Robinson+Cole

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Also admitted in Massachusetts

March 27, 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**
24 Rockdale Road, West Haven, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 146-foot level of the existing 180-foot tower at 24 Rockdale Road in West Haven, Connecticut (the "Property"). The tower is owned by Radio Communications Corporation. The Council approved Cellco's use of this tower in 1986. Cellco now intends to replace six (6) of its existing antennas with six (6) model JAHH-45B-R3B antennas, all at the 146-foot level on the tower. Cellco also intends to replace six (6) remote radio heads ("RRHs") with six (6) newer model RRHs located behind its antennas. Included in Attachment 1 are specifications for Cellco's replacement antennas and 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 West Haven Mayor, Nancy R. Rossi; Fred A. Messore, Commissioner, Department of Planning and Development; and Radio Communications Corporation, the owner of the tower and the Property.

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 new antennas and RRHs will be attached to its existing antenna platform at the 146-foot level of the tower.

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 installation of replacement antennas and RRHs will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included in Attachment 2.

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

6. 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 Property owner information is included in Attachment 4. A Certificate of Mailing verifying that this filing was sent to municipal officials and the Property owner 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:
Nancy R. Rossi, Mayor
Fred A. Messore, Commissioner, Department of Planning and Development
Radio Communications Corporation
Tim Parks

ATTACHMENT 1

JAHH-45B-R3B

8-port sector antenna, 2x 698–798, 2x 824-894 and 4x 1695–2360 MHz, 45° HPBW, low bands each have a RET and the high bands share a RET. Two internal SBTs.

- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- One RET for 700MHz, one RET for 850MHz, and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO
- Internal filter on low band and interleaved dipole technology providing for attractive, low wind load mechanical package
- Separate RS-485 RET input/output for low and high band
- Narrow beamwidth capacity antenna for higher level of densification and enhanced data throughput

Electrical Specifications

Frequency Band, MHz	**698–798**	**824–894**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain, dBi	16.5	17.2	19.4	20.2	20.5	21.1
Beamwidth, Horizontal, degrees	48	43	44	43	41	38
Beamwidth, Vertical, degrees	12.6	11.2	5.8	5.4	5.0	4.5
Beam Tilt, degrees	2–14	2–14	0–8	0–8	0–8	0–8
USLS (First Lobe), dB	16	21	18	18	18	18
Front-to-Back Ratio at 180°, dB	32	36	37	37	38	41
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	28	28	28	28
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	200	200	300	300	300	250
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

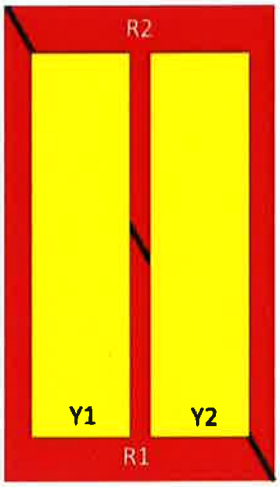
Electrical Specifications, BASTA*

Frequency Band, MHz	**698–798**	**824–894**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain by all Beam Tilts, average, dBi	16.3	17.0	19.1	19.9	20.2	20.9
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.3	±0.5	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	2 ° | 16.3 8 ° | 16.3 14 ° | 16.1	2 ° | 17.1 8 ° | 17.1 14 ° | 16.7	0 ° | 19.1 4 ° | 19.2 8 ° | 19.0	0 ° | 19.8 4 ° | 19.9 8 ° | 19.8	0 ° | 20.1 4 ° | 20.2 8 ° | 20.1	0 ° | 20.7 4 ° | 21.0 8 ° | 20.7
Beamwidth, Horizontal Tolerance, degrees	±1.1	±2.4	±2	±2.7	±2.9	±1.5
Beamwidth, Vertical Tolerance, degrees	±0.7	±0.6	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	16	21	17	17	17	17
Front-to-Back Total Power at 180° ± 30°, dB	23	24	29	31	33	34
CPR at Boresight, dB	25	26	20	21	20	20
CPR at Sector, dB	16	18	14	15	15	16

JAHH-45B-R3B

* 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.

Array Layout



Left Right
Bottom

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

Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-798	1-2	1	ANxxxxxxxxxxxxxxx1
R2	824-894	3-4	2	ANxxxxxxxxxxxxxxx2
Y1	1695-2360	5-6	3	ANxxxxxxxxxxxxxxx3
Y2	1695-2360	7-8		

Port Configuration

JAHH-45B-R3B

General Specifications

Operating Frequency Band	1695 – 2360 MHz | 698 – 798 MHz | 824 – 894 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage
Total Input Power, maximum	800 W @ 50 °C

Mechanical Specifications

RF Connector Quantity, total	8
RF Connector Quantity, low band	4
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Color	Light gray
Grounding Type	RF connector body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	1038.0 N @ 150 km/h 233.4 lbf @ 150 km/h
Wind Loading, lateral	234.0 N @ 150 km/h 52.6 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1829.0 mm | 72.0 in
Width	457.0 mm | 18.0 in
Depth	178.0 mm | 7.0 in
Net Weight, without mounting kit	41.5 kg | 91.5 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 5
Internal RET	High band (1) | Low band (2)
Power Consumption, idle state, maximum	1 W
Power Consumption, normal conditions, maximum	8 W
Protocol	3GPP/AISG 2.0 (Single RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male

JAHH-45B-R3B

RET Interface, quantity	2 female | 2 male

Packed Dimensions

Length	1970.0 mm | 77.6 in
Width	608.0 mm | 23.9 in
Depth	346.0 mm | 13.6 in
Shipping Weight	71.5 kg | 157.6 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
China RoHS SJ/T 11364-2014	Above Maximum Concentration Value (MCV)

Included Products

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

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

SAMSUNG

Dual-Band Radio Unit
700/850MHz (B13/B5)
RFV01U-D2A

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

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

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

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

Features and Benefits

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

Key Technical Specifications

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

SAMSUNG

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

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

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

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

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

Features and Benefits

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

Key Technical Specifications

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

ATTACHMENT 2

	General	Power	Density					
Site Name: West Haven								
Tower Height: 180Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**` FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Antenna 1	1	500	199	451.175	0.0048	0.3008	0.16%	
*Antenna 2	1	500	199	451.975	0.0048	0.3013	0.16%	
*Antenna 3	1	500	199	452.275	0.0048	0.3015	0.16%	
*Antenna 4	1	500	199	452.8	0.0048	0.3019	0.16%	
*Antenna 5	1	500	199	461.075	0.0048	0.3074	0.16%	
*Antenna 6	1	500	199	462.475	0.0048	0.3083	0.16%	
*Antenna 7	1	500	199	463.5	0.0048	0.3090	0.16%	
*Antenna 8	1	500	199	463.875	0.0048	0.3093	0.16%	
*Antenna 9	1	500	199	464.7	0.0048	0.3098	0.16%	
*Antenna 10	1	500	199	452.975	0.0048	0.3020	0.16%	
*Antenna 11	1	500	199	462.05	0.0048	0.3080	0.16%	
*Antenna 12	1	500	199	459.075	0.0048	0.3061	0.16%	
*Antenna 13	1	1400	199	454.075	0.0135	0.3027	0.45%	
*Antenna 14	1	3500	199	929.6625	0.0338	0.6198	0.55%	
*Antenna 15	1	3500	199	929.7625	0.0338	0.6198	0.55%	
*Antenna 16	1	3500	199	929.7125	0.0338	0.6198	0.55%	
*Antenna 17	1	3500	199	940.225	0.0338	0.6268	0.54%	
*Antenna 18	1	1500	102	940	0.0585	0.6267	0.93%	
*Antenna 19	1	500	199	162	0.0048	0.2000	0.24%	
*Antenna 20	1	500	175	13600	0.0063	1.0000	0.06%	
*TV Ch. 28	1	3500	178	554	0.0425	0.3693	1.15%	
*T-Mobile	4	2334	135	2100	0.2018	1.0000	2.02%	
*T-Mobile	2	2334	135	1900	0.1009	1.0000	1.01%	
*T-Mobile	2	1102	135	2100	0.0476	1.0000	0.48%	
*T-Mobile	2	1028	135	1900	0.0444	1.0000	0.44%	
*T-Mobile	2	620	135	600	0.0268	0.4000	0.67%	
*T-Mobile	2	679	135	700	0.0293	0.4667	0.63%	
Verizon PCS	**1**	**4245**	**146**	**0.0716**	**1970**	**1.0000**	**7.16%**	
Verizon Cellular	**3**	**397**	**146**	**0.0201**	**869**	**0.5793**	**3.47%**	
Verizon 850 LTE	**1**	**2268**	**146**	**0.0383**	**876**	**0.5840**	**6.55%**	
Verizon AWS	**1**	**5189**	**146**	**0.0875**	**2145**	**1.0000**	**8.75%**	
Verizon 700	**1**	**1996**	**146**	**0.0337**	**746**	**0.4973**	**6.77%**	
								44.86%
* Source: Siting Council								

