Robinson+Cole

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Also admitted in Massachusetts

October 28, 2019

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

Re: **Notice of Exempt Modification – Facility Modification**
705 West Johnson Avenue, Cheshire, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 138-foot level of the existing 140-foot tower at 705 West Johnson Avenue in Cheshire, Connecticut (the "Property"). The tower and Property are owned by the Connecticut Light & Power Company ("CL&P") (Eversource). CL&P obtained a variance from the Town of Cheshire to construct the tower in 1977 and zoning permits to rebuild the tower in 2004. Cellco received Siting Council approval to extend and share the tower in 2007 (Petition No. 827). Copies of the municipal permits and the Council's staff report in Petition No. 827 are included in Attachment 1.

Cellco now intends to modify its facility by removing nine (9) of its existing antennas and replacing them with six (6) newer model antennas; installing six (6) new remote radio heads ("RRHs"); and installing one (1) HYBRIFLEX™ fiber optic antenna cable. The existing antenna mounts will also be replaced as a part of this proposed modification. Included in Attachment 2 are plans and specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

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 Cheshire's Town Manager, Sean M. Kimball; William Voelker, Cheshire's Town Planner; and CL&P, the owner of the Property and the tower.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's new antennas and RRHs will be installed at a centerline height of 138 feet on the 140-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 six (6) new antennas and six (6) RRHs will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A worst-case radio frequency table for Cellco's 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 and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis Report and Mount Analysis Report included in Attachment 4).

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Sean M. Kimball, Cheshire Town Manager
William Voelker, Cheshire Town Planner
CL&P
Tim Parks

ATTACHMENT 1

WEST JOHNSON AVENUE & KNOTTER DRIVE I-2

August 1, 1977

F.I.P. Corporation, (C.L.&P.)

MOTION: That the Zoning Board of Appeals grant the application of F.I.P. Corporation, Box 354, Farmington, Ct., requesting a variance of Sec. 30, Sched. A., Para. 54, Permitted Uses, requesting a variance of 58 ft. to allow construction of a 99 ft. transmitting and receiving antenna, 140 ft. from southerly lot line, property located on Assessor's Map Plate #115, Lot #53 and portions of Lots #51 and 51C, in an I-2 zone, with a stipulation.

Stipulation: No future structure off the C. L. & P. site shall be located within 198 ft. of the antenna base and if such structure is developed, the antenna shall be moved by C. L. & P. to conform to the distance requirements of the Zoning Regulations.

Engkvist moved: Crimmins seconded: Unanimously approved.

Reasons for Approval:

1. The antenna should be close to garage for storage and security of equipment.

(Over)

2. The garage and antenna will be out of the mainstream of traffic flow for safety of equipment and antenna.

3. Garage will shield and obscure antenna for aesthetic reasons and security of the antenna.

4. No opposition.

5. Within present confines of site, development's present location of garage and antenna represents most logical location.

Application No. 77-8-2

Building 705 West Johnson Avenue Date Nov 5, 2004

Plumbing
Heating/AC
Electric 18454
Oil Tank
Water
Septic
Sewer

BUILDING PERMIT

24212

Estimated Cost $ 107,000.00
Fee . . . . $ 1177.00
Zoning Fee $ —
Total Cost $ 1177.00

TO BUILDING DEPARTMENT, TOWN OF CHESHIRE, CONN.

The undersigned, hereby applies for a permit to do work according to the following specifications:

No. 705 W. Johnson Ave Lot No. ..... Zone .....

Owner of building CT Light & Power Co. Address 1075 Elden St, Berlin

Builder Construction Services of Branford Address 63-3 No. Branford Rd, Branford

Architect URS Address Rocky Hill

Size Main Bldg.: Ft. Front Overall 11'-6 Ft. Deep Overall 20' Net Area 230# Garages .....

No. of Families ..... No. of Stories 1 Construction Type I No. of rooms: 1st ..... 2nd ..... 3rd .....

Purpose of this Permit: To Construct a replacement lattice style Cell

Use group U Tower, 100' Tall and install 2 Precast Concrete

Equipment Buildings 11'-6 x 20' Each

MCO # 900576

TOWN OF CHESHIRE, CONN.

No 24212

Total Estimated Cost $107,000.00

BUILDING PERMIT

Fee $ 1,177.00

Nov. 5, 2004

Permission is hereby granted to Cingular Wireless

to erect a replace cell tower

Address: 705 WEST JOHNSON AVENUE

as follows:—Size 11'6" ft. long, 20 ft. wide, ... stories high;

supported on ..... walls to be .....;

roof covered with .....

E. ..... feet; W. ..... feet; S. ..... feet; N. ..... feet.

Owner CL & P

Footing forms must be inspected before pouring of concrete.
All sewage systems, rough electrical and rough plumbing must be inspected before covered.
Certificate of Occupancy must be obtained before building is occupied.

BUILDING DEPARTMENT, TOWN OF CHESHIRE, CONN.

Robert L. Fee

Building Inspector

Permission must be obtained from the Office of the Town Engineer before Building Material can be placed in the highway. Surface and roof water must not be connected with the sewer.

Petition No. 827
Cellco partnership d/b/a Verizon Wireless
705 West Johnson Avenue, Cheshire, Connecticut
Staff Report
September 25, 2007

On July 27, 2007, the Connecticut Siting Council (Council) received a petition from Cellco partnership d/b/a Verizon Wireless (Verizon) for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the extension of an existing telecommunications tower at 705 West Johnson Avenue, Cheshire, Connecticut. The petition was field reviewed by Council member Edward Wilensky and Council staff member Robert Mercier on August 20, 2007.

Verizon proposes to install a 40-foot extension on an existing 100-foot self-supporting lattice tower owned by Northeast Utilities (NU). The existing tower was originally a 100-foot light duty lattice tower located adjacent to an existing maintenance building at the NU complex on the property. On August 12, 2004, the Council approved an Exempt Modification to rebuild and relocate the tower approximately 100 feet to the southeast, near the south property line and adjacent to the limit of development on the parcel.

The tower currently supports Cingular antennas at the 98-foot level, a dish antenna at the 78-foot level, and a whip antenna at the 98-foot level that extends to a height of 110 feet. A fenced compound is located at the base of the tower. The existing tower and foundation were designed to support the extension and proposed antenna loading.

Verizon would install the 40-foot extension and place 12 antennas on an antenna frame at the 138-foot level of the tower. The height of the tower with antennas would be 142 feet above ground level. Verizon would install a 12-foot by 30-foot equipment shelter within the existing compound.

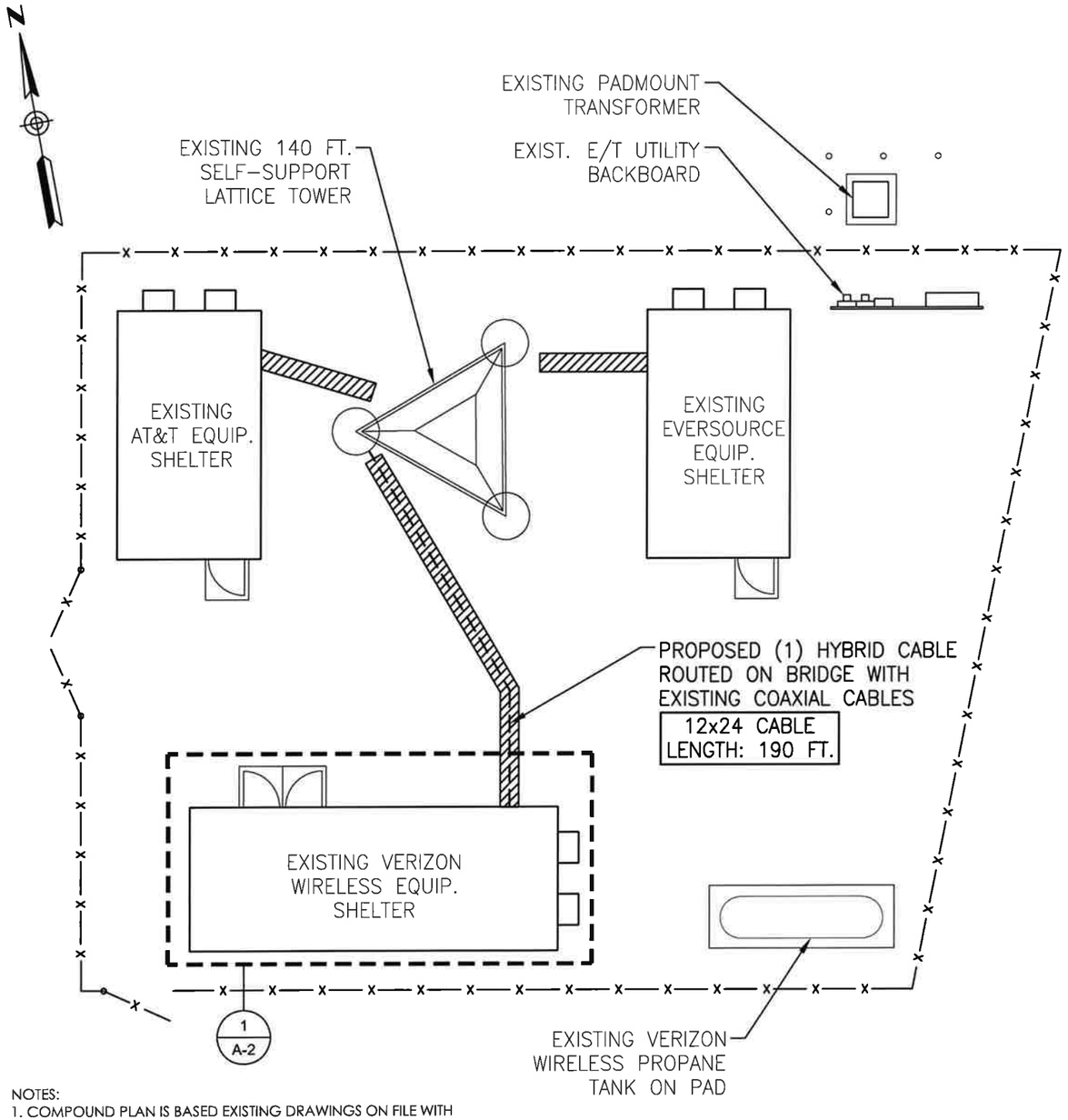
The current tower radius extends onto the abutting property to the south (Erikson Metals Corporation [EMC]) by approximately 15 feet. The tower radius of the 140-foot tower would extend onto EMC property by 55 feet but would not include the existing EMC building on the property. The EMC building is approximately 182 feet from the tower.

Verizon would provide both 850 MHz and 1900 MHz services from the site. Currently, Cellco has gaps in cellular coverage along I-84 and gaps in PCS coverage along I-84, I-691, and Route 322. The proposed extension would provide seamless coverage on I-84 and improve PCS coverage on the aforementioned routes. Gaps in PCS coverage would remain on I-84 and Route 322 west of the site. The site would provide 9.6 square miles of cellular coverage and 3.8 square miles of PCS coverage. Lowering the height of the tower to 130 feet would cause a <0.1 mile gap on I-84 west of the site and reduce the cellular and PCS coverage footprint to 7.4 square miles and 3.0 square miles, respectively.

The property is in a commercial/industrial area of Cheshire. I-84 is a quarter-mile northwest of the site. The extended tower would be visible from the surrounding commercial/ industrial area and a residential area 0.4 miles northwest of the site, beyond I-84. This residential area, along Upson Place, has no or limited visibility of the existing tower, depending on the vantage point.

EMC is opposed to the extension, stating the existing tower and compound is already a visual detriment to its property.

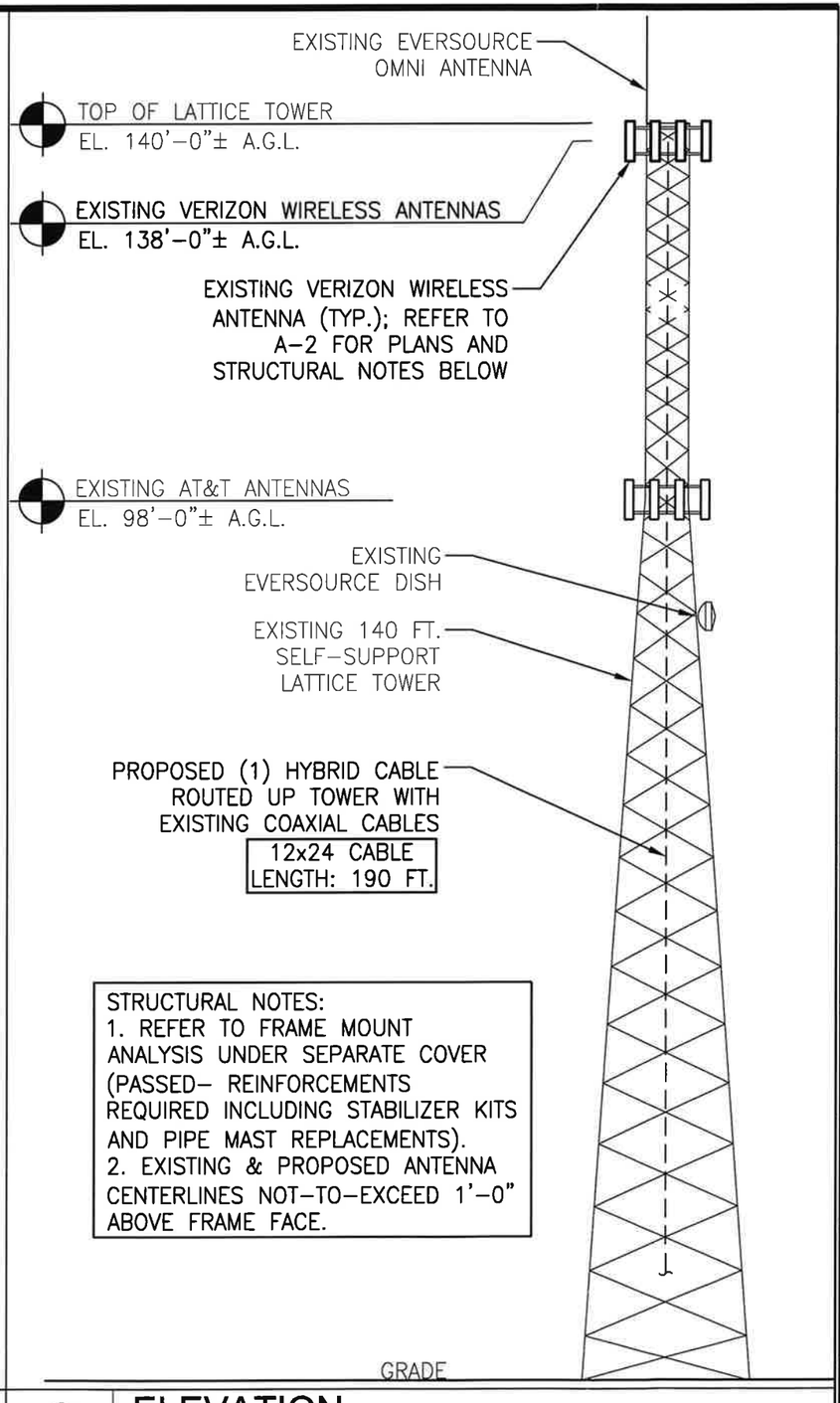
ATTACHMENT 2



NOTES:
1. COMPOUND PLAN IS BASED EXISTING DRAWINGS ON FILE WITH CT SITING COUNCIL AND A LIMITED DESIGN VISIT ON 4-26-19 FOR THE PURPOSE OF DETERMINING CABLE LENGTHS. A COMPOUND SURVEY WAS NOT PERFORMED.
2. PLANS ARE DIAGRAMMATIC ONLY AND NOT TO BE SCALED.
3. ELEVATION HEIGHTS ARE BASED ON EXISTING DRAWINGS ON FILE WITH CT SITING COUNCIL.
4. REFER TO STRUCTURAL EVALUATION UNDER SEPARATE COVER.

1 COMPOUND PLAN

Scale: 3/32" = 1'-0"



STRUCTURAL NOTES:
1. REFER TO FRAME MOUNT ANALYSIS UNDER SEPARATE COVER (PASSED– REINFORCEMENTS REQUIRED INCLUDING STABILIZER KITS AND PIPE MAST REPLACEMENTS).
2. EXISTING & PROPOSED ANTENNA CENTERLINES NOT–TO–EXCEED 1'–0" ABOVE FRAME FACE.

2 ELEVATION

Scale: N.T.S

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@optonlinc.net

LICENSURE

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

SUBMITTALS

NO	DATE	DESCRIPTION
0	08.10.19	REVIEW

DRAWN BY:	MF
CHECKED BY:	DW

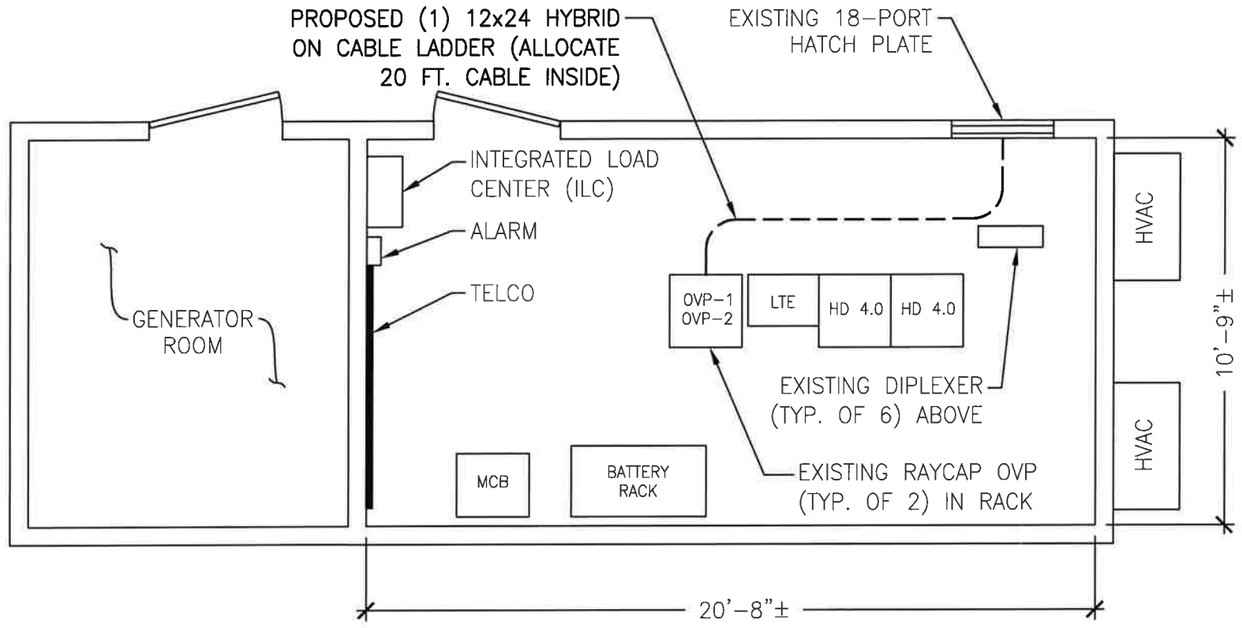
PROJECT NAME:
850-PCS-AWS CARRIER ADD CABLE DRAWINGS

SITE NAME:
CHESHIRE NORTH 2 CT

SITE ADDRESS:
EVERSOURCE TOWER
705 W. JOHNSON AVE.
CHESHIRE, CT 06410

SHEET TITLE:
COMPOUND PLAN & ELEVATION

SHEET NUMBER:
A-1

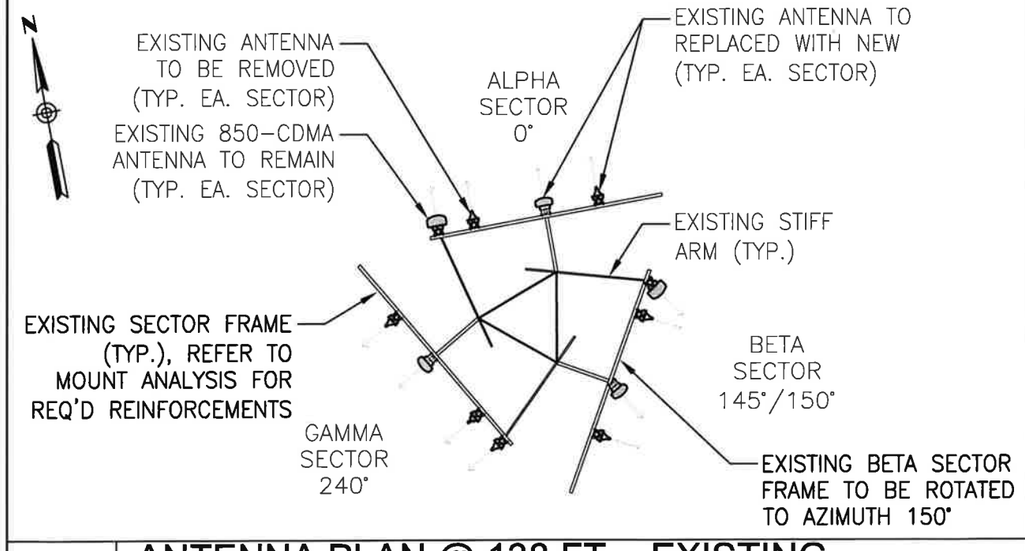


1 SHELTER PLAN - GRADE

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

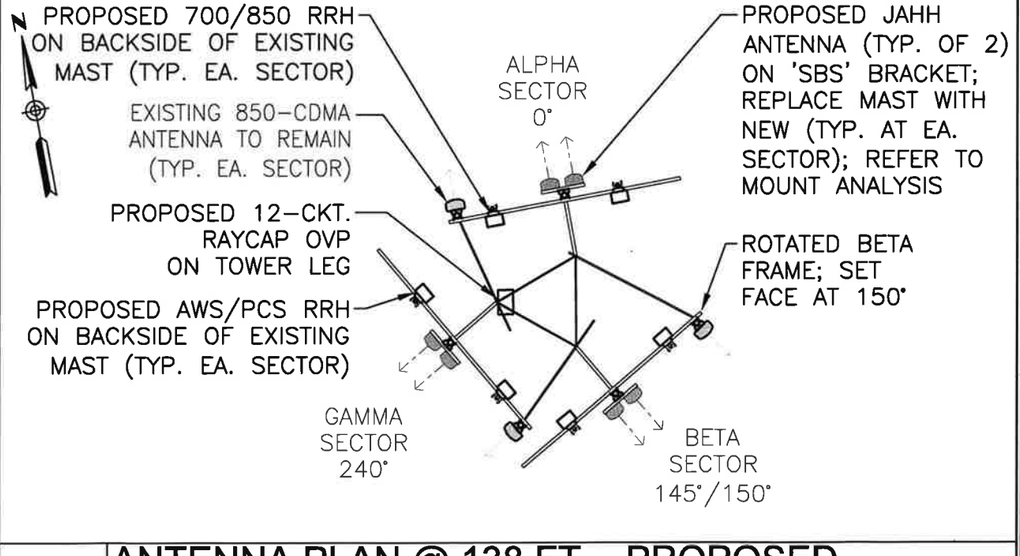
NOTES:
1. CONTRACTOR TO INSTALL NEW AND/OR MODIFY EXISTING EQUIP. RM. CABLE ENTRY PORTS FOR THE PROJECT AS REQUIRED INCLUDING THE REMOVAL OF ANY EXISTING COAXIAL CABLES AS DIRECTED BY VERIZON WIRELESS.

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



2 ANTENNA PLAN @ 138 FT. - EXISTING

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



3 ANTENNA PLAN @ 138 FT. - PROPOSED

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

verizon

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WALLINGFORD, CT 06492

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Cold Spring, NY 10516
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LICENSURE

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

SUBMITTALS

NO	DATE	DESCRIPTION
0	08.10.19	REVIEW

DRAWN BY:	MF
CHECKED BY:	DW

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

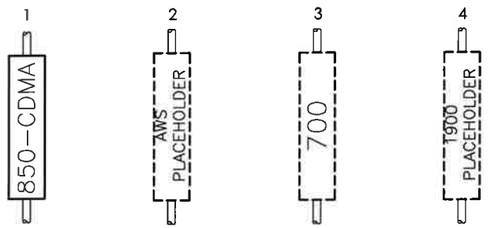
SITE NAME:
CHESHIRE NORTH 2 CT

SITE ADDRESS:
EVERSOURCE TOWER
705 W. JOHNSON AVE.
CHESHIRE, CT 06410

SHEET TITLE:
SHELTER PLAN & ANTENNA PLANS

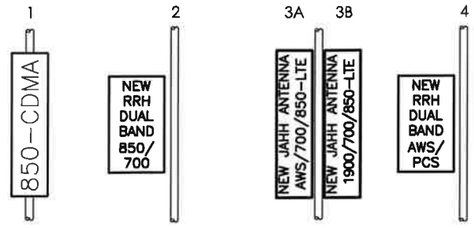
SHEET NUMBER:
A-2

EXISTING - ALPHA



(VIEWED FROM REAR)

PROPOSED - ALPHA



(VIEWED FROM REAR)

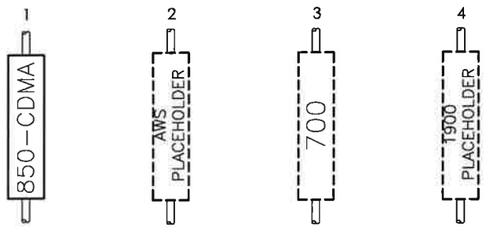
SECTOR: ALPHA				
POSITION	EXISTING ANTENNA	PROPOSED		
		ANTENNA	RRH	OVP
1	850-CDMA	EXISTING TO REMAIN	-	-
2	AWS PLACEHOLDER	REMOVE EXIST. SEE NOTE 2	700-850 DUAL BAND SEE NOTE 3	SEE NOTE 4
3	700	NEW JAHH SEE NOTE 1	-	-
4	1900 PLACEHOLDER	NEW JAHH SEE NOTE 1	AWS-PCS DUAL BAND SEE NOTE 3	-

NOTES:
1. NEW JAHH ANTENNA ON 'SBS' MOUNTING BRACKET AT POS. 3 CENTER FRAME (NEW) MAST; POS. 2 AND POS. 4 MASTS TO REMAIN FOR RRH SUPPORT
2. NEW AWS TO BE SHARED WITH 700 & 850-LTE JAHH ANTENNA AT POS. 3 (NEW) MAST
3. ALL NEW RRH's TO BE LOCATED ON BACKSIDE OF MASTS; REFER TO 3/A-2 FOR LOCATIONS
4. NEW 12-CKT. RAYCAP OVP TO BE LOCATED ON TOWER LEG AT GAMMA SECTOR (ALL SECTOR RRH's TO BE CONNECTED BACK TO (1) OVP)

1 ANTENNA SECTOR CONFIGURATIONS - ALPHA

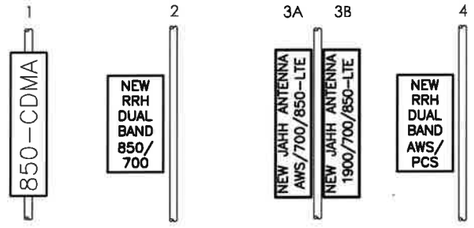
Scale: N.T.S.

