STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	
A SUB-PETITION OF CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS FOR THE MODIFICATION OF AN EXISTING WIRELESS TELECOMMUNICATIONS FACILITY AT 97 HIGH STREET, PORTLAND, CONNECTICUT	:	SUB-PETITION NO. 1133 97 HIGH STREET PORTLAND, CT
	:	JUNE 13, 2023

SUB-PETITION FOR DECLARATORY RULING: ELIGIBLE FACILITIES REQUEST FOR MODIFICATIONS THAT WILL NOT SUBSTANTIALLY CHANGE THE PHYSICAL DIMENSIONS OF AN EXISTING BASE STATION

I. Introduction

Pursuant to Section 6409(a) of the Middle Class Tax Relief and Job Creation Act of 2012, codified at 47 U.S.C. § 1455(a) and 47 CFR § 1.6100 et. seq. established by the Federal Communications Commission ("FCC"), Cellco Partnership d/b/a Verizon Wireless ("Cellco") hereby petitions the Connecticut Siting Council (the "Council") for a declaratory ruling ("Sub-Petition") that modifications described herein to the existing wireless telecommunications tower, (eligible support structure) at 97 High Street in Portland, Connecticut (the "Property") constitute an Eligible Facilities Request ("EFR"). The Property and the existing wireless telecommunications tower are owned by SRR Towers LLC.

II. Factual Background

The Property is a 0.8-acre parcel adjacent to Portland High School. The existing wireless telecommunications facility consists of an 80-foot tall lattice tower within a fenced facility compound. AT&T antennas are attached to the tower at a height of 76.7 feet above ground level ("AGL"). AT&T's ground-mounted equipment shelter is also located within the existing fenced compound. The existing tower was approved by the Town of Portland. Cellco's real estate consultant contacted the Town Planning and Zoning Department in an effort to locate a copy of municipal approvals for the tower. Town officials stated that they were not able to locate the original tower approval.

III. Proposed Facility Modifications

Cellco proposes to extend the tower by ten feet, to a height of 90 feet above ground level and will install nine (9) antennas and nine (9) remote radio heads ("RRHs") on an antenna mounting frame at the top of the tower. Project Plans, including specifications for Cellco's antennas and associated equipment, are included in Attachment 1. A Structural Analysis Report and Mount Analysis Report confirming that the tower and its foundation are capable of supporting the proposed tower extension is included in Attachment 2.

IV. Discussion

A. The Proposed Modification Will Not Cause a Substantial Change to the Physical Dimensions of the Existing Eligible Support Structure

Section 6409(a) provides, in relevant part, that "a State or local government may not deny, and shall approve, any eligible facilities request for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station." Pursuant to Title 47 CFR § 1.6100(b)(7), a modification substantially changes the physical dimensions of an eligible support structure only if it meets any of the following criteria.

1. *For towers other than towers in the public rights-of-way, it increases the height of the tower by more than 10% or by the height of an additional antenna array with separation from the nearest existing antenna not to exceed twenty feet, whichever is greater.*

The proposed modifications would extend the existing lattice tower height from 80 feet to 90 feet to accommodate one additional antenna array with a separation of less than 20 feet between the AT&T and Cellco antennas.[1]

2. *For towers other than towers in the public rights-of-way it involves adding an appurtenance to the body of the tower that would protrude from the edge of the structure more than twenty (20) feet or more than the width of the tower structure at the level of the appurtenance, whichever is greater.*

Cellco's new antennas, RRHs and antenna mounting system will not protrude more than twenty (20) feet from the face of the extended lattice tower.

3. *For any eligible support structure, it involves the installation of more than the standard number of new equipment cabinets for the technology involved, but not to exceed four cabinets.*

Cellco will install two equipment cabinets on a concrete pad near the base of the tower, within the existing fenced facility compound area. (*See* Attachment 1).

4. *It entails any excavation or deployment outside the current site.*

The proposed modifications will remain within the limits of the existing fenced facility compound and the Property.

5. *It does not defeat the existing concealment elements of the eligible support structure.*

The existing facility does not maintain any concealment elements and none are proposed as a part of Cellco's proposed modifications.

6. *It does not comply with conditions associated with the Siting approval the*

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[1] As further clarified by the FCC, the phrase "with separation from the nearest existing antenna not to exceed twenty feet" in the context of permissible tower height increases from adding an antenna array, is measured from the top of an existing (AT&T) antenna to the bottom of a proposed new (Cellco) antenna. See FCC Fact Sheet Declaratory Ruling and Notice of Proposed Rule-making – WT Docket No. 19-250 and RM-11849.

construction or modification of the eligible support structure.

As mentioned above, the Town could not locate, and therefore could not provide Cellco with a copy of the original tower approval. Cellco's proposed modifications, however, are similar to and consistent with AT&T's installation which suggests both the AT&T and Cellco installations will comply with the local approvals.

B. FCC Compliance

Included in Attachment 3 is a Cumulative Calculated Radio Frequency Emissions Report confirming that the 97 High Street facility, with Cellco's proposed antennas, will operate within the FCC safety standards for radio frequency emissions.

C. Notice to the Town, Property Owner and Abutting Landowners

On June 13, 2023 a copy of this Sub-Petition was sent to Portland First Selectman, Ryan Curley; Dan Bourret, Portland's Land Use Development Planner; and SRR Towers LLC, the owner of the tower and Property. Copies of the letters sent to First Selectman Curley, Mr. Bourret and SRR Towers LLC are included in Attachment 4. A copy of this Sub-Petition was also sent to the owners of land that abuts the Property. A sample abutter's letter and the list of those abutting landowners who were sent notice and a copy of this filing is included in Attachment 5.

V. Conclusion

Based on the information provided above, Cellco respectfully submits that the proposed modification of the existing eligible support structure will not cause a substantial change to the facility and therefore, constitutes an "eligible facilities request" under Section 6409(a) and the FCC Order.

Respectfully submitted,

CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS

By______________________________

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597
(860) 275-8200
Its Attorneys

ATTACHMENT 1

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WIRELESS COMMUNICATIONS FACILITY

PORTLAND HS CT

97 HIGH STREET
PORTLAND, CT 06480

SITE DIRECTIONS

FROM: 20 ALEXANDER DRIVE
WALLINGFORD, CONNECTICUT

TO: 97 HIGH STREET
PORTLAND, CONNECTICUT

1.	START BY HEADING NORTH ON ALEXANDER DR TOWARD BARNES INDUSTRIAL RD;	0.2 MI
2.	TAKE FIRST RIGHT ONTO BARNES INDUSTRIAL RD;	0.1 MI
3.	TURN SLIGHT LEFT ONTO DURHAM RD/CT-68. CONTINUE TO FOLLOW CT-68;	0.4 MI
4.	TURN RIGHT ONTO RAMP;	0.2 MI
5.	TURN RIGHT ONTO N COLONY RD/US-5 N;	0.3 MI
6.	MERGE ONTO CT-15 N TOWARD HARTFORD;	3.6 MI
7.	MERGE ONTO I-91 N VIA EXIT 68N-E TOWARD HARTFORD/MIDDLETOWN/CT-66 E.;	0.5 MI
8.	MERGE ONTO CT-66 E VIA EXIT 18 TOWARD MIDDLEFIELD/MIDDLETOWN.	8.9 MI
9.	TURN LEFT ONTO MAIN STREET/CT-66. CONTINUE TO FOLLOW MAIN STREET;	1.9 MI
10.	TURN LEFT ONTO SPRING STREET;	0.5 MI
11.	TURN LEFT ONTO HIGH STREET.	0.3 MI
12.	ARRIVE AT 97 HIGH STREET.	

GENERAL NOTES

1. PROPOSED ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY CELLCO PARTNERSHIP.

PROJECT SCOPE

1. THE PROPOSED SCOPE OF WORK AT THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY GENERALLY INCLUDES THE FOLLOWING:

A. <u>AT THE EXISTING TOWER:</u>

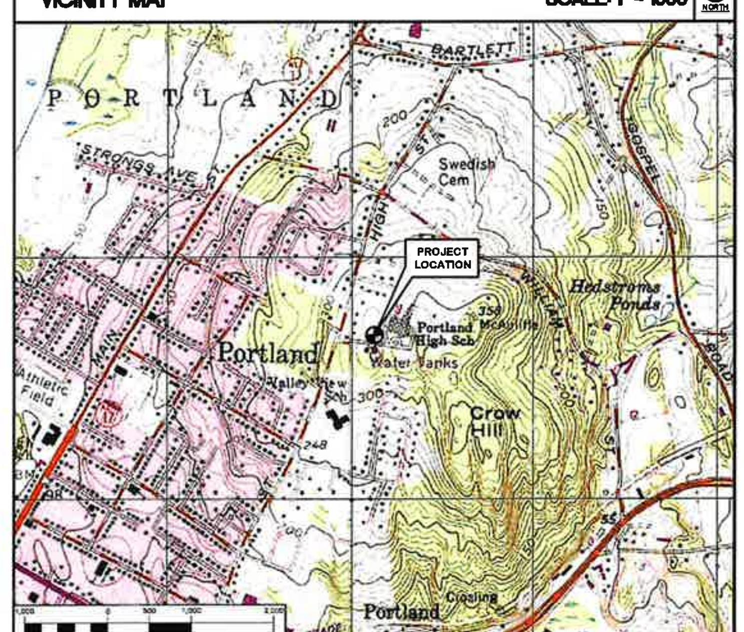
- INSTALLATION OF A 10.0 FT TALL TOWER EXTENSION TO THE EXISTING 80.4 FT TALL 4-LEGGED SELF-SUPPORTING COMMUNICATIONS TOWER AND ASSOCIATED TOWER REINFORCEMENTS (DESIGN BY OTHERS). REFER TO TOWER NOTES ON SHEET C-2 FOR ADDITIONAL INFORMATION.
- INSTALLATION OF A TOTAL OF (9) CELLCO PARTNERSHIP ANTENNAS, ASSOCIATED RRU UNITS, OVP EQUIPMENT AND ASSOCIATED CABLES.

B. <u>AT GRADE:</u>

- INSTALLATION OF OUTDOOR RADIO EQUIPMENT/BATTERY CABINETS ON A PROPOSED 10'-6" x 12'-0" CONCRETE PAD WITH ICE BRIDGE CANOPY WITHIN THE EXISTING WIRELESS COMMUNICATIONS FACILITY FENCED COMPOUND.

VICINITY MAP

SCALE: 1" = 1000'



RFDS NOTE:

1. EQUIPMENT SHOWN HEREIN IS FOR USE BY VERIZON WIRELESS EQUIPMENT OPERATIONS AND WAS PROVIDED FROM THE REV3 VERIZON RFDS "PORTLAND HS CT", DATED 2023-03-21.

PROJECT SUMMARY

SITE NAME:	PORTLAND HS CT
SITE ADDRESS:	97 HIGH STREET PORTLAND, CT 06480
PARCEL ID:	039/0084
PROPERTY/TOWER OWNER:	SRR TOWERS LLC 57 E WASHINGTON STREET CHAGRIN FALLS, OH 44022
LESSEE/TENANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 20 ALEXANDER DRIVE WALLINGFORD, CT 06492
VERIZON SITE ACQUISITION CONTACT:	PHILIP COTTO REAL ESTATE CONSULTANT STRUCTURE CONSULTING GROUP (617)454-7363
LEGAL/REGULATORY COUNSEL:	KENNETH C. BALDWIN, ESQ. ROBINSON & COLE LLP (860) 275-8345
TOWER COORDINATES:	LATITUDE: 41°-34'-50.63" LONGITUDE: 72°-37'-52.96" GROUND ELEVATION: 350'± A.M.S.L. COORDINATES AND GROUND ELEVATION ARE REFERENCED FROM GOOGLE EARTH SOFTWARE.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	0
C-1	ABUTTERS AND MUNICIPAL NOTIFICATION LIMIT MAPS	0
C-2	COMPOUND PLAN, ELEVATION AND ANTENNA MOUNTING CONFIGURATION	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	06/06/23	TJR	DMD	ISSUED FOR CT SITING COUNCIL – APPROVED FINAL
E	06/06/23	TJR	DMD	ISSUED FOR CT SITING COUNCIL – UPDATED REF. DOCS
D	05/11/23	TJR	DMD	ISSUED FOR CT SITING COUNCIL – UPDATED REF. DOCS
C	03/31/23	TJR	DMD	ISSUED FOR CT SITING COUNCIL – REVISED TO ADD RFDS REFERENCE
B	06/23/22	DMD	T.J.	ISSUED FOR CT SITING COUNCIL – REVISED FOR TOWER MAPPING REFERENCE
A	06/08/22	DMD	T.J.	ISSUED FOR CT SITING COUNCIL – CLIENT REVIEW

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www.CentekEng.com

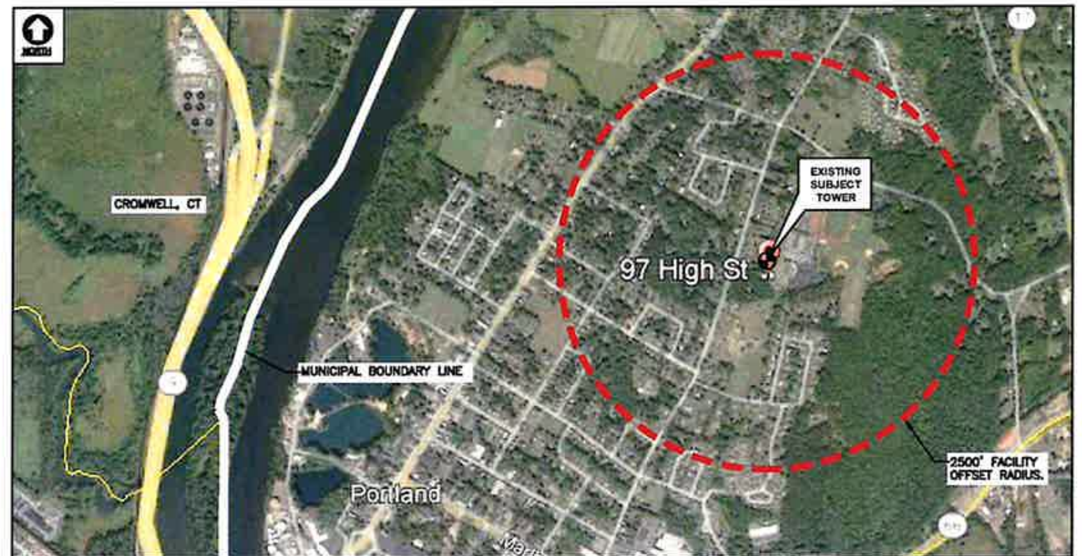
Cellco Partnership d/b/a Verizon Wireless
WIRELESS COMMUNICATIONS FACILITY
PORTLAND HS CT
97 HIGH STREET
PLYMOUTH, CT 06480

DATE:	06/01/2022
SCALE:	AS NOTED
JOB NO.	22017.06

TITLE SHEET

T-1

Sheet No. 1 of 3



MUNICIPALITY NOTIFICATION LIMIT MAP

1 / C-1 **ABUTTERS MAP**
SCALE: 1" = 40'- 0" NORTH

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	06/08/23	TJR	DMD	ISSUED FOR CT SITING COUNCIL – APPROVED FINAL
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SCALE: AS NOTED
JOB NO. 22017.06

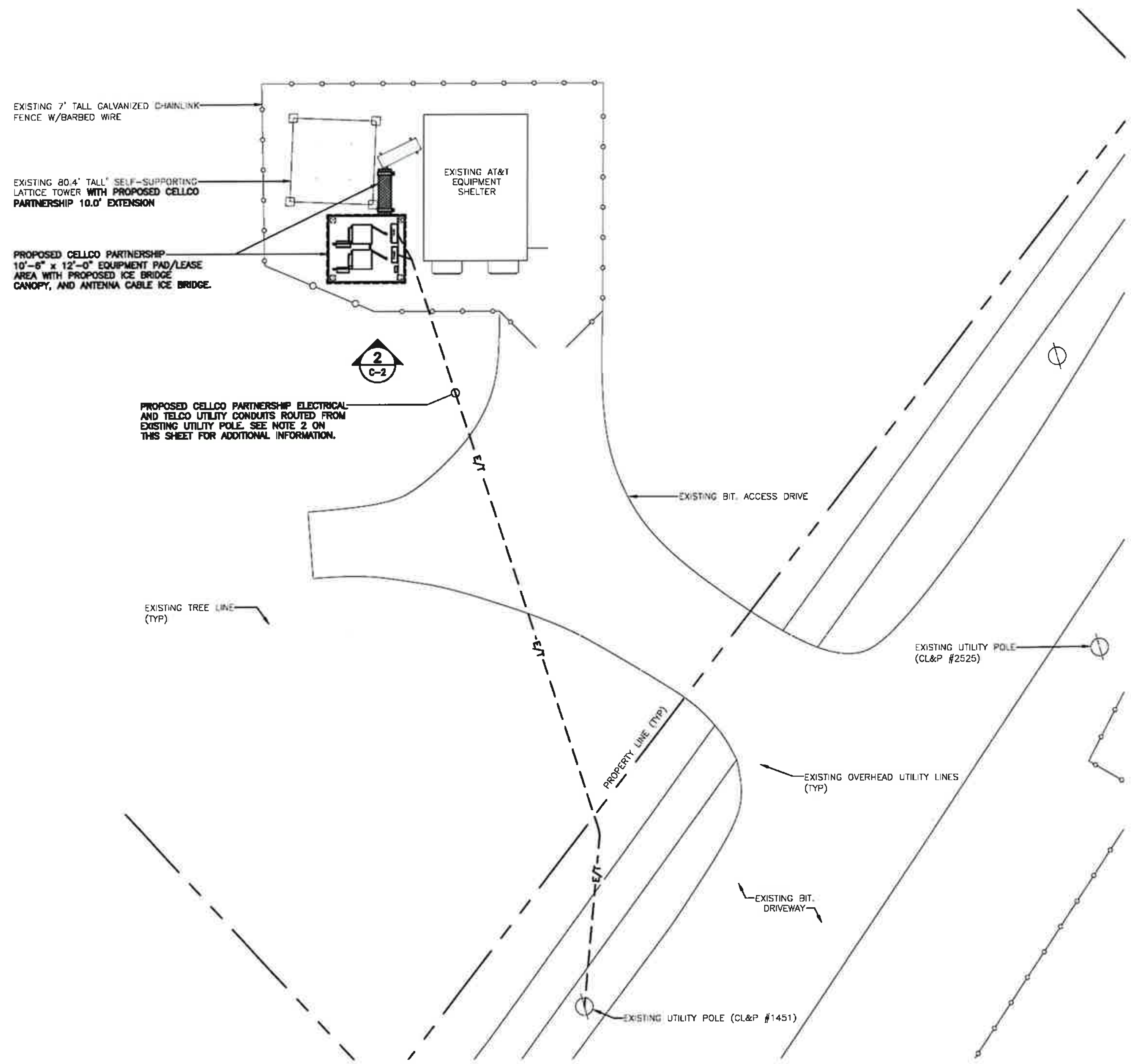
ABUTTERS AND MUNICIPALITY NOTIFICATION LIMIT MAPS

C-1

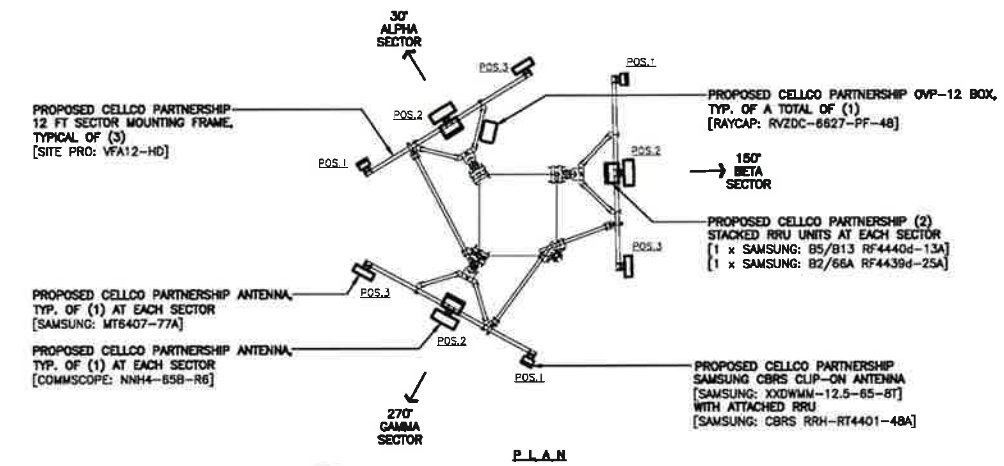
Sheet No. 2 of 3

UTILITIES NOTE:

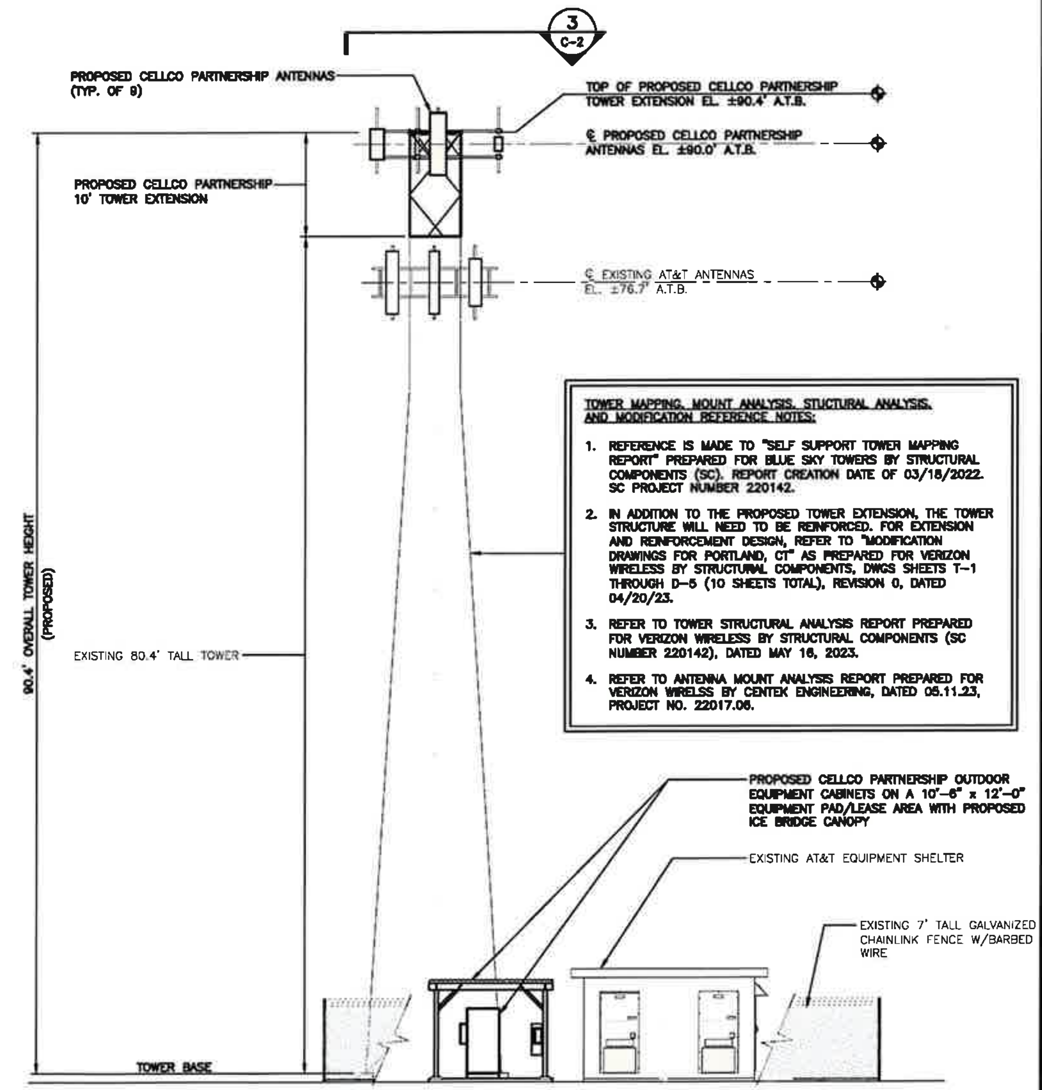
THE EXISTING UTILITY DEMARC LOCATIONS AND PROPOSED CELLCO PARTNERSHIP POWER & TELCO CONDUIT ROUTING SHOWN HEREIN ARE PRELIMINARY. FINAL DEMARC LOCATIONS AND CONDUIT ROUTING SHALL BE COORDINATED WITH LOCAL UTILITY PROVIDERS AND SITE OWNER DURING THE CONSTRUCTION DOCUMENT PHASE OF THE PROJECT.



1 / C-2 **PARTIAL SITE/ COMPOUND PLAN**
SCALE: 1/8" = 1'- 0"



3 / C-2 **ANTENNA MOUNTING CONFIGURATION**
SCALE: 3/16" = 1'- 0"



TOWER MAPPING, MOUNT ANALYSIS, STUCTURAL ANALYSIS, AND MODIFICATION REFERENCE NOTES:

1. REFERENCE IS MADE TO "SELF SUPPORT TOWER MAPPING REPORT" PREPARED FOR BLUE SKY TOWERS BY STRUCTURAL COMPONENTS (SC). REPORT CREATION DATE OF 03/18/2022. SC PROJECT NUMBER 220142.
2. IN ADDITION TO THE PROPOSED TOWER EXTENSION, THE TOWER STRUCTURE WILL NEED TO BE REINFORCED. FOR EXTENSION AND REINFORCEMENT DESIGN, REFER TO "MODIFICATION DRAWINGS FOR PORTLAND, CT" AS PREPARED FOR VERIZON WIRELESS BY STRUCTURAL COMPONENTS, DWGS SHEETS T-1 THROUGH D-5 (10 SHEETS TOTAL), REVISION 0, DATED 04/20/23.
3. REFER TO TOWER STRUCTURAL ANALYSIS REPORT PREPARED FOR VERIZON WIRELESS BY STRUCTURAL COMPONENTS (SC NUMBER 220142), DATED MAY 16, 2023.
4. REFER TO ANTENNA MOUNT ANALYSIS REPORT PREPARED FOR VERIZON WIRELSS BY CENTEK ENGINEERING, DATED 05.11.23, PROJECT NO. 22017.06.

2 / C-2 **WESTERN ELEVATION**
SCALE: 1/8" = 1'- 0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	06/08/23	TJR	DMD	ISSUED FOR CT SITING COUNCIL – APPROVED FINAL
E	06/05/23	TJR	DMD	ISSUED FOR CT SITING COUNCIL – UPDATED REF. DOCS
D	05/11/23	TJR	DMD	ISSUED FOR CT SITING COUNCIL – UPDATED REF. DOCS
C	03/31/23	TJR	DMD	ISSUED FOR CT SITING COUNCIL – REVISED TO ADD RFDS REFERENCE
B	06/23/22	DMD	TJL	ISSUED FOR CT SITING COUNCIL – REVISED FOR TOWER MAPPING REFERENCE
A	06/08/22	DMD	TJL	ISSUED FOR CT SITING COUNCIL – CLIENT REVIEW

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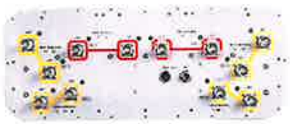
DATE: 06/01/2022
SCALE: AS NOTED
JOB NO. 22017.06

COMPOUND PLAN, ELEVATION AND ANTENNA MOUNTING CONFIG.

C-2

Sheet No. 3 of 3

NNH4-65B-R6



12-port sector antenna, 4x 698–896 and 8x 1695–2360 MHz, 65° HPBW, 6x RET.

- Features broadband Low Band (698-896 MHz) and High Band (1695-2360 MHz) arrays for 4T4R (4X MIMO) capability for Band 14, AWS, PCS and WCS applications.
- Independent tilt for all arrays.
- Array configuration provides capability for 4T4R (4x MIMO) on Low band and Dual 4T4R (4x MIMO) on High band
- Optimized SPR performance across all operating bands
- Excellent wind loading characteristics

General Specifications

Antenna Type	Sector
Band	Multiband
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Performance Note	Outdoor usage | Wind loading figures are validated by wind tunnel measurements described in white paper WP-112534-EN
Radome Material	Fiberglass, UV resistant
Radiator Material	Low loss circuit board
Reflector Material	Aluminum
RF Connector Interface	4.3-10 Female
RF Connector Location	Bottom
RF Connector Quantity, high band	8
RF Connector Quantity, low band	4
RF Connector Quantity, total	12

Remote Electrical Tilt (RET) Information

RET Hardware	CommRET v2
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male
Input Voltage	10–30 Vdc
Internal RET	High band (4) | Low band (2)
Power Consumption, idle state, maximum	1 W
Power Consumption, normal conditions, maximum	8 W

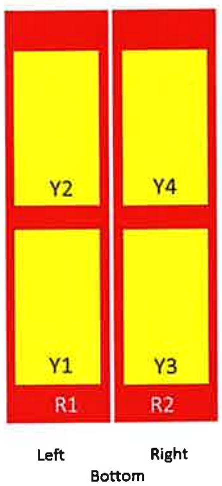
NNH4-65B-R6

Protocol	3GPP/AISG 2.0 (Multi-RET)

Dimensions

Width	498 mm | 19.606 in
Depth	197 mm | 7.756 in
Length	1828 mm | 71.969 in
Net Weight, without mounting kit	37.7 kg | 83.114 lb

Array Layout

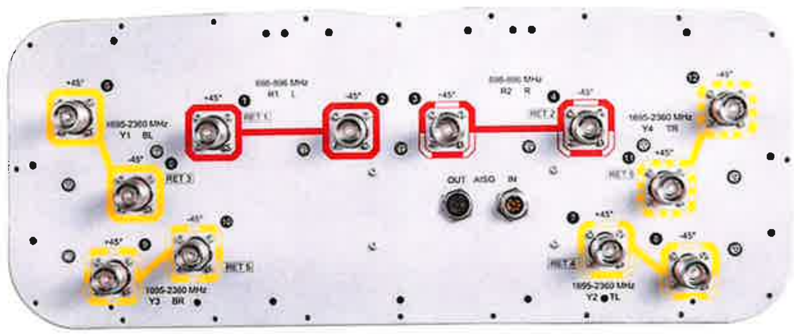


Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-896	1-2	1	CPxxxxxxxxxxxxxxxxmm.1
R2	698-896	3-4	2	CPxxxxxxxxxxxxxxxxmm.2
Y1	1695-2360	5-6	3	CPxxxxxxxxxxxxxxxxmm.3
Y2	1695-2360	7-8	4	CPxxxxxxxxxxxxxxxxmm.4
Y3	1695-2360	9-10	5	CPxxxxxxxxxxxxxxxxmm.5
Y4	1695-2360	11-12	6	CPxxxxxxxxxxxxxxxxmm.6

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

Port Configuration

NNH4-65B-R6



Electrical Specifications

Impedance	50 ohm
Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Polarization	±45°
Total Input Power, maximum	900 W @ 50 °C

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2180**	**2300–2360**
Gain, dBi	14.4	15	15.7	16.3	16.5	16.9
Beamwidth, Horizontal, degrees	69	65	58	60	60	58
Beamwidth, Vertical, degrees	12	10.5	11.2	10.4	9.8	8.8
Beam Tilt, degrees	2–14	2–14	2–14	2–14	2–14	2–14
USLS (First Lobe), dB	16	18	18	19	19	17
Front-to-Back Ratio at 180°, dB	28	32	33	38	35	37
Isolation, Cross Polarization, dB	25	25	25	25	25	25
Isolation, Inter-band, dB	25	25	25	25	25	25
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

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PIM, 3rd Order, 2 x 20 W, dBc	-150	-150	-150	-150	-150	-150
Input Power per Port at 50°C, maximum, watts	300	300	250	250	250	200

Electrical Specifications, BASTA

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2180**	**2300–2360**
Gain by all Beam Tilts, average, dBi	14	14.7	15.2	16	16.1	16.5
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.6	±0.8	±0.5	±0.4	±0.5
Gain by Beam Tilt, average, dBi	2 ° | 14.1 8 ° | 14.1 14 ° | 13.7	2 ° | 14.8 8 ° | 14.8 14 ° | 14.3	2 ° | 15.2 8 ° | 15.2 14 ° | 15.0	2 ° | 16.0 8 ° | 16.0 14 ° | 15.9	2 ° | 16.1 8 ° | 16.2 14 ° | 16.0	2 ° | 16.5 8 ° | 16.4 14 ° | 16.4
Beamwidth, Horizontal Tolerance, degrees	±3.7	±4.0	±5.7	±1.8	±2.8	±6.7
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.9	±0.8	±0.5	±0.6	±0.4
USLS, beampeak to 20° above beampeak, dB	16	16	18	19	17	16
Front-to-Back Total Power at 180° ± 30°, dB	21	21	28	32	28	28
CPR at Boresight, dB	23	24	15	21	21	17
CPR at Sector, dB	10	5	9	8	7	9

Mechanical Specifications

Effective Projective Area (EPA), frontal	0.64 m² | 6.889 ft²
Effective Projective Area (EPA), lateral	0.22 m² | 2.368 ft²
Wind Loading @ Velocity, frontal	685.0 N @ 150 km/h (154.0 lbf @ 150 km/h)
Wind Loading @ Velocity, lateral	232.0 N @ 150 km/h (52.2 lbf @ 150 km/h)
Wind Loading @ Velocity, maximum	889.0 N @ 150 km/h (199.9 lbf @ 150 km/h)
Wind Loading @ Velocity, rear	564.0 N @ 150 km/h (126.8 lbf @ 150 km/h)
Wind Speed, maximum	241 km/h | 149.75 mph

Packaging and Weights

Width, packed	608 mm | 23.937 in
Depth, packed	352 mm | 13.858 in
Length, packed	2010 mm | 79.134 in
Weight, gross	53 kg | 116.845 lb

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NNH4-65B-R6

Regulatory Compliance/Certifications

Agency	Classification
CHINA-ROHS	Above maximum concentration value
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
ROHS	Compliant/Exempted

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

COMMSCOPE®

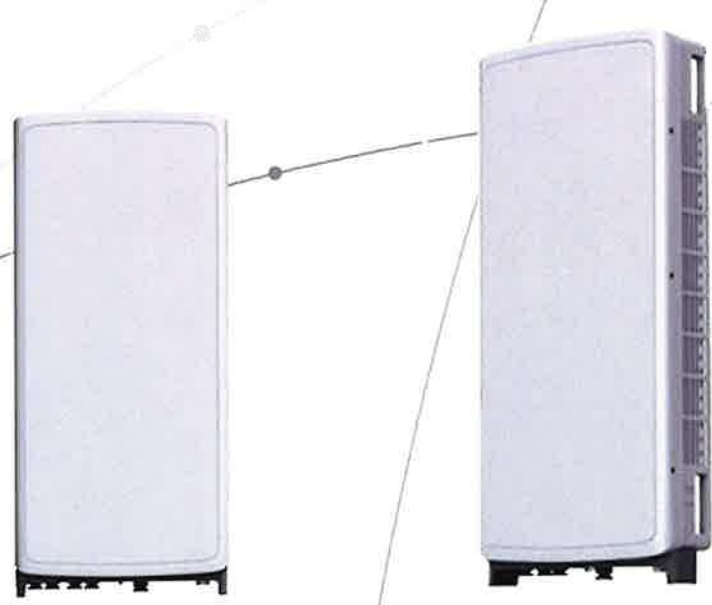
SAMSUNG

SAMSUNG C-Band 64T64R Massive MIMO Radio

for High Capacity and Wide Coverage

Samsung C-Band 64T64R Massive MIMO Radio enables mobile operators to increase coverage range, boost data speeds and ultimately offer enriched 5G experiences to users in the U.S..

Model Code : MT6407-77A



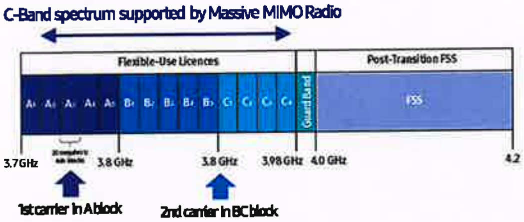
Points of Differentiation

Wide Bandwidth

With capability to support up to 2 CC carrier configuration, Samsung C-Band massive MIMO Radio supports 200 MHz bandwidth in the C-Band spectrum.

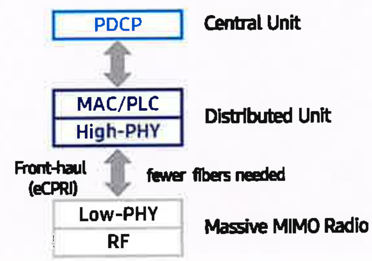
Samsung C-Band massive MIMO Radio covers the entire C-Band 280 MHz spectrum, so it can meet the operator's needs in current A block and future B/C blocks

C-Band spectrum supported by Massive MIMO Radio



Future Proof Product

Samsung C-Band 64T64R Massive MIMO radio supports not only CPRI but also eCPRI as front-haul interface.
It enables operators can cut down on OPEX/CAPEX by reducing front-haul bandwidth through low layer split and using ethernet based higher efficient line.



Enhanced Performance

C-Band massive MIMO Radio creates sharp beams and extends networks' coverage on the critical mid-band spectrum using a large number of antenna elements and high output power to boost data speeds.

This helps operators reduce their CAPEX as they now need less products to cover the same area than before.

Furthermore, as C-Band massive MIMO Radio supports MU-MIMO(Multi-user MIMO), it enables to increase user throughput by minimizing interference.

Well Matched Design

Samsung C-Band Massive MIMO radio utilizes 64 antennas, supports up to 280MHz bandwidth, and delivers a 200W output power. despite the above advanced performance, the Radio has a compact size of 50.9L and 79.4lbs. This makes it easy to install the Radio.

It is designed to look solid and compact, with a low profile appearance so that, when installed, harmonizes well with the surrounding environment..

Technical Specifications

Item	Specification
Tech	NR
Band	n77
Frequency Band	3700 - 3980 MHz
EIRP	78.5dBm (53.0 dBm+25.5 dBi)
IBW/OBW	280 MHz / 200 MHz
Installation	Pole/Wall
Size/ Weight	16.06 x 35.06 x 5.51 inch (50.86L)/ 79.4 lbs

SAMSUNG

About Samsung Electronics Co., Ltd.

Samsung inspires the world and shapes the future with transformative ideas and technologies. The company is redefining the worlds of TVs, smartphones, wearable devices, tablets, digital appliances, network systems, and memory, system LSI, foundry and LED solutions.

129 Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, Korea

[CBRS] Clip-on Antenna Specifications

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

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

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

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

SAMSUNG

AWS/PCS MACRO RADIO

DUAL-BAND AND HIGH POWER FOR MACRO COVERAGE

Samsung's future proof dual-band radio is designed to help effectively increase the coverage areas in wireless networks. This AWS/PCS 4T4R dual-band radio has 4Tx/4Rx to 2Tx/2Rx RF chains options and a total output power of 320W, making it ideal for macro sites.

Model Code	RF4439d-25A

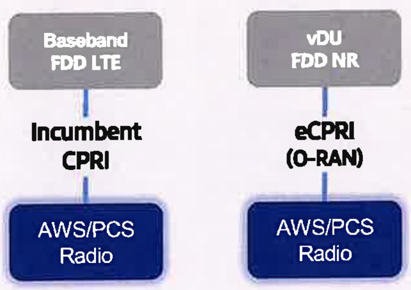
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

Samsung's AWS/PCS macro radio can support each incumbent CPRI interface as well as advanced eCPRI interfaces. This feature provides installable options for both legacy LTE networks and added NR networks.



O-RAN Compliant

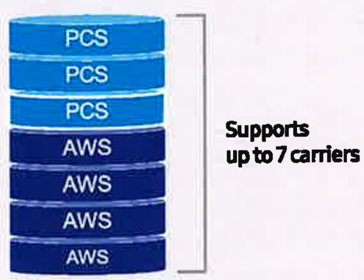
A standardized O-RAN radio can help in implementing cost-effective networks, which are capable of sending more data without compromising additional investments.

Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.

Optimum Spectrum Utilization

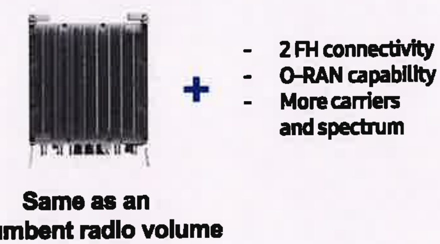
The number of required carriers varies according to site (region). Supporting many carriers is essential for using all frequencies that the operator has available.

The new AWS/PCS dual-band radio can support up to 3 carriers in the PCS (1.9GHz) band and 4 carriers in the AWS (2.1GHz) band, respectively.



Brand New Features in a Compact Size

Samsung's AWS/PCS macro radio offers several features, such as dual connectivity for baseband for both CDU and vDU, O-RAN capability, more carriers and an enlarged PCS spectrum, combined into an incumbent radio volume of 36.8L.



Technical Specifications

Item	Specification
Tech	LTE / NR
Brand	B25(PCS), B66(AWS)
Frequency Band	DL: 1930 – 1995MHz, UL: 1850 – 1915MHz DL: 2110 – 2200MHz, UL: 1710 – 1780MHz
RF Power	(B25) 4 × 40W or 2 × 60W (B66) 4 × 60W or 2 × 80W
IBW/OBW	(B25) 65MHz / 30MHz (B66) DL 90MHz, UL 70MHz / 60MHz
Installation	Pole, Wall
Size/ Weight	14.96 x 14.96 x 10.04inch (36.8L) / 74.7lb

SAMSUNG

700/850MHZ MACRO RADIO

DUAL-BAND AND HIGH POWER FOR MACRO COVERAGE

Samsung's future proof dual-band radio is designed to help effectively increase the coverage areas in wireless networks. This 700/850MHz 4T4R dual-band radio has 4Tx/4Rx to 2Tx/2Rx RF chains options and a total output power of 320W, making it ideal for macro sites.

Model Code	RF4440d-13A

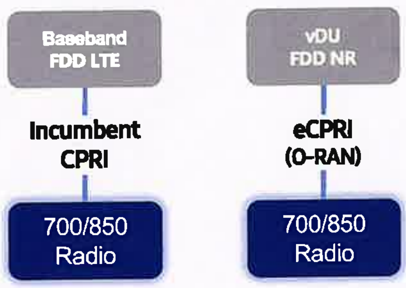
Homepage
samsungnetworks.com

Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

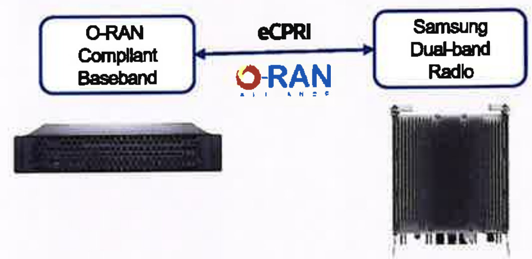
Samsung's 700/850MHz macro radio can support each incumbent CPRI interface as well as an advanced eCPRI interface. This feature provides installable options for both legacy LTE networks and added NR networks.



O-RAN Compliant

A standardized O-RAN radio can help when implementing cost-effective networks because it is capable of sending more data without compromising additional investments.

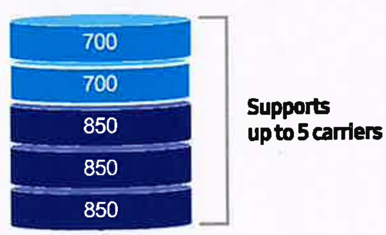
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



Optimum Spectrum Utilization

The number of required carriers varies according to site (region). The ability to support many carriers is essential for using all frequencies that the operator has available.

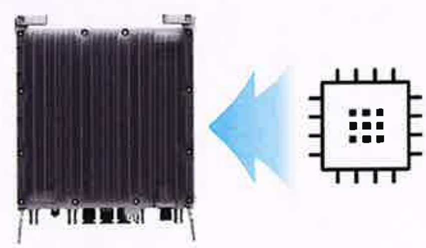
The new 700/850MHz dual-band radio can support up to 2 carriers in the B13 (700MHz) band and 3 carriers in the B5 (850MHz) band, respectively.



Secured Integrity

Access to sensitive data is allowed only to authorized software.

The Samsung radio's CPU can protect root of trust, which is credential information to verify SW integrity, and secure storage provides access control to sensitive data by using dedicated hardware (TPM).



Technical Specifications

Item	Specification
Tech	LTE / NR
Brand	B13(700MHz), B5(850MHz)
Frequency Band	DL: 746 – 756MHz, UL: 777 – 787MHz DL: 869 – 894MHz, UL: 824 – 849MHz
RF Power	(B13) 4 × 40W or 2 × 60W (B5) 4 × 40W or 2 × 60W
IBW/OBW	(B13) 10MHz / 10MHz (B5) 25MHz / 25MHz
Installation	Pole, Wall
Size/ Weight	14.96 x 14.96 x 9.05inch (33.2L) / 70.33 lb

Specifications

The table below outlines the main specifications of the RRH.

Table 1. Specifications

Item	RT4401-48A
Air Technology	LTE
Band	Band 48 (3.5 GHz)
Operating Frequency (MHz)	3550 to 3700
RF Chain	4TX/4RX
Input Power	-48 V DC (-38 to -57 V DC, 1 SKU), with clip-on AC-DC converter (Option)
Dimension (W × D × H) (mm)	8.55 in. (217.4) × 4.15 in. (105.5) × 13.91 in. (353.5) * RRH only 11.39 in. (289.4) × 5.45 in. (138.5) × 16.16 in. (410.5) * with Clip-on antenna, AC-DC power unit
Cooling	Natural convection
Unwanted Emission	3GPP 36.104 Category A
	[B48]: FCC 47 CFR 96.41 e)
Spectrum Analyzer	TX/RX Support
Antenna Type	Integrated (Clip-on) antenna (Option), External antenna (Option)
Operating Humidity	5 to 100 [%] (RH), condensing, not to exceed 30 g/m^3 absolute humidity
Altitude	-60 to 1,800 m
Earthquake	Telcordia Earthquake Risk Zone4 (Telcordia GR-63-CORE)
Vibration in Use Transportation Vibration	Office Vibration Transportation Vibration
Noise	Fanless (natural convection cooling)
Wind Resistance	Telcordia GR-487-CORE, Section 3.34
EMC	FCC Title 47, CFR Part 96
Safety	UL 60950-1 2nd ED

Item	RT4401-48A
	UL 62368-1 UL 60950-22
RF	FCC Title 47, CFR Part 96

The table below outlines the AC/DC power unit specifications of the RRH system.

ATTACHMENT 2

Structural Components
Bringing It All Together.

Structural Components, LLC
1870 West 64th Lane, Unit A
Denver, CO 80221

Voice: 866-386-7622

May 16, 2023

BST Management, LLC
352 Park Street
Suite 106
North Reading, MA 01864

Re: Comprehensive Structural Analysis Report

Structure:	80.4ft Self-Supporting Tower with 10ft Extension
Site Address:	97 High Street, Portland, Connecticut 06480 (Middlesex County) Latitude: 41.5807°N, Longitude: 72.6238°W
Site Name:	BST Management, LLC – Portland Verizon – Portland
Site Number:	BST Management, LLC – CT-1680 Verizon – 469381
SC Number:	230262
Status:	**Structure Passes with Modifications (80% Capacity)** **Foundation Passes**

Per your request, Structural Components, LLC has completed a structural analysis for the above referenced project to verify the tower's compliance to the following design criteria:

Standard:	TIA-222-H *Structural Standard for Antenna Supporting Structures and Antennas*
Building Code:	2021 International Building Code w/Amendments 2022 Connecticut State Building Code
Design Basic Wind Speed without Ice:	120 mph 3-second gust V_{ULT}
Design Basic Wind Speed with Ice:	50 mph 3-second gust
Ice Thickness:	1" radial
Serviceability Basic Wind Speed:	60 mph 3-second gust
Exposure Category:	C
Topographic Category:	1
Ground Elevation:	345ft
Risk Category:	II
Seismic Site Class:	D, S_s=0.208, S_1=0.056
Seismic Design Category:	B

Please refer to the following structural analysis report, which gives complete details of the tower loading, results, information provided, and necessary assumptions.

We trust you find this report satisfactory. Please do not hesitate to contact us if you should have any questions or concerns.

Best Regards,
Structural Components LLC

Wesley Culver
Engineering Manager

/TR

Michael Deboer, P.E.
Connecticut P.E. # 0018022

STATE OF CONNECTICUT
MICHAEL T. DE BOER
No. 18022
PROFESSIONAL ENGINEER
5/18/23

1 LOADING CONFIGURATION

The following antennas, mounts, transmission lines, and other appurtenances were considered for the structural analysis.

Elevation (ft)		Equipment	Feedlines	Notes
Mount	**Equip**			
90.5	90.5	(1) 5/8" x 6' Lightning Rod	---	Existing
90.0	**90.0**	**(3) CommScope NNH4-65B-R6 Panels** **(3) Samsung XXDWMM-12.5-65-8TCBRS Panels** **(3) Samsung MT6407-77A Panels** **(3) Samsung CBRS RRH - RT4401-48A RRUs** **(3) Samsung RF4439d-25A RRUs** **(3) Samsung RF4440d-13A RRUs** **(1) CommScope FE-16148-OVP-B12 TMA** **(3) SitePro VFA12-HD Sector Frame Mounts**	**(2) 6x12 Hybrid**	**Verizon Proposed**
77.0	77.0	(1) L6" x 6" x 7/16" Ring Mount	---	Existing
76.7[4]	78.7	(3) Ericsson RRUS 32 B2 (1) Raycap DC6-48-60-18-8F SSD	(6) 7/8" TX (3) 0.92" OD DC (4) 3/4" OD DC (1) 3/8" Fiber (1) 1/2" Fiber	AT&T Final
	77.2	(3) Ericsson RRUS 32 B30[3] (3) Ericsson RRUS 32 B66A[3] (1) Raycap DC6-48-60-18-8F SSD		
	76.7	(3) CCI TPA65R-BU6DA-K Panels (3) Ericsson AIR6449 B77D Panels (3) Ericsson AIR6419 B77G Panels (3) CCI DMP65R-BU6DA Panels (3) Ericsson RRUS 4478 B14 (3) Ericsson RRUS 4449 B5/B12 (1) Raycap DC9-48-60-24-8C-EV SSDs (3) 12' Sector Frame Mounts		
75.0	75.0	(1) L6" x 6" x 7/16" Ring Mount	---	Existing
73.0	73.0	(1) 2-3/8" x 8' Pipe Mount		
67.7	67.7	(1) L6" x 6" x 7/16" Ring Mount		

1) Elevations reference centerline of panel, yagi, mounts, and dish antennas, and base of whip antennas, in relation to the base of the tower.
2) Refer to the feed line diagram and analysis output in Appendix A for the location and orientation of feedlines and equipment.
3) Secondary appurtenances such as TMAs, Diplexers, and RRUs are considered to be installed directly behind panel antennas for frontal area shielding. See analysis output for magnitude of individual shielding.
4) Elevations adjusted from Structural Components Mapping dated 03/15/2022, Job # 220142.

2 RESULTS

The analysis was performed using tnxTower v8.1.1.0, a structural analysis program developed by Tower Numerics, Inc. specifically for the communication tower industry.

2.1 TOWER MEMBER STRESS LEVELS

The tower has the following stress ratios in its structural members.

Elev. (ft)	Member	Stress Ratio*
0 – 90.4	Legs	0.80
0 – 90.4	Bracing	0.64
0 – 90.4	Connections	0.65

Stress ratio (SR) criteria:
SR ≤ 1.00 is completely within code limits.
SR ≤ 1.05 is considered within acceptable tolerance of code limits.
SR > 1.05 is outside acceptable tolerance of code limits and requires structural modifications.
* Seismic analysis for similar structures under similar loading conditions has been shown to produce significantly lower stress ratios than wind and ice. Therefore, seismic analysis has not been included in the current analysis.

2.2 FOUNDATION REACTIONS

The reactions listed below are for the design wind speed listed. Reactions are factored loads.

Reaction Type	Current Wind Reactions	Current Iced Reactions	Foundation Status
Moment (ft-kips)	1,273.9	322.1	Passes*
Shear (kips)	22.8	5.6	
Axial (kips)	21.9	43.8	
Leg Compression (kips)	73.4	--	
Leg Uplift (kips)	65.2	--	
Leg Shear (kips)	11.7	--	

* See Appendix A for foundation calculations.

2.3 TOWER DEFLECTION

The tower deflections have been reviewed and are believed to be acceptable for the proposed equipment. The carrier(s) should review the deflections for the service wind condition included in Appendix A for compatibility with their equipment.

3 PROVIDED INFORMATION AND ASSUMPTIONS

The following information was directly used to generate this report, and can be found in Appendix B.

Document	Author	Date	Reference
Collocation Application	Verizon	11/08/2021	CT-1680
Mount Analysis	Centek Engineering	05/11/2023	22017.06
Collocation Application	AT&T	08/16/2022	CT-1680
Collocation Application EPA	AT&T	08/17/2022	CT-1680
Mount Analysis	Hudson Design Group, LLC	01/21/2022	MRCTB055774
Structural Analysis Report – AT&T	GDP	12/12/2017	2018701.10
Tower Design Drawings	Empire Telecom	12/13/2017	10035005
Construction Drawings	Centek	10/19/2017	17004.51
Construction Drawings	Centek	05/02/2018	17004.51
Self Supporting Tower Mapping Report	Structural Components, LLC	03/15/2022	220142
TIA Inspection + L&A Mapping Report	Structural Components, LLC	03/15/2022	220142
Foundation NDT Mapping Report	GDP	03/06/2017	217702.58
Geotechnical Report	GDP	03/06/2017	2017702.58

The following assumptions were made in order to complete the analysis. These assumptions must be checked. If they do not accurately represent the existing or proposed tower, foundation, soil, and loading conditions, we must be notified so that we can make the appropriate changes to our analysis, conclusions, and recommendations.

1. The tower and foundation are in good condition with no corrosion, damage or fatiguing issues which could reduce the carrying capacity of the tower.
2. All welds and connections are assumed to develop at least the member capacity, unless determined otherwise and explicitly stated in this report.
3. All prior structural modifications, if any, are assumed to be as per date supplied/ available, to be properly installed and to be fully effective.
4. The following assumptions regarding member minimum material or type apply to this structure, unless otherwise noted in analysis:
   - Angle Legs: A36
   - Angle Bracing: A36
   - Splice Bolts: A307
   - Gusset Plates: A36
   - Brace Bolts: A325N
5. The feedline and appurtenance configuration is as stated in the report. All antennas, coax, cables and waveguide cables are assumed to be properly installed and supported as per manufacturer requirement.
6. The support mounts and/or platforms are not analyzed and are considered adequate to support the loading.
7. All mounting systems connect at tower bracing points. Local stresses are not considered unless noted otherwise in analysis.
8. Some assumptions are made regarding antenna and mount sizes and their projected areas based on a best interpretation of the data supplied and a best knowledge of antenna type and industry practice.
9. The soil parameters are as per data supplied, or as assumed, and stated in the calculations.

4 REQUIRED STRUCTURAL MODIFICATIONS

Provided the assumptions outlined are accurate, we recommend the following modifications:

1. Install new L1-3/4" x 1-3/4" x 3/16" sub diagonals and sub horizontals from 0-13.5ft.
2. Upgrade top girt at 20.0ft from an L2" x 2-1/2" x 3/16" to a L2" x 2-1/2" x 1/4"
3. Install new 10ft tower extension.
4. Install new safety climb up climbing leg to rest platform and up inside of face to top.

Once the above upgrades are completed, the tower will be in structural compliance with the proposed antenna installation.

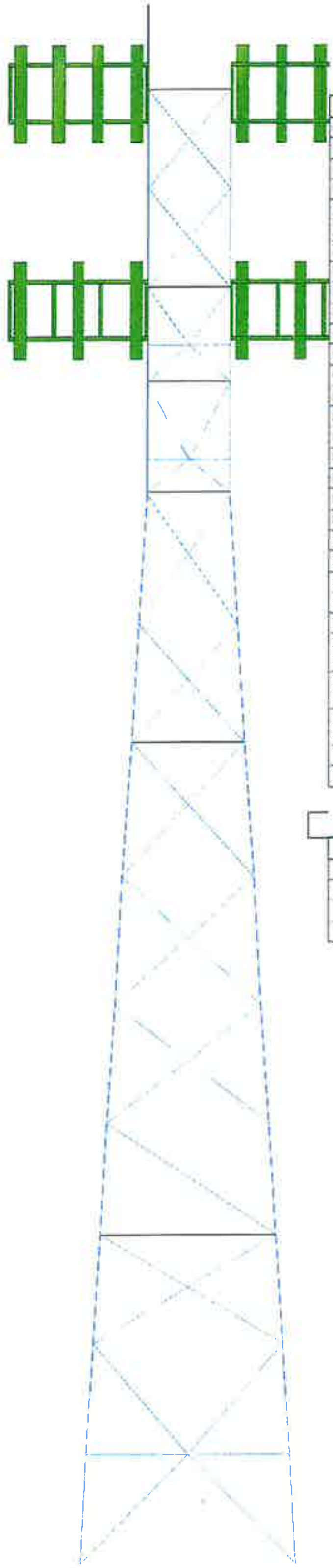
5 CONCLUSIONS

With the loadings listed and the installed structural modifications as outlined, the tower and foundations satisfy the structural strength requirements of the standards and codes listed.

APPENDIX A

Tower Profile and Calculations

Section	Elevation	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Bottom Girts	Horizontals	Red. Horizontals	Red. Diagonals	Inner Bracing	Face Width (ft)	# Panels @ (ft)	Weight (lb)
T1	90.3 ft – 78.1 ft	L4x4x1/4	A36	L2x2x1/4	A36	L2 1/2x2 1/2x3/16	N.A.	N.A.			N.A.	5.0416	2 @ 6.08292	[illegible]
T2	78.1 ft – 74.6 ft			A		D					G		1 @ 3.5	448.4
T3	74.6 ft – 72.3 ft			L2 1/2x2 1/2x3/16		N.A.		D			N.A.		H	309.2
T4	72.3 ft – 67.6 ft					2L4x4x3/8		N.A.					1 @ 4.75	733.1
T5	67.6 ft – 65.4 ft	L4x4x3/8		B			E	D			G		1 @ 2	449.5
T6	65.4 ft – 57.5 ft					N.A.					N.A.		1 @ 7.917	[illegible]
T7	57.5 ft – 50.3 ft								N.A.	N.A.		6.0147	1 @ 7.25	497.4
T8	50.3 ft – 42.0 ft			L2x2 1/2x3/16		L2 1/2x2 1/2x3/16					L2 1/2x2x3/16	6.9059	1 @ 8.292	792.6
T9	42.0 ft – 34.2 ft	L5x5x3/8						N.A.				7.9252	1 @ 7.792	638.9
T10	34.2 ft – 26.9 ft					N.A.	N.A.				N.A.	8.883	1 @ 7.292	620.0
T11	26.9 ft – 20.1 ft											9.7793	1 @ 6.792	605.0
T12	20.1 ft – 13.4 ft			C		L2x2 1/2x1/4					L2x2x3/16	10.6142	1 @ 6.688	819.8
T13	13.4 ft – 6.7 ft	L5x5x5/16										11.4363		[illegible]
T14	6.7 ft – 0.0 ft			L3x3x5/16		N.A.		F	L1 3/4x1 3/4x3/16	L1 3/4x1 3/4x3/16	N.A.	12.2597	2 @ 6.7075	979.7
	0.0 ft											13.083		9055.0



DESIGNED APPURTENANCE LOADING

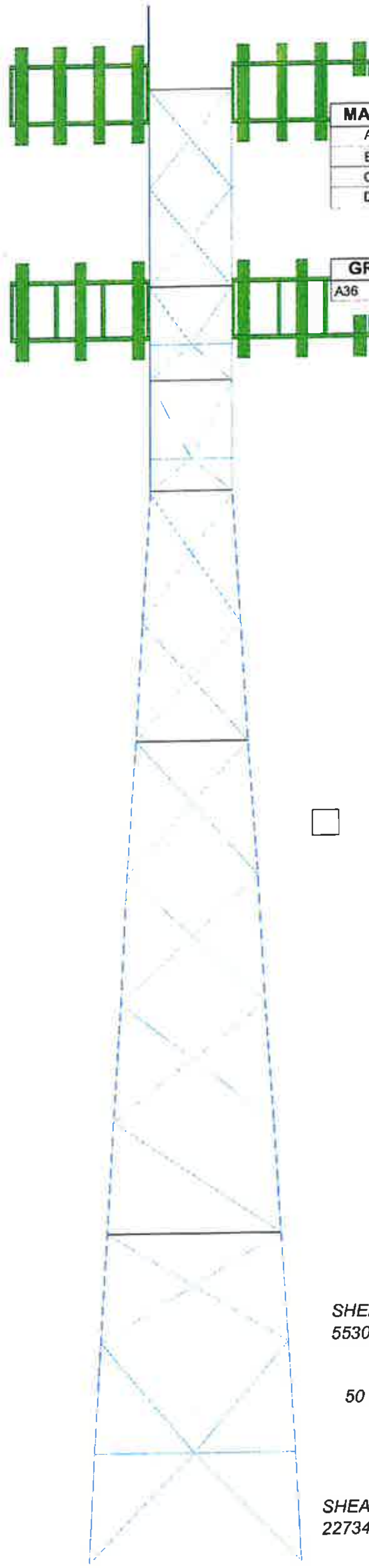
TYPE	ELEVATION	TYPE	ELEVATION
6' x 5/8" Lighting Rod	90.5	RRUS-32 (ATI)	76.7
NNH4-65B-R6 (Verizon)	90	RRUS-32 (Full Frontal Shielding) (ATI)	76.7
NNH4-65B-R6 (Verizon)	90	RRUS-32 (Full Frontal Shielding) (ATI)	76.7
NNH4-65B-R6 (Verizon)	90	RRUS-32 (Full Frontal Shielding) (ATI)	76.7
XXDWMM-12.5-65-8TCBRS (Verizon)	90	DC6-48-60-18-8F (ATI)	76.7
XXDWMM-12.5-65-8TCBRS (Verizon)	90	DC6-48-60-18-8F (ATI)	76.7
XXDWMM-12.5-65-8TCBRS (Verizon)	90	TPA65R-BU6DA-K (ATI)	76.7
MT6407-77A (Verizon)	90	TPA65R-BU6DA-K (ATI)	76.7
MT6407-77A (Verizon)	90	TPA65R-BU6DA-K (ATI)	76.7
MT6407-77A (Verizon)	90	AIR6449 B77D (ATI)	76.7
CBRS RT4401 RRH (Verizon)	90	AIR6449 B77D (ATI)	76.7
CBRS RT4401 RRH (Verizon)	90	AIR6449 B77D (ATI)	76.7
CBRS RT4401 RRH (Verizon)	90	AIR6419 B77G (ATI)	76.7
RF4439d-25A (Verizon)	90	AIR6419 B77G (ATI)	76.7
RF4439d-25A (Verizon)	90	AIR6419 B77G (ATI)	76.7
RF4439d-25A (Verizon)	90	DMP65R-BU6DA (ATI)	76.7
RF4440d-13A (Verizon)	90	DMP65R-BU6DA (ATI)	76.7
RF4440d-13A (Verizon)	90	DMP65R-BU6DA (ATI)	76.7
RF4440d-13A (Verizon)	90	4478 RRU (ATI)	76.7
FE-16148-OVP-B12 (Verizon)	90	4478 RRU (ATI)	76.7
(4) 2-3/8" x 8' Pipe Mount (Verizon)	90	4478 RRU (ATI)	76.7
(4) 2-3/8" x 8' Pipe Mount (Verizon)	90	4449 RRU (ATI)	76.7
(4) 2-3/8" x 8' Pipe Mount (Verizon)	90	4449 RRU (ATI)	76.7
(3) SitePro VFA12-HD (Verizon)	90	4449 RRU (ATI)	76.7
Ring Mount	77	DC9-48-60-24-8C-EV (ATI)	76.7
RRUS-32 (Full Frontal Shielding) (ATI)	76.7	(3) 12' Sector Frames (ATI)	76.7
RRUS-32 (Full Frontal Shielding) (ATI)	76.7	Ring Mount	75
RRUS-32 (Full Frontal Shielding) (ATI)	76.7	2-3/8" x 8' Pipe Mount	73
RRUS-32 (ATI)	76.7	Ring Mount	67.7
RRUS-32 (ATI)	76.7		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L2x2 1/2x3/16	E	L3x3x3/16
B	L2x2x3/16	F	L1 3/4x1 3/4x3/16
C	L2 1/2x2 1/2x3/16	G	L2 1/2x2x3/16
D	L4x3 1/2x1/4	H	1 @ 2.25

Structural Components 1870 W. 64th Lane, Unit A Denver, CO Phone: 866-386-7622 FAX:	Job: **230262**		
	Project: ***Portland (CT-1680)***		
	Client: BST Management, LLC	Drawn by: wculver	App'd:
	Code: TIA-222-H	Date: 05/16/23	Scale: NTS
	Path:		Dwg No. E-1

Section	Elevation	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Bottom Girts	Horizontals	Red. Horizontals	Red. Diagonals	Inner Bracing	Face Width (ft)	# Panels @ (ft)	Weight (lb)
T1	90.3 ft – 78.1 ft	L4x4x1/4	A36	L2x2x1/4	A36	L2 1/2x2 1/2x3/16	N.A.	N.A.	N.A.	N.A.	N.A.	5.0416	2 @ 6.08292	789.4
T2	78.1 ft – 74.6 ft	L4x4x3/8	A36	A	A36	D	N.A.	N.A.	N.A.	N.A.	G		1 @ 3.5	445.4
T3	74.6 ft – 72.3 ft	L4x4x3/8	A36	L2 1/2x2 1/2x3/16	A36	N.A.		D	N.A.	N.A.	N.A.		H	309.2
T4	72.3 ft – 67.6 ft	L4x4x3/8	A36	L2 1/2x2 1/2x3/16	A36	2L4x4x3/8		N.A.	N.A.	N.A.	N.A.		1 @ 4.75	733.1
T5	67.6 ft – 65.4 ft	L4x4x3/8	A36	B	A36		E	D	N.A.	N.A.	G		1 @ 2	449.5
T6	65.4 ft – 57.5 ft	L4x4x3/8	A36		A36	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.		1 @ 7.917	502.3
T7	57.5 ft – 50.3 ft	L4x4x3/8	A36		A36	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	6.0147	1 @ 7.25	497.4
T8	50.3 ft – 42.0 ft	L5x5x3/8	A36	L2x2 1/2x3/16	A36	L2 1/2x2 1/2x3/16	N.A.	N.A.	N.A.	N.A.	L2 1/2x2x3/16	6.9059	1 @ 8.292	792.8
T9	42.0 ft – 34.2 ft	L5x5x3/8	A36	L2x2 1/2x3/16	A36	L2 1/2x2 1/2x3/16	N.A.	N.A.	N.A.	N.A.	L2 1/2x2x3/16	7.9252	1 @ 7.792	638.9
T10	34.2 ft – 26.9 ft	L5x5x3/8	A36	L2x2 1/2x3/16	A36	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	8.883	1 @ 7.292	620.6
T11	26.9 ft – 20.1 ft	L5x5x3/8	A36	L2x2 1/2x3/16	A36	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	9.7793	1 @ 6.792	605.0
T12	20.1 ft – 13.4 ft	L5x5x3/8	A36	C	A36	L2x2 1/2x1/4	N.A.	N.A.	N.A.	N.A.	L2x2x3/16	10.6142	1 @ 6.688	819.8
T13	13.4 ft – 6.7 ft	L5x5x5/16	A36	L3x3x5/16	A36	N.A.	N.A.	N.A.	L1 3/4x1 3/4x3/16	L1 3/4x1 3/4x3/16	N.A.	11.4363	2 @ 6.7075	653.8
T14	6.7 ft – 0.0 ft	L5x5x5/16	A36	L3x3x5/16	A36	N.A.	N.A.	F	L1 3/4x1 3/4x3/16	L1 3/4x1 3/4x3/16	N.A.	12.2597	2 @ 6.7075	979.7
Base												13.083		9055.0



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L2x2 1/2x3/16	E	L3x3x3/16
B	L2x2x3/16	F	L1 3/4x1 3/4x3/16
C	L2 1/2x2 1/2x3/16	G	L2 1/2x2x3/16
D	L4x3 1/2x1/4	H	1 @ 2.25

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A36	36 ksi	58 ksi			

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 74343 lb
SHEAR: 12862 lb

UPLIFT: -64753 lb
SHEAR: 11145 lb

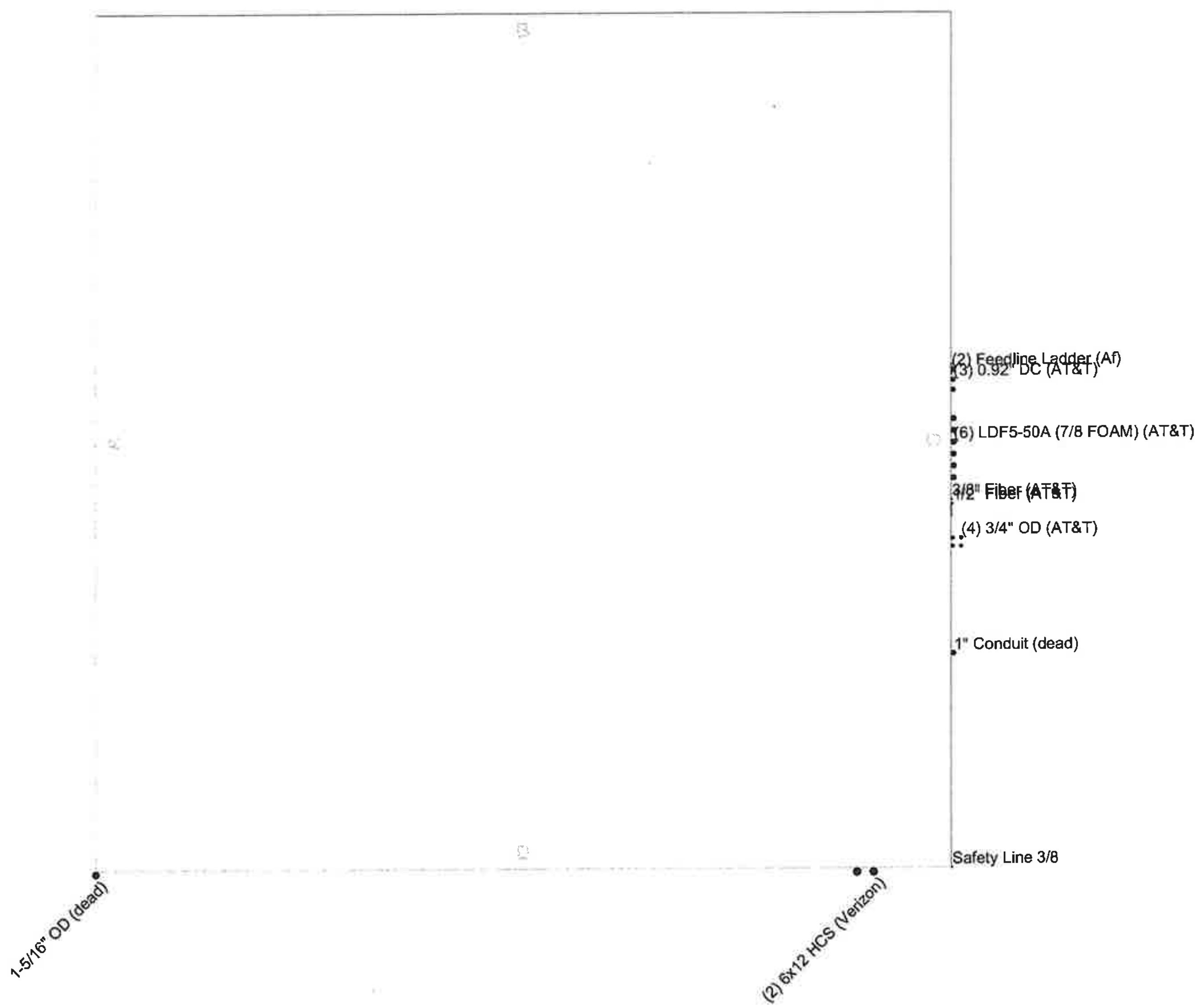
AXIAL 43727 lb
SHEAR 5530 lb
MOMENT 322058 lb-ft
TORQUE 2925 lb-ft
50 mph WIND - 1.0000 in ICE

AXIAL 21842 lb
SHEAR 22734 lb
MOMENT 1274515 lb-ft
TORQUE 9814 lb-ft
REACTIONS - 120 mph WIND

Structural Components 1870 W. 64th Lane, Unit A Denver, CO Phone: 866-386-7622 FAX:	Job: 230262		
	Project: Portland (CT-1680)		
	Client: BST Management, LLC	Drawn by: wculver	App'd:
	Code: TIA-222-H	Date: 05/16/23	Scale: NTS
	Path:		Dwg No. E-1

Feed Line Plan

Round Flat App In Face App Out Face



Structural Components	Job: ***230262***		
1870 W. 64th Lane, Unit A	Project: ***Portland (CT-1680)***		
Denver, CO	Client: BST Management, LLC	Drawn by: wculver	App'd:
Phone: 866-386-7622	Code: TIA-222-H	Date: 05/16/23	Scale: NTS
FAX:	Path:		Dwg No. E-7

Tower Input Data

The main tower is a 4x free standing tower with an overall height of 90.33 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 5.04 ft at the top and 13.08 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

- Tower base elevation above sea level: 345.00 ft.
- Basic wind speed of 120 mph.
- Risk Category II.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.0000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

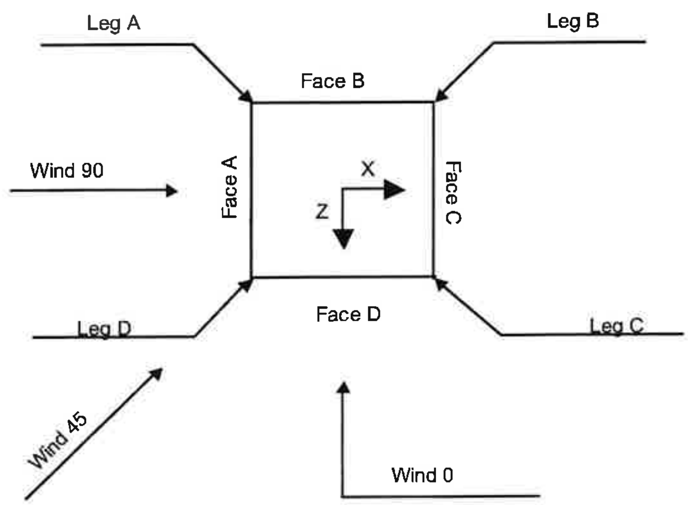
Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
√ Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
SR Members Have Cut Ends
SR Members Are Concentric

Distribute Leg Loads As Uniform
Assume Legs Pinned
Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
√ Use Clear Spans For KL/r
Retension Guys To Initial Tension
Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
Add IBC .6D+W Combination
√ Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Treat Feed Line Bundles As Cylinder
Ignore KL/ry For 60 Deg. Angle Legs

Use ASCE 10 X-Brace Ly Rules
√ Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
√ SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feed Line Torque
√ Include Angle Block Shear Check
Use TIA-222-H Bracing Resist. Exemption
Use TIA-222-H Tension Splice Exemption

Poles

Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets
Pole Without Linear Attachments
Pole With Shroud Or No Appurtenances
Outside and Inside Corner Radii Are Known



Square Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	90.33-78.06			5.04	1	12.27
T2	78.06-74.56			5.04	1	3.50
T3	74.56-72.31			5.04	1	2.25
T4	72.31-67.56			5.04	1	4.75
T5	67.56-65.44			5.04	1	2.13
T6	65.44-57.52			5.04	1	7.92
T7	57.52-50.27			6.01	1	7.25
T8	50.27-41.98			6.91	1	8.29
T9	41.98-34.19			7.93	1	7.79
T10	34.19-26.90			8.88	1	7.29
T11	26.90-20.10			9.78	1	6.79
T12	20.10-13.42			10.61	1	6.69
T13	13.42-6.71			11.44	1	6.71
T14	6.71-0.00			12.26	1	6.71

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	90.33-78.06	6.08	X Brace	No	Yes	1.2500	0.0000
T2	78.06-74.56	3.50	K Brace Up	No	Yes	0.0000	0.0000
T3	74.56-72.31	2.25	K Brace Down	No	Yes	0.0000	0.0000
T4	72.31-67.56	4.75	K Brace Up	No	Yes	0.0000	0.0000
T5	67.56-65.44	2.00	K Brace Down	No	Yes	0.0000	1.5000

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
T6	65.44-57.52	7.92	X Brace	No	No	0.0000	0.0000
T7	57.52-50.27	7.25	X Brace	No	No	0.0000	0.0000
T8	50.27-41.98	8.29	X Brace	No	No	0.0000	0.0000
T9	41.98-34.19	7.79	X Brace	No	No	0.0000	0.0000
T10	34.19-26.90	7.29	X Brace	No	No	0.0000	0.0000
T11	26.90-20.10	6.79	X Brace	No	No	0.0000	0.0000
T12	20.10-13.42	6.69	X Brace	No	No	0.0000	0.0000
T13	13.42-6.71	6.71	K1 Up	No	Yes	0.0000	0.0000
T14	6.71-0.00	6.71	K1 Down	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 90.33-78.06	Equal Angle	L4x4x1/4	A36 (36 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T2 78.06-74.56	Equal Angle	L4x4x3/8	A36 (36 ksi)	Single Angle	L2x2 1/2x3/16	A36 (36 ksi)
T3 74.56-72.31	Equal Angle	L4x4x3/8	A36 (36 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 72.31-67.56	Equal Angle	L4x4x3/8	A36 (36 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 67.56-65.44	Equal Angle	L4x4x3/8	A36 (36 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T6 65.44-57.52	Equal Angle	L4x4x3/8	A36 (36 ksi)	Single Angle	L2x2 1/2x3/16	A36 (36 ksi)
T7 57.52-50.27	Equal Angle	L4x4x3/8	A36 (36 ksi)	Single Angle	L2x2 1/2x3/16	A36 (36 ksi)
T8 50.27-41.98	Equal Angle	L5x5x3/8	A36 (36 ksi)	Single Angle	L2x2 1/2x3/16	A36 (36 ksi)
T9 41.98-34.19	Equal Angle	L5x5x3/8	A36 (36 ksi)	Single Angle	L2x2 1/2x3/16	A36 (36 ksi)
T10 34.19-26.90	Equal Angle	L5x5x3/8	A36 (36 ksi)	Single Angle	L2x2 1/2x3/16	A36 (36 ksi)
T11 26.90-20.10	Equal Angle	L5x5x3/8	A36 (36 ksi)	Single Angle	L2x2 1/2x3/16	A36 (36 ksi)
T12 20.10-13.42	Equal Angle	L5x5x5/16	A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T13 13.42-6.71	Equal Angle	L5x5x5/16	A36 (36 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T14 6.71-0.00	Equal Angle	L5x5x5/16	A36 (36 ksi)	Equal Angle	L3x3x5/16	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 90.33-78.06	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T2 78.06-74.56	Single Angle	L4x3 1/2x1/4	A36	Solid Round		A36

Tower Elevation ft	*Top Girt Type*	*Top Girt Size*	*Top Girt Grade*	*Bottom Girt Type*	*Bottom Girt Size*	*Bottom Girt Grade*
			(36 ksi)			(36 ksi)
T4 72.31-67.56	Double Equal Angle	2L4x4x3/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T5 67.56-65.44	Single Angle		A36 (36 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T8 50.27-41.98	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T12 20.10-13.42	Single Angle	L2x2 1/2x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*No. of Mid Girts*	*Mid Girt Type*	*Mid Girt Size*	*Mid Girt Grade*	*Horizontal Type*	*Horizontal Size*	*Horizontal Grade*
T2 78.06-74.56	None	Flat Bar		A36 (36 ksi)	Single Angle	L4x3 1/2x1/4	A36 (36 ksi)
T3 74.56-72.31	None	Flat Bar		A36 (36 ksi)	Single Angle	L4x3 1/2x1/4	A36 (36 ksi)
T4 72.31-67.56	None	Flat Bar		A36 (36 ksi)	Single Angle	L4x3 1/2x1/4	A36 (36 ksi)
T5 67.56-65.44	None	Flat Bar		A36 (36 ksi)	Single Angle	L4x3 1/2x1/4	A36 (36 ksi)
T13 13.42-6.71	None	Flat Bar		A36 (36 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T14 6.71-0.00	None	Flat Bar		A36 (36 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Secondary Horizontal Type*	*Secondary Horizontal Size*	*Secondary Horizontal Grade*	*Inner Bracing Type*	*Inner Bracing Size*	*Inner Bracing Grade*
T2 78.06-74.56	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T3 74.56-72.31	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T5 67.56-65.44	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T6 65.44-57.52	Solid Round		A36 (36 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T8 50.27-41.98	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T12 20.10-13.42	Solid Round		A36 (36 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T13 13.42-6.71	A36 (36 ksi)	Horizontal (1)	Equal Angle	L1 3/4x1 3/4x3/16	1
		Diagonal (1)	Equal Angle	L1 3/4x1 3/4x3/16	1
T14 6.71-0.00	A36 (36 ksi)	Horizontal (1)	Equal Angle	L1 3/4x1 3/4x3/16	1
		Diagonal (1)	Equal Angle	L1 3/4x1 3/4x3/16	1

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 90.33-78.06	0.00	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 78.06-74.56	0.35	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 74.56-72.31	0.35	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 72.31-67.56	0.58	0.2500	A36 (36 ksi)	1	1	1	36.0000	Third-Pt	36.0000
T5 67.56-65.44	0.58	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 65.44-57.52	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 57.52-50.27	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 50.27-41.98	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T9 41.98-34.19	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T10 34.19-26.90	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T11 26.90-20.10	0.00	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T12 20.10-13.42	0.00	0.3125	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T13 13.42-6.71	0.43	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T14 6.71-0.00	0.43	0.2500	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

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	No	No	1	1	1	1	1	1	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*
90.33-78.06				1	1	1	1	1	1	1
T2	No	No	1	1	1	1	1	1	1	1
78.06-74.56				1	1	1	1	1	1	1
T3	No	No	1	1	1	1	1	1	1	1
74.56-72.31				1	1	1	1	1	1	1
T4	No	No	1	1	1	1	1	1	1	1
72.31-67.56				1	1	1	1	1	1	1
T5	No	No	1	1	1	1	1	1	1	1
67.56-65.44				1	1	1	1	1	1	1
T6	No	No	1	1	1	1	1	1	1	1
65.44-57.52				1	1	1	1	1	1	1
T7	No	No	1	1	1	1	1	1	1	1
57.52-50.27				1	1	1	1	1	1	1
T8	No	No	1	1	1	1	1	1	1	1
50.27-41.98				1	1	1	1	1	1	1
T9	No	No	1	1	1	1	1	1	1	1
41.98-34.19				1	1	1	1	1	1	1
T10	No	No	1	1	1	1	1	1	1	1
34.19-26.90				1	1	1	1	1	1	1
T11	No	No	1	1	1	1	1	1	1	1
26.90-20.10				1	1	1	1	1	1	1
T12	No	No	1	1	1	1	1	1	1	1
20.10-13.42				1	1	1	1	1	1	1
T13	No	No	1	1	1	1	1	1	1	1
13.42-6.71				1	1	1	1	1	1	1
T14 6.71-0.00	No	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	*U*	*Diagonal* *Net Width Deduct* in	*U*	*Top Girt* *Net Width Deduct* in	*U*	*Bottom Girt* *Net Width Deduct* in	*U*	*Mid Girt* *Net Width Deduct* in	*U*	*Long Horizontal* *Net Width Deduct* in	*U*	*Short Horizontal* *Net Width Deduct* in	*U*
T1 90.33-78.06	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 78.06-74.56	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 74.56-72.31	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 72.31-67.56	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 67.56-65.44	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 65.44-57.52	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 57.52-50.27	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 50.27-41.98	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 41.98-34.19	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 34.19-26.90	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T11 26.90-20.10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T12 20.10-13.42	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T13 13.42-6.71	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T14 6.71-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 90.33-78.06	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 78.06-74.56	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 74.56-72.31	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 72.31-67.56	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 67.56-65.44	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 65.44-57.52	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 57.52-50.27	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 50.27-41.98	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 41.98-34.19	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 34.19-26.90	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T11 26.90-20.10	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T12 20.10-13.42	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T13 13.42-6.71	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T14 6.71-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T1 90.33-78.06	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T2 78.06-74.56	4.2500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T3 74.56-72.31	0.0000	0.0000	3.2500	0.0000	0.0000	0.0000	0.0000	0.0000
T4 72.31-67.56	4.2500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T5 67.56-65.44	0.0000	0.0000	3.2500	0.0000	0.0000	0.0000	0.0000	0.0000
T6 65.44-57.52	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T7 57.52-50.27	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T8 50.27-41.98	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T9 41.98-34.19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T10 34.19-26.90	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T11 26.90-20.10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Tower Elevation	*Connection Offsets*							
	Diagonal				*K-Bracing*			
	Vert. Top	*Horiz. Top*	*Vert. Bot.*	*Horiz. Bot.*	*Vert. Top*	*Horiz. Top*	*Vert. Bot.*	*Horiz. Bot.*
ft	in	in	in	in	in	in	in	in
T12 20.10-13.42	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T13 13.42-6.71	0.0000	0.0000	5.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T14 6.71-0.00	0.0000	0.0000	5.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Leg Connection Type*	*Leg*		*Diagonal*		*Top Girt*		*Bottom Girt*		*Mid Girt*		*Long Horizontal*		*Short Horizontal*	
		Bolt Size in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*	*Bolt Size* in	*No.*
T1 90.33-78.06	Sleeve DS	0.6250 A307	12	0.6240 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 78.06-74.56	Flange	0.7500 A307	0	0.5410 A325N	2	0.6250 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	3	0.6250 A325N	0
T3 74.56-72.31	Flange	0.7500 A307	0	0.5410 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	3	0.6250 A325N	0
T4 72.31-67.56	Flange	0.7500 A307	0	0.5410 A325N	2	0.6250 A325N	3	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	3	0.6250 A325N	0
T5 67.56-65.44	Flange	0.7500 A307	0	0.5410 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	3	0.6250 A325N	0
T6 65.44-57.52	Flange	0.7500 A307	0	0.5410 A325N	2	0.6250 A325N	0	0.6250 A325N	3	0.6250 A325N	0	0.6250 A325N	3	0.6250 A325N	0
T7 57.52-50.27	Flange	0.7500 A307	0	0.5410 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 50.27-41.98	Sleeve DS	0.6250 A307	12	0.5410 A325N	2	0.6250 A325N	3	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 41.98-34.19	Flange	0.7500 A307	0	0.5410 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 34.19-26.90	Flange	0.7500 A307	0	0.5410 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11 26.90-20.10	Flange	0.7500 A307	0	0.5410 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T12 20.10-13.42	Sleeve DS	0.6250 A307	12	0.5410 A325N	2	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T13 13.42-6.71	Flange	0.7500 A307	0	0.5410 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1	0.6250 A325N	0
T14 6.71-0.00	Flange	0.7500 A307	0	0.5410 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1	0.6250 A325N	0

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 90.33-78.06	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 78.06-74.56	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 74.56-72.31	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 72.31-67.56	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 67.56-65.44	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 65.44-57.52	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 57.52-50.27	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 50.27-41.98	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 41.98-34.19	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 34.19-26.90	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11 26.90-20.10	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T12 20.10-13.42	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T13 13.42-6.71	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T14 6.71-0.00	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 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
Leg A AZ 0 Deg													
Feedline Ladder (Af)	C	No	No	Af (CaAa)	77.00 - 0.00	0.0000	0	2	2	24.0000	2.0000		4.20
LDF5-50A (7/8 FOAM) (AT&T)	C	No	No	Ar (CaAa)	76.70 - 0.00	0.0000	0.01	6	6	1.0900	1.0900		0.33
0.92" DC (AT&T)	C	No	No	Ar (CaAa)	76.70 - 0.00	0.0000	-0.07	3	3	0.9200	0.9200		0.42
3/8" Fiber (AT&T)	C	No	No	Ar (CaAa)	76.70 - 0.00	0.0000	0.07	1	1	0.3750	0.3750		0.10
1/2" Fiber (AT&T)	C	No	No	Ar (CaAa)	76.70 - 0.00	0.0000	0.075	1	1	0.5000	0.5000		0.10
3/4" OD (AT&T)	C	No	No	Ar (CaAa)	76.70 - 0.00	0.0000	0.12	4	2	0.7500	0.7500		0.40
1" Conduit (dead)	C	No	No	Ar (CaAa)	48.00 - 0.00	0.0000	0.25	1	1	1.0000	1.0000		0.75
5/16" OD (dead)	D	No	No	Ar (CaAa)	48.00 - 50.00	-4.0000	0.25	1	1	0.3125	0.3125		2.00

Description	*Face or Leg*	*Allow Shield*	*Exclude From Torque Calculation*	*Component Type*	*Placement* *ft*	*Face Offset* *in*	*Lateral Offset (Frac FW)*	*#*	*# Per Row*	*Clear Spacing* *in*	*Width or Diameter* *in*	*Perimeter* *in*	*Weight* *plf*
1-5/16" OD (dead)	D	No	No	Ar (CaAa)	54.00 - 0.00	0.0000	0.5	1	1	1.3125	1.3125		1.00
Safety Line 3/8	C	No	No	Ar (CaAa)	90.33 - 0.00	0.0000	0.5	1	1	0.3750	0.3750		0.22
*****													
6x12 HCS (Verizon)	D	No	No	Ar (CaAa)	90.00 - 0.00	0.0000	-0.4	2	2	1.5400	1.5400		1.70

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* *lb*
T1	90.33-78.06	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.460	0.000	2.70
		D	0.000	0.000	3.677	0.000	40.59
T2	78.06-74.56	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	4.571	0.000	31.98
		D	0.000	0.000	1.078	0.000	11.90
T3	74.56-72.31	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	4.549	0.000	30.70
		D	0.000	0.000	0.693	0.000	7.65
T4	72.31-67.56	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	9.603	0.000	64.82
		D	0.000	0.000	1.463	0.000	16.15
T5	67.56-65.44	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	4.296	0.000	29.00
		D	0.000	0.000	0.654	0.000	7.22
T6	65.44-57.52	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	16.006	0.000	108.03
		D	0.000	0.000	2.438	0.000	26.92
T7	57.52-50.27	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	14.657	0.000	98.93
		D	0.000	0.000	2.722	0.000	28.38
T8	50.27-41.98	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	17.366	0.000	117.67
		D	0.000	0.000	3.705	0.000	40.48
T9	41.98-34.19	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	16.532	0.000	112.17
		D	0.000	0.000	3.423	0.000	34.28
T10	34.19-26.90	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	15.471	0.000	104.97
		D	0.000	0.000	3.203	0.000	32.08
T11	26.90-20.10	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	14.410	0.000	97.78

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 lb
		D	0.000	0.000	2.983	0.000	29.88
T12	20.10-13.42	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	14.190	0.000	96.28
		D	0.000	0.000	2.938	0.000	29.43
T13	13.42-6.71	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	14.231	0.000	96.56
		D	0.000	0.000	2.946	0.000	29.51
T14	6.71-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	14.231	0.000	96.56
		D	0.000	0.000	2.946	0.000	29.51

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 lb
T1	90.33-78.06	A	1.098	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	3.155	0.000	26.95
		D		0.000	0.000	11.599	0.000	127.61
T2	78.06-74.56	A	1.087	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	12.238	0.000	124.42
		D		0.000	0.000	3.388	0.000	37.16
T3	74.56-72.31	A	1.083	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	12.153	0.000	122.52
		D		0.000	0.000	2.175	0.000	23.82
T4	72.31-67.56	A	1.078	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	25.606	0.000	257.55
		D		0.000	0.000	4.583	0.000	50.12
T5	67.56-65.44	A	1.073	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	11.432	0.000	114.71
		D		0.000	0.000	2.046	0.000	22.34
T6	65.44-57.52	A	1.064	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	42.461	0.000	424.44
		D		0.000	0.000	7.601	0.000	82.78
T7	57.52-50.27	A	1.050	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	38.684	0.000	384.26
		D		0.000	0.000	8.199	0.000	90.14
T8	50.27-41.98	A	1.034	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	45.824	0.000	453.63
		D		0.000	0.000	11.032	0.000	125.26
T9	41.98-34.19	A	1.014	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	43.382	0.000	426.20
		D		0.000	0.000	9.954	0.000	109.09
T10	34.19-26.90	A	0.992	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	40.246	0.000	391.36

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 lb
		D		0.000	0.000	9.228	0.000	100.35
T11	26.90-20.10	A	0.967	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	37.106	0.000	356.54
		D		0.000	0.000	8.501	0.000	91.61
T12	20.10-13.42	A	0.934	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	36.070	0.000	341.38
		D		0.000	0.000	8.256	0.000	87.94
T13	13.42-6.71	A	0.888	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	35.496	0.000	328.58
		D		0.000	0.000	8.112	0.000	84.98
T14	6.71-0.00	A	0.796	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	34.148	0.000	302.15
		D		0.000	0.000	7.780	0.000	78.78

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	90.33-78.06	1.4277	1.2043	3.6056	2.9720
T2	78.06-74.56	2.7626	0.9732	5.9068	1.8610
T3	74.56-72.31	3.1920	0.8580	4.9996	1.2167
T4	72.31-67.56	3.7135	0.9794	7.9591	1.8220
T5	67.56-65.44	2.3399	0.6493	1.9241	0.5003
T6	65.44-57.52	4.9646	1.2717	10.6230	2.3454
T7	57.52-50.27	5.0162	1.7458	10.8198	3.1358
T8	50.27-41.98	4.6827	2.1503	10.5243	4.0324
T9	41.98-34.19	5.6369	2.5305	12.3747	4.5809
T10	34.19-26.90	5.9797	2.6998	13.0637	4.8597
T11	26.90-20.10	6.2439	2.8346	13.5615	5.0672
T12	20.10-13.42	5.5037	2.5544	12.3642	4.7105
T13	13.42-6.71	5.8564	2.7208	12.9968	4.9381
T14	6.71-0.00	5.5916	2.6253	12.0543	4.6085

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	14	Safety Line 3/8	78.06 - 90.33	0.6000	0.6000
T1	16	6x12 HCS	78.06 - 90.00	0.6000	0.6000
T2	2	Feedline Ladder (Af)	74.56 - 77.00	0.6000	0.5038
T2	5	LDF5-50A (7/8 FOAM)	74.56 - 76.70	0.6000	0.5038
T2	6	0.92" DC	74.56 - 76.70	0.6000	0.5038
T2	7	3/8" Fiber	74.56 - 76.70	0.6000	0.5038
T2	8	1/2" Fiber	74.56 - 76.70	0.6000	0.5038
T2	10	3/4" OD	74.56 - 76.70	0.6000	0.5038
T2	14	Safety Line 3/8	74.56 - 78.06	0.6000	0.5038

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	K_a *No Ice*	K_a *Ice*
T2	16	6x12 HCS	74.56 - 78.06	0.6000	0.5038
T3	2	Feedline Ladder (Af)	72.31 - 74.56	0.5973	0.3629
T3	5	LDF5-50A (7/8 FOAM)	72.31 - 74.56	0.5973	0.3629
T3	6	0.92" DC	72.31 - 74.56	0.5973	0.3629
T3	7	3/8" Fiber	72.31 - 74.56	0.5973	0.3629
T3	8	1/2" Fiber	72.31 - 74.56	0.5973	0.3629
T3	10	3/4" OD	72.31 - 74.56	0.5973	0.3629
T3	14	Safety Line 3/8	72.31 - 74.56	0.5973	0.3629
T3	16	6x12 HCS	72.31 - 74.56	0.5973	0.3629
T4	2	Feedline Ladder (Af)	67.56 - 72.31	0.6000	0.5315
T4	5	LDF5-50A (7/8 FOAM)	67.56 - 72.31	0.6000	0.5315
T4	6	0.92" DC	67.56 - 72.31	0.6000	0.5315
T4	7	3/8" Fiber	67.56 - 72.31	0.6000	0.5315
T4	8	1/2" Fiber	67.56 - 72.31	0.6000	0.5315
T4	10	3/4" OD	67.56 - 72.31	0.6000	0.5315
T4	14	Safety Line 3/8	67.56 - 72.31	0.6000	0.5315
T4	16	6x12 HCS	67.56 - 72.31	0.6000	0.5315
T5	2	Feedline Ladder (Af)	65.44 - 67.56	0.4832	0.1706
T5	5	LDF5-50A (7/8 FOAM)	65.44 - 67.56	0.4832	0.1706
T5	6	0.92" DC	65.44 - 67.56	0.4832	0.1706
T5	7	3/8" Fiber	65.44 - 67.56	0.4832	0.1706
T5	8	1/2" Fiber	65.44 - 67.56	0.4832	0.1706
T5	10	3/4" OD	65.44 - 67.56	0.4832	0.1706
T5	14	Safety Line 3/8	65.44 - 67.56	0.4832	0.1706
T5	16	6x12 HCS	65.44 - 67.56	0.4832	0.1706
T6	2	Feedline Ladder (Af)	57.52 - 65.44	0.6000	0.6000
T6	5	LDF5-50A (7/8 FOAM)	57.52 - 65.44	0.6000	0.6000
T6	6	0.92" DC	57.52 - 65.44	0.6000	0.6000
T6	7	3/8" Fiber	57.52 - 65.44	0.6000	0.6000
T6	8	1/2" Fiber	57.52 - 65.44	0.6000	0.6000
T6	10	3/4" OD	57.52 - 65.44	0.6000	0.6000
T6	14	Safety Line 3/8	57.52 - 65.44	0.6000	0.6000
T6	16	6x12 HCS	57.52 - 65.44	0.6000	0.6000
T7	2	Feedline Ladder (Af)	50.27 - 57.52	0.6000	0.6000
T7	5	LDF5-50A (7/8 FOAM)	50.27 - 57.52	0.6000	0.6000
T7	6	0.92" DC	50.27 - 57.52	0.6000	0.6000
T7	7	3/8" Fiber	50.27 - 57.52	0.6000	0.6000
T7	8	1/2" Fiber	50.27 - 57.52	0.6000	0.6000
T7	10	3/4" OD	50.27 - 57.52	0.6000	0.6000
T7	13	1-5/16" OD	50.27 - 54.00	0.6000	0.6000
T7	14	Safety Line 3/8	50.27 - 57.52	0.6000	0.6000
T7	16	6x12 HCS	50.27 - 57.52	0.6000	0.6000
T8	2	Feedline Ladder (Af)	41.98 - 50.27	0.6000	0.6000
T8	5	LDF5-50A (7/8 FOAM)	41.98 - 50.27	0.6000	0.6000
T8	6	0.92" DC	41.98 - 50.27	0.6000	0.6000
T8	7	3/8" Fiber	41.98 - 50.27	0.6000	0.6000
T8	8	1/2" Fiber	41.98 - 50.27	0.6000	0.6000
T8	10	3/4" OD	41.98 - 50.27	0.6000	0.6000
T8	11	1" Conduit	41.98 - 48.00	0.6000	0.6000
T8	12	5/16" OD	48.00 - 50.00	0.6000	0.6000
T8	13	1-5/16" OD	41.98 - 50.27	0.6000	0.6000
T8	14	Safety Line 3/8	41.98 - 50.27	0.6000	0.6000
T8	16	6x12 HCS	41.98 - 50.27	0.6000	0.6000
T9	2	Feedline Ladder (Af)	34.19 - 41.98	0.6000	0.6000
T9	5	LDF5-50A (7/8 FOAM)	34.19 - 41.98	0.6000	0.6000
T9	6	0.92" DC	34.19 - 41.98	0.6000	0.6000
T9	7	3/8" Fiber	34.19 - 41.98	0.6000	0.6000
T9	8	1/2" Fiber	34.19 - 41.98	0.6000	0.6000
T9	10	3/4" OD	34.19 - 41.98	0.6000	0.6000
T9	11	1" Conduit	34.19 - 41.98	0.6000	0.6000
T9	13	1-5/16" OD	34.19 - 41.98	0.6000	0.6000
T9	14	Safety Line 3/8	34.19 - 41.98	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T9	16	6x12 HCS	34.19 - 41.98	0.6000	0.6000
T10	2	Feedline Ladder (Af)	26.90 - 34.19	0.6000	0.6000
T10	5	LDF5-50A (7/8 FOAM)	26.90 - 34.19	0.6000	0.6000
T10	6	0.92" DC	26.90 - 34.19	0.6000	0.6000
T10	7	3/8" Fiber	26.90 - 34.19	0.6000	0.6000
T10	8	1/2" Fiber	26.90 - 34.19	0.6000	0.6000
T10	10	3/4" OD	26.90 - 34.19	0.6000	0.6000
T10	11	1" Conduit	26.90 - 34.19	0.6000	0.6000
T10	13	1-5/16" OD	26.90 - 34.19	0.6000	0.6000
T10	14	Safety Line 3/8	26.90 - 34.19	0.6000	0.6000
T10	16	6x12 HCS	26.90 - 34.19	0.6000	0.6000
T11	2	Feedline Ladder (Af)	20.10 - 26.90	0.6000	0.6000
T11	5	LDF5-50A (7/8 FOAM)	20.10 - 26.90	0.6000	0.6000
T11	6	0.92" DC	20.10 - 26.90	0.6000	0.6000
T11	7	3/8" Fiber	20.10 - 26.90	0.6000	0.6000
T11	8	1/2" Fiber	20.10 - 26.90	0.6000	0.6000
T11	10	3/4" OD	20.10 - 26.90	0.6000	0.6000
T11	11	1" Conduit	20.10 - 26.90	0.6000	0.6000
T11	13	1-5/16" OD	20.10 - 26.90	0.6000	0.6000
T11	14	Safety Line 3/8	20.10 - 26.90	0.6000	0.6000
T11	16	6x12 HCS	20.10 - 26.90	0.6000	0.6000
T12	2	Feedline Ladder (Af)	13.42 - 20.10	0.6000	0.6000
T12	5	LDF5-50A (7/8 FOAM)	13.42 - 20.10	0.6000	0.6000
T12	6	0.92" DC	13.42 - 20.10	0.6000	0.6000
T12	7	3/8" Fiber	13.42 - 20.10	0.6000	0.6000
T12	8	1/2" Fiber	13.42 - 20.10	0.6000	0.6000
T12	10	3/4" OD	13.42 - 20.10	0.6000	0.6000
T12	11	1" Conduit	13.42 - 20.10	0.6000	0.6000
T12	13	1-5/16" OD	13.42 - 20.10	0.6000	0.6000
T12	14	Safety Line 3/8	13.42 - 20.10	0.6000	0.6000
T12	16	6x12 HCS	13.42 - 20.10	0.6000	0.6000
T13	2	Feedline Ladder (Af)	6.71 - 13.42	0.6000	0.6000
T13	5	LDF5-50A (7/8 FOAM)	6.71 - 13.42	0.6000	0.6000
T13	6	0.92" DC	6.71 - 13.42	0.6000	0.6000
T13	7	3/8" Fiber	6.71 - 13.42	0.6000	0.6000
T13	8	1/2" Fiber	6.71 - 13.42	0.6000	0.6000
T13	10	3/4" OD	6.71 - 13.42	0.6000	0.6000
T13	11	1" Conduit	6.71 - 13.42	0.6000	0.6000
T13	13	1-5/16" OD	6.71 - 13.42	0.6000	0.6000
T13	14	Safety Line 3/8	6.71 - 13.42	0.6000	0.6000
T13	16	6x12 HCS	6.71 - 13.42	0.6000	0.6000
T14	2	Feedline Ladder (Af)	0.00 - 6.71	0.6000	0.6000
T14	5	LDF5-50A (7/8 FOAM)	0.00 - 6.71	0.6000	0.6000
T14	6	0.92" DC	0.00 - 6.71	0.6000	0.6000
T14	7	3/8" Fiber	0.00 - 6.71	0.6000	0.6000
T14	8	1/2" Fiber	0.00 - 6.71	0.6000	0.6000
T14	10	3/4" OD	0.00 - 6.71	0.6000	0.6000
T14	11	1" Conduit	0.00 - 6.71	0.6000	0.6000
T14	13	1-5/16" OD	0.00 - 6.71	0.6000	0.6000
T14	14	Safety Line 3/8	0.00 - 6.71	0.6000	0.6000
T14	16	6x12 HCS	0.00 - 6.71	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
6' x 5/8" Lighting Rod	A	From Leg	0.00 0.00 3.00	0.0000	90.50	No Ice 1/2" Ice 1" Ice	0.38 0.99 1.62	0.38 0.99 1.62	10.00 14.19 22.26
***									
NNH4-65B-R6 (Verizon)	A	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	12.27 12.77 13.27	5.75 6.21 6.67	83.00 155.14 233.92
NNH4-65B-R6 (Verizon)	B	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	12.27 12.77 13.27	5.75 6.21 6.67	83.00 155.14 233.92
NNH4-65B-R6 (Verizon)	C	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	12.27 12.77 13.27	5.75 6.21 6.67	83.00 155.14 233.92
XXDWMM-12.5-65-8TCBR S (Verizon)	A	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.53 1.69 1.85	0.52 0.61 0.72	23.14 35.07 49.34
XXDWMM-12.5-65-8TCBR S (Verizon)	B	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.53 1.69 1.85	0.52 0.61 0.72	23.14 35.07 49.34
XXDWMM-12.5-65-8TCBR S (Verizon)	C	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.53 1.69 1.85	0.52 0.61 0.72	23.14 35.07 49.34
MT6407-77A (Verizon)	A	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	4.70 4.99 5.28	1.84 2.07 2.30	87.10 116.39 149.54
MT6407-77A (Verizon)	B	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	4.70 4.99 5.28	1.84 2.07 2.30	87.10 116.39 149.54
MT6407-77A (Verizon)	C	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	4.70 4.99 5.28	1.84 2.07 2.30	87.10 116.39 149.54
CBRS RT4401 RRH (Verizon)	A	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	0.99 1.12 1.26	0.50 0.60 0.70	19.00 26.77 36.46
CBRS RT4401 RRH (Verizon)	B	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	0.99 1.12 1.26	0.50 0.60 0.70	19.00 26.77 36.46
CBRS RT4401 RRH (Verizon)	C	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	0.99 1.12 1.26	0.50 0.60 0.70	19.00 26.77 36.46
RF4439d-25A (Verizon)	A	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.87 2.03 2.21	1.25 1.39 1.54	74.70 93.02 114.12
RF4439d-25A (Verizon)	B	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.87 2.03 2.21	1.25 1.39 1.54	74.70 93.02 114.12
RF4439d-25A (Verizon)	C	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.87 2.03 2.21	1.25 1.39 1.54	74.70 93.02 114.12
RF4440d-13A (Verizon)	A	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.87 2.03 2.21	1.13 1.27 1.41	72.50 89.82 109.87
RF4440d-13A (Verizon)	B	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.87 2.03 2.21	1.13 1.27 1.41	72.50 89.82 109.87
RF4440d-13A (Verizon)	C	From Leg	2.50 0.00	0.0000	90.00	No Ice 1/2" Ice	1.87 2.03	1.13 1.27	72.50 89.82

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* lb
			0.00			1" Ice	2.21	1.41	109.87
FE-16148-OVP-B12	A	From Leg	1.00	0.0000	90.00	No Ice	1.87	1.07	15.21
(Verizon)			0.00			1/2" Ice	2.04	1.20	31.51
			0.00			1" Ice	2.21	1.35	50.47
(4) 2-3/8" x 8' Pipe Mount	A	From Leg	3.00	0.0000	90.00	No Ice	1.90	1.90	30.00
(Verizon)			0.00			1/2" Ice	2.73	2.73	44.37
			0.00			1" Ice	3.40	3.40	64.01
(4) 2-3/8" x 8' Pipe Mount	B	From Leg	3.00	0.0000	90.00	No Ice	1.90	1.90	30.00
(Verizon)			0.00			1/2" Ice	2.73	2.73	44.37
			0.00			1" Ice	3.40	3.40	64.01
(4) 2-3/8" x 8' Pipe Mount	C	From Leg	3.00	0.0000	90.00	No Ice	1.90	1.90	30.00
(Verizon)			0.00			1/2" Ice	2.73	2.73	44.37
			0.00			1" Ice	3.40	3.40	64.01
(3) SitePro VFA12-HD	C	None		0.0000	90.00	No Ice	25.00	25.00	800.00
(Verizon)						1/2" Ice	37.00	37.00	1100.00
						1" Ice	47.00	47.00	1500.00
***									
Ring Mount	C	None		0.0000	77.00	No Ice	6.87	6.87	850.00
						1/2" Ice	8.25	8.25	1020.00
						1" Ice	9.62	9.62	1190.00
***									
RRUS-32 (Full Frontal	A	From Leg	1.50	30.0000	76.70	No Ice	0.00	2.42	77.00
Shielding)			-2.00			1/2" Ice	0.00	2.64	104.93
(AT&T)			0.50			1" Ice	0.00	2.86	136.47
RRUS-32 (Full Frontal	B	From Leg	1.50	60.0000	76.70	No Ice	0.00	2.42	77.00
Shielding)			-2.00			1/2" Ice	0.00	2.64	104.93
(AT&T)			0.50			1" Ice	0.00	2.86	136.47
RRUS-32 (Full Frontal	D	From Leg	1.50	0.0000	76.70	No Ice	0.00	2.42	77.00
Shielding)			-2.00			1/2" Ice	0.00	2.64	104.93
(AT&T)			0.50			1" Ice	0.00	2.86	136.47
RRUS-32	A	From Leg	1.50	30.0000	76.70	No Ice	3.31	2.42	77.00
(AT&T)			2.00			1/2" Ice	3.56	2.64	104.93
			2.00			1" Ice	3.81	2.86	136.47
RRUS-32	B	From Leg	1.50	60.0000	76.70	No Ice	3.31	2.42	77.00
(AT&T)			2.00			1/2" Ice	3.56	2.64	104.93
			2.00			1" Ice	3.81	2.86	136.47
RRUS-32	D	From Leg	1.50	0.0000	76.70	No Ice	3.31	2.42	77.00
(AT&T)			2.00			1/2" Ice	3.56	2.64	104.93
			2.00			1" Ice	3.81	2.86	136.47
RRUS-32 (Full Frontal	A	From Leg	1.50	30.0000	76.70	No Ice	0.00	2.42	77.00
Shielding)			5.00			1/2" Ice	0.00	2.64	104.93
(AT&T)			0.50			1" Ice	0.00	2.86	136.47
RRUS-32 (Full Frontal	B	From Leg	1.50	60.0000	76.70	No Ice	0.00	2.42	77.00
Shielding)			5.00			1/2" Ice	0.00	2.64	104.93
(AT&T)			0.50			1" Ice	0.00	2.86	136.47
RRUS-32 (Full Frontal	D	From Leg	1.50	0.0000	76.70	No Ice	0.00	2.42	77.00
Shielding)			5.00			1/2" Ice	0.00	2.64	104.93
(AT&T)			0.50			1" Ice	0.00	2.86	136.47
DC6-48-60-18-8F	B	From Leg	2.00	60.0000	76.70	No Ice	2.20	2.20	20.00
(AT&T)			2.00			1/2" Ice	2.40	2.40	42.56
			2.00			1" Ice	2.60	2.60	68.29
DC6-48-60-18-8F	B	From Leg	2.00	60.0000	76.70	No Ice	2.20	2.20	20.00
(AT&T)			2.00			1/2" Ice	2.40	2.40	42.56
			0.50			1" Ice	2.60	2.60	68.29
TPA65R-BU6DA-K	A	From Leg	2.00	30.0000	76.70	No Ice	12.71	5.62	69.00
(AT&T)			-5.00			1/2" Ice	13.21	6.07	142.96
			0.00			1" Ice	13.71	6.53	223.56

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 lb
TPA65R-BU6DA-K (AT&T)	B	From Leg	2.00	60.0000	76.70	No Ice	12.71	5.62	69.00
			-5.00			1/2" Ice	13.21	6.07	142.96
			0.00			1" Ice	13.71	6.53	223.56
TPA65R-BU6DA-K (AT&T)	D	From Leg	2.00	0.0000	76.70	No Ice	12.71	5.62	69.00
			-5.00			1/2" Ice	13.21	6.07	142.96
			0.00			1" Ice	13.71	6.53	223.56
AIR6449 B77D (AT&T)	A	From Leg	2.00	30.0000	76.70	No Ice	4.05	2.74	95.50
			-2.00			1/2" Ice	4.32	2.97	129.12
			0.00			1" Ice	4.59	3.20	166.64
AIR6449 B77D (AT&T)	B	From Leg	2.00	60.0000	76.70	No Ice	4.05	2.74	95.50
			-2.00			1/2" Ice	4.32	2.97	129.12
			0.00			1" Ice	4.59	3.20	166.64
AIR6449 B77D (AT&T)	D	From Leg	2.00	0.0000	76.70	No Ice	4.05	2.74	95.50
			-2.00			1/2" Ice	4.32	2.97	129.12
			0.00			1" Ice	4.59	3.20	166.64
AIR6419 B77G (AT&T)	A	From Leg	2.00	30.0000	76.70	No Ice	4.17	2.02	55.40
			-2.00			1/2" Ice	4.44	2.23	84.59
			0.00			1" Ice	4.71	2.44	117.51
AIR6419 B77G (AT&T)	B	From Leg	2.00	60.0000	76.70	No Ice	4.17	2.02	55.40
			-2.00			1/2" Ice	4.44	2.23	84.59
			0.00			1" Ice	4.71	2.44	117.51
AIR6419 B77G (AT&T)	D	From Leg	2.00	0.0000	76.70	No Ice	4.17	2.02	55.40
			-2.00			1/2" Ice	4.44	2.23	84.59
			0.00			1" Ice	4.71	2.44	117.51
DMP65R-BU6DA (AT&T)	A	From Leg	2.00	30.0000	76.70	No Ice	12.71	5.62	80.00
			5.00			1/2" Ice	13.21	6.07	153.96
			0.00			1" Ice	13.71	6.53	234.56
DMP65R-BU6DA (AT&T)	B	From Leg	2.00	60.0000	76.70	No Ice	12.71	5.62	80.00
			5.00			1/2" Ice	13.21	6.07	153.96
			0.00			1" Ice	13.71	6.53	234.56
DMP65R-BU6DA (AT&T)	C	From Leg	2.00	0.0000	76.70	No Ice	12.71	5.62	80.00
			5.00			1/2" Ice	13.21	6.07	153.96
			0.00			1" Ice	13.71	6.53	234.56
4478 RRU (AT&T)	A	From Leg	1.50	30.0000	76.70	No Ice	1.64	0.91	60.00
			2.00			1/2" Ice	1.80	1.03	74.20
			0.00			1" Ice	1.97	1.17	90.89
4478 RRU (AT&T)	B	From Leg	1.50	60.0000	76.70	No Ice	1.64	0.91	60.00
			2.00			1/2" Ice	1.80	1.03	74.20
			0.00			1" Ice	1.97	1.17	90.89
4478 RRU (AT&T)	D	From Leg	1.50	0.0000	76.70	No Ice	1.64	0.91	60.00
			2.00			1/2" Ice	1.80	1.03	74.20
			0.00			1" Ice	1.97	1.17	90.89
4449 RRU (AT&T)	A	From Leg	1.50	30.0000	76.70	No Ice	1.64	1.02	74.00
			2.00			1/2" Ice	1.80	1.15	90.04
			0.00			1" Ice	1.97	1.28	108.70
4449 RRU (AT&T)	B	From Leg	1.50	60.0000	76.70	No Ice	1.64	1.02	74.00
			2.00			1/2" Ice	1.80	1.15	90.04
			0.00			1" Ice	1.97	1.28	108.70
4449 RRU (AT&T)	D	From Leg	1.50	0.0000	76.70	No Ice	1.64	1.02	74.00
			2.00			1/2" Ice	1.80	1.15	90.04
			0.00			1" Ice	1.97	1.28	108.70
DC9-48-60-24-8C-EV (AT&T)	A	From Leg	2.00	30.0000	76.70	No Ice	2.74	4.78	16.00
			0.00			1/2" Ice	2.96	5.06	53.06
			0.00			1" Ice	3.20	5.35	94.20
(3) 12' Sector Frames (AT&T)	C	None		0.0000	76.70	No Ice	25.00	25.00	800.00
						1/2" Ice	37.00	37.00	1100.00
						1" Ice	47.00	47.00	1500.00

