



Northeast Site Solutions
Victoria Masse
420 Main Street #2, Sturbridge, MA 01566
860-306-2326
victoria@northeastsitesolutions.com

August 5, 2021

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

RE: Notice of Exempt Modification
160 Sound Beach Ave (aka Arcadia Road), Greenwich CT 06870
Latitude: 41.03302600
Longitude: -73.56729100
T-Mobile Site#: CT11001B_L600

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) antennas at the 105-foot mount on the existing 95-foot Utility Lattice Tower, located at 160 Sound Beach Ave (aka Arcadia Road), Greenwich CT. The tower is owned by owned by CL&P and the property is owned by Connecticut Department of Transportation. T-Mobile now intends to replace six (6) existing antennas with three (3) new 600/700/1900 MHz antenna and three (3) new 2100 MHz antenna. The new antennas would be installed at the 105-foot level of the Utility Lattice Tower. T-Mobile is also proposing mount modifications. As shown on the enclosed mount analysis dated July 8, 2021 by Centek Engineering. This modification includes B2, B5 hardware that is both 4G (LTE), and 5G capable.

T-Mobile Planned Modifications:

Remove:

(3) EMS RR90-17-XXDP Antenna

Remove and Replace:

(3) EMS RR90-17-XXDP Antenna (Remove) - (3) RFS APXVAALL18- 600/700/1900 MHz Antenna (Replace)
Platform Mount (Remove) – SitePro-RDS-284 Antenna Mast (Replace)

Install New:

(6) Smart Bias-T

Existing to Remain:

(3) RFS APX16DWV-16DWVS-E-A20 2100 MHz Antenna
(24) Coax



Ground Work:

- Install (1) H-Frame
- Install (3) Radio 4449 B71+B85
- Remove (1) Nortel Cabinet

This facility was approved by the CT Siting Council. Per the attached Petition No. 526 – Dated October 3, 2001. T-Mobile (formerly Voicestream) received approval to install on the existing transmission tower, with a total height of 112.5”. Please see attached.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to the Honorable Fred Camillo, First Selectman of Greenwich, Katie DeLuca, AICP, Planning and Zoning Director and Eversource (CL&P) is the tower owner and property owner.

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 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,

Victoria Masse
Mobile: 860-306-2326
Fax: 413-521-0558
Office: 420 Main Street, Unit 2, Sturbridge MA 01566



Email: victoria@northeastsitesolutions.com

Attachments cc:

The Honorable Fred Camillo, First Selectman
101 Field Point Road
First Floor
Greenwich, CT 06830

Katie DeLuca, AICP, Planning and Zoning Director
101 Field Point Road
2nd Floor
Greenwich, CT 06830

John A. Vitale- as property owner
Transportation Rail Officer II
Connecticut Department of Transportation
Bureau of Public Transportation
Office of Rails-Property Management Unit
4 Brewery Street, 4th Floor
New Haven, Connecticut 06511

Eversource (CL&P)- as tower owner
107 Selden Street
Berlin, CT 06037

Exhibit A

Original Facility Approval

Petition No. 526
VoiceStream Wireless
Greenwich, Connecticut
Staff Report
October 3, 2001

On October 1, 2001, Connecticut Siting Council (Council) member Edward S. Wilensky with Fred Cunliffe of Council staff met Voicestream Wireless (Voicestream) representatives Stephen Humes, Esq., Kurt Sheathelm, Haider Syed, and David Wicanpole for inspection of a Connecticut Light & Power Company (CL&P) electric transmission line structure (no. 1256) located at the Old Greenwich Metro North Railroad Station off Sound Beach Avenue, Greenwich. VoiceStream, with the agreement of CL&P, proposes to modify the structure by installing antennas and associated equipment for telecommunications use and is petitioning the Council for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need (Certificate) is required for the modification.

VoiceStream proposes to install 12 antennas on a platform attached to an 18-inch by 18-inch lattice extension to the top of the existing 95-foot high transmission structure. The extension with antennas would rise 17.5 feet above the existing structure (112.5 feet above ground level). Also, a microwave dish antenna would be mounted four feet below the 12-antenna array for telephone switching from an adjacent site. Voicestream has agreed to move its antennas five feet lower or 12.5 feet above the existing structure (107.5 feet above ground level). This adjustment complies with CL&P's design requiring a minimum of six feet above the shield wire.

An alternative structure located east of the proposed site contains dense vegetation that would require clearing and is adjacent to railroad tracks, which would create difficult construction access. An alternative structure located to the west is being used by AT&T, approved by the Council in Petition No. 467, and is not structurally sound for sharing. Use of flush-mounted antennas on a pipe extension at the proposed site would not provide sufficient capacity for demand in the area.

Equipment cabinets will be mounted on a 16.5-foot x 5-foot concrete slab within a 10.6-foot x 24-foot fenced compound at the base of the tower. An underground conduit from an adjacent utility pole will provide power to the site. This fence would be architecturally treated with plastic slats in the chain-link fence. In addition, no vegetation would be cleared at this site.

Voicestream would access the site via the parking lot at the Old Greenwich Metro North Railroad Station. Voice stream has an agreement with the Connecticut Department of Transportation for the lease area at the base of the structure and access.

The zoning designation of this site is R-12 (residential); however, a Local Retail Business zone is located south beyond the parking lot. In addition to the railroad tracks and the high-voltage transmission right-of-way, other land uses across the railroad tracks are a General Business zone with an Industrial Re-Use overlay containing multi-family residential units.

The worst-case power density for the telecommunications operations at the site has been calculated to be 5.7% of the applicable standard for uncontrolled environments.

VoiceStream contends that the proposed modification of the structure would not require a Certificate because the increase in height of this monopole structure will not result in a substantial environmental effect nor will there be damage to existing scenic, historical or recreational values, and the proposed project will prevent the construction of a new tower in the area.

Exhibit B

Property Card

ADMINISTRATIVE INFORMATION

OWNERSHIP

Tax ID 440/039

Printed 01/12/2021 Card No. 1 of 1

PARCEL NUMBER 06-4687/S
Parent Parcel Number

TOWN OF GREENWICH C/O FINANCE DEPT
101 FIELD POINT RD
GREENWICH, CT 06830
LOT NO 11A 8A ARCADIA RD N5

TRANSFER OF OWNERSHIP

Table with columns: Date, Value. Row: 12/09/1954 NA \$0

Property Address ARCADIA ROAD 0000
Neighborhood 111060 DISTRICT 6 S OLD GREENWICH [1]

Property Class 299 Exempt Commercial

TAXING DISTRICT INFORMATION

Jurisdiction 57 Greenwich, CT
Area 001
Corporation 057
District 06
Section & Plat 392
Routing Number 0220N0005

EXEMPT

VALUATION RECORD

Table with columns: Assessment Year, Reason for Change, VALUATION (Market, 70% Assessed), 2015 Prelim, 2015 Final, 2016 List, 2017 List, 2018 List, 2019 List, 2020 List

Site Description

Topography:
Public Utilities: Sewer, Electric

LAND DATA AND CALCULATIONS

Table with columns: Street or Road, Rating, Measured Acreage, Table, Prod. Factor, Depth Factor, Base Rate, Adjusted Rate, Extended Value, Influence Factor, Value. Includes Zoning: R-12 Single Fam 12,000 sq ft Residential Land

CKMP: 3484, 8701, 8702, 8725 & 8726
DBA: Railroad parking w/ access off Sound Beach Ave.
P: 213 spcs

Supplemental Cards

TRUE TAX VALUE 4654300

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

Supplemental Cards
TOTAL LAND VALUE

4654300

PHYSICAL CHARACTERISTICS

IMPROVEMENT DATA

Item Description Units Cost Total Pct

01

(LCM: 150.00)

SPECIAL FEATURES

SUMMARY OF IMPROVEMENTS

Description	Value	ID	Use	Stry Hgt	Const Type	Grade	Year Const	Eff Year	Cond	Base Rate	Feat-ures	Adj Rate	Size or Area	Computed Value	Phys Depr	Obsol Depr	Market Adj	% Comp	Value
		01	PAVING	0.00	85	Good	1990	2000	VG	2.90	N	6.53	69500	453840	0	0	100	100	453800

Data Collector/Date

Appraiser/Date

Neighborhood

Supplemental Cards

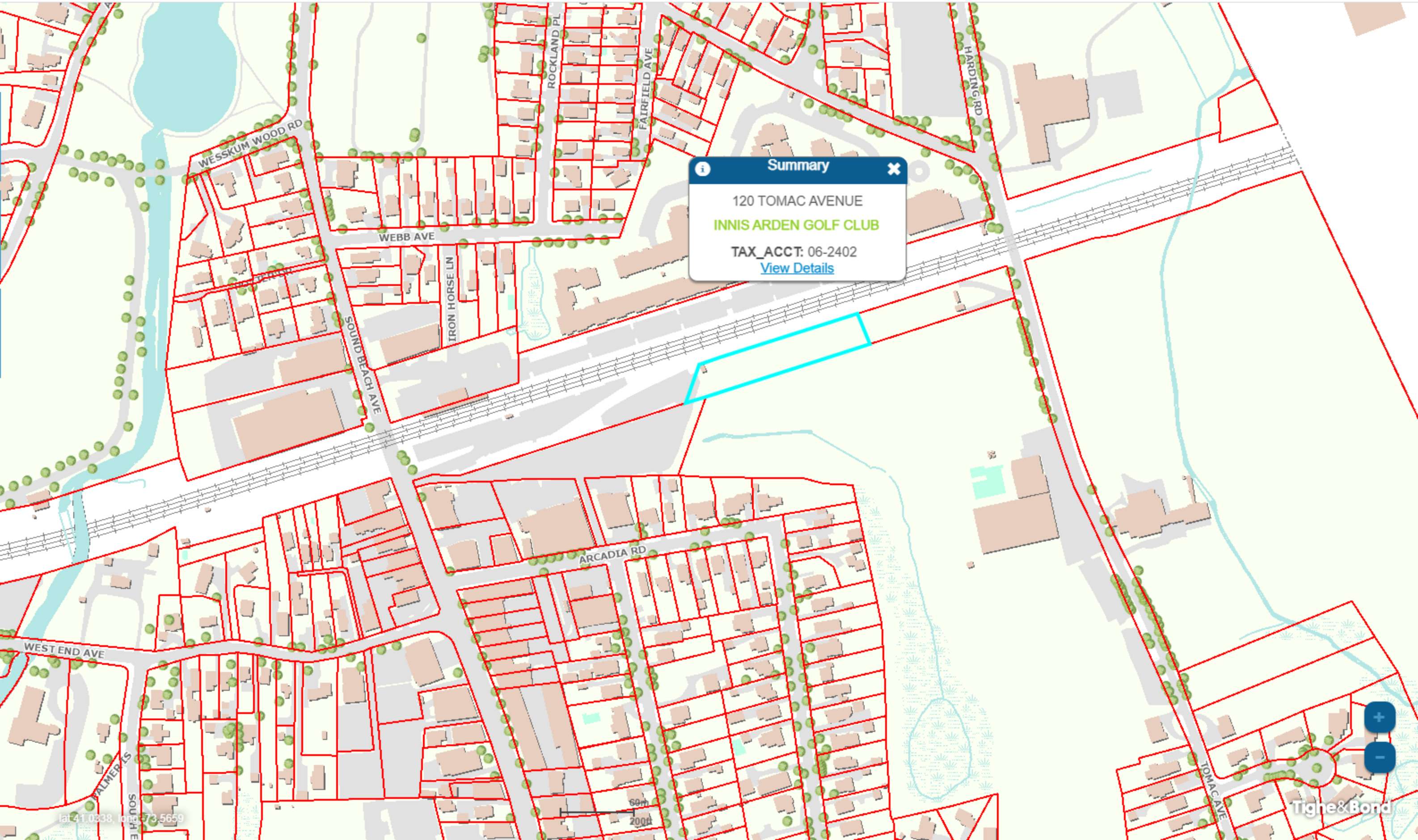
JB 09/07/1999

TOG 10/01/2015

Neigh 111060 AV

TOTAL IMPROVEMENT VALUE

453800



Summary ✕

120 TOMAC AVENUE
INNIS ARDEN GOLF CLUB
 TAX_ACCT: 06-2402
[View Details](#)

lat: 41.0838, long: -73.5659

Tigne & Bond



Victoria Masse <victoria@northeastsitesolutions.com>

T-Mobile Request for Property Record Card for 160 Sound Beach Ave, Greenwich CT

6 messages

Victoria Masse <victoria@northeastsitesolutions.com>

Wed, Aug 11, 2021 at 5:42 PM

To: prc@greenwichct.org

Cc: Denise Sabo <denise@northeastsitesolutions.com>, Deborah Chase <deborah@northeastsitesolutions.com>

Good Evening,

T-Mobile is looking to file an Exempt Modification with the Connecticut Siting Council for an antenna upgrade for an existing lattice tower located at 160 Sound Beach Ave, Greenwich CT. The Council requires that we provide a property card in our filing.

Can you please provide us with a copy of the property card for this address?

Address- 160 Sound Beach Ave, Greenwich CT
The Parcel ID is- 126833

Thank you

--

Victoria Masse

Zoning & Permitting Specialist

Notary Public

Mobile: 860-306-2326

Office: 420 Main Street Unit 1 Box 2 Sturbridge, MA 01566

Email: victoria@northeastsitesolutions.com

PRC <prc@greenwichct.org>

Thu, Aug 12, 2021 at 8:12 AM

To: Victoria Masse <victoria@northeastsitesolutions.com>

Cc: Denise Sabo <denise@northeastsitesolutions.com>, Deborah Chase <deborah@northeastsitesolutions.com>

Hi,

We do not have a [160 Sound Beach Avenue](#) in our system, I also could not locate the property on google, the parcel id you provided is also not any parcel id in our system. Would you have a property owner name or a map that illustrates where the tower is?

From: Victoria Masse <victoria@northeastsitesolutions.com>**Sent:** Wednesday, August 11, 2021 5:42 PM**To:** PRC <prc@greenwichct.org>

Cc: Denise Sabo <denise@northeastsitesolutions.com>; Deborah Chase <deborah@northeastsitesolutions.com>

Subject: T-Mobile Request for Property Record Card for [160 Sound Beach Ave, Greenwich CT](#)

[EXTERNAL]

[Quoted text hidden]

CAUTION: This email originated from outside the Town email system. Do not click links or open attachments unless you have verified the sender and know the content is safe.

Victoria Masse <victoria@northeastsitesolutions.com>

Thu, Aug 12, 2021 at 8:53 AM

To: PRC <prc@greenwichct.org>

Cc: Denise Sabo <denise@northeastsitesolutions.com>, Deborah Chase <deborah@northeastsitesolutions.com>

Good Morning,

I'm sorry the property itself is owned by Connecticut Department of Transportation Bureau of Public Transportation, I have attached to this email the parcel map that we have.

John A. Vitale

Transportation Rail Officer II

Connecticut Department of Transportation

Bureau of Public Transportation

Office of Rails-Property Management Unit

4 Brewery Street, 4th Floor

New Haven, Connecticut 06511

From google maps when I search by 160 Sound Beach Ave it takes me to this road and when I drop down for a closer look it looks like it shows it as 177 Sound Beach Ave-



I also tried to search the tax records to see if I could find a parcel ID when submitting my request and this is what I found for the 160 Sound Beach address-


BILL #	NAME/ADDRESS	PROPERTY/VEHICLE
2010-02-0003734 126833	T-MOBILE NORTHEAST LLC D/B/A T-MOBILE	160 SOUND BEACH AVENUE
(PERSONAL PROPERTY)		

Thank you!

[Quoted text hidden]

2 attachments

 **CT11001B-Parcel Map.pdf**
382K

 **2021-0805_21051.03 CT11001B - Rev1 CDs (S&S).pdf**
7651K

PRC <prc@greenwichct.org>

Thu, Aug 12, 2021 at 9:45 AM

To: Victoria Masse <victoria@northeastsitesolutions.com>

Cc: Denise Sabo <denise@northeastsitesolutions.com>, Deborah Chase <deborah@northeastsitesolutions.com>

If it is owned by the Connecticut Department of Transportation Bureau of Public Transportation then we would not have any parcel id or tax card for it. But if it fell within the boundaries depicted in the attached map, within the blue lines, then it would be [120 Tomac Avenue](#)(for our purposes) and I have attached their Field card. There simply isn't any kind of property card if it is located within the railroad row.

From: Victoria Masse <victoria@northeastsitesolutions.com>

Sent: Thursday, August 12, 2021 8:53 AM

To: PRC <prc@greenwichct.org>

Cc: Denise Sabo <denise@northeastsitesolutions.com>; Deborah Chase <deborah@northeastsitesolutions.com>


Subject: Re: T-Mobile Request for Property Record Card for [160 Sound Beach Ave, Greenwich CT](#)

[Quoted text hidden]

2 attachments



bgnsnth.PNG
364K

 **06-2402.pdf**
32K

PRC <prc@greenwichct.org>

Thu, Aug 12, 2021 at 10:28 AM

To: Victoria Masse <victoria@northeastsitesolutions.com>

Cc: Denise Sabo <denise@northeastsitesolutions.com>, Deborah Chase <deborah@northeastsitesolutions.com>

Hi,

I have been able to confirm that the correct property card is 0 Arcadia Road Parcel ID(06-4687) and I have attached it to this email.

Have a nice day!

From: Victoria Masse <victoria@northeastsitesolutions.com>


Sent: Thursday, August 12, 2021 8:53 AM

To: PRC <prc@greenwichct.org>

Cc: Denise Sabo <denise@northeastsitesolutions.com>; Deborah Chase <deborah@northeastsitesolutions.com>

Subject: Re: T-Mobile Request for Property Record Card for [160 Sound Beach Ave, Greenwich CT](#)

[Quoted text hidden]

 **06-4687_S.pdf**
36K

Victoria Masse <victoria@northeastsitesolutions.com>

Thu, Aug 12, 2021 at 10:29 AM

To: PRC <prc@greenwichct.org>

Cc: Denise Sabo <denise@northeastsitesolutions.com>, Deborah Chase <deborah@northeastsitesolutions.com>

Thank you so much for all your help!

[Quoted text hidden]

Exhibit C

Construction Drawings

T-Mobile

SITE NAME: GREENWICH/RIVERSIDE

SITE ID: CT11001B
 160 SOUND BEACH ROAD
 GREENWICH, CT 06870

T-MOBILE A&L TEMPLATE (PROVIDED BY RFDS)

67D94B_1DP+10P

T-MOBILE RAN TEMPLATE (PROVIDED BY RFDS)

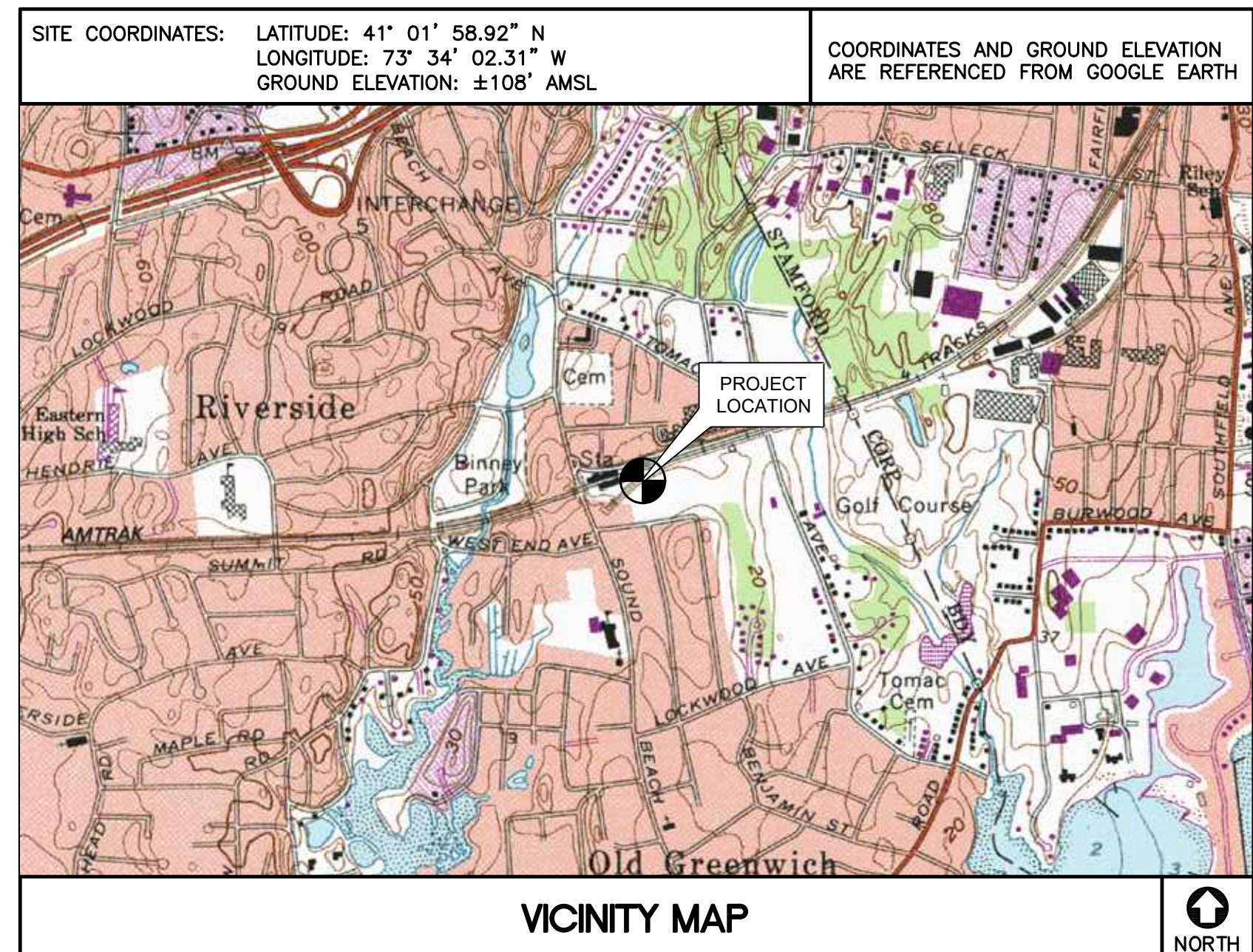
67D94B OUTDOOR

GENERAL NOTES

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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, UNDERPINNINGS, ETC. THAT MAY BE NECESSARY.
- 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.
- ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
- 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.
- 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: 160 SOUND BEACH ROAD GREENWICH, CT 06870
1. START OUT GOING NORTH ON GRIFFIN RD TOWARD HARTMAN RD.	0.30 MI.
2. TAKE THE SECOND RIGHT ONTO DAY HILL RD.	0.14 MI.
3. TAKE THE FIRST RIGHT ONTO BLUE HILLS AVENUE EXT/CT-187. CONTINUE TO FOLLOW CT-187	0.64 MI.
4. STAY STRAIGHT TO GO ONTO BLUE HILLS AVE/CT-187.	1.24 MI.
5. TURN LEFT ONTO OLD WINDSOR RD/CT-305. CONTINUE TO FOLLOW CT-305.	2.33 MI.
6. MERGE ONTO I-91 S TOWARD HARTFORD.	44.03 MI.
7. KEEP RIGHT TOWARD NY CITY	0.21 MI.
8. MERGE ONTO I-95 S VIA THE EXIT ON THE LEFT TOWARD NY CITY	42.20 MI.
9. TAKE THE US-1 EXIT, EXIT 5 TOWARD OLD GREENWICH/RIVERSIDE.	0.13 MI.
10. MERGE ONTO E PUTNAM AVE/US-1 N TOWARD OLD GREENWICH/RR STATION/STAMFORD/CIVIC CENTER	0.22 MI.
11. TURN RIGHT ONTO SOUND BEACH AVE.	0.82 MI.
12. 160 SOUND BEACH AVE, OLD GREENWICH, CT 06870-1712, 160 SOUND BEACH AVE IS ON THE LEFT	



PROJECT SUMMARY

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

- EXISTING LATTICE EXTENSION TO BE REMOVED.
- EXISTING EMS-RR90-17-XXDP ANTENNA, TYP. (2) PER SECTOR. TOTAL (6) TO BE REMOVED.
- INSTALL (1) APXVAARR18_43-U-NA20 ANTENNA PER SECTOR. TOTAL (3)
- INSTALL (1) EQUIPMENT FRAME
- INSTALL (1) RADIO 4449 B71+B85 PER SECTOR. TOTAL (3) MOUNTED TO NEW EQUIPMENT FRAME AT GRADE.
- INSTALL NEW ANTENNA MAST
- INSTALL NEW ANTENNA MOUNT TYP. (2). TOTAL (2).
- INSTALL BIAS-T AT ANTENNA TYP. (1) PER ANTENNA. TOTAL (6)

PROJECT SUMMARY (STRUCTURAL)

FOR REQUIRED STRUCTURAL MODIFICATIONS, SEE SHEET(S) S-1 FOR ADDITIONAL DETAILS. INSTALL NEW ANTENNA MOUNT AND MAST.

PROJECT INFORMATION

SITE NAME:	GREENWICH/RIVERSIDE
SITE ID:	CT11001B
SITE ADDRESS:	160 SOUND BEACH ROAD GREENWICH, CT 06870
APPLICANT:	T-MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
CONTACT PERSON:	SHELDON FREINCLE (PROJECT MANAGER) NORTHEAST SITE SOLUTIONS (203) 776-8521
ENGINEER OF RECORD:	CENITEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405 CARLO F. CENTORE, PE (203) 488-0580 EXT. 122
PROJECT COORDINATES:	LATITUDE: 41° 01' 58.92" N LONGITUDE: 73° 34' 02.31" W GROUND ELEVATION: ±108' AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

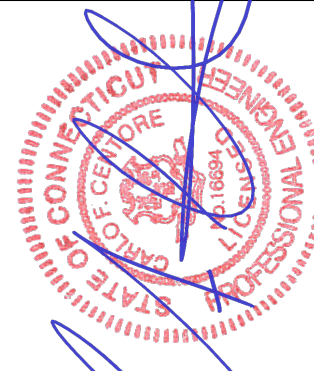
SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	1
N-1	GENERAL NOTES AND SPECIFICATIONS	1
C-1	SITE LOCATION PLAN	1
C-2	COMPOUND PLAN, EQUIPMENT PLANS, AND ELEVATION	1
C-3	ANTENNA PLANS AND ELEVATIONS	1
C-4	TYPICAL EQUIPMENT DETAILS	1
S-1	STRUCTURAL DETAILS	1
E-1	TYPICAL ELECTRICAL DETAILS	1
E-2	ELECTRICAL SPECIFICATIONS	1

DATE: 06/14/21
 SCALE: AS NOTED
 JOB NO. 21051.03

TITLE SHEET

T-1

REV.	DATE	BY	CHK'D	DESCRIPTION
0	07/29/21	RTS	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
		RTS	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION



T-MOBILE NORTHEAST LLC
 SITE NAME: GREENWICH/RIVERSIDE
 SITE ID: CT11001B
 160 SOUND BEACH ROAD
 GREENWICH, CT 06870

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

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 (OTHER STRUCTURE): 93 MPH (V_{wsd}) (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.

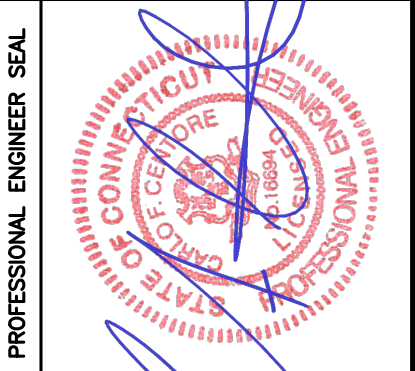
GENERAL NOTES

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 IT'S 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 MFR.'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 SITE OWNER'S 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 CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
17. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
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.
18. CONTRACTOR SHALL COMPLY WITH 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.
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.

STRUCTURAL STEEL

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

CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION	
CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION	
TJR	TJR
RJS	RJS
DATE	DATE
REV.	REV.
0	0
08/05/21	07/29/21



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T-MOBILE NORTHEAST LLC
SITE NAME: GREENWICH/RIVERSIDE
SITE ID: CT1001B
160 SOUND BEACH ROAD
GREENWICH, CT 06870

DATE: 06/14/21
 SCALE: AS NOTED
 JOB NO. 21051.03

GENERAL NOTES AND SPECIFICATIONS

N-1
 Sheet No. 2 of 9

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

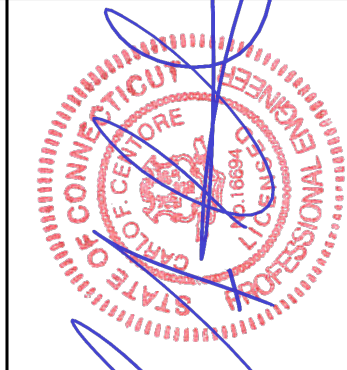


ANTENNA SCHEDULE

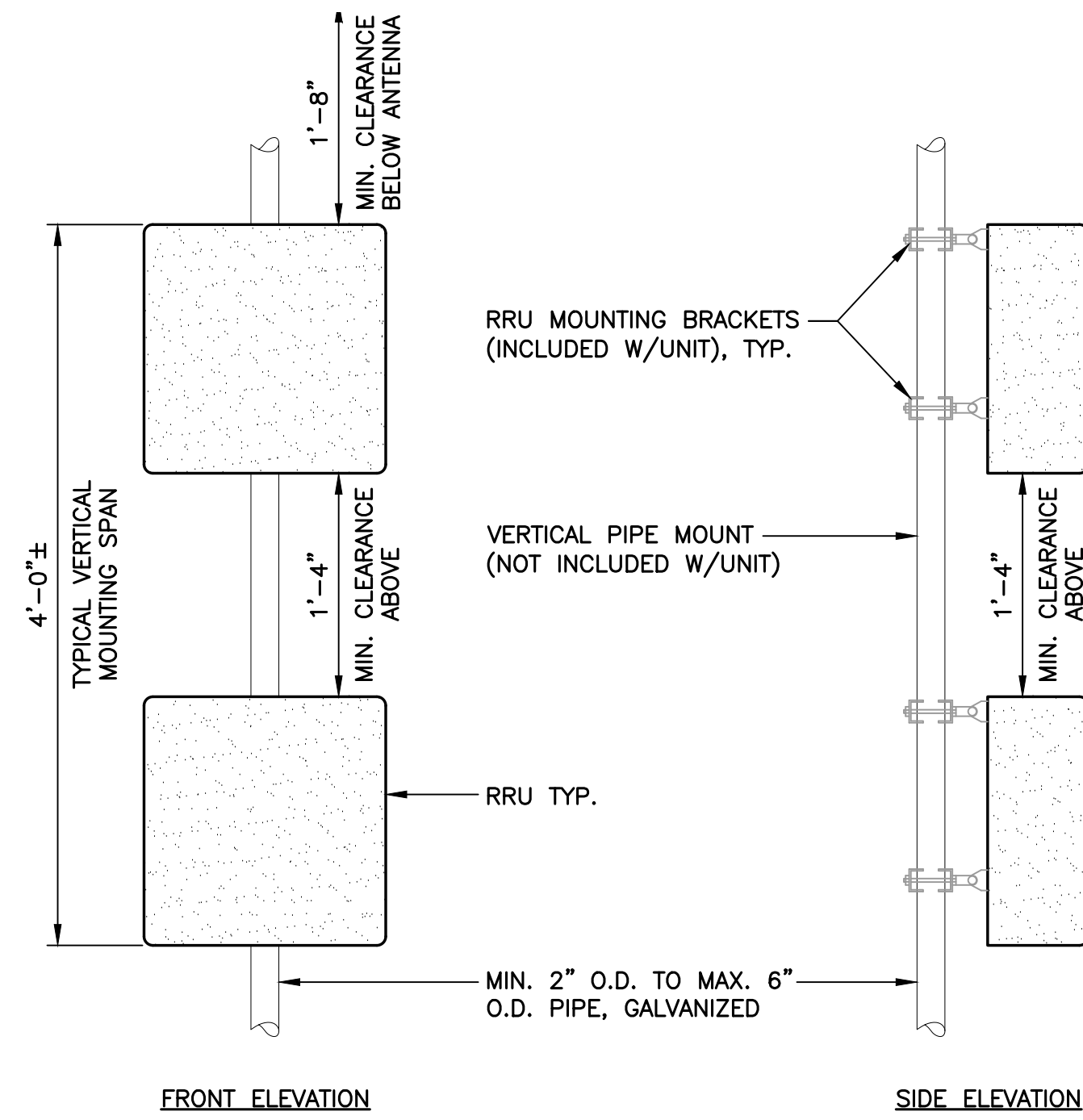
SECTOR	EXISTING/PROPOSED	ANTENNA	SIZE (INCHES) (L x W x D)	ANTENNA HEIGHT	AZIMUTH	(E/P) RRU (QTY)	(E/P) TMA (QTY)	(QTY) PROPOSED COAX
A1	PROPOSED	RFS (APXVAARR18_43-U-NA20)	72 x 24 x 8.5	105'	60°	(P) RADIO 4449 B71+B85 (AT CABINET) (1)	(P) ANDREW-SMART BIAS-T (AT ANTENNA) (1)	
A2	EXISTING	RFS (APX16DWV-16DWV-S-E-A20)	55.9 x 13 x 3.15	105'	60°		(P) ANDREW-SMART BIAS-T (AT ANTENNA) (1)	
B1	PROPOSED	RFS (APXVAARR18_43-U-NA20)	72 x 24 x 8.5	105'	180°	(P) RADIO 4449 B71+B85 (AT CABINET) (1)	(P) ANDREW-SMART BIAS-T (AT ANTENNA) (1)	
B2	EXISTING	RFS (APX16DWV-16DWV-S-E-A20)	55.9 x 13 x 3.15	105'	180°		(P) ANDREW-SMART BIAS-T (AT ANTENNA) (1)	
C1	PROPOSED	RFS (APXVAARR18_43-U-NA20)	72 x 24 x 8.5	105'	300°	(P) RADIO 4449 B71+B85 (AT CABINET) (1)	(P) ANDREW-SMART BIAS-T (AT ANTENNA) (1)	
C2	EXISTING	RFS (APX16DWV-16DWV-S-E-A20)	55.9 x 13 x 3.15	105'	300°		(P) ANDREW-SMART BIAS-T (AT ANTENNA) (1)	



1 SITE LOCATION PLAN
C-1 SCALE: NOT TO SCALE



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09/05/21 0 07/29/21	RTS RTS RTS	DATE DATE DATE	DRAWN BY/CHK'D BY TJR TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION	DESCRIPTION	REV.	TJR TJR

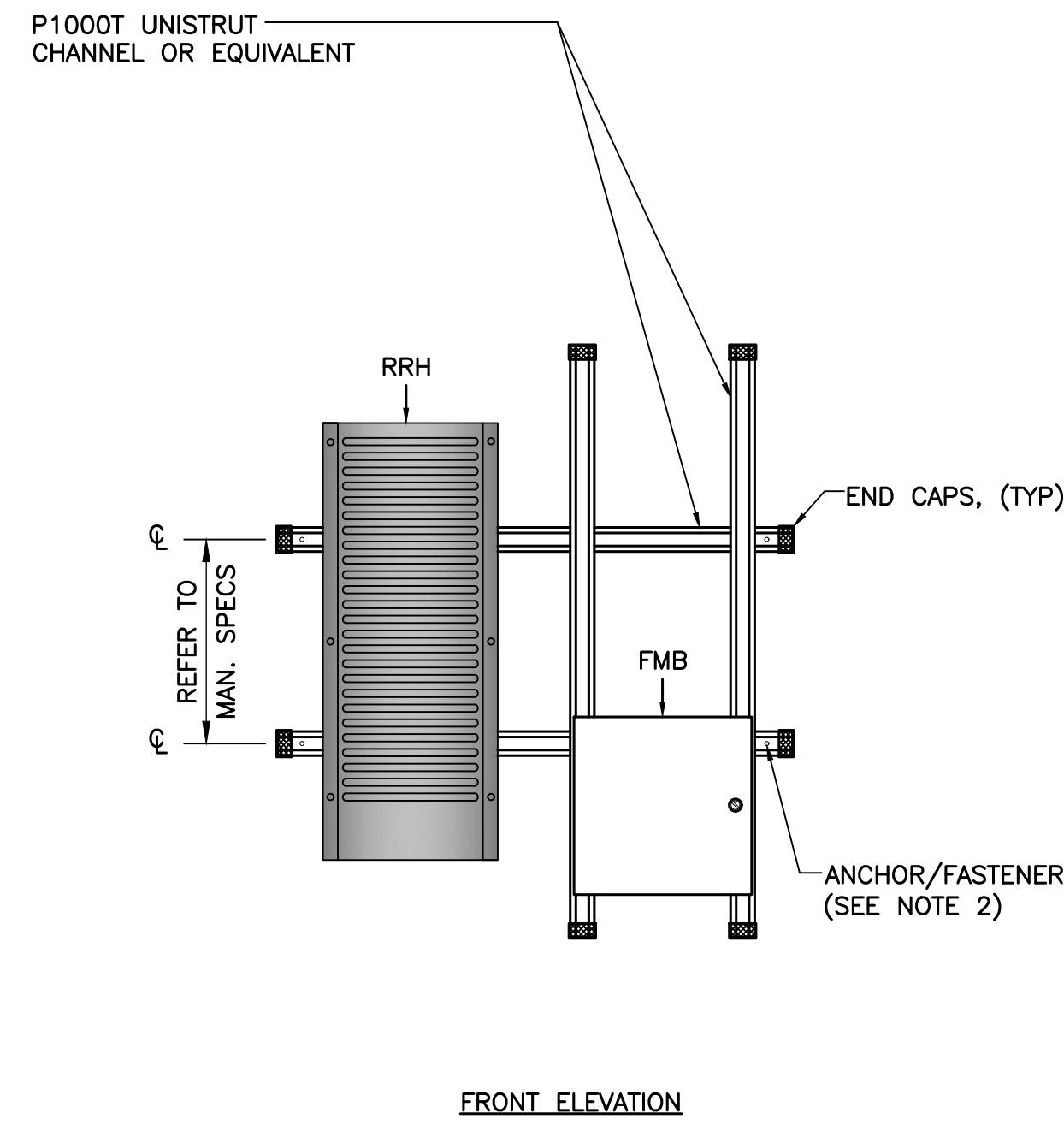


FRONT ELEVATION

SIDE ELEVATION

NOTES: (POLE 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 ($\pm 16^\circ/c$ MIN).
2. MOUNT RRU TO UNISTRUT WITH $3/8"$ UNISTRUT BOLTING HARDWARE AND SPRING NUTS. TYPICAL FOUR PER BRACKET.
3. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

1 TYPICAL RRU MOUNTING DETAILS
C-4 SCALE: NOT TO SCALE

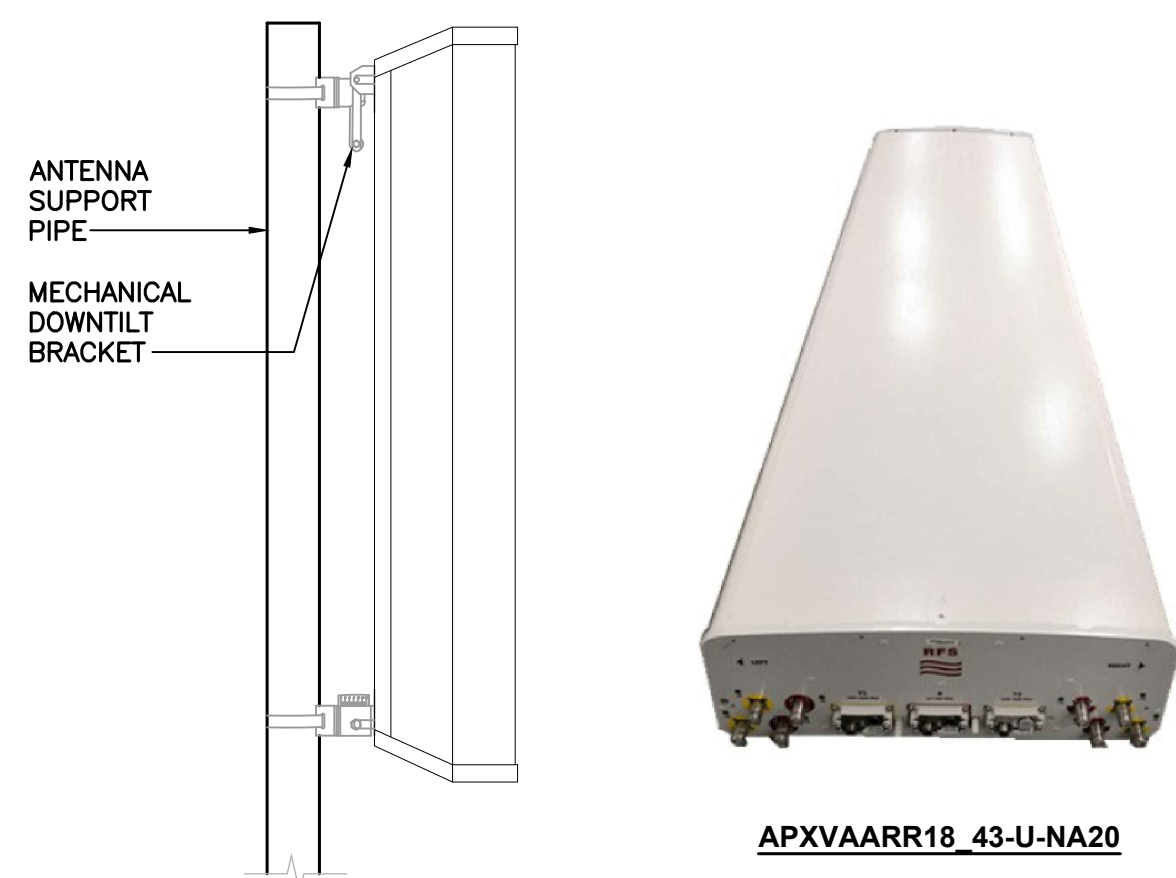


RADIO 4449 B71+B85

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RADIO 4449 B71+B85	14.9"L x 13.2"W x 5.4"D	±74 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 PROPOSED RRU DETAIL
C-4 SCALE: NOT TO SCALE



APXVAARR18_43-U-NA20

ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: RFS MODEL: APXVAARR18_43-U-NA20	72"L x 24"W x 8.5"D	±106 LBS.

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

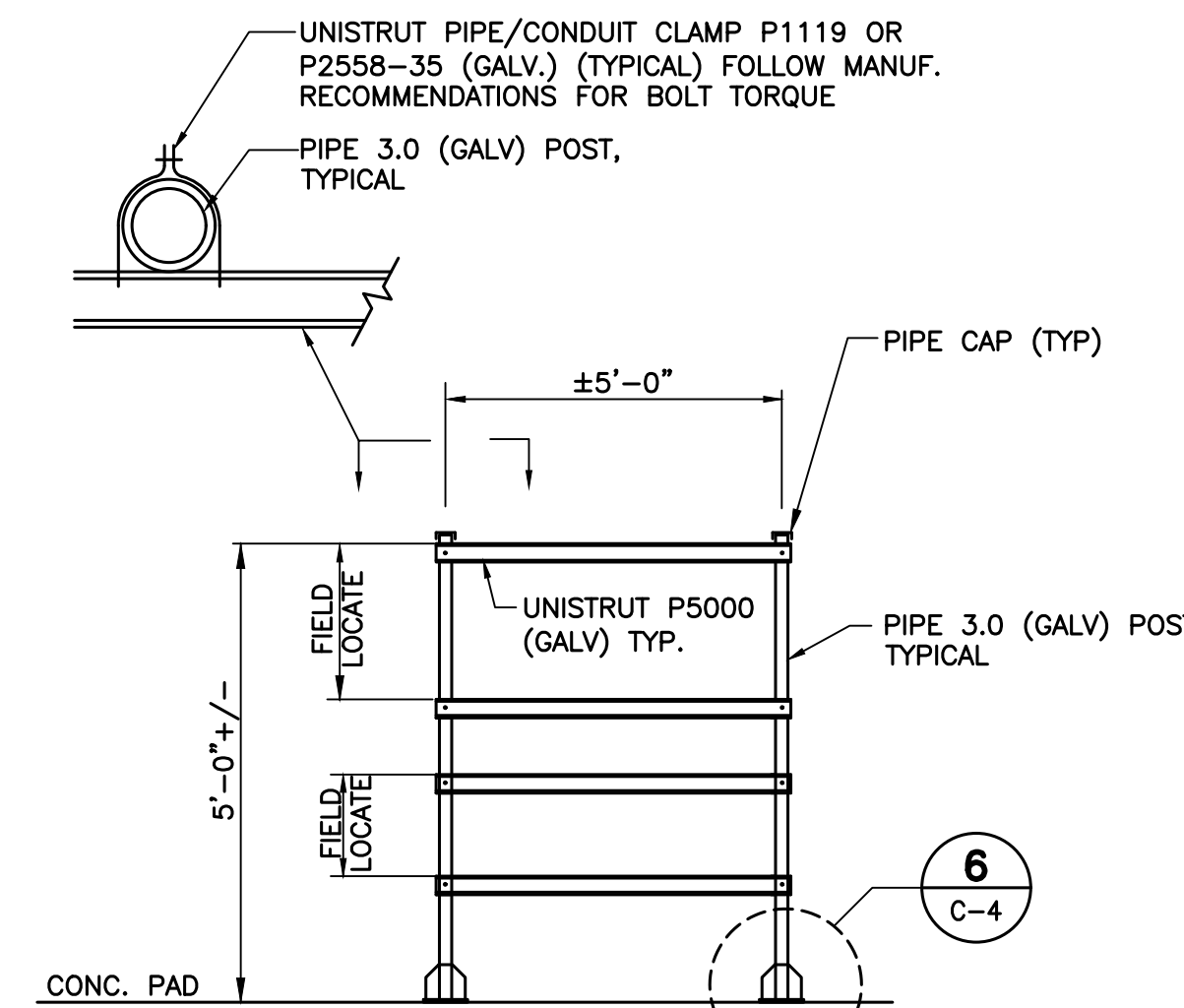
3 PROPOSED ANTENNA DETAIL
C-4 SCALE: NOT TO SCALE



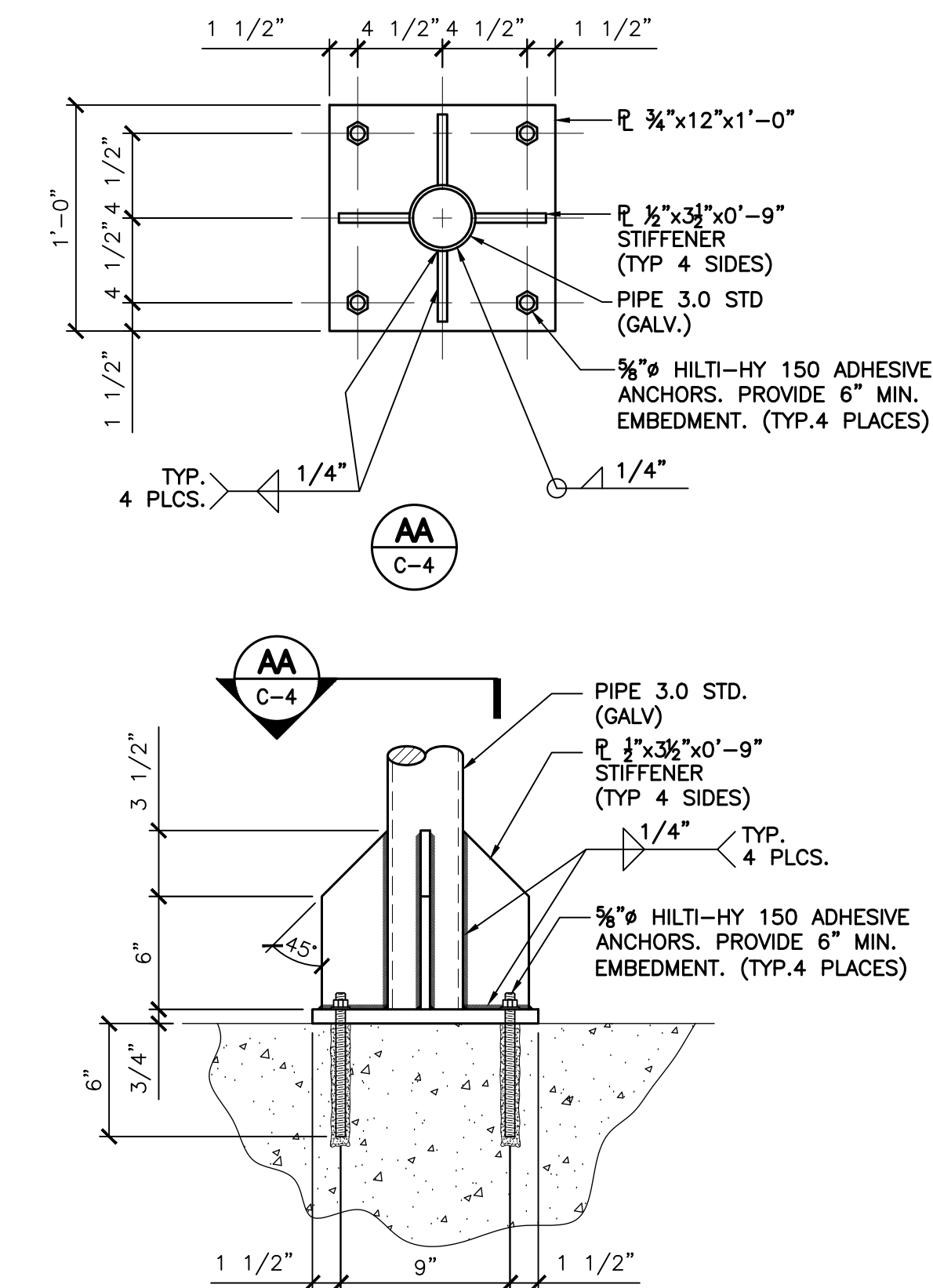
ANDREW SMART BIAS TEE		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: ATSBT-TOP-FF-4G	5.63"L x 3.7"W x 2"D	±1.7 LBS.