EXISTING - BETA



(VIEWED FROM REAR)

PROPOSED - BETA



(VIEWED FROM REAR)

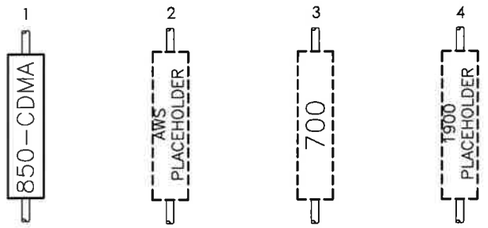
SECTOR: BETA				
POSITION	EXISTING ANTENNA	PROPOSED		
		ANTENNA	RRH	OVP
1	850-CDMA	EXISTING TO REMAIN	-	-
2	AWS PLACEHOLDER	REMOVE EXIST. SEE NOTE 2	700-850 DUAL BAND SEE NOTE 3	SEE NOTE 4
3	700	NEW JAHH SEE NOTE 1	-	-
4	1900 PLACEHOLDER	NEW JAHH SEE NOTE 1	AWS-PCS DUAL BAND SEE NOTE 3	-

NOTES:
1. NEW JAHH ANTENNA ON 'SBS' MOUNTING BRACKET AT POS. 3 CENTER FRAME (NEW) MAST; POS. 2 AND POS. 4 MASTS TO REMAIN FOR RRH SUPPORT
2. NEW AWS TO BE SHARED WITH 700 & 850-LTE JAHH ANTENNA AT POS. 3 (NEW) MAST
3. ALL NEW RRH's TO BE LOCATED ON BACKSIDE OF MASTS; REFER TO 3/A-2 FOR LOCATIONS
4. NEW 12-CKT. RAYCAP OVP TO BE LOCATED ON TOWER LEG AT GAMMA SECTOR (ALL SECTOR RRH's TO BE CONNECTED BACK TO (1) OVP)

2 ANTENNA SECTOR CONFIGURATIONS - BETA

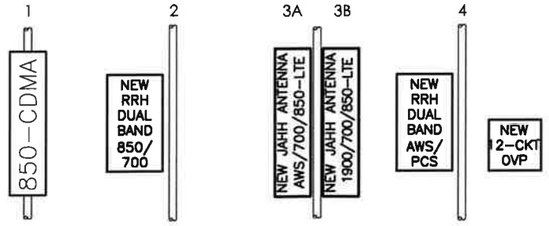
Scale: N.T.S.

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	AWS PLACEHOLDER	REMOVE EXIST. SEE NOTE 2	700-850 DUAL BAND SEE NOTE 3	SEE NOTE 4
3	700	NEW JAHH SEE NOTE 1	-	-
4	1900 PLACEHOLDER	NEW JAHH SEE NOTE 1	AWS-PCS DUAL BAND SEE NOTE 3	-

NOTES:
1. NEW JAHH ANTENNA ON 'SBS' MOUNTING BRACKET AT POS. 3 CENTER FRAME (NEW) MAST; POS. 2 AND POS. 4 MASTS TO REMAIN FOR RRH SUPPORT
2. NEW AWS TO BE SHARED WITH 700 & 850-LTE JAHH ANTENNA AT POS. 3 (NEW) MAST
3. ALL NEW RRH's TO BE LOCATED ON BACKSIDE OF MASTS; REFER TO 3/A-2 FOR LOCATIONS
4. NEW 12-CKT. RAYCAP OVP TO BE LOCATED ON TOWER LEG AT GAMMA SECTOR (ALL SECTOR RRH's TO BE CONNECTED BACK TO (1) OVP)

3 ANTENNA SECTOR CONFIGURATIONS - GAMMA

Scale: N.T.S.

verizon
WIRELESS COMMUNICATIONS FACILITY

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WALLINGFORD, CT 06492

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onair@optonlinc.net

LICENSURE

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

SUBMITTALS

NO	DATE	DESCRIPTION
0	08.10.19	REVIEW

DRAWN BY:	MF
CHECKED BY:	DW

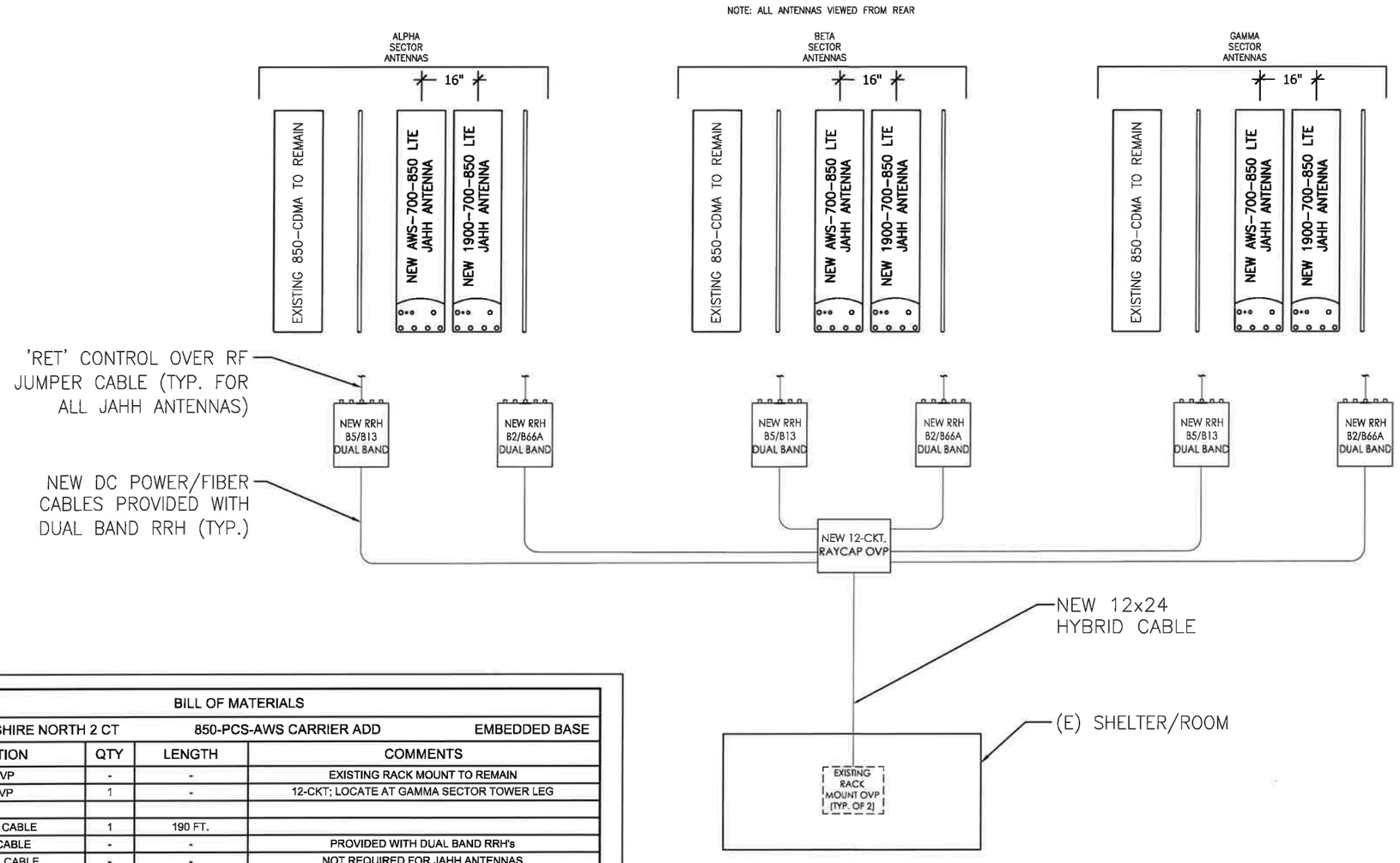
PROJECT NAME:
850-PCS-AWS
CARRIER ADD
CABLE DRAWINGS

SITE NAME:
CHESHIRE NORTH 2 CT

SITE ADDRESS:
EVERSOURCE TOWER
705 W. JOHNSON AVE.
CHESHIRE, CT 06410

SHEET TITLE:
ANTENNA SECTOR CONFIGURATIONS

SHEET NUMBER:
A-3



BILL OF MATERIALS			
SITE NAME: CHESHIRE NORTH 2 CT	850-PCS-AWS CARRIER ADD		EMBEDDED BASE
DESCRIPTION	QTY	LENGTH	COMMENTS
LOWER OVP	-	-	EXISTING RACK MOUNT TO REMAIN
UPPER OVP	1	-	12-CKT; LOCATE AT GAMMA SECTOR TOWER LEG
12x24 HYBRID CABLE	1	190 FT.	
1x1 HYBRID CABLE	-	-	PROVIDED WITH DUAL BAND RRH's
RET CONTROL CABLE	-	-	NOT REQUIRED FOR JAHH ANTENNAS
1/2" JUMPERS	48	6 FT.	(16) PER SECTOR; SEE NOTE 2
DUAL BAND AWS/PCS RRH	3	-	SAMSUNG B2/B66A
DUAL BAND 700/850 RRH	3	-	SAMSUNG B5/B13
RRH PIPE MOUNT BRACKET	6	-	
DIPLEXERS	3		FDJ85020Q4-S1 AT ANTENNAS; REFER TO RFDS FOR WIRING
AWS ANTENNA	3	-	NEW JAHH ANTENNA TO REPLACE EXISTING AWS
700 ANTENNA	-	-	SHARED WITH AWS & 1900 JAHH; REMOVE EXISTING
1900 ANTENNA	3	-	NEW JAHH ANTENNA TO REPLACE EXISTING 1900
850-CDMA ANTENNA	-	-	EXISTING TO REMAIN - 1 PER SECTOR
850-LTE ANTENNA	-	-	SHARED WITH AWS & 1900 JAHH
SBS MOUNTING BRACKET	3	-	COMMSCOPE BSAMNT-SBS-2-2

NOTES:
1. ITEMS SHOWN ARE FOR MAJOR DESIGN ELEMENTS ONLY. REFER TO VERIZON WIRELESS B.O.M. FOR ALL MANUFACTURER PART NUMBERS AND ACCESSORY ITEMS REQUIRED FOR A COMPLETE INSTALLATION.
2. EXISTING JUMPERS TO BE REPLACED WITH NEW; 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. RF JUMPER CABLES AND DIPLEXERS NOT SHOWN.

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

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

verizon
WIRELESS COMMUNICATIONS FACILITY

20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

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

LICENSURE

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

SUBMITTALS

NO	DATE	DESCRIPTION
0	08.10.19	REVIEW

DRAWN BY:	MF
CHECKED BY:	DW

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

SITE NAME:
CHESHIRE NORTH 2 CT

SITE ADDRESS:
EVERSOURCE TOWER
705 W. JOHNSON AVE.
CHESHIRE, CT 06410

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

SHEET NUMBER:
A-4

JAHH-65B-R3B

8-port sector antenna, 2x 698–787, 2x 824-894 and 4x 1695–2360 MHz, 65° HPBW, 3x RET and low bands have diplexers. Internal SBT's on first LB (Port 1) and first HB(Port 5).

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

Electrical Specifications

Frequency Band, MHz	**698–787**	**824–894**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain, dBi	14.5	15.8	18.0	18.4	18.5	18.8
Beamwidth, Horizontal, degrees	67	65	63	63	65	68
Beamwidth, Vertical, degrees	12.4	10.5	5.7	5.2	4.9	4.4
Beam Tilt, degrees	2–14	2–14	0–10	0–10	0–10	0–10
USLS (First Lobe), dB	18	18	20	20	21	23
Front-to-Back Ratio at 180°, dB	32	34	31	35	36	38
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	200	200	300	300	300	250
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

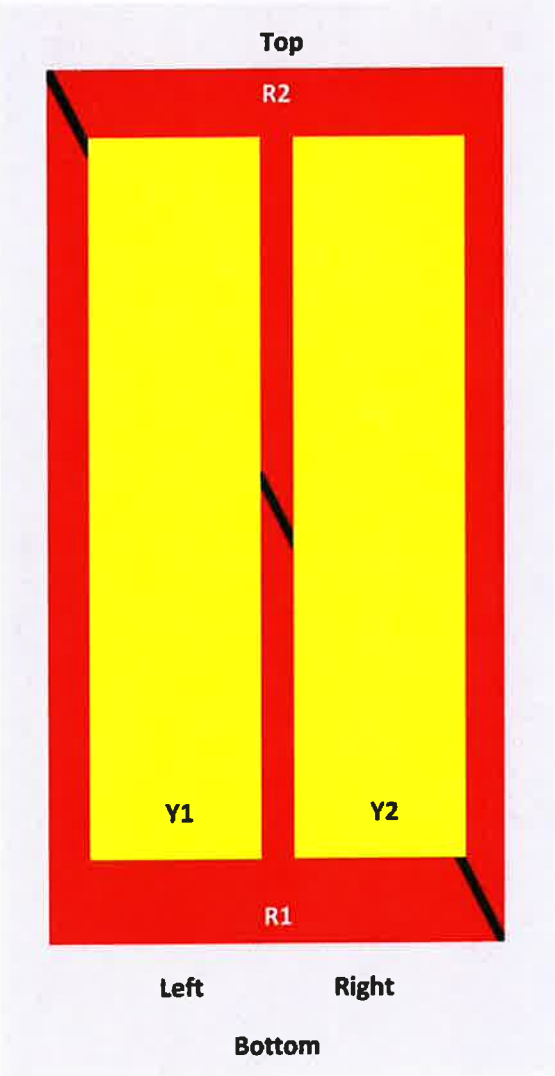
Electrical Specifications, BASTA*

Frequency Band, MHz	**698–787**	**824–894**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain by all Beam Tilts, average, dBi	14.3	14.9	17.6	18.1	18.2	18.5
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.5	±0.6	±0.4	±0.5	±0.6
Gain by Beam Tilt, average, dBi	2 ° | 14.3 8 ° | 14.3 14 ° | 14.3	2 ° | 15.0 8 ° | 14.9 14 ° | 15.4	0 ° | 17.2 5 ° | 17.6 10 ° | 17.6	0 ° | 17.6 5 ° | 18.2 10 ° | 18.2	0 ° | 17.7 5 ° | 18.3 10 ° | 18.3	0 ° | 17.9 5 ° | 18.7 10 ° | 18.7
Beamwidth, Horizontal Tolerance, degrees	±1.2	±1.4	±4	±2.4	±2.9	±2.7
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.5	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	18	17	17	18	19	18
Front-to-Back Total Power at 180° ± 30°, dB	25	24	26	29	27	29
CPR at Boresight, dB	22	23	20	21	21	24
CPR at Sector, dB	11	12	11	11	11	8

* 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

JAHH-65A-R3B JAHH-65B-R3B JAHH-65C-R3B



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

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 – 787 MHz | 824 – 894 MHz

JAHH-65B-R3B

Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage | Wind loading figures are validated by wind tunnel measurements described in white paper WP-112534-EN

Mechanical Specifications

RF Connector Quantity, total	8
RF Connector Quantity, low band	4
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Color	Light gray
Grounding Type	RF connector body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	301.0 N @ 150 km/h | 67.7 lbf @ 150 km/h
Wind Loading, lateral	254.0 N @ 150 km/h | 57.1 lbf @ 150 km/h
Wind Loading, maximum	143.4 lbf @ 150 km/h | 638.0 N @ 150 km/h
Effective Projected Area (EPA), frontal	0.28 m^2 | 3.01 ft^2
Effective Projected Area (EPA), lateral	0.24 m^2 | 2.58 ft^2
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1828.0 mm | 72.0 in
Width	350.0 mm | 13.8 in
Depth	208.0 mm | 8.2 in
Net Weight, without mounting kit	29.2 kg | 64.4 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 5
Internal RET	High band (1) | Low band (2)
Power Consumption, idle state, maximum	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

JAHH-65B-R3B

Packed Dimensions

Length	1975.0 mm | 77.8 in
Width	456.0 mm | 18.0 in
Depth	357.0 mm | 14.1 in
Shipping Weight	42.5 kg | 93.7 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.

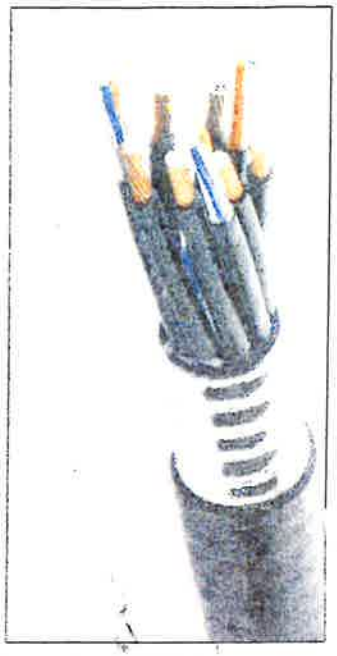


Figure 1: HYBRIFLEX Series

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
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)
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)
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
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
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

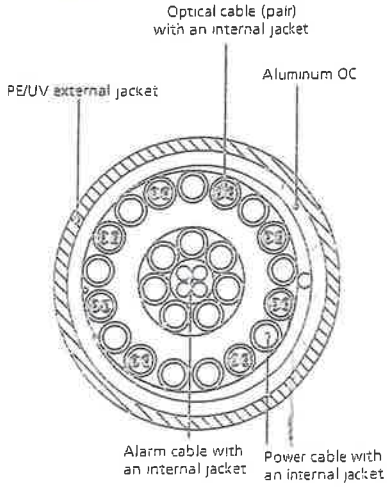


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 3

	General	Power	Density					
Site Name: Cheshire N 2								
Tower Height: 140'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*CL&P whip	1	120	103	low band	0.0046	1	0.05%	
*CL&P whip	1	120	103	150	0.0046	0.2	0.23%	
*CL&P microwave			78		very strongly directional & horizontal - no significant RF to reach the ground			
*Future CL&P whip	1	250	85	450	0.0144	0.3	0.48%	
*AT&T-UMTS	2	728	97	850	0.0632	0.5667	1.12%	
*AT&T-PCS-UMTS	2	1005	97	1900	0.0873	1	0.87%	
*AT&T-GSM	2	728	97	850	0.0632	0.5667	1.12%	
*AT&T-PCS-LTE	2	1791	97	1900	0.1556	1	1.56%	
*AT&T-LTE	2	940	97	700	0.0816	0.4667	1.75%	
*MetroPCS CDMA	3	727	120	2135	0.0604	1.0000	0.60%	
*MetroPCS LTE	1	1200	120	2130	0.0332	1.0000	0.33%	
VZW PCS	**4**	**1406**	**138**	**0.1062**	**1970**	**1.0**	**10.62%**	
VZW Cellular	**1**	**588**	**138**	**0.0111**	**880**	**0.5793**	**1.92%**	
VZW Cellular	**4**	**364**	**138**	**0.0275**	**869**	**0.5866**	**4.69%**	
VZW AWS	**4**	**1414**	**138**	**0.1068**	**2145**	**1.0**	**10.68%**	
VZW 700	**4**	**1039**	**138**	**0.0785**	**746**	**0.4973**	**15.78%**	
								51.8%
* Source: Siting Council								

ATTACHMENT 4

PAUL J. FORD & COMPANY

Report Date:	August 7, 2019
Client:	On Air Engineering, LLC 88 Foundry Pond Road Cold Spring, NY 10516 Attn: David Weinpahl, P.E. (201) 456-4624
Structure:	Existing 140-ft Self Support
VerizonSite Name:	Cheshire North 2 CT
Site Address:	705 West Johnson Ave
City, County, State:	Cheshire, New Haven County, CT
Latitude, Longitude:	41.555847, -72.917208
PJF Project:	A42919-0008.001.8700

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

Analysis Criteria:

Reference Standard:	2018 Connecticut State Building Code with the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1.
Ultimate Wind Speed:	135 mph 3-second gust wind speed without ice
Nominal Wind Speed:	105 mph 3-second gust wind speed without ice
Ice Wind Speed:	50 mph 3-second gust wind speed with 0.75" ice
Service Wind Speed:	105 mph (Serviceability) without ice
IBC Site Criteria:	Risk Category III, Topographic Category 1, Exposure Category C

Proposed Appurtenance Loads:

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

Summary of Analysis Results:

Existing Structure:	**Pass**
Existing Foundation:	**Pass**

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

Respectfully Submitted by:
Paul J. Ford and Company

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

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

08/07/2019

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 140 ft Self Support tower designed by Central Tower in October of 2004.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2018 Connecticut State Building based upon an ultimate 3-second gust wind speed of 135 mph converted to a nominal 3-second gust wind speed of 105 mph per section 1609.3.1 as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. and 50 mph with 0.75 inch ice thickness. Risk Category III, Exposure Category C and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1.00 were used in this analysis.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
137.0	138.0	1	raycap	RVZDC-6627-PF-48	1	1-5/8 Hybrid	-
		6	commscope	JAHH-65B-R3B w/ Mount Pipe			
		3	commscope	BSAMNT-SBS-2-2 (Mount Bracket)			
		3	rfs/celwave	FDJ85020Qa-S1			
		3	samsung telecommunications	B2/B66A RRH-BR049			
		3	samsung telecommunications	B5/B13 RRH-BR04C			
	137.0	6	mount modifications	L 2.5 x 2.5 x 1/4 x 6.5' Mount Angle (Horiz)			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
140.0	150.0	1	dbspectra	DS4C06F36D-D	2	7/8	2
	140.0	1		Andrew DB5004			
	146.3	3	celwave	PD1142-2C	1 2	1-5/8 7/8	1
137.0	138.0	3	antel	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	-	-	3
		6	antel	LPA-185080/12CFx2 w/ Mount Pipe			
		9	rfs celwave	FD9R6004/2C-3L			
		3	decibel	DB854DG65ESX w/ Mount Pipe	12	1-5/8	1
		6	tower mounts	6' x 2.375" Pipe Mount			
	137.0	3	tower mounts	12.5-Ft Sector Frames			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
98.0	98.0	6	cci antennas	DTMABP7819VG12A	12	1-5/8	1
		3	cci antennas	HPA-65R-BUU-H6 w/ Mount Pipe			
		3	ericsson	RRUS 11			
		3	ericsson	RRUS 12			
		3	ericsson	RRUS A2 MODULE	1	2-1/2 conduit	
		6	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		3	tower mounts	13-Ft Sector Frames			
83.0	83.0	1	andrew	HP4-102	1	EW90	1
		1	tower mounts	6' x 2.375" Pipe Mount			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment to be Removed

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Source	Reference	Date
Tower Drawings	Central Tower	CT2397-1	10/3/2004
Foundation Drawings	URS Corporation AES	36917714	10/28/2004
Geotechnical Report	Dr. Clarence Welti, P.E., P.C.	-	9/20/2004
Structural Analysis Report	All Points Technology Corporation	CT1416170	5/15/2018
Structural Analysis Report	Black & Veatch	400056	3/12/2019
Mount Structural Modification Report	Paul J. Ford and Company	42919-0008.003.8191	5/21/2019

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.

