Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
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Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

February 14, 2020

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**
22 Welsh Road, Hartland, Connecticut

Dear Attorney Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 168-foot level on the existing 180-foot tower at the Hartland Transfer Station, 22 Welsh Road in Hartland, Connecticut (the "Property"). The Property and tower are owned by the Town of Hartland. The tower is managed by Mariner Tower. The Siting Council approved Cellco's use of the tower in 2008 (TS-VER-065-080201). The existing tower was approved by the Hartland Planning and Zoning Commission on December 19, 2005. A copy of the legal notice of decision and a copy of the building permit are included in Attachment 1.

Cellco now intends to modify its facility by replacing six (6) of its existing antennas with six (6) new antennas, removing three (3) remote radio heads ("RRHs") and installing six (6) newer model RRHs, and one (1) HYBRIFLEX™ fiber optic antenna cable. The existing antenna mount will be replaced as part of the proposed modification. A set of project plans showing the proposed facility modifications and specifications for Cellco's antennas, RRHs and HYBRIFLEX™ fiber optic antenna cable are included in Attachment 2.

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 Hartland's First Selectman, Wade E. Cole; Scott Eisenlohr, Hartland's Zoning Enforcement Officer; and Mariner Tower, the tower manager.

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 168-foot level on the 180-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 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 cumulative General Power Density table for the modified facility is included in Attachment 3.

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 new antenna mounts can support Cellco's proposed facility modifications. (*See* Structural Analysis Report included in Attachment 4 and Mount Structural Analysis Report included in Attachment 5).

A copy of the parcel map and Property owner information is included in Attachment 6. A Certificate of Mailing verifying that this filing was sent to municipal officials is included in Attachment 7.

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Wade E. Cole, Hartland First Selectman
Scott Eisenlohr, Hartland Zoning Enforcement Officer
Mariner Tower
Tim Parks

ATTACHMENT 1

HARTLAND PLANNING & ZONING COMMISSION
LEGAL NOTICE OF DECISIONS

Notice is hereby given that at their Regular Meeting of December 19, 2005, the Planning & Zoning Commission took the following action:

Applicant:	Town of Hartland
Location:	Center Hill Road
Proposal:	Cell Tower
DECISION:	APPROVED with conditions

Applicant:	Town of Hartland
Location:	Welch Road
Proposal:	Cell Tower
DECISION:	APPROVED with conditions

Dated in Hartland this 19th day of December, 2005
Warren Haag, Chairman

NOTICE TO REGISTER CITIZEN:
Please publish under Legal Notices. **PLEASE ADDRESS ALL INQUIRIES TO THE PLANNING & ZONING OFFICE @ 653-6800.**

cc Town Clerk, file, book

HARTLAND (860) 653-9710 GRANBY (860) 653-8945 FAX (860) 653-4769	**TOWN OF HARTLAND PERMIT APPLICATION**	22 SOUTH ROAD EAST HARTLAND, CT 06027

PROPERTY ADDRESS Welsh Road

EST. COST OF JOB 105,000 **COST OF PERMIT** 1050.00 **CHECK#** 1016 **RCPT#** 1595107

BLANKET ☐ (includes mechanicals) **NON BLANKET** ☐ (does not include mechanicals) **PLEASE CHECK ONE**

TYPE OF PERMIT: BUILDING ☑ HEATING ☐ PLUMBING ☐ ELECTRICAL ☐ OTHER ☐

DESCRIPTION OF WORK: Install ~~new~~ tower (communications)

NEW HOME ☐ ADDITION ☐ ROOF ☐ SIDING ☐ POOL ☐ DECK ☐ SHED ☐ OTHER ☒

RECEIVED
APR 13 2006
GRANBY BLDG. DEPT.

BUILDING OFFICIAL COMMENTS:

OWNER(S) Town of Hartland	**CONTRACTOR** Roadrunner Inc
ADDRESS 22 South Rd	**ADDRESS** 1050 Buckley Hwy
TOWN E. Hartland **ST** Ct **ZIP** 06027	**TOWN** Union **ST** Ct **ZIP** 06076
HOME PHONE # **WORK PHONE #** 653-6800	**LICENSE #** 702306 **WORK PHONE #** 860 614-3060

AFFIDAVIT AND AGREEMENT

I HEREBY CERTIFY THAT I AM THE OWNER OF THE PROPERTY WHICH IS THE SUBJECT OF THIS APPLICATION OR THE AUTHORIZED AGENT OF THE PROPERTY OWNER; I AGREE TO CALL AT LEAST 24 HRS. IN ADVANCE FOR EACH INSPECTION INDICATED ON THE PERMIT; I AGREE TO UNCOVER AND EXPOSE ANY WORK WHICH IS COVERED OR CONCEALED WITHOUT INSPECTOR'S APPROVAL; I UNDERSTAND THAT WHEN A PERMIT IS ISSUED IT GRANTS NO RIGHT TO VIOLATE ANY CODE, ORDINANCE OR STATUTE, REGARDLESS OF WHAT MAY BE SHOWN OR OMITTED ON THE APPROVED PLANS AND SPECIFICATIONS AND REGARDLESS OF ANY AGREEMENT WITH ANY OFFICIAL.

I HAVE READ AND AGREE TO ALL THE ABOVE

SIGNATURE: Wayne Young **DATE:** 4-13-06

TOWN OF HARTLAND BUILDING PERMIT

DATE ISSUED 4/17/06 **BUILDING PERMIT #** B03-89

DATE CLOSED

Signature
BUILDING OFFICIAL SIGNATURE

**** OTHER APPROVALS OR PERMITS REQUIRED ****

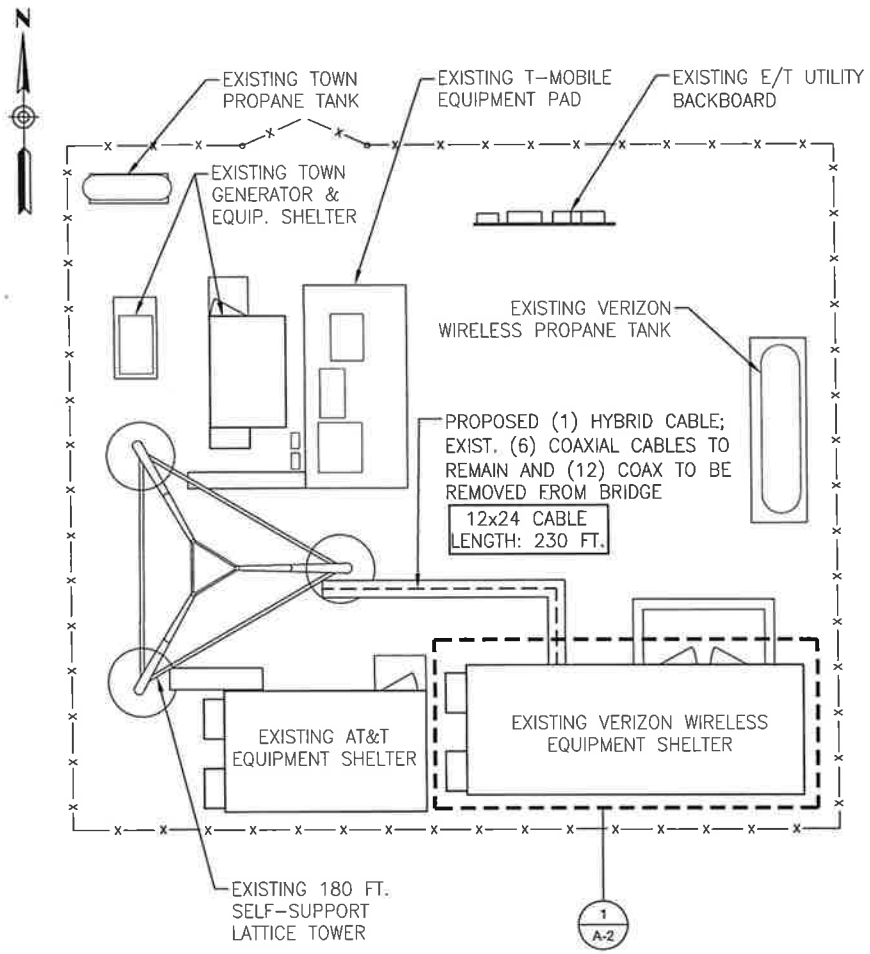
FIRE MARSHAL ☐ FVHD ☐ WETLANDS ☐ DRIVEWAY ☐ P&Z ☐ ZBA ☐ ZONING ☐ TAX ☐
WATER ☐ SEWER ☐

REQUIRED INSPECTIONS

- ☑ FOOTING (FORMS IN PLACE BEFORE BACKFILL)
- ☐ DAMPPROOF/DRAINS
- ☑ INGROUND MECHANICALS
- ☐ FIREPLACE/THROAT
- ☐ CERTIFICATE OF OCCUPANCY
- ☐ ROUGH FRAME/MECHANICALS
- ☐ INSULATION
- ☐ DRIVEWAY
- ☑ FINAL INSPECTION

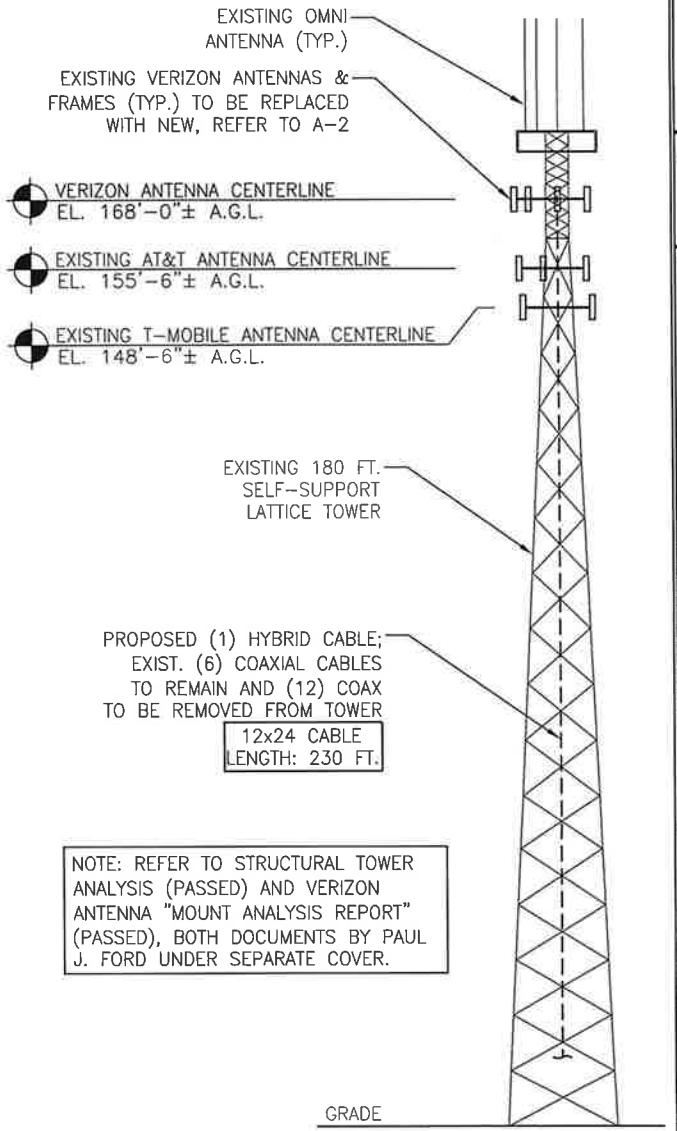
**** THIS PERMIT IS NOT VALID UNLESS PERTINENT INFORMATION IS ATTACHED ****

ATTACHMENT 2



NOTES:
1. COMPOUND PLAN IS BASED EXISTING DRAWINGS ON FILE WITH THE CT SITING COUNCIL AND A LIMITED DESIGN VISIT ON 7-19-19 FOR THE PURPOSE OF DETERMINING CABLE LENGTHS. A COMPOUND SURVEY WAS NOT PERFORMED.
2. PLANS ARE DIAGRAMMATIC ONLY AND NOT TO BE SCALED.
3. REFER TO STRUCTURAL ANALYSIS BY OTHERS.

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



NOTE: REFER TO STRUCTURAL TOWER ANALYSIS (PASSED) AND VERIZON ANTENNA "MOUNT ANALYSIS REPORT" (PASSED), BOTH DOCUMENTS BY PAUL J. FORD UNDER SEPARATE COVER.

2 ELEVATION
Scale: NTS

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. 22141

SUBMITTALS

NO	DATE	DESCRIPTION
0	07.23.19	REVIEW
1	08.02.19	REVISED PER STRUCTURAL ANALYSIS
2	10.10.19	REVISED PER OWNER COMMENTS
3	01.29.20	REVISED PER MOUNT ANALYSIS

DRAWN BY:	MF
CHECKED BY:	DW

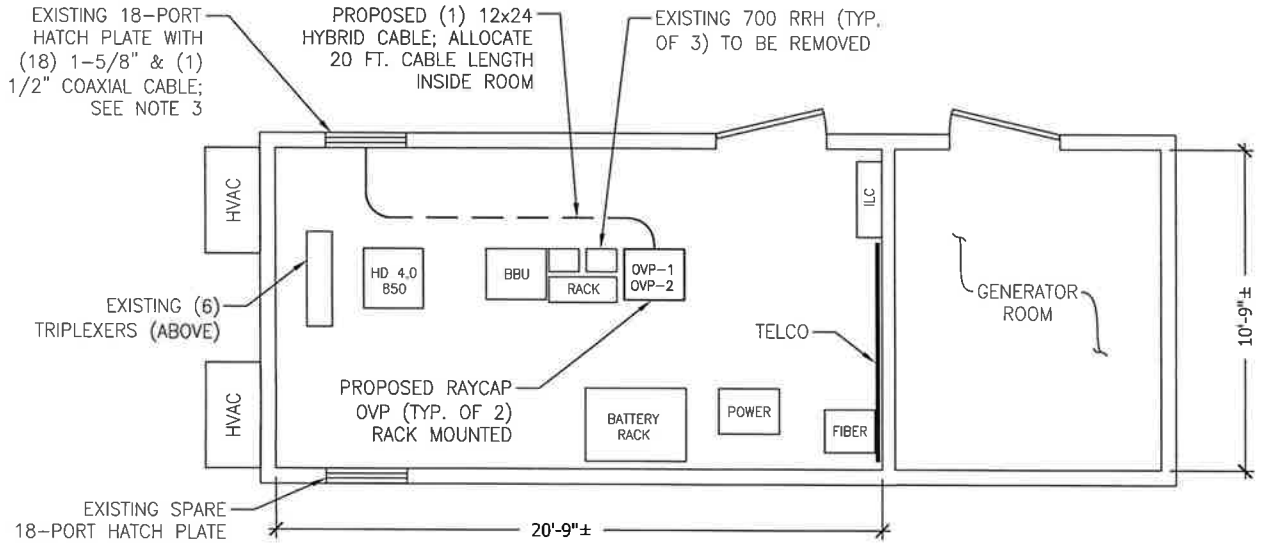
PROJECT NAME:
AWS-PCS-850 LTE CARRIER ADD CABLE DRAWINGS

SITE NAME:
EAST HARTLAND CT

SITE ADDRESS:
HARTLAND TRANSFER STATION
22 WELSH RD.
EAST HARTLAND, CT 06027

SHEET TITLE:
COMPOUND PLAN & ELEVATION

SHEET NUMBER:
A-1



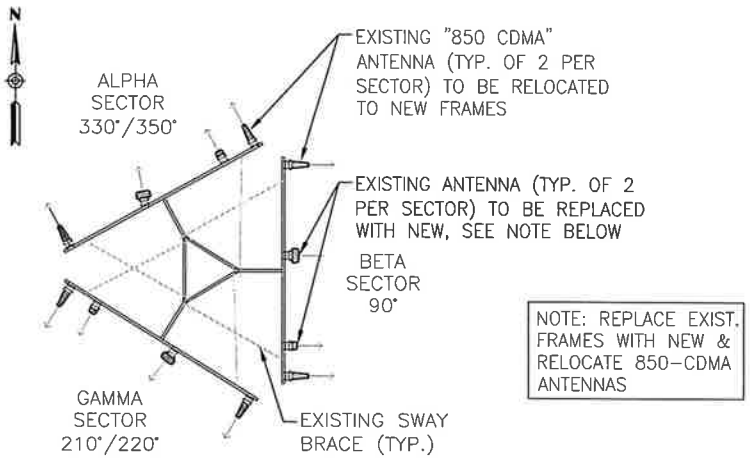
NOTES:
1. CONTRACTOR TO INSTALL NEW AND/OR MODIFY EXISTING SHELTER CABLE ENTRY PORTS FOR THE PROJECT AS REQUIRED INCLUDING THE REMOVAL OF ANY EXISTING COAXIAL CABLES AS DIRECTED BY VERIZON WIRELESS.

2. EQUIPMENT PLAN IS BASED ON LIMITED MEASUREMENTS FOR THE PURPOSE OF LOCATING THE PROPOSED OVP INSIDE. A DETAILED EQUIPMENT ROOM SURVEY WAS NOT PERFORMED.

3. CONTRACTOR TO REMOVE (12) 1-5/8" UNUSED COAX THRU HATCH PLATE AND PROVIDE BOOT COVERS. USE OPEN PORT FOR NEW HYBRID CABLE INTO SHELTER.

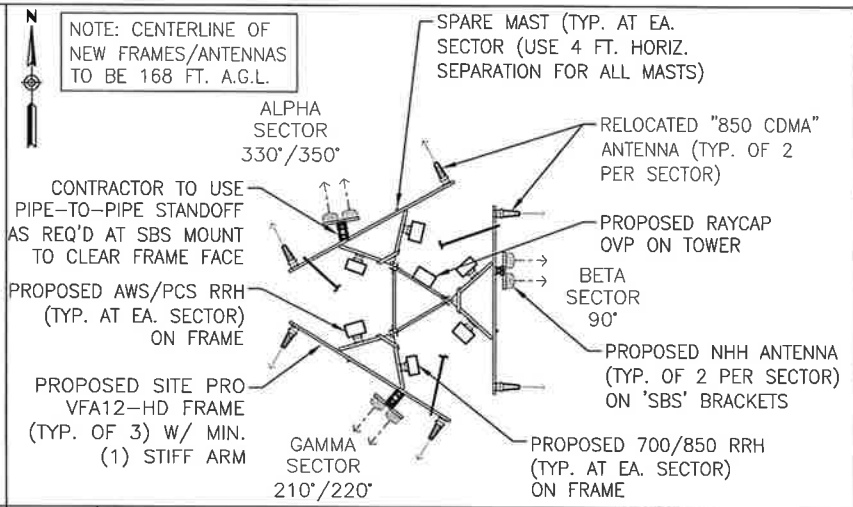
1 SHELTER PLAN - GRADE

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



2 ANTENNA PLAN @ 168 FT. - EXISTING

Scale: 1/8" = 1'-0"



3 ANTENNA PLAN @ 168 FT. - PROPOSED

Scale: 1/8" = 1'-0"

verizon
WIRELESS COMMUNICATIONS FACILITY

20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

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201-456-1624
onair@optonline.net

LICENSURE

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

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

SUBMITTALS

NO	DATE	DESCRIPTION
0	07.23.19	REVIEW
1	08.02.19	REVISED PER STRUCTURAL ANALYSIS
2	10.04.19	REVISED PER OWNER COMMENTS
3	01.29.20	REVISED PER MOUNT ANALYSIS

NO	DATE	DESCRIPTION

DRAWN BY:	MF
CHECKED BY:	DW

PROJECT NAME:
AWS-PCS-850 LTE CARRIER ADD CABLE DRAWINGS

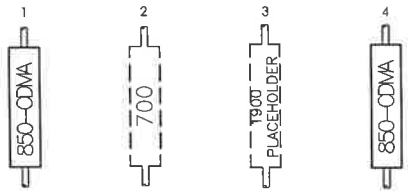
SITE NAME:
EAST HARTLAND CT

SITE ADDRESS:
HARTLAND TRANSFER STATION
22 WELSH RD.
EAST HARTLAND, CT 06027

SHEET TITLE:
SHELTER PLAN & ANTENNA PLANS

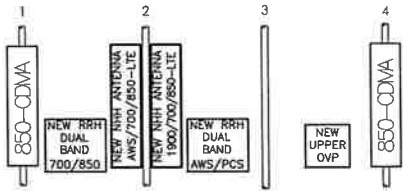
SHEET NUMBER:
A-2

EXISTING - ALPHA



(VIEWED FROM REAR)

PROPOSED - ALPHA



(VIEWED FROM REAR)

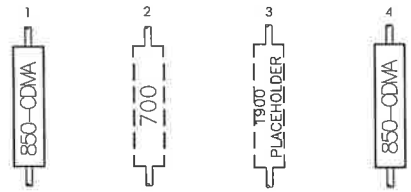
SECTOR: ALPHA				
POSITION	EXISTING ANTENNA	PROPOSED		
		ANTENNA	RRH	OVP
1	850-CDMA	EXISTING TO REMAIN	-	-
2	700	NEW NHH SEE NOTE 1	700/850 DUAL BAND; SEE NOTE 2	SEE NOTE 3
3	1900 PLACEHOLDER	NEW NHH SEE NOTE 1	AWS/PCS DUAL BAND; SEE NOTE 2	-
4	850-CDMA	EXISTING TO REMAIN	-	-

NOTES:
1. EXISTING MAST TO BE RELOCATED ON FRAME FACE; SEE 3/A-2
2. NEW DUAL BAND RRH TO BE MOUNTED ON BACKSIDE OF MAST; SEE 3/A-2
3. NEW 12-CKT, RAYCAP OVP TO BE MOUNTED ON TOWER AND FEED ALL RRH's, ALL SECTORS; SEE 3/A-2

1 ANTENNA SECTOR CONFIGURATIONS - ALPHA

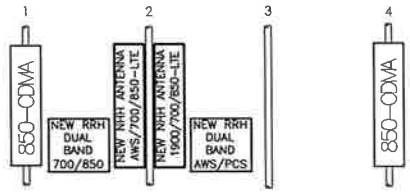
Scale: N.T.S.

EXISTING - BETA



(VIEWED FROM REAR)

PROPOSED - BETA



(VIEWED FROM REAR)

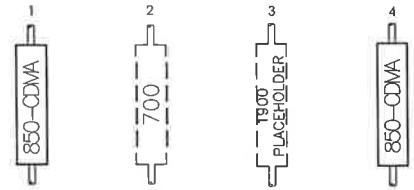
SECTOR: BETA				
POSITION	EXISTING ANTENNA	PROPOSED		
		ANTENNA	RRH	OVP
1	850-CDMA	EXISTING TO REMAIN	-	-
2	700	NEW NHH SEE NOTE 1	700/850 DUAL BAND; SEE NOTE 2	SEE NOTE 3
3	1900 PLACEHOLDER	NEW NHH SEE NOTE 1	AWS/PCS DUAL BAND; SEE NOTE 2	-
4	850-CDMA	EXISTING TO REMAIN	-	-

NOTES:
1. EXISTING MAST TO BE RELOCATED ON FRAME FACE; SEE 3/A-2
2. NEW DUAL BAND RRH TO BE MOUNTED ON BACKSIDE OF MAST; SEE 3/A-2
3. NEW 12-CKT, RAYCAP OVP TO BE MOUNTED ON TOWER AND FEED ALL RRH's, ALL SECTORS; SEE 3/A-2

2 ANTENNA SECTOR CONFIGURATIONS - BETA

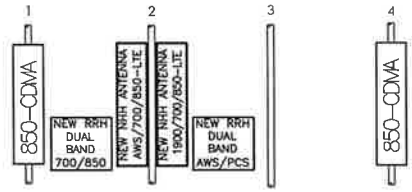
Scale: N.T.S.

