10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

Transcend Wireless

January 17, 2023

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

RE: Notice of Exempt Modification
761-763 Federal Road, Brookfield, CT 06804
Latitude: 41.2843
Longitude: -73.2429
T-Mobile Site#: CTFF896A - Sprint Keep Project

Dear Ms. Bachman:

Sprint currently maintains six (6) antennas at the 110-foot level of the existing 112-foot Utility Tower at 761-763 Federal Road, Brookfield, Connecticut. The 112-foot Utility Tower and property are owned and operated by Connecticut Light and Power Company (℅ Eversoucre). T-Mobile now intends to remove all existing Sprint equipment and replace it with their own. T-Mobile will be installing (6) antennas at the 110-foot level of the tower. The new antennas support 5G services.

Planned Modifications:
Tower:
Remove
(6) Sprint Antennas
All Existing Sprint RRHs
All Existing Sprint Hybrid Cables

Install New:
(3) APXVAALL24 43-U-NA20 Antennas
(3) Commscope VV-65A-R1 Antennas
(3) Ericsson Radio 4460 B25+B66
(3) Ericsson 4480 B71+B85
(6) Commscope Bias-T-ATSBT-TOP-MF-4G
(24) 1 ⅝" Coax Cables
(2) 6/24 Hybrid Cables

Ground:
Install New:
(1) 6160 Cabinet and (1) B160 Battery Cabinet.

To Be Removed:
All Sprint Ground Equipment

This facility was originally approved by the Connecticut Siting Council in Petition No. 494 dated November 30, 2000. A copy of this approval is attached. This modification complies with this approval.

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

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

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

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

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

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

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

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

For the foregoing reasons, T-Mobile 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,

Eric Breun
Transcend Wireless
Cell: 201-658-7728
Email: ebreun@transcendwireless.com

Attachments
cc: Tara Carr - First Selectwoman of Brookfield
Francis Lollie - Zoning Enforcement Officer
Connecticut Light and Power Co (℅ Eversource) - Land Owner

ERIC BREUN
2016587728
1 INTERNATIONAL BLVD.
MAHWAH NJ 07495

1 LBS **1 OF 1**

SHIP TO:
ZEO FRANCIS LOLLIE
100 POCONO ROAD
BROOKFIELD CT 06804

CT 068 0-03

UPS GROUND
TRACKING #: 1Z V25 742 03 9734 9721

BILLING: P/P

Reference #1: CTFF896A

XOL 22.12.20 NV45 2.0A 01/2023*

ERIC BREUN
2016587728
1 INTERNATIONAL BLVD.
MAHWAH NJ 07495

1 LBS **1 OF 1**

SHIP TO:
FIRST SELECTWOMAN
TARA CARR
100 POCONO ROAD
BROOKFIELD CT 06804

CT 068 0-03

UPS GROUND
TRACKING #: 1Z V25 742 03 9789 9717

BILLING: P/P

Reference #1: CTFF896A

XOL 22.12.20 NV45 2.0A 01/2023*

ERIC BREUN
2016587728
1 INTERNATIONAL BLVD.
MAHWAH NJ 07495

1 LBS **1 OF 1**

SHIP TO:
CHRIS GELINAS
860-665-2008
EVERSOURCE ENERGY
107 SELDEN ST.
BERLIN CT 06037

CT 061 9-02

UPS GROUND
TRACKING #: 1Z V25 742 03 9681 9733

BILLING: P/P

Reference #1: CTFF896A

XOL 22.12.20 NV45 2.0A 01/2023*

TM

Hello, your package has been delivered.

Delivery Date: Friday, 01/13/2023

Delivery Time: 9:57 AM

Left At: INSIDE DELIV

Signed by: linese

TRANSCEND WIRELESS

Tracking Number:	1ZV257420397899717
Ship To:	TARA CARR 100 POCONO ROAD BROOKFIELD, CT 06804 US
Number of Packages:	1
UPS Service:	UPS Ground
Package Weight:	1.0 LBS
Reference Number:	CTFF896A

Hello, your package has been delivered.

Delivery Date: Friday, 01/13/2023

Delivery Time: 10:22 AM

Signed by: KEITH

TRANSCEND WIRELESS

Tracking Number:	1ZV257420396819733
Ship To:	EVERSOURCE ENERGY 107 SELDEN ST. BERLIN, CT 06037 US
Number of Packages:	1
UPS Service:	UPS Ground
Package Weight:	1.0 LBS
Reference Number:	CTFF896A

Your shipment from

TRANSCEND WIRELESS

Estimated delivery

The delivery date will be provided as soon as possible.

Label Created

On the Way

Out for Delivery

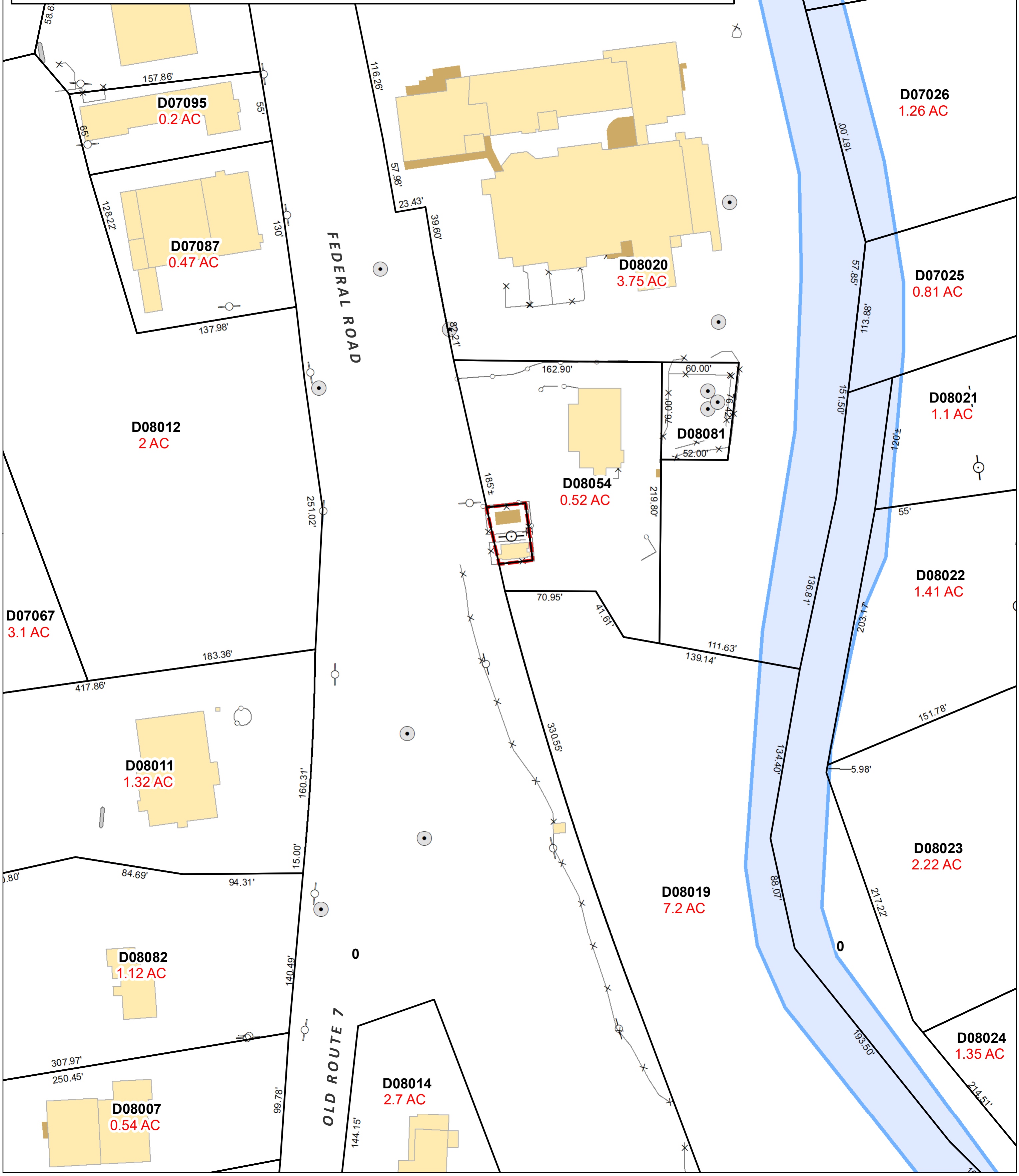
Delivery

Ship To

ZEO FRANCIS LOLLIE
100 POCONO ROAD
BROOKFIELD, CT 06804 US

Town of Brookfield, Connecticut - Assessment Parcel Map

Parcel: **D08060** **Address:** 761 FEDERAL RD



Approximate Scale:
1 inch = 100 feet

Map Produced May 2022

Disclaimer: This map is for informational purposes only. All information is subject to verification by any user.
The Town of Brookfield and its mapping contractors assume no legal responsibility for the information contained herein.

Town of Brookfield, CT

Property Listing Report

Map Block Lot	D08060	Building #	1	Section #	1	Account	01179000

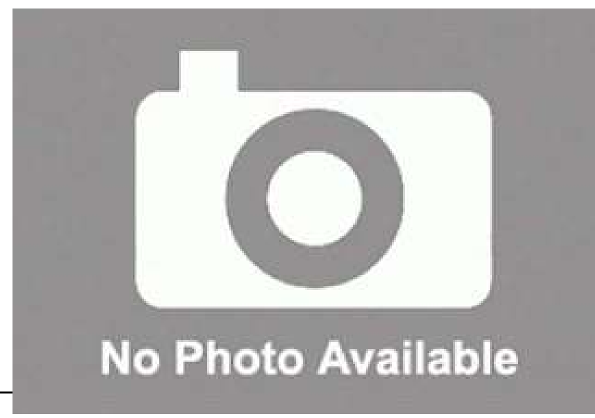
Property Information

Property Location	761 FEDERAL RD
Owner	CONNECTICUT LIGHT & POWER COMPANY
Co-Owner	na
Mailing Address	PO BOX 270 HARTFORD CT 06141
Land Use	435 Cell Site Vac Lnd
Land Class	I
Zoning Code	TCD
Census Tract	205100020100

Street Index	
Acreage	0.1
Utilities	UNKNOWN
Lot Setting/Desc	UNKNOWN Level
Additional Info	

Ph

Sketch



Primary Construction Details

Year Built	0	Bedrooms	0	Exterior Walls	
Stories		Full Bathrooms	0	Exterior Walls 2	NA
Building Style	UNKNOWN	Half Bathrooms	0	Interior Walls	
Building Use	Vacant	Extra Fixtures	0	Interior Walls 2	NA
Building Condition		Bath Style	NA	Heating Type	
Interior Floors 1		Kitchen Style	NA	Heating Fuel	
Interior Floors 2	NA	Roof Style		Sq. Ft. Basement	
Total Rooms	0	Roof Cover		Fin BSMT Quality	
Basement Garages	0	AC Type		Extra Kitchens	
Occupancy		Fireplaces	0		
Building Grade					

Report Created On 1/9/2023

Town of Brookfield, CT

Property Listing Report | Map Block Lot D08060 | Building # 1 | Section # 1 | Account 01179000

Valuation Summary

(Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	0	0
Extras	0	0
Improvements		
Outbuildings	33170	23230
Land	225730	158010
Total	258900	181240

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Total Area	0	0

Outbuilding and Extra Features

Type	Description
Comm Shed	200 S.F.
Fence 6'	110 L.F.
PreCastConc Shed	80 S.F
Cell Tower	1 Units

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
CONNECTICUT LIGHT & POWER COMPANY	103/ 160	1973-09-19	0
CONNECTICUT LIGHT & POWER COMPANY	046/ 331	1956-12-13	0

Petition No. 494
Springwich Cellular Limited Partnership
North Branford, Connecticut
Staff Report
November 30, 2000

On November 20, 2000, Connecticut Siting Council (Council) member Edward Wilensky and Christina Lepage of the Council staff met with Springwich Cellular Limited Partnership (SCLP) representative Theresa Ranciato-Viele at 763 Federal Road, Brookfield, Connecticut for inspection of an electric transmission structure. The property and structure is owned by Connecticut Light and Power Co. (CL&P). SCLP, 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.

SCLP proposes the installation of three 8-foot panel antennas on top of a mounting pole. The antennas will extend approximately 10-feet above the existing 90.8-foot transmission line monopole structure (#2683). The centerline of the antennas will be at about 96.8 feet above ground level (AGL) with the top of the antennas at 100.8-feet AGL.

Access to the site will be from Federal Road through an existing CL&P right-of-way. SCLP is proposing to install a 67-foot long driveway with a turn-around to access the structure during construction activity and all regular maintenance. A 2-foot retaining wall will be installed to separate the access road and the telecommunications equipment compound, which is at a higher level. Concrete stairs will be built to separate the two levels.

An 11'x20' equipment building will be placed on a 12'3"x21' concrete pad at the base of the tower. The equipment shelter will contain 12 batteries, which would provide power in the case of a commercial power failure. An 8-foot high chain-link fence will be installed around the entire facility for security of the site. Landscaping will consist of several 6 to 8-foot arborvitae trees to camouflage the fence. Electrical and telephone services will be provided to the property via an existing utility pole #2378, which is located on Federal Road. The power and telephone lines will be installed in underground conduits beneath SCLP's access driveway.

The proposed site is located east of Route 7 (Federal Road) in Brookfield. The site is bordered by commercial buildings and parking lots to the north and by undeveloped land to the south and east. The zoning designation of this site is "Central Business District". The nearest residence is approximately 500 feet to the east of the site.

SCLP states that the equipment will not be seen since it will be enclosed in the equipment building at the base of the structure. SCLP also contends that all erosion and sediment control measures shall be installed as necessary.

The worst-case power density for the telecommunications operations at the site has been calculated to be 14.30% of the applicable standard for uncontrolled environments.

SCLP submits that the proposed modification of the structure would not require a Certificate because it will reduce the need for a new telecommunications tower by utilizing an existing structure and contends that the proposed installation will not cause a substantial adverse environmental effect.

EVERSOURCE ENERGY

56 Prospect Street,
Hartford, CT 06103

P.O. Box 270
Hartford, CT 06141-0270
(860) 665-5000

December 30, 2022

Kyle Richers
Transcend Wireless
10 Industrial Ave Suite 3
Mahwah NJ 07430

RE: T-Mobile Antenna Site CTFF896A, Federal Rd, Brookfield CT, Eversource Structure 2683

Dear Mr. Richers:

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 Gelinas 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: 2022-1207 - CTFF896A - Structural Analysis Rev4 (21005.40)
2022-1221_21005.40 CTFF896A_CT54XC713 - Rev2 CDs (S&S)

Sprint Now part of T Mobile

SPRINT ID: CT54XC713
SITE ID: CTFF896A
761 FEDERAL RD
BROOKFIELD, CT 06804
EVERSOURCE STR: 2683

T-MOBILE RAN TEMPLATE (PROVIDED BY RFDS)
67E998E 6160

T-MOBILE A+L TEMPLATE (PROVIDED BY RFDS)
67E998E_1OP+1QP

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2021 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2022 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "H" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2022 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL, AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
12. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED' ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE T-MOBILE CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
14. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
15. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUITS AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
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.
19. CONTRACTOR SHALL COMPLY WITH THE OWNER'S ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

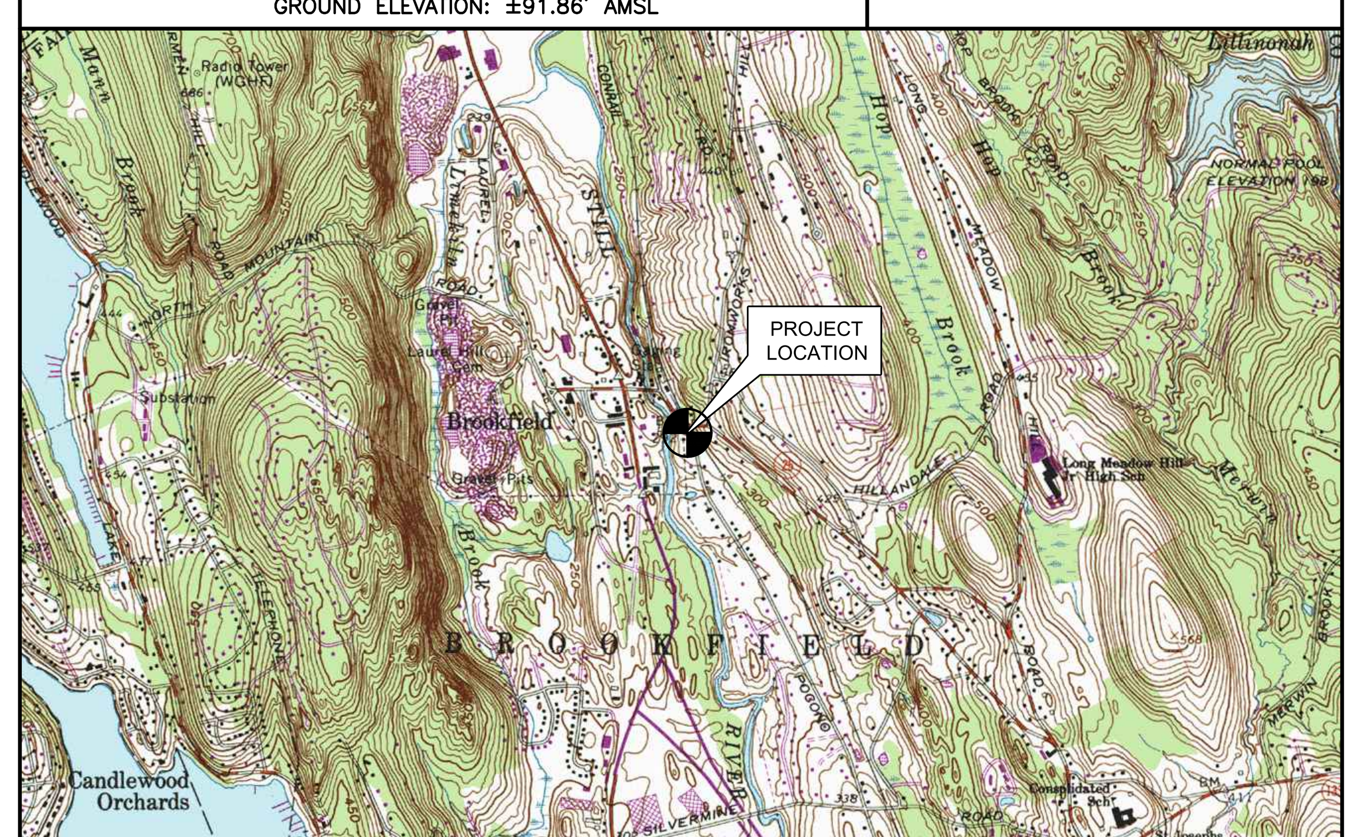
SITE DIRECTIONS

FROM: 35 GRIFFIN ROAD SOUTH, BLOOMFIELD, CT 06002 — TO: 761 FEDERAL RD, BROOKFIELD, CT 06804

1.	GET ON I-91 S IN WINDSOR FROM DAY HILL RD.	4.30 MI.
2.	MERGE ONTO I-91 S.	6.80 MI.
3.	TAKE EXIT 32A-32B FOR I-84 W TOWARD WATERBURY.	0.50 MI.
4.	MERGE ONTO I-84.	54.4 MI.
5.	TAKE EXIT 7 TO MERGE ONTO US-202 E/US-7 N TOWARD NEW MILFORD/BROOKFIELD.	4.00 MI.
6.	TAKE EXIT 12 FOR US-202 TOWARD BROOKFIELD.	0.50 MI.
7.	TURN RIGHT ONTO US-202 E.	0.40 MI.
8.	TURN RIGHT.	0.01 MI.
9.	TURN RIGHT. DESTINATION WILL BE ON THE RIGHT	

SITE COORDINATES: LATITUDE: 41° 28' 43" N; LONGITUDE: 73° 24' 29" W; GROUND ELEVATION: ±91.86' AMSL

COORDINATES AND GROUND ELEVATION ARE REFERENCED FROM GOOGLE EARTH



VICINITY MAP

NORTH

PROJECT SUMMARY

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

1. INSTALL (1) RADIO 4460 B25+B66 PER SECTOR AT GRADE, TOTAL (3).
2. INSTALL (1) RADIO 4480 B71+B85 PER SECTOR AT GRADE, TOTAL (3).
3. INSTALL (1) ANTENNA RFS: APXVAALL24_43 U-NA20 PER SECTOR, TOTAL (3).
4. INSTALL (1) ANTENNA COMMSCOPE: VV-65A-R1 PER SECTOR, TOTAL (3).
5. INSTALL BIAS-T FOR RET CONTROL, TOTAL OF (6).
6. INSTALL NEW POWER ENCLOSURE 6160.
7. INSTALL NEW BATTERY ENCLOSURE B160.
8. INSTALL MONOPOLE DOUBLE SUPPORT ARM (SITEPRO P/N: RDS-296, TYP. (2) SPACED 3' APART.
9. INSTALL (1) 8' LONG PIPE MAST PER SECTOR, TOTAL (3).
10. REMOVE EXISTING SPRINT EQUIPMENT AND ANTENNA MOUNT.
11. INSTALL (2) 6/24 HYBRID CABLES AND (24) 1-5/8" COAX CABLES.
12. REMOVE AND REPLACE EXISTING TOWER MAST. SEE SHEETS S-1/S-2 FOR ADDITIONAL INFORMATION.

PROJECT SUMMARY

TOWER AND MOUNT MODIFICATIONS REQUIRED PRIOR TO ANY ANTENNA EQUIPMENT INSTALLATIONS. SEE SHEETS S-1/S-2 FOR ADDITIONAL INFORMATION. SPECIAL INSPECTIONS REQUIRED, SEE SHEET N-1 FOR ADDITIONAL INFORMATION.

1. REMOVE AND REPLACE EXISTING TOWER MAST.
2. REMOVE AND REPLACE EXISTING ANTENNA MOUNT.

PROJECT INFORMATION

SPRINT ID:	CT54XC713
SITE ID:	CTFF896A
SITE ADDRESS:	761 FEDERAL RD BROOKFIELD, CT 06804
APPLICANT:	T-MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
CONTACT PERSON:	KYLE RICHERS TRANSCEND WIRELESS, (908) 447-4716
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405 CARLO F. CENTORE, PE (203) 488-0580 EXT. 122
PROJECT COORDINATES:	LATITUDE: 41°-28'-43" N LONGITUDE: 73°-24'-29" W GROUND ELEVATION: 91.86'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	12/21/22	RTS	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
1	12/15/22	RTS	TJR	CONSTRUCTION DRAWINGS – UPDATED SPECIAL INSPECTIONS CHART
0	12/14/22	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

Sprint Now part of T-Mobile · Transcend Wireless

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

T-MOBILE NORTHEAST LLC

SPRINT ID: CT54XC713
SITE ID: CTFF896A
761 FEDERAL RD
BROOKFIELD, CT 06804

DATE: 12/14/22
SCALE: AS NOTED
JOB NO. 21005.40

TITLE SHEET

T-1

Sheet No. 1 of 12

NOTES AND SPECIFICATIONS

DESIGN BASIS:

GOVERNING CODE: 2021 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2022 CONNECTICUT STATE BUILDING CODE.

1. DESIGN CRITERIA:

- RISK CATEGORY II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 93 MPH (Vasd) (EXPOSURE B/ IMPORTANCE FACTOR 1.0 BASED ON ASCE 7–16).

SITE NOTES

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

GENERAL NOTES

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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.

MODIFICATION INSPECTION NOTES:

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 MI 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.

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 AND COMPACTION	–	POST–INSTALLED ANCHOR ROD PULL–OUT TEST
–	EOR APPROVED POST–INSTALLED ANCHOR MPII	–	REBAR AND FORMWORK GEOMETRY VERIFICATION	X	PHOTOGRAPHS
–	FABRICATION INSPECTION	–	CONCRETE TESTING	–	STEEL INSPECTION
–	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 GALVANIZED VERIFICATION		
		X	CONTRACTOR AS–BUILT REDLINE DRAWINGS		
		–	HOST BUILDING (BEARING WALL/PARAPET ETC..) INTEGRITY VERIFICATION PRIOR TO ANY INSTALLATIONS		
		–	HOST BUILDING (ROOF OPENING) FRAMING VERIFICATION PRIOR TO ANY INSTALLATIONS		
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				
	5. MPII – MANUFACTURER'S PRINTED INSTALLATION GUIDELINES				

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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1	12/15/22	RTS	TJR	CONSTRUCTION DRAWINGS – UPDATED SPECIAL INSPECTIONS CHART
0	12/14/22	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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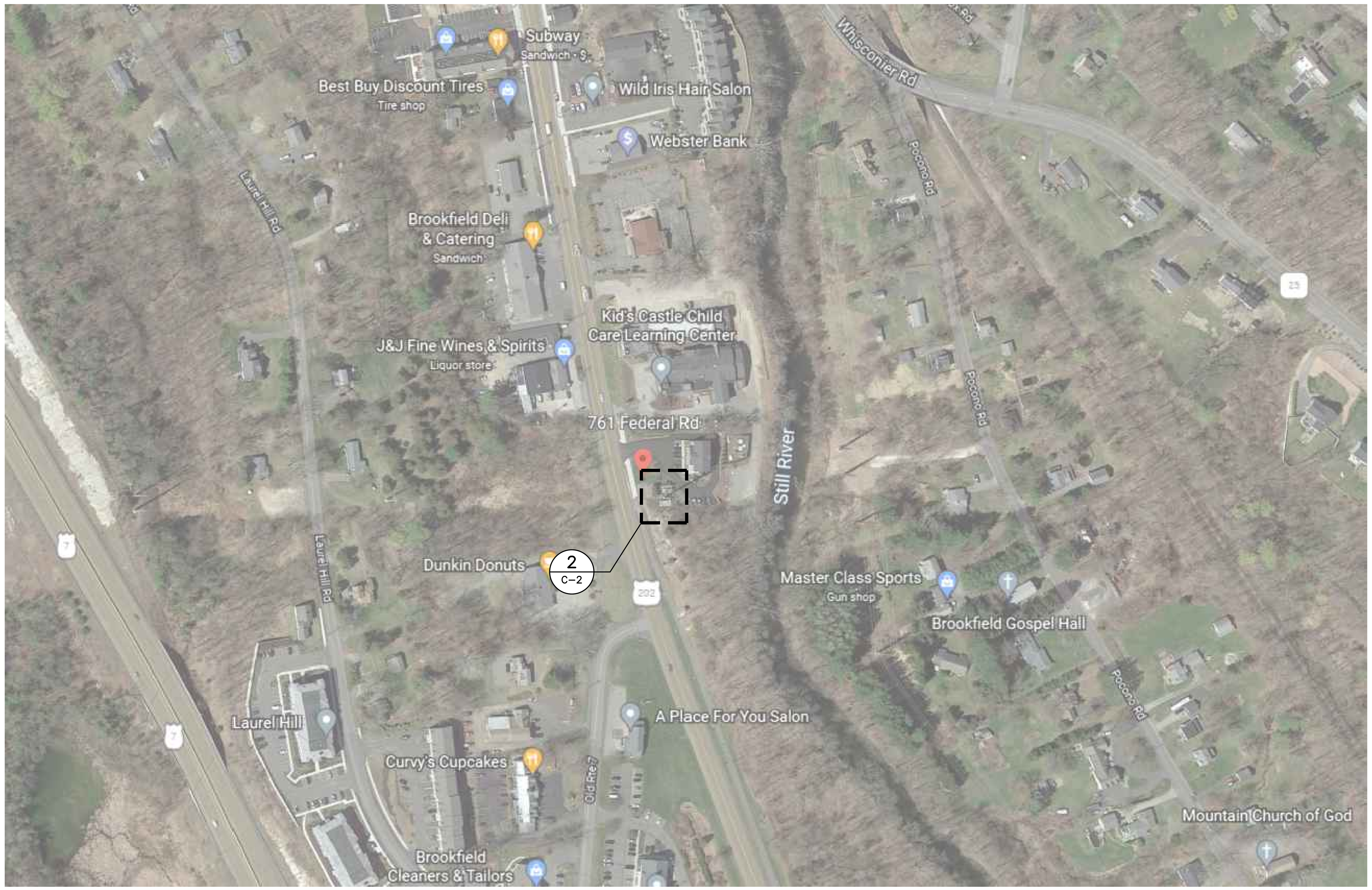
GENERAL NOTES AND SPECIFICATIONS

N–1

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

ANTENNA SCHEDULE

SECTOR	EXISTING/PROPOSED	ANTENNA	SIZE (INCHES) (L x W x D)	ANTENNA ℄ HEIGHT	AZIMUTH	(E/P) RRU (QTY)	(E/P) TMA (QTY)	(QTY) PROPOSED HYBRID/COAX CABLES
A1	PROPOSED	RFS: APXVAALL24_43-U-NA20	95.9 x 24 x 8.5	110'	330°	(P) RADIO 4480 B71+B85 (1)	(P) COMMSCOPE: BIAST – ATSBT-TOP-FM-4G (1)	(24) 1-5/8" COAX CABLES (TOWER) (2) 6/24 HYBRID CABLES (GRADE)
A2	PROPOSED	COMMSCOPE: VV65A-R1	54.7 x 12.1 x 4.6	110'	330°	(P) RADIO 4460 B25+B66 (1)	(P) COMMSCOPE: BIAST – ATSBT-TOP-FM-4G (1)	
B1	PROPOSED	RFS: APXVAALL24_43-U-NA20	95.9 x 24 x 8.5	110'	90°	(P) RADIO 4480 B71+B85 (1)	(P) COMMSCOPE: BIAST – ATSBT-TOP-FM-4G (1)	
B2	PROPOSED	COMMSCOPE: VV65A-R1	54.7 x 12.1 x 4.6	110'	90°	(P) RADIO 4460 B25+B66 (1)	(P) COMMSCOPE: BIAST – ATSBT-TOP-FM-4G (1)	
C1	PROPOSED	RFS: APXVAALL24_43-U-NA20	95.9 x 24 x 8.5	110'	170°	(P) RADIO 4480 B71+B85 (1)	(P) COMMSCOPE: BIAST – ATSBT-TOP-FM-4G (1)	
C2	PROPOSED	COMMSCOPE: VV65A-R1	54.7 x 12.1 x 4.6	110'	170°	(P) RADIO 4460 B25+B66 (1)	(P) COMMSCOPE: BIAST – ATSBT-TOP-FM-4G (1)	



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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	12/21/22	RTS	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
1	12/15/22	RTS	TJR	CONSTRUCTION DRAWINGS – UPDATED SPECIAL INSPECTIONS CHART
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SITE LOCATION PLAN

C-1

Sheet No. 3 of 12

STRUCTURAL COMPLIANCE

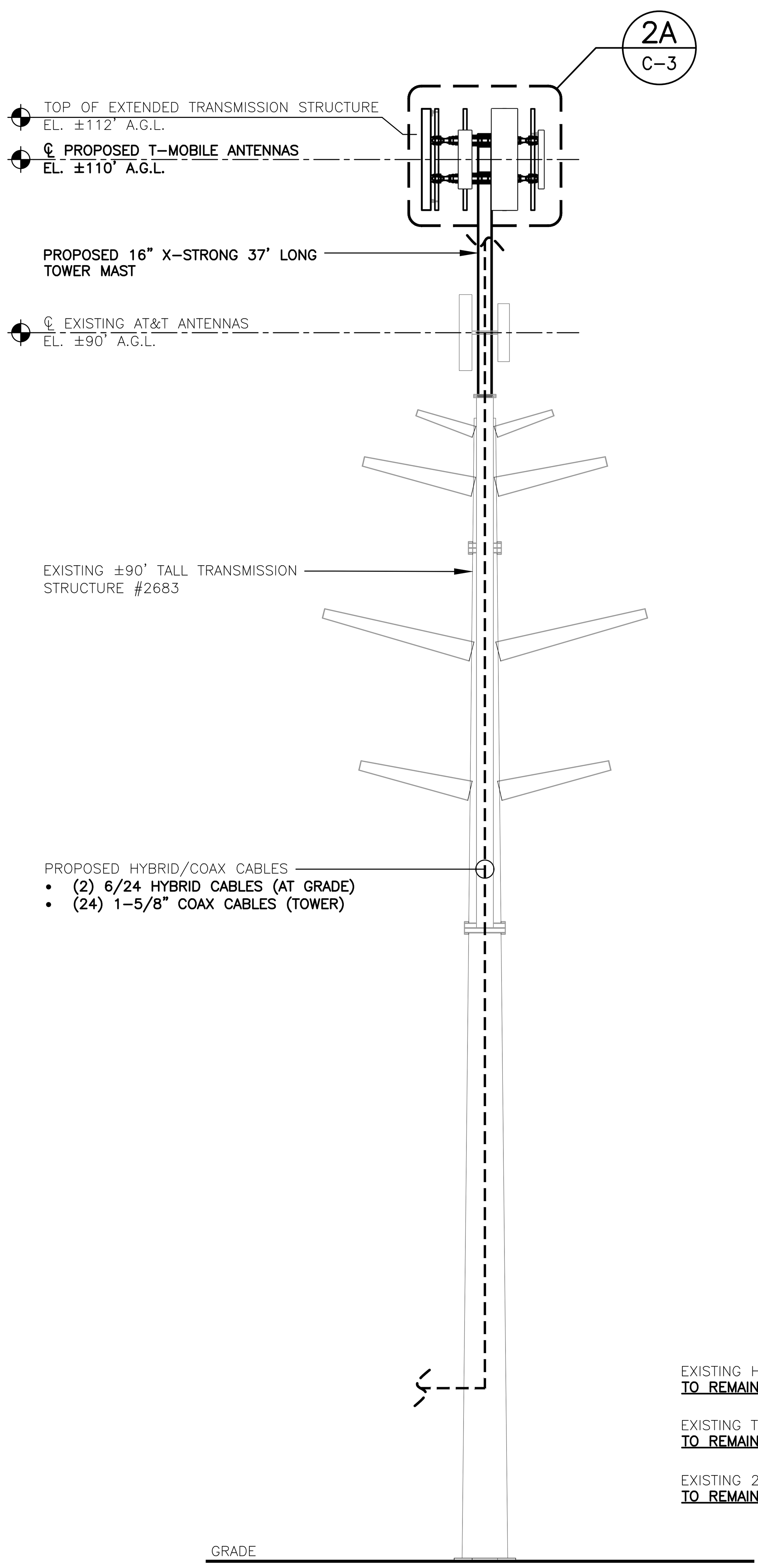
TOWER AND TOWER FOUNDATION

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

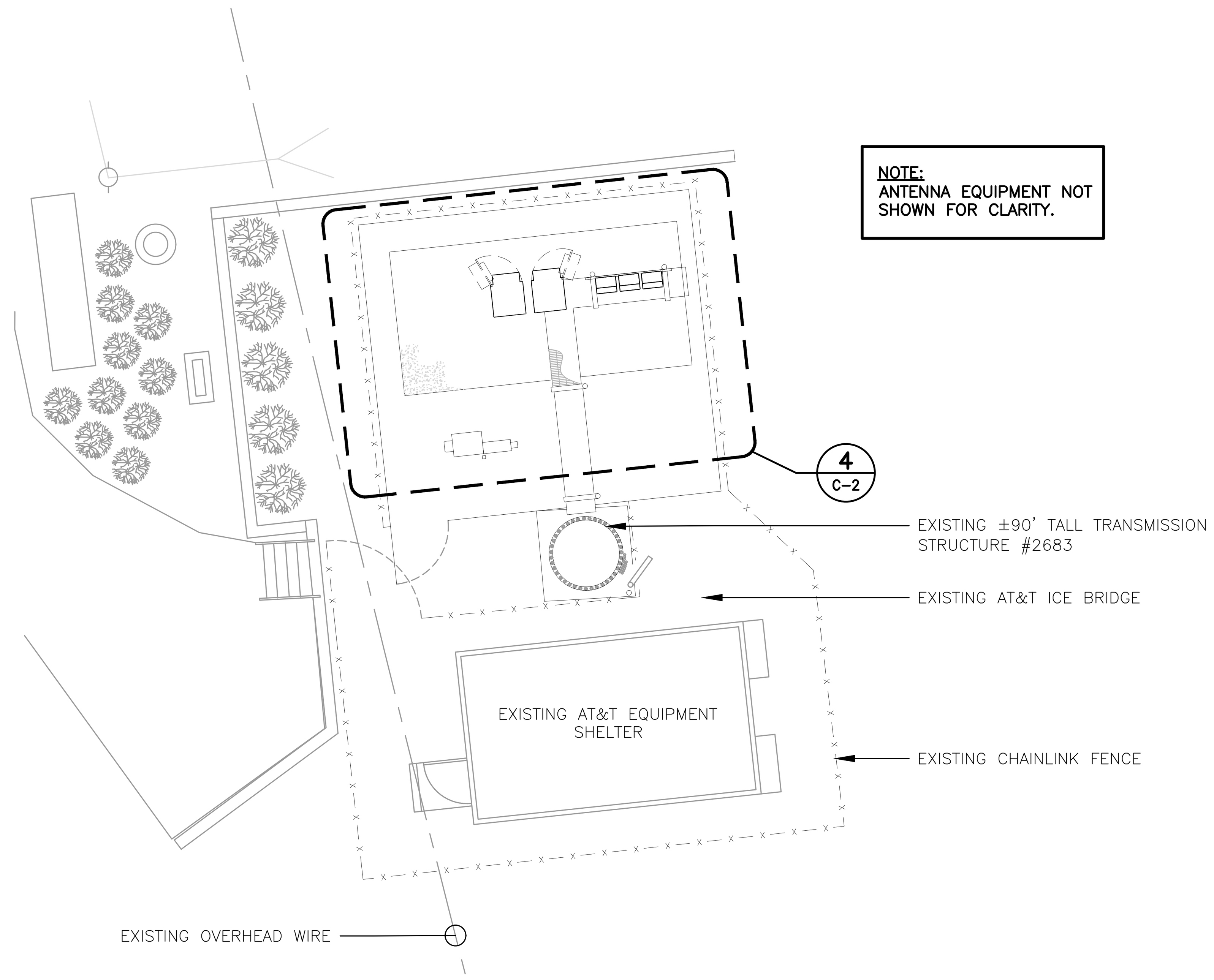
REFER TO THE STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 21005.40) DATED 12/07/22 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

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

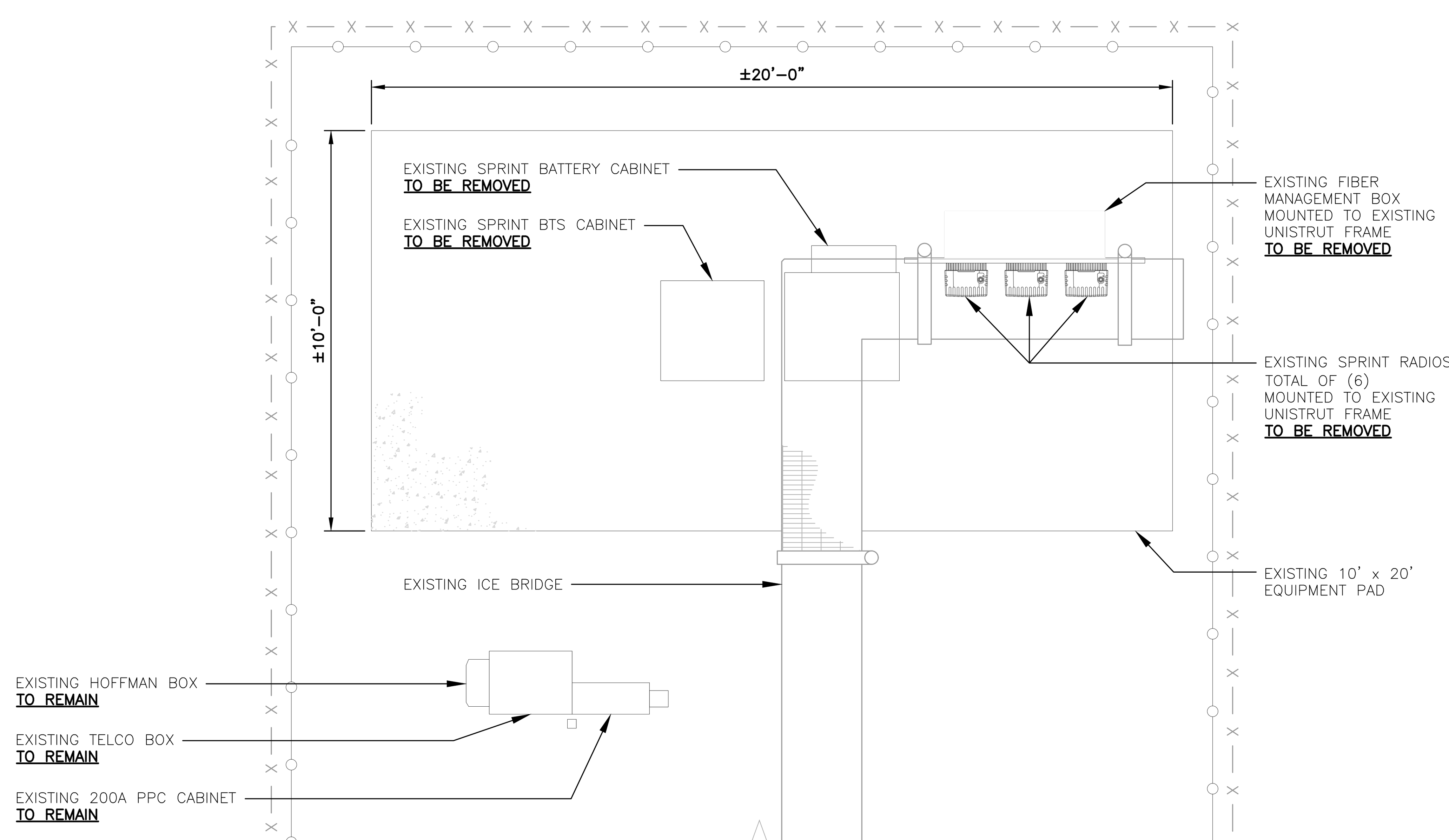
NOTE: ANTENNA EQUIPMENT NOT SHOWN FOR CLARITY.



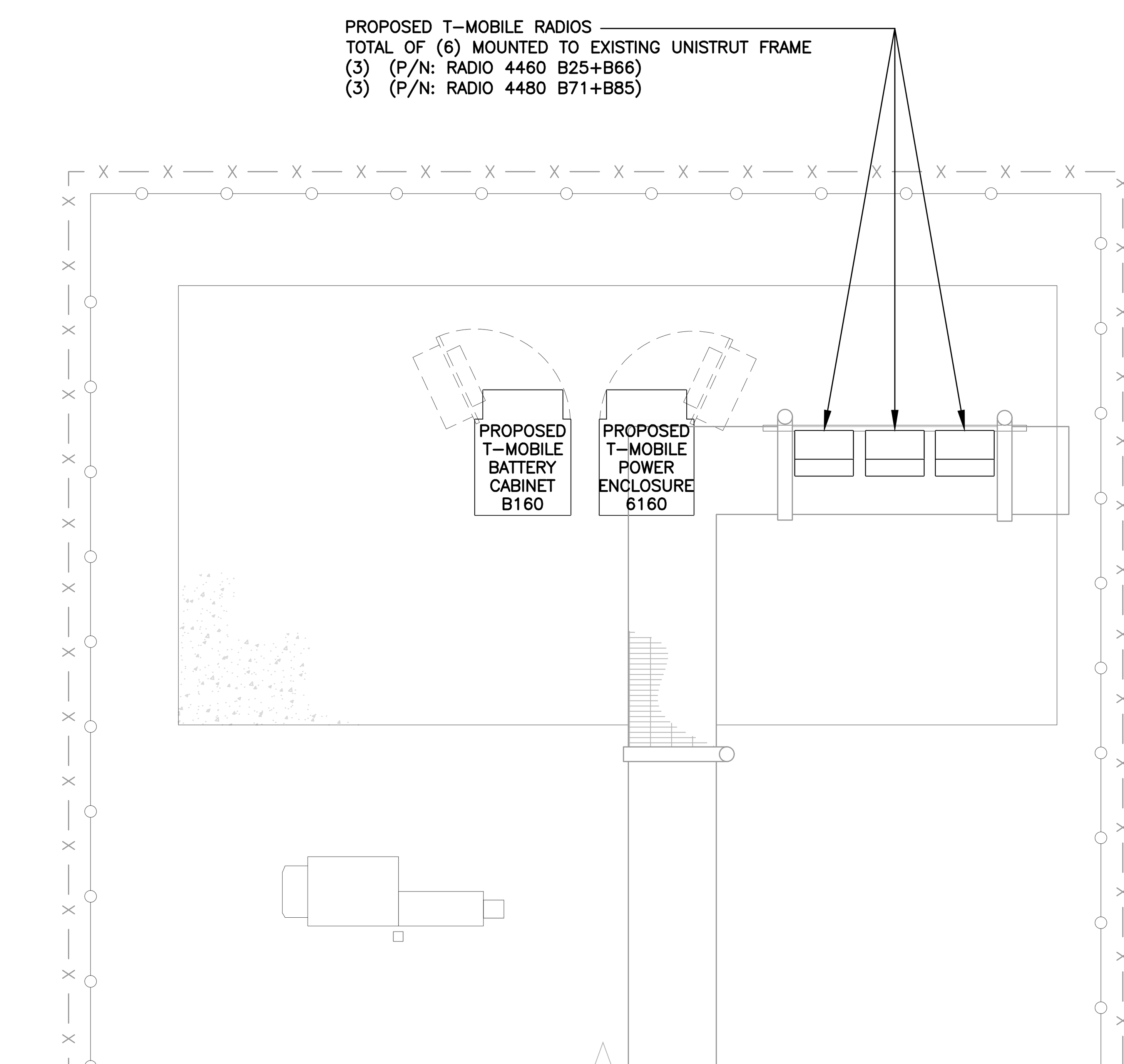
1 C-2 PROPOSED TOWER ELEVATION
SCALE: 1/8" = 1'



2 C-2 PROPOSED COMPOUND PLAN
SCALE: 1/8" = 1'
TRUE NORTH



3 C-2 EXISTING EQUIPMENT PLAN
SCALE: 3/8" = 1'
TRUE NORTH



4 C-2 PROPOSED EQUIPMENT PLAN
SCALE: 3/8" = 1'
TRUE NORTH

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	12/21/22	RTS	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
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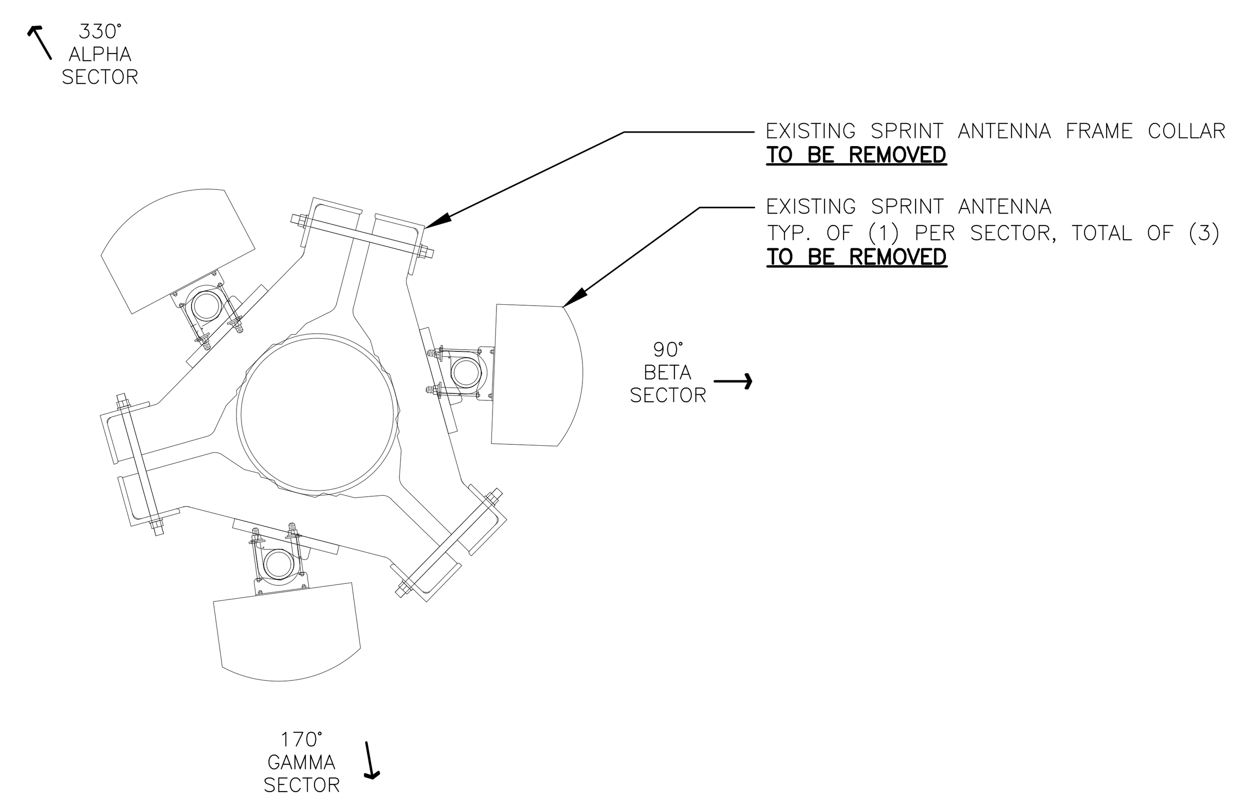
COMPOUND PLAN, EQUIPMENT PLAN, AND ELEVATION

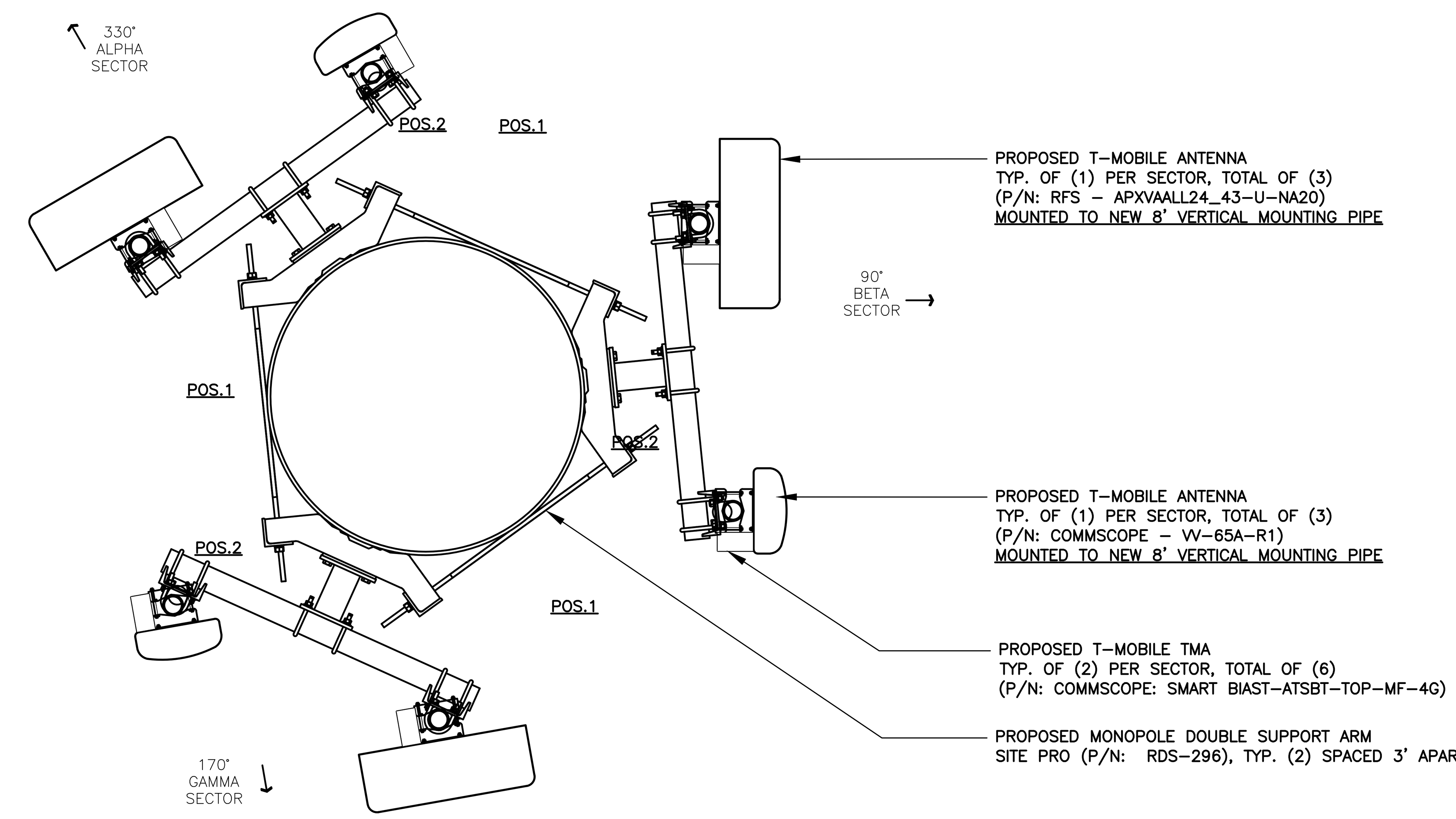
C-2

Sheet No. 4 of 12



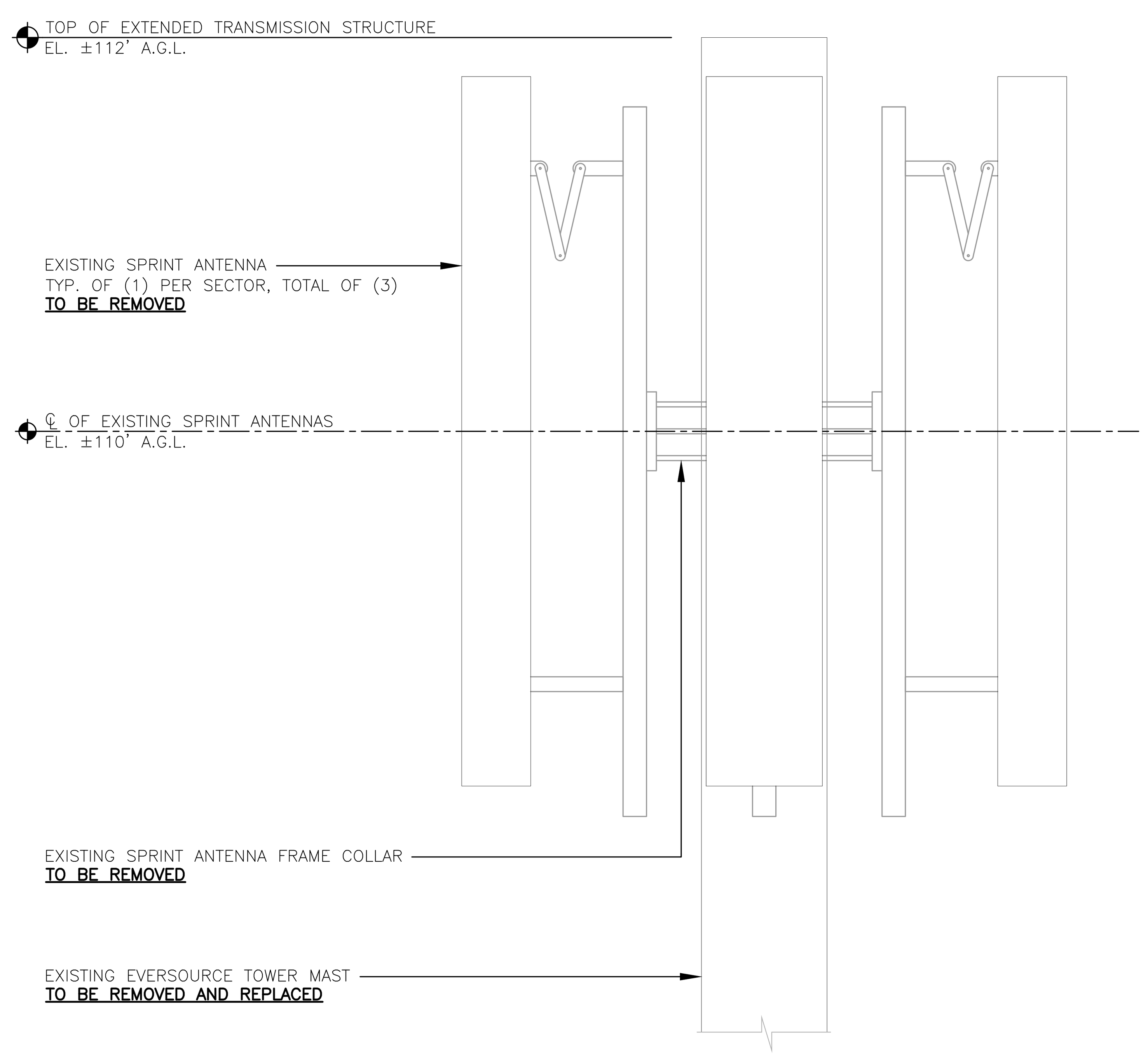
1 C-3 **EXISTING ANTENNA PLAN** TRUE NORTH

SCALE: 1" = 1'



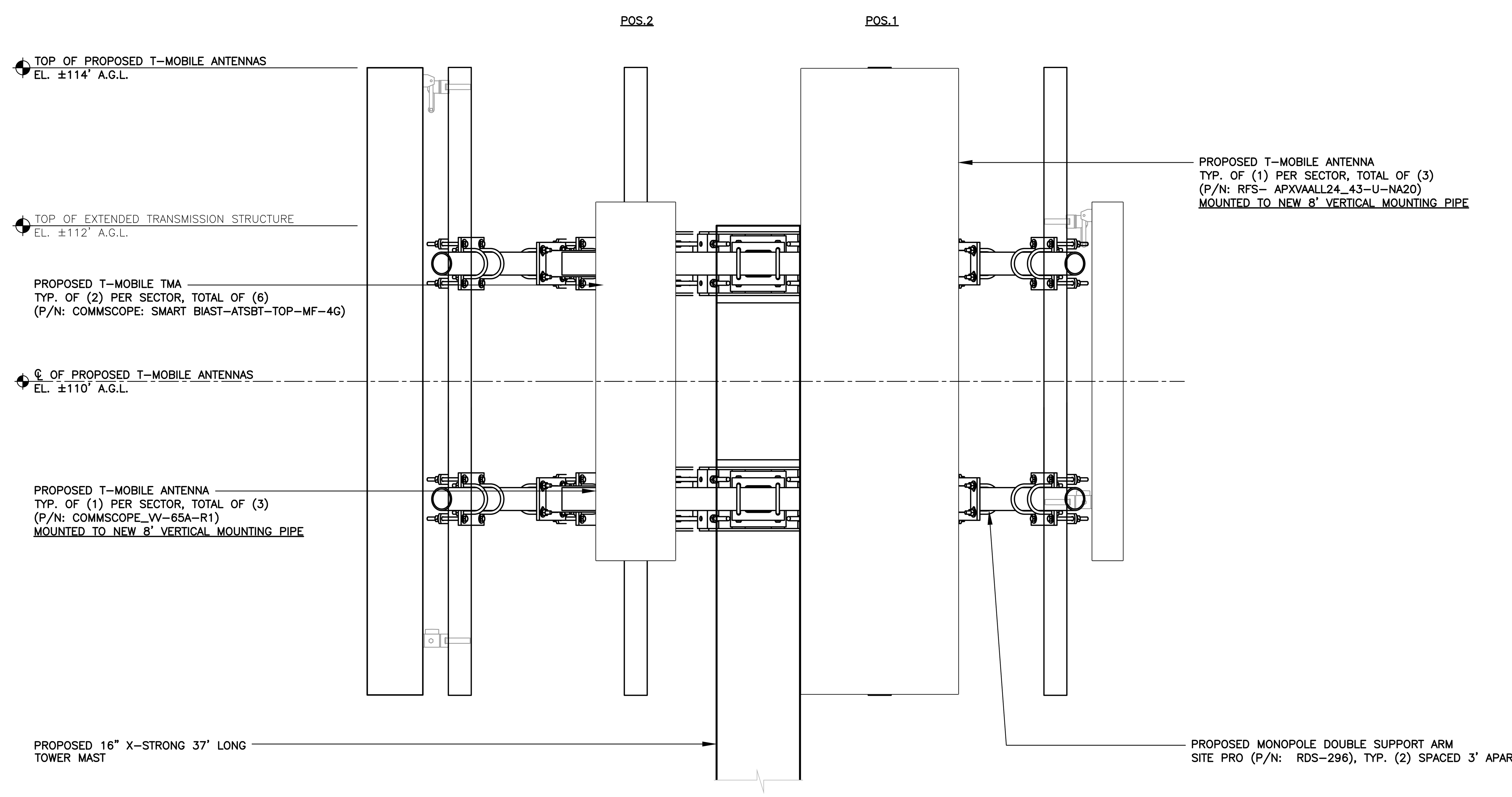
2 C-3 **PROPOSED ANTENNA PLAN** TRUE NORTH

SCALE: 3/4" = 1'



1A C-3 **EXISTING ANTENNA ELEVATION**

SCALE: 1" = 1'



2A C-3 **PROPOSED ANTENNA ELEVATION**

SCALE: 1" = 1'

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	12/21/22	RTS	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
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ANTENNA PLANS AND ELEVATIONS

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Sheet No. 5 of 12

APXVAALL24_43-U-NA20

VV-65A-R1

ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: RFS MODEL: APXVAALL24_43-U-NA20	95.9"L x 24.0"W x 8.5"D	±150 LBS.
MAKE: COMMSCOPE MODEL: VV-65A-R1	54.7"L x 12.1"W x 4.6"D	±41 LBS.

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

1 C-4 **PROPOSED ANTENNA DETAIL**
SCALE: NOT TO SCALE

RADIO 4460 B25+B66

RADIO 4480 B71+B85

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RADIO 4460 B25+B66	19.6"L x 15.7"W x 12.1"D	±109 LBS.	BEHIND ANT.: 8" MIN. BELOW ANT.: 20" MIN. BELOW RRU: 16" MIN.
MAKE: ERICSSON MODEL: RADIO 4480 B71+B85	21.8"L x 15.7"W x 7.5"D	±84 LBS.	BEHIND ANT.: 8" MIN. BELOW ANT.: 20" MIN. BELOW RRU: 16" MIN.