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	140 - 120	Leg	1 3/4	2	-28.30	61.44	46.1	Pass
T2	120 - 100	Leg	2 1/2	47	-69.66	167.37	41.6	Pass
T3	100 - 80	Leg	3 1/2	92	-110.35	375.66	29.4	Pass
T4	80 - 60	Leg	3 3/4	131	-147.55	314.76	46.9	Pass
T5	60 - 40	Leg	4	152	-183.32	378.50	48.4	Pass
T6	40 - 20	Leg	4 1/4	173	-217.88	447.33	48.7	Pass
T7	20 - 0	Leg	4 1/2	194	-251.49	521.15	48.3	Pass
T1	140 - 120	Diagonal	3/4	11	-2.90	3.62	80.1	Pass
T2	120 - 100	Diagonal	7/8	57	-4.09	6.88	59.4	Pass
T3	100 - 80	Diagonal	L 2 x 2 x 1/4	97	-5.20	16.35	31.8 45.4 (b)	Pass
T4	80 - 60	Diagonal	L 2.5 x 2.5 x 3/16	135	-6.47	13.71	47.2 60.9 (b)	Pass
T5	60 - 40	Diagonal	L 2.5 x 2.5 x 3/16	156	-7.14	10.75	66.4 67.2 (b)	Pass
T6	40 - 20	Diagonal	L 2.5 x 2.5 x 1/4	177	-7.81	10.81	72.2	Pass
T7	20 - 0	Diagonal	L 3 x 3 x 3/16	198	-8.68	11.56	75.1	Pass
T1	140 - 120	Top Girt	3/4	5	-0.43	2.11	20.6	Pass
T2	120 - 100	Top Girt	7/8	51	-1.03	4.01	25.6	Pass
T1	140 - 120	Bottom Girt	3/4	9	-1.12	2.11	53.2	Pass
T2	120 - 100	Bottom Girt	7/8	53	-0.10	4.01	2.5	Pass
							Summary	
						Leg (T6)	48.7	Pass
						Diagonal (T1)	80.1	Pass
						Top Girt (T2)	25.6	Pass
						Bottom Girt (T1)	53.2	Pass
						Bolt Checks	73.8	Pass
						Rating =	80.1	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	60.4	Pass
1	Base Foundation	0	26.5	Pass
1	Base Foundation Soil Interaction	0	42.5	Pass
Structure Rating (max from all components) =				**80.1%**

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

The results of the tilt and twist values for the design wind speed of 105 mph using unfactored service loads are given below (see page 23):

Table 6 – Deflections/ Tilt & Twist Results for Design Wind (Unfactored Service Load Combinations)

Elevation ft	Dish	Dish Diameter ft	Dish Frequency GHz	Analysis Results Tilt at Design Wind deg	Analysis Results Twist at Design Wind deg	Combined Max * deg	Deformation Limit (θ) deg
140.0	-	-	-	0.380	0.192	0.426	-
120.0	-	-	-	0.338	0.200	0.393	-
100.0	-	-	-	0.257	0.184	0.316	-
83.0	HP4-102	4	20	0.205	0.162	0.261	0.664
80.0	-	-	-	0.197	0.157	0.252	-
60.0	-	-	-	0.140	0.115	0.181	-
40.0	-	-	-	0.089	0.071	0.114	-
20.0	-	-	-	0.042	0.036		-

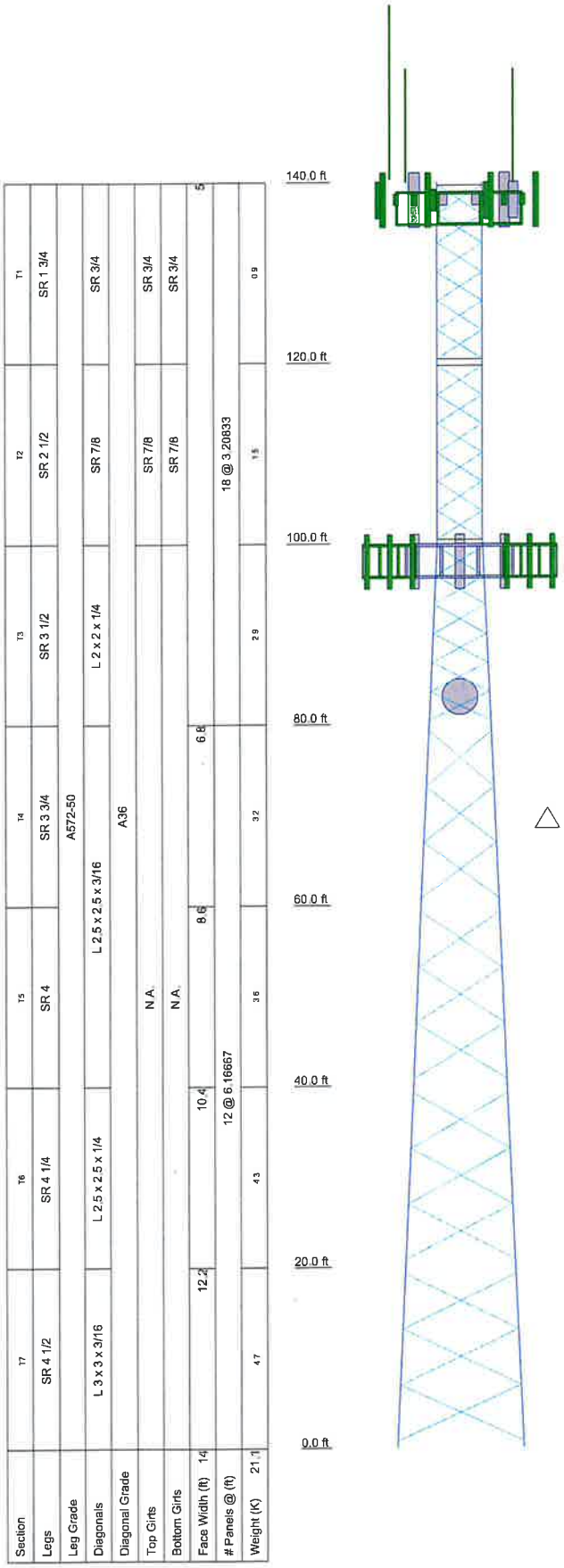
* Up to 0.5 degree is considered acceptable per SUB090 Section 7

4.1) Recommendations

The tower and its foundation(s) 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
DS4C06F36D-D	140	(2) L 2.5 x 2.5 x 1/4 x 6.5' Mount Angle (Horiz)	137
Andrew DB5004	140		
PD1142-2C	140	13-Ft Gate Mount	137
PD1142-2C	140	HPA-65R-BUU-H6 w/ Mount Pipe	98
PD1142-2C	140	HPA-65R-BUU-H6 w/ Mount Pipe	98
DB854DG65ESX w/ Mount Pipe	137	HPA-65R-BUU-H6 w/ Mount Pipe	98
DB854DG65ESX w/ Mount Pipe	137	(2) AM-X-CD-16-65-00T-RET_TIA w/ Mount Pipe	98
DB854DG65ESX w/ Mount Pipe	137		
(2) JAHH-65B-R3B_TIA w/ Mount Pipe	137	(2) AM-X-CD-16-65-00T-RET_TIA w/ Mount Pipe	98
(2) JAHH-65B-R3B_TIA w/ Mount Pipe	137		
(2) JAHH-65B-R3B_TIA w/ Mount Pipe	137	(2) AM-X-CD-16-65-00T-RET_TIA w/ Mount Pipe	98
B2/B66A RRH-BR049	137	(2) DTMABP7819VG12A	98
B2/B66A RRH-BR049	137	(2) DTMABP7819VG12A	98
B2/B66A RRH-BR049	137	(2) DTMABP7819VG12A	98
B5/B13 RRH-BR04C	137	RRUS 11	98
B5/B13 RRH-BR04C	137	RRUS 11	98
B5/B13 RRH-BR04C	137	RRUS 11	98
FDJ85020Qa-S1	137	RRUS 12	98
FDJ85020Qa-S1	137	RRUS 12	98
FDJ85020Qa-S1	137	RRUS 12	98
RVZDC-6627-PF-48	137	RRUS A2 MODULE	98
BSAMNT-SBS-2-2 (Mount Bracket)	137	RRUS A2 MODULE	98
BSAMNT-SBS-2-2 (Mount Bracket)	137	RRUS A2 MODULE	98
BSAMNT-SBS-2-2 (Mount Bracket)	137	DC6-48-60-18-8F	98
8' x 2-1/2" Sch 40 Pipe Mount	137	13-Ft Gate Mount	98
8' x 2-1/2" Sch 40 Pipe Mount	137	6' x 2.375" Pipe Mount	83
8' x 2-1/2" Sch 40 Pipe Mount	137	HP4-102	83
(2) L 2.5 x 2.5 x 1/4 x 6.5' Mount Angle (Horiz)	137		
(2) L 2.5 x 2.5 x 1/4 x 6.5' Mount Angle (Horiz)	137		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

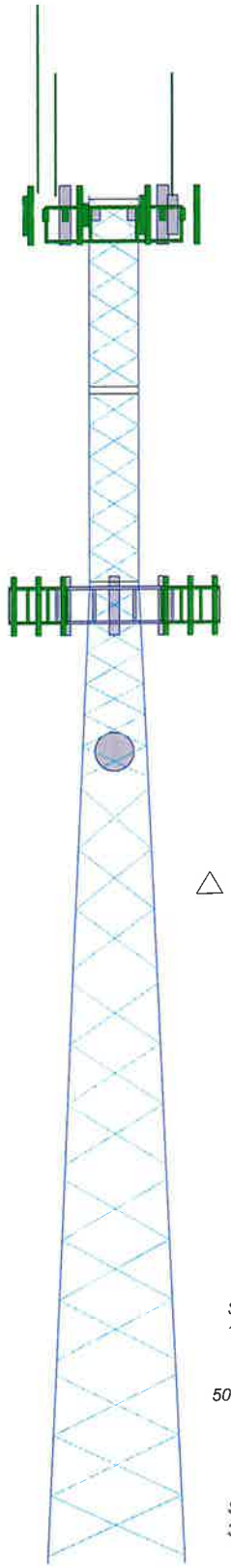
1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 105.00 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.00 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 105.00 mph wind.
6. Tower Structure Class III.
7. Topographic Category 1 with Crest Height of 0.00 ft

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

Job: Ex. 140' SST Chesire, CT			
Project: PJF #42919-0008.001.8700			
Client: On Air Engineering	Drawn by: kswarts	App'd:	
Code: TIA-222-G	Date: 07/11/19	Scale: NTS	
Path:		Dwg No. E-1	

Section	T7	T6	T5	T4	T3	T2	T1
Legs	SR 4 1/2	SR 4 1/4	SR 4	SR 3 3/4	SR 3 1/2	SR 2 1/2	SR 1 3/4
Leg Grade	A572-50						
Diagonals	L 3 x 3 x 3/16	L 2.5 x 2.5 x 1/4	L 2.5 x 2.5 x 3/16		L 2 x 2 x 1/4	SR 7/8	SR 3/4
Diagonal Grade	A36						
Top Girts	N.A.					SR 7/8	SR 3/4
Bottom Girts	N.A.					SR 7/8	SR 3/4
Face Width (ft)	12.2	10.4	8.6	6.8	5		
# Panels @ (ft)	12 @ 6.16667				18 @ 3.20833		
Weight (K)	21.1	43	36	32	29	15	09

140.0 ft
120.0 ft
100.0 ft
80.0 ft
60.0 ft
40.0 ft
20.0 ft
0.0 ft



MATERIAL STRENGTH

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

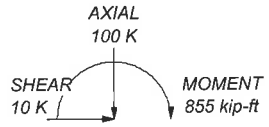
TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 105.00 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.00 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 105.00 mph wind.
6. Tower Structure Class III.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 80.1%

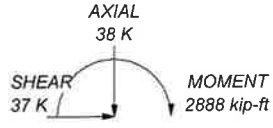
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 251 K
SHEAR: 22 K

UPLIFT: -223 K
SHEAR: 21 K



TORQUE 8 kip-ft
50.00 mph WIND - 0.75 in ICE



TORQUE 42 kip-ft
REACTIONS - 105.00 mph WIND

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

Job: Ex. 140' SST Chesire, CT		
Project: PJF #42919-0008.001.8700		
Client: On Air Engineering	Drawn by: kswarts	App'd:
Code: TIA-222-G	Date: 07/11/19	Scale: NTS
Path:		Dwg No. E-1

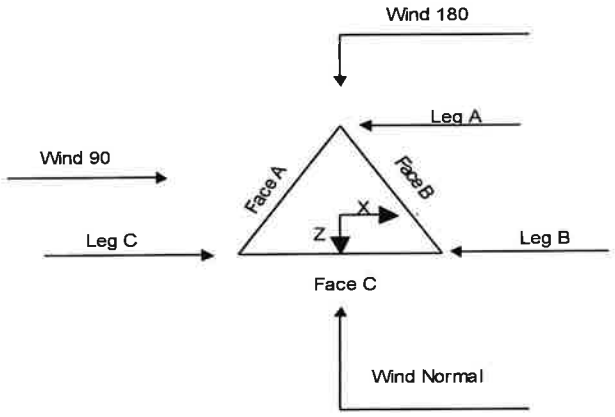
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 140.00 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 5.00 ft at the top and 14.00 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1) Tower is located in New Haven County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 105.00 mph.
4) Structure Class III.
5) Exposure Category C.
6) Topographic Category 1.
7) Crest Height 0.00 ft.
8) Nominal ice thickness of 0.75 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56 pcf.
11) A wind speed of 50.00 mph is used in combination with ice.
12) Temperature drop of 50 °F.
13) Deflections calculated using a wind speed of 105.00 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 ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	140.00-120.00			5.00	1	20.00
T2	120.00-100.00			5.00	1	20.00
T3	100.00-80.00			5.00	1	20.00
T4	80.00-60.00			6.80	1	20.00
T5	60.00-40.00			8.60	1	20.00
T6	40.00-20.00			10.40	1	20.00
T7	20.00-0.00			12.20	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	140.00-120.00	3.21	X Brace	No	No	4.50	4.50
T2	120.00-100.00	3.21	X Brace	No	No	4.50	4.50
T3	100.00-80.00	3.21	X Brace	No	No	4.50	4.50
T4	80.00-60.00	6.17	X Brace	No	No	9.00	9.00
T5	60.00-40.00	6.17	X Brace	No	No	9.00	9.00
T6	40.00-20.00	6.17	X Brace	No	No	9.00	9.00
T7	20.00-0.00	6.17	X Brace	No	No	9.00	9.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 140.00-120.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	3/4	A36 (36 ksi)
T2 120.00-100.00	Solid Round	2 1/2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T3 100.00-80.00	Solid Round	3 1/2	A572-50 (50 ksi)	Single Angle	L 2 x 2 x 1/4	A36 (36 ksi)
T4 80.00-60.00	Solid Round	3 3/4	A572-50 (50 ksi)	Single Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)
T5 60.00-40.00	Solid Round	4	A572-50 (50 ksi)	Single Angle	L 2.5 x 2.5 x 3/16	A36 (36 ksi)
T6 40.00-20.00	Solid Round	4 1/4	A572-50 (50 ksi)	Single Angle	L 2.5 x 2.5 x 1/4	A36 (36 ksi)
T7 20.00-0.00	Solid Round	4 1/2	A572-50 (50 ksi)	Single Angle	L 3 x 3 x 3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 140.00-120.00	Solid Round	3/4	A36 (36 ksi)	Solid Round	3/4	A36 (36 ksi)
T2 120.00-100.00	Solid Round	7/8	A36 (36 ksi)	Solid Round	7/8	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 140.00-120.00	0.00	0.00	A36 (36 ksi)	1	1	1.02	36.00	36.00	36.00
T2 120.00-100.00	0.00	0.00	A36 (36 ksi)	1	1	1.02	36.00	36.00	36.00
T3 100.00-80.00	2.08	0.38	A36 (36 ksi)	1	1	1.02	36.00	36.00	36.00
T4 80.00-60.00	2.08	0.38	A36 (36 ksi)	1	1	1.1	36.00	36.00	36.00
T5 60.00-40.00	2.08	0.38	A36 (36 ksi)	1	1	1.1	36.00	36.00	36.00
T6 40.00-20.00	2.08	0.38	A36 (36 ksi)	1	1	1.1	36.00	36.00	36.00
T7 20.00-0.00	2.08	0.38	A36 (36 ksi)	1	1	1.1	36.00	36.00	36.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 140.00-	No	No	1	0.9	0.9	0.9	0.7	0.7	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
120.00				0.9	0.9	0.9	0.7	0.7	1	1
T2 120.00-100.00	No	No	1	0.9	0.9	0.9	0.7	0.7	1	1
				0.9	0.9	0.9	0.7	0.7	1	1
T3 100.00-80.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T4 80.00-60.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T5 60.00-40.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T6 40.00-20.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T7 20.00-0.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 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
T2 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
T3 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
T4 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
T5 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
T6 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
T7 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 Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1 140.00-120.00	Flange	1.00 A325N	4	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0
T2 120.00-100.00	Flange	1.00 A325N	6	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0
T3 100.00-80.00	Flange	1.13 A325N	6	0.75 A325N	1	0.00 A325N	0	0.00 A325N	0	0.63 A325N	0	0.00 A325N	0	0.63 A325N	0
T4 80.00-60.00	Flange	1.13 A325N	6	0.75 A325N	1	0.88 A325N	0	0.88 A325N	0	0.63 A325N	0	0.88 A325N	0	0.63 A325N	0
T5 60.00-40.00	Flange	1.25 A325N	6	0.75 A325N	1	0.88 A325N	0	0.88 A325N	0	0.63 A325N	0	0.88 A325N	0	0.63 A325N	0
T6 40.00-20.00	Flange	1.25 A325N	6	0.75 A325N	1	0.88 A325N	0	0.88 A325N	0	0.63 A325N	0	0.88 A325N	0	0.63 A325N	0

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T7 20.00-0.00	Flange	1.25 A325N	0	0.75 A325N	1	0.88 A325N	0	0.88 A325N	0	0.63 A325N	0	0.88 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
LDF7-50A (1 5/8" foam)	A	No	No	Ar (CaAa)	136.00 - 0.00	0.00	0.4	13	7	0.50	1.98		0.92
1.5" flat Cable Ladder Rail ****	A	No	No	Af (CaAa)	136.00 - 0.00	0.00	0.37	2	2	30.00 1.50	1.50		1.80
LDF7-50A (1 5/8" foam)	B	No	No	Ar (CaAa)	98.00 - 0.00	0.00	-0.37	12	6	0.50	1.98		0.92
2.5" Conduit (2 1/2" Thick-Wall Conduit)	B	No	No	Ar (CaAa)	98.00 - 0.00	0.00	-0.43	1	1	2.87	2.87		5.53
1.5" flat Cable Ladder Rail ****	B	No	No	Af (CaAa)	98.00 - 0.00	0.00	-0.33	2	2	36.00 1.50	1.50		1.80
LDF7-50A (1 5/8" foam)	C	No	No	Ar (CaAa)	140.00 - 0.00	0.00	-0.45	1	1	1.98	1.98		0.92
LDF5-50A (7/8" foam)	C	No	No	Ar (CaAa)	140.00 - 0.00	0.00	-0.41	4	4	1.09	1.09		0.33
EW90	C	No	No	Ar (CaAa)	83.00 - 0.00	0.00	-0.38	1	1	1.32	1.32		0.32
1.5" flat Cable Ladder Rail	C	No	No	Af (CaAa)	140.00 - 0.00	0.00	-0.37	2	2	30.00 1.50	1.50		1.80

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	140.00-120.00	A	0.000	0.000	49.184	0.000	0.25
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	22.680	0.000	0.12
T2	120.00-100.00	A	0.000	0.000	61.480	0.000	0.31
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	22.680	0.000	0.12
T3	100.00-80.00	A	0.000	0.000	61.480	0.000	0.31
		B	0.000	0.000	56.939	0.000	0.36
		C	0.000	0.000	23.076	0.000	0.12
T4	80.00-60.00	A	0.000	0.000	61.480	0.000	0.31
		B	0.000	0.000	63.266	0.000	0.40
		C	0.000	0.000	25.320	0.000	0.12
T5	60.00-40.00	A	0.000	0.000	61.480	0.000	0.31
		B	0.000	0.000	63.266	0.000	0.40
		C	0.000	0.000	25.320	0.000	0.12
T6	40.00-20.00	A	0.000	0.000	61.480	0.000	0.31
		B	0.000	0.000	63.266	0.000	0.40
		C	0.000	0.000	25.320	0.000	0.12
T7	20.00-0.00	A	0.000	0.000	61.480	0.000	0.31
		B	0.000	0.000	63.266	0.000	0.40

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		C	0.000	0.000	25.320	0.000	0.12

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T1	140.00-120.00	A	2.151	0.000	0.000	67.569	0.000	1.43
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	72.498	0.000	1.23
T2	120.00-100.00	A	2.115	0.000	0.000	83.944	0.000	1.76
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	71.834	0.000	1.20
T3	100.00-80.00	A	2.073	0.000	0.000	83.334	0.000	1.73
		B		0.000	0.000	82.519	0.000	1.79
		C		0.000	0.000	72.692	0.000	1.20
T4	80.00-60.00	A	2.021	0.000	0.000	82.587	0.000	1.69
		B		0.000	0.000	90.729	0.000	1.94
		C		0.000	0.000	80.822	0.000	1.31
T5	60.00-40.00	A	1.955	0.000	0.000	81.616	0.000	1.64
		B		0.000	0.000	89.483	0.000	1.89
		C		0.000	0.000	79.311	0.000	1.25
T6	40.00-20.00	A	1.857	0.000	0.000	80.205	0.000	1.57
		B		0.000	0.000	87.671	0.000	1.80
		C		0.000	0.000	77.115	0.000	1.17
T7	20.00-0.00	A	1.664	0.000	0.000	77.407	0.000	1.43
		B		0.000	0.000	84.076	0.000	1.64
		C		0.000	0.000	72.761	0.000	1.03

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	140.00-120.00	5.72	-11.59	5.85	-4.23
T2	120.00-100.00	4.55	-12.41	5.17	-5.50
T3	100.00-80.00	3.93	-15.37	5.35	-10.89
T4	80.00-60.00	5.44	-19.49	8.60	-15.53
T5	60.00-40.00	6.28	-22.66	10.01	-18.23
T6	40.00-20.00	7.01	-25.46	11.23	-20.71
T7	20.00-0.00	7.17	-26.49	11.85	-22.51

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	LDF7-50A (1 5/8" foam)	120.00 - 136.00	0.6000	0.5150
T1	2	1.5" flat Cable Ladder Rail	120.00 - 136.00	0.6000	0.5150
T1	8	LDF7-50A (1 5/8" foam)	120.00 - 140.00	0.6000	0.5150
T1	9	LDF5-50A (7/8" foam)	120.00 - 140.00	0.6000	0.5150
T1	11	1.5" flat Cable Ladder Rail	120.00 -	0.6000	0.5150

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	1	LDF7-50A (1 5/8" foam)	140.00 - 100.00 - 120.00	0.6000	0.5003
T2	2	1.5" flat Cable Ladder Rail	100.00 - 120.00	0.6000	0.5003
T2	8	LDF7-50A (1 5/8" foam)	100.00 - 120.00	0.6000	0.5003
T2	9	LDF5-50A (7/8" foam)	100.00 - 120.00	0.6000	0.5003
T2	11	1.5" flat Cable Ladder Rail	100.00 - 120.00	0.6000	0.5003
T3	1	LDF7-50A (1 5/8" foam)	80.00 - 100.00	0.6000	0.4810
T3	2	1.5" flat Cable Ladder Rail	80.00 - 100.00	0.6000	0.4810
T3	4	LDF7-50A (1 5/8" foam)	80.00 - 98.00	0.6000	0.4810
T3	5	2.5" Conduit (2 1/2" Thick-Wall Conduit)	80.00 - 98.00	0.6000	0.4810
T3	6	1.5" flat Cable Ladder Rail	80.00 - 98.00	0.6000	0.4810
T3	8	LDF7-50A (1 5/8" foam)	80.00 - 100.00	0.6000	0.4810
T3	9	LDF5-50A (7/8" foam)	80.00 - 100.00	0.6000	0.4810
T3	10	EW90	80.00 - 83.00	0.6000	0.4810
T3	11	1.5" flat Cable Ladder Rail	80.00 - 100.00	0.6000	0.4810
T4	1	LDF7-50A (1 5/8" foam)	60.00 - 80.00	0.6000	0.6000
T4	2	1.5" flat Cable Ladder Rail	60.00 - 80.00	0.6000	0.6000
T4	4	LDF7-50A (1 5/8" foam)	60.00 - 80.00	0.6000	0.6000
T4	5	2.5" Conduit (2 1/2" Thick-Wall Conduit)	60.00 - 80.00	0.6000	0.6000
T4	6	1.5" flat Cable Ladder Rail	60.00 - 80.00	0.6000	0.6000
T4	8	LDF7-50A (1 5/8" foam)	60.00 - 80.00	0.6000	0.6000
T4	9	LDF5-50A (7/8" foam)	60.00 - 80.00	0.6000	0.6000
T4	10	EW90	60.00 - 80.00	0.6000	0.6000
T4	11	1.5" flat Cable Ladder Rail	60.00 - 80.00	0.6000	0.6000
T5	1	LDF7-50A (1 5/8" foam)	40.00 - 60.00	0.6000	0.6000
T5	2	1.5" flat Cable Ladder Rail	40.00 - 60.00	0.6000	0.6000
T5	4	LDF7-50A (1 5/8" foam)	40.00 - 60.00	0.6000	0.6000
T5	5	2.5" Conduit (2 1/2" Thick-Wall Conduit)	40.00 - 60.00	0.6000	0.6000
T5	6	1.5" flat Cable Ladder Rail	40.00 - 60.00	0.6000	0.6000
T5	8	LDF7-50A (1 5/8" foam)	40.00 - 60.00	0.6000	0.6000
T5	9	LDF5-50A (7/8" foam)	40.00 - 60.00	0.6000	0.6000
T5	10	EW90	40.00 - 60.00	0.6000	0.6000
T5	11	1.5" flat Cable Ladder Rail	40.00 - 60.00	0.6000	0.6000
T6	1	LDF7-50A (1 5/8" foam)	20.00 - 40.00	0.6000	0.6000
T6	2	1.5" flat Cable Ladder Rail	20.00 - 40.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T6	4	LDF7-50A (1 5/8" foam)	20.00 - 40.00	0.6000	0.6000
T6	5	2.5" Conduit (2 1/2" Thick-Wall Conduit)	20.00 - 40.00	0.6000	0.6000
T6	6	1.5" flat Cable Ladder Rail	20.00 - 40.00	0.6000	0.6000
T6	8	LDF7-50A (1 5/8" foam)	20.00 - 40.00	0.6000	0.6000
T6	9	LDF5-50A (7/8" foam)	20.00 - 40.00	0.6000	0.6000
T6	10	EW90	20.00 - 40.00	0.6000	0.6000
T6	11	1.5" flat Cable Ladder Rail	20.00 - 40.00	0.6000	0.6000
T7	1	LDF7-50A (1 5/8" foam)	0.00 - 20.00	0.6000	0.6000
T7	2	1.5" flat Cable Ladder Rail	0.00 - 20.00	0.6000	0.6000
T7	4	LDF7-50A (1 5/8" foam)	0.00 - 20.00	0.6000	0.6000
T7	5	2.5" Conduit (2 1/2" Thick-Wall Conduit)	0.00 - 20.00	0.6000	0.6000
T7	6	1.5" flat Cable Ladder Rail	0.00 - 20.00	0.6000	0.6000
T7	8	LDF7-50A (1 5/8" foam)	0.00 - 20.00	0.6000	0.6000
T7	9	LDF5-50A (7/8" foam)	0.00 - 20.00	0.6000	0.6000
T7	10	EW90	0.00 - 20.00	0.6000	0.6000
T7	11	1.5" flat Cable Ladder Rail	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
DS4C06F36D-D	C	From Leg	6.00 0 10	140.00	No Ice 1/2" Ice 1" Ice	6.11 8.18 10.17	6.11 8.18 10.17	0.05 0.09 0.15
Andrew DB5004	C	None	0.000	140.00	No Ice 1/2" Ice 1" Ice	0.98 1.70 2.42	3.03 5.22 7.41	0.05 0.08 0.10
****								
PD1142-2C	A	From Leg	4.00 0 6	0.000	140.00	No Ice 1/2" Ice 1" Ice	0.45 1.72 3.01	0.45 1.72 3.01	0.02 0.03 0.05
PD1142-2C	B	From Leg	4.00 0 6	0.000	140.00	No Ice 1/2" Ice 1" Ice	0.45 1.72 3.01	0.45 1.72 3.01	0.02 0.03 0.05
PD1142-2C	C	From Leg	4.00 0 6	0.000	140.00	No Ice 1/2" Ice 1" Ice	0.45 1.72 3.01	0.45 1.72 3.01	0.02 0.03 0.05
****								
DB854DG65ESX w/ Mount Pipe	A	From Leg	4.00 6 1	0.000	137.00	No Ice 1/2" Ice 1" Ice	5.55 5.94 6.34	4.10 4.73 5.36	0.04 0.08 0.14
DB854DG65ESX w/ Mount Pipe	B	From Leg	4.00 6	0.000	137.00	No Ice 1/2"	5.55 5.94	4.10 4.73	0.04 0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			1			Ice	6.34	5.36	0.14
						1" Ice			
DB854DG65ESX w/ Mount Pipe	C	From Leg	4.00 6 1	0.000	137.00	No Ice 1/2" Ice 1" Ice	5.55 5.94 6.34	4.10 4.73 5.36	0.04 0.08 0.14
(2) JAHH-65B-R3B_TIA w/ Mount Pipe	A	From Leg	4.00 0 1	0.000	137.00	No Ice 1/2" Ice 1" Ice	9.35 9.92 10.46	7.65 8.83 9.73	0.09 0.17 0.25
(2) JAHH-65B-R3B_TIA w/ Mount Pipe	B	From Leg	4.00 0 1	0.000	137.00	No Ice 1/2" Ice 1" Ice	9.35 9.92 10.46	7.65 8.83 9.73	0.09 0.17 0.25
(2) JAHH-65B-R3B_TIA w/ Mount Pipe	C	From Leg	4.00 0 1	0.000	137.00	No Ice 1/2" Ice 1" Ice	9.35 9.92 10.46	7.65 8.83 9.73	0.09 0.17 0.25
B2/B66A RRH-BR049	A	From Leg	4.00 2 1	0.000	137.00	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 2 1	0.000	137.00	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	C	From Leg	4.00 2 1	0.000	137.00	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 -2 1	0.000	137.00	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 -2 1	0.000	137.00	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 -2 1	0.000	137.00	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
FDJ85020Qa-S1	A	From Leg	4.00 0 1	0.000	137.00	No Ice 1/2" Ice 1" Ice	0.96 1.09 1.24	0.36 0.43 0.52	0.02 0.03 0.04
FDJ85020Qa-S1	B	From Leg	4.00 0 1	0.000	137.00	No Ice 1/2" Ice 1" Ice	0.96 1.09 1.24	0.36 0.43 0.52	0.02 0.03 0.04
FDJ85020Qa-S1	C	From Leg	4.00 0 1	0.000	137.00	No Ice 1/2" Ice 1" Ice	0.96 1.09 1.24	0.36 0.43 0.52	0.02 0.03 0.04
RVZDC-6627-PF-48	C	From Leg	0.50 0 1	0.000	137.00	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
BSAMNT-SBS-2-2 (Mount Bracket)	A	From Leg	4.00 0 1	0.000	137.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.00 0.00 0.00	0.07 0.09 0.11
BSAMNT-SBS-2-2 (Mount Bracket)	B	From Leg	4.00 0 1	0.000	137.00	No Ice 1/2" Ice	0.00 0.00 0.00	0.00 0.00 0.00	0.07 0.09 0.11

