112.43	65	52	1164.3
60.00		0.4375	48.125	66.218	19025.5	17.99	110.00	65	52	1139.2
65.00		0.4375	47.063	64.742	17781.9	17.56	107.57	65	52	1114.1
70.00		0.4375	46.000	63.267	16593.8	17.13	105.14	65	52	1089.0
75.00		0.4375	44.938	61.792	15459.7	16.70	102.71	65	52	1063.9
80.00		0.4375	43.875	60.316	14378.6	16.27	100.29	65	52	1038.8
84.17	Bot - Section 3	0.4375	42.990	59.087	13517.1	15.92	98.26	65	52	846.5
85.00		0.4375	42.813	58.841	13349.1	15.84	97.86	65	52	288.7
89.58	Top - Section 2	0.3125	42.464	41.807	9384.7	22.55	135.88	65	52	1566.7
90.00		0.3125	42.375	41.719	9325.7	22.50	135.60	65	52	59.2
95.00		0.3125	41.313	40.665	8636.7	21.90	132.20	65	52	700.8
100.00		0.3125	40.250	39.612	7982.5	21.30	128.80	65	52	682.9
105.00		0.3125	39.188	38.558	7362.2	20.70	125.40	65	52	665.0
110.00		0.3125	38.125	37.504	6774.9	20.10	122.00	65	52	647.1
115.00		0.3125	37.063	36.450	6219.7	19.50	118.60	65	52	629.1
120.00		0.3125	36.000	35.396	5695.6	18.90	115.20	65	52	611.2
120.67	Bot - Section 4	0.3125	35.858	35.256	5628.1	18.82	114.75	65	52	80.1
125.00		0.3125	34.938	34.342	5201.9	18.30	111.80	65	52	825.4
125.17	Top - Section 3	0.1875	35.277	20.882	3248.5	31.76	188.14	65	52	31.3
127.00		0.1875	34.888	20.650	3141.5	31.40	186.07	65	46	129.5
130.00		0.1875	34.250	20.271	2971.5	30.80	182.67	65	47	208.9
135.00		0.1875	33.188	19.638	2702.0	29.80	177.00	65	48	339.5
137.00		0.1875	32.763	19.385	2599.0	29.40	174.73	65	48	132.8
140.00		0.1875	32.125	19.006	2449.3	28.80	171.33	65	49	196.0
145.00		0.1875	31.063	18.374	2212.9	27.80	165.67	65	49	318.0
147.00		0.1875	30.638	18.121	2122.8	27.40	163.40	65	50	124.2
150.00		0.1875	30.000	17.742	1992.2	26.80	160.00	65	50	183.0
										31992.1

Wind Loading - Shaft

Structure: CT13076-A-SBA
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

11/13/2015

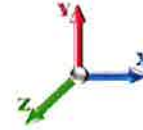


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Load Case: 85 mph Wind with 0" Ice

Dead Load Factor 1.00
Wind Load Factor 1.00

Iterations: 21



Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		0.00	1.00	18.496	31.26	425.00	0.650	0.000	0.00	0.000	0.00	0.0	0.0	0.0
5.00		0.00	1.00	18.496	31.26	417.47	0.650	0.000	5.00	24.779	16.11	503.4	0.0	1592.2
10.00		0.00	1.00	18.496	31.26	409.95	0.650	0.000	5.00	24.336	15.82	494.5	0.0	1563.5
15.00		0.00	1.00	18.496	31.26	402.42	0.650	0.000	5.00	23.893	15.53	485.5	0.0	1534.8
20.00		0.00	1.00	18.496	31.26	394.90	0.650	0.000	5.00	23.451	15.24	476.5	0.0	1506.1
25.00		0.00	1.00	18.496	31.26	387.37	0.650	0.000	5.00	23.008	14.96	467.5	0.0	1477.4
30.00		0.00	1.00	18.496	31.26	379.84	0.650	0.000	5.00	22.565	14.67	458.5	0.0	1448.7
35.00		0.00	1.02	18.810	31.79	375.46	0.650	0.000	5.00	22.122	14.38	457.1	0.0	1420.0
40.00		0.00	1.06	19.541	33.02	374.96	0.650	0.000	5.00	21.680	14.09	465.4	0.0	1391.3
41.58 Bot - Section 2		0.00	1.07	19.759	33.39	374.58	0.650	0.000	1.58	6.773	4.40	147.0	0.0	434.6
45.00		0.00	1.09	20.210	34.15	373.45	0.650	0.000	3.42	14.713	9.56	326.6	0.0	1755.2
48.00 Top - Section 1		0.00	1.11	20.586	34.79	372.15	0.650	0.000	3.00	12.748	8.29	288.3	0.0	1520.5
50.00		0.00	1.13	20.827	35.20	377.71	0.650	0.000	2.00	8.410	5.47	192.4	0.0	472.7
55.00		0.00	1.16	21.402	36.17	374.79	0.650	0.000	5.00	20.716	13.47	487.0	0.0	1164.3
60.00		0.00	1.19	21.941	37.08	371.28	0.650	0.000	5.00	20.273	13.18	488.6	0.0	1139.2
65.00		0.00	1.21	22.449	37.94	367.26	0.650	0.000	5.00	19.831	12.89	489.0	0.0	1114.1
70.00		0.00	1.24	22.929	38.75	362.79	0.650	0.000	5.00	19.388	12.60	488.3	0.0	1089.0
75.00		0.00	1.26	23.386	39.52	357.92	0.650	0.000	5.00	18.945	12.31	486.7	0.0	1063.9
80.00		0.00	1.29	23.821	40.26	352.69	0.650	0.000	5.00	18.503	12.03	484.2	0.0	1038.8
84.17 Bot - Section 3		0.00	1.31	24.169	40.85	348.09	0.650	0.000	4.17	15.081	9.80	400.4	0.0	846.5
85.00		0.00	1.31	24.237	40.96	347.14	0.650	0.000	0.83	3.023	1.96	80.5	0.0	288.7
89.58 Top - Section 2		0.00	1.33	24.603	41.58	341.80	0.650	0.000	4.58	16.405	10.66	443.4	0.0	1566.7
90.00		0.00	1.33	24.636	41.63	346.41	0.650	0.000	0.42	1.473	0.96	39.9	0.0	59.2
95.00		0.00	1.35	25.020	42.28	340.35	0.650	0.000	5.00	17.435	11.33	479.2	0.0	700.8
100.00		0.00	1.37	25.389	42.91	334.03	0.650	0.000	5.00	16.992	11.04	473.9	0.0	682.9
105.00		0.00	1.39	25.745	43.51	327.49	0.650	0.000	5.00	16.549	10.76	468.0	0.0	665.0
110.00		0.00	1.41	26.090	44.09	320.73	0.650	0.000	5.00	16.107	10.47	461.6	0.0	647.1
115.00		0.00	1.43	26.423	44.66	313.78	0.650	0.000	5.00	15.664	10.18	454.7	0.0	629.1
120.00		0.00	1.45	26.747	45.20	306.64	0.650	0.000	5.00	15.221	9.89	447.2	0.0	611.2
120.67 Bot - Section 4		0.00	1.45	26.789	45.27	305.68	0.650	0.000	0.67	1.996	1.30	58.7	0.0	80.1
125.00		0.00	1.46	27.060	45.73	299.34	0.650	0.000	4.33	12.918	8.40	384.0	0.0	825.4
125.17 Top - Section 3		0.00	1.46	27.071	45.75	299.09	0.650	0.000	0.17	0.490	0.32	14.6	0.0	31.3
127.00 Appurtenance(s)		0.00	1.47	27.183	45.94	299.59	0.650	0.000	1.83	5.360	3.48	160.0	0.0	129.5
130.00		0.00	1.48	27.365	46.25	295.09	0.650	0.000	3.00	8.642	5.62	259.8	0.0	208.9
135.00		0.00	1.50	27.662	46.75	287.48	0.650	0.000	5.00	14.049	9.13	426.9	0.0	339.5
137.00 Appurtenance(s)		0.00	1.50	27.778	46.95	284.40	0.650	0.000	2.00	5.496	3.57	167.7	0.0	132.8
140.00		0.00	1.51	27.951	47.24	279.73	0.650	0.000	3.00	8.111	5.27	249.0	0.0	196.0
145.00		0.00	1.53	28.233	47.71	271.84	0.650	0.000	5.00	13.164	8.56	408.3	0.0	318.0
147.00 Appurtenance(s)		0.00	1.53	28.343	47.90	268.64	0.650	0.000	2.00	5.142	3.34	160.1	0.0	124.2
150.00 Appurtenance(s)		0.00	1.54	28.507	48.18	263.81	0.650	0.000	3.00	7.580	4.93	237.4	0.0	183.0
Totals:									150.00			13,961.7		31,992.1

Discrete Appurtenance Forces

Structure: CT13076-A-SB

Site Name: Ledyard

Height: 150.00 (ft)

Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F

Exposure: C

Gh: 1.69

Struct Class: II

11/13/2015

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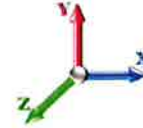


