Robinson+Cole

KENNETH C. BALDWIN

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Also admitted in Massachusetts

February 12, 2019

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

Re: **Notice of Exempt Modification – Facility Modification**
38 Elm Street, Meriden, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the top of an existing 45-foot roof-top tower at 38 Elm Street in Meriden, Connecticut (the "Property").[1] The roof-top tower and underlying property are owned by Ashley Harriman LLC. Cellco's use of this tower was approved by the Council in 1995. Cellco now intends to modify its facility by removing six (6) remote radio heads ("RRHs") and installing six (6) new RRHs behind its antennas. Included in Attachment 1 are specifications for Cellco's new RRHs.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Meriden's Mayor, Kevin Scarpati; Renata Bertotti, Meriden's Director of Development and Enforcement; and Ashley Harriman LLC, the owner of the Property and the tower.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement RRHs will be attached to Cellco's antenna mounting structure behind its antennas at the 66-foot level on the tower.

[1] The existing facility consists of a 45-foot self-support lattice tower on top of a single story building at the Property.

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement RRHs will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Far Field Approximation tables for each of Cellco's operating frequencies are included behind Attachment 2. The Far Field calculations demonstrate that Cellco's modified facility will operate well within the RF emissions limits established by the FCC.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

The tower and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis Report included in Attachment 3).

A copy of the parcel map and owner information for the Property is included in Attachment 4. A Certificate of Mailing verifying that this filing was sent to municipal officials and the owner of the Property is included in Attachment 5.

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Kevin Scarpati, Meriden Mayor
Renata Bertotti, Meriden Director of Development and Enforcement
Ashley Harriman LLC
Tim Parks

ATTACHMENT 1

SAMSUNG

Ultra-Compact Radio Unit
700MHz (B13)
RFD01P-13A

Samsung's RFD01P-13 is a compact remote Radio Unit (RU) designed for deployments that require extreme flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.

The RFD01P-13 RU targets support for Band 13 (700MHz) over a near-zero footprint, which makes it ideal for extending broad baseline LTE coverage in virtually any environment.

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

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

Features and Benefits

- Ultra-minimal footprint reduces site acquisition and deployment costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability minimizes site maintenance visits
- Convection cooled, silent operation

Key Technical Specifications

Duplex Type: FDD
Operating Frequency:
B13: DL(746-756MHz)/UL(777-787MHz)
Instantaneous Bandwidth: 10MHz
RF Chain: 4T4R/2T4R/2T2R changeable
Output Power: Total 160W
DU-RU Interface: CPRI (10Gbps)
Dimensions(WHD): 320 x 320 x 151mm (15.4L)
Weight: 17kg
Input Power: -48V DC
Operating Temp.: -40 - 55°(w/o solar load)
Cooling: Natural convection

SAMSUNG

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

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

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

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

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

Features and Benefits

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

Key Technical Specifications

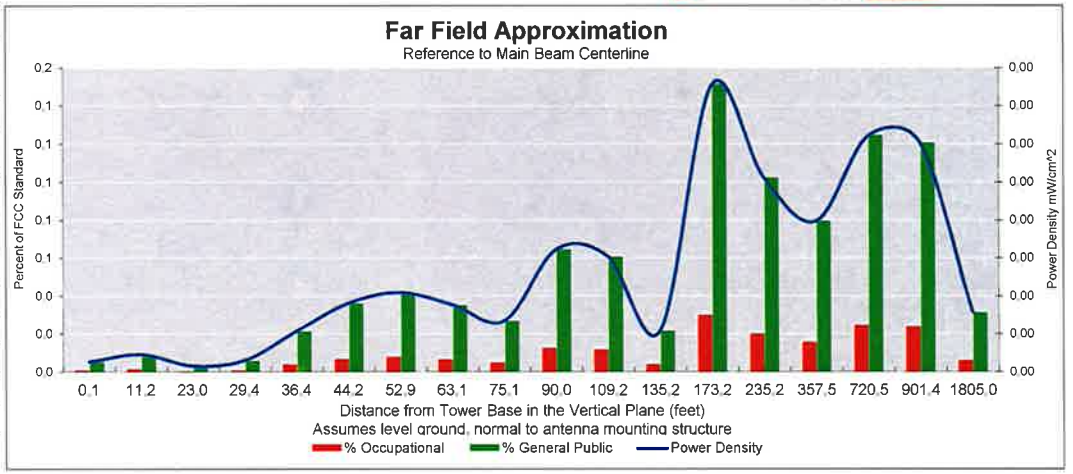
Duplex Type: FDD
Operating Frequencies:
B66: DL(2,110-2,180MHz)/UL(1,710-1,780MHz)
B2: DL(1,930-1,990MHz)/UL(1,850-1,910MHz)
Instantaneous Bandwidth:
70MHz(B66) + 60MHz(B2)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 255mm (36.8L)
Weight: 38.3kg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

ATTACHMENT 2

Estimated Radiated Emission
Single Emitter Far Field Model
Dipole/Wire/Yagi Antenna Types

Location:	**MERIDEN E CT**
Site #:	2-0151
Date:	02/07/19
Name:	Jaime Laredo
File Name:	MERIDEN E CT - FF POWER (LTE-700).xlsx

Operating Freq. (MHz):	**746.0**
Antenna Height (ft):	**66.0**
Antenna Gain (dBi):	**14.7**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
ERP (W):	**80.0**
No. of Channels:	**1**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r_d dx to antenna	63.0	64.0	67.1	69.5	72.8	76.9	82.3	89.1	98.1	109.9	126.1	149.1	184.3	243.5	363.0	723.2	903.6	1806.1
Distance from Antenna Structure Base in Horizontal plane	0.1	11.2	23.0	29.4	36.4	44.2	52.9	63.1	75.1	90.0	109.2	135.2	173.2	235.2	357.5	720.5	901.4	1805.0
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.0

Antenna Type: **SBNHH-1D65B**

Max%: **0.15%**

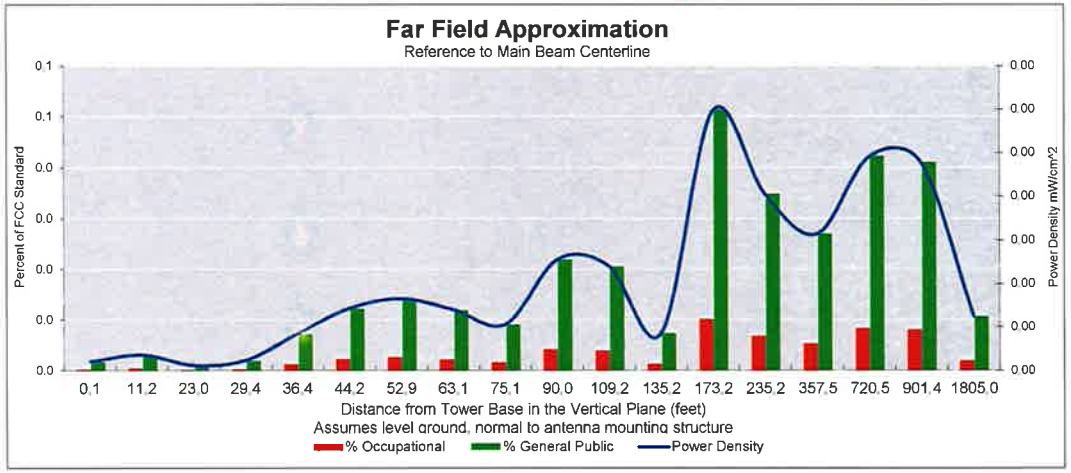
Far Field Approximation
with downtilt variation

Estimated Radiated Emission
Single Emitter Far Field Model
Dipole/Wire/Yagi Antenna Types

verizonwireless

Location:	**MERIDEN E CT**
Site #:	2-0151
Date:	02/07/19
Name:	Jaime Laredo
File Name:	MERIDEN E CT - FF POWER (Cellular).xlsx

Operating Freq. (MHz):	**869.0**
Antenna Height (ft):	**66.0**
Antenna Gain (dBi):	**16.7**
Antenna Size (in.):	**70.9**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
ERP (W):	**20.0**
No. of Channels:	**3**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r, dx to antenna	63.0	64.0	67.1	69.5	72.8	76.9	82.3	89.1	98.1	109.9	126.1	149.1	184.3	243.5	363.0	723.2	903.6	1806.1
Distance from Antenna Structure Base in Horizontal plane	0.1	11.2	23.0	29.4	36.4	44.2	52.9	63.1	75.1	90.0	109.2	135.2	173.2	235.2	357.5	720.5	901.4	1805.0
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dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0