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
						1" Ice			
BSAMNT-SBS-2-2 (Mount Bracket)	C	From Leg	4.00 0 1	0.000	137.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.00 0.00 0.00	0.07 0.09 0.11
8' x 2-1/2" Sch 40 Pipe Mount	A	From Leg	4.00 0 1	0.000	137.00	No Ice 1/2" Ice 1" Ice	2.30 3.13 3.62	2.30 3.13 3.62	0.05 0.06 0.09
8' x 2-1/2" Sch 40 Pipe Mount	B	From Leg	4.00 0 1	0.000	137.00	No Ice 1/2" Ice 1" Ice	2.30 3.13 3.62	2.30 3.13 3.62	0.05 0.06 0.09
8' x 2-1/2" Sch 40 Pipe Mount	C	From Leg	4.00 0 0	0.000	137.00	No Ice 1/2" Ice 1" Ice	2.30 3.13 3.62	2.30 3.13 3.62	0.05 0.06 0.09
(2) L 2.5 x 2.5 x 1/4 x 6.5' Mount Angle (Horiz)	A	From Leg	4.00 0 0	0.000	137.00	No Ice 1/2" Ice 1" Ice	2.71 3.45 3.92	0.01 0.74 1.48	0.03 0.04 0.05
(2) L 2.5 x 2.5 x 1/4 x 6.5' Mount Angle (Horiz)	B	From Leg	4.00 0 0	0.000	137.00	No Ice 1/2" Ice 1" Ice	2.71 3.45 3.92	0.01 0.74 1.48	0.03 0.04 0.05
(2) L 2.5 x 2.5 x 1/4 x 6.5' Mount Angle (Horiz)	C	From Leg	4.00 0 0	0.000	137.00	No Ice 1/2" Ice 1" Ice	2.71 3.45 3.92	0.01 0.74 1.48	0.03 0.04 0.05
13-Ft Gate Mount	C	None		0.000	137.00	No Ice 1/2" Ice 1" Ice	23.96 34.06 44.16	23.96 34.06 44.16	1.10 1.60 2.10
****									
HPA-65R-BUU-H6 w/ Mount Pipe	A	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	9.22 9.98 10.76	6.25 6.96 7.70	0.07 0.14 0.22
HPA-65R-BUU-H6 w/ Mount Pipe	B	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	9.22 9.98 10.76	6.25 6.96 7.70	0.07 0.14 0.22
HPA-65R-BUU-H6 w/ Mount Pipe	C	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	9.22 9.98 10.76	6.25 6.96 7.70	0.07 0.14 0.22
(2) AM-X-CD-16-65-00T-RET_TIA w/ Mount Pipe	A	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	6.36 7.54 8.43	0.07 0.14 0.21
(2) AM-X-CD-16-65-00T-RET_TIA w/ Mount Pipe	B	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	6.36 7.54 8.43	0.07 0.14 0.21
(2) AM-X-CD-16-65-00T-RET_TIA w/ Mount Pipe	C	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	6.36 7.54 8.43	0.07 0.14 0.21
(2) DTMABP7819VG12A	A	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	0.98 1.10 1.23	0.34 0.42 0.51	0.02 0.03 0.04
(2) DTMABP7819VG12A	B	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice	0.98 1.10 1.23	0.34 0.42 0.51	0.02 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
						1" Ice			
(2) DTMABP7819VG12A	C	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	0.98 1.10 1.23	0.34 0.42 0.51	0.02 0.03 0.04
RRUS 11	A	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10
RRUS 11	B	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10
RRUS 11	C	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10
RRUS 12	A	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	3.15 3.36 3.59	1.29 1.44 1.60	0.06 0.08 0.11
RRUS 12	B	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	3.15 3.36 3.59	1.29 1.44 1.60	0.06 0.08 0.11
RRUS 12	C	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	3.15 3.36 3.59	1.29 1.44 1.60	0.06 0.08 0.11
RRUS A2 MODULE	A	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	1.60 1.76 1.92	0.38 0.47 0.57	0.02 0.03 0.04
RRUS A2 MODULE	B	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	1.60 1.76 1.92	0.38 0.47 0.57	0.02 0.03 0.04
RRUS A2 MODULE	C	From Leg	4.00 0 0	0.000	98.00	No Ice 1/2" Ice 1" Ice	1.60 1.76 1.92	0.38 0.47 0.57	0.02 0.03 0.04
DC6-48-60-18-8F	C	From Leg	4.00 0 0	0.000	98.00	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
13-Ft Gate Mount	C	None		0.000	98.00	No Ice 1/2" Ice 1" Ice	23.96 34.06 44.16	23.96 34.06 44.16	1.10 1.60 2.10
***									
6' x 2.375" Pipe Mount	A	From Leg	0.50 0 0	0.000	83.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
HP4-102	A	Paraboloid w/Shroud (HP)	From Leg	1.00 0 0		0.000		83.00	4.00	No Ice 1/2" Ice 1" Ice	12.57 13.10 13.62	0.08 0.15 0.21

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+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	237.70	17.71	-11.28
	Max. H_x	18	237.70	17.71	-11.28
	Max. H_z	7	-210.71	-16.43	10.64
	Min. Vert	7	-210.71	-16.43	10.64
	Min. H_x	7	-210.71	-16.43	10.64
	Min. H_z	18	237.70	17.71	-11.28
Leg B	Max. Vert	10	250.73	-18.26	-12.17
	Max. H_x	23	-223.05	17.00	11.61
	Max. H_z	23	-223.05	17.00	11.61
	Min. Vert	23	-223.05	17.00	11.61
	Min. H_x	10	250.73	-18.26	-12.17
	Min. H_z	10	250.73	-18.26	-12.17
Leg A	Max. Vert	2	234.16	0.36	20.22
	Max. H_x	21	10.73	4.68	0.47
	Max. H_z	2	234.16	0.36	20.22
	Min. Vert	15	-203.75	-0.40	-18.75
	Min. H_x	9	11.23	-4.68	0.50
	Min. H_z	15	-203.75	-0.40	-18.75

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	31.42	0.00	0.00	-16	-2	0
1.2 Dead+1.6 Wind 0 deg - No Ice	37.71	0.02	-34.05	-2687	-6	9
0.9 Dead+1.6 Wind 0 deg - No Ice	28.28	0.02	-34.05	-2680	-5	9
1.2 Dead+1.6 Wind 30 deg - No Ice	37.71	15.88	-27.78	-2207	-1254	0
0.9 Dead+1.6 Wind 30 deg - No Ice	28.28	15.88	-27.78	-2200	-1252	0
1.2 Dead+1.6 Wind 60 deg - No Ice	37.71	29.32	-17.15	-1364	-2300	-23
0.9 Dead+1.6 Wind 60 deg - No Ice	28.28	29.32	-17.15	-1359	-2297	-23
1.2 Dead+1.6 Wind 90 deg - No Ice	37.71	34.39	-0.08	-27	-2695	-42
0.9 Dead+1.6 Wind 90 deg - No Ice	28.28	34.39	-0.08	-22	-2692	-42
1.2 Dead+1.6 Wind 120 deg - No Ice	37.71	32.02	18.83	1449	-2498	-35
0.9 Dead+1.6 Wind 120 deg - No Ice	28.28	32.02	18.83	1452	-2495	-35
1.2 Dead+1.6 Wind 150 deg - No Ice	37.71	16.82	29.54	2345	-1348	-19
0.9 Dead+1.6 Wind 150 deg - No Ice	28.28	16.82	29.54	2348	-1346	-19
1.2 Dead+1.6 Wind 180 deg - No Ice	37.71	-0.02	32.59	2582	0	-9
0.9 Dead+1.6 Wind 180 deg - No Ice	28.28	-0.02	32.59	2585	1	-9
1.2 Dead+1.6 Wind 210 deg - No Ice	37.71	-15.90	27.91	2179	1251	0
0.9 Dead+1.6 Wind 210 deg - No Ice	28.28	-15.90	27.91	2182	1250	0
1.2 Dead+1.6 Wind 240 deg - No Ice	37.71	-30.66	18.06	1375	2358	22
0.9 Dead+1.6 Wind 240 deg - No Ice	28.28	-30.66	18.06	1378	2357	22
1.2 Dead+1.6 Wind 270 deg - No Ice	37.71	-34.39	-0.03	-21	2689	42
0.9 Dead+1.6 Wind 270 deg - No Ice	28.28	-34.39	-0.03	-16	2688	42

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+1.6 Wind 300 deg - No Ice	37.71	-30.68	-17.92	-1438	2429	36
0.9 Dead+1.6 Wind 300 deg - No Ice	28.28	-30.68	-17.92	-1433	2428	36
1.2 Dead+1.6 Wind 330 deg - No Ice	37.71	-16.79	-29.41	-2372	1340	19
0.9 Dead+1.6 Wind 330 deg - No Ice	28.28	-16.79	-29.41	-2366	1340	19
1.2 Dead+1.0 Ice+1.0 Temp	100.20	0.00	0.00	-68	-24	0
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	100.20	0.00	-9.46	-855	-24	4
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	100.20	4.49	-7.82	-723	-399	2
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	100.20	8.01	-4.66	-457	-691	-4
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	100.20	9.19	-0.01	-70	-790	-8
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	100.20	8.33	4.87	335	-714	-7
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	100.20	4.62	8.07	611	-413	-5
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	100.20	-0.00	9.30	711	-23	-4
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	100.20	-4.49	7.84	587	352	-2
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	100.20	-8.16	4.77	326	650	4
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	100.20	-9.19	-0.01	-69	742	8
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	100.20	-8.18	-4.76	-466	660	7
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	100.20	-4.62	-8.05	-747	365	5
Dead+Wind 0 deg - Service	31.42	0.01	-21.28	-1682	-4	6
Dead+Wind 30 deg - Service	31.42	9.92	-17.36	-1383	-784	0
Dead+Wind 60 deg - Service	31.42	18.32	-10.72	-856	-1437	-14
Dead+Wind 90 deg - Service	31.42	21.49	-0.05	-21	-1684	-27
Dead+Wind 120 deg - Service	31.42	20.01	11.77	901	-1561	-22
Dead+Wind 150 deg - Service	31.42	10.51	18.46	1461	-843	-12
Dead+Wind 180 deg - Service	31.42	-0.01	20.37	1609	0	-6
Dead+Wind 210 deg - Service	31.42	-9.94	17.44	1357	781	0
Dead+Wind 240 deg - Service	31.42	-19.16	11.29	855	1473	14
Dead+Wind 270 deg - Service	31.42	-21.49	-0.02	-17	1679	27
Dead+Wind 300 deg - Service	31.42	-19.18	-11.20	-903	1517	22
Dead+Wind 330 deg - Service	31.42	-10.49	-18.38	-1486	837	12

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-31.42	0.00	0.00	31.42	0.00	0.000%
2	0.02	-37.71	-34.05	-0.02	37.71	34.05	0.000%
3	0.02	-28.28	-34.05	-0.02	28.28	34.05	0.000%
4	15.88	-37.71	-27.78	-15.88	37.71	27.78	0.000%
5	15.88	-28.28	-27.78	-15.88	28.28	27.78	0.000%
6	29.32	-37.71	-17.15	-29.32	37.71	17.15	0.000%
7	29.32	-28.28	-17.15	-29.32	28.28	17.15	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
8	34.39	-37.71	-0.08	-34.39	37.71	0.08	0.000%
9	34.39	-28.28	-0.08	-34.39	28.28	0.08	0.000%
10	32.02	-37.71	18.83	-32.02	37.71	-18.83	0.000%
11	32.02	-28.28	18.83	-32.02	28.28	-18.83	0.000%
12	16.82	-37.71	29.54	-16.82	37.71	-29.54	0.000%
13	16.82	-28.28	29.54	-16.82	28.28	-29.54	0.000%
14	-0.02	-37.71	32.59	0.02	37.71	-32.59	0.000%
15	-0.02	-28.28	32.59	0.02	28.28	-32.59	0.000%
16	-15.90	-37.71	27.91	15.90	37.71	-27.91	0.000%
17	-15.90	-28.28	27.91	15.90	28.28	-27.91	0.000%
18	-30.66	-37.71	18.06	30.66	37.71	-18.06	0.000%
19	-30.66	-28.28	18.06	30.66	28.28	-18.06	0.000%
20	-34.39	-37.71	-0.03	34.39	37.71	0.03	0.000%
21	-34.39	-28.28	-0.03	34.39	28.28	0.03	0.000%
22	-30.68	-37.71	-17.92	30.68	37.71	17.92	0.000%
23	-30.68	-28.28	-17.92	30.68	28.28	17.92	0.000%
24	-16.79	-37.71	-29.41	16.79	37.71	29.41	0.000%
25	-16.79	-28.28	-29.41	16.79	28.28	29.41	0.000%
26	0.00	-100.20	0.00	0.00	100.20	0.00	0.000%
27	0.00	-100.20	-9.46	-0.00	100.20	9.46	0.000%
28	4.49	-100.20	-7.82	-4.49	100.20	7.82	0.000%
29	8.01	-100.20	-4.66	-8.01	100.20	4.66	0.000%
30	9.19	-100.20	-0.01	-9.19	100.20	0.01	0.000%
31	8.33	-100.20	4.87	-8.33	100.20	-4.87	0.000%
32	4.62	-100.20	8.07	-4.62	100.20	-8.07	0.000%
33	-0.00	-100.20	9.30	0.00	100.20	-9.30	0.000%
34	-4.49	-100.20	7.84	4.49	100.20	-7.84	0.000%
35	-8.16	-100.20	4.77	8.16	100.20	-4.77	0.000%
36	-9.19	-100.20	-0.01	9.19	100.20	0.01	0.000%
37	-8.18	-100.20	-4.76	8.18	100.20	4.76	0.000%
38	-4.62	-100.20	-8.05	4.62	100.20	8.05	0.000%
39	0.01	-31.42	-21.28	-0.01	31.42	21.28	0.000%
40	9.92	-31.42	-17.36	-9.92	31.42	17.36	0.000%
41	18.32	-31.42	-10.72	-18.32	31.42	10.72	0.000%
42	21.49	-31.42	-0.05	-21.49	31.42	0.05	0.000%
43	20.01	-31.42	11.77	-20.01	31.42	-11.77	0.000%
44	10.51	-31.42	18.46	-10.51	31.42	-18.46	0.000%
45	-0.01	-31.42	20.37	0.01	31.42	-20.37	0.000%
46	-9.94	-31.42	17.44	9.94	31.42	-17.44	0.000%
47	-19.16	-31.42	11.29	19.16	31.42	-11.29	0.000%
48	-21.49	-31.42	-0.02	21.49	31.42	0.02	0.000%
49	-19.18	-31.42	-11.20	19.18	31.42	11.20	0.000%
50	-10.49	-31.42	-18.38	10.49	31.42	18.38	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000439
3	Yes	4	0.00000001	0.00000418
4	Yes	4	0.00000001	0.00000268
5	Yes	4	0.00000001	0.00000261
6	Yes	4	0.00000001	0.00000341
7	Yes	4	0.00000001	0.00000350
8	Yes	4	0.00000001	0.00000469
9	Yes	4	0.00000001	0.00000456
10	Yes	4	0.00000001	0.00000656
11	Yes	4	0.00000001	0.00000631
12	Yes	4	0.00000001	0.00000368
13	Yes	4	0.00000001	0.00000361
14	Yes	4	0.00000001	0.00000277
15	Yes	4	0.00000001	0.00000288
16	Yes	4	0.00000001	0.00000266
17	Yes	4	0.00000001	0.00000260

18	Yes	4	0.00000001	0.00000512
19	Yes	4	0.00000001	0.00000489
20	Yes	4	0.00000001	0.00000468
21	Yes	4	0.00000001	0.00000456
22	Yes	4	0.00000001	0.00000463
23	Yes	4	0.00000001	0.00000470
24	Yes	4	0.00000001	0.00000368
25	Yes	4	0.00000001	0.00000360
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000345
28	Yes	4	0.00000001	0.00000344
29	Yes	4	0.00000001	0.00000349
30	Yes	4	0.00000001	0.00000348
31	Yes	4	0.00000001	0.00000344
32	Yes	4	0.00000001	0.00000340
33	Yes	4	0.00000001	0.00000337
34	Yes	4	0.00000001	0.00000330
35	Yes	4	0.00000001	0.00000335
36	Yes	4	0.00000001	0.00000346
37	Yes	4	0.00000001	0.00000354
38	Yes	4	0.00000001	0.00000350
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000119
43	Yes	4	0.00000001	0.00000167
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000132
48	Yes	4	0.00000001	0.00000119
49	Yes	4	0.00000001	0.00000112
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	140 - 120	5.95	43	0.380	0.192
T2	120 - 100	4.35	43	0.338	0.200
T3	100 - 80	3.00	43	0.257	0.184
T4	80 - 60	1.98	43	0.197	0.157
T5	60 - 40	1.18	43	0.140	0.115
T6	40 - 20	0.58	43	0.089	0.071
T7	20 - 0	0.21	43	0.042	0.036

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.00	DS4C06F36D-D	43	5.95	0.380	0.192	70292
137.00	DB854DG65ESX w/ Mount Pipe	43	5.70	0.375	0.194	70292
98.00	HPA-65R-BUU-H6 w/ Mount Pipe	43	2.88	0.250	0.182	12710
83.00	HP4-102	43	2.12	0.205	0.162	24208

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	140 - 120	9.54	10	0.608	0.308
T2	120 - 100	6.97	10	0.541	0.320
T3	100 - 80	4.80	10	0.412	0.295
T4	80 - 60	3.18	10	0.315	0.252
T5	60 - 40	1.89	10	0.225	0.184
T6	40 - 20	0.93	10	0.142	0.113
T7	20 - 0	0.33	10	0.067	0.058

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.00	DS4C06F36D-D	10	9.54	0.608	0.308	43970
137.00	DB854DG65ESX w/ Mount Pipe	10	9.14	0.600	0.311	43970
98.00	HPA-65R-BUU-H6 w/ Mount Pipe	10	4.62	0.400	0.291	7942
83.00	HP4-102	10	3.40	0.328	0.260	15125

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	140	Leg	A325N	1.00	4	6.40	53.01	0.121 ✔	1	Bolt Tension
T2	120	Leg	A325N	1.00	6	10.93	53.01	0.206 ✔	1	Bolt Tension
T3	100	Leg	A325N	1.13	6	16.96	67.10	0.253 ✔	1	Bolt Tension
		Diagonal	A325N	0.75	1	5.38	11.85	0.454 ✔	1	Member Block Shear
T4	80	Leg	A325N	1.13	6	22.52	67.10	0.336 ✔	1	Bolt Tension
		Diagonal	A325N	0.75	1	6.65	10.92	0.609 ✔	1	Member Block Shear
T5	60	Leg	A325N	1.25	6	27.74	82.83	0.335 ✔	1	Bolt Tension
		Diagonal	A325N	0.75	1	7.33	10.92	0.672 ✔	1	Member Block Shear
T6	40	Leg	A325N	1.25	6	32.64	82.83	0.394 ✔	1	Bolt Tension
		Diagonal	A325N	0.75	1	8.08	14.56	0.555 ✔	1	Member Block Shear
T7	20	Diagonal	A325N	0.75	1	8.81	11.94	0.738 ✔	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	140 - 120	1 3/4	20.00	3.21	88.0	2.41	-28.30	61.44	0.461 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	120 - 100	2 1/2	20.00	3.21	61.6 K=1.00	4.91	-69.66	167.37	0.416 [1] ✔
T3	100 - 80	3 1/2	20.03	3.21	44.1 K=1.00	9.62	-110.35	375.66	0.294 [1] ✔
T4	80 - 60	3 3/4	20.03	6.17	79.0 K=1.00	11.04	-147.55	314.76	0.469 [1] ✔
T5	60 - 40	4	20.03	6.17	74.1 K=1.00	12.57	-183.32	378.50	0.484 [1] ✔
T6	40 - 20	4 1/4	20.03	6.17	69.7 K=1.00	14.19	-217.88	447.33	0.487 [1] ✔
T7	20 - 0	4 1/2	20.03	6.17	65.9 K=1.00	15.90	-251.49	521.15	0.483 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	3/4	5.94	2.88	166.1 K=0.90	0.44	-2.90	3.62	0.801 [1] ✔
T2	120 - 100	7/8	5.94	2.85	140.5 K=0.90	0.60	-4.09	6.88	0.594 [1] ✔
T3	100 - 80	L 2 x 2 x 1/4	7.36	3.41	108.5 K=1.04	0.94	-5.20	16.35	0.318 [1] ✔
T4	80 - 60	L 2.5 x 2.5 x 3/16	10.31	4.94	119.9 K=1.00	0.90	-6.47	13.71	0.472 [1] ✔
T5	60 - 40	L 2.5 x 2.5 x 3/16	11.80	5.68	137.6 K=1.00	0.90	-7.14	10.75	0.664 [1] ✔
T6	40 - 20	L 2.5 x 2.5 x 1/4	13.36	6.45	157.7 K=1.00	1.19	-7.81	10.81	0.722 [1] ✔
T7	20 - 0	L 3 x 3 x 3/16	14.98	7.25	145.9 K=1.00	1.09	-8.68	11.56	0.751 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	3/4	5.00	4.85	217.5 K=0.70	0.44	-0.43	2.11	0.206 [1] ✔
T2	120 - 100	KL/R > 200 (C) - 5 7/8	5.00	4.79	184.0 K=0.70	0.60	-1.03	4.01	0.256 [1] ✔

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	3/4	5.00	4.85	217.5 K=0.70	0.44	-1.12	2.11	0.532 [1] ✔
T2	120 - 100	KL/R > 200 (C) - 9 7/8	5.00	4.79	184.0 K=0.70	0.60	-0.10	4.01	0.025 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	1 3/4	20.00	3.21	88.0	2.41	25.59	108.24	0.236 [1] ✔
T2	120 - 100	2 1/2	20.00	3.21	61.6	4.91	65.60	220.89	0.297 [1] ✔
T3	100 - 80	3 1/2	20.03	3.21	44.1	9.62	101.74	432.95	0.235 [1] ✔
T4	80 - 60	3 3/4	20.03	6.17	79.0	11.04	135.13	497.01	0.272 [1] ✔
T5	60 - 40	4	20.03	6.17	74.1	12.57	166.43	565.49	0.294 [1] ✔
T6	40 - 20	4 1/4	20.03	6.17	69.7	14.19	195.86	638.38	0.307 [1] ✔
T7	20 - 0	4 1/2	20.03	6.17	65.9	15.90	223.89	715.69	0.313 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	3/4	5.94	2.88	184.6	0.44	2.88	14.31	0.201 [1] ✔
T2	120 - 100	7/8	5.94	2.85	156.2	0.60	4.04	19.48	0.207 [1] ✔
T3	100 - 80	L 2 x 2 x 1/4	7.36	3.41	70.9	0.54	5.38	23.47	0.229 [1] ✔
T4	80 - 60	L 2.5 x 2.5 x 3/16	10.31	4.94	79.1	0.55	6.65	24.08	0.276 [1] ✔
T5	60 - 40	L 2.5 x 2.5 x 3/16	11.80	5.68	90.4	0.55	7.33	24.08	0.305 [1] ✔
T6	40 - 20	L 2.5 x 2.5 x 1/4	13.36	6.45	103.6	0.73	8.08	31.69	0.255 [1] ✔
T7	20 - 0	L 3 x 3 x 3/16	14.98	7.25	95.0	0.69	8.81	30.20	0.292 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
									✔