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 lb
***									
Ring Mount	C	None		0.0000	75.00	No Ice	6.87	6.87	850.00
						1/2" Ice	8.25	8.25	1020.00
						1" Ice	9.62	9.62	1190.00
***									
2-3/8" x 8' Pipe Mount	A	From Leg	0.00	0.0000	73.00	No Ice	1.90	1.90	30.00
			0.00			1/2" Ice	2.73	2.73	44.37
			0.00			1" Ice	3.40	3.40	64.01
***									
Ring Mount	C	None		0.0000	67.70	No Ice	6.87	6.87	850.00
						1/2" Ice	8.25	8.25	1020.00
						1" Ice	9.62	9.62	1190.00

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	3728.23					
Bracing Weight	5215.45					
Total Member Self-Weight	8943.69			-2911.06	-5962.81	
Gusset Weight	111.27					
Total Weight	18201.34			-2911.06	-5962.81	
Wind 0 deg - No Ice		-338.20	-19257.94	-1105620.52	22270.72	5215.37
Wind 45 deg - No Ice		15613.12	-15581.54	-860516.14	-865990.09	6961.11
Wind 90 deg - No Ice		20744.32	338.20	25322.48	-1169738.15	-2682.48
Wind 135 deg - No Ice		16091.41	16059.83	894622.27	-905918.34	-9814.44
Wind 180 deg - No Ice		338.20	19257.94	1099798.40	-34196.34	-5215.37
Wind 225 deg - No Ice		-15613.12	15581.54	854694.03	854064.48	-6961.11
Wind 270 deg - No Ice		-20744.32	-338.20	-31144.59	1157812.53	2682.48
Wind 315 deg - No Ice		-16091.41	-16059.83	-900444.39	893992.72	9814.44
Member Ice	11293.92					
Gusset Ice	118.44					
Total Weight Ice	40248.33			-3725.67	-20528.02	
Wind 0 deg - Ice		-60.47	-4740.78	-276690.25	-15472.26	2734.89
Wind 45 deg - Ice		3827.62	-3821.83	-214818.67	-232065.51	2924.74
Wind 90 deg - Ice		5184.68	60.47	1330.10	-310625.19	-100.68
Wind 135 deg - Ice		3913.14	3907.35	214517.27	-239215.45	-2779.80
Wind 180 deg - Ice		60.47	4740.78	269238.91	-25583.79	-2734.89
Wind 225 deg - Ice		-3827.62	3821.83	207367.33	191009.47	-2924.74
Wind 270 deg - Ice		-5184.68	-60.47	-8781.43	269569.15	100.68
Wind 315 deg - Ice		-3913.14	-3907.35	-221968.60	198159.40	2779.80
Total Weight	18201.34			-2911.06	-5962.81	
Wind 0 deg - Service		-84.55	-4814.48	-280366.83	6460.96	1303.84
Wind 45 deg - Service		3903.28	-3895.38	-219090.73	-215604.24	1740.28
Wind 90 deg - Service		5186.08	84.55	2368.92	-291541.26	-670.62
Wind 135 deg - Service		4022.85	4014.96	219693.87	-225586.31	-2453.61
Wind 180 deg - Service		84.55	4814.48	270987.90	-7655.81	-1303.84
Wind 225 deg - Service		-3903.28	3895.38	209711.81	214409.40	-1740.28
Wind 270 deg - Service		-5186.08	-84.55	-11747.85	290346.41	670.62

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 315 deg - Service		-4022.85	-4014.96	-229072.80	224391.46	2453.61

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 45 deg - No Ice
5	0.9 Dead+1.0 Wind 45 deg - No Ice
6	1.2 Dead+1.0 Wind 90 deg - No Ice
7	0.9 Dead+1.0 Wind 90 deg - No Ice
8	1.2 Dead+1.0 Wind 135 deg - No Ice
9	0.9 Dead+1.0 Wind 135 deg - No Ice
10	1.2 Dead+1.0 Wind 180 deg - No Ice
11	0.9 Dead+1.0 Wind 180 deg - No Ice
12	1.2 Dead+1.0 Wind 225 deg - No Ice
13	0.9 Dead+1.0 Wind 225 deg - No Ice
14	1.2 Dead+1.0 Wind 270 deg - No Ice
15	0.9 Dead+1.0 Wind 270 deg - No Ice
16	1.2 Dead+1.0 Wind 315 deg - No Ice
17	0.9 Dead+1.0 Wind 315 deg - No Ice
18	1.2 Dead+1.0 Ice+1.0 Temp
19	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
20	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
21	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
22	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
23	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
24	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
25	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
26	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 45 deg - Service
29	Dead+Wind 90 deg - Service
30	Dead+Wind 135 deg - Service
31	Dead+Wind 180 deg - Service
32	Dead+Wind 225 deg - Service
33	Dead+Wind 270 deg - Service
34	Dead+Wind 315 deg - Service

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg D	Max. Vert	12	70744.43	8881.63	-8602.35
	Max. H_x	12	70744.43	8881.63	-8602.35
	Max. H_z	5	-61900.91	-7701.65	7452.52
	Min. Vert	5	-61900.91	-7701.65	7452.52
	Min. H_x	5	-61900.91	-7701.65	7452.52
	Min. H_z	12	70744.43	8881.63	-8602.35
Leg C	Max. Vert	8	74343.27	-8876.48	-9307.93

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
	Max. H_x	17	-64542.64	7696.49	8036.21
	Max. H_z	17	-64542.64	7696.49	8036.21
	Min. Vert	17	-64542.64	7696.49	8036.21
	Min. H_x	8	74343.27	-8876.48	-9307.93
	Min. H_z	8	74343.27	-8876.48	-9307.93
Leg B	Max. Vert	4	71558.36	-8650.80	8938.02
	Max. H_x	13	-61290.47	7409.23	-7666.30
	Max. H_z	4	71558.36	-8650.80	8938.02
	Min. Vert	13	-61290.47	7409.23	-7666.30
	Min. H_x	4	71558.36	-8650.80	8938.02
	Min. H_z	13	-61290.47	7409.23	-7666.30
Leg A	Max. Vert	16	74063.35	9286.73	8863.22
	Max. H_x	16	74063.35	9286.73	8863.22
	Max. H_z	16	74063.35	9286.73	8863.22
	Min. Vert	9	-64752.57	-8045.17	-7713.39
	Min. H_x	9	-64752.57	-8045.17	-7713.39
	Min. H_z	9	-64752.57	-8045.17	-7713.39

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	18201.34	0.00	0.00	-2911.05	-5962.81	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	21841.61	-338.20	-19257.94	-1106725.54	21078.16	5215.37
0.9 Dead+1.0 Wind 0 deg - No Ice	16381.21	-338.20	-19257.94	-1105852.22	22867.00	5215.37
1.2 Dead+1.0 Wind 45 deg - No Ice	21841.61	15613.12	-15581.54	-861717.40	-867801.70	6961.11
0.9 Dead+1.0 Wind 45 deg - No Ice	16381.21	15613.12	-15581.54	-860844.08	-866012.86	6961.11
1.2 Dead+1.0 Wind 90 deg - No Ice	21841.61	20744.32	338.20	24740.26	-1171699.31	-2682.48
0.9 Dead+1.0 Wind 90 deg - No Ice	16381.21	20744.32	338.20	25613.58	-1169910.47	-2682.48
1.2 Dead+1.0 Wind 135 deg - No Ice	21841.61	16091.41	16059.83	894659.11	-907729.94	-9814.44
0.9 Dead+1.0 Wind 135 deg - No Ice	16381.21	16091.41	16059.83	895532.42	-905941.10	-9814.44
1.2 Dead+1.0 Wind 180 deg - No Ice	21841.61	338.20	19257.94	1099739.01	-35388.90	-5215.37
0.9 Dead+1.0 Wind 180 deg - No Ice	16381.21	338.20	19257.94	1100612.32	-33600.06	-5215.37
1.2 Dead+1.0 Wind 225 deg - No Ice	21841.61	-15613.12	15581.54	854730.87	853490.96	-6961.11
0.9 Dead+1.0 Wind 225 deg - No Ice	16381.21	-15613.12	15581.54	855604.18	855279.80	-6961.11
1.2 Dead+1.0 Wind 270 deg - No Ice	21841.61	-20744.32	-338.20	-31726.80	1157388.58	2682.48
0.9 Dead+1.0 Wind 270 deg - No Ice	16381.21	-20744.32	-338.20	-30853.48	1159177.42	2682.48
1.2 Dead+1.0 Wind 315 deg - No Ice	21841.61	-16091.41	-16059.83	-901645.64	893419.20	9814.44
0.9 Dead+1.0 Wind 315 deg - No Ice	16381.21	-16091.41	-16059.83	-900772.32	895208.05	9814.44
1.2 Dead+1.0 Ice+1.0 Temp	43727.48	0.00	0.00	-4307.87	-21720.58	0.00

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	43727.48	-60.47	-4740.78	-277455.91	-16664.82	2734.89
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	43727.48	3827.62	-3821.83	-215573.85	-233431.05	2924.74
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	43727.48	5184.68	60.47	747.89	-312081.04	-100.68
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	43727.48	3913.14	3907.35	214108.04	-240580.98	-2779.80
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	43727.48	60.47	4740.78	268840.16	-26776.35	-2734.89
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	43727.48	-3827.62	3821.83	206958.10	189989.89	-2924.74
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	43727.48	-5184.68	-60.47	-9363.64	268639.88	100.68
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	43727.48	-3913.14	-3907.35	-222723.78	197139.82	2779.80
Dead+Wind 0 deg - Service	18201.34	-84.55	-4814.48	-278719.12	1095.57	1303.84
Dead+Wind 45 deg - Service	18201.34	3903.28	-3895.38	-217467.09	-221124.39	1740.28
Dead+Wind 90 deg - Service	18201.34	5186.08	84.55	4147.33	-297098.79	-670.62
Dead+Wind 135 deg - Service	18201.34	4022.85	4014.96	221627.04	-231106.45	-2453.61
Dead+Wind 180 deg - Service	18201.34	84.55	4814.48	272897.01	-13021.19	-1303.84
Dead+Wind 225 deg - Service	18201.34	-3903.28	3895.38	211644.98	209198.77	-1740.28
Dead+Wind 270 deg - Service	18201.34	-5186.08	-84.55	-9969.44	285173.18	670.62
Dead+Wind 315 deg - Service	18201.34	-4022.85	-4014.96	-227449.15	219180.84	2453.61

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-18201.34	0.00	-0.00	18201.34	-0.00	0.000%
2	-338.20	-21841.61	-19257.94	338.20	21841.61	19257.94	0.000%
3	-338.20	-16381.21	-19257.94	338.20	16381.21	19257.94	0.000%
4	15613.12	-21841.61	-15581.54	-15613.12	21841.61	15581.54	0.000%
5	15613.12	-16381.21	-15581.54	-15613.12	16381.21	15581.54	0.000%
6	20744.32	-21841.61	338.20	-20744.32	21841.61	-338.20	0.000%
7	20744.32	-16381.21	338.20	-20744.32	16381.21	-338.20	0.000%
8	16091.41	-21841.61	16059.83	-16091.41	21841.61	-16059.83	0.000%
9	16091.41	-16381.21	16059.83	-16091.41	16381.21	-16059.83	0.000%
10	338.20	-21841.61	19257.94	-338.20	21841.61	-19257.94	0.000%
11	338.20	-16381.21	19257.94	-338.20	16381.21	-19257.94	0.000%
12	-15613.12	-21841.61	15581.54	15613.12	21841.61	-15581.54	0.000%
13	-15613.12	-16381.21	15581.54	15613.12	16381.21	-15581.54	0.000%
14	-20744.32	-21841.61	-338.20	20744.32	21841.61	338.20	0.000%
15	-20744.32	-16381.21	-338.20	20744.32	16381.21	338.20	0.000%
16	-16091.41	-21841.61	-16059.83	16091.41	21841.61	16059.83	0.000%
17	-16091.41	-16381.21	-16059.83	16091.41	16381.21	16059.83	0.000%
18	0.00	-43727.48	0.00	-0.00	43727.48	-0.00	0.000%
19	-60.47	-43727.48	-4740.78	60.47	43727.48	4740.78	0.000%
20	3827.62	-43727.48	-3821.83	-3827.62	43727.48	3821.83	0.000%
21	5184.68	-43727.48	60.47	-5184.68	43727.48	-60.47	0.000%
22	3913.14	-43727.48	3907.35	-3913.14	43727.48	-3907.35	0.000%
23	60.47	-43727.48	4740.78	-60.47	43727.48	-4740.78	0.000%
24	-3827.62	-43727.48	3821.83	3827.62	43727.48	-3821.83	0.000%
25	-5184.68	-43727.48	-60.47	5184.68	43727.48	60.47	0.000%
26	-3913.14	-43727.48	-3907.35	3913.14	43727.48	3907.35	0.000%
27	-84.55	-18201.34	-4814.48	84.55	18201.34	4814.48	0.000%
28	3903.28	-18201.34	-3895.38	-3903.28	18201.34	3895.38	0.000%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
29	5186.08	-18201.34	84.55	-5186.08	18201.34	-84.55	0.000%
30	4022.85	-18201.34	4014.96	-4022.85	18201.34	-4014.96	0.000%
31	84.55	-18201.34	4814.48	-84.55	18201.34	-4814.48	0.000%
32	-3903.28	-18201.34	3895.38	3903.28	18201.34	-3895.38	0.000%
33	-5186.08	-18201.34	-84.55	5186.08	18201.34	84.55	0.000%
34	-4022.85	-18201.34	-4014.96	4022.85	18201.34	4014.96	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	90.333 - 78.063	0.971	34	0.0839	0.0087
T2	78.063 - 74.563	0.754	34	0.0813	0.0075
T3	74.563 - 72.313	0.692	34	0.0797	0.0070
T4	72.313 - 67.563	0.653	34	0.0785	0.0067
T5	67.563 - 65.438	0.568	34	0.0741	0.0056
T6	65.438 - 57.521	0.533	34	0.0721	0.0052
T7	57.521 - 50.271	0.416	30	0.0623	0.0038
T8	50.271 - 41.979	0.323	30	0.0537	0.0029
T9	41.979 - 34.187	0.231	30	0.0451	0.0021
T10	34.187 - 26.895	0.158	30	0.0376	0.0015
T11	26.895 - 20.103	0.101	30	0.0300	0.0011
T12	20.103 - 13.415	0.058	30	0.0235	0.0007
T13	13.415 - 6.7075	0.027	30	0.0143	0.0003
T14	6.7075 - 0	0.003	34	0.0075	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
90.50	6' x 5/8" Lighting Rod	34	0.971	0.0839	0.0087	309877
90.00	NNH4-65B-R6	34	0.965	0.0839	0.0087	309877
77.00	Ring Mount	34	0.735	0.0808	0.0073	155023
76.70	RRUS-32 (Full Frontal Shielding)	34	0.730	0.0807	0.0073	150059
75.00	Ring Mount	34	0.699	0.0799	0.0070	229822
73.00	2-3/8" x 8' Pipe Mount	34	0.665	0.0789	0.0068	155250
67.70	Ring Mount	34	0.570	0.0742	0.0056	30084

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	90.333 - 78.063	3.861	16	0.3311	0.0347
T2	78.063 - 74.563	3.006	16	0.3209	0.0299
T3	74.563 - 72.313	2.759	16	0.3147	0.0278

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T4	72.313 - 67.563	2.605	16	0.3106	0.0267
T5	67.563 - 65.438	2.268	16	0.2936	0.0224
T6	65.438 - 57.521	2.130	16	0.2859	0.0208
T7	57.521 - 50.271	1.662	8	0.2480	0.0152
T8	50.271 - 41.979	1.290	8	0.2144	0.0118
T9	41.979 - 34.187	0.924	8	0.1801	0.0085
T10	34.187 - 26.895	0.631	8	0.1502	0.0062
T11	26.895 - 20.103	0.405	8	0.1195	0.0043
T12	20.103 - 13.415	0.232	8	0.0938	0.0027
T13	13.415 - 6.7075	0.108	8	0.0569	0.0014
T14	6.7075 - 0	0.012	16	0.0299	0.0007

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
90.50	6' x 5/8" Lighting Rod	16	3.861	0.3311	0.0347	94569
90.00	NNH4-65B-R6	16	3.838	0.3310	0.0346	94569
77.00	Ring Mount	16	2.930	0.3190	0.0293	52518
76.70	RRUS-32 (Full Frontal Shielding)	16	2.909	0.3185	0.0291	50082
75.00	Ring Mount	16	2.790	0.3154	0.0281	86750
73.00	2-3/8" x 8' Pipe Mount	16	2.653	0.3121	0.0271	44331
67.70	Ring Mount	16	2.277	0.2942	0.0225	7831

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	90.333	Leg	A307	0.6250	12	873.94	16240.00	0.054 ✔	1	Bearing
		Diagonal	A325N	0.6240	1	1692.28	9492.94	0.178 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	1	110.23	8482.50	0.013 ✔	1	Member Bearing
T2	78.063	Diagonal	A325N	0.5410	2	1481.68	5577.24	0.266 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	2	382.70	11010.90	0.035 ✔	1	Member Block Shear
T3	74.563	Diagonal	A325N	0.5410	2	1700.38	7208.49	0.236 ✔	1	Member Block Shear
		Horizontal	A325N	0.6250	3	294.36	10059.40	0.029 ✔	1	Member Block Shear
T4	72.313	Diagonal	A325N	0.5410	2	2642.85	7208.49	0.367 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	3	638.09	15080.00	0.042 ✔	1	Gusset Bearing
T5	67.563	Diagonal	A325N	0.5410	2	2125.55	5577.24	0.381 ✔	1	Member Block Shear
		Horizontal	A325N	0.6250	3	167.18	10059.40	0.017 ✔	1	Member Block Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T6	65.438	Diagonal	A325N	0.5410	2	1601.15	6188.96	0.259 ✔	1	Member Block Shear
T7	57.521	Diagonal	A325N	0.5410	2	1473.72	6188.96	0.238 ✔	1	Member Block Shear
T8	50.271	Leg	A307	0.6250	12	7168.65	17257.30	0.415 ✔	1	Bolt DS
		Diagonal	A325N	0.5410	2	1361.68	6188.96	0.220 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	3	215.46	6728.91	0.032 ✔	1	Member Block Shear
T9	41.979	Diagonal	A325N	0.5410	2	1411.77	6188.96	0.228 ✔	1	Member Block Shear
T10	34.187	Diagonal	A325N	0.5410	2	1254.64	6188.96	0.203 ✔	1	Member Block Shear
T11	26.895	Diagonal	A325N	0.5410	2	1326.03	6188.96	0.214 ✔	1	Member Block Shear
T12	20.103	Leg	A307	0.6250	12	11130.60	17257.30	0.645 ✔	1	Bolt DS
		Diagonal	A325N	0.5410	2	2430.86	7208.49	0.337 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	1	1967.71	9487.50	0.207 ✔	1	Member Block Shear
T13	13.415	Diagonal	A325N	0.5410	2	3483.81	10344.20	0.337 ✔	1	Bolt Shear
		Redund Horz 1 Bracing	A325N	0.5000	1	962.55	5709.38	0.169 ✔	1	Member Block Shear
		Redund Diag 1 Bracing	A325N	0.5000	1	742.82	5709.38	0.130 ✔	1	Member Block Shear
T14	6.7075	Diagonal	A325N	0.5410	2	3607.59	10344.20	0.349 ✔	1	Bolt Shear
		Horizontal	A325N	0.6250	1	971.04	6096.09	0.159 ✔	1	Member Block Shear
		Redund Horz 1 Bracing	A325N	0.5000	1	971.04	5709.38	0.170 ✔	1	Member Block Shear
		Redund Diag 1 Bracing	A325N	0.5000	1	698.89	5709.38	0.122 ✔	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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	90.333 - 78.063	L4x4x1/4	12.27	6.08	91.8 K=1.00	1.9400	-5243.66	50194.10	0.104 [1] ✔
T2	78.063 - 74.563	L4x4x3/8	3.50	3.50	53.3 K=1.00	2.8600	-11411.40	93762.70	0.122 [1] ✔
T3	74.563 - 72.313	L4x4x3/8	2.25	2.25	34.3 K=1.00	2.8600	-11474.70	99159.10	0.116 [1] ✔
T4	72.313 - 67.563	L4x4x3/8	4.75	4.75	72.3 K=1.00	2.8600	-20935.00	86020.10	0.243 [1] ✔
T5	67.563 -	L4x4x3/8	2.13	0.13	1.9	2.8600	-27002.70	102948.00	0.262 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	65.438				K=1.00				✔
T6	65.438 - 57.521	L4x4x3/8	7.95	7.95	121.0 K=1.00	2.8600	-30041.60	55545.30	0.541 [1] ✔
T7	57.521 - 50.271	L4x4x3/8	7.28	7.28	110.8 K=1.00	2.8600	-37998.40	63198.00	0.601 [1] ✔
T8	50.271 - 41.979	L5x5x3/8	8.32	8.32	100.9 K=1.00	3.6100	-43011.90	88365.70	0.487 [1] ✔
T9	41.979 - 34.187	L5x5x3/8	7.82	7.82	94.8 K=1.00	3.6100	-50006.60	93230.70	0.536 [1] ✔
T10	34.187 - 26.895	L5x5x3/8	7.32	7.32	88.7 K=1.00	3.6100	-54794.20	97793.20	0.560 [1] ✔
T11	26.895 - 20.103	L5x5x3/8	6.82	6.82	82.6 K=1.00	3.6100	-59276.50	102053.00	0.581 [1] ✔
T12	20.103 - 13.415	L5x5x5/16	6.71	6.71	81.0 K=1.00	3.0300	-66783.70	84358.10	0.792 [1] ✔
T13	13.415 - 6.7075	L5x5x5/16	6.73	3.37	40.6 K=1.00	3.0300	-64049.90	100100.00	0.640 [1] ✔
T14	6.7075 - 0	L5x5x5/16	6.73	3.37	40.6 K=1.00	3.0300	-64615.20	100100.00	0.646 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	90.333 - 78.063	L2x2x1/4	7.90	3.69	113.2 K=1.00	0.9380	-1718.89	20156.50	0.085 [1] ✔
T2	78.063 - 74.563	L2x2 1/2x3/16	4.31	4.03	113.2 K=1.00	0.8090	-3438.33	17388.40	0.198 [1] ✔
T3	74.563 - 72.313	L2 1/2x2 1/2x3/16	3.38	3.16	76.5 K=1.00	0.9020	-4052.43	26497.00	0.153 [1] ✔
T4	72.313 - 67.563	L2 1/2x2 1/2x3/16	5.38	5.02	121.7 K=1.00	0.9020	-5883.02	17338.40	0.339 [1] ✔
T5	67.563 - 65.438	L2x2x3/16	3.22	3.01	91.5 K=1.00	0.7150	-5119.39	18959.90	0.270 [1] ✔
T6	65.438 - 57.521	L2x2 1/2x3/16	9.67	4.97	139.7 K=1.00	0.8090	-3490.75	11872.90	0.294 [1] ✔
T7	57.521 - 50.271	L2x2 1/2x3/16	9.72	4.95	139.0 K=1.00	0.8090	-2799.12	11987.10	0.234 [1] ✔
T8	50.271 - 41.979	L2x2 1/2x3/16	11.14	5.64	158.5 K=1.00	0.8090	-2927.16	9221.79	0.317 [1] ✔
T9	41.979 - 34.187	L2x2 1/2x3/16	11.47	5.78	162.4 K=1.00	0.8090	-2725.29	8781.19	0.310 [1] ✔
T10	34.187 - 26.895	L2x2 1/2x3/16	11.85	5.95	167.1 K=1.00	0.8090	-2592.47	8293.25	0.313 [1] ✔
T11	26.895 - 20.103	L2x2 1/2x3/16	12.26	6.13	172.3 K=1.00	0.8090	-2678.06	7801.97	0.343 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T12	20.103 - 13.415	L2 1/2x2 1/2x3/16	12.90	6.45	156.3 K=1.00	0.9020	-4228.92	10566.60	0.400 [1] ✔
T13	13.415 - 6.7075	L3x3x5/16	8.82	8.50	110.7 K=1.00	1.7800	-6967.63	39401.70	0.177 [1] ✔
T14	6.7075 - 0	L3x3x5/16	9.38	9.08	118.2 K=1.00	1.7800	-7215.17	35938.10	0.201 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T3	74.563 - 72.313	L4x3 1/2x1/4	5.04	3.53	39.4 K=1.00	1.8100	-885.08	59980.20	0.015 [1] ✔
T5	67.563 - 65.438	L4x3 1/2x1/4	5.04	3.53	39.4 K=1.00	1.8100	-491.31	59980.20	0.008 [1] ✔
T14	6.7075 - 0	L1 3/4x1 3/4x3/16 KL/R > 200 (C) - 205	12.26	5.92	206.9 K=1.00	0.6211	-971.04	4152.93	0.234 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	90.333 - 78.063	L2 1/2x2 1/2x3/16	5.04	4.71	114.1 K=1.00	0.9020	-131.91	19169.70	0.007 [1] ✔
T2	78.063 - 74.563	L4x3 1/2x1/4	5.04	3.53	57.7 K=1.00	1.8100	-569.99	56580.10	0.010 [1] ✔
T4	72.313 - 67.563	2L4x4x3/8	5.04	4.71	45.9 K=1.00	5.7200	-1269.67	187393.00	0.007 [1] ✔
T8	50.271 - 41.979	L2 1/2x2 1/2x3/16	6.91	6.49	157.3 K=1.00	0.9020	-646.39	10431.90	0.062 [1] ✔
T12	20.103 - 13.415	L2x2 1/2x1/4 KL/R > 200 (C) - 190	10.61	10.20	288.6 K=1.00	1.0600	-2314.22	3642.36	0.635 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T5	67.563 - 65.438	L3x3x3/16	5.04	3.53	71.1 K=1.00	1.0900	-997.36	32089.70	0.031 [1] ✔

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T13	13.415 - 6.7075	L1 3/4x1 3/4x3/16	3.06	2.86	99.8 K=1.00	0.6211	-962.55	15355.50	0.063 [1] ✔
T14	6.7075 - 0	L1 3/4x1 3/4x3/16	3.06	2.86	99.8 K=1.00	0.6211	-971.04	15355.50	0.063 [1] ✔

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T13	13.415 - 6.7075	L1 3/4x1 3/4x3/16	4.69	4.39	153.4 K=1.00	0.6211	-742.82	7552.38	0.098 [1] ✔
T14	6.7075 - 0	L1 3/4x1 3/4x3/16	4.41	4.09	142.9 K=1.00	0.6211	-698.89	8699.96	0.080 [1] ✔

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	78.063 - 74.563	L2 1/2x2x3/16	3.56	3.23	90.8 K=1.00	0.8090	-6.21	21570.60	0.000 [1] ✔
T5	67.563 - 65.438	L2 1/2x2x3/16	3.56	3.23	90.8 K=1.00	0.8090	-3.69	21570.60	0.000 [1] ✔
T12	20.103 - 13.415	L2x2x3/16 KL/R > 250 (C) - 187	15.01	14.59	444.5 K=1.00	0.7150	-132.29	1035.81	0.128 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	90.333 - 78.063	L4x4x1/4	12.27	6.08	58.4	1.9400	3641.40	62856.00	0.058 [1] ✔
T2	78.063 - 74.563	L4x4x3/8	3.50	3.50	34.1	2.8600	8383.44	92664.00	0.090 [1] ✔
T3	74.563 - 72.313	L4x4x3/8	2.25	2.25	22.0	2.8600	7684.75	92664.00	0.083 [1] ✔
T4	72.313 - 67.563	L4x4x3/8	4.75	4.75	46.3	2.8600	16656.90	92664.00	0.180 [1] ✔
T5	67.563 - 65.438	L4x4x3/8	2.13	0.13	1.2	2.8600	21308.60	92664.00	0.230 [1] ✔
T6	65.438 - 57.521	L4x4x3/8	7.95	7.95	77.5	2.8600	24534.40	92664.00	0.265 [1] ✔
T7	57.521 - 50.271	L4x4x3/8	7.28	7.28	71.0	2.8600	31677.00	92664.00	0.342 [1] ✔
T8	50.271 - 41.979	L5x5x3/8	8.32	8.32	64.0	3.6100	36628.80	116964.00	0.313 [1] ✔
T9	41.979 - 34.187	L5x5x3/8	7.82	7.82	60.2	3.6100	42918.10	116964.00	0.367 [1] ✔
T10	34.187 - 26.895	L5x5x3/8	7.32	7.32	56.3	3.6100	47468.20	116964.00	0.406 [1] ✔
T11	26.895 - 20.103	L5x5x3/8	6.82	6.82	52.4	3.6100	51454.00	116964.00	0.440 [1] ✔
T12	20.103 - 13.415	L5x5x5/16	6.71	6.71	51.3	3.0300	57806.80	98172.00	0.589 [1] ✔
T13	13.415 - 6.7075	L5x5x5/16	6.73	3.37	25.7	3.0300	56535.00	98172.00	0.576 [1] ✔
T14	6.7075 - 0	L5x5x5/16	6.73	3.37	25.7	3.0300	56619.70	98172.00	0.577 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	90.333 - 78.063	L2x2x1/4	7.90	3.69	72.7	0.5631	1692.28	24493.20	0.069 [1] ✔
T2	78.063 - 74.563	L2x2 1/2x3/16	4.31	4.03	80.6	0.5131	2963.36	22319.60	0.133 [1] ✔

Structural Components
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Denver, CO
Phone: 866-386-7622
FAX:

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in²	P_u lb	ϕP_n lb	Ratio $P_u / \phi P_n$
T3	74.563 - 72.313	L2 1/2x2 1/2x3/16	3.38	3.16	48.7	0.5828	3400.75	25353.70	0.134 [1] ✔
T4	72.313 - 67.563	L2 1/2x2 1/2x3/16	5.38	5.02	77.5	0.5828	5285.70	25353.70	0.208 [1] ✔
T5	67.563 - 65.438	L2x2x3/16	3.22	3.01	58.4	0.4426	4251.09	19252.80	0.221 [1] ✔
T6	65.438 - 57.521	L2x2 1/2x3/16	9.67	4.97	99.4	0.5131	3202.30	22319.60	0.143 [1] ✔
T7	57.521 - 50.271	L2x2 1/2x3/16	9.72	4.95	99.0	0.5131	2947.44	22319.60	0.132 [1] ✔
T8	50.271 - 41.979	L2x2 1/2x3/16	11.14	5.64	112.8	0.5131	2723.37	22319.60	0.122 [1] ✔
T9	41.979 - 34.187	L2x2 1/2x3/16	11.47	5.78	115.6	0.5131	2823.53	22319.60	0.127 [1] ✔
T10	34.187 - 26.895	L2x2 1/2x3/16	11.85	5.95	119.0	0.5131	2509.28	22319.60	0.112 [1] ✔
T11	26.895 - 20.103	L2x2 1/2x3/16	12.26	6.13	122.7	0.5131	2652.07	22319.60	0.119 [1] ✔
T12	20.103 - 13.415	L2 1/2x2 1/2x3/16	12.90	6.45	99.5	0.5828	4861.72	25353.70	0.192 [1] ✔
T13	13.415 - 6.7075	L3x3x5/16	8.82	8.50	110.7	1.1789	6108.46	51282.40	0.119 [1] ✔
T14	6.7075 - 0	L3x3x5/16	9.38	9.08	118.2	1.1789	6145.36	51282.40	0.120 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in²	P_u lb	ϕP_n lb	Ratio $P_u / \phi P_n$
T3	74.563 - 72.313	L4x3 1/2x1/4	5.04	3.53	39.4	1.2169	883.08	52934.10	0.017 [1] ✔
T5	67.563 - 65.438	L4x3 1/2x1/4	5.04	3.53	39.4	1.2169	501.53	52934.10	0.009 [1] ✔
T14	6.7075 - 0	L1 3/4x1 3/4x3/16	12.26	5.92	198.5	0.3604	971.04	15675.30	0.062 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in²	P_u lb	ϕP_n lb	Ratio $P_u / \phi P_n$
T1	90.333 -	L2 1/2x2 1/2x3/16	5.04	4.71	72.6	0.5710	110.23	24839.90	0.004 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	78.063								✔
T2	78.063 - 74.563	L4x3 1/2x1/4	5.04	3.53	44.6	1.2169	765.40	52934.10	0.014 [1] ✔
T4	72.313 - 67.563	2L4x4x3/8	5.04	4.71	45.9	3.8681	1914.26	168263.00	0.011 [1] ✔
T8	50.271 - 41.979	L2 1/2x2 1/2x3/16	6.91	6.49	100.1	0.5710	646.39	24839.90	0.026 [1] ✔
T12	20.103 - 13.415	L2x2 1/2x1/4	10.61	10.20	206.6	0.6544	1967.71	28465.30	0.069 [1] ✔

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T5	67.563 - 65.438	L3x3x3/16	5.04	3.53	60.2	1.0900	1248.22	35316.00	0.035 [1] ✔

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T13	13.415 - 6.7075	L1 3/4x1 3/4x3/16	3.06	2.86	63.8	0.3779	962.55	16439.90	0.059 [1] ✔
T14	6.7075 - 0	L1 3/4x1 3/4x3/16	3.06	2.86	63.8	0.3779	971.04	16439.90	0.059 [1] ✔

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T13	13.415 - 6.7075	L1 3/4x1 3/4x3/16	4.69	4.39	98.1	0.3779	742.82	16439.90	0.045 [1] ✔
T14	6.7075 - 0	L1 3/4x1 3/4x3/16	4.41	4.09	91.4	0.3779	698.89	16439.90	0.043 [1] ✔

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

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	78.063 - 74.563	L2 1/2x2x3/16	7.13	6.80	136.0	0.8090	91.28	26211.60	0.003 [*1] ✔
T5	67.563 - 65.438	L2 1/2x2x3/16	7.13	6.80	136.0	0.8090	193.02	26211.60	0.007 [1] ✔
T8	50.271 - 41.979	L2 1/2x2x3/16	9.77	9.35	187.1	0.8090	29.22	26211.60	0.001 [1] ✔
T12	20.103 - 13.415	L2x2x3/16	15.01	14.59	283.8	0.7150	202.31	23166.00	0.009 [1] ✔

[*] DL controls
[1] P_u / ϕP_n controls

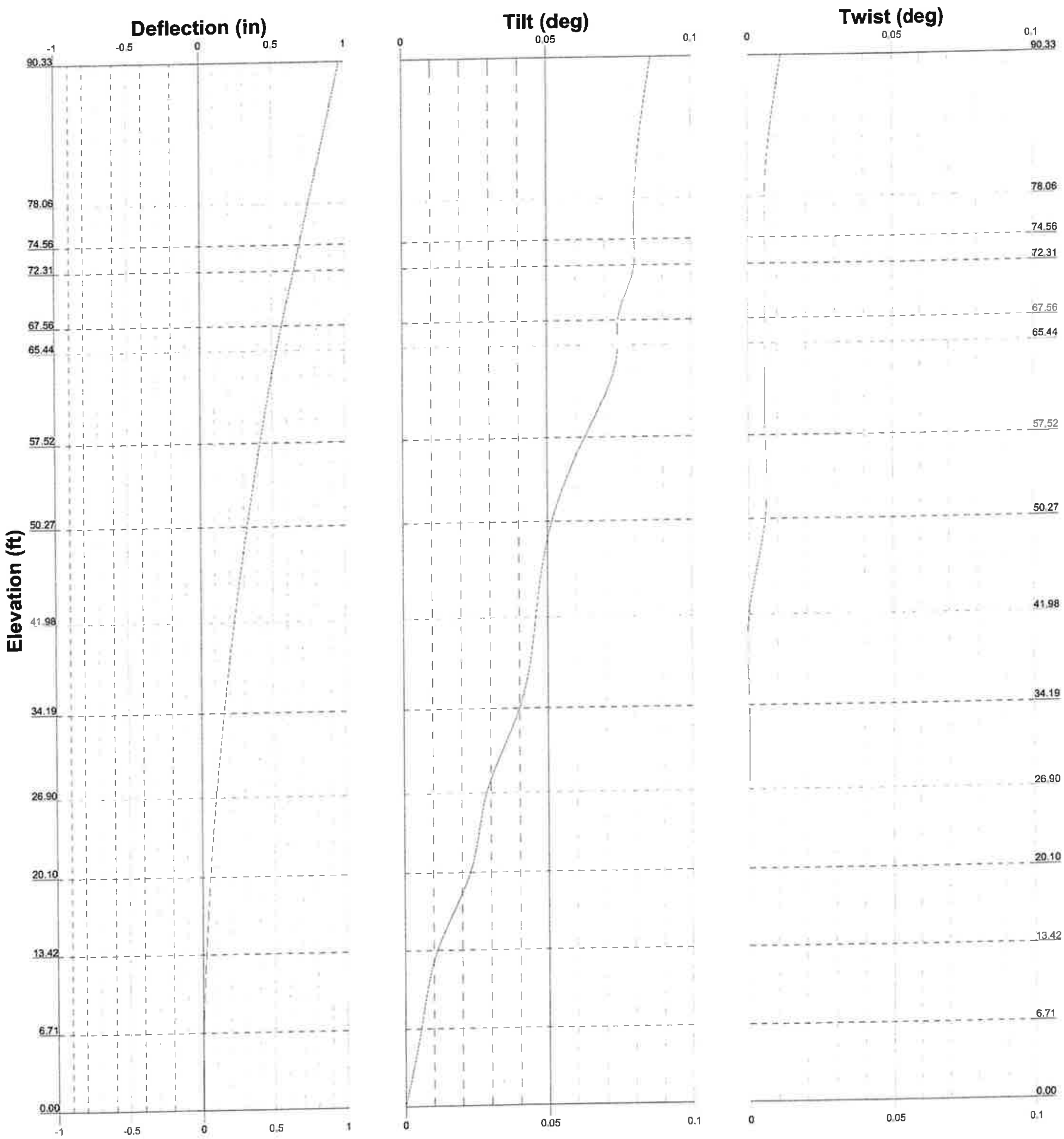
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	90.333 - 78.063	Leg	L4x4x1/4	3	-5243.66	50194.10	10.4	Pass
T2	78.063 - 74.563	Leg	L4x4x3/8	28	-11411.40	93762.70	12.2	Pass
T3	74.563 - 72.313	Leg	L4x4x3/8	54	-11474.70	99159.10	11.6	Pass
T4	72.313 - 67.563	Leg	L4x4x3/8	66	-20935.00	86020.10	24.3	Pass
T5	67.563 - 65.438	Leg	L4x4x3/8	86	-27002.70	102948.00	26.2	Pass
T6	65.438 - 57.521	Leg	L4x4x3/8	108	-30041.60	55545.30	54.1	Pass
T7	57.521 - 50.271	Leg	L4x4x3/8	120	-37998.40	63198.00	60.1	Pass
T8	50.271 - 41.979	Leg	L5x5x3/8	132	-43011.90	88365.70	48.7	Pass
T9	41.979 - 34.187	Leg	L5x5x3/8	150	-50006.60	93230.70	53.6	Pass
T10	34.187 - 26.895	Leg	L5x5x3/8	162	-54794.20	97793.20	56.0	Pass
T11	26.895 - 20.103	Leg	L5x5x3/8	172	-59276.50	102053.00	58.1	Pass
T12	20.103 - 13.415	Leg	L5x5x5/16	184	-66783.70	84358.10	79.2	Pass
T13	13.415 - 6.7075	Leg	L5x5x5/16	202	-64049.90	100100.00	64.0	Pass
T14	6.7075 - 0	Leg	L5x5x5/16	234	-64615.20	100100.00	64.6	Pass
T1	90.333 - 78.063	Diagonal	L2x2x1/4	11	-1718.89	20156.50	8.5	Pass
T2	78.063 - 74.563	Diagonal	L2x2 1/2x3/16	42	-3438.33	17388.40	19.8	Pass
T3	74.563 - 72.313	Diagonal	L2 1/2x2 1/2x3/16	60	-4052.43	26497.00	15.3	Pass
T4	72.313 - 67.563	Diagonal	L2 1/2x2 1/2x3/16	78	-5883.02	17338.40	33.9	Pass
T5	67.563 - 65.438	Diagonal	L2x2x3/16	98	-5119.39	18959.90	27.0	Pass
T6	65.438 - 57.521	Diagonal	L2x2 1/2x3/16	114	-3490.75	11872.90	29.4	Pass
T7	57.521 - 50.271	Diagonal	L2x2 1/2x3/16	126	-2799.12	11987.10	23.4	Pass
T8	50.271 - 41.979	Diagonal	L2x2 1/2x3/16	144	-2927.16	9221.79	31.7	Pass
T9	41.979 - 34.187	Diagonal	L2x2 1/2x3/16	156	-2725.29	8781.19	31.0	Pass
T10	34.187 - 26.895	Diagonal	L2x2 1/2x3/16	168	-2592.47	8293.25	31.3	Pass
T11	26.895 - 20.103	Diagonal	L2x2 1/2x3/16	180	-2678.06	7801.97	34.3	Pass
T12	20.103 - 13.415	Diagonal	L2 1/2x2 1/2x3/16	196	-4228.92	10566.60	40.0	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	øP_allow lb	% Capacity	Pass Fail
T13	13.415 - 6.7075	Diagonal	L3x3x5/16	216	-6967.63	39401.70	17.7	Pass
T14	6.7075 - 0	Diagonal	L3x3x5/16	243	-7215.17	35938.10	20.1	Pass
T3	74.563 - 72.313	Horizontal	L4x3 1/2x1/4	41	883.08	52934.10	1.7	Pass
T5	67.563 - 65.438	Horizontal	L4x3 1/2x1/4	74	501.53	52934.10	0.9	Pass
T14	6.7075 - 0	Horizontal	L1 3/4x1 3/4x3/16	205	-971.04	4152.93	23.4	Pass
T1	90.333 - 78.063	Top Girt	L2 1/2x2 1/2x3/16	5	-131.91	19169.70	0.7	Pass
T2	78.063 - 74.563	Top Girt	L4x3 1/2x1/4	33	765.40	52934.10	1.4	Pass
T4	72.313 - 67.563	Top Girt	2L4x4x3/8	69	1914.26	168263.00	1.1	Pass
T8	50.271 - 41.979	Top Girt	L2 1/2x2 1/2x3/16	137	-646.39	10431.90	6.2	Pass
T12	20.103 - 13.415	Top Girt	L2x2 1/2x1/4	190	-2314.22	3642.36	63.5	Pass
T5	67.563 - 65.438	Bottom Girt	L3x3x3/16	91	1248.22	35316.00	3.5	Pass
T13	13.415 - 6.7075	Redund Horz 1 Bracing	L1 3/4x1 3/4x3/16	210	-962.55	15355.50	6.3	Pass
T14	6.7075 - 0	Redund Horz 1 Bracing	L1 3/4x1 3/4x3/16	241	-971.04	15355.50	6.3	Pass
T13	13.415 - 6.7075	Redund Diag 1 Bracing	L1 3/4x1 3/4x3/16	211	-742.82	7552.38	9.8	Pass
T14	6.7075 - 0	Redund Diag 1 Bracing	L1 3/4x1 3/4x3/16	242	-698.89	8699.96	8.0	Pass
T2	78.063 - 74.563	Inner Bracing	L2 1/2x2x3/16	29	91.28	26211.60	0.3	Pass
T5	67.563 - 65.438	Inner Bracing	L2 1/2x2x3/16	87	193.02	26211.60	0.7	Pass
T8	50.271 - 41.979	Inner Bracing	L2 1/2x2x3/16	133	29.22	26211.60	0.5	Pass
T12	20.103 - 13.415	Inner Bracing	L2x2x3/16	188	-132.29	1035.81	12.8	Pass
							Summary	
						Leg (T12)	79.2	Pass
						Diagonal (T12)	40.0	Pass
						Horizontal (T14)	23.4	Pass
						Top Girt (T12)	63.5	Pass
						Bottom Girt (T5)	3.5	Pass
						Redund Horz 1 Bracing (T14)	6.3	Pass
						Redund Diag 1 Bracing (T13)	9.8	Pass
						Inner Bracing (T12)	12.8	Pass
						Bolt Checks	64.5	Pass
						RATING =	**79.2**	**Pass**

TIA-222-H - Service - 60 mph

Maximum Values



Structural Components	Job: 230262		
1870 W. 64th Lane, Unit A	Project: *Portland (CT-1680)*		
Denver, CO	Client: BST Management, LLC	Drawn by: wculver	App'd:
Phone: 866-386-7622	Code: TIA-222-H	Date: 05/16/23	Scale: NTS
FAX:	Path:		Dwg No. E-5

PIER/PAD & MAT FOUNDATION

Template = "SquareCombPierPadMat.xmcd"
Version = 4.02

Structural Components
Bringing It All Together.

1870 West 64th Lane, Unit A
Denver, CO 80221
866-386-7622

PROJECT DATA

Job = 230262
Client = "BST Management, LLC"
Site = "Portland (CT-1680)"
Model = "90ft SST"

DESIGN CODES AND STANDARDS

Code = ("TIA-222-H, "Structural Standard for Antenna Supporting Structures and Antennas" 2017."
"ACI 318-14, "Building Code Requirements for Structural Concrete and Commentary," 2014.")

FACTORED FOUNDATION DESIGN LOADS

Overdesign Factor: $\alpha = 1.00$

Calculation Mode: calc = "Analysis (no seismic provision check)"

Percentage for Passing: $PP = 100\cdot\%$

reinf = "Reinforcing Details Available"

	Load Comb. #1	Load Comb. #2	Load Comb. #3
Load Combination:	$Comb_1$ = "1.2D + 1.0W"	$Comb'_2$ = "0.9D + 1.6W"	$Comb_3$ = "1.2D + 1.0Di + 1.0W"
Overall Moment:	$M_{u_1} = 1172.0\cdot kip\cdot ft$	$M_{u_2} = 1274.0\cdot kip\cdot ft$	$M_{u_3} = 323.0\cdot kip\cdot ft$
Overall Shear:	$V_{u_1} = 21.0\cdot kip$	$V_{u_2} = 23.0\cdot kip$	$V_{u_3} = 6.0\cdot kip$
Overall Axial:	$P_{u_1} = 22.0\cdot kip$	$P_{u_2} = 17.0\cdot kip$	$P_{u_3} = 44.0\cdot kip$
Leg Moment:	$LM_{u_1} = 0.0\cdot kip\cdot ft$	$LM_{u_2} = 0.0\cdot kip\cdot ft$	$LM_{u_3} = 0.0\cdot kip\cdot ft$
Leg Shear:	$S_{u_1} = 12.0\cdot kip$	$S_{u_2} = 12.0\cdot kip$	$S_{u_3} = 12.0\cdot kip$
Leg Axial:	$Pmax_{u_1} = 52.0\cdot kip$	$Pmax_{u_2} = 74.0\cdot kip$	$Pmax_{u_3} = 70.0\cdot kip$
	$Pmin_{u_1} = -41.0\cdot kip$	$Pmin_{u_2} = -66.0\cdot kip$	$Pmin_{u_3} = -60.0\cdot kip$

DIMENSIONS

Depth:	$D = 6.5\cdot ft$	(from grade to bottom of pad)
Pad Width:	$W = 18.0\cdot ft$	(each way)
Pad Thickness:	$T = 2.0\cdot ft$	
Pier Separation:	$Wt = 13.0\cdot ft$	
Pier (or mat) Extension:	$E = 0.5\cdot ft$	(above-grade portion)
Pier: Pier = "Square"	$D_p = 2.0\cdot ft$	
Base Plate Geometry:	BPG = "None"	$BP = 0.0\cdot in$
Tower Offset:	$ecc1 = 0.0\cdot ft$	(center of tower to center of pad)
Tower Leg Offset:	$ecc2 = 0.0\cdot ft$	(center of tower leg to center of pier)

Concrete Volume:

$V_{pad} = 24.0\cdot yd^3$

$V_{pier} = 0.7\cdot yd^3$

$V_{conc} = 27.0\cdot yd^3$

SITE & GEOTECHNICAL DATA

Soil Parameters:	Geo = "GDP, 03/06/2017, Job # 2017702.58"			
Soil Unit Weight:	$\gamma_{soil} = 136.5385 \cdot pcf$			
Soil Cone Override:	soilcone = "N"	$\phi_{cone} = 0.0 \cdot deg$		
Constant Lateral Pressure:	costpres = "N"	$CP_p = 0 \cdot psf$ (for pier)	$CP_P = 0 \cdot psf$ (for pad)	
Equivalent Fluid Pressure:	EFpres = "N"	$EFP = 0.0 \cdot pcf$		
Angle of Internal Friction:	$\phi_1 = 15.0 \cdot deg$	(above water table)		
	ϕ_2 = "N/A" $\cdot deg$	(below water table)		
Ultimate Bearing Pressure:	$B'_c = 30.0 \cdot ksf$	Bearing = "Capacity at Depth"		
Cohesion:	$c = 10000 \cdot psf$			
Adhesion:	$c_A = 0 \cdot psf$			
Passive Pressure Coefficient (Rankine):	$K_{p1} = 1.70$	(above water table)	K_{p2} = "N/A"	(below water table)
Active Pressure Coefficient:	$K_{a1} = 0.59$	(above water table)	K_{a2} = "N/A"	(below water table)
Ultimate Friction Coefficient:	$\mu = 0.60$	(base)	$\mu_s = 0.60$	(sides)
Ultimate Sliding Friction:	$f_s = 0 \cdot psf$	(base)	$f_{s.s} = 0.0000 \cdot psf$	(sides)
Depth Neglected:	$D_n = 2.5\,ft$			
Depth of Water Table:	D_w = "Below Footing"			
Seismic Design Category:	SDCT = "Seismic Design Category B"	$Note_{SDC}$ = "N/A"		

MATERIAL SPECIFICATIONS

Concrete:	Compressive Strength:	$f'_c = 3000 \cdot psi$
	Clear Cover:	$cc = 3.0 \cdot in$
	Lightweight Aggregate Factor:	$\lambda = 1.00$
	Unit Weight:	$\gamma_{conc} = 150 \cdot pcf$
Rebar:	Yield Strength:	$F_y = 60 \cdot ksi$

LATERAL CAPACITY

Design Resist.	Lat. Load	Check	Ratio
$\min(\phi V_n) = 1112 \cdot kip$	$\max(V_u) = 23 \cdot kip$	$Check'_{lateral}$ = "OK"	$Ratio'_{lateral} = 0.02$

OVERTURNING

Design Resist.	O.T. Moment	Check	Ratio
$\min(MR1, MR2) = 6779\,ft \cdot kip$	$\max(M_{u.ot}) = 1435 \cdot ft \cdot kip$	$Check'_{over}$ = "OK"	$Ratio'_{over} = 0.62$

SOIL BEARING

Design Bearing Capacity	Max. Bearing	Check	Ratio
$\phi B_c = 22500 \cdot psf$	$P_{pos} = 2661 \cdot psf$	$Check'_{comp}$ = "OK"	$Ratio'_{comp} = 0.12$

PAD REINFORCEMENT/STRENGTH

*Pad reinforcement is assumed

Number of Reinforcing Layers:	Mats = "Top & Bottom Mats"
Pad has Hoops or Ties?	Tie_p = "No"
Bar Quantity:	$n_p = 21$ (per layer per direction)
Bar Size:	$s_p = 6$
Bar Spacing (center to center):	$sp_{p.ctr} = 10.5 \cdot in$
Bar Spacing (clear):	$sp_{p.cl} = 9.7 \cdot in$
Total Weight (per mat):	$Wt_{tp} = 1104\, lbf$
Check of Reinforcing Spacing and Minimum Reinforcing:	$Check_{spp.cl}$ = "OK" $Check_{spp.cl2}$ = "OK" $Check_{minp}$ = "No Good"

REINFORCING FLEXURAL STRENGTH

Case	Design Strength	Calculated Max Moment	Check	Ratio
A	$\phi M_{nA} = 805 \cdot ft \cdot kip$	$\max(M_{u.TA}) = 83\, ft \cdot kip$	$Check'_{flex}$ = "OK"	$Ratio_{flex} = 0.98$
B	$\phi M_{nB} = 805 \cdot ft \cdot kip$	$\max(M_{u.TB}) = 788\, ft \cdot kip$		

(Case A = Bottom of Pad in Tension at Toe, Case B = Top of Pad in Tension at Heel)

PAD ONE-WAY SHEAR

Case	Design Strength	Calculated Max Shear	Check	Ratio
1	$\phi V_{n1} = 353 \cdot kip$	$\left\|\max(V_{umax.C1T}, V_{umin.C1T})\right\| = 280 \cdot kip$	$Check'_{shear.1}$ = "OK"	$Ratio'_{shear.1} = 0.79$
2		$\left\|\max(V_{umax.C2T}, V_{umin.C2T})\right\| = 182 \cdot kip$		

(Case 1 = Hinging about Pad Edge Adjacent to Pier 1, Case 2 = Hinging about Pad Edge Adjacent to Piers 2/3.)

Shear Reinforcing Check: $Check'_{shrrnf}$ = "OK"

TWO-WAY PAD SHEAR

Design Strength	Calculated Max Shear	Check	Ratio
$\phi V_{n2} = 573 \cdot kip$	$\max(V_{u2}) = 128 \cdot kip$	$Check'_{shear.2}$ = "OK"	$Ratio'_{shear.2} = 0.22$

PIER REINFORCEMENT

Gross Area: $A_{pier} = 4.0 \cdot ft^2$

Effective Gross Area: $A'_{pier} = 2.0 \cdot ft^2$

Design Pier Area Factor: $P_{Ag} = 50 \cdot \%$

Check of Area Factor: $Check_{PAg} = \text{"OK"}$

LONGITUDINAL PIER REINFORCING

Bar Quantity: $n_c = 12$

Hook Length: $hook_{ca} = 0.0 \cdot in$ (actual/0 for none)

Hook Length: $hook_c = 9.0 \cdot in$ (required per ACI 7.1.2)

Check of Hook Length:

Bar Size: $s_c = 6$

Bend Dia: $bend_c = 4.5 \cdot in$ (inside)

Bar Weight: $Wt_{tc} = 133\ lbf$ (per pier)

$Check_{hookc} = \text{"N/A"}$

TIES

Tie Size: $s_t = 4.0000$

Check of Tie Size: $Check_{st} = \text{"OK"}$

Tie Weight: $Wt_{tc} = 133 \cdot lbf$ (per pier)

Maximum Crosstie Spacing (hx): $h_x = 0.0 \cdot in$
(0 for none)

$Note_{SDCt1} = \text{"N/A"}$

Tie Levels: (0 if none)	Qty. Spaces	Spacing	
	$qsp_{t1} = 7.0000$	$sp_{t1} = 8.0 \cdot in$	(top)
	$qsp_{t2} = 0.0000$	$sp_{t2} = 0.0 \cdot in$	(mid.)
	$qsp_{t3} = 0.0000$	$sp_{t3} = 0.0 \cdot in$	(bot.)

Tie Quantity: $n_t = 8$

Maximum Required Tie Spacing (top, mid., bot.): $sp_{t.max} = 12.0 \cdot in$

$Check_{tie} = \text{"OK"}$

$Note_{SDCt3} = \text{"N/A"}$

$Check_{sp.cl} = \text{"OK"}$

TIE SPLICE

Required Lap Splice Length: $Lap = 24.0000 \cdot in$

$Note_{SDCt2} = \text{"N/A"}$

MINIMUM LONGITUDINAL REINFORCEMENT

Pier Area of Steel: $A_{tc} = 5.3 \cdot in^2$ $Ratio_{min.c} = 1.8 \cdot \%$ (based on effective pier gross area)

Minimum Steel Area Required: $A_{min.c} = 2.9 \cdot in^2$

Maximum Steel Area Allowed: $A_{max.c} = 23.0 \cdot in^2$

Check of Steel Area: $Check_{min.c} = \text{"OK"}$

BASE PLATE BEARING ON CONCRETE

Design Strength	Calculated Max Compression	Check	Ratio
$\phi B_n = 0 \cdot kip$	$\max(Pmax_u) = 74 \cdot kip$	$Check'_{bear} = \text{"N/A"}$	$Ratio'_{bear} = 0.00$

COMPRESSIVE STRENGTH OF PIER CONCRETE

Design Strength	Calculated Max Compression	Check	Ratio
$\phi P_n = 382 \cdot kip$	$max(P_{upier}) = 77 \cdot kip$	$Check'_{comp2}$ = "OK"	$Ratio'_{comp2} = 0.20$

SHEAR STRENGTH OF PIER CONCRETE

Design Strength	Calculated Max Shear	Check	Ratio
$\phi V_{npM} = 72 \cdot kip$	$max(S_u) = 12 \cdot kip$	$Check'_{shear.p}$ = "OK"	$Ratio'_{shear.p} = 0.19$

Shear Reinforcing Check: $Check'_{shrrnfp}$ = "OK"

PIER MOMENT CAPACITY

Design Strength	Calculated Max Moment	Check	Ratio
$\phi Mn_{cm} = 109\,ft \cdot kip$	$max(M_{u1.c}, M_{u2.c}) = 60\,ft \cdot kip$	$Check'_{pier}$ = "OK"	$Ratio'_{pier} = 0.55$

DEVELOPMENT LENGTH IN TENSION

Case	Required Length	Length Available	Check	Ratio
w/o Hook	$l_{dc} = 12.0 \cdot in$	$l_{ac} = 21.0 \cdot in$	$Check_{dev.ch}$ = "Hook not Required"	$Ratio_{dev} = 0.57$
w/ Hook	$l_{dch} = 6.0 \cdot in$	$hook_{ca} = 0.0 \cdot in$		

Controlling Foundation: $CFP = 97.8 \cdot \%$

APPENDIX B

Data Provided for Analysis

SRR Towers Collocation Application

Installation Type: Anchor ☐ Collocation ☑ Add to Existing ☐

Contact:	James Burgess	Site Number:	
Email	jamesb@blueskytower.com	Site Name:	
Office:	617-549-2800	Submittal Date	
Fax:		Revision Date(s)	

PLEASE SUBMIT THIS APPLICATION VIA E-MAIL. Include Drawings, Specification Sheets, RFDS, Antenna Data Sheets

Applicant Information

Applicant Name:	Cellco Partnership d/b/a Verizon Wireless	Primary Contact/Agent Name:	Phil Cotto
Applicant Site Name:	PORTLAND	Contact/Agent Company Name:	Structure Consulting Group
Applicant Site Number:	469381	Contact/Agent Number:	617-454-7363
Proposed ON AIR Date:	9/30/2022	Contact Email:	Pcotto@structureconsulting.net

Applicant Contact Information

Leasing Contact Name:	Phil Cotto	Email:	Pcotto@structureconsulting.net	Number:	
RF Contact Name:		Email:		Number:	
Construction Contact Name:		Email:		Number:	
Emergency Contact Name:		Email:		Number:	
Account Payable Contact Name:		Email:		Number:	

Tower Information

Latitude:	N	Structure Type:	
Longitude:	W	Structure Height:	
AMSL:	FT	Site Address:	

EQUIPMENT SPECIFICATIONS

Summary of Work to be Completed:	New 3 sector installation of 9 panels and 9 RRUs. Tower extension to be performed to allow for VZW to take 90' CL.

EXISTING CONDITIONS - List all installed equipment prior to proposed modification. If this is a new installation, proceed to FINAL CONFIGURATION.

	SECTOR 1	SECTOR 2	SECTOR 3	SECTOR 4 (if necessary)
Current RAD Center (Ft AGL)				
Tower Mount Height (If different than RAD ctr)				
Mount Type (Label "Existing" if no change)				
Mount Model #				
Antenna Manufacturer				
Antenna Model# (Attach Specs)				
Antenna Dimensions (WxHxD in inches)				
Antenna Weight (Lbs.)				
Antenna Quantity				
Dish Manufacturer				
Dish Model# (attach Specs)				
Dish Diameter (Ft)				
Dish Weight (Lbs.)				
Dish Mount Height				
Azimuths				
Total # of Coax Lines per Sector				
Diameter Of Coax Cables (In)				
Total # of Hybrid Cables per Sector				
Diameter Of Hybrid Cables (In)				
Total # of other Cables per Sector				
Diameter Of Other Cables (In)				
Quantity of RRUs per Sector				
Manufacturer				
Model				
Dimensions				
Weight (Lbs.)				
Quantity of TMAs per Sector				
Manufacturer				
Model				
Dimensions				
Weight (Lbs.)				
Quantity of Surge Arrestors per Sector				
Manufacturer				
Model				
Antenna Model & Quantity to be Removed per Sector (If Applicable)				
RRU Model & Quantity to be Removed per Sector (If Applicable)				
Line/Cable Type, Size & Quantity to be Removed (If Applicable)				
List Any Other Equipment to be Removed (If Applicable)				

FINAL CONFIGURATION - List all installed equipment after proposed modification or initial installation.

	SECTOR 1	SECTOR 2	SECTOR 3	SECTOR 4 (if necessary)
Current/Proposed RAD Center (Ft AGL)	90	90	90	
Tower Mount Height (If different than RAD ctr)	90	90	90	
Mount Type (Label "Existing" if no change)	T-Arm	T-Arm	T-Arm	
Mount Model #	TBD	TBD	TBD	
Antenna Manufacturer	Commscope	Samsung	Samsung	
Antenna Model# (Attach Specs)	NHH4-65B-R6	XXDWMM-12.5-65-8TCBRS	MT6407-77A	
Antenna Dimensions (WxHxD in inches)	19.60 x 55.11 x 7.76	8.7 x 12.3 x 1.4	16.06 x 35.12 x 5.51	
Antenna Weight (Lbs.)	73.86	4.41	87.1	
Antenna Quantity	3	3	3	
Dish Manufacturer				
Dish Model# (attach Specs)				
Dish Diameter (Ft)				
Dish Weight (Lbs.)				
Dish Mount Height				
Azimuths				

Total # of Coax Lines per Sector	0			
Diameter Of Coax Cables (In)				
Total # of Hybrid Cables per Sector	2			
Diameter Of Hybrid Cables (In)	6x12 hybriflex			
Total # of other Cables per Sector	1			
Diameter Of Other Cables (In)				
Quantity of RRUs per Sector	3	3	3	
Manufacturer	Samsung	Samsung	Samsung	
Model	CBRS RRH - RT4401-48A	RF4439d-25A	RF4440d-13A	
Quantity of TMAs per Sector	1			
Manufacturer	Commscope			
Model	FE-16148-OVP-B12			
Quantity of Surge Arrestors per Sector				
Manufacturer				
Model				
Transmit Frequency (MHz)	5, 2145-2155, 869-880, 890-891.5 M			
Receive Frequency (MHz)	55, 1745-1755, 824-835,845-846.5 M			
Antenna Gain (Db)				
Type of Technology				
TX Power Output				
ERP (Watts)				
Electric Service Required (Amps/Volts)				

GROUND SPACE REQUIREMENTS

Existing Lease Area: DIMS: L(ft) ______ W(ft) ______ OR ______ Square footage
New/Add 'l Lease Area being requested: DIMS: L(ft) 20 W(ft) 10 OR ______ Square footage
Shelter: DIMS: L(ft) ______ W(ft) ______ H(ft) ______
Concrete Pad for Shelter/Cabinets: DIMS: L(ft) ______ W(ft)

POWER REQUIREMENTS

Power Provided by: ______ Electrical Service Provider: ______ Electrical Service Telephone Number: ______
Average Monthly Power Consumption: ______ KWH units
Is a multi-tenant meter rack present: Yes How many, if any, empty meter banks are present: ______
Telco/Interconnect Requirements: POTS ☐ T1 ☐ MICROWAVE ☐ FIBER OPTICS ☑
Fiber Provider: ______

BACK-UP POWER INFORMATION

Generator Required: No Generation Location: ______ Fuel Type: ______
Generator Ground Space Requirement: DIMS: L(ft) ______ W(ft) ______ H(ft) ______
Shared Generator Peak Usage: ______ KW
BST Generator: ______ Generator Owner: ______ Generator Model: ______
Generator Capacity: ______ KW Generator Make: ______ Fuel Tank S ______ Gallons
Fuel Tank Location: ______ Fuel Tank Size: DIMS: L(f ______ W(ft) ______
Pad for Fuel Tank (if required) DIMS: L(ft ______ W(ft) ______
Comments: ______

Comments: List any pertinent information that was not included above.

SRR Towers Collocation Application

Installation Type: Anchor ☐ Collocation ☑ Add to Existing ☐

Contact:	James Burgess	Site Number:	
Email	jamesb@blueskytower.com	Site Name:	
Office:	617-549-2800	Submittal Date	
Fax:		Revision Date(s)	

PLEASE SUBMIT THIS APPLICATION VIA E-MAIL. Include Drawings, Specification Sheets, RFDS, Antenna Data Sheets

Applicant Information

Applicant Name:	AT&T	Primary Contact/Agent Name:	Allison Conwell
Applicant Site Name:	Portland	Contact/Agent Company Name:	Centerline Communications
Applicant Site Number:	CT1066	Contact/Agent Number:	215-588-7035
Proposed ON AIR Date:		Contact Email:	aconwell@clinellc.com

Applicant Contact Information

Leasing Contact Name:	Allison Conwell	Email:	aconwell@clinellc.com	Number:	215-588-7035
RF Contact Name:		Email:		Number:	
Construction Contact Name:		Email:		Number:	
Emergency Contact Name:		Email:		Number:	
Account Payable Contact Name:		Email:		Number:	

Tower Information

Latitude:	41.5807139	N	Structure Type:	Self -Support
Longitude:	-72.62386	W	Structure Height:	80
AMSL:		FT	Site Address:	97 High Street Portland, CT 06480

EQUIPMENT SPECIFICATIONS

Summary of Work to be Completed:	Replacing (6) antennas, adding (3) antennas (new antennas stacked, no additional space required, replacing (3) RRUs, adding (3) RRUs, removing (3) TMAs, adding (1) surge arrestor, adding (1) fiber cable and adding (3) DC cables.

EXISTING CONDITIONS - List all installed equipment prior to proposed modification. If this is a new installation, proceed to FINAL CONFIGURATION.

	SECTOR 1	SECTOR 2	SECTOR 3	SECTOR 4 (if necessary)
Current RAD Center (Ft AGL)	77	77	77	
Tower Mount Height (if different than RAD ctr)				
Mount Type (Label "Existing" if no change)	Existing	Existing	Existing	
Mount Model #				
Antenna Manufacturer	Kathrein / CCI / Quintel	Kathrein / CCI / Quintel	Kathrein / CCI / Quintel	
Antenna Model# (Attach Specs)	800 10121 / HPA-65R-BUU-H6 / QS66510-6	800 10121 / HPA-65R-BUU-H6 / QS66510-6	800 10121 / HPA-65R-BUU-H6 / QS66510-6	
Antenna Dimensions (WxHxD in inches)	54.5 x 10.3 x 5.9 / 72 x 14.8 x 9 / 72 x 12 x 9.6	54.5 x 10.3 x 5.9 / 72 x 14.8 x 9 / 72 x 12 x 9.6	54.5 x 10.3 x 5.9 / 72 x 14.8 x 9 / 72 x 12 x 9.6	
Antenna Weight (Lbs.)	44.1 / 50.7 / 98	44.1 / 50.7 / 98	44.1 / 50.7 / 98	
Antenna Quantity	(1) / (1) / (1)	(1) / (1) / (1)	(1) / (1) / (1)	
Dish Manufacturer				
Dish Model# (attach Specs)				
Dish Diameter (Ft)				
Dish Weight (Lbs.)				
Dish Mount Height				
Azimuths	30	150	270	
Total # of Coax Lines per Sector	2	2	2	
Diameter Of Coax Cables (In)	7/8"	7/8"	7/8"	
Total # of Hybrid Cables per Sector				
Diameter Of Hybrid Cables (In)				
Total # of other Cables per Sector	4 DC / 2 Fiber			
Diameter Of Other Cables (In)	3/4" / 3/8"			
Quantity of RRUs per Sector	4	4	4	
Manufacturer	Ericsson	Ericsson	Ericsson	
Model	RRUS 11 B12 / RRUS 32 B2 / RRUS 32 B66A / RRUS 32 B30	RRUS 11 B12 / RRUS 32 B2 / RRUS 32 B66A / RRUS 32 B30	RRUS 11 B12 / RRUS 32 B2 / RRUS 32 B66A / RRUS 32 B30	
Dimensions	17.8 x 17 x 7.2 / 27.2 x 12.1 x 7 / 27.2 x 12.1 x 7 / 27.2 x 12.1 x 7	17.8 x 17 x 7.2 / 27.2 x 12.1 x 7 / 27.2 x 12.1 x 7 / 27.2 x 12.1 x 7	17.8 x 17 x 7.2 / 27.2 x 12.1 x 7 / 27.2 x 12.1 x 7 / 27.2 x 12.1 x 7	
Weight (Lbs.)	55 / 60 / 60 / 60	55 / 60 / 60 / 60	55 / 60 / 60 / 60	
Quantity of TMAs per Sector	1	1	1	
Manufacturer	CCI	CCI	CCI	
Model	DTMABP7819VG12A	DTMABP7819VG12A	DTMABP7819VG12A	
Dimensions	10.63x 11.02 x 3.78	10.63x 11.02 x 3.78	10.63x 11.02 x 3.78	
Weight (Lbs.)	19	19	19	
Quantity of Surge Arrestors per Sector	2	0	0	
Manufacturer	Raycap			
Model	DC6-48-60-18-8F			
Antenna Model & Quantity to be Removed per Sector (If Applicable)	3	3	3	
RRU Model & Quantity to be Removed per Sector (If Applicable)	3	3	3	
Line/Cable Type, Size & Quantity to be Removed (If Applicable)				
List Any Other Equipment to be Removed (If Applicable)	3 TMA	3 TMA	3 TMA	

FINAL CONFIGURATION - List all installed equipment after proposed modification or initial installation.

	SECTOR 1	SECTOR 2	SECTOR 3	SECTOR 4 (if necessary)
Current/Proposed RAD Center (Ft AGL)	77	77	77	
Tower Mount Height (if different than RAD ctr)				
Mount Type (Label "Existing" if no change)	Existing	Existing	Existing	
Mount Model #				
Antenna Manufacturer	CCI / Ericsson / CCI	CCI / Ericsson / CCI	CCI / Ericsson / CCI	
Antenna Model# (Attach Specs)	TPA65R-BU6DA-K / AIR6449 B77D + AIR6419 B77G / DMP65R-BU6DA	TPA65R-BU6DA-K / AIR6449 B77D + AIR6419 B77G / DMP65R-BU6DA	TPA65R-BU6DA-K / AIR6449 B77D + AIR6419 B77G / DMP65R-BU6DA	
Antenna Dimensions (WxHxD in inches)	71.2 x 20.7 x 7.7 / (2) 30.4 x 15.9 x 8.1 / 71.2 x 20.7 x 7.7	71.2 x 20.7 x 7.7 / (2) 30.4 x 15.9 x 8.1 / 71.2 x 20.7 x 7.7	71.2 x 20.7 x 7.7 / (2) 30.4 x 15.9 x 8.1 / 71.2 x 20.7 x 7.7	
Antenna Weight (Lbs.)	69 / (2) 82 / 80	69 / (2) 82 / 80	69 / (2) 82 / 80	

Antenna Quantity	4 (AIR's are stacked)	4 (AIR's are stacked)	4 (AIR's are stacked)	
Dish Manufacturer				
Dish Model# (attach Specs)				
Dish Diameter (Ft)				
Dish Weight (Lbs.)				
Dish Mount Height				
Azimuths	30	150	270	

Total # of Coax Lines per Sector	2	2	2	
Diameter Of Coax Cables (In)	7/8"	7/8"	7/8"	
Total # of Hybrid Cables per Sector				
Diameter Of Hybrid Cables (In)				
Total # of other Cables per Sector	4 DC / 1 Fiber	3 DC / 1 Fiber		
Diameter Of Other Cables (In)	3/4" / 3/8"	.92"/ 1/2"		
Quantity of RRUs per Sector	5	5	5	
Manufacturer	Ericsson	Ericsson	Ericsson	
Model	RRUS 32 B2 / RRUS 32 B30 / RRUS 32 B66A / RRUs 4478 B14 / RRUS 4449 B5/B12	RRUS 32 B2 / RRUS 32 B30 / RRUS 32 B66A / RRUs 4478 B14 / RRUS 4449 B5/B12	RRUS 32 B2 / RRUS 32 B30 / RRUS 32 B66A / RRUs 4478 B14 / RRUS 4449 B5/B12	
Quantity of TMAs per Sector				
Manufacturer				
Model				
Quantity of Surge Arrestors per Sector	2	1		
Manufacturer	Raycap	Raycap		
Model	DC6-48-60-18-8F	DC9-48-60-24-8C-EV		
Transmit Frequency (MHz)	734-746, 788-799880-890, 891.5-894, 1930-1945, 1965-1970, 1975-1990, 2170-2180, 2345-2360, 3450-3550, 3700-3980	734-746, 788-799880-890, 891.5-894, 1930-1945, 1965-1970, 1975-1990, 2170-2180, 2345-2360, 3450-3550, 3700-3980	734-746, 788-799880-890, 891.5-894, 1930-1945, 1965-1970, 1975-1990, 2170-2180, 2345-2360, 3450-3550, 3700-3980	
Receive Frequency (MHz)	704-728, 758-769, 835-845,846.5-849, 1770-1780, 1850-1865,1885-1890,1895-1910, 2305-2320, 3450-3550, 3700-3980	704-728, 758-769, 835-845,846.5-849, 1770-1780, 1850-1865,1885-1890,1895-1910, 2305-2320, 3450-3550, 3700-3980	704-728, 758-769, 835-845,846.5-849, 1770-1780, 1850-1865,1885-1890,1895-1910, 2305-2320, 3450-3550, 3700-3980	
Antenna Gain (Db)				
Type of Technology	CBAND DoD	CBAND DoD	CBAND DoD	
TX Power Output				
ERP (Watts)				
Electric Service Required (Amps/Volts)				

GROUND SPACE REQUIREMENTS

Existing Lease Area: DIMS: L(ft) 22 W(ft) 14' 7" OR 319 Square footage
New/Add 'l Lease Area being requested: DIMS: L(ft) ____ W(ft) ____ OR ____ Square footage
Shelter: DIMS: L(ft) ____ W(ft) ____ H(ft) ____
Concrete Pad for Shelter/Cabinets: DIMS: L(ft) W(ft)

POWER REQUIREMENTS

Power Provided by: ____ Electrical Service Provider: ____ Electrical Service Telephone Number: ____
Average Monthly Power Consumption: ____ KWH units
Is a multi-tenant meter rack present: Yes How many, if any, empty meter banks are present: ____
Telco/Interconnect Requirements: POTS ☐ T1 ☐ MICROWAVE ☐ FIBER OPTICS ☑
Fiber Provider: ____

BACK-UP POWER INFORMATION

Generator Required: ____ Generation Location: ____
Generator Ground Space Requirement: DIMS: L(ft) ____ W(ft) ____ H(ft) ____ Fuel Type: ____
BST Generator: ____ Generator Owner: ____ Shared Generator Peak Usage: ____ KW
Generator Capacity: ____ KW Generator Make: ____ Generator Model: ____
Fuel Tank Location: ____ Fuel Tank Size: DIMS: L(ft ____ W(ft) ____ Fuel Tank # ____ Gallons
Pad for Fuel Tank (if required) DIMS: L(ft ____ W(ft) ____
Comments: ____

Comments: List any pertinent information that was not included above.

EPA - Tower Summary

Totals:

Tower Top EPA SQIN (with Drag & Shielding)	19,172.9
Tower Top Weight lbs	1,819.5
Cabling SQ IN	8.1
TOTAL Tower Top + Cabling	19,181.0

Sub-Totals:

Antenna SQIN	11,521.4
RRH SQIN	3,721.7
Squid SQIN	929.9
TMA SQIN	-
WCS Filter SQIN	-
Combiner SQIN	-
RET SQIN	-
Microwave SQIN	-
ODU SQIN	-
Ice Bridge SQIN	-
Mount SQIN	3,000.0

CENTEK engineering

Centered on Solutions℠

Antenna Mount Analysis Report

Site Ref: Portland HS

97 High Street
Portland, CT

Centek Project No. 22017.06

Date: May 11, 2023

Max Stress Ratio = 44%

Prepared for:

Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

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CENTEK engineering

Centered on Solutions℠

May 11, 2023

Mr. Phillip Cotto
Structure Consulting Group
49 Brattle Street
Arlington, Ma

Re: Structural Letter ~ Antenna Mount
Verizon – Site Ref: Portland HS
97 High Street
Portland, CT

Centek Project No. 22017.06

Dear Mr. Cotto,

Centek Engineering, Inc. has reviewed the Verizon antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the **proposed mount, consisting of three (3) V-frame sector mounts (SitePro P/N: VFA12-HD)** to support the proposed equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2021 International Building Code as modified by the 2022 Connecticut State Building Code (CTBC) including ASCE 7-16 and ANSI/TIA-222-H *Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures"*.

The loads considered in this analysis consist of the following:

- **Verizon:**
  V-Frames: **Three (3) Commscope NNH4-65B-R6 panel antennas, three (3) Samsung MT6407-77A panel antennas, three (3) Samsung XXDWMM-12.5-65 panel antennas, three (3) Samsung RF4439d-25A (B2/B66A) RRHs, three (3) Samsung RF4440d-13A (B5/B13) RRHs, three (3) Samsung CBRS RRH RT4401-48A and one (1) OVP Box mounted on three (3) V-Frames with a RAD center elevation of 90 ft +/- AGL.**

The antenna mount was analyzed per the requirements of the 2021 International Building Code as modified by the 2022 Connecticut State Building Code considering a Ultimate design wind speed of 120 mph for Portland as required in Appendix P of the 2022 Connecticut State Building Code.

Based on our review of the installation, it is our opinion that the **subject antenna mount has sufficient capacity** to support the aforementioned antenna configuration.

If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Section 2 - Calculations

Development of Design Heights, Exposure Coefficients, and Velocity Pressures Per TIA-222-H

Wind Speeds

Basic Wind Speed	$V := 120$	mph	(User Input - CSBC 2022 Appendix P)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input - TIA-222-H Annex B)
Basic Wind Speed (Mount)	$V_m := 30$	mph	(User Input - TIA-222-H Section 16.3)

Input

Structure Type =	Structure_Type := Flexible		(User Input)
Structure Category =	SC := III		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	$h := 90$	ft	(User Input)
Height to Center of Antennas =	$z_{ant} := 90$	ft	(User Input)
Radial Ice Thickness =	$t_i := 1.0$	in	(User Input per Annex B of TIA-222-H)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1$		(User Input)
Shielding Factor for Appurtenances =	$K_a := 1.0$		(User Input)
Rooftop Wind Speed-up Factor =	$K_s := 1.0$		(User Input)
Ground Elevation Factor =	$K_e = 0.996$		(User Input)
Gust Response Factor =	$G_H = 1.35$		(User Input)

Output

Wind Direction Probability Factor = $K_d := 0.95$ (Per Table 2-2 of TIA-222-H)

Importance Factors = (Per Table 2-3 of TIA-222-H)

$$I_{ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.15 & \text{if } SC = 3 \\ 1.25 & \text{if } SC = 4 \end{cases} = 1.15$$

$$I_{Seismic} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.25 & \text{if } SC = 3 \\ 1.50 & \text{if } SC = 4 \end{cases} = 1.25$$

$$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.106 \qquad t_{iz} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.271$$

Velocity Pressure Coefficient Antennas = $Kz_{ant} := 2.01\left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.238$

Velocity Pressure w/o Ice Antennas = $qz_{ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V^2 = 43.16$

Velocity Pressure with Ice Antennas = $qz_{ice.ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_i^2 = 7.493$

Velocity Pressure with Ice Antennas = $qz_m := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_m^2 = 2.697$

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P: (203) 488-0580
F: (203) 488-8587

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Commscope NNH4-65B-R6		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 71.969$	in	(User Input)
Appurtenance Width =	$W_{app} := 19.606$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 7.756$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 90$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 3.7$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.25$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 9.8$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} \cdot N_{app} = 715$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 3.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 283$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front) =	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 11.5$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} \cdot N_{app} = 145$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 5.3$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 67$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 9.8$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} \cdot N_{app} = 45$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 3.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 18$	lbs

Gravity Loads (Ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 1 \times 10^4$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 6053$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 196$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 196$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Samsung MT6407-77A		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 35.1$	in	(User Input)
Appurtenance Width =	$W_{app} := 16.1$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 5.5$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 87$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 2.2$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without Ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 274$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.3$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 94$	lbs

Wind Load (with Ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 4.9$	sf
Total Appurtenance Wind Force w/ Ice=	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 59$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 2.1$	sf
Total Appurtenance Wind Force w/ Ice=	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 26$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 17$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.3$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 6$	lbs

Gravity Loads (Ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 3108$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 t_{iz})(W_{app} + 2 t_{iz}) \cdot (T_{app} + 2 t_{iz}) - V_{app} = 2536$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 82$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 82$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Samsung XXDWMM-12.5-65		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 12.3$	in	(User Input)
Appurtenance Width =	$W_{app} := 8.7$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 1.4$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 3$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.4$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.7$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} \cdot N_{app} = 52$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 8$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front) =	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 1.2$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} \cdot N_{app} = 14$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 0.4$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 5$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.7$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} \cdot N_{app} = 3$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 1$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 150$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 508$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 16$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 16$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Samsung RF4439-25A(B2/B66A)RRH		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 15$	in	(User Input)
Appurtenance Width =	$W_{app} := 15$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 10$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 75$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.0$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 109$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 73$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front) =	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 2.1$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 26$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 1.5$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 19$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 7$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 5$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 2250$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 1610$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 52$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 52$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Samsung RF4440d-13A(B5/B13) RRH		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 15$	in	(User Input)
Appurtenance Width =	$W_{app} := 15$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 9.1$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 70.3$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.0$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without Ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 109$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 66$	lbs

Wind Load (with Ice)

Surface Area for One Appurtenance w/ Ice (Front) =	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 2.1$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 26$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 1.4$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 17$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 7$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 4$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 2048$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 1536$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 50$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 50$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	CBRS RRH RT-4401-48A		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 12.1$	in	(User Input)
Appurtenance Width =	$W_{app} := 8.5$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 4.1$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 20$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.4$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.7$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 50$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.3$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 24$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front) =	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 1.1$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 14$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 0.7$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 8$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.7$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 3$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.3$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 2$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 422$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 652$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 21$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 21$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	OVP Box		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 29.5$	in	(User Input)
Appurtenance Width =	$W_{app} := 16.5$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 12.6$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 32$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.8$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.4$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 236$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 2.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 180$	lbs

Wind Load (with Ice)

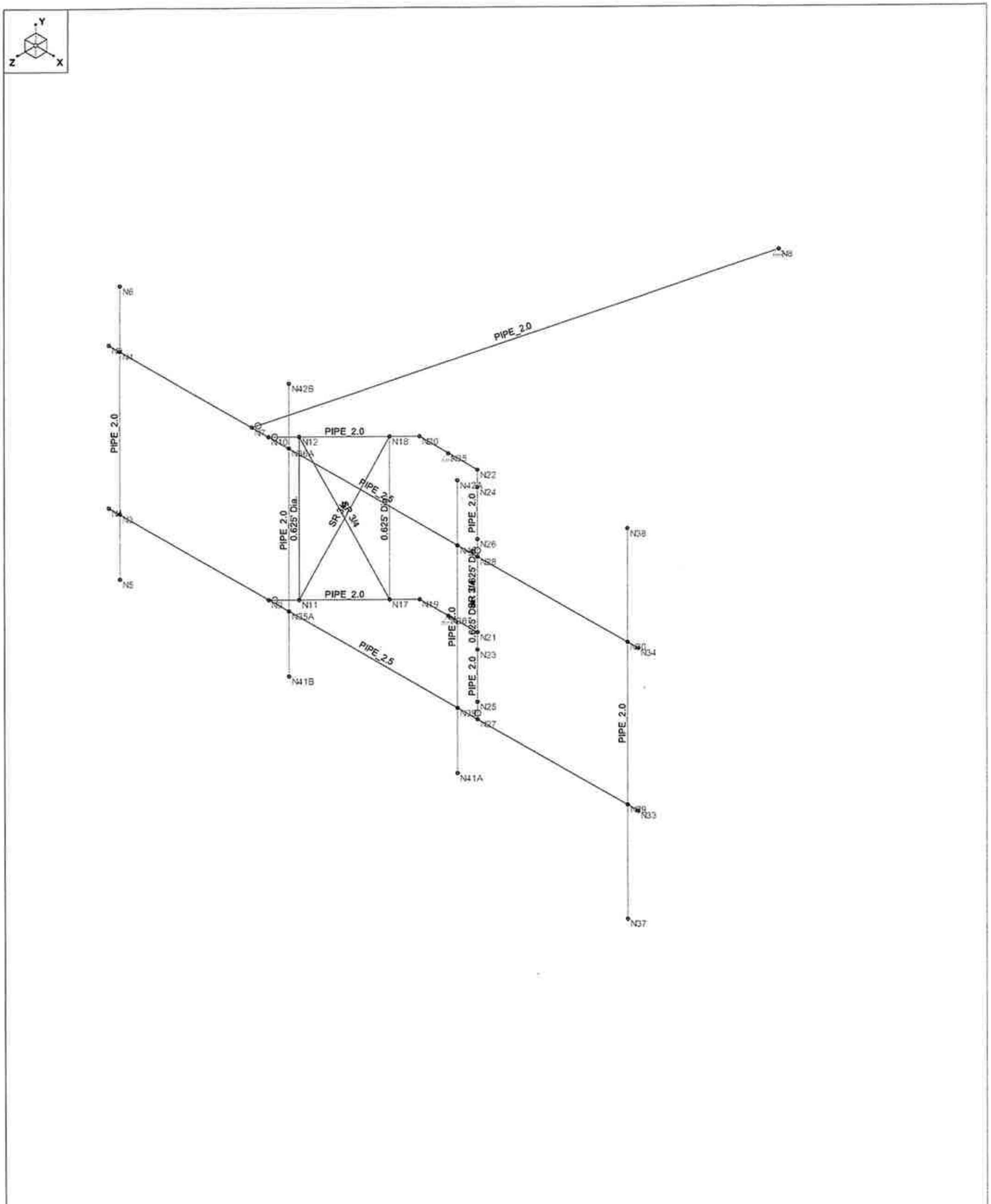
Surface Area for One Appurtenance w/ Ice (Front) =	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 4.2$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 51$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 3.4$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 41$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.4$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 15$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 2.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 11$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 6133$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 3107$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 101$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 101$	lbs



Envelope Only Solution

Centek Engineering		
TJL	Portland HS	May 11, 2023 at 11:39 AM
22017.06	Member Framing	Mount.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?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
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 15th(360-16): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 15th(360-16): LRFD
Cold Formed Steel Code	AISI S100-10: ASD
Wood Code	AWC NDS-12: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	ACI 530-11: ASD
Aluminum Code	AA ADM1-10: ASD - 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?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	1
Cd X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	150.001
Footing Concrete f'c (ksi)	4
Footing Concrete Ec (ksi)	3644
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	2
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Antenna Mast_2.0 ST...	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
2	Horizontal_2.5 STD Pi...	PIPE_2.5	Beam	Pipe	A53 Grade B	Typical	1.61	1.45	1.45	2.89
3	Outrigger_2.0 STD Pi...	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Stabilizer_2.0 STD Pipe	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
5	0.625" Dia. Bar	0.625' Dia.	Column	BAR	A36 Gr.36	Typical	.307	.007	.007	.015
6	0.75"Dia. Bar	SR 3/4	Column	BAR	A36 Gr.36	Typical	.442	.016	.016	.031

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	Horizontal_2.5 STD...	12.5	Segment		Lbyy						Lateral
2	M2	Horizontal_2.5 STD...	12.5	Segment		Lbyy						Lateral
3	M3	Stabilizer_2.0 STD ...	10.18			Lbyy						Lateral
4	M4	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
5	M5	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
6	M6	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
7	M7	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
8	M8	0.625" Dia. Bar	3.333									Lateral
9	M9	0.625" Dia. Bar	3.333									Lateral
10	M10	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
11	M11	0.625" Dia. Bar	3.333									Lateral
12	M12	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
13	M13	0.625" Dia. Bar	3.333									Lateral
14	M14	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
15	M15	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
16	PS.2	Antenna Mast_2.0 ...	6			Lbyy						Lateral
17	PS.1	Antenna Mast_2.0 ...	8			Lbyy						Lateral
18	M19	Antenna Mast_2.0 ...	6			Lbyy						Lateral
19	M21A	Antenna Mast_2.0 ...	6			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
1	M1	N2	N34			Horizontal_2.5 STD Pipe	Beam	Pipe	A53 Grade B	Typical
2	M2	N1	N33			Horizontal_2.5 STD Pipe	Beam	Pipe	A53 Grade B	Typical
3	M3	N7	N8			Stabilizer_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
4	M4	N10	N20			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
5	M5	N9	N19			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
6	M6	N28	N22			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
7	M7	N27	N21			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
8	M8	N12	N11			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
9	M9	N18	N17			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
10	M10	N12	N17			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
11	M11	N26	N25			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
12	M12	N18	N11			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
13	M13	N24	N23			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
14	M14	N26	N23			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
15	M15	N24	N25			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
16	PS.2	N5	N6			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical
17	PS.1	N37	N38			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
18	M19	N41A	N42A			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical
19	M20	N19	N21			RIGID	None	None	RIGID	Typical
20	M21	N20	N22			RIGID	None	None	RIGID	Typical
21	M21A	N41B	N42B			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0.	-0.	0	
2	N2	0	3.333334	-0.	0	
3	N3	.25	0.	-0.	0	
4	N4	.25	3.333334	-0.	0	
5	N5	.25	-1.333333	-0.	0	
6	N6	.25	4.666667	-0.	0	
7	N7	3.390625	3.333334	-0.	0	
8	N8	6.025403	3.333334	-9.833125	0	
9	N9	3.78125	0.	-0.	0	
10	N10	3.78125	3.333334	-0.	0	
11	N11	4.138628	0.	-0.357378	0	
12	N12	4.138628	3.333334	-0.357378	0	
13	N17	5.206335	0.	-1.425085	0	
14	N18	5.206335	3.333334	-1.425085	0	
15	N19	5.563713	0.	-1.782463	0	
16	N20	5.563713	3.333334	-1.782463	0	
17	N21	6.936287	0.	-1.782463	0	
18	N22	6.936287	3.333334	-1.782463	0	
19	N23	7.293665	0.	-1.425085	0	
20	N24	7.293665	3.333334	-1.425085	0	
21	N25	8.361372	0.	-0.357378	0	
22	N26	8.361372	3.333334	-0.357378	0	
23	N27	8.71875	0.	-0.	0	
24	N28	8.71875	3.333334	-0.	0	
25	N29	12.25	0.	-0.	0	
26	N30	12.25	3.333334	-0.	0	
27	N33	12.5	0.	-0.	0	
28	N34	12.5	3.333334	-0.	0	
29	N35	6.25	3.333334	-1.782463	0	
30	N36	6.25	0.	-1.782463	0	
31	N35A	4.25	0.	-0.	0	
32	N36A	4.25	3.333334	-0.	0	
33	N37	12.25	-2.333333	0	0	
34	N38	12.25	5.666667	0	0	
35	N39	8.25	0.	-0.	0	
36	N40	8.25	3.333334	-0.	0	
37	N41A	8.25	-1.333333	-0.	0	
38	N42A	8.25	4.666667	-0.	0	
39	N41B	4.25	-1.333333	-0.	0	
40	N42B	4.25	4.666667	-0.	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N8	Reaction	Reaction	Reaction			
2	N19						
3	N20						
4	N17						
5	N18						
6	N21						
7	N22						
8	N23						
9	N24						
10	N35	Reaction	Reaction	Reaction			
11	N36	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Y	-.045	1.5
2	PS.1	Y	-.045	6.5
3	PS.2	Y	-.044	2
4	PS.2	Y	-.044	4
5	PS.1	Y	-.075	3
6	PS.1	Y	-.07	5
7	M21A	Y	-.02	1
8	M19	Y	-.032	%50
9	M21A	Y	-.003	%50

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Y	-.098	1.5
2	PS.1	Y	-.098	6.5
3	PS.2	Y	-.041	2
4	PS.2	Y	-.041	4
5	PS.1	Y	-.052	3
6	PS.1	Y	-.05	5
7	M21A	Y	-.021	1
8	M19	Y	-.101	%50
9	M21A	Y	-.016	%50

Member Point Loads (BLC 6 : Wind with Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.034	1.5
2	PS.1	X	.034	6.5
3	PS.2	X	.013	2
4	PS.2	X	.013	4
5	PS.1	X	.019	3
6	PS.1	X	.017	5
7	M21A	X	.008	1
8	M19	X	.041	%50
9	M21A	X	.005	%50

Member Point Loads (BLC 7 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.142	1.5
2	PS.1	X	.142	6.5
3	PS.2	X	.047	2
4	PS.2	X	.047	4
5	PS.1	X	.073	3
6	PS.1	X	.066	5
7	M21A	X	.024	1
8	M19	X	.18	%50
9	M21A	X	.008	%50

Member Point Loads (BLC 8 : Wm Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.009	1.5
2	PS.1	X	.009	6.5
3	PS.2	X	.003	2
4	PS.2	X	.003	4
5	PS.1	X	.005	3
6	PS.1	X	.004	5
7	M21A	X	.002	1
8	M19	X	.011	%50
9	M21A	X	.001	%50

Member Point Loads (BLC 9 : Wind with Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.073	1.5
2	PS.1	Z	.073	6.5
3	PS.2	Z	.03	2
4	PS.2	Z	.03	4
5	M19	Z	.051	%50
6	M21A	Z	.014	%50

Member Point Loads (BLC 10 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.358	1.5
2	PS.1	Z	.358	6.5
3	PS.2	Z	.137	2
4	PS.2	Z	.137	4
5	M19	Z	.236	%50
6	M21A	Z	.052	%50

Member Point Loads (BLC 11 : Wm Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.023	1.5
2	PS.1	Z	.023	6.5
3	PS.2	Z	.009	2
4	PS.2	Z	.009	4
5	M19	Z	.015	%50
6	M21A	Z	.003	%50

Member Distributed Loads (BLC 6 : Wind with Ice X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M3	X	.003	.003	0	0
2	M4	X	.003	.003	0	0
3	M5	X	.003	.003	0	0
4	M6	X	.003	.003	0	0
5	M7	X	.003	.003	0	0
6	M8	X	.003	.003	0	0
7	M9	X	.003	.003	0	0
8	M10	X	.003	.003	0	0
9	M11	X	.003	.003	0	0
10	M12	X	.003	.003	0	0
11	M13	X	.003	.003	0	0
12	M14	X	.003	.003	0	0
13	M15	X	.003	.003	0	0
14	PS.2	X	.003	.003	0	0
15	PS.1	X	.003	.003	0	0
16	M19	X	.003	.003	0	0
17	M20	X	.003	.003	0	0
18	M21	X	.003	.003	0	0
19	M21A	X	.003	.003	0	0

Member Distributed Loads (BLC 7 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M3	X	.018	.018	0	0
2	M4	X	.018	.018	0	0
3	M5	X	.018	.018	0	0
4	M6	X	.018	.018	0	0
5	M7	X	.018	.018	0	0
6	M8	X	.018	.018	0	0
7	M9	X	.018	.018	0	0
8	M10	X	.018	.018	0	0
9	M11	X	.018	.018	0	0
10	M12	X	.018	.018	0	0
11	M13	X	.018	.018	0	0
12	M14	X	.018	.018	0	0
13	M15	X	.018	.018	0	0
14	PS.2	X	.018	.018	0	0
15	PS.1	X	.018	.018	0	0
16	M19	X	.018	.018	0	0
17	M20	X	.018	.018	0	0
18	M21	X	.018	.018	0	0
19	M21A	X	.018	.018	0	0

Member Distributed Loads (BLC 8 : Wm Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M3	X	.003	.003	0	0
2	M4	X	.003	.003	0	0
3	M5	X	.003	.003	0	0
4	M6	X	.003	.003	0	0
5	M7	X	.003	.003	0	0
6	M8	X	.003	.003	0	0

Member Distributed Loads (BLC 8 : Wm Wind X) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
7	M9	X	.003	.003	0	0
8	M10	X	.003	.003	0	0
9	M11	X	.003	.003	0	0
10	M12	X	.003	.003	0	0
11	M13	X	.003	.003	0	0
12	M14	X	.003	.003	0	0
13	M15	X	.003	.003	0	0
14	PS.2	X	.003	.003	0	0
15	PS.1	X	.003	.003	0	0
16	M19	X	.003	.003	0	0
17	M20	X	.003	.003	0	0
18	M21	X	.003	.003	0	0
19	M21A	X	.003	.003	0	0

Member Distributed Loads (BLC 9 : Wind with Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.003	.003	0	0
2	M2	Z	.003	.003	0	0
3	M3	Z	.003	.003	0	0
4	M4	Z	.003	.003	0	0
5	M5	Z	.003	.003	0	0
6	M6	Z	.003	.003	0	0
7	M7	Z	.003	.003	0	0
8	M8	Z	.003	.003	0	0
9	M9	Z	.003	.003	0	0
10	M10	Z	.003	.003	0	0
11	M11	Z	.003	.003	0	0
12	M12	Z	.003	.003	0	0
13	M13	Z	.003	.003	0	0
14	M14	Z	.003	.003	0	0
15	M15	Z	.003	.003	0	0
16	PS.2	Z	.003	.003	0	0
17	M19	Z	.003	.003	0	0
18	M20	Z	.003	.003	0	0
19	M21	Z	.003	.003	0	0
20	M21A	Z	.003	.003	0	0

Member Distributed Loads (BLC 10 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.018	.018	0	0
2	M2	Z	.018	.018	0	0
3	M3	Z	.018	.018	0	0
4	M4	Z	.018	.018	0	0
5	M5	Z	.018	.018	0	0
6	M6	Z	.018	.018	0	0
7	M7	Z	.018	.018	0	0
8	M8	Z	.018	.018	0	0
9	M9	Z	.018	.018	0	0
10	M10	Z	.018	.018	0	0
11	M11	Z	.018	.018	0	0
12	M12	Z	.018	.018	0	0

Member Distributed Loads (BLC 10 : Wind Z) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
13	M13	Z	.018	.018	0	0
14	M14	Z	.018	.018	0	0
15	M15	Z	.018	.018	0	0
16	PS.2	Z	.018	.018	0	0
17	M19	Z	.018	.018	0	0
18	M20	Z	.018	.018	0	0
19	M21	Z	.018	.018	0	0
20	M21A	Z	.018	.018	0	0

Member Distributed Loads (BLC 11 : Wm Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.003	.003	0	0
2	M2	Z	.003	.003	0	0
3	M3	Z	.003	.003	0	0
4	M4	Z	.003	.003	0	0
5	M5	Z	.003	.003	0	0
6	M6	Z	.003	.003	0	0
7	M7	Z	.003	.003	0	0
8	M8	Z	.003	.003	0	0
9	M9	Z	.003	.003	0	0
10	M10	Z	.003	.003	0	0
11	M11	Z	.003	.003	0	0
12	M12	Z	.003	.003	0	0
13	M13	Z	.003	.003	0	0
14	M14	Z	.003	.003	0	0
15	M15	Z	.003	.003	0	0
16	PS.2	Z	.003	.003	0	0
17	M19	Z	.003	.003	0	0
18	M20	Z	.003	.003	0	0
19	M21	Z	.003	.003	0	0
20	M21A	Z	.003	.003	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	None		-1						
2	Dead Load	None					9			
3	Ice Load	None					9			
4	Lm Maintenance Load (500lb)	None								
5	Lv Maintenance Load (250lb)	None								
6	Wind with Ice X	None					9	19		
7	Wind X	None					9	19		
8	Wm Wind X	None					9	19		
9	Wind with Ice Z	None					6	20		
10	Wind Z	None					6	20		
11	Wm Wind Z	None					6	20		

Load Combinations

	Description	So...	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac...
1	1.4D	Yes	Y		1	1.4	2	1.4																
2	1.2D +1.5Lv	Yes	Y		1	1.2	2	1.2	5	1.5														
3	1.2D + 1.0W (X-directi...	Yes	Y		1	1.2	2	1.2	7	1														
4	1.2D + 1.0Di + 1.0Wi (...	Yes	Y		1	1.2	2	1.2	3	1	6	1												
5	1.2D +1.5Lm+ 1.0Wm ...	Yes	Y		1	1.2	2	1.2	4	1.5	8	1												
6	1.2D + 1.0W (Z-directi...	Yes	Y		1	1.2	2	1.2	10	1														
7	1.2D + 1.0Di + 1.0Wi (...	Yes	Y		1	1.2	2	1.2	3	1	9	1												
8	1.2D +1.5Lm+ 1.0Wm ...	Yes	Y		1	1.2	2	1.2	4	1.5	11	1												

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	.235	3	.025	1	.788	6	0	8	0	8	0	8
2		min	-.236	6	.021	4	-1.22	3	0	1	0	1	0	1
3	N35	max	-.083	6	.706	7	.798	3	0	8	0	8	0	8
4		min	-1.687	3	.397	3	-2.787	6	0	1	0	1	0	1
5	N36	max	.747	7	.677	4	.699	4	0	8	0	8	0	8
6		min	-.662	3	.258	6	-.97	6	0	1	0	1	0	1
7	Totals:	max	0	8	1.372	4	0	3						
8		min	-2.115	3	.854	5	-2.97	6						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
1	N1	max	.067	3	.012	6	.362	6	3.704e-03	6	1.33e-02	6	1.218e-03	3
2		min	-.107	6	-.052	3	-.028	1	-2.314e-03	3	-3.928e-04	4	-5.743e-04	6
3	N2	max	.035	3	.012	6	.495	6	1.987e-03	6	1.356e-02	6	1.379e-03	3
4		min	-.047	6	-.052	3	-.007	4	-2.42e-03	3	-3.18e-04	4	-5.964e-04	6
5	N3	max	.067	3	.01	6	.322	6	3.704e-03	6	1.33e-02	6	1.218e-03	3
6		min	-.107	6	-.048	3	-.028	1	-2.314e-03	3	-3.928e-04	4	-5.744e-04	6
7	N4	max	.035	3	.01	6	.454	6	1.987e-03	6	1.356e-02	6	1.379e-03	3
8		min	-.047	6	-.048	3	-.006	4	-2.42e-03	3	-3.18e-04	4	-5.965e-04	6
9	N5	max	.087	3	.01	6	.263	6	3.634e-03	6	1.33e-02	6	1.288e-03	3
10		min	-.116	6	-.048	3	-.037	1	-2.314e-03	3	-3.928e-04	4	-5.744e-04	6
11	N6	max	.014	3	.01	6	.486	6	2.058e-03	6	1.356e-02	6	1.308e-03	3
12		min	-.037	6	-.048	3	-.042	3	-2.42e-03	3	-3.18e-04	4	-5.965e-04	6
13	N7	max	.035	3	.026	7	.016	3	1.153e-03	6	1.019e-02	6	9.214e-04	3
14		min	-.047	6	.005	3	-.017	6	-1.234e-03	3	-1.292e-03	3	5.801e-05	6
15	N8	max	0	8	0	8	0	8	1.873e-03	1	7.878e-03	3	1.628e-03	3
16		min	0	1	0	1	0	1	1.402e-03	3	3.987e-05	2	2.139e-04	6
17	N9	max	.067	3	.027	7	.086	3	2.082e-03	6	6.062e-03	6	6.448e-04	3
18		min	-.107	6	.008	3	-.142	6	-8.797e-04	3	-3.989e-04	1	-1.437e-04	6
19	N10	max	.035	3	.027	7	.023	3	1.05e-03	6	8.901e-03	6	6.426e-04	3
20		min	-.047	6	.008	3	-.063	6	-1.087e-03	3	-1.196e-03	3	-1.033e-04	6
21	N11	max	.053	3	.031	7	.072	3	1.785e-03	6	3.254e-03	3	3.135e-04	3
22		min	-.084	6	.008	3	-.119	6	-6.552e-04	3	-5.324e-03	6	-6.835e-04	6
23	N12	max	.023	3	.031	7	.012	3	1.138e-03	7	2.545e-03	3	6.215e-04	3
24		min	-.037	6	.008	3	-.054	6	-8.609e-04	3	-2.132e-03	6	-2.999e-04	7
25	N17	max	.012	3	.031	7	.032	3	1.088e-03	6	2.892e-03	3	-2.181e-04	3
26		min	-.019	6	0	3	-.055	6	4.419e-05	3	-4.588e-03	6	-2.088e-03	7

Envelope Joint Displacements (Continued)

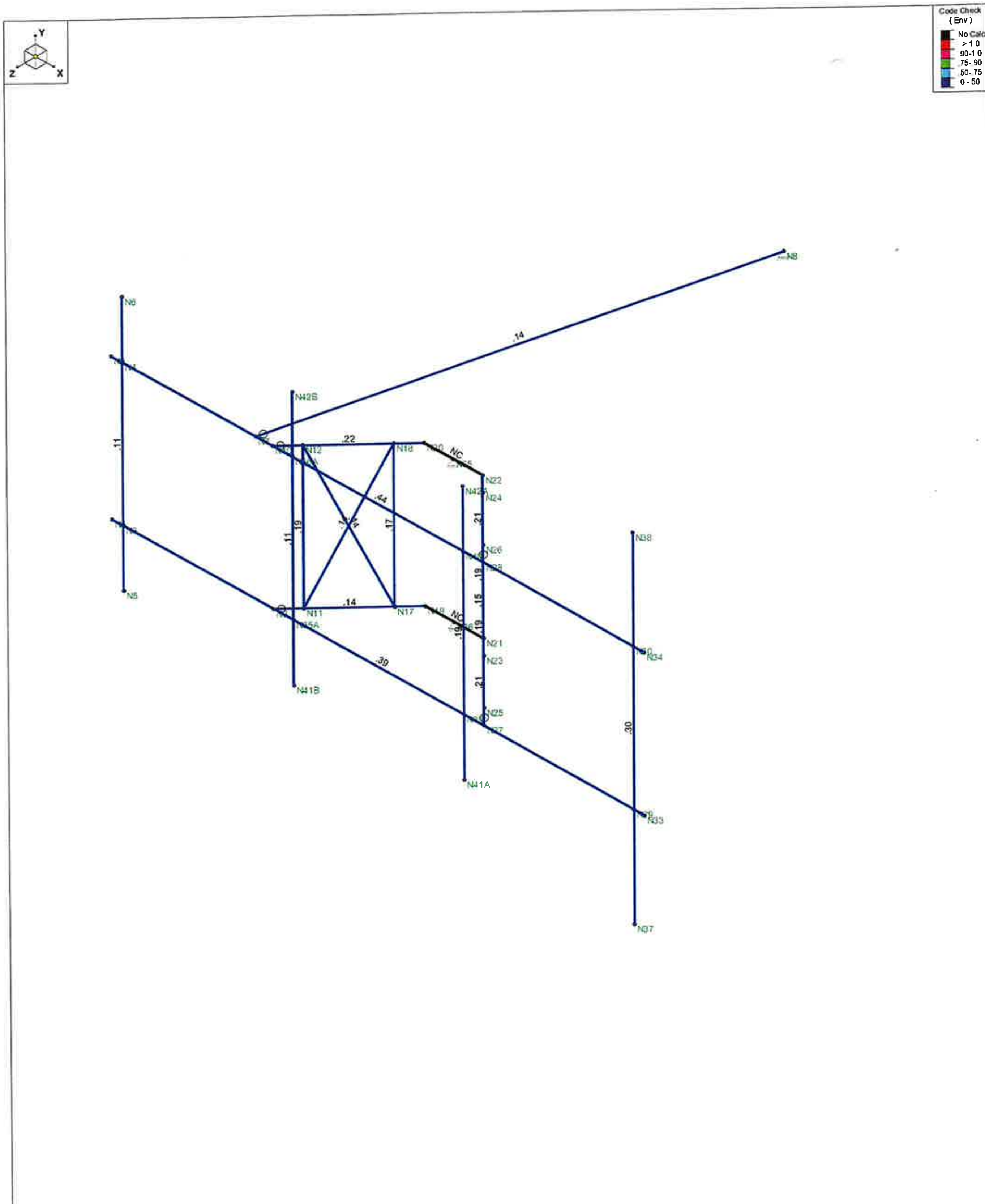
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
27	N18	max	0	3	.031	7	-.004	2	9.239e-04	7	4.583e-04	3	3.489e-06	3
28		min	-.01	6	0	3	-.029	6	-1.117e-04	3	-2.112e-03	6	-2.027e-03	7
29	N19	max	0	8	.024	7	.02	3	6.962e-04	7	2.435e-03	3	-1.437e-04	3
30		min	0	1	.001	3	-.036	6	3.951e-04	3	-4.401e-03	6	-2.896e-03	7
31	N20	max	0	8	.024	7	-.003	2	6.692e-04	4	-4.048e-04	2	-1.542e-04	3
32		min	0	1	.001	3	-.019	6	4.049e-04	6	-2.363e-03	6	-2.894e-03	7
33	N21	max	0	8	-.001	3	.036	6	6.962e-04	7	2.435e-03	3	-1.437e-04	3
34		min	0	1	-.024	7	-.02	3	3.951e-04	3	-4.401e-03	6	-2.896e-03	7
35	N22	max	0	8	-.001	3	.019	6	6.692e-04	4	-4.048e-04	2	-1.542e-04	3
36		min	0	1	-.024	7	.003	2	4.049e-04	6	-2.363e-03	6	-2.894e-03	7
37	N23	max	.012	3	-.004	3	.056	6	3.457e-04	3	2.894e-03	3	-3.945e-04	3
38		min	-.02	6	-.037	7	-.032	3	-2.178e-04	6	-4.88e-03	6	-2.289e-03	7
39	N24	max	0	3	-.005	3	.03	6	5.854e-04	3	5.245e-04	3	-1.389e-04	3
40		min	-.01	6	-.037	7	.004	2	-4.313e-04	6	-2.445e-03	6	-2.319e-03	7
41	N25	max	.052	3	-.015	3	.123	6	5.374e-04	3	3.274e-03	3	-1.078e-03	3
42		min	-.086	6	-.044	7	-.072	3	-1.363e-03	6	-5.224e-03	6	-2.378e-03	7
43	N26	max	.024	3	-.015	3	.061	6	7.121e-04	3	2.693e-03	3	-4.118e-04	3
44		min	-.039	6	-.044	7	-.014	3	-1.44e-03	6	-2.164e-03	6	-2.376e-03	7
45	N27	max	.066	3	-.023	3	.145	6	1.063e-03	3	3.184e-03	3	-1.655e-03	3
46		min	-.108	6	-.051	7	-.086	3	-1.307e-03	6	-1.66e-02	6	-3.677e-03	7
47	N28	max	.036	3	-.021	3	.07	6	1.186e-03	3	2.179e-03	3	-1.172e-03	3
48		min	-.048	6	-.051	7	-.026	3	-8.291e-04	6	-1.519e-02	6	-3.692e-03	7
49	N29	max	.067	3	-.107	3	1.12	6	1.616e-03	3	2.653e-03	3	-5.456e-04	3
50		min	-.108	6	-.28	7	-.206	3	-4.482e-03	6	-2.609e-02	6	-4.182e-03	7
51	N30	max	.036	3	-.107	3	1.029	6	1.681e-03	3	2.671e-03	3	-1.526e-03	3
52		min	-.048	6	-.28	7	-.133	3	-5.14e-04	7	-2.62e-02	6	-4.179e-03	7
53	N33	max	.067	3	-.108	3	1.198	6	1.616e-03	3	2.653e-03	3	-5.456e-04	3
54		min	-.108	6	-.292	7	-.214	3	-4.482e-03	6	-2.609e-02	6	-4.182e-03	7
55	N34	max	.036	3	-.111	3	1.108	6	1.681e-03	3	2.671e-03	3	-1.527e-03	3
56		min	-.048	6	-.292	7	-.141	3	-5.14e-04	7	-2.62e-02	6	-4.179e-03	7
57	N35	max	0	8	0	8	0	8	6.692e-04	4	-4.048e-04	2	-1.542e-04	3
58		min	0	1	0	1	0	1	4.049e-04	6	-2.363e-03	6	-2.894e-03	7
59	N36	max	0	8	0	8	0	8	6.962e-04	7	2.435e-03	3	-1.437e-04	3
60		min	0	1	0	1	0	1	3.951e-04	3	-4.401e-03	6	-2.896e-03	7
61	N35A	max	.067	3	.026	4	.076	3	1.819e-03	6	4.131e-03	6	4.075e-04	3
62		min	-.107	6	.009	6	-.17	6	-8.008e-04	3	-4.273e-04	1	-4.323e-04	7
63	N36A	max	.035	3	.026	4	.028	3	9.099e-04	6	6.889e-03	6	3.489e-04	3
64		min	-.047	6	.009	6	-.107	6	-9.593e-04	3	-6.214e-04	3	-4.104e-04	7
65	N37	max	.072	3	-.107	3	1.276	6	1.615e-03	3	2.653e-03	3	3.197e-04	3
66		min	-.19	6	-.28	7	-.251	3	-5.707e-03	6	-2.609e-02	6	-4.173e-03	7
67	N38	max	.132	4	-.107	3	1.076	6	1.804e-03	6	2.671e-03	3	-2.03e-03	2
68		min	.033	6	-.28	7	-.086	3	-3.206e-04	1	-2.62e-02	6	-4.189e-03	7
69	N39	max	.066	3	-.015	6	.059	6	9.786e-04	3	3.277e-03	3	-1.126e-03	3
70		min	-.108	6	-.034	4	-.068	3	-1.006e-03	6	-1.41e-02	6	-2.624e-03	7
71	N40	max	.036	3	-.015	6	-.001	2	1.063e-03	3	2.05e-03	3	-6.265e-04	3
72		min	-.048	6	-.034	4	-.014	3	-1.04e-03	6	-1.236e-02	6	-2.634e-03	7
73	N41A	max	.049	3	-.015	6	.076	6	9.786e-04	3	3.277e-03	3	-1.056e-03	3
74		min	-.133	6	-.034	4	-.084	3	-1.076e-03	6	-1.41e-02	6	-2.624e-03	7
75	N42A	max	.057	4	-.015	6	.003	3	1.063e-03	3	2.05e-03	3	-6.969e-04	3
76		min	-.022	6	-.034	4	-.023	6	-9.701e-04	6	-1.236e-02	6	-2.634e-03	7
77	N41B	max	.074	3	.026	4	.089	3	1.748e-03	6	4.131e-03	6	4.911e-04	3
78		min	-.113	6	.009	6	-.199	6	-8.007e-04	3	-4.273e-04	1	-4.322e-04	7

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
79	N42B	max	.03	3	.026	4	.016	4	9.803e-04	6	6.889e-03	6	2.786e-04	3
80		min	-.041	6	.009	6	-.092	6	-9.593e-04	3	-6.214e-04	3	-4.104e-04	7

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Mem...	Shape	Code Check	L...	LC	Sh...	Loc[ft]	Dir	...	phi*P...	phi*P...	phi*Mn y-y [k-ft]	phi*...	Cb	Eqn
1	M1	PIPE_2.5	.439	8...	6	.104	3.776		3	14.559	50.715	3.596	3.5...	2...	H1...
2	M2	PIPE_2.5	.387	8...	6	.092	8.724		6	14.559	50.715	3.596	3.5...	2...	H1...
3	PS.1	PIPE_2.0	.304	5...	4	.039	5.667		6	14.916	32.13	1.872	1.8...	4...	H1...
4	M4	PIPE_2.0	.216	2...	3	.084	2.521		3	32.032	32.13	1.872	1.8...	1...	H1...
5	M6	PIPE_2.0	.211	2...	3	.085	.499		7	32.032	32.13	1.872	1.8...	2...	H1...
6	M7	PIPE_2.0	.205	2...	7	.091	.499		7	32.032	32.13	1.872	1.8...	1...	H1...
7	M19	PIPE_2.0	.194	4...	3	.053	4.625		6	20.867	32.13	1.872	1.8...	1...	H1...
8	M11	0.625' Dia.	.193	0	3	.020	0		6	1.058	9.94	.104	.104	2...	H1...
9	M8	0.625' Dia.	.190	3...	6	.021	3.333		6	1.058	9.94	.104	.104	2...	H1...
10	M13	0.625' Dia.	.189	0	3	.018	0		6	1.058	9.94	.104	.104	2...	H1...
11	M9	0.625' Dia.	.171	0	3	.018	0		6	1.058	9.94	.104	.104	2...	H1...
12	M14	SR 3/4	.153	0	6	.015	0		6	6.954	14.314	.179	.179	2...	H1...
13	M15	SR 3/4	.146	0	3	.019	0		3	6.954	14.314	.179	.179	1	H1...
14	M3	PIPE_2.0	.143	5...	3	.009	10.18		3	9.492	32.13	1.872	1.8...	1...	H1...
15	M12	SR 3/4	.141	0	3	.018	0		6	6.954	14.314	.179	.179	2...	H1...
16	M5	PIPE_2.0	.141	2...	7	.070	2.521		4	32.032	32.13	1.872	1.8...	1...	H1...
17	M10	SR 3/4	.140	0	3	.018	3.659		6	6.954	14.314	.179	.179	1	H1...
18	PS.2	PIPE_2.0	.110	1...	7	.029	1.375		6	20.867	32.13	1.872	1.8...	1...	H1...
19	M21A	PIPE_2.0	.110	1...	6	.063	1.375		6	20.867	32.13	1.872	1.8...	1...	H1...