EXISTING - GAMMA



(VIEWED FROM REAR)

PROPOSED - GAMMA



(VIEWED FROM REAR)

SECTOR: GAMMA				
POSITION	EXISTING ANTENNA	PROPOSED		
		ANTENNA	RRH	OVP
1	850-CDMA	EXISTING TO REMAIN	-	-
2	700	NEW NHH SEE NOTE 1	700/850 DUAL BAND; SEE NOTE 2	SEE NOTE 3
3	1900 PLACEHOLDER	NEW NHH SEE NOTE 1	AWS/PCS DUAL BAND; SEE NOTE 2	-
4	850-CDMA	EXISTING TO REMAIN	-	-

NOTES:
1. EXISTING MAST TO BE RELOCATED ON FRAME FACE; SEE 3/A-2
2. NEW DUAL BAND RRH TO BE MOUNTED ON BACKSIDE OF MAST; SEE 3/A-2
3. NEW 12-CKT, RAYCAP OVP TO BE MOUNTED ON TOWER AND FEED ALL RRH's, ALL SECTORS; SEE 3/A-2

3 ANTENNA SECTOR CONFIGURATIONS - GAMMA

Scale: N.T.S.

verizon

WIRELESS COMMUNICATIONS FACILITY

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LICENSURE

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

DAVID W. WEINPAHL, P.E.
CT LICENSE: 22144

SUBMITTALS

NO	DATE	DESCRIPTION
E	07.25.19	REVISED
1	08.02.19	REVISED PER STRUCTURAL ANALYSIS
2	10.08.19	REVISED PER OWNER COMMENTS
3	01.29.20	REVISED PER MOUNT ANALYSIS

DRAWN BY: MF
CHECKED BY: DW

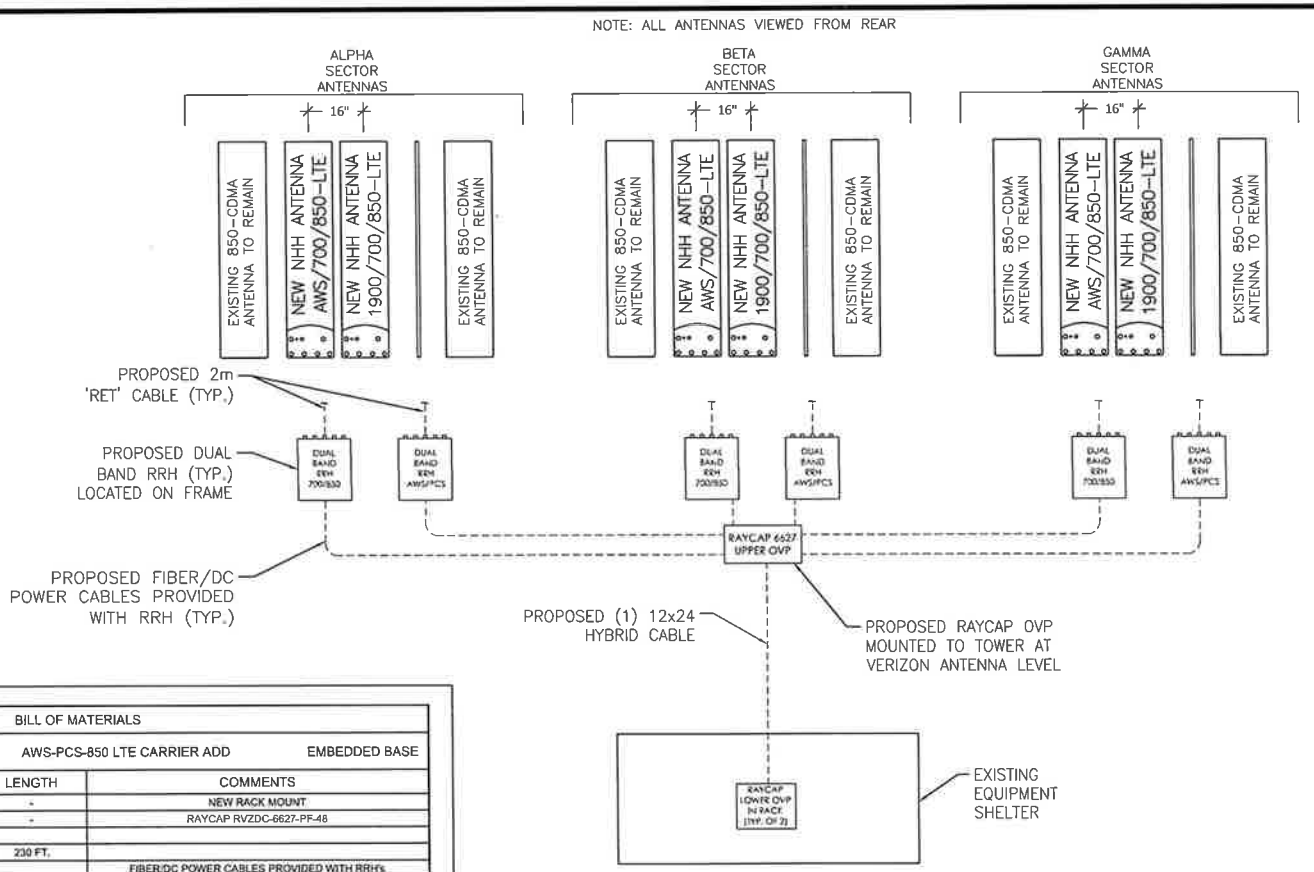
PROJECT NAME:
AWS-PCS-850 LTE
CARRIER ADD
CABLE DRAWINGS

SITE NAME:
EAST HARTLAND CT

SITE ADDRESS:
HARTLAND TRANSFER STATION
22 WELSH RD.
EAST HARTLAND, CT 06027

SHEET TITLE:
ANTENNA SECTOR CONFIGURATIONS

SHEET NUMBER:
A-3



BILL OF MATERIALS			
SITE NAME: EAST HARTLAND CT	AWS-PCS-850 LTE CARRIER ADD		EMBEDDED BASE
DESCRIPTION	QTY	LENGTH	COMMENTS
LOWER OVP	2	-	NEW RACK MOUNT
UPPER OVP	1	-	RAYCAP RVZDC-6627-PF-48
12x24 HYBRID CABLE	1	230 FT.	
1x1 HYBRID CABLE	-		FIBER/DC POWER CABLES PROVIDED WITH RRH's
RET CONTROL CABLE	6	2m - 6.6 FT.	REFER TO PLUMBING DIAGRAM
1/2" JUMPERS	36	6 FT.	(12) PER SECTOR; SEE NOTE 2
AWS/PCS DUAL BAND RRH	3	-	SAMSUNG B2/B66A
700/850 DUAL BAND RRH	3	-	SAMSUNG B5/B13; REMOVE EXIST. 700 RRH FROM SHELTER
AWS ANTENNA	-	-	SHARED WITH NEW 700 NNHH ANTENNA
700 ANTENNA	3	-	NEW NNHH-65B-R4 TO REPLACE EXIST. 700
1900 ANTENNA	3	-	NEW NNHH-65B-R4 TO REPLACE EXIST. 1900 PLACEHOLDER
850-CDMA ANTENNA	-	-	EXISTING TO REMAIN - 2 PER SECTOR
850-LTE ANTENNA	-	-	SHARED WITH NEW 700 NNHH ANTENNA
SIDE-BY-SIDE MTG. BRACKET	-	-	NOT USED FOR NNHH ANTENNAS

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 700 & 1900 JUMPERS TO BE REPLACED; PROVIDE TERMINATION CAPS ON ALL UN-USED ANTENNA PORTS.

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, COAX & TRIPLEXERS NOT SHOWN.

1 BILL OF MATERIALS
Scale: N.T.S.

2 RF PLUMBING DIAGRAM
Scale: N.T.S.

verizon
WIRELESS COMMUNICATIONS FACILITY

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LICENSURE

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

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

SUBMITTALS

0	07.23.19	REVIEW
1	08.02.19	REVISED PER STRUCTURAL ANALYSIS
2	10.08.19	REVISED PER OWNER COMMENTS
3	01.29.20	REVISED PER MOUNT ANALYSIS

NO. DATE DESCRIPTION

DRAWN BY: MF
CHECKED BY: DW

PROJECT NAME:
AWS-PCS-850 LTE CARRIER ADD CABLE DRAWINGS

SITE NAME:
EAST HARTLAND CT

SITE ADDRESS:
HARTLAND TRANSFER STATION
22 WELSH RD.
EAST HARTLAND, CT 06027

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

SHEET NUMBER:
A-4

NHH-65B-R2B

6-port sector antenna, 2x 698–896 and 4x 1695–2360 MHz, 65° HPBW, 2x RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package
- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- Separate RS-485 RET input/output for low and high band
- One RET for low band and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain, dBi	14.9	15.0	17.7	17.9	18.4	18.7
Beamwidth, Horizontal, degrees	65	60	71	69	64	57
Beamwidth, Vertical, degrees	12.4	11.2	5.7	5.2	4.9	4.6
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS (First Lobe), dB	13	14	18	18	19	18
Front-to-Back Ratio at 180°, dB	30	29	31	30	29	31
Isolation, Cross Polarization, dB	25	25	25	25	25	25
Isolation, Inter-band, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port at 50°C, maximum, watts	300	300	300	300	300	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

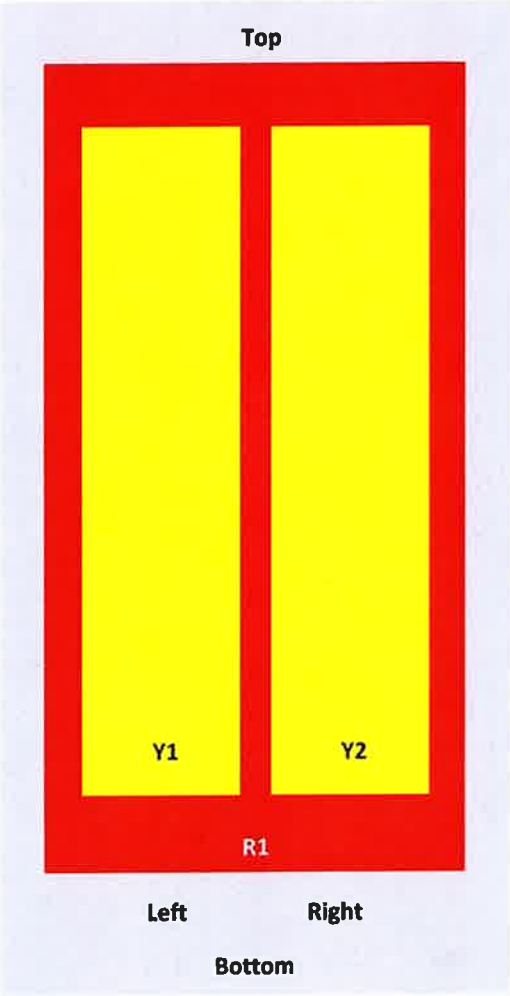
Electrical Specifications, BASTA*

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain by all Beam Tilts, average, dBi	14.5	14.5	17.3	17.7	18.1	18.5
Gain by all Beam Tilts Tolerance, dB	±0.6	±1.1	±0.4	±0.4	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.4 7 ° | 14.6 14 ° | 14.3	0 ° | 14.7 7 ° | 14.7 14 ° | 14.1	0 ° | 17.2 4 ° | 17.3 7 ° | 17.3	0 ° | 17.6 4 ° | 17.7 7 ° | 17.7	0 ° | 18.0 4 ° | 18.2 7 ° | 18.1	0 ° | 18.3 4 ° | 18.5 7 ° | 18.6
Beamwidth, Horizontal Tolerance, degrees	±2	±2.1	±3	±4.1	±6.5	±2.9
Beamwidth, Vertical Tolerance, degrees	±0.7	±0.7	±0.3	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, dB	13	14	16	16	17	15
Front-to-Back Total Power at 180° ± 30°, dB	23	22	27	27	25	25
CPR at Boresight, dB	22	21	23	23	22	19
CPR at Sector, dB	10	7	16	13	11	4

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

Array Layout

NHH



Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-896	1-2	1	ANxxxxxxxxxxxxxxx1
Y1	1695-2360	3-4	2	ANxxxxxxxxxxxxxxx2
Y2	1695-2360	5-6		

View from the front of the antenna

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

General Specifications

Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Antenna Type	Sector

NHH-65B-R2B

Band	Multiband
Performance Note	Outdoor usage | Wind loading figures are validated by wind tunnel measurements described in white paper WP-112534-EN
Total Input Power, maximum	600 W @ 50 °C

Mechanical Specifications

RF Connector Quantity, total	6
RF Connector Quantity, low band	2
RF Connector Quantity, high band	4
RF Connector Interface	7-16 DIN Female
Color	Light gray
Grounding Type	RF connector body grounded to reflector and mounting bracket
Radiator Material	Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	278.0 N @ 150 km/h | 63.6 lbf @ 150 km/h
Wind Loading, lateral	230.0 N @ 150 km/h | 51.7 lbf @ 150 km/h
Wind Loading, maximum	120.7 lbf @ 150 km/h | 537.0 N @ 150 km/h
Effective Projected Area (EPA), frontal	0.26 m^2 | 2.80 ft^2
Effective Projected Area (EPA), lateral	0.22 m^2 | 2.37 ft^2
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1828.0 mm | 72.0 in
Width	301.0 mm | 11.9 in
Depth	180.0 mm | 7.1 in
Net Weight, without mounting kit	19.8 kg | 43.7 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 3
Internal RET	High band (1) | Low band (1)
Power Consumption, idle state, maximum	2 W
Power Consumption, normal conditions, maximum	13 W
Protocol	3GPP/AISG 2.0 (Single RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	2 female | 2 male

NHH-65B-R2B

Packed Dimensions

Length	1952.0 mm | 76.9 in
Width	409.0 mm | 16.1 in
Depth	299.0 mm | 11.8 in
Shipping Weight	32.3 kg | 71.2 lb

Regulatory Compliance/Certifications

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

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

SAMSUNG

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

RFV01U-D2A

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

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

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

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

Features and Benefits

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

Key Technical Specifications

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

SAMSUNG

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

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

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

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

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

Features and Benefits

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

Key Technical Specifications

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

Product Data Sheet **HB158-1-08U8-S8J18**

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Figure 1: HYBRIFLEX Series

Features/Benefits

- Aluminum corrugated armor with outstanding bending characteristics – minimizes installation time and enables mechanical protection and shielding
- Same accessories as 1 5/8" coaxial cable
- Outer conductor grounding – Eliminates typical grounding requirements and saves on installation costs
- Lightweight solution and compact design – Decreases tower loading
- Robust cabling – Eliminates need for expensive cable trays and ducts
- Installation of tight bundled fiber optic cable pairs directly to the RRH – Reduces CAPEX and wind load by eliminating need for interconnection
- Optical fiber and power cables housed in single corrugated cable – Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- Outdoor polyethylene jacket – Ensures long-lasting cable protection

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Mechanical Properties			
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
Electrical Properties			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Fiber Optic Properties			
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
DC Power Cable Properties			
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Environmental			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

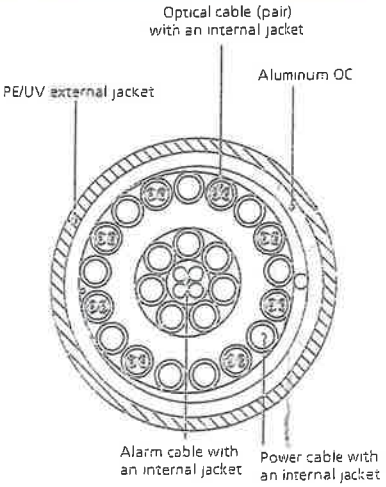


Figure 2: Construction Detail

- This data is provisional and subject to change

ATTACHMENT 3

	General	Power	Density					
Site Name: East Hartland								
Tower Height: 180'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*T-Mobile	6	629	150	1900	0.0655	1.0000	0.65%	
*T-Mobile	1	470	150	700	0.0082	0.4667	0.17%	
*Town of Hartland	2	85	190	154	0.0018	0.2000	0.09%	
*AT&T	2	649	155	880	0.0210	0.5867	0.36%	
*AT&T	2	1387	155	1900	0.0449	1.0000	0.45%	
*AT&T	1	324	155	880	0.0052	0.5867	0.09%	
*AT&T	4	832	155	1900	0.0539	1.0000	0.54%	
*AT&T	1	1313	155	734	0.0213	0.4893	0.43%	
VZW PCS	**1**	**6000**	**168**	**0.0764**	**1970**	**1.0**	**7.64%**	
VZW Cellular	**1**	**1825**	**168**	**0.0233**	**880**	**0.5793**	**4.01%**	
VZW Cellular	**2**	**389**	**168**	**0.0099**	**869**	**0.5793**	**1.71%**	
VZW AWS	**1**	**6300**	**168**	**0.0803**	**2145**	**1.0**	**8.03%**	
VZW 700	**1**	**2570**	**168**	**0.0327**	**746**	**0.4973**	**6.58%**	
								30.8%
* Source: Siting Council								

ATTACHMENT 4

PAUL J. FORD & COMPANY

Report Date:	January 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 180-ft Self Support
Carrier:	Verizon Wireless
Carrier Site Name:	East Hartland CT
Site Address:	22 Welsh Road
City, County, State:	East Hartland, Hartford County, CT
Latitude, Longitude:	41.997522, -72.887733
PJF Project:	A42919-0009.003.8700

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

Analysis Criteria:

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

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 - 78.4%
Existing Foundation:	Pass - 47.2%

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

Jonathan Sommer, PE
Project Engineer
jsommer@pauljford.com

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

01/24/2020

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 180 ft Self Support tower designed by Pirod. The original design standard and wind speed are unknown. All information on the tower was obtained from the previous structural analyses referenced in Table 3.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-G
Risk Category:	II
Wind Speed (Nominal):	93 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	1 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)
168.0	168.0	6	antel	LPA-80080/6CF	6 1 1	1-5/8 1/2 Hybrid
		6	commscope	NHH-65B-R4_TIA		
		3	commscope	BSAMNT-SBS-1-2		
		1	raycap	RVZDC-6627-PF-48		
		3	samsung telecommunications	B2/B66A RRH-BR049		
		3	samsung telecommunications	B5/B13 RRH-BR04C		
		3	sitepro1	VFA12-HD		

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)
179.0	189.0	1	antennae	20' 4-Bay Dipole	3 1	7/8 1-5/8
		3	antennae	3" x 20' Omni		
	179.0	1	tower mounts	Halo Mount (6-ARM)		
156.0	156.0	3	ericsson	RRUS-11	12 2 1	1-5/8 3/4 5/16
		3	kmw communications	AM-X-CD-16-65-00T-RET		
		6	powerwave technologies	7770.00		
		6	powerwave technologies	LGP2140X		
		1	raycap	DC6-48-60-18-8F		
		3	tower mounts	T-Frame		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
147.0	148.0	3	rfs celwave	APX16DWV-16DWVS	9 3	1-5/8 1.57
		3	rfs celwave	APXVAARR24-43-U-NA20		
	147.0	3	ericsson	RRUS B71/B12 4449		
		3	rfs	twin TMA		
		3	tower mounts	T-Frame		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Structural Analysis Report	Centek Engineering, 12/20/2011	12001.CO8	On Air Engineering
Structural Analysis Report	EBI Consulting, 8/19/2014	81140832	On Air Engineering
Compound Plan & Elevation	Verizon, 10/08/2019	AWS-PCS-850 LTE CARRIER ADD CABLE DRAWINGS	On Air Engineering
Shelter Plan & Antenna Plans	Verizon, 10/08/2019	AWS-PCS-850 LTE CARRIER ADD CABLE DRAWINGS	On Air Engineering
Radio Frequency Data Sheet	Verizon, 09/06/2019	1499033	On Air Engineering

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) All information on the tower and foundation was obtained from the previous structural analyses referenced in Table 3.

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	180 - 160	Leg	1 1/2" solid	3	-21.35	52.11	41.0	Pass
T2	160 - 140	Leg	Pirod 105216	67	-51.63	142.49	36.2	Pass
T3	140 - 120	Leg	Pirod 105216	80	-88.62	142.49	62.2	Pass
T4	120 - 100	Leg	Pirod 105217	95	-118.50	214.86	55.1	Pass
T5	100 - 80	Leg	Pirod 105218	110	-146.28	300.68	48.6	Pass
T6	80 - 60	Leg	Pirod 105218	125	-172.15	300.68	57.3	Pass
T7	60 - 40	Leg	Pirod 105219	140	-197.73	399.87	49.4	Pass
T8	40 - 20	Leg	Pirod 105219	155	-222.00	399.87	55.5	Pass
T9	20 - 0	Leg	Pirod 105220	170	-245.34	512.38	47.9	Pass
T1	180 - 160	Diagonal	3/4" solid	14	-2.49	3.94	63.2	Pass
T2	160 - 140	Diagonal	L 2.5 x 2.5 x 3/16	70	-7.35	10.12	72.6 78.4 (b)	Pass
T3	140 - 120	Diagonal	L 2.5 x 2.5 x 3/16	87	-5.67	8.20	69.1	Pass
T4	120 - 100	Diagonal	L 2.5 x 2.5 x 3/16	102	-5.38	6.89	78.1	Pass
T5	100 - 80	Diagonal	L 3 x 3 x 3/16	117	-5.49	10.02	54.8	Pass
T6	80 - 60	Diagonal	L 3 x 3 x 3/16	132	-5.67	8.32	68.2	Pass
T7	60 - 40	Diagonal	L 3 x 3 x 5/16	147	-6.01	11.14	53.9	Pass
T8	40 - 20	Diagonal	L 3 x 3 x 5/16	162	-6.42	9.37	68.5	Pass
T9	20 - 0	Diagonal	L 3.5 x 3.5 x 5/16	177	-7.76	12.81	60.6	Pass
T1	180 - 160	Horizontal	3/4" solid	23	-0.29	2.22	13.0	Pass
T1	180 - 160	Top Girt	7/8" solid	4	-0.26	5.69	4.6	Pass
T1	180 - 160	Bottom Girt	7/8" solid	9	-0.72	3.72	19.3	Pass
							Summary	
						Leg (T3)	62.2	Pass
						Diagonal (T2)	78.4	Pass
						Horizontal (T1)	13.0	Pass
						Top Girt (T1)	4.6	Pass
						Bottom Girt (T1)	19.3	Pass
						Bolt Checks	78.4	Pass
						RATING =	78.4	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	43.7	Pass
1	Base Foundation Structural	0	17.7	Pass
1	Base Foundation Soil Interaction	0	47.2	Pass
Structure Rating (max from all components) =				**78.4%**

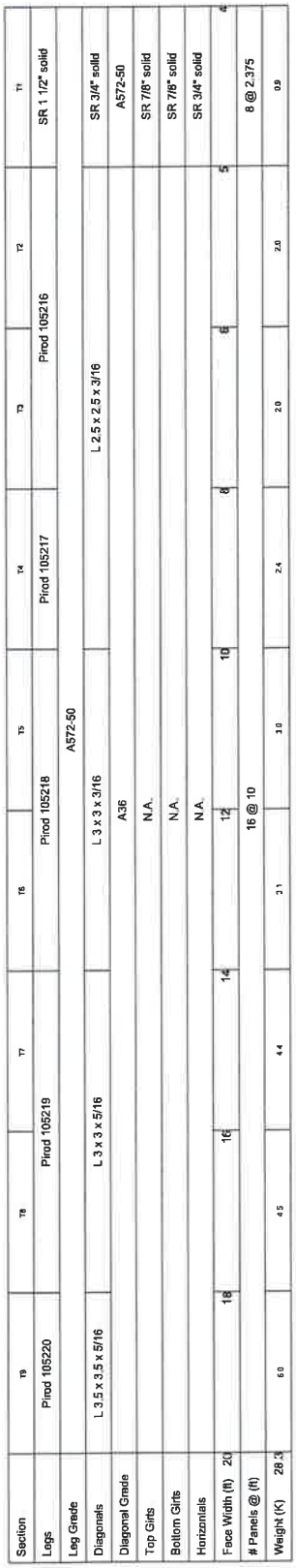
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

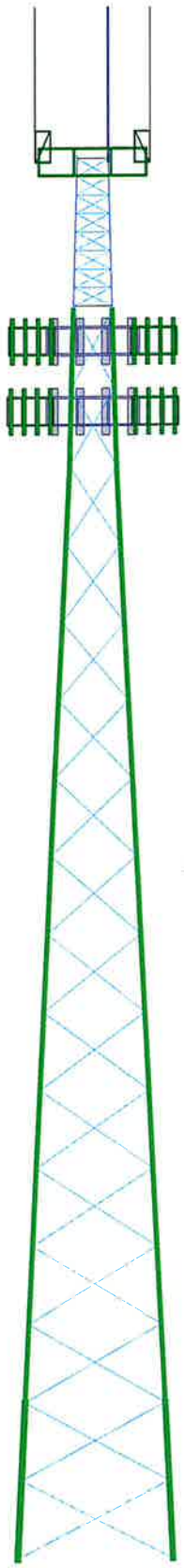
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Halo Mount (6 ARM)	179	(4) 2.375" OD x 6' Mount Pipe	156
20' 4-Bay Dipole	179	AM-X-CD-16-65-00T-RET	156
3" x 20' Omni	179	AM-X-CD-16-65-00T-RET	156
3" x 20' Omni	179	AM-X-CD-16-65-00T-RET	156
3" x 20' Omni	179	(2) 7770.00	156
(4) 2.375" OD x 8' Mount Pipe	168	(2) 7770.00	156
(4) 2.375" OD x 8' Mount Pipe	168	(2) 7770.00	156
(4) 2.375" OD x 8' Mount Pipe	168	(2) LGP2140X	156
(2) LPA-80080/6CF	168	(2) LGP2140X	156
(2) LPA-80080/6CF	168	(2) LGP2140X	156
(2) LPA-80080/6CF	168	RRUS-11	156
Site Pro 1 VFA12-HD	168	RRUS-11	156
Site Pro 1 VFA12-HD	168	RRUS-11	156
Site Pro 1 VFA12-HD	168	DC6-48-60-18-8F	156
BSAMNT-SBS-1-2 (Mount Bracket)	168	(3) T-Frame	147
BSAMNT-SBS-1-2 (Mount Bracket)	168	(4) 2.375" OD x 6' Mount Pipe	147
BSAMNT-SBS-1-2 (Mount Bracket)	168	(4) 2.375" OD x 6' Mount Pipe	147
(2) NHH-65B-R2B_TIA	168	(4) 2.375" OD x 6' Mount Pipe	147
(2) NHH-65B-R2B_TIA	168	rfs celwave APX16DWV-16DWVS	147
(2) NHH-65B-R2B_TIA	168	rfs celwave APX16DWV-16DWVS	147
B2/B66A RRH-BR049	168	rfs celwave APX16DWV-16DWVS	147
B2/B66A RRH-BR049	168	rfs celwave APXVAARR24-43-U-NA20	147
B2/B66A RRH-BR049	168	rfs celwave APXVAARR24-43-U-NA20	147
B5/B13 RRH-BR04C	168	rfs celwave APXVAARR24-43-U-NA20	147
B5/B13 RRH-BR04C	168	RFS twin TMA	147
B5/B13 RRH-BR04C	168	RFS twin TMA	147
RVZDC-6627-PF-48	168	RFS twin TMA	147
(3) T-Frame	156	ericsson RRUS B71/B12 4449	147
(4) 2.375" OD x 6' Mount Pipe	156	ericsson RRUS B71/B12 4449	147
(4) 2.375" OD x 6' Mount Pipe	156	ericsson RRUS B71/B12 4449	147

MATERIAL STRENGTH

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

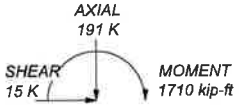
TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 78.4%

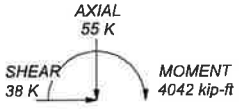
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 252 K
SHEAR: 25 K

UPLIFT: -214 K
SHEAR: 22 K



TORQUE 6 kip-ft
50 mph WIND - 1.00 in ICE



TORQUE 20 kip-ft
REACTIONS - 93 mph WIND

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

Job: 180' SST / East Hartland			
Project: PJF 42919-0009			
Client: East Hartland CT	Drawn by: Jonathan Sommer	App'd:	
Code: TIA-222-G	Date: 01/23/20	Scale: NTS	
Path:		Dwg No. E-1	

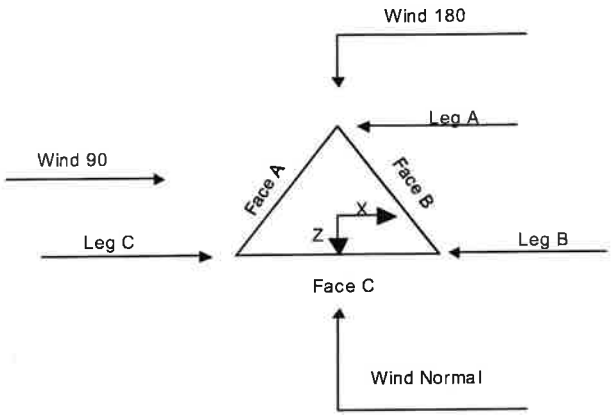
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 4.00 ft at the top and 20.00 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1) Tower is located in Hartford County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 93 mph.
4) Structure Class II.
5) Exposure Category B.
6) Topographic Category 1.
7) Crest Height 0.00 ft.
8) Nominal ice thickness of 1.00 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56 pcf.
11) A wind speed of 50 mph is used in combination with ice.
12) Temperature drop of 50 °F.
13) Deflections calculated using a wind speed of 60 mph.
14) A non-linear (P-delta) analysis was used.
15) Pressures are calculated at each section.
16) Stress ratio used in tower member design is 1.
17) 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	180.00-160.00			4.00	1	20.00
T2	160.00-140.00			5.00	1	20.00
T3	140.00-120.00			6.00	1	20.00
T4	120.00-100.00			8.00	1	20.00
T5	100.00-80.00			10.00	1	20.00
T6	80.00-60.00			12.00	1	20.00
T7	60.00-40.00			14.00	1	20.00
T8	40.00-20.00			16.00	1	20.00
T9	20.00-0.00			18.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180.00-160.00	2.38	X Brace	No	Steps	6.00	6.00
T2	160.00-140.00	10.00	X Brace	No	No	0.00	0.00
T3	140.00-120.00	10.00	X Brace	No	No	0.00	0.00
T4	120.00-100.00	10.00	X Brace	No	No	0.00	0.00
T5	100.00-80.00	10.00	X Brace	No	No	0.00	0.00
T6	80.00-60.00	10.00	X Brace	No	No	0.00	0.00
T7	60.00-40.00	10.00	X Brace	No	No	0.00	0.00
T8	40.00-20.00	10.00	X Brace	No	No	0.00	0.00
T9	20.00-0.00	10.00	X Brace	No	No	0.00	0.00

