Transcend Wireless

10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

December 17, 2021

Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: Notice of Exempt Modification
250 South Olcott Street, Manchester, CT 06040
Latitude: 41.76993889
Longitude: -72.55908056
T-Mobile/Sprint Site#: CTHA038A-CT03XC067

Dear Ms. Bachman:

T-Mobile/Sprint currently maintains six (6) antennas at the 135-foot level of the existing 180-foot lattice tower at 250 South Olcott Street, Manchester, CT. The 180-foot lattice tower is owned and operated by Connecticut Light and Power Company d/b/a Eversource Energy. The property is owned by Connecticut Light and Power Company d/b/a Eversource Energy. T-Mobile/Sprint now intends to remove the six (6) existing antennas and add six (6) new 600/700/1900/2100/2500 MHz antennas. The new antennas will be installed at the 135-foot level of the tower and will support 5G services.

Planned Modifications:
Tower:
Remove:
(3) Commscope NNVV-65B-RF Antennas
(3) Nokia AAHC Antennas
(3) 1900MHz 4X45W RRU
(6) 800MHz 2X50W RRU
Existing Sprint Hybrid Cables

Install New:
(3) RFS APXVAALL24-43-NA20 Antennas
(3) Ericsson AIR6449-B41 Antennas
(3) Ericsson 4480-B71+B85 RRU
(3) Ericsson 4460-B25+B66 RRU
(3) 1 ¼" 6/24 Hybrid Cables

Ground:
Existing To Remain:
(1) Telco Box

(1) Antenna Cable Ice Bridge
(1) 200A PPC Cabinet

Remove:
(1) Sprint Eltek Radio Equipment Cabinet
(1) 100A Circuit Breaker

Install New:
(1) Enclosure 6160
(1) B160 Battery Cabinet
(1) 150A Circuit Breaker

Enclosed please find a letter of authorization from Eversource dated December 14, 2021. This site was approved by the Connecticut Siting Council in Petition 1346 on July 19, 2018. T-Mobile/Sprint has been approved for subsequent modifications at their facility.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies§ 16- SOj-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.SA. § 16-SOj-73, a copy of this letter is being sent to Mayor Jay Moran, Elected Official, and James Davis, Acting Zoning Enforcement Officer as well as the tower and property owner.

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

1. The proposed modifications will not result in an increase in the height of the existing structure.

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.

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

6. The existing structure and its foundation can support the proposed loading.

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

Sincerely,

Dave DePinto
Transcend Wireless
Cell: 973-907-3243
Email: ddepinto@transcendwireless.com

Attachments
cc: Jay Moran – Mayor of the Town of Manchester
James Davis– Zoning Enforcement Officer
Connecticut Light and Power Company d/b/a Eversource Energy – Tower & Property Owner

Transcend Wireless

DePinto, Dave <ddepinto@transcendwireless.com>

UPS Delivery Notification, Tracking Number 1ZV257424291063851

UPS <pkginfo@ups.com>
To: DDEPINTO@transcendwireless.com

Mon, Dec 20, 2021 at 9:58 AM

Hello, your package has been delivered.

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Delivery Time: 9:52 AM
Left At: DOCK
Signed by: HAJ

TRANSCEND WIRELESS

Tracking Number:	1ZV257424291063851
Ship To:	EVERSOURCE ENERGY 107 SELDEN STREET BERLIN, CT 06037 US
Number of Packages:	1
UPS Service:	UPS Ground
Package Weight:	1.8 LBS
Reference Number:	CTHA038A-CT03XC067

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Transcend Wireless

DePinto, Dave <ddepinto@transcendwireless.com>

UPS Delivery Notification, Tracking Number 1ZV257424292321847

UPS <pkginfo@ups.com>
To: DDEPINTO@transcendwireless.com

Mon, Dec 20, 2021 at 11:43 AM

Hello, your package has been delivered.

Delivery Date: Monday, 12/20/2021
Delivery Time: 11:35 AM
Left At: RECEIVER
Signed by: TYLEF

TRANSCEND WIRELESS

Tracking Number:	1ZV257424292321847
Ship To:	TOWN OF MANCHESTER 41 CENTER STREET MANCHESTER, CT 06040 US
Number of Packages:	1
UPS Service:	UPS Ground
Package Weight:	1.8 LBS
Reference Number:	CTHA038A-CT03XC067

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Transcend Wireless

DePinto, Dave <ddepinto@transcendwireless.com>

UPS Delivery Notification, Tracking Number 1ZV257424299067002

UPS <pkginfo@ups.com>
To: DDEPINTO@transcendwireless.com

Mon, Dec 20, 2021 at 11:43 AM

Hello, your package has been delivered.

Delivery Date: Monday, 12/20/2021
Delivery Time: 11:35 AM
Left At: RECEIVER
Signed by: TYLEF

TRANSCEND WIRELESS

Tracking Number:	1ZV257424299067002
Ship To:	TOWN OF MANCHESTER-ZONING DEPT 41 CENTER STREET MANCHESTER, CT 06040 US
Number of Packages:	1
UPS Service:	UPS Ground
Package Weight:	1.8 LBS
Reference Number:	CTHA038A-CT03XC067

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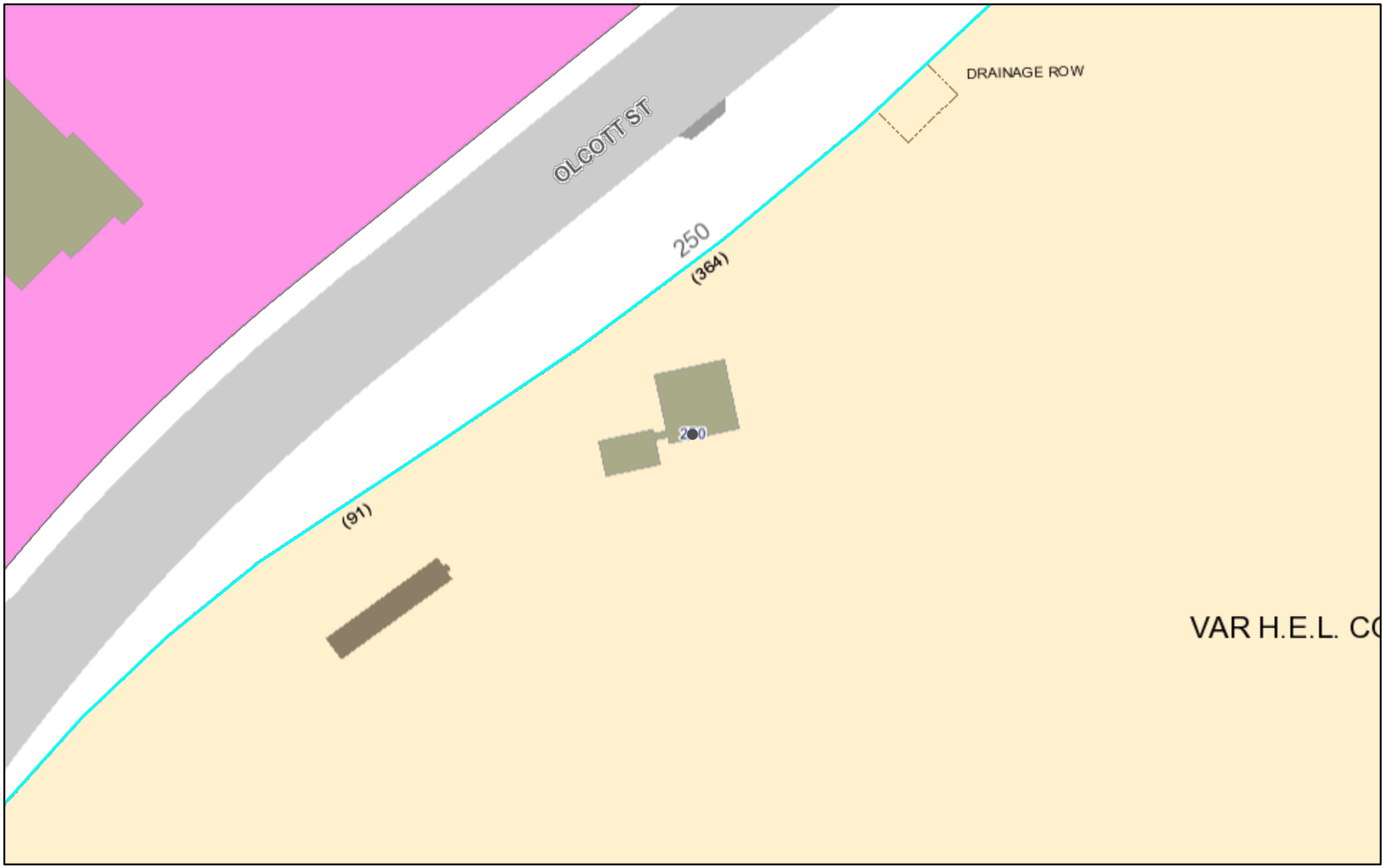
250 South Olcott Street, Manchester, CT



12/9/2021, 11:16:08 PM

Parcels

Plot Plans

Easement Lines

1:720

0 0.01 0.01 0.02 mi

0 0.01 0.01 0.03 km

Manchester GIS

250 OLCOTT STREET

Location	250 OLCOTT STREET	**Mblu**	33/ 4300/ 250/ /
Acct#	430000250	**Owner**	CONNECTICUT LIGHT & POWER CO
Assessment	$329,200	**Appraisal**	$470,300
PID	12560	**Building Count**	1
DISTRICT	T	**CONCRETE**	

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2021	$49,600	$420,700	$470,300
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2021	$34,700	$294,500	$329,200

Owner of Record

Owner	CONNECTICUT LIGHT & POWER CO	**Sale Price**	$0
Address	PO BOX 270 HARTFORD, CT 06141-0270	**Certificate**	C
		Book & Page	0422/0507
		Sale Date	
		Instrument	

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
CONNECTICUT LIGHT & POWER CO	$0	C	0422/0507		

Building Information

Building 1 : Section 1

Year Built: 1950
Living Area: 900
Replacement Cost: $49,320
Replacement Cost Less Depreciation: $27,100

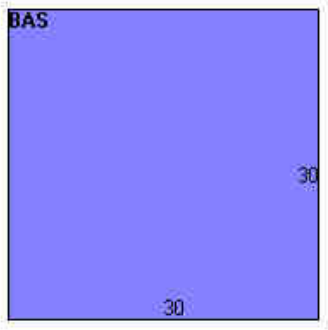
Building Attributes	
Field	**Description**
Style:	Light Indust
Model	Ind/Comm
Grade	Average
Stories:	1
Occupancy	1.00
Exterior Wall 1	Brick/Masonry
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Tar + Gravel
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Electric
Heating Type	Electr Basebrd
AC Type	None
Struct Class	

Building Photo

(http://images.vgsi.com/photos2/ManchesterCTPhotos//\00\03\84\38.jpg)

Bldg Use	Pub Util. 96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	400
Heat/AC	None
Frame Type	Steel
Baths/Plumbing	Average
Ceiling/Wall	Ceil & Min Wl
Rooms/Prtns	Average
Wall Height	12.00
% Comn Wall	0.00

Building Layout



(http://images.vgsi.com/photos2/ManchesterCTPhotos//Sketches/12560_1

Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	900	900
		900	900

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	400
Description	Pub Util. 96
Zone	IND
Neighborhood	3000
Alt Land Appr	No

Land Line Valuation

Size (Acres)	30.4
Frontage	0
Depth	0
Assessed Value	$294,500
Appraised Value	$420,700

Category

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
SHD2	Shed W/Imp			900.00 S.F.	$9,900	1
FN3	Fence 6' Chain			600.00 L.F.	$6,900	1
PAV1	Paving Asphalt			1000.00 S.F.	$1,300	1
SHD2	Shed W/Imp			160.00 S.F.	$1,800	1
SHD2	Shed W/Imp			240.00 S.F.	$2,600	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2020	$51,200	$420,700	$471,900
2015	$52,700	$420,700	$473,400
2010	$56,000	$426,300	$482,300

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2020	$35,800	$294,500	$330,300
2015	$36,900	$294,500	$331,400
2010	$39,100	$298,400	$337,500

Steven Florio
Telecom Engineering
Construction Manager

107 Selden St
Berlin, CT 06037
Office: (860) 728-5611
Steven Florio@Eversource.com

Mr. DePinto
Transcend Wireless, LLC.
10 Industrial Ave. Suite 3
Mahwah, New Jersey, 07430

December 14,2021

RE: Letter of Authorization

Project: Sprint/ T-Mobile Site # CTHA38A
250 Olcott Street
Manchester, CT. 06040

Owner: Eversource Energy

Dear Mr. DePinto,

Eversource Energy, owner of the tower facility located at the address identified above, do hereby authorize Sprint/ T-Mobile, and/ or it's agent to use this authorization letter for the sole purpose of filing and consummating any land-use or building permit application(s) as may be required by the applicable permitting authorities for the Licensee's telecommunication's installation.

Sincerely,
Steven J. Florio

Steven J. Florio
Eversource Energy

REF: CENTEK Engineering, LLC.
Project # 21005.36
Structural Analysis REV.1, Dated 10/12/2021

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

July 20, 2018

Kathleen M. Shanley
Manager-Transmission Siting
Eversource Energy
P.O. Box 270
Hartford, CT 06141-0270

RE: **PETITION NO. 1346** - The Connecticut Light and Power Company d/b/a Eversource Energy petition for a declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the proposed replacement and relocation of an existing telecommunications facility and an existing relay and control enclosure located at Manchester Substation, 250 Olcott Street, Manchester, Connecticut, and related substation improvements.

Dear Ms. Shanley:

At a public meeting held on July 19, 2018, the Connecticut Siting Council (Council) considered and ruled that the above-referenced proposal would not have a substantial adverse environmental effect, and pursuant to Connecticut General Statutes § 16-50k, would not require a Certificate of Environmental Compatibility and Public Need, with the following conditions:

1. Approval of any minor project changes be delegated to Council staff;

2. Unless otherwise approved by the Council, if the facility authorized herein is not fully constructed within three years from the date of the mailing of the Council's decision, this decision shall be void, and the facility owner/operator shall dismantle the facility and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made. The time between the filing and resolution of any appeals of the Council's decision shall not be counted in calculating this deadline. Authority to monitor and modify this schedule, as necessary, is delegated to the Executive Director. The facility owner/operator shall provide written notice to the Executive Director of any schedule changes as soon as is practicable;

3. Any request for extension of the time period to fully construct the facility shall be filed with the Council not later than 60 days prior to the expiration date of this decision and shall be served on all parties and intervenors, if applicable, and the Town of Manchester;

4. Unless otherwise approved by the Council, the existing tower shall be removed within 180 days of the installation of the new self-supporting lattice tower;

5. The Council shall be notified in writing within 45 days of when the existing tower is removed and the new self-supporting lattice tower is operational unless a written request for an extension is submitted to the Council within that timeframe;

6. Within 45 days after completion of construction of the control enclosure, the Council shall be notified in writing that construction has been completed;

7. The facility owner/operator shall remit timely payments associated with annual assessments and invoices submitted by the Council for expenses attributable to the facility under Conn. Gen. Stat. §16-50v;

8. This Declaratory Ruling may be transferred, provided the facility owner/operator/transferor is current with payments to the Council for annual assessments and invoices under Conn. Gen. Stat. §16-50v and the transferee provides written confirmation that the transferee agrees to comply with the terms, limitations and conditions contained in the Declaratory Ruling, including timely payments to the Council for annual assessments and invoices under Conn. Gen. Stat. §16-50v; and

9. If the facility owner/operator is a wholly owned subsidiary of a corporation or other entity and is sold/transferred to another corporation or other entity, the Council shall be notified of such sale and/or transfer and of any change in contact information for the individual or representative responsible for management and operations of the facility within 30 days of the sale and/or transfer.

This decision is under the exclusive jurisdiction of the Council and is not applicable to any other modification or construction. All work is to be implemented as specified in the petition dated June 1, 2018 and additional information received on June 7, 2018, July 9, 2018 and July 10, 2018.

Enclosed for your information is a copy of the staff report on this project.

Sincerely,

Robert Stein

Robert Stein
Chairman

RS/MP/lm

Enclosure: Staff Report dated July 19, 2018

c: The Honorable Jay Moran, Mayor, Town of Manchester
Scott A. Shanley, General Manager, Town of Manchester
James Davis, Zoning Enforcement Officer, Town of Manchester

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

Petition No. 1346
Eversource
Manchester Substation, Manchester, Connecticut
Staff Report
July 19, 2018

Introduction

On June 1, 2018, The Connecticut Light and Power Company d/b/a Eversource Energy (Eversource) submitted a petition to the Connecticut Siting Council (Council) for a declaratory ruling pursuant to Connecticut General Statutes (CGS) §4-176 and §16-50k for the proposed replacement and relocation of an existing telecommunications facility and an existing relay and control enclosure and related substation improvements at Manchester Substation, 250 Olcott Street, Manchester, Connecticut.

Council member Daniel P. Lynch, Jr. and Council staff member Michael Perrone conducted a field review of the proposed project on June 19, 2018. Paul Melzen, Substation Engineer, Eversource; Steven Florio, Construction Manager, Eversource; Ryan Ericson, Telecom Engineer, Eversource; Matthew LeClair, Substation Engineer, Eversource; Shodan Patel, Project Manager, Eversource; Susan Bellion, Project Siting Specialist, Eversource; Ian Cole, Environmental, Eversource; and Kyle Shiel, Senior Planner, Town of Manchester Planning Department also attended the field review.

Eversource met with the Town of Manchester officials in February 2018. Notice of the Petition was provided to the Town of Manchester and abutting property owners on or about May 30, 2018. To date, the Council has not received any comments regarding the Petition filing.

The Council issued interrogatories to Eversource on June 22, 2018 and July 2, 2018. Eversource submitted responses to Council interrogatories on July 9, 2018 and July 10, 2018, respectively.

On June 21, 2018, pursuant to CGS §4-176(e) of the Uniform Administrative Procedure Act (UAPA), which requires an administrative agency to take action on a petition within 60 days of receipt, the Council voted to set the date by which to render a decision on the above-referenced petition by November 28, 2018. November 28, 2018, is the statutorily-mandated 180-day decision deadline for this petition under CGS §4-176(i).

Proposed Project

Manchester Substation is located on a 30.4-acre parcel surrounded by a mix of municipal, commercial and industrial facilities including the Town of Manchester Landfill, Transfer Station, and Sewage Treatment Plant located north of the subject property and residential areas located to the east and southwest. The nearest residence is located off of Olcott Street West, approximately 540 feet southwest of the proposed replacement tower compound.

Eversource would remove an existing communications tower and existing 345-kV relay and control enclosure from the center of the substation and replace them with a new communications tower and new 115-kV/345-kV relay and control enclosure to the west of the current positions. The proposed replacement tower would be located outside of the substation fence line, and the replacement enclosure would be located within an expanded area of the substation.

The replacement tower and replacement control enclosure project is being proposed to allow for future upgrades and newer telecommunications technologies to be installed at the site. It would provide future capacity for Eversource, municipal and emergency communications and commercial wireless service providers. The control enclosure portion of the project is identified in Eversource's 2018 Forecast of Loads and Resources dated March 1, 2018 and in the June 2018 ISO-New England Regional System Plan Asset Condition Update as the proposed "Manchester Control House Expansion" with an estimated in-service date of 2019.

Tower Replacement

The existing tower is an approximately 200-foot self-supporting lattice tower located inside the fenced substation. It is 30 feet wide at the base, and it tapers to 8-feet 6-inches wide at the top. The existing tower contains antennas of multiple entities including, but not limited to, Eversource, Hartford Ops/Meter & Service, Talcott Microwave, DSCADA, EDACS/Voice Radio, Bolton Microwave, Sprint[1], Yankee Gas, and Hartford Underground.

The proposed replacement tower would be a 180-foot self-supporting lattice tower. It would be 23 feet wide at the base and tapering to 5-feet wide at the top. It would be located approximately 435 feet to the west of the existing tower location (and outside of the fenced substation). The proposed (and future) antenna inventory is listed below.

Antenna Type[1]	Antenna Make/Model or Capacity[2]	Antenna Center Line Elevation (ft. AGL)	Comments	Frequency (MHz)
14-ft. Omni	(1) Kreco CO-41-AN	±187.0	Hartford Ops / Meter & Service	RX: 49.02
19.2-ft. Dual Omni w/TTA	(1) dbSpectra DS9A09F36D-N (1) Bird 430-94C-09168-M-110_48	±189.4	DSCADA	TX: 936.95 & 938.95 RX: 897.95 & 899.95
23.3-ft. Dual Omni	(1) Sinclair SC351D-HF2LDF(D00-G6)	±187.3	EDACS / Voice Radio	TX: 451.675 RX: 456.675
8' Dish w/ Radome	(1) RFS PADX8-W59AC	±175.0	Bolton Microwave	TX: 6093.45 RX: 6345.49
8' Dish w/ Radome	(1) RFS PADX8-W59AC	±175.0	Talcott Microwave	TX: 6004.50 RX: 6256.54
8' Dish w/ Radome	(1) RFS PADX8-W59AC	±175.0	Future Eversource	NA - Future Dish
8' Dish w/ Radome	(1) RFS PADX8-W59AC	±164.0	Future Eversource	NA - Future Dish
23.3-ft. Dual Omni	(1) Sinclair SC351D-HF2LDF(D00-G6)	±156.4	Future Eversource	NA - Future Antenna
10-ft Dipole	(1) Sinclair SD212-SF2P2SNF(D00)	±163.0	Yankee Gas	TX & RX: 173.39625
15.75-ft Dipole	(1) Comprod 531-70HD*8	±158.1	Hartford Underground	TX & RX: 47.90
Wireless Carrier	(12) Panel Antennas (8'x1'), (12) RRHs, (3) MDB	±135.0	Future Carrier	TBD
Wireless Carrier	(12) Panel Antennas (8'x1'), (12) RRHs, (3) MDB	±125.0	Future Carrier	TBD
Wireless Carrier	(12) Panel Antennas (8'x1'), (12) RRHs, (3) MDB	±115.0	Future Carrier	TBD
Wireless Carrier	(12) Panel Antennas (8'x1'), (12) RRHs, (3) MDB	±105.0	Future Carrier	TBD

[1] Sprint PCS is the only commercial wireless telecommunications carrier on the existing tower. The relocation of Sprint onto the replacement tower would require a separate filing with the Council for review and approval. Thus, it is not yet known which height Sprint would co-locate at on the replacement tower in the future.

The total height with appurtenances would be approximately 199 feet, i.e. the tops of the 19.2-foot and 23.3-foot omni antennas would reach a maximum height of approximately 199 feet.

A Professional Engineer duly licensed in the State of Connecticut has certified that the proposed replacement tower is structurally adequate to support the proposed (and future) loading as identified above. Specifically, the proposed replacement tower is designed support all existing entities and a total of four future wireless carriers (i.e. Sprint plus three other carriers).

Once the replacement tower is constructed and operational, the existing tower would be removed.

The proposed replacement tower radius would remain within the boundaries of the subject property.

An existing fenced laydown area located to the west of the substation (but still on the subject property) would be removed to accommodate the proposed approximately 69-foot 9-inch by 94-foot 4-inch tower compound. The proposed compound fence would be eight feet tall anti-climb mesh fence with three strands of barbed wire on top that would add approximately one foot of additional height. Eversource would install a 10-foot by 20-foot equipment shelter inside the proposed tower compound.

A new electrical power supply for the proposed replacement tower would be trenched underground from an existing Eversource utility pole (#3343), located approximately 217 feet to the west on Olcott Road to a new electrical service panel located just outside of the proposed compound. For backup power, Eversource's proposed 20-kW propane-fueled generator would be located on a 4-foot by 6-foot concrete pad within the proposed tower compound. Eversource's generator is sized for its needs only. Eversource's proposed 1,000-gallon propane tank would be located within the tower compound and would provide approximately five days of run time at 100-percent load.

Substation Modifications/Expansion

The proposed substation modifications would require the removal of the existing 11-foot by 16-foot control enclosure from the interior of the substation and the removal of approximately 400 feet of existing substation security fencing from the western side of the substation. These modifications would allow for an approximately 21,470 square foot expansion of the substation to the west to accommodate the new 150-foot by 32-foot replacement control enclosure.

New water and sewer lines would be run to the new control enclosure. The existing water and sewer lines that currently supply the 345-kV control enclosure would be removed from the substation and capped at a location just inside the substation fence line.

Additional substation modifications would include the replacement of three existing 115-kV oil-filled circuit breakers with new gas-insulated circuit breakers and the installation of two new station service transformers to feed the replacement enclosure.

The base of the substation expansion area would match the existing ground surface with gravel, and the final fence design of the proposed substation expansion area would match the fence design of the existing substation.

Environmental Effects and Mitigation Measures

The substation expansion area for the new control enclosure and new tower compound would require minimal grading. However, the proposed project would require soil removal for the new tower foundation excavation and fill to remediate below grade facilities and foundations. Approximately 460 cubic yards of material would be removed for the construction of the tower and compound. Approximately 5,200 cubic yards of material would be removed for the construction of the new control enclosure, below-grade facilities and the new security fence. The removal of the obsolete 345-kV control enclosure and existing below-grade facilities would require approximately 3,500 cubic yards of fill.

If the quality of the excavated material is acceptable, it would be reused on site. If soil cannot be reused on-site, it would be field sampled for characterization and disposed of at a pre-approved soil disposal facility in accordance with Eversource polices and state and federal regulations.

Approximately 12 conifers greater than six inches diameter and several small deciduous saplings would be removed for the expansion of the substation and replacement control enclosure. No additional tree removal is anticipated for construction, but if needed, areas to the north and south of the proposed substation modifications would be cleared and re-graded to allow for additional work/laydown areas. Specifically, a small scrub/shrub habitat block exists in the southwest corner of the site. This habitat block totals approximately 4.1 acres. If needed, a portion of this habitat block would be cleared and converted to additional work zone and gravel laydown areas to provide additional space for work zones. Due to the relatively small size of this area and the minor clearing proposed, the removal of portions of scrub/shrub habitat block would not be expected to result in a significant negative impact on any dependent wildlife populations.

The foundation design for the proposed station service transformers do not include measures for insulating oil containment because the oil volumes are not significant and do not trigger such requirement under 40 Code of Federal Regulations (CFR) 112. However, in accordance with Federal Spill Prevention Containment & Countermeasure (SPCC) rules under 40 CFR 112, there would be above-ground oil volume triggers that require spill plans and either engineered secondary containment or a strong response plan. Eversource notes that all of its substations are covered under a SPCC Multi Plan, which includes a strong contingency in the event of oil release.

The proposed replacement 115-kV circuit breakers would be gas-insulated using sulfur hexafluoride (SF_6); therefore, oil containment measures are not required.

The project would be located in an upland area and would not be expected to have a significant adverse impact on wetland resources or watercourses because such project area would be limited to areas within or immediately west of the substation footprint. Such wetland/watercourse resources are located east of the substation. An inspection to field delineate wetlands was conducted on February 14, 2018. One wetland area, consisting of a contributing unnamed intermittent watercourse and backwater wetlands/floodplains to the South Fork Hockanum River is located approximately 160 feet north of the existing control enclosure and approximately 356 feet east of the proposed substation fence expansion.

The proposed project is located within the Federal Emergency Management Agency (FEMA) unshaded Zone X, an area outside of the 100-year and 500-year flood zones.

The proposed project is not located with a Connecticut Department of Energy and Environmental Protection (DEEP) Aquifer Protection Area.

Eversource developed and submitted a Stormwater Pollution Control Plan (SWPCP) to DEEP to register under a *General Permit for the Discharge of Stormwater and Remediation Wastewaters from Construction Activities.*

Eversource would conform to its Best Management Practices Manual for Massachusetts and Connecticut, *2002 Connecticut Guidelines for Soil Erosion and Sediment Control,* and the *2004 Connecticut Stormwater Manual,* as applicable. No soil remediation would be required for this proposed project.

The proposed project is located about 0.4 mile outside of the shaded area of the DEEP Natural Diversity Database (NDDB) Map. Because such distance is greater than 0.25 mile, no consultation with DEEP regarding the NDDB is required.

Connecticut is within the range of the northern long-eared bat (NLEB), a federally-listed Threatened species and state-listed Endangered species. There are no known NLEB hibernacula within 0.25 mile of the project or known maternity roost trees within 150 feet of the proposed project area. The existing white pines slated for removal, originally planted as landscape evergreens, do not provide optimal NLEB roosting habitat. Thus, the proposed project is not likely to adversely affect the NLEB.

The proposed replacement tower would not be located near an Important Bird Area (IBA), as designated by the National Audubon Society. The nearest IBA to the proposed replacement tower site is Meshomasic State Forest Block in Manchester, located approximately 2.6 miles to the southeast. The proposed replacement tower would not be expected to adversely impact this IBA because of the distance.

The proposed replacement tower would comply with the United States Fish and Wildlife Service guidelines for minimizing the potential for telecommunications towers to impact bird species.

By letter dated March 26, 2018, the State Historic Preservation Office (SHPO) notes that the area possesses a low potential to contain intact archaeological resources[2]. SHPO also indicated that no historic properties would be affected by the proposed project.

The final fence design of the proposed substation expansion area would be visually consistent with the existing fence design of the substation. While the proposed replacement tower would be located closer to the nearest residence versus the existing tower, it would be 20 feet shorter than the existing tower, and it would be narrower in width.

Construction-related noise is exempt per DEEP noise regulations. Post-construction noise levels would not increase beyond the property boundaries. Therefore, noise emissions would be consistent with present day levels.

Aviation Safety

According to Eversource's TOWAIR analysis, notification to the Federal Aviation Administration is not required.

Magnetic Fields and Radio Frequency Power Density

Magnetic field levels at the property boundaries would not be materially affected by the proposed substation expansion.

The proposed replacement telecommunications facility would have a cumulative worst-case power density of 3.29 percent of the applicable limit using a -10 dB off-beam adjustment.

[2] SHPO incorrectly refers to the replacement tower height as 280 feet.

Construction Schedule

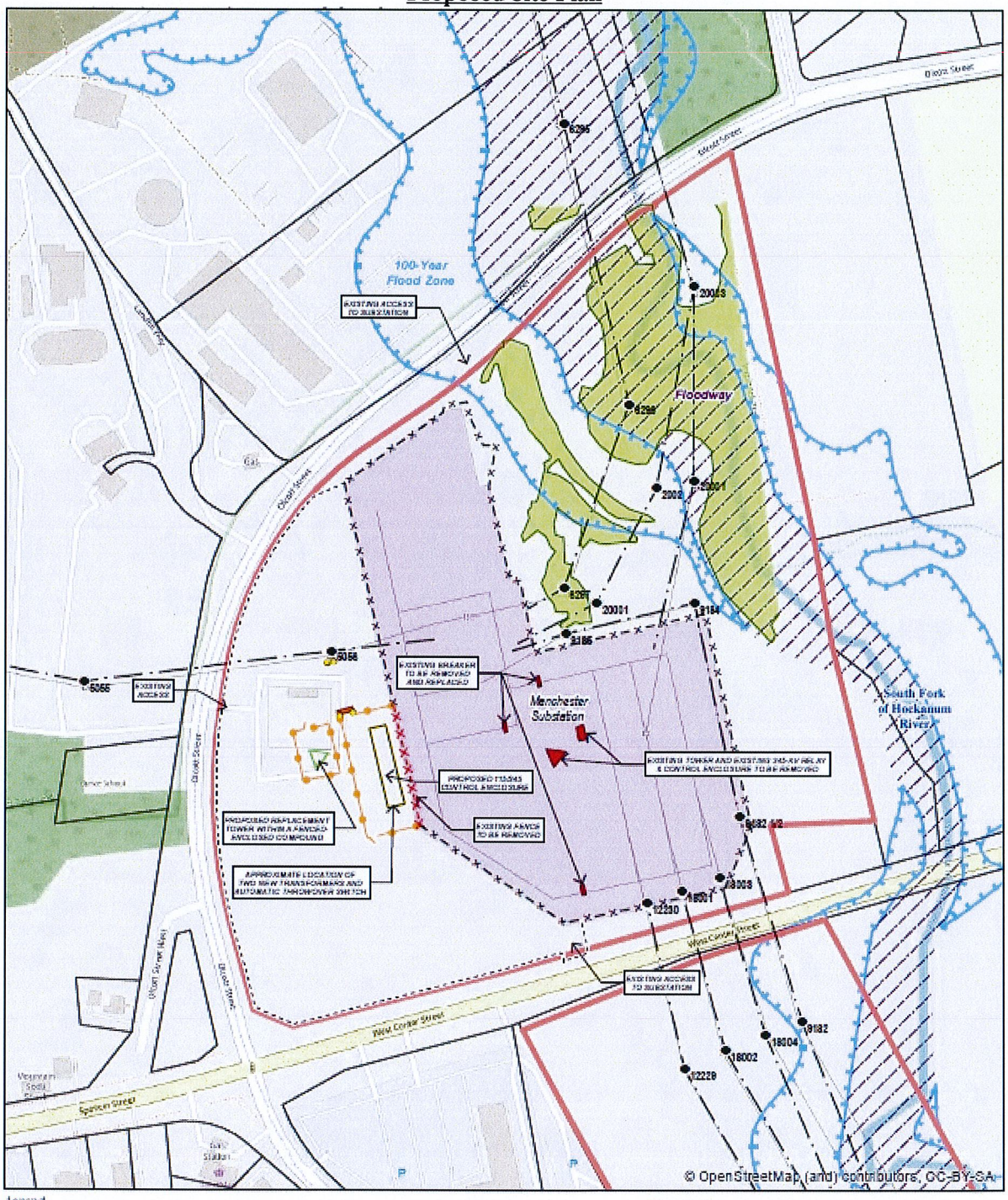
Eversource intends to begin construction in August 2018 and complete construction and restoration by the end of 2020. Removal of the existing tower and existing enclosure would be completed following the installation of the replacement facilities. In general, work hours would be from 7 AM to 7 PM Monday through Saturday. Eversource would submit a request to the Council in advance of the need for any non-standard work hours.