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek Engineering	Portland HS Unity Check	
TJL		May 11, 2023 at 11:38 AM
22017.06		Mount.R3D

Antenna Mount Connection:

Anchor Data:

A307 Threaded Rod =

Number of Anchor Bolts =	$N := 4$	(User Input)
Diameter of Bolts =	$D := 0.625in$	(User Input)
Design Tension =	$T_{design} := 10.4 \cdot kips$	(User Input)
Design Shear =	$V_{design} := 6.23 \cdot kips$	(User Input)

Design Reactions:

Fx =	$F_x := 1.7 \cdot kips$	(User Input)
Fy =	$F_y := 0.7 \cdot kips$	(User Input)
Fz =	$F_z := 2.8 \cdot kips$	(User Input)

Anchor Check:

Max Tension Force = $T_{Max} := \frac{F_z}{N} = 700\,lb$

Max Shear Force = $V_{Max} := \frac{F_y}{N} + \frac{F_x}{N} = 600\,lb$

Condition 1 = $Condition1 := if\left(\frac{T_{Max}}{T_{design}} + \frac{V_{Max}}{V_{design}} \leq 1.0, "OK", "NG"\right) = "OK"$

% of Capacity = $max\left[\frac{T_{Max}}{T_{design}}, \frac{V_{Max}}{V_{design}}, \left(\frac{\frac{T_{Max}}{T_{design}} + \frac{V_{Max}}{V_{design}}}{1.0}\right)\right] = 16.4 \cdot \%$

verizon fuze | RFDS

EAST > North East > New England > New England West > PORTLAND HS CT - B

RF Submit by: Cheiban, Ziad - ziad.cheiban@verizonwireless.com - 3/21/2023, 11:10:23 AM

EE Submit by: , - -

Project Details

FUZE Project ID: 16599668
Project Name: PORTLAND HS CT
Project Alt Name: PORTLAND HS CT
Project Type: Initial Build
Modification Type:
Designed Sector Carrier 4G: 26
Designed Sector Carrier 5G: N/A
Additional Sector Carrier 4G: N/A
Additional Sector Carrier 5G: N/A
FP Solution Type & Tech Type: MCR;4G_700,4G_850,4G_AWS,4G_CBRS,4G_PCS,5G_850,5G_L-Sub6
Carrier Aggregation: false
MPT Id:
eCIP-0: false
Suffix: Rev3_2023-03-21

Location Information

Site ID: 616480547
E-NodeB ID: 064040,0640040
PSLC: 469381
Switch Name: Wallingford 1
Tower Owner:
Tower Type: Self Support (Lattice Tower)
Site Type: MACRO
Site Sub Type: TRADITIONAL
Street Address: 97 High Street
City: Portland
State: CT
Zip Code: 06480
County: Middlesex
Latitude: 41.580714 / 41° 34' 50.5704" N
Longitude: -72.631361 / 72° 37' 52.8996" W

RFDS Project Scope: New build macro - colo

Rev3_2023-03-21: Using NNH4-65B antennas for Sub3
Rev2_2023-03-21: Changed centerline to match drawings
Rev0_2021-10-20: New build.

Antenna Summary

Added

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
LTE	LTE	LTE	LTE			COMMSCOPE	NNH4-65B-R6	90	93	30(01) 150(02) 270(03)	false	false	PHYSICAL	3	
				LTE		SAMSUNG	XXDWMM-12.5-65	90	90.5	30(19) 150(20) 270(21)	false	false	PHYSICAL	3	
					5G	Samsung	MT6407-77A	90	91.5	30(0001) 150(0002) 270(0003)	false	false	PHYSICAL	3	

Removed

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID

No data available

Retained

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID

No data available

Added: 9 **Removed: 0** **Retained: 0**

Equipment Summary

Added

Equipment Type	Location	700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
OVP Box	Tower							N/A	12 OVP			PHYSICAL	1	
Hybrid Cable	Tower							N/A	6x12 Hybriflex			PHYSICAL	2	
RRU	Tower			LTE	LTE			Samsung	B2/B66A RRH ORAN (RF4439d-25A)			PHYSICAL	3	
RRU	Tower	LTE	LTE					Samsung	B5/B13 RRH ORAN (RF4440d-13A)			PHYSICAL	3	
RRU	Tower					LTE		Samsung	CBRS RRH - RT4401-48A			PHYSICAL	3	000000001900167
RRU	Tower						5G	Samsung	MT6407-77A			PHYSICAL	0	

Removed

Equipment Type	Location	700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID

No data available

Retained

Equipment Type	Location	700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID

No data available

Service Info

CBRS 3_5 GHz

		0002	
Sector	**19**	**20**	**21**
Azimuth	30	150	270
Cell / ENode B ID	064040	064040	064040
Antenna Model	XXDWMM-12.5-65	XXDWMM-12.5-65	XXDWMM-12.5-65
Antenna Make	SAMSUNG	SAMSUNG	SAMSUNG
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	8	8	8
Tip Height	90.5	90.5	90.5
Regulatory Power	3.86	3.86	3.86
DLEARFCN	55343, 55541, 55739, 55937	55343, 55541, 55739, 55937	55343, 55541, 55739, 55937
Channel Bandwidth(MHz)	20	20	20
Total ERP (W)	42.32	42.32	42.32
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	CBRS RRH - RT4401-48A	CBRS RRH - RT4401-48A	CBRS RRH - RT4401-48A
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	11298781	11298782	11298783
Source	ATOLL_API	ATOLL_API	ATOLL_API

700 MHz LTE

		0002	
Sector	**01**	**02**	**03**
Azimuth	30	150	270
Cell / ENode B ID	064040	064040	064040
Antenna Model	NNH4-65B-R6	NNH4-65B-R6	NNH4-65B-R6
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	2	2
Tip Height	93	93	93
Regulatory Power	66.49	66.49	66.49
DLEARFCN	5230	5230	5230
Channel Bandwidth(MHz)	10	10	10
Total ERP (W)	598.41	598.41	598.41
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	11232662	11232663	11232664
Source	ATOLL_API	ATOLL_API	ATOLL_API

850 MHz LTE

	0002		
Sector	01	02	03
Azimuth	30	150	270
Cell / ENode B ID	064040	064040	064040
Antenna Model	NNH4-65B-R6	NNH4-65B-R6	NNH4-65B-R6
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	2	2
Tip Height	93	93	93
Regulatory Power	301.17	301.17	301.17
DLEARFCN	2450	2450	2450
Channel Bandwidth(MHz)	10	10	10
Total ERP (W)	677.64	677.64	677.64
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	11298595	11298596	11298597
Source	ATOLL_API	ATOLL_API	ATOLL_API

1900 MHz LTE

	0002		
Sector	01	02	03
Azimuth	30	150	270
Cell / ENode B ID	064040	064040	064040
Antenna Model	NNH4-65B-R6	NNH4-65B-R6	NNH4-65B-R6
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	2	2
Tip Height	93	93	93
Regulatory Power	219.41	219.41	219.41
DLEARFCN	1050	1050	1050
Channel Bandwidth(MHz)	10	10	10
Total ERP (W)	1203.65	1203.65	1203.65
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	11298592	11298593	11298594
Source	ATOLL_API	ATOLL_API	ATOLL_API

2100 MHz LTE

		0002	
Sector	**01**	**02**	**03**
Azimuth	30	150	270
Cell / ENode B ID	064040	064040	064040
Antenna Model	NNH4-65B-R6	NNH4-65B-R6	NNH4-65B-R6
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	2	2
Tip Height	93	93	93
Regulatory Power	85.06	85.06	85.06
DLEARFCN	2050	2050	2050
Channel Bandwidth(MHz)	20	20	20
Total ERP (W)	933.25	933.25	933.25
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	11298467	11298468	11298469
Source	ATOLL_API	ATOLL_API	ATOLL_API

nL-Sub6

		0002	
Sector	**0001**	**0002**	**0003**
Azimuth	30	150	270
Cell / ENode B ID	0640040	0640040	0640040
Antenna Model	MT6407-77A	MT6407-77A	MT6407-77A
Antenna Make	Samsung	Samsung	Samsung
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	1	1	1
Tip Height	91.5	91.5	91.5
Regulatory Power	673.96	673.96	673.96
DLEARFCN	648672	648672	648672
Channel Bandwidth(MHz)	60	60	60
Total ERP (W)	11091.75	11091.75	11091.75
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	MT6407-77A	MT6407-77A	MT6407-77A
Number of Tx, Rx Lines	2,2	2,2	2,2
Position			
Transmitter Id	11298702	11298703	11298704
Source	ATOLL_API	ATOLL_API	ATOLL_API

Service Comments

Callsigns Per Antenna

Sector	Antenna Make	Antenna Model	Ant CL Height AGL	Tip Height	Azimuth (TN)	Elec Tilt	Mech Tilt	Gain	Beam Width	Regulatory Power	Callsigns 700	850	1900	2100	28 GHz	31 GHz	39 GHz

No data available.

Callsigns

Callsign	Market	Radio Code	Market Number	Block	State	County	Licensee Name	Wholly Owned	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs /Sq MI	Status	Action	Approved for Insvc
WQJQ689	Northeast	WU	REA001	C	CT	Middlese:	Cellco Partnership	Yes	22.000	746.000-757.000	776.000-787.000	.000-.000	.000-.000	66.49	1000	444.75	Active	added	Yes
KNKA404	Hartford-New Britain-Bristol, CT	CL	CMA032	A	CT	Middlese:	Cellco Partnership	Yes	25.000	824.000-835.000	869.000-880.000	845.000-846.500	890.000-891.500	301.17 - PSD	400	444.75	Active	added	Yes
WPOJ730	Hartford, CT	CW	BTA184	C	CT	Middlese:	Cellco Partnership	Yes	10.000	1895.000-1900.000	1975.000-1980.000	.000-.000	.000-.000	219.41	1640	444.75	Active	added	Yes
KNLH251	Hartford, CT	CW	BTA184	F	CT	Middlese:	Cellco Partnership	Yes	10.000	1890.000-1895.000	1970.000-1975.000	.000-.000	.000-.000	219.41	1640	444.75	Active	added	Yes
CBRS_CALI	UNLICENSED	3.5 GHz	UNLICEN	UNLICI	CT	Middlese:	UNLICENSED	UNLICI	UNLICEN.	UNLICENSED-UNLICENSED	UNLICENSED-UNLICENSED	UNLICENSED-UNLICENSED	UNLICENSED-UNLICENSED	3.86		444.75	Active	added	No
WQGB276	Hartford-New Britain-Bristol, CT	AW	CMA032	A	CT	Middlese:	Cellco Partnership	Yes	20.000	1710.000-1720.000	2110.000-2120.000	.000-.000	.000-.000	85.06	1640	444.75	Active	added	Yes
WRNE581	New York, NY	PM	PEA001	A1	CT	Middlese:	Cellco Partnership	Yes	20.000	3700.000-3720.000	.000-.000	.000-.000	.000-.000	673.96	1640	444.75	Active	added	Yes
WRNE582	New York, NY	PM	PEA001	A2	CT	Middlese:	Cellco Partnership	Yes	20.000	3720.000-3740.000	.000-.000	.000-.000	.000-.000	673.96	1640	444.75	Active	added	Yes
WRNE583	New York, NY	PM	PEA001	A3	CT	Middlese:	Cellco Partnership	Yes	20.000	3740.000-3760.000	.000-.000	.000-.000	.000-.000	673.96	1640	444.75	Active	added	Yes
WQGA906	New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-	AW	BEA010	B	CT	Middlese:	Cellco Partnership	Yes	20.000	1720.000-1730.000	2120.000-2130.000	.000-.000	.000-.000	85.06	1640	444.75	Active	added	Yes
WRBA710	Hartford, CT	UU	BTA184	L1	CT	Middlese:	Cellco Partnership	Yes	325.000	27500.000-27600.000	27700.000-27925.000	.000-.000	.000-.000			444.75	Active		Yes
WRBA711	Hartford, CT	UU	BTA184	L2	CT	Middlese:	Cellco Partnership	Yes	325.000	27925.000-28050.000	28150.000-28350.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD609	New York, NY	UU	PEA001	M1	CT	Middlese:	Cellco Partnership	Yes	100.000	37600.000-37700.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD610	New York, NY	UU	PEA001	M10	CT	Middlese:	Cellco Partnership	Yes	100.000	38500.000-38600.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD611	New York, NY	UU	PEA001	M2	CT	Middlese:	Cellco Partnership	Yes	100.000	37700.000-37800.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD612	New York, NY	UU	PEA001	M3	CT	Middlese:	Cellco Partnership	Yes	100.000	37800.000-37900.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD613	New York, NY	UU	PEA001	M4	CT	Middlese:	Cellco Partnership	Yes	100.000	37900.000-38000.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD614	New York, NY	UU	PEA001	M5	CT	Middlese:	Cellco Partnership	Yes	100.000	38000.000-38100.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD615	New York, NY	UU	PEA001	M6	CT	Middlese:	Cellco Partnership	Yes	100.000	38100.000-38200.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD616	New York, NY	UU	PEA001	M7	CT	Middlese:	Cellco Partnership	Yes	100.000	38200.000-38300.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD617	New York, NY	UU	PEA001	M8	CT	Middlese:	Cellco Partnership	Yes	100.000	38300.000-38400.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes

WRHD618	New York, NY	UU	PEA001	M9	CT	Middlese:	Cellco Partnership	Yes	100.000	38400.000-38500.000	.000-.000	.000-.000	.000-.000		444.75	Active	Yes
WRHD619	New York, NY	UU	PEA001	N1	CT	Middlese:	Cellco Partnership	Yes	100.000	38600.000-38700.000	.000-.000	.000-.000	.000-.000		444.75	Active	Yes
WRNE584	New York, NY	PM	PEA001	A4	CT	Middlese:	Cellco Partnership	Yes	20.000	3760.000-3780.000	.000-.000	.000-.000	.000-.000	1640	444.75	Active	No
WRNE585	New York, NY	PM	PEA001	A5	CT	Middlese:	Cellco Partnership	Yes	20.000	3780.000-3800.000	.000-.000	.000-.000	.000-.000	1640	444.75	Active	No
WRNE586	New York, NY	PM	PEA001	B1	CT	Middlese:	Cellco Partnership	Yes	20.000	3800.000-3820.000	.000-.000	.000-.000	.000-.000	1640	444.75	Active	No
WRNE587	New York, NY	PM	PEA001	B2	CT	Middlese:	Cellco Partnership	Yes	20.000	3820.000-3840.000	.000-.000	.000-.000	.000-.000	1640	444.75	Active	No
WRNE588	New York, NY	PM	PEA001	B3	CT	Middlese:	Cellco Partnership	Yes	20.000	3840.000-3860.000	.000-.000	.000-.000	.000-.000	1640	444.75	Active	No

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GPD# 2018701.10
December 12, 2017

RIGOROUS STRUCTURAL ANALYSIS REPORT

AT&T DESIGNATION:	**Site USID:**	**59359**
	Site FA:	**10035005**
	Site Name:	**PORTLAND**
	Client Site #:	**CT1066**
ANALYSIS CRITERIA:	**Codes:**	**TIA-222-G, 2012 IBC & 2016 CSBC** **130-mph Ultimate 3 second gust with 0" ice** **101-mph Nominal 3 second gust with 0" ice** **50-mph Nominal 3 second gust with 3/4" ice**
SITE DATA:		**213 High Street, Portland, CT 06480, Middlesex County** **Latitude 41° 34' 50.5704" N, Longitude 72° 37' 25.8954" W** **Market: NEW ENGLAND** **80' Self Support Tower**

Ms. Kristen White,

GPD is pleased to submit this Rigorous Structural Analysis Report to determine the structural integrity of the aforementioned tower. The purpose of the analysis is to determine the suitability of the tower with the existing and proposed loading configuration detailed in the analysis report.

Analysis Results

Tower Stress Level with Proposed Equipment:	91.3%	Pass
Foundation Ratio with Proposed Equipment:	49.2%	Pass

We at GPD appreciate the opportunity of providing our continuing professional services to you and Empire Telecommunications. If you have any questions or need further assistance on this or any other projects please do not hesitate to call.

Respectfully submitted,

STATE OF CONNECTICUT CHRISTOPHER J. SCHEKS No. 30026 LICENSED PROFESSIONAL ENGINEER

Christopher J. Scheks, P.E.
Connecticut #: 0030026

SUMMARY & RESULTS

The purpose of this analysis was to verify whether the existing structure is capable of carrying the proposed loading configuration as specified by AT&T Mobility to Empire Telecommunications. This report was commissioned by Ms. Kristen White of Empire Telecommunications.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 130 mph converted to a nominal 3-second gust wind speed of 101 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category C with a maximum topographic factor, Kzt, of 1.0 and Risk Category II were used in this analysis.

TOWER SUMMARY AND RESULTS

Member	Capacity	Results
Legs	74.5%	Pass
Diagonals	77.1%	Pass
Secondary Horizontals	91.3%	Pass
Top Girts	20.4%	Pass
Bolt Checks	36.1%	Pass
Anchor Rods	44.5%	Pass
Foundation	49.2%	Pass

ANALYSIS METHOD

tnxTower (Version 7.0.7.0), a commercially available software program, was used to create a three-dimensional model of the tower and calculate primary member stresses for various dead, live, wind, and ice load cases. Selected output from the analysis is included in Appendix B. The following table details the information provided to complete this structural analysis. This analysis is solely based on this information and is being completed without the benefit of a detailed site visit.

DOCUMENTS PROVIDED

Document	Remarks	Source
RF Data Sheet	AT&T RFDS Name: CT1066, updated 8/17/2017	Empire
Construction Drawings	Centek Job #: 17004.51, dated 10/4/2017	Empire
Tower Design	Not Provided	N/A
Foundation Design	Not Provided	N/A
Geotechnical Report	GPD Project #: 2017702.58, dated 3/6/2017	AT&T
Foundation Mapping	GPD Project #: 2017702.58, dated 3/6/2017	AT&T
Previous Structural Analysis	GPD Project #: 2017702.58, dated 3/17/2017	AT&T

ASSUMPTIONS

This structural analysis is based on the theoretical capacity of the members and is not a condition assessment of the tower. This analysis is from information supplied, and therefore, its results are based on and are as accurate as that supplied data. GPD has made no independent determination, nor is it required to, of its accuracy. The following assumptions were made for this structural analysis.

1. The tower member sizes and shapes are considered accurate as supplied. The material grade is as per data supplied and/or as assumed and as stated in the materials section.
2. The appurtenance configuration is as supplied, determined from available photos, and/or as modeled in the analysis. It is assumed to be complete and accurate. All antennas, mounts, coax and waveguides are assumed to be properly installed and supported as per manufacturer requirements.
3. All mounts, if applicable, are considered adequate to support the loading. No actual analysis of the mount(s) is performed. This analysis is limited to analyzing the tower only.
4. The soil parameters are as per data supplied or as assumed and stated in the calculations.
5. Foundations are properly designed and constructed to resist the original design loads indicated in the documents provided.
6. The tower and structures have been properly maintained in accordance with TIA Standards and/or with manufacturer's specifications.
7. All welds and connections are assumed to develop at least the member capacity unless determined otherwise and explicitly stated in this report.
8. All prior structural modifications, if applicable, are assumed to be as per data supplied/available and to have been properly installed.
9. Loading interpreted from photos is accurate to $\pm 5'$ AGL, antenna size accurate to ± 3.3 sf, and coax equal to the number of existing antennas without reserve.
10. All existing loading has been modeled based on the previous structural analysis by GPD (Project #: 2017702.58, dated 3/17/2017), the provided RF Data Sheet, the construction drawings and site photos and is assumed to be accurate.
11. There were some discrepancies between the existing loading between the previous analysis and the RF Data Sheet, the existing loading was modeled based upon the provided RF Data Sheet.
12. Leg A is at an azimuth of 15° based on satellite imagery.
13. Foundation reinforcement information was not available. Therefore, it was assumed that the foundation reinforcement in place is equal to or in excess of the code specified minimum.

If any of these assumptions are not valid or have been made in error, this analysis may be affected, and GPD should be allowed to review any new information to determine its effect on the structural integrity of the tower.

DISCLAIMER OF WARRANTIES

GPD has not performed a site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD in connection with this Rigorous Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

This analysis is limited to the designated maximum wind and seismic conditions per the governing tower standards and code. Wind forces resulting in tower vibrations near the structure's resonant frequencies were not considered in this analysis and are outside the scope of this analysis. Lateral loading from any dynamic response was not evaluated under a time-domain based fatigue analysis.

GPD does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the capability of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owner's responsibility to determine the amount of ice accumulation in excess of the code specified amount, if any, that should be considered in the structural analysis.

The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD, but are beyond the scope of this report.

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.

Towers are designed to carry gravity, wind, and ice loads. All members, legs, diagonals, struts, and redundant members provide structural stability to the tower with little redundancy. Absence or removal of a member can trigger catastrophic failure unless a substitute is provided before any removal. Legs carry axial loads and derive their strength from shorter unbraced lengths by the presence of redundant members and their connection to the diagonals with bolts or welds. If the bolts or welds are removed without providing any substitute to the frame, the leg is subjected to a higher unbraced length that immediately reduces its load carrying capacity. If a diagonal is also removed in addition to the connection, the unbraced length of the leg is greatly increased, jeopardizing its load carrying capacity. Failure of one leg can result in a tower collapse because there is no redundancy. Redundant members and diagonals are critical to the stability of the tower.

GPD makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD pursuant to this report will be limited to the total fee received for preparation of this report.

APPENDIX A

Tower Analysis Summary Form

Tower Analysis Summary Form

The information contained in this summary report is not to be used independently from the PE stamped tower analysis.

General Info

Site Name	PORTLAND
Site Number	59359 (CT1066)
FA Number	10035005
Date of Analysis	12/12/2017
Company Performing Analysis	GPD

Tower Info	Description	Date
Tower Type (G, SST, MP)	SST	
Tower Height (top of steel AGL)	80'	
Tower Manufacturer	n/a	
Tower Model	n/a	
Tower Design	n/a	
Foundation Design	n/a	
Geotech Report	GPD Project #: 2017702.58	3/6/2017
Foundation Mapping	GPD Project #: 2017702.58	3/6/2017
Tower Mapping	n/a	
Previous Structural Analysis	GPD Project #: 2017702.58	3/17/2017

Design Parameters

Design Code Used	TIA-222-G, 2012 IBC & 2016 CSBC
Location of Tower (County, State)	Middlesex, CT
Nominal Wind Speed (mph)	101 (3-second gust)
Ice Thickness (in)	0.75
Structure Classification (I, II, III)	II
Exposure Category (B, C, D)	C
Topographic Category (1 to 5)	1

Analysis Results (% Maximum Usage)

Existing/Reserved + Future + Proposed Condition	
Tower (%)	91.3%
Anchor Rods (%)	44.5%
Foundation (%)	49.2%
Foundation Adequate?	YES

Steel Yield Strength (ksi)

Legs	36
Bracing	36
Bolts	A325
Anchor Rods	36

Note: Steel strengths have been assumed based on previous experience with similar towers.

Existing / Reserved Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Leg/Face
AT&T Mobility	77	77	3	Panel	Kathrein	800-10121	30/150/270	3	Unknown	Ring w/ Sector Frames	15	Unknown	7/8"	Face C
AT&T Mobility	77	77	3	Panel	CCI	HPA-65R-BUU-H6	30/150/270			on the same mounts	3	Unknown	1-5/8"	Face C
AT&T Mobility	77	77	3	Panel	KMW	AM-X-CD-16-65-00T-RET	30/150/270			on the same mounts	2	DC Power	3/4"	Face C
AT&T Mobility	77	77	6	RET	Kathrein	860-10025				on the same mounts	1	Fiber Cable	1/2"	Face C
AT&T Mobility	77	77	6	TMA	CCI	DTMABP7819VG12A				on the same mounts				
AT&T Mobility	77	77	3	RRU	Ericsson	RRUS 11				on the same mounts				
AT&T Mobility	77	77	3	RRU	Ericsson	RRUS 32 B2				on the same mounts				
AT&T Mobility	77	77	1	Surge	Raycap	DC6-48-60-18-F				on the same mounts				

Note: (3) KMW panels and (3) CCI TMAs at 77' shall be removed prior to the installation of the proposed loading. All other existing/reserved equipment shall be reused.

Proposed Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Leg/Face
AT&T Mobility	77	77	3	Panel	Quintel	QS66510-6	30/150/270			on the existing mount	2	DC Power	3/4"	Face C
AT&T Mobility	77	77	6	Kaelus	Combiner	DBC0061F1V51-2				on the existing mount	1	Fiber Cable	1/2"	Face C
AT&T Mobility	77	77	3	Ericsson	RRU	RRUS-32				on the existing mount				
AT&T Mobility	77	77	3	Ericsson	RRU	RRUS-32 B66				on the existing mount				
AT&T Mobility	77	77	1	Raycap	DC Unit	DC6-48-60-18-F				on the existing mount				

Note: The proposed equipment shall be installed in addition to the remaining existing/reserved loading at the same elevation.

Future Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Leg/Face

APPENDIX B

tnxTower Output File

Tower Input Data

The main tower is a 4x free standing tower with an overall height of 80.00 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 5.38 ft at the top and 13.17 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

- Tower is located in Middlesex County, Connecticut.
- Basic wind speed of 101 mph.
- Structure Class II.
- Exposure Category C.
- Topographic Category 1.
- Crest Height 0.00 ft.
- Nominal ice thickness of 0.7500 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	*Face or Leg*	*Allow Shield*	*Component Type*	*Placement ft*	*Face Offset in*	*Lateral Offset (Frac FW)*	*#*	*# Per Row*	*Clear Spacing in*	*Width or Diameter in*	*Weight klf*
Safety Line (3/8")	C	No	Ar (CaAa)	80.00 - 8.00	0.0000	0.25	1	1	0.3750	0.3750	0.000
Feedline Ladder (Af)	C	No	Af (CaAa)	77.00 - 8.00	0.0000	0	1	1	3.0000	3.0000	0.008
LDF5-50A (7/8 FOAM)	C	No	Ar (CaAa)	77.00 - 8.00	0.0000	0	15	5	0.7500	1.0900	0.000
LDF7-50A (1-5/8 FOAM)	C	No	Ar (CaAa)	77.00 - 8.00	0.0000	0.06	3	3	0.7500	1.9800	0.001
3/4" DC Power Line	C	No	Ar (CaAa)	77.00 - 8.00	0.0000	-0.04	4	4	0.7500	0.7500	0.000
1/2" Fiber Cable	C	No	Ar (CaAa)	77.00 - 8.00	0.0000	-0.06	2	2	0.5000	0.6300	0.000

Discrete Tower Loads

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 lb*
8' Lightning Rod	C	From Leg	0.00 0.000 4.000	0.000	80.00	No Ice	0.60	0.60	12.000
						1/2" Ice	1.41	1.41	18.187
						1" Ice	2.25	2.25	29.489
10' Diameter Tower Ring Mount	C	None		0.000	77.00	No Ice	7.00	7.00	298.000
						1/2" Ice	8.80	8.80	325.500
						1" Ice	10.60	10.60	353.000
10' Diameter Tower Ring Mount	C	None		0.000	75.00	No Ice	7.00	7.00	298.000
						1/2" Ice	8.80	8.80	325.500

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* *lb*
						1" Ice	10.60	10.60	353.000
10' Diameter Tower Ring Mount	C	None		0.000	68.00	No Ice	7.00	7.00	298.000
						1/2" Ice	8.80	8.80	325.500
						1" Ice	10.60	10.60	353.000
MTS 10' Boom Gate	A	From Leg	2.00	0.000	77.00	No Ice	15.43	10.89	434.000
			0.000			1/2" Ice	20.15	15.23	614.248
			0.000			1" Ice	24.87	19.57	794.496
MTS 10' Boom Gate	B	From Face	2.00	0.000	77.00	No Ice	15.43	10.89	434.000
			0.000			1/2" Ice	20.15	15.23	614.248
			0.000			1" Ice	24.87	19.57	794.496
MTS 10' Boom Gate	C	From Face	2.00	0.000	77.00	No Ice	15.43	10.89	434.000
			0.000			1/2" Ice	20.15	15.23	614.248
			0.000			1" Ice	24.87	19.57	794.496
800 10121 w/ Mount Pipe	A	From Leg	4.00	15.000	77.00	No Ice	5.26	4.47	64.550
			0.000			1/2" Ice	5.64	5.13	110.681
			0.000			1" Ice	6.03	5.79	163.059
800 10121 w/ Mount Pipe	B	From Face	4.00	0.000	77.00	No Ice	5.26	4.47	64.550
			0.000			1/2" Ice	5.64	5.13	110.681
			0.000			1" Ice	6.03	5.79	163.059
800 10121 w/ Mount Pipe	C	From Face	4.00	30.000	77.00	No Ice	5.26	4.47	64.550
			0.000			1/2" Ice	5.64	5.13	110.681
			0.000			1" Ice	6.03	5.79	163.059
HPA-65R-BUU-H6 w/ Mount Pipe	A	From Leg	4.00	15.000	77.00	No Ice	9.90	8.11	76.550
			0.000			1/2" Ice	10.47	9.30	158.030
			0.000			1" Ice	11.01	10.21	247.793
HPA-65R-BUU-H6 w/ Mount Pipe	B	From Face	4.00	0.000	77.00	No Ice	9.90	8.11	76.550
			0.000			1/2" Ice	10.47	9.30	158.030
			0.000			1" Ice	11.01	10.21	247.793
HPA-65R-BUU-H6 w/ Mount Pipe	C	From Face	4.00	30.000	77.00	No Ice	9.90	8.11	76.550
			0.000			1/2" Ice	10.47	9.30	158.030
			0.000			1" Ice	11.01	10.21	247.793
QS66510-6 w/ Mount Pipe	A	From Leg	4.00	15.000	77.00	No Ice	8.13	8.22	119.900
			0.000			1/2" Ice	8.59	9.19	192.986
			0.000			1" Ice	9.05	10.02	274.011
QS66510-6 w/ Mount Pipe	B	From Face	4.00	0.000	77.00	No Ice	8.13	8.22	119.900
			0.000			1/2" Ice	8.59	9.19	192.986
			0.000			1" Ice	9.05	10.02	274.011
QS66510-6 w/ Mount Pipe	C	From Face	4.00	30.000	77.00	No Ice	8.13	8.22	119.900
			0.000			1/2" Ice	8.59	9.19	192.986
			0.000			1" Ice	9.05	10.02	274.011
Pipe Mount 8'x2.375"	A	From Leg	4.00	15.000	77.00	No Ice	1.90	1.90	33.700
			0.000			1/2" Ice	2.73	2.73	48.040
			0.000			1" Ice	3.40	3.40	67.661
Pipe Mount 8'x2.375"	B	From Face	4.00	0.000	77.00	No Ice	1.90	1.90	33.700
			0.000			1/2" Ice	2.73	2.73	48.040
			0.000			1" Ice	3.40	3.40	67.661
Pipe Mount 8'x2.375"	C	From Face	4.00	30.000	77.00	No Ice	1.90	1.90	33.700
			0.000			1/2" Ice	2.73	2.73	48.040
			0.000			1" Ice	3.40	3.40	67.661
(2) 860 10025	A	From Leg	4.00	0.000	77.00	No Ice	0.14	0.12	1.160
			0.000			1/2" Ice	0.19	0.17	2.650
			0.000			1" Ice	0.25	0.23	5.060
(2) 860 10025	B	From Face	4.00	0.000	77.00	No Ice	0.14	0.12	1.160
			0.000			1/2" Ice	0.19	0.17	2.650
			0.000			1" Ice	0.25	0.23	5.060
(2) 860 10025	C	From Face	4.00	0.000	77.00	No Ice	0.14	0.12	1.160
			0.000			1/2" Ice	0.19	0.17	2.650

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* lb
			0.000			1" Ice	0.25	0.23	5.060
DTMABP7819VG12A	A	From Leg	4.00	0.000	77.00	No Ice	0.98	0.34	19.180
			0.000			1/2" Ice	1.10	0.42	26.485
			0.000			1" Ice	1.23	0.51	35.633
DTMABP7819VG12A	B	From Face	4.00	0.000	77.00	No Ice	0.98	0.34	19.180
			0.000			1/2" Ice	1.10	0.42	26.485
			0.000			1" Ice	1.23	0.51	35.633
DTMABP7819VG12A	C	From Face	4.00	0.000	77.00	No Ice	0.98	0.34	19.180
			0.000			1/2" Ice	1.10	0.42	26.485
			0.000			1" Ice	1.23	0.51	35.633
(2) DBC0061F1V51-2	A	From Leg	4.00	15.000	77.00	No Ice	0.43	0.41	25.500
			0.000			1/2" Ice	0.51	0.50	30.777
			0.000			1" Ice	0.61	0.59	37.587
(2) DBC0061F1V51-2	B	From Face	4.00	0.000	77.00	No Ice	0.43	0.41	25.500
			0.000			1/2" Ice	0.51	0.50	30.777
			0.000			1" Ice	0.61	0.59	37.587
(2) DBC0061F1V51-2	C	From Face	4.00	30.000	77.00	No Ice	0.43	0.41	25.500
			0.000			1/2" Ice	0.51	0.50	30.777
			0.000			1" Ice	0.61	0.59	37.587
RRUS 11	A	From Leg	4.00	0.000	77.00	No Ice	2.78	1.19	50.700
			0.000			1/2" Ice	2.99	1.33	71.500
			0.000			1" Ice	3.21	1.49	95.335
RRUS 11	B	From Face	4.00	0.000	77.00	No Ice	2.78	1.19	50.700
			0.000			1/2" Ice	2.99	1.33	71.500
			0.000			1" Ice	3.21	1.49	95.335
RRUS 11	C	From Face	4.00	0.000	77.00	No Ice	2.78	1.19	50.700
			0.000			1/2" Ice	2.99	1.33	71.500
			0.000			1" Ice	3.21	1.49	95.335
RRUS 32 B2	A	From Leg	4.00	0.000	77.00	No Ice	2.73	1.67	52.900
			0.000			1/2" Ice	2.95	1.86	73.957
			0.000			1" Ice	3.18	2.05	98.206
RRUS 32 B2	B	From Face	4.00	0.000	77.00	No Ice	2.73	1.67	52.900
			0.000			1/2" Ice	2.95	1.86	73.957
			0.000			1" Ice	3.18	2.05	98.206
RRUS 32 B2	C	From Face	4.00	0.000	77.00	No Ice	2.73	1.67	52.900
			0.000			1/2" Ice	2.95	1.86	73.957
			0.000			1" Ice	3.18	2.05	98.206
RRUS 32	A	From Leg	4.00	15.000	77.00	No Ice	3.31	2.42	77.000
			0.000			1/2" Ice	3.56	2.64	104.928
			0.000			1" Ice	3.81	2.86	136.466
RRUS 32	B	From Face	4.00	0.000	77.00	No Ice	3.31	2.42	77.000
			0.000			1/2" Ice	3.56	2.64	104.928
			0.000			1" Ice	3.81	2.86	136.466
RRUS 32	C	From Face	4.00	30.000	77.00	No Ice	3.31	2.42	77.000
			0.000			1/2" Ice	3.56	2.64	104.928
			0.000			1" Ice	3.81	2.86	136.466
RRUS 32 B66	A	From Leg	4.00	15.000	77.00	No Ice	2.74	1.67	53.000
			0.000			1/2" Ice	2.96	1.86	74.114
			0.000			1" Ice	3.19	2.05	98.424
RRUS 32 B66	B	From Face	4.00	0.000	77.00	No Ice	2.74	1.67	53.000
			0.000			1/2" Ice	2.96	1.86	74.114
			0.000			1" Ice	3.19	2.05	98.424
RRUS 32 B66	C	From Face	4.00	30.000	77.00	No Ice	2.74	1.67	53.000
			0.000			1/2" Ice	2.96	1.86	74.114
			0.000			1" Ice	3.19	2.05	98.424
DC6-48-60-18-8F Surge Suppression Unit	A	From Leg	2.00	0.000	77.00	No Ice	0.92	0.92	18.900
			0.000			1/2" Ice	1.46	1.46	36.615

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 lb
			0.000			1" Ice	1.64	1.64	56.825
DC6-48-60-18-8F Surge Suppression Unit	B	From Leg	2.00 0.000 0.000	0.000	77.00	No Ice 1/2" Ice 1" Ice	0.92 1.46 1.64	0.92 1.46 1.64	18.900 36.615 56.825
Catwalk	B	From Leg	0.00 0.000 0.000	0.000	51.00	No Ice 1/2" Ice 1" Ice	27.50 39.50 51.50	27.50 39.50 51.50	1587.000 2182.000 2777.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
80.00	8' Lightning Rod	40	0.4660	0.046	0.016	234893
77.00	10' Diameter Tower Ring Mount	40	0.4359	0.045	0.015	234893
75.00	10' Diameter Tower Ring Mount	40	0.4159	0.045	0.014	234893
68.00	10' Diameter Tower Ring Mount	40	0.3479	0.043	0.012	99818
51.00	Catwalk	40	0.2066	0.032	0.007	106573

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	80	Leg	A325N	0.6250	12	1312.060	24360.000	0.054 ✔	1	Bearing
		Diagonal	A325N	0.6250	2	1837.060	7187.700	0.256 ✔	1	Member Block Shear
		Horizontal	A325N	0.6250	2	874.220	11622.700	0.075 ✔	1	Member Block Shear
		Secondary Horizontal	A325N	0.6250	2	497.873	23245.301	0.021 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	2	127.100	6168.160	0.021 ✔	1	Member Block Shear
T2	66	Leg	A325N	0.6250	12	3250.580	24360.000	0.133 ✔	1	Bearing
		Diagonal	A325N	0.6250	2	1550.780	7187.700	0.216 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	1	261.984	7830.000	0.033 ✔	1	Member Bearing
T3	54	Leg	A325N	0.6250	12	7045.350	24850.500	0.284 ✔	1	Bolt DS
		Diagonal	A325N	0.6250	2	1876.840	7187.700	0.261 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	2	120.714	7187.700	0.017 ✔	1	Member Block Shear
T4	24	Diagonal	A325N	0.6250	2	2314.440	7697.460	0.301 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	2	301.492	7187.700	0.042 ✔	1	Member Block Shear
T5	14.75	Diagonal	A325N	0.6250	2	2782.240	7697.460	0.361 ✔	1	Member Block Shear

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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
		Secondary Horizontal	A325N	0.6250	1	831.428	3194.530	0.260 ✔	1	Member Block Shear

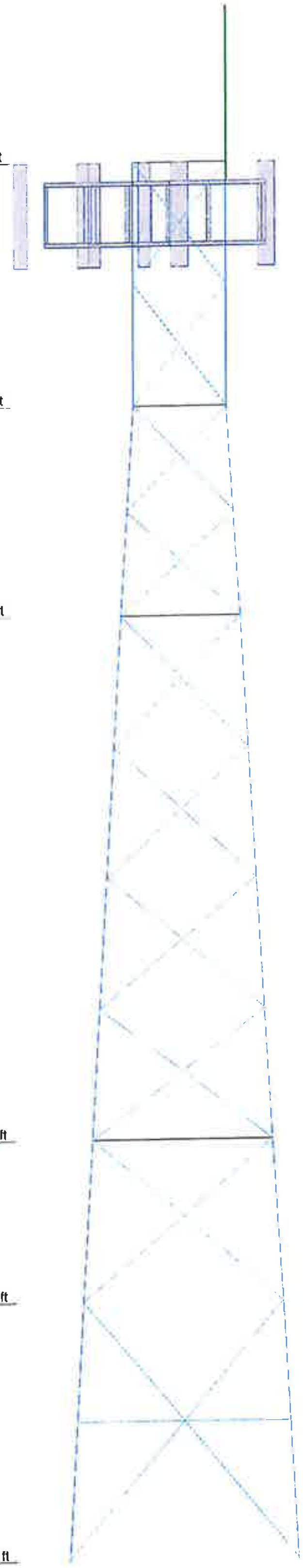
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	80 - 66	Leg	L4x4x3/8	3	-7872.390	79761.797	9.9	Pass
T2	66 - 54	Leg	L4x4x3/8	60	-19503.500	59484.199	32.8	Pass
T3	54 - 24	Leg	L5x5x7/16	80	-42272.102	87162.000	48.5	Pass
T4	24 - 14.75	Leg	L5x5x7/16	120	-50098.602	69246.000	72.3	Pass
T5	14.75 - 0	Leg	L5x5x7/16	136	-62258.199	83563.797	74.5	Pass
T1	80 - 66	Diagonal	L2 1/2x2x3/16	17	-4380.000	13446.900	32.6	Pass
T2	66 - 54	Diagonal	L2 1/2x2x3/16	74	-3205.170	13232.400	24.2	Pass
T3	54 - 24	Diagonal	L2 1/2x2x3/16	90	-3707.320	7348.230	50.5	Pass
T4	24 - 14.75	Diagonal	L3x3x3/16	129	-4333.360	13225.700	32.8	Pass
T5	14.75 - 0	Diagonal	L3x3x3/16	142	-6006.740	7787.350	77.1	Pass
T1	80 - 66	Horizontal	L3 1/2x3 1/2x1/4	43	-1752.300	39066.500	4.5	Pass
T1	80 - 66	Secondary Horizontal	2L4x4x1/4x3/8	35	995.745	114351.000	0.9	Pass
T5	14.75 - 0	Secondary Horizontal	L1 1/2x1 1/2x1/8	147	-831.428	910.763	91.3	Pass
T1	80 - 66	Top Girt	L2x2x3/16	7	254.201	18733.900	1.4	Pass
T2	66 - 54	Top Girt	L3x3x3/16	23	261.984	30968.301	0.8	Pass
T3	54 - 24	Top Girt	L2 1/2x2 1/2x3/16	81	-253.370	10922.700	2.3	Pass
T4	24 - 14.75	Top Girt	L2 1/2x2x3/16	123	-837.711	4114.760	20.4	Pass

Summary	ELC:	Existing + Proposed
Leg (T5)	74.5	Pass
Diagonal (T5)	77.1	Pass
Horizontal (T1)	4.5	Pass
Secondary Horizontal (T5)	91.3	Pass
Top Girt (T4)	20.4	Pass
Bolt Checks	36.1	Pass
Rating =	**91.3**	**Pass**

APPENDIX C

Tower Elevation Drawing



Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Horizontals	Sec. Horizontals	Face Width (ft)	# Panels @ (ft)	Weight (lb)
T1	L4x4x3/8	A36	L2 1/2x2x3/16	A36	L2x2x3/16	L3 1/2x3 1/2x1/4	2L4x4x1/4x3/8	5.375	4 @ 3.5	1517.0
T2	L4x4x3/8	A36	L2 1/2x2x3/16	A36	L3x3x3/16	N.A.	N.A.	6.79167	2 @ 6	925.2
T3	L5x5x7/16	A36	L2 1/2x2x3/16	A36	L2 1/2x2 1/2x3/16	N.A.	N.A.		4 @ 7.5	2802.8
T4	L5x5x7/16	A36	L3x3x3/16	A36	L2 1/2x2x3/16	N.A.	N.A.	10.3333	1 @ 9.25	1066.3
T5	L5x5x7/16	A36	L3x3x3/16	A36	N.A.	N.A.	L1 1/2x1 1/2x1/8	11.4253	1 @ 14.6667	1471.0
								13.1667		7782.3

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
8' Lightning Rod	80	(2) DBC0061F1V51-2	77
10' Diameter Tower Ring Mount	77	(2) DBC0061F1V51-2	77
MTS 10' Boom Gate	77	(2) DBC0061F1V51-2	77
MTS 10' Boom Gate	77	RRUS 11	77
MTS 10' Boom Gate	77	RRUS 11	77
800 10121 w/ Mount Pipe	77	RRUS 11	77
800 10121 w/ Mount Pipe	77	RRUS 32 B2	77
800 10121 w/ Mount Pipe	77	RRUS 32 B2	77
HPA-65R-BUU-H6 w/ Mount Pipe	77	RRUS 32 B2	77
HPA-65R-BUU-H6 w/ Mount Pipe	77	RRUS 32	77
HPA-65R-BUU-H6 w/ Mount Pipe	77	RRUS 32	77
QS66510-6 w/ Mount Pipe	77	RRUS 32	77
QS66510-6 w/ Mount Pipe	77	RRUS 32 B66	77
QS66510-6 w/ Mount Pipe	77	RRUS 32 B66	77
Pipe Mount 8'x2.375"	77	RRUS 32 B66	77
Pipe Mount 8'x2.375"	77	DC6-48-60-18-8F Surge Suppression Unit	77
Pipe Mount 8'x2.375"	77	DC6-48-60-18-8F Surge Suppression Unit	77
(2) 860 10025	77	10' Diameter Tower Ring Mount	75
(2) 860 10025	77	10' Diameter Tower Ring Mount	68
(2) 860 10025	77	Catwalk	51
DTMABP7819VG12A	77		
DTMABP7819VG12A	77		
DTMABP7819VG12A	77		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 91.3%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 61712 lb
SHEAR: 9193 lb

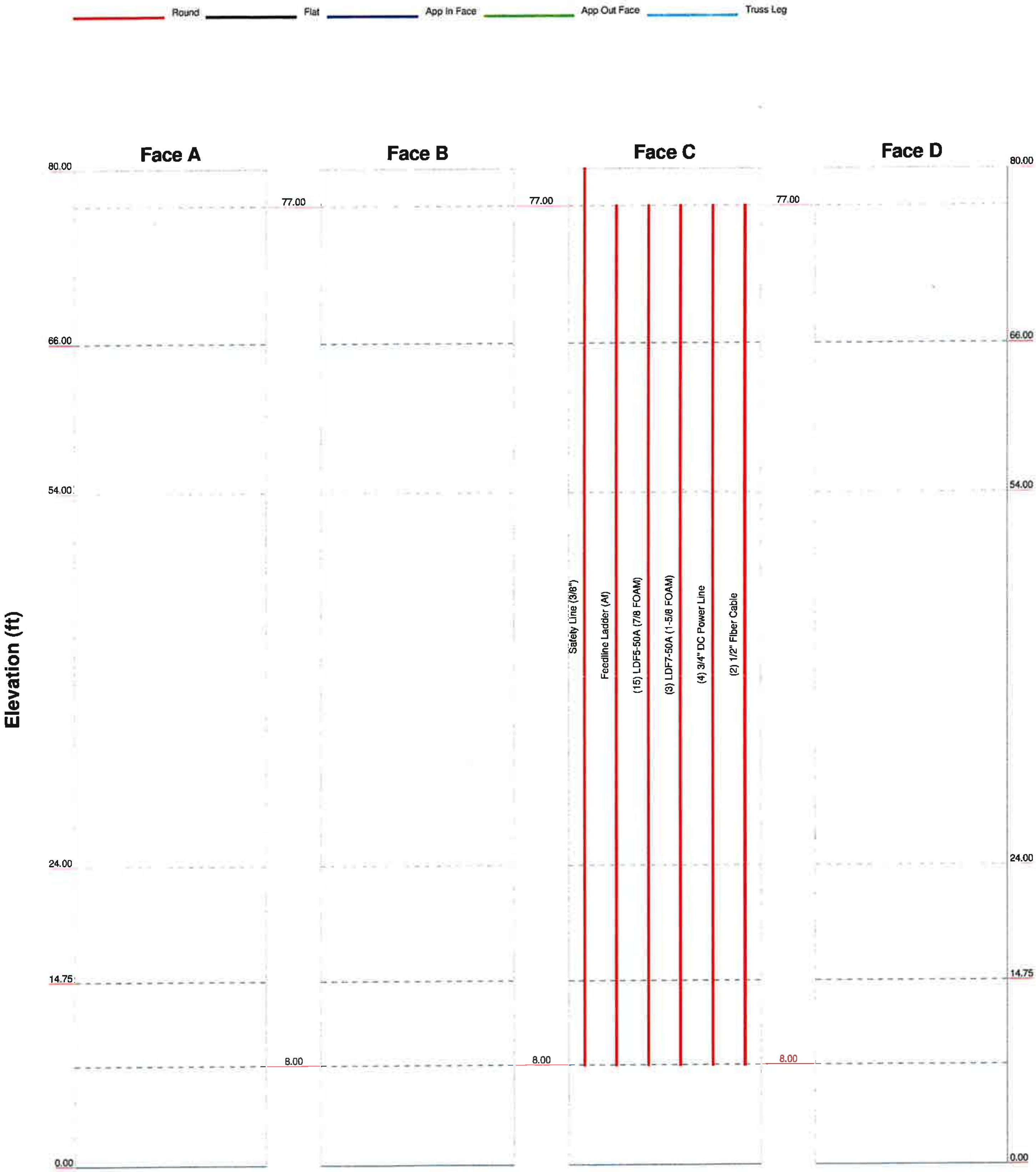
UPLIFT: -54412 lb
SHEAR: 8466 lb

AXIAL 45809 lb
SHEAR 5078 lb
MOMENT 318337 lb-ft
TORQUE 5392 lb-ft
50 mph WIND - 0.7500 in ICE

AXIAL 17563 lb
SHEAR 22000 lb
MOMENT 1114478 lb-ft
TORQUE 21161 lb-ft
REACTIONS - 101 mph WIND

GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (555) 555-1234 FAX: (555) 555-1235	Job: ***59359 (CT1066) PORTLAND***		
	Project: ***2018701.10***		
	Client: Empire Telecom	Drawn by: dbays	App'd:
	Code: TIA-222-G	Date: 12/12/17	Scale: NTS
	Path: [illegible]		Dwg No. E-1

Feed Line Distribution Chart
0' - 80'

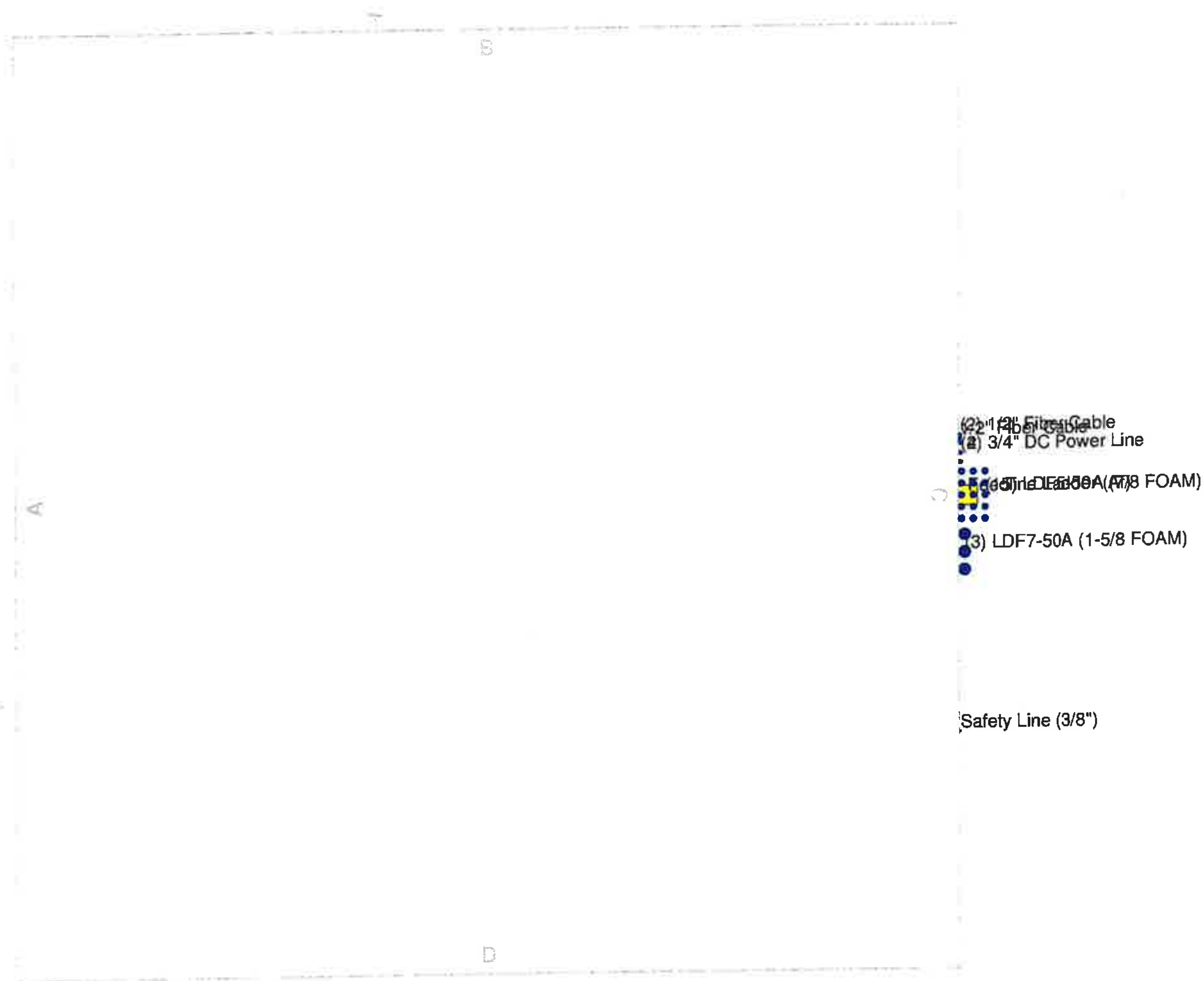


GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (555) 555-1234 FAX: (555) 555-1235	Job: ***59359 (CT1066) PORTLAND***	
	Project: ***2018701.10***	
	Client: Empire Telecom	Drawn by: dbays
	Code: TIA-222-G	Date: 12/12/17
	Path:	

App'd:	
Scale:	NTS
Dwg No.	E-7

Feed Line Plan

Round ______ Flat ______ App In Face ______ App Out Face



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Job: 59359 (CT1066) PORTLAND		
Project: 2018701.10		
Client: Empire Telecom	Drawn by: dbays	App'd:
Code: TIA-222-G	Date: 12/12/17	Scale: NTS
Path:		Dwg No. E-7

APPENDIX D

Anchor Rod Analysis

Self-Support Anchor Rod Analysis
59359 (CT1066) PORTLAND
2018701.10

GPD GROUP

General Info	
Code	TIA-222-G
Modified Anchor Rods	No
Clear Distance > d_b	No
Leg Eccentricity	No
Max Capacity	1.05

Anchor Rod Results		
$(P_u + V_u/\eta)$	20.0	kips
$\phi*R_{nt} = \phi*F_{ub}*A_n$ =	45.0	kips
Anchor Rod Stress Ratio =	44.5%	OK

Tower Reactions		
Detail Type =	d	
Eta Factor, η =	0.50	
Down Load, P_u =	61.70	kips
Down Load Shear, V_u =	9.20	kips
Uplift, P_u =	54.40	kips
Uplift Shear, V_u =	8.50	kips

Anchor Rods		
Number of Anchor Rods, N =	4	
Anchor Rod Grade =	A36	
Anchor Rod Diameter, d_d =	1.25	in
Bolt Circle, BC =		in
Yield, F_y =	36	ksi
Tensile, F_{ub} =	58	ksi

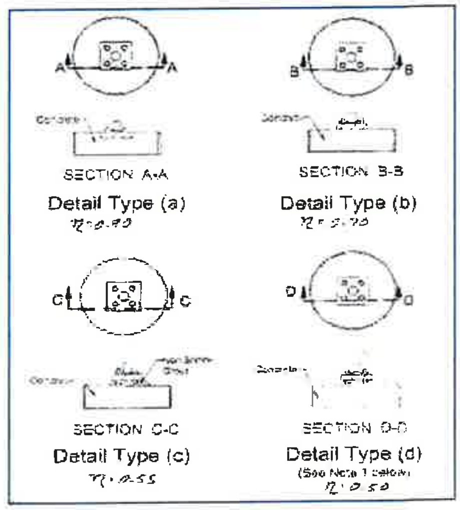


Figure 4-4 of TIA-222-G

GPD Self-Support Anchor Rod Analysis - V1.0

APPENDIX E

Foundation Analysis

SST Unit Base Foundation

Site #:	59359 (CT1066)
Site Name:	Portland
App. Number:	2018701.10

TIA-222 Revision: G

Tower Centroid Offset?:	☐
Block Foundation?:	☐

Superstructure Analysis Reactions		
Global Moment, **M**:	1114.5	ft-kips
Global Axial, **P**:	17.56	kips
Global Shear, **V**:	22	kips
Leg Compression, P_{comp}:	61.7	kips
Leg Comp. Shear, V_{u_comp}:	9.2	kips
Leg Uplift, P_{uplift}:	54.4	kips
Leg Uplift. Shear, V_{u_uplift}:	8.5	kips
Tower Height, **H**:	80	ft
Base Face Width, **BW**:	13.167	ft
BP Dist. Above Fdn, bp_{dist}:	3	in

Foundation Analysis Checks	Capacity	Demand	Rating	Check
Lateral (Sliding) (kips)	172.49	22.00	**12.8%**	**Pass**
Bearing Pressure (ksf)	23.04	2.68	**11.6%**	**Pass**
*Overturning (kip*ft)*	2589.68	1274.00	**49.2%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	216.30	46.00	**21.3%**	**Pass**
*Pier Flexure (Tension) (kip*ft)*	163.73	42.50	**26.0%**	**Pass**
Pier Compression (kip)	1334.73	65.30	**4.9%**	**Pass**
*Pad Flexure (kip*ft)*	522.74	217.63	**41.6%**	**Pass**
Pad Shear - 1-way (kips)	349.38	64.27	**18.4%**	**Pass**
Pad Shear - 2-way (ksi)	0.16	0.03	**16.7%**	**Pass**

Soil Rating:	**49.2%**
Structural Rating:	**41.6%**

Pier Properties		
Pier Shape:	Square	
Pier Diameter, **dpier**:	2.0	ft
Ext. Above Grade, **E**:	0.50	ft
Pier Rebar Size, **Sc**:	6	
Pier Rebar Quantity, **mc**:	12	
Pier Tie/Spiral Size, **St**:	4	
Pier Tie/Spiral Quantity, **mt**:	8	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties		
Depth, **D**:	6.50	ft
Pad Width, **W**:	18.00	ft
Pad Thickness, **T**:	2.00	ft
Pad Rebar Size (Bottom), **Sp**:	7	
Pad Rebar Quantity (Bottom), **mp**:	10	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties		
Rebar Grade, **Fy**:	60000	psi
Concrete Compressive Strength, **F'c**:	3000	psi
Dry Concrete Density, δc:	150	pcf

Soil Properties		
Total Soil Unit Weight, γ:	110	pcf
Ultimate Net Bearing, **Qnet**:	30.000	ksf
Cohesion, **Cu**:		ksf
Friction Angle, φ:	30	degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:	0.6	
Neglected Depth, **N**:	2.5	ft
Foundation Bearing on Rock?	Yes	
Groundwater Depth, **gw**:	None	ft

<-- Toggle between Gross and Net

Version 2.6.4

EMPIRE
telecom

December 13, 2017

Melanie A. Bachman
Executive Director
Connecticut Siting Council
10 Franklin Street
New Britain, CT 06051

Regarding:	Notice of Exempt Modification – Swap of 3 Panel Antennas, Addition of 6 Remote Radios, Addition of 6 Combiners, and Addition of 1 Squid Surge Arrestor.
Property Address:	213 High Street (aka 97 High Street) Portland, CT 06480 (the "Property")
Applicant:	AT&T Mobility ("AT&T", Site # CT1066)

Dear Ms. Bachman:

AT&T currently maintains a wireless telecommunications facility on an existing 80 foot self-support tower ("tower") at the above-referenced address, latitude 41.5807139, longitude -72.6238600. AT&T's facility consists of nine (9) wireless telecommunications antennas at 77 feet. The land and tower is owned by AT&T. Assessor's information is attached hereto.

AT&T desires to modify its existing telecommunications facility by swapping (3) antennas, adding (6) remote radios, and adding (1) squid. The centerline height of said antennas is and will remain at 77 feet.

Please accept this application 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 the First Selectwoman of the Town of Portland, the Town's Building Official, and the Town's Zoning Administrator. A copy of this letter is also being sent to the tower and property owner New Cingular Wireless PCS LLC (AT&T).

The planned modifications to AT&T's facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The planned modifications will not result in an increase in the height of the existing structure. AT&T's antennas and associated lines will be installed at the 77 foot level of the 80 Foot Monopole tower.
2. The proposed modifications will not involve any changes to ground-mounted equipment and, therefore will not require an extension of the site boundary.
3. The proposed modification will not increase the noise level at the facility by six decibel or more, or to levels that exceed state and local criteria.

16 Esquire Road, Billerica, MA 01862 Phone 978-284-3801 Email: kwhite@empiretelecomm.com

EMPIRE telecom

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. An RF emissions calculation is attached.
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 AT&T's proposed modifications. (Please see attached Structural Analysis completed by GPD Engineering and Architecture Professional Corporation dated December 12, 2017).

For the foregoing reasons AT&T respectfully requests that the proposed swap of antennas, addition of radios and addition of squids be allowed within the exempt modifications under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kristen White
Site Acquisition Specialist
Empire Telecom
kwhite@empiretelecomm.com
978-284-3801

cc: Susan Bransfield, First Selectman of the Town of Portland (municipality)
Ashley Majorowski (Land Use Administrator)
Lincoln White, Building Official (Building Department Administrator)
New Cingular Wireless PCS LLC (AT&T) (land owner & tower owner)

Portland, CT : Assessor Database

Property Search:

Parcel ID:	Alternate ID:	Owner 1 Name:	Street Number:	Street Name:
			97	HIGH ST

Search Reset

Property Detail:

Parcel ID:	Alternate ID/Map Block Lot:	Card:	Card:	Street Name:	Street Number:	Zoning:	LUC:	Acres:
039-0084	00220000	1	1	HIGH ST	97	R15	Communication Towers	0.80

Owner Information:

Owner 1 Name: NEW CINGULAR WIRELESS PCS LLC

Owner 2 Name:

Street 1: 1025 LENOX PARK BLVD NE

Street 2:

City: ATLANTA

State: GA

Zip: 30319

Volume: 899

Page: 207

Property Images:

Picture:

Sketch:

There is no sketch available.

Building Information:

Building Number: 1

Units: 1

Structure Type: TELEPHONE EQUIPMENT BLDG

Grade: C

Identical Units: 1

Year Built: 1961

Valuation:

Appraised Land: $81,600.00

Appraised Bldg: $88,100.00

Appraised Total: $169,700.00

Total Assessment: $118,790.00

Out-Buildings:

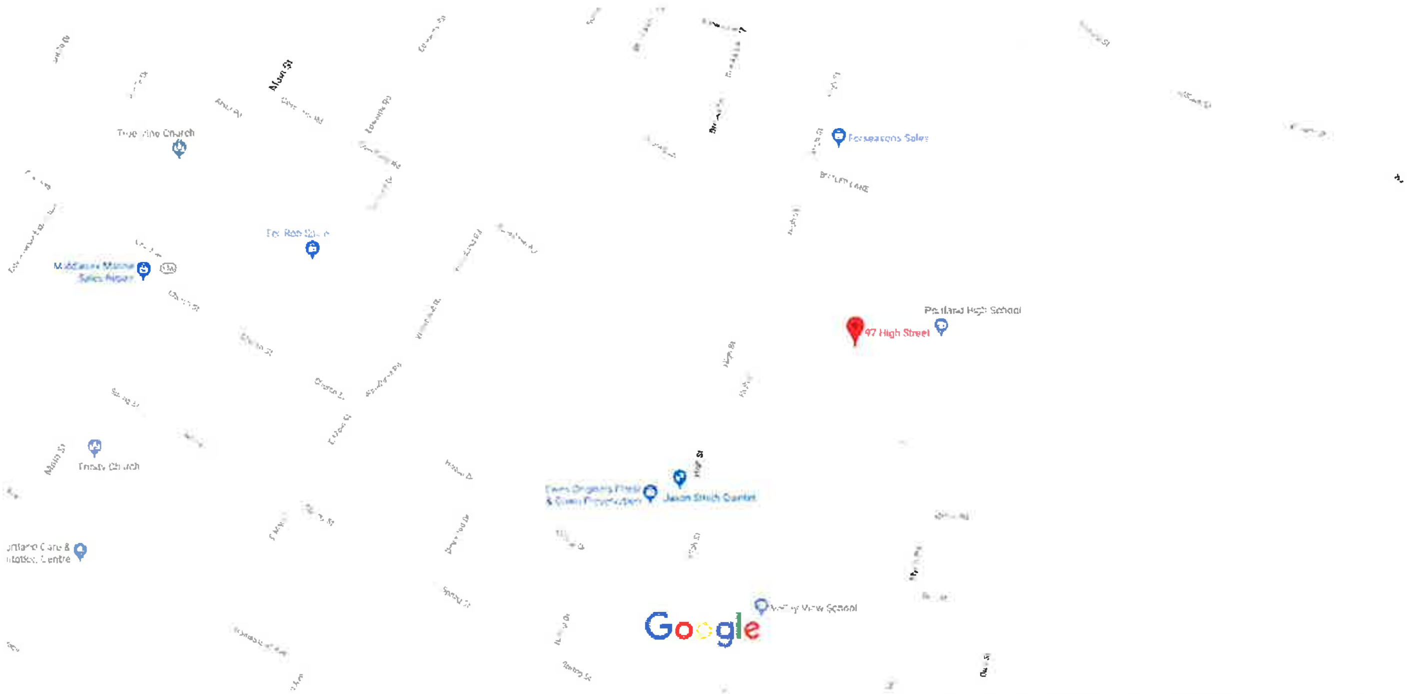
Code:	Description:	Units:	Year Built:	Size1:	Size2:	Area:	Grade:	Condition:
FN1	FENCE CHAIN	3	1961	6	180	0	1	
TT4	TOWER CELLULAR	4	1990	1	80	0	8	

Building Interior/Exterior Information:

Floor From:	Floor To:	Area:	Use Type:	Exterior Walls:	Contruction Type:	Heating:	A/C:	Plumbing:	Functional Utility:
01	01	384	MULTI USE STORAGE	CONCRETE BLOCK	WOOD FRAME/JOIST/BEAM	NONE	NONE	NONE	4

The information delivered through this on-line database is provided in the spirit of open access to government information and is intended as an enhanced service

Google Maps 97 High St



Map data ©2017 Google 200 ft

97 High St

Portland, CT 06480

Empire Telecommunications
1150 1st Avenue, Suite 600
King of Prussia, PA 19406
(484) 804-4500

GPD Engineering and Architecture
Professional Corporation

Kevin Fraleigh
520 South Main Street, Suite 2531
Akron, OH 44311
(330) 572-2191
kfraleigh@gpdgroup.com

GPD# 2018701.10
December 12, 2017

RIGOROUS STRUCTURAL ANALYSIS REPORT

AT&T DESIGNATION:	**Site USID:**	**59359**
	Site FA:	**10035005**
	Site Name:	**PORTLAND**
	Client Site #:	**CT1066**
ANALYSIS CRITERIA:	**Codes:**	**TIA-222-G, 2012 IBC & 2016 CSBC** **130-mph Ultimate 3 second gust with 0" ice** **101-mph Nominal 3 second gust with 0" ice** **50-mph Nominal 3 second gust with 3/4" ice**
SITE DATA:		**213 High Street, Portland, CT 06480, Middlesex County** **Latitude 41° 34' 50.5704" N, Longitude 72° 37' 25.8954" W** **Market: NEW ENGLAND** **80′ Self Support Tower**

Ms. Kristen White,

GPD is pleased to submit this Rigorous Structural Analysis Report to determine the structural integrity of the aforementioned tower. The purpose of the analysis is to determine the suitability of the tower with the existing and proposed loading configuration detailed in the analysis report.

Analysis Results

Tower Stress Level with Proposed Equipment:	91.3%	Pass
Foundation Ratio with Proposed Equipment:	49.2%	Pass

We at GPD appreciate the opportunity of providing our continuing professional services to you and Empire Telecommunications. If you have any questions or need further assistance on this or any other projects please do not hesitate to call.

Respectfully submitted,

Christopher J. Scheks, P.E.
Connecticut #: 0030026

STATE OF CONNECTICUT CHRISTOPHER J. SCHEKS No. 30026 LICENSED PROFESSIONAL ENGINEER

SUMMARY & RESULTS

The purpose of this analysis was to verify whether the existing structure is capable of carrying the proposed loading configuration as specified by AT&T Mobility to Empire Telecommunications. This report was commissioned by Ms. Kristen White of Empire Telecommunications.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 130 mph converted to a nominal 3-second gust wind speed of 101 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category C with a maximum topographic factor, Kzt, of 1.0 and Risk Category II were used in this analysis.

TOWER SUMMARY AND RESULTS

Member	Capacity	Results
Legs	74.5%	Pass
Diagonals	77.1%	Pass
Secondary Horizontals	91.3%	Pass
Top Girts	20.4%	Pass
Bolt Checks	36.1%	Pass
Anchor Rods	44.5%	Pass
Foundation	49.2%	Pass

ANALYSIS METHOD

tnxTower (Version 7.0.7.0), a commercially available software program, was used to create a three-dimensional model of the tower and calculate primary member stresses for various dead, live, wind, and ice load cases. Selected output from the analysis is included in Appendix B. The following table details the information provided to complete this structural analysis. This analysis is solely based on this information and is being completed without the benefit of a detailed site visit.

DOCUMENTS PROVIDED

Document	Remarks	Source
RF Data Sheet	AT&T RFDS Name: CT1066, updated 8/17/2017	Empire
Construction Drawings	Centek Job #: 17004.51, dated 10/4/2017	Empire
Tower Design	Not Provided	N/A
Foundation Design	Not Provided	N/A
Geotechnical Report	GPD Project #: 2017702.58, dated 3/6/2017	AT&T
Foundation Mapping	GPD Project #: 2017702.58, dated 3/6/2017	AT&T
Previous Structural Analysis	GPD Project #: 2017702.58, dated 3/17/2017	AT&T

ASSUMPTIONS

This structural analysis is based on the theoretical capacity of the members and is not a condition assessment of the tower. This analysis is from information supplied, and therefore, its results are based on and are as accurate as that supplied data. GPD has made no independent determination, nor is it required to, of its accuracy. The following assumptions were made for this structural analysis.

1. The tower member sizes and shapes are considered accurate as supplied. The material grade is as per data supplied and/or as assumed and as stated in the materials section.
2. The appurtenance configuration is as supplied, determined from available photos, and/or as modeled in the analysis. It is assumed to be complete and accurate. All antennas, mounts, coax and waveguides are assumed to be properly installed and supported as per manufacturer requirements.
3. All mounts, if applicable, are considered adequate to support the loading. No actual analysis of the mount(s) is performed. This analysis is limited to analyzing the tower only.
4. The soil parameters are as per data supplied or as assumed and stated in the calculations.
5. Foundations are properly designed and constructed to resist the original design loads indicated in the documents provided.
6. The tower and structures have been properly maintained in accordance with TIA Standards and/or with manufacturer's specifications.
7. All welds and connections are assumed to develop at least the member capacity unless determined otherwise and explicitly stated in this report.
8. All prior structural modifications, if applicable, are assumed to be as per data supplied/available and to have been properly installed.
9. Loading interpreted from photos is accurate to ±5' AGL, antenna size accurate to ±3.3 sf, and coax equal to the number of existing antennas without reserve.
10. All existing loading has been modeled based on the previous structural analysis by GPD (Project #: 2017702.58, dated 3/17/2017), the provided RF Data Sheet, the construction drawings and site photos and is assumed to be accurate.
11. There were some discrepancies between the existing loading between the previous analysis and the RF Data Sheet, the existing loading was modeled based upon the provided RF Data Sheet.
12. Leg A is at an azimuth of 15° based on satellite imagery.
13. Foundation reinforcement information was not available. Therefore, it was assumed that the foundation reinforcement in place is equal to or in excess of the code specified minimum.

If any of these assumptions are not valid or have been made in error, this analysis may be affected, and GPD should be allowed to review any new information to determine its effect on the structural integrity of the tower.

DISCLAIMER OF WARRANTIES

GPD has not performed a site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD in connection with this Rigorous Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

This analysis is limited to the designated maximum wind and seismic conditions per the governing tower standards and code. Wind forces resulting in tower vibrations near the structure's resonant frequencies were not considered in this analysis and are outside the scope of this analysis. Lateral loading from any dynamic response was not evaluated under a time-domain based fatigue analysis.

GPD does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the capability of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owner's responsibility to determine the amount of ice accumulation in excess of the code specified amount, if any, that should be considered in the structural analysis.

The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD, but are beyond the scope of this report.

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.

Towers are designed to carry gravity, wind, and ice loads. All members, legs, diagonals, struts, and redundant members provide structural stability to the tower with little redundancy. Absence or removal of a member can trigger catastrophic failure unless a substitute is provided before any removal. Legs carry axial loads and derive their strength from shorter unbraced lengths by the presence of redundant members and their connection to the diagonals with bolts or welds. If the bolts or welds are removed without providing any substitute to the frame, the leg is subjected to a higher unbraced length that immediately reduces its load carrying capacity. If a diagonal is also removed in addition to the connection, the unbraced length of the leg is greatly increased, jeopardizing its load carrying capacity. Failure of one leg can result in a tower collapse because there is no redundancy. Redundant members and diagonals are critical to the stability of the tower.

GPD makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD pursuant to this report will be limited to the total fee received for preparation of this report.

APPENDIX A

Tower Analysis Summary Form

Tower Analysis Summary Form

The information contained in this summary report is not to be used independently from the PE stamped tower analysis.

General Info

Site Name	PORTLAND
Site Number	59359 (CT1066)
FA Number	10035005
Date of Analysis	12/12/2017
Company Performing Analysis	GPD

Tower Info	Description	Date
Tower Type (G, SST, MP)	SST	
Tower Height (top of steel AGL)	80'	
Tower Manufacturer	n/a	
Tower Model	n/a	
Tower Design	n/a	
Foundation Design	n/a	
Geotech Report	GPD Project #: 2017702.58	3/6/2017
Foundation Mapping	GPD Project #: 2017702.58	3/6/2017
Tower Mapping	n/a	
Previous Structural Analysis	GPD Project #: 2017702.58	3/17/2017

Design Parameters

Design Code Used	TIA-222-G, 2012 IBC & 2016 CSBC
Location of Tower (County, State)	Middlesex, CT
Nominal Wind Speed (mph)	101 (3-second gust)
Ice Thickness (in)	0.75
Structure Classification (I, II, III)	II
Exposure Category (B, C, D)	C
Topographic Category (1 to 5)	1

Analysis Results (% Maximum Usage)

Existing/Reserved + Future + Proposed Condition	
Tower (%)	91.3%
Anchor Rods (%)	44.5%
Foundation (%)	49.2%
Foundation Adequate?	YES

Steel Yield Strength (ksi)

Legs	36
Bracing	36
Bolts	A325
Anchor Rods	36

Note: Steel strengths have been assumed based on previous experience with similar towers.

Existing / Reserved Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Leg/Face
AT&T Mobility	77	77	3	Panel	Kathrein	800-10121	30/150/270	3	Unknown	Ring w/ Sector Frames	15	Unknown	7/8"	Face C
AT&T Mobility	77	77	3	Panel	CCI	HPA-65R-BUU-H6	30/150/270			on the same mounts	3	Unknown	1-5/8"	Face C
AT&T Mobility	77	77	3	Panel	KMW	AM-X-CD-16-65-00T-RET	30/150/270			on the same mounts	2	DC Power	3/4"	Face C
AT&T Mobility	77	77	6	RET	Kathrein	860-10025				on the same mounts	1	Fiber Cable	1/2"	Face C
AT&T Mobility	77	77	6	TMA	CCI	DTMABP7819VG12A				on the same mounts				
AT&T Mobility	77	77	3	RRU	Ericsson	RRUS 11				on the same mounts				
AT&T Mobility	77	77	3	RRU	Ericsson	RRUS 32 B2				on the same mounts				
AT&T Mobility	77	77	1	Surge	Raycap	DC6-48-60-18-F				on the same mounts				

Note: (3) KMW panels and (3) CCI TMAs at 77' shall be removed prior to the installation of the proposed loading. All other existing/reserved equipment shall be reused.

Proposed Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Leg/Face
AT&T Mobility	77	77	3	Panel	Quintel	QS66510-6	30/150/270			on the existing mount	2	DC Power	3/4"	Face C
AT&T Mobility	77	77	6	Kaelus	Combiner	DBC0061F1V51-2				on the existing mount	1	Fiber Cable	1/2"	Face C
AT&T Mobility	77	77	3	Ericsson	RRU	RRUS-32				on the existing mount				
AT&T Mobility	77	77	3	Ericsson	RRU	RRUS-32 B66				on the existing mount				
AT&T Mobility	77	77	1	Raycap	DC Unit	DC6-48-60-18-F				on the existing mount				

Note: The proposed equipment shall be installed in addition to the remaining existing/reserved loading at the same elevation.

Future Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Leg/Face

APPENDIX B

tnxTower Output File

Tower Input Data

The main tower is a 4x free standing tower with an overall height of 80.00 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 5.38 ft at the top and 13.17 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

- Tower is located in Middlesex County, Connecticut.
- Basic wind speed of 101 mph.
- Structure Class II.
- Exposure Category C.
- Topographic Category 1.
- Crest Height 0.00 ft.
- Nominal ice thickness of 0.7500 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	*Face or Leg*	*Allow Shield*	*Component Type*	*Placement* *ft*	*Face Offset* *in*	*Lateral Offset* *(Frac FW)*	*#*	*# Per Row*	*Clear Spacing* *in*	*Width or Diameter* *in*	*Weight* *klf*
Safety Line (3/8")	C	No	Ar (CaAa)	80.00 - 8.00	0.0000	0.25	1	1	0.3750	0.3750	0.000
Feedline Ladder (Af)	C	No	Af (CaAa)	77.00 - 8.00	0.0000	0	1	1	3.0000	3.0000	0.008
LDF5-50A (7/8 FOAM)	C	No	Ar (CaAa)	77.00 - 8.00	0.0000	0	15	5	0.7500	1.0900	0.000
LDF7-50A (1-5/8 FOAM)	C	No	Ar (CaAa)	77.00 - 8.00	0.0000	0.06	3	3	0.7500	1.9800	0.001
3/4" DC Power Line	C	No	Ar (CaAa)	77.00 - 8.00	0.0000	-0.04	4	4	0.7500	0.7500	0.000
1/2" Fiber Cable	C	No	Ar (CaAa)	77.00 - 8.00	0.0000	-0.06	2	2	0.5000	0.6300	0.000

Discrete Tower Loads

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* *lb*
8' Lightning Rod	C	From Leg	0.00	0.000	80.00	No Ice	0.60	0.60	12.000
			0.000			1/2" Ice	1.41	1.41	18.187
			4.000			1" Ice	2.25	2.25	29.489
10' Diameter Tower Ring Mount	C	None		0.000	77.00	No Ice	7.00	7.00	298.000
						1/2" Ice	8.80	8.80	325.500
						1" Ice	10.60	10.60	353.000
10' Diameter Tower Ring Mount	C	None		0.000	75.00	No Ice	7.00	7.00	298.000
						1/2" Ice	8.80	8.80	325.500

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 lb
						1" Ice	10.60	10.60	353.000
10' Diameter Tower Ring Mount	C	None		0.000	68.00	No Ice	7.00	7.00	298.000
						1/2" Ice	8.80	8.80	325.500
						1" Ice	10.60	10.60	353.000
MTS 10' Boom Gate	A	From Leg	2.00	0.000	77.00	No Ice	15.43	10.89	434.000
			0.000			1/2" Ice	20.15	15.23	614.248
			0.000			1" Ice	24.87	19.57	794.496
MTS 10' Boom Gate	B	From Face	2.00	0.000	77.00	No Ice	15.43	10.89	434.000
			0.000			1/2" Ice	20.15	15.23	614.248
			0.000			1" Ice	24.87	19.57	794.496
MTS 10' Boom Gate	C	From Face	2.00	0.000	77.00	No Ice	15.43	10.89	434.000
			0.000			1/2" Ice	20.15	15.23	614.248
			0.000			1" Ice	24.87	19.57	794.496
800 10121 w/ Mount Pipe	A	From Leg	4.00	15.000	77.00	No Ice	5.26	4.47	64.550
			0.000			1/2" Ice	5.64	5.13	110.681
			0.000			1" Ice	6.03	5.79	163.059
800 10121 w/ Mount Pipe	B	From Face	4.00	0.000	77.00	No Ice	5.26	4.47	64.550
			0.000			1/2" Ice	5.64	5.13	110.681
			0.000			1" Ice	6.03	5.79	163.059
800 10121 w/ Mount Pipe	C	From Face	4.00	30.000	77.00	No Ice	5.26	4.47	64.550
			0.000			1/2" Ice	5.64	5.13	110.681
			0.000			1" Ice	6.03	5.79	163.059
HPA-65R-BUU-H6 w/ Mount Pipe	A	From Leg	4.00	15.000	77.00	No Ice	9.90	8.11	76.550
			0.000			1/2" Ice	10.47	9.30	158.030
			0.000			1" Ice	11.01	10.21	247.793
HPA-65R-BUU-H6 w/ Mount Pipe	B	From Face	4.00	0.000	77.00	No Ice	9.90	8.11	76.550
			0.000			1/2" Ice	10.47	9.30	158.030
			0.000			1" Ice	11.01	10.21	247.793
HPA-65R-BUU-H6 w/ Mount Pipe	C	From Face	4.00	30.000	77.00	No Ice	9.90	8.11	76.550
			0.000			1/2" Ice	10.47	9.30	158.030
			0.000			1" Ice	11.01	10.21	247.793
QS66510-6 w/ Mount Pipe	A	From Leg	4.00	15.000	77.00	No Ice	8.13	8.22	119.900
			0.000			1/2" Ice	8.59	9.19	192.986
			0.000			1" Ice	9.05	10.02	274.011
QS66510-6 w/ Mount Pipe	B	From Face	4.00	0.000	77.00	No Ice	8.13	8.22	119.900
			0.000			1/2" Ice	8.59	9.19	192.986
			0.000			1" Ice	9.05	10.02	274.011
QS66510-6 w/ Mount Pipe	C	From Face	4.00	30.000	77.00	No Ice	8.13	8.22	119.900
			0.000			1/2" Ice	8.59	9.19	192.986
			0.000			1" Ice	9.05	10.02	274.011
Pipe Mount 8'x2.375"	A	From Leg	4.00	15.000	77.00	No Ice	1.90	1.90	33.700
			0.000			1/2" Ice	2.73	2.73	48.040
			0.000			1" Ice	3.40	3.40	67.661
Pipe Mount 8'x2.375"	B	From Face	4.00	0.000	77.00	No Ice	1.90	1.90	33.700
			0.000			1/2" Ice	2.73	2.73	48.040
			0.000			1" Ice	3.40	3.40	67.661
Pipe Mount 8'x2.375"	C	From Face	4.00	30.000	77.00	No Ice	1.90	1.90	33.700
			0.000			1/2" Ice	2.73	2.73	48.040
			0.000			1" Ice	3.40	3.40	67.661
(2) 860 10025	A	From Leg	4.00	0.000	77.00	No Ice	0.14	0.12	1.160
			0.000			1/2" Ice	0.19	0.17	2.650
			0.000			1" Ice	0.25	0.23	5.060
(2) 860 10025	B	From Face	4.00	0.000	77.00	No Ice	0.14	0.12	1.160
			0.000			1/2" Ice	0.19	0.17	2.650
			0.000			1" Ice	0.25	0.23	5.060
(2) 860 10025	C	From Face	4.00	0.000	77.00	No Ice	0.14	0.12	1.160
			0.000			1/2" Ice	0.19	0.17	2.650

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* lb
			0.000			1" Ice	0.25	0.23	5.060
DTMABP7819VG12A	A	From Leg	4.00	0.000	77.00	No Ice	0.98	0.34	19.180
			0.000			1/2" Ice	1.10	0.42	26.485
			0.000			1" Ice	1.23	0.51	35.633
DTMABP7819VG12A	B	From Face	4.00	0.000	77.00	No Ice	0.98	0.34	19.180
			0.000			1/2" Ice	1.10	0.42	26.485
			0.000			1" Ice	1.23	0.51	35.633
DTMABP7819VG12A	C	From Face	4.00	0.000	77.00	No Ice	0.98	0.34	19.180
			0.000			1/2" Ice	1.10	0.42	26.485
			0.000			1" Ice	1.23	0.51	35.633
(2) DBC0061F1V51-2	A	From Leg	4.00	15.000	77.00	No Ice	0.43	0.41	25.500
			0.000			1/2" Ice	0.51	0.50	30.777
			0.000			1" Ice	0.61	0.59	37.587
(2) DBC0061F1V51-2	B	From Face	4.00	0.000	77.00	No Ice	0.43	0.41	25.500
			0.000			1/2" Ice	0.51	0.50	30.777
			0.000			1" Ice	0.61	0.59	37.587
(2) DBC0061F1V51-2	C	From Face	4.00	30.000	77.00	No Ice	0.43	0.41	25.500
			0.000			1/2" Ice	0.51	0.50	30.777
			0.000			1" Ice	0.61	0.59	37.587
RRUS 11	A	From Leg	4.00	0.000	77.00	No Ice	2.78	1.19	50.700
			0.000			1/2" Ice	2.99	1.33	71.500
			0.000			1" Ice	3.21	1.49	95.335
RRUS 11	B	From Face	4.00	0.000	77.00	No Ice	2.78	1.19	50.700
			0.000			1/2" Ice	2.99	1.33	71.500
			0.000			1" Ice	3.21	1.49	95.335
RRUS 11	C	From Face	4.00	0.000	77.00	No Ice	2.78	1.19	50.700
			0.000			1/2" Ice	2.99	1.33	71.500
			0.000			1" Ice	3.21	1.49	95.335
RRUS 32 B2	A	From Leg	4.00	0.000	77.00	No Ice	2.73	1.67	52.900
			0.000			1/2" Ice	2.95	1.86	73.957
			0.000			1" Ice	3.18	2.05	98.206
RRUS 32 B2	B	From Face	4.00	0.000	77.00	No Ice	2.73	1.67	52.900
			0.000			1/2" Ice	2.95	1.86	73.957
			0.000			1" Ice	3.18	2.05	98.206
RRUS 32 B2	C	From Face	4.00	0.000	77.00	No Ice	2.73	1.67	52.900
			0.000			1/2" Ice	2.95	1.86	73.957
			0.000			1" Ice	3.18	2.05	98.206
RRUS 32	A	From Leg	4.00	15.000	77.00	No Ice	3.31	2.42	77.000
			0.000			1/2" Ice	3.56	2.64	104.928
			0.000			1" Ice	3.81	2.86	136.466
RRUS 32	B	From Face	4.00	0.000	77.00	No Ice	3.31	2.42	77.000
			0.000			1/2" Ice	3.56	2.64	104.928
			0.000			1" Ice	3.81	2.86	136.466
RRUS 32	C	From Face	4.00	30.000	77.00	No Ice	3.31	2.42	77.000
			0.000			1/2" Ice	3.56	2.64	104.928
			0.000			1" Ice	3.81	2.86	136.466
RRUS 32 B66	A	From Leg	4.00	15.000	77.00	No Ice	2.74	1.67	53.000
			0.000			1/2" Ice	2.96	1.86	74.114
			0.000			1" Ice	3.19	2.05	98.424
RRUS 32 B66	B	From Face	4.00	0.000	77.00	No Ice	2.74	1.67	53.000
			0.000			1/2" Ice	2.96	1.86	74.114
			0.000			1" Ice	3.19	2.05	98.424
RRUS 32 B66	C	From Face	4.00	30.000	77.00	No Ice	2.74	1.67	53.000
			0.000			1/2" Ice	2.96	1.86	74.114
			0.000			1" Ice	3.19	2.05	98.424
DC6-48-60-18-8F Surge	A	From Leg	2.00	0.000	77.00	No Ice	0.92	0.92	18.900
Suppression Unit			0.000			1/2" Ice	1.46	1.46	36.615

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 lb
			0.000			1" Ice	1.64	1.64	56.825
DC6-48-60-18-8F Surge Suppression Unit	B	From Leg	2.00 0.000 0.000	0.000	77.00	No Ice 1/2" Ice 1" Ice	0.92 1.46 1.64	0.92 1.46 1.64	18.900 36.615 56.825
Catwalk	B	From Leg	0.00 0.000 0.000	0.000	51.00	No Ice 1/2" Ice 1" Ice	27.50 39.50 51.50	27.50 39.50 51.50	1587.000 2182.000 2777.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
80.00	8' Lightning Rod	40	0.4660	0.046	0.016	234893
77.00	10' Diameter Tower Ring Mount	40	0.4359	0.045	0.015	234893
75.00	10' Diameter Tower Ring Mount	40	0.4159	0.045	0.014	234893
68.00	10' Diameter Tower Ring Mount	40	0.3479	0.043	0.012	99818
51.00	Catwalk	40	0.2066	0.032	0.007	106573

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	80	Leg	A325N	0.6250	12	1312.060	24360.000	0.054 ✔	1	Bearing
		Diagonal	A325N	0.6250	2	1837.060	7187.700	0.256 ✔	1	Member Block Shear
		Horizontal	A325N	0.6250	2	874.220	11622.700	0.075 ✔	1	Member Block Shear
		Secondary Horizontal	A325N	0.6250	2	497.873	23245.301	0.021 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	2	127.100	6168.160	0.021 ✔	1	Member Block Shear
T2	66	Leg	A325N	0.6250	12	3250.580	24360.000	0.133 ✔	1	Bearing
		Diagonal	A325N	0.6250	2	1550.780	7187.700	0.216 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	1	261.984	7830.000	0.033 ✔	1	Member Bearing
T3	54	Leg	A325N	0.6250	12	7045.350	24850.500	0.284 ✔	1	Bolt DS
		Diagonal	A325N	0.6250	2	1876.840	7187.700	0.261 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	2	120.714	7187.700	0.017 ✔	1	Member Block Shear
T4	24	Diagonal	A325N	0.6250	2	2314.440	7697.460	0.301 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	2	301.492	7187.700	0.042 ✔	1	Member Block Shear
T5	14.75	Diagonal	A325N	0.6250	2	2782.240	7697.460	0.361 ✔	1	Member Block Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
		Secondary Horizontal	A325N	0.6250	1	831.428	3194.530	0.260 ✔	1	Member Block Shear

Section Capacity Table

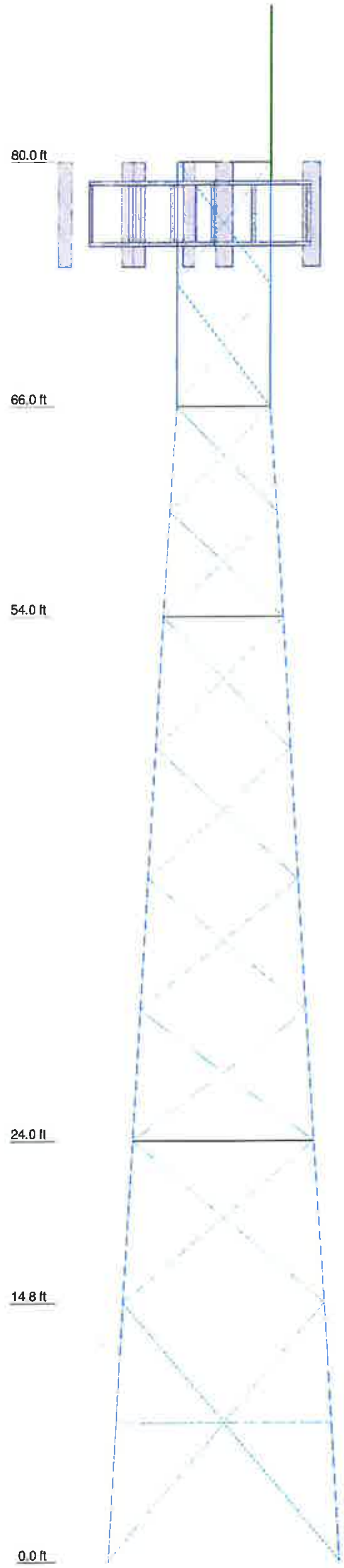
Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	80 - 66	Leg	L4x4x3/8	3	-7872.390	79761.797	9.9	Pass
T2	66 - 54	Leg	L4x4x3/8	60	-19503.500	59484.199	32.8	Pass
T3	54 - 24	Leg	L5x5x7/16	80	-42272.102	87162.000	48.5	Pass
T4	24 - 14.75	Leg	L5x5x7/16	120	-50098.602	69246.000	72.3	Pass
T5	14.75 - 0	Leg	L5x5x7/16	136	-62258.199	83563.797	74.5	Pass
T1	80 - 66	Diagonal	L2 1/2x2x3/16	17	-4380.000	13446.900	32.6	Pass
T2	66 - 54	Diagonal	L2 1/2x2x3/16	74	-3205.170	13232.400	24.2	Pass
T3	54 - 24	Diagonal	L2 1/2x2x3/16	90	-3707.320	7348.230	50.5	Pass
T4	24 - 14.75	Diagonal	L3x3x3/16	129	-4333.360	13225.700	32.8	Pass
T5	14.75 - 0	Diagonal	L3x3x3/16	142	-6006.740	7787.350	77.1	Pass
T1	80 - 66	Horizontal	L3 1/2x3 1/2x1/4	43	-1752.300	39066.500	4.5	Pass
T1	80 - 66	Secondary Horizontal	2L4x4x1/4x3/8	35	995.745	114351.000	0.9	Pass
T5	14.75 - 0	Secondary Horizontal	L1 1/2x1 1/2x1/8	147	-831.428	910.763	91.3	Pass
T1	80 - 66	Top Girt	L2x2x3/16	7	254.201	18733.900	1.4	Pass
T2	66 - 54	Top Girt	L3x3x3/16	23	261.984	30968.301	0.8	Pass
T3	54 - 24	Top Girt	L2 1/2x2 1/2x3/16	81	-253.370	10922.700	2.3	Pass
T4	24 - 14.75	Top Girt	L2 1/2x2x3/16	123	-837.711	4114.760	20.4	Pass

Summary	ELC:	Existing + Proposed
Leg (T5)	74.5	Pass
Diagonal (T5)	77.1	Pass
Horizontal (T1)	4.5	Pass
Secondary Horizontal (T5)	91.3	Pass
Top Girt (T4)	20.4	Pass
Bolt Checks	36.1	Pass
Rating =	**91.3**	**Pass**

APPENDIX C

Tower Elevation Drawing

Section	T1	T2	T3	T4	T5	
Legs	L4x4x3/8		L5x5x7/16			
Leg Grade			A36			
Diagonals			L2 1/2x2x3/16		L3x3x3/16	
Diagonal Grade			A36			
Top Girts	L2x2x3/16	L3x3x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2x3/16	N.A.	
Horizontals	L3 1/2x3 1/2x1/4		N.A.			
Sec. Horizontals	2L4x4x1/4x3/8		N.A.		L1 1/2x1 1/2x1/8	
Face Width (ft)	5.375		6.79167	10.3333	11.4253	13.1667
# Panels @ (ft)	4 @ 3.5	2 @ 6	4 @ 7.5	1 @ 9.25	1 @ 14.6667	
Weight (lb)	1517.0	925.2	2602.8	1066.3	1471.0	7782.3



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
8' Lightning Rod	80	(2) DBC0061F1V51-2	77
10' Diameter Tower Ring Mount	77	(2) DBC0061F1V51-2	77
MTS 10' Boom Gate	77	(2) DBC0061F1V51-2	77
MTS 10' Boom Gate	77	RRUS 11	77
MTS 10' Boom Gate	77	RRUS 11	77
800 10121 w/ Mount Pipe	77	RRUS 11	77
800 10121 w/ Mount Pipe	77	RRUS 32 B2	77
800 10121 w/ Mount Pipe	77	RRUS 32 B2	77
HPA-65R-BUU-H6 w/ Mount Pipe	77	RRUS 32 B2	77
HPA-65R-BUU-H6 w/ Mount Pipe	77	RRUS 32	77
HPA-65R-BUU-H6 w/ Mount Pipe	77	RRUS 32	77
QS66510-6 w/ Mount Pipe	77	RRUS 32	77
QS66510-6 w/ Mount Pipe	77	RRUS 32 B66	77
QS66510-6 w/ Mount Pipe	77	RRUS 32 B66	77
Pipe Mount 8'x2.375"	77	RRUS 32 B66	77
Pipe Mount 8'x2.375"	77	DC6-48-60-18-8F Surge Suppression Unit	77
Pipe Mount 8'x2.375"	77	DC6-48-60-18-8F Surge Suppression Unit	77
(2) 860 10025	77	10' Diameter Tower Ring Mount	75
(2) 860 10025	77	10' Diameter Tower Ring Mount	68
(2) 860 10025	77	Catwalk	51
DTMABP7819VG12A	77		
DTMABP7819VG12A	77		
DTMABP7819VG12A	77		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 91.3%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 61712 lb
SHEAR: 9193 lb

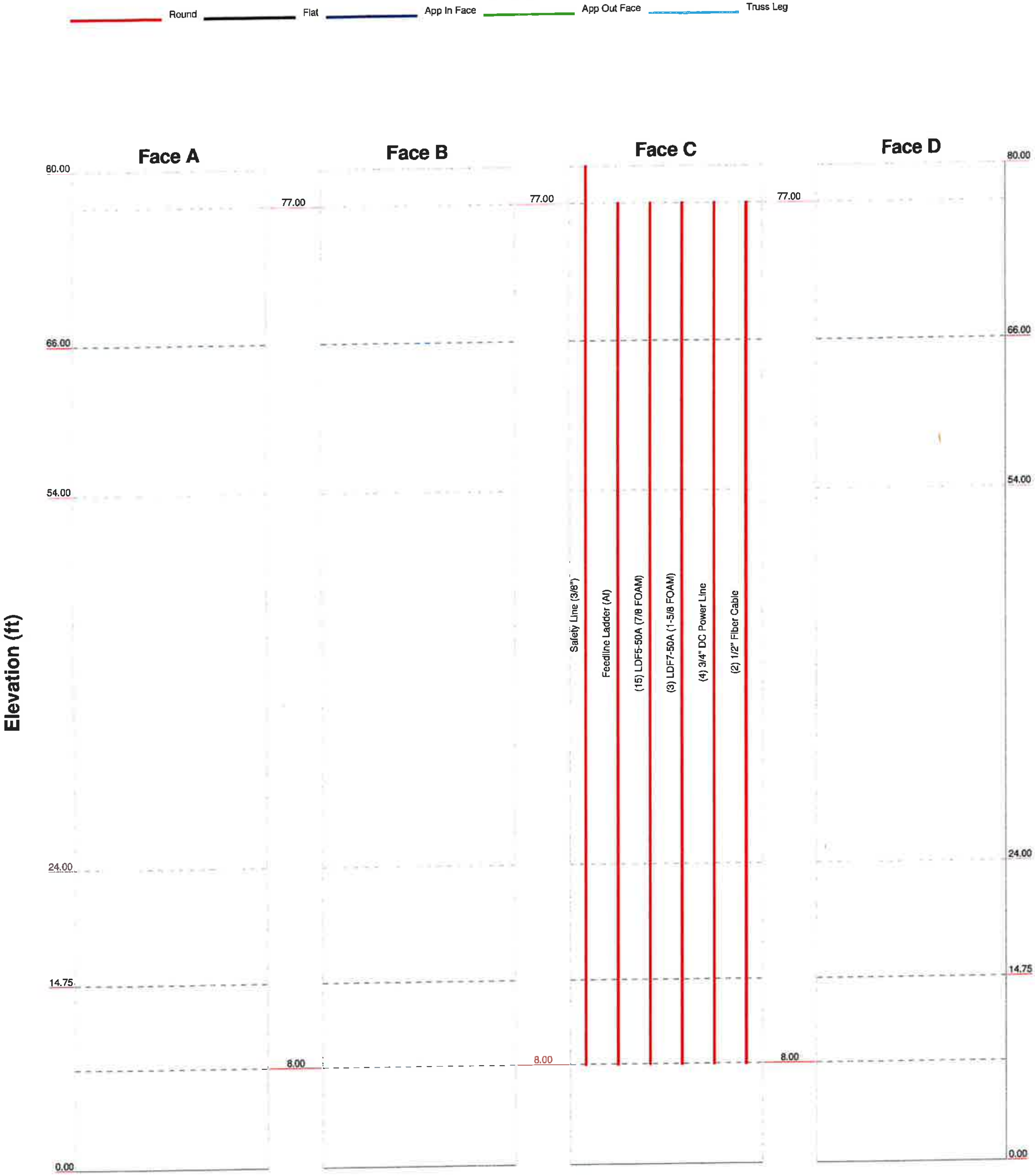
UPLIFT: -54412 lb
SHEAR: 8466 lb

AXIAL 45809 lb
SHEAR 5078 lb
MOMENT 318337 lb-ft
TORQUE 5392 lb-ft
50 mph WIND - 0.7500 in ICE

AXIAL 17563 lb
SHEAR 22000 lb
MOMENT 1114478 lb-ft
TORQUE 21161 lb-ft
REACTIONS - 101 mph WIND

GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (555) 555-1234 FAX: (555) 555-1235	Job: 59359 (CT1066) PORTLAND		
	Project: 2018701.10		
	Client: Empire Telecom	Drawn by: dbays	App'd:
	Code: TIA-222-G	Date: 12/12/17	Scale: NTS
	Path:		Dwg No. E-1

Feed Line Distribution Chart
0' - 80'

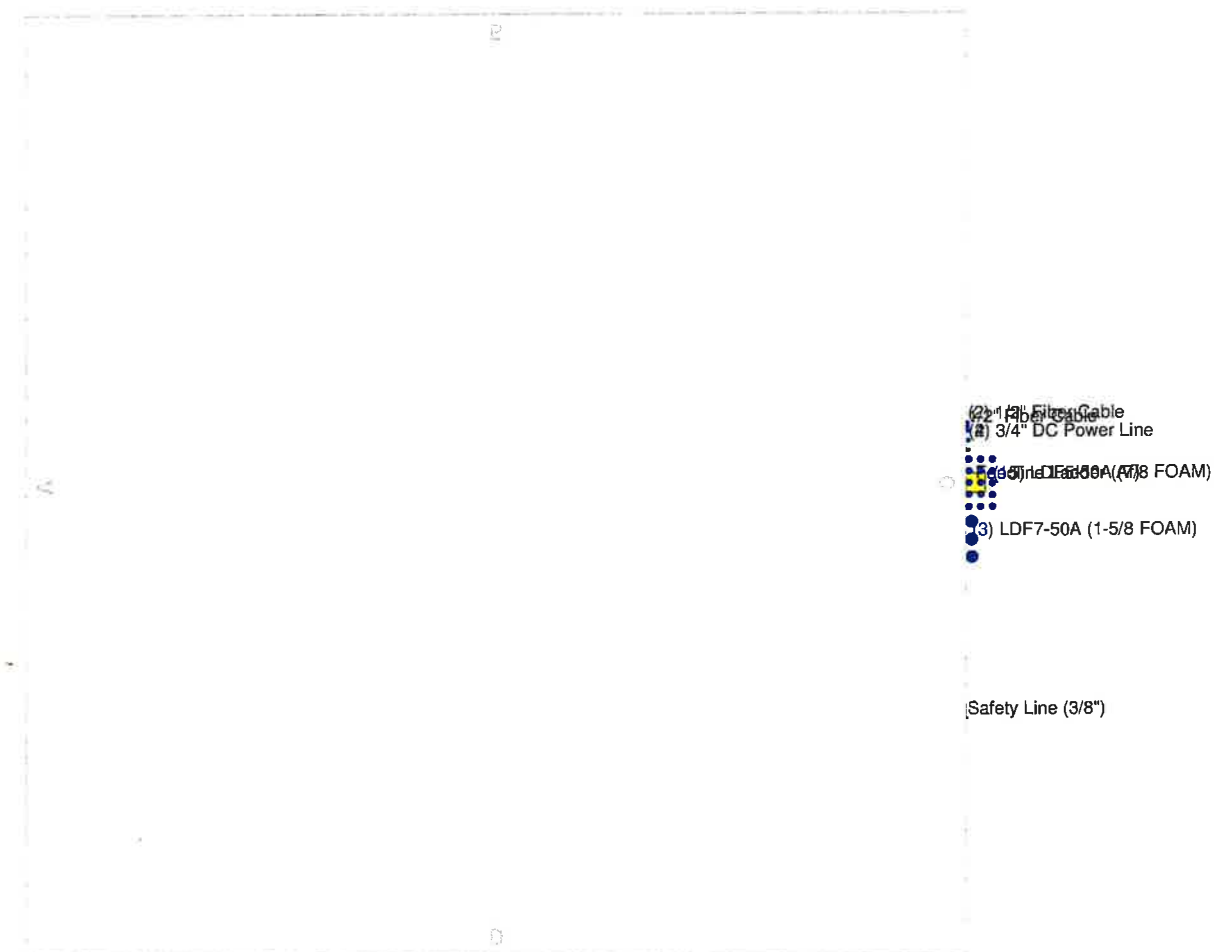


GPD
520 South Main Street Suite 2531
Akron, Ohio 44311
Phone: (555) 555-1234
FAX: (555) 555-1235

Job: ***59359 (CT1066) PORTLAND***		
Project: ***2018701.10***		
Client: Empire Telecom	Drawn by: dbays	App'd:
Code: TIA-222-G	Date: 12/12/17	Scale: NTS
Path:		Dwg No. E-7

Feed Line Plan

Round Flat App In Face App Out Face



GPD 520 South Main Street Suite 2531 Akron, Ohio 44311 Phone: (555) 555-1234 FAX: (555) 555-1235	Job: 59359 (CT1066) PORTLAND		
	Project: 2018701.10		
	Client: Empire Telecom	Drawn by: dbays	App'd:
	Code: TIA-222-G	Date: 12/12/17	Scale: NTS
	Path:		Dwg No. E-7

APPENDIX D

Anchor Rod Analysis

Self-Support Anchor Rod Analysis
59359 (CT1066) PORTLAND
2018701.10

GPD GROUP

General Info	
Code	TIA-222-G
Modified Anchor Rods	No
Clear Distance > d_b	No
Leg Eccentricity	No
Max Capacity	1.05

Tower Reactions		
Detail Type =	d	
Eta Factor, η =	0.50	
Down Load, P_u =	61.70	kips
Down Load Shear, V_u =	9.20	kips
Uplift, P_u =	54.40	kips
Uplift Shear, V_u =	8.50	kips

Anchor Rods		
Number of Anchor Rods, N =	4	
Anchor Rod Grade =	A36	
Anchor Rod Diameter, d_d =	1.25	in
Bolt Circle, BC =		in
Yield, F_y =	36	ksi
Tensile, F_{ub} =	58	ksi

Anchor Rod Results		
$(P_u + V_u/\eta)$	20.0	kips
$\phi*R_{nt} = \phi*F_{ub}*A_n$ =	45.0	kips
Anchor Rod Stress Ratio =	44.5%	OK

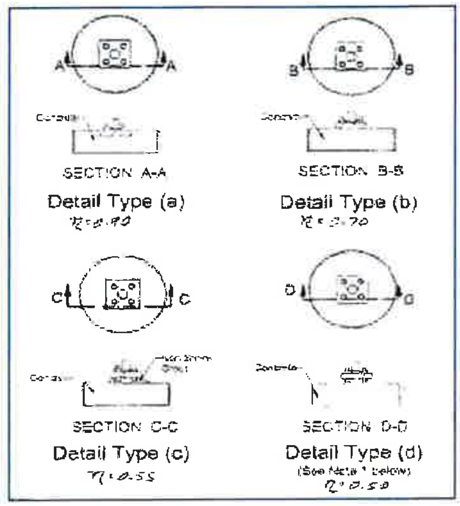


Figure 4-4 of TIA-222-G

APPENDIX E

Foundation Analysis

SST Unit Base Foundation

Site #:	59359 (CT1066)
Site Name:	Portland
App. Number:	2018701.10

TIA-222 Revision:	G

Tower Centroid Offset?:	☐
Block Foundation?:	☐

Superstructure Analysis Reactions		
Global Moment, **M**:	1114.5	ft-kips
Global Axial, **P**:	17.56	kips
Global Shear, **V**:	22	kips
Leg Compression, P_{comp}:	61.7	kips
Leg Comp. Shear, V_{u_comp}:	9.2	kips
Leg Uplift, P_{uplift}:	54.4	kips
Leg Uplift. Shear, V_{u_uplift}:	8.5	kips
Tower Height, **H**:	80	ft
Base Face Width, **BW**:	13.167	ft
BP Dist. Above Fdn, bp_{dist}:	3	in

Foundation Analysis Checks	Capacity	Demand	Rating	Check
Lateral (Sliding) (kips)	172.49	22.00	**12.8%**	**Pass**
Bearing Pressure (ksf)	23.04	2.68	**11.6%**	**Pass**
*Overturning (kip*ft)*	2589.68	1274.00	**49.2%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	216.30	46.00	**21.3%**	**Pass**
*Pier Flexure (Tension) (kip*ft)*	163.73	42.50	**26.0%**	**Pass**
Pier Compression (kip)	1334.73	65.30	**4.9%**	**Pass**
*Pad Flexure (kip*ft)*	522.74	217.63	**41.6%**	**Pass**
Pad Shear - 1-way (kips)	349.38	64.27	**18.4%**	**Pass**
Pad Shear - 2-way (ksi)	0.16	0.03	**16.7%**	**Pass**

Soil Rating:	**49.2%**
Structural Rating:	**41.6%**

Pier Properties		
Pier Shape:	Square	
Pier Diameter, **dpier**:	2.0	ft
Ext. Above Grade, **E**:	0.50	ft
Pier Rebar Size, **Sc**:	6	
Pier Rebar Quantity, **mc**:	12	
Pier Tie/Spiral Size, **St**:	4	
Pier Tie/Spiral Quantity, **mt**:	8	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties		
Depth, **D**:	6.50	ft
Pad Width, **W**:	18.00	ft
Pad Thickness, **T**:	2.00	ft
Pad Rebar Size (Bottom), **Sp**:	7	
Pad Rebar Quantity (Bottom), **mp**:	10	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties		
Rebar Grade, **Fy**:	60000	psi
Concrete Compressive Strength, **F'c**:	3000	psi
Dry Concrete Density, δc:	150	pcf

Soil Properties		
Total Soil Unit Weight, γ:	110	pcf
Ultimate Net Bearing, Qnet:	30.000	ksf
Cohesion, **Cu**:		ksf
Friction Angle, φ:	30	degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:	0.6	
Neglected Depth, **N**:	2.5	ft
Foundation Bearing on Rock?	Yes	
Groundwater Depth, **gw**:	None	ft

<-- Toggle between Gross and Net

Version 2.6.4

Radio Frequency Emissions Analysis Report

AT&T Existing Facility

Site ID: CT1066

Portland
213 High Street
Portland, CT 6480

October 26, 2017

Centerline Communications Project Number: 950006-078

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**12.59 %**

October 26, 2017

AT&T Mobility – New England
Attn: John Benedetto, RF Manager
550 Cochituate Road
Suite 550 – 13&14
Framingham, MA 06040

Emissions Analysis for Site: **CT1066 – Portland**

Centerline Communications, LLC ("Centerline") was directed to analyze the proposed AT&T facility located at **213 High Street, Portland, CT**, for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general population may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 700 and 850 MHz Bands are approximately 467 $\mu W/cm^2$ and 567 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

<u>Occupational/controlled exposure</u> limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were performed for the proposed AT&T Wireless antenna facility located at **213 High Street, Portland, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. All power values expressed and analyzed are maximum power levels expected to be used on all radios.