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-160.00	Solid Round	1 1/2" solid	A572-50 (50 ksi)	Solid Round	3/4" solid	A572-50 (50 ksi)
T2 160.00-140.00	Truss Leg	Pirod 105216	A572-50 (50 ksi)	Single Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)
T3 140.00-120.00	Truss Leg	Pirod 105216	A572-50 (50 ksi)	Equal Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)
T4 120.00-100.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Equal Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)
T5 100.00-80.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L 3 x 3 x 3/16	A36 (36 ksi)
T6 80.00-60.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L 3 x 3 x 3/16	A36 (36 ksi)
T7 60.00-40.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L 3 x 3 x 5/16	A36 (36 ksi)
T8 40.00-20.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L 3 x 3 x 5/16	A36 (36 ksi)
T9 20.00-0.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Equal Angle	L 3.5 x 3.5 x 5/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.00-160.00	Solid Round	7/8" solid	A572-50 (50 ksi)	Solid Round	7/8" solid	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 180.00-160.00	None	Solid Round		A572-50 (50 ksi)	Solid Round	3/4" solid	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 180.00-160.00	0.00	0.00	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T2 160.00-140.00	0.00	0.00	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T3 140.00-120.00	0.00	0.00	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T4 120.00-100.00	0.00	0.00	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T5 100.00-80.00	0.00	0.00	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T6 80.00-60.00	0.00	0.00	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft^2	in					in	in	in
T7 60.00-40.00	0.00	0.00	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T8 40.00-20.00	0.00	0.00	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T9 20.00-0.00	0.00	0.00	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt

Tower Section Geometry *(cont'd)*

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Single Diags X	K Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
ft															
T1 180.00-160.00	No	Yes	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 160.00-140.00	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
T3 140.00-120.00	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
T4 120.00-100.00	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
T5 100.00-80.00	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
T6 80.00-60.00	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
T7 60.00-40.00	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
T8 40.00-20.00	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
T9 20.00-0.00	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]*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	Truss-Leg K Factors: Truss-Legs Used As Leg Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals
ft						
T2 160.00-140.00	1	0.5	0.85	1	0.5	0.85
T3 140.00-120.00	1	0.5	0.85	1	0.5	0.85
T4 120.00-100.00	1	0.5	0.85	1	0.5	0.85
T5 100.00-80.00	1	0.5	0.85	1	0.5	0.85
T6 80.00-60.00	1	0.5	0.85	1	0.5	0.85
T7 60.00-40.00	1	0.5	0.85	1	0.5	0.85
T8 40.00-20.00	1	0.5	0.85	1	0.5	0.85
T9 20.00-0.00	1	0.5	0.85	1	0.5	0.85

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 180.00-160.00	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1
T2 160.00-140.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T3 140.00-120.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T4 120.00-100.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T5 100.00-80.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T6 80.00-60.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T7 60.00-40.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T8 40.00-20.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T9 20.00-0.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.00-160.00	Flange	1.00 A325N	6	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0
T2 160.00-140.00	Flange	1.00 A325N	6	1.00 A325N	1	0.00 A325N	0	0.00 A325N	0	1.00 A325N	0	0.00 A325N	0	1.00 A325N	0
T3 140.00-120.00	Flange	1.00 A325N	6	1.00 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0
T4 120.00-100.00	Flange	1.00 A325N	6	1.00 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0
T5 100.00-80.00	Flange	1.00 A325N	6	1.00 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0
T6 80.00-60.00	Flange	1.00 A325N	6	1.00 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0
T7 60.00-40.00	Flange	1.25 A325N	6	1.25 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0
T8 40.00-20.00	Flange	1.25 A325N	6	1.25 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0
T9 20.00-0.00	Flange	0.00 A687	0	1.25 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
T-Brackets (Af)	A	No	No	Af (CaAa)	160.00 - 8.00	-6.00	0.5	1	1	1.00	1.00		8.40

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
T-Brackets (Af)	B	No	No	Af (CaAa)	160.00 - 8.00	-6.00	0.5	1	1	1.00	1.00		8.40
T-Brackets (Af)	C	No	No	Af (CaAa)	160.00 - 8.00	-6.00	0.5	1	1	1.00	1.00		8.40
Safety Line 3/8 ***	A	No	No	Ar (CaAa)	180.00 - 0.00	4.00	0.5	1	1	0.38	0.38		0.22
LDF5-50A(7/8")	C	No	No	Ar (CaAa)	179.00 - 8.00	-6.00	0.5	3	2	1.00 0.50	1.09		0.33
LDF7-50A(1-5/8")	C	No	No	Ar (CaAa)	179.00 - 8.00	-6.00	0.5	1	1	1.00 0.50	1.98		0.82
LDF7-50A(1-5/8")	A	No	No	Ar (CaAa)	168.00 - 8.00	-12.00	0.5	6	6	1.00 0.50	1.98		0.82
FSJ4P-50B-1(1/2")	A	No	No	Ar (CaAa)	168.00 - 8.00	-12.00	0.5	1	1	1.00 0.50	0.53		0.14
MLC HYBRID 6X12 LI(1-1/2")	A	No	No	Ar (CaAa)	168.00 - 8.00	-12.00	0.5	1	1	1.00 0.50	1.55		1.85
LDF7-50A(1-5/8")	B	No	No	Ar (CaAa)	156.00 - 8.00	-9.00	0.5	12	6	1.00 0.50	1.98		0.82
3/4" power	B	No	No	Ar (CaAa)	156.00 - 8.00	-12.00	0.5	2	2	1.00 0.50	0.75		0.60
5/16" Fiberoptic cable	B	No	No	Ar (CaAa)	156.00 - 8.00	-12.00	0.5	1	1	0.31	0.31		0.00
LDF7-50A(1-5/8")	C	No	No	Ar (CaAa)	148.00 - 8.00	-6.00	0.5	9	9	1.00 0.50	1.98		0.82
1.57" Hybrid fiber-power cable ******	C	No	No	Ar (CaAa)	148.00 - 8.00	-6.00	0.5	3	3	1.00 0.50	1.98		0.82

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Halo Mount (6-ARM)	C	None		0.000	179.00	No Ice 1/2" Ice 1" Ice	61.00 88.00 115.00	61.00 88.00 115.00	2.00 3.00 4.00
20' 4-Bay Dipole	A	From Leg	5.00 0 10	0.000	179.00	No Ice 1/2" Ice 1" Ice	4.00 6.00 8.00	4.00 6.00 8.00	0.06 0.10 0.14
3" x 20' Omni	A	From Leg	5.00 0 10	0.000	179.00	No Ice 1/2" Ice 1" Ice	6.00 8.03 10.08	6.00 8.03 10.08	0.06 0.10 0.15
3" x 20' Omni	B	From Leg	5.00 0 10	0.000	179.00	No Ice 1/2" Ice 1" Ice	6.00 8.03 10.08	6.00 8.03 10.08	0.06 0.10 0.15
3" x 20' Omni	C	From Leg	5.00 0 10	0.000	179.00	No Ice 1/2" Ice 1" Ice	6.00 8.03 10.08	6.00 8.03 10.08	0.06 0.10 0.15
*** (4) 2.375" OD x 8' Mount Pipe	A	From Leg	4.00 0	0.000	168.00	No Ice	1.90 2.73	1.90 2.73	0.03 0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0			1/2" Ice	3.40	3.40	0.06
						1" Ice			
(4) 2.375" OD x 8' Mount Pipe	B	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	1.90 2.73 3.40	1.90 2.73 3.40	0.03 0.04 0.06
(4) 2.375" OD x 8' Mount Pipe	C	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	1.90 2.73 3.40	1.90 2.73 3.40	0.03 0.04 0.06
(2) LPA-80080/6CF	A	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	4.33 4.76 5.21	8.62 9.08 9.54	0.02 0.07 0.12
(2) LPA-80080/6CF	B	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	4.33 4.76 5.21	8.62 9.08 9.54	0.02 0.07 0.12
(2) LPA-80080/6CF	C	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	4.33 4.76 5.21	8.62 9.08 9.54	0.02 0.07 0.12
Site Pro 1 VFA12-HD	A	From Leg	2.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	13.20 19.50 25.80	9.20 14.60 19.50	0.66 0.80 1.01
Site Pro 1 VFA12-HD	B	From Leg	2.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	13.20 19.50 25.80	9.20 14.60 19.50	0.66 0.80 1.01
Site Pro 1 VFA12-HD	C	From Leg	2.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	13.20 19.50 25.80	9.20 14.60 19.50	0.66 0.80 1.01
BSAMNT-SBS-1-2 (Mount Bracket)	A	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.00 0.00 0.00	0.03 0.05 0.07
BSAMNT-SBS-1-2 (Mount Bracket)	B	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.00 0.00 0.00	0.03 0.05 0.07
BSAMNT-SBS-1-2 (Mount Bracket)	C	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.00 0.00 0.00	0.03 0.05 0.07
(2) NHH-65B-R2B_TIA	A	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	8.08 8.53 9.00	5.34 5.79 6.26	0.04 0.09 0.15
(2) NHH-65B-R2B_TIA	B	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	8.08 8.53 9.00	5.34 5.79 6.26	0.04 0.09 0.15
(2) NHH-65B-R2B_TIA	C	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	8.08 8.53 9.00	5.34 5.79 6.26	0.04 0.09 0.15
B2/B66A RRH-BR049	A	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B2/B66A RRH-BR049	B	From Leg	4.00 0	0.000	168.00	No Ice	1.88 2.05	1.01 1.14	0.07 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0			1/2" Ice	2.22	1.28	0.11
						1" Ice			
B2/B66A RRH-BR049	C	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B5/B13 RRH-BR04C	A	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B5/B13 RRH-BR04C	B	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
B5/B13 RRH-BR04C	C	From Leg	4.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.07 0.09 0.11
RVZDC-6627-PF-48	C	From Face	1.00 0 0	0.000	168.00	No Ice 1/2" Ice 1" Ice	3.79 4.04 4.30	2.51 2.73 2.95	0.03 0.06 0.10
***									
(3) T-Frame	C	None		0.000	156.00	No Ice 1/2" Ice 1" Ice	19.83 29.41 38.99	19.83 29.41 38.99	0.92 1.33 1.73
(4) 2.375" OD x 6' Mount Pipe	A	From Leg	4.00 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.03 0.04 0.05
(4) 2.375" OD x 6' Mount Pipe	B	From Leg	4.00 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.03 0.04 0.05
(4) 2.375" OD x 6' Mount Pipe	C	From Leg	4.00 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.03 0.04 0.05
AM-X-CD-16-65-00T-RET	A	From Leg	4.00 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	4.69 5.15 5.61	2.34 2.77 3.20	0.05 0.10 0.15
AM-X-CD-16-65-00T-RET	B	From Leg	4.00 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	4.69 5.15 5.61	2.34 2.77 3.20	0.05 0.10 0.15
AM-X-CD-16-65-00T-RET	C	From Leg	4.00 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	4.69 5.15 5.61	2.34 2.77 3.20	0.05 0.10 0.15
(2) 7770.00	A	From Leg	4.00 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	5.51 5.87 6.23	2.93 3.27 3.63	0.04 0.07 0.11
(2) 7770.00	B	From Leg	4.00 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	5.51 5.87 6.23	2.93 3.27 3.63	0.04 0.07 0.11
(2) 7770.00	C	From Leg	4.00 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	5.51 5.87 6.23	2.93 3.27 3.63	0.04 0.07 0.11
(2) LGP2140X	A	From Leg	3.50	0.000	156.00	No Ice	1.08	0.36	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0 0			1/2" Ice 1" Ice	1.21 1.35	0.45 0.56	0.02 0.03
(2) LGP2140X	B	From Leg	3.50 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	1.08 1.21 1.35	0.36 0.45 0.56	0.01 0.02 0.03
(2) LGP2140X	C	From Leg	3.50 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	1.08 1.21 1.35	0.36 0.45 0.56	0.01 0.02 0.03
RRUS-11	A	From Leg	3.50 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.09
RRUS-11	B	From Leg	3.50 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.09
RRUS-11	C	From Leg	3.50 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.09
DC6-48-60-18-8F	A	From Leg	0.50 0 0	0.000	156.00	No Ice 1/2" Ice 1" Ice	1.21 1.89 2.11	1.21 1.89 2.11	0.03 0.05 0.08
***									
(3) T-Frame	C	None		0.000	147.00	No Ice 1/2" Ice 1" Ice	19.83 29.41 38.99	19.83 29.41 38.99	0.92 1.33 1.73
(4) 2.375" OD x 6' Mount Pipe	A	From Leg	4.00 0 1	0.000	147.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.03 0.04 0.05
(4) 2.375" OD x 6' Mount Pipe	B	From Leg	4.00 0 1	0.000	147.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.03 0.04 0.05
(4) 2.375" OD x 6' Mount Pipe	C	From Leg	4.00 0 1	0.000	147.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.03 0.04 0.05
rfs celwave APX16DWV-16DWVS	A	From Leg	4.00 0 1	0.000	147.00	No Ice 1/2" Ice 1" Ice	6.08 6.44 6.80	2.00 2.33 2.66	0.03 0.06 0.09
rfs celwave APX16DWV-16DWVS	B	From Leg	4.00 0 1	0.000	147.00	No Ice 1/2" Ice 1" Ice	6.08 6.44 6.80	2.00 2.33 2.66	0.03 0.06 0.09
rfs celwave APX16DWV-16DWVS	C	From Leg	4.00 0 1	0.000	147.00	No Ice 1/2" Ice 1" Ice	6.08 6.44 6.80	2.00 2.33 2.66	0.03 0.06 0.09
rfs celwave APXVAARR24-43-U-NA20	A	From Leg	4.00 0 1	0.000	147.00	No Ice 1/2" Ice 1" Ice	22.38 23.16 23.95	8.89 9.49 10.09	0.09 0.20 0.32
rfs celwave APXVAARR24-43-U-NA20	B	From Leg	4.00 0 1	0.000	147.00	No Ice 1/2" Ice 1" Ice	22.38 23.16 23.95	8.89 9.49 10.09	0.09 0.20 0.32

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
rfs celwave APXVAARR24-43-U-NA20	C	From Leg	4.00 0 1	0.000	147.00	No Ice 1/2" Ice 1" Ice	22.38 23.16 23.95	8.89 9.49 10.09	0.09 0.20 0.32
RFS twin TMA	A	From Leg	3.50 0 0	0.000	147.00	No Ice 1/2" Ice 1" Ice	1.00 1.13 1.26	0.41 0.50 0.59	0.01 0.02 0.03
RFS twin TMA	B	From Leg	3.50 0 0	0.000	147.00	No Ice 1/2" Ice 1" Ice	1.00 1.13 1.26	0.41 0.50 0.59	0.01 0.02 0.03
RFS twin TMA	C	From Leg	3.50 0 0	0.000	147.00	No Ice 1/2" Ice 1" Ice	1.00 1.13 1.26	0.41 0.50 0.59	0.01 0.02 0.03
ericsson RRUS B71/B12 4449	A	From Leg	3.50 0 0	0.000	147.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.30 1.45 1.60	0.07 0.09 0.11
ericsson RRUS B71/B12 4449	B	From Leg	3.50 0 0	0.000	147.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.30 1.45 1.60	0.07 0.09 0.11
ericsson RRUS B71/B12 4449	C	From Leg	3.50 0 0	0.000	147.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.30 1.45 1.60	0.07 0.09 0.11
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Truss-Leg Properties

Section Designation	Area in²	Area Ice in²	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in²
Pirod 105216	2176.93	6564.48	0.50	1.85	7.56	22.79	3.68
Pirod 105216	2176.93	6540.97	0.50	1.81	7.56	22.71	3.68
Pirod 105217	2303.92	6585.93	0.62	1.79	8.00	22.87	5.30
Pirod 105218	2432.86	6626.05	0.76	1.75	8.45	23.01	7.22
Pirod 105218	2432.86	6587.02	0.76	1.68	8.45	22.87	7.22
Pirod 105219	2441.87	7020.06	0.99	1.67	8.48	24.38	9.42
Pirod 105219	2441.87	6928.27	0.99	1.54	8.48	24.06	9.42
Pirod 105220	2797.76	6818.07	1.32	1.46	9.71	23.67	11.93

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

Comb. No.	Description
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	251.70	21.99	-12.19
	Max. H_x	18	251.70	21.99	-12.19
	Max. H_z	7	-214.18	-19.12	10.53
	Min. Vert	7	-214.18	-19.12	10.53
	Min. H_x	7	-214.18	-19.12	10.53
	Min. H_z	18	251.70	21.99	-12.19
Leg B	Max. Vert	10	245.21	-21.14	-12.07
	Max. H_x	23	-207.04	18.21	10.39
	Max. H_z	23	-207.04	18.21	10.39
	Min. Vert	23	-207.04	18.21	10.39
	Min. H_x	10	245.21	-21.14	-12.07
	Min. H_z	10	245.21	-21.14	-12.07
Leg A	Max. Vert	2	248.81	-0.53	24.84
	Max. H_x	21	13.56	1.26	1.14
	Max. H_z	2	248.81	-0.53	24.84
	Min. Vert	15	-210.52	0.54	-21.42
	Min. H_x	9	13.56	-1.25	1.14
	Min. H_z	15	-210.52	0.54	-21.42

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	45.85	0.00	0.00	4	0	0
1.2 Dead+1.6 Wind 0 deg - No Ice	55.02	-0.00	-37.24	-3992	1	-19
0.9 Dead+1.6 Wind 0 deg - No Ice	41.27	-0.00	-37.24	-3987	0	-19
1.2 Dead+1.6 Wind 30 deg - No Ice	55.02	18.37	-31.84	-3430	-1980	2
0.9 Dead+1.6 Wind 30 deg - No Ice	41.27	18.37	-31.84	-3426	-1977	2
1.2 Dead+1.6 Wind 60 deg - No Ice	55.02	31.54	-18.23	-1976	-3425	15
0.9 Dead+1.6 Wind 60 deg - No Ice	41.27	31.54	-18.23	-1973	-3419	15
1.2 Dead+1.6 Wind 90 deg - No Ice	55.02	35.24	-0.00	5	-3858	1
0.9 Dead+1.6 Wind 90 deg - No Ice	41.27	35.24	-0.00	3	-3852	1
1.2 Dead+1.6 Wind 120 deg - No Ice	55.02	31.50	18.20	1970	-3400	4
0.9 Dead+1.6 Wind 120 deg - No Ice	41.27	31.50	18.20	1966	-3394	4
1.2 Dead+1.6 Wind 150 deg - No Ice	55.02	18.10	31.37	3406	-1960	20
0.9 Dead+1.6 Wind 150 deg - No Ice	41.27	18.10	31.37	3399	-1957	20
1.2 Dead+1.6 Wind 180 deg - No Ice	55.02	0.00	35.79	3892	1	19
0.9 Dead+1.6 Wind 180 deg - No Ice	41.27	0.00	35.79	3885	0	19
1.2 Dead+1.6 Wind 210 deg - No Ice	55.02	-18.33	31.77	3428	1975	-2
0.9 Dead+1.6 Wind 210 deg - No Ice	41.27	-18.33	31.77	3421	1971	-2
1.2 Dead+1.6 Wind 240 deg - No Ice	55.02	-32.66	18.87	2026	3497	-15
0.9 Dead+1.6 Wind 240 deg - No Ice	41.27	-32.66	18.87	2022	3492	-15
1.2 Dead+1.6 Wind 270 deg - No Ice	55.02	-35.16	-0.00	5	3846	-1
0.9 Dead+1.6 Wind 270 deg - No Ice	41.27	-35.16	-0.00	3	3840	-1
1.2 Dead+1.6 Wind 300 deg - No Ice	55.02	-30.32	-17.52	-1913	3318	-4
0.9 Dead+1.6 Wind 300 deg - No Ice	41.27	-30.32	-17.52	-1911	3312	-4
1.2 Dead+1.6 Wind 330 deg - No Ice	55.02	-18.10	-31.37	-3396	1962	-20
0.9 Dead+1.6 Wind 330 deg - No Ice	41.27	-18.10	-31.37	-3392	1958	-20
1.2 Dead+1.0 Ice+1.0 Temp	190.69	0.00	-0.00	25	30	0
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	190.69	0.00	-15.24	-1696	31	-6
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	190.69	7.48	-12.96	-1448	-819	0
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	190.69	12.69	-7.33	-814	-1422	3
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	190.69	14.57	-0.00	26	-1642	-1
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	190.69	12.71	7.34	858	-1410	-2
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	190.69	7.40	12.82	1476	-806	4
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	190.69	0.00	14.89	1706	31	6

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
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	190.69	-7.40	12.82	1474	867	0
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	190.69	-12.71	7.34	857	1470	-3
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	190.69	-14.40	-0.00	26	1675	1
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	190.69	-12.55	-7.25	-800	1461	2
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	190.69	-7.40	-12.82	-1425	868	-4
Dead+Wind 0 deg - Service	45.85	0.00	-9.69	-1035	0	-5
Dead+Wind 30 deg - Service	45.85	4.78	-8.28	-889	-514	0
Dead+Wind 60 deg - Service	45.85	8.21	-4.74	-511	-890	4
Dead+Wind 90 deg - Service	45.85	9.17	0.00	4	-1002	0
Dead+Wind 120 deg - Service	45.85	8.20	4.74	515	-883	1
Dead+Wind 150 deg - Service	45.85	4.71	8.16	888	-509	5
Dead+Wind 180 deg - Service	45.85	0.00	9.31	1014	0	5
Dead+Wind 210 deg - Service	45.85	-4.77	8.27	893	513	0
Dead+Wind 240 deg - Service	45.85	-8.50	4.91	529	909	-4
Dead+Wind 270 deg - Service	45.85	-9.15	0.00	4	1000	0
Dead+Wind 300 deg - Service	45.85	-7.89	-4.56	-495	863	-1
Dead+Wind 330 deg - Service	45.85	-4.71	-8.16	-880	510	-5

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	4.61	47	0.255	0.018
T2	160 - 140	3.56	47	0.236	0.017
T3	140 - 120	2.59	47	0.205	0.016
T4	120 - 100	1.80	47	0.156	0.013
T5	100 - 80	1.20	47	0.118	0.010
T6	80 - 60	0.75	47	0.090	0.008
T7	60 - 40	0.41	47	0.061	0.005
T8	40 - 20	0.18	47	0.039	0.003
T9	20 - 0	0.05	47	0.017	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.00	Halo Mount (6-ARM)	47	4.56	0.254	0.018	338090
168.00	(4) 2.375" OD x 8' Mount Pipe	47	3.97	0.244	0.018	93914
156.00	(3) T-Frame	47	3.35	0.231	0.017	43992
147.00	(3) T-Frame	47	2.91	0.219	0.016	29458

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	17.74	18	0.981	0.070
T2	160 - 140	13.68	18	0.908	0.066
T3	140 - 120	9.96	18	0.790	0.060
T4	120 - 100	6.93	18	0.600	0.050
T5	100 - 80	4.63	18	0.455	0.039
T6	80 - 60	2.87	18	0.346	0.029
T7	60 - 40	1.57	18	0.235	0.019
T8	40 - 20	0.71	18	0.150	0.012
T9	20 - 0	0.19	18	0.066	0.006

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.00	Halo Mount (6-ARM)	18	17.53	0.978	0.070	90313
168.00	(4) 2.375" OD x 8' Mount Pipe	18	15.28	0.939	0.068	25087
156.00	(3) T-Frame	18	12.90	0.890	0.065	11636
147.00	(3) T-Frame	18	11.19	0.841	0.063	7657

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	180	Leg	A325N	1.00	6	3.13	53.01	0.059	1	Bolt Tension
T2	160	Leg	A325N	1.00	6	7.21	53.01	0.136	1	Bolt Tension
		Diagonal	A325N	1.00	1	7.17	9.14	0.784	1	Member Block Shear
T3	140	Leg	A325N	1.00	6	13.00	53.01	0.245	1	Bolt Tension
		Diagonal	A325N	1.00	1	5.68	9.14	0.621	1	Member Block Shear
T4	120	Leg	A325N	1.00	6	17.47	53.01	0.330	1	Bolt Tension
		Diagonal	A325N	1.00	1	5.22	9.14	0.571	1	Member Block Shear
T5	100	Leg	A325N	1.00	6	21.50	53.01	0.406	1	Bolt Tension
		Diagonal	A325N	1.00	1	5.29	10.16	0.520	1	Member Block Shear
T6	80	Leg	A325N	1.00	6	25.19	53.01	0.475	1	Bolt Tension
		Diagonal	A325N	1.00	1	5.43	10.16	0.534	1	Member Block Shear
T7	60	Leg	A325N	1.25	6	28.68	82.83	0.346	1	Bolt Tension
		Diagonal	A325N	1.25	1	5.81	17.14	0.339	1	Member Block Shear
T8	40	Leg	A325N	1.25	6	31.93	82.83	0.385	1	Bolt Tension
		Diagonal	A325N	1.25	1	6.02	17.14	0.352	1	Member Block Shear
T9	20	Diagonal	A325N	1.25	1	7.00	23.94	0.293	1	Member Block Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	1 1/2" solid	20.01	2.38	76.0 K=1.00	1.77	-21.35	52.11	0.410 [1]
T2	160 - 140	Pirod 105216	20.01	10.00	45.4 K=1.00	3.68	-51.63	142.49	0.362 [1]
T3	140 - 120	Pirod 105216	20.03	10.02	45.4 K=1.00	3.68	-88.62	142.49	0.622 [1]
T4	120 - 100	Pirod 105217	20.03	10.02	37.8 K=1.00	5.30	-118.50	214.86	0.551 [1]
T5	100 - 80	Pirod 105218	20.03	10.02	32.4 K=1.00	7.22	-146.28	300.68	0.486 [1]
T6	80 - 60	Pirod 105218	20.03	10.02	32.4 K=1.00	7.22	-172.15	300.68	0.573 [1]
T7	60 - 40	Pirod 105219	20.03	10.02	28.4 K=1.00	9.42	-197.73	399.87	0.494 [1]
T8	40 - 20	Pirod 105219	20.03	10.02	28.4 K=1.00	9.42	-222.00	399.87	0.555 [1]
T9	20 - 0	Pirod 105220	20.03	10.02	25.2 K=1.00	11.93	-245.34	512.38	0.479 [1]