Staff Recommendations

Staff recommends the following:

1. Approval of any minor project changes be delegated to Council staff.

Proposed Site Plan



Legend

- Proposed Control Enclosure
- Replacement Tower
- Existing Fence
- Existing Fence to be Removed
- Proposed Fence
- Proposed Pedestrian Gate
- Strongarm Gate
- Limit of Work/Laydown Area
- Structures to be removed
- Bollard
- Transmission Tower
- Transmission Line
- Eversource Owned Property
- Approximate Parcel Boundary
- Watercourse (CTDEEP)
- Wetland Boundary
- Wetland Area
- FEMA 100-Year Flood Zone
- FEMA Floodway

Map Notes:
Base Map Source: ESRI Open Street Map
Map Scale: 1 inch = 250 feet
Map Date: May 2018

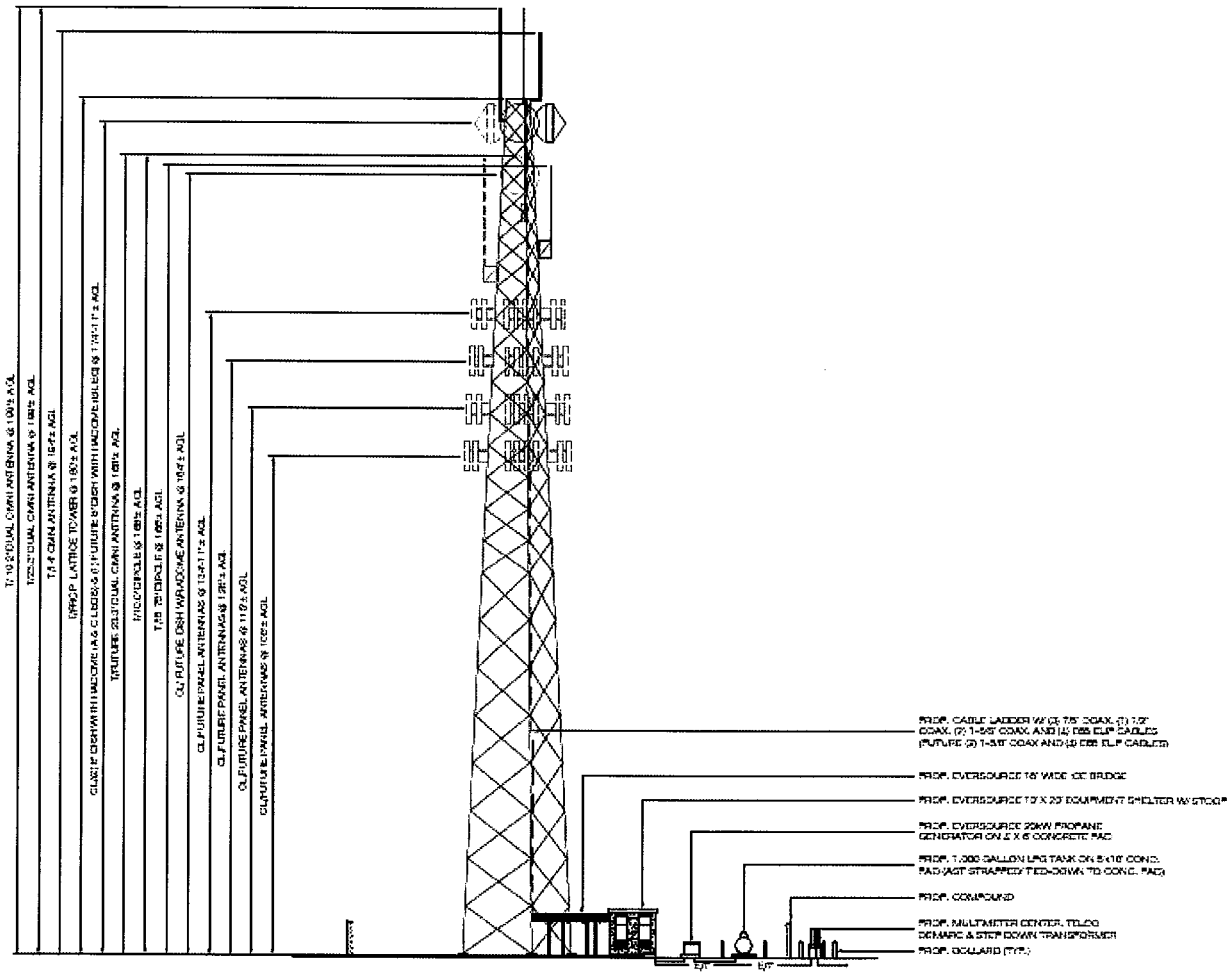
250 125 0 250 Feet

Figure 2
Site Schematic Map
Manchester 3A Substation Expansion and Replacement Communications Facility Project
250 Olcott Street
Manchester, Connecticut

EVERSOURCE ENERGY

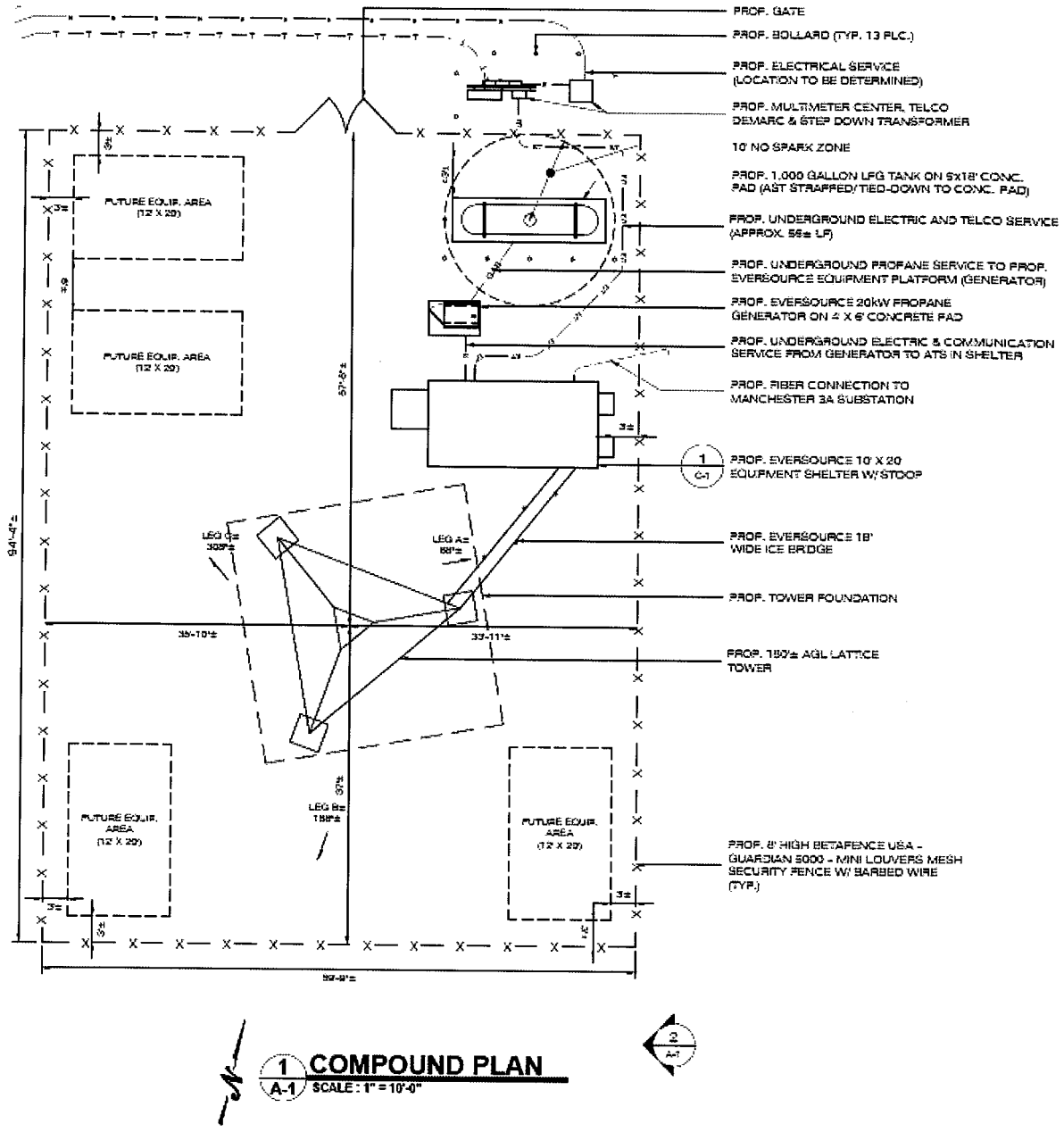
ALL POINTS TECHNOLOGY CORPORATION

Proposed Replacement Tower



2 EAST ELEVATION
A-1 SCALE: 1" = 16'-0"

Proposed Tower Compound



1 A-1 **COMPOUND PLAN**
SCALE : 1" = 10'-0"

SPRINT ID: CT03XC067
SITE ID: CTHA038A
250 SOUTH OLCOTT STREET
MANCHESTER, CT 06040

T-MOBILE A&L TEMPLATE (PROVIDED BY RFDS)
67E5998E_1xAIR+1OP+1QP

RAN TEMPLATE (PROVIDED BY RFDS)
67E5A998E 6160

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2017 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
12. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED' ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE T-MOBILE 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.
13. 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.
14. 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.
15. 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.
16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUITS AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
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18. 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. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
19. CONTRACTOR SHALL COMPLY WITH THE OWNER'S 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

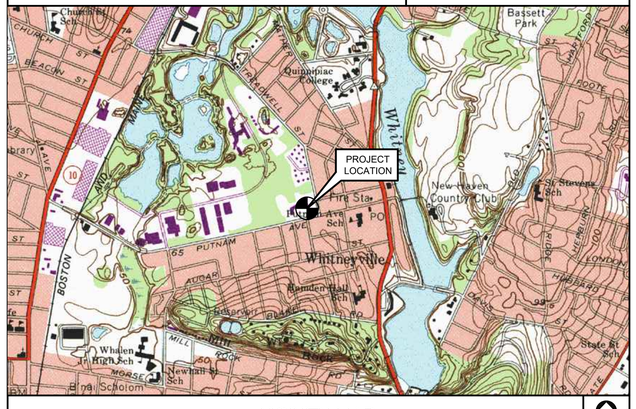
FROM: 35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

TO: 250 SOUTH OLCOTT ST
MANCHESTER, CT 06040

1.	HEAD NORTHEAST TOWARD GRIFFIN RD S	0.01 MI.
2.	TURN LEFT ONTO GRIFFIN RD S	0.02 MI.
3.	TURN RIGHT ONTO DAY HILL RD	3.60 MI.
4.	USE THE RIGHT LANE TO MERGE ONTO I-91 S VIA THE RAMP TO HARTFORD	0.50 MI.
5.	MERGE ONTO I-91 S	3.50 MI.
6.	TAKE EXIT 35A FOR I-291 TOWARD MANCHESTER	0.60 MI.
7.	CONTINUE ONTO I-291 E	5.60 MI.
8.	TAKE THE I-384 E EXIT	1.50 MI.
9.	KEEP RIGHT TO CONTINUE ON EXIT 1, FOLLOW SIGNS FOR SPENCER ST/SILVER LANE	0.40 MI.
10.	TURN LEFT ONTO STATE HWY 502/SPENCER ST	1.40 MI.
11.	TURN LEFT ONTO ADAMS ST S	0.20 MI.
12.	TURN RIGHT ONTO FLINT DR	0.01 MI.
13.	TURN LEFT	0.01 MI.
14.	TURN RIGHT, DESTINATION WILL BE ON THE LEFT	

SITE COORDINATES: LATITUDE: 41°-46'-11.00" N
LONGITUDE: 72°-33'-32.00" W
GROUND ELEVATION: 93'± AMSL

COORDINATES AND GROUND ELEVATION ARE REFERENCED FROM GOOGLE EARTH



VICINITY MAP — NORTH

PROJECT SUMMARY

THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:

1. REMOVE EXISTING SPRINT EQUIPMENT
2. INSTALL T-MOBILE POWER ENCLOSURE 6160
3. INSTALL T-MOBILE BATTERY CABINET B160
4. INSTALL (1) RADIO 4480 B71+B85 PER SECTOR. TOTAL (3)
5. INSTALL (1) RADIO 4460 B25+B66 PER SECTOR. TOTAL (3)
6. INSTALL (1) ERICSSON AIR 6449 B41 ANTENNA PER SECTOR. TOTAL (3)
7. INSTALL (1) RFS APXVAALL24_43-U-NA20 ANTENNA PER SECTOR. TOTAL (3)
8. INSTALL 150A CIRCUIT BREAKER TO SERVE NEW EQUIPMENT

PROJECT INFORMATION

SPRINT ID:	CT03XC067
SITE ID:	CTHA038A
SITE ADDRESS:	250 SOUTH OLCOTT ST MANCHESTER, CT 06040
APPLICANT:	T-MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
CONTACT PERSON:	KYLE RICHERS TRANSCEND WIRELESS, LLC (908) 447-4716
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405 CARLO F. CENTORE, PE (203) 488-0580 EXT. 122
PROJECT COORDINATES:	LATITUDE: 41°-46'-11.00" N LONGITUDE: 72°-33'-32.00" W GROUND ELEVATION: 93'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/07/21	ANC	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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

T-MOBILE NORTHEAST LLC
SPRINT ID: CT03XC067
SITE ID: CTHA038A
250 SOUTH WOLCOTT STREET
MANCHESTER, CT 06040

DATE: 09/08/21
SCALE: AS NOTED
JOB NO. 21005.36

TITLE SHEET

T-1

Sheet No. 1 of 9

NOTES AND SPECIFICATIONS

DESIGN BASIS:

GOVERNING CODE: 2015 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2018 CONNECTICUT STATE BUILDING CODE.

1. DESIGN CRITERIA:

- RISK CATEGORY II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED: 97 MPH (Vasd)
  (EXPOSURE B/ IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10).

SITE NOTES

1. THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.
2. ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.
4. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
5. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

GENERAL NOTES

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19. THE COUNTY/CITY/TOWN WILL MAKE PERIODIC FIELD OBSERVATION AND INSPECTIONS TO MONITOR THE INSTALLATION, MATERIALS, WORKMANSHIP AND EQUIPMENT INCORPORATED INTO THE PROJECT TO ENSURE COMPLIANCE WITH THE DESIGN PLANS, SPECIFICATIONS, CONTRACT DOCUMENTS AND APPROVED SHOP DRAWINGS.
20. THE COUNTY/CITY/TOWN MUST BE NOTIFIED (2) WORKING DAYS PRIOR TO CONCEALMENT/BURIAL OF ANY SYSTEM OR MATERIAL THAT WILL PREVENT THE DIRECT INSPECTION OF MATERIALS, METHODS OR WORKMANSHIP. EXAMPLES OF THESE PROCESSES ARE BACKFILLING A GROUND RING OR TOWER FOUNDATION, POURING TOWER FOUNDATIONS, BURYING GROUND RODS, PLATES OR GRIDS, ETC. THE CONTRACTOR MAY PROCEED WITH THE SCHEDULED PROCESS (2) WORKING DAYS AFTER PROVIDING NOTICE UNLESS NOTIFIED OTHERWISE BY THE COUNTY/CITY/TOWN.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/07/21	ANC	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

Sprint · T-Mobile · Transcend Wireless

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T-MOBILE NORTHEAST LLC

SPRINT ID: CT03XC067
SITE ID: CTHA038A
250 SOUTH WOLCOTT STREET
MANCHESTER, CT 06040

DATE: 09/08/21
SCALE: AS NOTED
JOB NO. 21005.36

GENERAL NOTES AND SPECIFICATIONS

N-1

NOTE:
ALL COAX LENGTHS TO BE MEASURED
AND VERIFIED IN FIELD BEFORE ORDERING

ANTENNA SCHEDULE

SECTOR	EXISTING/PROPOSED	ANTENNA	SIZE (INCHES) (L x W x D)	ANTENNA ℄ HEIGHT	AZIMUTH	(E/P) RRU (QTY)	(E/P) TMA (QTY)	(QTY) PROPOSED COAX (LENGTH)
A1	PROPOSED	RFS–APXVAALL24_43–U–NA20	95.9 x 24 x 8.5	135'	0°	(P) RADIO 4480 B71+B85 (1), (P) RADIO 4460 B25+B66 (1)		(1) 6/24 4AWG HYBRID CABLE (±185')
A2	PROPOSED	ERICSSON–AIR6449 B41	33.1 x 20.6 x 8.6	135'	0°			
B1	PROPOSED	RFS–APXVAALL24_43–U–NA20	95.9 x 24 x 8.5	135'	120°	(P) RADIO 4480 B71+B85 (1), (P) RADIO 4460 B25+B66 (1)		(1) 6/24 4AWG HYBRID CABLE (±185)
B2	PROPOSED	ERICSSON–AIR6449 B41	33.1 x 20.6 x 8.6	135'	120°			
C1	PROPOSED	RFS–APXVAALL24_43–U–NA20	95.9 x 24 x 8.5	135'	240°	(P) RADIO 4480 B71+B85 (1), (P) RADIO 4460 B25+B66 (1)		(1) 6/24 4AWG HYBRID CABLE (±185')
C2	PROPOSED	ERICSSON–AIR6449 B41	33.1 x 20.6 x 8.6	135'	240°			

1 / C–1 **SITE LOCATION PLAN** — SCALE: NOT TO SCALE — TRUE NORTH

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/07/21	ANC	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

Sprint T-Mobile Transcend Wireless

CENTEK engineering
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(203) 488-0580
(203) 488-8587 Fax
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SPRINT ID: CT03XC067
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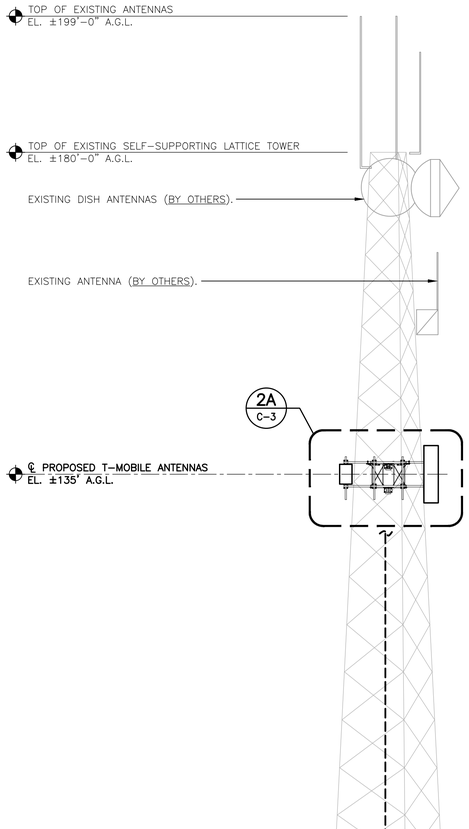
250 SOUTH WOLCOTT STREET
MANCHESTER, CT 06040

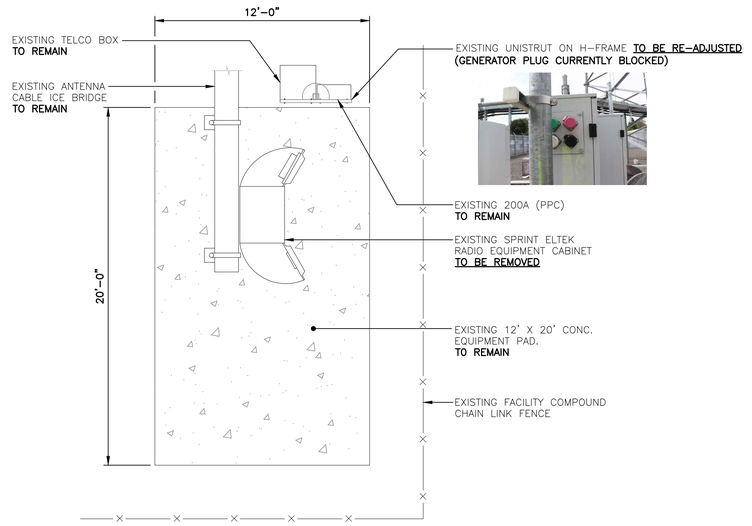
DATE: 09/08/21
SCALE: AS NOTED
JOB NO. 21005.36

SITE LOCATION PLANS

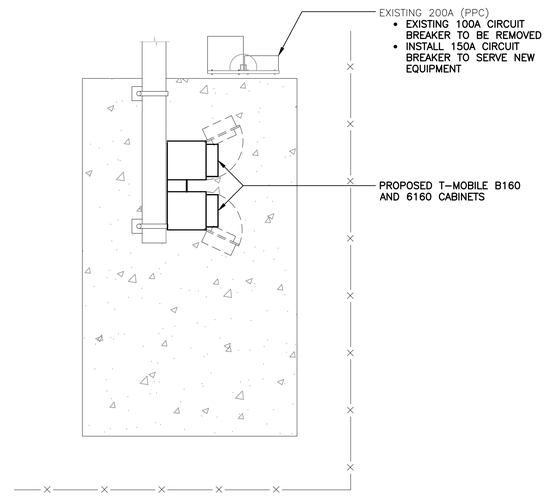
C–1

Sheet No. 3 of 9





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



3A C-2 **EQUIPMENT PLAN - PROPOSED**
SCALE: 1/4" = 1'-0"

STRUCTURAL COMPLIANCE

ANTENNA MOUNTS

A STRUCTURAL ANALYSIS OF THE ANTENNA MOUNTS WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING..

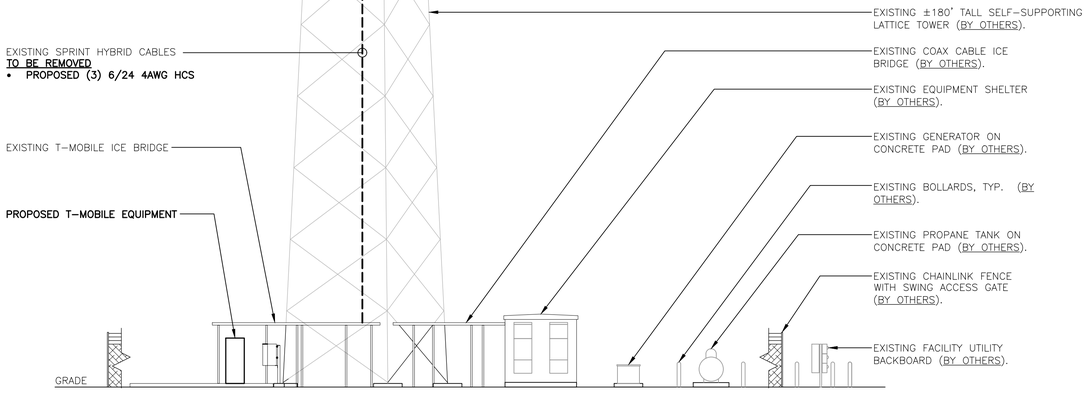
REFER TO THE ANTENNA MOUNT ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 21005.36) DATED 09/03/21 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

TOWER AND TOWER FOUNDATION

A STRUCTURAL ANALYSIS OF THE TOWER AND TOWER FOUNDATION WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING.

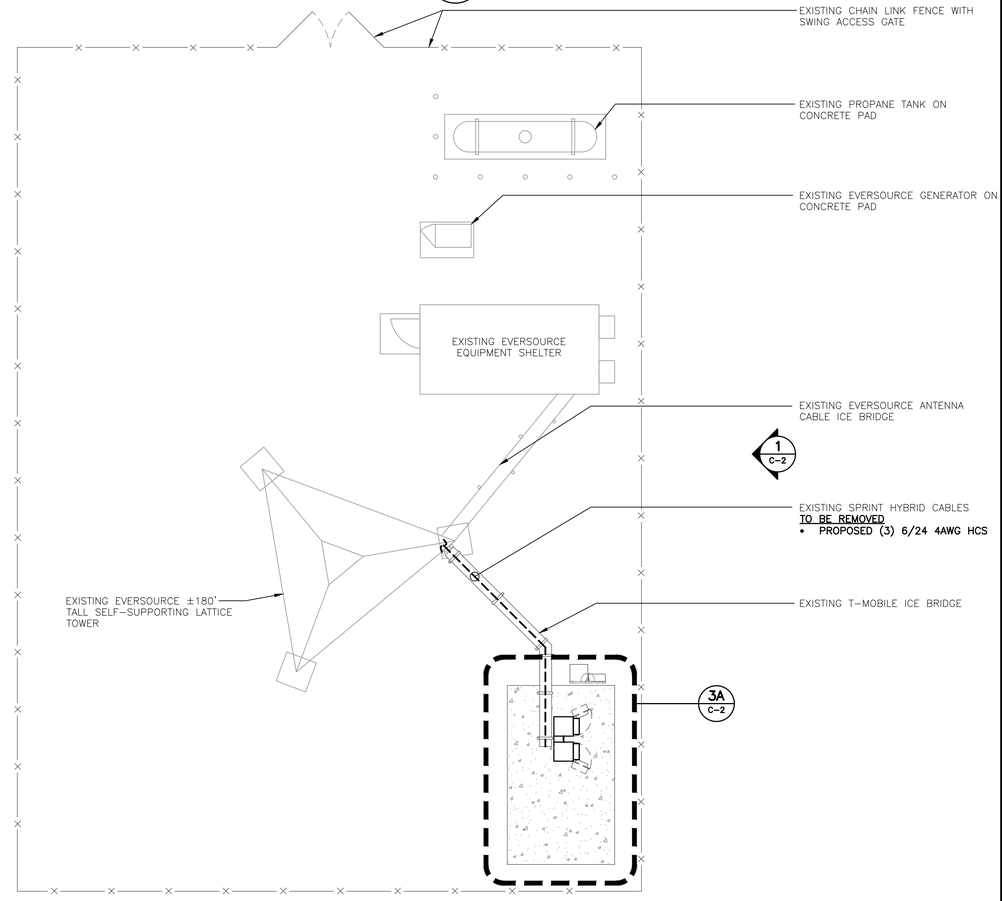
REFER TO THE STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 21005.36) DATED 09/13/21 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

NOTE: NO EQUIPMENT SHALL BE INSTALLED ON THE HOSTING STRUCTURE WITHOUT A PASSING STRUCTURAL ANALYSIS REPORT AND CONTRACTOR PRIOR CONFIRMATION THAT ANY AND ALL REQUISITE MODIFICATIONS HAVE BEEN COMPLETED.



1 C-2 **TOWER ELEVATION**
SCALE: 1" = 10'-0"

GRAPHIC SCALE
10 0 5 10 20 40
(IN FEET)
1 inch = 10 ft.



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

TRUE NORTH

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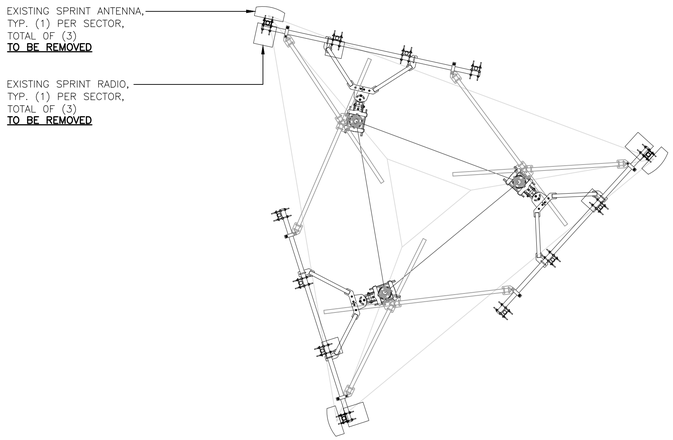
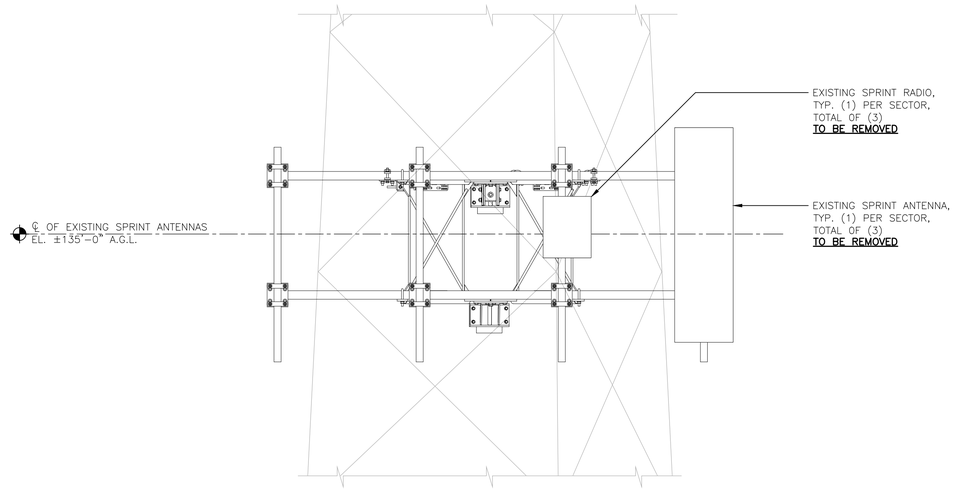
COMPOUND PLAN, ELEVATION, AND EQUIPMENT PLANS

C-2

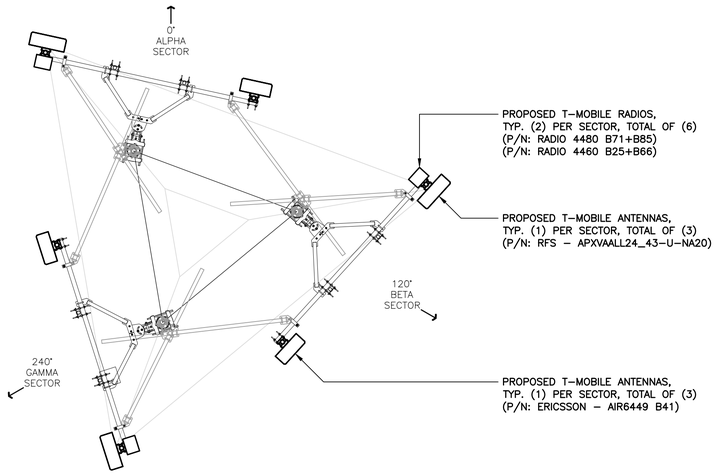
Sheet No. 4 of 9



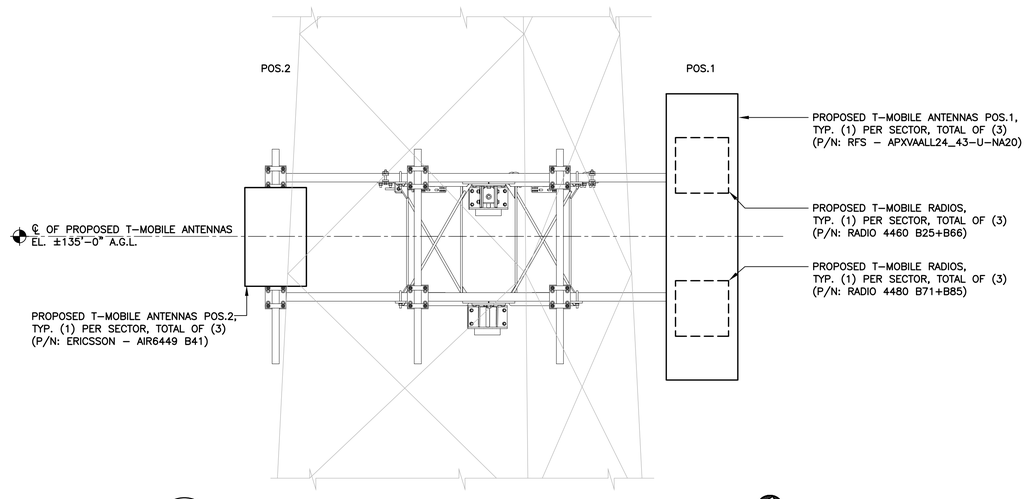
1 / C-3 **ANTENNA MOUNTING CONFIGURATION PLAN - EXISTING**
SCALE: 1/8" = 1'-0"
TRUE NORTH



1A / C-3 **ANTENNA MOUNTING CONFIGURATION PLAN - PROPOSED**
SCALE: 1/2" = 1'-0"
TRUE NORTH



2 / C-3 **ANTENNA MOUNTING CONFIGURATION PLAN - PROPOSED**
SCALE: 1/4" = 1'-0"
TRUE NORTH



2A / C-3 **ANTENNA MOUNTING CONFIGURATION PLAN - PROPOSED**
SCALE: 1/2" = 1'-0"
TRUE NORTH

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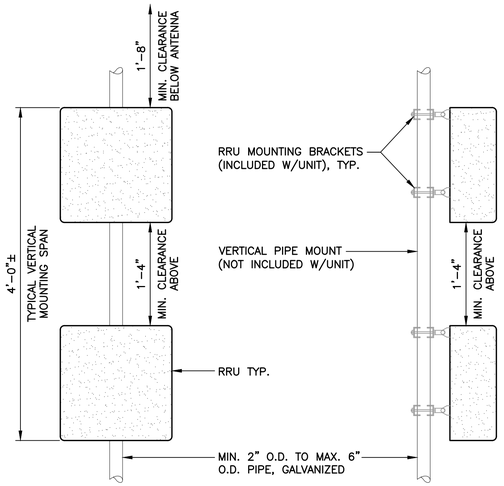
ANTENNA PLANS AND ELEVATIONS

C-3

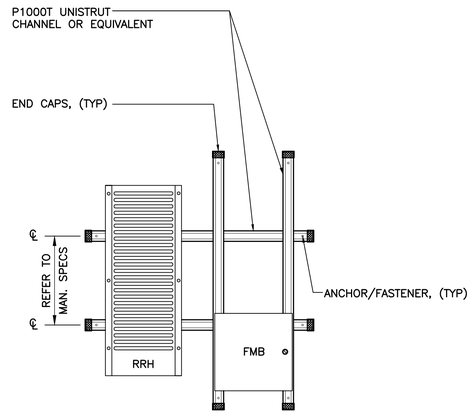
Sheet No. 5 of 9



FRONT ELEVATION SIDE ELEVATION

NOTES: (PIPE MOUNTING)

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



FRONT ELEVATION

NOTES: (UNISTRUT MOUNTING)

1. INSTALL A MINIMUM OF (2) ANCHORS PER UNISTRUT (± 16"o/c MIN).
2. MOUNT RRU TO UNISTRUT WITH 3/8"ø UNISTRUT BOLTING HARDWARE AND SPRING NUTS. TYPICAL FOUR PER BRACKET.
3. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

1 C-4 TYPICAL RRU MOUNTING DETAILS

SCALE: NOT TO SCALE

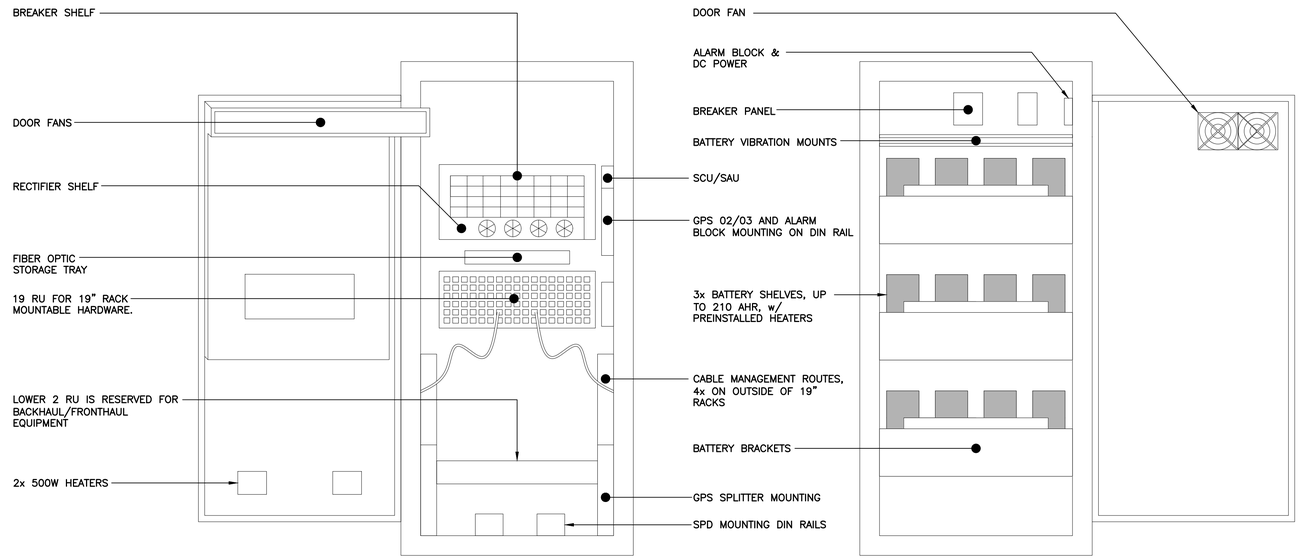
RADIO 4460 B25+B66

RADIO 4480 B71+B85

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RADIO 4460 B25+B66	19.6"L x 15.7"W x 12.1"D	±109 LBS.	BEHIND ANT.: 8" MIN. BELOW ANT.: 20" MIN. BELOW RRU: 16" MIN.
MAKE: ERICSSON MODEL: RADIO 4480 B71+B85	21.8"L x 15.7"W x 7.5"D	±84 LBS.	BEHIND ANT.: 8" MIN. BELOW ANT.: 20" MIN. BELOW RRU: 16" MIN.
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.			