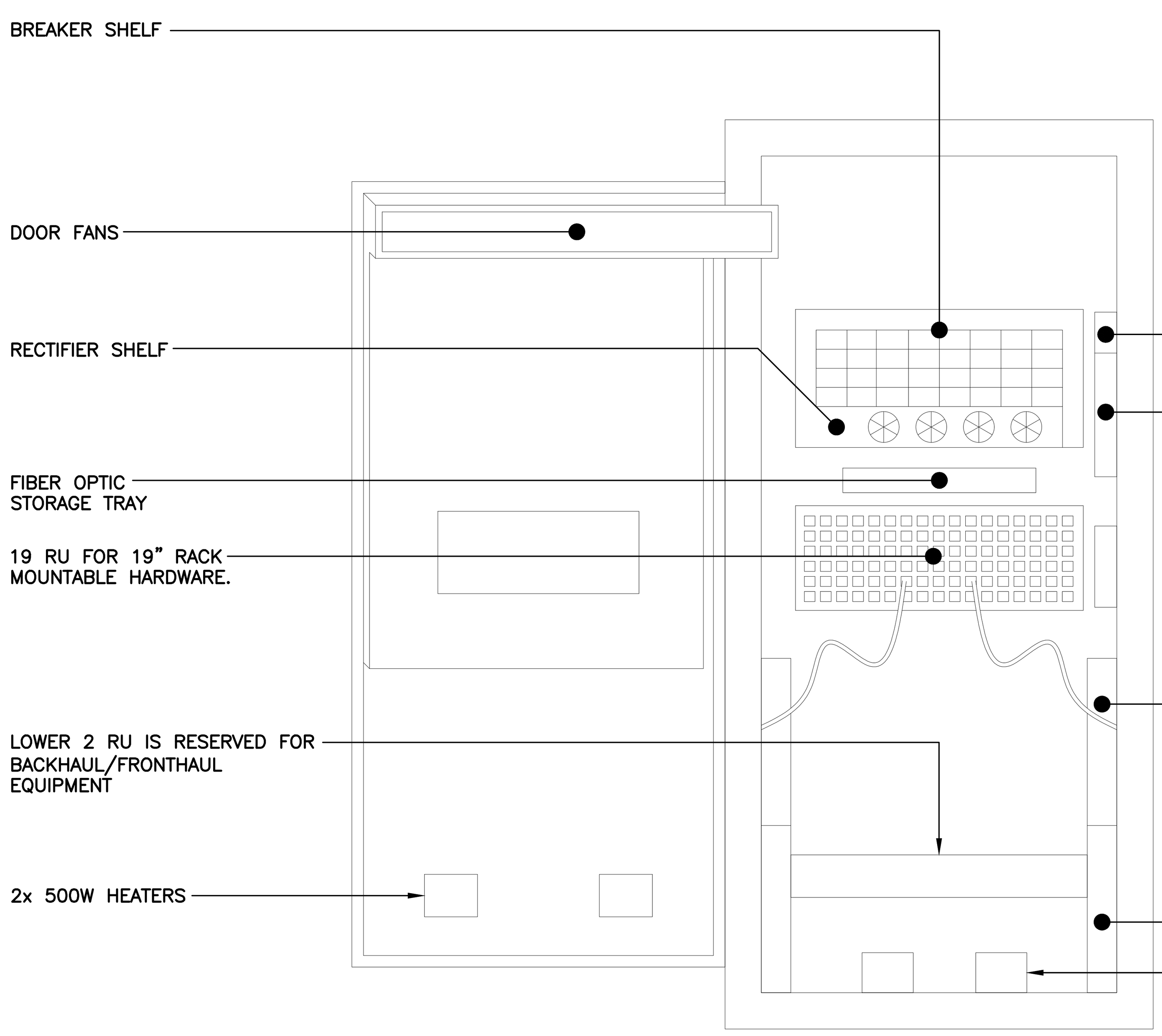
NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

2 C-4 **PROPOSED RRU DETAIL**
SCALE: NOT TO SCALE

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

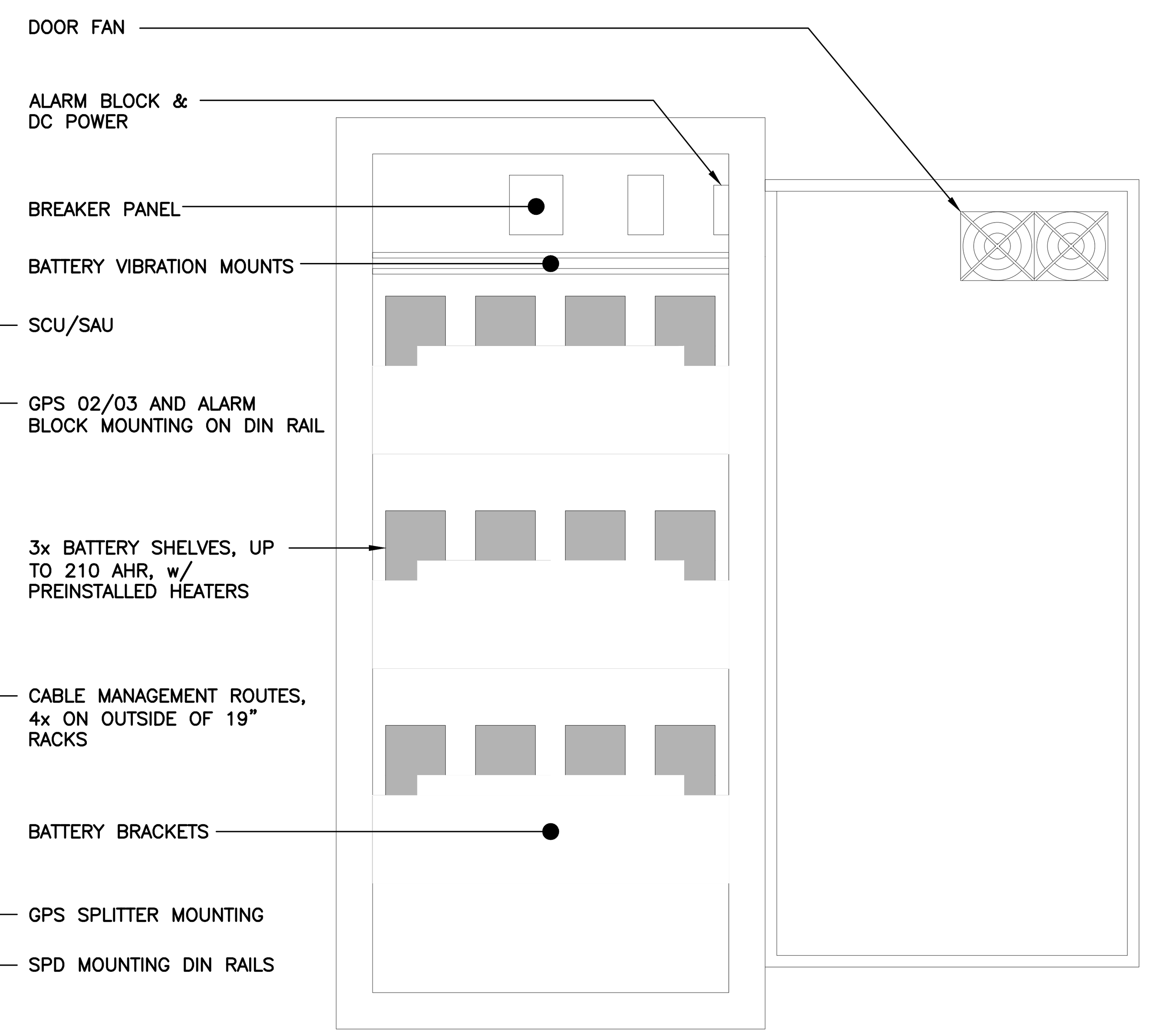
NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

3 C-4 **PROPOSED BIAS-TEE DETAIL**
SCALE: NOT TO SCALE



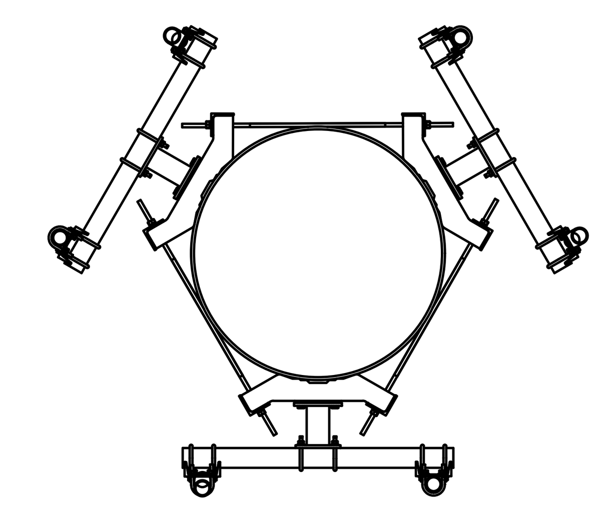
EQUIPMENT CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: ENCLOSURE 6160 CABINET	62.0"H x 26.0"W x 26.0"D	±1200 LBS

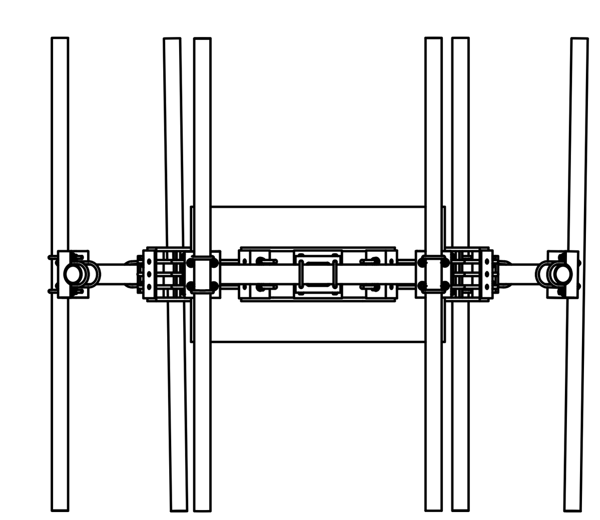
4 C-4 **ENCLOSURE 6160 CABINET DETAIL**
SCALE: NOT TO SCALE



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

5 C-4 **BATTERY B160 CABINET DETAIL**
SCALE: NOT TO SCALE





SITEPRO1: RDS-296

6 C-4 **DUAL ANTENNA POLE MOUNT DETAIL**
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	12/21/22	RTS	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
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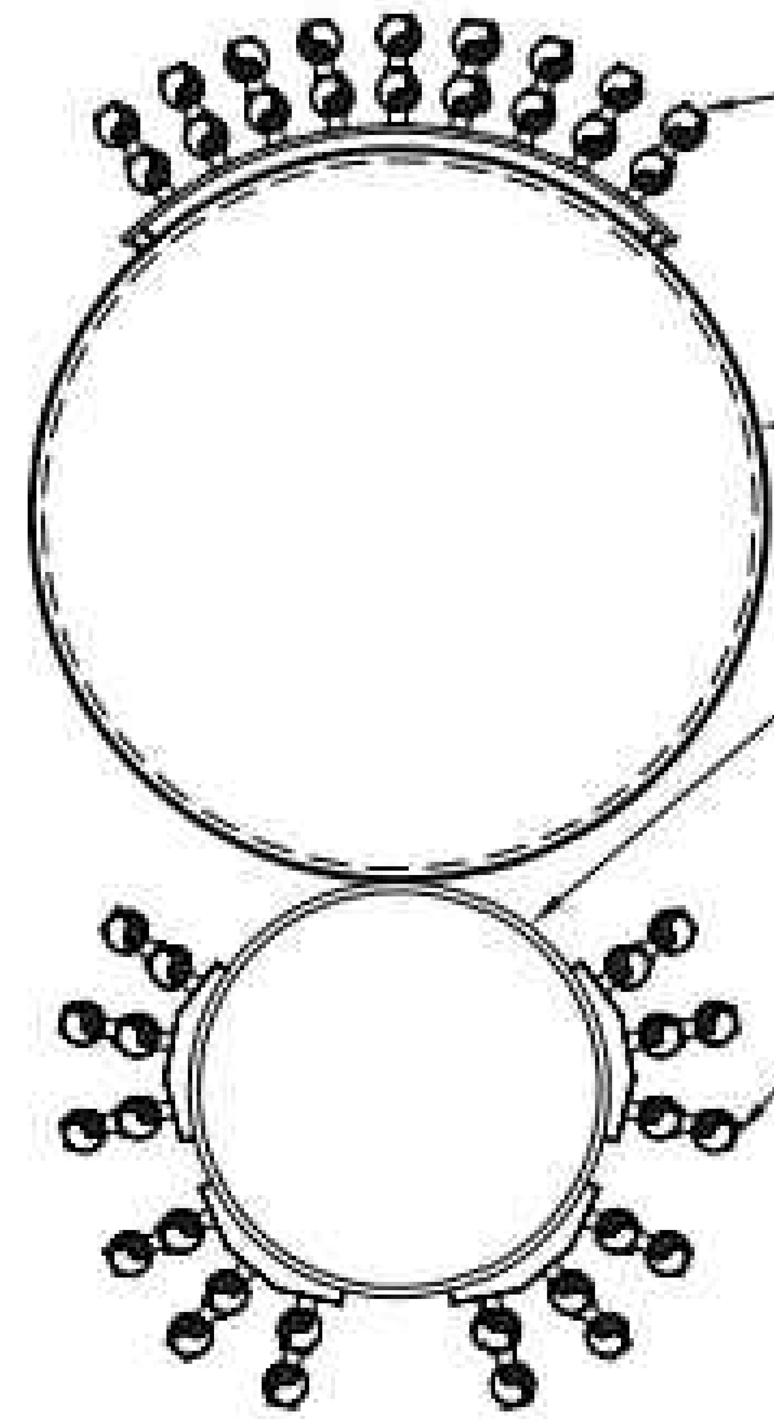
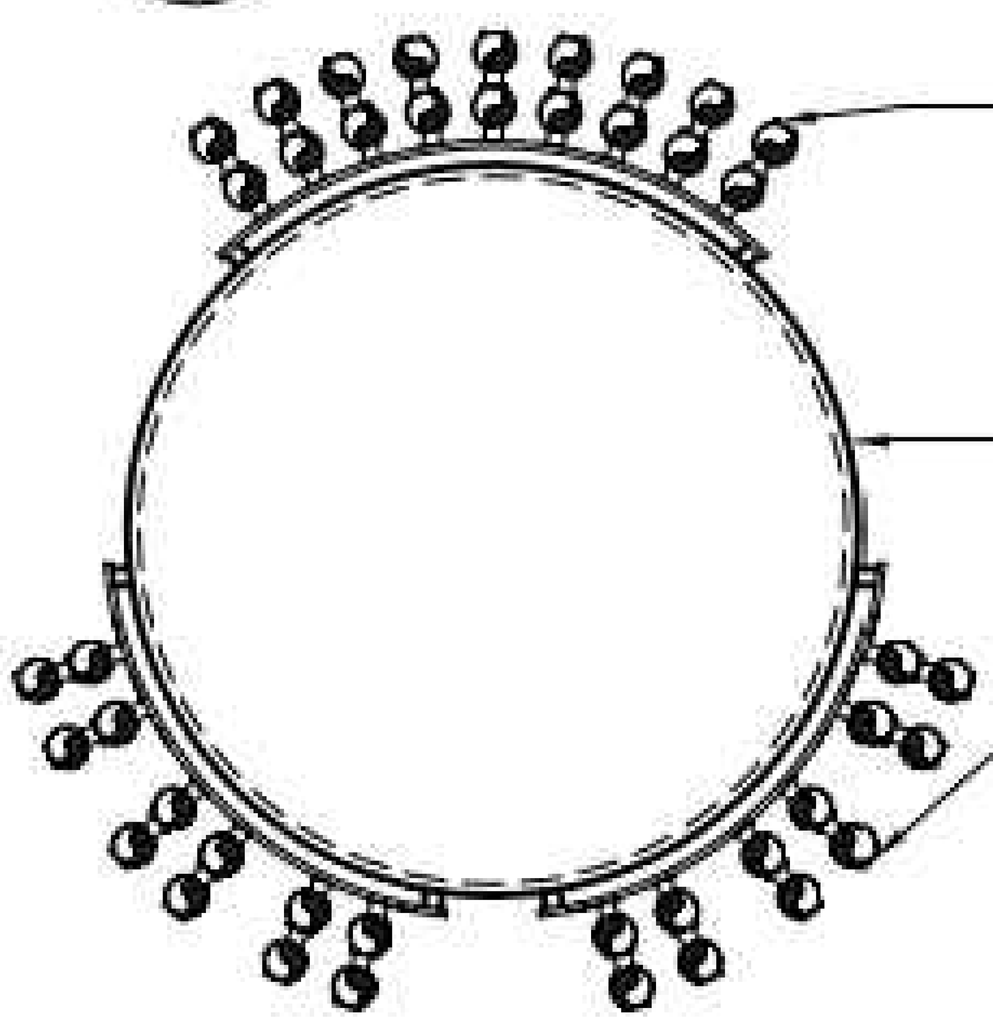
TYPICAL EQUIPMENT DETAILS

C-4

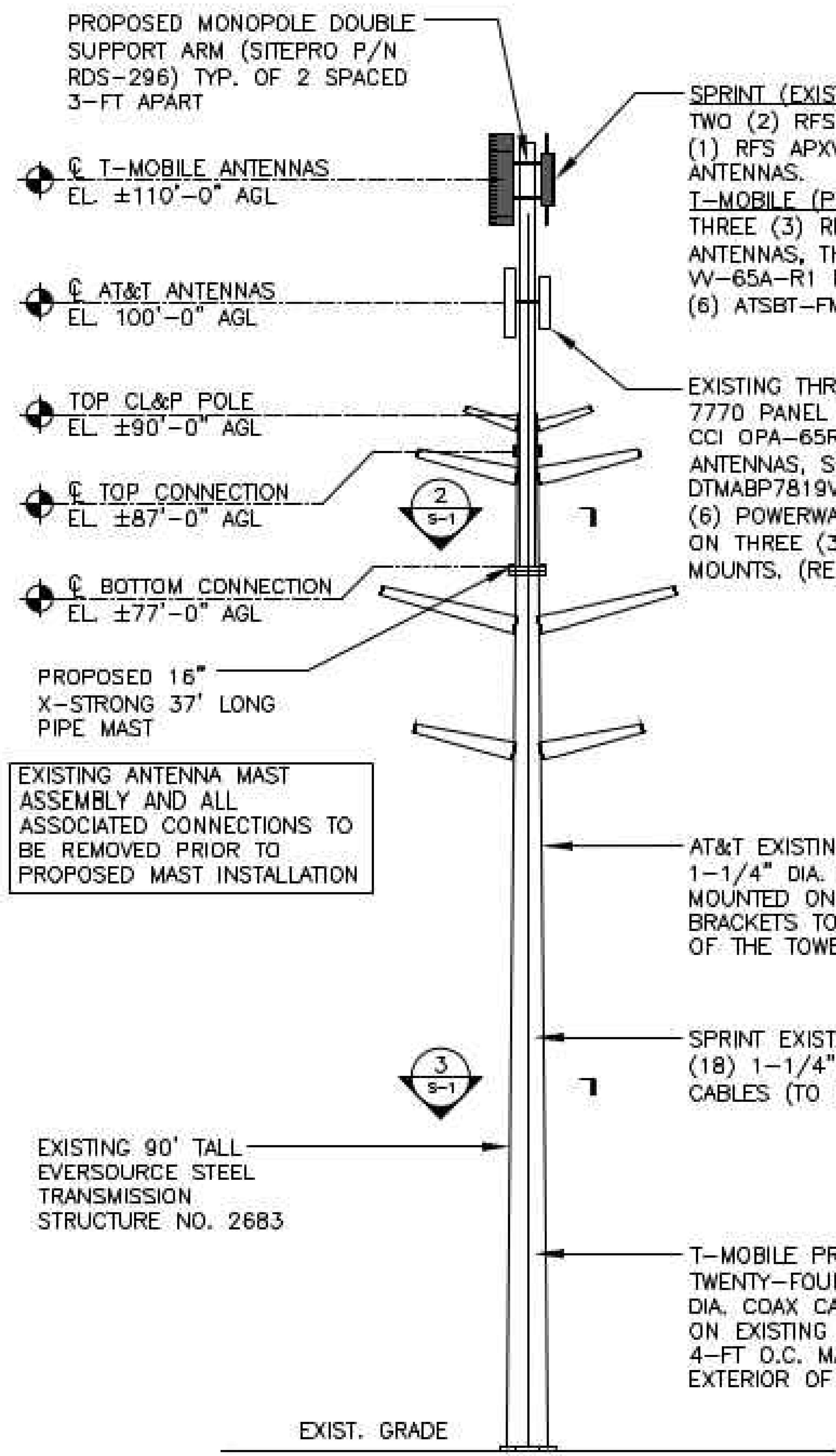
Sheet No. 6 of 12



2 / S-1 COAX CABLE PLAN
SCALE: 1" = 1'-0"



3 / S-1 COAX CABLE PLAN
SCALE: 1" = 1'-0"



1 / S-1 TOWER & MAST ELEVATION
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	12/21/22	RTS	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
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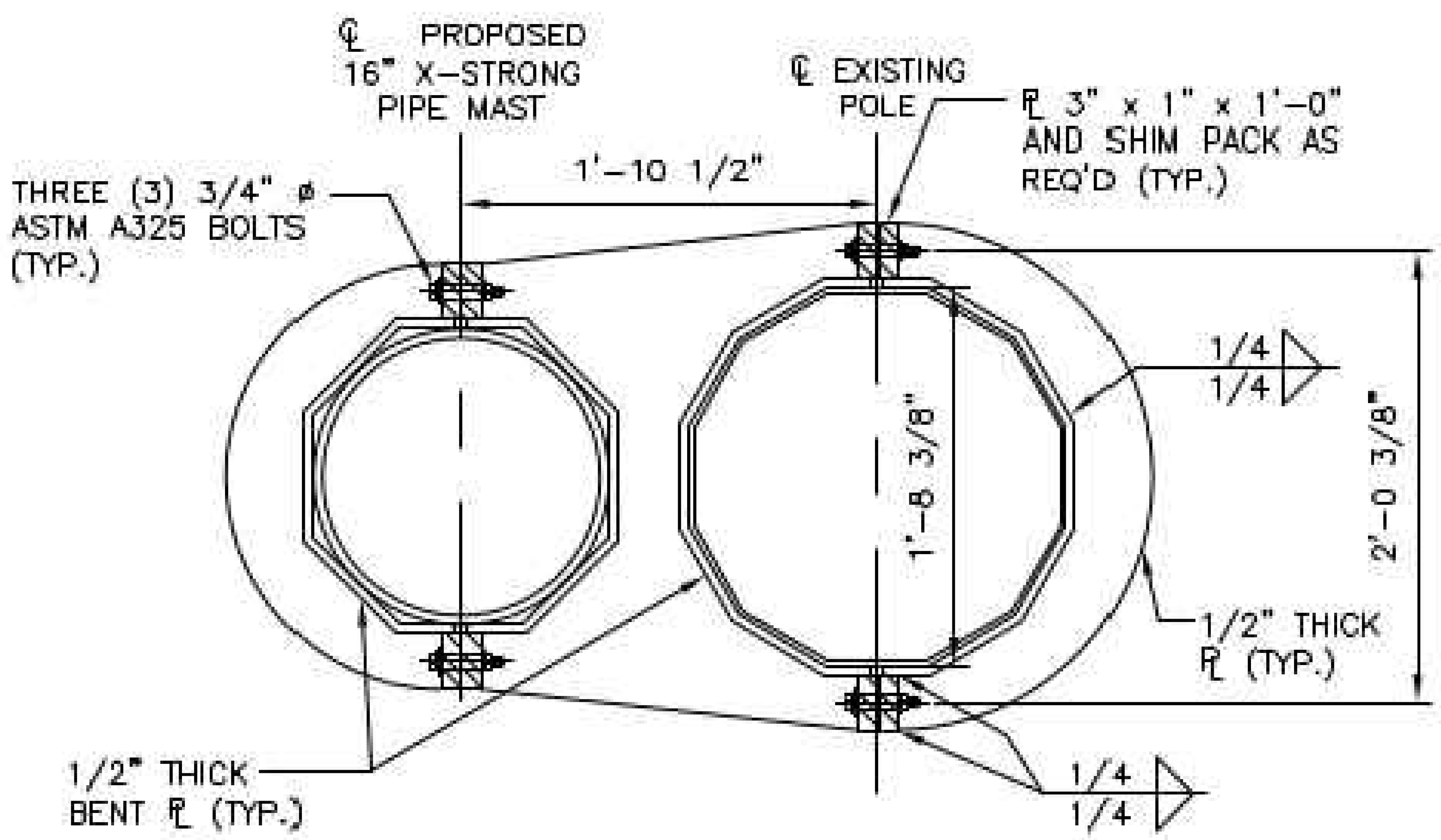
JOB NO. 21005.40

TOWER ELEVATION AND FEEDLINE PLAN

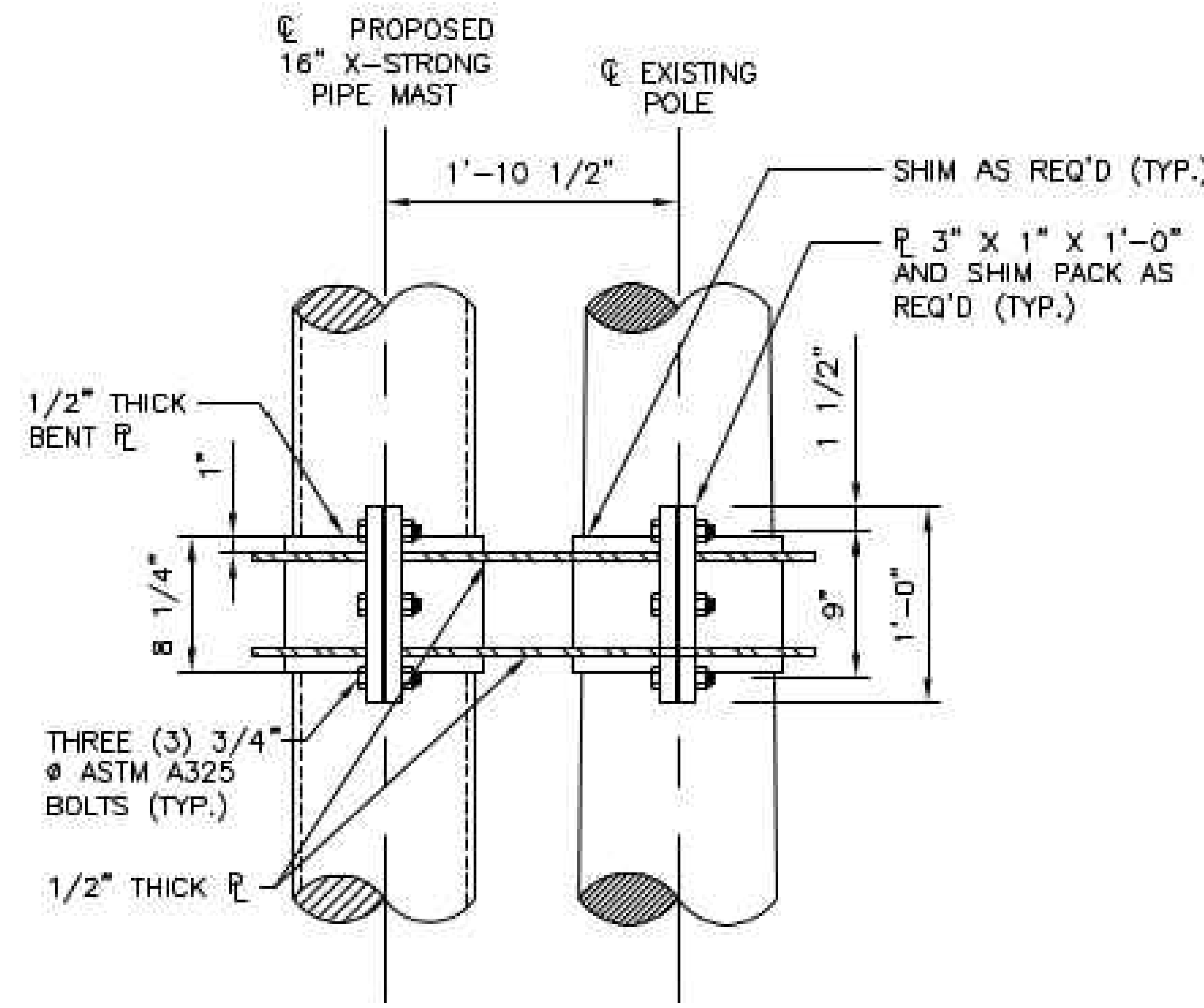
S-1

Sheet No. 7 of 12



2 / S-2 **TOP PCS BRACKET PLAN VIEW**

SCALE: 1" = 1'-0"



1 / S-2 **TOP PCS BRACKET DETAIL**

SCALE: 1" = 1'-0"

NOTE:

1. POLE TAPER = 0.262"/FT (V.I.F.)

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	12/21/22	RTS	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
1	12/15/22	RTS	TJR	CONSTRUCTION DRAWINGS – UPDATED SPECIAL INSPECTIONS CHART
0	12/14/22	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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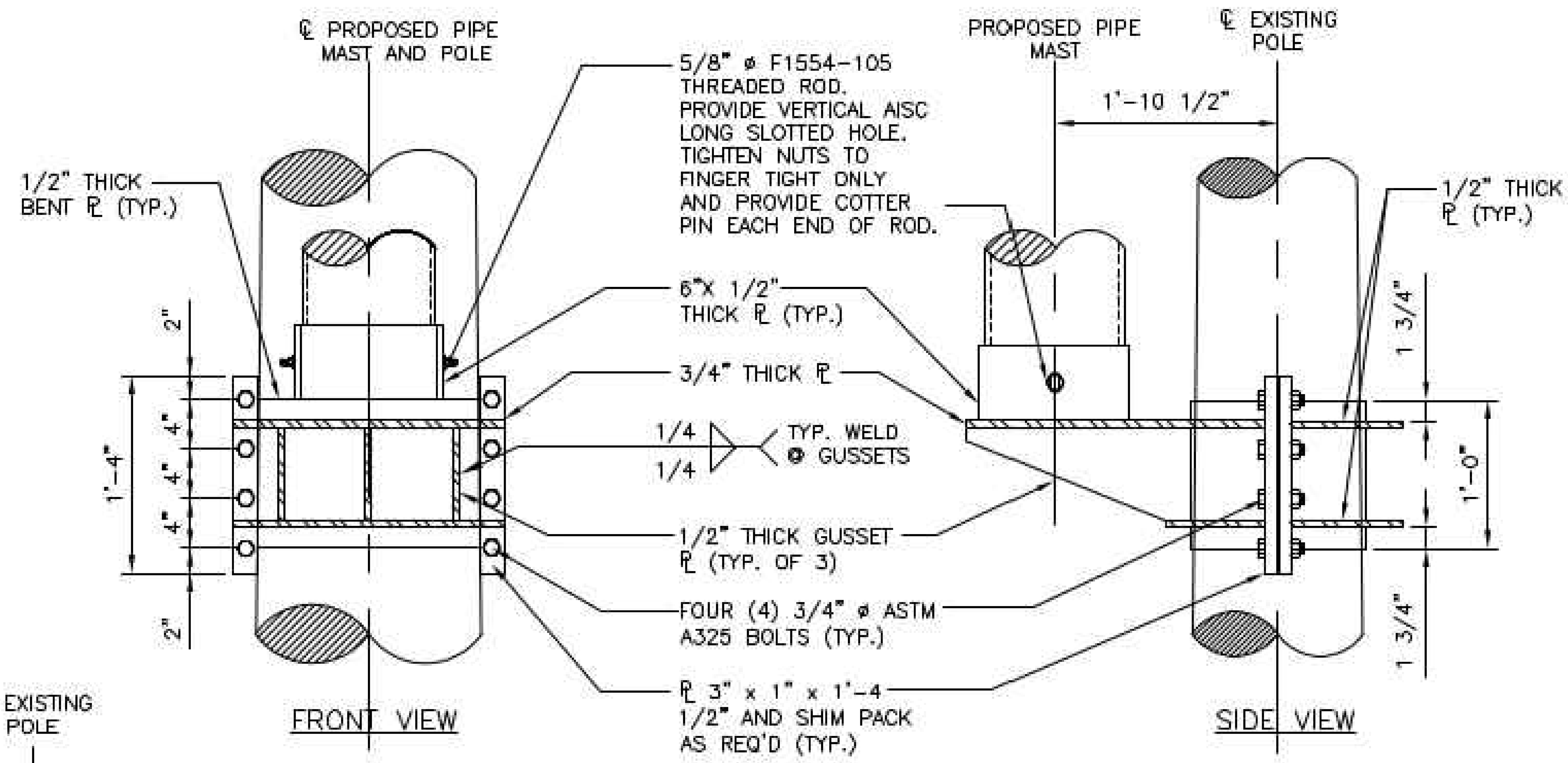
TOP CONNECTION DETAILS

S-3

Sheet No. 8 of 12

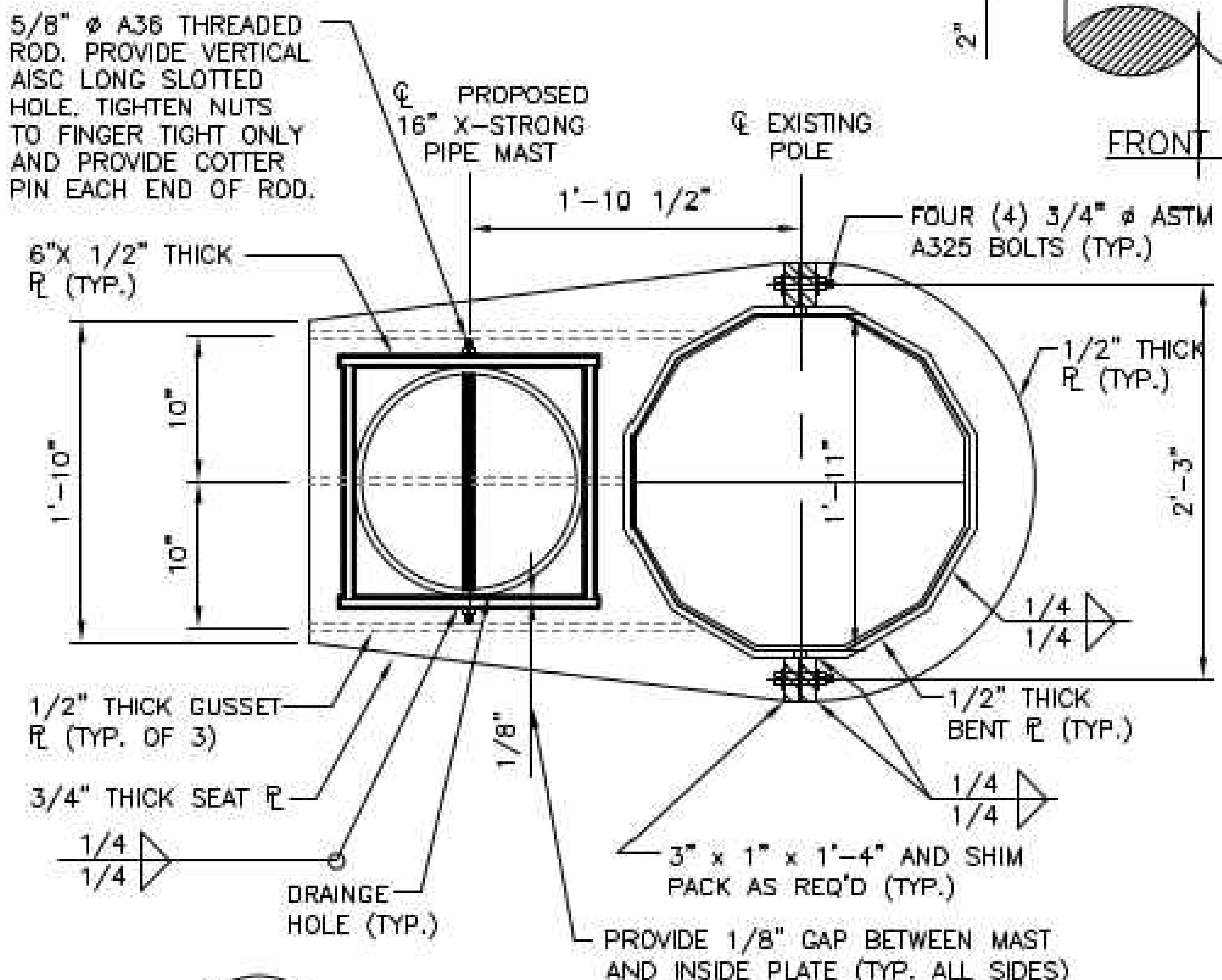
NOTE:

1. POLE TAPER = 0.262"/FT (V.I.F.)



1 / S-3 **BOTTOM PCS BRACKET DETAIL**

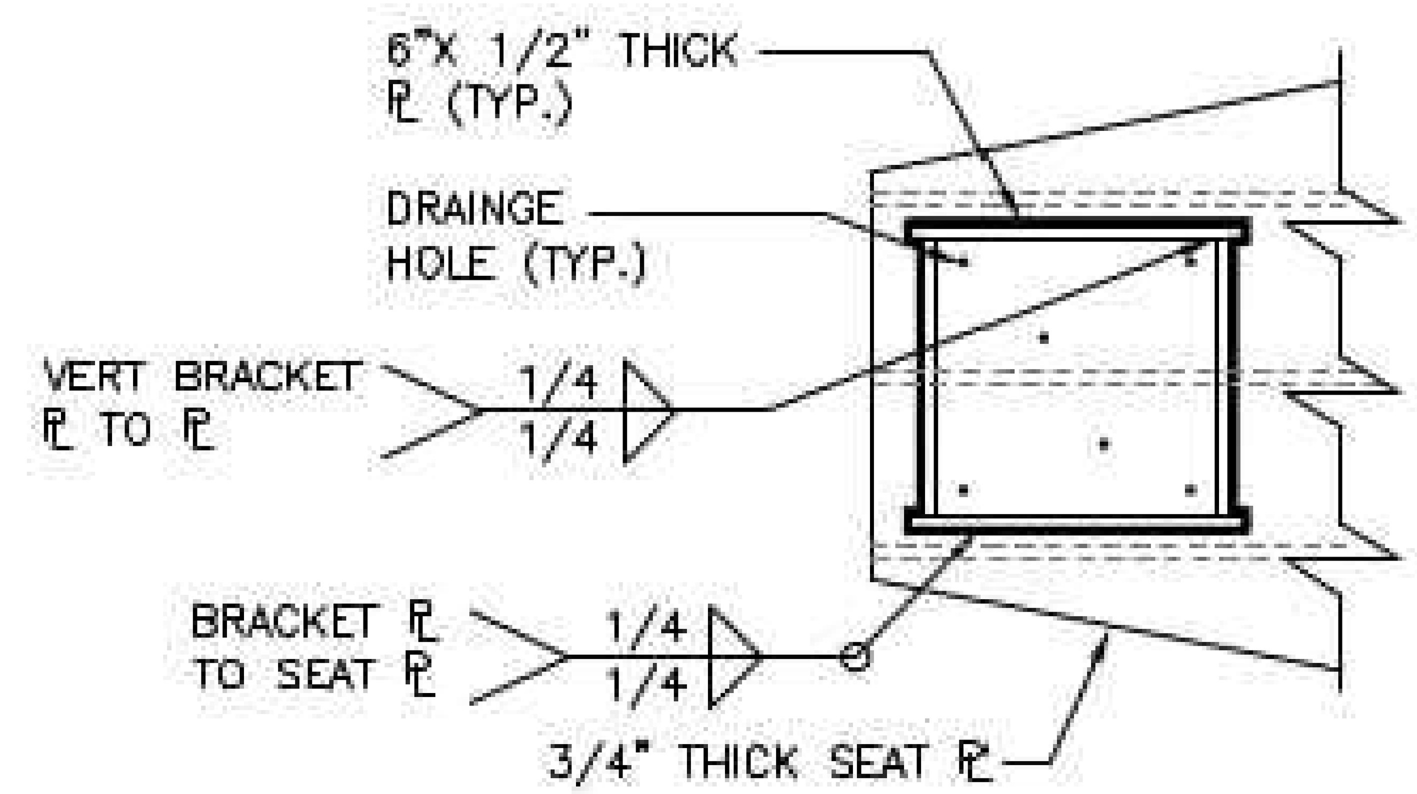
SCALE: 1" = 1'-0"



2 / S-3 **BOTTOM PCS BRACKET PLAN VIEW**

SCALE: 1" = 1'-0"

NOTE:
DRAINAGE HOLES 3/4" DIA. (TYP.)



3 / S-3 **BRACKET ASSEMBLY DETAIL**

SCALE: 1" = 1'-0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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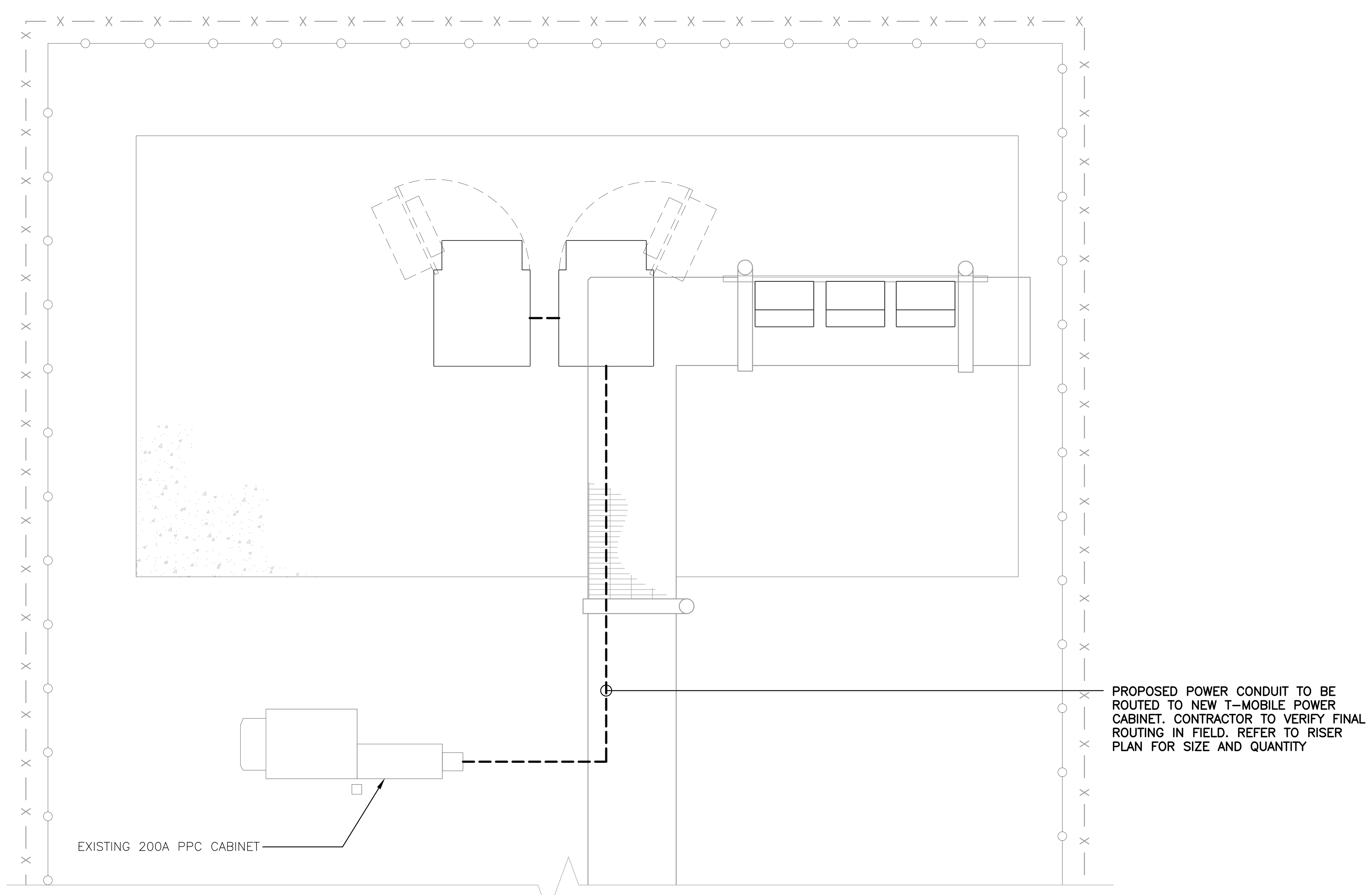
BOTTOM CONNECTION DETAILS

S-3

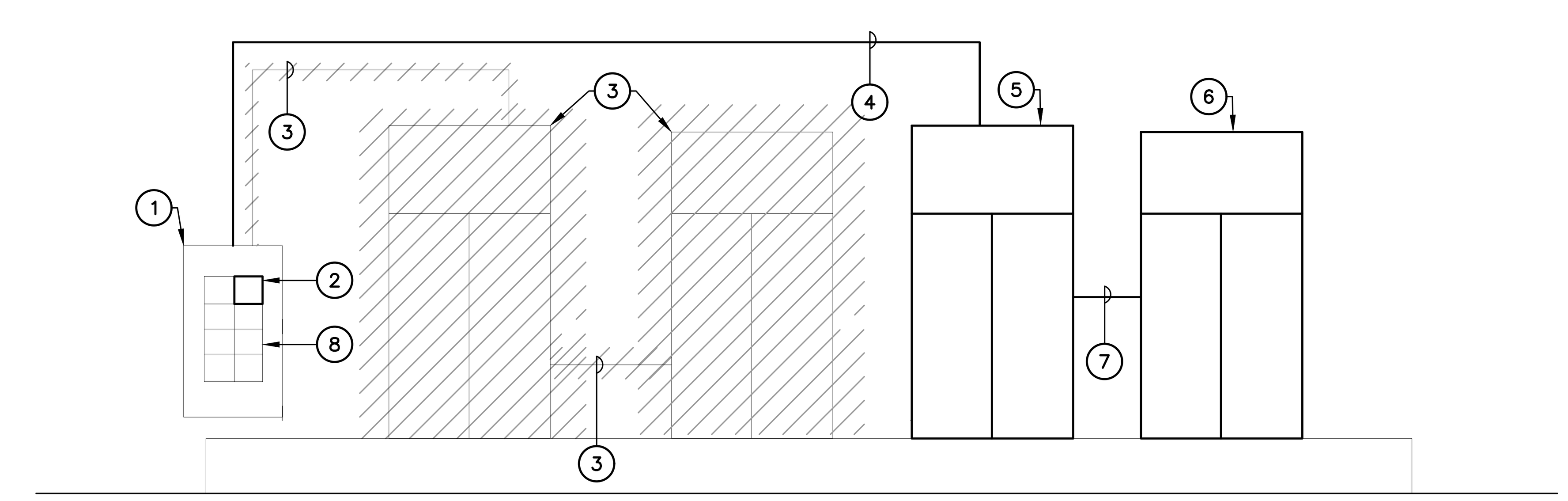
Sheet No. 9 of 12



1 / E-1 **ELECTRICAL CONDUIT ROUTING PLAN**
SCALE: 3/8" = 1'

RISER DIAGRAM NOTES

1. EXISTING 200A, PPC CABINET TO REMAIN.
2. NEW 150A/2P CIRCUIT BREAKER TO SERVE NEW EQUIPMENT CABINET.
3. EXISTING CABINETS AND ASSOCIATED CONDUITS AND CONDUCTORS TO BE REMOVED.
4. (3) 1/0 AWG, (1) #6 AWG GROUND, 1-1/2" CONDUIT.
5. NEW T-MOBILE EQUIPMENT CABINET
6. NEW T-MOBILE BATTERY CABINET
7. DC CONDUIT AND CONDUCTORS FOR BATTERY CABINET CONNECTION PER MANUFACTURERS SPECIFICATIONS.
8. EXISTING 100A CIRCUIT BREAKER TO BE REMOVED.



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

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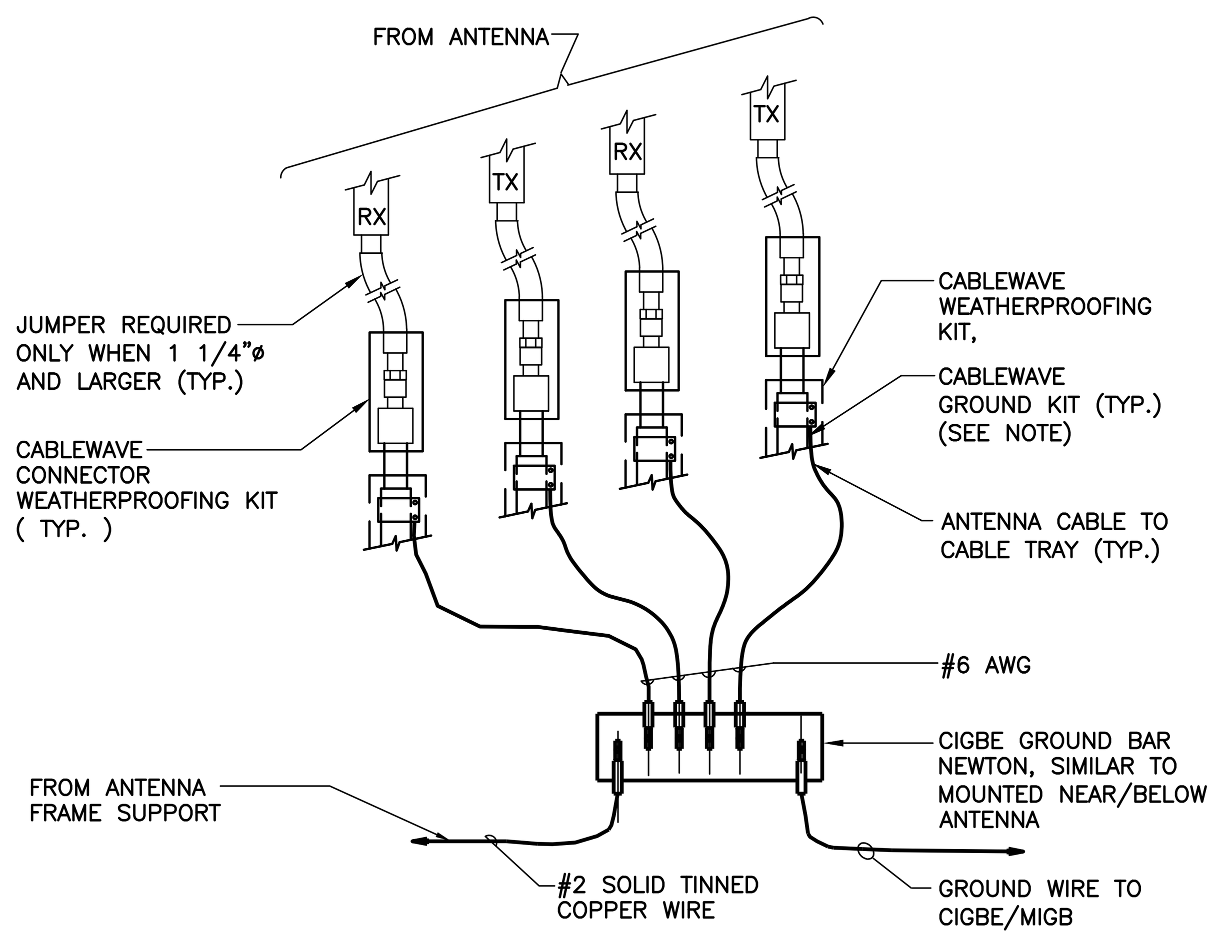
ELECTRICAL RISER DIAGRAM AND CONDUIT ROUTING

E-1

Sheet No. 10 of 12

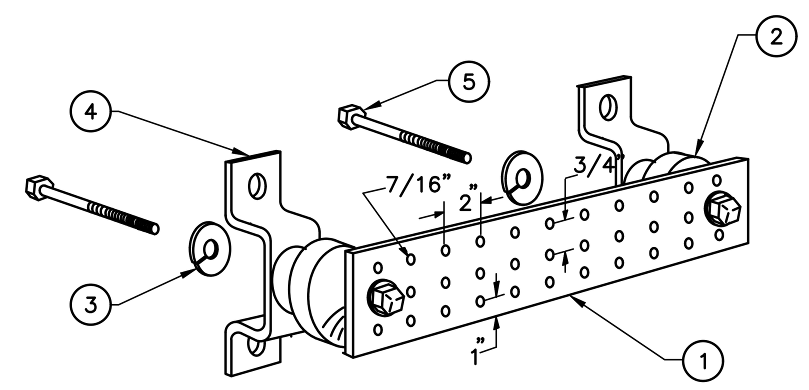


NOTES:

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

1 E-2 **CONNECTION OF GROUND WIRES TO GROUND BAR**

SCALE: NOT TO SCALE

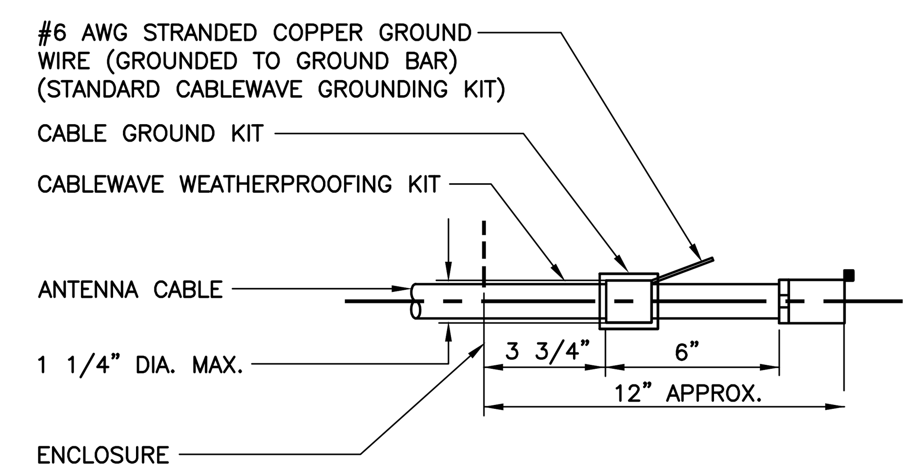


NOTES

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

2 E-2 **GROUND BAR DETAIL**

SCALE: NOT TO SCALE

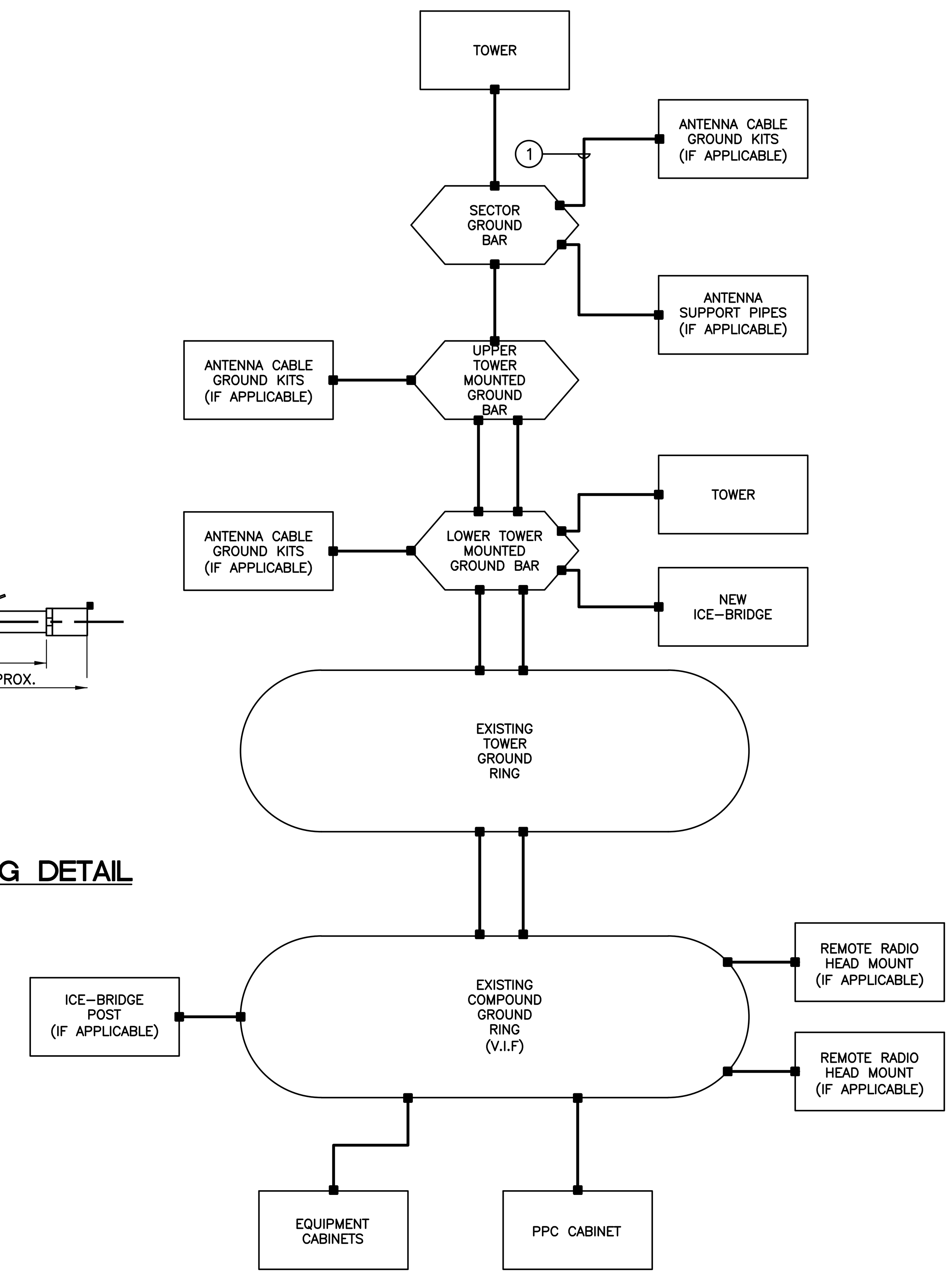


NOTES:

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

3 E-2 **ANTENNA CABLE GROUNDING DETAIL**

SCALE: NOT TO SCALE

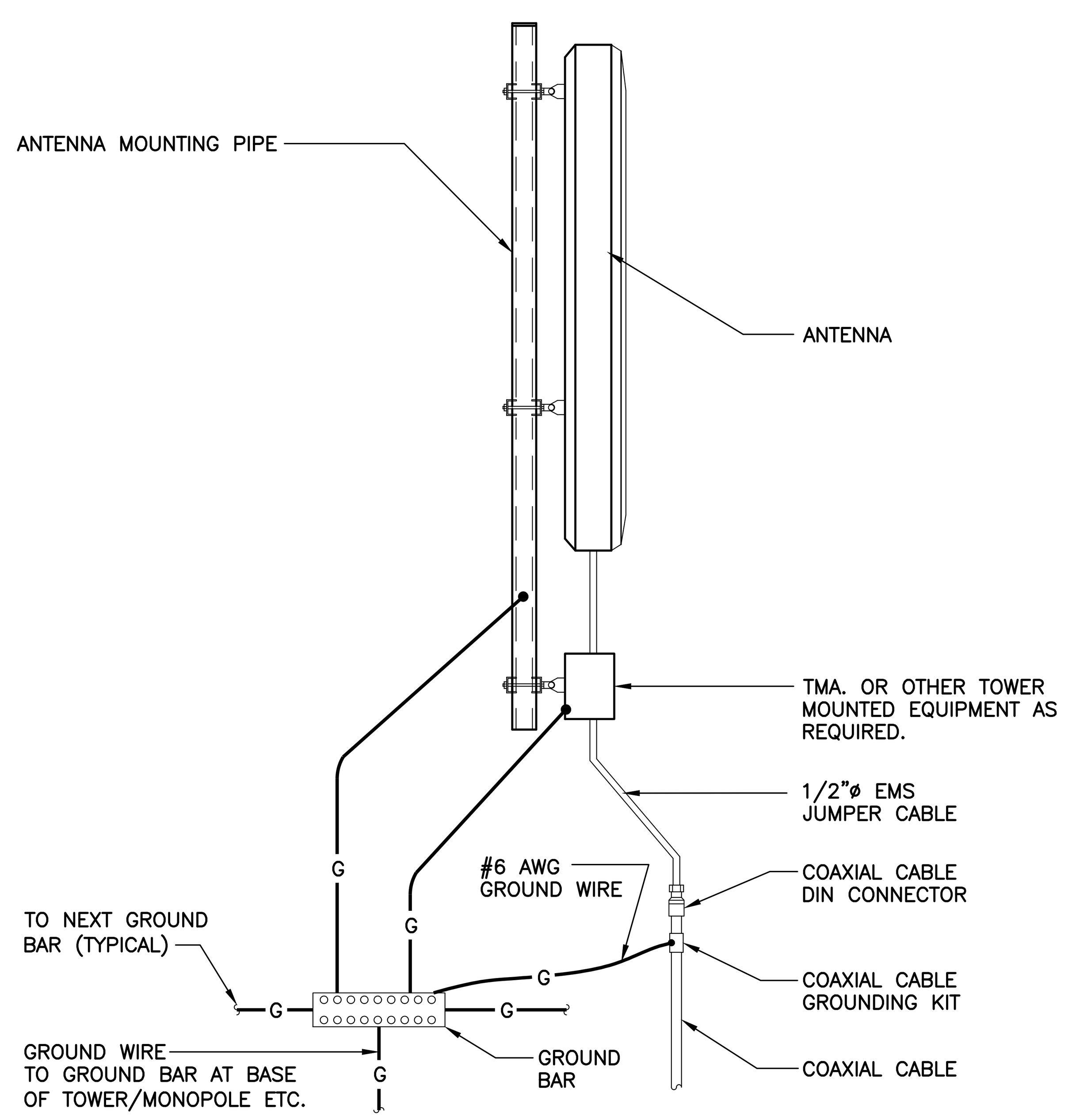


GROUNDING SCHEMATIC NOTES

1. #6 AWG

GENERAL NOTES:

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

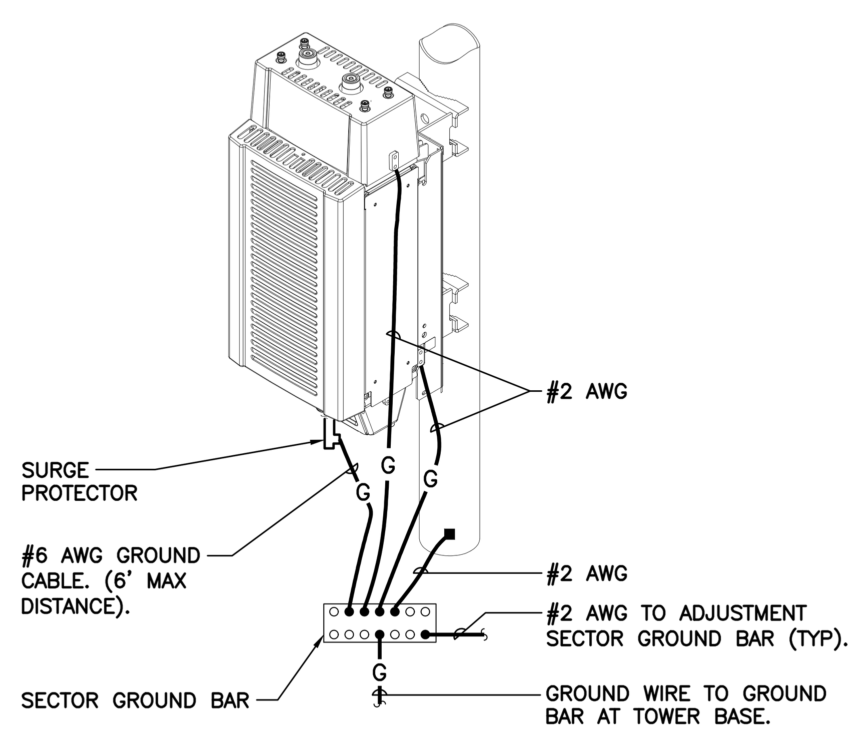


4 E-2 **TYPICAL ANTENNA GROUNDING DETAIL**

SCALE: NOT TO SCALE

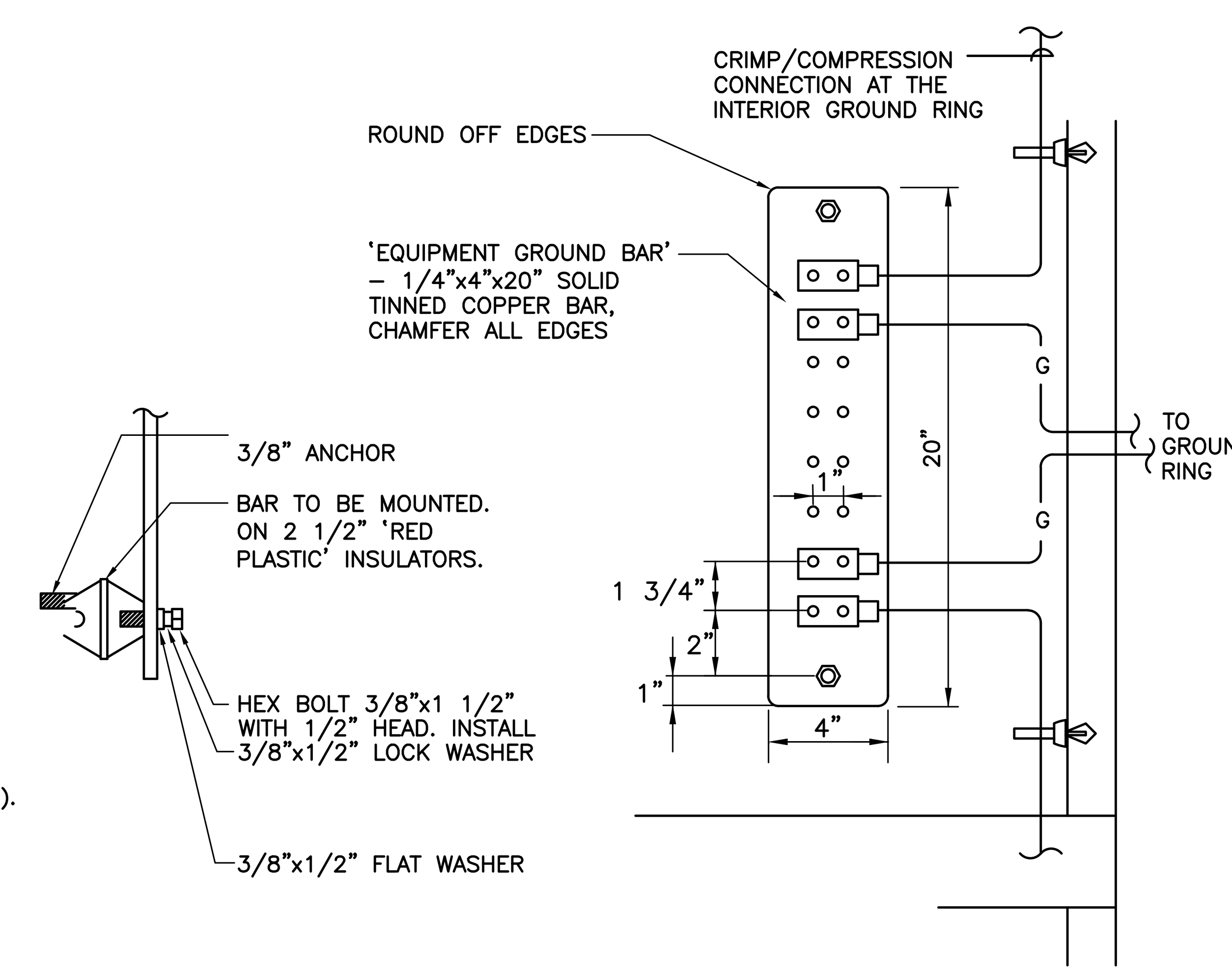
EACH RRH CABINET SHALL BE GROUNDED IN THE FOLLOWING MANNER:

1. AT TOP OF THE CABINET
2. AT RIGHT SIDE OF THE CABINET.



5 E-2 **RRH POLE MOUNT GROUNDING**

SCALE: NOT TO SCALE



6 E-2 **EQUIPMENT GROUND BAR DETAIL**

SCALE: NOT TO SCALE

7 E-2 **ELECTRICAL SCHEMATIC DIAGRAM**

SCALE: NOT TO SCALE

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TYPICAL ELECTRICAL DETAILS

E-2

ELECTRICAL SPECIFICATIONS

SECTION 16010

1.1. SCOPE OF WORK

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

1. INSTALL 150A/2P CIRCUIT BREAKER TO SERVE NEW EQUIPMENT
2. EXISTING 100A CIRCUIT BREAKER TO BE REMOVED
3. FEEDERS AND BRANCH CIRCUIT WIRING TO PANELS AND EQUIPMENTS AS INDICATED OR NOTED ON PLANS.
4. FIELD MEASURE EXISTING ELECTRICAL SERVICES TO CONFIRM AVAILABLE EXISTING POWER.

1.02. GENERAL REQUIREMENTS

A. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE MADE IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS WHICH MAY APPLY AND NOTHING IN THE DRAWINGS OR SPECIFICATIONS SHALL BE INTERPRETED AS AN INFRINGEMENT OF SUCH CODES OR REGULATIONS.

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

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

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

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

F. THE CONTRACTOR SHALL GUARANTEE ALL NEW WORK FOR A PERIOD OF ONE YEAR FROM THE ACCEPTANCE DATE BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING WARRANTIES FROM ALL EQUIPMENT MANUFACTURERS FOR SUBMISSION TO THE OWNER.

G. DRAWINGS INDICATE GENERAL ARRANGEMENT OF WORK INCLUDED IN CONTRACT. CONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE MODIFICATIONS TO THE LAYOUT OF THE WORK TO PREVENT CONFLICT WITH WORK OF OTHER TRADES AND FOR THE PROPER INSTALLATION OF WORK. CHECK ALL DRAWINGS AND VISIT JOB SITE TO VERIFY SPACE AND TYPE OF EXISTING CONDITIONS IN WHICH WORK WILL BE DONE, PRIOR TO SUBMITTAL OF BID.