Load Case: 85 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00

Iterations: 21



No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa Factor	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	150.00	Lightning Rod	1	28.642	48.406	1.00	1.05	35.00	0.000	2.500	50.83	0.00	127.06
2	147.00	Low Profile Platform	1	28.343	47.900	1.00	22.00	1500.00	0.000	0.000	1053.80	0.00	0.00
3	147.00	Ericsson KRY 112 144/1	3	28.343	47.900	0.70	0.86	33.00	0.000	0.000	41.24	0.00	0.00
4	147.00	Ericsson AIR 21 B4A B2P	3	28.343	47.900	0.86	16.98	271.20	0.000	0.000	813.17	0.00	0.00
5	147.00	Ericsson AIR 21 B2A B4P	3	28.343	47.900	0.86	16.98	274.50	0.000	0.000	813.17	0.00	0.00
6	137.00	T-Arms	3	27.778	46.946	0.75	18.43	726.00	0.000	0.000	865.09	0.00	0.00
7	137.00	Kathrein 742 351	6	27.778	46.946	0.61	21.52	178.80	0.000	0.000	1010.31	0.00	0.00
8	127.00	B13 RRH4X30-4R	3	27.183	45.940	0.88	6.65	171.60	0.000	0.000	305.63	0.00	0.00
9	127.00	SBNHH-1D45C	6	27.183	45.940	0.84	57.41	297.60	0.000	0.000	2637.21	0.00	0.00
10	127.00	RRH2x90-AWS	3	27.183	45.940	0.82	6.20	132.00	0.000	0.000	284.79	0.00	0.00
11	127.00	RRH2X60-PCS	3	27.183	45.940	0.89	6.86	165.00	0.000	0.000	315.24	0.00	0.00
12	127.00	RFS DB-T1-6Z-8AB-0Z	2	27.183	45.940	0.71	7.95	37.80	0.000	0.000	365.31	0.00	0.00
13	127.00	Platform w/ Handrails	1	27.183	45.940	1.00	32.00	1600.00	0.000	0.000	1470.08	0.00	0.00
14	127.00	LNx-6514DS-AIM	3	27.183	45.940	0.83	20.94	116.40	0.000	0.000	962.02	0.00	0.00
Totals:								5,538.90			10,987.89		

Total Applied Force Summary

Structure: CT13076-A-SB

Code: EIA/TIA-222-F

11/13/2015



Site Name: Ledyard

Exposure: C

Height: 150.00 (ft)

Gh: 1.69

Base Elev: 0.000 (ft)

Struct Class: II

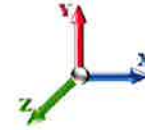
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Load Case: 85 mph Wind with 0" Ice

Iterations: 21

Dead Load Factor 1.00

Wind Load Factor 1.00



Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
5.00		503.45	1740.43	0.00	0.00
10.00		494.45	1711.74	0.00	0.00
15.00		485.46	1683.05	0.00	0.00
20.00		476.46	1654.36	0.00	0.00
25.00		467.47	1625.68	0.00	0.00
30.00		458.47	1596.99	0.00	0.00
35.00		457.10	1568.30	0.00	0.00
40.00		465.37	1539.61	0.00	0.00
41.58		147.01	481.56	0.00	0.00
45.00		326.64	1856.54	0.00	0.00
48.00		288.29	1609.42	0.00	0.00
50.00		192.42	532.04	0.00	0.00
55.00		487.05	1312.54	0.00	0.00
60.00		488.64	1287.44	0.00	0.00
65.00		489.02	1262.33	0.00	0.00
70.00		488.34	1237.23	0.00	0.00
75.00		486.69	1212.13	0.00	0.00
80.00		484.16	1187.03	0.00	0.00
84.17		400.38	970.02	0.00	0.00
85.00		80.48	313.45	0.00	0.00
89.58		443.37	1702.61	0.00	0.00
90.00		39.86	71.57	0.00	0.00
95.00		479.18	849.11	0.00	0.00
100.00		473.91	831.18	0.00	0.00
105.00		468.04	813.25	0.00	0.00
110.00		461.62	795.32	0.00	0.00
115.00		454.67	777.39	0.00	0.00
120.00		447.22	759.46	0.00	0.00
120.67		58.74	99.91	0.00	0.00
125.00		384.00	953.88	0.00	0.00
125.17		14.58	36.26	0.00	0.00
127.00	(21) appurtenances	6500.33	2704.31	0.00	0.00
130.00		259.79	291.23	0.00	0.00
135.00		426.92	476.77	0.00	0.00
137.00	(9) appurtenances	2043.10	1092.50	0.00	0.00
140.00		249.04	240.64	0.00	0.00
145.00		408.26	392.45	0.00	0.00
147.00	(10) appurtenances	2881.48	2232.67	0.00	0.00
150.00	(1) appurtenances	288.19	221.99	0.00	127.06
Totals:		24,949.64	41,724.35	0.00	127.06

Resulting Forces and Deflections

Structure: CT13076-A-SB
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.000 (ft)

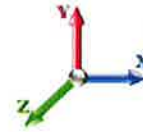
Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

11/13/2015
 Page: 10



Load Case: 85 mph Wind with 0" Ice

Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 21

Elev (ft)	Lateral FX (-) (kips)	Axial FY (-) (kips)	Lateral FZ (kips)	Moment MX (ft-kips)	Torsion MY (ft-kips)	Moment MZ (ft-kips)	Deflect X (in)	Deflect Z (in)	Deflect Resultant (in)	Rotation Sway (deg)	Rotation Twist (deg)
0.00	-24.981	-41.705	0.000	0.000	0.000	-2565.6	0.000	0.000	0.000	0.000	0.000
5.00	-24.535	-39.929	0.000	0.000	0.000	-2440.7	-0.046	0.000	0.046	-0.084	0.000
10.00	-24.093	-38.183	0.000	0.000	0.000	-2318.0	-0.180	0.000	0.180	-0.169	0.000
15.00	-23.655	-36.467	0.000	0.000	0.000	-2197.5	-0.402	0.000	0.402	-0.254	0.000
20.00	-23.222	-34.780	0.000	0.000	0.000	-2079.3	-0.714	0.000	0.714	-0.339	0.000
25.00	-22.793	-33.124	0.000	0.000	0.000	-1963.2	-1.115	0.000	1.115	-0.424	0.000
30.00	-22.368	-31.498	0.000	0.000	0.000	-1849.2	-1.605	0.000	1.605	-0.509	0.000
35.00	-21.940	-29.902	0.000	0.000	0.000	-1737.4	-2.183	0.000	2.183	-0.594	0.000
40.00	-21.485	-28.346	0.000	0.000	0.000	-1627.7	-2.851	0.000	2.851	-0.678	0.000
41.58	-21.353	-27.851	0.000	0.000	0.000	-1593.6	-3.080	0.000	3.080	-0.705	0.000
45.00	-21.027	-25.979	0.000	0.000	0.000	-1520.7	-3.607	0.000	3.607	-0.763	0.000
48.00	-20.735	-24.358	0.000	0.000	0.000	-1457.6	-4.103	0.000	4.103	-0.814	0.000
50.00	-20.561	-23.806	0.000	0.000	0.000	-1416.1	-4.452	0.000	4.452	-0.848	0.000
55.00	-20.088	-22.470	0.000	0.000	0.000	-1313.3	-5.389	0.000	5.389	-0.938	0.000
60.00	-19.610	-21.162	0.000	0.000	0.000	-1212.9	-6.420	0.000	6.420	-1.026	0.000
65.00	-19.127	-19.880	0.000	0.000	0.000	-1114.8	-7.542	0.000	7.542	-1.113	0.000
70.00	-18.642	-18.625	0.000	0.000	0.000	-1019.2	-8.754	0.000	8.754	-1.199	0.000
75.00	-18.154	-17.398	0.000	0.000	0.000	-926.04	-10.055	0.000	10.055	-1.282	0.000
80.00	-17.663	-16.200	0.000	0.000	0.000	-835.27	-11.442	0.000	11.442	-1.363	0.000
84.17	-17.250	-15.228	0.000	0.000	0.000	-761.68	-12.661	0.000	12.661	-1.429	0.000
85.00	-17.172	-14.904	0.000	0.000	0.000	-747.30	-12.912	0.000	12.912	-1.442	0.000
89.58	-16.694	-13.203	0.000	0.000	0.000	-668.60	-14.331	0.000	14.331	-1.511	0.000
90.00	-16.664	-13.117	0.000	0.000	0.000	-661.64	-14.464	0.000	14.464	-1.518	0.000
95.00	-16.181	-12.256	0.000	0.000	0.000	-578.32	-16.105	0.000	16.105	-1.612	0.000
100.00	-15.700	-11.415	0.000	0.000	0.000	-497.42	-17.842	0.000	17.842	-1.701	0.000
105.00	-15.222	-10.596	0.000	0.000	0.000	-418.92	-19.669	0.000	19.669	-1.783	0.000
110.00	-14.747	-9.798	0.000	0.000	0.000	-342.81	-21.577	0.000	21.577	-1.856	0.000
115.00	-14.277	-9.022	0.000	0.000	0.000	-269.07	-23.557	0.000	23.557	-1.920	0.000
120.00	-13.808	-8.271	0.000	0.000	0.000	-197.69	-25.598	0.000	25.598	-1.974	0.000
120.67	-13.749	-8.168	0.000	0.000	0.000	-188.49	-25.874	0.000	25.874	-1.980	0.000
125.00	-13.334	-7.224	0.000	0.000	0.000	-128.91	-27.689	0.000	27.689	-2.015	0.000
125.17	-13.319	-7.187	0.000	0.000	0.000	-126.69	-27.760	0.000	27.760	-2.016	0.000
127.00	-6.729	-4.712	0.000	0.000	0.000	-102.27	-28.537	0.000	28.537	-2.028	0.000
130.00	-6.461	-4.426	0.000	0.000	0.000	-82.086	-29.819	0.000	29.819	-2.053	0.000
135.00	-6.018	-3.963	0.000	0.000	0.000	-49.782	-31.988	0.000	31.988	-2.084	0.000
137.00	-3.937	-2.945	0.000	0.000	0.000	-37.745	-32.863	0.000	32.863	-2.093	0.000
140.00	-3.680	-2.713	0.000	0.000	0.000	-25.933	-34.182	0.000	34.182	-2.104	0.000
145.00	-3.258	-2.336	0.000	0.000	0.000	-7.532	-36.391	0.000	36.391	-2.114	0.000
147.00	-0.296	-0.211	0.000	0.000	0.000	-1.016	-37.277	0.000	37.277	-2.115	0.000
150.00	-0.288	0.000	0.000	0.000	0.000	-0.127	0.000	0.000	38.606	-2.115	0.000

Resulting Stresses

Structure: CT13076-A-SBA
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

11/13/2015

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Load Case: 85 mph Wind with 0" Ice

Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 21

Applied Stresses

Elev (ft)	fa Axial (Y) (ksi)	fvx Shear (X) (ksi)	fvz Shear (Z) (ksi)	fvx Torsion (ksi)	fbx Bending (X) (ksi)	fbz Bending (Z) (ksi)	fb Combined (ksi)	Allow Stress (ksi)	f/Fb Stress Ratio
0.00	0.44	0.53	0.00	0.00	0.00	22.21	22.67	52.0	0.436
5.00	0.43	0.53	0.00	0.00	0.00	21.90	22.35	52.0	0.430
10.00	0.42	0.53	0.00	0.00	0.00	21.58	22.02	52.0	0.424
15.00	0.41	0.53	0.00	0.00	0.00	21.25	21.67	52.0	0.417
20.00	0.40	0.53	0.00	0.00	0.00	20.89	21.30	52.0	0.410
25.00	0.39	0.53	0.00	0.00	0.00	20.50	20.91	52.0	0.402
30.00	0.37	0.53	0.00	0.00	0.00	20.10	20.49	52.0	0.394
35.00	0.36	0.54	0.00	0.00	0.00	19.66	20.05	52.0	0.386
40.00	0.35	0.54	0.00	0.00	0.00	19.20	19.57	52.0	0.377
41.58	0.35	0.54	0.00	0.00	0.00	19.05	19.42	52.0	0.374
45.00	0.33	0.53	0.00	0.00	0.00	18.72	19.07	52.0	0.367
48.00	0.35	0.60	0.00	0.00	0.00	20.23	20.61	52.0	0.396
50.00	0.34	0.60	0.00	0.00	0.00	19.99	20.37	52.0	0.392
55.00	0.33	0.60	0.00	0.00	0.00	19.36	19.72	52.0	0.379
60.00	0.32	0.60	0.00	0.00	0.00	18.69	19.04	52.0	0.366
65.00	0.31	0.60	0.00	0.00	0.00	17.98	18.31	52.0	0.352
70.00	0.29	0.59	0.00	0.00	0.00	17.21	17.54	52.0	0.337
75.00	0.28	0.59	0.00	0.00	0.00	16.40	16.71	52.0	0.322
80.00	0.27	0.59	0.00	0.00	0.00	15.53	15.83	52.0	0.305
84.17	0.26	0.59	0.00	0.00	0.00	14.76	15.05	52.0	0.290
85.00	0.25	0.59	0.00	0.00	0.00	14.60	14.89	52.0	0.286
89.58	0.32	0.80	0.00	0.00	0.00	18.43	18.80	52.0	0.362
90.00	0.31	0.81	0.00	0.00	0.00	18.32	18.68	52.0	0.359
95.00	0.30	0.80	0.00	0.00	0.00	16.85	17.21	52.0	0.331
100.00	0.29	0.80	0.00	0.00	0.00	15.28	15.63	52.0	0.301
105.00	0.27	0.80	0.00	0.00	0.00	13.59	13.93	52.0	0.268
110.00	0.26	0.79	0.00	0.00	0.00	11.75	12.09	52.0	0.233
115.00	0.25	0.79	0.00	0.00	0.00	9.77	10.11	52.0	0.194
120.00	0.23	0.79	0.00	0.00	0.00	7.61	7.96	52.0	0.153
120.67	0.23	0.79	0.00	0.00	0.00	7.32	7.67	52.0	0.148
125.00	0.21	0.78	0.00	0.00	0.00	5.27	5.65	52.0	0.109
125.17	0.34	1.29	0.00	0.00	0.00	8.38	9.01	52.0	0.173
127.00	0.23	0.66	0.00	0.00	0.00	6.92	7.24	46.4	0.156
130.00	0.22	0.64	0.00	0.00	0.00	5.76	6.09	46.9	0.130
135.00	0.20	0.62	0.00	0.00	0.00	3.73	4.07	47.7	0.085
137.00	0.15	0.41	0.00	0.00	0.00	2.90	3.13	48.1	0.065
140.00	0.14	0.39	0.00	0.00	0.00	2.07	2.32	48.6	0.048
145.00	0.13	0.36	0.00	0.00	0.00	0.64	0.99	49.4	0.020
147.00	0.01	0.03	0.00	0.00	0.00	0.09	0.12	49.8	0.002
150.00	0.00	0.03	0.00	0.00	0.00	0.01	0.06	50.3	0.001

Wind Loading - Shaft

Structure: CT13076-A-SBA
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

11/13/2015



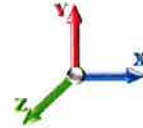
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Load Case: 73.61 mph Wind with 0.5" Ice

Iterations: 21

Dead Load Factor 1.00

Wind Load Factor 1.00



Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		0.00	1.00	13.871	23.44	368.05	0.650	0.500	0.00	0.000	0.00	0.0	0.0	0.0
5.00		0.00	1.00	13.871	23.44	361.53	0.650	0.500	5.00	25.195	16.38	383.9	183.4	1775.6
10.00		0.00	1.00	13.871	23.44	355.01	0.650	0.500	5.00	24.753	16.09	377.2	180.1	1743.6
15.00		0.00	1.00	13.871	23.44	348.50	0.650	0.500	5.00	24.310	15.80	370.4	176.9	1711.6
20.00		0.00	1.00	13.871	23.44	341.98	0.650	0.500	5.00	23.867	15.51	363.7	173.6	1679.7
25.00		0.00	1.00	13.871	23.44	335.46	0.650	0.500	5.00	23.424	15.23	356.9	170.3	1647.7
30.00		0.00	1.00	13.871	23.44	328.94	0.650	0.500	5.00	22.982	14.94	350.2	167.0	1615.7
35.00		0.00	1.02	14.106	23.84	325.15	0.650	0.500	5.00	22.539	14.65	349.3	163.7	1583.8
40.00		0.00	1.06	14.655	24.77	324.71	0.650	0.500	5.00	22.096	14.36	355.7	160.5	1551.8
41.58 Bot - Section 2		0.00	1.07	14.818	25.04	324.38	0.650	0.500	1.58	6.905	4.49	112.4	50.5	485.1
45.00		0.00	1.09	15.156	25.61	323.41	0.650	0.500	3.42	14.998	9.75	249.7	109.3	1864.5
48.00 Top - Section 1		0.00	1.11	15.439	26.09	322.28	0.650	0.500	3.00	12.998	8.45	220.4	94.7	1615.2
50.00		0.00	1.13	15.620	26.40	327.09	0.650	0.500	2.00	8.577	5.58	147.2	62.6	535.4
55.00		0.00	1.16	16.051	27.13	324.57	0.650	0.500	5.00	21.133	13.74	372.6	153.3	1317.6
60.00		0.00	1.19	16.455	27.81	321.53	0.650	0.500	5.00	20.690	13.45	374.0	150.0	1289.2
65.00		0.00	1.21	16.836	28.45	318.04	0.650	0.500	5.00	20.247	13.16	374.5	146.8	1260.8
70.00		0.00	1.24	17.196	29.06	314.17	0.650	0.500	5.00	19.805	12.87	374.1	143.5	1232.5
75.00		0.00	1.26	17.538	29.64	309.96	0.650	0.500	5.00	19.362	12.59	373.0	140.2	1204.1
80.00		0.00	1.29	17.865	30.19	305.43	0.650	0.500	5.00	18.919	12.30	371.3	136.9	1175.7
84.17 Bot - Section 3		0.00	1.31	18.126	30.63	301.45	0.650	0.500	4.17	15.428	10.03	307.2	111.8	958.3
85.00		0.00	1.31	18.177	30.72	300.63	0.650	0.500	0.83	3.092	2.01	61.7	22.6	311.3
89.58 Top - Section 2		0.00	1.33	18.452	31.18	296.00	0.650	0.500	4.58	16.787	10.91	340.2	121.5	1688.2
90.00		0.00	1.33	18.476	31.22	299.99	0.650	0.500	0.42	1.508	0.98	30.6	11.0	70.2
95.00		0.00	1.35	18.764	31.71	294.74	0.650	0.500	5.00	17.852	11.60	368.0	129.0	829.9
100.00		0.00	1.37	19.041	32.18	289.27	0.650	0.500	5.00	17.409	11.32	364.1	125.7	808.7
105.00		0.00	1.39	19.308	32.63	283.61	0.650	0.500	5.00	16.966	11.03	359.8	122.5	787.4
110.00		0.00	1.41	19.566	33.07	277.76	0.650	0.500	5.00	16.523	10.74	355.1	119.2	766.2
115.00		0.00	1.43	19.816	33.49	271.73	0.650	0.500	5.00	16.081	10.45	350.0	115.9	745.0
120.00		0.00	1.45	20.059	33.90	265.55	0.650	0.500	5.00	15.638	10.16	344.6	112.6	723.8
120.67 Bot - Section 4		0.00	1.45	20.091	33.95	264.72	0.650	0.500	0.67	2.052	1.33	45.3	15.0	95.1
125.00		0.00	1.46	20.294	34.30	259.22	0.650	0.500	4.33	13.279	8.63	296.0	95.8	921.2
125.17 Top - Section 3		0.00	1.46	20.302	34.31	259.01	0.650	0.500	0.17	0.504	0.33	11.2	3.7	35.0
127.00 Appurtenance(s)		0.00	1.47	20.386	34.45	259.44	0.650	0.500	1.83	5.513	3.58	123.5	40.0	169.6
130.00		0.00	1.48	20.523	34.68	255.55	0.650	0.500	3.00	8.892	5.78	200.5	64.3	273.2
135.00		0.00	1.50	20.745	35.06	248.96	0.650	0.500	5.00	14.466	9.40	329.7	104.0	443.5
137.00 Appurtenance(s)		0.00	1.50	20.833	35.21	246.29	0.650	0.500	2.00	5.663	3.68	129.6	41.1	173.8
140.00		0.00	1.51	20.962	35.43	242.25	0.650	0.500	3.00	8.361	5.43	192.5	60.4	256.4
145.00		0.00	1.53	21.173	35.78	235.41	0.650	0.500	5.00	13.581	8.83	315.9	97.4	415.4
147.00 Appurtenance(s)		0.00	1.53	21.256	35.92	232.65	0.650	0.500	2.00	5.308	3.45	123.9	38.4	162.6
150.00 Appurtenance(s)		0.00	1.54	21.379	36.13	228.46	0.650	0.500	3.00	7.830	5.09	183.9	56.5	239.5
Totals:									150.00			10,709.9		36,163.9