[1] $P_u / \phi P_n$ 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	140 - 120	3/4	5.00	4.85	310.7	0.44	0.42	14.31	0.029 [1] ✔
T2	120 - 100	7/8	5.00	4.79	262.9	0.60	1.05	19.48	0.054 [1] ✔

[1] $P_u / \phi P_n$ 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	140 - 120	3/4	5.00	4.85	310.7	0.44	1.12	14.31	0.078 [1] ✔
T2	120 - 100	7/8	5.00	4.79	262.9	0.60	0.03	19.48	0.001 [1] ✔

[1] $P_u / \phi P_n$ controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	140 - 120	Leg	1 3/4	2	-28.30	61.44	46.1	Pass
T2	120 - 100	Leg	2 1/2	47	-69.66	167.37	41.6	Pass
T3	100 - 80	Leg	3 1/2	92	-110.35	375.66	29.4	Pass
T4	80 - 60	Leg	3 3/4	131	-147.55	314.76	46.9	Pass
T5	60 - 40	Leg	4	152	-183.32	378.50	48.4	Pass
T6	40 - 20	Leg	4 1/4	173	-217.88	447.33	48.7	Pass
T7	20 - 0	Leg	4 1/2	194	-251.49	521.15	48.3	Pass
T1	140 - 120	Diagonal	3/4	11	-2.90	3.62	80.1	Pass
T2	120 - 100	Diagonal	7/8	57	-4.09	6.88	59.4	Pass
T3	100 - 80	Diagonal	L 2 x 2 x 1/4	97	-5.20	16.35	31.8 45.4 (b)	Pass
T4	80 - 60	Diagonal	L 2.5 x 2.5 x 3/16	135	-6.47	13.71	47.2 60.9 (b)	Pass
T5	60 - 40	Diagonal	L 2.5 x 2.5 x 3/16	156	-7.14	10.75	66.4 67.2 (b)	Pass
T6	40 - 20	Diagonal	L 2.5 x 2.5 x 1/4	177	-7.81	10.81	72.2	Pass
T7	20 - 0	Diagonal	L 3 x 3 x 3/16	198	-8.68	11.56	75.1	Pass
T1	140 - 120	Top Girt	3/4	5	-0.43	2.11	20.6	Pass
T2	120 - 100	Top Girt	7/8	51	-1.03	4.01	25.6	Pass
T1	140 - 120	Bottom Girt	3/4	9	-1.12	2.11	53.2	Pass
T2	120 - 100	Bottom Girt	7/8	53	-0.10	4.01	2.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
						Summary		
						Leg (T6)	48.7	Pass
						Diagonal (T1)	80.1	Pass
						Top Girt (T2)	25.6	Pass
						Bottom Girt (T1)	53.2	Pass
						Bolt Checks	73.8	Pass
						RATING =	**80.1**	**Pass**

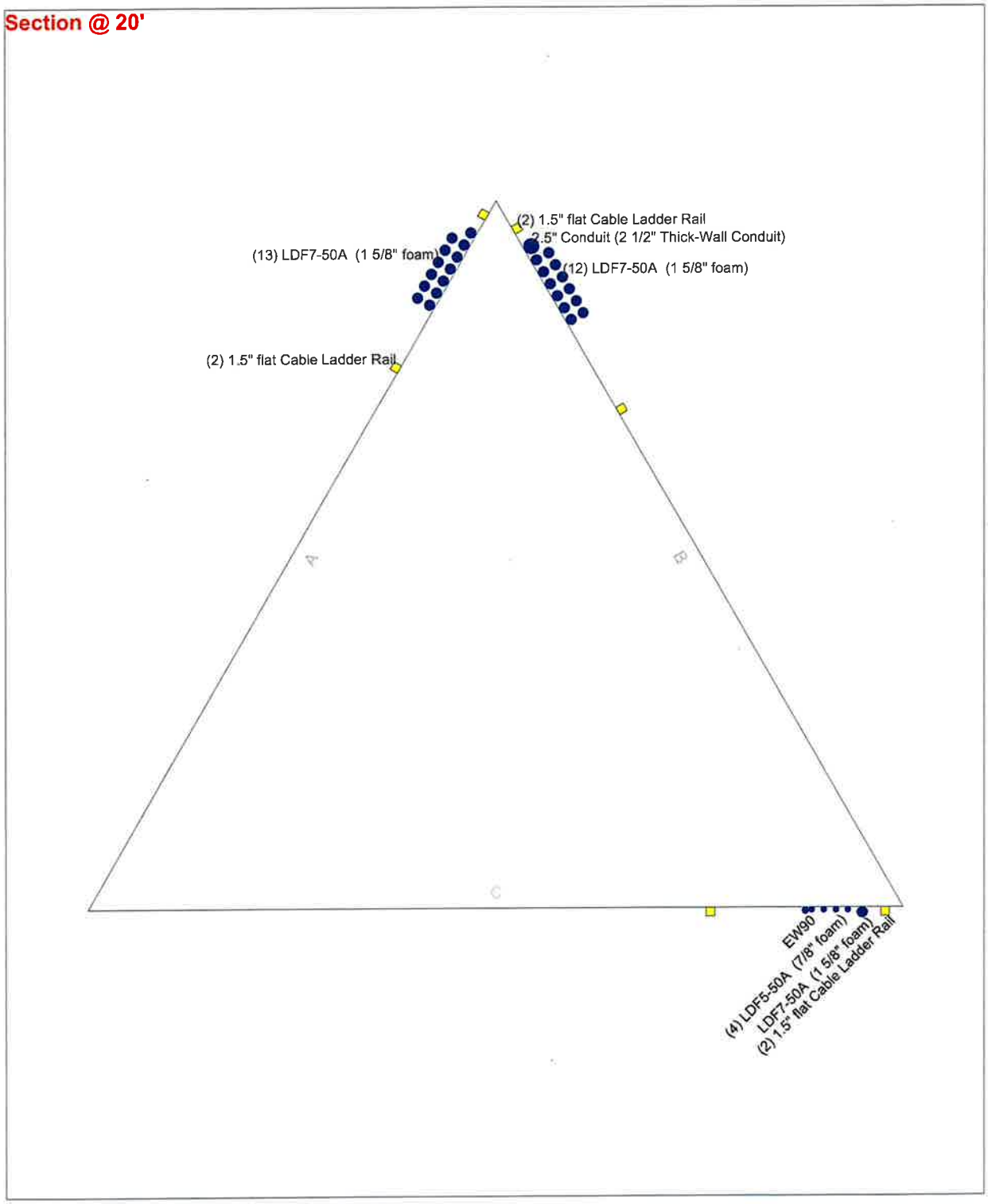
APPENDIX B

BASE LEVEL DRAWING

Feed Line Plan
20'

Round Flat App In Face App Out Face

Section @ 20'



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

Job: Ex. 140' SST Chesire, CT		
Project: PJF #42919-0008.001.8700		
Client: On Air Engineering	Drawn by: kswarts	App'd:
Code: TIA-222-G	Date: 07/11/19	Scale: NTS
Path:		Dwg No. E-7

APPENDIX C

ADDITIONAL CALCULATIONS

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

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

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

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

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

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

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

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

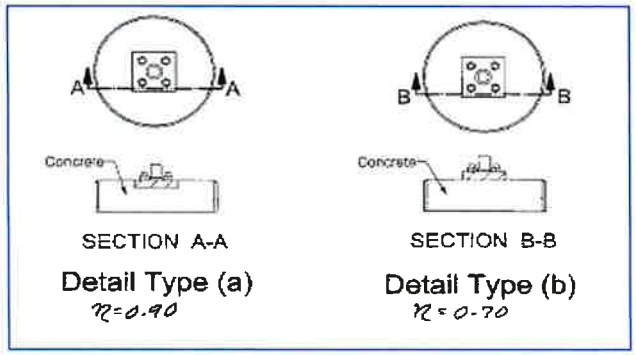
Self-Support Tower Anchor Rod Capacity - TIA-G

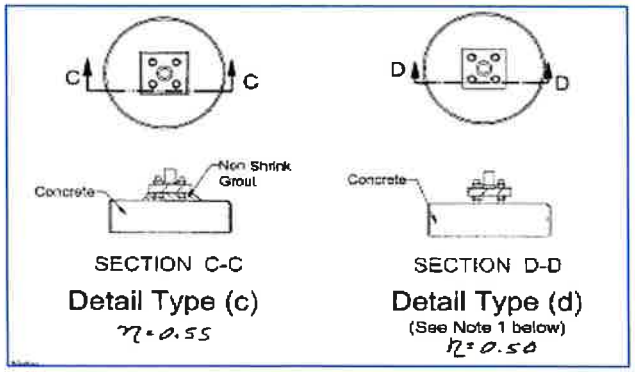
Loads

Compression :	251	kips	Tension :	223	kips	Code:	TIA-G
Comp. Shear :	22	kips	Ten.Shear :	21	kips	Maximum Ratio:	1.00

Existing Anchor Rods

Anchor Rod Condition (n) :	0.5				
Anchor Rod ø :	1 1/4	in	l_{ar} :	0	inches
Anchor Rod Quantity :	6		Comp. M_u :	0.00	k-in
Anchor Rod Grade :	A449 (1-1/8 to 1-1/2 Incl.)				
F_y :	81	ksi			
F_u :	105	ksi			
Threads per Inch	7				
Net Tensile Area	0.97	in^2			
ϕ_t :	0.80				
$\phi_t R_{nt}$:	488.43	kip			
Anchor Rod Ratio :	0.604				

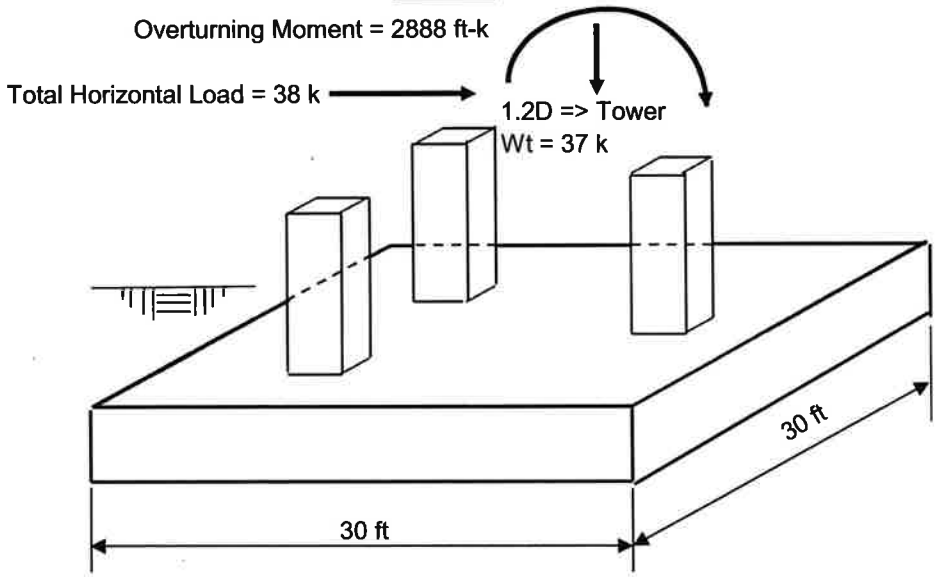


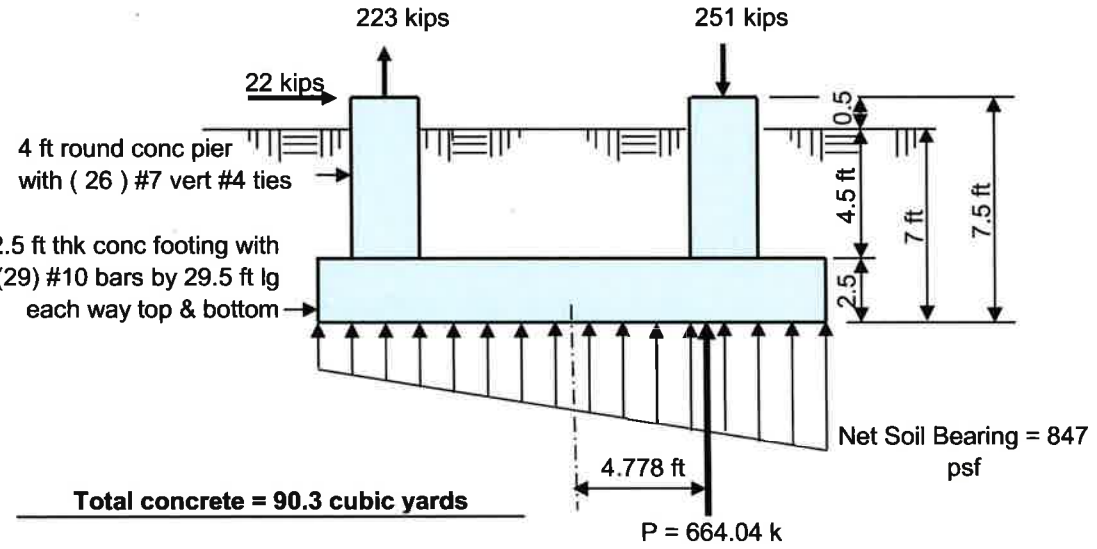


PJF job no. **42919-0008.001** Project name **Cheshire North 2**

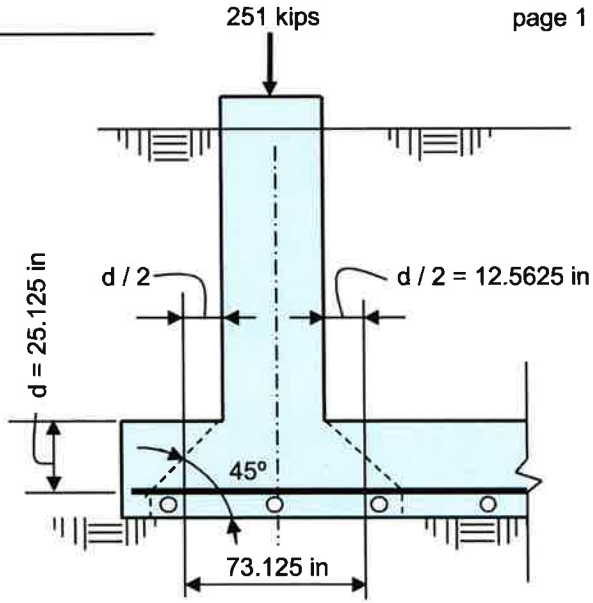
Combined Footing Foundation

Concrete strength F'c =	4	(ksi)
Rebar Strength Fy =	60	(ksi)
Soil Density =	120	(pcf)
Depth to Water Table =	1.5	(ft)
minimum cover over vert rebar =	3	inches





Total concrete = 90.3 cubic yards



Ftg Overturning Resistance = 7470.5 ft-kips
Total Overturning Moment = 3173 ft-kips
Required Overturning Safety Factor = 1
Overturning Safety Factor = 2.35
Ratio = 0.42 OK

Maximum Net Soil Bearing = 1.153 ksf
Ultimate Net Soil Bearing = 4.5 ksf
Soil Bearing Stress Ratio = 0.26 OK

Ult Punching Shear Capacity = 253 psi
Ult Punching Shear Force = 52 psi
Punching Shear Stress Ratio = 0.2 OK

Pad Bending Moment Capacity= 4014 ft-k
Pad Bending Moment = 746 ft-k
Bending Moment Stress Ratio = 0.19 OK

Pier Rebar Capacity = -842.4 kips
Pier Rebar Required = -223 kips
Pier Rebar Stress Ratio = 0.26 OK

Pad Bending Shear Capacity= 858 ft-k
Pad Bending Shear = 123 ft-k
Bending Shear Stress Ratio = 0.14 OK

BSAMNT-SBS-2-2

Side-By-Side Mounting Kit to mount two antennas on a pipe with 2.375 - 4.5 inch (60 – 115 mm) diameter

- 4x4 MIMO capability at both UMTS and LTE band for faster data throughput
- Ensures consistent distance between the antennas for each site (2 inches / 50mm)
- Forces both antennas to point to the same boresight direction

General Specifications

Application	Outdoor
Includes	Brackets | Hardware
Package Quantity	1

Mechanical Specifications

Color	Silver
Material Type	Galvanized steel

Dimensions

Compatible Diameter, maximum	115.0 mm | 4.5 in
Compatible Diameter, minimum	60.0 mm | 2.4 in
Net Weight	30.6 kg | 67.4 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)

JAHH-65B-R3B

8-port sector antenna, 2x 698–787, 2x 824–894 and 4x 1695–2360 MHz, 65° HPBW, 3x RET and low bands have diplexers. Internal SBT's on first LB (Port 1) and first HB(Port 5).

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

Electrical Specifications

Frequency Band, MHz	**698–787**	**824–894**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain, dBi	14.5	15.8	18.0	18.4	18.5	18.8
Beamwidth, Horizontal, degrees	67	65	63	63	65	68
Beamwidth, Vertical, degrees	12.4	10.5	5.7	5.2	4.9	4.4
Beam Tilt, degrees	2–14	2–14	0–10	0–10	0–10	0–10
USLS (First Lobe), dB	18	18	20	20	21	23
Front-to-Back Ratio at 180°, dB	32	34	31	35	36	38
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	200	200	300	300	300	250
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

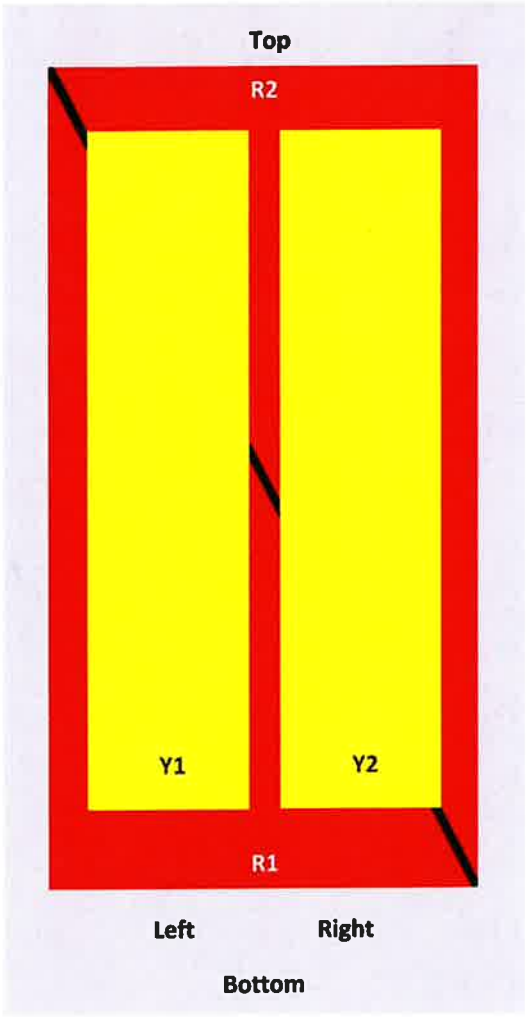
Electrical Specifications, BASTA*

Frequency Band, MHz	**698–787**	**824–894**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain by all Beam Tilts, average, dBi	14.3	14.9	17.6	18.1	18.2	18.5
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.5	±0.6	±0.4	±0.5	±0.6
Gain by Beam Tilt, average, dBi	2 ° | 14.3 8 ° | 14.3 14 ° | 14.3	2 ° | 15.0 8 ° | 14.9 14 ° | 15.4	0 ° | 17.2 5 ° | 17.6 10 ° | 17.6	0 ° | 17.6 5 ° | 18.2 10 ° | 18.2	0 ° | 17.7 5 ° | 18.3 10 ° | 18.3	0 ° | 17.9 5 ° | 18.7 10 ° | 18.7
Beamwidth, Horizontal Tolerance, degrees	±1.2	±1.4	±4	±2.4	±2.9	±2.7
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.5	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	18	17	17	18	19	18
Front-to-Back Total Power at 180° ± 30°, dB	25	24	26	29	27	29
CPR at Boresight, dB	22	23	20	21	21	24
CPR at Sector, dB	11	12	11	11	11	8

* 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

JAHH-65A-R3B JAHH-65B-R3B JAHH-65C-R3B



Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-798	1-2	1	ANxxxxxxxxxxxxxxxx1
R2	824-894	3-4	2	ANxxxxxxxxxxxxxxxx2
Y1	1695-2360	5-6	3	ANxxxxxxxxxxxxxxxx3
Y2	1695-2360	7-8		

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 – 787 MHz | 824 – 894 MHz

JAHH-65B-R3B

Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage | Wind loading figures are validated by wind tunnel measurements described in white paper WP-112534-EN

Mechanical Specifications

RF Connector Quantity, total	8
RF Connector Quantity, low band	4
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Color	Light gray
Grounding Type	RF connector body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	301.0 N @ 150 km/h 67.7 lbf @ 150 km/h
Wind Loading, lateral	254.0 N @ 150 km/h 57.1 lbf @ 150 km/h
Wind Loading, maximum	638.0 N @ 150 km/h 143.4 lbf @ 150 km/h
Effective Projected Area (EPA), frontal	0.28 m^2 | 3.01 ft^2
Effective Projected Area (EPA), lateral	0.24 m^2 | 2.58 ft^2
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1828.0 mm | 72.0 in
Width	350.0 mm | 13.8 in
Depth	208.0 mm | 8.2 in
Net Weight, without mounting kit	28.7 kg | 63.3 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 5
Internal RET	High band (1) | Low band (2)
Power Consumption, idle state, maximum	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

JAHH-65B-R3B

RET Interface, quantity	2 female | 2 male

Packed Dimensions

Length	1975.0 mm | 77.8 in
Width	456.0 mm | 18.0 in
Depth	357.0 mm | 14.1 in
Shipping Weight	42.0 kg | 92.6 lb

Regulatory Compliance/Certifications

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

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

PRODUCT DATASHEET

FDJ85020Q7-S1

RADIO FREQUENCY SYSTEMS
The Clear Choice®

ShareLite™ 555-806/824-960 MHz Diplexer with Auto DC Sense, Quad configuration, 7/16 Connectors

The FDJ8 Series of diplexers are designed to enable feeder sharing between systems in the 555-806 MHz range and in the 824-960 MHz range. RFS's innovative cavity filter design provides a very low insertion loss of 0.2dB typical while keeping the product extremely compact and lightweight. The usage of highly selective filters also guarantees a high isolation level of 50dB between ports, to ensure an interference-free environment for any technology deployed. The filter design also comprises of lightning protection for additional reliabiltiy. Designed to withstand the most severe outdoor environments, it also features an IP67 class pretection with a vented enclosure to avoid any possible effects of condensation and pressure instability, thus providing a long lasting, extremely reliable solution to any network.

FEATURES / BENEFITS

- Quad unit for 4x4 MIMO use
- Auto DC Sense to prevent installation mistakes and eliminate the need for DC stops
- Extremely Low Insertion Loss
- High level of Rejection between bands - Protection against interference
- Extremely High Power Handling Capability
- Very compact & small size design - Easy installation and reduced tower load
- Exceptional reliability & environmental protection (IP-67)
- Mounting hardware for Wall and Pole mount provided

Technical Features

GENERAL SPECIFICATIONS			
Product Type		Diplexer/Cross Band Combiner	
Application		600MHz, LTE700, Cellular 800, GSM900	
Configuration		Dual indoor/outdoor	
ELECTRICAL SPECIFICATIONS			
Branch		1	2
Frequency Range	MHz	555-806	824-960
Impedance	Ohms	50.0	50.0
Frequency Band		600MHz, LTE700	Cellular 800, GSM900
Insertion Loss	dB	20 typ.	20 typ.
Group Delay Variation	ns	0.0	0.0
Group delay	ns	<7 typ., 40 max	<9 typ., 35 max
Rejection between bands	dB	50	50
PIM at Common Port	dBm (dBc)	-118 (-161) @2x43 typ.	-118 (-161) @2x43 typ.