ATTACHMENT 3

STRUCTURAL ANALYSIS REPORT

For

verizon

Verizon Wireless
99 E. River Dr.
9th Floor
East Hartford, CT 06108

West Haven
KM No. 120514.08

180' Self Support Tower
24 Rockdale Road
West Haven, CT 06516

Prepared By:

KM CONSULTING ENGINEERS, INC.
262 Upper Ferry Rd, Ewing, NJ 08628
Ph: (609) 538-0400 www.kmengr.com

November 15, 2018

Prepared to ANSI/TIA-222-G-4 December 2014
Structural Standards for Antenna Supporting
Structures and Antennas

Verizon Wireless
West Haven

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

Structure

Tower Manager: Radio Communications, Inc.

Location: 24 Rockdale Road
West Haven, CT 06516
41.291205, -72.967881

Manufacturer: Rohn

Equipment

Existing tower inventory plus the proposed installation are detailed in Section 2.0 "Tower Inventory."

Synopsis

Load Case No. 1: The existing tower superstructure with the current inventory and proposed Verizon installation.

The tower superstructure has sufficient capacity and therefore meets the current TIA standards. The tower superstructure is rated at 82.5% and the base foundation is rated at 55.5%.

2.0 TOWER INVENTORY

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
20' Dipole	191	HTTA box (Verizon)	144.5
10' Whip	183.5	BXA-171063-8BF (Verizon)	144.5
10' Dipole	183	BXA-171063-8BF (Verizon)	144.5
10' Whip	182.5	BXA-171063-8BF (Verizon)	144.5
6' Yagi	182	BXA-80063-6BF (Verizon)	144.5
PG1N0F-0090-310	182	BXA-80063-6BF (Verizon)	144.5
16' Whip	182	Stand-Off T-Frame (Verizon)	143.5
6' Yagi	182	Stand-Off T-Frame (Verizon)	143.5
21' Whip	182	Stand-Off T-Frame (Verizon)	143.5
21' Whip	181.5	AIR 3246 B66 (T-Mobile)	135
21' Whip	181.5	AIR 3246 B66 (T-Mobile)	135
20' Dipole	181.5	AIR 3246 B66 (T-Mobile)	135
14' Inverted Whip	180 - 166	APXVAARR24 43-U-NA20 (T-Mobile)	135
Top Platform	180	APXVAARR24 43-U-NA20 (T-Mobile)	135
10' Inverted Whip	180 - 170	APXVAARR24 43-U-NA20 (T-Mobile)	135
TMA	180	Radio 4449 B71 B12 (T-Mobile)	135
TMA	180	Radio 4449 B71 B12 (T-Mobile)	135
(2) Scala Panels	175.5	Radio 4449 B71 B12 (T-Mobile)	135
(2) Raycap (Verizon)	148.5	Radio 2217 B2 (T-Mobile)	135
(2) JAHH-45B-R3B (Verizon)	146	Radio 2217 B2 (T-Mobile)	135
(2) JAHH-45B-R3B (Verizon)	146	Radio 2217 B2 (T-Mobile)	135
(2) JAHH-45B-R3B (Verizon)	146	Stand-Off T-Frame (T-Mobile)	135
BSAMNT-SBS-2-2 (Verizon)	146	Stand-Off T-Frame (T-Mobile)	135
BSAMNT-SBS-2-2 (Verizon)	146	AIR32 B66Aa/B2a (T-Mobile)	135
BSAMNT-SBS-2-2 (Verizon)	146	TMA (T-Mobile)	135
B5/B13 Dual Band RRH (Verizon)	146	TMA (T-Mobile)	135
B5/B13 Dual Band RRH (Verizon)	146	AIR32 B66Aa/B2a (T-Mobile)	135
B5/B13 Dual Band RRH (Verizon)	146	AIR32 B66Aa/B2a (T-Mobile)	135
B2/B66a Dual Band RRH (Verizon)	146	Stand-Off T-Frame (T-Mobile)	135
B2/B66a Dual Band RRH (Verizon)	146	TMA (T-Mobile)	135
B2/B66a Dual Band RRH (Verizon)	146	IBR1300	125
FDJ85020Q7-S1 diplexer (Verizon)	146	Empty Mount	103
FDJ85020Q7-S1 diplexer (Verizon)	146	2' yagi	102.5
FDJ85020Q7-S1 diplexer (Verizon)	146	GPS	59.5
BXA-80063-6BF (Verizon)	144.5	(2) GPS	18
HTTA box (Verizon)	144.5	(2) GPS	17.67

Proposed Verizon Loading:

Addition of:

*(6) JAHH-45B-R3B panel antennas @ 146' AGL
*(3) B5/B13 RRH-BR04C @ 146' AGL
*(3) B2/B66A RRH-BR049 @ 146' AGL
*(3) FDJ85020Q7-S1 diplexers @ 146' AGL
*(3) BSAMNT-SBS-2-2 mounts @ 146' AGL

Removal of:

*(3) BXA-171063-8BF panel antennas @ 144.5' AGL
*(2) BXA-70040-6CF panel antennas @ 144.5' AGL
*(1) BXA-70063-6CF panel antenna @ 144.5' AGL
*(3) RH 2x40-AWS RRU's @ 144.5' AGL

3.0 COMMENTARY

Our scope of work is to determine if the existing structure is capable of withstanding the additional stresses/forces imposed by the installation of the proposed Verizon equipment noted in the tower inventory.

Tower structure information and foundation information was obtained from previous structural analyses by KMCE. The tower has been reinforced as per KMCE drawings in November 1997, July 2002, January 2009, August 2012, and December 2014. The existing tower inventory was determined from a tower climb and mapping completed on February 16, 2015. The proposed loading was obtained from an RFDS dated July 3, 2018 and from correspondence with Verizon.

The following report will provide analytical calculations and commentary regarding the capacity of the proposed tower and subsequent recommendations.

4.0 ANALYSIS PROCEDURE

KM Consulting Engineers, Inc. carried out their structural analysis by correlating field inspection and tower member data into proprietary software designed specifically for communication tower analysis.

These programs run in conjunction with the guidelines set down in the ANSI/TIA-222-G Standard entitled "Structural Standards for Antenna Supporting Structures and Antennas."

The existing tower is analyzed by placing wind forces on the structure in 30° positional increments around the tower (i.e. wind pressure directly onto the tower corners, faces and parallel to the faces). This enables the user to "create" a three-dimensional representation, yielding results for worst case scenarios. In effect, the production of these results allows the user to study the structural integrity of the tower when influenced by wind forces from any direction.

The proceeding report includes analysis for the tower with the addition of antennas in the scenarios stated. For clarity, the analysis shall include worst case loadings and a typical elevation view with maximum foundation loads tabulated.

Should the client require to be furnished with a full copy of our analysis, we will gladly do so (approximately 80 pages).