2 C-4 PROPOSED RRU DETAIL

SCALE: NOT TO SCALE



EQUIPMENT CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: ENCLOSURE 6160 CABINET	62.0"H x 26.0"W x 26.0"D	±1200 LBS

3 C-4 ENCLOSURE 6160 CABINET DETAIL

SCALE: NOT TO SCALE

EQUIPMENT CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: BATTERY B160 CABINET	62.0"H x 26.0"W x 26.0"D	±1883 LBS

4 C-4 BATTERY B160 CABINET DETAIL

SCALE: NOT TO SCALE

SIDE

AIR6449 B41

APXVAALL24_43-U-NA20

ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: AIR6449 B41	33.1"L x 20.6"W x 8.6"D	±104 LBS.
MAKE: RFS MODEL: APXVAALL24_43-U-NA20	95.9"L x 24.0"W x 8.5"D	±150 LBS.
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.		

5 C-4 PROPOSED ANTENNA DETAIL

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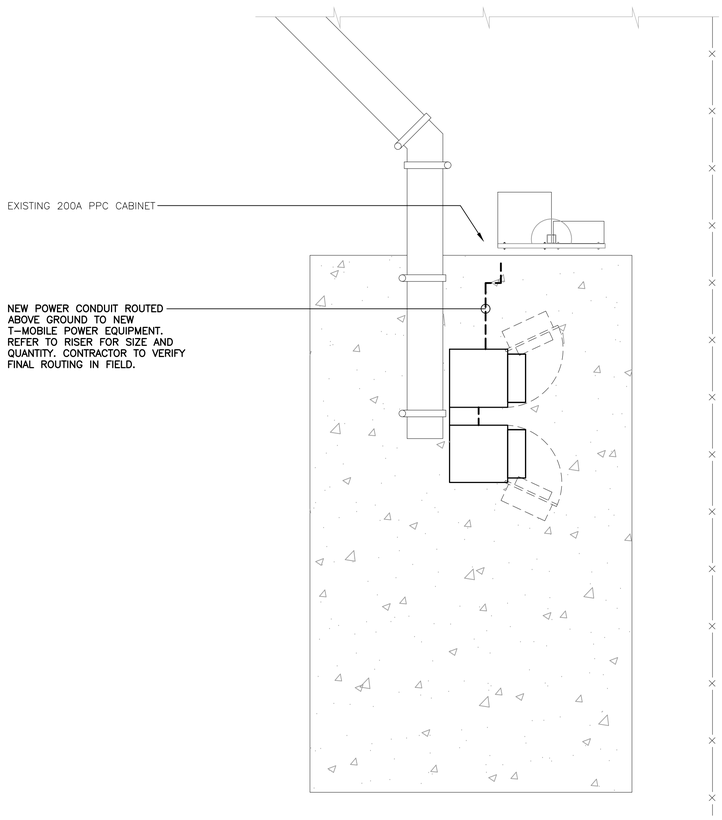
TYPICAL EQUIPMENT DETAILS

C-4

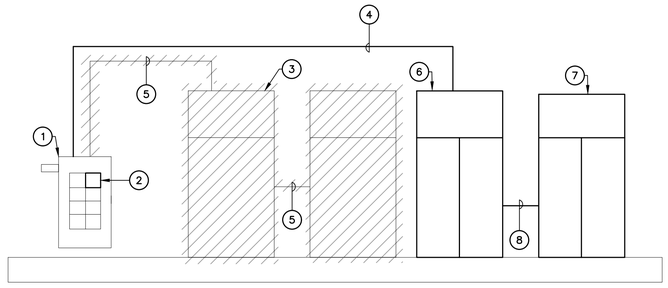
Sheet No. 6 of 9



1 / E-1 **ELECTRICAL CONDUIT ROUTING**
SCALE: NOT TO SCALE

RISER DIAGRAM NOTES

1. EXISTING 200A, PPC CABINET TO REMAIN.
2. NEW 150A/2P CIRCUIT BREAKER TO SERVE NEW EQUIPMENT CABINET.
3. EXISTING CABINETS TO BE REMOVED.
4. (3) 1/0 AWG, (1) #6 AWG GROUND, 1-1/2" CONDUIT.
5. EXISTING CONDUITS AND CONDUCTORS TO BE REMOVED.
6. NEW T-MOBILE EQUIPMENT CABINET
7. NEW T-MOBILE BATTERY CABINET
8. DC CONDUIT AND CONDUCTORS FOR BATTERY CABINET CONNECTION PER MANUFACTURERS SPECIFICATIONS.



2 / E-1 **ELECTRICAL POWER RISER DIAGRAM**
SCALE: NOT TO SCALE

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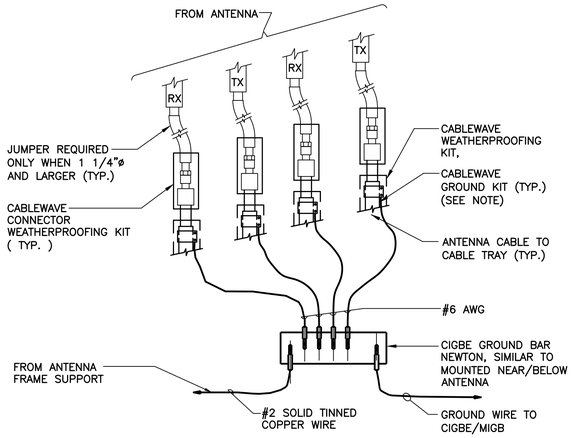
ELECTRICAL RISER DIAGRAM AND CONDUIT ROUTING

E-1

Sheet No. 7 of 9

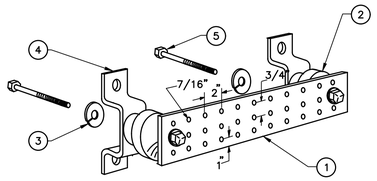


NOTES:

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

1 E-2 CONNECTION OF GROUND WIRES TO GROUND BAR

SCALE: NOT TO SCALE

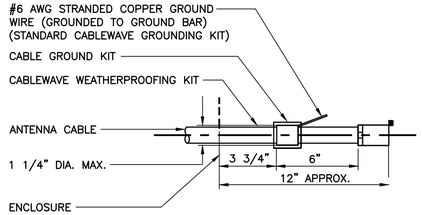


NOTES

1. TINNED COPPER GROUND BAR, 1/4" x 4" x 20", NEWTON INSTRUMENT CO. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION.
2. INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061–4.
3. 5/8" LOCK WASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015–8.
4. WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A–6056.
5. 5/8–11 x 1" STAINLESS STEEL TRUSS SPANNER MACHINE SCREWS.

2 E-2 GROUND BAR DETAIL

SCALE: NOT TO SCALE

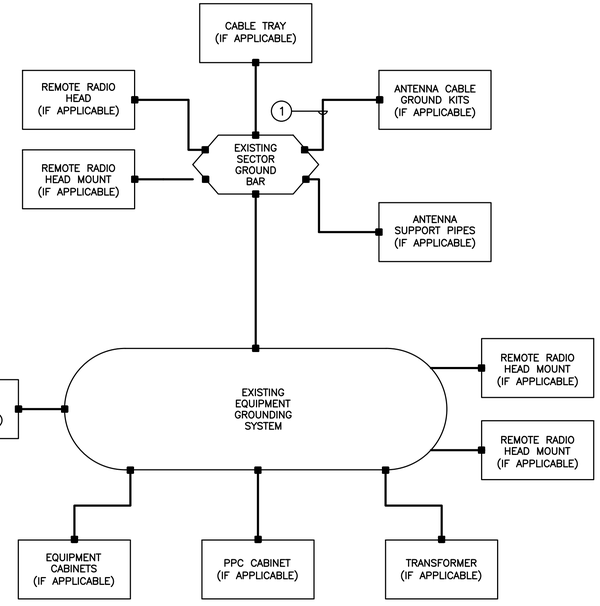


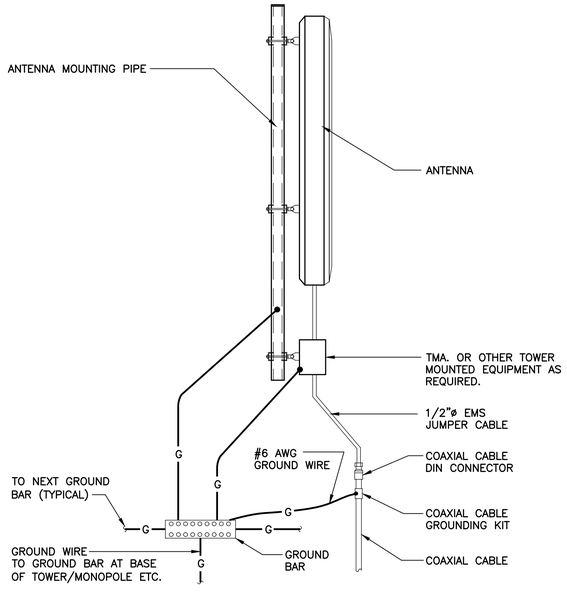
NOTES:

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

3 E-2 ANTENNA CABLE GROUNDING DETAIL

SCALE: NOT TO SCALE

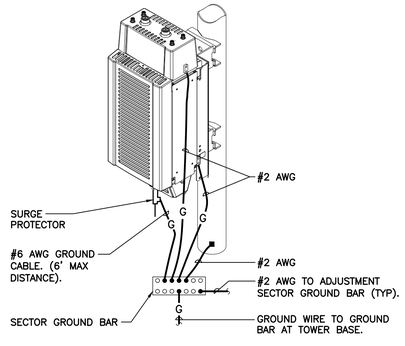




4 E-2 TYPICAL ANTENNA GROUNDING DETAIL

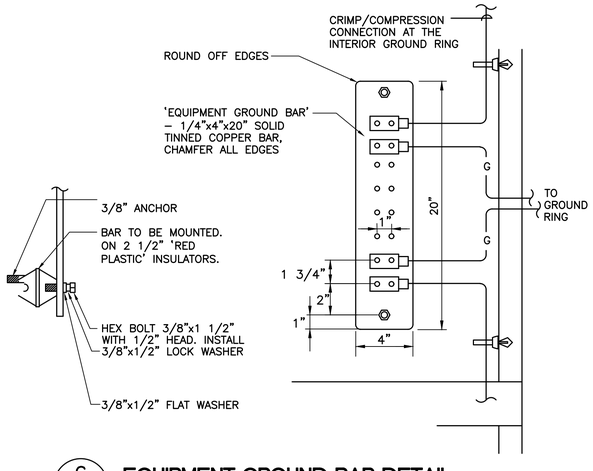
SCALE: NOT TO SCALE

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-2 RRH POLE MOUNT GROUNDING

SCALE: NOT TO SCALE



6 E-2 EQUIPMENT GROUND BAR DETAIL

SCALE: NOT TO SCALE

GROUNDING SCHEMATIC NOTES

(1) #6 AWG

GENERAL NOTES:

1. ALL SURGE SUPPRESSION EQUIPMENT SHALL BE BONDED TO GROUND PER MANUFACTURER'S SPECIFICATIONS
2. UNLESS OTHERWISE NOTED OR REQUIRED BY CODE, GROUND CONDUCTORS SHOWN SHALL BE #2 AWG (SOLID TINNED BCW – EXTERIOR; STRANDED GREEN INSULATED – INTERIOR).
3. BOND CABLE TRAY SECTIONS TOGETHER WITH #6 AWG STRANDED GREEN INSULATED JUMPERS.
4. ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.
5. BOND ALL EQUIPMENT CABINETS AND BATTERY CABINETS TO GROUND PER MANUFACTURER'S SPECIFICATIONS.
6. REFER TO ALL ELECTRICAL AND GROUNDING DETAILS.
7. COORDINATE ALL ROOF MOUNTED EQUIPMENT WITH OWNER.
8. ALL ROOF MOUNTED AMPLIFIERS AND ASSOCIATED EQUIPMENT SHALL BE BONDED TO THE SECTOR GROUND BAR PER MANUFACTURER'S SPECIFICATIONS.
9. ALL GROUNDING SHALL BE IN ACCORDANCE WITH NEC AND OWNER'S REQUIREMENTS.

7 E-2 ELECTRICAL SCHEMATIC DIAGRAM

SCALE: NOT TO SCALE

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TYPICAL ELECTRICAL DETAILS

E-2

Sheet No. 8 of 9

ELECTRICAL SPECIFICATIONS

SECTION 16010

1.01. SCOPE OF WORK

A. WORK SHALL INCLUDE ALL LABOR, EQUIPMENT AND SERVICES REQUIRED TO COMPLETE (MAKE READY FOR OPERATION) ALL THE ELECTRICAL WORK INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:

1. INSTALL 200A/3P CIRCUIT BREAKER WITH ASSOCIATED SUBMETER FOR OWNER'S EQUIPMENT
2. FEEDERS AND BRANCH CIRCUIT WIRING TO PANELS, RECEPTACLES, EQUIPMENT, LIGHTING FIXTURES, ETC. AS INDICATED OR NOTED ON PLANS.
3. FIELD MEASURE EXISTING ELECTRICAL SERVICES TO CONFIRM AVAILABLE EXISTING POWER.

1.02. GENERAL REQUIREMENTS

A. 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.

B. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR THE COMPLETE INSTALLATION AND COORDINATION OF THE ENTIRE ELECTRICAL SERVICE. ALL ACTIVITIES TO BE COORDINATED THROUGH OWNERS REPRESENTATIVE, DESIGN ENGINEER AND OTHER AUTHORITIES HAVING JURISDICTION OF TRADES.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES THAT MAY BE REQUIRED FOR THE ELECTRICAL WORK AND FOR THE SCHEDULING OF ALL INSPECTIONS THAT MAY BE REQUIRED BY THE LOCAL AUTHORITY.

D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE BUILDING OWNER FOR NEW AND/OR DEMOLITION WORK INVOLVED.

E. NO MATERIAL OTHER THAN THAT CONTAINED IN THE "LATEST LIST OF ELECTRICAL FITTINGS" APPROVED BY THE UNDERWRITERS' LABORATORIES, SHALL BE USED IN ANY PART OF THE WORK. ALL MATERIAL FOR WHICH LABEL SERVICE HAS BEEN ESTABLISHED SHALL BEAR THE U.L. LABEL.

F. 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.

G. 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.

H. THE ELECTRICAL CONTRACTOR SHALL SUPPLY THREE (3) COMPLETE SETS OF APPROVED DRAWINGS, ENGINEERING DATA SHEETS, MAINTENANCE AND OPERATING INSTRUCTION MANUALS FOR ALL SYSTEMS AND THEIR RESPECTIVE EQUIPMENT. THESE MANUALS SHALL BE INSERTED IN VINYL COVERED 3-RING BINDERS AND TURNED OVER TO OWNER'S REPRESENTATIVE ONE (1) WEEK PRIOR TO FINAL PUNCH LIST.

I. ALL WORK SHALL BE INSTALLED IN A NEAT AND WORKMAN LIKE MANNER AND WILL BE SUBJECT TO THE APPROVAL OF THE OWNER'S REPRESENTATIVE.

J. ALL EQUIPMENT AND MATERIALS TO BE INSTALLED SHALL BE NEW, UNLESS OTHERWISE NOTED.

K. BEFORE FINAL PAYMENT, THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF PRINTS (AS-BUILTS), LEGIBLY MARKED IN RED PENCIL TO SHOW ALL CHANGES FROM THE ORIGINAL PLANS.

L. PROVIDE TEMPORARY POWER AND LIGHTING IN WORK AREAS AS REQUIRED.

M. SHOP DRAWINGS:

1. CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF SHOP DRAWINGS ON ALL EQUIPMENT AND MATERIALS PROPOSED FOR USE ON THIS PROJECT, GIVING ALL DETAILS, WHICH INCLUDE DIMENSIONS, CAPACITIES, ETC.
2. CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF ALL TEST REPORTS CALLED FOR IN THE SPECIFICATIONS AND DRAWINGS.

N. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE IN ACCORDANCE WITH OWNER'S SPECIFICATIONS, AND REQUIREMENTS OF ALL LOCAL AUTHORITIES HAVING JURISDICTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH APPROPRIATE INDIVIDUALS TO OBTAIN ALL SUCH SPECIFICATIONS AND REQUIREMENTS. NOTHING CONTAINED IN, OR OMITTED FROM, THESE DOCUMENTS SHALL RELIEVE CONTRACTOR FROM THIS OBLIGATION.

SECTION 16111

1.01. CONDUITS

A. MINIMUM CONDUIT SIZE FOR BRANCH CIRCUITS, LOW VOLTAGE CONTROL AND ALARM CIRCUITS SHALL BE 3/4". CONDUITS SHALL BE PROPERLY FASTENED AS REQUIRED BY THE N.E.C.

B. THE INTERIOR OF RACEWAYS/ENCLOSURES INSTALLED UNDERGROUND SHALL BE CONSIDERED TO BE WET LOCATION, INSULATED CONDUCTORS SHALL BE LISTED FOR USE IN WET LOCATIONS. PROVIDE WEATHERPROOF CONSTRUCTION IN WET LOCATIONS.

C. CONDUIT INSTALLED UNDERGROUND SHALL BE INSTALLED TO MEET MINIMUM COVER REQUIREMENTS OF TABLE 300.5.

D. PROVIDE RIGID GALVANIZED STEEL CONDUIT (RMC) FOR THE FIRST 10 FOOT SECTION WHEN LEAVING A BUILDING OR SECTIONS PASSING THROUGH FLOOR SLABS

E. ONLY LISTED PVC CONDUIT AND FITTINGS ARE PERMITTED FOR THE INSTALLATION OF ELECTRICAL CONDUCTORS, SUITABLE FOR UNDERGROUND APPLICATIONS.

CONDUIT SCHEDULE SECTION 16111

CONDUIT TYPE	NEC REFERENCE	APPLICATION	MIN. BURIAL DEPTH (PER NEC TABLE 300.5) [2,3]
EMT	ARTICLE 358	INTERIOR CIRCUITING, EQUIPMENT ROOMS, SHELTERS	N/A
RMC, RIGID GALV. STEEL	ARTICLE 344, 300.5, 300.50	ALL INTERIOR/ EXTERIOR CIRCUITING, ALL UNDERGROUND INSTALLATIONS.	6 INCHES
PVC, SCHEDULE 40	ARTICLE 352, 300.5, 300.50	INTERIOR/ EXTERIOR CIRCUITING AND GROUNDING SYSTEMS, UNDERGROUND INSTALLATIONS, WHERE NOT SUBJECT TO PHYSICAL DAMAGE. [1]	18 INCHES
PVC, SCHEDULE 80	ARTICLE 352, 300.5, 300.50	INTERIOR/ EXTERIOR CIRCUITING AND GROUNDING SYSTEMS, UNDERGROUND INSTALLATIONS, WHERE SUBJECT TO PHYSICAL DAMAGE. [1]	18 INCHES
LIQUID TIGHT FLEX. METAL	ARTICLE 350	SHORT LENGTHS (MAX. 3FT.) WIRING TO VIBRATING EQUIPMENT IN WET LOCATIONS.	N/A
FLEX. METAL	ARTICLE 348	SHORT LENGTHS (MAX. 3FT.) WIRING TO VIBRATING EQUIPMENT IN WET LOCATIONS.	N/A

[1] PHYSICAL DAMAGE IS SUBJECT TO THE AUTHORITY HAVING JURISDICTION.

[2] UNDERGROUND CONDUIT INSTALLED UNDER ROADS, HIGHWAYS, DRIVEWAYS, PARKING LOTS SHALL HAVE MINIMUM DEPTH OF 24".

[3] WHERE SOLID ROCK PREVENTS COMPLIANCE WITH MINIMUM COVER DEPTHS, WIRING SHALL BE INSTALLED IN PERMITTED RACEWAY FOR DIRECT BURIAL. THE RACEWAY SHALL BE COVERED BY A MINIMUM OF 2" OF CONCRETE EXTENDING DOWN TO ROCK.

SECTION 16123

1.01. CONDUCTORS

A. 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:

	120/208/240V	277/480V
LINE	COLOR	COLOR
A	BLACK	BROWN
B	RED	ORANGE
C	BLUE	YELLOW
N	CONTINUOUS WHITE	GREY
G	CONTINUOUS GREEN	GREEN WITH YELLOW STRIPE

B. MINIMUM BENDING RADIUS FOR CONDUCTORS SHALL BE 12 TIMES THE LARGEST DIAMETER OF BRANCH CIRCUIT CONDUCTOR.

SECTION 16130

1.01. BOXES

A. FURNISH AND INSTALL OUTLET BOXES FOR ALL DEVICES, SWITCHES, RECEPTACLES, ETC.. BOXES TO BE ZINC COATED STEEL.

B. FURNISH AND INSTALL PULL BOXES IN MAIN FEEDERS RUNS WHERE REQUIRED. PULL BOXES SHALL BE GALVANIZED STEEL WITH SCREW REMOVABLE COVERS, SIZE AND QUANTITY AS REQUIRED. PROVIDE WEATHERPROOF CONSTRUCTION IN WET LOCATIONS.

SECTION 16140

1.01. WIRING DEVICES

A. THE FOLLOWING LIST IS PROVIDED TO CONVEY THE QUALITY AND RATING OF WIRING DEVICES WHICH ARE TO BE INSTALLED. A COMPLETE LIST OF ALL DEVICES MUST BE SUBMITTED BEFORE INSTALLATION FOR APPROVAL.

1. 15 MINUTE TIMER SWITCH – INTERMATIC #FF15M (INTERIOR LIGHTS)
2. DUPLEX RECEPTACLE – P&S #2095 (GFCI) SPECIFICATION GRADE
3. SINGLE POLE SWITCH – P&S #CSB20AC2 (20A-120V HARD USE) SPECIFICATION GRADE
4. DUPLEX RECEPTACLE – P&S #5362 (20A-120V HARD USE) SPECIFICATION GRADE

B. PLATES – ALL PLATES USED SHALL BE CORROSION RESISTANT TYPE 304 STAINLESS STEEL. PLATES SHALL BE FROM SAME MANUFACTURER AS SWITCHES AND RECEPTACLES. PROVIDE WEATHERPROOF HOUSING FOR DEVICES LOCATED IN WET LOCATIONS.

C. OTHER MANUFACTURERS OF THE SWITCHES, RECEPTACLES AND PLATES MAY BE SUBMITTED FOR APPROVAL BY THE ENGINEER.

SECTION 16170

1.01. DISCONNECT SWITCHES

A. FUSIBLE AND NON-FUSIBLE, 600V, HEAVY DUTY DISCONNECT SWITCHES SHALL BE AS MANUFACTURED BY SQUARE "D". PROVIDE FUSES AS CALLED FOR ON THE CONTRACT DRAWINGS. AMPERE RATING SHALL BE CONSISTENT WITH LOAD BEING SERVED. DISCONNECT SWITCH COVER SHALL BE MECHANICALLY INTERLOCKED TO PREVENT COVER FROM OPENING WHEN THE SWITCH IS IN THE "ON" POSITION. EXTERIOR APPLICATIONS SHALL BE NEMA 3R CONSTRUCTION WITH PADLOCK FEATURE.

SECTION 16190

1.01. SEISMIC RESTRAINT

A. ALL DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH ZONE 2 SEISMIC REQUIREMENTS.

SECTION 16195

1.01. LABELING AND IDENTIFICATION NOMENCLATURE FOR ELECTRICAL EQUIPMENT

A. CONTRACTOR SHALL FURNISH AND INSTALL NON-METALLIC ENGRAVED BACK-LIT NAMEPLATES ON ALL PANELS AND MAJOR ITEMS OF ELECTRICAL EQUIPMENT.

B. LETTERS TO BE WHITE ON BLACK BACKGROUND WITH LETTERS 1-1/2 INCH HIGH WITH 1/4 INCH MARGIN.

C. IDENTIFICATION NOMENCLATURE SHALL BE IN ACCORDANCE WITH OWNER'S STANDARDS.

SECTION 16450

1.01. GROUNDING

A. 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.

B. GROUNDING SYSTEM WILL BE IN ACCORDANCE WITH THE LATEST ACCEPTABLE EDITION OF THE NATIONAL ELECTRICAL CODE AND REQUIREMENTS PER LOCAL INSPECTOR HAVING JURISDICTION.

C. GROUNDING OF PANELBOARDS:

1. PANELBOARD SHALL BE GROUNDED BY TERMINATING THE PANELBOARD FEEDER'S EQUIPMENT GROUND CONDUCTOR TO THE EQUIPMENT GROUND BAR KIT(S) LUGGED TO THE CABINET. ENSURE THAT THE SURFACE BETWEEN THE KIT AND CABINET ARE BARE METAL TO BARE METAL. PRIME AND PAINT OVER TO PREVENT CORROSION.
2. CONDUIT(S) TERMINATING INTO THE PANELBOARD SHALL HAVE GROUNDING TYPE BUSHINGS. THE BUSHINGS SHALL BE BONDED TOGETHER WITH BARE #10 AWG COPPER CONDUCTOR WHICH IN TURN IS TERMINATED INTO THE PANELBOARD'S EQUIPMENT GROUND BAR KIT(S).

D. EQUIPMENT GROUNDING CONDUCTOR:

1. EACH EQUIPMENT GROUND CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH THE N.E.C. ARTICLE 250-122.
2. THE MINIMUM SIZE OF EQUIPMENT GROUND CONDUCTOR SHALL BE #12 AWG COPPER.
3. EACH FEEDER OR BRANCH CIRCUIT SHALL HAVE EQUIPMENT GROUND CONDUCTOR(S) INSTALLED IN THE SAME RACEWAY(S).

E. CELLULAR GROUNDING SYSTEM:

CONTRACTOR SHALL PROVIDE A CELLULAR GROUNDING SYSTEM WITH THE MAXIMUM AC RESISTANCE TO GROUND OF 10 OHM BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3-POINT GROUNDING TEST. (REFER TO SECTION 16960).

PROVIDE THE CELLULAR GROUNDING SYSTEM AS SPECIFIED ON DRAWINGS, INCLUDING, BUT NOT LIMITED TO:

1. GROUND BARS
2. EXTERIOR GROUNDING (WHERE REQUIRED DUE TO MEASURED AC RESISTANCE GREATER THAN SPECIFIED).
3. ANTENNA GROUND CONNECTIONS AND PLATES.

F. CONTRACTOR, AFTER COMPLETION OF THE COMPLETE GROUNDING SYSTEM BUT PRIOR TO CONCEALMENT/BURIAL OF SAME, SHALL NOTIFY OWNER'S PROJECT ENGINEER WHO WILL HAVE A DESIGN ENGINEER VISIT SITE AND MAKE A VISUAL INSPECTION OF THE GROUNDING GRID AND CONNECTIONS OF THE SYSTEM.

G. ALL EQUIPMENT SHALL BE BONDED TO GROUND AS REQUIRED BY N.E.C., MFG. SPECIFICATIONS, AND OWNER'S SPECIFICATIONS.

SECTION 16470

1.01. DISTRIBUTION EQUIPMENT

A. REFER TO CONTRACT DRAWINGS FOR DETAILS AND SCHEDULES.

SECTION 16477

1.01. FUSES

A. FUSES SHALL BE NONRENEWABLE TYPE AS MANUFACTURED BY "BUSSMAN" OR APPROVED EQUAL. FUSES RATED TO 1/10 AMPERE UP TO 600 AMPERES SHALL BE EQUIVALENT TO BUSSMAN TYPE LPN-RK (250V) UL CLASS RK1, LOW PEAK, DUAL ELEMENT, TIME-DELAY FUSES. FUSES SHALL HAVE SEPARATE SHORT CIRCUIT AND OVERLOAD ELEMENTS AND HAVE AN INTERRUPTING RATING OF 200 KAIC. UPON COMPLETION OF WORK, PROVIDE ONE SPARE SET OF FUSES FOR EACH TYPE INSTALLED.

SECTION 16960

1.01. 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: THERMAL OVERLOAD AND MAGNETIC TRIP TEST, AND CABLE INSULATION TEST FOR ALL CIRCUIT BREAKERS RATED 100 AMPS OR GREATER.

TEST 2: 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. THESE TESTS SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF OWNER'S CONSTRUCTION REPRESENTATIVE. TESTING DATA SHALL BE INITIALED AND DATED BY THE CONSTRUCTION REPRESENTATIVE AND INCLUDED WITH THE WRITTEN REPORT/ANALYSIS.

C. THE CONTRACTOR SHALL FORWARD SIX (6) COPIES OF THE INDEPENDENT ELECTRICAL TESTING FIRM'S 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.

SECTION 16961

1.01. TESTS BY CONTRACTOR

A. ALL TESTS AS REQUIRED UPON COMPLETION OF WORK, SHALL BE MADE BY THIS CONTRACTOR. THESE SHALL BE CONTINUITY AND INSULATION TESTS; TEST TO DETERMINE THE QUALITY OF MATERIALS, ETC. AND SHALL BE MADE IN ACCORDANCE WITH N.E.C. RECOMMENDATIONS. ALL FEEDERS AND BRANCH CIRCUIT WIRING (EXCEPT CLASS 2 SIGNAL CIRCUITS) MUST BE TESTED FREE FROM SHORT CIRCUIT AND GROUND FAULT CONDITIONS AT 500V IN A REASONABLY DRY AMBIENT OF APPROXIMATELY 70 DEGREES F.

B. CONTRACTOR SHALL PERFORM LOAD PHASE BALANCING TESTS. CIRCUITS SHALL BE CONNECTED TO THE PANELBOARDS SO THAT THE NEW LOAD IS DISTRIBUTED AS EQUALLY AS POSSIBLE BETWEEN EACH LOAD AND NEUTRAL. 10% SHALL BE CONSIDERED AS A REASONABLE AND ACCEPTABLE ALLOWANCE. BRANCH CIRCUITS SHALL BE BALANCED ON THEIR OWN PANELBOARDS; FEEDER LOADS SHALL, IN TURN, BE BALANCED ON THE SERVICE EQUIPMENT. REASONABLE LOAD TEST SHALL BE ARRANGED TO VERIFY LOAD BALANCE IF REQUESTED BY THE ENGINEER.

C. ALL TESTS, UPON REQUEST, SHALL BE REPEATED IN THE PRESENCE OF OWNER'S REPRESENTATIVE. ALL TESTS SHALL BE DOCUMENTED AND TURNED OVER TO OWNER. OWNER SHALL HAVE THE AUTHORITY TO STOP ANY OF THE WORK NOT BEING PROPERLY INSTALLED. ALL SUCH DETECTED WORK SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL EXPENSE TO THE OWNER AND THE TESTS SHALL BE REPEATED.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/07/21	ANC	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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

T-MOBILE NORTHEAST LLC

SPRINT ID: CT03XC067
SITE ID: CTHA038A
250 SOUTH WOLCOTT STREET
MANCHESTER, CT 06040

DATE: 09/08/21
SCALE: AS NOTED
JOB NO. 21005.36

ELECTRICAL SPECIFICATIONS

E-3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

180-ft Self-Supporting Lattice Tower

Proposed T-Mobile Antenna Installation

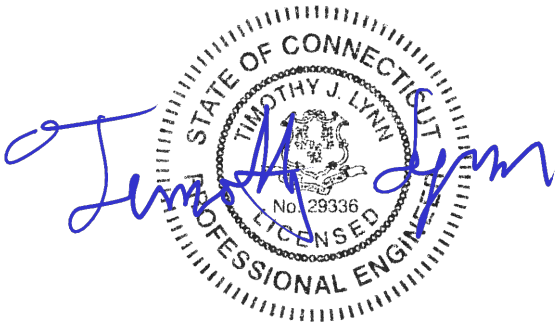
Site Ref: CTHA038A

250 Olcott Street
Manchester, CT

CENTEK Project No. 21005.36

~~Date: September 13, 2021~~
Rev 1: October 12, 2021

Max Stress Ratio = 64.0%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna installation proposed by T-Mobile on the self-supporting lattice tower located in Manchester, Connecticut.

The host tower is a 180-ft, nine-section, three legged, self-supporting tapered lattice tower originally designed and manufactured by Sabre Industries report no. 408277, dated May 9, 2018. The tower geometry, structure member sizes and the foundation system information were obtained from the aforementioned design documents.

Antenna and appurtenance information were obtained from the tower design documents, a previous structural analysis report prepared by All-Points Technology dated May 26, 2021 and a T-Mobile RF sheet.