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

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

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

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

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

M. SHOP DRAWINGS:

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

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

SECTION 16111

1.01. CONDUIT

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

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

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

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

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

CONDUIT SCHEDULE SECTION 16111

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

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

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

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

SECTION 16123

1.01. CONDUCTORS

A. ALL CONDUCTORS SHALL BE TYPE THWN (INT. APPLICATION) AND XHHW (EXT. APPLICATION), 75 DEGREE C, 600 VOLT INSULATION, SOFT ANNEALED STRANDED COPPER. #10 AWG AND SMALLER SHALL BE SPLICED USING ACCEPTABLE SOLDERLESS PRESSURE CONNECTORS. #8 AWG AND LARGER SHALL BE SPLICED USING COMPRESSION SPLIT-BOLT TYPE CONNECTORS. #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR FOR LINE VOLTAGE BRANCH CIRCUITS. REFER TO PANEL SCHEDULE FOR BRANCH CIRCUIT CONDUCTOR SIZE(S). CONDUCTORS SHALL BE COLOR CODED FOR CONSISTENT PHASE IDENTIFICATION:

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

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

SECTION 16130

1.01. BOXES

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

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

SECTION 16140

1.01. WIRING DEVICES

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

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

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

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

SECTION 16170

1.01. DISCONNECT SWITCHES

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

SECTION 16190

1.01. SEISMIC RESTRAINT

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

SECTION 16195

1.01. LABELING AND IDENTIFICATION NOMENCLATURE FOR ELECTRICAL EQUIPMENT

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

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

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

SECTION 16450

1.01. GROUNDING

A. ALL NON-CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUIT SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONNECTED TO PROVIDE AN INDEPENDENT RETURN PATH TO THE EQUIPMENT GROUNDING SOURCES.

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

C. GROUNDING OF PANELBOARDS:

1. CONDUIT(S) TERMINATING INTO THE PANELBOARD SHALL HAVE GROUNDING TYPE BUSHINGS. THE BUSHINGS SHALL BE BONDED TOGETHER WITH BARE #10 AWG COPPER CONDUCTOR WHICH IN TURN IS TERMINATED INTO THE PANELBOARD'S EQUIPMENT GROUND BAR KIT(S).

D. EQUIPMENT GROUNDING CONDUCTOR:

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

E. GROUNDING SYSTEM:

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

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

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

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

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

SECTION 16477

1.01. FUSES

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

SECTION 16960

1.01. TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

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

TEST 1: THERMAL OVERLOAD AND MAGNETIC TRIP TEST, AND CABLE INSULATION TEST FOR ALL CIRCUIT BREAKERS RATED 100 AMPS OR GREATER.

TEST 2: RESISTANCE TO GROUND TEST ON THE GROUNDING SYSTEM.

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

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

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

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

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

SECTION 16961

1.01. TESTS BY CONTRACTOR

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

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

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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
2	12/21/22	RTS	TJR	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
1	12/15/22	RTS	TJR	CONSTRUCTION DRAWINGS – UPDATED SPECIAL INSPECTIONS CHART
0	12/14/22	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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Transcend Wireless

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T-MOBILE NORTHEAST LLC

SPRINT ID: CT54XC713

SITE ID: CTFF896A

761 FDERAL RD

BROOKFIELD, CT 06804

DATE: 12/14/22

SCALE: AS NOTED

JOB NO. 21005.40

ELECTRICAL SPECIFICATIONS

E-3

CENTEK engineering

Centered on Solutions℠

Structural Analysis of Antenna Mast and Tower

T-Mobile Site Ref: CTFF896A

Eversource Structure No. 2683
90' Electric Transmission Pole

761 Federal Road
Brookfield, CT

CENTEK Project No. 21005.40

~~Date: February 7, 2022~~
Rev 4: December 7, 2022

Prepared for:
Transcend Wireless
10 Industrial Ave, Suite 3
Mahwah, NJ 07430

Table of Contents

Introduction

The purpose of this report is to analyze the proposed replacement mast and 90' utility pole located at 761 Federal Road in Brookfield, CT for the proposed antenna and equipment upgrade by T-Mobile.

The existing 12" pipe mast and 16" pipe mast and all associated bracket connections and hardware are to be removed and replaced with the proposed mast.

The existing/proposed loads consist of the following:

- AT&T (Existing to Relocate):
  Antennas: Three (3) Powerwave 7770 panel antennas, three (3) CCI OPA-65R-LCUU-H6 panel antennas, six (6) CCI DTMABP7819VG12A TMAs and six (6) Powerwave LGP-21401 TMAs mounted on dual standoff mounts to the existing mast with a RAD center elevation of 100-ft above grade level.
  Coax Cables: Eighteen (18) 1-1/4" ∅ coax cables running on the exterior of the pole.

- SPRINT (Existing to Remove):
  Antennas: Two (2) RFS APXVSPP18-C and one (1) RFS APXV9ERR18-C panel antennas panel antennas flush mounted on the existing mast with a RAD center elevation of 110-ft above grade level.
  Coax Cables: Eighteen (18) 1-1/4" ∅ coax cables running on the exterior of the pole and antenna mast.

- **T-MOBILE (Proposed):**
  Antennas: Three (3) RFS APXVAALL24_43 panel antennas, three (3) Commscope VV-65A-R1 panel antennas and six (6) ATSBT-FM-4G Bias Tees mounted on monopole double support arm (SitePro p/n RDS-296) to the proposed pipe mast with RAD center elevation of 110-ft above grade.
  Coax Cables: Twenty-four (24) 1-5/8" ∅ coax cables running on the exterior of the pole and antenna mast.

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.
- For TIA analysis, shielding of antennas was accounted for using Ka factor per TIA, Section 2.6.9.2.2.

Analysis

The proposed/replacement mast consisting of a Pipe 16 x 37-ft long X-strong pipe (O.D. =16") connected at two points to the existing tower was analyzed for its ability to resist loads prescribed by the TIA-222-H 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/EIA loading and for NESC/NU loading are listed in report Sections 6 and 8, respectively.

An envelope solution was first made to determine maximum and minimum forces, stresses, and deflections to confirm the selected section as adequate. Additional analyses were then made to determine the NESC forces to be applied to the pole structure.

The RISA-3D program contains a library of all AISC shapes and corresponding section properties are computed and applied directly within the program. The program's Steel Code Check option was also utilized. The forces calculated in RISA-3D using NESC guidelines were then applied to the pole using PLS-Pole. Maximum usage for the pole was calculated considering the additional forces from the mast and associated appurtenances.

Design Basis

Our analysis was performed in accordance with TIA-222-H, ASCE 48-11, "Design of Steel Transmission Pole Structures", NESC C2-2017 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 C2-2017 ~ Construction Grade B, and ASCE 48-11.

  Load cases considered:

  Load Case 1: NESC Heavy
  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 Speed.………………………………. 100 mph (1)
  Radial Ice Thickness……………………….. 0"

  Note 1: NESC C2-2017, Section25, 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 TIA-222-H and AISC standards.

  Load cases considered:

  Load Case 1:
  Wind Speed………………………………... 125 mph (2022 CSBC Appendix-P)
  Radial Ice Thickness………………………. 0”

  Load Case 2:
  Wind Pressure.……………………………. 50 mph wind pressure
  Radial Ice Thickness……………………….. 1.0”

Results

- MAST ASSEMBLY

  The proposed replacement mast was determined to be structurally **adequate**.

Member	Stress Ratio (% of capacity)	Result
Pipe 16 X-strong x 37-ft long	77.4%	**PASS**
Connection	81.9%	**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 **89.55%** occurs in the utility pole under the **NESC Heavy** loading condition.

  POLE SECTION:

  The utility pole was found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (% of capacity)	Result
Tube Number 3	0’-20.67’ (AGL)	89.55%	**PASS**

  BASE PLATE:

  The base plate was found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Base Plate	Bending	88.99 %	**PASS**

- FOUNDATION AND ANCHORS

  The existing foundation consists of a 10-ft square x 9-ft long reinforced concrete pier with (16) rock anchors. The base of the tower is connected to the foundation by means of (12) 2.25”∅, ASTM A615-75 anchor bolts embedded approximately 8-ft into the concrete foundation structure. Foundation information was obtained from NUSCO drawing # 01039-60001.

  BASE REACTIONS:

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

Load Case	Shear	Axial	Moment
NESC Heavy Wind	24.69 kips	62.82 kips	1976.84 ft-kips
NESC Extreme Wind	30.45 kips	31.45 kips	2423.11 ft-kips
NESC Extreme Long	21.97 kips	31.48 kips	1739.23 ft-kips

Note 1 – 10% increase to be applied to the above tower base reactions for foundation verification 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	90.3%	**PASS**

FOUNDATION:

The foundation was found to be within allowable limits.

Foundation	Design Limit	Design Load (1)	Proposed Loading (2)	Result
Reinf. Conc. Pier w/ Rock Anchors	OTM(3)	2973.5 ft-kips	2665.4 ft-kips	**PASS**

Note 1: Design Load taken from NUSCO drawing no. 01039-50002.
Note 2: 10% increase to PLS base reactions used in foundation analysis per OTRM 051.
Note 3: OTM denotes Overturning Moment

Conclusion

This analysis shows that the subject utility pole **with the antenna mast replacement 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-3D

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 graphic drawing/editing capabilities that let you draw, modify and load elements as well as snap, move, rotate, copy, mirror, scale, split, merge, mesh, delete, apply, etc.
- Versatile drawing grids (orthogonal, radial, skewed)
- Universal snaps and object snaps allow drawing without grids
- Versatile general truss generator
- Powerful graphic select/unselect tools including box, line, polygon, invert, criteria, spreadsheet selection, with locking
- Saved selections to quickly recall desired selections
- Modification tools that modify single items or entire selections
- Real spreadsheets with cut, paste, fill, math, sort, find, etc.
- Dynamic synchronization between spreadsheets and views so you can edit or view any data in the plotted views or in the spreadsheets
- Simultaneous view of multiple spreadsheets
- Constant in-stream error checking and data validation
- Unlimited undo/redo capability
- Generation templates for grids, disks, cylinders, cones, arcs, trusses, tanks, hydrostatic loads, etc.
- Support for all units systems & conversions at any time
- Automatic interaction with RISASection libraries
- Import DXF, RISA-2D, STAAD and ProSteel 3D files
- Export DXF, SDNF and ProSteel 3D files

Analysis Features:

- Static analysis and P-Delta effects
- Multiple simultaneous dynamic and response spectra analysis using Gupta, CQC or SRSS mode combinations
- Automatic inclusion of mass offset (5% or user defined) for dynamic analysis
- Physical member modeling that does not require members to be broken up at intermediate joints
- State of the art 3 or 4 node plate/shell elements
- High-end automatic mesh generation — draw a polygon with any number of sides to create a mesh of well-formed quadrilateral (NOT triangular) elements.
- Accurate analysis of tapered wide flanges - web, top and bottom flanges may all taper independently
- Automatic rigid diaphragm modeling
- Area loads with one-way or two-way distributions
- Multiple simultaneous moving loads with standard AASHTO loads and custom moving loads for bridges, cranes, etc.
- Torsional warping calculations for stiffness, stress and design
- Automatic Top of Member offset modeling
- Member end releases & rigid end offsets
- Joint master-slave assignments
- Joints detachable from diaphragms
- Enforced joint displacements
- 1-Way members, for tension only bracing, slipping, etc.

- 1-Way springs, for modeling soils and other effects
- Euler members that take compression up to their buckling load, then turn off.
- Stress calculations on any arbitrary shape
- Inactive members, plates, and diaphragms allows you to quickly remove parts of structures from consideration
- Story drift calculations provide relative drift and ratio to height
- Automatic self-weight calculations for members and plates
- Automatic subgrade soil spring generator

Graphics Features:

- Unlimited simultaneous model view windows
- Extraordinary "true to scale" rendering, even when drawing
- High-speed redraw algorithm for instant refreshing
- Dynamic scrolling stops right where you want
- Plot & print virtually everything with color coding & labeling
- Rotate, zoom, pan, scroll and snap views
- Saved views to quickly restore frequent or desired views
- Full render or wire-frame animations of deflected model and dynamic mode shapes with frame and speed control
- Animation of moving loads with speed control
- High quality customizable graphics printing

Design Features:

- Designs concrete, hot rolled steel, cold formed steel and wood
- ACI 1999/2002, BS 8110-97, CSA A23.3-94, IS456:2000,EC 2-1992 with consistent bar sizes through adjacent spans
- Exact integration of concrete stress distributions using parabolic or rectangular stress blocks
- Concrete beam detailing (Rectangular, T and L)
- Concrete column interaction diagrams
- Steel Design Codes: AISC ASD 9th, LRFD 2nd & 3rd, HSS Specification, CAN/CSA-S16.1-1994 & 2004, BS 5950-1-2000, IS 800-1984, Euro 3-1993 including local shape databases
- AISI 1999 cold formed steel design
- NDS 1991/1997/2001 wood design, including Structural Composite Lumber, multi-ply, full sawn
- Automatic spectra generation for UBC 1997, IBC 2000/2003
- Generation of load combinations: ASCE, UBC, IBC, BOCA, SBC, ACI
- Unbraced lengths for physical members that recognize connecting elements and full lengths of members
- Automatic approximation of K factors
- Tapered wide flange design with either ASD or LRFD codes
- Optimization of member sizes for all materials and all design codes, controlled by standard or user-defined lists of available sizes and criteria such as maximum depths
- Automatic calculation of custom shape properties
- Steel Shapes: AISC, HSS, CAN, ARBED, British, Euro, Indian, Chilean
- Light Gage Shapes: AISI, SSMA, Dale / Incor, Dietrich, Marino\WARE
- Wood Shapes: Complete NDS species/grade database
- Full seamless integration with RISAFoot (Ver 2 or better) for advanced footing design and detailing
- Plate force summation tool

Results Features:

- Graphic presentation of color-coded results and plotted designs
- Color contours of plate stresses and forces with quadratic smoothing, the contours may also be animated
- Spreadsheet results with sorting and filtering of: reactions, member & joint deflections, beam & plate forces/stresses, optimized sizes, code designs, concrete reinforcing, material takeoffs, frequencies and mode shapes
- Standard and user-defined reports
- Graphic member detail reports with force/stress/deflection diagrams and detailed design calculations and expanded diagrams that display magnitudes at any dialed location
- Saved solutions quickly restore analysis and design results.

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

<u>Results Features:</u>

- 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 covering the design of telecommunications structures specifies LRFD design approach. This approach applies the loads from extreme weather loading conditions, and designs the structure so that it does not exceed code defined percentage of failure strength.

ANSI Standard C2-2017 (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 "Eversource 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 2017 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.

Attachment A
Eversource Design Criteria

Condition	Code	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
Ice Condition	NESC 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
Ice Condition	NESC Heavy	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
Ice Condition	NESC Heavy	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
High Wind Condition	NESC 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
High Wind Condition	NESC Extreme Wind	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
High Wind Condition	NESC Extreme Wind	Conductors:	Conductor Loads Provided by ES					
NESC 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
NESC Extreme Ice with Wind Condition*		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
NESC Extreme Ice with Wind Condition*		Conductors:	Conductor Loads Provided by ES					
NESC Extreme Ice with Wind Condition*		*Only for structures installed after 2007						

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.

Project: 1618/1887 Line, Structure 2683
Date: 3/1/2019
Engineer: TG
Purpose: Recalculate wire loads for AT&T/ Sprint site.

Shield Wires:

1618: 0.457" 24F OPGW, tensioned to 4200# @ NESC 250B final
1887: 0.646" 48 OPGW, tensioned to 5500# @ NESC 250B final

Conductors:

1618: 336 ACSR tensioned to 4000# @ NESC 250B final
1887: 556 ACSS tensioned to 4000# @ NESC 250B final

NESC 250B

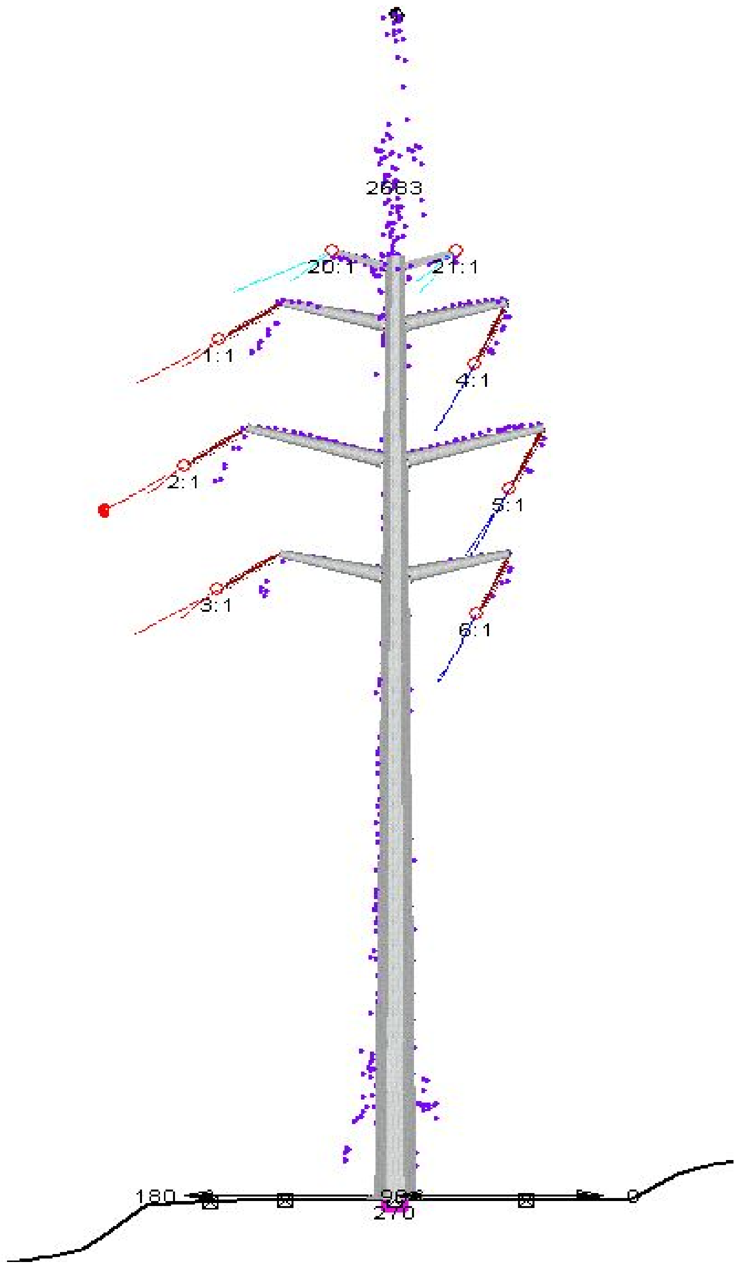
	Vert.	*Trans.*	*Long.*
1618 OPGW	871	-1715	105
1887 OPGW	1449	-2103	21
1618 Conductor	1581	-2183	124
1887 Conductor	2028	-2006	33

NESC 250C

	Vert.	*Trans.*	*Long.*
1618 OPGW	249	-930	57
1887 OPGW	558	-1299	15
1618 Conductor	634	-1392	78
1887 Conductor	878	-1548	27

Historical NESC 250C

	Vert.	*Trans.*	*Long.*
1618 OPGW	240	-843	51
1887 OPGW	541	-1193	14
1618 Conductor	617	-1265	71
1887 Conductor	856	-1408	25



Positive transverse loads are in the 0 degree direction.
Looking east. 1618 Line is on attachment sets 1, 2, 3. 1887 Line is on attachment sets 4, 5, 6.
Positive longitudinal loads are toward the west.

MAST REPLACEMENT DESIGN

STRUCTURE NO. 2683
T-MOBILE - CTFF896A
761 FEDERAL ROAD
BROOKFIELD, CT 06804

VICINITY MAP

NORTH

PROJECT SUMMARY

SITE ADDRESS:	761 FEDERAL ROAD BROOKFIELD, CT 06804
PROJECT COORDINATES:	LAT: 41°-28'-43.50"N LON: 73°-24'-29.80"W ELEV:±285' AMSL
EVERSOURCE STRUCT NO:	2683
EVERSOURCE CONTACT:	RICHARD BADON 860.728.4852
T-MOBILE SITE REF.:	CTFF896A
T-MOBILE CONTACT:	KYLE RICHERS 908.447.4716
ANTENNA CL HEIGHT:	110'-0"
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD ROAD BRANFORD, CT 06405
CENTEK CONTACT:	TIMOTHY J. LYNN, PE 203.433.7507

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
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3	12/7/22	TJL	CFC	ISSUED FOR CONSTRUCTION
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TITLE SHEET

SHEET NO. T-1

Sheet No. 1 of 7

DESIGN BASIS

1. GOVERNING CODE: 2021 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2022 CT STATE BUILDING CODE.

2. TIA–222–H, ASCE MANUAL NO. 48–11 – "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES SECOND EDITION", NESC C2–2017 AND EVERSOURCE DESIGN CRITERIA.

3. DESIGN CRITERIA

   WIND LOAD: (ANTENNA MAST)
   ULTIMATE DESIGN WIND SPEED (V) = 125 MPH (2022 CSBC: APPENDIX 'P')

   WIND LOAD: (UTILITY POLE & FOUNDATION)
   BASIC WIND SPEED (V) =100 MPH (3–SECOND GUST) BASED ON NESC C2–2017, SECTION 25 RULE 250C.

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS AND MAST DESIGN PREPARED BY CENTEK ENGINEERING, INC., FOR T–MOBILE, DATED 12/7/22.

2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE TOWER DESIGN DRAWINGS PREPARED BY MEYER INDUSTRIES INC.; JOB NO. HT–8145 DATED JANUARY 10, 1975.

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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DESIGN BASIS AND GENERAL NOTES

SHEET NO. N–1

Sheet No. 2 of 7

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY LOAD 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).
   C. STRUCTURAL STEEL (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 STEEL, ASTM E80XX FOR A572_65.
   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 TABLET J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 14TH 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

MODIFICATION INSPECTION REPORT REQUIREMENTS

PRE-CONSTUCTION		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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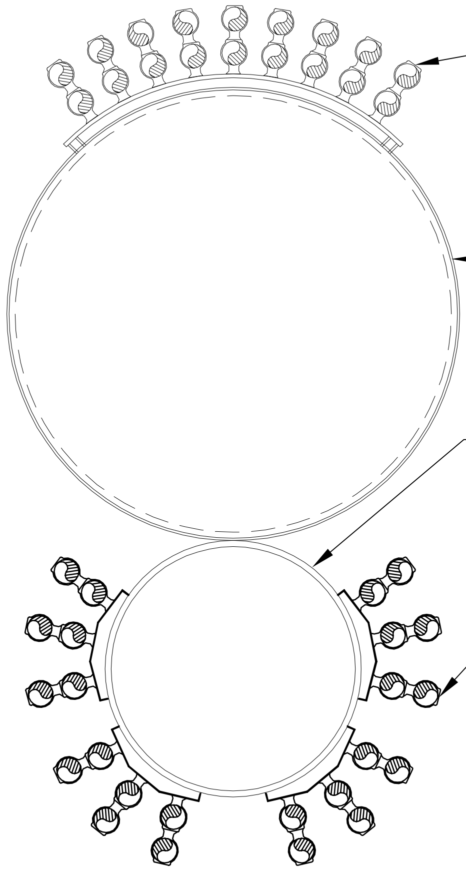
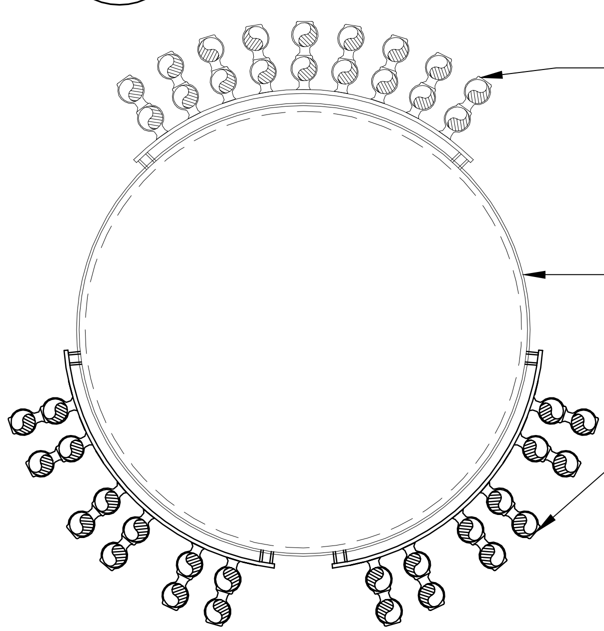
MODIFICATION INSPECTION REQUIREMENTS

SHEET NO. MI–1



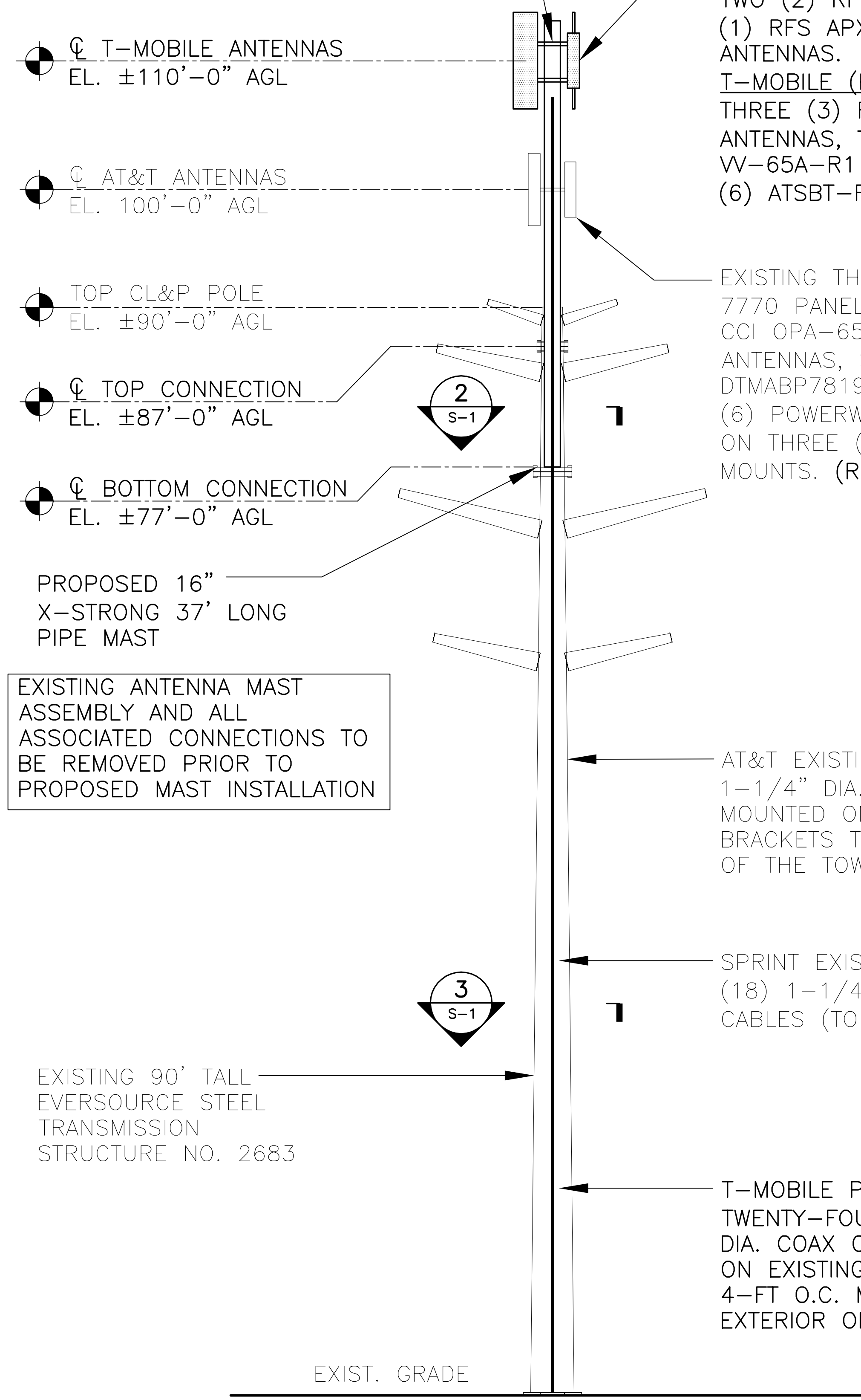
2 / S-1 COAX CABLE PLAN

SCALE: 1" = 1'-0"



3 / S-1 COAX CABLE PLAN

SCALE: 1" = 1'-0"



1 / S-1 TOWER & MAST ELEVATION

SCALE: NOT TO SCALE

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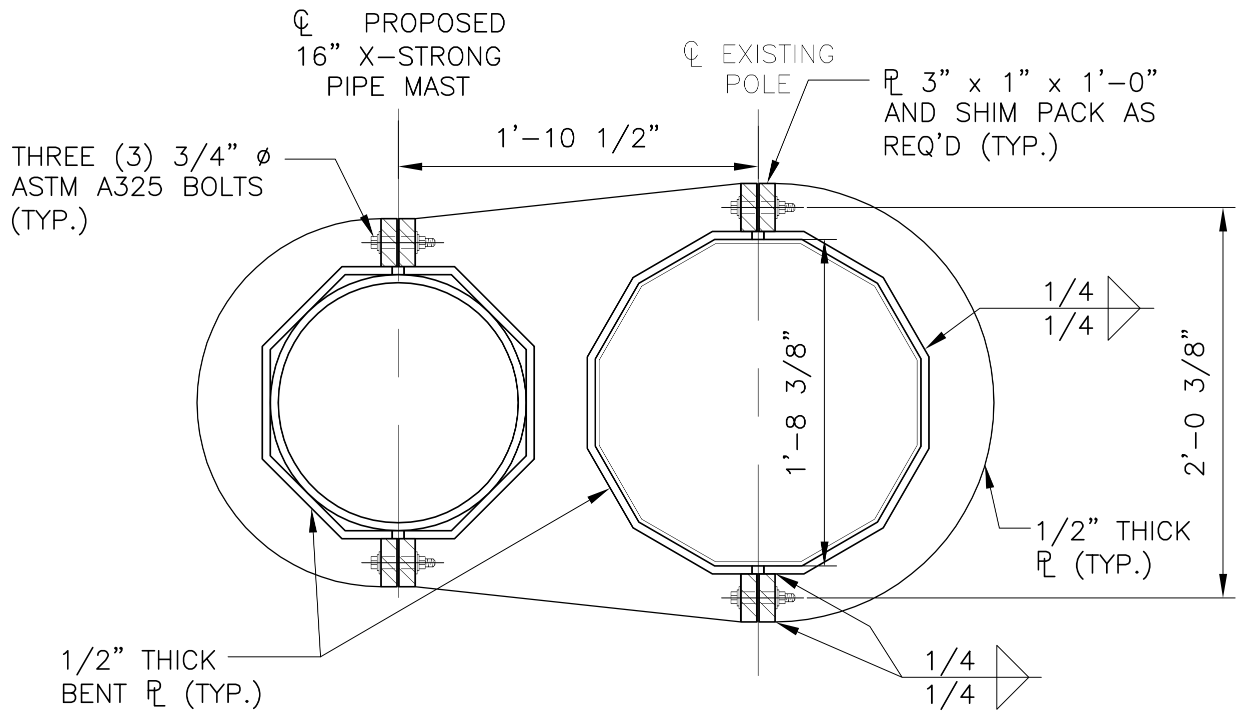
TOWER ELEVATION AND FEEDLINE PLAN

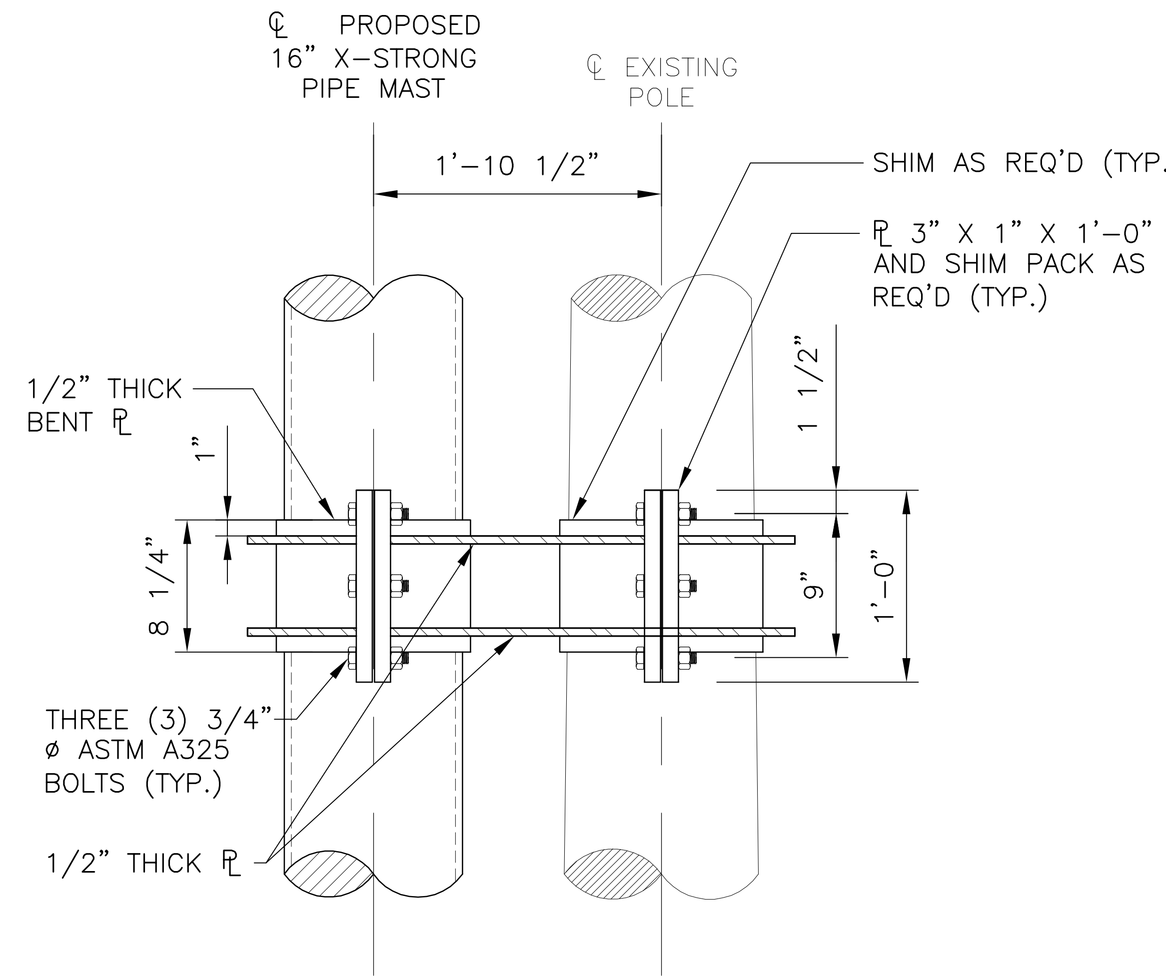
SHEET NO. S-1

Sheet No. 5 of 7



2 / S-2 TOP PCS BRACKET PLAN VIEW

SCALE: 1" = 1'-0"



1 / S-2 TOP PCS BRACKET DETAIL

SCALE: 1" = 1'-0"

NOTE:

1. POLE TAPER = 0.262"/FT (V.I.F.)

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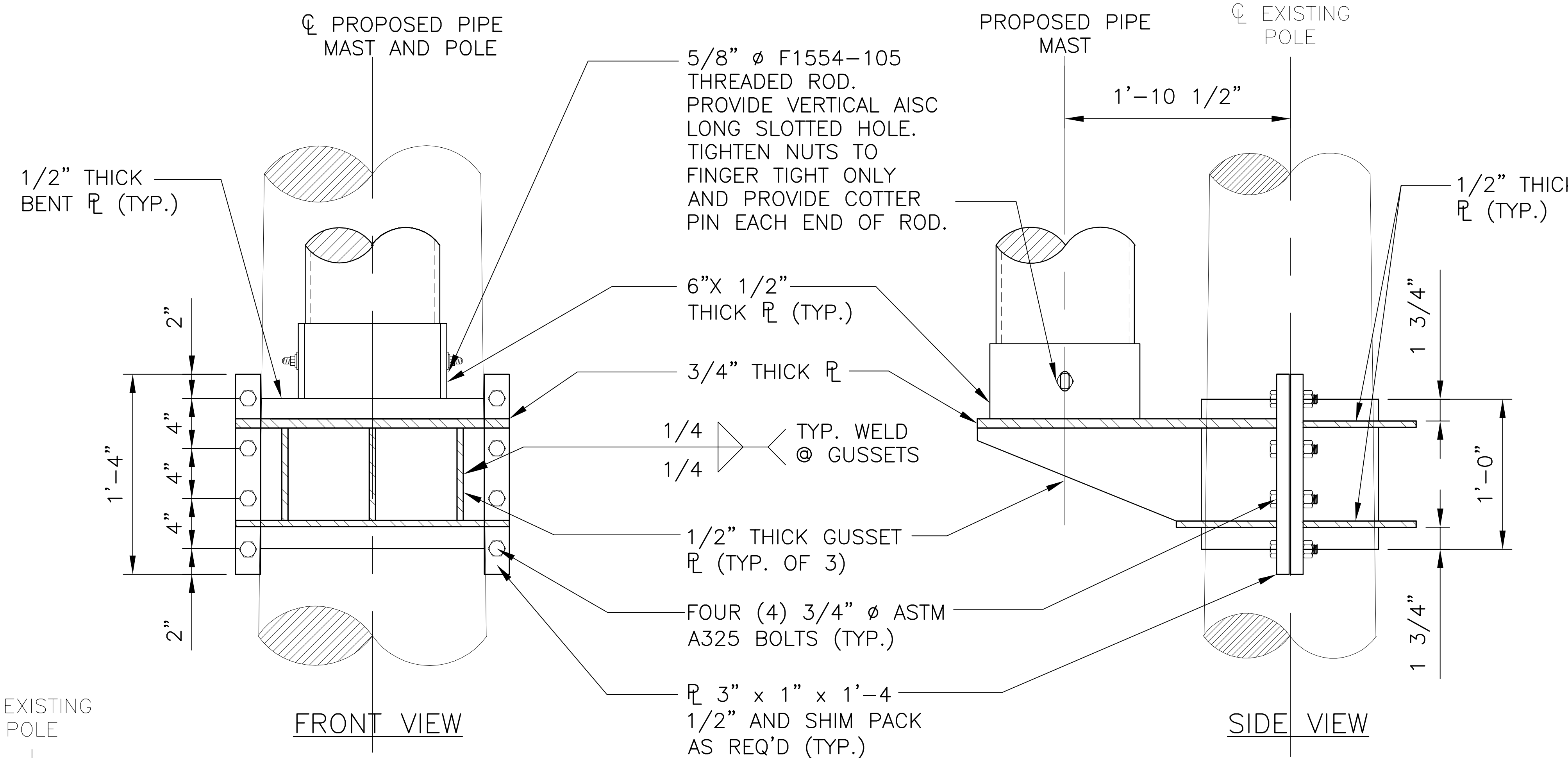
TOP CONNECTION DETAILS

SHEET NO.
S-2
Sheet No. 6 of 7

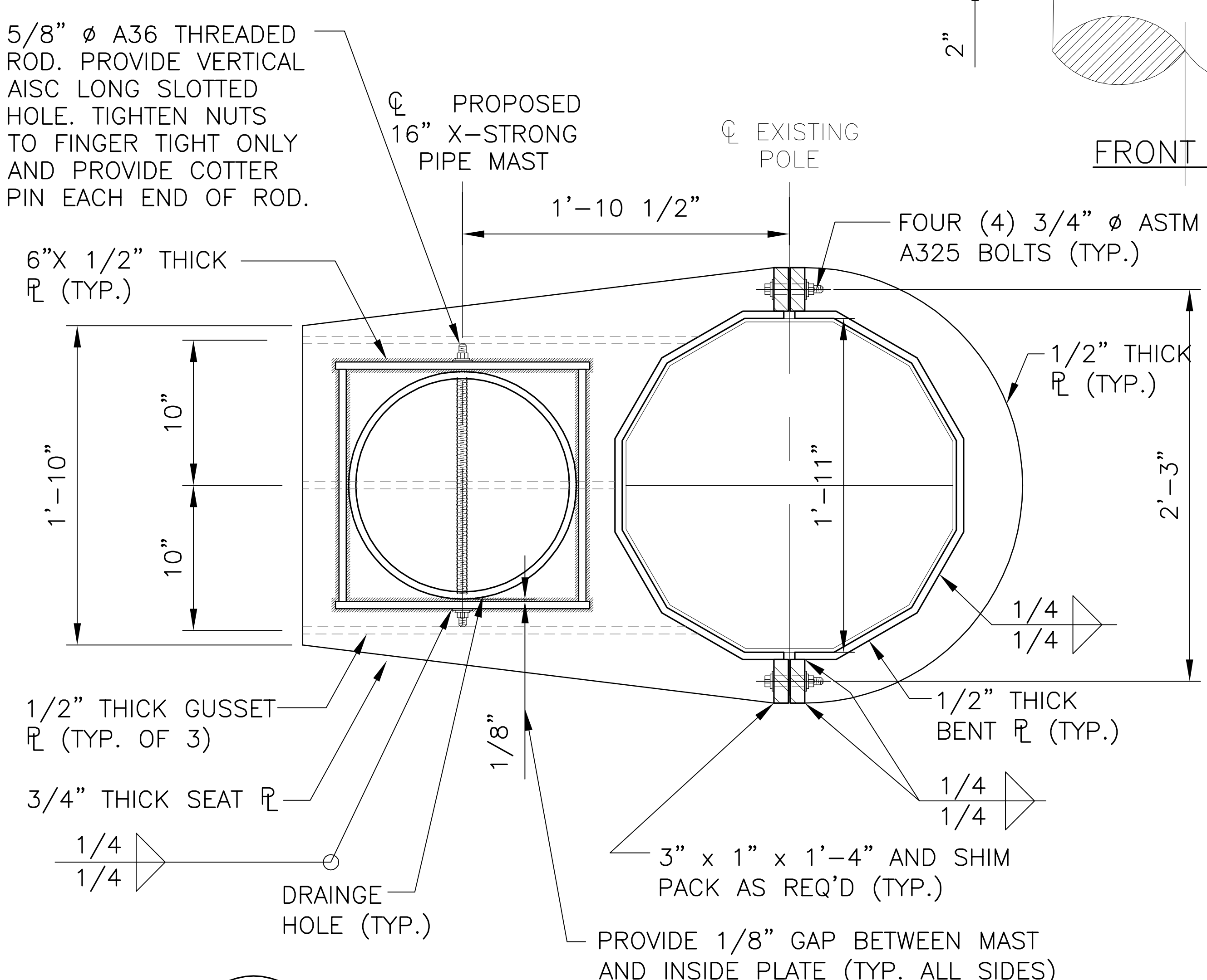
NOTE:

1. POLE TAPER = 0.262"/FT (V.I.F.)



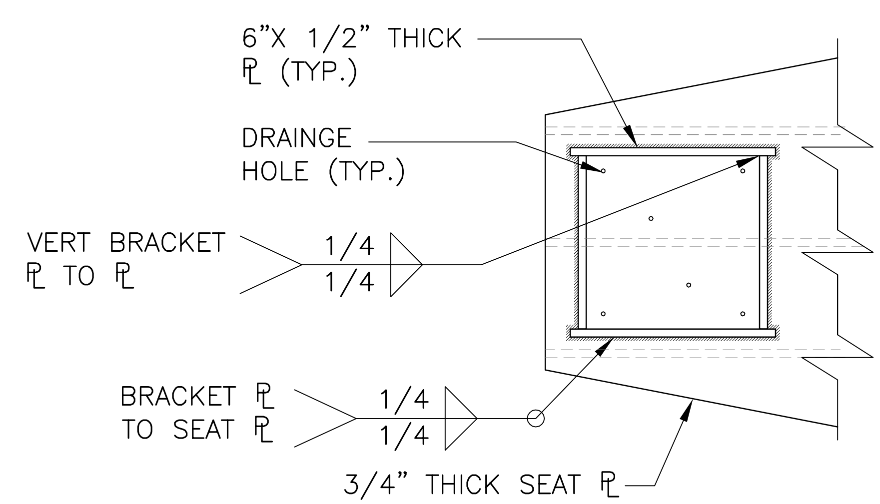
1 / S-3 **BOTTOM PCS BRACKET DETAIL**

SCALE: 1" = 1'-0"



2 / S-3 **BOTTOM PCS BRACKET PLAN VIEW**

SCALE: 1" = 1'-0"



3 / S-3 **BRACKET ASSEMBLY DETAIL**

SCALE: 1" = 1'-0"

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STRUCTURE 2683
761 FEDERAL RAOD
BROOKFIELD, CT 06804

DATE: 7/11/22
SCALE: AS SHOWN
JOB NO. 21005.40

BOTTOM CONNECTION DETAILS

SHEET NO. S-3

Sheet No. 7 of 7

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

Wind Speeds

Basic Wind Speed	$V := 125$	mph	(User Input - 2022 CSBC Appendix P)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input per Annex B of TIA-222-H)
Basic Wind Speed Service Loads	$V_{Ser} := 60$	mph	(User Input - TIA-222-H 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 =	$h := 90$	ft	(User Input)
Height to Center of Antennas=	$z_{T\_Mo} := 110$	ft	(User Input)
Height to Center of Antennas=	$z_{ATT} := 100$	ft	(User Input)
Height to Center of Mast =	$z_{Mast1} := 105.5$	ft	(User Input)
Height to Center of Mast =	$z_{Mast2} := 87$	ft	(User Input)
Radial Ice Thickness =	$t_i := 1.0$	in	(User Input per Annex B of TIA-222-H)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1.0$		(User Input)
Shielding Factor for Appurtenances =	$K_a := 0.8$		(User Input)
Ground Elevation Factor =	$K_e = 0.996$		(User Input)
Gust Response Factor =	$G_H := 1.35$		(User Input - Section 2.6.9.4 of TIA-222-H)

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-H)

Importance Factors =

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

(Per Table 2-3 of TIA-222-H)

Wind Direction Probability Factor (Service) = $K_{dSer} := 0.85$ (Per Section 2.8.3 of TIA-222-H)

$K_{iz} := \left(\frac{z_{T\_Mo}}{33}\right)^{0.1} = 1.128$ $\qquad t_{izT\_Mo} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.297$

Velocity Pressure Coefficient Antennas = $Kz_{T\_Mo} := 2.01\left(\left(\frac{z_{T\_Mo}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.291$

Velocity Pressure w/o Ice Antennas = $qz_{T\_Mo} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{T\_Mo} \cdot V^2 = 48.852$

Velocity Pressure with Ice Antennas = $qz_{ice.T\_Mo} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{T\_Mo} \cdot V_i^2 = 7.816$

Velocity Pressure Service = $qz_{T\_Mo.Ser} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_{dSer} \cdot Kz_{T\_Mo} \cdot V_{Ser}^2 = 10.071$

$K_{iz} := \left(\frac{z_{ATT}}{33}\right)^{0.1} = 1.117$ $\qquad t_{izATT} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.285$

Velocity Pressure Coefficient Antennas = $Kz_{ATT} := 2.01\left(\left(\frac{z_{ATT}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.266$

Velocity Pressure w/o Ice Antennas = $qz_{ATT} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{ATT} \cdot V^2 = 47.882$

Velocity Pressure with Ice Antennas = $qz_{ice.ATT} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{ATT} \cdot V_i^2 = 7.661$

Velocity Pressure Service = $qz_{ATT.Ser} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_{dSer} \cdot Kz_{ATT} \cdot V_{Ser}^2 = 9.871$

$K_{izMast1} := \left(\frac{z_{Mast1}}{33}\right)^{0.1} = 1.123$ $\qquad t_{izMast1} := t_i \cdot I_{ice} \cdot K_{izMast1} \cdot K_{zt}^{0.35} = 1.292$

Velocity Pressure Coefficient Mast = $Kz_{Mast1} := 2.01\left(\left(\frac{z_{Mast1}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.28$

Velocity Pressure w/o Ice Mast= $qz_{Mast1} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{Mast1} \cdot V^2 = 48.424$

Velocity Pressure with Ice Mast = $qz_{ice.Mast1} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{Mast1} \cdot V_i^2 = 7.748$

Velocity Pressure Service = $qz_{Mast1.Ser} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_{dSer} \cdot Kz_{Mast1} \cdot V_{Ser}^2 = 9.983$

$K_{izMast2} := \left(\frac{z_{Mast2}}{33}\right)^{0.1} = 1.102$ $\qquad t_{izMast2} := t_i \cdot I_{ice} \cdot K_{izMast2} \cdot K_{zt}^{0.35} = 1.267$

Velocity Pressure Coefficient Mast = $Kz_{Mast2} := 2.01\left(\left(\frac{z_{Mast2}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.229$

Velocity Pressure w/o Ice Mast= $qz_{Mast2} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{Mast2} \cdot V^2 = 46.498$

Velocity Pressure with Ice Mast = $qz_{ice.Mast2} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{Mast2} \cdot V_i^2 = 7.44$

Velocity Pressure Service = $qz_{Mast2.Ser} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_{dSer} \cdot Kz_{Mast2} \cdot V_{Ser}^2 = 9.585$

Development of Wind & Ice Load on Mast

Mast Data: (16 Sch. 80 (User Input)

Mast Shape = Round (User Input)

Mast Diameter = $D_{mast} := 16$ in (User Input)

Mast Length = $L_{mast} := 37$ ft (User Input)

Mast Thickness = $t_{mast} := 0.5$ in (User Input)

Mast Aspect Ratio = $Ar_{mast} := \frac{12L_{mast}}{D_{mast}} = 27.8$

Mast Force Coefficient = $Ca_{mast} = 1.2$

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 = $Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + t_{izMast1} \cdot 2\right)^2 - D_{mast}^{\;2}\right] = 70.2$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 27$ plf **BLC 3**

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + t_{izMast2} \cdot 2\right)^2 - D_{mast}^{\;2}\right] = 68.7$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 27$ plf **BLC 3**

Wind Load (with ice)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{\left(D_{mast} + 2 \cdot t_{izMast1}\right)}{12} = 1.549$ sf/ft

Total Mast Wind Force w/ Ice = $qz_{ice.Mast1} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 19$ plf **BLC 4**

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{\left(D_{mast} + 2 \cdot t_{izMast2}\right)}{12} = 1.545$ sf/ft

Total Mast Wind Force w/ Ice = $qz_{ice.Mast2} \cdot G_H \cdot Ca_{mast} \cdot AICE_{mast} = 19$ plf **BLC 4**

Wind Load (without ice)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 1.333$ sf/ft

Total Mast Wind Force = $qz_{Mast1} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 105$ plf **BLC 5**

Total Mast Wind Force = $qz_{Mast2} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 100$ plf **BLC 5**

Wind Load (Service)

Total Mast Wind Force Service Loads = $qz_{Mast1.Ser} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 22$ plf **BLC 6**

Total Mast Wind Force Service Loads = $qz_{Mast2.Ser} \cdot G_H \cdot Ca_{mast} \cdot A_{mast} = 21$ plf **BLC 6**

Development of Wind & Ice Load on Antennas

Antenna Data: (T-Mobile)

Antenna Model = RFSAPXVAALL24_43

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 95.9$ in (User Input)

Antenna Width = $W_{ant} := 24$ in (User Input)

Antenna Thickness = $T_{ant} := 8.5$ in (User Input)

Antenna Weight = $WT_{ant} := 150$ lbs (User Input)

Number of Antennas = $N_{ant} := 3$ (User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.0$

Antenna Force Coefficient = $Ca_{ant} = 1.27$

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 450$ lbs **BLC 2**

Gravity Loads (ice only) cu in

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \times 10^4$ cu in

Volume of Ice on Each Antenna = $V_{ice} := \left(L_{ant} + 2 \cdot t_{izT\_Mo}\right)\left(W_{ant} + 2 \cdot t_{izT\_Mo}\right) \cdot \left(T_{ant} + 2 \cdot t_{izT\_Mo}\right) - V_{ant} = 9497$

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 308$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 923$ lbs **BLC 3**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{\left(L_{ant} + 2 \cdot t_{izT\_Mo}\right) \cdot \left(W_{ant} + 2 \cdot t_{izT\_Mo}\right)}{144} = 18.2$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 54.6$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.T\_Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 583$ lbs **BLC 4**

Wind Load (without ice)

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 16$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 48$ sf

Total Antenna Wind Force = $F_{ant} := qz_{T\_Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 3204$ lbs **BLC 5**

Wind Load (Service)

Total Antenna Wind Force Service Loads = $F_{ant.Ser} := qz_{T\_Mo.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 660$ lbs **BLC 6**

Development of Wind & Ice Load on Antennas

Antenna Data: (T-Mobile)

Antenna Model =	Commscope VV-65A-R1		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 54.724$	in	(User Input)
Antenna Width =	$W_{ant} := 12.087$	in	(User Input)
Antenna Thickness =	$T_{ant} := 4.646$	in	(User Input)
Antenna Weight =	$WT_{ant} := 30$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.5$		
Antenna Force Coefficient =	$Ca_{ant} = 1.29$		

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 90$	lbs	**BLC 2**

Gravity Loads (ice only)

cu in

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3073$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{izT\_Mo})(W_{ant} + 2 \cdot t_{izT\_Mo}) \cdot (T_{ant} + 2 \cdot t_{izT\_Mo}) - V_{ant} = 3020$		
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 98$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 294$	lbs	**BLC 3**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izT\_Mo}) \cdot (W_{ant} + 2 \cdot t_{izT\_Mo})}{144} = 5.8$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 17.5$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.T\_Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 191$	lbs	**BLC 4**

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.6$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 13.8$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{T\_Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 938$	lbs	**BLC 5**

Wind Load (Service)

Total Antenna Wind Force Service Loads =	$F_{ant.Ser} := qz_{T\_Mo.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 193$	lbs	**BLC 6**

Development of Wind & Ice Load on Antennas

Antenna Data: (T-Mobile)

Antenna Model = ATSBT-TOP-FM4G 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 = $Ca_{ant} = 1.2$

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 12$ lbs **BLC 2**

Gravity Loads (ice only) cu in

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 42$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{izT\_Mo})(W_{ant} + 2 \cdot t_{izT\_Mo}) \cdot (T_{ant} + 2 \cdot t_{izT\_Mo}) - V_{ant} = 196$

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 6$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 38$ lbs **BLC 3**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izT\_Mo}) \cdot (W_{ant} + 2 \cdot t_{izT\_Mo})}{144} = 0.4$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 2.2$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.T\_Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 22$ lbs **BLC 4**

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 = $F_{ant} := qz_{T\_Mo} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 55$ lbs **BLC 5**

Wind Load (Service)

Total Antenna Wind Force Service Loads = $F_{ant.Ser} := qz_{T\_Mo.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 11$ lbs **BLC 6**

Development of Wind & Ice Load on Antennas

Mount Data:	(T-Mobile)		
Mount Type:	SitePro RDS-296 - Double Support Arm x2		
Mount Shape =	Flat		(User Input)
Mount Projected Surface Area =	$CaAa := 13.5$	sf	(User Input)
Mount Projected Surface Area w/ Ice =	$CaAa_{ice} := 17.6$	sf	(User Input)
Mount Weight =	$WT_{mnt} := 1100$	lbs	(User Input)
Mount Weight w/ Ice =	$WT_{mnt.ice} := 2000$	lbs	

Gravity Loads (without ice)

Weight of All Mounts =	$WT_{mnt} = 1100$	lbs	**BLC 2**

Gravity Loads (ice only)

Weight of Ice on All Mounts =	$WT_{mnt.ice} - WT_{mnt} = 900$	lbs	**BLC 3**

Wind Load (with ice)

Total Mount Wind Force =	$Fi_{mnt} := qz_{ice.T\_Mo} \cdot G_H \cdot CaAa_{ice} = 186$	lbs	**BLC 4**

Wind Load (without ice)

Total Mount Wind Force =	$F_{mnt} := qz_{T\_Mo} \cdot G_H \cdot CaAa = 890$	lbs	**BLC 5**

Wind Load (Service)

Total Mount Wind Force =	$Fi_{mnt} := qz_{T\_Mo.Ser} \cdot G_H \cdot CaAa = 184$	lbs	**BLC 6**

Total Pipe Length =	$TPL := 8 \cdot ft \cdot 6 = 48\,ft$
Total Antenna Length =	$TAL := 96 \cdot in \cdot 3 + 54.7 \cdot in \cdot 3 = 37.675\,ft$
Exposed Pipe Area =	$ExPA := (TPL - TAL)2.375 \cdot in = 2.043\,ft^2$
CaAa =	$1.2 \cdot ExPA + (3.5 \cdot in) \cdot 48 \cdot in \cdot 6 \cdot 1.2 + 4 \cdot in \cdot 8 \cdot in \cdot 6 \cdot 2.0 = 13.519\,ft^2$
Exposed Pipe Area (with Ice) =	$ExPA := (TPL - TAL)3.375 \cdot in = 2.904\,ft^2$
CaAa (with ice) =	$1.2 \cdot ExPA + (4.5 \cdot in) \cdot 48 \cdot in \cdot 6 \cdot 1.2 + 5 \cdot in \cdot 8 \cdot in \cdot 6 \cdot 2.0 = 17.6\,ft^2$

$463 \cdot lb \cdot 2 + 175 \cdot lb = 1101\,lb$

$$\frac{\pi}{4}\left[\left(2.375 \cdot in + 2 \cdot t_{izT\_Mo} \cdot in\right)^2 - (2.375 \cdot in)^2\right] \cdot 96 \cdot in \cdot 6 \cdot (Id \cdot pcf) + \frac{\pi}{4}\left[\left(3.5 \cdot in + 2 \cdot t_{izT\_Mo} \cdot in\right)^2 - (3.5 \cdot in)^2\right] \cdot 48 \cdot in \cdot 6 \cdot (Id \cdot pcf) = 462\,lbf$$

Development of Wind & Ice Load on Antennas

Antenna Data: (AT&T)

Antenna Model =	Powerwave 7770		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 55$	in	(User Input)
Antenna Width =	$W_{ant} := 11$	in	(User Input)
Antenna Thickness =	$T_{ant} := 5$	in	(User Input)
Antenna Weight =	$WT_{ant} := 39$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 5.0$		
Antenna Force Coefficient =	$Ca_{ant} = 1.31$		

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 117$ lbs **BLC 2**

Gravity Loads (ice only) cu in

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3025$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{izATT})(W_{ant} + 2 \cdot t_{izATT}) \cdot (T_{ant} + 2 \cdot t_{izATT}) - V_{ant} = 2888$

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 94$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 281$ lbs **BLC 3**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izATT}) \cdot (W_{ant} + 2 \cdot t_{izATT})}{144} = 5.4$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 16.3$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 177$ lbs **BLC 4**

Wind Load (without ice)

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.2$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 12.6$ sf

Total Antenna Wind Force = $F_{ant} := qz_{ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 855$ lbs **BLC 5**

Wind Load (Service)

Total Antenna Wind Force Service Loads = $F_{ant.Ser} := qz_{ATT.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 176$ lbs **BLC 6**

Development of Wind & Ice Load on Antennas

Antenna Data: (AT&T)

Antenna Model =	CCI OPA-65R-LCUU-H6		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72$	in	(User Input)
Antenna Width =	$W_{ant} := 14.8$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.4$	in	(User Input)
Antenna Weight =	$WT_{ant} := 75$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.9$		
Antenna Force Coefficient =	$Ca_{ant} = 1.31$		

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 225$ lbs **BLC 2**

Gravity Loads (ice only)

cu in

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 7885$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{izATT})(W_{ant} + 2 \cdot t_{izATT}) \cdot (T_{ant} + 2 \cdot t_{izATT}) - V_{ant} = 5028$

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 163$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 489$ lbs **BLC 3**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izATT}) \cdot (W_{ant} + 2 \cdot t_{izATT})}{144} = 9$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 27$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 291$ lbs **BLC 4**

Wind Load (without ice)

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 7.4$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 22.2$ sf

Total Antenna Wind Force = $F_{ant} := qz_{ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 1498$ lbs **BLC 5**

Wind Load (Service)

Total Antenna Wind Force Service Loads = $F_{ant.Ser} := qz_{ATT.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 309$ lbs **BLC 6**

Development of Wind & Ice Load on Antennas

Antenna Data:	(AT&T)			
Antenna Model =	Powerwave LGP21401			
Antenna Shape =	Flat		(User Input)	
Antenna Height =	$L_{ant} := 14.4$	in	(User Input)	
Antenna Width =	$W_{ant} := 9.2$	in	(User Input)	
Antenna Thickness =	$T_{ant} := 2.6$	in	(User Input)	
Antenna Weight =	$WT_{ant} := 14.1$	lbs	(User Input)	
Number of Antennas =	$N_{ant} := 6$		(User Input)	
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.6$			
Antenna Force Coefficient =	$Ca_{ant} = 1.2$			
Gravity Load (without ice)				
Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 85$	lbs		**BLC 2**
Gravity Loads (ice only)		cu in		
Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 344$	cu in		
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{izATT})(W_{ant} + 2 \cdot t_{izATT}) \cdot (T_{ant} + 2 \cdot t_{izATT}) - V_{ant} = 688$			
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 22$	lbs		
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 134$	lbs		**BLC 3**
Wind Load (with ice)				
Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izATT}) \cdot (W_{ant} + 2 \cdot t_{izATT})}{144} = 1.4$	sf		
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 8.3$	sf		
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 83$	lbs		**BLC 4**
Wind Load (without ice)				
Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.9$	sf		
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 5.5$	sf		
Total Antenna Wind Force =	$F_{ant} := qz_{ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 343$	lbs		**BLC 5**
Wind Load (Service)				
Total Antenna Wind Force Service Loads =	$F_{ant.Ser} := qz_{ATT.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 71$	lbs		**BLC 6**

Development of Wind & Ice Load on Antennas

Antenna Data: (AT&T)

Antenna Model =	CCI DTMABP7819VG12A		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 10.63$	in	(User Input)
Antenna Width =	$W_{ant} := 11.02$	in	(User Input)
Antenna Thickness =	$T_{ant} := 3.78$	in	(User Input)
Antenna Weight =	$WT_{ant} := 20$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 6$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{W_{ant}}{L_{ant}} = 1.0$		
Antenna Force Coefficient =	$Ca_{ant} = 1.2$		

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 120$	lbs	**BLC 2**

Gravity Loads (ice only) cu in

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 443$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{izATT})(W_{ant} + 2 \cdot t_{izATT}) \cdot (T_{ant} + 2 \cdot t_{izATT}) - V_{ant} = 696$		
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 23$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 135$	lbs	**BLC 3**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{izATT}) \cdot (W_{ant} + 2 \cdot t_{izATT})}{144} = 1.2$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 7.5$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 74$	lbs	**BLC 4**

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.8$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 4.9$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 303$	lbs	**BLC 5**

Wind Load (Service)

Total Antenna Wind Force Service Loads =	$F_{ant.Ser} := qz_{ATT.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 62$	lbs	**BLC 6**

Development of Wind & Ice Load on Antennas

Mount Data:	(AT&T)		
Mount Type:	SitePro RDS-272 - Double Support Arm		
Mount Shape =	Flat		(User Input)
Mount Projected Surface Area =	$CaAa := 6.5$	sf	(User Input)
Mount Projected Surface Area w/ Ice =	$CaAa_{ice} := 8.5$	sf	(User Input)
Mount Weight =	$WT_{mnt} := 595$	lbs	(User Input)
Mount Weight w/ Ice =	$WT_{mnt.ice} := 1175$	lbs	

Gravity Loads (without ice)

Weight of All Mounts =	$WT_{mnt} = 595$	lbs	**BLC 2**

Gravity Loads (ice only)

Weight of Ice on All Mounts =	$WT_{mnt.ice} - WT_{mnt} = 580$	lbs	**BLC 3**

Wind Load (with ice)

Total Mount Wind Force =	$Fi_{mnt} := qz_{ice.ATT} \cdot G_H \cdot CaAa_{ice} = 88$	lbs	**BLC 4**

Wind Load (without ice)

Total Mount Wind Force =	$F_{mnt} := qz_{ATT} \cdot G_H \cdot CaAa = 420$	lbs	**BLC 5**

Wind Load (Service)

Total Mount Wind Force =	$Fi_{mnt} := qz_{ATT.Ser} \cdot G_H \cdot CaAa = 87$	lbs	**BLC 6**

Total Pipe Length = $TPL := 6 \cdot ft \cdot 6 = 36\,ft$

Total Antenna Length = $TAL := 55 \cdot in \cdot 3 + 72 \cdot in \cdot 3 = 31.75\,ft$

Exposed Pipe Area = $ExPA := (TPL - TAL)2.375 \cdot in = 0.841\,ft^2$

CaAa = $1.2 \cdot ExPA + (3.5 \cdot in) \cdot 48 \cdot in \cdot 3 \cdot 1.2 + 4 \cdot in \cdot 8 \cdot in \cdot 3 \cdot 2.0 = 6.543\,ft^2$

Exposed Pipe Area (with Ice) = $ExPA := (TPL - TAL)3.375 \cdot in = 1.195\,ft^2$

CaAa (with ice) = $1.2 \cdot ExPA + (4.5 \cdot in) \cdot 48 \cdot in \cdot 3 \cdot 1.2 + 5 \cdot in \cdot 8 \cdot in \cdot 3 \cdot 2.0 = 8.5\,ft^2$

$463 \cdot lb + 132 \cdot lb = 595\,lb$

$$\frac{\pi}{4}\left[\left(2.375 \cdot in + 2 \cdot t_{izATT} \cdot in\right)^2 - (2.375 \cdot in)^2\right] \cdot 72 \cdot in \cdot 6 \cdot (Id \cdot pcf) + \frac{\pi}{4}\left[\left(3.5 \cdot in + 2 \cdot t_{izATT} \cdot in\right)^2 - (3.5 \cdot in)^2\right] \cdot 48 \cdot in \cdot 3 \cdot (Id \cdot pcf) = 296.947\,lbf$$

Development of Wind & Ice Load on Coax Cables

Cable Data: T-Mobile Cables

Type = 1-5/8"

Shape = Round (User Input)

Coax Outside Diameter = $D_{coax} := 1.98$ in (User Input)

Coax Cable Length = $L_{coax} := 34$ 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 PCS Mast = $NP_{coax} := 4$ (User Input)

Coax aspect ratio, $Ar_{coax} := \frac{(L_{coax} \cdot 12)}{D_{coax}} = 206.1$

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

Gravity Loads (without ice)

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

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[\left(D_{coax} + 2 \cdot t_{izMast1}\right)^2 - D_{coax}^{\ 2}\right] = 13.3$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 124$ plf **BLC 3**

Wind Load (with ice)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{\left(NP_{coax} \cdot D_{coax} + 2 \cdot t_{izMast1}\right)}{12} = 0.9$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := Ca_{coax} \cdot qz_{ice.Mast1} \cdot G_H \cdot AICE_{coax} = 11$ plf **BLC 4**

Wind Load (without ice)

Coax projected surface area = $A_{coax} := \frac{\left(NP_{coax} D_{coax}\right)}{12} = 0.7$ sf/ft

Total Coax Wind Force = $F_{coax} := Ca_{coax} \cdot qz_{Mast1} \cdot G_H \cdot A_{coax} = 52$ plf **BLC 5**

Wind Load (Service)

Total Coax Wind Force Service Loads = $F_{coax} := Ca_{coax} \cdot qz_{Mast1.Ser} \cdot G_H \cdot A_{coax} = 11$ plf **BLC 6**

Development of Wind & Ice Load on Coax Cables

Cable Data: AT&T Cables

Type =	1-1/4"		
Shape =	Round		(User Input)
Coax Outside Diameter =	$D_{coax} := 1.55$	in	(User Input)
Coax Cable Length =	$L_{coax} := 10$	ft	(User Input)
Weight of Coax per foot =	$Wt_{coax} := 0.66$	plf	(User Input)
Total Number of Coax =	$N_{coax} := 18$		(User Input
No. of Coax Projecting Outside Face of PCS Mast =	$NP_{coax} := 4$		(User Input)

Coax aspect ratio, $Ar_{coax} := \frac{(L_{coax} \cdot 12)}{D_{coax}} = 77.4$

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

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 12$ plf **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot t_{izMast1})^2 - D_{coax}^{\ 2}\right] = 11.5$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 81$ plf **BLC 3**

Wind Load (with ice)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} \cdot D_{coax} + 2 \cdot t_{izMast1})}{12} = 0.7$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := Ca_{coax} \cdot qz_{ice.Mast1} \cdot G_H \cdot AICE_{coax} = 9$ plf **BLC 4**

Wind Load (without ice)

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 0.5$ sf/ft

Total Coax Wind Force = $F_{coax} := Ca_{coax} \cdot qz_{Mast1} \cdot G_H \cdot A_{coax} = 41$ plf **BLC 5**

Wind Load (Service)

Total Coax Wind Force Service Loads = $F_{coax} := Ca_{coax} \cdot qz_{Mast1.Ser} \cdot G_H \cdot A_{coax} = 8$ plf **BLC 6**

(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)	12
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 530-05: ASD
Aluminum Code	AA ADM1-05: 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 Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Mast	PIPE_16.0X	Column	Pipe	A53 Gr. B	Typical	22	665	665	1330

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M2	Mast	37									Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
1	M2	BOT_C...	TOP_...			Mast	Column	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	BOT_CONN	0	0	0	0	
2	TOP_CONN	0	10	0	0	
3	TOP_MAST	0	37	0	0	
4	CL_TMO	0	33	0	0	
5	CL_ATT	0	23	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	BOT_CONN	Reaction	Reaction	Reaction		Reaction	
2	TOP_CONN	Reaction		Reaction			

Member Point Loads

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

Joint Loads and Enforced Displacements (BLC 2 : Weight of Appurtenances)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	CL_TMO	L	Y	-.45
2	CL_TMO	L	Y	-.09
3	CL_TMO	L	Y	-.012
4	CL_TMO	L	Y	-1.1
5	CL_ATT	L	Y	-.117
6	CL_ATT	L	Y	-.225
7	CL_ATT	L	Y	-.085
8	CL_ATT	L	Y	-.12
9	CL_ATT	L	Y	-.595

Joint Loads and Enforced Displacements (BLC 3 : Weight of Ice Only)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	CL_TMO	L	Y	-.923

Joint Loads and Enforced Displacements (BLC 3 : Weight of Ice Only) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
2	CL_TMO	L	Y	-.294
3	CL_TMO	L	Y	-.038
4	CL_TMO	L	Y	-.9
5	CL_ATT	L	Y	-.281
6	CL_ATT	L	Y	-.489
7	CL_ATT	L	Y	-.134
8	CL_ATT	L	Y	-.135
9	CL_ATT	L	Y	-.58

Joint Loads and Enforced Displacements (BLC 4 : (x) TIA Wind with Ice)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	CL_TMO	L	X	.583
2	CL_TMO	L	X	.191
3	CL_TMO	L	X	.022
4	CL_TMO	L	X	.186
5	CL_ATT	L	X	.177
6	CL_ATT	L	X	.291
7	CL_ATT	L	X	.083
8	CL_ATT	L	X	.074
9	CL_ATT	L	X	.088

Joint Loads and Enforced Displacements (BLC 5 : (x) TIA Wind)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	CL_TMO	L	X	3.204
2	CL_TMO	L	X	.938
3	CL_TMO	L	X	.055
4	CL_TMO	L	X	.89
5	CL_ATT	L	X	.855
6	CL_ATT	L	X	1.498
7	CL_ATT	L	X	.343
8	CL_ATT	L	X	.303
9	CL_ATT	L	X	.42

Joint Loads and Enforced Displacements (BLC 6 : Service)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	CL_TMO	L	X	.66
2	CL_TMO	L	X	.193
3	CL_TMO	L	X	.011
4	CL_TMO	L	X	.184
5	CL_ATT	L	X	.176
6	CL_ATT	L	X	.309
7	CL_ATT	L	X	.071
8	CL_ATT	L	X	.062
9	CL_ATT	L	X	.087

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
1	M2	Y	-.025	-.025	0	34
2	M2	Y	-.012	-.012	13	23

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
1	M2	Y	-.027	-.027	20	0
2	M2	Y	-.027	-.027	0	20
3	M2	Y	-.124	-.124	0	34
4	M2	Y	-.081	-.081	13	23

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
1	M2	X	.019	.019	20	0
2	M2	X	.019	.019	0	20
3	M2	X	.011	.011	0	34
4	M2	X	.009	.009	13	23

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
1	M2	X	.105	.105	20	0
2	M2	X	.1	.1	0	20
3	M2	X	.052	.052	0	34
4	M2	X	.041	.041	13	23

Member Distributed Loads (BLC 6 : Service)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
1	M2	X	.022	.022	20	0
2	M2	X	.021	.021	0	20
3	M2	X	.011	.011	0	34
4	M2	X	.008	.008	13	23

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight (Mast)	None		-1						
2	Weight of Appurtenances	None				9		2		
3	Weight of Ice Only	None				9		4		
4	(x) TIA Wind with Ice	None				9		4		
5	(x) TIA Wind	None				9		4		
6	Service	None				9		4		

Load Combinations

	Description	Sol...	PD...	SR...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
1	1.2D + 1.0...	Yes	Y		1	1.2	2	1.2	5	1														
2	0.9D + 1.0...	Yes	Y		1	.9	2	.9	5	1														
3	1.2D +1.0...	Yes	Y		1	1.2	2	1.2	3	1	4	1												
4	1.0D + 1.0...	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	BOT_CONN	max	21.22	1	17.64	3	0	4	0	4	0	4	0	4
2		min	4.205	3	5.88	2	0	1	0	1	0	1	0	1
3	TOP_CONN	max	-7.067	3	0	4	0	4	0	4	0	4	0	4
4		min	-35.689	1	0	1	0	1	0	1	0	1	0	1
5	Totals:	max	-2.862	3	17.64	3	0	4						
6		min	-14.469	1	5.88	2	0	1						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
1	BOT_CONN	max	0	4	0	4	0	4	0	4	0	4	3.192e-03	1
2		min	0	1	0	1	0	1	0	1	0	1	6.323e-04	3
3	TOP_CONN	max	0	4	-.001	2	0	4	0	4	0	4	-1.377e-03	3
4		min	0	1	-.004	3	0	1	0	1	0	1	-6.948e-03	1
5	TOP_MAST	max	7.068	1	-.003	2	0	4	0	4	0	4	-5.3e-03	3
6		min	1.396	3	-.009	3	0	1	0	1	0	1	-2.688e-02	1
7	CL_TMO	max	5.778	1	-.003	2	0	4	0	4	0	4	-5.298e-03	3
8		min	1.141	3	-.009	3	0	1	0	1	0	1	-2.687e-02	1
9	CL_ATT	max	2.666	1	-.003	2	0	4	0	4	0	4	-4.722e-03	3
10		min	.527	3	-.008	3	0	1	0	1	0	1	-2.391e-02	1

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

	Memb...	Shape	Code Check	L...	LC	Sh...	L...	Dir	...	phi*P...	phi*Pn...	phi*Mn y-y [k-ft]	phi*...	Cb	Eqn
1	M2	PIPE_16.0X	.774	1...	1	.109	9...		1	496.3...	693	286.125	286...	1.6	H1...