[1] P_u / ϕP_n controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T2	160 - 140	0.5	1.48	121.0	165.67	0.20	0.73	3.29	0.223
T3	140 - 120	0.5	1.48	121.0	165.67	0.20	0.25	3.29	0.078
T4	120 - 100	0.5	1.47	120.0	238.57	0.20	0.19	3.34	0.059
T5	100 - 80	0.5	1.46	119.0	324.71	0.20	0.21	3.38	0.064
T6	80 - 60	0.5	1.46	119.0	324.71	0.20	0.24	3.38	0.071
T7	60 - 40	0.625	1.45	94.4	424.12	0.31	0.23	6.96	0.035
T8	40 - 20	0.625	1.45	94.4	424.12	0.31	0.74	6.96	0.107
T9	20 - 0	0.625	1.43	93.6	536.77	0.31	1.30	7.01	0.186

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	180 - 160	3/4" solid	5.46	2.76	159.1 K=0.90	0.44	-2.49	3.94	0.632 [1]
T2	160 - 140	L 2.5 x 2.5 x 3/16	11.54	5.85	141.9 K=1.00	0.90	-7.35	10.12	0.726 [1]
T3	140 - 120	L 2.5 x 2.5 x 3/16	12.50	6.50	157.6 K=1.00	0.90	-5.67	8.20	0.691 [1]
T4	120 - 100	L 2.5 x 2.5 x 3/16	13.80	7.09	172.0 K=1.00	0.90	-5.38	6.89	0.781 [1]
T5	100 - 80	L 3 x 3 x 3/16	15.24	7.79	156.8 K=1.00	1.09	-5.49	10.02	0.548 [1]
T6	80 - 60	L 3 x 3 x 3/16	16.80	8.55	172.1 K=1.00	1.09	-5.67	8.32	0.682 [1]
T7	60 - 40	L 3 x 3 x 5/16	18.45	9.32	190.0 K=1.00	1.78	-6.01	11.14	0.539 [1]

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T8	40 - 20	L 3 x 3 x 5/16	20.16	10.17	207.2 K=1.00	1.78	-6.42	9.37	0.685 [1]
T9	20 - 0	KL/R > 200 (C) - 162 L 3.5 x 3.5 x 5/16	21.92	11.04	192.0 K=1.00	2.09	-7.76	12.81	0.606 [1]

[1] $P_u / \phi P_n$ controls

Horizontal Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 160	3/4" solid KL/R > 200 (C) - 23	4.74	4.74	212.2 K=0.70	0.44	-0.29	2.22	0.130 [1]

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 160	7/8" solid	4.02	4.02	154.6 K=0.70	0.60	-0.26	5.69	0.046 [1]

[1] $P_u / \phi P_n$ controls

Bottom Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 160	7/8" solid	4.98	4.98	191.0 K=0.70	0.60	-0.72	3.72	0.193 [1]

[1] $P_u / \phi P_n$ controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	180 - 160	1 1/2" solid	20.01	0.50	16.0	1.77	18.81	79.52	0.236 [1]
T2	160 - 140	Pirod 105216	20.01	10.00	45.4	3.68	43.24	165.67	0.261 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	140 - 120	Pirod 105216	20.03	10.02	45.4	3.68	77.99	165.67	0.471 [1]
T4	120 - 100	Pirod 105217	20.03	10.02	37.8	5.30	104.85	238.57	0.439 [1]
T5	100 - 80	Pirod 105218	20.03	10.02	32.4	7.22	129.01	324.71	0.397 [1]
T6	80 - 60	Pirod 105218	20.03	10.02	32.4	7.22	151.15	324.71	0.465 [1]
T7	60 - 40	Pirod 105219	20.03	10.02	28.4	9.42	172.10	424.12	0.406 [1]
T8	40 - 20	Pirod 105219	20.03	10.02	28.4	9.42	191.55	424.12	0.452 [1]
T9	20 - 0	Pirod 105220	20.03	10.02	25.2	11.93	209.48	536.77	0.390 [1]

[1] P_u / ϕP_n controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T2	160 - 140	0.5	1.48	121.0	165.67	0.20	0.73	3.29	0.223
T3	140 - 120	0.5	1.48	121.0	165.67	0.20	0.25	3.29	0.078
T4	120 - 100	0.5	1.47	120.0	238.57	0.20	0.19	3.34	0.059
T5	100 - 80	0.5	1.46	119.0	324.71	0.20	0.21	3.38	0.064
T6	80 - 60	0.5	1.46	119.0	324.71	0.20	0.24	3.38	0.071
T7	60 - 40	0.625	1.45	94.4	424.12	0.31	0.23	6.96	0.035
T8	40 - 20	0.625	1.45	94.4	424.12	0.31	0.74	6.96	0.107
T9	20 - 0	0.625	1.43	93.6	536.77	0.31	1.30	7.01	0.186

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	180 - 160	3/4" solid	5.25	2.66	170.0	0.44	2.44	19.88	0.123 [1]
T2	160 - 140	L 2.5 x 2.5 x 3/16	11.54	5.85	92.7	0.52	7.17	22.55	0.318 [1]
T3	140 - 120	L 2.5 x 2.5 x 3/16	11.93	6.26	99.1	0.52	5.68	22.55	0.252 [1]
T4	120 - 100	L 2.5 x 2.5 x 3/16	13.13	6.78	107.2	0.52	5.22	22.55	0.232 [1]
T5	100 - 80	L 3 x 3 x 3/16	14.50	7.43	97.1	0.66	5.29	28.68	0.184 [1]
T6	80 - 60	L 3 x 3 x 3/16	16.01	8.16	106.4	0.66	5.43	28.68	0.189 [1]
T7	60 - 40	L 3 x 3 x 5/16	17.62	8.91	118.6	1.01	5.81	44.05	0.132 [1]
T8	40 - 20	L 3 x 3 x 5/16	20.16	10.17	134.9	1.01	6.02	44.05	0.137 [1]
T9	20 - 0	L 3.5 x 3.5 x 5/16	21.92	11.04	124.9	1.25	7.00	54.17	0.129 [1]

[1] P_u / ϕP_n controls

Horizontal 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	180 - 160	3/4" solid	4.74	4.74	303.2	0.44	0.49	19.88	0.025 [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	180 - 160	7/8" solid	4.02	4.02	220.8	0.60	0.26	27.06	0.010 [1]

[1] P_u / ϕP_n controls

Bottom 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	180 - 160	7/8" solid	4.98	4.98	272.9	0.60	0.86	27.06	0.032 [1]

[1] P_u / ϕP_n controls

Section Capacity Table

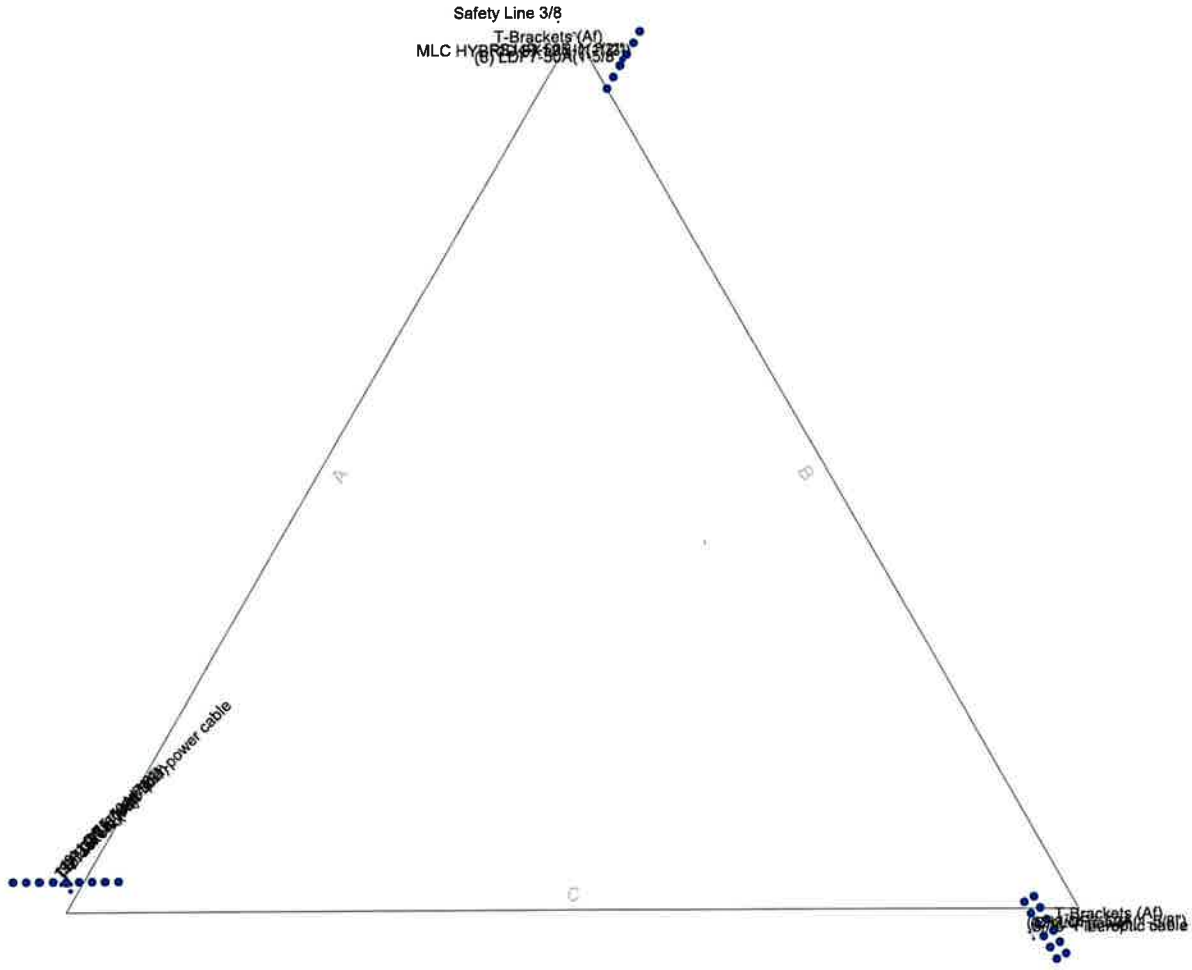
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	180 - 160	Leg	1 1/2" solid	3	-21.35	52.11	41.0	Pass
T2	160 - 140	Leg	Pirod 105216	67	-51.63	142.49	36.2	Pass
T3	140 - 120	Leg	Pirod 105216	80	-88.62	142.49	62.2	Pass
T4	120 - 100	Leg	Pirod 105217	95	-118.50	214.86	55.1	Pass
T5	100 - 80	Leg	Pirod 105218	110	-146.28	300.68	48.6	Pass
T6	80 - 60	Leg	Pirod 105218	125	-172.15	300.68	57.3	Pass
T7	60 - 40	Leg	Pirod 105219	140	-197.73	399.87	49.4	Pass
T8	40 - 20	Leg	Pirod 105219	155	-222.00	399.87	55.5	Pass
T9	20 - 0	Leg	Pirod 105220	170	-245.34	512.38	47.9	Pass
T1	180 - 160	Diagonal	3/4" solid	14	-2.49	3.94	63.2	Pass
T2	160 - 140	Diagonal	L 2.5 x 2.5 x 3/16	70	-7.35	10.12	72.6 78.4 (b)	Pass
T3	140 - 120	Diagonal	L 2.5 x 2.5 x 3/16	87	-5.67	8.20	69.1	Pass
T4	120 - 100	Diagonal	L 2.5 x 2.5 x 3/16	102	-5.38	6.89	78.1	Pass
T5	100 - 80	Diagonal	L 3 x 3 x 3/16	117	-5.49	10.02	54.8	Pass
T6	80 - 60	Diagonal	L 3 x 3 x 3/16	132	-5.67	8.32	68.2	Pass
T7	60 - 40	Diagonal	L 3 x 3 x 5/16	147	-6.01	11.14	53.9	Pass
T8	40 - 20	Diagonal	L 3 x 3 x 5/16	162	-6.42	9.37	68.5	Pass
T9	20 - 0	Diagonal	L 3.5 x 3.5 x 5/16	177	-7.76	12.81	60.6	Pass
T1	180 - 160	Horizontal	3/4" solid	23	-0.29	2.22	13.0	Pass
T1	180 - 160	Top Girt	7/8" solid	4	-0.26	5.69	4.6	Pass
T1	180 - 160	Bottom Girt	7/8" solid	9	-0.72	3.72	19.3	Pass
						Summary		
						Leg (T3)	62.2	Pass
						Diagonal (T2)	78.4	Pass
						Horizontal (T1)	13.0	Pass
						Top Girt (T1)	4.6	Pass
						Bottom Girt (T1)	19.3	Pass
						Bolt Checks	78.4	Pass
						RATING =	**78.4**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

Feed Line Plan

Round Flat App In Face App Out Face Truss-Leg



Paul J. Ford and Company 250 E. Broad St., Ste 600 Columbus, OH 43215 Phone: 614-221-6679 FAX:	Job: *180' SST / East Hartland*		
	Project: *PJF 42919-0009*		
	Client: East Hartland CT	Drawn by: Jonathan Sommer	App'd:
	Code: TIA-222-G	Date: 01/23/20	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

By JRS Date 1/23/2020
Project # 42919-0009

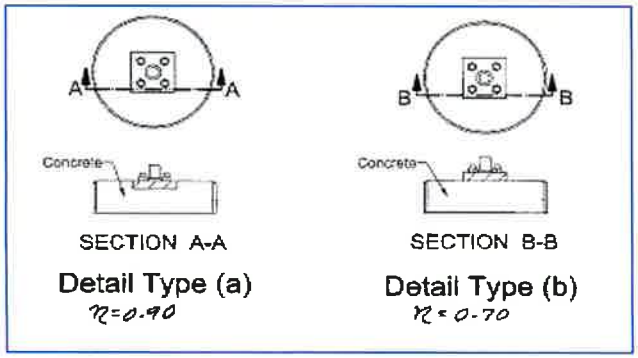
Self-Support Tower Anchor Rod Capacity - TIA-G

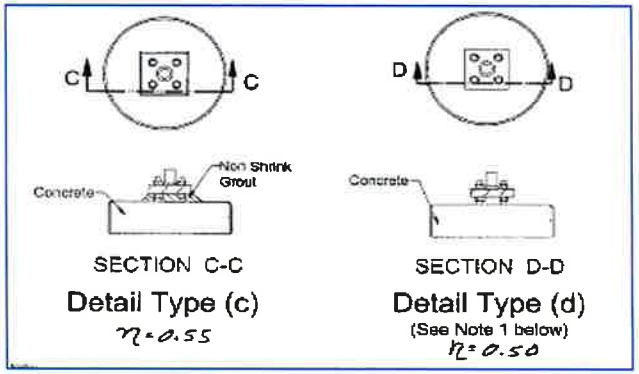
Loads

Compression :	252	kips	Tension :	214	kips	Code:	TIA-G
Comp. Shear :	25	kips	Ten.Shear :	22	kips	Maximum Ratio:	1.00

Existing Anchor Rods

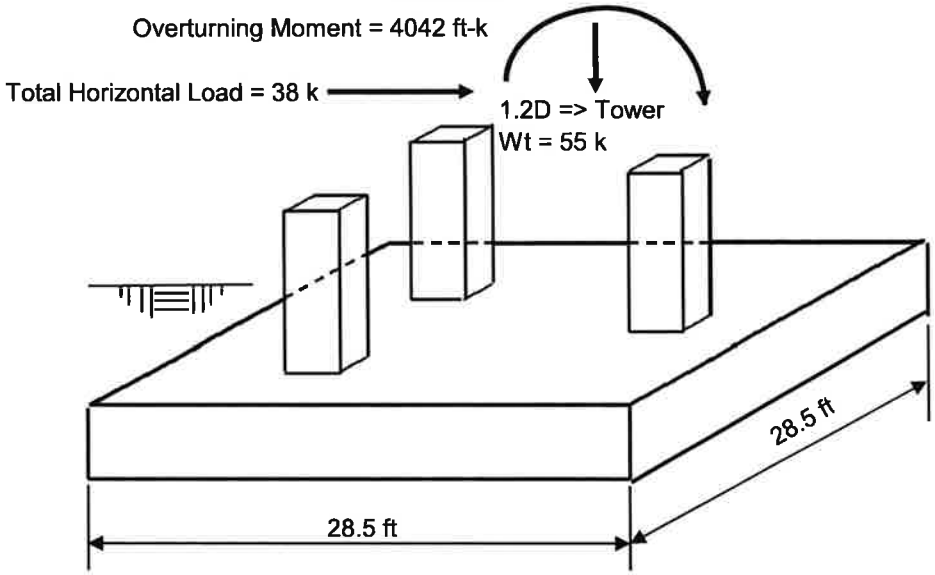
Anchor Rod Condition (n) :	0.55	
Anchor Rod ø :	1 1/4	in
Anchor Rod Quantity :	6	
Anchor Rod Grade :	A687	
F_y :	105	ksi
F_u :	125	ksi
Threads per Inch	7	
Net Tensile Area	0.97	in^2
ϕ_t :	0.80	
$\phi_t R_{nt}$:	581.47	kip
Anchor Rod Ratio :	0.437	

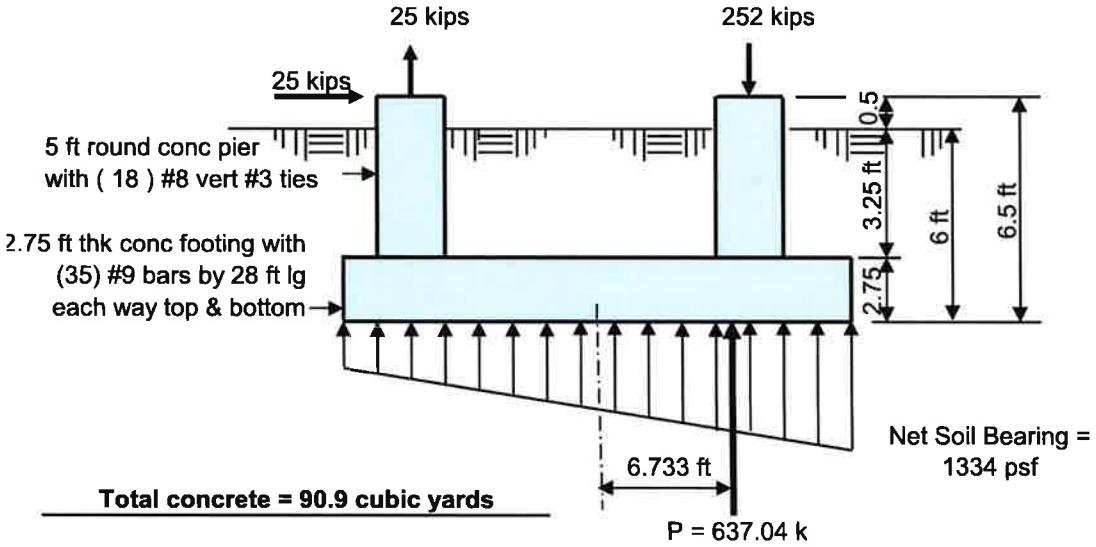




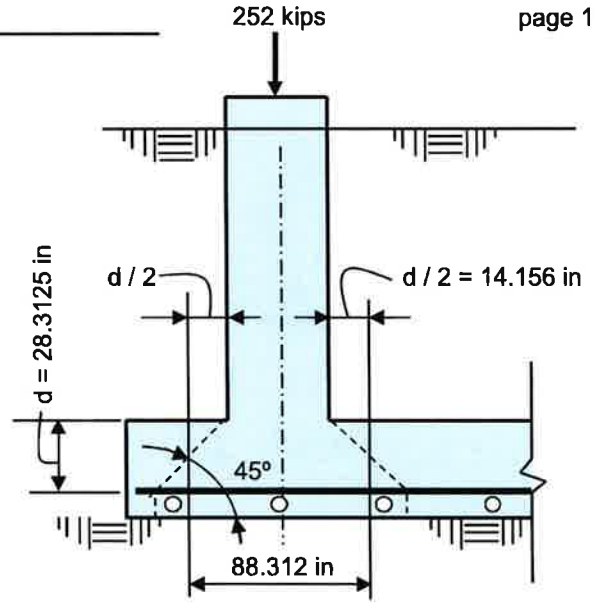
Combined Footing Foundation

Concrete strength F'c =	**3.5**	(ksi)
Rebar Strength Fy =	**60**	(ksi)
Soil Density =	**120**	(pcf)
Depth to Water Table =	**99**	(ft)
minimum cover over vert rebar =	**3**	inches





Total concrete = 90.9 cubic yards



Ftg Overturning Resistance = 9077.9 ft-kips
Total Overturning Moment = 4289 ft-kips
Required Overturning Safety Factor = 1
Overturning Safety Factor = 2.12
Ratio = 0.47 OK

Maximum Net Soil Bearing = 1.873 ksf
Ultimate Net Soil Bearing = 6 ksf
Soil Bearing Stress Ratio = 0.31 OK

Ult Punching Shear Capacity = 237 psi
Ult Punching Shear Force = 40 psi
Punching Shear Stress Ratio = 0.17 OK

Pad Bending Moment Capacity= 1948 ft-k
Pad Bending Moment = 344 ft-k
Bending Moment Stress Ratio = 0.18 OK

Pier Rebar Capacity = 1579.56 k-ft
Pier Rebar Required = 93.75 k-ft
Pier Rebar Stress Ratio = 0.06 OK

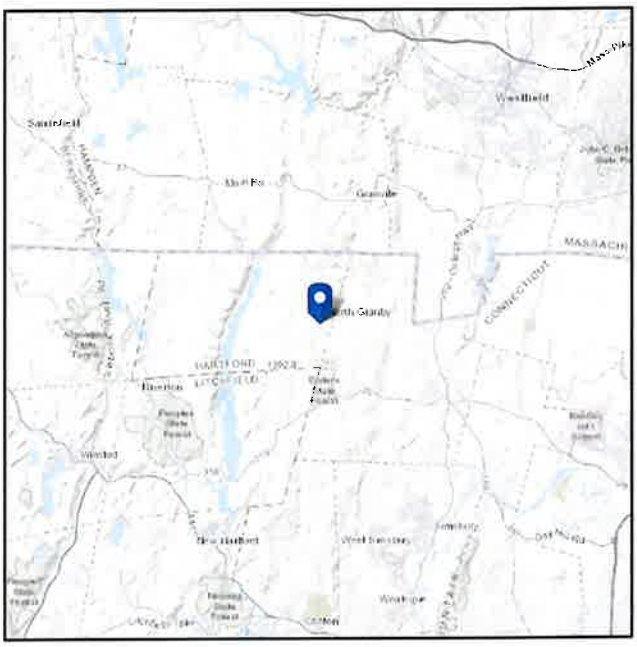
Pad Bending Shear Capacity= 859 ft-k
Pad Bending Shear = 114 ft-k
Bending Shear Stress Ratio = 0.13 OK

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 1067.8 ft (NAVD 88)
Latitude: 41.997522
Longitude: -72.887733



Wind

Results:

Wind Speed:	117 Vmph ← 120 Vmph per Local Requirements
10-year MRI	76 Vmph
25-year MRI	85 Vmph
50-year MRI	90 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:	Thu Jul 25 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

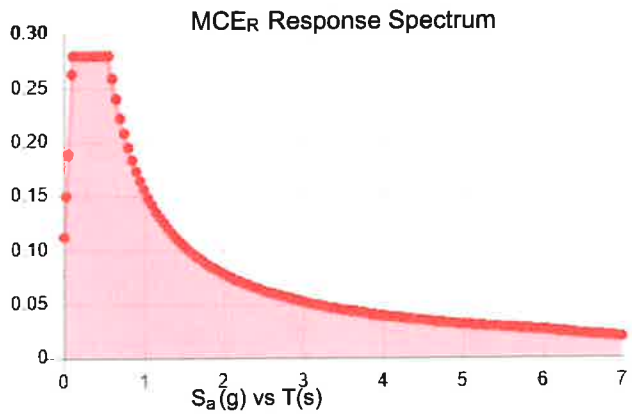
Seismic

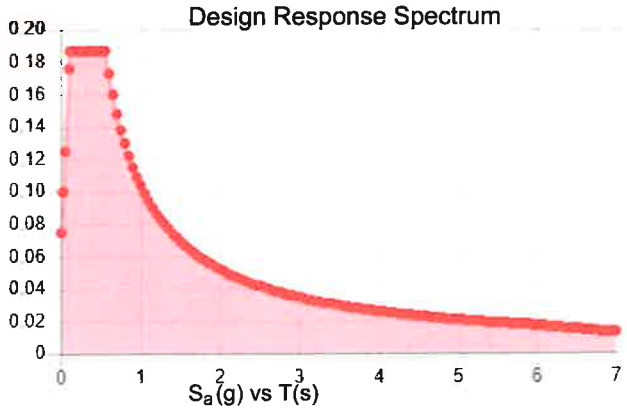
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.175	S_{DS} :	0.187
S_1 :	0.065	S_{D1} :	0.104
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.086
S_{MS} :	0.28	PGA_M :	0.137
S_{M1} :	0.156	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Thu Jul 25 2019

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Thu Jul 25 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.

PAUL J. FORD & COMPANY

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

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

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

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

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

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

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

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

ATTACHMENT 5

PAUL J. FORD & COMPANY

Report Date:	January 29, 2020
Client:	On Air Engineering, LLC 88 Foundry Pond Road Cold Spring, NY 10516 Attn: David Weinpahl, P.E. (201) 456-4624
Structure:	Existing 180-ft Self Support
Carrier:	Verizon Wireless
Carrier Site Name:	East Hartland CT
Mount Type:	(3) 12 Foot Sector Frames
Site Address:	22 Welsh Road
City, County, State:	East Hartland, Hartford County, CT
Latitude, Longitude:	41.997522, -72.887733
PJF Project:	A42919-0009.005.8190

Paul J. Ford and Company is pleased to submit this "**Mount 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 1.0" ice
IBC Site Criteria:	Risk Category II, Topographic Category 1, Exposure Category B

Summary of Analysis Results:

Antenna Mount:	**34.8%**	**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 22761
LICENSED
PROFESSIONAL ENGINEER

01/31/2020

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

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

TABLE OF CONTENTS

1) INTRODUCTION

The proposed mounts under consideration are (3) 12' Sector Frames installed at the 168' elevation on a 180' Self Support tower. The proposed mounts considered in this analysis are a SitePro1 VFA12-HD will replace existing Verizon mounts which failed under a separate analysis.