Codes and Standards

ACI - American Concrete Institute - *Building Code Requirements for Structural Concrete (ACI 318-011)*, 2011

AISC - American Institute of Steel Construction - *Manual of Steel Construction, Allowable Stress Design, 14th edition*, 2011

TIA - Telecommunications Industry Association - *ANSI/TIA-222-G-4 Structural Standards for Antenna Supporting Structures and Antennas*, 2014

CSBC - Connecticut State Building Code 2018

ASCE - *Minimum Design Loads for Buildings and Other Structures (ASCE/SEI 7)*

5.0 TOWER ANALYSIS RESULTS

The tower was analyzed for the inventory detailed in Section 2.0 "Tower Inventory".

The basic wind speed of 97 MPH with no radial ice is in accordance with ANSI/TIA-222-G is taken from Appendix N in the 2018 Connecticut State Building Code for the nominal design wind speed for the municipality of West Haven, CT. The basic wind speed of 50 MPH concurrent with ¾" design ice thickness is taken from the ANSI/TIA-222-G listing applicable for New Haven County, CT. Additional criteria include Structure Class II, Exposure Category B, and Topographic Category 1.

All allowable capacities have been calculated to comply with the permitted EIA allowable increases (for wind). All bolts loaded in shear assume the threads **are included** in the shear plane.

Load Case No. 1: Proposed Verizon addition of (6) JAHH-45B-R3B panel antennas, (3) B5/B13 RRH-BR04C, (3) B2/B66A RRH-BR049, (3) FDJ85020Q7-S1 diplexers, and (3) BSAMNT-SBS-2-2 mounts, and the removal of (3) BXA-171063-8BF panel antennas, (2) BXA-70040-6CF panel antennas, (1) BXA-70063-6CF panel antenna, and (3) RH 2x40-AWS RRU's.

The tower superstructure has sufficient capacity and therefore meets the current TIA standards. The tower superstructure is rated at 82.5% and the base foundation is rated at 55.5%.

Foundation Capacity		
Actual Uplift	Allowable Uplift	% Use
213.2 kips	384 kips	55.5%

6.0 RECOMMENDATIONS

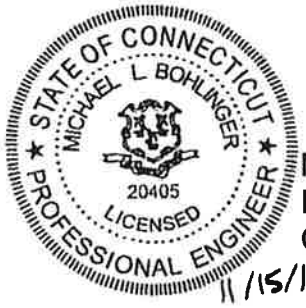
Further to our calculations, we conclude that the tower superstructure has adequate capacity and therefore meets the current ANSI/TIA-222-G design standards. The tower is acceptable to support the proposed Verizon Wireless installation.

Please do not hesitate to contact our office with any questions or concerns regarding this report.

Sincerely,
KM CONSULTING ENGINEERS, INC

Domenic Aversa, PE
Project Manager

Reviewed and Approved by:

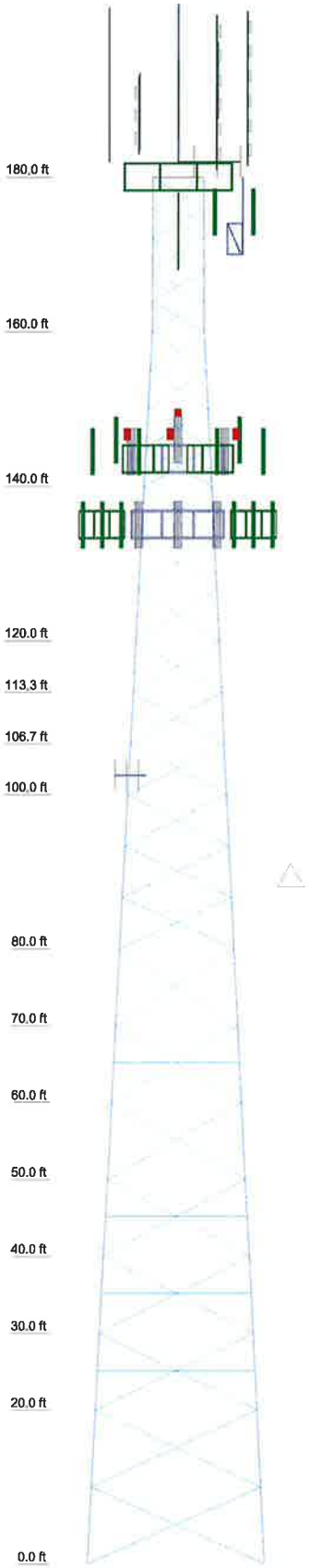


11/15/18

Michael L. Bohlinger, PE
Principal
CT License No. 20405

7.0 APPENDIX

LOAD CASE 1



Description	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Sec. Horizontals	Face Width (ft)	# Panels @ (ft)	Weight (lb)
T1	ROHN 2 STD (GR)		L1 1/2x1 1/2x1/8		L3x3x1/4		6.5	5 @ 4	898.2
T2	A		L1 3/4x1 3/4x1/8				6.6	4 @ 5	890.1
T3	B		G			N.A.	8.625		1636.6
T4	C		H				10.65		537.1
T5							11.325	9 @ 6.66667	547.6
T6							12		712.7
T7	D	A572-50	L3x3x1/4	A572-50	N.A.		12.675		2696.0
T8	E						14.7		1378.2
T9						J	15.7125		1780.1
T10	ROHN 5 X-STR (GR) w/ 5/8" Cable		L3 1/2x3 1/2x1/4			N.A.	16.725		1961.2
T11							17.7375	8 @ 10	1806.1
T12			I			L3 1/2x3 1/2x1/4	18.75		2159.1
T13							19.7625		2216.3
T14	F		4x4x1/4 w/ sch 40			N.A.	20.775		6783.7
							22.8		28620.1

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
20' Dipole	191	HTTA box (Verizon)	144.5
10' Whip	183.5	BXA-171063-8BF (Verizon)	144.5
10' Dipole	183	BXA-171063-8BF (Verizon)	144.5
10' Whip	182.5	BXA-171063-8BF (Verizon)	144.5
6' Yagi	182	BXA-80063-6BF (Verizon)	144.5
PG1N0F-0090-310	182	BXA-80063-6BF (Verizon)	144.5
16' Whip	182	Stand-Off T-Frame (Verizon)	143.5
6' Yagi	182	Stand-Off T-Frame (Verizon)	143.5
21' Whip	182	Stand-Off T-Frame (Verizon)	143.5
21' Whip	181.5	AIR 3246 B66 (T-Mobile)	135
21' Whip	181.5	AIR 3246 B66 (T-Mobile)	135
20' Dipole	181.5	AIR 3246 B66 (T-Mobile)	135
14' Inverted Whip	180 - 166	APXVAARR24 43-U-NA20 (T-Mobile)	135
Top Platform	180	APXVAARR24 43-U-NA20 (T-Mobile)	135
10' Inverted Whip	180 - 170	APXVAARR24 43-U-NA20 (T-Mobile)	135
TMA	180	Radio 4449 B71 B12 (T-Mobile)	135
TMA	180	Radio 4449 B71 B12 (T-Mobile)	135
(2) Scala Panels	175.5	Radio 4449 B71 B12 (T-Mobile)	135
(2) Raycap (Verizon)	148.5	Radio 2217 B2 (T-Mobile)	135
(2) JAHH-45B-R3B (Verizon)	146	Radio 2217 B2 (T-Mobile)	135
(2) JAHH-45B-R3B (Verizon)	146	Radio 2217 B2 (T-Mobile)	135
(2) JAHH-45B-R3B (Verizon)	146	Stand-Off T-Frame (T-Mobile)	135
BSAMNT-SBS-2-2 (Verizon)	146	Stand-Off T-Frame (T-Mobile)	135
BSAMNT-SBS-2-2 (Verizon)	146	AIR32 B66Aa/B2a (T-Mobile)	135
BSAMNT-SBS-2-2 (Verizon)	146	TMA (T-Mobile)	135
B5/B13 Dual Band RRH (Verizon)	146	TMA (T-Mobile)	135
B5/B13 Dual Band RRH (Verizon)	146	AIR32 B66Aa/B2a (T-Mobile)	135
B5/B13 Dual Band RRH (Verizon)	146	AIR32 B66Aa/B2a (T-Mobile)	135
B2/B66a Dual Band RRH (Verizon)	146	Stand-Off T-Frame (T-Mobile)	135
B2/B66a Dual Band RRH (Verizon)	146	TMA (T-Mobile)	135
B2/B66a Dual Band RRH (Verizon)	146	IBR1300	125
FDJ85020Q7-S1 diplexer (Verizon)	146	Empty Mount	103
FDJ85020Q7-S1 diplexer (Verizon)	146	2' yagi	102.5
FDJ85020Q7-S1 diplexer (Verizon)	146	GPS	59.5
BXA-80063-6BF (Verizon)	144.5	(2) GPS	18
HTTA box (Verizon)	144.5	(2) GPS	17.67