Joint Reactions (By Combination)

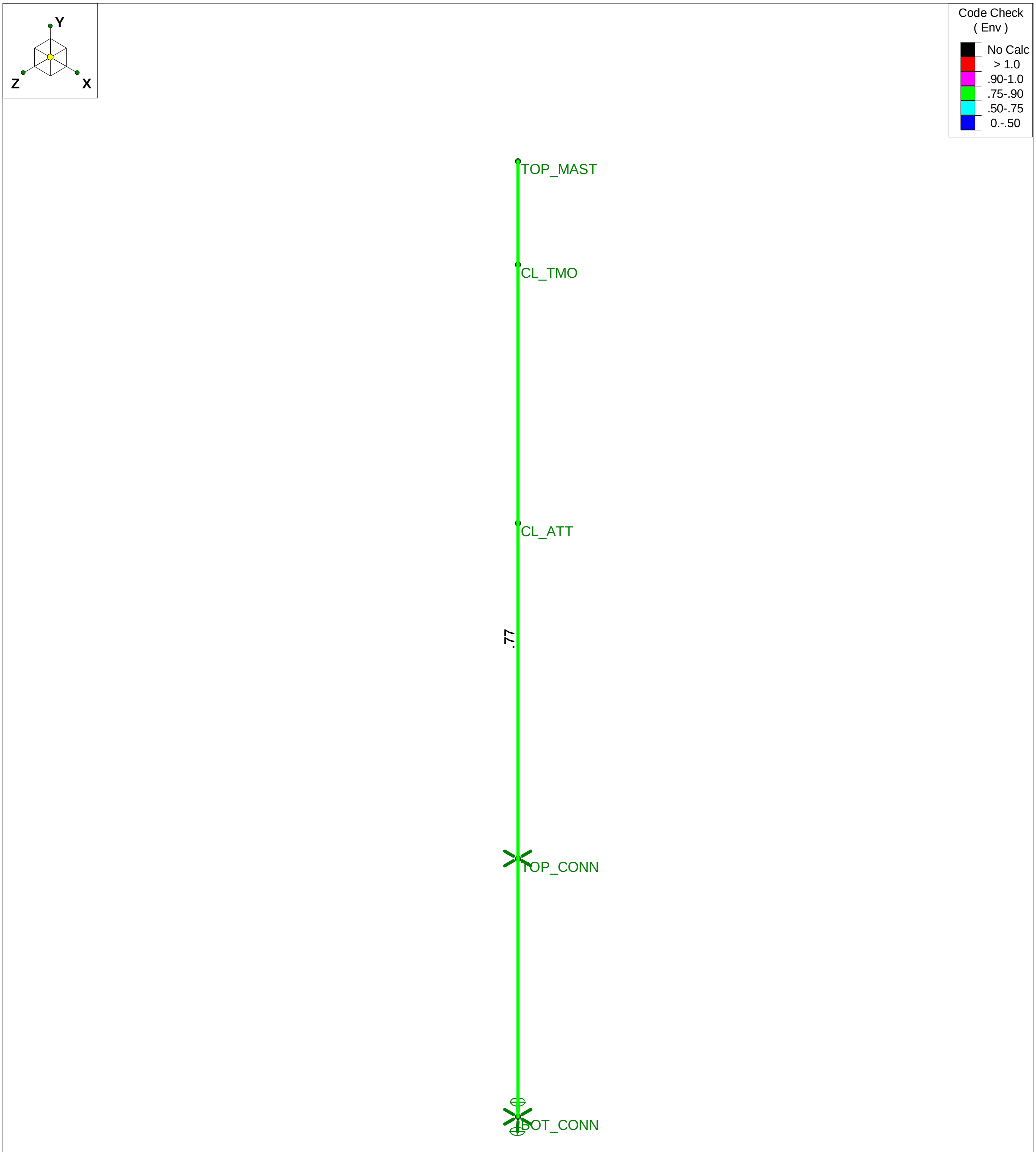
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOT_CONN	21.22	7.841	0	0	0	0
2	1	TOP_CONN	-35.689	0	0	0	0	0
3	1	Totals:	-14.469	7.841	0			
4	1	COG (ft):	X: 0	Y: 22.748	Z: 0			

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOT_CONN	21.168	5.88	0	0	0	0
2	2	TOP_CONN	-35.637	0	0	0	0	0
3	2	Totals:	-14.469	5.88	0			
4	2	COG (ft):	X: 0	Y: 22.748	Z: 0			

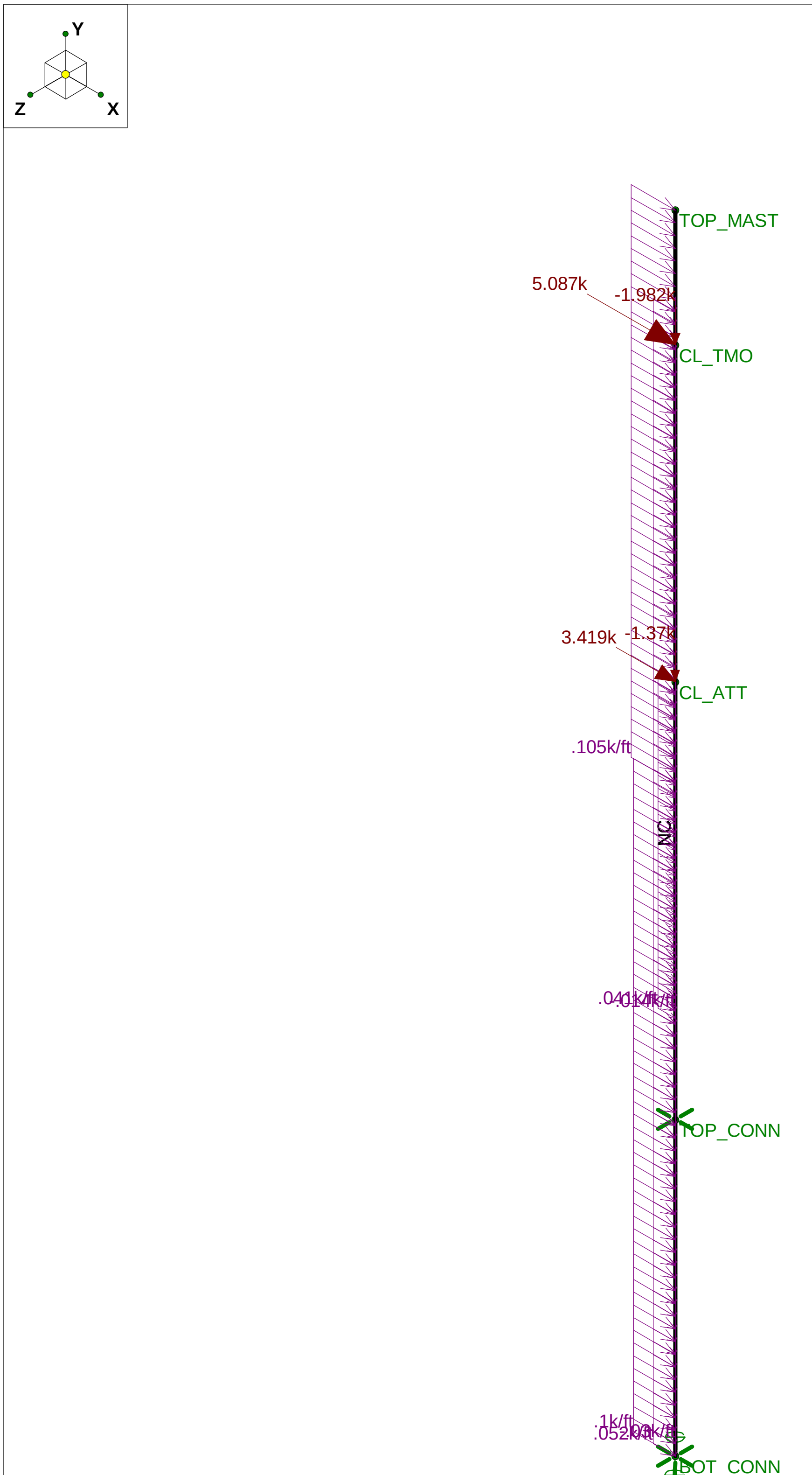
Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	BOT_CONN	4.205	17.64	0	0	0	0
2	3	TOP_CONN	-7.067	0	0	0	0	0
3	3	Totals:	-2.862	17.64	0			
4	3	COG (ft):	X: 0	Y: 22.191	Z: 0			



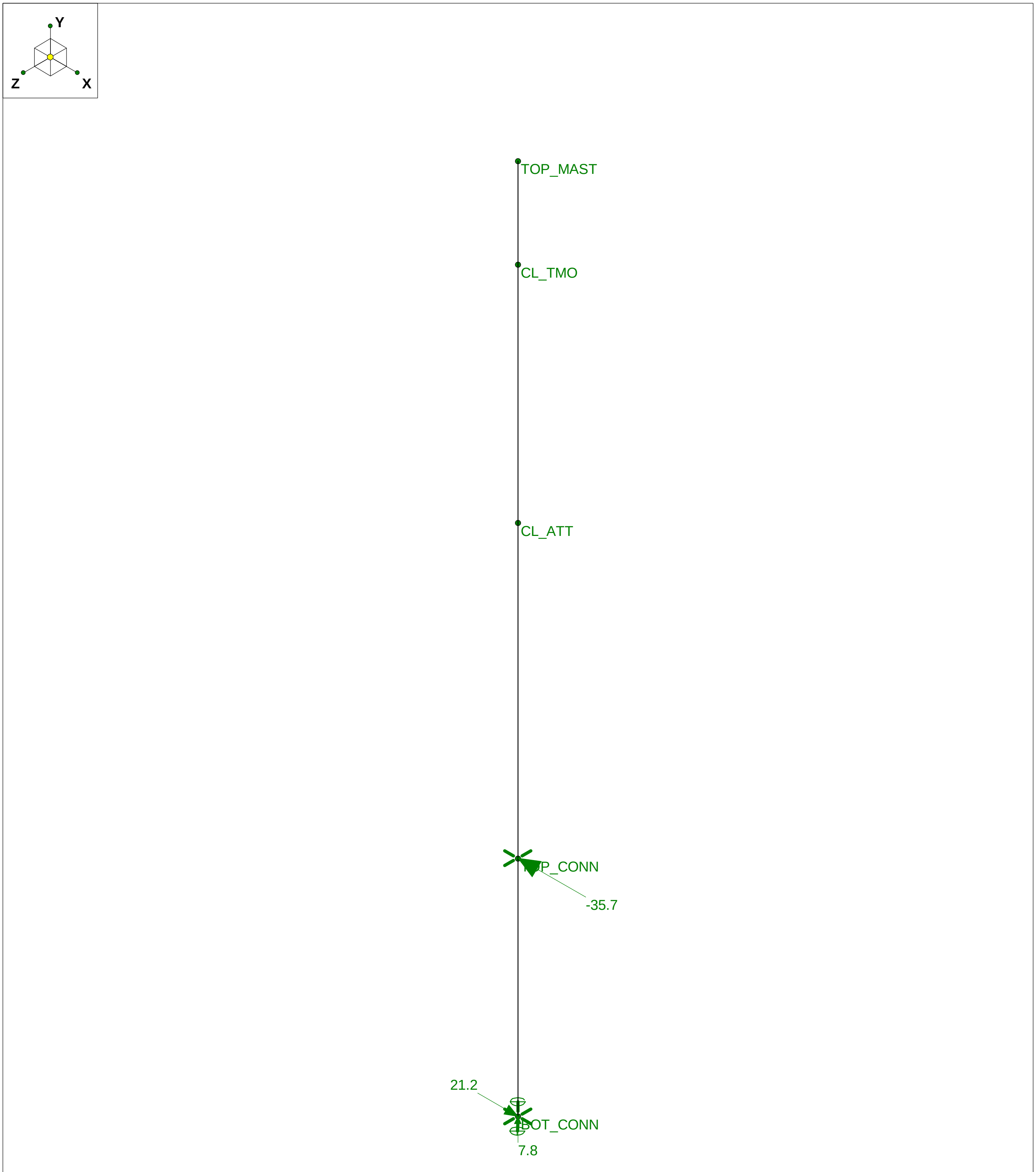
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Nov 2, 2022 at 8:45 PM
21005.40 /T-Mobile CTFF8...	Unity Check	TIA Loads.r3d



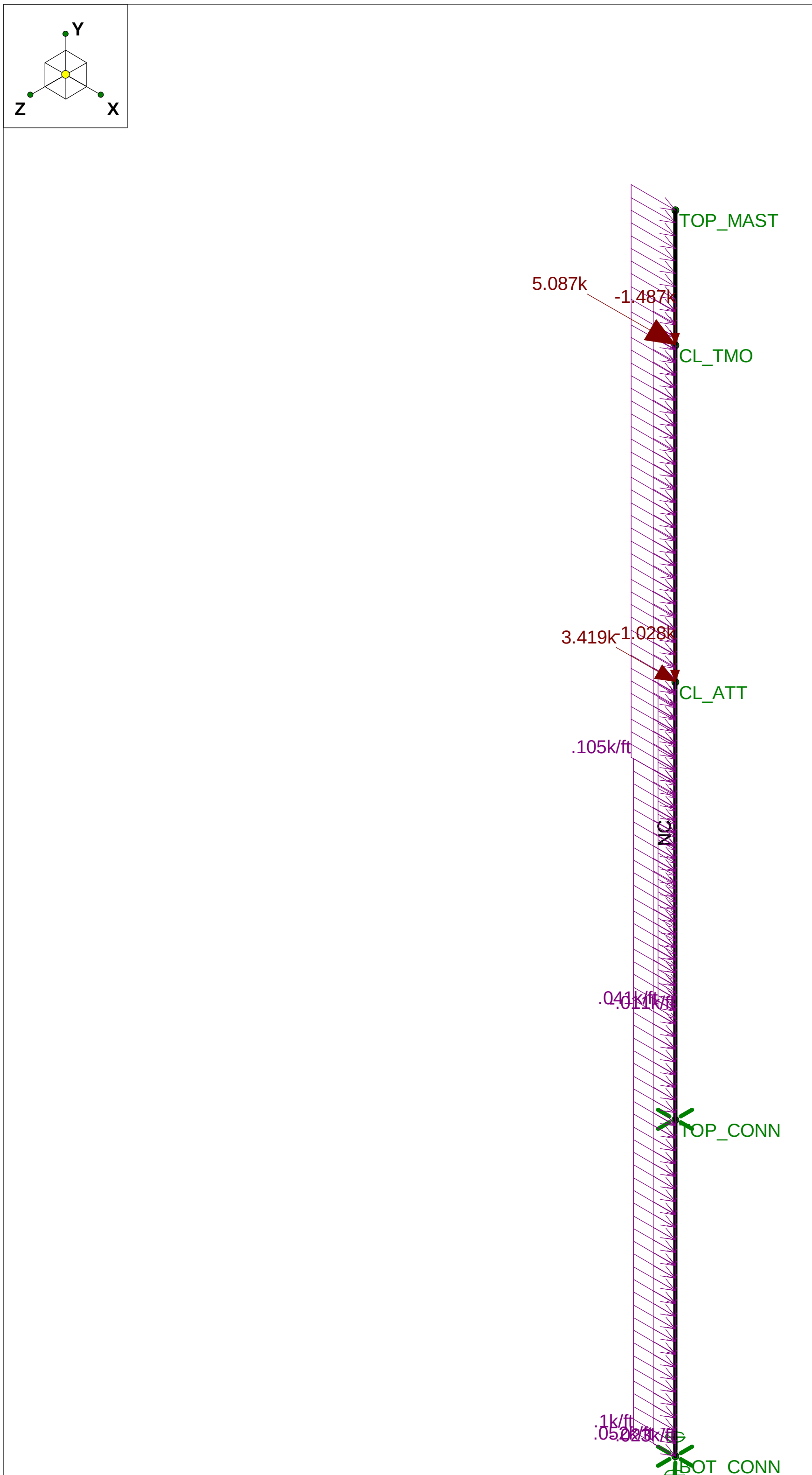
Member Code Checks Displayed
Loads: LC 1, 1.2D + 1.0W

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Nov 2, 2022 at 8:46 PM
21005.40 /T-Mobile CTFF8...	LC #1 Loads	TIA Loads.r3d



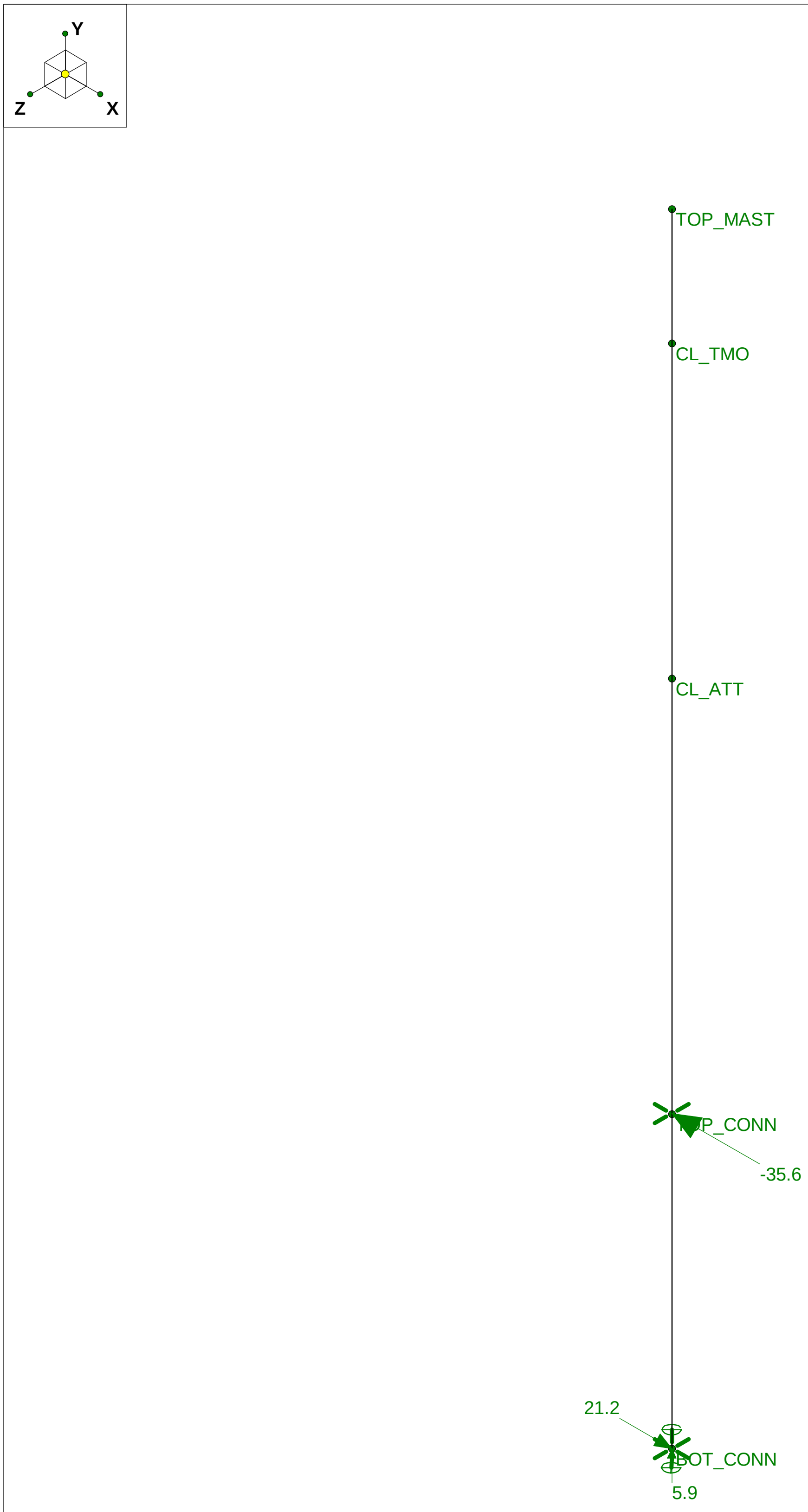
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Nov 2, 2022 at 8:47 PM
21005.40 /T-Mobile CTFF8...	LC #1 Reactions	TIA Loads.r3d



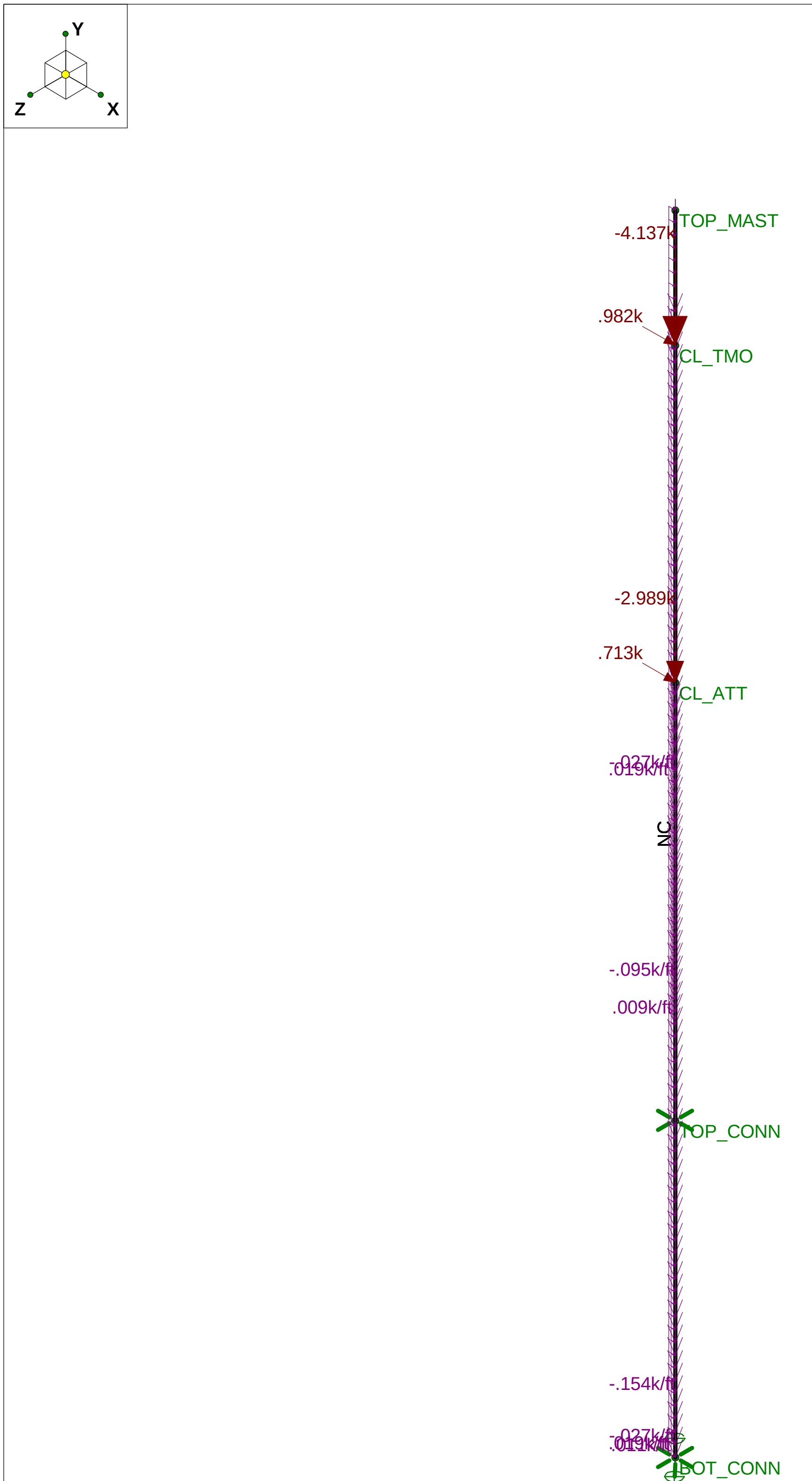
Member Code Checks Displayed
Loads: LC 2, 0.9D + 1.0W

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Nov 2, 2022 at 8:46 PM
21005.40 /T-Mobile CTFF8...	LC #2 Loads	TIA Loads.r3d



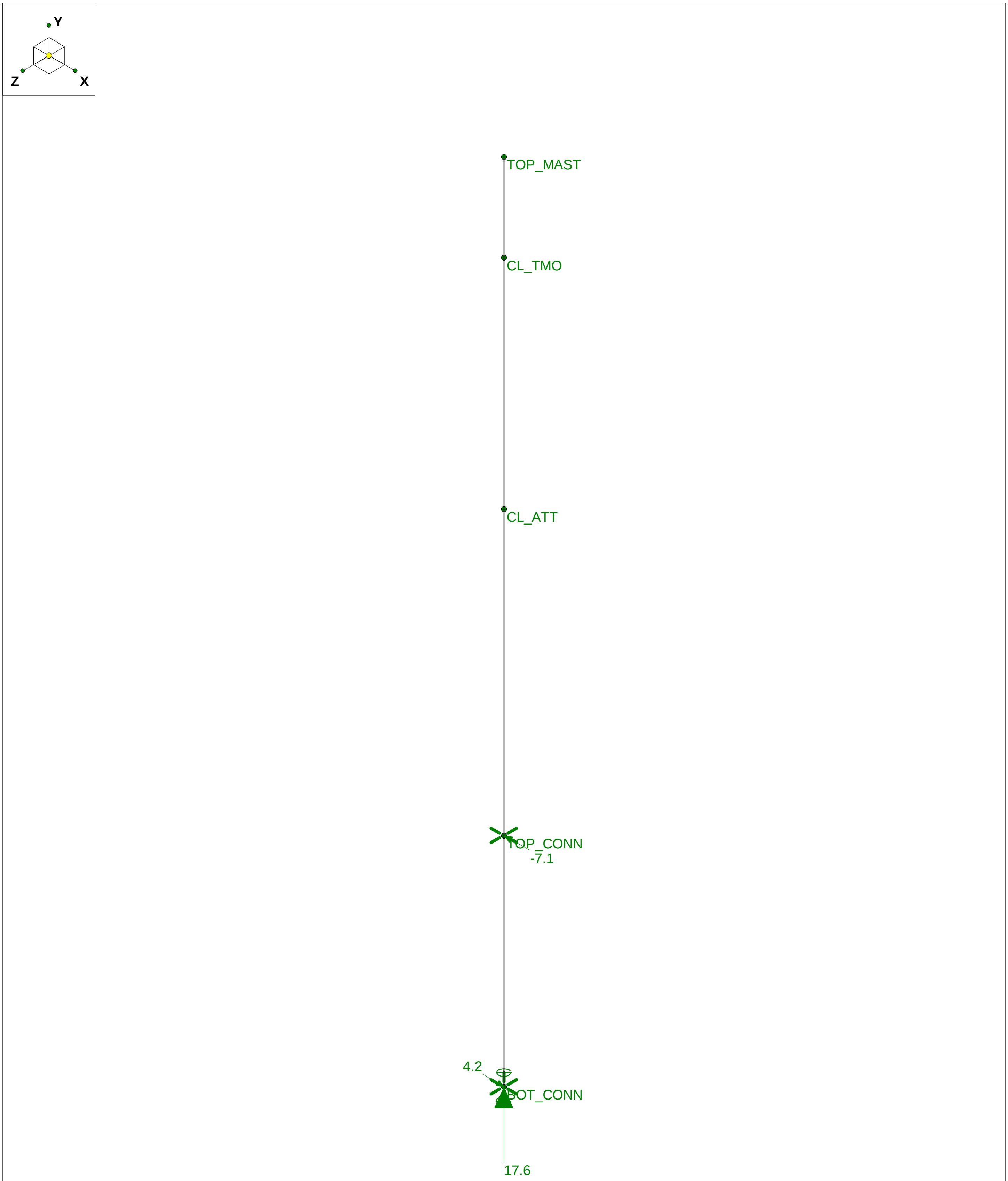
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Nov 2, 2022 at 8:48 PM
21005.40 /T-Mobile CTFF8...	LC #2 Reactions	TIA Loads.r3d



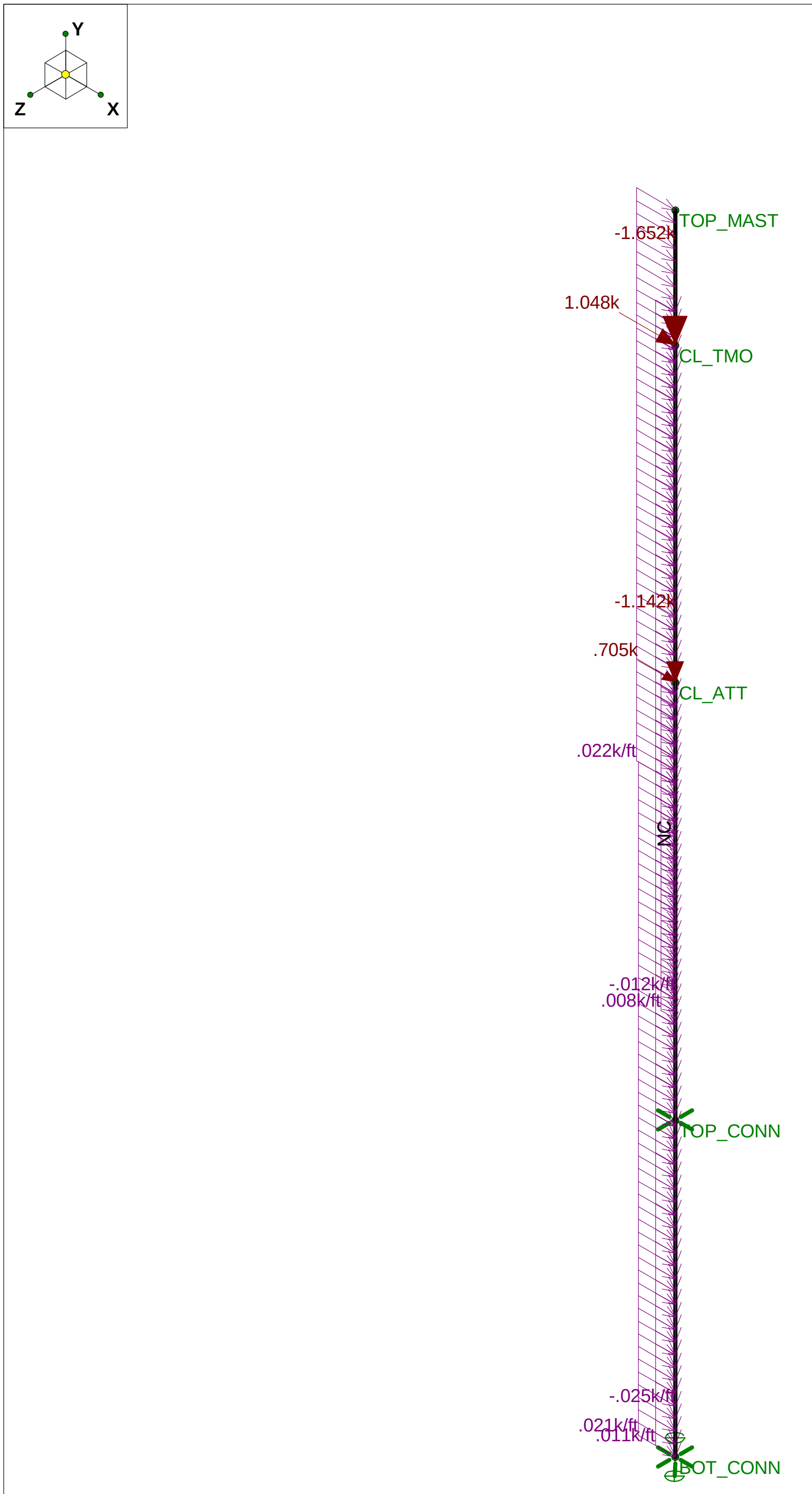
Member Code Checks Displayed
Loads: LC 3, 1.2D +1.0Di + 1.0Wi

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Nov 2, 2022 at 8:46 PM
21005.40 /T-Mobile CTFF8...	LC #3 Loads	TIA Loads.r3d



Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Nov 2, 2022 at 8:49 PM
21005.40 /T-Mobile CTFF8...	LC #3 Reactions	TIA Loads.r3d

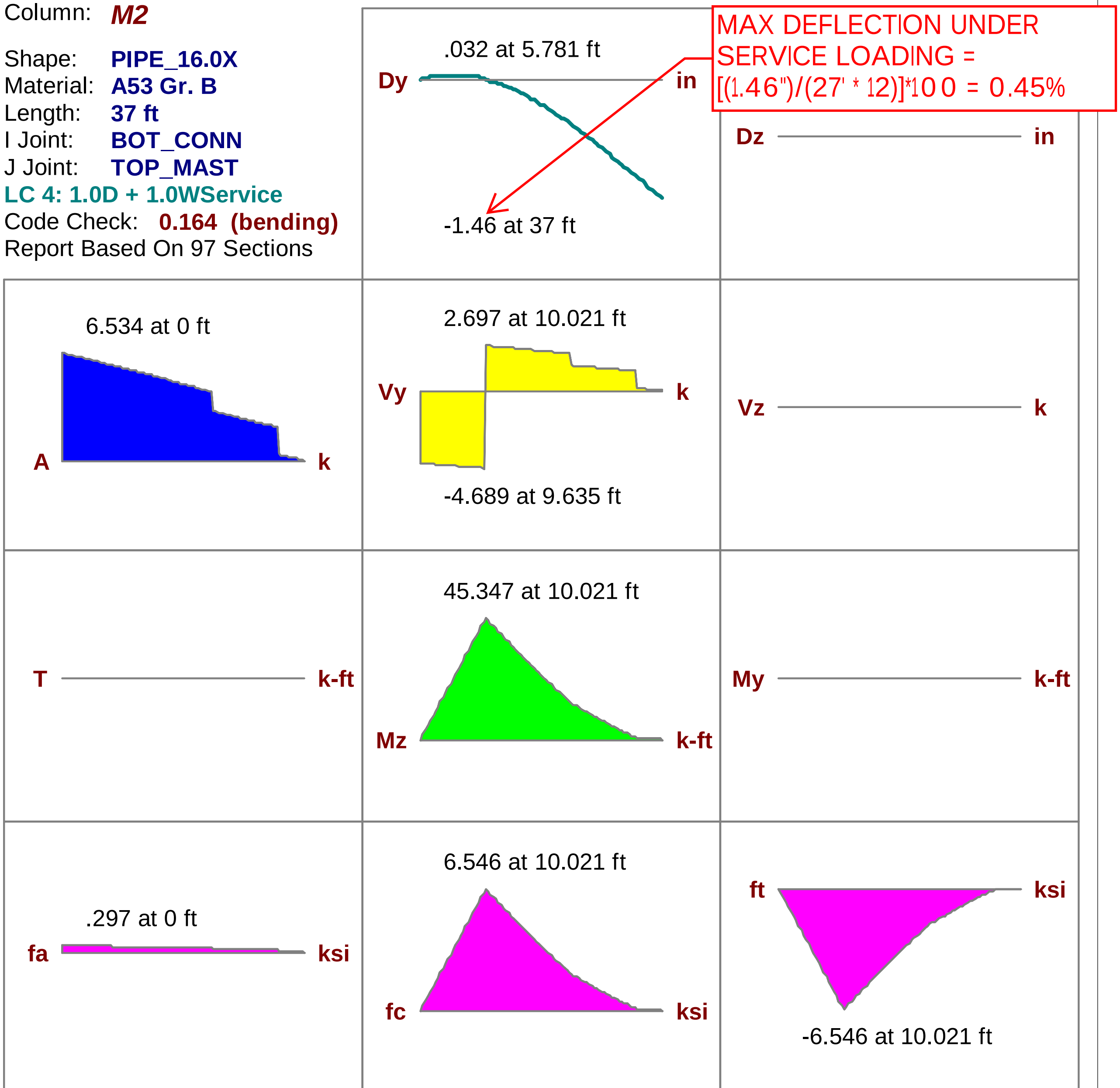


Member Code Checks Displayed
Loads: LC 4, 1.0D + 1.0WService

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Nov 2, 2022 at 8:46 PM
21005.40 /T-Mobile CTFF8...	LC #4 Loads	TIA Loads.r3d

Column: *M2*

Shape: **PIPE_16.0X**
Material: **A53 Gr. B**
Length: **37 ft**
I Joint: **BOT_CONN**
J Joint: **TOP_MAST**
LC 4: 1.0D + 1.0WService
Code Check: **0.164 (bending)**
Report Based On 97 Sections



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

Direct Analysis Method

Max Bending Check	**0.164**	Max Shear Check	**0.023 (s)**
Location	**10.021 ft**	Location	**9.635 ft**
Equation	**H1-1b**	Max Defl Ratio	**L/304**
Bending	**Compact**	Compression	**Non-Slender**

			y-y	z-z
Fy	**35 ksi**	Lb	**37 ft**	**37 ft**
phi*Pnc	**496.325 k**	KL/r	**80.758**	**80.758**
phi*Pnt	**693 k**			
phi*Mny	**286.125 k-ft**	L Comp Flange	**37 ft**	
phi*Mnz	**286.125 k-ft**	L-torque	**37 ft**	
phi*Vny	**207.9 k**	Tau_b	**1**	
phi*Vnz	**207.9 k**			
phi*Tn	**277.636 k-ft**			
Cb	**1.6**			

Mast Top Connection:

Maximum Design Reactions at Brace:

Vertical =	$Vert := 0 \cdot kips$	(User Input)
Horizontal =	$Horz := 35.7 \cdot kips$	(User Input)
Moment =	$Moment := 0$	(User Input)

Bolt Data:

Bolt Grade =	A325	(User Input)
Number of Bolts =	$n_b := 6$	(User Input)
Bolt Diameter =	$d_b := 0.75in$	(User Input)
Nominal Tensile Strength =	$F_{nt} := 90 \cdot ksi$	(User Input)
Nominal Shear Strength =	$F_{nv} := 54 \cdot ksi$	(User Input)
Resistance Factor =	$\phi := 0.75$	(User Input)
Bolt Eccentricity from C.L. Mast =	$e := 22.5 \cdot in$	(User Input)
Vetical Spacing Between Top and Bottom Bolts =	$S_{vert} := 9 \cdot in$	(User Input)
Horizontal Spacing Between Bolts =	$S_{horz} := 24.375 \cdot in$	(User Input)

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

Check Bolt Stresses:

Wind Acting Parallel to Stiffiner Plate:

Shear Stress per Bolt = $f_v := \frac{Vert}{n_b \cdot a_b} = 0 \cdot ksi$

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

Condition1 = "OK"

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

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

Tension Force Each Bolt = $F_{tension.bolt} := \frac{Horz}{n_b} + \frac{Vert \cdot e}{S_{vert} \cdot 2} = 5.95 \cdot kips$

Tension Stress Each Bolt = $f_t := \frac{F_{tension.bolt}}{a_b} = 13.5 \cdot ksi$

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

Condition2 = "OK"

$\frac{f_t}{(\phi \cdot F'_{nt})} = 20 \cdot \%$

Wind Acting Perpendicular to Stiffiner Plate:

Shear Stress per Bolt = $f_v := \frac{\sqrt{Vert^2 + Horz^2}}{n_b \cdot a_b} = 13.468 \cdot ksi$

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

Condition3 = "OK"

$\frac{f_v}{(\phi \cdot F_{nv})} = 33.3 \cdot \%$

Tensile Stress Adjusted for Shear = $F'_{nt} := \begin{cases} \left(1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v\right) & \text{if } 1.3 \cdot F_{nt} - \frac{F_{nt}}{\phi \cdot F_{nv}} \cdot f_v \le F_{nt} \\ F_{nt} & \text{otherwise} \end{cases} = 87.07 \cdot ksi$

Tension Force per Bolt = $F_{tension.conn} := \frac{Horz \cdot e}{S_{horz} \cdot \frac{n_b}{2}} + \frac{Vert \cdot e}{S_{vert} \cdot 2} = 10.985 \cdot kips$

Tension Stress Each Bolt = $f_t := \frac{F_{tension.conn}}{a_b} = 24.864 \cdot ksi$

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

Condition4 = "OK"

$\frac{f_t}{(\phi \cdot F'_{nt})} = 38.1 \cdot \%$

Mast Connection to Bottom Bracket:

Design Reactions at Brace:

Axial (Max) =	$Axial_{max} := 17.6 \cdot kips$	(User Input)
Axial (Min) =	$Axial_{min} := 7.8 \cdot kips$	(User Input - LC # 1)
Horz =	$Horz := 21.2 \cdot kips$	(User Input)
Moment =	$Moment := 0 \cdot kips \cdot ft$	(User Input)

Resistance Factors:

Yielding Factor =	$\phi_t := 0.9$	(User Input)
Rupture Factor =	$\phi_r := 0.75$	(User Input)
Shear Factor =	$\phi_v := 0.9$	(User Input)

Bolt Data:

Bolt Type =	ASTM F1554-105 Rod	(User Input)
Bolt Diameter =	$D := 0.625 \cdot in$	(User Input)
Number of Bolts =	$N_b := 1$	(User Input)
Tensile Stress =	$F_u := 125 \cdot ksi$	(User Input)
Nominal Shear Strength =	$F_{nv} := 0.45 \cdot F_u = 56.25 \cdot ksi$	(User Input)
Bolt Area =	$a_b := \frac{1}{4} \cdot \pi \cdot D^2 = 0.307 \cdot in^2$	
Design Shear Strength =	$F_v := 2 \cdot 0.75 \cdot F_{nv} \cdot a_b = 25.9 \cdot kips$	(User Input - Double Shear)
Distance from Seat Plate to Threaded Rod =	$dist := 3 \cdot in$	(User Input)

Check Bolt:

Shear Force = $f_v := \frac{Horz}{N_b} = 21.2 \cdot kips$

Check Bolt Shear = $Condition1 := if\left(\frac{f_v}{F_v} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

$\frac{f_v}{F_v} = 81.9 \cdot \%$

Check Bracket:

Yield Strength =	$F_y := 36 \cdot ksi$	(User Input)
Plate Height =	$Pl_h := 6 \cdot in$	(User Input)
Plate Thickness =	$Pl_t := 0.5 \cdot in$	(User Input)
Inside Box Plate Length =	$Pl_l := 16.25 \cdot in$	(User Input)
Number of Plates =	$n_{plt} := 4$	(User Input)
Plate Gross Area =	$A_g := Pl_l \cdot Pl_t = 8.125 \cdot in^2$	
Inside of Bracket Box Dimension =	$d_1 := 16.25 \cdot in$	(User Input)
Outside of Bracket Box Dimension =	$d_2 := d_1 + 2 \cdot Pl_t = 17.25 \cdot in$	
Section Modulus Bracket Assembly =	$S_x := \frac{(d_2)^4 - (d_1)^4}{6 \cdot (d_2)} = 181.8 \cdot in^3$	(User Input)
Design Bending Stress =	$F_b := 0.9 \cdot F_y = 32.4 \cdot ksi$	
Design Shear =	$V_n := \phi_v \cdot 0.6 \cdot F_y \cdot A_g = 157.95 \cdot kips$	
Local Moment =	$M_{minor} := Horz \cdot dist = 5.3 \cdot ft \cdot kips$	
Bending Stress =	$f_b := \frac{M_{minor}}{S_x} = 0.35 \cdot ksi$	
Max Shear =	$V_{max} := \frac{Horz}{n_{plt} \cdot 0.5} = 10.6 \cdot kips$	

$$Condition2 := if\left(\frac{f_b}{F_b} + \frac{V_{max}}{V_n} < 1, "OK", "Overstressed"\right)$$

Condition2 = "OK"

$$\frac{f_b}{F_b} + \frac{V_{max}}{V_n} = 7.8 \cdot \%$$

Weld Yield Stress =	$F_{yw} := 70 \cdot ksi$	(User Input)
Design Weld Stress =	$F_w := 0.45 \cdot F_{yw} = 31.5 \cdot ksi$	
Weld Size =	$sw := 0.25 \cdot in$	(User Input)
Weld Area =	$A_w := (d_2 + 2 \cdot 0.707 \cdot sw)^2 - d_2^2 = 12.321 \cdot in^2$	(User Input)
Section Modulus of Weld =	$S_x := \frac{(d_2 + 2 \cdot 0.707 \cdot sw)^4 - (d_2)^4}{6 \cdot (d_2 + 2 \cdot 0.707 \cdot sw)} = 70.859 \cdot in^3$	(User Input)
Weld Stress =	$f_w := \frac{M_{minor}}{S_x} + \frac{Horz}{A_w \cdot 0.5} = 4.34 \cdot ksi$	

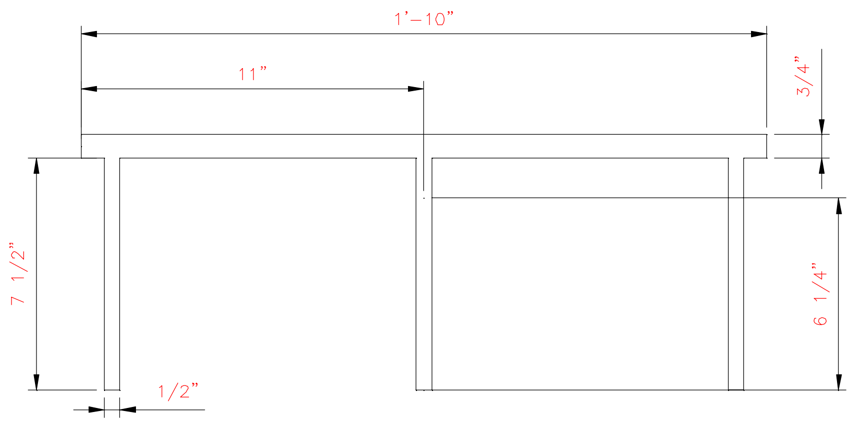
$$Condition3 := if(f_w < F_w, "OK", "Overstressed")$$

$$\frac{f_w}{F_w} = 13.8 \cdot \%$$

Condition3 = "OK"

Gusset Plate Data:

Yield Strength =	$F_y := 36 \cdot ksi$	(User Input)
Tensile Strength =	$F_u := 58 \cdot ksi$	(User Input)
Plate Height =	$Pl_h := 7.5 \cdot in$	(User Input)
Plate Thickness =	$Pl_t := 0.5 \cdot in$	(User Input)
Number of Plates =	$n_{plt} := 3$	(User Input)
Distance from CL Pole to Face of Collar =	$d := 10.5 \cdot in$	(User Input)
Section Modulus Gusset Assembly =	$S_x := \frac{167.3}{6.25} \cdot in^3 = 26.768 \cdot in^3$	(User Input)
Dist Between Outter 2 Gusset Plates =	$d_{plt} := 20 \cdot in$	(User Input)
Vertical Distance from Bot of Mast to Center of Bracket =	$S_{vert} := 7.25 \cdot in$	(User Input)



Area: 27.75000 in^2
Principal moments about centroid:
I: 167.32855 in^4
J: 1415.73438

Plate Gross Area =	$A_g := Pl_h \cdot Pl_t = 3.75 \cdot in^2$
Effective Net Area =	$A_{en} := A_g = 3.75 \cdot in^2$
Tensile Yielding =	$P_{at} := \phi_t \cdot F_y \cdot A_g = 121.5 \cdot kips$
Tensile Rupture =	$P_{ar} := \phi_r \cdot F_u \cdot A_{en} = 163.125 \cdot kips$
Design Tension =	$Pa := \min(P_{at}, P_{ar}) = 121.5 \cdot kips$
Design Shear =	$V_n := \phi_v \cdot 0.6 \cdot F_y \cdot A_g = 72.9 \cdot kips$
Design Bending Stress =	$F_b := 0.9 \cdot F_y = 32.4 \cdot ksi$

Wind Acting Parallel to Stiffiner Plates:

Moment Parallel = $M_{par} := Moment + Axial_{max} \cdot d + M_{minor} + Horz \cdot S_{vert} = 402.1 \cdot in \cdot kips$

Bending Stress = $f_b := \frac{M_{par}}{S_x} = 15.02 \cdot ksi$

Max Tension = $T_{max} := \frac{Horz}{n_{plt}} = 7.067 \cdot kips$

Max Shear = $V_{max} := \frac{Axial_{max}}{n_{plt}} = 5.867 \cdot kips$

$\frac{f_b}{F_b} + \frac{T_{max}}{Pa} + \frac{V_{max}}{V_n} = 60.2 \cdot \%$

$Condition4 := if\left(\frac{f_b}{F_b} + \frac{T_{max}}{Pa} + \frac{V_{max}}{V_n} < 1, \text{"OK"}, \text{"Overstressed"}\right)$

Condition4 = "OK"

Wind Acting Perpendicular to Stiffiner Plates:

Moment Parallel = $M_{par} := Axial_{max} \cdot d = 184.8 \cdot in \cdot kips$

Moment **Perpendicular** = $M_{perp} := Horz \cdot d = 222.6 \cdot in \cdot kips$

Bending Stress = $f_b := \frac{M_{par}}{S_x} = 6.9 \cdot ksi$

Max Tension = $T_{max} := \frac{M_{perp}}{d_{plt}} = 11.13 \cdot kips$

Max Shear = $V_{max} := \frac{Axial_{max} + Horz}{n_{plt}} + \frac{Moment + M_{minor} + Horz \cdot S_{vert}}{d_{plt}} = 23.798 \cdot kips$

$Condition5 := if\left(\frac{f_b}{F_b} + \frac{T_{max}}{Pa} + \frac{V_{max}}{V_n} < 1, \text{"OK"}, \text{"Overstressed"}\right)$

Condition5 = "OK"

$\frac{f_b}{F_b} + \frac{T_{max}}{Pa} + \frac{V_{max}}{V_n} = 63.1 \cdot \%$

Weld Data:

Weld Yield Stress = $F_{yw} := 70 \cdot ksi$ (User Input)

Design Weld Stress = $F_w := 0.45 \cdot F_{yw} = 31.5 \cdot ksi$

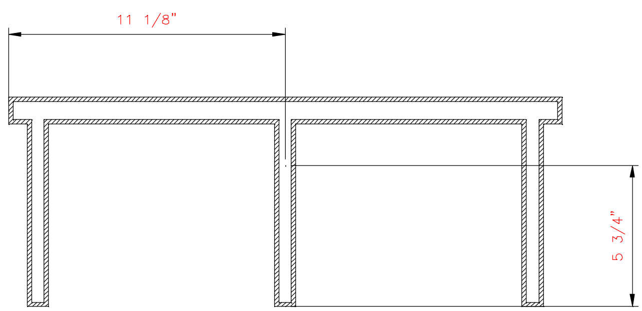
Weld Size = $sw := 0.25 \cdot in$ (User Input)

Weld Area = $A_w := 16.12 \cdot in^2$ (User Input)

Section Modulus of Weld = $S_x := \frac{121.8}{5.75} \cdot in^3 = 21.2 \cdot in^3$ (User Input)

Section Modulus of Weld = $S_z := \frac{892.8}{11.125} \cdot in^3 = 80.3 \cdot in^3$ (User Input)

Weld Area of 1 Gusset = $A_{w1} := 2.8 \cdot in^2$ (User Input)



Area: 16.12084 in^2
Principal moments about centroid:
I: 121.64930 in^4
J: 892.81677 in^4

Wind Acting Parallel to Stiffiner Plates:

Moment Parallel = $M_{par} := Moment + Axial_{max} \cdot d + M_{minor} + Horz \cdot S_{vert} = 402.1 \cdot in \cdot kips$

Weld Stress = $f_w := \frac{M_{par}}{S_x} + \frac{Axial_{max} + Horz}{A_w} = 21.39 \cdot ksi$

Condition6 := if($f_w < F_w$, "OK", "Overstressed")

Condition6 = "OK" $\frac{f_w}{F_w} = 67.9 \cdot \%$

Wind Acting Perpendicular to Stiffiner Plates:

Moment Parallel = $M_{par} := Axial_{max} \cdot d = 184.8 \cdot in \cdot kips$

Moment **Perpendicular** = $M_{perp} := Horz \cdot d = 222.6 \cdot in \cdot kips$

Weld Stress = $f_w := \frac{M_{par}}{S_x} + \frac{M_{perp}}{S_z} + \frac{Axial_{max} + Horz}{A_w} + \frac{Moment + M_{minor} + Horz \cdot S_{vert}}{(d_{plt} \cdot A_{w1})} = 17.79 \cdot ksi$

Condition7 := if($f_w < F_w$, "OK", "Overstressed")

Condition7 = "OK" $\frac{f_w}{F_w} = 56.5 \cdot \%$

Mast Bottom Connection:

Maximum Design Reactions at Brace:

Vertical =	$Vert := 17.6 \cdot kips$	(User Input)
Horizontal =	$Horz := 21.2 \cdot kips$	(User Input)
Moment =	$Moment := 0 \cdot ft \cdot kips$	(User Input)

Bolt Data:

Bolt Grade =	A325	(User Input)
Number of Bolts =	$n_b := 8$	(User Input)
Bolt Diameter =	$d_b := 0.75in$	(User Input)
Nominal Tensile Strength =	$F_{nt} := 90 \cdot ksi$	(User Input)
Nominal Shear Strength =	$F_{nv} := 54 \cdot ksi$	(User Input)
Resistance Factor =	$\phi := 0.75$	(User Input)
Bolt Eccentricity from C.L. Mast =	$e := 22.5 \cdot in$	(User Input)
Horizontal Spacing Between Bolts =	$S_{horz} := 27 \cdot in$	(User Input)
Vertical Distance from Rod to Center of Bracket =	$S_{vert} := 7.25 \cdot in$	(User Input)
Vetical Spacing From Plate CL to Bolt 1 =	$d_1 := 2 \cdot in$	(User Input)
Vetical Spacing From Plate CL to Bolt 2 =	$d_2 := 6 \cdot in$	(User Input)
Bolt Polar Moment of Inertia =	$I_p := 4 \cdot (d_1)^2 + 4 \cdot (d_2)^2 = 160 \cdot in^2$	
Bolt Area =	$a_b := \frac{1}{4} \cdot \pi \cdot d_b^{\ 2} = 0.442 \cdot in^2$	

Check Bolt Stresses:

Wind Acting Parallel to Stiffener Plate:

Shear Stress per Bolt = $f_v := \frac{Vert}{n_b \cdot a_b} = 4.98 \cdot ksi$

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

Condition1 = "OK"

$\frac{f_v}{(\phi \cdot F_{nv})} = 12.3 \cdot \%$

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

Tension Force Each Bolt = $F_{tension.bolt} := \frac{Horz}{n_b} + \frac{(Vert \cdot e + Moment + Horz \cdot S_{vert}) \cdot d_2}{I_p} = 23.3 \cdot kips$

Tension Stress Each Bolt = $f_t := \frac{F_{tension.bolt}}{a_b} = 52.7 \cdot ksi$

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

Condition2 = "OK"

$\frac{f_t}{(\phi \cdot F'_{nt})} = 78 \cdot \%$

Wind Acting Perpendicular to Stiffener Plate:

Shear Stress per Bolt = $f_v := \sqrt{\left[\frac{Vert}{n_b \cdot a_b} + \frac{(Moment + Horz \cdot S_{vert}) \cdot 2}{S_{horz} \cdot n_b \cdot a_b}\right]^2 + \left(\frac{Horz}{n_b \cdot a_b}\right)^2} = 10.161 \cdot ksi$

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

Condition3 = "OK"

$\frac{f_v}{(\phi \cdot F_{nv})} = 25.1 \cdot \%$

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

Tension Force per Bolt = $F_{tension.conn} := \frac{Horz \cdot e}{S_{horz} \cdot \frac{n_b}{2}} + \frac{Vert \cdot e \cdot d_2}{I_p} = 19.267 \cdot kips$

Tension Stress Each Bolt = $f_t := \frac{F_{tension.conn}}{a_b} = 43.611 \cdot ksi$

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

Condition4 = "OK"

$\frac{f_t}{(\phi \cdot F'_{nt})} = 64.6 \cdot \%$

Basic Components

Heavy Wind Pressure =	$p := 4.00$	psf	(User Input NESC 2017 Figure 250-1 & Table 250-1)
Basic Windspeed =	$V := 100$	mph	(User Input NESC 2017 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 PCS Mast Above Grade =	$TME := 114$	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 2017 Table 250-3 equation)
Importance Factor =	$I := 1.0$		(User Input from NESC 2017 Section 250.C.2)

Velocity Pressure Coefficient = $Kz := 2.01 \cdot \left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.301$ (NESC 2017 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TME)}\right]^{\frac{1}{7}} = 0.307$ (NESC 2017 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220}\right)} = 0.837$ (NESC 2017 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.86$ (NESC 2017 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 28.6$ psf (NESC 2017 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 Coax Cables Attached to Outside of Pole =	$Cd_{coax} := 1.6$	(User Input)

Overload Factors

Eversource Design Criteria Table

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 PCS Mast

Existing Upper PCS Mast Data: (Pipe 16 Sch. 80)

Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 16$	in	(User Input)
Mast Length =	$L_{mast} := 37$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.5$	in	(User Input)

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 = $Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + Ir \cdot 2\right)^2 - D_{mast}^{\,2}\right] = 25.9$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 10$ plf **BLC 3**

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{\left(D_{mast} + 2 \cdot Ir\right)}{12} = 1.417$ sf/ft

Total Mast Wind Force w/ Ice = $p \cdot Cd_{coax} \cdot AICE_{mast} = 9$ plf **BLC 4**

Wind Load (NESC Extreme)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 1.333$ sf/ft

Total Mast Wind Force (Above Structure) = $qz \cdot Cd_{coax} \cdot A_{mast} \cdot m = 76$ plf **BLC 5**

