Robinson+Cole

KENNETH C. BALDWIN

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Also admitted in Massachusetts and New York

May 29, 2020

Via Electronic Mail

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**
370 West Main Street, Stamford, Connecticut

Dear Attorney Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at a height of 81'-6" above ground level ("AGL") on the existing roof-top tower at 370 West Main Street in Stamford, Connecticut (the "Property").[1] The roof-top tower and the Property are owned by Demarco Associates LLP. Cellco's shared use of this rooftop tower was approved by the Council in 1995.

Cellco now intends to modify its facility by replacing six (6) antennas with three (3) newer model antennas and installing six (6) new antenna/remote radio head integrated units. A set of project plans showing the proposed facility modifications and the specifications for Cellco's new antennas and antenna/RRHs units are included in Attachment 1.

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 Stamford's Mayor, David Martin; Ralph Blessing, Stamford's Land Use Bureau Chief; and Demarco Associates LLP, the owner of the Property and roof-top tower.

[1] The existing facility consists of a 40-foot lattice tower on top of a 52'-6" tall self-storage building at 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 replacement antennas will be installed at the same level on the 40-foot 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 Cellco's new antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A worst-case General Power Density table for Cellco's modified facility is included in Attachment 2.[2]

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

6. The tower, its foundation and antenna mounts, with certain modifications, can support Cellco's proposed facility modifications. (*See* Structural Analysis Report included in Attachment 3 and Mount Structural Analysis Report included in Attachment 4).

A copy of the parcel map and Property owner information is included in Attachment 5. A Certificate of Mailing verifying that this filing was sent to municipal officials and the owner of the Property is included in Attachment 6.

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).

---

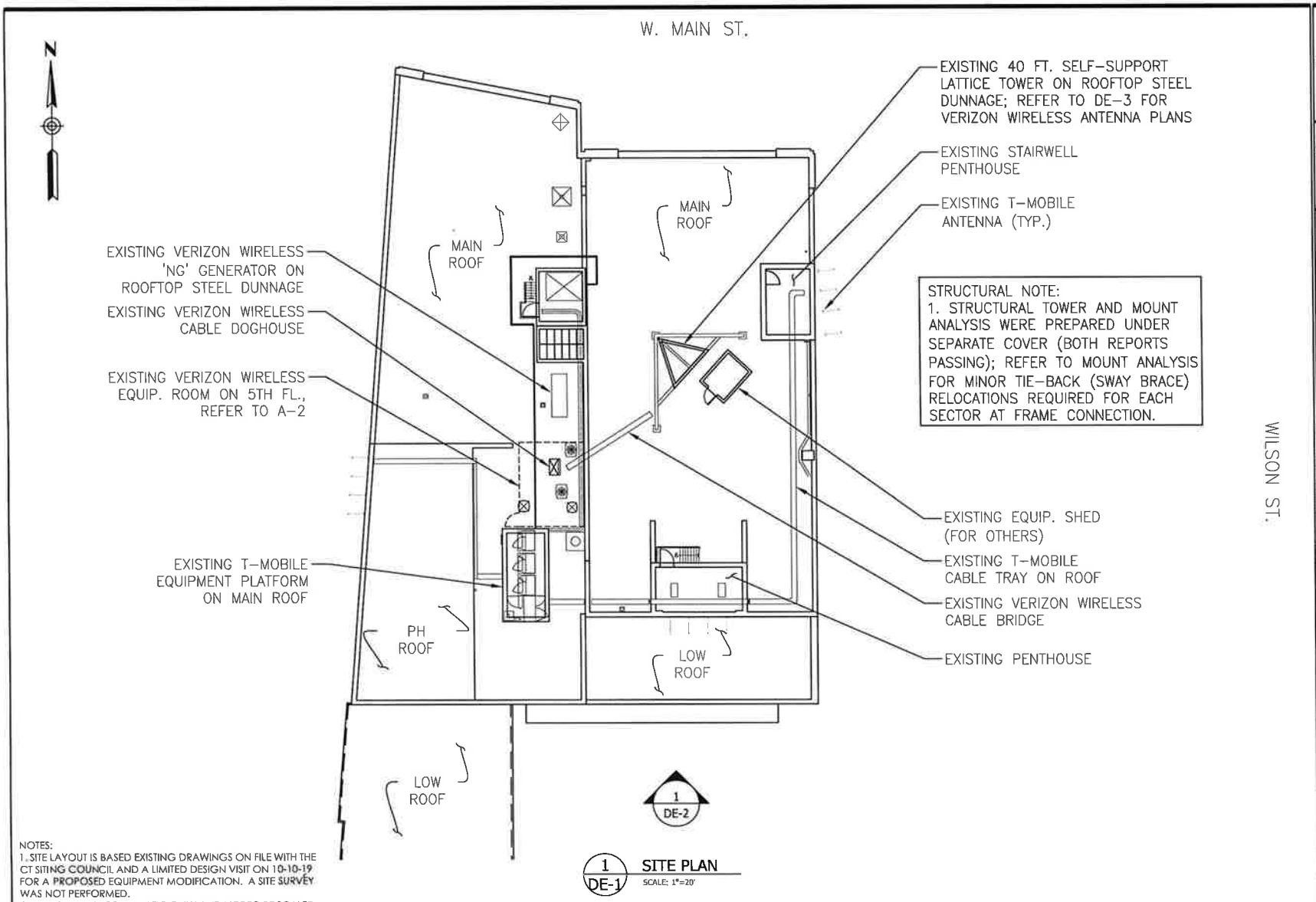
[2] Cellco is the only wireless carrier listed on the Council's RF Power Density database. Therefore, a cumulative Power Density table could not be produced.

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
David Martin, Stamford Mayor
Ralph Blessing, Stamford Land Use Bureau Chief
Demarco Associates LLP
Tim Parks

ATTACHMENT 1



NOTES:
1. SITE LAYOUT IS BASED EXISTING DRAWINGS ON FILE WITH THE CT SITING COUNCIL AND A LIMITED DESIGN VISIT ON 10-10-19 FOR A PROPOSED EQUIPMENT MODIFICATION. A SITE SURVEY WAS NOT PERFORMED.
2. PLANS ARE DIAGRAMMATIC ONLY AND NOT TO BE SCALED.
3. REFER TO STRUCTURAL MOUNT AND TOWER ANALYSIS REPORTS UNDER SEPARATE COVER.

verizon
WIRELESS COMMUNICATIONS FACILITY

20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

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

LICENSURE

STATE OF CONNECTICUT
DAVID A. WEINPAHL
NO. 22144
LICENSED PROFESSIONAL ENGINEER

DAVID WEINPAHL, P.E.
CT LIC NO 22144

SUBMITTALS		
0	12.13.19	ISSUED
1	01.06.22	REVISED PER UPDATED RFDS
2	03.24.22	REVISED PER MOUNT ANALYSIS
NO	DATE	DESCRIPTION

DRAWN BY	MF
CHECKED BY	DW

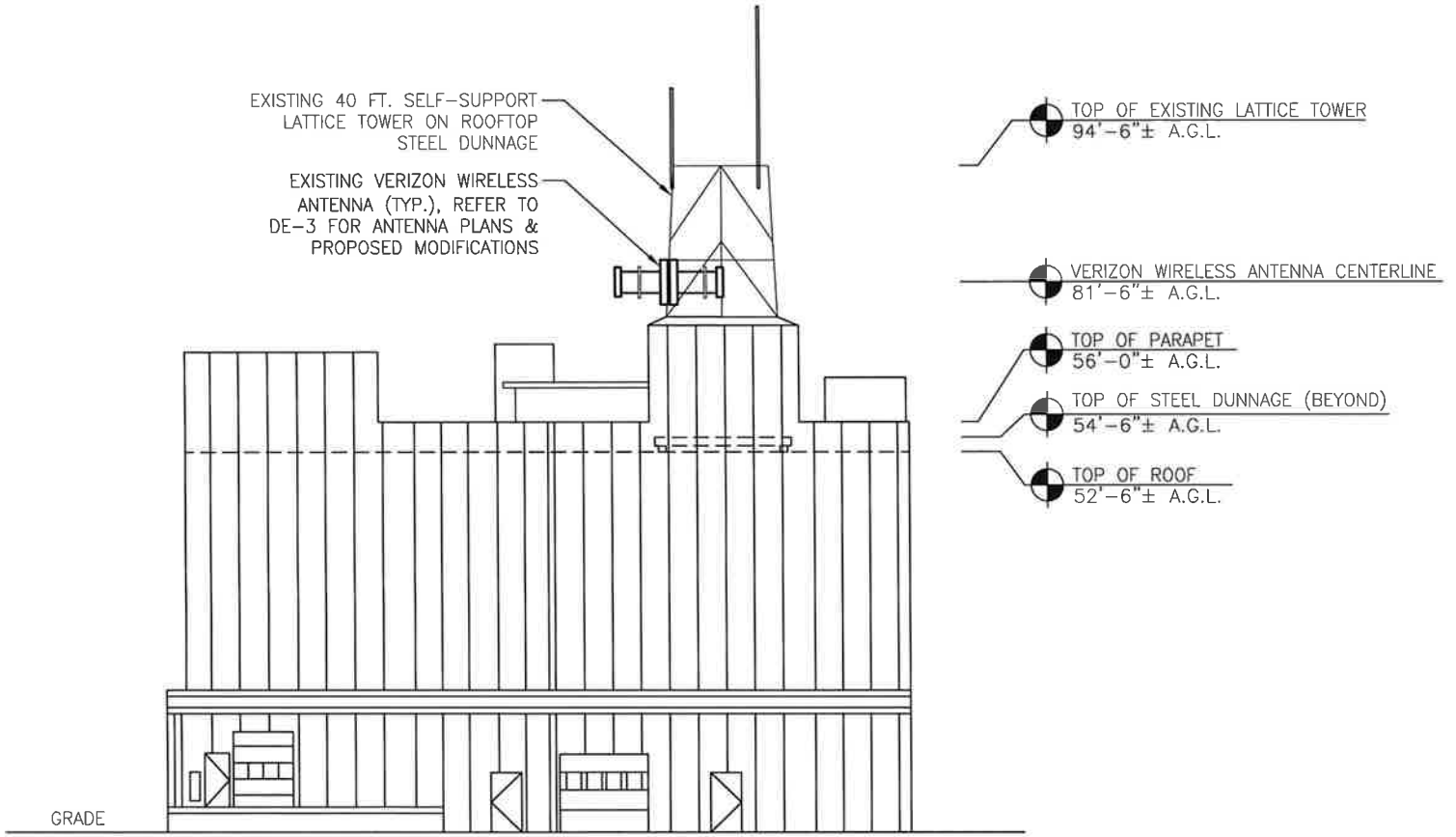
PROJECT NAME:
CBRS-28 GHz
CARRIER ADD
CABLE DRAWINGS

SITE NAME:
STAMFORD W CT

SITE ADDRESS:
STORAGE WORKS LLC
370 W. MAIN ST.
STAMFORD, CT 06902

SHEET TITLE:
SITE LAYOUT

SHEET NUMBER:
DE-1



1 / DE-2 SOUTH ELEVATION

SCALE: 1/16"=1'-0"

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SUBMITTALS

NO	DATE	DESCRIPTION
0	12.15.19	DRAWING
1	01.24.20	REVISED PER UPDATED RFDS
2	02.24.20	REVISED PER SHIELDING ANALYSIS

DRAWN BY	MF
CHECKED BY	DW

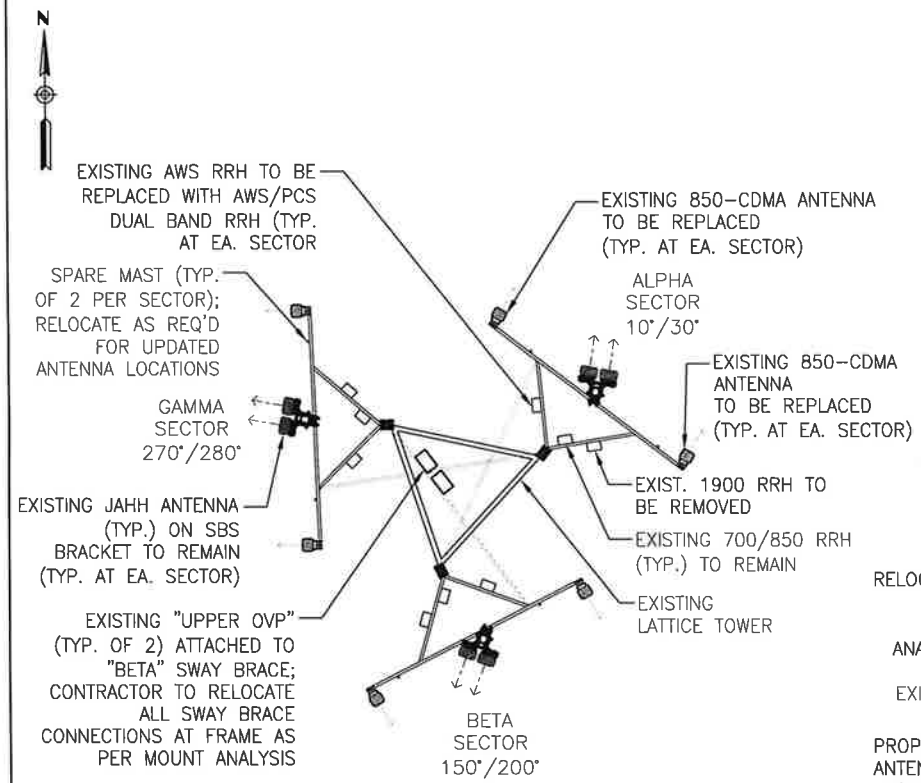
PROJECT NAME:
CBRS-28 GHz
CARRIER ADD
CABLE DRAWINGS

SITE NAME:
STAMFORD W CT

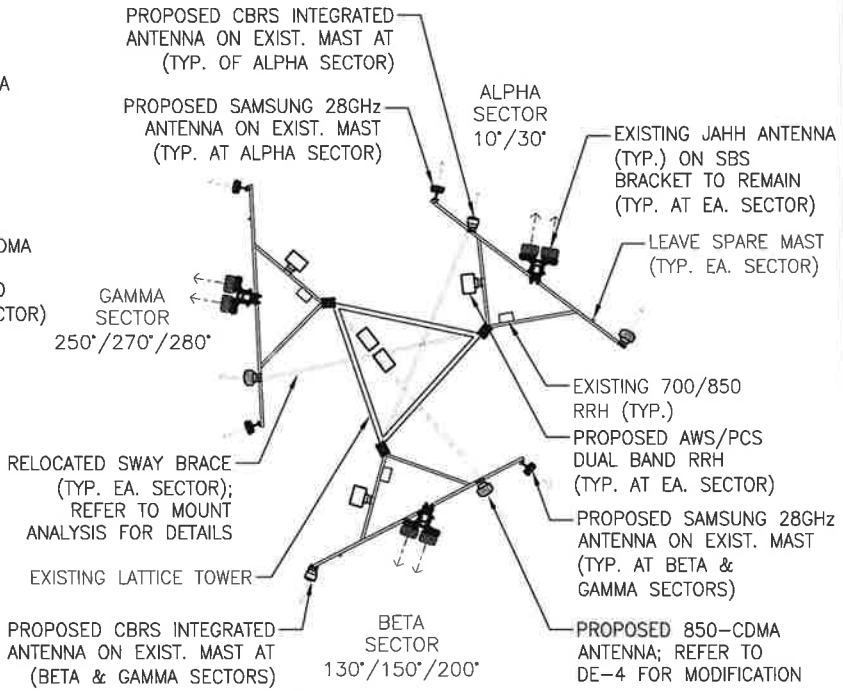
SITE ADDRESS:
STORAGE WORKS LLC
370 W. MAIN ST.
STAMFORD, CT 06902

SHEET TITLE
SOUTH ELEVATION

SHEET NUMBER:
DE-2



1 DE-3 ANTENNA PLAN - EXISTING
SCALE: 1/8"=1'-0"



2 DE-3 ANTENNA PLAN - PROPOSED
SCALE: 1/8"=1'-0"

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20 ALEXANDER DRIVE
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SUBMITTALS

NO	DATE	DESCRIPTION
0	12.15.15	REVISED
1	01.08.16	REVISED PER UPDATED RFDS
2	10.27.16	REVISED PER MOUNT ANALYSIS

DRAWN BY	MF
CHECKED BY	DW

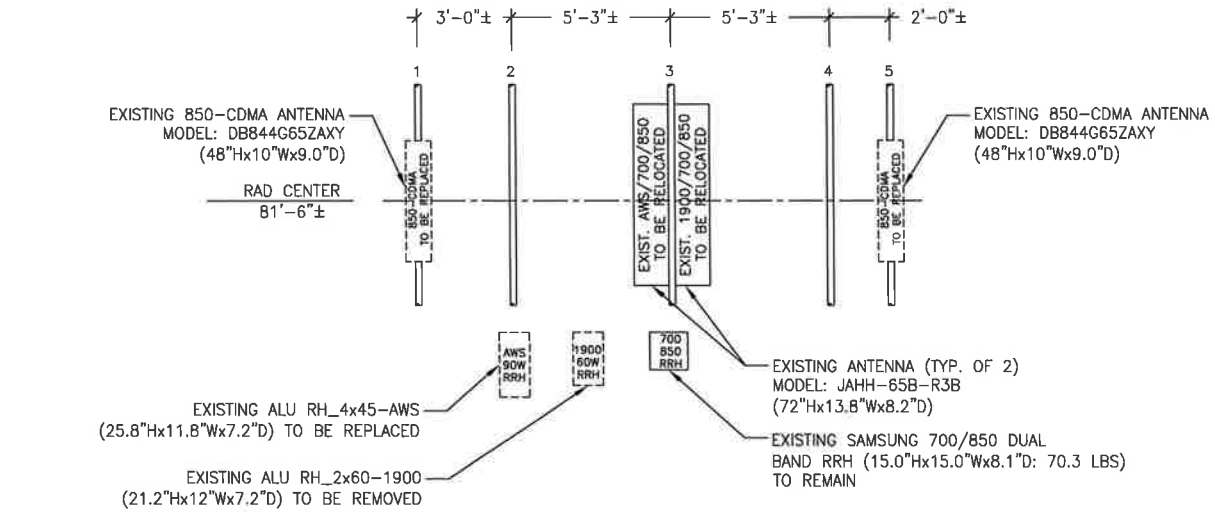
PROJECT NAME:
CBRS-28 GHz
CARRIER ADD
CABLE DRAWINGS

SITE NAME:
STAMFORD W CT

SITE ADDRESS:
STORAGE WORKS LLC
370 W. MAIN ST.
STAMFORD, CT 06902

SHEET TITLE:
ANTENNA PLANS

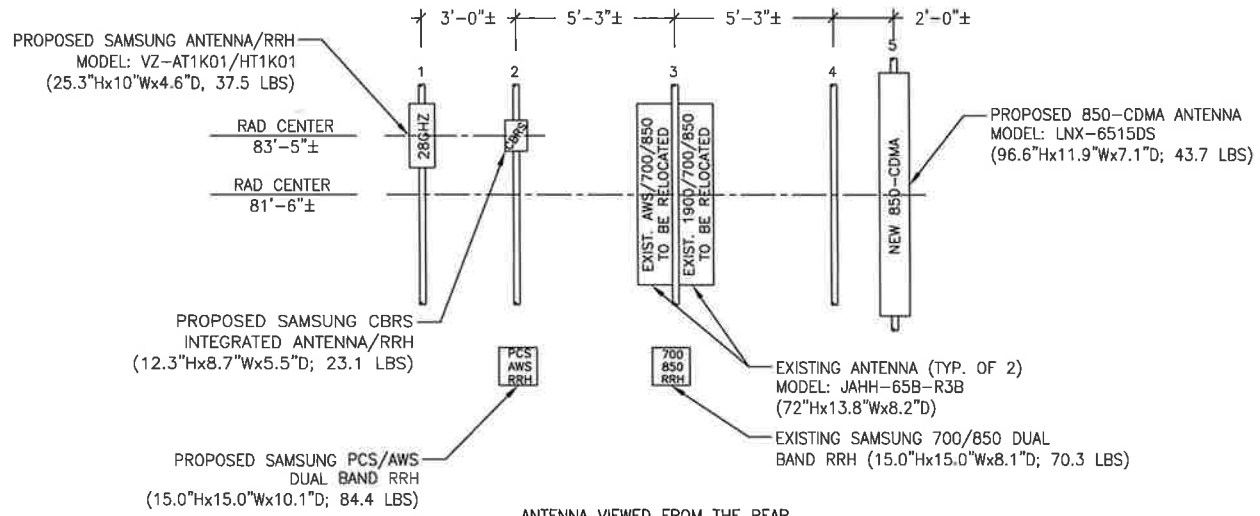
SHEET NUMBER:
DE-3



ANTENNA VIEWED FROM THE REAR

1 DE-4 ANTENNA CONFIGURATION - EXISTING (ALPHA SECTOR)

SCALE: 1/4"=1'-0"



ANTENNA VIEWED FROM THE REAR

2 DE-4 ANTENNA CONFIGURATION - PROPOSED (ALPHA SECTOR)

SCALE: 1/4"=1'-0"

verizon

WIRELESS COMMUNICATIONS FACILITY

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PROFESSIONAL ENGINEER

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

NO.	DATE	DESCRIPTION
0	12.15.19	REVISED PER UPDATED DATA
1	01.06.20	REVISED PER UPDATED DATA
2	02.24.20	REVISED PER SITE WALK

DRAWN BY	MF
CHECKED BY	DW

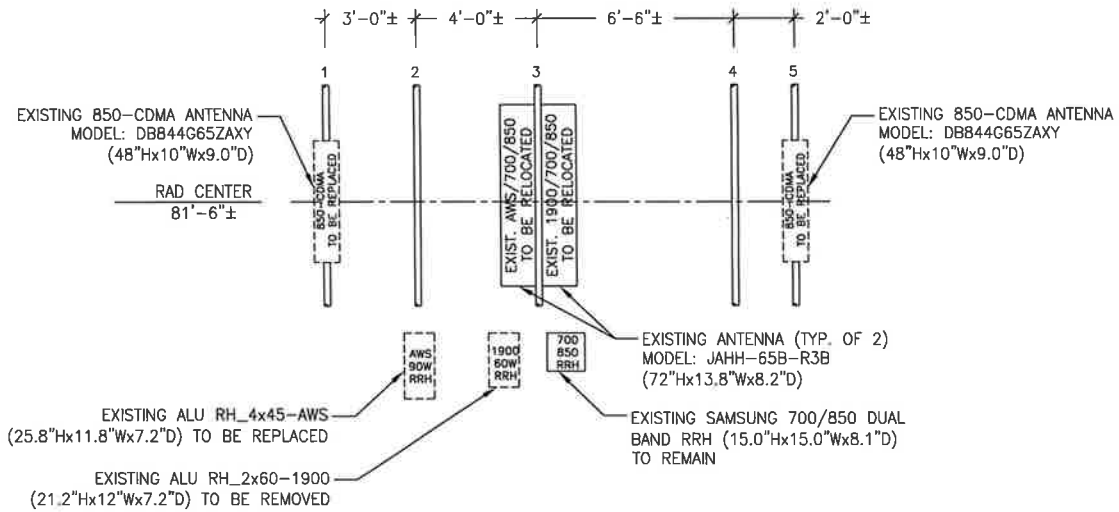
PROJECT NAME:
CBRS-28 GHz
CARRIER ADD
CABLE DRAWINGS

SITE NAME:
STAMFORD W CT

SITE ADDRESS:
STORAGE WORKS LLC
370 W. MAIN ST.
STAMFORD, CT 06902

SHEET TITLE:
ANTENNA
CONFIGURATIONS
ALPHA SECTOR

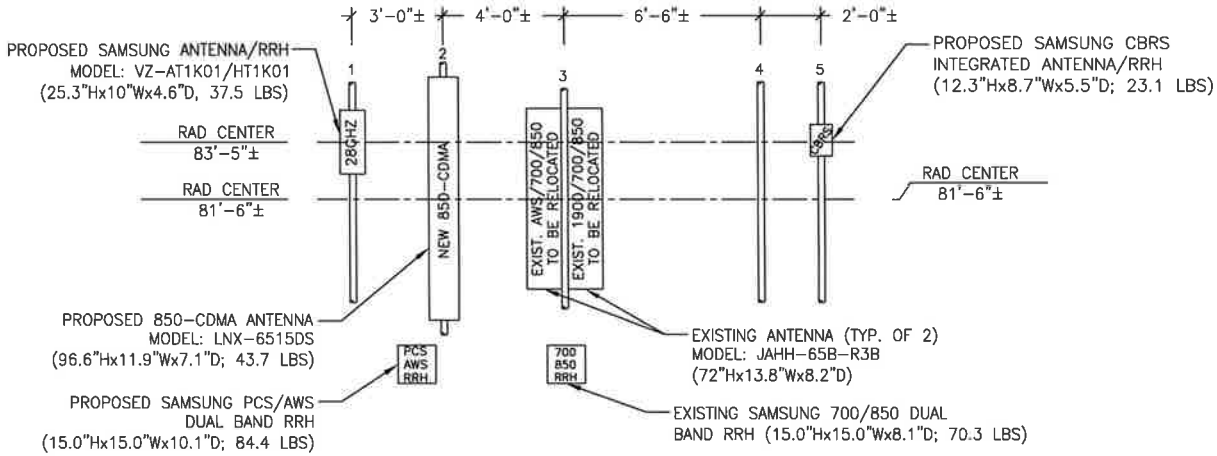
SHEET NUMBER:
DE-4



ANTENNA VIEWED FROM THE REAR

1 / DE-5 **ANTENNA CONFIGURATION - EXISTING (BETA SECTOR)**

SCALE: 1/4"=1'-0"



ANTENNA VIEWED FROM THE REAR

2 / DE-5 **ANTENNA CONFIGURATION - PROPOSED (BETA SECTOR)**

SCALE: 1/4"=1'-0"

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WIRELESS COMMUNICATIONS FACILITY

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SUBMITTALS		
0	12.13.19	REVIEW
1	01.06.20	REVISED PER UPDATED RFDS
2	02.24.20	REVISED PER AMENDMENT ANALYSIS