All emissions values for additional carriers were taken from the Connecticut Siting Council (CSC) active MPE database. Values in this database are provided by the individual carriers themselves

For each sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
UMTS	850 MHz	2	30
UMTS	1900 MHz (PCS)	2	30
LTE	700 MHz	2	60
LTE	1900 MHz (PCS)	2	60
LTE	2100 MHz (AWS)	2	60
LTE	2300 MHz (WCS)	2	60

Table 1: Channel Data Table

The following antennas listed in *Table 2* were used in the modeling for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	Kathrein 800-10121	77
A	2	CCI HPA-65R-BUU-H6	77
A	3	Quintel QS66510-6	77
B	1	Kathrein 800-10121	77
B	2	CCI HPA-65R-BUU-H6	77
B	3	Quintel QS66510-6	77
C	1	Kathrein 800-10121	77
C	2	CCI HPA-65R-BUU-H6	77
C	3	Quintel QS66510-6	77

Table 2: Antenna Data

All calculations were done with respect to uncontrolled / general population threshold limits.

RESULTS

Per the calculations completed for the proposed AT&T configurations *Table 3* shows resulting emissions power levels and percentages of the FCC's allowable general population limit.

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	Kathrein 800-10121	850 MHz / 1900 MHz (PCS)	11.45 / 14.35	4	120	2,471.44	2.22
Antenna A2	CCI HPA-65R-BUU-H6	700 MHz / 1900 MHz (PCS)	11.95 / 14.75	4	240	5,462.56	5.43
Antenna A3	Quintel QS66510-6	2100 MHz (AWS) / 2300 MHz (WCS)	14.35 / 14.85	4	240	6,933.15	4.94
						Sector A Composite MPE%	12.59
Antenna B1	Kathrein 800-10121	850 MHz / 1900 MHz (PCS)	11.45 / 14.35	4	120	2,471.44	2.22
Antenna B2	CCI HPA-65R-BUU-H6	700 MHz / 1900 MHz (PCS)	11.95 / 14.75	4	240	5,462.56	5.43
Antenna B3	Quintel QS66510-6	2100 MHz (AWS) / 2300 MHz (WCS)	14.35 / 14.85	4	240	6,933.15	4.94
						Sector B Composite MPE%	12.59
Antenna C1	Kathrein 800-10121	850 MHz / 1900 MHz (PCS)	11.45 / 14.35	4	120	2,471.44	2.22
Antenna C2	CCI HPA-65R-BUU-H6	700 MHz / 1900 MHz (PCS)	11.95 / 14.75	4	240	5,462.56	5.43
Antenna C3	Quintel QS66510-6	2100 MHz (AWS) / 2300 MHz (WCS)	14.35 / 14.85	4	240	6,933.15	4.94
						Sector C Composite MPE%	12.59

Table 3: AT&T Emissions Levels

The Following table (*table 4*) shows all additional carriers on site and their MPE% as recorded in the CSC active MPE database for this facility along with the newly calculated maximum AT&T MPE contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, all three sectors have the same configuration yielding the same results on all three sectors. *Table 5* below shows a summary for each AT&T Sector as well as the composite MPE value for the site.

Site Composite MPE%	
Carrier	**MPE%**
AT&T – Max Sector Value	**12.59 %**
No Additional Carriers on Site per CSC Active MPE Database	NA
Site Total MPE %:	**12.59 %**

Table 4: All Carrier MPE Contributions

AT&T Sector A Total:	12.59 %
AT&T Sector B Total:	12.59 %
AT&T Sector C Total:	12.59 %
Site Total:	12.59 %

Table 5: Site MPE Summary

FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. *Table 6* below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated AT&T sector(s). For this site, all three sectors have the same configuration yielding the same results on all three sectors.

AT&T _ Frequency Band / Technology (All Sectors)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
AT&T 850 MHz UMTS	2	418.91	77	5.98	850 MHz	567	1.05%
AT&T 1900 MHz (PCS) UMTS	2	816.81	77	11.65	1900 MHz (PCS)	1000	1.17%
AT&T 700 MHz LTE	2	940.05	77	13.41	700 MHz	467	2.87%
AT&T 1900 MHz (PCS) LTE	2	1,791.23	77	25.55	1900 MHz (PCS)	1000	2.55%
AT&T 2100 MHz (AWS) LTE	2	1,633.62	77	23.30	2100 MHz (AWS)	1000	2.33%
AT&T 2300 MHz (WCS) LTE	2	1,832.95	77	26.14	2300 MHz (WCS)	1000	2.61%
						Total:	**12.59%**

Table 6: AT&T Maximum Sector MPE Power Values

CENTERLINE COMMUNICATIONS

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the AT&T facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

AT&T Sector	Power Density Value (%)
Sector A:	12.59 %
Sector B:	12.59 %
Sector C:	12.59 %
AT&T Maximum Total (per sector):	12.59 %
Site Total:	12.59 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **12.59 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

Scott Heffernan
RF Engineering Director
Centerline Communications, LLC
95 Ryan Drive, Suite 1
Raynham, MA 02767

at&t

WIRELESS COMMUNICATIONS FACILITY
CT1066 - LTE 3C/4C
PORTLAND
213 HIGH STREET
PORTLAND, CT 06480

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE, INCLUDING THE TIA-222 REVISION "G" STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES, 2016 CONNECTICUT FIRE SAFETY CODE AND, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. THE COMPOUND, TOWER, PRIMARY GROUND RING, ELECTRICAL SERVICE TO THE METER BANK AND TELEPHONE SERVICE TO THE DEMARCATION POINT ARE PROVIDED BY SITE OWNER. AS BUILT FIELD CONDITIONS REGARDING THESE ITEMS SHALL BE CONFIRMED BY THE CONTRACTOR. SHOULD ANY FIELD CONDITIONS PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
3. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
4. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
5. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
6. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
7. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
8. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING BUILDING'S/PROPERTY'S OPERATIONS, COORDINATE WORK WITH BUILDING/PROPERTY OWNER.
10. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
11. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
12. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
13. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED' ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE AT&T CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
15. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
16. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
17. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
18. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS FOR ANY CONDITION PER THE MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
19. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
20. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED PRIOR TO ANY EXCAVATION WORK. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
21. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

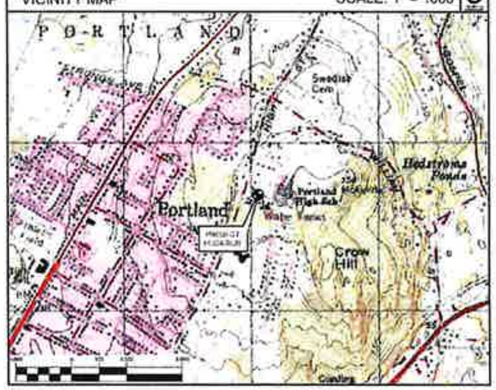
SITE DIRECTIONS

FROM: 500 ENTERPRISE DRIVE, ROCKY HILL, CONNECTICUT
TO: 213 HIGH STREET, PORTLAND, CONNECTICUT

1.	HEAD NORTHEAST ON ENTERPRISE DR TOWARD CAPITAL BLVD	0.31 MI
2.	TURN LEFT ONTO CAPITAL BLVD	0.27 MI
3.	TURN LEFT ONTO WEST ST	0.30 MI
4.	TURN LEFT TO MERGE ONTO I-91 S TOWARD NEW HAVEN	1.20 MI
5.	MERGE ONTO CT-9 S TOWARD MIDDLETOWN/OLD SAYBROOK via EXIT 22S ON THE LEFT	5.80 MI
6.	TURN RIGHT ONTO HWY 17 N/ST JOHNS SQUARE (SIGNS FOR ROUTE 66 E/PORTLAND/WILLIMANTIC)	0.20 MI
7.	TURN RIGHT ONTO MAIN ST	0.80 MI
8.	TURN RIGHT ONTO MARLBOROUGH ST	0.50 MI
9.	TURN LEFT ONTO HIGH ST	0.90 MI

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
   A. REMOVE AND REPLACE POS. 3 GSM ANTENNA FOR (3) NEW LTE TWELVE-PORT ANTENNA, (1) PER SECTOR.
   B. REMOVE AND REPLACE (6) DIPLEXERS/TRIPLEXERS WITH (6) NEW LOW BAND COMBINERS WITHIN EQUIPMENT SHELTER.
   C. INSTALL (3) NEW LTE RRUS-32'S MOUNTED TO PROPOSED ANTENNA PIPE MAST.
   D. INSTALL (3) NEW LTE RRUS-32 B66'S BEHIND ANTENNA POSITION 1.
   E. INSTALL (1) NEW SURGE ARRESTOR.
   F. REMOVE AND REPLACE EXISTING DUS41 FOR A NEW 5216 UNIT WITHIN EXISTING LTE RACK.
   G. INSTALL (1) NEW XMU UNIT WITHIN THE LTE RACK.

PROJECT INFORMATION

AT&T SITE NUMBER:	CT1066
AT&T SITE NAME:	PORTLAND
SITE ADDRESS:	213 HIGH STREET PORTLAND, CT 06480
LESSEE/APPLICANT:	AT&T MOBILITY 500 ENTERPRISE DRIVE, SUITE 3A ROCKY HILL, CT 06067
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-34'-50.57" N LONGITUDE: 72°-37'-25.90" W GROUND ELEVATION: ±345' AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	NOTES AND SPECIFICATIONS	0
C-1	PLANS AND ELEVATION	0
C-2	LTE 3C/4C EQUIPMENT DETAILS	0
C-3	MOUNT MODIFICATIONS	0
E-1	LTE SCHEMATIC DIAGRAM AND NOTES	0
E-2	LTE WIRING DIAGRAM	0
E-3	TYPICAL ELECTRICAL DETAILS	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/19/17	JTD	CAG	CONSTRUCTION DOCUMENTS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

at&t

EMPIRE telecom

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

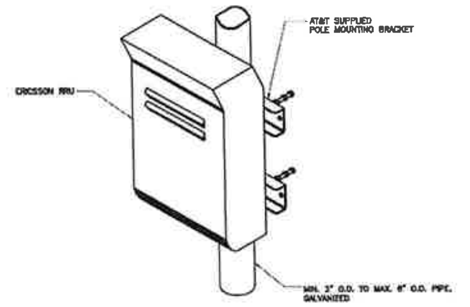
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
PORTLAND
CT1086 - LTE 3C/4C
213 HIGH STREET
PORTLAND, CT 06480

DATE: 10/04/17
SCALE: AS NOTED
JOB NO. 17004.51

TITLE SHEET

T-1

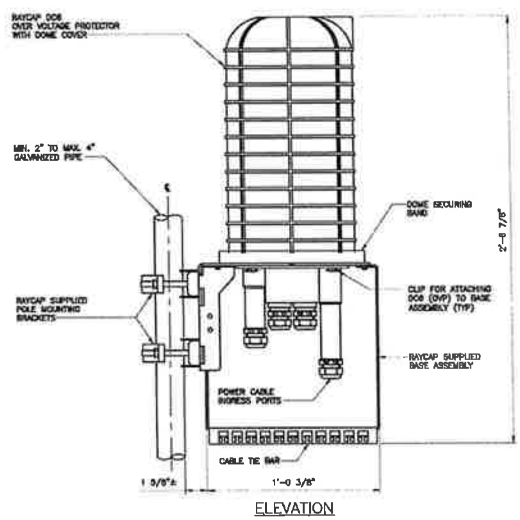
Sheet No. 1 of 1



NOTES:

1. AT&T SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

(1 / N-1) TYPICAL RRUS MOUNTING DETAILS
SCALE: NTS



NOTES:

1. RAYCAP VIA AT&T SUPPLIES THE DC6 OVER VOLTAGE PROTECTOR AND PIPE MOUNTING BRACKETS. SUBCONTRACTOR SHALL SUPPLY THE PIPE.

(2 / N-1) RAYCAP DC6 MOUNTING DETAIL
SCALE: 3" = 1'-0"

NOTES AND SPECIFICATIONS

DESIGN BASIS:

GOVERNING CODE: 2012 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2016 CT STATE BUILDING CODE AND AMENDMENTS.

1. DESIGN CRITERIA:

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 100-120 MPH (3 SECOND GUST)
- RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 101 MPH (Vasd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10) PER 2012 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)
   - A. STRUCTURAL STEEL (W SHAPES)——ASTM A992 (FY = 50 KSI)
   - B. STRUCTURAL STEEL (OTHER SHAPES)——ASTM A36 (FY = 36 KSI)
   - C. STRUCTURAL HSS (RECTANGULAR SHAPES)——ASTM A500 GRADE B, (FY = 46 KSI)
   - D. STRUCTURAL HSS (ROUND SHAPES)——ASTM A500 GRADE B, (FY = 42 KSI)
   - E. PIPE——ASTM A53 (FY = 35 KSI)
   - F. CONNECTION BOLTS——ASTM A325-N
   - G. U-BOLTS——ASTM A36
   - H. ANCHOR RODS——ASTM F 1554
   - I. WELDING ELECTRODE——ASTM E 70XX
2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL. ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

PAINT NOTES

PAINTING SCHEDULE:

1. ANTENNA PANELS:
   - A. SHERWIN WILLIAMS POLANE-B
   - B. COLOR TO BE MATCHED WITH EXISTING TOWER STRUCTURE.
2. COAXIAL CABLES:
   - A. ONE COAT OF DTM BONDING PRIMER (2-5 MILS. DRY FINISH)
   - B. TWO COATS OF DTM ACRYLIC PRIMER/FINISH (2.5-5 MILS. DRY FINISH)
   - C. COLOR TO BE FIELD MATCHED WITH EXISTING STRUCTURE.

EXAMINATION AND PREPARATION:

1. DO NOT APPLY PAINT IN SNOW, RAIN, FOG OR MIST OR WHEN RELATIVE HUMIDITY EXCEEDS 85%. DO NOT APPLY PAINT TO DAMP OR WET SURFACES.
2. VERIFY THAT SUBSTRATE CONDITIONS ARE READY TO RECEIVE WORK. EXAMINE SURFACE SCHEDULED TO BE FINISHED PRIOR TO COMMENCEMENT OF WORK. REPORT ANY CONDITION THAT MAY POTENTIALLY AFFECT PROPER APPLICATION.
3. TEST SHOP APPLIED PRIMER FOR COMPATIBILITY WITH SUBSEQUENT COVER MATERIALS.
4. PERFORM PREPARATION AND CLEANING PROCEDURE IN STRICT ACCORDANCE WITH COATING MANUFACTURER'S INSTRUCTIONS FOR EACH SUBSTRATE CONDITION.
5. CORRECT DEFECTS AND CLEAN SURFACES WHICH AFFECT WORK OF THIS SECTION. REMOVE EXISTING COATINGS THAT EXHIBIT LOOSE SURFACE DEFECTS.
6. IMPERVIOUS SURFACE: REMOVE MILDEW BY SCRUBBING WITH SOLUTION OF TRI-SODIUM PHOSPHATE AND BLEACH. RINSE WITH CLEAN WATER AND ALLOW SURFACE TO DRY.
7. ALUMINUM SURFACE SCHEDULED FOR PAINT FINISH: REMOVE SURFACE CONTAMINATION BY STEAM OR HIGH-PRESSURE WATER. REMOVE OXIDATION WITH ACID ETCH AND SOLVENT WASHING. APPLY ETCHING PRIMER IMMEDIATELY FOLLOWING CLEANING.
8. FERROUS METALS: CLEAN UNGALVANIZED FERROUS METAL SURFACES THAT HAVE NOT BEEN SHOP COATED; REMOVE OIL, GREASE, DIRT, LOOSE MILL SCALE, AND OTHER FOREIGN SUBSTANCES. USE SOLVENT OR MECHANICAL CLEANING METHODS THAT COMPLY WITH THE STEEL STRUCTURES PAINTING COUNCIL'S (SSPC) RECOMMENDATIONS. TOUCH UP BARE AREAS AND SHOP APPLIED PRIME COATS THAT HAVE BEEN DAMAGED. WIRE BRUSH, CLEAN WITH SOLVENTS RECOMMENDED BY PAINT MANUFACTURER, AND TOUCH UP WITH THE SAME PRIMER AS THE SHOP COAT.
9. GALVANIZED SURFACES: CLEAN GALVANIZED SURFACES WITH NON-PETROLEUM-BASED SOLVENTS SO SURFACE IS FREE OF OIL AND SURFACE CONTAMINANTS. REMOVE PRETREATMENT FROM GALVANIZED SHEET METAL FABRICATED FROM COIL STOCK BY MECHANICAL METHODS.
10. ANTENNA PANELS: REMOVE ALL OIL, DUST, GREASE, DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION. PANELS MUST BE WIPED WITH METHYL ETHYL KETONE (MEK).
11. COAXIAL CABLES: REMOVE ALL OIL, DUST, GREASE, DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION.

CLEANING:

1. COLLECT WASTE MATERIAL, WHICH MAY CONSTITUTE A FIRE HAZARD, PLACE IN CLOSED METAL CONTAINERS AND REMOVE DAILY FROM SITE.

APPLICATION:

1. APPLY PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. DO NOT APPLY FINISHES TO SURFACES THAT ARE NOT DRY.
3. APPLY EACH COAT TO UNIFORM FINISH.
4. APPLY EACH COAT OF PAINT SLIGHTLY DARKER THAN PRECEDING COAT UNLESS OTHERWISE APPROVED.
5. SAND METAL LIGHTLY BETWEEN COATS TO ACHIEVE REQUIRED FINISH.
6. VACUUM CLEAN SURFACES FREE OF LOOSE PARTICLES. USE TACK CLOTH JUST PRIOR TO APPLYING NEXT COAT.
7. ALLOW APPLIED COAT TO DRY BEFORE NEXT COAT IS APPLIED.

COMPLETED WORK:

1. SAMPLES: PREPARE 24" X 24" SAMPLE AREA FOR REVIEW.
2. MATCH APPROVED SAMPLES FOR COLOR, TEXTURE AND COVERAGE. REMOVE REFINISH OR REPAINT WORK NOT IN COMPLIANCE WITH SPECIFIED REQUIREMENTS.

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NOTES AND SPECIFICATIONS

N-1

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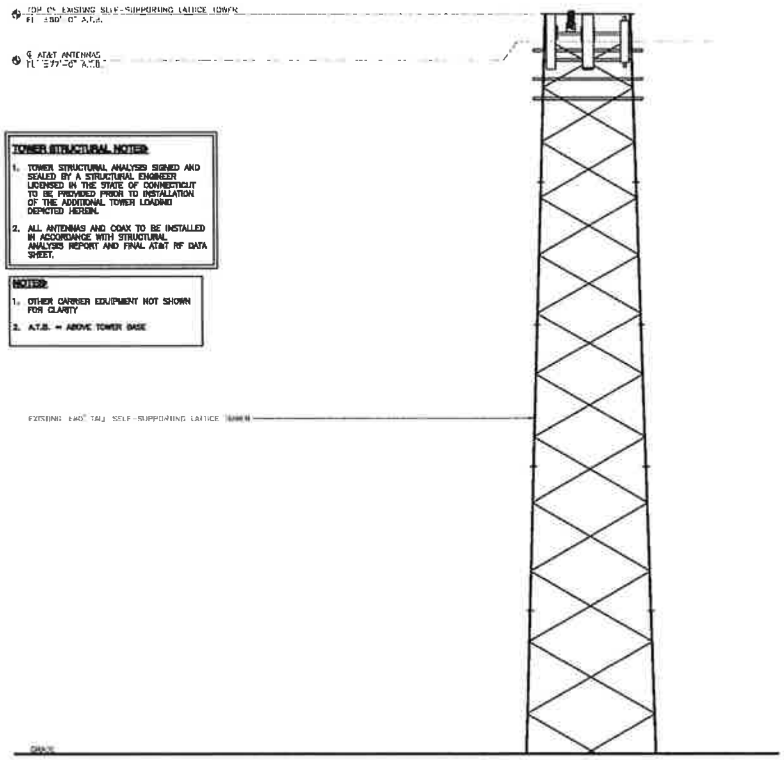


TOWER STRUCTURAL NOTES:

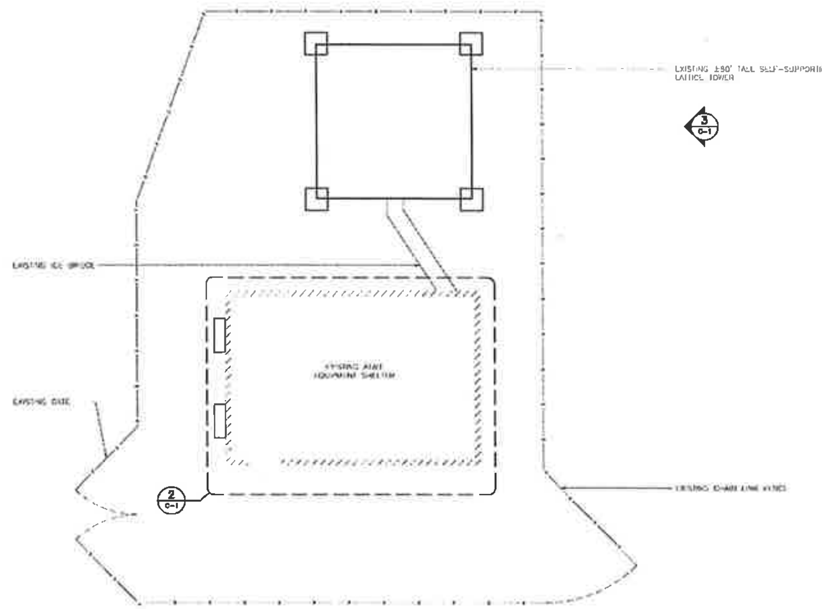
1. TOWER STRUCTURAL ANALYSIS SIGNED AND SEALED BY A STRUCTURAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT TO BE PROVIDED PRIOR TO INSTALLATION OF THE ADDITIONAL TOWER LOADING DEPICTED HEREIN.
2. ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS REPORT AND FINAL AT&T RF DATA SHEET.

NOTES:

1. OTHER CARRIER EQUIPMENT NOT SHOWN FOR CLARITY
2. A.T.B. = ABOVE TOWER BASE

3 / C-1 **EAST ELEVATION**
SCALE: 1" = 6'-0"

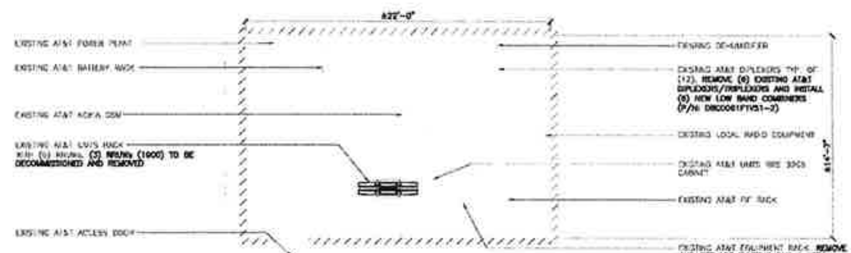
GRAPHIC SCALE (IN FEET) 1 inch = 6 ft.



1 / C-1 **COMPOUND PLAN**
SCALE: 1" = 5'-0"

APPROX. NORTH

GRAPHIC SCALE (IN FEET) 1 inch = 5 ft.



2 / C-1 **EQUIPMENT ROOM FLOOR PLAN**
SCALE: 1/4" = 1'-0"

APPROX. NORTH

GRAPHIC SCALE (IN FEET) 1 inch = 4 ft.

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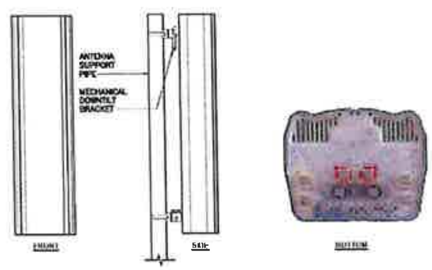
PLANS & ELEVATION

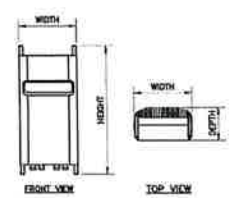
C-1

Sheet No. 2 of 4



ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: QUINTEL MODEL: QS66510-6	72"L x 12"W x 9.6"D	98 LBS.

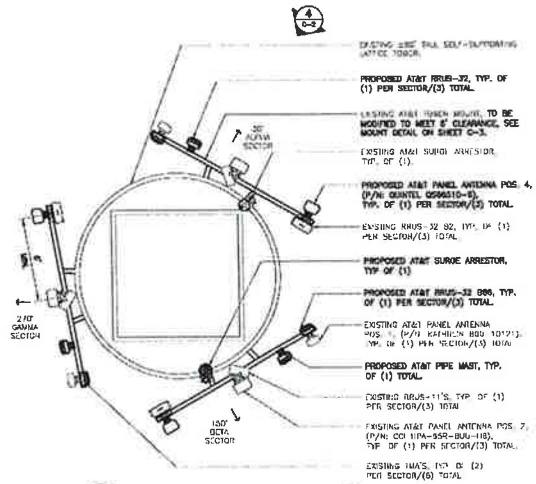
5 / C-2 **PROPOSED ANTENNA DETAIL**
SCALE: 1/2" = 1'-0"



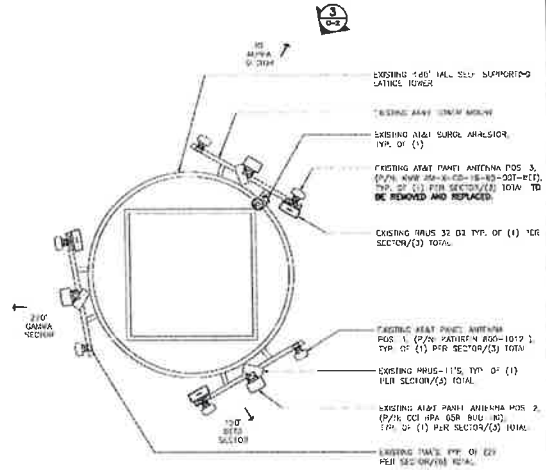
RRH (REMOTE RADIO UNIT)				
EQUIPMENT		DIMENSIONS	WEIGHT	CLEARANCES
MAKE: MODEL:	ERICSSON RRUS 32	27.17"L x 12.05"W x 7.01"D	52.91 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.
MAKE: MODEL:	ERICSSON RRUS 32 B66	27.17"L x 12.05"W x 7.01"D	52.91 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.

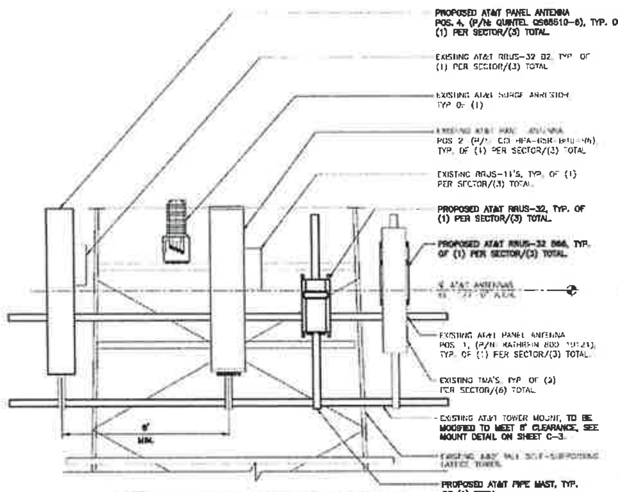
6 / C-2 **ERICSSON REMOTE RADIO UNITS**
SCALE: 1" = 1'-0"



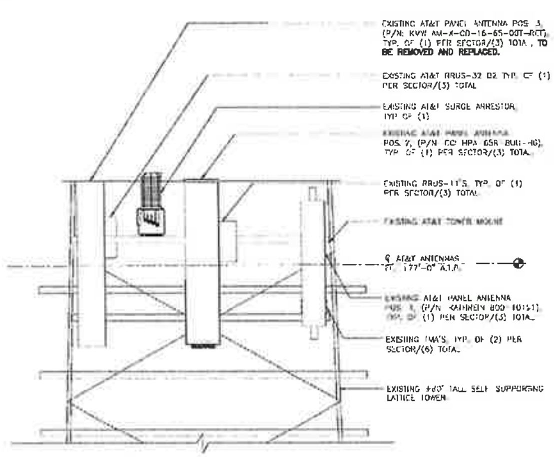
2 / C-2 **PROPOSED ANTENNA PLAN**
SCALE: 1/4" = 1'-0"



1 / C-2 **EXISTING ANTENNA PLAN**
SCALE: 1/4" = 1'-0"



4 / C-2 **PROPOSED ANTENNA ELEVATION**
SCALE: 1/2" = 1'-0"



3 / C-2 **EXISTING ANTENNA ELEVATION**
SCALE: 1/2" = 1'-0"

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LTE 3C/4C
EQUIPMENT
DETAILS

C-2

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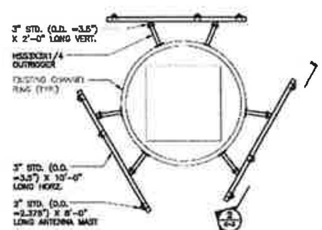
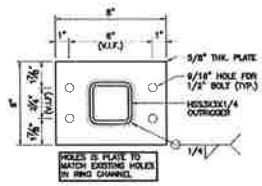
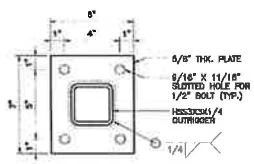


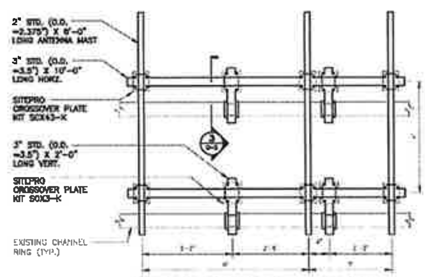
1 C-3 ANTENNA MOUNT PLAN
SCALE: 1/4" = 1'-0"



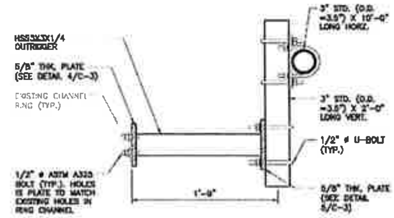
4 C-3 PLATE DETAILS
SCALE: 3" = 1'-0"



5 C-3 PLATE DETAILS
SCALE: 3" = 1'-0"



2 C-3 ANTENNA MOUNT ELEVATION
SCALE: 1/2" = 1'-0"



3 C-3 OUTRIGGER DETAIL
SCALE: 1-1/2" = 1'-0"

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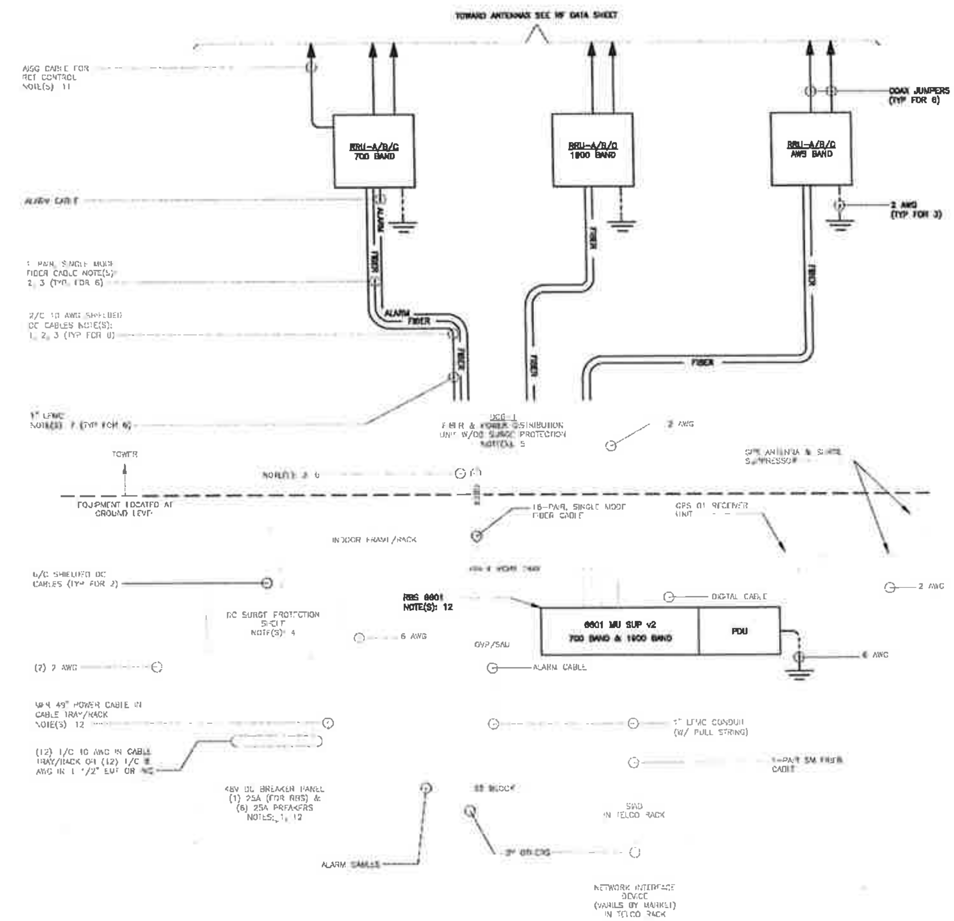
MOUNT MODIFICATION

C-3



1 / E-1 LTE SCHEMATIC DIAGRAM

NOT TO SCALE

LTE SCHEMATIC DIAGRAM NOTES:

1. BREAKERS TO BE TAGGED AND LOCKED OUT. A 20A (MIN.) OR 30A (MAX.) BREAKER FOR RRUs MAY BE SUBSTITUTED FOR THE RECOMMENDED 25A BREAKER. SIZE 12 CONDUCTORS MAY BE USED ONLY WITH 20A BREAKERS.
2. LEAVE COILED AND PROTECTED UNTIL TERMINATED.
3. DC AND FIBER CABLE SHALL BE ROUTED WITH THE EXISTING COAX CABLE.
4. DC SURGE PROTECTION SHELF SHALL BE RAYCAP DCx-48-60-RM.
5. FIBER & DC DISTRIBUTION BOX W/DC SURGE PROTECTION SHALL BE RAYCAP DC6-48-60-18-8F.
6. SUPPORT FIBER & DC POWER CABLES WITH SNAP-IN HANGERS SPACED NO GREATER THAN 3 FEET APART ON TOWER. SUPPORT FIBER AND DC POWER CABLES INSIDE MONOPOLE WITH CABLE HOISTING GRIPS AT 250 FT MAXIMUM INTERVALS. DRESS CABLES TO PREVENT CONTACT WITH ENTRANCE AND EXIT OPENINGS.
7. CONDUIT TO BE USED ON A TOWER IF THE RRU IS MORE THAN 10' FROM THE DISTRIBUTION UNITS. MAX CABLE LENGTH IS 16 FEET.
8. SINGLE-CONDUCTOR DC POWER CABLES SHALL BE TELCOFLEX OR KS24194, COPPER, UL LISTED RHH NON-HALOGEN, LOW SMOKE WITH BRAIDED COVER, TYPE TC (1/0 AND LARGER). UNLESS OTHERWISE NOTED, STRANDING SHALL BE CLASS B (TYPE II) FOR CABLES SIZES 14, 12 & 10 AWG AND CLASS I (TYPE IV) FOR SIZES 8 AWG AND LARGER. CABLES SHALL BE COLOR CODED RED FOR +24V, BLUE FOR -48V AND GRAY FOR 24V AND 48V RETURN CONDUCTORS. MULTI-CONDUCTOR DC POWER CABLES SHALL BE COPPER, CLASS B STRANDING WITH FLAME RETARDANT PVC JACKET, TYPE TC, UL LISTED FOR 90°C DRY/75°C WET INSTALLATION.
9. GROUNDING WIRES SHALL BE COPPER, GREEN THHN/THWN UL LISTED FOR 90°C DRY/75°C WET INSTALLATION. MINIMUM SIZE IS 6 AWG UNLESS NOTED OTHERWISE.
10. FIBER OPTIC CABLES SHALL BE INSTALLED IN FLEXIBLE CONDUIT AS SCOPED BY MARKET.
11. RET CONTROL FROM THE RRU IS AN OPTIONAL METHOD OF CONNECTION. REFER TO RF DATA SHEET FOR APPLICABILITY.
12. RBS 6601 VARIANT 2 REQUIRES A 25A BREAKER AND 10 AWG (MIN.) CONDUCTORS. REPLACE EXISTING 15A OR 20A BREAKERS AND 12 AWG CONDUCTORS WHEN UPGRADING AN EXISTING RBS 6601 VARIANT 1.

ELECTRICAL NOTES

1. PRIOR TO START OF CONSTRUCTION CONTRACTOR SHALL COORDINATE WITH OWNER FOR ALL CONSTRUCTION STANDARDS AND SPECIFICATIONS, AND ALL MANUFACTURER DOCUMENTATION FOR ALL EQUIPMENT TO BE INSTALLED.
2. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH LOCAL BUILDING CODE, NATIONAL ELECTRIC CODE, OWNER AND MANUFACTURER'S SPECIFICATIONS.
3. CONNECT ALL NEW EQUIPMENT TO EXISTING TELCO AS REQUIRED BY MANUFACTURER.
4. MAINTAIN ALL CLEARANCES REQUIRED BY NEC AND EQUIPMENT MANUFACTURER.
5. PRIOR TO INSTALLATION CONTRACTOR SHALL MEASURE EXISTING ELECTRICAL LOAD AND VERIFY EXISTING AVAILABLE CAPACITY FOR PROPOSED INSTALLATION. IF INADEQUATE CAPACITY IS AVAILABLE, CONTRACTOR SHALL COORDINATE WITH LOCAL ELECTRIC UTILITY COMPANY TO UPGRADE EXISTING ELECTRIC SERVICE.
6. CONTRACTOR SHALL INSPECT EXISTING GROUNDING AND LIGHTNING PROTECTION SYSTEM AND ENSURE THAT IT IS IN COMPLIANCE WITH NEC, AND SITE OWNER'S SPECIFICATIONS. THE RESULTS OF THIS INSPECTION SHALL BE PRESENTED TO OWNERS REPRESENTATIVE, AND ANY DEFICIENCIES SHALL BE CORRECTED.
7. ALL TRANSMISSION TOWER SITES CONTAIN AN EXTENSIVE BURIED GROUNDING SYSTEM. ALL GROUNDING WORK MUST BE COORDINATED WITH, AND APPROVED BY, THE TOWER OWNER'S SITE REPRESENTATIVE. ALL OF THE TOWER OWNER'S SPECIFICATIONS MUST BE STRICTLY FOLLOWED.
8. PROVIDE AND INSTALL GROUND KITS FOR ALL NEW COAXIAL CABLES AND BOND TO EXISTING OWNERS GROUNDING SYSTEM PER OWNERS SPECIFICATIONS AND NEC.
9. ALL CONDUCTORS SHALL BE TYPE THWN (INT. APPLICATION) AND XHHW (EXT. APPLICATION), 75 DEGREE C, 600 VOLT INSULATION, SOFT ANNEALED STRANDED COPPER. #10 AWG AND SMALLER SHALL BE SPLICED USING ACCEPTABLE SOLDERLESS PRESSURE CONNECTORS. #8 AWG AND LARGER SHALL BE SPLICED USING COMPRESSION SPLIT-BOLT TYPE CONNECTORS. #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR FOR LINE VOLTAGE BRANCH CIRCUITS. REFER TO PANEL SCHEDULE FOR BRANCH CIRCUIT CONDUCTOR SIZE(S). CONDUCTORS SHALL BE COLOR CODED FOR CONSISTENT PHASE IDENTIFICATION.
10. MINIMUM BENDING RADIUS FOR CONDUCTORS SHALL BE 12 TIMES THE LARGEST DIAMETER OF BRANCH CIRCUIT CONDUCTOR.
11. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE MADE IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS WHICH MAY APPLY AND NOTHING IN THE DRAWINGS OR SPECIFICATIONS SHALL BE INTERPRETED AS AN INFRINGEMENT OF SUCH CODES OR REGULATIONS.
12. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR THE COMPLETE INSTALLATION AND COORDINATION OF THE ENTIRE ELECTRICAL SERVICE. ALL ACTIVITIES TO BE COORDINATED THROUGH OWNER'S REPRESENTATIVE, DESIGN ENGINEER AND OTHER AUTHORITIES HAVING JURISDICTION OF TRADES.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES AS MAY BE REQUIRED FOR THE ELECTRICAL WORK AND FOR SCHEDULING OF ALL INSPECTIONS AS MAY BE REQUIRED BY THE LOCAL AUTHORITY.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE SITE AND/OR BUILDING OWNER FOR NEW AND/OR DEMOLITION WORK INVOLVED.
15. THE CONTRACTOR SHALL GUARANTEE ALL NEW WORK FOR A PERIOD OF ONE YEAR FROM THE ACCEPTANCE DATE BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING WARRANTIES FROM ALL EQUIPMENT MANUFACTURERS FOR SUBMISSION TO THE OWNER.
16. DRAWINGS INDICATE GENERAL ARRANGEMENT OF WORK INCLUDED IN CONTRACT. CONTRACTOR SHALL WITHOUT EXTRA CHARGE, MAKE MODIFICATIONS TO THE LAYOUT OF THE WORK TO PREVENT CONFLICT WITH WORK OF OTHER TRADES AND FOR THE PROPER INSTALLATION OF WORK. CHECK ALL DRAWINGS AND VISIT JOB SITE TO VERIFY SPACE AND TYPE OF EXISTING CONDITIONS IN WHICH WORK WILL BE DONE, PRIOR TO SUBMITTAL OF BID.
17. ALL NON-CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUIT SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONNECTED TO PROVIDE AN INDEPENDENT RETURN PATH TO THE EQUIPMENT GROUNDING SOURCES.
18. GROUNDING SYSTEM WILL BE IN ACCORDANCE WITH THE LATEST ACCEPTABLE EDITION OF THE NATIONAL ELECTRICAL CODE AND REQUIREMENTS PER LOCAL INSPECTOR HAVING JURISDICTION.
19. EACH EQUIPMENT GROUND CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH THE N.E.C. ARTICLE 250-122. (MIN. #12 AWG).
20. CONTRACTOR SHALL PROVIDE A CELLULAR GROUNDING SYSTEM WITH THE MAXIMUM AC RESISTANCE TO GROUND OF 5 OHM BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3-POINT GROUNDING TEST. (REFER TO SECTION 16950).

TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

A. CONTRACTOR SHALL RETAIN THE SERVICES OF A LOCAL INDEPENDENT ELECTRICAL TESTING FIRM (WITH MINIMUM 5 YEARS COMMERCIAL EXPERIENCE IN THE ELECTRICAL TESTING INDUSTRY) AS SPECIFIED BY OWNER TO PERFORM:

TEST 1: RESISTANCE TO GROUND TEST ON THE CELLULAR GROUNDING SYSTEM.

THE TESTING FIRM SHALL INCLUDE THE FOLLOWING INFORMATION WITH THE REPORT:

1. TESTING PROCEDURE INCLUDING THE MAKE AND MODEL OF TEST EQUIPMENT.
2. CERTIFICATION OF TESTING EQUIPMENT CALIBRATION WITHIN SIX (6) MONTHS OF DATE OF TESTING. INCLUDE CERTIFICATION LAB ADDRESS AND TELEPHONE NUMBER.
3. GRAPHICAL DESCRIPTION OF TESTING METHOD ACTUALLY IMPLEMENTED.

B. TESTING SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF OWNERS CONSTRUCTION REPRESENTATIVE. TESTING DATA SHALL BE INITIALED AND DATED BY THE CONSTRUCTION AND INCLUDED WITH THE WRITTEN REPORT/ANALYSIS.

C. THE CONTRACTOR SHALL FORWARD SIX (6) COPIES OF THE INDEPENDENT ELECTRICAL TESTING FIRM REPORT/ANALYSIS TO ENGINEER A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO THE JOB TURNOVER.

D. CONTRACTOR TO PROVIDE A MINIMUM OF ONE (1) WEEK NOTICE TO OWNER AND ENGINEER FOR ALL TESTS REQUIRING WITNESSING.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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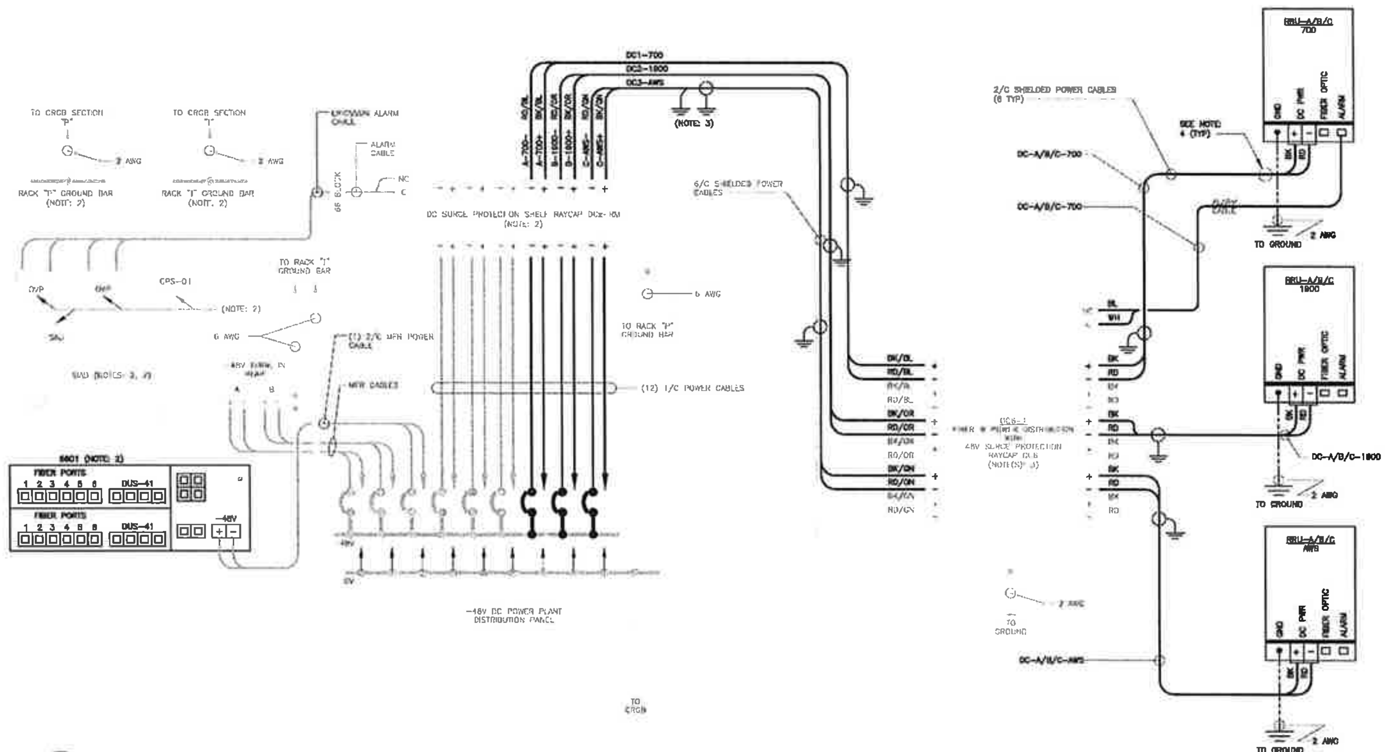
23 HIGH STREET
PORTLAND, CT 06480

DATE: 10/04/17
SCALE: AS NOTED
JOB NO. 17004.51

LTE SCHEMATIC DIAGRAM AND NOTES

E-1



1 E-2 LTE WIRING DIAGRAM

NOT TO SCALE

LTE WIRING DIAGRAM NOTES:

1. LABEL THE DC POWER CABLES AT BOTH ENDS OF EVERY WIRE AND IN ANY PULL BOX IF USED. LABEL SHALL BE DURABLE, SELF ADHESIVE, WRAPPED LONGITUDINALLY ALONG THE CABLE AND STATE THE SECTOR, FREQUENCY BAND AND POLARITY; I.E. "A-1900+". CABLE AND WIRE LABELS SHOWN ARE REPRESENTATIVE AND MAY BE MODIFIED AS DIRECTED BY AT&T.
2. INSTALL ON BASEBAND EQUIPMENT RACK.
3. THE BARE GROUND WIRE OF EACH MULTI-CONDUCTOR CABLE SHALL BE CONNECTED TO THE "P" GROUND BAR ON THE RACK. WHEN A SHIELDED CABLE IS USED, THE DRAIN WIRE ALSO SHALL BE CONNECTED TO THE "P" GROUND BAR.
4. CABLE GROUND WIRE AND SHIELD DRAIN WIRE TO BE LEFT UN-TERMINATED AT RRU AND DC POWER PLANT.
5. SEE LTE SCHEMATIC DIAGRAM DETAIL 1/E-1 FOR BREAKER RATING.

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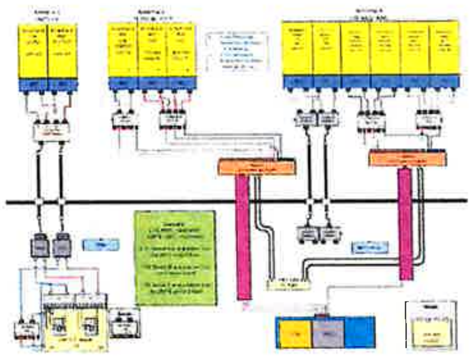
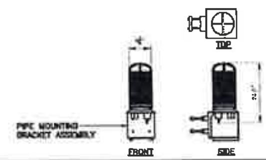
LTE WIRING DIAGRAM

E-2

Sheet No. 7 of 8



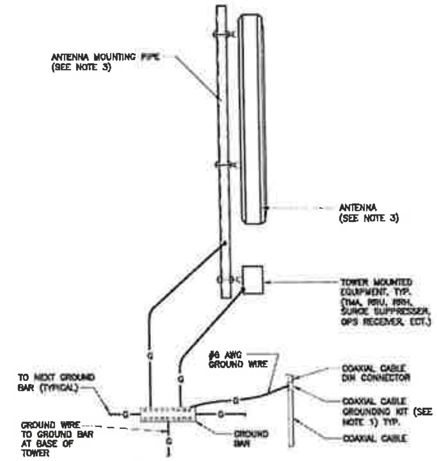
(3/E-3) RF PLUMBING DIAGRAM
NOT TO SCALE



SITE TYPE	ARRESTOR MAKE/MODEL	QTY REQUIRED	ARRESTOR LOCATION	WEIGHT
	MAKE: RAYCAP (SQUID) MODEL: DC6-48-60-18-8F	(1) PER SITE	TOWER, ADJACENT TO AT&T ANTENNAS AND RRUs.	20 LBS. (WITHOUT MOUNT)

NOTES:
1. CONTRACTOR TO COORDINATE FINAL SURGE ARRESTOR MODEL SELECTION(S) WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.
2. CONTRACTOR TO INSTALL ARRESTOR IN CONFORMANCE WITH MANUFACTURERS RECOMMENDATIONS.

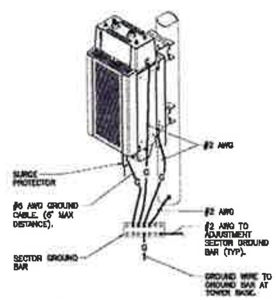
(2/E-3) SURGE ARRESTOR DETAIL
SCALE: NTS



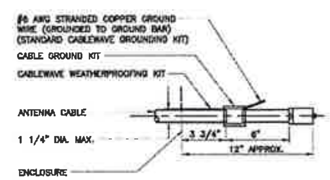
NOTES:
1. BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

(1/E-3) TYPICAL ANTENNA GROUNDING DETAIL
NOT TO SCALE

EACH RRH CABINET SHALL BE GROUNDED IN THE FOLLOWING MANNER:
1. AT TOP OF THE CABINET
2. AT RIGHT SIDE OF THE CABINET.



(5/E-3) RRU POLE MOUNT GROUNDING
NOT TO SCALE



NOTE:
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

(4/E-3) ANTENNA CABLE GROUNDING DETAIL
NOT TO SCALE

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TYPICAL ELECTRICAL DETAILS

E-3

WIRELESS COMMUNICATIONS FACILITY
CT1066 - LTE 3C/4C
PORTLAND
213 HIGH STREET
PORTLAND, CT 06480

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE, INCLUDING THE TIA-222 REVISION "G" STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES, 2016 CONNECTICUT FIRE SAFETY CODE AND, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. THE COMPOUND, TOWER, PRIMARY GROUND RING, ELECTRICAL SERVICE TO THE METER BANK AND TELEPHONE SERVICE TO THE DEMARCATION POINT ARE PROVIDED BY SITE OWNER. AS BUILT FIELD CONDITIONS REGARDING THESE ITEMS SHALL BE CONFIRMED BY THE CONTRACTOR. SHOULD ANY FIELD CONDITIONS PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
3. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
4. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
5. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
6. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
7. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
8. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING BUILDING'S/PROPERTY'S OPERATIONS, COORDINATE WORK WITH BUILDING/PROPERTY OWNER.
10. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
11. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
12. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
13. ANY AND ALL ERRORS, DISCREPANCIES, AND "MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE AT&T CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
15. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
16. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
17. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
18. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS FOR ANY CONDITION PER THE MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
19. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
20. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED PRIOR TO ANY EXCAVATION WORK. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
21. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

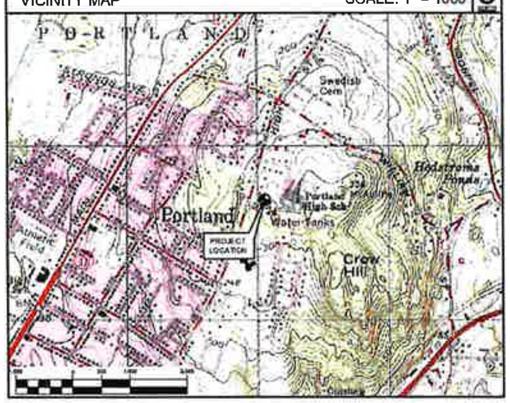
SITE DIRECTIONS

FROM: 500 ENTERPRISE DRIVE, ROCKY HILL, CONNECTICUT
TO: 213 HIGH STREET, PORTLAND, CONNECTICUT

1.	HEAD NORTHEAST ON ENTERPRISE DR TOWARD CAPITAL BLVD	0.31 MI
2.	TURN LEFT ONTO CAPITAL BLVD	0.27 MI
3.	TURN LEFT ONTO WEST ST	0.30 MI
4.	TURN LEFT TO MERGE ONTO I-91 S TOWARD NEW HAVEN	1.20 MI
5.	MERGE ONTO CT-9 S TOWARD MIDDLETOWN/OLD SAYBROOK via EXIT 22S ON THE LEFT	6.60 MI
6.	TURN RIGHT ONTO HWY 17 N/ST JOHNS SQUARE (SIGNS FOR ROUTE 66 E/PORTLAND/WILLIMANTIC)	0.20 MI
7.	TURN RIGHT ONTO MAIN ST	0.80 MI
8.	TURN RIGHT ONTO MARLBOROUGH ST	0.50 MI
9.	TURN LEFT ONTO HIGH ST	0.90 MI

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
   - A. REMOVE AND REPLACE POS. 3 GSM ANTENNA FOR (3) NEW LTE TWELVE-PORT ANTENNA, (1) PER SECTOR.
   - B. REMOVE AND REPLACE (6) DIPLEXERS/TRIPLEXERS WITH (6) NEW LOW BAND COMBINERS WITHIN EQUIPMENT SHELTER.
   - C. INSTALL (3) NEW LTE RRUS-32'S MOUNTED TO PROPOSED ANTENNA PIPE MAST.
   - D. INSTALL (3) NEW LTE RRUS-32 B66'S BEHIND ANTENNA POSITION 1.
   - E. INSTALL (1) NEW SURGE ARRESTOR.
   - F. REMOVE AND REPLACE EXISTING DUS41 FOR A NEW 5216 UNIT WITHIN EXISTING LTE RACK.
   - G. INSTALL (1) NEW XMU UNIT WITHIN THE LTE RACK.

PROJECT INFORMATION

AT&T SITE NUMBER:	CT1066
AT&T SITE NAME:	PORTLAND
SITE ADDRESS:	213 HIGH STREET PORTLAND, CT 06480
LESSEE/APPLICANT:	AT&T MOBILITY 500 ENTERPRISE DRIVE, SUITE 3A ROCKY HILL, CT 06067
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-34'-50.57" N LONGITUDE: 72°-37'-25.90" W GROUND ELEVATION: ±345' AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
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C-1	PLANS AND ELEVATION	0
C-2	LTE 3C/4C EQUIPMENT DETAILS	0
C-3	MOUNT MODIFICATIONS	0
E-1	LTE SCHEMATIC DIAGRAM AND NOTES	0
E-2	LTE WIRING DIAGRAM	0
E-3	TYPICAL ELECTRICAL DETAILS	0

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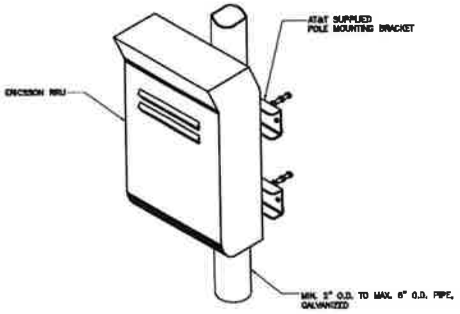
TITLE SHEET

T-1

Sheet No. 1 of 6

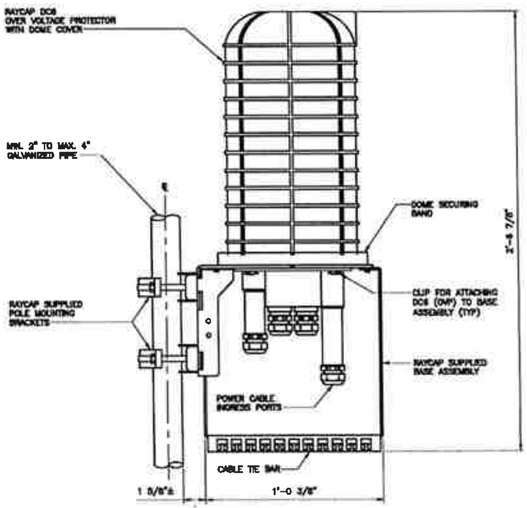


ISOMETRIC VIEW

NOTES:

1. AT&T SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

1 / N-1 TYPICAL RRUS MOUNTING DETAILS
SCALE: NTS



ELEVATION

NOTES:

1. RAYCAP VIA AT&T SUPPLIES THE DC6 OVER VOLTAGE PROTECTOR AND PIPE MOUNTING BRACKETS. SUBCONTRACTOR SHALL SUPPLY THE PIPE.

2 / N-1 RAYCAP DC6 MOUNTING DETAIL
SCALE: 3" = 1'-0"

NOTES AND SPECIFICATIONS

DESIGN BASIS:

GOVERNING CODE: 2012 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2016 CT STATE BUILDING CODE AND AMENDMENTS.

1. DESIGN CRITERIA:
   - WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 100-120 MPH (3 SECOND GUST)
   - RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
   - NOMINAL DESIGN SPEED (OTHER STRUCTURE): 101 MPH (Vasd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10) PER 2012 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE.
   - SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)
   - A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   - B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI)
   - C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   - D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   - E. PIPE---ASTM A53 (FY = 35 KSI)
   - F. CONNECTION BOLTS---ASTM A325-N
   - G. U-BOLTS---ASTM A36
   - H. ANCHOR RODS---ASTM F 1554
   - I. WELDING ELECTRODE---ASTM E 70XX
2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

PAINT NOTES

PAINTING SCHEDULE:

1. ANTENNA PANELS:
   - A. SHERWIN WILLIAMS POLANE-B
   - B. COLOR TO BE MATCHED WITH EXISTING TOWER STRUCTURE.
2. COAXIAL CABLES:
   - A. ONE COAT OF DTM BONDING PRIMER (2-5 MILS. DRY FINISH)
   - B. TWO COATS OF DTM ACRYLIC PRIMER/FINISH (2.5-3 MILS. DRY FINISH)
   - D. COLOR TO BE FIELD MATCHED WITH EXISTING STRUCTURE.

EXAMINATION AND PREPARATION:

1. DO NOT APPLY PAINT IN SNOW, RAIN, FOG OR MIST OR WHEN RELATIVE HUMIDITY EXCEEDS 85%. DO NOT APPLY PAINT TO DAMP OR WET SURFACES.
2. VERIFY THAT SUBSTRATE CONDITIONS ARE READY TO RECEIVE WORK. EXAMINE SURFACE SCHEDULED TO BE FINISHED PRIOR TO COMMENCEMENT OF WORK. REPORT ANY CONDITION THAT MAY POTENTIALLY AFFECT PROPER APPLICATION.
3. TEST SHOP APPLIED PRIMER FOR COMPATIBILITY WITH SUBSEQUENT COVER MATERIALS.
4. PERFORM PREPARATION AND CLEANING PROCEDURE IN STRICT ACCORDANCE WITH COATING MANUFACTURER'S INSTRUCTIONS FOR EACH SUBSTRATE CONDITION.
5. CORRECT DEFECTS AND CLEAN SURFACES WHICH AFFECT WORK OF THIS SECTION. REMOVE EXISTING COATINGS THAT EXHIBIT LOOSE SURFACE DEFECTS.
6. IMPERVIOUS SURFACE: REMOVE MILDEW BY SCRUBBING WITH SOLUTION OF TRI-SODIUM PHOSPHATE AND BLEACH. RINSE WITH CLEAN WATER AND ALLOW SURFACE TO DRY.
7. ALUMINUM SURFACE SCHEDULED FOR PAINT FINISH: REMOVE SURFACE CONTAMINATION BY STEAM OR HIGH-PRESSURE WATER. REMOVE OXIDATION WITH ACID ETCH AND SOLVENT WASHING. APPLY ETCHING PRIMER IMMEDIATELY FOLLOWING CLEANING.
8. FERROUS METALS: CLEAN UNGALVANIZED FERROUS METAL SURFACES THAT HAVE NOT BEEN SHOP COATED; REMOVE OIL, GREASE, DIRT, LOOSE MILL SCALE, AND OTHER FOREIGN SUBSTANCES. USE SOLVENT OR MECHANICAL CLEANING METHODS THAT COMPLY WITH THE STEEL STRUCTURES PAINTING COUNCIL'S (SSPC) RECOMMENDATIONS. TOUCH UP BARE AREAS AND SHOP APPLIED PRIME COATS THAT HAVE BEEN DAMAGED. WIRE BRUSH, CLEAN WITH SOLVENTS RECOMMENDED BY PAINT MANUFACTURER, AND TOUCH UP WITH THE SAME PRIMER AS THE SHOP COAT.
9. GALVANIZED SURFACES: CLEAN GALVANIZED SURFACES WITH NON-PETROLEUM-BASED SOLVENTS SO SURFACE IS FREE OF OIL AND SURFACE CONTAMINANTS. REMOVE PRETREATMENT FROM GALVANIZED SHEET METAL FABRICATED FROM COIL STOCK BY MECHANICAL METHODS.
10. ANTENNA PANELS: REMOVE ALL OIL, DUST, GREASE, DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION. PANELS MUST BE WIPED WITH METHYL ETHYL KETONE (MEK).
11. COAXIAL CABLES: REMOVE ALL OIL, DUST, GREASE, DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION.

CLEANING:

1. COLLECT WASTE MATERIAL, WHICH MAY CONSTITUTE A FIRE HAZARD, PLACE IN CLOSED METAL CONTAINERS AND REMOVE DAILY FROM SITE.

APPLICATION:

1. APPLY PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. DO NOT APPLY FINISHES TO SURFACES THAT ARE NOT DRY.
3. APPLY EACH COAT TO UNIFORM FINISH.
4. APPLY EACH COAT OF PAINT SLIGHTLY DARKER THAN PRECEDING COAT UNLESS OTHERWISE APPROVED.
5. SAND METAL LIGHTLY BETWEEN COATS TO ACHIEVE REQUIRED FINISH.
6. VACUUM CLEAN SURFACES FREE OF LOOSE PARTICLES. USE TACK CLOTH JUST PRIOR TO APPLYING NEXT COAT.
7. ALLOW APPLIED COAT TO DRY BEFORE NEXT COAT IS APPLIED.

COMPLETED WORK:

1. SAMPLES: PREPARE 24" X 24" SAMPLE AREA FOR REVIEW.
2. MATCH APPROVED SAMPLES FOR COLOR, TEXTURE AND COVERAGE. REMOVE REFINISH OR REPAINT WORK NOT IN COMPLIANCE WITH SPECIFIED REQUIREMENTS.

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NOTES AND SPECIFICATIONS

N-1

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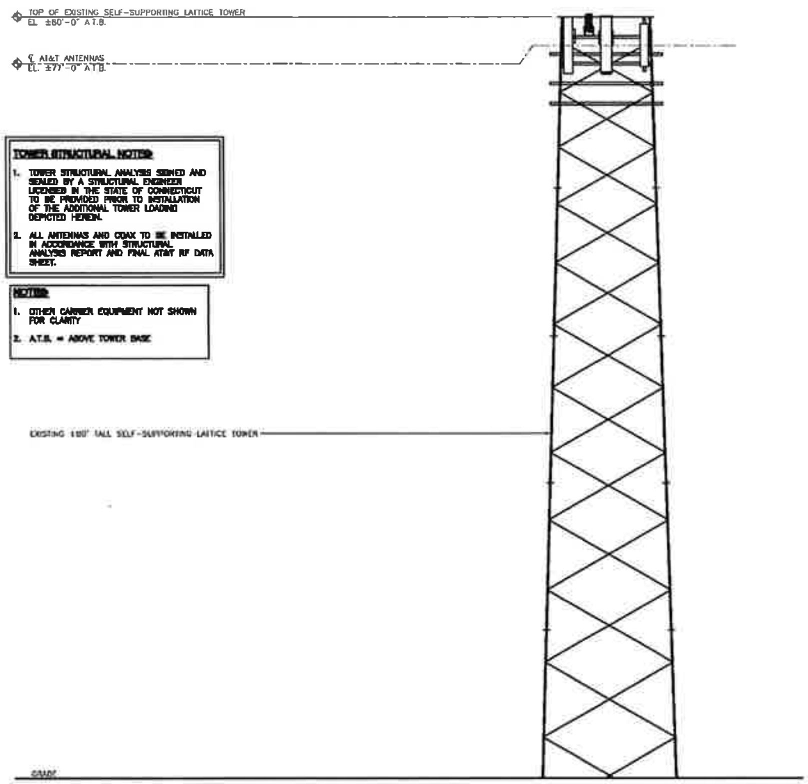


TOWER STRUCTURAL NOTES:

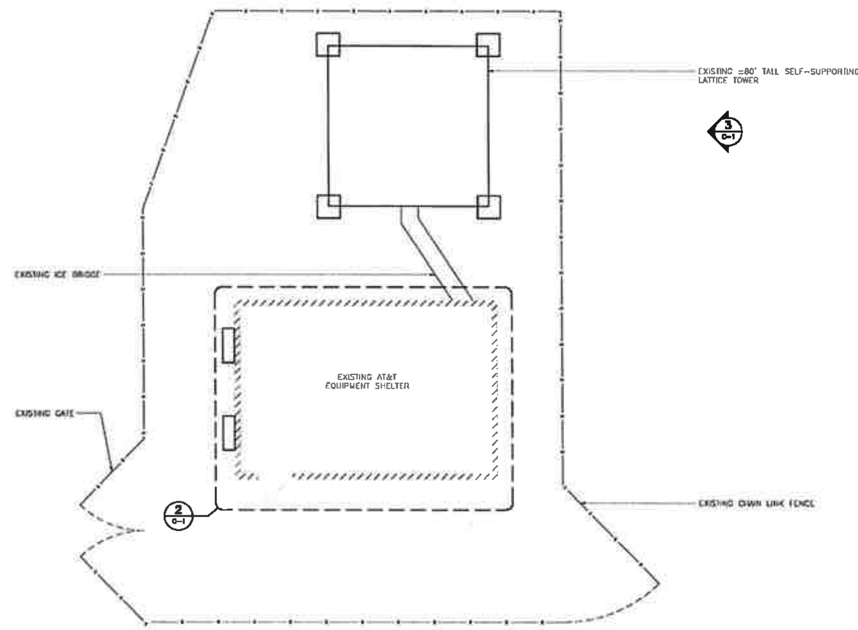
1. TOWER STRUCTURAL ANALYSIS SIGNED AND SEALED BY A STRUCTURAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT TO BE PROVIDED PRIOR TO INSTALLATION OF THE ADDITIONAL TOWER LOADING DEPICTED HEREIN.
2. ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS REPORT AND FINAL AT&T RF DATA SHEET.

NOTES:

1. OTHER CARRIER EQUIPMENT NOT SHOWN FOR CLARITY.
2. A.T.B. = ABOVE TOWER BASE

3 / C-1 **EAST ELEVATION**
SCALE: 1" = 6'-0"

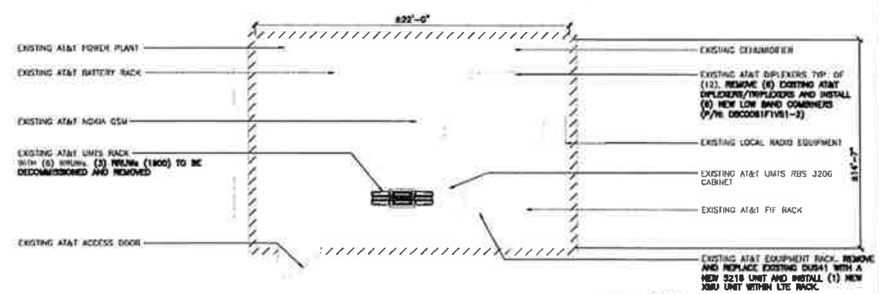
GRAPHIC SCALE (IN FEET) 1 inch = 6 ft.



1 / C-1 **COMPOUND PLAN**
SCALE: 1" = 5'-0"

APPROX. NORTH

GRAPHIC SCALE (IN FEET) 1 inch = 5 ft.



2 / C-1 **EQUIPMENT ROOM FLOOR PLAN**
SCALE: 1/4" = 1'-0"

APPROX. NORTH

GRAPHIC SCALE (IN FEET) 1 inch = 4 ft.

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PLANS & ELEVATION

C-1

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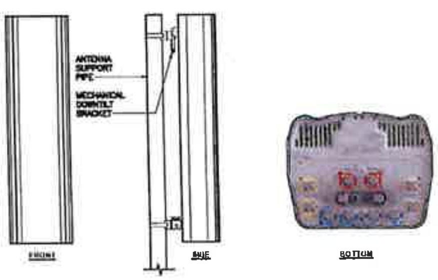
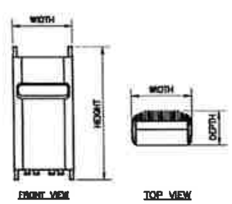


ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: QUINTEL MODEL: QS66510-6	72"L x 12"W x 9.6"D	96 LBS.

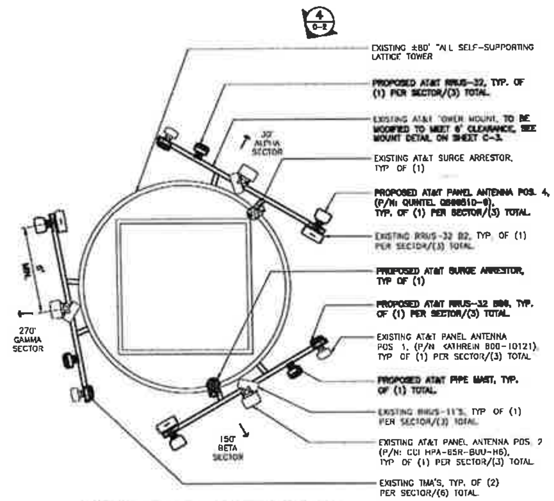
5 (C-2) PROPOSED ANTENNA DETAIL
SCALE: 1/2" = 1'-0"



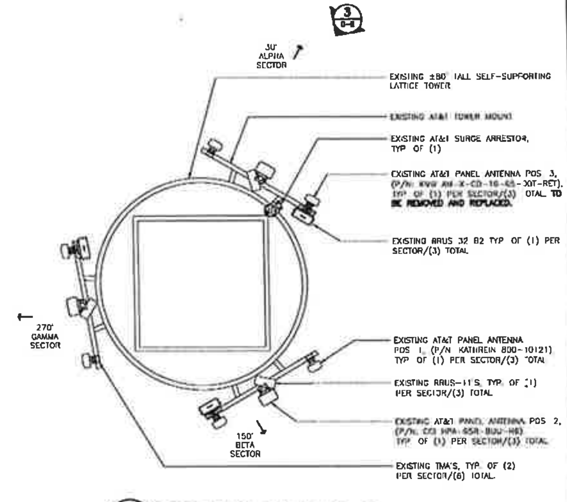
RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RRUS 32	27.17"L x 12.05"W x 7.01"D	52.91 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.
MAKE: ERICSSON MODEL: RRUS 32 B66	27.17"L x 12.05"W x 7.01"D	52.91 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.

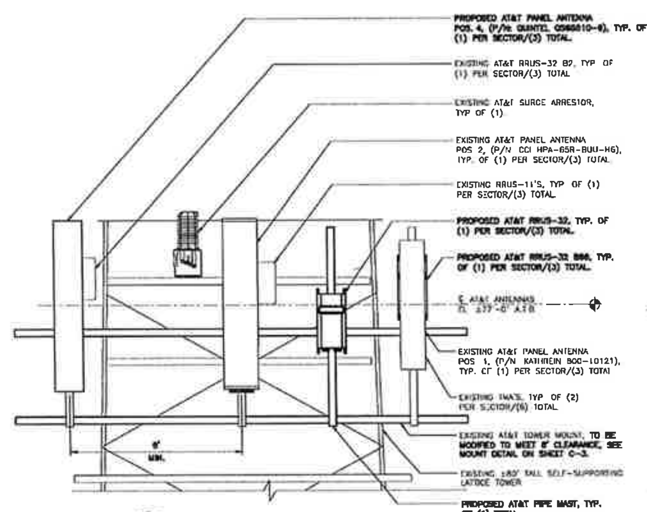
6 (C-2) ERICSSON REMOTE RADIO UNITS
SCALE: 1" = 1'-0"



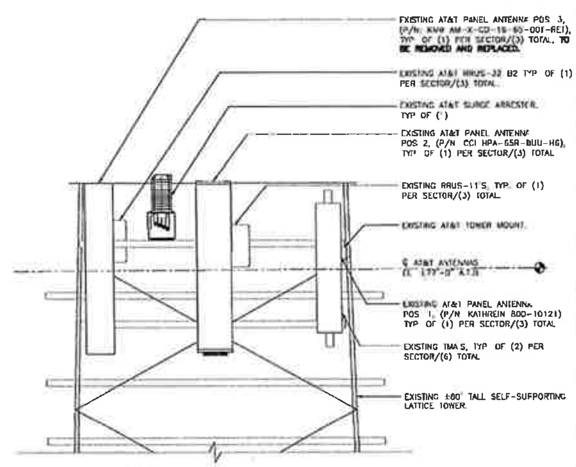
2 (C-2) PROPOSED ANTENNA PLAN
SCALE: 1/4" = 1'-0"



1 (C-2) EXISTING ANTENNA PLAN
SCALE: 1/4" = 1'-0"



4 (C-2) PROPOSED ANTENNA ELEVATION
SCALE: 1/2" = 1'-0"



3 (C-2) EXISTING ANTENNA ELEVATION
SCALE: 1/2" = 1'-0"

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LTE 3C/4C EQUIPMENT DETAILS

C-2

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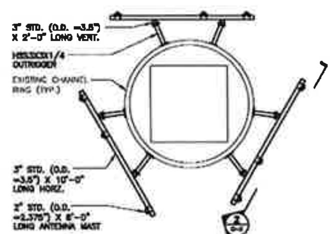
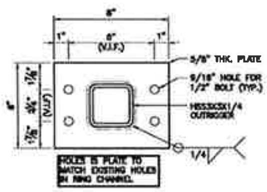
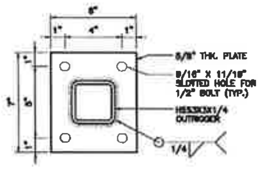


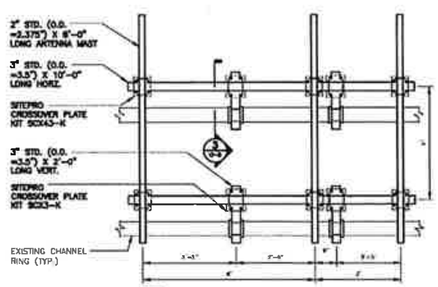
1 C-3 ANTENNA MOUNT PLAN
SCALE: 1/4" = 1'-0"



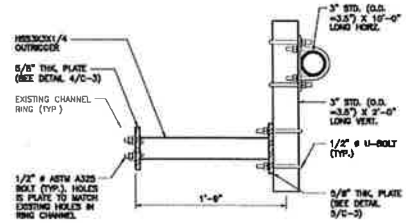
4 C-3 PLATE DETAILS
SCALE: 3" = 1'-0"



5 C-3 PLATE DETAILS
SCALE: 3" = 1'-0"



2 C-3 ANTENNA MOUNT ELEVATION
SCALE: 1/2" = 1'-0"



3 C-3 OUTRIGGER DETAIL
SCALE: 1-1/2" = 1'-0"

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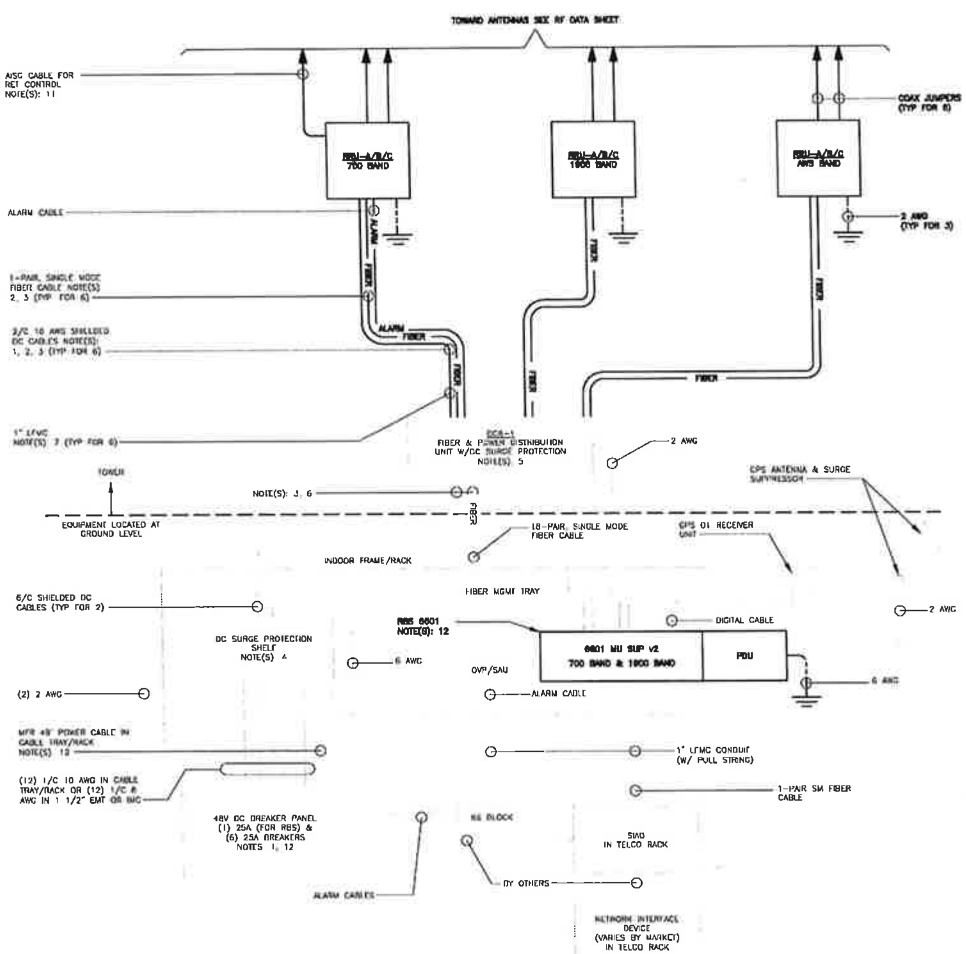
MOUNT MODIFICATION

C-3



1/E-1 LTE SCHEMATIC DIAGRAM

NOT TO SCALE

LTE SCHEMATIC DIAGRAM NOTES:

1. BREAKERS TO BE TAGGED AND LOCKED OUT. A 20A (MIN.) OR 30A (MAX.) BREAKER FOR RRUs MAY BE SUBSTITUTED FOR THE RECOMMENDED 25A BREAKER. SIZE 12 CONDUCTORS MAY BE USED ONLY WITH 20A BREAKERS.
2. LEAVE COILED AND PROTECTED UNTIL TERMINATED.
3. DC AND FIBER CABLE SHALL BE ROUTED WITH THE EXISTING COAX CABLE.
4. DC SURGE PROTECTION SHELF SHALL BE RAYCAP DCx-48-60-RM.
5. FIBER & DC DISTRIBUTION BOX W/DC SURGE PROTECTION SHALL BE RAYCAP DC6-48-60-18-8F.
6. SUPPORT FIBER & DC POWER CABLES WITH SNAP-IN HANGERS SPACED NO GREATER THAN 3 FEET APART ON TOWER. SUPPORT FIBER AND DC POWER CABLES INSIDE MONOPOLE WITH CABLE HOISTING GRIPS AT 200 FT MAXIMUM INTERVALS. DRESS CABLES TO PREVENT CONTACT WITH ENTRANCE AND EXIT OPENINGS.
7. CONDUIT TO BE USED ON A TOWER IF THE RRU IS MORE THAN 10' FROM THE DISTRIBUTION UNITS. MAX CABLE LENGTH IS 18 FEET.
8. SINGLE-CONDUCTOR DC POWER CABLES SHALL BE TELCOFLEX" OR KS24194", COPPER, UL LISTED RHH NON-HALOGEN, LOW SMOKE WITH BRAIDED COVER, TYPE TC (1/0 AND LARGER). UNLESS OTHERWISE NOTED, STRANDING SHALL BE CLASS B (TYPE II) FOR CABLES SIZES 14, 12 & 10 AWG AND CLASS I (TYPE IV) FOR SIZES 8 AWG AND LARGER. CABLES SHALL BE COLOR CODED RED FOR +24V, BLUE FOR -48V AND GRAY FOR 24V AND 48V RETURN CONDUCTORS. MULTI-CONDUCTOR DC POWER CABLES SHALL BE COPPER, CLASS B STRANDING WITH FLAME RETARDANT PVC JACKET, TYPE TC, UL LISTED FOR 90°C DRY/75°C WET INSTALLATION.
9. GROUNDING WIRES SHALL BE COPPER, GREEN THHN/THWN UL LISTED FOR 90°C DRY/75°C WET INSTALLATION. MINIMUM SIZE IS 6 AWG UNLESS NOTED OTHERWISE.
10. FIBER OPTIC CABLES SHALL BE INSTALLED IN FLEXIBLE CONDUIT AS SCOPED BY MARKET.
11. RET CONTROL FROM THE RRU IS AN OPTIONAL METHOD OF CONNECTION. REFER TO RF DATA SHEET FOR APPLICABILITY.
12. RBS 6601 VARIANT 2 REQUIRES A 25A BREAKER AND 10 AWG (MIN.) CONDUCTORS. REPLACE EXISTING 15A OR 20A BREAKERS AND 12 AWG CONDUCTORS WHEN UPGRADING AN EXISTING RBS 6601 VARIANT 1.

ELECTRICAL NOTES

1. PRIOR TO START OF CONSTRUCTION CONTRACTOR SHALL COORDINATE WITH OWNER FOR ALL CONSTRUCTION STANDARDS AND SPECIFICATIONS, AND ALL MANUFACTURER DOCUMENTATION FOR ALL EQUIPMENT TO BE INSTALLED.
2. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH LOCAL BUILDING CODE. NATIONAL ELECTRIC CODE, OWNER AND MANUFACTURER'S SPECIFICATIONS.
3. CONNECT ALL NEW EQUIPMENT TO EXISTING TELCO AS REQUIRED BY MANUFACTURER.
4. MAINTAIN ALL CLEARANCES REQUIRED BY NEC AND EQUIPMENT MANUFACTURER.
5. PRIOR TO INSTALLATION CONTRACTOR SHALL MEASURE EXISTING ELECTRICAL LOAD AND VERIFY EXISTING AVAILABLE CAPACITY FOR PROPOSED INSTALLATION. IF INADEQUATE CAPACITY IS AVAILABLE, CONTRACTOR SHALL COORDINATE WITH LOCAL ELECTRIC UTILITY COMPANY TO UPGRADE EXISTING ELECTRIC SERVICE.
6. CONTRACTOR SHALL INSPECT EXISTING GROUNDING AND LIGHTNING PROTECTION SYSTEM AND ENSURE THAT IT IS IN COMPLIANCE WITH NEC, AND SITE OWNER'S SPECIFICATIONS. THE RESULTS OF THIS INSPECTION SHALL BE PRESENTED TO OWNERS REPRESENTATIVE, AND ANY DEFICIENCIES SHALL BE CORRECTED.
7. ALL TRANSMISSION TOWER SITES CONTAIN AN EXTENSIVE BURIED GROUNDING SYSTEM. ALL GROUNDING WORK MUST BE COORDINATED WITH, AND APPROVED BY, THE TOWER OWNER'S SITE REPRESENTATIVE. ALL OF THE TOWER OWNER'S SPECIFICATIONS MUST BE STRICTLY FOLLOWED.
8. PROVIDE AND INSTALL GROUND KITS FOR ALL NEW COAXIAL CABLES AND BOND TO EXISTING OWNERS GROUNDING SYSTEM PER OWNERS SPECIFICATIONS AND NEC.
9. ALL CONDUCTORS SHALL BE TYPE THWN (INT. APPLICATION) AND XHHW (EXT. APPLICATION), 75 DEGREE C, 600 VOLT INSULATION, SOFT ANNEALED STRANDED COPPER. #10 AWG AND SMALLER SHALL BE SPLICED USING ACCEPTABLE SOLDERLESS PRESSURE CONNECTORS. #8 AWG AND LARGER SHALL BE SPLICED USING COMPRESSION SPLIT-BOLT TYPE CONNECTORS. #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR FOR LINE VOLTAGE BRANCH CIRCUITS. REFER TO PANEL SCHEDULE FOR BRANCH CIRCUIT CONDUCTOR SIZE(S). CONDUCTORS SHALL BE COLOR CODED FOR CONSISTENT PHASE IDENTIFICATION.
10. MINIMUM BENDING RADIUS FOR CONDUCTORS SHALL BE 12 TIMES THE LARGEST DIAMETER OF BRANCH CIRCUIT CONDUCTOR.
11. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE MADE IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS WHICH MAY APPLY AND NOTHING IN THE DRAWINGS OR SPECIFICATIONS SHALL BE INTERPRETED AS AN INFRINGEMENT OF SUCH CODES OR REGULATIONS.
12. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR THE COMPLETE INSTALLATION AND COORDINATION OF THE ENTIRE ELECTRICAL SERVICE. ALL ACTIVITIES TO BE COORDINATED THROUGH OWNER'S REPRESENTATIVE, DESIGN ENGINEER AND OTHER AUTHORITIES HAVING JURISDICTION OF TRADES.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES AS MAY BE REQUIRED FOR THE ELECTRICAL WORK AND FOR SCHEDULING OF ALL INSPECTIONS AS MAY BE REQUIRED BY THE LOCAL AUTHORITY.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE SITE AND/OR BUILDING OWNER FOR NEW AND/OR DEMOLITION WORK INVOLVED.
15. THE CONTRACTOR SHALL GUARANTEE ALL NEW WORK FOR A PERIOD OF ONE YEAR FROM THE ACCEPTANCE DATE BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING WARRANTIES FROM ALL EQUIPMENT MANUFACTURERS FOR SUBMISSION TO THE OWNER.
16. DRAWINGS INDICATE GENERAL ARRANGEMENT OF WORK INCLUDED IN CONTRACT. CONTRACTOR SHALL WITHOUT EXTRA CHARGE, MAKE MODIFICATIONS TO THE LAYOUT OF THE WORK TO PREVENT CONFLICT WITH WORK OF OTHER TRADES AND FOR THE PROPER INSTALLATION OF WORK. CHECK ALL DRAWINGS AND VISIT JOB SITE TO VERIFY SPACE AND TYPE OF EXISTING CONDITIONS IN WHICH WORK WILL BE DONE PRIOR TO SUBMITTAL OF BID.
17. ALL NON-CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUIT SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONNECTED TO PROVIDE AN INDEPENDENT RETURN PATH TO THE EQUIPMENT GROUNDING SOURCES.
18. GROUNDING SYSTEM WILL BE IN ACCORDANCE WITH THE LATEST ACCEPTABLE EDITION OF THE NATIONAL ELECTRICAL CODE AND REQUIREMENTS PER LOCAL INSPECTOR HAVING JURISDICTION.
19. EACH EQUIPMENT GROUND CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH THE N.E.C. ARTICLE 250-122. (MIN. #12 AWG).
20. CONTRACTOR SHALL PROVIDE A CELLULAR GROUNDING SYSTEM WITH THE MAXIMUM AC RESISTANCE TO GROUND OF 5 OHM BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3-POINT GROUNDING TEST. (REFER TO SECTION 16060).

TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

A. CONTRACTOR SHALL RETAIN THE SERVICES OF A LOCAL INDEPENDENT ELECTRICAL TESTING FIRM (WITH MINIMUM 5 YEARS COMMERCIAL EXPERIENCE IN THE ELECTRICAL TESTING INDUSTRY) AS SPECIFIED BY OWNER TO PERFORM:

TEST 1: RESISTANCE TO GROUND TEST ON THE CELLULAR GROUNDING SYSTEM.

THE TESTING FIRM SHALL INCLUDE THE FOLLOWING INFORMATION WITH THE REPORT:

1. TESTING PROCEDURE INCLUDING THE MAKE AND MODEL OF TEST EQUIPMENT.
2. CERTIFICATION OF TESTING EQUIPMENT CALIBRATION WITHIN SIX (6) MONTHS OF DATE OF TESTING. INCLUDE CERTIFICATION LAB ADDRESS AND TELEPHONE NUMBER.
3. GRAPHICAL DESCRIPTION OF TESTING METHOD ACTUALLY IMPLEMENTED.

B. TESTING SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF OWNERS CONSTRUCTION REPRESENTATIVE. TESTING DATA SHALL BE INITIALED AND DATED BY THE CONSTRUCTION AND INCLUDED WITH THE WRITTEN REPORT/ANALYSIS.

C. THE CONTRACTOR SHALL FORWARD SIX (6) COPIES OF THE INDEPENDENT ELECTRICAL TESTING FIRM REPORT/ANALYSIS TO ENGINEER A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO THE JOB TURNOVER.

D. CONTRACTOR TO PROVIDE A MINIMUM OF ONE (1) WEEK NOTICE TO OWNER AND ENGINEER FOR ALL TESTS REQUIRING WITNESSING.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/18/17	JTD	CAD	CONSTRUCTION DOCUMENTS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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EMPIRE telecom

CENTEK engineering

AT&T MOBILITY

WIRELESS COMMUNICATIONS FACILITY

PORTLAND

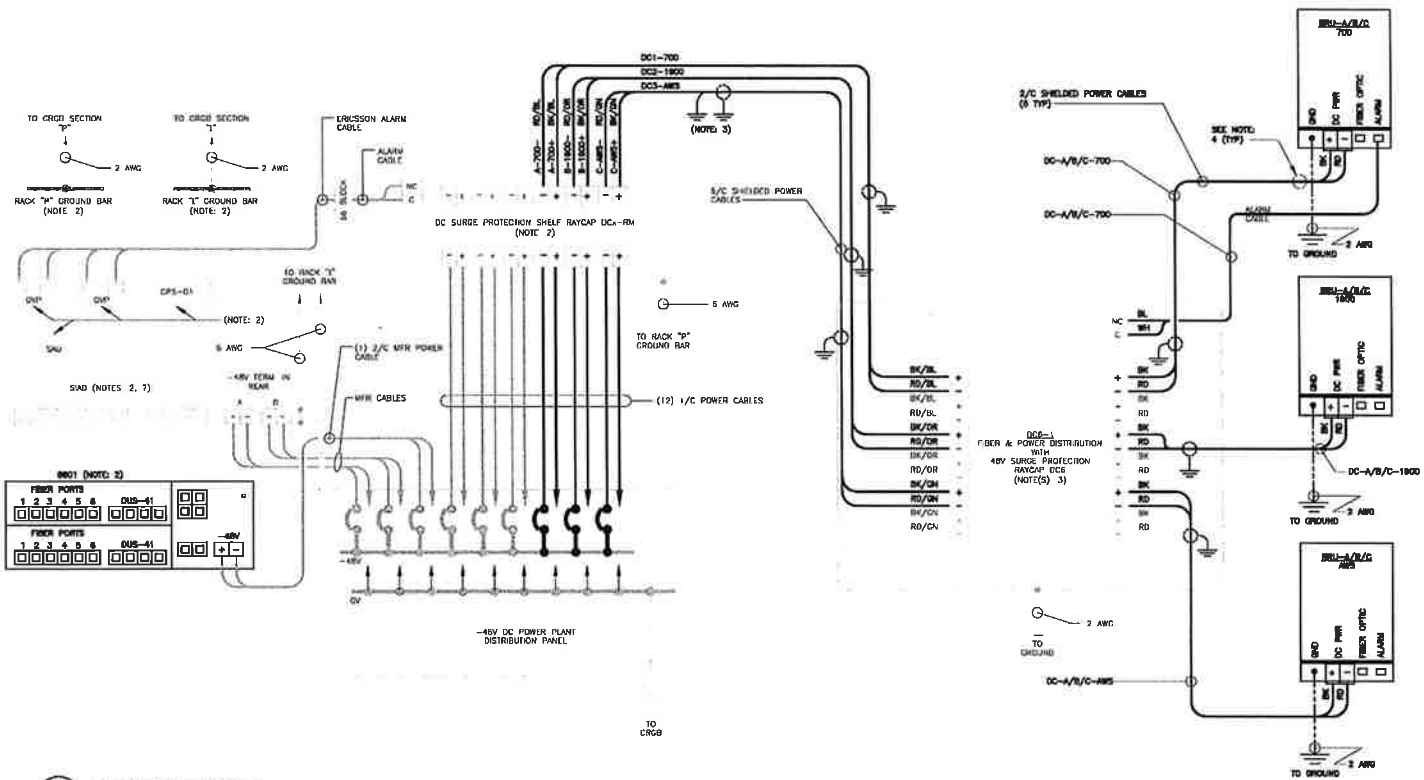
CT1066 - LTE 3C/4C

23 HIGH STREET
PORTLAND, CT 06480

DATE:	10/04/17
SCALE:	AS NOTED
JOB NO.	17004.61

LTE SCHEMATIC DIAGRAM AND NOTES

E-1



LTE WIRING DIAGRAM

1 / E-2 — NOT TO SCALE

LTE WIRING DIAGRAM NOTES:

1. LABEL THE DC POWER CABLES AT BOTH ENDS OF EVERY WIRE AND IN ANY PULL BOX IF USED. LABEL SHALL BE DURABLE, SELF ADHESIVE, WRAPPED LONGITUDINALLY ALONG THE CABLE AND STATE THE SECTOR, FREQUENCY BAND AND POLARITY; I.E. "A-1900+". CABLE AND WIRE LABELS SHOWN ARE REPRESENTATIVE AND MAY BE MODIFIED AS DIRECTED BY AT&T.
2. INSTALL ON BASEBAND EQUIPMENT RACK.
3. THE BARE GROUND WIRE OF EACH MULTI-CONDUCTOR CABLE SHALL BE CONNECTED TO THE "P" GROUND BAR ON THE RACK. WHEN A SHIELDED CABLE IS USED, THE DRAIN WIRE ALSO SHALL BE CONNECTED TO THE "P" GROUND BAR.
4. CABLE GROUND WIRE AND SHIELD DRAIN WIRE TO BE LEFT UN-TERMINATED AT RRU AND DC POWER PLANT.
5. SEE LTE SCHEMATIC DIAGRAM DETAIL 1/E-1 FOR BREAKER RATING.

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at&t

EMPIRE telecom

CENTEK engineering — Centered on Solutions
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www.CentekEng.com

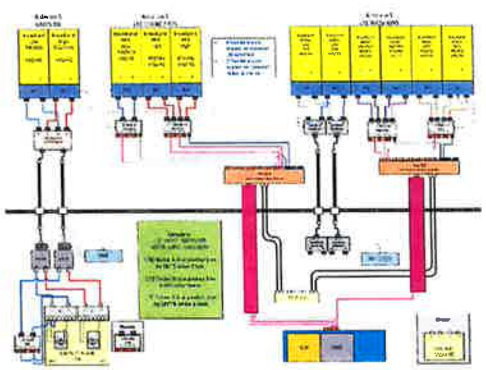
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
PORTLAND
CT1066 - LTE 3C/4C
223 HIGH STREET
PORTLAND, CT 06480

DATE: 10/04/17
SCALE: AS NOTED
JOB NO. 17004.01

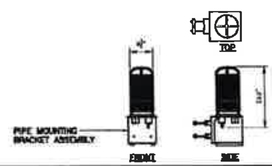
LTE WIRING DIAGRAM

E-2

Sheet No. 7 of 1



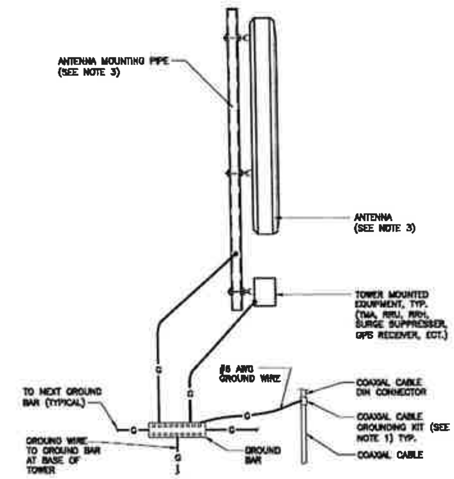
3 RF PLUMBING DIAGRAM
E-3 NOT TO SCALE



SITE TYPE	ARRESTOR MAKE/MODEL	QTY REQUIRED	ARRESTOR LOCATION	WEIGHT
	MAKE: RAYCAP (SQUID) MODEL: DC6-48-60-18-8F	(1) PER SITE	TOWER, ADJACENT TO AT&T ANTENNAS AND RRUs.	20 LBS. (WITHOUT MOUNT)

NOTES:
1. CONTRACTOR TO COORDINATE FINAL SURGE ARRESTOR MODEL SELECTION(S) WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.
2. CONTRACTOR TO INSTALL ARRESTOR IN CONFORMANCE WITH MANUFACTURERS RECOMMENDATIONS.

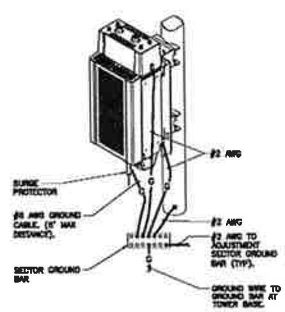
2 SURGE ARRESTOR DETAIL
E-3 SCALE: NTS



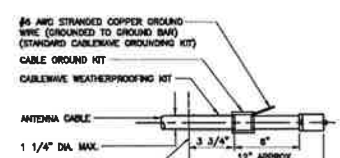
NOTES:
1. BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

1 TYPICAL ANTENNA GROUNDING DETAIL
E-3 NOT TO SCALE

EACH RRH CABINET SHALL BE GROUNDED IN THE FOLLOWING MANNER:
1. AT TOP OF THE CABINET
2. AT RIGHT SIDE OF THE CABINET.



5 RRU POLE MOUNT GROUNDING
E-3 NOT TO SCALE



NOTE:
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

4 ANTENNA CABLE GROUNDING DETAIL
E-3 NOT TO SCALE

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PORTLAND
CT1066 - LTE 3C/4C
23 HIGH STREET
PORTLAND, CT 06480

DATE: 10/04/17
SCALE: AS NOTED
JOB NO. 17004.81

TYPICAL ELECTRICAL DETAILS

E-3

As-Built By
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5.2.2018

at&t

WIRELESS COMMUNICATIONS FACILITY
CT1066 - LTE 3C/4C
PORTLAND
213 HIGH STREET
PORTLAND, CT 06480

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE, INCLUDING THE TIA-222 REVISION "G" STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES, 2016 CONNECTICUT FIRE SAFETY CODE AND, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. THE COMPOUND, TOWER, PRIMARY GROUND RING, ELECTRICAL SERVICE TO THE METER BANK AND TELEPHONE SERVICE TO THE DEMARCATION POINT ARE PROVIDED BY SITE OWNER. AS BUILT FIELD CONDITIONS REGARDING THESE ITEMS SHALL BE CONFIRMED BY THE CONTRACTOR. SHOULD ANY FIELD CONDITIONS PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
3. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
4. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
5. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
6. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
7. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
8. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING BUILDING'S/PROPERTY'S OPERATIONS, COORDINATE WORK WITH BUILDING/PROPERTY OWNER.
10. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
11. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
12. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
13. ANY AND ALL ERRORS, DISCREPANCIES, AND "MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE AT&T CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
15. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
16. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
17. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
18. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS FOR ANY CONDITION PER THE MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
19. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
20. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED PRIOR TO ANY EXCAVATION WORK. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
21. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

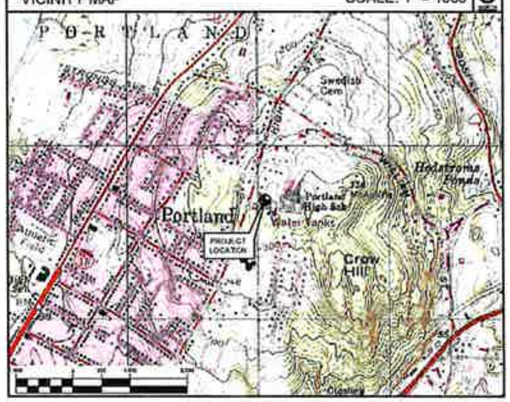
SITE DIRECTIONS

FROM: 500 ENTERPRISE DRIVE, ROCKY HILL, CONNECTICUT
TO: 213 HIGH STREET, PORTLAND, CONNECTICUT

1.	HEAD NORTHEAST ON ENTERPRISE DR TOWARD CAPITAL BLVD	0.31 MI
2.	TURN LEFT ONTO CAPITAL BLVD	0.27 MI
3.	TURN LEFT ONTO WEST ST	0.30 MI
4.	TURN LEFT TO MERGE ONTO I-91 S TOWARD NEW HAVEN	1.20 MI
5.	MERGE ONTO CT-9 S TOWARD MIDDLETOWN/OLD SAYBROOK via EXIT 22S ON THE LEFT	5.50 MI
6.	TURN RIGHT ONTO HWY 17 N/ST JOHNS SQUARE (SIGNS FOR ROUTE 66 E/PORTLAND/WILLIMANTIC)	0.20 MI
7.	TURN RIGHT ONTO MAIN ST	0.80 MI
8.	TURN RIGHT ONTO MARLBOROUGH ST	0.50 MI
9.	TURN LEFT ONTO HIGH ST	0.90 MI

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
   - A. REMOVE AND REPLACE POS. 3 GSM ANTENNA FOR (3) NEW LTE TWELVE-PORT ANTENNA, (1) PER SECTOR.
   - B. REMOVE AND REPLACE (6) DIPLEXERS/TRIPLEXERS WITH (6) NEW LOW BAND COMBINERS WITHIN EQUIPMENT SHELTER.
   - C. INSTALL (3) NEW LTE RRUS-32'S MOUNTED TO PROPOSED ANTENNA PIPE MAST.
   - D. INSTALL (3) NEW LTE RRUS-32 B66'S BEHIND ANTENNA POSITION 1.
   - E. INSTALL (1) NEW SURGE ARRESTOR.
   - F. REMOVE AND REPLACE EXISTING DUS41 FOR A NEW 5216 UNIT WITHIN EXISTING LTE RACK.
   - G. INSTALL (1) NEW XMU UNIT WITHIN THE LTE RACK.

PROJECT INFORMATION

AT&T SITE NUMBER:	CT1066
AT&T SITE NAME:	PORTLAND
SITE ADDRESS:	213 HIGH STREET PORTLAND, CT 06480
LESSEE/APPLICANT:	AT&T MOBILITY 500 ENTERPRISE DRIVE, SUITE 3A ROCKY HILL, CT 06067
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-34'-50.57" N LONGITUDE: 72°-37'-25.80" W GROUND ELEVATION: ±345' AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
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C-1	PLANS AND ELEVATION	0
C-2	LTE 3C/4C EQUIPMENT DETAILS	0
C-3	MOUNT MODIFICATIONS	0
E-1	LTE SCHEMATIC DIAGRAM AND NOTES	0
E-2	LTE WIRING DIAGRAM	0
E-3	TYPICAL ELECTRICAL DETAILS	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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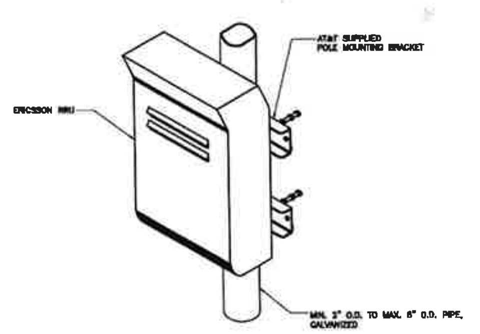
JOB NO. 17004.51

TITLE SHEET

T-1

Sheet No. 1 of 8

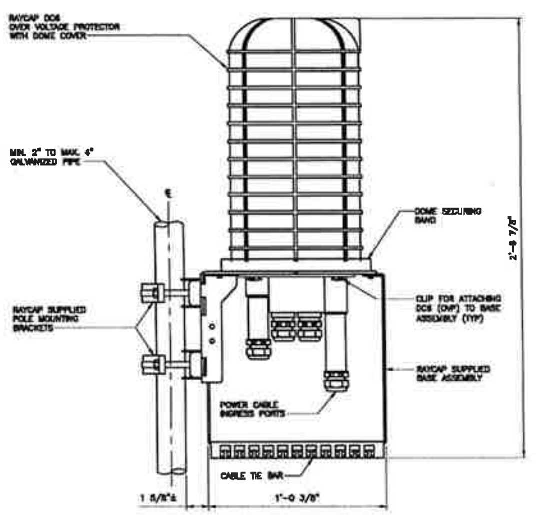


ISOMETRIC VIEW

NOTES:

1. AT&T SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

1 (N-1) TYPICAL RRUS MOUNTING DETAILS
SCALE: NTS



ELEVATION

NOTES:

1. RAYCAP VIA AT&T SUPPLIES THE DC6 OVER VOLTAGE PROTECTOR AND PIPE MOUNTING BRACKETS. SUBCONTRACTOR SHALL SUPPLY THE PIPE.

2 (N-1) RAYCAP DC6 MOUNTING DETAIL
SCALE: 3" = 1'-0"

NOTES AND SPECIFICATIONS

DESIGN BASIS:

GOVERNING CODE: 2012 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2016 CT STATE BUILDING CODE AND AMENDMENTS.

1. DESIGN CRITERIA:
- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 100–120 MPH (3 SECOND GUST)
- RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 101 MPH (Vasd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10) PER 2012 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)
   A. STRUCTURAL STEEL (W SHAPES)----ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)----ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)----ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)----ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE----ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS----ASTM A325-N
   G. U-BOLTS----ASTM A36
   H. ANCHOR RODS----ASTM F 1554
   I. WELDING ELECTRODE----ASTM E 70XX
2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

PAINT NOTES

PAINTING SCHEDULE:

1. ANTENNA PANELS:
   A. SHERWIN WILLIAMS POLANE-B
   B. COLOR TO BE MATCHED WITH EXISTING TOWER STRUCTURE.
2. COAXIAL CABLES:
   A. ONE COAT OF DTM BONDING PRIMER (2-5 MILS. DRY FINISH)
   B. TWO COATS OF DTM ACRYLIC PRIMER/FINISH (2.5-3 MILS. DRY FINISH)
   C. COLOR TO BE FIELD MATCHED WITH EXISTING STRUCTURE.

EXAMINATION AND PREPARATION:

1. DO NOT APPLY PAINT IN SNOW, RAIN, FOG OR MIST OR WHEN RELATIVE HUMIDITY EXCEEDS 85%. DO NOT APPLY PAINT TO DAMP OR WET SURFACES.
2. VERIFY THAT SUBSTRATE CONDITIONS ARE READY TO RECEIVE WORK. EXAMINE SURFACE SCHEDULED TO BE FINISHED PRIOR TO COMMENCEMENT OF WORK. REPORT ANY CONDITION THAT MAY POTENTIALLY AFFECT PROPER APPLICATION.
3. TEST SHOP APPLIED PRIMER FOR COMPATIBILITY WITH SUBSEQUENT COVER MATERIALS.
4. PERFORM PREPARATION AND CLEANING PROCEDURE IN STRICT ACCORDANCE WITH COATING MANUFACTURER'S INSTRUCTIONS FOR EACH SUBSTRATE CONDITION.
5. CORRECT DEFECTS AND CLEAN SURFACES WHICH AFFECT WORK OF THIS SECTION. REMOVE EXISTING COATINGS THAT EXHIBIT LOOSE SURFACE DEFECTS.
6. IMPERVIOUS SURFACE: REMOVE MILDEW BY SCRUBBING WITH SOLUTION OF TRI-SODIUM PHOSPHATE AND BLEACH. RINSE WITH CLEAN WATER AND ALLOW SURFACE TO DRY.
7. ALUMINUM SURFACE SCHEDULED FOR PAINT FINISH: REMOVE SURFACE CONTAMINATION BY STEAM OR HIGH-PRESSURE WATER. REMOVE OXIDATION WITH ACID ETCH AND SOLVENT WASHING. APPLY ETCHING PRIMER IMMEDIATELY FOLLOWING CLEANING.
8. FERROUS METALS: CLEAN UNGALVANIZED FERROUS METAL SURFACES THAT HAVE NOT BEEN SHOP COATED; REMOVE OIL, GREASE, DIRT, LOOSE MILL SCALE, AND OTHER FOREIGN SUBSTANCES. USE SOLVENT OR MECHANICAL CLEANING METHODS THAT COMPLY WITH THE STEEL STRUCTURES PAINTING COUNCIL'S (SSPC) RECOMMENDATIONS. TOUCH UP BARE AREAS AND SHOP APPLIED PRIME COATS THAT HAVE BEEN DAMAGED. WIRE BRUSH, CLEAN WITH SOLVENTS RECOMMENDED BY PAINT MANUFACTURER, AND TOUCH UP WITH THE SAME PRIMER AS THE SHOP COAT.
9. GALVANIZED SURFACES: CLEAN GALVANIZED SURFACES WITH NON-PETROLEUM-BASED SOLVENTS SO SURFACE IS FREE OF OIL AND SURFACE CONTAMINANTS. REMOVE PRETREATMENT FROM GALVANIZED SHEET METAL FABRICATED FROM COIL STOCK BY MECHANICAL METHODS.
10. ANTENNA PANELS: REMOVE ALL OIL, DUST, GREASE, DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION. PANELS MUST BE WIPED WITH METHYL ETHYL KETONE (MEK).
11. COAXIAL CABLES: REMOVE ALL OIL, DUST, GREASE, DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION.

CLEANING:

1. COLLECT WASTE MATERIAL, WHICH MAY CONSTITUTE A FIRE HAZARD, PLACE IN CLOSED METAL CONTAINERS AND REMOVE DAILY FROM SITE.

APPLICATION:

1. APPLY PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. DO NOT APPLY FINISHES TO SURFACES THAT ARE NOT DRY.
3. APPLY EACH COAT TO UNIFORM FINISH.
4. APPLY EACH COAT OF PAINT SLIGHTLY DARKER THAN PRECEDING COAT UNLESS OTHERWISE APPROVED.
5. SAND METAL LIGHTLY BETWEEN COATS TO ACHIEVE REQUIRED FINISH.
6. VACUUM CLEAN SURFACES FREE OF LOOSE PARTICLES. USE TACK CLOTH JUST PRIOR TO APPLYING NEXT COAT.
7. ALLOW APPLIED COAT TO DRY BEFORE NEXT COAT IS APPLIED.

COMPLETED WORK:

1. SAMPLES: PREPARE 24" X 24" SAMPLE AREA FOR REVIEW.
2. MATCH APPROVED SAMPLES FOR COLOR, TEXTURE AND COVERAGE. REMOVE REFINISH OR REPAINT WORK NOT IN COMPLIANCE WITH SPECIFIED REQUIREMENTS.