Discrete Appurtenance Forces

Structure: CT13076-A-SB

Site Name: Ledyard

Height: 150.00 (ft)

Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F

Exposure: C

Gh: 1.69

Struct Class: II

11/13/2015

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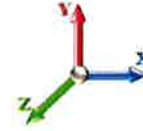


Load Case: 73.61 mph Wind with 0.5" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00

Iterations: 21



No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa Factor	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	150.00	Lightning Rod	1	21.480	36.302	1.00	1.73	44.00	0.000	2.500	62.80	0.00	157.01
2	147.00	Low Profile Platform	1	21.256	35.923	1.00	27.00	1800.00	0.000	0.000	969.92	0.00	0.00
3	147.00	Ericsson KRY 112 144/1	3	21.256	35.923	0.71	1.17	42.30	0.000	0.000	42.08	0.00	0.00
4	147.00	Ericsson AIR 21 B4A B2P	3	21.256	35.923	0.87	18.19	384.30	0.000	0.000	653.50	0.00	0.00
5	147.00	Ericsson AIR 21 B2A B4P	3	21.256	35.923	0.87	18.19	387.60	0.000	0.000	653.50	0.00	0.00
6	137.00	T-Arms	3	20.833	35.207	1.00	33.39	903.00	0.000	0.000	1175.57	0.00	0.00
7	137.00	Kathrein 742 351	6	20.833	35.207	0.62	24.22	342.60	0.000	0.000	852.62	0.00	0.00
8	127.00	B13 RRH4X30-4R	3	20.386	34.453	0.89	7.24	217.50	0.000	0.000	249.29	0.00	0.00
9	127.00	SBNHH-1D45C	6	20.386	34.453	0.85	60.49	667.20	0.000	0.000	2083.92	0.00	0.00
10	127.00	RRH2x90-AWS	3	20.386	34.453	0.83	7.15	184.20	0.000	0.000	246.21	0.00	0.00
11	127.00	RRH2X60-PCS	3	20.386	34.453	0.90	7.45	212.70	0.000	0.000	256.74	0.00	0.00
12	127.00	RFS DB-T1-6Z-8AB-0Z	2	20.386	34.453	0.72	8.45	92.00	0.000	0.000	291.22	0.00	0.00
13	127.00	Platform w/ Handrails	1	20.386	34.453	1.00	40.00	2200.00	0.000	0.000	1378.12	0.00	0.00
14	127.00	LNx-6514DS-AIM	3	20.386	34.453	0.84	23.28	267.90	0.000	0.000	802.23	0.00	0.00
Totals:								7,745.30			9,717.73		

Total Applied Force Summary

Structure: CT13076-A-SB

Site Name: Ledyard

Height: 150.00 (ft)

Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F

Exposure: C

Gh: 1.69

Struct Class: II

11/13/2015

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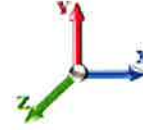


Load Case: 73.61 mph Wind with 0.5" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00

Iterations: 21



Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
5.00		383.91	1917.27	0.00	0.00
10.00		377.17	1885.30	0.00	0.00
15.00		370.42	1853.34	0.00	0.00
20.00		363.68	1821.37	0.00	0.00
25.00		356.93	1789.40	0.00	0.00
30.00		350.18	1757.44	0.00	0.00
35.00		349.26	1725.47	0.00	0.00
40.00		355.72	1693.50	0.00	0.00
41.58		112.40	529.97	0.00	0.00
45.00		249.71	1961.30	0.00	0.00
48.00		220.44	1700.23	0.00	0.00
50.00		147.17	592.06	0.00	0.00
55.00		372.61	1459.29	0.00	0.00
60.00		373.99	1430.91	0.00	0.00
65.00		374.45	1402.53	0.00	0.00
70.00		374.10	1374.15	0.00	0.00
75.00		373.02	1345.77	0.00	0.00
80.00		371.28	1317.39	0.00	0.00
84.17		307.18	1076.38	0.00	0.00
85.00		61.74	334.95	0.00	0.00
89.58		340.25	1818.12	0.00	0.00
90.00		30.60	82.05	0.00	0.00
95.00		367.95	971.56	0.00	0.00
100.00		364.13	950.36	0.00	0.00
105.00		359.85	929.15	0.00	0.00
110.00		355.15	907.94	0.00	0.00
115.00		350.05	886.73	0.00	0.00
120.00		344.58	865.52	0.00	0.00
120.67		45.28	113.99	0.00	0.00
125.00		296.03	1043.97	0.00	0.00
125.17		11.24	39.72	0.00	0.00
127.00	(21) appurtenances	5431.18	4063.04	0.00	0.00
130.00		200.47	351.62	0.00	0.00
135.00		329.66	574.16	0.00	0.00
137.00	(9) appurtenances	2157.77	1471.73	0.00	0.00
140.00		192.52	297.10	0.00	0.00
145.00		315.87	483.28	0.00	0.00
147.00	(10) appurtenances	2442.96	2803.98	0.00	0.00
150.00	(1) appurtenances	246.68	283.52	0.00	157.01
Totals:		20,427.58	47,905.55	0.00	157.01

Resulting Forces and Deflections

Structure: CT13076-A-SB
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.000 (ft)

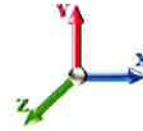
Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

11/13/2015
 Page: 15



Load Case: 73.61 mph Wind with 0.5" Ice

Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 21

Elev (ft)	Lateral FX (-) (kips)	Axial FY (-) (kips)	Lateral FZ (kips)	Moment MX (ft-kips)	Torsion MY (ft-kips)	Moment MZ (ft-kips)	Deflect X (in)	Deflect Z (in)	Deflect Resultant (in)	Rotation Sway (deg)	Rotation Twist (deg)
0.00	-20.458	-47.892	0.000	0.000	0.000	-2156.6	0.000	0.000	0.000	0.000	0.000
5.00	-20.130	-45.951	0.000	0.000	0.000	-2054.3	-0.038	0.000	0.038	-0.071	0.000
10.00	-19.804	-44.041	0.000	0.000	0.000	-1953.6	-0.151	0.000	0.151	-0.142	0.000
15.00	-19.480	-42.165	0.000	0.000	0.000	-1854.6	-0.339	0.000	0.339	-0.214	0.000
20.00	-19.159	-40.321	0.000	0.000	0.000	-1757.2	-0.601	0.000	0.601	-0.285	0.000
25.00	-18.841	-38.510	0.000	0.000	0.000	-1661.4	-0.939	0.000	0.939	-0.357	0.000
30.00	-18.525	-36.732	0.000	0.000	0.000	-1567.2	-1.352	0.000	1.352	-0.429	0.000
35.00	-18.205	-34.986	0.000	0.000	0.000	-1474.6	-1.841	0.000	1.841	-0.501	0.000
40.00	-17.861	-33.282	0.000	0.000	0.000	-1383.6	-2.405	0.000	2.405	-0.573	0.000
41.58	-17.764	-32.742	0.000	0.000	0.000	-1355.3	-2.599	0.000	2.599	-0.596	0.000
45.00	-17.518	-30.769	0.000	0.000	0.000	-1294.6	-3.044	0.000	3.044	-0.646	0.000
48.00	-17.296	-29.060	0.000	0.000	0.000	-1242.1	-3.464	0.000	3.464	-0.689	0.000
50.00	-17.168	-28.454	0.000	0.000	0.000	-1207.5	-3.759	0.000	3.759	-0.718	0.000
55.00	-16.812	-26.978	0.000	0.000	0.000	-1121.6	-4.553	0.000	4.553	-0.795	0.000
60.00	-16.451	-25.531	0.000	0.000	0.000	-1037.6	-5.426	0.000	5.426	-0.870	0.000
65.00	-16.085	-24.114	0.000	0.000	0.000	-955.37	-6.377	0.000	6.377	-0.945	0.000
70.00	-15.716	-22.726	0.000	0.000	0.000	-874.95	-7.407	0.000	7.407	-1.018	0.000
75.00	-15.345	-21.369	0.000	0.000	0.000	-796.37	-8.511	0.000	8.511	-1.089	0.000
80.00	-14.970	-20.043	0.000	0.000	0.000	-719.64	-9.690	0.000	9.690	-1.159	0.000
84.17	-14.652	-18.964	0.000	0.000	0.000	-657.27	-10.728	0.000	10.728	-1.216	0.000
85.00	-14.594	-18.621	0.000	0.000	0.000	-645.06	-10.941	0.000	10.941	-1.227	0.000
89.58	-14.224	-16.803	0.000	0.000	0.000	-578.17	-12.149	0.000	12.149	-1.287	0.000
90.00	-14.204	-16.711	0.000	0.000	0.000	-572.25	-12.262	0.000	12.262	-1.293	0.000
95.00	-13.836	-15.729	0.000	0.000	0.000	-501.22	-13.661	0.000	13.661	-1.374	0.000
100.00	-13.467	-14.770	0.000	0.000	0.000	-432.05	-15.143	0.000	15.143	-1.451	0.000
105.00	-13.100	-13.836	0.000	0.000	0.000	-364.71	-16.702	0.000	16.702	-1.522	0.000
110.00	-12.734	-12.924	0.000	0.000	0.000	-299.21	-18.332	0.000	18.332	-1.586	0.000
115.00	-12.370	-12.037	0.000	0.000	0.000	-235.54	-20.025	0.000	20.025	-1.643	0.000
120.00	-12.005	-11.176	0.000	0.000	0.000	-173.70	-21.772	0.000	21.772	-1.689	0.000
120.67	-11.960	-11.060	0.000	0.000	0.000	-165.69	-22.008	0.000	22.008	-1.695	0.000
125.00	-11.636	-10.022	0.000	0.000	0.000	-113.87	-23.563	0.000	23.563	-1.726	0.000
125.17	-11.624	-9.981	0.000	0.000	0.000	-111.93	-23.623	0.000	23.623	-1.727	0.000
127.00	-6.074	-6.083	0.000	0.000	0.000	-90.623	-24.288	0.000	24.288	-1.737	0.000
130.00	-5.866	-5.735	0.000	0.000	0.000	-72.400	-25.387	0.000	25.387	-1.759	0.000
135.00	-5.520	-5.170	0.000	0.000	0.000	-43.072	-27.246	0.000	27.246	-1.787	0.000
137.00	-3.318	-3.766	0.000	0.000	0.000	-32.032	-27.996	0.000	27.996	-1.795	0.000
140.00	-3.117	-3.474	0.000	0.000	0.000	-22.078	-29.127	0.000	29.127	-1.803	0.000
145.00	-2.786	-3.001	0.000	0.000	0.000	-6.495	-31.021	0.000	31.021	-1.812	0.000
147.00	-0.255	-0.276	0.000	0.000	0.000	-0.923	-31.781	0.000	31.781	-1.813	0.000
150.00	-0.247	0.000	0.000	0.000	0.000	-0.157	0.000	0.000	32.919	-1.813	0.000