NO	DATE	DESCRIPTION

DRAWN BY	MF
CHECKED BY	DW

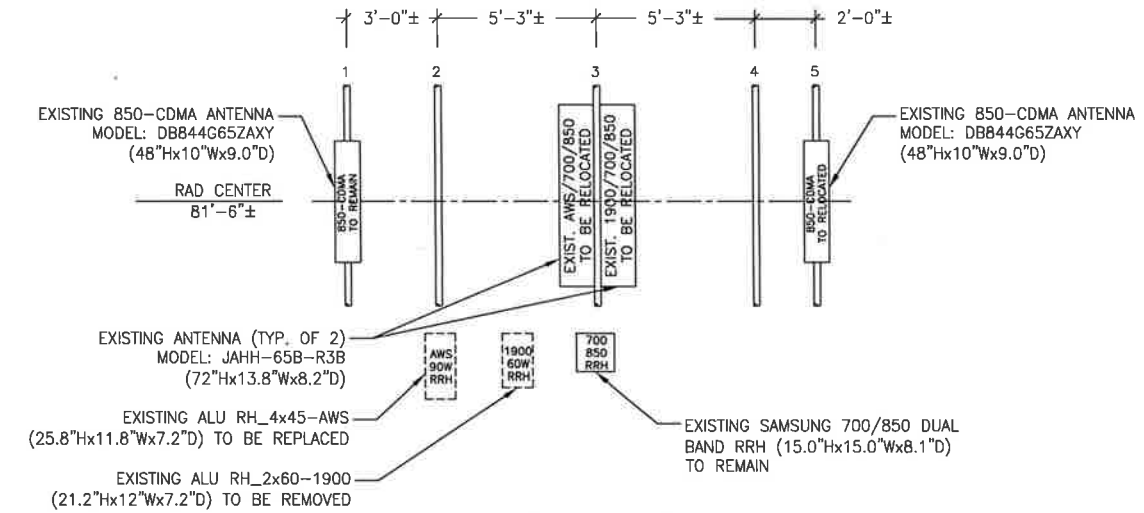
PROJECT NAME:
CBRS-28 GHz
CARRIER ADD
CABLE DRAWINGS

SITE NAME:
STAMFORD W CT

SITE ADDRESS:
STORAGE WORKS LLC
370 W. MAIN ST.
STAMFORD, CT 06902

SHEET TITLE:
ANTENNA
CONFIGURATIONS
BETA SECTOR

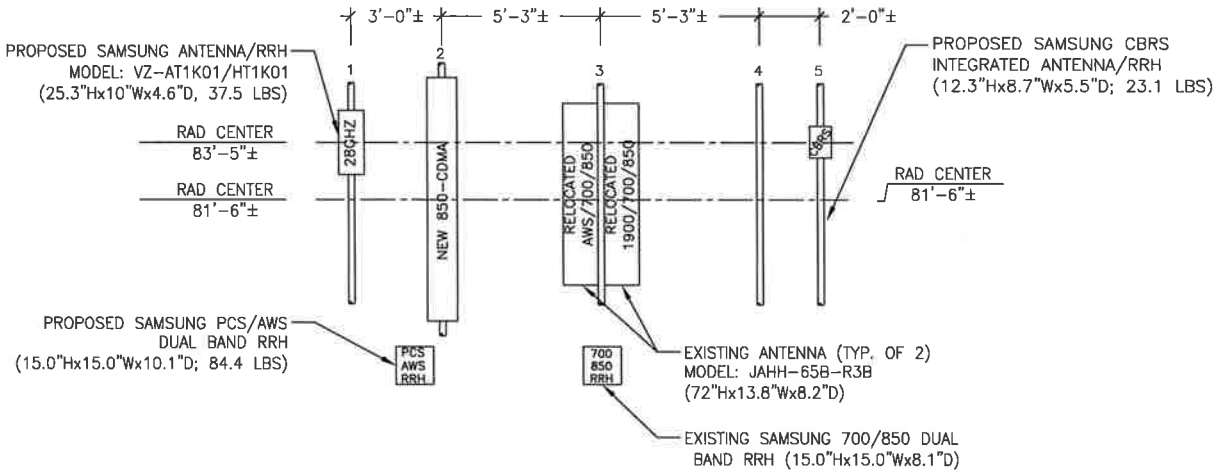
SHEET NUMBER:
DE-5



ANTENNA VIEWED FROM THE REAR

1 DE-6 **ANTENNA CONFIGURATION - EXISTING (GAMMA SECTOR)**

SCALE: 1/4"=1'-0"



ANTENNA VIEWED FROM THE REAR

2 DE-6 **ANTENNA CONFIGURATION - PROPOSED (GAMMA SECTOR)**

SCALE: 1/4"=1'-0"

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SUBMITTALS

NO	DATE	DESCRIPTION
0	12.15.19	REVISED
1	01.06.20	REVISED PER UPDATED RFDS
2	02.24.20	REVISED PER MOUNT ANALYSIS

DRAWN BY:	MF
CHECKED BY:	DW

PROJECT NAME:
CBRS-28 GHz
CARRIER ADD
CABLE DRAWINGS

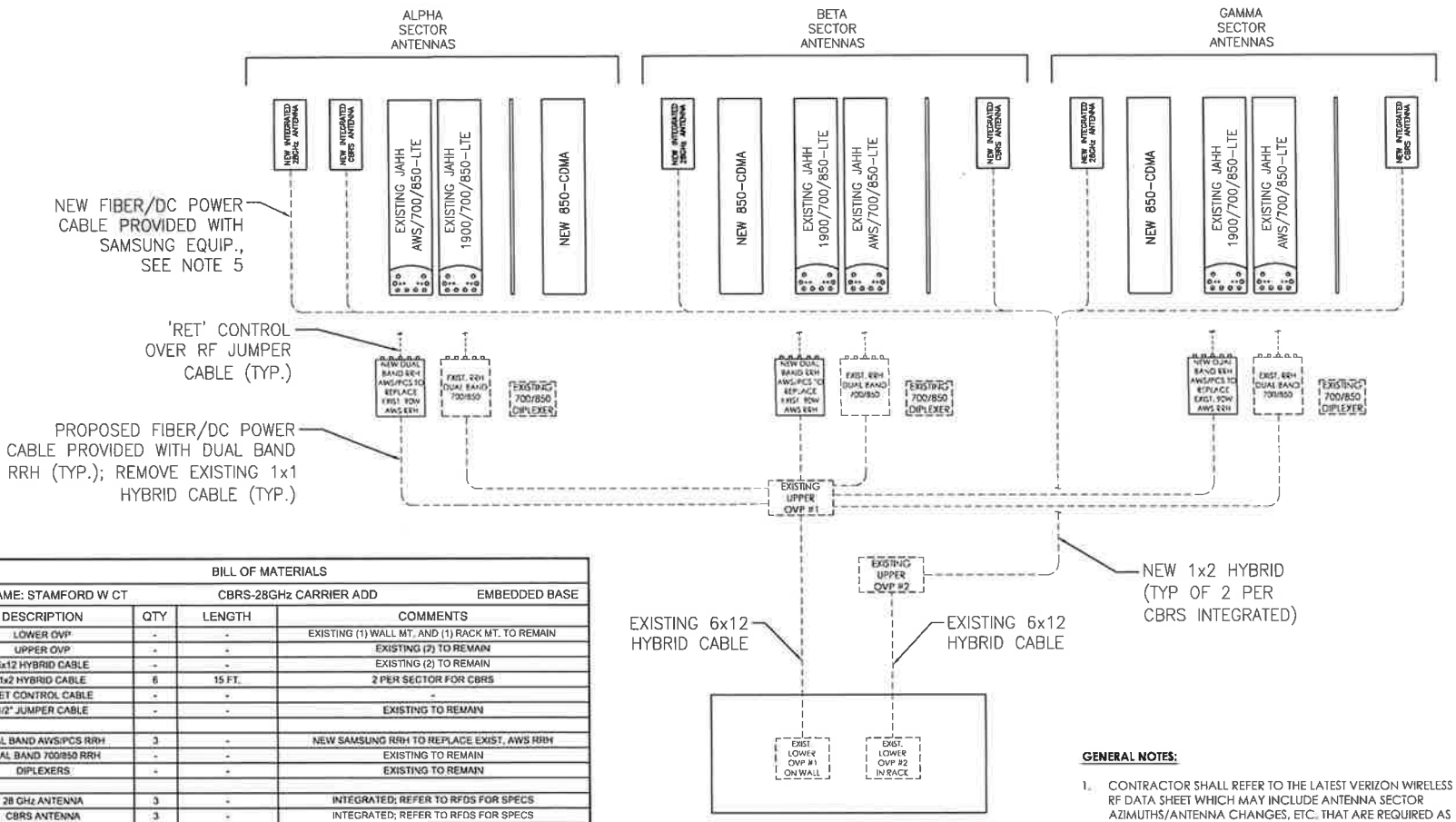
SITE NAME:
STAMFORD W CT

SITE ADDRESS:
STORAGE WORKS LLC
370 W. MAIN ST.
STAMFORD, CT 06902

SHEET TITLE:
ANTENNA
CONFIGURATIONS
GAMMA SECTOR

SHEET NUMBER:
DE-6

NOTE: ALL ANTENNAS VIEWED FROM REAR



2 DE-7 **RF PLUMBING DIAGRAM**
Scale: N.T.S.

BILL OF MATERIALS			
SITE NAME: STAMFORD W CT	CBRS-28GHz CARRIER ADD		EMBEDDED BASE
DESCRIPTION	QTY	LENGTH	COMMENTS
LOWER OVP	-	-	EXISTING (1) WALL MT. AND (1) RACK MT. TO REMAIN
UPPER OVP	-	-	EXISTING (2) TO REMAIN
6x12 HYBRID CABLE	-	-	EXISTING (2) TO REMAIN
1x2 HYBRID CABLE	6	15 FT.	2 PER SECTOR FOR CBRS
RET CONTROL CABLE	-	-	-
1/2" JUMPER CABLE	-	-	EXISTING TO REMAIN
DUAL BAND AWS/PCS RRH	3	-	NEW SAMSUNG RRH TO REPLACE EXIST. AWS RRH
DUAL BAND 700/850 RRH	-	-	EXISTING TO REMAIN
DIPLEXERS	-	-	EXISTING TO REMAIN
28 GHz ANTENNA	3	-	INTEGRATED; REFER TO RFDS FOR SPECS
CBRS ANTENNA	3	-	INTEGRATED; REFER TO RFDS FOR SPECS
AWS ANTENNA	-	-	EXISTING JAHH AWS-700-850 LTE; RELOCATE AS PER PLANS
700 ANTENNA	-	-	SHARED WITH JAHH ANTENNAS
1900 ANTENNA	-	-	EXISTING JAHH 1900-700-850 LTE; RELOCATE AS PER PLANS
850-CDMA ANTENNA	3	-	1 PER SECTOR TO REPLACE EXISTING 2 PER SECTOR
850-LTE ANTENNA	-	-	SHARED WITH JAHH ANTENNAS
SIDE-BY-SIDE MOUNTING BRACKET	-	-	EXISTING TO REMAIN

NOTES:
1. ITEMS SHOWN ARE FOR MAJOR DESIGN ELEMENTS ONLY. REFER TO VERIZON WIRELESS B.O.M. FOR ALL MANUFACTURER PART NUMBERS AND ACCESSORY ITEMS REQUIRED FOR A COMPLETE INSTALLATION.
2. EXISTING JUMPERS TO REMAIN; PROVIDE TERMINATION CAPS ON ALL UN-USED ANTENNA PORTS.

1 DE-7 **BILL OF MATERIALS**
Scale: N.T.S.

GENERAL NOTES:

1. CONTRACTOR SHALL REFER TO THE LATEST VERIZON WIRELESS RF DATA SHEET WHICH MAY INCLUDE ANTENNA SECTOR AZIMUTHS/ANTENNA CHANGES, ETC. THAT ARE REQUIRED AS PART OF THE PROJECT.
2. CONTRACTOR SHALL SECURE ALL CONTROL CABLES IN ACCORDANCE WITH INDUSTRY STANDARDS AND MANUFACTURERS INSTRUCTIONS. EXTERIOR CONTROL CABLES MAY BE TAPED OR TIE-WRAPPED TO EXISTING COAXIAL CABLES EVERY 4 FT. MAX. FOR HORIZONTAL RUNS. CONTRACTOR MAY USE HOISTING GRIPS AT TOP OF VERTICAL CABLE RUNS IN CERTAIN APPLICATIONS.
3. RET CABLES SHALL BE ROUTED AND SECURED ON STRUCTURAL MEMBERS ONLY - DO NOT "LOOP" THE CABLES IN MID-AIR BETWEEN ANTENNAS
4. JUMPER CABLES, COAXIAL CABLES AND DIPLEXER WIRING NOT SHOWN.
5. CONTRACTOR SHALL PERFORM ALL WIRING AS SPECIFIED BY SAMSUNG ANTENNA AND RRH SPECS, INCLUDING BUT NOT LIMITED TO INSTALLATION OF INNERDUCT AND/OR OTHER WIRING PROTECTION METHODS, ETC.

verizon
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SUBMITTALS		
0	12.15.19	ISSUED FOR CONSTRUCTION
1	07.06.20	REVISED PER UPDATED RFDS
2	07.23.20	REVISED PER MOUNT ANALYSIS
NO.	DATE	DESCRIPTION

DRAWN BY:	MF
CHECKED BY:	DW

PROJECT NAME:
CBRS-28 GHz CARRIER ADD CABLE DRAWINGS

SITE NAME:
STAMFORD W CT

SITE ADDRESS:
STORAGE WORKS LLC
370 W. MAIN ST.
STAMFORD, CT 06902

SHEET TITLE:
RF PLUMBING DIAGRAM & B.O.M.

SHEET NUMBER:
DE-7

Specifications

The table below outlines the main specifications of the AU:

Table 1. Specifications

Item		AT1K01
Technology		5G NR
Operating Frequency		27.5 to 28.35 GHz
RF Chain		1024 TR/unit
Antenna Array	Configuration	1024 AE (4T4R)
	Element	256 AE (16H16V)/path, 1024 AE/unit
	Gain	28 dBi/path
IBW/OBW		850/800 MHz
Channel Bandwidth/Capacity		100 MHz Max 8CC (50/200/400 MHz will be supported in ES2, SVR19A: 100 MHz)
RF Output Power		26 dBm/path, 32 dBm/unit
Input Voltage		-48 V DC (-36 to -58 V DC) or 100 to 240 V AC
Input Current		10.9 A @ -48 V DC 4.3 A @ 100 to 240 V AC
LED		Total: 1 EA Powered, Operational, Fail (3 Status w/different colors)
Operational Temperature		-40~55°C (with solar load)
Humidity		TBD
IP rating		IP65
EMC		FCC Title 47 CFR Part 15 Subpart B
Safety		UL 60950 or 62368
Installation		Pole/Wall/Tower mounting
Dimension (W × D × H)		• 9.57 in. (243 mm) × 6.89 in. (175 mm) × 16.81 in. (427 mm) •(@without cover) • 9.57 in. (243 mm) × 6.89 in. (175 mm) × 19.4 in. (493 mm) (@with cover & GPS Port)
Volume		< 18.16 L
Weight		< 33.07 lb (15.8 kg)

LNX-6515DS-VTM | LNX-6515DS-A1M

2-port sector antenna, 2x 698–896 MHz, 65° HPBW, RET compatible

- Excellent choice to maximize both coverage and capacity in suburban and rural applications
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- Exceptional horizontal pattern roll-off and strong front-to-back ratio
- Extended bandwidth allows one antenna to serve multiple frequency allocations
- Great solution to maximize network coverage and capacity
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

This product will be discontinued on: March 31, 2021

Replaced By:

LNX-6515DS-A1M	2-port sector antenna, 2x 698–896 MHz, 65° HPBW, 1x RET

General Specifications

Antenna Type	Sector
Band	Single band
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Performance Note	Outdoor usage | Wind loading figures are validated by wind tunnel measurements described in white paper WP-112534-EN
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, low band	2
RF Connector Quantity, total	2

Remote Electrical Tilt (RET) Information, General

Model with Factory Installed AISG 2.0 Actuator	LNX-6515DS-A1M

Dimensions

Width	301 mm | 11.85 in
Length	2453 mm | 96.575 in
Depth	180.5 mm | 7.106 in

Array Layout

Array	Freq (MHz)	Conns
R1	698-896	1-2

Bottom

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

Electrical Specifications

Impedance	50 ohm
Operating Frequency Band	698 – 896 MHz

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	16.7	17.6
Beamwidth, Horizontal, degrees	65	63.8
Beamwidth, Vertical, degrees	9.7	8.6
Beam Tilt, degrees	0–8	0–8
USLS (First Lobe), dB	17	17
Front-to-Back Ratio at 180°, dB	32	27

CPR at Boresight, dB	24	27
CPR at Sector, dB	15	13
Isolation, Cross Polarization, dB	30	30
VSWR | Return loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400

Electrical Specifications, BASTA

Frequency Band, MHz	**698–806**	**806–896**
Gain by all Beam Tilts, average, dBi	16.6	16.9
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 16.6 4 ° | 16.6 8 ° | 16.4	0 ° | 17.0 4 ° | 17.0 8 ° | 16.8
Beamwidth, Horizontal Tolerance, degrees	±1	±0.9
Beamwidth, Vertical Tolerance, degrees	±0.6	±0.4
USLS, beampeak to 20° above beampeak, dB	18	18
Front-to-Back Total Power at 180° ± 30°, dB	25	23
CPR at Boresight, dB	24	27
CPR at Sector, dB	15	13

Material Specifications

Radiator Material	Aluminum

Mechanical Specifications

Wind Loading at Velocity, frontal	396.0 N @ 150 km/h | 89.0 lbf @ 150 km/h
Wind Loading at Velocity, lateral	333.0 N @ 150 km/h | 74.9 lbf @ 150 km/h
Wind Loading at Velocity, maximum	171.3 lbf @ 150 km/h | 762.0 N @ 150 km/h
Wind Speed, maximum	241 km/h | 149.75 mph

Packaging and Weights

Width, packed	392 mm | 15.433 in
Depth, packed	295 mm | 11.614 in
Length, packed	2718 mm | 107.008 in
Net Weight, without mounting kit	19.8 kg | 43.651 lb
Weight, gross	36.9 kg | 81.35 lb

Regulatory Compliance/Certifications

Agency	Classification
CE	Compliant with the relevant CE product directives
CHINA-ROHS	Below maximum concentration value
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
REACH-SVHC	Compliant as per SVHC revision on www.commscope.com/ProductCompliance
ROHS	Compliant

Included Products

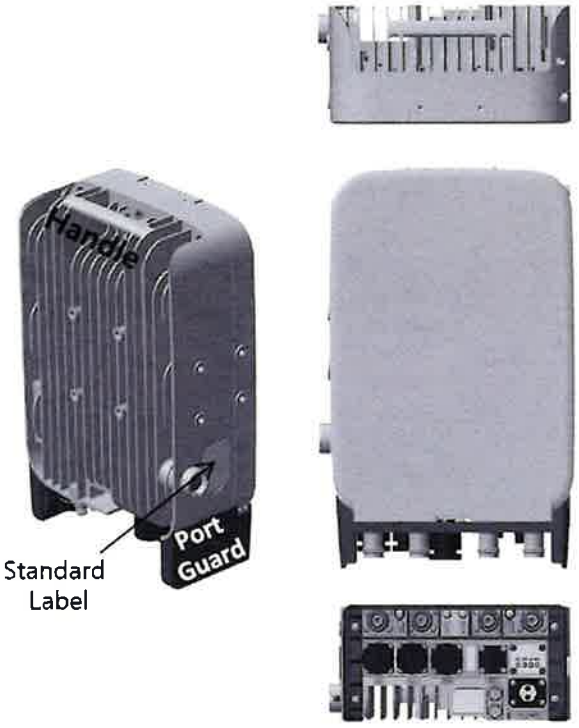
BSAMNT-3 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

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

[CBRS RRH] Spec.



Current Size: 216 x 307 x 105.5 mm (6.99L)
(8.5 x 12.1 x 4.1 inch., excluding Port Guard)
Design is subject to minor change

Item	Specification
Band	Band 48 (3.5 GHz)
Frequency	3550~3700 MHz
IBW	150 MHz
OBW	80 MHz
# of Carriers	5/10/15/20 MHz x 4 carriers
RF Chain	4TX / 4RX
RF Output Power & EIRP	4 path x 5 W (Total: 20 W = 43 dBm) (EIRP: 47 dBm / 10 MHz)
RX Sensitivity	Typical : -101.5 dBm @ 1 Rx (3GPP 36.104, Wide Area)
Modulation	256-QAM support (1024-QAM with 1~2dB power back-off)
Input Power	-48 VDC (-38 to -57 VDC, 1 SKU), with clip-on AC-DC converter (Option)
Power Consumption	About 160 Watt @ 100% RF load, typical conditions
Volume	Under 7L (w/o Antenna), Under 9.6L (with antenna)
Weight	Under 8.0 kg (18.64 lb) (w/o Antenna), Under 10.5 Kg (with ant.)
Operating Temperature	-40°C (-40°F) ~ 55°C (131°F) (W/o solar load)
Cooling	Natural convection
Unwanted Emission	3GPP 36.104 Category A [B48] : FCC 47 CFR 96.41 e)
Optic Interface	20km, 2 ports (9.8Gbps x 2), SFP, single mode, duplex or Bi-Di
CPRI Cascade	Not supported
# of Antenna Port	4
External Alarm (UDA)	4
RET	AISG 2.2
TMA & built-in Bias-T I//F and PIM cancellation	Not supported
Mounting Options	Pole, wall, tower, back to back, side by side (for external ant), 3 RRH with Clip-on Antenna on the pole
Antenna Type	Integrated (Clip-on) antenna (Option), External antenna (Option)
NB-IoT	Not Supported (HW Resource reserved for 1 Guard Band NB-IoT per LTE carrier)
Spectrum Analyzer	TX/RX Support
External Alarm (UDA)	4
5G NR	Support with S/W upgrade
XRAN	Support with S/W upgrade

[CBRS] Clip-on Antenna Specifications

VzW accepted IP45 in FLD,
but IP55 is Samsung Spec.

Items	Clip-on Antenna, BASTA**
Antenna Gain	12.5 ± 0.5 dBi (Max 13 dBi)
Horizontal BW (-3dB)	65° ± 5°
Vertical BW (-3dB)	17° ±3°
Electrical Tilt	8° (fixed) ±2°
Front-to-Back Ratio	> 25 dB
Port-to-Port Tracking	< 3 dB
VSWR	< 1.5
Isolation	> 25 dB
Ingress Protection	**IP55**
Size	220(W)×313(H)×34.3(D) mm (*) (8.7 x 12.3 x 1.4 inch.)
Weight	< **2.0** kg [Typ. 1.3 kg]
It is required that the radio should be weatherproofed properly with JMA WPS Boot with external antenna or with Weatherproof Boot for clip-on antennas.	

Antenna includes integrated cable with connector
* Design is subject to minor change

** Ant. spec. follows NGMN recommendations on Base Station Antenna Standards (BASTA). For example, 'mean ± tolerance of 86.6%' is applied to double-sided specification of statistical RF parameters.

ATTACHMENT 2

Site Name: STAMFORD W CT
Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissible Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)	(%)
5G 28GHz	28000	1	610	610	83.5	0.0312	1.0	3.12%
VZW CBRS	3600	1	50	50	83.5	0.0028	1.0	0.28%
VZW PCS	1970	1	1565	1564.58	81.5	0.0847	1.0	8.47%
VZW Cellular LTE	869	1	499	499	81.5	0.0270	0.579333333	4.66%
VZW Cellular	869	1	499	499	81.5	0.0270	0.579333333	4.66%
VZW AWS	2145	1	1,581.61	1581.61	81.5	0.0856	1.0	8.56%
VZW 700	746	1	633.57	633.57	81.5	0.0343	0.497333333	6.90%

Total Percentage of Maximum Permissible Exposure 36.66%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Section 1.13101 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

MHz = Megahertz
mW/cm^2 = milliwatts per square centimeter
ERP = Effective Radiated Power

Absolute worst case maximum values used, including the following assumptions:
1. closest accessible point is distance from antenna to base of pole;
2. continuous transmission from all available channels at full power for indefinite time period; and,
3. all RF energy is assumed to be directed solely to the base of the pole.

ATTACHMENT 3

PAUL J. FORD & COMPANY

Report Date:	February 24, 2020
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 40-ft Self Support on 54-ft Rooftop
Site Name:	Verizon Wireless - Stamford W CT
Site Address:	370 W Main St
City, County, State:	Stamford, Fairfield County, CT
Latitude, Longitude:	41.047824, -73.553628
PJF Project:	A42919-0001.004.8700

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 State 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 and Appendix N.
Ultimate Wind Speed:	120 mph 3-second gust wind speed without ice
Nominal Wind Speed:	93 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 loads shown in Table 2 of this report.