The existing tower consists of nine (9) tapered steel pipe leg sections conforming to ASTM A500-50. Diagonal lateral support bracing consists of steel angle sections conforming to ASTM A572-50. The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by bolted and welded gusset connections. The width of the tower face is 7-ft at the top and 23-ft at the base.

Antenna and Appurtenance Summary

- Eversource:
  Appurtenance: One (1) dBSpectra DS9A09F36D-N antenna, one (1) 24' x 6" Omni antenna, one (1) Kreco CO-41A antenna and one (1) TTA leg mounted to the top of the tower.
  Conduit: Four (4) 1-5/8"∅, one (1) 1/2" ∅ and one (1) 7/8" ∅ coax cable.
- Eversource :
  Appurtenance: Two (2) 8-ft ∅ microwave dishes pipe mounted with a RAD center elevation of 175-ft above existing grade.
  Conduit: Two (2) E65 cables.
- Eversource (Reserved):
  Appurtenance: One (1) 8-ft ∅ microwave dish pipe mounted with a RAD center elevation of 175-ft above existing grade.
  Conduit: One (1) E65 cable.
- Eversource (Reserved):
  Appurtenance: One (1) 8-ft ∅ microwave dish pipe mounted with a RAD center elevation of 164-ft above existing grade.
  Conduit: One (1) E65 cable.
- Eversource:
  Appurtenance: One (1) Comprod 531-70HD antenna and one (1) Sinclair SD212 antenna mounted one a 6-ft sidearm with an elevation of 158-ft above existing grade.
  Conduit: Two (2) 7/8" ∅ coax cables.
- Eversource:
  Appurtenance: One (1) 24' x 6" Omni antenna mounted one a 6-ft sidearm with an elevation of 156-ft above existing grade.
  Conduit: One (1) 7/8" ∅ coax cable

- AT&T (Reserved):
  Antennas: Three (3) CCI HPA-65R-BU8A panel antennas, three (3) CCI DMP65R-BU8DA panel antennas, three (3) CCI TPA65R-BU8DA panel antennas, three (3) Ericsson 4449 RRHs, three (3) Ericsson 8843 RRHs, three (3) Ericsson 4478 RRHs, three (3) Ericsson 4415 RRHs and three (3) Ericsson E2 RRHs mounted on three (3) V-Frames with a RAD center elevation of 124-ft above existing grade.
  Coax Cables: Two (2) fiber cables and four (4) DC cables running on a face of the existing tower as specified in Section 3 of this report.
- **Sprint (Existing to Remove):**
  Antenna: Three (3) Commscope NNVV-65B-R4 panel antennas, three (3) Nokia AAHC panel antennas, three (3) 1900MHz 4X45W RRHs and six (6) 800MHz 2X50W RRHs mounted on three (3) V-Frames with a RAD center elevation of 135-ft above existing grade.
- **T-Mobile (Proposed Final Configuration):**
  Antennas: Three (3) RFS APXVAALL24_43-U-NA20 panel antennas, three (3) Ericsson AIR6449 B41 panel antennas, three (3) Ericsson 4480 b71+b85 RRHs and three (3) Ericsson 4460 b25+b66 RRHs mounted on three (3) V-Frames with a RAD center elevation of 135-ft above existing grade.
  Coax Cables: Three (3) 1-1/4"∅ Hybriflex cable running on a face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower, and the model assumes that the tower members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (3-second gust) with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-H entitled "Structural Standard for Antenna Support Structures and Antennas", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix N of the CSBC[1] and the wind speed data available in the TIA-222-H Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-H, gravity loads of the tower structure and its components, and the application of 1.50" radial ice on the tower structure and its components.

Load Cases:	Load Case 1; 135 mph (Ultimate) wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix N of the 2018 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 1.50" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-H]*
	Load Case 3; 105 mph (Nominal) wind speed used for deflection calculation.	

[1] The 2015 International Building Code as amended by the 2018 Connecticut State Building Code (CSBC).

Tower Capacity

- Calculated stresses were found to be within allowable limits. This tower was found to be at **64.0%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T5)	80'-0"-100'-0"	64.0%	**PASS**
Diagonal (T2)	140'-0"-160'-0"	60.9%	**PASS**

- The tower combined deflection is **0.4656 degrees**.

Deflection Criteria	Proposed (degrees)
Sway (Tilt)	0.4425
Twist	0.1449
Combined	0.4656

Note 1: *Tower deflection calculated utilizing the service wind load combination and nominal wind speed of 105 mph.*

Foundation and Anchors

The existing foundation consists of three (3) 4'-0" diameter x 4'-9" long piers on one (1) 34'-0" square x 1'-9" thick concrete mat. The foundation properties and sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned original design documents. Tower legs are connected to the foundation by means of (6) 1-1/2"∅, ASTM F1554-105 anchor bolts per leg, embedded into the concrete foundation structure.

- The tower base maximum corner reactions developed from the governing Load Case were used in the verification of the foundation and its anchors:

Reactions	Vector	Proposed Base Reactions
Base	Shear	**64 kips**
	Compression	**49 kips**
	Moment	**6,909 kip-ft**
Leg	Shear	**40 kips**
	Uplift	**319 kips**
	Compression	**363 kips**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	FS[(1)]	Proposed Loading (FS)[(1)]	Result
Reinf. Conc. Pad and Piers	Uplift	1.0	1.97	**PASS**

Note 1: FS denotes Factor of Safety

- The anchor bolts were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	37.0%	**PASS**

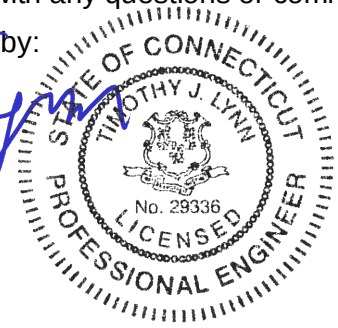
Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by T-Mobile. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

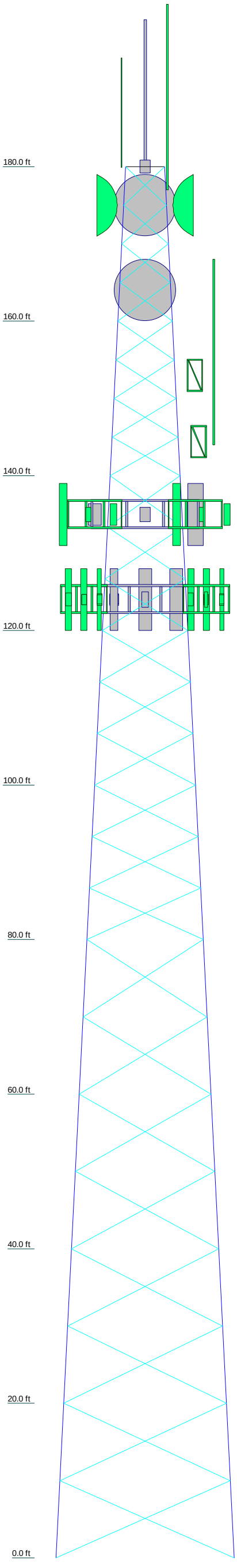
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Face Width (ft)	# Panels @ (ft)	Weight (K)
T1	P2.5x.276	A500-50	L2x2x1/8	A572-50	L2x2x1/8	5	8 @ 5	0.8
T2	P3x.3		L2x2x3/16			7		1.2
T3	L2 1/2x2 1/2x1/4				N.A.	9		2.5
T4	P5x0.5		L3 1/2x3x1/4			11	9 @ 6.66667	2.9
T5						13		3.1
T6	P8x.5		L4x3 1/2x5/16			15		4.3
T7			L4x3 1/2x3/8			17		4.9
T8			L4x4x3/8			19	8 @ 10	5.2
T9	P10x.5		L5x5x5/16			21		6.3
						23		31.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DS9A09F36D-N (Eversource)	189.4	DMP65R-BU8DA (ATI - Reserved)	124
24' x 6" Omni (Eversource)	189	TPA65R-BU8DA (ATI - Reserved)	124
CO-41A (Eversource)	187	HPA65R-BU8A (ATI - Reserved)	124
Tower Top Amplifier (Eversource)	180	DMP65R-BU8DA (ATI - Reserved)	124
8' Dish (Eversource)	175	TPA65R-BU8DA (ATI - Reserved)	124
8' Dish (Eversource)	175	4449 B5/B12 (ATI - Reserved)	124
8' Dish (Eversource (Reserved))	175	4449 B5/B12 (ATI - Reserved)	124
8' Dish (Eversource (Reserved))	164	4449 B5/B12 (ATI - Reserved)	124
531-70HD (Eversource)	158	8843 B2/B66A (ATI - Reserved)	124
SD212 (Eversource)	158	8843 B2/B66A (ATI - Reserved)	124
ROHN 6-ft Side Arm (Eversource)	158	8843 B2/B66A (ATI - Reserved)	124
24' x 6" Omni (Eversource)	156	4478 B14 (ATI - Reserved)	124
ROHN 6-ft Side Arm (Eversource)	153	4478 B14 (ATI - Reserved)	124
ROHN 3-ft Side Arm (Eversource)	144.4	4478 B14 (ATI - Reserved)	124
APXVAALL24-43 (T-Mobile - Proposed)	135	4415 B25 (ATI - Reserved)	124
AIR6449 (T-Mobile - Proposed)	135	4415 B25 (ATI - Reserved)	124
4460 B25+B60 (T-Mobile - Proposed)	135	4415 B25 (ATI - Reserved)	124
4460 B25+B60 (T-Mobile - Proposed)	135	RRUS-E2 (ATI - Reserved)	124
4460 B25+B60 (T-Mobile - Proposed)	135	RRUS-E2 (ATI - Reserved)	124
4480 b71+b85 (T-Mobile - Proposed)	135	RRUS-E2 (ATI - Reserved)	124
4480 b71+b85 (T-Mobile - Proposed)	135	DC6-48-60-18-8F Surge Arrestor (ATI - Reserved)	124
4480 b71+b85 (T-Mobile - Proposed)	135	DC6-48-60-18-8F Surge Arrestor (ATI - Reserved)	124
13-ft Sector Frame (T-Mobile - Existing)	135	SitePro VFA12-HD (ATI - Reserved)	124
13-ft Sector Frame (T-Mobile - Existing)	135	SitePro VFA12-HD (ATI - Reserved)	124
13-ft Sector Frame (T-Mobile - Existing)	135	SitePro VFA12-HD (ATI - Reserved)	124
APXVAALL24-43 (T-Mobile - Proposed)	135	HPA65R-BU8A (ATI - Reserved)	124
AIR6449 (T-Mobile - Proposed)	135	DMP65R-BU8DA (ATI - Reserved)	124
APXVAALL24-43 (T-Mobile - Proposed)	135	TPA65R-BU8DA (ATI - Reserved)	124
AIR6449 (T-Mobile - Proposed)	135	HPA65R-BU8A (ATI - Reserved)	124

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A572-50	50 ksi	65 ksi

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-H Standard.
2. Tower designed for a 135 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 105 mph wind.
5. Tower Risk Category III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 64%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 363 K
SHEAR: 40 K

UPLIFT: -319 K
SHEAR: 35 K

AXIAL 127 K
SHEAR 16 K *MOMENT 1801 kip-ft*
TORQUE 25 kip-ft
50 mph WIND - 1.5000 in ICE

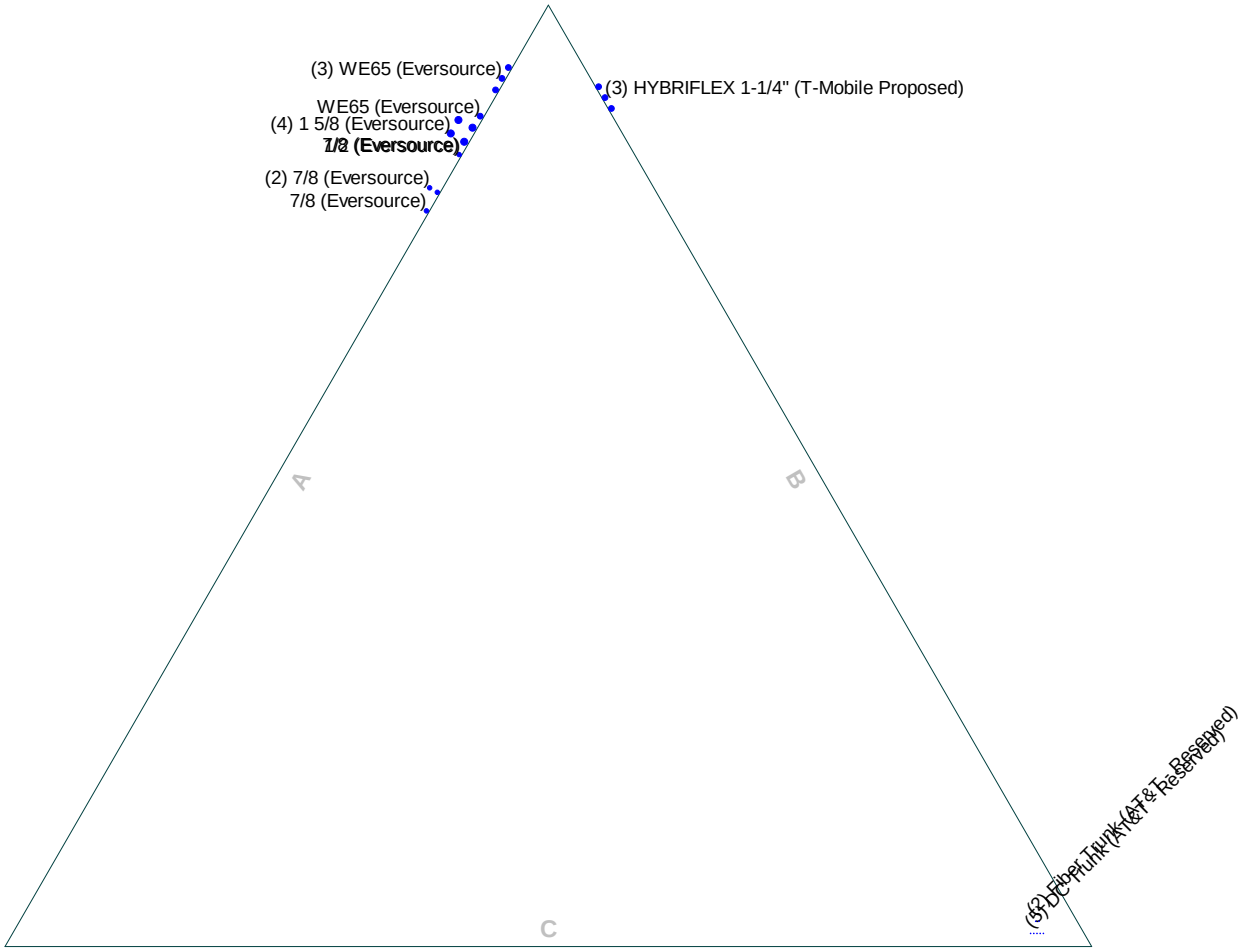
AXIAL 49 K
SHEAR 64 K *MOMENT 6909 kip-ft*
TORQUE 66 kip-ft
REACTIONS - 135 mph WIND

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job:	***21005.36 - CTHA038A***		
Project:	***180-ft Sabre Lattice Tower - 250 Olcott St., Manchester, CT***		
Client: T-Mobile	Drawn by: TJL	App'd:	
Code: TIA-222-H	Date: 10/12/21	Scale: NTS	
Path:		Dwg No. E-1	

Feed Line Plan

Round Flat App In Face App Out Face



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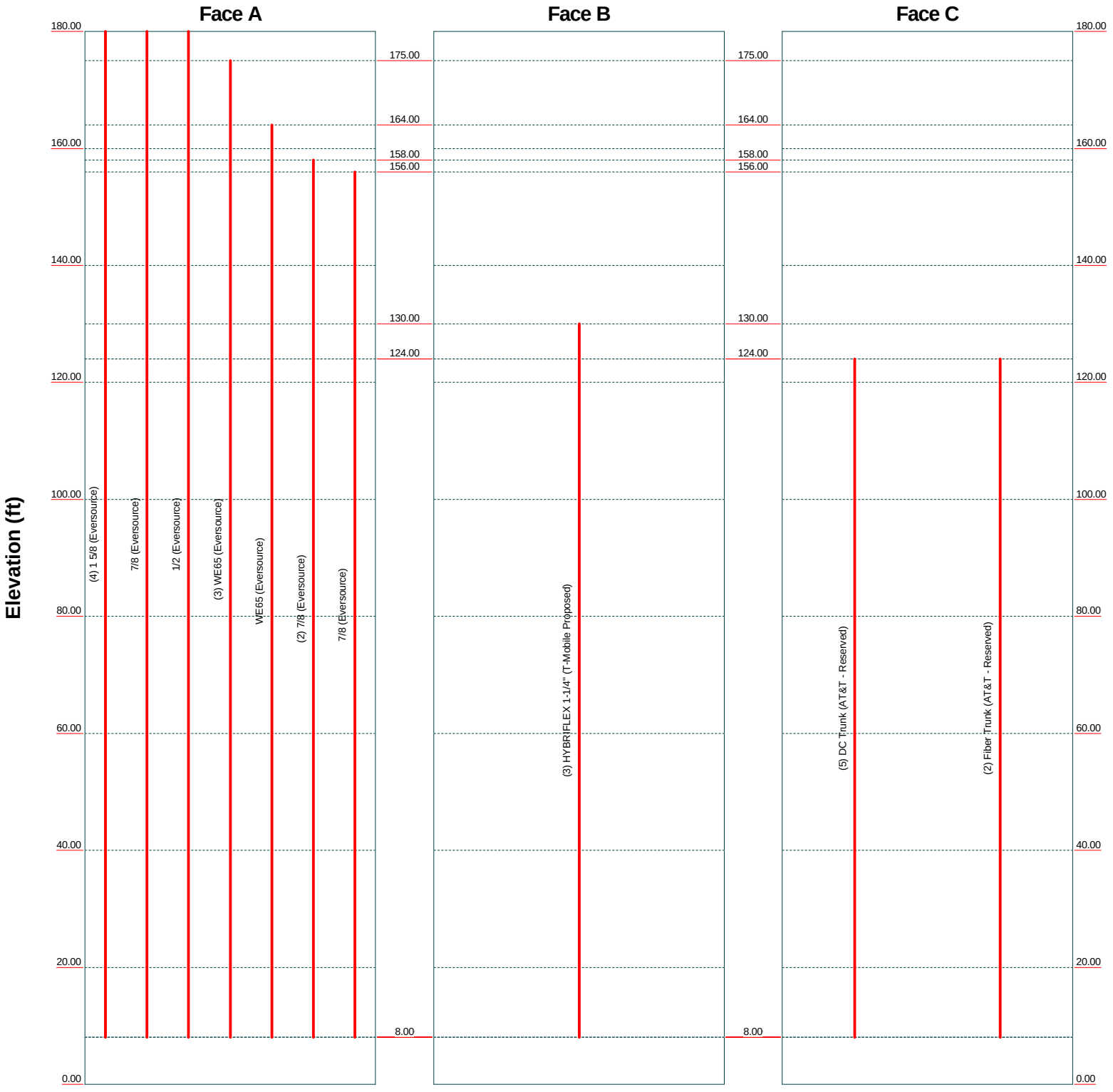
Client: T-Mobile	Drawn by: TJL	App'd:	
Code: TIA-222-H	Date: 10/12/21	Scale: NTS	
Path:		Dwg No. E-7	

Feed Line Distribution Chart
0' - 180'

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



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Code: TIA-222-H	Date: 10/12/21	Scale: NTS
Path:		Dwg No. E-7

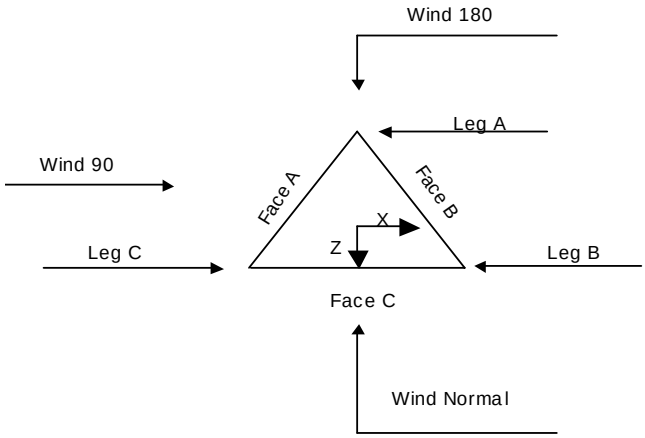
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 5.00 ft at the top and 23.00 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: 0.00 ft.
Basic wind speed of 135 mph.
Risk Category III.
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 1.5000 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 105 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.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	180.00-160.00			5.00	1	20.00
T2	160.00-140.00			7.00	1	20.00
T3	140.00-120.00			9.00	1	20.00
T4	120.00-100.00			11.00	1	20.00
T5	100.00-80.00			13.00	1	20.00
T6	80.00-60.00			15.00	1	20.00
T7	60.00-40.00			17.00	1	20.00
T8	40.00-20.00			19.00	1	20.00
T9	20.00-0.00			21.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	180.00-160.00	5.00	X Brace	No	Yes	0.0000	0.0000
T2	160.00-140.00	5.00	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	6.67	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000
T5	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T6	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000

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
T7	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T8	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T9	20.00-0.00	10.00	X Brace	No	No	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 180.00-160.00	Pipe	P2.5x.276	A500-50 (50 ksi)	Single Angle	L2x2x1/8	A572-50 (50 ksi)
T2 160.00-140.00	Pipe	P3x.3	A500-50 (50 ksi)	Single Angle	L2x2x3/16	A572-50 (50 ksi)
T3 140.00-120.00	Pipe	P5x0.5	A500-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A572-50 (50 ksi)
T4 120.00-100.00	Pipe	P5x0.5	A500-50 (50 ksi)	Single Angle	L3 1/2x3x1/4	A572-50 (50 ksi)
T5 100.00-80.00	Pipe	P5x0.5	A500-50 (50 ksi)	Single Angle	L3 1/2x3x1/4	A572-50 (50 ksi)
T6 80.00-60.00	Pipe	P8x.5	A500-50 (50 ksi)	Single Angle	L4x3 1/2x5/16	A572-50 (50 ksi)
T7 60.00-40.00	Pipe	P8x.5	A500-50 (50 ksi)	Single Angle	L4x3 1/2x3/8	A572-50 (50 ksi)
T8 40.00-20.00	Pipe	P8x.5	A500-50 (50 ksi)	Single Angle	L4x4x3/8	A572-50 (50 ksi)
T9 20.00-0.00	Pipe	P10x.5	A500-50 (50 ksi)	Single Angle	L5x5x5/16	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.00-160.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T9 20.00-0.00	0.00	0.0000	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 180.00-160.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 160.00-140.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 140.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 120.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9 20.00-0.00	Yes	Yes	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		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 180.00-160.00	0.0000	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 160.00-140.00	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
T3 140.00-120.00	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
T4 120.00-100.00	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
T5 100.00-80.00	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
T6 80.00-60.00	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
T7 60.00-40.00	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
T8 40.00-20.00	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
T9 20.00-0.00	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 180.00-160.00	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
T2 160.00-140.00	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
T3 140.00-120.00	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
T4 120.00-100.00	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
T5 100.00-80.00	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
T6 80.00-60.00	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
T7 60.00-40.00	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
T8 40.00-20.00	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
T9 20.00-0.00	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 ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.00-160.00	Flange	0.7500 A325N	0	0.6250 A325X	1	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 160.00-140.00	Flange	0.7500 A325N	0	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	0.7500 A325N	0	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T4 120.00-100.00	Flange	1.5000 A325N	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 100.00-80.00	Flange	1.5000 A325N	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 80.00-60.00	Flange	1.5000 A325N	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 60.00-40.00	Flange	1.5000 A325N	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 40.00-20.00	Flange	1.5000 A325N	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 20.00-0.00	Flange	1.5000 F1554-105	6	0.7500 A325X	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
1 5/8 (Eversource)	A	No	No	Ar (CaAa)	180.00 - 8.00	0.0000	0.36	4	2	1.9800	1.9800		1.04
7/8 (Eversource)	A	No	No	Ar (CaAa)	180.00 - 8.00	0.0000	0.34	1	1	1.1100	1.1100		0.54
1/2 (Eversource)	A	No	No	Ar (CaAa)	180.00 - 8.00	0.0000	0.34	1	1	0.5800	0.5800		0.25
WE65 (Eversource)	A	No	No	Ar (CaAa)	175.00 - 8.00	0.0000	0.42	3	3	1.5836	1.5836		0.53
WE65 (Eversource)	A	No	No	Ar (CaAa)	164.00 - 8.00	0.0000	0.38	1	1	1.5836	1.5836		0.53
7/8 (Eversource)	A	No	No	Ar (CaAa)	158.00 - 8.00	0.0000	0.3	2	1	1.1100	1.1100		0.54
7/8 (Eversource)	A	No	No	Ar (CaAa)	156.00 - 8.00	0.0000	0.28	1	1	1.1100	1.1100		0.54
HYBRIFLEX 1-1/4" (T-Mobile Proposed)	B	No	No	Ar (CaAa)	130.00 - 8.00	0.0000	-0.4	3	3	1.5400	1.5400		1.30
DC Trunk (AT&T - Reserved)	C	No	No	Ar (CaAa)	124.00 - 8.00	-3.0000	-0.45	5	5	0.4000	0.4000		0.11
Fiber Trunk (AT&T - Reserved)	C	No	No	Ar (CaAa)	124.00 - 8.00	-6.0000	-0.45	2	2	0.4000	0.4000		1.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	0.000	0.000	26.980	0.000	0.12

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	0.000	0.000	37.661	0.000	0.17
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T3	140.00-120.00	A	0.000	0.000	38.549	0.000	0.17
		B	0.000	0.000	4.620	0.000	0.04
		C	0.000	0.000	1.120	0.000	0.01
T4	120.00-100.00	A	0.000	0.000	38.549	0.000	0.17
		B	0.000	0.000	9.240	0.000	0.08
		C	0.000	0.000	5.600	0.000	0.05
T5	100.00-80.00	A	0.000	0.000	38.549	0.000	0.17
		B	0.000	0.000	9.240	0.000	0.08
		C	0.000	0.000	5.600	0.000	0.05
T6	80.00-60.00	A	0.000	0.000	38.549	0.000	0.17
		B	0.000	0.000	9.240	0.000	0.08
		C	0.000	0.000	5.600	0.000	0.05
T7	60.00-40.00	A	0.000	0.000	38.549	0.000	0.17
		B	0.000	0.000	9.240	0.000	0.08
		C	0.000	0.000	5.600	0.000	0.05
T8	40.00-20.00	A	0.000	0.000	38.549	0.000	0.17
		B	0.000	0.000	9.240	0.000	0.08
		C	0.000	0.000	5.600	0.000	0.05
T9	20.00-0.00	A	0.000	0.000	23.129	0.000	0.10
		B	0.000	0.000	5.544	0.000	0.05
		C	0.000	0.000	3.360	0.000	0.03

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	2.032	0.000	0.000	82.107	0.000	1.39
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	2.007	0.000	0.000	127.120	0.000	2.06
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T3	140.00-120.00	A	1.978	0.000	0.000	130.362	0.000	2.09
		B		0.000	0.000	16.110	0.000	0.24
		C		0.000	0.000	7.737	0.000	0.08
T4	120.00-100.00	A	1.946	0.000	0.000	129.160	0.000	2.05
		B		0.000	0.000	32.002	0.000	0.47
		C		0.000	0.000	38.231	0.000	0.40
T5	100.00-80.00	A	1.907	0.000	0.000	127.743	0.000	2.00
		B		0.000	0.000	31.745	0.000	0.47
		C		0.000	0.000	37.695	0.000	0.39
T6	80.00-60.00	A	1.860	0.000	0.000	126.008	0.000	1.94
		B		0.000	0.000	31.431	0.000	0.46
		C		0.000	0.000	37.039	0.000	0.38
T7	60.00-40.00	A	1.798	0.000	0.000	123.754	0.000	1.87
		B		0.000	0.000	31.023	0.000	0.44
		C		0.000	0.000	36.187	0.000	0.36
T8	40.00-20.00	A	1.709	0.000	0.000	120.475	0.000	1.77
		B		0.000	0.000	30.431	0.000	0.42
		C		0.000	0.000	34.948	0.000	0.34
T9	20.00-0.00	A	1.531	0.000	0.000	68.384	0.000	0.94
		B		0.000	0.000	17.556	0.000	0.23

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C		0.000	0.000	19.497	0.000	0.18

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.00-160.00	-1.6988	-10.1720	-2.2199	-13.3007
T2	160.00-140.00	-2.4503	-14.7893	-3.6440	-20.6988
T3	140.00-120.00	-1.8791	-17.4736	-2.1610	-24.5684
T4	120.00-100.00	-0.0127	-16.8154	2.9799	-23.2856
T5	100.00-80.00	0.0272	-18.1208	3.3162	-25.6425
T6	80.00-60.00	0.0642	-19.8426	3.7201	-28.4965
T7	60.00-40.00	0.0965	-21.1793	3.9990	-30.6858
T8	40.00-20.00	0.1254	-22.3732	4.2121	-32.6359
T9	20.00-0.00	0.0806	-12.9342	2.7060	-21.9327