Antenna Type: **LPA-80063/6CF**

Max%: **0.05%**

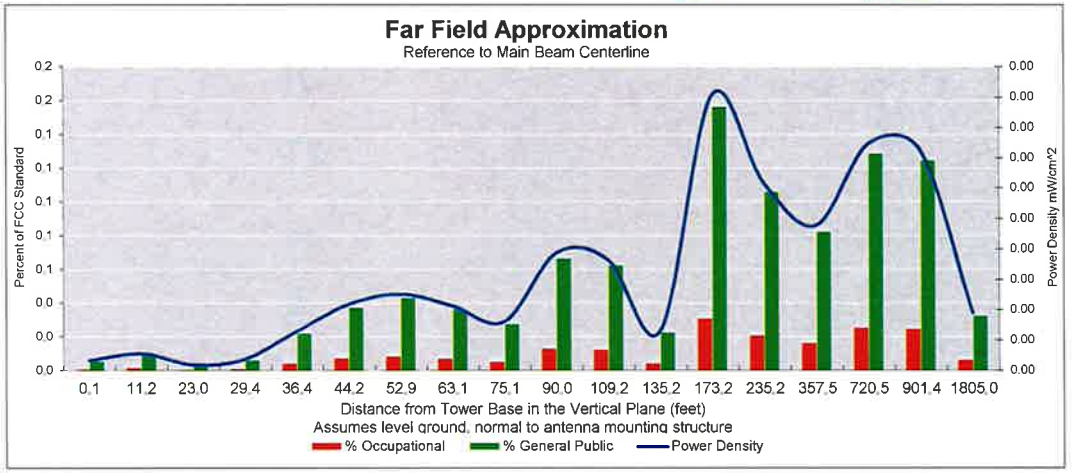
Far Field Approximation
with downtilt variation

Estimated Radiated Emission
Single Emitter Far Field Model
Dipole/Wire/Yagi Antenna Types

verizonwireless

Location:	**MERIDEN E CT**
Site #:	2-0151
Date:	02/07/19
Name:	Jaime Laredo
File Name:	MERIDEN E CT - FF POWER (850 LTE).xlsx

Operating Freq. (MHz):	**869.0**
Antenna Height (ft):	**66.0**
Antenna Gain (dBi):	**15.5**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
ERP (W):	**80.0**
No. of Channels:	**1**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r, dx to antenna	63.0	64.0	67.1	69.5	72.8	76.9	82.3	89.1	98.1	109.9	126.1	149.1	184.3	243.5	363.0	723.2	903.6	1806.1
Distance from Antenna Structure Base in Horizontal plane	0.1	11.2	23.0	29.4	36.4	44.2	52.9	63.1	75.1	90.0	109.2	135.2	173.2	235.2	357.5	720.5	901.4	1805.0
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.0

Antenna Type: **SBNHH-1D65B**

Max%: **0.16%**

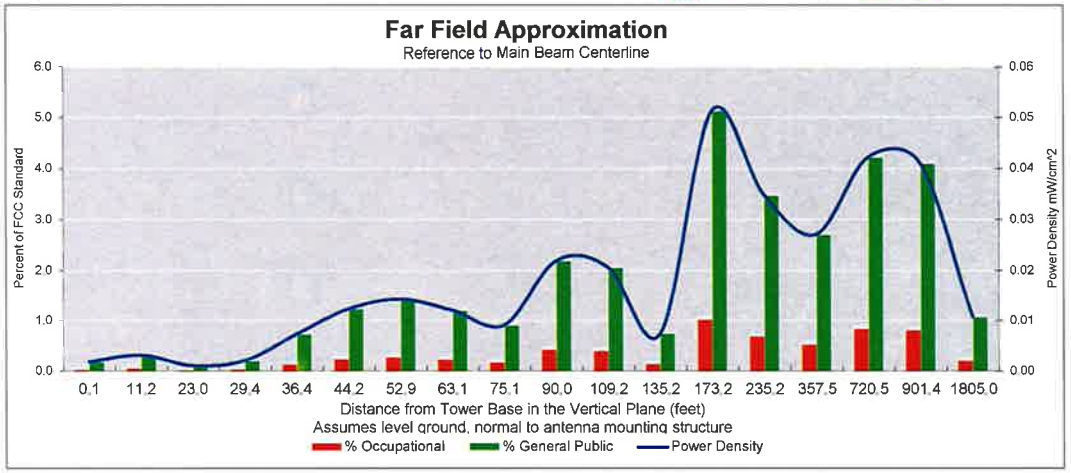
Far Field Approximation
with downtilt variation

Estimated Radiated Emission
Single Emitter Far Field Model
Dipole/Wire/Yagi Antenna Types

verizonwireless

Location:	**MERIDEN E CT**
Site #:	2-0151
Date:	02/07/19
Name:	Jaime Laredo
File Name:	MERIDEN E CT - FF POWER (PCS).xlsx

Operating Freq. (MHz):	**1970.0**
Antenna Height (ft):	**66.0**
Antenna Gain (dBi):	**18.4**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
ERP (W):	**80.0**
No. of Channels:	**1**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r, dx to antenna	63.0	64.0	67.1	69.5	72.8	76.9	82.3	89.1	98.1	109.9	126.1	149.1	184.3	243.5	363.0	723.2	903.6	1806.1
Distance from Antenna Structure Base in Horizontal plane	0.1	11.2	23.0	29.4	36.4	44.2	52.9	63.1	75.1	90.0	109.2	135.2	173.2	235.2	357.5	720.5	901.4	1805.0
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.05	0.03	0.03	0.04	0.04	0.01
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.1	0.2	0.3	0.2	0.2	0.4	0.4	0.1	1.0	0.7	0.5	0.8	0.8	0.2
Percent of General Population Standard	0.2	0.3	0.1	0.2	0.7	1.2	1.4	1.2	0.9	2.2	2.1	0.7	5.1	3.5	2.7	4.2	4.1	1.1

Antenna Type: **SBNHH-1D65B**

Max%: **5.14%**

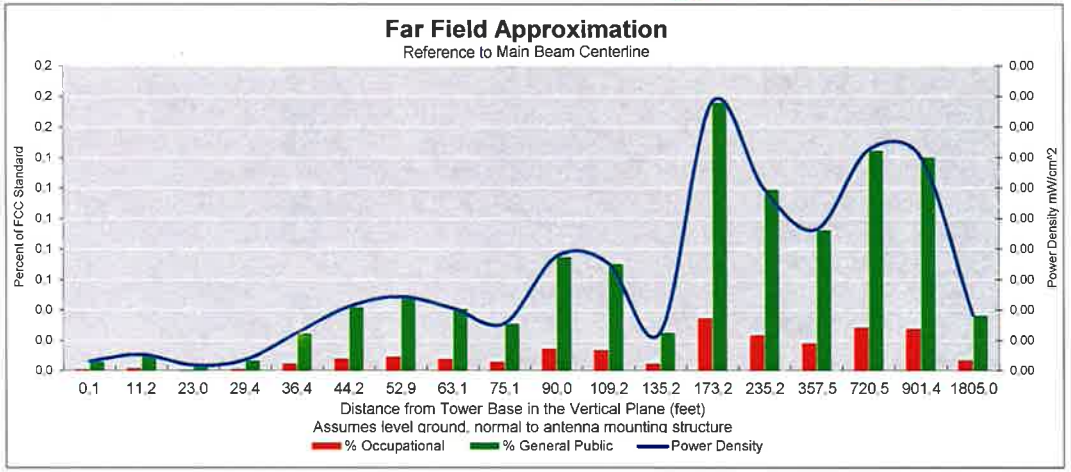
Far Field Approximation
with downtilt variation

Estimated Radiated Emission
Single Emitter Far Field Model
Dipole/Wire/Yagi Antenna Types

verizonwireless

Location:	**MERIDEN E CT**
Site #:	2-0151
Date:	02/07/19
Name:	Jaime Laredo
File Name:	MERIDEN E CT - FF POWER (LTE-AWS).xlsx