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

4 PROPOSED BIAS-T DETAIL
C-4 SCALE: NOT TO SCALE



5 EQUIPMENT MOUNTING FRAME DETAIL
C-4 SCALE: NOT TO SCALE



6 FRAME TO CONCRETE CONNECTION DETAIL
C-4 SCALE: NOT TO SCALE

REV.	DATE	BY	DESCRIPTION
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0	09/05/21	RTS	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION



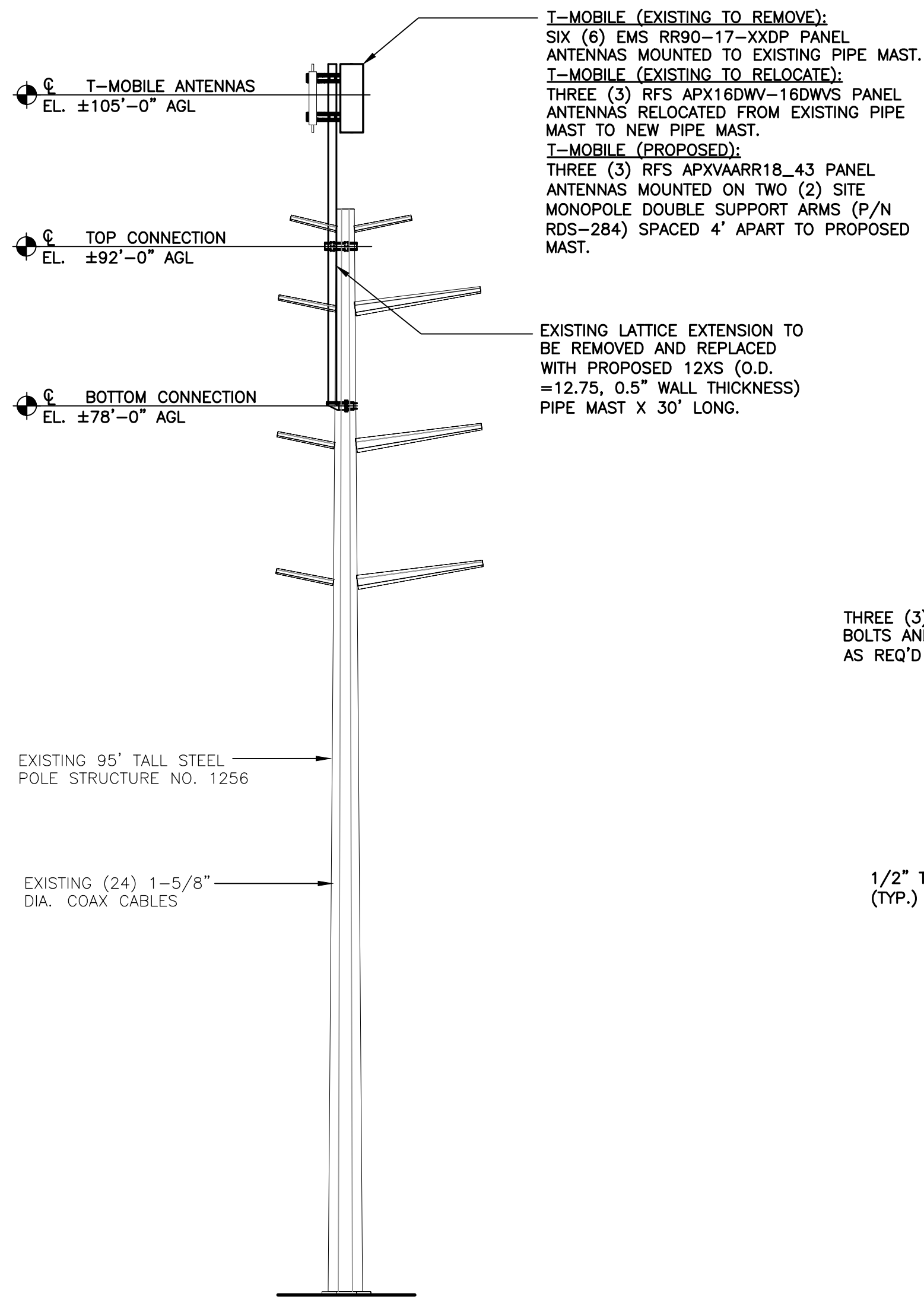
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SITE ID: CT1001B
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GREENWICH, CT 06870

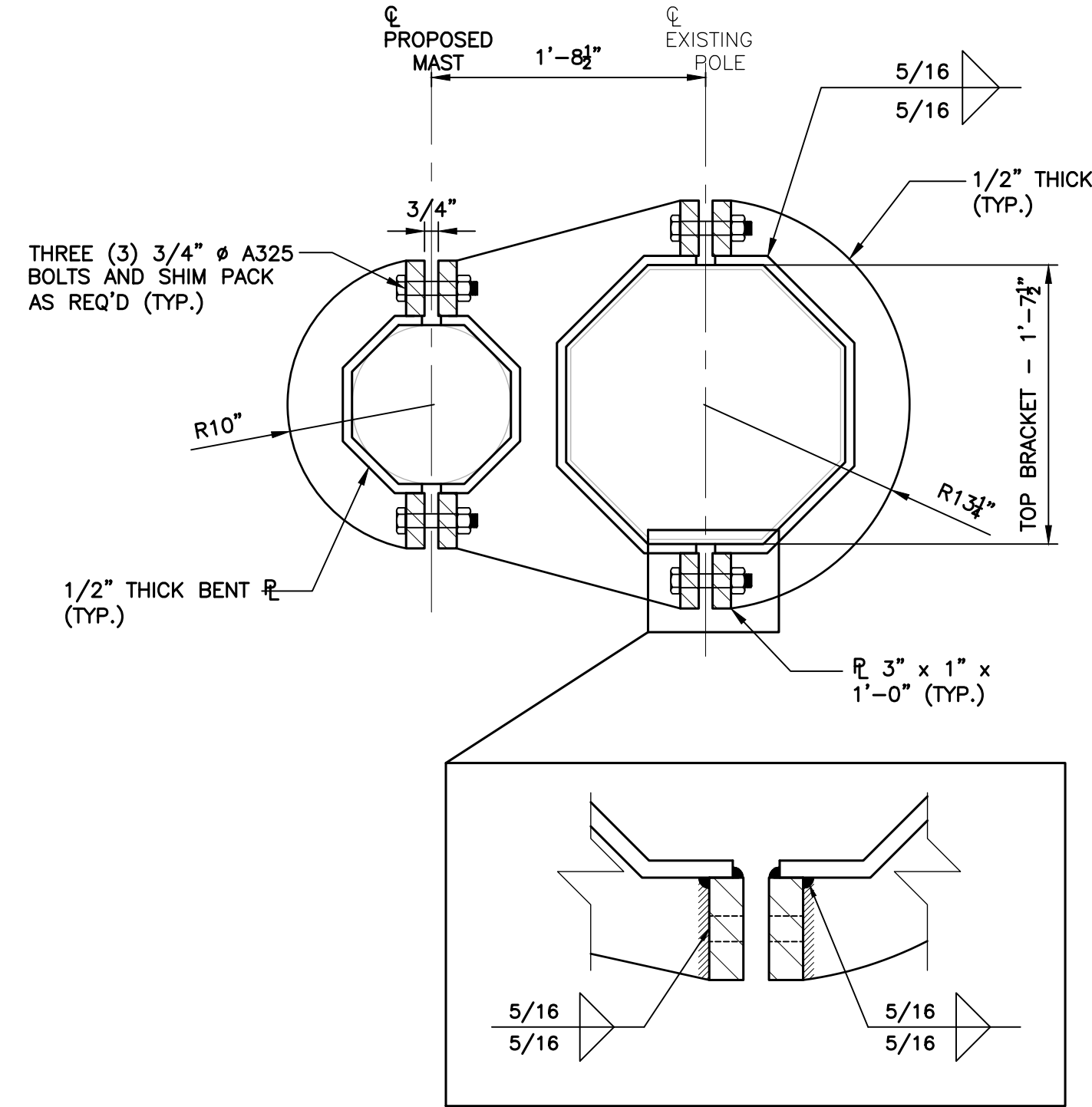
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JOB NO. 21051.03

TYPICAL EQUIPMENT DETAILS

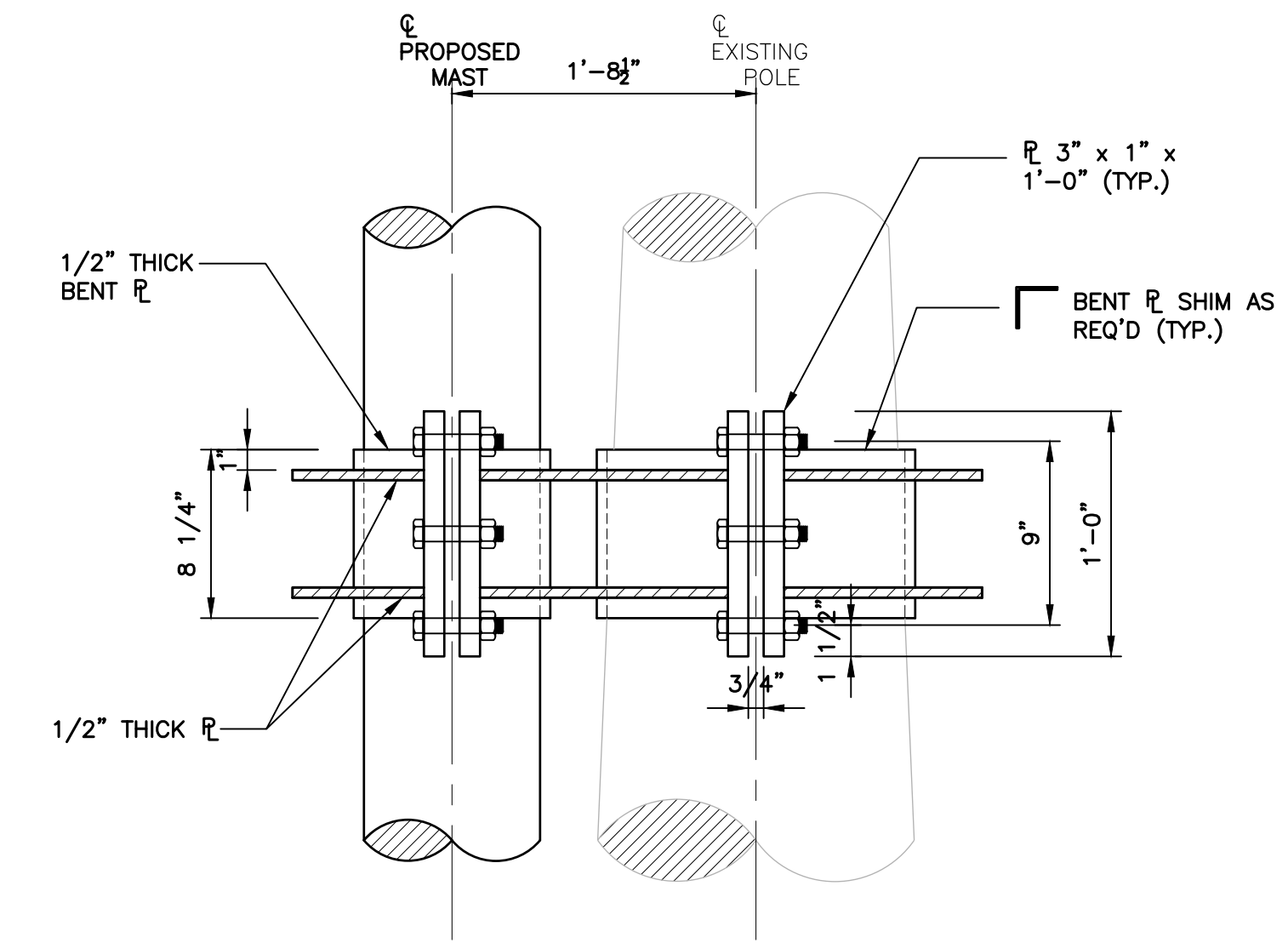
C-4
Sheet No. 6 of 9



1 TOWER AND MAST ELEVATION
S-1 SCALE: NTS

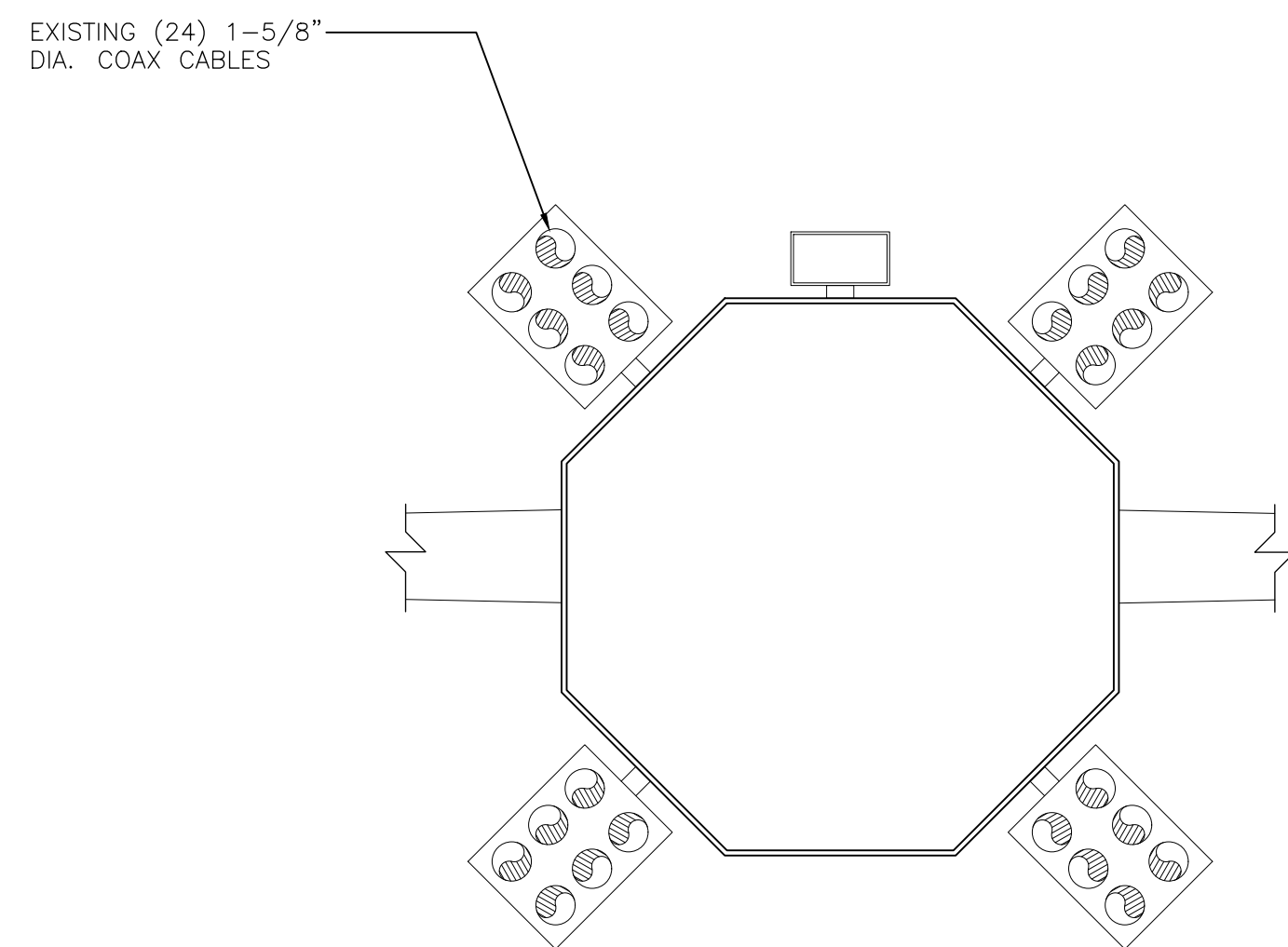


2 TOP BRACKET PLAN VIEW
S-1 SCALE: NTS

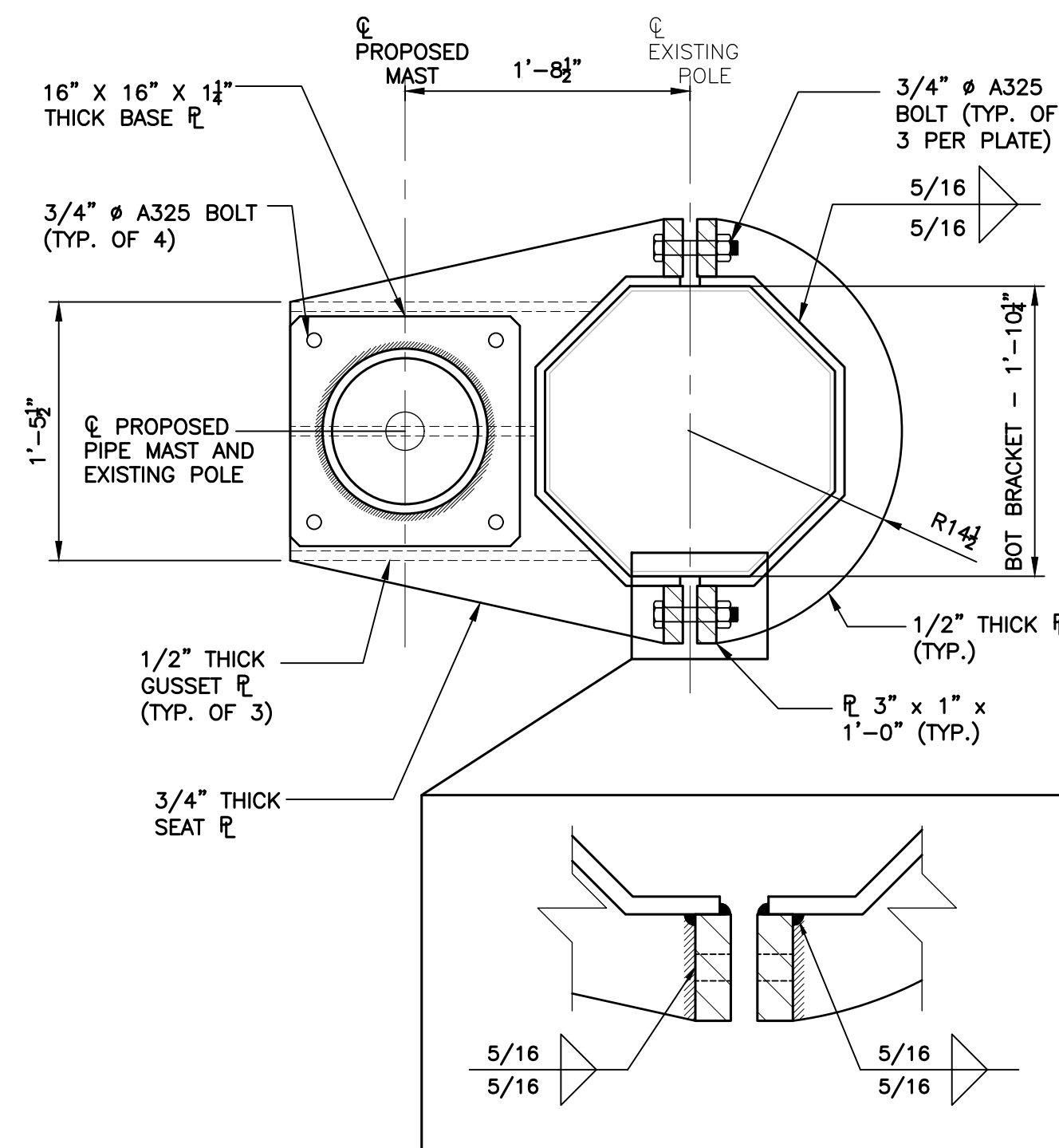


3 TOP BRACKET DETAIL
S-1 SCALE: NTS

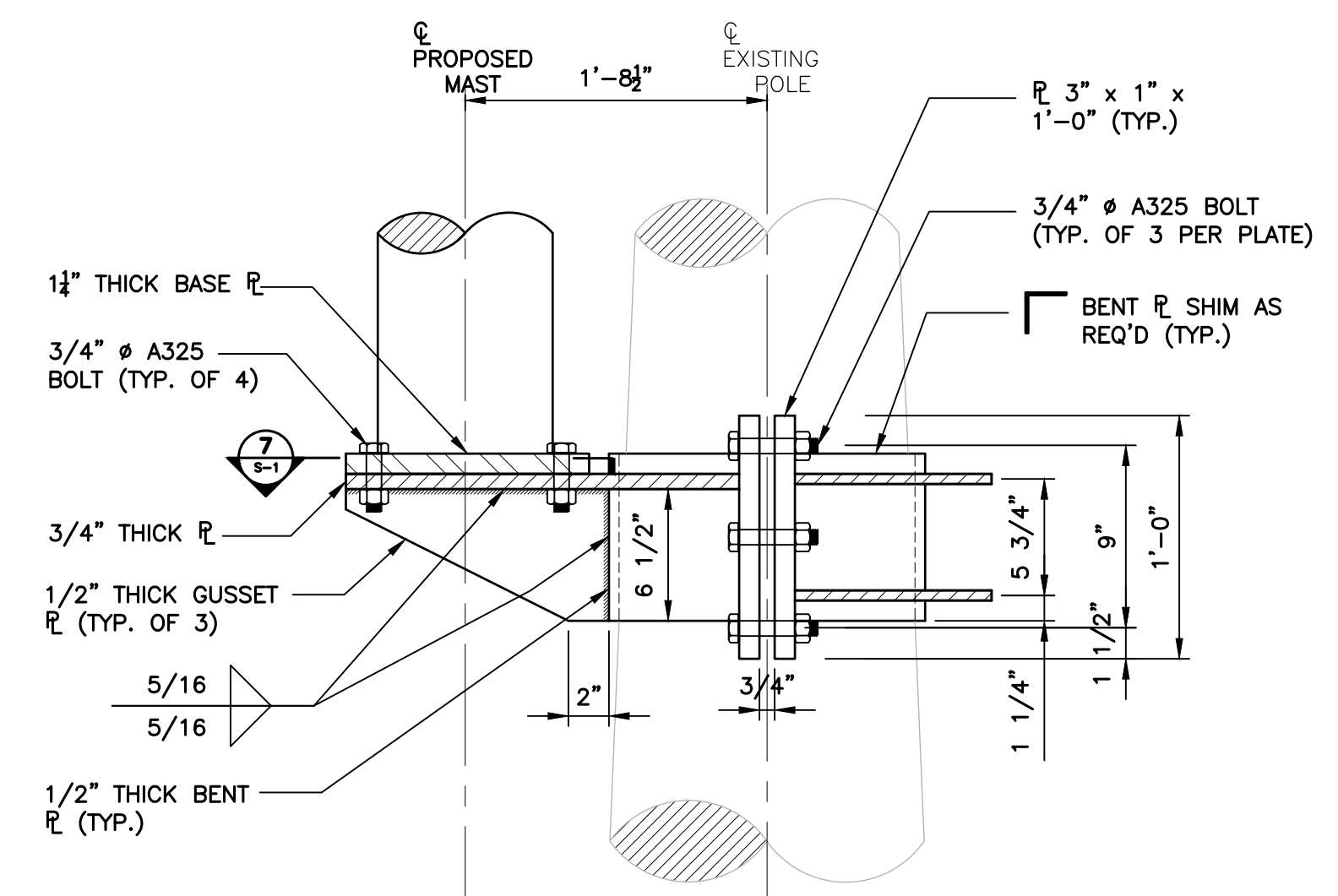
NOTE:
1. POLE TAPER = 0.20"/FT (V.I.F.)



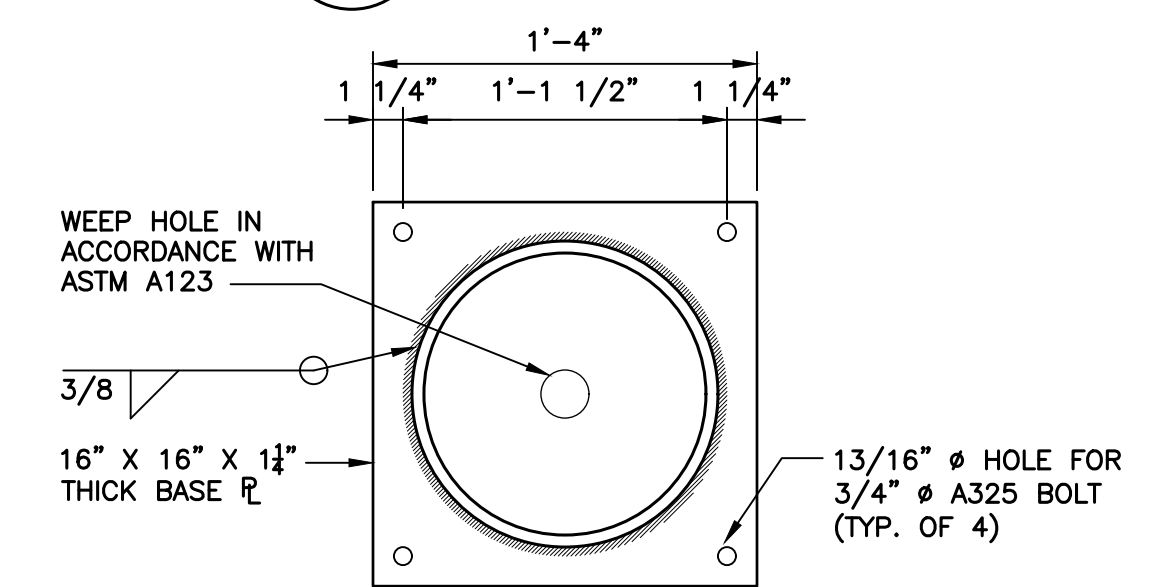
4 COAX CABLE RUN PLAN
S-1 SCALE: NTS



5 BOTTOM BRACKET PLAN VIEW
S-1 SCALE: NTS



6 BOTTOM BRACKET DETAIL
S-1 SCALE: NTS



7 BOTTOM PLATE DETAIL
S-1 SCALE: 1" = 1'-0"

NOTE:
1. POLE TAPER = 0.20"/FT (V.I.F.)

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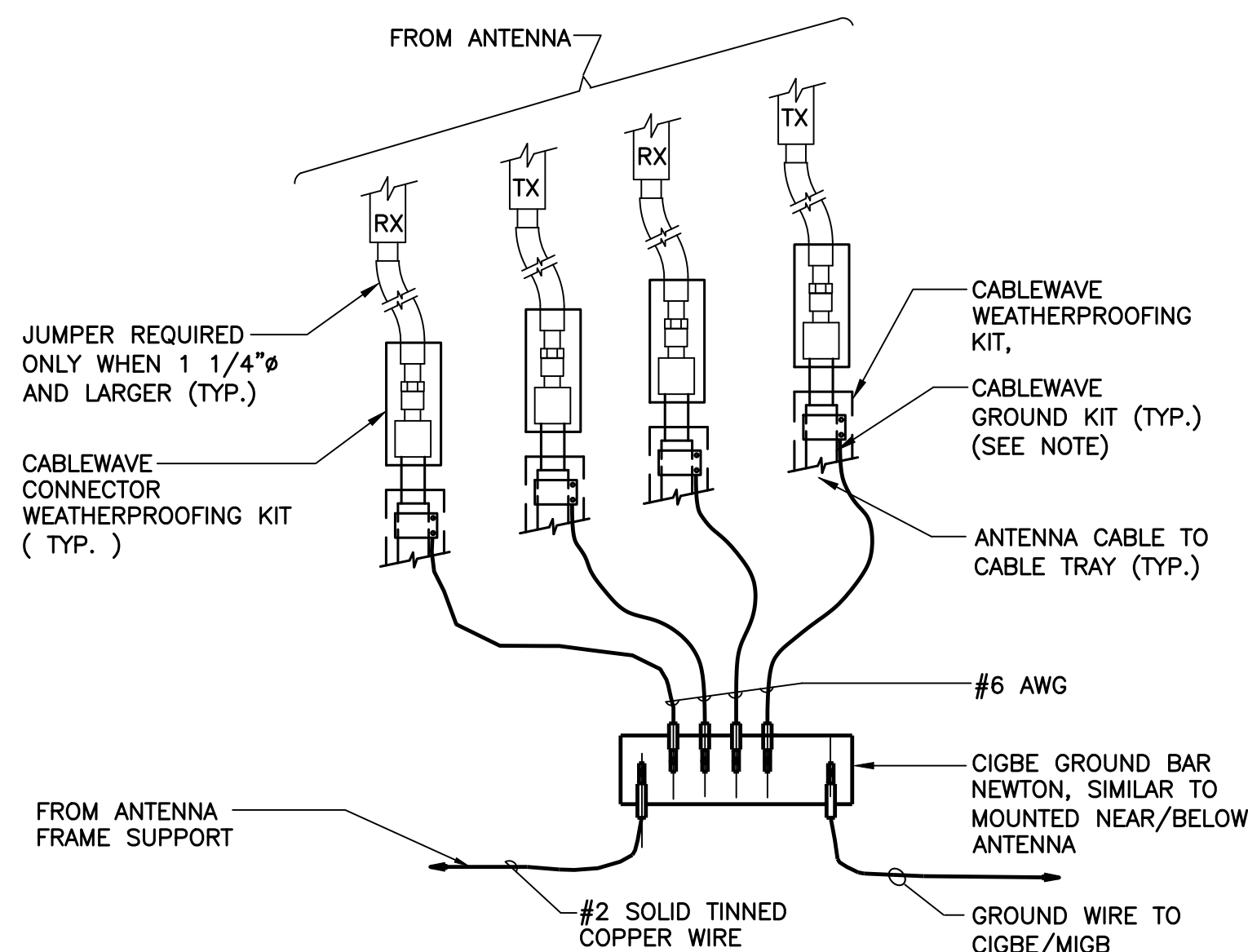
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JOB NO. 21051.03

STRUCTURAL DETAILS

S-1

Sheet No. 7 of 9

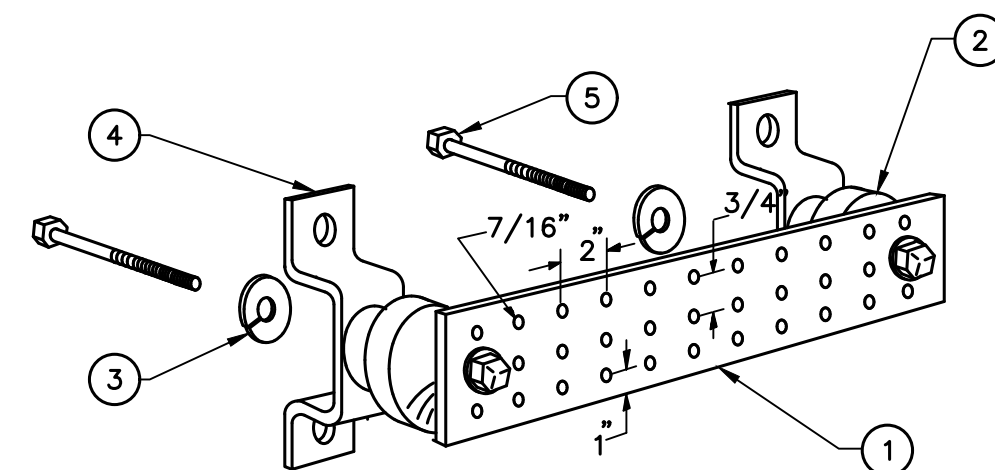
REV.	DATE	DRAWN BY/CHECK'D BY	DESCRIPTION
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	07/29/21	RTS	TJR
			CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
			CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION



NOTES:

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

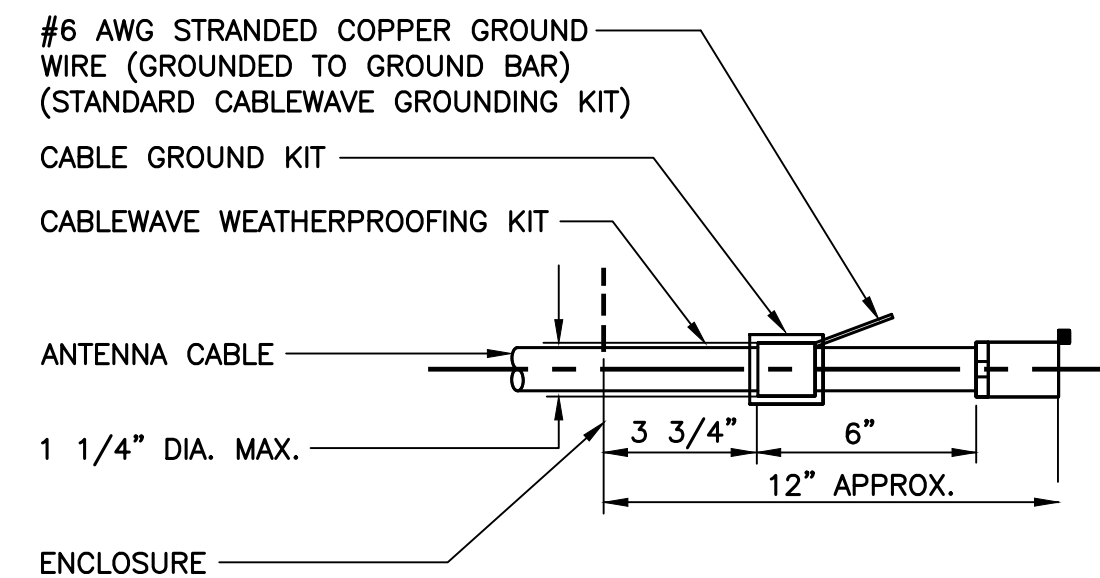
1 CONNECTION OF GROUND WIRES TO GROUND BAR
E-1 SCALE: NOT TO SCALE



NOTES

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

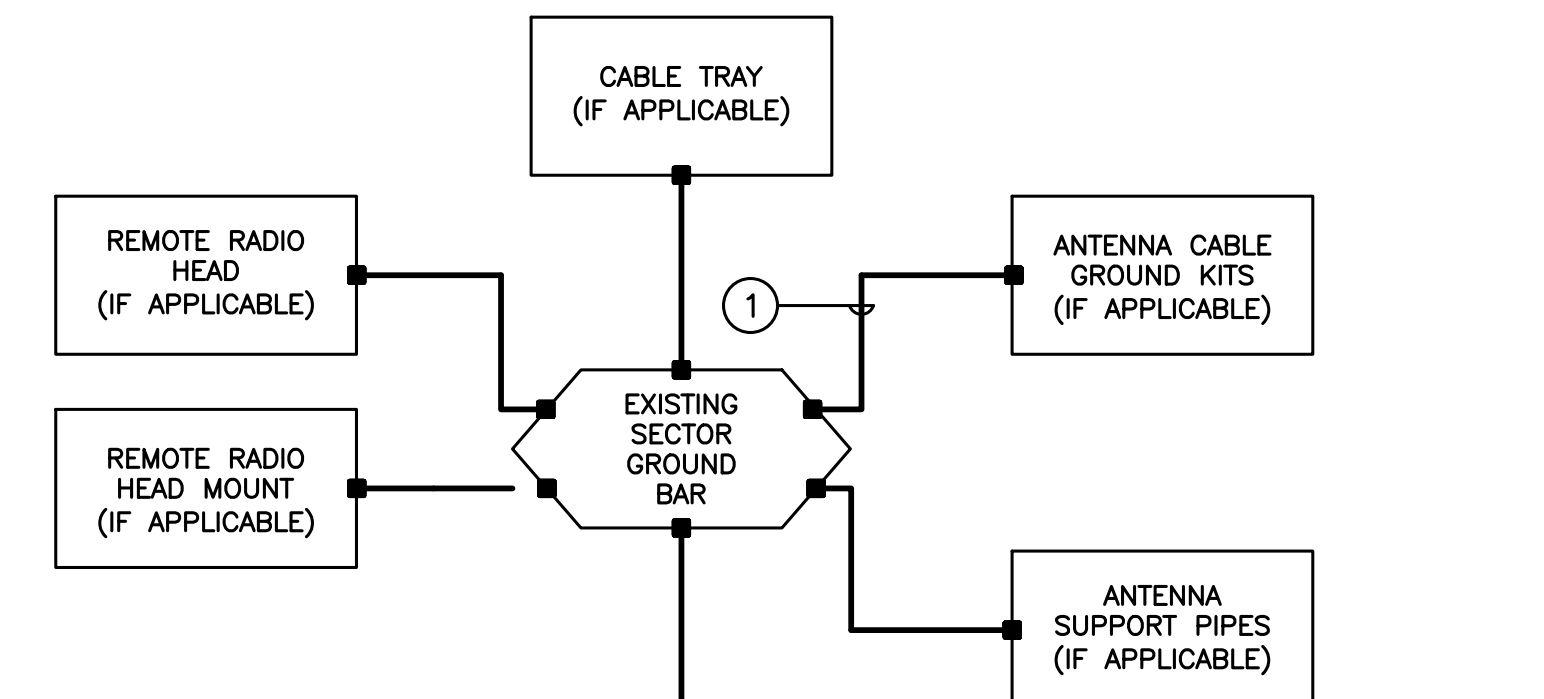
2 GROUND BAR DETAIL
E-1 SCALE: NOT TO SCALE



NOTES:

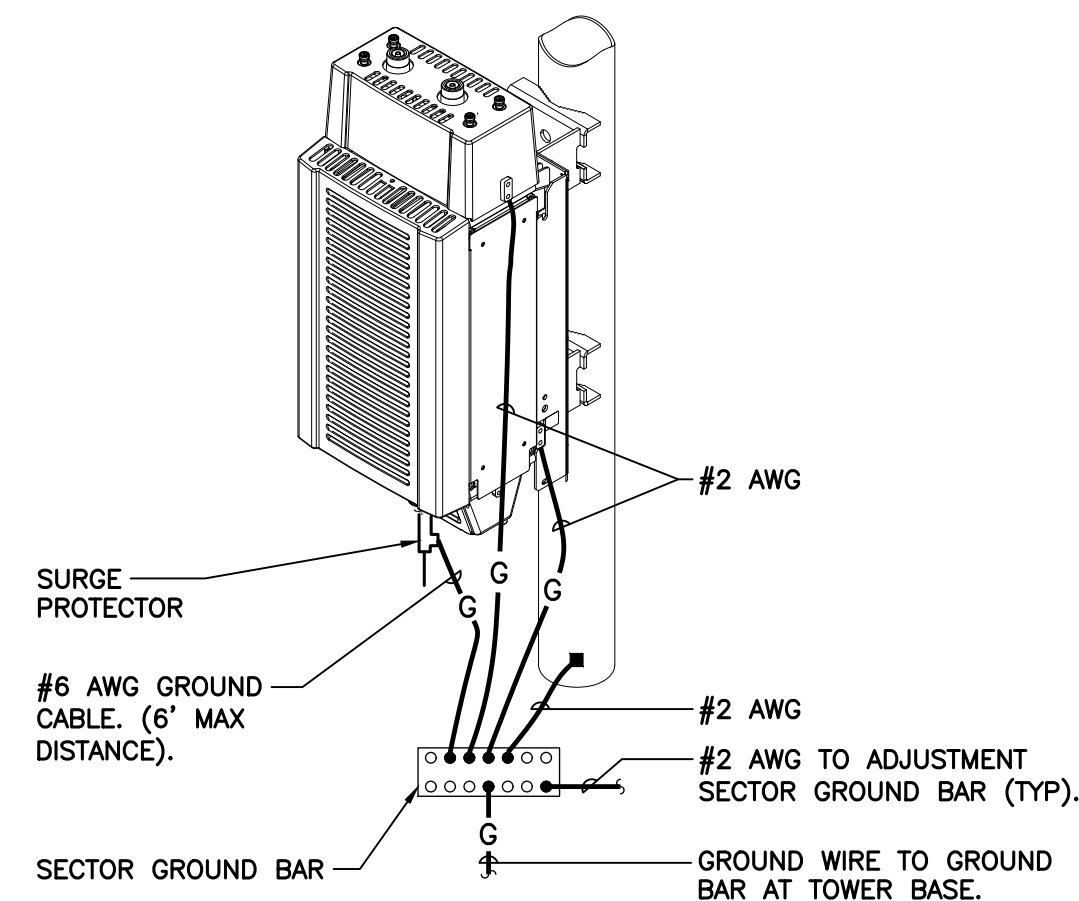
- DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

3 ANTENNA CABLE GROUNDING DETAIL
E-1 SCALE: NOT TO SCALE

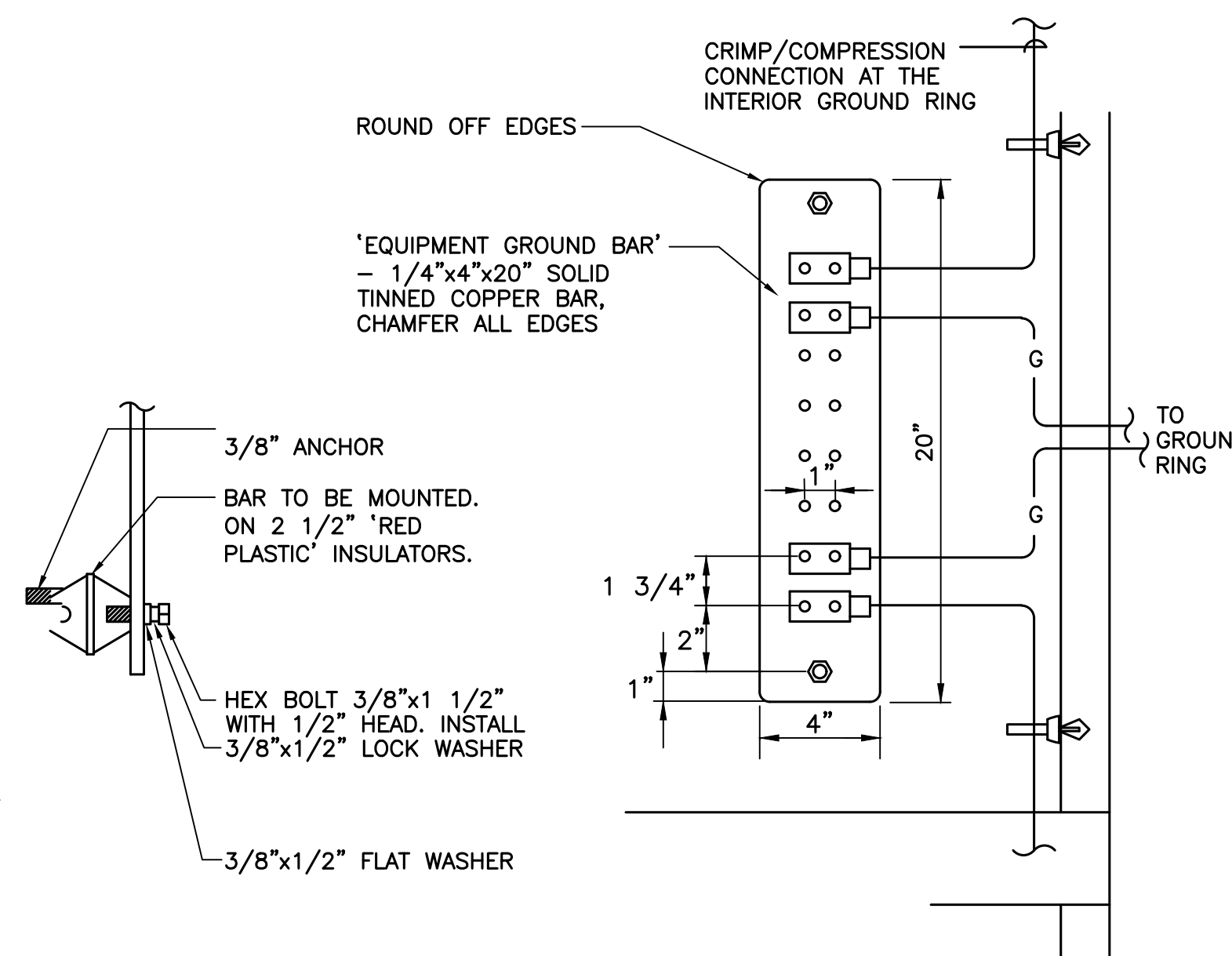


4 TYPICAL ANTENNA GROUNDING DETAIL
E-1 SCALE: NOT TO SCALE

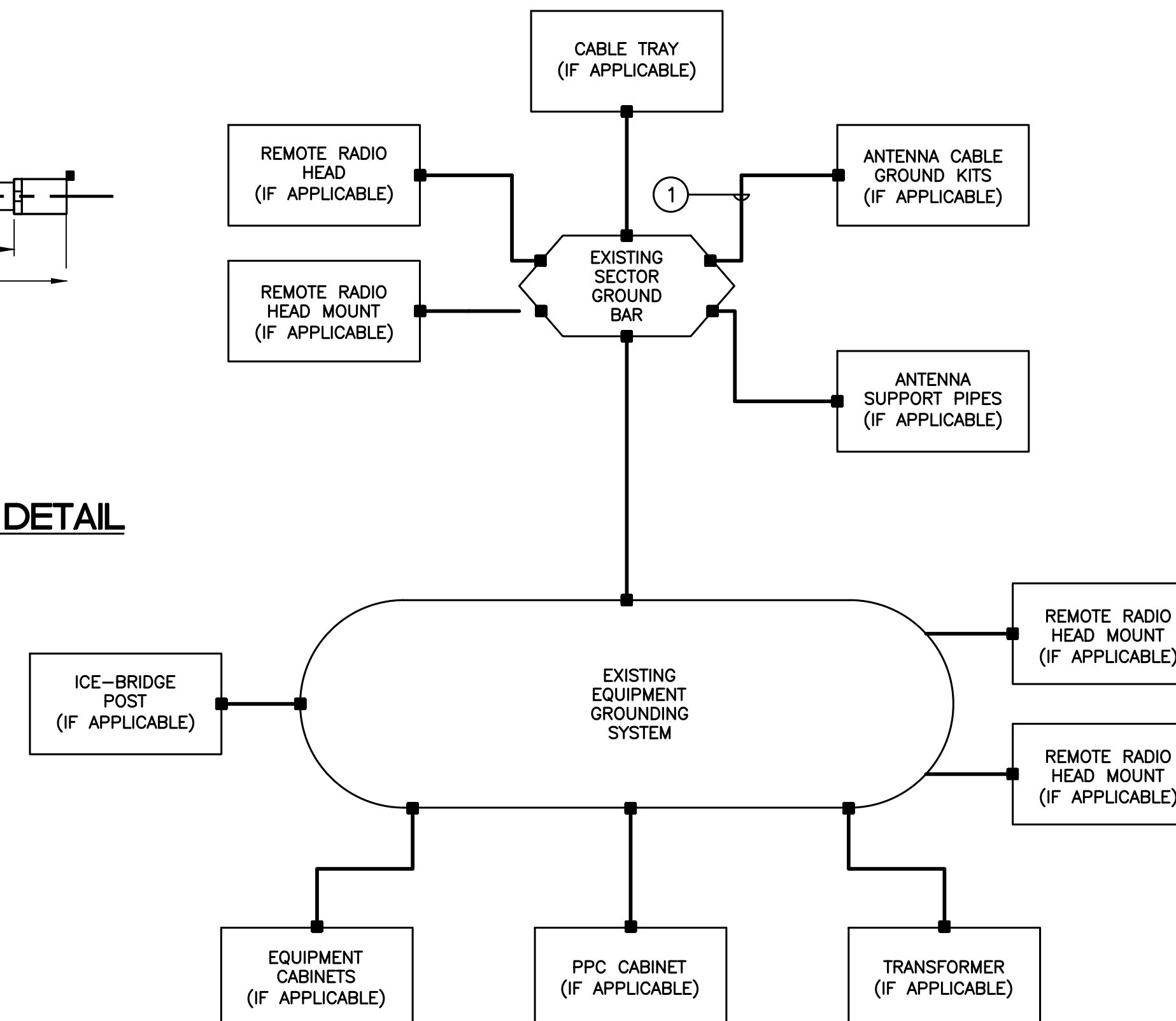
EACH RRH CABINET SHALL BE GROUNDED IN THE FOLLOWING MANNER:
1. AT TOP OF THE CABINET
2. AT RIGHT SIDE OF THE CABINET.



5 RRH POLE MOUNT GROUNDING
E-1 SCALE: NOT TO SCALE



6 EQUIPMENT GROUND BAR DETAIL
E-1 SCALE: NOT TO SCALE



GROUNDING SCHEMATIC NOTES

- #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 ELECTRICAL SCHEMATIC DIAGRAM
E-1 SCALE: NOT TO SCALE

PROFESSIONAL ENGINEER SEAL

T-Mobile

NSS
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(203) 489-0380
(203) 488-8587 Fax
65-2 North Branford Road
Branford, CT 06405
www.CenterEng.com

T-MOBILE NORTHEAST LLC
SITE NAME: GREENWICH/RIVERSIDE
SITE ID: CT1001B
160 SOUND BEACH ROAD
GREENWICH, CT 06870

DATE: 06/14/21
SCALE: AS NOTED
JOB NO. 21051.03

TYPICAL ELECTRICAL DETAILS

E-1

Sheet No. 8 of 9

CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
DATE: 08/05/21
REV. 0
DRAWN BY: TJR
CHECKED BY: TJR

Exhibit D

Structural Analysis Report

**Structural Analysis of
Antenna Mast and Tower**

T-Mobile Site Ref: CT11001B

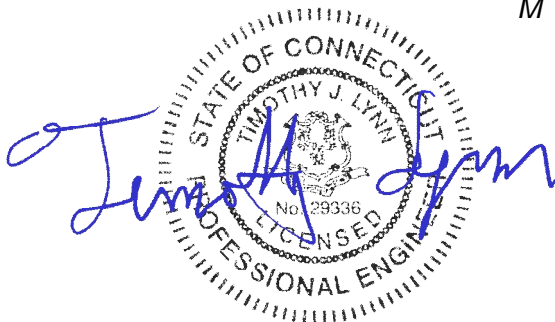
*Eversource Structure No. 1256
95' Electric Transmission Lattice Tower*

*160 Sound Beach Road
Greenwich, CT*

CEN TEK Project No. 21051.03

Date: July 8, 2021

Max Stress Ratio = 96.8%



Prepared for:
T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

SECTION 1 - REPORT

- INTRODUCTION
- PRIMARY ASSUMPTIONS USED IN THE ANALYSIS
- ANALYSIS
- DESIGN BASIS
- RESULTS
- CONCLUSION

SECTION 2 - CONDITIONS & SOFTWARE

- STANDARD ENGINEERING CONDITIONS
- GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAMS
 - RISA 3-D
 - PLS POLE

SECTION 3 - DESIGN CRITERIA

- CRITERIA FOR DESIGN OF PCS FACILITIES ON OR EXTENDING ABOVE METAL ELECTRIC TRANSMISSION TOWERS
- DESIGN CRITERIA TABLE
- SHAPE FACTOR CRITERIA
- WIRE LOADS SHEET

SECTION 4 - DRAWINGS

- MAST REPLACEMENT DRAWINGS

SECTION 5 - TIA-222-G LOAD CALCULATIONS FOR ANTENNA MAST ANALYSIS

- ANTENNA MAST WIND & ICE LOAD

SECTION 6 - ANTENNA MAST ANALYSIS PER TIA-222G

- RISA 3-D ANALYSIS REPORT
- ANTENNA MAST CONNECTION TO TOWER

SECTION 7 - NECS LOAD CALCULATIONS

- EQUIPMENT WIND LOAD CALCULATION

SECTION 8 - ANTENNA MAST ANALYSIS PER NESC

- RISA 3-D ANALYSIS REPORT

SECTION 9 - UTILITY TOWER ANALYSIS

- COAX CABLE LOAD ON TOWER CALCULATION
- PLS REPORT
- ANCHOR BOLT ANALYSIS
- FOUNDATION ANALYSIS

SECTION 10 - REFERENCE MATERIAL

- RFDS DATA SHEET
- EQUIPMENT CUT SHEETS

Introduction

The purpose of this report is to analyze the existing 26'-5" PCS lattice structure and 95' utility pole located at 160 Sound Beach Road in Greenwich, CT for the proposed antenna and equipment upgrade by T-Mobile.

The proposed loads consist of the following:

- **T-MOBILE (Existing to Relocate):**
Antennas: Three (3) RFS APX16DWV-16DWVS-E-A20 panel antennas to be relocated to the new mast with a RAD center elevation of 105-ft above grade.
Coax Cables: Twenty-Four (24) 1-5/8" \varnothing coax cables mounted to the exterior of the existing pole and antenna mast.
- **T-MOBILE (Existing to Remove):**
Antennas: Six (6) EMS RR90-17-XXDP panel antennas mounted on an existing low profile platform with a RAD center elevation of 105-ft above grade.
- **T-MOBILE (Proposed):**
Antennas: Three (3) RFS APXVAALL18_43 panel antennas and six (6) Andrew ATSBT-TOP-FM-4G Smart Bias Tees mounted on a proposed mast with a RAD center elevation of 105-ft above grade.

Primary assumptions used in the analysis

- Design steel stresses are defined by AISC-LRFD 14th edition for design of the antenna Mast and antenna supporting elements.
- ASCE Manual No. 48-11, "Design of Steel Transmission Pole Structures", defines allowable steel stresses for evaluation of the utility pole.
- All utility pole members are adequately protected to prevent corrosion of steel members.
- All proposed antenna mounts are modeled as listed above.
- Pipe mast will be properly installed and maintained.
- No residual stresses exist due to incorrect pole erection.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds conform to the requirements of AWS D1.1.
- Pipe mast and utility pole will be in plumb condition.
- Utility pole was properly installed and maintained and all members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- Any deviation from the analyzed loading will require a new analysis for verification of structural adequacy.

A n a l y s i s

The existing mast assembly will be replaced with a 12 SCH. 80 (O.D. = 12.75") x 30' long pipe connected at two points to the existing tower. The proposed mast was designed to resist loads prescribed by the TIA-222G standard. Section 5 of this report details these gravity and lateral wind loads. NESC prescribed loads were also applied to the mast in order to obtain reactions needed for analyzing the utility pole structure. These loads are developed in Section 7 of this report. Load cases and combinations used in RISA-3D for TIA-222-G loading and for NESC/NU loading are listed in report Sections 6 and 8, respectively.

D e s i g n B a s i s

Our analysis was performed in accordance with TIA-222-G, ASCE 48-11, "Design of Steel Transmission Pole Structures", NESC C2-2012 and Eversource Design Criteria.

▪ UTILITY POLE ANALYSIS

The purpose of this analysis is to determine the adequacy of the existing utility pole to support the proposed antenna loads. The loading and design requirements were analyzed in accordance with the Eversource Design Criteria Table, NESC C2-2012 ~ Construction Grade B, and ASCE Manual No. 48-11.

Load cases considered:

Load Case 1: NESC Heavy Wind

Wind Pressure.....	4.0 psf
Radial Ice Thickness.....	0.5"
Vertical Overload Capacity Factor.....	1.50
Wind Overload Capacity Factor.....	2.50
Wire Tension Overload Capacity Factor.....	1.65

Load Case 2: NESC Extreme Wind

Wind Speed.....	110 mph ⁽¹⁾
Radial Ice Thickness.....	0"

Note 1: NESC C2-2012, Section 25, Rule 250C: Extreme Wind Loading,
1.25 x Gust Response Factor (wind speed: 3-second gust)

▪ MAST ASSEMBLY ANALYSIS

Mast, appurtenances and connections to the utility tower were analyzed and designed in accordance with the Eversource Design Criteria Table, TIA-222-G and AISC standards.

Load cases considered:

Load Case 1:

Wind Speed.....	93 mph ^(2018 CSBC Appendix-N)
Radial Ice Thickness.....	0"

Load Case 2:

Wind Pressure.....	50 mph wind pressure
Radial Ice Thickness.....	0.75"

Results

▪ MAST ASSEMBLY

The proposed pipe mast was determined to be structurally adequate.

Component	Stress Ratio	Result
12" Sch. X-Strong	38.4%	PASS
Connection	53.8%	PASS

▪ UTILITY POLE

This analysis finds that the subject utility pole is adequate to support the proposed antenna mast and related appurtenances. The pole stresses meet the requirements set forth by the ASCE Manual No. 48-11, "Design of Steel Transmission Pole Structures", for the applied NESC Heavy and Hi-Wind load cases. The detailed analysis results are provided in Section 6 of this report. The analysis results are summarized as follows:

A maximum usage of **96.82%** occurs in the utility pole under the **NESC Extreme** loading condition.

POLE SECTION:

The utility pole was found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (% of capacity)	Result
Section 2	15.00' -53.67' (AGL)	96.82%	PASS

BASE PLATE:

The base plate was found to be within allowable limits from the PLS output based on 16 bend lines.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Base Plate	Bending	88.64%	PASS

▪ FOUNDATION AND ANCHORS

The existing foundation consists of a 10-ft \varnothing x 18.5-ft long reinforced concrete caisson. The base of the tower is connected to the foundation by means of (16) 2.25" \varnothing , ASTM A615-75 anchor bolts embedded into the concrete foundation structure. Foundation information was obtained from NUSCO drawing # 01037-60005.

BASE REACTIONS:

From PLS-Pole analysis of utility pole based on NESC/NU prescribed loads.

Load Case	Shear	Axial	Moment
NESC Heavy Wind	27.34 kips	53.30 kips	2204.84 ft-kips
NESC Extreme Wind	32.99 kips	28.00 kips	2442.02 ft-kips

Note 1 – 10% increase applied to tower base reactions per OTRM 051

ANCHOR BOLTS:

The anchor bolts were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (% of capacity)	Result
Anchor Bolts	Tension	62.1%	PASS

FOUNDATION:

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	25.6%	PASS

Conclusion

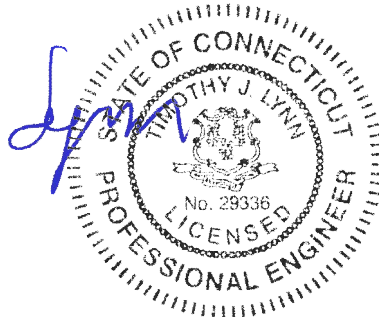
This analysis shows that the subject utility pole **is adequate** to support the proposed equipment upgrade.

The analysis is based, in part on the information provided to this office by Eversource and 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 are performed, results obtained, and recommendations made 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 ~ RISA - 3 D

RISA-3D Structural Analysis Program is an integrated structural analysis and design software package for buildings, bridges, tower structures, etc.