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 1 inch ice thickness. Risk Category II, Exposure Category B 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
168	168	1	RAYCAP	RVZDC-6627-PF-48	Proposed	Tower Mounted
		6	COMMSCOPE	NHH-65B-R2B		(3) SitePro1 VFA12-HD
		3	COMMSCOPE	BSAMNT-SBS-1-2		
		3	SAMSUNG	B2/B66A RRH-BR049		
		3	SAMSUNG	B5/B13 RRH-BR04C		
		6	ANTEL	LPA-80080/6CF	Existing	
		3	ANTEL	BXA-70063-6CF-2-750MHZ	Equipment to be removed	(3) 12' Sector Frames
		3	ANTEL	BXA-185063-12		
		3	NOKIA	UHBA B13 RRH 4X30		

3) ANALYSIS PROCEDURE

Table 2 – Documents Provided

Document	Remarks	Reference	Source
Mount Manufacturer Drawings	SitePro1, 06/29/2018	VFA12-HD Rev D	SitePro1
Construction Drawings	OnAir, 10/08/2019	East Hartland CT Rev 2	OnAir
Radio Frequency Data Sheet	Verizon, 09/06/2019	1499033	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.*

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	29.7	Pass
1, 2	Face Horizontal	34.8	Pass
1, 2	Standoff Members	20.7	Pass
1, 2	Bracing Members	20.9	Pass
1, 2	Tie Back	9.9	Pass
1, 2	Mount to Tower Connection (bolts/welds)	15.0	Pass

Mount Rating (max from all components) =	34.8%

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

In order for the results of the analysis to be considered valid, the mount listed below shall be installed to support the proposed loading configuration.

- SitePro1 VFA12-HD

Verizon Mount Rating: M1550R(2800)-4(6)

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.

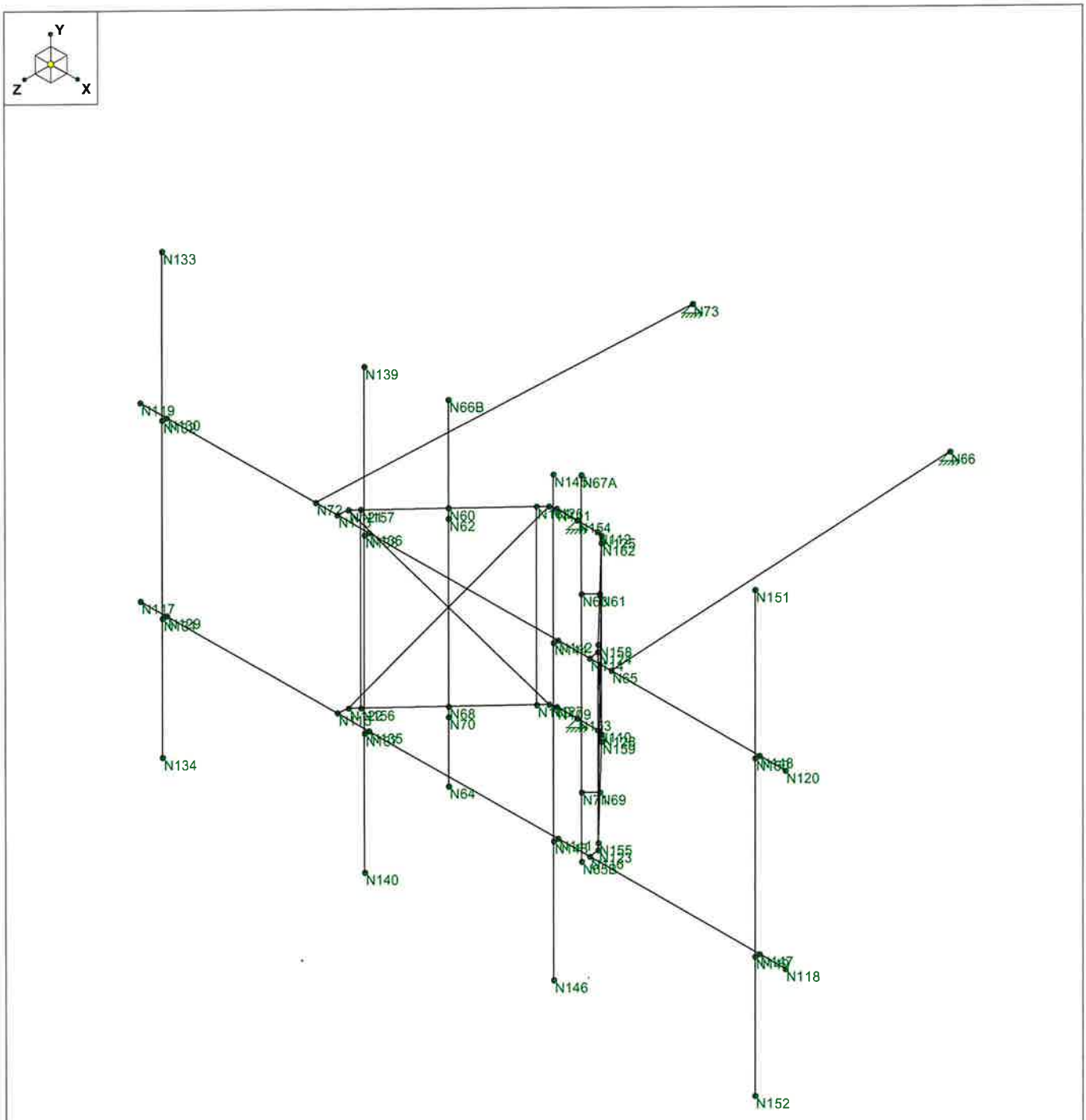
4) The standard of care for all Professional Engineering Services performed or furnished by Paul J. Ford and Company under this project will be the skill and care used by members of the Consultant's profession practicing under similar circumstances at the same time and in the same locality.

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

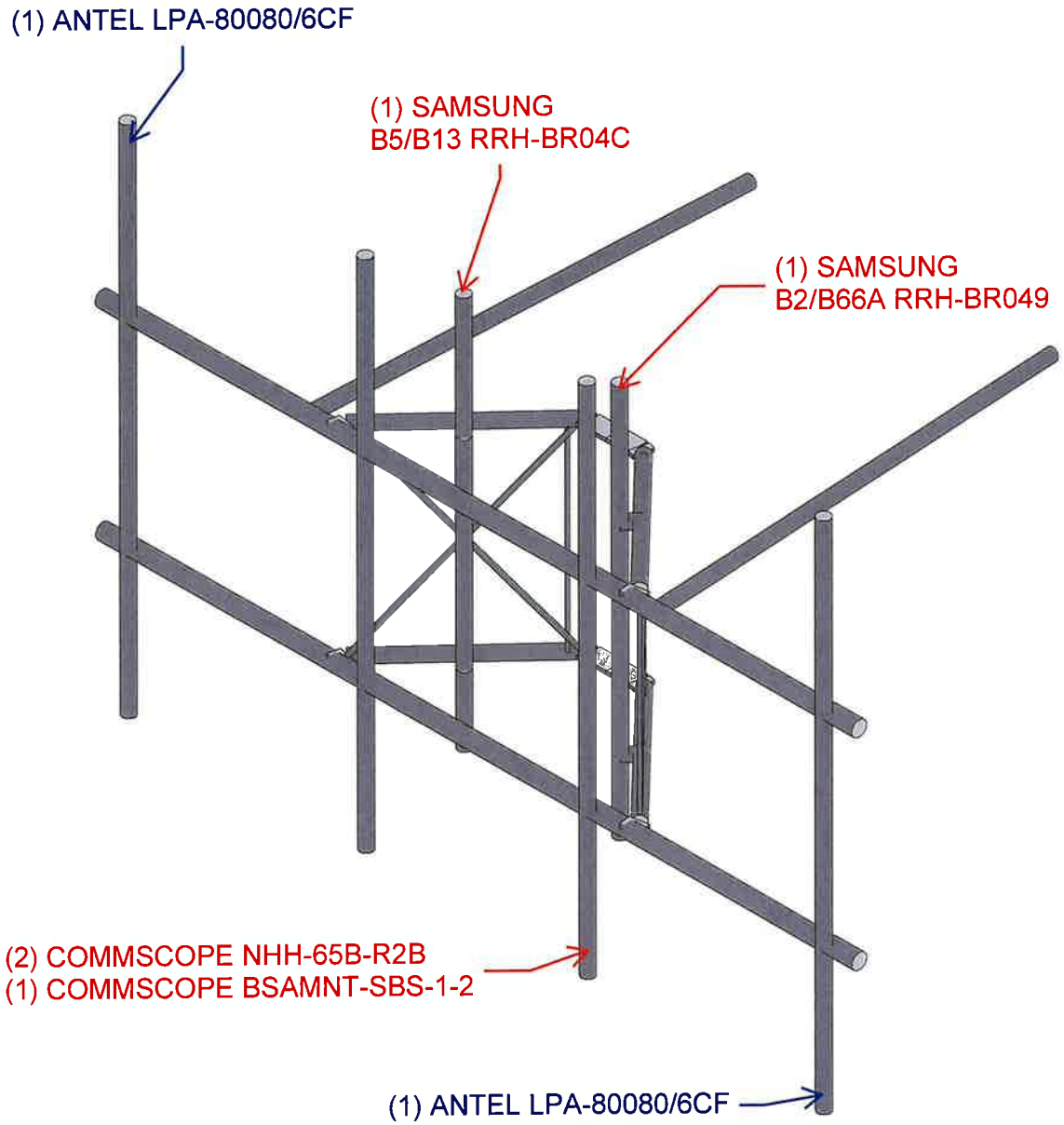


Envelope Only Solution

Paul J. Ford and Company	East Hartland CT	SK - 1
AMS		Jan 28, 2020 at 9:01 AM
42919-0009.005.8190		42919-0009.005.8190_Wind.r3d

ALPHA SECTOR ANTENNA AZIMUTH - 90°

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	East Hartland CT	SK - 2
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BETA SECTOR ANTENNA AZIMUTH - 220°

LEGEND
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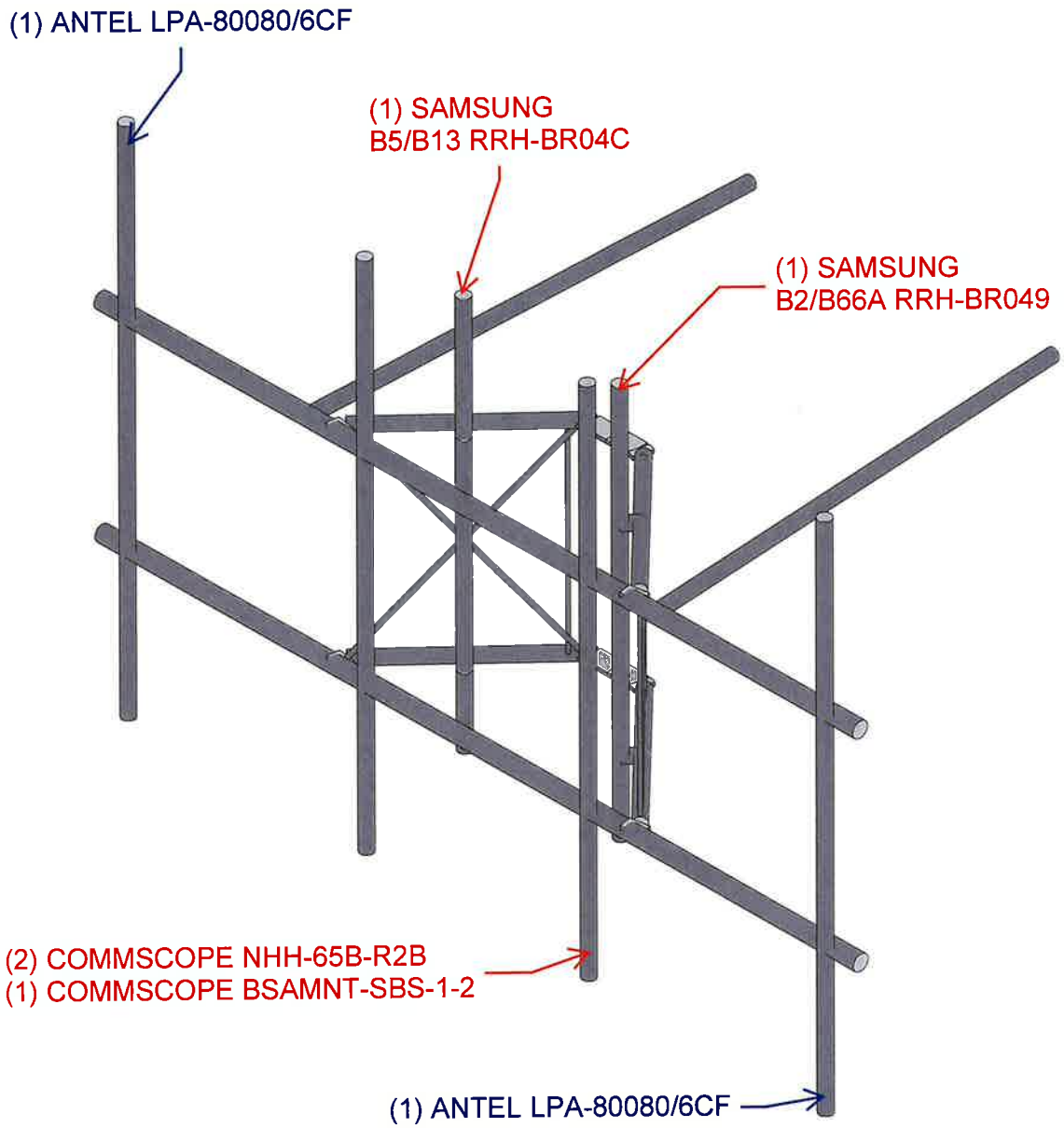
PROPOSED: RED



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

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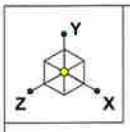
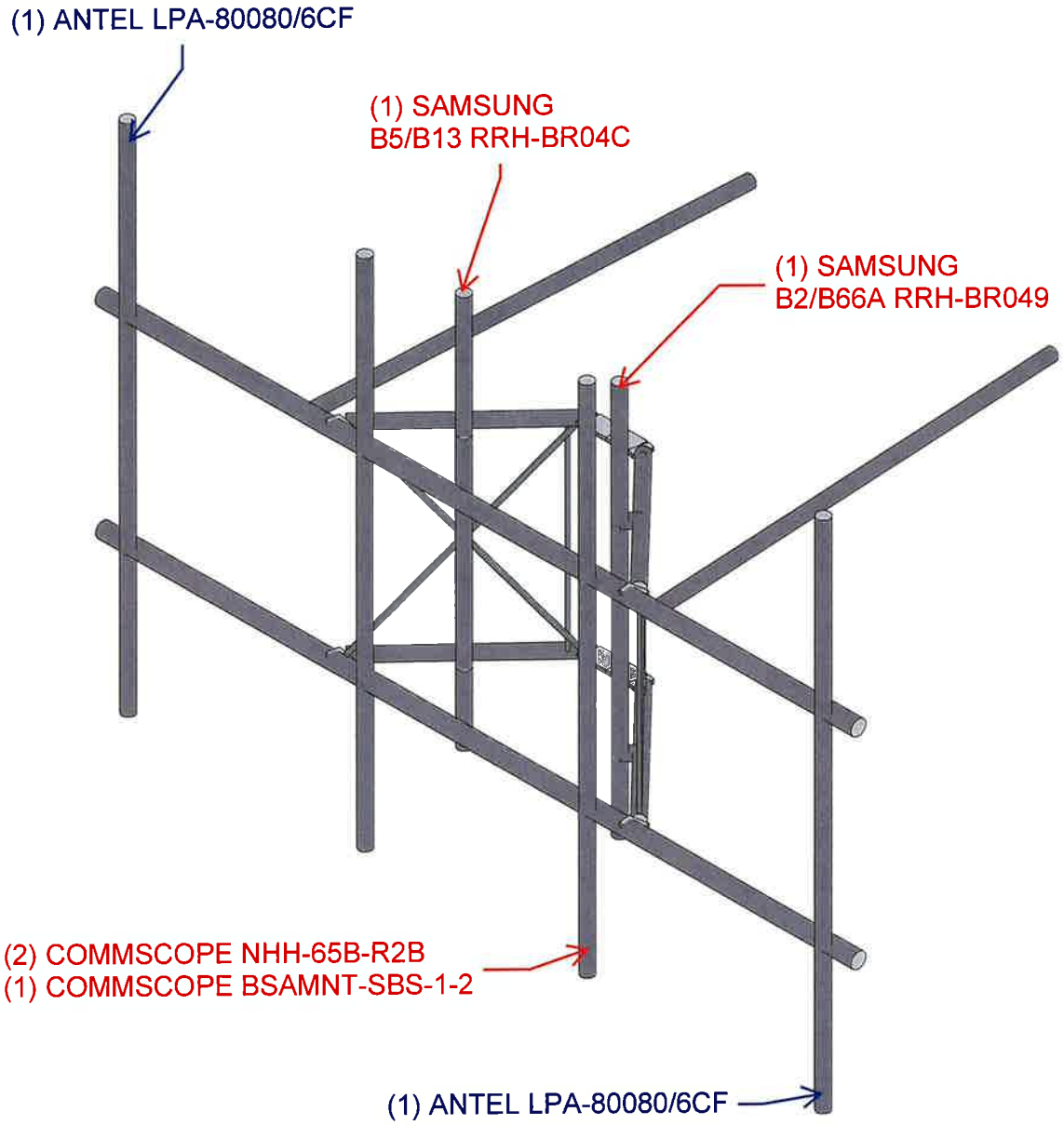


GAMMA SECTOR ANTENNA AZIMUTH - 350°

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.
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Paul J. Ford and Company	East Hartland CT	SK - 2
AMS		Jan 28, 2020 at 9:01 AM
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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 # A42919-0009.005.8190
By AMS

Date: 01/28/20

Analysis 30 degrees

v4.3, Effective 6/27/19

Mount Loading per TIA-222-G-2

Structure & Wind Speed

Structure Type =	Mount	
Mount Type =	1 Sector	
Mount Centerline, z =	168	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 =	1	in

Topo

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

Velocity Pressure Coefficients

z_g =	1200	ft	
a =	7.00		
K_{zmin} =	0.70		
K_z =	1.15		Calculated Value
K_z =	1.15		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 =	24.11	psf	Section 2.6.9.6

Ice Loading

Ii =	1.00		Table 2-3
Iwi =	1.00		Table 2-3
q_z =	6.97	psf	Section 2.6.9.6
K_{iz} =	1.18		Section 2.6.8
T_{iz} =	2.35	in	Section 2.6.8
h =	0.00	in	Bar Grating Height
W_i =	10.98	psf	Grating Ice Weight

Wind Pressures

Pressure =	24.108	psf
Ice Pressure =	6.968	psf

Antennas

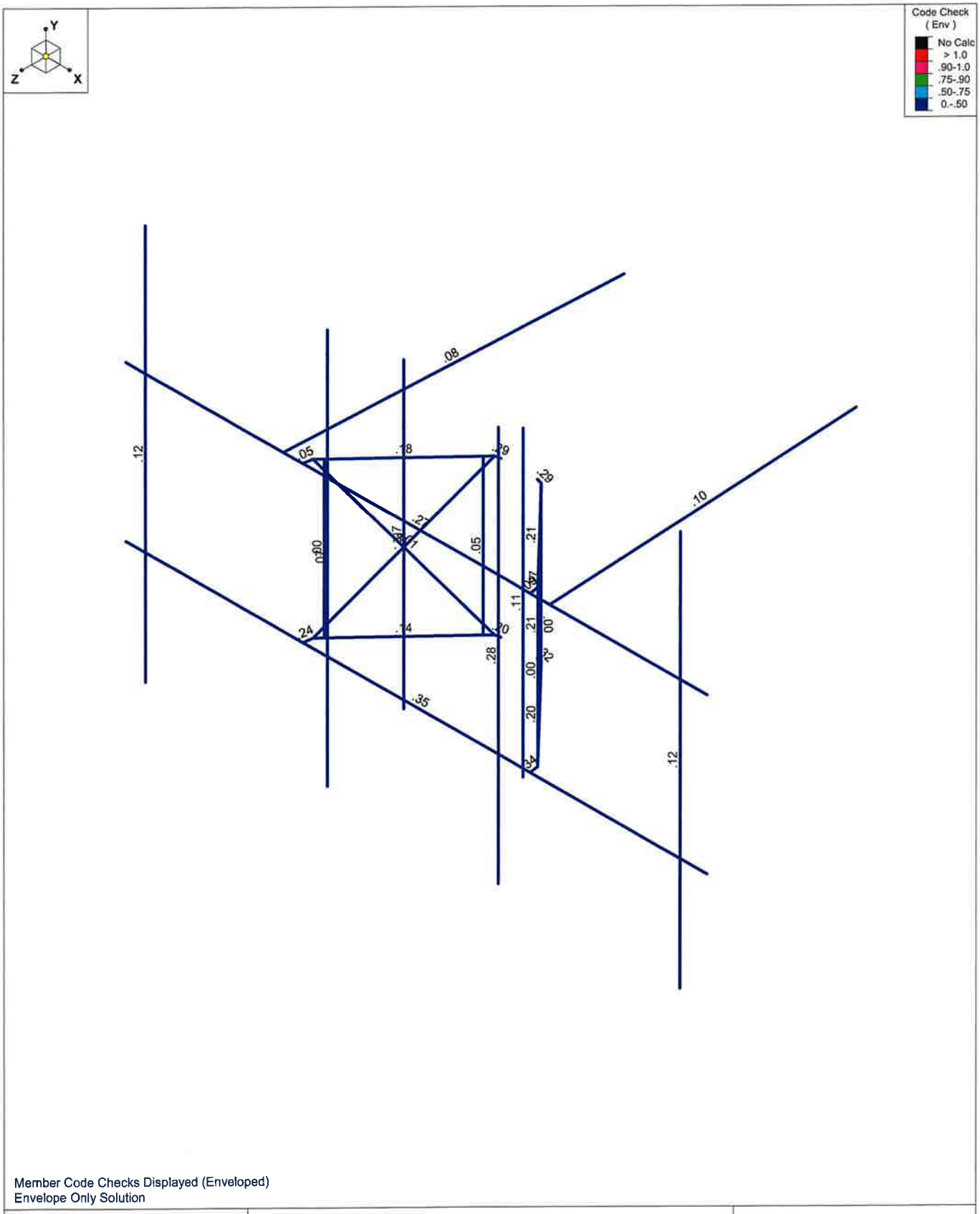
Item	Status	Manufacturer	Antenna	Height (in)	Width (in)	Depth (in)	Flat or Round	Weight (lbs)	Sector / Face	Position	Assumed Spacing (in)	Override Spacing (in)	Max Equip C/L (ft)	Min Equip C/L (ft)	Equip C/L (ft)	Top Location (in)	Bottom Location (in)	Overrride Top Location (in)	Override Bottom Location (in)
1	P	COMMSCOPE	NHH-65B-R2B	72	11.9	0.1	Flat	63.7	C	2	66.00		169.75	166.75	168	33.00	-33.00		
2	P	COMMSCOPE	NHH-65B-R2B	72	11.9	7.1	Flat	63.7	C	2	66.00		169.75	166.75	168	33.00	-33.00		
3	E	ANTEL	LPA-80080/6CF	70.87	5.51	13.19	Flat	21	C	1	64.87		169.80	166.70	168	32.44	-32.44		
4	E	ANTEL	LPA-80080/6CF	70.87	5.51	13.19	Flat	21	C	4	64.87		169.80	166.70	168	32.44	-32.44		
5	P	SAMSUNG TELECOMMUNICATIONS	B2/B66A RRH-BR049	15	15	8.1	Flat	70.3	C	5	9.00		171.29	165.54	168	4.50	-4.50		
6	P	SAMSUNG TELECOMMUNICATIONS	B5/B13 RRH-BR04C	15	15	8.1	Flat	70.3	C	6	9.00		171.29	165.54	168	4.50	-4.50		

Dishes

Item	Status	Manufacturer	Microwave Dish	Dia (in)	Dish Type	Weight (lbs)	Sector / Face	Position	Assumed Spacing (in)	Override Spacing (in)	Max Equip C/L (ft)	Min Equip C/L (ft)	Equip C/L (ft)	Top Location (in)	Bottom Location (in)	Overrride Top Location (in)	Override Bottom Location (in)

APPENDIX C

SOFTWARE ANALYSIS OUTPUT



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

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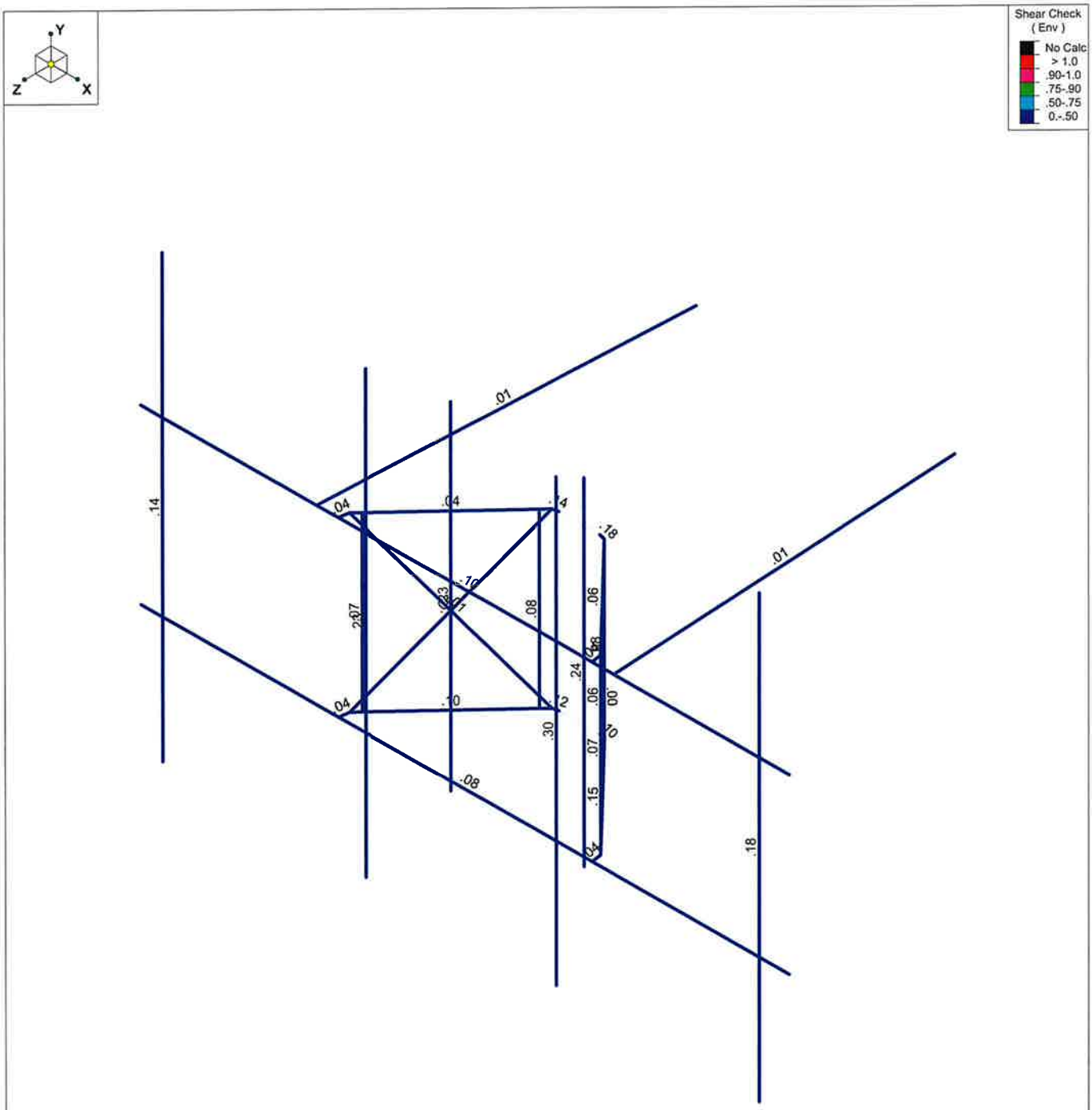

Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

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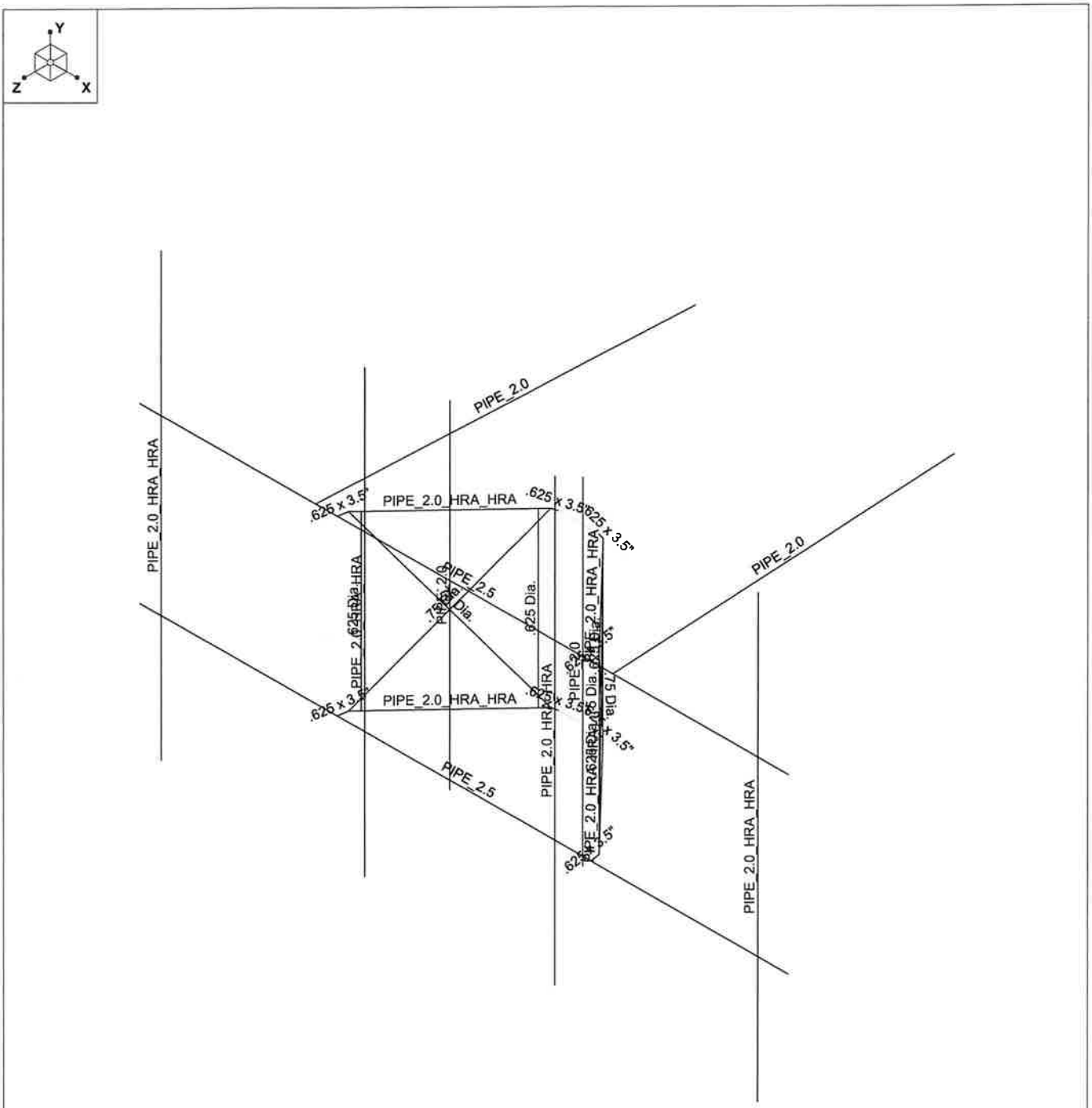

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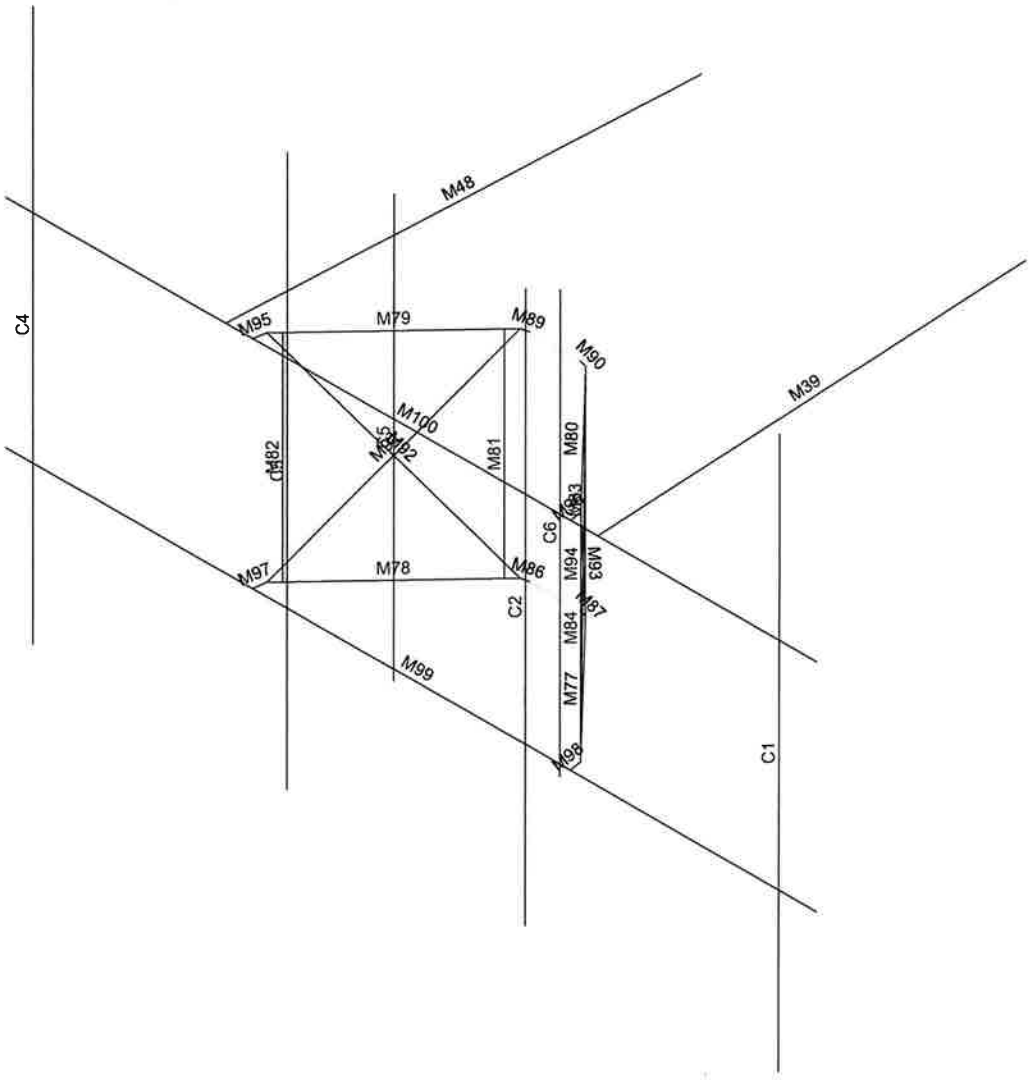

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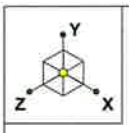

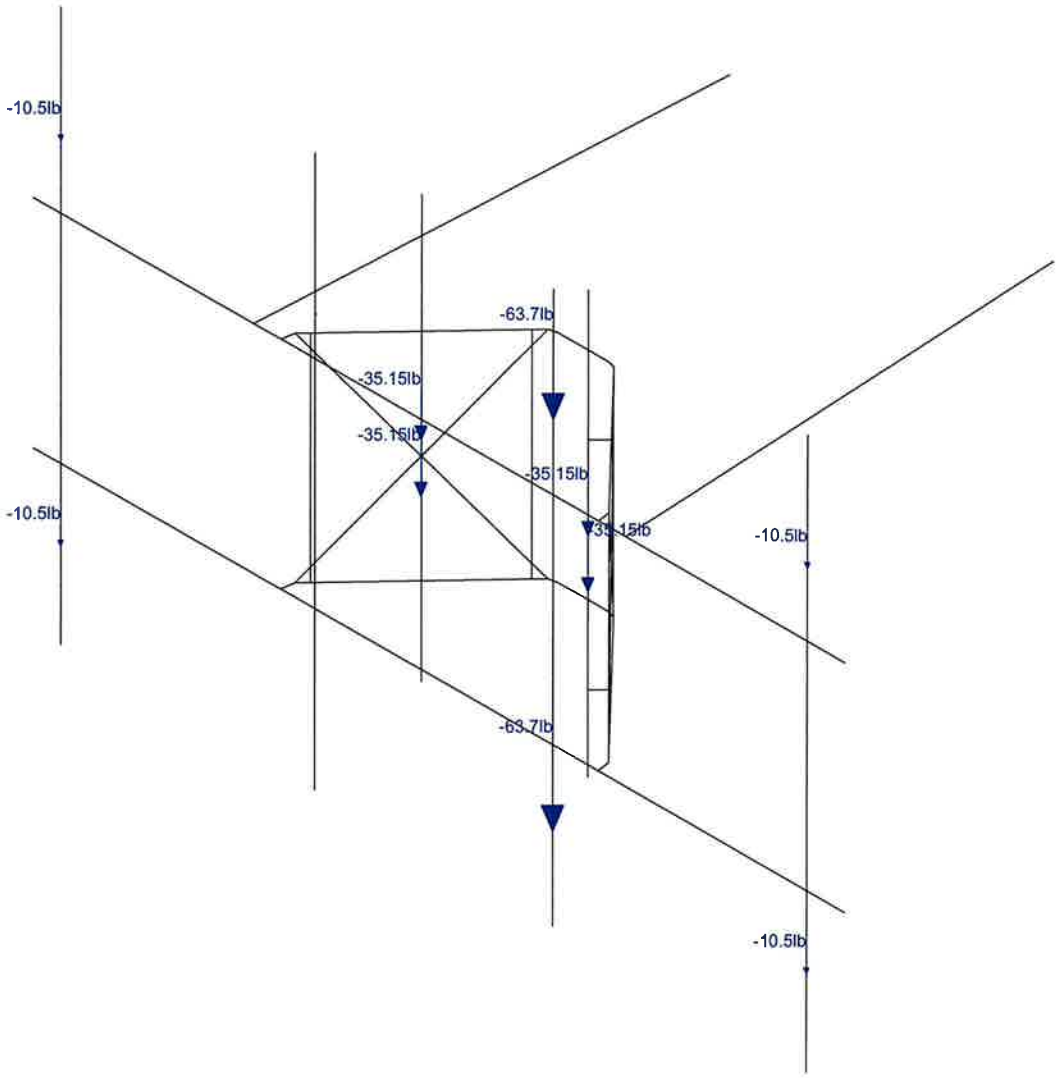

Loads: BLC 1, Dead
Envelope Only Solution

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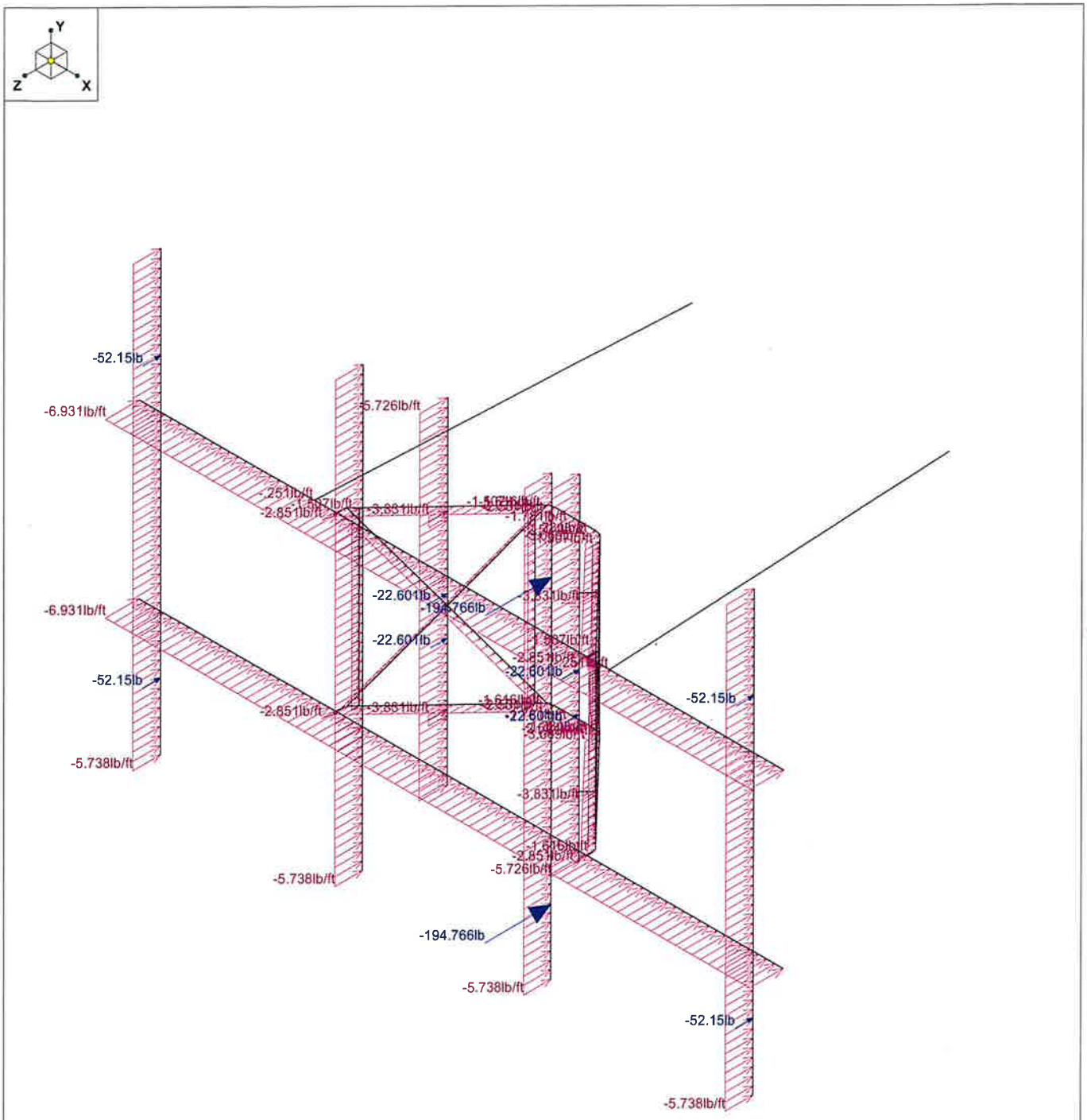

Loads: BLC 3, Wind 0
Envelope Only Solution

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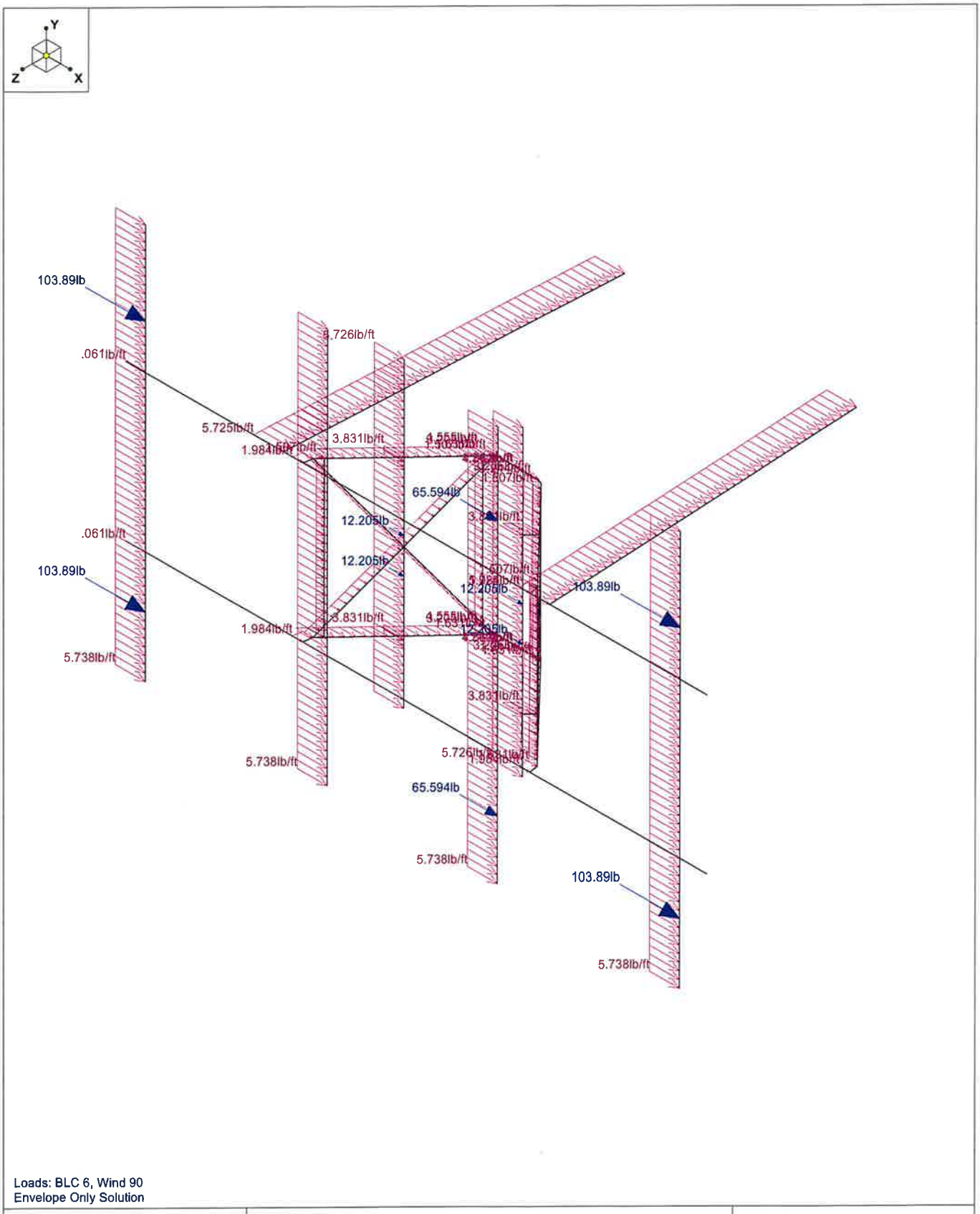

Loads: BLC 6, Wind 90
Envelope Only Solution

Paul J. Ford and Company	East Hartland CT	SK - 9
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(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?	Yes
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	None
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?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (in)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	4
Cd X	4
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E..	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	58	1.2
3	A992	29000	11154	.3	.65	.49	50	1.1	58	1.2
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.2	58	1.1
6	A53 Gr. B	29000	11154	.3	.65	.49	35	1.5	60	1.2

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M102	N130	N132			RIGID	None	None	RIGID	Typical
2	M103	N129	N131			RIGID	None	None	RIGID	Typical
3	M105	N136	N138			RIGID	None	None	RIGID	Typical
4	M106	N135	N137			RIGID	None	None	RIGID	Typical
5	M108	N142	N144			RIGID	None	None	RIGID	Typical
6	M109	N141	N143			RIGID	None	None	RIGID	Typical
7	M111	N148	N150			RIGID	None	None	RIGID	Typical
8	M112	N147	N149			RIGID	None	None	RIGID	Typical
9	M99	N117	N118			PIPE_2.5	None	None	A53 Gr. B	Typical
10	M100	N119	N120			PIPE_2.5	None	None	A53 Gr. B	Typical
11	M77	N128	N123			PIPE_2.0_HR...	None	None	A53 Gr. B	Typical
12	M78	N127	N122			PIPE_2.0_HR...	None	None	A53 Gr. B	Typical
13	M79	N126	N121			PIPE_2.0_HR...	None	None	A53 Gr. B	Typical
14	M80	N125	N124			PIPE_2.0_HR...	None	None	A53 Gr. B	Typical
15	C4	N134	N133			PIPE_2.0_HR...	None	None	A53 Gr. B	Typical
16	C3	N140	N139			PIPE_2.0_HR...	None	None	A53 Gr. B	Typical
17	C2	N146	N145			PIPE_2.0_HR...	None	None	A53 Gr. B	Typical
18	C1	N152	N151			PIPE_2.0_HR...	None	None	A53 Gr. B	Typical
19	M39	N65	N66			PIPE_2.0	None	None	A53 Gr. B	Typical
20	M85	N110	N153		90	RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
21	M86	N109	N127		90	.625 x 3.5"	None	None	A36 Gr.36	Typical
22	M87	N110	N128		90	.625 x 3.5"	None	None	A36 Gr.36	Typical
23	M88	N112	N154		90	RIGID	None	None	RIGID	Typical
24	M89	N111	N126		90	.625 x 3.5"	None	None	A36 Gr.36	Typical
25	M90	N112	N125		90	.625 x 3.5"	None	None	A36 Gr.36	Typical
26	M95	N113	N121		90	.625 x 3.5"	None	None	A36 Gr.36	Typical
27	M96	N114	N124		90	.625 x 3.5"	None	None	A36 Gr.36	Typical
28	M97	N115	N122		90	.625 x 3.5"	None	None	A36 Gr.36	Typical
29	M98	N116	N123		90	.625 x 3.5"	None	None	A36 Gr.36	Typical
30	M113	N153	N109		90	RIGID	None	None	RIGID	Typical
31	M114	N154	N111		90	RIGID	None	None	RIGID	Typical
32	M81	N161	N160			.625 Dia.	None	None	A36 Gr.36	Typical
33	M82	N157	N156			.625 Dia.	None	None	A36 Gr.36	Typical
34	M83	N162	N159			.625 Dia.	None	None	A36 Gr.36	Typical
35	M84	N158	N155			.625 Dia.	None	None	A36 Gr.36	Typical
36	M91	N126	N122			.75 Dia.	None	None	A36 Gr.36	Typical
37	M92	N127	N121			.75 Dia.	None	None	A36 Gr.36	Typical
38	M93	N128	N124			.75 Dia.	None	None	A36 Gr.36	Typical
39	M94	N123	N125			.75 Dia.	None	None	A36 Gr.36	Typical
40	M42	N60	N62			RIGID	None	None	RIGID	Typical
41	G8A	N61	N63			RIGID	None	None	RIGID	Typical
42	C5	N66B	N64			PIPE_2.0	None	None	A53 Gr. B	Typical
43	C6	N65B	N67A			PIPE_2.0	None	None	A53 Gr. B	Typical
44	M46	N68	N70			RIGID	None	None	RIGID	Typical
45	M47	N69	N71			RIGID	None	None	RIGID	Typical
46	M48	N72	N73			PIPE_2.0	None	None	A53 Gr. B	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	M102	OOOXOX					Yes	** NA **			None
2	M103	OOOXOX					Yes	** NA **			None
3	M105	OOOXOX					Yes	** NA **			None
4	M106	OOOXOX					Yes	** NA **			None
5	M108	OOOXOX					Yes	** NA **			None
6	M109	OOOXOX					Yes	** NA **			None
7	M111	OOOXOX					Yes	** NA **			None
8	M112	OOOXOX					Yes	** NA **			None
9	M99						Yes	** NA **			None
10	M100						Yes	** NA **			None
11	M77						Yes	** NA **			None
12	M78						Yes	** NA **			None
13	M79						Yes	** NA **			None
14	M80						Yes	** NA **			None
15	C4						Yes	** NA **			None
16	C3						Yes	** NA **			None
17	C2						Yes	** NA **			None
18	C1						Yes	** NA **			None
19	M39	BenPIN					Yes	** NA **			None
20	M85						Yes	** NA **			None
21	M86						Yes	** NA **			None
22	M87						Yes	** NA **			None
23	M88						Yes	** NA **			None
24	M89						Yes	** NA **			None
25	M90						Yes	** NA **			None
26	M95	BenPIN					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...
27	M96	BenPIN					Yes	** NA **			None
28	M97	BenPIN					Yes	** NA **			None
29	M98	BenPIN					Yes	** NA **			None
30	M113						Yes	** NA **			None
31	M114						Yes	** NA **			None
32	M81	BenPIN	BenPIN				Yes	** NA **			None
33	M82	BenPIN	BenPIN			Euler Buc..	Yes	** NA **			None
34	M83	BenPIN	BenPIN				Yes	** NA **			None
35	M84	BenPIN	BenPIN			Euler Buc..	Yes	** NA **			None
36	M91	BenPIN	BenPIN				Yes	** NA **			None
37	M92	BenPIN	BenPIN			Tension ...	Yes	** NA **			None
38	M93	BenPIN	BenPIN			Tension ...	Yes	** NA **			None
39	M94	BenPIN	BenPIN				Yes	** NA **			None
40	M42	OOOXOX					Yes	** NA **			None
41	G8A	OOOXOX					Yes	** NA **			None
42	C5						Yes	** NA **			None
43	C6						Yes	** NA **			None
44	M46	OOOXOX					Yes	** NA **			None
45	M47	OOXOOX					Yes	** NA **			None
46	M48	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	M99	PIPE_2.5	150			Lbyy						Lateral
2	M100	PIPE_2.5	150			Lbyy						Lateral
3	M77	PIPE_2.0_...	33.054			Lbyy						Lateral
4	M78	PIPE_2.0_...	33.056			Lbyy						Lateral
5	M79	PIPE_2.0_...	33.056			Lbyy						Lateral
6	M80	PIPE_2.0_...	33.054			Lbyy						Lateral
7	C4	PIPE_2.0_...	102									Lateral
8	C3	PIPE_2.0_...	102									Lateral
9	C2	PIPE_2.0_...	102									Lateral
10	C1	PIPE_2.0_...	102									Lateral
11	M39	PIPE_2.0	83.539									Lateral
12	M86	.625 x 3.5"	1.396			Lbyy						Lateral
13	M87	.625 x 3.5"	1.393			Lbyy						Lateral
14	M89	.625 x 3.5"	1.396			Lbyy						Lateral
15	M90	.625 x 3.5"	1.393			Lbyy						Lateral
16	M95	.625 x 3.5"	2.284			Lbyy						Lateral
17	M96	.625 x 3.5"	2.284			Lbyy						Lateral
18	M97	.625 x 3.5"	2.284			Lbyy						Lateral
19	M98	.625 x 3.5"	2.284			Lbyy						Lateral
20	M81	.625 Dia.	40			Lbyy						Lateral
21	M82	.625 Dia.	40			Lbyy						Lateral
22	M83	.625 Dia.	40			Lbyy						Lateral
23	M84	.625 Dia.	40			Lbyy						Lateral
24	M91	.75 Dia.	51.891			Lbyy						Lateral
25	M92	.75 Dia.	51.891			Lbyy						Lateral
26	M93	.75 Dia.	51.89			Lbyy						Lateral
27	M94	.75 Dia.	51.89			Lbyy						Lateral
28	C5	PIPE_2.0	78									Lateral
29	C6	PIPE_2.0	78									Lateral
30	M48	PIPE_2.0	83.539									Lateral