SYMBOL LIST

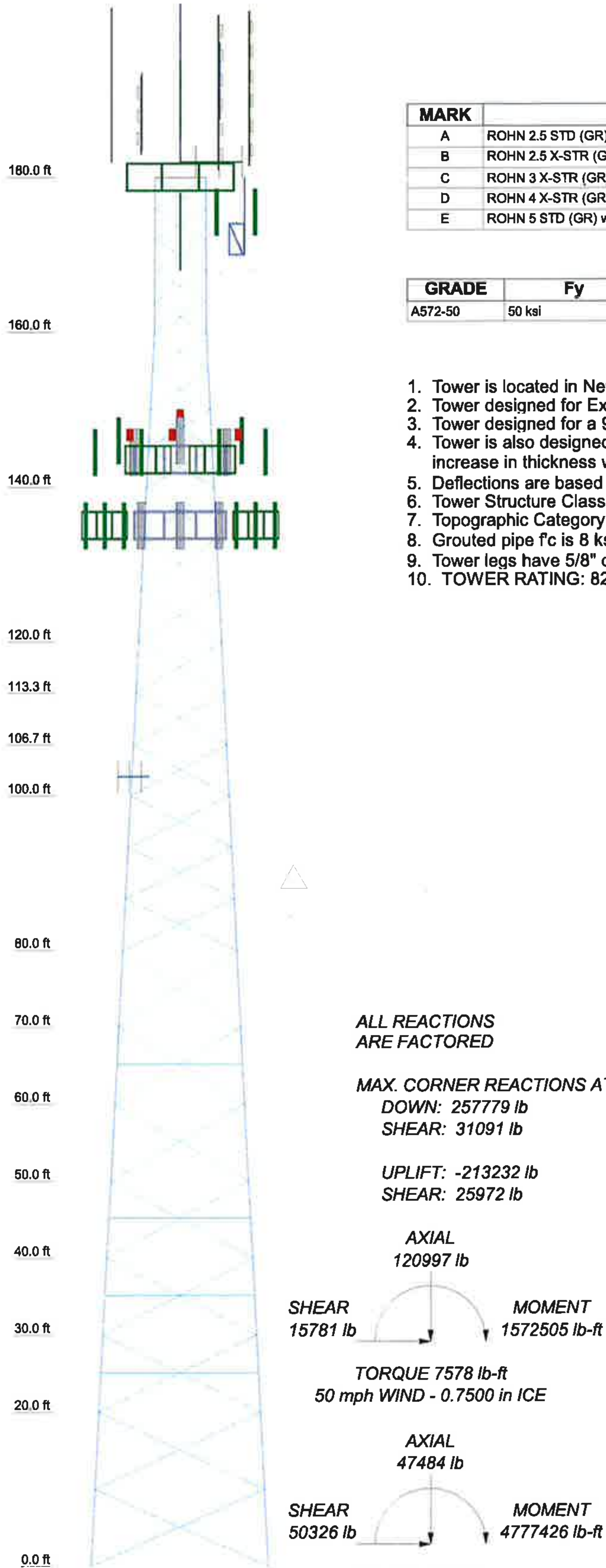
MARK	SIZE	MARK	SIZE
A	ROHN 2.5 STD (GR) w/ 5/8" Cable	F	ROHN 6 EH (GR) w/ 5/8" Cable (GR)
B	ROHN 2.5 X-STR (GR) w/ 5/8" Cable	G	L2x2x1/8 w/1.5" sch 40 pipe
C	ROHN 3 X-STR (GR) w/ 5/8" Cable	H	L2 1/2x2 1/2x3/16
D	ROHN 4 X-STR (GR) w/ 5/8" Cable	I	L3.5x3.5x1/4 w/ 2x1/4 plate
E	ROHN 5 STD (GR) w/ 5/8" Cable	J	L3 1/2x3 1/2x1/4

MATERIAL STRENGTH

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

KM Consulting Engineers, Inc.
262 Upper Ferry Road
Ewing, NJ 08628
Phone: (609) 538-0400
FAX:
Consulting Engineers

Job: West Haven LC1
Project: 180 ft. Self Support Tower
Client: Verizon Wireless | Drawn by: DCA | App'd:
Code: TIA-222-G | Date: 11/08/18 | Scale: N
Path: K:\Verizon\West Haven\Engineering\West Haven LC1.eri | Dwg No.



Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Sec. Horizontals	Face Width (ft)	# Panels @ (ft)	Weight (lb)
T1	ROHN 2 STD (GR)		L1 1/2x1 1/2x1/8		L3x3x1/4		6.5	5 @ 4	808.2
T2	A		L1 3/4x1 3/4x1/8				6.6	4 @ 5	890.1
T3	B		G			N.A.	8.625		1835.8
T4			H				10.65		537.1
T5	C						11.325	9 @ 6.66667	547.8
T6							12		712.7
T7	D	A572-50	L3x3x1/4	A572-50	N.A.		12.675		2896.0
T8							14.7		1378.2
T9	E					J	15.7125		1760.1
T10			L3 1/2x3 1/2x1/4			N.A.	16.725		1561.2
T11	ROHN 5 X-STR (GR) w/ 5/8" Cable						17.7375		1808.1
T12			I			L3 1/2x3 1/2x1/4	18.75	8 @ 10	2159.1
T13							19.7625		2218.3
T14	F		4x4x1/4 w/ sch 40			N.A.	20.775		9783.7
							22.8		28620.1

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	ROHN 2.5 STD (GR) w/ 5/8" Cable	F	ROHN 6 EH (GR) w/ 5/8" Cable (GR)
B	ROHN 2.5 X-STR (GR) w/ 5/8" Cable	G	L2x2x1/8 w/1.5" sch 40 pipe
C	ROHN 3 X-STR (GR) w/ 5/8" Cable	H	L2 1/2x2 1/2x3/16
D	ROHN 4 X-STR (GR) w/ 5/8" Cable	I	L3.5x3.5x1/4 w/ 2x1/4 plate
E	ROHN 5 STD (GR) w/ 5/8" Cable	J	L3 1/2x3 1/2x1/4

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. Grouted pipe f'c is 8 ksi
9. Tower legs have 5/8" diameter stainless steel cable(40K tension) in grouted leg.
10. TOWER RATING: 82.5%

ALL REACTIONS
ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 257779 lb
SHEAR: 31091 lb

UPLIFT: -213232 lb
SHEAR: 25972 lb

AXIAL 120997 lb
SHEAR 15781 lb
MOMENT 1572505 lb-ft
TORQUE 7578 lb-ft
50 mph WIND - 0.7500 in ICE

AXIAL 47484 lb
SHEAR 50326 lb
MOMENT 4777426 lb-ft
TORQUE 4553 lb-ft
REACTIONS - 97 mph WIND