Operating Freq. (MHz):	**2145.0**
Antenna Height (ft):	**66.0**
Antenna Gain (dBi):	**18.4**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
ERP (W):	**80.0**
No. of Channels:	**1**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r, dx to antenna	63.0	64.0	67.1	69.5	72.8	76.9	82.3	89.1	98.1	109.9	126.1	149.1	184.3	243.5	363.0	723.2	903.6	1806.1
Distance from Antenna Structure Base in Horizontal plane	0.1	11.2	23.0	29.4	36.4	44.2	52.9	63.1	75.1	90.0	109.2	135.2	173.2	235.2	357.5	720.5	901.4	1805.0
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.0

Antenna Type: **SBNHH-1D65B**

Max%: **0.18%**

ATTACHMENT 3

PJF PAUL J. FORD & COMPANY

Report Date:	January 17, 2019
Client:	On Air Engineering, LLC 88 Foundry Pond Road Cold Spring, NY 10516 Attn: David Weinpahl, P.E. (201) 456-4624 dweinpahl@onaireng.com
Structure:	Existing 45-ft Self Support on 24-ft Building
Site Name:	Meriden E CT
Site Address:	38 Elm Street
City, County, State:	Meriden, New Haven County, CT
Latitude, Longitude:	41.534265, -72.796485
PJF Project:	42918-0029.002.8700

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

Analysis Criteria:

Reference Standard:	2018 Connecticut Building Code with the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1.
Ultimate Wind Speed:	125 mph 3-second gust wind speed without ice
Nominal Wind Speed:	97 mph 3-second gust wind speed without ice
Ice Wind Speed:	50 mph 3-second gust wind speed with 0.75" ice
Service Wind Speed:	60 mph (Serviceability) without ice
IBC Site Criteria:	Risk Category II, Topographic Category 1, Exposure Category C

Proposed Appurtenance Loads:

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

Summary of Analysis Results:

Existing Structure:	Pass
Existing Foundation:	Pass

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

Respectfully Submitted by:
Paul J. Ford and Company

John M. Fawcett

John M. Fawcett, E.I.
Structural Designer
jfawcett@pauljford.com RMD

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

JAN 17 2019

Columbus
250 E Broad St, Suite 600
Columbus, OH 43215
Phone 614.221.6679

Orlando
1801 Lee Rd, Suite 230
Winter Park, FL 32789
Phone 407.898.9039

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 45 ft self-support tower designed by Rohn.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-G
Risk Category:	II
Wind Speed(Nominal):	97 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	0.75 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
66.0	66.0	3	SitePro1	STK-U Stiff Arm	-	-	-
		3	commscope	BSAMNT-SBS-1-2 (Mount Bracket)			
		3	samsung	B2/B66A RRH			
		3	samsung	B5/B13 RRH			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
66.0	66.0	6	andrew	SBNHH-1D65B w/ Mount Pipe	15 1	1-1/4 coax 1-1/4 hybrid	1
		2	antel	LPA-80063/6CF w/ Mount Pipe			
		4	antel	LPA-80080/6CF w/ Mount Pipe			
		1	raycap	RCXXDC-3315-PF-48			
		3	tower mounts	20' T-Frame			
		3	nokia	B4 RRH 2X60-4R	-	-	2
		3	nokia	UHBA B13 RRH 4X30			
55.0	55.0	1	microwave dishes	8 ft standard	1	WE65	3

Notes:
1) Existing Equipment
2) Equipment To Be Removed
3) Reserved Equipment

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Site Photos	On Air, 12/5/2018	-	On Air
Construction Drawings	Verizon, 9/14/2018	-	On Air
Radio Frequency Data Sheet	Verizon, 8/22/2018	-	On Air
Mount Structural Analysis Report	PJF, 12/13/2018	-	On File
Tower Structural Analysis Report	Natcomm, 4/20/2010	-	On Air
Tower Structural Analysis Report	Centek, 7/30/2015	-	On Air

3.1) Analysis Method

tnxTower (version 8.0.4.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built and maintained in accordance with the manufacturer's specifications.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
3) At the time of analysis, the original foundation drawings or a foundation mapping was not available. However, the 2010 tower structural analysis report, referenced in Table 3, provided the base design reactions from the original drawings. Using these reactions, we have compared them to the reactions of this analysis. By doing this we have assumed the existing foundation was properly designed to handle the loading from the original tower design.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	69 - 64	Leg	Pipe 2.375" x 0.218" (2 EH)	3	-4.08	42.47	9.6	Pass
T2	64 - 44	Leg	Pipe 2.375" x 0.218" (2 EH)	13	-26.14	49.90	52.4	Pass
T3	44 - 24	Leg	Pipe 2.875" x 0.276" (2.5 EH)	46	-50.39	74.43	67.7	Pass
T1	69 - 64	Diagonal	L 1.5 x 1.5 x 3/16	10	-1.12	4.73	23.6 23.8 (b)	Pass
T2	64 - 44	Diagonal	L 1.5 x 1.5 x 3/16	20	-4.60	5.42	84.8 98.3 (b)	Pass
T3	44 - 24	Diagonal	L 1.75 x 1.75 x 3/16	56	-3.45	5.09	67.8	Pass
T1	69 - 64	Top Girt	L 1.5 x 1.5 x 3/16	4	-0.44	1.90	23.2	Pass
T3	44 - 24	Top Girt	L 1.5 x 1.5 x 3/16	49	-0.09	1.88	4.8	Pass
							Summary	
						Leg (T3)	67.7	Pass
						Diagonal (T2)	98.3	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
						Top Girt (T1)	23.2	Pass
						Bolt Checks	98.3	Pass
						Rating =	98.3	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Base Foundation (Compared w/ Design Loads)	24	83.1	Pass

Structure Rating (max from all components) =	98.3%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Foundation capacity determined by comparing analysis reactions to original design reactions.

4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

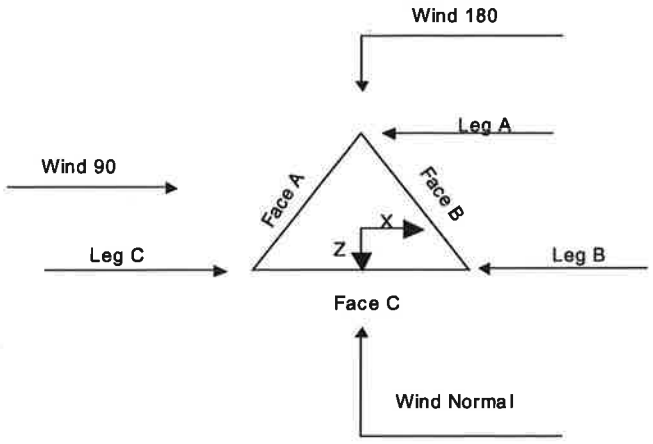
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 69.00 ft above the ground line.
The base of the tower is set at an elevation of 24.00 ft above the ground line.
The face width of the tower is 6.52 ft at the top and 8.56 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1. Tower is located in New Haven County, Connecticut.
2. ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3. Basic wind speed of 97.00 mph.
4. Structure Class II.
5. Exposure Category C.
6. Topographic Category 1.
7. Crest Height 0.00 ft.
8. Nominal ice thickness of 0.75 in.
9. Ice thickness is considered to increase with height.
10. Ice density of 56.00 pcf.
11. A wind speed of 50.00 mph is used in combination with ice.
12. Deflections calculated using a wind speed of 60.00 mph.
13. A non-linear (P-delta) analysis was used.
14. Pressures are calculated at each section.
15. Stress ratio used in tower member design is 1.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	69.00-64.00			6.52	1	5.00
T2	64.00-44.00			6.52	1	20.00
T3	44.00-24.00			6.56	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	69.00-64.00	5.00	X Brace	No	No	0.00	0.00
T2	64.00-44.00	4.00	X Brace	No	No	0.00	0.00
T3	44.00-24.00	5.00	X Brace	No	No	0.00	0.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 69.00-64.00	Pipe	Pipe 2.375" x 0.218" (2 EH)	A572-50 (50 ksi)	Single Angle	L 1.5 x 1.5 x 3/16	A36 (36 ksi)
T2 64.00-44.00	Pipe	Pipe 2.375" x 0.218" (2 EH)	A572-50 (50 ksi)	Single Angle	L 1.5 x 1.5 x 3/16	A36 (36 ksi)
T3 44.00-24.00	Pipe	Pipe 2.875" x 0.276" (2.5 EH)	A572-50 (50 ksi)	Single Angle	L 1.75 x 1.75 x 3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 69.00-64.00	Single Angle	L 1.5 x 1.5 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T3 44.00-24.00	Single Angle	L 1.5 x 1.5 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 69.00-64.00	0.00	0.00	A36 (36 ksi)	1	1	1.1	36.00	36.00	36.00
T2 64.00-44.00	0.00	0.00	A36 (36 ksi)	1	1	1.1	36.00	36.00	36.00
T3 44.00-24.00	0.00	0.00	A36 (36 ksi)	1	1	1.1	36.00	36.00	36.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 69.00-64.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T2 64.00-44.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T3 44.00-24.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 69.00-64.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T2 64.00-44.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T3 44.00-24.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 69.00-64.00	Flange	0.63 A325N	4	0.50 A325N	1	0.50 A325N	1	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0
T2 64.00-44.00	Flange	0.63 A325N	4	0.50 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0
T3 44.00-24.00	Flange	0.63 A325N	4	0.50 A325N	1	0.50 A325N	1	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1/4" x 2-1/2" Climb Ladder Rail	B	No	No	Af (CaAa)	24.00 - 29.00	-7.00	0	2	2	12.00 0.25	0.25		2.12
3/4" ladder rung (12" long 12" oc)	B	No	No	Ar (CaAa)	24.00 - 29.00	-7.00	0	1	1	0.75	0.75		1.50
Safety Line 3/8 *	B	No	No	Ar (CaAa)	24.00 - 29.00	-11.00	0	1	1	0.38	0.38		0.22
1.5" flat Cable Ladder Rail	B	No	No	Af (CaAa)	66.50 - 24.00	0.00	0	2	2	42.00 1.50	1.50		1.80
AVA6-50(1-1/4")	B	No	No	Ar (CaAa)	64.00 - 24.00	0.00	0	16	15	0.75 0.50	1.56		0.45
WE65(ELLIPTICAL) ******	B	No	No	Ar (CaAa)	55.00 - 28.00	3.00	0.28	1	1	2.03	2.03		0.53