Summary of Analysis Results:

Existing Structure:	Pass – 78.6%
Existing Foundation:	Pass – 83.0% -See Note2, Table 5

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

Respectfully Submitted by:
Paul J. Ford and Company

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

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22701
LICENSED
PROFESSIONAL ENGINEER

02/24/2020

Columbus
250 E Broad St, Suite 600
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1801 Lee Rd, Suite 230
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Phone 407.898.9039

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 40 ft Self Support tower mounted on top of a roof. The roof elevation is at 54-ft above ground. Original tower design drawings were not available at the time of this analysis. Tower dimensions and member sizes were obtained from a March 17, 2015 "Structural Analysis Report" prepared by Centek Engineering.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-G
Risk Category:	II
Nominal Wind Speed:	93 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	0.75 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
81.5	83.4	3	samsung	CBRS Integrated Antenna/RRU	-	-	-
		3	samsung	VZ-AT1K01/HT1K01 Integrated AU			
	81.5	3	andrew	LNX-6515DS-A1M w/ Mount Pipe			
		3	samsung	B2/B66A RRH-BR049			

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
90.0	103.5	1	antennae	2.5"OD x 16' Omni Whip	3	1/2	1
	96.0	1	antennae	3' Yagi			
	93.0	1	antennae	3' Yagi			
	90.0	1	tower mount	2.375" OD x 12' Mount Pipe			
91.0	91.0	1	tower mount	13-Ft Wireless Frame	-	-	1
		3	tower mounts	2.375" OD x 6' Mount Pipe			
87.5	87.5	1	antennae	3' Yagi	1	1/2	1
85.5	87.0	1	miscl	GPS	1	1/2	1
	85.5	1	tower mount	4-Ft Standoff Mount			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		1	scala	PR-850			
81.5	81.5	1	tower mounts	(3) 16-Ft Sector Mounts	6 2	7/8 1-1/4 Hybrid	1
		6	commscope	BSAMNT-SBS-2-2			
		6	commscope	CBC78T-DS-43			
		6	commscope	JAHH-65B-R3B-V3 w/ Mount Pipe			
		9	pole mounts	2.375" OD x 8' Mount Pipe			
		2	-	OVP			
		3	samsung	B5/B13 RRH-BR04C			
		6	decibel	DB844G65ZAXY	12	7/8	2
		3	nokia	UHFA B25 RRH 4X30			
		3	nokia	UHIE B66A RRH 4X45			
67.0	67.0	1	tower mounts	2.375" OD x 6' Side Arm-Pipe	1	1/2	1
		1	antennae	3' Yagi			

Notes:
1) Existing equipment
2) Equipment to be removed not considered in analysis.

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Structural Analysis	3/17/2015	14067	Centek
Construction Drawings	01/08/2020	Stamford W CT Rev 1	OnAir
Radio Frequency Data Sheet	Verizon Wireless, 01/07/2020	15866233	OnAir

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Original tower manufacturers drawing were not available at the time of the analysis. Tower dimensions and member sizes were obtained from a March 17, 2015 "Structural Analysis Report" prepared by Centek Engineering. The analysis assumes that Centek analysis accurately presents the current "as is" conditions of the tower.
5) The analysis has been completed assuming the following material specifications for the tower members and connections; tower legs = ASTM A572 GR 50 (Fy = 50 ksi), tower diagonals = ASTM A36 (Fy = 36 ksi), and diagonal and flange bolts = ASTM A325N.

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	94 - 74	Leg	ROHN 2.5 STD	3	-8.773	45.449	19.3	Pass
		Diagonal	L 1.75 x 1.75 x 1/4	11	-3.180	4.048	78.6	Pass
		Top Girt	L3x3x1/4	5	-0.505	11.430	4.4	Pass
T2	74 - 54	Leg	ROHN 2.5 STD	25	-24.936	45.484	54.8	Pass
		Diagonal	L 2 x 2 x 1/4	33	-3.292	5.035	65.4	Pass
							Summary	
						Leg (T2)	54.8	Pass
						Diagonal (T1)	78.6	Pass
						Top Girt (T1)	4.4	Pass
						Bolt Checks	41.8	Pass
						Rating =	78.6	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	54	25.0	Pass
2	Base Foundation (Compared w/ Design Loads)	54	83.0	Pass

Structure Rating (max from all components) =	83%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) An analysis of the roof mounted steel support frame was not part of the scope of service for this analysis. For information purposes only, a comparison of the current analysis reactions to the analysis reactions listed in the 3/17/2015 analysis report by Centek Engineering has been provided

4.1) Recommendations

The tower has sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

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) 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.

5) 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.

6) 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.

APPENDIX A

TNXTOWER OUTPUT

DESIGNED APPURTENANCE LOADING

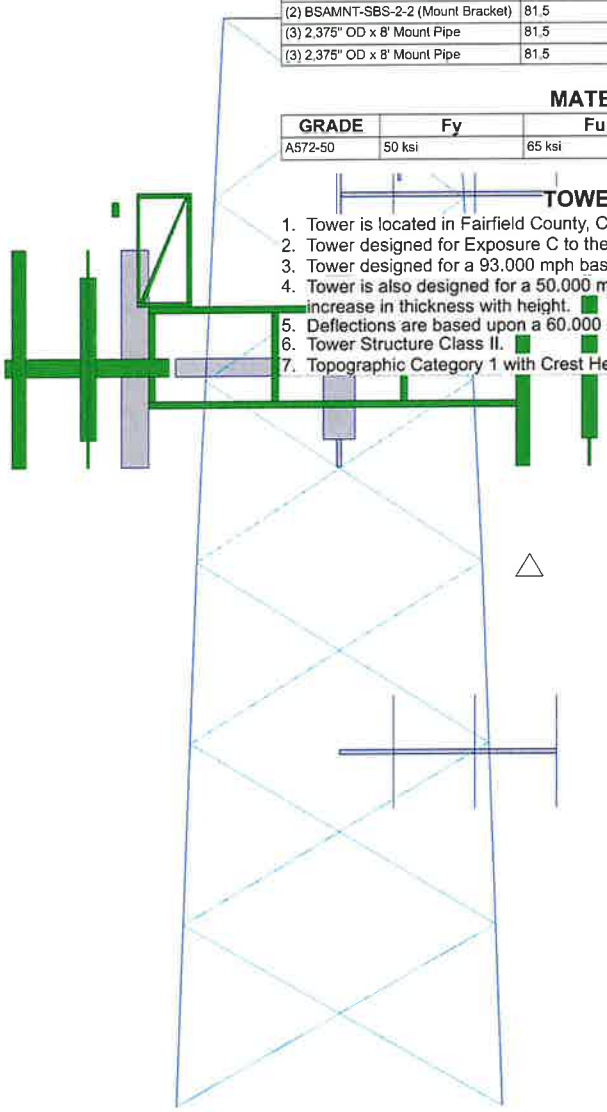
TYPE	ELEVATION	TYPE	ELEVATION
2.5"OD x 16' Omni Whip	94	(3) 2.375" OD x 8' Mount Pipe	81.5
3' Yagi	94	B5/B13 RRH-BR04C	81.5
3' Yagi	93	B5/B13 RRH-BR04C	81.5
13-Ft Wireless Frame	91	B5/B13 RRH-BR04C	81.5
(3) 2.375" OD x 6' Mount Pipe	91	(2) CBC78T-DS-43	81.5
2.375" OD x 12' Mount Pipe	90	(2) CBC78T-DS-43	81.5
3' Yagi	87.5	(2) CBC78T-DS-43	81.5
4-Ft Standoff Mount	85.5	(2) RC2DC-3315-PF-48	81.5
GPS	85.5	LNX-6515DS-A1M_TIA w/ Mount Pipe	81.5
PR-850	85.5	LNX-6515DS-A1M_TIA w/ Mount Pipe	81.5
(3) 16-Ft Sector Mounts	81.5	LNX-6515DS-A1M_TIA w/ Mount Pipe	81.5
JAHH-65B-R3B-V3_TIA w/ Mount Pipe	81.5	VZ-AT1K01	81.5
JAHH-65B-R3B-V3_TIA w/ Mount Pipe	81.5	VZ-AT1K01	81.5
JAHH-65B-R3B-V3_TIA w/ Mount Pipe	81.5	VZ-AT1K01	81.5
JAHH-65B-R3B-V3_TIA w/ Mount Pipe	81.5	CBRS	81.5
JAHH-65B-R3B-V3_TIA w/ Mount Pipe	81.5	CBRS	81.5
JAHH-65B-R3B-V3_TIA w/ Mount Pipe	81.5	CBRS	81.5
(2) BSAMNT-SBS-2-2 (Mount Bracket)	81.5	B2/B66A RRH-BR049	81.5
(2) BSAMNT-SBS-2-2 (Mount Bracket)	81.5	B2/B66A RRH-BR049	81.5
(2) BSAMNT-SBS-2-2 (Mount Bracket)	81.5	B2/B66A RRH-BR049	81.5
(3) 2.375" OD x 8' Mount Pipe	81.5	3' Yagi	67
(3) 2.375" OD x 8' Mount Pipe	81.5	2.375" OD x 6' Side Arm- Pipe	67

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 Fairfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 93.000 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.000 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.000 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.000 ft



Section	T1	T2	T3
Legs	ROHN 2.5 STD		
Leg Grade	A572-50		
Diagonals	L 1.75 x 1.75 x 1/4	L 2 x 2 x 1/4	
Diagonal Grade	A36	N.A.	
Top Girts	L3x3x1/4		
Face Width (ft)	8.5625	10.5625	12.0625
# Panels @ (ft)	6 @ 6.66667		
Weight (K)	1.2	1.3	2.5

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

Job: 40-Ft Roof Mounted S/S: Stamford West: Stamford, C		
Project: 42919-0001.004.8700		
Client: On-Air Engieering, LLC	Drawn by: Kurt Swarts	App'd:
Code: TIA-222-G	Date: 02/24/20	Scale: NTS
Path:		Dwg No. E-1

MATERIAL STRENGTH

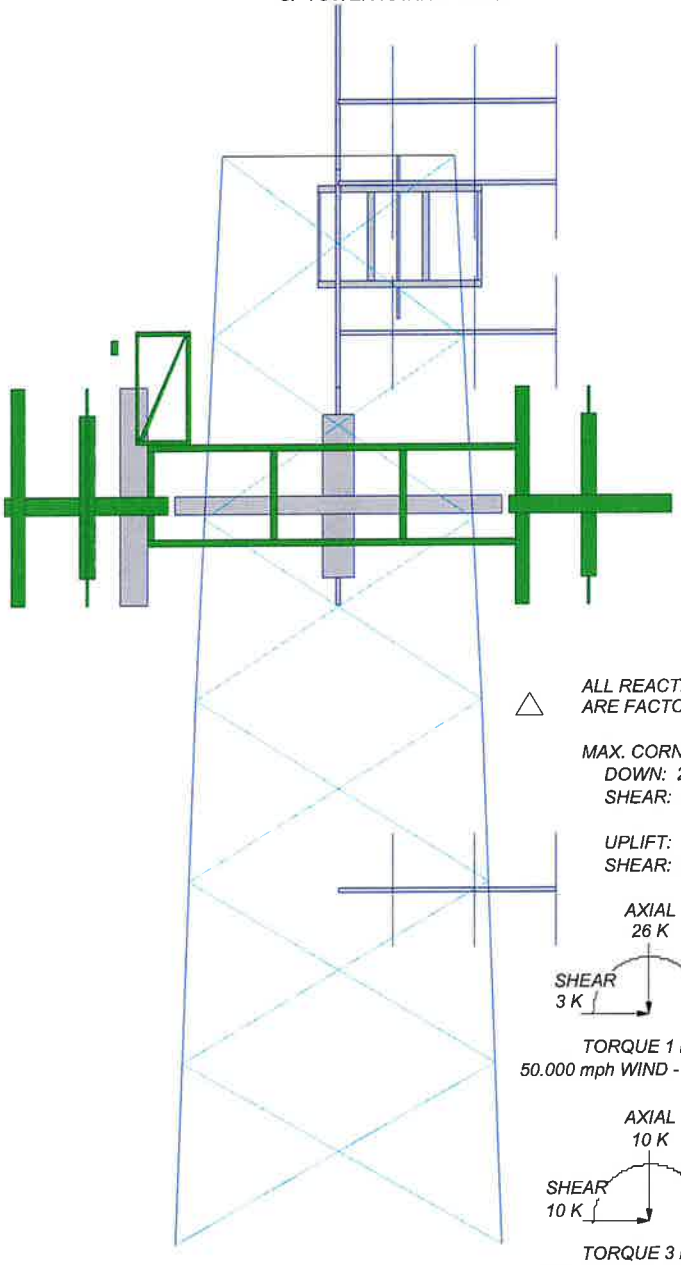
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 93.000 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.000 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.000 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TOWER RATING: 78.8%

Section								
Legs	T1	ROHN 2.5 STD						T2
Leg Grade		A572-50						
Diagonals			L 1.75 x 1.75 x 1/4					L 2 x 2 x 1/4
Diagonal Grade				A36				
Top Girts					L3x3x1/4			N.A.
Face Width (ft)	8.5625						10.5625	
# Panels @ (ft)				6 @ 6.66667				
Weight (K)	T2					T3		

94.0 ft
74.0 ft
54.0 ft



ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 28 K
SHEAR: 5 K

UPLIFT: -21 K
SHEAR: 5 K

AXIAL 26 K
SHEAR 3 K
MOMENT 92 kip-ft

TORQUE 1 kip-ft
50.000 mph WIND - 0.750 in ICE

AXIAL 10 K
SHEAR 10 K
MOMENT 255 kip-ft

TORQUE 3 kip-ft
REACTIONS - 93.000 mph WIND

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250 E. Broad St., Ste 600
Columbus, OH 43215
Phone: 614-221-6679
FAX:

Job: 40-Ft Roof Mounted S/S: Stamford West: Stamford, C			
Project: 42919-0001.004.8700			
Client: On-Air Engieering, LLC	Drawn by: Kurt Swarts	App'd:	
Code: TIA-222-G	Date: 02/24/20	Scale: NTS	
Path:		Dwg No. E-1	

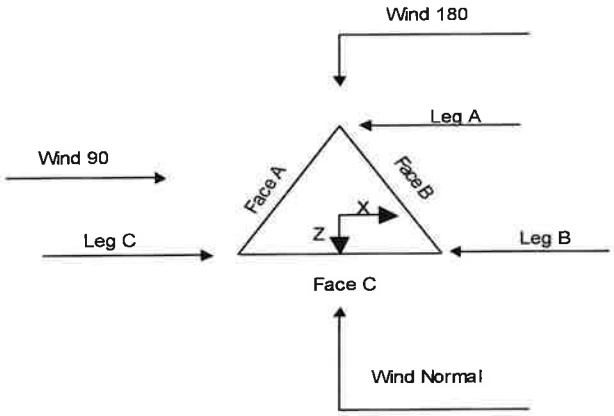
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 94.000 ft above the ground line.
The base of the tower is set at an elevation of 54.000 ft above the ground line.
The face width of the tower is 8.563 ft at the top and 12.063 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1) Tower is located in Fairfield County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 93.000 mph.
4) Structure Class II.
5) Exposure Category C.
6) Topographic Category 1.
7) Crest Height 0.000 ft.
8) Nominal ice thickness of 0.750 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56.000 pcf.
11) A wind speed of 50.000 mph is used in combination with ice.
12) Deflections calculated using a wind speed of 60.000 mph.
13) Pressures are calculated at each section.
14) Stress ratio used in tower member design is 1.
15) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	94.000-74.000			8.563	1	20.000
T2	74.000-54.000			10.563	1	20.000

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	94.000-74.000	6.667	X Brace	No	No	0.000	0.000
T2	74.000-54.000	6.667	X Brace	No	No	0.000	0.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 94.000-74.000	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L 1.75 x 1.75 x 1/4	A36 (36 ksi)
T2 74.000-54.000	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L 2 x 2 x 1/4	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft²	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 94.000-74.000	0.000	0.000	A36 (36 ksi)	1	1	1.15	36.000	36.000	36.000
T2 74.000-54.000	0.000	0.000	A36 (36 ksi)	1	1	1.15	36.000	36.000	36.000

Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 94.000-74.000	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T2 74.000-54.000	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1	1	1	1	1	1	1	1

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

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 94.000-74.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T2 74.000-54.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1 94.000-74.000	Flange	0.750 A325N	4	0.500 A325N	1	0.000 A325N	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0
T2 74.000-54.000	Flange	0.750 A325N	4	0.500 A325N	1	0.000 A325N	1	0.625 A325N	0	0.625 A325N	0	0.625 A325N	0	0.625 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
LDF4-50A (1/2" foam) ****	A	No	No	Ar (CaAa)	94.000 - 57.000	0.000	0.45	6	3	0.630	0.630		0.150
1.5" flat Cable Ladder Rail	C	No	No	Af (CaAa)	81.500 - 57.000	0.000	-0.3	2	2	30.000 1.500	1.500		1.800
LDF5-50A (7/8" foam)	C	No	No	Ar (CaAa)	81.500 - 57.000	0.000	-0.33	6	6	0.500 1.090	1.090		0.330
HFT1206-24S49-150(1-1/4")	C	No	No	Ar (CaAa)	81.500 - 57.000	0.000	-0.23	2	2	0.500 1.560	1.560		1.781

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	94.000-74.000	A	0.000	0.000	7.560	0.000	0.018
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	10.995	0.000	0.069
T2	74.000-54.000	A	0.000	0.000	6.426	0.000	0.015
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	24.922	0.000	0.155

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	94.000-74.000	A	1.647	0.000	0.000	20.675	0.000	0.238
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	28.882	0.000	0.387
T2	74.000-54.000	A	1.603	0.000	0.000	17.310	0.000	0.196
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	64.664	0.000	0.853

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	94.000-74.000	3.703	-3.369	4.876	-2.803
T2	74.000-54.000	8.072	-0.896	10.340	1.210

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	LDF4-50A (1/2" foam)	74.00 - 94.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	3	1.5" flat Cable Ladder Rail	74.00 - 81.50	0.6000	0.6000
T1	4	LDF5-50A (7/8" foam)	74.00 - 81.50	0.6000	0.6000
T1	5	HFT1206-24S49-150(1-1/4")	74.00 - 81.50	0.6000	0.6000
T2	1	LDF4-50A (1/2" foam)	57.00 - 74.00	0.6000	0.6000
T2	3	1.5" flat Cable Ladder Rail	57.00 - 74.00	0.6000	0.6000
T2	4	LDF5-50A (7/8" foam)	57.00 - 74.00	0.6000	0.6000
T2	5	HFT1206-24S49-150(1-1/4")	57.00 - 74.00	0.6000	0.6000

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
2.5"OD x 16' Omni Whip	A	From Leg	0.000 0.000 9.500	0.000	94.000	No Ice 1/2" Ice 1" Ice	4.000 5.629 7.275	4.000 5.629 7.275	0.050 0.080 0.119
3' Yagi	A	From Leg	0.000 0.000 2.000	0.000	94.000	No Ice 1/2" Ice 1" Ice	2.083 3.787 5.517	2.083 3.787 5.517	0.031 0.053 0.085
3' Yagi	A	From Leg	0.000 0.000 0.000	0.000	93.000	No Ice 1/2" Ice 1" Ice	2.083 3.787 5.517	2.083 3.787 5.517	0.031 0.053 0.085
3' Yagi	A	From Leg	0.000 0.000 0.000	0.000	87.500	No Ice 1/2" Ice 1" Ice	2.083 3.787 5.517	2.083 3.787 5.517	0.031 0.053 0.085
2.375" OD x 12' Mount Pipe	A	From Leg	0.000 0.000 0.000	0.000	90.000	No Ice 1/2" Ice 1" Ice	2.850 4.078 5.323	2.850 4.078 5.323	0.109 0.130 0.159
**** PR-850	C	From Leg	4.000 0.000 0.000	0.000	85.500	No Ice 1/2" Ice 1" Ice	6.350 11.430 16.510	6.350 11.430 16.510	0.038 0.049 0.061
GPS	C	From Leg	4.000 0.000 1.500	0.000	85.500	No Ice 1/2" Ice 1" Ice	0.146 0.238 0.311	0.146 0.238 0.311	0.015 0.018 0.023
4-Ft Standoff Mount	C	From Leg	2.000 0.000 0.000	0.000	85.500	No Ice 1/2" Ice 1" Ice	1.670 2.510 3.350	3.270 4.990 6.710	0.055 0.088 0.121
**** [SO 302-1] 3' Yagi	A	From Leg	6.000 0.000 0.000	0.000	67.000	No Ice 1/2" Ice 1" Ice	2.083 3.787 5.517	2.083 3.787 5.517	0.031 0.053 0.085

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
2.375" OD x 6' Side Arm-Pipe	A	From Leg	3.000 0.000 0.000	0.000	67.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.025 0.036 0.051
****									
13-Ft Wireless Frame	B	From Face	0.000 0.000 0.000	0.000	91.000	No Ice 1/2" Ice 1" Ice	17.890 24.350 30.810	5.840 9.070 12.300	0.361 0.497 0.632
**** SM 201-1 (3) 2.375" OD x 6' Mount Pipe	B	From Face	0.000 0.000 0.000	0.000	91.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.025 0.036 0.051
****									
(3) 16-Ft Sector Mounts	C	None		0.000	81.500	No Ice 1/2" Ice 1" Ice	41.210 58.100 74.620	41.210 58.100 74.620	2.466 3.171 4.086
**** SM 511-3 JAHH-65B-R3B-V3_TIA w/ Mount Pipe	A	From Leg	5.000 0.000 0.000	0.000	81.500	No Ice 1/2" Ice 1" Ice	9.351 9.921 10.455	7.646 8.833 9.734	0.089 0.165 0.250
JAHH-65B-R3B-V3_TIA w/ Mount Pipe	A	From Leg	5.000 0.000 0.000	0.000	81.500	No Ice 1/2" Ice 1" Ice	9.351 9.921 10.455	7.646 8.833 9.734	0.089 0.165 0.250
JAHH-65B-R3B-V3_TIA w/ Mount Pipe	B	From Leg	5.000 0.000 0.000	0.000	81.500	No Ice 1/2" Ice 1" Ice	9.351 9.921 10.455	7.646 8.833 9.734	0.089 0.165 0.250
JAHH-65B-R3B-V3_TIA w/ Mount Pipe	B	From Leg	5.000 0.000 0.000	0.000	81.500	No Ice 1/2" Ice 1" Ice	9.351 9.921 10.455	7.646 8.833 9.734	0.089 0.165 0.250
JAHH-65B-R3B-V3_TIA w/ Mount Pipe	C	From Leg	5.000 0.000 0.000	0.000	81.500	No Ice 1/2" Ice 1" Ice	9.351 9.921 10.455	7.646 8.833 9.734	0.089 0.165 0.250
JAHH-65B-R3B-V3_TIA w/ Mount Pipe	C	From Leg	5.000 0.000 0.000	0.000	81.500	No Ice 1/2" Ice 1" Ice	9.351 9.921 10.455	7.646 8.833 9.734	0.089 0.165 0.250
(2) BSAMNT-SBS-2-2 (Mount Bracket)	A	From Leg	5.000 0.000 0.000	0.000	81.500	No Ice 1/2" Ice 1" Ice	0.000 0.000 0.000	0.000 0.000 0.000	0.067 0.088 0.108
(2) BSAMNT-SBS-2-2 (Mount Bracket)	B	From Leg	5.000 0.000 0.000	0.000	81.500	No Ice 1/2" Ice 1" Ice	0.000 0.000 0.000	0.000 0.000 0.000	0.067 0.088 0.108
(2) BSAMNT-SBS-2-2 (Mount Bracket)	C	From Leg	5.000 0.000 0.000	0.000	81.500	No Ice 1/2" Ice 1" Ice	0.000 0.000 0.000	0.000 0.000 0.000	0.067 0.088 0.108
(3) 2.375" OD x 8' Mount Pipe	A	From Leg	5.000 0.000 0.000	0.000	81.500	No Ice 1/2" Ice 1" Ice	1.900 2.728 3.401	1.900 2.728 3.401	0.029 0.043 0.063
(3) 2.375" OD x 8' Mount Pipe	B	From Leg	5.000 0.000 0.000	0.000	81.500	No Ice 1/2" Ice 1" Ice	1.900 2.728 3.401	1.900 2.728 3.401	0.029 0.043 0.063
(3) 2.375" OD x 8' Mount	C	From Leg	5.000	0.000	81.500	No Ice	1.900	1.900	0.029

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
Pipe			0.000			1/2"	2.728	2.728	0.043
			0.000			Ice	3.401	3.401	0.063
						1" Ice			
B5/B13 RRH-BR04C	A	From Leg	2.500	0.000	81.500	No Ice	1.875	1.013	0.070
			0.000			1/2"	2.045	1.145	0.087
			0.000			Ice	2.223	1.284	0.106
						1" Ice			
B5/B13 RRH-BR04C	B	From Leg	2.500	0.000	81.500	No Ice	1.875	1.013	0.070
			0.000			1/2"	2.045	1.145	0.087
			0.000			Ice	2.223	1.284	0.106
						1" Ice			
B5/B13 RRH-BR04C	C	From Leg	2.500	0.000	81.500	No Ice	1.875	1.013	0.070
			0.000			1/2"	2.045	1.145	0.087
			0.000			Ice	2.223	1.284	0.106
						1" Ice			
(2) CBC78T-DS-43	A	From Leg	5.000	0.000	81.500	No Ice	0.362	0.270	0.011
			0.000			1/2"	0.439	0.338	0.015
			0.000			Ice	0.524	0.414	0.020
						1" Ice			
(2) CBC78T-DS-43	B	From Leg	5.000	0.000	81.500	No Ice	0.362	0.270	0.011
			0.000			1/2"	0.439	0.338	0.015
			0.000			Ice	0.524	0.414	0.020
						1" Ice			
(2) CBC78T-DS-43	C	From Leg	5.000	0.000	81.500	No Ice	0.362	0.270	0.011
			0.000			1/2"	0.439	0.338	0.015
			0.000			Ice	0.524	0.414	0.020
						1" Ice			
(2) RC2DC-3315-PF-48	C	From Leg	0.000	0.000	81.500	No Ice	4.050	2.958	0.032
			0.000			1/2"	4.308	3.192	0.068
			0.000			Ice	4.573	3.432	0.107
						1" Ice			
LNX-6515DS-A1M_TIA w/ Mount Pipe	A	From Leg	5.000	0.000	81.500	No Ice	11.683	9.842	0.086
			-7.500			1/2"	12.404	11.366	0.176
			0.000			Ice	13.135	12.914	0.276
						1" Ice			
LNX-6515DS-A1M_TIA w/ Mount Pipe	B	From Leg	5.000	0.000	81.500	No Ice	11.683	9.842	0.086
			5.000			1/2"	12.404	11.366	0.176
			0.000			Ice	13.135	12.914	0.276
						1" Ice			
LNX-6515DS-A1M_TIA w/ Mount Pipe	C	From Leg	5.000	0.000	81.500	No Ice	11.683	9.842	0.086
			5.000			1/2"	12.404	11.366	0.176
			0.000			Ice	13.135	12.914	0.276
						1" Ice			
VZ-AT1K01	A	From Leg	5.000	0.000	81.500	No Ice	2.111	1.078	0.038
			7.500			1/2"	2.308	1.242	0.052
			1.900			Ice	2.515	1.414	0.070
						1" Ice			
VZ-AT1K01	B	From Leg	5.000	0.000	81.500	No Ice	2.111	1.078	0.038
			7.500			1/2"	2.308	1.242	0.052
			1.900			Ice	2.515	1.414	0.070
						1" Ice			
VZ-AT1K01	C	From Leg	5.000	0.000	81.500	No Ice	2.111	1.078	0.038
			7.500			1/2"	2.308	1.242	0.052
			1.900			Ice	2.515	1.414	0.070
						1" Ice			
CBRS	A	From Leg	5.000	0.000	81.500	No Ice	1.534	0.747	0.023
			5.000			1/2"	1.691	0.866	0.035
			1.900			Ice	1.855	0.992	0.049
						1" Ice			
CBRS	B	From Leg	5.000	0.000	81.500	No Ice	1.534	0.747	0.023
			-7.500			1/2"	1.691	0.866	0.035
			1.900			Ice	1.855	0.992	0.049
						1" Ice			
CBRS	C	From Leg	5.000	0.000	81.500	No Ice	1.534	0.747	0.023
			-7.500			1/2"	1.691	0.866	0.035