Modeling Features

- Comprehensive CAD-like drawing/editing environment: draw, generate, modify and load elements as well as snap, move, rotate, copy, mirror, scale, split, merge, mesh, delete, apply, trim, extend, etc.
- Versatile drawing grids (orthogonal, radial, skewed, DXF underlay)
- Universal snaps and object snaps allow drawing without grids
- Powerful graphic select/unselect tools including box, line, polygon, invert, criteria, spreadsheet based, save/recall selections with locking
- True spreadsheet editing with cut, paste, fill, math, sort, find, etc.
- Dynamic synchronization between spreadsheets and graphics
- Open multiple spreadsheets simultaneously
- Constant in-stream error checking and data validation
- Unlimited undo/redo capability, automatic timed backup
- Generation templates for grids, disks, cylinders, cones, arcs, trusses, tanks, hydrostatic loads, geodesic domes, etc.
- Support for all units systems & conversions at any time
- Automatic interaction with RISASection custom shape libraries
- Steel Shapes: AISC, Historic, Australian, British, Canadian, Chilean, Chinese, European, Indian, Mexican
- Light Gage Shapes: AISI, SSMA, Dale/Incor, Dietrich, Marino\WARE
- Import DXF, RISA-2D, STAAD and CIS/2 files
- Export DXF, SDNF and CIS/2 files
- Robust two-way link with Revit Structure 2019
- Link with Tekla Structures 2018

Analysis Features

- Analysis of 1D members (beams, columns, braces, etc.) using Finite Element Method
- Analysis of 2D elements (plates, walls) using Finite Element Method
- Analysis of 3D elements (solids) using Finite Element Method
- Partial fixity member end releases using rotational spring constants
- Time History Analysis
- Accelerated true sparse solver for static analysis
- Flexible modeling of P-Delta effects
- Accelerated Sparse Lanczos dynamics solver, very fast and robust
- Multiple simultaneous dynamic and response spectra analysis using Gupta, CQC or SRSS with automatic calc of scaling factors
- Automatic inclusion of mass offset (5% or user defined) for dynamics when integrated with RISAFloor
- Ritz vector dynamic solver
- True physical member modeling (members are aware of interior joints)
- Plate/shell elements with plane stress only option
- 8 node solid elements
- High end mesh generation — draw a polygon with any number of sides to create a mesh of well formed quadrilateral (NO triangular) elements
- Automatic rigid diaphragm modeling with detachable joints

- Area loads with one-way or two-way distributions with optional “blow through” distribution for loading open structures
- Plate thermal loads
- Simultaneous moving loads, AASHTO/custom for bridges, cranes...
- Torsional warping calculations for stiffness, stress and design of hot rolled steel
- Member end releases, rigid end offsets, analysis offsets
- Enforced joint displacements
- One Way members, for tension only bracing, slipping, etc.
- One Way springs, for modeling soils and other effects
- Euler members: Compression up to buckling load, then disable
- Stress calculations on any arbitrary shape
- Inactivate members, plates, solids and diaphragms without deleting them
- Story drift calculations provide relative drift and ratio to height
- Automatic self-weight calculations for members, plates and solids

Graphics Features

- Unlimited simultaneous model view windows
- “True to scale” rendering with translucency, even when drawing
- High-speed redraw algorithm for instant refreshing
- Dynamically zoom, pan, rotate, scroll, snap views
- Font and color control
- Saved views to quickly restore frequent or desired views
- Rendered or wire-frame animations of deflected model and mode shapes
- Animation of moving loads with speed control
- Distance tool for measuring between points
- Force/moment summation about any arbitrary cut line
- High quality customizable graphics printing

Design Codes

- Steel Design Codes: AISC 360-16/10/05: ASD & LRFD, AISC 2nd & 3rd: LRFD, AISC 9th: ASD, CSA S16-14/09/05/01/CSA-S16.1-94, BS 5950-1: 2000, EN 1993-1-1:2014/2005, ENV 1993-1-1:1992, IS 800: 2007/1998, AS 4100-1998, NZS 3404: 1997
- Seismic design per AISC 341-10/05, including 358 prequalified connections
- Concrete Design Codes: ACI 318-14/11/08/05/02/99, CSA A23.3-14/04/94, NTC-DF 2004, BS 8110-1: 1997, BS EN 1992-1-1: 2004+A1: 2014/2004, EN 1992-1-1:1992, IS 456: 2000, AS 3600-2001, NZS 3101: 1995, SBC 304-2007
- Cold Formed Steel Design Codes: AISI S100-16/12/10/07: ASD & LRFD, AISI NAS-04/01: ASD & LRFD, AISI 1999: ASD & LRFD, CSA S136-16/12/10/07/04/01: LSD, CANACERO 16: ASD, CANACERO 12/10/07/04/01: ASD & LRFD
- Aluminum Design Codes: AA ADM1-15/10: ASD & LRFD, AA ADM1-05: ASD
- Wood Design Codes: AWC NDS-18/15/12: ASD, AF&PA NDS-08/05/01/97/91: ASD, CSA 086-14/09 Ultimate, Structural Composite Lumber, multi-ply, full sawn, Glulam, shear walls
- Masonry Design Codes: TMS 402-16: ASD & Strength, ACI 530-13/11/08/05/02: ASD & Strength, ACI 530-99: ASD, UBC 1997: ASD & Strength
- Stainless Steel Design Code: AISC 360-10: ASD & LRFD
- Wind loads are generated automatically (ASCE 7-16/10/05/02/98/95, NBC 15/10/05, NTC 2004, & IS 875: 1987) for building-type structures, including partial wind cases
- Seismic loads are generated automatically (ASCE 7-16/10/05/02, CBC 2001, IBC 2000, UBC 1997, NBC 15/10/05, NTC 2004, & IS 1893: 2002) for building-type structures, including accidental torsion

Design Features

- Designs/optimizes concrete, hot rolled & cold formed steel, masonry, wood and aluminum

- Program selected or user-defined rebar layouts for flexure and shear
- Concrete beam detailing (Rectangular, T and L).
- Concrete column interaction diagrams
- Concrete wall design including in-plane, out-of-plane & bearing loads
- Automatic spectra generation for ASCE 7, NBC, IS 1893, NTC
- Extensive user controlled generation of load combinations
- Intelligent unbraced length calculations for physical members
- Tapered wide flange design per AISC Design Guide 25
- Masonry wall design for in-plane and out-of-plane
- Wood Shapes: Complete NDS species/grade and Glulam database
- Complete wood wall design for bearing & shear walls: Segmented, Perforated & Force Transfer Around Openings design methods
- Strap and Hold Down design for Wood Shear Walls
- Seismic design of concrete walls using ACI 318-14 Chapter 18
- Concrete seismic coupling beams for multi-story walls with diaphragms

Results Features

- Graphic presentation of color-coded results and plotted designs
- Color contours on plates, solid stresses/forces with smoothing and animation
- Spreadsheet results with sorting and filtering of: deflections, forces, stresses, optimized sizes for strength or deflection, code designs, concrete reinforcing, material takeoffs, etc.
- Standard and user-defined reports
- Graphic member detail reports with force/stress/deflection diagrams and detailed design calculations and expanded diagrams

Integrated Building Design

RISA-3D, RISAFloor, RISAFoundation and RISACconnection are so tightly integrated that they operate as one program on the same building model. Optimize the gravity system in RISAFloor, the lateral system in RISA-3D, the connection design in RISACconnection and the foundation system in RISAFoundation, with a complete flow of information both ways.

General Features

- Compatible with Windows 7/8.1/10 (64-bit Windows)
- Program technical support provided by Professional Engineers

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ PLS-POLE

PLS-POLE provides all of the capabilities a structural engineer requires to design transmission, substation or communications structures. It does so using a simple easy to use graphical interface that rests upon our time tested finite element engine. Regardless of whether you want to model a simple wood pole or a guyed steel X-Frame; PLS-POLE can handle the job simply, reliably and efficiently.

Modeling Features:

- Structures are made of standard reusable components that are available in libraries. You can easily create your own libraries or get them from a manufacturer
- Structure models are built interactively using interactive menus and graphical commands
- Automatic generation of underlying finite element model of structure
- Steel poles can have circular, 4, 6, 8, 12, 16, or 18-sided, regular, elliptical or user input cross sections (flat-to-flat or tip-to-tip orientations)
- Steel and concrete poles can be selected from standard sizes available from manufacturers
- Automatic pole class selection
- Cross brace position optimizer
- Capability to specify pole ground line rotations
- Capability to model foundation displacements
- Can optionally model foundation stiffness
- Guys are easily handled (modeled as exact cable elements in nonlinear analysis)
- Powerful graphics module (members color-coded by stress usage)
- Graphical selection of joints and components allows graphical editing and checking
- Poles can be shown as lines, wire frames or can be rendered as 3-d polygon surfaces

Analysis Features:

- Automatic distribution of loads in 2-part suspension insulators (v-strings, horizontal vees, etc.)
- Design checks for ASCE, ANSI/TIA/EIA 222 (Revisions F and G) or other requirements
- Automatic calculation of dead and wind loads
- Automated loading on structure (wind, ice and drag coefficients) according to:
 - ASCE 74-1991
 - NESC 2002
 - NESC 2007
 - IEC 60826:2003
 - EN50341-1:2001 (CENELEC)
 - EN50341-3-9:2001 (UK NNA)
 - EN50341-3-17:2001 (Portugal NNA)
 - ESAA C(b)1-2003 (Australia)
 - TPNZ (New Zealand)
 - REE (Spain)
 - EIA/TIA 222-F
 - ANSI/TIA 222-G
 - CSA S37-01
- Automated microwave antenna loading as per EIA/TIA 222-F and ANSI/TIA 222-G
- Detects buckling by nonlinear analysis

CEN TEK Engineering, Inc.

Structural Analysis – 95-ft Eversource Tower # 1256

T-Mobile Antenna Upgrade – CT11001B

Greenwich, CT

July 8, 2021

Results Features:

- Detects buckling by nonlinear analysis
- Easy to interpret text, spreadsheet and graphics design summaries
- Automatic determination of allowable wind and weight spans
- Automatic determination of interaction diagrams between allowable wind and weight spans
- Automatic tracking of part numbers and costs

*Criteria for Design of PCS Facilities On or
Extending Above Metal Electric Transmission
Towers & Analysis of Transmission Towers
Supporting PCS Masts* ⁽¹⁾

Introduction

This criteria is the result from an evaluation of the methods and loadings specified by the separate standards, which are used in designing telecommunications towers and electric transmission towers. That evaluation is detailed elsewhere, but in summary; the methods and loadings are significantly different. This criteria specifies the manner in which the appropriate standard is used to design PCS facilities including masts and brackets (hereafter referred to as “masts”), and to evaluate the electric transmission towers to support PCS masts. The intent is to achieve an equivalent level of safety and security under the extreme design conditions expected in Connecticut and Massachusetts.

ANSI Standard TIA-222-G covering the design of telecommunications structures specifies a limit state design approach. This approach applies the loads from extreme weather loading conditions, and designs the structure so that the design strength exceeds the required strength.

ANSI Standard C2-2012 (National Electrical Safety Code) covering the design of electric transmission metal structures is based upon an ultimate strength/yield stress design approach. This approach applies a multiplier (overload capacity factor) to the loads possible from extreme weather loading conditions, and designs the structure so that it does not exceed its ultimate strength (yield stress).

Each standard defines the details of how loads are to be calculated differently. Most of the NU effort in “unifying” both codes was to establish what level of strength each approach would provide, and then increasing the appropriate elements of each to achieve a similar level of security under extreme weather loadings.

Two extreme weather conditions are considered. The first is an extreme wind condition (hurricane) based upon a 50-year recurrence (2% annual probability). The second is a winter condition combining wind and ice loadings.

The following sections describe the design criteria for any PCS mast extending above the top of an electric transmission tower, and the analysis criteria for evaluating the loads on the transmission tower from such a mast from the lower portions of such a mast, and loads on the pre-existing electric lower portions of such a mast, and loads on the pre-existing electric transmission tower and the conductors it supports.

| Note 1: Prepared from documentation provide from Northeast Utilities.

P C S M a s t

The PCS facility (mast, external cable/trays, including the initial and any planned future support platforms, antennas, etc. extending the full height above the top level of the electric transmission structure) shall be designed in accordance with the provisions of TIA 222-G:

E L E C T R I C T R A N S M I S S I O N T O W E R

The electric transmission tower shall be analyzed using yield stress theory in accordance with the attached table titled “NU Design Criteria”. This specifies uniform loadings (different from the TIA loadings) on the each of the following components of the installed facility:

- PCS mast for its total height above ground level, including the initial and planned future support platforms, antennas, etc. above the top of an electric transmission structure.
- Conductors are related devices and hardware.
- Electric transmission structure. The loads from the PCS facility and from the electric conductors shall be applied to the structure at conductor and PCS mast attachment points, where those load transfer to the tower.

The uniform loadings and factors specified for the above components in the table are based upon the National Electrical Safety Code 2007 Edition Extreme Wind (Rule 250C) and Combined Ice and Wind (Rule 250B-Heavy) Loadings. These provide equivalent loadings compared to TIA and its loads and factors with the exceptions noted above. (Note that the NESC does not require the projected wind surfaces of structures and equipment to be increased by the ice covering.)

In the event that the electric transmission tower is not sufficient to support the additional loadings of the PCS mast, reinforcement will be necessary to upgrade the strength of the overstressed members.

Overhead Transmission Standards

Attachment A
Eversource Design Criteria

		Attachment A ES Design Criteria	Basic Wind Speed	Pressure	Height Factor	Gust Factor	Load or Stress Factor	Force Coef. - Shape Factor
			V (MPH)	Q (PSF)	Kz	Gh		
Ice Condition	TIA/EIA	Antenna Mount	TIA	TIA (0.75Wi)	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
	NESCH Heavy	Tower/Pole Analysis with antennas extending above top of Tower/Pole (Yield Stress)	-----	4	1	1	2.5	1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with antennas below top of Tower/Pole (on two faces)	-----	4	1	1	2.5	1.6 Flat Surfaces 1.3 Round Surfaces
	Conductors:		Conductor Loads Provided by ES					
High Wind Condition	TIA/EIA	Antenna Mount	85	TIA	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
	NESCH Extreme Wind	Tower/Pole Analysis with antennas extending above top of Tower/Pole	For wind speed use OTRM 060 Map 1, Rule 250C: Extreme Wind Loading Apply a 1.25 x Gust Response Factor to all telecommunication equipment projected above top of tower/pole and apply a 1.0 x Gust Response Factor to the tower/pole structure					1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with antennas below top of Tower/Pole	For wind speed use OTRM 060 Map 1, Rule 250C: Extreme Wind Loading Height above ground is based on overall height to top of tower/pole					1.6 Flat Surfaces 1.3 Round Surfaces
	Conductors:		Conductor Loads Provided by ES					
NESCH Extreme Ice with Wind Condition*		Tower/Pole Analysis with antennas extending above top of Tower/Pole	For wind speed use OTRM 060 Map 1, Rule 250D: Extreme Ice with Wind Loading 4 PSF Wind Load 1.25 x Gust Response Factor Apply a 1.25 x Gust Response Factor to all telecommunication equipment projected above top of tower/pole and apply a 1.0 x Gust Response Factor to the tower/pole structure					1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with antennas below top of Tower/Pole	For wind speed use OTRM 060 Map 1, Rule 250D: Extreme Ice with Wind Loading 4 PSF Wind Load Height above ground is based on overall height to top of tower/pole					1.6 Flat Surfaces 1.3 Round Surfaces
	Conductors:		Conductor Loads Provided by ES					

*Only for structures installed after 2007

Communication Antennas on Transmission Structures

Eversource Approved by: CPS (CT/WMA) JCC (NH/EMA)	Design	OTRM 059	Rev. 1 11/19/2018
		Page 8 of 10	

Overhead Transmission Standards

determined from NESC applied loading conditions (not TIA Loads) on the structure and mount as specified below, and shall include the wireless communication mast and antenna loads per NESC criteria)

The strength reduction factor obtained from the field investigation shall be applied to the members or connections that are showing signs of deterioration from their original condition. With the written approval of Eversource Transmission Line Engineering on a case by case the existing structures may be analyzed initially using the current NESC code, then it is permitted to use the original design code with the original conductor load should the existing tower fail the current NESC code.

The structure shall be analyzed using yield stress theory in accordance with Attachment A, "Eversource Design Criteria." This specifies uniform loadings (different from the TIA loadings) on each of the following components of the installed facility:

- a) Wireless communication mast for its total height above ground level, including the initial and any planned future equipment (Support Platforms, Antennas, TMA's etc.) above the top of an electric transmission structure.
- b) Conductors and related devices and hardware (wire loads will be provided by Eversource).
- c) Electric Transmission Structure

- i) The loads from the wireless communication equipment components based on NESC and Eversource Criteria in Attachment A, and from the electric conductors shall be applied to the structure at conductor and wireless communication mast attachment points, where those loads transfer to the tower. ii)
- ii) Shape Factor Multiplier:

NESC Structure Shape	Cd
Polyround (for polygonal steel poles)	1.3
Flat	1.6
Open Lattice	3.2
Pole with Coaxial Cable	See Below Table

- iii) When Coaxial Cables are mounted alongside the pole structure, the shape multiplier shall be:

Mount Type	Cable Cd	Pole Cd
Coaxial Cables on outside periphery (One layer)	1.45	1.45
Coaxial Cables mounted on stand offs	1.6	1.6

- d) The uniform loadings and factors specified for the above components in Attachment A, "Eversource Design Criteria" are based upon the National Electric Safety Code 2007 Edition Extreme Wind (Rule 250C) and Combined Ice and Wind (Rule 250B-Heavy) Loadings. These provide equivalent loadings compared to the TIA and its loads and factors with the exceptions noted above.

Communication Antennas on Transmission Structures			
Eversource Approved by: CPS (CT/WMA) JCC (NH/EMA)	Design	OTRM 059	Rev. 1 11/19/2018
		Page 3 of 10	

Project: 1740/1750 Lines, Structure 1256
Date: 7/23/19
Engineer: JS
Purpose: Recalculate wire loads for T-Mobile site.

Shield Wires:
1740: 336 "Linnet" ACSR, sagged in PLS-CADD
1750: AFL DNO-8363 OPGW, sagged in PLS-CADD

Conductors:
1272 "Bittern" ACSR, sagged in PLS-CADD

NESC 250B

1740 Line			1750 Line	
Linnet V	1148	_____		1128 V OPGW
T	-1936			-1723 T
L	0			0 L
Top Phase: V	2515	_____		2523 V
T	-2802			-2844 T
L	0			0 L
Mid Phase: V	2528	_____		2523 V
T	-2868			-2877 T
L	0			0 L
Bot Phase: V	2522	_____		2540 V
T	-2841			-2965 T
L	0			0 L

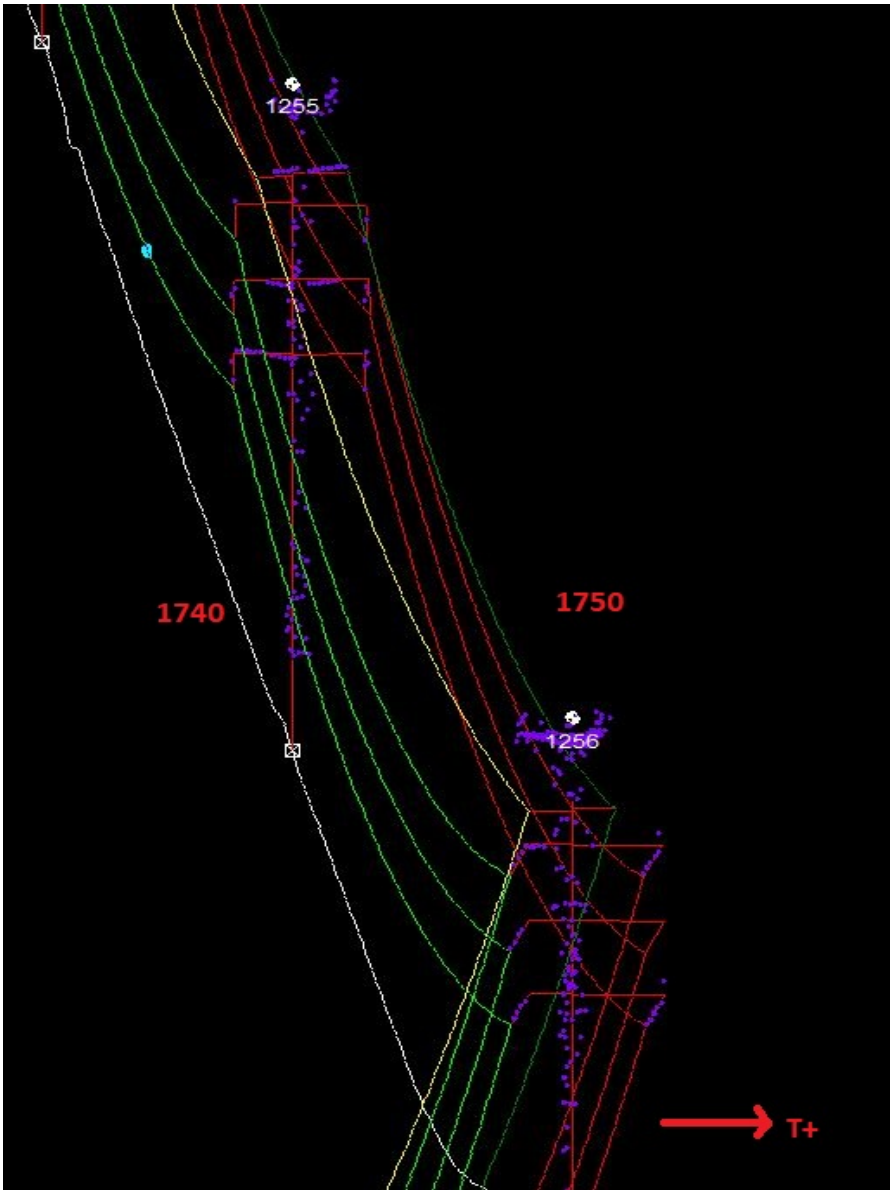
Project: 1740/1750 Lines, Structure 1256
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Conductors:
1272 "Bittern" ACSR, sagged in PLS-CADD

NESC 250C - 23 PSF

1740 Line			1750 Line		
Linnet V	392	_____			374 V OPGW
T	-1239				-1120 T
L	0				7 L
Top Phase: V	1116	_____			1119 V
T	-2247				-2266 T
L	0				0 L
Mid Phase: V	1122	_____			1119 V
T	-2274				-2280 T
L	0				0 L
Bot Phase: V	1120	_____			1127 V
T	-2265				-2319 T
L	0				0 L



ANTENNA MAST DESIGN

T-MOBILE - CT11001B

STRUCT NO. 1256

160 SOUND BEACH ROAD

GREENWICH, CT 06870



VICINITY MAP



PROJECT SUMMARY

SITE ADDRESS: 160 SOUND BEACH ROAD
GREENWICH, CT 06870

PROJECT COORDINATES: LAT: 41°-01'-58.86N
LON: 73°-34'-02.30W
ELEV: ±30' AMSL

EVERSOURCE STRUCT NO: 1256

EVERSOURCE CONTACT: RICHARD BADON
860.728.4852

T-MOBILE SITE REF.: CT11001B

T-MOBILE CONTACT: SHELDON FREINCLE
201.776.8521

ANTENNA CL HEIGHT: 105'-0"

ENGINEER OF RECORD: CENTEK ENGINEERING, INC.
63-2 NORTH BRANFORD ROAD
BRANFORD, CT 06405

CEN TEK CONTACT: TIMOTHY J LYNN, PE
203.433.7507

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	DESIGN BASIS & GENERAL NOTES	0
N-2	STRUCTURAL STEEL NOTES	0
MI-1	MODIFICATION INSPECTION REQUIREMENTS	0
S-1	TOWER ELEVATION & FEEDLINE PLAN	0
S-2	TOP CONNECTION DETAILS	0
S-3	BOTTOM CONNECTION DETAILS	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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EVERSOURCE STRUCTURE 1256

160 SOUND BEACH ROAD
GREENWICH, CT 06870

DATE: 7/8/21
SCALE: AS SHOWN
JOB NO. 21051.03

TITLE SHEET

SHEET NO.
T-1
Sheet No. 1 of 7

DESIGN BASIS

1. GOVERNING CODE: 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CT STATE SUPPLEMENT.
2. TIA-222-G, ASCE MANUAL NO. 48-11 – "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES SECOND EDITION", NESC C2-2012 AND NORTHEAST UTILITIES DESIGN CRITERIA.
3. DESIGN CRITERIA

WIND LOAD: (ANTENNA MAST)

NOMINAL DESIGN WIND SPEED (V) = 93 MPH (2018 CSBC: APPENDIX 'N')

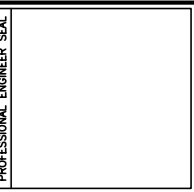
WIND LOAD: (UTILITY POLE & FOUNDATION)

BASIC WIND SPEED (V) = 110 MPH (3-SECOND GUST)
BASED ON NESC C2-2012, SECTION 25 RULE 250C.

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING, INC., FOR T-MOBILE, DATED 7/8/21.
2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE TOWER DESIGN DRAWINGS PREPARED BY A. B. CHANCE CO.
3. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE GOVERNING BUILDING CODE.
4. 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 SCOPE OF WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
5. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK. THIS INCLUDES VERIFYING ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.
6. PCS MAST INSTALLATION SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF TRANSMISSION STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.
7. 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.
8. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
9. NO DRILLING WELDING OR TAPING IS PERMITTED ON CL&P OWNED EQUIPMENT.

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 GREENWICH, CT 06070

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DESIGN BASIS
 AND GENERAL
 NOTES

SHEET NO.
N-1
 Sheet No. 2 of 7

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY LOAD AND RESISTANCE FACTOR DESIGN (LRFD).
2. MATERIAL SPECIFICATIONS
 - A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
 - B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI).
 - A. STRUCTURAL STEEL (TOWER REINF. SOLID ROUND BAR)---ASTM A572_GR50 (50 KSI)
 - D. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
 - E. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
 - F. PIPE---ASTM A53 GRADE B (FY = 35 KSI)
3. FASTENER SPECIFICATIONS
 - A. CONNECTION BOLTS---ASTM A325-N, UNLESS OTHERWISE SCHEDULED.
 - B U-BOLTS---ASTM A307
 - C. ANCHOR RODS---ASTM F1554
 - D. WELDING ELECTRODES---ASTM E70XX FOR A36 & A572_GR50 STEELS, ASTM E80XX FOR A572_GR65 STEEL.
 - E. BLIND BOLTS---AS1252 PROPERTY CLASS 8.8 (FU=120 KSI).
4. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
5. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
6. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
7. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
8. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
9. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
10. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
11. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
12. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING THE SCHEDULED ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.
13. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
14. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
15. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
16. ALL BOLTS SHALL BE INSTALLED PER THE REQUIREMENTS OF AISC 14TH EDITION & RCSC "SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH STRENGTH BOLTS".
17. ALL BOLTS SHALL BE INSTALLED AS SNUG-TIGHT CONNECTIONS UNLESS OTHERWISE INDICATED. CONNECTIONS SPECIFIED AS PRETENSIONED OR SLIP-CRITICAL SHALL BE TIGHTENED TO A BOLT TENSION NOT LESS THAN THAT GIVEN IN TABLE J3.1 OF AISC 14TH EDITION.
18. LOCK WASHER ARE NOT PERMITTED FOR A325 BOLTED STEEL ASSEMBLIES.
19. LOAD INDICATOR WASHERS SHALL BE UTILIZED ON ALL PRETENSIONED OR SLIP-CRITICAL CONNECTIONS.
20. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
21. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
22. FABRICATE BEAMS WITH MILL CAMBER UP.
23. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
24. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

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STRUCTURAL STEEL NOTES

SHEET NO.
N-2
 Sheet No. 3 of 7

MODIFICATION INSPECTION REPORT REQUIREMENTS

PRE-CONSTRUCTION		DURING CONSTRUCTION		POST-CONSTRUCTION	
SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM
X	EOR MODIFICATION INSPECTION DRAWING	-	FOUNDATIONS	X	MODIFICATION INSPECTOR RECORD REDLINE DRAWING
X	EOR APPROVED SHOP DRAWINGS	-	EARTHWORK: BACKFILL MATERIAL & COMPACTION	-	POST-INSTALLED ANCHOR ROD PULL-OUT TEST
-	EOR APPROVED POST-INSTALLED ANCHOR MPII	-	REBAR & FORMWORK GEOMETRY VERIFICATION	X	PHOTOGRAPHS
-	FABRICATION INSPECTION	-	CONCRETE TESTING		
-	FABRICATOR CERTIFIED WELDER INSPECTION	X	STEEL INSPECTION		
X	MATERIAL CERTIFICATIONS	-	POST INSTALLED ANCHOR ROD VERIFICATION		
		-	BASE PLATE GROUT VERIFICATION		
		-	CONTRACTOR'S CERTIFIED WELD INSPECTION		
		X	ON-SITE COLD GALVANIZING VERIFICATION		
		X	CONTRACTOR AS-BUILT REDLINE DRAWINGS		

- NOTES:**
1. REFER TO MODIFICATION INSPECTION NOTES FOR ADDITIONAL REQUIREMENTS
 2. "X" DENOTES DOCUMENT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
 3. "-" DENOTES DOCUMENT NOT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
 4. EOR - ENGINEER OF RECORD
 4. MPII - "MANUFACTURER'S PRINTED INSTALLATION GUIDELINES"

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF STRUCTURAL MODIFICATIONS, TO INCLUDE A REVIEW AND COMPILATION OF SPECIFIED SUBMITTALS AND CONSTRUCTION INSPECTIONS, AS AN ASSURANCE OF COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS PREPARED UNDER THE DIRECTION OF THE ENGINEER OF RECORD (EOR).
2. THE MODIFICATION INSPECTION IS TO CONFIRM INSTALLATION CONFIGURATION AND GENERAL WORKMANSHIP AND IS NOT A REVIEW OF THE MODIFICATION DESIGN. OWNERSHIP OF THE MODIFICATION DESIGN EFFECTIVENESS AND INTENT RESIDES WITH THE ENGINEER OF RECORD.
3. TO ENSURE COMPLIANCE WITH THE MODIFICATION INSPECTION REQUIREMENTS THE GENERAL CONTRACTOR (GC) AND THE MODIFICATION INSPECTOR (MI) COMMENCE COMMUNICATION UPON AUTHORIZATION TO PROCEED BY THE CLIENT. EACH PARTY SHALL BE PROACTIVE IN CONTACTING THE OTHER. THE EOR SHALL BE CONTACTED IF SPECIFIC GC/MI CONTACT INFORMATION IS NOT MADE AVAILABLE.
4. THE GC SHALL PROVIDE THE MI WITH A MINIMUM OF 5 BUSINESS DAYS NOTICE OF IMPENDING INSPECTIONS.
5. WHEN POSSIBLE, THE GC AND MI SHALL BE ON SITE DURING THE MODIFICATION INSPECTION TO HAVE ANY NOTED DEFICIENCIES ADDRESSED DURING THE INITIAL MODIFICATION INSPECTION.

MODIFICATION INSPECTOR (MI)

1. THE MI SHALL CONTACT THE GC UPON AUTHORIZATION BY THE CLIENT TO:
 - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
 - WORK WITH THE GC IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
 - DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
2. THE MI IS RESPONSIBLE FOR COLLECTION OF ALL INSPECTION AND TEST REPORTS, REVIEWING REPORTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING ON-SITE INSPECTIONS AND COMPILATION & SUBMISSION OF THE MODIFICATION INSPECTION REPORT TO THE CLIENT AND THE EOR.

GENERAL CONTRACTOR (GC)

1. THE GC IS REQUIRED TO CONTACT THE GC UPON AUTHORIZATION TO PROCEED WITH CONSTRUCTION BY THE CLIENT TO:
 - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
 - WORK WITH THE MI IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
 - DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
2. THE GC IS RESPONSIBLE FOR COORDINATING AND SCHEDULING IN ADVANCE ALL REQUIRED INSPECTIONS AND TESTS WITH THE MI.

CORRECTION OF FAILING MODIFICATION INSPECTION

1. SHOULD THE STRUCTURAL MODIFICATION NOT COMPLY WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS, THE GC SHALL WORK WITH THE MODIFICATION INSPECTOR IN A VIABLE REMEDIATION PLAN AS FOLLOWS:
 - CORRECT ALL DEFICIENCIES TO COMPLY WITH THE CONTRACT DOCUMENTS AND COORDINATE WITH THE MI FOR A FOLLOW UP INSPECTION.
 - WITH CLIENT AUTHORIZATION, THE GC MAY WORK WITH THE EOR TO REANALYZE THE MODIFICATION USING THE AS-BUILT CONDITION.

REQUIRED PHOTOGRAPHS

1. THE GC AND MI SHALL AT MINIMUM PHOTO DOCUMENT THE FOLLOWING FOR INCLUSION IN THE MODIFICATION INSPECTION REPORT:
 - PRE-CONSTRUCTION: GENERAL CONDITION OF THE SITE.
 - DURING CONSTRUCTION: RAW MATERIALS, CRITICAL DETAILS, WELD PREPARATION, BOLT INSTALLATION & TORQUE, FINAL INSTALLED CONDITION & SURFACE COATING REPAIRS.
 - POST-CONSTRUCTION: FINAL CONDITION OF THE SITE

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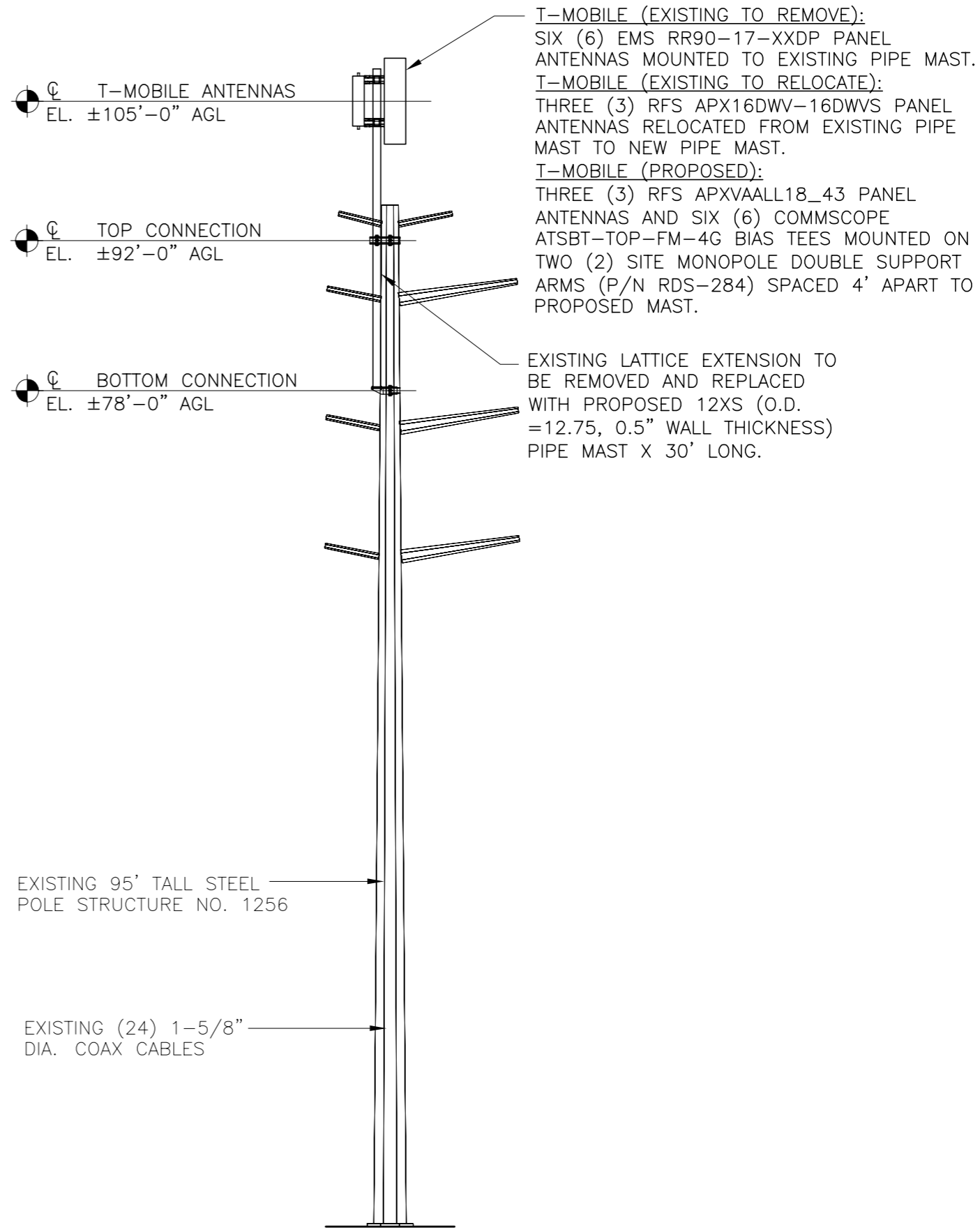
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180 SOUND BEACH ROAD
 GREENWICH, CT 06607

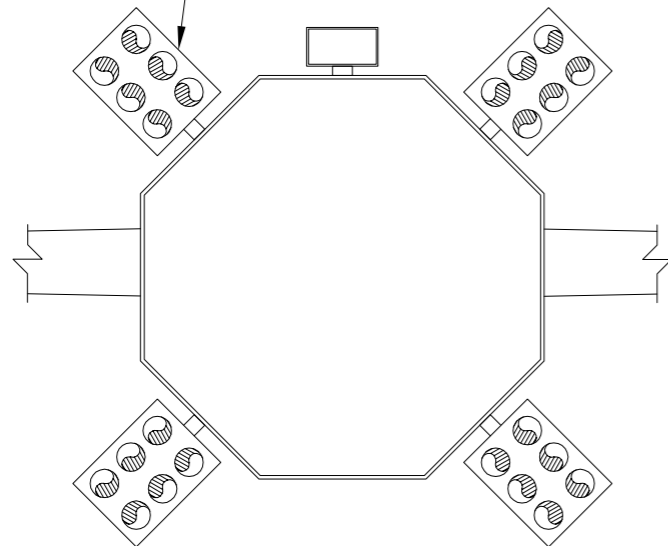
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**MODIFICATION
 INSPECTION
 REQUIREMENTS**

SHEET NO.
MI-1
 Sheet No. 1 of 7



EXISTING (24) 1-5/8" DIA. COAX CABLES



3
COAX CABLE PLAN
 S-1 SCALE: NTS

1
TOWER + MAST ELEVATION
 S-1 SCALE: NOT TO SCALE

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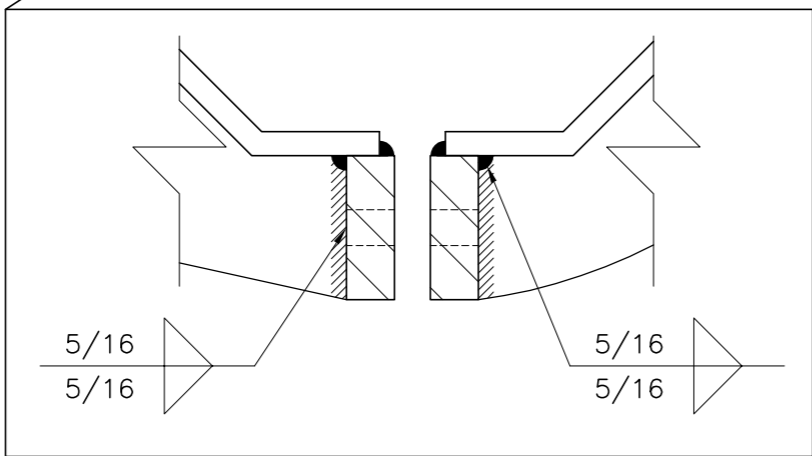
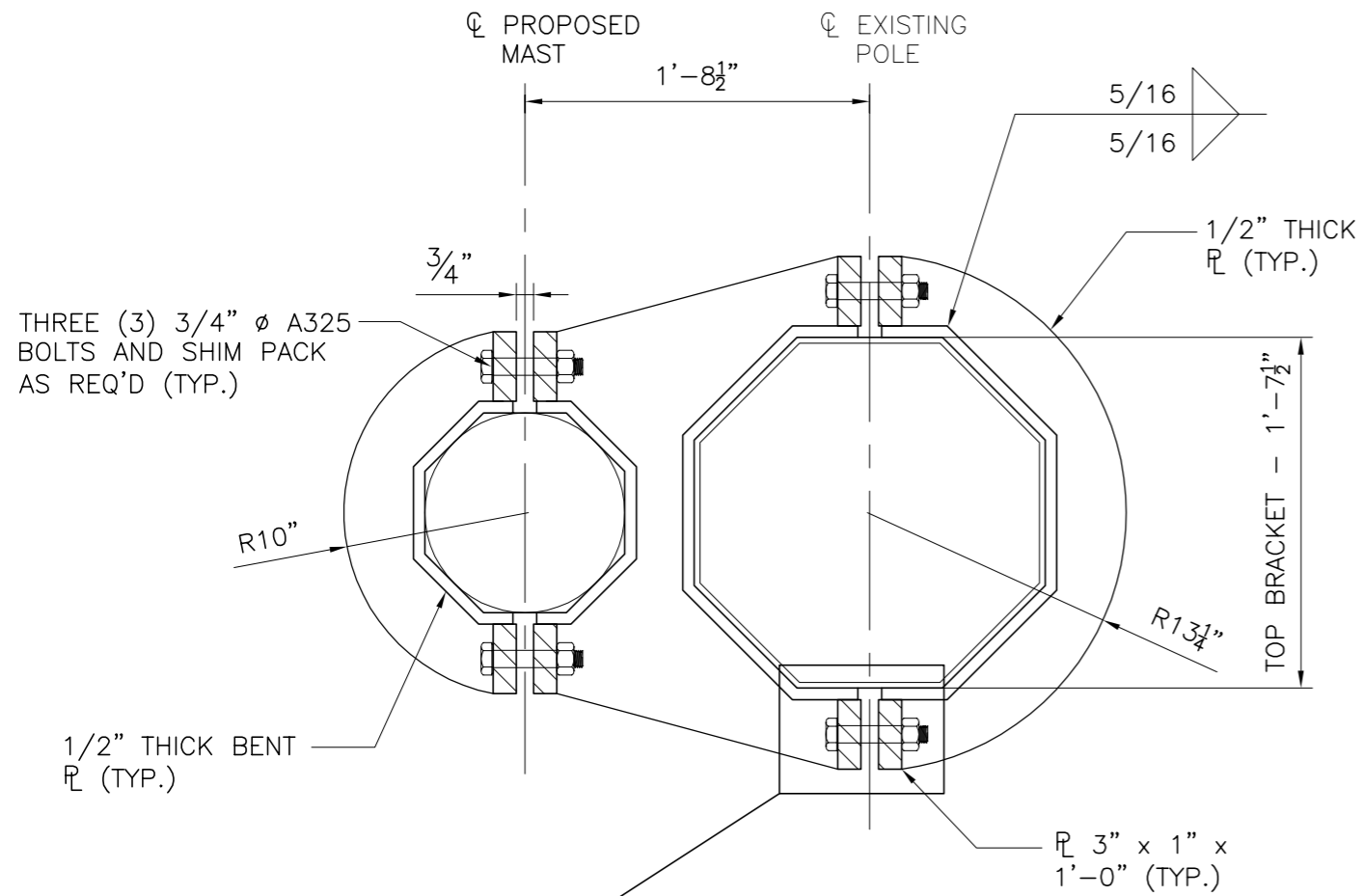
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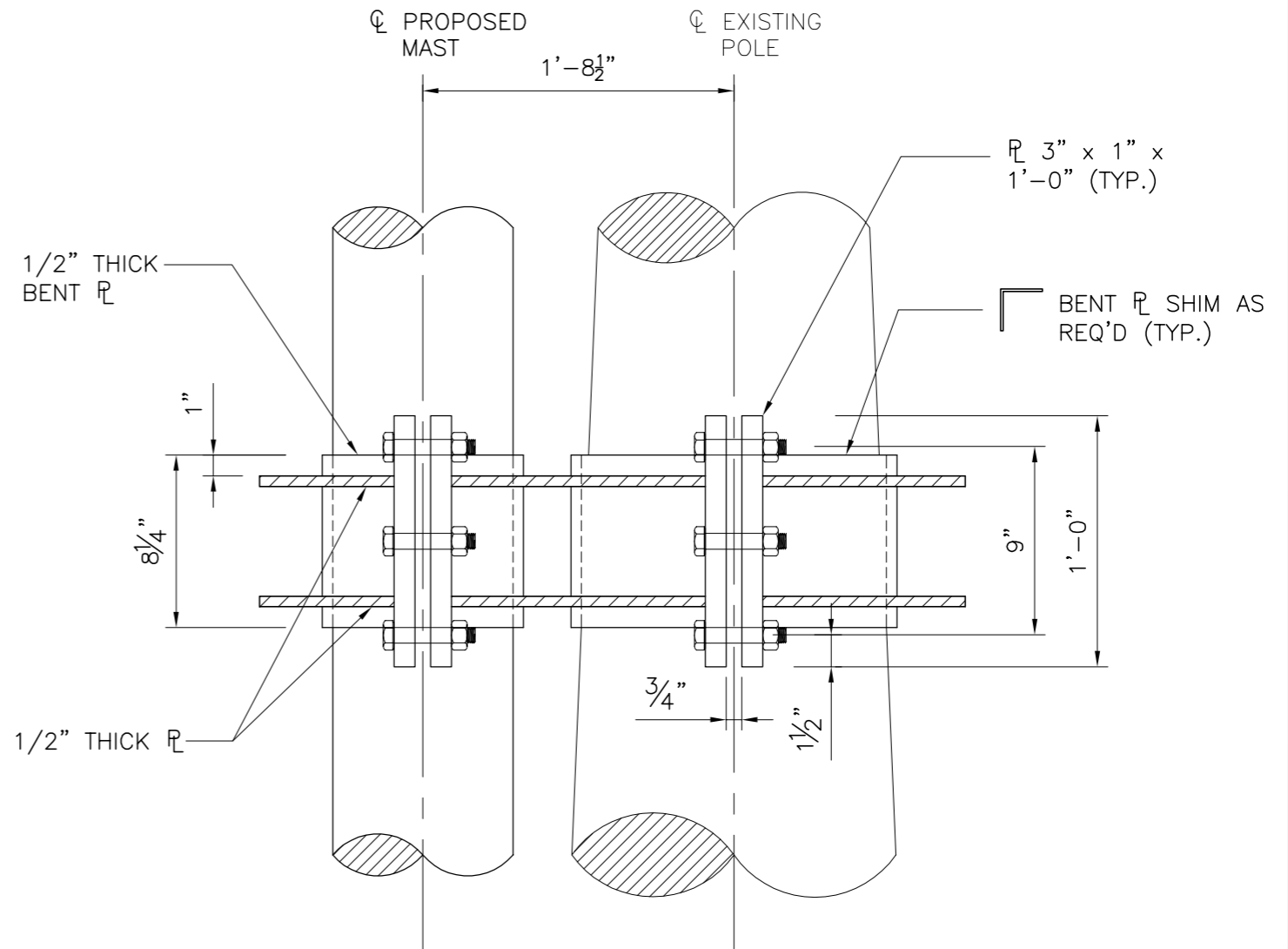
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TOWER ELEVATION AND FEEDLINE PLAN

SHEET NO.
S-1
 Sheet No. 5 of 7



2 TOP BRACKET PLAN VIEW
 S-2 SCALE: NTS



1 TOP BRACKET DETAIL
 S-2 SCALE: NTS

NOTE:
 1. POLE TAPER = 0.20"/FT (V.I.F.)

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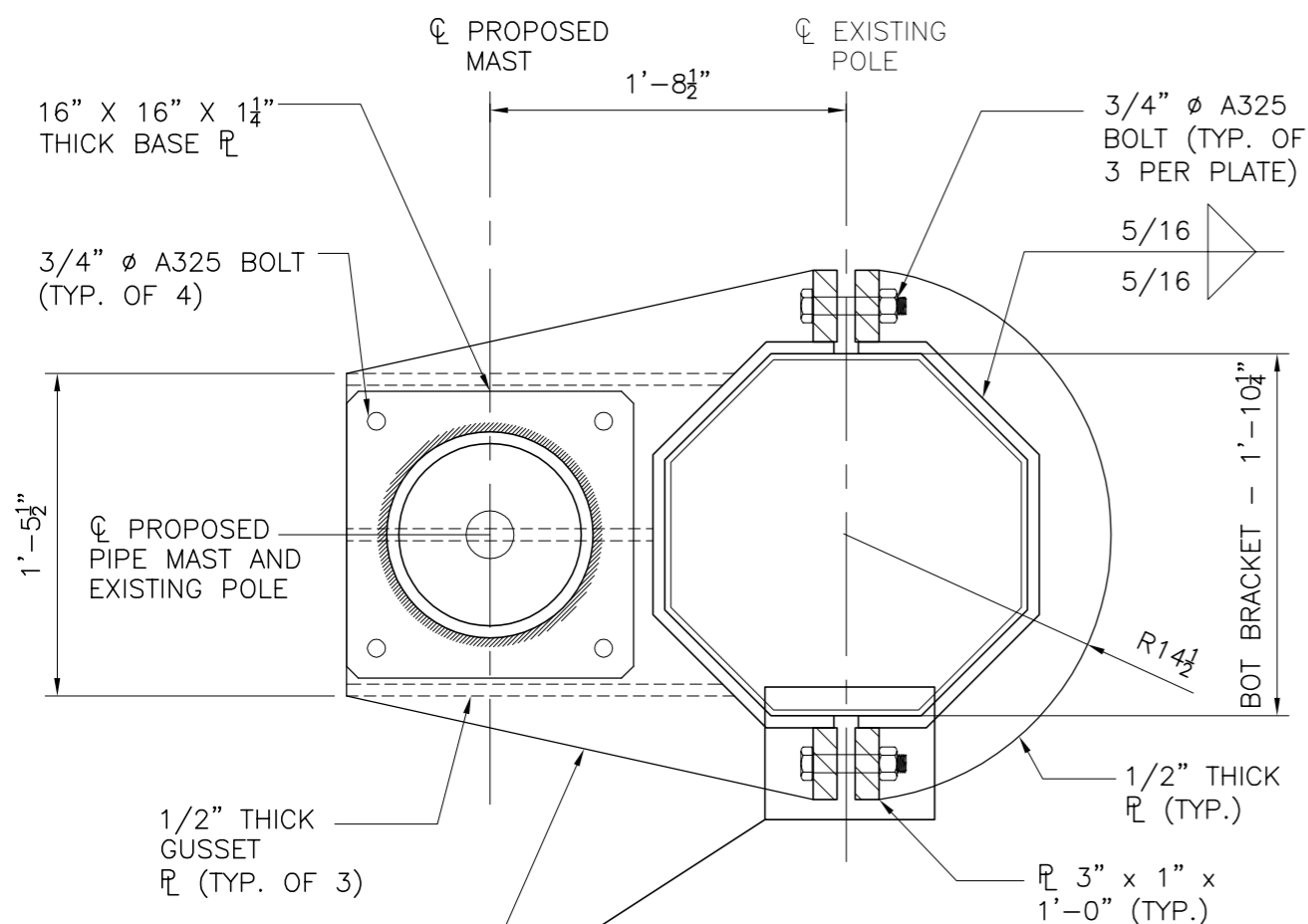
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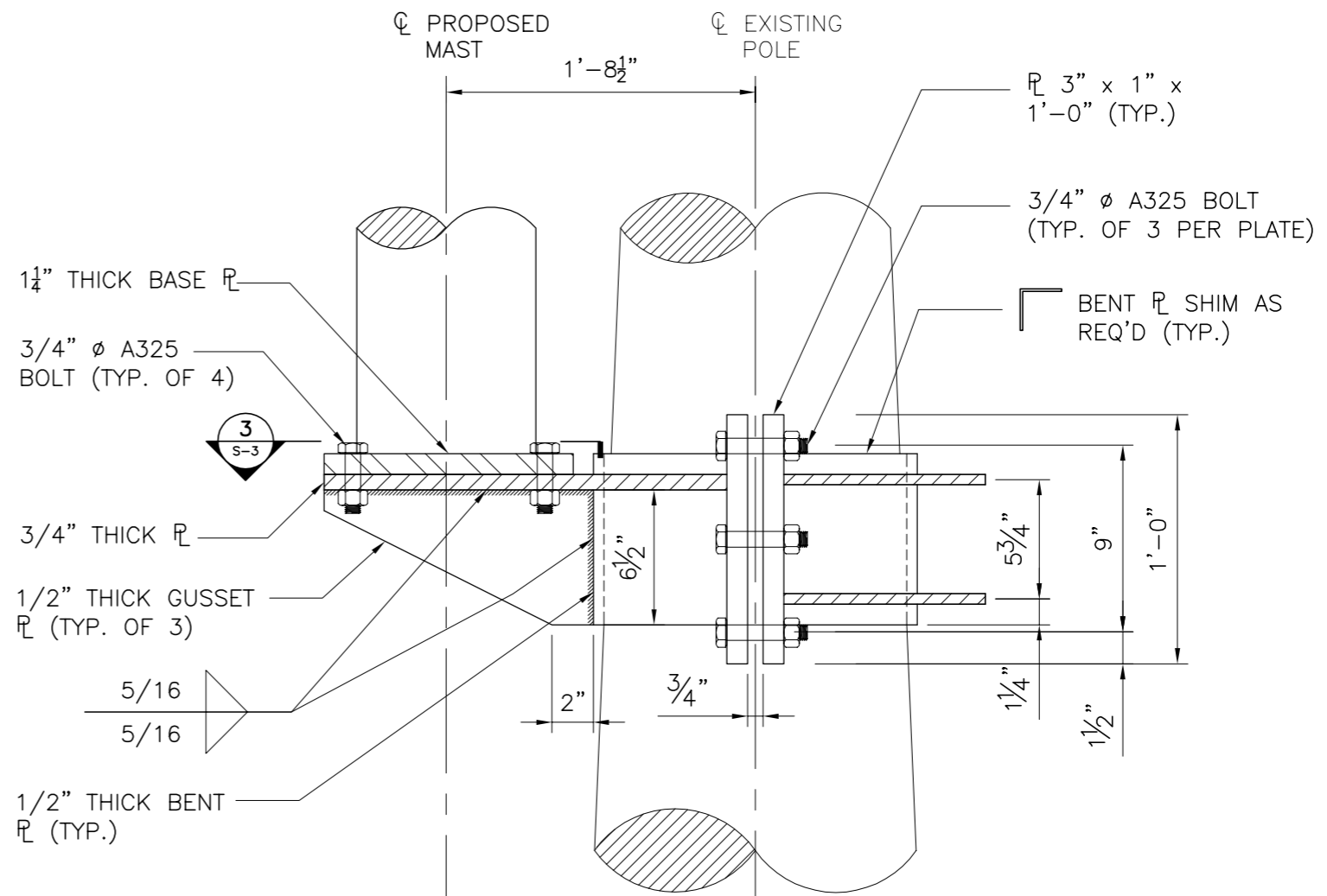
TOP CONNECTION DETAILS

SHEET NO.
S-2
 Sheet No. 2 of 7

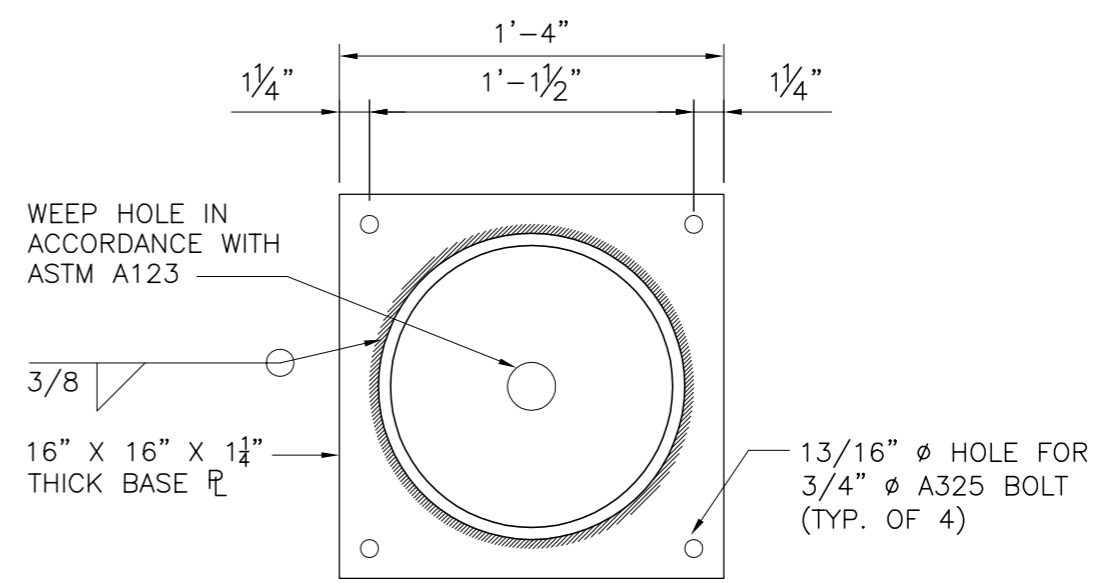


2 BOTTOM BRACKET PLAN VIEW
SCALE: NTS

NOTE:
1. POLE TAPER = 0.20"/FT (V.I.F.)