Resulting Stresses

Structure: CT13076-A-SBA
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

11/13/2015



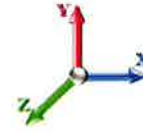
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Load Case: 73.61 mph Wind with 0.5" Ice

Iterations: 21

Dead Load Factor 1.00

Wind Load Factor 1.00



Applied Stresses

Elev (ft)	fa Axial (Y) (ksi)	fvx Shear (X) (ksi)	fvz Shear (Z) (ksi)	fv Torsion (ksi)	fbx Bending (X) (ksi)	fbz Bending (Z) (ksi)	fb Combined (ksi)	Allow Stress (ksi)	f/Fb Stress Ratio
0.00	0.51	0.44	0.00	0.00	0.00	18.67	19.19	52.0	0.369
5.00	0.50	0.44	0.00	0.00	0.00	18.44	18.95	52.0	0.365
10.00	0.48	0.44	0.00	0.00	0.00	18.19	18.69	52.0	0.360
15.00	0.47	0.44	0.00	0.00	0.00	17.93	18.42	52.0	0.354
20.00	0.46	0.44	0.00	0.00	0.00	17.65	18.13	52.0	0.349
25.00	0.45	0.44	0.00	0.00	0.00	17.35	17.82	52.0	0.343
30.00	0.44	0.44	0.00	0.00	0.00	17.03	17.49	52.0	0.336
35.00	0.42	0.44	0.00	0.00	0.00	16.69	17.13	52.0	0.330
40.00	0.41	0.44	0.00	0.00	0.00	16.32	16.75	52.0	0.322
41.58	0.41	0.45	0.00	0.00	0.00	16.20	16.63	52.0	0.320
45.00	0.39	0.45	0.00	0.00	0.00	15.93	16.34	52.0	0.314
48.00	0.42	0.50	0.00	0.00	0.00	17.24	17.68	52.0	0.340
50.00	0.41	0.50	0.00	0.00	0.00	17.05	17.48	52.0	0.336
55.00	0.40	0.50	0.00	0.00	0.00	16.54	16.96	52.0	0.326
60.00	0.39	0.50	0.00	0.00	0.00	15.99	16.40	52.0	0.315
65.00	0.37	0.50	0.00	0.00	0.00	15.41	15.80	52.0	0.304
70.00	0.36	0.50	0.00	0.00	0.00	14.78	15.16	52.0	0.292
75.00	0.35	0.50	0.00	0.00	0.00	14.10	14.48	52.0	0.278
80.00	0.33	0.50	0.00	0.00	0.00	13.38	13.74	52.0	0.264
84.17	0.32	0.50	0.00	0.00	0.00	12.74	13.09	52.0	0.252
85.00	0.32	0.50	0.00	0.00	0.00	12.60	12.95	52.0	0.249
89.58	0.40	0.69	0.00	0.00	0.00	15.94	16.38	52.0	0.315
90.00	0.40	0.69	0.00	0.00	0.00	15.84	16.29	52.0	0.313
95.00	0.39	0.69	0.00	0.00	0.00	14.61	15.04	52.0	0.289
100.00	0.37	0.69	0.00	0.00	0.00	13.27	13.70	52.0	0.264
105.00	0.36	0.68	0.00	0.00	0.00	11.83	12.24	52.0	0.236
110.00	0.34	0.68	0.00	0.00	0.00	10.26	10.67	52.0	0.205
115.00	0.33	0.68	0.00	0.00	0.00	8.55	8.96	52.0	0.172
120.00	0.32	0.68	0.00	0.00	0.00	6.69	7.10	52.0	0.137
120.67	0.31	0.68	0.00	0.00	0.00	6.43	6.85	52.0	0.132
125.00	0.29	0.68	0.00	0.00	0.00	4.66	5.09	52.0	0.098
125.17	0.48	1.12	0.00	0.00	0.00	7.41	8.12	52.0	0.156
127.00	0.29	0.59	0.00	0.00	0.00	6.13	6.51	46.4	0.140
130.00	0.28	0.58	0.00	0.00	0.00	5.08	5.46	46.9	0.116
135.00	0.26	0.57	0.00	0.00	0.00	3.22	3.62	47.7	0.076
137.00	0.19	0.34	0.00	0.00	0.00	2.46	2.72	48.1	0.057
140.00	0.18	0.33	0.00	0.00	0.00	1.76	2.03	48.6	0.042
145.00	0.16	0.31	0.00	0.00	0.00	0.56	0.89	49.4	0.018
147.00	0.02	0.03	0.00	0.00	0.00	0.08	0.11	49.8	0.002
150.00	0.00	0.03	0.00	0.00	0.00	0.01	0.05	50.3	0.001

Wind Loading - Shaft

Structure: CT13076-A-SBA

Site Name: Ledyard

Height: 150.00 (ft)

Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F

Exposure: C

Gh: 1.69

Struct Class: II

11/13/2015

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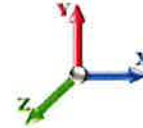


Load Case: 50 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00

Iterations: 20



Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		0.00	1.00	6.400	10.82	250.00	0.650	0.000	0.00	0.000	0.00	0.0	0.0	0.0
5.00		0.00	1.00	6.400	10.82	245.57	0.650	0.000	5.00	24.779	16.11	174.2	0.0	1592.2
10.00		0.00	1.00	6.400	10.82	241.15	0.650	0.000	5.00	24.336	15.82	171.1	0.0	1563.5
15.00		0.00	1.00	6.400	10.82	236.72	0.650	0.000	5.00	23.893	15.53	168.0	0.0	1534.8
20.00		0.00	1.00	6.400	10.82	232.29	0.650	0.000	5.00	23.451	15.24	164.9	0.0	1506.1
25.00		0.00	1.00	6.400	10.82	227.86	0.650	0.000	5.00	23.008	14.96	161.8	0.0	1477.4
30.00		0.00	1.00	6.400	10.82	223.44	0.650	0.000	5.00	22.565	14.67	158.6	0.0	1448.7
35.00		0.00	1.02	6.509	11.00	220.86	0.650	0.000	5.00	22.122	14.38	158.2	0.0	1420.0
40.00		0.00	1.06	6.762	11.43	220.56	0.650	0.000	5.00	21.680	14.09	161.0	0.0	1391.3
41.58 Bot - Section 2		0.00	1.07	6.837	11.55	220.34	0.650	0.000	1.58	6.773	4.40	50.9	0.0	434.6
45.00		0.00	1.09	6.993	11.82	219.68	0.650	0.000	3.42	14.713	9.56	113.0	0.0	1755.2
48.00 Top - Section 1		0.00	1.11	7.123	12.04	218.91	0.650	0.000	3.00	12.748	8.29	99.8	0.0	1520.5
50.00		0.00	1.13	7.207	12.18	222.18	0.650	0.000	2.00	8.410	5.47	66.6	0.0	472.7
55.00		0.00	1.16	7.406	12.52	220.46	0.650	0.000	5.00	20.716	13.47	168.5	0.0	1164.3
60.00		0.00	1.19	7.592	12.83	218.40	0.650	0.000	5.00	20.273	13.18	169.1	0.0	1139.2
65.00		0.00	1.21	7.768	13.13	216.03	0.650	0.000	5.00	19.831	12.89	169.2	0.0	1114.1
70.00		0.00	1.24	7.934	13.41	213.40	0.650	0.000	5.00	19.388	12.60	169.0	0.0	1089.0
75.00		0.00	1.26	8.092	13.68	210.54	0.650	0.000	5.00	18.945	12.31	168.4	0.0	1063.9
80.00		0.00	1.29	8.242	13.93	207.47	0.650	0.000	5.00	18.503	12.03	167.5	0.0	1038.8
84.17 Bot - Section 3		0.00	1.31	8.363	14.13	204.76	0.650	0.000	4.17	15.081	9.80	138.5	0.0	846.5
85.00		0.00	1.31	8.387	14.17	204.20	0.650	0.000	0.83	3.023	1.96	27.8	0.0	288.7
89.58 Top - Section 2		0.00	1.33	8.513	14.39	201.06	0.650	0.000	4.58	16.405	10.66	153.4	0.0	1566.7
90.00		0.00	1.33	8.525	14.41	203.77	0.650	0.000	0.42	1.473	0.96	13.8	0.0	59.2
95.00		0.00	1.35	8.657	14.63	200.20	0.650	0.000	5.00	17.435	11.33	165.8	0.0	700.8
100.00		0.00	1.37	8.785	14.85	196.49	0.650	0.000	5.00	16.992	11.04	164.0	0.0	682.9
105.00		0.00	1.39	8.908	15.06	192.64	0.650	0.000	5.00	16.549	10.76	162.0	0.0	665.0
110.00		0.00	1.41	9.028	15.26	188.67	0.650	0.000	5.00	16.107	10.47	159.7	0.0	647.1
115.00		0.00	1.43	9.143	15.45	184.58	0.650	0.000	5.00	15.664	10.18	157.3	0.0	629.1
120.00		0.00	1.45	9.255	15.64	180.38	0.650	0.000	5.00	15.221	9.89	154.7	0.0	611.2
120.67 Bot - Section 4		0.00	1.45	9.270	15.67	179.81	0.650	0.000	0.67	1.996	1.30	20.3	0.0	80.1
125.00		0.00	1.46	9.363	15.82	176.08	0.650	0.000	4.33	12.918	8.40	132.9	0.0	825.4
125.17 Top - Section 3		0.00	1.46	9.367	15.83	175.93	0.650	0.000	0.17	0.490	0.32	5.0	0.0	31.3
127.00 Appurtenance(s)		0.00	1.47	9.406	15.90	176.23	0.650	0.000	1.83	5.360	3.48	55.4	0.0	129.5
130.00		0.00	1.48	9.469	16.00	173.58	0.650	0.000	3.00	8.642	5.62	89.9	0.0	208.9
135.00		0.00	1.50	9.572	16.18	169.11	0.650	0.000	5.00	14.049	9.13	147.7	0.0	339.5
137.00 Appurtenance(s)		0.00	1.50	9.612	16.24	167.29	0.650	0.000	2.00	5.496	3.57	58.0	0.0	132.8
140.00		0.00	1.51	9.672	16.35	164.55	0.650	0.000	3.00	8.111	5.27	86.2	0.0	196.0
145.00		0.00	1.53	9.769	16.51	159.90	0.650	0.000	5.00	13.164	8.56	141.3	0.0	318.0
147.00 Appurtenance(s)		0.00	1.53	9.807	16.57	158.03	0.650	0.000	2.00	5.142	3.34	55.4	0.0	124.2
150.00 Appurtenance(s)		0.00	1.54	9.864	16.67	155.18	0.650	0.000	3.00	7.580	4.93	82.1	0.0	183.0
Totals:									150.00			4,831.1		31,992.1