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	1 5/8	160.00 - 180.00	0.6000	0.5750
T1	2	7/8	160.00 - 180.00	0.6000	0.5750
T1	3	1/2	160.00 - 180.00	0.6000	0.5750
T1	5	WE65	160.00 - 175.00	0.6000	0.5750
T1	6	WE65	160.00 - 164.00	0.6000	0.5750
T2	1	1 5/8	140.00 - 160.00	0.6000	0.6000
T2	2	7/8	140.00 - 160.00	0.6000	0.6000
T2	3	1/2	140.00 - 160.00	0.6000	0.6000
T2	5	WE65	140.00 - 160.00	0.6000	0.6000
T2	6	WE65	140.00 - 160.00	0.6000	0.6000
T2	7	7/8	140.00 - 158.00	0.6000	0.6000
T2	8	7/8	140.00 - 156.00	0.6000	0.6000
T3	1	1 5/8	120.00 - 140.00	0.6000	0.6000
T3	2	7/8	120.00 - 140.00	0.6000	0.6000
T3	3	1/2	120.00 - 140.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T3	5	WE65	120.00 - 140.00	0.6000	0.6000
T3	6	WE65	120.00 - 140.00	0.6000	0.6000
T3	7	7/8	120.00 - 140.00	0.6000	0.6000
T3	8	7/8	120.00 - 140.00	0.6000	0.6000
T3	9	HYBRIFLEX 1-1/4"	120.00 - 130.00	0.6000	0.6000
T3	12	DC Trunk	120.00 - 124.00	0.6000	0.6000
T3	13	Fiber Trunk	120.00 - 124.00	0.6000	0.6000
T4	1	1 5/8	100.00 - 120.00	0.6000	0.6000
T4	2	7/8	100.00 - 120.00	0.6000	0.6000
T4	3	1/2	100.00 - 120.00	0.6000	0.6000
T4	5	WE65	100.00 - 120.00	0.6000	0.6000
T4	6	WE65	100.00 - 120.00	0.6000	0.6000
T4	7	7/8	100.00 - 120.00	0.6000	0.6000
T4	8	7/8	100.00 - 120.00	0.6000	0.6000
T4	9	HYBRIFLEX 1-1/4"	100.00 - 120.00	0.6000	0.6000
T4	12	DC Trunk	100.00 - 120.00	0.6000	0.6000
T4	13	Fiber Trunk	100.00 - 120.00	0.6000	0.6000
T5	1	1 5/8	80.00 - 100.00	0.6000	0.6000
T5	2	7/8	80.00 - 100.00	0.6000	0.6000
T5	3	1/2	80.00 - 100.00	0.6000	0.6000
T5	5	WE65	80.00 - 100.00	0.6000	0.6000
T5	6	WE65	80.00 - 100.00	0.6000	0.6000
T5	7	7/8	80.00 - 100.00	0.6000	0.6000
T5	8	7/8	80.00 - 100.00	0.6000	0.6000
T5	9	HYBRIFLEX 1-1/4"	80.00 - 100.00	0.6000	0.6000
T5	12	DC Trunk	80.00 - 100.00	0.6000	0.6000
T5	13	Fiber Trunk	80.00 - 100.00	0.6000	0.6000
T6	1	1 5/8	60.00 - 80.00	0.6000	0.6000
T6	2	7/8	60.00 - 80.00	0.6000	0.6000
T6	3	1/2	60.00 - 80.00	0.6000	0.6000
T6	5	WE65	60.00 - 80.00	0.6000	0.6000
T6	6	WE65	60.00 - 80.00	0.6000	0.6000
T6	7	7/8	60.00 - 80.00	0.6000	0.6000
T6	8	7/8	60.00 - 80.00	0.6000	0.6000
T6	9	HYBRIFLEX 1-1/4"	60.00 - 80.00	0.6000	0.6000
T6	12	DC Trunk	60.00 - 80.00	0.6000	0.6000
T6	13	Fiber Trunk	60.00 - 80.00	0.6000	0.6000
T7	1	1 5/8	40.00 - 60.00	0.6000	0.6000
T7	2	7/8	40.00 - 60.00	0.6000	0.6000
T7	3	1/2	40.00 - 60.00	0.6000	0.6000
T7	5	WE65	40.00 - 60.00	0.6000	0.6000
T7	6	WE65	40.00 - 60.00	0.6000	0.6000
T7	7	7/8	40.00 - 60.00	0.6000	0.6000
T7	8	7/8	40.00 - 60.00	0.6000	0.6000
T7	9	HYBRIFLEX 1-1/4"	40.00 - 60.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T7	12	DC Trunk	40.00 - 60.00	0.6000	0.6000
T7	13	Fiber Trunk	40.00 - 60.00	0.6000	0.6000
T8	1	1 5/8	20.00 - 40.00	0.6000	0.6000
T8	2	7/8	20.00 - 40.00	0.6000	0.6000
T8	3	1/2	20.00 - 40.00	0.6000	0.6000
T8	5	WE65	20.00 - 40.00	0.6000	0.6000
T8	6	WE65	20.00 - 40.00	0.6000	0.6000
T8	7	7/8	20.00 - 40.00	0.6000	0.6000
T8	8	7/8	20.00 - 40.00	0.6000	0.6000
T8	9	HYBRIFLEX 1-1/4"	20.00 - 40.00	0.6000	0.6000
T8	12	DC Trunk	20.00 - 40.00	0.6000	0.6000
T8	13	Fiber Trunk	20.00 - 40.00	0.6000	0.6000
T9	1	1 5/8	8.00 - 20.00	0.6000	0.6000
T9	2	7/8	8.00 - 20.00	0.6000	0.6000
T9	3	1/2	8.00 - 20.00	0.6000	0.6000
T9	5	WE65	8.00 - 20.00	0.6000	0.6000
T9	6	WE65	8.00 - 20.00	0.6000	0.6000
T9	7	7/8	8.00 - 20.00	0.6000	0.6000
T9	8	7/8	8.00 - 20.00	0.6000	0.6000
T9	9	HYBRIFLEX 1-1/4"	8.00 - 20.00	0.6000	0.6000
T9	12	DC Trunk	8.00 - 20.00	0.6000	0.6000
T9	13	Fiber Trunk	8.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
DS9A09F36D-N	A	From Leg	1.00	0.0000	189.40	No Ice	5.55	5.55	0.05
(Eversource)			0.00			1/2" Ice	7.73	7.73	0.09
			0.00			1" Ice	9.71	9.71	0.15
						2" Ice	13.71	13.71	0.29
24' x 6" Omni	B	From Leg	1.00	0.0000	189.00	No Ice	7.20	7.20	0.10
(Eversource)			0.00			1/2" Ice	16.86	16.86	0.20
			0.00			1" Ice	19.33	19.33	0.31
						2" Ice	24.33	24.33	0.58
CO-41A	C	From Leg	1.00	0.0000	187.00	No Ice	2.27	2.27	0.01
(Eversource)			0.00			1/2" Ice	3.71	3.71	0.03
			0.00			1" Ice	5.16	5.16	0.06
						2" Ice	8.12	8.12	0.14
Tower Top Amplifier	A	From Leg	1.00	0.0000	180.00	No Ice	2.67	1.03	0.04
(Eversource)			0.00			1/2" Ice	2.87	1.17	0.06
			0.00			1" Ice	3.08	1.32	0.08
						2" Ice	3.53	1.64	0.13
531-70HD	A	From Leg	6.00	0.0000	158.00	No Ice	6.00	6.00	0.04
(Eversource)			0.00			1/2" Ice	6.90	6.90	0.05
			0.00			1" Ice	7.80	7.80	0.06
						2" Ice	9.60	9.60	0.08
SD212	A	From Leg	6.00	0.0000	158.00	No Ice	2.14	2.14	0.03
(Eversource)			0.00			1/2" Ice	3.71	3.71	0.06
			0.00			1" Ice	5.28	5.28	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	8.42	8.42	0.13
ROHN 6-ft Side Arm	A	From Leg	3.00	0.0000	158.00	No Ice	6.68	6.68	0.08
(Eversource)			0.00			1/2" Ice	10.00	10.00	0.10
			0.00			1" Ice	13.32	13.32	0.13
						2" Ice	19.96	19.96	0.18
24' x 6" Omni	B	From Leg	6.00	0.0000	156.00	No Ice	7.20	7.20	0.10
(Eversource)			0.00			1/2" Ice	16.86	16.86	0.20
			0.00			1" Ice	19.33	19.33	0.31
						2" Ice	24.33	24.33	0.58
ROHN 6-ft Side Arm	B	From Leg	3.00	0.0000	153.00	No Ice	6.68	6.68	0.08
(Eversource)			0.00			1/2" Ice	10.00	10.00	0.10
			0.00			1" Ice	13.32	13.32	0.13
						2" Ice	19.96	19.96	0.18
ROHN 3-ft Side Arm	B	From Leg	3.00	0.0000	144.40	No Ice	3.10	3.10	0.07
(Eversource)			0.00			1/2" Ice	5.00	5.00	0.10
			0.00			1" Ice	6.90	6.90	0.13
						2" Ice	10.70	10.70	0.19
APXVAALL24-43	A	From Leg	3.00	0.0000	135.00	No Ice	20.24	8.89	0.15
(T-Mobile - Proposed)			6.50			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
						2" Ice	22.87	11.33	0.66
AIR6449	A	From Leg	3.00	0.0000	135.00	No Ice	5.65	2.42	0.10
(T-Mobile - Proposed)			-6.50			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
						2" Ice	6.90	3.36	0.28
APXVAALL24-43	B	From Leg	3.00	0.0000	135.00	No Ice	20.24	8.89	0.15
(T-Mobile - Proposed)			6.50			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
						2" Ice	22.87	11.33	0.66
AIR6449	B	From Leg	3.00	0.0000	135.00	No Ice	5.65	2.42	0.10
(T-Mobile - Proposed)			-6.50			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
						2" Ice	6.90	3.36	0.28
APXVAALL24-43	C	From Leg	3.00	0.0000	135.00	No Ice	20.24	8.89	0.15
(T-Mobile - Proposed)			6.50			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
						2" Ice	22.87	11.33	0.66
AIR6449	C	From Leg	3.00	0.0000	135.00	No Ice	5.65	2.42	0.10
(T-Mobile - Proposed)			-6.50			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
						2" Ice	6.90	3.36	0.28
4460 B25+B60	A	From Leg	3.00	0.0000	135.00	No Ice	2.56	1.98	0.11
(T-Mobile - Proposed)			0.00			1/2" Ice	2.76	2.16	0.13
			0.00			1" Ice	2.97	2.34	0.16
						2" Ice	3.41	2.74	0.23
4460 B25+B60	B	From Leg	3.00	0.0000	135.00	No Ice	2.56	1.98	0.11
(T-Mobile - Proposed)			0.00			1/2" Ice	2.76	2.16	0.13
			0.00			1" Ice	2.97	2.34	0.16
						2" Ice	3.41	2.74	0.23
4460 B25+B60	C	From Leg	3.00	0.0000	135.00	No Ice	2.56	1.98	0.11
(T-Mobile - Proposed)			0.00			1/2" Ice	2.76	2.16	0.13
			0.00			1" Ice	2.97	2.34	0.16
						2" Ice	3.41	2.74	0.23
4480 b71+b85	A	From Leg	3.00	0.0000	135.00	No Ice	2.85	1.38	0.08
(T-Mobile - Proposed)			0.00			1/2" Ice	3.06	1.54	0.11
			0.00			1" Ice	3.28	1.71	0.13
						2" Ice	3.74	2.07	0.19

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
4480 b71+b85	B	From Leg	3.00	0.0000	135.00	No Ice	2.85	1.38	0.08
(T-Mobile - Proposed)			0.00			1/2" Ice	3.06	1.54	0.11
			0.00			1" Ice	3.28	1.71	0.13
						2" Ice	3.74	2.07	0.19
4480 b71+b85	C	From Leg	3.00	0.0000	135.00	No Ice	2.85	1.38	0.08
(T-Mobile - Proposed)			0.00			1/2" Ice	3.06	1.54	0.11
			0.00			1" Ice	3.28	1.71	0.13
						2" Ice	3.74	2.07	0.19
13-ft Sector Frame	A	From Leg	2.00	0.0000	135.00	No Ice	12.00	12.00	0.35
(T-Mobile - Existing)			0.00			1/2" Ice	16.00	16.00	0.53
			0.00			1" Ice	20.00	20.00	0.70
						2" Ice	28.00	28.00	1.05
13-ft Sector Frame	B	From Leg	2.00	0.0000	135.00	No Ice	12.00	12.00	0.35
(T-Mobile - Existing)			0.00			1/2" Ice	16.00	16.00	0.53
			0.00			1" Ice	20.00	20.00	0.70
						2" Ice	28.00	28.00	1.05
13-ft Sector Frame	C	From Leg	2.00	0.0000	135.00	No Ice	12.00	12.00	0.35
(T-Mobile - Existing)			0.00			1/2" Ice	16.00	16.00	0.53
			0.00			1" Ice	20.00	20.00	0.70
						2" Ice	28.00	28.00	1.05
HPA65R-BU8A	A	From Leg	3.00	0.0000	124.00	No Ice	11.23	10.02	0.09
(AT&T - Reserved)			-4.00			1/2" Ice	11.85	11.44	0.18
			0.00			1" Ice	12.47	12.72	0.27
						2" Ice	13.72	14.94	0.50
DMP65R-BU8DA	A	From Leg	3.00	0.0000	124.00	No Ice	17.87	8.12	0.12
(AT&T - Reserved)			0.00			1/2" Ice	18.50	8.72	0.22
			0.00			1" Ice	19.14	9.32	0.32
						2" Ice	20.44	10.54	0.56
TPA65R-BU8DA	A	From Leg	3.00	0.0000	124.00	No Ice	17.87	8.12	0.09
(AT&T - Reserved)			4.00			1/2" Ice	18.50	8.72	0.19
			0.00			1" Ice	19.14	9.32	0.29
						2" Ice	20.44	10.54	0.53
HPA65R-BU8A	B	From Leg	3.00	0.0000	124.00	No Ice	11.23	10.02	0.09
(AT&T - Reserved)			-4.00			1/2" Ice	11.85	11.44	0.18
			0.00			1" Ice	12.47	12.72	0.27
						2" Ice	13.72	14.94	0.50
DMP65R-BU8DA	B	From Leg	3.00	0.0000	124.00	No Ice	17.87	8.12	0.12
(AT&T - Reserved)			0.00			1/2" Ice	18.50	8.72	0.22
			0.00			1" Ice	19.14	9.32	0.32
						2" Ice	20.44	10.54	0.56
TPA65R-BU8DA	B	From Leg	3.00	0.0000	124.00	No Ice	17.87	8.12	0.09
(AT&T - Reserved)			4.00			1/2" Ice	18.50	8.72	0.19
			0.00			1" Ice	19.14	9.32	0.29
						2" Ice	20.44	10.54	0.53
HPA65R-BU8A	C	From Leg	3.00	0.0000	124.00	No Ice	11.23	10.02	0.09
(AT&T - Reserved)			-4.00			1/2" Ice	11.85	11.44	0.18
			0.00			1" Ice	12.47	12.72	0.27
						2" Ice	13.72	14.94	0.50
DMP65R-BU8DA	C	From Leg	3.00	0.0000	124.00	No Ice	17.87	8.12	0.12
(AT&T - Reserved)			0.00			1/2" Ice	18.50	8.72	0.22
			0.00			1" Ice	19.14	9.32	0.32
						2" Ice	20.44	10.54	0.56
TPA65R-BU8DA	C	From Leg	3.00	0.0000	124.00	No Ice	17.87	8.12	0.09
(AT&T - Reserved)			4.00			1/2" Ice	18.50	8.72	0.19
			0.00			1" Ice	19.14	9.32	0.29
						2" Ice	20.44	10.54	0.53
4449 B5/B12	A	From Leg	3.00	0.0000	124.00	No Ice	1.97	1.41	0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(AT&T - Reserved)			-4.00			1/2" Ice	2.14	1.56	0.09
			0.00			1" Ice	2.33	1.73	0.11
						2" Ice	2.72	2.07	0.16
4449 B5/B12	B	From Leg	3.00	0.0000	124.00	No Ice	1.97	1.41	0.07
(AT&T - Reserved)			-4.00			1/2" Ice	2.14	1.56	0.09
			0.00			1" Ice	2.33	1.73	0.11
						2" Ice	2.72	2.07	0.16
4449 B5/B12	C	From Leg	3.00	0.0000	124.00	No Ice	1.97	1.41	0.07
(AT&T - Reserved)			-4.00			1/2" Ice	2.14	1.56	0.09
			0.00			1" Ice	2.33	1.73	0.11
						2" Ice	2.72	2.07	0.16
8843 B2/B66A	A	From Leg	3.00	0.0000	124.00	No Ice	1.64	1.35	0.07
(AT&T - Reserved)			-4.00			1/2" Ice	1.80	1.50	0.09
			0.00			1" Ice	1.97	1.65	0.11
						2" Ice	2.32	1.99	0.16
8843 B2/B66A	B	From Leg	3.00	0.0000	124.00	No Ice	1.64	1.35	0.07
(AT&T - Reserved)			-4.00			1/2" Ice	1.80	1.50	0.09
			0.00			1" Ice	1.97	1.65	0.11
						2" Ice	2.32	1.99	0.16
8843 B2/B66A	C	From Leg	3.00	0.0000	124.00	No Ice	1.64	1.35	0.07
(AT&T - Reserved)			-4.00			1/2" Ice	1.80	1.50	0.09
			0.00			1" Ice	1.97	1.65	0.11
						2" Ice	2.32	1.99	0.16
4478 B14	A	From Leg	3.00	0.0000	124.00	No Ice	1.84	1.06	0.06
(AT&T - Reserved)			0.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
						2" Ice	2.57	1.66	0.14
4478 B14	B	From Leg	3.00	0.0000	124.00	No Ice	1.84	1.06	0.06
(AT&T - Reserved)			0.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
						2" Ice	2.57	1.66	0.14
4478 B14	C	From Leg	3.00	0.0000	124.00	No Ice	1.84	1.06	0.06
(AT&T - Reserved)			0.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
						2" Ice	2.57	1.66	0.14
4415 B25	A	From Leg	3.00	0.0000	124.00	No Ice	1.84	0.82	0.05
(AT&T - Reserved)			0.00			1/2" Ice	2.01	0.94	0.06
			0.00			1" Ice	2.19	1.07	0.08
						2" Ice	2.57	1.37	0.12
4415 B25	B	From Leg	3.00	0.0000	124.00	No Ice	1.84	0.82	0.05
(AT&T - Reserved)			0.00			1/2" Ice	2.01	0.94	0.06
			0.00			1" Ice	2.19	1.07	0.08
						2" Ice	2.57	1.37	0.12
4415 B25	C	From Leg	3.00	0.0000	124.00	No Ice	1.84	0.82	0.05
(AT&T - Reserved)			0.00			1/2" Ice	2.01	0.94	0.06
			0.00			1" Ice	2.19	1.07	0.08
						2" Ice	2.57	1.37	0.12
RRUS-E2	A	From Leg	3.00	0.0000	124.00	No Ice	3.15	1.29	0.06
(AT&T - Reserved)			4.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
						2" Ice	4.07	1.95	0.17
RRUS-E2	B	From Leg	3.00	0.0000	124.00	No Ice	3.15	1.29	0.06
(AT&T - Reserved)			4.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
						2" Ice	4.07	1.95	0.17
RRUS-E2	C	From Leg	3.00	0.0000	124.00	No Ice	3.15	1.29	0.06
(AT&T - Reserved)			4.00			1/2" Ice	3.36	1.44	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	3.59	1.60	0.11
						2" Ice	4.07	1.95	0.17
DC6-48-60-18-8F Surge Arrestor	A	From Leg	3.00	0.0000	124.00	No Ice	1.91	1.91	0.02
			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T - Reserved)			0.00			1" Ice	2.29	2.29	0.06
						2" Ice	2.71	2.71	0.12
DC6-48-60-18-8F Surge Arrestor	B	From Leg	3.00	0.0000	124.00	No Ice	1.91	1.91	0.02
			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T - Reserved)			0.00			1" Ice	2.29	2.29	0.06
						2" Ice	2.71	2.71	0.12
SitePro VFA12-HD	A	From Leg	3.00	0.0000	124.00	No Ice	21.00	21.00	0.75
(AT&T - Reserved)			0.00			1/2" Ice	25.00	25.00	0.90
			0.00			1" Ice	29.00	29.00	1.05
						2" Ice	37.00	37.00	1.35
SitePro VFA12-HD	B	From Leg	3.00	0.0000	124.00	No Ice	21.00	21.00	0.75
(AT&T - Reserved)			0.00			1/2" Ice	25.00	25.00	0.90
			0.00			1" Ice	29.00	29.00	1.05
						2" Ice	37.00	37.00	1.35
SitePro VFA12-HD	C	From Leg	3.00	0.0000	124.00	No Ice	21.00	21.00	0.75
(AT&T - Reserved)			0.00			1/2" Ice	25.00	25.00	0.90
			0.00			1" Ice	29.00	29.00	1.05
						2" Ice	37.00	37.00	1.35

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
8' Dish	A	Paraboloid w/o	From	1.00	0.0000		175.00	8.00	No Ice	50.27	0.10
(Eversource)		Radome	Leg	0.00					1/2" Ice	51.32	0.26
				0.00					1" Ice	52.37	0.49
									2" Ice	54.48	0.95
8' Dish	B	Paraboloid w/o	From	1.00	0.0000		175.00	8.00	No Ice	50.27	0.10
(Eversource)		Radome	Leg	0.00					1/2" Ice	51.32	0.26
				0.00					1" Ice	52.37	0.49
									2" Ice	54.48	0.95
8' Dish	C	Paraboloid w/o	From	1.00	0.0000		175.00	8.00	No Ice	50.27	0.10
(Eversource (Reserved))		Radome	Leg	0.00					1/2" Ice	51.32	0.26
				0.00					1" Ice	52.37	0.49
									2" Ice	54.48	0.95
8' Dish	A	Paraboloid w/o	From	1.00	0.0000		164.00	8.00	No Ice	50.27	0.10
(Eversource (Reserved))		Radome	Leg	0.00					1/2" Ice	51.32	0.26
				0.00					1" Ice	52.37	0.49
									2" Ice	54.48	0.95

Tower Pressures - No Ice

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	170.00	1.415	56	124.798	A	10.802	9.599	9.599	47.05	26.980	0.000
180.00-160.00					B	10.802	9.599		47.05	0.000	0.000
					C	10.802	9.599		47.05	0.000	0.000
T2	150.00	1.378	55	165.841	A	12.127	11.686	11.686	49.07	37.661	0.000
160.00-140.00					B	12.127	11.686		49.07	0.000	0.000
					C	12.127	11.686		49.07	0.000	0.000
T3	130.00	1.337	53	209.283	A	14.333	18.574	18.574	56.44	38.549	0.000
140.00-120.00					B	14.333	18.574		56.44	4.620	0.000
					C	14.333	18.574		56.44	1.120	0.000
T4	110.00	1.291	51	249.283	A	23.101	18.574	18.574	44.57	38.549	0.000
120.00-100.00					B	23.101	18.574		44.57	9.240	0.000
					C	23.101	18.574		44.57	5.600	0.000
T5	90.00	1.238	49	289.283	A	26.242	18.574	18.574	41.45	38.549	0.000
100.00-80.00					B	26.242	18.574		41.45	9.240	0.000
					C	26.242	18.574		41.45	5.600	0.000
T6 80.00-60.00	70.00	1.174	47	334.393	A	24.032	28.798	28.798	54.51	38.549	0.000
					B	24.032	28.798		54.51	9.240	0.000
					C	24.032	28.798		54.51	5.600	0.000
T7 60.00-40.00	50.00	1.094	43	374.393	A	26.363	28.798	28.798	52.21	38.549	0.000
					B	26.363	28.798		52.21	9.240	0.000
					C	26.363	28.798		52.21	5.600	0.000
T8 40.00-20.00	30.00	0.982	39	414.393	A	28.747	28.798	28.798	50.04	38.549	0.000
					B	28.747	28.798		50.04	9.240	0.000
					C	28.747	28.798		50.04	5.600	0.000
T9 20.00-0.00	10.00	0.85	34	457.939	A	38.641	35.893	35.893	48.16	23.129	0.000
					B	38.641	35.893		48.16	5.544	0.000
					C	38.641	35.893		48.16	3.360	0.000

Tower Pressure - With Ice

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	170.00	1.415	8	2.0323	131.580	A	10.802	45.123	23.170	41.43	82.107	0.000
180.00-160.00						B	10.802	45.123		41.43	0.000	0.000
						C	10.802	45.123		41.43	0.000	0.000
T2	150.00	1.378	7	2.0070	172.539	A	12.127	49.427	25.088	40.76	127.120	0.000
160.00-140.00						B	12.127	49.427		40.76	0.000	0.000
						C	12.127	49.427		40.76	0.000	0.000
T3	130.00	1.337	7	1.9785	215.886	A	14.333	54.471	31.786	46.20	130.362	0.000
140.00-120.00						B	14.333	54.471		46.20	16.110	0.000
						C	14.333	54.471		46.20	7.737	0.000
T4	110.00	1.291	7	1.9457	255.777	A	23.101	57.252	31.567	39.29	129.160	0.000
120.00-100.00						B	23.101	57.252		39.29	32.002	0.000
						C	23.101	57.252		39.29	38.231	0.000
T5 100.00-80.00	90.00	1.238	7	1.9070	295.648	A	26.242	59.906	31.309	36.34	127.743	0.000
						B	26.242	59.906		36.34	31.745	0.000
						C	26.242	59.906		36.34	37.695	0.000
T6 80.00-60.00	70.00	1.174	6	1.8597	340.600	A	24.032	63.563	41.217	47.05	126.008	0.000
						B	24.032	63.563		47.05	31.431	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	24.032	63.563		47.05	37.039	0.000
T7 60.00-40.00	50.00	1.094	6	1.7982	380.394	A	26.363	64.509	40.806	44.90	123.754	0.000
						B	26.363	64.509		44.90	31.023	0.000
						C	26.363	64.509		44.90	36.187	0.000
T8 40.00-20.00	30.00	0.982	5	1.7086	420.096	A	28.747	64.767	40.208	43.00	120.475	0.000
						B	28.747	64.767		43.00	30.431	0.000
						C	28.747	64.767		43.00	34.948	0.000
T9 20.00-0.00	10.00	0.85	5	1.5309	463.048	A	38.641	69.777	46.116	42.54	68.384	0.000
						B	38.641	69.777		42.54	17.556	0.000
						C	38.641	69.777		42.54	19.497	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	170.00	1.415	34	124.798	A	10.802	9.599	9.599	47.05	26.980	0.000
180.00-160.00					B	10.802	9.599		47.05	0.000	0.000
					C	10.802	9.599		47.05	0.000	0.000
T2	150.00	1.378	33	165.841	A	12.127	11.686	11.686	49.07	37.661	0.000
160.00-140.00					B	12.127	11.686		49.07	0.000	0.000
					C	12.127	11.686		49.07	0.000	0.000
T3	130.00	1.337	32	209.283	A	14.333	18.574	18.574	56.44	38.549	0.000
140.00-120.00					B	14.333	18.574		56.44	4.620	0.000
					C	14.333	18.574		56.44	1.120	0.000
T4	110.00	1.291	31	249.283	A	23.101	18.574	18.574	44.57	38.549	0.000
120.00-100.00					B	23.101	18.574		44.57	9.240	0.000
					C	23.101	18.574		44.57	5.600	0.000
T5	90.00	1.238	30	289.283	A	26.242	18.574	18.574	41.45	38.549	0.000
100.00-80.00					B	26.242	18.574		41.45	9.240	0.000
					C	26.242	18.574		41.45	5.600	0.000
T6 80.00-60.00	70.00	1.174	28	334.393	A	24.032	28.798	28.798	54.51	38.549	0.000
					B	24.032	28.798		54.51	9.240	0.000
					C	24.032	28.798		54.51	5.600	0.000
T7 60.00-40.00	50.00	1.094	26	374.393	A	26.363	28.798	28.798	52.21	38.549	0.000
					B	26.363	28.798		52.21	9.240	0.000
					C	26.363	28.798		52.21	5.600	0.000
T8 40.00-20.00	30.00	0.982	24	414.393	A	28.747	28.798	28.798	50.04	38.549	0.000
					B	28.747	28.798		50.04	9.240	0.000
					C	28.747	28.798		50.04	5.600	0.000
T9 20.00-0.00	10.00	0.85	20	457.939	A	38.641	35.893	35.893	48.16	23.129	0.000
					B	38.641	35.893		48.16	5.544	0.000
					C	38.641	35.893		48.16	3.360	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.12	0.79	A	0.163	2.723	56	1	1	16.265	2.88	144.23	C
180.00-160.00			B	0.163	2.723		1	1	16.265			
			C	0.163	2.723		1	1	16.265			
T2	0.17	1.17	A	0.144	2.795	55	1	1	18.424	3.44	172.14	C
160.00-140.00			B	0.144	2.795		1	1	18.424			
			C	0.144	2.795		1	1	18.424			
T3	0.22	2.50	A	0.157	2.745	53	1	1	22.569	3.99	199.56	C
140.00-120.00			B	0.157	2.745		1	1	22.569			
			C	0.157	2.745		1	1	22.569			
T4	0.30	2.94	A	0.167	2.709	51	1	1	31.509	5.11	255.51	C
120.00-100.00			B	0.167	2.709		1	1	31.509			
			C	0.167	2.709		1	1	31.509			
T5	0.30	3.11	A	0.155	2.753	49	1	1	34.651	5.32	265.89	C
100.00-80.00			B	0.155	2.753		1	1	34.651			
			C	0.155	2.753		1	1	34.651			
T6	0.30	4.34	A	0.158	2.742	47	1	1	36.208	5.20	259.87	C
80.00-60.00			B	0.158	2.742		1	1	36.208			
			C	0.158	2.742		1	1	36.208			
T7	0.30	4.86	A	0.147	2.781	43	1	1	38.382	5.12	255.85	C
60.00-40.00			B	0.147	2.781		1	1	38.382			
			C	0.147	2.781		1	1	38.382			
T8	0.30	5.22	A	0.139	2.813	39	1	1	40.644	4.85	242.30	C
40.00-20.00			B	0.139	2.813		1	1	40.644			
			C	0.139	2.813		1	1	40.644			
T9 20.00-0.00	0.18	6.28	A	0.163	2.725	34	1	1	53.906	4.76	237.99	C
			B	0.163	2.725		1	1	53.906			
			C	0.163	2.725		1	1	53.906			
Sum Weight:	2.21	31.22						OTM	3379.05 kip-ft	40.67		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.12	0.79	A	0.163	2.723	56	0.8	1	14.104	2.60	130.20	C
180.00-160.00			B	0.163	2.723		0.8	1	14.104			
			C	0.163	2.723		0.8	1	14.104			
T2	0.17	1.17	A	0.144	2.795	55	0.8	1	15.999	3.13	156.39	C
160.00-140.00			B	0.144	2.795		0.8	1	15.999			
			C	0.144	2.795		0.8	1	15.999			
T3	0.22	2.50	A	0.157	2.745	53	0.8	1	19.703	3.64	181.83	C
140.00-120.00			B	0.157	2.745		0.8	1	19.703			
			C	0.157	2.745		0.8	1	19.703			
T4	0.30	2.94	A	0.167	2.709	51	0.8	1	26.889	4.57	228.26	C
120.00-100.00			B	0.167	2.709		0.8	1	26.889			
			C	0.167	2.709		0.8	1	26.889			
T5	0.30	3.11	A	0.155	2.753	49	0.8	1	29.403	4.71	235.74	C
100.00-80.00			B	0.155	2.753		0.8	1	29.403			
			C	0.155	2.753		0.8	1	29.403			
T6	0.30	4.34	A	0.158	2.742	47	0.8	1	31.402	4.68	233.79	C
80.00-60.00			B	0.158	2.742		0.8	1	31.402			
			C	0.158	2.742		0.8	1	31.402			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T7	0.30	4.86	A	0.147	2.781	43	0.8	1	33.109	4.58	228.82	C
60.00-40.00			B	0.147	2.781		0.8	1	33.109			
			C	0.147	2.781		0.8	1	33.109			
T8	0.30	5.22	A	0.139	2.813	39	0.8	1	34.894	4.31	215.53	C
40.00-20.00			B	0.139	2.813		0.8	1	34.894			
			C	0.139	2.813		0.8	1	34.894			
T9 20.00-0.00	0.18	6.28	A	0.163	2.725	34	0.8	1	46.178	4.16	207.82	C
			B	0.163	2.725		0.8	1	46.178			
			C	0.163	2.725		0.8	1	46.178			
Sum Weight:	2.21	31.22						OTM	3038.13 kip-ft	36.37		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.12	0.79	A	0.163	2.723	56	0.85	1	14.644	2.67	133.71	C
180.00-160.00			B	0.163	2.723		0.85	1	14.644			
			C	0.163	2.723		0.85	1	14.644			
T2	0.17	1.17	A	0.144	2.795	55	0.85	1	16.605	3.21	160.33	C
160.00-140.00			B	0.144	2.795		0.85	1	16.605			
			C	0.144	2.795		0.85	1	16.605			
T3	0.22	2.50	A	0.157	2.745	53	0.85	1	20.419	3.73	186.26	C
140.00-120.00			B	0.157	2.745		0.85	1	20.419			
			C	0.157	2.745		0.85	1	20.419			
T4	0.30	2.94	A	0.167	2.709	51	0.85	1	28.044	4.70	235.08	C
120.00-100.00			B	0.167	2.709		0.85	1	28.044			
			C	0.167	2.709		0.85	1	28.044			
T5	0.30	3.11	A	0.155	2.753	49	0.85	1	30.715	4.87	243.28	C
100.00-80.00			B	0.155	2.753		0.85	1	30.715			
			C	0.155	2.753		0.85	1	30.715			
T6	0.30	4.34	A	0.158	2.742	47	0.85	1	32.603	4.81	240.31	C
80.00-60.00			B	0.158	2.742		0.85	1	32.603			
			C	0.158	2.742		0.85	1	32.603			
T7	0.30	4.86	A	0.147	2.781	43	0.85	1	34.427	4.71	235.58	C
60.00-40.00			B	0.147	2.781		0.85	1	34.427			
			C	0.147	2.781		0.85	1	34.427			
T8	0.30	5.22	A	0.139	2.813	39	0.85	1	36.332	4.44	222.22	C
40.00-20.00			B	0.139	2.813		0.85	1	36.332			
			C	0.139	2.813		0.85	1	36.332			
T9 20.00-0.00	0.18	6.28	A	0.163	2.725	34	0.85	1	48.110	4.31	215.36	C
			B	0.163	2.725		0.85	1	48.110			
			C	0.163	2.725		0.85	1	48.110			
Sum Weight:	2.21	31.22						OTM	3123.36 kip-ft	37.44		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	1.39	3.97	A	0.425	2.017	8	1	1	40.016	0.84	41.85	C
180.00-160.00			B	0.425	2.017		1	1	40.016			
			C	0.425	2.017		1	1	40.016			
T2	2.06	4.67	A	0.357	2.156	7	1	1	42.703	1.07	53.65	C
160.00-140.00			B	0.357	2.156		1	1	42.703			
			C	0.357	2.156		1	1	42.703			
T3	2.41	6.48	A	0.319	2.247	7	1	1	47.286	1.23	61.47	C
140.00-120.00			B	0.319	2.247		1	1	47.286			
			C	0.319	2.247		1	1	47.286			
T4	2.93	7.86	A	0.314	2.259	7	1	1	57.650	1.49	74.60	C
120.00-100.00			B	0.314	2.259		1	1	57.650			
			C	0.314	2.259		1	1	57.650			
T5	2.86	8.39	A	0.291	2.319	7	1	1	61.964	1.50	74.99	C
100.00-80.00			B	0.291	2.319		1	1	61.964			
			C	0.291	2.319		1	1	61.964			
T6	2.78	9.47	A	0.257	2.416	6	1	1	61.331	1.44	71.90	C
80.00-60.00			B	0.257	2.416		1	1	61.331			
			C	0.257	2.416		1	1	61.331			
T7	2.68	10.09	A	0.239	2.471	6	1	1	63.930	1.38	68.93	C
60.00-40.00			B	0.239	2.471		1	1	63.930			
			C	0.239	2.471		1	1	63.930			
T8	2.53	10.64	A	0.223	2.522	5	1	1	66.234	1.27	63.26	C
40.00-20.00			B	0.223	2.522		1	1	66.234			
			C	0.223	2.522		1	1	66.234			
T9 20.00-0.00	1.35	12.33	A	0.234	2.486	5	1	1	79.202	1.02	51.13	C
			B	0.234	2.486		1	1	79.202			
			C	0.234	2.486		1	1	79.202			
Sum Weight:	20.98	73.91						OTM	979.91 kip-ft	11.24		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	1.39	3.97	A	0.425	2.017	8	0.8	1	37.856	0.81	40.42	C
180.00-160.00			B	0.425	2.017		0.8	1	37.856			
			C	0.425	2.017		0.8	1	37.856			
T2	2.06	4.67	A	0.357	2.156	7	0.8	1	40.278	1.04	51.98	C
160.00-140.00			B	0.357	2.156		0.8	1	40.278			
			C	0.357	2.156		0.8	1	40.278			
T3	2.41	6.48	A	0.319	2.247	7	0.8	1	44.419	1.19	59.48	C
140.00-120.00			B	0.319	2.247		0.8	1	44.419			
			C	0.319	2.247		0.8	1	44.419			
T4	2.93	7.86	A	0.314	2.259	7	0.8	1	53.030	1.43	71.48	C
120.00-100.00			B	0.314	2.259		0.8	1	53.030			
			C	0.314	2.259		0.8	1	53.030			
T5	2.86	8.39	A	0.291	2.319	7	0.8	1	56.715	1.43	71.50	C
100.00-80.00			B	0.291	2.319		0.8	1	56.715			
			C	0.291	2.319		0.8	1	56.715			
T6	2.78	9.47	A	0.257	2.416	6	0.8	1	56.524	1.37	68.75	C
80.00-60.00			B	0.257	2.416		0.8	1	56.524			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
			C	0.257	2.416		0.8	1	56.524			
T7	2.68	10.09	A	0.239	2.471	6	0.8	1	58.658	1.31	65.63	C
60.00-40.00			B	0.239	2.471		0.8	1	58.658			
			C	0.239	2.471		0.8	1	58.658			
T8	2.53	10.64	A	0.223	2.522	5	0.8	1	60.484	1.20	59.97	C
40.00-20.00			B	0.223	2.522		0.8	1	60.484			
			C	0.223	2.522		0.8	1	60.484			
T9 20.00-0.00	1.35	12.33	A	0.234	2.486	5	0.8	1	71.473	0.95	47.35	C
			B	0.234	2.486		0.8	1	71.473			
			C	0.234	2.486		0.8	1	71.473			
Sum Weight:	20.98	73.91						OTM	941.32 kip-ft	10.73		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	1.39	3.97	A	0.425	2.017	8	0.85	1	38.396	0.82	40.78	C
180.00-160.00			B	0.425	2.017		0.85	1	38.396			
			C	0.425	2.017		0.85	1	38.396			
T2	2.06	4.67	A	0.357	2.156	7	0.85	1	40.884	1.05	52.40	C
160.00-140.00			B	0.357	2.156		0.85	1	40.884			
			C	0.357	2.156		0.85	1	40.884			
T3	2.41	6.48	A	0.319	2.247	7	0.85	1	45.136	1.20	59.98	C
140.00-120.00			B	0.319	2.247		0.85	1	45.136			
			C	0.319	2.247		0.85	1	45.136			
T4	2.93	7.86	A	0.314	2.259	7	0.85	1	54.185	1.45	72.26	C
120.00-100.00			B	0.314	2.259		0.85	1	54.185			
			C	0.314	2.259		0.85	1	54.185			
T5	2.86	8.39	A	0.291	2.319	7	0.85	1	58.027	1.45	72.37	C
100.00-80.00			B	0.291	2.319		0.85	1	58.027			
			C	0.291	2.319		0.85	1	58.027			
T6	2.78	9.47	A	0.257	2.416	6	0.85	1	57.726	1.39	69.53	C
80.00-60.00			B	0.257	2.416		0.85	1	57.726			
			C	0.257	2.416		0.85	1	57.726			
T7	2.68	10.09	A	0.239	2.471	6	0.85	1	59.976	1.33	66.46	C
60.00-40.00			B	0.239	2.471		0.85	1	59.976			
			C	0.239	2.471		0.85	1	59.976			
T8	2.53	10.64	A	0.223	2.522	5	0.85	1	61.922	1.22	60.79	C
40.00-20.00			B	0.223	2.522		0.85	1	61.922			
			C	0.223	2.522		0.85	1	61.922			
T9 20.00-0.00	1.35	12.33	A	0.234	2.486	5	0.85	1	73.405	0.97	48.29	C
			B	0.234	2.486		0.85	1	73.405			
			C	0.234	2.486		0.85	1	73.405			
Sum Weight:	20.98	73.91						OTM	950.97 kip-ft	10.86		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.12	0.79	A	0.163	2.723	34	1	1	16.265	1.75	87.25	C
180.00-160.00			B	0.163	2.723		1	1	16.265			
			C	0.163	2.723		1	1	16.265			
T2	0.17	1.17	A	0.144	2.795	33	1	1	18.752	2.11	105.42	C
160.00-140.00			B	0.144	2.795		1	1	18.752			
			C	0.144	2.795		1	1	18.752			
T3	0.22	2.50	A	0.157	2.745	32	1	1	23.687	2.50	124.91	C
140.00-120.00			B	0.157	2.745		1	1	23.687			
			C	0.157	2.745		1	1	23.687			
T4	0.30	2.94	A	0.167	2.709	31	1	1	32.577	3.17	158.38	C
120.00-100.00			B	0.167	2.709		1	1	32.577			
			C	0.167	2.709		1	1	32.577			
T5	0.30	3.11	A	0.155	2.753	30	1	1	35.734	3.29	164.61	C
100.00-80.00			B	0.155	2.753		1	1	35.734			
			C	0.155	2.753		1	1	35.734			
T6	0.30	4.34	A	0.158	2.742	28	1	1	36.208	3.14	157.21	C
80.00-60.00			B	0.158	2.742		1	1	36.208			
			C	0.158	2.742		1	1	36.208			
T7	0.30	4.86	A	0.147	2.781	26	1	1	38.382	3.10	154.77	C
60.00-40.00			B	0.147	2.781		1	1	38.382			
			C	0.147	2.781		1	1	38.382			
T8	0.30	5.22	A	0.139	2.813	24	1	1	41.007	2.95	147.60	C
40.00-20.00			B	0.139	2.813		1	1	41.007			
			C	0.139	2.813		1	1	41.007			
T9 20.00-0.00	0.18	6.28	A	0.163	2.725	20	1	1	53.906	2.88	143.97	C
			B	0.163	2.725		1	1	53.906			
			C	0.163	2.725		1	1	53.906			
Sum Weight:	2.21	31.22						OTM	2074.62 kip-ft	24.88		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.12	0.79	A	0.163	2.723	34	0.8	1	14.104	1.58	78.76	C
180.00-160.00			B	0.163	2.723		0.8	1	14.104			
			C	0.163	2.723		0.8	1	14.104			
T2	0.17	1.17	A	0.144	2.795	33	0.8	1	16.327	1.92	95.89	C
160.00-140.00			B	0.144	2.795		0.8	1	16.327			
			C	0.144	2.795		0.8	1	16.327			
T3	0.22	2.50	A	0.157	2.745	32	0.8	1	20.820	2.28	114.18	C
140.00-120.00			B	0.157	2.745		0.8	1	20.820			
			C	0.157	2.745		0.8	1	20.820			
T4	0.30	2.94	A	0.167	2.709	31	0.8	1	27.957	2.84	141.89	C
120.00-100.00			B	0.167	2.709		0.8	1	27.957			
			C	0.167	2.709		0.8	1	27.957			
T5	0.30	3.11	A	0.155	2.753	30	0.8	1	30.485	2.93	146.37	C
100.00-80.00			B	0.155	2.753		0.8	1	30.485			
			C	0.155	2.753		0.8	1	30.485			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T6	0.30	4.34	A	0.158	2.742	28	0.8	1	31.402	2.83	141.43	C
80.00-60.00			B	0.158	2.742		0.8	1	31.402			
			C	0.158	2.742		0.8	1	31.402			
T7	0.30	4.86	A	0.147	2.781	26	0.8	1	33.109	2.77	138.42	C
60.00-40.00			B	0.147	2.781		0.8	1	33.109			
			C	0.147	2.781		0.8	1	33.109			
T8	0.30	5.22	A	0.139	2.813	24	0.8	1	35.257	2.63	131.40	C
40.00-20.00			B	0.139	2.813		0.8	1	35.257			
			C	0.139	2.813		0.8	1	35.257			
T9 20.00-0.00	0.18	6.28	A	0.163	2.725	20	0.8	1	46.178	2.51	125.72	C
			B	0.163	2.725		0.8	1	46.178			
			C	0.163	2.725		0.8	1	46.178			
Sum Weight:	2.21	31.22						OTM	1868.39 kip-ft	22.28		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.12	0.79	A	0.163	2.723	34	0.85	1	14.644	1.62	80.89	C
180.00-160.00			B	0.163	2.723		0.85	1	14.644			
			C	0.163	2.723		0.85	1	14.644			
T2	0.17	1.17	A	0.144	2.795	33	0.85	1	16.933	1.97	98.28	C
160.00-140.00			B	0.144	2.795		0.85	1	16.933			
			C	0.144	2.795		0.85	1	16.933			
T3	0.22	2.50	A	0.157	2.745	32	0.85	1	21.537	2.34	116.86	C
140.00-120.00			B	0.157	2.745		0.85	1	21.537			
			C	0.157	2.745		0.85	1	21.537			
T4	0.30	2.94	A	0.167	2.709	31	0.85	1	29.112	2.92	146.02	C
120.00-100.00			B	0.167	2.709		0.85	1	29.112			
			C	0.167	2.709		0.85	1	29.112			
T5	0.30	3.11	A	0.155	2.753	30	0.85	1	31.797	3.02	150.93	C
100.00-80.00			B	0.155	2.753		0.85	1	31.797			
			C	0.155	2.753		0.85	1	31.797			
T6	0.30	4.34	A	0.158	2.742	28	0.85	1	32.603	2.91	145.37	C
80.00-60.00			B	0.158	2.742		0.85	1	32.603			
			C	0.158	2.742		0.85	1	32.603			
T7	0.30	4.86	A	0.147	2.781	26	0.85	1	34.427	2.85	142.51	C
60.00-40.00			B	0.147	2.781		0.85	1	34.427			
			C	0.147	2.781		0.85	1	34.427			
T8	0.30	5.22	A	0.139	2.813	24	0.85	1	36.695	2.71	135.45	C
40.00-20.00			B	0.139	2.813		0.85	1	36.695			
			C	0.139	2.813		0.85	1	36.695			
T9 20.00-0.00	0.18	6.28	A	0.163	2.725	20	0.85	1	48.110	2.61	130.28	C
			B	0.163	2.725		0.85	1	48.110			
			C	0.163	2.725		0.85	1	48.110			
Sum Weight:	2.21	31.22						OTM	1919.95 kip-ft	22.93		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	17.08					
Bracing Weight	14.14					
Total Member Self-Weight	31.22			-12.63	-3.32	
Total Weight	40.92			-12.63	-3.32	
Wind 0 deg - No Ice		0.00	-63.84	-6892.01	-3.32	5.76
Wind 30 deg - No Ice		30.84	-50.02	-5319.04	-3412.35	-29.50
Wind 60 deg - No Ice		49.73	-29.21	-3186.18	-5357.17	-55.39
Wind 90 deg - No Ice		57.44	-1.88	-341.36	-6089.15	-65.63
Wind 120 deg - No Ice		53.62	34.59	3864.66	-5686.74	-54.31
Wind 150 deg - No Ice		26.63	53.73	5922.88	-2686.22	-31.79
Wind 180 deg - No Ice		0.00	59.94	6583.00	-3.32	-5.76
Wind 210 deg - No Ice		-26.63	53.73	5922.88	2679.58	21.80
Wind 240 deg - No Ice		-53.62	34.59	3864.66	5680.09	48.55
Wind 270 deg - No Ice		-57.44	-1.88	-341.36	6082.50	65.63
Wind 300 deg - No Ice		-49.73	-29.21	-3186.18	5350.52	61.15
Wind 330 deg - No Ice		-30.84	-50.02	-5319.04	3405.70	39.49
Member Ice	42.70					
Total Weight Ice	119.19			-116.57	-10.48	
Wind 0 deg - Ice		0.00	-15.83	-1786.50	-10.48	4.82
Wind 30 deg - Ice		7.80	-13.02	-1474.37	-845.21	-8.35
Wind 60 deg - Ice		13.00	-7.58	-918.15	-1377.66	-19.06
Wind 90 deg - Ice		14.98	-0.28	-165.01	-1572.07	-24.55
Wind 120 deg - Ice		13.46	8.31	782.84	-1416.14	-22.87
Wind 150 deg - Ice		7.18	13.56	1333.90	-738.23	-15.56
Wind 180 deg - Ice		0.00	15.38	1523.18	-10.48	-4.82
Wind 210 deg - Ice		-7.18	13.56	1333.90	717.28	7.21
Wind 240 deg - Ice		-13.46	8.31	782.84	1395.19	18.05
Wind 270 deg - Ice		-14.98	-0.28	-165.01	1551.12	24.55
Wind 300 deg - Ice		-13.00	-7.58	-918.15	1356.71	23.88
Wind 330 deg - Ice		-7.80	-13.02	-1474.37	824.26	16.70
Total Weight	40.92			-12.63	-3.32	
Wind 0 deg - Service		0.00	-39.01	-4212.01	-2.35	4.13
Wind 30 deg - Service		18.85	-30.60	-3253.83	-2089.35	-17.12
Wind 60 deg - Service		30.42	-17.87	-1945.46	-3283.97	-32.89
Wind 90 deg - Service		35.14	-1.14	-199.76	-3733.40	-39.36
Wind 120 deg - Service		32.78	21.12	2369.37	-3483.34	-32.88
Wind 150 deg - Service		16.31	32.84	3632.59	-1650.09	-19.61
Wind 180 deg - Service		0.00	36.65	4038.55	-2.35	-4.13
Wind 210 deg - Service		-16.31	32.84	3632.59	1645.40	12.46
Wind 240 deg - Service		-32.78	21.12	2369.37	3478.64	28.75
Wind 270 deg - Service		-35.14	-1.14	-199.76	3728.71	39.36
Wind 300 deg - Service		-30.42	-17.87	-1945.46	3279.27	37.02
Wind 330 deg - Service		-18.85	-30.60	-3253.83	2084.65	24.27