TESTING AND ENVIRONMENTAL		
Temperature Range	°C (°F)	-40 to 65 (-40 to 149)
Ingress Protection		IP 67
Environmental		ETSI 300-019-2-4 Class 4.1E
Lightning Protection		EN/IEC61000-4-5 Level 4
MECHANICAL SPECIFICATIONS		
RF Connectors		7/16 Female; 8 ports in, 4 ports out
Weight	kg (lb)	10.7 (23.6)
Dimensions, H x W x D	mm (in)	172 x 429 x 159 (6.8 x 16.9 x 6.3)
Mounting		Wall Mounting: With 4 screws (maximum 6mm diameter) Pole Mounting: With included clamp set 40-110mm (1.57-4.33")

Document Links

Notes

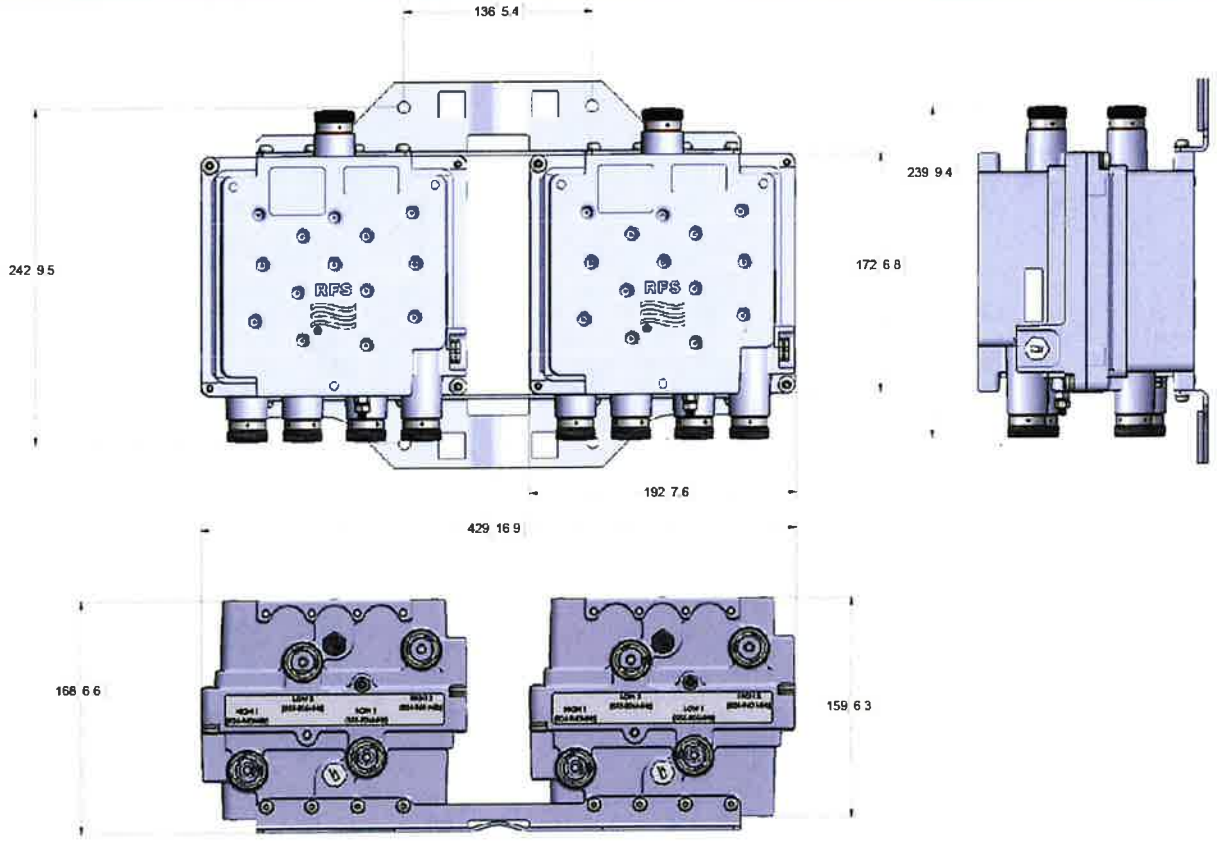
External Link Reference

FDJ85020 SELECTION GUIDE:

Configuration	Model Number	Connector Type	Auto DC Sense
Dual	FDJ85020D4-S1	4.3-10	X
Dual	FDJ85020D7-S1	7/16	X
Quad	FDJ85020Q4-S1	4.3-10	X
Quad	FDJ85020Q7-S1	7/16	X

RADIO FREQUENCY SYSTEMS
The Clear Choice

ShareLite™ 555-806/824-960 MHz Diplexer with Auto DC Sense, Quad configuration, 7/16 Connectors



RADIO FREQUENCY SYSTEMS
The Clear Choice®

ShareLite™ 555-806/824-960 MHz Diplexer with Auto DC Sense, Quad configuration, 7/16 Connectors

Diplexer Auto DC Sense

FDJ85020D4-S1 and FDJ85020D4-S1A Models ONLY

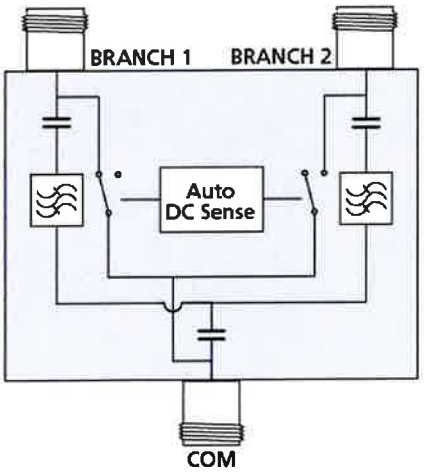
	Branch 1 555-806 MHz	Branch 2 824-960 MHz
Priority 1 (Highest)	X	
Priority 2 (Lowest)		X

In case of more than one port supplying DC/AISG signal:

- Higher Priority will automatically bypass to/from the COM port
- Lower Priority will not pass
- DC-Block Jumper can be used if DC Should not be passed per logic above

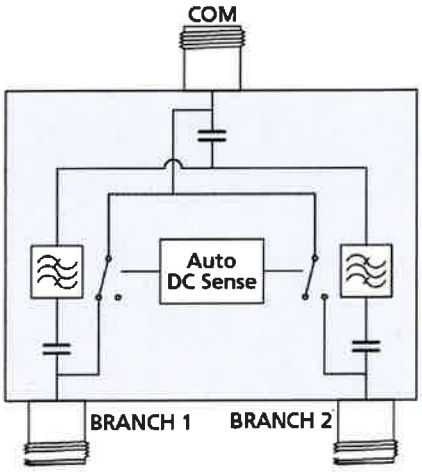
Diplexer Mode (Near Antenna)

- DC Blocks provide a DC open circuit, will not pass DC/AISG
- Antennas connected without a Bias-T provide a DC short circuit, will not pass DC/AISG
- To turn on port after it has been shut off due to short, reset unit by cycling the power



Standard Priority for Diplexer Mode

Combiner Mode (Near BTS)



Standard Priority for Combiner Mode

DATA SHEET

DC Surge Protection for RRH/Integrated Antenna Radio Head

RVZDC-6627-PF-48

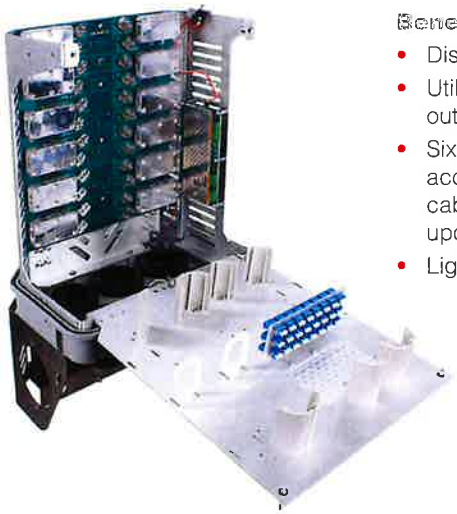
Tower / Base / Rooftop

Raycap's flexible Tower, Base Stations and Rooftop protection and Distribution products provide protection for up to 12 Remote Radio Heads/Integrated Antennas. The solutions mitigate the risk of damage due to lightning and provide high levels of availability and reliability to radio equipment.

Mounting Bracket Included

Features

- Designed for distribution to 12 RRH circuits, DC power and fiber optics.
- Alarms for moisture detection and intrusion
- Digital Voltmeter with twelve (12) position switch to monitor each DC circuit
- Power alarms for wiring anomalies and power disruptions
- Employs the Strikesorb® 30-V1-2CHV Surge Protective Device (SPD) specifically designed for the Remote Radio Head (RRH) installation environment and certified for use in DC applications and at low DC operating voltages (48V)
- The Strikesorb 30-V1-2CHV is a Class I SPD certified by VDE per the IEC 61643-11 standard as suitable for installation in areas where direct lightning exposure is expected. Strikesorb 30-V1-2CHV is able to withstand direct lightning currents of up to 5kA (10/350) and induced surge currents of up to 60kA (8/20)
- Provides very low let through / clamping voltage - unique for a Class I product - as it does not employ spark gaps or other switching elements. Strikesorb offers unique protection levels to the RRH equipment as well as the Base Band Units
- RS485 communication link uses two (2) twisted pair (+ground) wires per hybrid cable, and communicates all voltage, boost system and alarm data
- Patent pending design



Benefits

- Distributes DC up to 12 Remote Radio Heads and connects up to 24 LC fiber pairs
- Utilizes an IP 67 rated enclosure, also rated to NEBS and UL, allowing for indoor or outdoor installation on a roof or tower top
- Six total cable ports for cable access with custom configurable UL rated glands that accommodate varying diameters of hybrid (combined power and fiber optic) or standard cables with diameters up to 2" (will fit most standard 1⅝" coax class cables), depending upon port configuration
- Lightweight aerodynamic design provides maximum flexibility for tower top installation

Strikesorb 30-V1-2CHV

Raycap

www.raycap.com

SPECIFICATIONS

DC Surge Protection for RRH/Integrated Antenna Radio Head

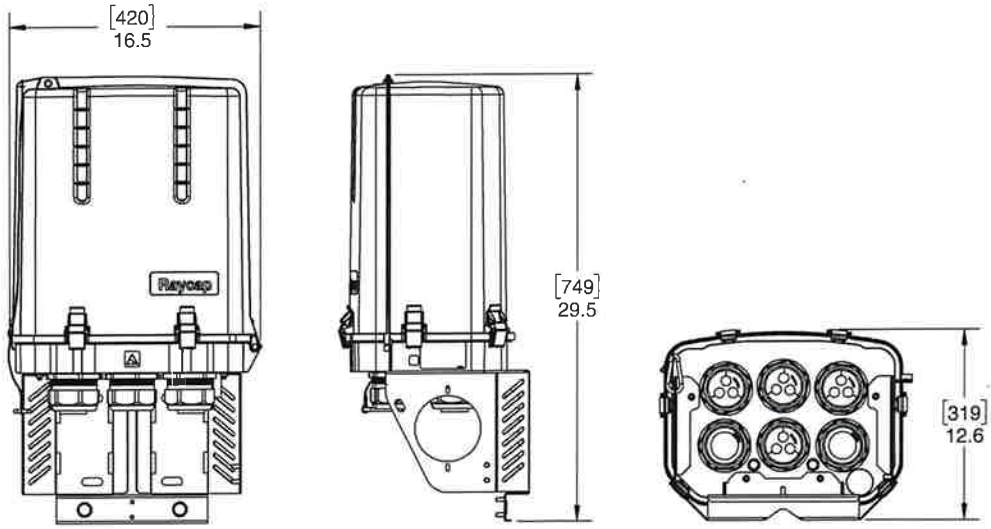
RVZDC-6627-PF-48

Tower / Base / Rooftop

Electrical	
Model Numbers	**RVZDC-6627-PF-48**
Nominal Operating Voltage	48 VDC
Nominal Discharge Current [I_n]	20kA 8/20 µs
Maximum Surge Current [I_{max}]	60kA 8/20 µs
Maximum Impulse (Lightning) Current per IEC 61643-11	5 kA 10/350 µs
Maximum Continuous Operating Voltage [U_c]	75 VDC
Voltage Protection Rating (VPR) per UL 1449 4th Edition	400V
Protection Class as per IEC 61643-11	Class I
Power Alarm	cross polarity, short circuit, or power outage
Intrusion Sensor	microswitch
Moisture Sensor	infrared moisture detector
Strikesorb Module Type	30-V1-2CHV Strikesorb modules installed to protect 12 Remote Radio Heads
Power Boost Ready	RS485 twisted pair connection available
Mechanical	
Suppression Connection Method	Compression lug, #14 - #2 AWG (2 mm² - 33 mm²)
Fiber Connection Method	LC-LC Single mode
Pressure Equalizing Vent	Gore™ Vent
Environmental Rating	IP 67
Operating Temperature	-40° C to +80° C
UV Resistant	Yes
Dimensions (L x W x H)	12.6" x 16.5" x 29.5" [319mm x 420mm 749mm]
Weight	System: 32 lbs (14.51 kg)
Combined Wind Loading	150mph (sustained): 185 lbs (823 N)
Standards Compliance	
Strikesorb modules are compliant to the following Surge Protective Device (SPD) Standards	
Standards	UL 1449 4th Edition, IEC 61643-11:2011, EN 61643-11:2012, IEEE C62.11, IEEE C62.41.2, IEEE C62.45 NEBS certified to: GR-63-CORE Issue 4, GR-1089-CORE Issue 6, GR-3108-CORE Issue 3, GR-487-CORE Issue 4, GR-950-CORE Issue 1

Product Diagram

[mm]
inches



AWG=American Wire Gauge

Raycap

www.raycap.com

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

PJF PAUL J. FORD & COMPANY

Report Date:	May 20, 2019
Client:	On Air Engineering, LLC 88 Foundry Pond Road Cold Spring, NY 10516 Attn: David Weinpahl, P.E. (201) 456-4624
Structure:	Existing 140-ft Self Support Tower
Verizon Site Name:	Cheshire North 2 CT
Mount Type:	(3) 12.5 Foot Sector Frames
Site Address:	705 West Johnson Ave
City, County, State:	Cheshire, New Haven County, CT
Latitude, Longitude:	41.555847, -72.917208
PJF Project:	A42919-0008.003.8191

Paul J. Ford and Company is pleased to submit this "**Mount Structural Modification 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:	135 mph 3-second gust wind speed without ice
Nominal Wind Speed:	105 mph 3-second gust wind speed without ice
Ice Wind Speed:	50 mph 3-second gust wind speed with 0.75" ice
IBC Site Criteria:	Risk Category III, Topographic Category 1, Exposure Category C

Summary of Analysis Results:

Antenna Mount:	**94.1%**	**SUFFICIENT***

***Sufficient upon completion of the modifications 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, EI
Structural Designer
asage@pauljford.com

D.S.

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

MAY 21 2019

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

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

TABLE OF CONTENTS

1) INTRODUCTION

The existing mounts under consideration are (3) 12.5 Foot Sector Frames installed at the 137' elevation on a 140' Self Support tower. The existing mounts were estimated based on photos and models of previously analyzed mounts of similar type.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2018 Connecticut State Building based upon an ultimate 3-second gust wind speed of 135 mph converted to a nominal 3-second gust wind speed of 105 mph per section 1609.3.1 as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. and 50 mph with 0.75 inch ice thickness. Risk Category III, Exposure Category C and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1.00 were used in this analysis.

In addition, the mounts have been analyzed for various live loading conditions consisting of a 250-pound man live load applied individually at the midpoint and cantilevered ends of horizontal members as well as a 250-pound man live 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
137	138 +/-	1	Raycap	RVZDC-6627-PF-48	Proposed	Tower Mounted
		6	Andrew	JAHH-65B-R3B		(3) 12.5' Sector Frames
		3	Commscope	BSAMNT-SBS-2-2		
		3	RFS Celwave	FDJ85020Q4-S1		
		3	Samsung	B2/B66A RRH-BR049		
		3	Samsung	B5/B13 RRH-BR04C		
		3	DB-Products	DB854DG65ESX	Existing	
		3	Antel	BXA-70063-6CF-750MHZ	Equipment to be removed	
		6	Antel	LPA-185080-12CF-2		

3) ANALYSIS PROCEDURE

Table 2 – Documents Provided

Document	Remarks	Reference	Source
Site Photos	Dated 04/29/2019	-	On Air
Construction Drawings	Verizon, 05/01/2019	CHESHIRE NORTH 2 CT	On Air
Radio Frequency Data Sheet	Verizon, 04/30/2019	785843	On Air

3.1) Analysis Method

RISA-3D (version 15.0.4), 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.

3.2) Assumptions

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

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	52.6	Pass
1, 2	Face Horizontal	75.6	Pass
1, 2	Standoff Members	94.1	Pass
1, 2	Kick-Brace	44.6	Pass
1, 2	Bracing Members	59.7	Pass
1, 2	Tie Back	47.4	Pass
1, 2	Mount to Tower Connection (bolts/welds)	12.3	Pass
Mount Rating (max from all components) =			**94.1%**

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

- Rotate Beta sector frame to match antenna azimuths prior to installation of modification kit and proposed loading.
- Install SitePro1 SFS-V-L Sector Frame Stabilizer Kits or EOR approved equivalent on existing 2.5STD (2.875" O.D x 0.203") horizontal pipe face. Refer to "Appendix D – Supplemental Modification Information" for additional information and clarification. If the assumed member is smaller than what is specified, contractor shall notify EOR immediately.
- Replace existing mount pipes with 8-ft long, P2.5 STD (2.88" O.D. x 0.189") mount pipes where required. See Appendix A/D for details.

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

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

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

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

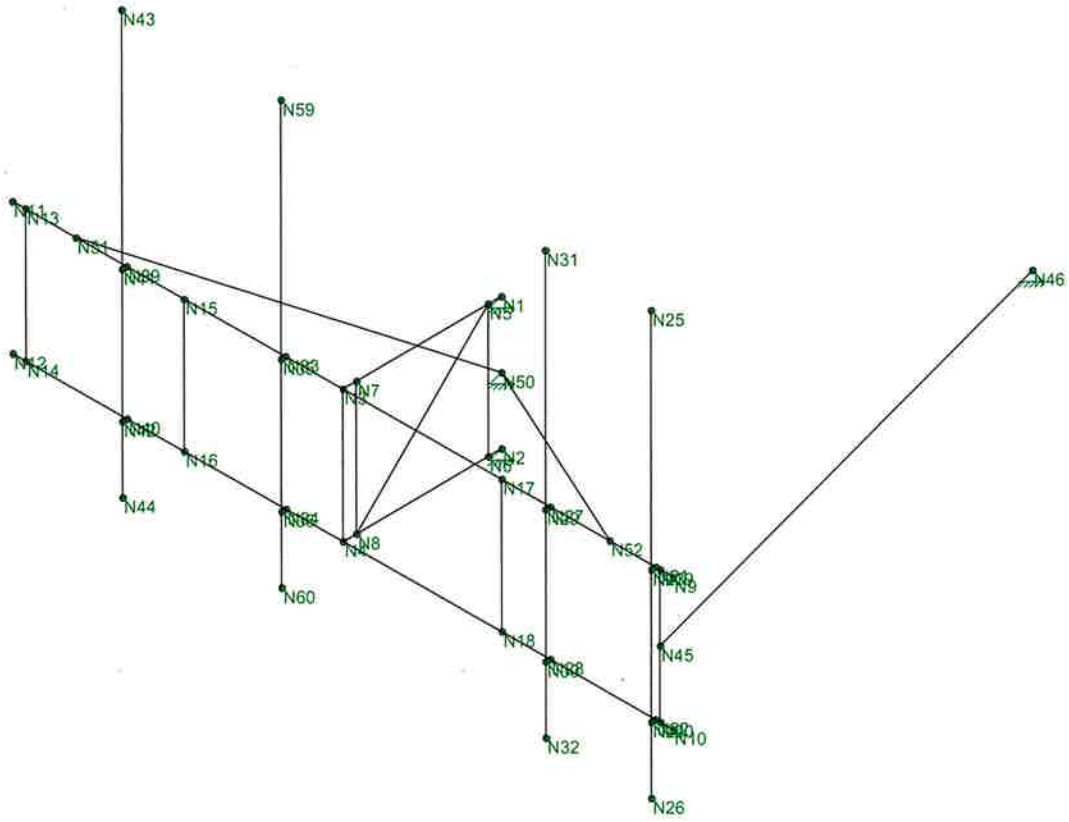
4) The standard of care for all Professional Engineering Services performed or furnished by Paul J. Ford and Company under this project will be the skill and care used by members of the Consultant's profession practicing under similar circumstances at the same time and in the same locality.

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

****

APPENDIX A

WIRE FRAME AND RENDERED MODELS



Envelope Only Solution

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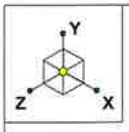
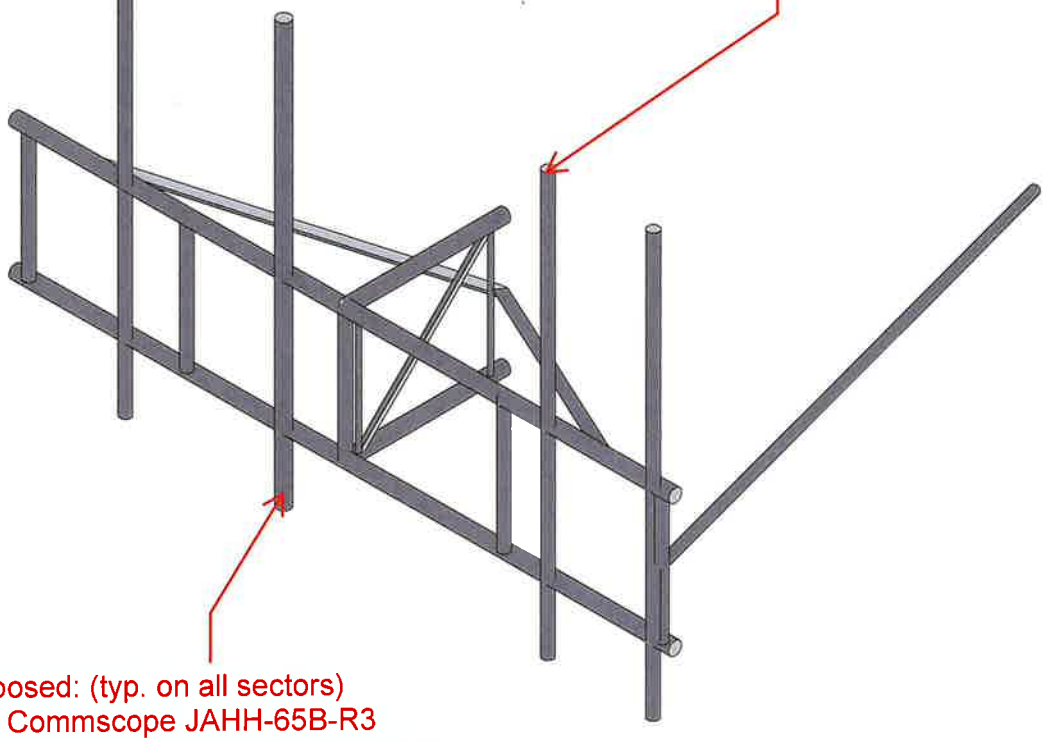


Proposed: (typ. on all sectors)
- (1) Samsung B2/B66A RRH-BR049

Proposed: (typ. on all sectors)
- (1) Samsung B5/B13 RRH-BR04C
- (1) RFS Celwave FDJ85020Q4-S1



Proposed: (typ. on all sectors)
- (2) Commscope JAHH-65B-R3
- (1) Commscope BSAMNT-SBS-2-2
installed on proposed 8-ft long P2.5STD mount pipe

Envelope Only Solution

Paul J. Ford and Company	On Air- Cheshire North 2 CT	SK - 2
AMS		May 21, 2019 at 2:55 PM
42919-0008.003.8191		42919-0008_Wind.r3d

APPENDIX B

SOFTWARE INPUT CALCULATIONS

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

Project # 42919-0008.003.8191
By AMS

Analysis 30 degrees

Date: 05/20/19

v4.2, Effective 4/18/19

Mount Loading per TIA-222-G-2

Structure & Wind Speed

Structure Type =	Mount	
Mount Type =	1 Sector	
Mount Centerline, z =	138	ft
Centerline Y Coordinate =	0	in
Wind Speed =	105	mph
Service Wind Speed =	30	mph
Const. Duration =		
Non-Op Wind Speed =	#N/A	mph
Op Wind Speed =	30	mph
Ice Wind Speed =	50	mph
Ice Thickness =	0.75	in

Topo

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

Velocity Pressure Coefficients

z_g =	900	ft	
a =	9.50		
K_{zmin} =	0.85		
K_z =	1.35		Calculated Value
K_z =	1.35		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 =	1.15		Table 2-3
q_z =	41.76	psf	Section 2.6.9.6

Ice Loading

Ii =	1.25		Table 2-3
Iwi =	1.00		Table 2-3
q_z =	8.23	psf	Section 2.6.9.6
K_{iz} =	1.15		Section 2.6.8
T_{iz} =	2.16	in	Section 2.6.8
h =	0.00	in	Bar Grating Height
W_i =	10.10	psf	Grating Ice Weight

Wind Pressures

Pressure =	41.763	psf
Ice Pressure =	8.235	psf

Antennas

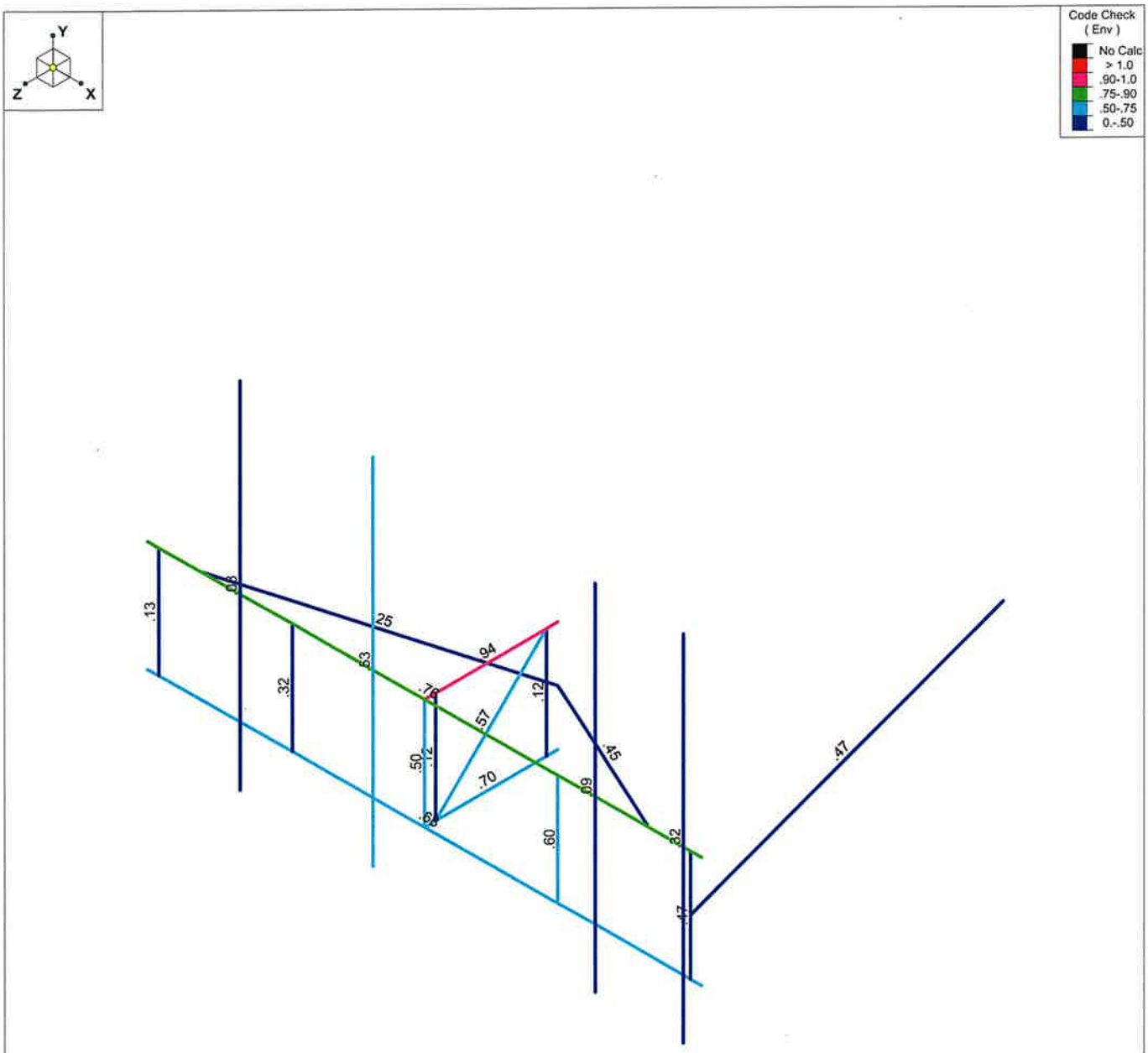
Item	Status	Manufacturer	Antenna	Height (in)	Width (in)	Depth (in)	Flat or Round	Weight (lbs)	Sector / Face	Position	Assumed Spacing (in)	Override Spacing (in)	Max Equip C/L (ft)	Min Equip C/L (ft)	Equip C/L (ft)	Top Location (in)	Bottom Location (in)	Overrride Top Location (in)	Override Bottom Location (in)
1		COMMSCOPE	(2) JAHH-65B-R3B W/ BSAMNT-SBS-2-2	72	27.6	8.2	Flat	194	C	3	66.00		140.75	138.25	139.5	51.00	-15.00		
2		SAMSUNG TELECOMMUNICATIONS	B5/B13 RRH-BR04C (RFV01U-D2A)	15	15	8.1	Flat	70.3	C	2	9.00		143.13	135.88	138	4.50	-4.50		
3		SAMSUNG TELECOMMUNICATIONS	B2/B66A RRH-BR049 (RFV01U-D1A)	15	15	10	Flat	84.4	C	4	9.00		143.13	135.88	138	4.50	-4.50		
4		RFS CELWAVE	FDJ85020Q4-S1	6.8	16.9	6.3	Flat	23.6	C	3	0.80		143.47	135.53	138	0.40	-0.40		
5		DECIBEL	DB854DG65ESX	48	12.6	5.7	Flat	18.5	C	1	42.00		141.75	137.25	139.5	39.00	-3.00		