Discrete Appurtenance Forces

Structure: CT13076-A-SB
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

11/13/2015

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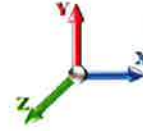


Load Case: 50 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00

Iterations: 20



No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa Factor	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	150.00	Lightning Rod	1	9.911	16.749	1.00	1.05	35.00	0.000	2.500	17.59	0.00	43.97
2	147.00	Low Profile Platform	1	9.807	16.574	1.00	22.00	1500.00	0.000	0.000	364.64	0.00	0.00
3	147.00	Ericsson KRY 112 144/1	3	9.807	16.574	0.70	0.86	33.00	0.000	0.000	14.27	0.00	0.00
4	147.00	Ericsson AIR 21 B4A B2P	3	9.807	16.574	0.86	16.98	271.20	0.000	0.000	281.37	0.00	0.00
5	147.00	Ericsson AIR 21 B2A B4P	3	9.807	16.574	0.86	16.98	274.50	0.000	0.000	281.37	0.00	0.00
6	137.00	T-Arms	3	9.612	16.244	0.75	18.43	726.00	0.000	0.000	299.34	0.00	0.00
7	137.00	Kathrein 742 351	6	9.612	16.244	0.61	21.52	178.80	0.000	0.000	349.59	0.00	0.00
8	127.00	B13 RRH4X30-4R	3	9.406	15.896	0.88	6.65	171.60	0.000	0.000	105.75	0.00	0.00
9	127.00	SBNHH-1D45C	6	9.406	15.896	0.84	57.41	297.60	0.000	0.000	912.53	0.00	0.00
10	127.00	RRH2x90-AWS	3	9.406	15.896	0.82	6.20	132.00	0.000	0.000	98.54	0.00	0.00
11	127.00	RRH2X60-PCS	3	9.406	15.896	0.89	6.86	165.00	0.000	0.000	109.08	0.00	0.00
12	127.00	RFS DB-T1-6Z-8AB-0Z	2	9.406	15.896	0.71	7.95	37.80	0.000	0.000	126.41	0.00	0.00
13	127.00	Platform w/ Handrails	1	9.406	15.896	1.00	32.00	1600.00	0.000	0.000	508.68	0.00	0.00
14	127.00	LNx-6514DS-AIM	3	9.406	15.896	0.83	20.94	116.40	0.000	0.000	332.88	0.00	0.00
Totals:								5,538.90			3,802.04		

Total Applied Force Summary

Structure: CT13076-A-SB

Code: EIA/TIA-222-F

11/13/2015



Site Name: Ledyard

Exposure: C

Height: 150.00 (ft)

Gh: 1.69

Base Elev: 0.000 (ft)

Struct Class: II

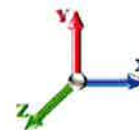
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Tower Engineering Solutions

Load Case: 50 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 20

Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
5.00		174.20	1740.43	0.00	0.00
10.00		171.09	1711.74	0.00	0.00
15.00		167.98	1683.05	0.00	0.00
20.00		164.87	1654.36	0.00	0.00
25.00		161.75	1625.68	0.00	0.00
30.00		158.64	1596.99	0.00	0.00
35.00		158.17	1568.30	0.00	0.00
40.00		161.03	1539.61	0.00	0.00
41.58		50.87	481.56	0.00	0.00
45.00		113.02	1856.54	0.00	0.00
48.00		99.75	1609.42	0.00	0.00
50.00		66.58	532.04	0.00	0.00
55.00		168.53	1312.54	0.00	0.00
60.00		169.08	1287.44	0.00	0.00
65.00		169.21	1262.33	0.00	0.00
70.00		168.98	1237.23	0.00	0.00
75.00		168.40	1212.13	0.00	0.00
80.00		167.53	1187.03	0.00	0.00
84.17		138.54	970.02	0.00	0.00
85.00		27.85	313.45	0.00	0.00
89.58		153.41	1702.61	0.00	0.00
90.00		13.79	71.57	0.00	0.00
95.00		165.81	849.11	0.00	0.00
100.00		163.98	831.18	0.00	0.00
105.00		161.95	813.25	0.00	0.00
110.00		159.73	795.32	0.00	0.00
115.00		157.32	777.39	0.00	0.00
120.00		154.75	759.46	0.00	0.00
120.67		20.33	99.91	0.00	0.00
125.00		132.87	953.88	0.00	0.00
125.17		5.04	36.26	0.00	0.00
127.00	(21) appurtenances	2249.25	2704.31	0.00	0.00
130.00		89.89	291.23	0.00	0.00
135.00		147.72	476.77	0.00	0.00
137.00	(9) appurtenances	706.96	1092.50	0.00	0.00
140.00		86.17	240.64	0.00	0.00
145.00		141.27	392.45	0.00	0.00
147.00	(10) appurtenances	997.05	2232.67	0.00	0.00
150.00	(1) appurtenances	99.72	221.99	0.00	43.97
Totals:		8,633.09	41,724.35	0.00	43.97

Resulting Forces and Deflections

Structure: CT13076-A-SB

Site Name: Ledyard

Height: 150.00 (ft)

Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F

Exposure: C

Gh: 1.69

Struct Class: II

11/13/2015

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Load Case: 50 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 20