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
			1.900			Ice	1.855	0.992	0.049
						1" Ice			
B2/B66A RRH-BR049	A	From Leg	2.500	0.000	81.500	No Ice	1.875	1.013	0.070
			0.000			1/2"	2.045	1.145	0.087
			0.000			Ice	2.223	1.284	0.106
						1" Ice			
B2/B66A RRH-BR049	B	From Leg	2.500	0.000	81.500	No Ice	1.875	1.013	0.070
			0.000			1/2"	2.045	1.145	0.087
			0.000			Ice	2.223	1.284	0.106
						1" Ice			
B2/B66A RRH-BR049	C	From Leg	2.500	0.000	81.500	No Ice	1.875	1.013	0.070
			0.000			1/2"	2.045	1.145	0.087
			0.000			Ice	2.223	1.284	0.106
						1" Ice			

Tower Pressures - No Ice

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % 	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 94.000-74.000	84.000	1.22	22.961	196.048	A	12.346	9.599	9.599	43.74	7.560	0.000
					B	12.346	9.599		43.74	0.000	0.000
					C	12.346	9.599		43.74	10.995	0.000
T2 74.000-54.000	64.000	1.152	21.683	231.045	A	13.133	9.592	9.592	42.21	6.426	0.000
					B	13.133	9.592		42.21	0.000	0.000
					C	13.133	9.592		42.21	24.922	0.000

Tower Pressure - With Ice

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % 	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 94.000-74.000	84.000	1.22	6.637	1.647	201.544	A	12.346	42.155	20.597	37.79	20.675	0.000
						B	12.346	42.155		37.79	0.000	0.000
						C	12.346	42.155		37.79	28.882	0.000
T2 74.000-54.000	64.000	1.152	6.268	1.603	236.391	A	13.133	41.336	20.287	37.25	17.310	0.000
						B	13.133	41.336		37.25	0.000	0.000
						C	13.133	41.336		37.25	64.664	0.000

Tower Pressure - Service

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 94.000-74.000	84.000	1.22	9.557	196.048	A	12.346	9.599	9.599	43.74	7.560	0.000
					B	12.346	9.599		43.74	0.000	0.000
					C	12.346	9.599		43.74	10.995	0.000
T2 74.000-54.000	64.000	1.152	9.025	231.045	A	13.133	9.592	9.592	42.21	6.426	0.000
					B	13.133	9.592		42.21	0.000	0.000
					C	13.133	9.592		42.21	24.922	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 94.000-74.000	0.087	1.213	A	0.112	2.917	22.96	1	1	17.767	1.205	60.230	C
			B	0.112	2.917	1	1	1	17.767			
			C	0.112	2.917		1	1	17.767			
T2 74.000-54.000	0.171	1.268	A	0.098	2.971	21.68	1	1	18.546	1.343	67.142	C
			B	0.098	2.971	3	1	1	18.546			
			C	0.098	2.971		1	1	18.546			
Sum Weight:	0.257	2.481						OTM	49.566 kip-ft	2.547		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 94.000-74.000	0.087	1.213	A	0.112	2.917	22.96	0.8	1	15.298	1.064	53.203	A
			B	0.112	2.917	1	0.8	1	15.298			
			C	0.112	2.917		0.8	1	15.298			
T2 74.000-54.000	0.171	1.268	A	0.098	2.971	21.68	0.8	1	15.920	1.199	59.951	A
			B	0.098	2.971	3	0.8	1	15.920			
			C	0.098	2.971		0.8	1	15.920			
Sum Weight:	0.257	2.481						OTM	43.912 kip-ft	2.263		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 94.000-74.000	0.087	1.213	A	0.112	2.917	22.96	0.85	1	15.915	1.118	55.882	B
			B	0.112	2.917	1	0.85	1	15.915			
			C	0.112	2.917		0.85	1	15.915			
T2 74.000-54.000	0.171	1.268	A	0.098	2.971	21.68	0.85	1	16.576	1.250	62.489	B
			B	0.098	2.971	3	0.85	1	16.576			
			C	0.098	2.971		0.85	1	16.576			
Sum Weight:	0.257	2.481						OTM	46.027 kip-ft	2.367		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 94.000-74.000	0.625	3.805	A	0.27	2.378	6.637	1	1	37.229	0.636	31.819	C
			B	0.27	2.378		1	1	37.229			
			C	0.27	2.378		1	1	37.229			
T2 74.000-54.000	1.049	3.846	A	0.23	2.498	6.268	1	1	37.127	0.722	36.115	C
			B	0.23	2.498		1	1	37.127			
			C	0.23	2.498		1	1	37.127			
Sum Weight:	1.674	7.651						OTM	26.314 kip-ft	1.359		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 94.000-74.000	0.625	3.805	A	0.27	2.378	6.637	0.8	1	34.760	0.603	30.163	A
			B	0.27	2.378		0.8	1	34.760			
			C	0.27	2.378		0.8	1	34.760			
T2 74.000-54.000	1.049	3.846	A	0.23	2.498	6.268	0.8	1	34.501	0.687	34.367	A
			B	0.23	2.498		0.8	1	34.501			
			C	0.23	2.498		0.8	1	34.501			
Sum Weight:	1.674	7.651						OTM	24.971 kip-ft	1.291		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 94.000-74.000	0.625	3.805	A	0.27	2.378	6.637	0.85	1	35.377	0.609	30.447	B
			B	0.27	2.378		0.85	1	35.377			
			C	0.27	2.378		0.85	1	35.377			
T2 74.000-54.000	1.049	3.846	A	0.23	2.498	6.268	0.85	1	35.157	0.683	34.168	B
			B	0.23	2.498		0.85	1	35.157			
			C	0.23	2.498		0.85	1	35.157			
Sum Weight:	1.674	7.651						OTM	25.102 kip-ft	1.292		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 94.000-74.000	0.087	1.213	A	0.112	2.917	9.557	1	1	17.767	0.501	25.070	C
			B	0.112	2.917		1	1	17.767			
			C	0.112	2.917		1	1	17.767			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T2 74.000-54.000	0.171	1.268	A	0.098	2.971	9.025	1	1	18.546	0.559	27.947	C
			B	0.098	2.971		1	1	18.546			
			C	0.098	2.971		1	1	18.546			
Sum Weight:	0.257	2.481						OTM	20.631 kip-ft	1.060		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 94.000-74.000	0.087	1.213	A	0.112	2.917	9.557	0.8	1	15.298	0.443	22.145	A
			B	0.112	2.917		0.8	1	15.298			
			C	0.112	2.917		0.8	1	15.298			
T2 74.000-54.000	0.171	1.268	A	0.098	2.971	9.025	0.8	1	15.920	0.499	24.954	A
			B	0.098	2.971		0.8	1	15.920			
			C	0.098	2.971		0.8	1	15.920			
Sum Weight:	0.257	2.481						OTM	18.278 kip-ft	0.942		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 94.000-74.000	0.087	1.213	A	0.112	2.917	9.557	0.85	1	15.915	0.465	23.260	B
			B	0.112	2.917		0.85	1	15.915			
			C	0.112	2.917		0.85	1	15.915			
T2 74.000-54.000	0.171	1.268	A	0.098	2.971	9.025	0.85	1	16.576	0.520	26.010	B
			B	0.098	2.971		0.85	1	16.576			
			C	0.098	2.971		0.85	1	16.576			
Sum Weight:	0.257	2.481						OTM	19.158 kip-ft	0.985		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	0.801					
Bracing Weight	1.680					
Total Member Self-Weight	2.481			-1.293	0.252	
Total Weight	8.247			-1.293	0.252	
Wind 0 deg - No Ice		0.105	-6.134	-155.600	-3.555	-2.150
Wind 30 deg - No Ice		3.103	-5.165	-132.855	-80.101	-2.095
Wind 60 deg - No Ice		5.146	-2.971	-78.190	-132.937	-1.963
Wind 90 deg - No Ice		5.813	-0.105	-5.101	-150.636	-1.586
Wind 120 deg - No Ice		5.325	2.954	72.292	-134.816	0.289

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 150 deg - No Ice		2.947	5.104	127.372	-74.032	1.495
Wind 180 deg - No Ice		-0.105	5.850	147.360	4.060	2.150
Wind 210 deg - No Ice		-3.103	5.165	130.268	80.606	2.095
Wind 240 deg - No Ice		-5.392	3.113	78.431	138.339	1.963
Wind 270 deg - No Ice		-5.813	0.105	2.514	151.140	1.586
Wind 300 deg - No Ice		-5.079	-2.811	-72.051	130.424	-0.289
Wind 330 deg - No Ice		-2.947	-5.104	-129.958	74.537	-1.495
Member Ice	5.170					
Total Weight Ice	24.440			-4.608	1.828	
Wind 0 deg - Ice		0.050	-3.383	-91.272	-0.043	-1.051
Wind 30 deg - Ice		1.723	-2.884	-79.283	-43.446	-1.334
Wind 60 deg - Ice		2.881	-1.663	-48.276	-73.808	-1.423
Wind 90 deg - Ice		3.255	-0.050	-6.478	-83.832	-1.165
Wind 120 deg - Ice		2.902	1.618	36.644	-73.364	-0.187
Wind 150 deg - Ice		1.644	2.847	68.460	-40.358	0.593
Wind 180 deg - Ice		-0.050	3.315	80.713	3.699	1.051
Wind 210 deg - Ice		-1.723	2.884	70.068	47.102	1.334
Wind 240 deg - Ice		-2.940	1.697	39.732	78.627	1.423
Wind 270 deg - Ice		-3.255	0.050	-2.737	87.488	1.165
Wind 300 deg - Ice		-2.843	-1.584	-45.188	75.856	0.187
Wind 330 deg - Ice		-1.644	-2.847	-77.675	44.013	-0.593
Total Weight	8.247			-1.293	0.252	
Wind 0 deg - Service		0.044	-2.553	-66.054	-0.662	-0.895
Wind 30 deg - Service		1.292	-2.150	-56.586	-32.523	-0.872
Wind 60 deg - Service		2.142	-1.237	-33.833	-54.515	-0.817
Wind 90 deg - Service		2.420	-0.044	-3.411	-61.882	-0.660
Wind 120 deg - Service		2.216	1.229	28.803	-55.297	0.120
Wind 150 deg - Service		1.227	2.124	51.729	-29.997	0.622
Wind 180 deg - Service		-0.044	2.435	60.048	2.507	0.895
Wind 210 deg - Service		-1.292	2.150	52.934	34.368	0.872
Wind 240 deg - Service		-2.244	1.296	31.358	58.399	0.817
Wind 270 deg - Service		-2.420	0.044	-0.241	63.727	0.660
Wind 300 deg - Service		-2.114	-1.170	-31.278	55.104	-0.120
Wind 330 deg - Service		-1.227	-2.124	-55.380	31.842	-0.622

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

Comb. No.	Description
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
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 Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	94 - 74	Leg	Max Tension	7	3.436	-0.564	0.023
			Max. Compression	27	-9.091	-0.051	-0.018
			Max. Mx	6	-0.946	0.676	0.023
			Max. My	12	-2.428	-0.034	0.769
			Max. Vy	6	1.500	-0.572	0.023
			Max. Vx	12	1.610	-0.034	-0.572
		Diagonal	Max Tension	16	3.163	0.000	0.000
			Max. Compression	4	-3.192	0.000	0.000
			Max. Mx	35	0.059	0.048	0.006
			Max. My	34	-1.066	0.043	-0.008
			Max. Vy	35	0.040	0.048	0.006
			Max. Vx	34	0.002	0.000	0.000
		Top Girt	Max Tension	19	0.410	0.000	0.000
			Max. Compression	6	-0.508	0.000	0.000
			Max. Mx	26	-0.158	-0.171	0.000
			Max. My	26	-0.160	0.000	0.005
			Max. Vy	26	-0.080	0.000	0.000
			Max. Vx	26	-0.002	0.000	0.000
T2	74 - 54	Leg	Max Tension	7	18.694	-0.050	-0.010
			Max. Compression	18	-24.997	0.000	0.000
			Max. Mx	2	-18.607	0.125	-0.005
			Max. My	4	-3.602	-0.011	-0.141
			Max. Vy	18	0.083	0.124	0.002
			Max. Vx	8	0.108	0.009	0.008
		Diagonal	Max Tension	4	3.324	0.000	0.000
			Max. Compression	16	-3.294	0.000	0.000
			Max. Mx	38	0.706	0.072	-0.007
			Max. My	28	-1.125	0.055	0.007
			Max. Vy	28	0.050	0.071	-0.007
			Max. Vx	28	-0.002	0.000	0.000

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	27.671	4.517	-2.783
	Max. H_x	18	27.671	4.517	-2.783
	Max. H_z	5	-18.296	-3.206	2.868
	Min. Vert	7	-21.118	-4.049	2.510
	Min. H_x	7	-21.118	-4.049	2.510
	Min. H_z	16	23.983	3.465	-3.020
Leg B	Max. Vert	10	26.750	-4.501	-2.557
	Max. H_x	23	-20.285	4.031	2.282
	Max. H_z	25	-17.307	3.207	2.557
	Min. Vert	23	-20.285	4.031	2.282
	Min. H_x	10	26.750	-4.501	-2.557
	Min. H_z	12	22.906	-3.467	-2.711
Leg A	Max. Vert	2	27.081	-0.180	5.215
	Max. H_x	20	2.864	1.543	0.079
	Max. H_z	2	27.081	-0.180	5.215
	Min. Vert	15	-20.183	0.181	-4.668
	Min. H_x	9	3.169	-1.542	0.226
	Min. H_z	15	-20.183	0.181	-4.668

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	8.247	0.000	0.000	-1.293	0.252	0.000
1.2 Dead+1.6 Wind 0 deg - No Ice	9.896	0.167	-9.814	-248.442	-5.789	-3.439
0.9 Dead+1.6 Wind 0 deg - No Ice	7.422	0.167	-9.814	-248.054	-5.865	-3.439
1.2 Dead+1.6 Wind 30 deg - No Ice	9.896	4.965	-8.265	-212.049	-128.263	-3.351
0.9 Dead+1.6 Wind 30 deg - No Ice	7.422	4.965	-8.265	-211.661	-128.338	-3.351
1.2 Dead+1.6 Wind 60 deg - No Ice	9.896	8.233	-4.754	-124.586	-212.800	-3.141
0.9 Dead+1.6 Wind 60 deg - No Ice	7.422	8.233	-4.754	-124.198	-212.876	-3.141
1.2 Dead+1.6 Wind 90 deg - No Ice	9.896	9.301	-0.167	-7.643	-241.117	-2.538
0.9 Dead+1.6 Wind 90 deg - No Ice	7.422	9.301	-0.167	-7.255	-241.193	-2.538
1.2 Dead+1.6 Wind 120 deg - No Ice	9.896	8.520	4.726	116.185	-215.806	0.463
0.9 Dead+1.6 Wind 120 deg - No Ice	7.422	8.520	4.726	116.573	-215.882	0.463
1.2 Dead+1.6 Wind 150 deg - No Ice	9.896	4.715	8.166	204.312	-118.552	2.392
0.9 Dead+1.6 Wind 150 deg - No Ice	7.422	4.715	8.166	204.700	-118.628	2.392
1.2 Dead+1.6 Wind 180 deg - No Ice	9.896	-0.167	9.359	236.293	6.395	3.439
0.9 Dead+1.6 Wind 180 deg - No Ice	7.422	-0.167	9.359	236.681	6.319	3.439
1.2 Dead+1.6 Wind 210 deg - No Ice	9.896	-4.965	8.265	208.947	128.868	3.351
0.9 Dead+1.6 Wind 210 deg - No Ice	7.422	-4.965	8.265	209.335	128.793	3.351
1.2 Dead+1.6 Wind 240 deg - No Ice	9.896	-8.627	4.981	126.008	221.241	3.141
0.9 Dead+1.6 Wind 240 deg - No Ice	7.422	-8.627	4.981	126.395	221.165	3.141
1.2 Dead+1.6 Wind 270 deg - No Ice	9.896	-9.301	0.167	4.541	241.723	2.538
0.9 Dead+1.6 Wind 270 deg	7.422	-9.301	0.167	4.929	241.647	2.538

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
- No Ice 1.2 Dead+1.6 Wind 300 deg	9.896	-8.126	-4.498	-114.764	208.577	-0.463
- No Ice 0.9 Dead+1.6 Wind 300 deg	7.422	-8.126	-4.498	-114.376	208.502	-0.463
- No Ice 1.2 Dead+1.6 Wind 330 deg	9.896	-4.715	-8.166	-207.415	119.158	-2.392
- No Ice 0.9 Dead+1.6 Wind 330 deg	7.422	-4.715	-8.166	-207.027	119.083	-2.392
- No Ice 1.2 Dead+1.0 Ice	26.089	0.000	0.000	-4.864	1.878	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice	26.089	0.050	-3.383	-91.528	0.007	-1.050
1.2 Dead+1.0 Wind 30 deg+1.0 Ice	26.089	1.723	-2.884	-79.539	-43.396	-1.333
1.2 Dead+1.0 Wind 60 deg+1.0 Ice	26.089	2.881	-1.663	-48.533	-73.758	-1.422
1.2 Dead+1.0 Wind 90 deg+1.0 Ice	26.089	3.255	-0.050	-6.735	-83.782	-1.165
1.2 Dead+1.0 Wind 120 deg+1.0 Ice	26.089	2.902	1.618	36.387	-73.313	-0.187
1.2 Dead+1.0 Wind 150 deg+1.0 Ice	26.089	1.644	2.847	68.203	-40.308	0.593
1.2 Dead+1.0 Wind 180 deg+1.0 Ice	26.089	-0.050	3.315	80.456	3.749	1.050
1.2 Dead+1.0 Wind 210 deg+1.0 Ice	26.089	-1.723	2.884	69.811	47.152	1.333
1.2 Dead+1.0 Wind 240 deg+1.0 Ice	26.089	-2.940	1.697	39.475	78.677	1.422
1.2 Dead+1.0 Wind 270 deg+1.0 Ice	26.089	-3.255	0.050	-2.993	87.538	1.165
1.2 Dead+1.0 Wind 300 deg+1.0 Ice	26.089	-2.843	-1.584	-45.444	75.906	0.187
1.2 Dead+1.0 Wind 330 deg+1.0 Ice	26.089	-1.644	-2.847	-77.932	44.063	-0.593
Dead+Wind 0 deg - Service	8.247	0.044	-2.553	-65.520	-1.332	-0.895
Dead+Wind 30 deg - Service	8.247	1.292	-2.150	-56.053	-33.193	-0.872
Dead+Wind 60 deg - Service	8.247	2.142	-1.237	-33.300	-55.185	-0.817
Dead+Wind 90 deg - Service	8.247	2.420	-0.044	-2.877	-62.552	-0.660
Dead+Wind 120 deg - Service	8.247	2.216	1.229	29.336	-55.967	0.120
Dead+Wind 150 deg - Service	8.247	1.227	2.124	52.262	-30.667	0.622
Dead+Wind 180 deg - Service	8.247	-0.044	2.435	60.582	1.837	0.895
Dead+Wind 210 deg - Service	8.247	-1.292	2.150	53.468	33.698	0.872
Dead+Wind 240 deg - Service	8.247	-2.244	1.296	31.891	57.729	0.817
Dead+Wind 270 deg - Service	8.247	-2.420	0.044	0.292	63.057	0.660
Dead+Wind 300 deg - Service	8.247	-2.114	-1.170	-30.744	54.434	-0.120
Dead+Wind 330 deg - Service	8.247	-1.227	-2.124	-54.847	31.172	-0.622

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.000	-8.247	0.000	0.000	8.247	0.000	0.000%
2	0.167	-9.896	-9.814	-0.167	9.896	9.814	0.000%
3	0.167	-7.422	-9.814	-0.167	7.422	9.814	0.000%
4	4.965	-9.896	-8.265	-4.965	9.896	8.265	0.000%
5	4.965	-7.422	-8.265	-4.965	7.422	8.265	0.000%
6	8.233	-9.896	-4.754	-8.233	9.896	4.754	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
7	8.233	-7.422	-4.754	-8.233	7.422	4.754	0.000%
8	9.301	-9.896	-0.167	-9.301	9.896	0.167	0.000%
9	9.301	-7.422	-0.167	-9.301	7.422	0.167	0.000%
10	8.520	-9.896	4.726	-8.520	9.896	-4.726	0.000%
11	8.520	-7.422	4.726	-8.520	7.422	-4.726	0.000%
12	4.715	-9.896	8.166	-4.715	9.896	-8.166	0.000%
13	4.715	-7.422	8.166	-4.715	7.422	-8.166	0.000%
14	-0.167	-9.896	9.359	0.167	9.896	-9.359	0.000%
15	-0.167	-7.422	9.359	0.167	7.422	-9.359	0.000%
16	-4.965	-9.896	8.265	4.965	9.896	-8.265	0.000%
17	-4.965	-7.422	8.265	4.965	7.422	-8.265	0.000%
18	-8.627	-9.896	4.981	8.627	9.896	-4.981	0.000%
19	-8.627	-7.422	4.981	8.627	7.422	-4.981	0.000%
20	-9.301	-9.896	0.167	9.301	9.896	-0.167	0.000%
21	-9.301	-7.422	0.167	9.301	7.422	-0.167	0.000%
22	-8.126	-9.896	-4.498	8.126	9.896	4.498	0.000%
23	-8.126	-7.422	-4.498	8.126	7.422	4.498	0.000%
24	-4.715	-9.896	-8.166	4.715	9.896	8.166	0.000%
25	-4.715	-7.422	-8.166	4.715	7.422	8.166	0.000%
26	0.000	-26.089	0.000	0.000	26.089	0.000	0.000%
27	0.050	-26.089	-3.383	-0.050	26.089	3.383	0.000%
28	1.723	-26.089	-2.884	-1.723	26.089	2.884	0.000%
29	2.881	-26.089	-1.663	-2.881	26.089	1.663	0.000%
30	3.255	-26.089	-0.050	-3.255	26.089	0.050	0.000%
31	2.902	-26.089	1.618	-2.902	26.089	-1.618	0.000%
32	1.644	-26.089	2.847	-1.644	26.089	-2.847	0.000%
33	-0.050	-26.089	3.315	0.050	26.089	-3.315	0.000%
34	-1.723	-26.089	2.884	1.723	26.089	-2.884	0.000%
35	-2.940	-26.089	1.697	2.940	26.089	-1.697	0.000%
36	-3.255	-26.089	0.050	3.255	26.089	-0.050	0.000%
37	-2.843	-26.089	-1.584	2.843	26.089	1.584	0.000%
38	-1.644	-26.089	-2.847	1.644	26.089	2.847	0.000%
39	0.044	-8.247	-2.553	-0.044	8.247	2.553	0.000%
40	1.292	-8.247	-2.150	-1.292	8.247	2.150	0.000%
41	2.142	-8.247	-1.237	-2.142	8.247	1.237	0.000%
42	2.420	-8.247	-0.044	-2.420	8.247	0.044	0.000%
43	2.216	-8.247	1.229	-2.216	8.247	-1.229	0.000%
44	1.227	-8.247	2.124	-1.227	8.247	-2.124	0.000%
45	-0.044	-8.247	2.435	0.044	8.247	-2.435	0.000%
46	-1.292	-8.247	2.150	1.292	8.247	-2.150	0.000%
47	-2.244	-8.247	1.296	2.244	8.247	-1.296	0.000%
48	-2.420	-8.247	0.044	2.420	8.247	-0.044	0.000%
49	-2.114	-8.247	-1.170	2.114	8.247	1.170	0.000%
50	-1.227	-8.247	-2.124	1.227	8.247	2.124	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	94 - 74	0.125	47	0.017	0.003
T2	74 - 54	0.048	47	0.014	0.002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
94.000	2.5"OD x 16' Omni Whip	47	0.125	0.017	0.003	433484
93.000	3' Yagi	47	0.121	0.017	0.003	433484
91.000	13-Ft Wireless Frame	47	0.113	0.017	0.003	433484

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
90.000	2.375" OD x 12' Mount Pipe	47	0.109	0.017	0.003	433484
87.500	3' Yagi	47	0.098	0.017	0.003	333450
85.500	PR-850	47	0.090	0.017	0.003	254991
81.500	(3) 16-Ft Sector Mounts	47	0.074	0.017	0.002	173394
67.000	3' Yagi	47	0.029	0.011	0.001	166725

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	94 - 74	0.484	19	0.065	0.013
T2	74 - 54	0.186	19	0.056	0.007

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
94.000	2.5"OD x 16' Omni Whip	19	0.484	0.065	0.013	114659
93.000	3' Yagi	19	0.468	0.065	0.013	114659
91.000	13-Ft Wireless Frame	19	0.435	0.065	0.012	114659
90.000	2.375" OD x 12' Mount Pipe	19	0.419	0.065	0.012	114659
87.500	3' Yagi	19	0.379	0.065	0.011	88199
85.500	PR-850	19	0.348	0.065	0.011	67447
81.500	(3) 16-Ft Sector Mounts	19	0.287	0.063	0.009	45864
67.000	3' Yagi	19	0.111	0.041	0.005	44100