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

Comb. No.	Description
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	15	21.60	-0.47	-0.01
			Max. Compression	2	-24.55	0.32	-0.01
			Max. Mx	10	11.82	0.62	-0.00
			Max. My	12	-4.76	0.14	0.68
			Max. Vy	11	2.57	0.06	-0.00
			Max. Vx	18	-2.17	-0.06	0.13

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Diagonal	Max Tension	10	4.66	0.00	0.00
			Max. Compression	10	-4.64	0.00	0.00
			Max. Mx	29	0.47	0.03	0.00
			Max. My	10	-4.01	-0.00	0.01
			Max. Vy	29	0.03	0.03	0.00
			Max. Vx	10	-0.00	0.00	0.00
		Top Girt	Max Tension	15	0.69	0.00	0.00
			Max. Compression	18	-0.74	0.00	0.00
			Max. Mx	35	-0.10	-0.04	0.00
			Max. My	30	-0.06	0.00	0.00
			Max. Vy	35	0.04	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
T2	160 - 140	Leg	Max Tension	15	58.55	-0.06	-0.01
			Max. Compression	2	-62.41	0.42	-0.03
			Max. Mx	14	58.15	-0.43	0.03
			Max. My	23	-15.93	0.14	-0.62
			Max. Vy	14	-0.25	-0.41	0.01
			Max. Vx	8	0.58	0.00	0.59
		Diagonal	Max Tension	10	5.70	0.00	0.00
			Max. Compression	10	-5.91	0.00	0.00
			Max. Mx	29	1.00	0.04	-0.01
			Max. My	22	-5.20	0.00	-0.01
			Max. Vy	29	0.04	0.04	-0.01
			Max. Vx	22	0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	15	93.12	-1.40	0.01
			Max. Compression	2	-102.62	1.68	-0.02
			Max. Mx	22	80.82	2.56	-0.11
			Max. My	20	-15.81	0.01	2.57
			Max. Vy	14	-1.51	-1.42	0.01
			Max. Vx	8	1.54	-0.03	1.42
		Diagonal	Max Tension	24	8.95	0.00	0.00
			Max. Compression	10	-9.20	0.00	0.00
			Max. Mx	29	1.25	0.08	0.01
			Max. My	22	-7.95	0.01	-0.01
			Max. Vy	29	0.06	0.08	0.01
			Max. Vx	37	0.00	0.00	0.00
T4	120 - 100	Leg	Max Tension	15	138.63	-0.62	0.00
			Max. Compression	2	-152.71	0.46	0.00
			Max. Mx	14	106.66	-1.74	0.02
			Max. My	8	-16.67	0.01	1.52
			Max. Vy	14	-0.33	-1.74	0.02
			Max. Vx	20	-0.31	0.01	-1.52
		Diagonal	Max Tension	24	10.26	0.00	0.00
			Max. Compression	24	-10.35	0.00	0.00
			Max. Mx	27	1.82	0.14	-0.02
			Max. My	22	-9.30	0.01	-0.02
			Max. Vy	29	0.09	0.14	0.02
			Max. Vx	30	-0.01	0.00	0.00
T5	100 - 80	Leg	Max Tension	15	179.89	-0.41	-0.00
			Max. Compression	2	-198.18	1.26	-0.02
			Max. Mx	3	-196.02	1.26	-0.02
			Max. My	8	-21.75	0.06	1.28
			Max. Vy	19	-0.22	1.26	-0.24
			Max. Vx	8	-0.28	0.06	1.28
		Diagonal	Max Tension	24	10.12	0.00	0.00
			Max. Compression	24	-10.21	0.00	0.00
			Max. Mx	29	1.43	0.17	0.02
			Max. My	30	-1.31	0.14	0.02
			Max. Vy	29	0.10	0.17	0.02
			Max. Vx	30	0.01	0.00	0.00
T6	80 - 60	Leg	Max Tension	15	213.95	-1.51	-0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	2	-237.10	1.93	-0.01
			Max. Mx	2	-237.10	1.93	-0.01
			Max. My	12	-36.09	0.10	-1.67
			Max. Vy	19	-0.22	1.92	-0.25
			Max. Vx	8	-0.27	0.02	1.64
		Diagonal	Max Tension	24	11.40	0.00	0.00
			Max. Compression	24	-11.58	0.00	0.00
			Max. Mx	29	1.73	0.27	0.04
			Max. My	30	-1.51	0.23	0.04
			Max. Vy	29	0.14	0.27	0.04
			Max. Vx	30	0.01	0.00	0.00
T7	60 - 40	Leg	Max Tension	15	248.63	-1.48	-0.00
			Max. Compression	2	-277.72	1.94	-0.00
			Max. Mx	2	-277.72	1.94	-0.00
			Max. My	12	-39.84	0.06	-1.63
			Max. Vy	33	0.30	-1.92	0.01
			Max. Vx	8	0.25	-0.01	1.63
		Diagonal	Max Tension	24	11.77	0.00	0.00
			Max. Compression	10	-11.97	0.00	0.00
			Max. Mx	29	2.08	0.33	0.04
			Max. My	30	-1.17	0.28	0.05
			Max. Vy	29	0.16	0.33	0.04
			Max. Vx	30	0.01	0.00	0.00
T8	40 - 20	Leg	Max Tension	15	281.09	-1.37	-0.00
			Max. Compression	2	-316.53	2.36	-0.00
			Max. Mx	29	35.10	-5.37	0.04
			Max. My	12	-43.39	0.00	-1.97
			Max. Vy	33	0.83	-5.36	0.01
			Max. Vx	8	0.30	-0.06	1.95
		Diagonal	Max Tension	24	12.14	0.00	0.00
			Max. Compression	10	-12.57	0.00	0.00
			Max. Mx	29	0.69	0.42	0.05
			Max. My	37	-3.60	0.35	-0.05
			Max. Vy	29	0.17	0.38	-0.04
			Max. Vx	30	0.01	0.00	0.00
T9	20 - 0	Leg	Max Tension	15	311.29	-2.59	0.00
			Max. Compression	2	-353.74	0.00	-0.00
			Max. Mx	27	-120.92	8.59	0.01
			Max. My	12	-46.91	0.02	-4.58
			Max. Vy	33	-1.33	-5.36	0.01
			Max. Vx	8	0.61	-0.08	4.33
		Diagonal	Max Tension	12	12.91	0.00	0.00
			Max. Compression	10	-13.85	0.00	0.00
			Max. Mx	29	-1.41	0.62	0.07
			Max. My	37	-6.37	0.57	-0.07
			Max. Vy	29	0.21	0.62	0.07
			Max. Vx	37	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	360.98	33.72	-20.90
	Max. H_x	18	360.98	33.72	-20.90
	Max. H_z	7	-301.07	-28.48	18.07
	Min. Vert	7	-301.07	-28.48	18.07

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. H_x	7	-301.07	-28.48	18.07
	Min. H_z	18	360.98	33.72	-20.90
Leg B	Max. Vert	10	361.32	-33.65	-21.03
	Max. H_x	23	-300.81	28.40	18.19
	Max. H_z	23	-300.81	28.40	18.19
	Min. Vert	23	-300.81	28.40	18.19
	Min. H_x	10	361.32	-33.65	-21.03
	Min. H_z	10	361.32	-33.65	-21.03
Leg A	Max. Vert	2	363.24	0.15	39.75
	Max. H_x	21	29.39	5.50	2.32
	Max. H_z	2	363.24	0.15	39.75
	Min. Vert	15	-318.81	-0.14	-35.17
	Min. H_x	9	29.39	-5.50	2.32
	Min. H_z	15	-318.81	-0.14	-35.17

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	40.92	0.00	0.00	-12.63	-3.32	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	49.10	0.00	-63.84	-6909.13	-4.02	5.80
0.9 Dead+1.0 Wind 0 deg - No Ice	36.83	0.00	-63.84	-6901.65	-3.02	5.79
1.2 Dead+1.0 Wind 30 deg - No Ice	49.10	30.84	-50.02	-5332.74	-3420.28	-29.52
0.9 Dead+1.0 Wind 30 deg - No Ice	36.83	30.84	-50.02	-5326.14	-3417.44	-29.53
1.2 Dead+1.0 Wind 60 deg - No Ice	49.10	49.73	-29.21	-3195.57	-5369.10	-55.43
0.9 Dead+1.0 Wind 60 deg - No Ice	36.83	49.73	-29.21	-3190.07	-5365.24	-55.42
1.2 Dead+1.0 Wind 90 deg - No Ice	49.10	57.44	-1.88	-344.91	-6102.57	-65.67
0.9 Dead+1.0 Wind 90 deg - No Ice	36.83	57.44	-1.88	-340.89	-6098.35	-65.65
1.2 Dead+1.0 Wind 120 deg - No Ice	49.10	53.62	34.59	3870.35	-5699.44	-54.42
0.9 Dead+1.0 Wind 120 deg - No Ice	36.83	53.62	34.59	3872.05	-5695.41	-54.39
1.2 Dead+1.0 Wind 150 deg - No Ice	49.10	26.63	53.73	5932.99	-2692.43	-31.86
0.9 Dead+1.0 Wind 150 deg - No Ice	36.83	26.63	53.73	5933.59	-2690.05	-31.86
1.2 Dead+1.0 Wind 180 deg - No Ice	49.10	0.00	59.94	6594.51	-4.03	-5.79
0.9 Dead+1.0 Wind 180 deg - No Ice	36.83	0.00	59.94	6594.76	-3.03	-5.79
1.2 Dead+1.0 Wind 210 deg - No Ice	49.10	-26.63	53.73	5933.00	2684.38	21.82
0.9 Dead+1.0 Wind 210 deg - No Ice	36.83	-26.63	53.73	5933.60	2684.01	21.83
1.2 Dead+1.0 Wind 240 deg - No Ice	49.10	-53.62	34.59	3870.36	5691.42	48.62
0.9 Dead+1.0 Wind 240 deg - No Ice	36.83	-53.62	34.59	3872.06	5689.40	48.60

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 270 deg - No Ice	49.10	-57.44	-1.88	-344.92	6094.57	65.67
0.9 Dead+1.0 Wind 270 deg - No Ice	36.83	-57.44	-1.88	-340.90	6092.36	65.66
1.2 Dead+1.0 Wind 300 deg - No Ice	49.10	-49.73	-29.21	-3195.61	5361.09	61.22
0.9 Dead+1.0 Wind 300 deg - No Ice	36.83	-49.73	-29.21	-3190.11	5359.24	61.20
1.2 Dead+1.0 Wind 330 deg - No Ice	49.10	-30.84	-50.02	-5332.77	3412.26	39.55
0.9 Dead+1.0 Wind 330 deg - No Ice	36.83	-30.84	-50.02	-5326.17	3411.42	39.55
1.2 Dead+1.0 Ice+1.0 Temp	127.37	-0.00	0.00	-119.75	-11.26	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	127.37	-0.00	-15.83	-1800.56	-11.25	4.84
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	127.37	7.80	-13.02	-1486.33	-851.39	-8.40
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	127.37	13.00	-7.58	-926.64	-1387.18	-19.16
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	127.37	14.98	-0.28	-168.78	-1582.79	-24.67
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	127.37	13.46	8.31	785.34	-1425.90	-23.00
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	127.37	7.18	13.56	1339.90	-743.55	-15.64
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	127.37	-0.00	15.38	1530.37	-11.27	-4.84
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	127.37	-7.18	13.56	1339.90	721.02	7.25
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	127.37	-13.46	8.31	785.33	1403.38	18.16
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	127.37	-14.98	-0.28	-168.80	1560.28	24.67
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	127.37	-13.00	-7.58	-926.66	1364.68	24.00
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	127.37	-7.80	-13.02	-1486.35	828.90	16.78
Dead+Wind 0 deg - Service	40.92	0.00	-39.01	-4231.22	-3.34	4.14
Dead+Wind 30 deg - Service	40.92	18.85	-30.60	-3271.29	-2094.06	-17.15
Dead+Wind 60 deg - Service	40.92	30.42	-17.87	-1960.69	-3290.73	-32.91
Dead+Wind 90 deg - Service	40.92	35.14	-1.14	-212.00	-3740.93	-39.38
Dead+Wind 120 deg - Service	40.92	32.78	21.12	2361.86	-3490.47	-32.93
Dead+Wind 150 deg - Service	40.92	16.31	32.84	3627.34	-1653.90	-19.66
Dead+Wind 180 deg - Service	40.92	0.00	36.65	4034.01	-3.34	-4.14
Dead+Wind 210 deg - Service	40.92	-16.31	32.84	3627.34	1647.22	12.49
Dead+Wind 240 deg - Service	40.92	-32.78	21.12	2361.86	3483.80	28.79
Dead+Wind 270 deg - Service	40.92	-35.14	-1.14	-212.00	3734.27	39.38
Dead+Wind 300 deg - Service	40.92	-30.42	-17.87	-1960.71	3284.06	37.05
Dead+Wind 330 deg - Service	40.92	-18.85	-30.60	-3271.30	2087.39	24.32

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-40.92	0.00	0.00	40.92	0.00	0.000%
2	0.00	-49.10	-63.84	-0.00	49.10	63.84	0.000%
3	0.00	-36.83	-63.84	-0.00	36.83	63.84	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
4	30.84	-49.10	-50.02	-30.84	49.10	50.02	0.000%
5	30.84	-36.83	-50.02	-30.84	36.83	50.02	0.000%
6	49.73	-49.10	-29.21	-49.73	49.10	29.21	0.000%
7	49.73	-36.83	-29.21	-49.73	36.83	29.21	0.000%
8	57.44	-49.10	-1.88	-57.44	49.10	1.88	0.000%
9	57.44	-36.83	-1.88	-57.44	36.83	1.88	0.000%
10	53.62	-49.10	34.59	-53.62	49.10	-34.59	0.000%
11	53.62	-36.83	34.59	-53.62	36.83	-34.59	0.001%
12	26.63	-49.10	53.73	-26.63	49.10	-53.73	0.000%
13	26.63	-36.83	53.73	-26.63	36.83	-53.73	0.000%
14	0.00	-49.10	59.94	-0.00	49.10	-59.94	0.000%
15	0.00	-36.83	59.94	0.00	36.83	-59.94	0.000%
16	-26.63	-49.10	53.73	26.63	49.10	-53.73	0.000%
17	-26.63	-36.83	53.73	26.63	36.83	-53.73	0.000%
18	-53.62	-49.10	34.59	53.62	49.10	-34.59	0.000%
19	-53.62	-36.83	34.59	53.62	36.83	-34.59	0.001%
20	-57.44	-49.10	-1.88	57.44	49.10	1.88	0.000%
21	-57.44	-36.83	-1.88	57.44	36.83	1.88	0.000%
22	-49.73	-49.10	-29.21	49.73	49.10	29.21	0.000%
23	-49.73	-36.83	-29.21	49.73	36.83	29.21	0.000%
24	-30.84	-49.10	-50.02	30.84	49.10	50.02	0.000%
25	-30.84	-36.83	-50.02	30.84	36.83	50.02	0.000%
26	0.00	-127.37	0.00	0.00	127.37	-0.00	0.000%
27	0.00	-127.37	-15.83	0.00	127.37	15.83	0.000%
28	7.80	-127.37	-13.02	-7.80	127.37	13.02	0.000%
29	13.00	-127.37	-7.58	-13.00	127.37	7.58	0.000%
30	14.98	-127.37	-0.28	-14.98	127.37	0.28	0.000%
31	13.46	-127.37	8.31	-13.46	127.37	-8.31	0.000%
32	7.18	-127.37	13.56	-7.18	127.37	-13.56	0.000%
33	0.00	-127.37	15.38	0.00	127.37	-15.38	0.000%
34	-7.18	-127.37	13.56	7.18	127.37	-13.56	0.000%
35	-13.46	-127.37	8.31	13.46	127.37	-8.31	0.000%
36	-14.98	-127.37	-0.28	14.98	127.37	0.28	0.000%
37	-13.00	-127.37	-7.58	13.00	127.37	7.58	0.000%
38	-7.80	-127.37	-13.02	7.80	127.37	13.02	0.000%
39	0.00	-40.92	-39.01	-0.00	40.92	39.01	0.000%
40	18.85	-40.92	-30.60	-18.85	40.92	30.60	0.000%
41	30.42	-40.92	-17.87	-30.42	40.92	17.87	0.000%
42	35.14	-40.92	-1.14	-35.14	40.92	1.14	0.000%
43	32.78	-40.92	21.12	-32.78	40.92	-21.12	0.000%
44	16.31	-40.92	32.84	-16.31	40.92	-32.84	0.000%
45	0.00	-40.92	36.65	0.00	40.92	-36.65	0.000%
46	-16.31	-40.92	32.84	16.31	40.92	-32.84	0.000%
47	-32.78	-40.92	21.12	32.78	40.92	-21.12	0.000%
48	-35.14	-40.92	-1.14	35.14	40.92	1.14	0.000%
49	-30.42	-40.92	-17.87	30.42	40.92	17.87	0.000%
50	-18.85	-40.92	-30.60	18.85	40.92	30.60	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001

5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000093
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000095
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000219
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	8.684	39	0.4425	0.1449
T2	160 - 140	6.800	39	0.4119	0.1259
T3	140 - 120	5.148	39	0.3339	0.0794
T4	120 - 100	3.768	39	0.2926	0.0572
T5	100 - 80	2.580	39	0.2380	0.0427
T6	80 - 60	1.634	39	0.1742	0.0285
T7	60 - 40	0.940	39	0.1309	0.0198
T8	40 - 20	0.437	39	0.0851	0.0126

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T9	20 - 0	0.129	39	0.0379	0.0060

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
189.40	DS9A09F36D-N	39	8.684	0.4425	0.1449	71170
189.00	24' x 6" Omni	39	8.684	0.4425	0.1449	71170
187.00	CO-41A	39	8.684	0.4425	0.1449	71170
180.00	Tower Top Amplifier	39	8.684	0.4425	0.1449	71170
175.00	8' Dish	39	8.202	0.4385	0.1422	71170
164.00	8' Dish	39	7.164	0.4225	0.1323	22248
158.00	531-70HD	39	6.622	0.4053	0.1219	17691
156.00	24' x 6" Omni	39	6.447	0.3980	0.1176	17330
153.00	ROHN 6-ft Side Arm	39	6.189	0.3860	0.1104	16990
144.40	ROHN 3-ft Side Arm	39	5.486	0.3499	0.0889	16099
135.00	APXVAALL24-43	39	4.780	0.3203	0.0712	18000
124.00	HPA65R-BU8A	39	4.027	0.2999	0.0602	27099

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	14.168	2	0.7206	0.2388
T2	160 - 140	11.098	2	0.6718	0.2079
T3	140 - 120	8.401	2	0.5449	0.1312
T4	120 - 100	6.150	2	0.4775	0.0962
T5	100 - 80	4.211	2	0.3884	0.0717
T6	80 - 60	2.667	2	0.2842	0.0476
T7	60 - 40	1.535	2	0.2136	0.0330
T8	40 - 20	0.715	2	0.1390	0.0210
T9	20 - 0	0.212	2	0.0619	0.0100

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
189.40	DS9A09F36D-N	2	14.168	0.7206	0.2388	44089
189.00	24' x 6" Omni	2	14.168	0.7206	0.2388	44089
187.00	CO-41A	2	14.168	0.7206	0.2388	44089
180.00	Tower Top Amplifier	2	14.168	0.7206	0.2388	44089
175.00	8' Dish	2	13.384	0.7144	0.2346	44089
164.00	8' Dish	2	11.691	0.6889	0.2183	13782
158.00	531-70HD	2	10.808	0.6611	0.2014	10943
156.00	24' x 6" Omni	2	10.522	0.6492	0.1942	10707
153.00	ROHN 6-ft Side Arm	2	10.101	0.6296	0.1824	10478

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
144.40	ROHN 3-ft Side Arm	2	8.954	0.5709	0.1469	9880
135.00	APXVAALL24-43	2	7.802	0.5227	0.1176	11012
124.00	HPA65R-BU8A	2	6.573	0.4894	0.1008	16618