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(3) 20' T-Frame	C	None		0.000	66.00	No Ice 1/2" Ice 1" Ice	37.91 53.84 69.77	37.91 53.84 69.77	1.81 2.44 3.07
SitePro1 STK-U Stiff Arm	A	From Leg	2.00 0.00 0.00	0.000	66.00	No Ice 1/2" Ice 1" Ice	2.97 4.25 5.54	2.97 4.25 5.54	0.06 0.08 0.11
SitePro1 STK-U Stiff Arm	B	From Leg	2.00 0.00 0.00	0.000	66.00	No Ice 1/2" Ice 1" Ice	2.97 4.25 5.54	2.97 4.25 5.54	0.06 0.08 0.11
SitePro1 STK-U Stiff Arm	C	From Leg	2.00	0.000	66.00	No Ice	2.97	2.97	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2"	4.25	4.25	0.08
			0.00			Ice	5.54	5.54	0.11
						1" Ice			
3 Sch 40 X 6' Mount Pipe	A	From Leg	4.00	0.000	66.00	No Ice	1.93	1.93	0.06
			0.00			1/2"	2.29	2.29	0.07
			0.00			Ice	2.67	2.67	0.09
						1" Ice			
3 Sch 40 X 6' Mount Pipe	B	From Leg	4.00	0.000	66.00	No Ice	1.93	1.93	0.06
			0.00			1/2"	2.29	2.29	0.07
			0.00			Ice	2.67	2.67	0.09
						1" Ice			
3 Sch 40 X 6' Mount Pipe	C	From Leg	4.00	0.000	66.00	No Ice	1.93	1.93	0.06
			0.00			1/2"	2.29	2.29	0.07
			0.00			Ice	2.67	2.67	0.09
						1" Ice			
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00	0.000	66.00	No Ice	8.42	7.42	0.08
			0.00			1/2"	8.96	8.45	0.15
			0.00			Ice	9.48	9.35	0.23
						1" Ice			
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00	0.000	66.00	No Ice	8.42	7.42	0.08
			0.00			1/2"	8.96	8.45	0.15
			0.00			Ice	9.48	9.35	0.23
						1" Ice			
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00	0.000	66.00	No Ice	8.42	7.42	0.08
			0.00			1/2"	8.96	8.45	0.15
			0.00			Ice	9.48	9.35	0.23
						1" Ice			
(2) LPA-80063/6CF w/ Mount Pipe	A	From Leg	4.00	0.000	66.00	No Ice	9.83	10.22	0.05
			0.00			1/2"	10.40	11.38	0.14
			0.00			Ice	10.93	12.27	0.25
						1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.00	0.000	66.00	No Ice	4.56	10.26	0.05
			0.00			1/2"	5.11	11.43	0.11
			0.00			Ice	5.61	12.31	0.19
						1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00	0.000	66.00	No Ice	4.56	10.26	0.05
			0.00			1/2"	5.11	11.43	0.11
			0.00			Ice	5.61	12.31	0.19
						1" Ice			
raycap RCXXDC-3315-PF-48	C	From Face	0.00	0.000	66.00	No Ice	3.01	1.96	0.02
			0.00			1/2"	3.23	2.15	0.05
			0.00			Ice	3.46	2.35	0.08
						1" Ice			
BSAMNT-SBS-1-2 (Mount Bracket)	A	From Leg	4.00	0.000	66.00	No Ice	0.00	0.00	0.07
			0.00			1/2"	0.00	0.00	0.09
			0.00			Ice	0.00	0.00	0.11
						1" Ice			
BSAMNT-SBS-1-2 (Mount Bracket)	B	From Leg	4.00	0.000	66.00	No Ice	0.00	0.00	0.07
			0.00			1/2"	0.00	0.00	0.09
			0.00			Ice	0.00	0.00	0.11
						1" Ice			
BSAMNT-SBS-1-2 (Mount Bracket)	C	From Leg	4.00	0.000	66.00	No Ice	0.00	0.00	0.07
			0.00			1/2"	0.00	0.00	0.09
			0.00			Ice	0.00	0.00	0.11
						1" Ice			
samsung B5/B13 RRH	A	From Leg	4.00	0.000	66.00	No Ice	1.88	1.01	0.07
			0.00			1/2"	2.05	1.14	0.09
			0.00			Ice	2.22	1.28	0.11
						1" Ice			
samsung B5/B13 RRH	B	From Leg	4.00	0.000	66.00	No Ice	1.88	1.01	0.07
			0.00			1/2"	2.05	1.14	0.09
			0.00			Ice	2.22	1.28	0.11
						1" Ice			
samsung B5/B13 RRH	C	From Leg	4.00	0.000	66.00	No Ice	1.88	1.01	0.07
			0.00			1/2"	2.05	1.14	0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	2.22	1.28	0.11
						1" Ice			
samsung B2/B66A RRH	A	From Leg	4.00	0.000	66.00	No Ice	1.88	1.01	0.07
			0.00			1/2"	2.05	1.14	0.09
			0.00			Ice	2.22	1.28	0.11
						1" Ice			
samsung B2/B66A RRH	B	From Leg	4.00	0.000	66.00	No Ice	1.88	1.01	0.07
			0.00			1/2"	2.05	1.14	0.09
			0.00			Ice	2.22	1.28	0.11
						1" Ice			
samsung B2/B66A RRH	C	From Leg	4.00	0.000	66.00	No Ice	1.88	1.01	0.07
			0.00			1/2"	2.05	1.14	0.09
			0.00			Ice	2.22	1.28	0.11
						1" Ice			
***									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
8 ft standard	C	Paraboloid w/o Radome	From Leg	2.00	Worst		55.00	8.00	No Ice	50.27	0.26
				0.00					1/2" Ice	51.32	0.55
				0.00					1" Ice	52.37	0.84

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice

Comb. No.	Description
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	53.17	6.14	-3.53
	Max. H_x	18	53.17	6.14	-3.53
	Max. H_z	5	-41.34	-4.55	3.66
	Min. Vert	7	-47.31	-5.70	3.28
	Min. H_x	7	-47.31	-5.70	3.28
	Min. H_z	16	45.98	4.79	-3.80
Leg B	Max. Vert	10	50.91	-6.11	-2.74
	Max. H_x	23	-45.24	5.68	2.47
	Max. H_z	23	-45.24	5.68	2.47
	Min. Vert	23	-45.24	5.68	2.47
	Min. H_x	10	50.91	-6.11	-2.74
	Min. H_z	10	50.91	-6.11	-2.74
Leg A	Max. Vert	2	52.18	-0.68	6.79
	Max. H_x	19	-24.01	0.97	-3.41
	Max. H_z	2	52.18	-0.68	6.79
	Min. Vert	15	-46.54	0.69	-6.29
	Min. H_x	6	27.81	-0.94	3.57
	Min. H_z	15	-46.54	0.69	-6.29