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	94	Leg	A325N	0.750	4	0.859	29.821	0.029 ✔	1	Bolt Tension
		Diagonal	A325N	0.500	1	3.163	7.612	0.415 ✔	1	Member Block Shear
T2	74	Leg	A325N	0.750	4	4.674	29.821	0.157 ✔	1	Bolt Tension
		Diagonal	A325N	0.500	1	3.324	7.952	0.418 ✔	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 $\frac{P_u}{\phi P_n}$

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	94 - 74	ROHN 2.5 STD	20.033	6.678	84.6 K=1.00	1.704	-9.091	45.449	0.200 [1] ✔
T2	74 - 54	ROHN 2.5 STD	20.019	6.673	84.5 K=1.00	1.704	-24.997	45.484	0.550 [1] ✔

[1] $P_u / \phi P_n$ 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	94 - 74	L 1.75 x 1.75 x 1/4	12.211	6.058	212.9 K=1.00	0.813	-3.192	4.048	0.788 [1] ✔
T2	74 - 54	KL/R > 200 (C) - 11 L 2 x 2 x 1/4 KL/R > 200 (C) - 33	13.565	6.684	205.1 K=1.00	0.938	-3.294	5.035	0.654 [1] ✔

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	94 - 74	L3x3x1/4	8.563	8.323	168.7 K=1.00	1.440	-0.508	11.430	0.044 [1] ✔

[1] $P_u / \phi P_n$ controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	94 - 74	ROHN 2.5 STD	20.033	6.678	84.6	1.704	3.436	76.682	0.045 [1] ✔
T2	74 - 54	ROHN 2.5 STD	20.019	6.673	84.5	1.704	18.694	76.682	0.244 [1] ✔

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	94 - 74	L 1.75 x 1.75 x 1/4	12.211	6.058	139.8	0.492	3.163	21.410	0.148 [1] ✔
T2	74 - 54	L 2 x 2 x 1/4	13.565	6.684	133.8	0.586	3.324	25.505	0.130 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	94 - 74	L3x3x1/4	8.563	8.323	107.4	1.440	0.410	46.656	0.009 [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	94 - 74	Leg	ROHN 2.5 STD	3	-9.091	45.449	20.0	Pass
		Diagonal	L 1.75 x 1.75 x 1/4	11	-3.192	4.048	78.8	Pass
		Top Girt	L3x3x1/4	5	-0.508	11.430	4.4	Pass
T2	74 - 54	Leg	ROHN 2.5 STD	25	-24.997	45.484	55.0	Pass
		Diagonal	L 2 x 2 x 1/4	33	-3.294	5.035	65.4	Pass
							Summary	
						Leg (T2)	55.0	Pass
						Diagonal (T1)	78.8	Pass
						Top Girt (T1)	4.4	Pass
						Bolt Checks	41.8	Pass
						RATING =	**78.8**	**Pass**

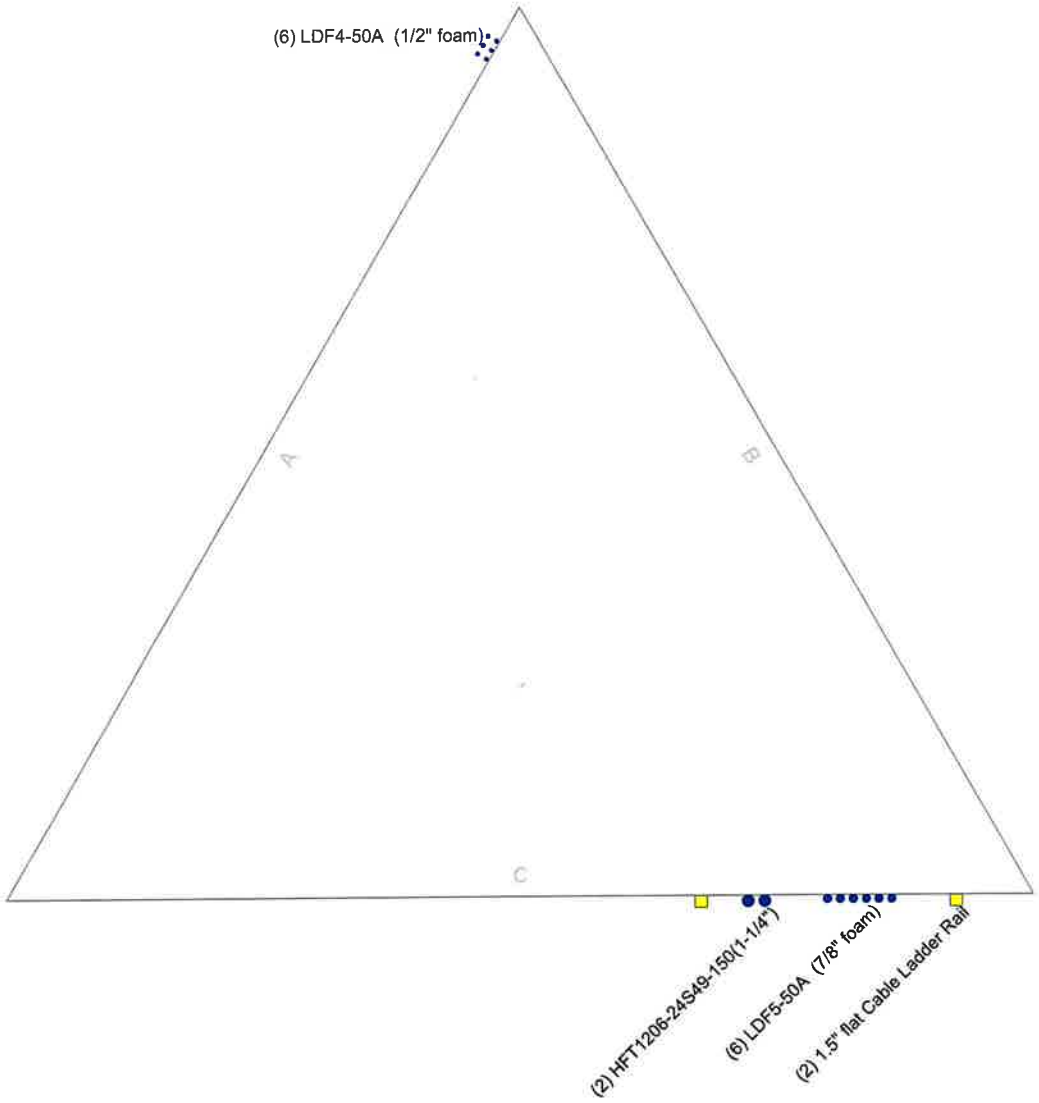
APPENDIX B

BASE LEVEL DRAWING

Feed Line Plan
74'

Round Flat App In Face App Out Face

Section @ 74'



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

Job: 40-Ft Roof Mounted S/S: Stamford West: Stamford, C			
Project: 42919-0001.004.8700			
Client: On-Air Engieering, LLC	Drawn by: Kurt Swarts	App'd:	
Code: TIA-222-G	Date: 02/24/20	Scale: NTS	
Path:		Dwg No. E-7	

APPENDIX C

ADDITIONAL CALCULATIONS

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

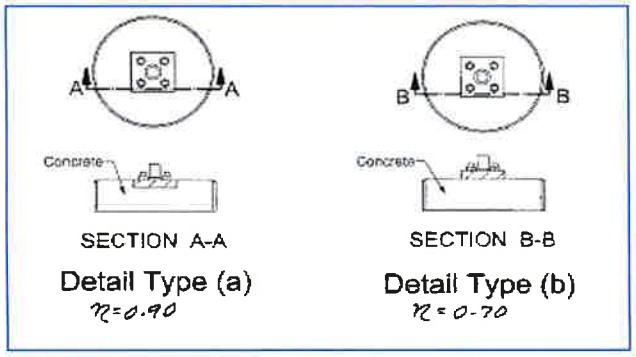
Self-Support Tower Anchor Rod Capacity - TIA-G

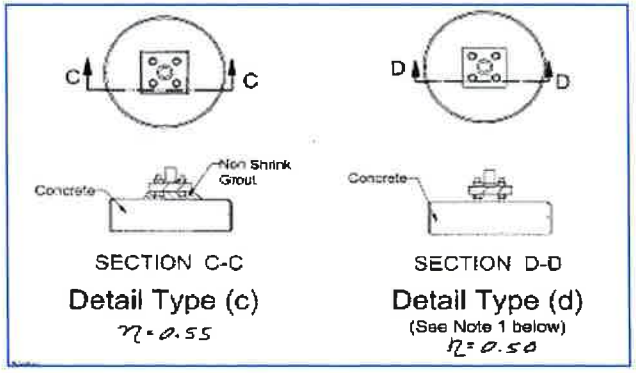
Loads

Compression :	28	kips	Tension :	21	kips	Code:	TIA-G
Comp. Shear :	5	kips	Ten.Shear :	5	kips	Maximum Ratio:	1.00

Existing Anchor Rods

Anchor Rod Condition (n) :	0.7	
Anchor Rod ø :	3/4	in
Anchor Rod Quantity :	4	
Anchor Rod Grade :	User Defined	
F_y :	81	ksi
F_u :	105	ksi
Threads per Inch	10	
Net Tensile Area	0.33	in^2
ϕ_t :	0.80	
$\phi_t R_{nt}$:	112.38	kip
Anchor Rod Ratio :	0.250	





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

By KJS Date 2/4/2019
Project # 42919-0001.004.8700

Foundation Reaction Comparison

Previous Structural Analysis

Firm:	Centek Engieering, Inc
Document #:	Structural Analysis #14067.006
Drawings Date:	3/17/2015

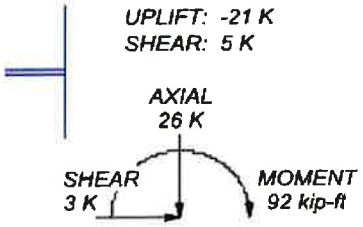
Reactions	Previous Analysis	Modified Original Design*	Current Analysis	Ratio
Compression (kips)	25	**33.75**	28.00	0.82963
Tension (kips)	20	**27**	21.00	0.77778
Shear (kips)	10	**13.5**	10.00	0.74074
OTM (kip-ft)	238	**321.3**	255.00	0.79365

* 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.

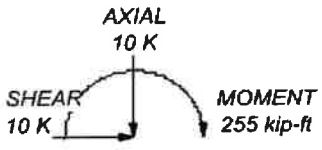
△ *ALL REACTIONS ARE FACTORED*

MAX. CORNER REACTIONS AT BASE:
DOWN: 28 K
SHEAR: 5 K

UPLIFT: -21 K
SHEAR: 5 K



TORQUE 1 kip-ft
50.000 mph WIND - 0.750 in ICE



TORQUE 3 kip-ft
REACTIONS - 93.000 mph WIND

ATTACHMENT 4

PAUL J. FORD & COMPANY

Report Date:	February 21, 2020
Client:	On Air Engineering, LLC 88 Foundry Pond Road Cold Spring, NY 10516 Attn: David Weinpahl, P.E. (201) 456-4624
Structure:	Existing 40-ft Self Support Tower on a 54-ft Rooftop
Carrier:	Verizon Wireless
Carrier Site Name:	Stamford W CT
Mount Type:	(3) 16 Foot Sector Frames
Site Address:	370 W Main St
City, County, State:	Stamford, Fairfield County, CT
Latitude, Longitude:	41.047824, -73.553628
PJF Project:	A42919-0001.003.8190

Paul J. Ford and Company is pleased to submit this "**Mount Structural Analysis Report**". The purpose of this analysis is to determine if the mount has sufficient capacity to support the equipment described herein. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point is not part of this document.

Analysis Criteria:

Reference Standard:	2018 Connecticut State 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:	120 mph 3-second gust wind speed without ice
Nominal Wind Speed:	93 mph 3-second gust wind speed without ice
Ice Wind Speed:	50 mph 3-second gust wind speed with 0.75" ice
IBC Site Criteria:	Risk Category II, Topographic Category 1, Exposure Category C

Summary of Analysis Results:

Antenna Mount: **88.5%** **SUFFICIENT***

***Sufficient upon completion of the changes listed in the 'Recommendations' section of this report.**

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

Angela Sage, E.I.
Structural Designer
asage@pauljford.com

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

02/21/2020

TABLE OF CONTENTS

1) INTRODUCTION

The existing mounts under consideration are (3) 16 ft Sector Frames installed at the 81.5' elevation on a 40' Self Support tower that is on a 54' rooftop. The existing mounts considered in this analysis are identified as a Rohn D930624 based on photos.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2018 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 120 mph converted to a nominal 3-second gust wind speed of 93 mph per section 1609.3.1 as required for use in 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. and 50 mph with 0.75 inch ice thickness. Risk Category II, Exposure Category C and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1 were used in this analysis.

In addition, the mounts have been analyzed for various live loading conditions consisting of a 250-pound maintenance load applied individually at the midpoint and cantilevered ends of horizontal members as well as a 250-pound maintenance load applied individually at mount pipe locations using a 3-second wind speed of 30 mph.

Table 1 – Equipment Configuration

Mounting Level (feet)	Center Line Elevation (feet)	Quantity	Manufacturer	Model	Status	Mount Type
81.5	83.4	3	Samsung	VZ-AT1K01/HT1K01 Integrated AU	Proposed	(3) 16' Sector Frames
		3	Samsung	CBRS Integrated Antenna/RRU		
	81.5	3	Andrew	LNX-6515DS-A1M		
		3	Samsung	B2/B66A RRH-BR049		
		6	Commscope	JAHH-65B-R3B	Existing to remain	
		3	Commscope	BSAMNT-SBS-2-2		
		3	Samsung	B5/B13 RRH-BR04C		
		6	Commscope	CBC78T-DS-43		
		2	-	OVP		Tower Mounted
		6	Decibal	DB844G65ZAXY	To be removed	(3) 16' Sector Frames
		3	Nokia	UHFA B25 RRH 4X30		
		3	Nokia	UHIE B66A RRH 4X45		

3) ANALYSIS PROCEDURE

Table 2 – Documents Provided

Document	Remarks	Reference	Source
Mount Manufacturer Drawings	Rohn, 09/21/2001	D9300624 Rev 5	Rohn
Loading Confirmation	OnAir, 2/19/2020	Email Correspondence by David Weinpahl	OnAir
Site Photos	Dated 05/27/2018	-	OnAir
Construction Drawings	OnAir, 01/08/2020	Stamford W CT Rev 1	OnAir
Radio Frequency Data Sheet	Verizon Wireless, 01/07/2020	15866233	OnAir

3.1) Analysis Method

RISA-3D (version 17.0.3), a commercially available analysis software package, was used to create a three-dimensional model of the mount and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix C. In addition, this analysis is in accordance with Verizon's NSTD-446 *Antenna Mount Analysis and Modification Process (dated 03/29/19)*.

3.2) Assumptions

1) *The analysis of the existing self support tower or the effect of the mount attachment to the tower is not within the current scope of work.*
2) *The antenna mounting system was properly fabricated, installed and maintained in good condition, twist free and plumb in accordance with its original design and manufacturer's specifications and all bolts are tightened as specified by the manufacturer and AISC requirements.*
3) *The configuration of antennas, mounts, and other appurtenances are as specified in Table 1.*
4) *All member connections have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report. All U-Bolt connections have been properly tightened. This analysis will be required to be revised if the existing conditions in the field differ from those shown in the above referenced documents or assumed in this analysis. No allowance was made for any damaged, missing, or rusted members.*
5) *Steel grades have been assumed as follows:*
   - *a) Channel, Solid Round, Angle, Plate, Unistrut* — *ASTM A36 (GR 36)*
   - *b) Pipe* — *ASTM A53 (GR 35)*
   - *c) HSS (Rectangular)* — *ASTM 500 (GR B-46)*
   - *d) HSS (Round)* — *ASTM 500 (GR B-42)*
   - *e) Connection Bolts* — *ASTM A325*
   - *f) Threaded Rods* — *ASTM F1554 (GR 36)*
   - *g) U-Bolts* — *SAE J429 (GR2)*
6) *Proposed equipment is to be installed in the locations specified in Appendix A. Any changes to the proposed equipment locations will render this report invalid.*
7) *Mount has been modeled based on the photographs referenced in Table 2, indicating a match to the Rohn D9300624. Member information and dimensions not provided have been assumed to match those specified in the manufacturer drawings referenced in Table 2. No guarantee can be made as to the accuracy of these assumptions without a complete mount mapping.*
8) *Existing mount pipes will be replaced with 7-ft tall x 2STD (2.375" OD x 0.154") pipes to accommodate the proposed antennas where required, unless noted otherwise.*

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 3 – Mount Component Capacity

Notes	Component	% Capacity	Pass / Fail
1, 2	Mount Pipes	88.5	Pass
1, 2	Face Horizontal	45.5	Pass
1, 2	Standoff Members	64.2	Pass
1, 2	Bracing Members	61.0	Pass
1, 2	Tie Back	18.5	Pass
1, 2	Mount to Tower Connection (bolts/welds)	22.5	Pass

Mount Rating (max from all components) =	88.5%

Notes:
1. See additional documentation in "Appendix C – Software analysis Output" for calculations supporting the % capacity consumed.
2. All sectors are typical.

4.1) Recommendations

The mount will have sufficient capacity to carry the proposed loading configuration. In order for the results of the analysis to be considered valid, the modification listed below must be completed.

- Relocate existing tieback as shown in Appendix D.

No structural modifications are required at this time, provided that the above-listed changes are implemented.

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

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

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

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

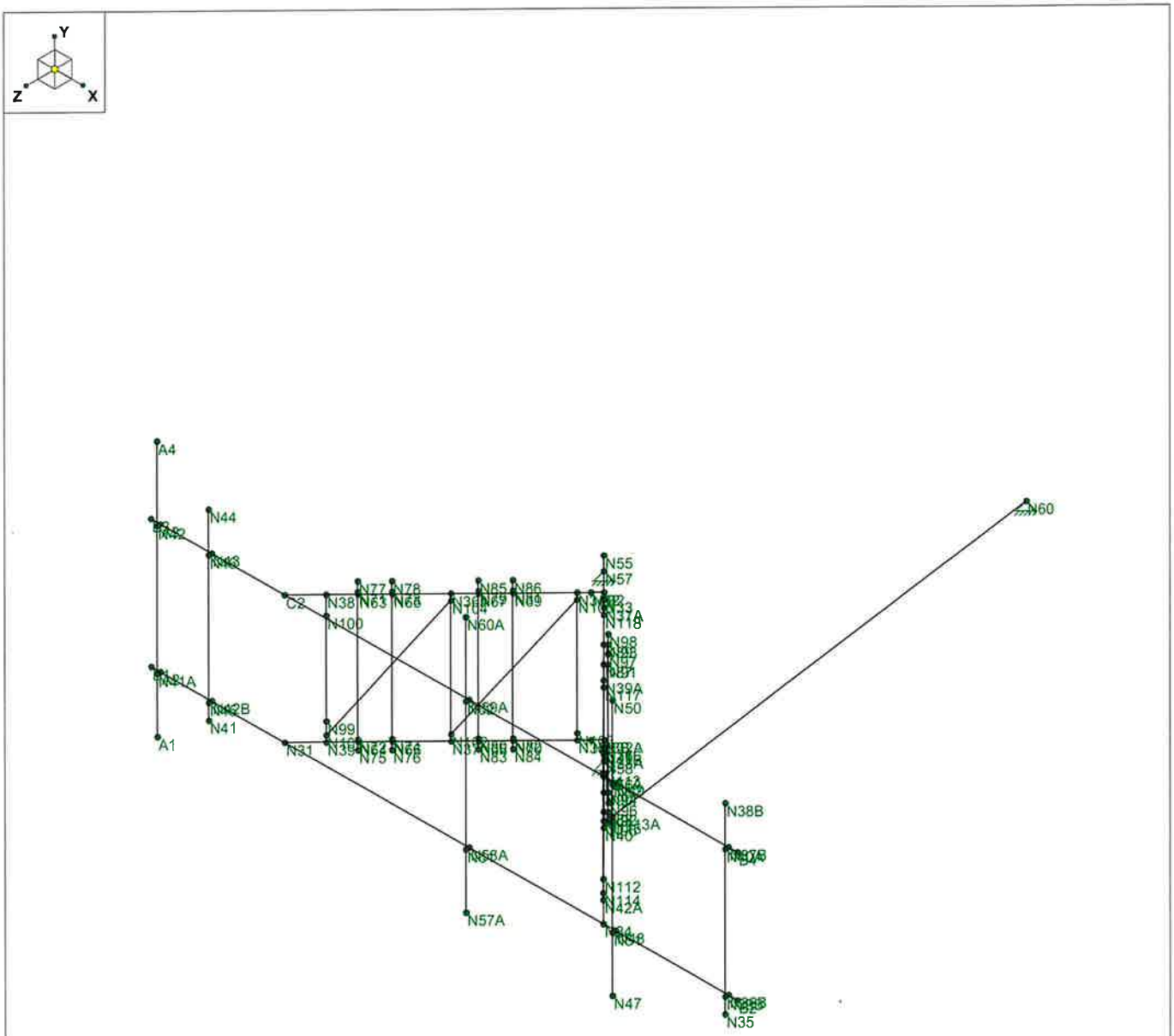
4) The standard of care for all Professional Engineering Services performed or furnished by Paul J. Ford and Company under this project will be the skill and care used by members of the Consultant's profession practicing under similar circumstances at the same time and in the same locality.

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

****

APPENDIX A

WIRE FRAME AND RENDERED MODELS



Envelope Only Solution

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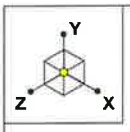
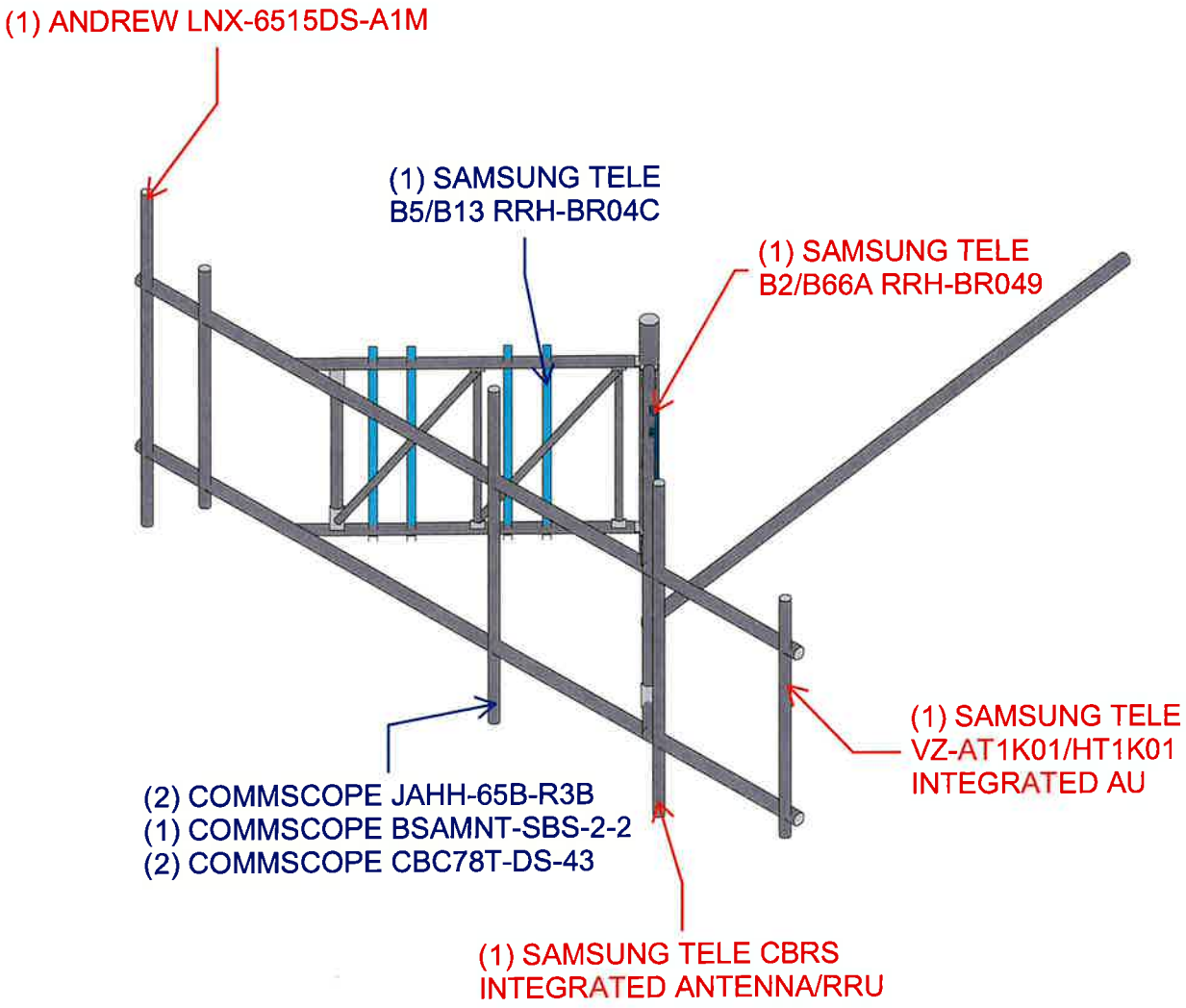
42919-0001.003.8190		42919-0001.003.8190_Wind (Alph...



ALPHA SECTOR ANTENNA AZIMUTH - 10°/30°

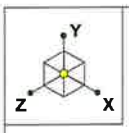
LEGEND
EXISTING: BLUE
PROPOSED: RED



NOTES:
1) A 6" VERTICAL TOLERANCE FOR PROPOSED EQUIPMENT IS ACCEPTABLE.
2) CONTRACTOR TO VERIFY LOCATION OF EXISTING EQUIPMENT PRIOR TO INSTALLATION OF PROPOSED EQUIPMENT. NOTIFY EOR FOR ANY DEVIATIONS.
3) INSTALL SHALL NOT CAUSE HARM TO THE STRUCTURE, CLIMBING FACILITY, SAFETY CLIMB OR ANY SYSTEM INSTALLED ON THE STRUCTURE.