Total Mast Wind Force (Below Structure) = $qz \cdot Cd_{coax} \cdot A_{mast} = 61$ plf **BLC 5**

Development of Wind & Ice Load on Antennas

Antenna Data: (T-Mobile)

Antenna Model = RFS APXVAALL24_43

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 95.9$ in (User Input)

Antenna Width = $W_{ant} := 24$ in (User Input)

Antenna Thickness = $T_{ant} := 8.5$ in (User Input)

Antenna Weight = $WT_{ant} := 150$ lbs (User Input)

Number of Antennas = $N_{ant} := 3$ (User Input)

Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant1} := WT_{ant} \cdot N_{ant} = 450$ lbs

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \times 10^{4}$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 3450$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 112$ lbs

Weight of Ice on All Antennas = $Wt_{ice.ant1} := W_{ICEant} \cdot N_{ant} = 335$ lbs

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 16.8$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 50.5$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant1} := p \cdot Cd_F \cdot A_{ICEant} = 323$ lbs

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 16$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 48$ sf

Total Antenna Wind Force = $F_{ant1} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 2746$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data: (T-Mobile)

Antenna Model = Commscope VV-65A-R1

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 54.724$ in (User Input)

Antenna Width = $W_{ant} := 12.087$ in (User Input)

Antenna Thickness = $T_{ant} := 4.646$ in (User Input)

Antenna Weight = $WT_{ant} := 30$ lbs (User Input)

Number of Antennas = $N_{ant} := 3$ (User Input)

Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant2} := WT_{ant} \cdot N_{ant} = 90$ lbs

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3073$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 1044$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 34$ lbs

Weight of Ice on All Antennas = $Wt_{ice.ant2} := W_{ICEant} \cdot N_{ant} = 102$ lbs

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 5.1$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 15.2$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant2} := p \cdot Cd_F \cdot A_{ICEant} = 97$ lbs

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.6$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 13.8$ sf

Total Antenna Wind Force = $F_{ant2} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 789$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data: (T-Mobile)

Antenna Model = ATSBT-TOP-FM4G 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 = $T_{ant} := 2.0$ in (User Input)

Antenna Weight = $WT_{ant} := 2$ lbs (User Input)

Number of Antennas = $N_{ant} := 6$ (User Input)

Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant3} := WT_{ant} \cdot N_{ant} = 12$ lbs

Gravity Load (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 = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 52$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 2$ lbs

Weight of Ice on All Antennas = $Wt_{ice.ant3} := W_{ICEant} \cdot N_{ant} = 10$ lbs

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 0.2$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 1.3$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant3} := p \cdot Cd_F \cdot A_{ICEant} = 8$ lbs

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

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

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 0.9$ sf

Total Antenna Wind Force = $F_{ant3} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 50$ lbs

Development of Wind & Ice Load on Mounts

Mount Data: (T-Mobile)

Mount Type = SitePro RDS-296 - Double SupportArm x2

Mount Shape = Flat (User Input)

Mount Area = $CdA_{mnt} := 13.9$ sq ft (User Input)

Mount Area w/ Ice = $CdA_{ICEmnt} := 18.1$ sq ft (User Input)

Mount Weight = $WT_{mnt} := 1100$ lbs (User Input)

Mount Weight w/ Ice = $WT_{ICEmnt} := 1250$ lbs (User Input)

Gravity Load (without ice)

Weight of Mount = $WT_{mnt} = 1100$ lbs **BLC 2**

Gravity Load (ice only)

Weight of Ice on Mount = $WT_{ICEmnt} - WT_{mnt} = 150$ lbs **BLC 3**

Wind Load (NESC Heavy)

Total Mount Wind Force w/ Ice = $Fi_{mnt} := p \cdot Cd_F \cdot CdA_{ICEmnt} = 116$ lbs **BLC 4**

Wind Load (NESC Extreme)

Total Mount Wind Force = $F_{mnt} := qz \cdot Cd_F \cdot CdA_{mnt} \cdot m = 796$ lbs **BLC 5**

Total Pipe Length = $TPL := 8 \cdot ft \cdot 6 = 48\,ft$

Total Antenna Length = $TAL := 96 \cdot in \cdot 3 + 54.7 \cdot in \cdot 3 = 37.675\,ft$

Exposed Pipe Area = $ExPA := (TPL - TAL)2.375 \cdot in = 2.043\,ft^2$

CaAa = $1.3 \cdot ExPA + (3.5 \cdot in) \cdot 48 \cdot in \cdot 6 \cdot 1.3 + 4 \cdot in \cdot 8 \cdot in \cdot 6 \cdot 1.6 = 13.89\,ft^2$

Exposed Pipe Area (with Ice) = $ExPA := (TPL - TAL)3.375 \cdot in = 2.904\,ft^2$

CaAa (with ice) = $1.3 \cdot ExPA + (4.5 \cdot in) \cdot 48 \cdot in \cdot 6 \cdot 1.3 + 5 \cdot in \cdot 8 \cdot in \cdot 6 \cdot 1.6 = 18.1\,ft^2$

$463 \cdot lb \cdot 2 + 175 \cdot lb = 1101\,lb$

$$\frac{\pi}{4}\left[(3.375 \cdot in)^2 - (2.375 \cdot in)^2\right] \cdot 96 \cdot in \cdot 6 \cdot (Id \cdot pcf) + \frac{\pi}{4}\left[(4.5 \cdot in)^2 - (3.5 \cdot in)^2\right] \cdot 48 \cdot in \cdot 6 \cdot (Id \cdot pcf) = 142.942\,lbf$$

Development of Wind & Ice Load on Antennas

Existing Antenna Data: (AT&T)

Antenna Model = Powerwave 7770.00

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 55$ in (User Input)

Antenna Width = $W_{ant} := 11.0$ in (User Input)

Antenna Thickness = $T_{ant} := 5$ in (User Input)

Antenna Weight = $WT_{ant} := 39$ lbs (User Input)

Number of Antennas = $N_{ant} := 3$ (User Input)

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 117$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3025$ cu in

Volume of Ice on Each Antenna = $V_{ice} := \left(L_{ant} + 1\right)\left(W_{ant} + 1\right) \cdot \left(T_{ant} + 1\right) - V_{ant} = 1007$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 33$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 98$ lbs **BLC 3**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{\left(L_{ant} + 1\right) \cdot \left(W_{ant} + 1\right)}{144} = 4.7$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 14$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 90$ lbs **BLC 4**

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.2$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 12.6$ sf

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 722$ lbs **BLC 5**

Development of Wind & Ice Load on Antennas

Proposed Antenna Data: (AT&T)

Antenna Model =	CCI OPA-65R-LCUU-H6		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72$	in	(User Input)
Antenna Width =	$W_{ant} := 14.8$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.4$	in	(User Input)
Antenna Weight =	$WT_{ant} := 75$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 225$	lbs	**BLC 2**

Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 7885$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := \left(L_{ant} + 1\right)\left(W_{ant} + 1\right)\cdot\left(T_{ant} + 1\right) - V_{ant} = 1803$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 58$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 175$	lbs	**BLC 3**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{\left(L_{ant} + 1\right)\cdot\left(W_{ant} + 1\right)}{144} = 8$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 24$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 154$	lbs	**BLC 4**

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 7.4$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 22.2$	sf	
Total Antenna Wind Force =	$F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 1271$	lbs	**BLC 5**

Development of Wind & Ice Load on TMA's

Existing TMA Data: (AT&T)

TMA Model = Powerwave LGP 21401

TMA Shape = Flat (User Input)

TMA Height = $L_{TMA} := 14.4$ in (User Input)

TMA Width = $W_{TMA} := 9.2$ in (User Input)

TMA Thickness = $T_{TMA} := 2.6$ in (User Input)

TMA Weight = $WT_{TMA} := 14.1$ lbs (User Input)

Number of TMA's = $N_{TMA} := 6$ (User Input)

Gravity Load (without ice)

Weight of All TMAs = $WT_{TMA} \cdot N_{TMA} = 85$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each TMAs = $V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 344$ cu in

Volume of Ice on Each TMAs = $V_{ice} := (L_{TMA} + 1)(W_{TMA} + 1) \cdot (T_{TMA} + 1) - V_{TMA} = 221$ cu in

Weight of Ice on Each TMAs = $W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 7$ lbs

Weight of Ice on All TMAs = $W_{ICETMA} \cdot N_{TMA} = 43$ lbs **BLC 3**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all TMAss Simultaneously

Surface Area for One TMAs w/ Ice = $SA_{ICETMA} := \frac{(L_{TMA} + 1) \cdot (W_{TMA} + 1)}{144} = 1.1$ sf

TMAs Projected Surface Area w/ Ice = $A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 6.5$ sf

Total TMAs Wind Force w/ Ice = $Fi_{TMA} := p \cdot Cd_F \cdot A_{ICETMA} = 42$ lbs **BLC 4**

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all TMAss Simultaneously

Surface Area for One TMAs = $SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.9$ sf

TMAs Projected Surface Area = $A_{TMA} := SA_{TMA} \cdot N_{TMA} = 5.5$ sf

Total TMAs Wind Force = $F_{TMA} := qz \cdot Cd_F \cdot A_{TMA} \cdot m = 316$ lbs **BLC 5**

Development of Wind & Ice Load on TMA's

Proposed TMA Data: (AT&T)

TMA Model = CCI DTMABP7819VG12A

TMA Shape = Flat (User Input)

TMA Height = $L_{TMA} := 10.63$ in (User Input)

TMA Width = $W_{TMA} := 11.02$ in (User Input)

TMA Thickness = $T_{TMA} := 3.78$ in (User Input)

TMA Weight = $WT_{TMA} := 20$ lbs (User Input)

Number of TMA's = $N_{TMA} := 6$ (User Input)

Gravity Load (without ice)

Weight of All TMAss = $WT_{TMA} \cdot N_{TMA} = 120$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each TMAs = $V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 443$ cu in

Volume of Ice on Each TMAs = $V_{ice} := (L_{TMA} + 1)(W_{TMA} + 1) \cdot (T_{TMA} + 1) - V_{TMA} = 225$ cu in

Weight of Ice on Each TMAs = $W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 7$ lbs

Weight of Ice on All TMAss = $W_{ICETMA} \cdot N_{TMA} = 44$ lbs **BLC 3**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all TMAss Simultaneously

Surface Area for One TMAs w/ Ice = $SA_{ICETMA} := \frac{(L_{TMA} + 1) \cdot (W_{TMA} + 1)}{144} = 1$ sf

TMAs Projected Surface Area w/ Ice = $A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 5.8$ sf

Total TMAs Wind Force w/ Ice = $Fi_{TMA} := p \cdot Cd_F \cdot A_{ICETMA} = 37$ lbs **BLC 4**

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all TMAss Simultaneously

Surface Area for One TMAs = $SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.8$ sf

TMAs Projected Surface Area = $A_{TMA} := SA_{TMA} \cdot N_{TMA} = 4.9$ sf

Total TMAs Wind Force = $F_{TMA} := qz \cdot Cd_F \cdot A_{TMA} \cdot m = 280$ lbs **BLC 5**

Development of Wind & Ice Load on Mounts

Mount Data: (AT&T)

Mount Type = SitePro RDS-272 - Double SupportArm

Mount Shape = Flat (User Input)

Mount Area = $CdA_{mnt} := 6.7$ sq ft (User Input)

Mount Area w/ Ice = $CdA_{ICEmnt} := 8.7$ sq ft (User Input)

Mount Weight = $WT_{mnt} := 595$ lbs (User Input)

Mount Weight w/ Ice = $WT_{ICEmnt} := 690$ lbs (User Input)

Gravity Load (without ice)

Weight of Mount = $WT_{mnt} = 595$ lbs **BLC 2**

Gravity Load (ice only)

Weight of Ice on Mount = $WT_{ICEmnt} - WT_{mnt} = 95$ lbs **BLC 3**

Wind Load (NESC Heavy)

Total Mount Wind Force w/ Ice = $Fi_{mnt} := p \cdot CdA_{ICEmnt} = 35$ lbs **BLC 4**

Wind Load (NESC Extreme)

Total Mount Wind Force = $F_{mnt} := qz \cdot CdA_{mnt} \cdot m = 240$ lbs **BLC 5**

Total Pipe Length = $TPL := 6 \cdot ft \cdot 6 = 36\,ft$

Total Antenna Length = $TAL := 55 \cdot in \cdot 3 + 72 \cdot in \cdot 3 = 31.75\,ft$

Exposed Pipe Area = $ExPA := (TPL - TAL)2.375 \cdot in = 0.841\,ft^2$

CaAa = $1.3 \cdot ExPA + (3.5 \cdot in) \cdot 48 \cdot in \cdot 3 \cdot 1.3 + 4 \cdot in \cdot 8 \cdot in \cdot 3 \cdot 1.6 = 6.71\,ft^2$

Exposed Pipe Area (with Ice) = $ExPA := (TPL - TAL)3.375 \cdot in = 1.195\,ft^2$

CaAa (with ice) = $1.3 \cdot ExPA + (4.5 \cdot in) \cdot 48 \cdot in \cdot 3 \cdot 1.3 + 5 \cdot in \cdot 8 \cdot in \cdot 3 \cdot 1.6 = 8.7\,ft^2$

$463 \cdot lb + 132 \cdot lb = 595\,lb$

$$\frac{\pi}{4}\left[(3.375 \cdot in)^2 - (2.375 \cdot in)^2\right] \cdot 72 \cdot in \cdot 6 \cdot (Id \cdot pcf) + \frac{\pi}{4}\left[(4.5 \cdot in)^2 - (3.5 \cdot in)^2\right] \cdot 48 \cdot in \cdot 3 \cdot (Id \cdot pcf) = 92.546\,lbf$$

Development of Wind & Ice Load on Coax Cables

Existing Coax Cable Data: (T-Mobile)

Coax Type =	HELIAX 1-5/8"		
Shape =	Round		(User Input)
Coax Outside Diameter =	$D_{coax} := 1.98$	in	(User Input)
Coax Cable Length =	$L_{coax} := 34$	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 PCS Mast =	$NP_{coax} := 4$		(User Input)

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 = $Ai_{coax} := \frac{\pi}{4}\left[\left(D_{coax} + 2 \cdot Ir\right)^2 - D_{coax}^{\ 2}\right] = 3.9$ sq in

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

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{\left(NP_{coax} \cdot D_{coax} + 2 \cdot Ir\right)}{12} = 0.7$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := p \cdot Cd_{coax} \cdot AICE_{coax} = 5$ plf **BLC 4**

Wind Load (NESC Extreme)

Coax projected surface area = $A_{coax} := \frac{\left(NP_{coax} D_{coax}\right)}{12} = 0.7$ sf/ft

Total Coax Wind Force (Above Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 38$ plf **BLC 5**

Total Coax Wind Force (Below Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} = 30$ plf **BLC 5**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data: (AT&T)

Coax Type = HELIAX 1-1/4"

Shape = Round (User Input)

Coax Outside Diameter = $D_{coax} := 1.55$ in (User Input)

Coax Cable Length = $L_{coax} := 10$ ft (User Input)

Weight of Coax per foot = $Wt_{coax} := 0.66$ plf (User Input)

Total Number of Coax = $N_{coax} := 18$ (User Input)

No. of Coax Projecting Outside Face of PCS Mast = $NP_{coax} := 4$ (User Input)

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 12$ plf **BLC 2**

Gravity Load (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[\left(D_{coax} + 2 \cdot Ir\right)^2 - D_{coax}^{\ 2}\right] = 3.2$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 23$ plf **BLC 3**

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{\left(NP_{coax} \cdot D_{coax} + 2 \cdot Ir\right)}{12} = 0.6$ sf/ft

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

Wind Load (NESC Extreme)

Coax projected surface area = $A_{coax} := \frac{\left(NP_{coax} D_{coax}\right)}{12} = 0.5$ sf/ft

Total Coax Wind Force (Above Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 30$ plf **BLC 5**

Total Coax Wind Force (Below Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} = 24$ plf **BLC 5**

(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)	12
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 9th: ASD
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 530-05: ASD
Aluminum Code	AA ADM1-05: 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 Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Mast	PIPE_16.0X	Column	Pipe	A53 Gr. B	Typical	22	665	665	1330

Hot Rolled Steel Design Parameters

	Label	Shape	Lengt...	Lbyy[ft]	Lbzz[ft]	Lcomp to...	Lcomp b...	Kyy	Kzz	Cm-yy	Cm-zz	Cb	y sway	z sway	Function
1	M2	Mast	37												Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
1	M2	BOT_C...	TOP_...			Mast	Column	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	BOT_CONN	0	0	0	0	
2	TOP_CONN	0	10	0	0	
3	TOP_MAST	0	37	0	0	
4	CL_TMO	0	33	0	0	
5	CL_ATT	0	23	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	BOT_CONN	Reaction	Reaction	Reaction		Reaction	
2	TOP_CONN	Reaction		Reaction			

Member Point Loads

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

Joint Loads and Enforced Displacements (BLC 2 : Weight of Appurtenances)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	CL_TMO	L	Y	-.45
2	CL_TMO	L	Y	-.09
3	CL_TMO	L	Y	-.012
4	CL_TMO	L	Y	-1.1
5	CL_ATT	L	Y	-.117
6	CL_ATT	L	Y	-.225
7	CL_ATT	L	Y	-.085
8	CL_ATT	L	Y	-.12
9	CL_ATT	L	Y	-.595

Joint Loads and Enforced Displacements (BLC 3 : Weight of Ice Only on PCS Struct)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	CL_TMO	L	Y	-.335

Joint Loads and Enforced Displacements (BLC 3 : Weight of Ice Only on PCS Struct) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
2	CL_TMO	L	Y	-.102
3	CL_TMO	L	Y	-.01
4	CL_TMO	L	Y	-.15
5	CL_ATT	L	Y	-.098
6	CL_ATT	L	Y	-.175
7	CL_ATT	L	Y	-.043
8	CL_ATT	L	Y	-.044
9	CL_ATT	L	Y	-.095

Joint Loads and Enforced Displacements (BLC 4 : NESC Heavy Wind on PCS Structure)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	CL_TMO	L	X	.323
2	CL_TMO	L	X	.097
3	CL_TMO	L	X	.008
4	CL_TMO	L	X	.116
5	CL_ATT	L	X	.09
6	CL_ATT	L	X	.154
7	CL_ATT	L	X	.042
8	CL_ATT	L	X	.037
9	CL_ATT	L	X	.035

Joint Loads and Enforced Displacements (BLC 5 : NESC Extreme Wind on PCS Structu)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	CL_TMO	L	X	2.746
2	CL_TMO	L	X	.789
3	CL_TMO	L	X	.05
4	CL_TMO	L	X	.796
5	CL_ATT	L	X	.722
6	CL_ATT	L	X	1.271
7	CL_ATT	L	X	.316
8	CL_ATT	L	X	.28
9	CL_ATT	L	X	.24

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
1	M2	Y	-.025	-.025	0	34
2	M2	Y	-.012	-.012	13	23

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
1	M2	Y	-.01	-.01	0	0
2	M2	Y	-.036	-.036	0	34
3	M2	Y	-.023	-.023	13	23

Member Distributed Loads (BLC 4 : NESC Heavy Wind on PCS Structure)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
1	M2	X	.009	.009	0	0
2	M2	X	.005	.005	0	34

Member Distributed Loads (BLC 4 : NESC Heavy Wind on PCS Structure) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
3	M2	X	.004	.004	13	23

Member Distributed Loads (BLC 5 : NESC Extreme Wind on PCS Structu)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
1	M2	X	.061	.061	0	13
2	M2	X	.076	.076	13	0
3	M2	X	.03	.03	0	13
4	M2	X	.038	.038	13	34
5	M2	X	.03	.03	13	23

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib...	Area(...	Surfa...
1	Self Weight (Mast)	None		-1						
2	Weight of Appurtenances	None				9		2		
3	Weight of Ice Only on PCS Struct	None				9		3		
4	NESC Heavy Wind on PCS Structure	None				9		3		
5	NESC Extreme Wind on PCS Structu	None				9		5		

Load Combinations

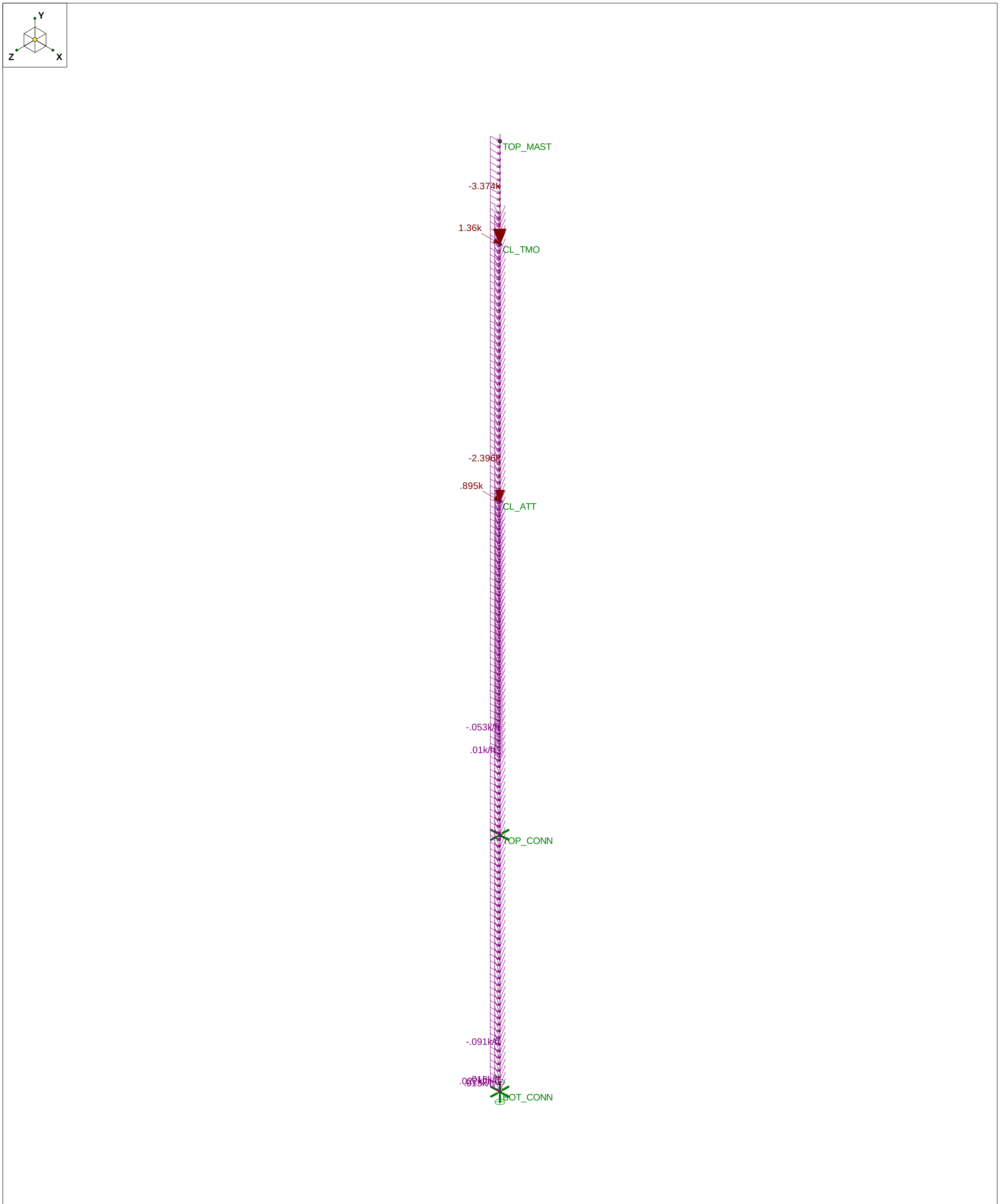
	Description	Sol...	PD...	SR...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
1	NESC He...	Yes			1	1.5	2	1.5	3	1.5	4	2.5												
2	NESC Ext...	Yes			1	1	2	1	5	1														
3	Self Weight				1	1																		

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOT_CONN	5.377	14.115	0	0	0	0
2	1	TOP_CONN	-8.989	0	0	0	0	0
3	1	Totals:	-3.613	14.115	0			
4	1	COG (ft):	X: 0	Y: 22.38	Z: 0			

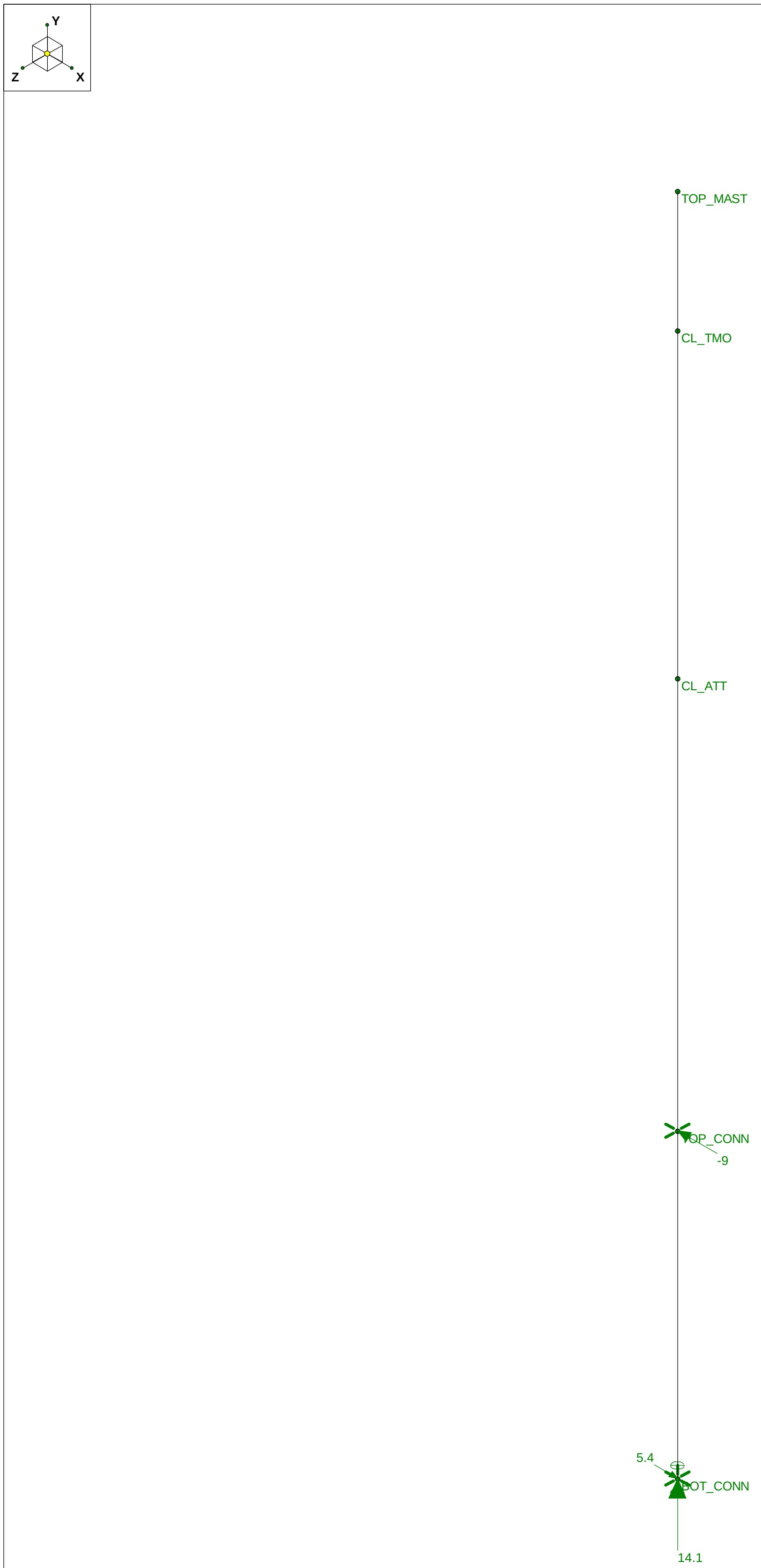
Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOT_CONN	17.393	6.534	0	0	0	0
2	2	TOP_CONN	-28.708	0	0	0	0	0
3	2	Totals:	-11.315	6.534	0			
4	2	COG (ft):	X: 0	Y: 22.748	Z: 0			



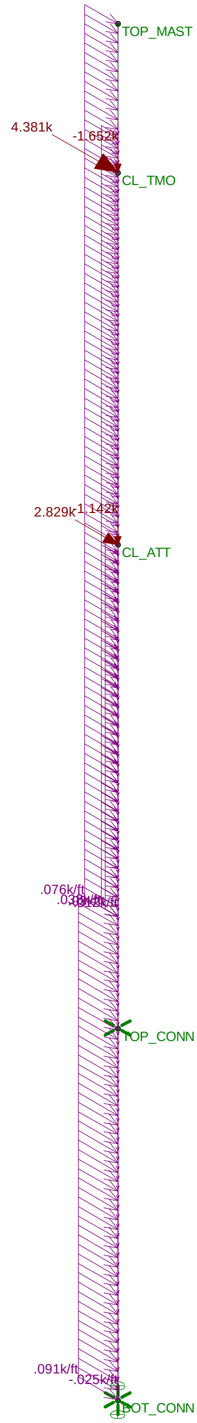
Loads: LC 1, NESC Heavy Wind on PCS Structure

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Sept 20, 2022 at 4:50 PM
21005.40 /T-Mobile CTFF8...	LC #1 Loads	NESC Loads.r3d



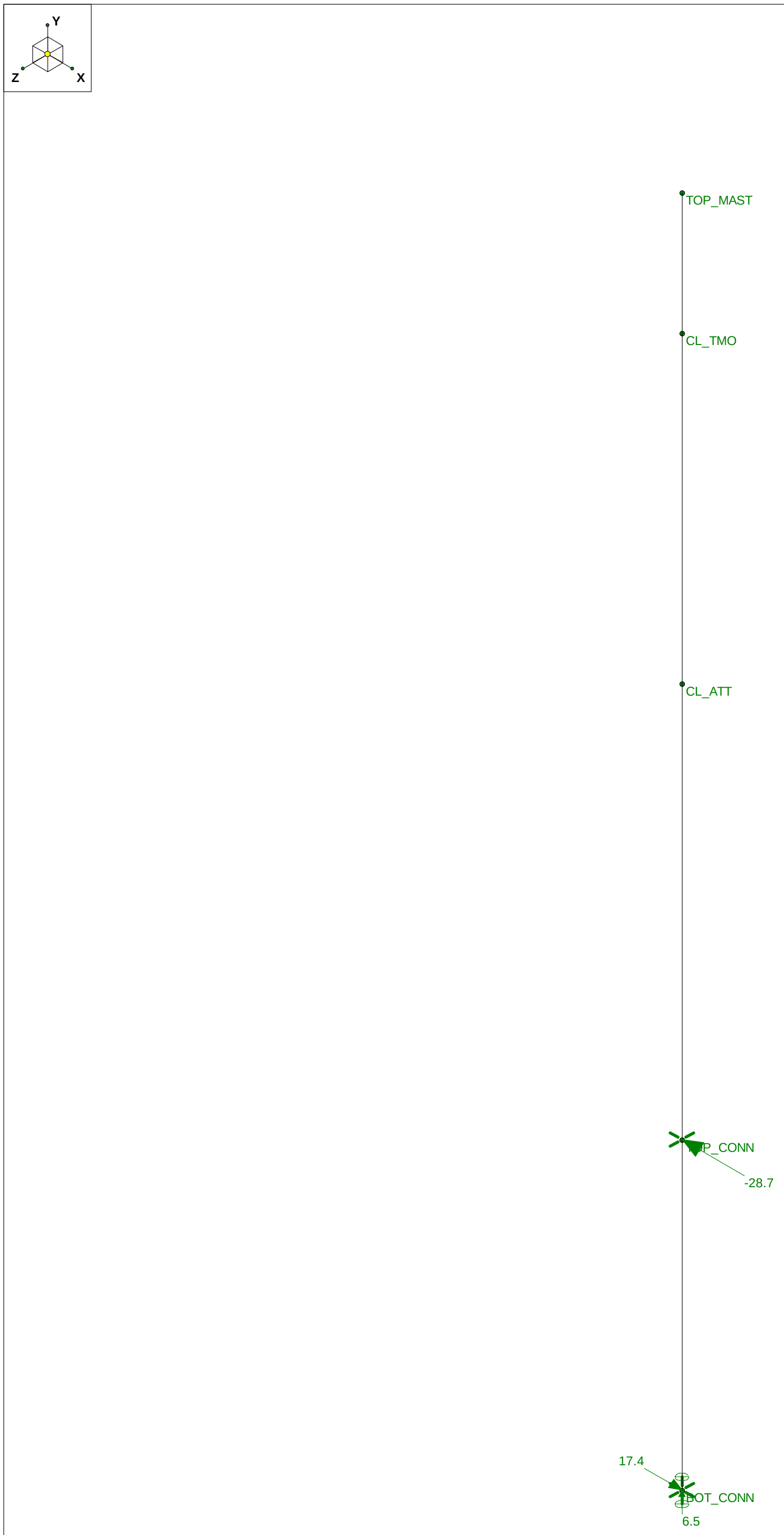
Results for LC 1, NESC Heavy Wind on PCS Structure
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Sept 20, 2022 at 4:50 PM
21005.40 /T-Mobile CTFF8...	LC #1 Reactions	NESC Loads.r3d



Loads: LC 2, NESC Extreme Wind on PCS Structure

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Sept 20, 2022 at 4:50 PM
21005.40 /T-Mobile CTFF8...	LC #2 Loads	NESC Loads.r3d



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

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Sept 20, 2022 at 4:51 PM
21005.40 /T-Mobile CTFF8...	LC #2 Reactions	NESC Loads.r3d

Coax Cable on CL&P Pole (Below 75-ft AGL)

Heavy Wind Pressure = $p := 4 \cdot psf$ *(User Input)*

Radial Ice Thickness = $Ir := 0.5 \cdot in$ *(User Input)*

Radial Ice Density = $Id := 56 \cdot pcf$ *(User Input)*

Basic Windspeed = $V := 100$ mph (User Input NESC 2017 Figure 250-2(e))

Height to Top of Coax Above Grade = $TC := 90$ ft (User Input)

NESC Factor = $kv := 1.43$ (User Input from NESC 2017 Table 250-3 equation)

Importance Factor = $I := 1.0$ (User Input from NESC 2017 Section 250.C.2)

Velocity Pressure Coefficient = $Kz := 2.01 \cdot \left(\frac{0.67TC}{900}\right)^{\frac{2}{9.5}} = 1.138$ (NESC 2017 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TC)}\right]^{\frac{1}{7}} = 0.317$ (NESC 2017 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TC}{220}\right)} = 0.867$ (NESC 2017 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.879$ (NESC 2017 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 25.6$ psf (NESC 2017 Section 250.C.

Coaxial Cable Span = $Coax_{Span} := \begin{pmatrix} 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \end{pmatrix} \cdot ft$ *(User Input)* Cables start on tower at 10-ft above grade

Diameter of Coax Cable = $D_{coax1} := 1.98 \cdot in$ *(User Input)*

Weight of Coax Cable = $W_{coax1} := 1.04 \cdot plf$ *(User Input)*

Number of Coax Cables = $N_{coax1} := 42$ *(User Input)* 18 AT&T Cables and 24 T-Mobile Cables

Number of Projected Coax Cables = $NP_{coax1} := 4$ *(User Input)*

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

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

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

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

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

Projected Width with Ice = $A_{ice} := \left(NP_{coax1} \cdot D_{coax1} + 2 \cdot Ir\right) = 8.92 \cdot in$

Projected Width without Ice = $A := \left(NP_{coax1} \cdot D_{coax1}\right) = 7.92 \cdot in$

Ice Area per Liner Ft = $Ai_{coax1} := \frac{\pi}{4} \cdot \left[\left(D_{coax1} + 2 \cdot Ir\right)^2 - D_{coax1}{}^2\right] = 0.027\,ft^2$

Weight of Ice on All Coax Cables = $W_{ice} := Ai_{coax1} \cdot Id \cdot N_{coax1} = 64 \cdot plf$

Heavy Vertical Load =

$$Heavy_{Vert} := \overrightarrow{\left[\left(N_{coax1} \cdot W_{coax1} + W_{ice}\right) \cdot Coax_{Span} \cdot OF_{HV}\right]}$$

Heavy Transverse Load =

$$Heavy_{Trans} := \overrightarrow{\left(p \cdot A_{ice} \cdot Cd_{coax} \cdot Coax_{Span} \cdot OF_{HW}\right)}$$

$$Heavy_{Vert} = \begin{pmatrix} 1610 \\ 1610 \\ 1610 \\ 1610 \\ 1610 \\ 1610 \\ 1610 \end{pmatrix} lb \qquad Heavy_{Trans} = \begin{pmatrix} 119 \\ 119 \\ 119 \\ 119 \\ 119 \\ 119 \\ 119 \end{pmatrix} lb$$

Extreme Vertical Load =

$$Extreme_{Vert} := \overrightarrow{\left[\left(N_{coax1} \cdot W_{coax1}\right) \cdot Coax_{Span} \cdot OF_{EV}\right]}$$

Extreme Transverse Load =

$$Extreme_{Trans} := \overrightarrow{\left[\left(qz \cdot psf \cdot A \cdot Cd_{coax}\right) \cdot Coax_{Span} \cdot OF_{EW}\right]}$$

$$Extreme_{Vert} = \begin{pmatrix} 437 \\ 437 \\ 437 \\ 437 \\ 437 \\ 437 \\ 437 \end{pmatrix} lb \qquad Extreme_{Trans} = \begin{pmatrix} 270 \\ 270 \\ 270 \\ 270 \\ 270 \\ 270 \\ 270 \end{pmatrix} lb$$

Coax Cable on CL&P Pole (Above 75-ft AGL)

Heavy Wind Pressure =	$p := 4 \cdot psf$		*(User Input)*
Radial Ice Thickness =	$Ir := 0.5 \cdot in$		*(User Input)*
Radial Ice Density =	$Id := 56 \cdot pcf$		*(User Input)*
Basic Windspeed =	$V := 100$	mph	(User Input NESC 2017 Figure 250-2(e))
Height to Top of Coax Above Grade =	$TC := 90$	ft	(User Input)
NESC Factor =	$kv := 1.43$		(User Input from NESC 2017 Table 250-3 equation)
Importance Factor =	$I := 1.0$		(User Input from NESC 2017 Section 250.C.2)
Velocity Pressure Coefficient =	$Kz := 2.01 \cdot \left(\frac{0.67TC}{900}\right)^{\frac{2}{9.5}} = 1.138$		(NESC 2017 Table 250-2)
Exposure Factor =	$Es := 0.346 \left[\frac{33}{(0.67 \cdot TC)}\right]^{\frac{1}{7}} = 0.317$		(NESC 2017 Table 250-3)
Response Term =	$Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TC}{220}\right)} = 0.867$		(NESC 2017 Table 250-3)
Gust Response Factor =	$Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.879$		(NESC 2017 Table 250-3)
Wind Pressure =	$qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 25.6$	psf	(NESC 2017 Section 250.C.:

Coaxial Cable Span =	$Coax_{Span} := 10 \cdot ft$	*(User Input)*	
Diameter of Coax Cable =	$D_{coax1} := 1.55 \cdot in$	*(User Input)*	
Weight of Coax Cable =	$W_{coax1} := 0.66 \cdot plf$	*(User Input)*	
Number of Coax Cables =	$N_{coax1} := 18$	*(User Input)*	18 AT&T Cables
Number of Projected Coax Cables =	$NP_{coax1} := 2$	*(User Input)*	T-Mobile Cables on Mast

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

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

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

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

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

Projected Width with Ice = $A_{ice} := \left(NP_{coax1} \cdot D_{coax1} + 2 \cdot Ir\right) = 4.1 \cdot in$

Projected Width without Ice = $A := \left(NP_{coax1} \cdot D_{coax1}\right) = 3.1 \cdot in$

Ice Area per Liner Ft = $Ai_{coax1} := \frac{\pi}{4} \cdot \left[\left(D_{coax1} + 2 \cdot Ir\right)^2 - D_{coax1}^{\ 2}\right] = 0.022 ft^2$

Weight of Ice on All Coax Cables = $W_{ice} := Ai_{coax1} \cdot Id \cdot N_{coax1} = 23 \cdot plf$

Heavy Vertical Load =

$$Heavy_{Vert} := \overrightarrow{\left[\left(N_{coax1} \cdot W_{coax1} + W_{ice}\right) \cdot Coax_{Span} \cdot OF_{HV}\right]}$$

Heavy Transverse Load =

$$Heavy_{Trans} := \overrightarrow{\left(p \cdot A_{ice} \cdot Cd_{coax} \cdot Coax_{Span} \cdot OF_{HW}\right)}$$

$Heavy_{Vert} = 516 lb$ $Heavy_{Trans} = 55 lb$

Extreme Vertical Load =

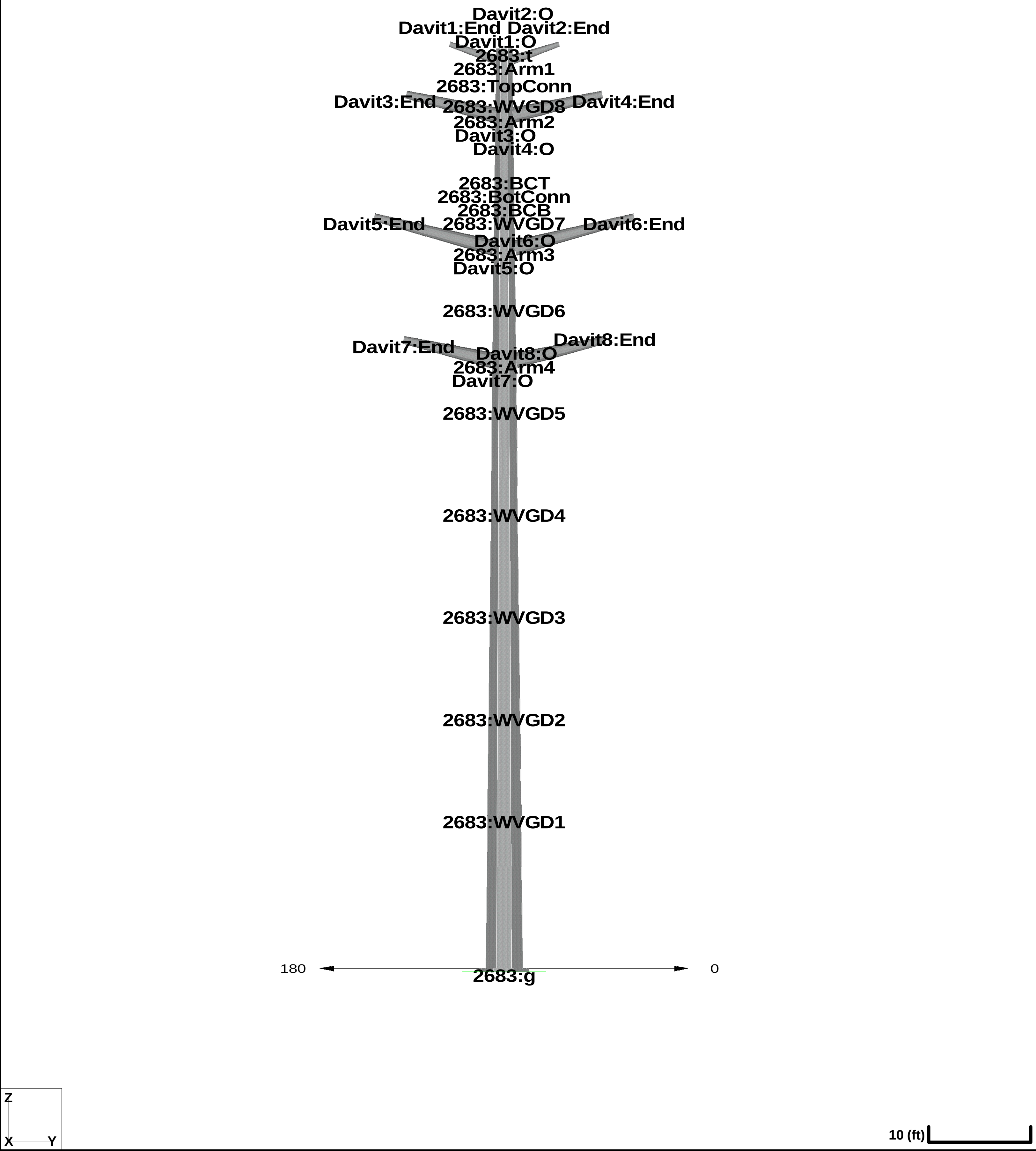
$$Extreme_{Vert} := \overrightarrow{\left[\left(N_{coax1} \cdot W_{coax1}\right) \cdot Coax_{Span} \cdot OF_{EV}\right]}$$

Extreme Transverse Load =

$$Extreme_{Trans} := \overrightarrow{\left[\left(qz \cdot psf \cdot A \cdot Cd_{coax}\right) \cdot Coax_{Span} \cdot OF_{EW}\right]}$$

$Extreme_{Vert} = 119 lb$ $Extreme_{Trans} = 106 lb$

Centek Engineering Inc, Project: "cl&p structure # 2683"
PLS-POLE Version 16.81, 4:48:12 PM Tuesday, September 20, 2022
Undeformed geometry displayed



Project Name : 17159.18 - Brookfield, CT
Project Notes: Struct # 2683/ Sprint - CT54XC713
Project File : J:\Jobs\2100500.WI\40_CTFF896A_CT54XC713\05_Structural\Backup Documentation\Rev (2)\Calcs\PLS Pole\cl&p structure # 2683.pol
Date run : 4:47:17 PM Tuesday, September 20, 2022
by : PLS-POLE Version 16.81
Licensed to : Centek Engineering Inc

Successfully performed nonlinear analysis

The model has 0 warnings.

Loads from file: J:\Jobs\2100500.WI\40_CTFF896A_CT54XC713\05_Structural\Backup Documentation\Rev (2)\Calcs\PLS Pole\cl&p #2683.lca

*** Analysis Results:

Maximum element usage is 89.55% for Steel Pole "2683" in load case "NESC Extreme"
Maximum insulator usage is 35.88% for Clamp "Clamp17" in load case "NESC Extreme"

Foundation Design Forces For All Load Cases:

Note: loads are factored.

Load Case	Foundation Description	Axial Force (kips)	Shear Force (kips)	Bending Moment (ft-k)	Foundation Usage %
NESC Heavy	2683:g	62.82	24.69	1976.84	0.00
NESC Extreme	2683:g	31.45	30.45	2423.11	0.00
NESC Extreme Long	2683:g	31.48	21.97	1739.23	0.00

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	2683:g	-0.60	-24.68	-62.82	24.69	1976.24	-48.64	1976.84	-3.33	0.00
NESC Extreme	2683:g	-0.39	-30.44	-31.45	30.45	2422.92	-30.49	2423.11	-1.83	0.00
NESC Extreme Long	2683:g	-21.97	-0.03	-31.48	21.97	10.96	-1739.20	1739.23	-1.29	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	2683:t	0.93	40.41	-1.04	40.43	0.09	-3.92	0.02
NESC Extreme	2683:t	0.58	51.54	-1.69	51.57	0.05	-5.22	0.01
NESC Extreme Long	2683:t	38.04	0.39	-0.94	38.05	3.96	-0.05	0.01

Tubes Summary:

Pole Label	Tube Num.	Weight (lbs)	Load Case	Maximum Usage %	Resultant Moment (ft-k)
2683	1	3397	NESC Extreme	73.54	861.45

2683	2	5750	NESC Extreme	79.12	1820.56
2683	3	3427	NESC Extreme	89.55	2423.11

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

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Height AGL (ft)	Segment Number	Weight (lbs)
2683	89.55	NESC Extreme	2.5	29	13920.9

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Height AGL (ft)	Segment Number	Weight (lbs)
Davit1	1.74	NESC Heavy	89.7	1	77.9
Davit2	11.29	NESC Heavy	89.7	1	77.9
Davit3	3.10	NESC Heavy	84.0	1	321.0
Davit4	6.70	NESC Heavy	84.0	1	321.0
Davit5	4.16	NESC Heavy	71.1	1	434.7
Davit6	9.39	NESC Heavy	71.1	1	434.7
Davit7	3.21	NESC Heavy	60.0	1	321.0
Davit8	6.77	NESC Heavy	60.0	1	321.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	80.06	2683	Steel Pole
NESC Extreme	89.55	2683	Steel Pole
NESC Extreme Long	88.99	2683	Base Plate

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Height AGL (ft)	Segment Number
NESC Heavy	80.06	2683	2.5	29
NESC Extreme	89.55	2683	2.5	29
NESC Extreme Long	64.40	2683	2.5	29

Summary of Base Plate Usages by Load Case:

Load Case	Pole Label	Bend Line #	Length (in)	Vertical Load (kips)	X Moment (ft-k)	Y Moment (ft-k)	Bending 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	2683	10	19.000	61.471	1976.240	-48.633	28.894	68.623	3	94.407	2.174	52.53
NESC Extreme	2683	10	19.000	30.104	2422.918	-30.482	33.416	79.363	3	109.354	2.338	60.76
NESC Extreme Long	2683	10	19.000	30.132	10.960	-1739.200	48.946	116.245	3	219.623	2.830	88.99

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Height AGL (ft)	Segment Number
NESC Heavy	11.29	Davit2	89.7	1
NESC Extreme	5.10	Davit2	89.7	1
NESC Extreme Long	3.74	Davit6	71.1	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	2.41	NESC Heavy	0.0
Clamp2	Clamp	3.19	NESC Heavy	0.0
Clamp3	Clamp	3.37	NESC Heavy	0.0
Clamp4	Clamp	3.57	NESC Heavy	0.0
Clamp5	Clamp	3.37	NESC Heavy	0.0
Clamp6	Clamp	3.57	NESC Heavy	0.0
Clamp7	Clamp	3.37	NESC Heavy	0.0
Clamp8	Clamp	3.57	NESC Heavy	0.0
Clamp9	Clamp	2.02	NESC Heavy	0.0
Clamp10	Clamp	2.02	NESC Heavy	0.0
Clamp11	Clamp	2.02	NESC Heavy	0.0
Clamp12	Clamp	2.02	NESC Heavy	0.0
Clamp13	Clamp	2.02	NESC Heavy	0.0
Clamp14	Clamp	2.02	NESC Heavy	0.0
Clamp15	Clamp	2.02	NESC Heavy	0.0
Clamp17	Clamp	35.88	NESC Extreme	0.0
Clamp18	Clamp	23.22	NESC Extreme	0.0
Clamp19	Clamp	0.65	NESC Heavy	0.0
Clamp20	Clamp	33.08	NESC Heavy	0.0
Clamp21	Clamp	33.08	NESC Heavy	0.0

*** Weight of structure (lbs):

Weight of Tubular Davit Arms:	2309.3
Weight of Steel Poles:	13920.9
Total:	16230.2

*** End of Report

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*************************************************************************
*                                                                       *
*                               PLS-POLE                                *
*                   POLE AND FRAME ANALYSIS AND DESIGN                  *
*              Copyright Power Line Systems 1999-2021                   *
*                                                                       *
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Project Name : 17159.18 - Brookfield, CT
Project Notes: Struct # 2683/ Sprint - CT54XC713
Project File : J:\Jobs\2100500.WI\40_CTFF896A_CT54XC713\05_Structural\Backup Documentation\Rev (2)\Calcs\PLS Pole\cl&p structure # 2683.pol
Date run   : 4:47:16 PM Tuesday, September 20, 2022
by   : PLS-POLE Version 16.81
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 and tubular arms checked with ASCE/SEI 48-05

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

Steel Pole Properties:

Steel Pole Property	Stock Number	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	Ultimate Trans.	Ultimate Texture

Label			Length						Coef.		Override	Override	Base Type	Tip	Load	Long. Load	
		(ft)	(ft)			(in)	(in)	(in/ft)			(ksi)	(lbs/ft^3)		(ft)	(kips)	(kips)	
CL&P2683	2683	90.00	0	Yes	8F	19.63	43.21	0	1.6	3 tubes	0	0	Calculated	0.000	0.0000	0.0000	Galvanized Steel

Steel Tubes Properties:

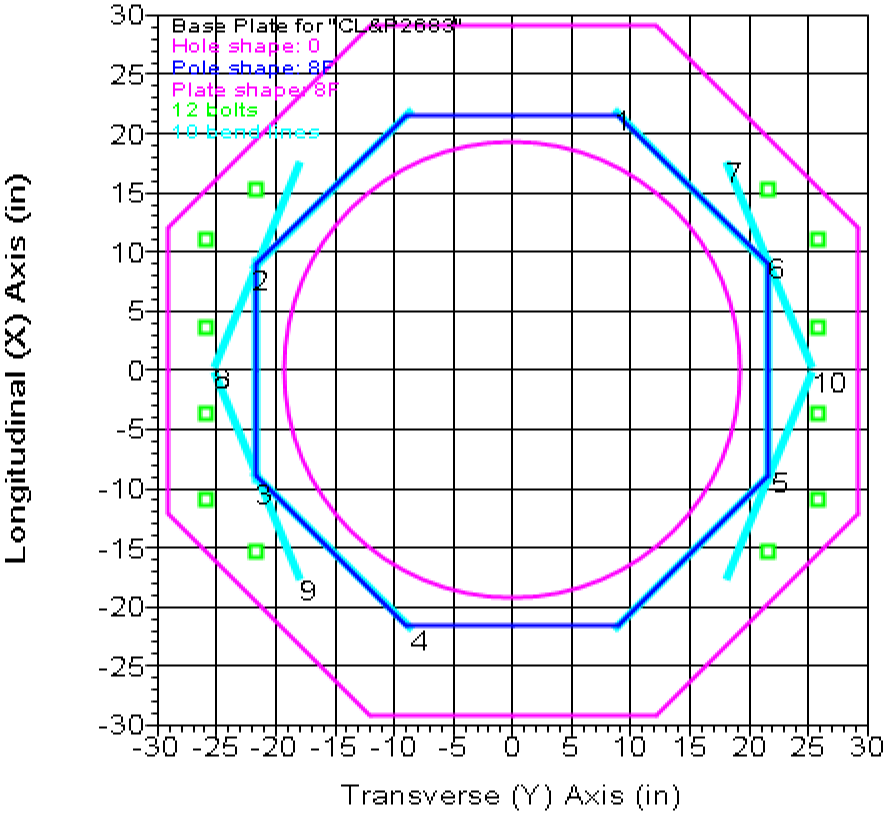
Pole Property	Tube No.	Length (ft)	Thickness (in)	Lap Length (ft)	Lap Factor	Lap Gap or Butt Offset (in)	Yield Stress (ksi)	Moment Cap. Override (ft-k)	Tube Weight (lbs)	Center of Gravity (ft)	Calculated Taper (in/ft)	Tube Top Diameter (in)	Tube Bot. Diameter (in)	1.5x Diam. Lap Length (ft)	Actual Overlap (ft)
CL&P2683	1	39	0.3125	4.167	0.000	0.000	65.000	0.000	3397	20.92	0.27728	19.63	30.44	3.727	4.167
CL&P2683	2	40.1667	0.375	5.250	0.000	0.000	65.000	0.000	5750	21.18	0.27728	28.66	39.80	4.881	5.250
CL&P2683	3	20.25	0.375	0.000	0.000	0.000	65.000	0.000	3427	10.36	0.27728	37.59	43.20	0.000	0.000

Base Plate Properties:

Pole Property	Plate Diam. (in)	Plate Shape	Plate Thick. (in)	Plate Weight (lbs)	Bend Line Length Override (in)	Hole Diam. (in)	Hole Shape	Steel Density (lbs/ft^3)	Steel Yield Stress (ksi)	Bolt Diam. (in)	Bolt Pattern Diam. (in)	Num. Of Bolts	Bolt Cage X Inertia (in^4)	Bolt Cage Y Inertia (in^4)
CL&P2683	58.250	8F	3.000	1347	19.000	38.750	0	490.00	55.000	2.250	51.750	12	28733.01	5839.56

Base Plate Bolt Coordinates for Property "CL&P2683":

Bolt X Coord.	Bolt Y Coord.	Bolt Angle (deg)
0.5894	0.8357	0
0.4251	1	0
0.1425	1	0



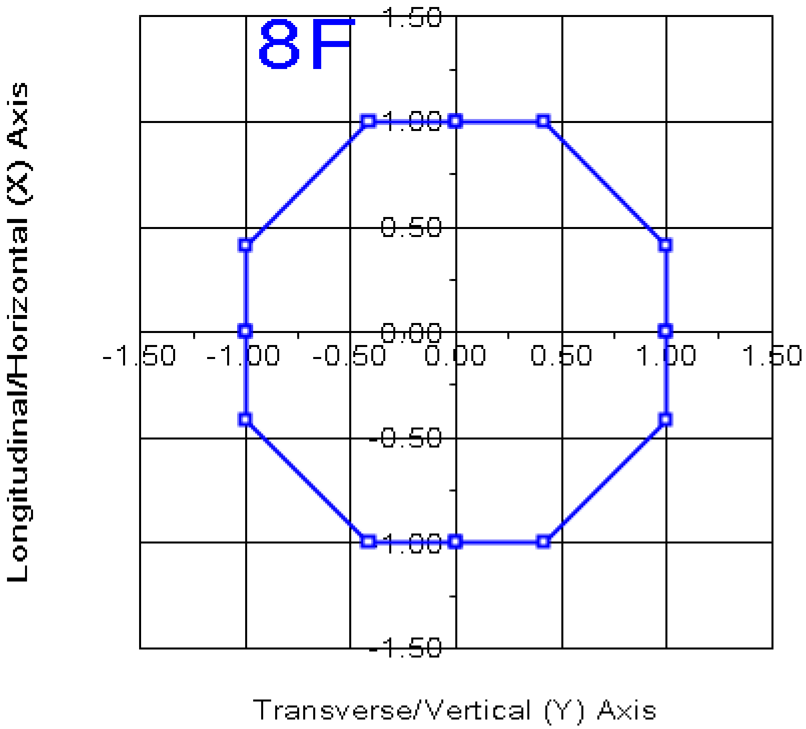
Steel Pole Connectivity:

Pole Label	Tip Joint	Base Joint	X of Base (ft)	Y of Base (ft)	Z of Base (ft)	Inclin. About X (deg)	Inclin. About Y (deg)	Property Set	Attach. Labels	Base Connect	Embed % Override	Embed C. Override (ft)
2683			0	0	0	0	0	CL&P2683	16 labels	Fixed	0.00	0

Relative Attachment Labels for Steel Pole "2683":

Joint Label	Distance From Origin/Top Joint (ft)	Global Z of Attach (ft)
2683:WVGD1	0.00	15.00
2683:WVGD2	0.00	25.00
2683:WVGD3	0.00	35.00
2683:WVGD4	0.00	45.00
2683:WVGD5	0.00	55.00

2683:WVGD6	0.00	65.00
2683:WVGD7	0.00	75.00
2683:TopConn	0.00	87.00
2683:BotConn	0.00	77.00
2683:WVGD8	0.00	85.00
2683:Arm1	0.00	88.92
2683:Arm2	0.00	83.50
2683:Arm3	0.00	70.50
2683:Arm4	0.00	59.50
2683:BCT	0.00	77.50
2683:BCB	0.00	76.50



Pole Steel Properties:

Warning: Capacities and usages printed in splices are listed for the inner tube except at the splice top which uses the outer tube. ??