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NOTES AND SPECIFICATIONS

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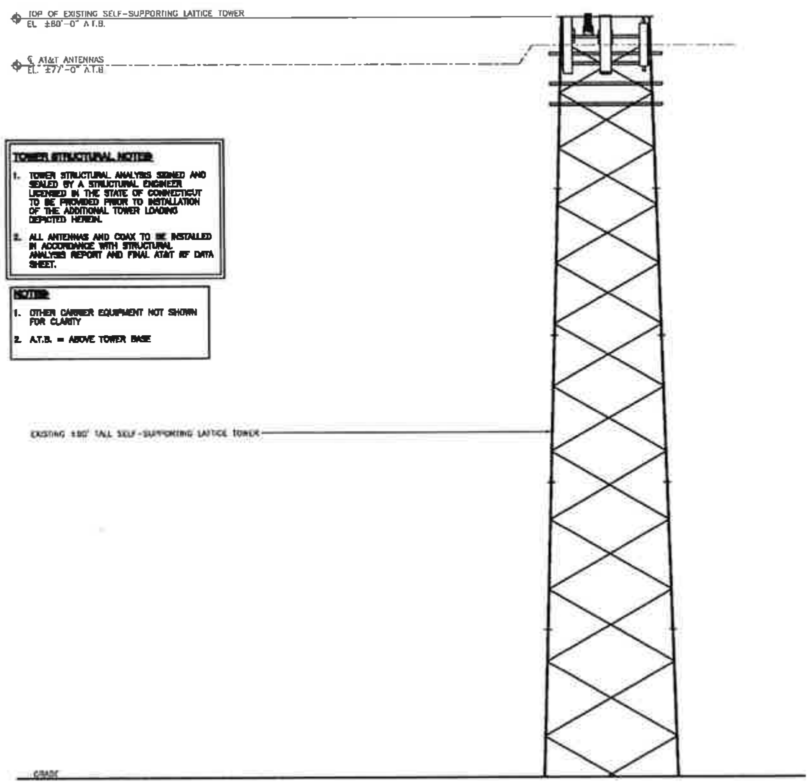


TOWER STRUCTURAL NOTES:

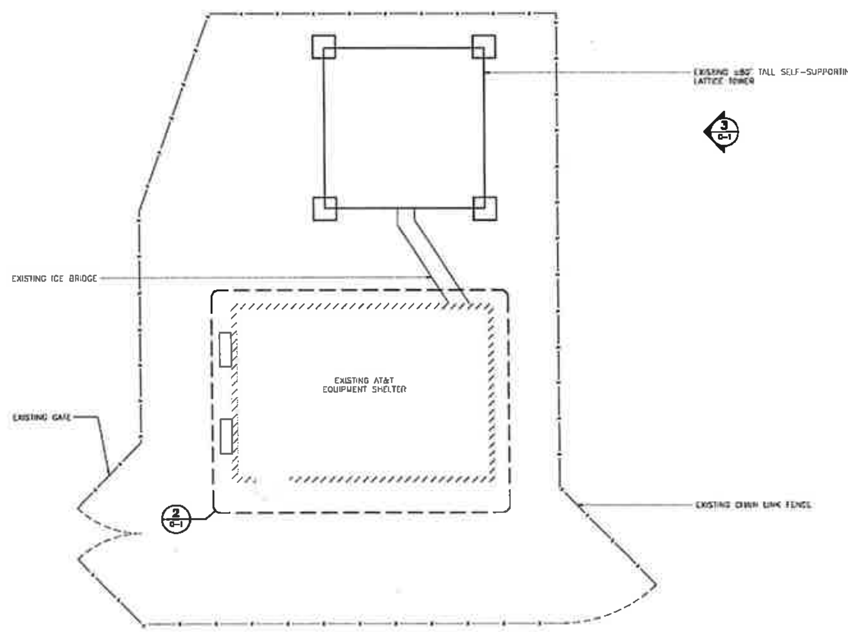
1. TOWER STRUCTURAL ANALYSIS SIGNED AND SEALED BY A STRUCTURAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT TO BE PROVIDED PRIOR TO INSTALLATION OF THE ADDITIONAL TOWER LOADING DEPICTED HEREIN.
2. ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS REPORT AND FINAL AT&T RF DATA SHEET.

NOTES:

1. OTHER CARRIER EQUIPMENT NOT SHOWN FOR CLARITY
2. A.T.B. = ABOVE TOWER BASE

3 / C-1 **EAST ELEVATION**
SCALE: 1" = 8'-0"

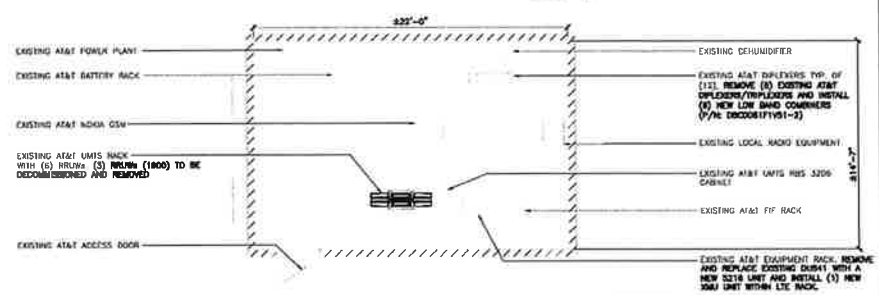
GRAPHIC SCALE (IN FEET) 1 inch = 8 ft.



1 / C-1 **COMPOUND PLAN**
SCALE: 1" = 8'-0"

APPROX. NORTH

GRAPHIC SCALE (IN FEET) 1 inch = 8 ft.



2 / C-1 **EQUIPMENT ROOM FLOOR PLAN**
SCALE: 1/4" = 1'-0"

APPROX. NORTH

GRAPHIC SCALE (IN FEET) 1 inch = 4 ft.

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PLANS & ELEVATION

C-1

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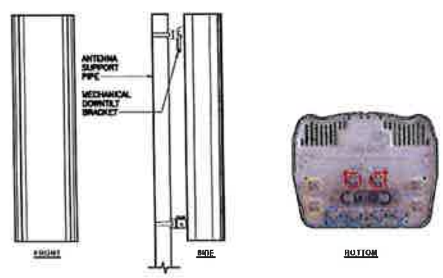
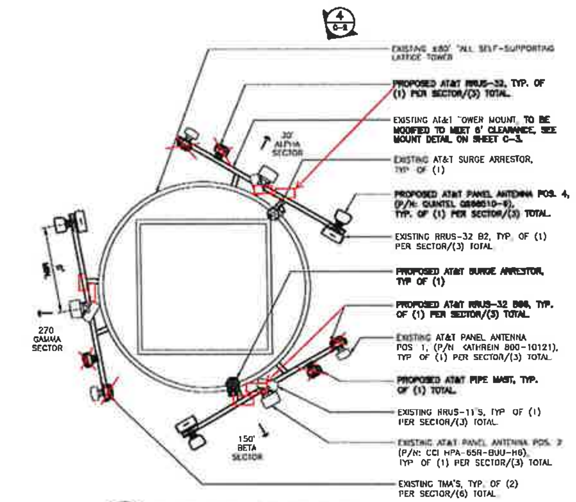
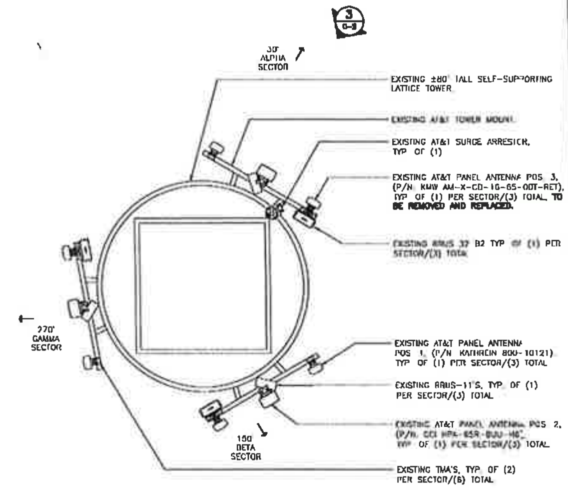


ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: QUINTEL MODEL: QS66510-6	72"L x 12"W x 9.6"D	56 LBS.

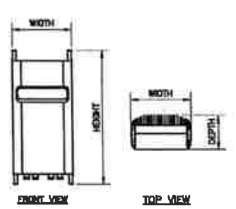
5 (C-2) PROPOSED ANTENNA DETAIL
SCALE: 1/2" = 1'-0"



2 (C-2) PROPOSED ANTENNA PLAN
SCALE: 1/4" = 1'-0"



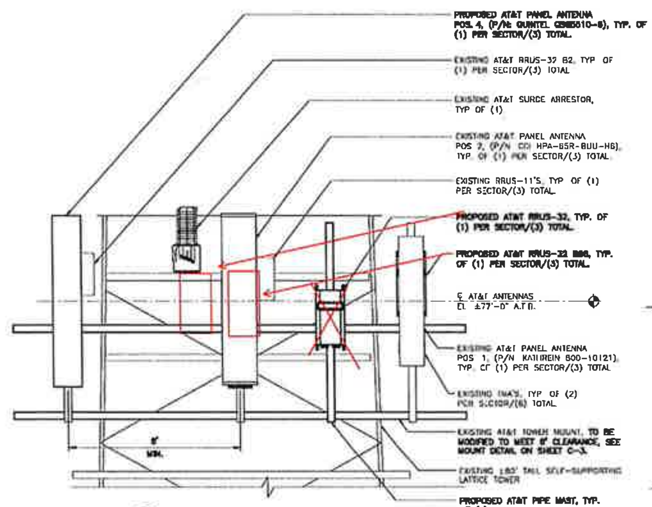
1 (C-2) EXISTING ANTENNA PLAN
SCALE: 1/4" = 1'-0"



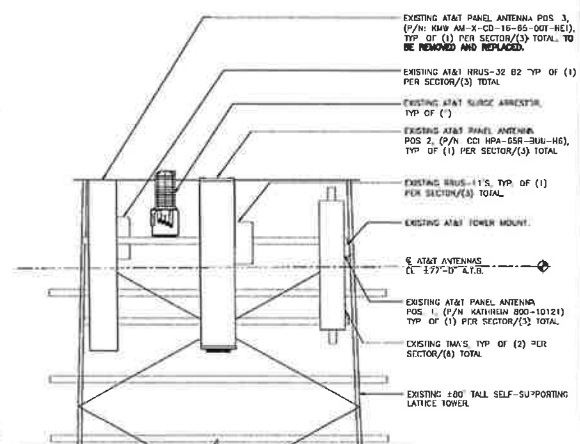
RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RRUS 32	27.17"L x 12.05"W x 7.01"D	52.91 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.
MAKE: ERICSSON MODEL: RRUS 32 B66	27.17"L x 12.05"W x 7.01"D	52.91 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.

6 (C-2) ERICSSON REMOTE RADIO UNITS
SCALE: 1" = 1'-0"



4 (C-2) PROPOSED ANTENNA ELEVATION
SCALE: 1/2" = 1'-0"



3 (C-2) EXISTING ANTENNA ELEVATION
SCALE: 1/2" = 1'-0"

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LTE 3C/4C
EQUIPMENT DETAILS

C-2
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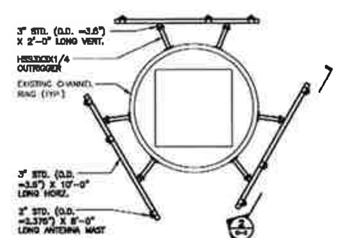
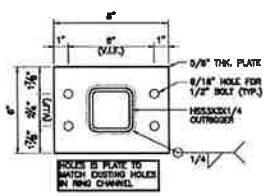
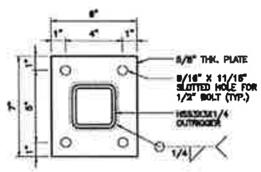


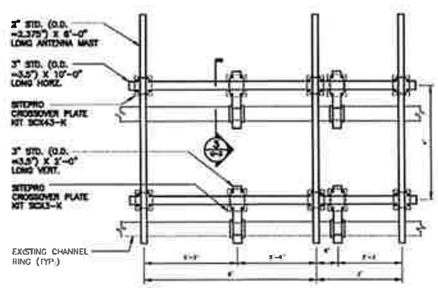
1 C-3 ANTENNA MOUNT PLAN
SCALE: 1/4" = 1'-0"



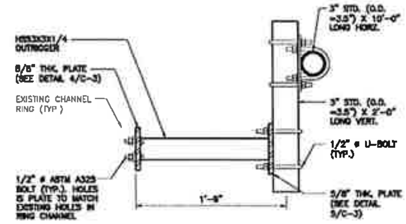
4 C-3 PLATE DETAILS
SCALE: 3" = 1'-0"



5 C-3 PLATE DETAILS
SCALE: 3" = 1'-0"



2 C-3 ANTENNA MOUNT ELEVATION
SCALE: 1/2" = 1'-0"



3 C-3 OUTRIGGER DETAIL
SCALE: 1-1/2" = 1'-0"

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MOUNT MODIFICATION

C-3

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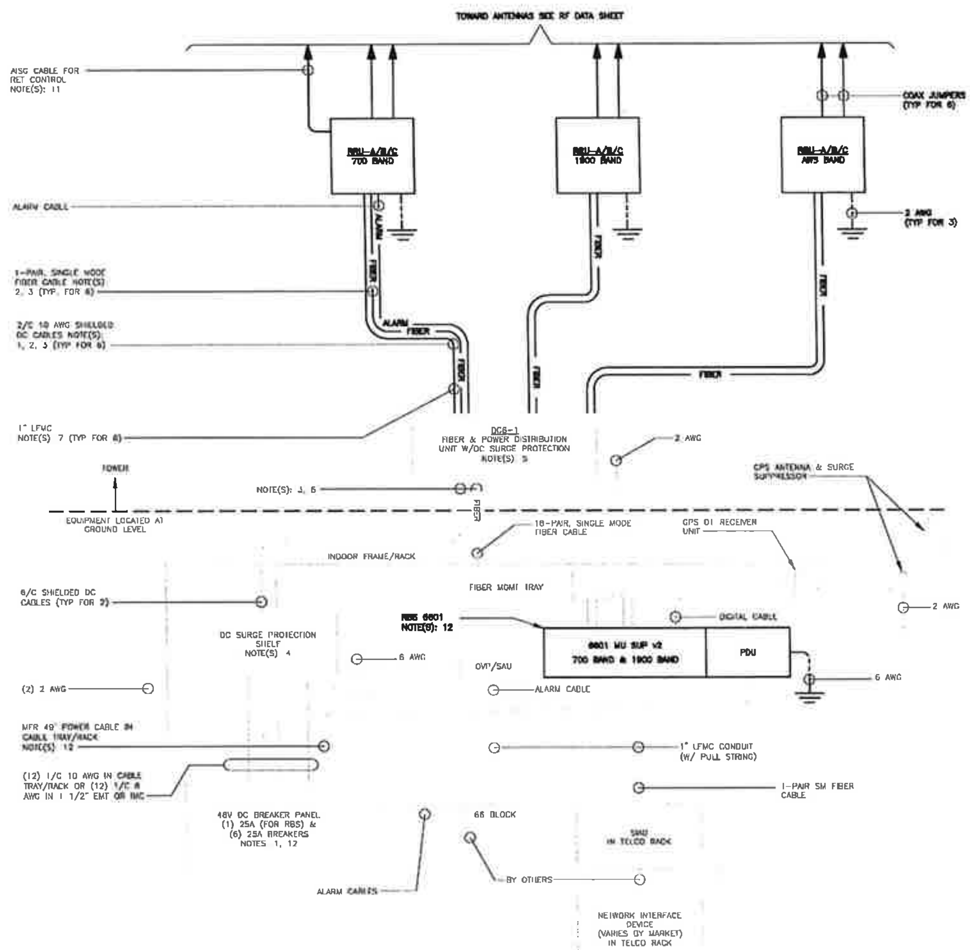


1 / E-1 LTE SCHEMATIC DIAGRAM

NOT TO SCALE

LTE SCHEMATIC DIAGRAM NOTES:

1. BREAKERS TO BE TAGGED AND LOCKED OUT. A 20A (MIN.) OR 30A (MAX.) BREAKER FOR RRUs MAY BE SUBSTITUTED FOR THE RECOMMENDED 25A BREAKER. SIZE 12 CONDUCTORS MAY BE USED ONLY WITH 20A BREAKERS.
2. LEAVE COILED AND PROTECTED UNTIL TERMINATED.
3. DC AND FIBER CABLE SHALL BE ROUTED WITH THE EXISTING COAX CABLE.
4. DC SURGE PROTECTION SHELF SHALL BE RAYCAP DC=-48-60-RM.
5. FIBER & DC DISTRIBUTION BOX W/DC SURGE PROTECTION SHALL BE RAYCAP DC6-48-60-18-8F.
6. SUPPORT FIBER & DC POWER CABLES WITH SNAP-IN HANGERS SPACED NO GREATER THAN 3 FEET APART ON TOWER. SUPPORT FIBER AND DC POWER CABLES INSIDE MONOPOLE WITH CABLE HOISTING GRIPS AT 250 FT MAXIMUM INTERVALS. DRESS CABLES TO PREVENT CONTACT WITH ENTRANCE AND EXIT OPENINGS.
7. CONDUIT TO BE USED ON A TOWER IF THE RRU IS MORE THAN 10' FROM THE DISTRIBUTION UNITS. MAX CABLE LENGTH IS 18 FEET.
8. SINGLE-CONDUCTOR DC POWER CABLES SHALL BE TELCOFLEX® OR KS24194™, COPPER, UL LISTED RHH NON-HALOGEN, LOW SMOKE WITH BRAIDED COVER, TYPE TC (1/0 AND LARGER). UNLESS OTHERWISE NOTED, STRANDING SHALL BE CLASS B (TYPE II) FOR CABLES SIZES 14, 12 & 10 AWG AND CLASS I (TYPE IV) FOR SIZES 8 AWG AND LARGER. CABLES SHALL BE COLOR CODED RED FOR +24V, BLUE FOR -48V AND GRAY FOR 24V AND 48V RETURN CONDUCTORS. MULTI-CONDUCTOR DC POWER CABLES SHALL BE COPPER, CLASS B STRANDING WITH FLAME RETARDANT PVC JACKET, TYPE TC, UL LISTED FOR 90°C DRY/75°C WET INSTALLATION.
9. GROUNDING WIRES SHALL BE COPPER, GREEN THHN/THWN UL LISTED FOR 90°C DRY/75°C WET INSTALLATION. MINIMUM SIZE IS 6 AWG UNLESS NOTED OTHERWISE.
10. FIBER OPTIC CABLES SHALL BE INSTALLED IN FLEXIBLE CONDUIT AS SCOPED BY MARKET.
11. RET CONTROL FROM THE RRU IS AN OPTIONAL METHOD OF CONNECTION. REFER TO RF DATA SHEET FOR APPLICABILITY.
12. RBS 6601 VARIANT 2 REQUIRES A 25A BREAKER AND 10 AWG (MIN.) CONDUCTORS. REPLACE EXISTING 15A OR 20A BREAKERS AND 12 AWG CONDUCTORS WHEN UPGRADING AN EXISTING RBS 6601 VARIANT 1.

ELECTRICAL NOTES

1. PRIOR TO START OF CONSTRUCTION CONTRACTOR SHALL COORDINATE WITH OWNER FOR ALL CONSTRUCTION STANDARDS AND SPECIFICATIONS, AND ALL MANUFACTURER DOCUMENTATION FOR ALL EQUIPMENT TO BE INSTALLED.
2. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH LOCAL BUILDING CODE, NATIONAL ELECTRIC CODE, OWNER AND MANUFACTURER'S SPECIFICATIONS.
3. CONNECT ALL NEW EQUIPMENT TO EXISTING TELCO AS REQUIRED BY MANUFACTURER.
4. MAINTAIN ALL CLEARANCES REQUIRED BY NEC AND EQUIPMENT MANUFACTURER.
5. PRIOR TO INSTALLATION CONTRACTOR SHALL MEASURE EXISTING ELECTRICAL LOAD AND VERIFY EXISTING AVAILABLE CAPACITY FOR PROPOSED INSTALLATION. IF INADEQUATE CAPACITY IS AVAILABLE, CONTRACTOR SHALL COORDINATE WITH LOCAL ELECTRIC UTILITY COMPANY TO UPGRADE EXISTING ELECTRIC SERVICE.
6. CONTRACTOR SHALL INSPECT EXISTING GROUNDING AND LIGHTNING PROTECTION SYSTEM AND ENSURE THAT IT IS IN COMPLIANCE WITH NEC, AND SITE OWNER'S SPECIFICATIONS. THE RESULTS OF THIS INSPECTION SHALL BE PRESENTED TO OWNERS REPRESENTATIVE, AND ANY DEFICIENCIES SHALL BE CORRECTED.
7. ALL TRANSMISSION TOWER SITES CONTAIN AN EXTENSIVE BURIED GROUNDING SYSTEM. ALL GROUNDING WORK MUST BE COORDINATED WITH, AND APPROVED BY, THE TOWER OWNER'S SITE REPRESENTATIVE. ALL OF THE TOWER OWNER'S SPECIFICATIONS MUST BE STRICTLY FOLLOWED.
8. PROVIDE AND INSTALL GROUND KITS FOR ALL NEW COAXIAL CABLES AND BOND TO EXISTING OWNERS GROUNDING SYSTEM PER OWNERS SPECIFICATIONS AND NEC.
9. ALL CONDUCTORS SHALL BE TYPE THWN (INT. APPLICATION) AND XHHW (EXT. APPLICATION), 75 DEGREE C, 600 VOLT INSULATION, SOFT ANNEALED STRANDED COPPER. #10 AWG AND SMALLER SHALL BE SPLICED USING ACCEPTABLE SOLDERLESS PRESSURE CONNECTORS. #8 AWG AND LARGER SHALL BE SPLICED USING COMPRESSION SPLIT-BOLT TYPE CONNECTORS. #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR FOR LINE VOLTAGE BRANCH CIRCUITS. REFER TO PANEL SCHEDULE FOR BRANCH CIRCUIT CONDUCTOR SIZE(S). CONDUCTORS SHALL BE COLOR CODED FOR CONSISTENT PHASE IDENTIFICATION.
10. MINIMUM BENDING RADIUS FOR CONDUCTORS SHALL BE 12 TIMES THE LARGEST DIAMETER OF BRANCH CIRCUIT CONDUCTOR.
11. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE MADE IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS WHICH MAY APPLY AND NOTHING IN THE DRAWINGS OR SPECIFICATIONS SHALL BE INTERPRETED AS AN INFRINGEMENT OF SUCH CODES OR REGULATIONS.
12. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR THE COMPLETE INSTALLATION AND COORDINATION OF THE ENTIRE ELECTRICAL SERVICE. ALL ACTIVITIES TO BE COORDINATED THROUGH OWNER'S REPRESENTATIVE, DESIGN ENGINEER AND OTHER AUTHORITIES HAVING JURISDICTION OF TRADES.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES AS MAY BE REQUIRED FOR THE ELECTRICAL WORK AND FOR SCHEDULING OF ALL INSPECTIONS AS MAY BE REQUIRED BY THE LOCAL AUTHORITY.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE SITE AND/OR BUILDING OWNER FOR NEW AND/OR DEMOLITION WORK INVOLVED.
15. THE CONTRACTOR SHALL GUARANTEE ALL NEW WORK FOR A PERIOD OF ONE YEAR FROM THE ACCEPTANCE DATE BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING WARRANTIES FROM ALL EQUIPMENT MANUFACTURERS FOR SUBMISSION TO THE OWNER.
16. DRAWINGS INDICATE GENERAL ARRANGEMENT OF WORK INCLUDED IN CONTRACT. CONTRACTOR SHALL WITHOUT EXTRA CHARGE, MAKE MODIFICATIONS TO THE LAYOUT OF THE WORK TO PREVENT CONFLICT WITH WORK OF OTHER TRADES AND FOR THE PROPER INSTALLATION OF WORK. CHECK ALL DRAWINGS AND VISIT JOB SITE TO VERIFY SPACE AND TYPE OF EXISTING CONDITIONS IN WHICH WORK WILL BE DONE, PRIOR TO SUBMITTAL OF BID.
17. ALL NON-CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUIT SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONNECTED TO PROVIDE AN INDEPENDENT RETURN PATH TO THE EQUIPMENT GROUNDING SOURCES.
18. GROUNDING SYSTEM WILL BE IN ACCORDANCE WITH THE LATEST ACCEPTABLE EDITION OF THE NATIONAL ELECTRICAL CODE AND REQUIREMENTS PER LOCAL INSPECTOR HAVING JURISDICTION.
19. EACH EQUIPMENT GROUND CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH THE N.E.C. ARTICLE 250-122. (MIN. #12 AWG).
20. CONTRACTOR SHALL PROVIDE A CELLULAR GROUNDING SYSTEM WITH THE MAXIMUM AC RESISTANCE TO GROUND OF 5 OHM BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3-POINT GROUNDING TEST. (REFER TO SECTION 16060).

TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

A. CONTRACTOR SHALL RETAIN THE SERVICES OF A LOCAL INDEPENDENT ELECTRICAL TESTING FIRM (WITH MINIMUM 5 YEARS COMMERCIAL EXPERIENCE IN THE ELECTRICAL TESTING INDUSTRY) AS SPECIFIED BY OWNER TO PERFORM:

TEST 1: RESISTANCE TO GROUND TEST ON THE CELLULAR GROUNDING SYSTEM.

THE TESTING FIRM SHALL INCLUDE THE FOLLOWING INFORMATION WITH THE REPORT:

1. TESTING PROCEDURE INCLUDING THE MAKE AND MODEL OF TEST EQUIPMENT.
2. CERTIFICATION OF TESTING EQUIPMENT CALIBRATION WITHIN SIX (6) MONTHS OF DATE OF TESTING. INCLUDE CERTIFICATION LAB ADDRESS AND TELEPHONE NUMBER.
3. GRAPHICAL DESCRIPTION OF TESTING METHOD ACTUALLY IMPLEMENTED.

B. TESTING SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF OWNERS CONSTRUCTION REPRESENTATIVE. TESTING DATA SHALL BE INITIALED AND DATED BY THE CONSTRUCTION AND INCLUDED WITH THE WRITTEN REPORT/ANALYSIS.

C. THE CONTRACTOR SHALL FORWARD SIX (6) COPIES OF THE INDEPENDENT ELECTRICAL TESTING FIRM REPORT/ANALYSIS TO ENGINEER A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO THE JOB TURNOVER.

D. CONTRACTOR TO PROVIDE A MINIMUM OF ONE (1) WEEK NOTICE TO OWNER AND ENGINEER FOR ALL TESTS REQUIRING WITNESSING.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/18/17	JTD	CAD	CONSTRUCTION DOCUMENTS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

at&t

EMPIRE telecom

CENTEK engineering
Centered on Solutions™
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

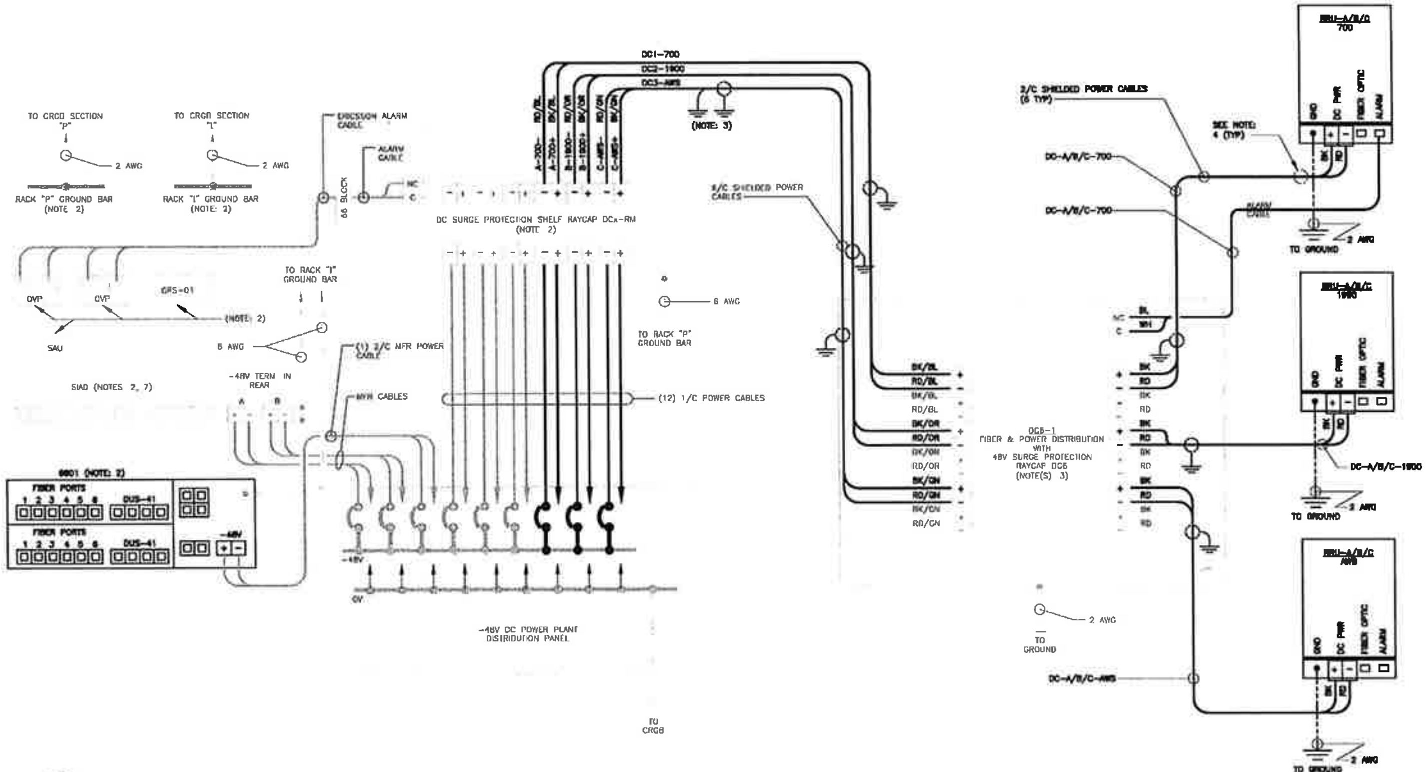
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
PORTLAND
CT1066 - LTE 3C/4C
23 HIGH STREET
PORTLAND, CT 06480

DATE: 10/04/17
SCALE: AS NOTED
JOB NO. 17004.51

LTE SCHEMATIC DIAGRAM AND NOTES

E-1

Sheet No. 6 of 6



1 / E-2 LTE WIRING DIAGRAM

NOT TO SCALE

LTE WIRING DIAGRAM NOTES:

1. LABEL THE DC POWER CABLES AT BOTH ENDS OF EVERY WIRE AND IN ANY PULL BOX IF USED. LABEL SHALL BE DURABLE, SELF ADHESIVE, WRAPPED LONGITUDINALLY ALONG THE CABLE AND STATE THE SECTOR, FREQUENCY BAND AND POLARITY; I.E. "A-1900+". CABLE AND WIRE LABELS SHOWN ARE REPRESENTATIVE AND MAY BE MODIFIED AS DIRECTED BY AT&T.
2. INSTALL ON BASEBAND EQUIPMENT RACK.
3. THE BARE GROUND WIRE OF EACH MULTI-CONDUCTOR CABLE SHALL BE CONNECTED TO THE "P" GROUND BAR ON THE RACK. WHEN A SHIELDED CABLE IS USED, THE DRAIN WIRE ALSO SHALL BE CONNECTED TO THE "P" GROUND BAR.
4. CABLE GROUND WIRE AND SHIELD DRAIN WIRE TO BE LEFT UN-TERMINATED AT RRU AND DC POWER PLANT.
5. SEE LTE SCHEMATIC DIAGRAM DETAIL 1/E-1 FOR BREAKER RATING.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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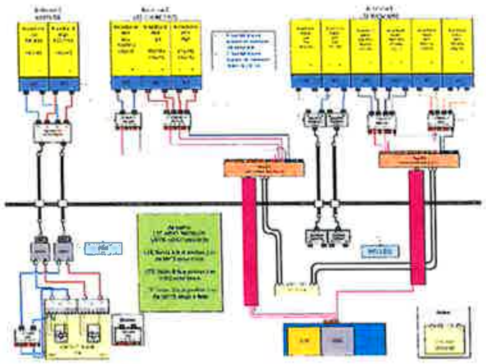
PORTLAND
CT1066 - LTE 3C/4C
225 HIGH STREET
PORTLAND, CT 06480

DATE: 10/04/17
SCALE: AS NOTED
JOB NO. 17004.01

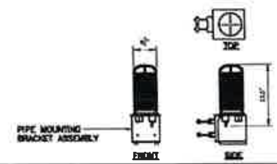
LTE WIRING DIAGRAM

E-2

Sheet No. 7 of 8



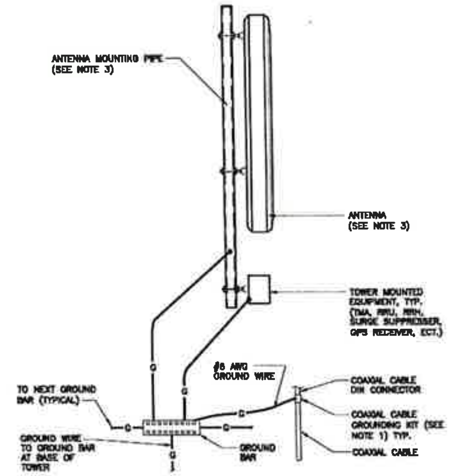
3 RF PLUMBING DIAGRAM
E-3 NOT TO SCALE



SITE TYPE	ARRESTOR MAKE/MODEL	QTY REQUIRED	ARRESTOR LOCATION	WEIGHT
	MAKE: RAYCAP (SQUID) MODEL: DC6-48-60-18-8F	(1) PER SITE	TOWER, ADJACENT TO AT&T ANTENNAS AND RRUs.	20 LBS. (WITHOUT MOUNT)

NOTES:
1. CONTRACTOR TO COORDINATE FINAL SURGE ARRESTOR MODEL SELECTION(S) WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.
2. CONTRACTOR TO INSTALL ARRESTOR IN CONFORMANCE WITH MANUFACTURERS RECOMMENDATIONS.

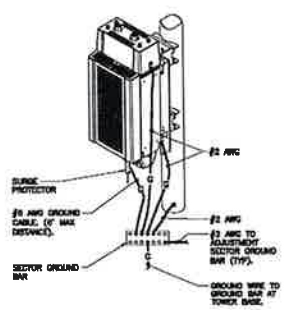
2 SURGE ARRESTOR DETAIL
E-3 SCALE: NTS



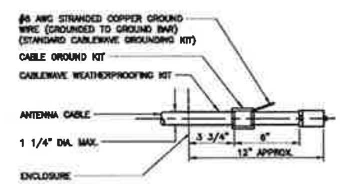
NOTES:
1. BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

1 TYPICAL ANTENNA GROUNDING DETAIL
E-3 NOT TO SCALE

EACH RRH CABINET SHALL BE GROUNDED IN THE FOLLOWING MANNER:
1. AT TOP OF THE CABINET
2. AT RIGHT SIDE OF THE CABINET.



5 RRU POLE MOUNT GROUNDING
E-3 NOT TO SCALE



NOTE:
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

4 ANTENNA CABLE GROUNDING DETAIL
E-3 NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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PORTLAND, CT 06480

DATE: 10/04/17
SCALE: AS NOTED
JOB NO. 17004.51

TYPICAL ELECTRICAL DETAILS

E-3
Sheet No. 4 of 4

Structural Components
Bringing It All Together.

1870 W 64th Lane, Unit A
Denver, Colorado 80221
PH: 800-584-8839
sales@structuralcomponents.net

Self Support Tower Mapping Report

Site Name CT-1680

Site ID

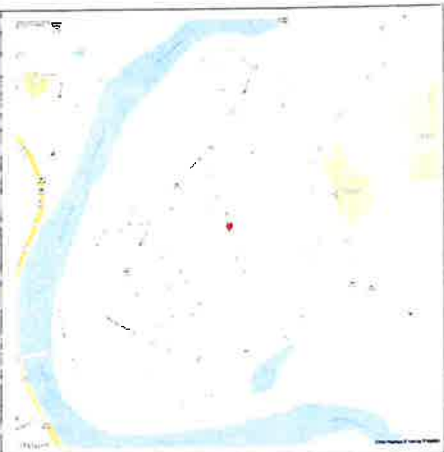
Prepared For Blue Sky Towers

SC #	220142
Date of Inspection	03/15/2022
Weather During Inspection	Sunny 60F Calm
SC Lead	Wes Culver
SC Support	Jeff Ham

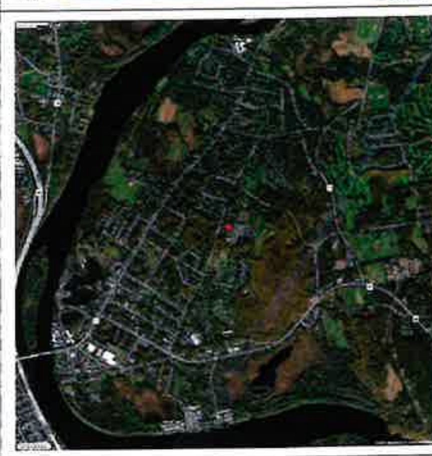
Site Information

City	Portland
State	CT
Latitude	41.580714
Longitude	-72.623860
Site Address	97 High St
Tower Type	SST
Tower Make/Model	Unknown
Measured Tower Height (T)	80' 6"
Measured Foundation Height (F)	6"
Measured Highest Appurtenance Height (A)	4'
Measured Overall Height (AGL) = F+T+A	85'
Tower Safe to Climb	Yes
Total Height Climbed	81'
Power Down Requirements	N/A
Power Down Contact Info	N/A
Any Site Safety Issues	No Safety Climb

Street Map



Satellite Map



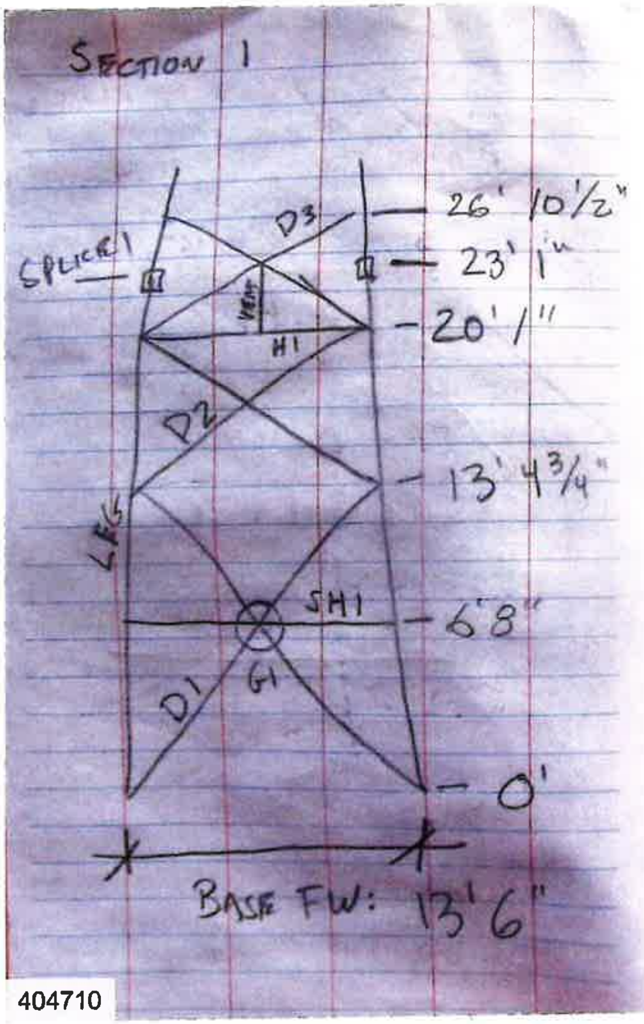
Tower Mast Profile

Section #	Elevation (Ft)	Face Width (in)	Number of Panels	Panel Type	Leg Type/Size	Diagonal Type/Size	Horizontal Type/Size	Girt Type/Size	Girt Offset Top/Bottom
1	0 - 23' - 1"	13' 6" @ base H/H	2 - See Notes for heights	X	L5" x 5" x 5/16"	Panel 1: L3" x 3" x 5/16" (2) 5/8" Bolts, 2-1/2" C-C, 1" TO Panel 2: L2-1/2" x 2-1/2" x 3/16" (2) 5/8" Bolts, 2-1/2" C-C, 1" TO	Sub horizontal: L1-3/4" x 1-3/4" x 3/16" (1) 5/8" Bolt, 1" C-E	Top girt: L2-1/2" x 2" x 3/16" LLH (2) 5/8" Bolts, 2" C-C, 1" C-E	Bottom - N/A Top - 3' to splice
2	23' - 1" - 50' - 3"	constant taper	4 - See Notes for heights	X	L5" x 5" x 3/8"	Panels 1-4: L2-1/2" x 2" x 3/16" LLH (2) 5/8" Bolts, (1) shared between panels 1" C-E TO 2-1/2" C-C Top		Top Girt L2-1/2" x 2-1/2" x 3/16" (2) 5/8" Bolts 2" C-C, 1" C-E	Bottom - N/A Top - 3'
3	50' 3" - 80' 6"	Taper ends at 65' 6-1/2" FW above is 64.5" H/H	4 - See Notes for heights	X	L4" x 4" x 3/8"	Panels 1,2 L2-1/2" x 2" x 3/16" LLH (2) 5/8" Bolts 1" C-E TO 2-1/2" C-C Top See notes for Panels 3,4. Size and bolt spacing vary	Panel 2: L3" x 3" x 3/16" (2) 5/8" Bolts, 3/4" C-E, 1-3/4" C-C Panel 3: 2L4" x 4" x 3/8", stitched at 1/3rd points (2) 5/8" Bolts, 1" C-E, 2" C-C Panel 4 and Secondary Horizontals in Panels 3/4 L4" x 3-1/2" x 1/4" LLV (3) 5/8" Bolts, 7/8" C-E, 1-3/4" C-C	Top Girt L2" x 2" x 1/8" (1) 5/8" Bolt, 7/8" C-E	N/A

Comments - Tower Mast Profile	
	Internals at 20' 1" L2" x 2" x 3/16" (1) 5/8" Bolt, 1" C-E Internals at 50' 3" L2-1/2" x 2" x 3/16" LLV (1) 5/8" Bolt, 1" C-E Internals at 65' 8" L1-3/4" x 1-3/4" x 3/16" (1) 5/8" Bolt, 1" C-E See notes for internals at ring elevations

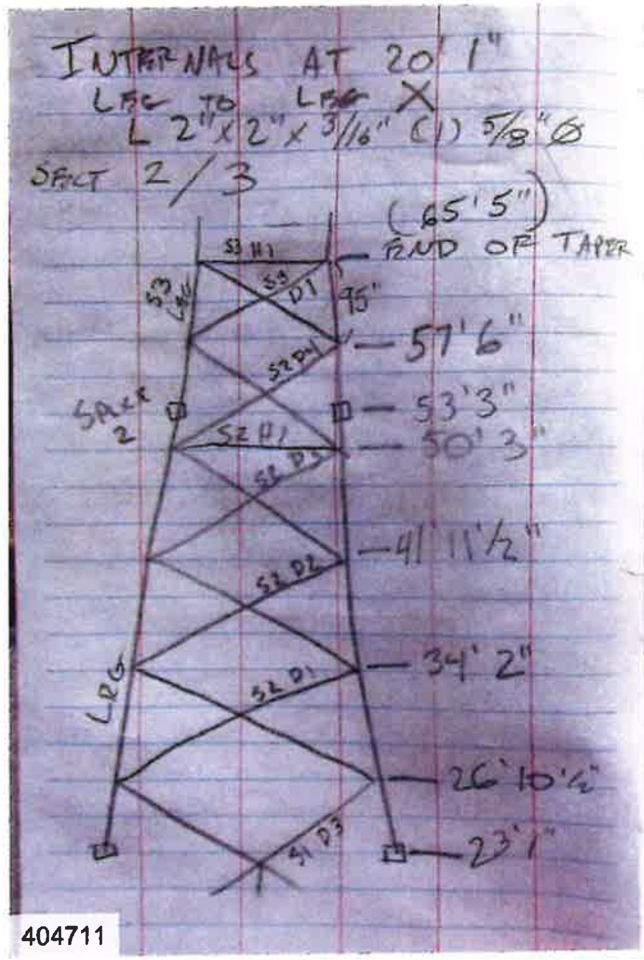
(Tower Mast Profile Continued)

Comments - Tower Mast Profile



404710

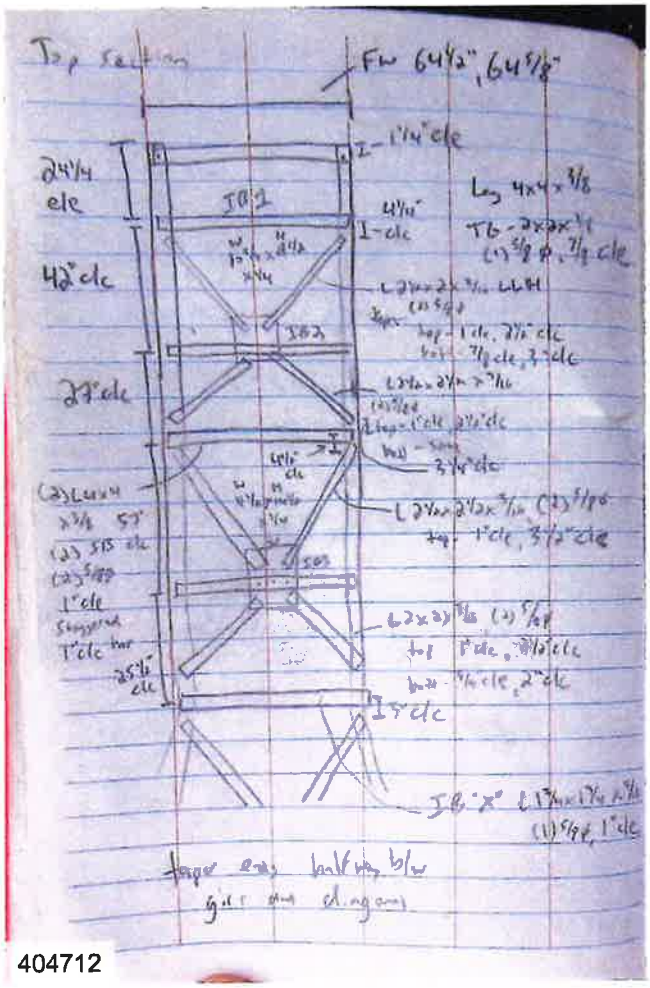
Comments - Tower Mast Profile



404711

(Tower Mast Profile Continued)

Comments - Tower Mast Profile



404712

Existing Reinforcement

Reinforcement Number	Reinforcement Type	Reinforcement Elevation	Reinforcement Description	Comments on Reinforcement

Comments - Existing Reinforcement	

Tower Base Details

Add photos of Details Outlined Below
Add sketch to Comments section

Base Plate Size (L x W x thk)	13" x 13" x 1"
Anchor Rod Size / C-C / Qty	1-1/4" / 8-1/2" C-C / (4)
Stiffeners	10" x 4" x 1" 1/4" Weld
Foundation Size (L x W x A.E.)	24" x 24" x 6"
Is there grout under base plate?	Yes
Void or Grout Space Height	2-1/2"
Condition of Grout	Satisfactory
Comments - Tower Base Details	
Photo of Base Section	

Base Plate Size (L x W x thk)

Photo of Base Section

Leg Splice Details

Add Photos of each different type/size of splice.
Add Sketch of each different type/size of splice.

Splice # (SPL1, SPL2..)	Elevation(s)	Plate Dimensions	# Bolts / Size / Grade / Spacing	Weld Size	Stiffeners
SPL1	23' - 1"	Inside PL: L5" x 5" x 10" x 3/8" Outside PL: 4" x 10" x 1/4"	(6) 5/8" Bolts 2-1/2" C-C Vertical, 2" C-C Horizontal	N/A	N/A
SPL2	53' - 3"	Inside PL: L4" x 4" x 10" x 1/4" Outside PL: 3" x 10" x 1/4"	(6) 5/8" Bolts 2-1/2" C-C Vertical, 1-1/2" C-C Horizontal	N/A	N/A

Comments - Leg Splice Details	

SPL1

SPL2

Gusset Plate Details

Add photo of each different gusset type/size.
Add sketch of each different gusset type/size.

Gusset Location Description	Elevation(s)	Dimensions (H x W x thk)	Gusset Edge Distance (C-E)	# Bolt / Size / Grade / Spacing	Weld Size
Section 3, Panel 3 center	67' 8"	11-1/2" x 14" x 1/2"	Min. 1"	(4) 5/8"	N/A
Section 3, Panel 4 center	74' 8"	10-3/4" x 9-1/2" x 1/4"	Min. 1"	(4) 5/8"	N/A

Comments - Gusset Plate Details	

Section 3, Panel 3 center

Section 3, Panel 4 center

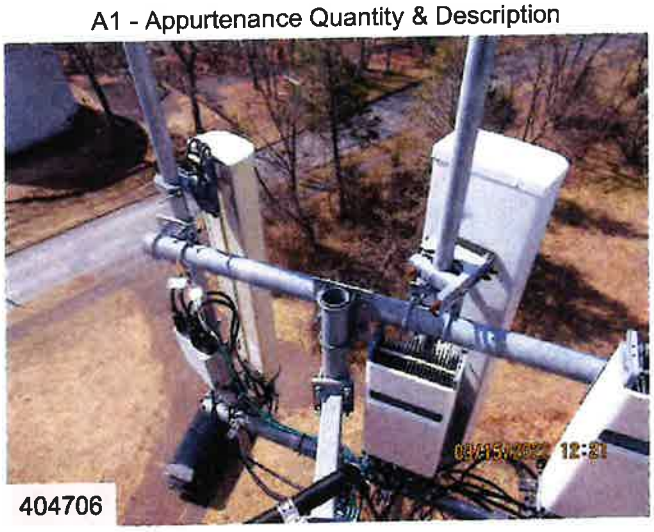
Antenna & Mount Details

*Unless Noted Otherwise: Elevations reference centerline of panel, yagi, and dish antennas, and base of dipole, and omni antennas, in relation to the base of the tower steel.

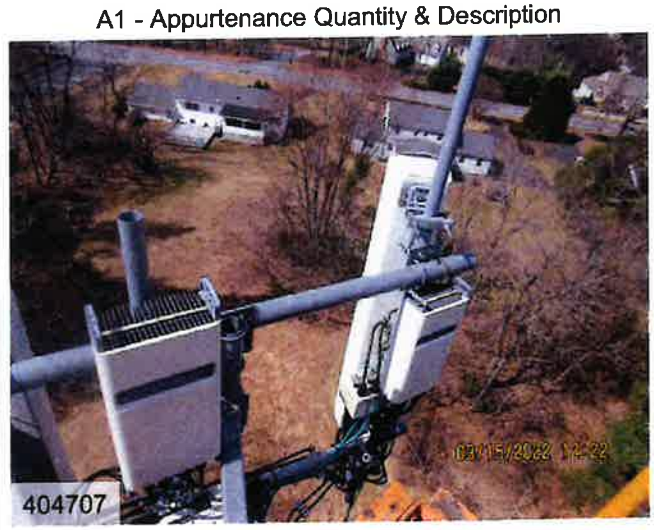
Appurtenance #	CL Mount / CL Antenna Elevation (Ft)	Appurtenance Quantity & Description	Mount Quantity & Description	Mount Leg / Face	Mount Azimuth / Antenna Azimuth
A1	Mount: 76' 8" Pos 1: CLM: +1.5', CLM: 0', CLM: -1' Pos 2: CLM: +1/2' Pos 3: CLM: -1.5', CLM: +2' Pos 4: CLM: +1', CLM: +1/2', CLM: -1'	Pos 1: (1) Kathrein 80010121 Antenna Pos 1: (1) 12" x 12" x 4" TMA Pos 1: (1) Kathrein 78211054 Antenna Pos 2: (1) CCI BUU-H6 Antenna Pos 2: (1) RRUS 32 Pos 3: (1) RRUS 11 B12 Pos 3: (1) RRUS 32 Pos 4: (1) Quintel 10 Port Multiserv Antenna Pos 4: (1) RRUS 32 Pos 4: (2) TMA Combiners	(2) 3-1/2" x 12' pipes @ 48" C-C on (4) 18" standoffs		Mount AZ: 330 Deg, 110 Deg, 230 Deg Antenna AZ: 10 Deg, 130 Deg, 250 Deg
A2	CLM: 74'	(1) 4' Lightning Rod	Direct Mount	B	135
A3	CLM: 73'	(1) 2-3/8" x 8' Unused Pipe Mount	Standoff attached to tower ring mount	Face DA	315
A4	67' 8"	Unused L6" x 6" x 7/16" x 8' 7" Diameter ring mount	Attached to internal members/horizontals		N/A

Comments - Antenna & Mounts	

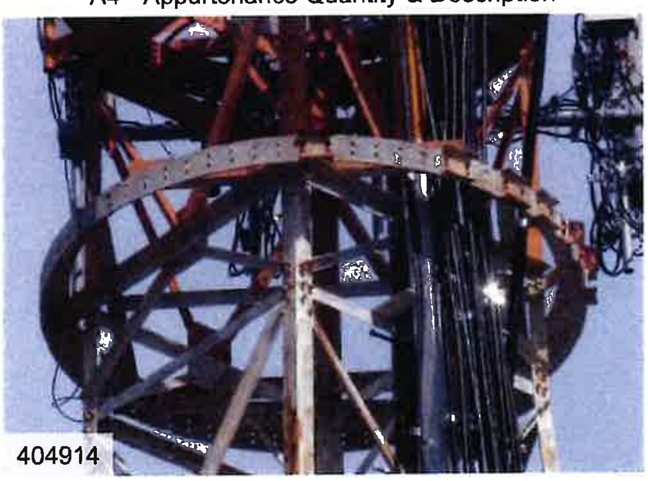
A1 - Appurtenance Quantity & Description



A1 - Appurtenance Quantity & Description



(Antenna & Mount Details Continued)

A2 - Appurtenance Quantity & Description	A3 - Appurtenance Quantity & Description
	
A4 - Appurtenance Quantity & Description	
	

Transmission Line Details

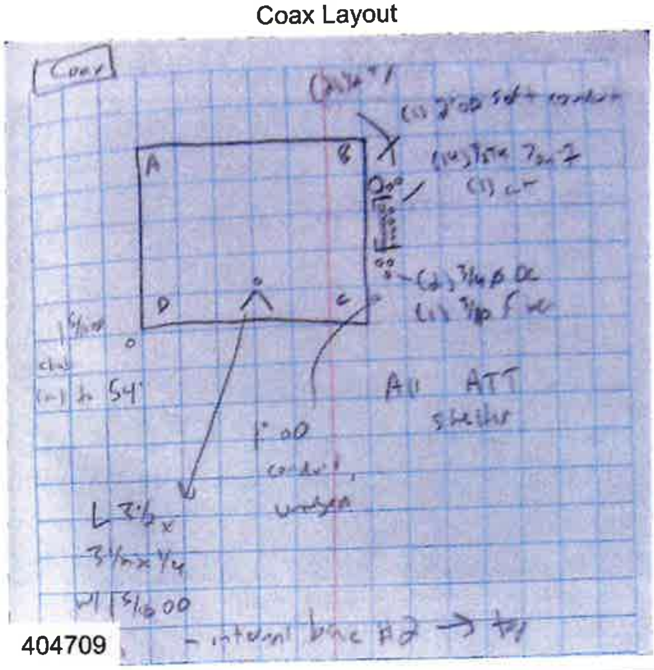
Insert photo up each tower face / leg under "Coax Leg / Face". Only include 1 photo for each face or leg.
List which coax go to which shelter. Shelter # 1, 2, 3 should match Shelter # in Site Details and Compound Sketch.

Coax Layout	

Appurtenance #	Coax Quantity / Size / Type	Coax Leg / Face	Active?	Shelter #	Owner
A1	(2) 1/2" TX (1) 2" OD (14) 7/8" TX (2) 3/4" OD (1) 3/4" Fiber	Face BC	Yes	1	AT&T;
A2	N/A	N/A	N/A	N/A	Tower
A3	N/A	N/A	No	N/A	N/A
A4	N/A	N/A	No	N/A	N/A

Compound Sketch	
Comments - Transmission Lines	(1) 1" OD from Face BC - Unused Conduit

Coax Layout



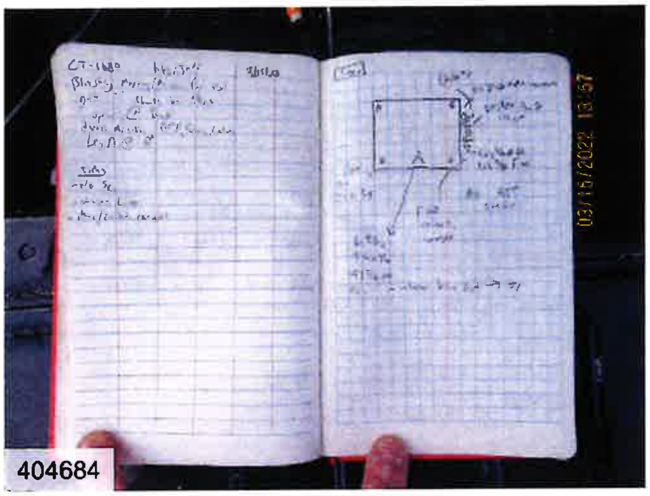
404709

Field Notes

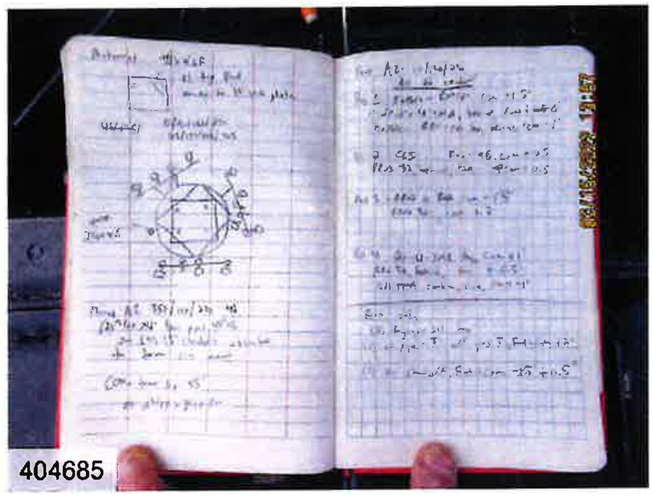
Crop and Attach all Mapping Field Notes

Field Notes Upload	

Field Notes Upload



Field Notes Upload



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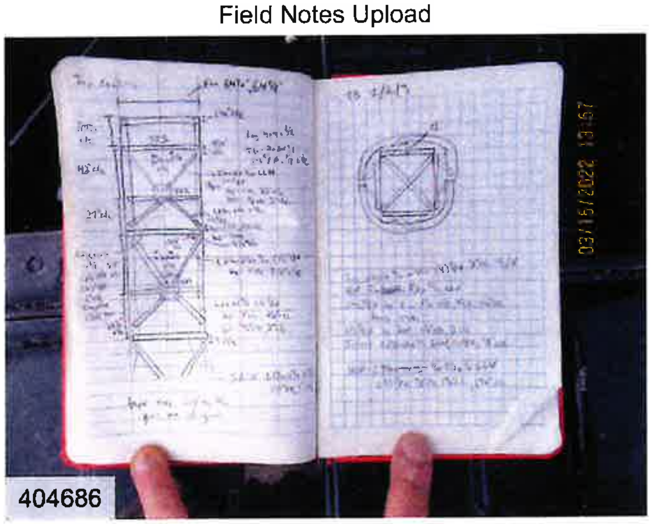

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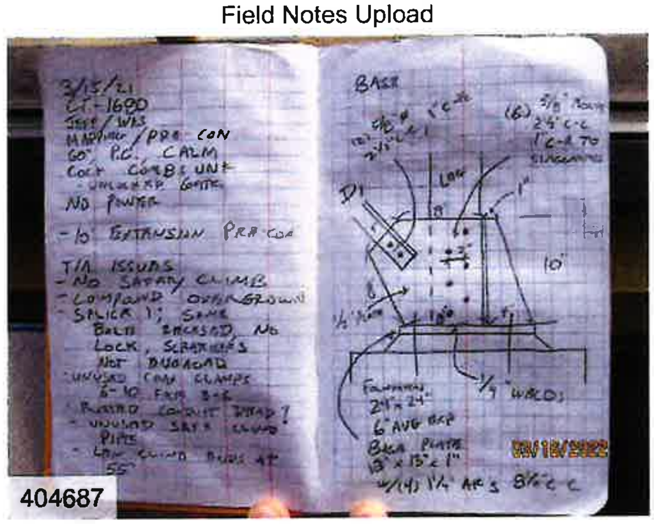
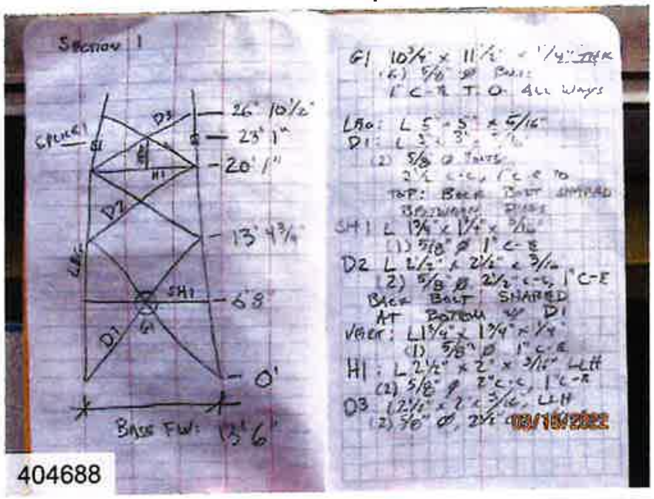


(Field Notes Continued)

Field Notes Upload



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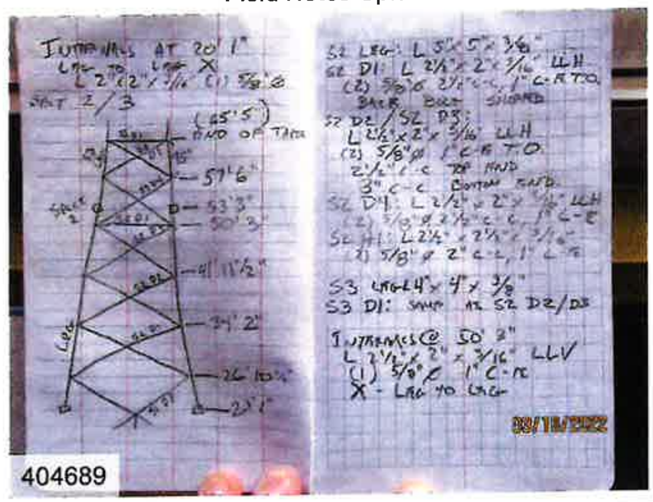

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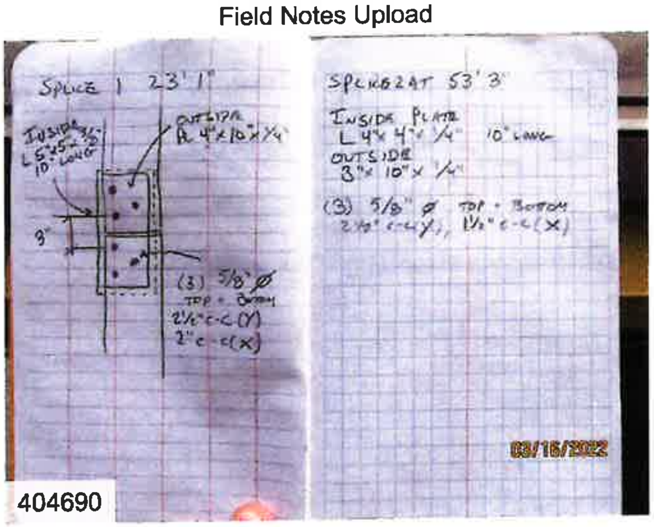


Structural Components
Bringing It All Together.

1870 W 64th Lane, Unit A
Denver, Colorado 80221
PH: 800-584-8839
sales@structuralcomponents.net

TIA Inspection + L&A; Mapping Report

Site Name CT-1680

Site ID

Prepared For Blue Sky Towers LLC

SC #	220142
Date of Inspection	03/15/2022
SC Lead	Wes Culver
SC Support	Jeff Ham
Weather During Inspection	Sunny 60F Calm

Site Information

City	Portland
State	CT
Site Address	97 High St
Latitude	41.580714
Longitude	-72.623860
Tower Type	SST
Tower Make/Model	Unknown
Measured Tower Height (T)	80' 6"
Measured Foundation Height (F)	6"
Measured Highest Appurtenance Height (A)	4'
Measured Overall Height (AGL) = F+T+A	85'
Tower Face Width (inches)	Bottom FW: 162"
Leg Type	Angle (90Â°)
Number of Tower Legs	4
Total Height Climbed	81'
Power Down Requirements	N/A
Power Down Contact Info	N/A
AM Detuning	No
Any Site Safety Issues	No Safety Climb
Comments - Site Info	

Street Map	
Satellite Map	

Site Details

Access Gate (at Access Road)	No
Gate Combo (Access Gate and/or Compound Gate)	Unknown - Unlocked Gate
Access Road Type	Asphalt
Access Road Width (feet)	13'
Approximate Road Length (feet)	75'
2WD Accessable	Yes
Compound Gate Photo	
Compound Signage	

# of Shelters	1
Shelters (Owner/# & LxW)	AT&T; / `25' x 18'
Outdoor Equipment - Carrier Pads/Platforms (Owner/# & LxW)	N/A
Overhead Power Lines to Site	No
Generator	No
Compound (LxW)	`50' x 35'
Compound Fence Height (feet)	8'
Anti-Climb Wire	Barbed
Compound Aerial Photo	
Compound Sketch	

Compound Gate Photo

Compound Gate Photo

(Site Details Continued)

Compound Aerial Photo

Site Deficiencies

Critical - Items may lead to collapse or failure of the structural system or antenna or pose a threat to the safety of personnel that might be on site
Moderate - Items or faults which do not have an immediate effect on the tower but if not corrected, will in time shorten the service life of the tower or its elementsÂ
Non-Critical - Items or faults relating to the general maintenance of the access road, gate, debris on-site, grounding

Site Deficiency	Condition	Description	Repair Description
Access Gate to Site	Moderate Repair	No lock on one of the compound gates	Install lock
Roadway to Site	Satisfactory		
Compound Fence	Satisfactory		
Compound	Non-Critical Repair	Compound overgrown	Remove vegetation in compound
Environmental Issues	N/A		
Shelters	Satisfactory		
Soil Erosion	N/A		
Anchor Fence	N/A		

Comments - Site Deficiencies	

Description - Description

Compound - Description

(Site Deficiencies Continued)

Compound - Description

404793

Tower Deficiencies

Critical - Items may lead to collapse or failure of the structural system or antenna or pose a threat to the safety of personnel that might be on site
Moderate - Items or faults which do not have an immediate effect on the tower but if not corrected, will in time shorten the service life of the tower or its elementsÂ
Non-Critical - Items or faults relating to the general maintenance of the access road, gate, debris on-site, grounding

Item	Condition	Description	Repair Description
Foundation / Concrete	Satisfactory		
Grout Under Base	Satisfactory		
Tower Base Grounding	Satisfactory		
Weep Holes at Base	Satisfactory		
Guy Anchors & Hardware	N/A		
Grounding at Anchors	N/A		
Guy Wires & Obstructions	N/A		
Guy Attachments at Tower	N/A		
Connection Bolts	Moderate Repair	Loose bolts / no lock on splice 1	Tighten bolts / install lock
Tower Members	Satisfactory		
Safety Climb & Ladder/Pegs	Urgent Repair	No safety climb / unused safety climb pipe	Install new safety climb
Paint	Satisfactory	Paint is faded/chipping on tower. Roughly 10-20% of tower is showing rust, primarily on hardware.	Remove rust and cold galvanize. Re-paint tower if required
Tower Reinforcement	N/A		
Transmission Lines	Non-Critical Repair	Cut coax at tower base / unused coax on tower / unused coax clamps on Face BC	Remove dead coax and unused clamps
Appurtenances	Satisfactory		
Aviation Lighting	N/A		
Lightning Rod	Satisfactory		
Other	N/A		

Comments - Tower Deficiencies	

(Tower Deficiencies Continued)

Connection Bolts - Description	Safety Climb & Ladder/Pegs - Description
	

(Tower Deficiencies Continued)

Paint - Description

Paint - Description

Paint - Description

Transmission Lines - Description

Antenna & Mount Details

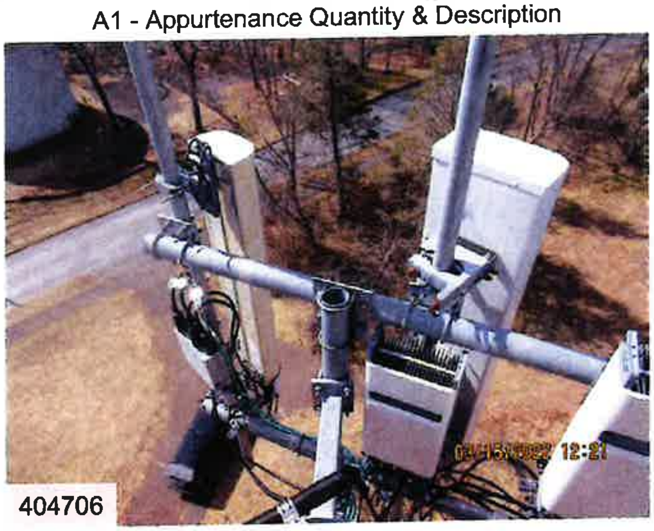
List Appurtenances top to bottom. Include lightning rod, lights, and unused mounts. Include all RRHs, TMAs, Squids, junction boxes, etc...
Number Appurtenance A1, A2, A3 etc. If there are a group of antennas at the same elevation, list A1-A6, etc.
Upload photos for each Appurtenance under "Appurtenance Description" column

Unused Antennas & Mounts on Tower

Appurtenance #	CL Mount / CL Antenna Elevation (Ft)	Appurtenance Quantity & Description	Mount Quantity & Description	Mount Leg / Face	Mount Azimuth / Antenna Azimuth
A1	Mount: 76' 8" Pos 1: CLM: +1.5', CLM: 0', CLM: -1' Pos 2: CLM: +1/2' Pos 3: CLM: -1.5', CLM: +2' Pos 4: CLM: +1', CLM: +1/2', CLM: -1'	Pos 1: (1) Kathrein 80010121 Antenna Pos 1: (1) 12" x 12" x 4" TMA Pos 1: (1) Kathrein 78211054 Antenna Pos 2: (1) CCI BUU-H6 Antenna Pos 2: (1) RRUS 32 Pos 3: (1) RRUS 11 B12 Pos 3: (1) RRUS 32 Pos 4: (1) Quintel 10 Port Multiserv Antenna Pos 4: (1) RRUS 32 Pos 4: (2) TMA Combiners	(2) 3-1/2" x 12' pipes @ 48" C-C on (4) 18" standoffs		Mount AZ: 330 Deg, 110 Deg, 230 Deg Antenna AZ: 10 Deg, 130 Deg, 250 Deg
A2	CLM: 74'	(1) 4' Lightning Rod	Direct Mount	B	135
A3	CLM: 73'	(1) 2-3/8" x 8' Unused Pipe Mount	Standoff attached to tower ring mount	Face DA	315
A4	67' 8"	Unused L6" x 6" x 7/16" x 8' 7" Diameter ring mount	Attached to internal members/horizontals		N/A

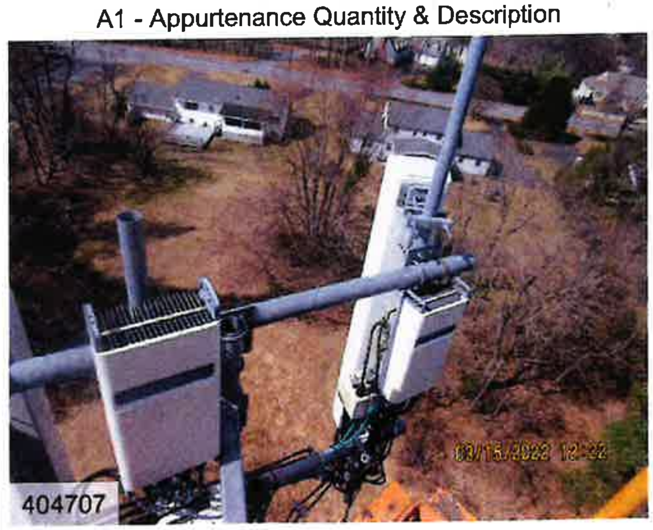
Comments - Antenna & Mounts

A1 - Appurtenance Quantity & Description



404706

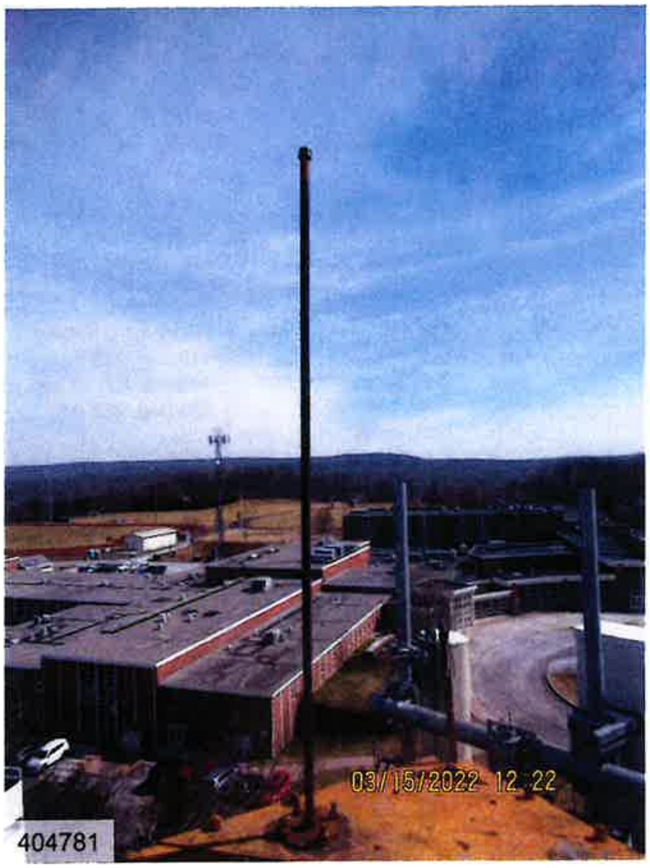
A1 - Appurtenance Quantity & Description



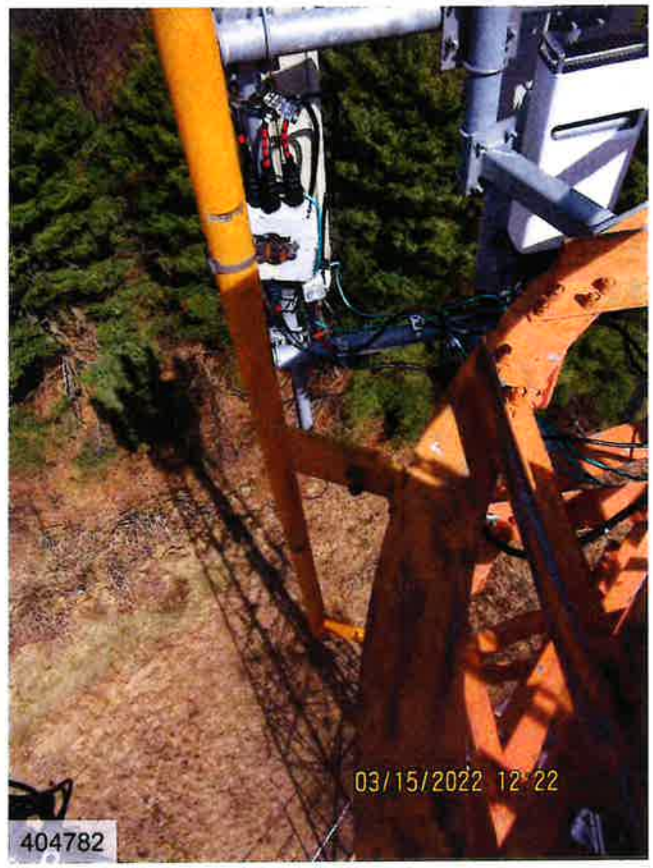
404707

(Antenna & Mount Details Continued)

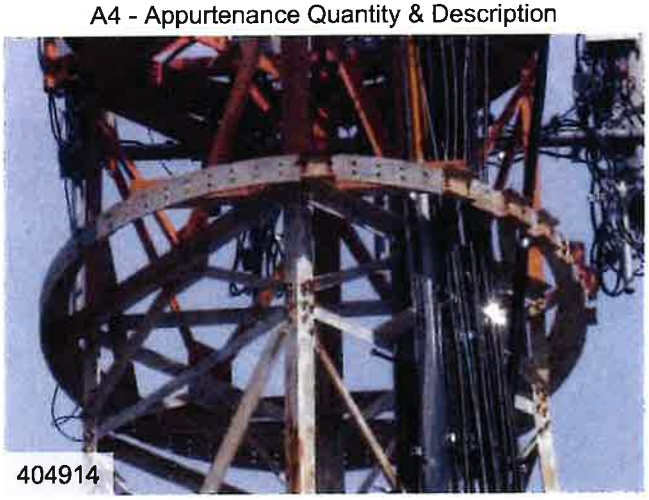
A2 - Appurtenance Quantity & Description



A3 - Appurtenance Quantity & Description



A4 - Appurtenance Quantity & Description



Transmission Line Details

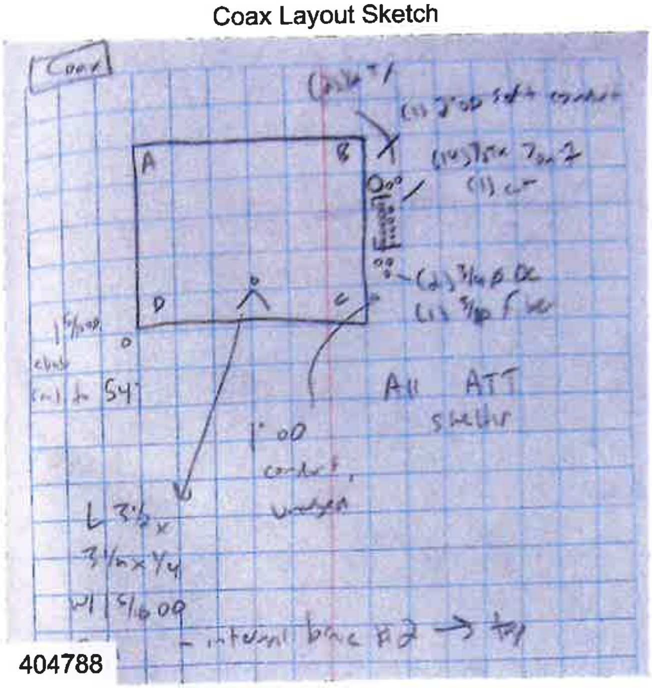
Insert photo up each tower face / leg under "Coax Leg / Face". Only include 1 photo for each face or leg.
List which coax go to which shelter.
Shelter # 1, 2, 3 should match Shelter # in Site Details and Compound Sketch.

Coax Painted	No
Unused Coax on Tower	Yes
Coax Layout Sketch	

Appurtenance #	Coax Quantity / Size / Type	Coax Leg / Face	Active?	Shelter #	Owner
A1	(2) 1/2" TX (1) 2" OD (14) 7/8" TX (2) 3/4" OD (1) 3/4" Fiber	Face BC	Yes	1	AT&T;
A2	N/A	N/A	N/A	N/A	Tower
A3	N/A	N/A	No	N/A	N/A
A4	N/A	N/A	No	N/A	N/A

Compound Sketch	
Comments - Transmission Lines	(1) 1" OD from Face BC - Unused Conduit

Coax Layout Sketch



404788

Power & Telco Information

AC Power Routing	
Power Company	
Overhead Pole #	
Phase	
Max # of Meter Cans	
Meter Owner / Number	
Amperage (Amps)	

Telco Provider	
Telco provided via	

P&T; Calculations & Guy Details

ONLY complete re-tensioning of guy wires if they are outside 7% - 15% of their Initial Tensions.Â Â If a re-tension is required, bring guy wires within 8% - 12% of their Initial Tensions.
Attach PDF or JPG of P&T Calculations.

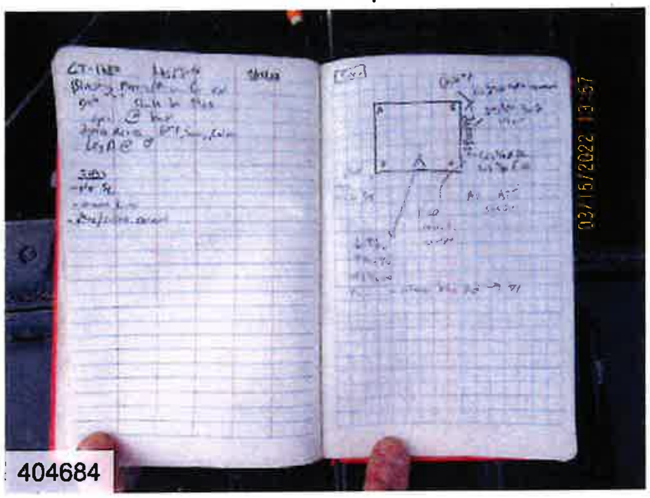
P&T; Calcs & Guy Details	
Quantity of Guy Wires Requiring Re-Gripping to Complete P&T;	
Minimum 2" Adjustment Range for all Turnbuckles?	
Total # of Anchors at Site	
Qty of Anchors Encased in Concrete	
Qty of Anchors Hand Dug	
Was Water Encountered During Digging	
Coating on Anchors	
External Galvanic Corrosion on Anchor Shaft	
Did Condition of Anchors Vary	
General Condition of Anchors Between 0 - 12" B.G.	
General Condition of Anchors Between 12 - 24" B.G.	
Did Soil Properties Vary Between Guy Lines	
General Soil Type 12" B.G.	

Field Notes

Crop and Attach all Field Notes

Field Notes Upload	

Field Notes Upload



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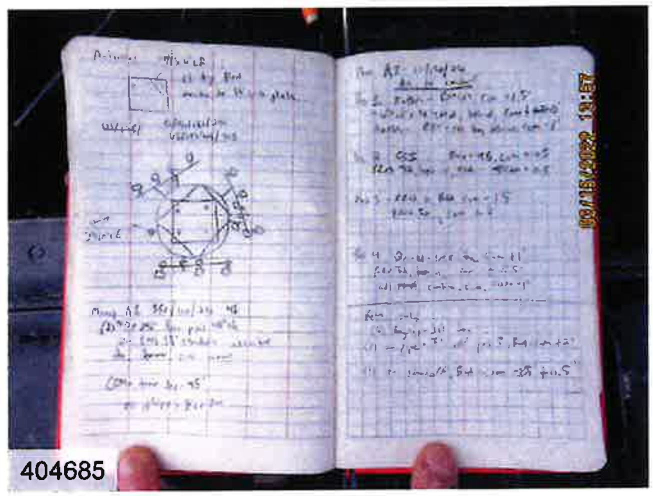

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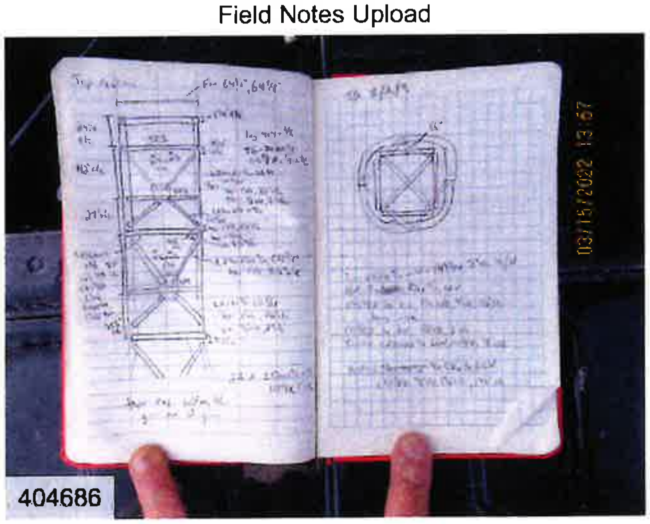

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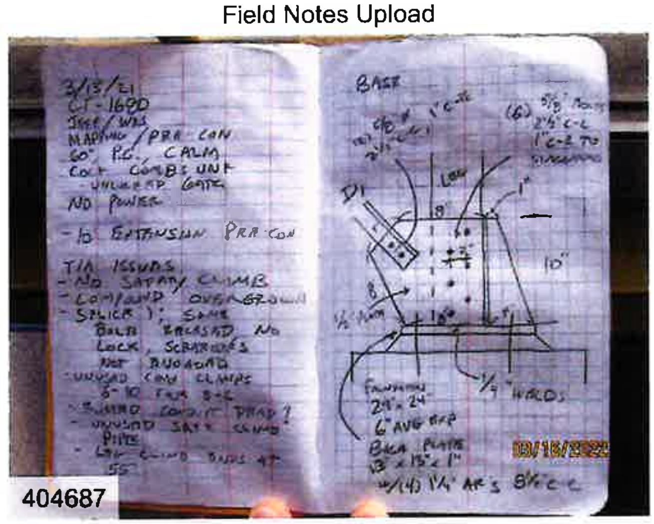
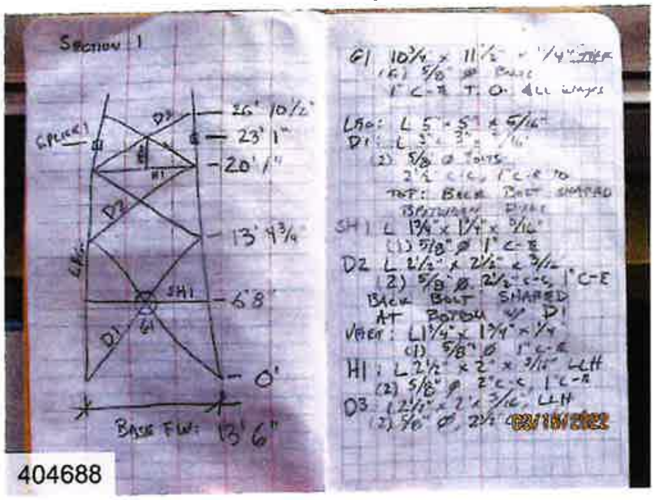
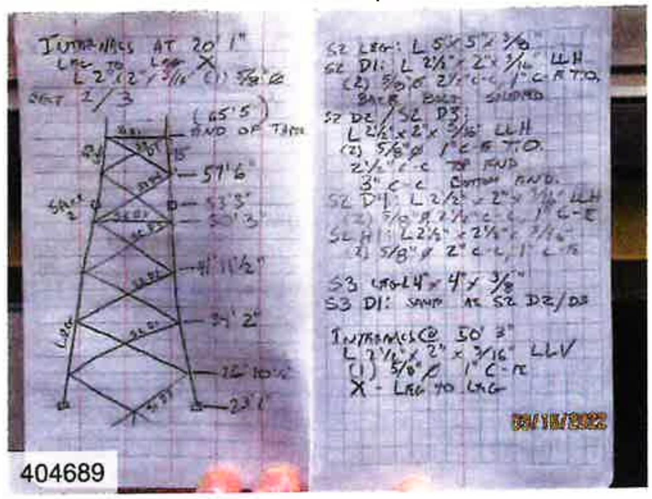


(Field Notes Continued)

Field Notes Upload	Field Notes Upload
	

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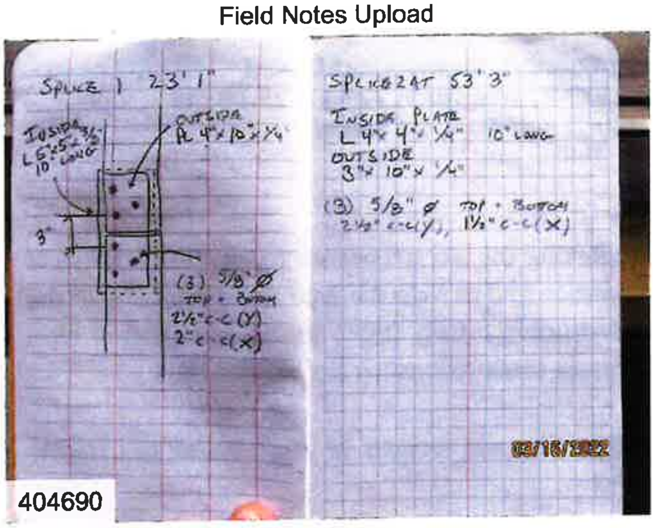


EMPIRE telecom

GPD Engineering and Architecture Professional Corporation

GPD# 2017702.58
March 6, 2017

FOUNDATION NDT MAPPING REPORT

Client Site Number:	**CT1006**
Site USID:	**59359**
FA Number:	**10035005**
Site Name:	**PORTLAND**
Site Data:	**213 High Street** **Portland (Middlesex County), Connecticut 06480** **Latitude 41° 34' 50.57" N, Longitude 72° 37' 25.90" W** **Existing 80-ft 4-Legged Self-Support Tower**

GPD is pleased to submit this **Foundation NDT Mapping Report** for the aforementioned tower. The purpose of this report is to summarize the results of our foundation exploration and provide the type and dimensions of the existing tower foundation system. The results of our non-destructive testing (NDT) for the detection of steel reinforcement bars within the upper exposed portion of the concrete tower foundation are also provided.

We at *GPD* appreciate the opportunity to provide continuing professional services to you. Please feel free to contact us with any questions or if you need additional assistance.

Respectfully Submitted,

Nicholas Zadd
GPD Engineering and Architecture Professional Corporation

Report Prepared by: Tyler Gaebler

Attachments: *Tower Foundation Drawing*
Site Photographs

TESTING METHODOLOGY

The dimensions of the existing foundation system were estimated using Sonic-Echo Impulse Response non-destructive testing (NDT) equipment in conjunction with hand tooling (i.e. probe rods and hand augers). In the Sonic-Echo Impulse Response testing procedure, the exposed top surface of an existing foundation is impacted with an instrumented hammer. The echoes of this impaction are recorded by a receiver. This data is then analyzed in order to determine the length of the existing foundation.

The size and spacing of the steel reinforcement (rebar) within the upper exposed portion of the formed concrete piers were estimated using a GSSI StructureScan Mini GPR Unit. GPR antennas transmit electrical pulses into the ground or concrete at a particular frequency. The strength and time required for the return of the pulse are recorded. A series of electric pulses are recorded in a scan which is then interpreted via computer software.

Refer to the attached Tower Foundation Drawing for the results of this field exploration.

DISCUSSION OF RESULTS AND LIMITATIONS

If the foundation discussed herein has been modified, it is likely that full access to portions of the original foundation is limited. Access to the foundation system may also be precluded by the presence of nearby equipment, excessive grounding wires, ice-bridge posts, etc. If access is limited, portions of non-destructive testing may not be able to be performed and the data obtained and testing results may be limited.

The recorded lengths and depths of foundation systems can be affected by various factors including the velocity of the energy wave within the foundation systems (varies depending on concrete composition, age of concrete, and other factors), the presence of a groundwater table, changes in soil stratification, and the presence of bedrock. Additionally, variations in the geometric dimensions (including breaks/voids in the concrete) of the foundation system may affect the depth interpreted from the testing data. Furthermore, the presence and dimensions of belled or tapered portions of piers may not be able to be detected using conventional NDT methods.

The dimensions, quantity, and spacing of rock anchors, micropiles, and helical anchors (if present) typically cannot be determined using conventional NDT methods. More invasive testing may be required to determine the properties of these foundation components (if present). This testing can be cost-prohibitive and may still yield limited results.

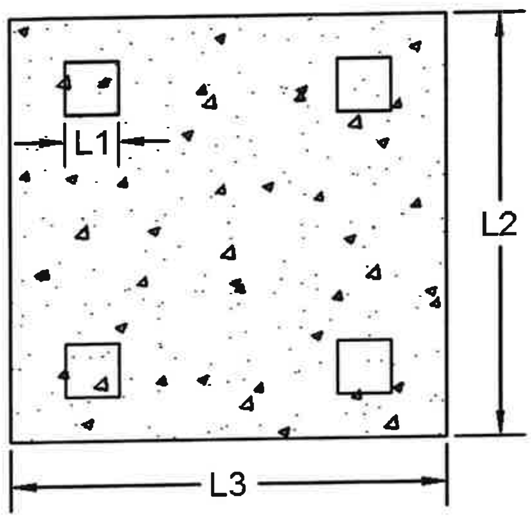
GPR testing can detect metallic and non-metallic objects within about 20 inches of the concrete surface under ideal conditions using a 1600 MHz antenna. If the depth to steel reinforcement is greater than 20 inches or environmental interference is limiting the penetration depth of the GPR, steel reinforcement (if present) will not be able to be detected using conventional NDT practices. Additionally, multiple layers of steel reinforcement may not be detected due to interference from previous layers of reinforcement. Furthermore, if the steel reinforcement does not extend to where testing is conducted, steel reinforcement (if present) will not be detected. The location where testing is conducted is affected by the presence of concrete overspill (where the smooth concrete pier cap transitions to a cast-in-place drilled pier), the presence of water near the ground surface, access to the side of the foundation, and/or the feasibility of hand-excavation of the soil. It should be noted that determining if reinforcement is present along the full length of a foundation system is beyond the scope of this investigation.

QUALIFICATIONS

The findings presented in this report are based upon the data obtained from the foundation exploration and from other information discussed in this report. The scope of services does not include either specifically or by implication any environmental assessment of the site or identification of contaminated or hazardous materials or conditions.

This report has been prepared for the exclusive use of **Empire Telecom** for specific application to the project discussed and has been prepared in accordance with generally accepted foundation exploration practices. No warranties, either expressed or implied, are intended or made. In the event that changes in the nature or design of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless ***GPD*** reviews the changes, and either verifies or modifies the conclusions of this report in writing.

Plan View



Foundation Dimensions

L1: 2 feet

L2: 18 feet

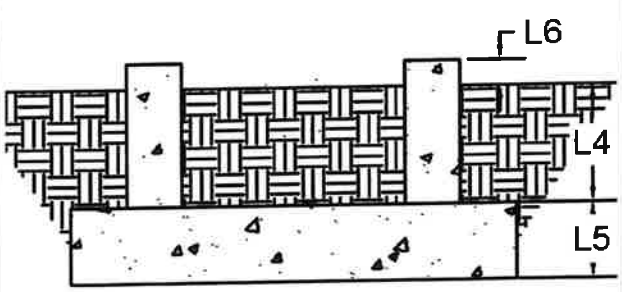
L3: 18 feet

L4: 4.5 feet

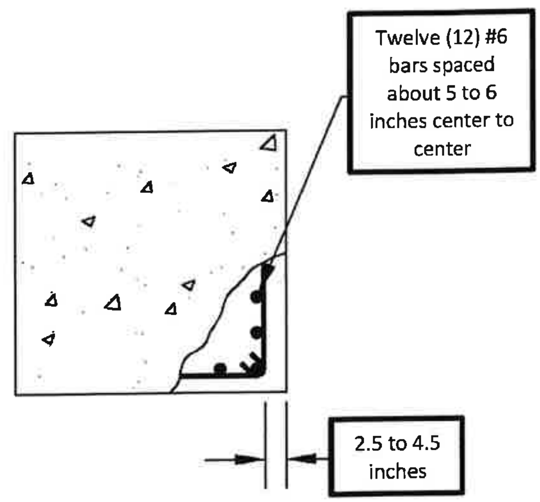
L5: 2 feet

L6: 6 inches

Elevation View



Steel Reinforcement



GPD Engineering and Architecture
Professional Corporation

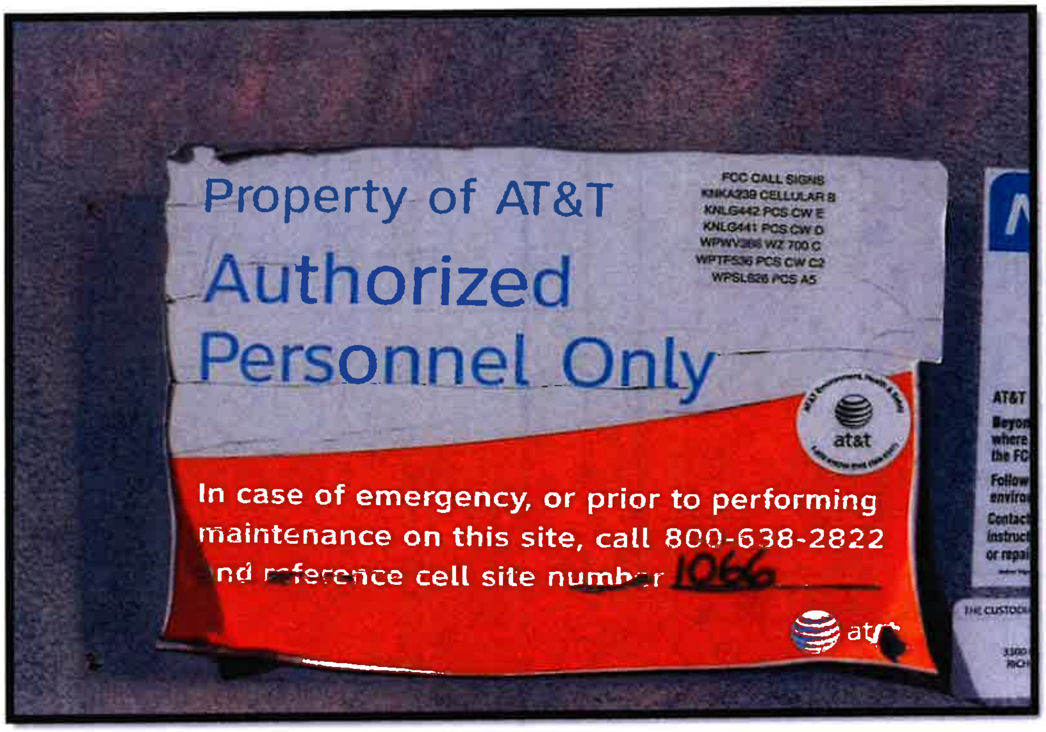
TOWER FOUNDATION DRAWING

Site Name: PORTLAND

Site USID: 59359

GPD Job Number: 2017702.58

Date: March 2017



1) PLACARD

2) ANTENNA CONFIGURATION

3) TOWER COMPOUND

4) TOWER BASE

5) VIEW OF FOUNDATION AT GROUND SURFACE

6) OVERALL VIEW OF TOWER

EMPIRE telecom

GPD Engineering and Architecture Professional Corporation

GPD# 2017702.58
March 6, 2017

GEOTECHNICAL REPORT

Client Site Number:	**CT1006**
Site USID:	**59359**
FA Number:	**10035005**
Site Name:	**PORTLAND**

Site Data:	**213 High Street** **Portland (Middlesex County), Connecticut 06480** **Latitude 41° 34' 50.57" N, Longitude 72° 37' 25.90" W** **Existing 80-ft 4-Legged Self-Support Tower**

GPD is pleased to submit this **Geotechnical Report** for the aforementioned tower. The purpose of the following report is to summarize the soil/rock conditions encountered during the subsurface exploration at this site and provide geotechnical engineering parameters for structural evaluation of the existing tower foundation system.

We at *GPD* appreciate the opportunity to provide continuing professional services to you. Please feel free to contact us with any questions or if you need additional assistance.

Respectfully Submitted,

Christopher J. Scheks, P.E.
GPD Engineering and Architecture Professional Corporation

STATE OF CONNECTICUT CHRISTOPHER J. SCHEKS No. 30026 LICENSED PROFESSIONAL ENGINEER

Report Prepared by: Dustin Vincent

Attachments: *Site Location Map*
Satellite Photograph
Topographic Map
Boring Log

GEOTECHNICAL EXPLORATION

Drilling and soil sampling was performed by SoilTesting, Inc. using a truck-mounted Diedrich D-120 drill rig with hollow-stem augers and a manual SPT hammer. One (1) sample boring was drilled near the tower foundation. Representative samples were obtained by the split-barrel sampling procedure in general accordance with appropriate ASTM standards. In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (N). Sampling depths and penetration distance, plus the standard penetration resistance values, are shown on the attached boring log. The samples were sealed and mailed to our laboratory for soil classification in general accordance with appropriate ASTM standards.

The subsurface conditions encountered at the boring location are indicated on the attached boring log. The stratification boundaries on the boring log represent the approximate location of changes in soil/rock types; in-situ, the transition between materials may be gradual. The boring log includes visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples.

ROCK EXPLORATION

The boring was advanced into the rock using core drilling procedures in general accordance with the appropriate ASTM standard. The rock was classified in the field and the "percent recovery" and rock quality designation (RQD) values were determined.

The "percent recovery" is the ratio of the sample length retrieved to the drilled length, expressed as a percent. An indication of the actual in-situ rock quality is provided by calculating the sample's RQD. The RQD is the percentage of the length of broken cores retrieved which have core segments at least 4 inches in length compared to each drilled length. The percent recovery and RQD are related to rock soundness and quality as illustrated below:

ROCK QUALITY DESIGNATION (RQD)

Relation of RQD and In-situ Rock Quality	
RQD (%)	Rock Quality
90 – 100	Excellent
75 – 90	Good
50 – 75	Fair
25 – 50	Poor
0 -25	Very Poor

Classification and descriptions of rock core samples are based on visual and tactile observations. Petrographic analysis of thin sections may indicate other rock types. Percent recovery and rock quality designation (RQD) were calculated for these samples and are noted at their depths of occurrence on the boring log.

SOIL CLASSIFICATION

The soil samples were classified in general accordance with the appropriate ASTM standard based on visual observation, texture and plasticity. Estimated group symbols according to the Unified Soil Classification System are given on the attached boring log.

GROUNDWATER

Groundwater was not encountered during drilling operations as noted on the attached boring log. It should be noted that fluctuations in the groundwater level can occur and perched water can develop over low permeability soil or rock strata following periods of heavy or prolonged precipitation. Long term monitoring in cased holes or piezometers would be necessary to accurately evaluate the potential range of groundwater conditions on the site.

GEOTECHNICAL RECOMMENDATIONS

Based on the results of this study, the following net design parameters may be used to evaluate the capacity of the foundation system. A factor of safety on the order of 2 to 3 should be applied to the ultimate bearing pressure values provided below. The cohesion, internal angle of friction and unit weight parameters along with the vertical modulus of subgrade reaction and sliding friction coefficient values given in the following table are based on the results of the sample boring, published values and our past experience with similar soil/rock types. These values should, therefore, be considered approximate.

Self-Support Tower – Mat Foundation – Ultimate Design Parameters

Depth (feet)	USCS	Unit Weight (pcf)	Ultimate Bearing Pressure (psf)	Sliding Friction Coefficient @ Base	Vertical Modulus of Subgrade Reaction (pci)	Internal Angle of Friction (Degrees)	Cohesion (psf)
0 – 2.5*	SP	115	Ignore	-	-	-	-
2.5 – 6.5*	CONGLOMERATE	150	30,000	0.60	500	0	10,000
6.5 – 12.5	CONGLOMERATE	150	36,000	0.60	600	0	12,000

*A unit weight of 110 pcf and an internal angle of friction of 30 degrees should be used for the backfill above the mat foundation in analysis.

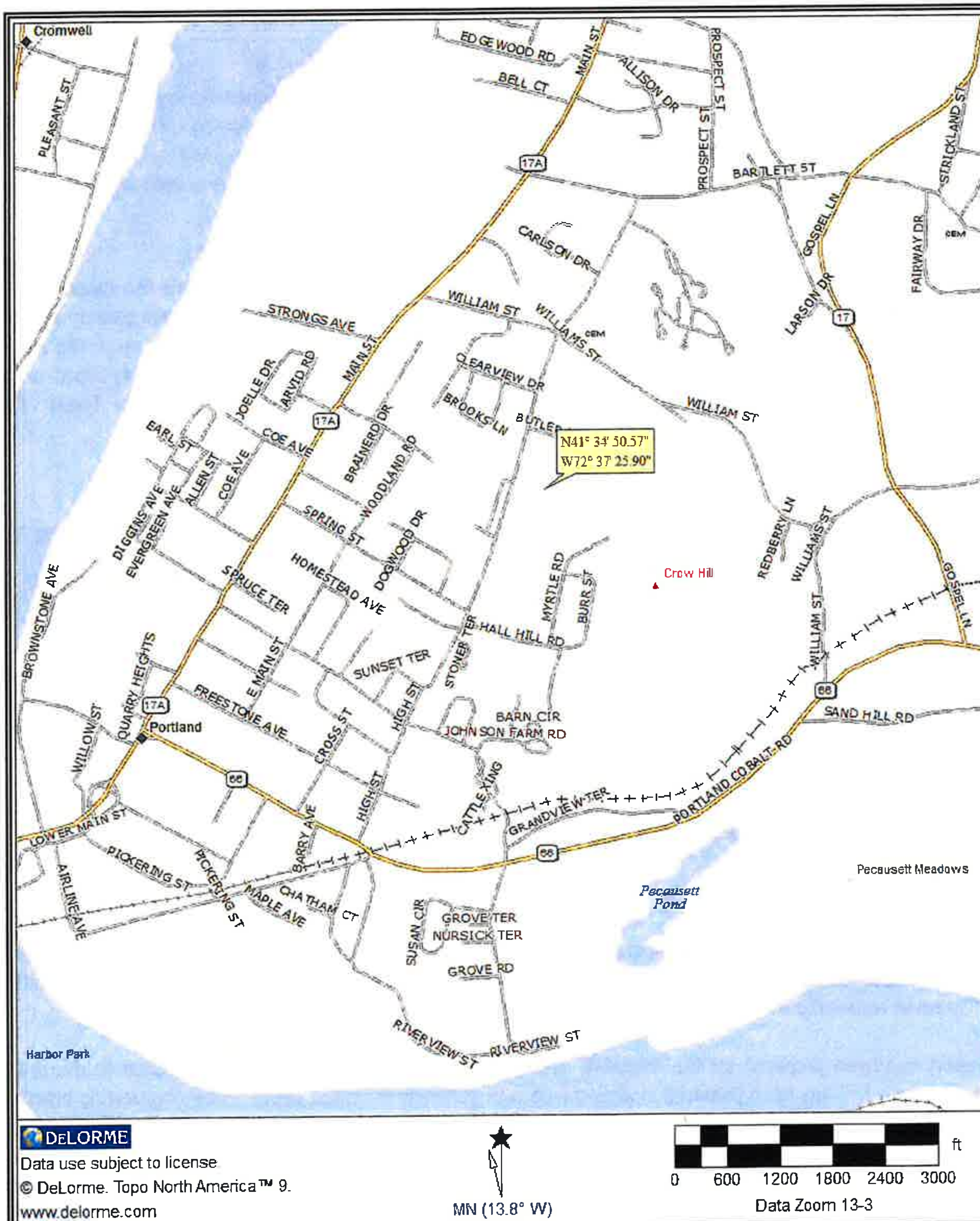
The above parameters are provided for the evaluation of the existing tower foundation system. In the event that modifications or new tower construction is required, these parameters are not considered valid and GPD should be notified immediately to provide appropriate design parameters, as warranted.

QUALIFICATIONS

The analysis and recommendations presented in this report are based upon the data obtained from the boring performed at this site and from other information discussed in this report. This report does not reflect variations that may occur across the site or due to the modifying effects of weather.

This report has been prepared for the exclusive use of **Empire Telecom** for specific application to the project discussed herein and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made. In the event that changes in the nature or design as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless ***GPD*** reviews the changes and either verifies or modifies the conclusions of this report in writing.

The scope of services for this project does not include either specifically or by implication any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken.



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SITE LOCATION MAP

Site Name: PORTLAND

Site USID: 59359

GPD Job Number: 2017702.58

Date: March 2017

GPD Engineering and Architecture Professional Corporation

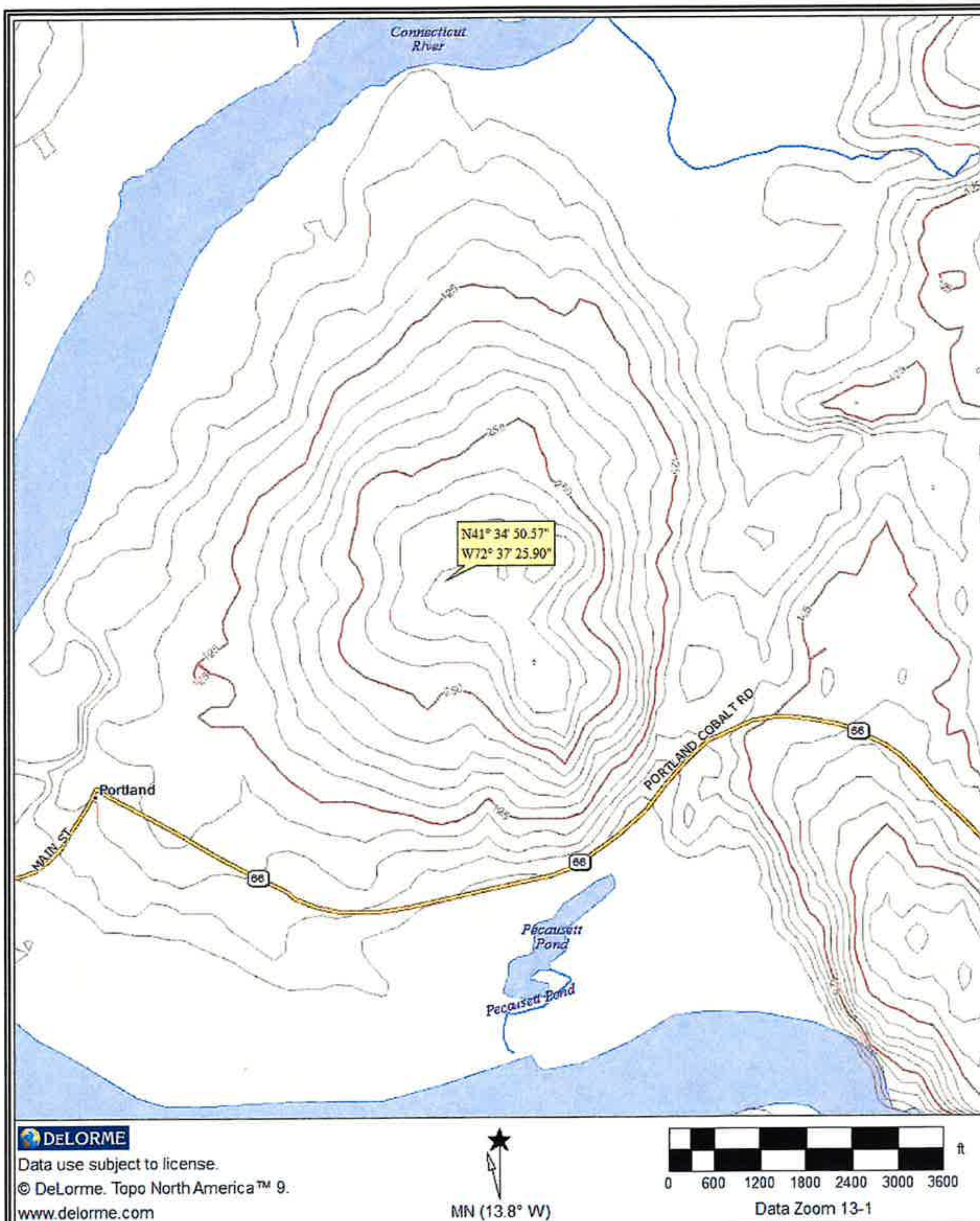
SATELLITE PHOTOGRAPH

Site Name: PORTLAND

Site USID: 59359

GPD Job Number: 2017702.58

Date: March 2017



GPD Engineering and Architecture
Professional Corporation

TOPOGRAPHIC MAP

Site Name: PORTLAND

Site USID: 59359

GPD Job Number: 2017702.58

Date: March 2017

Boring Number: B-1

CLIENT Empire Telecom
PROJECT NUMBER 2017702.58
DATE STARTED February 27, 2017 COMPLETED February 27, 2017
DRILLING CONTRACTOR SoilTesting, Inc.
DRILLING METHOD Hollow Stem Auger - 4 1/4" ID
LOGGED BY Dustin Vincent CHECKED BY Nicholas Zadd
NOTES Diedrich D-120 Drill Rig with Manual SPT Hammer

PROJECT NAME PORTLAND
PROJECT LOCATION Portland, Connecticut
GROUND ELEVATION ______ HOLE SIZE ______
GROUND WATER LEVELS:
AT TIME OF DRILLING --- DRY
AT END OF DRILLING --- DRY

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0.0		Topsoil - 4 inches									
		Medium Dense brown fine to coarse SAND (SP) with gravel and weathered rock fragments	SS 1	94	6-12-100/5"		6				
2.5		Auger refusal at 2.5 feet									
		Well cemented, moderately weathered, moderately fractured gray CONGLOMERATE									
5.0			RC 2	80 (30)							
7.5											
10.0			RC 3	93 (52)							
12.5											

Boring terminated at 12.5 feet

CENTER TERMINATION NOTE - GINT STD US LAB.GDT - 3/6/17 14:15 - O:\GEOTECH\JOBS\GINT PROJECTS (STARTED AFTER 032414)\GINT PROJECTS 2015\59359 PORTLAND.GPJ

SRR Towers Collocation Application

Installation Type: Anchor ☐ Collocation ☑ Add to Existing ☐

Contact: James Burgess
Email jamesb@blueskytower.com
Office: 617-549-2800
Fax:

Site Number:
Site Name:
Submittal Date
Revision Date(s)

PLEASE SUBMIT THIS APPLICATION VIA E-MAIL. Include Drawings, Specification Sheets, RFDS, Antenna Data Sheets

Applicant Information

Applicant Name:	AT&T	Primary Contact/Agent Name:	Allison Conwell
Applicant Site Name:	Portland	Contact/Agent Company Name:	Centerline Communications
Applicant Site Number:	CT1066	Contact/Agent Number:	215-588-7035
Proposed ON AIR Date:		Contact Email:	aconwell@clinellc.com

Applicant Contact Information

Leasing Contact Name:	Allison Conwell	Email:	aconwell@clinellc.com	Number:	215-588-7035
RF Contact Name:		Email:		Number:	
Construction Contact Name:		Email:		Number:	
Emergency Contact Name:		Email:		Number:	
Account Payable Contact Name:		Email:		Number:	

Tower Information

Latitude:	41.5807139 N	Structure Type:	Self -Support
Longitude:	-72.62386 W	Structure Height:	80
AMSL:	FT	Site Address:	97 High Street Portland, CT 06480

EQUIPMENT SPECIFICATIONS

Summary of Work to be Completed:	Replacing (6) antennas, adding (3) antennas (new antennas stacked, no additional space required, replacing (3) RRUs, adding (3) RRUs, removing (3) TMAs, adding (1) surge arrestor, adding (1) fiber cable and adding (3) DC cables.

EXISTING CONDITIONS - List all installed equipment prior to proposed modification. If this is a new installation, proceed to FINAL CONFIGURATION.