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	6.40	0.00	0.00	0.30	0.39	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	7.68	-0.00	-11.56	-367.98	0.49	-10.14
0.9 Dead+1.6 Wind 0 deg - No Ice	5.76	-0.00	-11.56	-367.89	0.38	-10.14
1.2 Dead+1.6 Wind 30 deg - No Ice	7.68	5.87	-10.42	-326.54	-181.90	-4.84
0.9 Dead+1.6 Wind 30 deg - No Ice	5.76	5.87	-10.42	-326.47	-181.94	-4.84
1.2 Dead+1.6 Wind 60 deg - No Ice	7.68	10.07	-5.97	-187.23	-313.46	0.29

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
0.9 Dead+1.6 Wind 60 deg - No Ice	5.76	10.07	-5.97	-187.23	-313.43	0.29
1.2 Dead+1.6 Wind 90 deg - No Ice	7.68	11.73	-0.00	0.37	-364.30	5.34
0.9 Dead+1.6 Wind 90 deg - No Ice	5.76	11.73	-0.00	0.28	-364.24	5.34
1.2 Dead+1.6 Wind 120 deg - No Ice	7.68	9.75	5.78	184.54	-307.51	10.42
0.9 Dead+1.6 Wind 120 deg - No Ice	5.76	9.75	5.78	184.36	-307.49	10.42
1.2 Dead+1.6 Wind 150 deg - No Ice	7.68	5.02	8.96	297.04	-164.45	13.83
0.9 Dead+1.6 Wind 150 deg - No Ice	5.76	5.02	8.96	296.81	-164.49	13.82
1.2 Dead+1.6 Wind 180 deg - No Ice	7.68	0.00	11.16	359.59	0.49	10.14
0.9 Dead+1.6 Wind 180 deg - No Ice	5.76	0.00	11.16	359.33	0.37	10.14
1.2 Dead+1.6 Wind 210 deg - No Ice	7.68	-5.87	10.42	327.24	182.86	4.84
0.9 Dead+1.6 Wind 210 deg - No Ice	5.76	-5.87	10.42	326.99	182.66	4.84
1.2 Dead+1.6 Wind 240 deg - No Ice	7.68	-10.42	6.17	192.50	322.28	-0.29
0.9 Dead+1.6 Wind 240 deg - No Ice	5.76	-10.42	6.17	192.32	322.01	-0.29
1.2 Dead+1.6 Wind 270 deg - No Ice	7.68	-11.73	-0.00	0.37	365.24	-5.34
0.9 Dead+1.6 Wind 270 deg - No Ice	5.76	-11.73	-0.00	0.28	364.95	-5.34
1.2 Dead+1.6 Wind 300 deg - No Ice	7.68	-9.40	-5.58	-179.24	300.60	-10.42
0.9 Dead+1.6 Wind 300 deg - No Ice	5.76	-9.40	-5.58	-179.25	300.34	-10.42
1.2 Dead+1.6 Wind 330 deg - No Ice	7.68	-5.02	-8.96	-296.30	165.43	-13.83
0.9 Dead+1.6 Wind 330 deg - No Ice	5.76	-5.02	-8.96	-296.25	165.24	-13.82
1.2 Dead+1.0 Ice	23.11	0.00	0.00	-1.34	-1.02	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice	23.11	0.00	-2.95	-95.79	-1.01	-1.51
1.2 Dead+1.0 Wind 30 deg+1.0 Ice	23.11	1.54	-2.72	-86.35	-49.01	-0.57
1.2 Dead+1.0 Wind 60 deg+1.0 Ice	23.11	2.76	-1.62	-51.42	-85.88	0.10
1.2 Dead+1.0 Wind 90 deg+1.0 Ice	23.11	3.09	0.00	-1.34	-97.01	0.74
1.2 Dead+1.0 Wind 120 deg+1.0 Ice	23.11	2.51	1.48	45.89	-80.94	1.61
1.2 Dead+1.0 Wind 150 deg+1.0 Ice	23.11	1.34	2.37	76.41	-44.82	2.19
1.2 Dead+1.0 Wind 180 deg+1.0 Ice	23.11	0.00	2.90	91.95	-1.01	1.51
1.2 Dead+1.0 Wind 210 deg+1.0 Ice	23.11	-1.54	2.72	83.67	46.98	0.57
1.2 Dead+1.0 Wind 240 deg+1.0 Ice	23.11	-2.80	1.64	49.32	84.86	-0.10
1.2 Dead+1.0 Wind 270 deg+1.0 Ice	23.11	-3.09	0.00	-1.34	94.98	-0.74
1.2 Dead+1.0 Wind 300 deg+1.0 Ice	23.11	-2.47	-1.45	-47.98	77.90	-1.61
1.2 Dead+1.0 Wind 330 deg+1.0 Ice	23.11	-1.34	-2.37	-79.09	42.79	-2.19
Dead+Wind 0 deg - Service	6.40	0.00	-2.76	-87.76	0.39	-2.42
Dead+Wind 30 deg - Service	6.40	1.40	-2.49	-77.85	-43.21	-1.16
Dead+Wind 60 deg - Service	6.40	2.41	-1.43	-44.55	-74.65	0.07
Dead+Wind 90 deg - Service	6.40	2.81	0.00	0.30	-86.81	1.28
Dead+Wind 120 deg - Service	6.40	2.33	1.38	44.33	-73.24	2.49

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 150 deg - Service	6.40	1.20	2.14	71.22	-39.04	3.31
Dead+Wind 180 deg - Service	6.40	0.00	2.67	86.17	0.39	2.42
Dead+Wind 210 deg - Service	6.40	-1.40	2.49	78.44	43.99	1.16
Dead+Wind 240 deg - Service	6.40	-2.49	1.47	46.23	77.32	-0.07
Dead+Wind 270 deg - Service	6.40	-2.81	0.00	0.30	87.59	-1.28
Dead+Wind 300 deg - Service	6.40	-2.25	-1.33	-42.64	72.14	-2.49
Dead+Wind 330 deg - Service	6.40	-1.20	-2.14	-70.62	39.82	-3.31

Maximum Tower Deflections - Service Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
T1	69 - 64	0.41	46	0.059	0.038
T2	64 - 44	0.34	46	0.059	0.038
T3	44 - 24	0.10	47	0.037	0.020

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
66.00	(3) 20' T-Frame	46	0.37	0.060	0.038	88317
55.00	8 ft standard	46	0.23	0.053	0.032	79235

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
T1	69 - 64	1.68	16	0.245	0.158
T2	64 - 44	1.43	16	0.245	0.158
T3	44 - 24	0.42	18	0.153	0.084

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
66.00	(3) 20' T-Frame	16	1.53	0.246	0.159	21142
55.00	8 ft standard	16	0.94	0.219	0.135	19438

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	69	Leg	A325N	0.63	4	0.34	20.71	0.016	1	Bolt Tension
		Diagonal	A325N	0.50	1	1.12	4.69	0.238	1	Member Block Shear
		Top Girt	A325N	0.50	1	0.43	4.69	0.091	1	Member Block Shear
T2	64	Leg	A325N	0.63	4	5.59	20.71	0.270	1	Bolt Tension
		Diagonal	A325N	0.50	1	4.61	4.69	0.983	1	Member Block Shear
T3	44	Leg	A325N	0.63	4	11.19	20.71	0.540	1	Bolt Tension
		Diagonal	A325N	0.50	1	3.76	5.71	0.658	1	Member Block Shear
		Top Girt	A325N	0.50	1	0.09	7.95	0.011	1	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	69 - 64	Pipe 2.375" x 0.218" (2 EH)	5.00	5.00	78.3 K=1.00	1.48	-4.08	42.47	0.096 [1]
T2	64 - 44	Pipe 2.375" x 0.218" (2 EH)	20.00	4.00	62.6 K=1.00	1.48	-26.14	49.90	0.524 [1]
T3	44 - 24	Pipe 2.875" x 0.276" (2.5 EH)	20.03	5.01	65.0 K=1.00	2.25	-50.39	74.43	0.677 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	69 - 64	L 1.5 x 1.5 x 3/16	8.22	3.88	158.7 K=1.00	0.53	-1.12	4.73	0.236 [1]
T2	64 - 44	L 1.5 x 1.5 x 3/16	7.68	3.62	148.2 K=1.00	0.53	-4.60	5.42	0.848 [1]
T3	44 - 24	L 1.75 x 1.75 x 3/16	9.70	4.75	166.1 K=1.00	0.62	-3.45	5.09	0.678 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	69 - 64	L 1.5 x 1.5 x 3/16 KL/R > 200 (C) - 4	6.52	6.11	250.1 K=1.00	0.53	-0.44	1.90	0.232 [1]
T3	44 - 24	L 1.5 x 1.5 x 3/16 KL/R > 200 (C) - 49	6.56	6.16	251.9 K=1.00	0.53	-0.09	1.88	0.048 [1]