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Diagonal	A325X	0.6250	1	4.66	9.75	0.478 ✔	1	Member Bearing
		Top Girt	A325X	0.6250	1	0.69	5.22	0.132 ✔	1	Member Bearing
T2	160	Diagonal	A325X	0.6250	1	5.91	14.63	0.404 ✔	1	Member Bearing
T3	140	Diagonal	A325X	0.6250	1	9.20	17.26	0.533 ✔	1	Bolt Shear
T4	120	Diagonal	A325X	0.7500	1	10.26	19.99	0.513 ✔	1	Member Bearing
T5	100	Diagonal	A325X	0.7500	1	10.12	19.99	0.506 ✔	1	Member Bearing
T6	80	Diagonal	A325X	0.7500	1	11.58	24.85	0.466 ✔	1	Bolt Shear
T7	60	Diagonal	A325X	0.7500	1	11.97	24.85	0.482 ✔	1	Bolt Shear
T8	40	Diagonal	A325X	0.7500	1	12.57	24.85	0.506 ✔	1	Bolt Shear
T9	20	Leg	F1554-105	1.5000	6	51.88	131.74	0.394 ✔	1	Bolt Tension
		Diagonal	A325X	0.7500	1	13.85	24.85	0.557 ✔	1	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	P2.5x.276	20.03	5.01	65.0 K=1.00	2.2535	-24.55	74.43	0.330 [1] ✔
T2	160 - 140	P3x.3	20.03	5.01	52.9 K=1.00	3.0159	-62.41	110.61	0.564 [1] ✔
T3	140 - 120	P5x0.5	20.03	6.68	44.5 K=1.00	7.9529	-102.62	309.54	0.332 [1] ✔
T4	120 - 100	P5x0.5	20.03	6.68	44.5 K=1.00	7.9529	-152.71	309.54	0.493 [1] ✔
T5	100 - 80	P5x0.5	20.03	6.68	44.5 K=1.00	7.9529	-198.18	309.54	0.640 [1] ✔
T6	80 - 60	P8x.5	20.03	10.02	41.8 K=1.00	12.7627	-237.10	505.56	0.469 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T7	60 - 40	P8x.5	20.03	10.02	41.8 K=1.00	12.7627	-277.72	505.56	0.549 [1] ✔
T8	40 - 20	P8x.5	20.03	10.02	41.8 K=1.00	12.7627	-316.53	505.56	0.626 [1] ✔
T9	20 - 0	P10x.5	20.03	10.02	33.1 K=1.00	16.1007	-353.74	668.66	0.529 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x1/8	8.40	4.04	122.0 K=1.00	0.4844	-4.64	9.32	0.498 [1] ✔
T2	160 - 140	L2x2x3/16	10.08	4.85	147.7 K=1.00	0.7150	-5.71	9.38	0.609 [1] ✔
T3	140 - 120	L2 1/2x2 1/2x1/4	12.58	6.05	147.8 K=1.00	1.1900	-9.20	15.60	0.590 [1] ✔
T4	120 - 100	L3 1/2x3x1/4	14.32	6.92	131.6 K=1.00	1.5600	-10.06	25.80	0.390 [1] ✔
T5	100 - 80	L3 1/2x3x1/4	16.11	7.82	148.7 K=1.00	1.5600	-10.16	20.20	0.503 [1] ✔
T6	80 - 60	L4x3 1/2x5/16	19.30	9.35	153.8 K=1.00	2.2500	-11.58	27.24	0.425 [1] ✔
T7	60 - 40	L4x3 1/2x3/8	21.03	10.22	168.8 K=1.00	2.6700	-11.97	26.83	0.446 [1] ✔
T8	40 - 20	L4x4x3/8	22.81	11.12	169.3 K=1.00	2.8600	-12.57	28.56	0.440 [1] ✔
T9	20 - 0	L5x5x5/16	24.62	11.93	144.0 K=1.00	3.0300	-13.85	41.82	0.331 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x1/8	5.00	4.52	136.5 K=1.00	0.4844	-0.74	7.44	0.100 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	P2.5x.276	20.03	5.01	65.0	2.2535	21.60	101.41	0.213 [1] ✔
T2	160 - 140	P3x.3	20.03	5.01	52.9	3.0159	58.55	135.72	0.431 [1] ✔
T3	140 - 120	P5x0.5	20.03	6.68	44.5	7.9529	93.12	357.88	0.260 [1] ✔
T4	120 - 100	P5x0.5	20.03	6.68	44.5	7.9529	138.63	357.88	0.387 [1] ✔
T5	100 - 80	P5x0.5	20.03	6.68	44.5	7.9529	179.89	357.88	0.503 [1] ✔
T6	80 - 60	P8x.5	20.03	10.02	41.8	12.7627	213.95	574.32	0.373 [1] ✔
T7	60 - 40	P8x.5	20.03	10.02	41.8	12.7627	248.63	574.32	0.433 [1] ✔
T8	40 - 20	P8x.5	20.03	10.02	41.8	12.7627	281.09	574.32	0.489 [1] ✔
T9	20 - 0	P10x.5	20.03	10.02	33.1	16.1007	311.29	724.53	0.430 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x1/8	8.40	4.04	80.6	0.2930	4.66	14.28	0.326 [1] ✔
T2	160 - 140	L2x2x3/16	9.65	4.64	93.4	0.4308	5.70	21.00	0.271 [1] ✔
T3	140 - 120	L2 1/2x2 1/2x1/4	12.58	6.05	97.0	0.7519	8.95	36.65	0.244 [1] ✔
T4	120 - 100	L3 1/2x3x1/4	13.15	6.34	85.5	1.0059	10.26	49.04	0.209 [1] ✔
T5	100 - 80	L3 1/2x3x1/4	15.51	7.52	101.0	1.0059	10.12	49.04	0.206 [1] ✔
T6	80 - 60	L4x3 1/2x5/16	19.30	9.35	107.3	1.4824	11.40	72.27	0.158 [1] ✔
T7	60 - 40	L4x3 1/2x3/8	21.03	10.22	118.6	1.7564	11.77	85.62	0.137 [1] ✔
T8	40 - 20	L4x4x3/8	22.81	11.12	110.1	1.8989	12.14	92.57	0.131 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T9	20 - 0	L5x5x5/16	24.62	11.93	92.4	2.0674	12.91	100.79	0.128 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x1/8	5.00	4.52	91.2	0.2930	0.69	12.74	0.054 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	180 - 160	Leg	P2.5x.276	3	-24.55	74.43	33.0	Pass
T2	160 - 140	Leg	P3x.3	33	-62.41	110.61	56.4	Pass
T3	140 - 120	Leg	P5x0.5	60	-102.62	309.54	33.2	Pass
T4	120 - 100	Leg	P5x0.5	81	-152.71	309.54	49.3	Pass
T5	100 - 80	Leg	P5x0.5	102	-198.18	309.54	64.0	Pass
T6	80 - 60	Leg	P8x.5	123	-237.10	505.56	46.9	Pass
T7	60 - 40	Leg	P8x.5	138	-277.72	505.56	54.9	Pass
T8	40 - 20	Leg	P8x.5	153	-316.53	505.56	62.6	Pass
T9	20 - 0	Leg	P10x.5	168	-353.74	668.66	52.9	Pass
T1	180 - 160	Diagonal	L2x2x1/8	9	-4.64	9.32	49.8	Pass
T2	160 - 140	Diagonal	L2x2x3/16	36	-5.71	9.38	60.9	Pass
T3	140 - 120	Diagonal	L2 1/2x2 1/2x1/4	63	-9.20	15.60	59.0	Pass
T4	120 - 100	Diagonal	L3 1/2x3x1/4	85	-10.06	25.80	39.0 51.3 (b)	Pass
T5	100 - 80	Diagonal	L3 1/2x3x1/4	106	-10.16	20.20	50.3 50.6 (b)	Pass
T6	80 - 60	Diagonal	L4x3 1/2x5/16	127	-11.58	27.24	42.5 46.6 (b)	Pass
T7	60 - 40	Diagonal	L4x3 1/2x3/8	141	-11.97	26.83	44.6 48.2 (b)	Pass
T8	40 - 20	Diagonal	L4x4x3/8	156	-12.57	28.56	44.0 50.6 (b)	Pass
T9	20 - 0	Diagonal	L5x5x5/16	171	-13.85	41.82	33.1 55.7 (b)	Pass
T1	180 - 160	Top Girt	L2x2x1/8	5	-0.74	7.44	10.0 13.2 (b)	Pass
							Summary	
							Leg (T5) 64.0	Pass
							Diagonal (T2) 60.9	Pass
							Top Girt (T1) 13.2	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
						Bolt Checks	55.7	Pass
						RATING =	**64.0**	**Pass**

Program Version 8.1.1.0 - 6/3/2021 File:J:/Jobs/2100500.WI/36_CTHA038A_CT03XC067/05_Structural/Structural Analysis Report/Backup Documentation/Rev (1)/ERI files/180' Self-supporting Lattice.eri

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Subject:	Anchor Bolt Analysis
Location:	180-ft Lattice Tower Manchester, CT
Rev. 1: 10/12/21	Prepared by: T.J.L. Checked by: C.F.C. Job No. 21005.36

Anchor Bolt Analysis:

Input Data:

Tower Reactions:

Tension Force =	Tension := 319·kips	(Input From tnxTower)
Compression Force =	Compression := 363·kips	(Input From tnxTower)
Shear Force =	Shear := 40·kips	(Input From tnxTower)

Anchor Bolt Data:

ASTM F1554-105

Number of Anchor Bolts =	N := 6	(User Input)
Bolt Ultimate Strength =	F_u := 125·ksi	(User Input)
Bolt Yield Strength =	F_y := 105·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Anchor Bolts =	D := 1.5·in	(User Input)
Threads per Inch =	n := 6	(User Input)
Length from Top of Pier to Bottom of Leveling Nut =	L_{ar} := 0·in	(User Input)

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Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 1.767 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 = 1.405 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 1.338 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.334 \cdot in$

Elastic Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.235 \cdot in^3$

Plastic Section Modulus of Bolt = $Z_x := \frac{D_n^3}{6} = 0.399 \cdot in^3$

Anchor Bolt Design Strength:

Resistance Factor for Flexure = $\phi_f := 0.9$

Resistance Factor for Compression = $\phi_c := 0.9$

Resistance Factor for Tension = $\phi_t := 0.75$

Resistance Factor for Shear = $\phi_v := 0.75$

Design Tensile Strength = $\Phi R_{nt} := \phi_t \cdot F_u \cdot A_n = 131.7 \cdot k$

Design Compression Strength = $\Phi R_{nc} := \phi_c \cdot F_y \cdot A_g = 167 \cdot k$

Design Shear Strength (Tension) = $\Phi R_{nv} := \phi_v \cdot 0.5 F_u \cdot A_g = 82.8 \cdot k$

Design Shear Strength (Compression) = $\Phi R_{nvc} := \phi_c \cdot 0.6 F_y \cdot A_g \cdot 0.75 = 75.1 \cdot k$

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Check Anchor Bolt Tension Force:

Maximum Tensile Force = $P_{ut} := \frac{Tension}{N} = 53.2 \cdot kips$

Maximum Compressive Force = $P_{uc} := \frac{Compression}{N} = 60.5 \cdot kips$

Maximum Shear Force = $V_u := \frac{Shear}{N} = 6.7 \cdot kips$

Condition1 = $Condition1 := if\left[\left[\left(\frac{P_{ut}}{\Phi R_{nt}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv}}\right)^2\right] \le 1.00, "OK", "Overstressed"\right]$

Condition1 = "OK"

Condition2 = $Condition2 := if\left[\left[\left(\frac{P_{uc}}{\Phi R_{nc}}\right) + \left(\frac{V_u}{\Phi R_{nvc}}\right)^2\right] \le 1.00, "OK", "Overstressed"\right]$

Condition2 = "OK"

Bolt % of Capacity = $\max\left[\left(\frac{P_{ut}}{\Phi R_{nt}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv}}\right)^2, \left(\frac{P_{uc}}{\Phi R_{nc}}\right) + \left(\frac{V_u}{\Phi R_{nvc}}\right)^2\right] = 37 \cdot \%$

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Subject:	FOUNDATION ANALYSIS
Location:	Manchester, CT
Rev. 1: 10/12/21	Prepared by: T.J.L. Checked by: C.F.C. Job No. 21005.36

Pier and Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 6909 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 64 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 49 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 363 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 319 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 180 \cdot ft$	(User Input)	
Tower Width =	$W_t := 23 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 1$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 6.0 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 4.75 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 4.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 1.75 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 34.0 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4500 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 8000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 125 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.0 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 20$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 0.5 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 10$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.27 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 67$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 10$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.27 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 67$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.785 \cdot in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 1.267 \cdot in^2$

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 1.267 \cdot in^2$

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$

Load Factor = $LF := 1$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := if(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}) = 150 \cdot pcf$

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 125 \cdot pcf$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.594 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.594 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.25 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.922 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 1.75 \cdot ft$

$A_p := W_f \cdot T_p = 59.5 \cdot ft^2$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 114.352 \cdot kip$

Weight of Concrete = $WT_c := \left[\left(W_f^2 \cdot T_f\right) + (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4} L_p\right)\right] \cdot \gamma_c = 330.311 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left[\left[W_f^2 - (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4}\right)\right] \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 594.1 \cdot kip$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left[\frac{(D_f - n)^2 \cdot \tan(\Phi_s)}{2} \cdot W_f\right] \cdot \gamma_s = 44.167 \cdot kip$

Foundation has undercut toe per Fred A. Nudd dwg 96-4992-1

Tower Offset = $X_{t1} := \left[\frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{2}\right]$ $X_{t2} := \frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{3}$

$X_t := if(Pos_t = 1, X_{t1}, X_{t2}) = 7.041$

$X_{off1} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right] = 3.32$ $X_{off2} := 0$

$X_{off} := if(Pos_t = 1, X_{off1}, X_{off2})$ $X_{off} = 3.32 \cdot ft$

Total Weight = $WT_{tot} := 0.9WT_c + 0.75WT_{s1} = 742.9 \cdot kip$

Resisting Moment = $M_r := (WT_{tot}) \cdot \frac{W_f}{2} + 0.9WT_t \cdot \left(\frac{W_f}{2} - X_{off}\right) + 0.75\left(S_u \cdot \frac{T_p}{3}\right) + 0.75WT_{s2} \cdot \left[W_f + \frac{(D_f - n) \cdot \tan(\Phi_s)}{3}\right] = 14446 \cdot kip \cdot ft$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 7325 \cdot kip \cdot ft$

Foundation has undercut toe per Fred A. Nudd dwg 96-4992-1

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 1.97$

Factor of Safety Required = $FS_{req} := 1$ $OverTurning\_Moment\_Check := if(FS \geq FS_{req}, "Okay", "No Good")$

$OverTurning\_Moment\_Check = "Okay"$

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 448.635 \cdot kips$

$Shear\_Check := if(S_p > S_t, "Okay", "No Good")$

$Shear\_Check = "Okay"$

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 973 \cdot kip$

Area of the Mat = $A_{mat} := W_f^2 = 1.156 \times 10^3$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 6550.67 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.96 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < 0.75q_s, "Okay", "No Good")$

$Max\_Pressure\_Check = "Okay"$

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.276 \cdot ksf$

$Min\_Pressure\_Check := if[(P_{min} \geq 0) \cdot (P_{min} < 0.75q_s), "Okay", "No Good"]$

$Min\_Pressure\_Check = "No Good"$

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 9.934$

Distance to Kern = $X_k := \frac{W_f}{6} = 5.667$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 7.525$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 2.014 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 2.014 \cdot ksf$

$Pressure\_Check := if(q_{adj} < 0.75q_s, "Okay", "No Good")$

$Pressure\_Check = "Okay"$

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 4.499 \times 10^3 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if(P_b > LF \cdot C_t, "Okay", "No Good")$

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 16.73 \cdot in$

$FL := LF \cdot \frac{C_t}{W_f^2} = 0.314 \cdot ksf$

$V_{req} := FL \cdot (X_t - .5 \cdot d_p - d) \cdot W_f = 38.932 \cdot kips$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 778 \cdot kip$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 16.9$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 22.9$

Required Shear Strength = $V_{req} := FL \cdot (W_f^2 - A_{bo}) = 356 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 776 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

Maximum Moment in Pad = $M_{max} := 5200 \cdot kip \cdot ft$ (User Input)

Design Moment = $M_n := \frac{LF \cdot M_{max}}{\phi_m} = 5.778 \times 10^3 \cdot kips \cdot ft$

$$\beta := \begin{cases} 0.85 \text{ if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 \text{ if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000\right)}{1000}\right] \cdot 0.5\right] \text{ otherwise} \end{cases} = 0.6$$

(ACI-200810.2.7.3)

$b_{eff} := W_t \cdot \cos(30 \cdot deg) + d_p = 287.023 \cdot in$

$A_s := \frac{M_n}{(f_y \cdot d)} = 69.071 \cdot in^2$

$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 5.348 \cdot in$

$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 82.21 \cdot in^2$

$\rho := \frac{A_s}{b_{eff} d} = 0.20544 \cdot in$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases} = 0.0018$$ (ACI-2008 7.12.2.1)

Check Bottom Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 82.2 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 84.9 \cdot in^2$$

$$Pad\_Reinforcement\_Bot := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 82.2 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 84.9 \cdot in^2$$

$$Pad\_Reinforcement\_Top := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 4.8 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 2.401 \cdot in$$

Transverse Reinforcement Index =

$$k_{tr} := 0$$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 45.1 \cdot in$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot in$$ (ACI-2008 12.2.1)

$$L_{dbtCheck} := if\left(L_{dbt} \geq L_{dbmin}, "Use\ L.dbt", "Use\ L.dbmin"\right) = "Use\ L.dbt"$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 63 \cdot in$$

$$Lpad\_Check := if\left(L_{Pad} > L_{dbt}, "Okay", "No\ Good"\right)$$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 1809.56 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 9.05 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 15.71 \cdot in^2$

$Steel\_Area\_Check := if(A_{sprov} > A_{smin}, "Okay", "No Good")$

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 6.54 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 42 \cdot in$

Maximum Moment in Pier = $M_p := S_t \cdot (L_p) \cdot LF = 3648 \cdot in \cdot kips$

Pier Check evaluated from outside program and results are listed below;

$(D \ N \ n \ P_u \ M_{xu}) := \left(d_p \cdot 12 \ \ NB_{pier} \ \ BS_{pier} \ \ \frac{C_t \cdot 1.333}{kips} \ \ \frac{M_p}{in \cdot kips}\right)$

$(D \ N \ n \ P_u \ M_{xu}) = (48 \ \ 20 \ \ 8 \ \ 483.879 \ \ 3.648 \times 10^3)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := (0 \ \ 0 \ \ 0 \ \ 0)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := \phi P'_n(D, N, n, P_u, M_{xu})^T$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) = (2.517 \times 10^3 \ \ 1.897 \times 10^4 \ \ -31.915 \ \ 8.731 \times 10^{-3})$

$Axial\_Load\_Check := if(\phi P_n \geq P_u, "Okay", "No Good")$

Axial_Load_Check = "Okay"

$Bending\_Check := if(\phi M_{xn} \geq M_{xu}, "Okay", "No Good")$

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 54 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 18 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3 \cdot in$

Transverse Reinforcement =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 22.36 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 12.522 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right) = 22.361 \cdot in$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 17.889 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 18 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 18 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CTHA038A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Section 1 - Site Information

Site ID: CTHA038A
Status: Draft
Version: 1
Project Type: Sprint Retain
Approved: Not Approved
Approved By: Not Approved
Last Modified: 8/13/2021 8:35:30 AM
Last Modified By: Farhan.Badar@T-Mobile.com

Site Name: CTHA038A
Site Class: Utility Lattice Tower
Site Type: Structure Non Building
Plan Year: 2022
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: Not Specified

Latitude: 41.76993889
Longitude: -72.55908056
Address: 250 South Olcott Street
City, State: Manchester, CT
Region: NORTHEAST

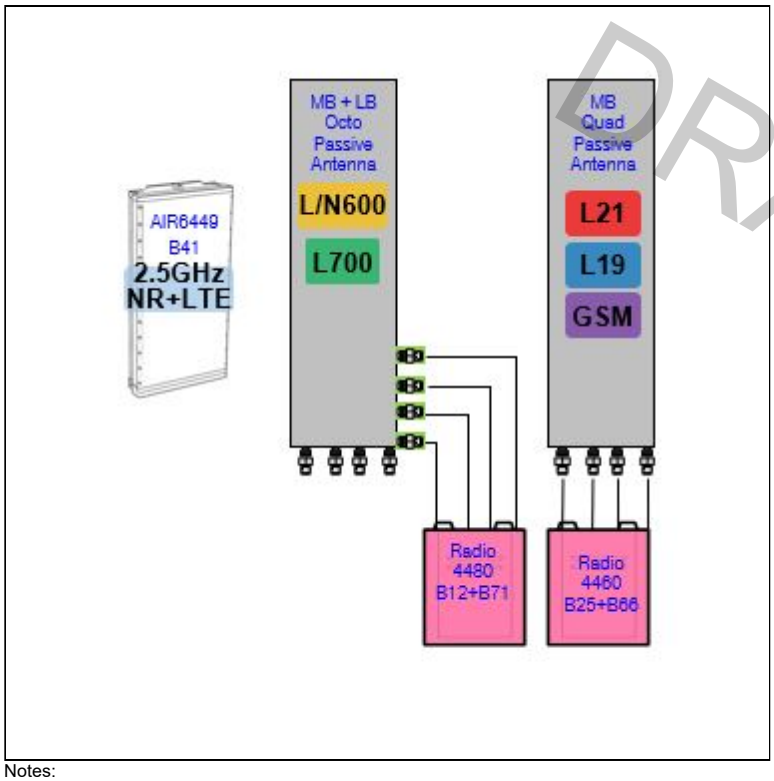
RAN Template: 67E5A998E 6160			AL Template: 67E5998E_1xAIR+1OP+1QP	
Sector Count: 3	**Antenna Count:** 6	**Coax Line Count:** 0	**TMA Count:** 0	**RRU Count:** 9

Section 2 - Existing Template Images

----- This section is intentionally blank. -----

Section 3 - Proposed Template Images

67E5A998E.JPG



Notes:

Section 4 - Siteplan Images

----- This section is intentionally blank. -----

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CTHA038A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Section 5 - RAN Equipment

Existing RAN Equipment

----- This section is intentionally blank. -----

Proposed RAN Equipment

Template: 67E5A998E 6160

Enclosure	1	2	3
Enclosure Type	Enclosure 6160	RBS 6601	B160
Baseband	BB 6648 (L2500, N2500); BB 6648 (L700, L600, N600); BB 6648 (L2100, L1900)	DUG20 (G1900)	
Hybrid Cable System	Ericsson Hybrid Trunk 6/24 4AWG 100m **(x 3)**		
Transport System	CSR IXRe V2 (Gen2)		

RAN Scope of Work:

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CTHA038A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Section 6 - A&L Equipment

Existing Template: Custom
Proposed Template: 67E5998E_1xAIR+1OP+1QP

Sector 1 (Proposed) view from behind

Coverage Type	A - Outdoor Macro					
Antenna	1				2	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)	
Azimuth	0				0	
M. Tilt						
Height	135				135	
Ports	P1	P2	P3	P4	P5	P6
Active Tech.	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900	L2100 L1900 G1900	L2500 N2500	L2500 N2500
Dark Tech.						
Restricted Tech.						
Decomm. Tech.						
E. Tilt						
Cables	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**		
TMAs						
Diplexers / Combiners						
Radio	Radio 4480 B71+B85 (At Antenna)	SHARED Radio 4480 B71+B85 (At Antenna)	Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)		
Sector Equipment						

Unconnected Equipment:

Cable: Coax Jumper | Cable: Coax Jumper | Cable: Coax Jumper | Cable: Coax Jumper | Sector Equipment: Radio 4460 B25+B66

Scope of Work:

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CTHA038A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Sector 2 (Proposed) view from behind

Coverage Type	A - Outdoor Macro					
Antenna	1				2	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)	
Azimuth	120				120	
M. Tilt						
Height	135				135	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**
Active Tech.	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900	L2100 L1900 G1900	L2500 N2500	L2500 N2500
Dark Tech.						
Restricted Tech.						
Decomm. Tech.						
E. Tilt						
Cables	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**		
TMAs						
Diplexers / Combiners						
Radio	Radio 4480 B71+B85 (At Antenna)	SHARED Radio 4480 B71+B85 (At Antenna)	Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)		
Sector Equipment						

Unconnected Equipment:

Cable: Coax Jumper | Cable: Coax Jumper | Cable: Coax Jumper | Cable: Coax Jumper | Sector Equipment: Radio 4460 B25+B66

Scope of Work:

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CTHA038A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Sector 3 (Proposed) view from behind

Coverage Type	A - Outdoor Macro					
Antenna	1				2	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)	
Azimuth	240				240	
M. Tilt						
Height	135				135	
Ports	P1	P2	P3	P4	P5	P6
Active Tech.	L700 L600 N600	L700 L600 N600	L2100 L1900 G1900	L2100 L1900 G1900	L2500 N2500	L2500 N2500
Dark Tech.						
Restricted Tech.						
Decomm. Tech.						
E. Tilt						
Cables	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**		
TMAs						
Diplexers / Combiners						
Radio	Radio 4480 B71+B85 (At Antenna)	SHARED Radio 4480 B71+B85 (At Antenna)	Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)		
Sector Equipment						

Unconnected Equipment:

Cable: Coax Jumper | Cable: Coax Jumper | Cable: Coax Jumper | Cable: Coax Jumper | Sector Equipment: Radio 4460 B25+B66

Scope of Work:

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CTHA038A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Section 7 - Power Systems Equipment

Existing Power Systems Equipment
----- This section is intentionally blank. -----

	Proposed Power Systems Equipment
Enclosure	1
Enclosure Type	Enclosure 6160

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Structural Analysis Report

Antenna Mount Analysis

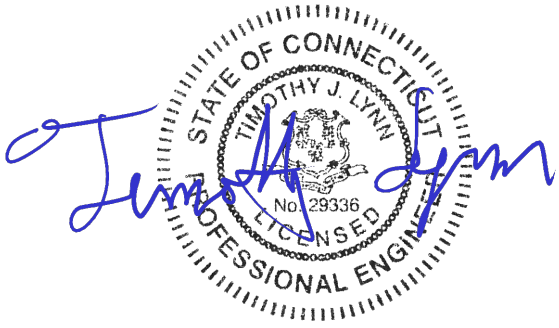
Site Ref: CTHA038A

250 Olcott Street
Manchester, CT

Centek Project No. 21005.36

Date: September 3, 2021

Max Stress Ratio = 71.4%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

CENTEK engineering

Centered on Solutions℠

September 3, 2021

Mr. Kyle Richers
Transcend Wireless
10 Industrial Ave
Mahwah, NJ 07430

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CTHA038A
250 Olcott Street
Manchester, CT 06040

Centek Project No. 21005.36

Dear Mr. Richers,

Centek Engineering, Inc. has reviewed the T-Mobile antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the existing mount, consisting of three (3) 12-ft gate booms to support the equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2015 International Building Code as modified by the 2018 Connecticut State Building Code (CTBC) including ASCE 7-10 and ANSI/TIA-222-G *Structural Standards for Steel Antenna Towers and Supporting Structures*.

The loads considered in this analysis consist of the following:

- T-Mobile:
  Gate Booms: Three (3) RFS APXVAALL24_43 panel antennas, three (3) Ericsson AIR6449 B41 panel antennas, three (3) Ericsson 4460 B25+B66 remote radio units and three (3) Ericsson 4480 B71+B85 remote radio units mounted on three (3) gate booms with a RAD center elevation of 135-ft +/- AGL.

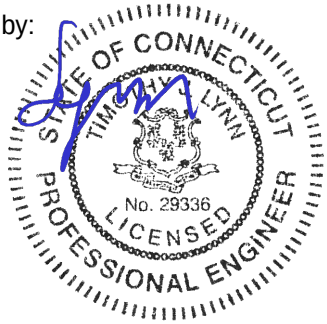
The antenna mount was analyzed per the requirements of the 2015 International Building Code as modified by the 2018 Connecticut State Building Code considering a nominal design wind speed of 97 mph for Manchester as required in Appendix N of the 2018 Connecticut State Building Code.

A structural analysis of tower and foundation needs to be completed prior to any work.

Based on our review of the installation, it is our opinion that the subject antenna mount have 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



Prepared by:

Fernando J. Palacios
Engineer

Section 2 - Calculations

Figure 1 Antenna Mount

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63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject: Loads on Equipment

Location: Berlin,CT

Rev. 0: 07/20/2021

Prepared by: F.J.P Checked by: T.J.L.
Job No. 21088.00

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

Wind Speeds

Basic Wind Speed =	$V := 125$	mph	(User Input - 2018 CSBC Appendix N)
Basic Wind Speed with Ice =	$V_i := 50$	mph	(User Input per Figure B-9, Annex B of TIA-222-H)
Appurtenance at 30 mph Basic Wind Speed =	$W_m := 30$	mph	(User Input per,TIA-222-H Section 16.3)

Input

Structure Category =	$SC := II$		(User Input)
Exposure Category =	$Exp := C$		(User Input)
Structure Height =	$h := 180$	ft	(User Input)
Height to Center of Antennas =	$z := 135$	ft	(User Input)
Radial Ice Thickness =	$t_i := 1.5$	in	(User Input per Figure B-9, Annex B of TIA-222-H)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topographic Factor =	$K_{zt} := 1.0$		(User Input)
Ground Elevation Factor	$K_e := 1.0$		(Per TIA-222-H, Section 2.6.8)
Shielding Factor =	$K_a := 0.90$		(Per TIA-222-H, Section 16.6)
Gust Response Factor =	$G_H := 1.0$		(Per TIA-222-H, Section 16.6)
Wind Direction Probability Factor =	$K_d := 0.95$		(Per TIA-222-H, Section 16.6)

Output

Importance Factors = $I_{ice} :=$ if $SC = 1$ → 0; if $SC = 2$ → 1.00; if $SC = 3$ → 1.15; if $SC = 4$ → 1.25 $= 1$ (Per Table 2-3 of TIA-222-H)

$K_{iz} := \left(\frac{z}{33}\right)^{0.1} = 1.151$ (Per TIA-222-H, Section 2.6.10)

$t_{iz} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.727$ (Per TIA-222-H, Section 2.6.10)

Velocity Pressure Coefficient Antennas = $Kz := 2.01 \cdot \left(\left(\frac{z}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.348$ (Per TIA-222-H, Section 2.6.5.2)

Velocity Pressure w/o Ice Antennas =	$qz := 0.00256 \cdot K_d \cdot K_e \cdot Kz \cdot V^2 = 51$	psf
Velocity Pressure with Ice Antennas =	$qz_{ice} := 0.00256 \cdot K_d \cdot K_e \cdot Kz \cdot V_i^2 = 8$	psf
Velocity Pressure Service at 30 mph=	$qz_{Wm} := 0.00256 \cdot K_d \cdot K_e \cdot Kz \cdot W_m^2 = 3$	psf

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APXVAALL24_43-U-NA20		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 95.9$	in	(User Input)
Antenna Width =	$W_{ant} := 24.0$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.5$	in	(User Input)
Antenna Weight =	$WT_{ant} := 149.9$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.0$		
Antenna Force Coefficient =	$Ca_{ant} = 1.27$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 16$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 933$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.66$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 331$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 18.9$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 177$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 8.2$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 77$	lbs

Wind Load (Wm at 30 mph)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 16$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz_{Wm} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 54$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.66$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz_{Wm} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 19$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 150$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \cdot 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 1 \cdot 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 423$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 423$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson AIR6449 B41		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 33.1$	in	(User Input)
Antenna Width =	$W_{ant} := 20.5$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.3$	in	(User Input)
Antenna Weight =	$WT_{ant} := 103$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.6$		
Antenna Force Coefficient =	$Ca_{ant} = 1.2$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.7$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 261$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.91$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 106$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.1$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 54$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 3$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 26$	lbs

Wind Load (Wm at 30 mph)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.7$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz_{Wm} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 15$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.91$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz_{Wm} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 6$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 103$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5632$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 4660$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 151$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 151$	lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model =	Ericsson 4480 B71+B85		
RRUS Shape =	Flat		(User Input)
RRUS Height =	$L_{RRUS} := 21.8$	in	(User Input)
RRUS Width =	$W_{RRUS} := 15.7$	in	(User Input)
RRUS Thickness =	$T_{RRUS} := 7.8$	in	(User Input)
RRUS Weight =	$WT_{RRUS} := 84$	lbs	(User Input)
Number of RRUS's =	$N_{RRUS} := 1$		
RRUS Aspect Ratio =	$Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.4$		
RRUS Force Coefficient =	$Ca_{RRUS} = 1.2$		

Wind Load (without ice)

Surface Area for One RRU=	$SA_{RRUF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 2.4$	sf
Total RRU Wind Force Front =	$F_{RRUF} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUF} = 132$	lbs
Surface Area for One RRU =	$SA_{RRUS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.18$	sf
Total RRU Wind Force Side =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUS} = 65$	lbs

Wind Load (with ice)

Surface Area for One RRU w/ Ice =	$SA_{ICERRUF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 3.4$	sf
Total RRU Wind Force w/ Ice Front =	$Fi_{RRU} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUF} = 30$	lbs
Surface Area for One RRU w/ Ice =	$SA_{ICERRUS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 2$	sf
Total RRU Wind Force w/ Ice Side =	$Fi_{RRU} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUS} = 17$	lbs

Wind Load (Wm at 30 mph)

Surface Area for One RRU =	$SA_{RRUF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 2.4$	sf
Total RRU Wind Force Front =	$F_{RRUF} := qz_{Wm} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUF} = 8$	lbs
Surface Area for One RRU =	$SA_{RRUS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.18$	sf
Total RRU Wind Force Side =	$F_{RRUS} := qz_{Wm} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUS} = 4$	lbs

Gravity Load (without ice)

Weight of All RRUs =	$WT_{RRUS} \cdot N_{RRUS} = 84$	lbs

Gravity Loads (ice only)

Volume of Each RRU =	$V_{RRU} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 2670$	cu in
Volume of Ice on Each RRU =	$V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRU} = 2774$	cu in
Weight of Ice on Each RRU =	$W_{ICERRU} := \frac{V_{ice}}{1728} \cdot Id = 90$	lbs
Weight of Ice on All RRUs =	$W_{ICERRU} \cdot N_{RRUS} = 90$	lbs

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Branford, CT 06405 F: (203) 488-8587

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model =	Ericsson 4460 B25+B66		
RRUS Shape =	Flat		(User Input)
RRUS Height =	$L_{RRUS} := 19.6$	in	(User Input)
RRUS Width =	$W_{RRUS} := 15.7$	in	(User Input)
RRUS Thickness =	$T_{RRUS} := 12.1$	in	(User Input)
RRUS Weight =	$WT_{RRUS} := 109$	lbs	(User Input)
Number of RRUS's =	$N_{RRUS} := 1$		
RRUS Aspect Ratio =	$Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.2$		
RRUS Force Coefficient =	$Ca_{RRUS} = 1.2$		

Wind Load (without ice)

Surface Area for One RRU=	$SA_{RRUF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 2.1$	sf
Total RRU Wind Force Front =	$F_{RRUF} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUF} = 118$	lbs
Surface Area for One RRU =	$SA_{RRUS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.65$	sf
Total RRU Wind Force Side =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUS} = 91$	lbs

Wind Load (with ice)

Surface Area for One RRU w/ Ice =	$SA_{ICERRUF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 3.1$	sf
Total RRU Wind Force w/ Ice Front =	$Fi_{RRU} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUF} = 27$	lbs
Surface Area for One RRU w/ Ice =	$SA_{ICERRUS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 2.5$	sf
Total RRU Wind Force w/ Ice Side =	$Fi_{RRU} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUS} = 22$	lbs

Wind Load (Wm at 30 mph)

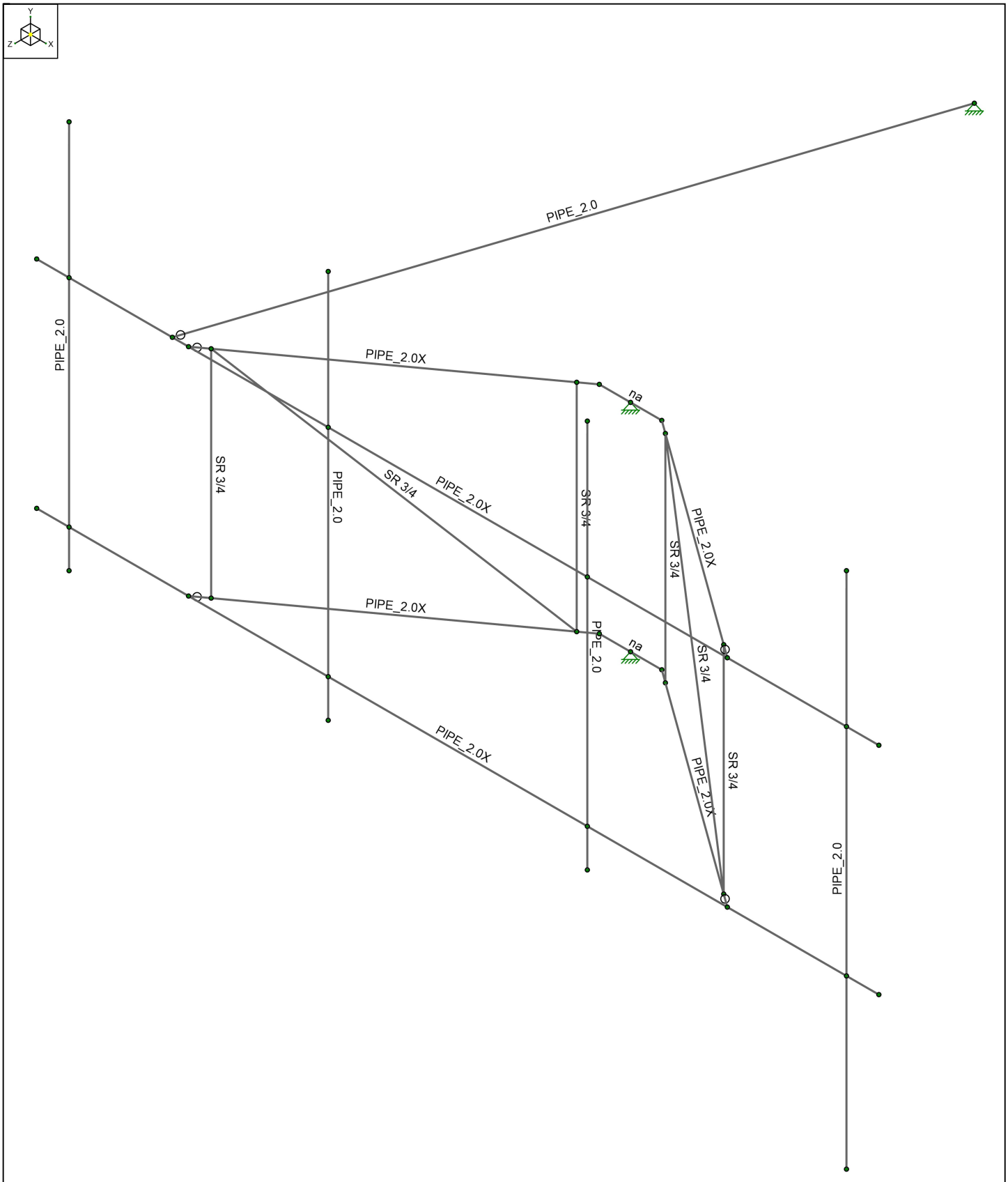
Surface Area for One RRU =	$SA_{RRUF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 2.1$	sf
Total RRU Wind Force Front =	$F_{RRUF} := qz_{Wm} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUF} = 7$	lbs
Surface Area for One RRU =	$SA_{RRUS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.65$	sf
Total RRU Wind Force Side =	$F_{RRUS} := qz_{Wm} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUS} = 5$	lbs