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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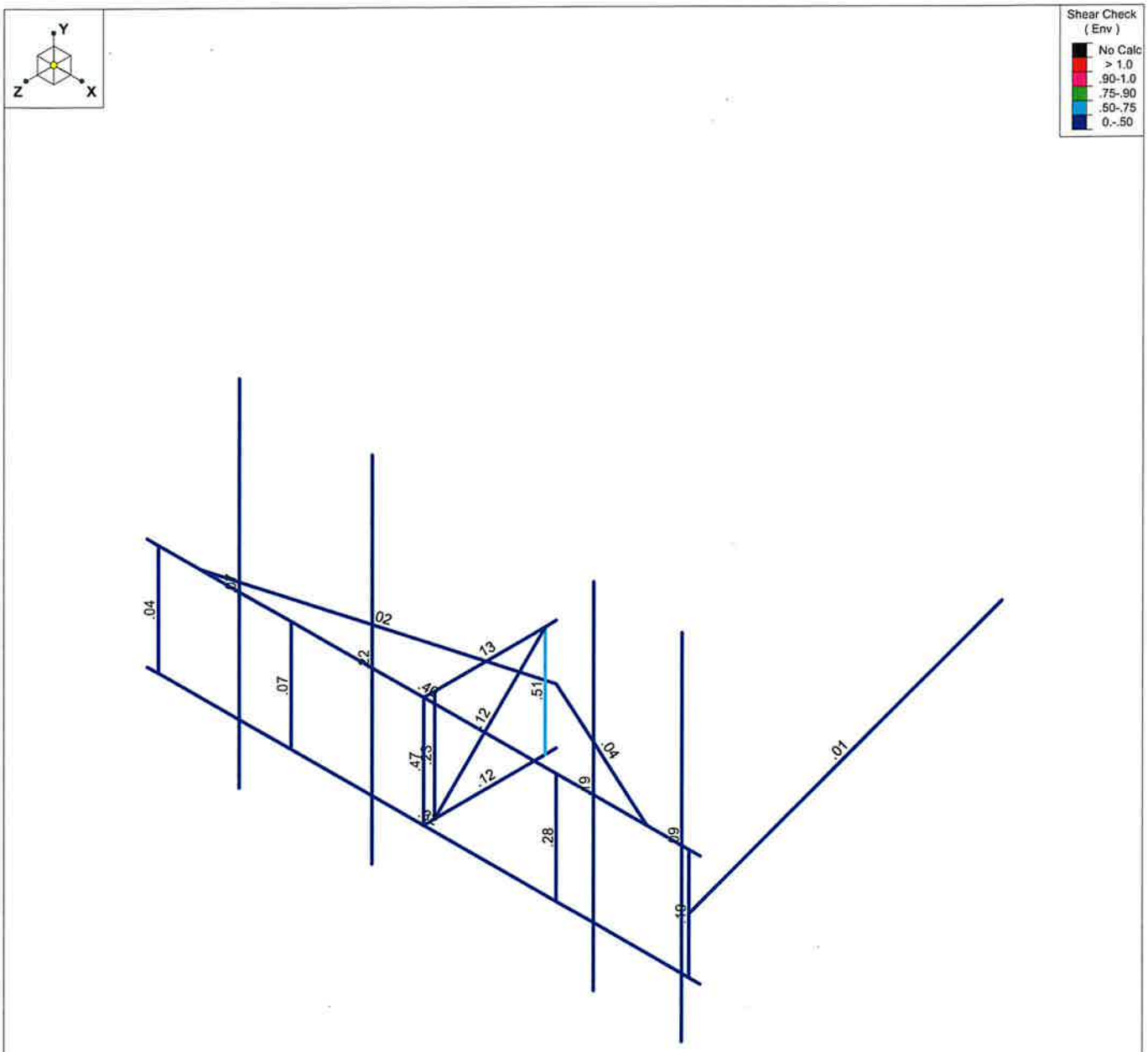

Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

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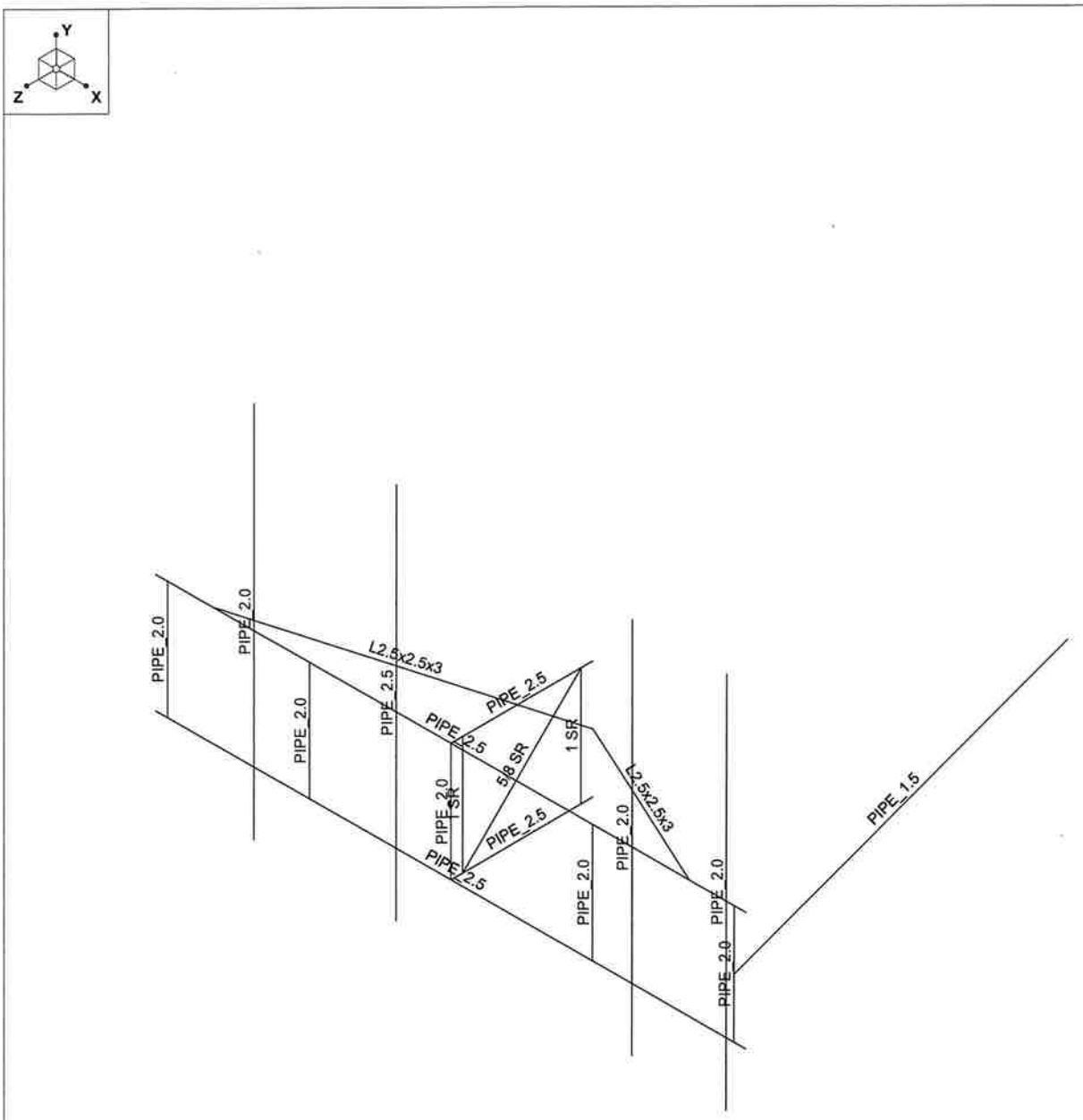

Envelope Only Solution

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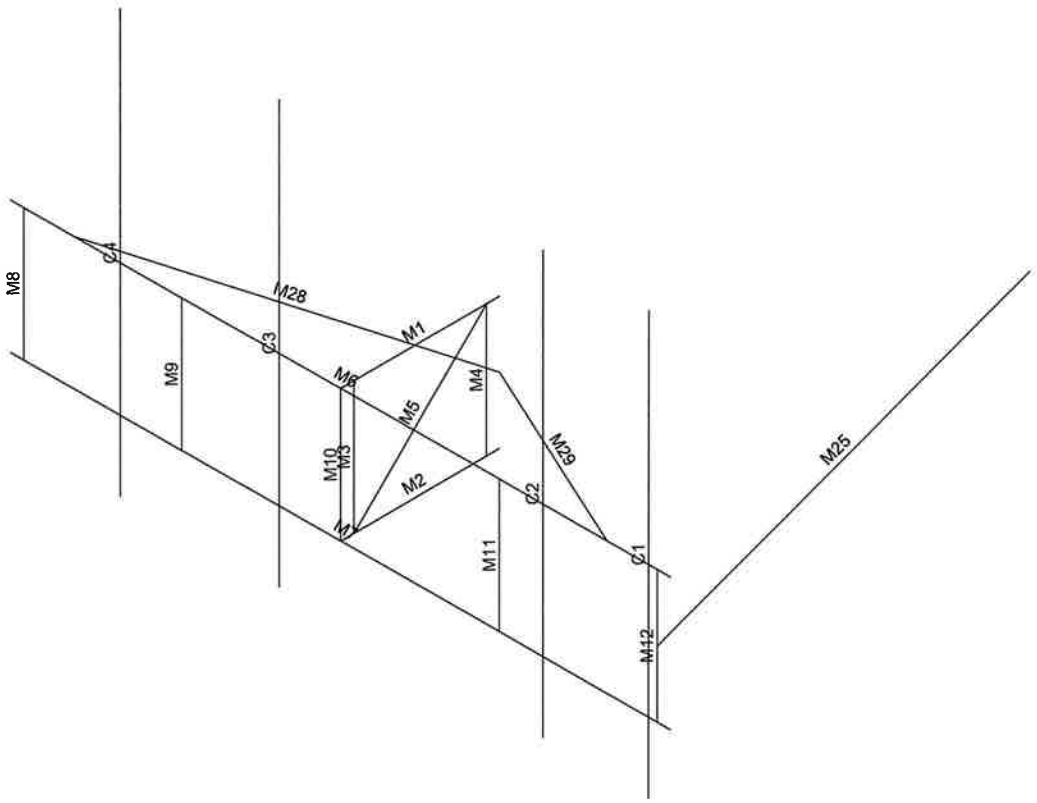

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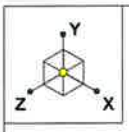

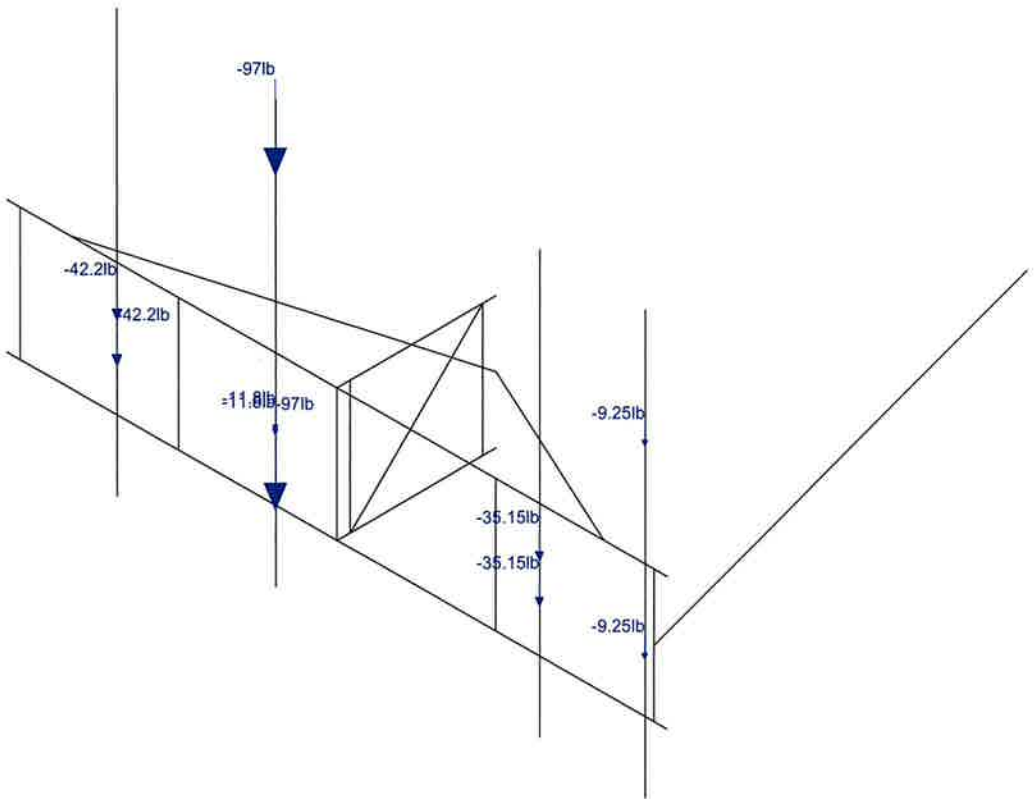

Loads: BLC 1, Dead
Envelope Only Solution

Paul J. Ford and Company	On Air- Cheshire North 2 CT	SK - 7
AMS		May 20, 2019 at 11:45 AM
42919-0008.003.8191		42919-0008_Wind.r3d

(Global) Model Settings

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

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

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

(Global) Model Settings, Continued

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

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(de...	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N3			PIPE_2.5	None	None	A53 Gr.B	Typical
2	M2	N2	N4			PIPE_2.5	None	None	A53 Gr.B	Typical
3	M3	N7	N8			1 SR	None	None	A36 Gr.36	Typical
4	M4	N5	N6			1 SR	None	None	A36 Gr.36	Typical
5	M5	N5	N8			5/8 SR	None	None	A36 Gr.36	Typical
6	M6	N11	N9			PIPE_2.5	None	None	A53 Gr.B	Typical
7	M7	N12	N10			PIPE_2.5	None	None	A53 Gr.B	Typical
8	M8	N14	N13			PIPE_2.0	None	None	A53 Gr.B	Typical
9	M9	N16	N15			PIPE_2.0	None	None	A53 Gr.B	Typical
10	M10	N4	N3			PIPE_2.0	None	None	A53 Gr.B	Typical
11	M11	N18	N17			PIPE_2.0	None	None	A53 Gr.B	Typical
12	M12	N20	N19			PIPE_2.0	None	None	A53 Gr.B	Typical
13	M13	N23	N21			RIGID	None	None	RIGID	Typical
14	M14	N24	N22			RIGID	None	None	RIGID	Typical
15	C1	N26	N25			PIPE_2.0	None	None	A53 Gr.B	Typical
16	M16	N29	N27			RIGID	None	None	RIGID	Typical
17	M17	N30	N28			RIGID	None	None	RIGID	Typical
18	C2	N32	N31			PIPE_2.0	None	None	A53 Gr.B	Typical
19	M19	N35	N33			RIGID	None	None	RIGID	Typical
20	M20	N36	N34			RIGID	None	None	RIGID	Typical
21	M22	N41	N39			RIGID	None	None	RIGID	Typical
22	M23	N42	N40			RIGID	None	None	RIGID	Typical
23	C4	N44	N43			PIPE_2.0	None	None	A53 Gr.B	Typical
24	M25	N45	N46			PIPE_1.5	None	None	A53 Gr.B	Typical
25	C3	N60	N59			PIPE_2.5	None	None	A53 Gr.B	Typical
26	M28	N51	N50		90	L2.5x2.5x3	None	None	A36 Gr.36	Typical
27	M29	N52	N50		180	L2.5x2.5x3	None	None	A36 Gr.36	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	M1						Yes	** NA **			None
2	M2						Yes	** NA **			None
3	M3	BenPIN	BenPIN				Yes	** NA **			None
4	M4	BenPIN	BenPIN				Yes	** NA **			None
5	M5	BenPIN	BenPIN				Yes	** NA **			None
6	M6						Yes	** NA **			None
7	M7						Yes	** NA **			None
8	M8						Yes	** NA **			None
9	M9						Yes	** NA **			None
10	M10						Yes	** NA **			None
11	M11						Yes	** NA **			None
12	M12						Yes	** NA **			None
13	M13		OOOXOO				Yes	** NA **			None
14	M14		OOOXOO				Yes	** NA **			None
15	C1						Yes	** NA **			None
16	M16		OOOXOO				Yes	** NA **			None
17	M17		OOOXOO				Yes	** NA **			None
18	C2						Yes	** NA **			None
19	M19		OOOXOO				Yes	** NA **			None
20	M20		OOOXOO				Yes	** NA **			None
21	M22		OOOXOO				Yes	** NA **			None
22	M23		OOOXOO				Yes	** NA **			None
23	C4						Yes	** NA **			None
24	M25	BenPIN					Yes	** NA **			None
25	C3						Yes	** NA **			None
26	M28	BenPIN					Yes	** NA **			None
27	M29	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	M1	PIPE_2.5	36									Lateral
2	M2	PIPE_2.5	36									Lateral
3	M3	1 SR	30									Lateral
4	M4	1 SR	30									Lateral
5	M5	5/8 SR	42.426									Lateral
6	M6	PIPE_2.5	150									Lateral
7	M7	PIPE_2.5	150									Lateral
8	M8	PIPE_2.0	30									Lateral
9	M9	PIPE_2.0	30									Lateral
10	M10	PIPE_2.0	30									Lateral
11	M11	PIPE_2.0	30									Lateral
12	M12	PIPE_2.0	30									Lateral
13	C1	PIPE_2.0	96									Lateral
14	C2	PIPE_2.0	96									Lateral
15	C4	PIPE_2.0	96									Lateral
16	M25	PIPE_1.5	120									Lateral
17	C3	PIPE_2.5	96									Lateral
18	M28	L2.5x2.5x3	72									Lateral
19	M29	L2.5x2.5x3	72									Lateral

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Dead	None		-1.1			10			
2	Live	None								
3	Wind 0	None					20	38		
4	Wind 30	None					20	38		
5	Wind 60	None					20	38		
6	Wind 90	None					20	38		
7	Wind 120	None					20	38		
8	Wind 150	None					20	38		
9	Ice Load	None					10	19		
10	Ice 0	None					20	38		
11	Ice 30	None					20	38		
12	Ice 60	None					20	38		
13	Ice 90	None					20	38		
14	Ice 120	None					20	38		
15	Ice 150	None					20	38		
16	Lm	None				1				
17	Lv	None				1				

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.4 D	Yes	Y		1	1.4																				
2	1.2 D + 1.6 L	Yes	Y		1	1.2	2	1.6																		
3	1.2 D + 1.6 Wo @ 0	Yes	Y		1	1.2	3	1.6																		
4	1.2 D + 1.6 Wo @ 30	Yes	Y		1	1.2	4	1.6																		
5	1.2 D + 1.6 Wo @ 60	Yes	Y		1	1.2	5	1.6																		
6	1.2 D + 1.6 Wo @ 90	Yes	Y		1	1.2	6	1.6																		
7	1.2 D + 1.6 Wo @ 120	Yes	Y		1	1.2	7	1.6																		
8	1.2 D + 1.6 Wo @ 150	Yes	Y		1	1.2	8	1.6																		
9	1.2 D + 1.6 Wo @ 180	Yes	Y		1	1.2	3	-1.6																		
10	1.2 D + 1.6 Wo @ 210	Yes	Y		1	1.2	4	-1.6																		
11	1.2 D + 1.6 Wo @ 240	Yes	Y		1	1.2	5	-1.6																		
12	1.2 D + 1.6 Wo @ 270	Yes	Y		1	1.2	6	-1.6																		
13	1.2 D + 1.6 Wo @ 300	Yes	Y		1	1.2	7	-1.6																		
14	1.2 D + 1.6 Wo @ 330	Yes	Y		1	1.2	8	-1.6																		
15	1.2 D + 1.0 Di + 1.0 Wi @ 0	Yes	Y		1	1.2	9	1	10	1																
16	1.2 D + 1.0 Di + 1.0 Wi @ 30	Yes	Y		1	1.2	9	1	11	1																
17	1.2 D + 1.0 Di + 1.0 Wi @ 60	Yes	Y		1	1.2	9	1	12	1																
18	1.2 D + 1.0 Di + 1.0 Wi @ 90	Yes	Y		1	1.2	9	1	13	1																
19	1.2 D + 1.0 Di + 1.0 Wi @ 1...	Yes	Y		1	1.2	9	1	14	1																
20	1.2 D + 1.0 Di + 1.0 Wi @ 1...	Yes	Y		1	1.2	9	1	15	1																
21	1.2 D + 1.0 Di + 1.0 Wi @ 1...	Yes	Y		1	1.2	9	1	10	-1																
22	1.2 D + 1.0 Di + 1.0 Wi @ 2...	Yes	Y		1	1.2	9	1	11	-1																
23	1.2 D + 1.0 Di + 1.0 Wi @ 2...	Yes	Y		1	1.2	9	1	12	-1																
24	1.2 D + 1.0 Di + 1.0 Wi @ 2...	Yes	Y		1	1.2	9	1	13	-1																
25	1.2 D + 1.0 Di + 1.0 Wi @ 3...	Yes	Y		1	1.2	9	1	14	-1																
26	1.2 D + 1.0 Di + 1.0 Wi @ 3...	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	.111	16	1.5																
28	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	4	.111	16	1.5																
29	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	5	.111	16	1.5																
30	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	6	.111	16	1.5																
31	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	7	.111	16	1.5																
32	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	8	.111	16	1.5																
33	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	3	-.111	16	1.5																
34	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	4	-.111	16	1.5																
35	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	5	-.111	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...
36	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	6	-.111	16	1.5														
37	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	7	-.111	16	1.5														
38	1.2 D + 1.5 Lm + 1.0 Wm @...	Yes	Y		1	1.2	8	-.111	16	1.5														
39	1.2 D + 1.5 Lv	Yes	Y		1	1.2	17	1.5																

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	1141.789	11	1836.78	20	965.552	3	0	39	0	39	0	39
2		min	-1172.494	5	71.065	14	-4009.535	21	0	1	0	1	0	1
3	N2	max	882.677	31	1252.667	20	3491.672	21	0	39	0	39	0	39
4		min	-803.635	13	-19.682	13	689.204	14	0	1	0	1	0	1
5	N46	max	367.991	5	74.369	22	1581.266	5	0	39	0	39	0	39
6		min	-356.193	11	-35.96	5	-1578.17	11	0	1	0	1	0	1
7	N50	max	2502.216	13	981.892	13	2211.42	14	0	39	0	39	0	39
8		min	-2497.313	7	-708.962	8	-2040.709	8	0	1	0	1	0	1
9	Totals:	max	2483.608	11	3156.385	25	3340.957	3						
10		min	-2483.588	5	1022.278	7	-3340.954	9						

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

	Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	phi*Pnc ...	phi*Pnt [...	phi*Mn y...	phi*Mn z...	Cb	Eqn
1	M1	PIPE 2.5	.941	36	5	.129	3		19	47114.0...	50715	3.596	3.596	1....	H1-1b
2	M6	PIPE 2.5	.756	75	5	.398	75		5	14558.7...	50715	3.596	3.596	1....	H3-6
3	M2	PIPE 2.5	.698	36	31	.123	33		19	47114.0...	50715	3.596	3.596	2....	H1-1b
4	M7	PIPE 2.5	.685	75	7	.317	75		5	14558.7...	50715	3.596	3.596	1....	H3-6
5	M11	PIPE 2.0	.597	0	7	.281	30		5	29810.2...	32130	1.872	1.872	2....	H1-1b
6	M5	5/8 SR	.569	21.213	17	.125	0		5	878.548	9946.8	.097	.097	1....	H1-1a
7	C3	PIPE 2.5	.526	45	8	.222	45		7	30038.4...	50715	3.596	3.596	1....	H1-1b
8	M10	PIPE 2.0	.505	30	13	.474	30		7	29810.2...	32130	1.872	1.872	2....	H3-6
9	M25	PIPE 1.5	.474	61.25	5	.010	120		24	4596.687	23593.5	1.105	1.105	1....	H1-1a
10	M12	PIPE 2.0	.465	30	5	.189	15		5	29810.2...	32130	1.872	1.872	1....	H1-1b
11	M29	L2.5x2.5x3	.446	72	14	.040	72	z	5	9122.082	29192.4	.873	1.897	2....	H2-1
12	M9	PIPE 2.0	.318	30	21	.072	0		14	29810.2...	32130	1.872	1.872	2....	H1-1b
13	C1	PIPE 2.0	.315	45	8	.094	45		10	14916.0...	32130	1.872	1.872	1....	H1-1b
14	M28	L2.5x2.5x3	.247	72	3	.020	72	y	9	9122.082	29192.4	.873	1.908	2....	H2-1
15	M8	PIPE 2.0	.131	0	21	.044	0		8	29810.2...	32130	1.872	1.872	2....	H1-1b
16	M4	1 SR	.117	30	20	.509	0		5	11923.4...	25446.8...	.424	.424	1....	H1-1b*
17	M3	1 SR	.116	30	19	.235	0		7	11923.4...	25446.8...	.424	.424	1....	H1-1b*
18	C2	PIPE 2.0	.093	45	5	.192	45		11	14916.0...	32130	1.872	1.872	1....	H1-1b
19	C4	PIPE 2.0	.081	45	9	.065	45		14	14916.0...	32130	1.872	1.872	1....	H1-1b

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

Project # 42919-0008.003.8191
By AMS
Date: 05/20/19
v0.1, Effective 07/10/18

MOUNT TO TOWER CONNECTION CHECKS

REACTIONS

Px=	1.172	Kip
Py=	1.837	Kip
(Axial)Pz=	4.01	Kip
Mx=		Kip-in
My=		Kip-in
(Torque)Mz=		Kip-in

Number of Bolts = 2

BOLT CHECKS

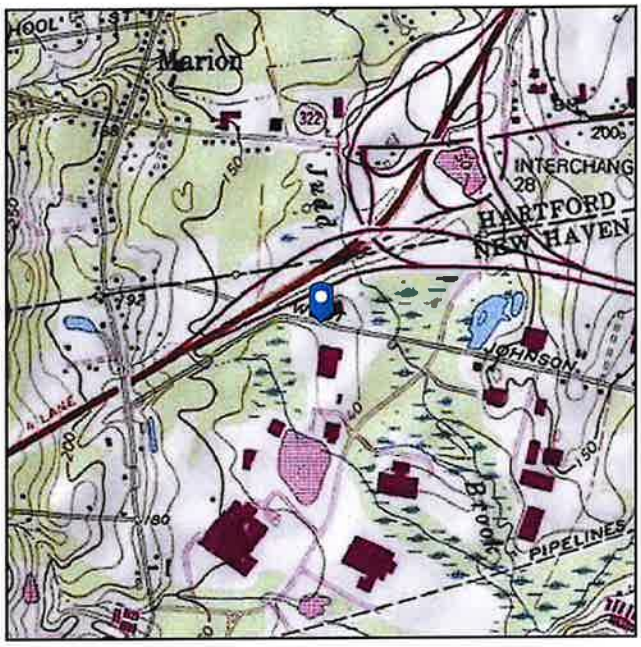
Tension Reaction	2.01	kip
Shear Reaction	1.09	kip
Bolt Type	U-Bolt	
Bolt Diameter	0.5	in
Tensile Strength	16.3	kips
Shear Strength	9.8	kips
Reduced Tensile Strength	-	kips
Tensile Capacity Used	12.3%	**Note: Tension reduction not required if tension or shear capacity < 30%**
Shear Capacity Used	11.1%	

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 139.44 ft (NAVD 88)
Latitude: 41.557975
Longitude: -72.918239



Wind

Results:

Wind Speed:	132 Vmph ← 135 mph Per Jurisdiction
10-year MRI	76 Vmph
25-year MRI	86 Vmph
50-year MRI	92 Vmph
100-year MRI	99 Vmph
Data Source:	ASCE/SEI 7-10, Fig. 26.5-1B and Figs. CC-1–CC-4, incorporating errata of March 12, 2014
Date Accessed:	Mon May 06 2019

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (annual exceedance probability = 0.000588, MRI = 1,700 years).