KM Consulting Engineers, Inc.
Consulting Engineers
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Ewing, NJ 08628
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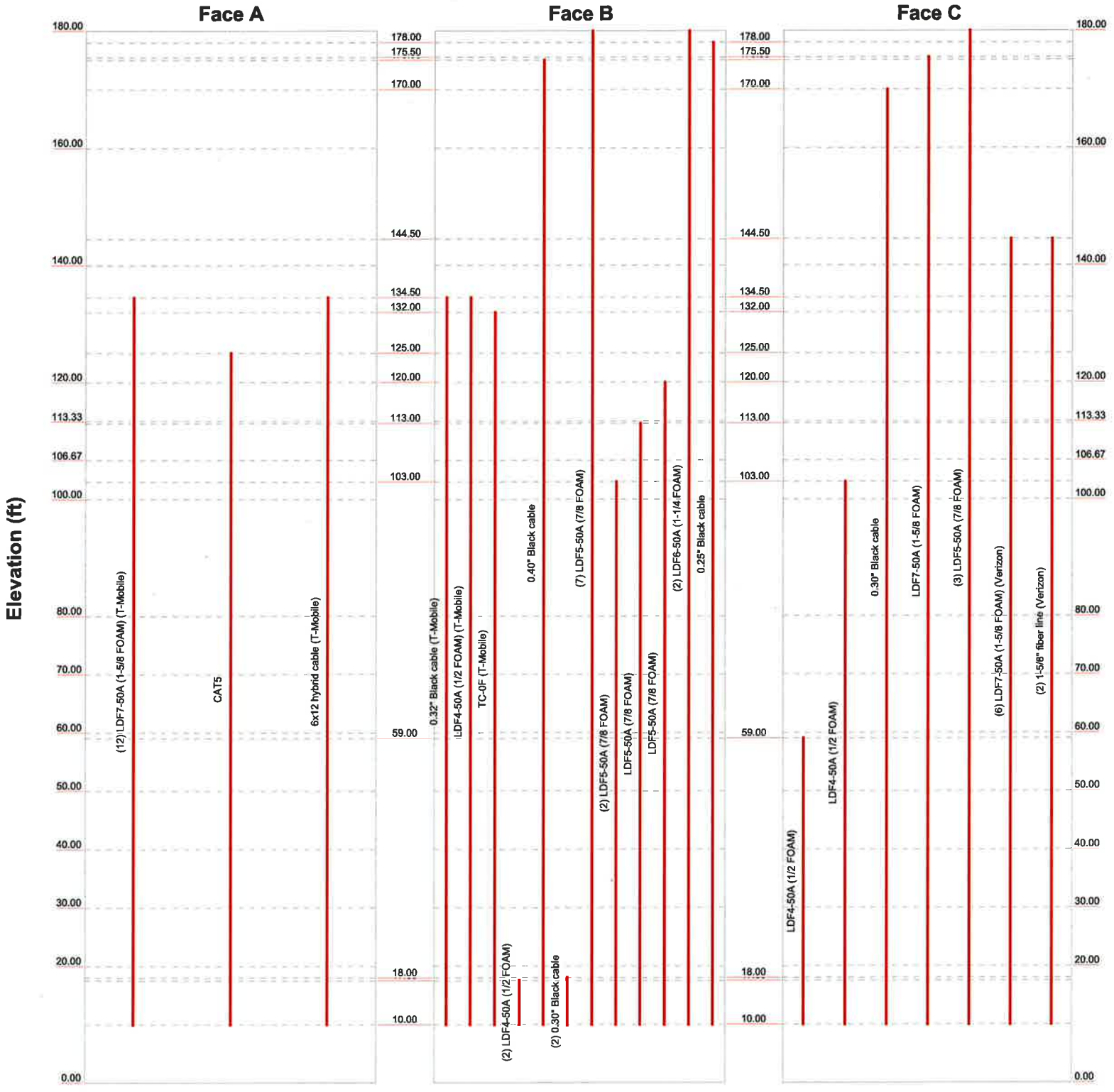
FAX:

Job: **West Haven LC1**			
Project: **180 ft. Self Support Tower**			
Client: Verizon Wireless	Drawn by: DCA	App'd:	
Code: TIA-222-G	Date: 11/08/18	Scale: N	
Path: K:\Verizon\West Haven\Engineering\West Haven LC1.eri		Dwg No.	

0' - 180'

Round | Flat | App In Face | App Out Face | Truss Leg



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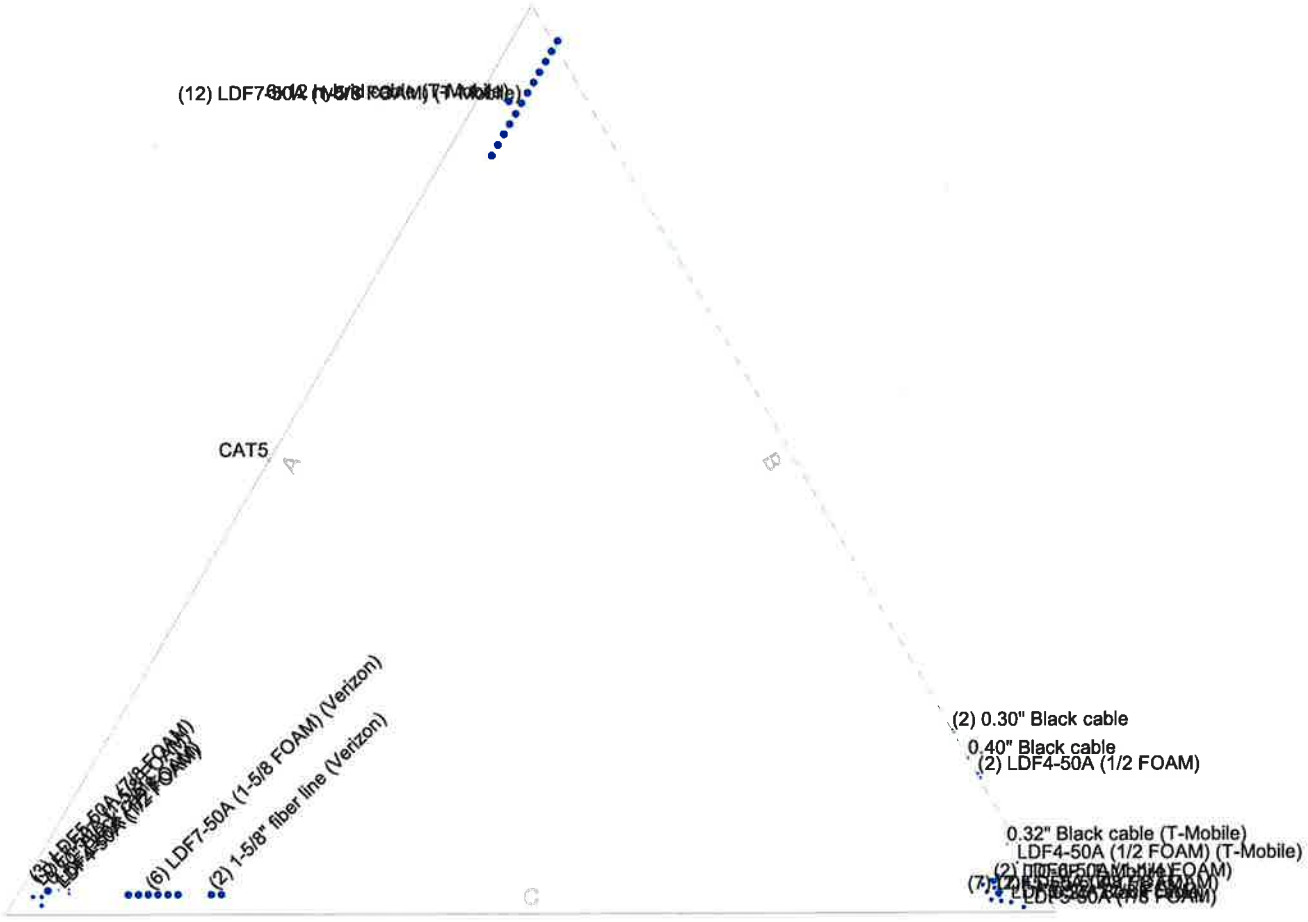
Round Flat App In Face App Out Face