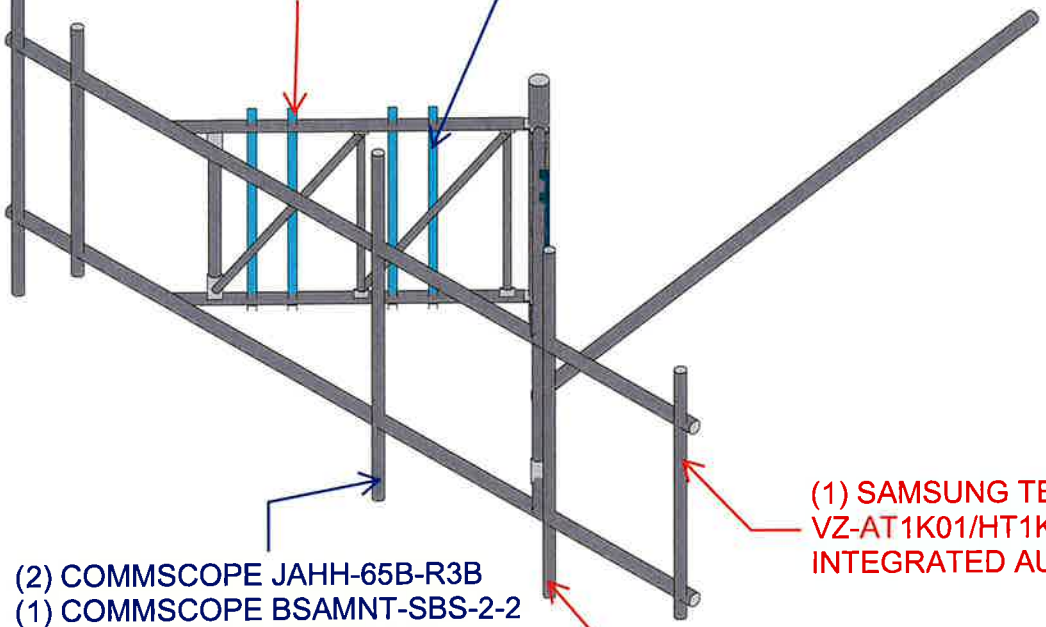
Envelope Only Solution

Paul J. Ford and Company	Stamford W CT	SK - 2
AMS		Feb 19, 2020 at 1:41 PM
42919-0001.003.8190		42919-0001.003.8190_Wind (Alph...



BETA SECTOR ANTENNA AZIMUTH - 130°/150°/200°

LEGEND
EXISTING: BLUE
PROPOSED: RED



NOTES:
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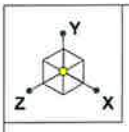
2) CONTRACTOR TO VERIFY LOCATION OF EXISTING EQUIPMENT PRIOR TO INSTALLATION OF PROPOSED EQUIPMENT. NOTIFY EOR FOR ANY DEVIATIONS.
3) INSTALL SHALL NOT CAUSE HARM TO THE STRUCTURE, CLIMBING FACILITY, SAFETY CLIMB OR ANY SYSTEM INSTALLED ON THE STRUCTURE.

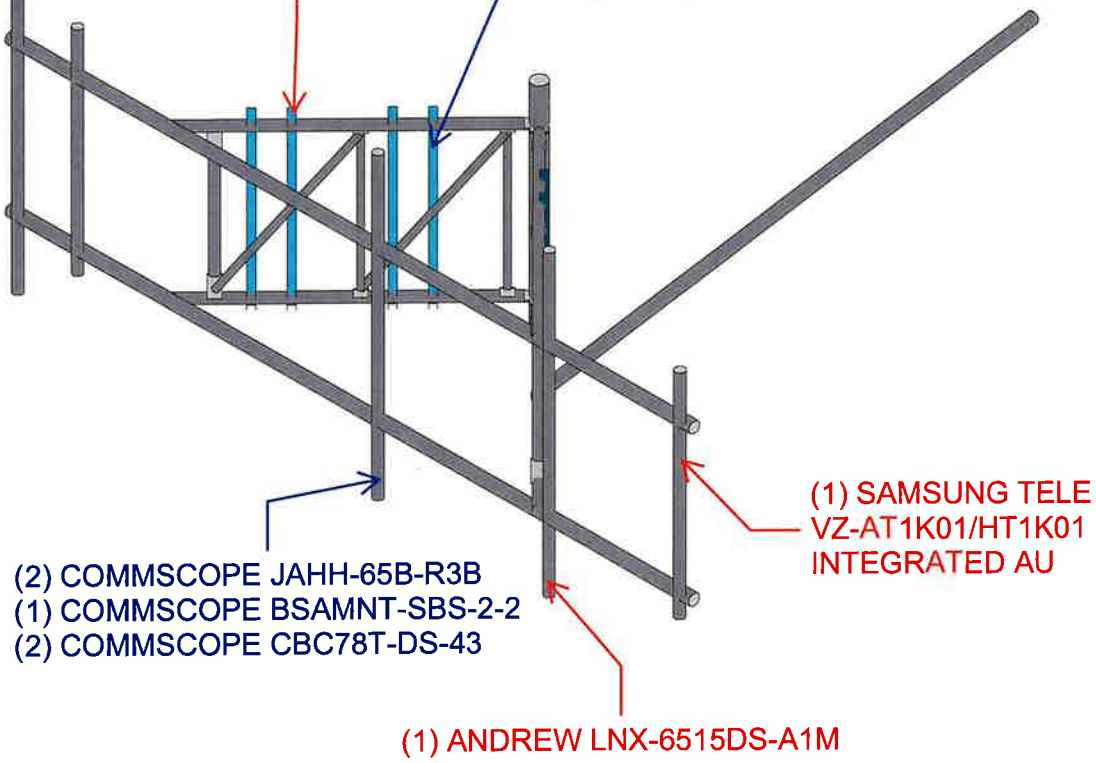
Envelope Only Solution

Paul J. Ford and Company	Stamford W CT	SK - 2
AMS		Feb 19, 2020 at 1:41 PM
42919-0001.003.8190		42919-0001.003.8190_Wind (Alph...



GAMMA SECTOR ANTENNA AZIMUTH - 250°/270°/280°

LEGEND
EXISTING: BLUE
PROPOSED: RED



NOTES:
1) A 6" VERTICAL TOLERANCE FOR PROPOSED EQUIPMENT IS ACCEPTABLE.
2) CONTRACTOR TO VERIFY LOCATION OF EXISTING EQUIPMENT PRIOR TO INSTALLATION OF PROPOSED EQUIPMENT. NOTIFY EOR FOR ANY DEVIATIONS.
3) INSTALL SHALL NOT CAUSE HARM TO THE STRUCTURE, CLIMBING FACILITY, SAFETY CLIMB OR ANY SYSTEM INSTALLED ON THE STRUCTURE.

Envelope Only Solution

Paul J. Ford and Company	Stamford W CT	SK - 2
AMS		Feb 19, 2020 at 1:41 PM
42919-0001.003.8190		42919-0001.003.8190_Wind (Alph...

APPENDIX B

SOFTWARE INPUT CALCULATIONS

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

Project # 42919-0001.003.8190
By AMS

Analysis 30 degrees

Mount Loading per TIA-222-G-2

Structure & Wind Speed

Structure Type =	Mount	
Mount Type =	1 Sector	
Mount Centerline, z =	81.5	ft
Centerline Y Coordinate =	0	in
Wind Speed =	93	mph
Service Wind Speed =	30	mph
Const. Duration =		
Non-Op Wind Speed =	#N/A	mph
Op Wind Speed =	30	mph
Ice Wind Speed =	50	mph
Ice Thickness =	0.75	in

Topo

Exposure Cat =	C	
Structure Class =	II	
Topographic Cat =	1	
Crest Height =	0	ft

Velocity Pressure Coefficients

z_g =	900	ft	
a =	9.50		
K_{zmin} =	0.85		
K_z =	1.21		Calculated Value
K_z =	1.21		Section 2.6.5.2
K_{zt} =	1.00		Section 2.6.6.4
Gh =	1.00		Section 2.6.7
K_d =	0.95		Table 2-2
I =	1.00		Table 2-3
q_z=	25.50	psf	Section 2.6.9.6

Ice Loading

Ii =	1.00	
Iwi =	1.00	
q_z=	7.37	psf
K_{iz} =	1.09	
T_{iz} =	1.64	in
h =	0.00	in
W_i =	7.66	psf

Wind Pressures

Pressure =	25.499
Ice Pressure =	7.371

Antennas

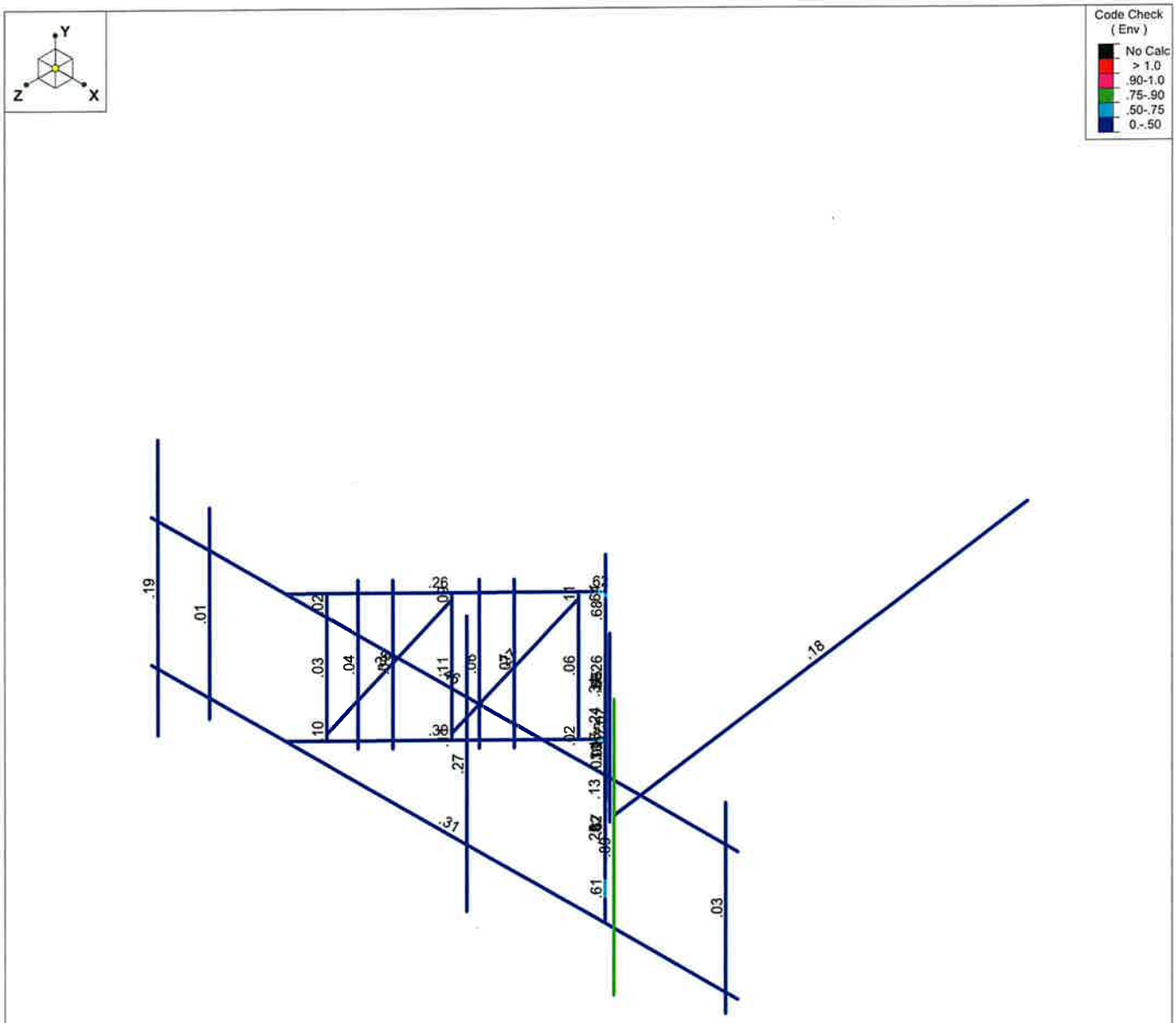
Item	Status	Manufacturer	Antenna	Height (in)	Width (in)	Depth (in)	Flat or Round	Weight (lbs)	Sector / Face	Position	Top/Bottom Mounting Point Spacing	Override Spacing (in)	Max Antenna C/L (ft)	Min Antenna C/L (ft)	Antenna C/L (ft)	Antenna Top Mount Location from Mount Pipe Bottom (in)	Antenna Bottom Mount Location from Mount Pipe Bottom (in)
1	P	SAMSUNG TELECOMMUNICATIONS	VZ-AT1K01/HT1K01 Integrated AU	25.3	10	4.6	Flat	37.5	C	1	19.30		83.53	80.14	83.4	58.45	39.15
3	P	SAMSUNG TELECOMMUNICATIONS	CBRS Integrated Antenna/RRU	12.3	8.7	5.5	Flat	23.1	C	2	6.30		84.99	78.51	83.4	64.95	58.65
5	P	ANDREW	LNX-6515DS-A1M	96.6	11.9	7.1	Flat	43.7	C	5	90.60	72	82.25	81.25	81.5	75.00	3.00
6	P	SAMSUNG TELECOMMUNICATIONS	half of B2/B66A RRH-BR049	15	7.5	5.05	Flat	42.2	C	10	9.00		83.13	79.88	81.5	28.50	19.50
7	P	SAMSUNG TELECOMMUNICATIONS	half of B2/B66A RRH-BR049	15	7.5	5.05	Flat	42.2	C	11	9.00		83.13	79.88	81.5	28.50	19.50
8	I	COMMSCOPE	(2) JAHH-65B-R3B w/ BSAMNT-SBS-2-2	72	27.6	8.1	Flat	194	C	3	66.00		82.50	81.00	81.5	72.00	6.00
9	I	SAMSUNG TELECOMMUNICATIONS	half of B5/B13 RRH-BR04C	15	7.5	4.05	Flat	35.15	C	8	9.00		83.13	79.88	81.5	28.50	19.50
10	I	SAMSUNG TELECOMMUNICATIONS	half of B5/B13 RRH-BR04C	15	7.5	4.05	Flat	35.15	C	9	9.00		83.13	79.88	81.5	28.50	19.50
11	I	COMMSCOPE	CBC78T-DS-43	6.9	6.3	4.7	Flat	10.6	C	3	0.90		85.21	78.29	81.5	39.45	38.55
12	I	COMMSCOPE	CBC78T-DS-43	6.9	6.3	4.7	Flat	10.6	C	3	0.90		85.21	78.29	81.5	39.45	38.55

Dishes

Item	Status	Manufacturer	Microwave Dish	Dia (in)	Dish Type	Weight (lbs)	Sector / Face	Position	Top/Bottom Mounting Point Spacing	Override Spacing (in)	Max Antenna C/L (ft)	Min Antenna C/L (ft)	Antenna C/L (ft)	Antenna Top Mount Location from Mount Pipe Bottom (in)	Antenna Bottom Mount Location from Mount Pipe Bottom (in)

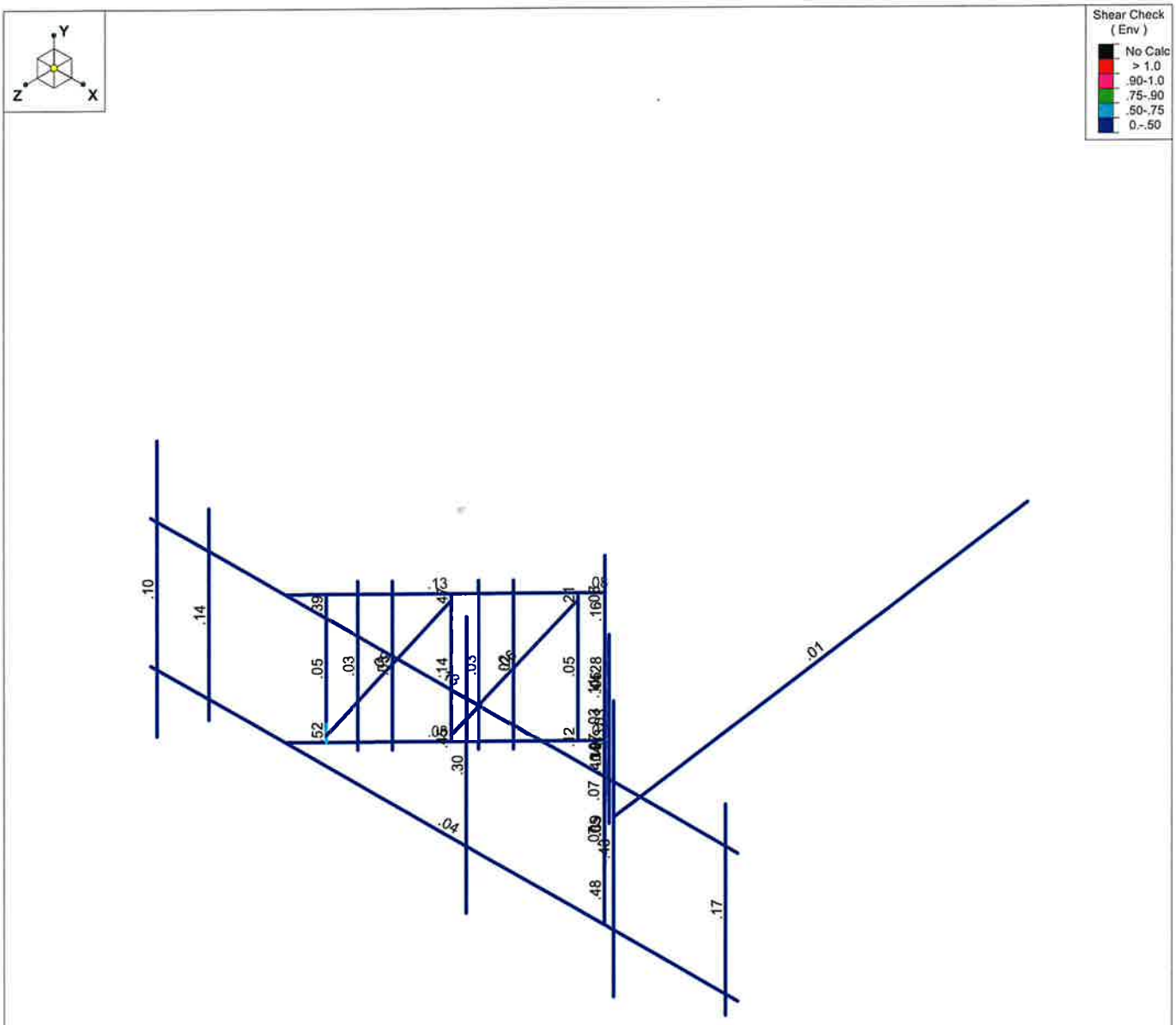
APPENDIX C

SOFTWARE ANALYSIS OUTPUT



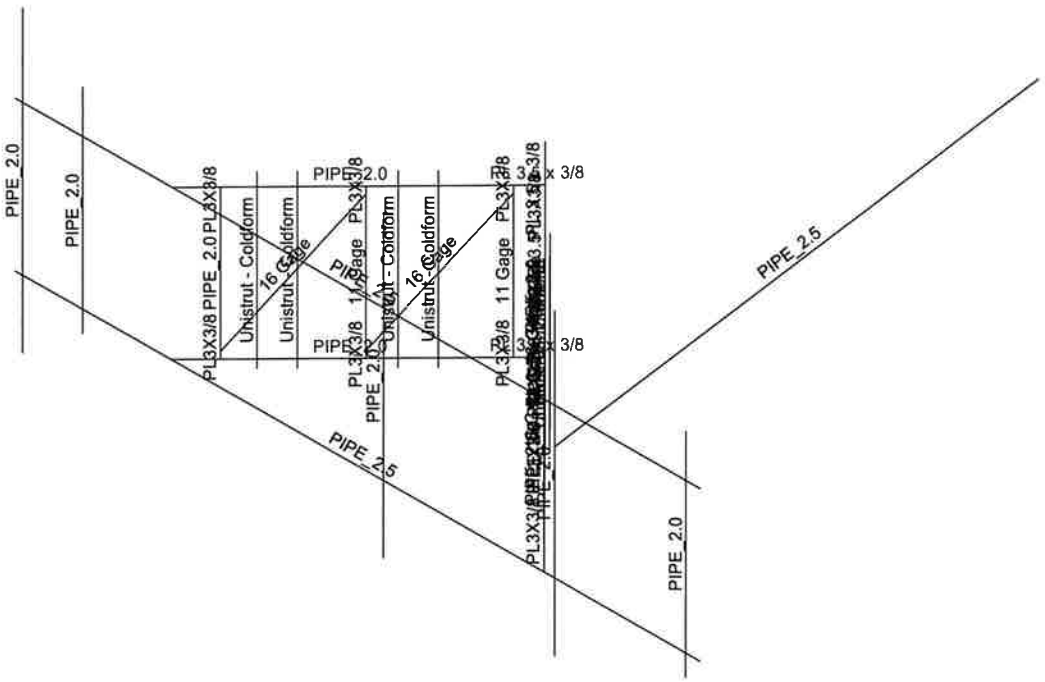
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Paul J. Ford and Company	Stamford W CT	SK - 3
AMS		Feb 21, 2020 at 8:14 AM
42919-0001.003.8190		42919-0001.003.8190_Wind (Alph ...



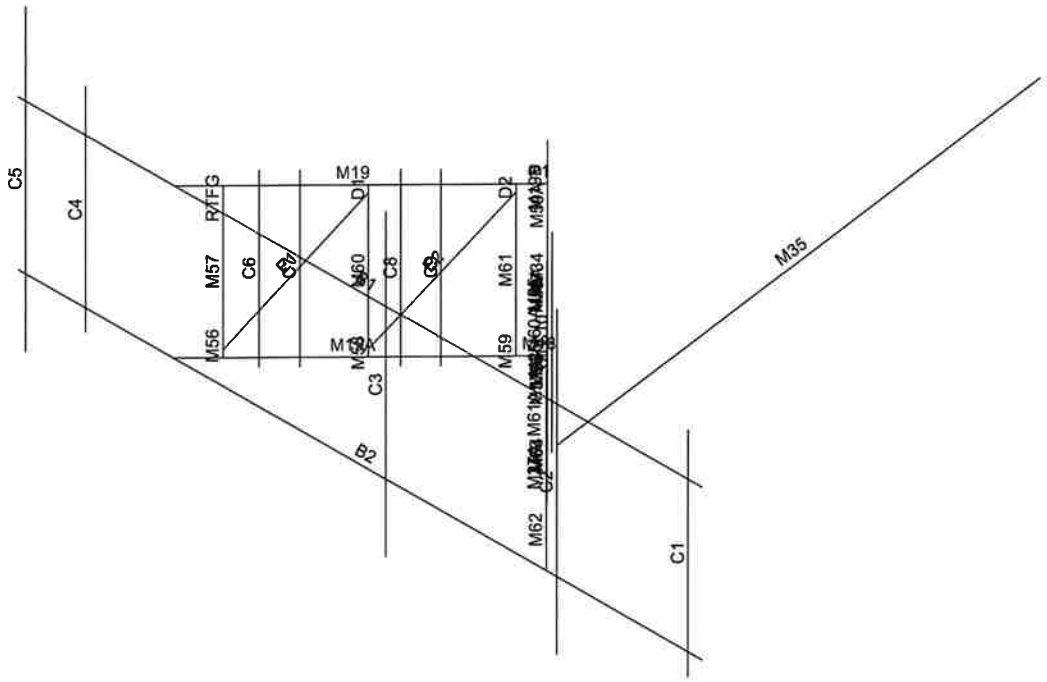
Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Paul J. Ford and Company	Stamford W CT	SK - 4
AMS		Feb 21, 2020 at 8:15 AM
42919-0001.003.8190		42919-0001.003.8190_Wind (Alph...



Envelope Only Solution

Paul J. Ford and Company	Stamford W CT	SK - 5
AMS		Feb 19, 2020 at 1:41 PM
42919-0001.003.8190		42919-0001.003.8190_Wind (Alph ...