	SECTOR 1	SECTOR 2	SECTOR 3	SECTOR 4 (if necessary)
Current RAD Center (Ft AGL)	77	77	77	
Tower Mount Height (if different than RAD ctr)				
Mount Type (Label "Existing" if no change)	Existing	Existing	Existing	
Mount Model #				
Antenna Manufacturer	Kathrein / CCI / Quintel	Kathrein / CCI / Quintel	Kathrein / CCI / Quintel	
Antenna Model# (Attach Specs)	800 10121 / HPA-65R-BUU-H6 / QS66510-6	800 10121 / HPA-65R-BUU-H6 / QS66510-6	800 10121 / HPA-65R-BUU-H6 / QS66510-6	
Antenna Dimensions (WxHxD in inches)	54.5 x 10.3 x 5.9 / 72 x 14.8 x 9 / 72 x 12 x 9.6	54.5 x 10.3 x 5.9 / 72 x 14.8 x 9 / 72 x 12 x 9.6	54.5 x 10.3 x 5.9 / 72 x 14.8 x 9 / 72 x 12 x 9.6	
Antenna Weight (Lbs.)	44.1 / 50.7 / 98	44.1 / 50.7 / 98	44.1 / 50.7 / 98	
Antenna Quantity	(1) / (1) / (1)	(1) / (1) / (1)	(1) / (1) / (1)	
Dish Manufacturer				
Dish Model# (attach Specs)				
Dish Diameter (Ft)				
Dish Weight (Lbs.)				
Dish Mount Height				
Azimuths	30	150	270	
Total # of Coax Lines per Sector	2	2	2	
Diameter Of Coax Cables (In)	7/8"	7/8"	7/8"	
Total # of Hybrid Cables per Sector				
Diameter Of Hybrid Cables (In)				
Total # of other Cables per Sector	4 DC / 2 Fiber			
Diameter Of Other Cables (In)	3/4" / 3/8"			
Quantity of RRUs per Sector	4	4	4	
Manufacturer	Ericsson	Ericsson	Ericsson	
Model	RRUS 11 B12 / RRUS 32 B2 / RRUS 32 B66A / RRUS 32 B30	RRUS 11 B12 / RRUS 32 B2 / RRUS 32 B66A / RRUS 32 B30	RRUS 11 B12 / RRUS 32 B2 / RRUS 32 B66A / RRUS 32 B30	
Dimensions	17.8 x 17 x 7.2 / 27.2 x 12.1 x 7 / 27.2 x 12.1 x 7 / 27.2 x 12.1 x 7	17.8 x 17 x 7.2 / 27.2 x 12.1 x 7 / 27.2 x 12.1 x 7 / 27.2 x 12.1 x 7	17.8 x 17 x 7.2 / 27.2 x 12.1 x 7 / 27.2 x 12.1 x 7 / 27.2 x 12.1 x 7	
Weight (Lbs.)	55 / 60 / 60 / 60	55 / 60 / 60 / 60	55 / 60 / 60 / 60	
Quantity of TMAs per Sector	1	1	1	
Manufacturer	CCI	CCI	CCI	
Model	DTMABP7819VG12A	DTMABP7819VG12A	DTMABP7819VG12A	
Dimensions	10.63x 11.02 x 3.78	10.63x 11.02 x 3.78	10.63x 11.02 x 3.78	
Weight (Lbs.)	19	19	19	
Quantity of Surge Arrestors per Sector	2	0	0	
Manufacturer	Raycap			
Model	DC6-48-60-18-8F			
Antenna Model & Quantity to be Removed per Sector (If Applicable)	3	3	3	
RRU Model & Quantity to be Removed per Sector (If Applicable)	3	3	3	
Line/Cable Type, Size & Quantity to be Removed (If Applicable)				
List Any Other Equipment to be Removed (If Applicable)	3 TMA	3 TMA	3 TMA	

FINAL CONFIGURATION - List all installed equipment after proposed modification or initial installation.

	SECTOR 1	SECTOR 2	SECTOR 3	SECTOR 4 (if necessary)
Current/Proposed RAD Center (Ft AGL)	77	77	77	
Tower Mount Height (If different than RAD ctr)				
Mount Type (Label "Existing" if no change)	Existing	Existing	Existing	
Mount Model #				
Antenna Manufacturer	CCI / Ericsson / CCI	CCI / Ericsson / CCI	CCI / Ericsson / CCI	
Antenna Model# (Attach Specs)	TPA65R-BU6DA-K / AIR6449 B77D + AIR6419 B77G / DMP65R-BU6DA	TPA65R-BU6DA-K / AIR6449 B77D + AIR6419 B77G / DMP65R-BU6DA	TPA65R-BU6DA-K / AIR6449 B77D + AIR6419 B77G / DMP65R-BU6DA	
Antenna Dimensions (WxHxD in inches)	71.2 x 20.7 x 7.7 / (2) 30.4 x 15.9 x 8.1 / 71.2 x 20.7 x 7.7	71.2 x 20.7 x 7.7 / (2) 30.4 x 15.9 x 8.1 / 71.2 x 20.7 x 7.7	71.2 x 20.7 x 7.7 / (2) 30.4 x 15.9 x 8.1 / 71.2 x 20.7 x 7.7	
Antenna Weight (Lbs.)	69 / (2) 82 / 80	69 / (2) 82 / 80	69 / (2) 82 / 80	

Antenna Quantity	4 (AIR's are stacked)	4 (AIR's are stacked)	4 (AIR's are stacked)	
Dish Manufacturer				
Dish Model# (attach Specs)				
Dish Diameter (Ft)				
Dish Weight (Lbs.)				
Dish Mount Height				
Azimuths	30	150	270	

Total # of Coax Lines per Sector	2	2	2	
Diameter Of Coax Cables (In)	7/8"	7/8"	7/8"	
Total # of Hybrid Cables per Sector				
Diameter Of Hybrid Cables (In)				
Total # of other Cables per Sector	4 DC / 1 Fiber	3 DC / 1 Fiber		
Diameter Of Other Cables (In)	3/4" / 3/8"	.92"/ 1/2"		
Quantity of RRUs per Sector	5	5	5	
Manufacturer	Ericsson	Ericsson	Ericsson	
Model	RRUS 32 B2 / RRUS 32 B30 / RRUS 32 B66A / RRUs 4478 B14 / RRUS 4449 B5/B12	RRUS 32 B2 / RRUS 32 B30 / RRUS 32 B66A / RRUs 4478 B14 / RRUS 4449 B5/B12	RRUS 32 B2 / RRUS 32 B30 / RRUS 32 B66A / RRUs 4478 B14 / RRUS 4449 B5/B12	
Quantity of TMAs per Sector				
Manufacturer				
Model				
Quantity of Surge Arrestors per Sector	2	1		
Manufacturer	Raycap	Raycap		
Model	DC6-48-60-18-8F	DC9-48-60-24-8C-EV		
Transmit Frequency (MHz)	734-746, 788-799880-890, 891.5-894, 1930-1945, 1965-1970, 1975-1990, 2170-2180, 2345-2360, 3450-3550, 3700-3980	734-746, 788-799880-890, 891.5-894, 1930-1945, 1965-1970, 1975-1990, 2170-2180, 2345-2360, 3450-3550, 3700-3980	734-746, 788-799880-890, 891.5-894, 1930-1945, 1965-1970, 1975-1990, 2170-2180, 2345-2360, 3450-3550, 3700-3980	
Receive Frequency (MHz)	704-728, 758-769, 835-845,846.5-849, 1770-1780, 1850-1865,1885-1890,1895-1910, 2305-2320, 3450-3550, 3700-3980	704-728, 758-769, 835-845,846.5-849, 1770-1780, 1850-1865,1885-1890,1895-1910, 2305-2320, 3450-3550, 3700-3980	704-728, 758-769, 835-845,846.5-849, 1770-1780, 1850-1865,1865-1890,1895-1910, 2305-2320, 3450-3550, 3700-3980	
Antenna Gain (Db)				
Type of Technology	CBAND DoD	CBAND DoD	CBAND DoD	
TX Power Output				
ERP (Watts)				
Electric Service Required (Amps/Volts)				

GROUND SPACE REQUIREMENTS

Existing Lease Area: DIMS: L(ft) 22 W(ft) 14' 7" OR 319 Square footage

New/Add 'l Lease Area being requested: DIMS: L(ft) ______ W(ft) ______ OR ______ Square footage

Shelter: DIMS: L(ft) ______ W(ft) ______ H(ft) ______

Concrete Pad for Shelter/Cabinets: DIMS: L(ft) ______ W(ft)

POWER REQUIREMENTS

Power Provided by: ______ Electrical Service Provider: ______ Electrical Service Telephone Number: ______

Average Monthly Power Consumption: ______ KWH units

Is a multi-tenant meter rack present: Yes How many, if any, empty meter banks are present: ______

Telco/Interconnect Requirements: POTS ☐ T1 ☐ MICROWAVE ☐ FIBER OPTICS ☑

Fiber Provider: ______

BACK-UP POWER INFORMATION

Generator Required: ______ Generation Location: ______ **Fuel Type:** ______

Generator Ground Space Requirement: DIMS: L(ft) ______ W(ft) ______ H(ft) ______ KW

BST Generator: ______ Generator Owner: ______ Shared Generator Peak Usage: ______

Generator Capacity: ______ KW Generator Make: ______ Generator Model: ______

Fuel Tank Location: ______ Fuel Tank Size: DIMS: L(f ______ W(ft) ______ Fuel Tank S ______ Gallons

Pad for Fuel Tank (if required) DIMS: L(ft ______ W(ft) ______

Comments: ______

Comments: List any pertinent information that was not included above.

EPA - Tower Summary

Totals:

Tower Top EPA SQIN (with Drag & Shielding)	19,172.9
Tower Top Weight lbs	1,819.5
Cabling SQ IN	8.1
TOTAL Tower Top + Cabling	19,181.0

Sub-Totals:

Antenna SQIN	11,521.4
RRH SQIN	3,721.7
Squid SQIN	929.9
TMA SQIN	-
WCS Filter SQIN	-
Combiner SQIN	-
RET SQIN	-
Microwave SQIN	-
ODU SQIN	-
Ice Bridge SQIN	-
Mount SQIN	3,000.0

HUDSON
Design Group LLC

January 21, 2022

Centerline Communications
750 West Center Street, Suite #301
West Bridgewater, MA 02379

RE:	Site Number:	CT1066
	FA Number:	10035005
	PACE Number:	MRCTB055774
	PT Number:	2051A11LZZ
	Site Name:	PORTLAND
	Site Address:	213 High Street Portland, CT 06480

To Whom It May Concern:

Hudson Design Group LLC (HDG) has been authorized by Centerline Communications to perform a mount analysis on the existing AT&T antenna/RRH mounts to determine their capability of supporting the following additional loading:

- (3) RRUS-32 B2 RRH's (27.2"x12.1"x7.0" – Wt. = 60 lbs. /each)
- (3) RRUS-32 B30 RRH's (27.2"x12.1"x7.0" – Wt. = 60 lbs. /each)
- (3) RRUS-32 B66A RRH's (27.2"x12.1"x7.0" – Wt. = 60 lbs. /each)
- (2) Squid Surge Arrestors (24.0"x9.7" Ø – Wt. = 33 lbs. /each)
- **(3) TPA65R-BU6DA-K Antennas (71.2"x20.7"x7.7" – Wt. = 69 lbs. /each)**
- **(3) AIR6449 Antennas (30.6"x15.9"x10.6" – 82 lbs. /each)**
- **(3) AIR6419 Antennas (31.0"x16.1"x7.3" – Wt. = 66 lbs. /each)**
- **(3) DMP65R-BU6DA Antennas (71.2"x20.7"x7.7" – Wt. = 80 lbs. /each)**
- **(3) 4478 B14 RRH's (18.1"x13.4"x8.3" – Wt. = 60 lbs. /each)**
- **(3) 4449 B5/B12 RRH's (17.9"x13.2"x9.4" – Wt. = 73 lbs. /each)**
- **(1) Squid Surge Arrestor (24.0"x9.7" Ø – Wt. = 33 lbs.)**

**Proposed equipment shown in bold*

No original structural design documents or fabrication drawings were available for the existing mounts. HDG's subconsultant, ProVertic LLC, performed a survey climb and mapping of the existing AT&T antenna mounts on January 5, 2022. HDG conducted a ground audit of the existing AT&T antenna mounts on October 20, 2021.

Mount Analysis Methods:

- This analysis was conducted in accordance with EIA/TIA-222-H, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, the International Building Code 2015 with 2018 Connecticut State Building Code, and AT&T Mount Technical Directive – R16.
- HDG considers this mount to be asymmetrical and has applied wind loads in 30-degree increments all around the mount. Per TIA-222-H and Appendix N of the Connecticut State Building Code, the max basic wind speed for this site is equal to 130 mph with a max basic wind speed with ice of 50 mph and a max ice thickness of 1.0 in. An escalated ice thickness of 1.09 in was used for this analysis.
- HDG considers this site to be exposure category C; tower is located near large, flat, open, terrain/grasslands.
- HDG considers this site to be topographic category 1; tower is located on flat terrain or the bottom of a hill or ridge.
- HDG considers this site to have a spectral response acceleration parameter at short periods, S_S, of 0.180 and a spectral response acceleration parameter at a period of 1 second, S_1, of 0.063.
- The mount has been analyzed with load combinations consisting of 500 lbs live load using a service wind speed of 30 mph wind on the worst-case antenna. Analysis performed on each antenna pipe to determine worst case location; worst case location was antenna position 4.
- The mount has been analyzed with load combinations consisting of a 250 lbs live load in a worst-case location on the mount.
- The existing mount is secured to the existing self-supporting tower with threaded rods and steel plates and/or clamps tightened around the tower leg. HDG considers the threaded rods as the governing connection members.

Based on our evaluation, we have determined that the existing mounts **ARE CAPABLE** of supporting the proposed installation.

	Component	Controlling Load Case	Stress Ratio	Pass/Fail
Existing Mount Rating	18	LC7	94%	**PASS**

Reference Documents:

- Mount mapping report prepared by ProVertic LLC.

p: 978.557.5553 f: 978.336.5586 a: 45 Beechwood Drive, N. Andover, MA 01845

This determination was based on the following limitations and assumptions:

1. HDG is not responsible for any modifications completed prior to and hereafter which HDG was not directly involved.
2. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities.
3. All antennas, coax cables and waveguide cables are assumed to be properly installed and supported as per the manufacturer's requirements.
4. The existing mount has been adequately secured to the tower structure per the mount manufacturer's specifications.
5. All components pertaining to AT&T's mounts must be tightened and re-plumbed prior to the installation of new appurtenances.
6. HDG performed a localized analysis on the mount itself and not on the supporting tower structure.

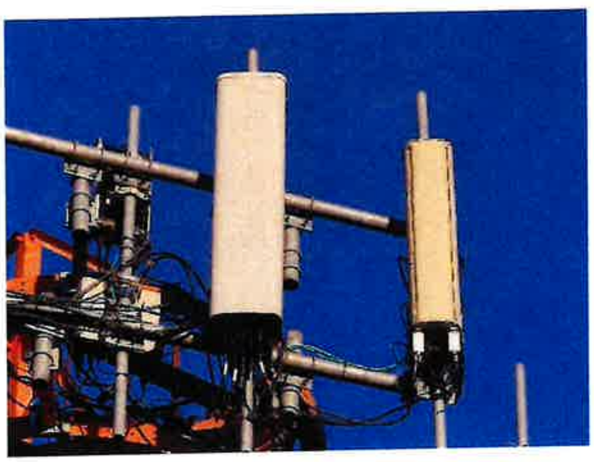
Please feel free to contact our office should you have any questions.

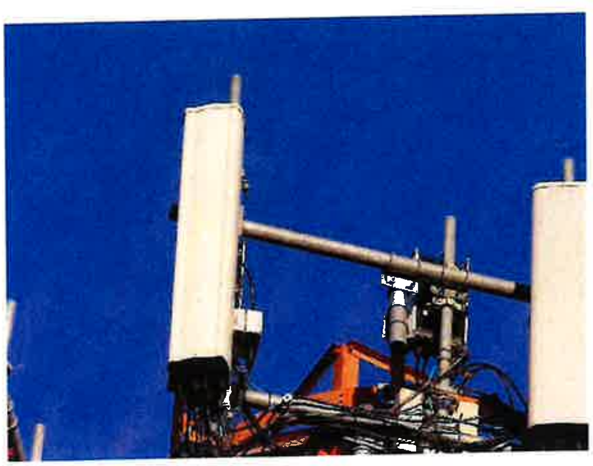
Respectfully Submitted,
Hudson Design Group LLC

Michael Cabral
Vice President

Daniel P. Hamm, PE
Principal

FIELD PHOTOS:







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Wind & Ice Calculations

Date: 1/21/2022
Project Name: PORTLAND
Project No.: CT1066
Designed By: CL **Checked By:** MSC

HUDSON Design Group LLC

2.6.5.2 Velocity Pressure Coeff:

$K_z = 2.01\ (z/z_g)^{2/\alpha}$

z= 77 (ft)
z_g= 900 (ft)
α= 9.5

K_z= 1.198

Kzmin ≤ Kz ≤ 2.01

Table 2-4

Exposure	Z_g	α	K_{zmin}	K_c
B	1200 ft	7.0	0.70	0.9
C	900 ft	9.5	0.85	1.0
D	700 ft	11.5	1.03	1.1

2.6.6.2 Topographic Factor:

Table 2-5

Topo. Category	K_t	f
2	0.43	1.25
3	0.53	2.0
4	0.72	1.5

$K_{zt} = [1+(K_c K_t/K_h)]^2$

$K_h = e^{(f*z/H)}$

K_{zt}= 1

(If Category 1 then K_{zt}=1.0)

Category= **1**

K_h= 1
K_c= 1 (from Table 2-4)
K_t= 0 (from Table 2-5)
f= 0 (from Table 2-5)
z= 77
z_s= 350 (Mean elevation of base of structure above sea level)
H= 0 (Ht. of the crest above surrounding terrain)
K_{zt}= 1.00 (from 2.6.6.2.1)
K_e= 0.99 (from 2.6.8)

2.6.10 Design Ice Thickness

Max Ice Thickness = t_i = 1.00 in
Importance Factor = I= 1.0 (from Table 2-3)
K_{iz} = 1.09 (from Sec. 2.6.10)

$t_{iz} = t_i*I*K_{iz}*(K_{zt})^{0.35}$

t_{iz} = 1.09 in

Date: 1/21/2022
Project Name: PORTLAND
Project No.: CT1066
Designed By: CL Checked By: MSC

HUDSON Design Group LLC

2.6.9 Gust Effect Factor

2.6.9.1 Self Supporting Lattice Structures

G_h = 1.0 Latticed Structures > 600 ft

G_h = 0.85 Latticed Structures 450 ft or less

G_h = 0.85 + 0.15 [h/150 - 3.0]   h= ht. of structure

h= 80 G_h= 0.85

2.6.9.2 Guyed Masts G_h= 0.85

2.6.9.3 Pole Structures G_h= 1.1

2.6.9 Appurtenances G_h= 1.0

2.6.9.4 Structures Supported on Other Structures
(Cantilivered tubular or latticed spines, pole, structures on buildings (ht. : width ratio > 5)

G_h= 1.35   Gh= 1.00

2.6.11.2 Design Wind Force on Appurtenances

$F= q_z*G_h*(EPA)_A$

$q_z= 0.00256*K_z*K_{zt}*K_s*K_e*K_d*V_{max}^2$

q_z= 43.50
$q_{z\,(ice)}$= 6.43
$q_{z\,(30)}$= 2.32

K_z= 1.198 (from 2.6.5.2)
K_{zt}= 1.0 (from 2.6.6.2.1)
K_s= 1.0 (from 2.6.7)
K_e= 0.99 (from 2.6.8)
K_d= 0.85 (from Table 2-2)
V_{max}= 130 mph (Ultimate Wind Speed)
$V_{max\,(ice)}$= 50 mph
V_{30}= 30 mph

Table 2-2

Structure Type	Wind Direction Probability Factor, Kd
Latticed structures with triangular, square or rectangular cross sections	0.85
Tubular pole structures, latticed structures with other cross sections, appurtenances	0.95
Tubular pole structures supporting antennas enclosed within a cylindrical shroud	1.00

Date: 1/21/2022
Project Name: PORTLAND
Project No.: CT1066
Designed By: CL Checked By: MSC

HUDSON Design Group LLC

Determine Ca:

Table 2-9

Force Coefficients (Ca) for Appurtenances				
Member Type		Aspect Ratio ≤ 2.5	Aspect Ratio = 7	Aspect Ratio ≥ 25
		Ca	Ca	Ca
Flat		1.2	1.4	2.0
Square/Rectangular HSS		$1.2 - 2.8(r_s) \geq 0.85$	$1.4 - 4.0(r_s) \geq 0.90$	$2.0 - 6.0(r_s) \geq 1.25$
Round	C < 39 (Subcritical)	0.7	0.8	1.2
	39 ≤ C ≤ 78 (Transitional)	$4.14/(C^{0.485})$	$3.66/(C^{0.415})$	$46.8/(C^{1.0})$
	C > 78 (Supercritical)	0.5	0.6	0.6

Aspect Ratio is the overall length/width ratio in the plane normal to the wind direction.
(Aspect ratio is independent of the spacing between support points of a linear appurtenance,

Note: Linear interpolation may be used for aspect ratios other than those shown.

Ice Thickness = 1.09 in

Angle = 0 (deg) **Equivalent Angle =** 180 (deg)

Appurtenances	Height	Width	Depth	Flat Area	Aspect Ratio	Ca	Force (lbs)	Force (lbs) (w/ Ice)	Force (lbs) (30 mph)
TPA65R-BU6DA-K Antenna	71.2	20.7	7.7	10.24	3.44	1.24	553	93	29
AIR6449 Antenna	30.6	15.9	10.6	3.38	1.92	1.20	176	32	9
AIR6419 Antenna	31.0	16.1	7.3	3.47	1.93	1.20	181	33	10
DMP65R-BU6DA Antenna	71.2	20.7	7.7	10.24	3.44	1.24	553	93	29
RRUS-32 B66A RRH	27.2	12.1	7.0	2.29	2.25	1.20	119	22	6
RRUS-32 B66A RRH (Shielded)	27.2	6.1	7.0	1.14	4.50	1.29	64	14	3
RRUS-32 B2 RRH	27.2	7.0	12.1	1.32	3.89	1.26	73	15	4
RRUS-32 B2 RRH (Shielded)	27.2	3.5	12.1	0.66	7.77	1.43	41	11	2
4478 B14 RRH	18.1	8.3	13.4	1.04	2.18	1.20	54	11	3
4478 B14 RRH (Shielded)	18.1	4.2	13.4	0.52	4.36	1.28	29	7	2
RRUS-32 B30 RRH	27.2	7.0	12.1	1.32	3.89	1.26	73	15	4
RRUS-32 B30 RRH (Shielded)	27.2	3.5	12.1	0.66	7.77	1.43	41	11	2
4449 B5/B12 RRH	17.9	9.4	13.2	1.17	1.90	1.20	61	12	3
4449 B5/B12 RRH (Shielded)	17.9	4.7	13.2	0.58	3.81	1.26	32	8	2
Squid Surge Arrestor	24.0	9.7	9.7	1.62	2.47	0.70	49	10	3
2" Pipe	2.4	12.0		0.20	0.20	0.70	6		
3" Pipe	3.5	12.0		0.29	0.29	0.70	9		
HSS 3x3	3.0	12.0		0.25	0.25	1.20	13		

Date: 1/21/2022
Project Name: PORTLAND
Project No.: CT1066
Designed By: CL Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle = 30 (deg) | Ice Thickness = 1.09 in. | Equivalent Angle = 210 (deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Aspect Ratio	Aspect Ratio	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	553	244	476
AIR6449 Antenna	30.6	15.9	10.6	3.38	2.25	1.92	2.89	1.20	1.22	176	119	162
AIR6419 Antenna	31.0	16.1	7.3	3.47	1.57	1.93	4.25	1.20	1.28	181	87	158
DMP65R-BU6DA Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	553	244	476
RRUS-32 B66A RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	119	73	108
RRUS-32 B66A RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	64	73	66
RRUS-32 B2 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	73	119	84
RRUS-32 B2 RRH (Shielded)	27.2	3.5	12.1	0.66	2.29	7.77	2.25	1.43	1.20	41	119	61
4478 B14 RRH	18.1	8.3	13.4	1.04	1.68	2.18	1.35	1.20	1.20	54	88	63
4478 B14 RRH (Shielded)	18.1	4.2	13.4	0.52	1.68	4.36	1.35	1.28	1.20	29	88	44
RRUS-32 B30 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	73	119	84
RRUS-32 B30 RRH (Shielded)	27.2	3.5	12.1	0.66	2.29	7.77	2.25	1.43	1.20	41	119	61
4449 B5/B12 RRH	17.9	9.4	13.2	1.17	1.64	1.90	1.36	1.20	1.20	61	86	67
4449 B5/B12 RRH (Shielded)	17.9	4.7	13.2	0.58	1.64	3.81	1.36	1.26	1.20	32	86	45

WIND LOADS WITH ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Aspect Ratio	Aspect Ratio	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	73.4	22.9	9.9	11.66	5.03	3.21	7.43	1.23	1.41	92	46	81
AIR6449 Antenna	32.8	18.1	12.8	4.11	2.91	1.81	2.57	1.20	1.20	32	23	29
AIR6419 Antenna	33.2	18.3	9.5	4.21	2.18	1.82	3.50	1.20	1.24	33	17	29
DMP65R-BU6DA Antenna	73.4	22.9	9.9	11.66	5.03	3.21	7.43	1.23	1.41	92	46	81
RRUS-32 B66A RRH	29.4	14.3	9.2	2.91	1.87	2.06	3.20	1.20	1.23	22	15	21
RRUS-32 B66A RRH (Shielded)	29.4	7.1	9.2	1.46	1.87	4.12	3.20	1.27	1.23	12	15	13
RRUS-32 B2 RRH	29.4	9.2	14.3	1.87	2.91	3.20	2.06	1.23	1.20	15	22	17
RRUS-32 B2 RRH (Shielded)	29.4	4.6	14.3	0.94	2.91	6.40	2.06	1.37	1.20	8	22	12
4478 B14 RRH	20.3	10.5	15.6	1.48	2.19	1.94	1.30	1.20	1.20	11	17	13
4478 B14 RRH (Shielded)	20.3	5.2	15.6	0.74	2.19	3.87	1.30	1.26	1.20	6	17	9
RRUS-32 B30 RRH	29.4	9.2	14.3	1.87	2.91	3.20	2.06	1.23	1.20	15	22	17
RRUS-32 B30 RRH (Shielded)	29.4	4.6	14.3	0.94	2.91	6.40	2.06	1.37	1.20	8	22	12
4449 B5/B12 RRH	20.1	11.6	15.4	1.61	2.14	1.73	1.31	1.20	1.20	12	17	13
4449 B5/B12 RRH (Shielded)	20.1	5.8	15.4	0.81	2.14	3.47	1.31	1.24	1.20	6	17	9

WIND LOADS AT 30 MPH:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Aspect Ratio	Aspect Ratio	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	29	13	25
AIR6449 Antenna	30.6	15.9	10.6	3.38	2.25	1.92	2.89	1.20	1.22	9	6	9
AIR6419 Antenna	31.0	16.1	7.3	3.47	1.57	1.93	4.25	1.20	1.28	10	5	8
DMP65R-BU6DA Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	29	13	25
RRUS-32 B66A RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	6	4	6
RRUS-32 B66A RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	3	4	4
RRUS-32 B2 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	4
RRUS-32 B2 RRH (Shielded)	27.2	3.5	12.1	0.66	2.29	7.77	2.25	1.43	1.20	2	6	3
4478 B14 RRH	18.1	8.3	13.4	1.04	1.68	2.18	1.35	1.20	1.20	3	5	3
4478 B14 RRH (Shielded)	18.1	4.2	13.4	0.52	1.68	4.36	1.35	1.28	1.20	2	5	2
RRUS-32 B30 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	4
RRUS-32 B30 RRH (Shielded)	27.2	3.5	12.1	0.66	2.29	7.77	2.25	1.43	1.20	2	6	3
4449 B5/B12 RRH	17.9	9.4	13.2	1.17	1.64	1.90	1.36	1.20	1.20	3	5	4
4449 B5/B12 RRH (Shielded)	17.9	4.7	13.2	0.58	1.64	3.81	1.36	1.26	1.20	2	5	2

Date: 1/21/2022
Project Name: PORTLAND
Project No.: CT1066
Designed By: CL Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle = 60 (deg) | Ice Thickness = 1.09 in. | Equivalent Angle = 240 (deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	553	244	321
AIR6449 Antenna	30.6	15.9	10.6	3.38	2.25	1.92	2.89	1.20	1.22	176	119	134
AIR6419 Antenna	31.0	16.1	7.3	3.47	1.57	1.93	4.25	1.20	1.28	181	87	111
DMP65R-BU6DA Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	553	244	321
RRUS-32 B66A RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	119	73	84
RRUS-32 B66A RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	91	73	77
RRUS-32 B2 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	73	119	108
RRUS-32 B2 RRH (Shielded)	27.2	5.3	12.1	0.99	2.29	5.18	2.25	1.32	1.20	57	119	104
4478 B14 RRH	18.1	8.3	13.4	1.04	1.68	2.18	1.35	1.20	1.20	54	88	80
4478 B14 RRH (Shielded)	18.1	6.2	13.4	0.78	1.68	2.91	1.35	1.22	1.20	41	88	76
RRUS-32 B30 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	73	119	108
RRUS-32 B30 RRH (Shielded)	27.2	5.3	12.1	0.99	2.29	5.18	2.25	1.32	1.20	57	119	104
4449 B5/B12 RRH	17.9	9.4	13.2	1.17	1.64	1.90	1.36	1.20	1.20	61	86	79
4449 B5/B12 RRH (Shielded)	17.9	7.1	13.2	0.88	1.64	2.54	1.36	1.20	1.20	46	86	76

WIND LOADS WITH ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	73.4	22.9	9.9	11.66	5.03	3.21	7.43	1.23	1.41	92	46	57
AIR6449 Antenna	32.8	18.1	12.8	4.11	2.91	1.81	2.57	1.20	1.20	32	23	25
AIR6419 Antenna	33.2	18.3	9.5	4.21	2.18	1.82	3.50	1.20	1.24	33	17	21
DMP65R-BU6DA Antenna	73.4	22.9	9.9	11.66	5.03	3.21	7.43	1.23	1.41	92	46	57
RRUS-32 B66A RRH	29.4	14.3	9.2	2.91	1.87	2.06	3.20	1.20	1.23	22	15	17
RRUS-32 B66A RRH (Shielded)	29.4	10.7	9.2	2.18	1.87	2.74	3.20	1.21	1.23	17	15	15
RRUS-32 B2 RRH	29.4	9.2	14.3	1.87	2.91	3.20	2.06	1.23	1.20	15	22	21
RRUS-32 B2 RRH (Shielded)	29.4	6.9	14.3	1.40	2.91	4.27	2.06	1.28	1.20	12	22	20
4478 B14 RRH	20.3	10.5	15.6	1.48	2.19	1.94	1.30	1.20	1.20	11	17	16
4478 B14 RRH (Shielded)	20.3	7.9	15.6	1.11	2.19	2.58	1.30	1.20	1.20	9	17	15
RRUS-32 B30 RRH	29.4	9.2	14.3	1.87	2.91	3.20	2.06	1.23	1.20	15	22	21
RRUS-32 B30 RRH (Shielded)	29.4	6.9	14.3	1.40	2.91	4.27	2.06	1.28	1.20	12	22	20
4449 B5/B12 RRH	20.1	11.6	15.4	1.61	2.14	1.73	1.31	1.20	1.20	12	17	16
4449 B5/B12 RRH (Shielded)	20.1	8.7	15.4	1.21	2.14	2.31	1.31	1.20	1.20	9	17	15

WIND LOADS AT 30 MPH:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	29	13	17
AIR6449 Antenna	30.6	15.9	10.6	3.38	2.25	1.92	2.89	1.20	1.22	9	6	7
AIR6419 Antenna	31.0	16.1	7.3	3.47	1.57	1.93	4.25	1.20	1.28	10	5	6
DMP65R-BU6DA Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	29	13	17
RRUS-32 B66A RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	6	4	4
RRUS-32 B66A RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	5	4	4
RRUS-32 B2 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	6
RRUS-32 B2 RRH (Shielded)	27.2	5.3	12.1	0.99	2.29	5.18	2.25	1.32	1.20	3	6	6
4478 B14 RRH	18.1	8.3	13.4	1.04	1.68	2.18	1.35	1.20	1.20	3	5	4
4478 B14 RRH (Shielded)	18.1	6.2	13.4	0.78	1.68	2.91	1.35	1.22	1.20	2	5	4
RRUS-32 B30 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	6
RRUS-32 B30 RRH (Shielded)	27.2	5.3	12.1	0.99	2.29	5.18	2.25	1.32	1.20	3	6	6
4449 B5/B12 RRH	17.9	9.4	13.2	1.17	1.64	1.90	1.36	1.20	1.20	3	5	4
4449 B5/B12 RRH (Shielded)	17.9	7.1	13.2	0.88	1.64	2.54	1.36	1.20	1.20	2	5	4

Date: 1/21/2022
Project Name: PORTLAND
Project No.: CT1066
Designed By: CL Checked By: MSC

HDG HUDSON Design Group LLC

WIND LOADS

Angle =	90	(deg)	Ice Thickness =	1.09	in.	Equivalent Angle =	270	(deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	553	244	244
AIR6449 Antenna	30.6	15.9	10.6	3.38	2.25	1.92	2.89	1.20	1.22	176	119	119
AIR6419 Antenna	31.0	16.1	7.3	3.47	1.57	1.93	4.25	1.20	1.28	181	87	87
DMP65R-BU6DA Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	553	244	244
RRUS-32 B66A RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	119	73	73
RRUS-32 B66A RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	64	73	73
RRUS-32 B2 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	73	119	119
RRUS-32 B2 RRH (Shielded)	27.2	3.5	12.1	0.66	2.29	7.77	2.25	1.43	1.20	41	119	119
4478 B14 RRH	18.1	8.3	13.4	1.04	1.68	2.18	1.35	1.20	1.20	54	88	88
4478 B14 RRH (Shielded)	18.1	4.2	13.4	0.52	1.68	4.36	1.35	1.28	1.20	29	88	88
RRUS-32 B30 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	73	119	119
RRUS-32 B30 RRH (Shielded)	27.2	3.5	12.1	0.66	2.29	7.77	2.25	1.43	1.20	41	119	119
4449 B5/B12 RRH	17.9	9.4	13.2	1.17	1.64	1.90	1.36	1.20	1.20	61	86	86
4449 B5/B12 RRH (Shielded)	17.9	4.7	13.2	0.58	1.64	3.81	1.36	1.26	1.20	32	86	86

WIND LOADS WITH ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	73.4	22.9	9.9	11.66	5.03	3.21	7.43	1.23	1.41	92	46	46
AIR6449 Antenna	32.8	18.1	12.8	4.11	2.91	1.81	2.57	1.20	1.20	32	23	23
AIR6419 Antenna	33.2	18.3	9.5	4.21	2.18	1.82	3.50	1.20	1.24	33	17	17
DMP65R-BU6DA Antenna	73.4	22.9	9.9	11.66	5.03	3.21	7.43	1.23	1.41	92	46	46
RRUS-32 B66A RRH	29.4	14.3	9.2	2.91	1.87	2.06	3.20	1.20	1.23	22	15	15
RRUS-32 B66A RRH (Shielded)	29.4	8.2	9.2	1.68	1.87	3.57	3.20	1.25	1.23	13	15	15
RRUS-32 B2 RRH	29.4	9.2	14.3	1.87	2.91	3.20	2.06	1.23	1.20	15	22	22
RRUS-32 B2 RRH (Shielded)	29.4	5.7	14.3	1.16	2.91	5.17	2.06	1.32	1.20	10	22	22
4478 B14 RRH	20.3	10.5	15.6	1.48	2.19	1.94	1.30	1.20	1.20	11	17	17
4478 B14 RRH (Shielded)	20.3	6.3	15.6	0.89	2.19	3.20	1.30	1.23	1.20	7	17	17
RRUS-32 B30 RRH	29.4	9.2	14.3	1.87	2.91	3.20	2.06	1.23	1.20	15	22	22
RRUS-32 B30 RRH (Shielded)	29.4	5.7	14.3	1.16	2.91	5.17	2.06	1.32	1.20	10	22	22
4449 B5/B12 RRH	20.1	11.6	15.4	1.61	2.14	1.73	1.31	1.20	1.20	12	17	17
4449 B5/B12 RRH (Shielded)	20.1	6.9	15.4	0.96	2.14	2.92	1.31	1.22	1.20	8	17	17

WIND LOADS AT 30 MPH:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	29	13	13
AIR6449 Antenna	30.6	15.9	10.6	3.38	2.25	1.92	2.89	1.20	1.22	9	6	6
AIR6419 Antenna	31.0	16.1	7.3	3.47	1.57	1.93	4.25	1.20	1.28	10	5	5
DMP65R-BU6DA Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	29	13	13
RRUS-32 B66A RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	6	4	4
RRUS-32 B66A RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	3	4	4
RRUS-32 B2 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	6
RRUS-32 B2 RRH (Shielded)	27.2	3.5	12.1	0.66	2.29	7.77	2.25	1.43	1.20	2	6	6
4478 B14 RRH	18.1	8.3	13.4	1.04	1.68	2.18	1.35	1.20	1.20	3	5	5
4478 B14 RRH (Shielded)	18.1	4.2	13.4	0.52	1.68	4.36	1.35	1.28	1.20	2	5	5
RRUS-32 B30 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	6
RRUS-32 B30 RRH (Shielded)	27.2	3.5	12.1	0.66	2.29	7.77	2.25	1.43	1.20	2	6	6
4449 B5/B12 RRH	17.9	9.4	13.2	1.17	1.64	1.90	1.36	1.20	1.20	3	5	5
4449 B5/B12 RRH (Shielded)	17.9	4.7	13.2	0.58	1.64	3.81	1.36	1.26	1.20	2	5	5

Date: 1/21/2022
Project Name: PORTLAND
Project No: CT1066
Designed By: CL Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle = 120 (deg) | Ice Thickness = 1.09 in. | Equivalent Angle = 300 (deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	553	244	321
AIR6449 Antenna	30.6	15.9	10.6	3.38	2.25	1.92	2.89	1.20	1.22	176	119	134
AIR6419 Antenna	31.0	16.1	7.3	3.47	1.57	1.93	4.25	1.20	1.28	181	87	111
DMP65R-BU6DA Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	553	244	321
RRUS-32 B66A RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	119	73	84
RRUS-32 B66A RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	91	73	77
RRUS-32 B2 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	73	119	108
RRUS-32 B2 RRH (Shielded)	27.2	5.3	12.1	0.99	2.29	5.18	2.25	1.32	1.20	57	119	104
4478 B14 RRH	18.1	8.3	13.4	1.04	1.68	2.18	1.35	1.20	1.20	54	88	80
4478 B14 RRH (Shielded)	18.1	6.2	13.4	0.78	1.68	2.91	1.35	1.22	1.20	41	88	76
RRUS-32 B30 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	73	119	108
RRUS-32 B30 RRH (Shielded)	27.2	5.3	12.1	0.99	2.29	5.18	2.25	1.32	1.20	57	119	104
4449 B5/B12 RRH	17.9	9.4	13.2	1.17	1.64	1.90	1.36	1.20	1.20	61	86	79
4449 B5/B12 RRH (Shielded)	17.9	7.1	13.2	0.88	1.64	2.54	1.36	1.20	1.20	46	86	76

WIND LOADS WITH ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	73.4	22.9	9.9	11.66	5.03	3.21	7.43	1.23	1.41	92	46	57
AIR6449 Antenna	32.8	18.1	12.8	4.11	2.91	1.81	2.57	1.20	1.20	32	23	25
AIR6419 Antenna	33.2	18.3	9.5	4.21	2.18	1.82	3.50	1.20	1.24	33	17	21
DMP65R-BU6DA Antenna	73.4	22.9	9.9	11.66	5.03	3.21	7.43	1.23	1.41	92	46	57
RRUS-32 B66A RRH	29.4	14.3	9.2	2.91	1.87	2.06	3.20	1.20	1.23	22	15	17
RRUS-32 B66A RRH (Shielded)	29.4	10.7	9.2	2.18	1.87	2.74	3.20	1.21	1.23	17	15	15
RRUS-32 B2 RRH	29.4	9.2	14.3	1.87	2.91	3.20	2.06	1.23	1.20	15	22	21
RRUS-32 B2 RRH (Shielded)	29.4	6.9	14.3	1.40	2.91	4.27	2.06	1.28	1.20	12	22	20
4478 B14 RRH	20.3	10.5	15.6	1.48	2.19	1.94	1.30	1.20	1.20	11	17	16
4478 B14 RRH (Shielded)	20.3	7.9	15.6	1.11	2.19	2.58	1.30	1.20	1.20	9	17	15
RRUS-32 B30 RRH	29.4	9.2	14.3	1.87	2.91	3.20	2.06	1.23	1.20	15	22	21
RRUS-32 B30 RRH (Shielded)	29.4	6.9	14.3	1.40	2.91	4.27	2.06	1.28	1.20	12	22	20
4449 B5/B12 RRH	20.1	11.6	15.4	1.61	2.14	1.73	1.31	1.20	1.20	12	17	16
4449 B5/B12 RRH (Shielded)	20.1	8.7	15.4	1.21	2.14	2.31	1.31	1.20	1.20	9	17	15

WIND LOADS AT 30 MPH:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	29	13	17
AIR6449 Antenna	30.6	15.9	10.6	3.38	2.25	1.92	2.89	1.20	1.22	9	6	7
AIR6419 Antenna	31.0	16.1	7.3	3.47	1.57	1.93	4.25	1.20	1.28	10	5	6
DMP65R-BU6DA Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	29	13	17
RRUS-32 B66A RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	6	4	4
RRUS-32 B66A RRH (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	5	4	4
RRUS-32 B2 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	6
RRUS-32 B2 RRH (Shielded)	27.2	5.3	12.1	0.99	2.29	5.18	2.25	1.32	1.20	3	6	6
4478 B14 RRH	18.1	8.3	13.4	1.04	1.68	2.18	1.35	1.20	1.20	3	5	4
4478 B14 RRH (Shielded)	18.1	6.2	13.4	0.78	1.68	2.91	1.35	1.22	1.20	2	5	4
RRUS-32 B30 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	6
RRUS-32 B30 RRH (Shielded)	27.2	5.3	12.1	0.99	2.29	5.18	2.25	1.32	1.20	3	6	6
4449 B5/B12 RRH	17.9	9.4	13.2	1.17	1.64	1.90	1.36	1.20	1.20	3	5	4
4449 B5/B12 RRH (Shielded)	17.9	7.1	13.2	0.88	1.64	2.54	1.36	1.20	1.20	2	5	4

Date: 1/21/2022
Project Name: PORTLAND
Project No.: CT1066
Designed By: CL Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle =	150	(deg)	Ice Thickness =	1.09	in.	Equivalent Angle =	330	(deg)

WIND LOADS WITH NO ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	553	244	476
AIR6449 Antenna	30.6	15.9	10.6	3.38	2.25	1.92	2.89	1.20	1.22	176	119	162
AIR6419 Antenna	31.0	16.1	7.3	3.47	1.57	1.93	4.25	1.20	1.28	181	87	158
DMP65R-BU6DA Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	553	244	476
RRUS-32 B66A RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	119	73	108
RRUS-32 B66A RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	64	73	66
RRUS-32 B2 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	73	119	84
RRUS-32 B2 RRH (Shielded)	27.2	3.5	12.1	0.66	2.29	7.77	2.25	1.43	1.20	41	119	61
4478 B14 RRH	18.1	8.3	13.4	1.04	1.68	2.18	1.35	1.20	1.20	54	88	63
4478 B14 RRH (Shielded)	18.1	4.2	13.4	0.52	1.68	4.36	1.35	1.28	1.20	29	88	44
RRUS-32 B30 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	73	119	84
RRUS-32 B30 RRH (Shielded)	27.2	3.5	12.1	0.66	2.29	7.77	2.25	1.43	1.20	41	119	61
4449 B5/B12 RRH	17.9	9.4	13.2	1.17	1.64	1.90	1.36	1.20	1.20	61	86	67
4449 B5/B12 RRH (Shielded)	17.9	4.7	13.2	0.58	1.64	3.81	1.36	1.26	1.20	32	86	45

WIND LOADS WITH ICE:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	73.4	22.9	9.9	11.66	5.03	3.21	7.43	1.23	1.41	92	46	81
AIR6449 Antenna	32.8	18.1	12.8	4.11	2.91	1.81	2.57	1.20	1.20	32	23	29
AIR6419 Antenna	33.2	18.3	9.5	4.21	2.18	1.82	3.50	1.20	1.24	33	17	29
DMP65R-BU6DA Antenna	73.4	22.9	9.9	11.66	5.03	3.21	7.43	1.23	1.41	92	46	81
RRUS-32 B66A RRH	29.4	14.3	9.2	2.91	1.87	2.06	3.20	1.20	1.23	22	15	21
RRUS-32 B66A RRH (Shielded)	29.4	7.1	9.2	1.46	1.87	4.12	3.20	1.27	1.23	12	15	13
RRUS-32 B2 RRH	29.4	9.2	14.3	1.87	2.91	3.20	2.06	1.23	1.20	15	22	17
RRUS-32 B2 RRH (Shielded)	29.4	4.6	14.3	0.94	2.91	6.40	2.06	1.37	1.20	8	22	12
4478 B14 RRH	20.3	10.5	15.6	1.48	2.19	1.94	1.30	1.20	1.20	11	17	13
4478 B14 RRH (Shielded)	20.3	5.2	15.6	0.74	2.19	3.87	1.30	1.26	1.20	6	17	9
RRUS-32 B30 RRH	29.4	9.2	14.3	1.87	2.91	3.20	2.06	1.23	1.20	15	22	17
RRUS-32 B30 RRH (Shielded)	29.4	4.6	14.3	0.94	2.91	6.40	2.06	1.37	1.20	8	22	12
4449 B5/B12 RRH	20.1	11.6	15.4	1.61	2.14	1.73	1.31	1.20	1.20	12	17	13
4449 B5/B12 RRH (Shielded)	20.1	5.8	15.4	0.81	2.14	3.47	1.31	1.24	1.20	6	17	9

WIND LOADS AT 30 MPH:

Appurtenances	Height	Width	Depth	Flat Area (normal)	Flat Area (side)	Ratio (normal)	Ratio (side)	Ca (normal)	Ca (side)	Force (lbs)	Force (lbs)	Force (lbs)
TPA65R-BU6DA-K Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	29	13	25
AIR6449 Antenna	30.6	15.9	10.6	3.38	2.25	1.92	2.89	1.20	1.22	9	6	9
AIR6419 Antenna	31.0	16.1	7.3	3.47	1.57	1.93	4.25	1.20	1.28	10	5	8
DMP65R-BU6DA Antenna	71.2	20.7	7.7	10.24	3.81	3.44	9.25	1.24	1.47	29	13	25
RRUS-32 B66A RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	6	4	6
RRUS-32 B66A RRH (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	3	4	4
RRUS-32 B2 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	4
RRUS-32 B2 RRH (Shielded)	27.2	3.5	12.1	0.66	2.29	7.77	2.25	1.43	1.20	2	6	3
4478 B14 RRH	18.1	8.3	13.4	1.04	1.68	2.18	1.35	1.20	1.20	3	5	3
4478 B14 RRH (Shielded)	18.1	4.2	13.4	0.52	1.68	4.36	1.35	1.28	1.20	2	5	2
RRUS-32 B30 RRH	27.2	7.0	12.1	1.32	2.29	3.89	2.25	1.26	1.20	4	6	4
RRUS-32 B30 RRH (Shielded)	27.2	3.5	12.1	0.66	2.29	7.77	2.25	1.43	1.20	2	6	3
4449 B5/B12 RRH	17.9	9.4	13.2	1.17	1.64	1.90	1.36	1.20	1.20	3	5	4
4449 B5/B12 RRH (Shielded)	17.9	4.7	13.2	0.58	1.64	3.81	1.36	1.26	1.20	2	5	2

Date: 1/21/2022
Project Name: PORTLAND
Project No.: CT1066
Designed By: CL **Checked By:** MSC

HUDSON Design Group LLC

ICE WEIGHT CALCULATIONS

Thickness of ice:	1.09	in.
Density of ice:	56	pcf

TPA65R-BU6DA-K Antenna

Weight of ice based on total radial SF area:		
Height (in):	71.2	
Width (in):	20.7	
Depth (in):	7.7	
Total weight of ice on object:		183 lbs
Weight of object:	69.0 lbs	
Combined weight of ice and object:		252 lbs

AIR6449 Antenna

Weight of ice based on total radial SF area:		
Height (in):	30.6	
Width (in):	15.9	
Depth (in):	10.6	
Total weight of ice on object:		69 lbs
Weight of object:	82.0 lbs	
Combined weight of ice and object:		151 lbs

AIR6419 Antenna

Weight of ice based on total radial SF area:		
Height (in):	31.0	
Width (in):	16.1	
Depth (in):	7.3	
Total weight of ice on object:		65 lbs
Weight of object:	66.0 lbs	
Combined weight of ice and object:		131 lbs

DMP65R-BU6DA Antenna

Weight of ice based on total radial SF area:		
Height (in):	71.2	
Width (in):	20.7	
Depth (in):	7.7	
Total weight of ice on object:		183 lbs
Weight of object:	80.0 lbs	
Combined weight of ice and object:		263 lbs

RRUS-32 B66A RRH

Weight of ice based on total radial SF area:		
Height (in):	27.2	
Width (in):	12.1	
Depth (in):	7.0	
Total weight of ice on object:		45 lbs
Weight of object:	60.0 lbs	
Combined weight of ice and object:		105 lbs

RRUS-32 B2 RRH

Weight of ice based on total radial SF area:		
Height (in):	27.2	
Width (in):	12.1	
Depth (in):	7.0	
Total weight of ice on object:		45 lbs
Weight of object:	60.0 lbs	
Combined weight of ice and object:		105 lbs

4478 B14 RRH

Weight of ice based on total radial SF area:		
Height (in):	18.1	
Width (in):	13.4	
Depth (in):	8.3	
Total weight of ice on object:		34 lbs
Weight of object:	60.0 lbs	
Combined weight of ice and object:		94 lbs

RRUS-32 B30 RRH

Weight of ice based on total radial SF area:		
Height (in):	27.2	
Width (in):	12.1	
Depth (in):	7.0	
Total weight of ice on object:		45 lbs
Weight of object:	60.0 lbs	
Combined weight of ice and object:		105 lbs

4449 B5/B12 RRH

Weight of ice based on total radial SF area:		
Height (in):	17.9	
Width (in):	13.2	
Depth (in):	9.4	
Total weight of ice on object:		34 lbs
Weight of object:	73.0 lbs	
Combined weight of ice and object:		107 lbs

Squid Surge Arrestor

Weight of ice based on total radial SF area:		
Depth (in):	24.0	
Diameter(in):	9.7	
Total weight of ice on object:		29 lbs
Weight of object:	33 lbs	
Combined weight of ice and object:		62 lbs

2" Pipe

Per foot weight of ice:		
diameter (in):	2.38	
Per foot weight of ice on object:		5 plf

3" Pipe

Per foot weight of ice:		
diameter (in):	3.5	
Per foot weight of ice on object:		6 plf

HSS 3x3

Weight of ice based on total radial SF area:		
Height (in):	3	
Width (in):	3	
Per foot weight of ice on object:		7 plf

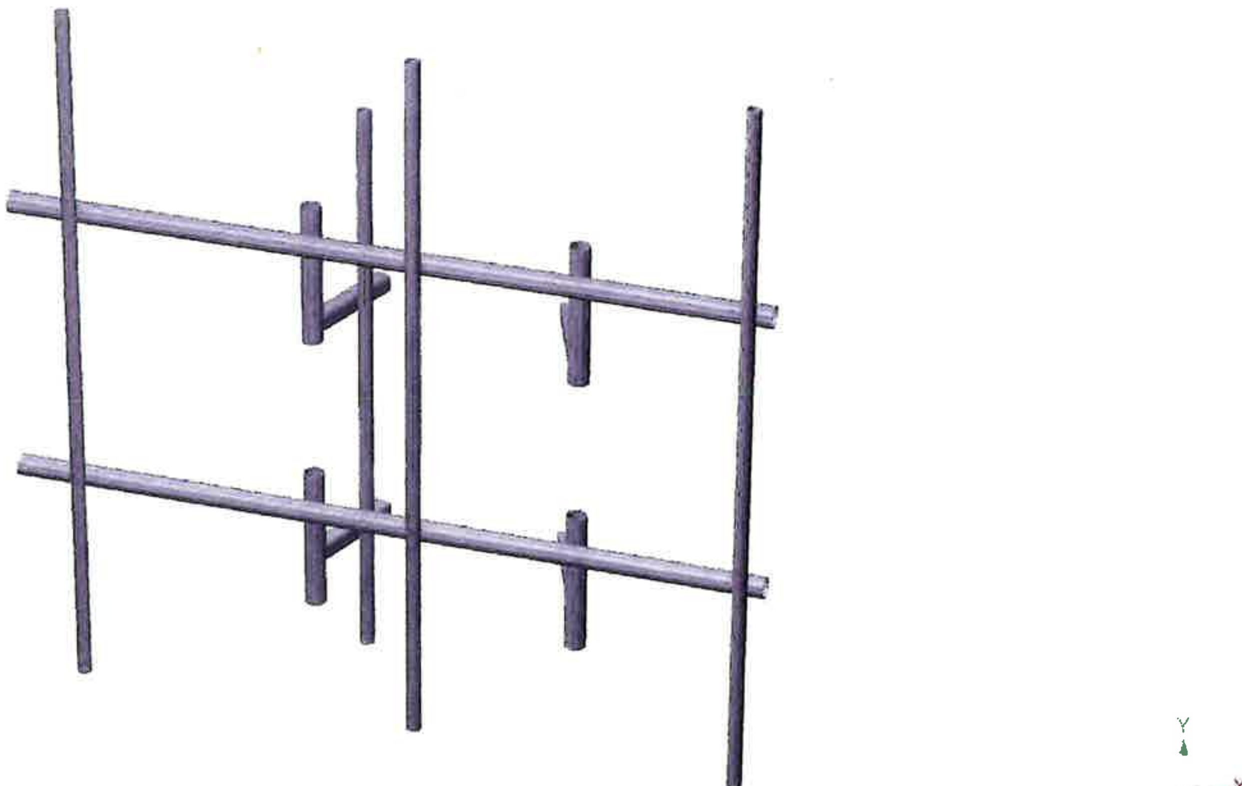
HUDSON
Design Group LLC

Mount Calculations
(Existing Conditions)

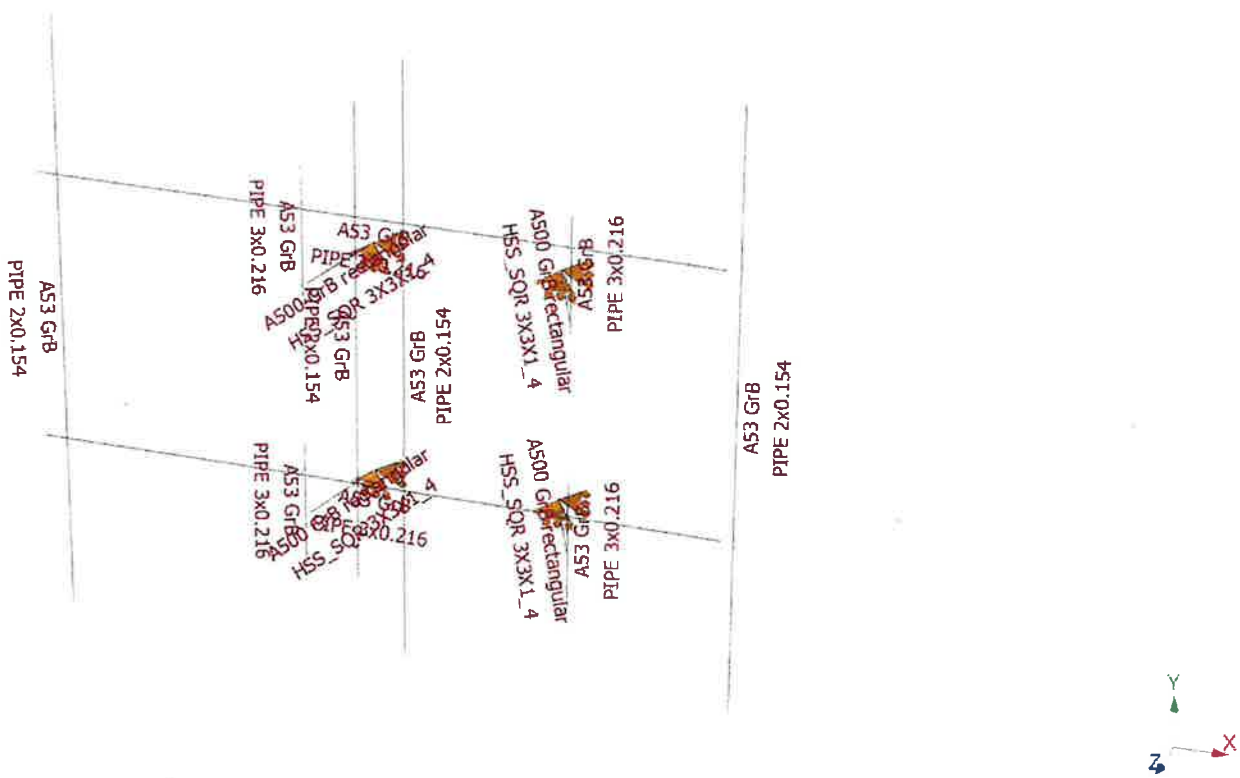
Bentley

Current Date: 1/21/2022 1:22 PM

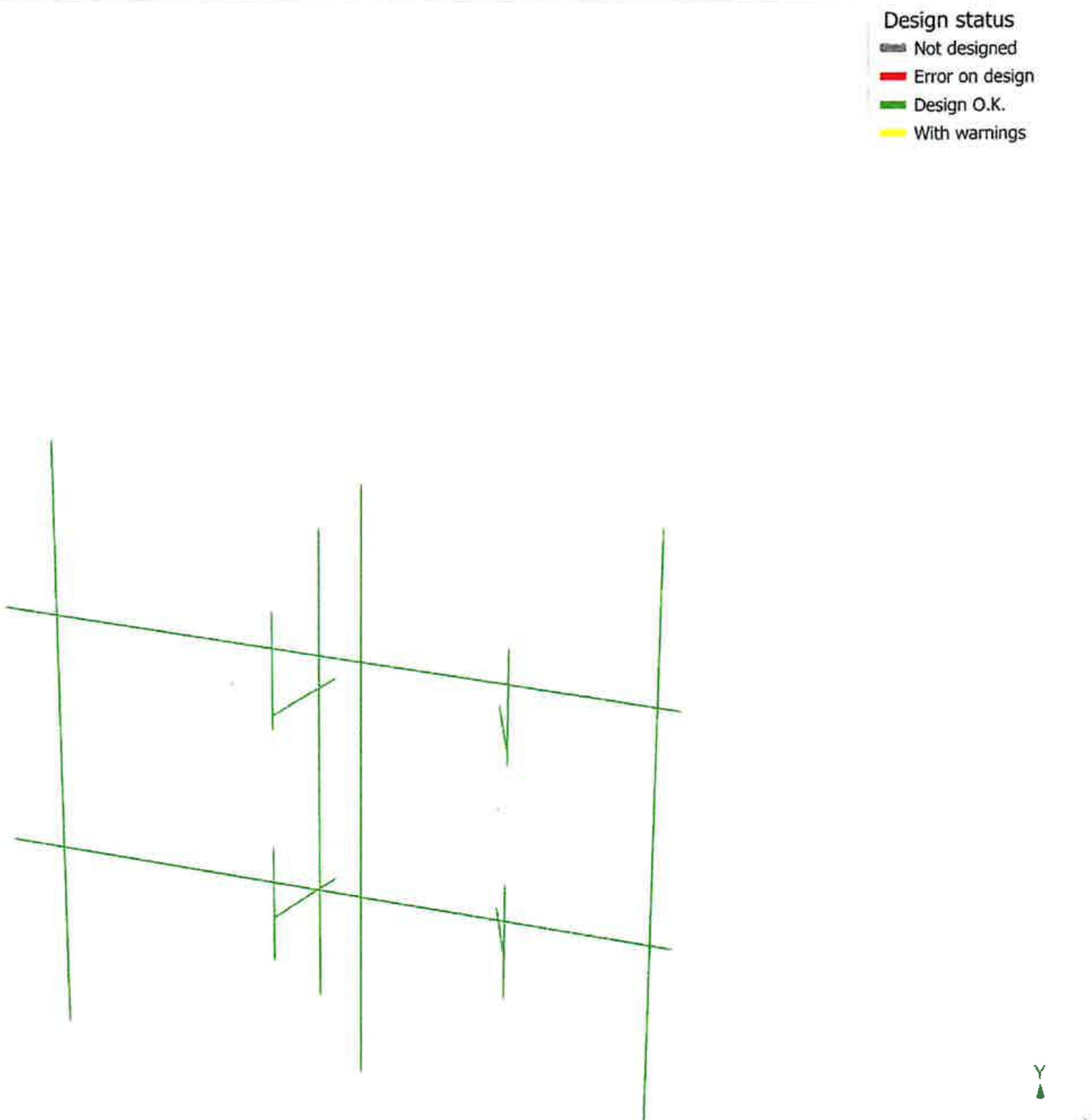
Units system: English



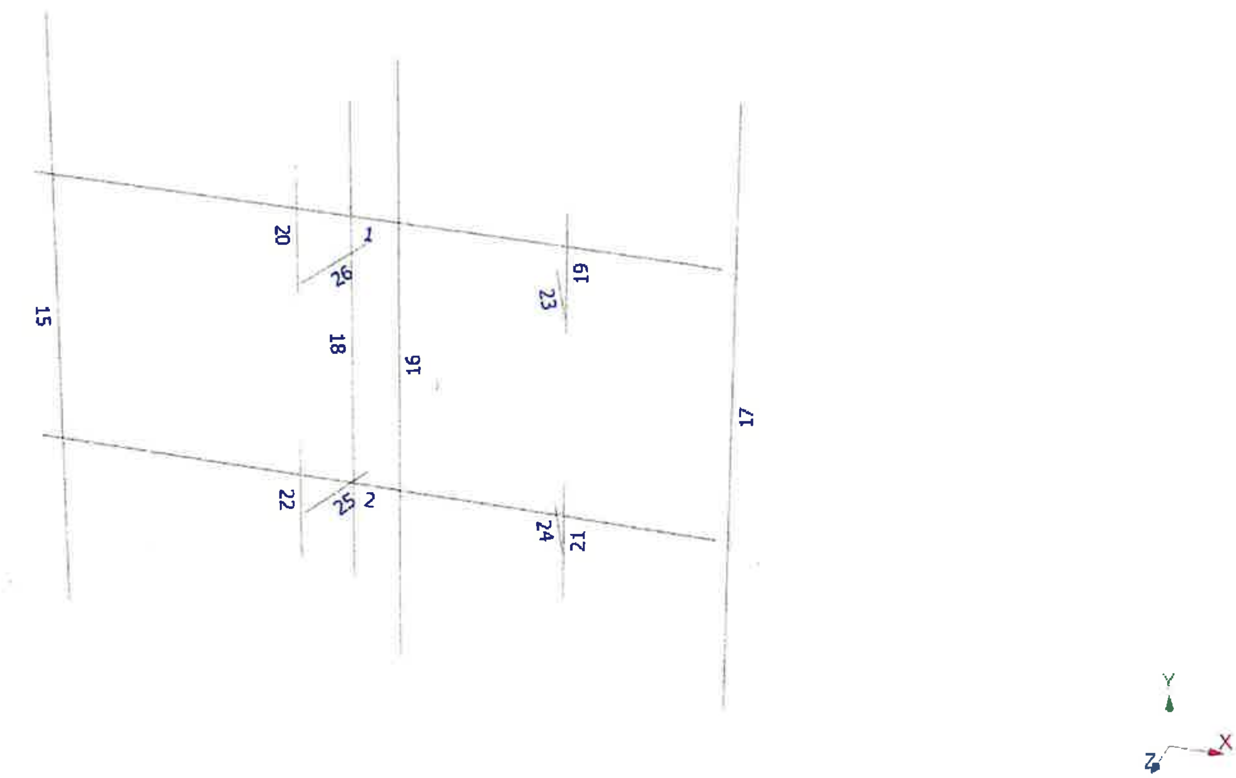
Current Date: 1/21/2022 1:22 PM
Units system: English



Current Date: 1/21/2022 1:22 PM
Units system: English



Bentley
Current Date: 1/21/2022 1:22 PM
Units system: English



Current Date: 1/21/2022 1:21 PM
Units system: English

Load data

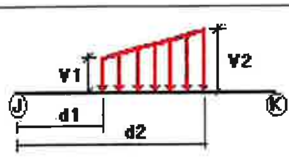
GLOSSARY

Comb : Indicates if load condition is a load combination

Load Conditions

Condition	Description	Comb.	Category
D	Dead Load	No	DL
Wo	Wind Load (NO ICE)	No	WIND
W30	WL 30deg	No	WIND
W60	WL 60deg	No	WIND
W90	WL 90deg	No	WIND
W120	WL 120deg	No	WIND
W150	WL 150deg	No	WIND
Di	Ice Load	No	LL
WI0	WL ICE 0deg	No	WIND
WI30	WL ICE 30deg	No	WIND
WI60	WL ICE 60deg	No	WIND
WI90	WL ICE 90deg	No	WIND
WI120	WL ICE 120deg	No	WIND
WI150	WL ICE 150deg	No	WIND
WL0	WL 30 mph 0deg	No	WIND
WL30	WL 30 mph 30deg	No	WIND
WL60	WL 30 mph 60deg	No	WIND
WL90	WL 30 mph 90deg	No	WIND
WL120	WL 30 mph 120deg	No	WIND
WL150	WL 30 mph 150deg	No	WIND
LL1	250 lb Live Load Center of Mount	No	LL
LL2	250 lb Live Load Right End of Mount	No	LL
LL3	250 lb Live Load Left End of Mount	No	LL
LLa1	500 lb Live Load Antenna 1	No	LL
LLa2	500 lb Live Load Antenna 2	No	LL
LLa3	500 lb Live Load Antenna 3	No	LL
LLa4	500 lb Live Load Antenna 4	No	LL

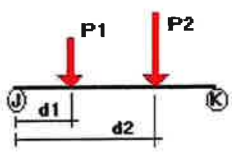
Distributed force on members



Condition	Member	Dir1	Val1 [Kip/ft]	Val2 [Kip/ft]	Dist1 [ft]	%	Dist2 [ft]	%
Wo	1	z	-0.009	-0.009	0.00	No	100.00	Yes
	2	z	-0.009	-0.009	0.00	No	100.00	Yes
	18	z	-0.006	-0.006	0.00	No	100.00	Yes
	19	z	-0.009	-0.009	0.00	No	100.00	Yes
	20	z	-0.009	-0.009	0.00	No	100.00	Yes
	21	z	-0.009	-0.009	0.00	No	100.00	Yes
	22	z	-0.009	-0.009	0.00	No	100.00	Yes
	23	z	-0.013	-0.013	0.00	No	100.00	Yes
	24	z	-0.013	-0.013	0.00	No	100.00	Yes
	25	z	-0.013	-0.013	0.00	No	100.00	Yes
	26	z	-0.013	-0.013	0.00	No	100.00	Yes
W30	1	z	-0.009	-0.009	0.00	No	100.00	Yes
	2	z	-0.009	-0.009	0.00	No	100.00	Yes
	18	z	-0.006	-0.006	0.00	No	100.00	Yes
	19	z	-0.009	-0.009	0.00	No	100.00	Yes
	20	z	-0.009	-0.009	0.00	No	100.00	Yes
	21	z	-0.009	-0.009	0.00	No	100.00	Yes
	22	z	-0.009	-0.009	0.00	No	100.00	Yes
	23	z	-0.013	-0.013	0.00	No	100.00	Yes
	24	z	-0.013	-0.013	0.00	No	100.00	Yes
	25	z	-0.013	-0.013	0.00	No	100.00	Yes
	26	z	-0.013	-0.013	0.00	No	100.00	Yes
W60	15	x	-0.006	-0.006	0.00	No	100.00	Yes
	16	x	-0.006	-0.006	0.00	No	100.00	Yes
	17	x	-0.006	-0.006	0.00	No	100.00	Yes
	18	x	-0.006	-0.006	0.00	No	100.00	Yes
	19	x	-0.009	-0.009	0.00	No	100.00	Yes
	20	x	-0.009	-0.009	0.00	No	100.00	Yes
	21	x	-0.009	-0.009	0.00	No	100.00	Yes
	22	x	-0.009	-0.009	0.00	No	100.00	Yes
	23	x	-0.013	-0.013	0.00	No	100.00	Yes
	24	x	-0.013	-0.013	0.00	No	100.00	Yes
	25	x	-0.013	-0.013	0.00	No	100.00	Yes
	26	x	-0.013	-0.013	0.00	No	100.00	Yes
W90	15	x	-0.006	-0.006	0.00	No	100.00	Yes
	16	x	-0.006	-0.006	0.00	No	100.00	Yes
	17	x	-0.006	-0.006	0.00	No	100.00	Yes
	18	x	-0.006	-0.006	0.00	No	100.00	Yes
	19	x	-0.009	-0.009	0.00	No	100.00	Yes
	20	x	-0.009	-0.009	0.00	No	100.00	Yes
	21	x	-0.009	-0.009	0.00	No	100.00	Yes
	22	x	-0.009	-0.009	0.00	No	100.00	Yes
	23	x	-0.013	-0.013	0.00	No	100.00	Yes
	24	x	-0.013	-0.013	0.00	No	100.00	Yes
	25	x	-0.013	-0.013	0.00	No	100.00	Yes
	26	x	-0.013	-0.013	0.00	No	100.00	Yes
W120	15	x	-0.006	-0.006	0.00	No	100.00	Yes
	16	x	-0.006	-0.006	0.00	No	100.00	Yes
	17	x	-0.006	-0.006	0.00	No	100.00	Yes
	18	x	-0.006	-0.006	0.00	No	100.00	Yes
	19	x	-0.009	-0.009	0.00	No	100.00	Yes
	20	x	-0.009	-0.009	0.00	No	100.00	Yes
	21	x	-0.009	-0.009	0.00	No	100.00	Yes
	22	x	-0.009	-0.009	0.00	No	100.00	Yes
	23	x	-0.013	-0.013	0.00	No	100.00	Yes
	24	x	-0.013	-0.013	0.00	No	100.00	Yes
	25	x	-0.013	-0.013	0.00	No	100.00	Yes
	26	x	-0.013	-0.013	0.00	No	100.00	Yes
W150	1	z	0.009	0.009	0.00	No	100.00	Yes
	2	z	0.009	0.009	0.00	No	100.00	Yes

	15	z	0.006	0.006	0.00	No	100.00	Yes
	16	z	0.006	0.006	0.00	No	100.00	Yes
	17	z	0.006	0.006	0.00	No	100.00	Yes
	18	z	0.006	0.006	0.00	No	100.00	Yes
	19	z	0.009	0.009	0.00	No	100.00	Yes
	20	z	0.009	0.009	0.00	No	100.00	Yes
	21	z	0.009	0.009	0.00	No	100.00	Yes
	22	z	0.009	0.009	0.00	No	100.00	Yes
	23	z	0.013	0.013	0.00	No	100.00	Yes
	24	z	0.013	0.013	0.00	No	100.00	Yes
	25	z	0.013	0.013	0.00	No	100.00	Yes
	26	z	0.013	0.013	0.00	No	100.00	Yes
Di	1	y	-0.006	-0.006	0.00	No	100.00	Yes
	2	y	-0.006	-0.006	0.00	No	100.00	Yes
	15	y	-0.005	-0.005	0.00	No	100.00	Yes
	16	y	-0.005	-0.005	0.00	No	100.00	Yes
	17	y	-0.005	-0.005	0.00	No	100.00	Yes
	18	y	-0.005	-0.005	0.00	No	100.00	Yes
	19	y	-0.006	-0.006	0.00	No	100.00	Yes
	20	y	-0.006	-0.006	0.00	No	100.00	Yes
	21	y	-0.006	-0.006	0.00	No	100.00	Yes
	22	y	-0.006	-0.006	0.00	No	100.00	Yes
	23	y	-0.007	-0.007	0.00	No	100.00	Yes
	24	y	-0.007	-0.007	0.00	No	100.00	Yes
	25	y	-0.007	-0.007	0.00	No	100.00	Yes
	26	y	-0.007	-0.007	0.00	No	100.00	Yes

Concentrated forces on members



Condition	Member	Dir1	Value1 [Kip]	Dist1 [ft]	%
D	15	y	-0.04	2.50	No
		y	-0.04	7.50	No
		y	-0.073	5.00	No
		y	-0.06	5.00	No
	16	y	-0.041	2.00	No
		y	-0.041	4.50	No
		y	-0.033	5.50	No
		y	-0.033	8.00	No
	17	y	-0.035	2.50	No
		y	-0.035	7.50	No
		y	-0.06	4.00	No
		y	-0.06	6.00	No
		y	-0.06	6.00	No
	18	y	-0.033	1.50	No
	27	y	-0.033	0.20	No
Wo	15	z	-0.267	2.50	No
		z	-0.267	7.50	No
		z	-0.032	5.00	No
		z	-0.041	5.00	No

	16	z	-0.088	2.00	No
		z	-0.088	4.50	No
		z	-0.091	5.50	No
		z	-0.091	8.00	No
	17	z	-0.267	2.50	No
		z	-0.267	7.50	No
		z	-0.064	4.00	No
		z	-0.029	6.00	No
		z	-0.041	6.00	No
	18	z	-0.049	1.50	No
	27	z	-0.049	0.20	No
W30	15	3	-0.238	2.50	No
		3	-0.238	7.50	No
		3	-0.084	5.00	No
	16	3	-0.081	2.00	No
		3	-0.081	4.50	No
		3	-0.079	5.50	No
		3	-0.079	8.00	No
	17	3	-0.238	2.50	No
		3	-0.238	7.50	No
		3	-0.108	4.00	No
		3	-0.084	6.00	No
	18	3	-0.049	1.50	No
	27	3	-0.049	0.20	No
W60	15	3	-0.161	2.50	No
		3	-0.161	7.50	No
		3	-0.108	5.00	No
	16	3	-0.067	2.00	No
		3	-0.067	4.50	No
		3	-0.056	5.50	No
		3	-0.056	8.00	No
	17	3	-0.161	2.50	No
		3	-0.161	7.50	No
		3	-0.084	4.00	No
		3	-0.108	6.00	No
	18	3	-0.049	1.50	No
	27	3	-0.049	0.20	No
W90	15	x	-0.122	2.50	No
		x	-0.122	7.50	No
		x	-0.119	5.00	No
	16	x	-0.06	2.00	No
		x	-0.06	4.50	No
		x	-0.044	5.50	No
		x	-0.044	8.00	No
	17	x	-0.122	2.50	No
		x	-0.122	7.50	No
		x	-0.073	4.00	No
		x	-0.119	6.00	No
	18	x	-0.049	1.50	No
	27	x	-0.049	0.20	No
W120	15	2	-0.161	2.50	No
		2	-0.161	7.50	No
		2	-0.108	5.00	No
	16	2	-0.067	2.00	No
		2	-0.067	4.50	No
		2	-0.056	5.50	No
		2	-0.056	8.00	No
	17	2	-0.161	2.50	No
		2	-0.161	7.50	No
		2	-0.084	4.00	No

		2	-0.108	6.00	No
	18	2	-0.049	1.50	No
	27	2	-0.049	0.20	No
W150	15	2	-0.238	2.50	No
		2	-0.238	7.50	No
		2	-0.084	5.00	No
	16	2	-0.081	2.00	No
		2	-0.081	4.50	No
		2	-0.079	5.50	No
		2	-0.079	8.00	No
	17	2	-0.238	2.50	No
		2	-0.238	7.50	No
		2	-0.108	4.00	No
		2	-0.084	6.00	No
	18	2	-0.049	1.50	No
	27	2	-0.049	0.20	No
Di	15	y	-0.092	2.50	No
		y	-0.092	7.50	No
		y	-0.034	5.00	No
		y	-0.045	5.00	No
	16	y	-0.035	2.00	No
		y	-0.035	4.50	No
		y	-0.033	5.50	No
		y	-0.033	8.00	No
	17	y	-0.092	2.50	No
		y	-0.092	7.50	No
		y	-0.045	4.00	No
		y	-0.034	6.00	No
		y	-0.045	6.00	No
	18	y	-0.029	1.50	No
	27	y	-0.029	0.20	No
WI0	15	z	-0.047	2.50	No
		z	-0.047	7.50	No
		z	-0.008	5.00	No
		z	-0.011	5.00	No
	16	z	-0.016	2.00	No
		z	-0.016	4.50	No
		z	-0.017	5.50	No
		z	-0.017	8.00	No
	17	z	-0.047	2.50	No
		z	-0.047	7.50	No
		z	-0.014	4.00	No
		z	-0.007	6.00	No
		z	-0.011	6.00	No
	18	z	-0.01	1.50	No
	27	z	-0.01	0.20	No
WI30	15	3	-0.041	2.50	No
		3	-0.041	7.50	No
		3	-0.017	5.00	No
	16	3	-0.015	2.00	No
		3	-0.015	4.50	No
		3	-0.015	5.50	No
		3	-0.015	8.00	No
	17	3	-0.041	2.50	No
		3	-0.041	7.50	No
		3	-0.021	4.00	No
		3	-0.017	6.00	No
	18	3	-0.01	1.50	No
	27	3	-0.01	0.20	No
WI60	15	3	-0.029	2.50	No

		3	-0.029	7.50	No
		3	-0.021	5.00	No
	16	3	-0.013	2.00	No
		3	-0.013	4.50	No
		3	-0.011	5.50	No
		3	-0.011	8.00	No
	17	3	-0.029	2.50	No
		3	-0.029	7.50	No
		3	-0.017	4.00	No
		3	-0.021	6.00	No
	18	3	-0.01	1.50	No
	27	3	-0.01	0.20	No
WI90	15	x	-0.023	2.50	No
		x	-0.023	7.50	No
		x	-0.022	5.00	No
	16	x	-0.012	2.00	No
		x	-0.012	4.50	No
		x	-0.009	5.50	No
		x	-0.009	8.00	No
	17	x	-0.023	2.50	No
		x	-0.023	7.50	No
		x	-0.015	4.00	No
		x	-0.022	6.00	No
	18	x	-0.01	1.50	No
	27	x	-0.01	0.20	No
WI120	15	2	-0.029	2.50	No
		2	-0.029	7.50	No
		2	-0.021	5.00	No
	16	2	-0.013	2.00	No
		2	-0.013	4.50	No
		2	-0.011	5.50	No
		2	-0.011	8.00	No
	17	2	-0.029	2.50	No
		2	-0.029	7.50	No
		2	-0.017	4.00	No
		2	-0.021	6.00	No
	18	2	-0.01	1.50	No
	27	2	-0.01	0.20	No
WI150	15	2	-0.041	2.50	No
		2	-0.041	7.50	No
		2	-0.017	5.00	No
	16	2	-0.015	2.00	No
		2	-0.015	4.50	No
		2	-0.015	5.50	No
		2	-0.015	8.00	No
	17	2	-0.041	2.50	No
		2	-0.041	7.50	No
		2	-0.021	4.00	No
		2	-0.017	6.00	No
	18	2	-0.01	1.50	No
	27	2	-0.01	0.20	No
WL0	15	z	-0.015	2.50	No
		z	-0.015	7.50	No
		z	-0.002	5.00	No
		z	-0.002	5.00	No
	16	z	-0.005	2.00	No
		z	-0.005	4.50	No
		z	-0.005	5.50	No
		z	-0.005	8.00	No
	17	z	-0.015	2.50	No

		z	-0.015	7.50	No
		z	-0.003	4.00	No
		z	-0.002	6.00	No
		z	-0.002	6.00	No
	18	z	-0.003	1.50	No
	27	z	-0.003	0.20	No
WL30	15	3	-0.013	2.50	No
		3	-0.013	7.50	No
		3	-0.004	5.00	No
	16	3	-0.005	2.00	No
		3	-0.005	4.50	No
		3	-0.004	5.50	No
		3	-0.004	8.00	No
	17	3	-0.013	2.50	No
		3	-0.013	7.50	No
		3	-0.006	4.00	No
		3	-0.004	6.00	No
	18	3	-0.003	1.50	No
	27	3	-0.003	0.20	No
WL60	15	3	-0.009	2.50	No
		3	-0.009	7.50	No
		3	-0.006	5.00	No
	16	3	-0.004	2.00	No
		3	-0.004	4.50	No
		3	-0.003	5.50	No
		3	-0.003	8.00	No
	17	3	-0.009	2.50	No
		3	-0.009	7.50	No
		3	-0.004	4.00	No
		3	-0.006	6.00	No
	18	3	-0.003	1.50	No
	27	3	-0.003	0.20	No
WL90	15	x	-0.007	2.50	No
		x	-0.007	7.50	No
		x	-0.006	5.00	No
	16	x	-0.003	2.00	No
		x	-0.003	4.50	No
		x	-0.003	5.50	No
		x	-0.003	8.00	No
	17	x	-0.007	2.50	No
		x	-0.007	7.50	No
		x	-0.004	4.00	No
		x	-0.006	6.00	No
	18	x	-0.003	1.50	No
	27	x	-0.003	0.20	No
WL120	15	2	-0.009	2.50	No
		2	-0.009	7.50	No
		2	-0.006	5.00	No
	16	2	-0.004	2.00	No
		2	-0.004	4.50	No
		2	-0.003	5.50	No
		2	-0.003	8.00	No
	17	2	-0.009	2.50	No
		2	-0.009	7.50	No
		2	-0.004	4.00	No
		2	-0.006	6.00	No
	18	2	-0.003	1.50	No
	27	2	-0.003	0.20	No
WL150	15	2	-0.013	2.50	No
		2	-0.013	7.50	No

		2	-0.004	5.00	No
	16	2	-0.005	2.00	No
		2	-0.005	4.50	No
		2	-0.004	5.50	No
		2	-0.004	8.00	No
	17	2	-0.013	2.50	No
		2	-0.013	7.50	No
		2	-0.006	4.00	No
		2	-0.004	6.00	No
	18	2	-0.003	1.50	No
	27	2	-0.003	0.20	No
LL1	1	y	-0.25	50.00	Yes
LL2	1	y	-0.25	100.00	Yes
LL3	1	y	-0.25	0.00	Yes
LLa2	17	y	-0.50	50.00	Yes
LLa3	16	y	-0.50	50.00	Yes
LLa4	15	y	-0.50	50.00	Yes

Self weight multipliers for load conditions

Condition	Description	Self weight multiplier			
		Comb.	MultX	MultY	MultZ
D	Dead Load	No	0.00	-1.00	0.00
Wo	Wind Load (NO ICE)	No	0.00	0.00	0.00
W30	WL 30deg	No	0.00	0.00	0.00
W60	WL 60deg	No	0.00	0.00	0.00
W90	WL 90deg	No	0.00	0.00	0.00
W120	WL 120deg	No	0.00	0.00	0.00
W150	WL 150deg	No	0.00	0.00	0.00
Di	Ice Load	No	0.00	0.00	0.00
WI0	WL ICE 0deg	No	0.00	0.00	0.00
WI30	WL ICE 30deg	No	0.00	0.00	0.00
WI60	WL ICE 60deg	No	0.00	0.00	0.00
WI90	WL ICE 90deg	No	0.00	0.00	0.00
WI120	WL ICE 120deg	No	0.00	0.00	0.00
WI150	WL ICE 150deg	No	0.00	0.00	0.00
WL0	WL 30 mph 0deg	No	0.00	0.00	0.00
WL30	WL 30 mph 30deg	No	0.00	0.00	0.00
WL60	WL 30 mph 60deg	No	0.00	0.00	0.00
WL90	WL 30 mph 90deg	No	0.00	0.00	0.00
WL120	WL 30 mph 120deg	No	0.00	0.00	0.00
WL150	WL 30 mph 150deg	No	0.00	0.00	0.00
LL1	250 lb Live Load Center of Mount	No	0.00	0.00	0.00
LL2	250 lb Live Load Right End of Mount	No	0.00	0.00	0.00
LL3	250 lb Live Load Left End of Mount	No	0.00	0.00	0.00
LLa1	500 lb Live Load Antenna 1	No	0.00	0.00	0.00
LLa2	500 lb Live Load Antenna 2	No	0.00	0.00	0.00
LLa3	500 lb Live Load Antenna 3	No	0.00	0.00	0.00
LLa4	500 lb Live Load Antenna 4	No	0.00	0.00	0.00

Earthquake (Dynamic analysis only)

Condition	a/g	Ang. [Deg]	Damp. [%]
D	0.00	0.00	0.00
Wo	0.00	0.00	0.00
W30	0.00	0.00	0.00
W60	0.00	0.00	0.00
W90	0.00	0.00	0.00
W120	0.00	0.00	0.00
W150	0.00	0.00	0.00
Di	0.00	0.00	0.00
WI0	0.00	0.00	0.00
WI30	0.00	0.00	0.00
WI60	0.00	0.00	0.00
WI90	0.00	0.00	0.00
WI120	0.00	0.00	0.00
WI150	0.00	0.00	0.00
WL0	0.00	0.00	0.00
WL30	0.00	0.00	0.00
WL60	0.00	0.00	0.00
WL90	0.00	0.00	0.00
WL120	0.00	0.00	0.00
WL150	0.00	0.00	0.00
LL1	0.00	0.00	0.00
LL2	0.00	0.00	0.00
LL3	0.00	0.00	0.00
LLa1	0.00	0.00	0.00
LLa2	0.00	0.00	0.00
LLa3	0.00	0.00	0.00
LLa4	0.00	0.00	0.00

Bentley

Current Date: 1/21/2022 1:22 PM
Units system: English

Steel Code Check

Report: Summary - Group by member

Load conditions to be included in design :

LC1=1.2D+Wo
LC2=1.2D+W30
LC3=1.2D+W60
LC4=1.2D+W90
LC5=1.2D+W120
LC6=1.2D+W150
LC7=1.2D-Wo
LC8=1.2D-W30
LC9=1.2D-W60
LC10=1.2D-W90
LC11=1.2D-W120
LC12=1.2D-W150
LC13=0.9D+Wo
LC14=0.9D+W30
LC15=0.9D+W60
LC16=0.9D+W90
LC17=0.9D+W120
LC18=0.9D+W150
LC19=0.9D-Wo
LC20=0.9D-W30
LC21=0.9D-W60
LC22=0.9D-W90
LC23=0.9D-W120
LC24=0.9D-W150
LC25=1.2D+Di+WI0
LC26=1.2D+Di+WI30
LC27=1.2D+Di+WI60
LC28=1.2D+Di+WI90
LC29=1.2D+Di+WI120
LC30=1.2D+Di+WI150
LC31=1.2D+Di-WI0
LC32=1.2D+Di-WI30
LC33=1.2D+Di-WI60
LC34=1.2D+Di-WI90
LC35=1.2D+Di-WI120
LC36=1.2D+Di-WI150
LC37=1.2D+1.6LL1
LC38=1.2D+1.6LL2
LC39=1.2D+1.6LL3
LC40=1.2D+WL0+1.6LLa1
LC41=1.2D+WL30+1.6LLa1
LC42=1.2D+WL60+1.6LLa1
LC43=1.2D+WL90+1.6LLa1
LC44=1.2D+WL120+1.6LLa1
LC45=1.2D+WL150+1.6LLa1
LC46=1.2D-WL0+1.6LLa1
LC47=1.2D-WL30+1.6LLa1
LC48=1.2D-WL60+1.6LLa1
LC49=1.2D-WL90+1.6LLa1
LC50=1.2D-WL120+1.6LLa1
LC51=1.2D-WL150+1.6LLa1
LC52=1.2D+WL0+1.6LLa2
LC53=1.2D+WL30+1.6LLa2
LC54=1.2D+WL60+1.6LLa2

LC55=1.2D+WL90+1.6LLa2
LC56=1.2D+WL120+1.6LLa2
LC57=1.2D+WL150+1.6LLa2
LC58=1.2D-WL0+1.6LLa2
LC59=1.2D-WL30+1.6LLa2
LC60=1.2D-WL60+1.6LLa2
LC61=1.2D-WL90+1.6LLa2
LC62=1.2D-WL120+1.6LLa2
LC63=1.2D-WL150+1.6LLa2
LC64=1.2D+WL0+1.6LLa3
LC65=1.2D+WL30+1.6LLa3
LC66=1.2D+WL60+1.6LLa3
LC67=1.2D+WL90+1.6LLa3
LC68=1.2D+WL120+1.6LLa3
LC69=1.2D+WL150+1.6LLa3
LC70=1.2D-WL0+1.6LLa3
LC71=1.2D-WL30+1.6LLa3
LC72=1.2D-WL60+1.6LLa3
LC73=1.2D-WL90+1.6LLa3
LC74=1.2D-WL120+1.6LLa3
LC75=1.2D-WL150+1.6LLa3
LC76=1.2D+WL0+1.6LLa4
LC77=1.2D+WL30+1.6LLa4
LC78=1.2D+WL60+1.6LLa4
LC79=1.2D+WL90+1.6LLa4
LC80=1.2D+WL120+1.6LLa4
LC81=1.2D+WL150+1.6LLa4
LC82=1.2D-WL0+1.6LLa4
LC83=1.2D-WL30+1.6LLa4
LC84=1.2D-WL60+1.6LLa4
LC85=1.2D-WL90+1.6LLa4
LC86=1.2D-WL120+1.6LLa4
LC87=1.2D-WL150+1.6LLa4

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	HSS_SQR 3X3X1_4	**23**	LC10 at 100.00%	0.22	OK	Eq. H1-1b
		24	LC57 at 100.00%	0.39	OK	Eq. H1-1b
		25	LC83 at 100.00%	**0.47**	**OK**	Eq. H1-1b
		26	LC2 at 0.00%	0.24	OK	Eq. H1-1b
	PIPE 2x0.154	**15**	LC82 at 68.75%	0.90	OK	Eq. H1-1b
		16	LC7 at 31.25%	0.92	OK	Eq. H1-1b
		17	LC58 at 68.75%	0.83	OK	Eq. H1-1b
		18	LC7 at 25.00%	**0.94**	**OK**	Eq. H1-1b
	PIPE 3x0.216	**1**	LC8 at 39.84%	0.58	OK	Eq. H3-6
		2	LC81 at 39.84%	0.60	OK	Eq. H3-6
		19	LC59 at 72.92%	0.51	OK	Eq. H1-1b
		20	LC81 at 72.92%	0.60	OK	Eq. H1-1b
		21	LC59 at 37.50%	0.57	OK	Eq. H1-1b
		22	LC81 at 37.50%	**0.69**	**OK**	Eq. H1-1b

Bentley

Current Date: 1/21/2022 1:22 PM
Units system: English

Geometry data

GLOSSARY

Cb22, Cb33	: Moment gradient coefficients
Cm22, Cm33	: Coefficients applied to bending term in interaction formula
d0	: Tapered member section depth at J end of member
DJX	: Rigid end offset distance measured from J node in axis X
DJY	: Rigid end offset distance measured from J node in axis Y
DJZ	: Rigid end offset distance measured from J node in axis Z
DKX	: Rigid end offset distance measured from K node in axis X
DKY	: Rigid end offset distance measured from K node in axis Y
DKZ	: Rigid end offset distance measured from K node in axis Z
dL	: Tapered member section depth at K end of member
Ig factor	: Inertia reduction factor (Effective Inertia/Gross Inertia) for reinforced concrete members
K22	: Effective length factor about axis 2
K33	: Effective length factor about axis 3
L22	: Member length for calculation of axial capacity
L33	: Member length for calculation of axial capacity
LB pos	: Lateral unbraced length of the compression flange in the positive side of local axis 2
LB neg	: Lateral unbraced length of the compression flange in the negative side of local axis 2
RX	: Rotation about X
RY	: Rotation about Y
RZ	: Rotation about Z
TO	: 1 = Tension only member 0 = Normal member
TX	: Translation in X
TY	: Translation in Y
TZ	: Translation in Z

Nodes

Node	X [ft]	Y [ft]	Z [ft]	Rigid Floor
1	0.00	0.00	6.01	0
2	-5.25	0.00	6.01	0
3	5.25	0.00	6.01	0
4	0.00	-4.00	6.01	0
5	-5.25	-4.00	6.01	0
6	5.25	-4.00	6.01	0
7	4.95	0.00	6.01	0
8	4.95	-4.00	6.01	0
9	0.45	0.00	6.01	0
10	0.45	-4.00	6.01	0
11	-0.34	0.00	6.01	0
12	-0.34	-4.00	6.01	0
13	-4.33	0.00	6.01	0
14	-4.33	-4.00	6.01	0
15	4.95	0.00	6.21	0
16	4.95	-4.00	6.21	0
17	0.45	0.00	6.21	0
18	0.45	-4.00	6.21	0
19	-4.33	0.00	6.21	0
20	-4.33	-4.00	6.21	0
21	-0.34	0.00	5.81	0
22	-0.34	-4.00	5.81	0
23	2.583	0.00	6.01	0

24	2.583	-4.00	6.01	0
25	-1.08	0.00	6.01	0
26	-1.08	-4.00	6.01	0
27	2.583	0.00	5.81	0
28	2.583	-4.00	5.81	0
29	-1.08	0.00	5.81	0
30	-1.08	-4.00	5.81	0
31	4.95	3.00	6.21	0
32	0.45	3.00	6.21	0
33	-4.33	3.00	6.21	0
34	-4.33	-7.00	6.21	0
35	0.45	-7.00	6.21	0
36	4.95	-7.00	6.21	0
37	-0.34	2.00	5.81	0
38	-0.34	-6.00	5.81	0
39	2.583	0.50	5.81	0
40	-1.08	0.50	5.81	0
41	2.583	-1.50	5.81	0
42	-1.08	-1.50	5.81	0
43	2.583	-3.50	5.81	0
44	-1.08	-3.50	5.81	0
45	2.583	-5.50	5.81	0
46	-1.08	-5.50	5.81	0
47	2.583	-4.75	5.81	0
48	-1.08	-4.75	5.81	0
49	2.583	-1.25	5.81	0
50	-1.08	-1.25	5.81	0
71	2.023	-4.75	4.42	0
72	-0.58	-4.75	4.40	0
73	2.023	-1.25	4.42	0
74	-0.58	-1.25	4.40	0
75	-0.83	-1.25	5.105	0
76	-0.83	-1.05	5.105	0

Restraints

Node	TX	TY	TZ	RX	RY	RZ
71	1	1	1	0	0	0
72	1	1	1	0	0	0
73	1	1	1	0	0	0
74	1	1	1	0	0	0

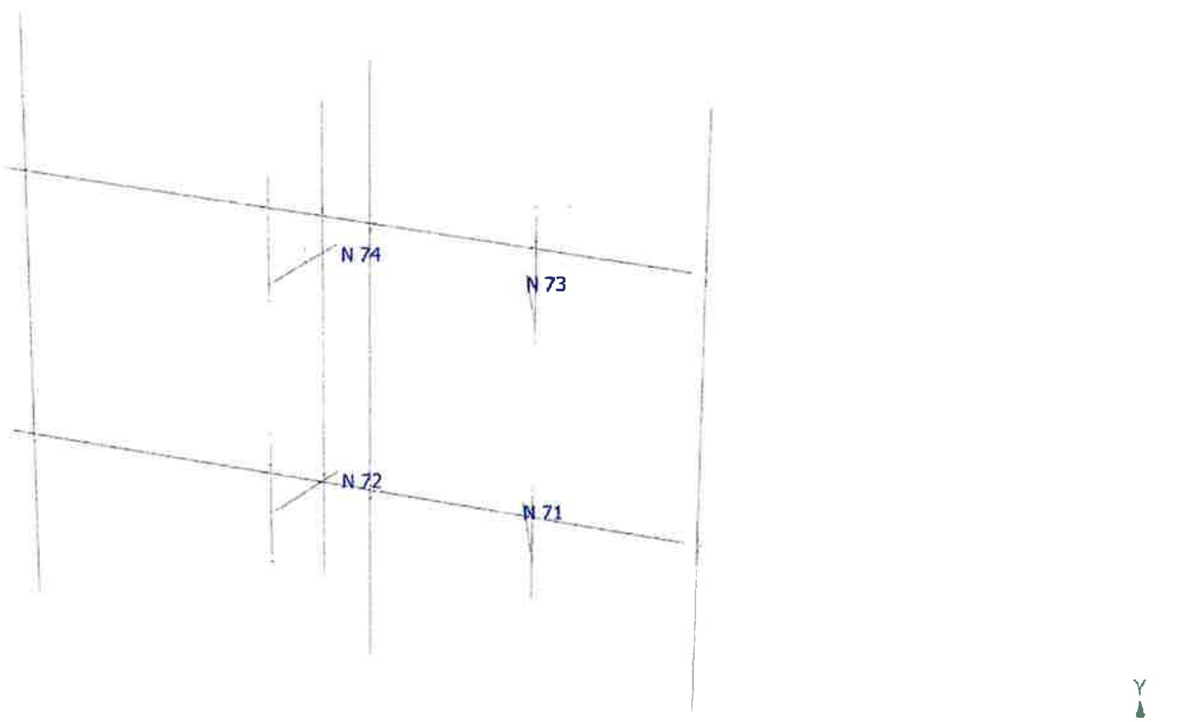
Members

Member	NJ	NK	Description	Section	Material	d0 [in]	dL [in]	Ig factor
1	2	3		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
2	5	6		PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
15	33	34		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
16	32	35		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
17	31	36		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00

18	37	38	PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
19	41	39	PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
20	42	40	PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
21	45	43	PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
22	46	44	PIPE 3x0.216	A53 GrB	0.00	0.00	0.00
23	73	49	HSS_SQR 3X3X1_4	A500 GrB rectangular	0.00	0.00	0.00
24	71	47	HSS_SQR 3X3X1_4	A500 GrB rectangular	0.00	0.00	0.00
25	72	48	HSS_SQR 3X3X1_4	A500 GrB rectangular	0.00	0.00	0.00
26	50	74	HSS_SQR 3X3X1_4	A500 GrB rectangular	0.00	0.00	0.00

Orientation of local axes

Member	Rotation [Deg]	Axes23	NX	NY	NZ
15	315.00	0	0.00	0.00	0.00
16	315.00	0	0.00	0.00	0.00
17	315.00	0	0.00	0.00	0.00
18	315.00	0	0.00	0.00	0.00

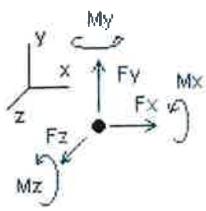

N 74
N 73
N 72
N 71
Y
X
Z

Bentley

Current Date: 1/21/2022 1:23 PM
Units system: English

Analysis result

Reactions



Direction of positive forces and moments

Node	Forces [Kip]			Moments [Kip*ft]		
	FX	**FY**	**FZ**	**MX**	**MY**	**MZ**
Condition **LC1=1.2D+Wo**						
71	0.44112	0.18391	0.40654	0.00000	0.00000	0.00000
72	-0.45327	0.29186	0.62614	0.00000	0.00000	0.00000
73	0.38038	0.33351	0.38342	0.00000	0.00000	0.00000
74	-0.36823	0.49476	0.65146	0.00000	0.00000	0.00000
SUM	0.00000	1.30404	2.06756	0.00000	0.00000	0.00000
Condition **LC2=1.2D+W30**						
71	0.62229	0.05129	-0.05242	0.00000	0.00000	0.00000
72	-0.11796	0.57634	0.97048	0.00000	0.00000	0.00000
73	0.57077	0.05493	-0.10954	0.00000	0.00000	0.00000
74	0.08880	0.62149	0.69194	0.00000	0.00000	0.00000
SUM	1.16390	1.30404	1.50046	0.00000	0.00000	0.00000
Condition **LC3=1.2D+W60**						
71	0.60131	0.11732	-0.10612	0.00000	0.00000	0.00000
72	-0.03803	0.65287	0.88368	0.00000	0.00000	0.00000
73	0.49772	-0.01025	-0.30699	0.00000	0.00000	0.00000
74	0.22255	0.54410	0.44018	0.00000	0.00000	0.00000
SUM	1.28355	1.30404	0.91075	0.00000	0.00000	0.00000
Condition **LC4=1.2D+W90**						
71	0.51673	0.17945	-0.26873	0.00000	0.00000	0.00000
72	0.12164	0.81059	0.88586	0.00000	0.00000	0.00000
73	0.35874	-0.13648	-0.67329	0.00000	0.00000	0.00000
74	0.48070	0.45048	0.05616	0.00000	0.00000	0.00000
SUM	1.47780	1.30404	0.00000	0.00000	0.00000	0.00000
Condition **LC5=1.2D+W120**						
71	0.34901	0.30695	-0.29429	0.00000	0.00000	0.00000
72	0.19802	0.89404	0.74729	0.00000	0.00000	0.00000
73	0.11967	-0.17991	-0.92510	0.00000	0.00000	0.00000
74	0.61685	0.28296	-0.43865	0.00000	0.00000	0.00000
SUM	1.28355	1.30404	-0.91075	0.00000	0.00000	0.00000

Condition **LC6=1.2D+W150**

71	0.23712	0.40171	-0.32467	0.00000	0.00000	0.00000
72	0.22988	0.98310	0.59332	0.00000	0.00000	0.00000
73	-0.03847	-0.24800	-1.14458	0.00000	0.00000	0.00000
74	0.73537	0.16723	-0.80453	0.00000	0.00000	0.00000
SUM	1.16390	1.30404	-1.68046	0.00000	0.00000	0.00000

Condition **LC7=1.2D-Wo**

71	-0.09266	0.65403	0.09649	0.00000	0.00000	0.00000
72	0.01166	0.82177	0.08550	0.00000	0.00000	0.00000
73	-0.41110	-0.04353	-0.88588	0.00000	0.00000	0.00000
74	0.49210	-0.12823	-1.36367	0.00000	0.00000	0.00000
SUM	0.00000	1.30404	-2.06756	0.00000	0.00000	0.00000

Condition **LC8=1.2D-W30**

71	-0.26775	0.78783	0.55537	0.00000	0.00000	0.00000
72	-0.32518	0.54467	-0.25195	0.00000	0.00000	0.00000
73	-0.60330	0.23009	-0.39764	0.00000	0.00000	0.00000
74	0.03234	-0.25855	-1.40624	0.00000	0.00000	0.00000
SUM	-1.16390	1.30404	-1.50046	0.00000	0.00000	0.00000

Condition **LC9=1.2D-W60**

71	-0.24695	0.72506	0.61221	0.00000	0.00000	0.00000
72	-0.40723	0.47022	-0.16442	0.00000	0.00000	0.00000
73	-0.53026	0.29407	-0.20062	0.00000	0.00000	0.00000
74	-0.09912	-0.18531	-1.15792	0.00000	0.00000	0.00000
SUM	-1.28355	1.30404	-0.91075	0.00000	0.00000	0.00000

Condition **LC10=1.2D-W90**

71	-0.16273	0.66602	0.77852	0.00000	0.00000	0.00000
72	-0.57042	0.31293	-0.16759	0.00000	0.00000	0.00000
73	-0.38997	0.42055	0.16651	0.00000	0.00000	0.00000
74	-0.35467	-0.09545	-0.77744	0.00000	0.00000	0.00000
SUM	-1.47780	1.30404	0.00000	0.00000	0.00000	0.00000

Condition **LC11=1.2D-W120**

71	0.00180	0.53865	0.80525	0.00000	0.00000	0.00000
72	-0.64735	0.22559	-0.03314	0.00000	0.00000	0.00000
73	-0.14933	0.46705	0.42119	0.00000	0.00000	0.00000
74	-0.48867	0.07276	-0.28254	0.00000	0.00000	0.00000
SUM	-1.28355	1.30404	0.91075	0.00000	0.00000	0.00000

Condition **LC12=1.2D-W150**

71	0.11055	0.44165	0.83465	0.00000	0.00000	0.00000
72	-0.67798	0.13099	0.11622	0.00000	0.00000	0.00000
73	0.01056	0.53896	0.64361	0.00000	0.00000	0.00000
74	-0.60703	0.19244	0.08598	0.00000	0.00000	0.00000
SUM	-1.16390	1.30404	1.68046	0.00000	0.00000	0.00000

Condition	**LC13=0.9D+Wo**					
71	0.39690	0.07718	0.34219	0.00000	0.00000	0.00000
72	-0.39701	0.14995	0.53546	0.00000	0.00000	0.00000
73	0.38493	0.29893	0.44737	0.00000	0.00000	0.00000
74	-0.38482	0.45197	0.74254	0.00000	0.00000	0.00000
SUM	0.00000	0.97803	2.06756	0.00000	0.00000	0.00000
Condition	**LC14=0.9D+W30**					
71	0.57855	-0.05548	-0.11669	0.00000	0.00000	0.00000
72	-0.06138	0.43536	0.88003	0.00000	0.00000	0.00000
73	0.57487	0.01971	-0.04584	0.00000	0.00000	0.00000
74	0.07186	0.57844	0.78296	0.00000	0.00000	0.00000
SUM	1.16390	0.97803	1.50046	0.00000	0.00000	0.00000
Condition	**LC15=0.9D+W60**					
71	0.55767	0.01092	-0.17026	0.00000	0.00000	0.00000
72	0.01845	0.51237	0.79343	0.00000	0.00000	0.00000
73	0.50171	-0.04580	-0.24343	0.00000	0.00000	0.00000
74	0.20572	0.50054	0.53102	0.00000	0.00000	0.00000
SUM	1.28355	0.97803	0.91075	0.00000	0.00000	0.00000
Condition	**LC16=0.9D+W90**					
71	0.47331	0.07355	-0.33267	0.00000	0.00000	0.00000
72	0.17802	0.67101	0.79594	0.00000	0.00000	0.00000
73	0.36247	-0.17261	-0.60996	0.00000	0.00000	0.00000
74	0.46401	0.40609	0.14669	0.00000	0.00000	0.00000
SUM	1.47780	0.97803	0.00000	0.00000	0.00000	0.00000
Condition	**LC17=0.9D+W120**					
71	0.30567	0.20167	-0.35799	0.00000	0.00000	0.00000
72	0.25414	0.75523	0.65766	0.00000	0.00000	0.00000
73	0.12328	-0.21652	-0.86194	0.00000	0.00000	0.00000
74	0.60047	0.23765	-0.34848	0.00000	0.00000	0.00000
SUM	1.28355	0.97803	-0.91075	0.00000	0.00000	0.00000
Condition	**LC18=0.9D+W150**					
71	0.19385	0.29688	-0.38820	0.00000	0.00000	0.00000
72	0.28581	0.84490	0.50394	0.00000	0.00000	0.00000
73	-0.03496	-0.28497	-1.08157	0.00000	0.00000	0.00000
74	0.71920	0.12123	-0.71463	0.00000	0.00000	0.00000
SUM	1.16390	0.97803	-1.68046	0.00000	0.00000	0.00000
Condition	**LC19=0.9D-Wo**					
71	-0.13630	0.54981	0.03312	0.00000	0.00000	0.00000
72	0.06702	0.68351	-0.00378	0.00000	0.00000	0.00000
73	-0.40727	-0.08032	-0.82281	0.00000	0.00000	0.00000
74	0.47656	-0.17497	-1.27409	0.00000	0.00000	0.00000
SUM	0.00000	0.97803	-2.06756	0.00000	0.00000	0.00000

Condition **LC20=0.9D-W30**

71	-0.31186	0.68367	0.49192	0.00000	0.00000	0.00000
72	-0.27013	0.40552	-0.34146	0.00000	0.00000	0.00000
73	-0.59903	0.19389	-0.33432	0.00000	0.00000	0.00000
74	0.01713	-0.30505	-1.31660	0.00000	0.00000	0.00000
SUM	-1.16390	0.97803	-1.50046	0.00000	0.00000	0.00000

Condition **LC21=0.9D-W60**

71	-0.29115	0.62056	0.54864	0.00000	0.00000	0.00000
72	-0.35209	0.33062	-0.25413	0.00000	0.00000	0.00000
73	-0.52588	0.25819	-0.13717	0.00000	0.00000	0.00000
74	-0.11444	-0.23133	-1.06809	0.00000	0.00000	0.00000
SUM	-1.28355	0.97803	-0.91075	0.00000	0.00000	0.00000

Condition **LC22=0.9D-W90**

71	-0.20717	0.56103	0.71475	0.00000	0.00000	0.00000
72	-0.51520	0.17243	-0.25763	0.00000	0.00000	0.00000
73	-0.38533	0.38526	0.23020	0.00000	0.00000	0.00000
74	-0.37011	-0.14068	-0.68731	0.00000	0.00000	0.00000
SUM	-1.47780	0.97803	0.00000	0.00000	0.00000	0.00000

Condition **LC23=0.9D-W120**

71	-0.04273	0.43303	0.74124	0.00000	0.00000	0.00000
72	-0.59188	0.08429	-0.12349	0.00000	0.00000	0.00000
73	-0.14455	0.43225	0.48506	0.00000	0.00000	0.00000
74	-0.50439	0.02846	-0.19206	0.00000	0.00000	0.00000
SUM	-1.28355	0.97803	0.91075	0.00000	0.00000	0.00000

Condition **LC24=0.9D-W150**

71	0.06595	0.33556	0.77047	0.00000	0.00000	0.00000
72	-0.62233	-0.01095	0.02562	0.00000	0.00000	0.00000
73	0.01544	0.50457	0.70763	0.00000	0.00000	0.00000
74	-0.62296	0.14886	0.17674	0.00000	0.00000	0.00000
SUM	-1.16390	0.97803	1.68046	0.00000	0.00000	0.00000

Condition **LC25=1.2D+Di+WI0**

71	0.35933	0.69684	0.47112	0.00000	0.00000	0.00000
72	-0.43163	0.91449	0.65802	0.00000	0.00000	0.00000
73	0.04178	0.27939	-0.33678	0.00000	0.00000	0.00000
74	0.03052	0.34625	-0.46736	0.00000	0.00000	0.00000
SUM	0.00000	2.23697	0.32500	0.00000	0.00000	0.00000

Condition **LC26=1.2D+Di+WI30**

71	0.38870	0.67296	0.38572	0.00000	0.00000	0.00000
72	-0.36865	0.96577	0.71893	0.00000	0.00000	0.00000
73	0.07450	0.22964	-0.42846	0.00000	0.00000	0.00000
74	0.11686	0.36860	-0.46476	0.00000	0.00000	0.00000
SUM	0.21142	2.23697	0.21142	0.00000	0.00000	0.00000

Condition **LC27=1.2D+Di+WI60**

71	0.37428	0.68535	0.39749	0.00000	0.00000	0.00000
72	-0.37264	0.96492	0.69864	0.00000	0.00000	0.00000
73	0.05492	0.23095	-0.43200	0.00000	0.00000	0.00000
74	0.11527	0.35575	-0.49230	0.00000	0.00000	0.00000
SUM	0.17183	2.23697	0.17183	0.00000	0.00000	0.00000

Condition **LC28=1.2D+Di+WI90**

71	0.35985	0.69531	0.36428	0.00000	0.00000	0.00000
72	-0.34183	0.99502	0.70165	0.00000	0.00000	0.00000
73	0.03029	0.20650	-0.50306	0.00000	0.00000	0.00000
74	0.16470	0.34014	-0.56287	0.00000	0.00000	0.00000
SUM	0.21300	2.23697	0.00000	0.00000	0.00000	0.00000

Condition **LC29=1.2D+Di+WI120**

71	0.32829	0.71964	0.36046	0.00000	0.00000	0.00000
72	-0.32859	1.00975	0.67498	0.00000	0.00000	0.00000
73	-0.01595	0.19921	-0.55007	0.00000	0.00000	0.00000
74	0.18807	0.30836	-0.65719	0.00000	0.00000	0.00000
SUM	0.17183	2.23697	-0.17183	0.00000	0.00000	0.00000

Condition **LC30=1.2D+Di+WI150**

71	0.33290	0.71770	0.34150	0.00000	0.00000	0.00000
72	-0.31360	1.02239	0.68556	0.00000	0.00000	0.00000
73	-0.01529	0.18581	-0.57756	0.00000	0.00000	0.00000
74	0.20742	0.31106	-0.66093	0.00000	0.00000	0.00000
SUM	0.21142	2.23697	-0.21142	0.00000	0.00000	0.00000

Condition **LC31=1.2D+Di-WI0**

71	0.26665	0.76845	0.41391	0.00000	0.00000	0.00000
72	-0.34736	0.99855	0.58751	0.00000	0.00000	0.00000
73	-0.09135	0.21920	-0.54334	0.00000	0.00000	0.00000
74	0.17206	0.25077	-0.78307	0.00000	0.00000	0.00000
SUM	0.00000	2.23697	-0.32500	0.00000	0.00000	0.00000

Condition **LC32=1.2D+Di-WI30**

71	0.23745	0.79237	0.49932	0.00000	0.00000	0.00000
72	-0.41039	0.94748	0.52680	0.00000	0.00000	0.00000
73	-0.12413	0.26881	-0.45180	0.00000	0.00000	0.00000
74	0.08565	0.22831	-0.78575	0.00000	0.00000	0.00000
SUM	-0.21142	2.23697	-0.21142	0.00000	0.00000	0.00000

Condition **LC33=1.2D+Di-WI60**

71	0.25184	0.78003	0.48759	0.00000	0.00000	0.00000
72	-0.40641	0.94835	0.54708	0.00000	0.00000	0.00000
73	-0.10456	0.26749	-0.44825	0.00000	0.00000	0.00000
74	0.08730	0.24110	-0.75825	0.00000	0.00000	0.00000
SUM	-0.17183	2.23697	-0.17183	0.00000	0.00000	0.00000

Condition **LC34=1.2D+Di-WI90**

71	0.26627	0.77016	0.52092	0.00000	0.00000	0.00000
72	-0.43733	0.91827	0.54406	0.00000	0.00000	0.00000
73	-0.07989	0.29193	-0.37718	0.00000	0.00000	0.00000
74	0.03795	0.25660	-0.68779	0.00000	0.00000	0.00000
SUM	-0.21300	2.23697	0.00000	0.00000	0.00000	0.00000

Condition **LC35=1.2D+Di-WI120**

71	0.29774	0.74582	0.52475	0.00000	0.00000	0.00000
72	-0.45057	0.90342	0.57061	0.00000	0.00000	0.00000
73	-0.03361	0.29931	-0.33009	0.00000	0.00000	0.00000
74	0.01462	0.28842	-0.59345	0.00000	0.00000	0.00000
SUM	-0.17183	2.23697	0.17183	0.00000	0.00000	0.00000

Condition **LC36=1.2D+Di-WI150**

71	0.29312	0.74775	0.54372	0.00000	0.00000	0.00000
72	-0.46560	0.89072	0.55997	0.00000	0.00000	0.00000
73	-0.03422	0.31276	-0.30256	0.00000	0.00000	0.00000
74	-0.00473	0.28574	-0.58970	0.00000	0.00000	0.00000
SUM	-0.21142	2.23697	0.21142	0.00000	0.00000	0.00000