1 BOTTOM BRACKET DETAIL
SCALE: NTS



3 BOTTOM PLATE DETAIL
SCALE: 1" = 1'-0"

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BOTTOM CONNECTION DETAILS

SHEET NO. **S-3**
Sheet No. 3 of 3

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

Wind Speeds

Basic Wind Speed	$V := 93$	mph	(User Input - 2018 CSBC Appendix N)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input per Annex B of TIA-222-G)
Basic Wind Speed Service Loads	$V_{Ser} := 60$	mph	(User Input - TIA-222-G Section 2.8.3)

Input

Structure Type =	Structure_Type := Pole		(User Input)
Structure Category =	SC := III		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	h := 95	ft	(User Input)
Height to Center of Antennas =	$z_{T-Mo} := 105$	ft	(User Input)
Height to Center of Mast =	$z_{Mast1} := 93$	ft	(User Input)
Radial Ice Thickness =	$t_i := 0.75$	in	(User Input per Annex B of TIA-222-G)
Radial Ice Density =	$\rho_d := 56.00$	pcf	(User Input)
Topographic Factor =	$K_{zt} := 1.0$		(User Input)
	$K_a := 1.0$		(User Input)
Gust Response Factor =	$G_H := 1.35$		(User Input)

Output

Wind Direction Probability Factor =	$K_d := \begin{cases} 0.95 & \text{if Structure_Type = Pole} \\ 0.85 & \text{if Structure_Type = Lattice} \end{cases} = 0.95$	(Per Table 2-2 of TIA-222-G)
Importance Factors =	$I_{Wind} := \begin{cases} 0.87 & \text{if SC = 1} \\ 1.00 & \text{if SC = 2} \\ 1.15 & \text{if SC = 3} \end{cases} = 1.15$	(Per Table 2-3 of TIA-222-G)
	$I_{Wind_w_Ice} := \begin{cases} 0 & \text{if SC = 1} \\ 1.00 & \text{if SC = 2} \\ 1.00 & \text{if SC = 3} \end{cases} = 1$	
	$I_{ice} := \begin{cases} 0 & \text{if SC = 1} \\ 1.00 & \text{if SC = 2} \\ 1.25 & \text{if SC = 3} \end{cases} = 1.25$	
Wind Direction Probability Factor (Service) =	$K_{dSer} := 0.85$	(Per Section 2.8.3 of TIA-222-G)
Importance Factor (Service) =	$I_{Ser} := 1$	(Per Section 2.8.3 of TIA-222-G)

$$K_{iz} := \left(\frac{z_{T-Mo}}{33} \right)^{0.1} = 1.123$$

Velocity Pressure Coefficient Antennas =

Velocity Pressure w/o Ice Antennas =

Velocity Pressure with Ice Antennas =

Velocity Pressure Service =

$$K_{izMast1} := \left(\frac{z_{Mast1}}{33} \right)^{0.1} = 1.109$$

Velocity Pressure Coefficient Mast =

Velocity Pressure w/o Ice Mast =

Velocity Pressure with Ice Mast =

Velocity Pressure Service =

$$t_{izT-Mo} := 2.0 \cdot t_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.105$$

$$K_{zT-Mo} := 2.01 \left(\frac{\left(\frac{z_{T-Mo}}{z_g} \right)^{\frac{2}{\alpha}}}{z_g} \right) = 1.279$$

$$q_{zT-Mo} := 0.00256 \cdot K_d \cdot K_{zT-Mo} \cdot V_{Wind}^2 \cdot I_{Wind} = 30.931$$

$$q_{z_{ice.T-Mo}} := 0.00256 \cdot K_d \cdot K_{zT-Mo} \cdot V_i^2 \cdot I_{Wind_w_Ice} = 7.774$$

$$q_{zT-Mo.Ser} := 0.00256 \cdot K_{dSer} \cdot K_{zT-Mo} \cdot V_{Ser}^2 \cdot I_{Ser} = 10.017$$

$$t_{izMast1} := 2.0 \cdot t_{ice} \cdot K_{izMast1} \cdot K_{zt}^{0.35} = 2.08$$

$$K_{zMast1} := 2.01 \left(\frac{\left(\frac{z_{Mast1}}{z_g} \right)^{\frac{2}{\alpha}}}{z_g} \right) = 1.246$$

$$q_{zMast1} := 0.00256 \cdot K_d \cdot K_{zMast1} \cdot V_{Wind}^2 \cdot I_{Wind} = 30.151$$

$$q_{z_{ice.Mast1}} := 0.00256 \cdot K_d \cdot K_{zMast1} \cdot V_i^2 \cdot I_{Wind_w_Ice} = 7.578$$

$$q_{zMast1.Ser} := 0.00256 \cdot K_{dSer} \cdot K_{zMast1} \cdot V_{Ser}^2 \cdot I_{Ser} = 9.764$$

Development of Wind & Ice Load on Mast

Mast Data:

	(Pipe 12" SCH. 80)	(User Input)
Mast Shape =	Round	(User Input)
Mast Diameter =	$D_{mast} := 12.75$ in	(User Input)
Mast Length =	$L_{mast} := 30$ ft	(User Input)
Mast Thickness =	$t_{mast} := 0.5$ in	(User Input)
Mast Aspect Ratio =	$Ar_{mast} := \frac{12L_{mast}}{D_{mast}} = 28.2$	
Mast Force Coefficient =	$Ca_{mast} = 1.2$	

Wind Load (without ice)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 1.063$ s/ft

Total Mast Wind Force = $qZ_{Mast1} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 52$ plf **BLC 5**

Wind Load (with ice)

Mast Projected Surface Area w/ Ice = $A_{ICE_{mast}} := \frac{(D_{mast} + 2 \cdot t_{izMast1})}{12} = 1.409$ s/ft

Total Mast Wind Force w/ Ice = $qZ_{ice.Mast1} \cdot G_H \cdot Ca_{mast} \cdot A_{ICE_{mast}} = 17$ plf **BLC 4**

Wind Load (Service)

Total Mast Wind Force Service Loads = $qZ_{Mast1.Ser} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 17$ plf **BLC 6**

Gravity Loads (without ice)

Weight of the mast = Self Weight (Computed internally by Risa-3D) plf **BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4} [(D_{mast} + t_{izMast1} \cdot 2)^2 - D_{mast}^2] = 96.9$ sq in

Weight of Ice on Mast = $W_{ICE_{mast}} := Id \cdot \frac{Ai_{mast}}{144} = 38$ plf **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPXVAALL18_43	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 72$	in (User Input)
Antenna Width =	$W_{ant} := 24$	in (User Input)
Antenna Thickness =	$T_{ant} := 8.5$	in (User Input)
Antenna Weight =	$WT_{ant} := 132$	lbs (User Input)
Number of Antennas =	$N_{ant} := 3$	(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 3.0$	
Antenna Force Coefficient =	$Ca_{ant} = 1.22$	

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 12$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 36$	sf

Total Antenna Wind Force = $F_{ant} := qz_{T-Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 1837$ lbs **BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izT-Mo}) \cdot (W_{ant} + 2 \cdot t_{izT-Mo})}{144} = 14.9$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 44.8$	sf

Total Antenna Wind Force w/ Ice = $F_{ant} := qz_{ice.T-Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 575$ lbs **BLC 4**

Wind Load (Service)

Total Antenna Wind Force Service Loads = $F_{ant.Ser} := qz_{T-Mo.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 595$ lbs **BLC 6**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 396$ lbs **BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1 \times 10^4$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{izT-Mo}) \cdot (W_{ant} + 2 \cdot t_{izT-Mo}) \cdot (T_{ant} + 2 \cdot t_{izT-Mo}) - V_{ant} = 1 \times 10^4$

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot \rho_d = 410$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 1229$ lbs **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPX16DWV-16DWVS
Antenna Shape =	Flat (User Input)
Antenna Height =	$L_{ant} := 55.9$ in (User Input)
Antenna Width =	$W_{ant} := 13$ in (User Input)
Antenna Thickness =	$T_{ant} := 3.15$ in (User Input)
Antenna Weight =	$WT_{ant} := 41$ lbs (User Input)
Number of Antennas =	$N_{ant} := 3$ (User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.3$
Antenna Force Coefficient =	$Ca_{ant} = 1.28$

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 15.1$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{T-Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 809$	lbs BLC 5

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izT-Mo}) \cdot (W_{ant} + 2 \cdot t_{izT-Mo})}{144} = 7.2$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 21.6$	sf
Total Antenna Wind Force w/ Ice =	$F_{ant} := qz_{ice.T-Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 290$	lbs BLC 4

Wind Load (Service)

Total Antenna Wind Force Service Loads =	$F_{ant.Ser} := qz_{T-Mo.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 262$	lbs BLC 6
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Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 123$	lbs BLC 2
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Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2289$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{izT-Mo}) \cdot (W_{ant} + 2 \cdot t_{izT-Mo}) \cdot (T_{ant} + 2 \cdot t_{izT-Mo}) - V_{ant} = 5325$	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 173$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 518$	lbs BLC 3

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Commscope ATSBT-TOP-FM-4G Bias Tee
Antenna Shape =	Flat (User Input)
Antenna Height =	$L_{ant} := 5.63$ in (User Input)
Antenna Width =	$W_{ant} := 3.7$ in (User Input)
Antenna Thickness =	$T_{ant} := 2$ in (User Input)
Antenna Weight =	$WT_{ant} := 2$ lbs (User Input)
Number of Antennas =	$N_{ant} := 6$ (User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.5$
Antenna Force Coefficient =	$Ca_{ant} = 1.2$

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.1$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 0.9$	sf

Total Antenna Wind Force =

$F_{ant} := qz_{T-Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 43$ lbs **BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izT-Mo}) \cdot (W_{ant} + 2 \cdot t_{izT-Mo})}{144} = 0.5$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 3.2$	sf

Total Antenna Wind Force w/ Ice =

$F_{i_{ant}} := qz_{ice, T-Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 41$ lbs **BLC 4**

Wind Load (Service)

Total Antenna Wind Force Service Loads =

$F_{ant, Ser} := qz_{T-Mo, Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 14$ lbs **BLC 6**

Gravity Load (without ice)

Weight of All Antennas =

$WT_{ant} \cdot N_{ant} = 12$ lbs **BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna =

$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 42$ cu in

Volume of Ice on Each Antenna =

$V_{ice} := (L_{ant} + 2 \cdot t_{izT-Mo}) \cdot (W_{ant} + 2 \cdot t_{izT-Mo}) \cdot (T_{ant} + 2 \cdot t_{izT-Mo}) - V_{ant} = 442$

Weight of Ice on Each Antenna =

$W_{ICEant} := \frac{V_{ice}}{1728} \cdot \rho_d = 14$ lbs

Weight of Ice on All Antennas =

$W_{ICEant} \cdot N_{ant} = 86$ lbs **BLC 3**

Development of Wind & Ice Load on Antenna Mounts

Mount Data:

Mount Type =	SitePro Double SupportArm RDS-284 (x2)	
Mount Shape =	Flat	(User Input)
Mount Projected Surface Area =	CaAa := 7	sf (User Input)
Mount Projected Surface Area w/ Ice =	CaAa _{ice} := 11	sf (User Input)
Mount Weight =	WT _{mnt} := 1080	lbs (User Input)
Mount Weight w/ Ice =	WT _{mnt.ice} := 1250	lbs

Wind Load (without ice)

Total Mount Wind Force = $F_{mnt} := q_{T-Mo} \cdot G_H \cdot CaAa = 292$ lbs **BLC 5**

Wind Load (with ice)

Total Mount Wind Force = $F_{mnt} := q_{ice.T-Mo} \cdot G_H \cdot CaAa_{ice} = 115$ lbs **BLC 4**

Wind Load (Service)

Total Mount Wind Force = $F_{mnt.Ser} := q_{T-Mo.Ser} \cdot G_H \cdot CaAa = 95$ lbs **BLC 6**

Gravity Loads (without ice)

Weight of All Mounts = $WT_{mnt} = 1080$ lbs **BLC 2**

Gravity Loads (ice only)

Weight of Ice on All Mounts = $WT_{mnt.ice} - WT_{mnt} = 170$ lbs **BLC 3**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:

Coax Type =	HELJAX 1-5/8"	
Shape =	Round	(User Input)
Coax Outside Diameter =	$D_{\text{coax}} := 1.98$	in (User Input)
Coax Cable Length =	$L_{\text{coax}} := 14$	ft (User Input)
Weight of Coax per foot =	$Wt_{\text{coax}} := 1.04$	plf (User Input)
Total Number of Coax =	$N_{\text{coax}} := 24$	(User Input)
No. of Coax Projecting Outside Face of Member =	$NP_{\text{coax}} := 6$	(User Input)

Coax aspect ratio, $Ar_{\text{coax}} := \frac{(L_{\text{coax}} \cdot 12)}{D_{\text{coax}}} = 84.8$

Coax Cable Force Factor Coefficient = $Ca_{\text{coax}} = 1.2$

Wind Load (without ice)

Coax projected surface area = $A_{\text{coax}} := \frac{(NP_{\text{coax}} \cdot D_{\text{coax}})}{12} = 1$ s/ft

Total Coax Wind Force = $F_{\text{coax}} := Ca_{\text{coax}} \cdot qz_{\text{Mast1}} \cdot G_H \cdot A_{\text{coax}} = 48$ plf **BLC 5**

Wind Load (with ice)

Coax projected surface area w/ ice = $A_{\text{ICE}_{\text{coax}}} := \frac{(NP_{\text{coax}} \cdot D_{\text{coax}} + 2 \cdot t_{\text{izMast1}})}{12} = 1.3$ s/ft

Total Coax Wind Force w/ ice = $F_{\text{coax}} := Ca_{\text{coax}} \cdot qz_{\text{Ice.Mast1}} \cdot G_H \cdot A_{\text{ICE}_{\text{coax}}} = 16$ plf **BLC 4**

Wind Load (Service)

Total Coax Wind Force Service Loads = $F_{\text{coax}} := Ca_{\text{coax}} \cdot qz_{\text{Mast1.Ser}} \cdot G_H \cdot A_{\text{coax}} = 16$ plf **BLC 6**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{\text{coax}} := Wt_{\text{coax}} \cdot N_{\text{coax}} = 25$ plf **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{\text{coax}} := \frac{\pi}{4} [(D_{\text{coax}} + 2 \cdot t_{\text{izMast1}})^2 - D_{\text{coax}}^2] = 26.5$ sq in

Ice Weight All Coax per foot = $WT_{\text{Ice}_{\text{coax}}} := N_{\text{coax}} \cdot Id \cdot \frac{Ai_{\text{coax}}}{144} = 248$ plf **BLC 3**

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	No
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	24
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Standard Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI 1999: ASD
Wood Code	AF&PA NDS-91/97: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-02
Masonry Code	ACI 530-13: ASD
Aluminum Code	AA ADM1-15: 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	PCA Load Contour
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
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	UBC 1997
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	No
Ct X	.035
Ct Z	.035
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	8.5
R Z	8.5
Ca	.36
Cv	.54
Nv	1
Occupancy Category	4
Seismic Zone	3
Om Z	1
Om X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1.5
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	0
Footing Concrete f'c (ksi)	3
Footing Concrete Ec (ksi)	4000
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	3.5
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 Gr. 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 [in ²]	I _{yy} [in ⁴]	I _{zz} [in ⁴]	J [in ⁴]	
1	Mast	PIPE_12.0X	Column	Wide Flange	A53 Gr. B	Typical	17.5	339	339	678

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	L _{byy} [ft]	L _{bzz} [ft]	L _{comp top} [...]	L _{comp bot} [...]	L _{torq} [...]	K _{yy}	K _{zz}	C _b	Funci...
1	M1	Mast	30						L _{byy}			Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...)	Section/Shape	Type	Design List	Material	Design R...
1	M1	N1	N4			Mast	Column	Wide Flange	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	14	0	0	
3	N3	0	27	0	0	
4	N4	0	30	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N2	Reaction		Reaction			
2	N1	Reaction	Reaction	Reaction		Reaction	

Member Point Loads

Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
No Data to Print ...			

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-0.25	-0.25	0 24

Member Distributed Loads (BLC 3 : Weight of Ice Only)

Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-0.038	-0.038	0 0
2	M1	Y	-0.248	-0.248	0 24

Member Distributed Loads (BLC 4 : TIA Wind with Ice)

Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.017	.017	0 24
2	M1	X	.016	.016	0 24

Member Distributed Loads (BLC 5 : TIA Wind)

Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
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Member Distributed Loads (BLC 5 : TIA Wind) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.052	.052	0	24
2	M1	X	.048	.048	0	24

Member Distributed Loads (BLC 6 : Service Wind)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.017	.017	0	24
2	M1	X	.016	.016	0	24

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib...	Area(... Surfa...
1	Self Weight	None		-1					
2	Weight of Appurtenances	None				4		1	
3	Weight of Ice Only	None				4		2	
4	TIA Wind with Ice	None				4		2	
5	TIA Wind	None				4		2	
6	Service Wind	None				4		2	

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	BLC	Fact...	BLC	Fa...	BLC	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	1.0D + 1.0WService	Yes	Y		1	1	2	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	N2	max	-2.547	4	0	4	0	4	0	4	0	4	0	4
2		min	-12.519	1	0	1	0	1	0	1	0	1	0	1
3	N1	max	3.909	1	13.892	3	0	4	0	4	0	4	0	4
4		min	.789	4	3.598	2	0	1	0	1	0	1	0	1
5	Totals:	max	-1.758	4	13.892	3	0	4						
6		min	-8.61	1	3.598	2	0	1						

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	0	4	0	4	0	4	0	4	0	4	2.625e-03	1
2		min	0	1	0	1	0	1	0	1	0	1	5.31e-04	4
3	N2	max	0	4	-.001	2	0	4	0	4	0	4	-1.161e-03	4
4		min	0	1	-.005	3	0	1	0	1	0	1	-5.73e-03	1
5	N3	max	1.736	1	-.002	2	0	4	0	4	0	4	-2.764e-03	4
6		min	.352	4	-.007	3	0	1	0	1	0	1	-1.365e-02	1
7	N4	max	2.227	1	-.002	2	0	4	0	4	0	4	-2.764e-03	4
8		min	.451	4	-.007	3	0	1	0	1	0	1	-1.365e-02	1



Company : Centek
 Designer : TJL
 Job Number : 21051.03 - CT11001B
 Model Name : Structure # 1256 - Mast

July 8, 2021
 2:13 PM
 Checked By: CFC

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

Member	Shape	Code Check	Lo...	LC	She...Lo...	Dir	...phi*...	phi*...	phi*...	phi*...	Cb	Eqn
1	M1	PIPE_12.0X	.384	14...	1	.03914...	1	391...	551.25	184...	184...	1.4...H1-...

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N2	-12.519	0	0	0	0	0
2	1	N1	3.909	4.797	0	0	0	0
3	1	Totals:	-8.61	4.797	0			
4	1	COG (ft):	X: 0	Y: 19.386	Z: 0			

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N2	-12.511	0	0	0	0	0
2	2	N1	3.902	3.598	0	0	0	0
3	2	Totals:	-8.61	3.598	0			
4	2	COG (ft):	X: 0	Y: 19.386	Z: 0			

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	N2	-2.662	0	0	0	0	0
2	3	N1	.849	13.892	0	0	0	0
3	3	Totals:	-1.813	13.892	0			
4	3	COG (ft):	X: 0	Y: 16.959	Z: 0			

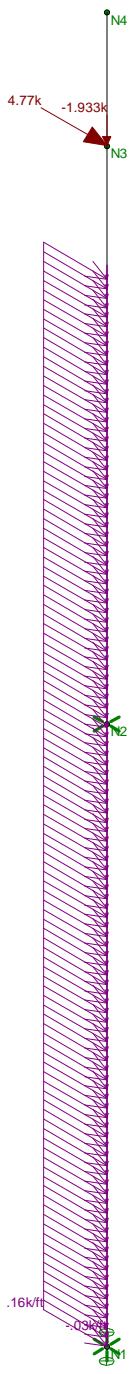


Code Check (Env)	
Black	No Calc
Red	> 1.0
Purple	.90-1.0
Green	.75-.90
Cyan	.50-.75
Blue	0-.50



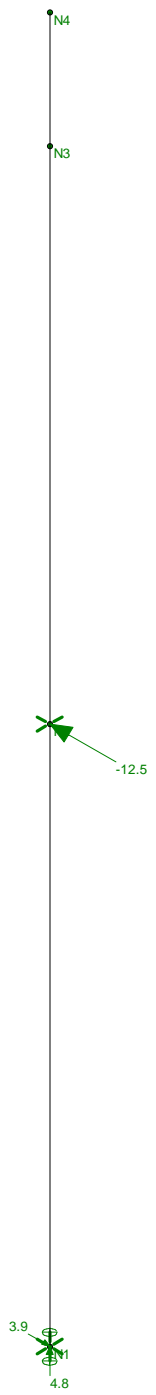
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek	Structure # 1256 - Mast Unity Check	
TJL		July 8, 2021 at 2:17 PM
21051.03 - CT11001B		TIA.r3d



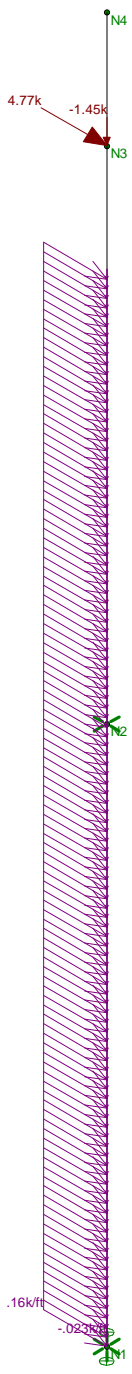
Loads: LC 1, 1.2D + 1.6W (X-direction)
Envelope Only Solution

Centek	Structure # 1256 - Mast LC #1 Loads	July 8, 2021 at 2:13 PM
TJL		TIA.r3d
21051.03 - CT11001B		



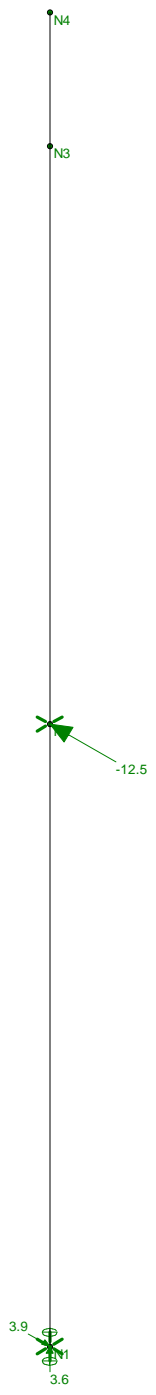
Results for LC 1, 1.2D + 1.6W (X-direction)
Reaction and Moment Units are k and k-ft

Centek	Structure # 1256 - Mast LC #1 Reactions	
TJL		July 8, 2021 at 2:14 PM
21051.03 - CT11001B		TIA.r3d



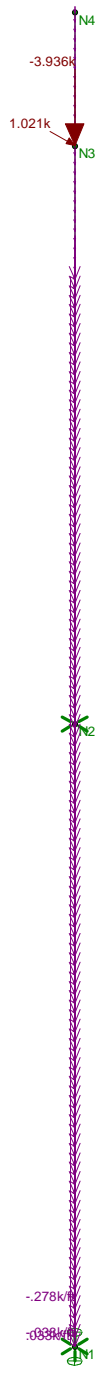
Loads: LC 2, 0.9D + 1.6W (X-direction)
Envelope Only Solution

Centek	Structure # 1256 - Mast LC #2 Loads	July 8, 2021 at 2:13 PM
TJL		TIA.r3d
21051.03 - CT11001B		



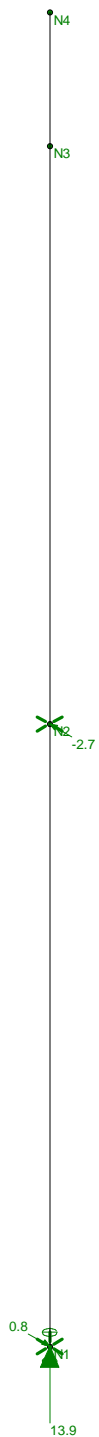
Results for LC 2, 0.9D + 1.6W (X-direction)
Reaction and Moment Units are k and k-ft

Centek	Structure # 1256 - Mast LC #2 Reactions	
TJL		July 8, 2021 at 2:15 PM
21051.03 - CT11001B		TIA.r3d



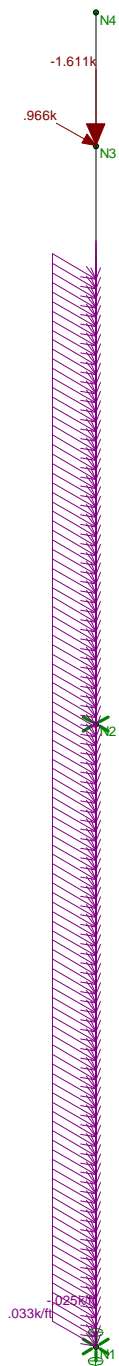
Loads: LC 3, 1.2D + 1.0Di + 1.0Wi (X-direction)
Envelope Only Solution

Centek	Structure # 1256 - Mast LC #3 Loads	July 8, 2021 at 2:13 PM
TJL		TIA.r3d
21051.03 - CT11001B		



Results for LC 3, 1.2D + 1.0Di + 1.0Wi (X-direction)
Reaction and Moment Units are k and k-ft

Centek	Structure # 1256 - Mast LC #3 Reactions	
TJL		July 8, 2021 at 2:15 PM
21051.03 - CT11001B		TIA.r3d



Loads: LC 4, 1.0D + 1.0WService
Envelope Only Solution

Centek	Structure # 1256 - Mast LC #4 Loads	July 8, 2021 at 2:14 PM
TJL		TIA.r3d
21051.03 - CT11001B		

Column: **M1**

Shape: **PIPE_12.0X**

Material: **A53 Gr. B**

Length: **30 ft**

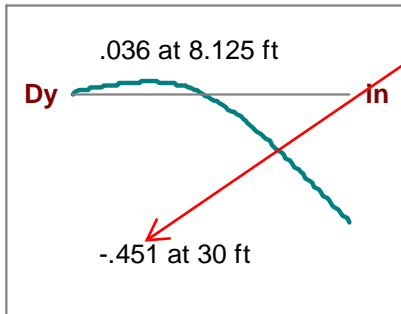
I Joint: **N1**

J Joint: **N4**

LC 4: **1.0D + 1.0WService**

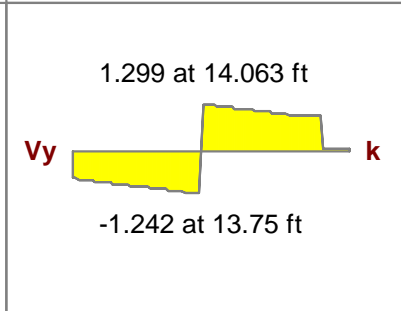
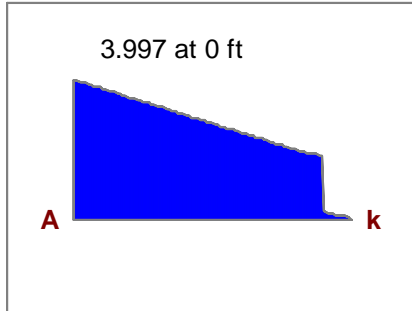
Code Check: **0.081 (bending)**

Report Based On 97 Sections



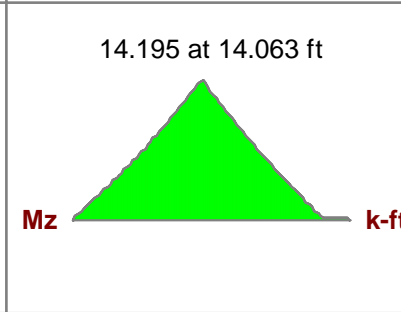
MAX DEFLECTION UNDER SERVICE LOADING = $[(0.45")/(16 * 12)] * 100 = 0.23\%$

Dz **in**

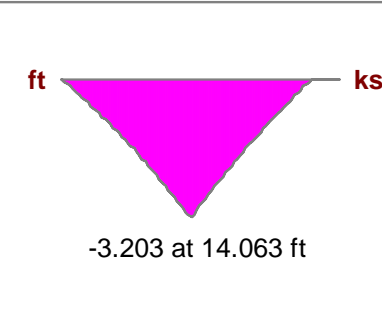
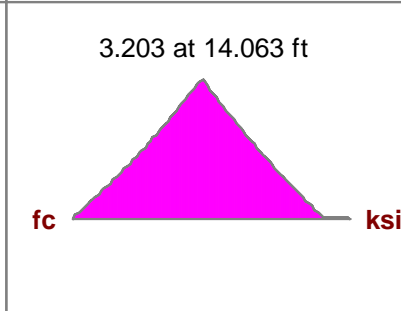
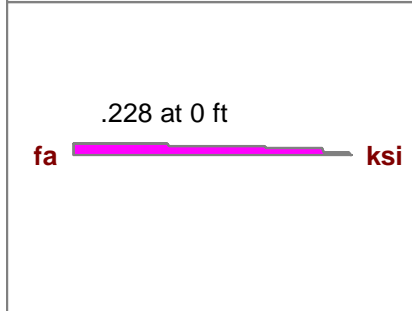


Vz **k**

T **k-ft**



My **k-ft**



AISC 14th(360-10): LRFD Code Check

Direct Analysis Method

Max Bending Check **0.081**
 Location **14.063 ft**
 Equation **H1-1b**

Max Shear Check **0.008 (s)**
 Location **14.063 ft**
 Max Defl Ratio **L/798**

Bending

Compact

Compression

Non-Slender

Fy **35 ksi**
 phi*Pnc **391.414 k**
 phi*Pnt **551.25 k**
 phi*Mny **184.275 k-ft**
 phi*Mnz **184.275 k-ft**
 phi*Vny **165.375 k**
 phi*Vnz **165.375 k**
 phi*Tn **173.622 k-ft**
 Cb **1.464**

y-y z-z
 Lb **30 ft** **30 ft**
 KL/r **81.794** **81.794**
 L Comp Flange **30 ft**
 L-torque **30 ft**
 Tau_b **1**

Mast Top Connection:

Maximum Design Reactions at Brace:

Vertical =	Vert := 0-kips	(User Input)
Horizontal =	Horz := 12.5-kips	(User Input)
Moment =	Moment := 0	(User Input)

Bolt Data:

Bolt Grade =	A325	(User Input)
Number of Bolts =	$n_b := 6$	(User Input)
Bolt Diameter =	$d_b := 0.75\text{in}$	(User Input)
Nomianl Tensile Strength =	$F_{nt} := 90\text{-ksi}$	(User Input)
Nomianl Shear Strength =	$F_{nv} := 54\text{-ksi}$	(User Input)
Resistance Factor =	$\phi := 0.75$	(User Input)
Bolt Eccentricity from C.L. Mast =	$e := 20.5\text{-in}$	(User Input)
Vertical Spacing Between Top and Bottom Bolts =	$S_{vert} := 9\text{-in}$	(User Input)
Horizontal Spacing Between Bolts =	$S_{horz} := 23.5\text{-in}$	(User Input)
BoltArea =	$a_b := \frac{1}{4} \cdot \pi \cdot d_b^2 = 0.442\text{-in}^2$	

Check Bolt Stresses:

Wind Acting Parallel to Stiffener Plate:

Shear Stress per Bolt =

$$f_v := \frac{\text{Vert}}{n_b \cdot a_b} = 0 \cdot \text{ksi}$$

$$\text{Condition1} := \text{if}(f_v < \phi \cdot F_{nv}, \text{"OK"}, \text{"Overstressed"})$$

Condition1 = "OK"

$$\frac{f_v}{(\phi \cdot F_{nv})} = 0\%$$

Tensile Stress Adjusted for Shear =

$$F'_{nt} := \begin{cases} \left(1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \right) & \text{if } 1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \leq F_{nt} = 90 \cdot \text{ksi} \\ F_{nt} & \text{otherwise} \end{cases}$$

Tension Force Each Bolt =

$$F_{\text{tension.bolt}} := \frac{\text{Horz} \cdot e}{n_b} + \frac{\text{Vert} \cdot e}{S_{\text{vert}} \cdot 2} = 2.083 \cdot \text{kips}$$

Tension Stress Each Bolt =

$$f_t := \frac{F_{\text{tension.bolt}}}{a_b} = 4.7 \cdot \text{ksi}$$

$$\text{Condition2} := \text{if}(f_t < \phi \cdot F'_{nt}, \text{"OK"}, \text{"Overstressed"})$$

Condition2 = "OK"

$$\frac{f_t}{(\phi \cdot F'_{nt})} = 7\%$$

Wind Acting Perpendicular to Stiffener Plate:

Shear Stress per Bolt =

$$f_v := \frac{\sqrt{\text{Vert}^2 + \text{Horz}^2}}{n_b \cdot a_b} = 4.716 \cdot \text{ksi}$$

$$\text{Condition3} := \text{if}(f_v < \phi \cdot F_{nv}, \text{"OK"}, \text{"Overstressed"})$$

Condition3 = "OK"

$$\frac{f_v}{(\phi \cdot F_{nv})} = 11.6\%$$

Tensile Stress Adjusted for Shear =

$$F'_{nt} := \begin{cases} \left(1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \right) & \text{if } 1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \leq F_{nt} = 90 \cdot \text{ksi} \\ F_{nt} & \text{otherwise} \end{cases}$$

Tension Force per Bolt =

$$F_{\text{tension.conn}} := \frac{\text{Horz} \cdot e}{n_b} + \frac{\text{Vert} \cdot e}{S_{\text{horz}} \cdot \frac{1}{2}} = 3.635 \cdot \text{kips}$$

Tension Stress Each Bolt =

$$f_t := \frac{F_{\text{tension.conn}}}{a_b} = 8.227 \cdot \text{ksi}$$

$$\text{Condition4} := \text{if}(f_t < \phi \cdot F'_{nt}, \text{"OK"}, \text{"Overstressed"})$$

Condition4 = "OK"

$$\frac{f_t}{(\phi \cdot F'_{nt})} = 12.2\%$$

Mast Connection to Bottom Bracket:

Design Reactions at Brace:

Axial (Max) =	Axial _{max} := 13.9-kips	(User Input)
Axial (Min) =	Axial _{min} := 3.6-kips	(User Input)
Shear =	Shear := 3.9-kips	(User Input)
Moment =	Moment := 0-kips-ft	(User Input)

Anchor Bolt Data:

Bolt Grade =	A325	(User Input)
Design Shear Stress =	F _v := 40.5-ksi	(User Input)
Design Tension Stress =	F _T := 67.5-ksi	(User Input)
Total Number of Bolts =	n _b := 4	(User Input)
Number of Bolts Tension Side Parallel =	n _{b.par} := 2	(User Input)
Number of Bolts Tension Side Diagonal =	n _{b.diag} := 1	(User Input)
Bolt Diameter =	d _b := 0.75in	(User Input)
Bolt Spacing X Direction =	S _x := 13.5-in	(User Input)
Bolt Spacing Z Direction =	S _z := 13.5-in	(User Input)

Base Plate Data:

Base Plate Steel =	A36	(User Input)
Allowable Yield Stress =	F _y := 36-ksi	(User Input)
Base Plate Width =	Pl _w := 16-in	(User Input)
Base Plate Thickness =	Pl _t := 1.25-in	(User Input)
Bolt Edge Distance =	B _E := 1.25-in	(User Input)
Pole Diameter =	D _p := 12.75-in	(User Input)

Base Plate Data:

Weld Grade	E70XX	(User Input)
Weld Yield Stress =	F _{yw} := 70-ksi	(User Input)
Weld Size =	sw := 0.375-in	(User Input)

Anchor Bolt Check:

BoltArea = $a_b := \frac{1}{4} \cdot \pi \cdot d_b^2 = 0.442 \cdot \text{in}^2$

Shear per bolt = $V_{\text{bolt}} := \frac{\text{Shear}}{n_b} = 0.98 \cdot \text{kips}$

Actual Shear Stress = $f_v := \frac{V_{\text{bolt}}}{a_b} = 2.21 \cdot \text{ksi}$

Condition1 := if($f_v < F_v$, "OK", "Overstressed")

Condition1 = "OK"

Bolt Spacing Diag. Direction = $S_{\text{diag}} := \sqrt{S_x^2 + S_z^2} = 19.09 \cdot \text{in}$

Tension Load per Bolt Parallel = $T_{\text{par}} := \frac{\text{Moment}}{S_x \cdot n_{b,\text{par}}} - \frac{\text{Axial}_{\text{min}}}{n_b} = -0.9 \cdot \text{kips}$

Tension Load per Bolt Diagonal = $T_{\text{diag}} := \frac{\text{Moment}}{S_{\text{diag}} \cdot n_{b,\text{diag}}} - \frac{\text{Axial}_{\text{min}}}{n_b} = -0.9 \cdot \text{kips}$

Tension per bolt = $T := \text{if}(T_{\text{par}} > T_{\text{diag}}, T_{\text{par}}, T_{\text{diag}}) = -0.9 \cdot \text{kips}$

Actual Tensile Stress = $f_t := \frac{T}{a_b} = -2.04 \cdot \text{ksi}$

Condition2 := if($f_t < F_T$, "OK", "Overstressed")

Condition2 = "OK"

Base Plate Check:

Design Bending Stress = $F_b := 0.9 \cdot F_y = 32.4 \cdot \text{ksi}$

Plate Bending Width = $Z := (P_l \cdot W \cdot \sqrt{2} - D_p) = 9.88 \cdot \text{in}$

Moment Arm = $K := \frac{(S_{\text{diag}} - D_p)}{2} = 3.17 \cdot \text{in}$

Load per Bolt Diagonal = $P_{\text{diag}} := \frac{\text{Moment}}{S_{\text{diag}} \cdot n_{b,\text{diag}}} + \frac{\text{Axial}_{\text{max}}}{n_b} = 3.48 \cdot \text{kips}$

Moment in Base Plate = $M := K \cdot P_{\text{diag}} = 11.02 \cdot \text{kips} \cdot \text{in}$

Plastic Section Modulus = $Z := \frac{1}{4} \cdot Z \cdot P_t^2 = 3.86 \cdot \text{in}^3$

Bending Stress = $f_b := \frac{M}{Z} = 2.86 \cdot \text{ksi}$

Condition3 := if($f_b < F_b$, "OK", "Overstressed")

Condition3 = "OK"

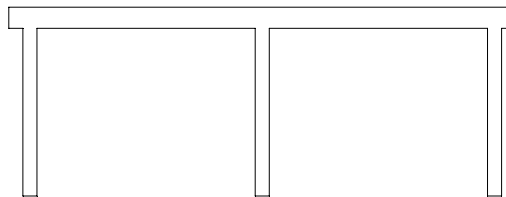
Base Plate to PCS Mast Weld Check:

Design Weld Stress =	$F_W := 0.45 \cdot F_{yW} = 31.5 \text{ ksi}$
Weld Area =	$A_W := \frac{\pi}{4} \cdot \left[(D_p + 2sw \cdot 0.707)^2 - D_p^2 \right] = 10.84 \text{ in}^2$
Weld Moment of Inertia =	$I_W := \frac{\pi}{64} \cdot \left[(D_p + 2sw \cdot 0.707)^4 - D_p^4 \right] = 229.63 \text{ in}^4$
	$c := \frac{D_p}{2} + sw \cdot 0.707 = 6.64 \text{ in}$
Section Modulus of Weld =	$S_W := \frac{I_W}{c} = 34.58 \text{ in}^3$
Weld Stress =	$f_W := \frac{\text{Moment}}{S_W} + \frac{\text{Shear}}{A_W} = 0.36 \text{ ksi}$
	Condition4 := if($f_W < F_W$, "OK", "Overstressed")
	Condition4 = "OK"

Check Gusset Plates Below Base Plates:

Gusset Plate Data:

Allowable Yield Stress =	$F_y := 36 \text{ ksi}$	(User Input)
Plate Height =	$Pl_h := 6 \text{ in}$	(User Input)
Plate Thickness =	$Pl_t := 0.5 \text{ in}$	(User Input)
Distance from CL Pole to Face of Collar =	$d := 10 \text{ in}$	(User Input)
Section Modulus Gusset Assembly =	$S_x := 17.73 \text{ in}^3$	(User Input)



Max Moment =	$\text{Moment}_{max} := \text{Moment} + \text{Axial}_{max} \cdot d = 139 \text{ in-kips}$
Bending Stress =	$f_b := \frac{\text{Moment}_{max}}{S_x} = 7.84 \text{ ksi}$
	Condition5 := if($f_b < F_b$, "OK", "Overstressed")
	Condition5 = "OK"

Subject:

Mast Connection to Bottom Bracket

Location:

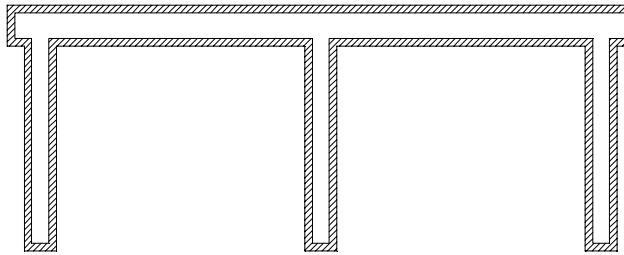
Greenwich, CT

Rev. 0: 7/8/21

Prepared by: T.J.L. Checked by: C.F.C.
 Job No. 21051.03

Weld Data:

Weld Yield Stress =	$F_{yw} := 70\text{-ksi}$	(User Input)
Weld Size =	$sw := 0.3125\text{-in}$	(User Input)
Weld Area =	$A_w := 16.4\text{-in}^2$	(User Input)
Section Modulus of Weld =	$S_w := 17.1\text{-in}^3$	(User Input)



Weld Stress = $f_w := \frac{\text{Moment}_{\max}}{S_w} + \frac{\text{Axial}_{\max}}{A_w} = 8.98\text{-ksi}$

Condition6 := if($f_w < F_{yw}$, "OK", "Overstressed")

Condition6 = "OK"

Mast Bottom Connection:

Maximum Design Reactions at Brace:

Vertical =	Vert := 13.9-kips	(User Input)
Horizontal =	Horz := 0.85-kips	(User Input)
Moment =	Moment := 0-ft-kips	(User Input)

Bolt Data:

Bolt Grade =	A325	(User Input)
Number of Bolts =	$n_b := 6$	(User Input)
Bolt Diameter =	$d_b := 0.75\text{in}$	(User Input)
Nomianl Tensile Strength =	$F_{nt} := 90\text{-ksi}$	(User Input)
Nomianl Shear Strength =	$F_{nv} := 54\text{-ksi}$	(User Input)
Resistance Factor =	$\phi := 0.75$	(User Input)
Bolt Eccentricity from C.L. Mast =	$e := 20.5\text{-in}$	(User Input)
Horizontal Spacing Between Bolts =	$S_{horz} := 26.25\text{-in}$	(User Input)
Vertical Spacing Between Top and Bottom Bolts =	$S_{vert} := 9\text{-in}$	(User Input)
BoltArea =	$a_b := \frac{1}{4} \cdot \pi \cdot d_b^2 = 0.442\text{-in}^2$	

Check Bolt Stresses:

Wind Acting Parallel to Stiffener Plate:

Shear Stress per Bolt =

$$f_v := \frac{\text{Vert}}{n_b \cdot a_b} = 5.244 \cdot \text{ksi}$$

$$\text{Condition1} := \text{if}(f_v < \phi \cdot F_{nv}, \text{"OK"}, \text{"Overstressed"})$$

Condition1 = "OK"

$$\frac{f_v}{(\phi \cdot F_{nv})} = 12.9\%$$

Tensile Stress Adjusted for Shear =

$$F'_{nt} := \begin{cases} \left(1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \right) & \text{if } 1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \leq F_{nt} = 90 \cdot \text{ksi} \\ F_{nt} & \text{otherwise} \end{cases}$$

Tension Force Each Bolt =

$$F_{\text{tension.bolt}} := \frac{\text{Horz}}{n_b} + \frac{(\text{Vert} \cdot e + \text{Moment})}{2 \cdot S_{\text{vert}}} = 15.972 \cdot \text{kips}$$

Tension Stress Each Bolt =

$$f_t := \frac{F_{\text{tension.bolt}}}{a_b} = 36.2 \cdot \text{ksi}$$

$$\text{Condition2} := \text{if}(f_t < \phi \cdot F'_{nt}, \text{"OK"}, \text{"Overstressed"})$$

Condition2 = "OK"

$$\frac{f_t}{(\phi \cdot F'_{nt})} = 53.6\%$$

Wind Acting Perpendicular to Stiffener Plate:

Shear Stress per Bolt =

$$f_v := \sqrt{\left(\frac{\text{Vert}}{n_b \cdot a_b} + \frac{\text{Moment} \cdot 2}{S_{\text{horz}} \cdot n_b \cdot a_b} \right)^2 + \left(\frac{\text{Horz}}{n_b \cdot a_b} \right)^2} = 5.254 \cdot \text{ksi}$$

$$\text{Condition3} := \text{if}(f_v < \phi \cdot F_{nv}, \text{"OK"}, \text{"Overstressed"})$$

Condition3 = "OK"

$$\frac{f_v}{(\phi \cdot F_{nv})} = 13\%$$

Tensile Stress Adjusted for Shear =

$$F'_{nt} := \begin{cases} \left(1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \right) & \text{if } 1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \leq F_{nt} = 90 \cdot \text{ksi} \\ F_{nt} & \text{otherwise} \end{cases}$$

Tension Force per Bolt =

$$F_{\text{tension.conn}} := \frac{\text{Horz} \cdot e}{n_b} + \frac{\text{Vert} \cdot e}{2 \cdot S_{\text{vert}}} = 16.052 \cdot \text{kips}$$

Tension Stress Each Bolt =

$$f_t := \frac{F_{\text{tension.conn}}}{a_b} = 36.334 \cdot \text{ksi}$$

$$\text{Condition4} := \text{if}(f_t < \phi \cdot F'_{nt}, \text{"OK"}, \text{"Overstressed"})$$

Condition4 = "OK"

$$\frac{f_t}{(\phi \cdot F'_{nt})} = 53.8\%$$

Basic Components

Heavy Wind Pressure =	p := 4.00	psf	(User Input NESC 2012 Figure 250-1 & Table 250-1)
Basic Windspeed =	V := 110	mph	(User Input NESC 2012 Figure 250-2(e))
Radial Ice Thickness =	Ir := 0.50	in	(User Input)
Radial Ice Density =	Id := 56.0	pcf	(User Input)

Factors for Extreme Wind Calculation

Elevation of Top of Mast Above Grade =	TME := 108	ft	(User Input)
Multiplier Gust Response Factor =	m := 1.25		(User Input - Only for NESC Extreme wind case)
NESC Factor =	kv := 1.43		(User Input from NESC 2012 Table 250-3 equation)
Importance Factor =	I := 1.0		(User Input from NESC 2012 Section 250.C.2)

Velocity Pressure Coefficient =
$$K_z := 2.01 \cdot \left(\frac{TME}{900} \right)^{\frac{2}{9.5}} = 1.286$$
 (NESC 2012 Table 250-2)

Exposure Factor =
$$E_s := 0.346 \left[\frac{33}{(0.67 \cdot TME)} \right]^{\frac{1}{7}} = 0.309$$
 (NESC 2012 Table 250-3)

Response Term =
$$B_s := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220} \right)} = 0.845$$
 (NESC 2012 Table 250-3)

Gust Response Factor =
$$G_{rf} := \frac{\left[1 + \left(2.7 \cdot E_s \cdot B_s \cdot \frac{1}{2} \right) \right]}{k_v^2} = 0.864$$
 (NESC 2012 Table 250-3)

Wind Pressure =
$$q_z := 0.00256 \cdot K_z \cdot V^2 \cdot G_{rf} \cdot I = 34.4$$
 psf (NESC 2012 Section 250.C.2)

Shape Factors

Shape Factor for Round Members =	Cd _R := 1.3	(User Input)
Shape Factor for Flat Members =	Cd _F := 1.6	(User Input)
Shape Factor for Open Lattice =	Cd _{OL} := 3.2	(User Input)
Shape Factor for Coax Cables Attached to Outside of Pole =	Cd _{coax} := 1.6	(User Input)

Overload Factors

Overload Factors for Wind Loads:

NESC Heavy Loading =	2.5	(User Input)	Apply in Risa-3D Analysis
NESC Extreme Loading =	1.0	(User Input)	Apply in Risa-3D Analysis

Overload Factors for Vertical Loads:

NESC Heavy Loading =	1.5	(User Input)	Apply in Risa-3D Analysis
NESC Extreme Loading =	1.0	(User Input)	Apply in Risa-3D Analysis

Development of Wind & Ice Load on Mast

Mast Data:

(Pipe 12.0 SCH. 80)

Mast Shape =	Round	(User Input)
Mast Diameter =	$D_{mast} := 12.75$ in	(User Input)
Mast Length =	$L_{mast} := 30$ ft	(User Input)
Mast Thickness =	$t_{mast} := 0.5$ in	(User Input)

Wind Load (NESC Extreme)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 1.063$ sq/ft

Total Mast Wind Force (Above NU Structure) = $qz \cdot C_d \cdot A_{mast} \cdot m = 73$ plf **BLC 5**

Total Mast Wind Force (Below NU Structure) = $qz \cdot C_d \cdot A_{mast} = 59$ plf **BLC 5**

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice = $A_{ICE_{mast}} := \frac{(D_{mast} + 2 \cdot I_r)}{12} = 1.146$ sq/ft

Total Mast Wind Force w/ Ice = $p \cdot C_d \cdot A_{ICE_{mast}} = 6$ plf **BLC 4**

Gravity Loads (without ice)

Weight of the Mast = Self Weight (Computed internally by Risa-3D) plf **BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot = $A_{i_{mast}} := \frac{\pi}{4} [(D_{mast} + I_r \cdot 2)^2 - D_{mast}^2] = 20.8$ sq in

Weight of Ice on Mast = $W_{ICE_{mast}} := I_d \cdot \frac{A_{i_{mast}}}{144} = 8$ plf **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPXVAALL18_43	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 72$	in (User Input)
Antenna Width =	$W_{ant} := 24$	in (User Input)
Antenna Thickness =	$T_{ant} := 8.5$	in (User Input)
Antenna Weight =	$WT_{ant} := 132$	lbs (User Input)
Number of Antennas =	$N_{ant} := 3$	(User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 12$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 36$	sf

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot A_{ant} = 2480$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 12.7$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 38$	sf

Total Antenna Wind Force w/ Ice = $F_{i_{ant}} := p \cdot Cd_F \cdot A_{ICEant} = 243$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 396$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1 \times 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 2650$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 86$	lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 258$ lbs **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPX16DWV-16DWVS
Antenna Shape =	Flat (User Input)
Antenna Height =	$L_{ant} := 55.9$ in (User Input)
Antenna Width =	$W_{ant} := 13$ in (User Input)
Antenna Thickness =	$T_{ant} := 3.15$ in (User Input)
Antenna Weight =	$WT_{ant} := 41$ lbs (User Input)
Number of Antennas =	$N_{ant} := 3$ (User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$	sf
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 15.1$	sf

Total Antenna Wind Force =

$F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 1043$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 5.5$	sf
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 16.6$	sf

Total Antenna Wind Force w/ Ice =

$F_{i_{ant}} := p \cdot Cd_F \cdot A_{ICEant} = 106$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas =

$WT_{ant} \cdot N_{ant} = 123$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2289$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1017$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 33$	lbs

Weight of Ice on All Antennas =

$W_{ICEant} \cdot N_{ant} = 99$ lbs **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Andrew ATSBT-TOP-FM-4G
Antenna Shape =	Flat (User Input)
Antenna Height =	$L_{ant} := 5.63$ in (User Input)
Antenna Width =	$W_{ant} := 3.7$ in (User Input)
Antenna Thickness =	$T_{ant} := 2.0$ in (User Input)
Antenna Weight =	$WT_{ant} := 2$ lbs (User Input)
Number of Antennas =	$N_{ant} := 6$ (User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna =

$$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.1 \quad sf$$

Antenna Projected Surface Area =

$$A_{ant} := SA_{ant} \cdot N_{ant} = 0.9 \quad sf$$

Total Antenna Wind Force =

$$F_{ant} := qz \cdot C_d \cdot A_{ant} \cdot m = 60 \quad lbs \quad \text{BLC 5}$$

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =

$$SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 0.2 \quad sf$$

Antenna Projected Surface Area w/ Ice =

$$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 1.3 \quad sf$$

Total Antenna Wind Force w/ Ice =

$$F_{ant} := p \cdot C_d \cdot A_{ICEant} = 8 \quad lbs \quad \text{BLC 4}$$

Gravity Load (without ice)

Weight of All Antennas =

$$WT_{ant} \cdot N_{ant} = 12 \quad lbs \quad \text{BLC 2}$$

Gravity Load (ice only)

Volume of Each Antenna =

$$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 42 \quad cu \text{ in}$$

Volume of Ice on Each Antenna =

$$V_{ice} := (L_{ant} + 1) \cdot (W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 52 \quad cu \text{ in}$$

Weight of Ice on Each Antenna =

$$W_{ICEant} := \frac{V_{ice}}{1728} \cdot \rho = 2 \quad lbs$$

Weight of Ice on All Antennas =

$$W_{ICEant} \cdot N_{ant} = 10 \quad lbs \quad \text{BLC 3}$$

Development of Wind & Ice Load on Platform

Platform Data:

Platform Model =	SitePro Double SupportArm RDS-284 (x2)
Mount Shape =	Flat
Mount Projected Surface Area =	CdAa := 7 sf (User Input)
Mount Projected Surface Area w/ Ice =	CdAa _{ice} := 11 sf (User Input)
Mount Weight =	WT _{mnt} := 1080 lbs (User Input)
Mount Weight w/ Ice =	WT _{mnt.ice} := 1250 lbs (User Input)

Gravity Loads (without ice)

Weight of All Mounts =

$W_{t_{mnt1}} := W_{T_{mnt}} = 1080$

lbs **BLC 2**

Gravity Load (ice only)

Weight of Ice on All Mounts =

$W_{t_{ice.mnt1}} := (W_{T_{mnt.ice}} - W_{T_{mnt}}) = 170$

lbs **BLC 3**

Wind Load (NESC Heavy)

Total Mount Wind Force w/ Ice =

$F_{i_{mnt1}} := p \cdot C_d A_{a_{ice}} = 44$

lbs **BLC 4**

Wind Load (NESC Extreme)

Total Mount Wind Force =

$F_{mnt1} := qz \cdot C_d A_{a_{m}} = 301$

lbs **BLC 5**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:

Coax Type =	HELIAX 1-5/8"	
Shape =	Round	(User Input)
Coax Outside Diameter =	$D_{coax} := 1.98$	in (User Input)
Coax Cable Length =	$L_{coax} := 14$	ft (User Input)
Weight of Coax per foot =	$Wt_{coax} := 1.04$	plf (User Input)
Total Number of Coax =	$N_{coax} := 24$	(User Input)
No. of Coax Projecting Outside Face of Member =	$NP_{coax} := 6$	(User Input)

Wind Load (NESC Extreme)

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 1$ ft

Total Coax Wind Force = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 68$ plf **BLC 5**

Total Coax Wind Force = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} = 55$ plf **BLC 5**

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} D_{coax} + 2 \cdot lr)}{12} = 1.1$ ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := p \cdot Cd_{coax} \cdot AICE_{coax} = 7$ plf **BLC 4**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 25$ plf **BLC 2**

Gravity Load (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4} [(D_{coax} + 2 \cdot lr)^2 - D_{coax}^2] = 3.9$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 36$ plf **BLC 3**

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	No
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	24
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Standard Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI 1999: ASD
Wood Code	AF&PA NDS-91/97: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-02
Masonry Code	ACI 530-13: ASD
Aluminum Code	AA ADM1-15: 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	PCA Load Contour
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
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	UBC 1997
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	No
Ct X	.035
Ct Z	.035
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	8.5
R Z	8.5
Ca	.36
Cv	.54
Nv	1
Occupancy Category	4
Seismic Zone	3
Om Z	1
Om X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1.5
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	0
Footing Concrete f'c (ksi)	3
Footing Concrete Ec (ksi)	4000
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	3.5
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 Gr. 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 [in ²]	Iyy [in ⁴]	Izz [in ⁴]	J [in ⁴]	
1	Mast	PIPE_12.0X	Column	Wide Flange	A53 Gr. B	Typical	17.5	339	339	678

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...Lcomp bot[...L-torq...	Kyy	Kzz	Cb	Funci...
1	M1	Mast	30							Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
1	M1	N1	N4			Mast	Column	Wide Flange	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	14	0	0	
3	N3	0	27	0	0	
4	N4	0	30	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N2	Reaction		Reaction			
2	N1	Reaction	Reaction	Reaction		Reaction	

Member Point Loads

Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
No Data to Print ...			