Gravity Load (without ice)

Weight of All RRUs =	$WT_{RRUS} \cdot N_{RRUS} = 109$	lbs

Gravity Loads (ice only)

Volume of Each RRU =	$V_{RRU} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 3723$	cu in
Volume of Ice on Each RRU =	$V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRU} = 3145$	cu in
Weight of Ice on Each RRU =	$W_{ICERRU} := \frac{V_{ice}}{1728} \cdot Id = 102$	lbs
Weight of Ice on All RRUs =	$W_{ICERRU} \cdot N_{RRUS} = 102$	lbs



Envelope Only Solution

Centek Engineering	CTHA038A - AMA	SK-2
FJP		Sep 12, 2021 at 11:04 PM
21005.36	Member Fraaming	CTHA038A_AMA .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 Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Antenna Mast_2.0 STD...	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
2	Horizontal_2.0 X-STR...	PIPE_2.0X	Beam	Pipe	A53 Grade B	Typical	1.4	.827	.827	1.65
3	Outrigger_2.0 X-STRN...	PIPE_2.0X	Beam	Pipe	A53 Grade B	Typical	1.4	.827	.827	1.65
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	H1	Horizontal_2.0 X-S...	13	Segment	Segment	Lbyy						Lateral
2	H2	Horizontal_2.0 X-S...	13	Segment	Segment	Lbyy						Lateral
3	M4	Outrigger_2.0 X-ST...	4.54	Segment	Segment	Lbyy						Lateral
4	M5	Outrigger_2.0 X-ST...	4.54	Segment	Segment	Lbyy						Lateral
5	M6	Outrigger_2.0 X-ST...	4.543	Segment	Segment	Lbyy						Lateral
6	M7	Outrigger_2.0 X-ST...	4.543	Segment	Segment	Lbyy						Lateral
7	PS.1	Antenna Mast_2.0 ...	8	Segment	Segment	Lbyy						Lateral
8	PS.2	Antenna Mast_2.0 ...	6	Segment	Segment	Lbyy						Lateral
9	M21	Antenna Mast_2.0 ...	6	Segment	Segment	Lbyy						Lateral
10	M21A	Antenna Mast_2.0 ...	6	Segment	Segment	Lbyy						Lateral
11	M20B	0.75" Dia. Bar	3.333									Lateral
12	M21C	0.75" Dia. Bar	3.333									Lateral
13	M22A	0.75" Dia. Bar	5.238									Lateral
14	M17	0.75" Dia. Bar	5.24									Lateral
15	M18	0.75" Dia. Bar	3.333									Lateral
16	M19A	0.75" Dia. Bar	3.333									Lateral
17	M20A	Stabilizer_2.0 STD ...	9.809			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
1	H1	N2	N30			Horizontal_2.0 X-STRONG...	Beam	Pipe	A53 Grade B	Typical
2	H2	N1	N29			Horizontal_2.0 X-STRONG...	Beam	Pipe	A53 Grade B	Typical
3	M4	N10	N20			Outrigger_2.0 X-STRNG P...	Beam	Pipe	A53 Grade B	Typical
4	M5	N9	N19			Outrigger_2.0 X-STRNG P...	Beam	Pipe	A53 Grade B	Typical
5	M6	N24	N22			Outrigger_2.0 X-STRNG P...	Beam	Pipe	A53 Grade B	Typical
6	M7	N23	N21			Outrigger_2.0 X-STRNG P...	Beam	Pipe	A53 Grade B	Typical
7	M19	N20	N22			RIGID	None	None	RIGID	Typical
8	M20	N19	N21			RIGID	None	None	RIGID	Typical
9	PS.1	N27	N28			Antenna Mast_2.0 STD Pipe	Column	Pipe	A53 Grade B	Typical
10	PS.2	N5	N6			Antenna Mast_2.0 STD Pipe	Column	Pipe	A53 Grade B	Typical
11	M21	N16	N15			Antenna Mast_2.0 STD Pipe	Column	Pipe	A53 Grade B	Typical
12	M21A	N36	N35			Antenna Mast_2.0 STD Pipe	Column	Pipe	A53 Grade B	Typical
13	M20B	N44	N43			0.75" Dia. Bar	Column	BAR	A36 Gr.36	Typical
14	M21C	N46	N45			0.75" Dia. Bar	Column	BAR	A36 Gr.36	Typical
15	M22A	N44	N45			0.75" Dia. Bar	Column	BAR	A36 Gr.36	Typical
16	M17	N38	N39			0.75" Dia. Bar	Column	BAR	A36 Gr.36	Typical
17	M18	N38	N37			0.75" Dia. Bar	Column	BAR	A36 Gr.36	Typical
18	M19A	N40	N39			0.75" Dia. Bar	Column	BAR	A36 Gr.36	Typical
19	M20A	N41	N43A			Stabilizer_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	3.576234	0.083333	10.363023	0	
2	N2	3.576234	3.416667	10.363023	0	
3	N3	4.076233	0.083333	10.363068	0	
4	N4	4.076233	3.416667	10.363068	0	
5	N5	4.076233	-.5	10.363068	0	
6	N6	4.076233	5.5	10.363068	0	
7	N9	5.920415	0.083333	10.363023	0	
8	N10	5.920415	3.416667	10.363023	0	
9	N13	8.076233	0.083333	10.363068	0	
10	N14	8.076233	3.416667	10.363068	0	
11	N15	8.076233	-.5	10.363068	0	
12	N16	8.076233	5.5	10.363068	0	
13	N19	9.594576	0.083333	7.696419	0	
14	N20	9.594576	3.416667	7.696419	0	
15	N21	10.558704	0.083333	7.696342	0	
16	N22	10.558704	3.416667	7.696342	0	
17	N31	12.076233	0.083333	10.363068	0	
18	N33	12.076233	3.416667	10.363068	0	
19	N35	12.076233	-.5	10.363068	0	
20	N36	12.076233	5.5	10.363068	0	
21	N23	14.23707	0.083333	10.363023	0	
22	N24	14.23707	3.416667	10.363023	0	
23	N25	16.076233	0.083333	10.363068	0	
24	N26	16.076233	3.416667	10.363068	0	
25	N27	16.076233	-2.5	10.363068	0	
26	N28	16.076233	5.5	10.363068	0	
27	N29	16.576233	0.083333	10.363068	0	
28	N30	16.576233	3.416667	10.363068	0	
29	N41A	10.076659	3.416667	7.696408	0	
30	N42A	10.076659	0.083333	7.696408	0	
31	N43	6.122737	0.083333	10.216183	0	
32	N44	6.122737	3.416667	10.216183	0	
33	N45	9.392248	0.083333	7.843263	0	
34	N46	9.392248	3.416667	7.843263	0	
35	N37	10.761107	0.083333	7.843077	0	
36	N38	10.761107	3.416667	7.843077	0	
37	N39	14.034674	0.083333	10.216293	0	
38	N40	14.034674	3.416667	10.216293	0	
39	N41	5.670415	3.416667	10.363023	0	
40	N43A	8.73099	3.416667	1.043971	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	N19						
2	N20						
3	N21						
4	N22						
5	N41A	Reaction	Reaction	Reaction			
6	N42A	Reaction	Reaction	Reaction			

Joint Boundary Conditions (Continued)

	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]
7	N45						
8	N46						
9	N37						
10	N38						
11	N43A	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Equipment Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.2	Y	-.052	1.75
2	PS.2	Y	-.052	4.25
3	PS.1	Y	-.075	.5
4	PS.1	Y	-.075	7.5
5	PS.1	Y	-.084	3.5
6	PS.1	Y	-.109	3.5

Member Point Loads (BLC 3 : Ice Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.2	Y	-.107	1.75
2	PS.2	Y	-.107	4.25
3	PS.1	Y	-.294	.5
4	PS.1	Y	-.294	7.5
5	PS.1	Y	-.129	3.5
6	PS.1	Y	-.145	3.5

Member Point Loads (BLC 4 : Wind w/ Ice X (7 psf))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.2	X	.017	1.75
2	PS.2	X	.017	4.25
3	PS.1	X	.048	.5
4	PS.1	X	.048	7.5
5	PS.1	X	.037	3.5

Member Point Loads (BLC 5 : Wind X(27 psf))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.2	X	.036	1.75
2	PS.2	X	.036	4.25
3	PS.1	X	.111	.5
4	PS.1	X	.111	7.5
5	PS.1	X	.088	3.5

Member Point Loads (BLC 6 : Wind w/ Ice Z(7 psf))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.2	Z	.033	1.75
2	PS.2	Z	.033	4.25
3	PS.1	Z	.104	.5
4	PS.1	Z	.104	7.5
5	PS.1	Z	.022	3.5
6	PS.1	Z	.028	3.5

Member Point Loads (BLC 7 : Wind Z (27 psf))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.2	Z	.088	1.75
2	PS.2	Z	.088	4.25
3	PS.1	Z	.313	.5
4	PS.1	Z	.313	7.5
5	PS.1	Z	.044	3.5
6	PS.1	Z	.061	3.5

Member Distributed Loads (BLC 4 : Wind w/ Ice X (7 psf))

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	M4	X	.001	.001	0	0
2	M5	X	.001	.001	0	0
3	M6	X	.001	.001	0	0
4	M7	X	.001	.001	0	0
5	PS.2	X	.001	.001	0	0
6	PS.1	X	.001	.001	0	0
7	M21	X	.001	.001	0	0
8	M21A	X	.001	.001	0	0
9	M20A	X	.001	.001	0	0

Member Distributed Loads (BLC 5 : Wind X(27 psf))

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	M4	X	.006	.006	0	0
2	M5	X	.006	.006	0	0
3	PS.2	X	.006	.006	0	0
4	PS.1	X	.006	.006	0	0
5	M21	X	.006	.006	0	0
6	M6	X	.006	.006	0	0
7	M7	X	.006	.006	0	0
8	M21A	X	.006	.006	0	0
9	M20A	X	.006	.006	0	0

Member Distributed Loads (BLC 6 : Wind w/ Ice Z(7 psf))

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	H2	Z	.001	.001	1.292	11.25
2	H1	Z	.001	.001	1.292	11.25
3	M21	Z	.001	.001	0	0
4	PS.2	Z	.001	.001	0	1.75
5	PS.2	Z	.001	.001	4.25	0
6	M21A	Z	.001	.001	0	0

Member Distributed Loads (BLC 7 : Wind Z (27 psf))

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	H2	Z	.006	.006	1.292	11.25
2	H1	Z	.006	.006	1.292	11.25
3	M21	Z	.005	.005	0	0
4	PS.2	Z	.006	.006	0	1.75
5	PS.2	Z	.006	.006	4.25	0
6	M21A	Z	.005	.005	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	Equipment Weight	None					6			
3	Ice Weight	None					6			
4	Wind w/ Ice X (7 psf)	None					5	9		
5	Wind X(27 psf)	None					5	9		
6	Wind w/ Ice Z(7 psf)	None					6	6		
7	Wind Z (27 psf)	None					6	6		

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	BLC	Fact...	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D + 1.6W (X-dir...	Yes	Y		1	1.2	2	1.2	5	1.6														
2	0.9D + 1.6W (X-dir...	Yes	Y		1	.9	2	.9	5	1.6														
3	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	4	1												
4	1.2D + 1.6W (Z-dire...	Yes	Y		1	1.2	2	1.2	7	1.6														
5	0.9D + 1.6W (Z-dire...	Yes	Y		1	.9	2	.9	7	1.6														
6	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	6	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	N41A	max	.097	5	1.174	3	.2	2	0	6	0	6	0	6
2		min	-1.843	3	.034	5	-3.008	4	0	1	0	1	0	1
3	N42A	max	1.669	6	.908	6	1.571	3	0	6	0	6	0	6
4		min	-.127	2	.416	2	-.362	5	0	1	0	1	0	1
5	N43A	max	.196	1	.021	6	1.439	4	0	6	0	6	0	6
6		min	-.473	4	.015	2	-.732	1	0	1	0	1	0	1
7	Totals:	max	0	6	2.057	6	0	1						
8		min	-1.095	1	.736	2	-1.753	4						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotation [rad]	LC
1	N1	max	.053	2	.033	5	.121	5	7.123e-03	4	1.593e-02	5	8.325e-04	1
2		min	-.197	4	-.013	1	-.033	3	-1.965e-03	2	-6.851e-04	1	-2.221e-03	5
3	N2	max	.019	1	.033	5	.445	5	7.132e-03	4	1.871e-02	5	9.341e-04	1
4		min	-.058	5	-.014	1	-.026	2	-1.952e-03	2	-1.277e-03	1	-2.203e-03	5
5	N3	max	.053	2	.02	5	.074	2	7.123e-03	4	1.593e-02	5	8.316e-04	1
6		min	-.197	4	-.008	1	-.041	6	-1.965e-03	2	-6.851e-04	1	-2.222e-03	5
7	N4	max	.019	1	.02	5	.333	4	7.132e-03	4	1.871e-02	5	9.332e-04	1
8		min	-.058	5	-.008	1	-.018	2	-1.952e-03	2	-1.277e-03	1	-2.204e-03	5
9	N5	max	.059	2	.02	5	.088	2	7.12e-03	4	1.593e-02	5	8.345e-04	1
10		min	-.212	4	-.008	1	-.061	6	-1.965e-03	2	-6.851e-04	1	-2.222e-03	5
11	N6	max	.006	3	.02	5	.516	4	7.348e-03	4	1.871e-02	5	7.684e-04	1
12		min	-.003	4	-.008	1	-.067	2	-1.953e-03	2	-1.277e-03	1	-2.205e-03	5
13	N9	max	.053	2	.035	3	.082	2	4.353e-03	4	1.237e-02	5	1.225e-03	3
14		min	-.197	4	-.002	5	-.301	4	-1.061e-03	2	-5.137e-04	3	-7.969e-05	5
15	N10	max	.019	1	.036	3	.016	1	4.999e-03	4	1.792e-02	5	1.215e-03	3
16		min	-.058	5	-.002	5	-.082	5	-1.034e-03	2	-1.832e-03	1	-8.319e-05	5

Envelope Joint Displacements (Continued)

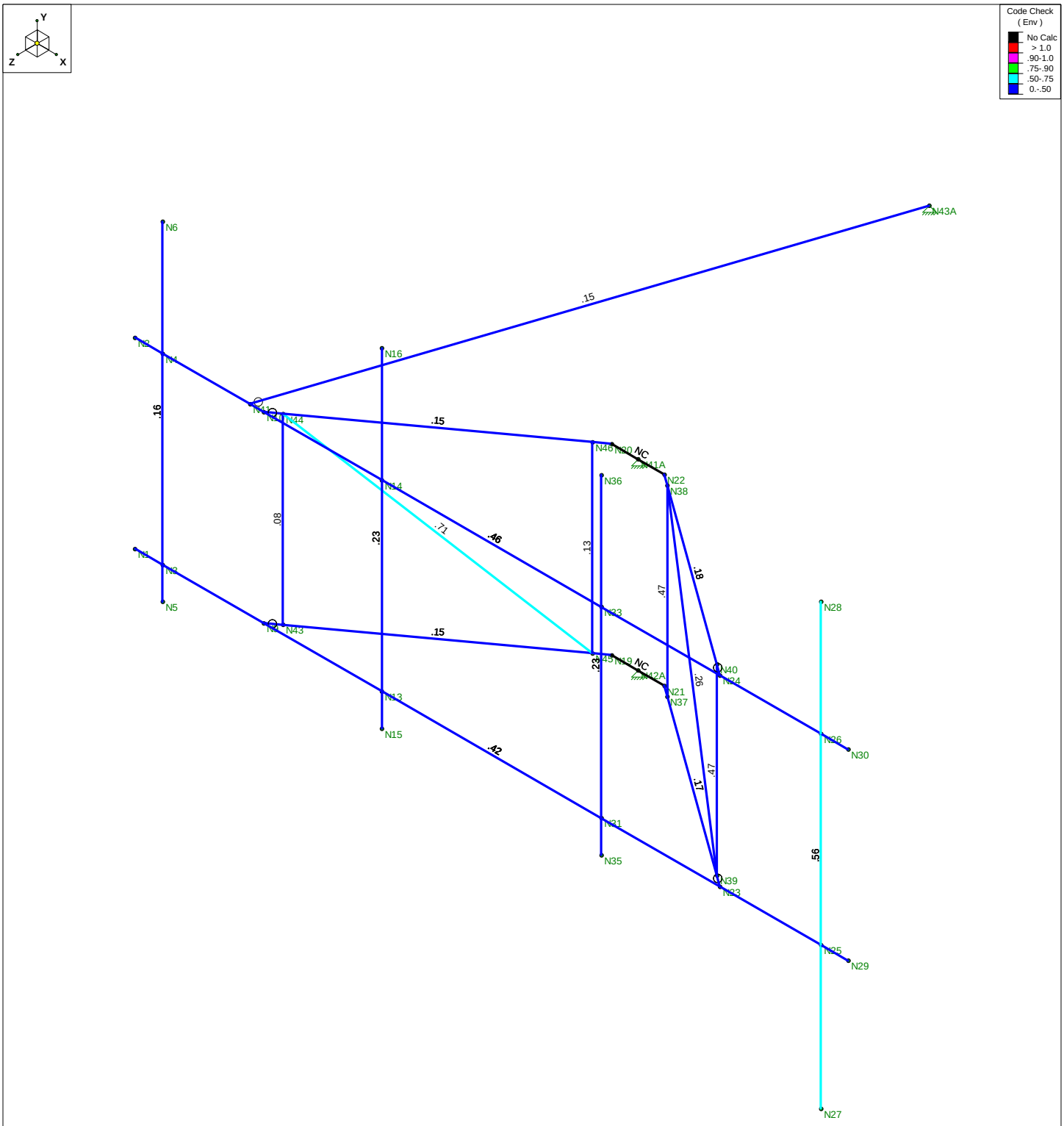
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotation [rad]	LC
17	N13	max	.053	2	.049	3	.065	2	1.747e-03	4	5.047e-03	5	1.333e-04	2
18		min	-.197	4	-.007	5	-.526	4	-4.901e-04	2	-3.158e-04	3	-9.728e-04	4
19	N14	max	.02	1	.049	3	.043	1	2.979e-03	4	8.777e-03	5	1.18e-04	2
20		min	-.059	5	-.007	5	-.432	5	-4.867e-04	2	-2.614e-04	1	-9.927e-04	4
21	N15	max	.054	2	.049	3	.068	2	1.745e-03	4	5.047e-03	5	1.362e-04	2
22		min	-.204	4	-.007	5	-.538	4	-4.901e-04	2	-3.158e-04	3	-9.728e-04	4
23	N16	max	.022	3	.049	3	.033	1	3.094e-03	4	8.777e-03	5	-1.572e-05	2
24		min	-.035	5	-.007	5	-.357	5	-4.867e-04	2	-2.614e-04	1	-9.928e-04	4
25	N19	max	0	6	.022	6	.012	3	3.697e-04	1	2.016e-03	3	-2.153e-04	2
26		min	0	1	.001	2	-.031	5	-1.375e-04	5	-5.437e-03	5	-3.787e-03	6
27	N20	max	0	6	.023	6	-.007	2	1.143e-03	4	-1.187e-03	2	-3.037e-04	2
28		min	0	1	.002	2	-.015	6	3.944e-04	2	-2.612e-03	6	-4.028e-03	6
29	N21	max	0	6	-.001	2	.031	5	3.697e-04	1	2.016e-03	3	-2.153e-04	2
30		min	0	1	-.022	6	-.012	3	-1.375e-04	5	-5.437e-03	5	-3.787e-03	6
31	N22	max	0	6	-.002	2	.015	6	1.143e-03	4	-1.187e-03	2	-3.037e-04	2
32		min	0	1	-.023	6	.007	2	3.944e-04	2	-2.612e-03	6	-4.028e-03	6
33	N31	max	.053	2	.026	6	.007	3	9.123e-04	2	2.239e-03	2	-2.396e-05	2
34		min	-.198	4	-.003	2	-.3	5	-4.468e-03	5	-1.56e-02	4	-1.898e-03	6
35	N33	max	.02	1	.026	6	.017	1	8.806e-04	1	1.278e-03	1	-9.29e-05	2
36		min	-.061	5	-.003	2	-.399	5	-1.244e-04	6	-1.198e-02	5	-1.967e-03	6
37	N35	max	.053	2	.026	6	.007	3	9.123e-04	2	2.239e-03	2	-2.103e-05	2
38		min	-.207	4	-.003	2	-.269	5	-4.47e-03	5	-1.56e-02	4	-1.898e-03	6
39	N36	max	.06	3	.026	6	.039	1	8.807e-04	1	1.278e-03	1	-2.266e-04	2
40		min	-.033	5	-.003	2	-.395	5	-1.095e-04	6	-1.198e-02	5	-1.968e-03	6
41	N23	max	.053	2	-.018	5	.305	4	1.409e-03	1	2.249e-03	2	-1.71e-03	2
42		min	-.199	4	-.086	3	-.084	2	-9.359e-03	5	-3.129e-02	4	-7.284e-03	6
43	N24	max	.021	1	-.019	5	.099	5	1.576e-03	4	1.605e-03	2	-1.194e-03	2
44		min	-.062	5	-.088	3	-.02	1	3.644e-04	6	-2.739e-02	4	-7.328e-03	6
45	N25	max	.053	2	-.052	2	1.098	4	1.68e-03	2	2.007e-03	2	7.027e-04	2
46		min	-.199	4	-.264	6	-.13	2	-1.596e-02	4	-3.79e-02	4	-5.98e-03	6
47	N26	max	.021	1	-.052	2	.823	4	3.155e-03	5	1.834e-03	2	-1.386e-03	2
48		min	-.062	5	-.264	6	-.059	2	-1.803e-04	3	-3.563e-02	4	-5.826e-03	6
49	N27	max	.168	2	-.052	2	1.838	4	1.678e-03	2	2.007e-03	2	4.768e-03	2
50		min	-.327	4	-.265	6	-.182	2	-2.668e-02	4	-3.79e-02	4	-5.941e-03	6
51	N28	max	.164	3	-.052	2	1.019	5	9.375e-03	5	1.834e-03	2	-3.512e-03	5
52		min	.026	5	-.264	6	-.018	1	-1.811e-04	3	-3.563e-02	4	-6.008e-03	3
53	N29	max	.053	2	-.048	2	1.325	4	1.68e-03	2	2.007e-03	2	7.021e-04	2
54		min	-.199	4	-.3	6	-.142	2	-1.596e-02	4	-3.79e-02	4	-5.981e-03	6
55	N30	max	.021	1	-.06	2	1.036	4	3.155e-03	5	1.834e-03	2	-1.386e-03	2
56		min	-.062	5	-.299	6	-.07	2	-1.803e-04	3	-3.563e-02	4	-5.827e-03	6
57	N41A	max	0	6	0	6	0	6	1.143e-03	4	-1.187e-03	2	-3.037e-04	2
58		min	0	1	0	1	0	1	3.944e-04	2	-2.612e-03	6	-4.028e-03	6
59	N42A	max	0	6	0	6	0	6	3.697e-04	1	2.016e-03	3	-2.153e-04	2
60		min	0	1	0	1	0	1	-1.375e-04	5	-5.437e-03	5	-3.787e-03	6
61	N43	max	.05	2	.038	3	.078	2	3.502e-03	4	1.599e-03	2	6.167e-04	3
62		min	-.185	4	.001	5	-.285	4	-8.255e-04	2	-6.518e-03	4	-1.043e-03	5
63	N44	max	.016	1	.039	3	.013	2	3.821e-03	4	1.912e-03	3	5.755e-04	1
64		min	-.055	5	0	5	-.078	4	-7.971e-04	2	-1.728e-03	5	-1.532e-03	5
65	N45	max	.003	3	.03	6	.016	3	3.906e-04	6	1.729e-03	1	-1.591e-04	2
66		min	-.01	5	.001	2	-.045	5	1.978e-04	2	-5.527e-03	5	-3.329e-03	6
67	N46	max	-.002	2	.031	6	-.009	2	1.371e-03	4	-8.845e-04	2	-2.555e-04	2
68		min	-.004	6	.002	2	-.021	6	3.153e-04	2	-2.183e-03	6	-3.586e-03	6

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotation [rad]	LC
69	N37	max	.003	1	-.002	2	.045	5	3.556e-04	1	1.736e-03	1	-2.174e-04	2
70		min	-.01	5	-.031	6	-.016	3	-6.026e-04	5	-5.549e-03	5	-3.615e-03	6
71	N38	max	-.002	2	-.003	2	.021	6	8.951e-04	4	-8.66e-04	2	-3.187e-04	2
72		min	-.004	6	-.035	6	.009	2	4.293e-04	2	-2.185e-03	6	-3.751e-03	6
73	N39	max	.05	2	-.019	5	.289	4	6.871e-04	2	1.657e-03	2	-7.288e-04	2
74		min	-.187	4	-.08	3	-.08	2	-6.952e-03	4	-6.598e-03	4	-4.966e-03	4
75	N40	max	.018	1	-.02	5	.094	4	4.372e-04	2	1.957e-03	3	3.489e-04	5
76		min	-.058	5	-.083	3	-.017	2	-2.433e-03	6	-2.149e-03	5	-3.213e-03	6
77	N41	max	.019	1	.032	3	.01	1	5.288e-03	4	1.85e-02	5	1.399e-03	3
78		min	-.058	5	-.002	5	-.027	5	-1.159e-03	2	-1.848e-03	1	-2.71e-04	5
79	N43A	max	0	6	0	6	0	6	2.103e-03	4	3.497e-03	1	1.35e-03	1
80		min	0	1	0	1	0	1	8.277e-04	2	-5.382e-04	5	-1.388e-03	5

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

	Memb...	Shape	Code Check	L...	LC	Sh...	L...	Dir	...phi*P...	phi*Pn...	phi*Mn y-y [k-ft]	phi*...	Cb	Eqn
1	M22A	SR 3/4	.714	5....	3	.006	5....		3 .888	14.314	.179	.179	3....	H1..
2	PS.1	PIPE_2.0	.561	2....	4	.092	5....		4 28.122	32.13	1.872	1.872	2....	H1..
3	M19A	SR 3/4	.474	3....	6	.027	0		6 2.193	14.314	.179	.179	2....	H1..
4	M18	SR 3/4	.468	3....	6	.021	0		5 2.193	14.314	.179	.179	2....	H1..
5	H1	PIPE_2.0X	.465	1...	4	.186	2....		5 41.604	44.1	2.531	2.531	2....	H1..
6	H2	PIPE_2.0X	.424	1...	4	.259	1...		4 41.604	44.1	2.531	2.531	3....	H1..
7	M17	SR 3/4	.264	5....	6	.011	5....		4 .887	14.314	.179	.179	2....	H1..
8	M21	PIPE_2.0	.233	5....	4	.093	5....		4 28.122	32.13	1.872	1.872	2....	H1..
9	M21A	PIPE_2.0	.232	2....	5	.088	2....		4 28.122	32.13	1.872	1.872	2....	H1..
10	M6	PIPE_2.0X	.184	4....	6	.093	.2...		6 44.066	44.1	2.531	2.531	1....	H1..
11	M7	PIPE_2.0X	.168	4....	6	.135	4....		4 35.963	44.1	2.531	2.531	2....	H1..
12	PS.2	PIPE_2.0	.158	.6..	4	.073	.6...		4 28.122	32.13	1.872	1.872	2....	H1..
13	M5	PIPE_2.0X	.153	4....	6	.048	4....		3 44.066	44.1	2.531	2.531	1....	H1..
14	M4	PIPE_2.0X	.152	4....	6	.062	4....		3 44.066	44.1	2.531	2.531	1....	H1..
15	M20A	PIPE_2.0	.148	0	4	.005	0		1 10.224	32.13	1.872	1.872	1....	H1..
16	M21C	SR 3/4	.127	3....	5	.021	0		5 2.193	14.314	.179	.179	2....	H1..
17	M20B	SR 3/4	.084	3....	5	.028	0		6 2.193	14.314	.179	.179	2....	H1..



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek Engineering		
FJP	CTHA038A - AMA	Sept 13, 2021 at 2:52 PM
21005.36	Unity Check	CTHA038A_AMA .R3D

EBI Consulting

environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CTHA038A

CTHA038A
250 South Alcott Street
Manchester, Connecticut 06040

November 11, 2021

EBI Project Number: 6221006877

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**14.41%**

November 11, 2021

T-Mobile
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, Connecticut 06002

Emissions Analysis for Site: CTHA038A - CTHA038A

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **250 South Alcott Street** in **Manchester, Connecticut** for the purpose of determining whether the emissions from the Proposed T-Mobile 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 ($\mu W/cm^2$). 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.

Public 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 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$, respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency 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.

Occupational/controlled exposure 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 done for the proposed T-Mobile Wireless antenna facility located at 250 South Alcott Street in Manchester, Connecticut using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile 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 manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, 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. For power density calculations, the broadcast footprint of the AIR6449 antenna has been considered. Due to the beamforming nature of this antenna, the actual beam locations vary depending on demand and are narrow in nature. Using the broadcast footprint accounts for the potential location of beams at any given time.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 1 NR channel (600 MHz Band) was considered for each sector of the proposed installation. This Channel has a transmit power of 80 Watts.

3) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 4 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

5) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

6) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

7) 1 LTE Traffic channel (LTE 1C and 2C BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 60 Watts.

8) 1 LTE Broadcast channel (LTE 1C and 2C BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 20 Watts.

9) 1 NR Traffic channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 120 Watts.

10) 1 NR Broadcast channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 40 Watts.

11) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. 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. This is rarely the case, and if so, is never continuous.

12) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

13) The antennas used in this modeling are the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s) in Sector A, the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s) in Sector B, the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied

specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, 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.

14) The antenna mounting height centerline of the proposed antennas is 135 feet above ground level (AGL).

15) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	RFS APXVAALL24_43-U-NA20	Make / Model:	RFS APXVAALL24_43-U-NA20	Make / Model:	RFS APXVAALL24_43-U-NA20
Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz
Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd / 16.45 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd / 16.45 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd / 15.45 dBd / 15.45 dBd / 16.45 dBd
Height (AGL):	135 feet	Height (AGL):	135 feet	Height (AGL):	135 feet
Channel Count:	13	Channel Count:	13	Channel Count:	13
Total TX Power (W):	560 Watts	Total TX Power (W):	560 Watts	Total TX Power (W):	560 Watts
ERP (W):	17,868.72	ERP (W):	17,868.72	ERP (W):	17,868.72
Antenna A1 MPE %:	**5.10%**	Antenna B1 MPE %:	**5.10%**	Antenna C1 MPE %:	**5.10%**
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449
Frequency Bands:	2500 MHz / 2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz / 2500 MHz
Gain:	22.65 dBd / 17.3 dBd / 22.65 dBd / 17.3 dBd	Gain:	22.65 dBd / 17.3 dBd / 22.65 dBd / 17.3 dBd	Gain:	22.65 dBd / 17.3 dBd / 22.65 dBd / 17.3 dBd
Height (AGL):	135 feet	Height (AGL):	135 feet	Height (AGL):	135 feet
Channel Count:	4	Channel Count:	4	Channel Count:	4
Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts
ERP (W):	36,356.09	ERP (W):	36,356.09	ERP (W):	36,356.09
Antenna A2 MPE %:	**7.85%**	Antenna B2 MPE %:	**7.85%**	Antenna C2 MPE %:	**7.85%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	12.95%
Eversource	1.46%
Site Total MPE % :	14.41%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	12.95%
T-Mobile Sector B Total:	12.95%
T-Mobile Sector C Total:	12.95%
Site Total MPE % :	14.41%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile 600 MHz LTE	2	591.73	135.0	2.56	600 MHz LTE	400	0.64%
T-Mobile 600 MHz NR	1	1577.94	135.0	3.41	600 MHz NR	400	0.85%
T-Mobile 700 MHz LTE	2	695.22	135.0	3.00	700 MHz LTE	467	0.64%
T-Mobile 1900 MHz GSM	4	1052.26	135.0	9.09	1900 MHz GSM	1000	0.91%
T-Mobile 1900 MHz LTE	2	2104.51	135.0	9.09	1900 MHz LTE	1000	0.91%
T-Mobile 2100 MHz LTE	2	2649.42	135.0	11.45	2100 MHz LTE	1000	1.14%
T-Mobile 2500 MHz LTE 1C & 2C Traffic	1	11044.63	135.0	23.86	2500 MHz LTE 1C & 2C Traffic	1000	2.39%
T-Mobile 2500 MHz LTE 1C & 2C Broadcast	1	1074.06	135.0	2.32	2500 MHz LTE 1C & 2C Broadcast	1000	0.23%
T-Mobile 2500 MHz NR Traffic	1	22089.26	135.0	47.72	2500 MHz NR Traffic	1000	4.77%
T-Mobile 2500 MHz NR Broadcast	1	2148.13	135.0	4.64	2500 MHz NR Broadcast	1000	0.46%
						Total:	**12.95%**

• NOTE: Totals may vary by approximately 0.01% due to summation of remainders in calculations.

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 T-Mobile 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:

T-Mobile Sector	Power Density Value (%)
Sector A:	12.95%
Sector B:	12.95%
Sector C:	12.95%
T-Mobile Maximum MPE % (Sector A):	12.95%
Site Total:	14.41%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **14.41%** 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.