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)
2683	2683:t	2683:t Ori	0.00	19.63	20.00	985.95	985.95	0.00	21.9	65.00	65.00	544.26	544.26
2683	2683:Arm1	2683:Arm1 End	1.08	19.92	20.31	1032.52	1032.52	0.00	22.3	65.00	65.00	561.40	561.40
2683	2683:Arm1	2683:Arm1 Ori	1.08	19.92	20.31	1032.52	1032.52	0.00	22.3	65.00	65.00	561.40	561.40
2683	2683:TopConn	2683:TopConn End	3.00	20.46	20.86	1118.89	1118.89	0.00	23.0	65.00	65.00	592.53	592.53

2683	2683:TopConn	2683:TopConn	Ori	3.00	20.46	20.86	1118.89	1118.89	0.00	23.0	65.00	65.00	592.53	592.53
2683	2683:WVGD8	2683:WVGD8	End	5.00	21.01	21.43	1213.85	1213.85	0.00	23.7	65.00	65.00	625.85	625.85
2683	2683:WVGD8	2683:WVGD8	Ori	5.00	21.01	21.43	1213.85	1213.85	0.00	23.7	65.00	65.00	625.85	625.85
2683	2683:Arm2	2683:Arm2	End	6.50	21.43	21.87	1288.49	1288.49	0.00	24.3	65.00	65.00	651.44	651.44
2683	2683:Arm2	2683:Arm2	Ori	6.50	21.43	21.87	1288.49	1288.49	0.00	24.3	65.00	65.00	651.44	651.44
2683	#2683:0	Tube 1	End	9.50	22.26	22.73	1446.83	1446.83	0.00	25.4	65.00	65.00	704.16	704.16
2683	#2683:0	Tube 1	Ori	9.50	22.26	22.73	1446.83	1446.83	0.00	25.4	65.00	65.00	704.16	704.16
2683	2683:BCT	2683:BCT	End	12.50	23.09	23.59	1617.64	1617.64	0.00	26.5	65.00	65.00	758.93	758.93
2683	2683:BCT	2683:BCT	Ori	12.50	23.09	23.59	1617.64	1617.64	0.00	26.5	65.00	65.00	758.93	758.93
2683	2683:BotConn	2683:BotConn	End	13.00	23.23	23.73	1647.35	1647.35	0.00	26.6	65.00	65.00	768.26	768.26
2683	2683:BotConn	2683:BotConn	Ori	13.00	23.23	23.73	1647.35	1647.35	0.00	26.6	65.00	65.00	768.26	768.26
2683	2683:BCB	2683:BCB	End	13.50	23.37	23.87	1677.43	1677.43	0.00	26.8	65.00	65.00	777.64	777.64
2683	2683:BCB	2683:BCB	Ori	13.50	23.37	23.87	1677.43	1677.43	0.00	26.8	65.00	65.00	777.64	777.64
2683	2683:WVGD7	2683:WVGD7	End	15.00	23.78	24.31	1769.84	1769.84	0.00	27.4	65.00	65.00	806.14	806.14
2683	2683:WVGD7	2683:WVGD7	Ori	15.00	23.78	24.31	1769.84	1769.84	0.00	27.4	65.00	65.00	806.14	806.14
2683	2683:Arm3	2683:Arm3	End	19.50	25.03	25.60	2067.33	2067.33	0.00	29.0	65.00	65.00	894.70	894.70
2683	2683:Arm3	2683:Arm3	Ori	19.50	25.03	25.60	2067.33	2067.33	0.00	29.0	65.00	65.00	894.70	894.70
2683	#2683:1	Tube 1	End	22.25	25.79	26.39	2264.58	2264.58	0.00	30.0	65.00	65.00	951.09	951.09
2683	#2683:1	Tube 1	Ori	22.25	25.79	26.39	2264.58	2264.58	0.00	30.0	65.00	65.00	951.09	951.09
2683	2683:WVGD6	2683:WVGD6	End	25.00	26.56	27.18	2474.00	2474.00	0.00	31.1	65.00	65.00	1009.21	1009.21
2683	2683:WVGD6	2683:WVGD6	Ori	25.00	26.56	27.18	2474.00	2474.00	0.00	31.1	65.00	65.00	1009.21	1009.21
2683	#2683:2	Tube 1	End	27.75	27.32	27.97	2695.95	2695.95	0.00	32.1	65.00	65.00	1069.06	1069.06
2683	#2683:2	Tube 1	Ori	27.75	27.32	27.97	2695.95	2695.95	0.00	32.1	65.00	65.00	1069.06	1069.06
2683	2683:Arm4	2683:Arm4	End	30.50	28.08	28.76	2930.78	2930.78	0.00	33.1	65.00	64.24	1117.35	1117.35
2683	2683:Arm4	2683:Arm4	Ori	30.50	28.08	28.76	2930.78	2930.78	0.00	33.1	65.00	64.24	1117.35	1117.35
2683	#2683:3	SpliceT	End	34.83	29.28	30.00	3327.87	3327.87	0.00	34.7	65.00	62.89	1191.09	1191.09
2683	#2683:3	SpliceT	Ori	34.83	29.28	30.00	3327.87	3327.87	0.00	34.7	65.00	62.89	1191.10	1191.10
2683	2683:WVGD5	2683:WVGD5	End	35.00	28.70	35.20	3734.31	3734.31	0.00	27.6	65.00	65.00	1409.35	1409.35
2683	2683:WVGD5	2683:WVGD5	Ori	35.00	28.70	35.20	3734.31	3734.31	0.00	27.6	65.00	65.00	1409.35	1409.35
2683	#2683:4	SpliceB	End	39.00	29.81	36.58	4190.24	4190.24	0.00	28.8	65.00	65.00	1522.59	1522.59
2683	#2683:4	SpliceB	Ori	39.00	29.81	36.58	4190.24	4190.24	0.00	28.8	65.00	65.00	1522.59	1522.59
2683	#2683:5	Tube 2	End	42.00	30.65	37.62	4555.54	4555.54	0.00	29.7	65.00	65.00	1610.39	1610.39
2683	#2683:5	Tube 2	Ori	42.00	30.65	37.62	4555.54	4555.54	0.00	29.7	65.00	65.00	1610.39	1610.39
2683	2683:WVGD4	2683:WVGD4	End	45.00	31.48	38.65	4941.47	4941.47	0.00	30.6	65.00	65.00	1700.66	1700.66
2683	2683:WVGD4	2683:WVGD4	Ori	45.00	31.48	38.65	4941.47	4941.47	0.00	30.6	65.00	65.00	1700.66	1700.66
2683	#2683:6	Tube 2	End	50.00	32.86	40.37	5632.09	5632.09	0.00	32.2	65.00	65.00	1856.57	1856.57
2683	#2683:6	Tube 2	Ori	50.00	32.86	40.37	5632.09	5632.09	0.00	32.2	65.00	65.00	1856.57	1856.57
2683	2683:WVGD3	2683:WVGD3	End	55.00	34.25	42.09	6384.24	6384.24	0.00	33.7	65.00	63.72	1979.56	1979.56
2683	2683:WVGD3	2683:WVGD3	Ori	55.00	34.25	42.09	6384.24	6384.24	0.00	33.7	65.00	63.72	1979.56	1979.56
2683	#2683:7	Tube 2	End	60.00	35.64	43.82	7200.54	7200.54	0.00	35.2	65.00	62.42	2102.06	2102.06
2683	#2683:7	Tube 2	Ori	60.00	35.64	43.82	7200.54	7200.54	0.00	35.2	65.00	62.42	2102.06	2102.06
2683	2683:WVGD2	2683:WVGD2	End	65.00	37.02	45.54	8083.61	8083.61	0.00	36.8	65.00	61.12	2224.22	2224.22
2683	2683:WVGD2	2683:WVGD2	Ori	65.00	37.02	45.54	8083.61	8083.61	0.00	36.8	65.00	61.12	2224.22	2224.22
2683	#2683:8	SpliceT	End	69.75	38.34	47.18	8986.78	8986.78	0.00	38.2	65.00	59.89	2339.57	2339.57
2683	#2683:8	SpliceT	Ori	69.75	38.34	47.18	8986.78	8986.78	0.00	38.2	65.00	59.89	2339.57	2339.57
2683	#2683:9	Splice	End	72.38	38.32	47.15	8971.06	8971.06	0.00	38.2	65.00	59.91	2337.64	2337.64
2683	#2683:9	Splice	Ori	72.38	38.32	47.15	8971.06	8971.06	0.00	38.2	65.00	59.91	2337.64	2337.64
2683	2683:WVGD1	2683:WVGD1	End	75.00	39.05	48.05	9497.27	9497.27	0.00	39.0	65.00	59.23	2400.97	2400.97
2683	2683:WVGD1	2683:WVGD1	Ori	75.00	39.05	48.05	9497.27	9497.27	0.00	39.0	65.00	59.23	2400.97	2400.97
2683	#2683:10	Tube 3	End	80.00	40.43	49.78	10555.72	10555.72	0.00	40.5	65.00	57.93	2520.52	2520.52
2683	#2683:10	Tube 3	Ori	80.00	40.43	49.78	10555.72	10555.72	0.00	40.5	65.00	57.93	2520.52	2520.52
2683	#2683:11	Tube 3	End	85.00	41.82	51.50	11690.03	11690.03	0.00	42.0	65.00	56.63	2638.31	2638.31
2683	#2683:11	Tube 3	Ori	85.00	41.82	51.50	11690.03	11690.03	0.00	42.0	65.00	56.63	2638.31	2638.31
2683	2683:g	2683:g	End	90.00	43.20	53.22	12902.82	12902.82	0.00	43.6	65.00	55.27	2751.00	2751.00

Tubular Davit Properties:

Davit	Stock	Steel Thickness	Base	Tip	Taper	Drag	Modulus	Geometry	Strength	Vertical	Tension	Compres.	Long.	Yield	Weight

Steel Texture Property Label	Number Shape	(in)	Diameter or Depth (in)	Diameter or Depth (in)	(in/ft)	Coef.	of Elasticity (ksi)		Check Type	Capacity (lbs)	Capacity (lbs)	Capacity (lbs)	Capacity (lbs)	Stress (ksi)	Density Override (lbs/ft^3) Shape At End
ARM A	0	0.1875	10.76	6	0	1.3	29000	1 point	Calculated	0	0	0	0	65	0
ARM B	0	0.25	18.5	9	0	1.3	29000	1 point	Calculated	0	0	0	0	65	0
ARM C	0	0.25	18.5	9	0	1.3	29000	1 point	Calculated	0	0	0	0	65	0

Intermediate Joints for Davit Property "ARM A":

Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	4.5	-1.5

Intermediate Joints for Davit Property "ARM B":

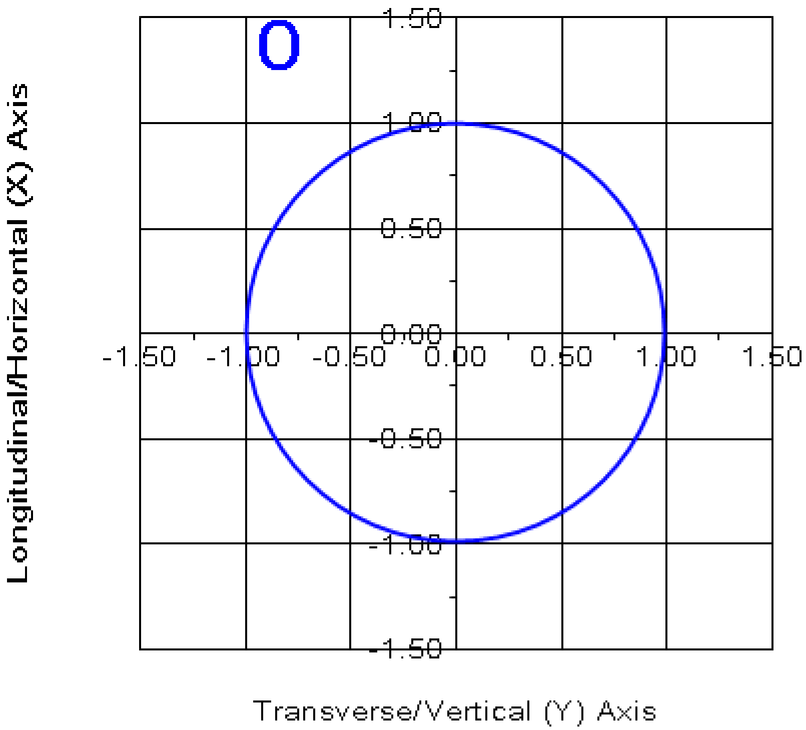
Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	8.67	-2

Intermediate Joints for Davit Property "ARM C":

Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	11.67	-3

Tubular Davit Arm Connectivity:

Davit Label	Attach Label	Davit Property Set	Azimuth (deg)
Davit1	2683:Arm1	ARM A	180
Davit2	2683:Arm1	ARM A	0
Davit3	2683:Arm2	ARM B	180
Davit4	2683:Arm2	ARM B	0
Davit5	2683:Arm3	ARM C	180
Davit6	2683:Arm3	ARM C	0
Davit7	2683:Arm4	ARM B	180
Davit8	2683:Arm4	ARM B	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)
Davit1	Davit1:O	Origin	0.00	10.76	6.23	87.04	87.04	57.39	0.0	65.00	65.00	87.64	87.64
Davit1	Davit1:End	End	4.74	6.00	3.42	14.47	14.47	32.00	0.0	65.00	65.00	26.13	26.13
Davit2	Davit2:O	Origin	0.00	10.76	6.23	87.04	87.04	57.39	0.0	65.00	65.00	87.64	87.64
Davit2	Davit2:End	End	4.74	6.00	3.42	14.47	14.47	32.00	0.0	65.00	65.00	26.13	26.13
Davit3	Davit3:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit3	#Davit3:0	End	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit3	#Davit3:0	Origin	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit3	Davit3:End	End	8.90	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit4	Davit4:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit4	#Davit4:0	End	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit4	#Davit4:0	Origin	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit4	Davit4:End	End	8.90	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit5	Davit5:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51

Davit5	#Davit5:0	End	5.00	14.56	11.24	287.65	287.65	58.23	0.0	65.00	65.00	214.05	214.05
Davit5	#Davit5:0	Origin	5.00	14.56	11.24	287.65	287.65	58.23	0.0	65.00	65.00	214.05	214.05
Davit5	#Davit5:1	End	8.52	11.78	9.05	150.51	150.51	47.12	0.0	65.00	65.00	138.43	138.43
Davit5	#Davit5:1	Origin	8.52	11.78	9.05	150.51	150.51	47.12	0.0	65.00	65.00	138.43	138.43
Davit5	Davit5:End	End	12.05	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit6	Davit6:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit6	#Davit6:0	End	5.00	14.56	11.24	287.65	287.65	58.23	0.0	65.00	65.00	214.05	214.05
Davit6	#Davit6:0	Origin	5.00	14.56	11.24	287.65	287.65	58.23	0.0	65.00	65.00	214.05	214.05
Davit6	#Davit6:1	End	8.52	11.78	9.05	150.51	150.51	47.12	0.0	65.00	65.00	138.43	138.43
Davit6	#Davit6:1	Origin	8.52	11.78	9.05	150.51	150.51	47.12	0.0	65.00	65.00	138.43	138.43
Davit6	Davit6:End	End	12.05	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit7	Davit7:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit7	#Davit7:0	End	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit7	#Davit7:0	Origin	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit7	Davit7:End	End	8.90	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit8	Davit8:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit8	#Davit8:0	End	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit8	#Davit8:0	Origin	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit8	Davit8:End	End	8.90	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23

*** Insulator Data

Clamp Properties:

Label	Stock Number	Holding Capacity (lbs)	Hardware Capacity (lbs)	Notes
clamp	clamp1	8e+04	0	

Clamp Insulator Connectivity:

Clamp Label	Structure And Tip Attach	Property Set	Min. Required Vertical Load (uplift) (lbs)
Clamp1	Davit1:End	clamp	No Limit
Clamp2	Davit2:End	clamp	No Limit
Clamp3	Davit3:End	clamp	No Limit
Clamp4	Davit4:End	clamp	No Limit
Clamp5	Davit5:End	clamp	No Limit
Clamp6	Davit6:End	clamp	No Limit
Clamp7	Davit7:End	clamp	No Limit
Clamp8	Davit8:End	clamp	No Limit
Clamp9	2683:WVGD1	clamp	No Limit
Clamp10	2683:WVGD2	clamp	No Limit
Clamp11	2683:WVGD3	clamp	No Limit
Clamp12	2683:WVGD4	clamp	No Limit
Clamp13	2683:WVGD5	clamp	No Limit
Clamp14	2683:WVGD6	clamp	No Limit
Clamp15	2683:WVGD7	clamp	No Limit
Clamp17	2683:TopConn	clamp	No Limit
Clamp18	2683:BotConn	clamp	No Limit
Clamp19	2683:WVGD8	clamp	No Limit
Clamp20	2683:BCT	clamp	No Limit

Clamp21	2683:BCB	clamp	No Limit

PLS-CADD Link Cable Sets:

Insulator Label	Conductor Attach Label	Insulator Type	Set Number	Phase Number	Set Description	Dead End	Framing Source
Clamp1	Davit1:End	Clamp	20	1		No	
Clamp2	Davit2:End	Clamp	21	1		No	
Clamp3	Davit3:End	Clamp	1	1		No	
Clamp4	Davit4:End	Clamp	4	1		No	
Clamp5	Davit5:End	Clamp	2	1		No	
Clamp6	Davit6:End	Clamp	5	1		No	
Clamp7	Davit7:End	Clamp	3	1		No	
Clamp8	Davit8:End	Clamp	6	1		No	
Clamp9	2683:WVGD1	Clamp	0	0		No	
Clamp10	2683:WVGD2	Clamp	0	0		No	
Clamp11	2683:WVGD3	Clamp	0	0		No	
Clamp12	2683:WVGD4	Clamp	0	0		No	
Clamp13	2683:WVGD5	Clamp	0	0		No	
Clamp14	2683:WVGD6	Clamp	0	0		No	
Clamp15	2683:WVGD7	Clamp	0	0		No	
Clamp17	2683:TopConn	Clamp	0	0		No	
Clamp18	2683:BotConn	Clamp	0	0		No	
Clamp19	2683:WVGD8	Clamp	0	0		No	
Clamp20	2683:BCT	Clamp	0	0		No	
Clamp21	2683:BCB	Clamp	0	0		No	

Material List Options:
Show Parts: YES
Decompose Assemblies: NO
Show Assemblies: YES

Material List

Stock Number	Item Description	Quantity	Unit of Measure
clamp1	Clamp property: clamp	20.00	Each
2683	Steel Pole property: CL&P2683	1.00	Each

*** Loads Data

Loads from file: J:\Jobs\2100500.WI\40_CTFF896A_CT54XC713\05_Structural\Backup Documentation\Rev (2)\Calcs\PLS Pole\cl&p #2683.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)	90.42 (ft)	
Structure height	90.42 (ft)	
Structure height above ground	90.42 (ft)	

Vector Load Cases:

Load Case Description	Dead Load Factor	Wind Area Factor	SF for Steel Poles Tubular Arms and Towers	SF for Wood Poles	SF for Conc. Ult.	SF for Conc. First Crack	SF for Conc. Zero Tens.	SF for Guys and Cables	SF for Non Tubular Arms	SF for Braces	SF for Insuls.	SF for Hardware	SF For Found.	Point Loads	Wind/Ice Model	Trans. Wind Pressure (psf)	Longit. Wind Pressure (psf)	Ice Thick. (in)	Ice Density (lbs/ft^3)	Temperature (deg F)	Pole Deflection Check	Pole Deflection Limit % or (ft)
NESC Heavy	1.5000	2.5000	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	20 loads	Wind on All	4	0	0.000	0.000	0.0	No Limit	0
NESC Extreme	1.0000	1.0000	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	20 loads	NESC 2017	25.6	0	0.000	0.000	0.0	No Limit	0
NESC Extreme Long	1.0000	1.0000	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	20 loads	NESC 2017	0	25.6	0.000	0.000	0.0	No Limit	0

Point Loads for Load Case "NESC Heavy":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Davit1:End	871	1715	105	
Davit2:End	1449	2103	21	
Davit3:End	1581	2183	124	
Davit4:End	2028	2006	33	
Davit5:End	1581	2183	124	
Davit6:End	2028	2006	33	
Davit7:End	1581	2183	124	
Davit8:End	2028	2006	33	
2683:TopConn	0	8989	0	
2683:BotConn	14115	-5377	0	
2683:BCT	0	26465.6	0	
2683:BCB	0	-26465.6	0	
2683:WVGD1	1610	119	0	
2683:WVGD2	1610	119	0	

2683:WVGD3	1610	119	0
2683:WVGD4	1610	119	0
2683:WVGD5	1610	119	0
2683:WVGD6	1610	119	0
2683:WVGD7	1610	119	0
2683:WVGD8	516	55	0

Point Loads for Load Case "NESC Extreme":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Davit1:End	249	930	57	
Davit2:End	558	1299	15	
Davit3:End	634	1392	78	
Davit4:End	878	1548	27	
Davit5:End	634	1392	78	
Davit6:End	878	1548	27	
Davit7:End	634	1392	78	
Davit8:End	878	1548	27	
2683:TopConn	0	28708	0	
2683:BotConn	6534	-17393	0	
2683:BCT	0	12251	0	
2683:BCB	0	-12251	0	
2683:WVGD1	437	270	0	
2683:WVGD2	437	270	0	
2683:WVGD3	437	270	0	
2683:WVGD4	437	270	0	
2683:WVGD5	437	270	0	
2683:WVGD6	437	270	0	
2683:WVGD7	437	270	0	
2683:WVGD8	119	106	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 Ice Vertical Load (lbs)	Pole Ice Wind Load (lbs)	Tran. Wind Load (lbs)	Long. Wind Load (lbs)
2683	2683:t	2683:Arm1	90.00	88.92	89.46	19.775	1.5e+06	1.000	25.60	0.00	74.07	45.56	0.00	0.00	45.56	0.00
2683	2683:Arm1	2683:TopConn	88.92	87.00	87.96	20.191	1.53e+06	1.000	25.60	0.00	134.49	82.71	0.00	0.00	82.71	0.00
2683	2683:TopConn	2683:WVGD8	87.00	85.00	86.00	20.734	1.57e+06	1.000	25.60	0.00	143.92	88.47	0.00	0.00	88.47	0.00
2683	2683:WVGD8	2683:Arm2	85.00	83.50	84.25	21.219	1.61e+06	1.000	25.60	0.00	110.50	67.91	0.00	0.00	67.91	0.00
2683	2683:Arm2		83.50	80.50	82.00	21.843	1.65e+06	1.000	25.60	0.00	227.60	139.81	0.00	0.00	139.81	0.00
2683		2683:BCT	80.50	77.50	79.00	22.675	1.72e+06	1.000	25.60	0.00	236.40	145.13	0.00	0.00	145.13	0.00
2683	2683:BCT	2683:BotConn	77.50	77.00	77.25	23.160	1.75e+06	1.000	25.60	0.00	40.25	24.71	0.00	0.00	24.71	0.00
2683	2683:BotConn	2683:BCB	77.00	76.50	76.75	23.299	1.76e+06	1.000	25.60	0.00	40.50	24.85	0.00	0.00	24.85	0.00
2683	2683:BCB	2683:WVGD7	76.50	75.00	75.75	23.576	1.79e+06	1.000	25.60	0.00	122.96	75.45	0.00	0.00	75.45	0.00
2683	2683:WVGD7	2683:Arm3	75.00	70.50	72.75	24.408	1.85e+06	1.000	25.60	0.00	382.07	234.33	0.00	0.00	234.33	0.00
2683	2683:Arm3		70.50	67.75	69.13	25.413	1.93e+06	1.000	25.60	0.00	243.23	149.10	0.00	0.00	149.10	0.00
2683		2683:WVGD6	67.75	65.00	66.38	26.176	1.98e+06	1.000	25.60	0.00	250.62	153.58	0.00	0.00	153.58	0.00
2683	2683:WVGD6		65.00	62.25	63.63	26.938	2.04e+06	1.000	25.60	0.00	258.01	158.05	0.00	0.00	158.05	0.00
2683		2683:Arm4	62.25	59.50	60.88	27.701	2.1e+06	1.000	25.60	0.00	265.40	162.52	0.00	0.00	162.52	0.00
2683	2683:Arm4		59.50	55.17	57.33	28.683	2.17e+06	1.000	25.60	0.00	433.19	265.17	0.00	0.00	265.17	0.00

2683		2683:WVGD5	55.17	55.00	55.08	28.994	2.2e+06	1.000	25.60	0.00	36.98	10.31	0.00	0.00	10.31	0.00
2683	2683:WVGD5		55.00	51.00	53.00	29.259	2.22e+06	1.000	25.60	0.00	905.35	249.70	0.00	0.00	249.70	0.00
2683			51.00	48.00	49.50	30.230	2.29e+06	1.000	25.60	0.00	378.80	193.48	0.00	0.00	193.48	0.00
2683		2683:WVGD4	48.00	45.00	46.50	31.062	2.35e+06	1.000	25.60	0.00	389.27	198.81	0.00	0.00	198.81	0.00
2683	2683:WVGD4		45.00	40.00	42.50	32.171	2.44e+06	1.000	25.60	0.00	672.23	343.18	0.00	0.00	343.18	0.00
2683		2683:WVGD3	40.00	35.00	37.50	33.557	2.54e+06	1.000	25.60	0.00	701.54	357.97	0.00	0.00	357.97	0.00
2683	2683:WVGD3		35.00	30.00	32.50	34.943	2.65e+06	1.000	25.60	0.00	730.85	372.76	0.00	0.00	372.76	0.00
2683		2683:WVGD2	30.00	25.00	27.50	36.330	2.75e+06	1.000	25.60	0.00	760.16	387.55	0.00	0.00	387.55	0.00
2683	2683:WVGD2		25.00	20.25	22.63	37.682	2.85e+06	1.000	25.60	0.00	749.30	381.87	0.00	0.00	381.87	0.00
2683			20.25	17.63	18.94	38.329	2.9e+06	1.000	25.60	0.00	842.55	214.66	0.00	0.00	214.66	0.00
2683		2683:WVGD1	17.63	15.00	16.31	38.682	2.93e+06	1.000	25.60	0.00	858.71	216.63	0.00	0.00	216.63	0.00
2683	2683:WVGD1		15.00	10.00	12.50	39.739	3.01e+06	1.000	25.60	0.00	832.34	423.91	0.00	0.00	423.91	0.00
2683			10.00	5.00	7.50	41.125	3.12e+06	1.000	25.60	0.00	861.55	438.70	0.00	0.00	438.70	0.00
2683		2683:g	5.00	0.00	2.50	42.512	3.22e+06	1.000	25.60	0.00	890.86	453.49	0.00	0.00	453.49	0.00

Point Loads for Load Case "NESC Extreme Long":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Davit1:End	249	0	57	
Davit2:End	558	0	15	
Davit3:End	634	0	78	
Davit4:End	878	0	27	
Davit5:End	634	0	78	
Davit6:End	878	0	27	
Davit7:End	634	0	78	
Davit8:End	878	0	27	
2683:TopConn	0	0	28708	
2683:BotConn	6534	0	-17393	
2683:BCT	0	0	12251	
2683:BCB	0	0	-12521	
2683:WVGD1	437	0	270	
2683:WVGD2	437	0	270	
2683:WVGD3	437	0	270	
2683:WVGD4	437	0	270	
2683:WVGD5	437	0	270	
2683:WVGD6	437	0	270	
2683:WVGD7	437	0	270	
2683:WVGD8	119	0	106	

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

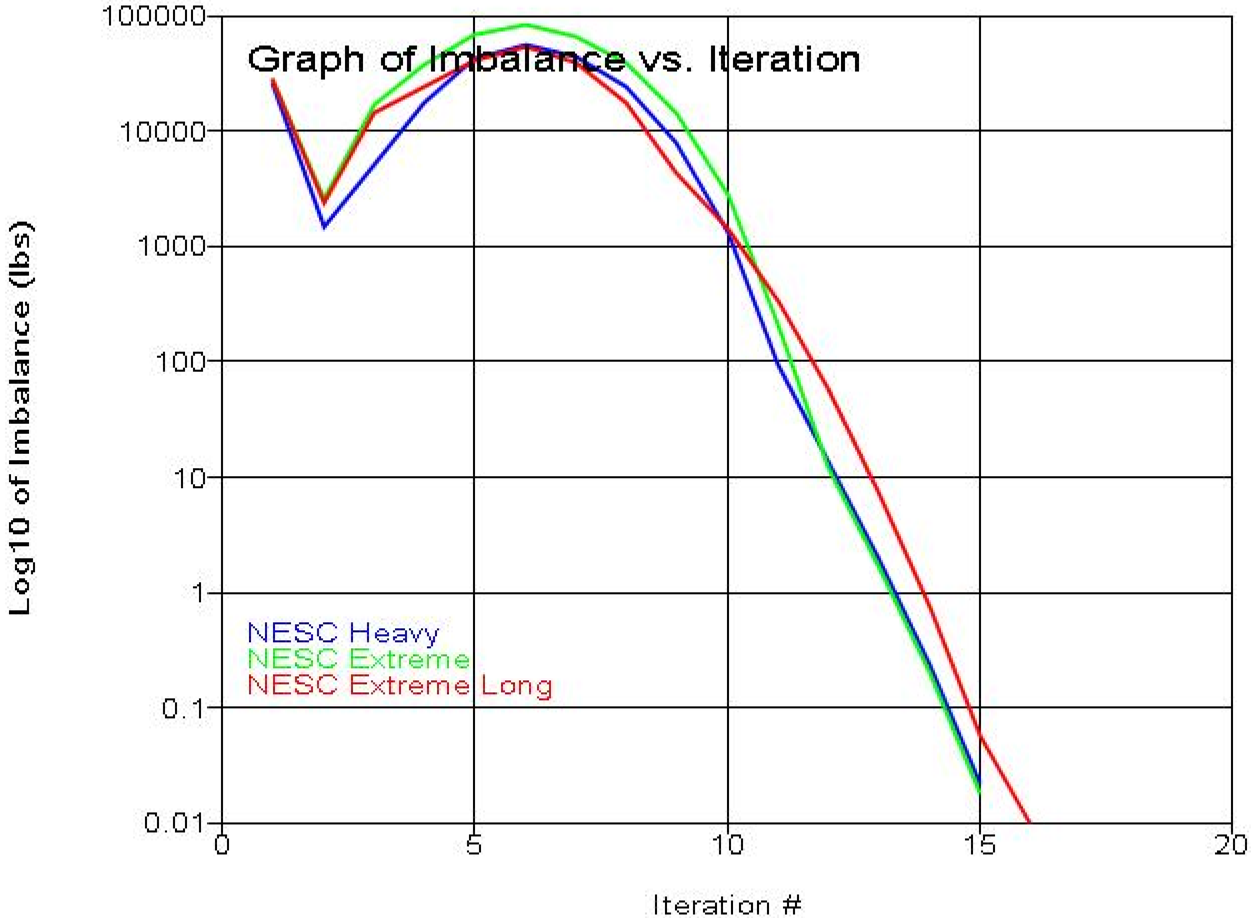
Notes: Does not include loads from equipment, arms, guys, braces, etc. or user input loads.
Wind load is calculated for the undeformed shape of a pole.

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 Ice Vertical Load (lbs)	Pole Ice Wind Load (lbs)	Tran. Wind Load (lbs)	Long. Wind Load (lbs)
2683	2683:t	2683:Arm1	90.00	88.92	89.46	19.775	1.5e+06	1.000	25.60	0.00	74.07	45.56	0.00	0.00	0.00	45.56
2683	2683:Arm1	2683:TopConn	88.92	87.00	87.96	20.191	1.53e+06	1.000	25.60	0.00	134.49	82.71	0.00	0.00	0.00	82.71
2683	2683:TopConn	2683:WVGD8	87.00	85.00	86.00	20.734	1.57e+06	1.000	25.60	0.00	143.92	88.47	0.00	0.00	0.00	88.47
2683	2683:WVGD8	2683:Arm2	85.00	83.50	84.25	21.219	1.61e+06	1.000	25.60	0.00	110.50	67.91	0.00	0.00	0.00	67.91
2683	2683:Arm2		83.50	80.50	82.00	21.843	1.65e+06	1.000	25.60	0.00	227.60	139.81	0.00	0.00	0.00	139.81
2683		2683:BCT	80.50	77.50	79.00	22.675	1.72e+06	1.000	25.60	0.00	236.40	145.13	0.00	0.00	0.00	145.13
2683	2683:BCT	2683:BotConn	77.50	77.00	77.25	23.160	1.75e+06	1.000	25.60	0.00	40.25	24.71	0.00	0.00	0.00	24.71

2683	2683:BotConn	2683:BCB	77.00	76.50	76.75	23.299	1.76e+06	1.000	25.60	0.00	40.50	24.85	0.00	0.00	0.00	24.85
2683	2683:BCB	2683:WVGD7	76.50	75.00	75.75	23.576	1.79e+06	1.000	25.60	0.00	122.96	75.45	0.00	0.00	0.00	75.45
2683	2683:WVGD7	2683:Arm3	75.00	70.50	72.75	24.408	1.85e+06	1.000	25.60	0.00	382.07	234.34	0.00	0.00	0.00	234.34
2683	2683:Arm3		70.50	67.75	69.13	25.413	1.93e+06	1.000	25.60	0.00	243.23	149.10	0.00	0.00	0.00	149.10
2683		2683:WVGD6	67.75	65.00	66.38	26.176	1.98e+06	1.000	25.60	0.00	250.62	153.58	0.00	0.00	0.00	153.58
2683	2683:WVGD6		65.00	62.25	63.63	26.938	2.04e+06	1.000	25.60	0.00	258.01	158.05	0.00	0.00	0.00	158.05
2683		2683:Arm4	62.25	59.50	60.88	27.701	2.1e+06	1.000	25.60	0.00	265.40	162.52	0.00	0.00	0.00	162.52
2683	2683:Arm4		59.50	55.17	57.33	28.683	2.17e+06	1.000	25.60	0.00	433.19	265.18	0.00	0.00	0.00	265.18
2683		2683:WVGD5	55.17	55.00	55.08	28.994	2.2e+06	1.000	25.60	0.00	36.98	10.31	0.00	0.00	0.00	10.31
2683	2683:WVGD5		55.00	51.00	53.00	29.259	2.22e+06	1.000	25.60	0.00	905.35	249.70	0.00	0.00	0.00	249.70
2683			51.00	48.00	49.50	30.230	2.29e+06	1.000	25.60	0.00	378.80	193.49	0.00	0.00	0.00	193.49
2683		2683:WVGD4	48.00	45.00	46.50	31.062	2.35e+06	1.000	25.60	0.00	389.27	198.81	0.00	0.00	0.00	198.81
2683	2683:WVGD4		45.00	40.00	42.50	32.171	2.44e+06	1.000	25.60	0.00	672.23	343.18	0.00	0.00	0.00	343.18
2683		2683:WVGD3	40.00	35.00	37.50	33.557	2.54e+06	1.000	25.60	0.00	701.54	357.97	0.00	0.00	0.00	357.97
2683	2683:WVGD3		35.00	30.00	32.50	34.943	2.65e+06	1.000	25.60	0.00	730.85	372.76	0.00	0.00	0.00	372.76
2683		2683:WVGD2	30.00	25.00	27.50	36.330	2.75e+06	1.000	25.60	0.00	760.16	387.55	0.00	0.00	0.00	387.55
2683	2683:WVGD2		25.00	20.25	22.63	37.682	2.85e+06	1.000	25.60	0.00	749.30	381.87	0.00	0.00	0.00	381.87
2683			20.25	17.63	18.94	38.329	2.9e+06	1.000	25.60	0.00	842.55	214.66	0.00	0.00	0.00	214.66
2683		2683:WVGD1	17.63	15.00	16.31	38.682	2.93e+06	1.000	25.60	0.00	858.71	216.64	0.00	0.00	0.00	216.64
2683	2683:WVGD1		15.00	10.00	12.50	39.739	3.01e+06	1.000	25.60	0.00	832.34	423.92	0.00	0.00	0.00	423.92
2683			10.00	5.00	7.50	41.125	3.12e+06	1.000	25.60	0.00	861.55	438.71	0.00	0.00	0.00	438.71
2683		2683:g	5.00	0.00	2.50	42.512	3.22e+06	1.000	25.60	0.00	890.86	453.50	0.00	0.00	0.00	453.50

*** Analysis Results:

Maximum element usage is 89.55% for Steel Pole "2683" in load case "NESC Extreme"
Maximum insulator usage is 35.88% for Clamp "Clamp17" in load case "NESC Extreme"



*** Analysis Results for Load Case No. 1 "NESC Heavy" - Number of iterations in SAPS 15

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)
2683:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
2683:t	0.07786	3.367	-0.08706	-3.9168	0.0872	0.0207	0.07786	3.367	89.91
2683:Arm1	0.07625	3.294	-0.08454	-3.9168	0.0872	0.0207	0.07625	3.294	88.84

2683:TopConn	0.07339	3.163	-0.08005	-3.9103	0.0871	0.0204	0.07339	3.163	86.92
2683:WVGD8	0.07041	3.026	-0.07539	-3.8958	0.0868	0.0201	0.07041	3.026	84.92
2683:Arm2	0.06819	2.925	-0.07193	-3.8777	0.0865	0.0199	0.06819	2.925	83.43
2683:BCT	0.05946	2.525	-0.05856	-3.7265	0.0841	0.0178	0.05946	2.525	77.44
2683:BotConn	0.05875	2.493	-0.0575	-3.7095	0.0838	0.0177	0.05875	2.493	76.94
2683:BCB	0.05803	2.461	-0.05643	-3.6911	0.0835	0.0175	0.05803	2.461	76.44
2683:WVGD7	0.0559	2.365	-0.05331	-3.6328	0.0826	0.0171	0.0559	2.365	74.95
2683:Arm3	0.04964	2.086	-0.04454	-3.4480	0.0796	0.0159	0.04964	2.086	70.46
2683:WVGD6	0.04237	1.767	-0.03506	-3.1874	0.0748	0.0136	0.04237	1.767	64.96
2683:Arm4	0.03556	1.474	-0.02702	-2.9092	0.0692	0.0117	0.03556	1.474	59.47
2683:WVGD5	0.0304	1.255	-0.02147	-2.6660	0.0640	0.0099	0.0304	1.255	54.98
2683:WVGD4	0.02031	0.8328	-0.01214	-2.1614	0.0525	0.0070	0.02031	0.8328	44.99
2683:WVGD3	0.01222	0.4989	-0.00615	-1.6557	0.0405	0.0048	0.01222	0.4989	34.99
2683:WVGD2	0.006191	0.2522	-0.002694	-1.1654	0.0286	0.0031	0.006191	0.2522	25
2683:WVGD1	0.002204	0.08963	-0.0009546	-0.6873	0.0169	0.0017	0.002204	0.08963	15
Davit1:O	0.07663	3.296	-0.02783	-3.9168	0.0872	0.0207	0.07663	2.465	88.89
Davit1:End	0.08135	3.408	0.2753	-3.9039	0.0898	0.0269	0.08135	-1.922	90.7
Davit2:O	0.07586	3.292	-0.1412	-3.9168	0.0872	0.0207	0.07586	4.122	88.78
Davit2:End	0.07608	3.386	-0.459	-4.0420	0.0876	0.0194	0.07608	8.716	89.96
Davit3:O	0.06859	2.927	-0.01155	-3.8777	0.0865	0.0199	0.06859	2.034	83.49
Davit3:End	0.0759	3.081	0.5668	-3.8388	0.0880	0.0246	0.0759	-6.482	86.07
Davit4:O	0.06779	2.923	-0.1323	-3.8777	0.0865	0.0199	0.06779	3.815	83.37
Davit4:End	0.06696	3.039	-0.7317	-3.9723	0.0867	0.0187	0.06696	12.6	84.77
Davit5:O	0.05002	2.088	0.01819	-3.4480	0.0796	0.0159	0.05002	1.045	70.52
Davit5:End	0.05939	2.287	0.7065	-3.3775	0.0824	0.0244	0.05939	-10.43	74.21
Davit6:O	0.04927	2.084	-0.1073	-3.4480	0.0796	0.0159	0.04927	3.127	70.39
Davit6:End	0.04942	2.248	-0.8355	-3.6283	0.0801	0.0136	0.04942	14.96	72.66
Davit7:O	0.03587	1.476	0.03236	-2.9092	0.0692	0.0117	0.03587	0.3058	59.53
Davit7:End	0.041	1.588	0.4662	-2.8686	0.0705	0.0163	0.041	-8.252	61.97
Davit8:O	0.03525	1.473	-0.08641	-2.9092	0.0692	0.0117	0.03525	2.643	59.41
Davit8:End	0.03545	1.565	-0.5376	-3.0049	0.0694	0.0104	0.03545	11.4	60.96

Joint Support Reactions for Load Case "NESC Heavy":

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 %
2683:g	-0.60	0.0	-24.68	0.0	0.0	-62.82	0.0	0.0	67.50	0.0	1976.24	0.0	-48.6	0.0	0.0	-3.33	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 Pt.
2683	2683:t	Origin	0.00	40.41	0.93	-1.04	0.00	0.00	0.0	-0.06	0.02	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	4
2683	2683:Arm1	End	1.08	39.52	0.91	-1.01	0.02	-0.00	0.0	-0.06	0.02	-0.00	-0.00	0.00	0.00	0.00	0.01	0.0	2
2683	2683:Arm1	Origin	1.08	39.52	0.91	-1.01	8.93	-0.20	0.4	-2.49	4.05	-0.13	-0.12	1.04	0.16	0.03	1.21	1.9	2
2683	2683:TopConn	End	3.00	37.95	0.88	-0.96	16.72	-0.45	0.4	-2.49	4.05	-0.13	-0.12	1.85	0.16	0.03	2.00	3.1	2
2683	2683:TopConn	Origin	3.00	37.95	0.88	-0.96	16.72	-0.45	0.4	-2.09	13.09	-0.14	-0.10	0.81	1.20	0.03	2.31	3.6	3
2683	2683:WVGD8	End	5.00	36.32	0.84	-0.90	42.90	-0.72	0.4	-2.09	13.09	-0.14	-0.10	4.49	0.49	0.02	4.67	7.2	2
2683	2683:WVGD8	Origin	5.00	36.32	0.84	-0.90	42.90	-0.72	0.4	-2.80	13.24	-0.14	-0.13	4.49	0.49	0.02	4.70	7.2	2
2683	2683:Arm2	End	6.50	35.09	0.82	-0.86	62.76	-0.92	0.4	-2.80	13.24	-0.14	-0.13	6.30	0.48	0.02	6.49	10.0	2
2683	2683:Arm2	Origin	6.50	35.09	0.82	-0.86	76.09	-1.25	1.3	-7.33	17.81	-0.30	-0.34	7.64	0.65	0.07	8.08	12.4	2
2683	Tube 1	End	9.50	32.68	0.77	-0.78	129.52	-2.16	1.3	-7.33	17.81	-0.30	-0.32	12.04	0.62	0.07	12.42	19.1	2
2683	Tube 1	Origin	9.50	32.68	0.77	-0.78	129.52	-2.16	1.3	-7.70	17.91	-0.30	-0.34	12.04	0.63	0.07	12.44	19.1	2
2683	2683:BCT	End	12.50	30.30	0.71	-0.70	183.26	-3.06	1.3	-7.70	17.91	-0.30	-0.33	15.80	0.60	0.06	16.17	24.9	2

2683	2683:BCT	Origin	12.50	30.30	0.71	-0.70	183.26	-3.06	1.3	-6.20	44.38	-0.31	-0.26	15.80	1.49	0.06	16.29	25.1	2
2683	2683:BotConn	End	13.00	29.91	0.70	-0.69	205.45	-3.22	1.3	-6.20	44.38	-0.31	-0.26	17.50	1.49	0.06	17.96	27.6	2
2683	2683:BotConn	Origin	13.00	29.91	0.70	-0.69	205.45	-3.22	1.3	-20.71	39.95	-0.33	-0.87	17.50	1.34	0.06	18.53	28.5	2
2683	2683:BCB	End	13.50	29.53	0.70	-0.68	225.42	-3.38	1.3	-20.71	39.95	-0.33	-0.87	18.96	1.33	0.06	19.97	30.7	2
2683	2683:BCB	Origin	13.50	29.53	0.70	-0.68	225.42	-3.38	1.3	-22.56	13.56	-0.32	-0.94	18.96	0.45	0.06	19.92	30.7	2
2683	2683:WVGD7	End	15.00	28.38	0.67	-0.64	245.76	-3.86	1.3	-22.56	13.56	-0.32	-0.93	19.94	0.44	0.06	20.89	32.1	2
2683	2683:WVGD7	Origin	15.00	28.38	0.67	-0.64	245.76	-3.86	1.3	-24.56	13.85	-0.32	-1.01	19.94	0.45	0.06	20.97	32.3	2
2683	2683:Arm3	End	19.50	25.04	0.60	-0.53	308.08	-5.31	1.3	-24.56	13.85	-0.32	-0.96	22.54	0.43	0.05	23.52	36.2	2
2683	2683:Arm3	Origin	19.50	25.04	0.60	-0.53	327.28	-5.80	2.5	-29.71	18.41	-0.49	-1.16	23.95	0.57	0.10	25.14	38.7	2
2683	Tube 1	End	22.25	23.08	0.55	-0.48	377.90	-7.13	2.5	-29.71	18.41	-0.49	-1.13	26.03	0.55	0.09	27.18	41.9	2
2683	Tube 1	Origin	22.25	23.08	0.55	-0.48	377.90	-7.14	2.5	-30.13	18.45	-0.49	-1.14	26.03	0.56	0.09	27.19	42.0	2
2683	2683:WVGD6	End	25.00	21.21	0.51	-0.42	428.65	-8.46	2.5	-30.13	18.45	-0.49	-1.11	27.83	0.54	0.09	28.96	45.4	2
2683	2683:WVGD6	Origin	25.00	21.21	0.51	-0.42	428.65	-8.47	2.5	-32.15	18.71	-0.49	-1.18	27.83	0.55	0.09	29.04	45.5	2
2683	Tube 1	End	27.75	19.41	0.47	-0.37	480.10	-9.80	2.5	-32.15	18.71	-0.49	-1.15	29.44	0.53	0.08	30.61	48.7	2
2683	Tube 1	Origin	27.75	19.41	0.47	-0.37	480.10	-9.80	2.5	-32.59	18.75	-0.48	-1.17	29.44	0.53	0.08	30.62	48.7	2
2683	2683:Arm4	End	30.50	17.69	0.43	-0.32	531.66	-11.13	2.5	-32.59	18.75	-0.48	-1.13	30.83	0.52	0.08	31.98	51.7	2
2683	2683:Arm4	Origin	30.50	17.69	0.43	-0.32	544.97	-11.46	3.3	-37.53	23.21	-0.65	-1.31	31.60	0.64	0.10	32.93	53.3	2
2683	SpliceT	End	34.83	15.15	0.37	-0.26	645.55	-14.24	3.3	-37.53	23.21	-0.65	-1.25	34.39	0.61	0.10	35.67	59.2	2
2683	SpliceT	Origin	34.83	15.15	0.37	-0.26	645.55	-14.25	3.3	-37.93	23.23	-0.64	-1.26	34.39	0.61	0.10	35.68	59.2	2
2683	2683:WVGD5	End	35.00	15.06	0.36	-0.26	649.43	-14.35	3.3	-37.93	23.23	-0.64	-1.08	30.23	0.53	0.08	31.32	48.2	2
2683	2683:WVGD5	Origin	35.00	15.06	0.36	-0.26	649.43	-14.36	3.3	-40.28	23.47	-0.65	-1.14	30.23	0.53	0.08	31.39	48.3	2
2683	SpliceB	End	39.00	12.91	0.31	-0.21	743.31	-16.92	3.3	-40.28	23.47	-0.65	-1.10	32.03	0.51	0.08	33.15	51.0	2
2683	SpliceB	Origin	39.00	12.91	0.31	-0.21	743.31	-16.93	3.3	-41.32	23.52	-0.64	-1.13	32.03	0.51	0.08	33.18	51.0	2
2683	Tube 2	End	42.00	11.40	0.28	-0.17	813.88	-18.85	3.3	-41.32	23.52	-0.64	-1.10	33.17	0.50	0.07	34.28	52.7	2
2683	Tube 2	Origin	42.00	11.40	0.28	-0.17	813.88	-18.85	3.3	-41.96	23.56	-0.64	-1.12	33.17	0.50	0.07	34.30	52.8	2
2683	2683:WVGD4	End	45.00	9.99	0.24	-0.15	884.55	-20.76	3.3	-41.96	23.56	-0.64	-1.09	34.14	0.48	0.07	35.24	54.9	2
2683	2683:WVGD4	Origin	45.00	9.99	0.24	-0.15	884.55	-20.77	3.3	-44.44	23.78	-0.64	-1.15	34.14	0.49	0.07	35.30	55.0	2
2683	Tube 2	End	50.00	7.86	0.19	-0.11	1003.47	-23.95	3.3	-44.44	23.78	-0.64	-1.10	35.48	0.47	0.06	36.59	58.3	2
2683	Tube 2	Origin	50.00	7.86	0.19	-0.11	1003.47	-23.96	3.3	-45.58	23.84	-0.63	-1.13	35.48	0.47	0.06	36.62	58.4	2
2683	2683:WVGD3	End	55.00	5.99	0.15	-0.07	1122.66	-27.11	3.3	-45.58	23.84	-0.63	-1.08	36.50	0.45	0.06	37.59	61.4	2
2683	2683:WVGD3	Origin	55.00	5.99	0.15	-0.07	1122.66	-27.12	3.3	-48.36	24.06	-0.63	-1.15	36.50	0.45	0.06	37.66	61.5	2
2683	Tube 2	End	60.00	4.38	0.11	-0.05	1242.95	-30.26	3.3	-48.36	24.06	-0.63	-1.10	37.28	0.44	0.05	38.39	64.3	2
2683	Tube 2	Origin	60.00	4.38	0.11	-0.05	1242.95	-30.27	3.3	-49.58	24.11	-0.63	-1.13	37.28	0.44	0.05	38.42	64.3	2
2683	2683:WVGD2	End	65.00	3.03	0.07	-0.03	1363.52	-33.38	3.3	-49.58	24.11	-0.63	-1.09	37.85	0.42	0.05	38.95	66.9	2
2683	2683:WVGD2	Origin	65.00	3.03	0.07	-0.03	1363.52	-33.39	3.3	-52.42	24.32	-0.62	-1.15	37.85	0.42	0.05	39.01	67.0	2
2683	SpliceT	End	69.75	1.97	0.05	-0.02	1479.04	-36.33	3.3	-52.42	24.32	-0.62	-1.11	38.25	0.41	0.05	39.36	69.3	2
2683	SpliceT	Origin	69.75	1.97	0.05	-0.02	1479.04	-36.34	3.3	-53.69	24.36	-0.62	-1.14	38.25	0.41	0.05	39.39	69.4	2
2683	Splice	End	72.38	1.49	0.04	-0.02	1543.00	-37.95	3.3	-53.69	24.36	-0.62	-1.14	39.95	0.41	0.05	41.09	72.3	2
2683	Splice	Origin	72.38	1.49	0.04	-0.02	1543.00	-37.96	3.3	-55.02	24.40	-0.62	-1.17	39.95	0.41	0.05	41.12	72.4	2
2683	2683:WVGD1	End	75.00	1.08	0.03	-0.01	1607.04	-39.56	3.3	-55.02	24.40	-0.62	-1.14	40.05	0.40	0.04	41.20	73.5	2
2683	2683:WVGD1	Origin	75.00	1.08	0.03	-0.01	1607.04	-39.57	3.3	-57.97	24.57	-0.61	-1.21	40.05	0.41	0.04	41.26	73.6	2
2683	Tube 3	End	80.00	0.48	0.01	-0.01	1729.89	-42.61	3.3	-57.97	24.57	-0.61	-1.16	40.16	0.39	0.04	41.33	75.8	2
2683	Tube 3	Origin	80.00	0.48	0.01	-0.01	1729.89	-42.62	3.3	-59.34	24.61	-0.61	-1.19	40.16	0.39	0.04	41.36	75.8	2
2683	Tube 3	End	85.00	0.12	0.00	-0.00	1852.94	-45.64	3.3	-59.34	24.61	-0.61	-1.15	40.18	0.38	0.04	41.34	77.9	2
2683	Tube 3	Origin	85.00	0.12	0.00	-0.00	1852.94	-45.65	3.3	-60.75	24.66	-0.60	-1.18	40.18	0.38	0.04	41.36	78.0	2
2683	2683:g	End	90.00	0.00	0.00	0.00	1976.24	-48.63	3.3	-60.75	24.66	-0.60	-1.14	40.11	0.37	0.04	41.26	80.1	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.
Davit1	Davit1:O	Origin	0.00	39.55	0.92	-0.33	-0.97	0.51	0.0	-1.94	0.20	-0.11	-0.31	0.81	0.07	0.00	1.13	1.7	1
Davit1	Davit1:End	End	4.74	40.90	0.98	3.30	-0.00	0.00	0.0	-1.94	0.20	-0.11	-0.57	0.00	0.13	0.00	0.61	0.9	1
Davit2	Davit2:O	Origin	0.00	39.50	0.91	-1.69	-9.42	-0.11	0.0	1.66	1.99	0.02	0.27	6.99	0.64	0.00	7.34	11.3	1
Davit2	Davit2:End	End	4.74	40.63	0.91	-5.51	0.00	0.00	0.0	1.66	1.99	0.02	0.49	0.00	1.16	0.00	2.07	3.2	1

Davit3	Davit3:O	Origin	0.00	35.12	0.82	-0.14	-9.66	1.13	0.0	-2.65	1.20	-0.13	-0.18	1.81	0.17	0.00	2.01	3.1	1
Davit3	#Davit3:0	End	4.45	36.05	0.87	3.34	-4.33	0.57	0.0	-2.65	1.20	-0.13	-0.25	1.49	0.23	0.00	1.78	2.7	1
Davit3	#Davit3:0	Origin	4.45	36.05	0.87	3.34	-4.33	0.57	0.0	-2.58	0.97	-0.13	-0.24	1.49	0.19	0.00	1.76	2.7	1
Davit3	Davit3:End	End	8.90	36.97	0.91	6.80	-0.00	0.00	0.0	-2.58	0.97	-0.13	-0.37	0.00	0.29	0.00	0.62	1.0	1
Davit4	Davit4:O	Origin	0.00	35.07	0.81	-1.59	-22.57	-0.33	-0.0	1.61	2.66	0.04	0.11	4.20	0.37	0.00	4.36	6.7	1
Davit4	#Davit4:0	End	4.45	35.77	0.81	-5.16	-10.75	-0.16	-0.0	1.61	2.66	0.04	0.15	3.67	0.50	0.00	3.92	6.0	1
Davit4	#Davit4:0	Origin	4.45	35.77	0.81	-5.16	-10.75	-0.16	0.0	1.65	2.42	0.04	0.16	3.67	0.46	0.00	3.91	6.0	1
Davit4	Davit4:End	End	8.90	36.47	0.80	-8.78	0.00	0.00	0.0	1.65	2.42	0.04	0.24	0.00	0.70	0.00	1.24	1.9	1
Davit5	Davit5:O	Origin	0.00	25.06	0.60	0.22	-13.35	1.53	0.0	-2.71	1.29	-0.13	-0.19	2.50	0.18	0.00	2.71	4.2	1
Davit5	#Davit5:0	End	5.00	26.06	0.64	3.67	-6.90	0.90	0.0	-2.71	1.29	-0.13	-0.24	2.11	0.23	0.00	2.39	3.7	1
Davit5	#Davit5:0	Origin	5.00	26.06	0.64	3.67	-6.90	0.89	0.0	-2.63	1.05	-0.13	-0.23	2.11	0.19	0.00	2.37	3.6	1
Davit5	#Davit5:1	End	8.52	26.75	0.68	6.08	-3.19	0.45	0.0	-2.63	1.05	-0.13	-0.29	1.51	0.23	0.00	1.85	2.8	1
Davit5	#Davit5:1	Origin	8.52	26.75	0.68	6.08	-3.19	0.45	0.0	-2.58	0.90	-0.13	-0.29	1.51	0.20	0.00	1.83	2.8	1
Davit5	Davit5:End	End	12.05	27.45	0.71	8.48	-0.00	0.00	0.0	-2.58	0.90	-0.13	-0.38	0.00	0.27	0.00	0.59	0.9	1
Davit6	Davit6:O	Origin	0.00	25.01	0.59	-1.29	-32.05	-0.44	-0.0	1.49	2.86	0.04	0.10	5.96	0.40	0.00	6.10	9.4	1
Davit6	#Davit6:0	End	5.00	25.82	0.59	-4.86	-17.77	-0.26	-0.0	1.49	2.86	0.04	0.13	5.40	0.51	0.00	5.60	8.6	1
Davit6	#Davit6:0	Origin	5.00	25.82	0.59	-4.86	-17.77	-0.26	-0.0	1.54	2.60	0.04	0.14	5.40	0.46	0.00	5.59	8.6	1
Davit6	#Davit6:1	End	8.52	26.39	0.59	-7.42	-8.60	-0.13	-0.0	1.54	2.60	0.04	0.17	4.04	0.57	0.00	4.32	6.7	1
Davit6	#Davit6:1	Origin	8.52	26.39	0.59	-7.42	-8.60	-0.13	0.0	1.58	2.44	0.04	0.17	4.04	0.54	0.00	4.31	6.6	1
Davit6	Davit6:End	End	12.05	26.97	0.59	-10.03	0.00	0.00	0.0	1.58	2.44	0.04	0.23	0.00	0.71	0.00	1.25	1.9	1
Davit7	Davit7:O	Origin	0.00	17.71	0.43	0.39	-10.06	1.13	0.0	-2.63	1.24	-0.13	-0.18	1.88	0.17	0.00	2.09	3.2	1
Davit7	#Davit7:0	End	4.45	18.38	0.46	3.00	-4.53	0.56	0.0	-2.63	1.24	-0.13	-0.25	1.56	0.24	0.00	1.85	2.8	1
Davit7	#Davit7:0	Origin	4.45	18.38	0.46	3.00	-4.53	0.56	0.0	-2.56	1.02	-0.13	-0.24	1.56	0.19	0.00	1.83	2.8	1
Davit7	Davit7:End	End	8.90	19.05	0.49	5.59	-0.00	0.00	0.0	-2.56	1.02	-0.13	-0.37	0.00	0.30	0.00	0.64	1.0	1
Davit8	Davit8:O	Origin	0.00	17.67	0.42	-1.04	-22.82	-0.32	-0.0	1.56	2.68	0.04	0.11	4.24	0.37	0.00	4.40	6.8	1
Davit8	#Davit8:0	End	4.45	18.22	0.42	-3.72	-10.87	-0.16	-0.0	1.56	2.68	0.04	0.15	3.71	0.51	0.00	3.96	6.1	1
Davit8	#Davit8:0	Origin	4.45	18.22	0.42	-3.72	-10.87	-0.16	0.0	1.61	2.44	0.04	0.15	3.71	0.46	0.00	3.95	6.1	1
Davit8	Davit8:End	End	8.90	18.78	0.43	-6.45	0.00	0.00	0.0	1.61	2.44	0.04	0.23	0.00	0.71	0.00	1.25	1.9	1

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

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Holding Usage %	Input Hardware Capacity (kips)	Factored Hardware Capacity (kips)	Hardware Usage %	Max. Usage %
Clamp1	1.926	80.00	80.00	2.41	0.00	0.00	0.00	2.41
Clamp2	2.554	80.00	80.00	3.19	0.00	0.00	0.00	3.19
Clamp3	2.698	80.00	80.00	3.37	0.00	0.00	0.00	3.37
Clamp4	2.853	80.00	80.00	3.57	0.00	0.00	0.00	3.57
Clamp5	2.698	80.00	80.00	3.37	0.00	0.00	0.00	3.37
Clamp6	2.853	80.00	80.00	3.57	0.00	0.00	0.00	3.57
Clamp7	2.698	80.00	80.00	3.37	0.00	0.00	0.00	3.37
Clamp8	2.853	80.00	80.00	3.57	0.00	0.00	0.00	3.57
Clamp9	1.614	80.00	80.00	2.02	0.00	0.00	0.00	2.02
Clamp10	1.614	80.00	80.00	2.02	0.00	0.00	0.00	2.02
Clamp11	1.614	80.00	80.00	2.02	0.00	0.00	0.00	2.02
Clamp12	1.614	80.00	80.00	2.02	0.00	0.00	0.00	2.02
Clamp13	1.614	80.00	80.00	2.02	0.00	0.00	0.00	2.02
Clamp14	1.614	80.00	80.00	2.02	0.00	0.00	0.00	2.02
Clamp15	1.614	80.00	80.00	2.02	0.00	0.00	0.00	2.02
Clamp17	8.989	80.00	80.00	11.24	0.00	0.00	0.00	11.24

Clamp18	15.104	80.00	80.00	18.88	0.00	0.00	0.00	18.88
Clamp19	0.519	80.00	80.00	0.65	0.00	0.00	0.00	0.65
Clamp20	26.466	80.00	80.00	33.08	0.00	0.00	0.00	33.08
Clamp21	26.466	80.00	80.00	33.08	0.00	0.00	0.00	33.08

*** Analysis Results for Load Case No. 2 "NESC Extreme" - Number of iterations in SAPS 15

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)
2683:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
2683:t	0.04806	4.295	-0.1407	-5.2208	0.0536	0.0117	0.04806	4.295	89.86
2683:Arm1	0.04707	4.197	-0.1362	-5.2208	0.0536	0.0117	0.04707	4.197	88.78
2683:TopConn	0.04532	4.022	-0.1282	-5.2171	0.0535	0.0116	0.04532	4.022	86.87
2683:WVGD8	0.0435	3.84	-0.1199	-5.1972	0.0534	0.0114	0.0435	3.84	84.88
2683:Arm2	0.04214	3.705	-0.1138	-5.1647	0.0532	0.0113	0.04214	3.705	83.39
2683:BCT	0.03679	3.176	-0.09045	-4.8952	0.0518	0.0101	0.03679	3.176	77.41
2683:BotConn	0.03635	3.134	-0.08863	-4.8650	0.0516	0.0100	0.03635	3.134	76.91
2683:BCB	0.03591	3.091	-0.08683	-4.8336	0.0514	0.0099	0.03591	3.091	76.41
2683:WVGD7	0.03461	2.966	-0.08157	-4.7377	0.0509	0.0097	0.03461	2.966	74.92
2683:Arm3	0.03076	2.605	-0.06702	-4.4423	0.0491	0.0089	0.03076	2.605	70.43
2683:WVGD6	0.02628	2.197	-0.05175	-4.0580	0.0462	0.0076	0.02628	2.197	64.95
2683:Arm4	0.02208	1.826	-0.03912	-3.6643	0.0428	0.0065	0.02208	1.826	59.46
2683:WVGD5	0.01889	1.551	-0.0306	-3.3353	0.0396	0.0055	0.01889	1.551	54.97
2683:WVGD4	0.01264	1.025	-0.01657	-2.6783	0.0326	0.0039	0.01264	1.025	44.98
2683:WVGD3	0.007619	0.6128	-0.007847	-2.0401	0.0252	0.0026	0.007619	0.6128	34.99
2683:WVGD2	0.003867	0.3093	-0.003026	-1.4314	0.0179	0.0017	0.003867	0.3093	25
2683:WVGD1	0.001379	0.1099	-0.0008149	-0.8429	0.0106	0.0009	0.001379	0.1099	15
Davit1:O	0.04731	4.2	-0.06065	-5.2208	0.0536	0.0117	0.04731	3.37	88.86
Davit1:End	0.0502	4.356	0.343	-5.2283	0.0551	0.0150	0.0502	-0.9744	90.76
Davit2:O	0.04683	4.194	-0.2117	-5.2208	0.0536	0.0117	0.04683	5.024	88.71
Davit2:End	0.04695	4.312	-0.6305	-5.2763	0.0538	0.0108	0.04695	9.642	89.79
Davit3:O	0.04239	3.708	-0.03343	-5.1647	0.0532	0.0113	0.04239	2.816	83.47
Davit3:End	0.04692	3.923	0.738	-5.1552	0.0542	0.0142	0.04692	-5.639	86.24
Davit4:O	0.04189	3.701	-0.1942	-5.1647	0.0532	0.0113	0.04189	4.594	83.31
Davit4:End	0.04136	3.847	-0.9868	-5.2099	0.0534	0.0103	0.04136	13.41	84.51
Davit5:O	0.03099	2.608	0.01376	-4.4423	0.0491	0.0089	0.03099	1.565	70.51
Davit5:End	0.03678	2.875	0.9066	-4.4251	0.0509	0.0142	0.03678	-9.838	74.41
Davit6:O	0.03053	2.602	-0.1478	-4.4423	0.0491	0.0089	0.03053	3.645	70.35
Davit6:End	0.03068	2.801	-1.071	-4.5308	0.0494	0.0070	0.03068	15.51	72.43
Davit7:O	0.02227	1.828	0.03566	-3.6643	0.0428	0.0065	0.02227	0.6583	59.54
Davit7:End	0.02543	1.974	0.5846	-3.6531	0.0437	0.0094	0.02543	-7.866	62.08
Davit8:O	0.0219	1.824	-0.1139	-3.6643	0.0428	0.0065	0.0219	2.994	59.39
Davit8:End	0.02206	1.934	-0.6763	-3.7109	0.0430	0.0055	0.02206	11.77	60.82

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 %
2683:g	-0.39	0.0	-30.44	0.0	0.0	-31.45	0.0	0.0	43.77	0.0	2422.92	0.0	-30.5	0.0	0.0	-1.83	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 Pt.