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.025	0	24

Member Distributed Loads (BLC 3 : Weight of Ice Only)

Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.008	0	0
2	M1	Y	-.036	0	24

Member Distributed Loads (BLC 4 : NESC Heavy Wind)

Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.006	0	24
2	M1	X	.007	0	24

Member Distributed Loads (BLC 5 : NESC Extreme Wind)

Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...]	Start Location[ft,%]	End Location[ft,%]
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Member Distributed Loads (BLC 5 : NESC Extreme Wind) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.059	.059	0	17
2	M1	X	.073	.073	17	24
3	M1	X	.055	.055	0	17
4	M1	X	.068	.068	17	24

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	None		-1						
2	Weight of Appurtenances	None				4		1		
3	Weight of Ice Only	None				4		2		
4	NESC Heavy Wind	None				4		2		
5	NESC Extreme Wind	None				4		4		

Load Combinations

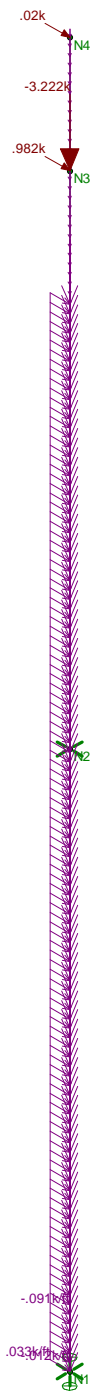
	Description	Solve	P...	S...	B...	Fa...	BLC	Fact...	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	NESC Heavy Wind	Yes	Y		1	1.5	2	1.5	3	1.5	4	2.5										
2	NESC Extreme Wind	Yes	Y		1	1	2	1	5	1												

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	N2	-2.616	0	0	0	0	0
2	1	N1	.834	8.458	0	0	0	0
3	1	Totals:	-1.783	8.458	0			
4	1	COG (ft):	X: 0	Y: 18.793	Z: 0			

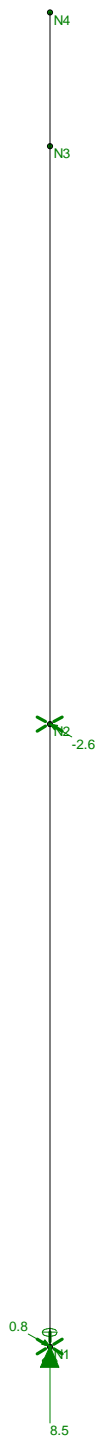
Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N2	-10.132	0	0	0	0	0
2	2	N1	3.323	3.997	0	0	0	0
3	2	Totals:	-6.809	3.997	0			
4	2	COG (ft):	X: 0	Y: 19.386	Z: 0			



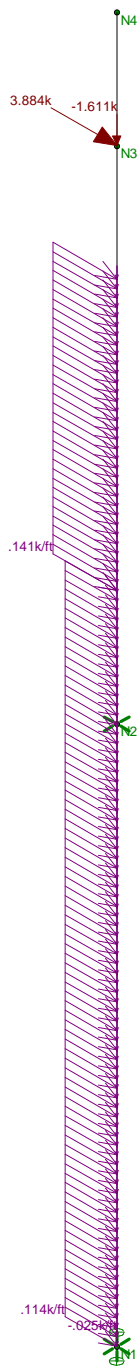
Loads: LC 1, NESC Heavy Wind
Envelope Only Solution

Centek	Structure # 1256 - Mast LC #1 Loads	July 8, 2021 at 2:06 PM
TJL		NESC.r3d
21051.03 - CT11001B		



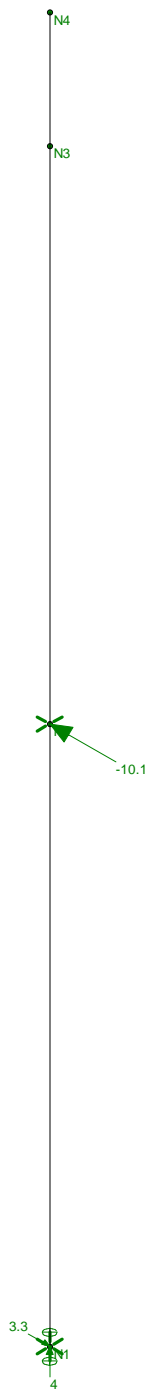
Results for LC 1, NESC Heavy Wind
Reaction and Moment Units are k and k-ft

Centek	Structure # 1256 - Mast LC #1 Reactions	
TJL		July 8, 2021 at 2:07 PM
21051.03 - CT11001B		NESC.r3d



Loads: LC 2, NESC Extreme Wind
Envelope Only Solution

Centek	Structure # 1256 - Mast LC #2 Loads	July 8, 2021 at 2:06 PM
TJL		NESC.r3d
21051.03 - CT11001B		



Results for LC 2, NESC Extreme Wind
Reaction and Moment Units are k and k-ft

Centek	Structure # 1256 - Mast LC #2 Reactions	
TJL		July 8, 2021 at 2:07 PM
21051.03 - CT11001B		NESC.r3d

Coax Cable on CL&P Pole

Coaxial Cable Span

CoaxSpan := 10.ft (User Input)

Heavy Wind Pressure =

p := 4 psf (User Input)

Radial Ice Thickness =

Ir := 0.5-in (User Input)

Radial Ice Density =

Id := 56-pcf (User Input)

Basic Windspeed =

V := 110 mph (User Input NESC 2007 Figure 250-2(e))

Height to Top of Coax Above Grade =

TC := 75 ft (User Input)

NESC Factor =

kv := 1.43 (User Input from NESC 2007 Table 250-3 equation)

Importance Factor =

I := 1.0 (User Input from NESC 2007 Section 250.C.2)

Velocity Pressure Coefficient =

$$Kz := 2.01 \cdot \left(\frac{0.67TC}{900} \right)^{\frac{2}{9.5}} = 1.095 \quad \text{(NESC 2007 Table 250-2)}$$

Exposure Factor =

$$Es := 0.346 \left[\frac{33}{(0.67 \cdot TC)} \right]^{\frac{1}{7}} = 0.326 \quad \text{(NESC 2007 Table 250-3)}$$

Response Term =

$$Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TC}{220} \right)} = 0.887 \quad \text{(NESC 2007 Table 250-3)}$$

Gust Response Factor =

$$Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs \cdot \frac{1}{2} \right) \right]}{kv^2} = 0.894 \quad \text{(NESC 2007 Table 250-3)}$$

Wind Pressure =

qz := 0.00256 · Kz · V² · Grf · I = 30.3 psf (NESC 2007 Section 250.C.2)

Diameter of Coax Cable = $D_{coax} := 1.98\text{-in}$ (User Input)

Weight of Coax Cable = $W_{coax} := 1.04\text{-plf}$ (User Input)

Number of Coax Cables = $N_{coax} := 24$ (User Input)

Number of Projected Coax Cables = $NP_{coax} := 6$ (User Input)

Shape Factor = $Cd_{coax} := 1.6$ (User Input)

Overload Factor for NESC Heavy Wind Transverse Load = $OF_{HWT} := 2.5$ (User Input)

Overload Factor for NESC Heavy Wind Vertical Load = $OF_{HWV} := 1.5$ (User Input)

Overload Factor for NESC Extreme Wind Transverse Load = $OF_{EWT} := 1.0$ (User Input)

Overload Factor for NESC Extreme Wind Vertical Load = $OF_{EWV} := 1.0$ (User Input)

Wind Area without Ice = $A := (NP_{coax} \cdot D_{coax}) = 11.88\text{-in}$

Wind Area with Ice = $A_{ice} := (NP_{coax} \cdot D_{coax} + 2 \cdot l_r) = 12.88\text{-in}$

Ice Area per Liner Ft = $A_{i_{coax}} := \frac{\pi}{4} \cdot [(D_{coax} + 2 \cdot l_r)^2 - D_{coax}^2] = 0.027\text{ft}^2$

Weight of Ice on All Coax Cables = $W_{ice} := A_{i_{coax}} \cdot l_d \cdot N_{coax} = 36.359\text{-plf}$

Heavy Wind Vertical Load =

$$\text{Heavy_Wind}_{\text{Vert}} := \overrightarrow{[(N_{coax} \cdot W_{coax} + W_{ice}) \cdot \text{CoaxSpan} \cdot OF_{HWV}]}$$

Heavy Wind Transverse Load =

$$\text{Heavy_Wind}_{\text{Trans}} := \overrightarrow{(p \cdot A_{ice} \cdot Cd_{coax} \cdot \text{CoaxSpan} \cdot OF_{HWT})}$$

Heavy_Wind_Vert = 920lb

Heavy_Wind_Trans = 172lb

Extreme Wind Vertical Load =

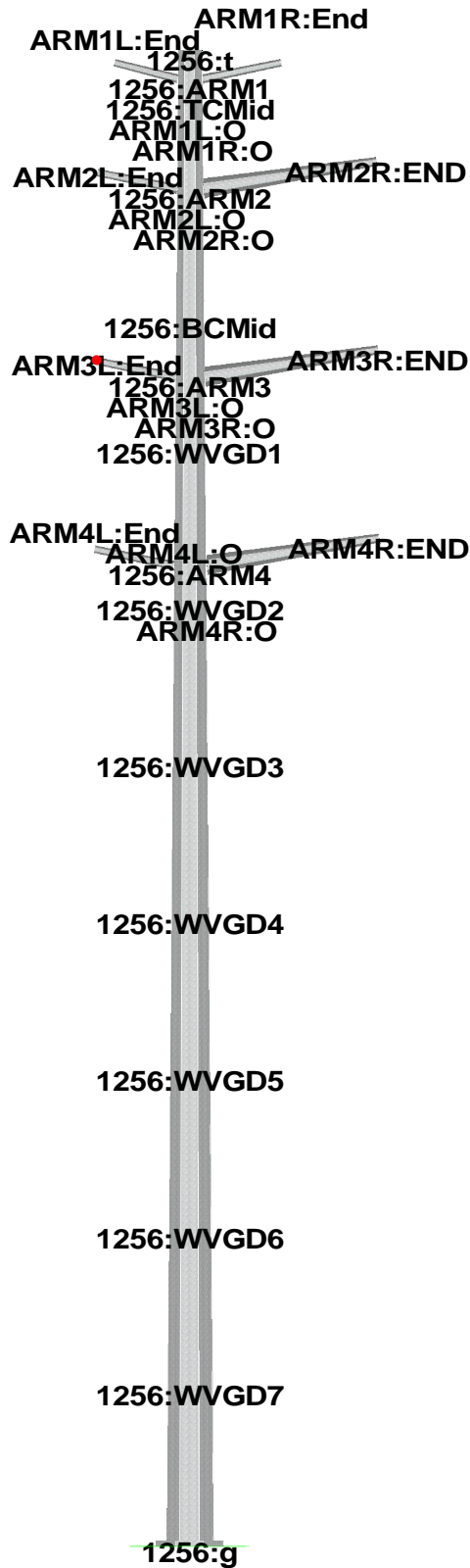
$$\text{Extreme_Wind}_{\text{Vert}} := \overrightarrow{(N_{coax} \cdot W_{coax} \cdot \text{CoaxSpan} \cdot OF_{EWV})}$$

Extreme Wind Transverse Load =

$$\text{Extreme_Wind}_{\text{Trans}} := \overrightarrow{[(qz \cdot \text{psf} \cdot A \cdot Cd_{coax}) \cdot \text{CoaxSpan} \cdot OF_{EWT}]}$$

Extreme_Wind_Vert = 250lb

Extreme_Wind_Trans = 480lb



Project Name : Eversoucre #1256
 Project Notes: T-Mobile - CT11001B
 Project File : J:\Jobs\2105100.WI\03_CT11001B\05_Structural\Tower\Calcs\PLS Tower\cl&p pole #1256.pol
 Date run : 1:57:39 PM Thursday, July 08, 2021
 by : PLS-POLE Version 12.50
 Licensed to : Centek Engineering Inc

Successfully performed nonlinear analysis

The model has 0 warnings.

Loads from file: j:\jobs\2105100.wi\03_ct11001b\05_structural\tower\calcs\pls tower\cl&p pole #1256.lca

*** Analysis Results:

Maximum element usage is 96.82% for Steel Pole "1256" in load case "NESC Extreme"
 Maximum insulator usage is 12.66% for Clamp "CL16" in load case "NESC Extreme"

Summary of Joint Support Reactions For All Load Cases:

Load Case	Joint Label	Long. Force (kips)	Tran. Force (kips)	Vert. Force (kips)	Shear Force (kips)	Tran. Moment (ft-k)	Long. Moment (ft-k)	Bending Moment (ft-k)	Vert. Moment (ft-k)	Found. Usage %
NESC Heavy	1256:g	-0.09	-27.34	-53.30	27.34	2204.84	-4.23	2204.84	0.01	0.00
NESC Extreme	1256:g	-0.03	-32.99	-28.00	32.99	2442.02	-1.73	2442.02	0.04	0.00

Summary of Tip Deflections For All Load Cases:

Note: positive tip load results in positive deflection

Load Case	Joint Label	Long. Defl. (in)	Tran. Defl. (in)	Vert. Defl. (in)	Resultant Defl. (in)	Long. Rot. (deg)	Tran. Rot. (deg)	Twist (deg)
NESC Heavy	1256:t	0.10	70.15	-2.84	70.21	0.01	-5.97	0.00
NESC Extreme	1256:t	0.05	76.98	-3.40	77.05	0.00	-6.66	-0.00

Tubes Summary:

Pole Label	Tube Num.	Weight (lbs)	Load Case	Maximum Usage %	Resultant Moment (ft-k)
1256	1	3650	NESC Extreme	78.07	811.56
1256	2	4878	NESC Extreme	96.82	1801.03
1256	3	3318	NESC Extreme	93.91	2442.02

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
1256	96.82	NESC Extreme	22	13405.8

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
ARM1L	7.62	NESC Heavy	1	48.4
ARM1R	24.95	NESC Heavy	1	59.9
ARM2L	31.35	NESC Heavy	1	59.9
ARM2R	25.37	NESC Heavy	1	229.0
ARM3L	31.67	NESC Heavy	1	59.9
ARM3R	25.55	NESC Heavy	1	229.0
ARM4L	32.44	NESC Heavy	1	59.9
ARM4R	26.04	NESC Heavy	1	229.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	93.52	1256 Steel Pole	
NESC Extreme	96.82	1256 Steel Pole	

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	93.52	1256	22
NESC Extreme	96.82	1256	22

Summary of Base Plate Usages by Load Case:

Load Case	Pole Bend Label	Length Line #	Vertical Load (kips)	X Moment (ft-k)	Y Bending Moment (ft-k)	Stress (ksi)	Bolt Moment Sum (ft-k)	# Bolts Acting On Bend Line	Max Bolt Load For Bend Line (kips)	Minimum Plate Thickness (in)	Usage %	
NESC Heavy	1256	8	31.000	51.742	2204.837	-4.230	44.580	202.736	4	138.333	2.926	81.05
NESC Extreme	1256	8	31.000	26.442	2442.018	-1.725	48.753	221.716	4	151.212	3.060	88.64

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	32.44	ARM4L	1
NESC Extreme	12.51	ARM4R	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
CL1	Clamp	2.81	NESC Heavy	0.0
CL2	Clamp	2.57	NESC Heavy	0.0
CL3	Clamp	4.71	NESC Heavy	0.0

CL4	Clamp	4.75	NESC Heavy	0.0
CL5	Clamp	4.78	NESC Heavy	0.0
CL6	Clamp	4.78	NESC Heavy	0.0
CL7	Clamp	4.75	NESC Heavy	0.0
CL8	Clamp	4.88	NESC Heavy	0.0
CL9	Clamp	1.17	NESC Heavy	0.0
CL10	Clamp	1.17	NESC Heavy	0.0
CL11	Clamp	1.17	NESC Heavy	0.0
CL12	Clamp	1.17	NESC Heavy	0.0
CL13	Clamp	1.17	NESC Heavy	0.0
CL14	Clamp	1.17	NESC Heavy	0.0
CL15	Clamp	1.17	NESC Heavy	0.0
CL16	Clamp	12.66	NESC Extreme	0.0
CL17	Clamp	10.62	NESC Heavy	0.0

```

*** Weight of structure (lbs):
Weight of Tubular Davit Arms:      974.9
Weight of Steel Poles:            13405.8
Total:                             14380.7

```

*** End of Report

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*****
*
*               PLS-POLE
*       POLE AND FRAME ANALYSIS AND DESIGN
*       Copyright Power Line Systems, Inc. 1999-2011
*
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Project Name : Eversoucre #1256
Project Notes: T-Mobile - CT11001B
Project File : J:\Jobs\2105100.WI\03_CT11001B\05_Structural\Tower\Calcs\PLS Tower\cl&p pole #1256.pol
Date run      : 1:57:39 PM Thursday, July 08, 2021
by           : PLS-POLE Version 12.50
Licensed to  : Centek Engineering Inc

```

Successfully performed nonlinear analysis

The model has 0 warnings.



Modeling options:

```

Offset Arms from Pole/Mast: Yes
Offset Braces from Pole/Mast: Yes
Offset Guys from Pole/Mast: Yes
Offset Posts from Pole/Mast: Yes
Offset Strains from Pole/Mast: Yes
Use Alternate Convergence Process: No
Steel poles checked with ASCE/SEI 48-05