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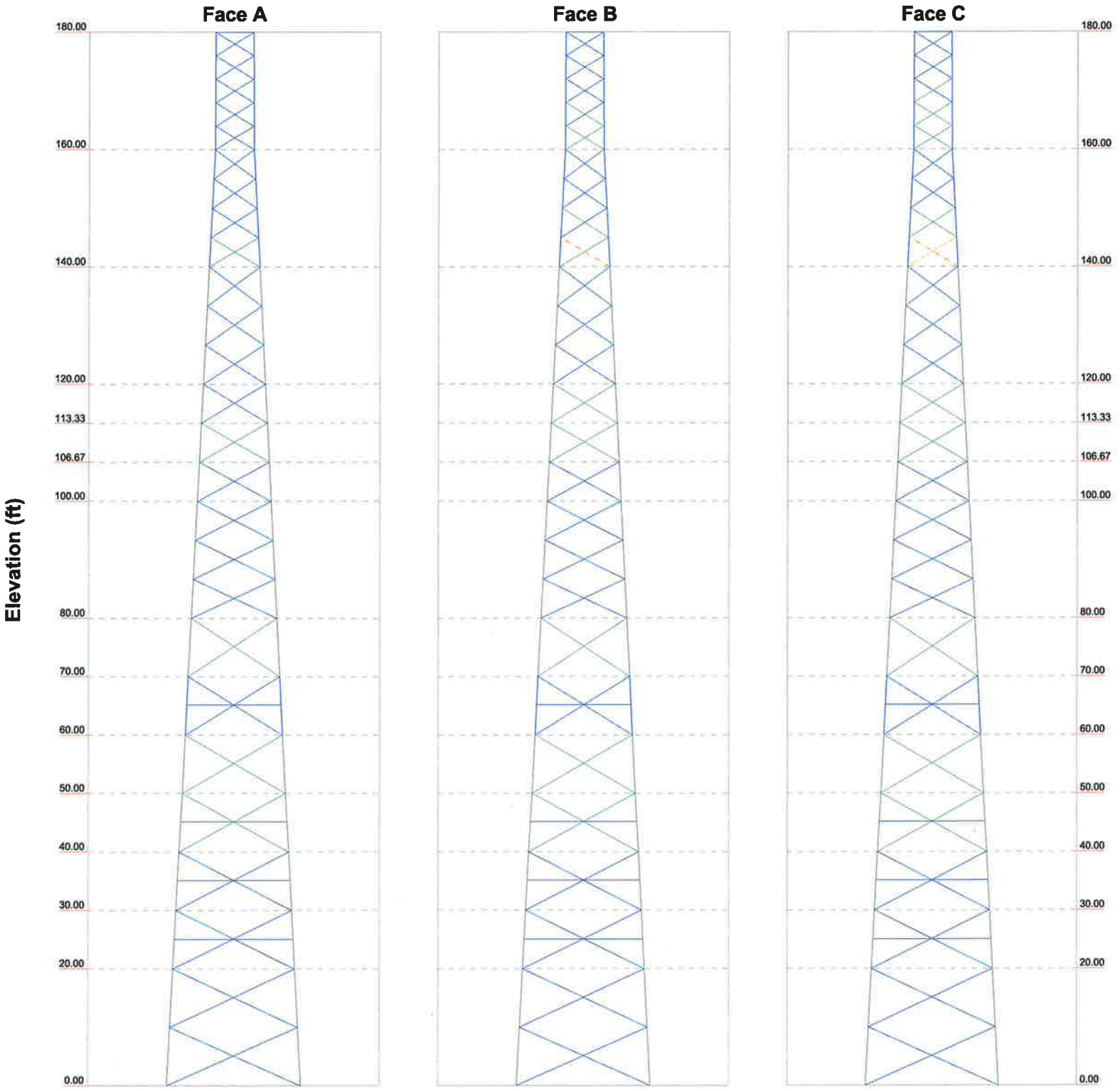
Path:	K:\Verizon\West Haven\Engineering\West Haven LC1.eri		Dwg No.

0' - 180'

> 100% | 90%-100% | 75%-90% | 50%-75% | < 50% Overstress



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Code:	TIA-222-G	Date: 11/08/18	Scale: N
Path:	K:\Verizon\West Haven\Engineering\West Haven LC1.eri		Dwg No.

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	180 - 160	Leg	ROHN 2 STD (GR)	2	-16513.60	47357.40	34.9	Pass
		Diagonal	L1 1/2x1 1/2x1/8	7	-2572.94	4237.09	60.7	Pass
		Top Girt	L3x3x1/4	4	-348.39	20560.00	1.7	Pass
T2	160 - 140	Leg	ROHN 2.5 STD (GR) w/ 5/8" Cable	38	-33214.40	85040.70	39.1	Pass
		Diagonal	L1 3/4x1 3/4x1/8	40	-3453.09	4183.54	82.5	Pass
T3	140 - 120	Leg	ROHN 2.5 X-STR (GR) w/ 5/8" Cable	65	-59637.10	89416.30	66.7	Pass
		Diagonal	L2x2x1/8 w/1.5" sch 40 pipe	67	-5310.84	10828.00	49.0	Pass
T4	120 - 113.333	Leg	ROHN 3 X-STR (GR) w/ 5/8" Cable	86	-69027.10	124199.00	55.6	Pass
		Diagonal	L2 1/2x2 1/2x3/16	88	-5469.44	10126.70	54.0	Pass
T5	113.333 - 106.667	Leg	ROHN 3 X-STR (GR) w/ 5/8" Cable	95	-78878.90	124199.00	63.5	Pass
		Diagonal	L2 1/2x2 1/2x3/16	97	-5707.23	9436.58	60.5	Pass
T6	106.667 - 100	Leg	ROHN 3 X-STR (GR) w/ 5/8" Cable	104	-88542.20	124199.00	71.3	Pass
		Diagonal	L3x3x1/4	106	-6049.73	18704.30	32.3 38.0 (b)	Pass
T7	100 - 80	Leg	ROHN 4 X-STR (GR) w/ 5/8" Cable	113	-119731.00	225464.00	53.1	Pass
		Diagonal	L3x3x1/4	115	-6851.01	15584.40	44.0	Pass
T8	80 - 70	Leg	ROHN 5 STD (GR) w/ 5/8" Cable	134	-132714.00	253652.00	52.3	Pass
		Diagonal	L3x3x1/4	136	-7961.16	12316.40	64.6	Pass
T9	70 - 60	Leg	ROHN 5 STD (GR) w/ 5/8" Cable	143	-148772.00	335317.00	44.4	Pass
		Diagonal	L3 1/2x3 1/2x1/4	145	-8503.51	17388.70	48.9	Pass
		Secondary Horizontal	L3 1/2x3 1/2x1/4	151	-2580.10	16359.70	15.8	Pass
T10	60 - 50	Leg	ROHN 5 X-STR (GR) w/ 5/8" Cable	155	-165414.00	262883.00	62.9	Pass
		Diagonal	L3 1/2x3 1/2x1/4	157	-8681.89	16180.50	53.7	Pass
T11	50 - 40	Leg	ROHN 5 X-STR (GR) w/ 5/8" Cable	164	-181428.00	347755.00	52.2	Pass
		Diagonal	L3 1/2x3 1/2x1/4	167	-9409.10	15078.40	62.4	Pass
		Secondary Horizontal	L3 1/2x3 1/2x1/4	172	-3146.45	13774.00	22.8	Pass
T12	40 - 30	Leg	ROHN 5 X-STR (GR) w/ 5/8" Cable	176	-198299.00	347854.00	57.0	Pass
		Diagonal	L3.5x3.5x1/4 w/ 2x1/4 plate	179	-9649.46	34444.50	28.0 38.8 (b)	Pass
		Secondary Horizontal	L3 1/2x3 1/2x1/4	184	-3439.03	12705.40	27.1	Pass
T13	30 - 20	Leg	ROHN 5 X-STR (GR) w/ 5/8" Cable	188	-214726.00	347943.00	61.7	Pass
		Diagonal	L3.5x3.5x1/4 w/ 2x1/4 plate	191	-10096.20	31753.50	31.8 40.6 (b)	Pass
		Secondary Horizontal	L3 1/2x3 1/2x1/4	197	-3723.92	11756.50	31.7	Pass
T14	20 - 0	Leg	ROHN 6 EH (GR) w/ 5/8" Cable (GR)	200	-249448.00	397313.00	62.8	Pass
		Diagonal	4x4x1/4 w/ sch 40	204	-10629.50	77127.90	13.8 21.4 (b)	Pass
						Summary		
						Leg (T6)	71.3	Pass
						Diagonal (T2)	82.5	Pass
						Secondary Horizontal (T13)	31.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
						Top Girt (T1)	1.7	Pass
						Bolt Checks	43.1	Pass
						RATING =	**82.5**	**Pass**