2683	2683:t	Origin	0.00	51.54	0.58	-1.69	-0.00	0.00	0.0	-0.04	0.03	-0.00	-0.00	0.00	0.00	0.00	0.01	0.0	4
2683	2683:Arm1	End	1.08	50.36	0.56	-1.63	0.03	-0.00	0.0	-0.04	0.03	-0.00	-0.00	0.00	0.00	0.00	0.01	0.0	2
2683	2683:Arm1	Origin	1.08	50.36	0.56	-1.63	5.01	-0.11	0.2	-0.89	2.41	-0.07	-0.04	0.59	0.09	0.01	0.66	1.0	2
2683	2683:TopConn	End	3.00	48.27	0.54	-1.54	9.65	-0.25	0.2	-0.89	2.41	-0.07	-0.04	1.07	0.09	0.01	1.13	1.7	2
2683	2683:TopConn	Origin	3.00	48.27	0.54	-1.54	9.65	-0.25	0.2	1.59	31.10	-0.08	0.08	0.03	3.08	0.01	5.36	8.3	4
2683	2683:WVGD8	End	5.00	46.09	0.52	-1.44	71.85	-0.41	0.2	1.59	31.10	-0.08	0.07	7.48	1.15	0.01	7.82	12.0	2
2683	2683:WVGD8	Origin	5.00	46.09	0.52	-1.44	71.85	-0.41	0.2	1.34	31.31	-0.08	0.06	7.48	1.16	0.01	7.81	12.0	2
2683	2683:Arm2	End	6.50	44.46	0.51	-1.37	118.81	-0.53	0.2	1.34	31.31	-0.08	0.06	11.88	1.14	0.01	12.10	18.6	2
2683	2683:Arm2	Origin	6.50	44.46	0.51	-1.37	127.36	-0.74	0.7	-0.73	34.56	-0.19	-0.03	12.74	1.26	0.04	12.97	20.0	2
2683	Tube 1	End	9.50	41.24	0.47	-1.22	231.03	-1.30	0.7	-0.73	34.56	-0.19	-0.03	21.38	1.21	0.04	21.52	33.1	2
2683	Tube 1	Origin	9.50	41.24	0.47	-1.22	231.03	-1.31	0.7	-1.04	34.72	-0.19	-0.05	21.38	1.21	0.04	21.53	33.1	2
2683	2683:BCT	End	12.50	38.11	0.44	-1.09	335.18	-1.86	0.7	-1.04	34.72	-0.19	-0.04	28.77	1.17	0.03	28.89	44.4	2
2683	2683:BCT	Origin	12.50	38.11	0.44	-1.09	335.18	-1.86	0.7	-0.19	47.02	-0.19	-0.01	28.77	1.58	0.03	28.92	44.5	2
2683	2683:BotConn	End	13.00	37.60	0.44	-1.06	358.68	-1.96	0.7	-0.19	47.02	-0.19	-0.01	30.42	1.57	0.03	30.55	47.0	2
2683	2683:BotConn	Origin	13.00	37.60	0.44	-1.06	358.68	-1.96	0.7	-8.24	30.27	-0.19	-0.35	30.42	1.01	0.03	30.82	47.4	2
2683	2683:BCB	End	13.50	37.09	0.43	-1.04	373.82	-2.05	0.7	-8.24	30.27	-0.19	-0.35	31.32	1.01	0.03	31.71	48.8	2
2683	2683:BCB	Origin	13.50	37.09	0.43	-1.04	373.82	-2.05	0.7	-9.38	18.11	-0.19	-0.39	31.32	0.60	0.03	31.73	48.8	2
2683	2683:WVGD7	End	15.00	35.59	0.42	-0.98	400.97	-2.34	0.7	-9.38	18.11	-0.19	-0.39	32.41	0.59	0.03	32.81	50.5	2
2683	2683:WVGD7	Origin	15.00	35.59	0.42	-0.98	400.97	-2.34	0.7	-10.11	18.55	-0.19	-0.42	32.41	0.61	0.03	32.84	50.5	2
2683	2683:Arm3	End	19.50	31.26	0.37	-0.80	484.46	-3.19	0.7	-10.11	18.55	-0.19	-0.39	35.29	0.58	0.03	35.70	54.9	2
2683	2683:Arm3	Origin	19.50	31.26	0.37	-0.80	497.01	-3.51	1.4	-12.62	21.85	-0.30	-0.49	36.21	0.68	0.05	36.73	56.5	2
2683	Tube 1	End	22.25	28.76	0.34	-0.71	557.10	-4.32	1.4	-12.62	21.85	-0.30	-0.48	38.20	0.66	0.05	38.69	59.5	2
2683	Tube 1	Origin	22.25	28.76	0.34	-0.71	557.10	-4.33	1.4	-12.94	21.98	-0.30	-0.49	38.20	0.66	0.05	38.71	59.5	2
2683	2683:WVGD6	End	25.00	26.36	0.32	-0.62	617.53	-5.14	1.4	-12.94	21.98	-0.30	-0.48	39.91	0.64	0.05	40.40	62.2	2
2683	2683:WVGD6	Origin	25.00	26.36	0.32	-0.62	617.53	-5.14	1.4	-13.68	22.40	-0.30	-0.50	39.91	0.65	0.05	40.43	62.2	2
2683	Tube 1	End	27.75	24.08	0.29	-0.54	679.14	-5.95	1.4	-13.68	22.40	-0.30	-0.49	41.44	0.64	0.04	41.95	64.5	2
2683	Tube 1	Origin	27.75	24.08	0.29	-0.54	679.14	-5.95	1.3	-14.02	22.53	-0.30	-0.50	41.44	0.64	0.04	41.96	64.6	2
2683	2683:Arm4	End	30.50	21.91	0.27	-0.47	741.11	-6.76	1.3	-14.02	22.53	-0.30	-0.49	42.77	0.62	0.04	43.27	67.4	2
2683	2683:Arm4	Origin	30.50	21.91	0.27	-0.47	749.69	-6.98	1.8	-16.42	25.78	-0.40	-0.57	43.27	0.71	0.06	43.86	68.3	2
2683	SpliceT	End	34.83	18.72	0.23	-0.37	861.41	-8.71	1.8	-16.42	25.78	-0.40	-0.55	45.67	0.68	0.05	46.23	73.5	2
2683	SpliceT	Origin	34.83	18.72	0.23	-0.37	861.41	-8.71	1.8	-16.73	25.88	-0.40	-0.56	45.67	0.68	0.05	46.25	73.5	2
2683	2683:WVGD5	End	35.00	18.61	0.23	-0.37	865.72	-8.78	1.8	-16.73	25.88	-0.40	-0.48	40.10	0.58	0.05	40.59	62.4	2
2683	2683:WVGD5	Origin	35.00	18.61	0.23	-0.37	865.72	-8.78	1.8	-17.69	26.29	-0.40	-0.50	40.10	0.59	0.05	40.61	62.5	2
2683	SpliceB	End	39.00	15.92	0.20	-0.29	970.89	-10.38	1.8	-17.69	26.29	-0.40	-0.48	41.63	0.57	0.04	42.13	64.8	2
2683	SpliceB	Origin	39.00	15.92	0.20	-0.29	970.89	-10.39	1.8	-18.43	26.48	-0.40	-0.50	41.63	0.57	0.04	42.15	64.8	2
2683	Tube 2	End	42.00	14.05	0.17	-0.24	1050.32	-11.58	1.8	-18.43	26.48	-0.40	-0.49	42.59	0.56	0.04	43.09	66.3	2
2683	Tube 2	Origin	42.00	14.05	0.17	-0.24	1050.32	-11.59	1.8	-18.91	26.63	-0.40	-0.50	42.59	0.56	0.04	43.10	66.3	2
2683	2683:WVGD4	End	45.00	12.30	0.15	-0.20	1130.20	-12.78	1.8	-18.91	26.63	-0.40	-0.49	43.40	0.55	0.04	43.90	67.5	2
2683	2683:WVGD4	Origin	45.00	12.30	0.15	-0.20	1130.20	-12.79	1.8	-19.98	27.12	-0.40	-0.52	43.40	0.56	0.04	43.93	67.6	2
2683	Tube 2	End	50.00	9.66	0.12	-0.14	1265.82	-14.77	1.8	-19.98	27.12	-0.40	-0.49	44.53	0.53	0.03	45.04	69.3	2
2683	Tube 2	Origin	50.00	9.66	0.12	-0.14	1265.82	-14.78	1.8	-20.82	27.39	-0.40	-0.52	44.53	0.54	0.03	45.06	69.3	2
2683	2683:WVGD3	End	55.00	7.35	0.09	-0.09	1402.76	-16.76	1.8	-20.82	27.39	-0.40	-0.49	45.38	0.52	0.03	45.88	72.0	2
2683	2683:WVGD3	Origin	55.00	7.35	0.09	-0.09	1402.76	-16.77	1.8	-22.12	27.95	-0.40	-0.53	45.38	0.53	0.03	45.91	72.1	2
2683	Tube 2	End	60.00	5.37	0.07	-0.06	1542.50	-18.74	1.8	-22.12	27.95	-0.40	-0.50	46.04	0.51	0.03	46.55	74.6	2
2683	Tube 2	Origin	60.00	5.37	0.07	-0.06	1542.50	-18.75	1.8	-23.01	28.23	-0.40	-0.53	46.04	0.51	0.03	46.57	74.6	2
2683	2683:WVGD2	End	65.00	3.71	0.05	-0.04	1683.65	-20.72	1.8	-23.01	28.23	-0.40	-0.51	46.50	0.49	0.03	47.02	76.9	2
2683	2683:WVGD2	Origin	65.00	3.71	0.05	-0.04	1683.65	-20.72	1.8	-24.34	28.80	-0.39	-0.53	46.50	0.50	0.03	47.05	77.0	2
2683	SpliceT	End	69.75	2.42	0.03	-0.02	1820.42	-22.59	1.8	-24.34	28.80	-0.39	-0.52	46.84	0.48	0.03	47.36	79.1	2
2683	SpliceT	Origin	69.75	2.42	0.03	-0.02	1820.42	-22.59	1.8	-25.24	29.02	-0.39	-0.54	46.84	0.49	0.03	47.38	79.1	2
2683	Splice	End	72.38	1.83	0.02	-0.01	1896.59	-23.62	1.8	-25.24	29.02	-0.39	-0.54	48.86	0.49	0.03	49.40	82.5	2
2683	Splice	Origin	72.38	1.83	0.02	-0.01	1896.59	-23.62	1.8	-26.17	29.18	-0.39	-0.56	48.86	0.49	0.03	49.42	82.5	2
2683	2683:WVGD1	End	75.00	1.32	0.02	-0.01	1973.17	-24.65	1.8	-26.17	29.18	-0.39	-0.54	48.93	0.48	0.02	49.48	83.5	2
2683	2683:WVGD1	Origin	75.00	1.32	0.02	-0.01	1973.17	-24.65	1.8	-27.57	29.68	-0.39	-0.57	48.93	0.49	0.02	49.51	83.6	2
2683	Tube 3	End	80.00	0.58	0.01	-0.00	2121.57	-26.60	1.8	-27.57	29.68	-0.39	-0.55	49.01	0.47	0.02	49.57	85.6	2
2683	Tube 3	Origin	80.00	0.58	0.01	-0.00	2121.57	-26.61	1.8	-28.56	29.98	-0.39	-0.57	49.01	0.48	0.02	49.59	85.6	2
2683	Tube 3	End	85.00	0.15	0.00	-0.00	2271.47	-28.54	1.8	-28.56	29.98	-0.39	-0.55	49.01	0.46	0.02	49.57	87.5	2
2683	Tube 3	Origin	85.00	0.15	0.00	-0.00	2271.47	-28.55	1.8	-29.58	30.29	-0.39	-0.57	49.01	0.47	0.02	49.59	87.6	2
2683	2683:g	End	90.00	0.00	0.00	0.00	2422.92	-30.48	1.8	-29.58	30.29	-0.39	-0.56	48.93	0.45	0.02	49.50	89.6	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.
Davit1	Davit1:O	Origin	0.00	50.40	0.57	-0.73	0.56	0.27	0.0	-0.97	-0.12	-0.06	-0.16	0.46	0.04	0.00	0.62	1.0	1
Davit1	Davit1:End	End	4.74	52.27	0.60	4.12	-0.00	0.00	0.0	-0.97	-0.12	-0.06	-0.28	0.00	0.08	0.00	0.31	0.5	1
Davit2	Davit2:O	Origin	0.00	50.32	0.56	-2.54	-4.18	-0.07	0.0	1.13	0.88	0.02	0.18	3.10	0.28	0.00	3.31	5.1	1
Davit2	Davit2:End	End	4.74	51.75	0.56	-7.57	0.00	0.00	0.0	1.13	0.88	0.02	0.33	0.00	0.51	0.00	0.95	1.5	1
Davit3	Davit3:O	Origin	0.00	44.50	0.51	-0.40	-2.61	0.70	0.0	-1.59	0.36	-0.08	-0.11	0.50	0.05	0.00	0.62	1.0	1
Davit3	#Davit3:0	End	4.45	45.79	0.54	4.23	-1.00	0.35	0.0	-1.59	0.36	-0.08	-0.15	0.36	0.07	0.00	0.53	0.8	1
Davit3	#Davit3:0	Origin	4.45	45.79	0.54	4.23	-1.00	0.35	0.0	-1.54	0.22	-0.08	-0.15	0.36	0.04	0.00	0.51	0.8	1
Davit3	Davit3:End	End	8.90	47.08	0.56	8.86	-0.00	0.00	0.0	-1.54	0.22	-0.08	-0.22	0.00	0.07	0.00	0.25	0.4	1
Davit4	Davit4:O	Origin	0.00	44.41	0.50	-2.33	-10.92	-0.25	-0.0	1.38	1.31	0.03	0.10	2.03	0.18	0.00	2.15	3.3	1
Davit4	#Davit4:0	End	4.45	45.28	0.50	-7.07	-5.10	-0.13	-0.0	1.38	1.31	0.03	0.13	1.74	0.25	0.00	1.92	3.0	1
Davit4	#Davit4:0	Origin	4.45	45.28	0.50	-7.07	-5.10	-0.13	0.0	1.41	1.15	0.03	0.13	1.74	0.22	0.00	1.91	2.9	1
Davit4	Davit4:End	End	8.90	46.16	0.50	-11.84	0.00	0.00	0.0	1.41	1.15	0.03	0.20	0.00	0.33	0.00	0.61	0.9	1
Davit5	Davit5:O	Origin	0.00	31.30	0.37	0.17	-3.77	0.95	0.0	-1.63	0.42	-0.08	-0.11	0.72	0.06	0.00	0.84	1.3	1
Davit5	#Davit5:0	End	5.00	32.63	0.40	4.62	-1.66	0.56	0.0	-1.63	0.42	-0.08	-0.14	0.53	0.08	0.00	0.69	1.1	1
Davit5	#Davit5:0	Origin	5.00	32.63	0.40	4.62	-1.66	0.56	0.0	-1.57	0.28	-0.08	-0.14	0.53	0.05	0.00	0.68	1.0	1
Davit5	#Davit5:1	End	8.52	33.57	0.42	7.75	-0.67	0.28	0.0	-1.57	0.28	-0.08	-0.17	0.34	0.06	0.00	0.53	0.8	1
Davit5	#Davit5:1	Origin	8.52	33.57	0.42	7.75	-0.67	0.28	0.0	-1.54	0.19	-0.08	-0.17	0.34	0.05	0.00	0.52	0.8	1
Davit5	Davit5:End	End	12.05	34.50	0.44	10.88	-0.00	0.00	0.0	-1.54	0.19	-0.08	-0.22	0.00	0.06	0.00	0.25	0.4	1
Davit6	Davit6:O	Origin	0.00	31.22	0.37	-1.77	-16.02	-0.34	-0.0	1.32	1.46	0.03	0.09	2.98	0.20	0.00	3.09	4.8	1
Davit6	#Davit6:0	End	5.00	32.21	0.37	-6.34	-8.71	-0.20	-0.0	1.32	1.46	0.03	0.12	2.64	0.26	0.00	2.80	4.3	1
Davit6	#Davit6:0	Origin	5.00	32.21	0.37	-6.34	-8.71	-0.20	-0.0	1.35	1.29	0.03	0.12	2.64	0.23	0.00	2.79	4.3	1
Davit6	#Davit6:1	End	8.52	32.91	0.37	-9.59	-4.16	-0.10	-0.0	1.35	1.29	0.03	0.15	1.95	0.29	0.00	2.16	3.3	1
Davit6	#Davit6:1	Origin	8.52	32.91	0.37	-9.59	-4.16	-0.10	0.0	1.37	1.18	0.03	0.15	1.95	0.26	0.00	2.15	3.3	1
Davit6	Davit6:End	End	12.05	33.61	0.37	-12.85	0.00	0.00	0.0	1.37	1.18	0.03	0.20	0.00	0.34	0.00	0.63	1.0	1
Davit7	Davit7:O	Origin	0.00	21.94	0.27	0.43	-2.99	0.70	0.0	-1.58	0.41	-0.08	-0.11	0.57	0.06	0.00	0.69	1.1	1
Davit7	#Davit7:0	End	4.45	22.81	0.29	3.72	-1.18	0.35	0.0	-1.58	0.41	-0.08	-0.15	0.42	0.08	0.00	0.59	0.9	1
Davit7	#Davit7:0	Origin	4.45	22.81	0.29	3.72	-1.18	0.35	0.0	-1.53	0.27	-0.08	-0.14	0.42	0.05	0.00	0.57	0.9	1
Davit7	Davit7:End	End	8.90	23.68	0.31	7.02	-0.00	0.00	0.0	-1.53	0.27	-0.08	-0.22	0.00	0.08	0.00	0.26	0.4	1
Davit8	Davit8:O	Origin	0.00	21.88	0.26	-1.37	-11.26	-0.25	-0.0	1.35	1.35	0.03	0.09	2.09	0.19	0.00	2.21	3.4	1
Davit8	#Davit8:0	End	4.45	22.55	0.26	-4.73	-5.26	-0.12	-0.0	1.35	1.35	0.03	0.13	1.80	0.25	0.00	1.97	3.0	1
Davit8	#Davit8:0	Origin	4.45	22.55	0.26	-4.73	-5.26	-0.12	0.0	1.38	1.18	0.03	0.13	1.80	0.22	0.00	1.97	3.0	1
Davit8	Davit8:End	End	8.90	23.21	0.26	-8.12	0.00	0.00	0.0	1.38	1.18	0.03	0.20	0.00	0.34	0.00	0.63	1.0	1

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

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Holding Usage %	Input Hardware Capacity (kips)	Factored Hardware Capacity (kips)	Hardware Usage %	Max. Usage %
Clamp1	0.964	80.00	80.00	1.21	0.00	0.00	0.00	1.21
Clamp2	1.414	80.00	80.00	1.77	0.00	0.00	0.00	1.77
Clamp3	1.532	80.00	80.00	1.91	0.00	0.00	0.00	1.91
Clamp4	1.780	80.00	80.00	2.22	0.00	0.00	0.00	2.22

Clamp5	1.532	80.00	80.00	1.91	0.00	0.00	0.00	1.91
Clamp6	1.780	80.00	80.00	2.22	0.00	0.00	0.00	2.22
Clamp7	1.532	80.00	80.00	1.91	0.00	0.00	0.00	1.91
Clamp8	1.780	80.00	80.00	2.22	0.00	0.00	0.00	2.22
Clamp9	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp10	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp11	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp12	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp13	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp14	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp15	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp17	28.708	80.00	80.00	35.88	0.00	0.00	0.00	35.88
Clamp18	18.580	80.00	80.00	23.22	0.00	0.00	0.00	23.22
Clamp19	0.159	80.00	80.00	0.20	0.00	0.00	0.00	0.20
Clamp20	12.251	80.00	80.00	15.31	0.00	0.00	0.00	15.31
Clamp21	12.251	80.00	80.00	15.31	0.00	0.00	0.00	15.31

*** Analysis Results for Load Case No. 3 "NESC Extreme Long" - Number of iterations in SAPS 16

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

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)
2683:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
2683:t	3.17	0.03233	-0.0783	-0.0482	3.9567	0.0081	3.17	0.03233	89.92
2683:Arm1	3.095	0.03141	-0.07572	-0.0482	3.9567	0.0081	3.095	0.03141	88.84
2683:TopConn	2.963	0.02979	-0.07114	-0.0473	3.9563	0.0080	2.963	0.02979	86.93
2683:WVGD8	2.825	0.02813	-0.06637	-0.0465	3.9415	0.0078	2.825	0.02813	84.93
2683:Arm2	2.722	0.02691	-0.06284	-0.0459	3.9136	0.0078	2.722	0.02691	83.44
2683:BCT	2.322	0.02227	-0.04948	-0.0412	3.6849	0.0070	2.322	0.02227	77.45
2683:BotConn	2.29	0.02191	-0.04844	-0.0408	3.6589	0.0069	2.29	0.02191	76.95
2683:BCB	2.258	0.02155	-0.04742	-0.0405	3.6319	0.0069	2.258	0.02155	76.45
2683:WVGD7	2.164	0.02048	-0.04445	-0.0395	3.5496	0.0067	2.164	0.02048	74.96
2683:Arm3	1.894	0.01745	-0.03632	-0.0367	3.3000	0.0063	1.894	0.01745	70.46
2683:WVGD6	1.592	0.01411	-0.02791	-0.0317	2.9898	0.0054	1.592	0.01411	64.97
2683:Arm4	1.32	0.01124	-0.02105	-0.0274	2.6793	0.0047	1.32	0.01124	59.48
2683:WVGD5	1.119	0.009219	-0.01648	-0.0234	2.4273	0.0039	1.119	0.009219	54.98
2683:WVGD4	0.738	0.0057	-0.009008	-0.0168	1.9363	0.0028	0.738	0.0057	44.99
2683:WVGD3	0.4404	0.003216	-0.004378	-0.0116	1.4691	0.0019	0.4404	0.003216	35
2683:WVGD2	0.2221	0.001544	-0.001795	-0.0075	1.0285	0.0012	0.2221	0.001544	25
2683:WVGD1	0.07888	0.0005234	-0.0005627	-0.0042	0.6051	0.0006	0.07888	0.0005234	15
Davit1:O	3.095	0.03142	-0.07503	-0.0482	3.9567	0.0081	3.095	-0.7988	88.84
Davit1:End	3.2	0.0313	-0.07902	-0.0309	3.9594	0.0148	3.2	-5.299	90.34
Davit2:O	3.095	0.03141	-0.07642	-0.0482	3.9567	0.0081	3.095	0.8616	88.84
Davit2:End	3.197	0.03437	-0.08885	-0.0839	3.9589	0.0039	3.197	5.365	90.33
Davit3:O	2.722	0.02691	-0.06212	-0.0459	3.9136	0.0078	2.722	-0.8659	83.44
Davit3:End	2.86	0.02693	-0.06681	-0.0187	3.9156	0.0144	2.86	-9.536	85.43
Davit4:O	2.721	0.0269	-0.06355	-0.0459	3.9136	0.0078	2.721	0.9197	83.44
Davit4:End	2.856	0.03025	-0.08271	-0.0824	3.9152	0.0030	2.856	9.593	85.42
Davit5:O	1.895	0.01745	-0.03565	-0.0367	3.3000	0.0063	1.895	-1.026	70.46
Davit5:End	2.07	0.01664	-0.04396	0.0145	3.3042	0.0197	2.07	-12.7	73.46
Davit6:O	1.894	0.01745	-0.03698	-0.0367	3.3000	0.0063	1.894	1.06	70.46
Davit6:End	2.066	0.02257	-0.06195	-0.1049	3.3035	-0.0035	2.066	12.74	73.44
Davit7:O	1.32	0.01124	-0.0205	-0.0274	2.6793	0.0047	1.32	-1.159	59.48
Davit7:End	1.415	0.01116	-0.02311	-0.0001	2.6812	0.0114	1.415	-9.829	61.48
Davit8:O	1.32	0.01124	-0.02161	-0.0274	2.6793	0.0047	1.32	1.181	59.48
Davit8:End	1.413	0.01341	-0.03323	-0.0638	2.6808	-0.0001	1.413	9.853	61.47

Joint Support Reactions for Load Case "NESC Extreme Long":

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 %
2683:g	-21.97	0.0	-0.03	0.0	0.0	-31.48	0.0	0.0	38.39	0.0	10.96	0.0	-1739.2	0.0	0.0	-1.29	0.0	0.0

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

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 Pt.

2683	2683:t	Origin	0.00	0.39	38.04	-0.94	0.00	0.00	0.0	-0.04	0.00	-0.03	-0.00	0.00	0.00	0.00	0.00	0.0	1
2683	2683:Arm1	End	1.08	0.38	37.14	-0.91	0.00	-0.03	0.0	-0.04	0.00	-0.03	-0.00	0.00	0.00	0.00	0.01	0.0	3
2683	2683:Arm1	Origin	1.08	0.38	37.14	-0.91	1.66	-0.39	0.1	-1.08	0.00	-0.45	-0.05	0.21	0.04	0.01	0.28	0.4	2
2683	2683:TopConn	End	3.00	0.36	35.55	-0.85	1.66	-1.26	0.1	-1.08	0.00	-0.45	-0.05	0.24	0.04	0.01	0.30	0.5	2
2683	2683:TopConn	Origin	3.00	0.36	35.55	-0.85	1.66	-1.26	0.1	0.76	-0.00	-29.19	0.04	0.18	2.89	0.01	5.03	7.7	1
2683	2683:WVGD8	End	5.00	0.34	33.89	-0.80	1.66	-59.64	0.1	0.76	-0.00	-29.19	0.04	6.27	1.08	0.01	6.58	10.1	3
2683	2683:WVGD8	Origin	5.00	0.34	33.89	-0.80	1.66	-59.64	0.1	0.51	-0.00	-29.39	0.02	6.27	1.09	0.01	6.57	10.1	3
2683	2683:Arm2	End	6.50	0.32	32.66	-0.75	1.65	-103.73	0.1	0.51	-0.00	-29.39	0.02	10.42	1.07	0.01	10.61	16.3	3
2683	2683:Arm2	Origin	6.50	0.32	32.66	-0.75	4.02	-104.80	0.4	-1.79	-0.00	-30.43	-0.08	10.62	1.11	0.02	10.88	16.7	3
2683	Tube 1	End	9.50	0.29	30.22	-0.67	4.02	-196.09	0.4	-1.79	-0.00	-30.43	-0.08	18.25	1.06	0.02	18.43	28.4	3
2683	Tube 1	Origin	9.50	0.29	30.22	-0.67	4.02	-196.09	0.4	-2.08	0.00	-30.59	-0.09	18.25	1.07	0.02	18.44	28.4	3
2683	2683:BCT	End	12.50	0.27	27.86	-0.59	4.02	-287.85	0.4	-2.08	0.00	-30.59	-0.09	24.80	1.03	0.02	24.95	38.4	3
2683	2683:BCT	Origin	12.50	0.27	27.86	-0.59	4.02	-287.85	0.4	-1.47	-0.00	-42.90	-0.06	24.80	1.44	0.02	24.99	38.4	3
2683	2683:BotConn	End	13.00	0.26	27.48	-0.58	4.02	-309.30	0.4	-1.47	-0.00	-42.90	-0.06	26.31	1.44	0.02	26.49	40.8	3
2683	2683:BotConn	Origin	13.00	0.26	27.48	-0.58	4.02	-309.30	0.4	-9.17	0.01	-25.99	-0.39	26.31	0.87	0.02	26.74	41.1	3
2683	2683:BCB	End	13.50	0.26	27.09	-0.57	4.02	-322.29	0.4	-9.17	0.01	-25.99	-0.38	27.08	0.86	0.02	27.51	42.3	3
2683	2683:BCB	Origin	13.50	0.26	27.09	-0.57	4.02	-322.29	0.4	-10.06	0.01	-13.54	-0.42	27.08	0.45	0.02	27.51	42.3	3
2683	2683:WVGD7	End	15.00	0.25	25.97	-0.53	4.03	-342.60	0.4	-10.06	0.01	-13.54	-0.41	27.76	0.44	0.02	28.18	43.4	3
2683	2683:WVGD7	Origin	15.00	0.25	25.97	-0.53	4.03	-342.60	0.4	-10.77	0.01	-13.97	-0.44	27.76	0.46	0.02	28.21	43.4	3
2683	2683:Arm3	End	19.50	0.21	22.73	-0.44	4.08	-405.47	0.4	-10.77	0.01	-13.97	-0.42	29.58	0.43	0.02	30.01	46.2	3
2683	2683:Arm3	Origin	19.50	0.21	22.73	-0.44	7.22	-407.35	0.9	-13.45	0.01	-15.30	-0.53	29.81	0.47	0.04	30.35	46.7	3
2683	Tube 1	End	22.25	0.19	20.88	-0.38	7.26	-449.42	0.9	-13.45	0.01	-15.30	-0.51	30.92	0.46	0.03	31.44	48.4	3
2683	Tube 1	Origin	22.25	0.19	20.88	-0.38	7.26	-449.42	0.9	-13.74	0.01	-15.43	-0.52	30.92	0.46	0.03	31.45	48.4	3
2683	2683:WVGD6	End	25.00	0.17	19.11	-0.33	7.29	-491.85	0.9	-13.74	0.01	-15.43	-0.51	31.87	0.45	0.03	32.39	49.8	3
2683	2683:WVGD6	Origin	25.00	0.17	19.11	-0.33	7.29	-491.85	0.9	-14.46	0.01	-15.85	-0.53	31.87	0.46	0.03	32.42	49.9	3
2683	Tube 1	End	27.75	0.15	17.43	-0.29	7.33	-535.43	0.9	-14.46	0.01	-15.85	-0.52	32.74	0.45	0.03	33.27	51.2	3
2683	Tube 1	Origin	27.75	0.15	17.43	-0.29	7.33	-535.43	0.9	-14.77	0.01	-15.98	-0.53	32.74	0.45	0.03	33.28	51.2	3
2683	2683:Arm4	End	30.50	0.13	15.84	-0.25	7.36	-579.38	0.9	-14.77	0.01	-15.98	-0.51	33.48	0.44	0.03	34.01	52.9	3
2683	2683:Arm4	Origin	30.50	0.13	15.84	-0.25	9.79	-580.38	1.3	-17.29	0.01	-17.04	-0.60	33.60	0.47	0.04	34.21	53.3	3
2683	SpliceT	End	34.83	0.11	13.51	-0.20	9.86	-654.22	1.3	-17.29	0.01	-17.04	-0.58	34.76	0.45	0.04	35.34	56.2	3
2683	SpliceT	Origin	34.83	0.11	13.51	-0.20	9.86	-654.22	1.3	-17.56	0.01	-17.15	-0.59	34.76	0.45	0.04	35.35	56.2	3
2683	2683:WVGD5	End	35.00	0.11	13.43	-0.20	9.86	-657.08	1.3	-17.56	0.01	-17.15	-0.50	30.49	0.39	0.03	31.00	47.7	3
2683	2683:WVGD5	Origin	35.00	0.11	13.43	-0.20	9.86	-657.08	1.3	-18.49	0.01	-17.55	-0.53	30.49	0.40	0.03	31.03	47.7	3
2683	SpliceB	End	39.00	0.09	11.48	-0.16	9.92	-727.29	1.3	-18.49	0.01	-17.55	-0.51	31.22	0.38	0.03	31.74	48.8	3
2683	SpliceB	Origin	39.00	0.09	11.48	-0.16	9.92	-727.29	1.3	-19.18	0.02	-17.74	-0.52	31.22	0.38	0.03	31.76	48.9	3
2683	Tube 2	End	42.00	0.08	10.12	-0.13	9.97	-780.52	1.3	-19.18	0.02	-17.74	-0.51	31.67	0.37	0.03	32.19	49.5	3
2683	Tube 2	Origin	42.00	0.08	10.12	-0.13	9.97	-780.52	1.3	-19.61	0.02	-17.90	-0.52	31.67	0.38	0.03	32.20	49.5	3
2683	2683:WVGD4	End	45.00	0.07	8.86	-0.11	10.02	-834.23	1.3	-19.61	0.02	-17.90	-0.51	32.04	0.37	0.03	32.56	50.1	3
2683	2683:WVGD4	Origin	45.00	0.07	8.86	-0.11	10.02	-834.23	1.3	-20.63	0.02	-18.41	-0.53	32.04	0.38	0.03	32.58	50.1	3
2683	Tube 2	End	50.00	0.05	6.95	-0.08	10.11	-926.28	1.3	-20.63	0.02	-18.41	-0.51	32.58	0.36	0.02	33.09	50.9	3
2683	Tube 2	Origin	50.00	0.05	6.95	-0.08	10.10	-926.28	1.3	-21.39	0.02	-18.69	-0.53	32.58	0.37	0.02	33.11	50.9	3
2683	2683:WVGD3	End	55.00	0.04	5.29	-0.05	10.20	-1019.75	1.3	-21.39	0.02	-18.69	-0.51	32.96	0.35	0.02	33.48	52.5	3
2683	2683:WVGD3	Origin	55.00	0.04	5.29	-0.05	10.19	-1019.75	1.3	-22.61	0.02	-19.27	-0.54	32.96	0.36	0.02	33.50	52.6	3
2683	Tube 2	End	60.00	0.03	3.86	-0.03	10.29	-1116.11	1.3	-22.61	0.02	-19.27	-0.52	33.27	0.35	0.02	33.79	54.1	3
2683	Tube 2	Origin	60.00	0.03	3.86	-0.03	10.28	-1116.11	1.3	-23.44	0.02	-19.58	-0.53	33.27	0.35	0.02	33.81	54.2	3
2683	2683:WVGD2	End	65.00	0.02	2.67	-0.02	10.39	-1214.00	1.3	-23.44	0.02	-19.58	-0.51	33.48	0.34	0.02	34.00	55.6	3
2683	2683:WVGD2	Origin	65.00	0.02	2.67	-0.02	10.38	-1214.00	1.3	-24.69	0.02	-20.17	-0.54	33.48	0.35	0.02	34.03	55.7	3
2683	SpliceT	End	69.75	0.01	1.74	-0.01	10.48	-1309.80	1.3	-24.69	0.02	-20.17	-0.52	33.64	0.34	0.02	34.17	57.1	3
2683	SpliceT	Origin	69.75	0.01	1.74	-0.01	10.48	-1309.80	1.3	-25.55	0.02	-20.41	-0.54	33.64	0.34	0.02	34.19	57.1	3
2683	Splice	End	72.38	0.01	1.31	-0.01	10.54	-1363.37	1.3	-25.55	0.02	-20.41	-0.54	35.05	0.34	0.02	35.60	59.4	3
2683	Splice	Origin	72.38	0.01	1.31	-0.01	10.54	-1363.37	1.3	-26.44	0.02	-20.59	-0.56	35.05	0.35	0.02	35.62	59.5	3
2683	2683:WVGD1	End	75.00	0.01	0.95	-0.01	10.60	-1417.41	1.3	-26.44	0.02	-20.59	-0.55	35.07	0.34	0.02	35.63	60.2	3
2683	2683:WVGD1	Origin	75.00	0.01	0.95	-0.01	10.59	-1417.41	1.3	-27.77	0.02	-21.11	-0.58	35.07	0.35	0.02	35.66	60.2	3
2683	Tube 3	End	80.00	0.00	0.42	-0.00	10.71	-1522.97	1.3	-27.77	0.02	-21.11	-0.56	35.10	0.34	0.02	35.67	61.6	3
2683	Tube 3	Origin	80.00	0.00	0.42	-0.00	10.71	-1522.97	1.3	-28.70	0.02	-21.45	-0.58	35.10	0.34	0.02	35.69	61.6	3
2683	Tube 3	End	85.00	0.00	0.11	-0.00	10.83	-1630.22	1.3	-28.70	0.02	-21.45	-0.56	35.09	0.33	0.01	35.65	63.0	3
2683	Tube 3	Origin	85.00	0.00	0.11	-0.00	10.83	-1630.22	1.3	-29.65	0.02	-21.80	-0.58	35.09	0.33	0.01	35.67	63.0	3
2683	2683:g	End	90.00	0.00	0.00	0.00	10.96	-1739.20	1.3	-29.65	0.02	-21.80	-0.56	35.03	0.32	0.01	35.60	64.4	3

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

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.
Davit1	Davit1:O	Origin	0.00	0.38	37.14	-0.90	-1.27	0.61	0.0	-0.09	0.27	-0.13	-0.01	1.04	0.10	0.00	1.07	1.6	1
Davit1	Davit1:End	End	4.74	0.38	38.40	-0.95	-0.00	-0.00	0.0	-0.09	0.27	-0.13	-0.03	0.00	0.17	0.00	0.30	0.5	1
Davit2	Davit2:O	Origin	0.00	0.38	37.14	-0.92	-2.67	-0.49	-0.0	-0.19	0.56	0.10	-0.03	2.01	0.18	0.00	2.07	3.2	1
Davit2	Davit2:End	End	4.74	0.41	38.37	-1.07	-0.00	0.00	-0.0	-0.19	0.56	0.10	-0.05	0.00	0.33	0.00	0.58	0.9	1
Davit3	Davit3:O	Origin	0.00	0.32	32.66	-0.75	-6.63	2.50	0.0	-0.19	0.82	-0.37	-0.01	1.32	0.13	0.00	1.35	2.1	1
Davit3	#Davit3:0	End	4.45	0.32	33.49	-0.77	-2.99	0.85	0.0	-0.19	0.82	-0.37	-0.02	1.06	0.17	0.00	1.12	1.7	1
Davit3	#Davit3:0	Origin	4.45	0.32	33.49	-0.77	-2.99	0.85	0.0	-0.16	0.67	-0.19	-0.01	1.06	0.13	0.00	1.10	1.7	1
Davit3	Davit3:End	End	8.90	0.32	34.32	-0.80	-0.00	-0.00	0.0	-0.16	0.67	-0.19	-0.02	0.00	0.20	0.00	0.35	0.5	1
Davit4	Davit4:O	Origin	0.00	0.32	32.66	-0.76	-8.77	-2.18	-0.0	-0.25	1.06	0.33	-0.02	1.68	0.15	0.00	1.72	2.6	1
Davit4	#Davit4:0	End	4.45	0.34	33.46	-0.87	-4.06	-0.69	-0.0	-0.25	1.06	0.33	-0.02	1.41	0.21	0.00	1.48	2.3	1
Davit4	#Davit4:0	Origin	4.45	0.34	33.46	-0.87	-4.06	-0.69	-0.0	-0.21	0.91	0.16	-0.02	1.41	0.17	0.00	1.46	2.2	1
Davit4	Davit4:End	End	8.90	0.36	34.27	-0.99	-0.00	0.00	-0.0	-0.21	0.91	0.16	-0.03	0.00	0.27	0.00	0.47	0.7	1
Davit5	Davit5:O	Origin	0.00	0.21	22.74	-0.43	-9.49	3.93	0.0	-0.24	0.91	-0.47	-0.02	1.91	0.14	0.00	1.94	3.0	1
Davit5	#Davit5:0	End	5.00	0.21	23.61	-0.45	-4.96	1.57	0.0	-0.24	0.91	-0.47	-0.02	1.58	0.18	0.00	1.63	2.5	1
Davit5	#Davit5:0	Origin	5.00	0.21	23.61	-0.45	-4.96	1.57	0.0	-0.20	0.75	-0.28	-0.02	1.58	0.14	0.00	1.62	2.5	1
Davit5	#Davit5:1	End	8.52	0.21	24.22	-0.48	-2.30	0.57	0.0	-0.20	0.75	-0.28	-0.02	1.11	0.18	0.00	1.18	1.8	1
Davit5	#Davit5:1	Origin	8.52	0.21	24.22	-0.48	-2.30	0.57	0.0	-0.17	0.65	-0.16	-0.02	1.11	0.15	0.00	1.16	1.8	1
Davit5	Davit5:End	End	12.05	0.20	24.84	-0.53	-0.00	-0.00	0.0	-0.17	0.65	-0.16	-0.02	0.00	0.20	0.00	0.34	0.5	1
Davit6	Davit6:O	Origin	0.00	0.21	22.73	-0.44	-12.38	-3.46	-0.0	-0.30	1.15	0.43	-0.02	2.39	0.17	0.00	2.43	3.7	1
Davit6	#Davit6:0	End	5.00	0.23	23.58	-0.55	-6.64	-1.30	-0.0	-0.30	1.15	0.43	-0.03	2.05	0.22	0.00	2.12	3.3	1
Davit6	#Davit6:0	Origin	5.00	0.23	23.58	-0.55	-6.64	-1.30	-0.0	-0.25	0.99	0.24	-0.02	2.05	0.18	0.00	2.10	3.2	1
Davit6	#Davit6:1	End	8.52	0.25	24.19	-0.64	-3.14	-0.44	-0.0	-0.25	0.99	0.24	-0.03	1.49	0.23	0.00	1.57	2.4	1
Davit6	#Davit6:1	Origin	8.52	0.25	24.19	-0.64	-3.14	-0.44	-0.0	-0.23	0.89	0.12	-0.03	1.49	0.20	0.00	1.55	2.4	1
Davit6	Davit6:End	End	12.05	0.27	24.79	-0.74	-0.00	0.00	-0.0	-0.23	0.89	0.12	-0.03	0.00	0.26	0.00	0.46	0.7	1
Davit7	Davit7:O	Origin	0.00	0.13	15.84	-0.25	-6.67	2.36	0.0	-0.19	0.82	-0.35	-0.01	1.32	0.13	0.00	1.35	2.1	1
Davit7	#Davit7:0	End	4.45	0.14	16.41	-0.25	-3.01	0.79	0.0	-0.19	0.82	-0.35	-0.02	1.06	0.17	0.00	1.12	1.7	1
Davit7	#Davit7:0	Origin	4.45	0.14	16.41	-0.25	-3.01	0.79	0.0	-0.16	0.68	-0.18	-0.01	1.06	0.13	0.00	1.10	1.7	1
Davit7	Davit7:End	End	8.90	0.13	16.98	-0.28	-0.00	-0.00	0.0	-0.16	0.68	-0.18	-0.02	0.00	0.20	0.00	0.35	0.5	1
Davit8	Davit8:O	Origin	0.00	0.13	15.84	-0.26	-8.81	-2.00	-0.0	-0.25	1.06	0.31	-0.02	1.68	0.15	0.00	1.72	2.6	1
Davit8	#Davit8:0	End	4.45	0.15	16.39	-0.32	-4.07	-0.61	-0.0	-0.25	1.06	0.31	-0.02	1.41	0.21	0.00	1.47	2.3	1
Davit8	#Davit8:0	Origin	4.45	0.15	16.39	-0.32	-4.07	-0.61	-0.0	-0.21	0.92	0.14	-0.02	1.41	0.17	0.00	1.46	2.2	1
Davit8	Davit8:End	End	8.90	0.16	16.95	-0.40	-0.00	0.00	-0.0	-0.21	0.92	0.14	-0.03	0.00	0.27	0.00	0.47	0.7	1

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

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Holding Usage %	Input Hardware Capacity (kips)	Factored Hardware Capacity (kips)	Hardware Usage %	Max. Usage %
Clamp1	0.255	80.00	80.00	0.32	0.00	0.00	0.00	0.32
Clamp2	0.558	80.00	80.00	0.70	0.00	0.00	0.00	0.70
Clamp3	0.639	80.00	80.00	0.80	0.00	0.00	0.00	0.80
Clamp4	0.878	80.00	80.00	1.10	0.00	0.00	0.00	1.10

Clamp5	0.639	80.00	80.00	0.80	0.00	0.00	0.00	0.80
Clamp6	0.878	80.00	80.00	1.10	0.00	0.00	0.00	1.10
Clamp7	0.639	80.00	80.00	0.80	0.00	0.00	0.00	0.80
Clamp8	0.878	80.00	80.00	1.10	0.00	0.00	0.00	1.10
Clamp9	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp10	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp11	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp12	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp13	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp14	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp15	0.514	80.00	80.00	0.64	0.00	0.00	0.00	0.64
Clamp17	28.708	80.00	80.00	35.88	0.00	0.00	0.00	35.88
Clamp18	18.580	80.00	80.00	23.22	0.00	0.00	0.00	23.22
Clamp19	0.159	80.00	80.00	0.20	0.00	0.00	0.00	0.20
Clamp20	12.251	80.00	80.00	15.31	0.00	0.00	0.00	15.31
Clamp21	12.521	80.00	80.00	15.65	0.00	0.00	0.00	15.65

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

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Height AGL (ft)	Segment Number	Weight (lbs)
2683	89.55	NESC Extreme	2.5	29	13920.9

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)	Bolt Mom. Sum (ft-k)	# Bolts Acting	Bolt Max Load (kips)	Min Plate Thickness (in)	Actual Thickness (in)	Usage %
2683	NESC Heavy	1	1.833	0.713	0.713	1.833	19.000	10.987	26.094	1	70.024	1.341	3.000	19.98
2683	NESC Heavy	2	0.713	-1.833	1.833	-0.713	19.000	11.281	26.793	1	-71.899	1.359	3.000	20.51
2683	NESC Heavy	3	-0.792	-1.800	0.792	-1.800	19.000	23.923	56.818	2	-81.256	1.979	3.000	43.50
2683	NESC Heavy	4	-1.833	-0.713	-0.713	-1.833	19.000	9.380	22.276	1	-59.779	1.239	3.000	17.05
2683	NESC Heavy	5	-0.713	1.833	-1.833	0.713	19.000	12.889	30.611	1	82.145	1.452	3.000	23.43
2683	NESC Heavy	6	0.792	1.800	-0.792	1.800	19.000	26.995	64.113	2	91.501	2.102	3.000	49.08
2683	NESC Heavy	7	1.477	1.497	0.014	2.103	19.000	26.209	62.247	3	88.571	2.071	3.000	47.65
2683	NESC Heavy	8	0.014	-2.103	1.477	-1.497	19.000	25.623	60.855	3	-84.161	2.048	3.000	46.59
2683	NESC Heavy	9	-1.477	-1.497	-0.014	-2.103	19.000	22.939	54.480	3	-78.325	1.937	3.000	41.71
2683	NESC Heavy	10	-0.014	2.103	-1.477	1.497	19.000	28.894	68.623	3	94.407	2.174	3.000	52.53
2683	NESC Extreme	1	1.833	0.713	0.713	1.833	19.000	13.448	31.940	1	85.711	1.483	3.000	24.45
2683	NESC Extreme	2	0.713	-1.833	1.833	-0.713	19.000	13.853	32.901	1	-88.291	1.506	3.000	25.19
2683	NESC Extreme	3	-0.792	-1.800	0.792	-1.800	19.000	30.461	72.346	2	-102.515	2.233	3.000	55.38
2683	NESC Extreme	4	-1.833	-0.713	-0.713	-1.833	19.000	12.661	30.070	1	-80.694	1.439	3.000	23.02
2683	NESC Extreme	5	-0.713	1.833	-1.833	0.713	19.000	14.640	34.771	1	93.308	1.548	3.000	26.62
2683	NESC Extreme	6	0.792	1.800	-0.792	1.800	19.000	31.966	75.918	2	107.533	2.287	3.000	58.12
2683	NESC Extreme	7	1.477	1.497	0.014	2.103	19.000	31.734	75.367	3	105.696	2.279	3.000	57.70
2683	NESC Extreme	8	0.014	-2.103	1.477	-1.497	19.000	31.815	75.559	3	-104.336	2.282	3.000	57.84
2683	NESC Extreme	9	-1.477	-1.497	-0.014	-2.103	19.000	30.132	71.563	3	-100.679	2.221	3.000	54.79
2683	NESC Extreme	10	-0.014	2.103	-1.477	1.497	19.000	33.416	79.363	3	109.354	2.338	3.000	60.76
2683	NESC Extreme Long	1	1.833	0.713	0.713	1.833	19.000	33.548	79.677	1	-213.814	2.343	3.000	61.00
2683	NESC Extreme Long	2	0.713	-1.833	1.833	-0.713	19.000	33.672	79.970	1	-214.601	2.347	3.000	61.22
2683	NESC Extreme Long	3	-0.792	-1.800	0.792	-1.800	19.000	15.710	37.311	2	54.436	1.603	3.000	28.56
2683	NESC Extreme Long	4	-1.833	-0.713	-0.713	-1.833	19.000	34.336	81.548	1	218.836	2.370	3.000	62.43
2683	NESC Extreme Long	5	-0.713	1.833	-1.833	0.713	19.000	34.460	81.841	1	219.623	2.375	3.000	62.65
2683	NESC Extreme Long	6	0.792	1.800	-0.792	1.800	19.000	15.710	37.311	2	55.378	1.603	3.000	28.56
2683	NESC Extreme Long	7	1.477	1.497	0.014	2.103	19.000	47.055	111.755	3	-213.814	2.775	3.000	85.55
2683	NESC Extreme Long	8	0.014	-2.103	1.477	-1.497	19.000	47.342	112.438	3	-214.601	2.783	3.000	86.08
2683	NESC Extreme Long	9	-1.477	-1.497	-0.014	-2.103	19.000	48.658	115.563	3	218.836	2.822	3.000	88.47
2683	NESC Extreme Long	10	-0.014	2.103	-1.477	1.497	19.000	48.946	116.245	3	219.623	2.830	3.000	88.99

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Height AGL (ft)	Segment Number	Weight (lbs)
Davit1	1.74	NESC Heavy	89.7	1	77.9
Davit2	11.29	NESC Heavy	89.7	1	77.9
Davit3	3.10	NESC Heavy	84.0	1	321.0
Davit4	6.70	NESC Heavy	84.0	1	321.0

Davit5	4.16	NESC Heavy	71.1	1	434.7
Davit6	9.39	NESC Heavy	71.1	1	434.7
Davit7	3.21	NESC Heavy	60.0	1	321.0
Davit8	6.77	NESC Heavy	60.0	1	321.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	80.06	2683	Steel Pole
NESC Extreme	89.55	2683	Steel Pole
NESC Extreme Long	88.99	2683	Base Plate

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Height AGL (ft)	Segment Number
NESC Heavy	80.06	2683	2.5	29
NESC Extreme	89.55	2683	2.5	29
NESC Extreme Long	64.40	2683	2.5	29

Summary of Base Plate Usages by Load Case:

Load Case	Pole Label	Bend Line #	Length (in)	Vertical Load (kips)	X Moment (ft-k)	Y Moment (ft-k)	Bending 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	2683	10	19.000	61.471	1976.240	-48.633	28.894	68.623	3	94.407	2.174	52.53
NESC Extreme	2683	10	19.000	30.104	2422.918	-30.482	33.416	79.363	3	109.354	2.338	60.76
NESC Extreme Long	2683	10	19.000	30.132	10.960	-1739.200	48.946	116.245	3	219.623	2.830	88.99

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Height AGL (ft)	Segment Number
NESC Heavy	11.29	Davit2	89.7	1
NESC Extreme	5.10	Davit2	89.7	1
NESC Extreme Long	3.74	Davit6	71.1	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	2.41	NESC Heavy	0.0
Clamp2	Clamp	3.19	NESC Heavy	0.0
Clamp3	Clamp	3.37	NESC Heavy	0.0
Clamp4	Clamp	3.57	NESC Heavy	0.0
Clamp5	Clamp	3.37	NESC Heavy	0.0
Clamp6	Clamp	3.57	NESC Heavy	0.0

Clamp7	Clamp	3.37	NESC Heavy	0.0
Clamp8	Clamp	3.57	NESC Heavy	0.0
Clamp9	Clamp	2.02	NESC Heavy	0.0
Clamp10	Clamp	2.02	NESC Heavy	0.0
Clamp11	Clamp	2.02	NESC Heavy	0.0
Clamp12	Clamp	2.02	NESC Heavy	0.0
Clamp13	Clamp	2.02	NESC Heavy	0.0
Clamp14	Clamp	2.02	NESC Heavy	0.0
Clamp15	Clamp	2.02	NESC Heavy	0.0
Clamp17	Clamp	35.88	NESC Extreme	0.0
Clamp18	Clamp	23.22	NESC Extreme	0.0
Clamp19	Clamp	0.65	NESC Heavy	0.0
Clamp20	Clamp	33.08	NESC Heavy	0.0
Clamp21	Clamp	33.08	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	Clamp1	Clamp	Davit1:End	0.105	1.715	0.871	1.926
NESC Heavy	Clamp2	Clamp	Davit2:End	0.021	2.103	1.449	2.554
NESC Heavy	Clamp3	Clamp	Davit3:End	0.124	2.183	1.581	2.698
NESC Heavy	Clamp4	Clamp	Davit4:End	0.033	2.006	2.028	2.853
NESC Heavy	Clamp5	Clamp	Davit5:End	0.124	2.183	1.581	2.698
NESC Heavy	Clamp6	Clamp	Davit6:End	0.033	2.006	2.028	2.853
NESC Heavy	Clamp7	Clamp	Davit7:End	0.124	2.183	1.581	2.698
NESC Heavy	Clamp8	Clamp	Davit8:End	0.033	2.006	2.028	2.853
NESC Heavy	Clamp9	Clamp	2683:WVGD1	0.000	0.119	1.610	1.614
NESC Heavy	Clamp10	Clamp	2683:WVGD2	0.000	0.119	1.610	1.614
NESC Heavy	Clamp11	Clamp	2683:WVGD3	0.000	0.119	1.610	1.614
NESC Heavy	Clamp12	Clamp	2683:WVGD4	0.000	0.119	1.610	1.614
NESC Heavy	Clamp13	Clamp	2683:WVGD5	0.000	0.119	1.610	1.614
NESC Heavy	Clamp14	Clamp	2683:WVGD6	0.000	0.119	1.610	1.614
NESC Heavy	Clamp15	Clamp	2683:WVGD7	0.000	0.119	1.610	1.614
NESC Heavy	Clamp17	Clamp	2683:TopConn	0.000	8.989	0.000	8.989
NESC Heavy	Clamp18	Clamp	2683:BotConn	0.000	-5.377	14.115	15.104
NESC Heavy	Clamp19	Clamp	2683:WVGD8	0.000	0.055	0.516	0.519
NESC Heavy	Clamp20	Clamp	2683:BCT	0.000	26.466	0.000	26.466
NESC Heavy	Clamp21	Clamp	2683:BCB	0.000	-26.466	0.000	26.466
NESC Extreme	Clamp1	Clamp	Davit1:End	0.057	0.930	0.249	0.964
NESC Extreme	Clamp2	Clamp	Davit2:End	0.015	1.299	0.558	1.414
NESC Extreme	Clamp3	Clamp	Davit3:End	0.078	1.392	0.634	1.532
NESC Extreme	Clamp4	Clamp	Davit4:End	0.027	1.548	0.878	1.780
NESC Extreme	Clamp5	Clamp	Davit5:End	0.078	1.392	0.634	1.532
NESC Extreme	Clamp6	Clamp	Davit6:End	0.027	1.548	0.878	1.780
NESC Extreme	Clamp7	Clamp	Davit7:End	0.078	1.392	0.634	1.532
NESC Extreme	Clamp8	Clamp	Davit8:End	0.027	1.548	0.878	1.780
NESC Extreme	Clamp9	Clamp	2683:WVGD1	0.000	0.270	0.437	0.514
NESC Extreme	Clamp10	Clamp	2683:WVGD2	0.000	0.270	0.437	0.514
NESC Extreme	Clamp11	Clamp	2683:WVGD3	0.000	0.270	0.437	0.514
NESC Extreme	Clamp12	Clamp	2683:WVGD4	0.000	0.270	0.437	0.514
NESC Extreme	Clamp13	Clamp	2683:WVGD5	0.000	0.270	0.437	0.514
NESC Extreme	Clamp14	Clamp	2683:WVGD6	0.000	0.270	0.437	0.514
NESC Extreme	Clamp15	Clamp	2683:WVGD7	0.000	0.270	0.437	0.514
NESC Extreme	Clamp17	Clamp	2683:TopConn	0.000	28.708	0.000	28.708
NESC Extreme	Clamp18	Clamp	2683:BotConn	0.000	-17.393	6.534	18.580

NESC Extreme	Clamp19	Clamp	2683:WVGD8	0.000	0.106	0.119	0.159
NESC Extreme	Clamp20	Clamp	2683:BCT	0.000	12.251	0.000	12.251
NESC Extreme	Clamp21	Clamp	2683:BCB	0.000	-12.251	0.000	12.251
NESC Extreme Long	Clamp1	Clamp	Davit1:End	0.057	0.000	0.249	0.255
NESC Extreme Long	Clamp2	Clamp	Davit2:End	0.015	0.000	0.558	0.558
NESC Extreme Long	Clamp3	Clamp	Davit3:End	0.078	0.000	0.634	0.639
NESC Extreme Long	Clamp4	Clamp	Davit4:End	0.027	0.000	0.878	0.878
NESC Extreme Long	Clamp5	Clamp	Davit5:End	0.078	0.000	0.634	0.639
NESC Extreme Long	Clamp6	Clamp	Davit6:End	0.027	0.000	0.878	0.878
NESC Extreme Long	Clamp7	Clamp	Davit7:End	0.078	0.000	0.634	0.639
NESC Extreme Long	Clamp8	Clamp	Davit8:End	0.027	0.000	0.878	0.878
NESC Extreme Long	Clamp9	Clamp	2683:WVGD1	0.270	0.000	0.437	0.514
NESC Extreme Long	Clamp10	Clamp	2683:WVGD2	0.270	0.000	0.437	0.514
NESC Extreme Long	Clamp11	Clamp	2683:WVGD3	0.270	0.000	0.437	0.514
NESC Extreme Long	Clamp12	Clamp	2683:WVGD4	0.270	0.000	0.437	0.514
NESC Extreme Long	Clamp13	Clamp	2683:WVGD5	0.270	0.000	0.437	0.514
NESC Extreme Long	Clamp14	Clamp	2683:WVGD6	0.270	0.000	0.437	0.514
NESC Extreme Long	Clamp15	Clamp	2683:WVGD7	0.270	0.000	0.437	0.514
NESC Extreme Long	Clamp17	Clamp	2683:TopConn	28.708	0.000	0.000	28.708
NESC Extreme Long	Clamp18	Clamp	2683:BotConn	-17.393	0.000	6.534	18.580
NESC Extreme Long	Clamp19	Clamp	2683:WVGD8	0.106	0.000	0.119	0.159
NESC Extreme Long	Clamp20	Clamp	2683:BCT	12.251	0.000	0.000	12.251
NESC Extreme Long	Clamp21	Clamp	2683:BCB	-12.521	0.000	0.000	12.521

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)
NESC Heavy	20.885	0.597	39.048	1722.974	-46.011	-3.370
NESC Extreme	24.360	0.387	15.055	2123.945	-29.663	-1.862
NESC Extreme Long	0.000	13.428	15.055	9.483	-1273.654	-1.862

*** Weight of structure (lbs):

Weight of Tubular Davit Arms:	2309.3
Weight of Steel Poles:	13920.9
Total:	16230.2

*** End of Report

Anchor Bolt Analysis:

Input Data:

Bolt Force:

Maximum Tensile Force =	$T_{Max} := 220 \cdot kips$	(User Input from PLS-Pole)
Maximum Shear Force at Base =	$V_{base} := 31 \cdot kips$	(User Input from PLS-Pole)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	$N := 12$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)

Anchor Bolt Analysis:

Stress Area of Bolt = $A_s := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Maximum Shear Force per Bolt = $V_{Max} := \frac{V_{base}}{N} = 2.6 \cdot kips$

Shear Stress per Bolt = $f_v := \frac{V_{Max}}{A_s} = 795.4\,psi$

Tensile Stress Permitted = $F_t := 0.75 \cdot F_u = 75 \cdot ksi$

Shear Stress Permitted = $F_v := 0.35 F_u = 35 \cdot ksi$

Permitted Axial Tensile Stress in Conjuction with Shear = $F_{tv} := F_t \cdot \sqrt{1 - \left(\frac{f_v}{F_v}\right)^2} = 74.98 \cdot ksi$

Bolt Tension % of Capacity = $\frac{T_{Max}}{F_{tv} \cdot A_s} = 90.34 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{F_{tv} \cdot A_s} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

RAN Template:	A&L Template:
67E998E 6160	67E998E_1OP+1QP

CTFF896A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Section 1 - Site Information

Site ID: CTFF896A
Status: Draft
Version: 1
Project Type: Sprint Retain
Approved: Not Approved
Approved By: Not Approved
Last Modified: 12/6/2021 3:33:49 PM
Last Modified By: Justin.Darrow@t-mobile.com

Site Name: CT54XC713
Site Class: Utility Lattice Tower
Site Type: Structure Non Building
Plan Year: 2022
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: Not Specified

Latitude: 41.47877500
Longitude: -73.40830800
Address: 761 Federal Rd
City, State: Brookfield, CT
Region: NORTHEAST

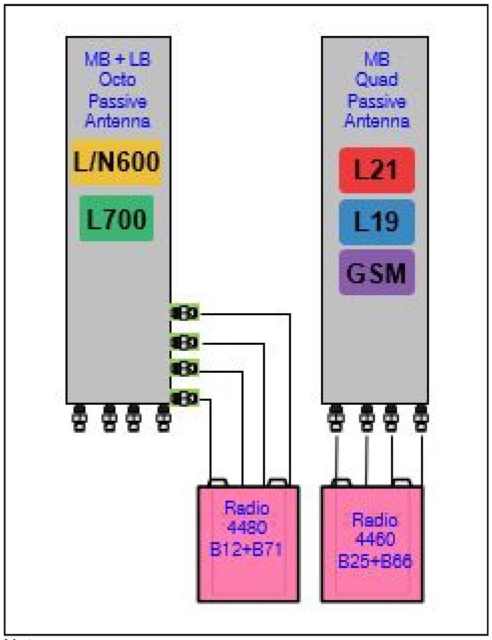
RAN Template: 67E998E 6160	AL Template: 67E998E_1OP+1QP			
Sector Count: 3	Antenna Count: 6	Coax Line Count: 24	TMA Count: 6	RRU Count: 6

Section 2 - Existing Template Images

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

Section 3 - Proposed Template Images

67E998E.JPG



Notes:

Section 4 - Siteplan Images

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

RAN Template: 67E998E 6160	**A&L Template:** 67E998E_1OP+1QP

CTFF896A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Section 5 - RAN Equipment

Existing RAN Equipment

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

Proposed RAN Equipment

Template: 67E998E 6160

Enclosure	1	2	3
Enclosure Type	Enclosure 6160 AC V1	B160	RBS 6601
Baseband	BB 6648 L700 L600 N600 L2100 L1900		DUG20 G1900
Hybrid Cable System	Ericsson Hybrid Trunk 6/24 4AWG 50m **(x 2)**		
Transport System	CSR IXRe V2 (Gen2)		

RAN Scope of Work:

SA at 83% Should be able to go with 2 Antenna per sector
200 Amp existing
No Generator space

RAN Template: 67E998E 6160	**A&L Template:** 67E998E_1OP+1QP

CTFF896A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Section 6 - A&L Equipment

Existing Template: Custom
Proposed Template: 67E998E_1OP+1QP

Sector 1 (Proposed) view from behind

Coverage Type	A - Outdoor Macro					
Antenna	1				2	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Commscope_VV-65A-R1 (Quad)	
Azimuth	330				330	
M. Tilt						
Height	110				110	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**
Active Tech.	L700 L600 N600	L700 L600 N600			L2100 L1900 G1900	L2100 L1900 G1900
Dark Tech.						
Restricted Tech.						
Decomm. Tech.						
E. Tilt						
Cables	1-5/8" Coax - 140 ft. **(x2)**	1-5/8" Coax - 140 ft. **(x2)**			1-5/8" Coax - 140 ft. **(x2)**	1-5/8" Coax - 140 ft. **(x2)**
TMAs	Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)			Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)
Diplexers / Combiners						
Radio	Radio 4480 B71+B85 (At Cabinet)	SHARED Radio 4480 B71+B85 (At Cabinet)			Radio 4460 B25+B66 (At Cabinet)	SHARED Radio 4460 B25+B66 (At Cabinet)
Sector Equipment						

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:
67E998E 6160	67E998E_1OP+1QP

CTFF896A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Sector 2 (Proposed) view from behind						
Coverage Type	A - Outdoor Macro					
Antenna	1				2	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Commscope_VV-65A-R1 (Quad)	
Azimuth	90				90	
M. Tilt						
Height	110				110	
Ports	P1	P2	P3	P4	P5	P6
Active Tech.	L700 L600 N600	L700 L600 N600			L2100 L1900 G1900	L2100 L1900 G1900
Dark Tech.						
Restricted Tech.						
Decomm. Tech.						
E. Tilt						
Cables	1-5/8" Coax - 140 ft. **(x2)**	1-5/8" Coax - 140 ft. **(x2)**			1-5/8" Coax - 140 ft. **(x2)**	1-5/8" Coax - 140 ft. **(x2)**
TMAs	Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)			Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)
Diplexers / Combiners						
Radio	Radio 4480 B71+B85 (At Cabinet)	SHARED Radio 4480 B71+B85 (At Cabinet)			Radio 4460 B25+B66 (At Cabinet)	SHARED Radio 4460 B25+B66 (At Cabinet)
Sector Equipment						

Unconnected Equipment:

Scope of Work:

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

RAN Template: 67E998E 6160	**A&L Template:** 67E998E_1OP+1QP

CTFF896A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Sector 3 (Proposed) view from behind

Coverage Type	A - Outdoor Macro					
Antenna	1				2	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Commscope_VV-65A-R1 (Quad)	
Azimuth	170				170	
M. Tilt						
Height	110				110	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**
Active Tech.	L700 L600 N600	L700 L600 N600			L2100 L1900 G1900	L2100 L1900 G1900
Dark Tech.						
Restricted Tech.						
Decomm. Tech.						
E. Tilt						
Cables	1-5/8" Coax - 140 ft. **(x2)**	1-5/8" Coax - 140 ft. **(x2)**			1-5/8" Coax - 140 ft. **(x2)**	1-5/8" Coax - 140 ft. **(x2)**
TMAs	Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)			Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)
Diplexers / Combiners						
Radio	Radio 4480 B71+B85 (At Cabinet)	SHARED Radio 4480 B71+B85 (At Cabinet)			Radio 4460 B25+B66 (At Cabinet)	SHARED Radio 4460 B25+B66 (At Cabinet)
Sector Equipment						

Unconnected Equipment:

Scope of Work:

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

RAN Template: 67E998E 6160	A&L Template: 67E998E_1OP+1QP

CTFF896A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

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

	Proposed Power Systems Equipment
Enclosure	1
Enclosure Type	Enclosure 6160 AC V1

VV-65A-R1

4-port sector antenna, 4x 1695–2690 MHz, 65° HPBW, 1x RET,The two high band arrays utilize a common tilt.