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

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

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Ice

Results:

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

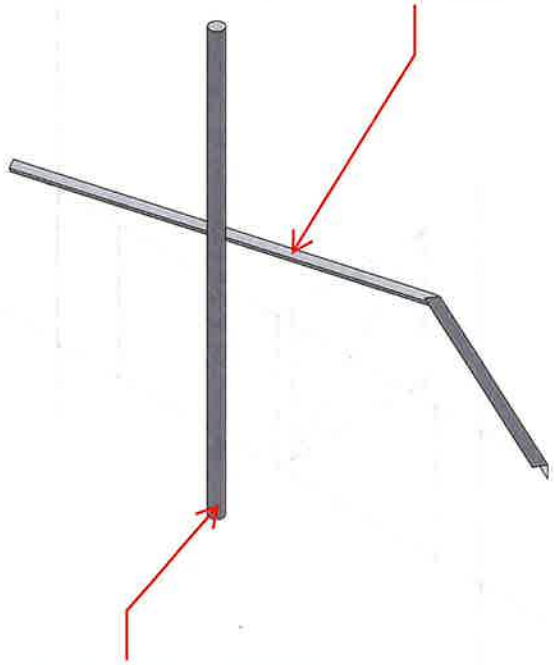
Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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

APPENDIX D

SUPPLEMENTAL MODIFICATION INFORMATION

MODIFICATION DRAWING 1 OF 2

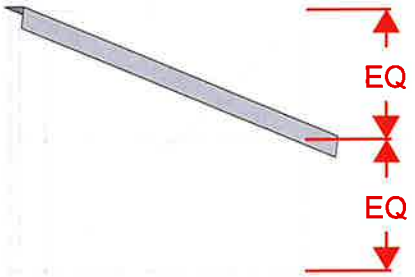


REPLACE EXISTING MOUNT
PIPE WITH 8-FT LONG
P2.5STD MOUNT PIPE

NOTE:
Rotate Beta sector frame to match antenna azimuths prior to installation of modification kit and proposed loading

Paul J. Ford and Company	On Air- Cheshire North 2 CT	SK - 8
AMS		May 21, 2019 at 3:08 PM
42919-0008.003.8191		42919-0008_Wind.r3d

MODIFICATION DRAWING 2 OF 2



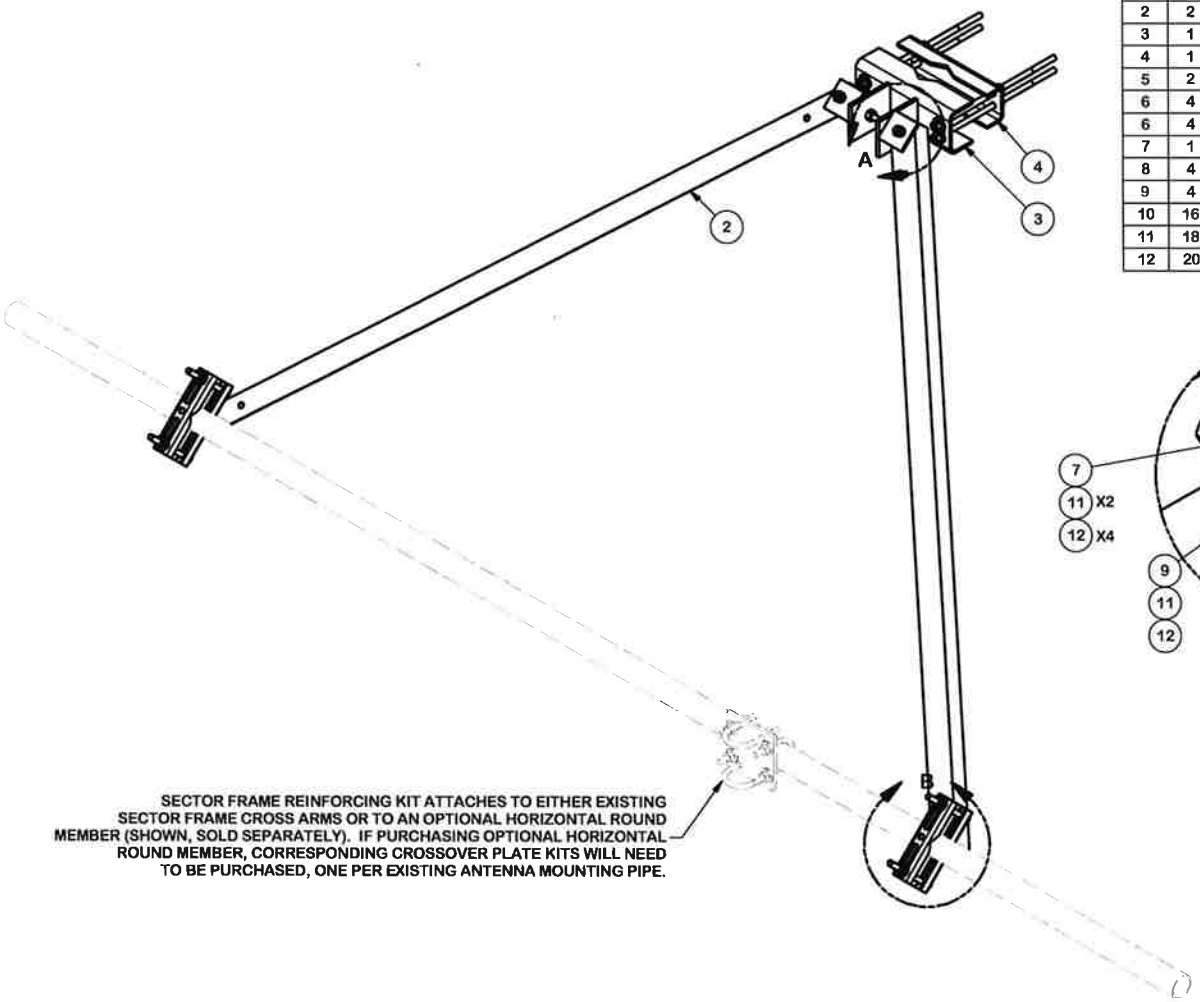
Envelope Only Solution

Paul J. Ford and Company	On Air- Cheshire North 2 CT	SK - 9
AMS		May 20, 2019 at 11:46 AM
42919-0008.003.8191		42919-0008_Wind.r3d

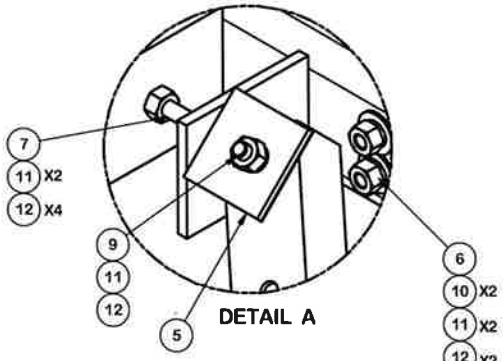
APPENDIX E

MANUFACTURER DRAWINGS (FOR REFERENCE ONLY)

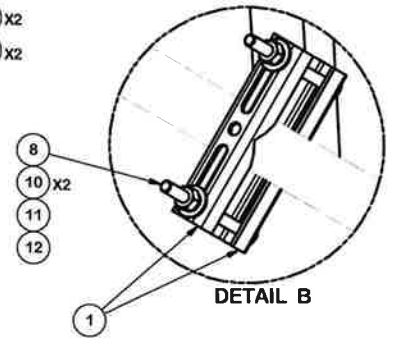
PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	4	X-STU	STIFF ARM CHANNEL BRACKET	8 1/2 in	1.37	5.49
2	2	X-254924	DIAGONAL ANGLE - SITE PRO 1	72 in	19.71	39.41
3	1	CFS	LOWER GATE FOOT WELDMENT		12.72	12.72
4	1	GBB	GATE BACKING BAR	11 1/2 in	4.53	4.53
5	2	SHCM-T	CHAIN MOUNT TIGHTENER BRACKET	3 in	1.86	3.72
6	4	G12R-15	1/2" x 15" THREADED ROD (HDG.)		0.40	1.60
6	4	G12R-12	1/2" x 12" THREADED ROD (HDG.)		0.40	1.60
7	1	G12R-6	1/2" x 6" GALV. THREADED ROD		0.33	0.33
8	4	G12065	1/2" x 6-1/2" HDG HEX BOLT GR5 FULL THREAD	6 1/2 in	0.41	1.64
9	4	G12112	1/2" x 1-1/2" HDG HEX BOLT GR5	1/2 in	0.15	0.59
10	16	G12FW	1/2" HDG USS FLATWASHER	3/32 in	0.03	0.55
11	18	G12LW	1/2" HDG LOCKWASHER	1/8 in	0.01	0.25
12	20	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	1.43
					TOTAL WT. #	76.65



SECTOR FRAME REINFORCING KIT ATTACHES TO EITHER EXISTING SECTOR FRAME CROSS ARMS OR TO AN OPTIONAL HORIZONTAL ROUND MEMBER (SHOWN, SOLD SEPARATELY). IF PURCHASING OPTIONAL HORIZONTAL ROUND MEMBER, CORRESPONDING CROSSOVER PLATE KITS WILL NEED TO BE PURCHASED, ONE PER EXISTING ANTENNA MOUNTING PIPE.



DETAIL A



DETAIL B

TOLERANCE NOTES

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES (± 0.030")
DRILLED AND GAS CUT HOLES (± 0.030") - NO CONING OF HOLES
LASER CUT EDGES AND HOLES (± 0.010") - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING (± 0.030")
ALL OTHER ASSEMBLY (± 0.060")

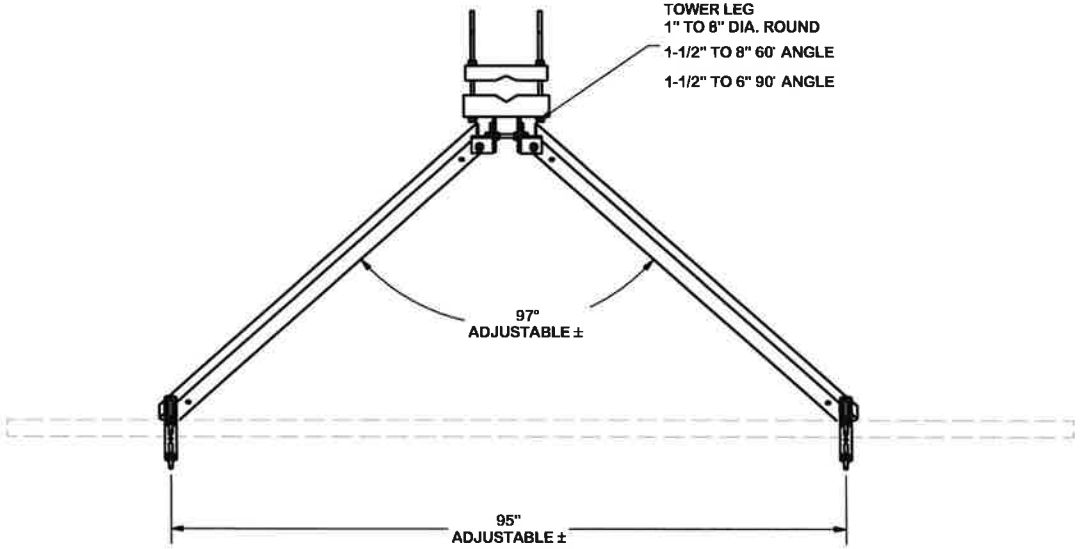
REVISION HISTORY				
REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
A	CHANGED MAX. DIA. FOR HANDRAIL CONNECTION	5563	BC	10/25/2017

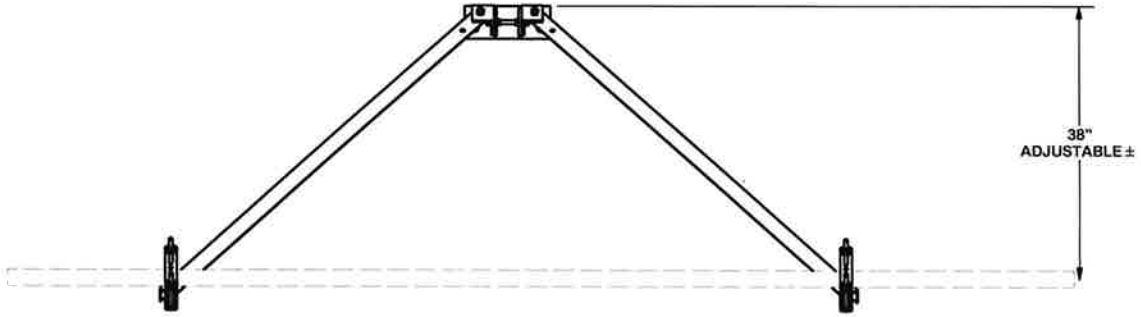
DESCRIPTION: SECTOR FRAME STABILIZER - VERTICAL LONG

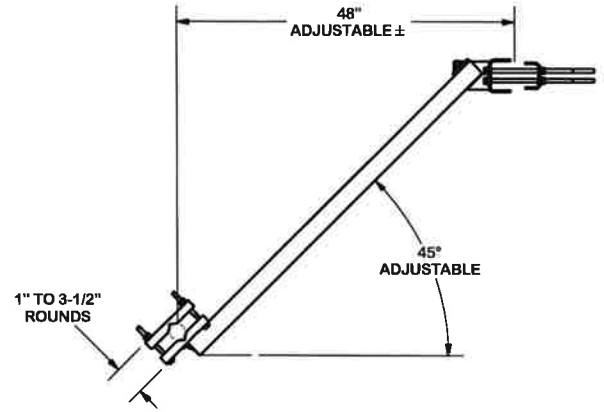
CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
5563	CEK 3/23/2017		SFS-V-L

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	BMC 3/23/2017	SFS-V-L

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







TOLERANCE NOTES

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REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
A	CHANGED MAX. DIA. FOR HANDRAIL CONNECTION	5563	BC	10/25/2017

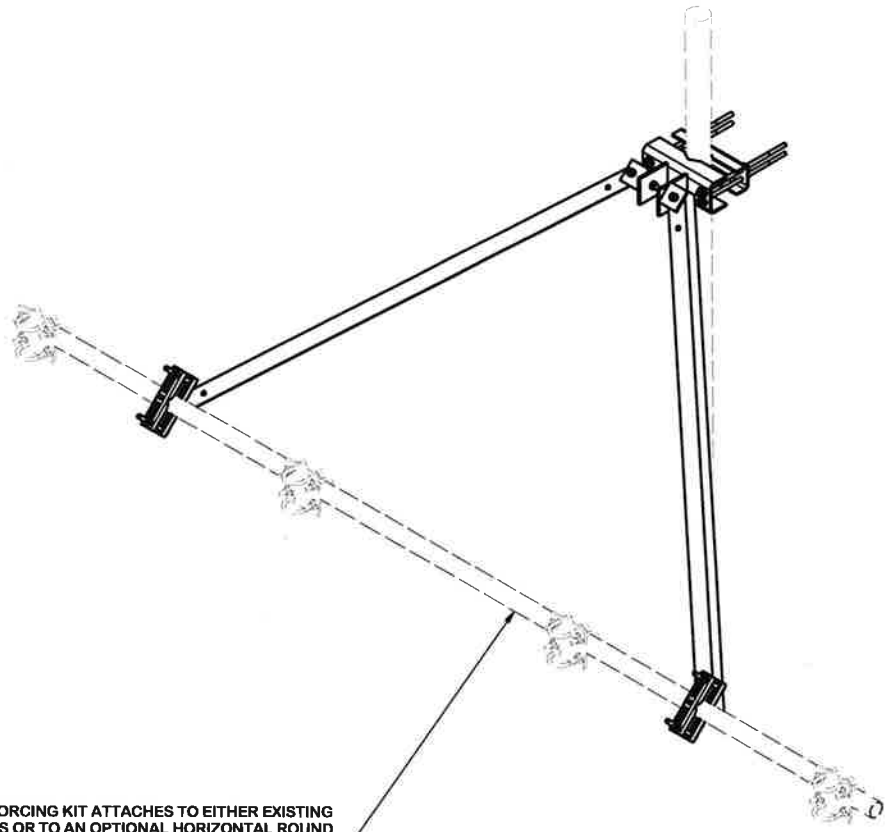
REVISION HISTORY

DESCRIPTION
SECTOR FRAME
STABILIZER - VERTICAL
LONG

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
5563	CEK 3/23/2017		SFS-V-L

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	BMC 3/23/2017	SFS-V-L

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



SECTOR FRAME REINFORCING KIT ATTACHES TO EITHER EXISTING SECTOR FRAME CROSS ARMS OR TO AN OPTIONAL HORIZONTAL ROUND MEMBER (SHOWN, SOLD SEPARATELY). IF PURCHASING OPTIONAL HORIZONTAL ROUND MEMBER, CORRESPONDING CROSSOVER PLATE KITS WILL NEED TO BE PURCHASED, ONE PER EXISTING ANTENNA MOUNTING PIPE.

REVISION HISTORY				
REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
A	CHANGED MAX. DIA. FOR HANDRAIL CONNECTION	5563	BC	10/25/2017

TOLERANCE NOTES

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DESCRIPTION: SECTOR FRAME STABILIZER - VERTICAL LONG

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
5563	CEK 3/23/2017		SFS-V-L

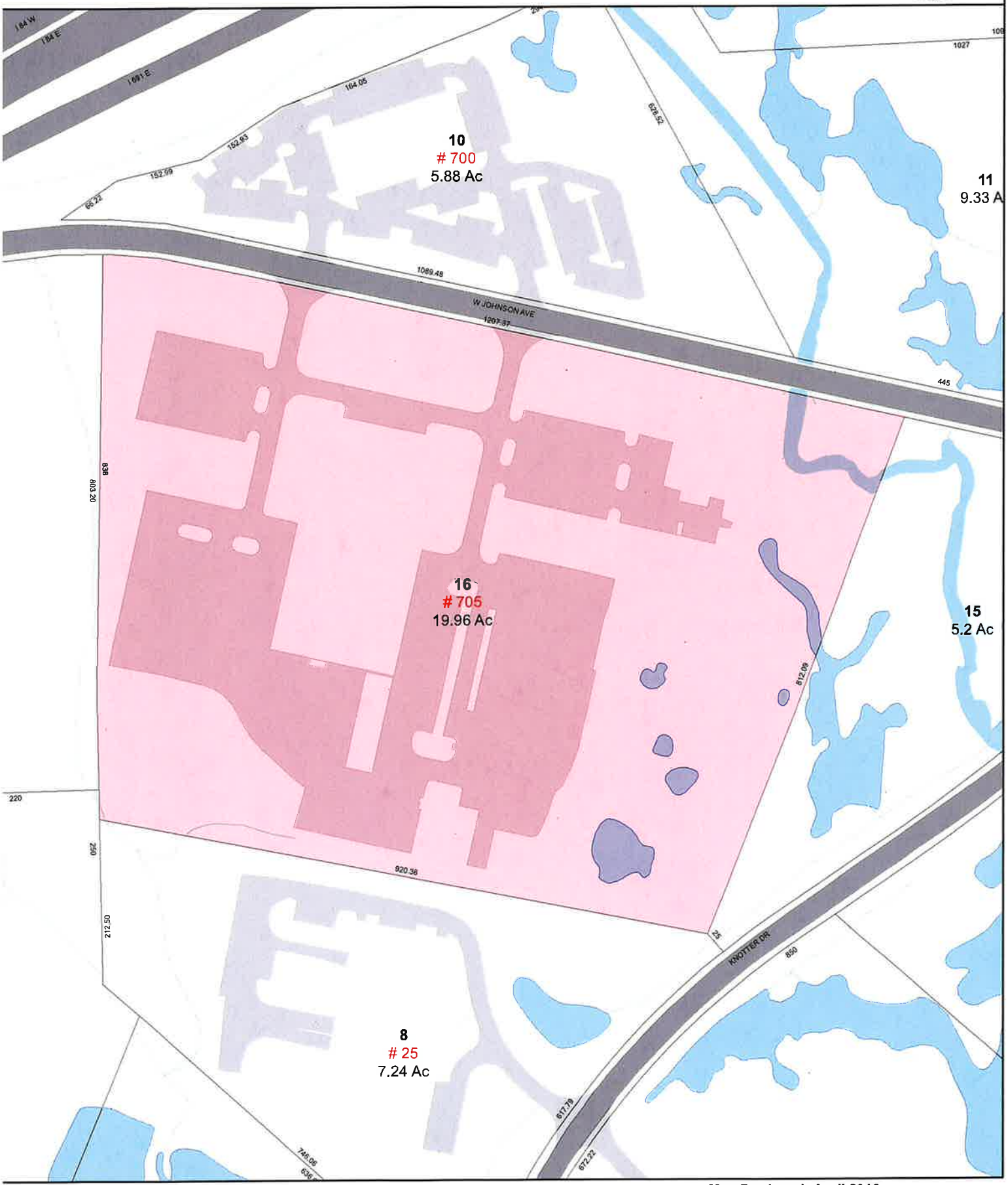
CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	BMC 3/23/2017	SFS-V-L

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

ATTACHMENT 5

Town of Cheshire, Connecticut - Assessment Parcel Map

Parcel: 00001900 **Location:** 705 W JOHNSON AVE



Approximate Scale: 1 inch = 182 feet

0 90 180 270 360

Feet

Map Produced: April 2019

The Assessor's office is responsible for the maintenance of records on the ownership of properties. Assessments are computed at 70% of the estimated market value of real property at the time of the last revaluation which was 2018.

Town of Cheshire

The bedding plant capital of Connecticut

Information on the Property Records for the Municipality of Cheshire was last updated on 10/23/2019.

Property Summary Information

Parcel Data And Values | Building | Outbuildings | Sales

Parcel Information

Location:	705 W JOHNSON AVE	Property Use:	Office	Primary Use:	Office Building
Unique ID:	00001900	Map Block Lot:	2 16	Acres:	19.96
Zone:	I-2	Volume / Page:	2227/0294	Developers Map / Lot:	173230
Census:	3432				

Value Information

	Appraised Value	Assessed Value
Land	646,393	452,470
Buildings	2,503,627	1,752,540
Detached Outbuildings	133,450	93,420

	Appraised Value	Assessed Value
Total	3,283,470	2,298,430

Owner's Information

Owner's Data

CONN LIGHT & POWER CO
P O BOX 270
HARTFORD CT 06141

Back To Search (JavaScript:window.history.back(1);)

Print View (PrintPage.aspx?towncode=025&uniqueid=00001900)

ATTACHMENT 6

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	3	3	neopost 10/26/2019 US POSTAGE $002.79⁰ ZIP 06103 041L12203937
	Postmaster, per *(name of receiving employee)*		OLD STATE HOUSE STATION 06103 OCT 28 2019

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Sean M. Kimball, Town Manager Town of Cheshire 84 South Main Street Cheshire, CT 06410				
2.	William Voelker, Town Planner Town of Cheshire 84 South Main Street Cheshire, CT 06410				
3.	Connecticut Light & Power Company P.O. Box 270 Hartford, CT 06141				
4.					
5.					
6.					