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```

Default Modulus of Elasticity for Steel = 29000.00 (ksi)
Default Weight Density for Steel = 490.00 (lbs/ft^3)

```

Steel Pole Properties:

Steel Pole Ultimate Property Number	Stock Ultimate Length	Default Embedded	Base Plate	Shape	Tip Diameter	Base Diameter	Taper	Default Drag	Tubes	Modulus of Elasticity	Weight Density	Shape At	Strength Check	Distance From
-------------------------------------	-----------------------	------------------	------------	-------	--------------	---------------	-------	--------------	-------	-----------------------	----------------	----------	----------------	---------------

Trans. Load	Long. Label	Length (ft)	Length (ft)	Coef. (in)	Coef. (in)	Coef. (in/ft)	Override (ksi)	Override (lbs/ft^3)	Base	Type	Tip (ft)
-------------	-------------	-------------	-------------	------------	------------	---------------	----------------	---------------------	------	------	----------

 CL&P1256 1256 95.00 0 Yes 8F 18.83 36.2 0 1.6 3 tubes 0 0 Calculated 0.000
 0.0000 0.0000

Steel Tubes Properties:

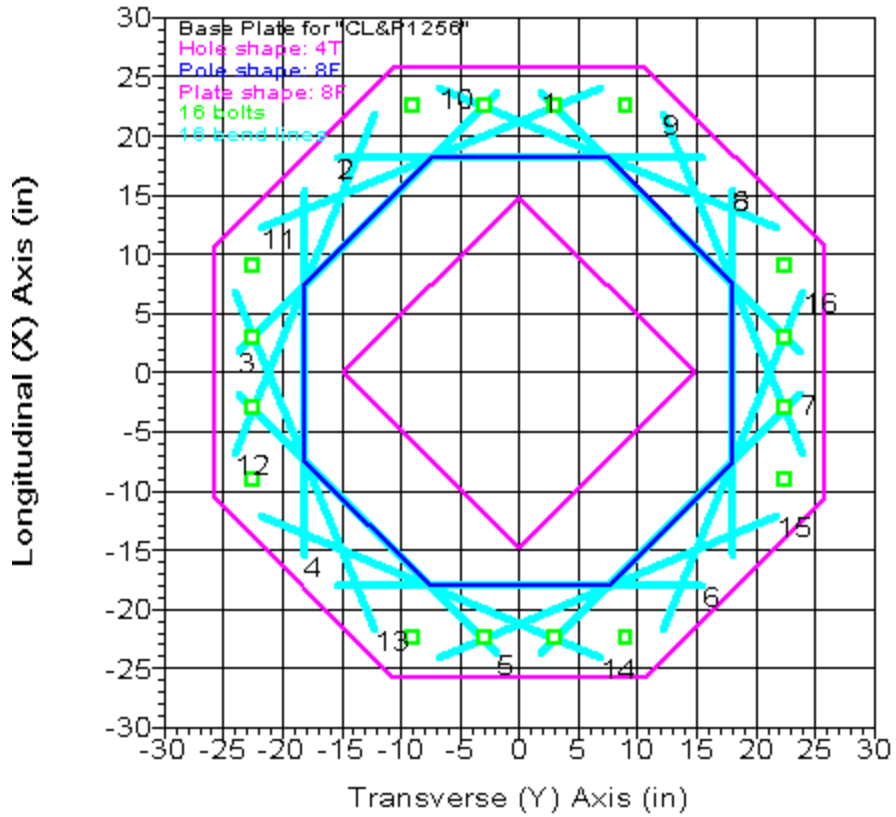
Pole Property	Tube No.	Length (ft)	Thickness (in)	Lap Length (ft)	Lap Factor	Lap Gap (in)	Yield Stress (ksi)	Moment Cap. Override (ft-k)	Tube Weight (lbs)	Center of Gravity (ft)	Calculated Taper (in/ft)	Tube Top Diameter (in)	Tube Bot. Diameter (in)	1.5x Diam. Lap Length (ft)	Actual Overlap (ft)
CL&P1256	1	45	0.3125	3.667	0.000	0.063	65.000	0.000	3650	23.97	0.19995	18.83	27.83	3.400	3.667
CL&P1256	2	38.667	0.375	4.917	0.000	0.063	65.000	0.000	4878	20.17	0.19995	26.34	34.08	4.166	4.917
CL&P1256	3	19.917	0.4375	0.000	0.000	0.000	65.000	0.000	3318	10.15	0.19995	32.22	36.20	0.000	0.000

Base Plate Properties:

Pole Property	Plate Diam. (in)	Plate Shape	Plate Thick. (in)	Plate Weight (lbs)	Plate Bend Length (in)	Line Length Override (in)	Hole Diam. (in)	Hole Shape	Steel Density (lbs/ft^3)	Steel Yield Stress (ksi)	Bolt Diam. (in)	Bolt Pattern (in)	Num. Of Bolts	Bolt Cage X Inertia (in^4)	Bolt Cage Y Inertia (in^4)
CL&P1256	51.500	8F	3.250	1560	31.000	21.000	4T	490.00	55.000	2.250	45.000	16	17533.79	17533.79	

Base Plate Bolt Coordinates for Property "CL&P1256":

Bolt X Coord.	Bolt Y Coord.	Bolt Angle (deg)
0.133	1	0
0.4	1	0
1	0.4	0
1	0.133	0



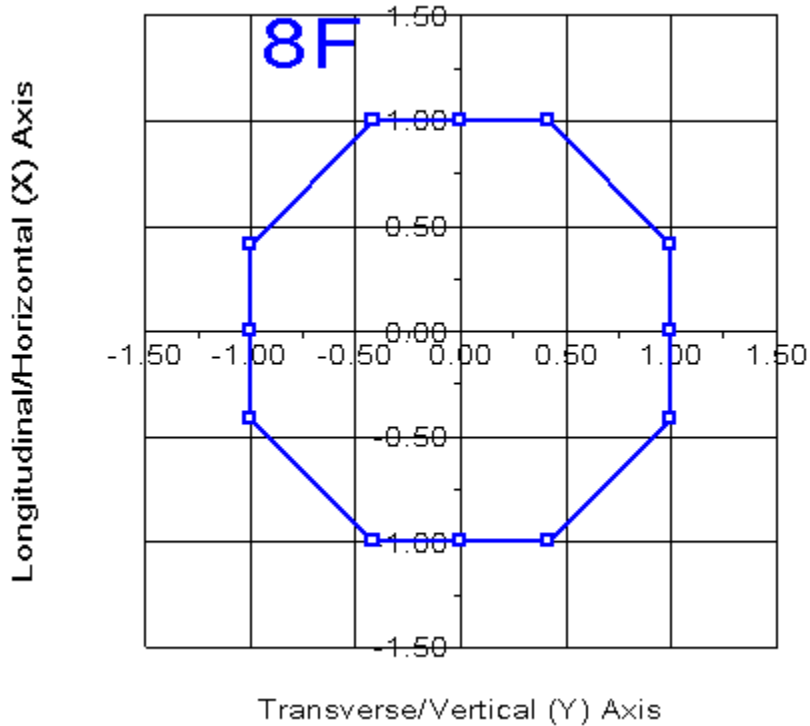
Steel Pole Connectivity:

Pole Label	Tip Joint	Base X of Joint (ft)	Base Y of Joint (ft)	Base Z of Joint (ft)	Inclin. About X (deg)	Inclin. About Y (deg)	Property Set	Attach. Labels	Base Connect	Embed % Override	Embed C. Override (ft)
1256		0	0	0	0	0	CL&P1256	13 labels		0.00	0

Relative Attachment Labels for Steel Pole "1256":

Joint Label	Distance From Origin/Top Joint (ft)	Global Z of Attach (ft)
1256:ARM1	1.75	0.00
1256:ARM2	8.75	0.00
1256:ARM3	20.75	0.00
1256:ARM4	32.75	0.00
1256:WVGD1	25.00	0.00

1256:WVGD2	35.00	0.00
1256:WVGD3	45.00	0.00
1256:WVGD4	55.00	0.00
1256:WVGD5	65.00	0.00
1256:WVGD6	75.00	0.00
1256:WVGD7	85.00	0.00
1256:TCMid	3.00	0.00
1256:BCMid	17.00	0.00



Pole Steel Properties:

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Outer Diam. (in)	Area (in ²)	T-Moment Inertia (in ⁴)	L-Moment Inertia (in ⁴)	D/t	W/t Max.	Fy (ksi)	Fa Min. (ksi)	T-Moment Capacity (ft-k)	L-Moment Capacity (ft-k)
1256	1256:t	1256:t Ori	0.00	18.83	19.18	869.15	869.15	0.00	20.8	65.00	65.00	500.04	500.04
1256	1256:ARM1	1256:ARM1 End	1.75	19.18	19.54	919.35	919.35	0.00	21.3	65.00	65.00	519.27	519.27
1256	1256:ARM1	1256:ARM1 Ori	1.75	19.18	19.54	919.35	919.35	0.00	21.3	65.00	65.00	519.27	519.27
1256	1256:TCMid	1256:TCMid End	3.00	19.43	19.80	956.37	956.37	0.00	21.6	65.00	65.00	533.23	533.23
1256	1256:TCMid	1256:TCMid Ori	3.00	19.43	19.80	956.37	956.37	0.00	21.6	65.00	65.00	533.23	533.23
1256	#1256:0	Tube 1 End	5.87	20.00	20.39	1045.24	1045.24	0.00	22.4	65.00	65.00	566.04	566.04
1256	#1256:0	Tube 1 Ori	5.87	20.00	20.39	1045.24	1045.24	0.00	22.4	65.00	65.00	566.04	566.04
1256	1256:ARM2	1256:ARM2 End	8.75	20.58	20.99	1139.46	1139.46	0.00	23.1	65.00	65.00	599.83	599.83
1256	1256:ARM2	1256:ARM2 Ori	8.75	20.58	20.99	1139.46	1139.46	0.00	23.1	65.00	65.00	599.83	599.83

1256	#1256:1	Tube 1	End	12.87	21.40	21.84	1284.29	1284.29	0.00	24.2	65.00	65.00	650.01	650.01
1256	#1256:1	Tube 1	Ori	12.87	21.40	21.84	1284.29	1284.29	0.00	24.2	65.00	65.00	650.01	650.01
1256	1256:BCMid	1256:BCMid	End	17.00	22.23	22.70	1440.90	1440.90	0.00	25.3	65.00	65.00	702.22	702.22
1256	1256:BCMid	1256:BCMid	Ori	17.00	22.23	22.70	1440.90	1440.90	0.00	25.3	65.00	65.00	702.22	702.22
1256	1256:ARM3	1256:ARM3	End	20.75	22.98	23.47	1593.88	1593.88	0.00	26.3	65.00	65.00	751.43	751.43
1256	1256:ARM3	1256:ARM3	Ori	20.75	22.98	23.47	1593.88	1593.88	0.00	26.3	65.00	65.00	751.43	751.43
1256	1256:WVGD1	1256:WVGD1	End	25.00	23.83	24.35	1779.93	1779.93	0.00	27.4	65.00	65.00	809.22	809.22
1256	1256:WVGD1	1256:WVGD1	Ori	25.00	23.83	24.35	1779.93	1779.93	0.00	27.4	65.00	65.00	809.22	809.22
1256	#1256:2	Tube 1	End	28.88	24.60	25.15	1961.70	1961.70	0.00	28.5	65.00	65.00	863.77	863.77
1256	#1256:2	Tube 1	Ori	28.88	24.60	25.15	1961.70	1961.70	0.00	28.5	65.00	65.00	863.77	863.77
1256	1256:ARM4	1256:ARM4	End	32.75	25.38	25.96	2155.44	2155.44	0.00	29.5	65.00	65.00	920.10	920.10
1256	1256:ARM4	1256:ARM4	Ori	32.75	25.38	25.96	2155.44	2155.44	0.00	29.5	65.00	65.00	920.10	920.10
1256	1256:WVGD2	1256:WVGD2	End	35.00	25.83	26.42	2273.59	2273.59	0.00	30.1	65.00	65.00	953.63	953.63
1256	1256:WVGD2	1256:WVGD2	Ori	35.00	25.83	26.42	2273.59	2273.59	0.00	30.1	65.00	65.00	953.63	953.63
1256	#1256:3	Tube 1	End	38.17	26.46	27.08	2447.05	2447.05	0.00	30.9	65.00	65.00	1001.83	1001.83
1256	#1256:3	Tube 1	Ori	38.17	26.46	27.08	2447.05	2447.05	0.00	30.9	65.00	65.00	1001.83	1001.83
1256	#1256:4	SpliceT	End	41.33	27.09	27.73	2629.12	2629.12	0.00	31.8	65.00	65.00	1051.22	1051.22
1256	#1256:4	SpliceT	Ori	41.33	27.09	27.73	2629.12	2629.12	0.00	31.8	65.00	65.00	1051.22	1051.22
1256	1256:WVGD3	1256:WVGD3	End	45.00	27.08	33.18	3127.19	3127.19	0.00	25.8	65.00	65.00	1251.14	1251.14
1256	1256:WVGD3	1256:WVGD3	Ori	45.00	27.08	33.18	3127.19	3127.19	0.00	25.8	65.00	65.00	1251.14	1251.14
1256	#1256:5	Tube 2	End	50.00	28.08	34.42	3491.70	3491.70	0.00	26.9	65.00	65.00	1347.23	1347.23
1256	#1256:5	Tube 2	Ori	50.00	28.08	34.42	3491.70	3491.70	0.00	26.9	65.00	65.00	1347.23	1347.23
1256	1256:WVGD4	1256:WVGD4	End	55.00	29.08	35.67	3883.49	3883.49	0.00	28.0	65.00	65.00	1446.88	1446.88
1256	1256:WVGD4	1256:WVGD4	Ori	55.00	29.08	35.67	3883.49	3883.49	0.00	28.0	65.00	65.00	1446.88	1446.88
1256	#1256:6	Tube 2	End	60.00	30.08	36.91	4303.55	4303.55	0.00	29.1	65.00	65.00	1550.09	1550.09
1256	#1256:6	Tube 2	Ori	60.00	30.08	36.91	4303.55	4303.55	0.00	29.1	65.00	65.00	1550.09	1550.09
1256	1256:WVGD5	1256:WVGD5	End	65.00	31.08	38.15	4752.85	4752.85	0.00	30.2	65.00	65.00	1656.85	1656.85
1256	1256:WVGD5	1256:WVGD5	Ori	65.00	31.08	38.15	4752.85	4752.85	0.00	30.2	65.00	65.00	1656.85	1656.85
1256	#1256:7	Tube 2	End	70.00	32.08	39.39	5232.39	5232.39	0.00	31.3	65.00	65.00	1767.16	1767.16
1256	#1256:7	Tube 2	Ori	70.00	32.08	39.39	5232.39	5232.39	0.00	31.3	65.00	65.00	1767.16	1767.16
1256	1256:WVGD6	1256:WVGD6	End	75.00	33.08	40.64	5743.14	5743.14	0.00	32.4	65.00	64.82	1875.83	1875.83
1256	1256:WVGD6	1256:WVGD6	Ori	75.00	33.08	40.64	5743.14	5743.14	0.00	32.4	65.00	64.82	1875.83	1875.83
1256	#1256:8	SpliceT	End	75.08	33.09	40.66	5751.89	5751.89	0.00	32.4	65.00	64.80	1877.30	1877.30
1256	#1256:8	SpliceT	Ori	75.08	33.09	40.66	5751.89	5751.89	0.00	32.4	65.00	64.80	1877.30	1877.30
1256	#1256:9	SpliceB	End	80.00	33.20	47.50	6738.97	6738.97	0.00	27.3	65.00	65.00	2198.91	2198.91
1256	#1256:9	SpliceB	Ori	80.00	33.20	47.50	6738.97	6738.97	0.00	27.3	65.00	65.00	2198.91	2198.91
1256	1256:WVGD7	1256:WVGD7	End	85.00	34.20	48.95	7374.81	7374.81	0.00	28.2	65.00	65.00	2336.04	2336.04
1256	1256:WVGD7	1256:WVGD7	Ori	85.00	34.20	48.95	7374.81	7374.81	0.00	28.2	65.00	65.00	2336.04	2336.04
1256	#1256:10	Tube 3	End	90.00	35.20	50.40	8049.44	8049.44	0.00	29.2	65.00	65.00	2477.31	2477.31
1256	#1256:10	Tube 3	Ori	90.00	35.20	50.40	8049.44	8049.44	0.00	29.2	65.00	65.00	2477.31	2477.31
1256	1256:g	1256:g	End	95.00	36.20	51.85	8764.00	8764.00	0.00	30.1	65.00	65.00	2622.74	2622.74

Tubular Davit Properties:

Davit Steel	Stock Property Number	Steel Thickness Shape	Base Diameter	Tip Diameter	Taper	Drag	Modulus of Elasticity	Geometry	Strength	Vertical Capacity	Tension Capacity	Compres. Capacity	Long. Capacity	Yield Stress	Weight Density
At End	Label	(in)	(in)	(in)	(in/ft)		(ksi)		Type	(lbs)	(lbs)	(lbs)	(lbs)	(ksi)	(lbs/ft^3)
ARM1	6T	0.1875	6	5	0	1.3	29000	1 point	Calculated	0	0	0	0	65	0
ARM2	6T	0.1875	6	5	0	1.3	29000	1 point	Calculated	0	0	0	0	65	0
ARM3	6T	0.1875	13	6	0	1.3	29000	1 point	Calculated	0	0	0	0	60	0

Intermediate Joints for Davit Property "ARM1":

Joint	Horz.	Vert.
Label	Offset	Offset
	(ft)	(ft)

End	4	-1

Intermediate Joints for Davit Property "ARM2":

Joint	Horz.	Vert.
Label	Offset	Offset
	(ft)	(ft)

End	5	-1

Intermediate Joints for Davit Property "ARM3":

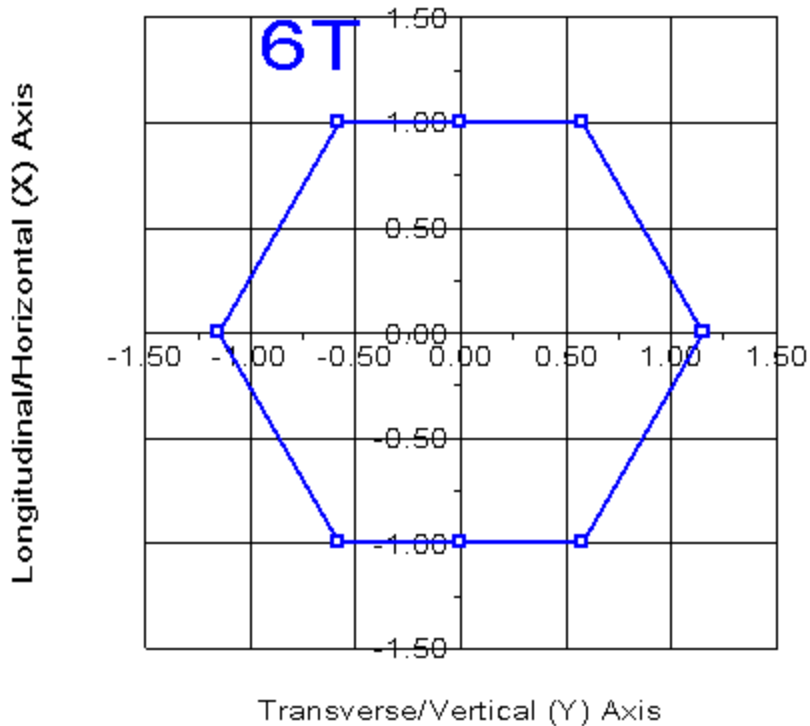
Joint	Horz.	Vert.
Label	Offset	Offset
	(ft)	(ft)

END	11	-1.67

Tubular Davit Arm Connectivity:

Davit	Attach	Davit	Azimuth
Label	Label	Property	Set (deg)

ARM1L	1256:ARM1	ARM1	180
ARM1R	1256:ARM1	ARM2	0
ARM2L	1256:ARM2	ARM2	180
ARM2R	1256:ARM2	ARM3	0
ARM3L	1256:ARM3	ARM2	180
ARM3R	1256:ARM3	ARM3	0
ARM4L	1256:ARM4	ARM2	180
ARM4R	1256:ARM4	ARM3	0



Tubular Davit Arm Steel Properties:

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Outer Diam. (in)	Area (in ²)	V-Moment Inertia (in ⁴)	H-Moment Inertia (in ⁴)	D/t	W/t Max.	Fy (ksi)	Fa Min. (ksi)	V-Moment Capacity (ft-k)	H-Moment Capacity (ft-k)
ARM1L	ARM1L:0	Origin	0.00	6.00	3.78	17.73	17.73	0.00	12.7	65.00	65.00	27.73	32.02
ARM1L	ARM1L:End	End	4.12	5.00	3.13	10.07	10.07	0.00	9.6	65.00	65.00	18.89	21.82
ARM1R	ARM1R:0	Origin	0.00	6.00	3.78	17.73	17.73	0.00	12.7	65.00	65.00	27.73	32.02
ARM1R	#ARM1R:0	End	2.55	5.50	3.45	13.54	13.54	0.00	11.2	65.00	65.00	23.10	26.67
ARM1R	#ARM1R:0	Origin	2.55	5.50	3.45	13.54	13.54	0.00	11.2	65.00	65.00	23.10	26.67
ARM1R	ARM1R:End	End	5.10	5.00	3.13	10.07	10.07	0.00	9.6	65.00	65.00	18.89	21.82
ARM2L	ARM2L:0	Origin	0.00	6.00	3.78	17.73	17.73	0.00	12.7	65.00	65.00	27.73	32.02
ARM2L	#ARM2L:0	End	2.55	5.50	3.45	13.54	13.54	0.00	11.2	65.00	65.00	23.10	26.67
ARM2L	#ARM2L:0	Origin	2.55	5.50	3.45	13.54	13.54	0.00	11.2	65.00	65.00	23.10	26.67
ARM2L	ARM2L:End	End	5.10	5.00	3.13	10.07	10.07	0.00	9.6	65.00	65.00	18.89	21.82
ARM2R	ARM2R:0	Origin	0.00	13.00	8.32	189.77	189.77	0.00	34.3	60.00	59.43	125.21	144.58
ARM2R	#ARM2R:0	End	5.00	9.85	6.28	81.52	81.52	0.00	24.6	60.00	60.00	71.64	82.72
ARM2R	#ARM2R:0	Origin	5.00	9.85	6.28	81.52	81.52	0.00	24.6	60.00	60.00	71.64	82.72
ARM2R	#ARM2R:1	End	8.06	7.93	5.03	41.85	41.85	0.00	18.6	60.00	60.00	45.72	52.79

ARM2R	#ARM2R:1	Origin	8.06	7.93	5.03	41.85	41.85	0.00	18.6	60.00	60.00	45.72	52.79
ARM2R	ARM2R:END	End	11.13	6.00	3.78	17.73	17.73	0.00	12.7	60.00	60.00	25.60	29.55
ARM3L	ARM3L:0	Origin	0.00	6.00	3.78	17.73	17.73	0.00	12.7	65.00	65.00	27.73	32.02
ARM3L	#ARM3L:0	End	2.55	5.50	3.45	13.54	13.54	0.00	11.2	65.00	65.00	23.10	26.67
ARM3L	#ARM3L:0	Origin	2.55	5.50	3.45	13.54	13.54	0.00	11.2	65.00	65.00	23.10	26.67
ARM3L	ARM3L:End	End	5.10	5.00	3.13	10.07	10.07	0.00	9.6	65.00	65.00	18.89	21.82
ARM3R	ARM3R:0	Origin	0.00	13.00	8.32	189.77	189.77	0.00	34.3	60.00	59.43	125.21	144.58
ARM3R	#ARM3R:0	End	5.00	9.85	6.28	81.52	81.52	0.00	24.6	60.00	60.00	71.64	82.72
ARM3R	#ARM3R:0	Origin	5.00	9.85	6.28	81.52	81.52	0.00	24.6	60.00	60.00	71.64	82.72
ARM3R	#ARM3R:1	End	8.06	7.93	5.03	41.85	41.85	0.00	18.6	60.00	60.00	45.72	52.79
ARM3R	#ARM3R:1	Origin	8.06	7.93	5.03	41.85	41.85	0.00	18.6	60.00	60.00	45.72	52.79
ARM3R	ARM3R:END	End	11.13	6.00	3.78	17.73	17.73	0.00	12.7	60.00	60.00	25.60	29.55
ARM4L	ARM4L:0	Origin	0.00	6.00	3.78	17.73	17.73	0.00	12.7	65.00	65.00	27.73	32.02
ARM4L	#ARM4L:0	End	2.55	5.50	3.45	13.54	13.54	0.00	11.2	65.00	65.00	23.10	26.67
ARM4L	#ARM4L:0	Origin	2.55	5.50	3.45	13.54	13.54	0.00	11.2	65.00	65.00	23.10	26.67
ARM4L	ARM4L:End	End	5.10	5.00	3.13	10.07	10.07	0.00	9.6	65.00	65.00	18.89	21.82
ARM4R	ARM4R:0	Origin	0.00	13.00	8.32	189.77	189.77	0.00	34.3	60.00	59.43	125.21	144.58
ARM4R	#ARM4R:0	End	5.00	9.85	6.28	81.52	81.52	0.00	24.6	60.00	60.00	71.64	82.72
ARM4R	#ARM4R:0	Origin	5.00	9.85	6.28	81.52	81.52	0.00	24.6	60.00	60.00	71.64	82.72
ARM4R	#ARM4R:1	End	8.06	7.93	5.03	41.85	41.85	0.00	18.6	60.00	60.00	45.72	52.79
ARM4R	#ARM4R:1	Origin	8.06	7.93	5.03	41.85	41.85	0.00	18.6	60.00	60.00	45.72	52.79
ARM4R	ARM4R:END	End	11.13	6.00	3.78	17.73	17.73	0.00	12.7	60.00	60.00	25.60	29.55

*** Insulator Data

Clamp Properties:

Label Stock Holding
Number Capacity
(lbs)

clamp clamp1 8e+004

Clamp Insulator Connectivity:

Clamp Structure Property Min. Required
Label And Tip Set Vertical Load
Attach (uplift)
(lbs)

CL1 ARM1L:End clamp No Limit
CL2 ARM1R:End clamp No Limit
CL3 ARM2L:End clamp No Limit
CL4 ARM2R:END clamp No Limit
CL5 ARM3L:End clamp No Limit
CL6 ARM3R:END clamp No Limit
CL7 ARM4L:End clamp No Limit
CL8 ARM4R:END clamp No Limit
CL9 1256:WVGD1 clamp No Limit
CL10 1256:WVGD2 clamp No Limit
CL11 1256:WVGD3 clamp No Limit
CL12 1256:WVGD4 clamp No Limit
CL13 1256:WVGD5 clamp No Limit
CL14 1256:WVGD6 clamp No Limit
CL15 1256:WVGD7 clamp No Limit

CL16	1256:TCMid	clamp	No Limit
CL17	1256:BCMid	clamp	No Limit

*** Loads Data

Loads from file: j:\jobs\2105100.wi\03_ct11001b\05_structural\tower\calcs\pls tower\cl&p pole #1256.lca

Insulator dead and wind loads are already included in the point loads printed below.

Loading Method Parameters:

Structure Height Summary (used for calculating wind/ice adjust with height):

Z of ground for wind height adjust 0.00 (ft) and structure Z coordinate that will be put on the centerline ground profile in PLS-CADD.
 Ground elevation shift 0.00 (ft)
 Z of ground with shift 0.00 (ft)
 Z of structure top (highest joint) 95.00 (ft)
 Structure height 95.00 (ft)
 Structure height above ground 95.00 (ft)

Vector Load Cases:

Load Case	Dead	Wind	SF for Pole	SF for Wood	SF for Conc.	SF for Conc.	SF for Guys	SF for Non Braces	SF for Insuls.	SF For Found.	Point Loads	Wind/Ice Model	Trans. Wind	Longit. Wind		
Ice Description	Temperature	Area	Steel Tubular	Poles Arms	Conc. Ult.	Conc. First	Zero	and Tubular	Arms				(psf)	(psf)		
Thick. Density	Factor	Factor	and Towers	Deflection	Deflection	Crack	Tens.	Cables	Arms							
Check	Limit			% or (ft)												
(in)	(lbs/ft^3)	(deg F)														
NESC Heavy	1.5000	2.5000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	17 loads	Wind on All	4	0
0.000	0.000	60.0	No Limit			0										
NESC Extreme	1.0000	1.0000	1.00000	0.6500	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	17 loads	NESC 2012	31	0
0.000	0.000	60.0	No Limit			0										

Point Loads for Load Case "NESC Heavy":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
ARM1L:End	1148	1936	0	
ARM1R:End	1128	1723	0	
ARM2L:End	2515	2802	0	
ARM2R:END	2523	2844	0	
ARM3L:End	2528	2868	0	
ARM3R:END	2523	2877	0	
ARM4L:End	2522	2841	0	
ARM4R:END	2540	2965	0	
1256:WVGD1	920	172	0	
1256:WVGD2	920	172	0	
1256:WVGD3	920	172	0	
1256:WVGD4	920	172	0	
1256:WVGD5	920	172	0	
1256:WVGD6	920	172	0	
1256:WVGD7	920	172	0	
1256:TCMid	0	2616	0	

1256:BCMid 8458 -834 0

Point Loads for Load Case "NESC Extreme":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
ARM1L:End	392	1239	0	
ARM1R:End	374	1120	7	
ARM2L:End	1116	2247	0	
ARM2R:END	1119	2266	0	
ARM3L:End	1122	2274	0	
ARM3R:END	1119	2280	0	
ARM4L:End	1120	2265	0	
ARM4R:END	1127	2319	0	
1256:WVGD1	250	480	0	
1256:WVGD2	250	480	0	
1256:WVGD3	250	480	0	
1256:WVGD4	250	480	0	
1256:WVGD5	250	480	0	
1256:WVGD6	250	480	0	
1256:WVGD7	250	480	0	
1256:TCMid	0	10132	0	
1256:BCMid	3997	-3323	0	

Detailed Pole Loading Data for Load Case "NESC Extreme":

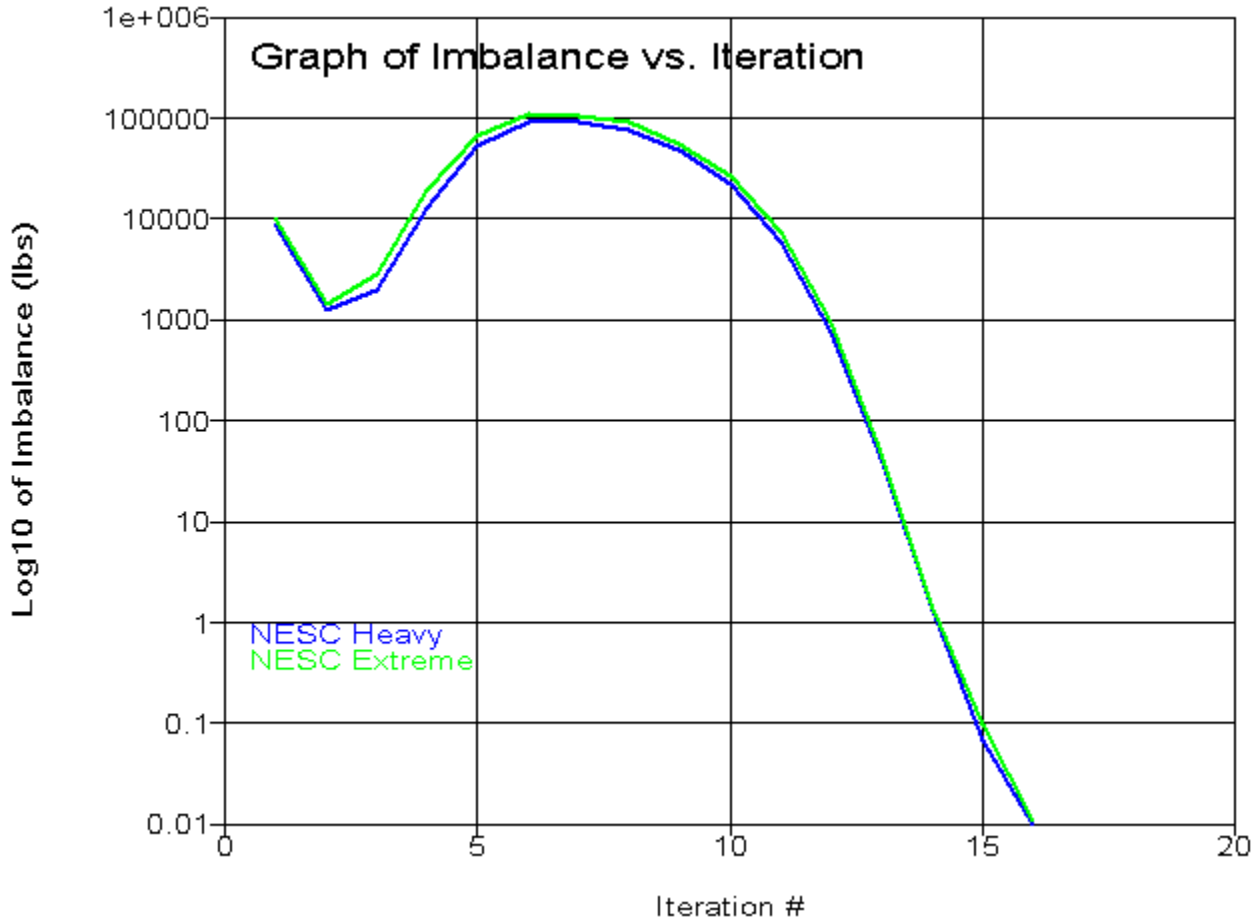
Notes: Does not include loads from equipment, arms, guys, braces, etc. or user input loads.
 Wind load is calculated for the undeformed shape of a pole.

Pole Label	Top Joint	Bottom Joint	Section Top Z (ft)	Section Bottom Z (ft)	Section Average Elevation (ft)	Outer Diameter (in)	Reynolds Number	Drag Coef.	Adjusted Wind Pressure (psf)	Adjusted Ice Thickness (in)	Pole Vert. Load (lbs)	Pole Wind Load (lbs)	Pole Vertical Ice Load (lbs)	Pole Ice Wind Load (lbs)	Tran. Wind Load (lbs)	Long. Wind Load (lbs)
1256	1256:t	1256:ARM1	95.00	93.25	94.13	19.005	1.59e+006	1.000	31.18	0.00	115.27	86.42	0.00	0.00	86.42	0.00
1256	1256:ARM1	1256:TCMid	93.25	92.00	92.63	19.305	1.61e+006	1.000	31.18	0.00	83.65	62.71	0.00	0.00	62.71	0.00
1256	1256:TCMid		92.00	89.13	90.56	19.717	1.65e+006	1.000	31.18	0.00	196.58	147.30	0.00	0.00	147.30	0.00
1256		1256:ARM2	89.13	86.25	87.69	20.292	1.7e+006	1.000	31.18	0.00	202.41	151.60	0.00	0.00	151.60	0.00
1256	1256:ARM2		86.25	82.13	84.19	20.992	1.75e+006	1.000	31.18	0.00	300.58	225.01	0.00	0.00	225.01	0.00
1256		1256:BCMid	82.13	78.00	80.06	21.817	1.82e+006	1.000	31.18	0.00	312.57	233.85	0.00	0.00	233.85	0.00
1256	1256:BCMid	1256:ARM3	78.00	74.25	76.13	22.604	1.89e+006	1.000	31.18	0.00	294.56	220.27	0.00	0.00	220.27	0.00
1256	1256:ARM3	1256:WVGD1	74.25	70.00	72.13	23.404	1.96e+006	1.000	31.18	0.00	345.81	258.47	0.00	0.00	258.47	0.00
1256	1256:WVGD1		70.00	66.13	68.06	24.216	2.02e+006	1.000	31.18	0.00	326.39	243.84	0.00	0.00	243.84	0.00
1256		1256:ARM4	66.13	62.25	64.19	24.991	2.09e+006	1.000	31.18	0.00	336.97	251.64	0.00	0.00	251.64	0.00
1256	1256:ARM4	1256:WVGD2	62.25	60.00	61.12	25.603	2.14e+006	1.000	31.18	0.00	200.51	149.69	0.00	0.00	149.69	0.00
1256	1256:WVGD2		60.00	56.83	58.42	26.145	2.19e+006	1.000	31.18	0.00	288.23	215.13	0.00	0.00	215.13	0.00
1256			56.83	53.67	55.25	26.778	2.24e+006	1.000	31.18	0.00	295.29	220.34	0.00	0.00	220.34	0.00
1256		1256:WVGD3	53.67	50.00	51.83	27.086	2.26e+006	1.000	31.18	0.00	759.15	258.10	0.00	0.00	258.10	0.00
1256	1256:WVGD3		50.00	45.00	47.50	27.577	2.31e+006	1.000	31.18	0.00	575.22	358.31	0.00	0.00	358.31	0.00
1256		1256:WVGD4	45.00	40.00	42.50	28.577	2.39e+006	1.000	31.18	0.00	596.26	371.30	0.00	0.00	371.30	0.00
1256	1256:WVGD4		40.00	35.00	37.50	29.577	2.47e+006	1.000	31.18	0.00	617.39	384.28	0.00	0.00	384.28	0.00
1256		1256:WVGD5	35.00	30.00	32.50	30.577	2.56e+006	1.000	31.18	0.00	638.53	397.27	0.00	0.00	397.27	0.00
1256	1256:WVGD5		30.00	25.00	27.50	31.576	2.64e+006	1.000	31.18	0.00	659.66	410.26	0.00	0.00	410.26	0.00
1256		1256:WVGD6	25.00	20.00	22.50	32.576	2.72e+006	1.000	31.18	0.00	680.80	423.25	0.00	0.00	423.25	0.00
1256	1256:WVGD6		20.00	19.92	19.96	33.084	2.77e+006	1.000	31.18	0.00	11.48	7.14	0.00	0.00	7.14	0.00
1256			19.92	15.00	17.46	33.147	2.77e+006	1.000	31.18	0.00	1473.25	423.52	0.00	0.00	423.52	0.00
1256		1256:WVGD7	15.00	10.00	12.50	33.701	2.82e+006	1.000	31.18	0.00	820.60	437.86	0.00	0.00	437.86	0.00

1256	1256:WVGD7		10.00	5.00	7.50	34.700	2.9e+006	1.000	31.18	0.00	845.12	450.85	0.00	0.00	450.85	0.00
1256		1256:g	5.00	0.00	2.50	35.700	2.98e+006	1.000	31.18	0.00	869.78	463.84	0.00	0.00	463.84	0.00

*** Analysis Results:

Maximum element usage is 96.82% for Steel Pole "1256" in load case "NESC Extreme"
 Maximum insulator usage is 12.66% for Clamp "CL16" in load case "NESC Extreme"



*** Analysis Results for Load Case No. 1 "NESC Heavy" - Number of iterations in SAPS 16

Equilibrium Joint Positions and Rotations for Load Case "NESC Heavy":

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
1256:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
1256:t	0.008308	5.846	-0.2363	-5.9679	0.0076	0.0001	0.008308	5.846	94.76
1256:ARM1	0.008075	5.664	-0.2268	-5.9679	0.0076	0.0001	0.008075	5.664	93.02

1256:TCMid	0.00791	5.534	-0.22	-5.9651	0.0076	0.0001	0.00791	5.534	91.78
1256:ARM2	0.007148	4.938	-0.189	-5.9201	0.0076	0.0001	0.007148	4.938	86.06
1256:BCMid	0.006064	4.101	-0.1464	-5.6933	0.0075	0.0001	0.006064	4.101	77.85
1256:ARM3	0.00558	3.733	-0.1282	-5.5492	0.0073	0.0001	0.00558	3.733	74.12
1256:WVGD1	0.00504	3.33	-0.1088	-5.3377	0.0072	0.0000	0.00504	3.33	69.89
1256:ARM4	0.004095	2.638	-0.07765	-4.8734	0.0068	0.0000	0.004095	2.638	62.17
1256:WVGD2	0.003832	2.45	-0.06967	-4.7156	0.0066	0.0000	0.003832	2.45	59.93
1256:WVGD3	0.002741	1.693	-0.04052	-3.9428	0.0058	0.0000	0.002741	1.693	49.96
1256:WVGD4	0.001799	1.073	-0.02083	-3.1485	0.0049	0.0000	0.001799	1.073	39.98
1256:WVGD5	0.001032	0.5936	-0.008935	-2.3248	0.0038	-0.0000	0.001032	0.5936	29.99
1256:WVGD6	0.0004668	0.2589	-0.002899	-1.4992	0.0026	-0.0000	0.0004668	0.2589	20
1256:WVGD7	0.0001201	0.06425	-0.0006012	-0.7303	0.0013	-0.0000	0.0001201	0.06425	9.999
ARM1L:O	0.008087	5.668	-0.1437	-5.9679	0.0076	0.0001	0.008087	4.869	93.11
ARM1L:End	0.008282	5.793	0.2631	-5.8894	0.0076	0.0001	0.008282	0.9936	94.51
ARM1R:O	0.008063	5.66	-0.3099	-5.9679	0.0076	0.0001	0.008063	6.459	92.94
ARM1R:End	0.008118	5.738	-0.8544	-6.3023	0.0076	0.0001	0.008118	11.54	93.4
ARM2L:O	0.00716	4.943	-0.1006	-5.9201	0.0076	0.0001	0.00716	4.085	86.15
ARM2L:End	0.007368	5.066	0.3869	-5.5056	0.0076	0.0001	0.007368	-0.7918	87.64
ARM2R:O	0.007135	4.934	-0.2775	-5.9201	0.0076	0.0001	0.007135	5.791	85.97
ARM2R:END	0.007185	5.05	-1.479	-6.4643	0.0076	0.0001	0.007185	16.91	86.44
ARM3L:O	0.005592	3.738	-0.03561	-5.5492	0.0073	0.0001	0.005592	2.78	74.21
ARM3L:End	0.005787	3.851	0.42	-5.1306	0.0074	0.0001	0.005787	-2.106	75.67
ARM3R:O	0.005567	3.729	-0.2208	-5.5492	0.0073	0.0001	0.005567	4.686	74.03
ARM3R:END	0.005627	3.842	-1.351	-6.0973	0.0073	0.0000	0.005627	15.8	74.57
ARM4L:O	0.004106	2.642	0.01218	-4.8734	0.0068	0.0000	0.004106	1.585	62.26
ARM4L:End	0.004277	2.738	0.4095	-4.4437	0.0068	0.0001	0.004277	-3.319	63.66
ARM4R:O	0.004084	2.634	-0.1675	-4.8734	0.0068	0.0000	0.004084	3.692	62.08
ARM4R:END	0.004158	2.74	-1.167	-5.4322	0.0068	0.0000	0.004158	14.8	62.75

Joint Support Reactions for Load Case "NESC Heavy":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	Y H-Shear Usage %	Z Comp. Force (kips)	Z Usage %	Uplift Usage %	Result. Force (kips)	Result. Usage %	X X-M. Moment (ft-k)	X-M. Usage %	Y Y-M. Moment (ft-k)	Y-M. Usage %	H-Bend-M Usage %	Z Z-M. Moment (ft-k)	Z-M. Usage %	Max. Usage %
1256:g	-0.09	0.0	-27.34	0.0	0.0	-53.30	0.0	0.0	59.90	0.0	2204.84	0.0	-4.2	0.0	0.0	0.01	0.0	0.0

Detailed Steel Pole Usages for Load Case "NESC Heavy":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Usage Pt.
1256	1256:t	Origin	0.00	70.15	0.10	-2.84	-0.00	-0.00	0.0	-0.09	0.03	-0.00	-0.00	0.00	0.00	0.00	0.01	0.0	4
1256	1256:ARM1	End	1.75	67.97	0.10	-2.72	0.05	-0.00	0.0	-0.09	0.03	-0.00	-0.00	0.01	0.00	0.00	0.01	0.0	2
1256	1256:ARM1	Origin	1.75	67.97	0.10	-2.72	4.95	-0.00	0.0	-2.28	3.98	-0.00	-0.12	0.62	0.16	0.00	0.79	1.2	2
1256	1256:TCMid	End	3.00	66.41	0.09	-2.64	9.92	-0.00	0.0	-2.28	3.98	-0.00	-0.12	1.21	0.16	0.00	1.35	2.1	2
1256	1256:TCMid	Origin	3.00	66.41	0.09	-2.64	9.92	-0.00	0.0	-2.21	6.65	-0.00	-0.11	1.21	0.27	0.00	1.40	2.2	2
1256	Tube 1	End	5.87	62.83	0.09	-2.45	29.05	-0.01	0.0	-2.21	6.65	-0.00	-0.11	3.34	0.26	0.00	3.47	5.3	2
1256	Tube 1	Origin	5.87	62.83	0.09	-2.45	29.05	-0.01	0.0	-2.51	6.76	-0.01	-0.12	3.34	0.26	0.00	3.49	5.4	2
1256	1256:ARM2	End	8.75	59.26	0.09	-2.27	48.49	-0.03	0.0	-2.51	6.76	-0.01	-0.12	5.26	0.26	0.00	5.39	8.3	2
1256	1256:ARM2	Origin	8.75	59.26	0.09	-2.27	71.49	-0.03	-0.0	-7.76	13.07	-0.01	-0.37	7.75	0.50	0.00	8.16	12.6	2
1256	Tube 1	End	12.87	54.19	0.08	-2.01	125.40	-0.07	-0.0	-7.76	13.07	-0.01	-0.36	12.54	0.48	0.00	12.92	19.9	2
1256	Tube 1	Origin	12.87	54.19	0.08	-2.01	125.40	-0.07	-0.0	-8.24	13.22	-0.01	-0.38	12.54	0.48	0.00	12.95	19.9	2
1256	1256:BCMid	End	17.00	49.21	0.07	-1.76	179.91	-0.12	-0.0	-8.24	13.22	-0.01	-0.36	16.66	0.46	0.00	17.04	26.2	2
1256	1256:BCMid	Origin	17.00	49.21	0.07	-1.76	179.91	-0.12	-0.0	-17.23	13.36	-0.02	-0.76	16.66	0.47	0.00	17.44	26.8	2
1256	1256:ARM3	End	20.75	44.80	0.07	-1.54	230.00	-0.18	-0.0	-17.23	13.36	-0.02	-0.73	19.90	0.45	0.00	20.65	31.8	2
1256	1256:ARM3	Origin	20.75	44.80	0.07	-1.54	253.14	-0.19	-0.0	-22.66	19.71	-0.02	-0.97	21.90	0.67	0.00	22.90	35.2	2

1256	1256:WVGD1	End	25.00	39.95	0.06	-1.31	336.92	-0.27	-0.0	-22.66	19.71	-0.02	-0.93	27.07	0.64	0.00	28.02	43.1	2
1256	1256:WVGD1	Origin	25.00	39.95	0.06	-1.31	336.92	-0.27	-0.0	-24.13	20.05	-0.02	-0.99	27.07	0.65	0.00	28.09	43.2	2
1256	Tube 1	End	28.88	35.71	0.05	-1.11	414.62	-0.37	-0.0	-24.13	20.05	-0.02	-0.96	31.21	0.63	0.00	32.19	49.5	2
1256	Tube 1	Origin	28.88	35.71	0.05	-1.11	414.62	-0.37	-0.0	-24.71	20.13	-0.03	-0.98	31.21	0.63	0.00	32.21	49.6	2
1256	1256:ARM4	End	32.75	31.66	0.05	-0.93	492.61	-0.48	-0.0	-24.71	20.13	-0.03	-0.95	34.81	0.62	0.00	35.78	55.0	2
1256	1256:ARM4	Origin	32.75	31.66	0.05	-0.93	516.18	-0.48	-0.0	-30.17	26.42	-0.03	-1.16	36.48	0.81	0.00	37.67	57.9	2
1256	1256:WVGD2	End	35.00	29.40	0.05	-0.84	575.62	-0.55	-0.0	-30.17	26.42	-0.03	-1.14	39.25	0.79	0.00	40.42	62.4	2
1256	1256:WVGD2	Origin	35.00	29.40	0.05	-0.84	575.62	-0.55	-0.0	-31.53	26.69	-0.03	-1.19	39.25	0.80	0.00	40.47	62.5	2
1256	Tube 1	End	38.17	26.35	0.04	-0.71	660.12	-0.65	-0.0	-31.53	26.69	-0.03	-1.16	42.85	0.78	0.00	44.03	68.9	2
1256	Tube 1	Origin	38.17	26.35	0.04	-0.71	660.12	-0.65	-0.0	-32.08	26.70	-0.04	-1.18	42.85	0.78	0.00	44.05	68.9	2
1256	SpliceT	End	41.33	23.46	0.04	-0.60	744.64	-0.77	-0.0	-32.08	26.70	-0.04	-1.16	46.06	0.76	0.00	47.24	74.9	2
1256	SpliceT	Origin	41.33	23.46	0.04	-0.60	744.64	-0.77	-0.0	-32.99	26.72	-0.04	-1.19	46.06	0.76	0.00	47.27	74.9	2
1256	1256:WVGD3	End	45.00	20.32	0.03	-0.49	842.63	-0.92	-0.0	-32.99	26.72	-0.04	-0.99	43.80	0.64	0.00	44.80	68.9	2
1256	1256:WVGD3	Origin	45.00	20.32	0.03	-0.49	842.63	-0.91	-0.0	-35.06	26.98	-0.04	-1.06	43.80	0.65	0.00	44.87	69.0	2
1256	Tube 2	End	50.00	16.38	0.03	-0.36	977.55	-1.13	-0.0	-35.06	26.98	-0.04	-1.02	47.19	0.62	0.00	48.22	74.2	2
1256	Tube 2	Origin	50.00	16.38	0.03	-0.36	977.55	-1.13	-0.0	-36.12	26.98	-0.05	-1.05	47.19	0.62	0.00	48.25	74.2	2
1256	1256:WVGD4	End	55.00	12.87	0.02	-0.25	1112.43	-1.38	-0.0	-36.12	26.98	-0.05	-1.01	50.00	0.60	0.00	51.02	78.5	2
1256	1256:WVGD4	Origin	55.00	12.87	0.02	-0.25	1112.43	-1.37	-0.0	-38.13	27.18	-0.05	-1.07	50.00	0.60	0.00	51.08	78.6	2
1256	Tube 2	End	60.00	9.78	0.02	-0.17	1248.32	-1.64	-0.0	-38.13	27.18	-0.05	-1.03	52.37	0.58	0.00	53.42	82.2	2
1256	Tube 2	Origin	60.00	9.78	0.02	-0.17	1248.32	-1.64	-0.0	-39.27	27.15	-0.06	-1.06	52.37	0.58	0.00	53.45	82.2	2
1256	1256:WVGD5	End	65.00	7.12	0.01	-0.11	1384.04	-1.93	-0.0	-39.27	27.15	-0.06	-1.03	54.33	0.56	0.00	55.37	85.6	2
1256	1256:WVGD5	Origin	65.00	7.12	0.01	-0.11	1384.04	-1.93	-0.0	-41.35	27.31	-0.06	-1.08	54.33	0.57	0.00	55.42	85.7	2
1256	Tube 2	End	70.00	4.90	0.01	-0.06	1520.59	-2.25	-0.0	-41.35	27.31	-0.06	-1.05	55.96	0.55	0.00	57.02	89.7	2
1256	Tube 2	Origin	70.00	4.90	0.01	-0.06	1520.59	-2.25	-0.0	-42.55	27.25	-0.07	-1.08	55.96	0.55	0.00	57.05	89.7	2
1256	1256:WVGD6	End	75.00	3.11	0.01	-0.03	1656.86	-2.59	-0.0	-42.55	27.25	-0.07	-1.05	57.29	0.53	0.00	58.34	93.4	2
1256	1256:WVGD6	Origin	75.00	3.11	0.01	-0.03	1656.86	-2.59	-0.0	-44.09	27.42	-0.07	-1.08	57.29	0.53	0.00	58.38	93.4	2
1256	SpliceT	End	75.08	3.08	0.01	-0.03	1659.13	-2.60	-0.0	-44.09	27.42	-0.07	-1.08	57.31	0.53	0.00	58.40	93.5	2
1256	SpliceT	Origin	75.08	3.08	0.01	-0.03	1659.13	-2.60	-0.0	-45.29	27.40	-0.07	-1.11	57.31	0.53	0.00	58.43	93.5	2
1256	SpliceB	End	80.00	1.74	0.00	-0.02	1793.87	-2.96	-0.0	-45.29	27.40	-0.07	-0.95	53.06	0.46	0.00	54.02	83.1	2
1256	SpliceB	Origin	80.00	1.74	0.00	-0.02	1793.87	-2.96	-0.0	-47.20	27.35	-0.08	-0.99	53.06	0.46	0.00	54.06	83.2	2
1256	1256:WVGD7	End	85.00	0.77	0.00	-0.01	1930.61	-3.36	-0.0	-47.20	27.35	-0.08	-0.96	53.76	0.44	0.00	54.73	84.2	2
1256	1256:WVGD7	Origin	85.00	0.77	0.00	-0.01	1930.61	-3.36	-0.0	-49.54	27.46	-0.08	-1.01	53.76	0.45	0.00	54.78	84.3	2
1256	Tube 3	End	90.00	0.19	0.00	-0.00	2067.92	-3.78	-0.0	-49.54	27.46	-0.08	-0.98	54.30	0.43	0.00	55.29	85.1	2
1256	Tube 3	Origin	90.00	0.19	0.00	-0.00	2067.92	-3.78	-0.0	-51.00	27.39	-0.09	-1.01	54.30	0.43	0.00	55.32	85.1	2
1256	1256:g	End	95.00	0.00	0.00	0.00	2204.84	-4.23	-0.0	-51.00	27.39	-0.09	-0.98	54.69	0.42	0.00	55.67	85.7	2

Detailed Tubular Davit Arm Usages for Load Case "NESC Heavy":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
ARM1L	ARM1L:O	Origin	0.00	68.02	0.10	-1.72	-1.86	0.00	0.0	-2.22	0.45	-0.00	-0.59	4.36	0.00	0.00	4.95	7.6	1
ARM1L	ARM1L:End	End	4.12	69.51	0.10	3.16	-0.00	0.00	0.0	-2.22	0.45	-0.00	-0.71	0.00	0.31	0.00	0.89	1.4	3
ARM1R	ARM1R:O	Origin	0.00	67.92	0.10	-3.72	-6.74	-0.00	-0.0	1.61	1.35	0.00	0.43	15.79	0.00	0.00	16.22	25.0	1
ARM1R	#ARM1R:O	End	2.55	68.38	0.10	-6.94	-3.31	-0.00	-0.0	1.61	1.35	0.00	0.47	9.30	0.00	0.00	9.77	15.0	1
ARM1R	#ARM1R:O	Origin	2.55	68.38	0.10	-6.94	-3.31	-0.00	0.0	1.62	1.30	0.00	0.47	9.30	0.00	0.00	9.77	15.0	1
ARM1R	ARM1R:End	End	5.10	68.86	0.10	-10.25	0.00	0.00	0.0	1.62	1.30	0.00	0.52	0.00	0.89	0.00	1.62	2.5	3
ARM2L	ARM2L:O	Origin	0.00	59.31	0.09	-1.21	-8.31	0.00	0.0	-3.44	1.64	-0.00	-0.91	19.47	0.00	0.00	20.38	31.4	1
ARM2L	#ARM2L:O	End	2.55	60.07	0.09	1.77	-4.12	0.00	0.0	-3.44	1.64	-0.00	-1.00	11.58	0.00	0.00	12.58	19.3	1
ARM2L	#ARM2L:O	Origin	2.55	60.07	0.09	1.77	-4.12	0.00	0.0	-3.42	1.61	-0.00	-0.99	11.58	0.00	0.00	12.57	19.3	1
ARM2L	ARM2L:End	End	5.10	60.79	0.09	4.64	-0.00	0.00	0.0	-3.42	1.61	-0.00	-1.09	0.00	1.10	0.00	2.20	3.4	3
ARM2R	ARM2R:O	Origin	0.00	59.20	0.09	-3.33	-31.08	-0.00	-0.0	2.72	2.90	0.00	0.33	14.75	0.00	0.00	15.08	25.4	1
ARM2R	#ARM2R:O	End	5.00	59.82	0.09	-9.64	-16.59	-0.00	-0.0	2.72	2.90	0.00	0.43	13.89	0.00	0.00	14.33	23.9	1
ARM2R	#ARM2R:O	Origin	5.00	59.82	0.09	-9.64	-16.59	-0.00	-0.0	2.73	2.75	0.00	0.44	13.89	0.00	0.00	14.33	23.9	1

ARM2R	#ARM2R:1	End	8.06	60.21	0.09	-13.64	-8.16	-0.00	-0.0	2.73	2.75	0.00	0.54	10.71	0.00	0.00	11.26	18.8	1
ARM2R	#ARM2R:1	Origin	8.06	60.21	0.09	-13.64	-8.16	-0.00	0.0	2.74	2.66	0.00	0.55	10.71	0.00	0.00	11.26	18.8	1
ARM2R	ARM2R:END	End	11.13	60.60	0.09	-17.75	0.00	0.00	0.0	2.74	2.66	0.00	0.73	0.00	1.50	0.00	2.71	4.5	3
ARM3L	ARM3L:0	Origin	0.00	44.85	0.07	-0.43	-8.39	0.00	0.0	-3.49	1.66	-0.00	-0.93	19.66	0.00	0.00	20.59	31.7	1
ARM3L	#ARM3L:0	End	2.55	45.55	0.07	2.36	-4.16	0.00	0.0	-3.49	1.66	-0.00	-1.01	11.70	0.00	0.00	12.71	19.6	1
ARM3L	#ARM3L:0	Origin	2.55	45.55	0.07	2.36	-4.16	0.00	0.0	-3.47	1.63	-0.00	-1.01	11.70	0.00	0.00	12.70	19.5	1
ARM3L	ARM3L:End	End	5.10	46.22	0.07	5.04	-0.00	0.00	0.0	-3.47	1.63	-0.00	-1.11	0.00	1.11	0.00	2.23	3.4	3
ARM3R	ARM3R:0	Origin	0.00	44.75	0.07	-2.65	-31.29	-0.00	-0.0	2.73	2.92	0.00	0.33	14.85	0.00	0.00	15.18	25.5	1
ARM3R	#ARM3R:0	End	5.00	45.35	0.07	-8.58	-16.71	-0.00	-0.0	2.73	2.92	0.00	0.43	13.99	0.00	0.00	14.43	24.0	1
ARM3R	#ARM3R:0	Origin	5.00	45.35	0.07	-8.58	-16.71	-0.00	-0.0	2.75	2.77	0.00	0.44	13.99	0.00	0.00	14.43	24.0	1
ARM3R	#ARM3R:1	End	8.06	45.72	0.07	-12.34	-8.22	-0.00	-0.0	2.75	2.77	0.00	0.55	10.79	0.00	0.00	11.34	18.9	1
ARM3R	#ARM3R:1	Origin	8.06	45.72	0.07	-12.34	-8.22	-0.00	0.0	2.76	2.68	0.00	0.55	10.79	0.00	0.00	11.34	18.9	1
ARM3R	ARM3R:END	End	11.13	46.10	0.07	-16.21	0.00	0.00	0.0	2.76	2.68	0.00	0.73	0.00	1.52	0.00	2.72	4.5	3
ARM4L	ARM4L:0	Origin	0.00	31.70	0.05	0.15	-8.61	0.00	0.0	-3.44	1.70	-0.00	-0.91	20.18	0.00	0.00	21.09	32.4	1
ARM4L	#ARM4L:0	End	2.55	32.30	0.05	2.59	-4.27	0.00	0.0	-3.44	1.70	-0.00	-1.00	12.01	0.00	0.00	13.00	20.0	1
ARM4L	#ARM4L:0	Origin	2.55	32.30	0.05	2.59	-4.27	0.00	0.0	-3.43	1.67	-0.00	-0.99	12.01	0.00	0.00	13.00	20.0	1
ARM4L	ARM4L:End	End	5.10	32.86	0.05	4.91	-0.00	0.00	0.0	-3.43	1.67	-0.00	-1.10	0.00	1.14	0.00	2.26	3.5	3
ARM4R	ARM4R:0	Origin	0.00	31.61	0.05	-2.01	-31.90	-0.00	-0.0	2.78	2.97	0.00	0.33	15.14	0.00	0.00	15.47	26.0	1
ARM4R	#ARM4R:0	End	5.00	32.17	0.05	-7.23	-17.04	-0.00	-0.0	2.78	2.97	0.00	0.44	14.27	0.00	0.00	14.71	24.5	1
ARM4R	#ARM4R:0	Origin	5.00	32.17	0.05	-7.23	-17.04	-0.00	-0.0	2.80	2.82	0.00	0.45	14.27	0.00	0.00	14.72	24.5	1
ARM4R	#ARM4R:1	End	8.06	32.53	0.05	-10.57	-8.39	-0.00	-0.0	2.80	2.82	0.00	0.56	11.01	0.00	0.00	11.56	19.3	1
ARM4R	#ARM4R:1	Origin	8.06	32.53	0.05	-10.57	-8.39	-0.00	0.0	2.81	2.74	0.00	0.56	11.01	0.00	0.00	11.57	19.3	1
ARM4R	ARM4R:END	End	11.13	32.88	0.05	-14.01	-0.00	0.00	0.0	2.81	2.74	0.00	0.75	0.00	1.55	0.00	2.78	4.6	3

Summary of Clamp Capacities and Usages for Load Case "NESC Heavy":

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
CL1	2.251	80.00	80.00	2.81
CL2	2.059	80.00	80.00	2.57
CL3	3.765	80.00	80.00	4.71
CL4	3.802	80.00	80.00	4.75
CL5	3.823	80.00	80.00	4.78
CL6	3.827	80.00	80.00	4.78
CL7	3.799	80.00	80.00	4.75
CL8	3.904	80.00	80.00	4.88
CL9	0.936	80.00	80.00	1.17
CL10	0.936	80.00	80.00	1.17
CL11	0.936	80.00	80.00	1.17
CL12	0.936	80.00	80.00	1.17
CL13	0.936	80.00	80.00	1.17
CL14	0.936	80.00	80.00	1.17
CL15	0.936	80.00	80.00	1.17
CL16	2.616	80.00	80.00	3.27
CL17	8.499	80.00	80.00	10.62

Equilibrium Joint Positions and Rotations for Load Case "NESC Extreme":

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
1256:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
1256:t	0.004164	6.415	-0.2835	-6.6567	0.0042	-0.0005	0.004164	6.415	94.72
1256:ARM1	0.004033	6.212	-0.2717	-6.6567	0.0042	-0.0005	0.004033	6.212	92.98
1256:TCMid	0.003939	6.067	-0.2633	-6.6550	0.0042	-0.0005	0.003939	6.067	91.74
1256:ARM2	0.003507	5.403	-0.2248	-6.5892	0.0041	-0.0004	0.003507	5.403	86.03
1256:BCMid	0.002909	4.475	-0.1723	-6.2882	0.0039	-0.0003	0.002909	4.475	77.83
1256:ARM3	0.00265	4.07	-0.1503	-6.0979	0.0038	-0.0003	0.00265	4.07	74.1
1256:WVGD1	0.002367	3.627	-0.1272	-5.8427	0.0037	-0.0003	0.002367	3.627	69.87
1256:ARM4	0.001884	2.872	-0.09022	-5.3018	0.0033	-0.0002	0.001884	2.872	62.16
1256:WVGD2	0.001753	2.668	-0.08085	-5.1258	0.0032	-0.0002	0.001753	2.668	59.92
1256:WVGD3	0.001225	1.846	-0.04677	-4.2804	0.0027	-0.0001	0.001225	1.846	49.95
1256:WVGD4	0.0007868	1.172	-0.02381	-3.4233	0.0022	-0.0001	0.0007868	1.172	39.98
1256:WVGD5	0.0004423	0.6507	-0.009959	-2.5361	0.0017	-0.0001	0.0004423	0.6507	29.99
1256:WVGD6	0.0001962	0.2848	-0.003012	-1.6429	0.0011	-0.0000	0.0001962	0.2848	20
1256:WVGD7	4.959e-005	0.07095	-0.0004868	-0.8044	0.0006	-0.0000	4.959e-005	0.07095	10
ARM1L:O	0.004033	6.217	-0.179	-6.6567	0.0042	-0.0005	0.004033	5.418	93.07
ARM1L:End	0.004104	6.361	0.2783	-6.6660	0.0042	-0.0005	0.004104	1.561	94.53
ARM1R:O	0.004034	6.207	-0.3643	-6.6567	0.0042	-0.0005	0.004034	7.006	92.89
ARM1R:End	0.004216	6.29	-0.9578	-6.7803	0.0043	-0.0023	0.004216	12.09	93.29
ARM2L:O	0.003507	5.409	-0.1264	-6.5892	0.0041	-0.0004	0.003507	4.551	86.12
ARM2L:End	0.003584	5.555	0.4352	-6.4890	0.0041	-0.0004	0.003584	-0.3028	87.69
ARM2R:O	0.003506	5.397	-0.3231	-6.5892	0.0041	-0.0004	0.003506	6.255	85.93
ARM2R:END	0.003619	5.517	-1.623	-6.8389	0.0041	-0.0004	0.003619	17.37	86.3
ARM3L:O	0.002652	4.075	-0.04863	-6.0979	0.0038	-0.0003	0.002652	3.118	74.2
ARM3L:End	0.002729	4.208	0.471	-5.9928	0.0038	-0.0003	0.002729	-1.75	75.72
ARM3R:O	0.002648	4.064	-0.252	-6.0979	0.0038	-0.0003	0.002648	5.022	74
ARM3R:END	0.002739	4.181	-1.457	-6.3516	0.0038	-0.0003	0.002739	16.14	74.46
ARM4L:O	0.001886	2.877	0.007486	-5.3018	0.0033	-0.0002	0.001886	1.82	62.26
ARM4L:End	0.001954	2.989	0.4588	-5.1875	0.0034	-0.0002	0.001954	-3.068	63.71
ARM4R:O	0.001883	2.868	-0.1879	-5.3018	0.0033	-0.0002	0.001883	3.925	62.06
ARM4R:END	0.00196	2.977	-1.239	-5.5637	0.0033	-0.0002	0.00196	15.03	62.68

Joint Support Reactions for Load Case "NESC Extreme":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	H-Shear Usage %	Z Force (kips)	Comp. Usage %	Uplift Usage %	Result. Force (kips)	Result. Usage %	X Moment (ft-k)	X-M. Usage %	Y Moment (ft-k)	Y-M. Usage %	H-Bend-M Usage %	Z Moment (ft-k)	Z-M. Usage %	Max. Usage %
1256:g	-0.03	0.0	-32.99	0.0	0.0	-28.00	0.0	0.0	43.27	0.0	2442.02	0.0	-1.7	0.0	0.0	0.04	0.0	0.0

Detailed Steel Pole Usages for Load Case "NESC Extreme":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Usage Pt.
1256	1256:t	Origin	0.00	76.98	0.05	-3.40	-0.00	-0.00	0.0	-0.06	0.05	-0.00	-0.00	0.00	0.01	0.00	0.01	0.0	4
1256	1256:ARM1	End	1.75	74.55	0.05	-3.26	0.09	-0.00	0.0	-0.06	0.05	-0.00	-0.00	0.01	0.00	0.00	0.01	0.0	2
1256	1256:ARM1	Origin	1.75	74.55	0.05	-3.26	2.83	-0.01	-0.0	-0.74	2.58	-0.01	-0.04	0.15	0.25	0.00	0.48	0.7	3

1256	1256:TCMId	End	3.00	72.81	0.05	-3.16	6.05	-0.02	-0.0	-0.74	2.58	-0.01	-0.04	0.74	0.10	0.00	0.80	1.2	2
1256	1256:TCMId	Origin	3.00	72.81	0.05	-3.16	6.05	-0.02	-0.0	0.29	12.76	-0.01	0.01	0.00	1.33	0.00	2.32	3.6	4
1256	Tube 1	End	5.87	68.81	0.04	-2.93	42.75	-0.04	-0.0	0.29	12.76	-0.01	0.01	4.91	0.50	0.00	5.00	7.7	2
1256	Tube 1	Origin	5.87	68.81	0.04	-2.93	42.75	-0.04	-0.0	0.09	12.94	-0.01	0.00	4.91	0.50	0.00	4.99	7.7	2
1256	1256:ARM2	End	8.75	64.83	0.04	-2.70	79.94	-0.06	-0.0	0.09	12.94	-0.01	0.00	8.67	0.49	0.00	8.71	13.4	2
1256	1256:ARM2	Origin	8.75	64.83	0.04	-2.70	92.48	-0.06	-0.0	-2.17	17.92	-0.01	-0.10	10.02	0.68	0.00	10.20	15.7	2
1256	Tube 1	End	12.87	59.20	0.04	-2.38	166.42	-0.10	-0.0	-2.17	17.92	-0.01	-0.10	16.65	0.65	0.00	16.78	25.8	2
1256	Tube 1	Origin	12.87	59.20	0.04	-2.38	166.42	-0.10	-0.0	-2.52	18.18	-0.01	-0.12	16.65	0.66	0.00	16.80	25.8	2
1256	1256:BCMId	End	17.00	53.69	0.03	-2.07	241.40	-0.14	-0.0	-2.52	18.18	-0.01	-0.11	22.35	0.64	0.00	22.49	34.6	2
1256	1256:BCMId	Origin	17.00	53.69	0.03	-2.07	241.40	-0.14	-0.0	-7.21	15.55	-0.01	-0.32	22.35	0.54	0.00	22.69	34.9	2
1256	1256:ARM3	End	20.75	48.83	0.03	-1.80	299.73	-0.19	-0.0	-7.21	15.55	-0.01	-0.31	25.93	0.53	0.00	26.26	40.4	2
1256	1256:ARM3	Origin	20.75	48.83	0.03	-1.80	312.40	-0.19	-0.0	-9.63	20.59	-0.01	-0.41	27.03	0.70	0.00	27.47	42.3	2
1256	1256:WVGD1	End	25.00	43.52	0.03	-1.53	399.92	-0.24	-0.0	-9.63	20.59	-0.01	-0.40	32.13	0.67	0.00	32.55	50.1	2
1256	1256:WVGD1	Origin	25.00	43.52	0.03	-1.53	399.92	-0.24	-0.0	-10.25	21.33	-0.01	-0.42	32.13	0.70	0.00	32.57	50.1	2
1256	Tube 1	End	28.88	38.89	0.03	-1.29	482.58	-0.29	-0.0	-10.25	21.33	-0.01	-0.41	36.32	0.67	0.00	36.75	56.5	2
1256	Tube 1	Origin	28.88	38.89	0.03	-1.29	482.58	-0.29	-0.0	-10.69	21.56	-0.01	-0.42	36.32	0.68	0.00	36.77	56.6	2
1256	1256:ARM4	End	32.75	34.47	0.02	-1.08	566.12	-0.34	-0.0	-10.69	21.56	-0.01	-0.41	40.00	0.66	0.00	40.43	62.2	2
1256	1256:ARM4	Origin	32.75	34.47	0.02	-1.08	579.09	-0.34	-0.0	-13.14	26.54	-0.01	-0.51	40.92	0.81	0.00	41.45	63.8	2
1256	1256:WVGD2	End	35.00	32.01	0.02	-0.97	638.80	-0.38	-0.0	-13.14	26.54	-0.01	-0.50	43.55	0.80	0.00	44.07	67.8	2
1256	1256:WVGD2	Origin	35.00	32.01	0.02	-0.97	638.80	-0.38	-0.0	-13.69	27.19	-0.02	-0.52	43.55	0.82	0.00	44.09	67.8	2
1256	Tube 1	End	38.17	28.70	0.02	-0.82	724.90	-0.43	-0.0	-13.69	27.19	-0.02	-0.51	47.04	0.80	0.00	47.57	73.2	2
1256	Tube 1	Origin	38.17	28.70	0.02	-0.82	724.90	-0.43	-0.0	-14.11	27.37	-0.02	-0.52	47.04	0.80	0.00	47.59	73.2	2
1256	SpliceT	End	41.33	25.56	0.02	-0.69	811.56	-0.48	-0.0	-14.11	27.37	-0.02	-0.51	50.19	0.78	0.00	50.72	78.0	2
1256	SpliceT	Origin	41.33	25.56	0.02	-0.69	811.56	-0.48	-0.0	-14.78	27.57	-0.02	-0.53	50.19	0.79	0.00	50.74	78.1	2
1256	1256:WVGD3	End	45.00	22.15	0.01	-0.56	912.66	-0.54	-0.0	-14.78	27.57	-0.02	-0.45	47.43	0.66	0.00	47.89	73.7	2
1256	1256:WVGD3	Origin	45.00	22.15	0.01	-0.56	912.66	-0.54	-0.0	-15.83	28.33	-0.02	-0.48	47.43	0.68	0.00	47.92	73.7	2
1256	Tube 2	End	50.00	17.88	0.01	-0.41	1054.30	-0.63	-0.0	-15.83	28.33	-0.02	-0.46	50.88	0.65	0.00	51.35	79.0	2
1256	Tube 2	Origin	50.00	17.88	0.01	-0.41	1054.30	-0.63	-0.0	-16.63	28.61	-0.02	-0.48	50.88	0.66	0.00	51.38	79.0	2
1256	1256:WVGD4	End	55.00	14.07	0.01	-0.29	1197.35	-0.72	-0.0	-16.63	28.61	-0.02	-0.47	53.80	0.64	0.00	54.28	83.5	2
1256	1256:WVGD4	Origin	55.00	14.07	0.01	-0.29	1197.35	-0.72	-0.0	-17.68	29.39	-0.02	-0.50	53.80	0.65	0.00	54.31	83.6	2
1256	Tube 2	End	60.00	10.70	0.01	-0.19	1344.27	-0.83	-0.0	-17.68	29.39	-0.02	-0.48	56.38	0.63	0.00	56.87	87.5	2
1256	Tube 2	Origin	60.00	10.70	0.01	-0.19	1344.27	-0.83	-0.0	-18.54	29.67	-0.02	-0.50	56.38	0.64	0.00	56.90	87.5	2
1256	1256:WVGD5	End	65.00	7.81	0.01	-0.12	1492.60	-0.93	-0.0	-18.54	29.67	-0.02	-0.49	58.57	0.62	0.00	59.07	90.9	2
1256	1256:WVGD5	Origin	65.00	7.81	0.01	-0.12	1492.60	-0.93	-0.0	-19.65	30.44	-0.02	-0.51	58.57	0.63	0.00	59.10	90.9	2
1256	Tube 2	End	70.00	5.38	0.00	-0.07	1644.80	-1.05	-0.0	-19.65	30.44	-0.02	-0.50	60.52	0.61	0.00	61.02	93.9	2
1256	Tube 2	Origin	70.00	5.38	0.00	-0.07	1644.80	-1.05	-0.0	-20.56	30.72	-0.02	-0.52	60.52	0.62	0.00	61.05	93.9	2
1256	1256:WVGD6	End	75.00	3.42	0.00	-0.04	1798.42	-1.17	-0.0	-20.56	30.72	-0.02	-0.51	62.16	0.60	0.00	62.68	96.7	2
1256	1256:WVGD6	Origin	75.00	3.42	0.00	-0.04	1798.42	-1.17	-0.0	-21.26	31.35	-0.02	-0.52	62.16	0.61	0.00	62.69	96.7	2
1256	SpliceT	End	75.08	3.39	0.00	-0.04	1801.03	-1.17	-0.0	-21.26	31.35	-0.02	-0.52	62.19	0.61	0.00	62.72	96.8	2
1256	SpliceT	Origin	75.08	3.39	0.00	-0.04	1801.03	-1.17	-0.0	-22.12	31.51	-0.03	-0.54	62.19	0.61	0.00	62.74	96.8	2
1256	SpliceB	End	80.00	1.91	0.00	-0.02	1955.95	-1.30	-0.0	-22.12	31.51	-0.03	-0.47	57.83	0.53	0.00	58.31	89.7	2
1256	SpliceB	Origin	80.00	1.91	0.00	-0.02	1955.95	-1.30	-0.0	-23.50	31.80	-0.03	-0.49	57.83	0.53	0.00	58.34	89.7	2
1256	1256:WVGD7	End	85.00	0.85	0.00	-0.01	2114.94	-1.43	-0.0	-23.50	31.80	-0.03	-0.48	58.86	0.52	0.00	59.35	91.3	2
1256	1256:WVGD7	Origin	85.00	0.85	0.00	-0.01	2114.94	-1.43	-0.0	-24.80	32.57	-0.03	-0.51	58.86	0.53	0.00	59.38	91.4	2
1256	Tube 3	End	90.00	0.21	0.00	-0.00	2277.77	-1.58	-0.0	-24.80	32.57	-0.03	-0.49	59.78	0.51	0.00	60.28	92.7	2
1256	Tube 3	Origin	90.00	0.21	0.00	-0.00	2277.77	-1.58	-0.0	-25.89	32.85	-0.03	-0.51	59.78	0.52	0.00	60.30	92.8	2
1256	1256:g	End	95.00	0.00	0.00	0.00	2442.02	-1.73	-0.0	-25.89	32.85	-0.03	-0.50	60.54	0.50	0.00	61.04	93.9	2

Detailed Tubular Davit Arm Usages for Load Case "NESC Extreme":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
ARM1L	ARM1L:O	Origin	0.00	74.61	0.05	-2.15	0.22	0.00	0.0	-1.31	-0.05	-0.00	-0.35	0.52	0.00	0.00	0.86	1.3	1
ARM1L	ARM1L:End	End	4.12	76.33	0.05	3.34	-0.00	0.00	0.0	-1.31	-0.05	-0.00	-0.42	0.00	0.04	0.00	0.42	0.7	3
ARM1R	ARM1R:O	Origin	0.00	74.48	0.05	-4.37	-2.51	-0.04	-0.0	1.08	0.51	0.01	0.29	5.88	0.00	0.00	6.16	9.5	1

ARM1R	#ARM1R:0	End	2.55	74.98	0.05	-7.92	-1.21	-0.02	-0.0	1.08	0.51	0.01	0.31	3.41	0.00	0.00	3.73	5.7	1