Condition **LC37=1.2D+1.6LL1**

71	0.20289	0.52933	0.33159	0.00000	0.00000	0.00000
72	-0.28209	0.76053	0.46713	0.00000	0.00000	0.00000
73	-0.03419	0.16676	-0.33014	0.00000	0.00000	0.00000
74	0.11339	0.24743	-0.46859	0.00000	0.00000	0.00000
SUM	0.00000	1.70404	0.00000	0.00000	0.00000	0.00000

Condition **LC38=1.2D+1.6LL2**

71	0.38368	0.74369	0.33556	0.00000	0.00000	0.00000
72	-0.17015	0.52168	0.46153	0.00000	0.00000	0.00000
73	-0.13946	0.36861	-0.33429	0.00000	0.00000	0.00000
74	-0.07406	0.07006	-0.46279	0.00000	0.00000	0.00000
SUM	0.00000	1.70404	0.00000	0.00000	0.00000	0.00000

Condition **LC39=1.2D+1.6LL3**

71	0.06594	0.32088	0.32694	0.00000	0.00000	0.00000
72	-0.47267	0.95676	0.47441	0.00000	0.00000	0.00000
73	0.17182	0.00567	-0.32381	0.00000	0.00000	0.00000
74	0.23491	0.42073	-0.47754	0.00000	0.00000	0.00000
SUM	0.00000	1.70404	0.00000	0.00000	0.00000	0.00000

Condition **LC40=1.2D+WL0+1.6LLa1**

71	0.18918	0.41121	0.26211	0.00000	0.00000	0.00000
72	-0.23507	0.54862	0.37002	0.00000	0.00000	0.00000
73	0.00313	0.15139	-0.22301	0.00000	0.00000	0.00000
74	0.04276	0.19282	-0.31212	0.00000	0.00000	0.00000
SUM	0.00000	1.30404	0.09700	0.00000	0.00000	0.00000

Condition	**LC41=1.2D+WL30+1.6LLa1**					
71	0.19782	0.40386	0.23682	0.00000	0.00000	0.00000
72	-0.21657	0.56425	0.38764	0.00000	0.00000	0.00000
73	0.01360	0.13637	-0.24955	0.00000	0.00000	0.00000
74	0.06879	0.19956	-0.31128	0.00000	0.00000	0.00000
SUM	0.06364	1.30404	0.06364	0.00000	0.00000	0.00000

Condition	**LC42=1.2D+WL60+1.6LLa1**					
71	0.19377	0.40822	0.24064	0.00000	0.00000	0.00000
72	-0.21772	0.56411	0.38185	0.00000	0.00000	0.00000
73	0.00681	0.13644	-0.25163	0.00000	0.00000	0.00000
74	0.06806	0.19528	-0.31995	0.00000	0.00000	0.00000
SUM	0.05091	1.30404	0.05091	0.00000	0.00000	0.00000

Condition	**LC43=1.2D+WL90+1.6LLa1**					
71	0.18934	0.41193	0.23182	0.00000	0.00000	0.00000
72	-0.20864	0.57273	0.38194	0.00000	0.00000	0.00000
73	-0.00100	0.12973	-0.27162	0.00000	0.00000	0.00000
74	0.08230	0.18965	-0.34214	0.00000	0.00000	0.00000
SUM	0.06200	1.30404	0.00000	0.00000	0.00000	0.00000

Condition	**LC44=1.2D+WL120+1.6LLa1**					
71	0.17974	0.41904	0.23096	0.00000	0.00000	0.00000
72	-0.20485	0.57774	0.37401	0.00000	0.00000	0.00000
73	-0.01400	0.12717	-0.28526	0.00000	0.00000	0.00000
74	0.09001	0.18010	-0.37062	0.00000	0.00000	0.00000
SUM	0.05091	1.30404	-0.05091	0.00000	0.00000	0.00000

Condition	**LC45=1.2D+WL150+1.6LLa1**					
71	0.18135	0.41839	0.22495	0.00000	0.00000	0.00000
72	-0.20036	0.58234	0.37810	0.00000	0.00000	0.00000
73	-0.01382	0.12217	-0.29510	0.00000	0.00000	0.00000
74	0.09647	0.18114	-0.37160	0.00000	0.00000	0.00000
SUM	0.06364	1.30404	-0.06364	0.00000	0.00000	0.00000

Condition	**LC46=1.2D-WL0+1.6LLa1**					
71	0.16164	0.43418	0.24718	0.00000	0.00000	0.00000
72	-0.21059	0.57482	0.34790	0.00000	0.00000	0.00000
73	-0.03655	0.13257	-0.28367	0.00000	0.00000	0.00000
74	0.08551	0.16247	-0.40841	0.00000	0.00000	0.00000
SUM	0.00000	1.30404	-0.09700	0.00000	0.00000	0.00000

Condition	**LC47=1.2D-WL30+1.6LLa1**					
71	0.15302	0.44153	0.27247	0.00000	0.00000	0.00000
72	-0.22909	0.55921	0.33029	0.00000	0.00000	0.00000
73	-0.04704	0.14758	-0.25715	0.00000	0.00000	0.00000
74	0.05947	0.15572	-0.40926	0.00000	0.00000	0.00000
SUM	-0.06364	1.30404	-0.06364	0.00000	0.00000	0.00000

Condition **LC48=1.2D-WL60+1.6LLa1**

71	0.15707	0.43718	0.26866	0.00000	0.00000	0.00000
72	-0.22794	0.55936	0.33609	0.00000	0.00000	0.00000
73	-0.04024	0.14751	-0.25507	0.00000	0.00000	0.00000
74	0.06021	0.15999	-0.40059	0.00000	0.00000	0.00000
SUM	-0.05091	1.30404	-0.05091	0.00000	0.00000	0.00000

Condition **LC49=1.2D-WL90+1.6LLa1**

71	0.16149	0.43348	0.27749	0.00000	0.00000	0.00000
72	-0.23703	0.55074	0.33600	0.00000	0.00000	0.00000
73	-0.03243	0.15422	-0.23508	0.00000	0.00000	0.00000
74	0.04597	0.16561	-0.37841	0.00000	0.00000	0.00000
SUM	-0.06200	1.30404	0.00000	0.00000	0.00000	0.00000

Condition **LC50=1.2D-WL120+1.6LLa1**

71	0.17108	0.42637	0.27835	0.00000	0.00000	0.00000
72	-0.24083	0.54572	0.34391	0.00000	0.00000	0.00000
73	-0.01943	0.15679	-0.22143	0.00000	0.00000	0.00000
74	0.03826	0.17517	-0.34992	0.00000	0.00000	0.00000
SUM	-0.05091	1.30404	0.05091	0.00000	0.00000	0.00000

Condition **LC51=1.2D-WL150+1.6LLa1**

71	0.16947	0.42702	0.28436	0.00000	0.00000	0.00000
72	-0.24532	0.54112	0.33982	0.00000	0.00000	0.00000
73	-0.01960	0.16179	-0.21159	0.00000	0.00000	0.00000
74	0.03180	0.17412	-0.34895	0.00000	0.00000	0.00000
SUM	-0.06364	1.30404	0.06364	0.00000	0.00000	0.00000

Condition **LC52=1.2D+WL0+1.6LLa2**

71	0.60435	1.05116	0.45304	0.00000	0.00000	0.00000
72	-0.15262	0.51158	0.59234	0.00000	0.00000	0.00000
73	-0.24712	0.54697	-0.41413	0.00000	0.00000	0.00000
74	-0.20461	-0.00568	-0.53426	0.00000	0.00000	0.00000
SUM	0.00000	2.10404	0.09700	0.00000	0.00000	0.00000

Condition **LC53=1.2D+WL30+1.6LLa2**

71	0.61288	1.04381	0.42768	0.00000	0.00000	0.00000
72	-0.13414	0.52705	0.60985	0.00000	0.00000	0.00000
73	-0.23655	0.53212	-0.44055	0.00000	0.00000	0.00000
74	-0.17855	0.00105	-0.53334	0.00000	0.00000	0.00000
SUM	0.06364	2.10404	0.06364	0.00000	0.00000	0.00000

Condition **LC54=1.2D+WL60+1.6LLa2**

71	0.60884	1.04812	0.43150	0.00000	0.00000	0.00000
72	-0.13528	0.52690	0.60406	0.00000	0.00000	0.00000
73	-0.24334	0.53224	-0.44264	0.00000	0.00000	0.00000
74	-0.17931	-0.00322	-0.54201	0.00000	0.00000	0.00000
SUM	0.05091	2.10404	0.05091	0.00000	0.00000	0.00000

Condition **LC55=1.2D+WL90+1.6LLa2**

71	0.60439	1.05175	0.42263	0.00000	0.00000	0.00000
72	-0.12617	0.53542	0.60410	0.00000	0.00000	0.00000
73	-0.25111	0.52571	-0.46259	0.00000	0.00000	0.00000
74	-0.16510	-0.00884	-0.56415	0.00000	0.00000	0.00000
SUM	0.06200	2.10404	0.00000	0.00000	0.00000	0.00000

Condition **LC56=1.2D+WL120+1.6LLa2**

71	0.59479	1.05876	0.42174	0.00000	0.00000	0.00000
72	-0.12234	0.54035	0.59615	0.00000	0.00000	0.00000
73	-0.26409	0.52330	-0.47621	0.00000	0.00000	0.00000
74	-0.15745	-0.01838	-0.59260	0.00000	0.00000	0.00000
SUM	0.05091	2.10404	-0.05091	0.00000	0.00000	0.00000

Condition **LC57=1.2D+WL150+1.6LLa2**

71	0.59637	1.05809	0.41571	0.00000	0.00000	0.00000
72	-0.11786	0.54489	0.60021	0.00000	0.00000	0.00000
73	-0.26389	0.51839	-0.48602	0.00000	0.00000	0.00000
74	-0.15099	-0.01733	-0.59354	0.00000	0.00000	0.00000
SUM	0.06364	2.10404	-0.06364	0.00000	0.00000	0.00000

Condition **LC58=1.2D-WL0+1.6LLa2**

71	0.57676	1.07379	0.43797	0.00000	0.00000	0.00000
72	-0.12801	0.53743	0.57010	0.00000	0.00000	0.00000
73	-0.28669	0.52879	-0.47468	0.00000	0.00000	0.00000
74	-0.16205	-0.03597	-0.63039	0.00000	0.00000	0.00000
SUM	0.00000	2.10404	-0.09700	0.00000	0.00000	0.00000

Condition **LC59=1.2D-WL30+1.6LLa2**

71	0.56824	1.08114	0.46334	0.00000	0.00000	0.00000
72	-0.14649	0.52198	0.55260	0.00000	0.00000	0.00000
73	-0.29727	0.54363	-0.44826	0.00000	0.00000	0.00000
74	-0.18812	-0.04271	-0.63132	0.00000	0.00000	0.00000
SUM	-0.06364	2.10404	-0.06364	0.00000	0.00000	0.00000

Condition **LC60=1.2D-WL60+1.6LLa2**

71	0.57228	1.07684	0.45952	0.00000	0.00000	0.00000
72	-0.14536	0.52213	0.55839	0.00000	0.00000	0.00000
73	-0.29047	0.54352	-0.44617	0.00000	0.00000	0.00000
74	-0.18736	-0.03844	-0.62265	0.00000	0.00000	0.00000
SUM	-0.05091	2.10404	-0.05091	0.00000	0.00000	0.00000

Condition **LC61=1.2D-WL90+1.6LLa2**

71	0.57673	1.07322	0.46840	0.00000	0.00000	0.00000
72	-0.15448	0.51362	0.55835	0.00000	0.00000	0.00000
73	-0.28270	0.55004	-0.42623	0.00000	0.00000	0.00000
74	-0.20156	-0.03284	-0.60053	0.00000	0.00000	0.00000
SUM	-0.06200	2.10404	0.00000	0.00000	0.00000	0.00000

Condition **LC62=1.2D-WL120+1.6LLa2**

71	0.58632	1.06621	0.46929	0.00000	0.00000	0.00000
72	-0.15831	0.50868	0.56629	0.00000	0.00000	0.00000
73	-0.26972	0.55245	-0.41259	0.00000	0.00000	0.00000
74	-0.20921	-0.02329	-0.57208	0.00000	0.00000	0.00000
SUM	-0.05091	2.10404	0.05091	0.00000	0.00000	0.00000

Condition **LC63=1.2D-WL150+1.6LLa2**

71	0.58474	1.06687	0.47532	0.00000	0.00000	0.00000
72	-0.16279	0.50413	0.56223	0.00000	0.00000	0.00000
73	-0.26991	0.55738	-0.40279	0.00000	0.00000	0.00000
74	-0.21567	-0.02434	-0.57113	0.00000	0.00000	0.00000
SUM	-0.06364	2.10404	0.06364	0.00000	0.00000	0.00000

Condition **LC64=1.2D+WL0+1.6LLa3**

71	0.27623	0.67239	0.43294	0.00000	0.00000	0.00000
72	-0.33631	0.91644	0.61489	0.00000	0.00000	0.00000
73	-0.06536	0.22557	-0.39370	0.00000	0.00000	0.00000
74	0.12544	0.28965	-0.55713	0.00000	0.00000	0.00000
SUM	0.00000	2.10404	0.09700	0.00000	0.00000	0.00000

Condition **LC65=1.2D+WL30+1.6LLa3**

71	0.28480	0.66503	0.40764	0.00000	0.00000	0.00000
72	-0.31787	0.93194	0.63248	0.00000	0.00000	0.00000
73	-0.05483	0.21061	-0.42022	0.00000	0.00000	0.00000
74	0.15153	0.29645	-0.55626	0.00000	0.00000	0.00000
SUM	0.06364	2.10404	0.06364	0.00000	0.00000	0.00000

Condition **LC66=1.2D+WL60+1.6LLa3**

71	0.28075	0.66936	0.41146	0.00000	0.00000	0.00000
72	-0.31900	0.93178	0.62667	0.00000	0.00000	0.00000
73	-0.06162	0.21070	-0.42229	0.00000	0.00000	0.00000
74	0.15078	0.29221	-0.56492	0.00000	0.00000	0.00000
SUM	0.05091	2.10404	0.05091	0.00000	0.00000	0.00000

Condition **LC67=1.2D+WL90+1.6LLa3**

71	0.27630	0.67299	0.40260	0.00000	0.00000	0.00000
72	-0.30990	0.94027	0.62671	0.00000	0.00000	0.00000
73	-0.06941	0.20407	-0.44225	0.00000	0.00000	0.00000
74	0.16501	0.28671	-0.58706	0.00000	0.00000	0.00000
SUM	0.06200	2.10404	0.00000	0.00000	0.00000	0.00000

Condition **LC68=1.2D+WL120+1.6LLa3**

71	0.26669	0.68001	0.40171	0.00000	0.00000	0.00000
72	-0.30607	0.94517	0.61874	0.00000	0.00000	0.00000
73	-0.08240	0.20158	-0.45587	0.00000	0.00000	0.00000
74	0.17269	0.27729	-0.61550	0.00000	0.00000	0.00000
SUM	0.05091	2.10404	-0.05091	0.00000	0.00000	0.00000

Condition **LC69=1.2D+WL150+1.6LLa3**

71	0.26828	0.67935	0.39570	0.00000	0.00000	0.00000
72	-0.30159	0.94972	0.62282	0.00000	0.00000	0.00000
73	-0.08221	0.19661	-0.46569	0.00000	0.00000	0.00000
74	0.17916	0.27836	-0.61646	0.00000	0.00000	0.00000
SUM	0.06364	2.10404	-0.06364	0.00000	0.00000	0.00000

Condition **LC70=1.2D-WL0+1.6LLa3**

71	0.24861	0.69504	0.41789	0.00000	0.00000	0.00000
72	-0.31173	0.94218	0.59259	0.00000	0.00000	0.00000
73	-0.10499	0.20702	-0.45425	0.00000	0.00000	0.00000
74	0.16810	0.25980	-0.65323	0.00000	0.00000	0.00000
SUM	0.00000	2.10404	-0.09700	0.00000	0.00000	0.00000

Condition **LC71=1.2D-WL30+1.6LLa3**

71	0.24006	0.70240	0.44319	0.00000	0.00000	0.00000
72	-0.33018	0.92670	0.57502	0.00000	0.00000	0.00000
73	-0.11553	0.22196	-0.42775	0.00000	0.00000	0.00000
74	0.14200	0.25299	-0.65410	0.00000	0.00000	0.00000
SUM	-0.06364	2.10404	-0.06364	0.00000	0.00000	0.00000

Condition **LC72=1.2D-WL60+1.6LLa3**

71	0.24411	0.69808	0.43938	0.00000	0.00000	0.00000
72	-0.32905	0.92686	0.58083	0.00000	0.00000	0.00000
73	-0.10873	0.22187	-0.42567	0.00000	0.00000	0.00000
74	0.14276	0.25723	-0.64545	0.00000	0.00000	0.00000
SUM	-0.05091	2.10404	-0.05091	0.00000	0.00000	0.00000

Condition **LC73=1.2D-WL90+1.6LLa3**

71	0.24856	0.69445	0.44824	0.00000	0.00000	0.00000
72	-0.33815	0.91837	0.58078	0.00000	0.00000	0.00000
73	-0.10094	0.22850	-0.40571	0.00000	0.00000	0.00000
74	0.12853	0.26272	-0.62332	0.00000	0.00000	0.00000
SUM	-0.06200	2.10404	0.00000	0.00000	0.00000	0.00000

Condition **LC74=1.2D-WL120+1.6LLa3**

71	0.25816	0.68743	0.44914	0.00000	0.00000	0.00000
72	-0.34198	0.91346	0.58874	0.00000	0.00000	0.00000
73	-0.08795	0.23101	-0.39209	0.00000	0.00000	0.00000
74	0.12086	0.27214	-0.59488	0.00000	0.00000	0.00000
SUM	-0.05091	2.10404	0.05091	0.00000	0.00000	0.00000

Condition **LC75=1.2D-WL150+1.6LLa3**

71	0.25657	0.68809	0.45515	0.00000	0.00000	0.00000
72	-0.34647	0.90890	0.58466	0.00000	0.00000	0.00000
73	-0.08813	0.23598	-0.38226	0.00000	0.00000	0.00000
74	0.11439	0.27107	-0.59391	0.00000	0.00000	0.00000
SUM	-0.06364	2.10404	0.06364	0.00000	0.00000	0.00000

Condition **LC76=1.2D+WL0+1.6LLa4**

71	0.03026	0.29954	0.41693	0.00000	0.00000	0.00000
72	-0.68216	1.30861	0.63587	0.00000	0.00000	0.00000
73	0.30342	-0.08083	-0.37457	0.00000	0.00000	0.00000
74	0.34847	0.57673	-0.58122	0.00000	0.00000	0.00000
SUM	0.00000	2.10404	0.09700	0.00000	0.00000	0.00000

Condition **LC77=1.2D+WL30+1.6LLa4**

71	0.03886	0.29221	0.39167	0.00000	0.00000	0.00000
72	-0.66373	1.32410	0.65353	0.00000	0.00000	0.00000
73	0.31394	-0.09582	-0.40112	0.00000	0.00000	0.00000
74	0.37456	0.58355	-0.58045	0.00000	0.00000	0.00000
SUM	0.06364	2.10404	0.06364	0.00000	0.00000	0.00000

Condition **LC78=1.2D+WL60+1.6LLa4**

71	0.03481	0.29654	0.39548	0.00000	0.00000	0.00000
72	-0.66486	1.32392	0.64770	0.00000	0.00000	0.00000
73	0.30716	-0.09577	-0.40319	0.00000	0.00000	0.00000
74	0.37380	0.57935	-0.58909	0.00000	0.00000	0.00000
SUM	0.05091	2.10404	0.05091	0.00000	0.00000	0.00000

Condition **LC79=1.2D+WL90+1.6LLa4**

71	0.03034	0.30018	0.38665	0.00000	0.00000	0.00000
72	-0.65577	1.33238	0.64775	0.00000	0.00000	0.00000
73	0.29939	-0.10249	-0.42315	0.00000	0.00000	0.00000
74	0.38804	0.57396	-0.61124	0.00000	0.00000	0.00000
SUM	0.06200	2.10404	0.00000	0.00000	0.00000	0.00000

Condition **LC80=1.2D+WL120+1.6LLa4**

71	0.02072	0.30720	0.38575	0.00000	0.00000	0.00000
72	-0.65194	1.33723	0.63974	0.00000	0.00000	0.00000
73	0.28643	-0.10507	-0.43676	0.00000	0.00000	0.00000
74	0.39570	0.56468	-0.63965	0.00000	0.00000	0.00000
SUM	0.05091	2.10404	-0.05091	0.00000	0.00000	0.00000

Condition **LC81=1.2D+WL150+1.6LLa4**

71	0.02231	0.30655	0.37976	0.00000	0.00000	0.00000
72	-0.64747	1.34178	0.64384	0.00000	0.00000	0.00000
73	0.28663	-0.11006	-0.44659	0.00000	0.00000	0.00000
74	0.40217	0.56577	-0.64064	0.00000	0.00000	0.00000
SUM	0.06364	2.10404	-0.06364	0.00000	0.00000	0.00000

Condition **LC82=1.2D-WL0+1.6LLa4**

71	0.00260	0.32219	0.40189	0.00000	0.00000	0.00000
72	-0.65759	1.33419	0.61349	0.00000	0.00000	0.00000
73	0.26389	-0.09972	-0.43512	0.00000	0.00000	0.00000
74	0.39109	0.54738	-0.67726	0.00000	0.00000	0.00000
SUM	0.00000	2.10404	-0.09700	0.00000	0.00000	0.00000

Condition **LC83=1.2D-WL30+1.6LLa4**

71	-0.00598	0.32952	0.42715	0.00000	0.00000	0.00000
72	-0.67602	1.31872	0.59584	0.00000	0.00000	0.00000
73	0.25337	-0.08474	-0.40860	0.00000	0.00000	0.00000
74	0.36500	0.54054	-0.67803	0.00000	0.00000	0.00000
SUM	-0.06364	2.10404	-0.06364	0.00000	0.00000	0.00000

Condition **LC84=1.2D-WL60+1.6LLa4**

71	-0.00193	0.32520	0.42334	0.00000	0.00000	0.00000
72	-0.67489	1.31890	0.60167	0.00000	0.00000	0.00000
73	0.26015	-0.08480	-0.40652	0.00000	0.00000	0.00000
74	0.36576	0.54474	-0.66940	0.00000	0.00000	0.00000
SUM	-0.05091	2.10404	-0.05091	0.00000	0.00000	0.00000

Condition **LC85=1.2D-WL90+1.6LLa4**

71	0.00253	0.32157	0.43219	0.00000	0.00000	0.00000
72	-0.68399	1.31044	0.60163	0.00000	0.00000	0.00000
73	0.26792	-0.07808	-0.38656	0.00000	0.00000	0.00000
74	0.35154	0.55011	-0.64725	0.00000	0.00000	0.00000
SUM	-0.06200	2.10404	0.00000	0.00000	0.00000	0.00000

Condition **LC86=1.2D-WL120+1.6LLa4**

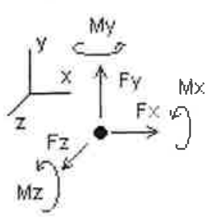
71	0.01215	0.31455	0.43308	0.00000	0.00000	0.00000
72	-0.68782	1.30559	0.60962	0.00000	0.00000	0.00000
73	0.28088	-0.07549	-0.37294	0.00000	0.00000	0.00000
74	0.34388	0.55940	-0.61885	0.00000	0.00000	0.00000
SUM	-0.05091	2.10404	0.05091	0.00000	0.00000	0.00000

Condition **LC87=1.2D-WL150+1.6LLa4**

71	0.01056	0.31519	0.43908	0.00000	0.00000	0.00000
72	-0.69230	1.30102	0.60552	0.00000	0.00000	0.00000
73	0.28069	-0.07049	-0.36310	0.00000	0.00000	0.00000
74	0.33740	0.55832	-0.61785	0.00000	0.00000	0.00000
SUM	-0.06364	2.10404	0.06364	0.00000	0.00000	0.00000

Envelope for nodal reactions

Note.- **lc** is the controlling load condition



Direction of positive forces and moments

Envelope of nodal reactions for :

LC1=1.2D+Wo
LC2=1.2D+W30
LC3=1.2D+W60
LC4=1.2D+W90
LC5=1.2D+W120
LC6=1.2D+W150
LC7=1.2D-Wo
LC8=1.2D-W30
LC9=1.2D-W60
LC10=1.2D-W90
LC11=1.2D-W120
LC12=1.2D-W150
LC13=0.9D+Wo
LC14=0.9D+W30
LC15=0.9D+W60
LC16=0.9D+W90
LC17=0.9D+W120
LC18=0.9D+W150
LC19=0.9D-Wo
LC20=0.9D-W30
LC21=0.9D-W60
LC22=0.9D-W90
LC23=0.9D-W120
LC24=0.9D-W150
LC25=1.2D+Di+WI0
LC26=1.2D+Di+WI30
LC27=1.2D+Di+WI60
LC28=1.2D+Di+WI90
LC29=1.2D+Di+WI120
LC30=1.2D+Di+WI150
LC31=1.2D+Di-WI0
LC32=1.2D+Di-WI30
LC33=1.2D+Di-WI60
LC34=1.2D+Di-WI90
LC35=1.2D+Di-WI120
LC36=1.2D+Di-WI150
LC37=1.2D+1.6LL1
LC38=1.2D+1.6LL2
LC39=1.2D+1.6LL3
LC40=1.2D+WL0+1.6LLa1
LC41=1.2D+WL30+1.6LLa1
LC42=1.2D+WL60+1.6LLa1
LC43=1.2D+WL90+1.6LLa1
LC44=1.2D+WL120+1.6LLa1
LC45=1.2D+WL150+1.6LLa1
LC46=1.2D-WL0+1.6LLa1
LC47=1.2D-WL30+1.6LLa1
LC48=1.2D-WL60+1.6LLa1
LC49=1.2D-WL90+1.6LLa1
LC50=1.2D-WL120+1.6LLa1
LC51=1.2D-WL150+1.6LLa1
LC52=1.2D+WL0+1.6LLa2
LC53=1.2D+WL30+1.6LLa2
LC54=1.2D+WL60+1.6LLa2
LC55=1.2D+WL90+1.6LLa2
LC56=1.2D+WL120+1.6LLa2
LC57=1.2D+WL150+1.6LLa2
LC58=1.2D-WL0+1.6LLa2
LC59=1.2D-WL30+1.6LLa2
LC60=1.2D-WL60+1.6LLa2
LC61=1.2D-WL90+1.6LLa2
LC62=1.2D-WL120+1.6LLa2
LC63=1.2D-WL150+1.6LLa2

LC64=1.2D+WL0+1.6LLa3
LC65=1.2D+WL30+1.6LLa3
LC66=1.2D+WL60+1.6LLa3
LC67=1.2D+WL90+1.6LLa3
LC68=1.2D+WL120+1.6LLa3
LC69=1.2D+WL150+1.6LLa3
LC70=1.2D-WL0+1.6LLa3
LC71=1.2D-WL30+1.6LLa3
LC72=1.2D-WL60+1.6LLa3
LC73=1.2D-WL90+1.6LLa3
LC74=1.2D-WL120+1.6LLa3
LC75=1.2D-WL150+1.6LLa3
LC76=1.2D+WL0+1.6LLa4
LC77=1.2D+WL30+1.6LLa4
LC78=1.2D+WL60+1.6LLa4
LC79=1.2D+WL90+1.6LLa4
LC80=1.2D+WL120+1.6LLa4
LC81=1.2D+WL150+1.6LLa4
LC82=1.2D-WL0+1.6LLa4
LC83=1.2D-WL30+1.6LLa4
LC84=1.2D-WL60+1.6LLa4
LC85=1.2D-WL90+1.6LLa4
LC86=1.2D-WL120+1.6LLa4
LC87=1.2D-WL150+1.6LLa4

		Forces						Moments					
Node		**Fx** [Kip]	**lc**	**Fy** [Kip]	**lc**	**Fz** [Kip]	**lc**	**Mx** [Kip*ft]	**lc**	**My** [Kip*ft]	**lc**	**Mz** [Kip*ft]	**lc**
71	Max	0.622	LC2	1.081	LC59	0.835	LC12	0.00000	LC1	0.00000	LC1	0.00000	LC1
	Min	-0.312	LC20	-0.055	LC14	-0.388	LC18	0.00000	LC1	0.00000	LC1	0.00000	LC1
72	Max	0.286	LC18	1.342	LC81	0.970	LC2	0.00000	LC1	0.00000	LC1	0.00000	LC1
	Min	-0.692	LC87	-0.011	LC24	-0.341	LC20	0.00000	LC1	0.00000	LC1	0.00000	LC1
73	Max	0.575	LC14	0.557	LC63	0.708	LC24	0.00000	LC1	0.00000	LC1	0.00000	LC1
	Min	-0.603	LC8	-0.285	LC18	-1.145	LC6	0.00000	LC1	0.00000	LC1	0.00000	LC1
74	Max	0.735	LC6	0.621	LC2	0.783	LC14	0.00000	LC1	0.00000	LC1	0.00000	LC1
	Min	-0.623	LC24	-0.305	LC20	-1.406	LC8	0.00000	LC1	0.00000	LC1	0.00000	LC1

Date: 1/21/2022
Project Name: PORTLAND
Project No.: CT1066
Designed By: CL **Checked By:** MSC

HDG HUDSON Design Group LLC

CHECK CONNECTION CAPACITY (Worst Case)

Reference: AISC Steel Construction Manual 14th Edition (ASD)

Bolt Type = A36 1/2" Threaded Rod

Allowable Tensile Load =

F_{Tall} = 4271 lbs.

Allowable Shear Load =

F_{Vall}= 2562 lbs.

TENSILE FORCES

Reaction F = 970 lbs. (See Bentley Output)

SHEAR FORCES

Reactions in X direction:	692 lbs.	(See Bentley Output)
Reactions in Y direction:	1342 lbs.	(See Bentley Output)
Resultant:	1510 lbs.	

No. of Supports = 1
No. of Bolts / Support = 4

Tension Design Load /Bolts =

f_t= 242.50 lbs. < 4271 lbs. **Therefore, OK !**

Shear Design Load / Bolts=

f_v= 377.48 lbs. < 2562 lbs. **Therefore, OK !**

CHECK COMBINED TENSION AND SHEAR

f_t / F_T + f_v / F_V ≤ 1.0

0.057 + 0.147 = 0.204 < 1.0 **Therefore, OK !**

Friday, April 21, 2023 2:31:37 PM

Z:\Jobs\Blue Sky Tower III LLC\Portland - CT 1680\230218 - RFQ QTE PO SA INV\Drawings\Upgrade_Drawings\

MODIFICATION DRAWINGS FOR PORTLAND, CT

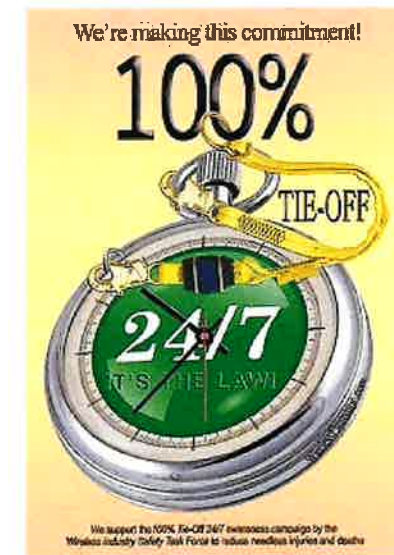
verizon wireless

SITE NAME:

BST MANAGEMENT, LLC - PORTLAND
VERIZON - PORTLAND

SITE NUMBER:

BST MANAGEMENT, LLC - CT-1680
VERIZON - 469381



SITE INFORMATION

SITE ADDRESS:

97 HIGH STREET
PORTLAND CT 06480

SITE COORDINATES:

LATITUDE: 41.5807° N
LONGITUDE: 72.6238° W

SITE ACCESS ISSUES:

NO SITE ACCESS ISSUES NOTED.

CODE COMPLIANCE

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF ALL GOVERNING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUCTED TO PERMIT WORK NOT CONFORMING TO THESE CODES.

DESIGN DATA

STANDARD:
TIA-222-H

BUILDING CODE:
2021 INTERNATIONAL BUILDING CODE W/ AMENDMENTS
2022 CONNECTICUT STATE BUILDING CODE

DESIGN BASIC WIND SPEED WITHOUT ICE:
120 MPH 3-SEC. GUST ULTIMATE

DESIGN BASIC WIND SPEED WITH ICE:
50 MPH 3-SEC. GUST

ICE THICKNESS:
1" RADIAL

SERVICEABILITY BASIC WIND SPEED:
60 MPH 3-SEC. GUST

EXPOSURE CATEGORY:
C

TOPOGRAPHIC CATEGORY:
1

GROUND ELEVATION:
345 FT

RISK CATEGORY:
II

SEISMIC SITE CLASS:
D, S_s= 0.280, S_1=0.056

SEISMIC DESIGN CATEGORY:
B

PROJECT SUMMARY

APPLICANT/LESSEE:

VERIZON

CONTRACTORS:

CONSTRUCTION:
TBD.

CONSULTANTS:

STRUCTURAL COMPONENTS, LLC
1-866-386-7622
FOR ENGINEERING QUESTIONS CONTACT: WESLEY CULVER
FOR CONSTRUCTION AND FIELD SERVICES QUESTIONS CONTACT: HOWARD ROTCHFORD

TOWER OWNER:

BST MANAGEMENT, LLC
352 PARK STREET
SUITE 106
NORTH READING, MA 01864

SHEET INDEX

BLUE SKY TOWERS LLC

Structural Components
Bringing It All Together.
1870 W 64TH LANE
DENVER, CO 80221
(866) 386 - 7622
JOB #: 230218

STAMP:

STATE OF CONNECTICUT
MICHAEL T. DE BOER
No. 18022
LICENSED PROFESSIONAL ENGINEER

REVISIONS:

NO.	DATE	DESCRIPTION	BY	CHK	APD
0	4/20/23	MODIFICATION DRAWINGS	RM	TR	WC
1					
2					
3					
4					
5					

SITE INFORMATION:
97 HIGH STREET
PORTLAND CT 06480

DESIGN TYPE:
SELF SUPPORT TOWER MODIFICATION

SHEET TITLE:
TITLE SHEET

SHEET TITLE: T-1
REVISION: 0

GENERAL NOTES:

1. THE MODIFICATIONS OUTLINED IN THESE DOCUMENTS WERE DESIGNED IN ACCORDANCE WITH THE TIA-222-H TOWER CODE.
2. PLANS, SECTIONS, AND DETAILS ARE NOT TO BE SCALED FOR DETERMINATION OF QUANTITIES, LENGTHS, OR FIT OF MATERIALS.
3. UNLESS NOTED OTHERWISE = U.N.O.
4. ALL WORK ON THESE DRAWINGS SHALL BE PERFORMED BY A QUALIFIED CONTRACTOR WITH A MINIMUM OF 5 YEARS OF PAST TOWER EXPERIENCE AND SHALL FOLLOW THE DICTATES OF GOOD CONSTRUCTION PRACTICE WITH WORKING KNOWLEDGE OF THE TIA CODE "STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS".
5. CONTRACTOR AND/OR SUB-CONTRACTOR SHALL BE RESPONSIBLE FOR ANY PERMITTING REQUIRED OR PROVIDE PROOF THAT THE LOCAL JURISDICTION DOES NOT REQUIRE A PERMIT FOR THE WORK COMPLETED.
6. ALL WORK SHALL BE DONE IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL CODES AND OSHA SAFETY REGULATIONS AND PERFORMED UNDER NORMAL WEATHER CONDITIONS WITH WINDS NOT IN EXCESS OF 20 MPH.
7. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ALL EXISTING EQUIPMENT, ANTENNAS, TX AND STRUCTURES. THE CONTRACTOR IS ALSO RESPONSIBLE FOR THE PROTECTION OF WORKERS, PUBLIC AND PRIVATE PROPERTY DURING CONSTRUCTION UP UNTIL COMPLETION OF WORK.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL MEASUREMENTS AT THE SITE BEFORE ORDERING ANY MATERIALS OR DOING ANY WORK. NO EXTRA CHARGE FOR COMPENSATIONS SHALL BE ALLOWED DUE TO DIFFERENCE BETWEEN ACTUAL DIMENSIONS AND DIMENSIONS INDICATED ON THE CONSTRUCTION DRAWINGS. ANY SUCH DISCREPANCY IN THE DIMENSION WHICH MAY BE FOUND SHALL BE SUBMITTED TO THE OWNER/CLIENT FOR CONSIDERATIONS BEFORE THE CONTRACTOR PROCEEDS WITH THE WORK IN THE AFFECTED AREA.
9. ANY SUBSTITUTIONS MUST CONFORM TO THE REQUIREMENTS OF THESE NOTES AND SPECIFICATIONS, AND SHOULD BE SIMILAR TO THOSE SHOWN. ALL SUBSTITUTIONS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO FABRICATION OR INSTALLATION.
10. CONTRACTOR'S PROPOSED INSTALLATION SHALL NOT INTERFERE, NOR DENY ACCESS TO ANY EXISTING OPERATIONAL AND SAFETY EQUIPMENT.
11. CONTRACTOR SHALL PROMPTLY REMOVE ANY AND ALL DEBRIS FROM SITE AND RESTORE AS BEST AS POSSIBLE TO PRECONSTRUCTION CONDITION INCLUDING BUT NOT LIMITED TO ANY DIVOTS ON ROADWAY OR SURROUNDING AREA.
12. DIGITAL PHOTOGRAPHS SHALL BE TAKEN OF SITE ACCESS, COMPOUND AND TOWER PRIOR TO CONSTRUCTION, DURING CONSTRUCTION AND POST CONSTRUCTION INCLUDING BUT NOT LIMITED TO ALL REINFORCED AREAS. CLOSE-OUT REPORT SHALL FOLLOW WITHIN 3 BUSINESS DAYS.

PARTS / FABRICATION / SHOP DRAWINGS:

1. ALL PARTS INCLUDED IN THESE DRAWINGS ARE MANUFACTURED AND OR SUPPLIED BY STRUCTURAL COMPONENTS, LLC. PARTS FROM OTHER MANUFACTURER'S ARE NOT TO BE USED UNLESS OTHERWISE AUTHORIZED BY THE STRUCTURAL ENGINEER OF RECORD.
2. ALL FABRICATION / SHOP DRAWINGS ARE TO BE REVIEWED FOR COMPLIANCE TO THE STRUCTURAL DRAWINGS AND SIGNED OFF BY THE STRUCTURAL ENGINEER PRIOR TO FABRICATION.

EARTHWORK:

1. THE STRUCTURAL DRAWINGS ILLUSTRATE THE COMPLETED FOUNDATION WITH ALL ELEMENTS IN THEIR FINAL POSITIONS, PROPERLY SUPPORTED AND BRACED.
2. THE CONTRACTOR, IN THE PROPER SEQUENCE, SHALL PROVIDE SHORING AND BRACING AS MAY BE REQUIRED DURING CONSTRUCTION TO ACHIEVE THE FINAL COMPLETED STRUCTURE.
3. OBSERVATION VISITS TO THE SITE BY THE STRUCTURAL ENGINEER SHALL NOT INCLUDE INSPECTION OF THE SHORING AND BRACING ELEMENTS.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND EXECUTION OF ALL MISCELLANEOUS SHORING, BRACING, ETC. NECESSARY TO PROVIDE A COMPLETE AND STABLE STRUCTURE AS SHOWN ON THESE DRAWINGS.
5. CONTRACTOR'S PROPOSED INSTALLATION SHALL NOT INTERFERE, NOR DENY ACCESS TO ANY EXISTING OPERATIONAL AND SAFETY EQUIPMENT.

FOUNDATION DESIGN:

1. REFER TO GEOTECHNICAL REPORT REFERENCED IN PASSING WITH MODIFICATIONS STRUCTURAL FOR SOILS INFORMATION.
2. CONTRACTOR SHALL VERIFY THAT THE SOILS ENCOUNTERED CORRESPOND TO THE GEOTECHNICAL REPORT WHILE EXCAVATING. THE CONTRACTOR SHALL CONTACT THE ENGINEER OF RECORD IF ANY UNEXPECTED SOILS ARE ENCOUNTERED.
3. ALL FILL SHALL BE CLEAN AND FREE OF ORGANIC OR FROZEN SOILS AND FOREIGN MATERIALS. STRUCTURAL BACKFILL SHALL BE COMPACTED IN 12 INCH LOOSE LIFTS TO 97% OF MAXIMUM DRY DENSITY WITHIN 3% OF OPTIMUM MOISTURE CONTENT IN ACCORDANCE WITH ASTM D698.
4. LOOSE MATERIAL SHALL BE REMOVED FROM BOTTOM OF EXCAVATION PRIOR TO PLACING CONCRETE.
5. CONCRETE SHALL BE PLACED AS SOON AS PRACTICAL AFTER EXCAVATION TO AVOID DISTURBANCE OF BEARING AND SIDE WALL SURFACES.
6. FOLLOW ALL RECOMMENDATIONS IN GEOTECHNICAL REPORT FOR SUB-GRADE PREPARATION UNDER FOUNDATION ELEMENTS.

CAST-IN-PLACE CONCRETE:

1. ALL CONCRETE DESIGN IS BASED ON THE "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI 318-14/318R-14).
2. ALL STRUCTURAL CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI. U.N.O.
3. CONCRETE SHALL BE PROPORTIONED UTILIZING TYPE II CEMENT. CONCRETE SUSCEPTIBLE TO FREEZING SHALL BE FORMULATED FOR MAXIMUM FROST RESISTANCE IN ACCORDANCE WITH THE ACI MANUAL OF CONCRETE PRACTICE.
4. COLD WEATHER AND/OR HOT WEATHER CONCRETING PROCEDURES SHALL BE PROVIDED, IF CONDITIONS WARRANT, AS RECOMMENDED IN THE ACI MANUAL OF CONCRETE PRACTICE.
5. ALL ANCHOR BOLTS IN NEW FOUNDATIONS SHALL BE PLACED WITH SETTING TEMPLATES.

REINFORCING STEEL:

1. ALL DETAILING, FABRICATION, AND PLACEMENT OF REINFORCING STEEL SHALL BE IN ACCORDANCE WITH THE ACI MANUAL OF CONCRETE PRACTICE.
2. REINFORCING BARS SHALL BE DEFORMED AND CONFORM TO ASTM A615-79 AND SHALL BE GRADE 60, EXCEPT TIES WHICH MAY BE GRADE 40.
3. AT REINFORCING STEEL SPLICES IN CONCRETE, LAP BARS 40 DIAMETERS FOR SIZES UNDER #7 AND 48 DIAMETERS FOR SIZES #7 AND LARGER U.N.O.
4. EXCEPT AS NOTED ON THE DRAWINGS, MINIMUM CONCRETE PROTECTION FOR REINFORCEMENT SHALL BE IN ACCORDANCE WITH ACI 318-14/318R-14.
5. NO.5 OR LARGER REINFORCING BARS SHALL NOT BE RE-BENT WITHOUT APPROVAL BY THE STRUCTURAL ENGINEER.
6. WELDING OF REBAR IS STRICTLY PROHIBITED.

BACKFILLING:

1. BACKFILLING OF SOILS AROUND FOUNDATION BASES / ANCHORS SHALL BE COMPLETED BEFORE ERECTION OF TOWER BEGINS.
2. BACKFILL SHALL BE COMPACTED IN LIFTS TO 90% COMPACTION.
3. BACKFILL SHALL BE NATIVE SOILS; IMPORTED FILL SHALL BE VERIFIED WITH THE GEOTECHNICAL ENGINEER AND STRUCTURAL ENGINEER PRIOR TO BACKFILLING.

STRUCTURAL STEEL:

1. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED, AND ERECTED IN ACCORDANCE WITH 2010 AISC SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, 2010 AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES AND CHAPTER 4 OF THE TIA CODE.
2. PRE-QUALIFIED STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING MINIMUM GRADES (SEE FABRICATION DRAWINGS FOR SPECIFIC GRADES FOR SPECIFIC PARTS):
   - CHANNELS, SOLID ROUND, & ANGLES ------ ASTM A36, (FY = 36 KSI)
   - PLATES ------------------------------------ A572 GR. 50, (FY = 50 KSI)
   - HSS ------------------------------------ ASTM A500 GR. B, (FY = 46 KSI)
   - STEEL PIPE ------------------------------ ASTM A53 GR. B, (FY = 36 KSI)
   - U-BOLTS ------------------------------ ASTM A307, (FY = 36 KSI) w/ LOCKING DEVICE U.N.O.
   - SEE TABLE 5-1 OF THE TIA CODE FOR ADDITIONAL SHAPES AND STANDARDS THAT ARE NOT LISTED ABOVE.
3. NON PRE QUALIFIED STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING STANDARDS AS PER THE TIA CODE:
   - THE CARBON EQUIVALENT OF STEEL SHALL NOT EXCEED 0.65 PER SECTION 5.4.2 OF THE TIA CODE
   - ELONGATION OF STEEL SHALL NOT BE LESS THAN 18%
   - TEST REPORTS SHALL BE IN ACCORDANCE WITH ASTM A6 OR A568
   - TOLERANCES SHALL BE IN ACCORDANCE WITH ASTM A6
4. FIELD CUT EDGES, EXCEPT DRILLED HOLES, SHALL BE GROUND SMOOTH.

CORROSION CONTROL:

1. ALL STEEL MEMBERS SHALL HAVE CORROSION CONTROL AS OUTLINED IN THE TIA CODE AND STATED BELOW:
   - STEEL MEMBERS SHALL BE HOT DIPPED GALVANIZED PER ASTM A123.
   - FASTENERS AND HARDWARE SHALL BE HOT DIPPED GALVANIZED PER ASTM A153 OR ASTM B695 CLASS 50 (A490 BOLTS SHALL NOT BE HOT DIPPED GALVANIZED).
   - GUYS STANDS SHALL BE PROTECTED IN ACCORDANCE WITH ASTM A475 OR A586 MINIMUM CLASS A COATING.
   - GUY ANCHORAGE IN DIRECT CONTACT OF GROUND SHALL BE HOT DIPPED GALVANIZED PER ASTM A123.
   - ALL REPAIRS SHALL BE PROTECTED IN ACCORDANCE WITH ASTM A780.
2. ALL FIELD CUT SURFACES SHALL BE REPAIRED WITH (2) COATS OF A 95% ZINC RICH PAINT PER ASTM A780 (ZRC PREFERRED).
3. ALL DAMAGED SURFACES, WELDED AREAS AND AUTHORIZED NON-GALVANIZED MEMBERS OR PARTS (EXISTING OR NEW) SHALL BE PAINTED WITH (2) COATS OF ZINC RICH PAINT (ZRC PREFERRED).
4. GUY ANCHOR GALVANIZATION SHALL EXTEND A MIN OF 6" INTO CONCRETE.

BOLTS:

1. ALL CONNECTIONS OF STRUCTURAL STEEL MEMBERS SHALL BE MADE USING SPECIFIED HIGH STRENGTH ASTM A325 OR A490 BOLTS WITH THREADS EXCLUDED IN SHEAR PLANE.
2. FASTENERS SHALL BE INSTALLED IN PROPERLY ALIGNED HOLES.
3. ALL BOLTS WITHOUT DTI WASHERS SHALL BE INSTALLED SNUG FIT UNTIL THE SECTION IS FULLY COMPACTED, AND THEN TIGHTENED FURTHER BY AISC - "TURN OF THE NUT". TIGHTENING SHALL PROGRESS SYSTEMATICALLY.
4. BOLT LENGTHS UP TO AND INCLUDING FOUR DIAMETERS SHALL BE TENSIONED 1/3 TURN BEYOND SNUG FIT. BOLT LENGTHS OVER 4 DIAMETERS SHALL BE 1/2 TURN BEYOND SNUG FIT.
5. FOR SITES WITH DTI WASHERS, REFER TO MANUFACTURER'S RECOMMENDED CALIBRATION PROCEDURE. HTTP://WWW.APPLIEDBOLTING.COM/PDF/SQUIRT_INSTALL.PDF
   - CHECK THE FIRST SET OF BOLTS WITH THE RECOMMENDED FEELER GAUGE TO VERIFY THE PROPER AMOUNT OF "SQUIRT".
   - FOR THE REMAINING BOLTS WITH DTI WASHERS, TIGHTEN UNTIL THE VOLUME AND APPEARANCE OF THE SQUIRT MATCHES THE FIRST "CALIBRATION" SET. THE NUMBER OF SQUIRTS MUST BE AT LEAST THE NUMBER OF BUMPS MINUS ONE. (FOR INSTANCE A FIVE BUMP DTI SHOULD SQUIRT IN AT LEAST FOUR PLACES).
   - PHOTOS OF THE FULLY ENGAGED SQUIRTER DTI WASHERS MUST BE TAKEN WITHIN 24 HOURS OF INSTALLATION BY THE CONTRACTOR.
6. FOR SETS OF BOLT, TIGHTEN GROUP INCREMENTALLY. COMPRESS ALL UNTIL MEMBERS ARE IN FIRM CONTACT. THEN COMPLETE FINAL BOLT TENSIONING.

WELDS:

1. ALL WELDING TO BE PERFORMED BY AWS CERTIFIED WELDERS AND CONDUCTED IN ACCORDANCE WITH AISC AND AWS WELDING CODE - STEEL AWS D1.1/D1.1M:2006 SPECIFICATIONS AND RECOMMENDATIONS.
2. ALL FIELD WELDS SHALL BE PERFORMED BY SMAW OR FCAW PROCESSES ONLY AND USE THE FOLLOWING ELECTRODE SPECIFICATIONS:
   - FILLER METAL YIELD <= 55 KSI
     - SMAC - 7015-X, 7016-X, 7018-X, OR 7028-X
     - FCAW - E7XT-X, OR E7XT-XM
   - FILLER METAL YIELD > 55 KSI
     - SMAC - 8015-X, 8016-X OR 8018-X
     - FCAW - E8XTX-X, OR E8XTX-XM
   - ALL FILLER METAL IS ASSUMED TO BE <= 55 KSI UNLESS WELD CALLOUT SPECIFIES OTHERWISE
   - ALL FCAW WIRE MUST BE SELF-SHIELDED
3. REFER TO STRUCTURAL DRAWINGS FOR ALL FIELD WELD SIZES AND TYPES.
4. PRIOR TO FIELD WELDING GALVANIZED MATERIAL, CONTRACTOR SHALL GRIND OFF GALVANIZING 1/2" BEYOND ALL FIELD WELD SURFACES.
5. REFER TO A DETAILED WELDING SPECIFICATION AND GUIDELINE BY STRUCTURAL COMPONENTS PRIOR TO COMMENCEMENT OF WORK.
6. CONTRACTOR RESPONSIBLE FOR PROTECTING NEARBY COMBUSTIBLE MATERIALS FROM HEAT, FLAME, SPARKS, AND SLAG BY MOVING OR COVERING THEM.
7. FIRE WATCH MUST REMAIN IN THE WORK AREA 30 MINUTES MINIMUM AFTER WELDING OR CUTTING OPERATIONS HAVE ENDED.

GUY ASSEMBLIES:

1. ALL GUY ASSEMBLIES AND COMPONENTS SHALL HAVE THE MINIMUM DESIGN STRENGTHS AS SHOWN ON THE STRUCTURAL DRAWINGS.
2. GUY STRANDS SHALL BE EXTRA HIGH STRENGTH (EHS) OR EQUAL AND SHALL BE IN ACCORDANCE WITH ASTM A475.
3. STRUCTURAL STRANDS SHALL BE IN ACCORDANCE WITH ASTM A586 OR EQUAL.
4. GUY GRIPS SHALL BE DESIGNED SPECIFICALLY FOR THE FULL STRENGTH OF THE GUY WIRES THEY ARE BEING USED FOR.
5. SOCKETS SHALL BE IN ACCORDANCE WITH ASTM A27 AND A148.
6. ZINC POURED ATTACHMENTS SHALL BE IN ACCORDANCE WITH ASTM B6.
7. SHACKLES AND TURNBUCKLES SHALL BE FORGED FROM AISI GRADE 1035 OR 1045 STEEL OR EQUIVALENT.
8. INITIAL TENSION OF GUYS SHALL BE AS STATED ON THE STRUCTURAL DRAWINGS.
9. TURNBUCKLE LOCKS SHALL BE INSTALLED AND SECURELY FIXED THROUGH ALL TURNBUCKLES.
10. FACTORY INSTALLED COMPONENTS SHALL BE PROOF LOADED, PRE-STRESSED AND HAVE LENGTH MEASUREMENTS CHECKED IN ACCORDANCE WITH CHAPTER 9 OF THE TIA CODE.
11. THE MAXIMUM DEVIATION FOR THE DESIGN INITIAL TENSION SHALL BE 10% FOR GUYS UP TO AND INCLUDING 1" DIAMETER OF THE SPECIFIED DESIGN INITIAL TENSION AT AN ANCHORAGE, CORRECTED FOR AMBIENT TEMPERATURE.
12. THE MAXIMUM DEVIATION FOR THE DESIGN INITIAL TENSION SHALL BE 5% FOR GUYS GREATER THAN 1" DIAMETER OF THE SPECIFIED DESIGN INITIAL TENSION AT AN ANCHORAGE, CORRECTED FOR AMBIENT TEMPERATURE.
13. FOR NEWLY INSTALLED GUY WIRES FINAL TURNBUCKLE GAPS MUST ALLOW FOR 3" OF ADJUSTMENT IN EITHER DIRECTION. FOR EXAMPLE, A 12" TURNBUCKLE SHALL HAVE A RANGE BETWEEN 3" AND 9".

TOLERANCES:

1. CONSTRUCTION OF TOWERS SHALL MEET ALL OF THE TOLERANCE REQUIREMENTS AS OUTLINED IN CHAPTER 6.1.2 OF THE TIA CODE.

GROUT:

1. ALL GROUT BENEATH BASE PLATES SHALL BE NON-SHRINK, "EMBECO","FIVE-STAR" OR EQUAL.
2. ALL GROUT SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 5,000 PSI. U.N.O.

STRUCTURAL ERECTION AND BRACING REQUIREMENTS:

1. THE STRUCTURAL DRAWINGS ILLUSTRATE THE COMPLETED STRUCTURE WITH ALL ELEMENTS IN THEIR FINAL POSITIONS, PROPERLY SUPPORTED AND BRACED.
2. THE CONTRACTOR, IN THE PROPER SEQUENCE, SHALL PROVIDE TEMPORARY BRACING AS MAY BE REQUIRED DURING CONSTRUCTION TO ACHIEVE THE FINAL COMPLETED STRUCTURE.
3. OBSERVATION VISITS TO THE SITE BY THE STRUCTURAL ENGINEER SHALL NOT INCLUDE INSPECTION OF THE BRACING ELEMENTS.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND EXECUTION OF ALL TEMPORARY SUPPORTS, GUYING, ETC. NECESSARY TO PROVIDE A COMPLETE AND STABLE STRUCTURE AS SHOWN ON THESE DRAWINGS.
5. CONTRACTOR'S PROPOSED INSTALLATION SHALL NOT INTERFERE, NOR DENY ACCESS TO ANY EXISTING OPERATIONAL AND SAFETY EQUIPMENT.

PAINT:

1. AS NOTED IN DRAWINGS, CLEAN AND PAINT PROPOSED STEEL ACCORDING TO FAA ADVISORY CIRCULAR AC 70/7460-IK.

PROTECTIVE GROUNDING:

1. GROUNDING OF THE TOWER SHALL BE IN ACCORDANCE WITH SECTION 10 OF THE TIA-222-H CODE WITH THE FOLLOWING EXCEPTIONS:
   - NO TESTING TO VERIFY FINAL RESISTANCE WILL BE COMPLETED UNLESS SPECIFICALLY REQUESTED BY CLIENT AND NOTED IN THE DRAWINGS.
   - ALTERNATIVE GROUNDING METHODS FOR SITE SPECIFIC CONDITIONS DESIGNED IN ACCORDANCE WITH MOTOROLA R56 "STANDARDS AND GUIDELINES FOR COMMUNICATION SITES" MAY BE APPROVED BY THE ENGINEER OF RECORD AND PRESENTED IN THE DRAWINGS.

MAPPING:

1. FIELD MAPPING SHALL BE IN ACCORDANCE WITH CHAPTER 14 OF THE TIA CODE.
2. CONTRACTOR SHALL THOROUGHLY INSPECT AND SURVEY EXISTING STRUCTURE TO VERIFY DIMENSIONS, ELEVATIONS, FRAMING, ETC. WHICH AFFECT THE WORK SHOWN ON THE DRAWINGS.
3. REPORT ANY VARIATIONS OR DISCREPANCIES TO THE STRUCTURAL ENGINEER BEFORE PROCEEDING.

MAINTENANCE:

1. A CONTINUOUS INSPECTION OF THE STRUCTURE SHALL BE COMPLETED PER TIA RECOMMENDATIONS AS OUTLINED IN CHAPTER 14 OF THE TIA CODE. ANY DEFECTS SHALL BE REPORTED TO ENSURE THE STRUCTURAL INTEGRITY FOR THE LIFE OF THE STRUCTURE.

AJAX BOLTS:

1. AJAX BOLTS USED FOR STRUCTURAL CONNECTIONS SHALL BE AJAX 'ONESIDE' PC8.8 W/ SLEEVE AND SHALL BE THE SIZE AS SPECIFIED ON THE STRUCTURAL DRAWINGS.
2. ALL AJAX BOLTS SHALL BE INSTALLED AS PER THE MANUFACTURER'S SPECIFICATIONS AND DETAILS SHOWN IN DRAWINGS.
3. ALL AJAX BOLTS SHALL RUST PROOF GALVANIZED.
4. AJAX BOLTS SHALL BE INSTALLED IN PROPERLY ALIGNED HOLES.

THREADED REBAR:

1. ALL DETAILING, FABRICATION, AND PLACEMENT OF THREADED REBAR REINFORCING STEEL SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS.
2. THREADED REBAR SHALL BE DEFORMED AND CONFORM TO THE FOLLOWING MINIMUM GRADES:
   - GRADE 75 ------------------------------ ASTM A615, (FY = 75 KSI, Fu = 100 KSI)
   - GRADE 90 ------------------------------ ASTM A615, (FY = 90 KSI, Fu = 100 KSI)
   - 150 KSI ------------------------------ ASTM A722, (FY = 127.5 KSI, Fu = 150 KSI)
3. THREADED REBAR SHALL HAVE A MINIMUM SIZE EQUAL TO THE SIZE AS INDICATED ON THE STRUCTURAL DRAWINGS.
4. ALL COUPLERS, NUTS AND LOCK NUTS USED WITH ALL-THREAD REINFORCING BARS SHALL BE OF THE APPROPRIATE SIZE AND PITCH TO MATCH THE CORRESPONDING BAR SIZE AND SHALL BE MANUFACTURED BY THE SAME MANUFACTURER AS THE REINFORCING BARS. (SEE BELOW)
5. ALL BARS AND PARTS ARE TO BE HOT DIPPED GALVANIZED.
6. WELDING OFALL-THREAD BARS IS STRICTLY PROHIBITED.

DYWIDAG THREADBAR REINFORCING BAR ATTACHMENTS:

1. ALL COUPLERS, NUTS AND LOCK NUTS USED WITH DYWIDAG REINFORCING BARS SHALL BE OF THE APPROPRIATE SIZE AND PITCH TO MATCH THE CORRESPONDING BAR SIZE AND SHALL BE MANUFACTURED BY DYWIDAG-SYSTEMS INTERNATIONAL.
2. ANCHOR BOLTS ARE TO BE ASTM A615 FOR ALL ALL-THREAD REINFORCING BAR GRADES EXCEPT FOR 150 KSI WHICH SHALL BE ASTM A722.
3. HEX NUTS AND JAM NUTS ARE TO BE ASTM A108 FOR ALL ALL-THREAD REINFORCING BAR GRADES.
4. HARDENED WASHERS ARE TO BE ASTM F436 FOR ALL ALL-THREAD REINFORCING BAR GRADES.
5. COUPLERS SHALL BE 'STOP-TYPE COUPLING AND ARE TO BE ASTM A108 FOR ALL ALL-THREAD REINFORCING BAR GRADES.

WILLIAMS FORM ALL-THREAD REINFORCING BAR ATTACHMENTS:

1. ALL COUPLERS, NUTS AND LOCK NUTS USED WITH WILLIAMS FORM ALL-THREAD REINFORCING BARS SHALL BE OF THE APPROPRIATE SIZE AND PITCH TO MATCH THE CORRESPONDING BAR SIZE AND SHALL BE MANUFACTURED BY WILLIAMS FORM ENGINEERING CORP.
2. ANCHOR BOLTS ARE TO BE ASTM A615 FOR ALL ALL-THREAD REINFORCING BAR GRADES EXCEPT FOR 150 KSI WHICH SHALL BE ASTM A722.
3. HEX NUTS AND JAM NUTS ARE TO BE ASTM A108 FOR ALL ALL-THREAD REINFORCING BAR GRADES.
4. HARDENED WASHERS ARE TO BE ASTM F436 FOR ALL ALL-THREAD REINFORCING BAR GRADES.
5. COUPLERS SHALL BE 'STOP-TYPE COUPLING AND ARE TO BE ASTM A108 FOR ALL ALL-THREAD REINFORCING BAR GRADES.

THREADED REBAR (VGX REINFORCING RODS):

1. ALL DETAILING, FABRICATION, AND PLACEMENT OF THREADED REBAR REINFORCING STEEL SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS.
2. THREADED REBAR SHALL BE DEFORMED AND CONFORM TO THE FOLLOWING MINIMUM GRADES:
   - GRADE 75 ------------------------------ ASTM A615, (FY = 75 KSI, Fu = 100 KSI)
   - GRADE 90 ------------------------------ ASTM A615, (FY = 90 KSI, Fu = 100 KSI)
   - GRADE 150 ------------------------------ ASTM A722, (FY = 127.5 KSI, Fu = 150 KSI)
3. THREADED REBAR SHALL HAVE A MINIMUM SIZE EQUAL TO THE SIZE AS INDICATED ON THE STRUCTURAL DRAWINGS.
4. ALL COUPLERS, NUTS AND LOCK NUTS USED WITH ALL-THREAD REINFORCING BARS SHALL BE OF THE APPROPRIATE SIZE AND PITCH TO MATCH THE CORRESPONDING BAR SIZE AND SHALL BE MANUFACTURED BY THE SAME MANUFACTURER AS THE REINFORCING BARS. (SEE BELOW)
5. ALL BARS AND PARTS ARE TO BE HOT DIPPED GALVANIZED.
6. WELDING OF ALL-THREAD BARS IS STRICTLY PROHIBITED.
7. ALL VGX REINFORCING RODS AND HELICAL ANCHORS SHALL BE PROOF LOADED TO THE LOADS AS SHOWN BELOW. INCREASE LOADS ON EACH ANCHOR AROUND THE POLE IN INCREMENTS OF 10 KIPS UNTIL PROOF LOAD ON ALL ANCHORS IS MET.
   - #14 GRADE 75 ------------------------------ 70 KIPS
   - #11 GRADE 75 ------------------------------ 50 KIPS
   - #11 GRADE 90 ------------------------------ 60 KIPS
   - #11 150 KSI ------------------------------ 70 KIPS
8. PRE-TENSIONING OF VGX REINFORCING RODS SHALL BE PROVIDED AFTER ALL PROOF LOADS HAVE BEEN APPLIED. PRE-TENSION LOADS ARE AS FOLLOWS:
   - #14 GRADE 75 ------------------------------ 11.2 KIPS
   - #11 GRADE 75 ------------------------------ 7.8 KIPS
   - #11 GRADE 90 ------------------------------ 9.4 KIPS
   - #11 150 KSI ------------------------------ 11.2 KIPS

HELICAL PIERS (BY OTHERS):

1. HELICAL PIERS SHALL BE DESIGNED FOR A VERTICAL LOAD AND A HORIZONTAL LOAD AS DETAILED IN THE PASSING WITH MODIFICATIONS STRUCTURAL ANALYSIS.
2. HELICAL PIERS SHALL BE INSTALLED TO HAVE A MINIMUM FACTOR OF SAFETY OF 1.5.
3. ALL HELICAL PIERS AND CONNECTIONS TO RVG BASE TERMINATION SHALL BE DESIGNED BY THE HELICAL PIER SUPPLIER, SUCH THAT THEY PROVIDE THE MINIMUM ALLOWABLE CAPACITIES AS INDICATED ON THE DRAWINGS. DESIGN SHALL BE SEALED BY A LICENSED PROFESSIONAL ENGINEER.
4. REFER TO GEOTECHNICAL REPORT REFERENCED IN PASSING WITH MODIFICATIONS STRUCTURAL FOR SOILS INFORMATION.
5. ALL STEEL FOR HELICAL PIERS SHALL BE HOT-DIP GALVANIZED.
6. HELICAL PIERS SHALL BE INSTALLED TO THE MANUFACTURERS SPECIFICATIONS. DOCUMENTATION OF THE INSTALLED CAPACITIES SHALL BE FURNISHED TO THE STRUCTURAL ENGINEER AFTER INSTALLATION IS COMPLETE.

REINFORCEMENT REQUIREMENTS OF EXISTING STRUCTURES:

1. ALL MODIFICATIONS AND REINFORCEMENTS TO THE STRUCTURE ARE BASED ON A RIGOROUS STRUCTURAL ANALYSIS.
2. ALL ADDED STRUCTURAL COMPONENTS HAVE BEEN DESIGN IN ACCORDANCE WITH THE CODES AS STATED ABOVE.
3. ALL ASSUMPTIONS MADE SHALL BE VERIFIED WITH THE STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION.

ANCHOR REINFORCEMENT INSTALLATION:

1. CONTRACTOR SHALL VERIFY THAT DRILLING CLEARANCE AT POLE AND ACCESS IS SATISFACTORY PRIOR TO CONSTRUCTION. ANY OBSTACLES SHALL BE REPORTED IMMEDIATELY TO ENGINEER.
2. DRILL HOLES SHALL BE LOCATED FAR ENOUGH INSIDE THE EDGE OF CAISSON OR PIER TO AVOID REBAR CAGE. DISTANCE SHOWN IN DRAWINGS.
3. COMPRESSED AIR SHALL BE USED TO BLOW DEBRIS OUT OF THE NEWLY DRILLED HOLES.
4. HOLES IN BASEPLATE ARE PREFERABLY DRILLED. IF HOLES IN BASEPLATE ARE TORCHED, EDGES SHALL BE GROUND SMOOTH AND REPAIRED ACCORDING TO "CORROSION CONTROL" SECTION.
5. PHOTOS SHALL BE TAKEN OF EACH HOLE WITH A TAPE MEASURE INSERTED TO SHOW ACTUAL DEPTH OF HOLE. HOLES SHALL BE NUMBERED WITH A MARKER PER DRAWINGS FOR REFERENCE.
6. HILTI RE 150 EPOXY SHALL BE USED TO SET ANCHORS. ALTERNATIVE EPOXY MAY BE APPROVED BY ENGINEER OF RECORD IF REQUESTED. FOLLOW MANUFACTURERS INSTRUCTIONS.
7. AFTER EPOXY HAS CURED FOR A MINIMUM OF 24 HOURS, TOP OFF HOLE WITH ADDITIONAL EPOXY TO CROWN OVER CONCRETE AND ENSURE THAT THERE WILL BE NO WATER RETENTION AROUND ANCHOR ROD.

BLUE SKY TOWERS LLC

Structural Components
Bringing It All Together

1870 W 64TH LANE
DENVER, CO 80221
(866) 386 - 7622
JOB #: 230218

STAMP:

STATE OF CONNECTICUT
No. 18022
LICENSED PROFESSIONAL ENGINEER

REVISIONS:

NO.	DATE	DESCRIPTION	BY	CHK	APD
0	4/20/23	MODIFICATION DRAWINGS	RM	TR	WC
1					
2					
3					
4					
5					

SITE INFORMATION:
97 HIGH STREET
PORTLAND CT 06480

DESIGN TYPE:
SELF SUPPORT TOWER MODIFICATION

SHEET TITLE:
GENERAL CONSTRUCTION NOTES

SHEET TITLE: GN-1
REVISION: 0

1. GENERAL INSPECTION NOTES:

a. THE CONSTRUCTION OF THE PROPOSED STRUCTURAL ELEMENTS SHOWN IN THESE DRAWINGS SHALL NOT BE CONSIDERED AS COMPLETE UNTIL THE SPECIAL INSPECTIONS AND STRUCTURAL OBSERVATIONS MARKED IN THE FOLLOWING TABLES HAVE BEEN REVIEWED AND APPROVED BY THE ENGINEER OF RECORD (EOR) AND SUBMITTED TO THE BUILDING OFFICIAL.
b. THIS SPECIAL INSPECTION PROGRAM DOES NOT RELIEVE THE CONTRACTOR OF HIS OR HER RESPONSIBILITIES.
c. THE QUALIFICATIONS OF ALL SPECIAL INSPECTORS MUST BE SUBMITTED TO THE EOR FOR REVIEW AND APPROVAL.
d. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH ALL INSPECTORS SUCH THAT WORK MAY BE INSPECTED AT APPROPRIATE TIMES.
e. THE EOR OR PERSONNEL WORKING UNDER THE DIRECTION OF THE EOR MAY BE CONTRACTED TO COMPLETE THE SPECIAL INSPECTIONS.
f. ANY CHANGES NOTED DURING THE INSPECTIONS MUST BE REVIEWED AND APPROVED BY THE EOR.
g. THE GENERAL CONTRACTOR SHALL PROVIDE AN AS-BUILT SET OF PLANS TO THE EOR DOCUMENTING ALL CHANGES THAT OCCURRED DURING CONSTRUCTION.
h. REFER TO THE NOTES THAT ACCOMPANY EACH TABLE FOR SPECIFICS ON REQUIRED INSPECTIONS.

2. DUTIES OF THE SPECIAL INSPECTOR:

a. ANY CHANGES NOTED DURING THE INSPECTION MUST BE REVIEWED AND APPROVED BY THE EOR.
b. THE INSPECTOR SHALL OBSERVE THE WORK FOR COMPLIANCE WITH THE JURISDICTION APPROVED PLANS, SPECIFICATIONS AND APPLICABLE PROVISIONS OF THE IBC. SHOP DRAWINGS MAY BE USED ONLY AS AN AID TO INSPECTIONS.
c. CONTINUOUS SPECIAL INSPECTIONS REQUIRE FULL-TIME OBSERVATION OF WORK REQUIRING SPECIAL INSPECTION BY AN APPROVED SPECIAL INSPECTOR WHO IS PRESENT IN THE AREA WHERE THE WORK IS BEING PERFORMED.
d. PERIODIC SPECIAL INSPECTIONS REQUIRE PART-TIME OR INTERMITTENT OBSERVATION OF WORK REQUIRING SPECIAL INSPECTION BY AN APPROVED SPECIAL INSPECTOR WHO IS PRESENT IN THE AREA WHERE THE WORK IS BEING PERFORMED AND AT THE COMPLETION OF THE WORK.
e. THE INSPECTOR SHALL BRING NON-CONFORMING ITEMS TO THE IMMEDIATE ATTENTION OF THE GENERAL CONTRACTOR. THE GENERAL CONTRACTOR SHALL BRING ALL NON-CONFORMING ITEMS TO THE IMMEDIATE ATTENTION OF THE EOR. IF ANY ITEM IS NOT RESOLVED IN A TIMELY MANNER AND IS ABOUT TO BE INCORPORATED IN THE WORK, THE SPECIAL INSPECTOR SHALL IMMEDIATELY NOTIFY THE EOR.
f. ALL NON-CONFORMING ITEMS, EVEN IF CORRECTED, SHALL BE DESCRIBED ON AN ASCE DAILY REPORT FORM AND ON AN ASCE DISCREPANCY NOTICE FORM.
g. THE SPECIAL INSPECTOR SHALL COMPLETE AN ASCE DAILY REPORT FORM, AN INTERIM REPORT FORM AND/OR A DISCREPANCY NOTICE FORM FOR EACH DAY'S INSPECTIONS. FORMS CAN BE OBTAINED UPON REQUEST FROM THE EOR.
h. THE SPECIAL INSPECTOR OR INSPECTION AGENCY SHALL SUBMIT FINAL SIGNED REPORTS TO THE EOR.

3. REQUIREMENTS FOR STRUCTURAL OBSERVATION:

STRUCTURES MEETING THE FOLLOWING CRITERIA ARE REQUIRED TO HAVE SPECIAL INSPECTIONS CONDUCTED BY REGISTERED PROFESSIONAL ENGINEERS:
- THE STRUCTURE IS CLASSIFIED AS RISK CATEGORY IV
- $V_{ULT} \geq 130$ MPH AND THE FOLLOWING CRITERIA:
  - RISK CATEGORY III OR IV.
- SEISMIC DESIGN CATEGORY D, E OR F AND THE FOLLOWING CRITERIA:
  - RISK CATEGORY III OR IV
- SEISMIC DESIGN CATEGORY E AND THE FOLLOWING CRITERIA:
  - RISK CATEGORY I OR II
  - THE STRUCTURE IS GREATER THAN TWO STORIES ABOVE THE GRADE PLANE

THE FOLLOWING ARE EXCEPTIONS TO THESE REQUIREMENTS:
- STRUCTURAL STEEL (CONCRETE NOT EXCEPTED) DESIGNED FOR SEISMIC DESIGN CATEGORY B OR C THAT WAS NOT SPECIFICALLY DESIGNED FOR SEISMIC RESISTANCE AND HAS A RESPONSE MODIFICATION FACTOR OF 3 OR LESS (EXCLUDING CANTILEVERED COLUMNS SYSTEMS).
- FOUNDATION MODIFICATIONS OR TOWER MODIFICATIONS DESIGNED FOR SEISMIC CATEGORY D, E OR F WHERE THE ORIGINAL TOWER OR FOUNDATION IS CAPABLE OF WITHSTANDING SEISMIC LOADS WITHOUT CONSIDERING REINFORCEMENTS.

4. REFERENCED STANDARDS:

a. ACI 318-14
b. AISC 360-16 AND AISC 303-10 IN ACCORDANCE WITH AISC FIFTEENTH EDITION
c. AWS D1.1 – 15, D1.3 – 08, D1.4 – 17
d. ASTM C 31/C 31M – 15, ASTM C 172/C 172M – 14a

5. SOILS AND EARTHWORK INSPECTION NOTES:

a. THE FINAL DEPTH AND SOIL CONDITION SHALL BE INSPECTED PRIOR TO PLACEMENT OF REINFORCING STEEL AND CONCRETE. THIS SHALL INCLUDE VERIFYING THAT THE SOIL TYPE AND MATERIAL MATCHES THE GEOTECHNICAL REPORT REFERENCED IN THE PASSING WITH MODIFICATIONS ANALYSIS. IF THERE IS ANY DOUBT TO SOIL CONDITION/TYPE THEN ADDITIONAL TESTING MAY BE REQUIRED TO VERIFY DESIGN BEARING CAPACITY. CONTACT THE EOR WITH ANY OBSERVED ISSUES.
b. THE BOTTOM OF EXCAVATION SHALL BE INSPECTED TO ENSURE THAT NO EXCESS LOOSE OR FOREIGN MATERIALS ARE PRESENT.
c. THE DENSITY AND LIFT THICKNESS SHALL BE CONTINUOUSLY MONITORED DURING BACKFILL TO MATCH RECOMMENDATIONS IN GEOTECHNICAL REPORT. IF NO RECOMMENDATIONS ARE LISTED, THE BACKFILL SHALL BE PERFORMED IN 9-12" HORIZONTAL LIFTS TO NOT LESS THAN 90% OF THE MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT DETERMINED IN ACCORDANCE WITH ASTM 1557. THE FILL SHALL BE FREE FROM LARGE ROCKS, WASTE AND DEBRIS.

6. REBAR INSPECTION NOTES:

a. ALL REBAR PARTS LISTS, INCLUDING MATERIAL SPECIFICATIONS, MUST BE MAINTAINED AND PROVIDED TO THE EOR.
b. ALL REBAR MUST BE INSPECTED BEFORE CONCRETE IS POURED INCLUDING BUT NOT LIMITED TO PLACEMENT, SIZES, BEND DIAMETERS, SPACING, LAP DISTANCES, CLEAR COVER AND TIES.
c. ANY EMBEDDED DOWELS SET WITH EPOXY OR GROUT MUST BE INSPECTED BEFORE CONCRETE IS POURED. THIS INCLUDES FINAL DEPTH AND HOLE DIAMETER, HOLE DRILLING AND CLEANING PROCEDURES. THE EPOXY OR GROUT APPLICATION MUST BE INSPECTED AND VERIFIED TO FOLLOW MANUFACTURER'S RECOMMENDATIONS. HORIZONTAL OR UPWARD SLOPING PLACEMENT OF DOWELS WITH EPOXY MUST BE CONTINUOUSLY MONITORED.
d. ANY CONDUITS OR OTHER ITEMS TO BE EMBEDDED IN CONCRETE SHALL BE INSPECTED TO CONFORM WITH ACI 318: 6.3.

7. CONCRETE INSPECTION NOTES:

a. BATCH DESIGN MIX RECORDS MUST BE RETAINED AND PROVIDED TO THE EOR.
b. AT LEAST 5 TEST CYLINDERS MUST BE TAKEN PER TRUCK IN ACCORDANCE WITH ASTM D3665.
c. SLUMP, AIR CONTENT AND TEMPERATURE TESTS MUST BE COMPLETED AT THE TIME THAT TEST CYLINDERS ARE TAKEN. THIS INFORMATION SHALL BE DOCUMENTED WITH THE STRENGTH TESTS.
d. ALL TEST CYLINDERS MUST BE CURED ON SITE AT IDENTICAL CONDITIONS AS TESTED CONCRETE.
e. IF ANY COLD WEATHER, HOT WEATHER OR ACCELERATE CURING METHODS ARE USED, THESE PROCEDURES AND MATERIALS MUST BE DOCUMENTED.
f. FINAL BREAK TESTS MUST BE COMPLETED AND PASS REQUIREMENTS IN ACI 318: 5.6.3.3 BEFORE NEW CONCRETE CAN BE LOADED.

8. ANCHOR ROD AND EMBEDMENT INSPECTION NOTES:

a. FOR EMBEDMENTS SET IN UNCURED CONCRETE, THE SPECIAL INSPECTOR SHALL VERIFY THAT THE EMBEDMENT MATCHES THE DRAWINGS FOR GEOMETRY, ELEVATION AND LOCATION.
b. FOR EMBEDMENTS SET IN HARDENED CONCRETE, THE HOLE DIAMETER(S) AND DEPTH(S) MUST BE INSPECTED BY THE SPECIAL INSPECTOR PRIOR TO SETTING THE EMBEDMENT. THE TECHNIQUE FOR DRILLING OR CORING AND CLEANING MUST BE DOCUMENTED BY THE SPECIAL INSPECTOR AND CONFIRMED TO MATCH DRAWINGS. GROUT OR EPOXY PRODUCTS AND VOLUMES MUST BE RECORDED BY THE SPECIAL INSPECTOR ON A PER HOLE BASIS.
c. VERTICALLY ORIENTATED EMBEDMENTS MUST BE PERIODICALLY MONITORED DURING INSTALLATION FOR ELEVATION AND TO VERIFY THE PROCEDURES MATCH MANUFACTURER'S RECOMMENDATIONS.
d. HORIZONTAL AND UPWARDLY SLOPING EMBEDMENTS MUST BE CONTINUOUSLY INSPECTED DURING ALL INSTALLATION ACTIVITIES TO VERIFY THE PROCEDURES MATCH MANUFACTURER'S RECOMMENDATIONS.

9. STRUCTURAL STEEL SHOP FABRICATION INSPECTION NOTES:

a. SHOP DRAWINGS SHALL BE REVIEWED AND APPROVED BY EOR PRIOR TO FABRICATION OF PARTS.
b. ALL BOLT MATERIAL SPECIFICATIONS MUST BE MAINTAINED FROM MANUFACTURER PROVIDED TO THE EOR.
c. ALL SHOP WELDING SHALL BE INSPECTED AND APPROVED BY A CERTIFIED WELDING INSPECTOR IN ACCORDANCE WITH AWS D1.1.
d. ALL WELDING MATERIAL SPECIFICATIONS MUST BE MAINTAINED FROM MANUFACTURER PROVIDED TO THE EOR.

10. STRUCTURAL STEEL FIELD FABRICATION INSPECTION NOTES:

a. FOR DTI WASHERS "LOT" CALIBRATION DETAILS MUST BE PROVIDED TO THE EOR. ALL DTI WASHERS INSTALLED MUST BE INSPECTED TO DETERMINE THEY HAVE MET THE TENSIONING SPECIFIED BY THE "LOT" CALIBRATION DETAILS.
b. FOR ANY OTHER DIRECT TENSION INDICATORS USED, THE CALIBRATION AND INSTALLATION TECHNIQUES MUST BE INSPECTED FOR CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS.
c. FOR SNUG TIGHT CONNECTIONS ALL PARTS MUST BE INSPECTED TO VERIFY THAT THE CONNECTED MATERIALS HAVE BEEN DRAWN TOGETHER AND PROPERLY SNUGGED. ANY LOCK WASHERS USED MUST BE VERIFIED TO BE FULLY COMPRESSED.
d. FOR ANY FIELD FABRICATION INCLUDING CUTTING, PUNCHING OR DRILLING, THE FINAL DIMENSIONS MUST BE VERIFIED TO MATCH THE DRAWINGS.
e. ALL COLD-GALVANIZED SURFACES MUST BE INSPECTED TO HAVE BEEN COATED PROPERLY. A PHOTOGRAPH OF THE COLD-GALVANIZING PRODUCT WITH THE SITE SIGN IS REQUIRED AS PART OF THE INSPECTION RECORDS.

11. FIELD WELDING INSPECTION NOTES:

ALL FIELD WELDS SHALL BE INSPECTED BY A CERTIFIED WELDING INSPECTOR IN ACCORDANCE WITH AWS D1.1. THIS INCLUDES, BUT IS NOT LIMITED TO, FIELD PREPARATION OF AREAS TO BE WELDED, WELDING MATERIALS TO BE USED, WELDING PROCEDURES AND TECHNIQUES, FINAL SIZE AND QUALITY OF WELD AND SURFACE FINISH OF WELDED AREAS.

12. GUY WIRE TENSION INSPECTION NOTES:

a. FINAL GUY WIRE TENSIONS MEASUREMENTS AND TOWER ALIGNMENT MEASUREMENTS MUST BE MADE FOLLOWING ALL GUY WIRE TENSION ADJUSTMENTS.
b. FINAL GUY WIRE TENSIONS MUST BE DOCUMENTED FOR EACH LEVEL BY CONTRACTOR. THIS SHALL INCLUDE PHOTOS TAKEN WITH TENSION METER OR DIRECT TENSION DEVICE AND WHITE BOARD SHOWING SITE, ANCHOR, GUY LEVEL, TEMPERATURE AND TENSION READING.
c. CALIBRATION CERTIFICATION OF TENSION METERS SHALL BE PROVIDED TO THE EOR.
d. FINAL ALIGNMENT OF TOWER SHALL BE MEASURED AND DOCUMENTED BY CONTRACTOR AS SHOWN ON A-1 SHEET. THIS ALIGNMENT SHALL ALSO BE MEASURED AND VERIFIED WITH CLOSEOUT INSPECTION.

SPECIAL INSPECTION CHECKLIST

INSPECTION	DESCRIPTION (SEE ABOVE NOTES)	REQUIRED	RESPONSIBILITY	FREQUENCY
STRUCTURAL OBSERVATION	IBC: 1704.6	NO	SI (RPE)	---
VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY	REFER TO GEOTECHNICAL REPORT IF AVAILABLE	NO	SI	PERIODIC
VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL	REFER TO GEOTECHNICAL REPORT IF AVAILABLE	NO	SI	PERIODIC
PERFORM CLASSIFICATION OF COMPACTED FILL MATERIALS	REFER TO GEOTECHNICAL REPORT IF AVAILABLE	NO	SI	CONTINUOUS
PERFORM TESTING OF COMPACTED FILL MATERIALS	REFER TO GEOTECHNICAL REPORT IF AVAILABLE	NO	TA	CONTINUOUS
VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL	REFER TO GEOTECHNICAL REPORT IF AVAILABLE	NO	SI	CONTINUOUS
PRIOR TO PLACEMENT OF COMPACTED FILL, INSPECT SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY	REFER TO GEOTECHNICAL REPORT IF AVAILABLE	NO	SI	PERIODIC
INSPECTION OF REINFORCEMENT, INCLUDING PRE-STRESSING TENDONS, AND VERIFY PLACEMENT.	ACI 318: CH 20, 25.2, 25.3, 26.6.1-26.6.3, IBC: 1908.4	NO	SI	PERIODIC
INSPECTION OF REINFORCING STEEL WELDING	AWS D1.4, ACI 318: 26.6.4	NO	CWI	PERIODIC
INSPECTION OF ANCHORS CAST IN CONCRETE	ACI 318: 17.8.2	NO	SI	CONTINUOUS
INSPECTION OF ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS	ACI 318: 17.8.2.4	NO	SI	CONTINUOUS
INSPECTION OF MECHANICAL ANCHORS AND ADHESIVE ANCHORS (OTHER ORIENTATIONS OR NOT UNDER SUSTAINED TENSION LOADS):	ACI 318: 17.8.2	NO	SI	PERIODIC
VERIFY MIX DESIGN: A. GC TO PROVIDE MIX DESIGN TO EOR PRIOR TO CONCRETE ORDER FOR REVIEW AND APPROVAL B. EOR TO APPROVE OR REJECT MIX DESIGN	ACI 318: CH 19, 26.4.3, 26.4.4, IBC: 1904.1, 1904.2, 1908.2, 1908.3	NO	GC EOR	PERIODIC
SAMPLING AND TESTING OF FRESH CONCRETE IMMEDIATELY PRIOR TO PLACEMENT FOR SLUMP, AIR AND TEMPERATURE	ASTM C 172, ASTM C 31, ACI 318: 26.5, 26.12, IBC: 1908.10	NO	TA	CONTINUOUS
INSPECTION OF CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES	ACI 318: 26.5, IBC: 1908.6, 1908.7, 1908.8	NO	SI	CONTINUOUS
VERIFY MAINTENANCE OF SPECIFIED CURING TEMPERATURES AND TECHNIQUES	ACI 318: 25.6.3-26.5.5, IBC: 1908.9	NO	SI	PERIODIC
INSPECTION OF PRE-STRESSED CONCRETE FOR APPLICATION OF PRE-STRESSING FORCES AND GROUTING OF BONDED PRE-STRESSING TENDONS	ACI 318: 26.10	NO	SI	CONTINUOUS
INSPECTION OF ERECTION OF PRECAST CONCRETE MEMBERS	ACI 318: 26.9	NO	SI	PERIODIC
VERIFICATION OF IN-SITU CONCRETE STRENGTH PRIOR TO LOADING, STRESSING OF TENDONS AND/OR REMOVAL OF FORMS: A. TA TO PROVIDE CONCRETE BREAK TEST(S) TO GC WHEN REQUESTED B. GC TO PROVIDE CONCRETE BREAK TEST(S) TO EOR FOR APPROVAL C. EOR TO APPROVE OR REJECT REQUESTED ACTIONS BASED ON TESTED STRENGTH(S)	ACI 318: 26.11.2	NO	TA GC EOR	PERIODIC
INSPECTION OF FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED	ACI 318: 26.11.1.2(B)	NO	SI	PERIODIC
PULL-TESTING OF INSTALLED FOUNDATION SYSTEMS OR EMBEDMENTS: A. SI SHALL CONDUCT TESTING OR OBSERVE TESTING BY OTHERS FOR CONFORMANCE WITH DRAWINGS B. SI SHALL DOCUMENT TEST RESULTS IN A REPORT	REFER TO DRAWINGS	NO	SI	CONTINUOUS
BASE PLATE GROUTING	REFER TO DRAWINGS	NO	SI	PERIODIC
IDENTIFICATION OF HARDWARE MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS	APPLICABLE ASTM MATERIAL STANDARDS	YES	SI	PERIODIC
HARDWARE MANUFACTURER CERTIFICATE OF COMPLIANCE	---	YES	FAB	PERIODIC
FIELD INSPECTION OF STRUCTURAL STEEL MEMBERS	REFER TO DRAWINGS	NO	SI	PERIODIC
SNUG TIGHT JOINTS	AISC 360, SECTION N5, IBC: 1705.2	YES	SI	PERIODIC
PRE-TENSIONED AND SLIP-CRITICAL JOINTS USING TURN-OF-NUT WITH MATCH-MARKING, TWIST OFF BOLT OR DIRECT TENSION INDICATOR METHODS OF INSTALLATION	AISC 360, SECTION N5, IBC: 1705.2	NO	SI	PERIODIC
PRE-TENSIONED AND SLIP-CRITICAL JOINTS USING TURN-OF-NUT WITHOUT MATCH-MARKING, OR CALIBRATED WRENCH METHODS OF INSTALLATION	AISC 360, SECTION N5, IBC: 1705.2	NO	SI	CONTINUOUS
IDENTIFICATION OF STRUCTURAL STEEL MARKINGS TO CONFORM TO AISC 303	AISC 303, SECTION 6.1	YES	FAB	PERIODIC
IDENTIFICATION OF OTHER STEEL MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS	APPLICABLE ASTM MATERIAL STANDARDS	NO	FAB	PERIODIC
STRUCTURAL STEEL MANUFACTURER CERTIFIED TEST REPORTS	---	YES	FAB	PERIODIC
WELD FILLER IDENTIFICATION AND MARKING TO CONFORM TO AWS SPECIFICATION IN THE APPROVED CONSTRUCTION DOCUMENTS	APPLICABLE AWS STANDARDS	NO	CWI	PERIODIC
WELD FILLER MATERIAL MANUFACTURER CERTIFICATION OF COMPLIANCE	---	NO	FAB	PERIODIC
COMPLETE AND PARTIAL JOINT PENETRATION GROOVE WELDS	AWS D1.1, IBC 1705.2	NO	CWI	CONTINUOUS
MULTI-PASS FILLET WELDS	AWS D1.1, IBC 1705.2	NO	CWI	CONTINUOUS
SINGLE-PASS FILLET WELDS >5/16"	AWS D1.1, IBC 1705.2	NO	CWI	CONTINUOUS
PLUG AND SLOT WELDS	AWS D1.1, IBC 1705.2	NO	CWI	CONTINUOUS
SINGLE-PASS FILLET WELDS <5/16"	AWS D1.1, IBC 1705.2	NO	CWI	PERIODIC

TABLE KEY: EOR – ENGINEER OF RECORD; SI – SPECIAL INSPECTOR UNDER CONTRACT WITH GC AND APPROVED BY EOR; RPE – REGISTERED PROFESSIONAL ENGINEER UNDER CONTRACT WITH GC AND APPROVED BY EOR; TA – 3RD PARTY TESTING AGENCY UNDER CONTRACT WITH GC; GC – GENERAL CONTRACTOR; CWI – CERTIFIED WELDING INSPECTOR UNDER CONTRACT WITH GC; FAB – FABRICATOR QA/QC REPRESENTATIVE

BLUE SKY TOWERS LLC

Structural Components
Bringing It All Together
1870 W 64TH LANE
DENVER, CO 80221
(866) 386 - 7622
JOB #: 230218

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NO.	DATE	DESCRIPTION	BY	CHK	APD
0	4/20/23	MODIFICATION DRAWINGS	RM	TR	WC
1					
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3					
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SITE INFORMATION:
97 HIGH STREET
PORTLAND CT 06480

DESIGN TYPE:
SELF SUPPORT TOWER MODIFICATION

SHEET TITLE:
SPECIAL INSPECTIONS

SHEET TITLE: GN-2
REVISION: 0

PORTLAND_CT-1680 (SC Job #230218) BOM

Quantity Required	Quantity Supplied	Elevations	Part Number	Revision	Description	Piece Weight	Total Weight
					SUB-DIAGONAL, SUB-HORIZONTAL, TOP GIRT, & HW		
16	16	0'-0" TO 13'-4"	CP-03102-07	0	3/8" THICK GUSSET PLATE	3.73	59.68
16	16		CP-03102-08	0	1-3/4"x1-3/4"x3/16" LONG SUB-HORIZONTAL	8.01	128.16
16	16		CP-03102-09	0	1-3/4"x1-3/4"x3/16" LONG SUB-DIAGONAL	11.85	189.60
32	35		HK1-0815-10	0	1/2" x 1-1/2" A325 BOLT HW KIT	0.24	8.40
64	70		HK1-0817-10	0	1/2" x 1-3/4" A325 BOLT HW KIT	0.26	18.20
4	4	20'-0"	CP-03102-10	0	2-1/2"x2"x1/4" LONG REPLACEMENT TOP GIRT	41.20	164.80
8	9		H01-1015-12	0	5/8" x 1-1/2" A325 BOLT	0.33	2.97
16	18		H01-1017-12	0	5/8" x 1-3/4" A325 BOLT	0.35	6.30
24	27		H04-0010-01	0	5/8" HEAVY LOCK WASHER	0.03	0.81
24	27		H02-0010-11	0	5/8"-11 A563DH NUT	0.13	3.51
					BOLT ON TOWER EXTENSION & HW		
16	16	80'-0"	CP-03102-01	0	EXTENSION - INNER & OUTER LEG SPLICE PLATE	1.97	31.52
8	8	80'-0"	CP-03102-02	0	EXTENSION - LEG SPLICE SHIM PLATE	0.44	3.52
4	4	80'-0" TO 90'-0"	CP-03102-03	0	EXTENSION - LEG	66.00	264.00
16	16	80'-0" TO 90'-0"	CP-03102-04	0	EXTENSION - DIAGONAL	23.92	382.72
4	4	90'-0"	CP-03102-05	0	EXTENSION - TOP GIRT	15.64	62.56
54	60	80'-0" TO 90'-0"	H01-1020-12	0	5/8" x 2" x 1-1/4" A325 BOLT	0.29	17.40
40	45		H01-1017-12	0	5/8" x 1-3/4" x 1-1/4" A325 BOLT	0.26	11.70
94	105		H04-0010-01	0	5/8" HEAVY LOCK WASHER	0.03	3.15
94	105		H02-0010-11	0	5/8"-11 A563DH NUT	0.13	13.65
8	10		H82-0010-02	0	RINGFILL - 5/8" BOLT - 1/4" THICK	0.19	1.90
1	1	90'-0"	H41-0010-06	0	5/8" x 6' LIGHTNING ROD KIT	5.50	5.50
					SAFETY CLIMB & HW		
2	2	90'-0"	CP-03102-06	0	LADDER TOP CONNECTION ANGLE	2.33	4.66
4	5	90'-0"	H01-1017-12	0	5/8" x 1-3/4" x 1-1/4" A325 BOLT	0.26	1.30
4	5		H04-0010-01	0	5/8" HEAVY LOCK WASHER	0.03	0.15
4	5		H02-0010-11	0	5/8"-11 A563DH NUT	0.13	0.65
1	1	79'-0" TO 91'-0"	CW-01133-01	0	12 FT LADDER WELDMENT	76.52	76.52
4	4	79'-0" TO 91'-0"	P597-018-06	0	CLIMBING LADDER BACKING PLATE	0.74	2.96
8	9	79'-0" TO 91'-0"	H26-1085-60	0	3/8" x 3/4" x 8-1/2" x 6" ROUND J-BOLT	0.32	2.88
8	9		H03-0006-02	0	3/8" F436 FLAT WASHER	0.01	0.09
8	9		H04-0006-01	0	3/8" SPRING LOCK WASHER	0.01	0.09
8	9		H02-0006-16	0	3/8"-16 HEAVY HEX NUT	0.04	0.36
1	1	7'-0" TO 57'-0"	H42-130-50	0	AF - 50' SAFETY CLIMB - ROUND & ANGLE LEG - SS - 14RCL50SS	115.00	115.00
1	1	54'-0" TO 91'-0"	H42-130-50	0	AF - 50' SAFETY CLIMB - ROUND & ANGLE LEG - SS - 14RCL50SS	115.00	115.00
1	1	54'-0"	CP-03102-07	0	AF - 2IN TO 4IN ROUND AND ANGLE LEG TERM. BRACKET - 14AFVB1	8.00	8.00
1	1	54'-0"	CP-03102-08	0	AF - SAFETY CLIMB BOTTOM TENSIONER BRACKET - 14AFPMJHB01	4.00	4.00
						TOTAL WEIGHT	1711.71

BLUE SKY TOWERS LLC

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DENVER, CO 80221
(866) 386 - 7622
JOB #: 230218

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STATE OF CONNECTICUT MICHAEL T. DE BOER No. 18022 LICENSED PROFESSIONAL ENGINEER

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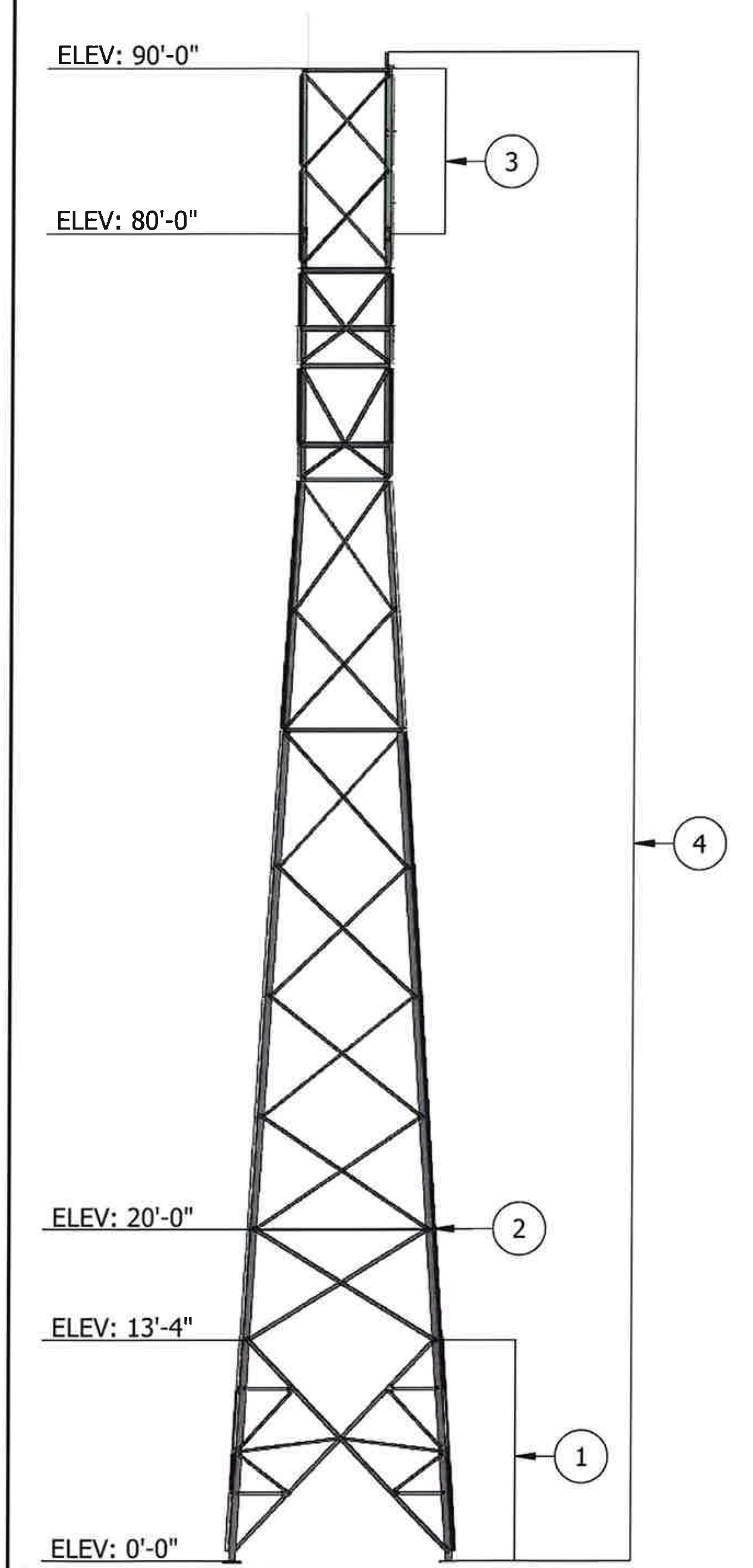
SITE INFORMATION:
97 HIGH STREET
PORTLAND CT 06480

DESIGN TYPE:
SELF SUPPORT TOWER MODIFICATION

SHEET TITLE:
BILL OF MATERIALS

SHEET TITLE: BOM
REVISION: 0



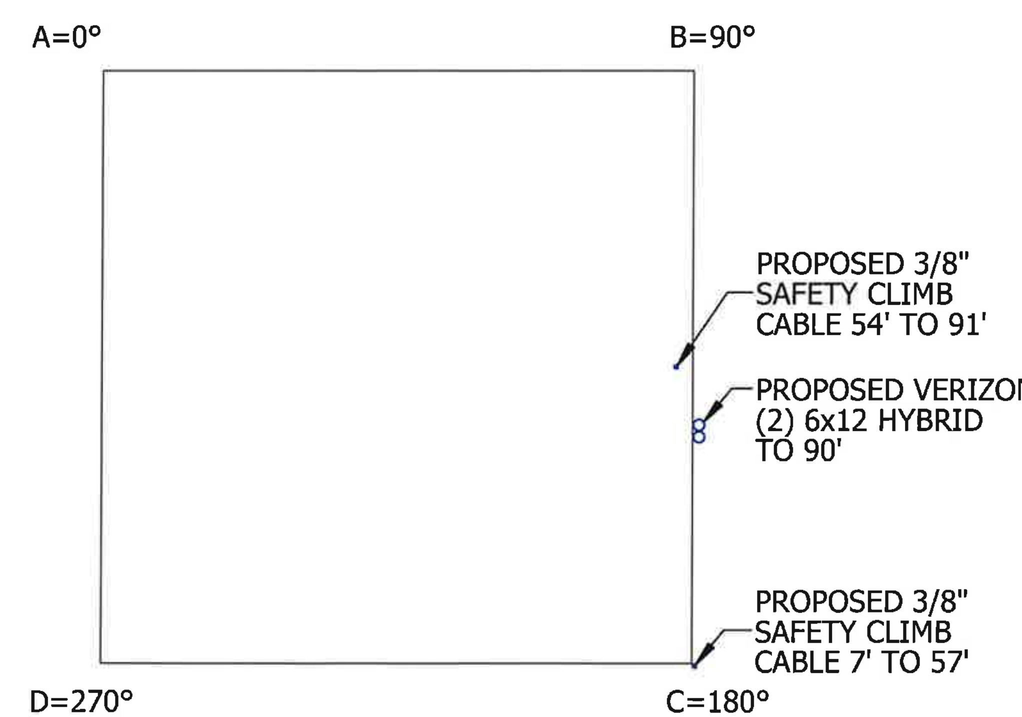
NOTE: ELEVATIONS ARE ROUNDED TO THE NEAREST INCH.

TOWER SPECIFICATIONS	
MANUFACTURER	UNKNOWN
TOWER TYPE / HEIGHT	(4) LEG SELF SUPPORT / 80' TOWER EXTENDED TO 90'

CURRENT STRUCTURAL ANALYSIS	
COMPANY	STRUCTURAL COMPONENTS, LLC
AUTHOR / FILE # / DATE	MICHAEL DEBOER, P.E. / 230218 / 4-20-2023

TOWER MODIFICATION SCHEDULE

ITEM	DESCRIPTION	ELEVATION		DWG. NO.
		BOTTOM	TOP	
1	INSTALL SUB-DIAGONALS AND SUB-HORIZONTALS.	0' - 0"	13' - 4"	D-1
2	UPGRADE TOP GIRT.	20' - 0"	20' - 0"	D-2
3	INSTALL NEW 10 FT TOWER EXTENSION.	80' - 0"	90' - 0"	D-3
4	INSTALL NEW SAFETY CLIMBS.	0' - 0"	91' - 0"	D-4 & D-5



NOTE: ONLY PROPOSED COAX LINES ARE SHOWN.

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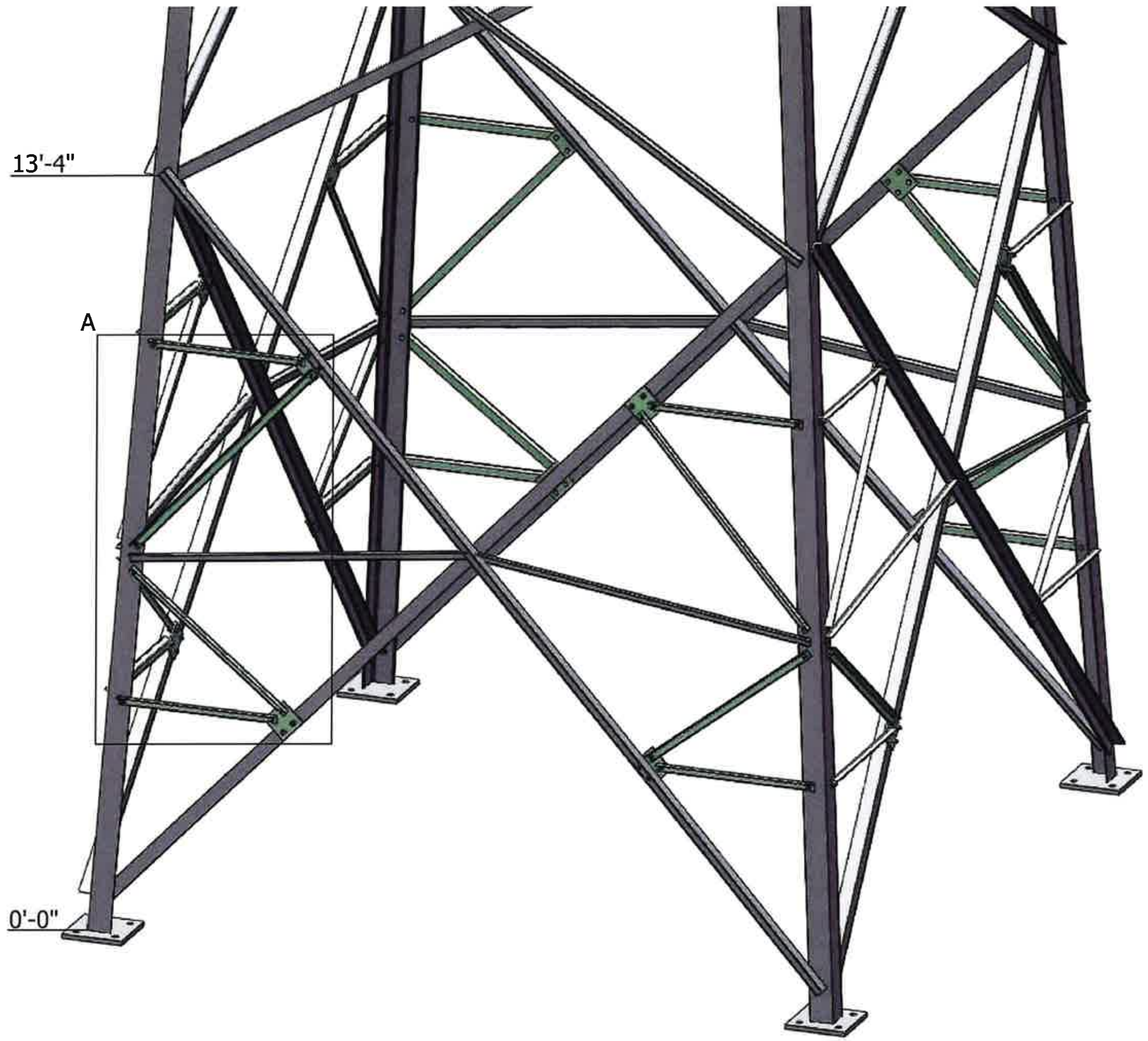
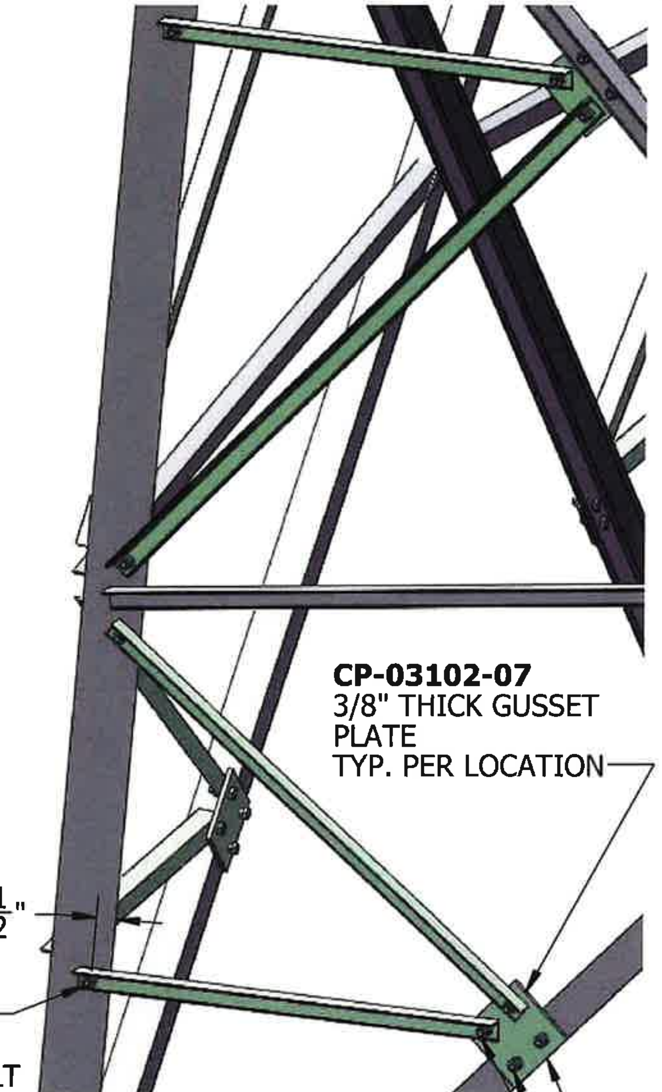
SITE INFORMATION:
97 HIGH STREET
PORTLAND CT 06480

DESIGN TYPE:
SELF SUPPORT TOWER MODIFICATION

SHEET TITLE:
SPECIFICATIONS

SHEET TITLE: S-1
REVISION: 0





CP-03102-07
3/8" THICK GUSSET PLATE
TYP. PER LOCATION

TYPICAL 1-1/2" E-C TEAR OUT ON THE TOWER LEG.

$1\frac{1}{2}$"

INSTALL SUB-HORZ. TO LEG WITH:
(1) 1/2" x 1-1/2" A325 BOLT
(1) 1/2" FLAT WASHER
(1) 1/2" LOCK WASHER
(1) 1/2" NUT
TYP. PER LOCATION

DETAIL A

TYPICAL GUSSET PLATE BOLT STACK AND TYPICAL GUSSET PLATE END BOLT:
(1) 1/2" x 1-3/4" A325 BOLT
(1) 1/2" FLAT WASHER
(1) 1/2" LOCK WASHER
(1) 1/2" NUT

ALIGN GUSSET PLATE FLUSH TO EDGE OF DIAGONAL
TYP. PER LOCATION

CP-03102-08
1-3/4"x1-3/4"x3/16" LONG SUB-HORIZONTAL

CP-03102-09
1-3/4"x1-3/4"x3/16" LONG SUB-DIAGONAL

NOTES:
1. 9/16" HOLES WILL NEED TO BE FIELD DRILLED THROUGH THE TOWER LEGS AND MAIN DIAGONALS TO ACCOMMODATE FIT UP. ENSURE THE LEG HOLES HAVE A 1-1/2" C-E TEAR OUT AND USE THE GUSSET PLATE AS A TEMPLATE TO LOCATE THE DIAGONAL HOLES.
2. SUB-HORIZONTALS AND SUB-DIAGONALS ARE SENT LONG WITH ONE END BOLT HOLE SHOP FABRICATED. ANGLES WILL NEED TO BE FIELD FABRICATED FOR FIT UP.
3. TRIM ANGLES TO LENGTH AND MATCH THE SHOWN SHOP FABRICATED END BOLT DIMENSIONS.
4. COAT ALL EXPOSED STEEL WITH TWO COATS OF BRUSH ON GALVALITE ZRC PAINT.