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	69 - 64	Pipe 2.375" x 0.218" (2 EH)	5.00	5.00	78.3	1.48	0.06	66.48	0.001 [1]
T2	64 - 44	Pipe 2.375" x 0.218" (2 EH)	20.00	4.00	62.6	1.48	22.36	66.48	0.336 [1]
T3	44 - 24	Pipe 2.875" x 0.276" (2.5 EH)	20.03	5.01	65.0	2.25	44.75	101.41	0.441 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	69 - 64	L 1.5 x 1.5 x 3/16	8.22	3.88	104.7	0.31	1.12	13.38	0.083 [1]
T2	64 - 44	L 1.5 x 1.5 x 3/16	7.68	3.62	97.9	0.31	4.61	13.38	0.345 [1]
T3	44 - 24	L 1.75 x 1.75 x 3/16	8.45	4.14	94.8	0.38	3.76	16.44	0.228 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	69 - 64	L 1.5 x 1.5 x 3/16	6.52	6.11	166.1	0.31	0.43	13.38	0.032 [1]
T3	44 - 24	L 1.5 x 1.5 x 3/16	6.56	6.16	167.3	0.31	0.03	13.38	0.002 [1]

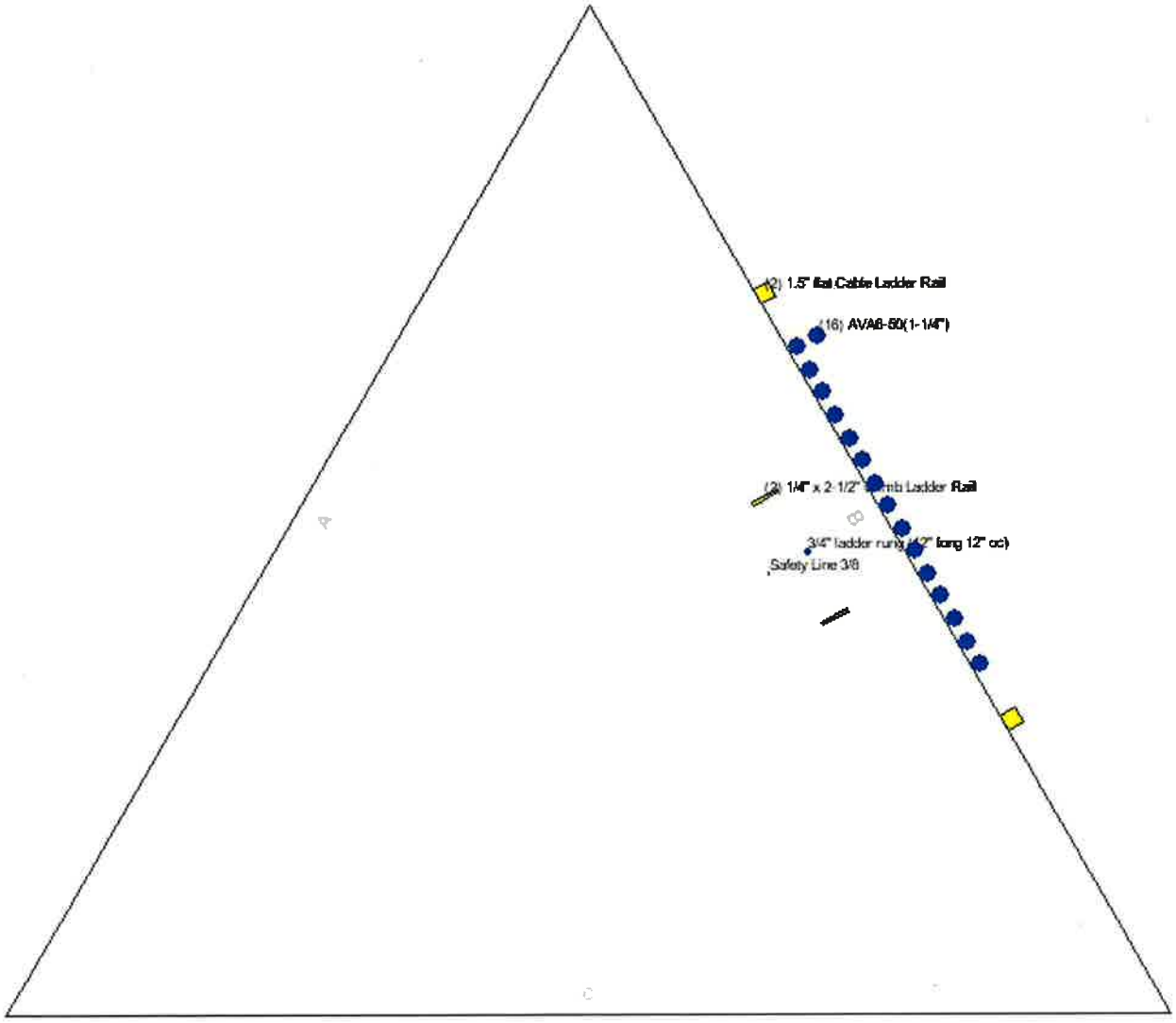
[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	69 - 64	Leg	Pipe 2.375" x 0.218" (2 EH)	3	-4.08	42.47	9.6	Pass
T2	64 - 44	Leg	Pipe 2.375" x 0.218" (2 EH)	13	-26.14	49.90	52.4	Pass
T3	44 - 24	Leg	Pipe 2.875" x 0.276" (2.5 EH)	46	-50.39	74.43	67.7	Pass
T1	69 - 64	Diagonal	L 1.5 x 1.5 x 3/16	10	-1.12	4.73	23.6	Pass
							23.8 (b)	
T2	64 - 44	Diagonal	L 1.5 x 1.5 x 3/16	20	-4.60	5.42	84.8	Pass
							98.3 (b)	
T3	44 - 24	Diagonal	L 1.75 x 1.75 x 3/16	56	-3.45	5.09	67.8	Pass
T1	69 - 64	Top Girt	L 1.5 x 1.5 x 3/16	4	-0.44	1.90	23.2	Pass
T3	44 - 24	Top Girt	L 1.5 x 1.5 x 3/16	49	-0.09	1.88	4.8	Pass
							Summary	
						Leg (T3)	67.7	Pass
						Diagonal (T2)	98.3	Pass
						Top Girt (T1)	23.2	Pass
						Bolt Checks	98.3	Pass
						RATING =	**98.3**	**Pass**