Program Version 8.0.4.0 - 8/15/2018 File:K:/Verizon/West Haven/Engineering/West Haven LC1.eri

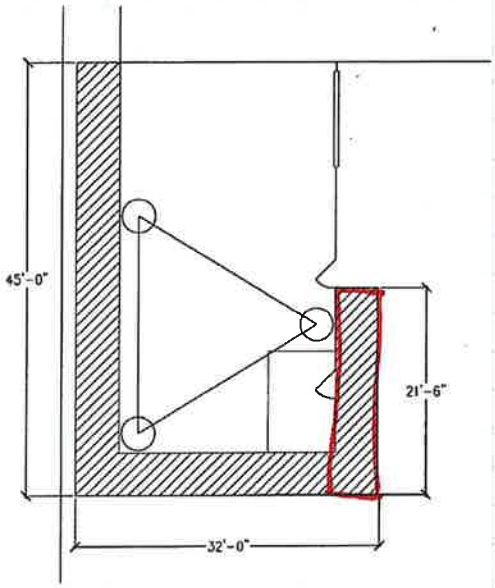
KM Consulting Engineers, Inc.
262 Upper Ferry Road
Ewing, NJ 08628

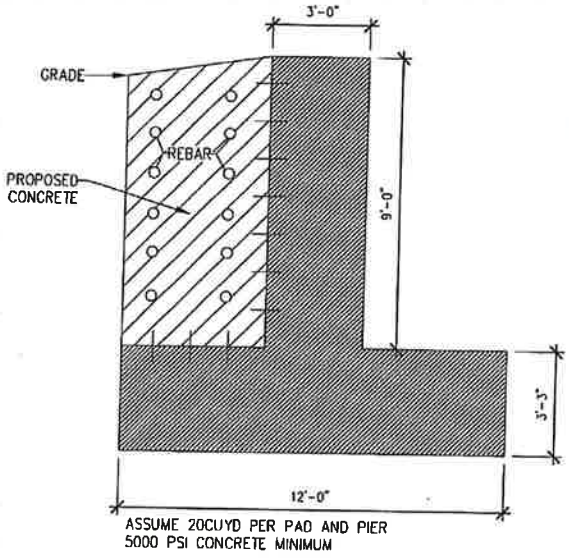
Tel.: (609) 538-0400
www.kmengr.com
Email: info@kmengr.com

Foundation Calculations

Allowable uplift prior to reinforcement: 467.96 k
Actual uplift from analysis: $Actual := 305.55\ k$

Proposed Reinforcement:





Assume section marked in red as minimum supporting max corner reaction

$Volume := 21.5 \cdot 4.5 \cdot 9 = 870.75\ ft^3\ concrete$

$Weight := 50\ \frac{lb}{ft^3}$ (150 lb/ft^3 concrete - 100 lb/ft^3 soil)

$Resistance := \frac{Volume \cdot Weight}{1000} = 43.54\ k$

$Total := Resistance + 467.96 = 511.5\ k$

$\phi := 0.75$

$Allow := Total \cdot \phi = 383.623$

$\frac{Actual}{Allow} = 0.796$ **OK**

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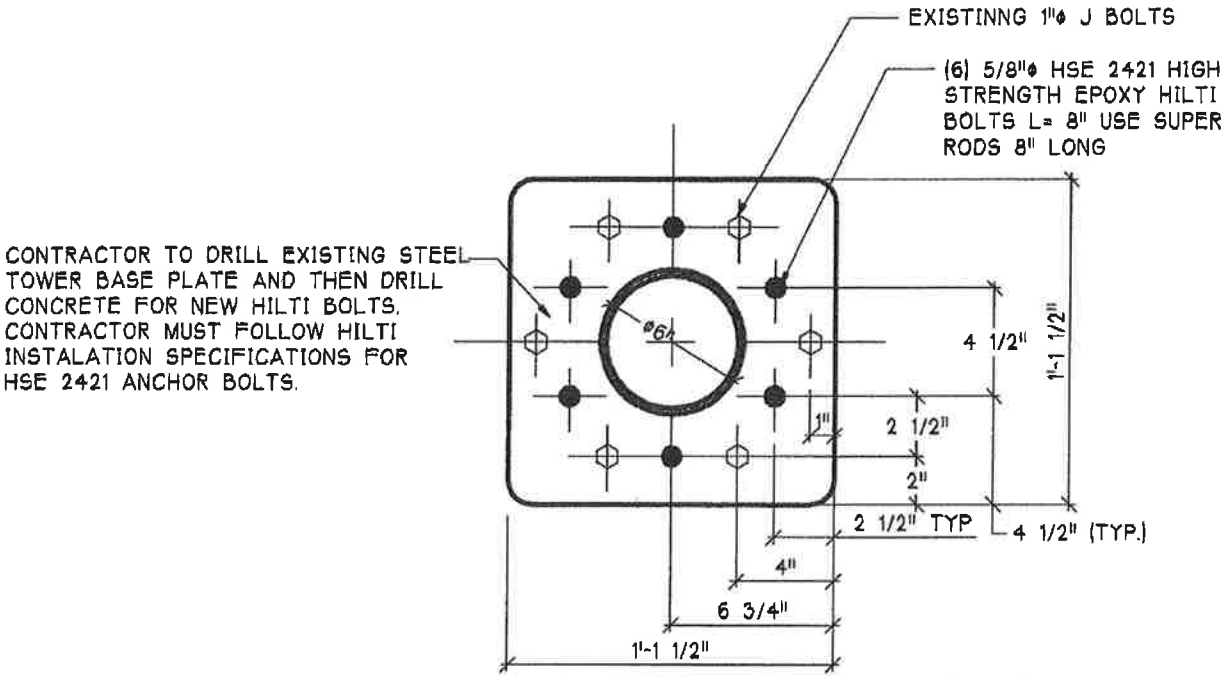
Anchor Bolt Calculations

Existing anchor bolt configuartion:



(6) Original 1" diameter A-490 anchor bolts:

Yield Strength: $F_y := 130 ksi$

Allowable Strength $F_{allow} := F_y \cdot 0.6 = 78 \ ksi$

Area of bolts: $A_b := 6 \cdot \pi \cdot (0.5)^2 = 4.712 \ in^2$

Allowable tenstion (per leg): $F_{allow} \cdot 4.712 = 367.5 \, k$

(6) reinforcement Hilti anchors:

Allowable tension (per bolt): $T_a := 6.25 \ k$

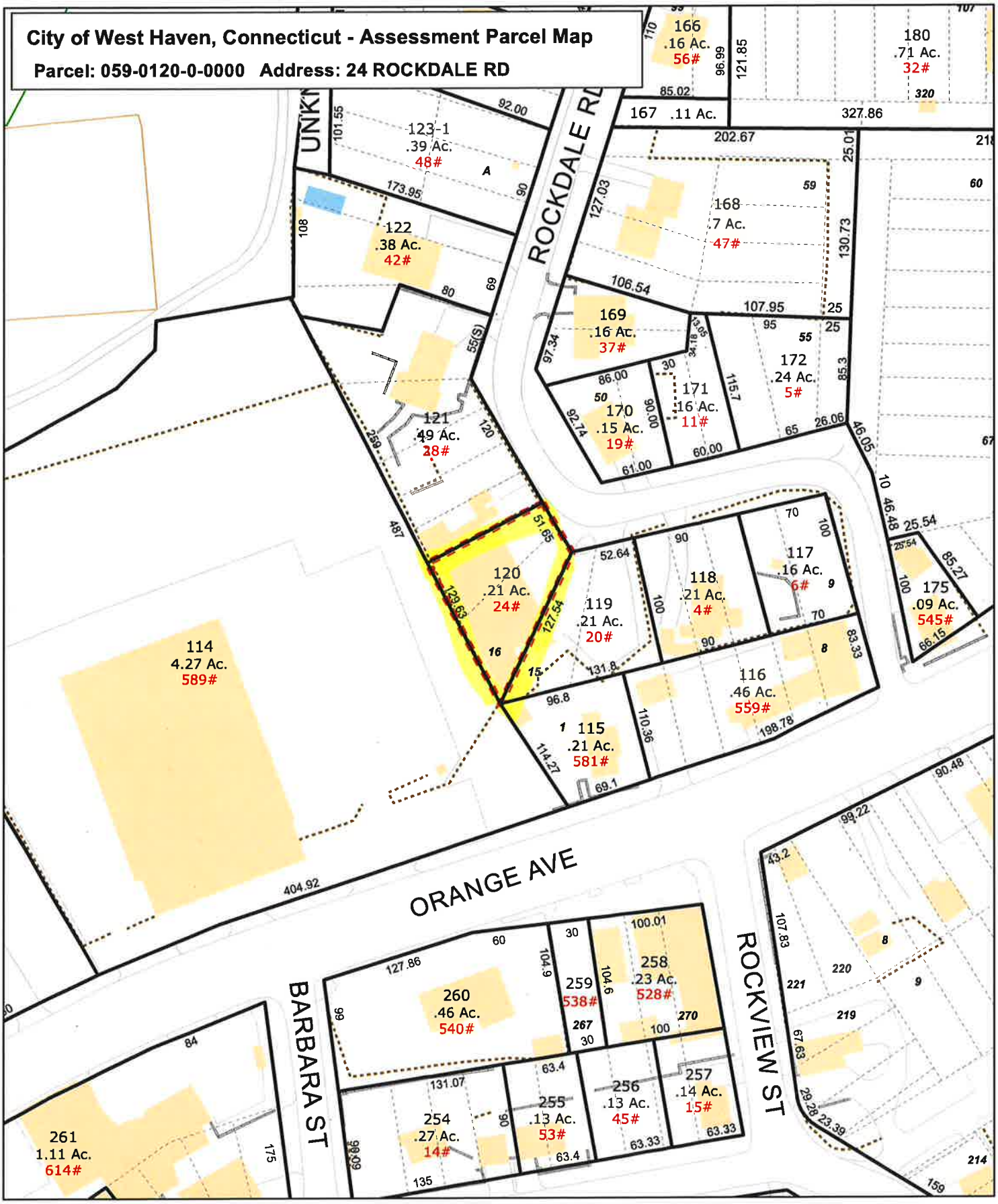
Total allowable tension: $T := 6 \cdot T_a = 37.5 \ k$

Total resistance: $T_{total} := 367.5 + 37.5 = 405 \, k$

Actual max tension per leg: $T_{max} := 305.6 \ k$

$$\frac{T_{max}}{T_{total}} = 0.755$$ **OK**

ATTACHMENT 4


City of West Haven, Connecticut - Assessment Parcel Map
Parcel: 059-0120-0-0000 Address: 24 ROCKDALE RD
ROCKDALE RD
ORANGE AVE
BARBARA ST
ROCKVIEW ST
UNKN
166 .16 Ac. 56#
180 .71 Ac. 32#
167 .11 Ac.
123-1 .39 Ac. 48#
122 .38 Ac. 42#
168 .7 Ac. 47#
169 .16 Ac. 37#
170 .15 Ac. 19#
171 .16 Ac. 11#
172 .24 Ac. 5#
121 .49 Ac. 38#
120 .21 Ac. 24#
119 .21 Ac. 20#
118 .21 Ac. 4#
117 .16 Ac. 6#
175 .09 Ac. 545#
114 4.27 Ac. 589#
115 .21 Ac. 581#
116 .46 Ac. 559#
260 .46 Ac. 540#
259 538#
258 .23 Ac. 528#
254 .27 Ac. 14#
255 .13 Ac. 53#
256 .13 Ac. 45#
257 .14 Ac. 15#
261 1.11 Ac. 614#
N
Approximate Scale: 1 inch = 100 feet
0 30 60 120 180 240 Feet
Map Produced: February 2019
Disclaimer: This map is for informational purposes only.
All information is subject to verification by any user.
The City of West Haven and its mapping contractors
assume no legal responsibility for the information
contained herein.

City of West Haven, CT

Property Listing Report

Map Block Lot	059-0120-0-0000	Building #	1	Section #	1	Account	00007905

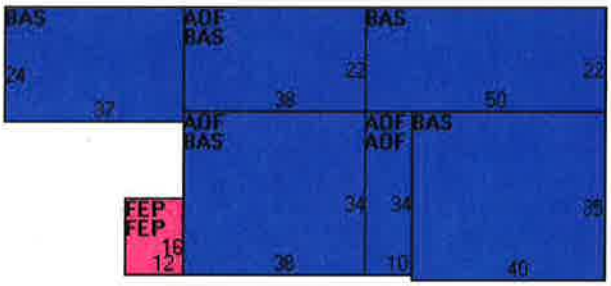
Property Information

Property Location	24 ROCKDALE RD
Owner	KNAPP ANDREW W & KNAPP ROBERT C & RADIO
Co-Owner	COMMUNICATIONS CORPORATION & SV
Mailing Address	24 ROCKDALE RD WEST HAVEN CT 06516
Land Use	3320 SVC SHOP MDL-94
Land Class	C
Zoning Code	R2
Census Tract	1541

Street Index	C400
Acreage	0.21
Utilities	Public Water,Public Sewer
Lot Setting/Desc	
Additional Info	

Photo

Sketch



Primary Construction Details

Year Built	1959
Stories	2
Building Style	Light Industrial
Building Use	Ind/Comm
Building Condition	G
Occupancy	1
Extra Fixtures	
Bath Style	
Kitchen Style	
AC Type	None
Heating Type	Forced Air-Duc
Heating Fuel	Gas

Bedrooms	
Full Bathrooms	0
Half Bathrooms	
Total Rooms	
Roof Style	Flat
Roof Cover	T&G/Rubber
Interior Floors 1	Concr-Finished
Interior Floors 2	Vinyl/Asphalt
Exterior Walls	Concr/Cinder
Exterior Walls 2	Brick/Masonry
Interior Walls	Minim/Masonry
Interior Walls 2	Drywall/Sheet

(*Industrial / Commercial Details)

Building Desc.	SVC SHOP MDL-94
Building Grade	Average +10
Heat / AC	HEAT/AC SPLIT
Frame Type	MASONRY
Baths / Plumbing	AVERAGE
Ceiling / Wall	SUS-CEIL & WL
Rooms / Prtns	AVERAGE
Wall Height	12
First Floor Use	3320

Report Created On 3/20/2019

City of West Haven, CT

Property Listing Report | Map Block Lot 059-0120-0-0000 | Building # 1 | Section # 1 | Account 00007905

Valuation Summary (Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	339600	237720
Extras	6600	4620
Improvements		
Outbuildings	377000	263900
Land	88800	62160
Total	812000	568400

Outbuilding and Extra Features

Type	Description
PAVING-ASPHALT	4000 S.F.
SITE	2 SITES
AIR COND	4100 S.F.

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	5516	5516
Porch, Enclosed	384	0
Office	2808	2808
Total Area	8708	8324

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
KNAPP ANDREW W & KNAPP ROBERT C & RADIO	1816/ 386	6/14/2018	
KNAPP ANDREW + LILLIAN R	412/ 375		0

Report Created On 3/20/2019

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	2	2	neopost 03/27/2019 US POSTAGE $002.79 ZIP 06103
	Postmaster, per *(name of receiving employee)*		

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Nancy R. Rossi, Mayor City of West Haven 355 Main Street West Haven, CT 06516		OLD STATE HOUSE STA 06103 MAR 27 2019 USPS		
2.	Fred A. Messore, Commissioner, Department of Planning and Development City of West Haven 355 Main Street West Haven, CT 06516				
3.	Radio Communications Corporation 24 Rockdale Road West Haven, CT 06516				
4.					
5.					
6.					