BLUE SKY TOWERS LLC

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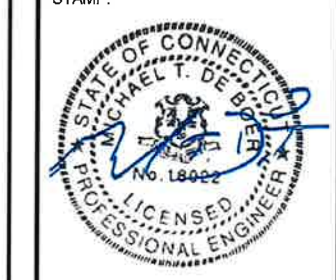

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1					
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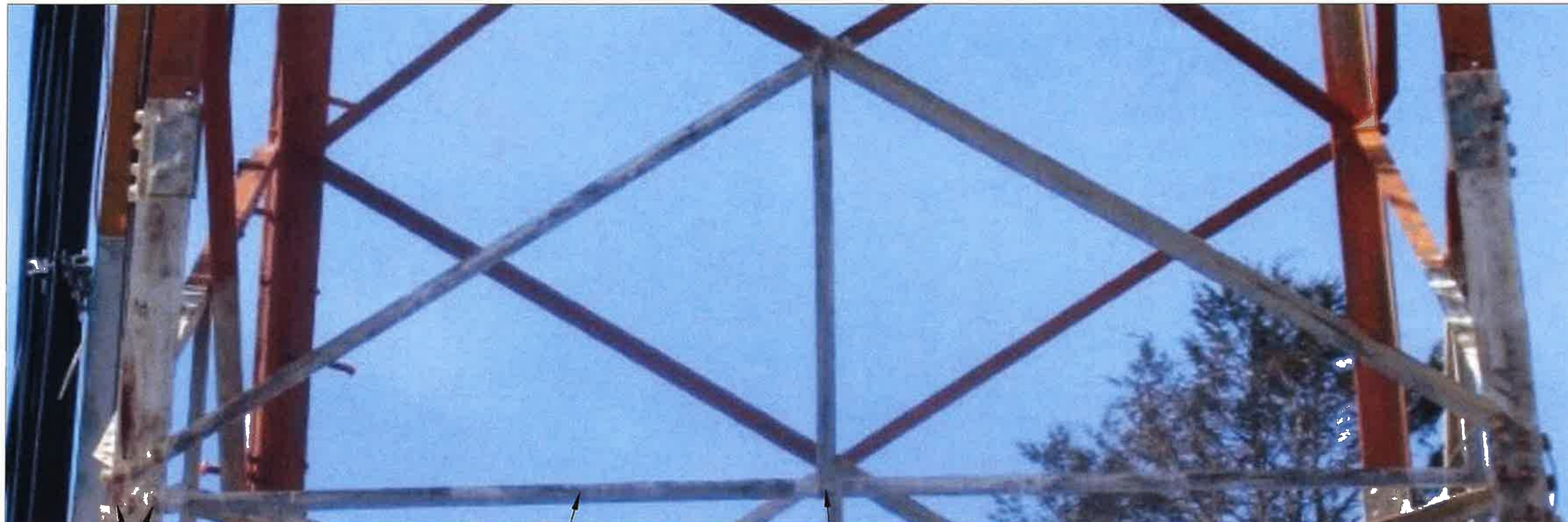
5					

SITE INFORMATION:
97 HIGH STREET
PORTLAND CT 06480

DESIGN TYPE:
SELF SUPPORT TOWER MODIFICATION

SHEET TITLE:
SUB-DIAG. & SUB-HORZ. INSTALL DETAILS

SHEET TITLE: D-1
REVISION: 0



TYPICAL GIRT END BOLTS:
(2) 5/8" x 1-3/4" A325 BOLTS
(2) 5/8" LOCK WASHERS
(2) 5/8" NUTS

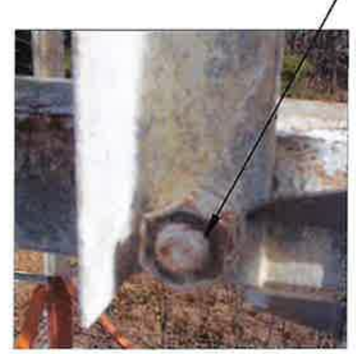
REPLACE EXISTING TOP GIRTS WITH
NEW 2-1/2"x2"x1/4" ANGLE.
TYP. PER TOWER FACE

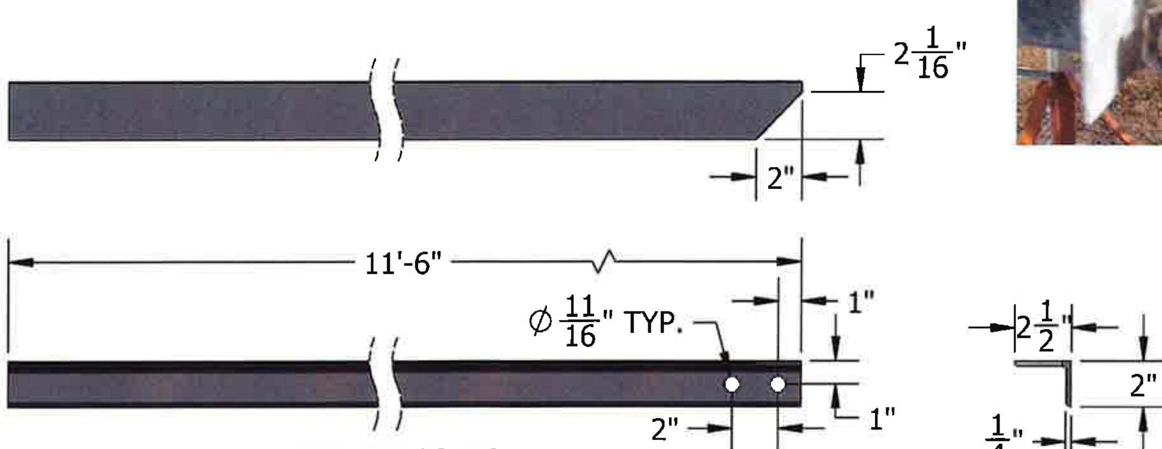
RE-ATTACH THE VERTICAL ANGLE TO
THE REPLACEMENT TOP GIRT WITH:
(1) 5/8" x 1-1/2" A325 BOLT
(1) 5//8" LOCK WASHER
(1) 5/8" NUT
TYP. PER LOCATION

RE-ATTACH THE INTERNAL
MEMBERS TO THE
REPLACEMENT TOP GIRT
WITH:
(1) 5/8" x 1-1/2" BOLT
(1) 5/8" LOCK WASHER
(1) 5/8" NUT
TYP. PER LOCATION

NOTE:
MATCH THE EXISTING TOP GIRT
COPE TO ACCOMMODATE FIT UP.
THE SHOP FABRICATED COPE
IS ESTIMATED AND MAY NEED
TO BE MODIFIED.

NOTES:
1. REPLACEMENT TOP GIRT ANGLES ARE SENT LONG WITH ONE END SHOP FABRICATED. ANGLES WILL NEED TO BE FIELD FABRICATED FOR FIT UP.
2. TRIM ANGLES TO LENGTH AND MATCH THE SHOWN SHOP FABRICATED END BOLT DIMENSIONS.
3. THE SHOP FABRICATED COPE IS ESTIMATED, COPE ANGLES AS NEEDED TO ACCOMMODATE FIT UP.
4. COAT ALL EXPOSED STEEL WITH TWO COATS OF BRUSH ON GALVALITE ZRC PAINT.
5. DO NOT REMOVE ANY TOWER HARDWARE OR MEMBERS IF WIND SPEEDS ARE FORECAST TO BE 20 MPH OR HIGHER.
6. ALL NEW TOP GIRT REPLACEMENT HARDWARE PROVIDED.





CP-03102-10
2-1/2"x2"x1/4" LONG REPLACEMENT TOP GIRT

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MICHAEL T. DE BOER
No. 18022
LICENSED
PROFESSIONAL ENGINEER

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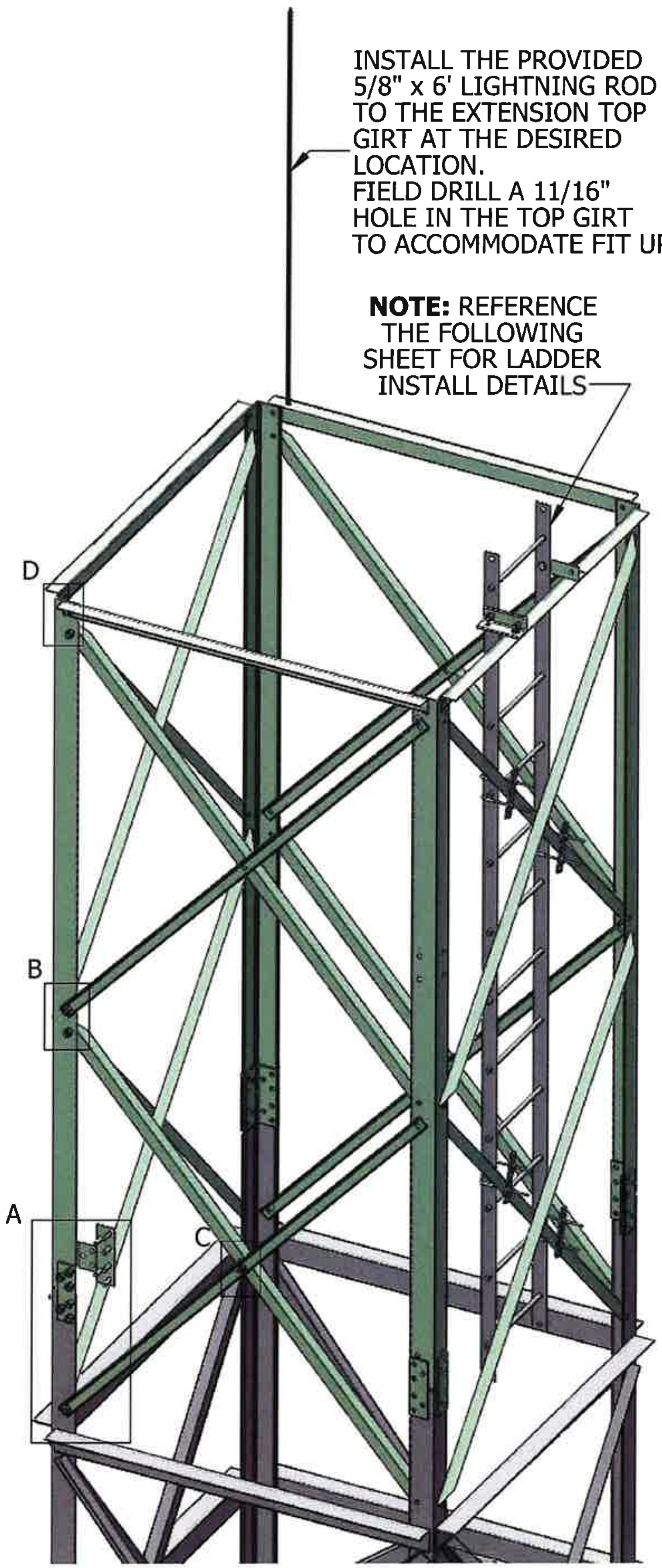
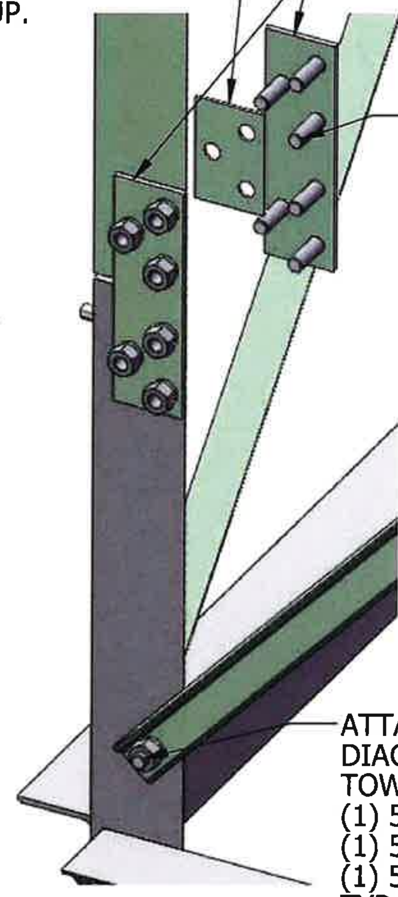
SITE INFORMATION:
97 HIGH STREET
PORTLAND CT 06480

DESIGN TYPE:
SELF SUPPORT
TOWER
MODIFICATION

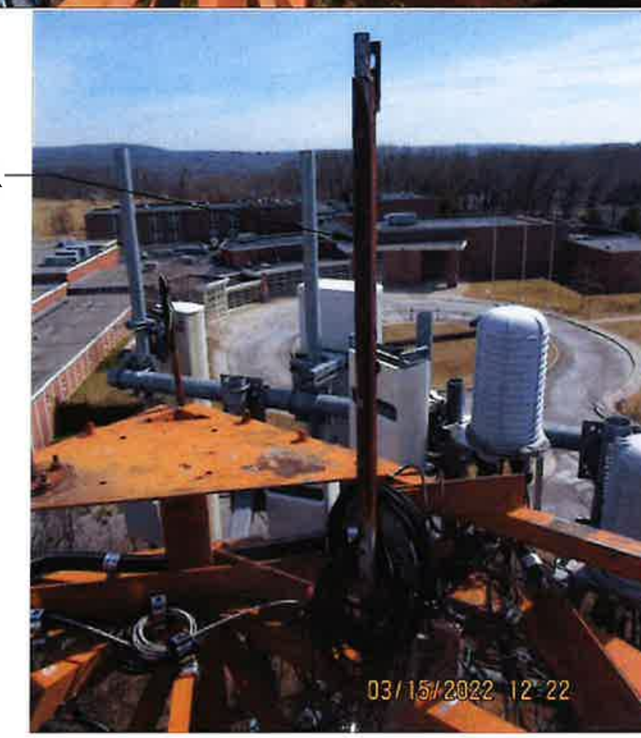
SHEET TITLE:
TOP GIRT
INSTALL DETAILS

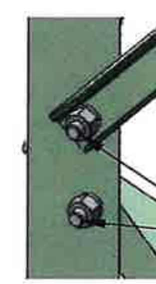
SHEET TITLE: **D-2** REVISION: **0**



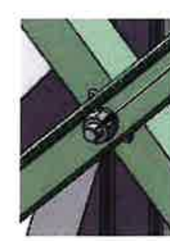


DETAIL A

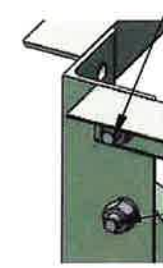




DETAIL B



DETAIL C



DETAIL D

NOTES:
1. NOT ALL HARDWARE IS SHOWN IN MODEL.
2. TOWER EXTENSION WILL BE SENT FULLY SHOP FABRICATED.
3. COAT ALL FIELD DRILLED HOLES WITH TWO COATS OF BRUSH ON GALVALITE ZRC PAINT.

BLUE SKY TOWERS LLC

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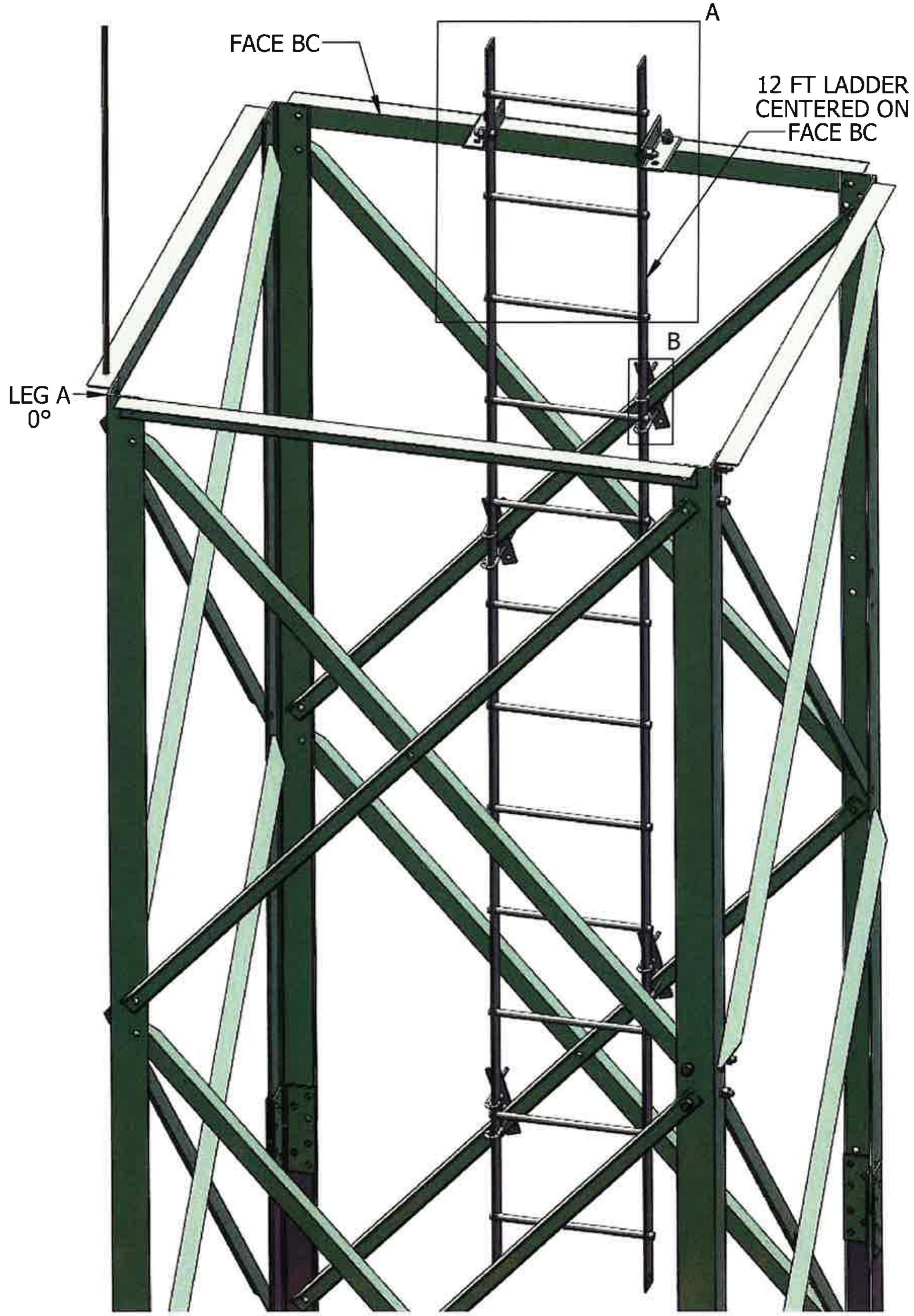
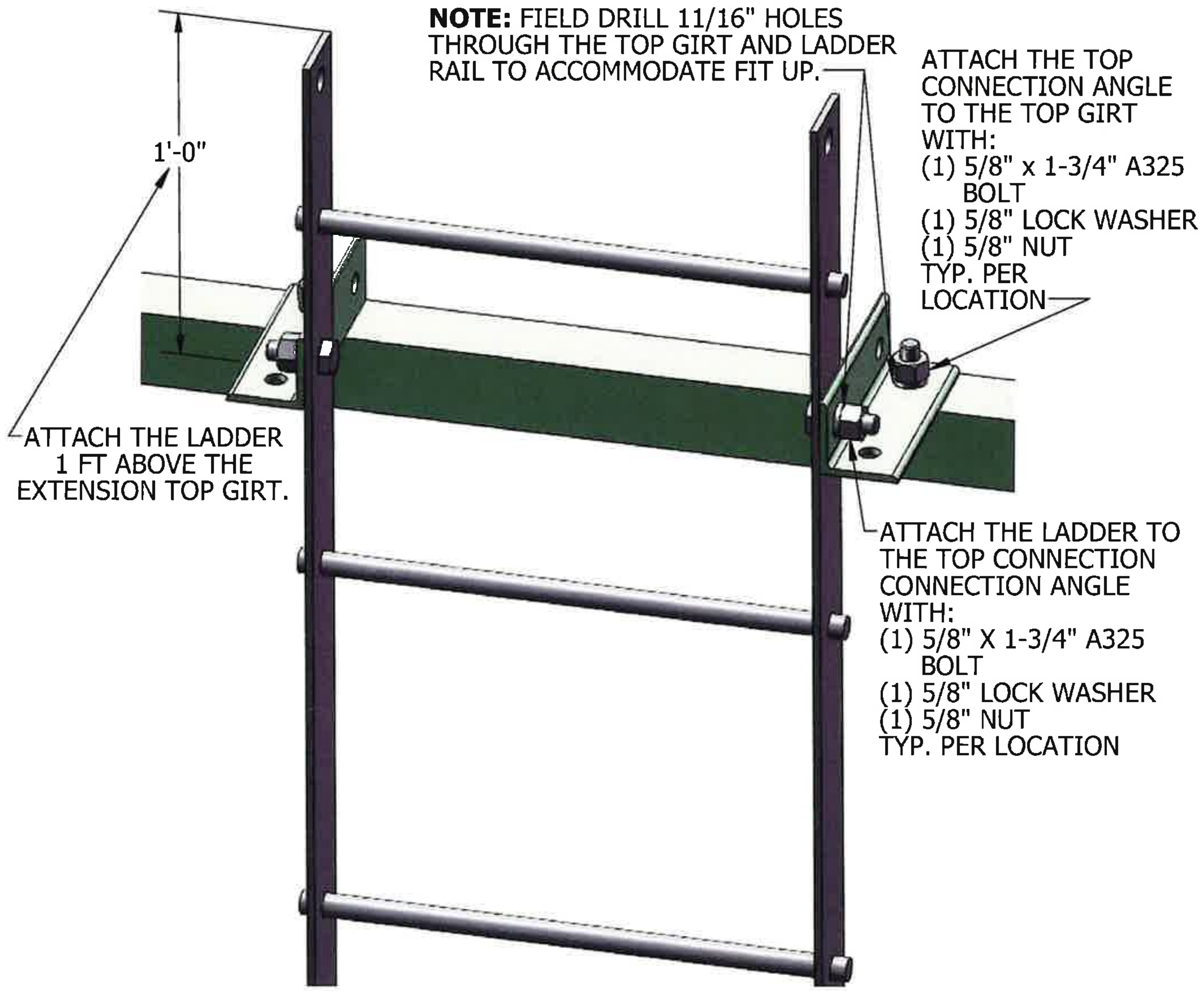
SITE INFORMATION:
97 HIGH STREET
PORTLAND CT 06480

DESIGN TYPE:
SELF SUPPORT TOWER MODIFICATION

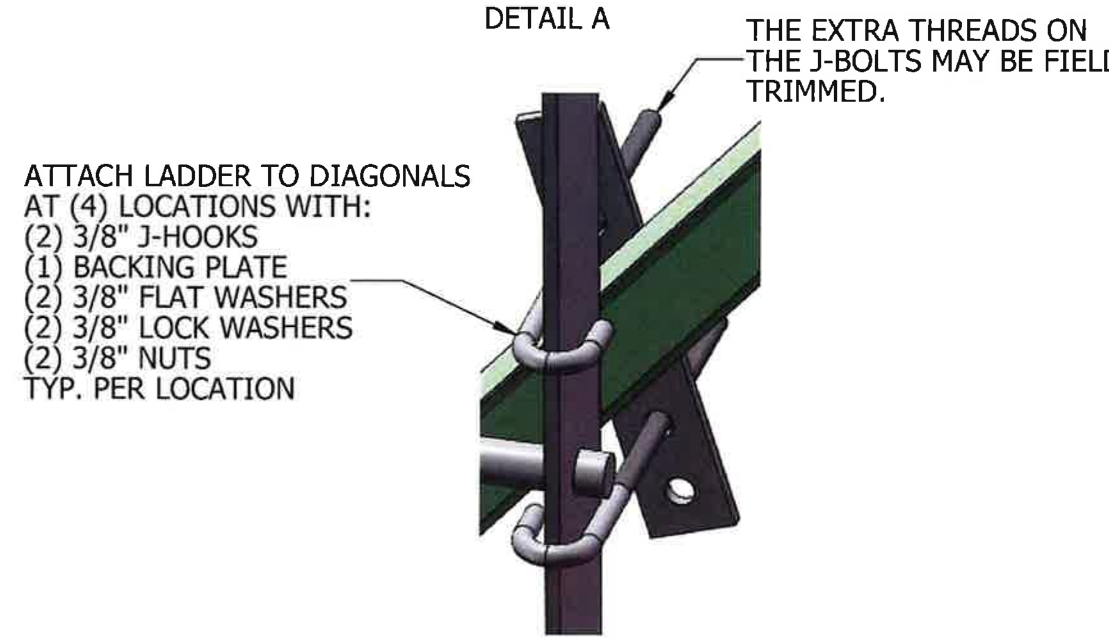
SHEET TITLE:
TOWER EXTENSION DETAILS

SHEET TITLE: D-3
REVISION: 0





DETAIL A



DETAIL B

NOTE: COAT EXPOSED STEEL WITH TWO COATS OF BRUSH ON GALVALITE ZRC PAINT.

BLUE SKY TOWERS LLC

Structural Components
Bringing It All Together

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JOB #: 230218

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REVISIONS:

NO.	DATE	DESCRIPTION	BY	CHK	APD
0	4/20/23	MODIFICATION DRAWINGS	RM	TR	WC
1					
2					
3					
4					
5					

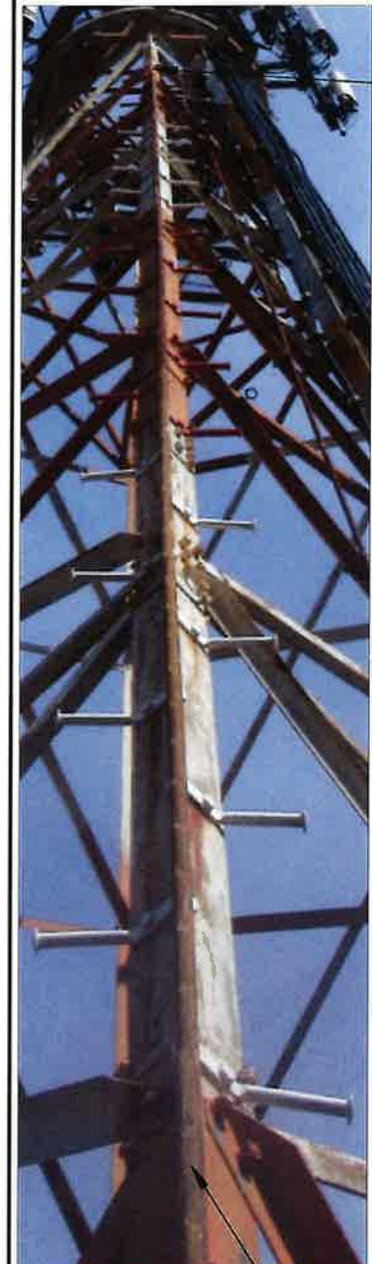
SITE INFORMATION:
97 HIGH STREET
PORTLAND CT 06480

DESIGN TYPE:
SELF SUPPORT TOWER MODIFICATION

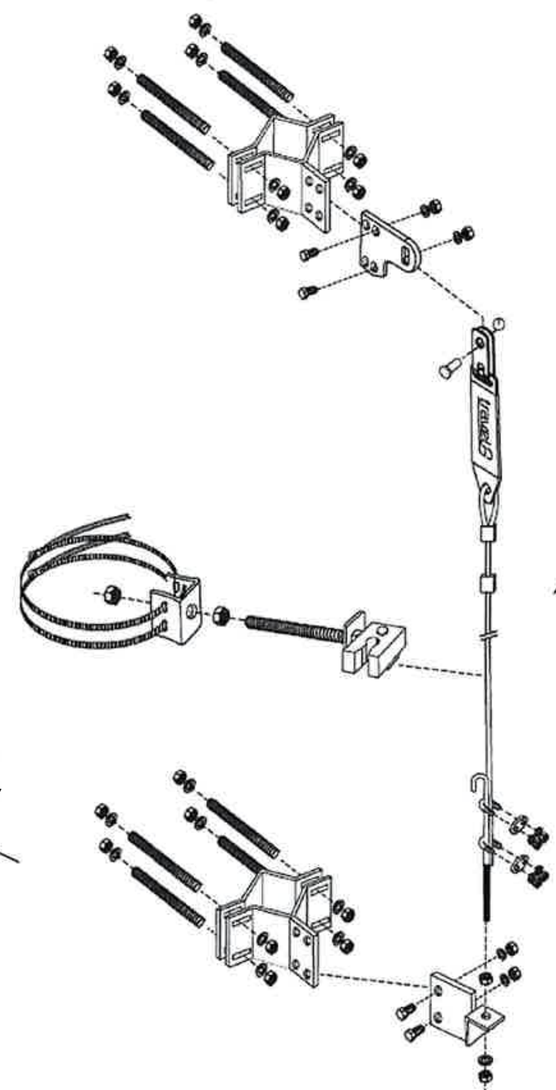
SHEET TITLE:
SAFETY CLIMB INSTALL DETAILS

SHEET TITLE: D-4
REVISION: 0

SAFETY CLIMB INSTALL (7' TO 57')



INSTALL THE TOP SAFETY CLIMB LEG BRACKET TO LEG C AT APPROXIMATELY 57 FT.

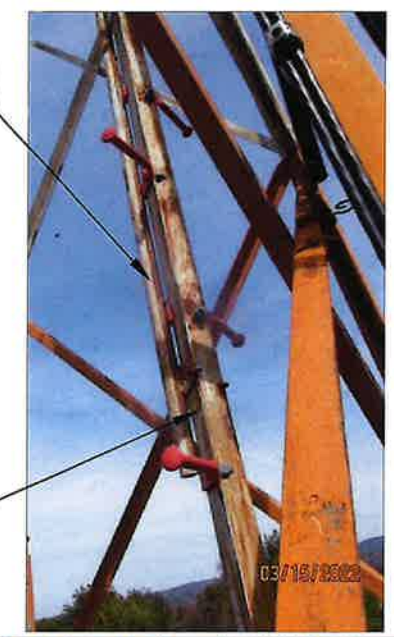


REMOVE THE LOWER 1-5/16" OD SAFETY CLIMB RAIL ON LEG C PRIOR TO INSTALLING THE NEW SAFETY CLIMB.

INSTALL THE BOTTOM SAFETY CLIMB LEG BRACKET TO LEG C AT APPROXIMATELY 7 FT.

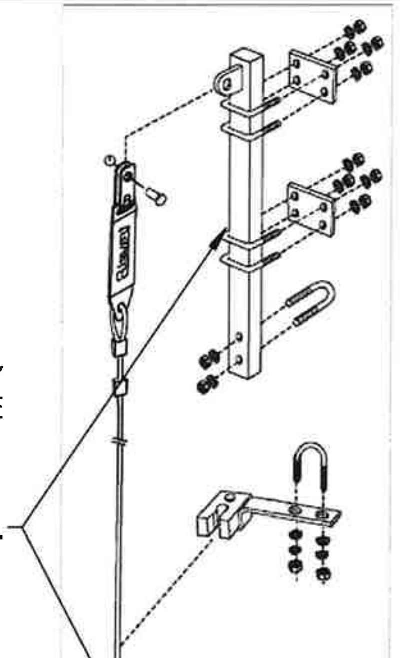
SAFETY CLIMB INSTALL (54' TO 91')

REMOVE THE UPPER 1-5/16" OD SAFETY CLIMB RAIL ON FACE BC PRIOR TO INSTALLING THE NEW SAFETY CLIMB.

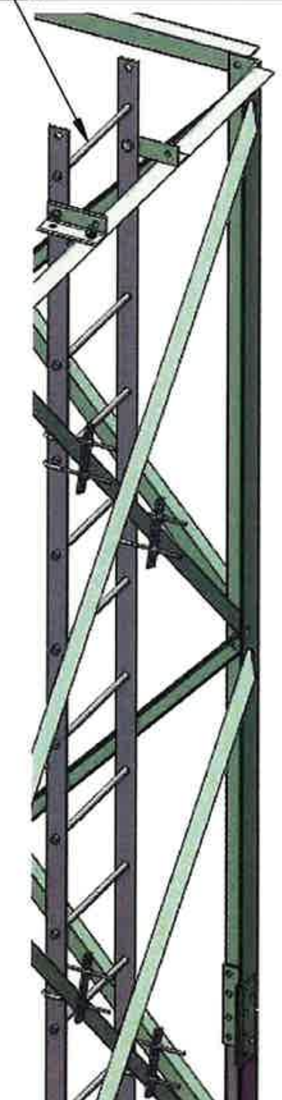


INSTALL THE BOTTOM SAFETY CLIMB LEG BRACKET TO THE INTERNAL CLIMBING ANGLE ON FACE BC APPROXIMATELY 4' ABOVE THE PLATFORM.

NOTE: FOLLOW ALL SAFETY CLIMB MANUFACTURES INSTALLATION INSTRUCTIONS.



INSTALL THE TOP LADDER MOUNT SAFETY CLIMB BRACKET TO THE CLIMBING LADDER. ENSURE THE BRACKET IS ATTACHED TO THE TOP (3) LADDER RUNGS.



NOTE: SAFETY CLIMB TRANSITION PLATFORM SITS AT APPROXIMATELY 50'-3".

BLUE SKY TOWERS LLC

Structural Components
Bringing It All Together
1870 W 64TH LANE
DENVER, CO 80221
(866) 386 - 7622
JOB #: 230218

STAMP:
STATE OF CONNECTICUT MICHAEL T. DE BOER No. 18022 LICENSED PROFESSIONAL ENGINEER

REVISIONS:

NO.	DATE	DESCRIPTION	BY	CHK	APD
0	4/20/23	MODIFICATION DRAWINGS	RM	TR	WC
1					
2					
3					
4					
5					

SITE INFORMATION:
97 HIGH STREET
PORTLAND CT 06480

DESIGN TYPE:
SELF SUPPORT TOWER MODIFICATION

SHEET TITLE:
SAFETY CLIMB INSTALL DETAILS (CONT'D)

SHEET TITLE: D-5
REVISION: 0

CENTEK engineering

Centered on Solutions℠

Antenna Mount Analysis Report

Site Ref: Portland HS

97 High Street
Portland, CT

Centek Project No. 22017.06

Date: May 11, 2023

Max Stress Ratio = 44%

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Prepared for:

Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

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CENTEK engineering

Centered on Solutions℠

May 11, 2023

Mr. Phillip Cotto
Structure Consulting Group
49 Brattle Street
Arlington, Ma

Re: Structural Letter ~ Antenna Mount
Verizon – Site Ref: Portland HS
97 High Street
Portland, CT

Centek Project No. 22017.06

Dear Mr. Cotto,

Centek Engineering, Inc. has reviewed the Verizon antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the **proposed mount, consisting of three (3) V-frame sector mounts (SitePro P/N: VFA12-HD)** to support the proposed equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2021 International Building Code as modified by the 2022 Connecticut State Building Code (CTBC) including ASCE 7-16 and ANSI/TIA-222-H *Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures"*.

The loads considered in this analysis consist of the following:

- **Verizon:**
  V-Frames: Three (3) Commscope NNH4-65B-R6 panel antennas, three (3) Samsung MT6407-77A panel antennas, three (3) Samsung XXDWMM-12.5-65 panel antennas, three (3) Samsung RF4439d-25A (B2/B66A) RRHs, three (3) Samsung RF4440d-13A (B5/B13) RRHs, three (3) Samsung CBRS RRH RT4401-48A and one (1) OVP Box mounted on three (3) V-Frames with a RAD center elevation of 90 ft +/- AGL.

The antenna mount was analyzed per the requirements of the 2021 International Building Code as modified by the 2022 Connecticut State Building Code considering a Ultimate design wind speed of 120 mph for Portland as required in Appendix P of the 2022 Connecticut State Building Code.

Based on our review of the installation, it is our opinion that the **subject antenna mount has sufficient capacity** to support the aforementioned antenna configuration.

If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Section 2 - Calculations

CENTEK engineering
Centered on Solutions
www.centekeng.com
63-2 North Branford Road
Branford, CT 06405
P: (203) 488-0580
F: (203) 488-8587

Subject:	TIA-222-H Loads
Location:	Portland, CT
Rev. 0: 5/11/23	Prepared by: T.J.L. Checked by: C.F.C. Job No. 22017.06

Development of Design Heights, Exposure Coefficients, and Velocity Pressures Per TIA-222-H

Wind Speeds

Basic Wind Speed	$V := 120$	mph	(User Input - CSBC 2022 Appendix P)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input - TIA-222-H Annex B)
Basic Wind Speed (Mount)	$V_m := 30$	mph	(User Input - TIA-222-H Section 16.3)

Input

Structure Type =	Structure_Type := Flexible		(User Input)
Structure Category =	SC := III		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	$h := 90$	ft	(User Input)
Height to Center of Antennas =	$z_{ant} := 90$	ft	(User Input)
Radial Ice Thickness =	$t_i := 1.0$	in	(User Input per Annex B of TIA-222-H)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1$		(User Input)
Shielding Factor for Appurtenances =	$K_a := 1.0$		(User Input)
Rooftop Wind Speed-up Factor =	$K_s := 1.0$		(User Input)
Ground Elevation Factor =	$K_e = 0.996$		(User Input)
Gust Response Factor =	$G_H = 1.35$		(User Input)

Output

Wind Direction Probability Factor = $K_d := 0.95$ (Per Table 2-2 of TIA-222-H)

Importance Factors =

$$I_{ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.15 & \text{if } SC = 3 \\ 1.25 & \text{if } SC = 4 \end{cases} = 1.15$$

(Per Table 2-3 of TIA-222-H)

$$I_{Seismic} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.25 & \text{if } SC = 3 \\ 1.50 & \text{if } SC = 4 \end{cases} = 1.25$$

$$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.106 \qquad t_{iz} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.271$$

Velocity Pressure Coefficient Antennas = $Kz_{ant} := 2.01\left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.238$

Velocity Pressure w/o Ice Antennas = $qz_{ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V^2 = 43.16$

Velocity Pressure with Ice Antennas = $qz_{ice.ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_i^2 = 7.493$

Velocity Pressure with Ice Antennas = $qz_m := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_m^2 = 2.697$

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Commscope NNH4-65B-R6		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height=	$L_{app} := 71.969$	in	(User Input)
Appurtenance Width =	$W_{app} := 19.606$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 7.756$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 90$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 3.7$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.25$		

Wind Load (without Ice)

Surface Area for One Appurtenance (Front) = $SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 9.8$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} \cdot N_{app} = 715$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 3.9$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 283$ lbs

Wind Load (with Ice)

Surface Area for One Appurtenance w/ Ice (Front)= $SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 11.5$ sf

Total Appurtenance Wind Force w/ Ice= $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} \cdot N_{app} = 145$ lbs

Surface Area for One Appurtenance w/ Ice (Side) = $SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 5.3$ sf

Total Appurtenance Wind Force w/ Ice= $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 67$ lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) = $SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 9.8$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} \cdot N_{app} = 45$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 3.9$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 18$ lbs

Gravity Loads (ice only)

Volume of Each Appurtenance = $V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 1 \times 10^4$ cu in

Volume of Ice on Each Appurtenance = $V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 6053$ cu in

Weight of Ice on Each Appurtenance = $W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 196$ lbs

Weight of Ice on All Appurtenances = $W_{ICEapp} \cdot N_{app} = 196$ lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Samsung MT6407-77A		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 35.1$	in	(User Input)
Appurtenance Width =	$W_{app} := 16.1$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 5.5$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 87$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 2.2$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without Ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 274$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.3$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 94$	lbs

Wind Load (with Ice)

Surface Area for One Appurtenance w/ Ice (Front) =	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 4.9$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 59$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 2.1$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 26$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 17$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.3$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 6$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 3108$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 2536$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 82$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 82$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model = Samsung XXDWMM-12.5-65

Appurtenance Shape = Flat (User Input)

Appurtenance Height = $L_{app} := 12.3$ in (User Input)

Appurtenance Width = $W_{app} := 8.7$ in (User Input)

Appurtenance Thickness = $T_{app} := 1.4$ in (User Input)

Appurtenance Weight = $WT_{app} := 3$ lbs (User Input)

Number of Appurtenances = $N_{app} := 1$ (User Input)

Appurtenance Aspect Ratio = $Ar_{app} := \frac{L_{app}}{W_{app}} = 1.4$

Appurtenance Force Coefficient = $Ca_{app} = 1.2$

Wind Load (without ice)

Surface Area for One Appurtenance (Front) = $SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.7$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} \cdot N_{app} = 52$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.1$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 8$ lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front) = $SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 1.2$ sf

Total Appurtenance Wind Force w/ Ice = $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} \cdot N_{app} = 14$ lbs

Surface Area for One Appurtenance w/ Ice (Side) = $SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 0.4$ sf

Total Appurtenance Wind Force w/ Ice = $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 5$ lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) = $SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.7$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} \cdot N_{app} = 3$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.1$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 1$ lbs

Gravity Loads (ice only)

Volume of Each Appurtenance = $V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 150$ cu in

Volume of Ice on Each Appurtenance = $V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 508$ cu in

Weight of Ice on Each Appurtenance = $W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 16$ lbs

Weight of Ice on All Appurtenances = $W_{ICEapp} \cdot N_{app} = 16$ lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Samsung RF4439-25A(B2,B66A) RRH		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 15$	in	(User Input)
Appurtenance Width =	$W_{app} := 15$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 10$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 75$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.0$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without Ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 109$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 73$	lbs

Wind Load (with Ice)

Surface Area for One Appurtenance w/ Ice (Front) =	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 2.1$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 26$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 1.5$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 19$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 7$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 5$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 2250$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 1610$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 52$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 52$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model = Samsung RF4440d-13A(B5/B13) RRH

Appurtenance Shape = Flat (User Input)

Appurtenance Height = $L_{app} := 15$ in (User Input)

Appurtenance Width = $W_{app} := 15$ in (User Input)

Appurtenance Thickness = $T_{app} := 9.1$ in (User Input)

Appurtenance Weight = $WT_{app} := 70.3$ lbs (User Input)

Number of Appurtenances = $N_{app} := 1$ (User Input)

Appurtenance Aspect Ratio = $Ar_{app} := \frac{L_{app}}{W_{app}} = 1.0$

Appurtenance Force Coefficient = $Ca_{app} = 1.2$

Wind Load (without ice)

Surface Area for One Appurtenance (Front) = $SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 109$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.9$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 66$ lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front) = $SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 2.1$ sf

Total Appurtenance Wind Force w/ Ice = $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 26$ lbs

Surface Area for One Appurtenance w/ Ice (Side) = $SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 1.4$ sf

Total Appurtenance Wind Force w/ Ice = $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 17$ lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) = $SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 7$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.9$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 4$ lbs

Gravity Loads (ice only)

Volume of Each Appurtenance = $V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 2048$ cu in

Volume of Ice on Each Appurtenance = $V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 1536$ cu in

Weight of Ice on Each Appurtenance = $W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 50$ lbs

Weight of Ice on All Appurtenances = $W_{ICEapp} \cdot N_{app} = 50$ lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	CBRS RRH RT-4401-48A		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 12.1$	in	(User Input)
Appurtenance Width =	$W_{app} := 8.5$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 4.1$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 20$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.4$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without Ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.7$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 50$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.3$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 24$	lbs

Wind Load (with Ice)

Surface Area for One Appurtenance w/ Ice (Front) =	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 1.1$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 14$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 0.7$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 8$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.7$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 3$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.3$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 2$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 422$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 652$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 21$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 21$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	OVP Box		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 29.5$	in	(User Input)
Appurtenance Width =	$W_{app} := 16.5$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 12.6$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 32$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.8$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.4$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 236$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 2.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 180$	lbs

Wind Load (with ice)

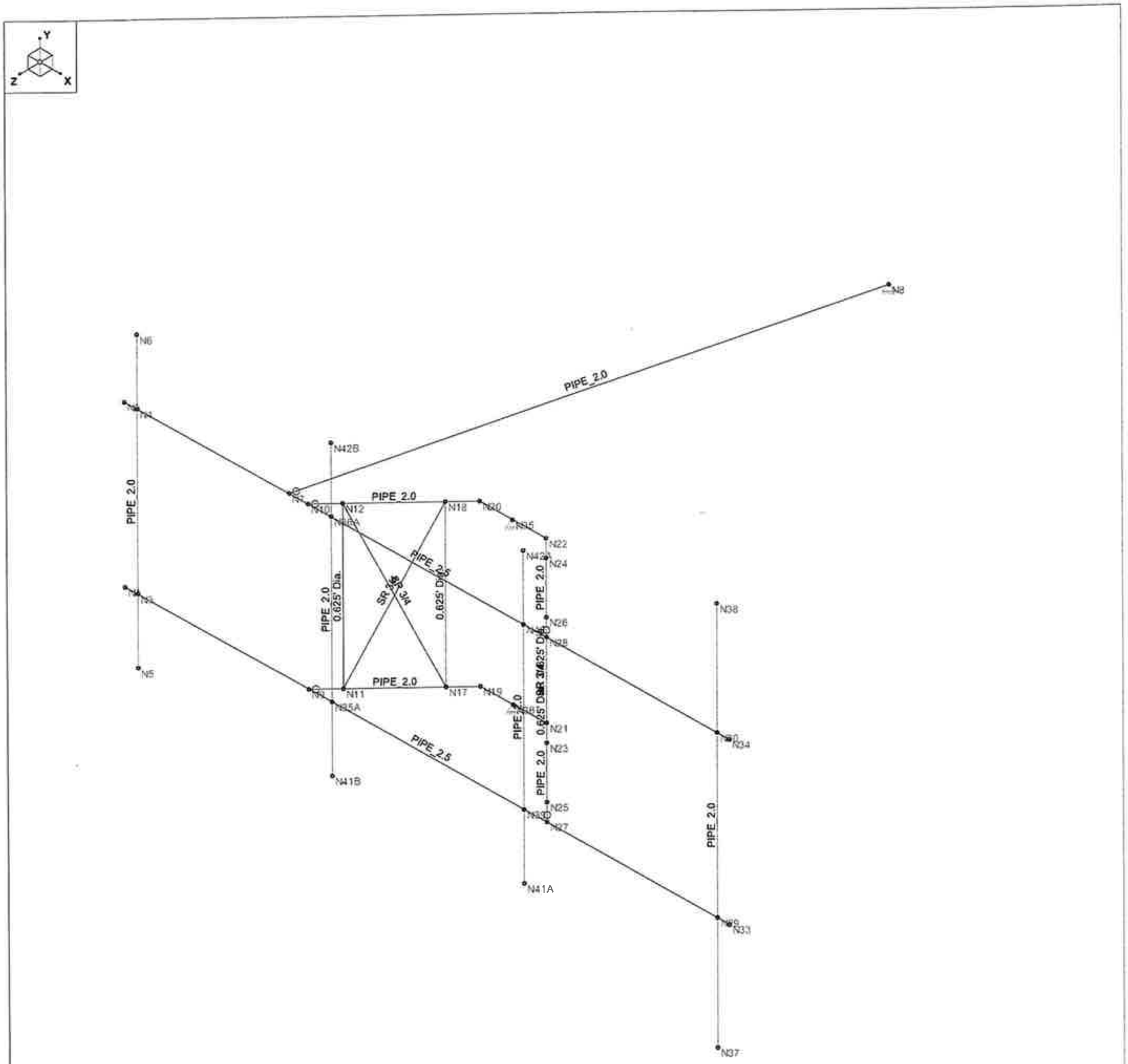
Surface Area for One Appurtenance w/ Ice (Front) =	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 4.2$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 51$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 3.4$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 41$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 3.4$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 15$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 2.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 11$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 6133$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 3107$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 101$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 101$	lbs



Envelope Only Solution

Centek Engineering	Portland HS	
TJL	Member Framing	May 11, 2023 at 11:39 AM
22017.06		Mount.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?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
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 15th(360-16): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 15th(360-16): LRFD
Cold Formed Steel Code	AISI S100-10: ASD
Wood Code	AWC NDS-12: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	ACI 530-11: ASD
Aluminum Code	AA ADM1-10: ASD - 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?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	1
Cd X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	150.001
Footing Concrete f'c (ksi)	4
Footing Concrete Ec (ksi)	3644
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	2
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Antenna Mast_2.0 ST...	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
2	Horizontal_2.5 STD Pi...	PIPE_2.5	Beam	Pipe	A53 Grade B	Typical	1.61	1.45	1.45	2.89
3	Outrigger_2.0 STD Pi...	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Stabilizer_2.0 STD Pipe	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
5	0.625" Dia. Bar	0.625' Dia.	Column	BAR	A36 Gr.36	Typical	.307	.007	.007	.015
6	0.75"Dia. Bar	SR 3/4	Column	BAR	A36 Gr.36	Typical	.442	.016	.016	.031

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	Horizontal_2.5 STD...	12.5	Segment		Lbyy						Lateral
2	M2	Horizontal_2.5 STD...	12.5	Segment		Lbyy						Lateral
3	M3	Stabilizer_2.0 STD ...	10.18			Lbyy						Lateral
4	M4	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
5	M5	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
6	M6	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
7	M7	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
8	M8	0.625" Dia. Bar	3.333									Lateral
9	M9	0.625" Dia. Bar	3.333									Lateral
10	M10	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
11	M11	0.625" Dia. Bar	3.333									Lateral
12	M12	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
13	M13	0.625" Dia. Bar	3.333									Lateral
14	M14	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
15	M15	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
16	PS.2	Antenna Mast_2.0 ...	6			Lbyy						Lateral
17	PS.1	Antenna Mast_2.0 ...	8			Lbyy						Lateral
18	M19	Antenna Mast_2.0 ...	6			Lbyy						Lateral
19	M21A	Antenna Mast_2.0 ...	6			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
1	M1	N2	N34			Horizontal_2.5 STD Pipe	Beam	Pipe	A53 Grade B	Typical
2	M2	N1	N33			Horizontal_2.5 STD Pipe	Beam	Pipe	A53 Grade B	Typical
3	M3	N7	N8			Stabilizer_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
4	M4	N10	N20			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
5	M5	N9	N19			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
6	M6	N28	N22			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
7	M7	N27	N21			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
8	M8	N12	N11			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
9	M9	N18	N17			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
10	M10	N12	N17			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
11	M11	N26	N25			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
12	M12	N18	N11			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
13	M13	N24	N23			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
14	M14	N26	N23			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
15	M15	N24	N25			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
16	PS.2	N5	N6			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical
17	PS.1	N37	N38			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
18	M19	N41A	N42A			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical
19	M20	N19	N21			RIGID	None	None	RIGID	Typical
20	M21	N20	N22			RIGID	None	None	RIGID	Typical
21	M21A	N41B	N42B			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0.	-0.	0	
2	N2	0	3.333334	-0.	0	
3	N3	.25	0.	-0.	0	
4	N4	.25	3.333334	-0.	0	
5	N5	.25	-1.333333	-0.	0	
6	N6	.25	4.666667	-0.	0	
7	N7	3.390625	3.333334	-0.	0	
8	N8	6.025403	3.333334	-9.833125	0	
9	N9	3.78125	0.	-0.	0	
10	N10	3.78125	3.333334	-0.	0	
11	N11	4.138628	0.	-0.357378	0	
12	N12	4.138628	3.333334	-0.357378	0	
13	N17	5.206335	0.	-1.425085	0	
14	N18	5.206335	3.333334	-1.425085	0	
15	N19	5.563713	0.	-1.782463	0	
16	N20	5.563713	3.333334	-1.782463	0	
17	N21	6.936287	0.	-1.782463	0	
18	N22	6.936287	3.333334	-1.782463	0	
19	N23	7.293665	0.	-1.425085	0	
20	N24	7.293665	3.333334	-1.425085	0	
21	N25	8.361372	0.	-0.357378	0	
22	N26	8.361372	3.333334	-0.357378	0	
23	N27	8.71875	0.	-0.	0	
24	N28	8.71875	3.333334	-0.	0	
25	N29	12.25	0.	-0.	0	
26	N30	12.25	3.333334	-0.	0	
27	N33	12.5	0.	-0.	0	
28	N34	12.5	3.333334	-0.	0	
29	N35	6.25	3.333334	-1.782463	0	
30	N36	6.25	0.	-1.782463	0	
31	N35A	4.25	0.	-0.	0	
32	N36A	4.25	3.333334	-0.	0	
33	N37	12.25	-2.333333	0	0	
34	N38	12.25	5.666667	0	0	
35	N39	8.25	0.	-0.	0	
36	N40	8.25	3.333334	-0.	0	
37	N41A	8.25	-1.333333	-0.	0	
38	N42A	8.25	4.666667	-0.	0	
39	N41B	4.25	-1.333333	-0.	0	
40	N42B	4.25	4.666667	-0.	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N8	Reaction	Reaction	Reaction			
2	N19						
3	N20						
4	N17						
5	N18						
6	N21						
7	N22						
8	N23						
9	N24						
10	N35	Reaction	Reaction	Reaction			
11	N36	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Y	-.045	1.5
2	PS.1	Y	-.045	6.5
3	PS.2	Y	-.044	2
4	PS.2	Y	-.044	4
5	PS.1	Y	-.075	3
6	PS.1	Y	-.07	5
7	M21A	Y	-.02	1
8	M19	Y	-.032	%50
9	M21A	Y	-.003	%50

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Y	-.098	1.5
2	PS.1	Y	-.098	6.5
3	PS.2	Y	-.041	2
4	PS.2	Y	-.041	4
5	PS.1	Y	-.052	3
6	PS.1	Y	-.05	5
7	M21A	Y	-.021	1
8	M19	Y	-.101	%50
9	M21A	Y	-.016	%50

Member Point Loads (BLC 6 : Wind with Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.034	1.5
2	PS.1	X	.034	6.5
3	PS.2	X	.013	2
4	PS.2	X	.013	4
5	PS.1	X	.019	3
6	PS.1	X	.017	5
7	M21A	X	.008	1
8	M19	X	.041	%50
9	M21A	X	.005	%50

Member Point Loads (BLC 7 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.142	1.5
2	PS.1	X	.142	6.5
3	PS.2	X	.047	2
4	PS.2	X	.047	4
5	PS.1	X	.073	3
6	PS.1	X	.066	5
7	M21A	X	.024	1
8	M19	X	.18	%50
9	M21A	X	.008	%50

Member Point Loads (BLC 8 : Wm Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.009	1.5
2	PS.1	X	.009	6.5
3	PS.2	X	.003	2
4	PS.2	X	.003	4
5	PS.1	X	.005	3
6	PS.1	X	.004	5
7	M21A	X	.002	1
8	M19	X	.011	%50
9	M21A	X	.001	%50

Member Point Loads (BLC 9 : Wind with Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.073	1.5
2	PS.1	Z	.073	6.5
3	PS.2	Z	.03	2
4	PS.2	Z	.03	4
5	M19	Z	.051	%50
6	M21A	Z	.014	%50

Member Point Loads (BLC 10 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.358	1.5
2	PS.1	Z	.358	6.5
3	PS.2	Z	.137	2
4	PS.2	Z	.137	4
5	M19	Z	.236	%50
6	M21A	Z	.052	%50

Member Point Loads (BLC 11 : Wm Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.023	1.5
2	PS.1	Z	.023	6.5
3	PS.2	Z	.009	2
4	PS.2	Z	.009	4
5	M19	Z	.015	%50
6	M21A	Z	.003	%50

Member Distributed Loads (BLC 6 : Wind with Ice X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M3	X	.003	.003	0	0
2	M4	X	.003	.003	0	0
3	M5	X	.003	.003	0	0
4	M6	X	.003	.003	0	0
5	M7	X	.003	.003	0	0
6	M8	X	.003	.003	0	0
7	M9	X	.003	.003	0	0
8	M10	X	.003	.003	0	0
9	M11	X	.003	.003	0	0
10	M12	X	.003	.003	0	0
11	M13	X	.003	.003	0	0
12	M14	X	.003	.003	0	0
13	M15	X	.003	.003	0	0
14	PS.2	X	.003	.003	0	0
15	PS.1	X	.003	.003	0	0
16	M19	X	.003	.003	0	0
17	M20	X	.003	.003	0	0
18	M21	X	.003	.003	0	0
19	M21A	X	.003	.003	0	0

Member Distributed Loads (BLC 7 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M3	X	.018	.018	0	0
2	M4	X	.018	.018	0	0
3	M5	X	.018	.018	0	0
4	M6	X	.018	.018	0	0
5	M7	X	.018	.018	0	0
6	M8	X	.018	.018	0	0
7	M9	X	.018	.018	0	0
8	M10	X	.018	.018	0	0
9	M11	X	.018	.018	0	0
10	M12	X	.018	.018	0	0
11	M13	X	.018	.018	0	0
12	M14	X	.018	.018	0	0
13	M15	X	.018	.018	0	0
14	PS.2	X	.018	.018	0	0
15	PS.1	X	.018	.018	0	0
16	M19	X	.018	.018	0	0
17	M20	X	.018	.018	0	0
18	M21	X	.018	.018	0	0
19	M21A	X	.018	.018	0	0

Member Distributed Loads (BLC 8 : Wm Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M3	X	.003	.003	0	0
2	M4	X	.003	.003	0	0
3	M5	X	.003	.003	0	0
4	M6	X	.003	.003	0	0
5	M7	X	.003	.003	0	0
6	M8	X	.003	.003	0	0

Member Distributed Loads (BLC 8 : Wm Wind X) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
7	M9	X	.003	.003	0	0
8	M10	X	.003	.003	0	0
9	M11	X	.003	.003	0	0
10	M12	X	.003	.003	0	0
11	M13	X	.003	.003	0	0
12	M14	X	.003	.003	0	0
13	M15	X	.003	.003	0	0
14	PS.2	X	.003	.003	0	0
15	PS.1	X	.003	.003	0	0
16	M19	X	.003	.003	0	0
17	M20	X	.003	.003	0	0
18	M21	X	.003	.003	0	0
19	M21A	X	.003	.003	0	0

Member Distributed Loads (BLC 9 : Wind with Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.003	.003	0	0
2	M2	Z	.003	.003	0	0
3	M3	Z	.003	.003	0	0
4	M4	Z	.003	.003	0	0
5	M5	Z	.003	.003	0	0
6	M6	Z	.003	.003	0	0
7	M7	Z	.003	.003	0	0
8	M8	Z	.003	.003	0	0
9	M9	Z	.003	.003	0	0
10	M10	Z	.003	.003	0	0
11	M11	Z	.003	.003	0	0
12	M12	Z	.003	.003	0	0
13	M13	Z	.003	.003	0	0
14	M14	Z	.003	.003	0	0
15	M15	Z	.003	.003	0	0
16	PS.2	Z	.003	.003	0	0
17	M19	Z	.003	.003	0	0
18	M20	Z	.003	.003	0	0
19	M21	Z	.003	.003	0	0
20	M21A	Z	.003	.003	0	0

Member Distributed Loads (BLC 10 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.018	.018	0	0
2	M2	Z	.018	.018	0	0
3	M3	Z	.018	.018	0	0
4	M4	Z	.018	.018	0	0
5	M5	Z	.018	.018	0	0
6	M6	Z	.018	.018	0	0
7	M7	Z	.018	.018	0	0
8	M8	Z	.018	.018	0	0
9	M9	Z	.018	.018	0	0
10	M10	Z	.018	.018	0	0
11	M11	Z	.018	.018	0	0
12	M12	Z	.018	.018	0	0

Member Distributed Loads (BLC 10 : Wind Z) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
13	M13	Z	.018	.018	0	0
14	M14	Z	.018	.018	0	0
15	M15	Z	.018	.018	0	0
16	PS.2	Z	.018	.018	0	0
17	M19	Z	.018	.018	0	0
18	M20	Z	.018	.018	0	0
19	M21	Z	.018	.018	0	0
20	M21A	Z	.018	.018	0	0

Member Distributed Loads (BLC 11 : Wm Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.003	.003	0	0
2	M2	Z	.003	.003	0	0
3	M3	Z	.003	.003	0	0
4	M4	Z	.003	.003	0	0
5	M5	Z	.003	.003	0	0
6	M6	Z	.003	.003	0	0
7	M7	Z	.003	.003	0	0
8	M8	Z	.003	.003	0	0
9	M9	Z	.003	.003	0	0
10	M10	Z	.003	.003	0	0
11	M11	Z	.003	.003	0	0
12	M12	Z	.003	.003	0	0
13	M13	Z	.003	.003	0	0
14	M14	Z	.003	.003	0	0
15	M15	Z	.003	.003	0	0
16	PS.2	Z	.003	.003	0	0
17	M19	Z	.003	.003	0	0
18	M20	Z	.003	.003	0	0
19	M21	Z	.003	.003	0	0
20	M21A	Z	.003	.003	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib...	Area(...	Surfa...
1	Self Weight	None		-1						
2	Dead Load	None					9			
3	Ice Load	None					9			
4	Lm Maintenance Load (500lb)	None								
5	Lv Maintenance Load (250lb)	None								
6	Wind with Ice X	None					9	19		
7	Wind X	None					9	19		
8	Wm Wind X	None					9	19		
9	Wind with Ice Z	None					6	20		
10	Wind Z	None					6	20		
11	Wm Wind Z	None					6	20		

Load Combinations

	Description	So..	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac...
1	1.4D	Yes	Y		1	1.4	2	1.4																
2	1.2D +1.5Lv	Yes	Y		1	1.2	2	1.2	5	1.5														
3	1.2D + 1.0W (X-directi...	Yes	Y		1	1.2	2	1.2	7	1														
4	1.2D + 1.0Di + 1.0Wi (...	Yes	Y		1	1.2	2	1.2	3	1	6	1												
5	1.2D +1.5Lm+ 1.0Wm ...	Yes	Y		1	1.2	2	1.2	4	1.5	8	1												
6	1.2D + 1.0W (Z-directi...	Yes	Y		1	1.2	2	1.2	10	1														
7	1.2D + 1.0Di + 1.0Wi (...	Yes	Y		1	1.2	2	1.2	3	1	9	1												
8	1.2D +1.5Lm+ 1.0Wm ...	Yes	Y		1	1.2	2	1.2	4	1.5	11	1												

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	.235	3	.025	1	.788	6	0	8	0	8	0	8
2		min	-.236	6	.021	4	-1.22	3	0	1	0	1	0	1
3	N35	max	-.083	6	.706	7	.798	3	0	8	0	8	0	8
4		min	-1.687	3	.397	3	-2.787	6	0	1	0	1	0	1
5	N36	max	.747	7	.677	4	.699	4	0	8	0	8	0	8
6		min	-.662	3	.258	6	-.97	6	0	1	0	1	0	1
7	Totals:	max	0	8	1.372	4	0	3						
8		min	-2.115	3	.854	5	-2.97	6						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
1	N1	max	.067	3	.012	6	.362	6	3.704e-03	6	1.33e-02	6	1.218e-03	3
2		min	-.107	6	-.052	3	-.028	1	-2.314e-03	3	-3.928e-04	4	-5.743e-04	6
3	N2	max	.035	3	.012	6	.495	6	1.987e-03	6	1.356e-02	6	1.379e-03	3
4		min	-.047	6	-.052	3	-.007	4	-2.42e-03	3	-3.18e-04	4	-5.964e-04	6
5	N3	max	.067	3	.01	6	.322	6	3.704e-03	6	1.33e-02	6	1.218e-03	3
6		min	-.107	6	-.048	3	-.028	1	-2.314e-03	3	-3.928e-04	4	-5.744e-04	6
7	N4	max	.035	3	.01	6	.454	6	1.987e-03	6	1.356e-02	6	1.379e-03	3
8		min	-.047	6	-.048	3	-.006	4	-2.42e-03	3	-3.18e-04	4	-5.965e-04	6
9	N5	max	.087	3	.01	6	.263	6	3.634e-03	6	1.33e-02	6	1.288e-03	3
10		min	-.116	6	-.048	3	-.037	1	-2.314e-03	3	-3.928e-04	4	-5.744e-04	6
11	N6	max	.014	3	.01	6	.486	6	2.058e-03	6	1.356e-02	6	1.308e-03	3
12		min	-.037	6	-.048	3	-.042	3	-2.42e-03	3	-3.18e-04	4	-5.965e-04	6
13	N7	max	.035	3	.026	7	.016	3	1.153e-03	6	1.019e-02	6	9.214e-04	3
14		min	-.047	6	.005	3	-.017	6	-1.234e-03	3	-1.292e-03	3	5.801e-05	6
15	N8	max	0	8	0	8	0	8	1.873e-03	1	7.878e-03	3	1.628e-03	3
16		min	0	1	0	1	0	1	1.402e-03	3	3.987e-05	2	2.139e-04	6
17	N9	max	.067	3	.027	7	.086	3	2.082e-03	6	6.062e-03	6	6.448e-04	3
18		min	-.107	6	.008	3	-.142	6	-8.797e-04	3	-3.989e-04	1	-1.437e-04	6
19	N10	max	.035	3	.027	7	.023	3	1.05e-03	6	8.901e-03	6	6.426e-04	3
20		min	-.047	6	.008	3	-.063	6	-1.087e-03	3	-1.196e-03	3	-1.033e-04	6
21	N11	max	.053	3	.031	7	.072	3	1.785e-03	6	3.254e-03	3	3.135e-04	3
22		min	-.084	6	.008	3	-.119	6	-6.552e-04	3	-5.324e-03	6	-6.835e-04	6
23	N12	max	.023	3	.031	7	.012	3	1.138e-03	7	2.545e-03	3	6.215e-04	3
24		min	-.037	6	.008	3	-.054	6	-8.609e-04	3	-2.132e-03	6	-2.999e-04	7
25	N17	max	.012	3	.031	7	.032	3	1.088e-03	6	2.892e-03	3	-2.181e-04	3
26		min	-.019	6	0	3	-.055	6	4.419e-05	3	-4.588e-03	6	-2.088e-03	7

Envelope Joint Displacements (Continued)

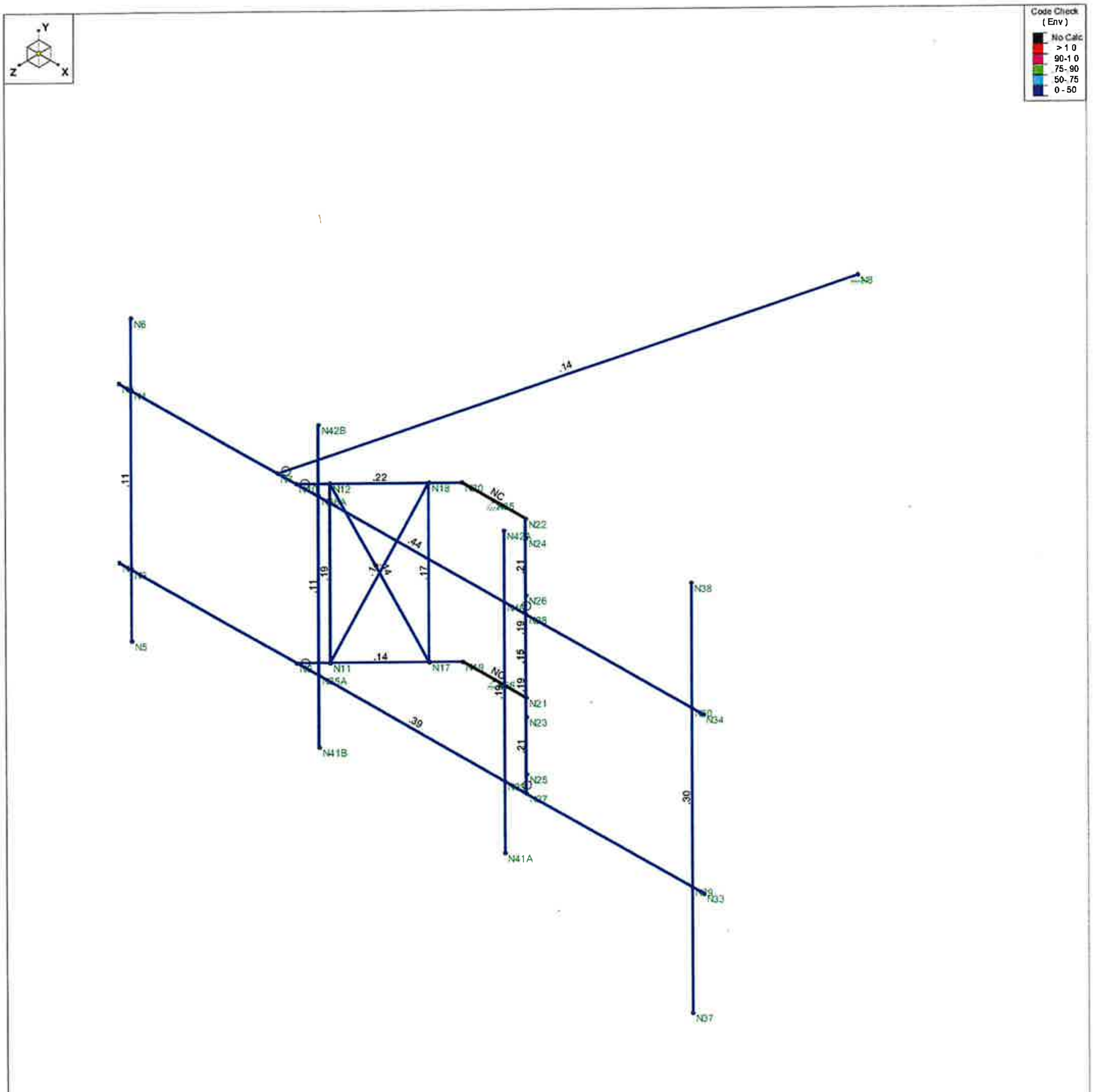
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
27	N18	max	0	3	.031	7	-.004	2	9.239e-04	7	4.583e-04	3	3.489e-06	3
28		min	-.01	6	0	3	-.029	6	-1.117e-04	3	-2.112e-03	6	-2.027e-03	7
29	N19	max	0	8	.024	7	.02	3	6.962e-04	7	2.435e-03	3	-1.437e-04	3
30		min	0	1	.001	3	-.036	6	3.951e-04	3	-4.401e-03	6	-2.896e-03	7
31	N20	max	0	8	.024	7	-.003	2	6.692e-04	4	-4.048e-04	2	-1.542e-04	3
32		min	0	1	.001	3	-.019	6	4.049e-04	6	-2.363e-03	6	-2.894e-03	7
33	N21	max	0	8	-.001	3	.036	6	6.962e-04	7	2.435e-03	3	-1.437e-04	3
34		min	0	1	-.024	7	-.02	3	3.951e-04	3	-4.401e-03	6	-2.896e-03	7
35	N22	max	0	8	-.001	3	.019	6	6.692e-04	4	-4.048e-04	2	-1.542e-04	3
36		min	0	1	-.024	7	.003	2	4.049e-04	6	-2.363e-03	6	-2.894e-03	7
37	N23	max	.012	3	-.004	3	.056	6	3.457e-04	3	2.894e-03	3	-3.945e-04	3
38		min	-.02	6	-.037	7	-.032	3	-2.178e-04	6	-4.88e-03	6	-2.289e-03	7
39	N24	max	0	3	-.005	3	.03	6	5.854e-04	3	5.245e-04	3	-1.389e-04	3
40		min	-.01	6	-.037	7	.004	2	-4.313e-04	6	-2.445e-03	6	-2.319e-03	7
41	N25	max	.052	3	-.015	3	.123	6	5.374e-04	3	3.274e-03	3	-1.078e-03	3
42		min	-.086	6	-.044	7	-.072	3	-1.363e-03	6	-5.224e-03	6	-2.378e-03	7
43	N26	max	.024	3	-.015	3	.061	6	7.121e-04	3	2.693e-03	3	-4.118e-04	3
44		min	-.039	6	-.044	7	-.014	3	-1.44e-03	6	-2.164e-03	6	-2.376e-03	7
45	N27	max	.066	3	-.023	3	.145	6	1.063e-03	3	3.184e-03	3	-1.655e-03	3
46		min	-.108	6	-.051	7	-.086	3	-1.307e-03	6	-1.66e-02	6	-3.677e-03	7
47	N28	max	.036	3	-.021	3	.07	6	1.186e-03	3	2.179e-03	3	-1.172e-03	3
48		min	-.048	6	-.051	7	-.026	3	-8.291e-04	6	-1.519e-02	6	-3.692e-03	7
49	N29	max	.067	3	-.107	3	1.12	6	1.616e-03	3	2.653e-03	3	-5.456e-04	3
50		min	-.108	6	-.28	7	-.206	3	-4.482e-03	6	-2.609e-02	6	-4.182e-03	7
51	N30	max	.036	3	-.107	3	1.029	6	1.681e-03	3	2.671e-03	3	-1.526e-03	3
52		min	-.048	6	-.28	7	-.133	3	-5.14e-04	7	-2.62e-02	6	-4.179e-03	7
53	N33	max	.067	3	-.108	3	1.198	6	1.616e-03	3	2.653e-03	3	-5.456e-04	3
54		min	-.108	6	-.292	7	-.214	3	-4.482e-03	6	-2.609e-02	6	-4.182e-03	7
55	N34	max	.036	3	-.111	3	1.108	6	1.681e-03	3	2.671e-03	3	-1.527e-03	3
56		min	-.048	6	-.292	7	-.141	3	-5.14e-04	7	-2.62e-02	6	-4.179e-03	7
57	N35	max	0	8	0	8	0	8	6.692e-04	4	-4.048e-04	2	-1.542e-04	3
58		min	0	1	0	1	0	1	4.049e-04	6	-2.363e-03	6	-2.894e-03	7
59	N36	max	0	8	0	8	0	8	6.962e-04	7	2.435e-03	3	-1.437e-04	3
60		min	0	1	0	1	0	1	3.951e-04	3	-4.401e-03	6	-2.896e-03	7
61	N35A	max	.067	3	.026	4	.076	3	1.819e-03	6	4.131e-03	6	4.075e-04	3
62		min	-.107	6	.009	6	-.17	6	-8.008e-04	3	-4.273e-04	1	-4.323e-04	7
63	N36A	max	.035	3	.026	4	.028	3	9.099e-04	6	6.889e-03	6	3.489e-04	3
64		min	-.047	6	.009	6	-.107	6	-9.593e-04	3	-6.214e-04	3	-4.104e-04	7
65	N37	max	.072	3	-.107	3	1.276	6	1.615e-03	3	2.653e-03	3	3.197e-04	3
66		min	-.19	6	-.28	7	-.251	3	-5.707e-03	6	-2.609e-02	6	-4.173e-03	7
67	N38	max	.132	4	-.107	3	1.076	6	1.804e-03	6	2.671e-03	3	-2.03e-03	2
68		min	.033	6	-.28	7	-.086	3	-3.206e-04	1	-2.62e-02	6	-4.189e-03	7
69	N39	max	.066	3	-.015	6	.059	6	9.786e-04	3	3.277e-03	3	-1.126e-03	3
70		min	-.108	6	-.034	4	-.068	3	-1.006e-03	6	-1.41e-02	6	-2.624e-03	7
71	N40	max	.036	3	-.015	6	-.001	2	1.063e-03	3	2.05e-03	3	-6.265e-04	3
72		min	-.048	6	-.034	4	-.014	3	-1.04e-03	6	-1.236e-02	6	-2.634e-03	7
73	N41A	max	.049	3	-.015	6	.076	6	9.786e-04	3	3.277e-03	3	-1.056e-03	3
74		min	-.133	6	-.034	4	-.084	3	-1.076e-03	6	-1.41e-02	6	-2.624e-03	7
75	N42A	max	.057	4	-.015	6	.003	3	1.063e-03	3	2.05e-03	3	-6.969e-04	3
76		min	-.022	6	-.034	4	-.023	6	-9.701e-04	6	-1.236e-02	6	-2.634e-03	7
77	N41B	max	.074	3	.026	4	.089	3	1.748e-03	6	4.131e-03	6	4.911e-04	3
78		min	-.113	6	.009	6	-.199	6	-8.007e-04	3	-4.273e-04	1	-4.322e-04	7

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
79	N42B	max	.03	3	.026	4	.016	4	9.803e-04	6	6.889e-03	6	2.786e-04	3
80		min	-.041	6	.009	6	-.092	6	-9.593e-04	3	-6.214e-04	3	-4.104e-04	7

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Mem...	Shape	Code Check	L...	LC	Sh...	Loc[ft]	Dir	...	phi*P...	phi*P...	phi*Mn y-y [k-ft]	phi*...	Cb	Eqn
1	M1	PIPE_2.5	.439	8...	6	.104	3.776		3	14.559	50.715	3.596	3.5...	2...	H1...
2	M2	PIPE_2.5	.387	8...	6	.092	8.724		6	14.559	50.715	3.596	3.5...	2...	H1...
3	PS.1	PIPE_2.0	.304	5...	4	.039	5.667		6	14.916	32.13	1.872	1.8...	4...	H1...
4	M4	PIPE_2.0	.216	2...	3	.084	2.521		3	32.032	32.13	1.872	1.8...	1...	H1...
5	M6	PIPE_2.0	.211	2...	3	.085	.499		7	32.032	32.13	1.872	1.8...	2...	H1...
6	M7	PIPE_2.0	.205	2...	7	.091	.499		7	32.032	32.13	1.872	1.8...	1...	H1...
7	M19	PIPE_2.0	.194	4...	3	.053	4.625		6	20.867	32.13	1.872	1.8...	1...	H1...
8	M11	0.625' Dia.	.193	0	3	.020	0		6	1.058	9.94	.104	.104	2...	H1...
9	M8	0.625' Dia.	.190	3...	6	.021	3.333		6	1.058	9.94	.104	.104	2...	H1...
10	M13	0.625' Dia.	.189	0	3	.018	0		6	1.058	9.94	.104	.104	2...	H1...
11	M9	0.625' Dia.	.171	0	3	.018	0		6	1.058	9.94	.104	.104	2...	H1...
12	M14	SR 3/4	.153	0	6	.015	0		6	6.954	14.314	.179	.179	2...	H1...
13	M15	SR 3/4	.146	0	3	.019	0		3	6.954	14.314	.179	.179	1	H1...
14	M3	PIPE_2.0	.143	5...	3	.009	10.18		3	9.492	32.13	1.872	1.8...	1...	H1...
15	M12	SR 3/4	.141	0	3	.018	0		6	6.954	14.314	.179	.179	2...	H1...
16	M5	PIPE_2.0	.141	2...	7	.070	2.521		4	32.032	32.13	1.872	1.8...	1...	H1...
17	M10	SR 3/4	.140	0	3	.018	3.659		6	6.954	14.314	.179	.179	1	H1...
18	PS.2	PIPE_2.0	.110	1...	7	.029	1.375		6	20.867	32.13	1.872	1.8...	1...	H1...
19	M21A	PIPE_2.0	.110	1...	6	.063	1.375		6	20.867	32.13	1.872	1.8...	1...	H1...



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek Engineering		
TJL	Portland HS	May 11, 2023 at 11:38 AM
22017.06	Unity Check	Mount.R3D

Antenna Mount Connection:

Anchor Data:

A307 Threaded Rod =		
Number of Anchor Bolts =	$N := 4$	(User Input)
Diameter of Bolts =	$D := 0.625in$	(User Input)
Design Tension =	$T_{design} := 10.4 \cdot kips$	(User Input)
Design Shear =	$V_{design} := 6.23 \cdot kips$	(User Input)

Design Reactions:

Fx =	$F_x := 1.7 \cdot kips$	(User Input)
Fy =	$F_y := 0.7 \cdot kips$	(User Input)
Fz =	$F_z := 2.8 \cdot kips$	(User Input)

Anchor Check:

Max Tension Force = $T_{Max} := \frac{F_z}{N} = 700\,lb$

Max Shear Force = $V_{Max} := \frac{F_y}{N} + \frac{F_x}{N} = 600\,lb$

Condition 1 = $Condition1 := if\left(\frac{T_{Max}}{T_{design}} + \frac{V_{Max}}{V_{design}} \le 1.0, \text{"OK"}, \text{"NG"}\right) = \text{"OK"}$

% of Capacity = $max\left[\frac{T_{Max}}{T_{design}}, \frac{V_{Max}}{V_{design}}, \left(\frac{\frac{T_{Max}}{T_{design}} + \frac{V_{Max}}{V_{design}}}{1.0}\right)\right] = 16.4 \cdot \%$

verizon fuze | RFDS

EAST > North East > New England > New England West > PORTLAND HS CT - B

RF Submit by: Cheiban, Ziad - ziad.cheiban@verizonwireless.com - 3/21/2023, 11:10:23 AM

EE Submit by: , - -

Project Details

FUZE Project ID: 16599668
Project Name: PORTLAND HS CT
Project Alt Name: PORTLAND HS CT
Project Type: Initial Build
Modification Type:
Designed Sector Carrier 4G: 26
Designed Sector Carrier 5G: N/A
Additional Sector Carrier 4G: N/A
Additional Sector Carrier 5G: N/A
FP Solution Type & Tech Type: MCR;4G_700,4G_850,4G_AWS,4G_CBRS,4G_PCS,5G_850,5G_L-Sub6
Carrier Aggregation: false
MPT Id:
eCIP-0: false
Suffix: Rev3_2023-03-21

Location Information

Site ID: 616480547
E-NodeB ID: 064040,0640040
PSLC: 469381
Switch Name: Wallingford 1
Tower Owner:
Tower Type: Self Support (Lattice Tower)
Site Type: MACRO
Site Sub Type: TRADITIONAL
Street Address: 97 High Street
City: Portland
State: CT
Zip Code: 06480
County: Middlesex
Latitude: 41.580714 / 41° 34' 50.5704" N
Longitude: -72.631361 / 72° 37' 52.8996" W

RFDS Project Scope: New build macro - colo

Rev3_2023-03-21: Using NNH4-65B antennas for Sub3
Rev2_2023-03-21: Changed centerline to match drawings
Rev0_2021-10-20: New build.

Antenna Summary

Added

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID
LTE	LTE	LTE	LTE			COMMSCOPE	NNH4-65B-R6	90	93	30(01) 150(02) 270(03)	false	false	PHYSICAL	3	
				LTE		SAMSUNG	XXDWMM-12.5-65	90	90.5	30(19) 150(20) 270(21)	false	false	PHYSICAL	3	
					5G	Samsung	MT6407-77A	90	91.5	30(0001) 150(0002) 270(0003)	false	false	PHYSICAL	3	

Removed

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID

No data available

Retained

700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	Quantity	Item ID

No data available

Added: 9 **Removed: 0** **Retained: 0**

Equipment Summary

Added

Equipment Type	Location	700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID
OVP Box	Tower							N/A	12 OVP			PHYSICAL	1	
Hybrid Cable	Tower							N/A	6x12 Hybriflex			PHYSICAL	2	
RRU	Tower			LTE	LTE			Samsung	B2/B66A RRH ORAN (RF4439d-25A)			PHYSICAL	3	
RRU	Tower	LTE	LTE					Samsung	B5/B13 RRH ORAN (RF4440d-13A)			PHYSICAL	3	
RRU	Tower					LTE		Samsung	CBRS RRH - RT4401-48A			PHYSICAL	3	000000001900167
RRU	Tower						5G	Samsung	MT6407-77A			PHYSICAL	0	

Removed

Equipment Type	Location	700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID

No data available

Retained

Equipment Type	Location	700	850	1900	AWS	CBRS	L-Sub6	Make	Model	Cable Length	Cable Size	Install Type	Quantity	Item ID

No data available.

Service Info

CBRS 3_5 GHz

		0002	
Sector	**19**	**20**	**21**
Azimuth	30	150	270
Cell / ENode B ID	064040	064040	064040
Antenna Model	XXDWMM-12.5-65	XXDWMM-12.5-65	XXDWMM-12.5-65
Antenna Make	SAMSUNG	SAMSUNG	SAMSUNG
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	8	8	8
Tip Height	90.5	90.5	90.5
Regulatory Power	3.86	3.86	3.86
DLEARFCN	55343, 55541, 55739, 55937	55343, 55541, 55739, 55937	55343, 55541, 55739, 55937
Channel Bandwidth(MHz)	20	20	20
Total ERP (W)	42.32	42.32	42.32
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	CBRS RRH - RT4401-48A	CBRS RRH - RT4401-48A	CBRS RRH - RT4401-48A
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	11298781	11298782	11298783
Source	ATOLL_API	ATOLL_API	ATOLL_API

700 MHz LTE

		0002	
Sector	**01**	**02**	**03**
Azimuth	30	150	270
Cell / ENode B ID	064040	064040	064040
Antenna Model	NNH4-65B-R6	NNH4-65B-R6	NNH4-65B-R6
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	2	2
Tip Height	93	93	93
Regulatory Power	66.49	66.49	66.49
DLEARFCN	5230	5230	5230
Channel Bandwidth(MHz)	10	10	10
Total ERP (W)	598.41	598.41	598.41
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	11232662	11232663	11232664
Source	ATOLL_API	ATOLL_API	ATOLL_API

850 MHz LTE

		0002	
Sector	01	02	03
Azimuth	30	150	270
Cell / ENode B ID	064040	064040	064040
Antenna Model	NNH4-65B-R6	NNH4-65B-R6	NNH4-65B-R6
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	2	2
Tip Height	93	93	93
Regulatory Power	301.17	301.17	301.17
DLEARFCN	2450	2450	2450
Channel Bandwidth(MHz)	10	10	10
Total ERP (W)	677.64	677.64	677.64
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)	B5/B13 RRH ORAN (RF4440d-13A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	11298595	11298596	11298597
Source	ATOLL_API	ATOLL_API	ATOLL_API

1900 MHz LTE

		0002	
Sector	01	02	03
Azimuth	30	150	270
Cell / ENode B ID	064040	064040	064040
Antenna Model	NNH4-65B-R6	NNH4-65B-R6	NNH4-65B-R6
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	2	2
Tip Height	93	93	93
Regulatory Power	219.41	219.41	219.41
DLEARFCN	1050	1050	1050
Channel Bandwidth(MHz)	10	10	10
Total ERP (W)	1203.65	1203.65	1203.65
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	11298592	11298593	11298594
Source	ATOLL_API	ATOLL_API	ATOLL_API

2100 MHz LTE

		0002	
Sector	01	02	03
Azimuth	30	150	270
Cell / ENode B ID	064040	064040	064040
Antenna Model	NNH4-65B-R6	NNH4-65B-R6	NNH4-65B-R6
Antenna Make	COMMSCOPE	COMMSCOPE	COMMSCOPE
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	2	2	2
Tip Height	93	93	93
Regulatory Power	85.06	85.06	85.06
DLEARFCN	2050	2050	2050
Channel Bandwidth(MHz)	20	20	20
Total ERP (W)	933.25	933.25	933.25
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)	B2/B66A RRH ORAN (RF4439d-25A)
Number of Tx, Rx Lines	4,4	4,4	4,4
Position			
Transmitter Id	11298467	11298468	11298469
Source	ATOLL_API	ATOLL_API	ATOLL_API

nL-Sub6

		0002	
Sector	0001	0002	0003
Azimuth	30	150	270
Cell / ENode B ID	0640040	0640040	0640040
Antenna Model	MT6407-77A	MT6407-77A	MT6407-77A
Antenna Make	Samsung	Samsung	Samsung
Antenna Centerline(Ft)	90	90	90
Mechanical Down-Tilt(Deg.)	0	0	0
Electrical Down-Tilt	1	1	1
Tip Height	91.5	91.5	91.5
Regulatory Power	673.96	673.96	673.96
DLEARFCN	648672	648672	648672
Channel Bandwidth(MHz)	60	60	60
Total ERP (W)	11091.75	11091.75	11091.75
TMA Make			
TMA Model			
RRU Make	Samsung	Samsung	Samsung
RRU Model	MT6407-77A	MT6407-77A	MT6407-77A
Number of Tx, Rx Lines	2,2	2,2	2,2
Position			
Transmitter Id	11298702	11298703	11298704
Source	ATOLL_API	ATOLL_API	ATOLL_API

Service Comments

Callsigns Per Antenna

Sector	Antenna Make	Antenna Model	Ant CL Height AGL	Tip Height	Azimuth (TN)	Elec Tilt	Mech Tilt	Gain	Beam Width	Regulatory Power	Callsigns						
											700	850	1900	2100	28 GHz	31 GHz	39 GHz

No data available

Callsigns

Callsign	Market	Radio Code	Market Number	Block	State	County	Licensee Name	Wholly Owned	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs /Sq Mi	Status	Action	Approved for Insvc
WQJQ689	*Northeast*	*WU*	*REA001*	*C*	*CT*	*Middlese:*	*Cellco Partnership*	*Yes*	*22.000*	*746.000-757.000*	*776.000-787.000*	*.000-.000*	*.000-.000*	*66.49*	*1000*	*444.75*	*Active*	*added*	*Yes*
KNKA404	*Hartford-New Britain-Bristol, CT*	*CL*	*CMA032*	*A*	*CT*	*Middlese:*	*Cellco Partnership*	*Yes*	*25.000*	*824.000-835.000*	*869.000-880.000*	*845.000-846.500*	*890.000-891.500*	*301.17 - PSD*	*400*	*444.75*	*Active*	*added*	*Yes*
WPQJ730	*Hartford, CT*	*CW*	*BTA184*	*C*	*CT*	*Middlese:*	*Cellco Partnership*	*Yes*	*10.000*	*1895.000-1900.000*	*1975.000-1980.000*	*.000-.000*	*.000-.000*	*219.41*	*1640*	*444.75*	*Active*	*added*	*Yes*
KNLH251	*Hartford, CT*	*CW*	*BTA184*	*F*	*CT*	*Middlese:*	*Cellco Partnership*	*Yes*	*10.000*	*1890.000-1895.000*	*1970.000-1975.000*	*.000-.000*	*.000-.000*	*219.41*	*1640*	*444.75*	*Active*	*added*	*Yes*
CBRS_CALI	*UNLICENSED*	*3.5 GHz*	*UNLICEN*	*UNLICI*	*CT*	*Middlese:*	*UNLICENSED*	*UNLICI*	*UNLICEN*	*UNLICENSED-UNLICENSED*	*UNLICENSED-UNLICENSED*	*UNLICENSED-UNLICENSED*	*UNLICENSED-UNLICENSED*	*3.86*		*444.75*	*Active*	*added*	*No*
WQGB276	*Hartford-New Britain-Bristol, CT*	*AW*	*CMA032*	*A*	*CT*	*Middlese:*	*Cellco Partnership*	*Yes*	*20.000*	*1710.000-1720.000*	*2110.000-2120.000*	*.000-.000*	*.000-.000*	*85.06*	*1640*	*444.75*	*Active*	*added*	*Yes*
WRNE581	*New York, NY*	*PM*	*PEA001*	*A1*	*CT*	*Middlese:*	*Cellco Partnership*	*Yes*	*20.000*	*3700.000-3720.000*	*.000-.000*	*.000-.000*	*.000-.000*	*673.96*	*1640*	*444.75*	*Active*	*added*	*Yes*
WRNE582	*New York, NY*	*PM*	*PEA001*	*A2*	*CT*	*Middlese:*	*Cellco Partnership*	*Yes*	*20.000*	*3720.000-3740.000*	*.000-.000*	*.000-.000*	*.000-.000*	*673.96*	*1640*	*444.75*	*Active*	*added*	*Yes*
WRNE583	*New York, NY*	*PM*	*PEA001*	*A3*	*CT*	*Middlese:*	*Cellco Partnership*	*Yes*	*20.000*	*3740.000-3760.000*	*.000-.000*	*.000-.000*	*.000-.000*	*673.96*	*1640*	*444.75*	*Active*	*added*	*Yes*
WQGA906	*New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-*	*AW*	*BEA010*	*B*	*CT*	*Middlese:*	*Cellco Partnership*	*Yes*	*20.000*	*1720.000-1730.000*	*2120.000-2130.000*	*.000-.000*	*.000-.000*	*85.06*	*1640*	*444.75*	*Active*	*added*	*Yes*
WRBA710	Hartford, CT	UU	BTA184	L1	CT	Middlese:	Cellco Partnership	Yes	325.000	27500.000-27600.000	27700.000-27925.000	.000-.000	.000-.000			444.75	Active		Yes
WRBA711	Hartford, CT	UU	BTA184	L2	CT	Middlese:	Cellco Partnership	Yes	325.000	27925.000-28050.000	28150.000-28350.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD609	New York, NY	UU	PEA001	M1	CT	Middlese:	Cellco Partnership	Yes	100.000	37600.000-37700.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD610	New York, NY	UU	PEA001	M10	CT	Middlese:	Cellco Partnership	Yes	100.000	38500.000-38600.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD611	New York, NY	UU	PEA001	M2	CT	Middlese:	Cellco Partnership	Yes	100.000	37700.000-37800.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD612	New York, NY	UU	PEA001	M3	CT	Middlese:	Cellco Partnership	Yes	100.000	37800.000-37900.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD613	New York, NY	UU	PEA001	M4	CT	Middlese:	Cellco Partnership	Yes	100.000	37900.000-38000.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD614	New York, NY	UU	PEA001	M5	CT	Middlese:	Cellco Partnership	Yes	100.000	38000.000-38100.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD615	New York, NY	UU	PEA001	M6	CT	Middlese:	Cellco Partnership	Yes	100.000	38100.000-38200.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD616	New York, NY	UU	PEA001	M7	CT	Middlese:	Cellco Partnership	Yes	100.000	38200.000-38300.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes
WRHD617	New York, NY	UU	PEA001	M8	CT	Middlese:	Cellco Partnership	Yes	100.000	38300.000-38400.000	.000-.000	.000-.000	.000-.000			444.75	Active		Yes

WRHD618	New York, NY	UU	PEA001	M9	CT	Middlese:	Cellco Partnership	Yes	100.000	38400.000-38500.000	.000-.000	.000-.000	.000-.000		444.75	Active	Yes
WRHD619	New York, NY	UU	PEA001	N1	CT	Middlese:	Cellco Partnership	Yes	100.000	38600.000-38700.000	.000-.000	.000-.000	.000-.000		444.75	Active	Yes
WRNE584	New York, NY	PM	PEA001	A4	CT	Middlese:	Cellco Partnership	Yes	20.000	3760.000-3780.000	.000-.000	.000-.000	.000-.000	1640	444.75	Active	No
WRNE585	New York, NY	PM	PEA001	A5	CT	Middlese:	Cellco Partnership	Yes	20.000	3780.000-3800.000	.000-.000	.000-.000	.000-.000	1640	444.75	Active	No
WRNE586	New York, NY	PM	PEA001	B1	CT	Middlese:	Cellco Partnership	Yes	20.000	3800.000-3820.000	.000-.000	.000-.000	.000-.000	1640	444.75	Active	No
WRNE587	New York, NY	PM	PEA001	B2	CT	Middlese:	Cellco Partnership	Yes	20.000	3820.000-3840.000	.000-.000	.000-.000	.000-.000	1640	444.75	Active	No
WRNE588	New York, NY	PM	PEA001	B3	CT	Middlese:	Cellco Partnership	Yes	20.000	3840.000-3860.000	.000-.000	.000-.000	.000-.000	1640	444.75	Active	No

ATTACHMENT 3

C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
(603) 644-2800
support@csquaredsystems.com

Calculated Radio Frequency Emissions Report

verizon

Portland HS

97 High Street, Portland, CT 06480

May 4, 2023

Table of Contents

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1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed installation of Verizon's antenna arrays to be mounted at 90' AGL on an existing self-support tower located at 97 High Street in Portland, CT. The coordinates of the self-support tower are 41° 34' 50.57" N, 72° 37' 25.89" W.

Verizon is proposing the following:

1) Install nine (9) multi-band antennas, three (3) per sector to support its commercial LTE network.

This report considers the planned antenna configuration for Verizon[1] and the existing antennas for AT&T[2] to derive the resulting % MPE of its proposed installation.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment C of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment C contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

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[1] As referenced to Verizon's Radio Frequency Design Sheet updated 3/21/2023.

[2] As referenced to Centerline's Radio Frequency Exposure Analysis, dated 9/6/2023.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{PowerDensity} = \left(\frac{EIRP}{\pi \times R^2}\right) \times \text{Off BeamLoss}$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Off Beam Loss is determined by the selected antenna patterns

Ground reflection factor of 1.6

These calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not take into account actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the final installations.

4. Antenna Inventory

Table 1 below outlines Verizon's proposed antenna configuration for the site. The associated data sheets and antenna patterns for these specific antenna models are included in Attachments C.

Operator	Sector / Call Sign	TX Freq (MHz)	Power at Antenna (Watts)	Ant Gain (dBi)	Power EIRP (Watts)	Antenna Model	Beam Width	Mech. Tilt	Length (ft)	Antenna Centerline Height (ft)
Verizon	Alpha / 30°	700	160	14.4	4407	NNH4-65B-R6	69	0	5.99	90
		850	160	15	5060		65			
		1900	160	16.3	6825		60			
		2100	240	16.5	10720		60			
		3500	20	12.5	356	XXDWMM-12.5-65	65		1.025	90
		3700	200	25.5	70963	MT6407-77A	-	0	2.9	90
	Beta / 150°	700	160	14.4	4407	NNH4-65B-R6	69	0	5.99	90
		850	160	15	5060		65			
		1900	160	16.3	6825		60			
		2100	240	16.5	10720		60			
		3500	20	12.5	356	XXDWMM-12.5-65	65		1.025	90
		3700	200	25.5	70963	MT6407-77A	-	0	2.9	90
	Gamma / 270°	700	160	14.4	4407	NNH4-65B-R6	69	0	5.99	90
		850	160	15	5060		65			
		1900	160	16.3	6825		60			
		2100	240	16.5	10720		60			
		3500	20	12.5	356	XXDWMM-12.5-65	65		1.025	90
		3700	200	25.5	70963	MT6407-77A	-	0	2.9	90

Table 1: Proposed Antenna Inventory[3] [4]

[3] Antenna heights are in reference to Verizon's Radio Frequency Design Sheet updated 3/21/2023.

[4] Transmit power assumes 0 dB of cable loss.

5. Calculation Results

The calculated power density results are shown in Figure 1 below. For completeness, the calculations for this analysis range from 0 feet horizontal distance (directly below the antennas) to a value of 3,000 feet horizontal distance from the site. In addition to the other worst-case scenario considerations that were previously mentioned, the power density calculations to each horizontal distance point away from the antennas was completed using a local maximum off beam antenna gain (within ± 5 degrees of the true mathematical angle) to incorporate a realistic worst-case scenario.

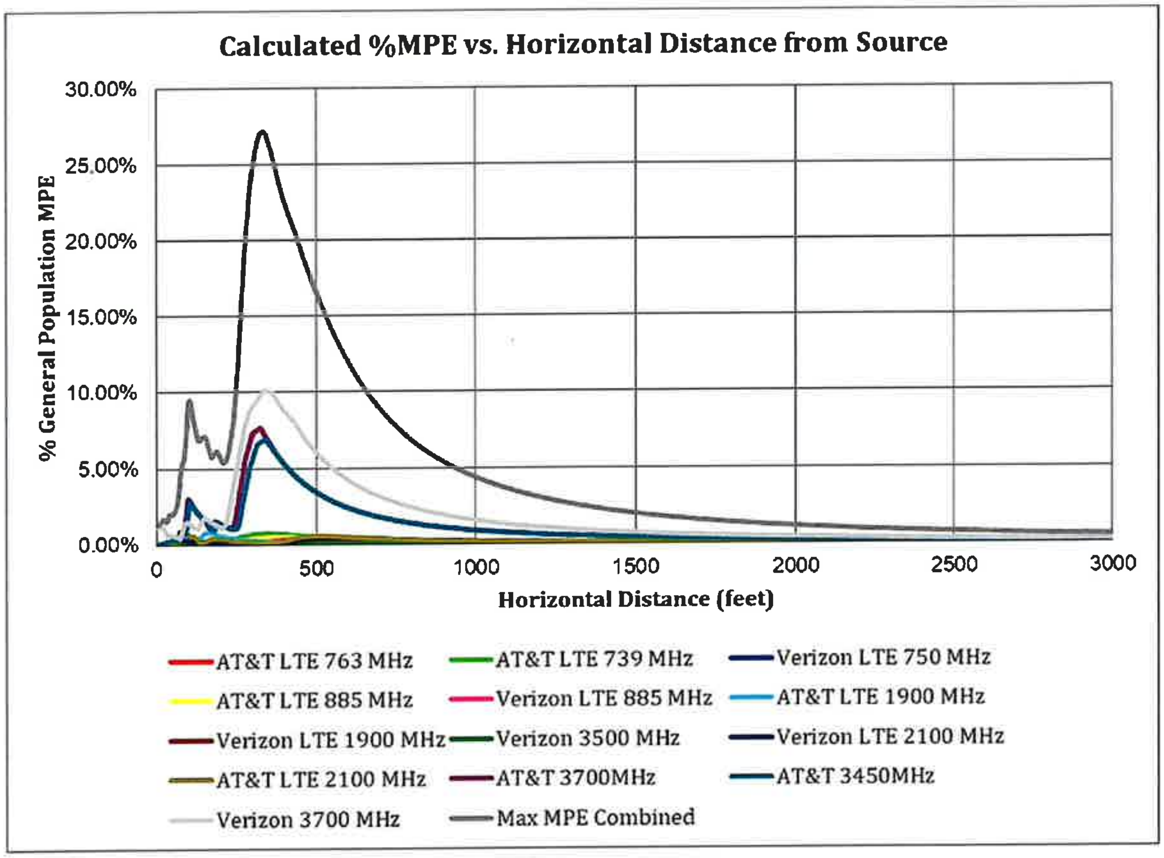


Figure 1: Graph of General Population % MPE vs. Distance

The highest percent of MPE (27.15% of the General Population limit) is calculated to occur at a horizontal distance of 337 feet from antennas. Please note that the percent of MPE calculations close to the site take into account off beam loss, which is determined from the vertical pattern of the antennas used. Therefore, RF power density levels may increase as the distance from the site increases. At distances of approximately 1500 feet and beyond, one would now be in the main beam of the antenna pattern and off beam loss is no longer considered. Beyond this point, RF levels become calculated solely on distance from the site and the percent of MPE decreases significantly as distance from the site increases.

Table 2 below lists percent of MPE values as well as the associated parameters that were included in the calculations. The highest percent of MPE value was calculated to occur at a horizontal distance of 337 feet from the site (reference Figure 1).

As stated in Section 3, all calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. In addition, a six foot height offset was considered in this analysis to account for average human height. As a result, the predicted signal levels are significantly higher than the actual signal levels will be from the final configuration. The results presented in Figure 1 and Table 2 assume level ground elevation from the base of the tower out to the horizontal distances calculated.

Carrier	Number of Transmitters	Power out of Base Station Per Transmitter (Watts)	Antenna Height (Feet)	Distance to the Base of Antennas (Feet)	Power Density (mW/cm^2)	Limit (mW/cm^2)	% MPE
AT&T 3450MHz	1	108.4	78.8	337	0.068806	1.000	6.88%
AT&T 3700MHz	1	108.4	75.2	337	0.072541	1.000	7.25%
AT&T LTE 1900 MHz	1	120.0	77.0	337	0.002184	1.000	0.22%
AT&T LTE 2100 MHz	1	120.0	77.0	337	0.001381	1.000	0.14%
AT&T LTE 739 MHz	1	120.0	77.0	337	0.003567	0.493	0.72%
AT&T LTE 763 MHz	1	120.0	77.0	337	0.003550	0.509	0.70%
AT&T LTE 885 MHz	1	120.0	78.0	337	0.002821	0.590	0.48%
Verizon 3500 MHz	1	20.0	90.0	337	0.000403	1.000	0.04%
Verizon 3700 MHz	1	200.0	90.0	337	0.101112	1.000	10.11%
Verizon LTE 1900 MHz	1	160.0	90.0	337	0.000343	1.000	0.03%
Verizon LTE 2100 MHz	1	240.0	90.0	337	0.000851	1.000	0.09%
Verizon LTE 750 MHz	1	160.0	90.0	337	0.001546	0.500	0.31%
Verizon LTE 885 MHz	1	160.0	90.0	337	0.000994	0.567	0.18%
						Total	**27.15%**

Table 2: Maximum Percent of General Population Exposure Values

6. Conclusion

The above analysis verifies that RF exposure levels from the site with Verizon's proposed antenna configuration will be well below the maximum permissible levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Using the conservative calculation methods and parameters detailed above, the maximum cumulative percent of MPE in consideration of all transmitters is calculated to be **27.15% of the FCC limit (General Population/Uncontrolled)**. This maximum cumulative percent of MPE value is calculated to occur 337 feet away from the site.

7. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.

Report Prepared By: Ram Acharya
RF Engineer 1
C Squared Systems, LLC

May 3, 2023
Date

Reviewed/Approved By: Martin J. Lavin
Senior RF Engineer
C Squared Systems, LLC

May 4, 2023
Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

IEEE C95.1-2005, IEEE Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz IEEE-SA Standards Board

IEEE C95.3-2002 (R2008), IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz IEEE-SA Standards Board

Verizon's Radio Frequency Design Sheet updated 10/21/2022

AT&T's filing, Connecticut Siting Council Notice of Exempt Modification – Antenna Add - 97 High Street (aka 1 Service Road) Portland, CT, dated 9/23/2022

As referenced to Dish Wireless LLC's filing, Connecticut Siting Council Tower Share Application – 97 High Street, Portland, CT, dated 11/19/2021

T-Mobile's filing, Connecticut Siting Council Notice of Exempt Modification – 97 High Street, Portland, CT, dated 10/1/2020

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure[5]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f^2)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure[6]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f^2)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 3: FCC Limits for Maximum Permissible Exposure

[5] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

[6] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

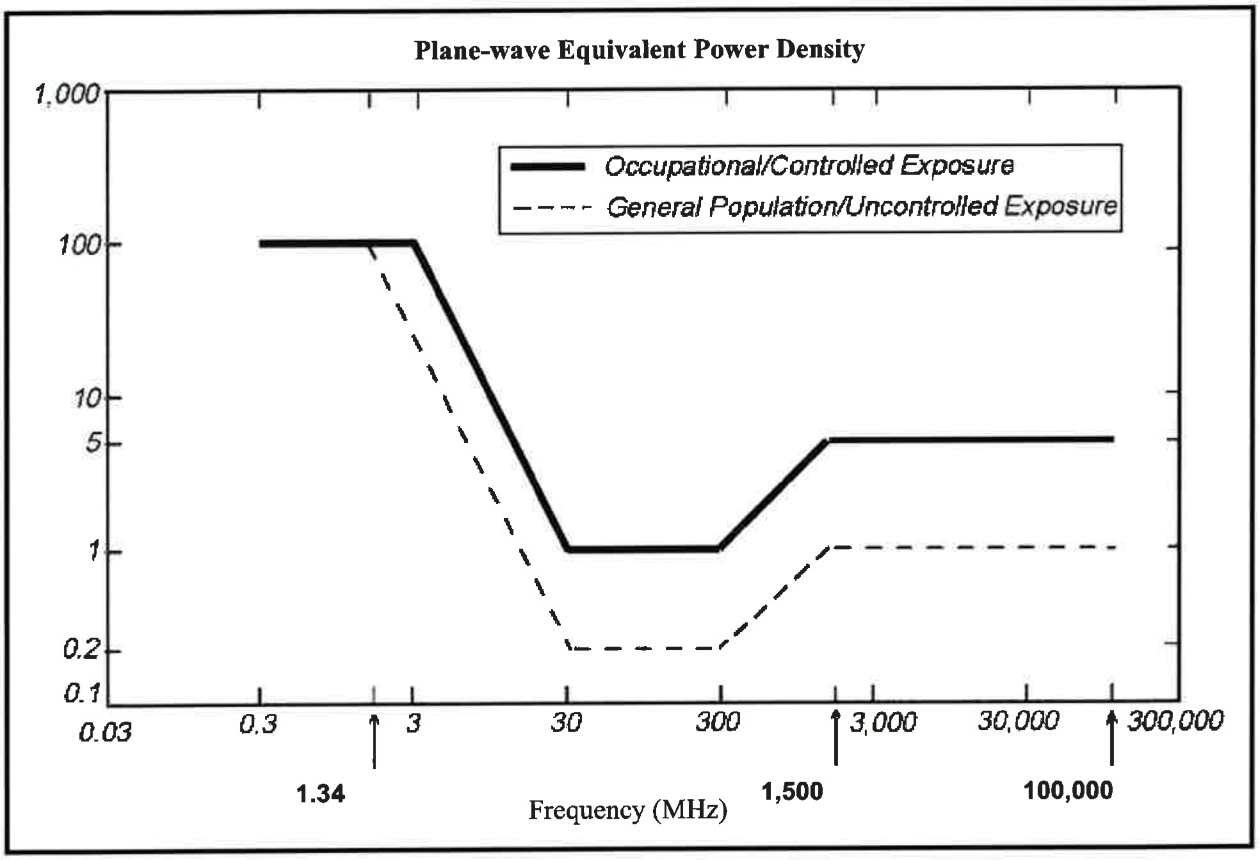


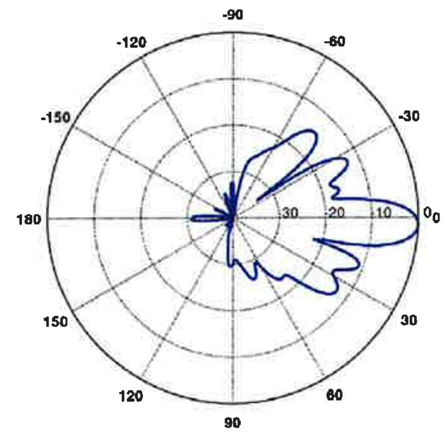
Figure 2: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

C2 Systems

Attachment C: Verizon Antenna Model Data Sheets and Electrical Patterns

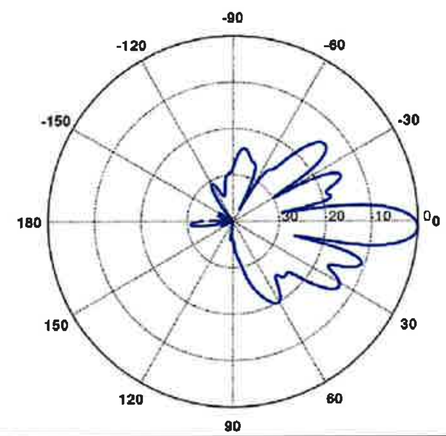
750 MHz

Manufacturer:	COMMSCOPE
Model #:	NNH4-65B-R6
Frequency Band:	698-806 MHz
Gain:	14.4 dBi
Vertical Beamwidth:	12°
Horizontal Beamwidth:	69°
Polarization:	±45°
Dimensions (L x W x D):	71.9" x 16.6" x 7.7"



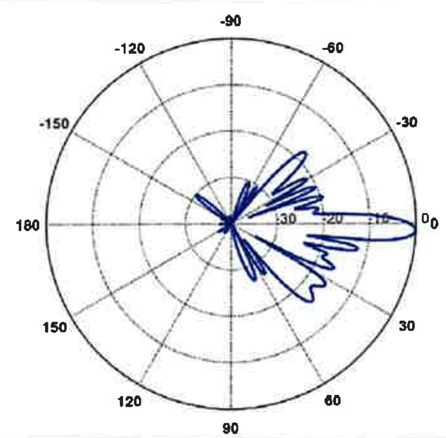
885 MHz

Manufacturer:	COMMSCOPE
Model #:	NNH4-65B-R6
Frequency Band:	806-896 MHz
Gain:	15.0 dBi
Vertical Beamwidth:	10.5°
Horizontal Beamwidth:	65°
Polarization:	±45°
Dimensions (L x W x D):	71.9" x 16.6" x 7.7"



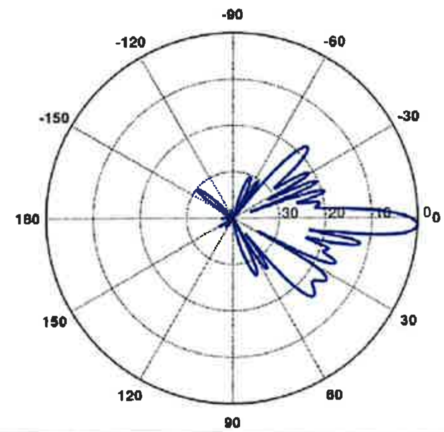
1900 MHz

Manufacturer:	COMMSCOPE
Model #:	NNH4-65B-R6
Frequency Band:	1850-1990 MHz
Gain:	16.3 dBi
Vertical Beamwidth:	10.4°
Horizontal Beamwidth:	60°
Polarization:	±45°
Dimensions (L x W x D):	71.9" x 16.6" x 7.7"



2100 MHz

Manufacturer:	COMMSCOPE
Model #:	NNH4-65B-R6
Frequency Band:	1920-2180 MHz
Gain:	16.5 dBi
Vertical Beamwidth:	9.8°
Horizontal Beamwidth:	60°
Polarization:	±45°
Dimensions (L x W x D):	71.9" x 16.6" x 7.7"



ATTACHMENT 4

Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts
and New York

June 13, 2023

Via Certificate of Mailing

Ryan Curley, First Selectman
Town of Portland
33 East Main Street
Portland, CT 06480

Re: **Proposed Modifications to a Telecommunications Facility at 97 High Street in Portland, Connecticut**

Dear Mr. Curley:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to extend the existing lattice tower at 97 High Street from 80 feet to 90 feet to accommodate Cellco's need for improved wireless service in Haddam.

As presented in the Sub-Petition, the proposed facility modification constitutes an eligible facility request pursuant to Section 6409(a) of the Federal Middle Class Tax Relief and Job Creation act of 2012 (47 U.S.C. § 1455(a)) and the October 21, 2014 Order of the Federal Communications Commission (FCC-14-153). A copy of the Sub-Petition is attached for your review. Landowners whose property abuts the Property were also sent notice of this filing along with a copy of the Sub-Petition.

Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the attached Sub-Petition.

Please contact me if you have any questions regarding this proposal.

Sincerely,

Kenneth C. Baldwin

Attachment

Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts
and New York

June 13, 2023

Via Certificate of Mailing

Dan Bourret, Land Use Development Planner
Town of Portland
33 East Main Street
Portland, CT 06480

Re: **Proposed Modifications to a Telecommunications Facility at 97 High Street in Portland, Connecticut**

Dear Mr. Bourret:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to extend the existing lattice tower at 97 High Street from 80 feet to 90 feet to accommodate Cellco's need for improved wireless service in Haddam.

As presented in the Sub-Petition, the proposed facility modification constitutes an eligible facility request pursuant to Section 6409(a) of the Federal Middle Class Tax Relief and Job Creation act of 2012 (47 U.S.C. § 1455(a)) and the October 21, 2014 Order of the Federal Communications Commission (FCC-14-153). A copy of the Sub-Petition is attached for your review. Landowners whose property abuts the Property were also sent notice of this filing along with a copy of the Sub-Petition.

Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the attached Sub-Petition.

Please contact me if you have any questions regarding this proposal.

Sincerely,

Kenneth C. Baldwin

Attachment

Robinson+Cole

KENNETH C. BALDWIN

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Hartford, CT 06103-3597
Main (860) 275-8200
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kbaldwin@rc.com
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Also admitted in Massachusetts
and New York

June 13, 2023

Via Certificate of Mailing

SRR Towers Inc.
57 East Washington Street
Chagrin Falls, OH 44022

Re: **Proposed Modifications to a Telecommunications Facility at 97 High Street in Portland, Connecticut**

Dear Sir or Madam:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to extend the existing lattice tower at 97 High Street from 80 feet to 90 feet to accommodate Cellco's need for improved wireless service in Haddam.

As presented in the Sub-Petition, the proposed facility modification constitutes an eligible facility request pursuant to Section 6409(a) of the Federal Middle Class Tax Relief and Job Creation act of 2012 (47 U.S.C. § 1455(a)) and the October 21, 2014 Order of the Federal Communications Commission (FCC-14-153). A copy of the Sub-Petition is attached for your review. Landowners whose property abuts the Property were also sent notice of this filing along with a copy of the Sub-Petition.

Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the attached Sub-Petition.

Please contact me if you have any questions regarding this proposal.

Sincerely,

Kenneth C. Baldwin

Attachment

ATTACHMENT 5

Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts
and New York

June 13, 2023

Via Certificate of Mailing

«Name_and_Address»

Re: **Proposed Telecommunications Facility at 97 High Street in Portland, Connecticut**

Dear «Salutation»:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to extend the existing lattice tower at 97 High Street from 80 feet to 90 feet to accommodate Cellco's need for improved wireless service in Portland.

As presented in the Sub-Petition, the proposed facility improvements at the Property constitute an eligible facility request pursuant to Section 6409(a) of the Federal Middle Class Tax Relief and Job Creation act of 2012 (47 U.S.C. § 1455(a)) and the October 21, 2014 Order of the Federal Communications Commission (FCC-14-153) as amended. A copy of the Sub-Petition is attached for your review.

Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the Sub-Petition.

This notice is being sent to you because you are listed as an owner of land that abuts the Property. If you have any questions regarding the Sub-Petition, the Council's process for reviewing the Sub-Petition or the details of the filing itself, please feel free to contact me at the number listed above. You may also contact the Council directly at 860-827-2935.

Sincerely,

Kenneth C. Baldwin

Attachment

CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS

ABUTTING PROPERTY OWNERS

97 HIGH STREET
PORTLAND, CONNECTICUT

	Property Address	**Owner's and Mailing Address**
1.	103 High Street	John Aletta 103 High Street Portland, CT 06480
2.	101 High Street	Daniel Richer 101 High Street Portland, CT 06480
3.	99 High Street	Lidiana Cruz Peralta and Julio Cesar Luna Acosta 99 High Street Portland, CT 06480
4.	93 High Street	Town of Portland Water Tanks P.O. Box 71 Portland, CT 06480-0071
5.	95 High Street	Town of Portland Portland High School and Middle School P.O. Box 71 Portland, CT 06480-0071