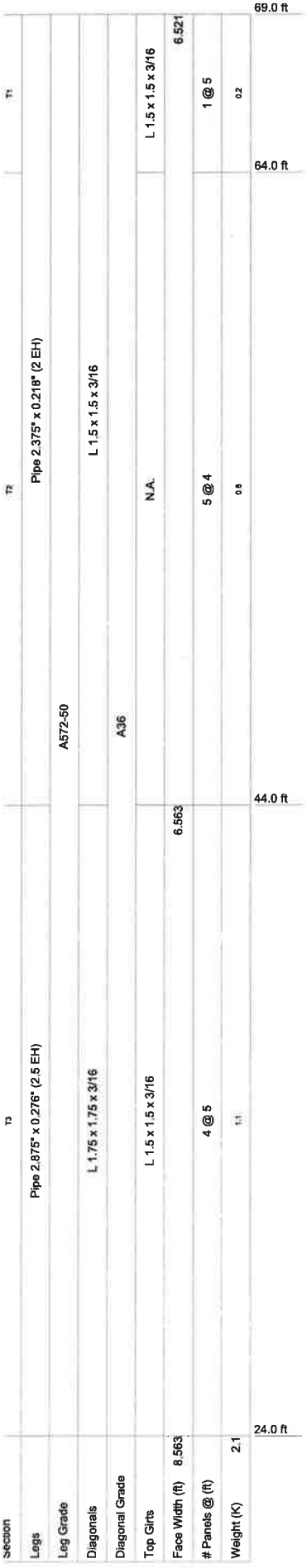
APPENDIX B

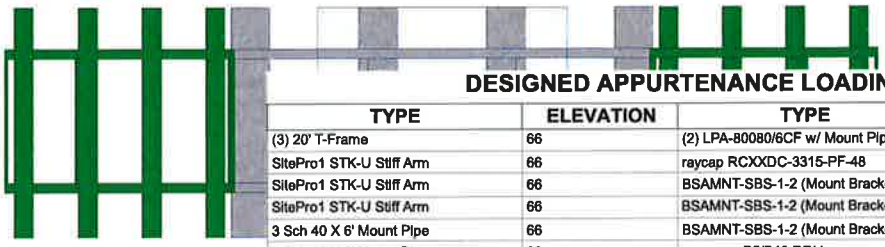
BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS





DESIGNED APPURTENANCE LOADING

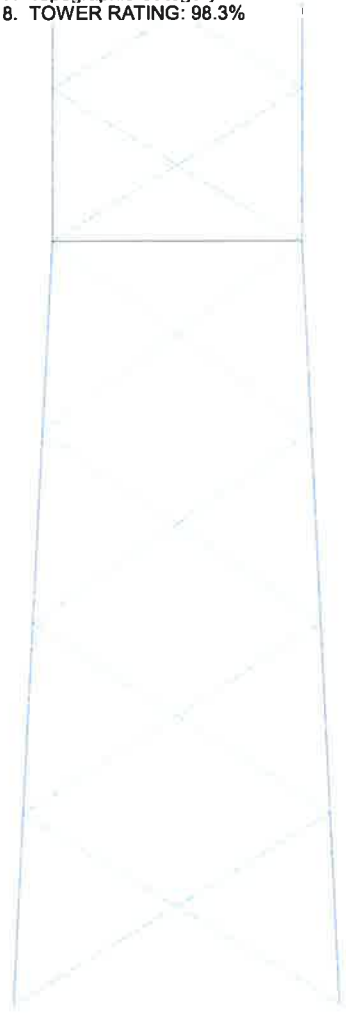
TYPE	ELEVATION	TYPE	ELEVATION
(3) 20' T-Frame	66	(2) LPA-80080/6CF w/ Mount Pipe	66
SitePro1 STK-U Stiff Arm	66	raycap RCXXDC-3315-PF-48	66
SitePro1 STK-U Stiff Arm	66	BSAMNT-SBS-1-2 (Mount Bracket)	66
SitePro1 STK-U Stiff Arm	66	BSAMNT-SBS-1-2 (Mount Bracket)	66
3 Sch 40 X 6' Mount Pipe	66	BSAMNT-SBS-1-2 (Mount Bracket)	66
3 Sch 40 X 6' Mount Pipe	66	samsung B5/B13 RRH	66
3 Sch 40 X 6' Mount Pipe	66	samsung B5/B13 RRH	66
(2) SBNHH-1D65B w/ Mount Pipe	66	samsung B5/B13 RRH	66
(2) SBNHH-1D65B w/ Mount Pipe	66	samsung B2/B66A RRH	66
(2) SBNHH-1D65B w/ Mount Pipe	66	samsung B2/B66A RRH	66
(2) LPA-80063/6CF w/ Mount Pipe	66	samsung B2/B66A RRH	66
(2) LPA-80080/6CF w/ Mount Pipe	66	8 ft standard	55

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

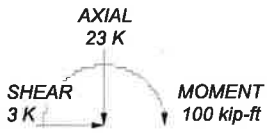
1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97.00 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.00 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.00 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 98.3%



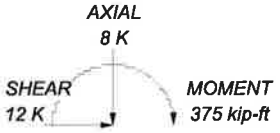
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 53 K
SHEAR: 7 K

UPLIFT: -47 K
SHEAR: 7 K



TORQUE 2 kip-ft
50.00 mph WIND - 0.75 in ICE



TORQUE 14 kip-ft
REACTIONS - 97.00 mph WIND

Paul J. Ford and Company
250 East Broad St., Suite 600
Columbus, OH 43215
Phone: (614) 221-6679
FAX:

Job:	*Existing 45 ft Rooftop SST / Meriden, CT*		
Project:	*42918-0029.002.8700*		
Client:	On Air Engineering, LLC	Drawn by: JMF	App'd:
Code:	TIA-222-G	Date: 01/31/19	Scale: N
Path:	G:\TOWER\429_On Air Engineering\2018\42918-0029 Meriden East\002_SAT\tnx\42918-0029.002.8700.eri		Dwg No.

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

By JMF Date 1/31/2019
Project # 42918-0029.002.8700

Foundation Reaction Comparison

Tower Manufacturer's Drawing Information		Reference File Information	
Manufacturer:	Rohn	Vendor:	Natcomm, Inc.
Drawing #:	-	Analysis #:	10001-CO13
Drawings Date:	-	Analysis Date:	4/20/2010

Reactions	Original Design	Modified Original Design*	Current Analysis	Ratio
Compression (kips)	50.9	**68.715**	53.0	77.1%
Tension (kips)	46.3	**62.505**	47.0	75.2%
Total Shear (kips)	10.7	**14.445**	12.0	83.1%
OTM (kip-ft)	356.3	**481.005**	375.0	78.0%

* The original tower design was completed in accordance with TIA/EIA-222-F standard. Per section 15.5.1 of the TIA-222-G standard, the reactions from the original design shall be multiplied by 1.35 for comparison to the reactions from this analysis.

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

1) Paul J. Ford and Company has not made a field inspection to verify the tower member sizes or the antenna/coax loading. If the existing conditions are not as represented on these drawings, we should be contacted immediately to evaluate the significance of the deviation.

2) No allowance was made for any damaged, missing, or rusted members. The analysis of this tower assumes that no physical deterioration has occurred in any of the structural components of the tower and that all the tower members have the same load carrying capacity as the day the tower was erected.

3) It is not possible to have all the detailed information to perform a thorough analysis of every structural sub-component of an existing tower. The structural analysis by Paul J. Ford and Company verifies the adequacy of the main structural members of the tower. Paul J. Ford and Company provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc.