Elev (ft)	Lateral FX (-) (kips)	Axial FY (-) (kips)	Lateral FZ (kips)	Moment MX (ft-kips)	Torsion MY (ft-kips)	Moment MZ (ft-kips)	Deflect X (in)	Deflect Z (in)	Deflect Resultant (in)	Rotation Sway (deg)	Rotation Twist (deg)
0.00	-8.643	-41.722	0.000	0.000	0.000	-887.85	0.000	0.000	0.000	0.000	0.000
5.00	-8.489	-39.977	0.000	0.000	0.000	-844.63	-0.016	0.000	0.016	-0.029	0.000
10.00	-8.336	-38.262	0.000	0.000	0.000	-802.19	-0.062	0.000	0.062	-0.058	0.000
15.00	-8.185	-36.575	0.000	0.000	0.000	-760.51	-0.139	0.000	0.139	-0.088	0.000
20.00	-8.035	-34.916	0.000	0.000	0.000	-719.59	-0.247	0.000	0.247	-0.117	0.000
25.00	-7.886	-33.287	0.000	0.000	0.000	-679.41	-0.386	0.000	0.386	-0.147	0.000
30.00	-7.740	-31.686	0.000	0.000	0.000	-639.98	-0.555	0.000	0.555	-0.176	0.000
35.00	-7.592	-30.115	0.000	0.000	0.000	-601.28	-0.756	0.000	0.756	-0.205	0.000
40.00	-7.434	-28.573	0.000	0.000	0.000	-563.33	-0.987	0.000	0.987	-0.235	0.000
41.58	-7.389	-28.090	0.000	0.000	0.000	-551.56	-1.066	0.000	1.066	-0.244	0.000
45.00	-7.276	-26.232	0.000	0.000	0.000	-526.31	-1.248	0.000	1.248	-0.264	0.000
48.00	-7.175	-24.621	0.000	0.000	0.000	-504.48	-1.420	0.000	1.420	-0.282	0.000
50.00	-7.115	-24.087	0.000	0.000	0.000	-490.13	-1.541	0.000	1.541	-0.294	0.000
55.00	-6.951	-22.771	0.000	0.000	0.000	-454.56	-1.865	0.000	1.865	-0.325	0.000
60.00	-6.786	-21.481	0.000	0.000	0.000	-419.81	-2.222	0.000	2.222	-0.355	0.000
65.00	-6.619	-20.217	0.000	0.000	0.000	-385.88	-2.610	0.000	2.610	-0.385	0.000
70.00	-6.451	-18.977	0.000	0.000	0.000	-352.78	-3.030	0.000	3.030	-0.415	0.000
75.00	-6.282	-17.763	0.000	0.000	0.000	-320.53	-3.480	0.000	3.480	-0.444	0.000
80.00	-6.113	-16.575	0.000	0.000	0.000	-289.11	-3.960	0.000	3.960	-0.472	0.000
84.17	-5.970	-15.605	0.000	0.000	0.000	-263.65	-4.382	0.000	4.382	-0.495	0.000
85.00	-5.943	-15.290	0.000	0.000	0.000	-258.67	-4.469	0.000	4.469	-0.499	0.000
89.58	-5.778	-13.588	0.000	0.000	0.000	-231.43	-4.960	0.000	4.960	-0.523	0.000
90.00	-5.767	-13.514	0.000	0.000	0.000	-229.02	-5.006	0.000	5.006	-0.525	0.000
95.00	-5.601	-12.664	0.000	0.000	0.000	-200.19	-5.574	0.000	5.574	-0.558	0.000
100.00	-5.434	-11.831	0.000	0.000	0.000	-172.19	-6.175	0.000	6.175	-0.589	0.000
105.00	-5.269	-11.017	0.000	0.000	0.000	-145.01	-6.808	0.000	6.808	-0.617	0.000
110.00	-5.105	-10.222	0.000	0.000	0.000	-118.67	-7.468	0.000	7.468	-0.642	0.000
115.00	-4.942	-9.445	0.000	0.000	0.000	-93.149	-8.153	0.000	8.153	-0.665	0.000
120.00	-4.780	-8.686	0.000	0.000	0.000	-68.439	-8.860	0.000	8.860	-0.683	0.000
120.67	-4.760	-8.586	0.000	0.000	0.000	-65.252	-8.956	0.000	8.956	-0.685	0.000
125.00	-4.616	-7.633	0.000	0.000	0.000	-44.627	-9.584	0.000	9.584	-0.697	0.000
125.17	-4.611	-7.597	0.000	0.000	0.000	-43.858	-9.608	0.000	9.608	-0.698	0.000
127.00	-2.329	-4.920	0.000	0.000	0.000	-35.405	-9.877	0.000	9.877	-0.702	0.000
130.00	-2.237	-4.629	0.000	0.000	0.000	-28.417	-10.321	0.000	10.321	-0.710	0.000
135.00	-2.084	-4.154	0.000	0.000	0.000	-17.234	-11.072	0.000	11.072	-0.721	0.000
137.00	-1.363	-3.071	0.000	0.000	0.000	-13.067	-11.375	0.000	11.375	-0.725	0.000
140.00	-1.274	-2.831	0.000	0.000	0.000	-8.978	-11.832	0.000	11.832	-0.728	0.000
145.00	-1.128	-2.440	0.000	0.000	0.000	-2.607	-12.597	0.000	12.597	-0.732	0.000
147.00	-0.102	-0.221	0.000	0.000	0.000	-0.351	-12.903	0.000	12.903	-0.732	0.000
150.00	-0.100	0.000	0.000	0.000	0.000	-0.044	0.000	0.000	13.363	-0.732	0.000

Resulting Stresses

Structure: CT13076-A-SBA

Code: EIA/TIA-222-F

11/13/2015



Site Name: Ledyard

Exposure: C

Height: 150.00 (ft)

Gh: 1.69

Base Elev: 0.000 (ft)

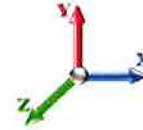
Struct Class: II

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Load Case: 50 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 20

Applied Stresses

Elev (ft)	fa Axial (Y) (ksi)	fvx Shear (X) (ksi)	fvz Shear (Z) (ksi)	fvx Torsion (ksi)	fbx Bending (X) (ksi)	fbz Bending (Z) (ksi)	fb Combined (ksi)	Allow Stress (ksi)	f/Fb Stress Ratio
0.00	0.44	0.18	0.00	0.00	0.00	7.68	8.13	52.0	0.156
5.00	0.43	0.18	0.00	0.00	0.00	7.58	8.02	52.0	0.154
10.00	0.42	0.18	0.00	0.00	0.00	7.47	7.90	52.0	0.152
15.00	0.41	0.18	0.00	0.00	0.00	7.35	7.77	52.0	0.149
20.00	0.40	0.18	0.00	0.00	0.00	7.23	7.63	52.0	0.147
25.00	0.39	0.18	0.00	0.00	0.00	7.10	7.49	52.0	0.144
30.00	0.38	0.19	0.00	0.00	0.00	6.96	7.34	52.0	0.141
35.00	0.36	0.19	0.00	0.00	0.00	6.81	7.18	52.0	0.138
40.00	0.35	0.19	0.00	0.00	0.00	6.65	7.01	52.0	0.135
41.58	0.35	0.19	0.00	0.00	0.00	6.59	6.95	52.0	0.134
45.00	0.33	0.19	0.00	0.00	0.00	6.48	6.82	52.0	0.131
48.00	0.35	0.21	0.00	0.00	0.00	7.00	7.36	52.0	0.142
50.00	0.35	0.21	0.00	0.00	0.00	6.92	7.28	52.0	0.140
55.00	0.34	0.21	0.00	0.00	0.00	6.70	7.05	52.0	0.136
60.00	0.32	0.21	0.00	0.00	0.00	6.47	6.80	52.0	0.131
65.00	0.31	0.21	0.00	0.00	0.00	6.22	6.54	52.0	0.126
70.00	0.30	0.21	0.00	0.00	0.00	5.96	6.27	52.0	0.121
75.00	0.29	0.20	0.00	0.00	0.00	5.68	5.97	52.0	0.115
80.00	0.27	0.20	0.00	0.00	0.00	5.37	5.66	52.0	0.109
84.17	0.26	0.20	0.00	0.00	0.00	5.11	5.38	52.0	0.104
85.00	0.26	0.20	0.00	0.00	0.00	5.05	5.33	52.0	0.102
89.58	0.33	0.28	0.00	0.00	0.00	6.38	6.72	52.0	0.129
90.00	0.32	0.28	0.00	0.00	0.00	6.34	6.68	52.0	0.129
95.00	0.31	0.28	0.00	0.00	0.00	5.83	6.16	52.0	0.119
100.00	0.30	0.28	0.00	0.00	0.00	5.29	5.61	52.0	0.108
105.00	0.29	0.28	0.00	0.00	0.00	4.70	5.01	52.0	0.096
110.00	0.27	0.27	0.00	0.00	0.00	4.07	4.37	52.0	0.084
115.00	0.26	0.27	0.00	0.00	0.00	3.38	3.67	52.0	0.071
120.00	0.25	0.27	0.00	0.00	0.00	2.64	2.92	52.0	0.056
120.67	0.24	0.27	0.00	0.00	0.00	2.53	2.82	52.0	0.054
125.00	0.22	0.27	0.00	0.00	0.00	1.83	2.10	52.0	0.040
125.17	0.36	0.45	0.00	0.00	0.00	2.90	3.36	52.0	0.065
127.00	0.24	0.23	0.00	0.00	0.00	2.40	2.66	46.4	0.057
130.00	0.23	0.22	0.00	0.00	0.00	2.00	2.26	46.9	0.048
135.00	0.21	0.21	0.00	0.00	0.00	1.29	1.55	47.7	0.032
137.00	0.16	0.14	0.00	0.00	0.00	1.00	1.19	48.1	0.025
140.00	0.15	0.14	0.00	0.00	0.00	0.72	0.90	48.6	0.018
145.00	0.13	0.12	0.00	0.00	0.00	0.22	0.42	49.4	0.008
147.00	0.01	0.01	0.00	0.00	0.00	0.03	0.05	49.8	0.001
150.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02	50.3	0.000

Final Analysis Summary

Structure: CT13076-A-SBA
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

11/13/2015

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Reactions

Load Case	Shear FX (kips)	Shear FZ (kips)	Axial FY (kips)	Moment MX (ft-kips)	Moment MY (ft-kips)	t MZ (ft-kips)
85 mph Wind with 0" Ice	25.0	0.00	41.71	0.00	0.00	2565.63
73.61 mph Wind with 0.5" Ice	20.5	0.00	47.89	0.00	0.00	2156.63
50 mph Wind with 0" Ice	8.6	0.00	41.72	0.00	0.00	887.85

Max Stresses

Load Case	fa Axial (Y) (ksi)	fvx Shear (X) (ksi)	fvz Shear (Z) (ksi)	fvz Torsion (ksi)	fbx Bending (X) (ksi)	fbz Bending (Z) (ksi)	Combined Stress (ksi)	Allowable Stress (ksi)	Elev (ft)	Stress Ratio
85 mph Wind with 0" Ice	0.44	0.53	0.00	0.00	0.00	22.21	22.67	52.0	0.00	0.436
73.61 mph Wind with 0.5" Ice	0.51	0.44	0.00	0.00	0.00	18.67	19.19	52.0	0.00	0.369
50 mph Wind with 0" Ice	0.44	0.18	0.00	0.00	0.00	7.68	8.13	52.0	0.00	0.156

Base Plate Summary

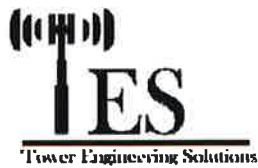
Structure: CT13076-A-SB
Site Name: Ledyard
Height: 150.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

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Reactions		Base Plate		Anchor Bolts	
Original Design		Yield (ksi):	50.00	Bolt Circle:	65.00
Moment (kip-ft):	6054.10	Width (in):	69.50	Number Bolts:	34.00
Axial (kip):	94.70	Style:	Round	Bolt Type:	1.5" F1554 105
Shear (kip):	55.40	Polygon Sides:	0.00	Bolt Diameter (in):	1.50
Analysis		Clip Length (in):	0.00	Yield (ksi):	105.00
Moment (kip-ft):	2565.63	Effective Len (in):	8.33	Ultimate (ksi):	125.00
Axial (kip):	47.89	Moment (kip-in):	142.83	Arrangement:	Radial
Shear (kip):	24.98	Allow Stress (ksi):	50.00	Cluster Dist (in):	0.00
		Applied Stress (ksi):	33.57	Start Angle (deg):	0.00
Moment Design %:	42.38	Stress Ratio:	0.67	Compression	
				Force (kip):	57.13
				Allowable (kip):	118.44
				Ratio:	0.48
				Tension	
				Force (kip):	54.32
				Allowable (kip):	118.44
				Ratio:	0.46



Monopole Mat Foundation Design

Date

11/13/2015

Customer Name:	Verizon	EIA/TIA Standard:	EIA-222-F
Site Name:		Structure Height (Ft.):	150
Site Number:	CT13076-A-SBA	Engineer Name:	D. Zhou
Engr. Number:	18755	Engineer Login ID:	TES

Foundation Info Obtained from:

Structure Type:

Monopole

Analysis or Design?