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead	None		-1.1			10			
2	Live	None								
3	Wind 0	None					20	76		
4	Wind 30	None					20	76		
5	Wind 60	None					20	76		
6	Wind 90	None					20	76		
7	Wind 120	None					20	76		
8	Wind 150	None					20	76		
9	Ice Load	None					10	38		
10	Ice 0	None					20	76		
11	Ice 30	None					20	76		
12	Ice 60	None					20	76		
13	Ice 90	None					20	76		
14	Ice 120	None					20	76		
15	Ice 150	None					20	76		
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...
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														

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
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																
40	1.0 D	Yes	Y		1	1																		

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	N153	max	940.986	11	221.925	20	2511.597	15	0	40	0	40	0	40
2		min	-775.144	7	-6.798	39	-434.739	9	0	1	0	1	0	1
3	N154	max	972.432	11	3547.246	26	810.754	10	0	40	0	40	0	40
4		min	-1142.328	5	693.927	40	-2425.687	16	0	1	0	1	0	1
5	N66	max	83.775	4	64.139	22	1771.619	4	0	40	0	40	0	40
6		min	-83.845	10	13.291	40	-1785.29	10	0	1	0	1	0	1
7	N73	max	63.797	8	63.618	20	1384.22	14	0	40	0	40	0	40
8		min	-63.389	14	13.29	40	-1398.052	8	0	1	0	1	0	1
9	Totals:	max	1881.541	13	3861.949	17	1962.844	3						
10		min	-1881.536	7	789.289	40	-1962.823	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	M99	PIPE_2.5	.348	104.6...	26	.080	103.1...		20	14558.792	50715	43.155	43.155	1....	H1-1b
2	M98	.625 x 3.5"	.344	2.284	25	.041	2.284	z	39	70279.484	70875	11.074	62.016	1....	H1-1b
3	M87	.625 x 3.5"	.319	1.393	23	.103	0	y	16	70652.85	70875	11.074	62.016	1....	H1-1b
4	M89	.625 x 3.5"	.292	0	17	.141	0	y	39	70651.974	70875	11.074	62.016	1....	H1-1b
5	M90	.625 x 3.5"	.290	1.393	39	.179	0	y	39	70652.85	70875	11.074	62.016	1....	H1-1b
6	C2	PIPE_2.0_H...	.277	68	10	.297	68		5	13511.278	32130	22.459	22.459	1....	H3-6
7	M100	PIPE_2.5	.267	53.125	26	.103	107.8...		10	14558.792	50715	43.155	43.155	1....	H1-1b
8	M83	.625 Dia.	.267	40	39	.080	0		5	1057.552	9940.19	1.243	1.243	1	H1-1a
9	M97	.625 x 3.5"	.236	2.284	16	.040	0	y	39	70279.484	70875	11.074	62.016	1....	H1-1b
10	M94	.75 Dia.	.209	25.945	26	.062	51.89		11	1303.155	14313.866	2.147	2.147	1....	H1-1b
11	M80	PIPE_2.0_H...	.207	16.527	5	.060	31.333		39	29336.067	32130	22.459	22.459	1....	H1-1b
12	M77	PIPE_2.0_H...	.205	16.527	26	.150	33.054		26	29336.067	32130	22.459	22.459	1....	H1-1b
13	M86	.625 x 3.5"	.204	0	26	.116	0	y	39	70651.974	70875	11.074	62.016	1....	H1-1b
14	M79	PIPE_2.0_H...	.180	16.528	5	.037	0		39	29335.75	32130	22.459	22.459	1....	H1-1b
15	M91	.75 Dia.	.178	25.946	17	.064	51.891		5	1303.092	14313.866	2.147	2.147	1....	H1-1b
16	M78	PIPE_2.0_H...	.141	16.528	5	.100	33.056		25	29335.75	32130	22.459	22.459	1....	H1-1b
17	C4	PIPE_2.0_H...	.119	68	11	.145	68		7	13511.278	32130	22.459	22.459	1....	H1-1b
18	C1	PIPE_2.0_H...	.119	68	7	.178	68		5	13511.278	32130	22.459	22.459	1....	H1-1b
19	C6	PIPE_2.0	.110	14.625	14	.238	14.625		5	19360.206	32130	22.459	22.459	1....	H1-1b
20	M39	PIPE_2.0	.099	83.539	4	.007	83.539		24	17970.309	32130	22.459	22.459	1....	H1-1b*
21	M96	.625 x 3.5"	.091	2.284	4	.038	2.284	y	16	70279.484	70875	11.074	62.016	1....	H1-1b
22	M48	PIPE_2.0	.077	83.539	14	.007	83.539		24	17970.309	32130	22.459	22.459	1....	H1-1b*
23	C5	PIPE_2.0	.072	48.75	5	.229	24.375		5	19360.206	32130	22.459	22.459	1....	H3-6
24	C3	PIPE_2.0_H...	.069	68	5	.227	68		5	13511.278	32130	22.459	22.459	1....	H3-6
25	M95	.625 x 3.5"	.054	2.284	8	.037	2.284	y	19	70279.484	70875	11.074	62.016	1....	H1-1b
26	M81	.625 Dia.	.047	19.583	26	.079	0		5	1057.552	9940.19	1.243	1.243	1....	H1-1b
27	M92	.75 Dia.	.008	51.891	39	.013	51.891		29	1303.092	14313.866	2.147	2.147	1....	H1-1b*
28	M82	.625 Dia.	.000	0	40	.069	0		5	1057.552	9940.19	1.243	1.243	1	H1-1a
29	M84	.625 Dia.	.000	0	40	.066	0		5	1057.552	9940.19	1.243	1.243	1	H1-1a
30	M93	.75 Dia.	.000	0	40	.000	0		40	1303.155	14313.866	2.147	2.147	1	H1-1a

PAUL J. FORD
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Project # 42919-0009.005.8190
By AMS
Date: 01/29/20
v0.1, Effective 07/10/18

MOUNT TO TOWER CONNECTION CHECKS

REACTIONS

Px=	1.142	Kip
Py=	2.426	Kip
(Axial)Pz=	3.547	Kip
Mx=	0	Kip-in
My=	0	Kip-in
(Torque)Mz=	0	Kip-in

Number of Bolts = 1

BOLT CHECKS

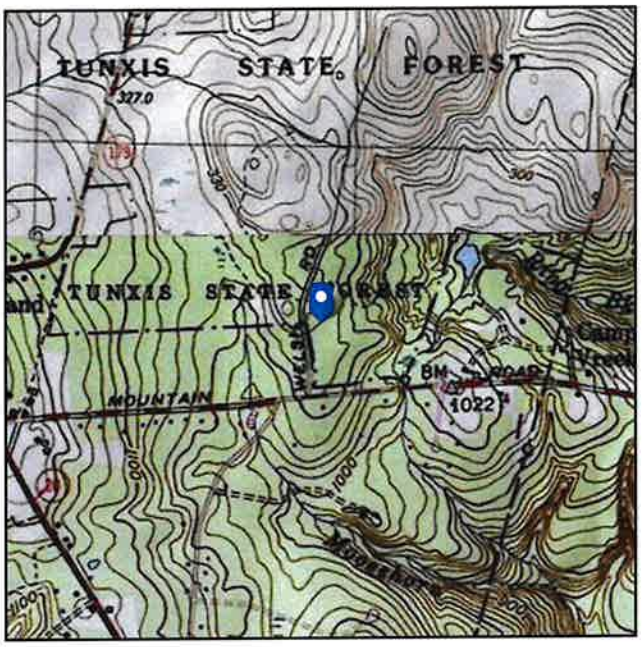
Tension Reaction	3.547	kip
Shear Reaction	2.68135	kip
Bolt Type	A325N	
Bolt Diameter	0.75	in
Tensile Strength	29.8	kips
Shear Strength	17.9	kips
Reduced Tensile Strength	-	kips
Tensile Capacity Used	11.9%	**Note: Tension reduction not required if tension or shear capacity < 30%**
Shear Capacity Used	15.0%	

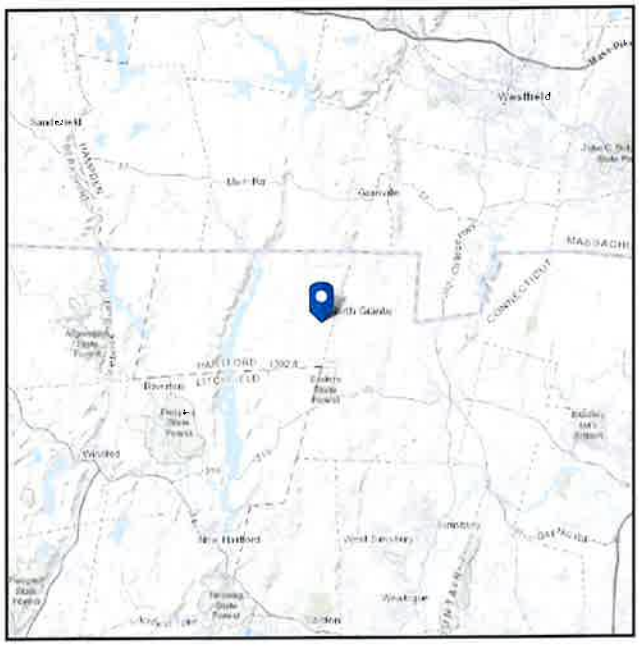
ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 1067.8 ft (NAVD 88)
Latitude: 41.997522
Longitude: -72.887733





Wind

Results:

Wind Speed:	117 Vmph ← 120 Vmph per Local Requirements
10-year MRI	76 Vmph
25-year MRI	85 Vmph
50-year MRI	90 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:	Thu Jul 25 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

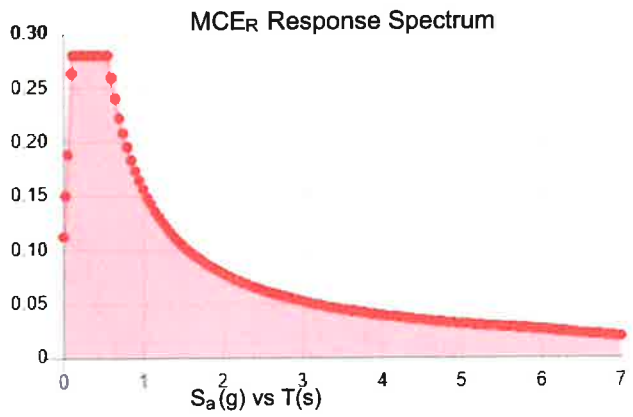
Seismic

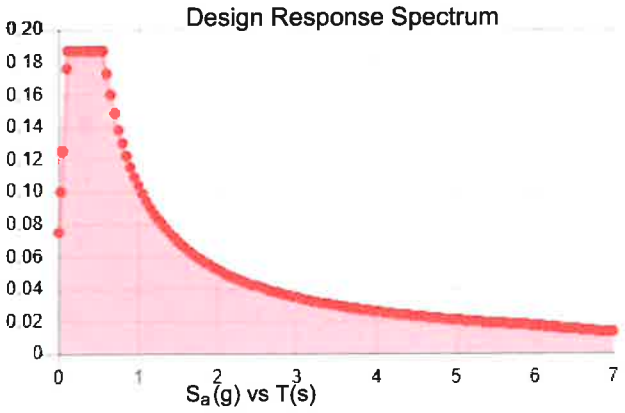
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.175	S_{DS} :	0.187
S_1 :	0.065	S_{D1} :	0.104
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.086
S_{MS} :	0.28	PGA_M :	0.137
S_{M1} :	0.156	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Thu Jul 25 2019

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Ice

Results:

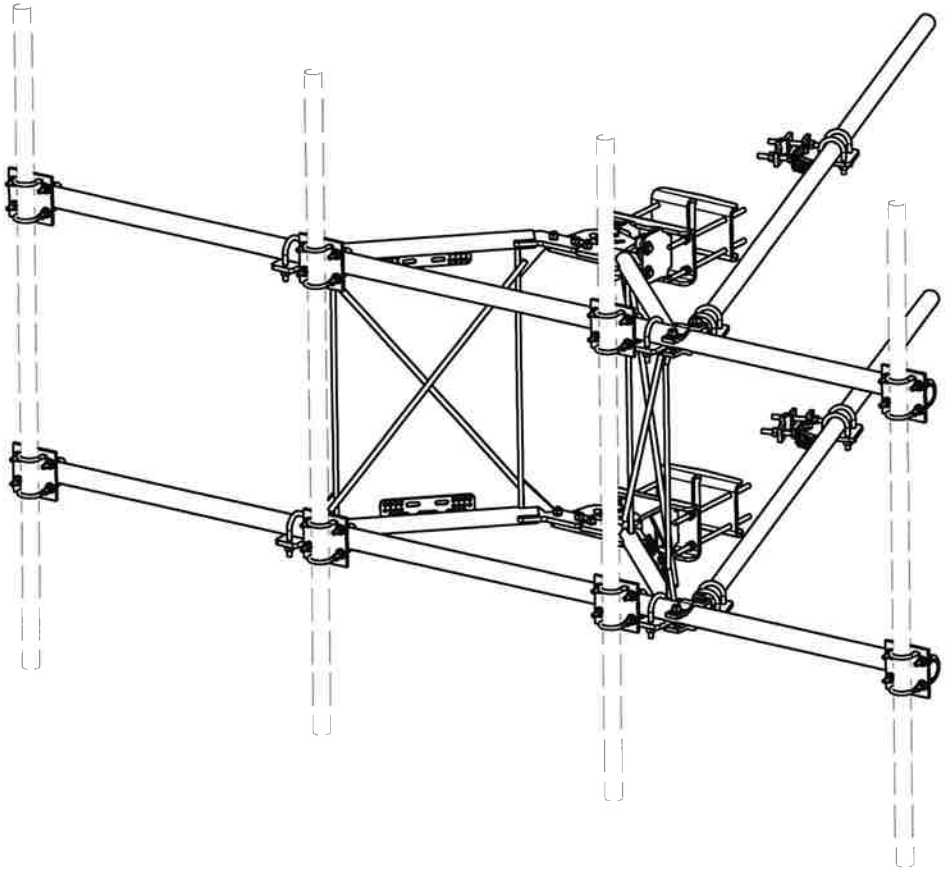
Ice Thickness:	1.00 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Thu Jul 25 2019

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

MANUFACTURER DRAWINGS (FOR REFERENCE ONLY)



PARTS LIST

ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	2	X-VFAW	SUPPORT ARM		71.41	142.81
2	1	X-HDCAMTBW	CLAMP WELDMENT FOR BCAM-HD		33.86	33.86
3	1	X-MHTPHD	MULTI-HOLE TAPER PLATE WELDMENT		36.24	36.24
4	2	X-VFAPL4	VFA-HD PIVOT PLATE	12 in	15.88	31.77
5	2	X-LCBP4	BENT BACKING PLATE	13 in	19.00	38.01
6	1	X-HDCAMSS	ANGLE ADJUSTMENT WELDMENT FOR BCAM-HD		16.39	16.39
7	4	X-SPTB	SLIDING PIPE TIE BACK PLATE	5 1/2 in	5.87	23.49
8	1	X-HDCAMSP	POSITIONING PLATE WELDMENT FOR BCAM-HD		2.58	2.58
9	4	X-TBCA	TIE BACK CLIP ANGLE		2.01	8.02
10	8	SCX2	CROSSOVER PLATE	7 in	4.80	38.37
11	4	MCP	CLAMP HALF 1/2" THICK, 11-5/8" LONG	12 1/16 in	3.59	14.37
12	8	DCP	1/2" THICK, 5-3/4" CNTER TO CENTER CLAMP HALF	8 1/8 in	2.36	18.90
13	2	P2126	2-3/8" X 126" (2" SCH. 40) GALVANIZED PIPE	126 in	40.75	81.50
14	2	P30150	2-7/8" X 150" (2-1/2" SCH. 40) GALVANIZED PIPE	150 in	76.94	153.87
15	4	A34212	3/4" x 2-1/2" UNC HEX BOLT (A325)	2 1/2 in	0.48	1.92
16	4	G34FW	3/4" HDG USS FLATWASHER		0.06	0.24
17	4	G34LW	3/4" HDG LOCKWASHER		0.04	0.17
18	4	G34NUT	3/4" HDG HEAVY 2H HEX NUT		0.21	0.85
19	8	G58R-18	5/8" x 18" THREADED ROD (HDG.)	18 in	0.40	3.19
20	4	G58R-12	5/8" x 12" THREADED ROD (HDG.)		1.05	4.18
21	4	G58R-8	5/8" x 8" THREADED ROD (HDG.)		0.70	2.79
22	4	X-UB5300	5/8" X 3" X 5-1/4" X 2-1/2" U-BOLT (HDG.)		1.15	4.60
23	8	X-UB5258	5/8" X 2-5/8" X 4-1/2" X 2" U-BOLT (HDG.)		1.00	8.00
24	2	G5807	5/8" x 7" HDG HEX BOLT GR5 FULL THREAD	7 in	0.70	1.41
25	1	G5806	5/8" x 6" HDG HEX BOLT GR5 FULL THREAD	6 in	0.62	0.62
26	8	G5804	5/8" x 4" HDG HEX BOLT GR5		0.44	3.55
27	4	G5802	5/8" x 2" HDG HEX BOLT GR5		0.27	1.08
28	8	A582114	5/8" x 2-1/4" HDG A325 HEX BOLT	2 1/4 in	0.31	2.50
29	25	G58FW	5/8" HDG USS FLATWASHER	1/8 in	0.07	1.76
30	66	G58LW	5/8" HDG LOCKWASHER		0.03	1.72
31	71	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	9.22
32	32	X-UB1300	1/2" X 3" X 5" X 2" GALV U-BOLT		0.74	23.64
33	16	X-UB1212	1/2" X 2" X 3" X 1-1/4" U-BOLT (HDG.)		0.60	9.56
34	64	G12FW	1/2" HDG USS FLATWASHER	3/32 in	0.03	2.18
35	64	G12LW	1/2" HDG LOCKWASHER	1/8 in	0.01	0.89
36	64	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	4.58
					TOTAL WT. #	738.06

TOLERANCE NOTES

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DESCRIPTION
12' 6" HEAVY DUTY
V-FRAME ASSEMBLY
WITH TWO STIFF ARMS

SITE PRO 1
A valmont COMPANY

Engineering Support Team:
1-888-753-7446

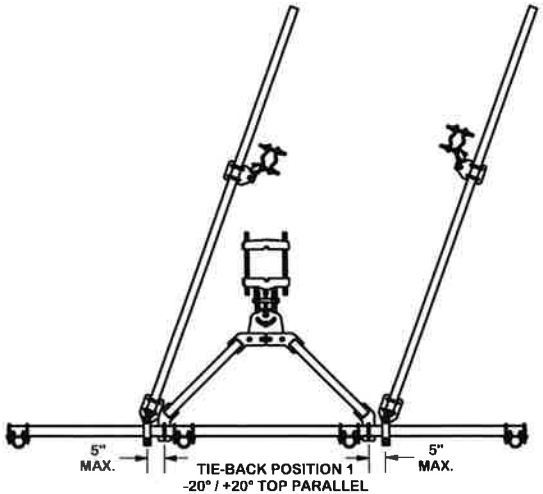
Locations:
New York, NY
Atlanta, GA
Los Angeles, CA
Plymouth, IN
Salem, OR
Dallas, TX

REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
	REVISION HISTORY			
D	UPDATED BCAM VERSION 1 TO BCAM VERSION 2		CEK	6/29/2018
C	UPDATED PIN LEG CONNECTION TO B-CAM CONNECTION		CEK	12/7/2017
B	CHANGED TIE-BACK BACK CONNECTION		CEK	7/31/2017
A	CHANGED TIE-BACK FRONT CONNECTION		CEK	2/2/2017

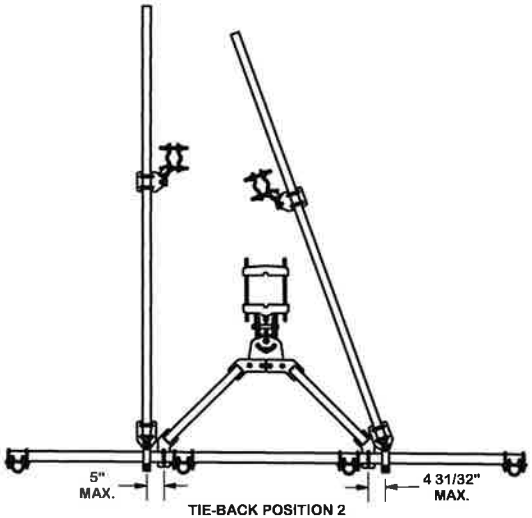
CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
	CEK 1/25/2017		VFA12-HD

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	02	CUSTOMER	BMC 12/13/2017	VFA12-HD

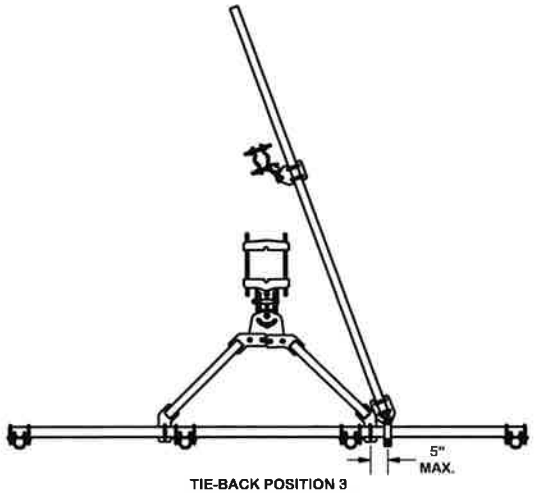
TIE-BACK POSITIONS



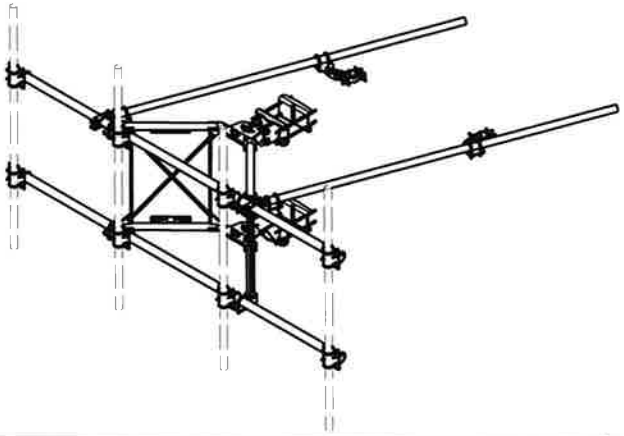
TIE-BACK POSITION 1
-20° / +20° TOP PARALLEL

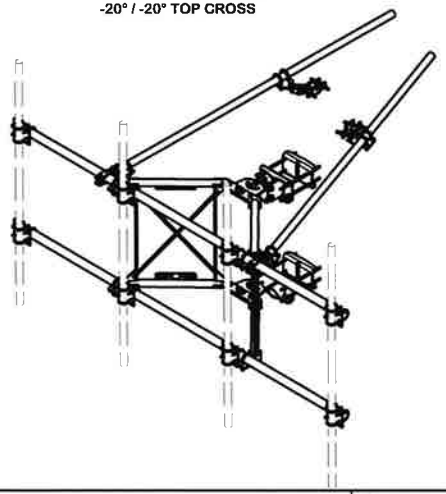


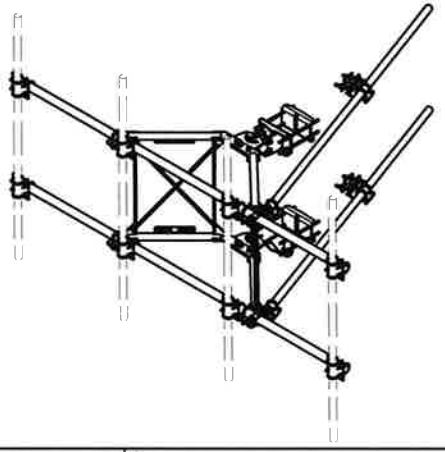
TIE-BACK POSITION 2
-20° / -20° TOP CROSS



TIE-BACK POSITION 3
-20° SAME SIDE STACKED







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REVISION HISTORY

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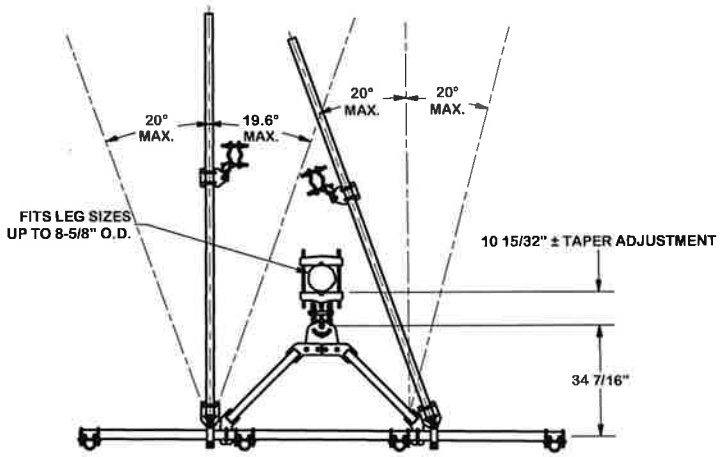
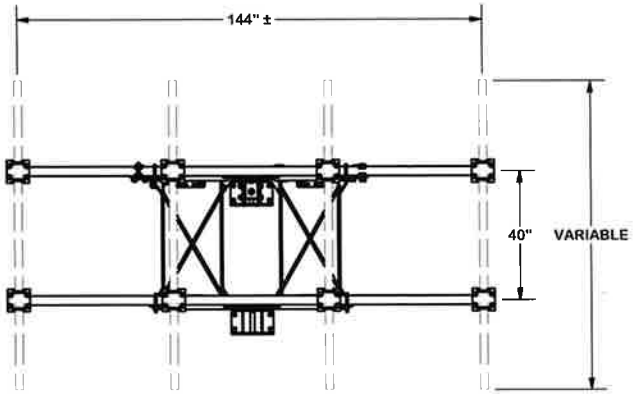
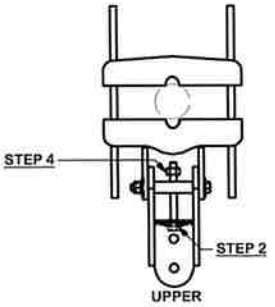
81	02	CUSTOMER	BMC 12/13/2017	VFA12-HD

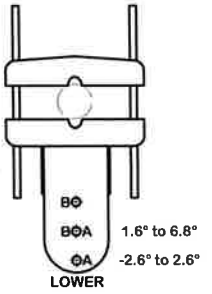


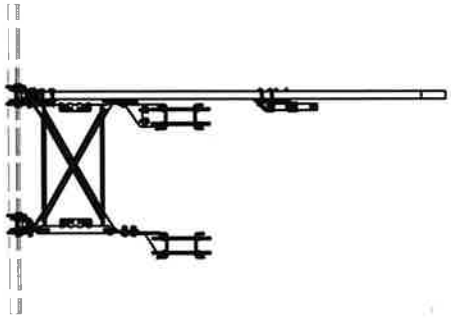


ANGLE CALIBRATING PROCEDURE:

1. MEASURE TOWER TAPER AND PICK LOWER BRACKET HOLE:
   - HOLE A = -2.6° TO 2.6°
   - HOLE B = 1.6° TO 6.8°
2. USE CALIBRATING BOLT TO ADJUST FRAME TO DESIRED TAPER
3. TORQUE LOCKING BOLTS TO 100 ft.-lbs.
4. ADVANCE LOCKING NUT TO POSITIONING PLATE, THEN TIGHTEN.