ARM1R	#ARM1R:0	Origin	2.55	74.98	0.05	-7.92	-1.21	-0.02	0.0	1.09	0.48	0.01	0.31	3.41	0.00	0.00	3.73	5.7	1
ARM1R	ARM1R:End	End	5.10	75.47	0.05	-11.49	0.00	0.00	0.0	1.09	0.48	0.01	0.35	0.00	0.33	0.00	0.66	1.0	3
ARM2L	ARM2L:0	Origin	0.00	64.90	0.04	-1.52	-2.03	0.00	0.0	-2.49	0.41	-0.00	-0.66	4.75	0.00	0.00	5.41	8.3	1
ARM2L	#ARM2L:0	End	2.55	65.78	0.04	1.87	-0.99	0.00	0.0	-2.49	0.41	-0.00	-0.72	2.77	0.00	0.00	3.50	5.4	1
ARM2L	#ARM2L:0	Origin	2.55	65.78	0.04	1.87	-0.99	0.00	0.0	-2.49	0.39	-0.00	-0.72	2.77	0.00	0.00	3.49	5.4	1
ARM2L	ARM2L:End	End	5.10	66.66	0.04	5.22	-0.00	0.00	0.0	-2.49	0.39	-0.00	-0.80	0.00	0.26	0.00	0.92	1.4	3
ARM2R	ARM2R:0	Origin	0.00	64.77	0.04	-3.88	-14.42	-0.00	-0.0	2.22	1.36	0.00	0.27	6.84	0.00	0.00	7.11	12.0	1
ARM2R	#ARM2R:0	End	5.00	65.41	0.04	-10.81	-7.60	-0.00	-0.0	2.22	1.36	0.00	0.35	6.37	0.00	0.00	6.72	11.2	1
ARM2R	#ARM2R:0	Origin	5.00	65.41	0.04	-10.81	-7.60	-0.00	-0.0	2.23	1.27	0.00	0.35	6.37	0.00	0.00	6.72	11.2	1
ARM2R	#ARM2R:1	End	8.06	65.81	0.04	-15.12	-3.72	-0.00	-0.0	2.23	1.27	0.00	0.44	4.88	0.00	0.00	5.32	8.9	1
ARM2R	#ARM2R:1	Origin	8.06	65.81	0.04	-15.12	-3.72	-0.00	0.0	2.23	1.21	0.00	0.44	4.88	0.00	0.00	5.32	8.9	1
ARM2R	ARM2R:END	End	11.13	66.21	0.04	-19.48	0.00	0.00	0.0	2.23	1.21	0.00	0.59	0.00	0.68	0.00	1.33	2.2	3
ARM3L	ARM3L:0	Origin	0.00	48.90	0.03	-0.58	-2.13	0.00	0.0	-2.52	0.43	-0.00	-0.67	4.99	0.00	0.00	5.65	8.7	1
ARM3L	#ARM3L:0	End	2.55	49.70	0.03	2.55	-1.04	0.00	0.0	-2.52	0.43	-0.00	-0.73	2.91	0.00	0.00	3.64	5.6	1
ARM3L	#ARM3L:0	Origin	2.55	49.70	0.03	2.55	-1.04	0.00	0.0	-2.51	0.41	-0.00	-0.73	2.91	0.00	0.00	3.64	5.6	1
ARM3L	ARM3L:End	End	5.10	50.49	0.03	5.65	-0.00	0.00	0.0	-2.51	0.41	-0.00	-0.80	0.00	0.28	0.00	0.94	1.4	3
ARM3R	ARM3R:0	Origin	0.00	48.77	0.03	-3.02	-14.64	-0.00	-0.0	2.22	1.38	0.00	0.27	6.95	0.00	0.00	7.21	12.1	1
ARM3R	#ARM3R:0	End	5.00	49.39	0.03	-9.45	-7.72	-0.00	-0.0	2.22	1.38	0.00	0.35	6.47	0.00	0.00	6.82	11.4	1
ARM3R	#ARM3R:0	Origin	5.00	49.39	0.03	-9.45	-7.72	-0.00	-0.0	2.23	1.29	0.00	0.35	6.47	0.00	0.00	6.82	11.4	1
ARM3R	#ARM3R:1	End	8.06	49.78	0.03	-13.44	-3.78	-0.00	-0.0	2.23	1.29	0.00	0.44	4.95	0.00	0.00	5.40	9.0	1
ARM3R	#ARM3R:1	Origin	8.06	49.78	0.03	-13.44	-3.78	-0.00	0.0	2.23	1.23	0.00	0.44	4.95	0.00	0.00	5.40	9.0	1
ARM3R	ARM3R:END	End	11.13	50.17	0.03	-17.49	0.00	0.00	0.0	2.23	1.23	0.00	0.59	0.00	0.70	0.00	1.34	2.2	3
ARM4L	ARM4L:0	Origin	0.00	34.52	0.02	0.09	-2.31	0.00	0.0	-2.50	0.46	-0.00	-0.66	5.42	0.00	0.00	6.08	9.4	1
ARM4L	#ARM4L:0	End	2.55	35.20	0.02	2.81	-1.13	0.00	0.0	-2.50	0.46	-0.00	-0.73	3.17	0.00	0.00	3.90	6.0	1
ARM4L	#ARM4L:0	Origin	2.55	35.20	0.02	2.81	-1.13	0.00	0.0	-2.49	0.44	-0.00	-0.72	3.17	0.00	0.00	3.89	6.0	1
ARM4L	ARM4L:End	End	5.10	35.87	0.02	5.51	-0.00	0.00	0.0	-2.49	0.44	-0.00	-0.80	0.00	0.30	0.00	0.95	1.5	3
ARM4R	ARM4R:0	Origin	0.00	34.42	0.02	-2.26	-15.09	-0.00	-0.0	2.24	1.42	0.00	0.27	7.16	0.00	0.00	7.43	12.5	1
ARM4R	#ARM4R:0	End	5.00	35.00	0.02	-7.85	-7.97	-0.00	-0.0	2.24	1.42	0.00	0.36	6.68	0.00	0.00	7.03	11.7	1
ARM4R	#ARM4R:0	Origin	5.00	35.00	0.02	-7.85	-7.97	-0.00	-0.0	2.25	1.33	0.00	0.36	6.68	0.00	0.00	7.03	11.7	1
ARM4R	#ARM4R:1	End	8.06	35.36	0.02	-11.34	-3.90	-0.00	-0.0	2.25	1.33	0.00	0.45	5.12	0.00	0.00	5.57	9.3	1
ARM4R	#ARM4R:1	Origin	8.06	35.36	0.02	-11.34	-3.90	-0.00	0.0	2.25	1.27	0.00	0.45	5.12	0.00	0.00	5.57	9.3	1
ARM4R	ARM4R:END	End	11.13	35.72	0.02	-14.87	0.00	0.00	0.0	2.25	1.27	0.00	0.60	0.00	0.72	0.00	1.38	2.3	3

Summary of Clamp Capacities and Usages for Load Case "NESC Extreme":

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
CL1	1.300	80.00	80.00	1.62
CL2	1.181	80.00	80.00	1.48
CL3	2.509	80.00	80.00	3.14
CL4	2.527	80.00	80.00	3.16
CL5	2.536	80.00	80.00	3.17
CL6	2.540	80.00	80.00	3.17
CL7	2.527	80.00	80.00	3.16
CL8	2.578	80.00	80.00	3.22
CL9	0.541	80.00	80.00	0.68
CL10	0.541	80.00	80.00	0.68
CL11	0.541	80.00	80.00	0.68

CL12	0.541	80.00	80.00	0.68
CL13	0.541	80.00	80.00	0.68
CL14	0.541	80.00	80.00	0.68
CL15	0.541	80.00	80.00	0.68
CL16	10.132	80.00	80.00	12.66
CL17	5.198	80.00	80.00	6.50

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
1256	96.82	NESC Extreme	22	13405.8

Base Plate Results by Bend Line:

Pole Label	Load Case	Bend Line #	Start X (ft)	Start Y (ft)	End X (ft)	End Y (ft)	Length (in)	Bending Stress (ksi)	Mom. Sum (ft-k)	Bolt # Acting	Max Load (kips)	Min Plate Thickness (in)	Actual Thickness (in)	Usage %
1256	NESC Heavy	1	1.980	0.153	0.153	1.980	31.000	14.922	67.860	2	138.126	1.693	3.250	27.13
1256	NESC Heavy	2	1.508	-1.292	1.508	1.292	31.000	11.603	52.765	4	56.973	1.493	3.250	21.10
1256	NESC Heavy	3	0.153	-1.980	1.980	-0.153	31.000	13.988	63.613	2	-131.865	1.639	3.250	25.43
1256	NESC Heavy	4	-1.292	-1.508	1.292	-1.508	31.000	42.494	193.250	4	-131.865	2.857	3.250	77.26
1256	NESC Heavy	5	-1.980	-0.153	-0.153	-1.980	31.000	13.932	63.361	2	-131.658	1.636	3.250	25.33
1256	NESC Heavy	6	-1.508	1.292	-1.508	-1.292	31.000	11.603	52.765	4	57.491	1.493	3.250	21.10
1256	NESC Heavy	7	-0.153	1.980	-1.980	0.153	31.000	14.977	68.113	2	138.333	1.696	3.250	27.23
1256	NESC Heavy	8	1.292	1.508	-1.292	1.508	31.000	44.580	202.736	4	138.333	2.926	3.250	81.05
1256	NESC Heavy	9	1.818	1.014	-0.569	2.003	31.000	17.802	80.958	3	138.264	1.849	3.250	32.37
1256	NESC Heavy	10	2.003	-0.569	1.014	1.818	31.000	5.756	26.177	3	56.973	1.051	3.250	10.47
1256	NESC Heavy	11	1.014	-1.818	2.003	0.569	31.000	5.000	22.741	3	-51.023	0.980	3.250	9.09
1256	NESC Heavy	12	-0.569	-2.003	1.818	-1.014	31.000	16.989	77.261	3	-131.865	1.806	3.250	30.89
1256	NESC Heavy	13	-1.818	-1.014	0.569	-2.003	31.000	16.968	77.168	3	-131.796	1.805	3.250	30.85
1256	NESC Heavy	14	-2.003	0.569	-1.014	-1.818	31.000	4.935	22.442	3	-50.505	0.973	3.250	8.97
1256	NESC Heavy	15	-1.014	1.818	-2.003	-0.569	31.000	5.822	26.476	3	57.491	1.057	3.250	10.59
1256	NESC Heavy	16	0.569	2.003	-1.818	1.014	31.000	17.822	81.051	3	138.333	1.850	3.250	32.40
1256	NESC Extreme	1	1.980	0.153	0.153	1.980	31.000	16.251	73.907	2	151.128	1.767	3.250	29.55
1256	NESC Extreme	2	1.508	-1.292	1.508	1.292	31.000	12.851	58.441	4	61.354	1.571	3.250	23.36
1256	NESC Extreme	3	0.153	-1.980	1.980	-0.153	31.000	15.768	71.710	2	-147.907	1.740	3.250	28.67
1256	NESC Extreme	4	-1.292	-1.508	1.292	-1.508	31.000	47.687	216.868	4	-147.907	3.026	3.250	86.70
1256	NESC Extreme	5	-1.980	-0.153	-0.153	-1.980	31.000	15.746	71.607	2	-147.823	1.739	3.250	28.63
1256	NESC Extreme	6	-1.508	1.292	-1.508	-1.292	31.000	12.851	58.441	4	61.565	1.571	3.250	23.36
1256	NESC Extreme	7	-0.153	1.980	-1.980	0.153	31.000	16.274	74.009	2	151.212	1.768	3.250	29.59
1256	NESC Extreme	8	1.292	1.508	-1.292	1.508	31.000	48.753	221.716	4	151.212	3.060	3.250	88.64
1256	NESC Extreme	9	1.818	1.014	-0.569	2.003	31.000	19.475	88.569	3	151.184	1.934	3.250	35.41
1256	NESC Extreme	10	2.003	-0.569	1.014	1.818	31.000	6.153	27.984	3	61.354	1.087	3.250	11.19
1256	NESC Extreme	11	1.014	-1.818	2.003	0.569	31.000	5.760	26.197	3	-58.260	1.052	3.250	10.47
1256	NESC Extreme	12	-0.569	-2.003	1.818	-1.014	31.000	19.058	86.670	3	-147.907	1.913	3.250	34.65
1256	NESC Extreme	13	-1.818	-1.014	0.569	-2.003	31.000	19.050	86.632	3	-147.879	1.913	3.250	34.64
1256	NESC Extreme	14	-2.003	0.569	-1.014	-1.818	31.000	5.734	26.075	3	-58.049	1.049	3.250	10.42
1256	NESC Extreme	15	-1.014	1.818	-2.003	-0.569	31.000	6.180	28.106	3	61.565	1.089	3.250	11.24
1256	NESC Extreme	16	0.569	2.003	-1.818	1.014	31.000	19.484	88.607	3	151.212	1.934	3.250	35.43

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
ARM1L	7.62	NESC Heavy	1	48.4
ARM1R	24.95	NESC Heavy	1	59.9
ARM2L	31.35	NESC Heavy	1	59.9

ARM2R	25.37	NESC Heavy	1	229.0
ARM3L	31.67	NESC Heavy	1	59.9
ARM3R	25.55	NESC Heavy	1	229.0
ARM4L	32.44	NESC Heavy	1	59.9
ARM4R	26.04	NESC Heavy	1	229.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	93.52	1256 Steel Pole	
NESC Extreme	96.82	1256 Steel Pole	

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	93.52	1256	22
NESC Extreme	96.82	1256	22

Summary of Base Plate Usages by Load Case:

Load Case	Pole Bend Label	Bend Line #	Length (in)	Vertical Load (kips)	X Moment (ft-k)	Y Bending Moment (ft-k)	Stress (ksi)	Bolt Moment Sum (ft-k)	# Bolts Acting On Bend Line	Max Bolt Load For Bend Line (kips)	Minimum Plate Thickness (in)	Usage %
NESC Heavy	1256	8	31.000	51.742	2204.837	-4.230	44.580	202.736	4	138.333	2.926	81.05
NESC Extreme	1256	8	31.000	26.442	2442.018	-1.725	48.753	221.716	4	151.212	3.060	88.64

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	32.44	ARM4L	1
NESC Extreme	12.51	ARM4R	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case Weight (lbs)
CL1	Clamp	2.81	NESC Heavy 0.0
CL2	Clamp	2.57	NESC Heavy 0.0
CL3	Clamp	4.71	NESC Heavy 0.0
CL4	Clamp	4.75	NESC Heavy 0.0
CL5	Clamp	4.78	NESC Heavy 0.0
CL6	Clamp	4.78	NESC Heavy 0.0
CL7	Clamp	4.75	NESC Heavy 0.0
CL8	Clamp	4.88	NESC Heavy 0.0
CL9	Clamp	1.17	NESC Heavy 0.0

CL10	Clamp	1.17	NESC Heavy	0.0
CL11	Clamp	1.17	NESC Heavy	0.0
CL12	Clamp	1.17	NESC Heavy	0.0
CL13	Clamp	1.17	NESC Heavy	0.0
CL14	Clamp	1.17	NESC Heavy	0.0
CL15	Clamp	1.17	NESC Heavy	0.0
CL16	Clamp	12.66	NESC Extreme	0.0
CL17	Clamp	10.62	NESC Heavy	0.0

Loads At Insulator Attachments For All Load Cases:

Load Case	Insulator Label	Insulator Type	Structure Attach Label	Structure Attach Load X (kips)	Structure Attach Load Y (kips)	Structure Attach Load Z (kips)	Structure Attach Load Res. (kips)
NESC Heavy	CL1	Clamp	ARM1L:End	0.000	1.936	1.148	2.251
NESC Heavy	CL2	Clamp	ARM1R:End	0.000	1.723	1.128	2.059
NESC Heavy	CL3	Clamp	ARM2L:End	0.000	2.802	2.515	3.765
NESC Heavy	CL4	Clamp	ARM2R:END	0.000	2.844	2.523	3.802
NESC Heavy	CL5	Clamp	ARM3L:End	0.000	2.868	2.528	3.823
NESC Heavy	CL6	Clamp	ARM3R:END	0.000	2.877	2.523	3.827
NESC Heavy	CL7	Clamp	ARM4L:End	0.000	2.841	2.522	3.799
NESC Heavy	CL8	Clamp	ARM4R:END	0.000	2.965	2.540	3.904
NESC Heavy	CL9	Clamp	1256:WVGD1	0.000	0.172	0.920	0.936
NESC Heavy	CL10	Clamp	1256:WVGD2	0.000	0.172	0.920	0.936
NESC Heavy	CL11	Clamp	1256:WVGD3	0.000	0.172	0.920	0.936
NESC Heavy	CL12	Clamp	1256:WVGD4	0.000	0.172	0.920	0.936
NESC Heavy	CL13	Clamp	1256:WVGD5	0.000	0.172	0.920	0.936
NESC Heavy	CL14	Clamp	1256:WVGD6	0.000	0.172	0.920	0.936
NESC Heavy	CL15	Clamp	1256:WVGD7	0.000	0.172	0.920	0.936
NESC Heavy	CL16	Clamp	1256:TCMid	0.000	2.616	0.000	2.616
NESC Heavy	CL17	Clamp	1256:BCMid	0.000	-0.834	8.458	8.499
NESC Extreme	CL1	Clamp	ARM1L:End	0.000	1.239	0.392	1.300
NESC Extreme	CL2	Clamp	ARM1R:End	0.007	1.120	0.374	1.181
NESC Extreme	CL3	Clamp	ARM2L:End	0.000	2.247	1.116	2.509
NESC Extreme	CL4	Clamp	ARM2R:END	0.000	2.266	1.119	2.527
NESC Extreme	CL5	Clamp	ARM3L:End	0.000	2.274	1.122	2.536
NESC Extreme	CL6	Clamp	ARM3R:END	0.000	2.280	1.119	2.540
NESC Extreme	CL7	Clamp	ARM4L:End	0.000	2.265	1.120	2.527
NESC Extreme	CL8	Clamp	ARM4R:END	0.000	2.319	1.127	2.578
NESC Extreme	CL9	Clamp	1256:WVGD1	0.000	0.480	0.250	0.541
NESC Extreme	CL10	Clamp	1256:WVGD2	0.000	0.480	0.250	0.541
NESC Extreme	CL11	Clamp	1256:WVGD3	0.000	0.480	0.250	0.541
NESC Extreme	CL12	Clamp	1256:WVGD4	0.000	0.480	0.250	0.541
NESC Extreme	CL13	Clamp	1256:WVGD5	0.000	0.480	0.250	0.541
NESC Extreme	CL14	Clamp	1256:WVGD6	0.000	0.480	0.250	0.541
NESC Extreme	CL15	Clamp	1256:WVGD7	0.000	0.480	0.250	0.541
NESC Extreme	CL16	Clamp	1256:TCMid	0.000	10.132	0.000	10.132
NESC Extreme	CL17	Clamp	1256:BCMid	0.000	-3.323	3.997	5.198

Overturning Moments For User Input Concentrated Loads:

Moments are static equivalents based on central axis of 0,0 (i.e. a single pole).

Load Case	Total Tran. Load (kips)	Total Long. Load (kips)	Total Vert. Load (kips)	Transverse Overturning Moment (ft-k)	Longitudinal Overturning Moment (ft-k)	Torsional Moment (ft-k)
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NESC Heavy 23.842 0.000 32.325 1913.289 -0.000 -0.000
NESC Extreme 26.179 0.007 13.236 2081.191 0.660 -0.041

*** Weight of structure (lbs):
Weight of Tubular Davit Arms: 974.9
Weight of Steel Poles: 13405.8
Total: 14380.7

*** End of Report

Anchor Bolt Analysis:

Input Data:

Bolt Force:

Maximum Tensile Force =	$T_{Max} := 151\text{-kips}$	(User Input from PLS-Pole)
Maximum Shear Force at Base =	$V_{base} := 33\text{-kips}$	(User Input from PLS-Pole)

Anchor Bolt Data:

Use ASTM A615 Grade 75		
Number of Anchor Bolts =	$N := 16$	(User Input)
Bolt "Column" Distance =	$l := 3.0\text{-in}$	(User Input)
Bolt Ultimate Strength =	$F_u := 100\text{-ksi}$	(User Input)
Bolt Yield Strength =	$F_y := 75\text{-ksi}$	(User Input)
Bolt Modulus =	$E := 29000\text{-ksi}$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25\text{-in}$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)

Anchor Bolt Analysis:

Stress Area of Bolt =	$A_s := \frac{\pi}{4} \cdot \left(D - \frac{0.9743\text{-in}}{n} \right)^2 = 3.248\text{-in}^2$
Maximum Shear Force per Bolt =	$V_{Max} := \frac{V_{base}}{N} = 2.1\text{-kips}$
Shear Stress per Bolt =	$f_v := \frac{V_{Max}}{A_s} = 635.1\text{ psi}$
Tensile Stress Permitted =	$F_t := 0.75 \cdot F_u = 75\text{-ksi}$
Shear Stress Permitted =	$F_v := 0.35 F_y = 26.25\text{-ksi}$
Permitted Axial Tensile Stress in Conjunction with Shear =	$F_{tv} := F_t \cdot \sqrt{1 - \left(\frac{f_v}{F_v} \right)^2} = 74.98\text{-ksi}$
Bolt Tension % of Capacity =	$\frac{T_{Max}}{F_{tv} \cdot A_s} = 62.01\%$
Condition1 =	$Condition1 := \text{if} \left(\frac{T_{Max}}{F_{tv} \cdot A_s} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$

Condition1 = "OK"

Caisson Foundation:

Input Data:

Shear Force =	S := 33.1.1k = 36.3-k	<i>USER INPUT-FROM PLS-Pole</i>
Overturning Moment =	M := 2442.1.1ft-k = 2686-ft-k	<i>USER INPUT-FROM PLS-Pole</i>
Applied Axial Load =	A1 := 28.1.1k = 30.8-k	<i>USER INPUT-FROM PLS-Pole</i>
Bending Moment =	Mu := 2788ft-k	<i>USER INPUT-FROM LPILE</i>
Moment Capacity =	Mn := 11957ft-k	<i>USER INPUT-FROM LPILE</i>
Foundation Diameter =	d := 10.0ft	<i>USER INPUT</i>
Overall Length of Caisson =	Lc := 18.5ft	<i>USER INPUT</i>
Depth From Top of Caisson to Grade =	Lpag := 0.5ft	<i>USER INPUT</i>
Number of Rebar =	n := 28	<i>USER INPUT</i>
Area of Rebar =	Ar := 1.56in ²	<i>USER INPUT</i>
Rebar Yield Strength =	fy := 60ksi	<i>USER INPUT</i>
Concrete Comp Strength =	fc := 3ksi	<i>USER INPUT</i>

Check Moment Capacity:

Factor of Safety =	FS := $\frac{0.9 \cdot Mn}{Mu} = 3.9$
Factor of Safety Required =	FS _{reqd} := 1.0
	FOSCheck := if(FS ≥ FS _{reqd} , "OK", "NO GOOD")
	FOSCheck = "OK"

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LPILE Plus for Windows, Version 5.0 (5.0.47)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

TJL
Centek Engineering

Files Used for Analysis

Path to file locations:

J:\Jobs\2105100.WI\03_CT11001B\05_Structural\Tower\Calcs\L-Pile\

Name of input data file: 1256 Cai sson Analysis.lpd

Name of output file: 1256 Cai sson Analysis.lpo

Name of plot output file: 1256 Cai sson Analysis.lpp

Name of runtime file: 1256 Cai sson Analysis.lpr

Time and Date of Analysis

Date: July 8, 2021 Time: 14:02:50

Problem Title

21051.03/CT11001B - Greenwich/Structure # 1256

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 3:

- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:

- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- Analysis includes computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:

- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-04 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:

- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 8

 Pile Structural Properties and Geometry

- Pile Length = 222.00 in
- Depth of ground surface below top of pile = 6.00 in
- Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	120.00000	10178760.	11309.7000	3122018.
2	222.0000	120.00000	10178760.	11309.7000	3122018.

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 6.000 in
 Distance from top of pile to bottom of layer = 222.000 in
 p-y subgrade modulus k for top of soil layer = 90.000 lbs/in**3
 p-y subgrade modulus k for bottom of layer = 90.000 lbs/in**3

(Depth of lowest layer extends 0.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 2 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	6.00	0.05800
2	222.00	0.05800

Shear Strength of Soils

Shear strength parameters with depth defined using 2 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	6.000	0.00000	30.00	-----	-----
2	222.000	0.00000	30.00	-----	-----

Notes:

- (1) Cohesion = uniaxial compressive strength for rock materials.
- (2) Values of E50 are reported for clay strata.
- (3) Default values will be generated for E50 when input values are 0.
- (4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)

Shear force at pile head = 36300.000 lbs

Bending moment at pile head = 32232000.000 in-lbs

Axial load at pile head = 30800.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 120.0000 in

Material Properties:

Compressive Strength of Concrete = 3.000 kip/in**2

Yield Stress of Reinforcement = 60. kip/in**2

Modulus of Elasticity of Reinforcement = 29000. kip/in**2

Number of Reinforcing Bars = 28

Area of Single Bar = 1.56000 in**2

Number of Rows of Reinforcing Bars = 15

Area of Steel = 43.680 in**2
 Area of Shaft = 11309.734 in**2
 Percentage of Steel Reinforcement = 0.386 percent
 Cover Thickness (edge to bar center) = 4.000 in

Unfactored Axial Squash Load Capacity = 31349.24 kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement in**2	Distance to Centroidal Axis in
1	1.560	56.000
2	3.120	54.596
3	3.120	50.454
4	3.120	43.783
5	3.120	34.915
6	3.120	24.297
7	3.120	12.461
8	3.120	0.000
9	3.120	-12.461
10	3.120	-24.297
11	3.120	-34.915
12	3.120	-43.783
13	3.120	-50.454
14	3.120	-54.596
15	1.560	-56.000

Axial Thrust Force = 30800.00 lbs

Bending Max. Steel Moment Stress in-lbs psi	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi
16962413.839.94597	3.392483E+13	5.000000E-07	0.00003096	61.92730844	95.03993093
33721968.1655.08080	3.372197E+13	0.00000100	0.00006107	61.07175171	185.68114
50279104.2470.20437	3.351940E+13	0.00000150	0.00009118	60.78630745	274.61627
66633823.3285.31654	3.331691E+13	0.00000200	0.00012129	60.64338863	361.84536
66633823.6532.80989	2.665353E+13	0.00000250	0.00006473	25.89227736	192.22376
66633823.	2.221127E+13	0.00000300	0.00007673	25.57679951	226.92059

7866. 81844						
66633823.	1. 903824E+13	0. 00000350	0. 00008875	25. 35595715	261. 40720	
9200. 37035						
66633823.	1. 665846E+13	0. 00000400	0. 00010078	25. 19428790	295. 68285	
10533. 46260						
66633823.	1. 480752E+13	0. 00000450	0. 00011282	25. 07209361	329. 74681	
11866. 09178						
66633823.	1. 332676E+13	0. 00000500	0. 00012489	24. 97755110	363. 59830	
13198. 25509						
66633823.	1. 211524E+13	0. 00000550	0. 00013697	24. 90314662	397. 23667	
14529. 94811						
66633823.	1. 110564E+13	0. 00000600	0. 00014906	24. 84386265	430. 66112	
15861. 16790						
66633823.	1. 025136E+13	0. 00000650	0. 00016118	24. 79622662	463. 87084	
17191. 91128						
66633823.	9. 519118E+12	0. 00000700	0. 00017330	24. 75776374	496. 86516	
18522. 17396						
66633823.	8. 884510E+12	0. 00000750	0. 00018545	24. 72665012	529. 64317	
19851. 95360						
66633823.	8. 329228E+12	0. 00000800	0. 00019761	24. 70153034	562. 20423	
21181. 24496						
66633823.	7. 839273E+12	0. 00000850	0. 00020979	24. 68135655	594. 54745	
22510. 04561						
66633823.	7. 403758E+12	0. 00000900	0. 00022199	24. 66531694	626. 67196	
23838. 35228						
66633823.	7. 014087E+12	0. 00000950	0. 00023420	24. 65277851	658. 57712	
25166. 15952						
66633823.	6. 663382E+12	0. 00001000	0. 00024643	24. 64322627	690. 26203	
26493. 46438						
66633823.	6. 346078E+12	0. 00001050	0. 00025868	24. 63624895	721. 72593	
27820. 26220						
66633823.	6. 057620E+12	0. 00001100	0. 00027095	24. 63150322	752. 96785	
29146. 55047						
66633823.	5. 794245E+12	0. 00001150	0. 00028323	24. 62871015	783. 98694	
30472. 32516						
66633823.	5. 552819E+12	0. 00001200	0. 00029553	24. 62764084	814. 78246	
31797. 58099						
66633823.	5. 330706E+12	0. 00001250	0. 00030785	24. 62809861	845. 35352	
33122. 31425						
66633823.	5. 125679E+12	0. 00001300	0. 00032019	24. 62991536	875. 69913	
34446. 52191						
66633823.	4. 935839E+12	0. 00001350	0. 00033254	24. 63295519	905. 81855	
35770. 19804						
66633823.	4. 759559E+12	0. 00001400	0. 00034492	24. 63709652	935. 71086	
37093. 33881						
66633823.	4. 595436E+12	0. 00001450	0. 00035731	24. 64223564	965. 37514	
38415. 93991						
66702192.	4. 446813E+12	0. 00001500	0. 00036972	24. 64827955	994. 81035	
39737. 99840						
68853072.	4. 442134E+12	0. 00001550	0. 00038215	24. 65515316	1024. 01566	
41059. 50866						

71001612. 42380. 46613	4. 437601E+12	0. 00001600	0. 00039460	24. 66278851	1052. 99014
73147805. 43700. 86506	4. 433200E+12	0. 00001650	0. 00040707	24. 67112839	1081. 73292
75291620. 45020. 70302	4. 428919E+12	0. 00001700	0. 00041956	24. 68011558	1110. 24287
77433052. 46339. 97362	4. 424746E+12	0. 00001750	0. 00043207	24. 68970716	1138. 51915
79572080. 47658. 67297	4. 420671E+12	0. 00001800	0. 00044460	24. 69986022	1166. 56069
81708691. 48976. 79584	4. 416686E+12	0. 00001850	0. 00045714	24. 71053898	1194. 36654
83842868. 50294. 33709	4. 412783E+12	0. 00001900	0. 00046971	24. 72171128	1221. 93568
85974599. 51611. 29143	4. 408954E+12	0. 00001950	0. 00048230	24. 73334849	1249. 26713
90230643. 54243. 42016	4. 401495E+12	0. 00002050	0. 00050754	24. 75791395	1303. 21269
94476669. 56873. 14297	4. 394264E+12	0. 00002150	0. 00053286	24. 78405297	1356. 19456
98712571. 59500. 41165	4. 387225E+12	0. 00002250	0. 00055826	24. 81162965	1408. 20448
1. 022908E+08 60000. 00000	4. 352801E+12	0. 00002350	0. 00058245	24. 78504002	1456. 54611
1. 051256E+08 60000. 00000	4. 290839E+12	0. 00002450	0. 00060519	24. 70150888	1500. 91864
1. 075022E+08 60000. 00000	4. 215771E+12	0. 00002550	0. 00062702	24. 58888471	1542. 57364
1. 096261E+08 60000. 00000	4. 136834E+12	0. 00002650	0. 00064832	24. 46503818	1582. 37113
1. 113675E+08 60000. 00000	4. 049727E+12	0. 00002750	0. 00066880	24. 31986272	1619. 78042
1. 131044E+08 60000. 00000	3. 968576E+12	0. 00002850	0. 00068931	24. 18638885	1656. 53269
1. 146900E+08 60000. 00000	3. 887797E+12	0. 00002950	0. 00070948	24. 05031860	1691. 91671
1. 165760E+08 60000. 00000	3. 822162E+12	0. 00003050	0. 00073200	24. 00000036	1730. 77418
1. 171852E+08 60000. 00000	3. 720164E+12	0. 00003150	0. 00075120	23. 84777248	1762. 94916
1. 183789E+08 60000. 00000	3. 642428E+12	0. 00003250	0. 00077003	23. 69308054	1793. 82023
1. 195694E+08 60000. 00000	3. 569236E+12	0. 00003350	0. 00078888	23. 54874194	1824. 13662
1. 205631E+08 60000. 00000	3. 494584E+12	0. 00003450	0. 00080710	23. 39412868	1852. 77405
1. 213464E+08 60000. 00000	3. 418207E+12	0. 00003550	0. 00082461	23. 22852910	1879. 70655
1. 221270E+08 60000. 00000	3. 345945E+12	0. 00003650	0. 00084216	23. 07283223	1906. 15646
1. 229051E+08	3. 277468E+12	0. 00003750	0. 00085973	22. 92625487	1932. 12136

60000.00000						
1. 236805E+08	3. 212481E+12	0.00003850	0.00087734	22. 78809249	1957. 59867	
60000.00000						
1. 244534E+08	3. 150719E+12	0.00003950	0.00089498	22. 65771210	1982. 58575	
60000.00000						
1. 252236E+08	3. 091941E+12	0.00004050	0.00091265	22. 53454149	2007. 07984	
60000.00000						
1. 259509E+08	3. 034962E+12	0.00004150	0.00093017	22. 41382778	2030. 82837	
60000.00000						
1. 264344E+08	2. 974928E+12	0.00004250	0.00094667	22. 27463186	2052. 61847	
60000.00000						
1. 269158E+08	2. 917605E+12	0.00004350	0.00096320	22. 14244187	2073. 97732	
60000.00000						
1. 273952E+08	2. 862813E+12	0.00004450	0.00097975	22. 01679647	2094. 90317	
60000.00000						
1. 276907E+08	2. 806390E+12	0.00004550	0.00100100	21. 99999869	2121. 44998	
60000.00000						
1. 284727E+08	2. 762853E+12	0.00004650	0.00101900	21. 91394269	2143. 11560	
60000.00000						
1. 289300E+08	2. 714315E+12	0.00004750	0.00103493	21. 78791106	2161. 67821	
60000.00000						
1. 293854E+08	2. 667741E+12	0.00004850	0.00105088	21. 66761935	2179. 83903	
60000.00000						
1. 298390E+08	2. 623010E+12	0.00004950	0.00106686	21. 55272067	2197. 59584	
60000.00000						
1. 302907E+08	2. 580013E+12	0.00005050	0.00108287	21. 44289672	2214. 94644	
60000.00000						
1. 307404E+08	2. 538649E+12	0.00005150	0.00109890	21. 33786142	2231. 88906	
60000.00000						
1. 311883E+08	2. 498825E+12	0.00005250	0.00111496	21. 23734295	2248. 42144	
60000.00000						
1. 315927E+08	2. 459677E+12	0.00005350	0.00113077	21. 13589466	2264. 24834	
60000.00000						
1. 318545E+08	2. 419348E+12	0.00005450	0.00114566	21. 02129996	2278. 70507	
60000.00000						
1. 321147E+08	2. 380445E+12	0.00005550	0.00116057	20. 91124356	2292. 80924	
60000.00000						
1. 323734E+08	2. 342893E+12	0.00005650	0.00117551	20. 80548227	2306. 55888	
60000.00000						
1. 326307E+08	2. 306621E+12	0.00005750	0.00119047	20. 70380151	2319. 95269	
60000.00000						
1. 328865E+08	2. 271563E+12	0.00005850	0.00120545	20. 60599029	2332. 98868	
60000.00000						
1. 331407E+08	2. 237658E+12	0.00005950	0.00122046	20. 51185548	2345. 66508	
60000.00000						
1. 336445E+08	2. 173081E+12	0.00006150	0.00125054	20. 33391058	2369. 93222	
60000.00000						
1. 341421E+08	2. 112475E+12	0.00006350	0.00128071	20. 16866505	2392. 73988	
60000.00000						
1. 346335E+08	2. 055473E+12	0.00006550	0.00131098	20. 01496732	2414. 07307	
60000.00000						

1. 363535E+08 60000. 00000	2. 020051E+12	0. 00006750	0. 00135000	20. 00000060	2439. 65847
1. 363535E+08 60000. 00000	1. 961920E+12	0. 00006950	0. 00138253	19. 89252269	2458. 75340
1. 363535E+08 60000. 00000	1. 907042E+12	0. 00007150	0. 00141162	19. 74290907	2474. 17748
1. 366317E+08 60000. 00000	1. 858935E+12	0. 00007350	0. 00144080	19. 60276544	2488. 22238
1. 369129E+08 60000. 00000	1. 813416E+12	0. 00007550	0. 00146824	19. 44692910	2500. 06370
1. 371405E+08 60000. 00000	1. 769555E+12	0. 00007750	0. 00149519	19. 29277360	2510. 45318
1. 373637E+08 60000. 00000	1. 727845E+12	0. 00007950	0. 00152222	19. 14740860	2519. 66054
1. 375823E+08 60000. 00000	1. 688127E+12	0. 00008150	0. 00154933	19. 01019037	2527. 67387
1. 377964E+08 60000. 00000	1. 650257E+12	0. 00008350	0. 00157653	18. 88055384	2534. 48148
1. 380059E+08 60000. 00000	1. 614104E+12	0. 00008550	0. 00160381	18. 75797331	2540. 07112
1. 382106E+08 60000. 00000	1. 579550E+12	0. 00008750	0. 00163117	18. 64197671	2544. 43043
1. 384107E+08 60000. 00000	1. 546488E+12	0. 00008950	0. 00165863	18. 53214204	2547. 54688
1. 386059E+08 60000. 00000	1. 514819E+12	0. 00009150	0. 00168617	18. 42807233	2549. 40752
1. 387958E+08 60000. 00000	1. 484447E+12	0. 00009350	0. 00171380	18. 32940996	2549. 83419
1. 389714E+08 60000. 00000	1. 455198E+12	0. 00009550	0. 00174152	18. 23583305	2545. 32234
1. 391453E+08 60000. 00000	1. 427131E+12	0. 00009750	0. 00176934	18. 14703763	2540. 79437
1. 393175E+08 60000. 00000	1. 400175E+12	0. 00009950	0. 00179724	18. 06275189	2536. 24999
1. 393175E+08 60000. 00000	1. 372586E+12	0. 00010150	0. 00182700	17. 99999893	2540. 87807
1. 393175E+08 60000. 00000	1. 346062E+12	0. 00010350	0. 00186300	17. 99999893	2545. 65388
1. 393277E+08 60000. 00000	1. 320642E+12	0. 00010550	0. 00189900	17. 99999893	2548. 67932
1. 401287E+08 60000. 00000	1. 303522E+12	0. 00010750	0. 00193379	17. 98878014	2549. 93690
1. 402784E+08 60000. 00000	1. 281081E+12	0. 00010950	0. 00196086	17. 90738761	2547. 71894
1. 404260E+08 60000. 00000	1. 259426E+12	0. 00011150	0. 00198806	17. 83012927	2544. 00023
1. 405728E+08 60000. 00000	1. 238527E+12	0. 00011350	0. 00201533	17. 75623620	2540. 26874
1. 406938E+08 60000. 00000	1. 218128E+12	0. 00011550	0. 00204200	17. 67968953	2536. 64285
1. 407475E+08	1. 197851E+12	0. 00011750	0. 00206693	17. 59090483	2533. 32289

60000.00000						
1.408007E+08	1.178249E+12	0.00011950	0.00209191	17.50556409	2534.82079	
60000.00000						
1.408534E+08	1.159288E+12	0.00012150	0.00211696	17.42350638	2538.25559	
60000.00000						
1.409056E+08	1.140936E+12	0.00012350	0.00214205	17.34457433	2541.26106	
60000.00000						
1.409573E+08	1.123166E+12	0.00012550	0.00216721	17.26862133	2543.83216	
60000.00000						
1.410084E+08	1.105948E+12	0.00012750	0.00219243	17.19551504	2545.96387	
60000.00000						
1.410590E+08	1.089258E+12	0.00012950	0.00221770	17.12513387	2547.65107	
60000.00000						
1.411090E+08	1.073072E+12	0.00013150	0.00224304	17.05734909	2548.88832	
60000.00000						
1.411584E+08	1.057366E+12	0.00013350	0.00226844	16.99205697	2549.67034	
60000.00000						
1.412073E+08	1.042120E+12	0.00013550	0.00229390	16.92915380	2549.99159	
60000.00000						
1.412539E+08	1.027301E+12	0.00013750	0.00231955	16.86947286	2547.77269	
60000.00000						
1.413000E+08	1.012903E+12	0.00013950	0.00234527	16.81199849	2545.01507	
60000.00000						
1.413913E+08	9.853052E+11	0.00014350	0.00239682	16.70260370	2539.48102	
60000.00000						
1.414816E+08	9.591974E+11	0.00014750	0.00244852	16.60012901	2533.92143	
60000.00000						
1.415709E+08	9.344614E+11	0.00015150	0.00250036	16.50404155	2528.33591	
60000.00000						
1.416591E+08	9.109912E+11	0.00015550	0.00255236	16.41386569	2526.48729	
60000.00000						
1.417463E+08	8.886913E+11	0.00015950	0.00260450	16.32917225	2533.22279	
60000.00000						
1.418323E+08	8.674759E+11	0.00016350	0.00265681	16.24957860	2538.85685	
60000.00000						
1.419172E+08	8.472668E+11	0.00016750	0.00270927	16.17473423	2543.36773	
60000.00000						
1.419978E+08	8.279758E+11	0.00017150	0.00276212	16.10563338	2546.75836	
60000.00000						
1.420640E+08	8.094814E+11	0.00017550	0.00281611	16.04618490	2549.01991	
60000.00000						
1.422372E+08	7.924078E+11	0.00017950	0.00287200	16.00000083	2549.98563	
60000.00000						
1.428721E+08	7.785945E+11	0.00018350	0.00293600	16.00000083	2544.36144	
60000.00000						
1.434856E+08	7.652563E+11	0.00018750	0.00300000	16.00000083	2538.04680	
60000.00000						
1.440817E+08	7.523850E+11	0.00019150	0.00306400	16.00000083	2531.73216	
60000.00000						
1.446480E+08	7.398876E+11	0.00019550	0.00312800	16.00000083	2525.41752	
60000.00000						

1. 450002E+08	7. 268182E+11	0. 00019950	0. 00319200	16. 00000083	2519. 10287
60000. 00000					
1. 453351E+08	7. 141776E+11	0. 00020350	0. 00325600	16. 00000083	2513. 07909
60000. 00000					
1. 456528E+08	7. 019410E+11	0. 00020750	0. 00332000	16. 00000083	2522. 92762
60000. 00000					
1. 459531E+08	6. 900855E+11	0. 00021150	0. 00338400	16. 00000083	2531. 25140
60000. 00000					
1. 462361E+08	6. 785898E+11	0. 00021550	0. 00344800	16. 00000083	2538. 05041
60000. 00000					
1. 465018E+08	6. 674343E+11	0. 00021950	0. 00351200	16. 00000083	2543. 32465
60000. 00000					
1. 467502E+08	6. 566006E+11	0. 00022350	0. 00357600	16. 00000083	2547. 07413
60000. 00000					
1. 469814E+08	6. 460720E+11	0. 00022750	0. 00364000	16. 00000083	2549. 29884
60000. 00000					
1. 473017E+08	6. 362924E+11	0. 00023150	0. 00370400	16. 00000083	2549. 79904
60000. 00000					
1. 473017E+08	6. 254848E+11	0. 00023550	0. 00376222	15. 97546041	2545. 90138
60000. 00000					
1. 473017E+08	6. 150383E+11	0. 00023950	0. 00381594	15. 93296349	2542. 79250
60000. 00000					

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 143485.55769
in-kip

 Computed Values of Load Distribution and Deflection
 for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)
 Specified shear force at pile head = 36300.000 lbs
 Specified moment at pile head = 32232000.000 in-lbs
 Specified axial load at pile head = 30800.000 lbs

Depth Es*h X F/L in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res. p lbs/in
0.000 0.000	2.957	3.22E+07	36300.	-0.018707	192.719	3.37E+13	0.000
17.760 444.499	2.625	3.29E+07	33200.	-0.018690	196.509	3.37E+13	-525.542
35.520	2.293	3.34E+07	16710.	-0.018673	199.311	3.37E+13	-1331.614

1289.232								
53.280	1.962	3.34E+07	-14005.	-0.018655	199.639	3.37E+13	-2121.945	
2401.580								
71.040	1.630	3.28E+07	-58311.	-0.018638	196.031	3.37E+13	-2855.393	
3888.109								
88.800	1.299	3.13E+07	-1.15E+05	-0.018621	187.129	3.37E+13	-3488.703	
5959.946								
106.560	0.968933	2.87E+07	-1.81E+05	-0.018605	171.766	3.38E+13	-3951.366	
9053.287								
124.320	0.638639	2.48E+07	-2.54E+05	-0.018591	149.097	3.38E+13	-4140.378	
14393.								
142.080	0.308574	1.97E+07	-3.25E+05	-0.018579	118.799	3.39E+13	-3779.173	
27189.								
159.840	-0.021307	1.35E+07	-3.58E+05	-0.018570	82.437	3.39E+13	295.009	
30737.								
177.600	-0.351063	7.47E+06	-3.09E+05	-0.018565	46.784	3.39E+13	4947.971	
31289.								
195.360	-0.680748	2.86E+06	-2.06E+05	-0.018562	19.598	3.39E+13	6618.674	
21584.								
213.120	-1.010	3.34E+05	-75187.	-0.018562	4.692	3.39E+13	8111.983	
17823.								

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	2.95685244 in
Computed slope at pile head	=	-0.01870732
Maximum bending moment	=	33450287. lbs-in
Maximum shear force	=	-357949.21362 lbs
Depth of maximum bending moment	=	46.62000000 in
Depth of maximum shear force	=	157.62000 in
Number of iterations	=	28
Number of zero deflection points	=	1

 Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacement in
 Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
 Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
 Type 4 = Deflection and Moment, S = Pile-head Slope, radians
 Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 36300.	M= 3.22E+07	30800.0000	2.9569	3.3450E+07	-357949.

Computed Pile-head Stiffness Matrix Members
 K22, K23, K32, K33 for Superstructure

Top y in	Shear React. lbs	Mom. React. in-lbs	K22 lbs/in	K32 in-lbs/in
0.00185372	3630.00005	538201.65562	1958225.	2.903361E+08
0.00558025	10927.38884	1620148.	1958225.	2.903361E+08
0.00884449	17319.50155	2567874.	1958225.	2.903361E+08
0.01116050	21854.77768	3240297.	1958225.	2.903361E+08
0.01295694	25372.61116	3761868.	1958225.	2.903361E+08
0.01442474	28246.89039	4188023.	1958225.	2.903361E+08
0.01566575	30677.05885	4548332.	1958225.	2.903361E+08
0.01674075	32782.16653	4860445.	1958225.	2.903361E+08
0.01768898	34639.00309	5135749.	1958225.	2.903361E+08
0.01853719	36300.00000	5382016.	1958225.	2.903361E+08

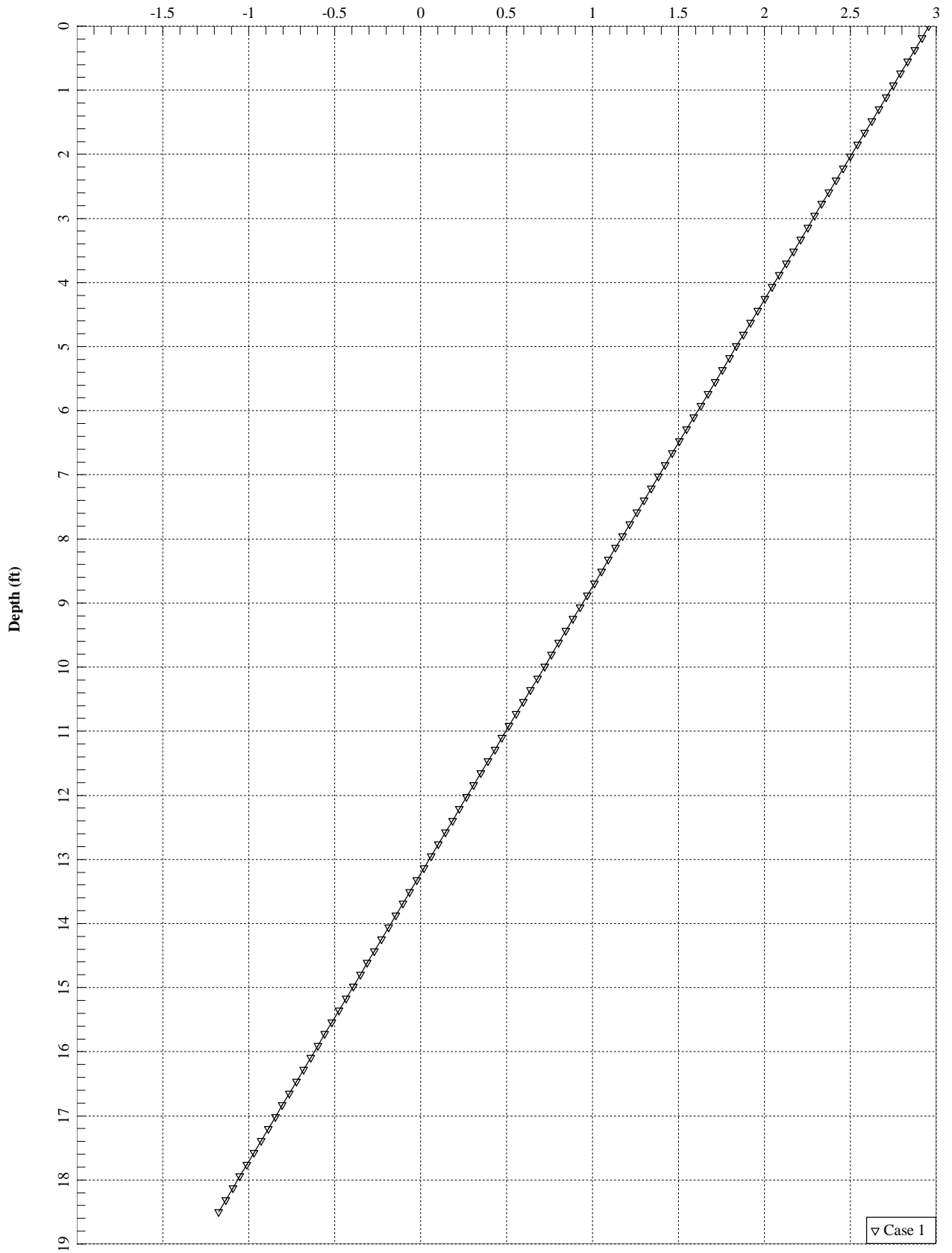
Top Rot. rad	Shear React. lbs	Mom. React. in-lbs	K23 lbs/rad	K33 in-lbs/rad
0.00006661	19339.60259	3223200.	2.903361E+08	4.838834E+10
0.00020052	58218.00398	9702799.	2.903361E+08	4.838834E+10
0.00031782	92273.35317	15378572.	2.903361E+08	4.838834E+10
0.00040105	116436.02190	19405598.	2.903297E+08	4.838727E+10
0.00046563	135178.13901	22529201.	2.903129E+08	4.838443E+10
0.00051840	150491.65326	25081371.	2.902975E+08	4.838182E+10
0.00056303	163439.10302	27239200.	2.902849E+08	4.837966E+10
0.00060169	174654.73168	29108396.	2.902745E+08	4.837788E+10
0.00063579	184547.64218	30757145.	2.902659E+08	4.837639E+10
0.00066629	193397.17019	32232000.	2.902586E+08	4.837514E+10

K22 = abs(Shear Reaction/Top y)
 K23 = abs(Shear Reaction/Top Rotation)

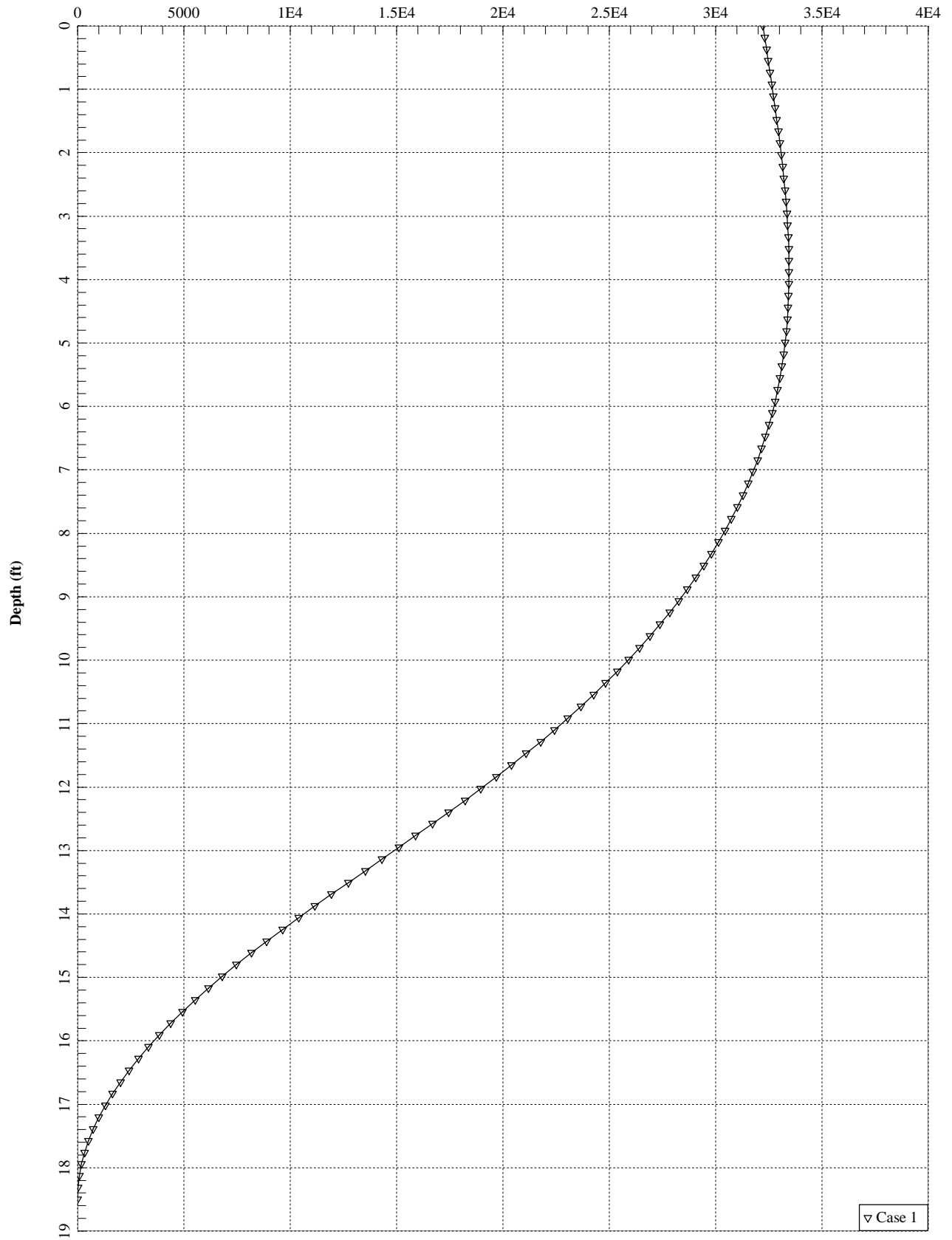
K32 = abs(Moment Reaction/Top y)
K33 = abs(Moment Reaction/Top Rotation)

The analysis ended normally.

Lateral Deflection (in)

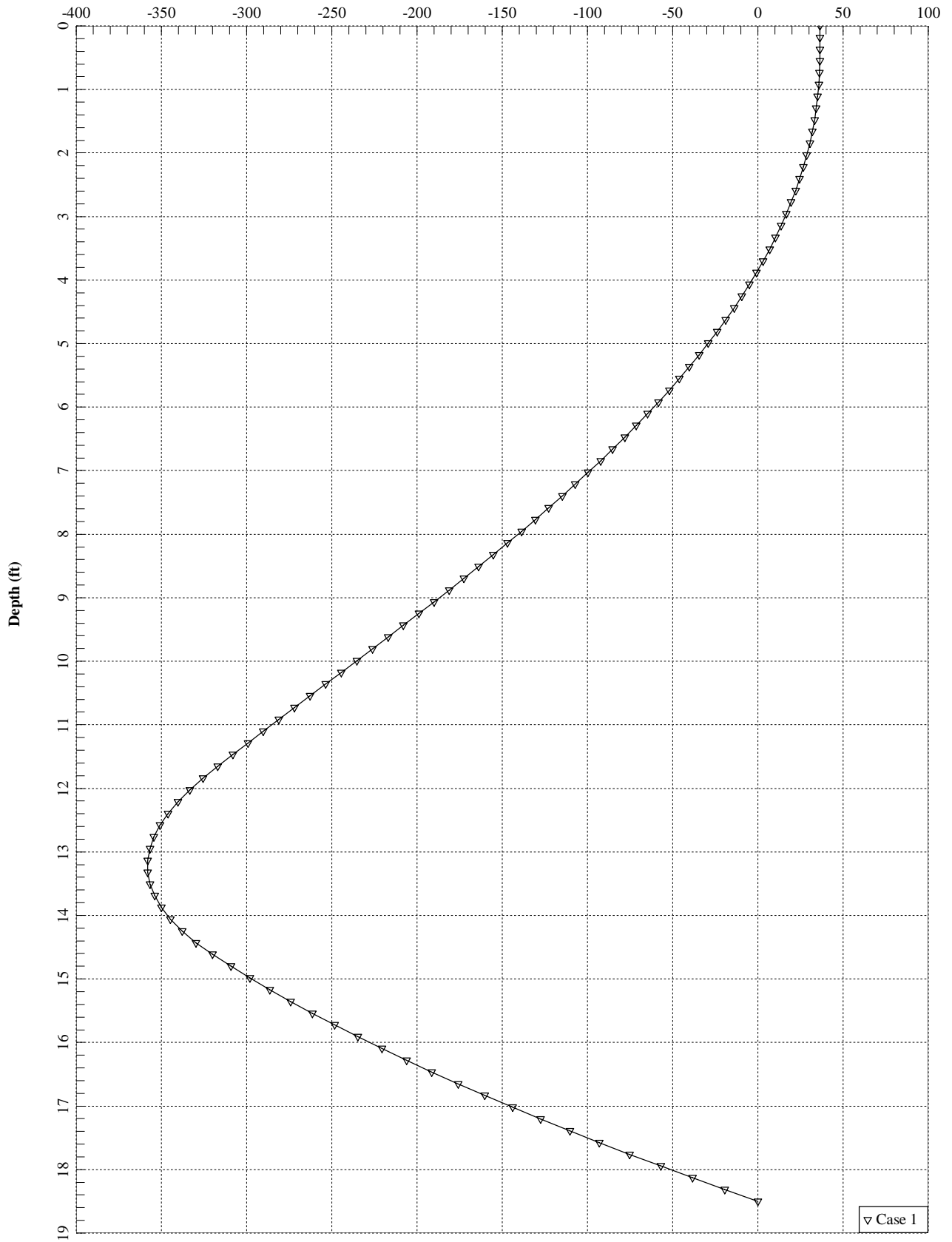


Bending Moment (in-kips)



▽ Case 1

Shear Force (kips)



▽ Case 1

RAN Template: 67D94B Outdoor	A&L Template: 67D94B_1DP+1OP
--	--

Section 1 - Site Information

Site ID: CT11001B	Site Name: Greenwich/ Riverside	Latitude: 41.03302600
Status: Final	Site Class: Utility Lattice Tower	Longitude: -73.56729100
Version: 6	Site Type: Structure Non Building	Address: 160 SOUND BEACH ROAD
Project Type: L600	Plan Year:	City, State: Greenwich, CT
Approved: 7/7/2021 9:25:40 AM	Market: CONNECTICUT CT	Region: NORTHEAST
Approved By: Alex.Murillo9@T-Mobile.com	Vendor: Ericsson	
Last Modified: 7/7/2021 9:25:40 AM	Landlord: CL&P	
Last Modified By: Alex.Murillo9@T-Mobile.com		

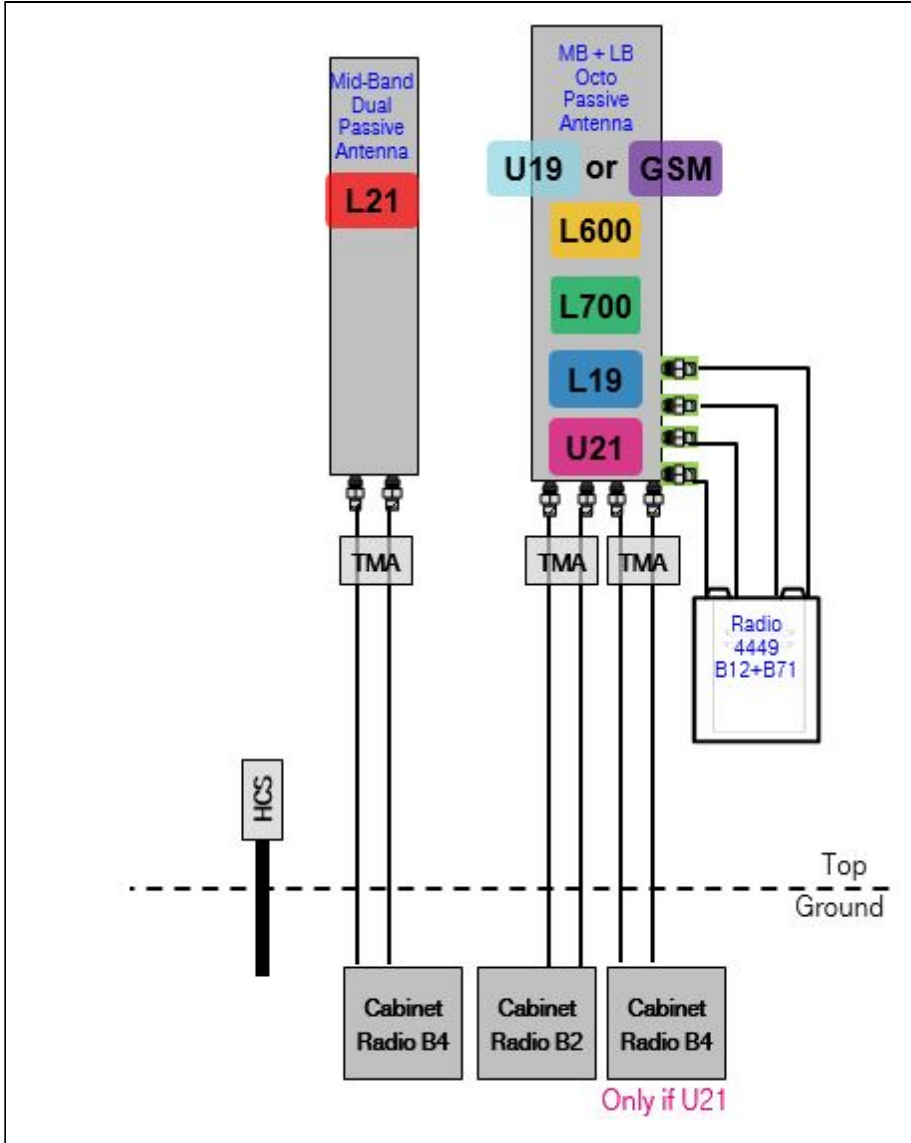
RAN Template: 67D94B Outdoor		AL Template: 67D94B_1DP+1OP		
Sector Count: 3	Antenna Count: 6	Coax Line Count: 24	TMA Count: 0	RRU Count: 3

Section 2 - Existing Template Images

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

Section 3 - Proposed Template Images

67D94B_1DP+10P.JPG



Notes:

Section 4 - Siteplan Images

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

RAN Template: 67D94B Outdoor	A&L Template: 67D94B_1DP+1OP
--	--

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 94DB Outdoor (evolved from 4B)

Enclosure	1			
Enclosure Type	RBS 6102			
Baseband	DUW30 U2100	DUW30 U1900 (DECOMMISSIONED)	DUG20 G1900	BB 6630 L1900 L2100
Radio	RUS01 B2 (x 3) L1900 G1900	RUS01 B2 (x 3) L1900	RUS01 B4 (x 3) U2100	RUS01 B4 (x 3) L2100

Proposed RAN Equipment

Template: 67D94B Outdoor

Enclosure	1			
Enclosure Type	RBS 6102			
Baseband	DUW30 U2100	DUG20 G1900	BB 6630 L2100 L1900	BB 6648 L700 L600 N600
Radio	RUS01 B2 (x 3) L1900 G1900	RUS01 B2 (x 3) L1900	RUS01 B4 (x 3) U2100	RUS01 B4 (x 3) L2100

RAN Scope of Work:

*** RBS6102 at Site ***

Existing: (24) Coaxial Lines

RAN Template: 67D94B Outdoor	A&L Template: 67D94B_1DP+1OP
--	--

Section 6 - A&L Equipment

Existing Template:
Proposed Template: 67D94B_1DP+1OP

Sector 1 (Existing) view from behind

Coverage Type	A - Outdoor Macro			
Antenna	1	2	3	4
Antenna Model	EMS - RR90-17-XXDP (Dual)	Empty Antenna Mount (Empty mount)	RFS - APX16DWV-16DWV-S-E-A20 (Quad)	EMS - RR90-17-XXDP (Dual)
Azimuth			60	
M. Tilt			0	
Height			110	
Ports	P1		P2	P3
Active Tech.			L1900 G1900	U2100 L2100
Dark Tech.				
Restricted Tech.				
Decomm. Tech.			U1900	
E. Tilt			6	6
Cables			1-5/8" Coax - 132 ft. (x2)	1-5/8" Coax - 132 ft. (x2)
TMA's				
Diplexers / Combiners				
Radio				
Sector Equipment				
Unconnected Equipment:				
Scope of Work:				

RAN Template: 67D94B Outdoor	A&L Template: 67D94B_1DP+1OP
--	--

Sector 1 (Proposed) view from behind							
Coverage Type	A - Outdoor Macro						
Antenna	1		2		3		4
Antenna Model	Empty Antenna Mount (Empty mount)		RFS - APXVAALL18_43-U-NA20 (Octo)		RFS - APX16DWV-16DWV-S-E-A20 (Quad)		Empty Antenna Mount (Empty mount)
Azimuth			60		60		
M. Tilt			0		0		
Height			105		105		
Ports			P1	P2	P3	P4	P5 P6
Active Tech.			L700 L600 N600	L700 L600 N600			L1900 G1900 U2100 L2100
Dark Tech.							
Restricted Tech.							
Decomm. Tech.							
E. Tilt			6	6		6	6
Cables			1-5/8" Coax - 132 ft. (x2)	1-5/8" Coax - 132 ft. (x2)			1-5/8" Coax - 152 ft. (x2) 1-5/8" Coax - 132 ft. (x2)
TMA's							
Diplexers / Combiners							
Radio			Radio 4449 B71 +B85 (At Cabinet)	SHARED Radio 4449 B71 +B85 (At Cabinet)			
Sector Equipment						Andrew Smart Bias T (Ericsson) (At Antenna)	Andrew Smart Bias T (Ericsson) (At Antenna)

Unconnected Equipment:

Scope of Work:

*** Empty Position 2. Quad in Position 3 ***
 Remove unused EMS antennae in Positions 1 and 4.
 Add (1) LB/MB Octo in Position 2.
 Move lines for PCS (L1900 and GSM) to two Mid-Band Ports of LB/MB Octo.
 Add (1) Radio 4449 B71+B12 at ground level.
 Use Bias-T for RETs as appropriate and daisy chain if needed.

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

RAN Template: 67D94B Outdoor	A&L Template: 67D94B_1DP+1OP
--	--

Sector 2 (Existing) view from behind				
Coverage Type	A - Outdoor Macro			
Antenna	1	2	3	4
Antenna Model	EMS - RR90-17-XXDP (Dual)	Empty Antenna Mount (Empty mount)	RFS - APX16DWW-16DWW-S-E-A20 (Quad)	EMS - RR90-17-XXDP (Dual)
Azimuth			180	
M. Tilt			0	
Height			110	
Ports	P1		P2	P3
Active Tech.			L1900 G1900	U2100 L2100
Dark Tech.				
Restricted Tech.				
Decomm. Tech.			U1900	
E. Tilt			3	3
Cables			1-5/8" Coax - 132 ft. (x2)	1-5/8" Coax - 132 ft. (x2)
TMA's				
Diplexers / Combiners				
Radio				
Sector Equipment				
Unconnected Equipment:				
Scope of Work:				

RAN Template: 67D94B Outdoor	A&L Template: 67D94B_1DP+1OP
--	--

Sector 2 (Proposed) view from behind							
Coverage Type	A - Outdoor Macro						
Antenna	1		2		3		4
Antenna Model	Empty Antenna Mount (Empty mount)		RFS - APXVAALL18_43-U-NA20 (Octo)		RFS - APX16DWV-16DWV-S-E-A20 (Quad)		Empty Antenna Mount (Empty mount)
Azimuth			180		180		
M. Tilt			0		0		
Height			105		105		
Ports			P1	P2	P3	P4	P5 P6
Active Tech.			L700 L600 N600	L700 L600 N600			L1900 G1900 U2100 L2100
Dark Tech.							
Restricted Tech.							
Decomm. Tech.							
E. Tilt			6	6		6	6
Cables			1-5/8" Coax - 132 ft. (x2)	1-5/8" Coax - 132 ft. (x2)			1-5/8" Coax - 132 ft. (x2) 1-5/8" Coax - 132 ft. (x2)
TMA's							
Diplexers / Combiners							
Radio			Radio 4449 B71 +B85 (At Cabinet)	SHARED Radio 4449 B71 +B85 (At Cabinet)			
Sector Equipment						Andrew Smart Bias T (Ericsson) (At Antenna)	Andrew Smart Bias T (Ericsson) (At Antenna)

Unconnected Equipment:

Scope of Work:

*** Empty Position 2. Quad in Position 3 ***
 Remove unused EMS antennae in Positions 1 and 4.
 Add (1) LB/MB Octo in Position 2.
 Move lines for PCS (L1900 and GSM) to two Mid-Band Ports of LB/MB Octo.
 Add (1) Radio 4449 B71+B12 at ground level.
 Use Bias-T for RETs as appropriate and daisy chain if needed.

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

RAN Template: 67D94B Outdoor	A&L Template: 67D94B_1DP+1OP
--	--

Sector 3 (Existing) view from behind				
Coverage Type	A - Outdoor Macro			
Antenna	1	2	3	4
Antenna Model	EMS - RR90-17-XXDP (Dual)	Empty Antenna Mount (Empty mount)	RFS - APX16DWW-16DWW-S-E-A20 (Quad)	EMS - RR90-17-XXDP (Dual)
Azimuth			300	
M. Tilt			0	
Height			110	
Ports	P1		P2	P3
Active Tech.			L1900 G1900	U2100 L2100
Dark Tech.				
Restricted Tech.				
Decomm. Tech.			U1900	
E. Tilt			5	5
Cables			1-5/8" Coax - 132 ft. (x2)	1-5/8" Coax - 132 ft. (x2)
TMA's				
Diplexers / Combiners				
Radio				
Sector Equipment				
Unconnected Equipment:				
Scope of Work:				

RAN Template: 67D94B Outdoor	A&L Template: 67D94B_1DP+1OP
--	--

Sector 3 (Proposed) view from behind							
Coverage Type	A - Outdoor Macro						
Antenna	1		2		3		4
Antenna Model	Empty Antenna Mount (Empty mount)		RFS - APXVAALL18_43-U-NA20 (Octo)		RFS - APX16DWV-16DWV-S-E-A20 (Quad)		Empty Antenna Mount (Empty mount)
Azimuth			300		300		
M. Tilt			0		0		
Height			105		105		
Ports			P1	P2	P3	P4	P5 P6
Active Tech.			L700 L600 N600	L700 L600 N600			L1900 G1900 U2100 L2100
Dark Tech.							
Restricted Tech.							
Decomm. Tech.							
E. Tilt			6	6		6	6
Cables			1-5/8" Coax - 132 ft. (x2)	1-5/8" Coax - 132 ft. (x2)			1-5/8" Coax - 132 ft. (x2) 1-5/8" Coax - 132 ft. (x2)
TMA's							