Analysis

Base Reactions (Unfactored)

Axial Load (Kips):	47.9	Shear Force (Kips):	25.0
Uplift Force (Kips):	0.0	Moment (Kips-ft):	2565.6

Foundation Geometries:

		Mods required -Yes/No ?:	No
Diameter of Pier (ft.):	7.5	Depth of Base BG (ft.):	6.0
Pier Height A. G. (ft.):	0.50	Thickness of Pad (ft):	3.25
Length of Pad (ft.):	24.5	Width of Pad (ft.):	24.5
Final Length of pad (ft)	24.5	Final width of pad (ft):	24.5
Control Value for Cell D18:	0	Control Value for Cell F18:	0

Material Properties and Rebar Info:

Concrete Strength (psi):	4000	Steel Elastic Modulus:	29000	ksi
Vertical bar yield (ksi)	60	Tie steel yield (ksi):	60	
Vertical Rebar Size #:	10	Tie / Stirrup Size #:	5	
Qty. of Vertical Rebars:	32	Tie Spacing (in):	3.0	
Pad Rebar Yield (Ksi):	60	Pad Steel Rebar Size (#):	8	
Concrete Cover (in.):	3	Unit Weight of Concrete:	150.0	pcf
Rebar at the bottom of the concrete pad:				
Qty. of Rebar in Pad (L):	26	Qty. of Rebar in Pad (W):	26	
Rebar at the top of the concrete pad:				
Qty. of Rebar in Pad (L):	26	Qty. of Rebar in Pad (W):	26	

Soil Design Parameters:

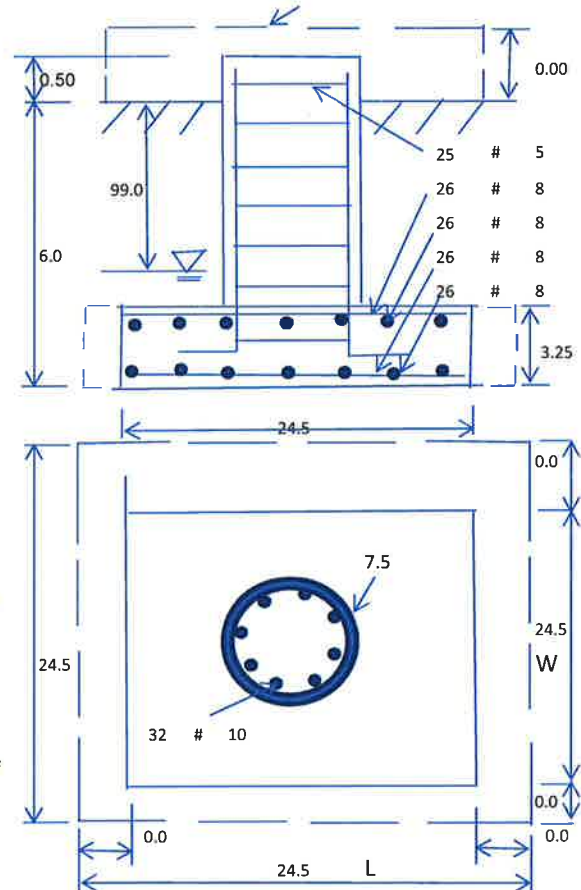
Soil Unit Weight (pcf):	110.0	Soil Buoyant Weight:	50.0	Pcf	
Water Table B.G.S. (ft):	99.0	Unit Weight of Water:	62.4	pcf	Angle from Top of Pad:
Allowable Net Soil Bearing (psf):	10000	Allowable Skin Friction:	0	Psf	25
Consider Friction for O.T.M. (Y/N):	No	Consider Friction for bearing (Y/N):	No		Angle from Bottm of Pad:
Consider soil hori. force for O.T.M.:	No				25

Foundation Analysis and Design:

Total Dry Soil Volume (cu. Ft.):	1529.20	Total Dry Soil Weight (Kips):	168.21
Total Buoyant Soil Volume (cu. Ft.):	0.00	Total Buoyant Soil Weight (Kips):	0.00
Total Effective Soil Weight (Kips):	168.21	Weight from the Concrete Block at Top (K):	0.00
Total Dry Concrete Volume (cu. Ft.):	2094.39	Total Dry Concrete Weight (Kips):	314.16
Total Buoyant Concrete Volume (cu. Ft.):	0.00	Total Buoyant Concrete Weight (Kips):	0.00
Total Effective Concrete Weight (Kips):	314.16	Total Vertical Load on Base (Kips):	530.27

Check Soil Capacities:

Calculated Maxium Net Soil Pressure under the base (psf):	1133	<	Allowable Soil Bearing (psf):	10000	0.11	OK!
Allowable Foundation Overturning Resistance (SF=1.5, kips-ft.):	4330.5	>	Applied Momont (kips-ft):	2728	0.63	OK!
Factor of Safety Against Overturning (O. R. Moment/Design Moment):	2.38					OK!



Check the capacities of Reinforcing Concrete:

Strength reduction factor (Flexure and axial tension):

0.90

Strength reduction factor (Shear):

0.75

Strength reduction factor (Axial compression):

0.65

Wind Load Factor on Concrete Design:

1.30

Load/
Capacity
Ratio**(1) Concrete Pier:**

Vertical Steel Rebar Area (sq. in./each):

1.27

Tie / Stirrup Area (sq. in./each):

0.31

Calculated Moment Capacity (Mn,Kips-Ft):

7267.6

>

Design Factored Moment (Mu, Kips-Ft)

2646.9

0.36

OK!

Calculated Shear Capacity (Kips):

1496.3

>

Design Factored Shear (Kips):

32.5

0.02

OK!

Calculated Tension Capacity (Tn, Kips):

2194.6

>

Design Factored Tension (Tu Kips):

0.0

0.00

OK!

Calculated Compression Capacity (Pn, Kips):

11175.7

>

Design Factored Axial Load (Pu Kips):

62.3

0.01

OK!

Moment & Axial Strength Combination:

0.36

OK!

Check Tie Spacing (Design/Required):

0.25

OK!

Pier Reinforcement Ratio:

0.006

Reinforcement Ratio is satisfied per ACI

(2).Concrete Pad:

One-Way Design Shear Capacity (L-Direction, Kips):

990.1

>

One-Way Factored Shear (L-D. Kips):

191.1

0.19

OK!

One-Way Design Shear Capacity (W-Direction, Kips):

990.1

>

One-Way Factored Shear (W-D., Kips):

191.1

0.19

OK!

One-Way Design Shear Capacity (Corner-Corner, Kips):

1097.2

>

One-Way Factored Shear (C-C, Kips):

329.8

0.30

OK!

Lower Steel Pad Reinforcement Ratio (L-Direct.):

0.0020

OK!

Lower Steel Pad Reinf. Ratio (W-Direct

0.0020

Lower Steel Pad Moment Capacity (L-Direction, Kips-ft):

3224.3

>

Moment at Bottom (L-Direct. K-Ft):

407.4

0.13

OK!

Lower Steel Pad Moment Capacity (W-Direction, Kips-ft):

3224.3

>

Moment at Bottom (W-Direct. K-Ft):

407.4

0.13

OK!

Lower Steel Pad Moment Capacity (Corner-Corner, K-ft):

4537.6

>

Moment at Bottom (C-C Dir. K-Ft):

576.2

0.13

OK!

Upper Steel Pad Reinforcement Ratio (L-Direct.):

0.0020

OK!

Upper Steel Reinf. Ratio (W-Direct.):

0.0020

Upper Steel Pad Moment Capacity (L-Direction, Kips-ft):

3224.3

>

Moment at the top (L-Dir Kips-Ft):

103.0

0.03

OK!

Upper Steel Pad Moment Capacity (W-Direction, Kips-ft):

3224.3

>

Moment at the top (W-Dir Kips-Ft):

103.0

0.03

OK!

Upper Steel Pad Moment Capacity (Corner-Corner, K-ft):

4537.6

>

Moment at the top (C-C Direc. K-Ft):

539.4

0.12

OK!

ATTACHMENT 5

Site Name: Ledyard North		General	Power	Density				
Tower Height: 150ft								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*T-Mobile	2	24	147	2100	0.0009	1.0000	0.01%	
*T-Mobile	2	12	147	1950	0.0004	1.0000	0.00%	
*T-Mobile	2	16	147	2100	0.0006	1.0000	0.01%	
*MetroPCS	3	444	137	2140	0.0279	1.0000	0.28%	
Verizon PCS	1	4769	127	0.1063	1970	1.0000	10.63%	
Verizon Cellular	0	422	127	0.0000	869	0.5793	0.00%	
Verizon AWS	1	1750	127	0.0390	2145	1.0000	3.90%	
Verizon 700	1	1050	127	0.0234	746	0.4973	4.71%	19.54%
* Source: Siting Council								