Envelope Only Solution

Paul J. Ford and Company	Stamford W CT	SK - 6
AMS		Feb 19, 2020 at 1:41 PM
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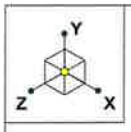
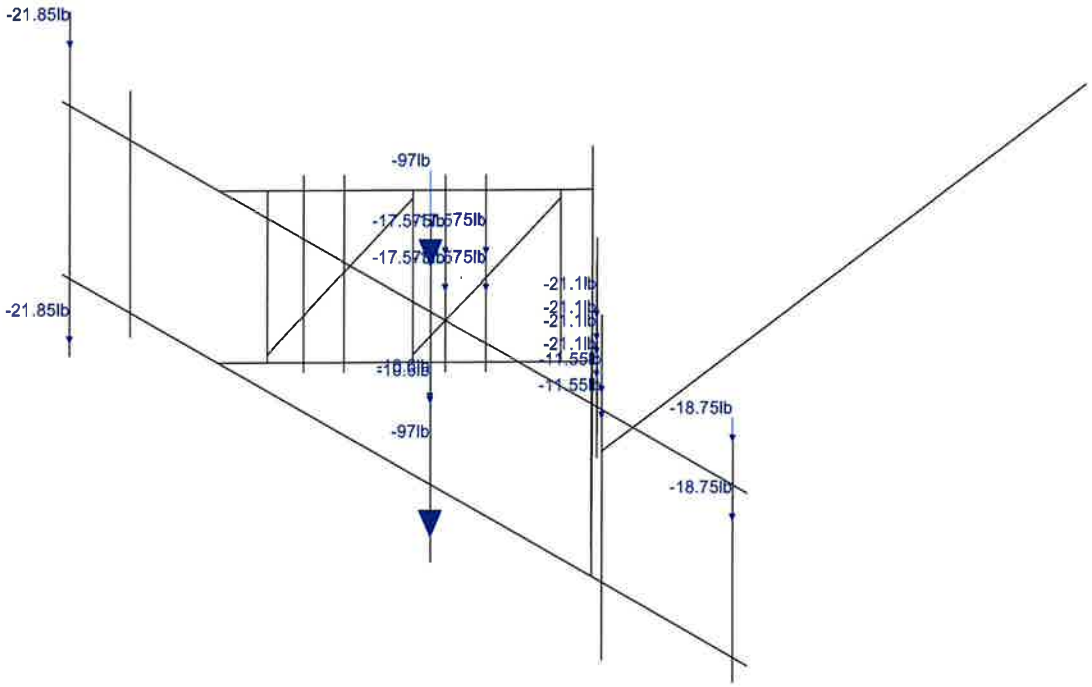
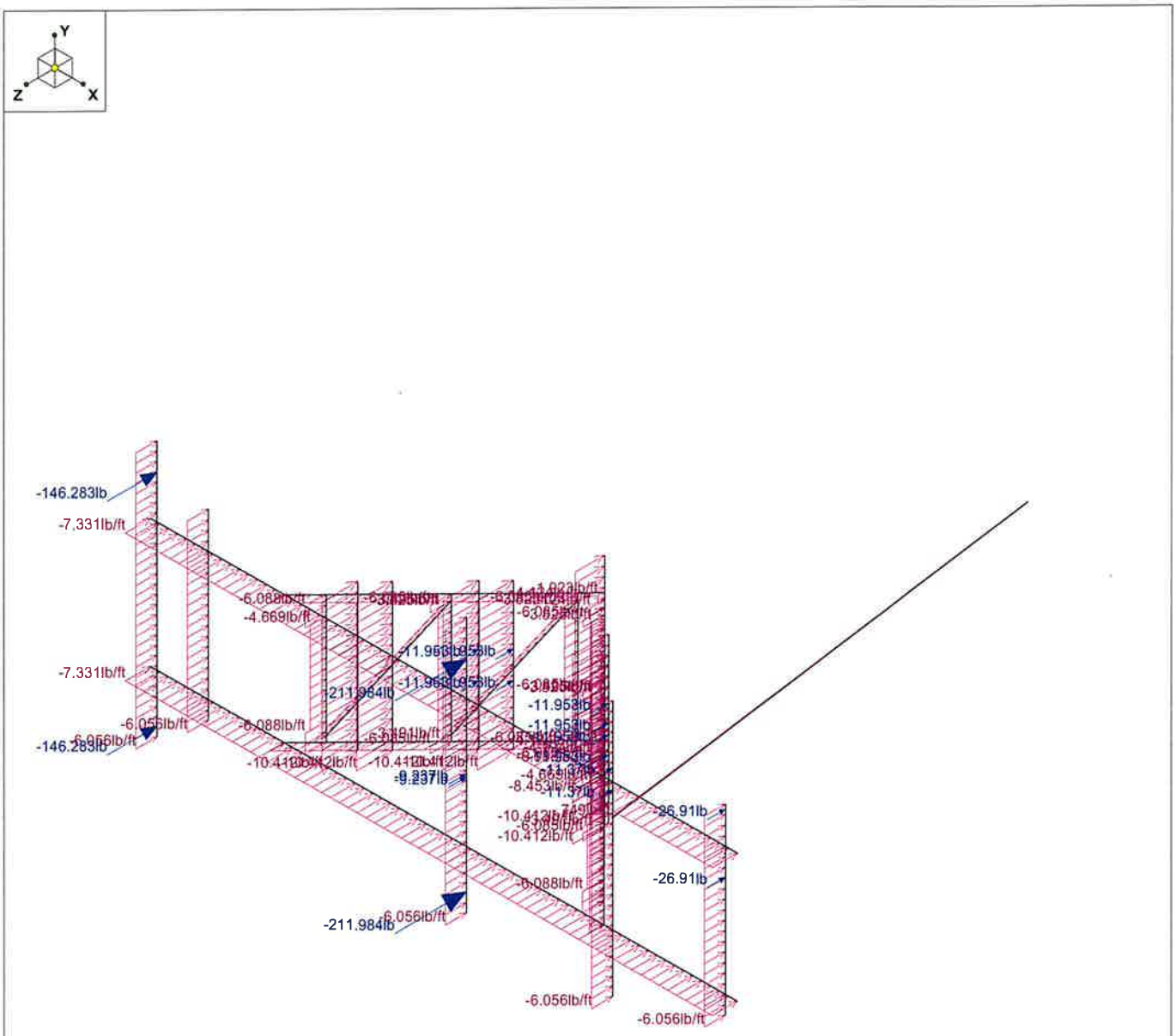




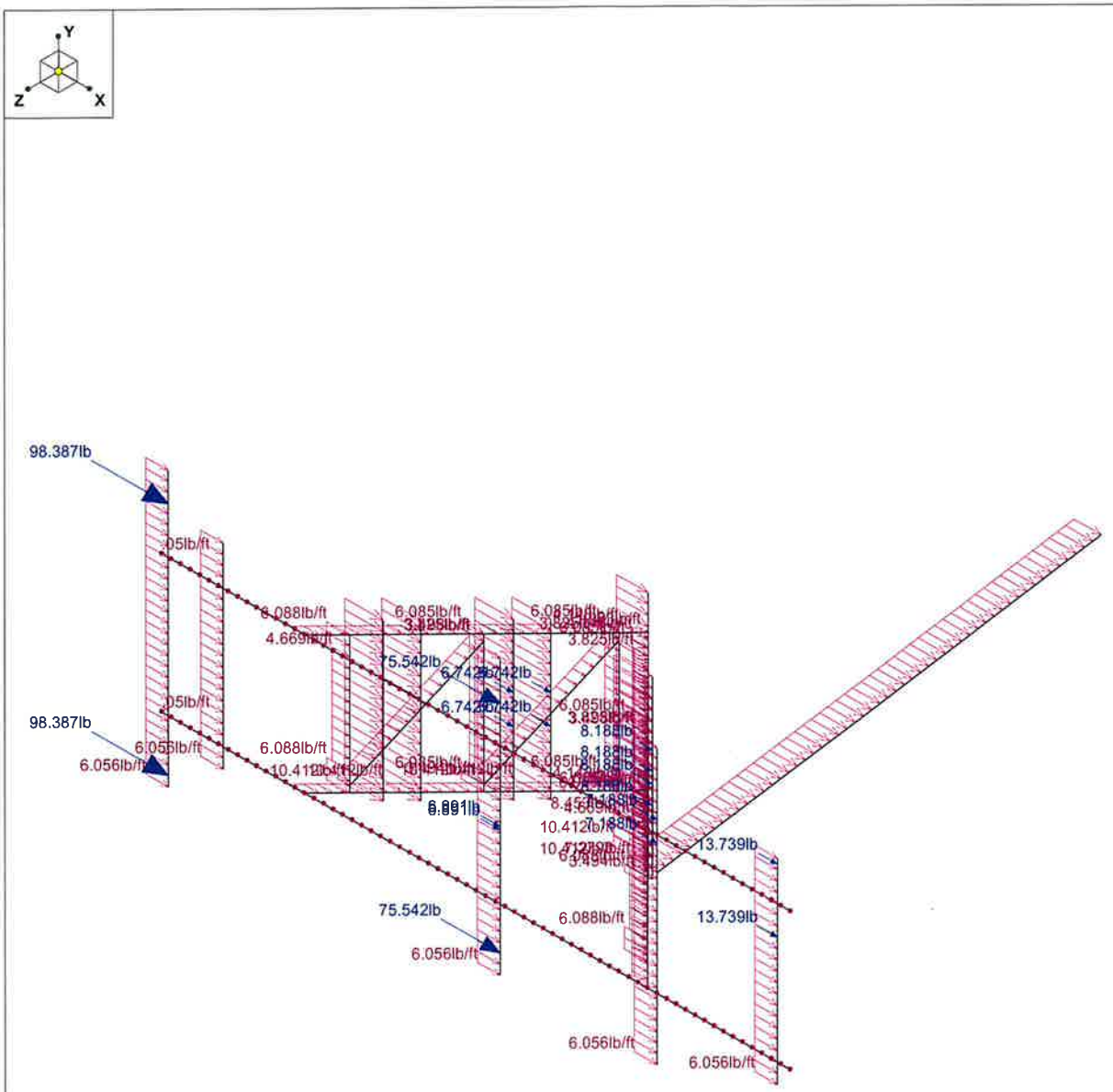
Loads: BLC 1, Dead
Envelope Only Solution

Paul J. Ford and Company	Stamford W CT	SK - 7
AMS		Feb 21, 2020 at 8:15 AM
42919-0001.003.8190		42919-0001.003.8190_Wind (Alph...



Loads: BLC 3, Wind 0
Envelope Only Solution

Paul J. Ford and Company	Stamford W CT	SK - 8
AMS		Feb 21, 2020 at 8:15 AM
42919-0001.003.8190		42919-0001.003.8190_Wind (Alph...



Loads: BLC 6, Wind 90
Envelope Only Solution

Paul J. Ford and Company	Stamford W CT	SK - 9
AMS		Feb 21, 2020 at 8:15 AM
42919-0001.003.8190		42919-0001.003.8190_Wind (Alph...

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	No
Max Iterations for Wall Stiffness	3
Gravity Acceleration (in/sec^2)	386.4
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	None
Cold Formed Steel Code	AISI S100-16: LRFD
Wood Code	None
Wood Temperature	< 100F
Concrete Code	None
Masonry Code	None
Aluminum Code	None - Building
Stainless Steel Code	None

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	No
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	No
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	0

(Global) Model Settings, Continued

Seismic Code	None
Seismic Base Elevation (in)	Not Entered
Add Base Weight?	No
Ct X	0
Ct Z	0
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	1
R Z	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E..	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A53 Gr. B (35 ksi)	29000	11154	.3	.65	.49	35	1.5	60	1.2
2	A500 Gr. B (46ksi)	29000	11154	.3	.65	.49	46	1.5	58	1.2
3	A36 (36ksi)	29000	11154	.3	.65	.49	36	1.5	58	1.2

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M22	A3	N42			RIGID	None	None	RIGID	Typical
2	M23	A2	N41A			RIGID	None	None	RIGID	Typical
3	M26A	N37B	N40A			RIGID	None	None	RIGID	Typical
4	M27	N36B	N39B			RIGID	None	None	RIGID	Typical
5	M29	N43	N46			RIGID	None	None	RIGID	Typical
6	M30	N42B	N45			RIGID	None	None	RIGID	Typical
7	M32	N49	N52			RIGID	None	None	RIGID	Typical
8	M33	N48	N51			RIGID	None	None	RIGID	Typical
9	M36	N59A	N62			RIGID	None	None	RIGID	Typical
10	M37	N58A	N61			RIGID	None	None	RIGID	Typical
11	M38	N71	N63			RIGID	None	None	RIGID	Typical
12	M39	N73	N65			RIGID	None	None	RIGID	Typical
13	M40	N72	N64			RIGID	None	None	RIGID	Typical
14	M41	N74	N66			RIGID	None	None	RIGID	Typical
15	M44	N79	N67			RIGID	None	None	RIGID	Typical
16	M45	N81	N69			RIGID	None	None	RIGID	Typical
17	M46	N80	N68			RIGID	None	None	RIGID	Typical
18	M47	N82	N70			RIGID	None	None	RIGID	Typical
19	M50	N91	N87			RIGID	None	None	RIGID	Typical
20	M51	N93	N89			RIGID	None	None	RIGID	Typical
21	M52	N92	N88			RIGID	None	None	RIGID	Typical
22	M53	N94	N90			RIGID	None	None	RIGID	Typical
23	C6	N75	N77		45	Unistrut - Cold...	None	None	A607 C1 Gr.55	Typical
24	C7	N76	N78		45	Unistrut - Cold...	None	None	A607 C1 Gr.55	Typical
25	C8	N83	N85		45	Unistrut - Cold...	None	None	A607 C1 Gr.55	Typical
26	C9	N84	N86		45	Unistrut - Cold...	None	None	A607 C1 Gr.55	Typical
27	C11	N95	N97		315	Unistrut - Cold...	None	None	A607 C1 Gr.55	Typical
28	C10	N96	N98		315	Unistrut - Cold...	None	None	A607 C1 Gr.55	Typical
29	C5	A1	A4			PIPE_2.0	Column	Pipe	A53 Gr. B (35 ...	Typical
30	B2	B1	B2			PIPE_2.5	None	None	A53 Gr. B (35 ...	Typical
31	B1	B3	B4			PIPE_2.5	None	None	A53 Gr. B (35 ...	Typical
32	RTFG	N38	N100		315	PL3X3/8	None	None	A36 (36ksi)	Typical
33	D1	N36A	N104		315	PL3X3/8	None	None	A36 (36ksi)	Typical
34	D2	N34B	N105		315	PL3X3/8	None	None	A36 (36ksi)	Typical
35	E2	N102	N105			16 Gage	None	None	A53 Gr. B (35 ...	Typical
36	E1	N104	N101			16 Gage	None	None	A53 Gr. B (35 ...	Typical
37	M19	N32	C2			PIPE_2.0	None	None	A53 Gr. B (35 ...	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
38	M19A	N33B	N31			PIPE 2.0	None	None	A53 Gr. B (35 ...	Typical
39	M25	N33	N31A			PIPE 2.0	None	None	A53 Gr. B (35 ...	Typical
40	M27A	N36	N34			PIPE 2.0	None	None	A53 Gr. B (35 ...	Typical
41	C1	N35	N38B			PIPE 2.0	Column	Pipe	A53 Gr. B (35 ...	Typical
42	C4	N41	N44			PIPE 2.0	None	None	A53 Gr. B (35 ...	Typical
43	C2	N47	N50			PIPE 2.0	None	None	A53 Gr. B (35 ...	Typical
44	M34	N56	N55			PIPE 3.5	None	None	A53 Gr. B (35 ...	Typical
45	C3	N57A	N60A			PIPE 2.0	None	None	A53 Gr. B (35 ...	Typical
46	P1	D2	N32		90	PL 3.5 x 3/8	None	None	A36 (36ksi)	Typical
47	M18	N32A	N33B		90	PL 3.5 x 3/8	None	None	A36 (36ksi)	Typical
48	M19B	D2	N33		90	PL 3.5 x 3/8	None	None	A36 (36ksi)	Typical
49	M26	N32A	N36		90	PL 3.5 x 3/8	None	None	A36 (36ksi)	Typical
50	M35	N113A	N60			PIPE 2.5	None	None	A53 Gr. B (35 ...	Typical
51	M56	N99	N39		315	PL3X3/8	None	None	A36 (36ksi)	Typical
52	M57	N100	N99			PIPE 2.0	None	None	A53 Gr. B (35 ...	Typical
53	M58	N102	N37		315	PL3X3/8	None	None	A36 (36ksi)	Typical
54	M59	N103	N35B		315	PL3X3/8	None	None	A36 (36ksi)	Typical
55	M60	N104	N102			11 Gage	None	None	A53 Gr. B (35 ...	Typical
56	M61	N105	N103			11 Gage	None	None	A53 Gr. B (35 ...	Typical
57	M57A	N41B	N113		315	PL3X3/8	None	None	A36 (36ksi)	Typical
58	M58A	N39A	N117		315	PL3X3/8	None	None	A36 (36ksi)	Typical
59	M59A	N37A	N118		315	PL3X3/8	None	None	A36 (36ksi)	Typical
60	M60A	N115	N118			16 Gage	None	None	A53 Gr. B (35 ...	Typical
61	M61A	N117	N114			16 Gage	None	None	A53 Gr. B (35 ...	Typical
62	M62	N112	N42A		315	PL3X3/8	None	None	A36 (36ksi)	Typical
63	M63	N113	N112			PIPE 2.0	None	None	A53 Gr. B (35 ...	Typical
64	M64	N115	N40		315	PL3X3/8	None	None	A36 (36ksi)	Typical
65	M65	N116	N38A		315	PL3X3/8	None	None	A36 (36ksi)	Typical
66	M66	N117	N115			11 Gage	None	None	A53 Gr. B (35 ...	Typical
67	M67	N118	N116			11 Gage	None	None	A53 Gr. B (35 ...	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
1	M22	OOOXOX					Yes	** NA **		Exclude	None
2	M23	OOOXOX					Yes	** NA **		Exclude	None
3	M26A	OOOXOX					Yes	** NA **		Exclude	None
4	M27	OOOXOX					Yes	** NA **		Exclude	None
5	M29	OOOXOX					Yes	** NA **		Exclude	None
6	M30	OOOXOX					Yes	** NA **		Exclude	None
7	M32	OOOXOX					Yes	** NA **		Exclude	None
8	M33	OOOXOX					Yes	** NA **		Exclude	None
9	M36	OOOXOX					Yes	** NA **		Exclude	None
10	M37	OOOXOX					Yes	** NA **		Exclude	None
11	M38		OOOXOO				Yes	** NA **			None
12	M39		OOOXOO				Yes	** NA **			None
13	M40		OOOXOO				Yes	** NA **			None
14	M41		OOOXOO				Yes	** NA **			None
15	M44		OOOXOO				Yes	** NA **			None
16	M45		OOOXOO				Yes	** NA **			None
17	M46		OOOXOO				Yes	** NA **			None
18	M47		OOOXOO				Yes	** NA **			None
19	M50		OOOXOO				Yes	** NA **			None
20	M51		OOOXOO				Yes	** NA **			None
21	M52		OOOXOO				Yes	** NA **			None
22	M53		OOOXOO				Yes	** NA **			None

Member Advanced Data (Continued)

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
23	C6						Yes	** NA **			None
24	C7						Yes	** NA **			None
25	C8						Yes	** NA **			None
26	C9						Yes	** NA **			None
27	C11						Yes	** NA **			None
28	C10						Yes	** NA **			None
29	C5						Yes	** NA **			None
30	B2						Yes	** NA **			None
31	B1						Yes	** NA **			None
32	RTFG						Yes	** NA **			None
33	D1						Yes	** NA **			None
34	D2						Yes	** NA **			None
35	E2	BenPIN	BenPIN				Yes	** NA **			None
36	E1	BenPIN	BenPIN				Yes	** NA **			None
37	M19		BenPIN				Yes	** NA **			None
38	M19A		BenPIN				Yes	** NA **			None
39	M25		BenPIN				Yes	** NA **			None
40	M27A		BenPIN				Yes	** NA **			None
41	C1						Yes	** NA **			None
42	C4						Yes	** NA **			None
43	C2						Yes	** NA **			None
44	M34						Yes	** NA **			None
45	C3						Yes	** NA **			None
46	P1						Yes	** NA **			None
47	M18						Yes	** NA **			None
48	M19B						Yes	** NA **			None
49	M26						Yes	** NA **			None
50	M35	BenPIN					Yes	** NA **			None
51	M56						Yes	** NA **			None
52	M57	BenPIN	BenPIN				Yes	** NA **			None
53	M58						Yes	** NA **			None
54	M59						Yes	** NA **			None
55	M60	BenPIN	BenPIN				Yes	** NA **			None
56	M61	BenPIN	BenPIN				Yes	** NA **			None
57	M57A						Yes	** NA **			None
58	M58A						Yes	** NA **			None
59	M59A						Yes	** NA **			None
60	M60A	BenPIN	BenPIN				Yes	** NA **			None
61	M61A	BenPIN	BenPIN				Yes	** NA **			None
62	M62						Yes	** NA **			None
63	M63	BenPIN	BenPIN				Yes	** NA **			None
64	M64						Yes	** NA **			None
65	M65						Yes	** NA **			None
66	M66	BenPIN	BenPIN				Yes	** NA **			None
67	M67	BenPIN	BenPIN				Yes	** NA **			None

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
1	C5	PIPE 2.0	84			Lbyy						Lateral
2	B2	PIPE 2.5	192			Lbyy						Lateral
3	B1	PIPE 2.5	192			Lbyy						Lateral
4	RTFG	PL3X3/8	6			Lbyy						Lateral
5	D1	PL3X3/8	2			Lbyy						Lateral
6	D2	PL3X3/8	2			Lbyy						Lateral
7	E2	16 Gage	47.916			Lbyy						Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
8	E1	16 Gage	47.764			Lbyy						Lateral
9	M19	PIPE_2.0	70.919									Lateral
10	M19A	PIPE_2.0	70.919									Lateral
11	M25	PIPE_2.0	70.919									Lateral
12	M27A	PIPE_2.0	70.919									Lateral
13	C1	PIPE_2.0	60			Lbyy						Lateral
14	C4	PIPE_2.0	60			Lbyy						Lateral
15	C2	PIPE_2.0	84			Lbyy						Lateral
16	M34	PIPE_3.5	63									Lateral
17	C3	PIPE_2.0	84			Lbyy						Lateral
18	P1	PL 3.5 x 3/8	3			Lbyy						Lateral
19	M18	PL 3.5 x 3/8	3			Lbyy						Lateral
20	M19B	PL 3.5 x 3/8	3			Lbyy						Lateral
21	M26	PL 3.5 x 3/8	3			Lbyy						Lateral
22	M35	PIPE_2.5	158.419									Lateral
23	M56	PL3X3/8	6			Lbyy						Lateral
24	M57	PIPE_2.0	30			Lbyy						Lateral
25	M58	PL3X3/8	2			Lbyy						Lateral
26	M59	PL3X3/8	2			Lbyy						Lateral
27	M60	11 Gage	38			Lbyy						Lateral
28	M61	11 Gage	38			Lbyy						Lateral
29	M57A	PL3X3/8	6			Lbyy						Lateral
30	M58A	PL3X3/8	2			Lbyy						Lateral
31	M59A	PL3X3/8	2			Lbyy						Lateral
32	M60A	16 Gage	47.916			Lbyy						Lateral
33	M61A	16 Gage	47.764			Lbyy						Lateral
34	M62	PL3X3/8	6			Lbyy						Lateral
35	M63	PIPE_2.0	30			Lbyy						Lateral
36	M64	PL3X3/8	2			Lbyy						Lateral
37	M65	PL3X3/8	2			Lbyy						Lateral
38	M66	11 Gage	38			Lbyy						Lateral
39	M67	11 Gage	38			Lbyy						Lateral

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead	None		-1.1			18			
2	Live	None								
3	Wind 0	None					36	90		
4	Wind 30	None					36	90		
5	Wind 60	None					36	90		
6	Wind 90	None					36	90		
7	Wind 120	None					36	90		
8	Wind 150	None					36	90		
9	Ice Load	None					18	45		
10	Ice 0	None					36	90		
11	Ice 30	None					36	90		
12	Ice 60	None					36	90		
13	Ice 90	None					36	90		
14	Ice 120	None					36	90		
15	Ice 150	None					36	90		
16	Lm	None				1				
17	Lv	None				1				

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.4 D	Yes	Y		1	1.4																				
2	1.2 D + 1.6 L	Yes	Y		1	1.2	2	1.6																		
3	1.2 D + 1.6 Wo @ 0	Yes	Y		1	1.2	3	1.6																		
4	1.2 D + 1.6 Wo @ 30	Yes	Y		1	1.2	4	1.6																		
5	1.2 D + 1.6 Wo @ 60	Yes	Y		1	1.2	5	1.6																		
6	1.2 D + 1.6 Wo @ 90	Yes	Y		1	1.2	6	1.6																		
7	1.2 D + 1.6 Wo @ 120	Yes	Y		1	1.2	7	1.6																		
8	1.2 D + 1.6 Wo @ 150	Yes	Y		1	1.2	8	1.6																		
9	1.2 D + 1.6 Wo @ 180	Yes	Y		1	1.2	3	-1.6																		
10	1.2 D + 1.6 Wo @ 210	Yes	Y		1	1.2	4	-1.6																		
11	1.2 D + 1.6 Wo @ 240	Yes	Y		1	1.2	5	-1.6																		
12	1.2 D + 1.6 Wo @ 270	Yes	Y		1	1.2	6	-1.6																		
13	1.2 D + 1.6 Wo @ 300	Yes	Y		1	1.2	7	-1.6																		
14	1.2 D + 1.6 Wo @ 330	Yes	Y		1	1.2	8	-1.6																		
15	1.2 D + 1.0 Di + 1.0 Wi @ 0	Yes	Y		1	1.2	9	1	10	1																
16	1.2 D + 1.0 Di + 1.0 Wi @ 30	Yes	Y		1	1.2	9	1	11	1																
17	1.2 D + 1.0 Di + 1.0 Wi @ 60	Yes	Y		1	1.2	9	1	12	1																
18	1.2 D + 1.0 Di + 1.0 Wi @ 90	Yes	Y		1	1.2	9	1	13	1																
19	1.2 D + 1.0 Di + 1.0 Wi @ ...	Yes	Y		1	1.2	9	1	14	1																
20	1.2 D + 1.0 Di + 1.0 Wi @ ...	Yes	Y		1	1.2	9	1	15	1																
21	1.2 D + 1.0 Di + 1.0 Wi @ ...	Yes	Y		1	1.2	9	1	10	-1																
22	1.2 D + 1.0 Di + 1.0 Wi @ ...	Yes	Y		1	1.2	9	1	11	-1																
23	1.2 D + 1.0 Di + 1.0 Wi @ ...	Yes	Y		1	1.2	9	1	12	-1																
24	1.2 D + 1.0 Di + 1.0 Wi @ ...	Yes	Y		1	1.2	9	1	13	-1																
25	1.2 D + 1.0 Di + 1.0 Wi @ ...	Yes	Y		1	1.2	9	1	14	-1																
26	1.2 D + 1.0 Di + 1.0 Wi @ ...	Yes	Y		1	1.2	9	1	15	-1																
27	1.2 D + 1.5 Lm + 1.0 Wm ...	Yes	Y		1	1.2	3	.104	16	1.5																
28	1.2 D + 1.5 Lm + 1.0 Wm ...	Yes	Y		1	1.2	4	.104	16	1.5																
29	1.2 D + 1.5 Lm + 1.0 Wm ...	Yes	Y		1	1.2	5	.104	16	1.5																
30	1.2 D + 1.5 Lm + 1.0 Wm ...	Yes	Y		1	1.2	6	.104	16	1.5																
31	1.2 D + 1.5 Lm + 1.0 Wm ...	Yes	Y		1	1.2	7	.104	16	1.5																
32	1.2 D + 1.5 Lm + 1.0 Wm ...	Yes	Y		1	1.2	8	.104	16	1.5																
33	1.2 D + 1.5 Lm + 1.0 Wm ...	Yes	Y		1	1.2	3	-.104	16	1.5																
34	1.2 D + 1.5 Lm + 1.0 Wm ...	Yes	Y		1	1.2	4	-.104	16	1.5																
35	1.2 D + 1.5 Lm + 1.0 Wm ...	Yes	Y		1	1.2	5	-.104	16	1.5																
36	1.2 D + 1.5 Lm + 1.0 Wm ...	Yes	Y		1	1.2	6	-.104	16	1.5																
37	1.2 D + 1.5 Lm + 1.0 Wm ...	Yes	Y		1	1.2	7	-.104	16	1.5																
38	1.2 D + 1.5 Lm + 1.0 Wm ...	Yes	Y		1	1.2	8	-.104	16	1.5																
39	1.2 D + 1.5 Lv	Yes	Y		1	1.2	17	1.5																		