Diplexers / Combiners							
Radio			Radio 4449 B71 +B85 (At Cabinet)	SHARED Radio 4449 B71 +B85 (At Cabinet)			
Sector Equipment						Andrew Smart Bias T (Ericsson) (At Antenna)	Andrew Smart Bias T (Ericsson) (At Antenna)

Unconnected Equipment:

Scope of Work:

*** Empty Position 2. Quad in Position 3 ***
 Remove unused EMS antennae in Positions 1 and 4.
 Add (1) LB/MB Octo in Position 2.
 Move lines for PCS (L1900 and GSM) to two Mid-Band Ports of LB/MB Octo.
 Add (1) Radio 4449 B71+B12 at ground level.
 Use Bias-T for RETs as appropriate and daisy chain if needed.

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

RAN Template: 67D94B Outdoor	A&L Template: 67D94B_1DP+1OP
--	--

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

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

Proposed Power Systems Equipment

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-894/617-894/1695-2690/1695-2690MHz, 65deg, 15.0/14.6/18.4/18.3dBi, 1.8m (6ft), RET, 2-12°/2-12°/2-12°/2-12°

FEATURES / BENEFITS

This antenna provides a 8 Port multi-band flexible platform for advanced use for flexible use in deployment scenarios for encompassing 600, 700, 800, AWS, PCS & BRS applications.

- ➔ 24 Inch Width For Easier Zoning
- ➔ Field Replaceable (Integrated) AISG RET platform for reduced environmental exposure and long lasting quality
- ➔ Superior elevation pattern performance across the entire electrical down tilt range
- ➔ Includes three AISG RET motors - Includes 0.5m AISG jumper for optional daisy chain of two high band RET motors for one single AISG point of high band tilt control.
- ➔ Low band arrays driven by a single RET motor



Technical Features

LOW BAND LEFT ARRAY (617-894 MHZ) [R1]

Frequency Band	MHz	617-698	698-746	746-806	806-894
Gain Typical	dBi	14.3	15.0	14.8	15.0
Gain Over All Tilts	dBi	13.8+/-0.5	14.5+/-0.5	14.3+/-0.5	14.6+/-0.4
Horizontal Beamwidth @3dB	Deg	65+/-2	64+/-2	66+/-2	62+/-5
Vertical Beamwidth @3dB	Deg	14+/-1	13+/-0.9	12+/-0.7	11+/-0.9
Electrical Downtilt Range	Deg	2 to 12			
Upper Side Lobe Suppression Peak to +20	dB	15	15	15	14
Front-to-Back, at +/-30°, Copolar	dB	22	22	24	27
Cross Polar Discrimination (XPD) @ Boresight	dB	18	18	16	15
Cross Polar Discrimination (XPD) @ +/-60	dB	4	3	7	5
3rd Order PIM 2 x 43dBm	dBc	-153			
VSWR	-	1.5:1			
Cross Polar Isolation	dB	25			
Maximum Effective Power per Port	Watt	400			



Dual Slant Polarized Quad Band (8 Port) Antenna, 617-894/617-894/1695-2690/1695-2690MHz, 65deg, 15.0/14.6/18.4/18.3dBi, 1.8m (6ft), RET, 2-12°/2-12°/2-12°/2-12°

HIGH BAND RIGHT ARRAY (1695-2690 MHZ) [Y2]

Frequency Band	MHz	1695-1880	1850-1990	1920-2200	2200-2490	2490-2690
Gain Typical	dBi	17.5	17.8	18.3	18.1	17.9
Gain Over All Tilts	dBi	17+/-0.5	17.3+/-0.5	17.6+/-0.7	17.4+/-0.7	17.1+/-0.8
Horizontal Beamwidth @3dB	Deg	66+/-6	64+/-5	64+/-7	62+/-4	61+/-7
Vertical Beamwidth @3dB	Deg	5.5+/-0.3	5.1+/-0.2	4.9+/-0.3	4.4+/-0.3	4+/-0.3
Electrical Downtilt Range	Deg	2 to 12				
Upper Side Lobe Suppression Peak to +20	dB	14	16	15	14	13
Front-to-Back, at +/-30°, Copolar	dB	25	23	23	23	20
Cross Polar Discrimination (XPD) @ Boresight	dB	22	17	16	17	17
Cross Polar Discrimination (XPD) @ +/-60	dB	8	8	9	4	1
3rd Order PIM 2 x 43dBm	dBc	-153				
VSWR	-	1.5:1				
Cross Polar Isolation	dB	25				
Maximum Effective Power per Port	Watt	300				

ELECTRICAL SPECIFICATIONS

Impedance	Ohm	50.0
Polarization	Deg	±45°

MECHANICAL SPECIFICATIONS

Dimensions - H x W x D	mm (in)	1829 x 609 x 215 (72 x 24 x 8.5)
Weight (Antenna Only)	kg (lb)	42 (92.6)
Weight (Mounting Hardware only)	kg (lb)	11.5 (25.3)
Shipping Weight	kg (lb)	63 (138.9)
Connector type		8 x 4.3-10 female at bottom
Radome Material / Color		Fiber Glass / Light Grey RAL7035

TESTING AND ENVIRONMENTAL

Temperature Range	°C (°F)	-40 to 60 (-40 to 140)
Lightning protection		Direct Ground
Survival/Rated Wind Velocity	km/h	240 (150)
Wind Load @Rated Wind Front	N	1072.0
Wind Load @Rated Wind Side	N	326.0
Wind Load @Rated Wind Rear	N	1160.0



ATSBT-TOP-FM-4G

Teletilt® Top Smart Bias Tee

- Injects AISG power and control signals onto a coaxial cable line
- Reduces cable and site lease costs by eliminating the need for AISG home run cables
- AISG 1.1 and 2.0 compliant
- Operates at 10-30 Vdc
- Weatherproof AISG connectors
- Intuitive schematics simplify and ensure proper installation
- Enhanced lightning protection plus grounding stud for additional surge protection
- 7-16 DIN female connector (BTS)
- 7-16 DIN male connector (ANT)

General Specifications

Smart Bias Tee Type	10–30 V Top
Brand	Teletilt®
Operating Frequency Band	694 – 2690 MHz

Electrical Specifications

EU Certification	CE
Protocol	AISG 1.1 AISG 2.0
Antenna Interface Signal	dc Blocked RF
BTS Interface Signal	AISG data dc RF
Interface Protocol Signal	Data dc
Voltage Range	10–30 Vdc
VSWR Return Loss	1.17:1 22 dB, typical
Power Consumption, maximum	0.6 W
RF Power, maximum	250 W @ 1850 MHz 500 W @ 850 MHz
Impedance	50 ohm
Insertion Loss, typical	0.1 dB
3rd Order IMD	-158.0 dBc (relative to carrier)
3rd Order IMD Test Method	Two +43 dBm carriers
Electromagnetic Compatibility (EMC)	CFR 47 Part 15, Subpart B, Class B EN 55022, Class B ICES-003 Issue 4 CAN/CSA-CEI/IEC CISPR 22:02

Mechanical Specifications

Antenna Interface	7-16 DIN Male
BTS Interface	7-16 DIN Female
AISG Input Connector	8-pin DIN Female
Color	Silver
Grounding Lug Thread Size	M8
Material Type	Aluminum
Lightning Surge Capability	5 times @ -3 kA 5 times @ 3 kA

ATSBT-TOP-FM-4G

POWERED BY



Lightning Surge Capability Test Method IEC 61000-4-5, Level X

Lightning Surge Capability Waveform 1.2/50 voltage and 8/20 current combination waveform

Environmental Specifications

Ingress Protection Test Method IEC 60529:2001, IP66

Operating Temperature -40 °C to +70 °C (-40 °F to +158 °F)

Interface Port Drawing



Dimensions

Width	94.0 mm 3.7 in
Depth	50.0 mm 2.0 in
Height	143.00 mm 5.63 in
Net Weight	0.8 kg 1.8 lb

Regulatory Compliance/Certifications

Agency
RoHS 2011/65/EU

Classification
Compliant by Exemption

Exhibit E

Mount Analysis

Structural Analysis Report

Antenna Mount Analysis

Site Ref: CT11001B

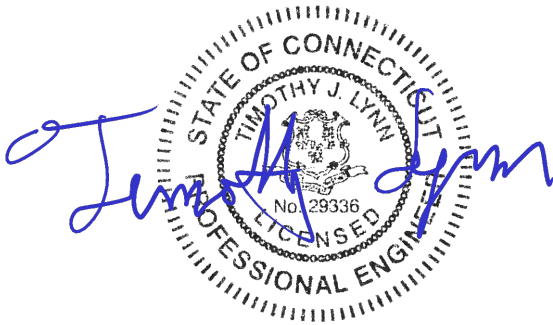
*Eversource Structure No. 1256
95' Electric Transmission Lattice Tower*

*160 Sound Beach Road
Greenwich, CT*

Centek Project No. 21051.03

Date: July 8, 2021

Max Stress Ratio = 12.4%



Prepared for:
T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

SECTION 1 – REPORT

- ANTENNA AND APPURTENANCE SUMMARY
- STRUCTURE LOADING
- CONCLUSION

SECTION 2 – CALCULATIONS

- WIND LOAD ON APPURTENANCES
- RISA3D OUTPUT REPORT
- CONNECTION TO STRUCTURE

SECTION 3 – REFERENCE MATERIALS (NOT INCLUDED WITHIN REPORT)

- RF DATA SHEET, DATED 07/7/2021

July 8, 2021

Mr. Sheldon Freinle
Northeast Site Solutions
420 Main Street, Building 4
Sturbridge, MA 01566

Re: *Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CT11001B
160 Sound Beach Road
Greenwich, CT 06870*

Centek Project No. 21051.03

Dear Mr. Freinle,

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 proposed mount, consisting two (2) monopole double support arm kits (SitePro P/N RDS-284) spaced 4' apart vertically to support the proposed/existing 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:

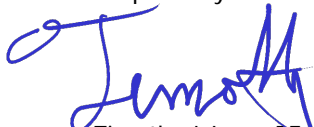
- T-Mobile:
Three (3) RFS APXVAALL18_43 panel antennas, three (3) RFS APX16DWV-16DWV-S-E-A20 panel antennas and six (6) Andrew ATSBT-TOP-FF-4G Bias-Tees mounted on the proposed mount with a RAD center elevation of 105-ft +/- AGL.

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 93 mph for Greenwich as required in Appendix N of the 2018 Connecticut State Building Code.

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

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

Respectfully Submitted by:


Timothy J. Lynn, PE
Structural Engineer



Prepared by:


Fernando J. Palacios
Engineer

CEN TEK Engineering, Inc.
Structural Analysis – Mount Analysis
T-Mobile Site Ref. ~ CT11001B
Greenwich, CT
July 8, 2021

Section 2 - Calculations

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

Wind Speeds

Basic Wind Speed	V := 93	mph	(User Input - 2018 CSBC Appendix N)
Basic Wind Speed with Ice	V _i := 50	mph	(User Input per Annex B of TIA-222-G)

Input

Structure Type =	Structure_Type := Pole		(User Input)
Structure Category =	SC := III		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	h := 95	ft	(User Input)
Height to Center of Antennas =	z := 105	ft	(User Input)
Radial Ice Thickness =	t _i := 0.75	in	(User Input per Annex B of TIA-222-G)
Radial Ice Density =	I _d := 56.00	pcf	(User Input)
Topographic Factor =	K _{zt} := 1.0		(User Input)
	K _a := 1.0		(User Input)
Gust Response Factor =	G _H = 1.1		(User Input)

Output

Wind Direction Probability Factor =
$$K_d := \begin{cases} \text{if Structure_Type = Pole} \\ 0.95 \\ \text{if Structure_Type = Lattice} \\ 0.85 \end{cases} = 0.95$$
 (Per Table 2-2 of TIA-222-G)

Importance Factors =
$$I_{Wind} := \begin{cases} \text{if SC = 1} \\ 0.87 \\ \text{if SC = 2} \\ 1.00 \\ \text{if SC = 3} \\ 1.15 \end{cases} = 1.15$$

$$I_{Wind_w_Ice} := \begin{cases} \text{if SC = 1} \\ 0 \\ \text{if SC = 2} \\ 1.00 \\ \text{if SC = 3} \\ 1.00 \end{cases} = 1$$

$$K_{iz} := \left(\frac{z}{33}\right)^{0.1} = 1.123$$

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

Velocity Pressure Coefficient Antennas =
$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.105$$

$$K_z := 2.01 \cdot \left(\frac{z}{zg}\right)^\alpha = 1.279$$

Velocity Pressure w/o Ice Antennas =
$$q_z := 0.00256 \cdot K_d \cdot K_z \cdot V^2 \cdot I_{Wind} = 31 \text{ psf}$$

Velocity Pressure with Ice Antennas =
$$q_{z_{ice}} := 0.00256 \cdot K_d \cdot K_z \cdot V_i^2 \cdot I_{Wind} = 9 \text{ psf}$$

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS - APXVAARR18_43-U-NA20	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 72.0$	in (User Input)
Antenna Width =	$W_{ant} := 24.0$	in (User Input)
Antenna Thickness =	$T_{ant} := 8.5$	in (User Input)
Antenna Weight =	$WT_{ant} := 131.3$	lbs (User Input)
Number of Antennas =	$N_{ant} := 1$	(User Input)
Antenna Aspect Ratio =	$AR_{ant} := \frac{L_{ant}}{W_{ant}} = 3.0$	

Antenna Force Coefficient = $Ca_{ant} = 1.22$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 12$ sf

Total Antenna Wind Force Front = $F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 499$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 4.3$ sf

Total Antenna Wind Force Side = $F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 177$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 14.9$ sf

Total Antenna Wind Force w/ Ice Front = $F_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 179$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 6.7$ sf

Total Antenna Wind Force w/ Ice Side = $F_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 81$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 131$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1 \cdot 10^4$ 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 = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot I_d = 410$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 410$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS-APX16DWV-16DWV-S-E-A20	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 55.9$	in (User Input)
Antenna Width =	$W_{ant} := 13.0$	in (User Input)
Antenna Thickness =	$T_{ant} := 3.15$	in (User Input)
Antenna Weight =	$WT_{ant} := 41.8$	lbs (User Input)
Number of Antennas =	$N_{ant} := 1$	(User Input)
Antenna Aspect Ratio =	$AR_{ant} := \frac{L_{ant}}{W_{ant}} = 4.3$	

Antenna Force Coefficient = $Ca_{ant} = 1.28$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$ sf

Total Antenna Wind Force Front = $F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 220$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.2$ sf

Total Antenna Wind Force Side = $F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 53$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 7.2$ sf

Total Antenna Wind Force w/ Ice Front = $F_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 90$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 3.1$ sf

Total Antenna Wind Force w/ Ice Side = $F_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 39$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 42$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2289$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5325$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot I_d = 173$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 173$ lbs

Development of Wind & Ice Load on Equipment

Equipment Data:

Equipment Model =	Andrew ATSBT-TOP-FF-4G	
Equipment Shape =	Flat	(User Input)
Equipment Height =	$L_{EQ} := 5.6$	in (User Input)
Equipment Width =	$W_{EQ} := 3.7$	in (User Input)
Equipment Thickness =	$T_{EQ} := 2.0$	in (User Input)
Equipment Weight =	$WT_{EQ} := 1.7$	lbs (User Input)
Number of Equipment 's=	$N_{EQ} := 1$	
Equipment Aspect Ratio =	$Ar_{EQ} := \frac{L_{EQ}}{W_{EQ}} = 1.5$	
Equipment Force Coefficient =	$Ca_{EQ} = 1.2$	

Wind Load (without ice)

Surface Area for One Equipment = $SA_{EQF} := \frac{L_{EQ} \cdot W_{EQ}}{144} = 0.1$ sf

Total Equipment Wind Force = $F_{RRUS} := qz \cdot G_H \cdot Ca_{EQ} \cdot K_a \cdot SA_{EQF} = 6$ lbs

Surface Area for One Equipment = $SA_{EOS} := \frac{L_{EQ} \cdot T_{EQ}}{144} = 7.8 \cdot 10^{-2}$ sf

Total Equipment Wind Force = $F_{RRUS} := qz \cdot G_H \cdot Ca_{EQ} \cdot K_a \cdot SA_{EOS} = 3$ lbs

Wind Load (with ice)

Surface Area for One Equipment w/ Ice = $SA_{ICEEQF} := \frac{(L_{EQ} + 2 \cdot t_{iz}) \cdot (W_{EQ} + 2 \cdot t_{iz})}{144} = 0.5$ sf

Total Equipment Wind Force w/ Ice = $F_{IEQF} := qz_{ice} \cdot G_H \cdot Ca_{EQ} \cdot K_a \cdot SA_{ICEEQF} = 6$ lbs

Surface Area for One Equipment w/ Ice = $SA_{ICEEQS} := \frac{(L_{EQ} + 2 \cdot t_{iz}) \cdot (T_{EQ} + 2 \cdot t_{iz})}{144} = 0.4$ sf

Total Equipment Wind Force w/ Ice = $F_{IEQS} := qz_{ice} \cdot G_H \cdot Ca_{EQ} \cdot K_a \cdot SA_{ICEEQS} = 5$ lbs

Gravity Load (without ice)

Weight of All Equipment 's= $WT_{EQ} \cdot N_{EQ} = 2$ lbs

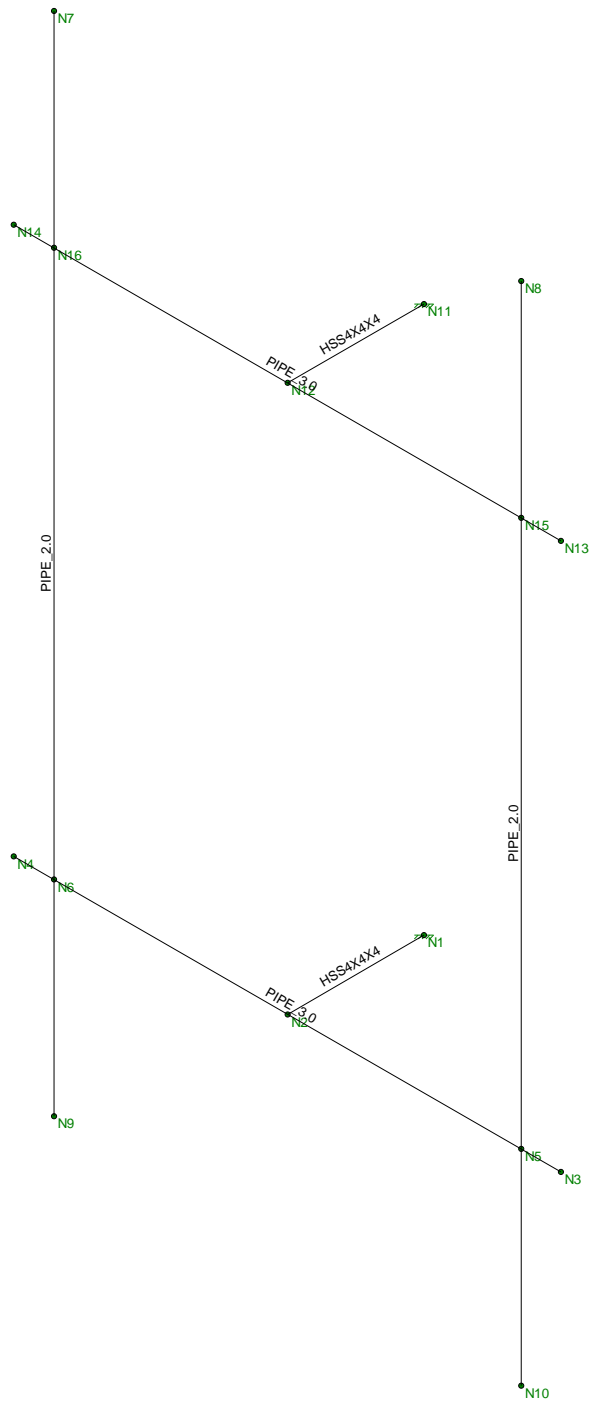
Gravity Loads (ice only)

Volume of Each Equipment = $V_{EQ} := L_{EQ} \cdot W_{EQ} \cdot T_{EQ} = 41$ cu in

Volume of Ice on Each Equipment = $V_{ice} := (L_{EQ} + 2 \cdot t_{iz}) \cdot (W_{EQ} + 2 \cdot t_{iz}) \cdot (T_{EQ} + 2 \cdot t_{iz}) - V_{EQ} = 440$ cu in

Weight of Ice on Each Equipment = $W_{ICEEQS} := \frac{V_{ice}}{1728} \cdot 1d = 14$ lbs

Weight of Ice on All Equipment 's= $W_{ICEEQS} \cdot N_{EQ} = 14$ lbs



Envelope Only Solution

Centek Engineering Inc.	CT11001B - AMA Member Framing	
FJP		July 8, 2021 at 3:47 PM
21051.03		CT11001B_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)	24
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 14th(360-10): ASD
Cold Formed Steel Code	AISI S100-12: ASD
Wood Code	AWC NDS-15: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-14
Masonry Code	ACI 530-13: ASD
Aluminum Code	AA ADM1-15: 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?	Yes
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	4
Cd X	4
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)	.145
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	#6
Footing Top Bar Cover (in)	1.5
Footing Bottom Bar	#6
Footing Bottom Bar Cover (in)	3
Pedestal Bar	#6
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#4

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Ru... A [in ²]	I _{yy} [in ⁴]	I _{zz} [in ⁴]	J [in ⁴]	
1	Horz_Pipe 3.0 STD	PIPE_3.0	Beam	None	A53 Gr.B	Typical	2.07	2.85	2.85	5.69
2	Outrigger	HSS4X4X4	Beam	None	A500 Gr.B ...	Typical	3.37	7.8	7.8	12.8
3	Antenna Mast	PIPE_2.0	Column	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	L _{by} [ft]	L _{bz} [ft]	L _{comp top} [...L _{comp bot} [...L _{torq} ...	K _{yy}	K _{zz}	C _b	Funci...
1	M1	Outrigger	1			L _{by}				Lateral
2	M2	Outrigger	1			L _{by}				Lateral
3	M3	Horz_Pipe 3.0 STD	4			L _{by}				Lateral
4	M4	Horz_Pipe 3.0 STD	4			L _{by}				Lateral
5	PS.2	Antenna Mast	7							Lateral
6	PS.1	Antenna Mast	7							Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design R...
1	M1	N11	N12			Outrigger	Beam	None	A500 Gr.B Rect	Typical
2	M2	N1	N2			Outrigger	Beam	None	A500 Gr.B Rect	Typical
3	M3	N14	N13			Horz_Pipe 3.0 STD	Beam	None	A53 Gr.B	Typical
4	M4	N4	N3			Horz_Pipe 3.0 STD	Beam	None	A53 Gr.B	Typical
5	PS.2	N10	N8			Antenna Mast	Column	Pipe	A53 Gr.B	Typical
6	PS.1	N9	N7			Antenna Mast	Column	Pipe	A53 Gr.B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N9	0.291667	-3.5	1	0	
2	N10	3.708333	-3.5	1	0	
3	N4	0	-2	1	0	
4	N6	0.291667	-2	1	0	
5	N1	2	-2	0	0	
6	N2	2	-2	1	0	
7	N5	3.708333	-2	1	0	
8	N3	4	-2	1	0	
9	N14	0	2	1	0	
10	N16	0.291667	2	1	0	
11	N11	2	2	0	0	
12	N12	2	2	1	0	
13	N15	3.708333	2	1	0	
14	N13	4	2	1	0	
15	N8	3.708333	3.5	1	0	
16	N7	0.291667	3.5	1	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	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N11	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Y	-.066	1.083
2	PS.1	Y	-.066	5.917
3	PS.2	Y	-.021	.5
4	PS.2	Y	-.021	6.5
5	PS.2	Y	-.002	3.5
6	PS.1	Y	-.002	%50

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Y	-.205	1.083
2	PS.1	Y	-.205	5.917
3	PS.2	Y	-.087	.5
4	PS.2	Y	-.087	6.5
5	PS.2	Y	-.014	3.5
6	PS.1	Y	-.014	%50

Member Point Loads (BLC 4 : (x) TIA Wind with Ice (9 psf))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.041	1.083
2	PS.1	X	.041	5.917
3	PS.2	X	.02	.5
4	PS.2	X	.02	6.5
5	PS.2	X	.005	3.5
6	PS.1	X	.005	%50

Member Point Loads (BLC 5 : (x) TIA Wind (31 psf))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.089	1.083
2	PS.1	X	.089	5.917
3	PS.2	X	.027	.5
4	PS.2	X	.027	6.5
5	PS.2	X	.003	3.5
6	PS.1	X	.003	%50

Member Point Loads (BLC 6 : (z) TIA Wind with Ice (9 psf))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.09	1.083
2	PS.1	Z	.09	5.917
3	PS.2	Z	.045	.5
4	PS.2	Z	.045	6.5
5	PS.2	Z	.006	3.5
6	PS.1	Z	.006	%50



Member Point Loads (BLC 7 : (z) TIA Wind (31 psf))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.25	1.083
2	PS.1	Z	.25	5.917
3	PS.2	Z	.11	.5
4	PS.2	Z	.11	6.5
5	PS.2	Z	.006	3.5
6	PS.1	Z	.006	%50

Member Distributed Loads (BLC 4 : (x) TIA Wind with Ice (9 psf))

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	PS.1	X	.002	.002	0	0
2	PS.2	X	.002	.002	0	0
3	M1	X	.003	.003	0	0
4	M2	X	.003	.003	0	0

Member Distributed Loads (BLC 5 : (x) TIA Wind (31 psf))

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	PS.1	X	.007	.007	0	0
2	PS.2	X	.007	.007	0	0
3	M1	X	.009	.009	0	0
4	M2	X	.009	.009	0	0

Member Distributed Loads (BLC 6 : (z) TIA Wind with Ice (9 psf))

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	M3	Z	.003	.003	1.292	3.167
2	M4	Z	.003	.003	1.292	3.167

Member Distributed Loads (BLC 7 : (z) TIA Wind (31 psf))

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	M3	Z	.009	.009	1.292	3.167
2	M4	Z	.009	.009	1.292	3.167

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib...	Area(...	Surfa...
1	Self Weight	None		-1						
2	Dead Load	None					6			
3	Ice Load	None					6			
4	(x) TIA Wind with Ice (9 psf)	None					6	4		
5	(x) TIA Wind (31 psf)	None					6	4		
6	(z) TIA Wind with Ice (9 psf)	None					6	2		
7	(z) TIA Wind (31 psf)	None					6	2		

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	BLC	Fact...	BLC Fa...	BLC Fa...	BLC 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							

Load Combinations (Continued)

	Description	Solve	P...	S...	B...	Fa...	BLC	Fact...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC
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	N1	max	-0.11	5	.502	6	.015	3	.086	5	-1.18	6	-.034	2
2		min	-.302	1	.128	2	-.609	5	-.456	3	-.39	4	-.203	6
3	N11	max	.045	6	.489	3	-.004	2	-.135	2	-.033	6	-.048	5
4		min	-.277	2	.087	5	-.618	4	-.502	6	-.366	5	-.208	3
5	Totals:	max	0	6	.981	6	0	3						
6		min	-.575	1	.277	2	-1.225	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	N9	max	.016	3	-.004	5	.042	5	1.069e-04	3	1.585e-03	5	8.388e-04	3
2		min	.006	5	-.016	3	-.001	3	-9.963e-04	5	2.472e-05	3	2.576e-04	5
3	N10	max	.005	2	0	5	.027	5	1.155e-04	3	1.215e-04	1	2.795e-04	2
4		min	-.003	6	-.003	6	-.003	3	-1.552e-03	5	-2.751e-04	5	-1.73e-04	6
5	N4	max	.002	4	-.005	5	.03	5	1.071e-04	3	1.585e-03	5	7.928e-04	3
6		min	0	3	-.019	3	0	3	-6.53e-04	5	2.472e-05	3	2.536e-04	2
7	N6	max	.002	4	-.004	5	.025	5	1.071e-04	3	1.585e-03	5	7.927e-04	3
8		min	0	3	-.016	3	0	3	-6.53e-04	5	2.472e-05	3	2.535e-04	2
9	N1	max	0	6	0	6	0	6	0	6	0	6	0	6
10		min	0	1	0	1	0	1	0	1	0	1	0	1
11	N2	max	.002	4	0	5	0	5	1.686e-04	3	3.045e-04	4	2.05e-04	6
12		min	0	3	-.002	3	0	3	-1.427e-04	5	4.838e-05	3	3.393e-05	2
13	N5	max	.002	4	0	5	.002	5	1.155e-04	3	1.215e-04	1	-2.566e-07	2
14		min	0	3	-.003	6	-.002	1	-6.813e-04	5	-2.751e-04	5	-1.731e-04	6
15	N3	max	.002	4	0	2	.003	5	1.155e-04	3	1.215e-04	1	-3.137e-07	2
16		min	0	3	-.004	6	-.003	1	-6.813e-04	5	-2.751e-04	5	-1.731e-04	6
17	N14	max	.002	5	-.004	2	.03	4	7.214e-04	4	1.591e-03	4	7.612e-04	6
18		min	0	3	-.018	6	0	3	3.254e-05	2	4.076e-05	3	1.2e-04	5
19	N16	max	.002	5	-.004	2	.025	4	7.214e-04	4	1.591e-03	4	7.611e-04	6
20		min	0	3	-.016	6	0	3	3.254e-05	2	4.076e-05	3	1.2e-04	5
21	N11	max	0	6	0	6	0	6	0	6	0	6	0	6
22		min	0	1	0	1	0	1	0	1	0	1	0	1
23	N12	max	.002	5	0	2	0	4	2.495e-04	4	2.959e-04	5	2.098e-04	3
24		min	0	3	-.002	6	0	2	4.974e-05	2	1.709e-05	3	4.827e-05	5
25	N15	max	.002	5	0	2	.002	4	7.542e-04	4	1.024e-04	2	2.593e-05	5
26		min	0	3	-.003	3	-.002	2	3.452e-05	2	-2.943e-04	4	-1.773e-04	3
27	N13	max	.002	5	0	5	.003	4	7.542e-04	4	1.024e-04	2	2.587e-05	5
28		min	0	3	-.004	3	-.002	2	3.452e-05	2	-2.943e-04	4	-1.774e-04	3
29	N8	max	.007	1	0	2	.029	4	1.626e-03	4	1.024e-04	2	2.593e-05	5
30		min	.001	5	-.003	3	-.002	2	3.453e-05	2	-2.943e-04	4	-3.798e-04	1
31	N7	max	.002	2	-.004	2	.043	4	1.066e-03	4	1.591e-03	4	7.624e-04	6
32		min	-.014	6	-.016	6	.003	3	3.256e-05	2	4.076e-05	3	-6.399e-05	2



Company : Centek Engineering Inc.
 Designer : FJP
 Job Number : 21051.03
 Model Name : CT11001B - AMA

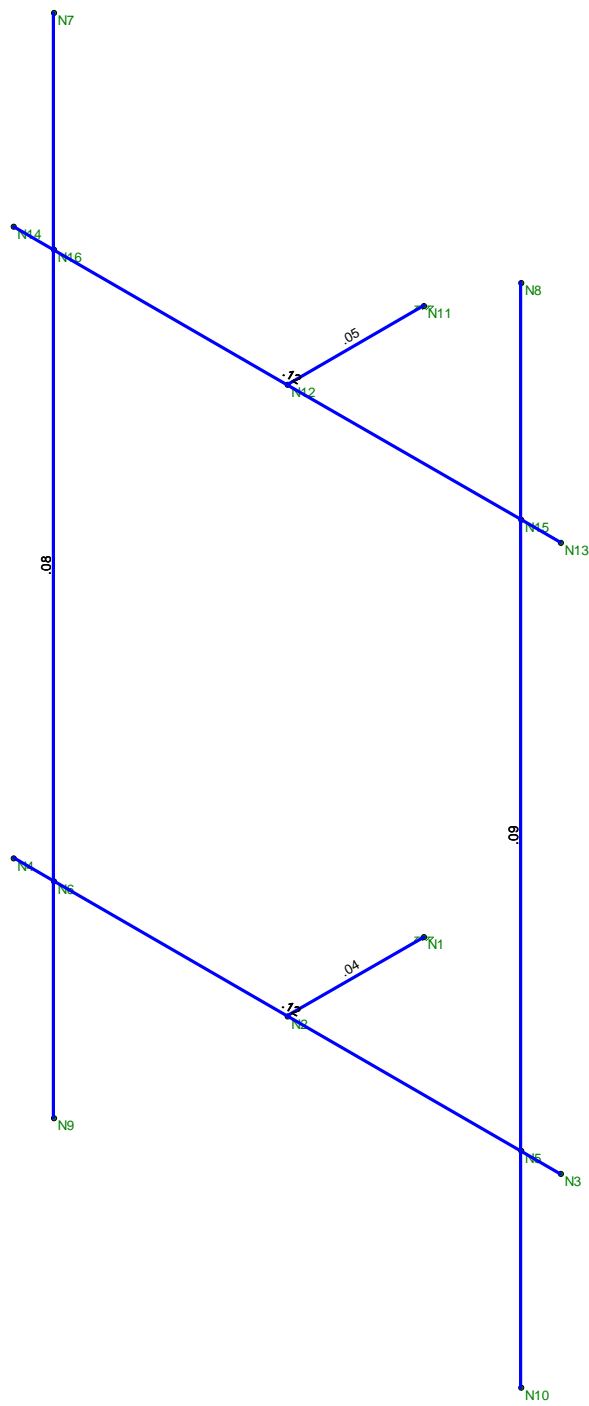
July 8, 2021
 3:45 PM
 Checked By: TJL

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

Member	Shape	Code Check	Lo...	LC	She...Lo...	Dir	...	phi*...	phi*...	phi*...	phi*...	Cb	Eqn
1	M1	HSS4X4X4	.048	0	4	.028 0	y	3	138....	139....	16.181	16.181	1.1...H1-...
2	M2	HSS4X4X4	.042	1	4	.028 0	y	6	138....	139....	16.181	16.181	1.4...H1-...
3	M3	PIPE 3.0	.123	2	4	.047 2		4	59.853	65.205	5.749	5.749	1.6...H1-...
4	M4	PIPE 3.0	.124	2	4	.050 2		4	59.853	65.205	5.749	5.749	1.5...H1-...
5	PS.2	PIPE 2.0	.091	5....	4	.0185....		4	17.855	32.13	1.872	1.872	1.6...H1-...
6	PS.1	PIPE 2.0	.083	5....	4	.0425....		4	17.855	32.13	1.872	1.872	1.62H1-...



Code Check (Env)	
Black	No Calc
Red	> 1.0
Magenta	.90-1.0
Green	.75-.90
Cyan	.50-.75
Blue	0-.50



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek Engineering Inc.	CT11001B - AMA Unity Check	SK - 1
FJP		July 8, 2021 at 3:46 PM
21051.03		CT11001B_AMA.R3D

Existing Connection to Host Structure

Bolts Grade	A325	(User Input)
Number of Bolts =	$n_b := 4$	(User Input)
Bolt Diameter =	$d\phi := \frac{5}{8} \text{ in}$	(User Input)
Nominal Tensile Strength=	$F_{nt} := 90 \text{ ksi}$	(User Input)
Nominal Shear Strength=	$F_{nv} := 54 \text{ ksi}$	(User Input)
Safety Factor=	$\phi := 0.75$	(User Input)
Horizontal Spacing Between Bolts=	$S := 6.0 \text{ in}$	(User Input)

Reactions at Connection:

Shear X =	$\text{Shear}_x := .275 \cdot \text{kip}$	(User Input)
Vertical=	$\text{Vertical} := .482 \text{ kip}$	(User Input)
Shear Z =	$\text{Shear}_z := .613 \cdot \text{kip}$	(User Input)
Moment X=	$M_x := .496 \cdot \text{kip} \cdot \text{ft}$	(User Input)
Moment Y=	$M_y := .358 \cdot \text{kip} \cdot \text{ft}$	(User Input)
Moment Z=	$M_z := .199 \text{ kip} \cdot \text{ft}$	(User Input)

Anchor Check:

Bolt Area=	$a_b := \pi \cdot \left(\frac{d\phi}{2}\right)^2 = 0.307 \text{ in}^2$
Allowable Shear Strength=	$R_{nv} := F_{nv} \cdot a_b \cdot \phi = 12.425 \text{ kip}$
Shear Stress per Bolt=	$V_{act} := \frac{\sqrt{\text{Shear}_x^2 + \text{Vertical}^2}}{n_b} + \frac{M_z}{S \cdot \frac{n_b}{2}} = 0.338 \text{ kip}$

Condition1 := If ($V_{act} \leq R_{nv}$, "OK", "Overstressed") = "OK"

Condition1 = "OK"

$f_v := \frac{V_{act}}{a_b} = 1.101 \text{ ksi}$

$\frac{V_{act}}{R_{nv}} = 2.7\%$

Tensile Stress Adjusted for Shear=	$F'_{nt} := \left\ \begin{array}{l} \text{if} \left(1.3 F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \right) \leq F_{nt} \\ \left\ \begin{array}{l} 1.3 F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \\ \text{else} \\ F_{nt} \end{array} \right\ \end{array} \right\ = 90 \text{ ksi}$
------------------------------------	--

Allowable Tensile Strength= $R_{nt} := F'_{nt} \cdot a_b \cdot \phi = 20.709 \text{ kip}$

Tension Force Each Bolt= $T_{act} := \frac{\text{Shear}_z}{n_b} + \frac{M_y}{S \cdot \frac{n_b}{2}} + \frac{M_x}{S \cdot \frac{n_b}{2}} = 1.007 \text{ kip}$

Tension Stress Each Bolt= $f_t := \frac{T_{act}}{a_b} = 3.283 \text{ ksi}$

Condition2 := If ($f_t \leq F'_{nt} \cdot \phi$, "OK", "Overstressed") = "OK"

Condition2 = "OK"

$\frac{T_{act}}{R_{nt}} = 4.9\%$

Exhibit F

Power Density/RF Emissions Report



Non-Ionizing Radiation Report

Compiled For: Northeast Site Solutions on behalf of T-Mobile

Site Name: CT11001B

Site ID: CT11001B

160 Sound Beach Road, Greenwich, CT 06870

Latitude: 41.033026; Longitude: -73.567291

Structure Type: Utility Lattice Tower

Report Date: July 9, 2021

Report Written By: Tim Harris

Status: T-Mobile will be compliant with FCC rules on RF Exposure.

Table of Contents

- 1. Executive Summary:..... 3
- 2. Site Summary:..... 4
- 3. Site Compliance..... 4
- 4. Site Compliance Recommendations 5
- 5. Antenna Inventory Table 6
- 6. RF Guidelines 8
- 7. T-Mobile Exposure Analysis By Band and Technology..... 9
- 8. Appendix A: FCC Guidelines 12
 - FCC Policies..... 12
 - Occupational / Controlled 12
 - General Population / Uncontrolled 12
- 9. Preparer Certification..... 15

1. Executive Summary:

Northeast Site Solutions on behalf of T-Mobile has contracted Infinigy Solutions, LLC to determine whether the site CT11001B located at 160 Sound Beach Road in Greenwich, CT Will Be Compliant with all Federal Communications Commission (FCC) rules and regulations for radio frequency (RF) exposure as indicated in **47CFR§1.1310**.

The report incorporates a theoretical RF field analysis in accordance with the FCC Rules and Regulations for all individuals classified as “Occupational or Controlled” and “General Public or Uncontrolled” (see Appendix A and B).

This document and the conclusions herein are based on information provided by Northeast Site Solutions on behalf of T-Mobile.

As a result of the analysis, **T-Mobile Will Be Compliant with FCC rules.**

T-Mobile, All Bands Cumulative Exposure %		
Uncontrolled / General Population	Exposure values at the site (mW/cm ²)	0.0205
	% Exposure	2.82 %
Controlled / Occupational	Exposure values at the site (mW/cm ²)	0.0205
	% Exposure	0.57 %

2. Site Summary:

Site Information	
Site Name: CT11001B	
Site Address: 160 Sound Beach Road, Greenwich, CT 06870	
Site Type: Utility Lattice Tower	
Compliance Status	Will Be Compliant
Mitigation Required	No
Signage Required	Yes
Barriers Required	No
Access Locked	No
Area Controlled or Uncontrolled	Uncontrolled

3. Site Compliance

This report also incorporates overview of the site information:

- Antenna Inventory Table
- Calculation Tables showing exposure for each carrier transmit frequency
- Total exposure for all carriers existing and proposed at ground level considering the centerline of all antennas and horizontal distance from the tower.
- Maximum Effective Radiated Power Assumed as Worst Case for Calculations used in this study
- Calculations based on flat ground around base of the structure

4. Site Compliance Recommendations

Infinigy recommends the following upon the installation of antennas at the site:

Base of tower

Install an RF caution sign. Note: The recommendation for alerting signage is moot if there is an RF caution, or greater already installed.

5. Antenna Inventory Table

Ant ID	Sector	Azimuth	Operator	Antenna manufacturer	Antenna Model	Operating Frequency/Technology	Rad Ctr (Ft)	Az (Deg)	Total ERP Power (Watts)
1	Alpha		Empty						
2a	Alpha	60	T-Mobile	RFS	APXVAARR18_N43-U-NA20	700 MHz LTE	105	60	2256
2b	Alpha	60	T-Mobile	RFS	APXVAARR18_N43-U-NA20	600 MHz LTE	105	60	1128
2c	Alpha	60	T-Mobile	RFS	APXVAARR18_N43-U-NA20	600 MHz 5G	105	60	1128
3a	Alpha	60	T-Mobile	RFS	APX16DW-16DWV-S-E-A20	1900 MHz LTE	105	60	3052
3b	Alpha	60	T-Mobile	RFS	APX16DW-16DWV-S-E-A20	1900 MHz GSM	105	60	3052
3c	Alpha	60	T-Mobile	RFS	APX16DW-16DWV-S-E-A20	2100 MHz UMTS	105	60	2154
3d	Alpha	60	T-Mobile	RFS	APX16DW-16DWV-S-E-A20	2100 MHz LTE	105	60	2154
4	Alpha		Empty						
5	Beta		Empty						
6a	Beta	180	T-Mobile	RFS	APXVAARR18_N43-U-NA20	700 MHz LTE	105	180	2256
6b	Beta	180	T-Mobile	RFS	APXVAARR18_N43-U-NA20	600 MHz LTE	105	180	1128
6c	Beta	180	T-Mobile	RFS	APXVAARR18_N43-U-NA20	600 MHz 5G	105	180	1128
7a	Beta	180	T-Mobile	RFS	APX16DW-16DWV-S-E-A20	1900 MHz LTE	105	180	3052
7b	Beta	180	T-Mobile	RFS	APX16DW-16DWV-S-E-A20	1900 MHz GSM	105	180	3052
7c	Beta	180	T-Mobile	RFS	APX16DW-16DWV-S-E-A20	2100 MHz UMTS	105	180	2154
7d	Beta	180	T-Mobile	RFS	APX16DW-16DWV-S-E-A20	2100 MHz LTE	105	180	2154
8	Beta		Empty						
9	Gamma		Empty						
10a	Gamma	300	T-Mobile	RFS	APXVAARR18_N43-U-NA20	700 MHz LTE	105	300	2256
10b	Gamma	300	T-Mobile	RFS	APXVAARR18_N43-U-NA20	600 MHz LTE	105	300	1128
10c	Gamma	300	T-Mobile	RFS	APXVAARR18_N43-U-NA20	600 MHz 5G	105	300	1128
11a	Gamma	300	T-Mobile	RFS	APX16DW-16DWV-S-E-A20	1900 MHz LTE	105	300	3052
11b	Gamma	300	T-Mobile	RFS	APX16DW-16DWV-S-E-A20	1900 MHz GSM	105	300	3052

INFINIGY

Ant ID	Sector	Azimuth	Operator	Antenna manufacturer	Antenna Model	Operating Frequency/Technology	Rad Ctr (Ft)	Az (Deg)	Total ERP Power (Watts)
11c	Gamma	300	T-Mobile	RFS	APX16DW-16DWV-S-E-A20	2100 MHz UMTS	105	300	2154
11d	Gamma	300	T-Mobile	RFS	APX16DW-16DWV-S-E-A20	2100 MHz LTE	105	300	2154
12	Gamma		Empty						

6. RF Guidelines

To ensure safety of company workers, the following points need to be taken into consideration and implemented at wireless sites in accordance with the Carriers policies:

- a) **Worksite:** Any employee at the site should avoid working directly in front of the antenna or in areas predicted to exceed general population exposure limits by 100%. Workers should insist that the transmitters be switched off during the work period.
- b) **RF Safety Training and Awareness:** All employees working in areas exceeding the general population limits should have a basic awareness of RF safety measures. Videos, classroom lectures and online courses are all appropriate training methods on these topics.
- c) **Site Access:** Restricting access to transmitting antenna locations is one of the most important elements of RF safety. This can be done with:
 - Locked doors/gates/ladder access
 - Alarmed doors
 - Restrictive barriers
- d) **Three-foot Buffer:** There is an inverse relationship between the strength of the field and the distance from the antenna. The RF field diminishes with distance from the antenna. Workers should maintain a three-foot distance from the antennas.
- e) **Antennas:** Workers should always assume that the antenna is transmitting and should never stop right in front of the antenna. If someone must pass by an antenna, he/she should move quickly, thus reducing RF exposure.

7. T-Mobile Exposure Analysis By Band and Technology

T-Mobile 600 MHz LTE		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	0.4
	Exposure values at the site (mW/cm ²)	0.0015
	% Exposure	0.39%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	2.0
	Exposure values at the site (mW/cm ²)	0.0015
	% Exposure	0.08%

T-Mobile 600 MHz 5G		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	0.4
	Exposure values at the site (mW/cm ²)	0.0015
	% Exposure	0.39%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	2.0
	Exposure values at the site (mW/cm ²)	0.0015
	% Exposure	0.08%

T-Mobile 700 MHz LTE		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	0.5
	Exposure values at the site (mW/cm ²)	0.0031
	% Exposure	0.62%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	2.3
	Exposure values at the site (mW/cm ²)	0.0031
	% Exposure	0.13%

T-Mobile 1900 MHz GSM		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	1.0
	Exposure values at the site (mW/cm ²)	0.0042
	% Exposure	0.42%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	5.0
	Exposure values at the site (mW/cm ²)	0.0042
	% Exposure	0.08%

T-Mobile 1900 MHz LTE		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	1.0
	Exposure values at the site (mW/cm ²)	0.0042
	% Exposure	0.42%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	5.0
	Exposure values at the site (mW/cm ²)	0.0042
	% Exposure	0.08%

T-Mobile 2100 MHz LTE		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	1.0
	Exposure values at the site (mW/cm ²)	0.0030
	% Exposure	0.30%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	5.0
	Exposure values at the site (mW/cm ²)	0.0030
	% Exposure	0.06%

T-Mobile 2100 MHz UMTS		
Uncontrolled / General Population	FCC's exposure limits (mW/cm ²)	1.0
	Exposure values at the site (mW/cm ²)	0.0030
	% Exposure	0.30%
Controlled / Occupational	FCC's Exposure limits(mW/cm ²)	5.0
	Exposure values at the site (mW/cm ²)	0.0030
	% Exposure	0.06%

8. Appendix A: FCC Guidelines

FCC Policies

The Federal Communications Commission (FCC) in 1996 implemented regulations and policies for analysis of RF propagation to evaluate RF emissions. All the analysis and results of this report are compared with FCC's (Federal Communications Commission) rules to determine whether a site is compliant for Occupational/Controlled or General Public/Uncontrolled exposure. All the analysis of RF propagation is done in terms of a percentage. The limits primarily indicate the power density and are generally expressed in terms of milliwatts per centimeter square, mW/cm².

FCC guidelines incorporate two separate tiers of exposure limits that are dependent on the scenario/ situation in which that exposure takes place or the status of the individuals who are subjected to that exposure. The decision as to which tier is applied to a scenario is based on the following definitions:

Occupational / Controlled

These limits apply in situations when someone is exposed to RF energy through his/her occupation, is fully aware of the harmful effects of the RF exposure and has an ability to exercise control over this exposure. Occupational / controlled exposure limits also apply when 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. limits for Occupational/Controlled exposure can be found on Table 1(A).

General Population / Uncontrolled

These limits apply to situations in which the general public may be exposed or in which persons who are exposed because of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure to RF. Therefore, members of the general public would always be considered under this category, for example, in the case of a telecommunications tower that exposes people in a nearby residential area. Exposure limits for General Population/Uncontrolled can be found on Table 1(B).

Table 1. LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

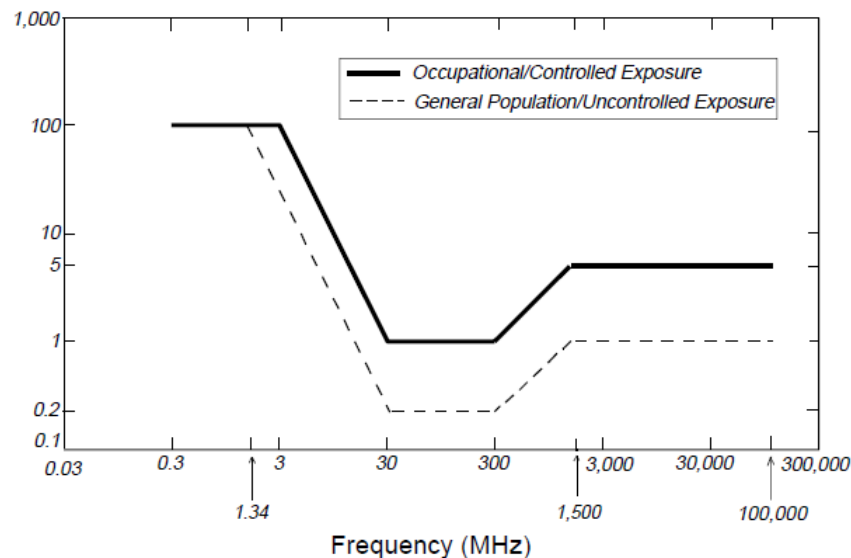
(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz

*Plane-wave equivalent power density

Figure 1. FCC Limits for Maximum Permissible Exposure (MPE)
Plane-wave Equivalent Power Density



OSHA Statement:

The objective of the OSHA Act is to ensure the safety and health of the working men and women by enforcing certain standards. The act also assists and encourages the states in their efforts to ensure safe and healthy working conditions through means of research, information, education and training in the field of occupational safety and health and for other purposes.

According to OSHA Act section 5, important duties to be considered are:

(a) Each employer

- 1) Shall furnish to each of his employees' employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious harm to his employees
- 2) Shall comply with occupational safety and health standards promulgated under this act.

(b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.

9. Preparer Certification

I, Tim Harris, preparer of this report, certify that I am fully trained and aware of the rules and regulations of both the Federal Communications Commission and the Occupational Safety and Health Administration regarding Human Exposure to Radio Frequency Radiation. In addition, I have been trained in RF safety practices, rules, and regulations.

I certify that the information contained in this report is true and correct to the best of my knowledge.

Timothy A. Harris

7/9/2021

Signature

Date

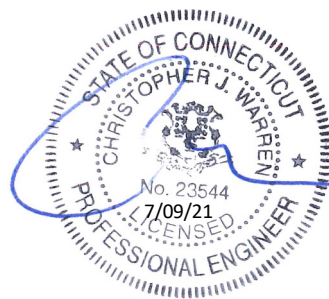


Exhibit G

Letter of Authorization



56 Prospect Street,
Hartford, CT 06103

P.O. Box 270
Hartford, CT 06141-0270
(860) 665-5000

August 11, 2021

Mr. Sheldon Freinle
Northeast Site Solutions
420 Main St,
Sturbridge, MA 01566

RE: T-Mobile Antenna Site CT11001B, Sound Beach Ave, Greenwich CT, Eversource Structure 1256

Dear Mr. Freinle:

Based on our reviews of the site drawings, the structural analysis and foundation review provided by Centek Engineering, along with a third party review performed by Paul J. Ford and Company, we accept the proposed modification.

Please work with Christopher Gelinis of Eversource Real Estate to process the site lease amendment. Please do not hesitate to contact us with questions or concerns. Christopher can be contacted at 860-665-2008, and I can be contacted at (203) 623-0409.

Sincerely,



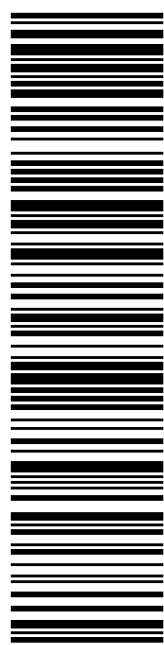
Richard Badon

Richard Badon
Transmission Line Engineering

Ref: 2021-0708 - CT11001B Structural Analysis Rev0 (21051.03)
CT11001B-L600-MA 7-8-21
2021-0810_21051.03 CT11001B - Rev2 CDs (S&S)

Exhibit H

Recipient Mailings

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DEBORAH CHASE NORTHEAST SITE SOLUTIONS 420 MAIN ST STE 1 STURBRIDGE MA 01566-1359	
SHIP TO: FRED CAMILLO FIRST SELECTMAN-GREENWICH 101 FIELD POINT RD GREENWICH CT 06830-6463	
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USPS TRACKING # : 9405 5036 9930 0479 6354 36	
Trans. #: 541295795 Print Date: 08/19/2021 Ship Date: 08/20/2021 Expected Delivery Date: 08/23/2021	Priority Mail® Postage: \$8.25 Total: \$8.25
From: DEBORAH CHASE NORTHEAST SITE SOLUTIONS 420 MAIN ST STE 1 STURBRIDGE MA 01566-1359	Re#: 001B-L600
To: FRED CAMILLO FIRST SELECTMAN-GREENWICH 101 FIELD POINT RD GREENWICH CT 06830-6463	
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0006

C027

SHIP TO: KATIE DELUCA
 PLANNING & ZONING-ZEO-TOWN PLANNER
 101 FIELD POINT RD
 GREENWICH CT 06830-6463

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9405 5036 9930 0479 6354 43

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Trans. #: 541295795	Priority Mail® Postage: \$8.25
Print Date: 08/19/2021	Total: \$8.25
Ship Date: 08/20/2021	
Expected Delivery Date: 08/23/2021	


From: DEBORAH CHASE Re#: 001B-L600
 NORTHEAST SITE SOLUTIONS
 420 MAIN ST
 STE 1
 STURBRIDGE MA 01566-1359

To: KATIE DELUCA
 PLANNING & ZONING-ZEO-TOWN PLANNER
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SHIP TO: CHRIS GELINAS
 EVERSOURCE
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9405 5036 9930 0479 6354 67

Trans. #: 541295795	Priority Mail® Postage: \$8.25
Print Date: 08/19/2021	Total: \$8.25
Ship Date: 08/20/2021	
Expected Delivery Date: 08/23/2021	

From: DEBORAH CHASE Ref#: 001B-L600
 NORTHEAST SITE SOLUTIONS
 420 MAIN ST
 STE 1
 STURBRIDGE MA 01566-1359

To: CHRIS GELINAS
 EVERSOURCE
 107 SELDEN ST
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(800)275-8777

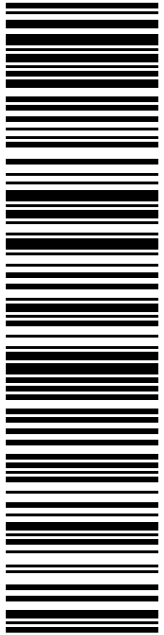
08/24/2021

12:17 PM

Product	Qty	Unit Price	Price
Prepaid Mail Greenwich, CT 06830 Weight: 2 lb 2.50 oz Acceptance Date: Tue 08/24/2021 Tracking #: 9405 5036 9930 0479 6354 36	1		\$0.00
Prepaid Mail Berlin, CT 06037 Weight: 2 lb 2.60 oz Acceptance Date: Tue 08/24/2021 Tracking #: 9405 5036 9930 0479 6354 67	1		\$0.00
Prepaid Mail Greenwich, CT 06830 Weight: 2 lb 2.40 oz Acceptance Date: Tue 08/24/2021 Tracking #: 9405 5036 9930 0479 6354 43	1		\$0.00

Grand Total: \$0.00

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9405 5036 9930 0032 3620 69

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CT DEPT OF TRANSPORTATION
4 BREWERY ST
NEW HAVEN CT 06511-5957

SHIP

P

10/14/2021

PRIORITY MAIL 2-DAY™

DEBORAH CHASE
NORTHEAST SITE SOLUTIONS
420 MAIN ST
STE 1
STURBRIDGE MA 01566-1359

Expected Delivery Date: 10/18/21
Ref#: 001-NHP
0006

C046

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9405 5036 9930 0032 3620 69

Trans. #: 545933823	Priority Mail® Postage: \$8.70
Print Date: 10/14/2021	Total: \$8.70
Ship Date: 10/14/2021	
Expected Delivery Date: 10/18/2021	

From: DEBORAH CHASE Ref#: 001-NHP
NORTHEAST SITE SOLUTIONS
420 MAIN ST
STE 1
STURBRIDGE MA 01566-1359

To: JOHN A VITALE
CT DEPT OF TRANSPORTATION
4 BREWERY ST
NEW HAVEN CT 06511-5957

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FISKDALE
 458 MAIN ST
 FISKDALE, MA 01518-9998
 (800)275-8777

10/14/2021 12:27 PM

Product	Qty	Unit Price	Price
Prepaid Mail	1		\$0.00
New Haven, CT 06511			
Weight: 2 lb 5.50 oz			
Acceptance Date:			
Thu 10/14/2021			
Tracking #:			
9405 5036 9930 0032 3620 45			
Prepaid Mail	1		\$0.00
New Haven, CT 06511			
Weight: 2 lb 3.50 oz			
Acceptance Date:			
Thu 10/14/2021			
Tracking #:			
9405 5036 9930 0032 3620 69			
Grand Total:			\$0.00

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 Clerk: 3

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