- The RET interface comprises one pair of AISG input/output ports

General Specifications

Antenna Type	Sector
Band	Single band
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Performance Note	Outdoor usage
Radome Material	PVC, UV resistant
Reflector Material	Aluminum
RF Connector Interface	4.3-10 Female
RF Connector Location	Bottom
RF Connector Quantity, high band	4
RF Connector Quantity, total	4

Remote Electrical Tilt (RET) Information

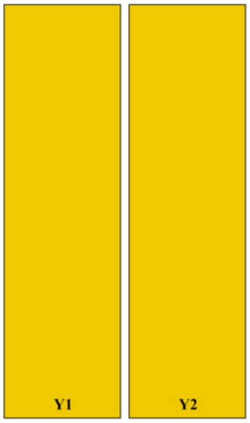
RET Hardware	CommRET v2
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male
Input Voltage	10–30 Vdc
Internal RET	High band (1)
Power Consumption, idle state, maximum	2 W
Power Consumption, normal conditions, maximum	10 W
Protocol	3GPP/AISG 2.0

Dimensions

Width	307 mm | 12.087 in
Depth	118 mm | 4.646 in
Length	1390 mm | 54.724 in

Net Weight, without mounting kit	10.8 kg | 23.81 lb

Array Layout



Array ID	Frequency (MHz)	RF Connector	HPBW	RET (SRET)	AISG No.	AISG RET UID
Y1	1695-2690	1 - 2	65°	1	AISG1	CPxxxxxxxxxxxxxxxY1
Y2	1695-2690	3 - 4	65°			

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

Port Configuration

Electrical Specifications

Impedance	50 ohm
Operating Frequency Band	1695 – 2690 MHz
Polarization	±45°
Total Input Power, maximum	400 W @ 50 °C

Electrical Specifications

Frequency Band, MHz	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2500**	**2490–2690**

RADIO FREQUENCY SYSTEMS

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-894/617-894/1695-2690/1695-2690MHz, 65deg, 16.2/16.1/18.9/18.7dBi, 2.4m (8ft), VET, 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	698-806	806-894
Gain Typical	dBi	15.5	16.1	16.2
Gain Over All Tilts	dBi	15.2 +/- .3	15.6 +/- .5	15.8 +/- .4
Horizontal Beamwidth @3dB	Deg	65 +/-3	64 +/-2	62 +/-3
Vertical Beamwidth @3dB	Deg	9.9 +/- .7	8.6 +/- .7	7.6 +/-.4
Electrical Downtilt Range	Deg	2 to 12		
Upper Side Lobe Suppression Peak to +20	dB	15	14	14
Front-to-Back, at +/-30°, Copolar	dB	25	25	29
Cross Polar Discrimination (XPD) @ Boresight	dB	18	18	17
Cross Polar Discrimination (XPD) @ +/-60	dB	5	5	6
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, 16.2/16.1/18.9/18.7dBi, 2.4m (8ft), VET, 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	17.7	18.1	18.7	18.5	18.0
Gain Over All Tilts	dBi	17.1 +/- .6	17.6 +/- .5	18 +/- .7	17.9 +/- .6	17.4 +/- .6
Horizontal Beamwidth @3dB	Deg	67 +/- 5	64 +/- 5	65 +/- 5	62 +/- 7	60 +/- 9
Vertical Beamwidth @3dB	Deg	5.7 +/- .5	5.2 +/- .3	4.7 +/- .6	4.2 +/- .3	4.2 +/- .3
Electrical Downtilt Range	Deg	2 to 12				
Upper Side Lobe Suppression Peak to +20	dB	15	15	14	14	13
Front-to-Back, at +/-30°, Copolar	dB	27	28	26	23	21
Cross Polar Discrimination (XPD) @ Boresight	dB	21	17	14	16	18
Cross Polar Discrimination (XPD) @ +/-60	dB	10	8	7	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)	2436 x 609 x 215 (95.9 x 24 x 8.5)
Weight (Antenna Only)	kg (lb)	55.7 (122.8)
Weight (Mounting Hardware only)	kg (lb)	12.3 (27.1)
Packing size- HxWxD	mm (in)	2565 x 735 x 390 (101 x 28.9 x 15.4)
Shipping Weight	kg (lb)	77.9 (171.7)
Connector type		8 x 4.3-10 female at bottom + 6 AISG connectors (3 male, 3 female)
Adjustment mechanism		Integrated RET solution AISG compliant (Field Replaceable) + Manual Override + External Tilt Indicator
Radome Material / Color		Fiber Glass / Light Grey RAL7035

TESTING AND ENVIRONMENTAL

Temperature Range	°C (°F)	-40 to 60 (-40 to 140)
Grounding type		DC Grounded
Lightning protection		IEC 61000-4-5
Survival/Rated Wind Velocity	km/h	240 (150)
Wind Load @Rated Wind Front	N	1428.0
Wind Load @Rated Wind Side	N	434.0
Wind Load @Rated Wind Rear	N	1544.0
Environmental		ETSI 300-019-2-4 Class 4.1E

Product Specifications

POWERED BY ANDREW

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

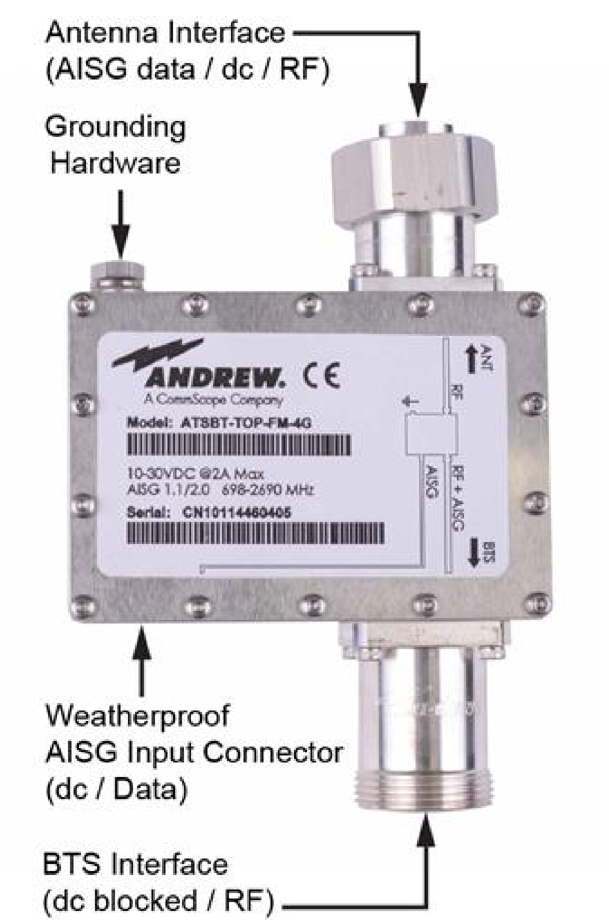
ATSBT-TOP-FM-4G

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



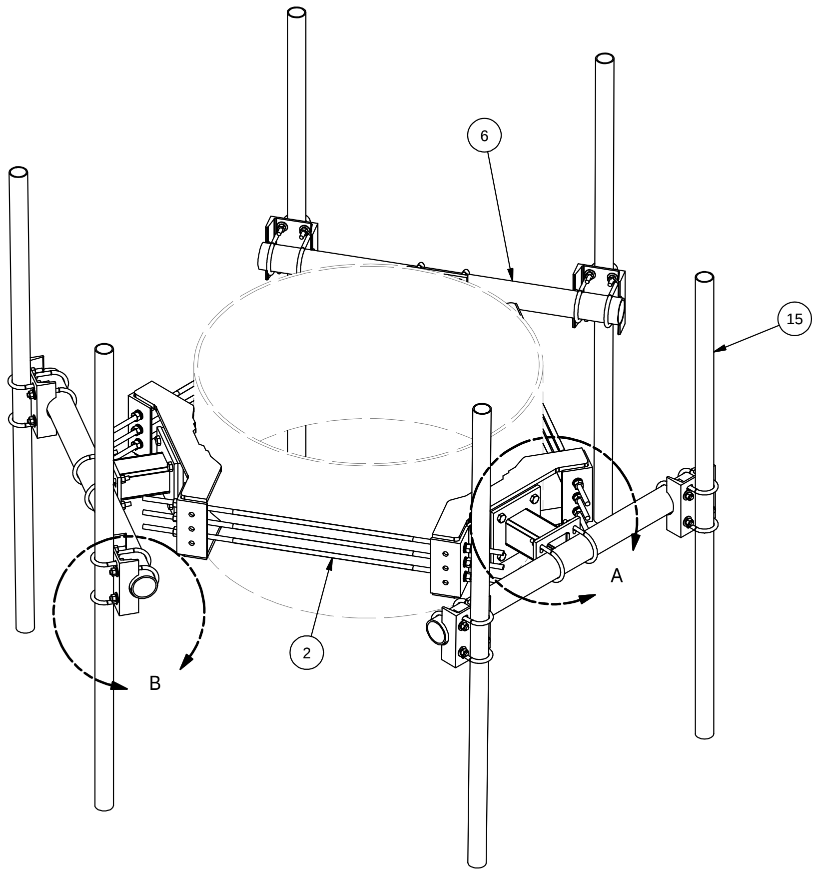
Dimensions

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

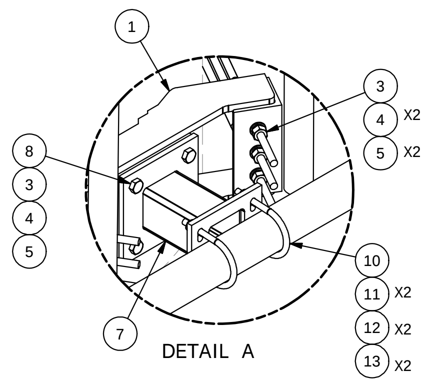
Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption

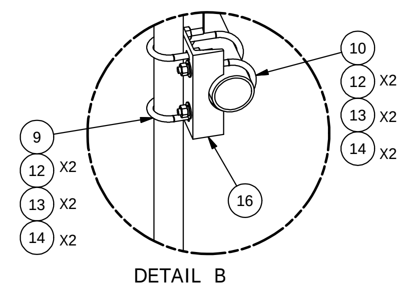
PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	3	X-LWRM	RING MOUNT WELDMENT		68.81	206.42
2	9	G58R-48	5/8" x 48" THREADED ROD (HDG.)		0.40	3.59
2	9	G58R-24	5/8" x 24" THREADED ROD (HDG.)		0.40	3.59
3	30	A58FW	5/8" HDG A325 FLATWASHER		0.03	1.02
4	30	G58LW	5/8" HDG LOCKWASHER		0.03	0.78
5	30	A58NUT	5/8" HDG A325 HEX NUT		0.13	3.90
6	3	P348	3-1/2" X 48" SCH 40 GALVANIZED PIPE	48	31.89	95.68
7	3	X-WWM01	8" STAND-OFF ARM / WALL MOUNT		18.12	54.37
8	12	A582112	5/8" x 2-1/2" HDG A325 HEX BOLT	2.5	0.33	4.01
9	12	X-UB1212	1/2" X 2-1/2" X 4-1/2" X 2" GALV. U-BOLT		0.66	7.88
10	12	X-UB1306	1/2" X 3-5/8" X 6" X 3" GALV U-BOLT		0.83	9.94
11	6	X-UB1358	1/2" X 3-5/8" X 5-1/2" X 3" GALV U-BOLT		0.77	4.63
12	60	G12FW	1/2" HDG USS FLATWASHER		0.03	2.04
13	60	G12LW	1/2" HDG LOCKWASHER		0.01	0.83
14	60	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	4.30
15	6	B	C	D	E	F
16	6	X-SP219	SMALL SUPPORT CROSS PLATE	8.250 in	8.61	51.66



2-3/8" MOUNTING PIPES						
ASSEMBLY "A	PART NO "B"	PART DESCRIPTION "C"	LENGTH "D"	UNIT WEIGHT "	NET WEIGHT "F	TOTAL WEIGHT
RDS-263	P263	2 3/8" O.D. VERTICAL MOUNTING PIPE	63"	19.22	115.32	578.11
RDS-272	P272	2 3/8" O.D. VERTICAL MOUNTING PIPE	72"	21.97	131.82	594.61
RDS-284	P284	2 3/8" O.D. VERTICAL MOUNTING PIPE	84"	25.63	153.78	616.57
RDS-296	P296	2 3/8" O.D. VERTICAL MOUNTING PIPE	96"	29.29	175.74	638.53
RDS-2126	P2126	2 3/8" O.D. VERTICAL MOUNTING PIPE	126"	40.75	122.25	585.04



DETAIL A



DETAIL B

REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
B	ADDED 126" 2-3/8" ANTENNA MOUNTING PIPES		CEK	6/29/2015
A	REDRAWN IN MDT		KC8	5/22/2012

REVISION HISTORY

TOLERANCE NOTES

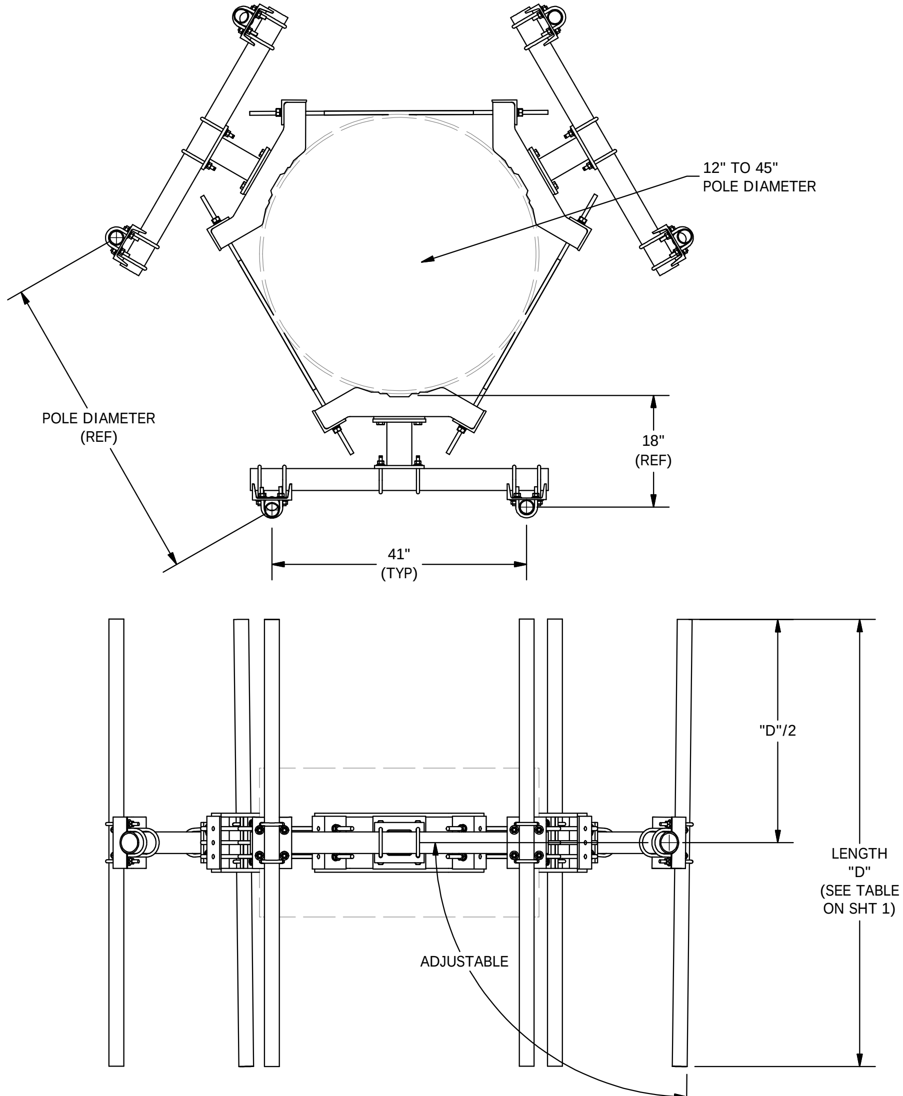
TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

DESCRIPTION
MONOPOLE DOUBLE SUPPORT ARM KIT

SITE PRO 1
A valmont COMPANY
Engineering Support Team:
1-888-753-7446
Locations:
New York, NY
Atlanta, GA
Los Angeles, CA
Plymouth, IN
Salem, OR
Dallas, TX

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
4546	CEK 7/13/2009		SEE ASSEMBLY "A"

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	CEK 8/20/2012	RDS-2XX



TOLERANCE NOTES

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

REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
A	REDRAWN IN INV		KC8	5/22/2012

REVISION HISTORY

DESCRIPTION
MONOPOLE
DOUBLE SUPPORT
ARM KIT

CPD NO.		DRAWN BY	ENG. APPROVAL
4546		CEK 7/13/2009	
CLASS	SUB	DRAWING USAGE	CHECKED BY
81	01	CUSTOMER	CEK 8/20/2012

SITE PRO 1
A valmont COMPANY
Engineering Support Team: 1-888-753-7446
Locations:
New York, NY
Atlanta, GA
Los Angeles, CA
Plymouth, IN
Salem, OR
Dallas, TX

PART NO. SEE ASSEMBLY "A"
DWG. NO. RDS-2XX

CENTEK engineering

Centered on Solutions℠

Antenna Mount Analysis Report

T-Mobile Site #: CTFF896A

761 Federal Road
Brookfield, CT

Centek Project No. 21005.40

Date: January 10, 2023

Max Stress Ratio =73%

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

Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

CENTEK engineering

Centered on Solutions℠

January 10, 2023

Mr. Dan Reid
Transcend Wireless
10 Industrial Ave
Mahwah, NJ 07430

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CTFF896A
761 Federal Road
Brookfield, CT

Centek Project No. 21005.40

Dear Mr. Reid,

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 (SitePro P/N: RDS-296 x2). The review considered the effects of wind load, dead load and ice load in accordance with the 2021 International Building Code as modified by the 2022 Connecticut State Building Code (CTBC) including ASCE 7-16 and ANSI/TIA-222-H *Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures"*.

The loads considered in this analysis consist of the following:

- T-Mobile:
  Double Support Arm: Three (3) Commscope VV-65A-R1 panel antennas, three (3) RFS APXVAALL24_43 panel antennas and six (6) ATSBT-TOP-FM-4G Bias Tees mounted on two (2) SitePro monopole double support arms with a RAD center elevation of 110 ft +/- AGL.

The antenna mount was analyzed per the requirements of the 2021 International Building Code as modified by the 2022 Connecticut State Building Code considering a Ultimate design wind speed of 125 mph for Brookfield as required in Appendix P of the 2022 Connecticut State Building Code.

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

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

Respectfully Submitted by:

STATE OF CONNECTICUT
TIMOTHY J. LYNN
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LICENSED
PROFESSIONAL ENGINEER

Timothy J. Lynn, PE
Structural Engineer

Section 2 - Calculations

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

Wind Speeds

Basic Wind Speed	$V := 125$	mph	(User Input - CSBC 2022 Appendix P)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input - TIA-222-H Annex B)
Basic Wind Speed (Mount)	$V_m := 30$	mph	(User Input - TIA-222-H Section 16.3)

Input

Structure Type =	Structure_Type := Flexible		(User Input)
Structure Category =	SC := III		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	$h := 90$	ft	(User Input)
Height to Center of Antennas =	$z_{ant} := 110$	ft	(User Input)
Radial Ice Thickness =	$t_i := 1.0$	in	(User Input per Annex B of TIA-222-H)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1$		(User Input)
Shielding Factor for Appurtenances =	$K_a := 1.0$		(User Input)
Rooftop Wind Speed-up Factor =	$K_s := 1.0$		(User Input)
Ground Elevation Factor =	$K_e = 0.996$		(User Input)
Gust Response Factor =	$G_H = 1.35$		(User Input)

Output

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

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

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

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

$$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.128 \qquad t_{iz} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.297$$

Velocity Pressure Coefficient Antennas = $Kz_{ant} := 2.01\left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.291$

Velocity Pressure w/o Ice Antennas = $qz_{ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V^2 = 48.852$

Velocity Pressure with Ice Antennas = $qz_{ice.ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_i^2 = 7.816$

Velocity Pressure with Ice Antennas = $qz_m := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_m^2 = 2.814$

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	RFSAPXVAALL24_43		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height=	$L_{app} := 95.9$	in	(User Input)
Appurtenance Width =	$W_{app} := 24$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 8.5$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 150$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 4.0$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.27$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 16$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 1335$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 5.7$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 473$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 18.2$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 243$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 7.6$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 101$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 16$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 77$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 5.7$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 27$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 2 \times 10^4$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 9497$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 308$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 308$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Commscope VV-65A-R1		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height=	$L_{app} := 54.724$	in	(User Input)
Appurtenance Width =	$W_{app} := 12.087$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 4.646$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 30$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 4.5$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.29$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 4.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 391$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.8$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 150$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 5.8$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 80$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 2.9$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 39$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 4.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 23$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.8$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 9$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 3073$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 3020$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 98$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 98$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	AT SBT-TOP-F M4G Bias Tee		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height=	$L_{app} := 5.63$	in	(User Input)
Appurtenance Width =	$W_{app} := 3.7$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 2$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 2$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 1.5$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) = $SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.1$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 11$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.1$ sf

Total Appurtenance Wind Force = $F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 6$ lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)= $SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 0.4$ sf

Total Appurtenance Wind Force w/ Ice = $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 5$ lbs

Surface Area for One Appurtenance w/ Ice (Side) = $SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 0.3$ sf

Total Appurtenance Wind Force w/ Ice = $Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 3$ lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) = $SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 0.1$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 1$ lbs

Surface Area for One Appurtenance (Side) = $SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.1$ sf

Total Appurtenance Wind Force = $F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 0$ lbs

Gravity Loads (ice only)

Volume of Each Appurtenance = $V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 42$ cu in

Volume of Ice on Each Appurtenance = $V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 196$ cu in

Weight of Ice on Each Appurtenance = $W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 6$ lbs

Weight of Ice on All Appurtenances = $W_{ICEapp} \cdot N_{app} = 6$ lbs

$Pole := 1$ $\quad B \equiv 2$ $\quad I \equiv 1$

$Lattice := 2$ $\quad C \equiv 3$ $\quad II \equiv 2$

$Flexible := 3$ $\quad D \equiv 4$ $\quad III \equiv 3$

$IV \equiv 4$

Mean Base Elevation of structure above sea level, Zs = $\quad Z_s := 122$

$$K_e := e^{-0.0000362 \cdot Z_s}$$

Roof Wind Speed-Up Factor, Ks =

$$zg := \begin{cases} 1200 & \text{if } Exp = B \\ 900 & \text{if } Exp = C \\ 700 & \text{if } Exp = D \end{cases} = 900$$

$$G_H := \begin{cases} 1.10 & \text{if } Structure\_Type = Pole \\ 0.85 & \text{if } Structure\_Type = Lattice \\ 1.35 & \text{if } Structure\_Type = Flexible \end{cases}$$

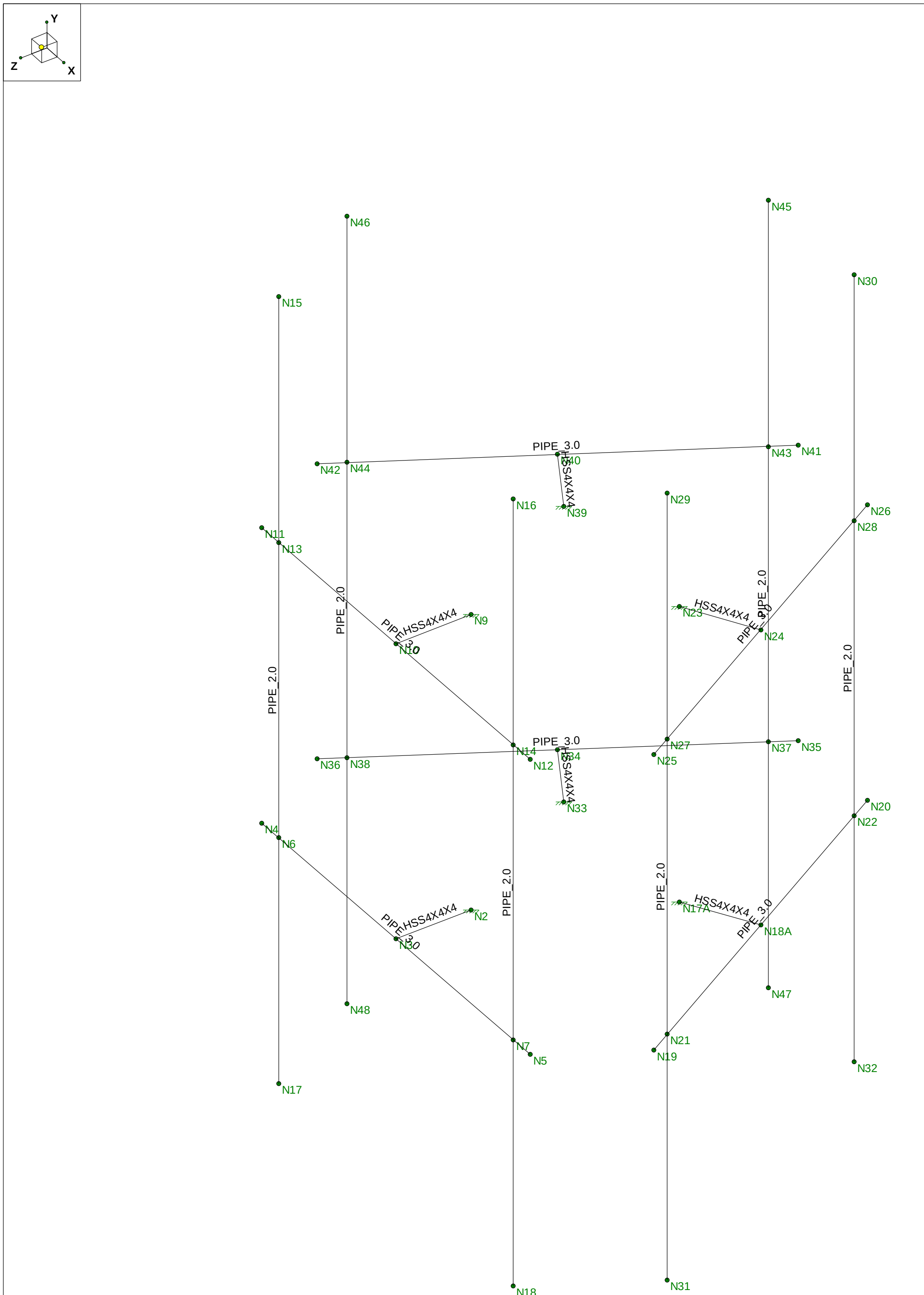
$$\alpha := \begin{cases} 7 & \text{if } Exp = B \\ 9.5 & \text{if } Exp = C \\ 11.5 & \text{if } Exp = D \end{cases} = 9.5$$

$$K_{Z.min} := \begin{cases} 0.7 & \text{if } Exp = B \\ 0.85 & \text{if } Exp = C \\ 1.03 & \text{if } Exp = D \end{cases} = 0.85$$

$$Ca_{app} := \begin{cases} 1.2 & \text{if } Ar_{app} \le 2.5 \\ 1.2 + \dfrac{(Ar_{app} - 2.5)\cdot(1.4 - 1.2)}{(7 - 2.5)} & \text{if } 2.5 < Ar_{app} < 7 \\ 1.4 & \text{if } Ar_{app} = 7 \\ 1.4 + \dfrac{(Ar_{app} - 7)\cdot(2.0 - 1.4)}{(25 - 7)} & \text{if } 7 < Ar_{app} < 25 \\ 2.0 & \text{if } Ar_{app} \ge 25 \end{cases}$$

$$Ca_{app} := \begin{cases} 1.2 & \text{if } Ar_{app} \le 2.5 \\ 1.2 + \dfrac{(Ar_{app} - 2.5)\cdot(1.4 - 1.2)}{(7 - 2.5)} & \text{if } 2.5 < Ar_{app} < 7 \\ 1.4 & \text{if } Ar_{app} = 7 \\ 1.4 + \dfrac{(Ar_{app} - 7)\cdot(2.0 - 1.4)}{(25 - 7)} & \text{if } 7 < Ar_{app} < 25 \\ 2.0 & \text{if } Ar_{app} \ge 25 \end{cases}$$

$$Ca_{app} := \begin{cases} 1.2 & \text{if } Ar_{app} \le 2.5 \\ 1.2 + \dfrac{\left(Ar_{app} - 2.5\right)\cdot(1.4 - 1.2)}{(7 - 2.5)} & \text{if } 2.5 < Ar_{app} < 7 \\ 1.4 & \text{if } Ar_{app} = 7 \\ 1.4 + \dfrac{\left(Ar_{app} - 7\right)\cdot(2.0 - 1.4)}{(25 - 7)} & \text{if } 7 < Ar_{app} < 25 \\ 2.0 & \text{if } Ar_{app} \ge 25 \end{cases}$$



Centek Engineering	CTFF896A- Mount	
TJL		Jan 10, 2023 at 1:12 PM
21005.40	Member Framing	Mount.R3D

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 15th(360-16): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI S100-10: ASD
Wood Code	AWC NDS-12: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	ACI 530-11: ASD
Aluminum Code	AA ADM1-10: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	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	1
Cd X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	150.001
Footing Concrete f'c (ksi)	4
Footing Concrete Ec (ksi)	3644
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	2
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Outrigger	HSS4X4X4	Beam	HSS Pipe	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
2	Horz	PIPE_3.0	Beam	Pipe	A53 Grade B	Typical	2.07	2.85	2.85	5.69
3	Antenna Pipe	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	Outrigger	.75			Lbyy						Lateral
2	M2	Horz	4			Lbyy						Lateral
3	M3	Outrigger	.75			Lbyy						Lateral
4	M4	Horz	4			Lbyy						Lateral
5	M5	Antenna Pipe	8									Lateral
6	M6	Antenna Pipe	8									Lateral
7	M7	Outrigger	.75			Lbyy						Lateral
8	M8	Horz	4			Lbyy						Lateral
9	M9	Outrigger	.75			Lbyy						Lateral
10	M10	Horz	4			Lbyy						Lateral
11	M11	Antenna Pipe	8									Lateral
12	M12	Antenna Pipe	8									Lateral
13	M13	Outrigger	.75			Lbyy						Lateral
14	M14	Horz	4			Lbyy						Lateral
15	M15	Outrigger	.75			Lbyy						Lateral
16	M16	Horz	4			Lbyy						Lateral
17	M17	Antenna Pipe	8									Lateral
18	M18	Antenna Pipe	8									Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
1	M1	N2	N3			Outrigger	Beam	HSS Pipe	A500 Gr.46	Typical
2	M2	N4	N5			Horz	Beam	Pipe	A53 Grade B	Typical
3	M3	N9	N10			Outrigger	Beam	HSS Pipe	A500 Gr.46	Typical
4	M4	N11	N12			Horz	Beam	Pipe	A53 Grade B	Typical
5	M5	N17	N15			Antenna Pipe	Column	Pipe	A53 Grade B	Typical
6	M6	N18	N16			Antenna Pipe	Column	Pipe	A53 Grade B	Typical
7	M7	N17A	N18A			Outrigger	Beam	HSS Pipe	A500 Gr.46	Typical
8	M8	N19	N20			Horz	Beam	Pipe	A53 Grade B	Typical
9	M9	N23	N24			Outrigger	Beam	HSS Pipe	A500 Gr.46	Typical
10	M10	N25	N26			Horz	Beam	Pipe	A53 Grade B	Typical
11	M11	N31	N29			Antenna Pipe	Column	Pipe	A53 Grade B	Typical
12	M12	N32	N30			Antenna Pipe	Column	Pipe	A53 Grade B	Typical
13	M13	N33	N34			Outrigger	Beam	HSS Pipe	A500 Gr.46	Typical
14	M14	N35	N36			Horz	Beam	Pipe	A53 Grade B	Typical
15	M15	N39	N40			Outrigger	Beam	HSS Pipe	A500 Gr.46	Typical
16	M16	N41	N42			Horz	Beam	Pipe	A53 Grade B	Typical
17	M17	N47	N45			Antenna Pipe	Column	Pipe	A53 Grade B	Typical
18	M18	N48	N46			Antenna Pipe	Column	Pipe	A53 Grade B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N2	0	0	1	0	
2	N3	0	0	1.75	0	
3	N4	-2	0	1.75	0	
4	N5	2	0	1.75	0	
5	N6	-1.75	0	1.75	0	
6	N7	1.75	0	1.75	0	
7	N9	0	3	1	0	
8	N10	0	3	1.75	0	
9	N11	-2	3	1.75	0	
10	N12	2	3	1.75	0	
11	N13	-1.75	3	1.75	0	
12	N14	1.75	3	1.75	0	
13	N15	-1.75	5.5	1.75	0	
14	N16	1.75	5.5	1.75	0	
15	N17	-1.75	-2.5	1.75	0	
16	N18	1.75	-2.5	1.75	0	
17	N17A	0.866025	0	-0.5	0	
18	N18A	1.515544	0	-0.875	0	
19	N19	2.515544	0	0.857051	0	
20	N20	0.515544	0	-2.607051	0	
21	N21	2.390544	0	0.640544	0	
22	N22	0.640544	0	-2.390544	0	
23	N23	0.866025	3	-0.5	0	
24	N24	1.515544	3	-0.875	0	
25	N25	2.515544	3	0.857051	0	
26	N26	0.515544	3	-2.607051	0	
27	N27	2.390544	3	0.640544	0	
28	N28	0.640544	3	-2.390544	0	
29	N29	2.390544	5.5	0.640544	0	
30	N30	0.640544	5.5	-2.390544	0	
31	N31	2.390544	-2.5	0.640544	0	
32	N32	0.640544	-2.5	-2.390544	0	
33	N33	-0.866025	0	-0.5	0	
34	N34	-1.515544	0	-0.875	0	
35	N35	-0.515544	0	-2.607051	0	
36	N36	-2.515544	0	0.857051	0	
37	N37	-0.640544	0	-2.390544	0	
38	N38	-2.390544	0	0.640544	0	
39	N39	-0.866025	3	-0.5	0	
40	N40	-1.515544	3	-0.875	0	
41	N41	-0.515544	3	-2.607051	0	
42	N42	-2.515544	3	0.857051	0	
43	N43	-0.640544	3	-2.390544	0	
44	N44	-2.390544	3	0.640544	0	
45	N45	-0.640544	5.5	-2.390544	0	
46	N46	-2.390544	5.5	0.640544	0	
47	N47	-0.640544	-2.5	-2.390544	0	
48	N48	-2.390544	-2.5	0.640544	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	N9	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N2	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N17A	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N23	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N33	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N39	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M6	Y	-.075	.5
2	M12	Y	-.075	.5
3	M18	Y	-.075	.5
4	M6	Y	-.075	7.5
5	M12	Y	-.075	7.5
6	M18	Y	-.075	7.5
7	M5	Y	-.015	2
8	M11	Y	-.015	2
9	M17	Y	-.015	2
10	M5	Y	-.015	6
11	M11	Y	-.015	6
12	M17	Y	-.015	6
13	M6	Y	-.004	%50
14	M12	Y	-.004	%50
15	M18	Y	-.004	%50

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M6	Y	-.154	.5
2	M12	Y	-.154	.5
3	M18	Y	-.154	.5
4	M6	Y	-.154	7.5
5	M12	Y	-.154	7.5
6	M18	Y	-.154	7.5
7	M5	Y	-.049	2
8	M11	Y	-.049	2
9	M17	Y	-.049	2
10	M5	Y	-.049	6
11	M11	Y	-.049	6
12	M17	Y	-.049	6
13	M6	Y	-.012	%50
14	M12	Y	-.012	%50
15	M18	Y	-.012	%50

Member Point Loads (BLC 4 : Lm Maintenance Load (500lb))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M6	Y	-.5	%50

Member Point Loads (BLC 5 : Lv Maintenance Load (250lb))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.25	4

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M6	X	.051	.5
2	M6	X	.051	7.5
3	M12	X	.122	.5
4	M18	X	.122	.5
5	M12	X	.122	7.5
6	M18	X	.122	7.5
7	M5	X	.02	2
8	M5	X	.02	6
9	M11	X	.04	2
10	M17	X	.04	2
11	M11	X	.04	6
12	M17	X	.04	6
13	M6	X	.01	%50
14	M12	X	.01	%50
15	M18	X	.01	%50

Member Point Loads (BLC 7 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M6	X	.237	.5
2	M6	X	.237	7.5
3	M12	X	.668	.5
4	M18	X	.668	.5
5	M12	X	.668	7.5
6	M18	X	.668	7.5
7	M5	X	.075	2
8	M5	X	.075	6
9	M11	X	.196	2
10	M17	X	.196	2
11	M11	X	.196	6
12	M17	X	.196	6
13	M6	X	.022	%50
14	M12	X	.022	%50
15	M18	X	.022	%50

Member Point Loads (BLC 8 : Wm Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M6	X	.014	.5
2	M6	X	.014	7.5
3	M12	X	.039	.5
4	M18	X	.039	.5
5	M12	X	.039	7.5
6	M18	X	.039	7.5
7	M5	X	.005	2
8	M5	X	.005	6
9	M11	X	.012	2
10	M17	X	.012	2

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
11	M11	X	.012	6
12	M17	X	.012	6
13	M6	X	.002	%50
14	M12	X	.002	%50
15	M18	X	.002	%50

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M6	Z	.122	.5
2	M6	Z	.122	7.5
3	M12	Z	.051	.5
4	M18	Z	.051	.5
5	M12	Z	.051	7.5
6	M18	Z	.051	7.5
7	M5	Z	.04	2
8	M5	Z	.04	6
9	M11	Z	.02	2
10	M17	Z	.02	2
11	M11	Z	.02	6
12	M17	Z	.02	6
13	M6	Z	.01	%50
14	M12	Z	.01	%50
15	M18	Z	.01	%50

Member Point Loads (BLC 10 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M6	Z	.668	.5
2	M6	Z	.668	7.5
3	M12	Z	.237	.5
4	M18	Z	.237	.5
5	M12	Z	.237	7.5
6	M18	Z	.237	7.5
7	M5	Z	.196	2
8	M5	Z	.196	6
9	M11	Z	.075	2
10	M17	Z	.075	2
11	M11	Z	.075	6
12	M17	Z	.075	6
13	M6	Z	.022	%50
14	M12	Z	.022	%50
15	M18	Z	.022	%50

Member Point Loads (BLC 11 : Wm Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M6	Z	.039	.5
2	M6	Z	.039	7.5
3	M12	Z	.014	.5
4	M18	Z	.014	.5
5	M12	Z	.014	7.5
6	M18	Z	.014	7.5

Member Point Loads (BLC 11 : Wm Wind Z) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
7	M5	Z	.012	2
8	M5	Z	.012	6
9	M11	Z	.005	2
10	M17	Z	.005	2
11	M11	Z	.005	6
12	M17	Z	.005	6
13	M6	Z	.002	%50
14	M12	Z	.002	%50
15	M18	Z	.002	%50

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft..	End Location[ft,...
1	M1	X	.003	.003	0	0
2	M3	X	.003	.003	0	0
3	M5	X	.003	.003	0	0
4	M6	X	.003	.003	0	0
5	M7	X	.003	.003	0	0
6	M8	X	.003	.003	0	0
7	M9	X	.003	.003	0	0
8	M10	X	.003	.003	0	0
9	M13	X	.003	.003	0	0
10	M14	X	.003	.003	0	0
11	M15	X	.003	.003	0	0
12	M16	X	.003	.003	0	0

Member Distributed Loads (BLC 7 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft..	End Location[ft,...
1	M1	X	.015	.015	0	0
2	M3	X	.015	.015	0	0
3	M5	X	.015	.015	0	0
4	M6	X	.015	.015	0	0
5	M7	X	.015	.015	0	0
6	M8	X	.015	.015	0	0
7	M9	X	.015	.015	0	0
8	M10	X	.015	.015	0	0
9	M13	X	.015	.015	0	0
10	M14	X	.015	.015	0	0
11	M15	X	.015	.015	0	0
12	M16	X	.015	.015	0	0

Member Distributed Loads (BLC 8 : Wm Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft..	End Location[ft,...
1	M1	X	.002	.002	0	0
2	M3	X	.002	.002	0	0
3	M5	X	.002	.002	0	0
4	M6	X	.002	.002	0	0
5	M7	X	.002	.002	0	0
6	M8	X	.002	.002	0	0
7	M9	X	.002	.002	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
8	M10	X	.002	.002	0	0
9	M13	X	.002	.002	0	0
10	M14	X	.002	.002	0	0
11	M15	X	.002	.002	0	0
12	M16	X	.002	.002	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
1	M2	Z	.003	.003	0	0
2	M4	Z	.003	.003	0	0
3	M7	Z	.003	.003	0	0
4	M8	Z	.003	.003	0	0
5	M9	Z	.003	.003	0	0
6	M10	Z	.003	.003	0	0
7	M11	Z	.003	.003	0	0
8	M12	Z	.003	.003	0	0
9	M13	Z	.003	.003	0	0
10	M14	Z	.003	.003	0	0
11	M15	Z	.003	.003	0	0
12	M16	Z	.003	.003	0	0
13	M17	Z	.003	.003	0	0
14	M18	Z	.003	.003	0	0

Member Distributed Loads (BLC 10 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
1	M2	Z	.015	.015	0	0
2	M4	Z	.015	.015	0	0
3	M7	Z	.015	.015	0	0
4	M8	Z	.015	.015	0	0
5	M9	Z	.015	.015	0	0
6	M10	Z	.015	.015	0	0
7	M11	Z	.015	.015	0	0
8	M12	Z	.015	.015	0	0
9	M13	Z	.015	.015	0	0
10	M14	Z	.015	.015	0	0
11	M15	Z	.015	.015	0	0
12	M16	Z	.015	.015	0	0
13	M17	Z	.015	.015	0	0
14	M18	Z	.015	.015	0	0

Member Distributed Loads (BLC 11 : Wm Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
1	M2	Z	.002	.002	0	0
2	M4	Z	.002	.002	0	0
3	M7	Z	.002	.002	0	0
4	M8	Z	.002	.002	0	0
5	M9	Z	.002	.002	0	0
6	M10	Z	.002	.002	0	0
7	M11	Z	.002	.002	0	0
8	M12	Z	.002	.002	0	0

Member Distributed Loads (BLC 11 : Wm Wind Z) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft...	End Location[ft,...
9	M13	Z	.002	.002	0	0
10	M14	Z	.002	.002	0	0
11	M15	Z	.002	.002	0	0
12	M16	Z	.002	.002	0	0
13	M17	Z	.002	.002	0	0
14	M18	Z	.002	.002	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	None		-1						
2	Dead Load	None					15			
3	Ice Load	None					15			
4	Lm Maintenance Load (500lb)	None					1			
5	Lv Maintenance Load (250lb)	None					1			
6	Wind with Ice X	None					15	12		
7	Wind X	None					15	12		
8	Wm Wind X	None					15	12		
9	Wind with Ice Z	None					15	14		
10	Wind Z	None					15	14		
11	Wm Wind Z	None					15	14		

Load Combinations

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

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N9	max	-.028	6	.556	8	-.005	3	.088	3	.826	6	.531	8
2		min	-.483	3	-.111	3	-.94	6	-1.098	6	-.356	3	-.018	3
3	N2	max	.17	8	.58	5	.014	5	.836	6	.864	6	.538	5
4		min	-.426	3	.219	1	-.93	6	-.41	5	-.317	3	.088	6
5	N17A	max	-.01	2	.34	4	-.027	2	.314	7	1.105	3	.144	7
6		min	-.956	3	-.134	3	-.541	6	-.547	3	.019	2	-.861	3
7	N23	max	.027	7	.51	3	.066	4	.83	3	1.067	3	1	3
8		min	-.937	3	.188	2	-.488	6	.141	2	-.023	1	.017	6
9	N33	max	-.018	6	.445	7	.056	4	.365	3	.023	1	-.157	2
10		min	-.964	3	-.35	3	-.492	6	-.027	7	-.462	6	-.545	3
11	N39	max	.044	7	.725	3	-.022	2	-.011	2	-.019	2	.233	3
12		min	-.929	3	-.046	6	-.537	6	-.388	3	-.501	6	-.279	4
13	Totals:	max	0	8	2.381	7	0	5						

Envelope Joint Reactions (Continued)

Joint			X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
14		min	-4.694	3	1.127	3	-3.927	6						

Envelope Joint Displacements

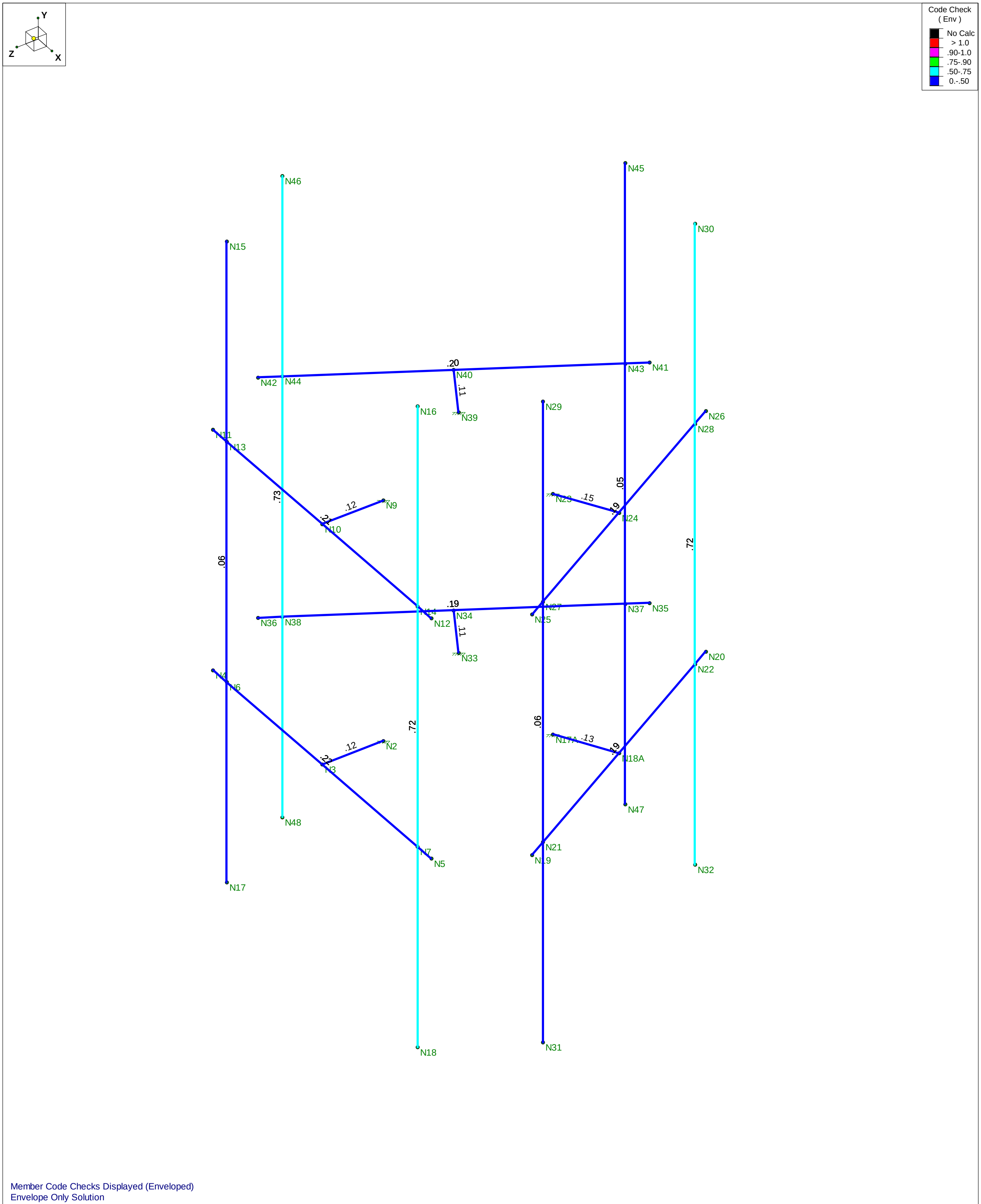
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
1	N2	max	0	8	0	8	0	8	0	8	0	8	0	8
2		min	0	1	0	1	0	1	0	1	0	1	0	1
3	N3	max	0	3	.002	6	0	6	1.154e-04	5	9.462e-05	3	-6.649e-05	6
4		min	-.002	6	-.001	5	0	5	-5.681e-04	6	-5.094e-04	6	-4.072e-04	5
5	N4	max	0	3	.005	5	.002	3	8.537e-05	5	1.834e-04	6	2.063e-04	6
6		min	-.002	6	-.001	7	0	8	-7.592e-04	6	-3.077e-05	5	-1.486e-04	5
7	N5	max	0	3	-.004	3	.053	6	7.028e-05	3	1.027e-04	3	3.153e-04	3
8		min	-.002	6	-.028	8	-.002	3	-4.612e-03	6	-2.808e-03	6	-1.182e-03	8
9	N6	max	0	3	.004	8	.002	3	8.537e-05	5	1.833e-04	6	2.063e-04	6
10		min	-.002	6	0	4	0	8	-7.592e-04	6	-3.077e-05	5	-1.486e-04	5
11	N7	max	0	3	-.005	3	.044	6	7.028e-05	3	1.027e-04	3	3.154e-04	3
12		min	-.002	6	-.024	8	-.002	3	-4.612e-03	6	-2.808e-03	6	-1.182e-03	8
13	N9	max	0	8	0	8	0	8	0	8	0	8	0	8
14		min	0	1	0	1	0	1	0	1	0	1	0	1
15	N10	max	0	3	0	3	0	6	6.42e-04	6	1.053e-04	3	1.339e-05	3
16		min	-.002	6	-.003	6	0	3	-2.658e-05	3	-4.994e-04	6	-4.017e-04	8
17	N11	max	0	3	.005	8	.003	3	8.096e-04	6	2.022e-04	6	5.858e-05	4
18		min	-.002	6	-.001	4	0	1	-2.485e-05	3	1.104e-05	1	-1.659e-04	8
19	N12	max	.001	3	-.006	6	.053	6	4.663e-03	6	9.706e-05	3	-9.546e-05	6
20		min	-.002	6	-.028	5	-.002	3	-2.907e-05	3	-2.816e-03	6	-1.209e-03	5
21	N13	max	0	3	.004	5	.002	3	8.096e-04	6	2.021e-04	6	5.854e-05	4
22		min	-.002	6	0	7	0	6	-2.485e-05	3	1.104e-05	1	-1.66e-04	8
23	N14	max	.001	3	-.005	6	.044	6	4.663e-03	6	9.706e-05	3	-9.541e-05	6
24		min	-.002	6	-.024	5	-.002	3	-2.907e-05	3	-2.816e-03	6	-1.209e-03	5
25	N15	max	.013	3	.004	5	.031	6	1.053e-03	6	2.021e-04	6	4.773e-05	1
26		min	-.002	7	-.001	7	.001	1	-2.486e-05	3	1.104e-05	1	-5.114e-04	3
27	N16	max	.139	3	-.005	6	.479	6	1.791e-02	6	9.706e-05	3	-9.556e-05	6
28		min	0	6	-.024	5	-.003	3	-2.912e-05	3	-2.816e-03	6	-5.925e-03	3
29	N17	max	.016	3	.004	8	.029	6	8.533e-05	5	1.833e-04	6	5.925e-04	3
30		min	-.005	8	-.001	4	-.003	5	-1.001e-03	6	-3.077e-05	5	-1.465e-04	8
31	N18	max	.123	3	-.005	3	.476	6	7.017e-05	3	1.027e-04	3	5.388e-03	3
32		min	-.036	8	-.024	8	-.004	3	-1.781e-02	6	-2.808e-03	6	-1.18e-03	8
33	N17A	max	0	8	0	8	0	8	0	8	0	8	0	8
34		min	0	1	0	1	0	1	0	1	0	1	0	1
35	N18A	max	.002	3	.003	3	.002	3	3.173e-04	3	-5.317e-06	2	4.836e-04	3
36		min	0	2	0	7	0	2	-1.773e-04	7	-5.476e-04	3	-9.123e-05	6
37	N19	max	0	5	0	6	.004	3	4.871e-04	3	5.188e-05	3	5.565e-04	3
38		min	-.004	6	-.001	4	0	2	-1.439e-04	6	-2.64e-04	6	-1.391e-04	6
39	N20	max	.043	3	-.006	2	.005	6	1.02e-03	3	5.305e-04	6	4.102e-03	3
40		min	-.008	6	-.015	4	-.021	3	-1.058e-03	6	-2.54e-03	3	-3.8e-04	6
41	N21	max	0	5	0	3	.004	3	4.871e-04	3	5.181e-05	3	5.566e-04	3
42		min	-.003	6	0	7	0	2	-1.439e-04	6	-2.64e-04	6	-1.391e-04	6
43	N22	max	.037	3	-.005	2	.004	6	1.02e-03	3	5.305e-04	6	4.102e-03	3
44		min	-.006	6	-.013	4	-.018	3	-1.058e-03	6	-2.539e-03	3	-3.8e-04	6
45	N23	max	0	8	0	8	0	8	0	8	0	8	0	8
46		min	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
47	N24	max	.001	3	0	6	.002	3	-7.578e-05	2	1.022e-05	7	9.478e-05	6
48		min	0	1	-.003	3	0	1	-4.691e-04	3	-5.375e-04	3	-4.813e-04	3
49	N25	max	0	4	0	3	.004	3	1.902e-04	6	7.066e-05	3	5.526e-05	6
50		min	-.004	6	-.001	7	0	1	-4.411e-04	3	-2.451e-04	6	-6.411e-04	3
51	N26	max	.043	3	-.003	3	.005	6	5.884e-04	6	5.254e-04	6	6.058e-04	6
52		min	-.008	6	-.014	7	-.022	3	-1.494e-03	3	-2.548e-03	3	-3.886e-03	3
53	N27	max	0	4	0	2	.004	3	1.902e-04	6	7.059e-05	3	5.528e-05	6
54		min	-.003	6	0	4	0	1	-4.411e-04	3	-2.451e-04	6	-6.411e-04	3
55	N28	max	.037	3	-.005	3	.004	6	5.884e-04	6	5.253e-04	6	6.058e-04	6
56		min	-.006	6	-.013	7	-.018	3	-1.494e-03	3	-2.547e-03	3	-3.886e-03	3
57	N29	max	.026	3	0	2	.019	6	6.699e-04	6	7.059e-05	3	5.531e-05	6
58		min	-.005	6	-.001	4	-.01	3	-4.413e-04	3	-2.451e-04	6	-8.84e-04	3
59	N30	max	.448	3	-.005	3	.135	6	5.674e-03	6	5.253e-04	6	6.067e-04	6
60		min	-.025	6	-.013	7	-.063	3	-1.496e-03	3	-2.547e-03	3	-1.713e-02	3
61	N31	max	.023	3	0	3	.018	6	4.869e-04	3	5.181e-05	3	7.988e-04	3
62		min	-.007	6	-.001	7	-.011	3	-6.232e-04	6	-2.64e-04	6	-1.391e-04	6
63	N32	max	.453	3	-.005	2	.149	6	1.018e-03	3	5.305e-04	6	1.731e-02	3
64		min	-.018	6	-.013	4	-.048	3	-6.13e-03	6	-2.539e-03	3	-3.794e-04	6
65	N33	max	0	8	0	8	0	8	0	8	0	8	0	8
66		min	0	1	0	1	0	1	0	1	0	1	0	1
67	N34	max	0	1	0	2	.001	6	9.859e-05	7	3.269e-04	3	3.901e-04	3
68		min	0	6	-.002	3	0	1	-2.633e-04	3	-6.203e-06	1	6.477e-05	2
69	N35	max	.002	3	0	3	.002	3	-4.787e-05	2	-9.464e-06	2	6.193e-04	3
70		min	0	6	-.001	7	0	2	-2.001e-04	6	-2.808e-04	3	1.034e-06	2
71	N36	max	.037	3	-.004	6	.022	3	3.247e-04	7	2.335e-03	3	3.871e-03	3
72		min	0	2	-.015	4	0	1	-1.217e-03	3	2.818e-06	2	1.483e-04	2
73	N37	max	.001	3	0	2	.002	3	-4.782e-05	2	-9.464e-06	2	6.193e-04	3
74		min	0	6	0	4	0	2	-2.001e-04	6	-2.807e-04	3	1.058e-06	2
75	N38	max	.031	3	-.005	6	.019	3	3.247e-04	7	2.335e-03	3	3.871e-03	3
76		min	0	2	-.013	4	0	1	-1.217e-03	3	2.818e-06	2	1.483e-04	2
77	N39	max	0	8	0	8	0	8	0	8	0	8	0	8
78		min	0	1	0	1	0	1	0	1	0	1	0	1
79	N40	max	0	2	.001	3	.001	6	3.423e-04	3	3.38e-04	3	1.111e-04	7
80		min	0	6	0	7	0	2	3.939e-05	2	5.317e-06	2	-2.617e-04	3
81	N41	max	.002	3	0	6	.002	3	1.046e-04	6	1.104e-05	1	1.208e-06	1
82		min	0	6	-.001	4	0	1	-6.45e-05	4	-2.618e-04	3	-6.179e-04	3
83	N42	max	.037	3	-.004	3	.022	3	1.65e-03	3	2.332e-03	3	2.375e-04	7
84		min	0	1	-.015	7	0	2	2.156e-04	2	-3.287e-06	1	-3.583e-03	3
85	N43	max	0	3	0	6	.002	3	1.047e-04	6	1.104e-05	1	1.236e-06	1
86		min	-.001	6	0	4	0	1	-6.446e-05	4	-2.617e-04	3	-6.178e-04	3
87	N44	max	.031	3	-.005	3	.019	3	1.65e-03	3	2.331e-03	3	2.375e-04	7
88		min	0	1	-.013	7	0	2	2.156e-04	2	-3.287e-06	1	-3.583e-03	3
89	N45	max	.026	3	0	6	.015	6	5.844e-04	6	1.104e-05	1	1.236e-06	1
90		min	0	1	-.001	4	-.002	1	-6.453e-05	4	-2.617e-04	3	-8.607e-04	3
91	N46	max	.433	3	-.005	3	.155	6	6.228e-03	6	2.331e-03	3	2.384e-04	7
92		min	-.005	1	-.013	7	.007	2	2.159e-04	2	-3.287e-06	1	-1.683e-02	3
93	N47	max	.027	3	0	2	.018	6	-4.78e-05	2	-9.464e-06	2	8.615e-04	3
94		min	0	2	-.001	4	.001	2	-6.793e-04	6	-2.807e-04	3	1.058e-06	2
95	N48	max	.44	3	-.005	6	.141	6	2.577e-04	4	2.335e-03	3	1.708e-02	3
96		min	.004	2	-.013	4	-.008	1	-5.779e-03	6	2.818e-06	2	1.48e-04	2

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

	Memb...	Shape	Code Check	L...	LC	Sh...	L...	Dir	...	phi*P...	phi*Pn...	phi*Mn y-y [k-ft]	phi*...	Cb	Eqn
1	M1	HSS4X4X4	.121	.75	6	.055	0	y	5	139.19	139.518	16.181	16....	1....	H1...
2	M2	PIPE_3.0	.216	2	6	.236	2		6	59.853	65.205	5.749	5.749	1....	H1...
3	M3	HSS4X4X4	.122	0	6	.053	0	y	8	139.19	139.518	16.181	16....	1....	H1...
4	M4	PIPE_3.0	.213	2	6	.234	2		6	59.853	65.205	5.749	5.749	1....	H1...
5	M5	PIPE_2.0	.056	2.5	6	.021	5.5		6	14.916	32.13	1.872	1.872	2....	H1...
6	M6	PIPE_2.0	.718	5.5	6	.070	5.5		6	14.916	32.13	1.872	1.872	3....	H1...
7	M7	HSS4X4X4	.134	0	3	.023	0	y	7	139.19	139.518	16.181	16....	1....	H1...
8	M8	PIPE_3.0	.187	2	3	.205	2		3	59.853	65.205	5.749	5.749	2....	H1...
9	M9	HSS4X4X4	.148	0	3	.030	0	y	4	139.19	139.518	16.181	16....	1....	H1...
10	M10	PIPE_3.0	.192	2	3	.211	2		3	59.853	65.205	5.749	5.749	2....	H1...
11	M11	PIPE_2.0	.058	2.5	3	.021	5.5		3	14.916	32.13	1.872	1.872	2....	H1...
12	M12	PIPE_2.0	.724	5.5	3	.070	5.5		3	14.916	32.13	1.872	1.872	1....	H1...
13	M13	HSS4X4X4	.105	.75	3	.029	0	y	7	139.19	139.518	16.181	16....	1....	H1...
14	M14	PIPE_3.0	.188	2	3	.208	2		3	59.853	65.205	5.749	5.749	2....	H1...
15	M15	HSS4X4X4	.106	.75	3	.035	0	y	3	139.19	139.518	16.181	16....	1....	H1...
16	M16	PIPE_3.0	.198	2	3	.218	2		3	59.853	65.205	5.749	5.749	2....	H1...
17	M17	PIPE_2.0	.054	2.5	3	.021	5.5		3	14.916	32.13	1.872	1.872	2....	H1...
18	M18	PIPE_2.0	.726	5.5	3	.069	5.5		3	14.916	32.13	1.872	1.872	1....	H1...



Centek Engineering		
TJL	CTFF896A- Mount	Jan 10, 2023 at 1:12 PM
21005.40	Unity Check	Mount.R3D

RAN Template:	A&L Template:
67E998E 6160	67E998E_1OP+1QP

CTFF896A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Section 1 - Site Information

Site ID: CTFF896A
Status: Draft
Version: 1
Project Type: Sprint Retain
Approved: Not Approved
Approved By: Not Approved
Last Modified: 12/6/2021 3:33:49 PM
Last Modified By: Justin.Darrow@t-mobile.com

Site Name: CT54XC713
Site Class: Utility Lattice Tower
Site Type: Structure Non Building
Plan Year: 2022
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: Not Specified

Latitude: 41.47877500
Longitude: -73.40830800
Address: 761 Federal Rd
City, State: Brookfield, CT
Region: NORTHEAST

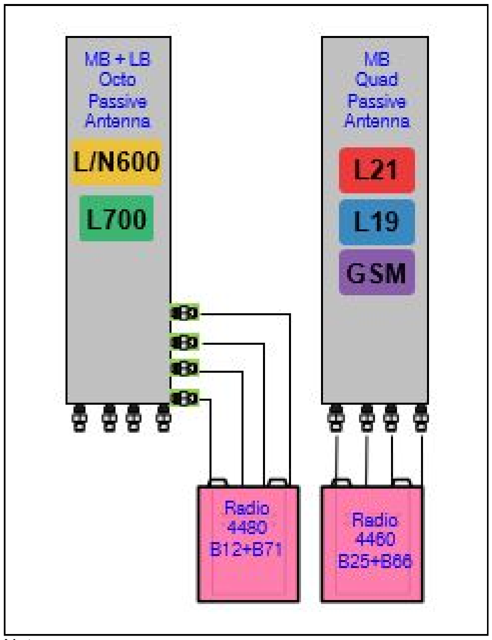
RAN Template: 67E998E 6160	AL Template: 67E998E_1OP+1QP			
Sector Count: 3	Antenna Count: 6	Coax Line Count: 24	TMA Count: 6	RRU Count: 6

Section 2 - Existing Template Images

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

Section 3 - Proposed Template Images

67E998E.JPG



Notes:

Section 4 - Siteplan Images

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RAN Template: 67E998E 6160	**A&L Template:** 67E998E_1OP+1QP

CTFF896A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Section 5 - RAN Equipment

Existing RAN Equipment

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

Proposed RAN Equipment

Template: 67E998E 6160

Enclosure	1	2	3
Enclosure Type	Enclosure 6160 AC V1	B160	RBS 6601
Baseband	BB 6648 L700 L600 N600 L2100 L1900		DUG20 G1900
Hybrid Cable System	Ericsson Hybrid Trunk 6/24 4AWG 50m **(x 2)**		
Transport System	CSR IXRe V2 (Gen2)		

RAN Scope of Work:

SA at 83% Should be able to go with 2 Antenna per sector
200 Amp existing
No Generator space

RAN Template: 67E998E 6160	A&L Template: 67E998E_1OP+1QP

CTFF896A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Section 6 - A&L Equipment

Existing Template: Custom
Proposed Template: 67E998E_1OP+1QP

Sector 1 (Proposed) view from behind

Coverage Type	A - Outdoor Macro					
Antenna	1				2	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Commscope_VV-65A-R1 (Quad)	
Azimuth	330				330	
M. Tilt						
Height	110				110	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**
Active Tech.	L700 L600 N600	L700 L600 N600			L2100 L1900 G1900	L2100 L1900 G1900
Dark Tech.						
Restricted Tech.						
Decomm. Tech.						
E. Tilt						
Cables	1-5/8" Coax - 140 ft. **(x2)**	1-5/8" Coax - 140 ft. **(x2)**			1-5/8" Coax - 140 ft. **(x2)**	1-5/8" Coax - 140 ft. **(x2)**
TMAs	Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)			Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)
Diplexers / Combiners						
Radio	Radio 4480 B71+B85 (At Cabinet)	SHARED Radio 4480 B71+B85 (At Cabinet)			Radio 4460 B25+B66 (At Cabinet)	SHARED Radio 4460 B25+B66 (At Cabinet)
Sector Equipment						

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:
67E998E 6160	67E998E_1OP+1QP

CTFF896A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Sector 2 (Proposed) view from behind

Coverage Type	A - Outdoor Macro					
Antenna	1				2	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Commscope_VV-65A-R1 (Quad)	
Azimuth	90				90	
M. Tilt						
Height	110				110	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**
Active Tech.	L700 L600 N600	L700 L600 N600			L2100 L1900 G1900	L2100 L1900 G1900
Dark Tech.						
Restricted Tech.						
Decomm. Tech.						
E. Tilt						
Cables	1-5/8" Coax - 140 ft. **(x2)**	1-5/8" Coax - 140 ft. **(x2)**			1-5/8" Coax - 140 ft. **(x2)**	1-5/8" Coax - 140 ft. **(x2)**
TMAs	Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)			Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)
Diplexers / Combiners						
Radio	Radio 4480 B71+B85 (At Cabinet)	SHARED Radio 4480 B71+B85 (At Cabinet)			Radio 4460 B25+B66 (At Cabinet)	SHARED Radio 4460 B25+B66 (At Cabinet)
Sector Equipment						

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:
67E998E 6160	67E998E_1OP+1QP

CTFF896A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Sector 3 (Proposed) view from behind						
Coverage Type	A - Outdoor Macro					
Antenna	1				2	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Commscope_VV-65A-R1 (Quad)	
Azimuth	170				170	
M. Tilt						
Height	110				110	
Ports	P1	P2	P3	P4	P5	P6
Active Tech.	L700 L600 N600	L700 L600 N600			L2100 L1900 G1900	L2100 L1900 G1900
Dark Tech.						
Restricted Tech.						
Decomm. Tech.						
E. Tilt						
Cables	1-5/8" Coax - 140 ft. **(x2)**	1-5/8" Coax - 140 ft. **(x2)**			1-5/8" Coax - 140 ft. **(x2)**	1-5/8" Coax - 140 ft. **(x2)**
TMAs	Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)			Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)	SHARED Commscope - Smart BiasT - ATSBT-TOP-MF-4G (AtAntenna)
Diplexers / Combiners						
Radio	Radio 4480 B71+B85 (At Cabinet)	SHARED Radio 4480 B71+B85 (At Cabinet)			Radio 4460 B25+B66 (At Cabinet)	SHARED Radio 4460 B25+B66 (At Cabinet)
Sector Equipment						

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:
67E998E 6160	67E998E_1OP+1QP

CTFF896A_Sprint Retain_1_draft

Print Name: Standard
PORs: New Build_Sprint Keep

Section 7 - Power Systems Equipment

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

	Proposed Power Systems Equipment
Enclosure	**1**
Enclosure Type	Enclosure 6160 AC V1

EBI Consulting

environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CTFF896A

CT54XC713
761 Federal Road
Brookfield, Connecticut 06804

January 13, 2023

EBI Project Number: 6222007212

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**0.35%**

21 B Street, Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

January 13, 2023

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

Emissions Analysis for Site: CTFF896A - CT54XC713

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **761 Federal Road** in **Brookfield, Connecticut** for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

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

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$, respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 761 Federal Road in Brookfield, Connecticut using the equipment information listed below. Modeling of the antennas and associated equipment was completed using RoofMaster™ software, which is a widely-used predictive modeling program that has been developed to predict RF power density values for rooftop and tower telecommunications sites produced by vertical collinear antennas that are typically used in the cellular, PCS, paging and other communications services. Using the computational methods set forth in Federal Communications (FCC) Office of Engineering & Technology (OET) Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields" (OET-65), RoofMaster™ calculates predicted power density in a scalable grid based on the contributions of all RF sources characterized in the study scenario. At each grid location, the cumulative power density is expressed as a percentage of the FCC limits. Manufacturer antenna pattern data is utilized in these calculations. RoofMaster™ models consist of the Far Field model as specified in OET-65 and an implementation of the OET-65 Cylindrical Model (Sula9). The models utilize several operational specifications for different types of antennas to produce a plot of spatially-averaged power densities that can be expressed as a percentage of the applicable exposure limit.

Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, telecommunications equipment was modeled using the following assumptions:

1) 1 LTE channel (600 MHz Band) was considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

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

3) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

4) 1 GSM channel (PCS Band - 1900 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 10 Watts per Channel.

5) 1 LTE channel (PCS Band - 1900 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 120/160 Watts per Channel.

6) 1 LTE channel (AWS Band – 2100 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 120/160 Watts per Channel.

7) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

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

9) The antennas used in this modeling are the RFS APXVAALL24_43-U-NA20 02DT 600 for the 600 MHz / 600 MHz / 600 MHz channel(s), the COMMSCOPE VV-65A-R1 00DT 1900 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector A, the RFS APXVAALL24_43-U-NA20 02DT 600 for the 600 MHz / 600 MHz / 700 MHz channel(s), the COMMSCOPE VV-65A-R1 00DT 1900 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector B, the RFS APXVAALL24_43-U-NA20 02DT 600 for the 600 MHz / 600 MHz / 700 MHz channel(s), the COMMSCOPE VV-65A-R1 00DT 1900 for the 1900 MHz / 1900 MHz / 2100 MHz

channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antenna mounting height centerline of the proposed antennas is 110 feet above ground level (AGL).

11) Emissions values for additional carriers were calculated in Far Field utilizing the antenna models provided in the structural analysis.

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APXVAALL24_43-U-NA20 02DT 600	Make / Model:	RFS APXVAALL24_43-U-NA20 02DT 600	Make / Model:	RFS APXVAALL24_43-U-NA20 02DT 600
Frequency Bands:	600 MHz / 600 MHz / 600 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz
Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd
Height (AGL):	110 feet	Height (AGL):	110 feet	Height (AGL):	110 feet
Channel Count:	3	Channel Count:	3	Channel Count:	3
Total TX Power (W):	160.00 Watts	Total TX Power (W):	160.00 Watts	Total TX Power (W):	160.00 Watts
ERP (W):	1,950.32	ERP (W):	1,950.32	ERP (W):	1,950.32
Antenna A1 MPE %:	**1.56%**	Antenna B1 MPE %:	**1.56%**	Antenna C1 MPE %:	**1.56%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	COMMSCOPE VV-65A-R1 00DT 1900	Make / Model:	COMMSCOPE VV-65A-R1 00DT 1900	Make / Model:	COMMSCOPE VV-65A-R1 00DT 1900
Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz
Gain:	15.8 dBd / 15.8 dBd / 16.43 dBd	Gain:	15.8 dBd / 15.8 dBd / 16.43 dBd	Gain:	15.8 dBd / 15.8 dBd / 16.43 dBd
Height (AGL):	110 feet	Height (AGL):	110 feet	Height (AGL):	110 feet
Channel Count:	3	Channel Count:	3	Channel Count:	3
Total TX Power (W):	330.00 Watts	Total TX Power (W):	330.00 Watts	Total TX Power (W):	330.00 Watts
ERP (W):	7,231.05	ERP (W):	7,231.05	ERP (W):	7,231.05
Antenna A2 MPE %:	**2.40%**	Antenna B2 MPE %:	**2.40%**	Antenna C2 MPE %:	**2.40%**

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Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Combined Sectors):	0.13%
AT&T	0.22%
Site Total MPE % :	0.35%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	0.13%
T-Mobile Sector B Total:	0.07%
T-Mobile Sector C Total:	0.10%
T-Mobile Total MPE % :	0.13%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile 600 MHz LTE	1	467.1539134	110	1.552779734	600 MHz LTE	400.0	0.39%
T-Mobile 600 MHz NR	1	934.3078268	110	3.105559468	600 MHz NR	400.0	0.78%
T-Mobile 700 MHz LTE	1	548.8579906	110	1.824357113	700 MHz LTE	467.0	0.39%
T-Mobile 1900 MHz GSM	1	203.7042078	110	0.677095399	1900 MHz GSM	1000.0	0.07%
T-Mobile 1900 MHz LTE	1	3259.267324	110	10.83352639	1900 MHz LTE	1000.0	1.08%
T-Mobile 2100 MHz LTE	1	3768.078854	110	12.52477248	2100 MHz LTE	1000.0	1.25%
						T-Mobile Total:	**0.13%**

• NOTE: Total T-Mobile MPE values reflect all T-Mobile antennas as reported by RoofMaster™ combined modeling.

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

Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector A:	0.13%
Sector B:	0.07%
Sector C:	0.10%
T-Mobile Maximum MPE % (Sector A):	0.13%
T-Mobile Combined Sectors MPE %:	0.13%
Site Total:	0.35%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **0.35%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions or documents available on the Connecticut Siting Council website.

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