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-in]	LC	MY [k-in]	LC	MZ [k-in]	LC
1	N57	max	1386.689	13	2142.435	20	1888.942	14	0	39	0	39	0	39
2		min	-1552.655	7	485.817	14	-3842.523	8	0	1	0	1	0	1
3	N58	max	1257.872	13	1531.06	26	3197.542	26	0	39	0	39	0	39
4		min	-1097.131	7	264.749	8	-826.474	8	0	1	0	1	0	1
5	N60	max	266.584	7	108.215	25	2320.826	7	0	39	0	39	0	39
6		min	-261.366	13	46.35	7	-2331.177	13	0	1	0	1	0	1
7	Totals:	max	2383.194	13	3596.792	19	3009.153	3						
8		min	-2383.202	7	1385.138	13	-3009.158	9						

Envelope AISC 14th(360-10): LRFD Steel Code Checks

	Member	Shape	Code C...	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-...	phi*Mn z-...	Cb	Eqn
1	C2	PIPE_2.0	.885	51.625	13	.434	59.5		13	17855.085	32130	22.459	22.459	2....	H3-6
2	M59A	PL3X3/8	.678	0	20	.156	0	y	7	35800.889	36450	3.417	27.338	1....	H1-1b
3	M64	PL3X3/8	.669	2	26	.385	2	y	13	35800.889	36450	3.417	27.338	1....	H1-1b
4	M19B	PL 3.5 x 3/8	.642	0	20	.084	0	y	8	40839.983	42525	3.987	37.209	1....	H1-1b
5	P1	PL 3.5 x 3/8	.624	0	22	.081	0	z	23	40839.983	42525	3.987	37.209	1....	H1-1b
6	M62	PL3X3/8	.610	6	26	.481	6	y	14	31007.302	36450	3.417	27.338	1....	H1-1b
7	M58A	PL3X3/8	.592	0	20	.441	0	y	13	35800.889	36450	3.417	27.338	1....	H1-1b
8	M18	PL 3.5 x 3/8	.513	0	26	.067	0	y	37	40839.983	42525	3.987	37.209	1....	H1-1b
9	M26	PL 3.5 x 3/8	.482	0	25	.067	0	y	39	40839.983	42525	3.987	37.209	1....	H1-1b
10	B1	PIPE_2.5	.455	44	8	.131	150		7	8885.981	50715	43.155	43.155	1....	H1-1b
11	M25	PIPE_2.0	.335	0	8	.109	0		20	21136.866	32130	22.459	22.459	2....	H1-1b
12	B2	PIPE_2.5	.307	44	10	.041	150		13	8885.981	50715	43.155	43.155	1....	H1-1b
13	M19A	PIPE_2.0	.300	0	14	.083	0		16	21136.866	32130	22.459	22.459	1....	H1-1b
14	E2	16 Gage	.273	24.457	16	.060	47.916		14	5646.071	8890.938	4.071	4.071	1....	H1-1a
15	C3	PIPE_2.0	.271	18.375	14	.297	18.375		14	17855.085	32130	22.459	22.459	1....	H3-6
16	M19	PIPE_2.0	.263	32.505	14	.125	0		22	21136.866	32130	22.459	22.459	1....	H1-1b
17	M34	PIPE_3.5	.257	52.5	8	.278	52.5		8	70380.845	78750	95.445	95.445	1....	H1-1b
18	M27A	PIPE_2.0	.249	62.054	25	.074	0		26	21136.866	32130	22.459	22.459	1....	H1-1b
19	E1	16 Gage	.245	23.384	16	.089	0		14	5662.32	8890.938	4.071	4.071	1....	H1-1a
20	M60A	16 Gage	.242	24.457	26	.026	47.916		7	5646.071	8890.938	4.071	4.071	1....	H1-1a
21	C5	PIPE_2.0	.188	59.5	10	.105	59.5		13	17855.085	32130	22.459	22.459	1....	H1-1b
22	M35	PIPE_2.5	.185	0	7	.007	0		24	13052.49	50715	43.155	43.155	1....	H1-1b*
23	M61A	16 Gage	.130	23.882	25	.072	47.764		13	5662.32	8890.938	4.071	4.071	1....	H1-1b
24	M60	11 Gage	.114	38	26	.139	0		13	12472.963	17008.772	7.465	7.465	1....	H1-1b*
25	D2	PL3X3/8	.114	0	18	.214	2	y	14	35800.889	36450	3.417	27.338	1....	H1-1b
26	M58	PL3X3/8	.107	2	20	.445	2	y	14	35800.889	36450	3.417	27.338	1....	H1-1b
27	M66	11 Gage	.104	38	26	.142	0		14	12472.963	17008.772	7.465	7.465	1....	H1-1b*
28	M56	PL3X3/8	.101	6	25	.518	6	y	14	31007.302	36450	3.417	27.338	3....	H1-1b
29	D1	PL3X3/8	.094	0	26	.473	2	y	14	35800.889	36450	3.417	27.338	1....	H1-1b
30	M61	11 Gage	.059	38	15	.049	0		13	12472.963	17008.772	7.465	7.465	1	H1-1b*
31	M67	11 Gage	.055	38	26	.052	0		7	12472.963	17008.772	7.465	7.465	1....	H1-1b*
32	M57A	PL3X3/8	.031	0	8	.402	0	y	14	31007.302	36450	3.417	27.338	1....	H1-1b
33	C1	PIPE_2.0	.028	46.875	10	.165	46.875		14	23808.54	32130	22.459	22.459	2....	H1-1b
34	M57	PIPE_2.0	.027	30	25	.051	0		14	29810.292	32130	22.459	22.459	1....	H1-1b*
35	RTFG	PL3X3/8	.025	6	25	.394	0	y	14	31007.302	36450	3.417	27.338	1....	H1-1b*
36	M63	PIPE_2.0	.024	30	19	.052	30		14	29810.292	32130	22.459	22.459	1....	H1-1b*
37	M59	PL3X3/8	.021	2	15	.122	2	y	13	35800.889	36450	3.417	27.338	2....	H1-1b*
38	M65	PL3X3/8	.019	2	26	.128	2	y	7	35800.889	36450	3.417	27.338	1....	H1-1b*
39	C4	PIPE_2.0	.007	23.75	6	.140	46.875		13	23808.54	32130	22.459	22.459	1....	H1-1b

PAUL J. FORD & COMPANY
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Phone 614.221.6679 www.pauljford.com

Project # A42919-0001.003.8190
By AMS
Date: 02/20/20
v0.1, Effective 07/10/18

MOUNT TO TOWER CONNECTION CHECKS

REACTIONS

Px=	2.929	Kip
Py=	0.088	Kip
(Axial)Pz=	1.168	Kip
Mx=	0.194	Kip-in
My=	2.337	Kip-in
(Torque)Mz=	3.816	Kip-in

Number of Bolts = 1

BOLT CHECKS

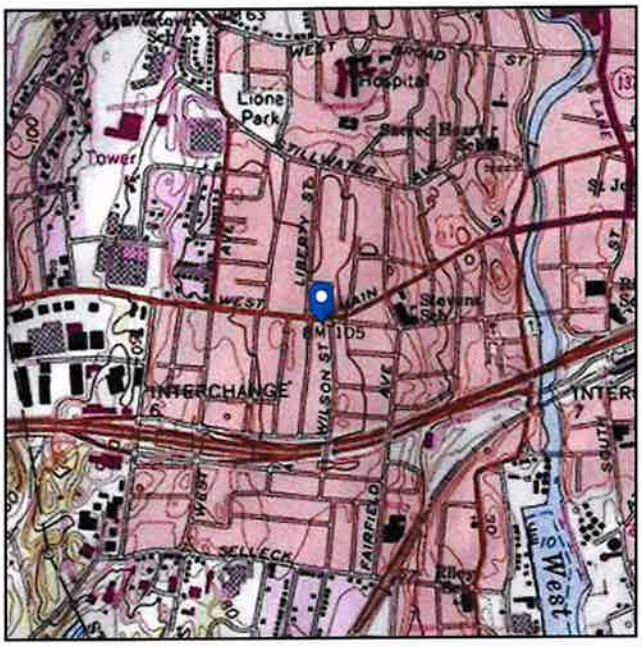
Tension Reaction	2.43	kip
Shear Reaction	4.02	kip
Bolt Type	A325N	
Bolt Diameter	0.75	in
Tensile Strength	29.8	kips
Shear Strength	17.9	kips
Reduced Tensile Strength	-	kips
Tensile Capacity Used	8.2%	**Note: Tension reduction not required if tension or shear capacity < 30%**
Shear Capacity Used	22.5%	

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 104.02 ft (NAVD 88)
Latitude: 41.047824
Longitude: -73.553628



Wind

Results:

Wind Speed:	118 Vmph
10-year MRI	76 Vmph
25-year MRI	86 Vmph
50-year MRI	91 Vmph
100-year MRI	97 Vmph
Data Source:	ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014
Date Accessed:	Wed Feb 06 2019

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Ice

Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	15 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Wed Feb 06 2019

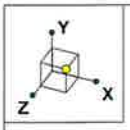
Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

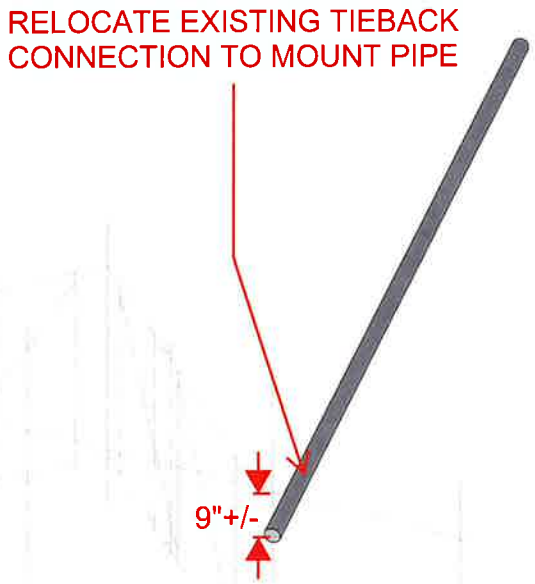
Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

APPENDIX D

SUPPLEMENTAL MODIFICATION INFORMATION

MODIFICATION DRAWING 1 OF 1





NOTES:
1) A 6" VERTICAL TOLERANCE FOR PROPOSED EQUIPMENT IS ACCEPTABLE.
2) CONTRACTOR TO VERIFY LOCATION OF EXISTING EQUIPMENT PRIOR TO INSTALLATION OF PROPOSED EQUIPMENT. NOTIFY EOR FOR ANY DEVIATIONS.
3) INSTALL SHALL NOT CAUSE HARM TO THE STRUCTURE, CLIMBING FACILITY, SAFETY CLIMB OR ANY SYSTEM INSTALLED ON THE STRUCTURE.

Envelope Only Solution

Paul J. Ford and Company	Stamford W CT	SK - 10
AMS		Feb 19, 2020 at 1:43 PM
42919-0001.003.8190		42919-0001.003.8190_Wind (Alph...

APPENDIX E

POST MODIFICATION INSPECTION (PMI) REQUIREMENTS FOR DESKTOP REVIEW

Post Modification Inspection (PMI) Report Requirements

Documents & Photos Required from Contractor

Purpose – to provide PJF the proper documentation in order to complete the required Mount Desktop review of the Post Modification Inspection Report.

- Contractor is responsible for making certain the photos provided as noted below provide confirmation that the modification was completed in accordance with the modification drawings.
- Contractor shall relay any data that can impact the performance of the mount or the mount modification, this includes safety issues.

Base Requirements:

- Provide "as built drawings" showing contractor's name, preparer's signature, and date. Any deviations from the drawing (proposed modification) must be shown.
- Notation that all hardware was properly installed, and the existing hardware was inspected for any issues.
- Verification that loading is as communicated in the modification drawings. NOTE if loading is different than what is conveyed in the modification drawing contact PJF immediately.
- Each photo should be time and date stamped.
- Photos should be high resolution and submitted in a Zip File and should be organized in the file structure as depicted in Schedule A attached.
- Any special photos outside of the standard requirements will be indicated on the drawings.
- Contractor shall ensure that the safety climb wire rope is supported and not adversely impacted by the install of the modification components. This may involve the install of wire rope guides, or other items to protect the wire rope.
- The photos in the file structure should be uploaded to **pjfmount@pauljford.com** as depicted on the drawings.

Photo Requirements:

- *Base and "During Installation Photos"*
  - Base pictures include
    - Photo of Gate Signs showing the tower owner, site name, and number.
    - Photo of carrier shelter showing the carrier site name and number if available.
    - Photos of the galvanizing compound and/or paint used (if applicable), clearly showing the label and name.
  - "During Installation" Photos if provided – must be placed only in this folder
- *Photos taken at ground level*
  - Overall tower structure before and after installation of the modifications
  - Photos of the appropriate mount before and after installation of the modifications; if the mounts are at different rad elevations, pictures must be provided for all elevations that the modifications were installed.
- *Photos taken at Mount Elevation*
  - Photos showing each individual sector before and after installation of modifications. Each entire sector must be in one photo to show in the inter-connection of members.
  - Close-up photos of each installed modification per the modification drawings; pictures should also include connection hardware (U-bolts, bolts, nuts, all-threaded rods, etc.)

- Photos showing the measurements of the installed modification member sizes (i.e. lengths, widths, depths, diameters, thicknesses).
- Photos showing the elevation or distances of the installed modifications from the appropriate reference locations shown in the modification drawings.
- Photos showing the installed modifications onto the tower with tape drop measurements (if applicable) (i.e. ring/collar mounts, tie-backs, V-bracing kits, etc.); if the existing mount elevations needs to be changed according to the modification drawings, a tape drop measurement shall be provided before the elevation change.
- Photos showing the safety climb wire rope above and below the mount prior to modification.
- Photos showing the safety climb wire rope above and below the mount post modification.

Antenna and equipment placement and Geometry Certification:

- The contractor must certify that the antenna and equipment placement and geometry is in accordance with the antenna placement diagrams as included in this mount analysis.

☐ The contractor certifies per photos that the equipment on the mount is as depicted on the antenna placement diagrams as included in this mount analysis.

☐ The contractor notes that the equipment on the mount is not in accordance with the antenna placement diagrams and has accordingly marked up the diagrams or provided a diagram outlining the differences.

Certifying Individual: Company _____

Name _____

Signature _____

Schedule A – Photo & Document File Structure

- VzW Site Number / Name
  - Base & "During Installation" Photos
  - Pre-Installation Photos
    - Alpha
    - Beta
    - Gamma
    - Ground Level
    - Tape Drop
  - Post-Installation Photos
    - Alpha
    - Beta
    - Gamma
    - Ground Level
    - Tape Drop
  - Material Certification – Submission of this document including executed certification on Page 2
  - Specific Required Additional Photos
  - Required Additional Photos

Special Instructions / Validation as required from the MA or any other information the contractor deems necessary to share that was identified:

Issue: _____

_____

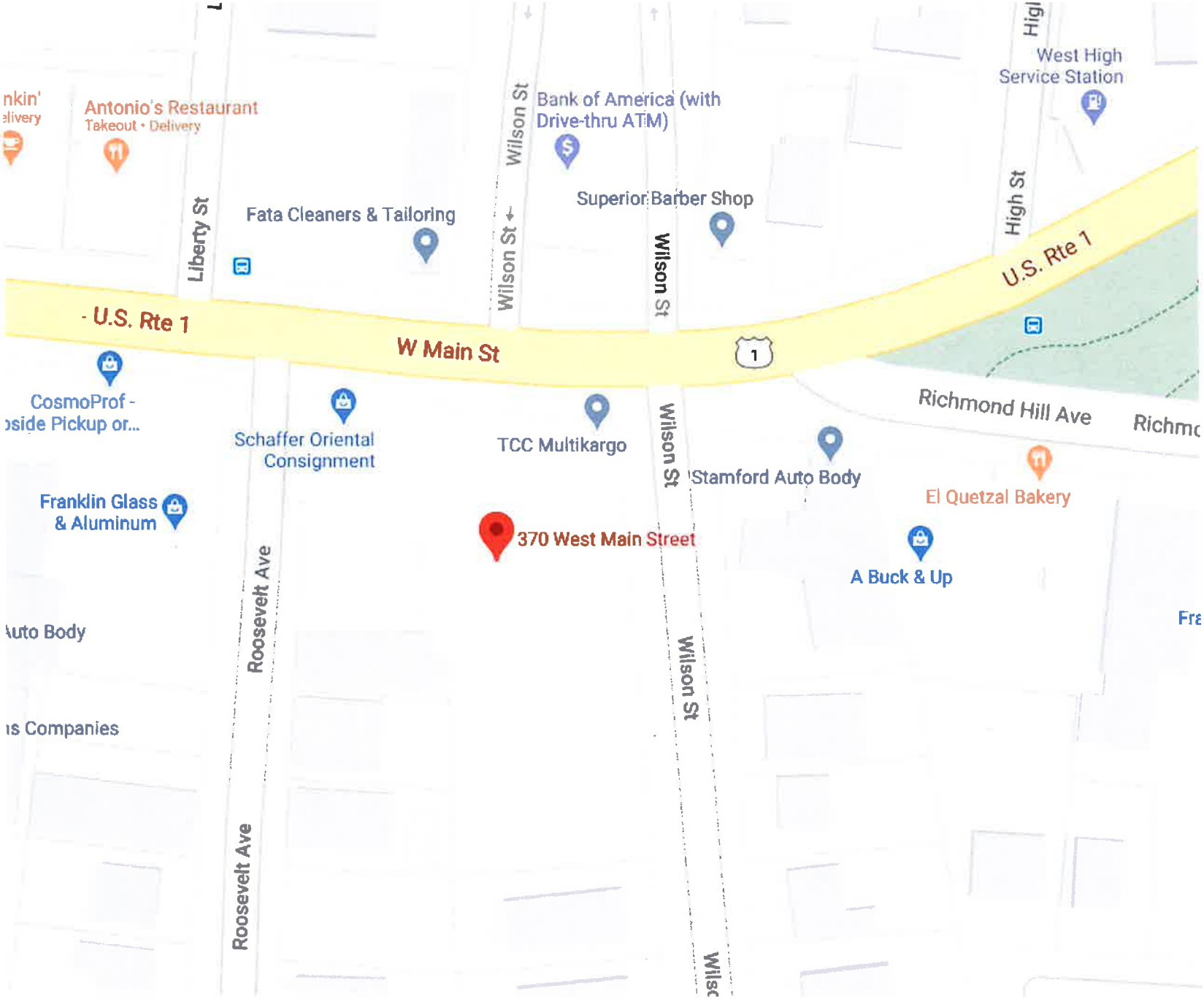
_____

Response: _____

_____

_____

ATTACHMENT 5


Antonio's Restaurant
Takeout • Delivery
Liberty St
Fata Cleaners & Tailoring
Wilson St
Bank of America (with Drive-thru ATM)
Superior Barber Shop
Wilson St
High St
West High Service Station
U.S. Rte 1
W Main St
1
U.S. Rte 1
CosmoProf -
Schaffer Oriental Consignment
TCC Multikargo
Wilson St
Stamford Auto Body
Richmond Hill Ave
El Quetzal Bakery
Franklin Glass & Aluminum
370 West Main Street
A Buck & Up
Roosevelt Ave
Roosevelt Ave
Wilson St

370 WEST MAIN STREET
Sales Print Map It

Location
370 WEST MAIN STREET
Mblu
002/ 0524/ / /
Acct#
002-0524
Owner
DEMARCO ASSOCIATES LLP
Assessment
$1,119,360
Appraisal
$1,599,090
PID
7394
Building Count
2
Current Value

Appraisal

Valuation Year	Improvements	Land
2019	$780,970	$818,120

Assessment

Valuation Year	Improvements	Land
2019	$546,680	$572,680

Owner of Record

Owner	DEMARCO ASSOCIATES LLP
Co-Owner	
Address	95 WILLIAM ST NORWALK, CT 06851-5622
Sale Price	$0
Book & Page	6068/0323
Sale Date	01/07/2002

Ownership History

Ownership History

Owner	Sale Price	Book & Page
DEMARCO ASSOCIATES LLP	$0	6068/0323

DEMARCO ASSOCIATES	$0	1962/0063

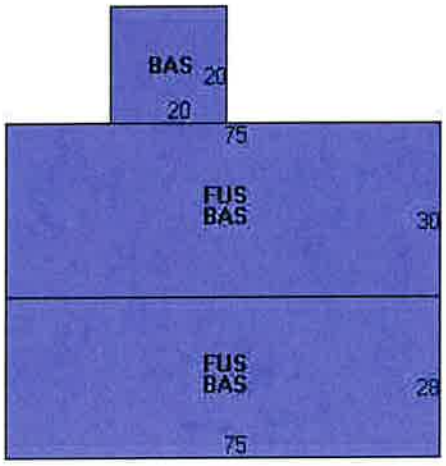
Building Information
Building 1 : Section 1
Year Built: 1953
Living Area: 9,100

Building Attributes

Field	Description
STYLE	Industry Light
MODEL	Ind/Comm
Grade	C
Stories:	2
Occupancy	1.00
Exterior Wall 1	Brick/Masonry
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	T&G/Rubber
Interior Wall 1	Minimum
Interior Wall 2	
Interior Floor 1	Concrete Slab
Interior Floor 2	
Heating Fuel	Gas/LP
Heating Type	Forced Air-Duc
AC Type	None
Struct Class	
Bldg Use	Industrial MDL-96
Total Rooms	
Total Bedrms	00
Total Baths	0
Usrfld 218	

Usrfld 219	
1st Floor Use:	300
Heat/AC	None
Frame Type	Masonry
Baths/Plumbing	Average
Ceiling/Wall	Ceil & Mn Wall
Rooms/Prtns	Light
Wall Height	15.00
% Comn Wall	

Building Photo



Building Layout

Building Sub-Areas (sq ft)Legend

Code	Description	Gross Area	Living Area
BAS	First Floor	4,750	4,750
FUS	Upper Story, Finished	4,350	4,350
		9,100	9,100

Building 2 : Section 1

Year Built: 1990

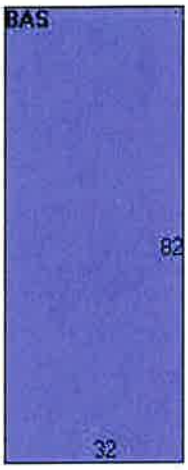
Living Area: 2,624

Building Attributes : Bldg 2 of 2

Field	Description
STYLE	Retail
MODEL	Comm/Ind
Grade	C-
Stories:	1
Occupancy	1.00
Exterior Wall 1	T111/Prefab Wd
Exterior Wall 2	Concr/Cinder
Roof Structure	Flat

Roof Cover	T&G/Rubber
Interior Wall 1	Minimum
Interior Wall 2	
Interior Floor 1	Carpet
Interior Floor 2	Hardwood
Heating Fuel	Gas/LP
Heating Type	Forced Air-Duc
AC Type	None
Struct Class	
Bldg Use	Industrial MDL-96
Total Rooms	
Total Bedrms	
Total Baths	
Usrfld 218	
Usrfld 219	
1st Floor Use:	
Heat/AC	None
Frame Type	Masonry
Baths/Plumbing	Average
Ceiling/Wall	Sus-Ceil&Wall
Rooms/Prtns	Average
Wall Height	10.00
% Comn Wall	

Building Photo



Building Layout

Building Sub-Areas (sq ft)Legend

Code	Description	Gross Area	Living Area
BAS	First Floor	2,624	2,624
		2,624	2,624

Extra Features

Extra FeaturesLegend

Code	Description	Size	Value

OH1	Door Overhd Co	5.00 UNITS	$13,880

Land
Land Use

Use Code 300
Description Industrial MDL-96
Zone CL
Neighborhood 0300
Alt Land Appr No
Category

Land Line Valuation

Size (Acres) 0.30
Depth
Assessed Value $572,680
Appraised Value $818,120

Outbuildings

OutbuildingsLegend

Code	Description	Sub Code	Sub Description	Size
AP1	Fence Chn Lk			630.00 L.F.
LP4	Pavng Asphlt			5600.00 S.F

Valuation History

Appraisal

Valuation Year	Improvements	Land
2019	$780,970	$818,120
2018	$780,970	$818,120
2017	$780,970	$818,120

Assessment

Valuation Year	Improvements	Land
2019	$546,680	$572,680
2018	$546,680	$572,680
2017	$546,680	$572,680

ATTACHMENT 6

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 05/29/2020 US POSTAGE $002.84⁰ ZIP 06103 041L12203937
	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.	David Martin, Mayor City of Stamford 888 Washington Boulevard Stamford, CT 06901				
2.	Ralph Blessing, Land Use Bureau Chief City of Stamford 888 Washington Boulevard Stamford, CT 06901				
3.	Demarco Associates LLP 95 William Street Norwalk, CT 06851-5622				
4.					
5.					
6.					

OLD STATE HOUSE STATION
MAY 29 2020
06103 USPS