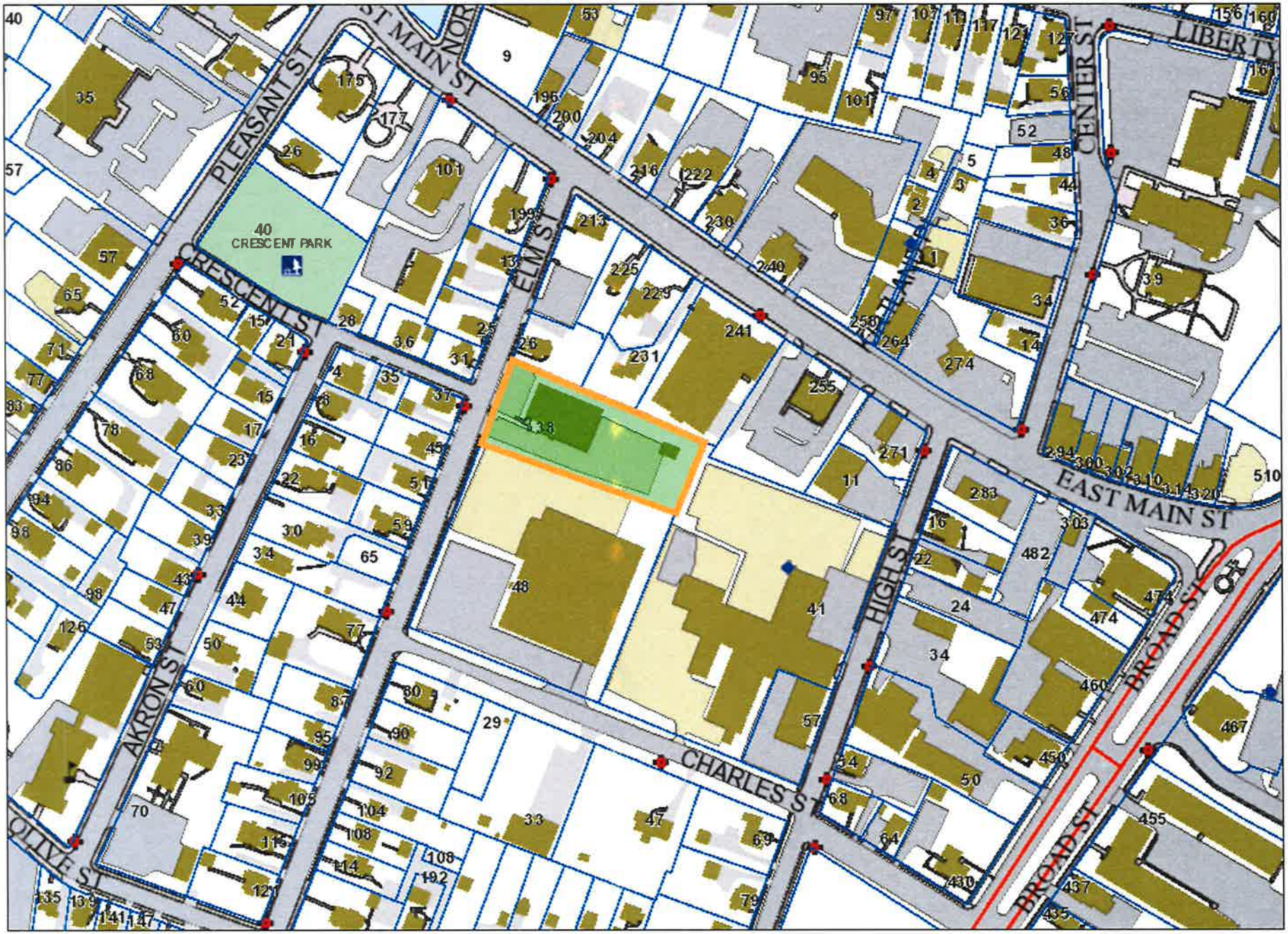
4) The structural integrity of the existing tower foundation can only be verified if exact foundation sizes are known. Paul J. Ford and Company will not accept any responsibility for the adequacy of the existing foundations unless the foundation sizes provided.

5) This tower has been analyzed according to the minimum design wind loads recommended by the Telecommunications Industry Association Standard ANSI/TIA-222-G. If the owner or local or state agencies require a higher design wind load, Paul J. Ford and Company should be made aware of this requirement.

6) The enclosed sketches are a schematic representation of the tower that we have analyzed. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions and for the proper fit and clearance in the field.

7) Miscellaneous items such as antenna mounts etc. have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

ATTACHMENT 4



CITY OF MERIDEN

Date: 1/24/2019

CITY OF MERIDEN, CT GIS

38 ELM ST

1 inch = 200 feet

CITY OF MERIDEN
GIS Services

Property Information: Address: 38 ELM ST Map/Lot: 0218-0111-0006-0000

Owner Information: ASHLEY HARRIMAN LLC Owner Address: 38 ELM ST
C/O TIM WALSH MERIDEN, CT 06450

Building Information:

Card	Units	Rooms	Bed rooms	Year Built	Full Bath	Half Bath	Other Fixtures	Fire Places	Heat Type	Heat Fuel	Roof Mat	Grade	Type	Ext Wall	Finished Area
1	1			1920					Conv	Oil		C-	Ind Mfg (L)		8,450

Sub Area Summary:

SubArea	Description	SketchedArea	Perimeter	AdjArea	Rate	AreaValue
AOL	OFFICE	1,345	164	1,345	61.22000	$82,347.13
AOL	OFFICE	1,345	164	1,345	61.22000	$82,347.13
MFG	MFG AREA	5,760	304	5,760	55.10000	$317,388.47

Special Features:

Description	Condition	Year	Assessed Value
PAVING ASPHALT	AV	1920	$33,300
CELL TOWER	AV	1920	$200,000
UTILITY BUILDING	AV	1920	$12,500

Appraisal Information: **Tax District:** 2 **District Name:** INNER DISTRICT **District Mill Rate:** 43.21

Current Values by Card Number

Card	Building Value	Yard Items	Land Value	Total	Assessed
1	$261,500	$245,800	$165,400	$672,700	$470,890
TOTAL PARCEL:					
	$261,500	**$245,800**	**$165,400**	**$672,700**	**$470,890**

Previous Year Totals

Year	Building Value	Yard Items	Land Value
2017	$261,500	$245,800	$165,400

Special Land Value: $0

Land Information:

Type	Lot Size	Lot Unit	Zoning*
Commercial Building	43,491.00	SF	M-2

Total Acreage:1.00

*Confirm zoning with Planning Office.
Zoning map is the official document to determine zone.

Sales Information:

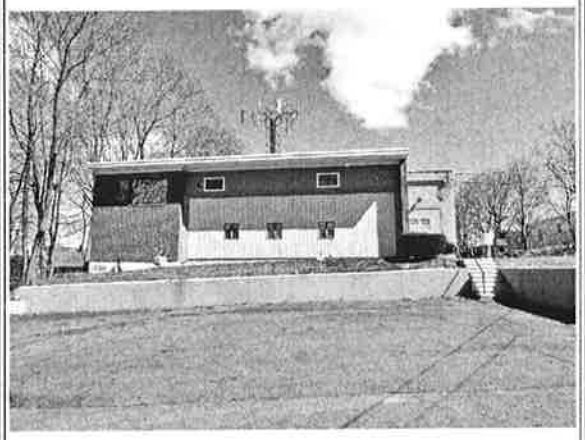
Book	Page	Grantor	Sale Date	Sale Price	Deed Type
2247	343		3/7/1997	$190,413	

Assessor's Permit History:

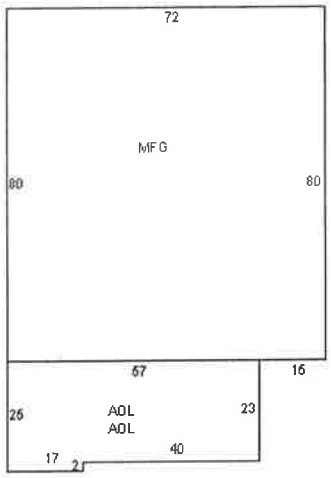
Date	Permit Number	Notes	Type
9/28/2017	M-17-298	INSTALLATION OF FM200 SYSTEM IN ONE ROOM 27X15,8X10FT.	
6/5/2017	E-17-318	NEW FIBER PIPE/CONDUIT FROM SHELTER TO STREET,NO CHANGE TO TOWER.6/29/17 APPROVED BY BLDG DEPT.	
4/21/2017	B-17-266	REPLACE 6 REMOTE RADIO HEADS TO CELL TOWER.	
12/3/2015	B-15-1017	REPLACE ANTENNAE PANELS/ADD REMOTE RADIO HEADS(6) ON EXISTING CELL TOWER.	
3/4/2013	530	VERIZON - SWAP 6 EXISTING ANTENNAE WITH NEW ONE. SWAP 6 DIPLEXERS WITH 6 RADIO HEADS AND 1 DISTRIBUTION BOX (TO BE LOCATED BEHIND ANTENNAE). ADD 1 CABLE TO EXISTING BUNDLE. 6/24/13 - SITE INSP - EST. COMPLETE - N/C	
7/20/2010	2105	CORRECT ELECTRICAL VIOLATIONS PER CODE.	
4/8/2010	872	Verizon - Remove 3 existing antennae and replace with 3 hte antennae per plans and to code.	C

Property Images

Building photo



Property Sketch



35500218-0111-0006-00001

ATTACHMENT 5

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103		3	neopost 02/12/2019 US POSTAGE $002.79 ZIP 06108 041L12203837
	Postmaster, per *(name of receiving employee)*	OLD STATE HOUSE STATION 06103 FEB 12 2019 USPS	

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Kevin Scarpati, Mayor City of Meriden 142 East Main Street Meriden, CT 06450				
2.	Renata Bertotti, Director of Development and Enforcement City of Meriden 142 East Main Street Meriden, CT 06450				
3.	Ashley Harriman LLC 38 Elm Street Meriden, CT 06450				
4.					
5.					
6.					

Meriden East

See Reverse for Instructions