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	CEK 1/25/2017		VFA12-HD

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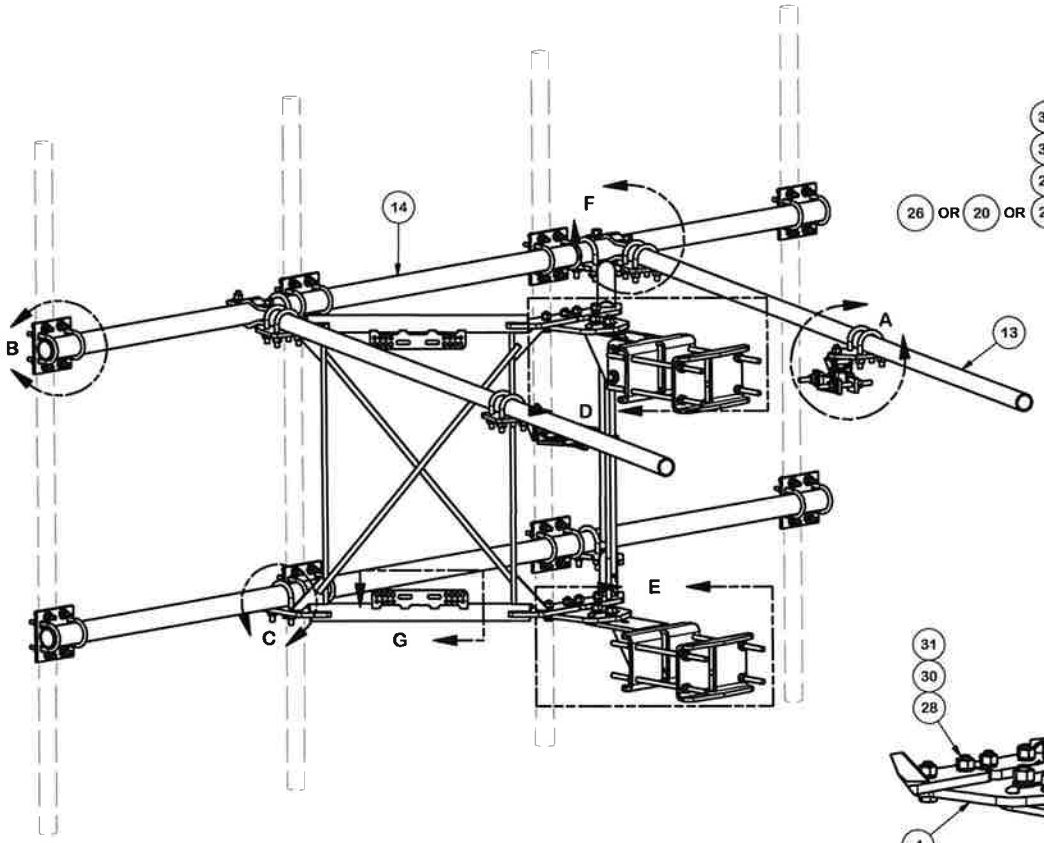
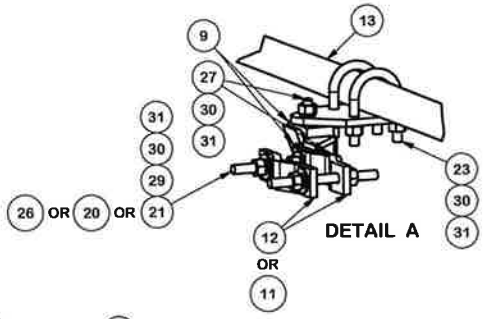
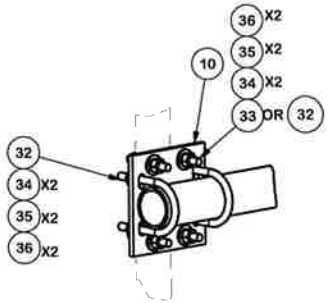
81	02	CUSTOMER	BMC 12/13/2017	VFA12-HD





DETAIL A



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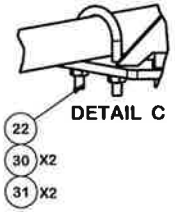

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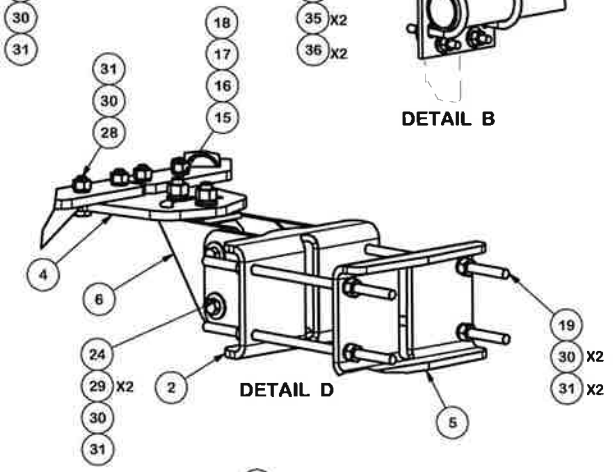
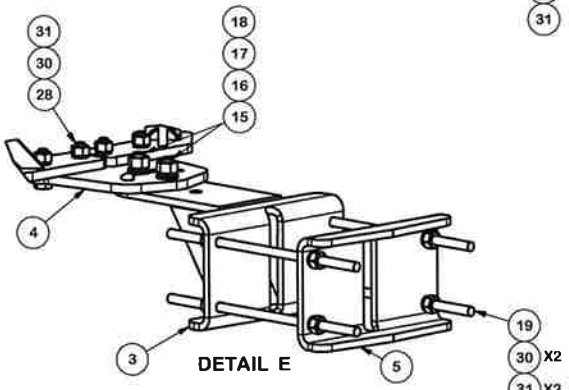
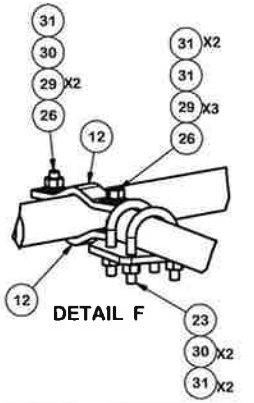


DETAIL D



DETAIL E

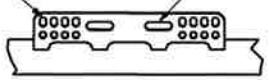


DETAIL F

7/16" LUG HOLES

REVIEW CARRIER STANDARDS FOR PROPER SURFACE PREPARTION AND ASSEMBLY OF ELECTRICAL CONNECTIONS

9/16" SLOTTED HOLE FOR EQUIPMENT PIPE U-BOLT



DETAIL G

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REVISION HISTORY

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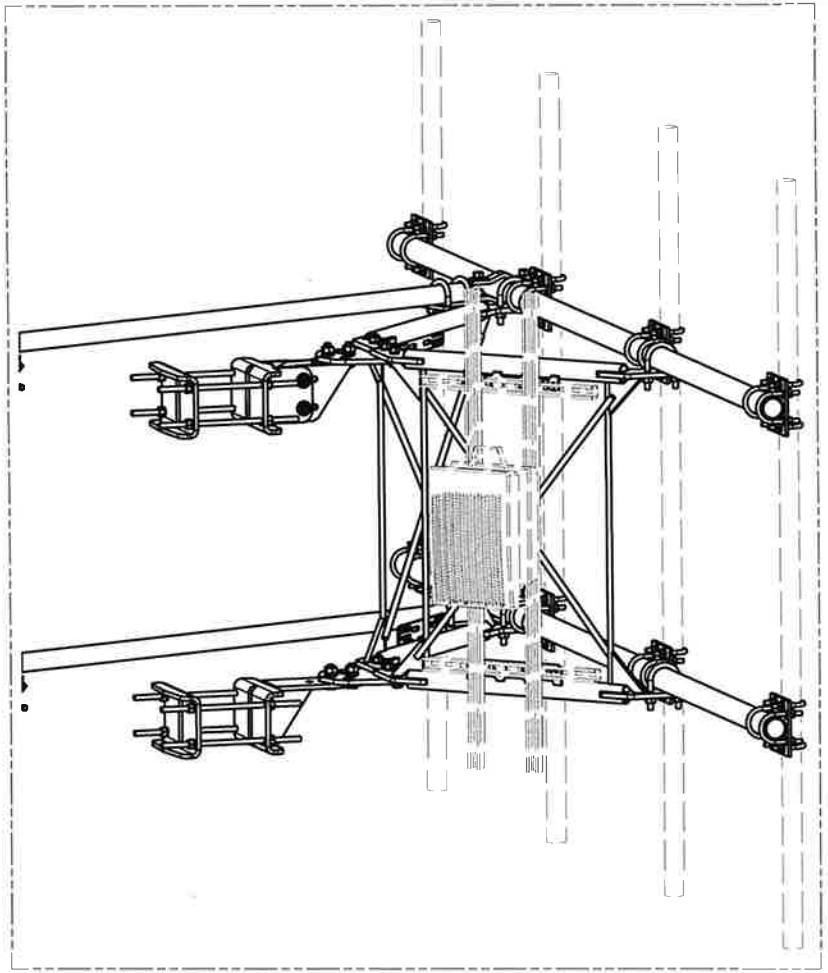
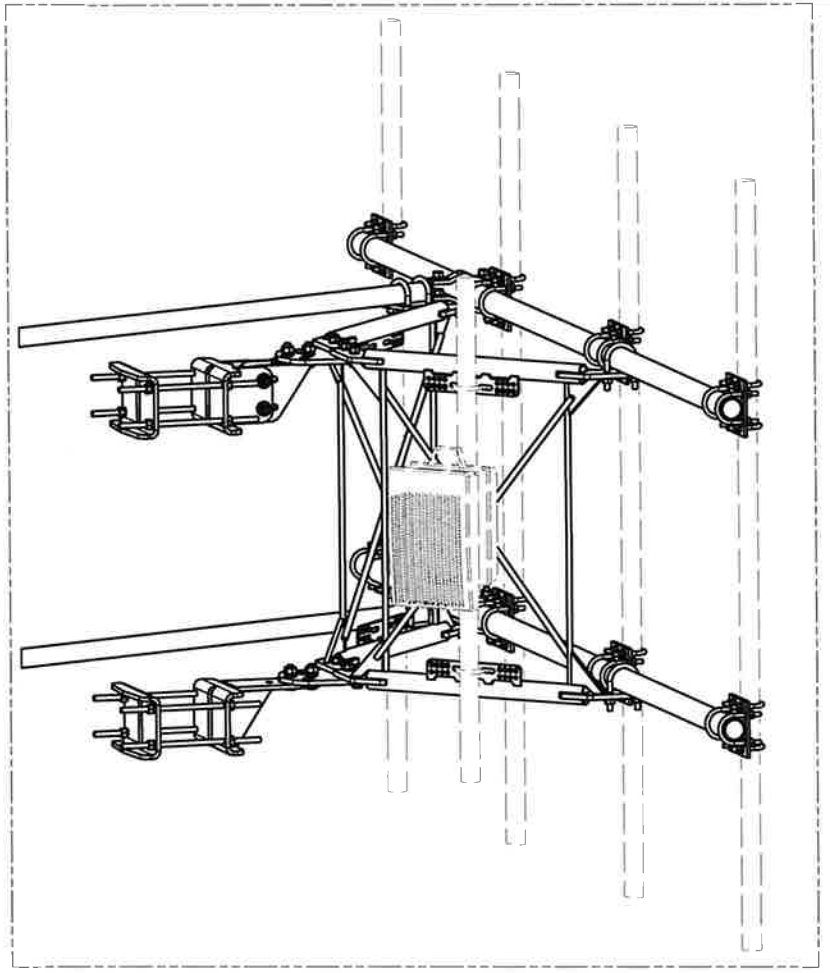
	CEK 1/25/2017		VFA12-HD

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	02	CUSTOMER	BMC 12/13/2017	VFA12-HD



UNISTRUT AND HARDWARE
SOLD SEPARATELY.

REQUIRES 3/8" HARDWARE



EQUIPMENT PIPE AND HARDWARE
SOLD SEPARATELY.

REQUIRES 1/2" HARDWARE
AND 2-3/8" TO 4-1/2" O.D. PIPE

REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
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Salem, OR
Dallas, TX

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
	CEK 1/25/2017		VFA12-HD

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	02	CUSTOMER	BMC 12/13/2017	VFA12-HD

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 6

ADMINISTRATIVE INFORMATION

PARCEL NUMBER
17-16-048

Parent Parcel Number

Property Address
WELSH RD

Neighborhood
1 East Hartland

Property Class
901 Exempt BAAX Municipal

TAXING DISTRICT INFORMATION

Jurisdiction 065

Area 065

Routing Number 98100966

OWNERSHIP

TOWN OF HARTLAND
SOUTH RD
EAST HARTLAND, CT 06027

Census Tract: 3301

Tax ID 17-16-048 Printed 02/12/2020 Card No. 1 of 2

TRANSFER OF OWNERSHIP

Date			
10/08/1996	NA	Bk/Pg: 60, 479	$0
12/21/1981	NA	Bk/Pg: 41, 86	$0

EXEMPT

VALUATION RECORD

Assessment Year		10/01/2003	10/01/2005	10/01/2006	10/01/2008	10/01/2011	10/01/2015
Reason for Change		Survey	2005	2006	Partial	2011 Reval	2015 Reval
VALUATION	L	51130	51130	51130	51130	46020	128510
Market Value	B	508000	530660	630660	930660	1033470	942540
	T	559130	581790	681790	981790	1079490	1071050
VALUATION	L	35791	35790	35790	35790	32210	89960
70% Assessed/Use	B	355600	371470	441470	651470	723430	659780
	T	391391	407260	477260	687260	755640	749740

Site Description

Topography:

Public Utilities:

Street or Road:

Neighborhood:

Zoning:
R-1

Legal Acres:
17.0440

LAND DATA AND CALCULATIONS

	Land Type	Rating Soil ID -or- Actual Frontage	Measured Acreage -or- Effective Frontage	Table Effective Depth	Prod. Factor -or- Depth Factor -or- Square Feet	Base Rate	Adjusted Rate	Extended Value	Influence Factor	Value
1	Primary Commercial		1.0000		1.00	90000.00	90000.00	90000		90000
2	Res Excess Acres		16.0440		1.00	2400.00	2400.00	38510		38510

G: GENERAL NOTES
INCLUDES TOWN GARAGE AND SAND & SALT SHED
ADDED CELL TOWER - 12/08
L: LAND NOTES
SEE MAP T28

Permit Number Type	FilingDate	Est. Cost Est. SqFt	Field Visit

Supplemental Cards

TRUE TAX VALUE 128510

Supplemental Cards
TOTAL LAND VALUE 128510

IMPROVEMENT DATA

PHYSICAL CHARACTERISTICS

ROOFING

Shingle

WALLS

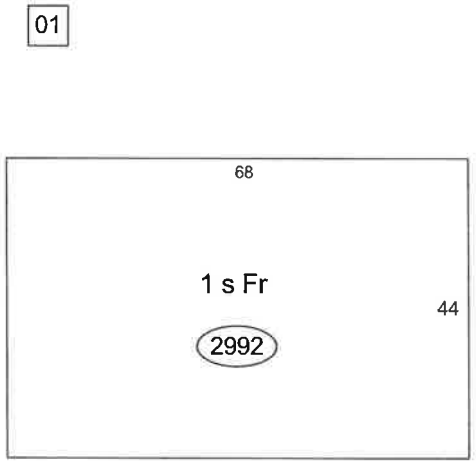
	B	1	2	U
Frame		Yes		
Brick				
Metal				
Guard				

FRAMING

	B	1	2	U
Wd Jst	0	2992	0	0

HEATING AND AIR CONDITIONING

	B	1	2	U
Heat	0	2992	0	0



Item Description	Units	Cost	Total	Pct
M & S Cost Database Date: 01/2016				
Base Cost	2992	76.00	227392	
Exterior Walls	2992	14.02	41948	
Basic Structure Cost	2992	90.02	269340	
Physical	0	0.00	64642	24.00
Depreciated Cost	2992	68.42	204698	
Rounded Total	0	0.00	204700	
Total Exterior Features Value				
Depreciated Ext Features				
Total Before Adjustments			204700	
Neighborhood Adjustment				
TOTAL VALUE			204700	

(LCM: 100.00)

SPECIAL FEATURES

Description	Value

SUMMARY OF IMPROVEMENTS

ID	Use	Stry Hgt	Const Type	Grade	Year Const	Eff Year	Cond	Base Rate	Feat-ures	Adj Rate	Size or Area	Computed Value	Phys Depr	Obsol Depr	Market Adj	% Comp	Value
C	STORGAR	0.00		Avg+	2001	2001	AV	0.00	N	0.00	2992		0	0	0	100 100	204700
01	TOWER	200.00		Avg	2005	2005	AV	0.00	N	0.00	1@ 0		0	0	SV	100 100	100000

Data Collector/Date	Appraiser/Date	Neighborhood	Supplemental Cards
01/01/1900	01/01/1900	Neigh 1 AV	

TOTAL IMPROVEMENT VALUE 304700

TRANSFER OF OWNERSHIP

Date

VALUATION RECORD

Assessment Year

Reason for Change

VALUATION

Site Description

LAND DATA AND CALCULATIONS

Land Type	Rating Soil ID -or- Actual Frontage	Measured Acreage -or- Effective Frontage	Table Effective Depth	Prod. Factor -or- Depth Factor -or- Square Feet	Base Rate	Adjusted Rate	Extended Value	Influence Factor	Value

Supplemental Cards
TOTAL LAND VALUE

IMPROVEMENT DATA

PHYSICAL CHARACTERISTICS

ROOFING

Shingle
Insulation

WALLS

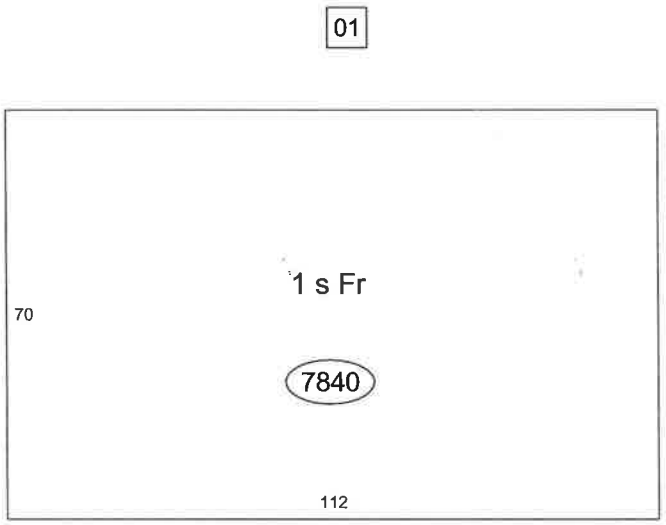
	B	1	2	U
Frame		Yes		
Brick				
Metal				
Guard				

FRAMING

	B	1	2	U
Wd Jst	0	7840	0	0

HEATING AND AIR CONDITIONING

B	1	2	U



(LCM: 100.00)

SPECIAL FEATURES

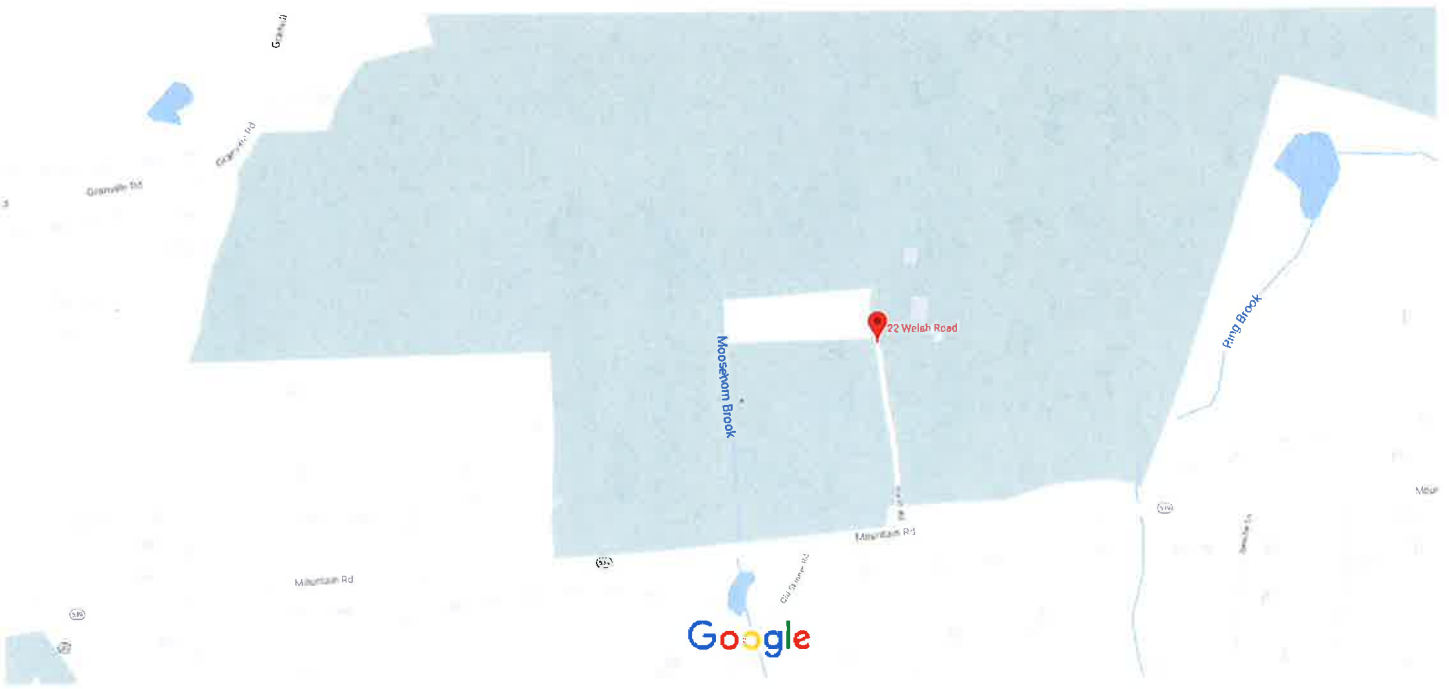
Description	Value

SUMMARY OF IMPROVEMENTS

ID	Use	Stry Hgt	Const Type	Grade	Year Const	Eff Year	Cond	Base Rate	Feat-ures	Adj Rate	Size or Area	Computed Value	Phys Depr	Obsol Depr	Market Adj	% Comp	Value
C	SERVGAR	0.00		Avg	2001	2001	AV	0.00	N	0.00	7840		0	0	0	100 100	337840
01	TOWER	200.00		Avg	2008	2008	AV	0.00	N	0.00	1		0	0	SV	100 100	300000

Data Collector/Date	Appraiser/Date	Neighborhood	Supplemental Cards TOTAL IMPROVEMENT VALUE	637840
01/01/1900	01/01/1900	Neigh 1 AV		

Google Maps 22 Welsh Rd



Map data ©2020 200 ft

22 Welsh Rd

East Hartland, CT 06027

Directions Save Nearby Send to your phone Share

ATTACHMENT 7

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	2	2	neopost 02/14/2020 US POSTAGE $002.84⁰ ZIP 06103 041L12203037
	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.	Wade E. Cole, First Selectman Town of Hartland 22 South Road Hartland, CT 06032				
2.	Scott Eisenlohr, Zoning Enforcement Officer Town of Hartland 22 South Road Hartland, CT 06032				
3.					
4.					
5.					
6.					

OLD STATE HOUSE FEB 2020

PS Form **3665**, January 2017 (Page ___ of ___) PSN 7530-17-000-5549

See Reverse for Instructions